Surface Mount

Frequency Mixer

SCM-2500LH+

Level 10 (LO Power +10 dBm) 500 to 2500 MHz

Generic photo used for illustration purposes only

CASE STYLE: YY109

+RoHS Compliant

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

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	8
IF	3
GROUND	2,4,5,6,7

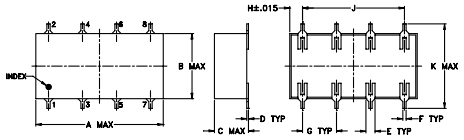
Features

- low conversion loss, 5.6 dB typ.
- wide bandwidth, 500 to 2500 MHz
- high L-R isolation, 35 dB typ.

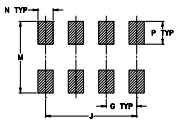
Applications

- UHF
- cellular
- satellite distribution

Outline Drawing



PCB Land Pattern



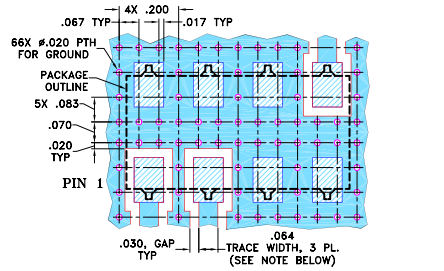
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.75	.38	.20	.010	.050	.020	.200
19.05	9.65	5.08	0.25	1.27	0.51	5.08

H	J	K	M	N	P	wt
.075	.600	.720	.740	.100	.150	grams
1.91	15.24	18.29	18.80	2.54	3.81	1.6

Demo Board MCL P/N: TB-171
Suggested PCB Layout (PL-130)



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

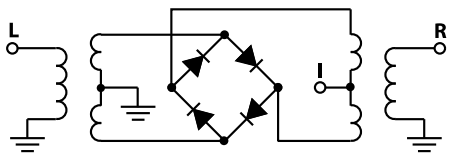
FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)
		Mid-Band m			Total Range					
LO/RF f_L-f_U	IF	$\overline{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.
500-2500	DC-500	5.6	.20	6.8	10	35	22	18	10	16

1 dB COMP.: +5 dBm typ.
m= mid band [$2f_L$ to $f_U/2$]

Typical Performance Data

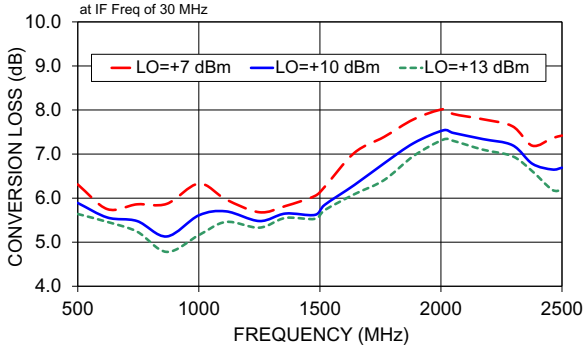
Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm
500.00	530.00	5.89	65.85	31.29	3.95	2.63
622.45	652.45	5.56	55.50	29.50	2.87	2.52
744.90	774.90	5.48	50.54	27.28	2.24	2.54
867.35	897.35	5.13	42.15	25.72	2.22	2.62
1000.00	1030.00	5.61	37.79	23.23	2.74	2.67
1112.24	1142.24	5.70	35.91	20.77	2.97	2.54
1250.00	1280.00	5.48	36.78	19.31	3.08	2.36
1357.14	1387.14	5.65	38.10	20.17	3.27	2.32
1479.59	1509.59	5.62	36.72	22.37	3.56	2.18
1520.41	1490.41	5.85	37.24	23.28	3.76	2.07
1642.86	1612.86	6.30	36.49	25.51	4.39	1.78
1765.31	1735.31	6.79	36.28	24.69	5.09	1.61
1887.76	1857.76	7.25	35.20	21.72	5.70	1.69
2010.20	1980.20	7.54	34.85	19.66	5.94	1.99
2051.02	2021.02	7.48	34.66	19.44	5.96	2.11
2173.47	2143.47	7.34	35.19	18.10	5.72	2.33
2295.92	2265.92	7.20	37.02	17.55	5.89	2.75
2377.55	2347.55	6.78	34.65	17.01	5.28	2.94
2459.18	2429.18	6.65	32.10	16.12	4.51	3.17
2500.00	2470.00	6.69	32.24	15.44	4.25	3.32

