NON-CATALOG

Surface Mount

Frequency Mixer

LRMS-30J

Level 7 (LO Power +7dBm) 200 to 3000 MHz

CASE STYLE: QQQ569

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
IF Current	40mA

Permanent damage may occur if any of these limits are exceeded.

Pin Connections

LO	1
RF	4
IF	5
GROUND	2,3,6

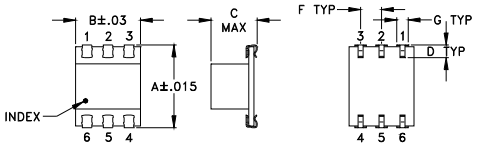
Features

- wide bandwidth, 200 to 3000 MHz
- low conversion loss, 5.92 dB typ.
- aqueous washable
- J-leads for strain relief

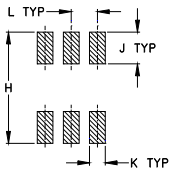
Applications

- cellular
- PCS
- GPS
- ISM
- cellular

Outline Drawing



PCB Land Pattern



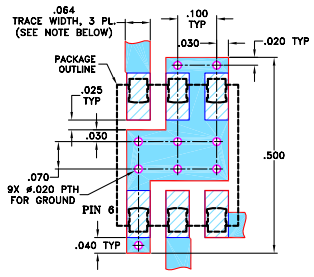
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

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

Demo Board MCL P/N: TB-44+
Suggested PCB Layout (PL-083)



NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 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

Electrical Specifications

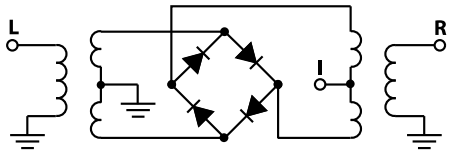
FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)
LO/RF	IF	Mid-Band m			Total Range					
f_L-f_U		$\overline{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.
200-3000	DC-1000	6.8	.30	9.0	9.8	30	17	27	7	14

1 dB COMP.: +1 dBm typ.
m= mid band [$2f_L$ to $f_U/2$]

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm
200.00	230.00	5.80	33.50	31.67	6.26	2.14
375.00	405.00	5.01	40.50	26.84	3.64	1.11
500.00	530.00	5.01	29.00	25.17	3.01	1.10
550.00	580.00	4.88	29.16	24.33	2.76	1.13
725.00	755.00	5.33	29.00	22.67	2.25	2.46
900.00	930.00	6.56	28.17	21.34	1.59	3.79
1000.00	1030.00	5.94	28.84	20.50	1.42	4.12
1075.00	1105.00	5.61	31.50	20.17	1.40	4.12
1250.00	1280.00	5.97	40.83	20.33	1.74	3.44
1425.00	1455.00	6.85	31.50	19.50	2.10	4.03
1600.00	1630.00	7.56	23.84	18.50	2.46	4.89
1775.00	1805.00	7.49	20.66	17.50	2.88	5.03
1950.00	1980.00	7.68	19.16	16.16	3.44	4.53
2000.00	2030.00	7.74	19.00	15.50	3.50	4.32
2125.00	2155.00	7.71	18.67	14.50	3.64	4.03
2300.00	2330.00	7.58	31.66	17.33	3.44	3.21
2475.00	2505.00	6.90	25.50	15.00	3.38	2.30
2650.00	2680.00	6.32	24.34	14.50	2.88	1.75
2825.00	2855.00	6.68	24.83	15.33	2.84	2.14
3000.00	3030.00	7.55	27.00	15.17	4.53	3.11

Electrical Schematic



Notes
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REV. D
M166133
LRMS-30J
ED-3427
DJ/FL/CP/AM
180418

