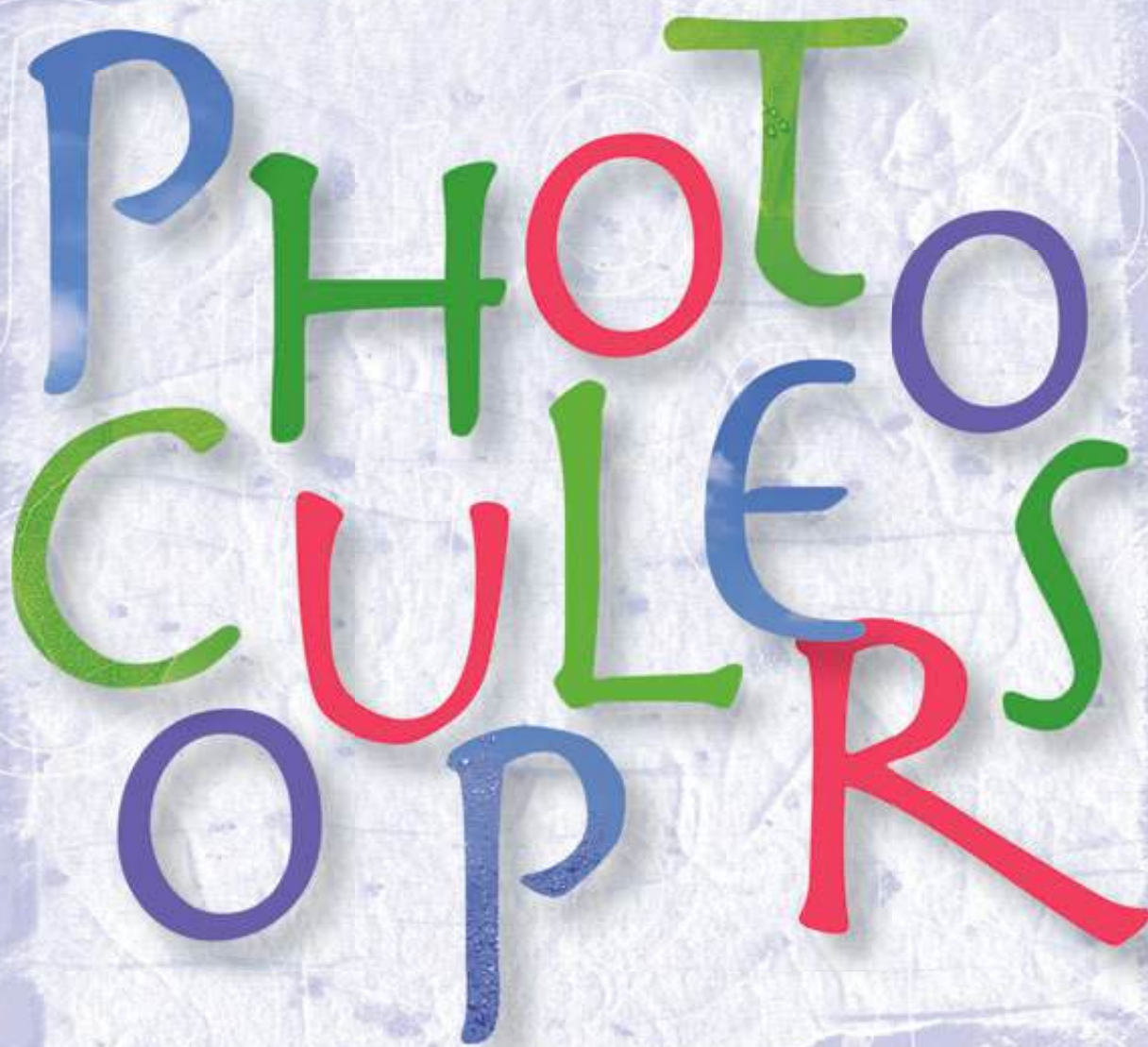


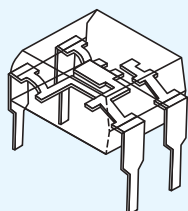
# Photocouplers and Photorelays



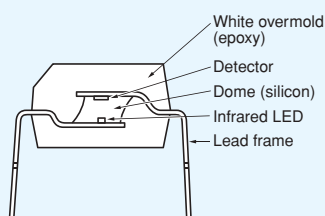
PHOTOCOUPLERS

## Preface

As a type of isolator favored by manufacturers, photocouplers now serve as noise protectors in many electronic devices. Toshiba's photocouplers consist of either a GaAs or GaAlAs infrared LED(s) and a silicon photodetector(s) housed in a mold package. GaAlAs LEDs are adopted in high-speed photo-IC types due to their high-speed and high-light output.



**Perspective view  
of the TLP523**



**Cross section  
of the TLP523**

## Extensive Line of Products

To meet customers' various needs, we offer an extensive product portfolio shown below as well as general-purpose photocouplers.

1. Photo-IC couplers: High speed and advanced functions (highly integrated detectors)
2. Zero-crossing phototriac couplers: Phototriac-output devices with zero-crossing detection
3. Photovoltaic couplers: MOSFET gate drive (high voltage output achieved using a photodiode array)
4. Photorelays (MOSFET-output devices):  
AC-DC switches (MOSFET output)  
Mechanical relay replacement

## Safety Standard Approvals

UL approval has been obtained under file number E67349 for most of our photocouplers. EN60747-5-2- or EN60747-5-5-approved photocouplers are also offered with a wide selection of output (transistor, thyristor, triac, IC output and photorelay). The designs of these devices meet other standards including IEC380/VDE0806, IEC60950/EN60950 and IEC60065/EN60065.

## Small-Package Products

Toshiba offers a wide variety of photocouplers in a small package to meet the space-saving requirement of increasingly smaller and thinner end products. Packaging options include mini-flat packages (SO6) and half-pitch (1.27 mm) mini-flat SOP packages.

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| TLP3331     | USOP4    | MOSFET (Photorelay) | 30   |
| TLP3340     | USOP4    | MOSFET (Photorelay) | 30   |
| TLP3341     | USOP4    | MOSFET (Photorelay) | 31   |
| TLP3342     | USOP4    | MOSFET (Photorelay) | 31   |
| TLP3350     | USOP4    | MOSFET (Photorelay) | 31   |
| TLP3351     | USOP4    | MOSFET (Photorelay) | 31   |
| TLP3375     | USOP4    | MOSFET (Photorelay) | 31   |
| TLP3542     | DIP6     | MOSFET (Photorelay) | 36   |
| TLP3543     | DIP6     | MOSFET (Photorelay) | 36   |
| TLP3544     | DIP6     | MOSFET (Photorelay) | 36   |
| TLP3545     | DIP6     | MOSFET (Photorelay) | 36   |
| TLP3546     | DIP6     | MOSFET (Photorelay) | 36   |
| TLP3553     | DIP4     | MOSFET (Photorelay) | 35   |
| TLP3554     | DIP4     | MOSFET (Photorelay) | 35   |
| TLP3555     | DIP4     | MOSFET (Photorelay) | 35   |
| TLP3556     | DIP4     | MOSFET (Photorelay) | 35   |
| TLP3762(S)  | DIP6     | Triac               | 41   |
| TLP3782(S)  | DIP6     | Triac               | 41   |
| TLP3783(S)  | DIP6     | Triac               | 41   |
| TLP3902     | MFSOP6   | Photovoltaic        | 42   |
| TLP3904     | SSOP4    | Photovoltaic        | 42   |
| TLP3914     | SSOP4    | Photovoltaic        | 42   |
| TLP3924     | SSOP4    | Photovoltaic        | 42   |
| TLP4006G    | DIP8     | MOSFET (Photorelay) | 37   |
| TLP4026G    | 2.54SOP8 | MOSFET (Photorelay) | 37   |
| TLP4176G    | 2.54SOP4 | MOSFET (Photorelay) | 37   |
| TLP4197G    | 2.54SOP6 | MOSFET (Photorelay) | 37   |
| TLP4206G    | 2.54SOP8 | MOSFET (Photorelay) | 37   |
| TLP4227G    | DIP4     | MOSFET (Photorelay) | 37   |
| TLP4227G-2  | DIP8     | MOSFET (Photorelay) | 37   |
| TLP4597G    | DIP6     | MOSFET (Photorelay) | 37   |
| TLPN137     | DIP8     | IC                  | 20   |
| 6N135       | DIP8     | IC                  | 24   |
| 6N136       | DIP8     | IC                  | 24   |
| 6N137       | DIP8     | IC                  | 24   |
| 6N138       | DIP8     | IC                  | 24   |
| 6N139       | DIP8     | IC                  | 24   |

## 2 New Products

### General-Purpose Thin Transistor-Output Photocouplers with Reinforced Insulation: TLP184 and TLP185

Housed in the SO6 package, the TLP184 and TLP185 feature a thin form factor. They provide guaranteed performance and specifications at ambient temperatures ( $T_a$ ) up to 110°C.

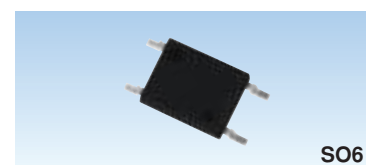
The TLP184 and TLP185 can be used as direct replacements for the TLP180 and TLP181 in the MFSOP6 package, respectively. Part replacement is easy because the recommended PCB land pattern dimensions of the SO6 package are the same as those of the MFSOP6 package. Moreover, SO6 features a PCB mounted height of 2.3 mm (max) compared to 2.8 mm for MFSOP6 and thus helps reduce the thickness of end applications.

SO6 provides guaranteed clearance and creepage distances of 5 mm compared to 4 mm for MFSOP6. Consequently, the TLP184 and TLP185 offer a maximum isolation voltage of 707 Vpk, meeting the EN60747-5-2 requirement. This means these photocouplers can replace part of the functionality that has traditionally been provided by photocouplers in a DIP package (such as the TLP781 and TLP785). The TLP184 and TLP185 comply with international safety standards for reinforced insulation by the use of a Faraday shield with a guaranteed thickness of 0.4 mm.

Certified for UL, cUL, VDE, BSI, etc., they are suitable for applications that target the worldwide market. The intended applications include various electronic devices such as AC adapters and switching power supplies, factory automation (FA) systems.

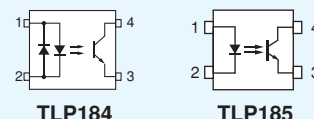
#### ■ Features

- Operating temperature range: -55 to 110°C
- Collector-emitter voltage: 80 V (min)
- Isolation voltage: 3750 Vrms (min)
- Current transfer ratio (CTR): 50 to 400% (at  $I_F = 5$  mA,  $V_{CE} = 5$  V,  $T_a = 25^\circ\text{C}$ )



SO6

#### Pin Configuration



TLP184

TLP185

### General-Purpose 1-Channel Thin Transistor-Output Photocouplers with Reinforced Insulation with 1.27-mm Lead Pitch: TLP290 and TLP291

The TLP290 and TLP291 are single-channel transistor-output photocouplers in the SO4 package. These photocouplers feature a high isolation voltage of 3750 Vrms and guaranteed performance and specifications at ambient temperatures ( $T_a$ ) up to 110°C.

The TLP290 is a successor to the TLP280 and TLP284, and the TLP291 is a successor to the TLP281 and TLP285. The TLP290 and TLP291 can be used as replacements for their predecessors because the recommended PCB land pattern dimensions of SO4 are the same as those of the SOP4 package that houses the predecessors. SO4 provides guaranteed clearance and creepage distances of 5 mm compared to 4 mm for SOP4. Consequently, the TLP290 and TLP291 offer a maximum isolation voltage of 707 Vpk, meeting the EN60747-5-2 requirement. Since the TLP290 and TLP291 provide the same isolation voltage as the TLP284 and TLP285, the new devices are suitable for replacement applications.

The TLP290 and TLP291 comply with international safety standards for reinforced insulation by the use of a Faraday shield with a guaranteed thickness of 0.4 mm. Certified for safety standards such as UL, cUL and VDE, the TLP290 and TLP291 are ideal for various electronic devices, including AC adapters, switching power supplies, programmable logic controllers, inverters, etc.

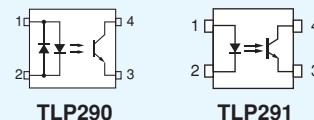
#### ■ Features

- Operating temperature range: -55 to 110°C
- Collector-emitter voltage: 80 V (min)
- Isolation voltage: 3750 Vrms (min)
- Current transfer ratio (CTR): 50 to 400% (at  $I_F = 5$  mA,  $V_{CE} = 5$  V,  $T_a = 25^\circ\text{C}$ )



SO4

#### Pin Configuration



TLP290

TLP291

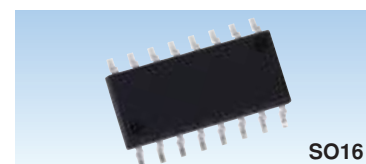
### General-Purpose 4-Channel Thin Transistor-Output Photocouplers: TLP290-4 and TLP291-4

The TLP290-4 and TLP291-4 are four-channel transistor-output photocouplers in the SO16 package that provide guaranteed performance and specifications at ambient temperatures ( $T_a$ ) up to 110°C.

The TLP290-4 and TLP291-4 are successors to the TLP280-4 and TLP281-4 in the SOP16 package, respectively. The new devices can be used as replacements for their predecessors because the recommended PCB land pattern dimensions of SO16 are the same as those of the SOP16 package. Certified for safety standards such as UL, cUL and VDE, the TLP290-4 and TLP291-4 are ideal for various FA applications such as programmable controllers, inverters and servo amplifiers.

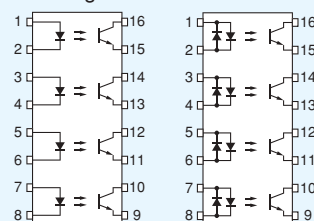
#### ■ Features

- Operating temperature range: -55 to 110°C
- Collector-emitter voltage: 80 V (min)
- Isolation voltage: 2500 Vrms (min)
- Current transfer ratio (CTR): 50 to 400% (at  $I_F = 5$  mA,  $V_{CE} = 5$  V,  $T_a = 25^\circ\text{C}$ )



SO16

#### Pin Configuration



TLP291-4

TLP290-4

## 2 New Products

### IGBT/MOSFET Gate-Drive IC-Output Photocouplers with an Extended Operating Temperature Range

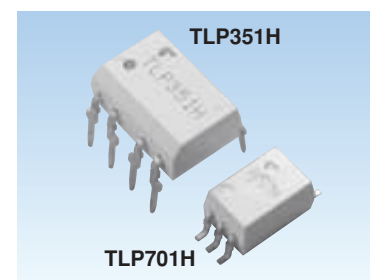
Printed circuit boards are becoming smaller and denser as a result of product miniaturization. This is driving the need for electronic components with an extended operating temperature range. To meet this need, Toshiba has been expanding its portfolio of IC-output photocouplers that are guaranteed up to 125°C instead of the conventional 100°C limit.

Although the SDIP6 package occupies approximately half the board area of the DIP package (that houses the TLP350), it complies with international safety standards for reinforced insulation.

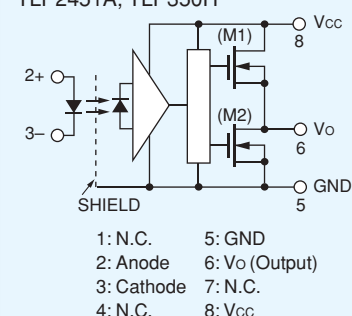
#### ■ Features

- Wide packaging options: SO6, SO8, SDIP6, DIP8
- Key specifications are guaranteed over –40°C to 125°C (–40°C to 110°C for the TLP151A)
- Low current consumption

| Peak Output Current | Part Number     | Package | Supply Voltage (Vcc) | Supply Current (Icc)(max) | Input Threshold Current(max) | Propagation Delay (max) | UVLO |
|---------------------|-----------------|---------|----------------------|---------------------------|------------------------------|-------------------------|------|
| ±0.6 A              | <b>TLP351H</b>  | DIP8    | 10 V to 30 V         | 2 mA                      | 5 mA                         | 700 ns                  | —    |
|                     | <b>TLP701H</b>  | SDIP6   |                      |                           |                              | 500 ns                  | —    |
|                     | <b>TLP2451A</b> | SO8     |                      |                           |                              |                         | —    |
|                     | <b>TLP151A</b>  | SO6     |                      |                           |                              |                         | —    |
| ±2.5 A              | <b>TLP700H</b>  | SDIP6   | 15 V to 30 V         | 3 mA                      | 5 mA                         | 500 ns                  | Yes  |
|                     | <b>TLP350H</b>  | DIP8    |                      |                           |                              | 200 ns                  | Yes  |
|                     | <b>TLP352</b>   | DIP8    |                      |                           |                              |                         | Yes  |
| ±6.0 A              | <b>TLP358H</b>  | DIP8    |                      | 2 mA                      |                              | 500 ns                  | Yes  |



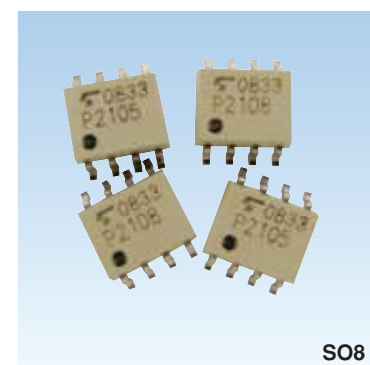
Functional Schematic  
TLP2451A, TLP350H



### Small Surface-Mount IC-Output Photocouplers in the SO8 Package

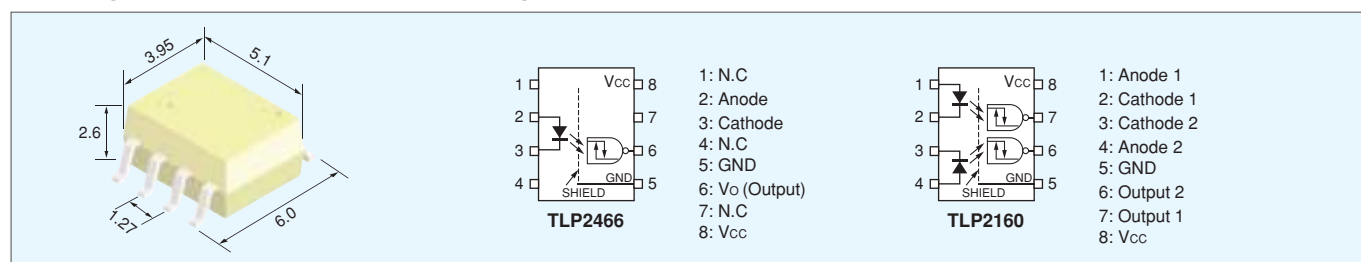
Toshiba is expanding its portfolio of IC-output photocouplers in the small and thin SO8 package. To meet customer needs, Toshiba has released photocouplers featuring various data rates, dual-channel configurations and power device drivers.

| Data rate (typ.)       | Part Number     | # of Circuits | Output              | Supply Voltage |
|------------------------|-----------------|---------------|---------------------|----------------|
| 0.1 Mbit/s             | <b>TLP2403</b>  | 1-ch          | Darlington          | Up to 18 V     |
| 1 Mbit/s               | <b>TLP2404</b>  | 1-ch          | Open-collector      | 4.5 V to 30 V  |
|                        | <b>TLP2409</b>  | 1-ch          |                     | Up to 30 V     |
| 5 Mbit/s               | <b>TLP2405</b>  | 1-ch          | Totem-pole          | 4.5 V to 20 V  |
|                        | <b>TLP2408</b>  | 1-ch          |                     |                |
|                        | <b>TLP2105</b>  | 2-ch          |                     |                |
|                        | <b>TLP2108</b>  | 2-ch          |                     |                |
| 15 Mbit/s to 20 Mbit/s | <b>TLP2466</b>  | 1-ch          | Totem-pole          | 3.3 V/5 V      |
|                        | <b>TLP2160</b>  | 2-ch          | Open-collector      | 5 V            |
|                        | <b>TLP2418</b>  | 1-ch          |                     |                |
|                        | <b>TLP2118E</b> | 2-ch          | Open-collector      | 3.3 V/5 V      |
|                        | <b>TLP2468</b>  | 1-ch          |                     |                |
|                        | <b>TLP2168</b>  | 2-ch          | Totem-pole          | 5 V            |
|                        | <b>TLP2116</b>  | 2-ch          |                     | 3.3 V          |
|                        | <b>TLP2166A</b> | 2-ch          |                     |                |
| Driver                 | <b>TLP2451A</b> | 1-ch          | ±0.6-A peak current | 10 V to 30 V   |



SO8

#### ■ Package Outline Dimensions and Pin Assignments





## IC-Output Photocouplers in the SO6 Package for Reinforced Insulation: Photocouplers for Logic Output and Signal Transmission and Photocouplers for IGBT/MOSFET Gate Drive

Despite the same footprint size as the MFSOP6 package, the new SO6 package provides reinforced insulation, offering clearance and creepage distances of  $\geq 5$  mm; an internal isolation thickness of  $\geq 0.4$  mm; and an isolation voltage of 3750 Vrms.

Additionally, the SO6 features the maximum PCB mounted height of 2.3 mm, approximately 20% lower than the MFSOP6. This makes the photocouplers in SO6 ideal for low-profile applications.

### ■ Features

- Clearance/creepage:  $\geq 5$  mm
- Thin package:  $\leq 2.3$  mm
- Internal Faraday shield:  $\geq 0.4$  mm
- Isolation voltage: 3750 Vrms (min)

### ■ Photocouplers for Logic Output and Signal Transmission

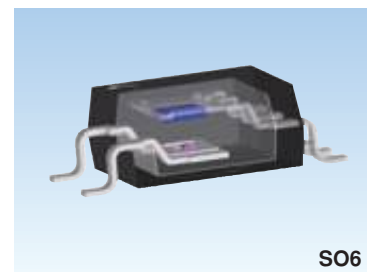
| Part Number | Data rate (typ.) | Output                                  | Supply voltage | Input Threshold Current (max) |
|-------------|------------------|-----------------------------------------|----------------|-------------------------------|
| TLP104      | 1 Mbit/s         | Open-collector, optimized for IPM drive | 4.5 V to 30 V  | 5 mA                          |
| TLP109      | 1 Mbit/s         | Open-collector                          | 4.5 V to 30 V  | —                             |
| TLP2309     | 1 Mbit/s         | Open-collector                          | 3.3 V/5 V      | —                             |
| TLP2355     | 5 Mbit/s         | Totem-pole buffer logic                 | 3.0 V to 20 V  | 1.6 mA                        |
| TLP2358     | 5 Mbit/s         | Totem-pole inverting logic              | 3.0 V to 20 V  | 1.6 mA                        |
| TLP2362     | 10 Mbit/s        | Open-collector                          | 3.3 V/5 V      | 5 mA                          |
| TLP116A     | 20 Mbit/s        | Totem-pole inverting logic              | 5 V            | 5 mA                          |
| TLP2366     |                  |                                         | 3.3 V/5 V      | 5 mA                          |
| TLP118      | 20 Mbit/s        | Open-collector                          | 5 V            | 5 mA                          |
| TLP2368     |                  |                                         | 3.3 V/5 V      | 5 mA                          |
| TLP2367*    | 40 Mbit/s        | Totem-pole inverting logic              | 3.3 V/5 V      | 5 mA                          |

\*Under development. Specifications subject to change without notice.  
For the latest information, please contact your nearest Toshiba sales representative.

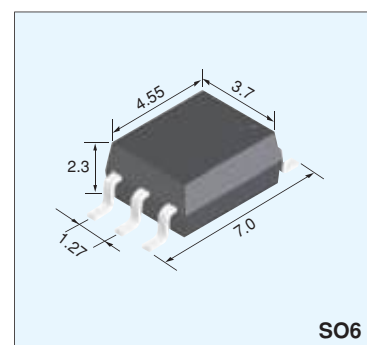
### ■ Photocouplers for IGBT/MOSFET Gate Drive

| Part Number | Peak Output Current (max) | Operating Temperature (Ta) | Supply Voltage (Vcc) | Supply Current (Icc)(max) | Input Threshold Current(max) | Propagation Delay (max) | UVLO |
|-------------|---------------------------|----------------------------|----------------------|---------------------------|------------------------------|-------------------------|------|
| TLP151A     | ±0.6 A                    | −40 to 110°C               | 10 to 30 V           | 2 mA                      | 5 mA                         | 700 ns                  | —    |
| TLP155      |                           | −40 to 100°C               |                      | 3 mA                      | 7.5 mA                       | 200 ns                  | —    |
| TLP155E     |                           |                            |                      |                           |                              |                         | —    |
| TLP152*     | ±2.5 A                    |                            |                      |                           |                              |                         |      |

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SO6

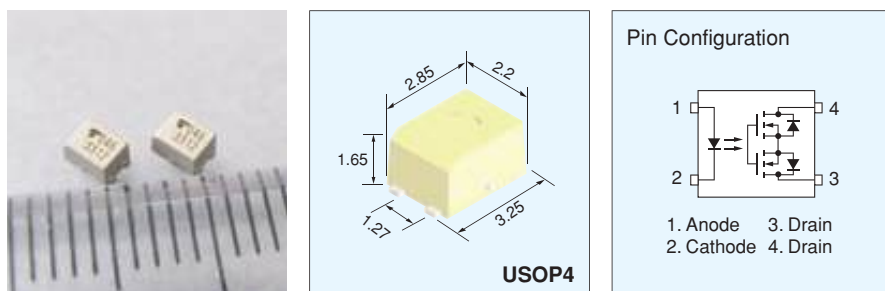


SO6

## 2 New Products

### Ultra-Small and Ultra-Low-Capacitance Photorelays: TLP33xx Series Photorelays in the Ultra-Small USOP4 Package with Low Off-State Output Capacitance

There is a strong market need for smaller photorelays. To meet this need, Toshiba has developed photorelays in the ultra-small USOP4 package, which are suitable for high-density board assembly. These photorelays help to reduce system size and cost. They are ideal for use in small measuring instruments such as semiconductor testers that require numerous relays.



Automatic test equipment (ATE) used at the front- and back-end semiconductor manufacturing processes needs to switch electric signals at high speeds in order to measure many pins and devices in a short time. High-end ATE models are equipped with thousands of relays. Because of the performance required for ATE applications, photorelays have been adopted in many ATE models and are rapidly replacing mechanical relays. Photorelays are used along signal paths. A photorelay remains in the off state when it is not conducting electric current. If the off-state output capacitance ( $C_{OFF}$ ) is large, test signals might be subjected to significant distortion, affecting measurement accuracy. To avoid this problem, ATE requires photorelays with low  $C_{OFF}$ . ATE has been driving the need for photorelays with even lower  $C_{OFF}$  and smaller form factors.

In 2011, Toshiba began production of the TLP3340 that features ultra-low  $C_{OFF}$  and has continually expanded its photorelay portfolio to address the challenges of various applications.

The TLP3342 features  $C_{OFF}$  even smaller than that of the TLP3340 and thus provides a cleaner signal waveform. The TLP3351 features a maximum off-state voltage of 60 V despite its ultra-small  $C_{OFF}$ . It helps expand the working voltage range of ATE. Housed in an ultra-small USOP package, the TLP3342 and TLP3351 allow high-density board assembly.

The TLP3312 and TLP3375 provide a good balance between off-state voltage and on-state current. They are ideal not only for ATE applications but also for various equipment requiring high-density board assembly such as for battery control applications.

| Part Number | OFF-State Voltage (max) | ON-State Current (max) | ON-State Resistance (max) | Output Capacitance (typ.) | Trigger LED Current (max) |
|-------------|-------------------------|------------------------|---------------------------|---------------------------|---------------------------|
| TLP3303     | 20 V                    | 0.9 A                  | 0.22 $\Omega$             | 40 pF                     | 3 mA                      |
| TLP3306*    | 75 V                    | 0.4 A                  | 2 $\Omega$                | 40 pF                     | 3 mA                      |
| TLP3312     | 60 V                    | 0.4 A                  | 1.5 $\Omega$              | 20 pF                     | 3 mA                      |
| TLP3314*    | 40 V                    | 0.25 A                 | 3 $\Omega$                | 5 pF                      | 4 mA                      |
| TLP3315*    | 40 V                    | 0.3 A                  | 1.5 $\Omega$              | 10 pF                     | 4 mA                      |
| TLP3316*    | 40 V                    | 0.12 A                 | 15 $\Omega$               | 1 pF                      | 4 mA                      |
| TLP3317*    | 80 V                    | 0.12 A                 | 12 $\Omega$               | 5 pF                      | 5 mA                      |
| TLP3318*    | 80 V                    | 0.14 A                 | 25 $\Omega$               | 3.5 pF                    | 3 mA                      |
| TLP3319*    | 80 V                    | 0.2 A                  | 8 $\Omega$                | 6.5 pF                    | 3 mA                      |
| TLP3320*    | 100 V                   | 0.08 A                 | 14 $\Omega$               | 6 pF                      | 5 mA                      |
| TLP3330*    | 20 V                    | 0.16 A                 | 8 $\Omega$                | 1 pF                      | 4 mA                      |
| TLP3331*    | 20 V                    | 0.45 A                 | 1.2 $\Omega$              | 5 pF                      | 4 mA                      |
| TLP3340     | 40 V                    | 0.12 A                 | 14 $\Omega$               | 0.45 pF                   | 3 mA                      |
| TLP3341     | 40 V                    | 0.41 A                 | 10 $\Omega$               | 0.7 pF                    | 3 mA                      |
| TLP3342     | 40 V                    | 0.1 A                  | 20 $\Omega$               | 0.3 pF                    | 3 mA                      |
| TLP3350     | 20 V                    | 0.2 A                  | 5 $\Omega$                | 0.8 pF                    | 3 mA                      |
| TLP3351     | 60 V                    | 0.12 A                 | 15 $\Omega$               | 0.7 pF                    | 3 mA                      |
| TLP3375     | 50 V                    | 0.3 A                  | 1.5 $\Omega$              | 12 pF                     | 3 mA                      |

\*Under development. Specifications subject to change without notice.

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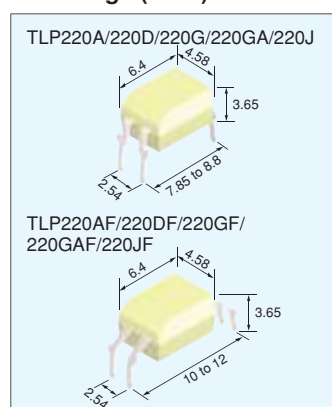
## Photorelays in DIP4 with Reinforced Insulation: TLP220 Series

### Available with five OFF-State Output Terminal Voltages ( $V_{OFF}$ )

The TLP220 Series in the DIP4 package provides an input-to-output isolation voltage of 5000 Vrms (AC, 1 min.) for reinforced insulation by the use of a double-mold structure. The new photorelay series is available with five OFF-state output terminal voltages (60, 200, 350, 400 and 600 V). Thus, it can be used for various applications such as electricity meters (e.g., smart meters), factory automation (FA) systems and security equipment. Additionally, the TLP220 Series features a trigger LED current of 2 mA (max) compared to 3 mA for its predecessor. Because switching between input and output occurs with less current, the TLP220 Series helps save energy.

The TLP220AF/DF/GF/GAF/JF with clearance and creepage distances of 8 mm (min) are also offered. Toshiba is planning to obtain safety standard certification (UL/cUL/VDE/BSI) for these photorelays.

#### ■ Package (DIP4)



| Characteristic                         | Symbol    | Unit     | TLP220A<br>TLP220AF | TLP220D<br>TLP220DF | TLP220G<br>TLP220GF | TLP220GA<br>TLP220GAF | TLP220J<br>TLP220JF |
|----------------------------------------|-----------|----------|---------------------|---------------------|---------------------|-----------------------|---------------------|
| OFF-state output terminal voltage(min) | $V_{OFF}$ | V        | 60                  | 200                 | 350                 | 400                   | 600                 |
| ON-state current (max)                 | $I_{ON}$  | mA       | 500                 | 250                 | 100                 | 120                   | 90                  |
| ON-state resistance (max)              | $R_{ON}$  | $\Omega$ | 2                   | 8                   | 50                  | 35                    | 60                  |
| Trigger LED current (max)              | $I_{FT}$  | mA       | 2                   |                     |                     |                       |                     |
| OFF-state current (max)                | $I_{OFF}$ | $\mu A$  | 1                   |                     |                     |                       |                     |
| Turn-on time (max)                     | $t_{ON}$  | ms       | 1                   |                     |                     |                       |                     |
| Turn-off time (max)                    | $t_{OFF}$ | ms       | 1                   |                     |                     |                       |                     |
| Isolation voltage (min)                | BVs       | Vrms     | 5000                |                     |                     |                       |                     |

#### ■ Features

- Reinforced insulation
- Low trigger LED current

#### ■ Application

- Replacement for mechanical relays
- Security systems
- Instrumentation and control systems
- FA control systems
- Amusement equipment
- Smart meters
- Electricity, gas and water meters
- Medical equipment

## High-Current Photorelays: TLP354x and TLP355x Series

### Available in the DIP4 and DIP6 Packages

Photorelays are superior to mechanical relays in terms of power consumption, size and reliability. On the other hand, photorelays might only be available with limited  $V_{OFF}$  and  $I_{ON}$  ranges.

Photorelays use MOSFETs, which have a trade-off between  $V_{OFF}$  and  $I_{ON}$ . Increasing  $V_{OFF}$  decreases  $I_{ON}$ . Therefore, although photorelays are widely used now, mechanical relays are still used for applications that handle relatively large current.

To address the needs for more wide-ranging applications, Toshiba has released the TLP354x Series in the DIP4 package and the TLP355x Series in the DIP6 package. Fabricated with the U-MOS IV process, the TLP355x Series is available with  $V_{OFF}/I_{ON}$  of 20 V/3 A, 40 V/2.5 A, 60 V/2 A and 100 V/1 A, and the TLP354x Series with  $V_{OFF}/I_{ON}$  of 20 V/4 A, 40 V/3.5 A, 60 V/3 A and 100 V/2 A.

The TLP354x Series in the DIP6 package allows B and C connections to provide control over a DC current of 8 A, 7 A, 6 A or 4 A.

#### ■ Features

- High current
- Available with a  $V_{OFF}$  of 20, 40, 60 and 100 V

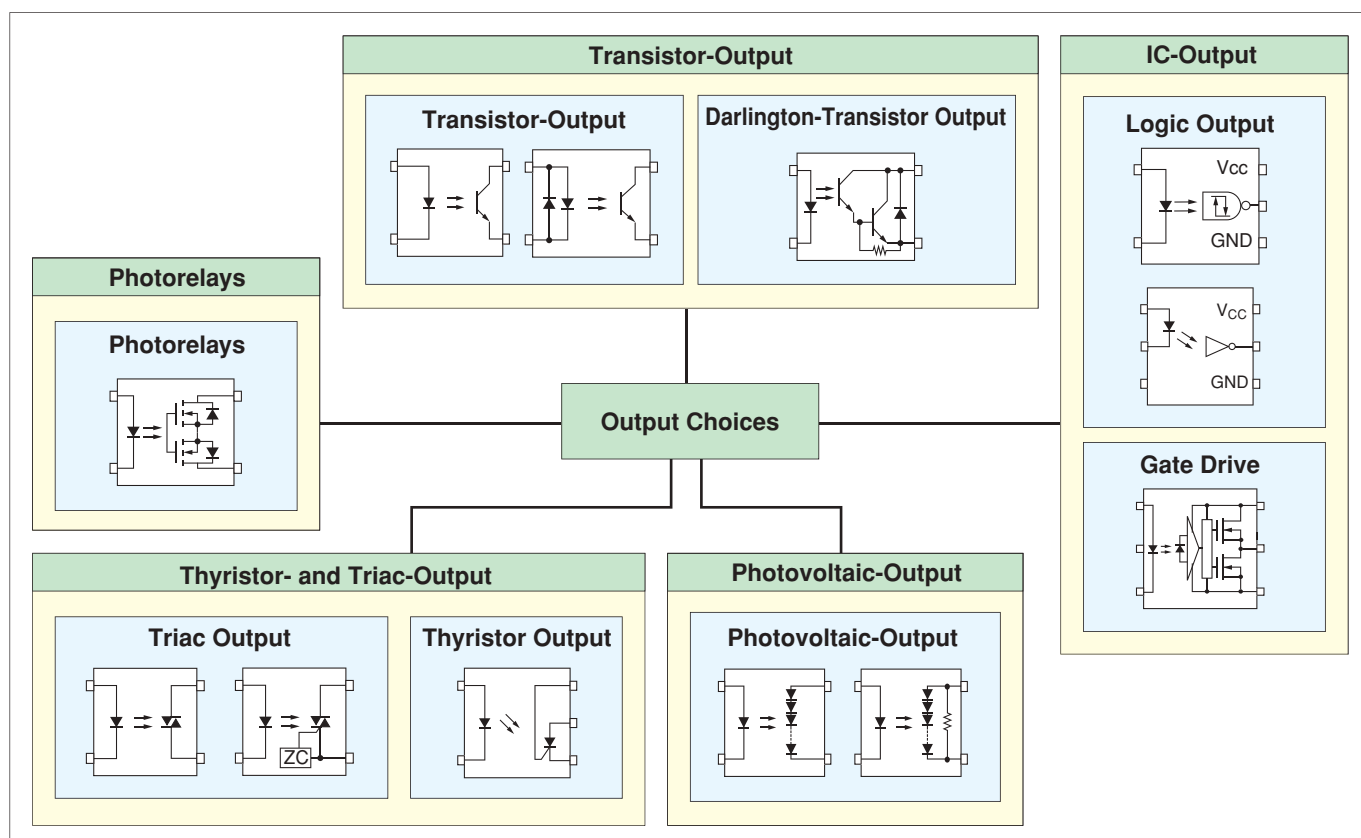
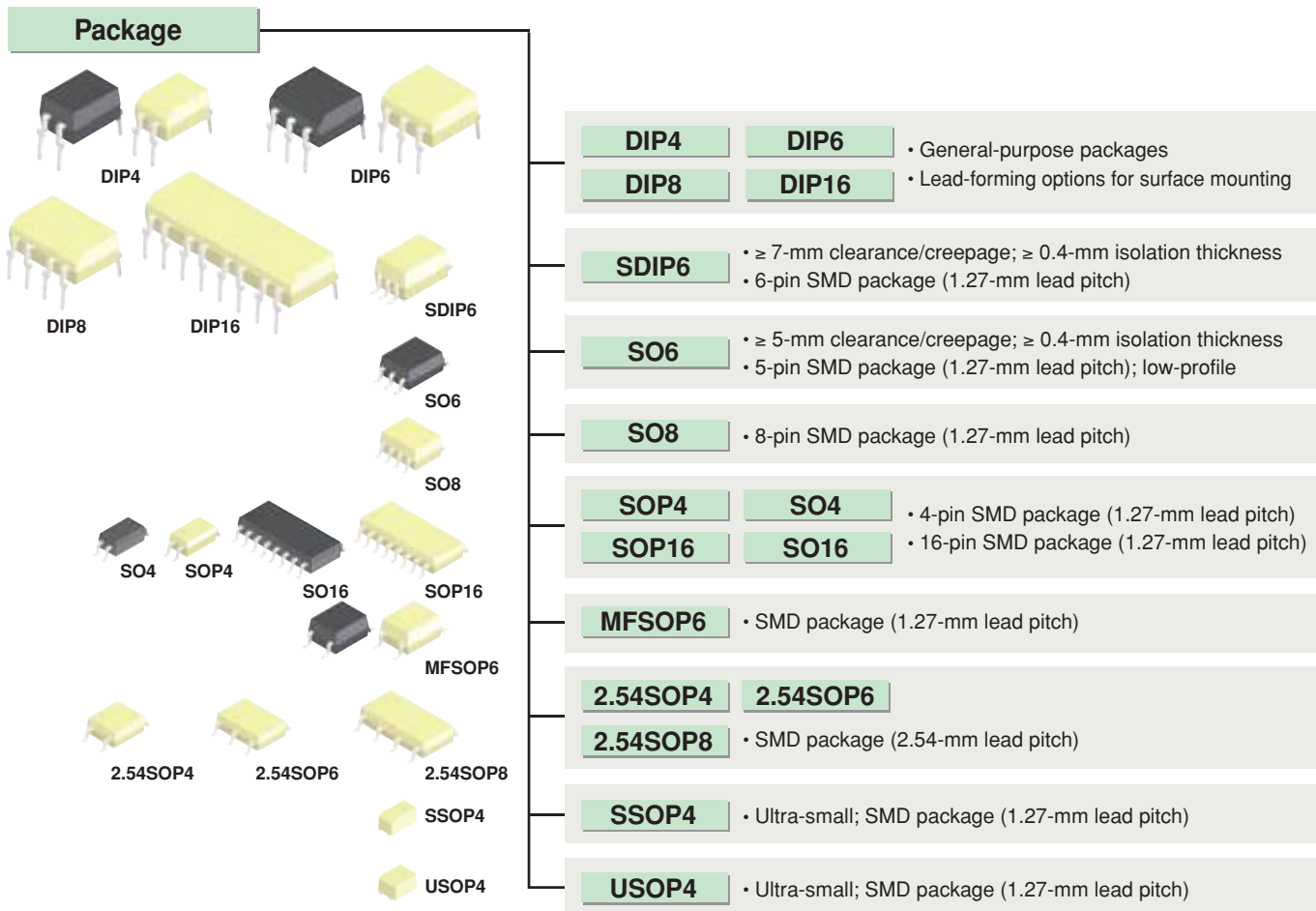
#### ■ Application

- Consumer electronics
- Replacement for mechanical relays
- Security systems
- Power supplies
- FA systems

| Series            | Package | Part Number | $V_{OFF}$ (min)<br>(V) | $I_{ON}$ (max)<br>(A) | $R_{ON}$ (typ.)<br>(m $\Omega$ ) | $R_{ON}$ (max)<br>(m $\Omega$ ) | $t_{ON}$ (max)<br>(ms) ( $I_F = 5$ mA) | $t_{OFF}$ (max)<br>(ms) ( $I_F = 5$ mA) |
|-------------------|---------|-------------|------------------------|-----------------------|----------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| TLP354x<br>Series |         | TLP3543     | 20                     | 4                     | 20                               | 50                              | 5                                      | 1                                       |
|                   |         | TLP3544     | 40                     | 3.5                   | 30                               | 60                              | 5                                      | 1                                       |
|                   |         | TLP3545     | 60                     | 3                     | 40                               | 70                              | 5                                      | 1                                       |
|                   |         | TLP3546     | 100                    | 2                     | 100                              | 200                             | 5                                      | 1                                       |
| TLP355x<br>Series |         | TLP3553     | 20                     | 3                     | 40                               | 80                              | 5                                      | 1                                       |
|                   |         | TLP3554     | 40                     | 2.5                   | 50                               | 150                             | 5                                      | 1                                       |
|                   |         | TLP3555     | 60                     | 2                     | 80                               | 200                             | 5                                      | 1                                       |
|                   |         | TLP3556     | 100                    | 1                     | 250                              | 700                             | 5                                      | 1                                       |

# 3 Photocoupler Product Tree

## Photocoupler Product Tree



# 4 Selection Guide

## 1 Transistor-Output and Darlington-Transistor-Output Photocouplers

| Features \ Package    |                   |  |  |  |  |  |  |  |  |  |
|-----------------------|-------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                   | SO4                                                                               | SOP16                                                                             | SO16                                                                              | SO6                                                                               | MFSOP6                                                                            | DIP6                                                                                | DIP4                                                                                | DIP8                                                                                | DIP16                                                                               |
|                       | Isolation Voltage | Single                                                                            | Quad                                                                              | Quad                                                                              | Single                                                                            | Single                                                                            | Single                                                                              | Single                                                                              | Dual                                                                                | Quad                                                                                |
| General-purpose       | 2500 Vrms         |                                                                                   | TLP281-4                                                                          | TLP291-4                                                                          |                                                                                   |                                                                                   | TLP531<br>TLP532                                                                    |                                                                                     | TLP504A                                                                             |                                                                                     |
|                       | 3750 Vrms         | TLP291                                                                            | TLP285-4                                                                          |                                                                                   | TLP185                                                                            | TLP131                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       | 4000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP731<br>TLP732<br>TLP733<br>TLP734                                                |                                                                                     |                                                                                     |                                                                                     |
|                       | 5000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP631<br>TLP632                                                                    | TLP781<br>TLP785                                                                    |                                                                                     |                                                                                     |
| Low I <sub>F</sub>    | 3750 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP124<br>TLP137                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       | 5000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP331<br>TLP332                                                                    | TLP624                                                                              | TLP624-2                                                                            | TLP624-4                                                                            |
| High V <sub>CEO</sub> | 5000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP628                                                                              | TLP628-2                                                                            | TLP628-4                                                                            |
| High I <sub>F</sub>   | 5000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP629                                                                              | TLP629-2                                                                            | TLP629-4                                                                            |
| AC input              | 2500 Vrms         |                                                                                   | TLP280-4                                                                          | TLP290-4                                                                          |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       | 3750 Vrms         | TLP290                                                                            | TLP284-4                                                                          |                                                                                   | TLP184                                                                            | TLP130                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       | 5000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP630                                                                              | TLP620                                                                              | TLP620-2                                                                            | TLP620-4                                                                            |
| Low I <sub>F</sub>    | 3750 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP126                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       | 5000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP626                                                                              | TLP626-2                                                                            | TLP626-4                                                                            |
| High I <sub>F</sub>   | 5000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP330                                                                              | TLP320                                                                              | TLP320-2                                                                            | TLP320-4                                                                            |
| Darlington            | 2500 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP570<br>TLP571<br>TLP572                                                          | TLP523                                                                              | TLP523-2                                                                            | TLP523-4                                                                            |
| High V <sub>CEO</sub> | 2500 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP127                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       | 5000 Vrms         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP371<br>TLP372<br>TLP373                                                          | TLP627                                                                              | TLP627-2                                                                            | TLP627-4                                                                            |

# 4 Selection Guide

## Reinforced Insulation in a Small, Surface-Mount SOP Package ( $\geq 5\text{-mm}$ Clearance/Creepage and $\geq 0.4\text{-mm}$ Internal Isolation Thickness)

| Part Number | Pin Configuration | Features                                                                                | CTR (%) <sup>(3)</sup> |     |     |                                   | V <sub>CEO</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                |                  |          |          |
|-------------|-------------------|-----------------------------------------------------------------------------------------|------------------------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|----------------|------------------|----------|----------|
|             |                   |                                                                                         | Rank                   | Min | Max | @I <sub>F</sub> , V <sub>CE</sub> |                  |                 | UL/cUL                          | TÜV            | VDE              | BSI      | IEC      |
| TLP184      |                   | <b>SO6</b><br>(reinforced insulation)<br>AC Input                                       | —                      | 50  | 400 | $\pm 5\text{ mA}$ ,<br>5 V        | 80 V             | 3750 Vrms       | ○/○                             | $\Delta^{(1)}$ | ○ <sup>(1)</sup> | ○        | $\Delta$ |
|             |                   |                                                                                         | Y                      | 50  | 150 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GR                     | 100 | 300 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | BLL                    | 200 | 400 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GB                     | 100 | 400 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | —                      | 50  | 400 |                                   |                  |                 |                                 |                |                  |          |          |
| TLP185      |                   | <b>SO6</b><br>(reinforced insulation)                                                   | GB                     | 100 | 400 | 5 mA,<br>5 V                      | 80 V             | 3750 Vrms       | ○/○                             | $\Delta^{(1)}$ | ○ <sup>(1)</sup> | ○        | $\Delta$ |
|             |                   |                                                                                         | Y                      | 50  | 150 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GR                     | 100 | 300 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | BLL                    | 200 | 400 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | YH                     | 75  | 150 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GRL                    | 100 | 200 |                                   |                  |                 |                                 |                |                  |          |          |
| TLP284-4    |                   | <b>SOP16</b><br>4-channel version<br>Lead pitch = 1.27 mm<br>AC Input<br>SEMKO-approved | —                      | 50  | 600 | $\pm 5\text{ mA}$ ,<br>5 V        | 80 V             | 3750 Vrms       | ○/○                             |                | ○ <sup>(1)</sup> | ◎        |          |
|             |                   |                                                                                         | GB                     | 100 | 600 |                                   |                  |                 |                                 |                |                  |          |          |
| TLP290      |                   | <b>SO4</b><br>(reinforced insulation)<br>AC Input<br>Lead pitch = 1.27 mm               | —                      | 50  | 400 | $\pm 5\text{ mA}$ ,<br>5 V        | 80 V             | 3750 Vrms       | ○/○                             |                | ○ <sup>(1)</sup> | $\Delta$ | $\Delta$ |
|             |                   |                                                                                         | Y                      | 50  | 150 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GR                     | 100 | 300 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | BLL                    | 200 | 400 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GB                     | 100 | 400 |                                   |                  |                 |                                 |                |                  |          |          |
| TLP285-4    |                   | <b>SOP16</b><br>4-channel version<br>Lead pitch = 1.27 mm<br>SEMKO-approved             | —                      | 50  | 600 | 5 mA,<br>5 V                      | 80 V             | 3750 Vrms       | ○/○                             |                | ○ <sup>(1)</sup> | ◎        |          |
|             |                   |                                                                                         | GB                     | 100 | 600 |                                   |                  |                 |                                 |                |                  |          |          |
| TLP291      |                   | <b>SO4</b><br>(reinforced insulation)<br>Lead pitch = 1.27 mm                           | —                      | 50  | 400 | 5 mA,<br>5 V                      | 80 V             | 3750 Vrms       | ○/○                             |                | ○ <sup>(1)</sup> | $\Delta$ | $\Delta$ |
|             |                   |                                                                                         | GB                     | 100 | 400 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | Y                      | 50  | 150 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GR                     | 100 | 300 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | BLL                    | 200 | 400 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | YH                     | 75  | 150 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GRL                    | 100 | 200 |                                   |                  |                 |                                 |                |                  |          |          |
|             |                   |                                                                                         | GRH                    | 150 | 300 |                                   |                  |                 |                                 |                |                  |          |          |

## General-Purpose, Transistor-Output Photocouplers

| Part Number | Pin Configuration | Features                                                             | CTR (%) <sup>(3)</sup> |     |      |                                   | V <sub>CEO</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-------------------|----------------------------------------------------------------------|------------------------|-----|------|-----------------------------------|------------------|-----------------|---------------------------------|-----|-----|-----|-----|
|             |                   |                                                                      | Rank                   | Min | Max  | @I <sub>F</sub> , V <sub>CE</sub> |                  |                 | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP124      |                   | <b>MFSOP6</b><br>Low input drive current                             | —                      | 100 | 1200 | 1 mA,<br>0.5 V                    | 80 V             | 3750 Vrms       | ○/○                             |     |     |     |     |
|             |                   |                                                                      | BV                     | 200 | 1200 |                                   |                  |                 |                                 |     |     |     |     |
| TLP131      |                   | <b>MFSOP6</b><br>Internal base connection                            | —                      | 50  | 600  | 5 mA,<br>5 V                      | 80 V             | 3750 Vrms       | ○/○                             |     |     |     |     |
|             |                   |                                                                      | Y                      | 50  | 150  |                                   |                  |                 |                                 |     |     |     |     |
|             |                   |                                                                      | GR                     | 100 | 300  |                                   |                  |                 |                                 |     |     |     |     |
|             |                   |                                                                      | BL                     | 200 | 600  |                                   |                  |                 |                                 |     |     |     |     |
| TLP137      |                   | <b>MFSOP6</b><br>Low input drive current<br>Internal base connection | —                      | 100 | 1200 | 1 mA,<br>0.5 V                    | 80 V             | 3750 Vrms       | ○/○                             |     |     |     |     |
|             |                   |                                                                      | BV                     | 200 | 1200 |                                   |                  |                 |                                 |     |     |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation)  $\Delta$ : Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved  $\Delta$ : Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

Note 3: Some CTR ranks may be limited in production quantities. For details, please contact your nearest Toshiba sales representative.