Electrical Schematic

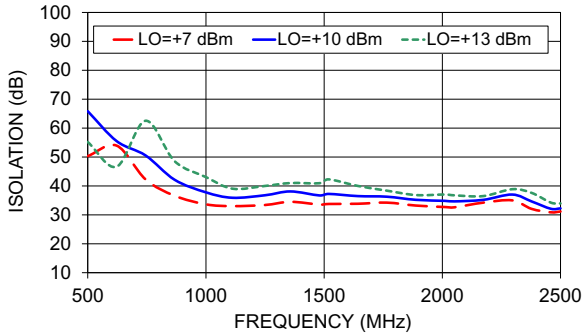


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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/MCLStore/terms.jsp

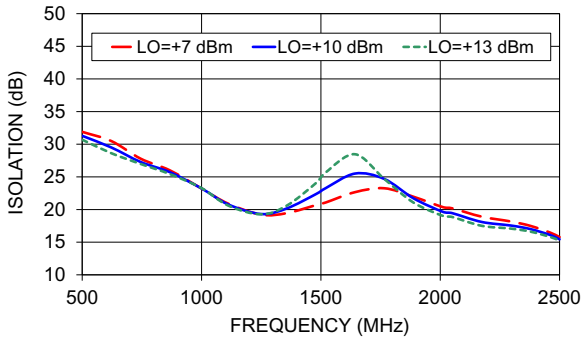
SCM-2500LH+
CONVERSION LOSS



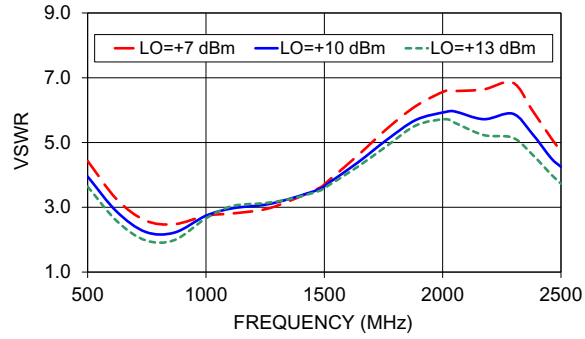
SCM-2500LH+
L-R ISOLATION



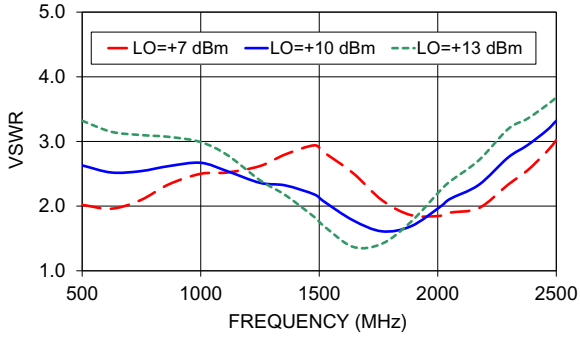
SCM-2500LH+
L-I ISOLATION



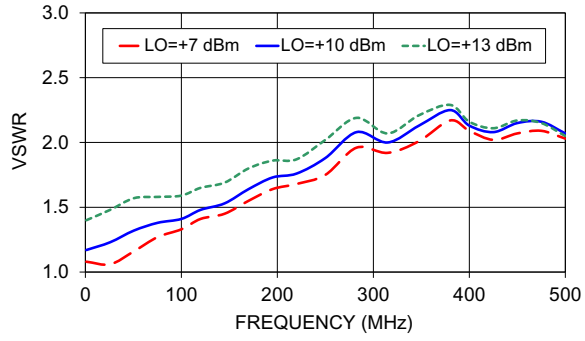
SCM-2500LH+
RF VSWR



SCM-2500LH+
LO VSWR



SCM-2500LH+
IF VSWR



Frequency Mixer SCM-2500LH+

Typical Performance Data

RF (MHz)	LO (MHz)	CONVERSION LOSS (dB) @LO (dBm)		
		+7	+10	+13
500.0	530.0	6.31	5.89	5.64
622.5	652.5	5.75	5.56	5.46
744.9	774.9	5.86	5.48	5.24
867.4	897.4	5.87	5.13	4.78
1000.0	1030.0	6.33	5.61	5.16
1112.2	1142.2	5.97	5.70	5.46
1250.0	1280.0	5.68	5.48	5.33
1357.1	1387.1	5.82	5.65	5.55
1479.6	1509.6	6.05	5.62	5.53
1520.4	1490.4	6.26	5.85	5.73
1642.9	1612.9	7.03	6.30	6.09
1765.3	1735.3	7.39	6.79	6.41
1887.8	1857.8	7.79	7.25	6.96
2010.2	1980.2	8.02	7.54	7.33
2051.0	2021.0	7.91	7.48	7.30
2173.5	2143.5	7.79	7.34	7.10
2295.9	2265.9	7.63	7.20	6.95
2377.6	2347.6	7.19	6.78	6.61
2459.2	2429.2	7.36	6.65	6.19
2500.0	2470.0	7.42	6.69	6.18

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+7	+10	+13	+7	+10	+13
500.0	50.32	65.85	55.19	31.90	31.29	30.70
622.5	53.94	55.50	46.66	30.48	29.50	28.62
744.9	42.25	50.54	62.54	27.79	27.28	26.98
867.4	36.62	42.15	48.57	26.00	25.72	25.43
1000.0	33.64	37.79	43.07	23.22	23.23	23.29
