

2 Way-90° 50Ω 30 to 100 MHz

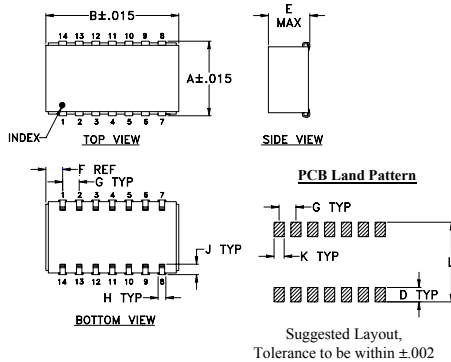
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	1W max.
Internal Dissipation	0.125W max.
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

SUMPORT	1
PORT 1 (0°)	7
PORT 2 (+90°)	8
GROUND	2,3,4,5,6,9,10,11,12,13,14

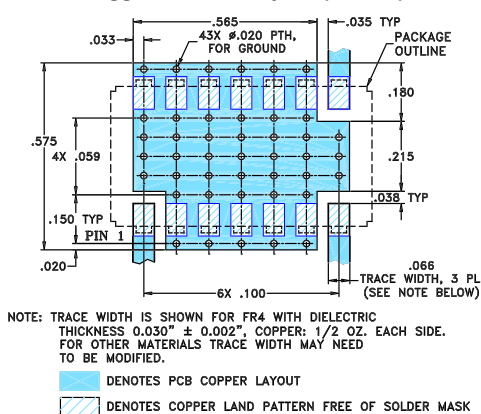
Outline Drawing



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H	J	K	L	wt
.450	.803	--	.100	.250	.102	.100	.047	.065	.065	.470	grams
11.43	20.40	--	2.54	6.35	2.59	2.54	1.19	1.65	1.65	11.94	3.0

Demo Board MCL P/N: TB-217 Suggested PCB Layout (PL-099)



Features

- low insertion loss, 0.5 dB typ.
- excellent isolation, 41 dB typ.
- aqueous washable

Applications

- VHF
- signal processing
- modulators
- instrumentation
- balanced amplifiers



Generic photo used for illustration purposes only

CASE STYLE: BK276

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

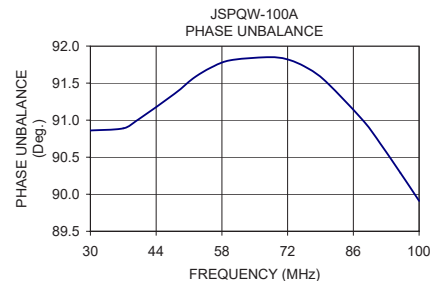
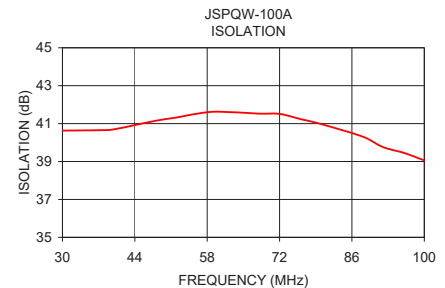
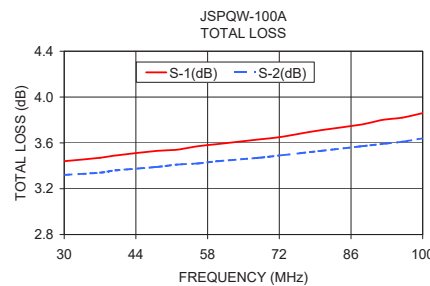
Electrical Specifications

FREQ. RANGE (MHz)	ISOLATION (dB)		INSERTION LOSS (dB) Avg. of Coupled Outputs ABOVE 3 dB		PHASE UNBALANCE (Degrees)	AMPLITUDE UNBALANCE (dB)
f_L - f_U	Typ.	Min.	Typ.	Max.	Max.	Max.
30-100	41	30	0.5	1.1	4	0.6

