

Surface Mount

CASE STYLE: QQQ569

2 Way-90°

50Ω

65 to 75 MHz

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

SUM PORT	6
PORT 1 (0°)	4
PORT 2 (+90°)	1
GROUND	2,5
50 OHM TERM EXTERNAL	3

Diagram illustrating the floor levels and column types for a three-story building. The building has three floors, labeled L TYP (top), J TYP (middle), and K TYP (bottom). The height of the building is indicated as H. The columns are shown as hatched rectangles, and the floor levels are indicated by horizontal lines.

Suggested Layout,
Tolerance to be within $\pm .002$

A	B	C	D	E	F	G
.390	.31	.225	.060	--	.100	.045
9.91	7.87	5.72	1.52	--	2.54	1.14
H	J	K	L	M		wt
.420	.120	.060	.100	--		grams
10.67	3.05	1.52	2.54	--		0.50

Figure 1: Dimensions of the package outline. The drawing shows a square package with a central cross-shaped cutout. Key dimensions include: overall width of .360, distance between pin holes of .070, pin hole diameter of .020, pin hole depth of .14 PL, .030 typical thickness, .025 typical gap, .140 typical distance from center to pin hole, .070 typical distance from center to pin hole, .080 typical distance from center to pin hole, 45° typical angle, and line width of .064 (4 PL). The package outline is shown in red, and the pin holes are shown in blue.

NOTE:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" $\pm$.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

Notes

A. 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.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. 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/MC/Store/terms.jsp

- low insertion loss, 0.1 dB typ.
- high isolation, 30 dB typ.
- excellent phase unbalance 1 deg. typ.
- excellent return loss, VSWR 1.12:1 typ.
- aqueous washable

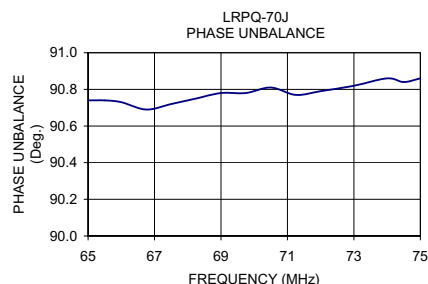
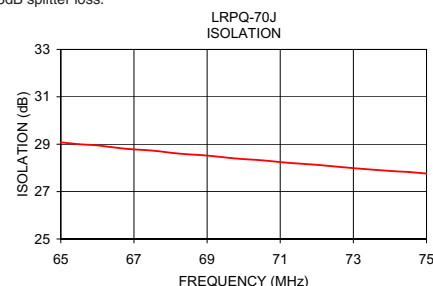
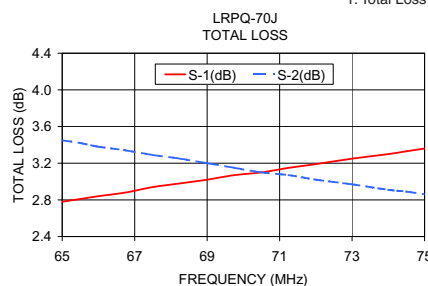
- VHF
- instrumentation
- modulators
- balanced amplifiers

FREQ. RANGE (MHz)	ISOLATION (dB)	INSERTION LOSS (dB) Avg. of Coupled Outputs ABOVE 3 dB	PHASE UNBALANCE (Degrees)	AMPLITUDE UNBALANCE (dB)
$f_c - f_u$	Typ. Min.	Typ. Max.	Max.	Max.
65-75	30 20	0.1 0.5	3	1.0

LRPQ units have bottom barrier ground plane insulated with glass barrier.