1112.2	33.03	35.91	39.05	20.89	20.77	20.60
1250.0	33.41	36.78	40.00	19.21	19.31	19.27
1357.1	34.51	38.10	41.00	19.45	20.17	20.60
1479.6	33.57	36.72	40.94	20.68	22.37	24.06
1520.4	33.77	37.24	42.27	21.08	23.28	25.69
1642.9	33.84	36.49	40.00	22.66	25.51	28.47
1765.3	34.23	36.28	38.37	23.26	24.69	24.70
1887.8	33.22	35.20	36.85	21.96	21.72	21.07
2010.2	32.71	34.85	37.04	20.38	19.66	19.04
2051.0	32.61	34.66	36.76	20.18	19.44	18.85
2173.5	34.23	35.19	36.49	18.91	18.10	17.51
2295.9	35.01	37.02	38.88	18.17	17.55	17.08
2377.6	32.07	34.65	37.61	17.50	17.01	16.62
2459.2	30.88	32.10	34.23	16.49	16.12	15.82
2500.0	31.16	32.24	33.95	15.78	15.44	15.24

Typical Performance Data

RF/LO (MHz)	RF VSWR (:1) @LO (dBm)			LO VSWR (:1) @LO (dBm)		
	+7	+10	+13	+7	+10	+13
500.0	4.43	3.95	3.64	2.02	2.63	3.32
622.5	3.25	2.87	2.58	1.96	2.52	3.15
744.9	2.59	2.24	1.98	2.09	2.54	3.10
867.4	2.48	2.22	1.99	2.34	2.62	3.07
1000.0	2.74	2.74	2.66	2.50	2.67	2.99
1112.2	2.81	2.97	3.04	2.52	2.54	2.79
1250.0	2.94	3.08	3.13	2.62	2.36	2.40
1357.1	3.21	3.27	3.26	2.80	2.32	2.17
1479.6	3.60	3.56	3.51	2.94	2.18	1.83
1520.4	3.84	3.76	3.69	2.83	2.07	1.69
1642.9	4.61	4.39	4.26	2.51	1.78	1.37
1765.3	5.43	5.09	4.90	2.09	1.61	1.42
1887.8	6.13	5.70	5.53	1.86	1.69	1.76
2010.2	6.59	5.94	5.72	1.85	1.99	2.24
2051.0	6.59	5.96	5.61	1.90	2.11	2.38
2173.5	6.64	5.72	5.23	1.97	2.33	2.71
2295.9	6.85	5.89	5.15	2.33	2.75	3.19
2377.6	6.01	5.28	4.64	2.55	2.94	3.35
2459.2	5.13	4.51	4.01	2.84	3.17	3.56
2500.0	4.74	4.25	3.73	3.02	3.32	3.68