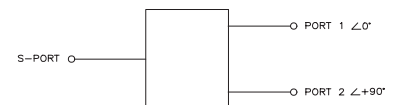
Typical Performance Data

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
30.00	3.44	3.32	0.12	40.63	90.86	1.07	1.23	1.18
37.00	3.47	3.34	0.13	40.65	90.89	1.06	1.22	1.19
40.00	3.49	3.36	0.13	40.70	91.00	1.06	1.21	1.20
48.00	3.53	3.39	0.14	41.15	91.36	1.06	1.19	1.21
52.00	3.54	3.41	0.13	41.32	91.57	1.06	1.18	1.22
56.00	3.57	3.42	0.15	41.52	91.72	1.07	1.17	1.22
60.00	3.59	3.44	0.15	41.63	91.81	1.09	1.17	1.23
68.00	3.63	3.47	0.16	41.53	91.85	1.13	1.18	1.24
72.00	3.65	3.49	0.17	41.51	91.82	1.15	1.19	1.25
76.00	3.68	3.51	0.18	41.24	91.71	1.17	1.21	1.26
80.00	3.71	3.53	0.18	40.98	91.53	1.20	1.23	1.27
88.00	3.76	3.57	0.20	40.32	91.00	1.25	1.28	1.29
92.00	3.80	3.59	0.21	39.76	90.66	1.28	1.30	1.30
96.00	3.82	3.61	0.21	39.46	90.29	1.30	1.33	1.32
100.00	3.86	3.64	0.22	39.06	89.91	1.33	1.36	1.33

1. Total Loss = Insertion Loss + 3dB splitter loss.



electrical schematic



Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp



2 Way-90° Power Splitter/Combiner JSPQW-100A+

Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +25°C

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
10	3.29	3.21	0.09	3.45	40.52	1.04	1.14	1.05
15	3.33	3.24	0.09	1.83	40.57	1.05	1.18	1.08
20	3.37	3.28	0.09	2.30	40.10	1.06	1.21	1.12
25	3.40	3.31	0.09	1.72	39.75	1.07	1.22	1.14
30	3.42	3.34	0.08	1.13	39.58	1.07	1.23	1.16
35	3.43	3.36	0.07	0.74	39.67	1.06	1.23	1.17
40	3.45	3.39	0.07	0.64	39.73	1.04	1.22	1.17
45	3.47	3.41	0.07	0.64	39.92	1.03	1.21	1.17
50	3.49	3.42	0.07	0.69	40.03	1.01	1.20	1.17
55	3.51	3.44	0.07	0.76	40.09	1.02	1.20	1.16
60	3.54	3.46	0.08	0.81	40.16	1.04	1.20	1.16
65	3.56	3.48	0.09	0.76	40.17	1.07	1.21	1.15
70	3.59	3.49	0.09	0.64	40.04	1.10	1.23	1.15
75	3.62	3.51	0.11	0.46	39.90	1.13	1.25	1.15
80	3.65	3.53	0.12	0.18	39.73	1.16	1.28	1.16
85	3.69	3.55	0.13	0.20	39.49	1.20	1.31	1.17
90	3.73	3.57	0.15	0.60	39.21	1.23	1.35	1.19
95	3.77	3.60	0.17	1.09	38.89	1.26	1.39	1.20
100	3.80	3.62	0.19	1.64	38.65	1.30	1.43	1.23
105	3.84	3.65	0.20	2.22	38.44	1.33	1.47	1.25
110	3.89	3.67	0.22	2.88	38.27	1.37	1.51	1.28
115	3.93	3.70	0.23	3.50	38.12	1.41	1.55	1.32
120	3.97	3.73	0.24	4.19	38.05	1.44	1.59	1.35
125	4.01	3.77	0.25	4.87	37.96	1.48	1.64	1.39
130	4.06	3.80	0.26	5.58	37.93	1.52	1.68	1.43
135	4.10	3.84	0.26	6.29	37.95	1.56	1.72	1.47
140	4.15	3.88	0.27	7.01	37.95	1.60	1.77	1.51
145	4.19	3.92	0.27	7.74	37.92	1.64	1.81	1.55
150	4.23	3.96	0.27	8.46	37.89	1.68	1.85	1.60
160	4.31	4.06	0.26	9.82	37.93	1.77	1.93	1.69
170	4.39	4.15	0.24	11.15	38.00	1.85	2.01	1.79
180	4.47	4.26	0.22	12.36	38.32	1.93	2.08	1.90
190	4.55	4.37	0.18	13.49	38.79	2.02	2.15	2.00
200	4.61	4.48	0.14	14.54	39.40	2.10	2.22	2.11