Frequency (MHz)	Total Loss¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
65.00	2.78	3.45	0.68	29.08	90.74	1.12	1.11	1.06
65.50	2.81	3.42	0.61	29.00	90.74	1.12	1.11	1.06
66.00	2.84	3.38	0.54	28.95	90.73	1.12	1.11	1.06
66.75	2.88	3.34	0.45	28.81	90.69	1.12	1.11	1.06
67.50	2.94	3.29	0.35	28.73	90.72	1.12	1.11	1.06
68.25	2.98	3.25	0.27	28.60	90.75	1.12	1.11	1.06
69.00	3.02	3.20	0.18	28.52	90.78	1.12	1.11	1.06
69.75	3.07	3.15	0.09	28.40	90.78	1.12	1.11	1.06
70.50	3.10	3.10	0.00	28.32	90.81	1.12	1.11	1.06
71.25	3.15	3.07	0.08	28.21	90.77	1.12	1.11	1.06
72.00	3.19	3.02	0.17	28.13	90.79	1.12	1.11	1.06
73.00	3.25	2.97	0.29	27.99	90.82	1.12	1.11	1.06
74.00	3.30	2.91	0.39	27.87	90.86	1.12	1.11	1.06
74.50	3.33	2.89	0.45	27.83	90.84	1.12	1.11	1.06
75.00	3.36	2.86	0.50	27.76	90.86	1.12	1.11	1.06

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



2 Way-90° Power Splitter/Combiner

LRPQ-70J

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	AVG.				S	1	2
40	1.39	5.86	3.63	4.47	0.37	34.53	1.10	1.08	1.06
45	1.68	5.15	3.42	3.47	0.46	33.44	1.10	1.08	1.06
50	1.99	4.56	3.28	2.57	0.53	32.42	1.10	1.09	1.06
55	2.30	4.07	3.19	1.76	0.62	31.59	1.10	1.09	1.06
60	2.62	3.64	3.13	1.03	0.71	30.82	1.10	1.09	1.06
65	2.93	3.29	3.11	0.36	0.81	30.10	1.10	1.09	1.05
66	2.99	3.23	3.11	0.23	0.82	29.97	1.10	1.09	1.05
68	3.12	3.10	3.11	0.03	0.85	29.69	1.10	1.09	1.05
70	3.25	2.98	3.12	0.26	0.87	29.47	1.10	1.09	1.05
72	3.37	2.88	3.13	0.49	0.92	29.25	1.10	1.09	1.05
74	3.50	2.76	3.13	0.73	0.93	29.05	1.10	1.09	1.05
75	3.56	2.72	3.14	0.84	0.94	28.91	1.10	1.09	1.05
80	3.86	2.49	3.17	1.37	1.02	28.42	1.11	1.09	1.05
85	4.16	2.30	3.23	1.86	1.12	27.97	1.11	1.09	1.05
90	4.45	2.12	3.29	2.33	1.21	27.54	1.11	1.09	1.05
95	4.73	1.98	3.36	2.75	1.29	27.11	1.11	1.09	1.04
100	5.01	1.85	3.43	3.17	1.40	26.71	1.11	1.09	1.04
105	5.27	1.73	3.50	3.55	1.51	26.33	1.11	1.09	1.04
110	5.53	1.63	3.58	3.90	1.60	25.95	1.11	1.09	1.04
115	5.78	1.53	3.65	4.24	1.71	25.58	1.11	1.09	1.04
120	6.02	1.45	3.74	4.57	1.84	25.21	1.11	1.09	1.04
125	6.25	1.39	3.82	4.87	1.95	24.89	1.12	1.09	1.04
130	6.48	1.33	3.90	5.15	2.08	24.56	1.12	1.10	1.04
135	6.69	1.27	3.98	5.41	2.23	24.24	1.12	1.10	1.04
140	6.89	1.22	4.05	5.67	2.36	23.95	1.12	1.10	1.04
145	7.09	1.18	4.14	5.91	2.52	23.65	1.13	1.10	1.05
150	7.27	1.14	4.21	6.13	2.68	23.34	1.13	1.11	1.05