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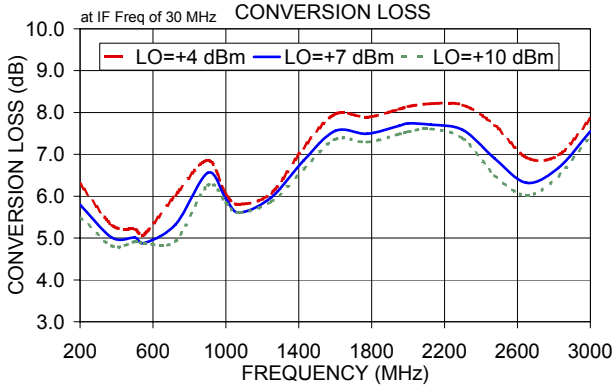
NON-CATALOG

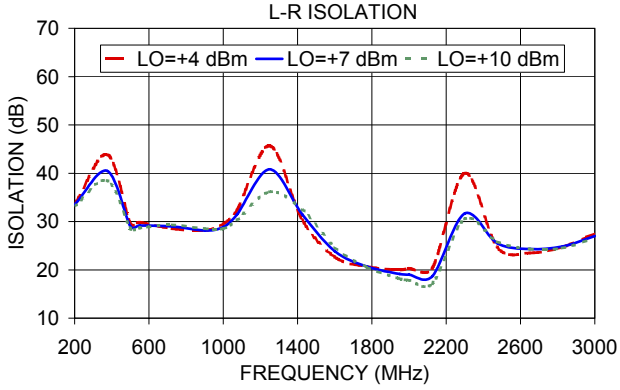
Performance Charts

LRMS-30J

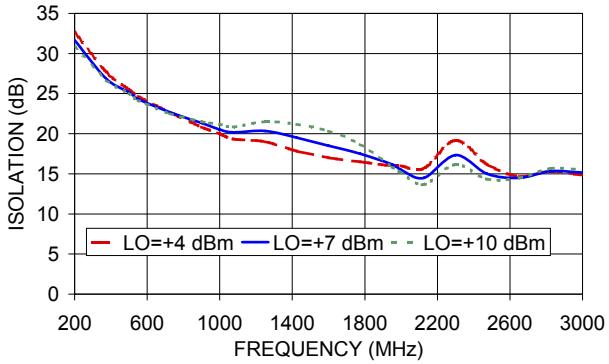
LRMS-30J
at IF Freq of 30 MHz CONVERSION LOSS



