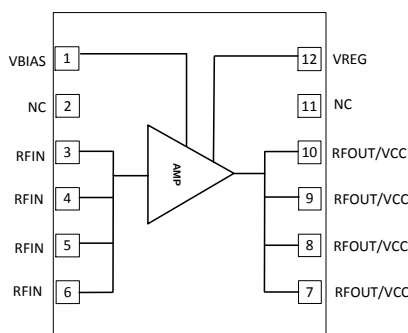


# RFPA2545

Broadband 4W GaAs HBT Power Amplifier  
1400MHz to 2700MHz

The RFPA2545 is a broadband GaAs HBT power amplifier specifically designed for wireless infrastructure applications. Using a highly reliable GaAs HBT technology, this high performance single stage amplifier achieves higher gain and ultra-high linearity over a broad frequency range. It exhibits excellent back-off characteristics making it ideal for ultra-linear applications. RFPA2545 can also be optimized for use as a small-cell PA output stage. External matching and bias control allows RFPA2545 to be utilized across various radio platforms within 1400MHz to 2700MHz.



Functional Block Diagram



Package: DFN, 12-pin,  
4.0mm x 5.0mm x 0.85mm

## Features

- 1400MHz to 2700MHz Operation
- P1dB = 34.9dBm at 2140MHz
- ACP = -52dBc at  $P_{OUT} = 25dBm$ , 2140MHz
- High Linearity OIP3 = 52.3dBm at 2140MHz
- DC Power 5V, 800mA

## Applications

- GaAs Pre-driver for Base Station Amplifiers
- Small Cell Output Stage
- PA Stage for Commercial Wireless Infrastructure

## Ordering Information

|                 |                                                 |
|-----------------|-------------------------------------------------|
| RFPA2545SQ      | Sample bag with 25 pieces                       |
| RFPA2545SR      | 7" Reel with 100 pieces                         |
| RFPA2545TR13    | 13" Reel with 2500 pieces                       |
| RFPA2545PCK-411 | 2110MHz to 2170MHz PCBA with 5-piece sample bag |
| RFPA2545PCK-412 | 2590MHz to 2690MHz PCBA with 5-piece sample bag |

## Absolute Maximum Ratings

| Parameter                                                    | Rating      | Unit |
|--------------------------------------------------------------|-------------|------|
| Device Voltage ( $V_{CC}$ and $V_{BIAS}$ )                   | 7.0         | V    |
| Device Current                                               | 2500        | mA   |
| $V_{REG}$ Current                                            | 6.0         | mA   |
| $V_{REG}$ Device Voltage                                     | 3.8         | V    |
| CW Input Power, 50 $\Omega$ Load, 2140MHz Band               | 39          | dBm  |
| CW Input Power, 50 $\Omega$ Load, 2640MHz Band               | 41          | dBm  |
| Modulated (WCDMA) Input Power, 6:1 Output VSWR, 2140MHz Band | 27          | dBm  |
| Modulated (WCDMA) Input Power, 6:1 Output VSWR, 2640MHz Band | 34          | dBm  |
| Storage Temperature Range                                    | -40 to +150 | °C   |
| ESD Rating – Human Body Model (HBM)                          | 500         | V    |
| ESD Rating – Charge Device Model (CDM)                       | 1000        | V    |
| Moisture Sensitivity Level                                   | MSL1        |      |

### Notes:

1. The maximum ratings must all be met simultaneously
2.  $P_{DISS} = P_{DC} + P_{RFIN} - P_{ROUT}$
3.  $T_J = T_L + P_{DISS} * R_{TH}$



**Caution!** ESD sensitive device.



RFMD Green: RoHS status based on EU Directive 2011/65/EU (at time of this document revision), halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

## Recommended Operating Condition

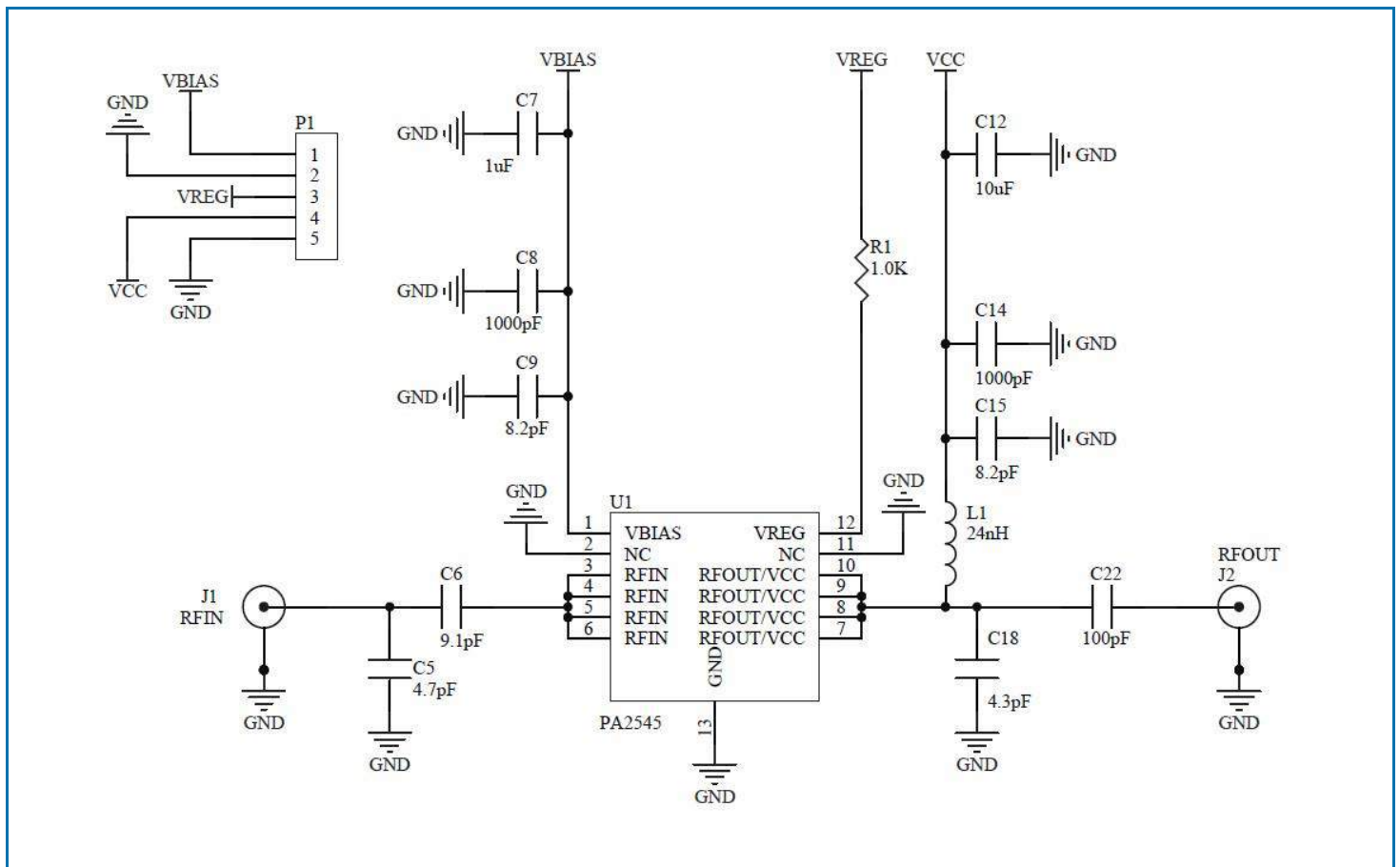
| Parameter                      | Specification |     |      | Unit |
|--------------------------------|---------------|-----|------|------|
|                                | Min           | Typ | Max  |      |
| Operating Temperature Range    | -40           | 25  | +105 | °C   |
| Operating Junction Temperature |               |     | 160  | °C   |
| Operating Voltage $V_{CC}$     | 4.75          | 5   | 5.25 | V    |