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

LRPQ-70J

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	AVG.				S	1	2
40	1.38	5.85	3.62	4.47	0.31	33.85	1.10	1.09	1.07
45	1.67	5.14	3.41	3.47	0.41	32.62	1.11	1.10	1.07
50	1.97	4.55	3.26	2.58	0.49	31.53	1.12	1.11	1.08
55	2.28	4.06	3.17	1.77	0.56	30.63	1.12	1.11	1.07
60	2.60	3.63	3.12	1.04	0.67	29.84	1.13	1.12	1.07
65	2.91	3.28	3.09	0.37	0.76	29.17	1.13	1.12	1.07
66	2.97	3.21	3.09	0.24	0.78	29.04	1.13	1.12	1.07
68	3.10	3.09	3.09	0.02	0.81	28.79	1.13	1.12	1.06
70	3.22	2.96	3.09	0.26	0.85	28.60	1.13	1.12	1.06
72	3.34	2.86	3.10	0.48	0.88	28.40	1.13	1.12	1.06
74	3.47	2.75	3.11	0.71	0.91	28.24	1.12	1.12	1.06
75	3.53	2.70	3.12	0.83	0.91	28.12	1.12	1.12	1.06
80	3.83	2.47	3.15	1.36	1.01	27.73	1.12	1.12	1.05
85	4.13	2.27	3.20	1.86	1.09	27.40	1.12	1.11	1.05
90	4.41	2.10	3.26	2.32	1.19	27.12	1.12	1.11	1.05
95	4.70	1.95	3.33	2.75	1.26	26.83	1.12	1.11	1.04
100	4.97	1.81	3.39	3.16	1.38	26.57	1.11	1.10	1.04
105	5.23	1.70	3.46	3.54	1.47	26.32	1.11	1.10	1.04
110	5.49	1.59	3.54	3.91	1.56	26.04	1.11	1.10	1.04
115	5.74	1.50	3.62	4.24	1.66	25.74	1.11	1.10	1.04
120	5.98	1.41	3.70	4.56	1.78	25.40	1.11	1.10	1.03
125	6.21	1.34	3.78	4.87	1.87	25.07	1.11	1.10	1.03
130	6.44	1.28	3.86	5.16	1.99	24.70	1.11	1.10	1.03
135	6.64	1.22	3.93	5.42	2.13	24.33	1.12	1.11	1.03
140	6.85	1.17	4.01	5.68	2.25	23.97	1.12	1.11	1.04
145	7.04	1.13	4.08	5.91	2.40	23.60	1.13	1.12	1.04
150	7.22	1.09	4.16	6.13	2.58	23.23	1.13	1.13	1.04

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

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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	AVG.				S	1	2
40	1.40	5.85	3.63	4.45	0.37	35.23	1.09	1.07	1.05
45	1.69	5.14	3.42	3.45	0.47	34.35	1.09	1.07	1.05
50	2.00	4.55	3.28	2.55	0.55	33.53	1.08	1.07	1.05
55	2.31	4.06	3.19	1.74	0.62	32.84	1.08	1.06	1.04
60	2.63	3.63	3.13	1.01	0.74	32.18	1.08	1.06	1.04
65	2.94	3.28	3.11	0.33	0.80	31.49	1.08	1.06	1.04
66	3.00	3.21	3.11	0.21	0.83	31.36	1.08	1.06	1.04
68	3.13	3.09	3.11	0.05	0.86	31.07	1.08	1.06	1.04
70	3.26	2.97	3.12	0.29	0.88	30.84	1.08	1.06	1.04
72	3.38	2.86	3.12	0.52	0.91	30.57	1.08	1.06	1.04
74	3.51	2.76	3.14	0.75	0.94	30.34	1.08	1.06	1.04
75	3.57	2.71	3.14	0.86	0.95	30.17	1.08	1.06	1.04
80	3.88	2.48	3.18	1.40	1.03	29.53	1.09	1.06	1.04
85	4.18	2.29	3.23	1.89	1.11	28.91	1.09	1.07	1.04
90	4.47	2.12	3.29	2.35	1.20	28.28	1.09	1.07	1.05
95	4.75	1.97	3.36	2.78	1.29	27.68	1.10	1.08	1.04
100	5.02	1.85	3.43	3.18	1.41	27.13	1.10	1.08	1.04
105	5.29	1.73	3.51	3.56	1.51	26.62	1.10	1.09	1.04
110	5.55	1.63	3.59	3.92	1.61	26.14	1.11	1.09	1.04
115	5.80	1.54	3.67	4.26	1.75	25.70	1.11	1.09	1.04
120	6.04	1.46	3.75	4.57	1.88	25.28	1.11	1.10	1.04
125	6.27	1.39	3.83	4.88	1.99	24.91	1.11	1.10	1.04
130	6.50	1.33	3.91	5.17	2.14	24.57	1.12	1.10	1.04
135	6.71	1.27	3.99	5.43	2.30	24.25	1.12	1.10	1.05
140	6.91	1.23	4.07	5.69	2.44	23.98	1.13	1.10	1.05
145	7.11	1.18	4.15	5.93	2.61	23.71	1.13	1.10	1.06
150	7.29	1.14	4.22	6.15	2.78	23.44	1.14	1.10	1.06