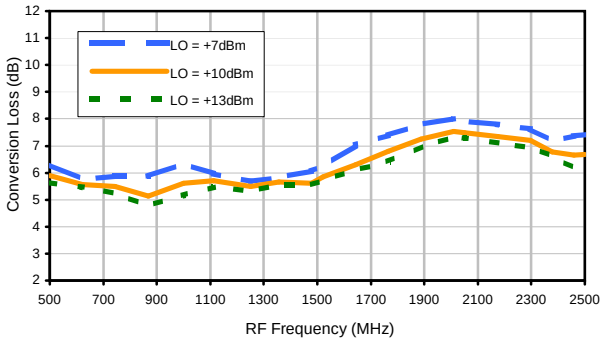
IF (MHz)	IF VSWR (:1) @LO (dBm)		
	+7	+10	+13
1.0	1.08	1.17	1.40
25.8	1.06	1.23	1.48
50.5	1.16	1.32	1.57
75.3	1.27	1.38	1.58
100.0	1.33	1.41	1.59
120.0	1.41	1.48	1.65
145.0	1.45	1.53	1.69
170.0	1.55	1.64	1.80
195.0	1.64	1.73	1.86
220.0	1.68	1.76	1.87
250.0	1.75	1.88	2.02
282.5	1.96	2.08	2.19
315.0	1.92	2.00	2.07
347.5	2.01	2.13	2.21
380.0	2.17	2.25	2.29
400.0	2.09	2.13	2.16
425.0	2.02	2.08	2.11
450.0	2.07	2.15	2.17
475.0	2.09	2.16	2.15
500.0	2.03	2.07	2.05

LO/RF (MHz) @LO (dBm) +10	max. DC output (mV)	DC Offset (mV)
500.00	-250.9	1.88
605.26	-264.3	-0.91
710.53	-226.2	0.56
815.79	-188.4	4.62
921.05	-171.7	4.07
1026.32	-188.4	3.27
1131.58	-202.5	-0.19
1236.84	-198.1	-1.51
1342.11	-194.4	-2.40
1447.37	-205.6	-2.02
1552.63	-191.5	-2.36
1657.89	-143.3	-2.01
1763.16	-121.7	-1.36
1868.42	-96.2	-0.68
1973.68	-68.2	-0.45
2078.95	-38.2	4.52
2184.21	-10.2	3.48
2289.47	3.0	4.41
2394.74	4.1	6.89
2500.00	-31.2	7.09