## General-Purpose, Transistor-Output Photocouplers (Continued)

| Part Number | Pin Configuration | Features                                                                    | CTR (%) <sup>(3)</sup> |     |      |                                   | V <sub>CEO</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|-------------|-------------------|-----------------------------------------------------------------------------|------------------------|-----|------|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|             |                   |                                                                             | Rank                   | Min | Max  | @I <sub>F</sub> , V <sub>CE</sub> |                  |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| TLP281-4    |                   | <b>SOP16</b><br>4-channel version<br>Lead pitch = 1.27 mm<br>SEMKO-approved | —                      | 50  | 600  | 5 mA,<br>5 V                      | 80 V             | 2500<br>Vrms    | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> | ◎   | △   |
|             |                   |                                                                             | GB                     | 100 | 600  |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP291-4    |                   | <b>SO16</b><br>4-channel version<br>Lead pitch = 1.27 mm                    | —                      | 50  | 400  | 5 mA,<br>5 V                      | 80 V             | 2500<br>Vrms    | ○/○                             |                  | ○ <sup>(1)</sup> | △   | △   |
|             |                   |                                                                             | GB                     | 100 | 400  |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP331      |                   | <b>DIP6</b><br>Low input drive current<br>Internal base connection          | —                      | 100 | 1200 | 1 mA,<br>0.5 V                    | 55 V             | 5000<br>Vrms    | ○/○                             |                  |                  |     |     |
|             |                   |                                                                             | BV                     | 200 | 1200 |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP332      |                   | <b>DIP6</b><br>Low input drive current                                      | —                      | 100 | 1200 | 1 mA,<br>0.5 V                    | 55 V             | 5000<br>Vrms    | ○/○                             |                  |                  |     |     |
|             |                   |                                                                             | BV                     | 200 | 1200 |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP504A     |                   | <b>DIP8</b>                                                                 | —                      | 50  | 600  | 5 mA,<br>5 V                      | 55 V             | 2500<br>Vrms    | ○/                              |                  |                  |     |     |
|             |                   |                                                                             | GB                     | 100 | 600  |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP531      |                   | <b>DIP6</b><br>Internal base connection                                     | —                      | 50  | 600  | 5 mA,<br>5 V                      | 55 V             | 2500<br>Vrms    | ○/○                             |                  |                  |     |     |
|             |                   |                                                                             | Y                      | 50  | 150  |                                   |                  |                 |                                 |                  |                  |     |     |
|             |                   |                                                                             | GR                     | 100 | 300  |                                   |                  |                 |                                 |                  |                  |     |     |
|             |                   |                                                                             | BL                     | 200 | 600  |                                   |                  |                 |                                 |                  |                  |     |     |
|             |                   |                                                                             | GB                     | 100 | 600  |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP532      |                   | <b>DIP6</b><br>High EMI immunity                                            | —                      | 50  | 600  | 5 mA,<br>5 V                      | 55 V             | 2500<br>Vrms    | ○/○                             |                  |                  |     |     |
|             |                   |                                                                             | Y                      | 50  | 150  |                                   |                  |                 |                                 |                  |                  |     |     |
|             |                   |                                                                             | GR                     | 100 | 300  |                                   |                  |                 |                                 |                  |                  |     |     |
|             |                   |                                                                             | BL                     | 200 | 600  |                                   |                  |                 |                                 |                  |                  |     |     |
|             |                   |                                                                             | GB                     | 100 | 600  |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP624      |                   | <b>DIP4</b><br>Low input drive current                                      | —                      | 100 | 1200 | 1 mA,<br>5 V                      | 55 V             | 5000<br>Vrms    | ○/○                             | △                | ○                | ◎   | △   |
|             |                   |                                                                             | BV                     | 200 | 1200 |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP624-2    |                   | <b>DIP8</b><br>Dual-channel version<br>of the TLP624                        | —                      | 100 | 1200 | 1 mA,<br>5 V                      | 55 V             | 5000<br>Vrms    | ○/○                             | △                | ○                | ◎   | △   |
|             |                   |                                                                             | BV                     | 200 | 1200 |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP624-4    |                   | <b>DIP16</b><br>4-channel version of<br>the TLP624                          | —                      | 100 | 1200 | 1 mA,<br>5 V                      | 55 V             | 5000<br>Vrms    | ○/○                             | △                | ○                | ◎   | △   |
|             |                   |                                                                             | BV                     | 200 | 1200 |                                   |                  |                 |                                 |                  |                  |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

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EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

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# 4 Selection Guide

## General-Purpose, Transistor-Output Photocouplers (Continued)

| Part Number       | Pin Configuration | Features                                                     | CTR (%) <sup>(3)</sup> |     |     |                                   | V <sub>CEO</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------------|-------------------|--------------------------------------------------------------|------------------------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|-----|-----|-----|-----|
|                   |                   |                                                              | Rank                   | Min | Max | @I <sub>F</sub> , V <sub>CE</sub> |                  |                 | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP628            |                   | <b>DIP4</b><br>High V <sub>CEO</sub>                         | —                      | 50  | 600 | 5 mA,<br>5 V                      | 350 V            | 5000<br>Vrms    | ○/○                             | △   | ○   | △   | △   |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
| TLP628-2          |                   | <b>DIP8</b><br>Dual-channel version<br>of the TLP628         | —                      | 50  | 600 | 5 mA,<br>5 V                      | 350 V            | 5000<br>Vrms    | ○/○                             | △   | ○   | △   | △   |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
| TLP628-4          |                   | <b>DIP16</b><br>4-channel version of<br>the TLP628           | —                      | 50  | 600 | 5 mA,<br>5 V                      | 350 V            | 5000<br>Vrms    | ○/○                             | △   | ○   | △   | △   |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
| TLP629            |                   | <b>DIP4</b><br>High input current<br>I <sub>F</sub> = 150 mA | —                      | 20  | 80  | 100 mA,<br>1 V                    | 55 V             | 5000<br>Vrms    | ○/                              | △   | ○   | △   | △   |
| TLP629-2          |                   | <b>DIP8</b><br>Dual-channel version<br>of the TLP629         | —                      | 20  | 80  | 100 mA,<br>1 V                    | 55 V             | 5000<br>Vrms    | ○/                              | △   | ○   | △   | △   |
| TLP629-4          |                   | <b>DIP16</b><br>4-channel version of<br>the TLP629           | —                      | 20  | 80  | 100 mA,<br>1 V                    | 55 V             | 5000<br>Vrms    | ○/                              | △   | ○   | △   | △   |
| TLP631            |                   | <b>DIP6</b><br>Internal base<br>connection                   | —                      | 50  | 600 | 5 mA,<br>5 V                      | 55 V             | 5000<br>Vrms    | ○/○                             |     |     |     |     |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                              | GR                     | 100 | 300 |                                   |                  |                 |                                 |     |     |     |     |
| TLP632            |                   | <b>DIP6</b><br>High EMI immunity                             | —                      | 50  | 600 | 5 mA,<br>5 V                      | 55 V             | 5000<br>Vrms    | ○/○                             |     |     |     |     |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                              | GR                     | 100 | 300 |                                   |                  |                 |                                 |     |     |     |     |
| TLP731            |                   | <b>DIP6</b><br>SEMKO-approved<br>Internal base<br>connection | —                      | 50  | 600 | 5 mA,<br>5 V                      | 55 V             | 4000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                              | GR                     | 100 | 300 |                                   |                  |                 |                                 |     |     |     |     |
| TLP732            |                   | <b>DIP6</b><br>SEMKO-approved                                | —                      | 50  | 600 | 5 mA,<br>5 V                      | 55 V             | 4000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                              | GR                     | 100 | 300 |                                   |                  |                 |                                 |     |     |     |     |
| TLP733<br>TLP733F |                   | <b>DIP6</b><br>SEMKO-approved<br>Internal base<br>connection | —                      | 50  | 600 | 5 mA,<br>5 V                      | 55 V             | 4000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                              | GR                     | 100 | 300 |                                   |                  |                 |                                 |     |     |     |     |
| TLP734<br>TLP734F |                   | <b>DIP6</b><br>SEMKO-approved                                | —                      | 50  | 600 | 5 mA,<br>5 V                      | 55 V             | 4000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |
|                   |                   |                                                              | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                              | GR                     | 100 | 300 |                                   |                  |                 |                                 |     |     |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

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## General-Purpose, Transistor-Output Photocouplers (Continued)

| Part Number       | Pin Configuration | Features                                                                                   | CTR (%) <sup>(3)</sup> |     |     |                                   | V <sub>CEO</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------------|-------------------|--------------------------------------------------------------------------------------------|------------------------|-----|-----|-----------------------------------|------------------|-----------------|---------------------------------|-----|-----|-----|-----|
|                   |                   |                                                                                            | Rank                   | Min | Max | @I <sub>F</sub> , V <sub>CE</sub> |                  |                 | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP781<br>TLP781F |                   | <b>DIP4</b><br>High isolation voltage<br>UL-approved (double protection)<br>SEMKO-approved | —                      | 50  | 600 | 5 mA,<br>5 V                      | 80 V             | 5000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |
|                   |                   |                                                                                            | Y                      | 50  | 150 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | GR                     | 100 | 300 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | BL                     | 200 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | YH                     | 75  | 150 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | GRL                    | 100 | 200 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | GRH                    | 150 | 300 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | BLL                    | 200 | 400 |                                   |                  |                 |                                 |     |     |     |     |
| TLP785<br>TLP785F |                   | <b>DIP4</b><br>High isolation voltage<br>UL-approved (double protection)                   | —                      | 50  | 600 | 5 mA,<br>5 V                      | 80 V             | 5000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |
|                   |                   |                                                                                            | Y                      | 50  | 150 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | GR                     | 100 | 300 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | BL                     | 200 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | GB                     | 100 | 600 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | YH                     | 75  | 150 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | GRL                    | 100 | 200 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | GRH                    | 150 | 300 |                                   |                  |                 |                                 |     |     |     |     |
|                   |                   |                                                                                            | BLL                    | 200 | 400 |                                   |                  |                 |                                 |     |     |     |     |

## AC-Input, Transistor-Output Photocouplers

| Part Number | Pin Configuration | Features                                                                                             | CTR (%) <sup>(3)</sup> |     |      |                                   | V <sub>CEO</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|-------------|-------------------|------------------------------------------------------------------------------------------------------|------------------------|-----|------|-----------------------------------|------------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|             |                   |                                                                                                      | Rank                   | Min | Max  | @I <sub>F</sub> , V <sub>CE</sub> |                  |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| TLP126      |                   | <b>MFSOP6</b><br>AC input<br>Low input drive current                                                 | —                      | 100 | 1200 | ± 1 mA,<br>0.5 V                  | 80 V             | 3750<br>Vrms    | ○/○                             |                  |                  |     |     |
| TLP130      |                   | <b>MFSOP6</b><br>AC input<br>Internal base connection                                                | —                      | 50  | 600  | ±5 mA,<br>5 V                     | 80 V             | 3750<br>Vrms    | ○/○                             |                  |                  |     |     |
|             |                   |                                                                                                      | GB                     | 100 | 600  |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP290-4    |                   | <b>SO16</b><br>4-channel version<br>Lead pitch = 1.27 mm<br>AC input                                 | —                      | 50  | 400  | ±5 mA,<br>5 V                     | 80 V             | 2500<br>Vrms    | ○/○                             |                  | ○ <sup>(1)</sup> | △   | △   |
|             |                   |                                                                                                      | GB                     | 100 | 400  |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP280-4    |                   | <b>SOP16</b><br>4-channel version<br>Lead pitch = 1.27 mm<br>AC input<br>SEMKO-approved              | —                      | 50  | 600  | ±5 mA,<br>5 V                     | 80 V             | 2500<br>Vrms    | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> | ◎   | △   |
|             |                   |                                                                                                      | GB                     | 100 | 600  |                                   |                  |                 |                                 |                  |                  |     |     |
| TLP320      |                   | <b>DIP4</b><br>High input current<br>AC input<br>I <sub>F</sub> = 150 mA                             | —                      | 20  | 80   | ±100 mA,<br>1 V                   | 55 V             | 5000<br>Vrms    | ○/○                             | △                | △                | ◎   | △   |
| TLP320-2    |                   | <b>DIP8</b><br>Dual-channel version<br>of the TLP320                                                 | —                      | 20  | 80   | ±100 mA,<br>1 V                   | 55 V             | 5000<br>Vrms    | ○/○                             | △                | △                | ◎   | △   |
| TLP320-4    |                   | <b>DIP16</b><br>4-channel version<br>of the TLP320                                                   | —                      | 20  | 80   | ±100 mA,<br>1 V                   | 55 V             | 5000<br>Vrms    | ○/○                             | △                | △                | ◎   | △   |
| TLP330      |                   | <b>DIP6</b><br>High input current<br>AC input<br>I <sub>F</sub> = 150 mA<br>Internal base connection | —                      | 20  | 80   | ±100 mA,<br>1 V                   | 55 V             | 5000<br>Vrms    | ○/○                             |                  |                  |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

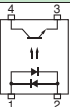
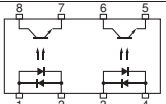
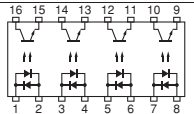
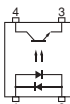
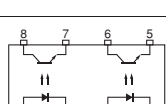
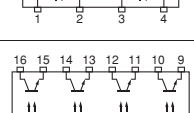
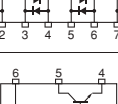
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# 4 Selection Guide

## AC-Input, Transistor-Output Photocouplers (Continued)

| Part Number       | Pin Configuration                                                                   | Features                                                                         | CTR (%) <sup>(3)</sup> |     |      | V <sub>CEO</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup>    |        |     |     |     |     |
|-------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------|-----|------|------------------|-----------------|------------------------------------|--------|-----|-----|-----|-----|
|                   |                                                                                     |                                                                                  | Rank                   | Min | Max  |                  |                 | @ I <sub>F</sub> , V <sub>CE</sub> | UL/cUL | TÜV | VDE | BSI | IEC |
| TLP620<br>TLP620F |    | <b>DIP4</b><br>AC input<br>SEMKO-approved                                        | —                      | 50  | 600  | ±5 mA,<br>5 V    | 55 V            | 5000<br>Vrms                       | ○/○    | △   | ○   | ◎   | △   |
|                   |                                                                                     |                                                                                  | Y                      | 50  | 150  |                  |                 |                                    |        |     |     |     |     |
|                   |                                                                                     |                                                                                  | GR                     | 100 | 300  |                  |                 |                                    |        |     |     |     |     |
|                   |                                                                                     |                                                                                  | BL                     | 200 | 600  |                  |                 |                                    |        |     |     |     |     |
|                   |                                                                                     |                                                                                  | GB                     | 100 | 600  |                  |                 |                                    |        |     |     |     |     |
| TLP620-2          |    | <b>DIP8</b><br>Dual-channel version<br>of the TLP620<br>SEMKO-approved           | —                      | 50  | 600  | ±5 mA,<br>5 V    | 55 V            | 5000<br>Vrms                       | ○/○    | △   | ○   | ◎   | △   |
|                   |                                                                                     |                                                                                  | GB                     | 100 | 600  |                  |                 |                                    |        |     |     |     |     |
| TLP620-4          |    | <b>DIP16</b><br>4-channel version of<br>the TLP620                               | —                      | 50  | 600  | ±5 mA,<br>5 V    | 55 V            | 5000<br>Vrms                       | ○/○    | △   | ○   | ◎   | △   |
|                   |                                                                                     |                                                                                  | GB                     | 100 | 600  |                  |                 |                                    |        |     |     |     |     |
| TLP626            |    | <b>DIP4</b><br>Low input drive current<br>AC input                               | —                      | 100 | 1200 | ±1 mA,<br>0.5 V  | 55 V            | 5000<br>Vrms                       | ○/○    | △   | ○   | ◎   | △   |
|                   |                                                                                     |                                                                                  | BV                     | 200 |      |                  |                 |                                    |        |     |     |     |     |
| TLP626-2          |    | <b>DIP8</b><br>Dual-channel version<br>of the TLP626                             | —                      | 100 | 1200 | ±1 mA,<br>0.5 V  | 55 V            | 5000<br>Vrms                       | ○/○    | △   | ○   | ◎   | △   |
|                   |                                                                                     |                                                                                  | BV                     | 200 |      |                  |                 |                                    |        |     |     |     |     |
| TLP626-4          |  | <b>DIP16</b><br>4-channel version of<br>the TLP626                               | —                      | 100 | 1200 | ±1 mA,<br>0.5 V  | 55 V            | 5000<br>Vrms                       | ○/○    | △   | ○   | ◎   | △   |
|                   |                                                                                     |                                                                                  | BV                     | 200 |      |                  |                 |                                    |        |     |     |     |     |
| TLP630            |  | <b>DIP6</b><br>AC input<br>High isolation voltage<br>Internal base<br>connection | —                      | 50  | 600  | ±5 mA,<br>5 V    | 55 V            | 5000<br>Vrms                       | ○/     |     |     |     |     |
|                   |                                                                                     |                                                                                  | GB                     | 100 |      |                  |                 |                                    |        |     |     |     |     |

## Darlington-Transistor-Output Photocouplers

| Part Number | Pin Configuration | Features                                                                              | CTR (%) <sup>(3)</sup> |                                   |       | V <sub>CE</sub> (sat)            |  | V <sub>CE</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|-------------|-------------------|---------------------------------------------------------------------------------------|------------------------|-----------------------------------|-------|----------------------------------|--|-----------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|             |                   |                                                                                       | Min                    | @I <sub>F</sub> , V <sub>CE</sub> | Max   | @I <sub>C</sub> , I <sub>F</sub> |  |                 |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| TLP127      |                   | MFSOP6<br>High V <sub>CEO</sub>                                                       | 1000                   | 1 mA,<br>1 V                      | 1.2 V | 100 mA,<br>10 mA                 |  | 300 V           | 2500<br>Vrms    | ○/○                             | ○ <sup>(1)</sup> | ○ <sup>(1)</sup> | ◎   | △   |
| TLP371      |                   | DIP6<br>High V <sub>CEO</sub><br>SEMKO-approved<br>Internal base<br>connection        | 1000                   | 1 mA,<br>1 V                      | 1.2 V | 100 mA,<br>10 mA                 |  | 300 V           | 5000<br>Vrms    | ○/○                             |                  |                  |     |     |
| TLP372      |                   | DIP6<br>High V <sub>CEO</sub><br>SEMKO-approved                                       | 1000                   | 1 mA,<br>1 V                      | 1.2 V | 100 mA,<br>10 mA                 |  | 300 V           | 5000<br>Vrms    | ○/○                             |                  |                  |     |     |
| TLP373      |                   | DIP6<br>High V <sub>CEO</sub><br>Long emitter-collector<br>distance<br>SEMKO-approved | 1000                   | 1 mA,<br>1 V                      | 1.2 V | 100 mA,<br>10 mA                 |  | 300 V           | 5000<br>Vrms    | ○/○                             |                  |                  |     |     |

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## Darlington-Transistor-Output Photocouplers (Continued)

| Part Number | Pin Configuration | Features                                                        | CTR (%) <sup>(3)</sup> |                                   | V <sub>CE</sub> (sat) |                                  | V <sub>CEO</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-------------------|-----------------------------------------------------------------|------------------------|-----------------------------------|-----------------------|----------------------------------|------------------|-----------------|---------------------------------|-----|-----|-----|-----|
|             |                   |                                                                 | Min                    | @I <sub>F</sub> , V <sub>CE</sub> | Max                   | @I <sub>C</sub> , I <sub>F</sub> |                  |                 | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP523      |                   | DIP4                                                            | 500                    | 1 mA,<br>1 V                      | 1 V                   | 50 mA,<br>10 mA                  | 55 V             | 2500<br>Vrms    | ○/○                             |     |     |     |     |
| TLP523-2    |                   | DIP8<br>Dual-channel version<br>of the TLP523                   | 500                    | 1 mA,<br>1 V                      | 1 V                   | 50 mA,<br>10 mA                  | 55 V             | 2500<br>Vrms    | ○/○                             |     |     |     |     |
| TLP523-4    |                   | DIP16<br>4-channel version of<br>the TLP523                     | 500                    | 1 mA,<br>1 V                      | 1 V                   | 50 mA,<br>10 mA                  | 55 V             | 2500<br>Vrms    | ○/○                             |     |     |     |     |
| TLP570      |                   | DIP6<br>High EMI immunity                                       | 1000                   | 1 mA,<br>1 V                      | 1.2 V                 | 100 mA,<br>10 mA                 | 35 V             | 2500<br>Vrms    | ○/○                             |     |     |     |     |
| TLP571      |                   | DIP6<br>Internal base<br>connection                             | 1000                   | 1 mA,<br>1 V                      | 1.2 V                 | 100 mA,<br>10 mA                 | 35 V             | 2500<br>Vrms    | ○/                              |     |     |     |     |
| TLP572      |                   | DIP6<br>Built-in R <sub>BE</sub>                                | 1000                   | 1 mA,<br>1.2 V                    | 1.2 V                 | 100 mA,<br>10 mA                 | 55 V             | 2500<br>Vrms    | ○/                              |     |     |     |     |
| TLP627      |                   | DIP4<br>High V <sub>CEO</sub><br>SEMKO-approved                 | 1000                   | 1 mA,<br>1 V                      | 1.2 V                 | 100 mA,<br>10 mA                 | 300 V            | 5000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |
| TLP627-2    |                   | DIP8<br>Dual-channel version<br>of the TLP627<br>SEMKO-approved | 1000                   | 1 mA,<br>1 V                      | 1.2 V                 | 100 mA,<br>10 mA                 | 300 V            | 5000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |
| TLP627-4    |                   | DIP16<br>4-channel version of<br>the TLP627                     | 1000                   | 1 mA,<br>1 V                      | 1.2 V                 | 100 mA,<br>10 mA                 | 300 V            | 5000<br>Vrms    | ○/○                             | △   | ○   | ◎   | △   |

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# 4 Selection Guide

## 2 Photocouplers for Logic Signal Transmission

| Package              |                                |                                    |  |  |  |  |  |  |  |                |
|----------------------|--------------------------------|------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|
| Features             |                                |                                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                |
| Data Rate<br>(Typ.)  | Output                         | MFSOP6                             | SO6                                                                               | SO8                                                                               |                                                                                   | SDIP6                                                                             | DIP6                                                                                | DIP8                                                                                |                                                                                     | JEDEC          |
|                      |                                |                                    |                                                                                   | 1ch                                                                               | 2ch                                                                               |                                                                                   |                                                                                     | 1ch                                                                                 | 2ch                                                                                 |                |
| 0.1 to 0.3<br>Mbit/s | Open-collector<br>(Darlington) |                                    |                                                                                   | TLP2403                                                                           |                                                                                   |                                                                                   |                                                                                     | TLP553                                                                              |                                                                                     | 6N138<br>6N139 |
| 1 Mbit/s             | Open-collector                 | TLP112**<br>TLP112A**<br>TLP114A** | TLP109<br>TLP2309                                                                 | TLP2409                                                                           |                                                                                   | TLP719                                                                            | TLP512                                                                              | TLP550<br>TLP551<br>TLP559<br>TLP651<br>TLP750<br>TLP751<br>TLP759                  | TLP2530<br>TLP2531                                                                  | 6N135<br>6N136 |
|                      |                                | IPM<br>drive                       | TLP114A(IGM)**<br><br>TLP109(IGM)<br><br>TLP104                                   | TLP2404                                                                           |                                                                                   | TLP714                                                                            | TLP559(IGM)<br>TLP759(IGM)<br>TLP754                                                |                                                                                     |                                                                                     |                |
| 5 Mbit/s             | Totem-pole                     | TLP105<br>TLP108                   | TLP2355<br>TLP2358                                                                | TLP2405<br>TLP2408                                                                | TLP2105<br>TLP2108                                                                | TLP715<br>TLP718                                                                  |                                                                                     | TLP2955<br>TLP2958                                                                  |                                                                                     |                |
|                      |                                | AC<br>input                        | TLP2095<br>TLP2098                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                |
|                      | 3-state                        |                                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP555<br>TLP558<br>TLP2200                                                         |                                                                                     |                |
| 10 Mbit/s            | Open-collector                 | TLP113**<br>TLP115**<br>TLP115A**  | TLP2362                                                                           |                                                                                   |                                                                                   |                                                                                   | TLP513                                                                              | TLP552<br>TLP554<br>TLP2601<br>TLPN137                                              | TLP2630<br>TLP2631<br>TLP2662                                                       | 6N137          |
| 15 to 20<br>Mbit/s   | Totem-<br>pole                 | 5 V                                | TLP116**                                                                          | TLP116A                                                                           |                                                                                   | TLP2116                                                                           | TLP716                                                                              |                                                                                     |                                                                                     |                |
|                      |                                | 3.3 V                              | TLP2066                                                                           |                                                                                   |                                                                                   | TLP2166A                                                                          |                                                                                     |                                                                                     |                                                                                     |                |
|                      |                                | 3.3/5 V                            |                                                                                   | TLP2366                                                                           | TLP2466                                                                           | TLP2160                                                                           | TLP2766                                                                             |                                                                                     |                                                                                     |                |
|                      | Open-<br>collector             | 5 V                                |                                                                                   | TLP118                                                                            | TLP2418                                                                           | TLP2118E                                                                          | TLP708                                                                              |                                                                                     |                                                                                     |                |
| 3.3/5 V              |                                |                                    | TLP2368                                                                           | TLP2468                                                                           | TLP2168                                                                           | TLP2768                                                                           |                                                                                     | TLP2962                                                                             |                                                                                     |                |
| 50 Mbit/s            | Totem-<br>pole                 | 5 V                                | TLP117                                                                            |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                |

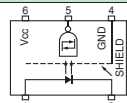
\*\* : Product Obsolescence \* : Under development as of July 2012. For the latest information, please contact your nearest Toshiba sales representative.

### Replacement Devices

| New Device      | Discontinued Devices            |
|-----------------|---------------------------------|
| TLP109, TLP2309 | TLP112, TLP112A, TLP114A        |
| TLP109(IGM)     | TLP114A(IGM)                    |
| TLP2362         | TLP113, TLP115, TLP115A, TLP116 |

The new and discontinued devices are not exactly identical in terms of electrical characteristics. When you consider replacing any device with a new one, please go over a relevant datasheet and/or verify the fitness of the device in the end-use application environment.

### Photocouplers for Logic Signal Transmission at 50 Mbit/s (Typ.)

| Part Number | Pin Configuration                                                                   | Features                                                 | Propagation Delay Time (Max) | Output Form                           | I <sub>FHL</sub> , I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|-------------|-------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------|---------------------------------------|-------------------------------------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|             |                                                                                     |                                                          |                              |                                       |                                           |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| TLP117      |  | MFSOP6<br>High speed: 50 Mbit/s<br>V <sub>CC</sub> = 5 V | 30 ns                        | Totem pole output<br>(Inverter logic) | 5 mA                                      | 3750 Vrms       | ○ / ○                           | ○ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## Photocouplers for Logic Signal Transmission at 15 to 20 Mbit/s (Typ.)

| Part Number                     | Pin Configuration | Features                                                                                             | Propagation Delay Time (Max) | Output Form                           | I <sub>FHL</sub> /I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|---------------------------------|-------------------|------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------|------------------------------------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|                                 |                   |                                                                                                      |                              |                                       |                                          |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| <b>TLP116A</b>                  |                   | <b>SO6</b><br>High speed: 20 Mbit/s<br>V <sub>CC</sub> = 5 V                                         | 60 ns                        | Totem pole output<br>(Inverter logic) | 5 mA                                     | 3750 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP2116</b>                  |                   | <b>SO8</b><br>High speed: 15 Mbit/s<br>V <sub>CC</sub> = 5 V<br>Dual-channel version                 | 75 ns                        | Totem pole output<br>(Inverter logic) | 5 mA                                     | 2500 Vrms       | ○/○                             | ○ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP716</b><br><b>TLP716F</b> |                   | <b>SDIP6</b><br>High speed: 15 Mbit/s<br>V <sub>CC</sub> = 5 V<br>High isolation voltage             | 75 ns                        | Totem pole output<br>(Inverter logic) | 6.5 mA                                   | 5000 Vrms       | ○/○                             | ○                | ○                |     |     |
| <b>TLP2066</b>                  |                   | <b>MFSOP6</b><br>High speed: 20 Mbit/s<br>V <sub>CC</sub> = 3.3 V                                    | 60 ns                        | Totem pole output<br>(Inverter logic) | 5 mA                                     | 3750 Vrms       | ○/                              | ○ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP2166A</b>                 |                   | <b>SO8</b><br>High speed: 15 Mbit/s<br>V <sub>CC</sub> = 3.3 V<br>Dual-channel version               | 75 ns                        | Totem pole output<br>(Inverter logic) | 3 mA                                     | 2500 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP2160</b>                  |                   | <b>SO8</b><br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)                          | 40 ns                        | Totem pole output<br>(Inverter logic) | 3.5 mA                                   | 2500 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |
| <b>TLP2366</b>                  |                   | <b>SO6</b><br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)                          | 40 ns                        | Totem pole output<br>(Inverter logic) | 3.5 mA                                   | 3750 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |
| <b>TLP2466</b>                  |                   | <b>SO8</b><br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)                          | 40 ns                        | Totem pole output<br>(Inverter logic) | 3.5 mA                                   | 3750 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |
| <b>TLP2766</b>                  |                   | <b>SDIP6</b><br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)                        | 40 ns                        | Totem pole output<br>(Inverter logic) | 3.5 mA                                   | 5000 Vrms       | ○/○                             |                  | ○                |     |     |
| <b>TLP118</b>                   |                   | <b>SO6</b><br>High speed: 20 Mbit/s<br>V <sub>CC</sub> = 5 V<br>T <sub>opr</sub> = 125°C (max)       | 60 ns                        | Open-collector<br>(Inverter logic)    | 5 mA                                     | 3750 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |
| <b>TLP2418</b>                  |                   | <b>SO8</b><br>High speed: 15 Mbit/s<br>V <sub>CC</sub> = 5 V<br>T <sub>opr</sub> = 125°C (max)       | 75 ns                        | Open-collector<br>(Inverter logic)    | 5 mA                                     | 3750 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |
| <b>TLP2118E</b>                 |                   | <b>SO8</b><br>High speed: 15 Mbit/s<br>V <sub>CC</sub> = 5 V<br>Dual-channel version                 | 75 ns                        | Open-collector<br>(Inverter logic)    | 5 mA                                     | 2500 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |
| <b>TLP708</b><br><b>TLP708F</b> |                   | <b>SDIP6</b><br>High speed: 15 Mbit/s<br>V <sub>CC</sub> = 5 V<br>T <sub>opr</sub> = 125°C (max)     | 75 ns                        | Open-collector<br>(Inverter logic)    | 5 mA                                     | 5000 Vrms       | ○/○                             |                  | ○                |     |     |
| <b>TLP2368</b>                  |                   | <b>SO6</b><br>High speed: 20 Mbit/s<br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max) | 60 ns                        | Open-collector<br>(Inverter logic)    | 5 mA                                     | 3750 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

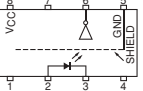
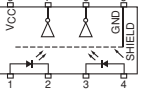
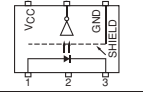
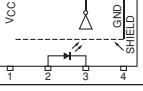
TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

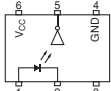
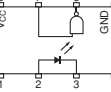
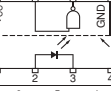
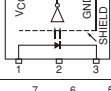
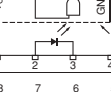
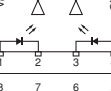
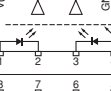
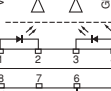
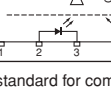
For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## Photocouplers for Logic Signal Transmission at 15 to 20 Mbit/s (Typ.) (Continued)

| Part Number         | Pin Configuration                                                                 | Features                                                                                                                     | Propagation Delay Time (Max) | Output Form                     | I <sub>FHL</sub> /I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |                  |     |     |
|---------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------|------------------------------------------|-----------------|---------------------------------|-----|------------------|-----|-----|
|                     |                                                                                   |                                                                                                                              |                              |                                 |                                          |                 | UL/cUL                          | TÜV | VDE              | BSI | IEC |
| TLP2468             |  | <b>SO8</b><br>High speed: 20 Mbit/s<br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)                         | 60 ns                        | Open-collector (Inverter logic) | 5 mA                                     | 3750 Vrms       | ○/○                             |     | ○ <sup>(1)</sup> |     |     |
| TLP2168             |  | <b>SO8</b><br>High speed: 20 Mbit/s<br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)<br>Dual-channel version | 60 ns                        | Open-collector (Inverter logic) | 5 mA                                     | 2500 Vrms       | ○/○                             |     | ○ <sup>(1)</sup> |     |     |
| TLP2768             |  | <b>SDIP6</b><br>High speed: 20 Mbit/s<br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)                       | 60 ns                        | Open-collector (Inverter logic) | 5 mA                                     | 5000 Vrms       | ○/○                             |     | ○                |     |     |
| TLP2962<br>TLP2962F |  | <b>DIP8</b><br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)                                                 | 75 ns                        | Open-collector                  | 5 mA                                     | 5000 Vrms       | △/△                             |     | △                |     |     |

## Photocouplers for Logic Signal Transmission at 10 Mbit/s (Typ.)

| Part Number         | Pin Configuration                                                                   | Features                                                                                 | Propagation Delay Time (Max)        | Output Form    | I <sub>FHL</sub> /I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |                  |     |     |
|---------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------|----------------|------------------------------------------|-----------------|---------------------------------|-----|------------------|-----|-----|
|                     |                                                                                     |                                                                                          |                                     |                |                                          |                 | UL/cUL                          | TÜV | VDE              | BSI | IEC |
| TLP513              |   | <b>DIP6</b><br>6-pin package version of the TLP552<br>V <sub>CC</sub> = 5 V              | 120 ns<br>(T <sub>opr</sub> = 25°C) | Open-collector | 5 mA                                     | 2500 Vrms       | ○/                              |     |                  |     |     |
| TLP552              |  | <b>DIP8</b><br>Logic output<br>V <sub>CC</sub> = 5 V                                     | 120 ns<br>(T <sub>opr</sub> = 25°C) | Open-collector | 5 mA                                     | 2500 Vrms       | ○/                              |     |                  |     |     |
| TLP554              |  | <b>DIP8</b><br>High CMR version of the TLP552<br>V <sub>CC</sub> = 5 V                   | 120 ns<br>(T <sub>opr</sub> = 25°C) | Open-collector | 5 mA                                     | 2500 Vrms       | ○/○                             |     | ○                |     |     |
| TLP2362             |  | <b>SO6</b><br>V <sub>CC</sub> = 3 to 20 V<br>T <sub>opr</sub> = 125°C (max)              | 250 ns                              | Open-collector | 5 mA                                     | 3750 Vrms       | ○/○                             |     | ○ <sup>(1)</sup> |     |     |
| TLP2601             |  | <b>DIP8</b><br>High CMR<br>V <sub>CC</sub> = 5 V                                         | 75 ns<br>(T <sub>opr</sub> = 25°C)  | Open-collector | 5 mA                                     | 2500 Vrms       | ○/○                             |     |                  |     |     |
| TLP2630             |  | <b>DIP8</b><br>Dual-channel version of the 6N137 and the TLP552<br>V <sub>CC</sub> = 5 V | 75 ns<br>(T <sub>opr</sub> = 25°C)  | Open-collector | 5 mA                                     | 2500 Vrms       | ○/○                             |     |                  |     |     |
| TLP2631             |  | <b>DIP8</b><br>High CMR<br>Dual-channel version of the TLP554<br>V <sub>CC</sub> = 5 V   | 75 ns<br>(T <sub>opr</sub> = 25°C)  | Open-collector | 5 mA                                     | 2500 Vrms       | ○/○                             |     |                  |     |     |
| TLP2662<br>TLP2662F |  | <b>DIP8</b><br>V <sub>CC</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 125°C (max)             | 75 ns                               | Open-collector | 5 mA                                     | 5000 Vrms       | △/△                             |     | △                |     |     |
| TLPN137             |  | <b>DIP8</b><br>High speed                                                                | 75 ns                               | Open-collector | 5 mA                                     | 5000 Vrms       | △/△                             |     | △                | △   | △   |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN60747-5-5- approved with option V4 or D4

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## Photocouplers for Logic Signal Transmission at 5 Mbit/s (Typ.)

| Part Number                     | Pin Configuration | Features                                                                                  | Propagation Delay Time (Max)        | Output Form                           | I <sub>FHL</sub> /I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|---------------------------------|-------------------|-------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------|------------------------------------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|                                 |                   |                                                                                           |                                     |                                       |                                          |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| <b>TLP105</b>                   |                   | <b>MFSOP6</b><br>V <sub>CC</sub> = 4.5 to 20 V<br>IPM drive                               | 250 ns                              | Totem pole output<br>(Buffer logic)   | 1.6 mA                                   | 3750 Vrms       | ○ / ○                           | ○ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP108</b>                   |                   | <b>MFSOP6</b><br>V <sub>CC</sub> = 4.5 to 20 V<br>IPM drive                               | 250 ns                              | Totem pole output<br>(Inverter logic) | 1.6 mA                                   | 3750 Vrms       | ○ / ○                           | ○ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP555</b>                   |                   | <b>DIP8</b><br>Low input current<br>V <sub>CC</sub> = 4.5 to 20 V                         | 400 ns<br>(T <sub>opr</sub> = 25°C) | 3-state<br>(Buffer logic)             | 1.6 mA                                   | 2500 Vrms       | ○ / ○                           |                  |                  |     |     |
| <b>TLP558</b>                   |                   | <b>DIP8</b><br>Inverting logic version of the TLP555<br>V <sub>CC</sub> = 4.5 to 20 V     | 400 ns<br>(T <sub>opr</sub> = 25°C) | 3-state<br>(Inverter logic)           | 1.6 mA                                   | 2500 Vrms       | ○ / ○                           |                  |                  |     |     |
| <b>TLP715</b><br><b>TLP715F</b> |                   | <b>SDIP6</b><br>IPM drive<br>High CMR<br>V <sub>CC</sub> = 4.5 to 20 V                    | 250 ns                              | Totem pole output<br>(Buffer logic)   | 3 mA                                     | 5000 Vrms       | ○ / ○                           | ○                | ○                |     |     |
| <b>TLP718</b><br><b>TLP718F</b> |                   | <b>SDIP6</b><br>IPM drive<br>High CMR<br>V <sub>CC</sub> = 4.5 to 20 V                    | 250 ns                              | Totem pole output<br>(Inverter logic) | 3 mA                                     | 5000 Vrms       | ○ / ○                           | ○                | ○                |     |     |
| <b>TLP2095</b>                  |                   | <b>MFSOP6</b><br>Dual polarity input version of the TLP105<br>V <sub>CC</sub> = 3 to 20 V | 250 ns                              | Totem pole output<br>(Buffer logic)   | 3 mA                                     | 3750 Vrms       | ○ / ○                           |                  | ○ <sup>(1)</sup> |     |     |
| <b>TLP2098</b>                  |                   | <b>MFSOP6</b><br>Dual polarity input version of the TLP108<br>V <sub>CC</sub> = 3 to 20 V | 250 ns                              | Totem pole output<br>(Inverter logic) | 3 mA                                     | 3750 Vrms       | ○ / ○                           |                  | ○ <sup>(1)</sup> |     |     |
| <b>TLP2105</b>                  |                   | <b>SO8</b><br>Dual-channel version for the TLP105<br>V <sub>CC</sub> = 4.5 to 20 V        | 250 ns                              | Totem pole output<br>(Buffer logic)   | 1.6 mA                                   | 2500 Vrms       | ○ / ○                           | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP2108</b>                  |                   | <b>SO8</b><br>Dual-channel version for the TLP108<br>V <sub>CC</sub> = 4.5 to 20 V        | 250 ns                              | Totem pole output<br>(Inverter logic) | 1.6 mA                                   | 2500 Vrms       | ○ / ○                           | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP2200</b>                  |                   | <b>DIP8</b><br>Low input current<br>V <sub>CC</sub> = 4.5 to 20 V                         | 400 ns                              | 3-state<br>(Buffer logic)             | 1.6 mA                                   | 2500 Vrms       | ○ / ○                           |                  |                  |     |     |
| <b>TLP2355</b>                  |                   | <b>SO6</b><br>V <sub>CC</sub> = 3 to 20 V<br>T <sub>opr</sub> = 125°C (max)               | 250 ns                              | Totem pole output<br>(Buffer logic)   | 1.6 mA                                   | 3750 Vrms       | △ / △                           |                  | △ <sup>(1)</sup> |     |     |
| <b>TLP2358</b>                  |                   | <b>SO6</b><br>V <sub>CC</sub> = 3 to 20 V<br>T <sub>opr</sub> = 125°C (max)               | 250 ns                              | Totem pole output<br>(Inverter logic) | 1.6 mA                                   | 3750 Vrms       | △ / △                           |                  | △ <sup>(1)</sup> |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

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EN 60747-5-2- or EN60747-5-5- approved with option V4 or D4

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# 4 Selection Guide

## Photocouplers for Logic Signal Transmission at 5 Mbit/s (Typ.) (Continued)

| Part Number                       | Pin Configuration | Features                                                                                         | Propagation Delay Time (Max) | Output Form                           | I <sub>FHL</sub> , I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |                  |     |     |
|-----------------------------------|-------------------|--------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------|-------------------------------------------|-----------------|---------------------------------|-----|------------------|-----|-----|
|                                   |                   |                                                                                                  |                              |                                       |                                           |                 | UL/cUL                          | TÜV | VDE              | BSI | IEC |
| <b>TLP2405</b>                    |                   | <b>SO8</b><br>High speed: 5 Mbit/s<br>V <sub>CC</sub> = 4.5 to 20 V                              | 250 ns                       | Totem pole output<br>(Buffer logic)   | 1.6 mA                                    | 3750 Vrms       | ○ / ○                           |     | ○ <sup>(1)</sup> |     |     |
| <b>TLP2408</b>                    |                   | <b>SO8</b><br>High speed: 5 Mbit/s<br>V <sub>CC</sub> = 4.5 to 20 V                              | 250 ns                       | Totem pole output<br>(Inverter logic) | 1.6 mA                                    | 3750 Vrms       | ○ / ○                           |     | ○ <sup>(1)</sup> |     |     |
| <b>TLP2955</b><br><b>TLP2955F</b> |                   | <b>DIP8</b><br>V <sub>CC</sub> = 3 to 20 V<br>T <sub>opr</sub> = 125°C(max)<br>Low input current | 250 ns                       | Totem pole output<br>(Buffer logic)   | 1.6 mA                                    | 5000 Vrms       | △ / △                           |     | △                |     |     |
| <b>TLP2958</b><br><b>TLP2958F</b> |                   | <b>DIP8</b><br>V <sub>CC</sub> = 3 to 20 V<br>T <sub>opr</sub> = 125°C(max)<br>Low input current | 250 ns                       | Totem pole output<br>(Inverter logic) | 1.6 mA                                    | 5000 Vrms       | △ / △                           |     | △                |     |     |

## Photocouplers for Logic Signal Transmission at 1 Mbit/s (Typ.)

| Part Number   | Pin Configuration | Features                                           | Data Rate (NRZ) (Typ.) | CTR                               | @I <sub>F</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|---------------|-------------------|----------------------------------------------------|------------------------|-----------------------------------|-----------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|               |                   |                                                    |                        |                                   |                 |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| <b>TLP109</b> |                   | <b>SO6</b>                                         | 1 Mbit/s               | 20% (min)                         | 16 mA           | 3750 Vrms       | ○ / ○                           | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP512</b> |                   | <b>DIP6</b><br>6-pin package version of the TLP550 | 1 Mbit/s               | 20% (min)                         | 16 mA           | 2500 Vrms       | ○ /                             |                  |                  |     |     |
| <b>TLP550</b> |                   | <b>DIP8</b><br>High CMR                            | 1 Mbit/s               | 10% (min)<br>(19% min for rank 0) | 16 mA           | 2500 Vrms       | ○ / ○                           |                  |                  |     |     |
| <b>TLP551</b> |                   | <b>DIP8</b><br>Internal base connection            | 1 Mbit/s               | 10% (min)<br>(19% min for rank 0) | 16 mA           | 2500 Vrms       | ○ / ○                           |                  |                  |     |     |
| <b>TLP553</b> |                   | <b>DIP8</b><br>Low input drive current             | 300 kbit/s             | 400% (min)                        | 0.5 mA          | 2500 Vrms       | ○ /                             |                  |                  |     |     |
| <b>TLP559</b> |                   | <b>DIP8</b><br>High CMR version of the TLP550      | 1 Mbit/s               | 20% (min)                         | 16 mA           | 2500 Vrms       | ○ / ○                           |                  |                  |     |     |
| <b>TLP651</b> |                   | <b>DIP8</b><br>Internal base connection            | 1 Mbit/s               | 10% (min)<br>(19% min for rank 0) | 16 mA           | 5000 Vrms       | ○ / ○                           |                  |                  |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

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EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