## Nominal Operating Parameters

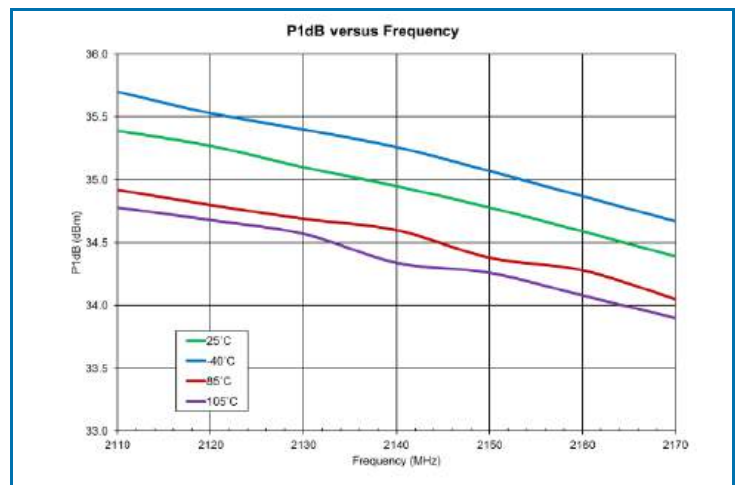
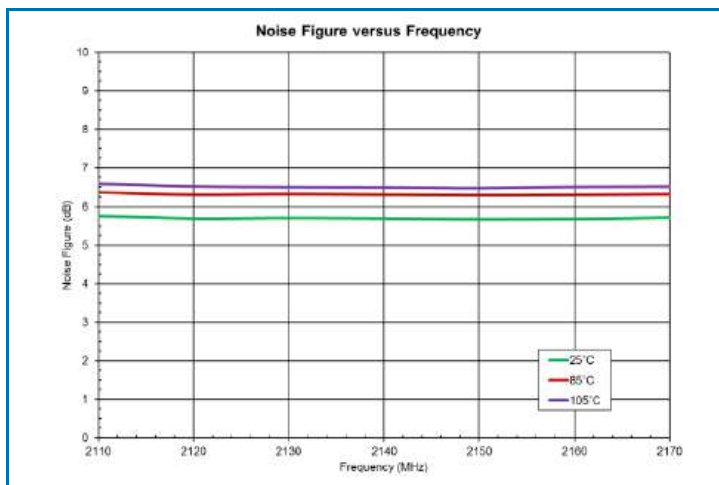
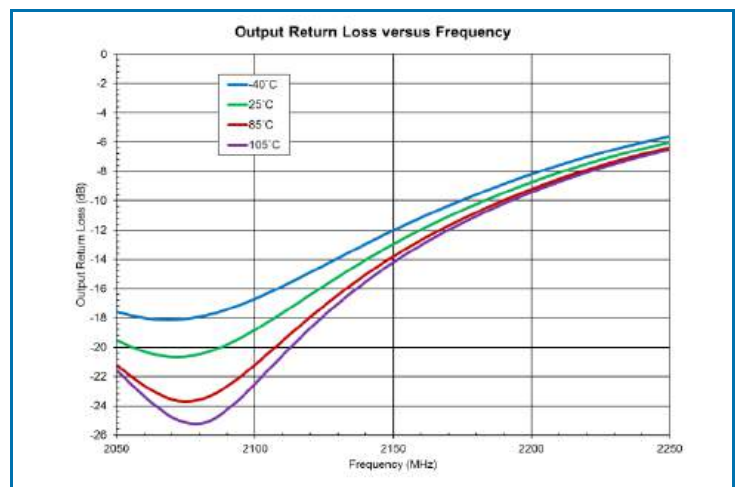
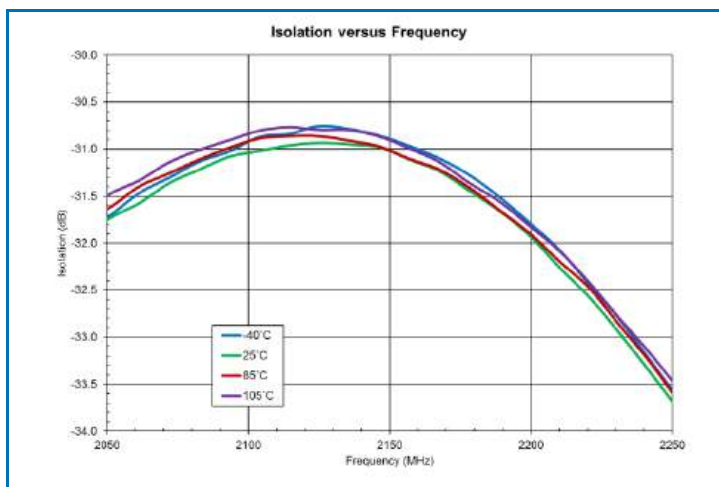
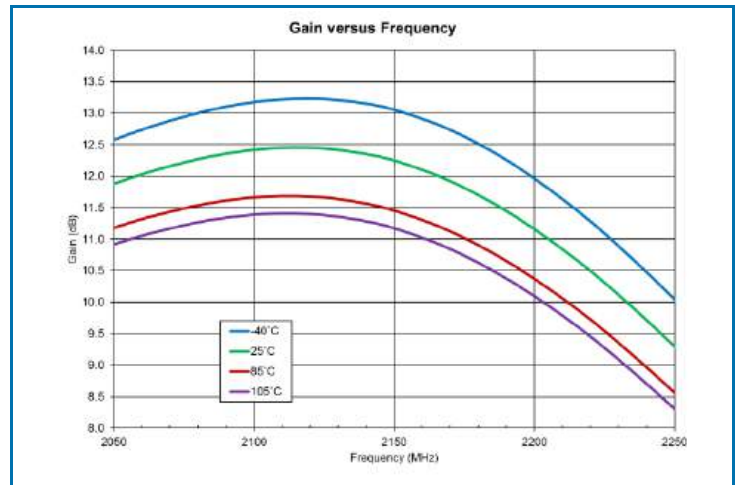
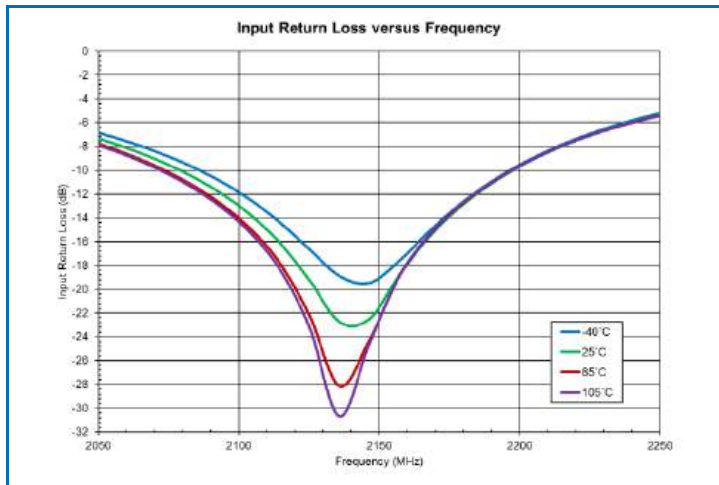
| Parameter                 | Specification |       |     | Unit | Condition                                                                                            |
|---------------------------|---------------|-------|-----|------|------------------------------------------------------------------------------------------------------|
|                           | Min           | Typ   | Max |      |                                                                                                      |
| <b>2110MHz to 2170MHz</b> |               |       |     |      | <b><math>V_{CC} = V_{BIAS} = V_{REG} = 5V</math>, Temp = 25°C, Optimized for ACPR at Rated Power</b> |
| Frequency                 |               | 2140  |     | MHz  |                                                                                                      |
| Gain                      |               | 12.3  |     | dB   |                                                                                                      |
| Output IP3                |               | 52.3  |     | dBm  | $P_{OUT}$ 18dBm per tone, 1MHz spacing                                                               |
| ACPR                      |               | -52   |     | dBc  | RF Output power = 25dBm, WCDMA 3GPP 3.5, test model 1, 64 DPCH                                       |
| P1dB                      |               | 34.9  |     | dBm  |                                                                                                      |
| Input Return Loss         |               | -20   |     | dB   | Small signal S11                                                                                     |
| Output Return Loss        |               | -13.7 |     | dB   | Small signal S22                                                                                     |

| Parameter                             | Specification |       |     | Unit | Condition                                                                                            |
|---------------------------------------|---------------|-------|-----|------|------------------------------------------------------------------------------------------------------|
|                                       | Min           | Typ   | Max |      |                                                                                                      |
| <b>2110MHz to 2170MHz – Continued</b> |               |       |     |      | <b><math>V_{CC} = V_{BIAS} = V_{REG} = 5V</math>, Temp = 25°C, Optimized for ACPR at Rated Power</b> |
| Noise Figure                          |               | 5.7   |     | dB   |                                                                                                      |
| Input Power ( $P_{IN}$ )              |               |       | 19  | dBm  | Max recommended continuous $P_{IN}$ , $V_{CC} = V_{BIAS} = 5V$ , Load VSWR = 2:1                     |
| <b>2590MHz to 2690MHz</b>             |               |       |     |      | <b><math>V_{CC} = V_{BIAS} = V_{REG} = 5V</math>, Temp = 25°C, Optimized for ACPR at Rated Power</b> |
| Frequency                             |               | 2640  |     | MHz  |                                                                                                      |
| Gain                                  |               | 11.8  |     | dB   |                                                                                                      |
| Output IP3                            |               | 48.1  |     | dBm  | $P_{OUT}$ 18dBm per tone, 1MHz spacing                                                               |
| ACPR                                  |               | -51.9 |     | dBc  | RF Output power = 25dBm, WCDMA 3GPP 3.5, test model 1, 64 DPCCH                                      |
| P1dB                                  |               | 35.6  |     | dBm  |                                                                                                      |
| Input Return Loss                     |               | -21   |     | dB   | Small signal S11                                                                                     |
| Output Return Loss                    |               | -25   |     | dB   | Small signal S22                                                                                     |
| Noise Figure                          |               | 5.9   |     | dB   |                                                                                                      |
| Input Power ( $P_{IN}$ )              |               |       | 20  | dBm  | Max recommended continuous $P_{IN}$ , $V_{CC} = V_{BIAS} = 5V$ , Load VSWR = 2:1                     |
| <b>Power Supply</b>                   |               |       |     |      |                                                                                                      |
| Operating Current (Quiescent)         |               | 800   |     | mA   | At $V_{CC} = V_{BIAS} = 5V$ , $V_{REG} = 5V$                                                         |
| Thermal Resistance                    |               | 8     |     | °C/W | Junction-to-back side of IC, at $V_{CC} = V_{BIAS} = V_{REG} = 5V$ , reference Temp = 85°C, No RF    |
| Shutdown Leakage Current              |               | 10    |     | μA   | At $V_{CC} = V_{BIAS} = 5V$ , $V_{REG} = 5V$                                                         |