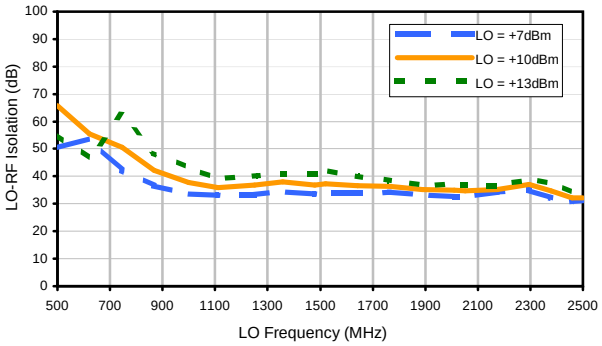
Frequency Mixer SCM-2500LH+

Typical Performance Curves

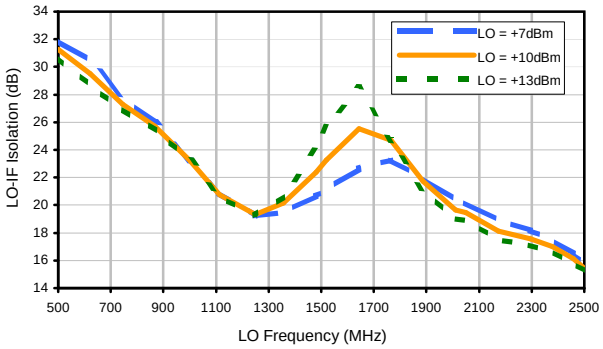
Conversion Loss



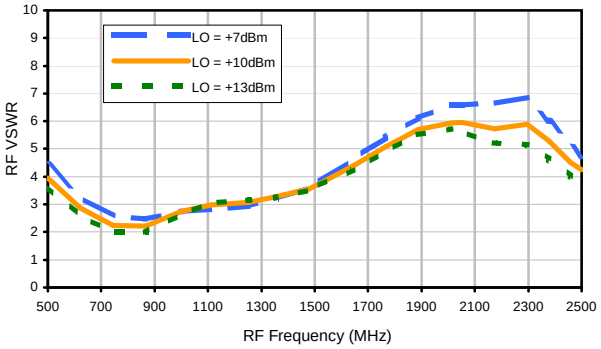
LO-RF Isolation



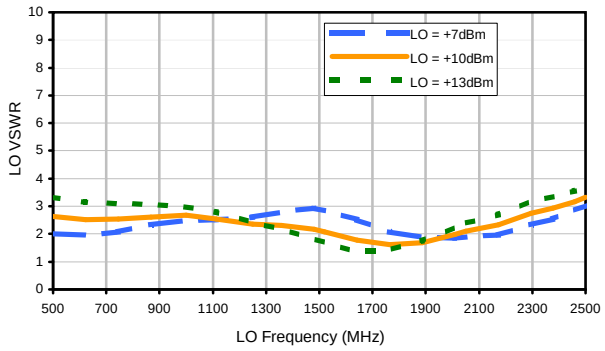
LO-IF Isolation



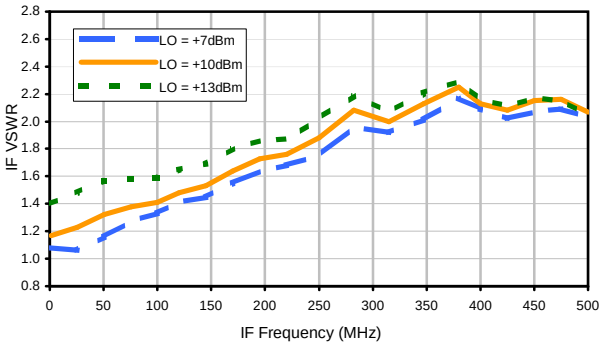
RF VSWR



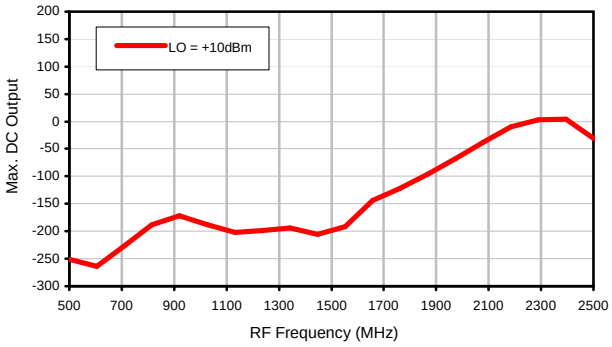
LO VSWR



IF VSWR



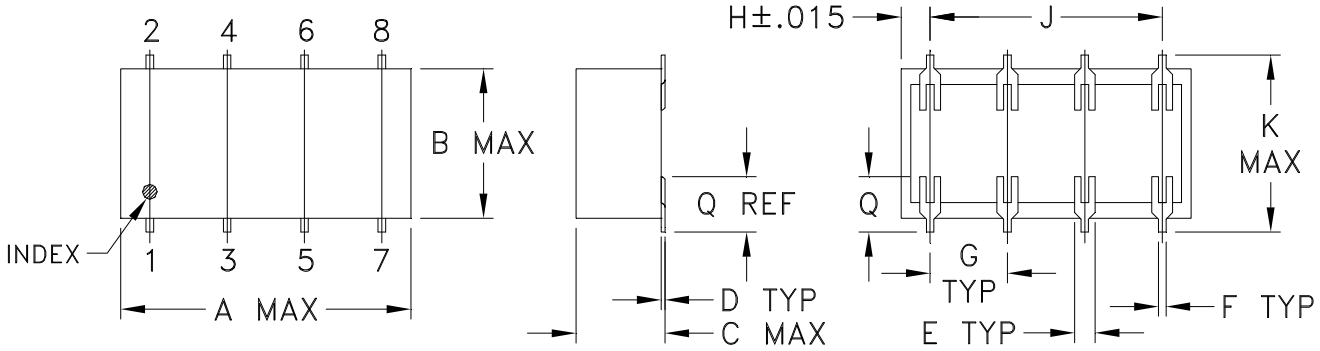
Max. DC Output



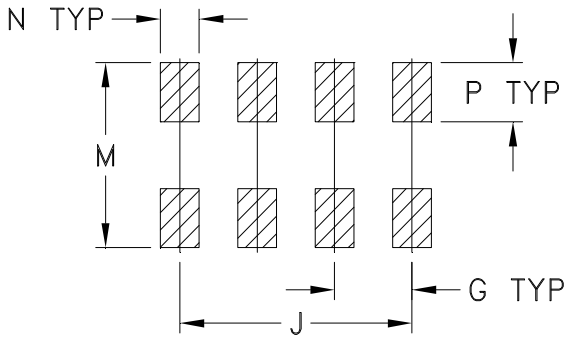
Case Style YY

Outline Dimensions

YY101
YY109
YY161



PCB Land Pattern



Suggested Layout
Tolerance to be within ±.002

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	WT. GRAMS
YY101*	.75 (19.05)	.38 (9.65)	.20 (5.08)	.010 (0.25)	.050 (1.27)	.020 (0.51)	.200 (5.08)	.075 (1.91)	.600 (15.24)	.450 (11.43)	-- --	.470 (11.94)	.100 (2.54)	.150 (3.81)	.148 (3.76)	1.6
YY109*			.20 (5.08)							.720 (18.29)	-- --	.740 (18.80)				1.6