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## Photocouplers for Logic Signal Transmission at 1 Mbit/s (Typ.) (Continued)

| Part Number                     | Pin Configuration | Features                                                                     | Data Rate<br>(NRZ) (Typ.) | CTR                               | @IF    | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |                  |     |     |
|---------------------------------|-------------------|------------------------------------------------------------------------------|---------------------------|-----------------------------------|--------|-----------------|---------------------------------|-----|------------------|-----|-----|
|                                 |                   |                                                                              |                           |                                   |        |                 | UL/cUL                          | TÜV | VDE              | BSI | IEC |
| <b>TLP719</b><br><b>TLP719F</b> |                   | <b>SDIP6</b><br>High CMR                                                     | 1 Mbit/s                  | 20% (min)                         | 16 mA  | 5000 Vrms       | ○/○                             | ○   | ○                |     |     |
| <b>TLP750</b><br><b>TLP750F</b> |                   | <b>DIP8</b><br>High CMR<br>SEMKO-approved                                    | 1 Mbit/s                  | 10% (min)<br>(19% min for rank 0) | 16 mA  | 5000 Vrms       | ○/○                             | △   | ○                | ◎   | △   |
| <b>TLP751</b><br><b>TLP751F</b> |                   | <b>DIP8</b><br>Internal base connection<br>SEMKO-approved                    | 1 Mbit/s                  | 10% (min)                         | 16 mA  | 5000 Vrms       | ○/○                             | △   | ○                | ◎   | △   |
| <b>TLP759</b><br><b>TLP759F</b> |                   | <b>DIP8</b><br>IEC60950-compliant version<br>of the TLP559<br>SEMKO-approved | 1 Mbit/s                  | 20% (min)                         | 16 mA  | 5000 Vrms       | ○/○                             | ○   | ○                | ◎   | △   |
| <b>TLP2309</b>                  |                   | <b>SO6</b><br>V <sub>cc</sub> = 3.3 V/5 V<br>T <sub>opr</sub> = 110°C (max)  | 1 Mbit/s                  | 15% (min)                         | 10 mA  | 3750 Vrms       | ○/○                             |     | ○ <sup>(1)</sup> |     |     |
| <b>TLP2403</b>                  |                   | <b>SO8</b><br>Low input drive current                                        | 300 kbit/s                | 400% (min)                        | 0.5 mA | 3750 Vrms       | ○/○                             |     | ○ <sup>(1)</sup> |     |     |
| <b>TLP2409</b>                  |                   | <b>SO8</b><br>V <sub>cc</sub> = Up to 30 V<br>T <sub>opr</sub> = 125°C (max) | 1 Mbit/s                  | 20% (min)                         | 16 mA  | 3750 Vrms       | ○/○                             |     | ○ <sup>(1)</sup> |     |     |
| <b>TLP2530</b>                  |                   | <b>DIP8</b><br>Dual-channel version of<br>the 6N135 and the<br>TLP550        | 1 Mbit/s                  | 7% (min)                          | 16 mA  | 2500 Vrms       | ○/○                             |     |                  |     |     |
| <b>TLP2531</b>                  |                   | <b>DIP8</b><br>Dual-channel version of<br>the 6N136 and the<br>TLP550        | 1 Mbit/s                  | 19% (min)                         | 16 mA  | 2500 Vrms       | ○/○                             |     |                  |     |     |

## IPM-Drive Photocouplers

| Part Number    | Pin Configuration | Features                                                                     | Propagation<br>Delay Time (Max)                        | Output Form    | I <sub>FHL</sub> , I <sub>FLH</sub><br>(Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |                  |     |     |
|----------------|-------------------|------------------------------------------------------------------------------|--------------------------------------------------------|----------------|----------------------------------------------|-----------------|---------------------------------|-----|------------------|-----|-----|
|                |                   |                                                                              |                                                        |                |                                              |                 | UL/cUL                          | TÜV | VDE              | BSI | IEC |
| <b>TLP104</b>  |                   | <b>SO6</b><br>V <sub>cc</sub> = Up to 30 V<br>T <sub>opr</sub> = 125°C (max) | tp <sub>HL</sub> = 400 ns<br>tp <sub>LH</sub> = 550 ns | Open-collector | 5 mA                                         | 3750 Vrms       | ○/○                             |     | ○ <sup>(1)</sup> |     |     |
| <b>TLP2404</b> |                   | <b>SO8</b><br>V <sub>cc</sub> = Up to 30 V<br>T <sub>opr</sub> = 125°C (max) | tp <sub>HL</sub> = 400 ns<br>tp <sub>LH</sub> = 550 ns | Open-collector | 5 mA                                         | 3750 Vrms       | ○/○                             |     | ○ <sup>(1)</sup> |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

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EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

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# 4 Selection Guide

## IPM-Drive Photocouplers (Continued)

| Part Number                               | Pin Configuration | Features                                                                       | Propagation Delay Time (Max)                           | Output Form/CTR                                                       | I <sub>FHL</sub> , I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|-------------------------------------------|-------------------|--------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|                                           |                   |                                                                                |                                                        |                                                                       |                                           |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| <b>TLP714</b><br><b>TLP714F</b>           |                   | <b>SDIP6</b><br>V <sub>cc</sub> = Up to 30 V<br>T <sub>opr</sub> = 125°C (max) | t <sub>pHL</sub> = 400 ns<br>t <sub>pLH</sub> = 550 ns | Open-collector                                                        | 5 mA                                      | 5000 Vrms       | ○/○                             |                  | ○                |     |     |
| <b>TLP754</b><br><b>TLP754F</b>           |                   | <b>DIP8</b><br>V <sub>cc</sub> = Up to 30 V<br>T <sub>opr</sub> = 125°C (max)  | t <sub>pHL</sub> = 400 ns<br>t <sub>pLH</sub> = 550 ns | Open-collector                                                        | 5 mA                                      | 5000 Vrms       | △/△                             |                  | △                |     |     |
| <b>TLP109(IGM)</b>                        |                   | <b>SO6</b><br>V <sub>cc</sub> = Up to 30 V                                     | 800 ns<br>(T <sub>opr</sub> = 25°C)                    | Open-collector<br>CTR = 25% (min)<br>@I <sub>F</sub> = 10 mA,<br>25°C | —                                         | 3750 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP559(IGM)</b>                        |                   | <b>DIP8</b><br>V <sub>cc</sub> = Up to 30 V                                    | 800 ns<br>(T <sub>opr</sub> = 25°C)                    | Open-collector<br>CTR = 25% (min)<br>@I <sub>F</sub> = 10 mA,<br>25°C | —                                         | 2500 Vrms       | ○/○                             |                  |                  |     |     |
| <b>TLP759(IGM)</b><br><b>TLP759F(IGM)</b> |                   | <b>DIP8</b><br>V <sub>cc</sub> = Up to 30 V                                    | 800 ns<br>(T <sub>opr</sub> = 25°C)                    | Open-collector<br>CTR = 25% (min)<br>@I <sub>F</sub> = 10 mA,<br>25°C | —                                         | 5000 Vrms       | ○/○                             | ○                | ○                | ◎   | △   |

## JEDEC-Compliant Photocouplers

| Part Number  | Pin Configuration | Features                    | Data Rate (NRZ) (Typ.) | CTR         | I <sub>FHL</sub> , I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |     |     |     |
|--------------|-------------------|-----------------------------|------------------------|-------------|-------------------------------------------|-----------------|---------------------------------|-----|-----|-----|-----|
|              |                   |                             |                        |             |                                           |                 | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>6N135</b> |                   | JEDEC-compliant             | 1 Mbit/s               | 7% (min)    | 16 mA                                     | 2500 Vrms       | ○/                              |     |     |     |     |
| <b>6N136</b> |                   | JEDEC-compliant             | 1 Mbit/s               | 19% (min)   | 16 mA                                     | 2500 Vrms       | ○/                              |     |     |     |     |
| <b>6N137</b> |                   | JEDEC-compliant             | 10 Mbit/s              | 700% (typ.) | 5 mA                                      | 2500 Vrms       | ○/                              |     |     |     |     |
| <b>6N138</b> |                   | JEDEC-compliant<br>High CTR | 300 kbit/s             | 300% (min)  | 1.6 mA                                    | 2500 Vrms       | ○/                              |     |     |     |     |
| <b>6N139</b> |                   | JEDEC-compliant<br>High CTR | 300 kbit/s             | 400% (min)  | 0.5 mA                                    | 2500 Vrms       | ○/                              |     |     |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

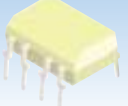
BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

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### 3 Photocouplers for IGBT/MOSFET Gate Drive

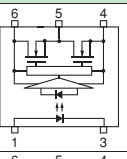
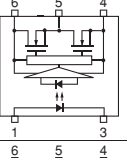
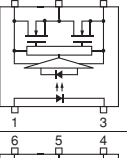
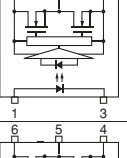
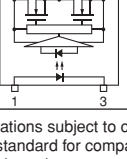
| Package<br>Output Peak Current |  |  |  |  |
|--------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                | SDIP6                                                                             | DIP8                                                                              | SO6                                                                                 | SO8                                                                                 |
| ± 0.25 A                       |                                                                                   | TLP557                                                                            |                                                                                     |                                                                                     |
| ± 0.45 A (max)                 | TLP705**                                                                          |                                                                                   |                                                                                     |                                                                                     |
| ± 0.6 A (max)                  | TLP701, TLP701A<br>TLP701H, TLP705A                                               | TLP351, TLP351A<br>TLP351H                                                        | TLP151, TLP151A<br>TLP155, TLP155E                                                  | TLP2451<br>TLP2451A                                                                 |
| ± 2.0 A (max)                  | TLP700                                                                            |                                                                                   |                                                                                     |                                                                                     |
| ± 2.5 A (max)                  | TLP700A<br>TLP700H                                                                | TLP350, TLP350H<br>TLP352                                                         | TLP152*                                                                             |                                                                                     |
| ± 6.0 A (max)                  |                                                                                   | TLP358<br>TLP358H                                                                 |                                                                                     |                                                                                     |

\*Under development as of July 2012. For the latest information, please contact your nearest Toshiba sales representative.

TLPxxxH: Guaranteed up to a Ta of 125°C

\*\* The TLP705A is recommended for new designs.

### Photocouplers for IGBT/MOSFET Gate Drive

| Part Number | Pin Configuration                                                                   | Features                                                                      | Propagation Delay Time (Max) | Peak Output Current | IFLH (Max) | BVs       | Safety Standards <sup>(2)</sup> |     |                  |     |     |
|-------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------|---------------------|------------|-----------|---------------------------------|-----|------------------|-----|-----|
|             |                                                                                     |                                                                               |                              |                     |            |           | UL/cUL                          | TÜV | VDE              | BSI | IEC |
| TLP151      |  | SO6<br>Vcc = 10 to 30 V<br>Icc = 2 mA (max)<br>T <sub>opr</sub> = 110°C (max) | 0.7 µs                       | ±0.6 A (max)        | 5 mA       | 3750 Vrms | ○ / ○                           |     | ○ <sup>(1)</sup> |     |     |
| TLP151A     |  | SO6<br>Vcc = 10 to 30 V<br>Icc = 2 mA (max)<br>T <sub>opr</sub> = 110°C (max) | 0.5 µs                       | ±0.6 A (max)        | 5 mA       | 3750 Vrms | ○ / ○                           |     | △ <sup>(1)</sup> |     |     |
| TLP152*     |  | SO6<br>Vcc = 10 to 30 V<br>Icc = 3 mA (max)<br>T <sub>opr</sub> = 100°C (max) | 0.2 µs                       | ±2.5 A (max)        | 7.5 mA     | 3750 Vrms | △ / △                           |     | △ <sup>(1)</sup> |     |     |
| TLP155      |  | SO6<br>Vcc = 10 to 30 V<br>Icc = 3 mA (max)<br>T <sub>opr</sub> = 100°C (max) | 0.2 µs                       | ±0.6 A (max)        | 7.5 mA     | 3750 Vrms | △ / △                           |     | △ <sup>(1)</sup> |     |     |
| TLP155E     |  | SO6<br>Vcc = 10 to 30 V<br>Icc = 3 mA (max)<br>T <sub>opr</sub> = 100°C (max) | 0.2 µs                       | ±0.6 A (max)        | 7.5 mA     | 3750 Vrms | ○ / ○                           |     | ○ <sup>(1)</sup> |     |     |

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

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# 4 Selection Guide

## Photocouplers for IGBT/MOSFET Gate Drive

| Part Number                       | Pin Configuration | Features                                                                                                      | Propagation Delay Time (Max) | Peak output Current | I <sub>FLH</sub> (Max) | BV <sub>s</sub>       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-----------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------|------------------------------|---------------------|------------------------|-----------------------|---------------------------------|-----|-----|-----|-----|
|                                   |                   |                                                                                                               |                              |                     |                        |                       | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>TLP350</b><br><b>TLP350F</b>   |                   | <b>DIP8</b><br>V <sub>CC</sub> = 15 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 100°C (max) | 0.5 μs                       | ±2.5 A (max)        | 5 mA                   | 3750 V <sub>rms</sub> | ○/○                             | ○   | ○   |     |     |
| <b>TLP350H</b><br><b>TLP350HF</b> |                   | <b>DIP8</b><br>V <sub>CC</sub> = 15 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 125°C (max) | 0.5 μs                       | ±2.5 A (max)        | 5 mA                   | 3750 V <sub>rms</sub> | ○/○                             |     | ○   |     |     |
| <b>TLP351</b><br><b>TLP351F</b>   |                   | <b>DIP8</b><br>V <sub>CC</sub> = 10 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 100°C (max) | 0.7 μs                       | ±0.6 A (max)        | 5 mA                   | 3750 V <sub>rms</sub> | ○/○                             | ○   | ○   |     |     |
| <b>TLP351A</b><br><b>TLP351AF</b> |                   | <b>DIP8</b><br>V <sub>CC</sub> = 10 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 100°C (max) | 0.5 μs                       | ±0.6 A (max)        | 5 mA                   | 3750 V <sub>rms</sub> | ○/○                             |     | △   |     |     |
| <b>TLP351H</b><br><b>TLP351HF</b> |                   | <b>DIP8</b><br>V <sub>CC</sub> = 10 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 125°C (max) | 0.7 μs                       | ±0.6 A (max)        | 5 mA                   | 3750 V <sub>rms</sub> | ○/○                             |     | ○   |     |     |
| <b>TLP352</b><br><b>TLP352F</b>   |                   | <b>DIP8</b><br>V <sub>CC</sub> = 15 to 30 V<br>I <sub>CC</sub> = 3 mA (max)<br>T <sub>opr</sub> = 125°C (max) | 0.2 μs                       | ±2.5 A (max)        | 5 mA                   | 3750 V <sub>rms</sub> | ○/○                             |     | △   |     |     |
| <b>TLP358</b><br><b>TLP358F</b>   |                   | <b>DIP8</b><br>V <sub>CC</sub> = 15 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 100°C (max) | 0.5 μs                       | ±6.0 A (max)        | 5 mA                   | 3750 V <sub>rms</sub> | ○/○                             | ○   | ○   |     |     |

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

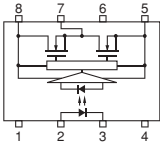
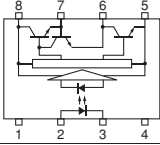
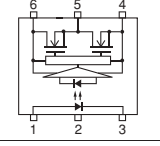
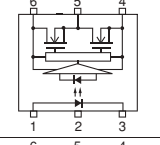
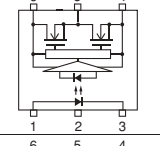
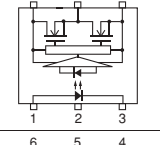
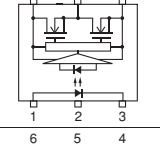
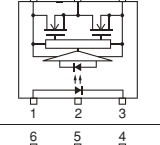
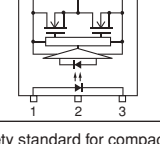
TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.



## Photocouplers for IGBT/MOSFET Gate Drive (Continued)

| Part Number                         | Pin Configuration                                                                   | Features                                                                                                                               | Propagation Delay Time (Max) | Peak output Current              | I <sub>FLH</sub> (Max) | BV <sub>s</sub>       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------|------------------------|-----------------------|---------------------------------|-----|-----|-----|-----|
|                                     |                                                                                     |                                                                                                                                        |                              |                                  |                        |                       | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>TLP358H</b><br><b>TLP358HF</b>   |    | <b>DIP8</b><br>V <sub>CC</sub> = 15 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 125°C (max)                          | 0.5 μs                       | ±6.0 A (max)                     | 5 mA                   | 3750 V <sub>rms</sub> | ○ / ○                           | ○   | ○   |     |     |
| <b>TLP557</b>                       |    | <b>DIP8</b><br>Direct drive of a power transistor                                                                                      | 5 μs                         | Constant current output : 0.25 A | 5 mA                   | 2500 V <sub>rms</sub> | ○ / ○                           |     |     |     |     |
| <b>TLP700</b><br><b>TLP700F</b>     |    | <b>SDIP6</b><br>V <sub>CC</sub> = 15 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 100°C (max)                         | 0.5 μs                       | ±2.0 A (max)                     | 5 mA                   | 5000 V <sub>rms</sub> | ○ / ○                           | ○   | ○   |     |     |
| <b>TLP700A</b><br><b>TLP700AF</b>   |   | <b>SDIP6</b><br>V <sub>CC</sub> = 15 to 30 V<br>I <sub>CC</sub> = 3 mA (max)<br>T <sub>opr</sub> = 110°C (max)                         | 0.2 μs                       | ±2.5 A (max)                     | 5 mA                   | 5000 V <sub>rms</sub> | △ / △                           |     | △   |     |     |
| <b>TLP700H</b><br><b>TLP700HF</b>   |  | <b>SDIP6</b><br>V <sub>CC</sub> = 15 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 125°C (max)                         | 0.5 μs                       | ±2.5 A (max)                     | 5 mA                   | 5000 V <sub>rms</sub> | ○ / ○                           |     | ○   |     |     |
| <b>TLP701</b><br><b>TLP701F</b>     |  | <b>SDIP6</b><br>V <sub>CC</sub> = 10 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 100°C (max)                         | 0.7 μs                       | ±0.6 A (max)                     | 5 mA                   | 5000 V <sub>rms</sub> | ○ / ○                           | ○   | ○   |     |     |
| <b>TLP701A</b><br><b>TLP701AF</b>   |  | <b>SDIP6</b><br>V <sub>CC</sub> = 10 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 100°C (max)                         | 0.5 μs                       | ±0.6 A (max)                     | 5 mA                   | 5000 V <sub>rms</sub> | ○ / ○                           |     | ○   |     |     |
| <b>TLP701H</b><br><b>TLP701HF</b>   |  | <b>SDIP6</b><br>V <sub>CC</sub> = 10 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 125°C (max)                         | 0.7 μs                       | ±0.6 A (max)                     | 5 mA                   | 5000 V <sub>rms</sub> | ○ / ○                           |     | ○   |     |     |
| <b>TLP705**</b><br><b>TLP705F**</b> |  | <b>SDIP6</b><br>V <sub>CC</sub> = 10 to 20 V<br>I <sub>CC</sub> = 3 mA (max)<br>T <sub>opr</sub> = 100°C (max)<br>High speed (250 kHz) | 0.2 μs                       | ±0.45 A (max)                    | 8 mA                   | 5000 V <sub>rms</sub> | ○ / ○                           | ○   | ○   |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

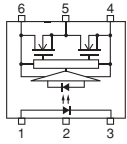
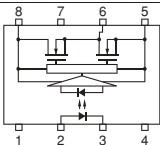
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

\*\* The TLP705A or TLP705AF is recommended for new designs.

# 4 Selection Guide

## Photocouplers for IGBT/MOSFET Gate Drive (Continued)

| Part Number                       | Pin Configuration                                                                 | Features                                                                                                                               | Propagation Delay Time (Max) | Peak Output Current | I <sub>FLH</sub> (Max) | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |                  |     |     |
|-----------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------|------------------------|-----------------|---------------------------------|-----|------------------|-----|-----|
|                                   |                                                                                   |                                                                                                                                        |                              |                     |                        |                 | UL/cUL                          | TÜV | VDE              | BSI | IEC |
| <b>TLP705A</b><br><b>TLP705AF</b> |  | <b>SDIP6</b><br>V <sub>CC</sub> = 10 to 30 V<br>I <sub>CC</sub> = 3 mA (max)<br>T <sub>opr</sub> = 100°C (max)<br>High speed (250 kHz) | 0.2 µs                       | ±0.6 A (max)        | 7.5 mA                 | 5000 Vrms       | ○ / ○                           |     | ○                |     |     |
| <b>TLP2451</b>                    |  | <b>SO8</b><br>V <sub>CC</sub> = 10 to 30 V<br>I <sub>CC</sub> = 2 mA (max)<br>T <sub>opr</sub> = 125°C (max)                           | 0.7 µs                       | ±0.6 A (max)        | 5 mA                   | 3750 Vrms       | ○ / ○                           |     | ○ <sup>(1)</sup> |     |     |
| <b>TLP2451A</b>                   |                                                                                   |                                                                                                                                        | 0.5 µs                       |                     |                        |                 |                                 |     |                  |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation)    ◎: Approved (reinforced insulation)    △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved    △: Design which meets safety standard/approval pending as of July 2012  
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

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## 4 Photorelays (1-Form-A and 2-Form-A)

| Package                     |                                        |                            |  |  |  |  |  |  |  |  |  |
|-----------------------------|----------------------------------------|----------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Features                    |                                        |                            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Off-State Voltage (max) (V) | On-State Resistance (max) ( $\Omega$ ) | On-State Current (max) (A) | USOP4                                                                             | SSOP4                                                                             | SO6                                                                               | 2.54SOP4                                                                          | 2.54SOP6                                                                          | 2.54SOP8                                                                            | DIP4                                                                                | DIP6                                                                                | DIP8                                                                                |
| 20                          | 8                                      | 0.16                       | TLP3330                                                                           | TLP3230                                                                           |                                                                                   | TLP3130                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 5                                      | 0.2                        | TLP3350                                                                           | TLP3250                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 1.2                                    | 0.3                        |                                                                                   |                                                                                   |                                                                                   | TLP3131                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 1.2                                    | 0.45                       | TLP3331                                                                           | TLP3231                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.22                                   | 0.9                        | TLP3303                                                                           | TLP3203                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.075                                  | 3                          |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP3553                                                                             |                                                                                     |                                                                                     |
|                             | 0.05                                   | 2.5                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP3100                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 40                          | 0.05                                   | 4                          |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | TLP3543                                                                             |                                                                                     |
|                             | 20                                     | 0.1                        | TLP3342                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 15                                     | 0.12                       | TLP3316                                                                           | TLP3216                                                                           |                                                                                   | TLP3116                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 14                                     | 0.12                       | TLP3340                                                                           | TLP3240                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 10                                     | 0.14                       | TLP3341                                                                           | TLP3241                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 3                                      | 0.25                       | TLP3314                                                                           | TLP3214                                                                           |                                                                                   | TLP3114                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 1.5                                    | 0.3                        | TLP3315                                                                           | TLP3215                                                                           |                                                                                   | TLP3115                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.13                                   | 1                          |                                                                                   |                                                                                   |                                                                                   | TLP3123                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.11                                   | 2.5                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP3554                                                                             |                                                                                     |                                                                                     |
|                             | 0.06                                   | 2.5                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP3102                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 50                          | 0.06                                   | 3.5                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | TLP3544                                                                             |                                                                                     |
|                             | 1.5                                    | 0.3                        | TLP3375                                                                           | TLP3275                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 50                                     | 0.07                       |                                                                                   |                                                                                   | TLP173A <sup>†</sup>                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 50                                     | 0.1                        |                                                                                   |                                                                                   | TLP175A*                                                                          |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 15                                     | 0.12                       | TLP3351                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 2                                      | 0.4                        |                                                                                   |                                                                                   |                                                                                   | TLP170A<br>TLP171A<br>TLP172A<br>TLP176A                                          | TLP192A<br>TLP197A                                                                | TLP202A*<br>TLP206A*                                                                |                                                                                     |                                                                                     |                                                                                     |
|                             | 2                                      | 0.5                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP220A<br>TLP222A<br>TLP227A                                                       | TLP598AA<br>TLP592A<br>TLP597A                                                      | TLP222A-2*<br>TLP227A-2*                                                            |
|                             | 1.5                                    | 0.4                        |                                                                                   | TLP3212                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 1.2                                    | 0.35                       |                                                                                   |                                                                                   |                                                                                   | TLP3110                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 1.1                                    | 0.5                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP225A                                                                             |                                                                                     |                                                                                     |
| 60                          | 1.5                                    | 0.4                        | TLP3312                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.7                                    | 1                          |                                                                                   |                                                                                   |                                                                                   | TLP3122                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.2                                    | 1.5                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP221A<br>TLP3555                                                                  |                                                                                     |                                                                                     |
|                             | 0.17                                   | 2                          |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.1                                    | 2.5                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | TLP3542                                                                             |                                                                                     |
|                             | 0.07                                   | 2.3                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP3103                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.07                                   | 3                          |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | TLP3545                                                                             |                                                                                     |
|                             | 2                                      | 0.4                        | TLP3306                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 25                                     | 0.04                       | TLP3318                                                                           |                                                                                   |                                                                                   | TLP3118<br>TLP3111                                                                |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 20                                     | 0.1                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 80                          | 12                                     | 0.12                       | TLP3317                                                                           | TLP3217                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 8                                      | 0.2                        | TLP3319                                                                           |                                                                                   |                                                                                   | TLP3119<br>TLP3121                                                                |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 1.2                                    | 0.35                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.15                                   | 1.25                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP3120                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 14                                     | 0.08                       | TLP3320                                                                           | TLP3220                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 100                         | 0.67                                   | 1                          |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP3556                                                                             |                                                                                     |                                                                                     |
|                             | 0.2                                    | 1.4                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP3105                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 0.2                                    | 2                          |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | TLP3546                                                                             |                                                                                     |
| 200                         | 50                                     | 0.05                       |                                                                                   |                                                                                   |                                                                                   | TLP179D<br>TLP170D<br>TLP171D<br>TLP176D                                          | TLP199D<br>TLP197D                                                                | TLP209D*<br>TLP200D*                                                                |                                                                                     |                                                                                     |                                                                                     |
|                             | 8                                      | 0.2                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                             | 8                                      | 0.25                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP220D                                                                             |                                                                                     |                                                                                     |

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

♦ Dual-channel †: MFSOP6

# 4 Selection Guide

| Package                     |                               |                            | Features                                                                          |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------|-------------------------------|----------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Off-State Voltage (max) (V) | On-State Resistance (max) (Ω) | On-State Current (max) (A) |  |  |  |  |  |  |  |  |  |
|                             |                               |                            | USOP4                                                                             | SSOP4                                                                             | SO6                                                                               | 2.54SOP4                                                                          | 2.54SOP6                                                                          | 2.54SOP8                                                                            | DIP4                                                                                | DIP6                                                                                | DIP8                                                                                |
| 350                         | 50                            | 0.1                        |                                                                                   |                                                                                   |                                                                                   | TLP170G                                                                           |                                                                                   |                                                                                     | TLP220G                                                                             |                                                                                     |                                                                                     |
|                             | 50                            | 0.12                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | TLP228G                                                                             |                                                                                     | TLP228G-2*                                                                          |
|                             | 35                            | 0.11                       |                                                                                   |                                                                                   |                                                                                   | TLP172G                                                                           | TLP192G                                                                           | TLP202G*                                                                            |                                                                                     |                                                                                     |                                                                                     |
|                             | 35                            | 0.12                       |                                                                                   |                                                                                   |                                                                                   | TLP174G<br>TLP176G                                                                | TLP197G                                                                           | TLP206G*                                                                            | TLP222G<br>TLP224G<br>TLP227G                                                       | TLP592G<br>TLP597G                                                                  | TLP222G-2*<br>TLP224G-2*<br>TLP227G-2*                                              |
| 400                         | 35                            | 0.12                       |                                                                                   |                                                                                   |                                                                                   | TLP171GA<br>TLP176GA                                                              | TLP197GA                                                                          | TLP206GA*                                                                           | TLP227GA<br>TLP220GA                                                                | TLP597GA<br>TLP797GA                                                                | TLP227GA-2*                                                                         |
|                             | 12                            | 0.15                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | TLP598GA<br>TLP798GA                                                                |                                                                                     |
|                             | 35                            | 0.12                       |                                                                                   |                                                                                   |                                                                                   | TLP174GA                                                                          |                                                                                   |                                                                                     | TLP224GA                                                                            |                                                                                     | TLP224GA-2*                                                                         |
|                             | 4                             | 0.2                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | TLP3125                                                                             |                                                                                     |                                                                                     |                                                                                     |
| 600                         | 35                            | 0.1                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | TLP797J                                                                             |                                                                                     |
|                             | 60                            | 0.09                       |                                                                                   |                                                                                   |                                                                                   | TLP171J<br>TLP170J                                                                |                                                                                   |                                                                                     | TLP220J                                                                             |                                                                                     |                                                                                     |

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

\* Dual-channel †: MFSOP6

## MOSFET-Output Photorelays, 1-Form-A in a USOP4 Package

| Part Number | Pin Configuration | Features                                        | IFT<br>(Max) | RON (Max) |       | ION<br>(Max) | VOFF  | BVs      | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-------------------|-------------------------------------------------|--------------|-----------|-------|--------------|-------|----------|---------------------------------|-----|-----|-----|-----|
|             |                   |                                                 |              | @IF       |       |              |       |          | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP3303     |                   | <b>USOP4</b><br>Ultra-low On-resistance         | 3 mA         | 0.22 Ω    | 5 mA  | 0.9 A        | 20 V  | 500 Vrms | ○ /                             |     |     |     |     |
| TLP3306*    |                   | <b>USOP4</b><br>75-V V <sub>OFF</sub>           | 3 mA         | 2 Ω       | 5 mA  | 0.4 A        | 75 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3312     |                   | <b>USOP4</b><br>C <sub>OFF</sub> : 20 pF (typ.) | 3 mA         | 1.5 Ω     | 5 mA  | 0.4 A        | 60 V  | 500 Vrms | ○ /                             |     |     |     |     |
| TLP3314*    |                   | <b>USOP4</b><br>Ultra-low CR                    | 4 mA         | 3 Ω       | 5 mA  | 0.25 A       | 40 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3315*    |                   | <b>USOP4</b><br>Ultra-low CR                    | 4 mA         | 1.5 Ω     | 5 mA  | 0.3 A        | 40 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3316*    |                   | <b>USOP4</b><br>Ultra-low CR                    | 4 mA         | 15 Ω      | 5 mA  | 0.12 A       | 40 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3317*    |                   | <b>USOP4</b><br>Low CR                          | 5 mA         | 12 Ω      | 5 mA  | 0.12 A       | 80 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3318*    |                   | <b>USOP4</b><br>Low CR                          | 3 mA         | 25 Ω      | 5 mA  | 0.04 A       | 80 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3319*    |                   | <b>USOP4</b><br>Low CR                          | 3 mA         | 8 Ω       | 5 mA  | 0.2 A        | 80 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3320*    |                   | <b>USOP4</b><br>100-V V <sub>OFF</sub>          | 5 mA         | 14 Ω      | 10 mA | 0.08 A       | 100 V | 500 Vrms | △ /                             |     |     |     |     |
| TLP3330*    |                   | <b>USOP4</b><br>Ultra-low CR                    | 4 mA         | 8 Ω       | 5 mA  | 0.16 A       | 20 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3331*    |                   | <b>USOP4</b><br>Ultra-low CR                    | 4 mA         | 1.2 Ω     | 5 mA  | 0.45 A       | 20 V  | 500 Vrms | △ /                             |     |     |     |     |
| TLP3340     |                   | <b>USOP4</b><br>Ultra-low CR                    | 3 mA         | 14 Ω      | 5 mA  | 0.12 A       | 40 V  | 500 Vrms | ○ /                             |     |     |     |     |

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

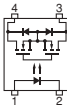
BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

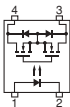
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## MOSFET-Output Photorelays, 1-Form-A in a USOP4 Package (Continued)

| Part Number | Pin Configuration                                                                 | Features                           | IFT<br>(Max) | RON (Max) |      | ION<br>(Max) | VOFF | BVs      | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-----------------------------------------------------------------------------------|------------------------------------|--------------|-----------|------|--------------|------|----------|---------------------------------|-----|-----|-----|-----|
|             |                                                                                   |                                    |              | @IF       |      |              |      |          | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP3341     |  | <b>USOP4</b><br>Ultra-low CR       | 3 mA         | 10 Ω      | 5 mA | 0.14 A       | 40 V | 500 Vrms | ○ /                             |     |     |     |     |
| TLP3342     |                                                                                   | <b>USOP4</b><br>Ultra-low COFF     | 3 mA         | 20 Ω      | 5 mA | 0.1 A        | 40 V | 500 Vrms | ○ /                             |     |     |     |     |
| TLP3350     |                                                                                   | <b>USOP4</b><br>Ultra-low CR       | 3 mA         | 5 Ω       | 5 mA | 0.2 A        | 20 V | 500 Vrms | ○ /                             |     |     |     |     |
| TLP3351     |                                                                                   | <b>USOP4</b><br>Ultra-low COFF     | 3 mA         | 15 Ω      | 5 mA | 0.12 A       | 60 V | 500 Vrms | ○ /                             |     |     |     |     |
| TLP3375     |                                                                                   | <b>USOP4</b><br>COFF: 12 pF (typ.) | 3 mA         | 1.5 Ω     | 5 mA | 0.3 A        | 50 V | 500 Vrms | △ /                             |     |     |     |     |

## MOSFET-Output Photorelays, 1-Form-A in a SSOP4 Package

| Part Number | Pin Configuration                                                                   | Features                             | IFT<br>(Max) | RON (Max) |       | ION<br>(Max) | VOFF      | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-------------------------------------------------------------------------------------|--------------------------------------|--------------|-----------|-------|--------------|-----------|-----------|---------------------------------|-----|-----|-----|-----|
|             |                                                                                     |                                      |              | @1F       |       |              |           |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP3203     |  | <b>SSOP4</b><br>COFF: 40 pF (typ.)   | 3 mA         | 0.22 Ω    | 5 mA  | 0.9 A        | 20 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3212     |                                                                                     | <b>SSOP4</b><br>COFF: 20 pF (typ.)   | 5 mA         | 1.5 Ω     | 5 mA  | 0.4 A        | 60 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3214     |                                                                                     | <b>SSOP4</b><br>COFF: 5 pF (typ.)    | 4 mA         | 3 Ω       | 5 mA  | 0.25 A       | 40 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3215     |                                                                                     | <b>SSOP4</b><br>COFF: 10 pF (typ.)   | 4 mA         | 1.5 Ω     | 5 mA  | 0.3 A        | 40 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3216     |                                                                                     | <b>SSOP4</b><br>COFF: 1 pF (typ.)    | 4 mA         | 15 Ω      | 5 mA  | 0.12 A       | 40 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3217     |                                                                                     | <b>SSOP4</b><br>COFF: 5 pF (typ.)    | 5 mA         | 12 Ω      | 5 mA  | 0.12 A       | 80 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3220     |                                                                                     | <b>SSOP4</b><br>COFF: 6 pF (typ.)    | 5 mA         | 14 Ω      | 10 mA | 0.08 A       | 100 V     | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3230     |                                                                                     | <b>SSOP4</b><br>COFF: 1 pF (typ.)    | 4 mA         | 8 Ω       | 5 mA  | 0.16 A       | 20 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3231     |                                                                                     | <b>SSOP4</b><br>COFF: 5 pF (typ.)    | 4 mA         | 1.2 Ω     | 5 mA  | 0.45 A       | 20 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3240     |                                                                                     | <b>SSOP4</b><br>COFF: 0.45 pF (typ.) | 3 mA         | 14 Ω      | 5 mA  | 0.12 A       | 40 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3241     |                                                                                     | <b>SSOP4</b><br>COFF: 0.7 pF (typ.)  | 3 mA         | 10 Ω      | 5 mA  | 0.14 A       | 40 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3250     |                                                                                     | <b>SSOP4</b><br>COFF: 0.8 pF (typ.)  | 3 mA         | 5 Ω       | 5 mA  | 0.2 A        | 20 V      | 1500 Vrms | ○ /                             |     |     |     |     |
| TLP3275     | <b>SSOP4</b><br>COFF: 12 pF (typ.)                                                  | 3 mA                                 | 1.5 Ω        | 5 mA      | 0.3 A | 50 V         | 1500 Vrms | △ /       |                                 |     |     |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

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# 4 Selection Guide

## MOSFET Output, 1-Form-A, 2.54SOP4, MFSOP6 and SO6 Packages

| Part Number | Pin Configuration                                                                   | Features                                                                                    | I <sub>FT</sub><br>(Max) | R <sub>ON</sub> (Max) |                 | I <sub>ON</sub><br>(Max) | V <sub>OFF</sub> | BV <sub>S</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|-------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------|-----------------------|-----------------|--------------------------|------------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|             |                                                                                     |                                                                                             |                          |                       | @I <sub>F</sub> |                          |                  |                 | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| TLP170A     |    | <b>2.54SOP4</b><br>Low trigger LED current                                                  | 1 mA                     | 2 Ω                   | 2 mA            | 0.4 A                    | 60 V             | 1500 Vrms       | ○/○                             |                  |                  |     |     |
| TLP170D     |                                                                                     | <b>2.54SOP4</b><br>Low trigger LED current                                                  | 1 mA                     | 8 Ω                   | 2 mA            | 0.2 A                    | 200 V            | 1500 Vrms       | ○/○                             |                  |                  |     |     |
| TLP170G     |                                                                                     | <b>2.54SOP4</b><br>Low trigger LED current                                                  | 1 mA                     | 50 Ω                  | 2 mA            | 0.1 A                    | 350 V            | 1500 Vrms       | ○/○                             |                  |                  |     |     |
| TLP170J     |                                                                                     | <b>2.54SOP4</b><br>Low trigger LED current                                                  | 1 mA                     | 60 Ω                  | 2 mA            | 0.09 A                   | 600 V            | 1500 Vrms       | ○/○                             |                  |                  |     |     |
| TLP171A*    |                                                                                     | <b>2.54SOP4</b><br>Ultra-low trigger LED current                                            | 0.1 mA                   | 2 Ω                   | 0.2 mA          | 0.4 A                    | 60 V             | 1500 Vrms       | △/△                             |                  |                  |     |     |
| TLP171D*    |                                                                                     | <b>2.54SOP4</b><br>Ultra-low trigger LED current                                            | 0.1 mA                   | 8 Ω                   | 0.2 mA          | 0.2 A                    | 200 V            | 1500 Vrms       | △/△                             |                  |                  |     |     |
| TLP171GA*   |                                                                                     | <b>2.54SOP4</b><br>Ultra-low trigger LED current                                            | 0.1 mA                   | 35 Ω                  | 0.2 mA          | 0.12 A                   | 400 V            | 1500 Vrms       | △/△                             |                  |                  |     |     |
| TLP171J*    |                                                                                     | <b>2.54SOP4</b><br>Ultra-low trigger LED current                                            | 0.1 mA                   | 60 Ω                  | 0.2 mA          | 0.09 A                   | 600 V            | 1500 Vrms       | △/△                             |                  |                  |     |     |
| TLP172A     |                                                                                     | <b>2.54SOP4</b><br>C <sub>OFF</sub> : 130 pF (typ.)                                         | 3 mA                     | 2 Ω                   | 5 mA            | 0.4 A                    | 60 V             | 1500 Vrms       | ○/○                             |                  |                  |     |     |
| TLP172G     |                                                                                     | <b>2.54SOP4</b><br>C <sub>OFF</sub> : 30 pF (typ.)                                          | 3 mA                     | 50 Ω                  | 5 mA            | 0.11 A                   | 350 V            | 1500 Vrms       | ○/○                             |                  |                  |     |     |
| TLP173A     |  | <b>MFSOP6</b><br>Low trigger LED current                                                    | 2 mA                     | 50 Ω                  | 3 mA            | 0.07 A                   | 60 V             | 3750 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |
| TLP174G     |  | <b>2.54SOP4</b> SEMKO-approved<br>Current-limiting function<br>Limit current: 150 to 300 mA | 3 mA                     | 35 Ω                  | 5 mA            | 0.12 A                   | 350 V            | 1500 Vrms       | ○/○                             |                  |                  |     |     |
| TLP174GA    |                                                                                     | <b>2.54SOP4</b><br>Current-limiting function<br>Limit current: 150 to 300 mA                | 3 mA                     | 35 Ω                  | 5 mA            | 0.12 A                   | 400 V            | 1500 Vrms       | ○/                              |                  |                  |     |     |
| TLP175A*    |  | <b>SO6</b><br>General-purpose<br>Low trigger LED current                                    | 1 mA                     | 50 Ω                  | 2 mA            | 0.1 A                    | 60 V             | 3750 Vrms       | △/△                             |                  |                  |     |     |
| TLP176A     |  | <b>2.54SOP4</b><br>C <sub>OFF</sub> : 130 pF (typ.)                                         | 3 mA                     | 2 Ω                   | 5 mA            | 0.4 A                    | 60 V             | 1500 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| TLP176D     |                                                                                     | <b>2.54SOP4</b><br>C <sub>OFF</sub> : 100 pF (typ.)                                         | 3 mA                     | 8 Ω                   | 5 mA            | 0.2 A                    | 200 V            | 1500 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| TLP176G     |                                                                                     | <b>2.54SOP4</b> SEMKO-approved<br>C <sub>OFF</sub> : 40 pF (typ.)                           | 3 mA                     | 35 Ω                  | 5 mA            | 0.12 A                   | 350 V            | 1500 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> | ○   | △   |
| TLP176GA    |                                                                                     | <b>2.54SOP4</b><br>C <sub>OFF</sub> : 70 pF (typ.)                                          | 3 mA                     | 35 Ω                  | 5 mA            | 0.12 A                   | 400 V            | 1500 Vrms       | ○/                              |                  |                  | ○   | △   |
| TLP179D     |                                                                                     | <b>2.54SOP4</b><br>C <sub>OFF</sub> : 15 pF (typ.)                                          | 3 mA                     | 50 Ω                  | 5 mA            | 0.05 A                   | 200 V            | 1500 Vrms       | ○/○                             |                  |                  |     |     |
| TLP3111     |                                                                                     | <b>2.54SOP4</b><br>C <sub>OFF</sub> : 11 pF (typ.)                                          | 4 mA                     | 20 Ω                  | 5 mA            | 0.1 A                    | 80 V             | 1500 Vrms       | ○/                              |                  |                  |     |     |

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

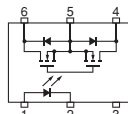
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

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## MOSFET Output, 1-Form-A, 2.54SOP4, MFSOP6 and SO6 Packages (Continued)

| Part Number | Pin Configuration                                                                 | Features                               | I <sub>FT</sub><br>(Max) | R <sub>ON</sub> (Max) |        | I <sub>ON</sub><br>(Max) | V <sub>OFF</sub> | B <sub>Vs</sub> | Safety Standards <sup>(2)</sup> |     |     |     |  |
|-------------|-----------------------------------------------------------------------------------|----------------------------------------|--------------------------|-----------------------|--------|--------------------------|------------------|-----------------|---------------------------------|-----|-----|-----|--|
|             |                                                                                   |                                        |                          | @I <sub>F</sub>       | UL/cUL |                          |                  |                 | TÜV                             | VDE | BSI | IEC |  |
| TLP3114     |  | <b>2.54SOP4</b><br>COFF: 5 pF (typ.)   | 4 mA                     | 3 Ω                   | 5 mA   | 0.25 A                   | 40 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3115     |                                                                                   | <b>2.54SOP4</b><br>COFF: 10 pF (typ.)  | 4 mA                     | 1.5 Ω                 | 5 mA   | 0.3 A                    | 40 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3116     |                                                                                   | <b>2.54SOP4</b><br>COFF: 1 pF (typ.)   | 4 mA                     | 15 Ω                  | 5 mA   | 0.12 A                   | 40 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3118     |                                                                                   | <b>2.54SOP4</b><br>COFF: 2.5 pF (typ.) | 3 mA                     | 25 Ω                  | 5 mA   | 0.04 A                   | 80 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3119     |                                                                                   | <b>2.54SOP4</b><br>COFF: 6.5 pF (typ.) | 3 mA                     | 8 Ω                   | 5 mA   | 0.2 A                    | 80 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3121     |                                                                                   | <b>2.54SOP4</b><br>COFF: 30 pF (typ.)  | 4 mA                     | 1.2 Ω                 | 5 mA   | 0.35 A                   | 80 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3122     |                                                                                   | <b>2.54SOP4</b><br>COFF: 90 pF (typ.)  | 3 mA                     | 0.7 Ω                 | 5 mA   | 1.0 A                    | 60 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3123     |                                                                                   | <b>2.54SOP4</b><br>COFF: 300 pF (typ.) | 3 mA                     | 0.13 Ω                | 5 mA   | 1 A                      | 40 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3130     |                                                                                   | <b>2.54SOP4</b><br>COFF: 1 pF (typ.)   | 4 mA                     | 8 Ω                   | 5 mA   | 0.16 A                   | 20 V             | 1500 Vrms       | ○/○                             |     |     |     |  |
| TLP3131     |                                                                                   | <b>2.54SOP4</b><br>COFF: 5 pF (typ.)   | 4 mA                     | 1.2 Ω                 | 5 mA   | 0.3 A                    | 20 V             | 1500 Vrms       | ○/○                             |     |     |     |  |

## MOSFET-Output Photorelays, 1-Form-A in a 2.54SOP6 or 2.54SOP8 Package

| Part Number | Pin Configuration                                                                   | Features                               | IFT<br>(Max) | RON (Max) |      | ION<br>(Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|-------------|-------------------------------------------------------------------------------------|----------------------------------------|--------------|-----------|------|--------------|-------|-----------|---------------------------------|------------------|------------------|-----|-----|
|             |                                                                                     |                                        |              | @IF       |      |              |       |           | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| TLP192A     |  | <b>2.54SOP6</b><br>COFF: 130 pF (typ.) | 3 mA         | 2 Ω       | 5 mA | 0.4 A        | 60 V  | 1500 Vrms | ○/○                             |                  |                  |     |     |
| TLP192G     |                                                                                     | <b>2.54SOP6</b><br>COFF: 30 pF (typ.)  | 3 mA         | 50 Ω      | 5 mA | 0.11 A       | 350 V | 1500 Vrms | ○/○                             |                  |                  |     |     |
| TLP197A     |                                                                                     | <b>2.54SOP6</b><br>COFF: 130 pF (typ.) | 3 mA         | 2 Ω       | 5 mA | 0.4 A        | 60 V  | 1500 Vrms | ○/○                             |                  |                  |     |     |
| TLP197D     |                                                                                     | <b>2.54SOP6</b><br>COFF: 100 pF (typ.) | 3 mA         | 8 Ω       | 5 mA | 0.2 A        | 200 V | 1500 Vrms | ○/○                             |                  |                  |     |     |
| TLP197G     |                                                                                     | <b>2.54SOP6</b><br>SEMKO-approved      | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 350 V | 1500 Vrms | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> | ○   | △   |
| TLP197GA    |                                                                                     | <b>2.54SOP6</b><br>COFF: 70 pF (typ.)  | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 400 V | 1500 Vrms | ○/                              |                  |                  | ○   | △   |
| TLP199D     |                                                                                     | <b>2.54SOP6</b><br>COFF: 15 pF (typ.)  | 3 mA         | 50 Ω      | 5 mA | 0.05 A       | 200 V | 1500 Vrms | ○/○                             |                  |                  |     |     |
| TLP3100     |                                                                                     | <b>2.54SOP6</b><br>ION = 2.5 A (max)   | 3 mA         | 0.05 Ω    | 5 mA | 2.5 A        | 20 V  | 1500 Vrms | ○/○                             |                  |                  |     |     |

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TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

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# 4 Selection Guide

## MOSFET-Output Photorelays, 1-Form-A in a 2.54SOP6 or 2.54SOP8 Package (Continued)

| Part Number | Pin Configuration | Features                                                | IFT<br>(Max) | RON (Max) |      | ION<br>(Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-------------------|---------------------------------------------------------|--------------|-----------|------|--------------|-------|-----------|---------------------------------|-----|-----|-----|-----|
|             |                   |                                                         |              |           | @IF  |              |       |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP3102     |                   | <b>2.54SOP6</b><br>ION (DC) = 5 A (max); C-connection   | 3 mA         | 0.06 Ω    | 5 mA | 2.5 A        | 40 V  | 1500 Vrms | ○/○                             |     |     |     |     |
| TLP3103     |                   | <b>2.54SOP6</b><br>ION (DC) = 4.6 A (max); C-connection | 3 mA         | 0.07 Ω    | 5 mA | 2.3 A        | 60 V  | 1500 Vrms | ○/○                             |     |     |     |     |
| TLP3105     |                   | <b>2.54SOP6</b><br>ION (DC) = 2.8 A (max); C-connection | 3 mA         | 0.2 Ω     | 5 mA | 1.4 A        | 100 V | 1500 Vrms | ○/○                             |     |     |     |     |
| TLP3120     |                   | <b>2.54SOP6</b><br>ION = 1.25 A (max)                   | 5 mA         | 0.15 Ω    | 5 mA | 1.25 A       | 80 V  | 1500 Vrms | ○/○                             |     |     |     |     |
| TLP3125     |                   | <b>2.54SOP8</b><br>COFF: 410 pF (typ.)                  | 3 mA         | 4 Ω       | 5 mA | 0.2 A        | 400 V | 1500 Vrms | ○/○                             |     |     |     |     |