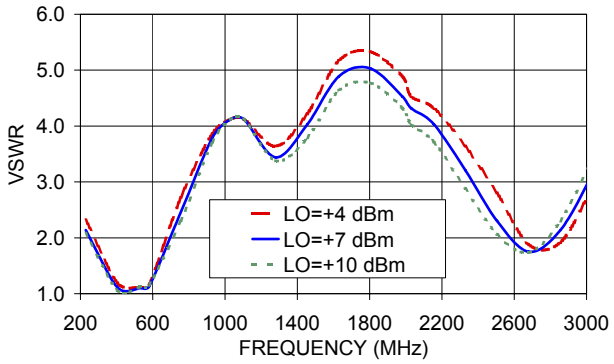
LRMS-30J
L-R ISOLATION



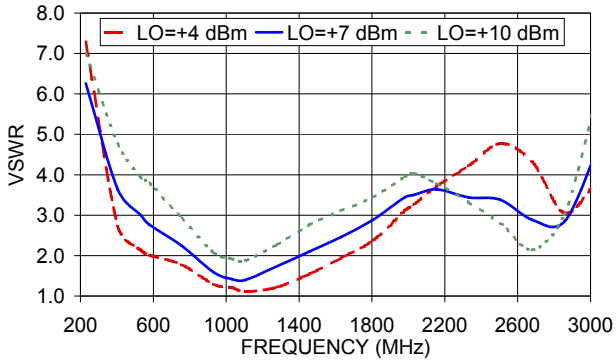
LRMS-30J
L-I ISOLATION



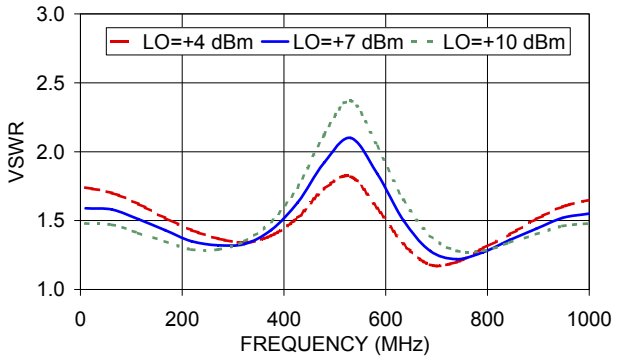
LRMS-30J
LO VSWR



LRMS-30J
RF VSWR



LRMS-30J
IF VSWR



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Frequency Mixer LRMS-30J

Typical Performance Data

RF (MHz)	LO (MHz)	CONVERSION LOSS (dB)		
		@LO (dBm)		
		+4	+7	+10
200.0	230.0	6.30	5.80	5.50
375.0	405.0	5.31	5.01	4.81
500.0	530.0	5.21	5.01	4.91
550.0	580.0	5.08	4.88	4.88
725.0	755.0	6.03	5.33	4.93
900.0	930.0	6.86	6.56	6.26
1000.0	1030.0	6.04	5.94	5.84
1075.0	1105.0	5.81	5.61	5.61
1250.0	1280.0	6.07	5.97	5.87
1425.0	1455.0	7.15	6.85	6.65
1600.0	1630.0	7.96	7.56	7.36
1775.0	1805.0	7.89	7.49	7.29
1950.0	1980.0	8.08	7.68	7.48
2000.0	2030.0	8.14	7.74	7.54
2125.0	2155.0	8.21	7.71	7.61
2300.0	2330.0	8.18	7.58	7.38
2475.0	2505.0	7.70	6.90	6.50
2650.0	2680.0	6.92	6.32	6.02
2825.0	2855.0	6.98	6.68	6.48
3000.0	3030.0	7.85	7.55	7.45

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+4	+7	+10	+4	+7	+10
230.0	33.50	33.50	33.16	32.66	31.67	30.83
405.0	43.84	40.50	38.50	27.67	26.84	26.66
530.0	29.50	29.00	28.50	25.50	25.17	25.00
580.0	29.84	29.16	28.66	24.66	24.33	24.16
755.0	28.50	29.00	29.33	22.67	22.67	22.50
930.0	28.17	28.17	28.50	20.83	21.34	21.50
1030.0	29.50	28.84	28.50	20.00	20.50	21.17
1105.0	32.33	31.50	30.33	19.33	20.17	20.83
1280.0	45.66	40.83	36.16	19.00	20.33	21.50
1455.0	30.34	31.50	32.50	17.84	19.50	21.16
1630.0	22.67	23.84	24.66	17.00	18.50	20.33
1805.0	20.66	20.66	20.50	16.50	17.50	18.67
1980.0	20.00	19.16	18.16	16.00	16.16	15.83
2030.0	20.34	19.00	17.83	16.00	15.50	15.16
2155.0	20.33	18.67	17.17	15.67	14.50	13.67
2330.0	40.00	31.66	30.50	19.17	17.33	16.16
2505.0	24.67	25.50	25.83	16.17	15.00	14.33
2680.0	23.50	24.34	24.34	14.67	14.50	14.50
2855.0	24.67	24.83	24.50	15.33	15.33	15.67
3030.0	27.50	27.00	26.67	14.83	15.17	15.50