YY161			.28 (7.11)							.450 (11.43)	-- --	.470 (11.94)				1.6

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

Notes:

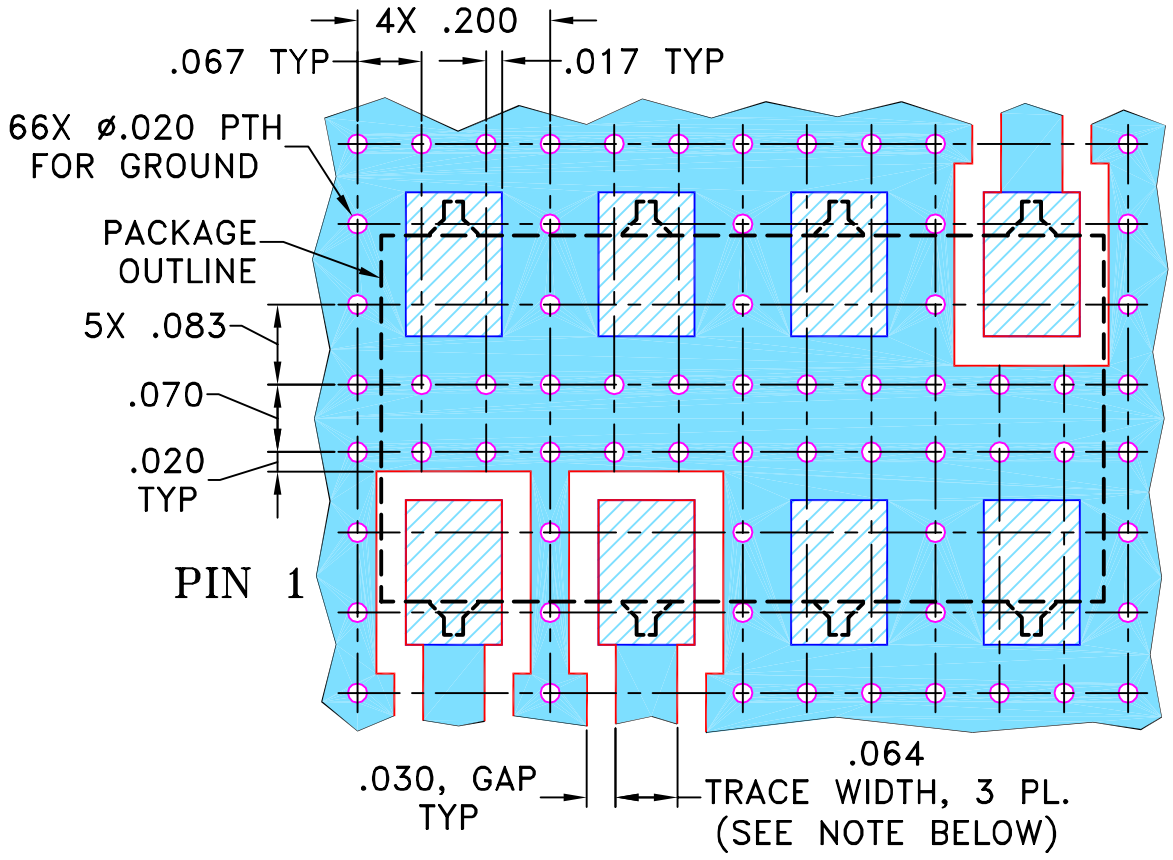
1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.
3. Special Tolerances: Termination thickness ± .003 inch.
4. * Denotes: For SCM mixers, long termination version (case YY109) is available upon request, consult factory. To order short termination version (case YY101) add -NL suffix.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M86774	NEW RELEASE	05/27/03	MMG	WL
A	M91639	REMOVED NOTE 2, UPDATED DIMENSIONS	04/14/04	AV	DJ
B	M102713	ADDED"...WITH SMOBC"	01/16/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR YY101 CASE STYLE, "r" 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	MMG	05/23/03
TOLERANCES ON:	CHECKED	AV	05/27/03
2 PL DECIMALS ±	APPROVED	WL	05/27/03
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