## MOSFET-Output Photorelays, 2-Form-A in a 2.54SOP8 Package

| Part Number | Pin Configuration | Features                                                | IFT<br>(Max) | RON (Max) |      | ION<br>(Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|-------------|-------------------|---------------------------------------------------------|--------------|-----------|------|--------------|-------|-----------|---------------------------------|------------------|------------------|-----|-----|
|             |                   |                                                         |              |           | @IF  |              |       |           | UL/cUL                          | TÜV              | VDE              | BSI | IEC |
| TLP200D     |                   | <b>2.54SOP8</b><br>Dual-channel version of the TLP176D  | 3 mA         | 8 Ω       | 5 mA | 0.2 A        | 200 V | 1500 Vrms | ○/                              |                  |                  |     |     |
| TLP202A     |                   | <b>2.54SOP8</b><br>Dual-channel version of the TLP172A  | 3 mA         | 2 Ω       | 5 mA | 0.4 A        | 60 V  | 1500 Vrms | ○/                              |                  |                  |     |     |
| TLP202G     |                   | <b>2.54SOP8</b><br>Dual-channel version of the TLP172G  | 3 mA         | 50 Ω      | 5 mA | 0.11 A       | 350 V | 1500 Vrms | ○/                              |                  |                  |     |     |
| TLP206A     |                   | <b>2.54SOP8</b><br>Dual-channel version of the TLP176A  | 3 mA         | 2 Ω       | 5 mA | 0.4 A        | 60 V  | 1500 Vrms | ○/                              |                  |                  |     |     |
| TLP206G     |                   | <b>2.54SOP8</b><br>Dual-channel version of the TLP176G  | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 350 V | 1500 Vrms | ○/                              | △ <sup>(1)</sup> | ○ <sup>(1)</sup> | ○   | △   |
| TLP206GA    |                   | <b>2.54SOP8</b><br>Dual-channel version of the TLP176GA | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 400 V | 1500 Vrms | ○/                              |                  |                  | ○   | △   |
| TLP209D     |                   | <b>2.54SOP8</b><br>Dual-channel version of the TLP179D  | 3 mA         | 50 Ω      | 5 mA | 0.05 A       | 200 V | 1500 Vrms | ○/                              |                  |                  |     |     |

## MOSFET-Output Photorelays, 1-Form-A in a DIP4 Package

| Part Number           | Pin Configuration | Features                                                | IFT<br>(Max) | RON (Max) |      | ION<br>(Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-----------------------|-------------------|---------------------------------------------------------|--------------|-----------|------|--------------|-------|-----------|---------------------------------|-----|-----|-----|-----|
|                       |                   |                                                         |              |           | @IF  |              |       |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP220A<br>TLP220AF   |                   | <b>DIP4</b><br>General-purpose<br>Reinforced insulation | 2 mA         | 2 Ω       | 5 mA | 0.5 A        | 60 V  | 5000 Vrms | ○/○                             |     | △   | △   |     |
| TLP220D<br>TLP220DF   |                   | <b>DIP4</b><br>General-purpose<br>Reinforced insulation | 2 mA         | 8 Ω       | 5 mA | 0.25 A       | 200 V | 5000 Vrms | ○/○                             |     | △   | △   |     |
| TLP220G<br>TLP220GF   |                   | <b>DIP4</b><br>General-purpose<br>Reinforced insulation | 2 mA         | 50 Ω      | 5 mA | 0.1 A        | 350 V | 5000 Vrms | ○/○                             |     | △   | △   |     |
| TLP220GA<br>TLP220GAF |                   | <b>DIP4</b><br>General-purpose<br>Reinforced insulation | 2 mA         | 35 Ω      | 5 mA | 0.12 A       | 400 V | 5000 Vrms | ○/○                             |     | △   | △   |     |
| TLP220J<br>TLP220JF   |                   | <b>DIP4</b><br>General-purpose<br>Reinforced insulation | 2 mA         | 60 Ω      | 5 mA | 0.09 A       | 600 V | 5000 Vrms | ○/○                             |     | △   | △   |     |
| TLP221A*<br>TLP221AF* |                   | <b>DIP4</b><br>General-purpose<br>Reinforced insulation | 2 mA         | 0.2 Ω     | 5 mA | 2 A          | 40 V  | 5000 Vrms | △/△                             |     | △   | △   |     |

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

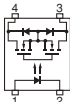
BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

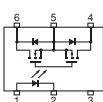
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## MOSFET-Output Photorelays, 1-Form-A in a DIP4 Package (Continued)

| Part Number | Pin Configuration                                                                   | Features                                                                                | IFT<br>(Max) | RON (Max) |       | ION<br>(Max) | VOFF      | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------|-----------|-------|--------------|-----------|-----------|---------------------------------|-----|-----|-----|-----|
|             |                                                                                     |                                                                                         |              | @IF       |       |              |           |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP222A     |    | <b>DIP4</b><br>COFF: 130 pF (typ.)                                                      | 3 mA         | 2 Ω       | 5 mA  | 0.5 A        | 60 V      | 2500 Vrms | ○/○                             |     |     |     |     |
| TLP222G     |                                                                                     | <b>DIP4</b><br>COFF: 30 pF (typ.)                                                       | 3 mA         | 50 Ω      | 5 mA  | 0.12 A       | 350 V     | 2500 Vrms | ○/○                             |     |     | ○   | △   |
| TLP224G     |                                                                                     | <b>DIP4</b> SEMKO-approved<br>Current-limiting function<br>Limit current: 150 to 300 mA | 3 mA         | 35 Ω      | 5 mA  | 0.12 A       | 350 V     | 2500 Vrms | ○/○                             |     |     | ◎   | △   |
| TLP224GA    |                                                                                     | <b>DIP4</b> For modems<br>Current-limiting function<br>Limit current: 150 to 300 mA     | 3 mA         | 35 Ω      | 5 mA  | 0.12 A       | 400 V     | 2500 Vrms | ○/                              |     |     |     |     |
| TLP227A     |                                                                                     | <b>DIP4</b> SEMKO-approved<br>COFF: 130 pF (typ.)                                       | 3 mA         | 2 Ω       | 5 mA  | 0.5 A        | 60 V      | 2500 Vrms | ○/○                             |     |     |     |     |
| TLP227G     |                                                                                     | <b>DIP4</b> SEMKO-approved<br>COFF: 40 pF (typ.)                                        | 3 mA         | 35 Ω      | 5 mA  | 0.12 A       | 350 V     | 2500 Vrms | ○/○                             | △   | ○   | ○   | △   |
| TLP227GA    |                                                                                     | <b>DIP4</b> SEMKO-approved                                                              | 3 mA         | 35 Ω      | 5 mA  | 0.12 A       | 400 V     | 2500 Vrms | ○/                              |     |     |     |     |
| TLP228G     |                                                                                     | <b>DIP4</b><br>General-purpose, SEMKO-approved,<br>High EMI immunity                    | 3 mA         | 50 Ω      | 5 mA  | 0.12 A       | 350 V     | 2500 Vrms | ○/○                             |     |     | ○   | △   |
| TLP3553     |                                                                                     | <b>DIP4</b><br>High output current: 3 A (max)                                           | 3 mA         | 0.075 Ω   | 5 mA  | 3 A          | 20 V      | 2500 Vrms | ○/○                             |     |     |     |     |
| TLP3554     |                                                                                     | <b>DIP4</b><br>High output current: 2.5 A (max)                                         | 3 mA         | 0.11 Ω    | 5 mA  | 2.5 A        | 40 V      | 2500 Vrms | ○/○                             |     |     |     |     |
| TLP3555     |                                                                                     | <b>DIP4</b><br>High output current: 2 A (max)                                           | 3 mA         | 0.17 Ω    | 5 mA  | 2 A          | 60 V      | 2500 Vrms | ○/○                             |     |     |     |     |
| TLP3556     | <b>DIP4</b><br>High output current: 1 A (max)                                       | 3 mA                                                                                    | 0.67 Ω       | 5 mA      | 1 A   | 100 V        | 2500 Vrms | ○/○       |                                 |     |     |     |     |
| TLP225A     |  | <b>DIP4</b><br>For DC use only                                                          | 5 mA         | 1.1 Ω     | 10 mA | 0.5 A        | 60 V      | 2500 Vrms | ○/○                             |     |     |     |     |

## MOSFET-Output Photorelays, 1-Form-A in a DIP6 Package

| Part Number | Pin Configuration                                                                   | Features                                          | IFT<br>(Max) | RON (Max) |      | ION<br>(Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-------------------------------------------------------------------------------------|---------------------------------------------------|--------------|-----------|------|--------------|-------|-----------|---------------------------------|-----|-----|-----|-----|
|             |                                                                                     |                                                   |              | @IF       |      |              |       |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP592A     |  | <b>DIP6</b><br>COFF: 130 pF (typ.)                | 3 mA         | 2 Ω       | 5 mA | 0.5 A        | 60 V  | 2500 Vrms | ○/                              |     |     |     |     |
| TLP592G     |                                                                                     | <b>DIP6</b><br>COFF: 30 pF (typ.)                 | 3 mA         | 50 Ω      | 5 mA | 0.12 A       | 350 V | 2500 Vrms | ○/                              |     |     |     |     |
| TLP597A     |                                                                                     | <b>DIP6</b> SEMKO-approved<br>COFF: 130 pF (typ.) | 3 mA         | 2 Ω       | 5 mA | 0.5 A        | 60 V  | 2500 Vrms | ○/                              |     |     |     |     |
| TLP597G     |                                                                                     | <b>DIP6</b> SEMKO-approved<br>COFF: 40 pF (typ.)  | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 350 V | 2500 Vrms | ○/                              | △   | ○   | ◎   | △   |
| TLP597GA    |                                                                                     | <b>DIP6</b> SEMKO-approved<br>COFF: 70 pF (typ.)  | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 400 V | 2500 Vrms | ○/                              |     |     |     |     |
| TLP598AA    |                                                                                     | <b>DIP6</b><br>COFF: 130 pF (typ.)                | 3 mA         | 2 Ω       | 5 mA | 0.5 A        | 60 V  | 2500 Vrms | ○/                              |     |     |     |     |
| TLP598GA    |                                                                                     | <b>DIP6</b>                                       | 3 mA         | 12 Ω      | 5 mA | 0.15 A       | 400 V | 2500 Vrms | ○/                              |     |     |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

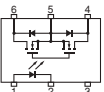
TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

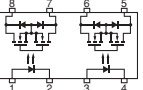
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# 4 Selection Guide

## MOSFET-Output Photorelays, 1-Form-A in a DIP6 Package (Continued)

| Part Number                         | Pin Configuration                                                                 | Features                                                               | IFT<br>(Max) | RON (Max) |       | ION<br>(Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------|--------------|-----------|-------|--------------|-------|-----------|---------------------------------|-----|-----|-----|-----|
|                                     |                                                                                   |                                                                        |              |           | @IF   |              |       |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>TLP797GA</b><br><b>TLP797GAF</b> |  | <b>DIP6</b><br>COFF: 40 pF (typ.)                                      | 3 mA         | 35 Ω      | 5 mA  | 0.12 A       | 400 V | 5000 Vrms | ○/○                             | △   | ○   | △   | △   |
| <b>TLP797J</b><br><b>TLP797JF</b>   |                                                                                   | <b>DIP6</b><br>COFF: 120 pF (typ.)                                     | 5 mA         | 35 Ω      | 10 mA | 0.1 A        | 600 V | 5000 Vrms | ○/○                             | △   | ○   | △   | △   |
| <b>TLP798GA</b>                     |                                                                                   | <b>DIP6</b>                                                            | 5 mA         | 12 Ω      | 5 mA  | 0.15 A       | 400 V | 5000 Vrms | ○/○                             | △   | △   | △   | △   |
| <b>TLP3542</b>                      |                                                                                   | <b>DIP6</b><br>High output current: 2.5 A (max)<br>COFF: 400 pF (typ.) | 3 mA         | 0.1 Ω     | 10 mA | 2.5 A        | 60 V  | 2500 Vrms | ○/○                             |     |     |     |     |
| <b>TLP3543</b>                      |                                                                                   | <b>DIP6</b><br>High output current: 4 A (max)                          | 3 mA         | 0.05 Ω    | 5 mA  | 4 A          | 20 V  | 2500 Vrms | ○/○                             |     |     |     |     |
| <b>TLP3544</b>                      |                                                                                   | <b>DIP6</b><br>High output current: 3.5 A (max)                        | 3 mA         | 0.06 Ω    | 5 mA  | 3.5 A        | 40 V  | 2500 Vrms | ○/○                             |     |     |     |     |
| <b>TLP3545</b>                      |                                                                                   | <b>DIP6</b><br>High output current: 3 A (max)                          | 3 mA         | 0.07 Ω    | 5 mA  | 3 A          | 60 V  | 2500 Vrms | ○/○                             |     |     |     |     |
| <b>TLP3546</b>                      |                                                                                   | <b>DIP6</b><br>High output current: 2 A (max)                          | 3 mA         | 0.2 Ω     | 5 mA  | 2 A          | 100 V | 2500 Vrms | ○/○                             |     |     |     |     |

## MOSFET-Output Photorelays, 2-Form-A in a DIP8 Package

| Part Number       | Pin Configuration                                                                   | Features                                                                                  | IFT<br>(Max) | RON (Max) |      | ION<br>(Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------|-----------|------|--------------|-------|-----------|---------------------------------|-----|-----|-----|-----|
|                   |                                                                                     |                                                                                           |              |           | @IF  |              |       |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>TLP222A-2</b>  |  | <b>DIP8</b><br>Dual-channel version of the TLP222A                                        | 3 mA         | 2 Ω       | 5 mA | 0.5 A        | 60 V  | 2500 Vrms | ○/○                             |     |     |     |     |
| <b>TLP222G-2</b>  |                                                                                     | <b>DIP8</b><br>Dual-channel version of the TLP222G<br>SEMKO-approved                      | 3 mA         | 50 Ω      | 5 mA | 0.12 A       | 350 V | 2500 Vrms | ○/○                             |     |     | ○   | △   |
| <b>TLP224G-2</b>  |                                                                                     | <b>DIP8</b><br>Dual-channel version of the TLP224G<br>SEMKO-approved                      | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 350 V | 2500 Vrms | ○/○                             |     |     | ○   | △   |
| <b>TLP224GA-2</b> |                                                                                     | <b>DIP8</b><br>Current-limiting function<br>Limit current: 150 to 300 mA                  | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 400 V | 2500 Vrms | ○/                              |     |     |     |     |
| <b>TLP227A-2</b>  |                                                                                     | <b>DIP8</b><br>Dual-channel version of the TLP227A<br>SEMKO-approved                      | 3 mA         | 2 Ω       | 5 mA | 0.5 A        | 60 V  | 2500 Vrms | ○/○                             |     |     |     | △   |
| <b>TLP227G-2</b>  |                                                                                     | <b>DIP8</b><br>Dual-channel version of the TLP227G<br>SEMKO-approved                      | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 350 V | 2500 Vrms | ○/○                             | △   | ○   | ○   | △   |
| <b>TLP227GA-2</b> |                                                                                     | <b>DIP8</b><br>Dual-channel version of the TLP227GA<br>SEMKO-approved                     | 3 mA         | 35 Ω      | 5 mA | 0.12 A       | 400 V | 2500 Vrms | ○/                              |     |     |     | △   |
| <b>TLP228G-2</b>  |                                                                                     | <b>DIP8</b><br>Dual-channel version of the TLP228G<br>SEMKO-approved, High noise immunity | 3 mA         | 50 Ω      | 5 mA | 0.12 A       | 350 V | 2500 Vrms | ○/○                             |     |     | ○   | △   |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

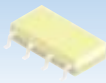
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## 5 Photorelays (1-Form-B, 2-Form-B and 1-Form-A/1-Form-B)

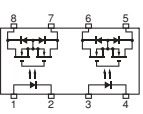
| Features              | Package                     |                                        |                            |  |  |  |  |  |  |
|-----------------------|-----------------------------|----------------------------------------|----------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       | Off-State Voltage (max) (V) | On-State Resistance (max) ( $\Omega$ ) | On-State Current (max) (A) |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| 1-Form-B, 2-Form-B    | 350                         | 25                                     | 0.12                       | <b>TLP4176G</b>                                                                   | <b>TLP4197G</b>                                                                   | <b>TLP4206G*</b>                                                                  |                                                                                     |                                                                                     |                                                                                     |
|                       |                             | 25                                     | 0.15                       |                                                                                   |                                                                                   |                                                                                   | <b>TLP4227G</b>                                                                     | <b>TLP4597G</b>                                                                     | <b>TLP4227G-2*</b>                                                                  |
| 1-Form-A/<br>1-Form-B | 350                         | 25                                     | 0.12                       |                                                                                   |                                                                                   | <b>TLP4026G*</b>                                                                  |                                                                                     |                                                                                     | <b>TLP4006G*</b>                                                                    |

\*: Dual-channel

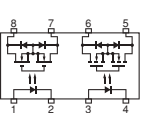
### MOSFET-Output Photorelays, 1-Form-B

| Part Number     | Pin Configuration                                                                   | Features                                  | IFT (Max) | RON (Max)   | @IF  | ION (Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-----------------|-------------------------------------------------------------------------------------|-------------------------------------------|-----------|-------------|------|-----------|-------|-----------|---------------------------------|-----|-----|-----|-----|
|                 |                                                                                     |                                           |           |             |      |           |       |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>TLP4176G</b> |    | <b>2.54SOP4</b><br>1-Form-B               | 3 mA      | 25 $\Omega$ | 0 mA | 0.12 A    | 350 V | 1500 Vrms | ○ /                             |     |     |     |     |
| <b>TLP4197G</b> |   | <b>2.54SOP6</b><br>1-Form-B               | 3 mA      | 25 $\Omega$ | 0 mA | 0.12 A    | 350 V | 1500 Vrms | ○ /                             |     |     |     |     |
| <b>TLP4227G</b> |  | <b>DIP4</b><br>1-Form-B<br>SEMKO-approved | 3 mA      | 25 $\Omega$ | 0 mA | 0.15 A    | 350 V | 2500 Vrms | ○ /                             |     |     |     |     |
| <b>TLP4597G</b> |  | <b>DIP6</b><br>1-Form-B<br>SEMKO-approved | 3 mA      | 25 $\Omega$ | 0 mA | 0.15 A    | 350 V | 2500 Vrms | ○ /                             |     |     |     |     |

### MOSFET-Output Photorelays, 2-Form-B

| Part Number       | Pin Configuration                                                                   | Features                                                                          | IFT (Max) | RON (Max)   | @IF  | ION (Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------|-------------|------|-----------|-------|-----------|---------------------------------|-----|-----|-----|-----|
|                   |                                                                                     |                                                                                   |           |             |      |           |       |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>TLP4206G</b>   |  | <b>2.54SOP8</b><br>Dual-channel version of the TLP4176G<br>2-Form-B               | 3 mA      | 25 $\Omega$ | 0 mA | 0.12 A    | 350 V | 1500 Vrms | ○ /                             |     |     |     |     |
| <b>TLP4227G-2</b> |                                                                                     | <b>DIP8</b><br>Dual-channel version of the TLP4227G<br>2-Form-B<br>SEMKO-approved | 3 mA      | 25 $\Omega$ | 0 mA | 0.15 A    | 350 V | 2500 Vrms | ○ /                             |     |     |     |     |

### MOSFET-Output Photorelays, 1-Form-A/1-Form-B

| Part Number     | Pin Configuration                                                                   | Features                              | IFT (Max) | RON (Max)   | @IF                                  | ION (Max) | VOFF  | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-----------------|-------------------------------------------------------------------------------------|---------------------------------------|-----------|-------------|--------------------------------------|-----------|-------|-----------|---------------------------------|-----|-----|-----|-----|
|                 |                                                                                     |                                       |           |             |                                      |           |       |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>TLP4026G</b> |  | <b>2.54SOP8</b><br>1a1b (N.C. + N.O.) | 3 mA      | 25 $\Omega$ | (Form-A)<br>5 mA<br>(Form-B)<br>0 mA | 0.12 A    | 350 V | 1500 Vrms | ○ /                             |     |     |     |     |
| <b>TLP4006G</b> |                                                                                     | <b>DIP8</b><br>1a1b (N.C. + N.O.)     | 3 mA      | 25 $\Omega$ | (Form-A)<br>5 mA<br>(Form-B)<br>0 mA | 0.12 A    | 350 V | 2500 Vrms | △ /                             |     |     |     |     |

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

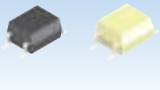
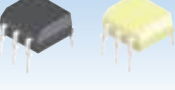
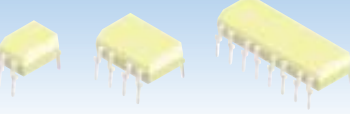
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.



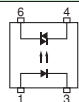
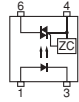
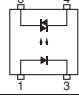
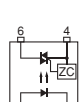
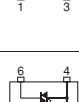
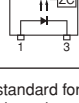
# 4 Selection Guide

## 6 Triac-Output Photocouplers

| Package          |                   |  |                                          |  |                                                      |  |                    |
|------------------|-------------------|-----------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------|
|                  |                   | MFSOP6                                                                            |                                          | DIP6                                                                              |                                                      | DIP4/8/16                                                                           |                    |
| V <sub>DRM</sub> | Isolation voltage | NZC                                                                               | ZC                                       | NZC                                                                               | ZC                                                   | NZC                                                                                 | ZC                 |
| 400 V            | 2500 Vrms         | TLP160G                                                                           | TLP161G                                  | TLP560G                                                                           | TLP561G                                              | TLP525G/-2/-4                                                                       |                    |
|                  | 5000 Vrms         |                                                                                   |                                          | TLP3022(S)<br>TLP3023(S)                                                          | TLP3042(S)<br>TLP3043(S)                             |                                                                                     |                    |
| 600 V            | 2500 Vrms         | TLP160J<br>TLP165J                                                                | TLP161J<br>TLP163J<br>TLP166J<br>TLP168J | TLP560J                                                                           | TLP561J                                              |                                                                                     |                    |
|                  | 3000 Vrms         | TLP260J                                                                           | TLP261J                                  |                                                                                   |                                                      |                                                                                     |                    |
|                  | 3750 Vrms         |                                                                                   |                                          |                                                                                   |                                                      |                                                                                     |                    |
|                  | 4000 Vrms         |                                                                                   |                                          | TLP762J                                                                           | TLP763J                                              |                                                                                     |                    |
|                  | 5000 Vrms         |                                                                                   |                                          | TLP3052(S)                                                                        | TLP3762(S)<br>TLP3062(S)<br>TLP3063(S)<br>TLP3064(S) | TLP360J                                                                             | TLP361J<br>TLP363J |
| 800 V            | 5000 Vrms         |                                                                                   |                                          |                                                                                   | TLP3082(S)<br>TLP3782(S)<br>TLP3783(S)               |                                                                                     |                    |

NZC: Non-zero cross  
ZC: Zero cross

### Triac-Output Photocouplers for Solid State Relays (SSRs)

| Part Number        | Pin Configuration                                                                   | Features                                                                             | IFT (Max) |       | V <sub>TM</sub> (Max) |                  | V <sub>DRM</sub> | BV <sub>S</sub> | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|--------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------|-------|-----------------------|------------------|------------------|-----------------|---------------------------------|------------------|------------------|-----|-----|
|                    |                                                                                     |                                                                                      | Rank      |       |                       | @I <sub>TM</sub> |                  |                 | UL/c-UL                         | TÜV              | VDE              | BSI | IEC |
| TLP160G            |  | MFSOP6<br>Non-zero cross                                                             | —         | 10 mA | 2.8 V                 | 70 mA            | 400 V            | 2500 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
|                    |                                                                                     |                                                                                      | IFT7      | 7 mA  |                       |                  |                  |                 |                                 |                  |                  |     |     |
|                    |                                                                                     |                                                                                      | IFT5      | 5 mA  |                       |                  |                  |                 |                                 |                  |                  |     |     |
| TLP161G            |  | MFSOP6<br>Zero cross                                                                 | —         | 10 mA | 2.8 V                 | 70 mA            | 400 V            | 2500 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
|                    |                                                                                     |                                                                                      | IFT7      | 7 mA  |                       |                  |                  |                 |                                 |                  |                  |     |     |
|                    |                                                                                     |                                                                                      | IFT5      | 5 mA  |                       |                  |                  |                 |                                 |                  |                  |     |     |
| TLP160J<br>TLP165J |  | MFSOP6<br>Non-zero cross                                                             | —         | 10 mA | 2.8 V                 | 70 mA            | 600 V            | 2500 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
|                    |                                                                                     |                                                                                      | IFT7      | 7 mA  |                       |                  |                  |                 |                                 |                  |                  |     |     |
| TLP161J<br>TLP166J |  | MFSOP6<br>Zero cross                                                                 | —         | 10 mA | 2.8 V                 | 70 mA            | 600 V            | 2500 Vrms       | ○/○                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
|                    |                                                                                     |                                                                                      | IFT7      | 7 mA  |                       |                  |                  |                 |                                 |                  |                  |     |     |
| TLP168J            |  | MFSOP6<br>Zero cross<br>Low trigger current                                          | —         | 3 mA  | 2.8 V                 | 70 mA            | 600 V            | 2500 Vrms       | ○/○                             |                  | ○ <sup>(1)</sup> |     |     |
| TLP163J            |  | MFSOP6<br>Zero cross<br>High impulse noise immunity<br>V <sub>N</sub> =2000 V (typ.) | —         | 10 mA | 2.8 V                 | 100 mA           | 600 V            | 2500 Vrms       | ○/○                             | △ <sup>(1)</sup> | △ <sup>(1)</sup> |     |     |

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

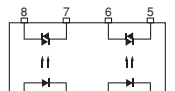
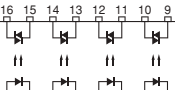
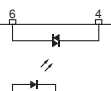
## Triac-Output Photocouplers for Solid State Relays (SSRs) (Continued)

| Part Number    | Pin Configuration                                                                 | Features                        | I <sub>FT</sub> (Max) |       | V <sub>TM</sub> (Max) |                  | V <sub>DRM</sub> | BV <sub>s</sub>       | Safety Standards <sup>(2)</sup> |                  |                  |     |     |
|----------------|-----------------------------------------------------------------------------------|---------------------------------|-----------------------|-------|-----------------------|------------------|------------------|-----------------------|---------------------------------|------------------|------------------|-----|-----|
|                |                                                                                   |                                 | Rank                  |       |                       | @I <sub>TM</sub> |                  |                       | UL/c-UL                         | TÜV              | VDE              | BSI | IEC |
| <b>TLP260J</b> |  | <b>MFSOP6</b><br>Non-zero cross | –                     | 10 mA | 2.8 V                 | 70 mA            | 600 V            | 3000 V <sub>rms</sub> | ○ /                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |
| <b>TLP261J</b> |  | <b>MFSOP6</b><br>Zero cross     | –                     | 10 mA | 2.8 V                 | 70 mA            | 600 V            | 3000 V <sub>rms</sub> | ○ /                             | △ <sup>(1)</sup> | ○ <sup>(1)</sup> |     |     |

## Triac-Output Photocouplers for Office Equipment

| Part Number                       | Pin Configuration                                                                  | Features                                                                                   | I <sub>FT</sub> (Max) |       | V <sub>TM</sub> (Max) |                  | V <sub>DRM</sub> | BV <sub>s</sub>       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-----------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------|-------|-----------------------|------------------|------------------|-----------------------|---------------------------------|-----|-----|-----|-----|
|                                   |                                                                                    |                                                                                            | Rank                  |       |                       | @I <sub>TM</sub> |                  |                       | UL/c-UL                         | TÜV | VDE | BSI | IEC |
| <b>TLP360J</b><br><b>TLP360JF</b> |   | <b>DIP4</b><br>Non-zero cross                                                              | –                     | 10 mA | 2.8 V                 | 70 mA            | 600 V            | 5000 V <sub>rms</sub> | ○ / ○                           | ○   | ○   |     |     |
|                                   |                                                                                    |                                                                                            | IFT7                  | 7 mA  |                       |                  |                  |                       |                                 |     |     |     |     |
| <b>TLP361J</b><br><b>TLP361JF</b> |   | <b>DIP4</b><br>Zero cross                                                                  | –                     | 10 mA | 2.8 V                 | 70 mA            | 600 V            | 5000 V <sub>rms</sub> | ○ / ○                           | ○   | ○   |     |     |
|                                   |                                                                                    |                                                                                            | IFT7                  | 7 mA  |                       |                  |                  |                       |                                 |     |     |     |     |
| <b>TLP363J</b><br><b>TLP363JF</b> |  | <b>DIP4</b><br>Zero cross<br>High impulse noise immunity<br>V <sub>N</sub> = 2000 V (typ.) | –                     | 10 mA | 2.8 V                 | 70 mA            | 600 V            | 5000 V <sub>rms</sub> | ○ / ○                           | ○   | ○   |     |     |

## Triac-Output Photocouplers for AC 100 to 120 V Lines

| Part Number      | Pin Configuration                                                                   | Features                                           | I <sub>FT</sub> (Max) |       | V <sub>TM</sub> (Max) |                  | V <sub>DRM</sub> | BV <sub>s</sub>       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------|-------|-----------------------|------------------|------------------|-----------------------|---------------------------------|-----|-----|-----|-----|
|                  |                                                                                     |                                                    | Rank                  |       |                       | @I <sub>TM</sub> |                  |                       | UL/c-UL                         | TÜV | VDE | BSI | IEC |
| <b>TLP525G</b>   |  | <b>DIP4</b>                                        | –                     | 10 mA | 3 V                   | 100 mA           | 400 V            | 2500 V <sub>rms</sub> | ○ / ○                           |     |     |     |     |
| <b>TLP525G-2</b> |  | <b>DIP8</b><br>Dual-channel version of the TLP525G | –                     | 10 mA | 3 V                   | 100 mA           | 400 V            | 2500 V <sub>rms</sub> | ○ / ○                           |     |     |     |     |
| <b>TLP525G-4</b> |  | <b>DIP16</b><br>4-channel version of the TLP525G   | –                     | 10 mA | 3 V                   | 100 mA           | 400 V            | 2500 V <sub>rms</sub> | ○ / ○                           |     |     |     |     |
| <b>TLP560G</b>   |  | <b>DIP6</b><br>General-purpose<br>Non-zero cross   | –                     | 10 mA | 3 V                   | 100 mA           | 400 V            | 2500 V <sub>rms</sub> | ○ / ○                           |     | ○   |     |     |
|                  |                                                                                     |                                                    | IFT7                  | 7 mA  |                       |                  |                  |                       |                                 |     |     |     |     |
|                  |                                                                                     |                                                    | IFT5                  | 5 mA  |                       |                  |                  |                       |                                 |     |     |     |     |

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## Triac-Output Photocouplers for AC 100 to 120 V Lines (Continued)

| Part Number               | Pin Configuration | Features                                                                                       | IFT (Max) |       | V <sub>TM</sub> (Max) |                  | V <sub>DRM</sub> | BV <sub>s</sub>       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|---------------------------|-------------------|------------------------------------------------------------------------------------------------|-----------|-------|-----------------------|------------------|------------------|-----------------------|---------------------------------|-----|-----|-----|-----|
|                           |                   |                                                                                                | Rank      |       |                       | @I <sub>TM</sub> |                  |                       | UL/c-UL                         | TÜV | VDE | BSI | IEC |
| TLP561G                   |                   | <b>DIP6</b><br>General-purpose<br>Zero cross                                                   | –         | 10 mA | 3 V                   | 100 mA           | 400 V            | 2500 V <sub>rms</sub> | ○/○                             |     | ○   |     |     |
|                           |                   |                                                                                                | IFT7      | 7 mA  |                       |                  |                  |                       |                                 |     |     |     |     |
|                           |                   |                                                                                                | IFT5      | 5 mA  |                       |                  |                  |                       |                                 |     |     |     |     |
| TLP3022(S)<br>TLP3022F(S) |                   | <b>DIP6</b><br>Direct replacement<br>for XXX3020/3021/3022<br>SEMKO-approved<br>Non-zero cross | –         | 10 mA | 3 V                   | 100 mA           | 400 V            | 5000 V <sub>rms</sub> | ○/○                             | △   | ○   | ◎   | △   |
| TLP3023(S)<br>TLP3023F(S) |                   | <b>DIP6</b><br>Direct replacement<br>for XXX3023<br>SEMKO-approved<br>Non-zero cross           | –         | 5 mA  | 3 V                   | 100 mA           | 400 V            | 5000 V <sub>rms</sub> | ○/○                             | △   | ○   | ◎   | △   |
| TLP3042(S)<br>TLP3042F(S) |                   | <b>DIP6</b><br>Direct replacement<br>for XXX3040/3041/3042<br>SEMKO-approved<br>Zero cross     | –         | 10 mA | 3 V                   | 100 mA           | 400 V            | 5000 V <sub>rms</sub> | ○/○                             | △   | ○   | ◎   | △   |
| TLP3043(S)<br>TLP3043F(S) |                   | <b>DIP6</b><br>Direct replacement<br>for XXX3043<br>SEMKO-approved<br>Zero cross               | –         | 5 mA  | 3 V                   | 100 mA           | 400 V            | 5000 V <sub>rms</sub> | ○/○                             | △   | ○   | ◎   | △   |

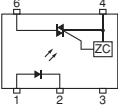
## Triac-Output Photocouplers for AC 200 to 240 V Line

| Part Number               | Pin Configuration | Features                                                                            | IFT (Max) |       | V <sub>TM</sub> (Max) |                  | V <sub>DRM</sub> | BV <sub>s</sub>       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|---------------------------|-------------------|-------------------------------------------------------------------------------------|-----------|-------|-----------------------|------------------|------------------|-----------------------|---------------------------------|-----|-----|-----|-----|
|                           |                   |                                                                                     | Rank      |       |                       | @I <sub>TM</sub> |                  |                       | UL/c-UL                         | TÜV | VDE | BSI | IEC |
| TLP560J                   |                   | <b>DIP6</b><br>General-purpose<br>Non-zero cross                                    | –         | 10 mA | 3 V                   | 100 mA           | 600 V            | 2500 V <sub>rms</sub> | ○/○                             |     | ○   |     |     |
|                           |                   |                                                                                     | IFT7      | 7 mA  |                       |                  |                  |                       |                                 |     |     |     |     |
| TLP561J                   |                   | <b>DIP6</b><br>General-purpose<br>Zero cross                                        | –         | 10 mA | 3 V                   | 100 mA           | 600 V            | 2500 V <sub>rms</sub> | ○/○                             |     | ○   |     |     |
|                           |                   |                                                                                     | IFT7      | 7 mA  |                       |                  |                  |                       |                                 |     |     |     |     |
| TLP762J<br>TLP762JF       |                   | <b>DIP6</b><br>Internal creepage: 4 mm (min)<br>SEMKO-approved<br>Non-zero cross-on | –         | 10 mA | 3 V                   | 100 mA           | 600 V            | 4000 V <sub>rms</sub> | ○/○                             | △   | ○   | ◎   | △   |
| TLP763J<br>TLP763JF       |                   | <b>DIP6</b><br>Internal creepage: 4 mm (min)<br>SEMKO-approved<br>Zero cross        | –         | 10 mA | 3 V                   | 100 mA           | 600 V            | 4000 V <sub>rms</sub> | ○/○                             | △   | ○   | ◎   | △   |
| TLP3052(S)<br>TLP3052F(S) |                   | <b>DIP6</b><br>High V <sub>DRM</sub><br>SEMKO-approved<br>Non-zero cross-on         | –         | 10 mA | 3 V                   | 100 mA           | 600 V            | 5000 V <sub>rms</sub> | ○/○                             | △   | ○   | ◎   | △   |
| TLP3062(S)<br>TLP3062F(S) |                   | <b>DIP6</b><br>SEMKO-approved<br>High V <sub>DRM</sub><br>Zero cross                | –         | 10 mA | 3 V                   | 100 mA           | 600 V            | 5000 V <sub>rms</sub> | ○/○                             | △   | ○   | ◎   | △   |

Note 2: Legend in the Safety Standards column:

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 EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved  
 TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012  
 EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4  
 For the latest information, please contact your nearest Toshiba sales representative.

## Triac-Output Photocouplers for AC 200 to 240 V Line (Continued)

| Part Number                             | Pin Configuration                                                                 | Features                                                                                   | IFT (Max) |       | V <sub>TM</sub> (Max) |                  | V <sub>DRM</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-----------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------|-------|-----------------------|------------------|------------------|-----------------|---------------------------------|-----|-----|-----|-----|
|                                         |                                                                                   |                                                                                            | Rank      |       |                       | @I <sub>TM</sub> |                  |                 | UL/c-UL                         | TÜV | VDE | BSI | IEC |
| <b>TLP3063(S)</b><br><b>TLP3063F(S)</b> |  | <b>DIP6</b><br>SEMKO-approved<br>High V <sub>DRM</sub><br>Zero cross                       | –         | 5 mA  | 3 V                   | 100 mA           | 600 V            | 5000 Vrms       | ○/○                             | △   | ○   | ◎   | △   |
| <b>TLP3064(S)</b><br><b>TLP3064F(S)</b> |                                                                                   | <b>DIP6</b><br>SEMKO-approved<br>Low trigger current<br>Zero cross                         | –         | 3 mA  | 3 V                   | 100 mA           | 600 V            | 5000 Vrms       | ○/○                             | △   | ○   | ◎   | △   |
| <b>TLP3762(S)</b><br><b>TLP3762F(S)</b> |                                                                                   | <b>DIP6</b><br>Zero cross<br>High impulse noise immunity<br>V <sub>N</sub> = 2000 V (typ.) | –         | 10 mA | 3 V                   | 100 mA           | 600 V            | 5000 Vrms       | ○/○                             | △   | ○   |     |     |
| <b>TLP3082(S)</b><br><b>TLP3082F(S)</b> |                                                                                   | <b>DIP6</b><br>Zero cross                                                                  | –         | 10 mA | 3 V                   | 100 mA           | 800 V            | 5000 Vrms       | ○/○                             | △   | ○   |     |     |
| <b>TLP3782(S)</b><br><b>TLP3782F(S)</b> |                                                                                   | <b>DIP6</b><br>High impulse noise immunity<br>V <sub>N</sub> = 1500 V (typ.)<br>Zero cross | –         | 10 mA | 3 V                   | 100 mA           | 800 V            | 5000 Vrms       | ○/○                             | △   | ○   |     |     |
| <b>TLP3783(S)</b><br><b>TLP3783F(S)</b> |                                                                                   |                                                                                            | –         | 5 mA  | 3 V                   | 100 mA           | 800 V            | 5000 Vrms       | ○/○                             | △   | ○   |     |     |

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

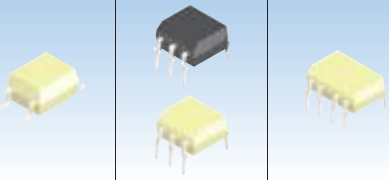
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

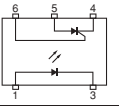
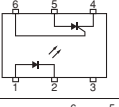
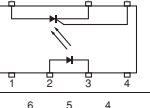
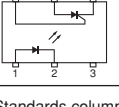
## 7 Thyristor-Output Photocouplers

| Package          |                   |  |                |                |
|------------------|-------------------|-------------------------------------------------------------------------------------|----------------|----------------|
| Features         |                   |                                                                                     |                |                |
| V <sub>DRM</sub> | Isolation voltage | MFSOP6                                                                              | DIP6           | DIP8           |
| 400 V            | 2500 Vrms         | <b>TLP148G</b>                                                                      |                |                |
| 600 V            | 2500 Vrms         |                                                                                     | <b>TLP548J</b> | <b>TLP549J</b> |
|                  | 4000 Vrms         |                                                                                     | <b>TLP748J</b> |                |

### Replacement Devices

| New Device     | Discontinued Devices |                  |                  |
|----------------|----------------------|------------------|------------------|
| <b>TLP148G</b> | <b>TLP141G</b>       |                  |                  |
| <b>TLP548J</b> | <b>TLP541G</b>       | <b>TLP545J</b>   |                  |
| <b>TLP549J</b> | <b>TLP542G</b>       | <b>TLP543J</b>   |                  |
| <b>TLP748J</b> | <b>TLP641G/J</b>     | <b>TLP741G/J</b> | <b>TLP747G/J</b> |

The new and discontinued devices are not exactly identical in terms of electrical characteristics. For device replacement, hardware evaluation must be performed in the real-world environment.

| Part Number                       | Pin Configuration                                                                   | Features                                         | IFT   | V <sub>TM</sub> |                  | V <sub>DRM</sub> | BV <sub>s</sub> | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-----------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------|-------|-----------------|------------------|------------------|-----------------|---------------------------------|-----|-----|-----|-----|
|                                   |                                                                                     |                                                  | Max   | Max             | @I <sub>TM</sub> |                  |                 | UL/cUL                          | TÜV | VDE | BSI | IEC |
| <b>TLP148G</b>                    |  | <b>MFSOP6</b>                                    | 10 mA | 1.45 V          | 100 mA           | 400 V            | 2500 Vrms       | ○/○                             |     |     |     |     |
| <b>TLP548J</b>                    |  | <b>DIP6</b><br>Low trigger current               | 7 mA  | 1.45 V          | 100 mA           | 600 V            | 2500 Vrms       | ○/△                             |     |     |     |     |
| <b>TLP549J</b>                    |  | <b>DIP8</b><br>Long anode-cathode distance (SCR) | 7 mA  | 1.45 V          | 100 mA           | 600 V            | 2500 Vrms       | ○/△                             |     |     |     |     |
| <b>TLP748J</b><br><b>TLP748JF</b> |  | <b>DIP6</b>                                      | 10 mA | 1.45 V          | 100 mA           | 600 V            | 4000 Vrms       | ○/○                             |     | ○   | ◎   |     |

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

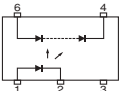
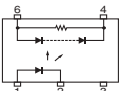
For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## 8 Photovoltaic-Output photocouplers

| Package               |              |  |  |  |
|-----------------------|--------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Features              |              |                                                                                   |                                                                                   |                                                                                   |
| Short-Circuit Current | Open Voltage | SSOP4                                                                             | MFSOP6                                                                            | DIP6                                                                              |
|                       |              | 1500 Vrms                                                                         | 2500 Vrms                                                                         |                                                                                   |
| 5 $\mu$ A             | 7 V          | TLP3904                                                                           | TLP3902                                                                           |                                                                                   |
| 12 $\mu$ A            | 7 V          |                                                                                   | TLP190B                                                                           | TLP590B                                                                           |
| 20 $\mu$ A            | 7 V          | TLP3914                                                                           |                                                                                   |                                                                                   |
| 24 $\mu$ A            | 7 V          |                                                                                   | TLP191B*                                                                          | TLP591B*                                                                          |
| 4 $\mu$ A             | 30 V         | TLP3924                                                                           |                                                                                   |                                                                                   |

\*Built-in shunt resistor

| Part Number | Pin Configuration                                                                   | Features                           | Short-Circuit Current |            |                 | Open-Circuit Voltage |                 | BVs       | Safety Standards <sup>(2)</sup> |     |     |     |     |
|-------------|-------------------------------------------------------------------------------------|------------------------------------|-----------------------|------------|-----------------|----------------------|-----------------|-----------|---------------------------------|-----|-----|-----|-----|
|             |                                                                                     |                                    | Rank                  | Min        | @I <sub>F</sub> | Min                  | @I <sub>F</sub> |           | UL/cUL                          | TÜV | VDE | BSI | IEC |
| TLP190B     |    | MFSOP6                             | —                     | 12 $\mu$ A | 10 mA           | 7 V                  | 10 mA           | 2500 Vrms | ○/○                             |     |     |     |     |
| TLP191B     |  | MFSOP6<br>Built-in shunt resistor  | —                     | 24 $\mu$ A | 20 mA           | 7 V                  | 20 mA           | 2500 Vrms | ○/○                             |     |     |     |     |
| TLP590B     |  | DIP6                               | —                     | 12 $\mu$ A | 10 mA           | 7 V                  | 10 mA           | 2500 Vrms | ○/                              |     |     |     |     |
|             |                                                                                     |                                    | C20                   | 20 $\mu$ A |                 |                      |                 |           |                                 |     |     |     |     |
| TLP591B     |  | DIP6<br>Built-in shunt resistor    | —                     | 24 $\mu$ A | 20 mA           | 7 V                  | 20 mA           | 2500 Vrms | ○/                              |     |     |     |     |
| TLP3902     |  | MFSOP6                             | —                     | 5 $\mu$ A  | 10 mA           | 7 V                  | 10 mA           | 2500 Vrms | ○/○                             |     |     |     |     |
| TLP3904     |  | SSOP4                              | —                     | 5 $\mu$ A  | 10 mA           | 7 V                  | 10 mA           | 1500 Vrms | ○/                              |     |     |     |     |
| TLP3914     |                                                                                     | SSOP4                              | —                     | 20 $\mu$ A | 10 mA           | 7 V                  | 10 mA           | 1500 Vrms | ○/                              |     |     |     |     |
| TLP3924     |                                                                                     | SSOP4<br>High open-circuit voltage | —                     | 4 $\mu$ A  | 10 mA           | 30 V                 | 10 mA           | 1500 Vrms | ○/                              |     |     |     |     |

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 5 Part Naming Conventions

## 1. Transistor-Output, Darlington-Transistor-Output and IC-Output Photocouplers

**TLP**     **F** (   -    -    ,  , **F** )

Part number

Wide-spaced leads  
Specify this option, if necessary.

Safety standard option

CTR rank  
See respective datasheets.

RoHS COMPATIBLE\*

Revision code  
The revision code may be added to identify a revision of a device. For details, contact your nearest Toshiba sales representative.

Lead form option for DIP packages  
Select one of the lead form options shown on page 44.

Carrier tape option  
Select one of the carrier tape options shown on pages 56.

Example 1: **TLP781(D4-GB-TP6,F**  
 [D4] = EN60747-5-2 option  
 [GB] = CTR rank  
 [TP6] = LF6 lead form  
 Tape-and-reel packing  
 [,F] = RoHS COMPATIBLE\*  
 The right parenthesis is omitted due to the limit to the number of characters.

Example 2: **TLP781F(GR,F)**  
 [F] = Wide-spaced leads  
 [GR] = CTR rank  
 [,F] = RoHS COMPATIBLE\*

## 2. Triac-Output and Thyristor-Output Photocouplers

**TLP**      **F** (   -    -    ,  , **F** )

Part number

V<sub>DRM</sub>  
 G: 400 V  
 J: 600 V  
 L: 800 V

Wide-spaced leads

Safety standard option

IFT rank  
 No character: No IFT rank specified  
 IFTx: For example, IFT5 denotes the 5-mA rank.  
 The available IFT ranks differ from product to product.  
 See datasheets.

RoHS COMPATIBLE\*

Revision code

Lead form option for DIP packages  
Carrier tape option

Example 3: **TLP361J(D4-IFT7-TP1,S,F)**  
**TLP361J(D4T7TP1S,F)**  
 (Abbreviated due to the limit to the number of characters.)  
 [J] = V<sub>DRM</sub>: 600 V  
 [D4] = EN60747-5-2 option  
 [IFT7] = [T7] = IFT = 7 mA  
 [TP1] = LF1 lead form  
 Tape-and-reel packing  
 [,S] = [S] = Revision code: S  
 [,F] = RoHS COMPATIBLE\*

## 3. Photorelays

**TLP**      **F** (   -    ,  , **F** )

Part number

V<sub>OFF</sub>  
 A: 60 V  
 D: 200 V  
 G: 350 V  
 GA: 400 V  
 J: 600 V  
 Some photorelays do not have a V<sub>OFF</sub> code in their names.  
 See respective datasheets.

Wide-spaced leads

Safety standard option

RoHS COMPATIBLE\*

Revision code

Lead form option for DIP packages  
Carrier tape option

Example 4: **TLP227A(TP1,F)**  
 [A] = V<sub>OFF</sub>: 60 V  
 [TP1] = LF1 lead form  
 Tape-and-reel packing  
 [,F] = RoHS COMPATIBLE\*

Example 5: **TLP3110(TP,F)**  
 [TP] = Tape-and-reel packing  
 [,F] = RoHS COMPATIBLE\*

\*: "F" identifies the indication of product Labels with "[[G]]/RoHS COMPATIBLE".

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.  
 The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

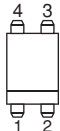
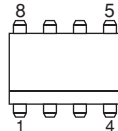
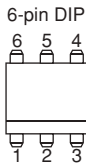
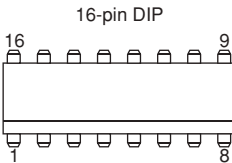
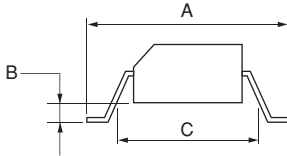
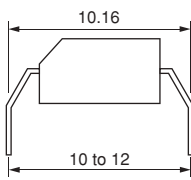
Note: The length of part names is limited to 18 characters. Longer names are abbreviated by omitting the "-" character and/or using shorthand symbols. However, be sure to give full part names when you have any inquiries. For details, please contact your nearest Toshiba sales representative.