¹Total Loss = Insertion Loss + 3dB Splitter Loss

REV. X2
JSPQW-100A+
100623
Page 1 of 3



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2 Way-90° Power Splitter/Combiner JSPQW-100A+

Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = -40°C

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
10	3.27	3.18	0.09	3.75	35.96	1.05	1.17	1.04
15	3.29	3.21	0.08	1.49	38.92	1.06	1.19	1.11
20	3.31	3.24	0.07	1.98	41.06	1.07	1.20	1.14
25	3.33	3.27	0.06	1.46	42.81	1.07	1.20	1.16
30	3.34	3.30	0.05	0.88	44.42	1.07	1.20	1.16
35	3.36	3.31	0.04	0.53	46.03	1.06	1.20	1.16
40	3.38	3.33	0.05	0.39	47.44	1.04	1.19	1.16
45	3.39	3.35	0.05	0.38	48.96	1.03	1.19	1.16
50	3.41	3.36	0.05	0.42	50.32	1.01	1.19	1.16
55	3.43	3.38	0.06	0.44	51.41	1.02	1.19	1.17
60	3.46	3.39	0.06	0.42	52.34	1.04	1.20	1.17
65	3.48	3.40	0.08	0.35	52.82	1.06	1.22	1.17
70	3.51	3.42	0.09	0.21	52.82	1.09	1.24	1.17
75	3.54	3.43	0.10	0.00	52.52	1.12	1.26	1.17
80	3.56	3.45	0.12	0.33	52.03	1.15	1.29	1.18
85	3.60	3.46	0.13	0.72	51.17	1.18	1.33	1.18
90	3.63	3.48	0.16	1.17	50.09	1.21	1.37	1.19
95	3.67	3.50	0.17	1.71	49.00	1.25	1.40	1.21
100	3.71	3.52	0.19	2.31	48.12	1.29	1.45	1.23
105	3.75	3.55	0.20	2.93	47.15	1.33	1.49	1.25
110	3.80	3.57	0.23	3.63	46.28	1.37	1.53	1.29
115	3.83	3.60	0.23	4.32	45.49	1.41	1.58	1.32
120	3.88	3.63	0.25	5.04	44.65	1.46	1.63	1.36
125	3.92	3.67	0.25	5.77	43.84	1.50	1.67	1.40
130	3.97	3.71	0.26	6.50	43.10	1.55	1.72	1.44
135	4.01	3.75	0.27	7.22	42.41	1.60	1.77	1.48
140	4.06	3.79	0.27	7.96	41.76	1.64	1.81	1.52
145	4.10	3.83	0.28	8.71	41.10	1.69	1.86	1.56
150	4.15	3.87	0.28	9.45	40.51	1.74	1.91	1.60
160	4.24	3.95	0.29	10.93	39.56	1.83	2.00	1.68
170	4.33	4.05	0.28	12.39	38.80	1.92	2.09	1.78
180	4.41	4.15	0.26	13.78	38.44	2.01	2.17	1.88
190	4.49	4.26	0.22	15.09	38.33	2.11	2.25	2.00
200	4.55	4.37	0.17	16.26	38.42	2.20	2.31	2.12

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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Page 2 of 3



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2 Way-90° Power Splitter/Combiner JSPQW-100A+

Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +85°C

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
10	3.34	3.25	0.09	3.18	36.28	1.04	1.15	1.03
15	3.40	3.28	0.12	2.07	36.03	1.05	1.21	1.06
20	3.44	3.31	0.12	2.45	35.62	1.06	1.24	1.10
25	3.47	3.35	0.11	1.81	35.35	1.07	1.26	1.15
30	3.49	3.39	0.10	1.16	35.20	1.07	1.26	1.18
35	3.50	3.42	0.08	0.79	35.19	1.06	1.26	1.20
40	3.52	3.45	0.07	0.68	35.19	1.05	1.25	1.20
45	3.54	3.47	0.06	0.74	35.22	1.03	1.24	1.20
50	3.55	3.49	0.06	0.80	35.19	1.01	1.22	1.19
55	3.57	3.51	0.06	0.92	35.15	1.02	1.21	1.18
60	3.60	3.53	0.07	1.00	35.09	1.05	1.21	1.16
65	3.62	3.55	0.07	0.98	34.99	1.08	1.21	1.15
70	3.65	3.57	0.08	0.91	34.83	1.12	1.23	1.14
75	3.69	3.59	0.10	0.73	34.67	1.15	1.25	1.14
80	3.73	3.61	0.11	0.47	34.52	1.19	1.28	1.15
85	3.76	3.64	0.13	0.13	34.34	1.22	1.31	1.17
90	3.81	3.66	0.15	0.25	34.14	1.26	1.35	1.19
95	3.85	3.69	0.17	0.72	33.94	1.29	1.39	1.22
100	3.89	3.71	0.18	1.25	33.80	1.33	1.43	1.24
105	3.94	3.74	0.20	1.77	33.69	1.36	1.47	1.27
110	3.98	3.77	0.22	2.40	33.61	1.39	1.52	1.30
115	4.02	3.80	0.23	3.03	33.54	1.42	1.56	1.33
120	4.07	3.82	0.24	3.69	33.55	1.45	1.60	1.36
125	4.11	3.86	0.25	4.36	33.52	1.48	1.64	1.40
130	4.16	3.89	0.26	5.07	33.56	1.52	1.69	1.43
135	4.20	3.92	0.27	5.78	33.66	1.55	1.73	1.47
140	4.24	3.96	0.28	6.50	33.79	1.59	1.77	1.51
145	4.28	4.01	0.27	7.24	33.90	1.62	1.81	1.56
150	4.32	4.05	0.27	7.98	34.03	1.66	1.85	1.61
160	4.40	4.14	0.26	9.32	34.42	1.74	1.93	1.71
170	4.48	4.25	0.23	10.61	34.87	1.81	2.00	1.83
180	4.55	4.36	0.20	11.74	35.51	1.89	2.07	1.94
190	4.62	4.47	0.15	12.74	36.36	1.97	2.14	2.05
200	4.69	4.58	0.11	13.69	37.36	2.05	2.21	2.15

¹Total Loss = Insertion Loss + 3dB Splitter Loss

REV. X2
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Page 3 of 3



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Patent Pending

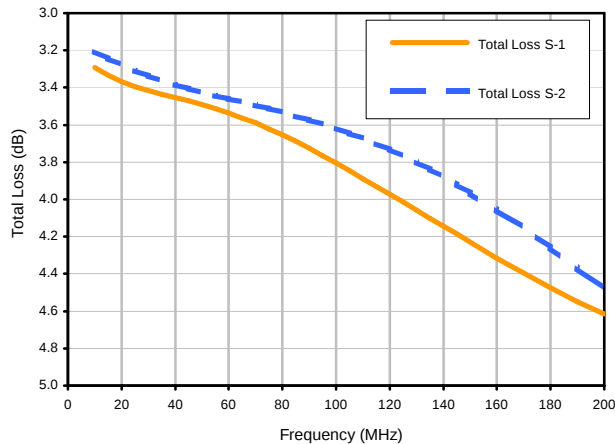
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2 Way-90° Power Splitter/Combiner

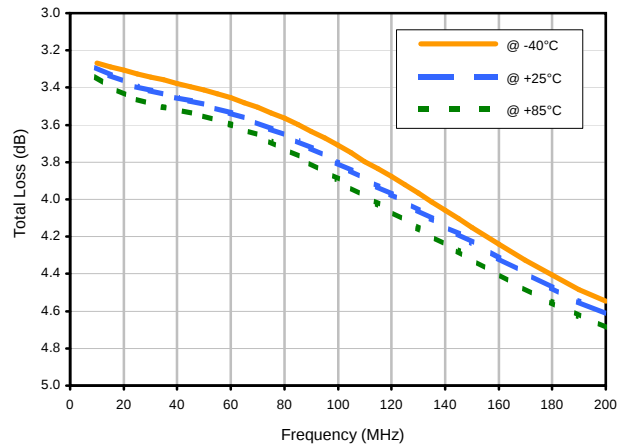
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Typical Performance Curves