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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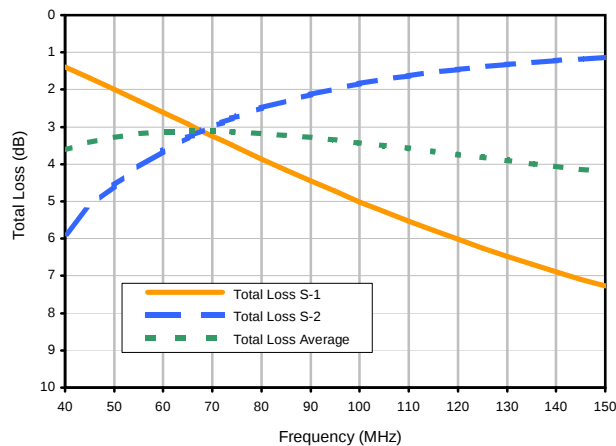


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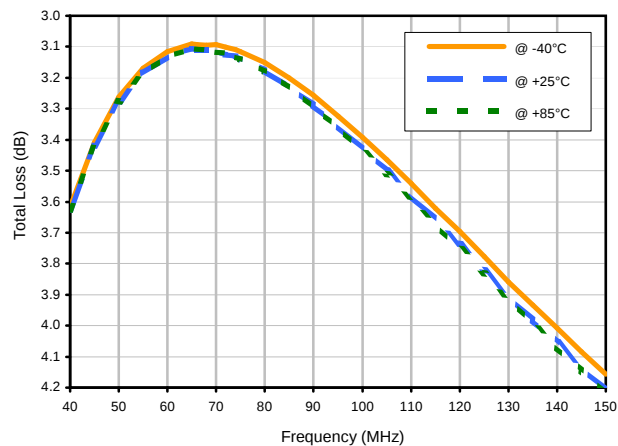
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Typical Performance Curves