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Frequency Mixer LRMS-30J

Typical Performance Data

RF/LO (MHz)	RF VSWR (:1) @LO (dBm)			LO VSWR (:1) @LO (dBm)			IF (MHz)	IF VSWR (:1) @LO (dBm)		
	+4	+7	+10	+4	+7	+10		+4	+7	+10
230.0	7.28	6.26	7.00	2.32	2.14	2.08	10.0	1.74	1.59	1.48
405.0	2.72	3.64	4.77	1.19	1.11	1.06	62.1	1.70	1.58	1.47
530.0	2.14	3.01	3.95	1.12	1.10	1.12	114.2	1.62	1.51	1.41
580.0	2.01	2.76	3.79	1.15	1.13	1.15	166.3	1.52	1.43	1.35
755.0	1.78	2.25	2.92	2.72	2.46	2.30	218.4	1.43	1.35	1.29
930.0	1.29	1.59	2.08	3.86	3.79	3.71	270.5	1.37	1.32	1.29
1030.0	1.21	1.42	1.92	4.12	4.12	4.12	322.6	1.34	1.33	1.35
1105.0	1.11	1.40	1.88	4.12	4.12	4.12	374.7	1.39	1.43	1.49
1280.0	1.22	1.74	2.27	3.64	3.44	3.38	426.8	1.52	1.63	1.74
1455.0	1.54	2.10	2.76	4.22	4.03	3.79	478.9	1.73	1.92	2.12
1630.0	1.94	2.46	3.11	5.17	4.89	4.64	531.1	1.82	2.10	2.37
1805.0	2.37	2.88	3.44	5.33	5.03	4.77	583.2	1.59	1.84	2.04
1980.0	3.11	3.44	3.95	4.89	4.53	4.32	635.3	1.33	1.50	1.65
2030.0	3.26	3.50	4.03	4.53	4.32	4.03	687.4	1.18	1.28	1.39
2155.0	3.71	3.64	3.79	4.32	4.03	3.71	739.5	1.20	1.22	1.28
2330.0	4.22	3.44	3.32	3.64	3.21	2.88	791.6	1.30	1.27	1.28
2505.0	4.77	3.38	2.80	2.80	2.30	2.06	843.7	1.40	1.36	1.34
2680.0	4.32	2.88	2.14	1.88	1.75	1.74	895.8	1.51	1.44	1.40
2855.0	3.06	2.84	3.01	1.92	2.14	2.30	947.9	1.60	1.52	1.46
3030.0	3.79	4.53	5.85	2.88	3.11	3.38	1000.0	1.65	1.55	1.48

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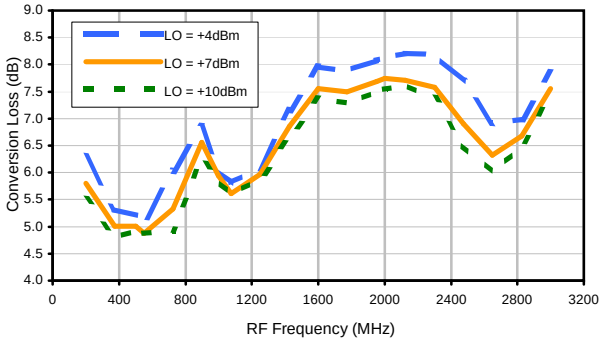
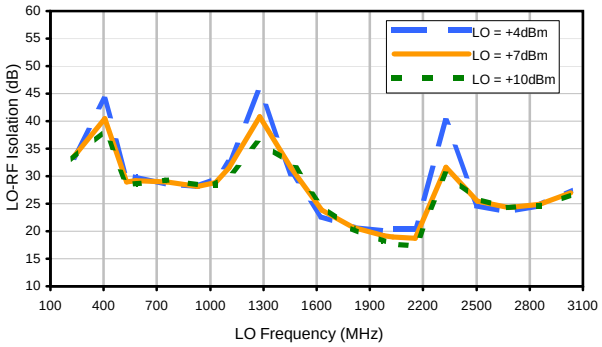
Typical Performance Curves