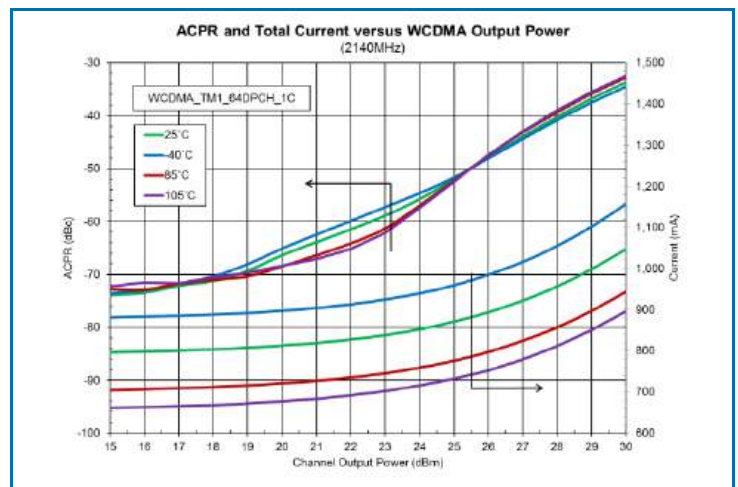
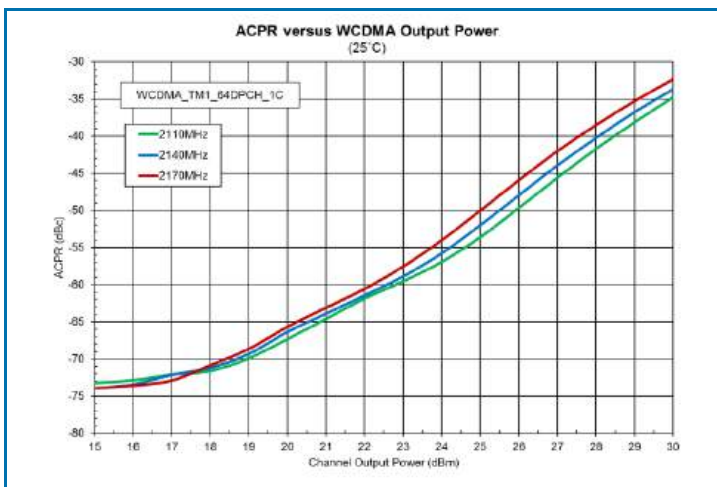
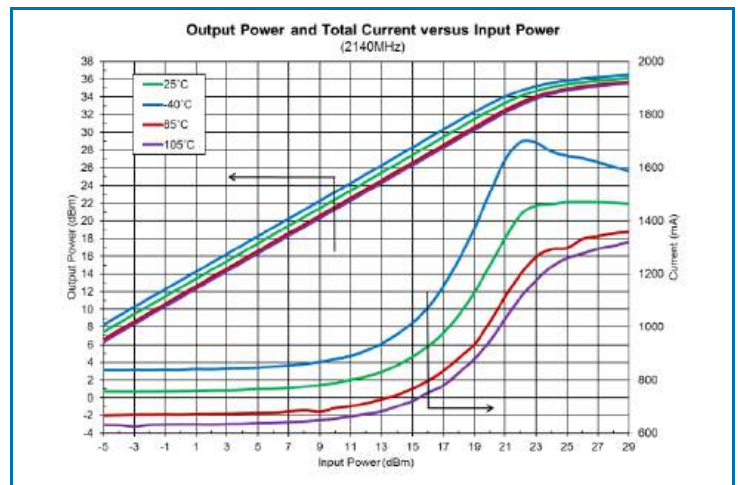
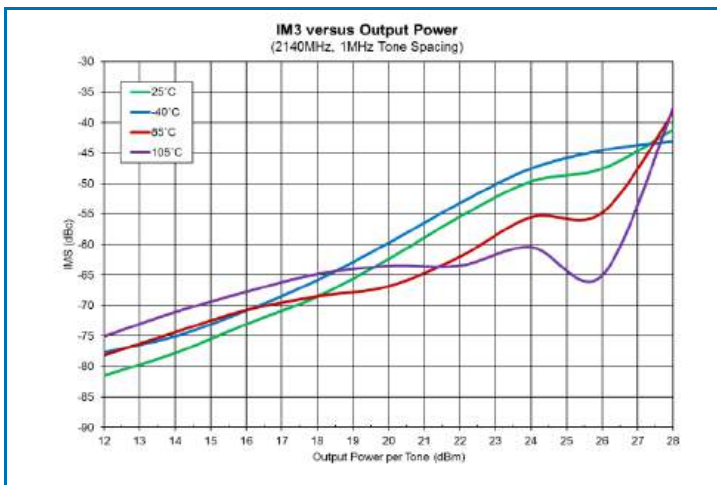
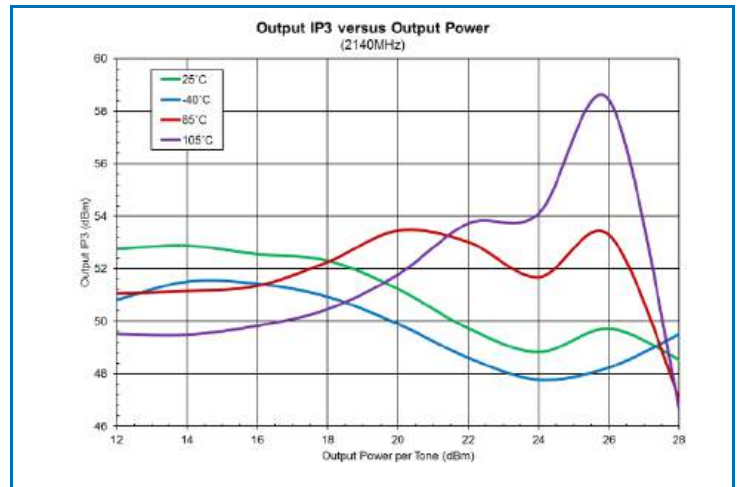
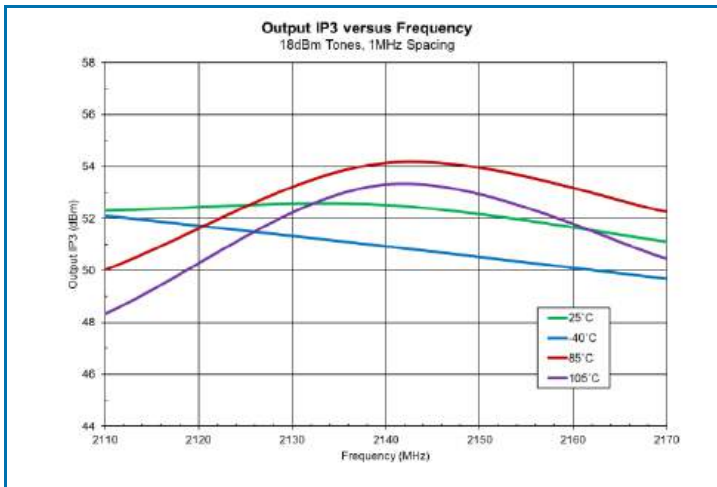
# Typical Application Schematic 2110MHz to 2170MHz Application Circuit



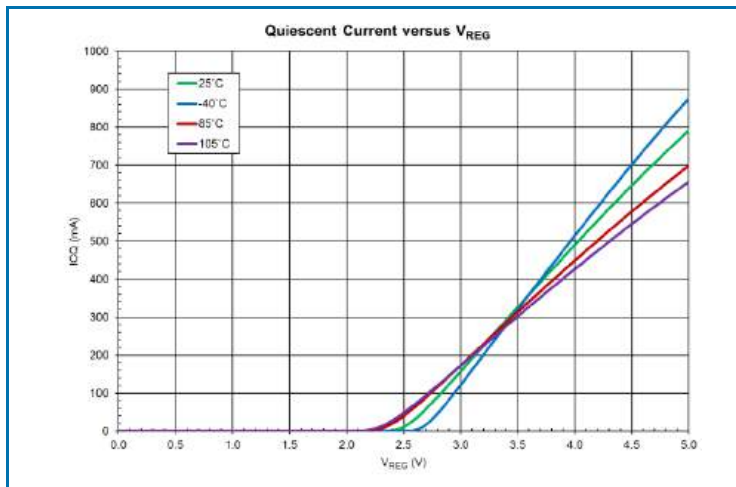
# Typical Performance: $V_{CC} = V_{BIAS} = V_{REG} = 5V$ 2110MHz to 2170MHz Application Circuit