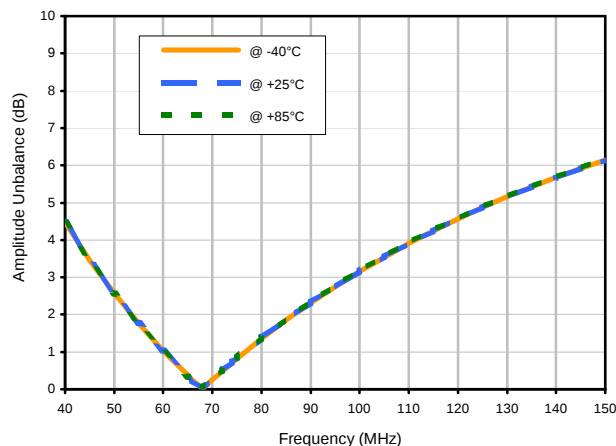
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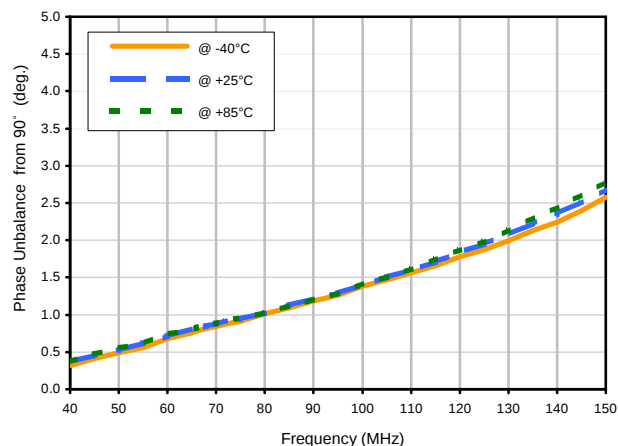
Average Total Loss vs. TEMPERATURE



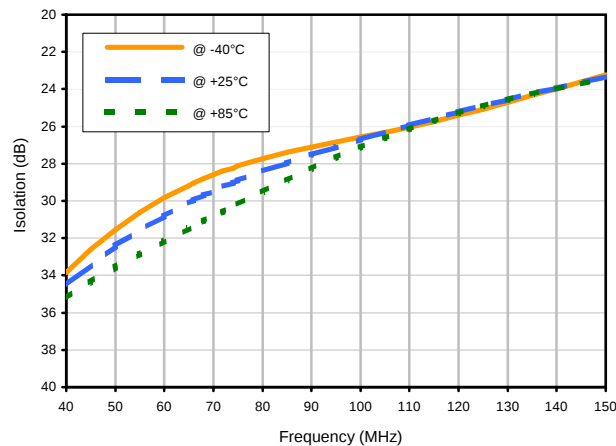
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE



Isolation 1-2 vs. TEMPERATURE



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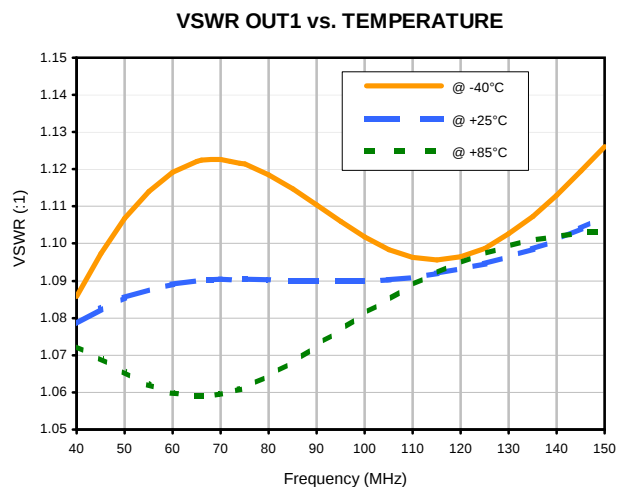
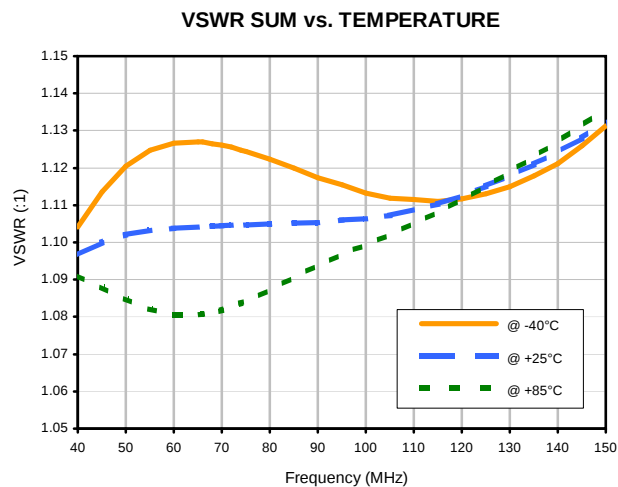
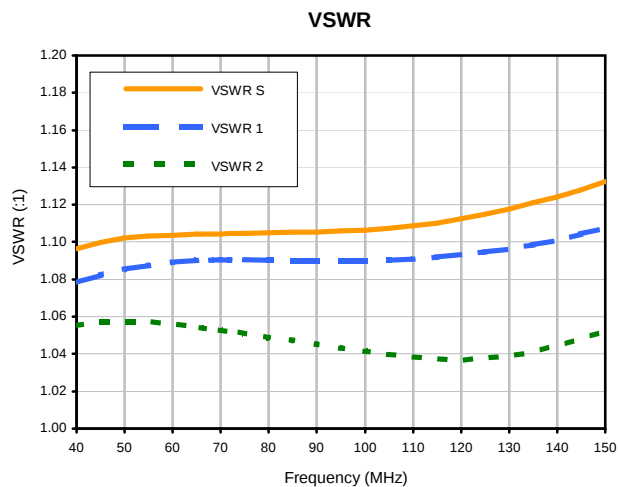