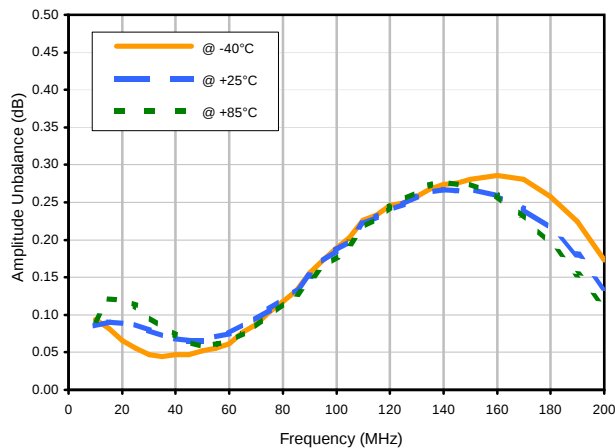
Total Loss



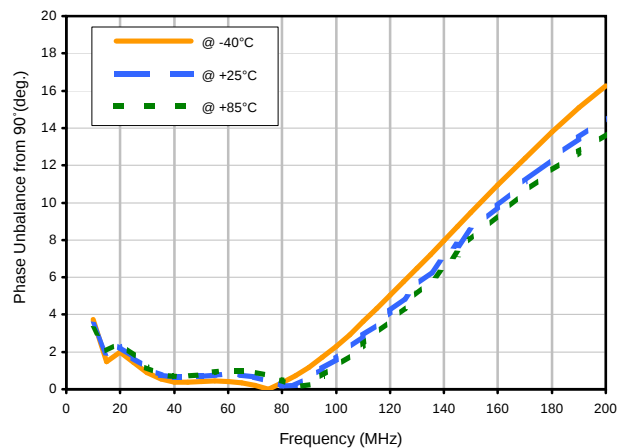
Total Loss S-1 vs. TEMPERATURE



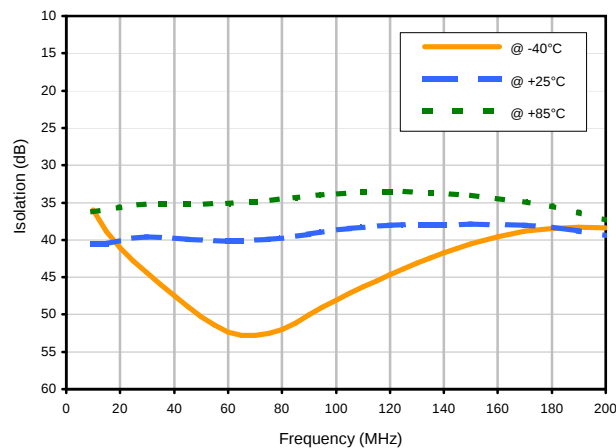
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE



Isolation 1-2 vs. TEMPERATURE



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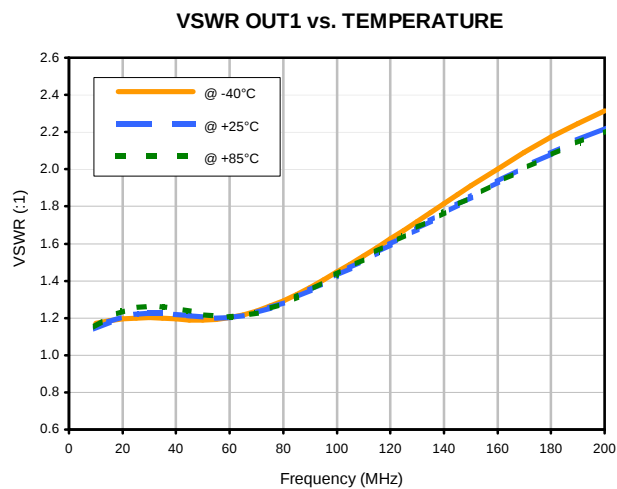
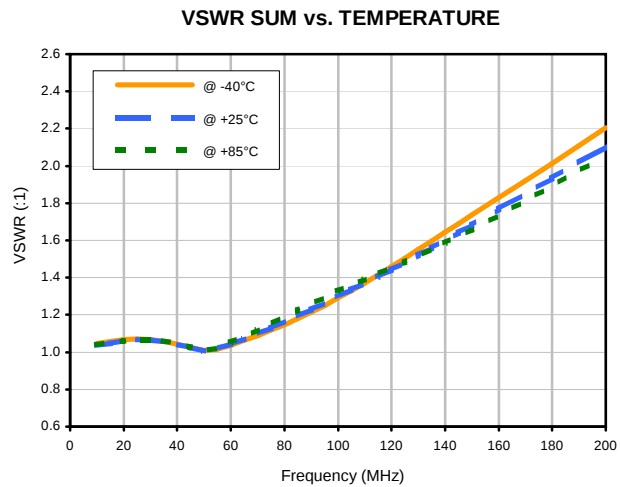
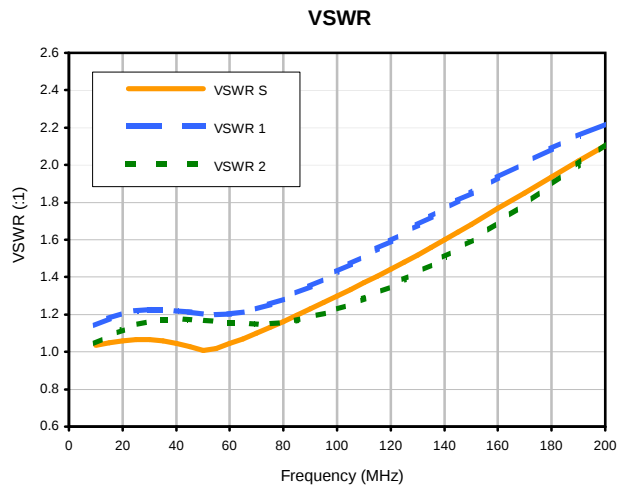


REV. X2
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Page 1 of 2

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Typical Performance Curves

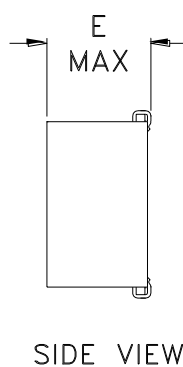
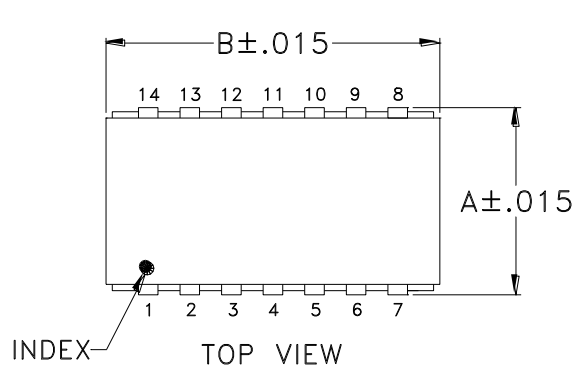


REV. X2
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Page 2 of 2

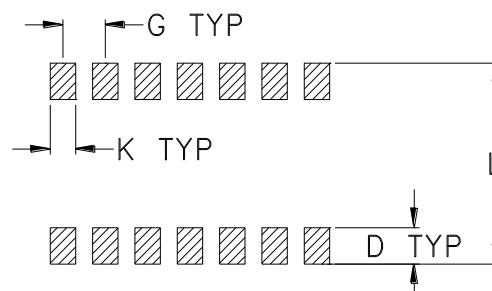
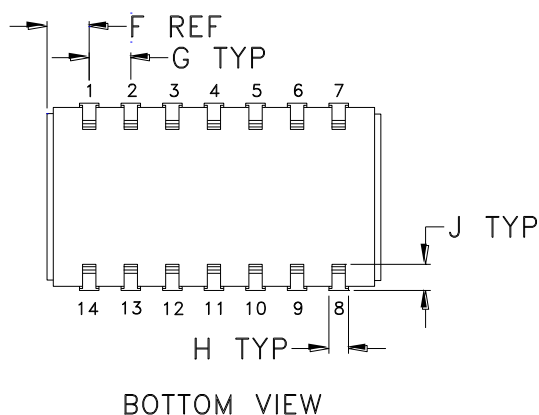