# 6 Package Information

## 1 Lead Form Options for DIP Packages

The **DIP4**, **DIP6**, **DIP8** and **DIP16** packages offer three surface-mount lead form options and a wide-spaced lead form option. The electrical characteristics are identical, regardless of these options.

| Lead Form         | Surface-Mount                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                   |                                                                                     | Wide-Spaced                                                                         |       |      |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|------|-------|--|-------|--|-----|-----|-----|-----|-----|-----|---|---|------|---|------|---|------|---|-------------|--|-------------|--|---|-----|---|-----|---|-----|---|-----|---|--------------------------------------------------------------------------------------|
| Appearance        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |       |      |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |
| Lead Form Code    | (LF1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (LF4)                                                                             | (LF5)                                                                               | (LF2)                                                                               |       |      |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |
| Carrier Tape Code | (TP1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (TP4)                                                                             | (TP5)                                                                               | Not available*                                                                      |       |      |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |
| Package Outlines  | <div><div><p>4-pin DIP</p></div><div><p>8-pin DIP</p></div><div><p>6-pin DIP</p></div><div><p>16-pin DIP</p></div><div><p>Dimensions</p></div></div> <div><p>Unit: mm</p><table><thead><tr><th rowspan="2">Version</th><th colspan="2">(LF1)</th><th colspan="2">(LF4)</th><th colspan="2">(LF5)</th></tr><tr><th>Min</th><th>Max</th><th>Min</th><th>Max</th><th>Min</th><th>Max</th></tr></thead><tbody><tr><td>A</td><td>—</td><td>10.0</td><td>—</td><td>12.0</td><td>—</td><td>10.0</td></tr><tr><td>B</td><td colspan="2">(0.35 typ.)</td><td colspan="2">(0.25 typ.)</td><td>—</td><td>0.2</td></tr><tr><td>C</td><td>6.4</td><td>—</td><td>8.0</td><td>—</td><td>6.4</td><td>—</td></tr></tbody></table><p>All other package dimensions are the same as for each standard package specification.</p></div> |                                                                                   |                                                                                     | Version                                                                             | (LF1) |      | (LF4) |  | (LF5) |  | Min | Max | Min | Max | Min | Max | A | — | 10.0 | — | 12.0 | — | 10.0 | B | (0.35 typ.) |  | (0.25 typ.) |  | — | 0.2 | C | 6.4 | — | 8.0 | — | 6.4 | — |  |
| Version           | (LF1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                   | (LF4)                                                                               |                                                                                     | (LF5) |      |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |
|                   | Min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Max                                                                               | Min                                                                                 | Max                                                                                 | Min   | Max  |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |
| A                 | —                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 10.0                                                                              | —                                                                                   | 12.0                                                                                | —     | 10.0 |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |
| B                 | (0.35 typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                   | (0.25 typ.)                                                                         |                                                                                     | —     | 0.2  |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |
| C                 | 6.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | —                                                                                 | 8.0                                                                                 | —                                                                                   | 6.4   | —    |       |  |       |  |     |     |     |     |     |     |   |   |      |   |      |   |      |   |             |  |             |  |   |     |   |     |   |     |   |     |   |                                                                                      |

\* Tape-and-reel packing is not available with (LF2).

Example 1: Standard part: TLP620(F)

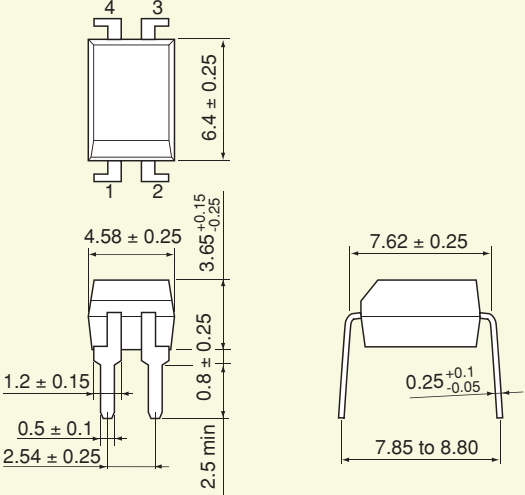
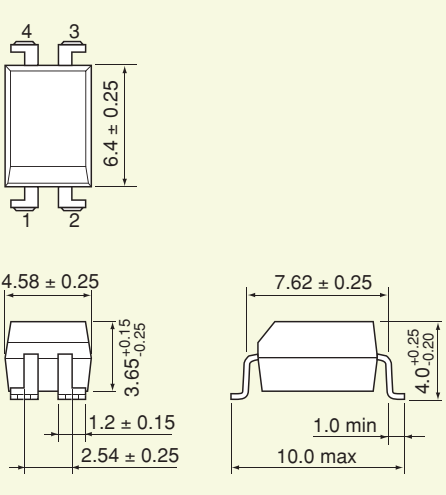
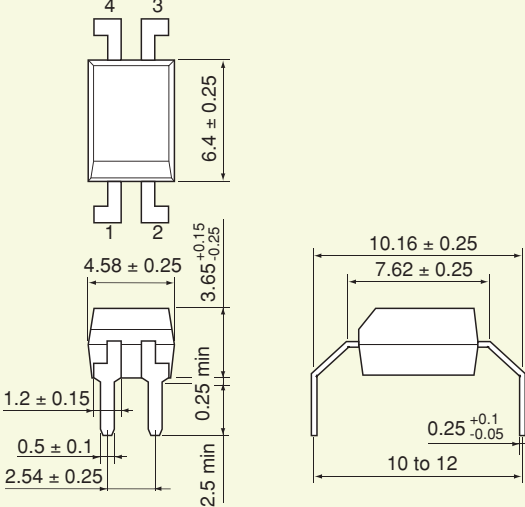
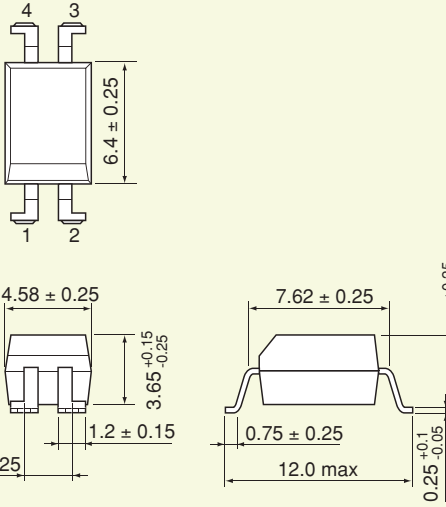
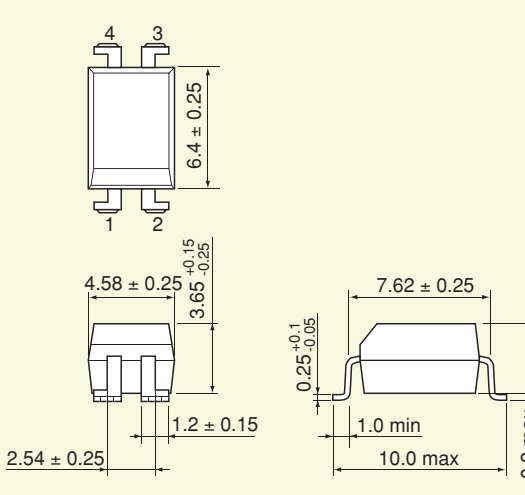
Surface-mount option: TLP620(LF1,F): Packed in stick magazines (see page 54).

Surface-mount and tape-and-reel options: TLP620(TP1,F): Packed in tape-and-reel (see page 56).

- Standard part names should be used when applying for safety standard approval.
- The package dimensions and lead form options of the TLP781, TLP785 differ from those shown above. See the TLP781, TLP785 datasheet.

\*All dimensions are for reference only unless tolerance is given.

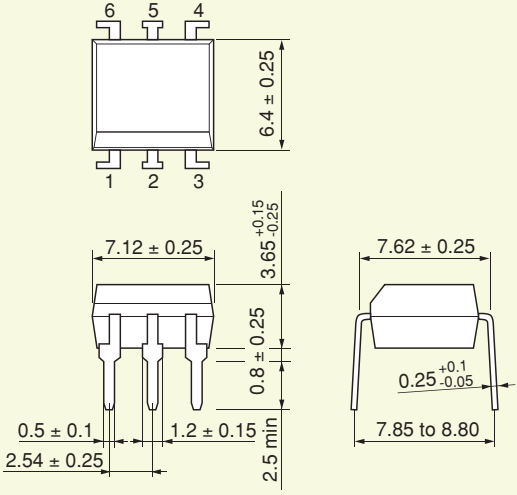
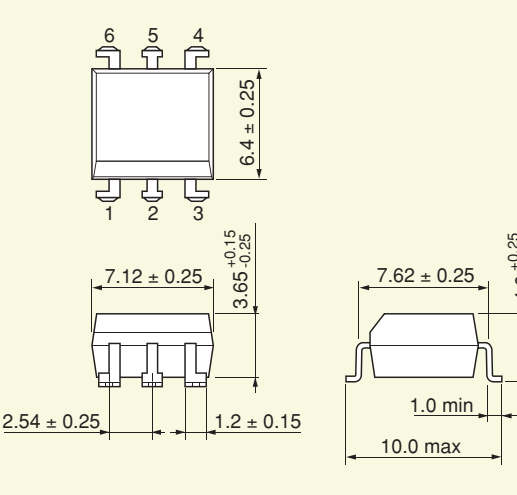
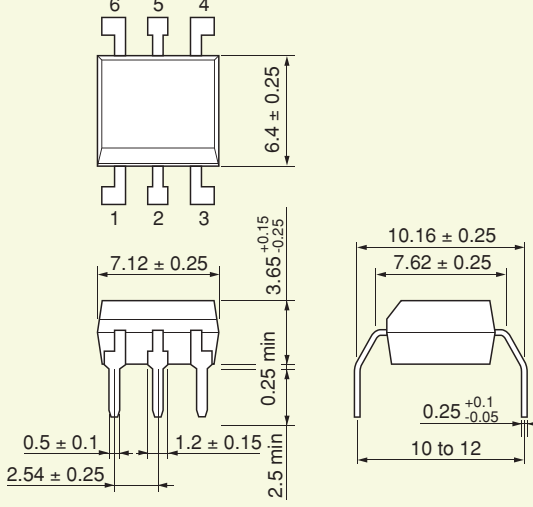
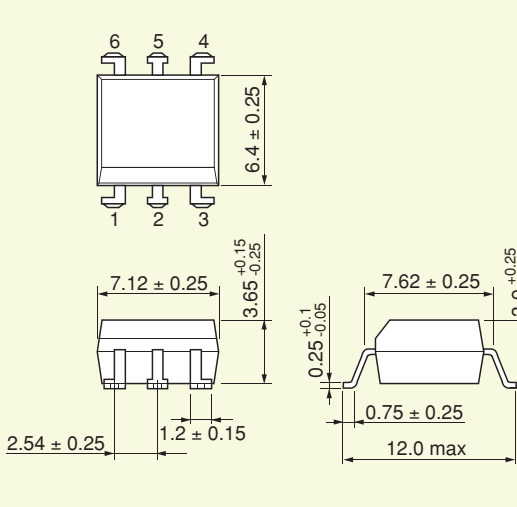
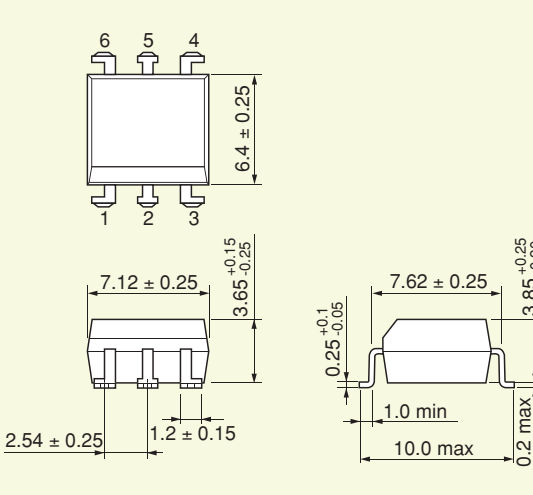
## 2 Package Dimensions (4-Pin DIP)

| Standard<br>DIP4                                                                                    | DIP4 (LF1) / (TP1)                                                                                  |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <p>Unit: mm</p>    | <p>Unit: mm</p>   |
| DIP4 (LF2)                                                                                          | DIP4 (LF4) / (TP4)                                                                                  |
| <p>Unit: mm</p>   | <p>Unit: mm</p>  |
| DIP4 (LF5) / (TP5)                                                                                  |                                                                                                     |
| <p>Unit: mm</p>  |                                                                                                     |

# 6 Package Information

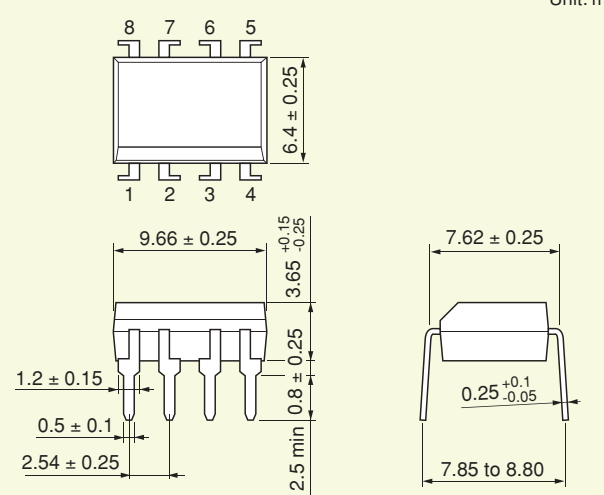
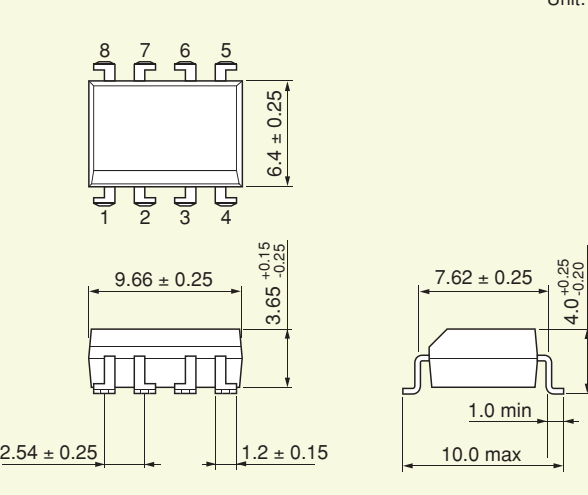
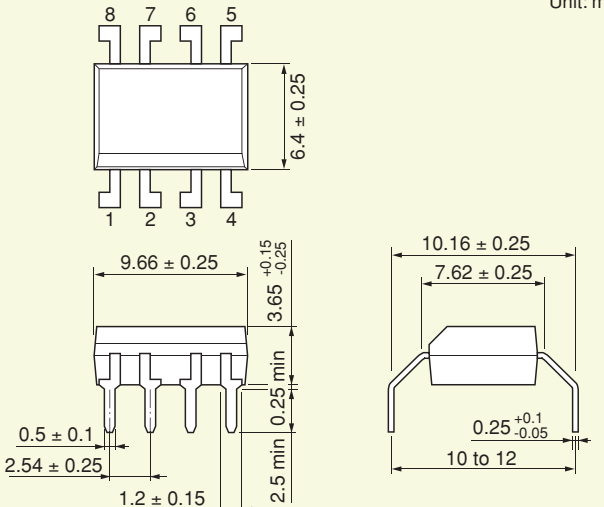
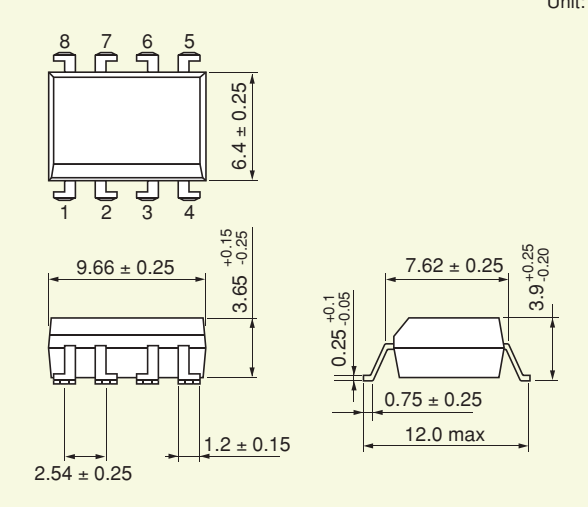
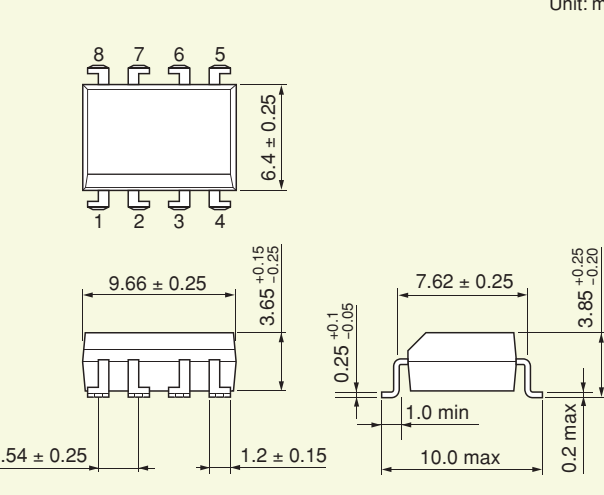
\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (6-Pin DIP)

| Standard DIP6                                                                                       | DIP6 (LF1) / (TP1)                                                                                   |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <p>Unit: mm</p>    | <p>Unit: mm</p>    |
| DIP6 (LF2)                                                                                          | DIP6 (LF4) / (TP4)                                                                                   |
| <p>Unit: mm</p>  | <p>Unit: mm</p>  |
| DIP6 (LF5) / (TP5)                                                                                  |                                                                                                      |
| <p>Unit: mm</p>  |                                                                                                      |

\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (8-Pin DIP)

| Standard <b>DIP8</b>                                                                                                                                                                                                                                                                                                               | <b>DIP8 (LF1) / (TP1)</b>                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Unit: mm</p>  <p>Dimensions: 6.4 ± 0.25, 9.66 ± 0.25, 3.65<sup>+0.15</sup><sub>-0.25</sub>, 7.62 ± 0.25, 0.8 ± 0.25, 2.5 min, 1.2 ± 0.15, 0.5 ± 0.1, 2.54 ± 0.25, 0.25<sup>+0.1</sup><sub>-0.05</sub>, 7.85 to 8.80.</p>                       | <p>Unit: mm</p>  <p>Dimensions: 6.4 ± 0.25, 9.66 ± 0.25, 3.65<sup>+0.15</sup><sub>-0.25</sub>, 7.62 ± 0.25, 4.0<sup>+0.25</sup><sub>-0.20</sub>, 1.0 min, 10.0 max, 2.54 ± 0.25, 1.2 ± 0.15.</p>                                           |
| <b>DIP8 (LF2)</b>                                                                                                                                                                                                                                                                                                                  | <b>DIP8 (LF4) / (TP4)</b>                                                                                                                                                                                                                                                                                                    |
| <p>Unit: mm</p>  <p>Dimensions: 6.4 ± 0.25, 9.66 ± 0.25, 3.65<sup>+0.15</sup><sub>-0.25</sub>, 10.16 ± 0.25, 7.62 ± 0.25, 0.25<sup>+0.1</sup><sub>-0.05</sub>, 10 to 12, 0.5 ± 0.1, 2.54 ± 0.25, 1.2 ± 0.15, 2.5 min, 0.25 min.</p>              | <p>Unit: mm</p>  <p>Dimensions: 6.4 ± 0.25, 9.66 ± 0.25, 3.65<sup>+0.15</sup><sub>-0.25</sub>, 7.62 ± 0.25, 3.9<sup>+0.25</sup><sub>-0.20</sub>, 0.75 ± 0.25, 12.0 max, 2.54 ± 0.25, 1.2 ± 0.15, 0.25<sup>+0.1</sup><sub>-0.05</sub>.</p> |
| <b>DIP8 (LF5) / (TP5)</b>                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                              |
| <p>Unit: mm</p>  <p>Dimensions: 6.4 ± 0.25, 9.66 ± 0.25, 3.65<sup>+0.15</sup><sub>-0.25</sub>, 7.62 ± 0.25, 3.85<sup>+0.25</sup><sub>-0.20</sub>, 1.0 min, 10.0 max, 0.2 max, 0.25<sup>+0.1</sup><sub>-0.05</sub>, 1.2 ± 0.15, 2.54 ± 0.25.</p> |                                                                                                                                                                                                                                                                                                                              |

# 6 Package Information

\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (Other DIP Packages)

| 5-pin DIP6       | 5-pin DIP6 (LF2) |
|------------------|------------------|
| <p>Unit: mm</p>  | <p>Unit: mm</p>  |
| 5-pin DIP6 (Cut) | DIP16            |
| <p>Unit: mm</p>  | <p>Unit: mm</p>  |

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# 6 Package Information

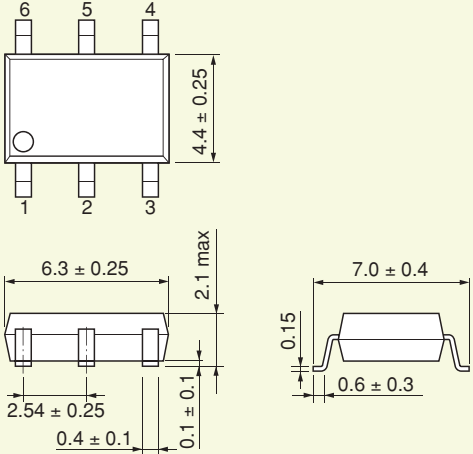
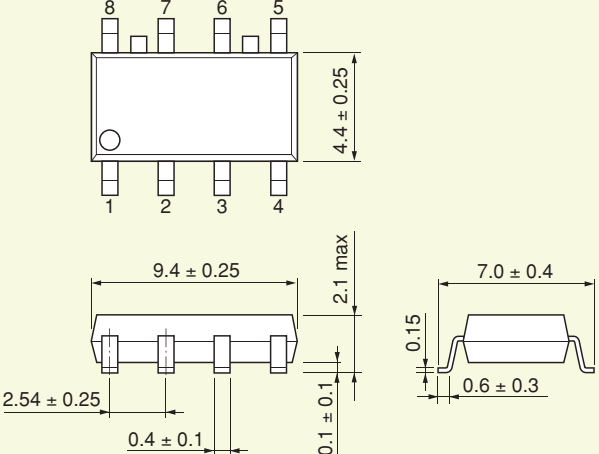
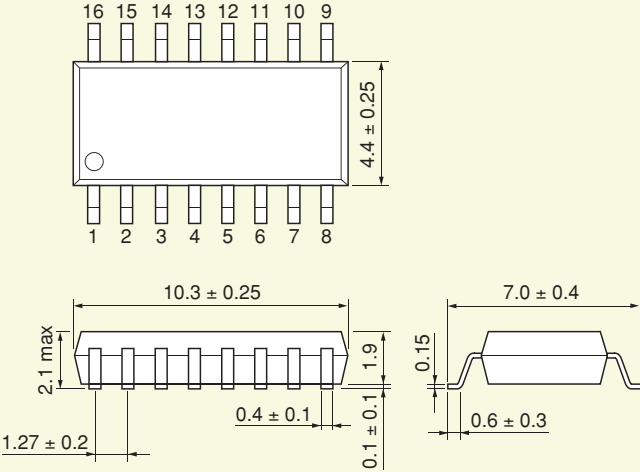
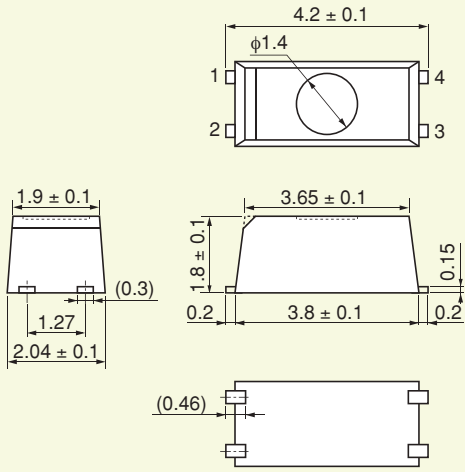
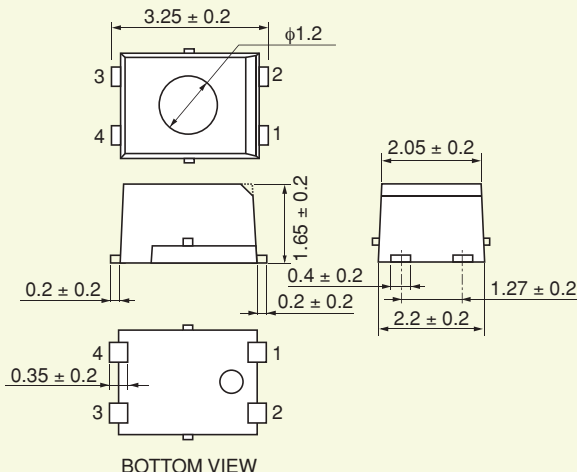
\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (Surface Mount)(Continued)

| SDIP6 (F type)  | 4-pin MFSOP6           |
|-----------------|------------------------|
| <p>Unit: mm</p> | <p>Unit: mm</p>        |
| 5-pin MFSOP6    | 4-pin MFSOP6 (No.5Cut) |
| <p>Unit: mm</p> | <p>Unit: mm</p>        |
| SOP4            | 2.54SOP4               |
| <p>Unit: mm</p> | <p>Unit: mm</p>        |

\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (Surface Mount)(Continued)

| 2.54SOP6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.54SOP8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Unit: mm</p>  <p>Top view shows a rectangular package with 6 pins (1-6). Dimensions: width <math>6.3 \pm 0.25</math>, height <math>4.4 \pm 0.25</math>, pin pitch <math>2.54 \pm 0.25</math>, pin width <math>0.4 \pm 0.1</math>, pin height <math>2.1 \text{ max}</math>, body width <math>7.0 \pm 0.4</math>, body height <math>0.6 \pm 0.3</math>, and standoff <math>0.1 \pm 0.1</math>.</p>                                                                                                                                                                                                                                          | <p>Unit: mm</p>  <p>Top view shows a rectangular package with 8 pins (1-8). Dimensions: width <math>9.4 \pm 0.25</math>, height <math>4.4 \pm 0.25</math>, pin pitch <math>2.54 \pm 0.25</math>, pin width <math>0.4 \pm 0.1</math>, pin height <math>2.1 \text{ max}</math>, body width <math>7.0 \pm 0.4</math>, body height <math>0.6 \pm 0.3</math>, and standoff <math>0.1 \pm 0.1</math>.</p>                                                                                                                                                                                  |
| SOP16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SSOP4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p>Unit: mm</p>  <p>Top view shows a rectangular package with 16 pins (1-16). Dimensions: width <math>10.3 \pm 0.25</math>, height <math>4.4 \pm 0.25</math>, pin pitch <math>1.27 \pm 0.2</math>, pin width <math>0.4 \pm 0.1</math>, pin height <math>2.1 \text{ max}</math>, body width <math>7.0 \pm 0.4</math>, body height <math>0.6 \pm 0.3</math>, and standoff <math>0.1 \pm 0.1</math>.</p>                                                                                                                                                                                                                                      | <p>Unit: mm</p>  <p>Top view shows a rectangular package with 4 pins (1-4). Dimensions: width <math>4.2 \pm 0.1</math>, height <math>3.65 \pm 0.1</math>, pin pitch <math>1.9 \pm 0.1</math>, pin width <math>0.2</math>, pin height <math>1.8 \pm 0.1</math>, body width <math>3.8 \pm 0.1</math>, body height <math>0.15</math>, and standoff <math>0.2</math>. A circular feature with diameter <math>\phi 1.4</math> is shown. A side view shows a width of <math>2.04 \pm 0.1</math> and a height of <math>1.27</math>. A bottom view shows a width of <math>0.46</math>.</p> |
| USOP4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p>Unit: mm</p>  <p>Top view shows a square package with 4 pins (1-4). Dimensions: width <math>3.25 \pm 0.2</math>, height <math>3.25 \pm 0.2</math>, pin pitch <math>1.27 \pm 0.2</math>, pin width <math>0.2 \pm 0.2</math>, pin height <math>1.65 \pm 0.2</math>, body width <math>2.05 \pm 0.2</math>, body height <math>0.4 \pm 0.2</math>, and standoff <math>0.2 \pm 0.2</math>. A circular feature with diameter <math>\phi 1.2</math> is shown. A side view shows a width of <math>2.2 \pm 0.2</math> and a height of <math>1.27 \pm 0.2</math>. A bottom view shows a width of <math>0.35 \pm 0.2</math>.</p> <p>BOTTOM VIEW</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

# 6 Package Information

## 3 Rank Marking

Transistor-output photocouplers are ranked according to their CTR ranges, whereas thyristor-output and triac-output photocouplers are ranked according to their maximum I<sub>FT</sub> value. The following gives the rank classifications and rank marks printed on packages. Note that the rank classifications differ from product to product. For details, please refer to the relevant technical datasheets.

### 1. CTR Rank Name and Rank Marking

Available CTR Rank Selection (○: Available, △: Contact Toshiba)

| Part Number | Rank Name |    |   |    |    |    |     |     |     |
|-------------|-----------|----|---|----|----|----|-----|-----|-----|
|             | None      | GB | Y | GR | BL | YH | GRL | GRH | BLL |
| TLP184      | ○         | ○  | ○ | ○  |    |    |     |     | ○   |
| TLP185      | ○         | ○  | ○ | ○  |    | ○  | ○   | ○   | ○   |
| TLP280-4    | ○         | ○  |   |    |    |    |     |     |     |
| TLP281-4    | ○         | ○  |   |    |    |    |     |     |     |
| TLP290      | ○         | ○  | ○ | ○  |    |    |     |     | ○   |
| TLP291      | ○         | ○  | ○ | ○  |    | ○  | ○   | ○   | ○   |
| TLP290-4    | ○         | ○  |   |    |    |    |     |     |     |
| TLP291-4    | ○         | ○  |   |    |    |    |     |     |     |
| TLP531/532  | ○         | ○  | △ | ○  | △  |    |     |     |     |
| TLP620      | ○         | ○  | △ | ○  | △  |    |     |     |     |
| TLP620-2    | ○         | ○  |   |    |    |    |     |     |     |
| TLP620-4    | ○         | ○  |   |    |    |    |     |     |     |
| TLP630      | ○         | ○  | △ | ○  | △  |    |     |     |     |
| TLP631/632  | ○         | ○  | △ | ○  | △  |    |     |     |     |
| TLP731/732  | ○         | ○  | △ | ○  | △  |    |     |     |     |
| TLP733/734  | ○         | ○  | △ | ○  | △  |    |     |     |     |

| Part Number      | Rank Name | CTR         | CTR Rank                         |
|------------------|-----------|-------------|----------------------------------|
| TLP185<br>TLP291 | None      | 50 to 400%  | Blank,YE,GR,<br>GB,Y+,G,<br>G+,B |
|                  | Y         | 50 to 150%  | YE                               |
|                  | GR        | 100 to 300% | GR                               |
|                  | GB        | 100 to 400% | GB                               |
|                  | YH        | 75 to 150%  | Y+                               |
|                  | GRL       | 100 to 200% | G                                |
|                  | GRH       | 150 to 300% | G+                               |
|                  | BLL       | 200 to 400% | B                                |

| Part Number                                                          | Rank Name | CTR         | CTR Rank                                 |
|----------------------------------------------------------------------|-----------|-------------|------------------------------------------|
| TLP531<br>TLP631<br>TLP632<br>TLP731<br>TLP732<br>TLP733F<br>TLP734F | None      | 50 to 600%  | Blank,Y,Y■,YE,<br>G,G■,GR,B,<br>B■,BL,GB |
|                                                                      | Y         | 50 to 150%  | YE                                       |
|                                                                      | GR        | 100 to 300% | GR                                       |
|                                                                      | GB        | 100 to 600% | GB                                       |
|                                                                      | BL        | 200 to 600% | BL                                       |
|                                                                      | GRL       | 100 to 200% | G                                        |
|                                                                      | GRH       | 150 to 300% | G■                                       |

| Part Number      | Rank Name | CTR         | CTR Rank              |
|------------------|-----------|-------------|-----------------------|
| TLP184<br>TLP290 | None      | 50 to 400%  | Blank,YE,GR,<br>GB, B |
|                  | Y         | 50 to 150%  | YE                    |
|                  | GR        | 100 to 300% | GR                    |
|                  | BLL       | 200 to 400% | B                     |
|                  | GB        | 100 to 400% | GB                    |

| Part Number      | Rank Name | CTR         | CTR Rank              |
|------------------|-----------|-------------|-----------------------|
| TLP620<br>TLP630 | None      | 50 to 600%  | Blank,YE,GR,<br>BL,GB |
|                  | Y         | 50 to 150%  | YE                    |
|                  | GR        | 100 to 300% | GR                    |
|                  | GB        | 100 to 600% | GB                    |
|                  | BL        | 200 to 600% | BL                    |
|                  | GRL       | 100 to 200% | G                     |
|                  | GRH       | 150 to 300% | G■                    |

| Part Number          | Rank Name | CTR         | CTR Rank |
|----------------------|-----------|-------------|----------|
| TLP290-4<br>TLP291-4 | None      | 50 to 400%  | Blank    |
|                      | GB        | 100 to 400% | GB       |

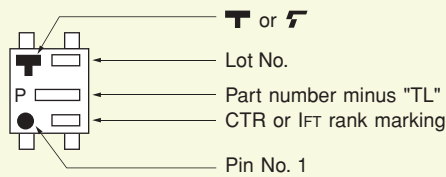
| Part Number                                  | Rank Name | CTR         | CTR Rank |
|----------------------------------------------|-----------|-------------|----------|
| TLP280-4<br>TLP281-4<br>TLP620-2<br>TLP620-4 | None      | 50 to 600%  | Blank,GB |
|                                              | GB        | 100 to 600% | GB       |

## 2. LED Trigger Current (IFT) Ranking and Marking

| Rank Name | IFT      | IFT Rank Marking          |
|-----------|----------|---------------------------|
| None      | IFT max  | Blank, T7, T5             |
| IFT7      | 7 mA max | T7, T5                    |
| IFT5      | 5 mA max | T5                        |
| IFT2      | 2 mA max | T2 (only for photorelays) |

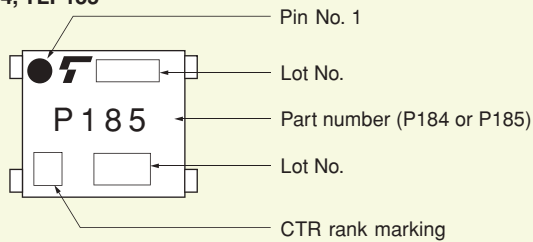
## 3. Marking Examples

### (a) 4-pin mini-flat 1-channel type

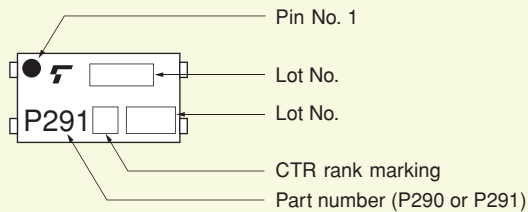


(Example: TLP626 : P626  
TLP785 : P785  TLP626)

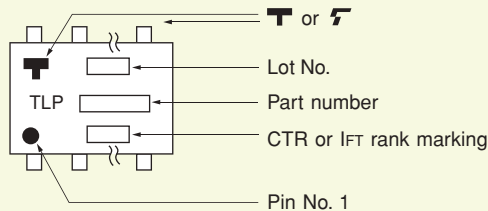
### (b) TLP184, TLP185



### (c) TLP290, TLP291



### (d) Others



(Example: TLP620-2 : TLP620-2  
TLP666GF : TLP666GF  TLP620-2)

Note: When ordering a standard photocoupler, add a CTR or IFT rank in parentheses to the standard part number.

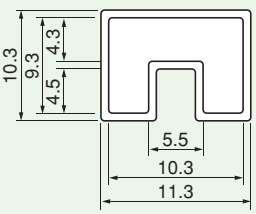
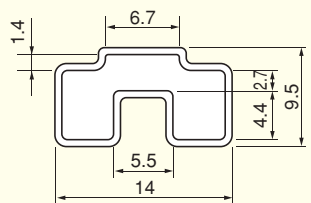
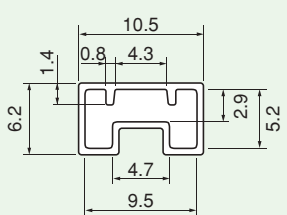
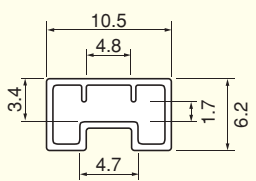
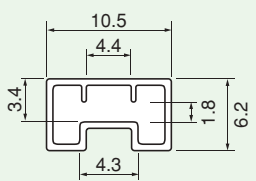
Examples: TLP185(GB) TLP785(GR)

Use the standard part number when applying for safety standard approval.

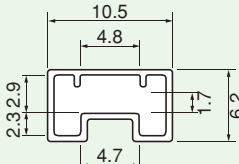
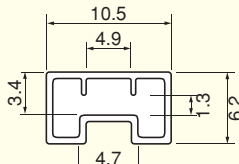
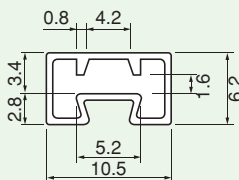
Example  $\frac{\text{Part number}}{\text{TLP291(GB)}} \rightarrow \frac{\text{Use this part number}}{\text{TLP291}}$

# 7 Packing Information

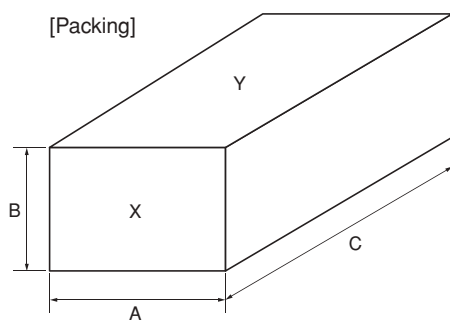
## 1 Photocoupler Magazine Packing Specifications

|                                              | Magazine Dimensions*                                                                                                                                           | Device Quantities per Magazine                                                                                                                                                                 | Packing Dimensions* |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|----------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------|----------------|----|---------------|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------|----------------|---|---------------|---|----|----------------|---|----|----------------|---|
| Standard DIP                                 | <div>Unit: mm</div> <div></div> <div>Length = 525<br/>Thickness = 0.5</div>   | <table><tr><td>Package Pin Count</td><td>4</td><td>6</td><td>8</td><td>12</td><td>16</td></tr><tr><td>Quantity (pcs)</td><td>100</td><td>50</td><td>50</td><td>25</td><td>25</td></tr></table> | Package Pin Count   | 4            | 6              | 8   | 12                                                                                                                                                             | 16                  | Quantity (pcs)         | 100            | 50 | 50            | 25 | 25 | <table><tr><td>Number of Magazines</td><td>Dimensions (A x B x C)</td><td>Label Position</td></tr><tr><td>4</td><td>50 × 12 × 531</td><td>Y</td></tr><tr><td>20</td><td>67 × 51 × 559</td><td>Y</td></tr><tr><td>60</td><td>123 × 76 × 568</td><td>X</td></tr></table> | Number of Magazines | Dimensions (A x B x C) | Label Position | 4 | 50 × 12 × 531 | Y | 20 | 67 × 51 × 559  | Y | 60 | 123 × 76 × 568 | X |
| Package Pin Count                            | 4                                                                                                                                                              | 6                                                                                                                                                                                              | 8                   | 12           | 16             |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Quantity (pcs)                               | 100                                                                                                                                                            | 50                                                                                                                                                                                             | 50                  | 25           | 25             |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Number of Magazines                          | Dimensions (A x B x C)                                                                                                                                         | Label Position                                                                                                                                                                                 |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| 4                                            | 50 × 12 × 531                                                                                                                                                  | Y                                                                                                                                                                                              |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| 20                                           | 67 × 51 × 559                                                                                                                                                  | Y                                                                                                                                                                                              |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| 60                                           | 123 × 76 × 568                                                                                                                                                 | X                                                                                                                                                                                              |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| DIPs with LF1, LF2, LF4 and LF5 Lead Forming | <div>Unit: mm</div> <div></div> <div>Length = 525<br/>Thickness = 0.5</div>   | <table><tr><td>Package Pin Count</td><td>4</td><td>6</td><td>8</td><td>12</td><td>16</td></tr><tr><td>Quantity (pcs)</td><td>100</td><td>50</td><td>50</td><td>25</td><td>25</td></tr></table> | Package Pin Count   | 4            | 6              | 8   | 12                                                                                                                                                             | 16                  | Quantity (pcs)         | 100            | 50 | 50            | 25 | 25 | <table><tr><td>Number of Magazines</td><td>Dimensions (A x B x C)</td><td>Label Position</td></tr><tr><td>4</td><td>60 × 13 × 531</td><td>Y</td></tr><tr><td>40</td><td>135 × 58 × 568</td><td>X</td></tr></table>                                                     | Number of Magazines | Dimensions (A x B x C) | Label Position | 4 | 60 × 13 × 531 | Y | 40 | 135 × 58 × 568 | X |    |                |   |
| Package Pin Count                            | 4                                                                                                                                                              | 6                                                                                                                                                                                              | 8                   | 12           | 16             |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Quantity (pcs)                               | 100                                                                                                                                                            | 50                                                                                                                                                                                             | 50                  | 25           | 25             |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Number of Magazines                          | Dimensions (A x B x C)                                                                                                                                         | Label Position                                                                                                                                                                                 |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| 4                                            | 60 × 13 × 531                                                                                                                                                  | Y                                                                                                                                                                                              |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| 40                                           | 135 × 58 × 568                                                                                                                                                 | X                                                                                                                                                                                              |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| SO4                                          | <div>Unit: mm</div> <div></div> <div>Length = 555<br/>Thickness = 0.5</div> | <table><tr><td>Package Pin Count</td><td>4 (SO4)</td></tr><tr><td>Quantity (pcs)</td><td>175</td></tr></table>                                                                                 | Package Pin Count   | 4 (SO4)      | Quantity (pcs) | 175 | <table><tr><td>Number of Magazines</td><td>Dimensions (A x B x C)</td><td>Label Position</td></tr><tr><td>40</td><td>71 × 32 × 584</td><td>X</td></tr></table> | Number of Magazines | Dimensions (A x B x C) | Label Position | 40 | 71 × 32 × 584 | X  |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Package Pin Count                            | 4 (SO4)                                                                                                                                                        |                                                                                                                                                                                                |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Quantity (pcs)                               | 175                                                                                                                                                            |                                                                                                                                                                                                |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Number of Magazines                          | Dimensions (A x B x C)                                                                                                                                         | Label Position                                                                                                                                                                                 |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| 40                                           | 71 × 32 × 584                                                                                                                                                  | X                                                                                                                                                                                              |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| SO6                                          | <div>Unit: mm</div> <div></div> <div>Length = 555<br/>Thickness = 0.5</div> | <table><tr><td>Package Pin Count</td><td>4 or 5 (SO6)</td></tr><tr><td>Quantity (pcs)</td><td>125</td></tr></table>                                                                            | Package Pin Count   | 4 or 5 (SO6) | Quantity (pcs) | 125 | <table><tr><td>Number of Magazines</td><td>Dimensions (A x B x C)</td><td>Label Position</td></tr><tr><td>40</td><td>70 × 55 × 585</td><td>X</td></tr></table> | Number of Magazines | Dimensions (A x B x C) | Label Position | 40 | 70 × 55 × 585 | X  |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Package Pin Count                            | 4 or 5 (SO6)                                                                                                                                                   |                                                                                                                                                                                                |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Quantity (pcs)                               | 125                                                                                                                                                            |                                                                                                                                                                                                |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Number of Magazines                          | Dimensions (A x B x C)                                                                                                                                         | Label Position                                                                                                                                                                                 |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| 40                                           | 70 × 55 × 585                                                                                                                                                  | X                                                                                                                                                                                              |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| SO8                                          | <div>Unit: mm</div> <div></div> <div>Length = 555<br/>Thickness = 0.5</div> | <table><tr><td>Package Pin Count</td><td>8 (SO8)</td></tr><tr><td>Quantity (pcs)</td><td>100</td></tr></table>                                                                                 | Package Pin Count   | 8 (SO8)      | Quantity (pcs) | 100 | <table><tr><td>Number of Magazines</td><td>Dimensions (A x B x C)</td><td>Label Position</td></tr><tr><td>24</td><td>75 × 29 × 579</td><td>X</td></tr></table> | Number of Magazines | Dimensions (A x B x C) | Label Position | 24 | 75 × 29 × 579 | X  |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Package Pin Count                            | 8 (SO8)                                                                                                                                                        |                                                                                                                                                                                                |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Quantity (pcs)                               | 100                                                                                                                                                            |                                                                                                                                                                                                |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| Number of Magazines                          | Dimensions (A x B x C)                                                                                                                                         | Label Position                                                                                                                                                                                 |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |
| 24                                           | 75 × 29 × 579                                                                                                                                                  | X                                                                                                                                                                                              |                     |              |                |     |                                                                                                                                                                |                     |                        |                |    |               |    |    |                                                                                                                                                                                                                                                                        |                     |                        |                |   |               |   |    |                |   |    |                |   |

\*All dimensions are typical values.

|                     | Magazine Dimensions*                                                                                                                                           | Device Quantities per Magazine                                                                                                                                                                                                                                                                                                    | Packing Dimensions* |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|----------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------|----------------|--------------|---------------|----------------|-----|---------------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------|----------------|---|---------------|---|----|---------------|---|----|---------------|---|
| SO16                | <div>Unit: mm</div> <div></div> <div>Length = 555<br/>Thickness = 0.5</div>   | <table><tr><td>Package Pin Count</td><td>16 (SO16)</td></tr><tr><td>Quantity (pcs)</td><td>50</td></tr></table>                                                                                                                                                                                                                   | Package Pin Count   | 16 (SO16)       | Quantity (pcs) | 50             | <table><tr><td>Number of Magazines</td><td>Dimensions (A x B x C)</td><td>Label Position</td></tr><tr><td>40</td><td>61 x 56 x 586</td><td>X</td></tr></table>                                                                                                        | Number of Magazines | Dimensions (A x B x C) | Label Position | 40           | 61 x 56 x 586 | X              |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Package Pin Count   | 16 (SO16)                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                   |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Quantity (pcs)      | 50                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                   |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Number of Magazines | Dimensions (A x B x C)                                                                                                                                         | Label Position                                                                                                                                                                                                                                                                                                                    |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| 40                  | 61 x 56 x 586                                                                                                                                                  | X                                                                                                                                                                                                                                                                                                                                 |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| MFSOP6              | <div>Unit: mm</div> <div></div> <div>Length = 555<br/>Thickness = 0.5</div>   | <table><tr><td>Package Pin Count</td><td>4 or 5 (MFSOP6)</td></tr><tr><td>Quantity (pcs)</td><td>150</td></tr></table>                                                                                                                                                                                                            | Package Pin Count   | 4 or 5 (MFSOP6) | Quantity (pcs) | 150            | <table><tr><td>Number of Magazines</td><td>Dimensions (A x B x C)</td><td>Label Position</td></tr><tr><td>4</td><td>29 x 13 x 563</td><td>Y</td></tr><tr><td>24</td><td>77 x 31 x 586</td><td>Y</td></tr><tr><td>40</td><td>67 x 55 x 586</td><td>X</td></tr></table> | Number of Magazines | Dimensions (A x B x C) | Label Position | 4            | 29 x 13 x 563 | Y              | 24  | 77 x 31 x 586 | Y  | 40                                                                                                                                                                                                                                                                    | 67 x 55 x 586       | X                      |                |   |               |   |    |               |   |    |               |   |
| Package Pin Count   | 4 or 5 (MFSOP6)                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                   |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Quantity (pcs)      | 150                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                   |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Number of Magazines | Dimensions (A x B x C)                                                                                                                                         | Label Position                                                                                                                                                                                                                                                                                                                    |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| 4                   | 29 x 13 x 563                                                                                                                                                  | Y                                                                                                                                                                                                                                                                                                                                 |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| 24                  | 77 x 31 x 586                                                                                                                                                  | Y                                                                                                                                                                                                                                                                                                                                 |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| 40                  | 67 x 55 x 586                                                                                                                                                  | X                                                                                                                                                                                                                                                                                                                                 |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| SOP Photocoupler    | <div>Unit: mm</div> <div></div> <div>Length = 555<br/>Thickness = 0.5</div> | <table><tr><td>Package Pin Count</td><td>4 (SOP4)</td><td>16 (SOP16)</td></tr><tr><td>Quantity (pcs)</td><td>150</td><td>50</td></tr></table> <table><tr><td>Package Pin Count</td><td>4 (2.54SOP4)</td><td>6 (2.54SOP6)</td><td>8 (2.54SOP8)</td></tr><tr><td>Quantity (pcs)</td><td>100</td><td>75</td><td>50</td></tr></table> | Package Pin Count   | 4 (SOP4)        | 16 (SOP16)     | Quantity (pcs) | 150                                                                                                                                                                                                                                                                   | 50                  | Package Pin Count      | 4 (2.54SOP4)   | 6 (2.54SOP6) | 8 (2.54SOP8)  | Quantity (pcs) | 100 | 75            | 50 | <table><tr><td>Number of Magazines</td><td>Dimensions (A x B x C)</td><td>Label Position</td></tr><tr><td>4</td><td>29 x 13 x 563</td><td>Y</td></tr><tr><td>24</td><td>77 x 31 x 586</td><td>Y</td></tr><tr><td>40</td><td>67 x 55 x 586</td><td>X</td></tr></table> | Number of Magazines | Dimensions (A x B x C) | Label Position | 4 | 29 x 13 x 563 | Y | 24 | 77 x 31 x 586 | Y | 40 | 67 x 55 x 586 | X |
| Package Pin Count   | 4 (SOP4)                                                                                                                                                       | 16 (SOP16)                                                                                                                                                                                                                                                                                                                        |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Quantity (pcs)      | 150                                                                                                                                                            | 50                                                                                                                                                                                                                                                                                                                                |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Package Pin Count   | 4 (2.54SOP4)                                                                                                                                                   | 6 (2.54SOP6)                                                                                                                                                                                                                                                                                                                      | 8 (2.54SOP8)        |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Quantity (pcs)      | 100                                                                                                                                                            | 75                                                                                                                                                                                                                                                                                                                                | 50                  |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| Number of Magazines | Dimensions (A x B x C)                                                                                                                                         | Label Position                                                                                                                                                                                                                                                                                                                    |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| 4                   | 29 x 13 x 563                                                                                                                                                  | Y                                                                                                                                                                                                                                                                                                                                 |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| 24                  | 77 x 31 x 586                                                                                                                                                  | Y                                                                                                                                                                                                                                                                                                                                 |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |
| 40                  | 67 x 55 x 586                                                                                                                                                  | X                                                                                                                                                                                                                                                                                                                                 |                     |                 |                |                |                                                                                                                                                                                                                                                                       |                     |                        |                |              |               |                |     |               |    |                                                                                                                                                                                                                                                                       |                     |                        |                |   |               |   |    |               |   |    |               |   |