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Typical Performance Curves



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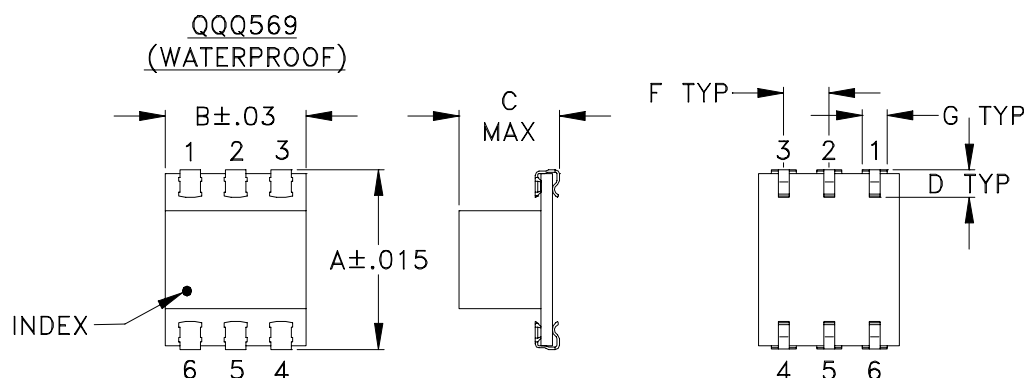
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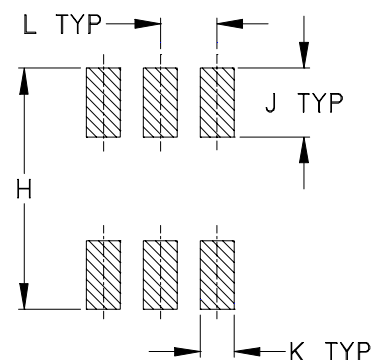
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Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	WT, GRAM
QQQ569	.390 (9.90)	.31 (7.87)	.225 (5.72)	.060 (1.52)	-	.100 (2.54)	.045 (1.14)	.420 (10.67)	.120 (3.05)	.060 (1.52)	.100 (2.54)	-	.50

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

Notes:

- Case material: Ceramic.
- Termination finish:
 - For RoHS Case Styles: Tin plate over Nickel plate.
 - For RoHS-5 Case Styles: Tin-Lead plate.

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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REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M88792	NEW RELEASE	10/20/03	GF	HY
A	M100924	CHANGED ORIENTATION PIN 1 TO PIN 6	09/23/05	GT	HY
B	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL

Technical drawing of a 14-pin package outline. The drawing shows a central horizontal bar with three vertical bars extending from it. The central bar has 14 pins (7 on each side). The vertical bars have 3 pins each. The package outline is shown in blue, and the pins are shown in red. Dimensions are given in inches.