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Outline Dimensions



PCB Land Pattern



CASE #	A	B	C	D	E	F	G	H	J	K	L	WT. GRAM
BK276	.450 (11.43)	.803 (20.40)	-- --	.100 (2.54)	.250 (6.35)	.102 (2.59)	.100 (2.54)	.047 (1.19)	.065 (1.65)	.065 (1.65)	.470 (11.94)	2.0 MAX.

Dimensions are in inches (mm). Tolerances: 2Pl. $\pm .01$; 3Pl. $\pm .005$

Notes:

1. Case material: Copper Nickel alloy.
2. Base material: Printed wiring laminate.
3. Termination finish:

For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.

For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



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Tape & Reel Packaging TR-F5



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	16	13	500

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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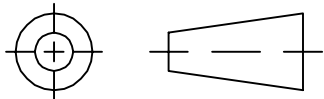
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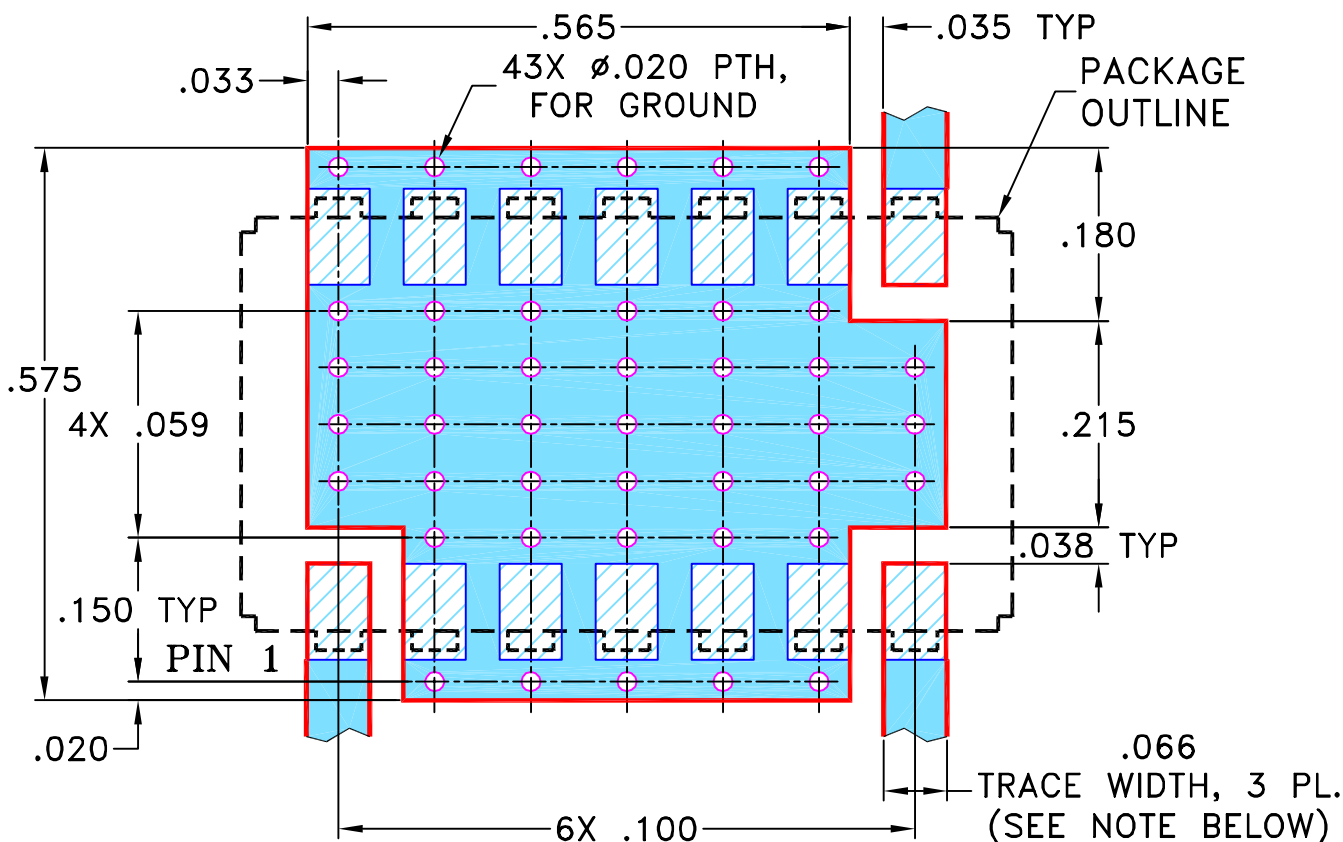
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82550	NEW RELEASE	11/07/02	MMG	HY
A	M102713	MODIFIED NOTES, ADDED "...WITH SMOBC"	01/16/06	GT	IL