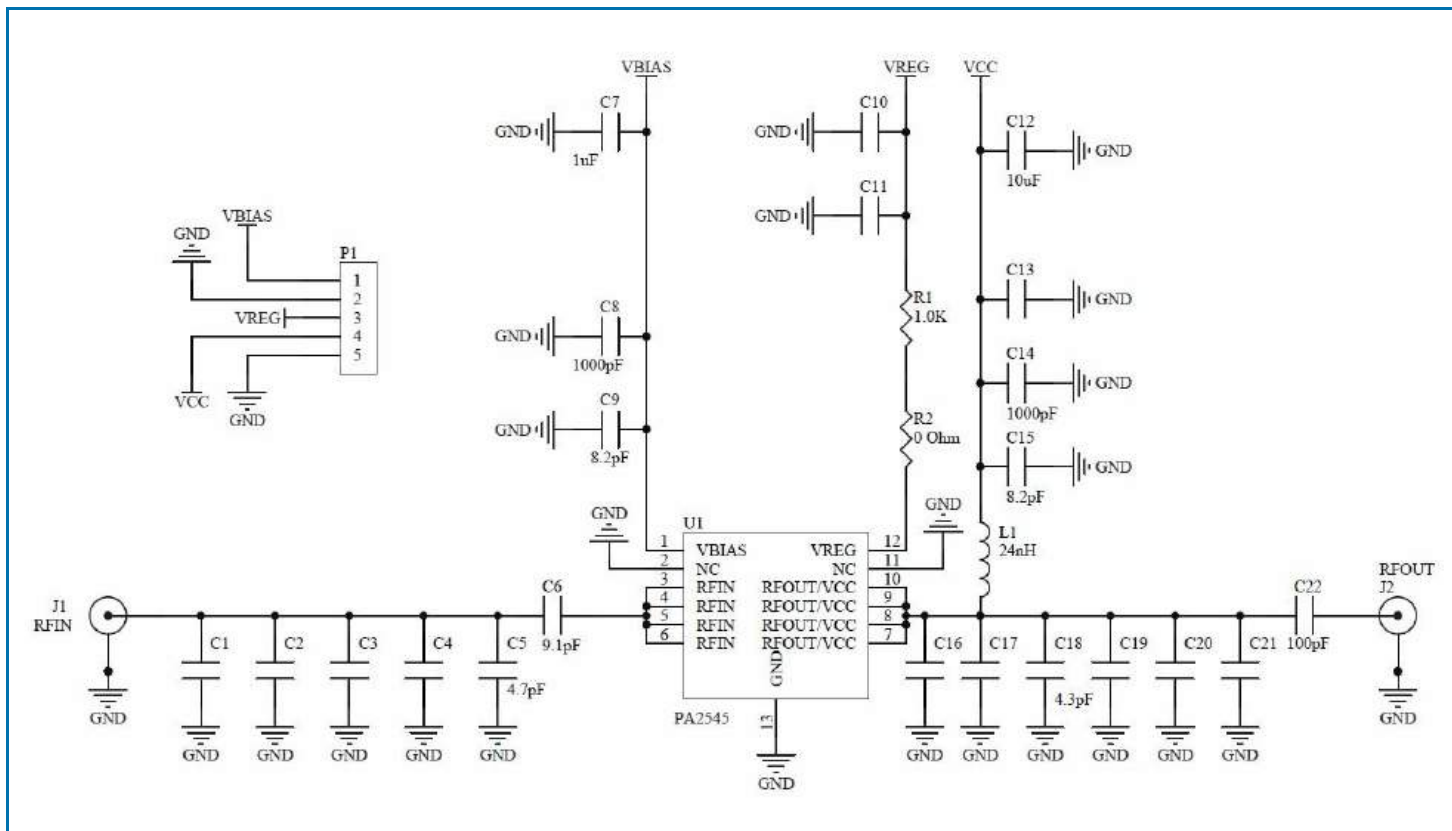
# Typical Performance: $V_{CC} = V_{BIAS} = V_{REG} = 5V$ 2110MHz to 2170MHz Application Circuit