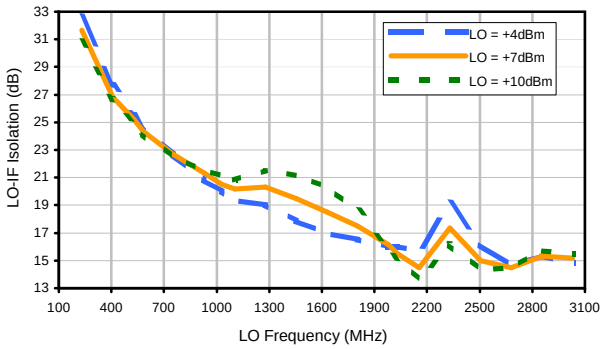
Conversion Loss



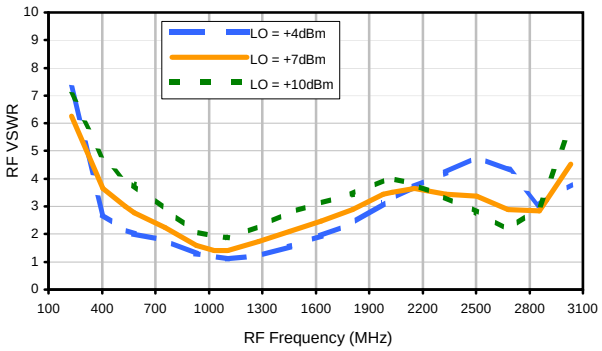
LO-RF Isolation



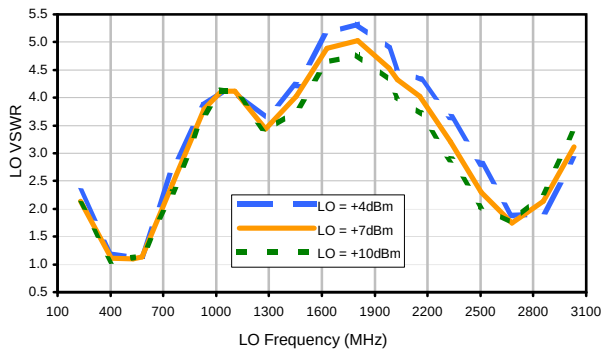
LO-IF Isolation



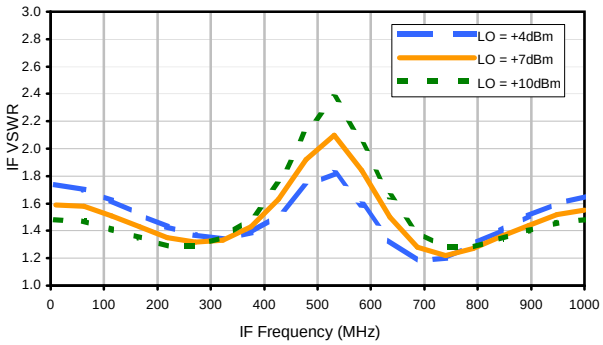
RF VSWR



LO VSWR



IF VSWR



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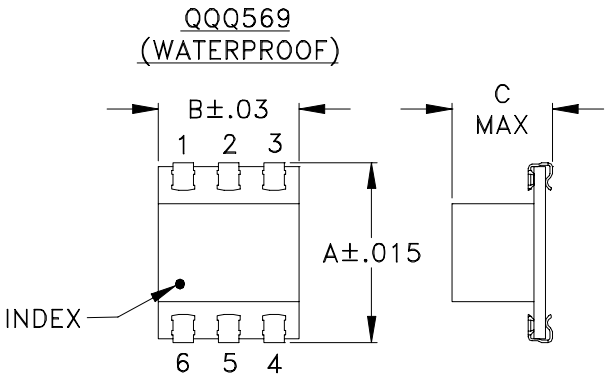
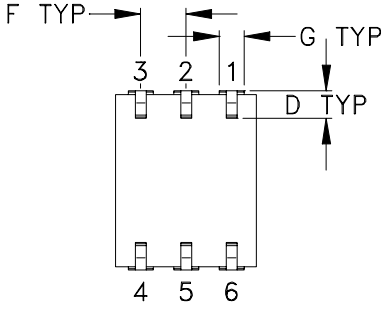
Case Style QQQ

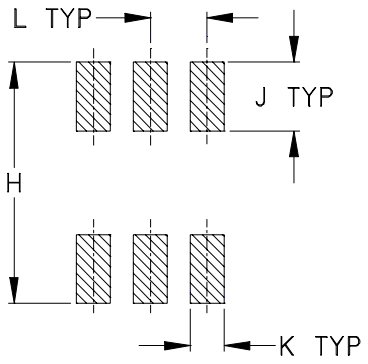
QQQ569 (waterproof)

Outline Dimensions





PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.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. ± .01; 3 Pl. ± .005

Notes:

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

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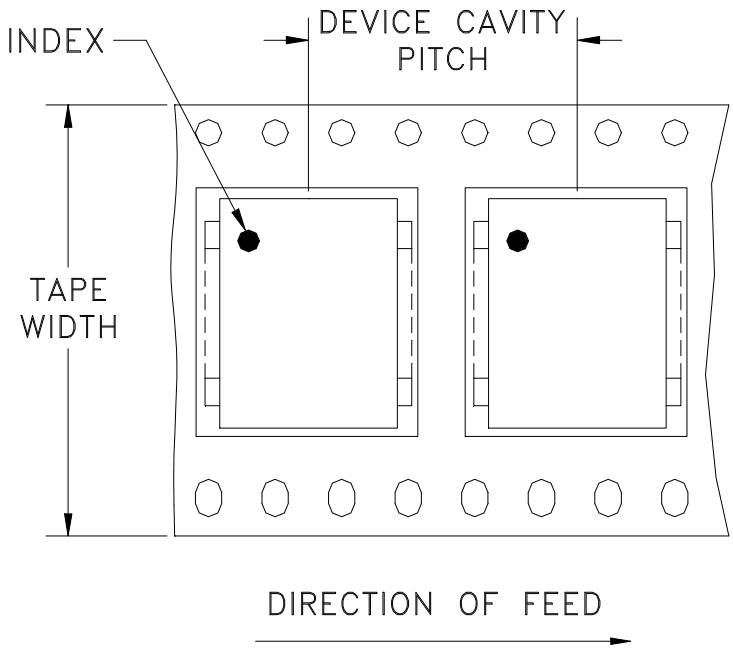
Tape & Reel Packaging TR-F5

DEVICE ORIENTATION IN T&R



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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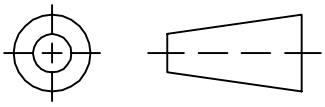
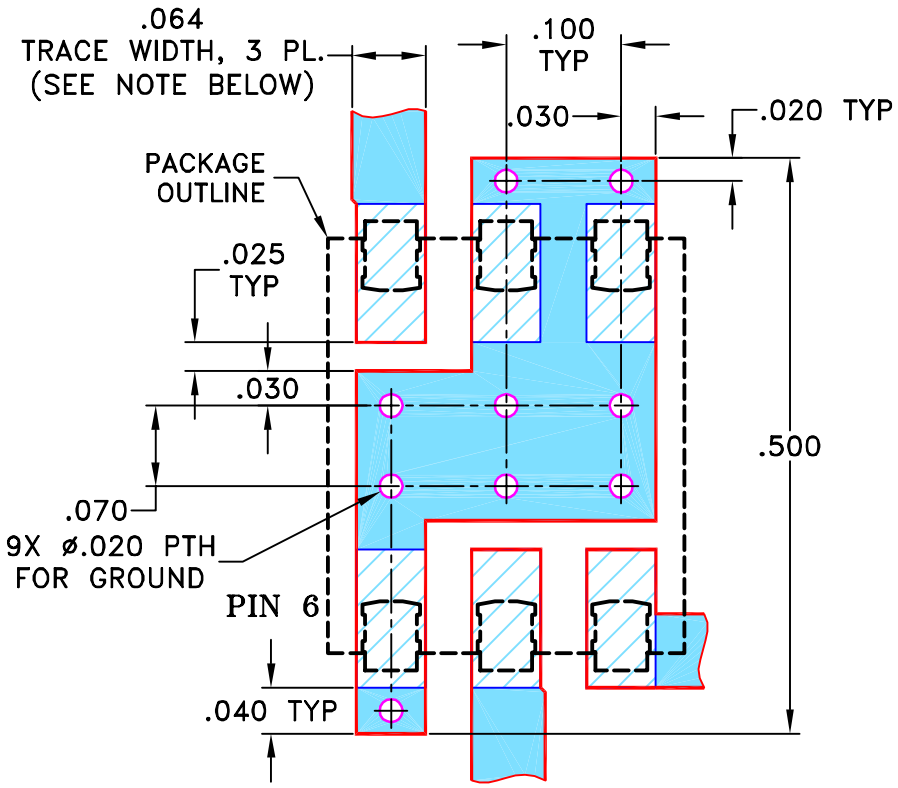
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82272	NEW RELEASE	08/02/02	AV	DJ
A	M102713	UPDATED NOTES	01/14/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR QQQ569 CASE STYLE, "w" PIN CONNECTION



NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 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	DRAWN	AV	07/19/02
TOLERANCES ON:	CHECKED	WL	08/02/02
2 PL DECIMALS ±	APPROVED	DJ	08/02/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

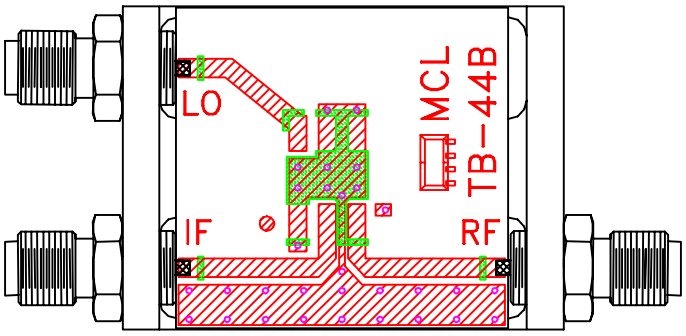
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, w, QQQ569, LRMS-J, TB-44

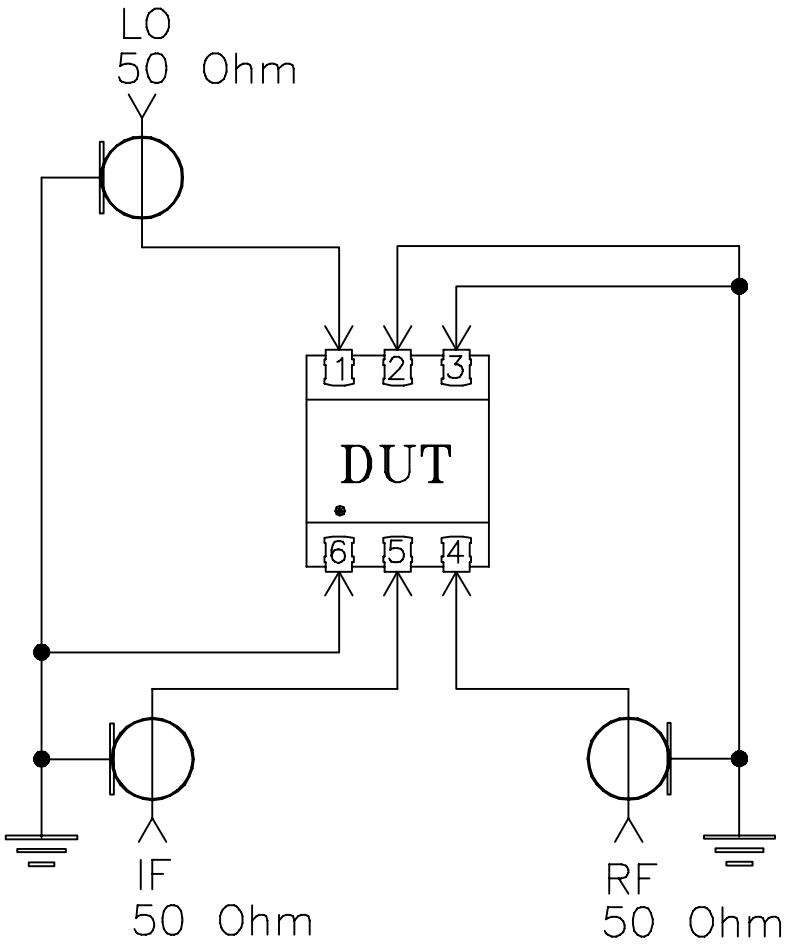
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-083	A

FILE:	SCALE:	SHEET:
98PL083	6:1	1 OF 1

Evaluation Board and Circuit



TB-44+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

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Environmental Specifications ENV02T1

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

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