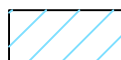
SUGGESTED MOUNTING CONFIGURATION FOR BK276 CASE STYLE, "mq" PIN CONNECTION



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS $0.030'' \pm 0.002''$; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

DRAWN

MMG

10/29/02

CHECKED

AV

11/07/02

APPROVED

HY

11/07/02



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL, mq, BK276, JSPQ, TB-217

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-099

REV:
A

FILE: 98PL099

SCALE: 5:1

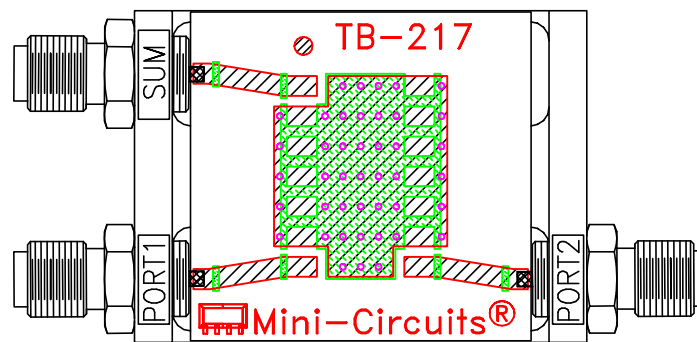
SHEET: 1 OF 1

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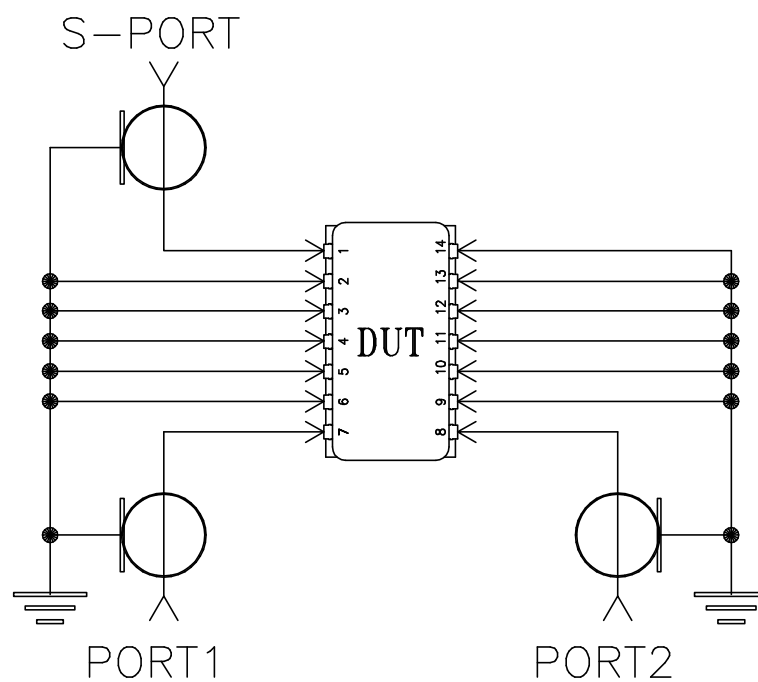
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ASHEETA1.DWG REV:A DATE:01/12/95

Evaluation Board and Circuit



TB-217



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 inch.

 **Mini-Circuits®**



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215