**Typical Performance:  $V_{CC} = V_{BIAS} = V_{REG} = 5V$  2110MHz to 2170MHz Application Circuit**

## Evaluation Board Schematic 2110MHz to 2170MHz Application Circuit

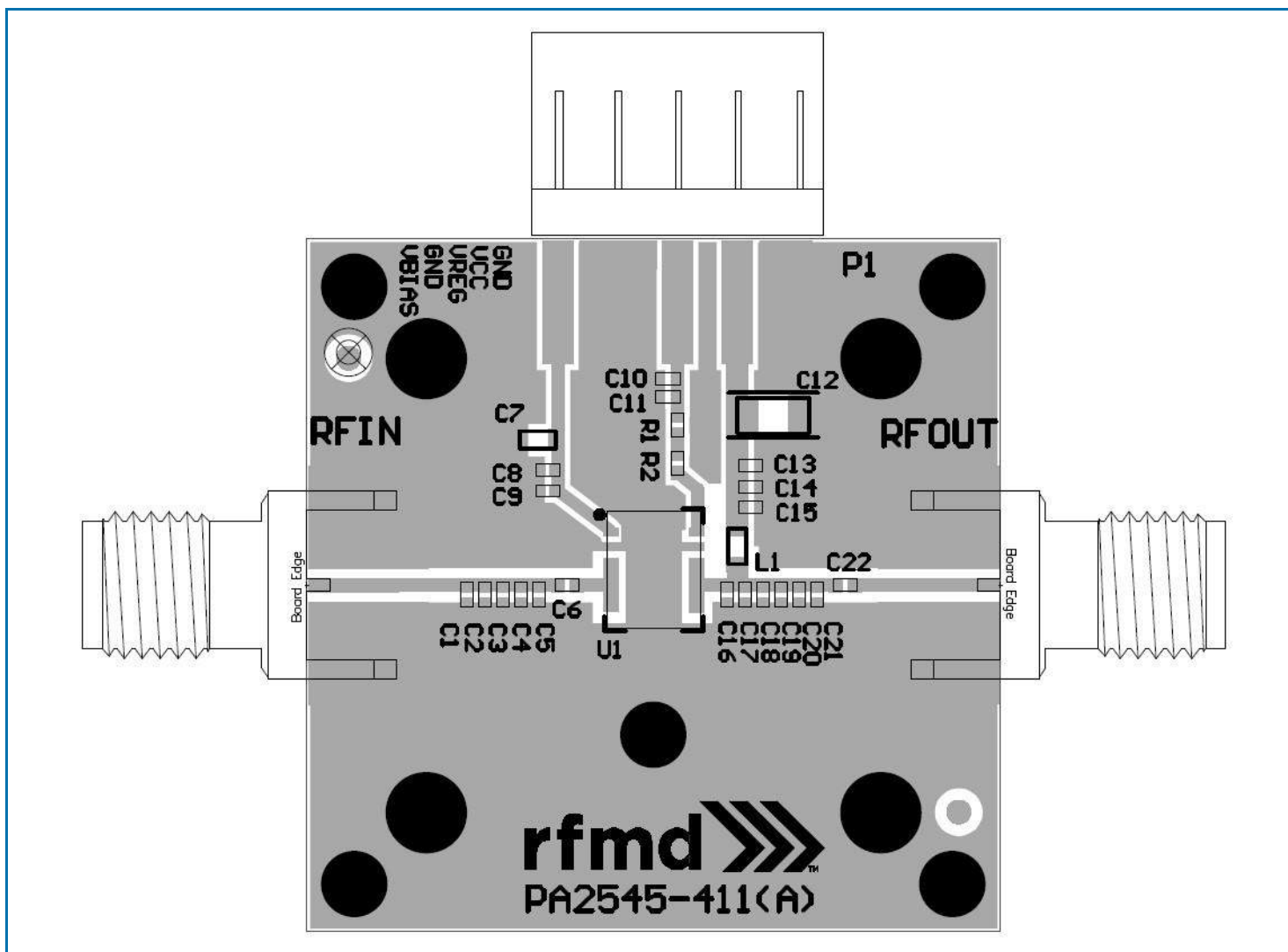




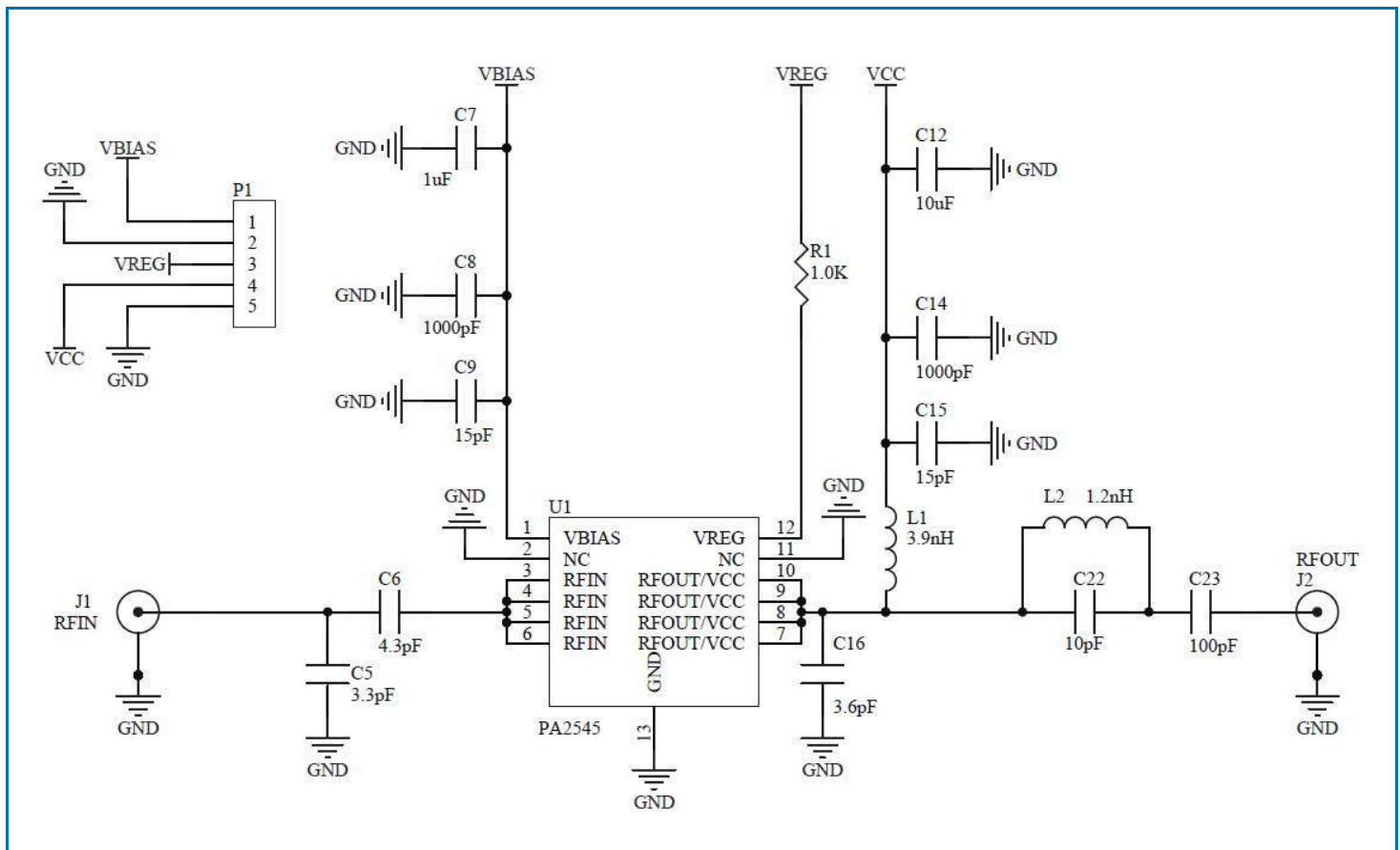
## Evaluation Board Bill of Materials (BOM) 2110MHz to 2170MHz Application Circuit

| Description                                       | Reference Designator                  | Manufacturer             | Manufacturer's P/N  |
|---------------------------------------------------|---------------------------------------|--------------------------|---------------------|
| RFPA2545 Evaluation Board                         |                                       |                          | PA2545-411(A)       |
| RFPA2545                                          | U1                                    | RFMD                     | RFPA2545            |
| CAP, 4.7pF, $\pm 0.1\text{pF}$ , 50V, HI-Q, 0402  | C5                                    | Murata Electronics       | GJM1555C1H4R7BB01D  |
| CAP, 9.1pF, $\pm 0.25\text{pF}$ , 50V, HI-Q, 0402 | C6                                    | Murata Electronics       | GJM1555C1H9R1CB01D  |
| CAP, 1 $\mu\text{F}$ , 10%, 16V, X7R, 0805        | C7                                    | Murata Electronics       | GRM21BR71C105KA01K  |
| CAP, 1000pF, 10%, 50V, X7R, 0402                  | C8, C14                               | Murata Electronics       | GRM155R71H102KA01D  |
| CAP, 8.2pF, $\pm 0.5\text{pF}$ , 50V, C0G, 0402   | C9, C15                               | Taiyo Yuden (USA), Inc.  | RM UMK105 CG8R2DV-F |
| CAP, 10 $\mu\text{F}$ , 10%, 25V, X7R, 1206       | C12                                   | Taiyo Yuden (USA), Inc.  | TMK316AB7106KL-T    |
| CAP, 4.3pF, $\pm 0.1\text{pF}$ , 50V, HI-Q, 0402  | C18                                   | Murata Electronics       | GJM1555C1H4R3BB01D  |
| CAP, 100pF, 5%, 50V, C0G, 0402                    | C22                                   | Murata Electronics       | GRM1555C1H101JA01D  |
| IND, 24nH, 5%, W/W, 0603                          | L1                                    | Coilcraft, Inc.          | 0603HC-24NXJLW      |
| RES, 1K, 5%, 1/16W, 0402                          | R1                                    | Kamaya, Inc.             | RMC1/16S-102JTH     |
| RES, 0 $\Omega$ , 0402 KAMAYA                     | R2                                    | Kamaya, Inc.             | RMC1/16SJPTH        |
| CONN, SMA, END LNCH, RND PIN, 0.039"              | J1-J2                                 | GIGALANE CO., LTD.       | PSF-S01-002         |
| CONN, HDR, ST, PLRZD, 5-PIN, 0.100"               | P1                                    | ITW Pancon               | MPSS100-5-C         |
| HEATSINK BLOCK, 1.16 SQ I                         |                                       | Robert S. Wells          | EEF-102059          |
| SCREW, 2-56 x 3/16", SOCKET HEAD                  | S1-S5                                 | McMaster-Carr Supply Co. | 92196A076           |
| DNP                                               | C1-C4, C10-C11, C13, C16-C17, C19-C21 |                          |                     |