\*All dimensions are typical values.



| Package Type |          | Typical Devices                      |
|--------------|----------|--------------------------------------|
| MFC          | MFSOP6   | TLP160J, TLP190B                     |
| SOP          | SO4      | TLP290, TLP291                       |
|              | SO6      | TLP184, TLP185                       |
|              | SO16     | TLP290-4, TLP291-4                   |
|              | SOP16    | TLP280-4, TLP281-4, TLP270D, TLP270G |
|              | 2.54SOP4 | TLP176G, TLP176A                     |
|              | 2.54SOP6 | TLP197G                              |
|              | 2.54SOP8 | TLP206G, TLP206A                     |



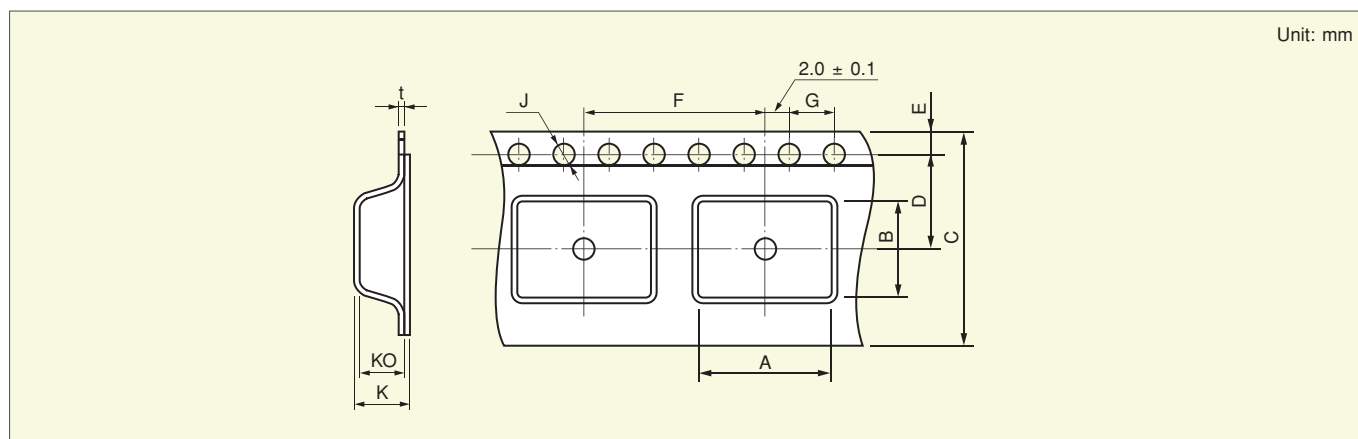
# 7 Packing Information

## 2 Tape-and-Reel Specifications

### 1. Embossed Tape Specifications for Surface-Mount Lead Form Options

| Photocoupler Package Types | Tape Option Symbol | Typical Devices                                 |
|----------------------------|--------------------|-------------------------------------------------|
| MFSOP6                     | (TPL) or (TPR)     | TLP165J, TLP190B                                |
| SO6                        | (TPL) or (TPR)     | TLP185, TLP186                                  |
| SO4                        | (TP)               | TLP290, TLP291                                  |
| SOP16                      | (TP)               | TLP280-4, TLP281-4                              |
| SO16                       | (TP)               | TLP290-4, TLP291-4                              |
| 2.54SOP4                   | (TP)               | TLP176G, TLP176A, TLP176D                       |
| 2.54SOP6                   | (TP)               | TLP197G                                         |
| 2.54SOP8                   | (TP)               | TLP200D, TLP206A, TLP206G                       |
| SSOP4                      | (TP15)             | TLP3212, TLP3214 to TLP3217, TLP3230 to TLP3250 |
| SDIP6                      | (TP)               | TLP701, TLP705, TLP719                          |
| DIP(LF1, LF5)              | (TP1) or (TP5)     | TLP550, TLP560G                                 |
| DIP(LF4)                   | (TP4)              | TLP560G                                         |
| SO8                        | (TP)               | TLP2168, TLP2468                                |

### 2. Tape Dimensions



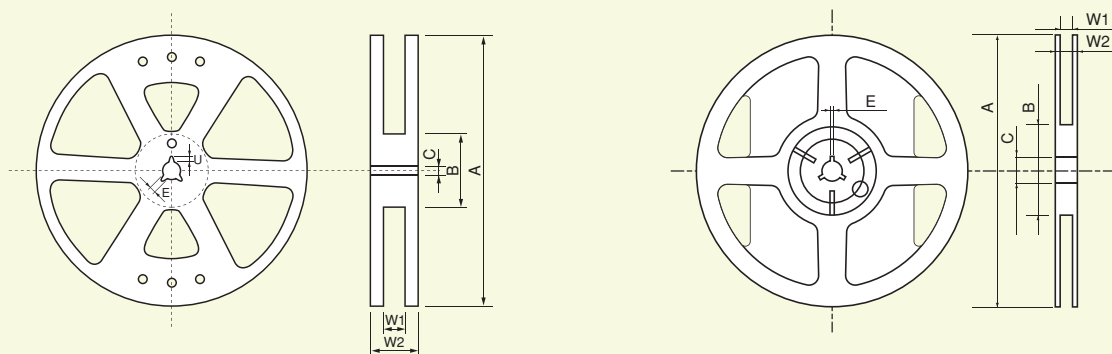
Unit: mm

| Photocoupler Package Type | MFSOP6       | SO6          | SO8       | SOP4      | SO4        | SOP16      | SO16       | 2.54SOP4   | 2.54SOP6   | 2.54SOP8   | SSOP4      | SDIP6      | SDIP6 F type | DIP(LF1, LF5) | DIP(LF4) |
|---------------------------|--------------|--------------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|---------------|----------|
| Tape Option               | (TPL), (TPR) | (TPL), (TPR) | (TP)      | (TP)      | (TP)       | (TP)       | (TP)       | (TP)       | (TP)       | (TP)       | (TP15)     | (TP)       | (TP)         | (TP1), (TP5)  | (TP4)    |
| Symbol (See figure above) | A            | 4.2 ± 0.1    | 4.0 ± 0.1 | 6.5 ± 0.1 | 3.1 ± 0.1  | 7.5 ± 0.1  | 4.3 ± 0.1  | 7.5 ± 0.1  | 2.35 ± 0.2 | 10.4 ± 0.1 | 12.3 ± 0.1 | 10.4 ± 0.1 | 12.3 ± 0.1   |               |          |
|                           | B            | 7.6 ± 0.1    | 5.6 ± 0.1 | 7.5 ± 0.1 | 10.5 ± 0.1 | 7.5 ± 0.1  | 6.7 ± 0.1  | 10.5 ± 0.1 | 4.5 ± 0.1  | 5.1 ± 0.1  | *          | *          |              |               |          |
|                           | C            | 12.0 ± 0.3   |           |           | 16.0 ± 0.3 | 12.0 ± 0.3 | 16.0 ± 0.3 | 12.0 ± 0.3 | 16.0 ± 0.3 |            |            |            |              |               |          |
|                           | D            | 5.5 ± 0.1    |           |           | 7.5 ± 0.1  | 5.5 ± 0.1  | 7.5 ± 0.1  | 5.5 ± 0.1  | 7.5 ± 0.1  |            |            |            |              |               |          |
|                           | E            | 1.75 ± 0.1   |           |           |            |            |            |            |            |            |            |            |              |               |          |
|                           | F            | 8.0 ± 0.1    |           |           | 12.0 ± 0.1 | 8.0 ± 0.1  | 12.0 ± 0.1 | 4.0 ± 0.1  | 12.0 ± 0.1 | 16.0 ± 0.1 | 12.0 ± 0.1 | 16.0 ± 0.1 |              |               |          |
|                           | G            | 4.0 ± 0.1    |           |           |            |            |            |            |            |            |            |            |              |               |          |
|                           | J            | 1.5 ± 0.1    |           |           |            |            |            |            |            |            |            |            |              |               |          |
|                           | K            | 3.15 ± 0.2   | 2.9 ± 0.2 | 3.4 ± 0.2 | 2.5 ± 0.2  | 3.15 ± 0.2 | 2.4 ± 0.2  | 2.6 ± 0.2  | 2.6 ± 0.2  | 2.5 ± 0.2  | 2.4 ± 0.2  | 2.4 ± 0.2  | 4.55 ± 0.2   |               |          |
|                           | KO           | 2.8 ± 0.1    | 2.6 ± 0.1 | 3.1 ± 0.1 | 2.3 ± 0.1  | 2.2 ± 0.1  | 2.4 ± 0.1  | 2.3 ± 0.1  | 2.2 ± 0.1  | 2.1 ± 0.1  | 4.1 ± 0.1  |            |              |               |          |
|                           | t            | 0.3 ± 0.05   |           |           |            |            |            |            |            |            |            |            |              |               |          |

\*1: Typical devices

|                      |                         |                                   |
|----------------------|-------------------------|-----------------------------------|
| DIP4                 | TLP620, TLP721          | 5.1 ± 0.1                         |
| DIP6 (short package) | TLP631, TLP734, TLP747G | 7.6 ± 0.1                         |
| DIP8                 | TLP555, TLP2601         | 10.1 ± 0.1 (TP4) is not available |

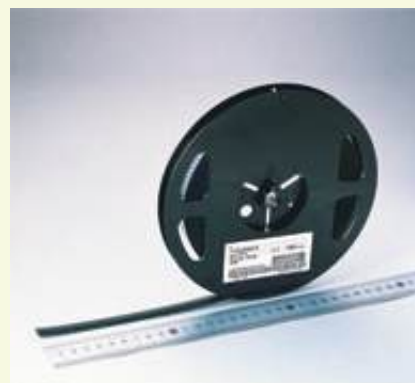
### 3. Reel Dimensions



ø380 mm



ø330 mm



ø180 mm

Unit: mm

| Photocoupler Package Type |    |            | MFSOP, SO6   | SOP4     | SO4  | SOP16      | SO16 | 2.54SOP4   | 2.54SOP6   | 2.54SOP8  | SSOP4                           | SDIP6      | SDIP6 F type | DIP(LF1, LF5) | DIP(LF4) |
|---------------------------|----|------------|--------------|----------|------|------------|------|------------|------------|-----------|---------------------------------|------------|--------------|---------------|----------|
| Tape Option               |    |            | (TPL), (TPR) | (TP)     | (TP) | (TP)       | (TP) | (TP)       | (TP)       | (TP)      | (TP15)                          | (TP)       | (TP)         | (TP1), (TP5)  | (TP4)    |
| Symbol (See figure above) | A  | Dimensions | ø380 ± 2     | ø330 ± 2 |      |            |      |            |            |           | 180 <sup>+0</sup> <sub>-4</sub> | ø380 ± 2   |              |               |          |
|                           | B  |            | ø80 ± 1      |          |      |            |      |            |            | ø60       | ø80 ± 1                         |            |              |               |          |
|                           | C  |            | ø13 ± 0.5    |          |      |            |      |            |            | ø13       | ø13 ± 0.5                       |            |              |               |          |
|                           | E  |            | 2.0 ± 0.5    |          |      |            |      |            |            | 2 ± 0.5   | 2.0 ± 0.5                       |            |              |               |          |
|                           | U  |            | 4.0 ± 0.5    |          |      |            |      |            |            | 4.0 ± 0.5 | 4.0 ± 0.5                       |            |              |               |          |
|                           | W1 |            | 13.5 ± 0.5   |          |      | 17.5 ± 0.5 |      | 13.5 ± 0.5 | 17.5 ± 0.5 |           | 13 ± 0.3                        | 17.5 ± 0.5 |              |               |          |
|                           | W2 |            | 17.5 ± 1.0   |          |      | 21.5 ± 1.0 |      | 17.5 ± 1.0 | 21.5 ± 1.0 |           | 15.4 ± 1.0                      | 21.5 ± 1.0 |              |               |          |

# 7 Packing Information

## 4. Other Packing Information

### a) Device orientation on tape

Photocouplers are oriented in cavity, as shown below.

| Photocoupler Package Type | Tape Option |
|---------------------------|-------------|
| <b>MFSOP6, SO6</b>        | TPR         |

A)

| Photocoupler Package Type  | Tape Option |
|----------------------------|-------------|
| <b>MFSOP6, SO6</b>         | TPL         |
| <b>SO4, SOP4, 2.54SOP4</b> | TP          |
| <b>SSOP4</b>               | TP15        |

B)

| Photocoupler Package Type | Tape Option |
|---------------------------|-------------|
| <b>SO16, SOP16, SO8</b>   | TP          |
| <b>2.54SOP6/8</b>         | TP          |
| <b>SDIP6</b>              | TP          |
| <b>DIP(LF1, LF5)</b>      | TP1, TP5    |
| <b>DIP(LF4)</b>           | TP4         |

C)

User direction of feed →

### b) Tape Specifications

#### ■ Quantities Per Reel

| Photocoupler Package Type | MFSOP6, SO6 | SO4, SOP4, SO8 | SOP16 | SO16 | 2.54SOP4/6/8 | SSOP4 | SDIP6 | SDIP6 F type | DIP(LF1, LF5) | DIP(LF4) |
|---------------------------|-------------|----------------|-------|------|--------------|-------|-------|--------------|---------------|----------|
| Quantity (pcs)            | 3000        | 2500           | 2500  | 2000 | 2500         | 1500  | 1500  | 1000         | 1500          | 1000     |

#### ■ Empty Cavities

| Item                           | Specification    | Note                                                 |
|--------------------------------|------------------|------------------------------------------------------|
| Consecutive empty cavities     | Zero             | Any 40-mm portion of tape except leader and trailer. |
| Non-consecutive empty cavities | 0.2% max/reel *2 | Except leader and trailer.                           |

\*2: 6 pcs max/reel for DIP and SDIP packages

### c) Packing boxes

One or five reels per box

### d) Label

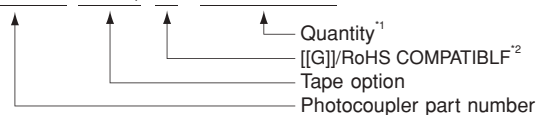
The reel label includes the following information:

1. Part number
2. Tape type
3. Quantity
4. Lot number

### e) Purchase order

Specify the part number, tape and quantity as follows.

Example TLP127 (TPL, F) 3000 units



\*1: Must be a multiple of the quantity per-reel.

\*2: "F" identifies the indication of product Labels with "[[G]]/RoHS COMPATIBLE".

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

# 8 Board Assembly

## 1 Example Land Patterns

Unit: mm

| SO6 (4-pin)<br>MFSOP6 (4-pin)<br>2.54SOP4 | SO6 (5-pin)<br>MFSOP6 (5-pin) | SOP4<br>SO4 | SSOP4 |
|-------------------------------------------|-------------------------------|-------------|-------|
|                                           |                               |             |       |

Unit: mm

| SO8 | SOP16<br>SO16 | SDIP6 |
|-----|---------------|-------|
|     |               |       |

Unit: mm

| SDIP6 (F type) | DIP package*<br>(LF1), (LF5) | DIP package*<br>(LF4) |
|----------------|------------------------------|-----------------------|
|                |                              |                       |

\*: For the example land patterns for the TLP781 and TLP785, see their respective datasheets.

# 8 Board Assembly

## 2 Board Assembly Considerations

### 1. Soldering

The profile below shows only the typical temperature profile and conditions, which might not apply to all Toshiba photocouplers. Temperature profiles and conditions may differ from product to product. Refer to the relevant technical datasheets and databooks when mounting a device.

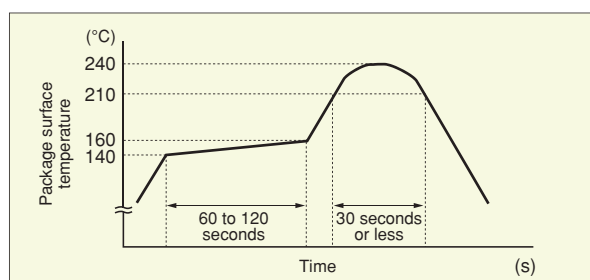
When using a soldering iron or medium infrared ray/hot air reflow, avoid a rise in device temperature as much as possible by observing the following conditions.

#### 1.1) Using a soldering iron

- Solder once within 10 seconds for a lead temperature of up to 260°C.
- Solder once within 3 seconds for a lead temperature of up to 350°C.

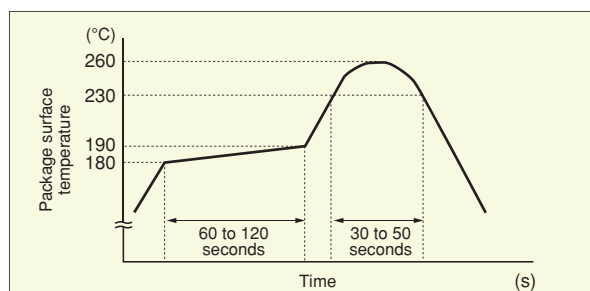
#### 1.2) Using medium infrared ray/hot air reflow

- Complete the infrared ray/hot air reflow process at once within 30 seconds at a package surface temperature between 210°C and 240°C.
- Example of temperature profile of lead (Pb) solder



Example of temperature profile of lead (Pb) solder

- Example of temperature profile of lead (Pb)-free solder



Example of temperature profile of lead (Pb)-free solder

- Precautions for heating

Keeping packages at high temperature for a long period of time can degrade the quality and reliability of devices. Soldering time has to be kept as short as possible to avoid a rise in package temperature. When using a halogen lamp or infrared heater, avoid direct irradiation of packages, since this may cause a rise in package temperature.

#### 1.3) Dip soldering (flow soldering)

The thermal shock of dip soldering increases thermal stress on devices. To avoid stress, the use of a soldering iron or medium infrared ray/hot air reflow is recommended. If you want to use dip soldering, contact your nearest Toshiba sales representative.

### 2. Flux Cleaning

- When cleaning circuit boards to remove flux, make sure that no residual reactive ions such as sodium( $\text{Na}^+$ ) or chloride( $\text{Cl}^-$ ) ions remain. Note that organic solvents react with water to generate hydrogen chloride and other corrosive gases, which can degrade device performance.
- Washing devices with water will not cause any problems. However, make sure that no reactive ions such as sodium( $\text{Na}^+$ ) or chloride( $\text{Cl}^-$ ) ions are left as residue. Also, be sure to dry devices sufficiently after washing.
- Do not rub device markings with a brush or with your hand during cleaning or while the devices are still wet from the cleaning agent. Doing so can rub off the markings.
- Dip cleaning, shower cleaning and steam cleaning processes all involve the chemical action of a solvent. Use only recommended solvents for these cleaning methods. When immersing devices in a solvent or steam bath, make sure that the temperature of the liquid is 50°C or below and that the circuit board is removed from the bath within one minute.
- If a device package allows ultrasonic cleaning, keep the duration of ultrasonic cleaning as short as possible, since long hours of ultrasonic cleaning degrade the adhesion between the mold resin and the frame material.

#### The following ultrasonic cleaning conditions are recommended.

Frequency: 27 kHz to 29 kHz

Ultrasonic output power: 300 W or less (0.25 W/cm<sup>2</sup> or less)

Cleaning time: 30 seconds or less

Suspend the circuit board in the solvent bath during ultrasonic cleaning in such a way that the ultrasonic vibrator does not come into direct contact with the circuit board or the device.

Conventional cleaning solvents that contain freon are not recommended due to its adverse effects on the earth's ozone layer. Alternative freon-free products are available on the market. Some of these alternative cleaning agents are listed in the table below.

Contact Toshiba or a Toshiba distributor regarding cleaning conditions and other relevant information for each product type.

#### Examples of Alternative Cleaning Agents

|               |                        |                            |
|---------------|------------------------|----------------------------|
| Technocare    | FRW-1, FRW-17, FRV-100 | GE Toshiba Silicon         |
| Asahi Clean   | AK-225AES              | Asahi Glass Co., Ltd       |
| Clean Through | 750H                   | Kao Co., Ltd.              |
| Pine Alpha    | ST-100S, ST-100SX      | Arakawa Chemical Co., Ltd. |

# 9 Device Degradation

## 1 Projected Operating Life Based on LED Light Output Degradation

Toshiba photocouplers use one of four types of LEDs and a projection of the operating life has been made for each LED. The table on page 62 shows the types of LED used in photocouplers and the figures on pages 63 to 66 show projections of long-term light output performance and operating life. Note that these operating life data are estimates extrapolated from long-term light output degradation over a single wafer lot and are shown as reference only.

|                   | Projected Operating Life<br>( $T_a = 40^\circ\text{C}$ , $I_F = 20\text{ mA}$ , failure criteria:<br>degradation rate $\Delta P_o < -50\%$ ) |                      | Photocouplers                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------|
|                   | F50% operating life                                                                                                                          | F0.1% operating life |                                                                                        |
| ① GaAs LED        | 1,300,000 h                                                                                                                                  | 260,000 h            | Mainly for phototransistor output devices<br>and phototriac output devices             |
| ② GaAlAs(SH) LED  | 540,000 h                                                                                                                                    | 100,000 h            | Mainly for photo-IC couplers                                                           |
| ③ GaAlAs(DH) LED  | 1,000,000 h                                                                                                                                  | 200,000 h            | Mainly for photorelays (MOSFET output),<br>photovoltaic couplers and photo-IC couplers |
| ④ GaAlAs(MQW) LED | Ask your local Toshiba sales representative.                                                                                                 |                      | Mainly for photo-IC couplers                                                           |

F50% (cumulative failure rate 50%) operating life: Time period until the projected long-term light output degradation curve of the average light output change ( $\bar{X}$ ) shown on pages 63 to 65 reaches the failure criteria.

F0.1% (cumulative failure rate 0.1%) operating life: Time period until the projected long-term light output degradation curve of  $\bar{X} - 3\sigma$  shown on pages 63 to 65 reaches the failure criteria.

The relationship between LED light output degradation and optical coupling characteristics is shown below.

- (1) The relationship between LED light output degradation and current transfer ratio (CTR)/short circuit current ( $I_{sc}$ ) is 1:1.

$$\frac{CTR(t)}{CTR(o)} = \frac{P_o(t)}{P_o(o)}$$

- (2) The relationship between a reciprocal value of LED light output degradation and  $I_{FT}/I_{FLH}/I_{FHL}/I_{FH}$  change is 1:1.

$$\frac{I_{FT}(t)}{I_{FT}(o)} = \left( \frac{P_o(t)}{P_o(o)} \right)^{-1}$$



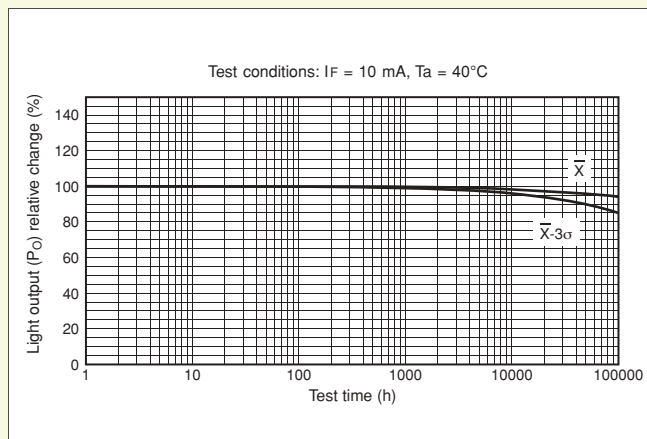
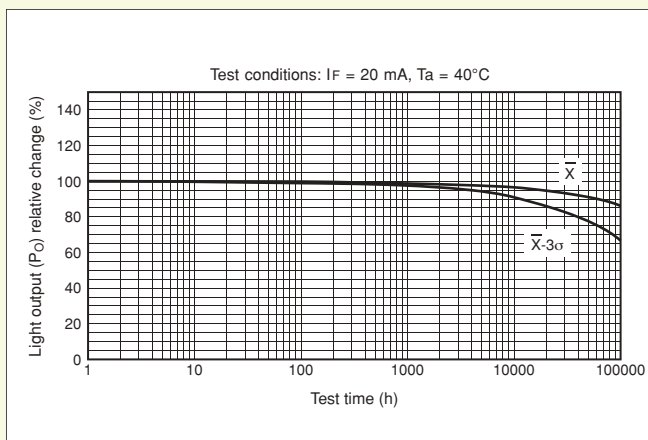
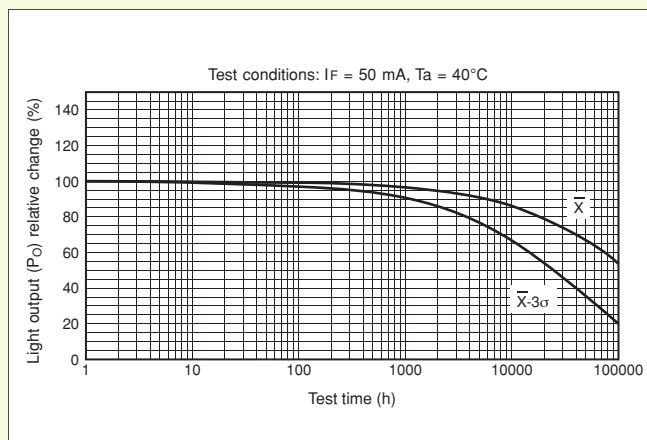
# 9 Device Degradation

## LEDs Used in Photocouplers

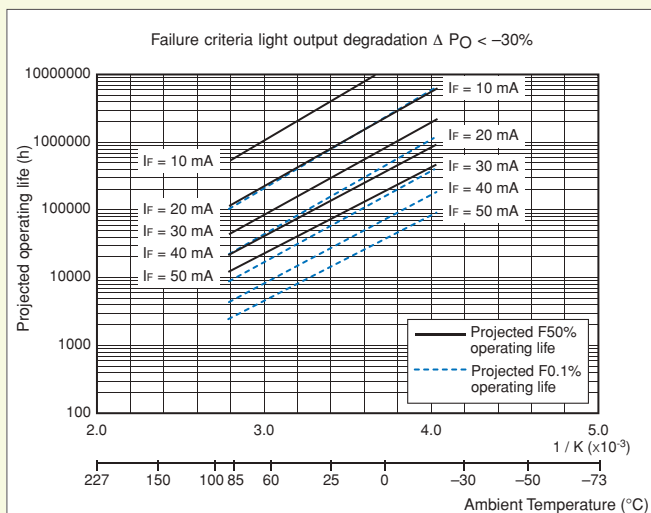
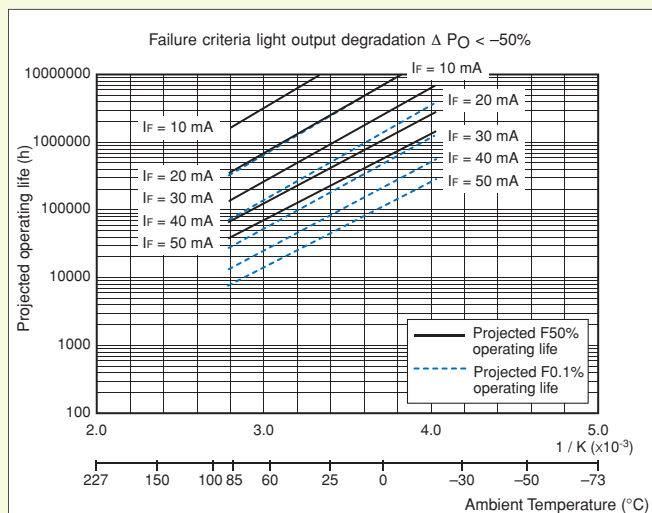
LED: ① GaAs LED ② GaAlAs (SH) LED ③ GaAlAs (DH) LED ④ GaAlAs (MQW) LED

| Photocouplers | LED | Photocouplers  | LED | Photocouplers  | LED | Photocouplers    | LED | Photocouplers     | LED |
|---------------|-----|----------------|-----|----------------|-----|------------------|-----|-------------------|-----|
| 6N135         | ②   | TLP200D        | ①   | TLP513         | ②   | TLP641 Series    | ①   | TLP2468           | ④   |
| 6N136         | ②   | TLP202 Series  | ①   | TLP523 Series  | ①   | TLP651           | ②   | TLP2530           | ②   |
| 6N137         | ②   | TLP206 Series  | ①   | TLP525G Series | ①   | TLP700           | ④   | TLP2531           | ②   |
| 6N138         | ②   | TLP222 Series  | ①   | TLP531         | ①   | TLP700A          | ④   | TLP2601           | ②   |
| 6N139         | ②   | TLP224G Series | ①   | TLP532         | ①   | TLP700H          | ④   | TLP260J           | ①   |
| TLP104        | ④   | TLP225A        | ①   | TLP541G        | ①   | TLP701           | ②   | TLP2630           | ②   |
| TLP105        | ④   | TLP227 Series  | ①   | TLP542G        | ①   | TLP701A          | ④   | TLP2631           | ②   |
| TLP108        | ④   | TLP250 Series  | ②   | TLP543J        | ①   | TLP701H          | ④   | TLP2768           | ④   |
| TLP116        | ③   | TLP251 Series  | ②   | TLP545J        | ①   | TLP705           | ②   | TLP3022(S) Series | ①   |
| TLP117        | ④   | TLP260J        | ①   | TLP550         | ②   | TLP708           | ④   | TLP3042(S) Series | ①   |
| TLP118        | ④   | TLP270 Series  | ①   | TLP551         | ②   | TLP714           | ④   | TLP3063(S) Series | ③   |
| TLP124        | ①   | TLP280 Series  | ①   | TLP552         | ②   | TLP715           | ②   | TLP31xx Series    | ①   |
| TLP126        | ①   | TLP281 Series  | ①   | TLP553         | ②   | TLP716           | ②   | TLP32xx Series    | ①   |
| TLP127        | ①   | TLP283 Series  | ①   | TLP554         | ②   | TLP718           | ②   | TLP3230           | ①   |
| TLP130        | ①   | TLP290         | ①   | TLP555         | ②   | TLP719           | ②   | TLP3231           | ①   |
| TLP131        | ①   | TLP291         | ①   | TLP557         | ②   | TLP731           | ①   | TLP3240           | ③   |
| TLP137        | ①   | TLP296G        | ①   | TLP558         | ②   | TLP732           | ①   | TLP3241           | ③   |
| TLP141G       | ①   | TLP320 Series  | ①   | TLP559         | ②   | TLP733 Series    | ①   | TLP3250           | ③   |
| TLP151        | ④   | TLP330         | ①   | TLP560 Series  | ①   | TLP734 Series    | ①   | TLP3762(S) Series | ①   |
| TLP151A       | ④   | TLP331         | ①   | TLP561 Series  | ①   | TLP741 Series    | ①   | TLP3904           | ①   |
| TLP155        | ④   | TLP332         | ①   | TLP570         | ①   | TLP747 Series    | ①   | TLP3914           | ③   |
| TLP155E       | ④   | TLP350         | ②   | TLP571         | ①   | TLP750 Series    | ②   | TLP3924           | ③   |
| TLP160 Series | ①   | TLP350A        | ④   | TLP572         | ①   | TLP751 Series    | ②   | TLP4xxx Series    | ①   |
| TLP161 Series | ①   | TLP350H        | ④   | TLP590B        | ③   | TLP754           | ④   |                   |     |
| TLP163        | ①   | TLP351         | ②   | TLP591B        | ③   | TLP759 Series    | ②   |                   |     |
| TLP165J       | ①   | TLP351A        | ④   | TLP592 Series  | ①   | TLP762J Series   | ①   |                   |     |
| TLP166J       | ①   | TLP351H        | ④   | TLP594 Series  | ①   | TLP763J Series   | ①   |                   |     |
| TLP168J       | ③   | TLP352         | ④   | TLP597 Series  | ①   | TLP797 Series    | ①   |                   |     |
| TLP172 Series | ①   | TLP358         | ④   | TLP598 Series  | ③   | TLP798GA         | ③   |                   |     |
| TLP174G       | ①   | TLP358H        | ④   | TLP599 Series  | ①   | TLP2066          | ③   |                   |     |
| TLP176 Series | ①   | TLP360 Series  | ①   | TLP620 Series  | ①   | TLP2118E         | ④   |                   |     |
| TLP180        | ①   | TLP361 Series  | ①   | TLP624 Series  | ①   | TLP2160          | ④   |                   |     |
| TLP181        | ①   | TLP363 Series  | ①   | TLP626 Series  | ①   | TLP2168          | ④   |                   |     |
| TLP184        | ①   | TLP371         | ①   | TLP627 Series  | ①   | TLP2200          | ②   |                   |     |
| TLP185        | ①   | TLP372         | ①   | TLP628 Series  | ①   | TLP2368          | ④   |                   |     |
| TLP190B       | ③   | TLP373         | ①   | TLP629 Series  | ①   | TLP2404          | ④   |                   |     |
| TLP191B       | ③   | TLP421 Series  | ①   | TLP630         | ①   | TLP2409          | ④   |                   |     |
| TLP192 Series | ①   | TLP504A        | ①   | TLP631         | ①   | TLP2418          | ④   |                   |     |
| TLP197 Series | ①   | TLP512         | ②   | TLP632         | ①   | TLP2451,TLP2451A | ④   |                   |     |

## ① GaAs LED Projected Light Output Degradation Data



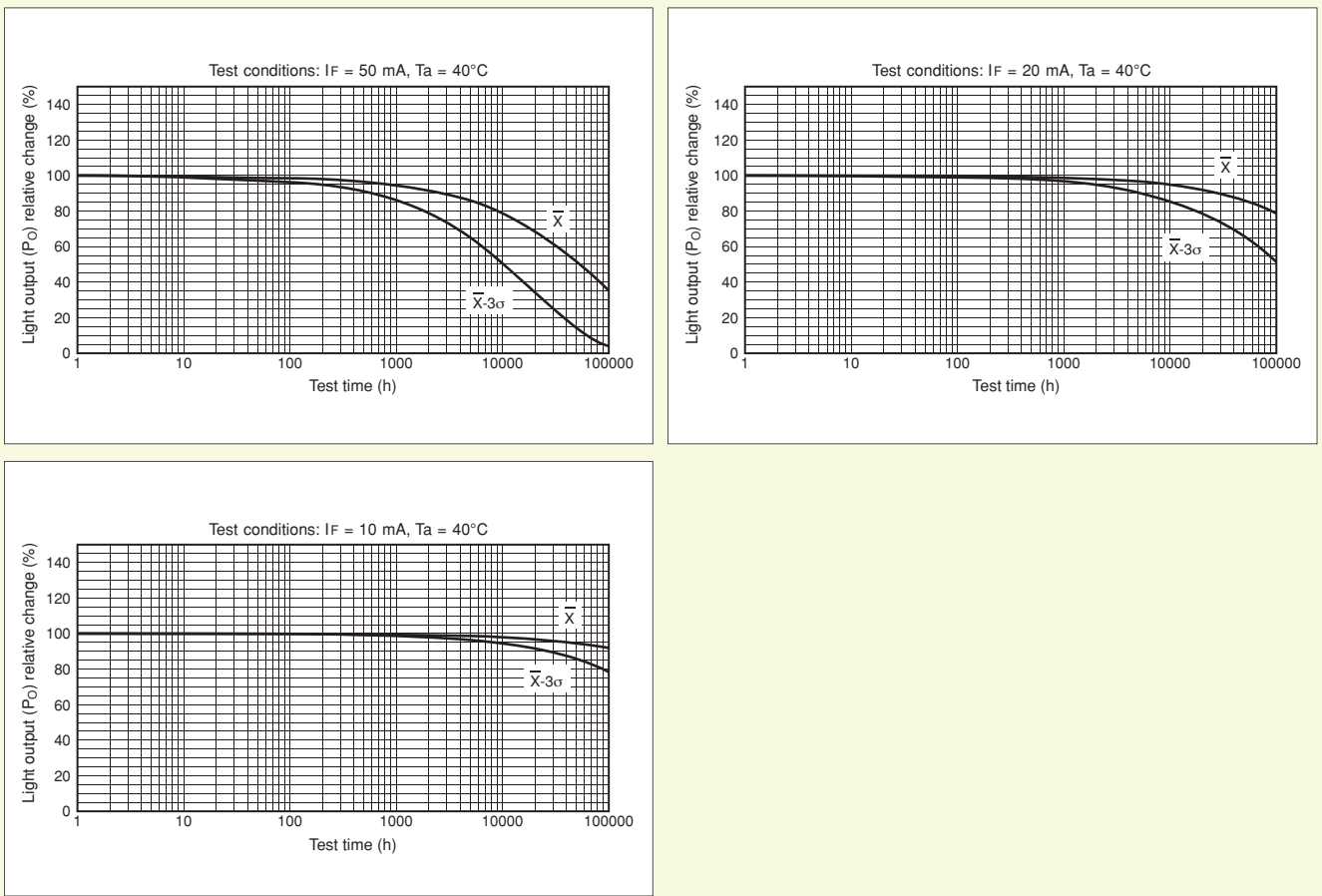
## ① GaAs LED Projected Operating Life Data



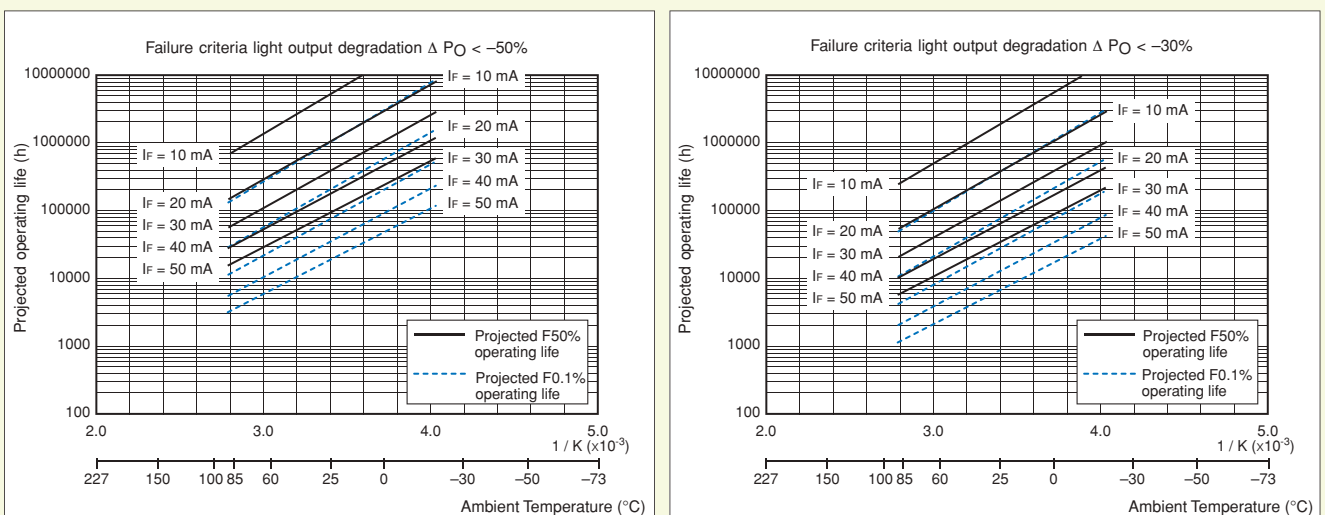
The above operating life data are estimates extrapolated from long-term light output degradation over a single wafer lot and are shown as reference only. Operating conditions exceeding the maximum ratings are not guaranteed.

# 9 Device Degradation

## ② GaAlAs (SH) LED Projected Light Output Degradation Data

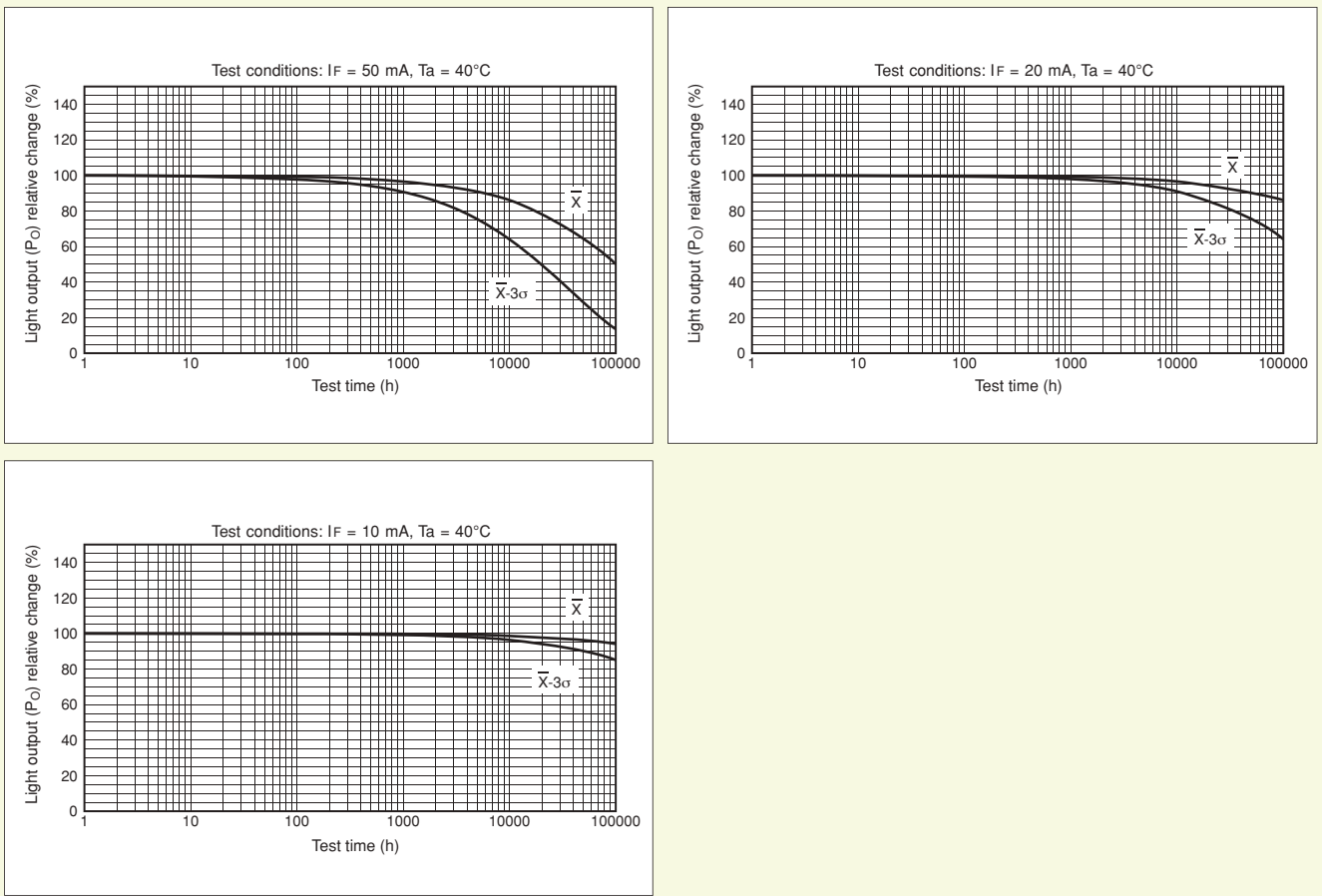


## ② GaAlAs (SH) LED Projected Operating Life Data

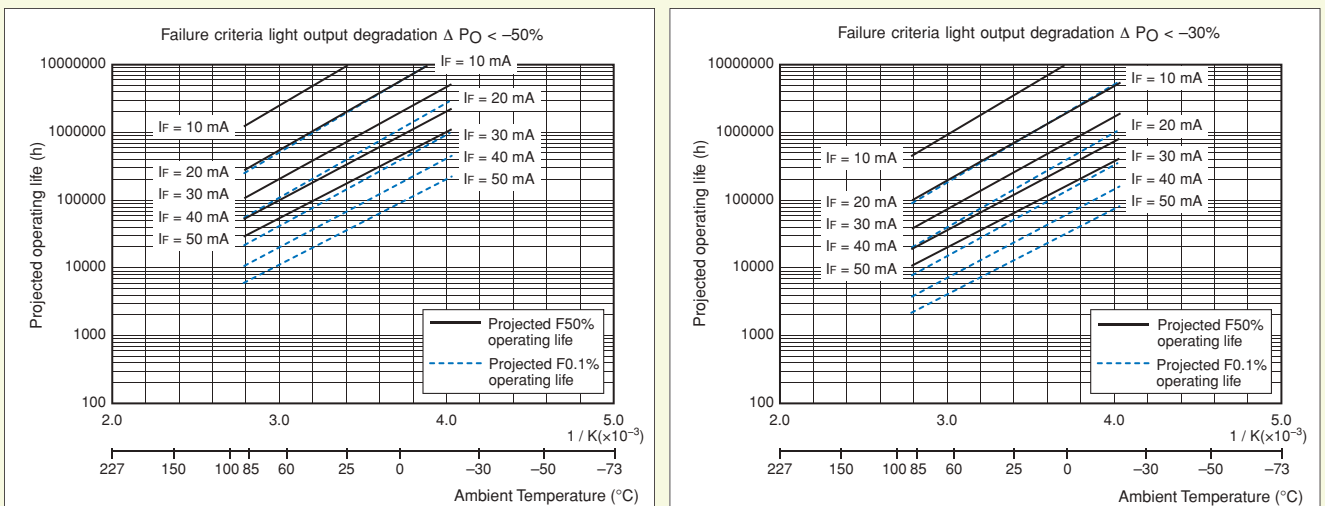


The above operating life data are estimates extrapolated from long-term light output degradation over a single wafer lot and are shown as reference only. Operating conditions exceeding the maximum ratings are not guaranteed.

### ③ GaAlAs (DH) LED Projected Light Output Degradation Data



### ③ GaAlAs (DH) LED Projected Operating Life Data



The above operating life data are estimates extrapolated from long-term light output degradation over a single wafer lot and are shown as reference only. Operating conditions exceeding the maximum ratings are not guaranteed.

# 9 Device Degradation

## ④ GaAlAs (MQW) LED Projected Light Output Degradation and Operating Life Data

Toshiba is now preparing the light output degradation and operating life data for GaAlAs LEDs.

These data are available for individual LEDs. Ask your local Toshiba sales representative.

## Note

## ■ Reading the Projected LED Operating Life Graph

For example, let's calculate the operating life of the GaAs LED, based on the data shown on page 63.

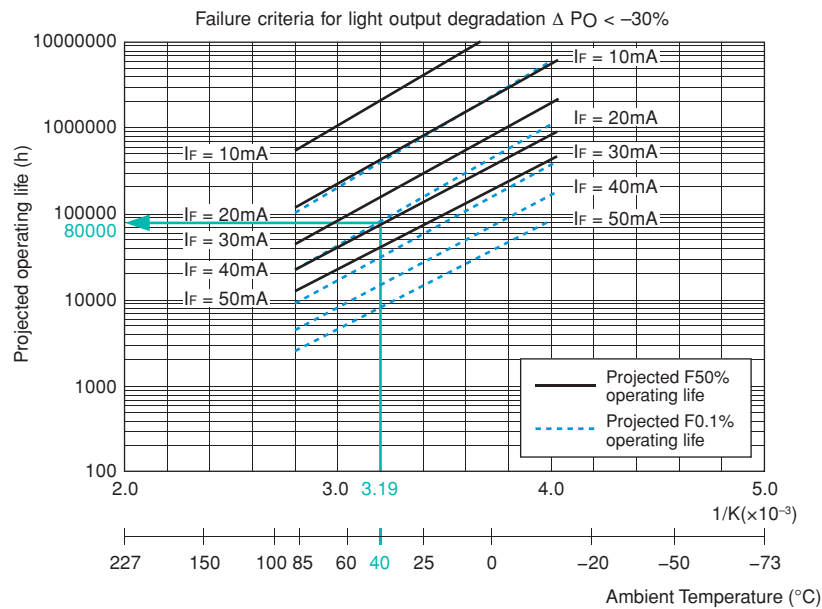
Here is an example of how to read an operating life, assuming that the ambient temperature ( $T_a$ ) is 40°C and that the failure criterion is a 30% decrease in light output.