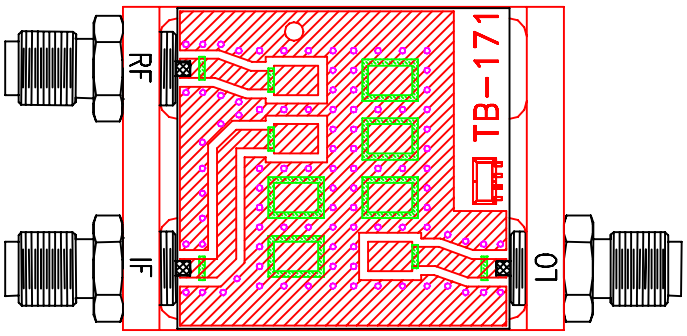
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, r, YY101, SCM, TB-171

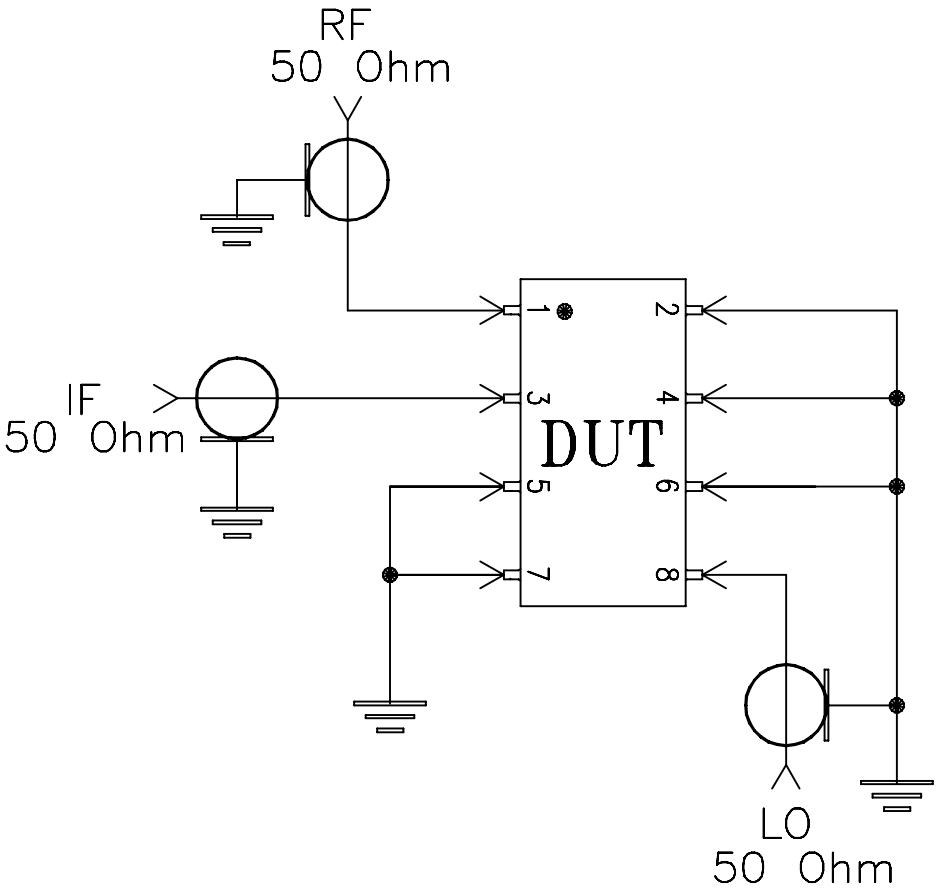
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-130	B

FILE:	SCALE:	SHEET:
98PL130	5:1	1 OF 1

Evaluation Board and Circuit



TB-171



Schematic Diagram

Notes:

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

Mini-Circuits®

Mini-Circuits

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