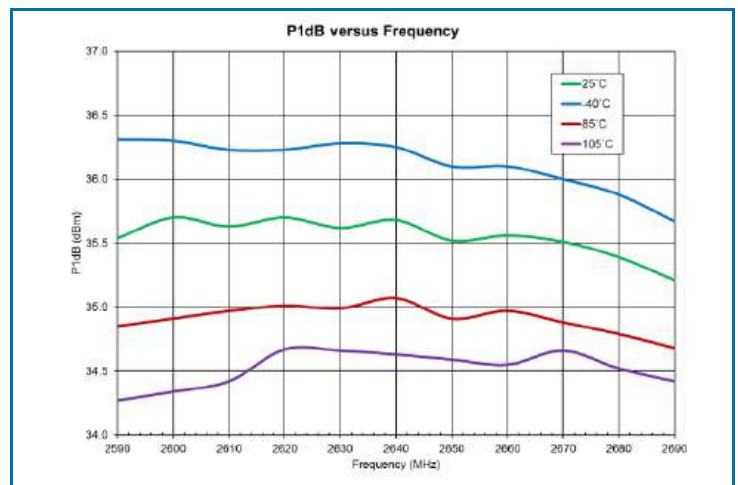
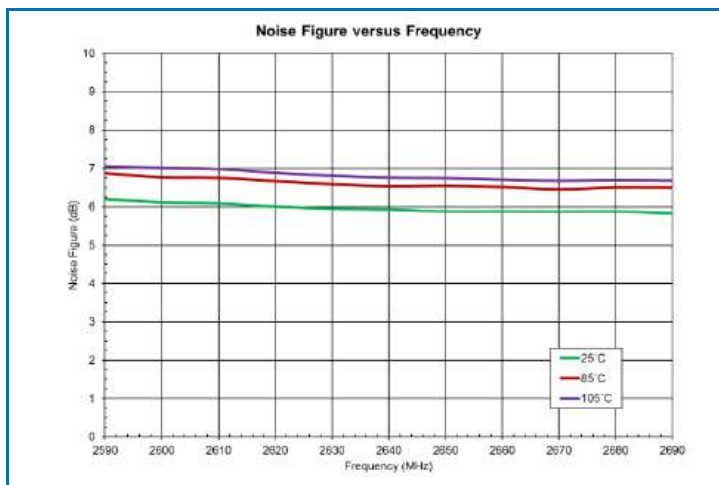
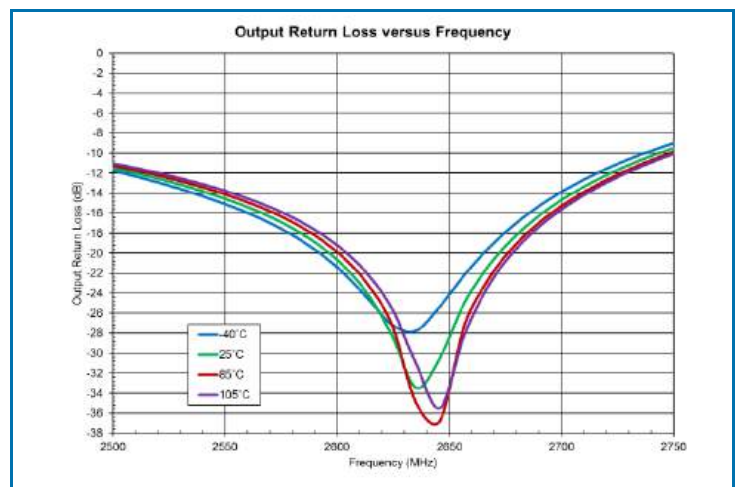
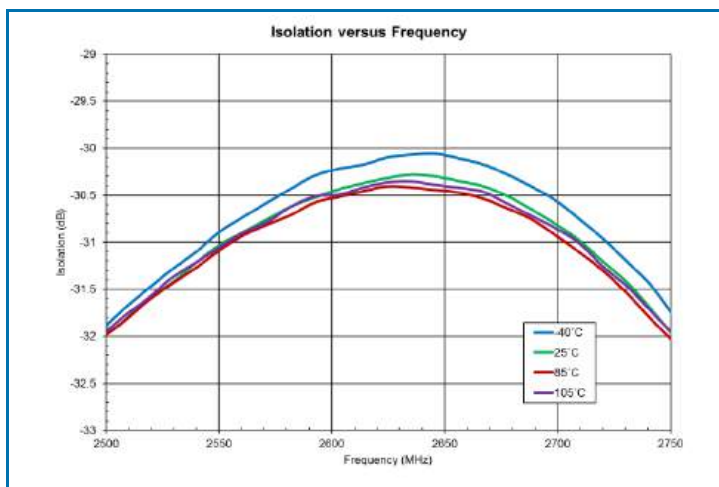
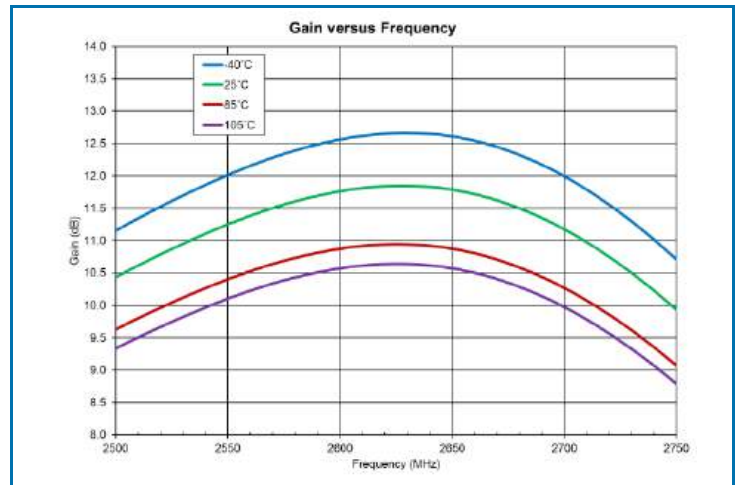
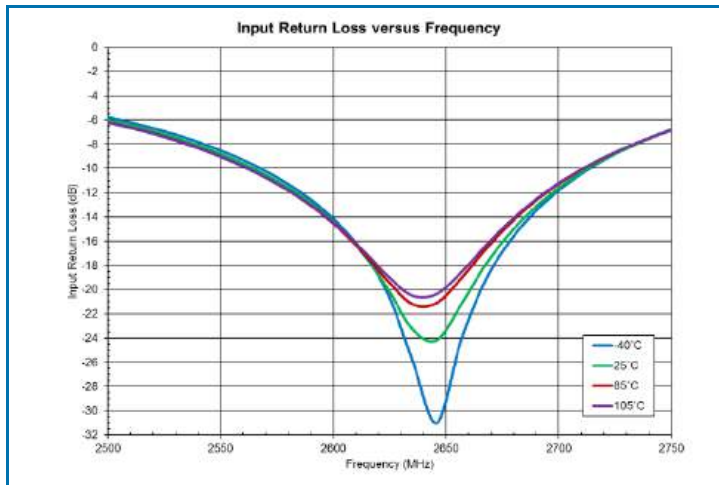
# Evaluation Board Assembly Drawing 2110MHz to 2170MHz Application Circuit



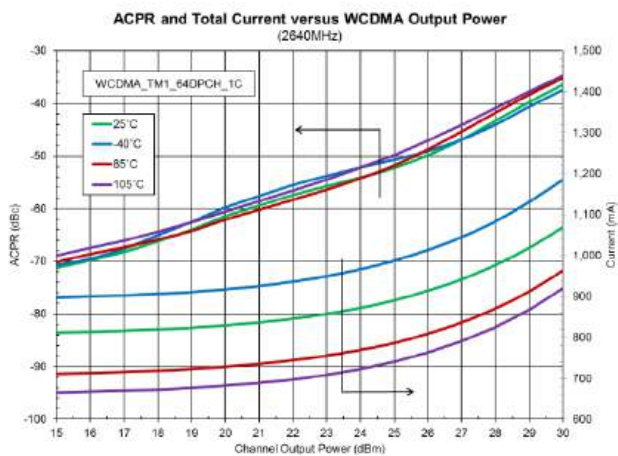
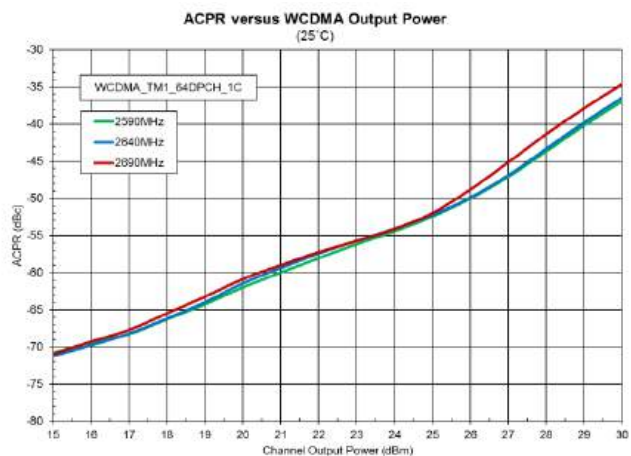
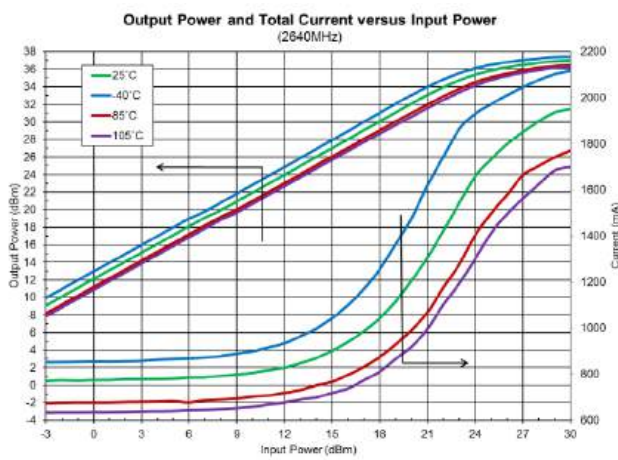
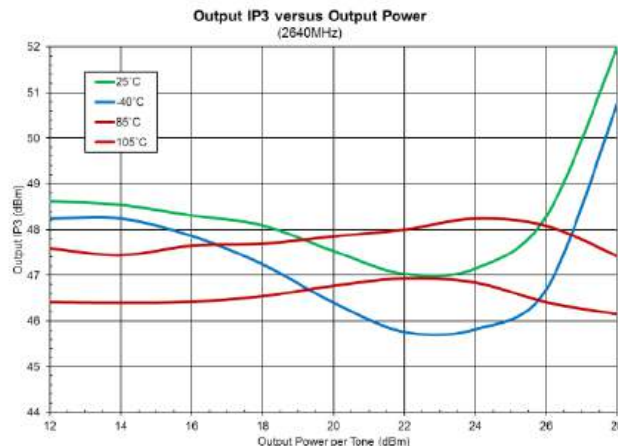
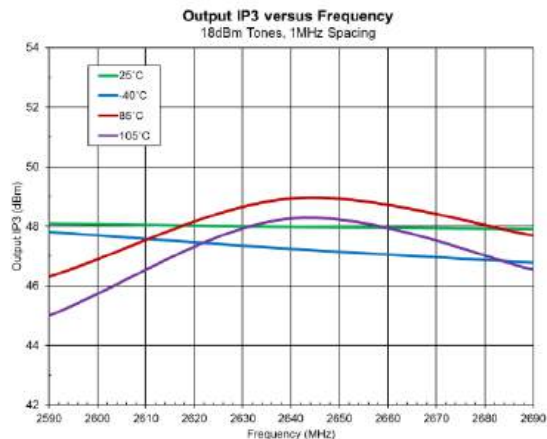
# Typical Application Schematic 2590MHz to 2690MHz Application Circuit



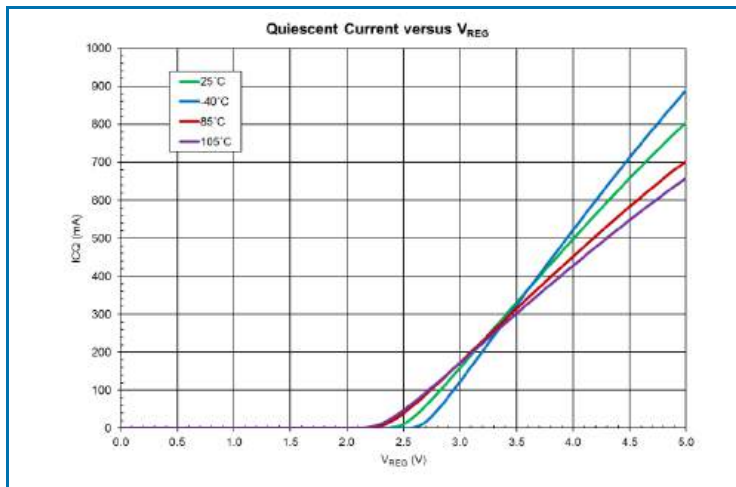
# Typical Performance: $V_{CC} = V_{BIAS} = V_{REG} = 5V$ 2590MHz to 2690MHz Application Circuit