Suppose that the initial LED current,  $I_F$ , is 20 mA. Since the horizontal axis of the failure criteria graph is the reciprocal of absolute temperature, it is necessary to convert the ambient temperature ( $T_a$ ) to the reciprocal of absolute temperature ( $T$ ):

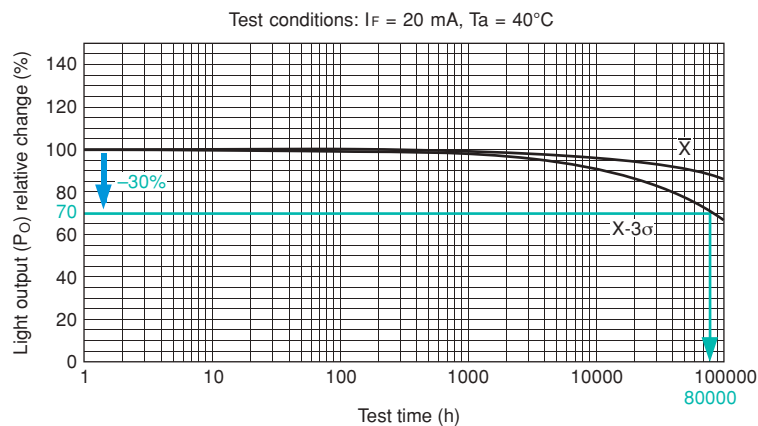
$$T = \frac{I}{T_a + 273.15} = \frac{I}{40 + 273.15} \div 3.19 \times 10^{-3}$$

The graph shows the projected lifetimes for F50% and F0.1% cumulative failure probabilities in solid and dashed lines respectively. Normally, it is recommended to use F0.1% lines.

As  $X = 3.19$ , its intersection with the  $I_F = 20$  mA line for F0.1% is approximately 80,000 hours. (This figure is for reference only.)



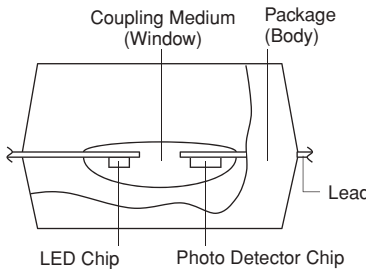
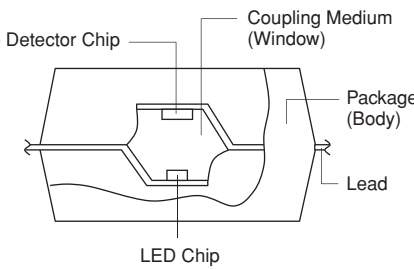
You can also estimate the projected operating life from the projected light output degradation data.



# 10 Safety Standard Approvals

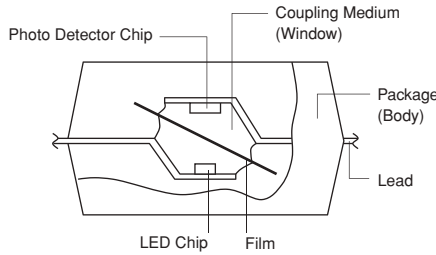
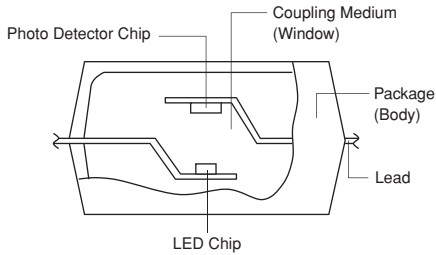
Toshiba offers a wide selection of photocouplers with a transistor output, IC output, thyristor output and triac output, as well as photorelays certified to UL (USA), cUL (Canada), VDE (Germany), BSI (Britain) and SEMKO (Sweden).

## Safety Standard Approvals for Photocouplers (DIN EN60747-5-2/5)

| Mechanical Construction                        |                                                           | Reflective Photocouplers in Single-Molded Packages                                |                      |                    |                                          | Transmissive Photocouplers in Single-Molded Packages                                   |                                                                |                                                     |                    |  |
|------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------|--------------------|------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------|--------------------|--|
| Internal Construction                          |                                                           |  |                      |                    |                                          |      |                                                                |                                                     |                    |  |
| Package                                        |                                                           | SOP4/SOP16                                                                        |                      | MFSOP6             | MFSOP6                                   | SO8<br>(2 ch)                                                                          | 2.54SOP<br>4/6/8                                               | DIP                                                 | DIP<br>(F type)    |  |
| Construction<br>Mechanical<br>Ratings<br>(min) | Isolation Creepage Path (mm)                              | 4.0                                                                               | 5.0                  | 4.0                | 4.0                                      | 4.2                                                                                    | 4.0                                                            | 6.4/7.0                                             | 8.0                |  |
|                                                | Isolation Clearance (mm)                                  | 4.0                                                                               | 5.0                  | 4.0                | 4.0                                      | 4.2                                                                                    | 4.0                                                            | 6.4/7.0                                             | 8.0                |  |
|                                                | Isolation Thickness (mm)                                  | 0.4                                                                               | 0.4                  | 0.4                | —                                        | —                                                                                      | —                                                              | (0.4)                                               | (0.4)              |  |
|                                                | Internal Creepage Path (mm)                               | —                                                                                 | —                    | —                  | —                                        | —                                                                                      | —                                                              | —                                                   | —                  |  |
| VDE/TÜV<br>DIN<br>EN<br>60747-5-2/5            | Max.<br>Working Insulation<br>Voltage (V <sub>orm</sub> ) | 565 Vpk                                                                           | 707 Vpk              | 565 Vpk            | 565 Vpk                                  | 565 Vpk                                                                                | 565 Vpk                                                        | 630 Vpk<br>/890 Vpk                                 | 1140 Vpk           |  |
|                                                | Highest Allowable<br>Overvoltage (V <sub>iotrm</sub> )    | 4000 Vpk                                                                          | 6000 Vpk             | 6000 Vpk           | 4000 Vpk                                 | 4000 Vpk                                                                               | 2500 Vpk                                                       | 4000 Vpk                                            | 6000 Vpk           |  |
| Certified<br>Devices                           | IC Output                                                 |                                                                                   |                      |                    |                                          | TLP2105<br>TLP2108<br>TLP2166<br>TLP2166A<br>TLP2116<br>TLP2118E<br>TLP2168<br>TLP2160 |                                                                | TLP350<br>TLP351                                    | TLP350F<br>TLP351F |  |
|                                                | Transistor Output                                         | TLP280-4<br>TLP281-4                                                              | TLP284-4<br>TLP285-4 |                    | TLP127                                   |                                                                                        |                                                                |                                                     |                    |  |
|                                                | Triac/Thyristor<br>Output                                 |                                                                                   |                      | TLP260J<br>TLP261J | TLP160G<br>TLP160J<br>TLP161G<br>TLP161J |                                                                                        |                                                                | TLP560G<br>TLP560J<br>TLP561G<br>TLP561J<br>TLP587G |                    |  |
|                                                | Photorelay                                                |                                                                                   |                      |                    |                                          |                                                                                        | TLP176A<br>TLP176D<br>TLP176G<br>TLP197G<br>TLP202G<br>TLP206G | TLP227G<br>TLP227G-2<br>TLP597G                     |                    |  |



The table above lists photocouplers and photorelays that have already been approved as of July 2012.  
The information herein is subject to change. For the latest information, please contact your nearest Toshiba sales representative.

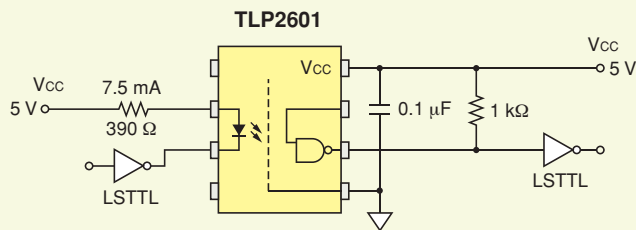
| Transmissive Photocouplers with an Insulating Film in Single-Molded Packages                                |                                                                                                                                                                              |                                                                                                                                                                                               |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                   |                                                            | Transmissive Photocouplers in Double-Molded Packages                               |                                                                                                                                                    |                      |                                      |                                          |  |
|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------|------------------------------------------|--|
|                            |                                                                                                                                                                              |                                                                                                                                                                                               |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                   |                                                            |  |                                                                                                                                                    |                      |                                      |                                          |  |
| SO8<br>(1 ch)                                                                                               | SDIP6                                                                                                                                                                        | SDIP6<br>(F type)                                                                                                                                                                             | DIP                                                                                                                                                                                                                                             | DIP<br>(F type)                                                                                                                                                                                                                                                   | MFSOP6                                                     | SO4                                                                                | SO6                                                                                                                                                | SO16                 | DIP                                  | DIP<br>(F type)                          |  |
| 4.0                                                                                                         | 7.0                                                                                                                                                                          | 8.0                                                                                                                                                                                           | 6.4/7.0                                                                                                                                                                                                                                         | 8.0                                                                                                                                                                                                                                                               | 4.0                                                        | 5.0                                                                                | 5.0                                                                                                                                                | 5.0                  | 6.5/7.0                              | 8.0                                      |  |
| 4.0                                                                                                         | 7.0                                                                                                                                                                          | 8.0                                                                                                                                                                                           | 6.4/7.0                                                                                                                                                                                                                                         | 8.0                                                                                                                                                                                                                                                               | 4.0                                                        | 5.0                                                                                | 5.0                                                                                                                                                | 5.0                  | 6.5/7.0                              | 8.0                                      |  |
| —                                                                                                           | 0.4                                                                                                                                                                          | 0.4                                                                                                                                                                                           | 0.4/0.5                                                                                                                                                                                                                                         | 0.4/0.5                                                                                                                                                                                                                                                           | —                                                          | 0.4                                                                                | 0.4                                                                                                                                                | —                    | 0.4/0.5                              | 0.4/0.5                                  |  |
| —                                                                                                           | —                                                                                                                                                                            | —                                                                                                                                                                                             | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                                                 | —                                                          | —                                                                                  | —                                                                                                                                                  | —                    | 0.4/0.5                              | 4.0                                      |  |
| 565 Vpk                                                                                                     | 890 Vpk                                                                                                                                                                      | 1140 Vpk                                                                                                                                                                                      | 890 Vpk                                                                                                                                                                                                                                         | 1140 Vpk                                                                                                                                                                                                                                                          | 565 Vpk                                                    | 707 Vpk                                                                            | 707 Vpk                                                                                                                                            | 565 Vpk              | 890 Vpk<br>/1130 Vpk                 | 890 Vpk<br>/1130 Vpk                     |  |
| 6000 Vpk                                                                                                    | 8000 Vpk                                                                                                                                                                     | 8000 Vpk                                                                                                                                                                                      | 6000 Vpk<br>/8000 Vpk                                                                                                                                                                                                                           | 6000 Vpk<br>/8000 Vpk                                                                                                                                                                                                                                             | 4000 Vpk<br>/6000 Vpk                                      | 6000 Vpk                                                                           | 6000 Vpk                                                                                                                                           | 4000 Vpk             | 6000 Vpk<br>/8000 Vpk                | 6000 Vpk<br>/8000 Vpk                    |  |
| TLP2403<br>TLP2404<br>TLP2405<br>TLP2408<br>TLP2409<br>TLP2418<br>TLP2451<br>TLP2451A<br>TLP2466<br>TLP2468 | TLP700<br>TLP700A<br>TLP700H<br>TLP701<br>TLP701A<br>TLP701H<br>TLP702<br>TLP705<br>TLP706<br>TLP708<br>TLP714<br>TLP715<br>TLP716<br>TLP718<br>TLP719<br>TLP2766<br>TLP2768 | TLP700F<br>TLP700AF<br>TLP700HF<br>TLP701F<br>TLP701AF<br>TLP701HF<br>TLP702F<br>TLP705F<br>TLP706F<br>TLP708F<br>TLP714F<br>TLP715F<br>TLP716F<br>TLP718F<br>TLP719F<br>TLP2766F<br>TLP2768F | TLP750<br>TLP751<br>TLP759<br>TLP350H<br>TLP351H<br>TLP358<br>TLP358H                                                                                                                                                                           | TLP750F<br>TLP751F<br>TLP759F<br>TLP350HF<br>TLP351HF<br>TLP358F<br>TLP358HF                                                                                                                                                                                      | TLP105<br>TLP108<br>TLP116<br>TLP117<br>TLP2066<br>TLP2095 |                                                                                    | TLP109<br>TLP116A<br>TLP104<br>TLP118<br>TLP151A<br>TLP155<br>TLP155E<br>TLP2309<br>TLP2355<br>TLP2358<br>TLP2362<br>TLP2366<br>TLP2367<br>TLP2368 |                      |                                      |                                          |  |
|                                                                                                             |                                                                                                                                                                              |                                                                                                                                                                                               | TLP620<br>TLP620-2<br>TLP620-4<br>TLP627<br>TLP627-2<br>TLP627-4<br>TLP731<br>TLP732                                                                                                                                                            | TLP620F<br>TLP620F-2                                                                                                                                                                                                                                              |                                                            | TLP290<br>TLP291                                                                   | TLP184<br>TLP185                                                                                                                                   | TLP290-4<br>TLP291-4 | TLP733<br>TLP734<br>TLP781<br>TLP785 | TLP733F<br>TLP734F<br>TLP781F<br>TLP785F |  |
|                                                                                                             |                                                                                                                                                                              |                                                                                                                                                                                               | TLP360J<br>TLP361J<br>TLP363J<br>TLP3022(S)<br>TLP3023(S)<br>TLP3042(S)<br>TLP3043(S)<br>TLP3052(S)<br>TLP3062(S)<br>TLP3063(S)<br>TLP3064(S)<br>TLP3065(S)<br>TLP3082(S)<br>TLP3083(S)<br>TLP3762(S)<br>TLP3763(S)<br>TLP3782(S)<br>TLP3783(S) | TLP360JF<br>TLP361JF<br>TLP363JF<br>TLP3022F(S)<br>TLP3023F(S)<br>TLP3042F(S)<br>TLP3043F(S)<br>TLP3052F(S)<br>TLP3062F(S)<br>TLP3063F(S)<br>TLP3064F(S)<br>TLP3065F(S)<br>TLP3082F(S)<br>TLP3083F(S)<br>TLP3762F(S)<br>TLP3763F(S)<br>TLP3782F(S)<br>TLP3783F(S) | TLP165J<br>TLP166J                                         |                                                                                    | TLP265J<br>TLP266J                                                                                                                                 |                      | TLP762J<br>TLP763J<br>TLP748J        | TLP762JF<br>TLP763JF<br>TLP748JF         |  |
|                                                                                                             |                                                                                                                                                                              |                                                                                                                                                                                               |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                   |                                                            |                                                                                    |                                                                                                                                                    |                      |                                      |                                          |  |

# 11 Photocoupler Application Circuit Examples

\*See datasheets for pin assignments.

## 1 Digital Interface Applications

### High Speed

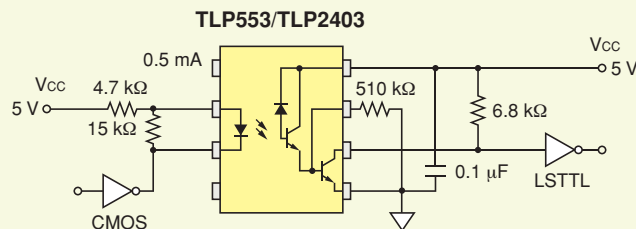


The **TLP2601** allows high-speed data transmission at up to approximately 5 MHz.

Data rate of left-side circuit

$f$  (typ.): 5 Mbit/s (duty cycle  $\approx 1/2$ )

### Low Input Current Drive

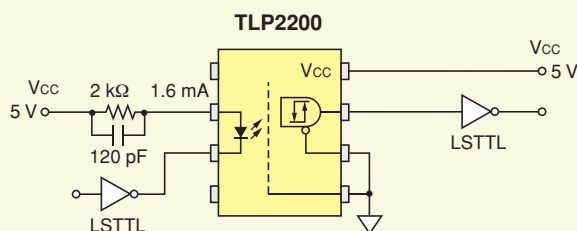


The high-CTR (current transfer ratio) **TLP553** and **TLP2403** allow operation with low input current (0.5 mA) and direct driving with a CMOS signal.

Data rate of left-side circuit

$f$  (typ.): 50 kbit/s (duty cycle  $\approx 1/2$ )

### No Pull-up Resistor Required

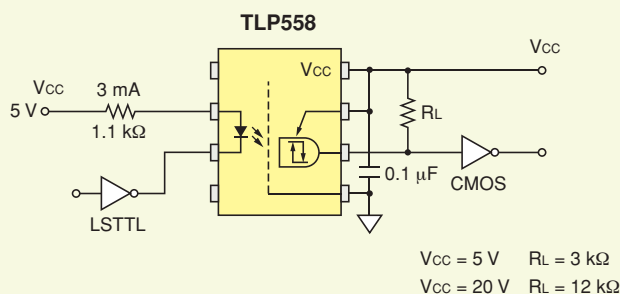


When the **TLP2200** with a 3-state output is used, the next-stage logic gate can be actuated without using a pull-up resistor.

Data rate of left-side circuit

$f$  (typ.): 1 Mbit/s (duty cycle  $\approx 1/2$ )

### High Vcc Tolerance



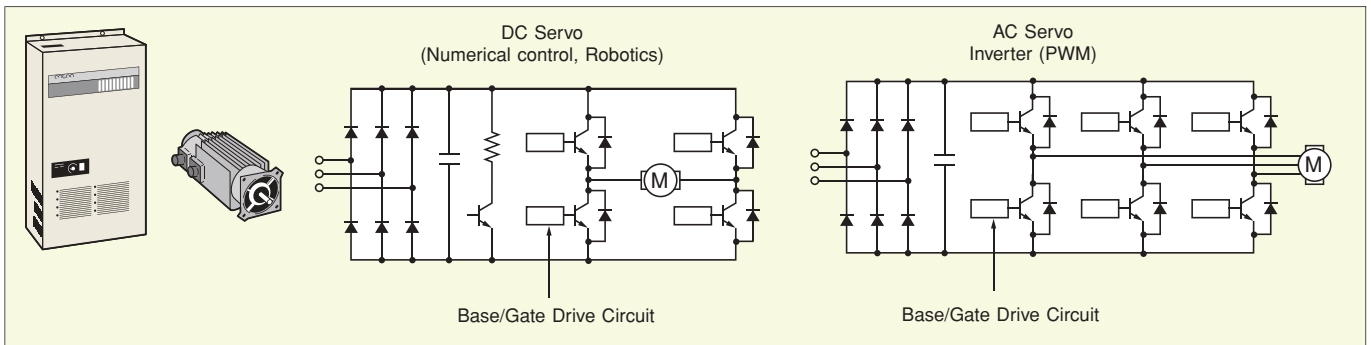
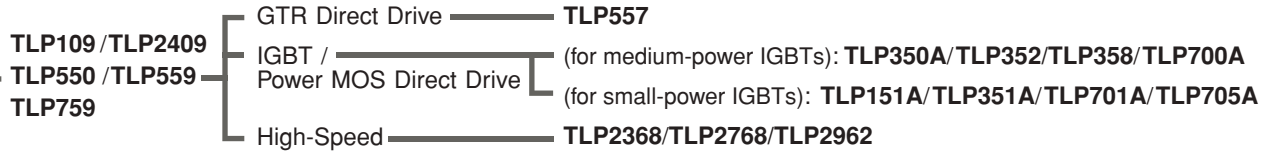
By using the **TLP558** which tolerates  $V_{CC}$  up to 20 V, CMOS logic gates and other components can be driven without design restrictions on  $V_{CC}$ .

Data rate of left-side circuit

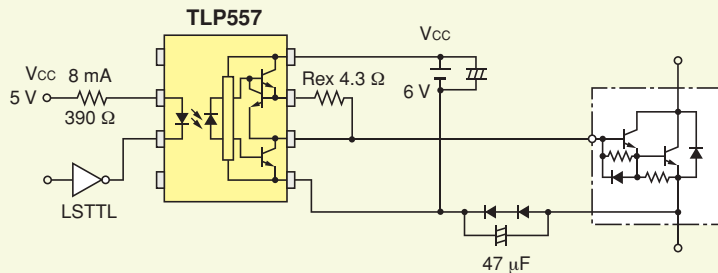
$f$  (typ.): 1 Mbit/s (duty cycle  $\approx 1/2$ )

## 2 Inverter and AC-DC Servo Applications

[Photo-IC couplers: high-speed base/gate drive applications]

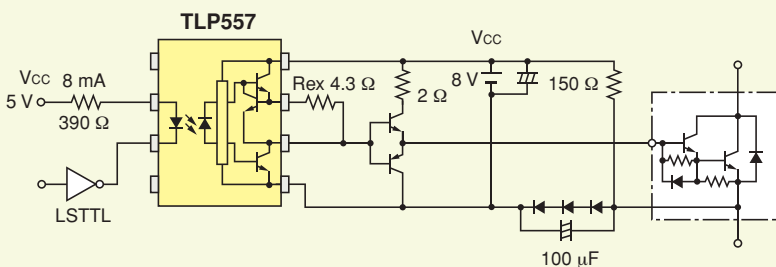


### Driving the Base of a 15-A-Class GTR (Giant Transistor) Module



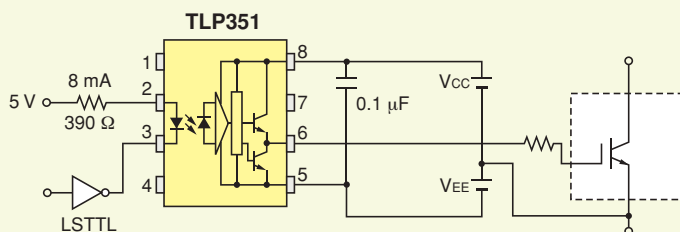
The **TLP557** drives the base of a GTR directly. An external resistor,  $R_{ex}$ , is connected between pins 6 and 7. This resistor causes the base current to become constant and stabilizes the GTR drive.

### Driving the Base of a 100-A-Class GTR Module



The **TLP557** photo-IC coupler and two booster transistors can drive a high-power GTR.

### Driving the Gate of a 15-A-Class IGBT (Insulated Gate Bipolar Transistor) Module



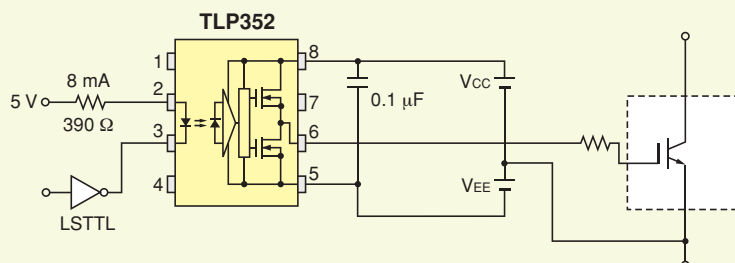
The **TLP151A**, **TLP351A**, **TLP701A**, **TLP705A** and **TLP2541A** high-speed photo-IC photocouplers can drive a low-power IGBT directly.

# 11 Photocoupler Application Circuit Examples

\*See datasheets for pin assignments.

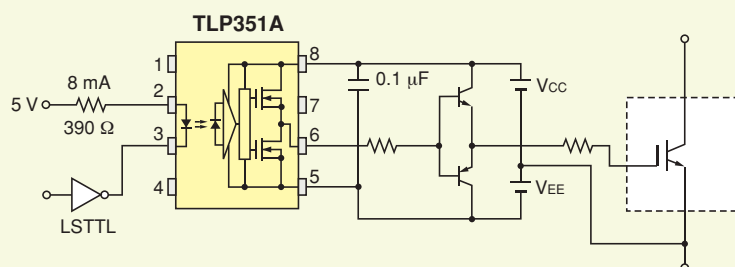
## 2 Inverter and AC-DC Servo Applications

### Driving the Gate of a 50-A-Class IGBT Module



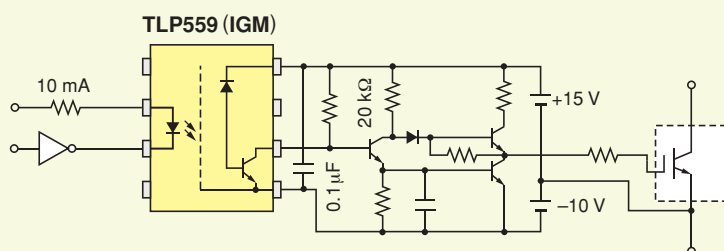
The **TLP350A**, **TLP352**, **TLP358** and **TLP700A** can drive a medium-power IGBT directly.

### Driving the Gate of a 400-A-Class IGBT Module



The **TLP151A**, **TLP351A**, **TLP701A**, **TLP705A** or **TLP2541A** high-speed photo-IC photocoupler and two booster transistors can drive a high power IGBT.

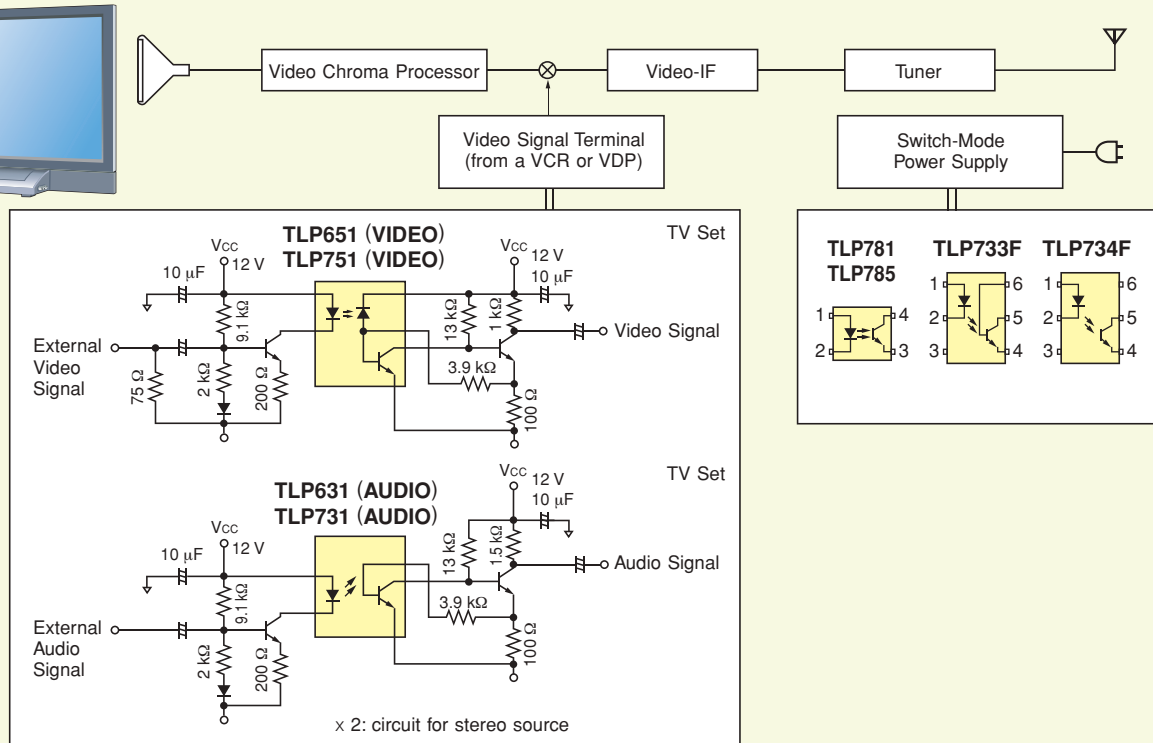
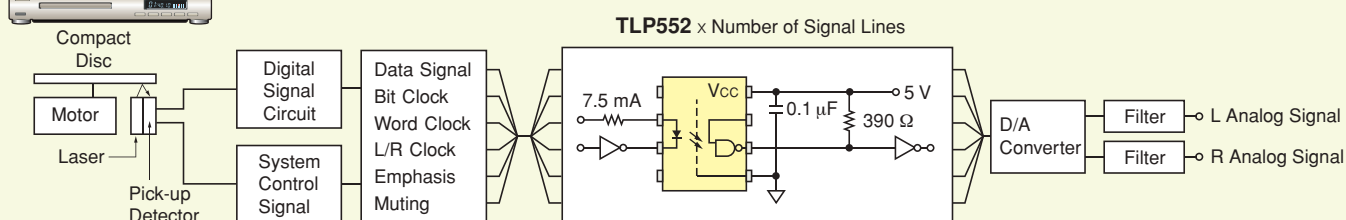
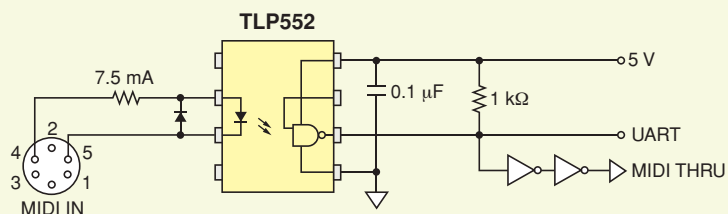
### Driving the Gate of an IGBT Module Using an IGM Photocoupler



IGM photocouplers are suitable for driving an intelligent power module (IPM). These photocouplers guarantee symmetrical low-to-high and high-to-low propagation delays ( $t_{PLH}$  -  $t_{PHL}$ ) and provides a high common mode transient immunity.

### IGM Selection

| Part Number         | Package | BVs (Vrms) | Vo/Vcc          | CTR                                                            | $ t_{PLH} - t_{PHL} $                   | CMH                                                             | CML                                                                |
|---------------------|---------|------------|-----------------|----------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------|
| <b>TLP109 (IGM)</b> | SO6     | 3750       | 20 V / 30 V max | 25% min<br>75% max<br>@If = 10 mA<br>Vcc = 4.5 V<br>Vo = 0.4 V | 0.7 μs max<br>@If = 10 mA<br>RL = 20 kΩ | 10000 V / μs min<br>@If = 0 mA<br>RL = 20 kΩ<br>VCM = 1500 Vp-p | - 10000 V / μs min<br>@If = 10 mA<br>RL = 20 kΩ<br>VCM = 1500 Vp-p |
| <b>TLP559 (IGM)</b> | DIP8    | 2500       |                 |                                                                |                                         |                                                                 |                                                                    |
| <b>TLP759 (IGM)</b> | DIP8    | 5000       |                 |                                                                |                                         |                                                                 |                                                                    |



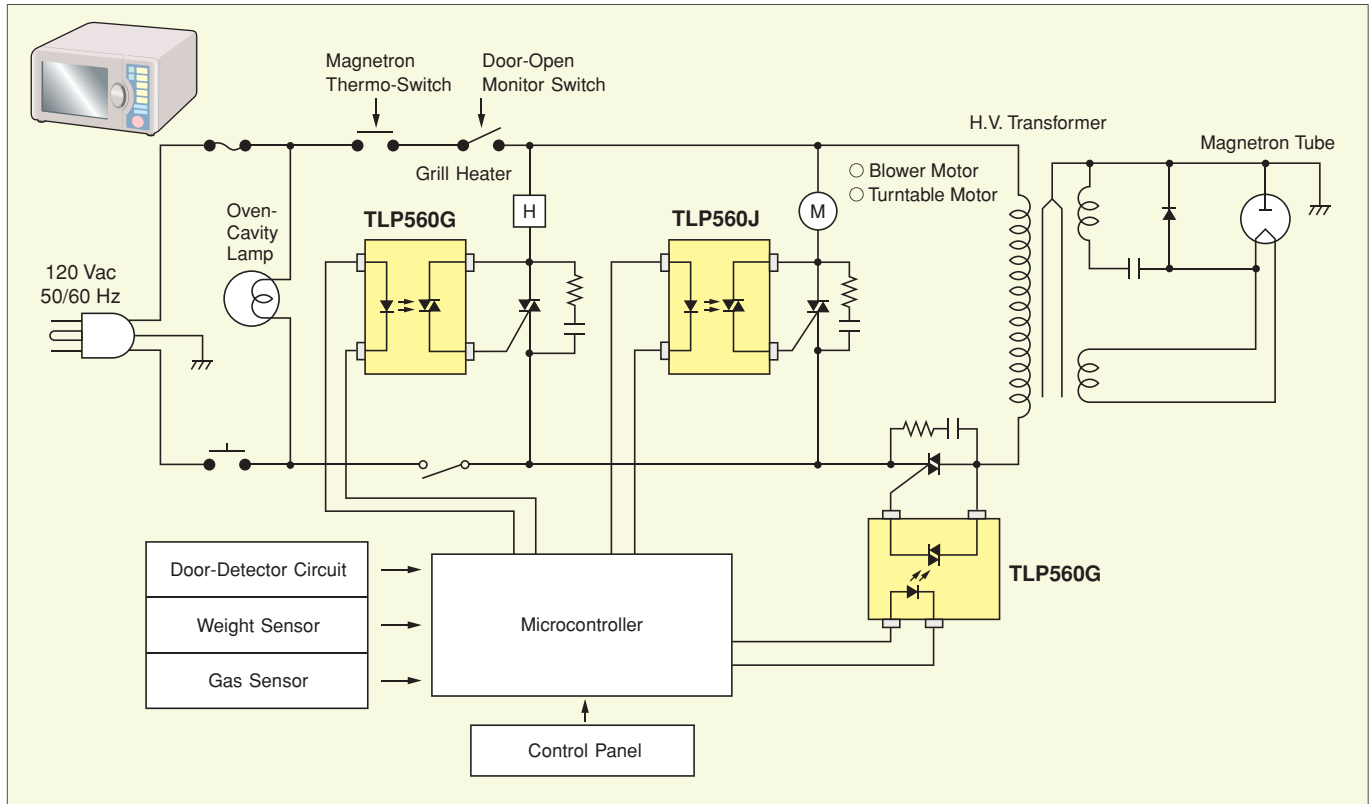
| Part Number    | Isolation Voltage | Bandwidth | Voltage Gain |
|----------------|-------------------|-----------|--------------|
| TLP651 (VIDEO) | 5000 Vrms         | > 4.5 MHz | 0.5 to 2     |
| TLP751 (VIDEO) | 5000 Vrms         |           | 0.4 to 1.8   |
| TLP631 (AUDIO) | 5000 Vrms         | > 100 kHz | 0.7 to 2     |
| TLP731 (AUDIO) | 4000 Vrms         |           |              |

# 11 Photocoupler Application Circuit Examples

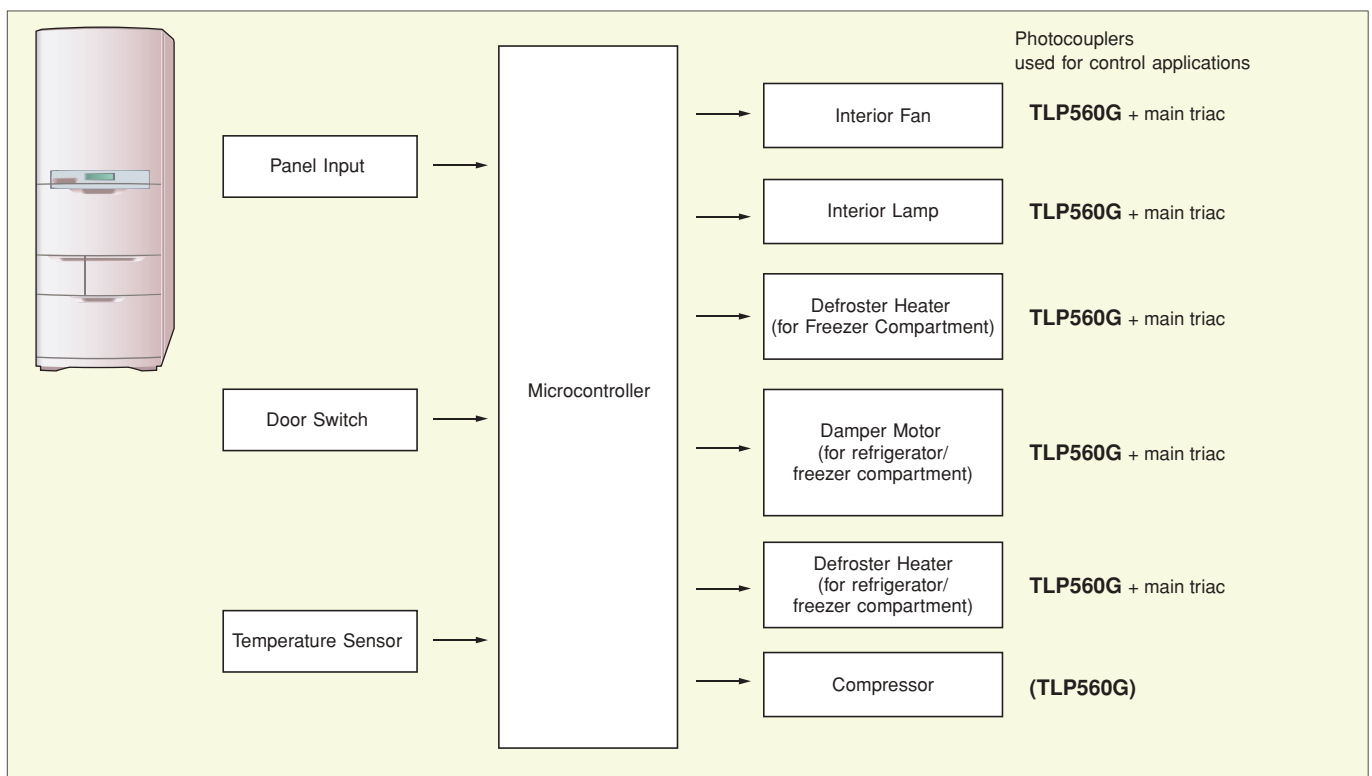
\*See datasheets for pin assignments.

## 4 Home Appliance Applications

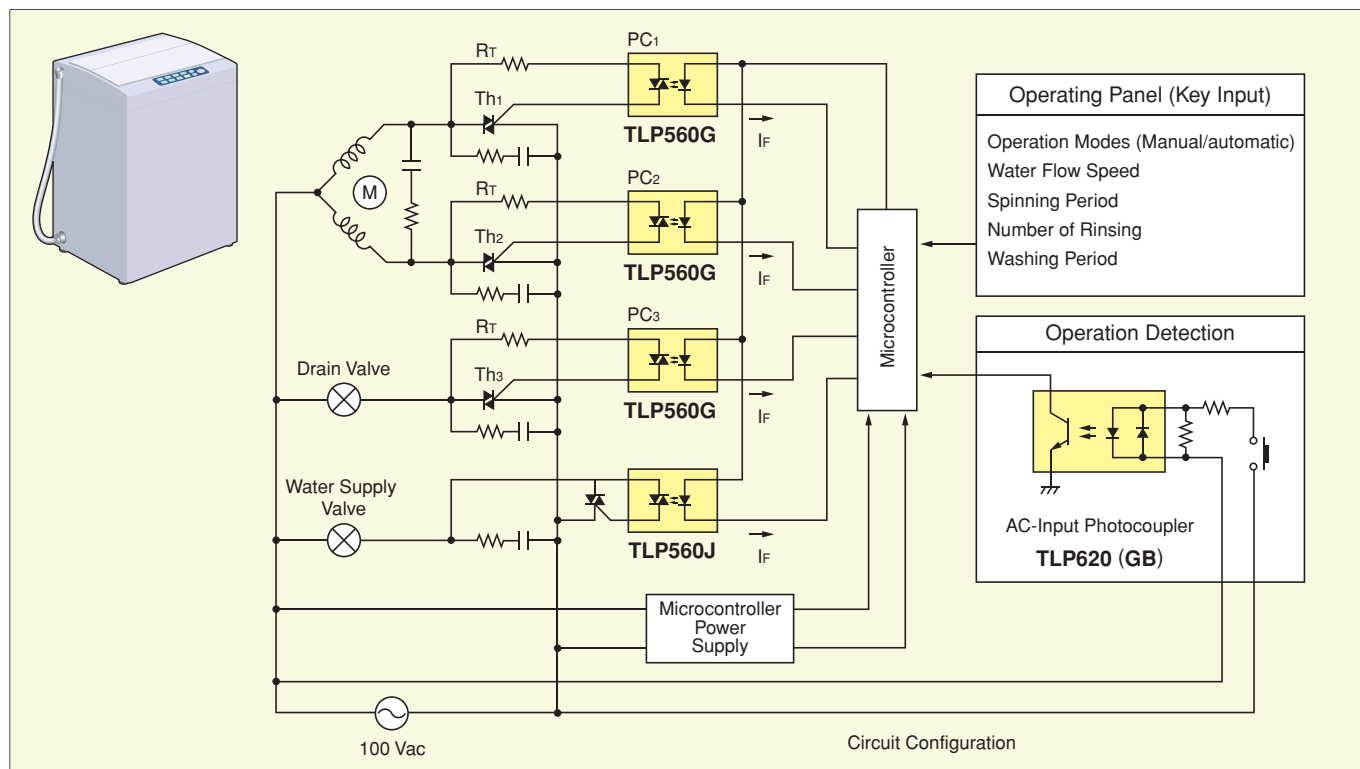
### Electric Oven/Grills



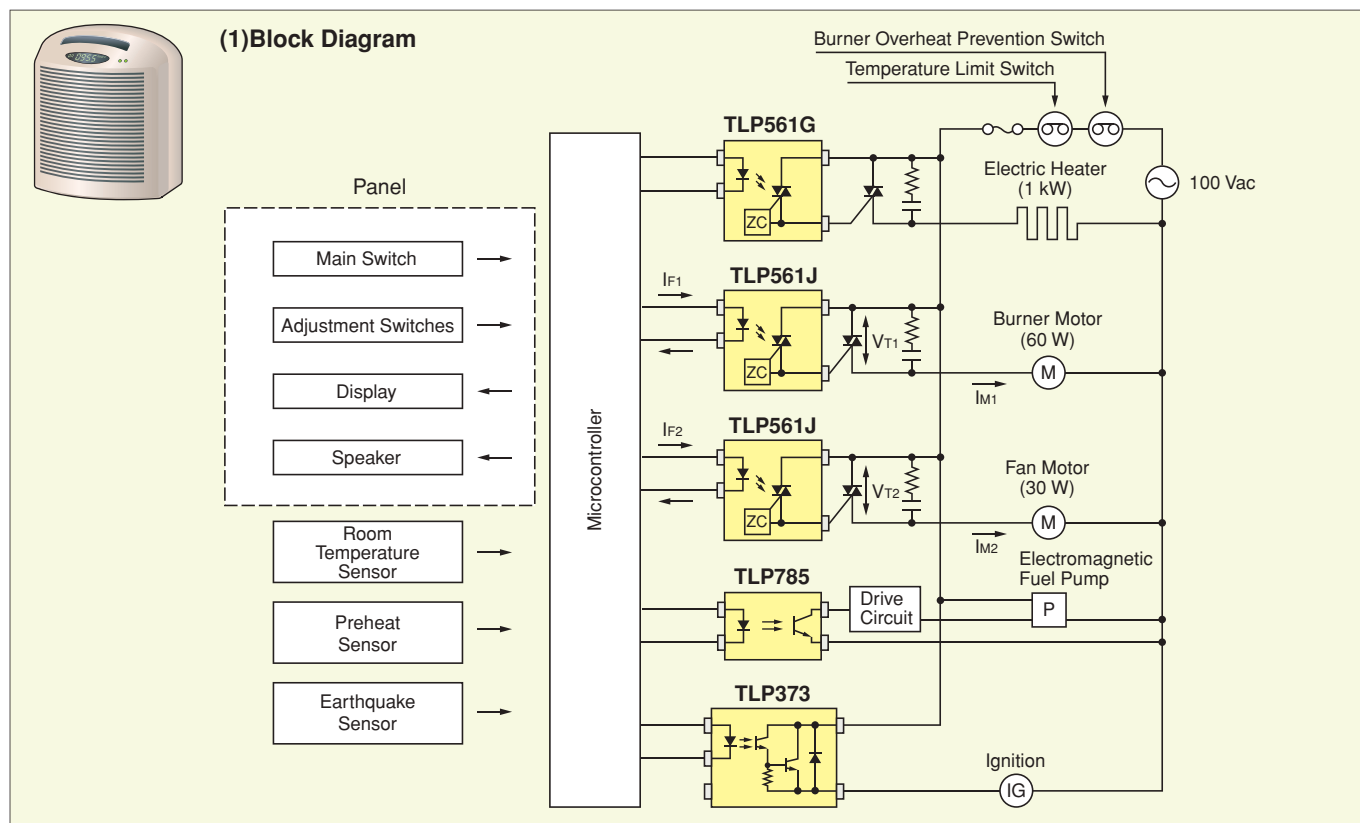
### Refrigerator Block Diagram



## Automatic Washing Machines



## Fan Heaters





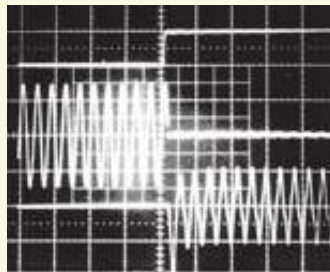
# 11 Photocoupler Application Circuit Examples

\*See datasheets for pin assignments.