- Overall width: .360
- Overall height: .140 TYP
- Pin pitch: .070 TYP
- Pin diameter: $\phi .020$ PTH 14 PL.
- Pin length: .030 TYP
- Pin gap: .025 GAP TYP
- Pin 6: PIN 6
- Pin angle: 45° TYP
- Pin width: .080 TYP
- Pin thickness: .064
- Line width: LINE WIDTH, 4 PL. (SEE NOTE BELOW)

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" $\pm$.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

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Brooklyn NY 11235

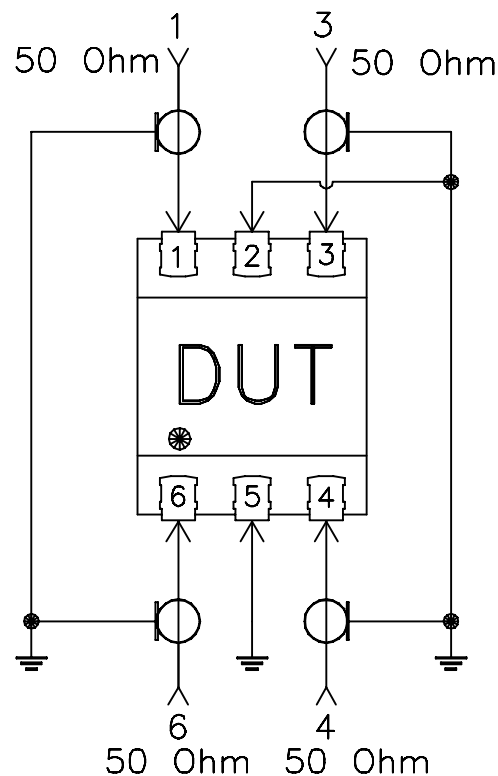
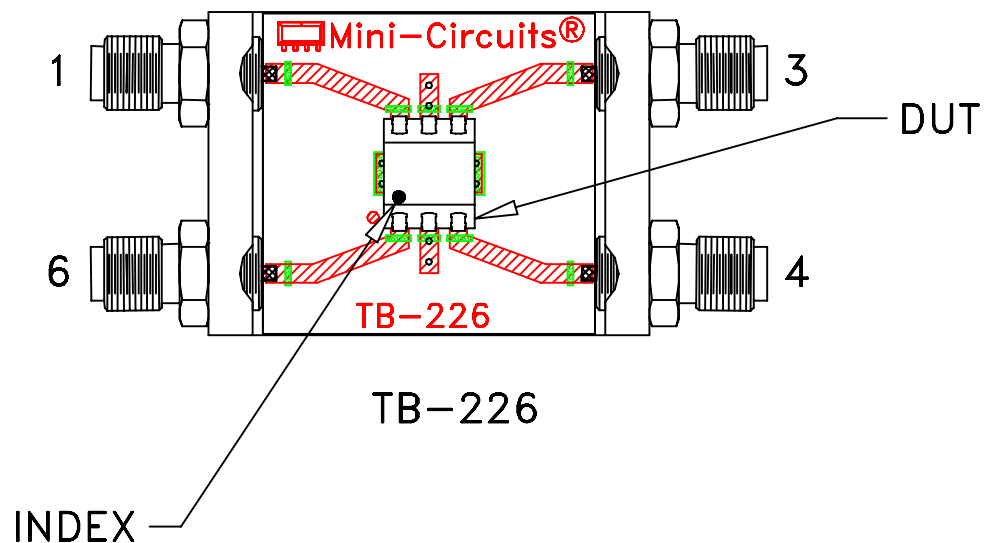
PL, ay/lr, QQQ569, LRPQ-J, TB-226

B

SHEET:	1 OF 1
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Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



Notes:

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

Schematic Diagram

 **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