# Typical Performance: $V_{CC} = V_{BIAS} = V_{REG} = 5V$ 2590MHz to 2690MHz Application Circuit

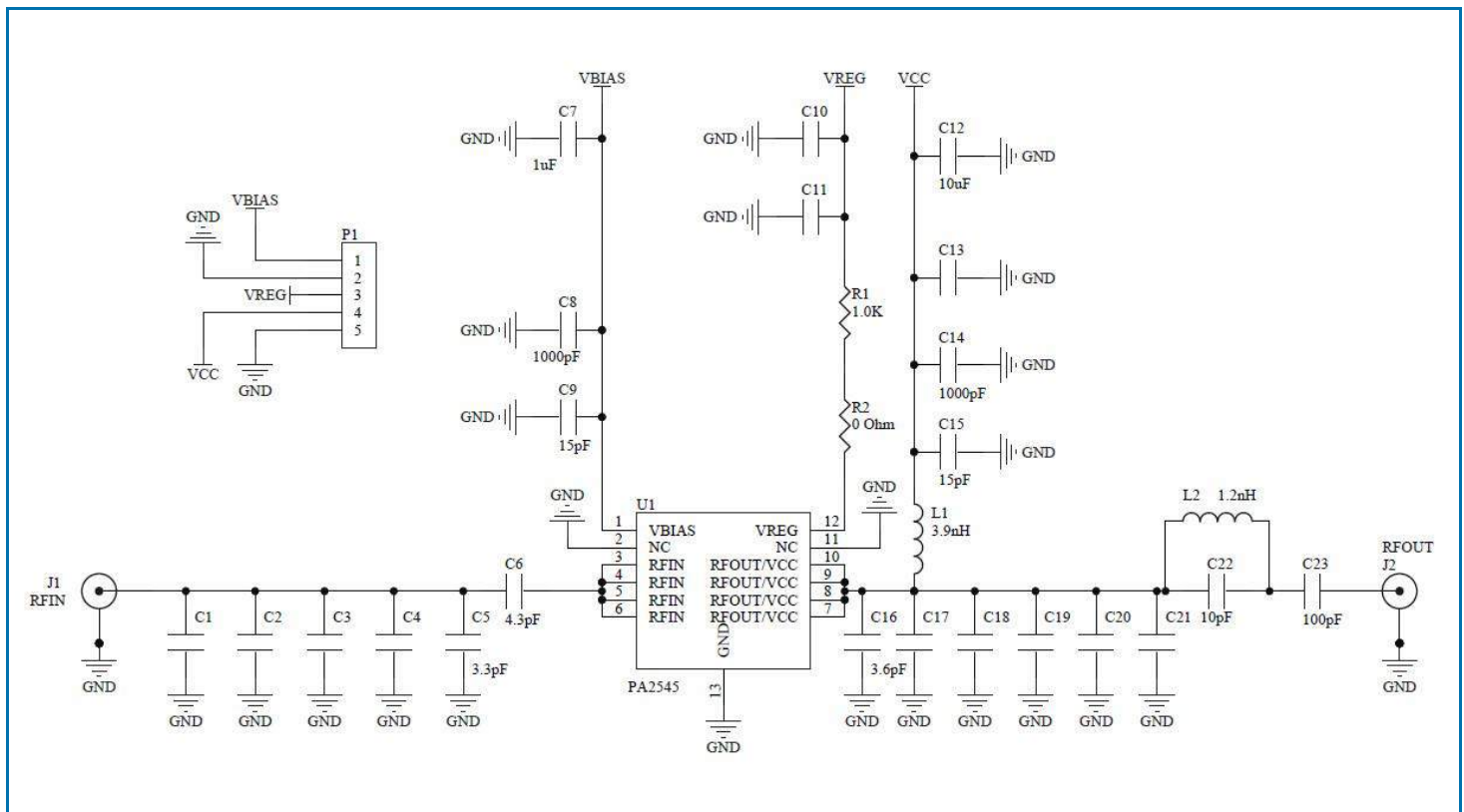


### Typical Performance: $V_{CC} = V_{BIAS} = V_{REG} = 5V$ 2590MHz to 2690MHz Application Circuit





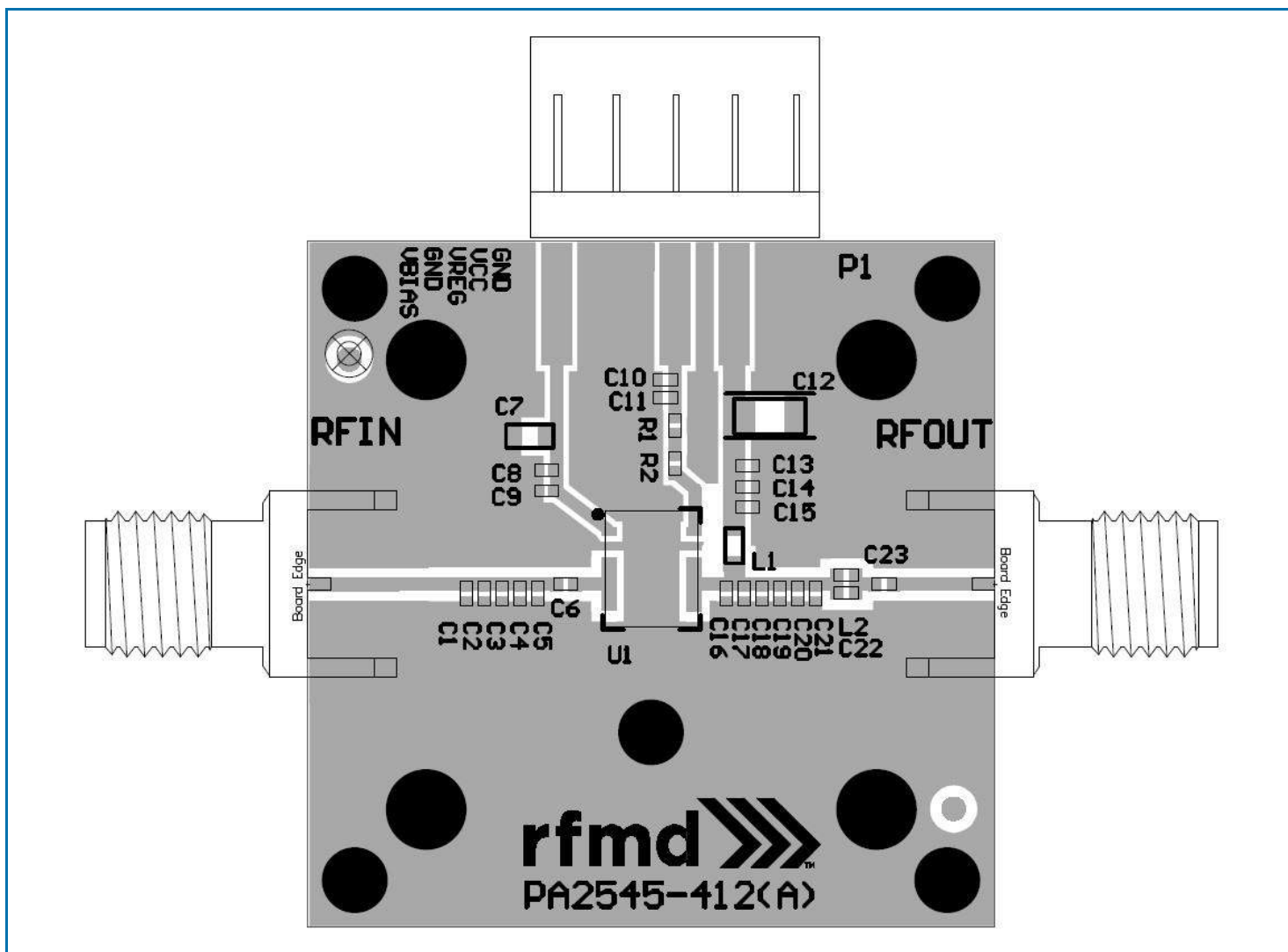
## Evaluation Board Schematic 2590MHz to 2690MHz Application Circuit