## 4 Home Appliance Applications (Continued)

### (2) Waveform Examples

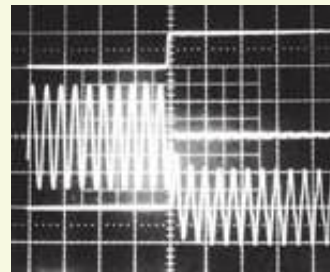
1. Example of Operating Waveform for Burner Motor



Trigger Point

waveforms {  
Top: If1 20 mA/div  
Medium: VT1 100 V/div  
Bottom: Im1 1 A/div  
Horizontal: time 50 ms/div

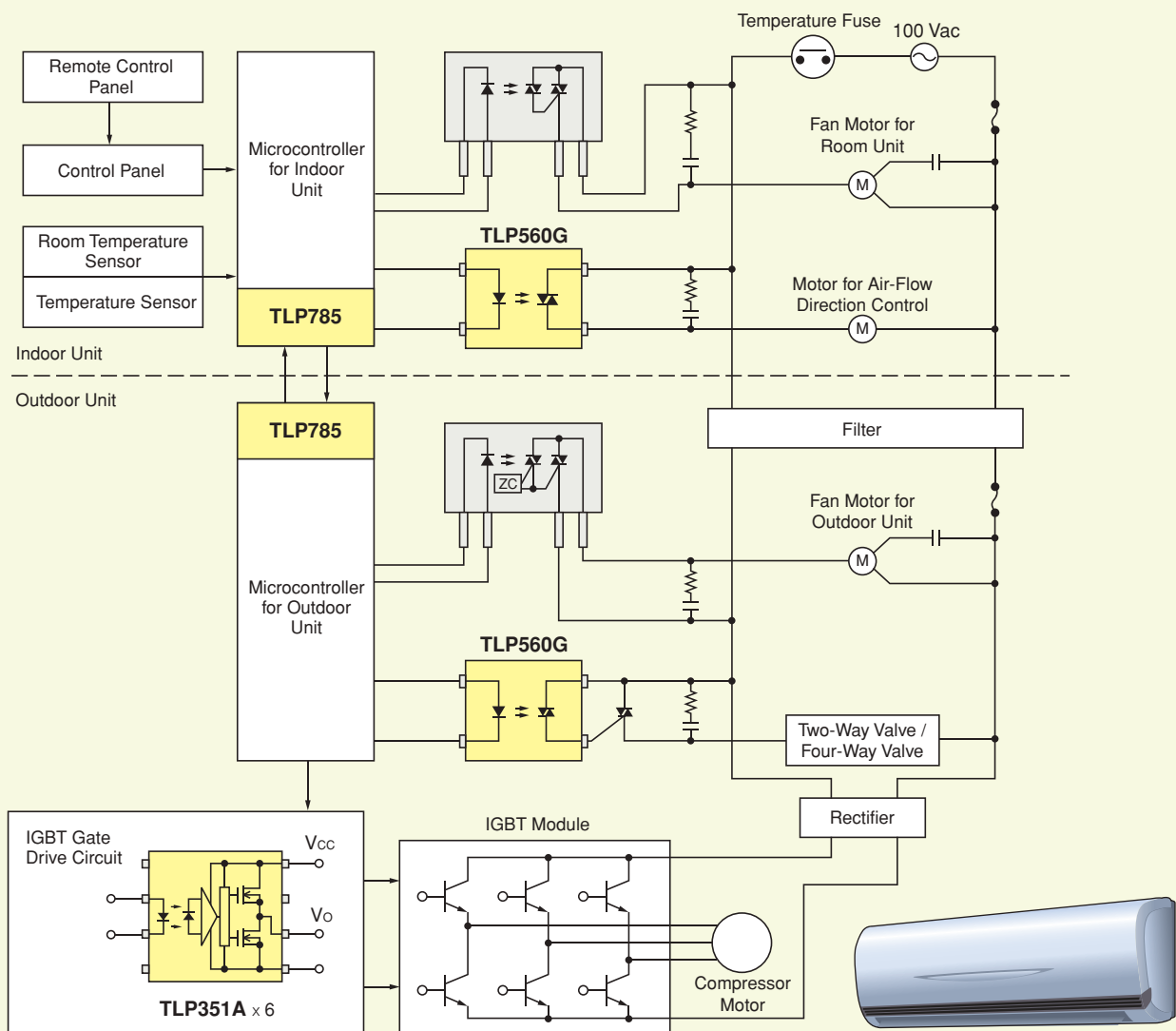
2. Example of Operating Waveform for Fan Motor



Trigger Point

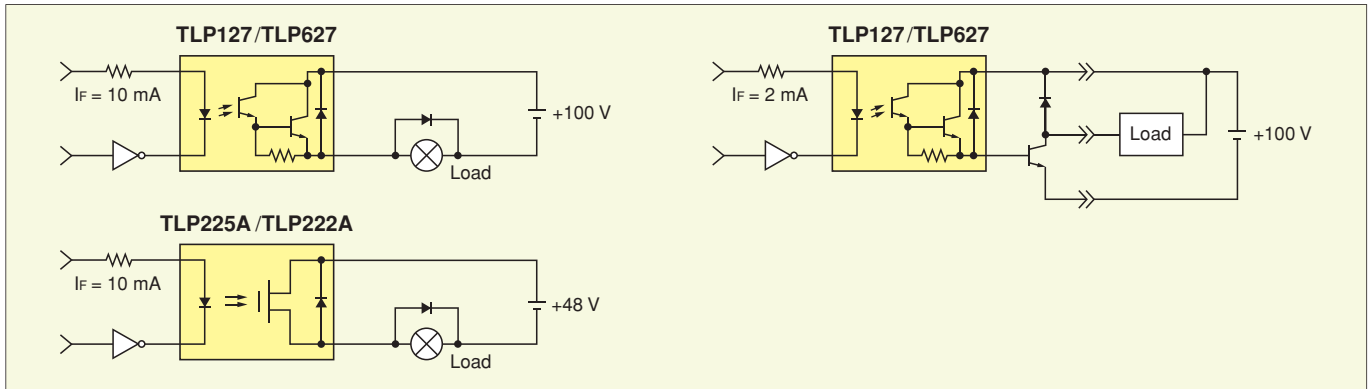
waveforms {  
Top: If2 20 mA/div  
Medium: VT2 100 V/div  
Bottom: Im2 0.5 A/div  
Horizontal: time 50 ms/div

### Inverter Air Conditioners

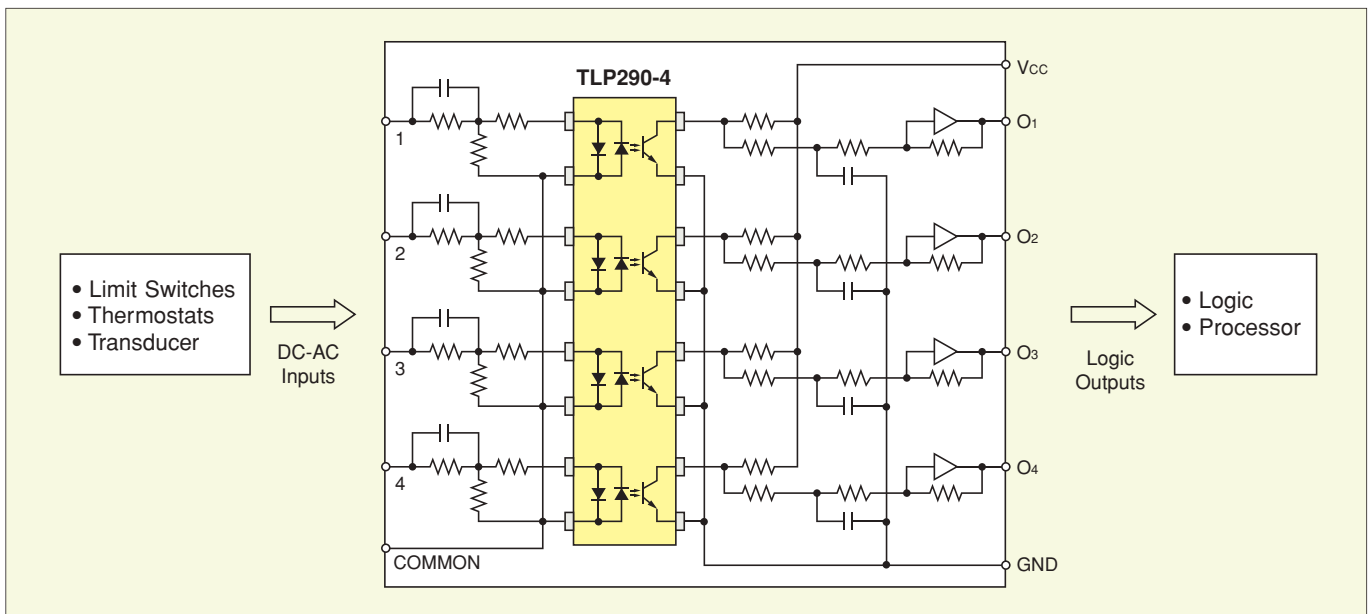


## 5 Programmable Controller Applications

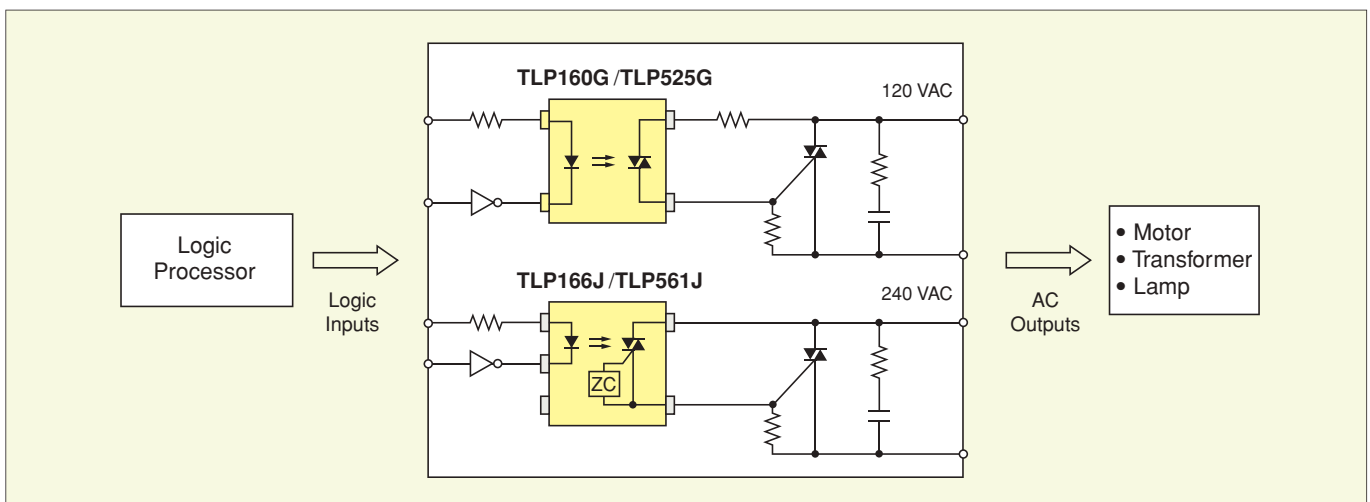
### DC Output for Sequencers



### AC Input for Sequencers



### 120-/240-Vac Output for Sequencers and Solid State Relays (SSRs)

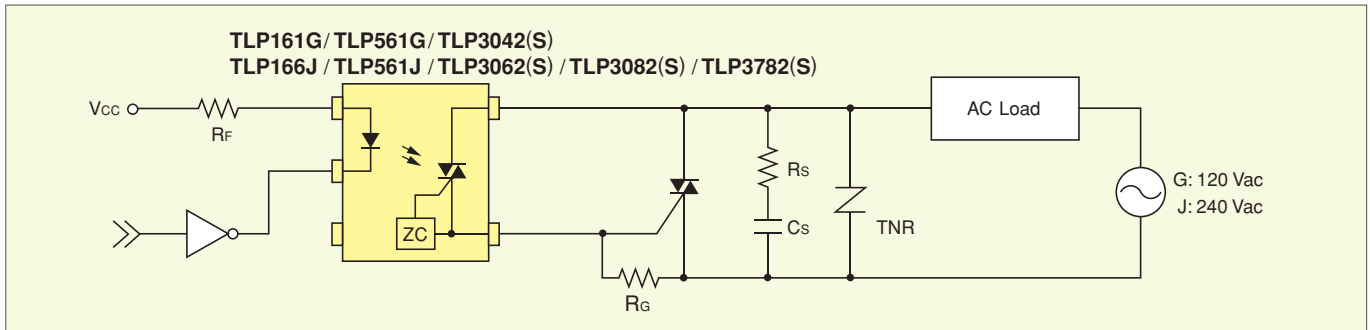


# 11 Photocoupler Application Circuit Examples

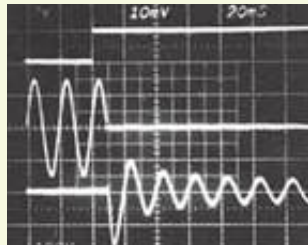
\*See datasheets for pin assignments.

## 6 SSR and Power Control Circuit Applications

### Zero-Crossing Phototriac Output: TLP561G/TLP561J and Mini-Flat TLP161G/TLP166J

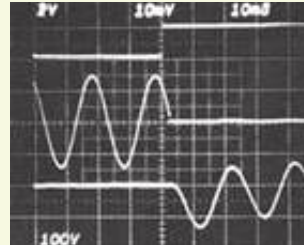


Lamp Load (1-A tungsten lamp)



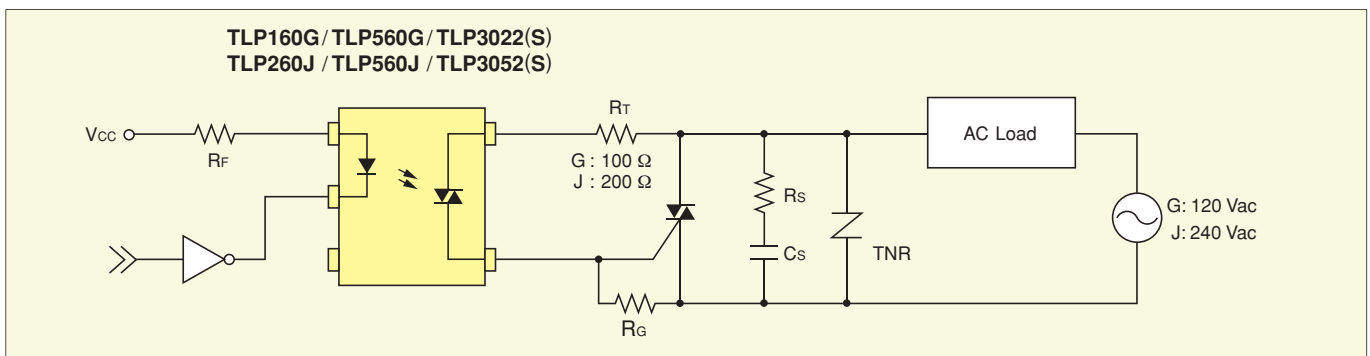
Waveforms { Top:  $I_F$  20 mA/div  
 Medium:  $V_T$  100 V/div  
 Bottom:  $I_T$  5 A/div

L load (2.5-A pure inductive load)

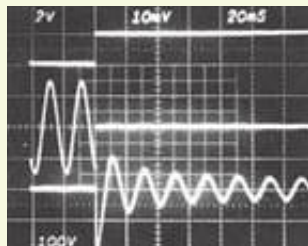


Recommended conditions {  $I_F$  = 20 mA  
 $R_G$  = 47  $\Omega$   
 $R_S$  = 47  $\Omega$ ,  $C_S$  = 0.033  $\mu$ F

### Non-Zero Crossing Phototriac Output: TLP560G/TLP560J and Mini-Flat TLP160G/TLP260J

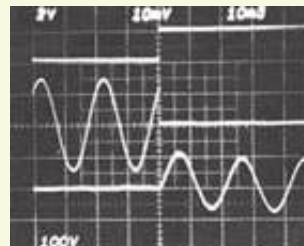


Lamp Load (1-A tungsten lamp)



Waveforms { Top:  $I_F$  20 mA/div  
 Medium:  $V_T$  100 V/div  
 Bottom:  $I_T$  5 A/div

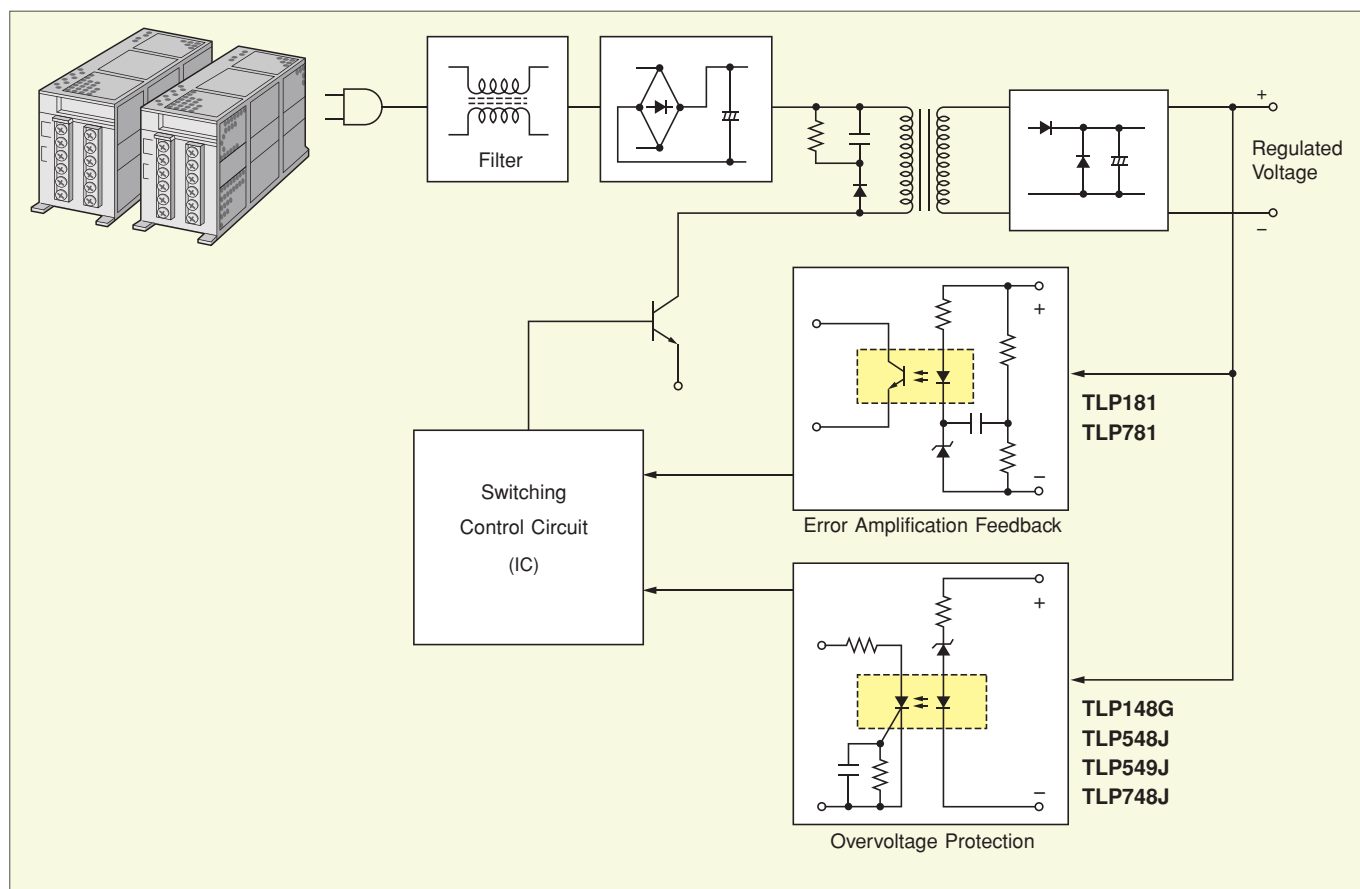
L load (2.5-A pure inductive load)



Recommended conditions {  $I_F$  = 20 mA  
 $R_T$  = 100  $\Omega$ /200  $\Omega$   
 $R_G$  = 47  $\Omega$   
 $R_S$  = 47  $\Omega$ ,  $C_S$  = 0.033  $\mu$ F

\*See datasheets for pin assignments.

## 7 Switching Power Supply Circuit Application



### ■ Transistor Output (○: Approved, as of July 2012)

| Part Number                | Package Type | Isolation Voltage | Safety Standard Approvals |                   |                  |              | CTR (Ic / If) Rank (%) |     |                  |
|----------------------------|--------------|-------------------|---------------------------|-------------------|------------------|--------------|------------------------|-----|------------------|
|                            |              |                   | UL 1577                   | BSI 7002(EN60950) | EN60747 (Note 1) | Nordic SEMKO |                        | Min | Max              |
| <b>TLP185</b>              | SO6          | 3750 Vrms         | ○                         | ○                 | ○(Note 2)        | ○            | No Rank                | 50  | 600 <sup>▲</sup> |
| <b>TLP781<br/>TLP785</b>   | DIP4         | 5000 Vrms         | ○*                        | ○                 | ○                | ○            | (GB) Rank              | 100 | 600 <sup>▲</sup> |
|                            |              |                   |                           |                   |                  |              | (Y) Rank               | 50  | 150              |
|                            |              |                   |                           |                   |                  |              | (GR) Rank              | 100 | 300              |
|                            |              |                   |                           |                   |                  |              | (BL) Rank**            | 200 | 600              |
|                            |              |                   |                           |                   |                  |              | (GRL) Rank             | 100 | 200              |
|                            |              |                   |                           |                   |                  |              | (GRH) Rank             | 150 | 300              |
| <b>TLP750 (high-speed)</b> | DIP8         | 5000 Vrms         | ○                         | ○                 | ○                | ○            | (O) Rank               | 19  | —                |
|                            |              |                   |                           |                   |                  |              | No Rank                | 10  | —                |

### ■ Thyristor Output (○: Approved, as of July 2012)

| Part Number | Package Type | Isolation Voltage | Safety Standard Approvals |                  | IFT (mA) | VDRM (V) |
|-------------|--------------|-------------------|---------------------------|------------------|----------|----------|
|             |              |                   | UL 1577                   | EN60747 (Note 1) |          |          |
| TLP148G     | MFSOP6       | 2500 Vrms         | ○                         |                  | 10       | 400      |
| TLP548J     | DIP6         |                   | ○                         |                  | 7        | 600      |
| TLP748J     |              | 4000 Vrms         | ○                         | ○                | 10       | 600      |

Note 1: EN60747-5-2/5 approved with option (V4) or (D4)

Note 2: The EN60747-5-2/5 safety standard for compact packages is different from those for standard DIP packages. Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

\*: Double protection    ▲: 400% for TLP185    \*\*: (BLL) class for TLP185; 200% minimum and 400% maximum

# 11 Photocoupler Application Circuit Examples

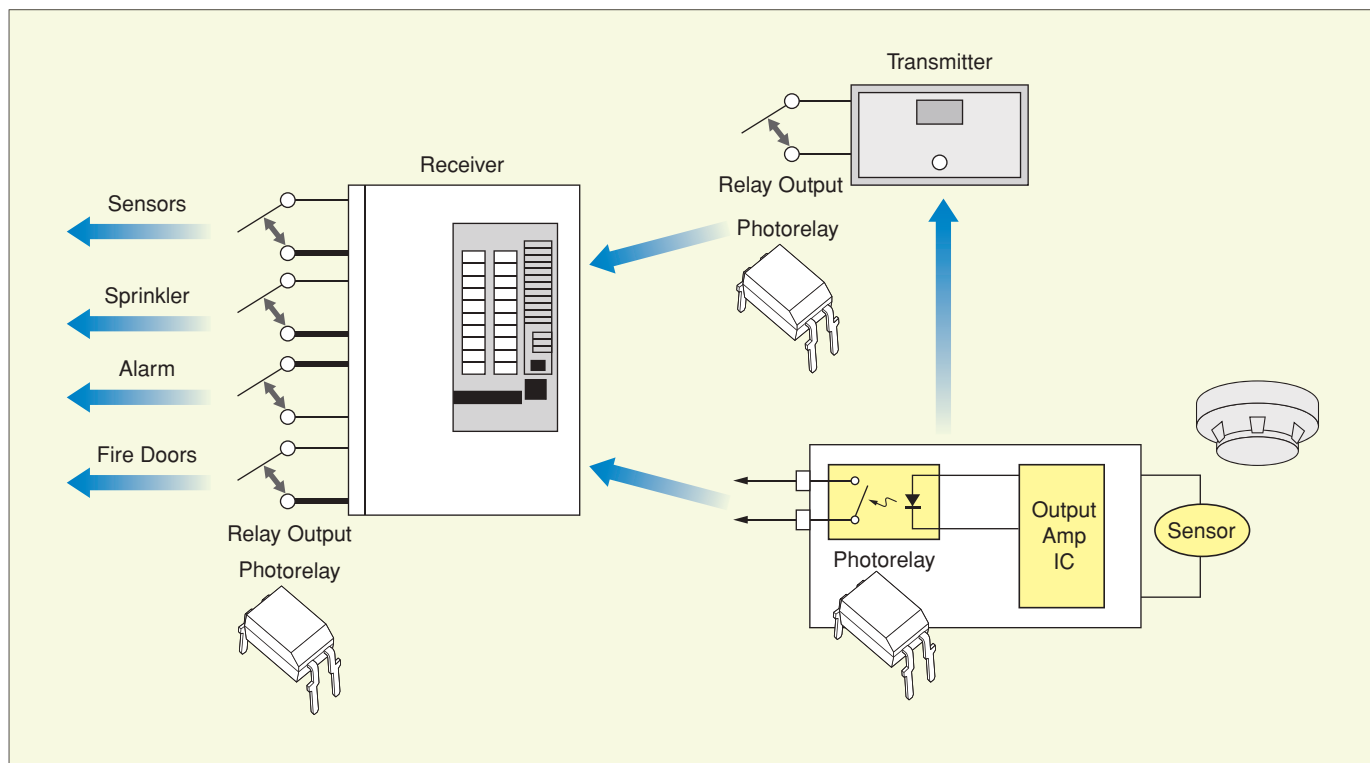
\*See datasheets for pin assignments.

## 8 Security System Applications

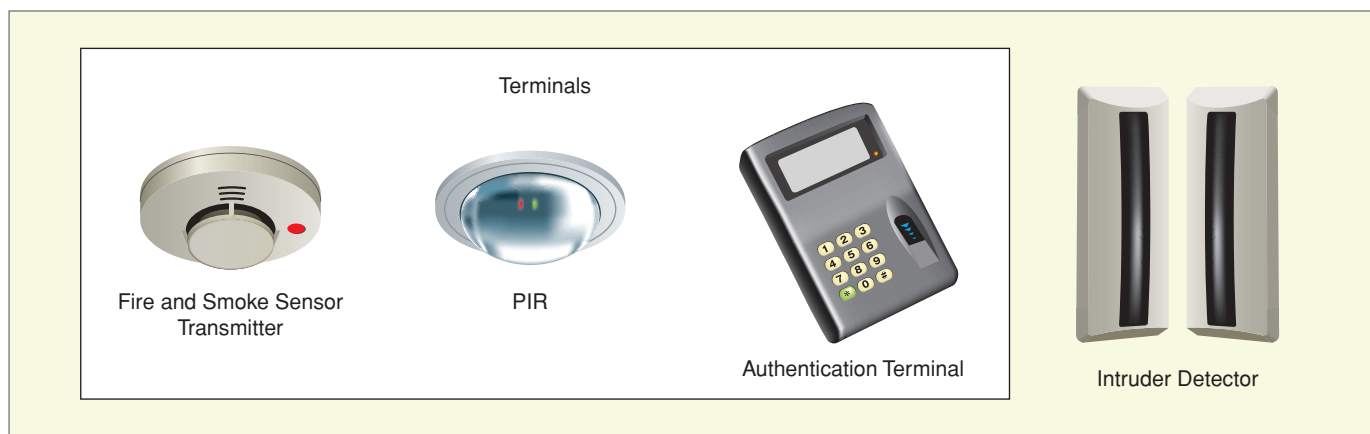
Security systems: House fire alarms, smoke sensors, passive infrared ray (PIR) sensors, intruder detectors, surveillance cameras, room entry/exit tracking systems, gas leak alarms, etc.

TLP220A/TLP220D/TLP220G/TLP220GA/TLP220J/TLP220AF/TLP220DF/TLP220GF/TLP220GAF/TLP220JF

### Fire Alarm System Example

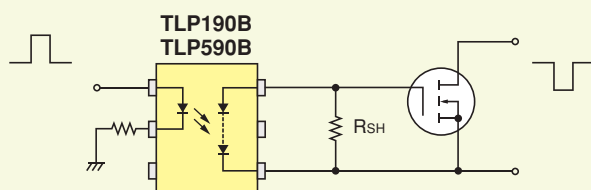


### Examples of Sensors

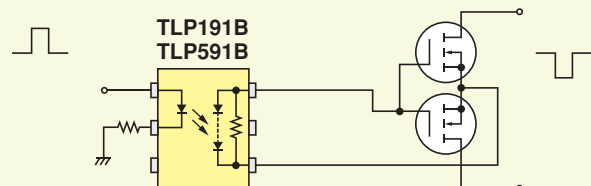


\*See datasheets for pin assignments.

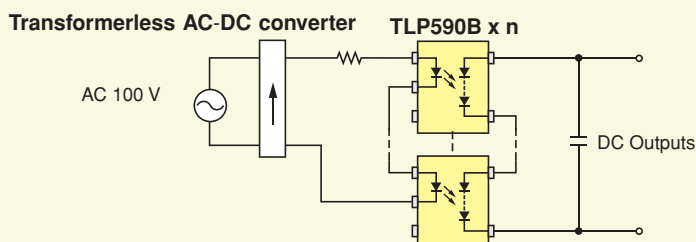
## 9 Photovoltaic Coupler Applications



This is the simplest power MOSFET drive circuit. The resistor  $R_{SH}$  for discharging the gate capacitor reduces turn-off time.  $R_{SH}$  is not required for the TLP591B, which has a built-in resistor. ( $T_{ON}$ ,  $T_{OFF}$   $\approx$  several ms)



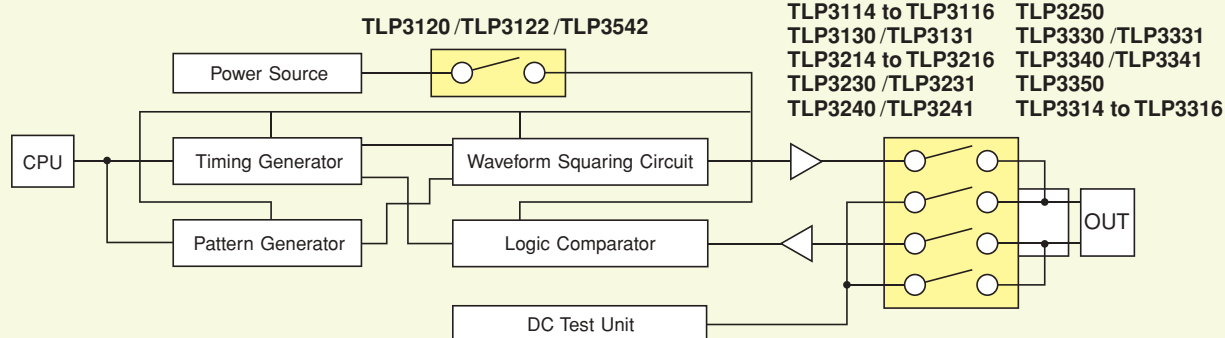
Both AC and DC drivers become possible by connecting power MOSFETs in a common-source configuration.



Photovoltaic couplers in a parallel-serial configuration convert AC power to DC without a transformer. This type of configuration requires tens to hundreds of photovoltaic couplers.

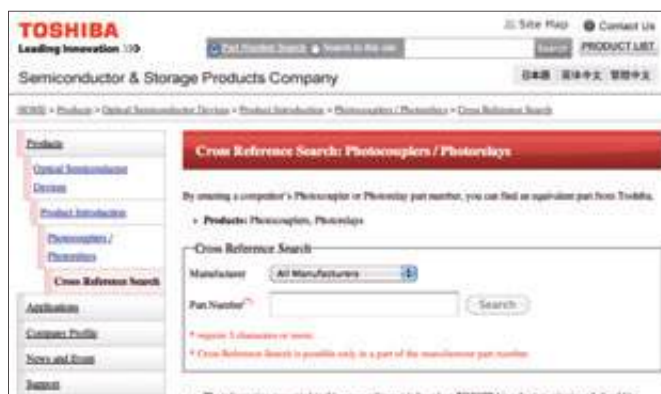
\*See datasheets for pin assignments.

## 10 Photorelays for Tester Application



## 11 Competitor Part Number Cross Reference Search

The Toshiba Semiconductor webpage at <http://www.semicon.toshiba.co.jp/eng/product/opto/selection/coupler/xref/index.html> offers a cross reference search tool for photocouplers and photorelays.





# 12 Competitor Cross Reference

## Avago-1

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| ACNW3120    | TLP352F             |
| ACNW3190    | TLP358F             |
| ACPL-071L   | TLP2466             |
| ACPL-074L   | TLP2160             |
| ACPL-214    | TLP290              |
| ACPL-217    | TLP291              |
| ACPL-247    | TLP291-4            |
| ACPL-312U   | TLP352              |
| ACPL-3130   | TLP352              |
| ACPL-827    | TLP785 x 2pcs       |
| ACPL-847    | TLP785 x 4pcs       |
| ACPL-H312   | TLP700A             |
| ACPL-J313   | TLP352              |
| ACPL-K312   | TLP700AF            |
| ACPL-M43U   | TLP109              |
| ACPL-M46U   | TLP104              |
| ACPL-M60L   | TLP2368             |
| ACPL-M61L   | TLP2366             |
| ACPL-M61U   | TLP2362             |
| ACPL-M75L   | TLP2366             |
| ACPL-P302   | TLP701H             |
| ACPL-P314   | TLP701H             |
| ACPL-P454   | TLP719              |
| ACPL-P456   | TLP714              |
| ACPL-P480   | TLP715              |
| ACPL-P481   | TLP718              |
| ACPL-P611   | TLP2768             |
| ACPL-T350   | TLP352              |
| ACPL-W302   | TLP701HF            |
| ACPL-W314   | TLP701HF            |
| ACPL-W454   | TLP719F             |
| ACPL-W456   | TLP714F             |
| ACPL-W480   | TLP715F             |
| ACPL-W481   | TLP718F             |
| ACPL-W60L   | TLP2768F            |
| ACPL-W611   | TLP2768F            |
| ACPL-W70L   | TLP2766F            |
| ASSR-1218   | TLP176A             |
| ASSR-1219   | TLP592A             |
| ASSR-1228   | TLP227A-2           |
| ASSR-1410   | TLP172A             |
| ASSR-1420   | TLP227A-2           |
| ASSR-1510   | TLP3122             |
| ASSR-1511   | TLP3542             |
| ASSR-1611   | TLP3542             |
| ASSR-301C   | TLP172G             |
| ASSR-302C   | TLP222G-2           |
| ASSR-3210   | TLP176G             |
| ASSR-401C   | TLP176GA            |
| ASSR-402C   | TLP227GA-2          |
| ASSR-4110   | TLP176GA            |
| ASSR-4118   | TLP176GA            |
| ASSR-4120   | TLP227GA-2          |
| HCNW2201    | TLP2955F            |
| HCNW2211    | TLP2955F            |
| HCNW3130    | TLP352F             |
| HCNW4502    | TLP759F             |
| HCNW4503    | TLP759F             |
| HCNW4504    | TLP759F             |
| HCPL-0201   | TLP2405             |
| HCPL-0211   | TLP2405             |
| HCPL-0302   | TLP2451A            |
| HCPL-0314   | TLP2451A            |
| HCPL-0452   | TLP2409             |
| HCPL-0453   | TLP2409             |

## Avago-2

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| HCPL-0454   | TLP2409             |
| HCPL-0466   | TLP2404             |
| HCPL-0500   | TLP2409             |
| HCPL-0501   | TLP2409             |
| HCPL-0600   | TLP2468             |
| HCPL-0601   | TLP2468             |
| HCPL-060L   | TLP2468             |
| HCPL-0611   | TLP2468             |
| HCPL-061A   | TLP2468             |
| HCPL-061N   | TLP2468             |
| HCPL-0630   | TLP2168             |
| HCPL-0631   | TLP2168             |
| HCPL-063A   | TLP2168             |
| HCPL-063L   | TLP2168             |
| HCPL-063N   | TLP2168             |
| HCPL-0661   | TLP2168             |
| HCPL-0700   | TLP2403             |
| HCPL-0701   | TLP2403             |
| HCPL-0708   | TLP2466             |
| HCPL-070A   | TLP2403             |
| HCPL-070L   | TLP2403             |
| HCPL-0738   | TLP2160             |
| HCPL-181    | TLP185              |
| HCPL-2200   | TLP2955             |
| HCPL-2201   | TLP2955             |
| HCPL-2202   | TLP2955             |
| HCPL-2211   | TLP2955             |
| HCPL-2212   | TLP2955             |
| HCPL-2219   | TLP2955             |
| HCPL-2231   | TLP2105             |
| HCPL-2232   | TLP2105             |
| HCPL-2300   | TLP2962             |
| HCPL-2601   | TLP2601             |
| HCPL-2611   | TLP2601             |
| HCPL-261A   | TLP2962             |
| HCPL-261N   | TLP2962             |
| HCPL-2630   | TLP2662             |
| HCPL-2631   | TLP2662             |
| HCPL-3020   | TLP351H             |
| HCPL-3100   | TLP351H             |
| HCPL-3101   | TLP351H             |
| HCPL-3120   | TLP352              |
| HCPL-3140   | TLP351H             |
| HCPL-314J   | TLP701H x 2pcs      |
| HCPL-3150   | TLP351H             |
| HCPL-315J   | TLP701H x 2pcs      |
| HCPL-3180   | TLP352              |
| HCPL-4502   | TLP759              |
| HCPL-4503   | TLP759              |
| HCPL-4504   | TLP759              |
| HCPL-4506   | TLP754              |
| HCPL-4661   | TLP2662             |
| HCPL-817    | TLP785              |
| HCPL-J312   | TLP352              |
| HCPL-J314   | TLP351H             |
| HCPL-J454   | TLP759              |
| HCPL-J456   | TLP754              |
| HCPL-M452   | TLP2309             |
| HCPL-M453   | TLP2309             |
| HCPL-M454   | TLP2309             |
| HCPL-M456   | TLP104              |
| HCPL-M600   | TLP2362             |
| HCPL-M601   | TLP2362             |
| HCPL-M611   | TLP2362             |
| HCPL-T250   | TLP352              |

## Renesas-1

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| PS2501-1    | TLP785              |
| PS2501-2    | TLP785 x 2pcs       |
| PS2501-4    | TLP785 x 4pcs       |
| PS2501A-1   | TLP785              |
| PS2501L-1   | TLP785              |
| PS2501L-2   | TLP785 x 2pcs       |
| PS2502L-1   | TLP627              |
| PS2502L-4   | TLP627-4            |
| PS2503L-1   | TLP624              |
| PS2505L-1   | TLP620              |
| PS2505L-2   | TLP620-2            |
| PS2505L-4   | TLP620-4            |
| PS2513L-1   | TLP628              |
| PS2521-1    | TLP629              |
| PS2521L-1   | TLP629              |
| PS2525L-1   | TLP320              |
| PS2532-1    | TLP627              |
| PS2532-2    | TLP627-2            |
| PS2532-4    | TLP627-4            |
| PS2532L-1   | TLP627              |
| PS2533L-1   | TLP627              |
| PS2535L-1   | TLP627              |
| PS2561      | TLP785              |
| PS2561AL    | TLP785F             |
| PS2561BL    | TLP785F             |
| PS2561F-1   | TLP785              |
| PS2561FL1-1 | TLP785F             |
| PS2561L1-1  | TLP785F             |
| PS2562L-1   | TLP627              |
| PS2565L-1   | TLP620              |
| PS2581AL    | TLP785F             |
| PS2581L1    | TLP785F             |
| PS2601      | TLP631              |
| PS2602      | TLP632              |
| PS2633      | TLP371              |
| PS2634      | TLP372              |
| PS2701-1    | TLP185              |
| PS2702-1    | TLP127              |
| PS2703-1    | TLP185              |
| PS2705A-1   | TLP184              |
| PS2711-1    | TLP124              |
| PS2715-1    | TLP184              |
| PS2732-1    | TLP127              |
| PS2733-1    | TLP127              |
| PS2761B-1   | TLP124              |
| PS2801-1    | TLP291              |
| PS2801-4    | TLP291-4            |
| PS2801C-1   | TLP291              |
| PS2801C-4   | TLP291-4            |
| PS2805-1    | TLP290              |
| PS2805-4    | TLP290-4            |
| PS2805C-1   | TLP290              |
| PS2805C-4   | TLP290-4            |
| PS2811-1    | TLP291              |
| PS2811-4    | TLP291-4            |
| PS2815-1    | TLP290              |
| PS2815-4    | TLP290-4            |
| PS2861B-1   | TLP291              |
| PS710B-1A   | TLP3542             |
| PS7113-1A   | TLP598GA            |
| PS7122A-1A  | TLP598GA            |
| PS7141-1B   | TLP4597G            |
| PS7141E-1A  | TLP597GA            |
| PS7200A-1A  | TLP3116             |
| PS7200H-1A  | TLP3114             |

## Renesas-2

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| PS7200K-1A  | TLP3115             |
| PS7200R-1A  | TLP3116             |
| PS7205B-1A  | TLP3121             |
| PS7206-1A   | TLP3122             |
| PS7221A-2A  | TLP200D             |
| PS7801-1A   | TLP3216             |
| PS7802-1A   | TLP3214             |
| PS7802A-1A  | TLP3214             |
| PS7802B-1A  | TLP3215             |
| PS7804-1A   | TLP3212             |
| PS8101      | TLP2309             |
| PS8302L     | TLP719              |
| PS8302L2    | TLP719F             |
| PS8501      | TLP751              |
| PS8502      | TLP759              |
| PS8601      | TLP751              |
| PS8602      | TLP759              |
| PS8701      | TLP2309             |
| PS8802      | TLP2409             |
| PS8821      | TLP2409             |
| PS9113      | TLP104              |
| PS9114      | TLP2362             |
| PS9115      | TLP2366             |
| PS9117A     | TLP2362             |
| PS9121      | TLP2368             |
| PS9122      | TLP2368             |
| PS9123      | TLP2366             |
| PS9124      | TLP2362             |
| PS9151      | TLP2366             |
| PS9213      | TLP104              |
| PS9214      | TLP2362             |
| PS9301      | TLP701H             |
| PS9302      | TLP700A             |
| PS9303L     | TLP715              |
| PS9305L     | TLP700A             |
| PS9306L     | TLP701H             |
| PS9307L     | TLP701H             |
| PS9308L     | TLP700A             |
| PS9309L     | TLP715              |
| PS9313L     | TLP714              |
| PS9317L     | TLP2768             |
| PS9317L2    | TLP2768F            |
| PS9324      | TLP2768             |
| PS9351      | TLP2766             |
| PS9505      | TLP352              |
| PS9506      | TLP351H             |
| PS9513      | TLP754              |
| PS9552      | TLP350H             |
| PS9553      | TLP351H             |
| PS9587      | TLP2601             |
| PS9614      | TLP2962             |
| PS9617      | TLP2601             |
| PS9701      | TLP2362             |
| PS9714      | TLP2362             |
| PS9801      | TLP2451A            |
| PS9817A-1   | TLP2418             |
| PS9817A-2   | TLP2168             |
| PS9821-1    | TLP2466             |
| PS9821-2    | TLP2160             |
| PS9822-1    | TLP2468             |
| PS9822-2    | TLP2168             |
| PS9851-1    | TLP2466             |
| PS9851-2    | TLP2160             |



## Panasonic

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| AQV210      | TLP592G             |
| AQV210E     | TLP597G             |
| AQV210EH    | TLP797GA            |
| AQV210S     | TLP192G             |
| AQV212      | TLP592A             |
| AQV212S     | TLP197A             |
| AQV214      | TLP597GA            |
| AQV214E     | TLP597G             |
| AQV214EH    | TLP797GA            |
| AQV214H     | TLP797GA            |
| AQV214S     | TLP197GA            |
| AQV215      | TLP597A             |
| AQV216      | TLP797J             |
| AQV217S     | TLP197D             |
| AQV251G     | TLP3544             |
| AQV252G     | TLP3545             |
| AQV255G     | TLP3105             |
| AQV414E     | TLP4597G            |
| AQV414S     | TLP4197G            |
| AQW210      | TLP222G-2           |
| AQW210S     | TLP202G             |
| AQW212      | TLP222A-2           |
| AQW214      | TLP206GA            |
| AQW214S     | TLP227GA-2          |
| AQW215      | TLP222A-2           |
| AQW217      | TLP222G-2           |
| AQW610S     | TLP4026G            |
| AQY210EH    | TLP227G             |
| AQY210LS    | TLP174G             |
| AQY210S     | TLP174G             |
| AQY211EHA   | TLP221A             |
| AQY212EHA   | TLP220A             |
| AQY212G     | TLP3555             |
| AQY214EH    | TLP227G             |
| AQY214EHA   | TLP220GA            |
| AQY214S     | TLP176GA            |
| AQY216EH    | TLP220J             |
| AQY221N1S   | TLP3113 /TLP3116    |
| AQY221N2S   | TLP3113 /TLP3116    |
| AQY221N2V   | TLP3216             |
| AQY221R2V   | TLP3215             |
| AQY410EH    | TLP4227G            |
| AQY414EH    | TLP4227G            |
| AQY414S     | TLP4176G            |

## Sharp

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| PC123       | TLP785              |
| PC1231      | TLP624              |
| PC352       | TLP185              |
| PC354NT     | TLP184              |
| PC355NT     | TLP127              |
| PC357NT     | TLP185              |
| PC367       | TLP124              |
| PC3H21      | TLP525G             |
| PC3H3       | TLP290              |
| PC3H4       | TLP290              |
| PC3H7       | TLP291              |
| PC410       | TLP2362             |
| PC411       | TLP2366             |
| PC417       | TLP2309             |
| PC452       | TLP127              |
| PC457       | TLP2309             |
| PC4D10S     | TLP2168             |
| PC4SD21     | TLP669L(S)*         |
| PC813       | TLP620              |
| PC814       | TLP626              |
| PC815       | TLP627              |
| PC817       | TLP785              |
| PC8171      | TLP624              |
| PC845       | TLP523 x 4pcs       |
| PC847       | TLP785 x 4pcs       |
| PC851       | TLP628              |
| PC852       | TLP627              |
| PC910       | TLP2962             |
| PC923       | TLP351H             |
| PC924       | TLP351H             |
| PC925       | TLP352              |
| PC942       | TLP351H             |
| PR36MF11    | TLP3506             |
| PR36MF12    | TLP3506             |
| S201D01     | TLP3526             |
| S201D02     | TLP3527             |
| S21MD3V     | TLP3051 (S)         |
| S2S3        | TLP260J             |
| S2S4        | TLP161J             |

## Vishay

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| SFH614A     | TLP628              |
| SFH615A     | TLP785              |
| SFH617A     | TLP785              |
| SFH618A     | TLP624              |
| TCET1100    | TLP785              |
| SFH690xT    | TLP185              |
| TCMT110     | TLP291              |
| TCMT4100    | TLP291-4            |
| SFH628A     | TLP620              |
| K815P       | TLP627              |
| SFH612A     | TLP627              |
| SFH619A     | TLP627              |
| SFH655A     | TLP627              |
| SFH692AT    | TLP127              |
| TCED1100    | TLP627              |
| IL66        | TLP371              |
| IL66B       | TLP372              |
| IL255       | TLP330              |
| SFH6156     | TLP785              |
| TCMT1600    | TLP290              |
| TCMT4600    | TLP290-4            |
| SFH618      | TLP785              |
| SFH619      | TLP628              |

## Fairchild-1

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| 6N137M      | TLPN137             |
| FOD050L     | TLP751              |
| FOD060L     | TLP2160             |
| FOD2200     | TLP2955             |
| FOD260L     | TLP2962             |
| FOD3120     | TLP352              |
| FOD3150     | TLP351H             |
| FOD3180     | TLP352              |
| FOD3181     | TLP351H             |
| FOD3184     | TLP352              |
| FOD410      | TLP668J(S)*         |
| FOD617      | TLP785              |
| FOD814      | TLP620              |
| FOD815      | TLP627              |
| FOD817      | TLP785              |
| FOD8320     | TLP700AF            |
| FOD8321     | TLP700AF            |
| FOD852      | TLP627              |
| FODM121     | TLP185              |
| FODM124     | TLP185              |
| FODM2701    | TLP185              |
| FODM2705    | TLP184              |
| FODM3021    | TLP160G             |
| FODM3022    | TLP160G             |
| FODM3051    | TLP160J             |
| FODM3052    | TLP160J             |
| FODM452     | TLP2309             |
| FODM453     | TLP2309             |
| FODM611     | TLP2368             |
| FODM8061    | TLP2368             |
| FODM8071    | TLP2366             |
| H11A1       | TLP631              |
| H11A617     | TLP785              |
| H11A817     | TLP785              |
| H11AA1      | TLP630              |
| H11AA814    | TLP620              |
| H11AG1      | TLP331              |
| H11B1       | TLP571              |
| H11B815     | TLP627              |
| H11C1       | TLP541G             |
| H11D1       | TLP371              |
| H11G1       | TLP371              |
| HCPL0452    | TLP2409             |
| HCPL0453    | TLP2409             |
| HCPL0500    | TLP2409             |
| HCPL0501    | TLP2409             |
| HCPL0600    | TLP2468             |
| HCPL0601    | TLP2468             |
| HCPL0611    | TLP2468             |
| HCPL062L    | TLP2168             |
| HCPL0637    | TLP2168             |
| HCPL0638    | TLP2168             |
| HCPL0639    | TLP2168             |
| HCPL2601    | TLP2601             |
| HCPL2611    | TLP2601             |
| HCPL2630    | TLP2662             |
| HCPL2631    | TLP2662             |
| HMA121      | TLP185              |
| HMA124      | TLP124              |
| HMA2701     | TLP185              |
| HMAA2705    | TLP184              |
| HMHA2801    | TLP291              |
| HMHA2801    | TLP291              |
| HMHA281     | TLP291              |
| HMHA280     | TLP290              |

## Fairchild-2

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| MCT5201     | TLP331              |
| MCT5210     | TLP331              |
| MCT5211     | TLP331              |
| MOC3021-M   | TLP3021 (S)         |
| MOC3022-M   | TLP3022 (S)         |
| MOC3023-M   | TLP3023 (S)         |
| MOC3041-M   | TLP3041 (S)         |
| MOC3042-M   | TLP3042 (S)         |
| MOC3043-M   | TLP3043 (S)         |
| MOC3051-M   | TLP3051 (S)         |
| MOC3052-M   | TLP3052 (S)         |
| MOC3061-M   | TLP3061 (S)         |
| MOC3062-M   | TLP3062 (S)         |
| MOC3063-M   | TLP3063 (S)         |

## LITEON

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| LTV-123     | TLP785              |
| LTV-816     | TLP785              |
| LTV-817     | TLP785              |
| LTV-851     | TLP628              |
| LTV-356T    | TLP185              |
| LTV-357T    | TLP185              |
| LTV-814     | TLP620              |
| LTV-814H    | TLP320              |
| LTV-354T    | TLP184              |
| LTV-815     | TLP627              |
| LTV-852     | TLP627              |
| LTV-352T    | TLP127              |
| LTV-355T    | TLP127              |
| MOC3020     | TLP3020 (S)         |
| MOC3021     | TLP3021 (S)         |
| MOC3022     | TLP3022 (S)         |
| MOC3023     | TLP3023 (S)         |
| MOC3051     | TLP3051 (S)         |
| MOC3052     | TLP3052 (S)         |
| MOC3061     | TLP3061 (S)         |
| MOC3062     | TLP3062 (S)         |
| MOC3063     | TLP3063 (S)         |

## COSMO

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| K1010       | TLP781              |
| K1020       | TLP621-2            |
| K2010       | TLP631              |
| K3010       | TLP620              |
| KP3020      | TLP620-2            |
| KP4010      | TLP627              |
| KP4020      | TLP627-2            |
| K5010       | TLP371              |
| K6010       | TLP630              |
| KPS2801     | TLP291              |
| KPC354NT    | TLP184              |
| KPC355NT    | TLP127              |
| KPC357NT    | TLP185              |
| KPC452      | TLP127              |

## Everlight

| Part Number | Toshiba Part Number |
|-------------|---------------------|
| EL3H7       | TLP291              |
| EL357       | TLP185              |
| EL816       | TLP785              |
| EL816M      | TLP785F             |
| EL817       | TLP785              |
| EL817M      | TLP785F             |

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For details of optical and electrical characteristics, package dimensions, pin assignments, etc., see the latest technical documentation  
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