## Evaluation Board Bill of Materials (BOM) 2590MHz to 2690MHz Application Circuit

| Description                               | Reference Designator         | Manufacturer             | Manufacturer's P/N |
|-------------------------------------------|------------------------------|--------------------------|--------------------|
| RFPA2545 Evaluation Board                 |                              |                          | RFPA2545-412(A)    |
| RFPA2545                                  | U1                           | RFMD                     | RFPA2545           |
| CAP, 3.3pF, $\pm 0.1$ pF, 50V, HI-Q, 0402 | C5                           | Murata Electronics       | GJM1555C1H3R3BB01D |
| CAP, 4.3pF, $\pm 0.1$ pF, 50V, HI-Q, 0402 | C6                           | Murata Electronics       | GJM1555C1H4R3BB01D |
| CAP, 1 $\mu$ F, 10%, 16V, X7R, 0805       | C7                           | Murata Electronics       | GRM21BR71C105KA01K |
| CAP, 1000pF, 10%, 50V, X7R, 0402          | C8, C14                      | Murata Electronics       | GRM155R71H102KA01D |
| CAP, 15pF, 5%, 50V, C0G, 0402             | C9, C15                      | Murata Electronics       | GRM1555C1H150JA01D |
| CAP, 10 $\mu$ F, 10%, 25V, X7R, 1206      | C12                          | Taiyo Yuden (USA), Inc.  | TMK316AB7106KL-T   |
| CAP, 3.6pF, $\pm 0.1$ pF, 50V, HI-Q, 0402 | C16                          | Murata Electronics       | GJM1555C1H3R6BB01D |
| CAP, 10pF, 1%, 50V, HI-Q, 0402            | C22                          | Murata Electronics       | GJM1555C1H100FB01D |
| CAP, 100pF, 5%, 50V, C0G, 0402            | C23                          | Murata Electronics       | GRM1555C1H101JA01D |
| IND, 3.9nH, 5%, WW, 0603                  | L1                           | Coilcraft, Inc.          | 0603HC-3N9XJLW     |
| IND, 1.2nH, 5%, W/W, 0402                 | L2                           | Coilcraft, Inc.          | 0402CS-1N2XJLW     |
| RES, 1K, 5%, 1/16W, 0402                  | R1                           | Kamaya, Inc.             | RMC1/16S-102JTH    |
| RES, 0 $\Omega$ , 0402                    | R2                           | Kamaya, Inc.             | RMC1/16SJPTH       |
| CONN, SMA, END LNCH, RND PIN, 0.039"      | J1-J2                        | GIGALANE CO., LTD.       | PSF-S01-002        |
| CONN, HDR, ST, PLRZD, 5-PIN, 0.100"       | P1                           | ITW Pancon               | MPSS100-5-C        |
| HEATSINK BLOCK, 1.16 SQ I                 |                              | Robert S. Wells          | EEF-102059         |
| SCREW, 2-56 x 3/16", SOCKET HEAD          | S1-S5                        | McMaster-Carr Supply Co. | 92196A076          |
| DNP                                       | C1-C4, C10-C11, C13, C17-C21 |                          |                    |

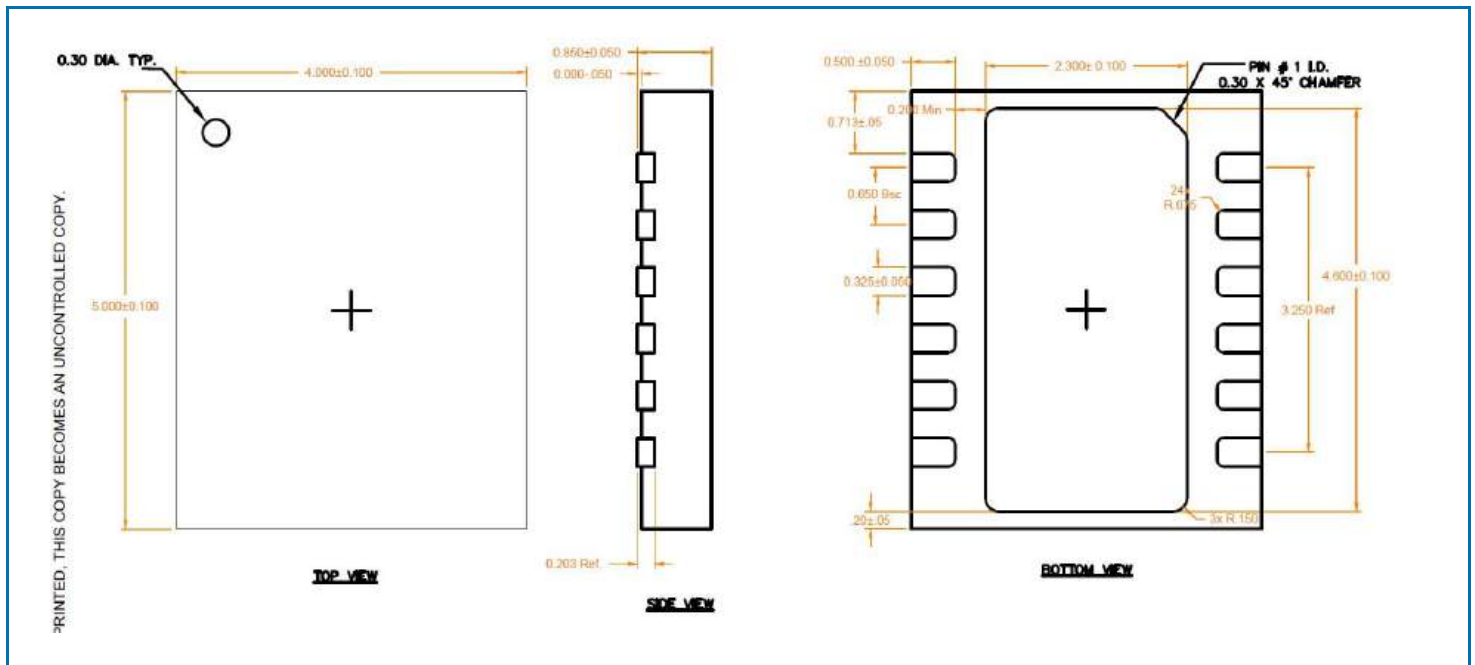
# Evaluation Board Assembly Drawing 2590MHz to 2690MHz Application Circuit



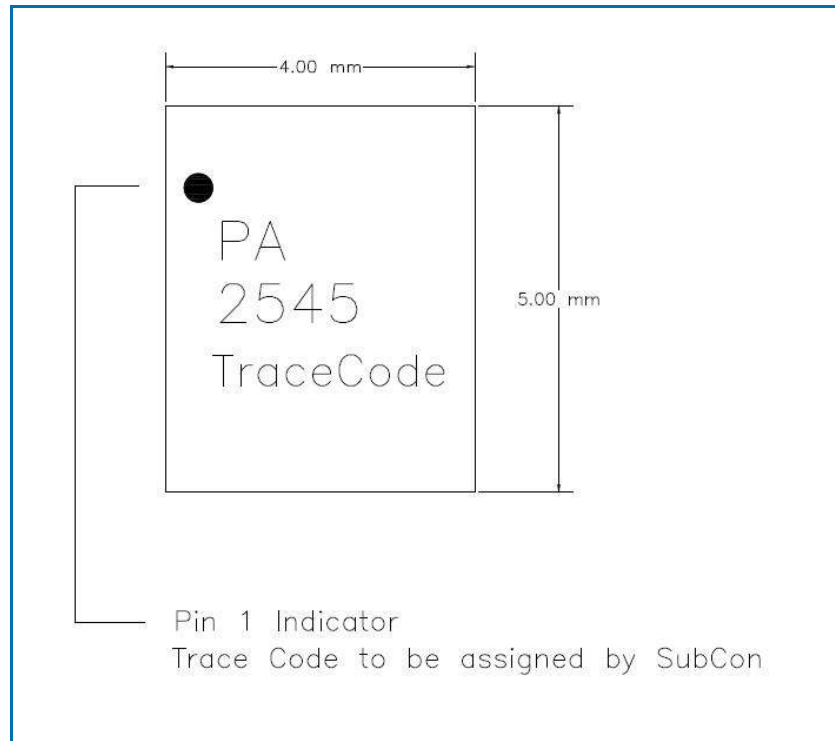
## Pin Names and Descriptions

| Pin  | Name      | Description                                                                                                                                                                                                          |
|------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | VBIAS     | VCC Supply to Active Bias Circuit                                                                                                                                                                                    |
| 2    | NC        | No Internal Connection                                                                                                                                                                                               |
| 3    | RFIN      | RF Input; Must be DC blocked                                                                                                                                                                                         |
| 4    | RFIN      | RF Input; Must be DC blocked                                                                                                                                                                                         |
| 5    | RFIN      | RF Input; Must be DC blocked                                                                                                                                                                                         |
| 6    | RFIN      | RF Input; Must be DC blocked                                                                                                                                                                                         |
| 7    | RFOUT/VCC | RF Output and Collector Supply                                                                                                                                                                                       |
| 8    | RFOUT/VCC | RF Output and Collector Supply                                                                                                                                                                                       |
| 9    | RFOUT/VCC | RF Output and Collector Supply                                                                                                                                                                                       |
| 10   | RFOUT/VCC | RF Output and Collector Supply                                                                                                                                                                                       |
| 11   | NC        | No Internal Connection                                                                                                                                                                                               |
| 12   | VREG      | Current Adjust / Shutdown Control                                                                                                                                                                                    |
| EPAD | GND       | DC and RF Ground; Must be soldered to EVB ground plane over a bed of vias for thermal and RF performance. Solder/epoxy voids under the EPAD will result in excessive junction temperatures causing permanent damage. |

## Package Outline (Dimensions in millimeters)



## Branding Diagram



# Mouser Electronics

Authorized Distributor

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