

Surface Mount Frequency Mixer

Level 10 (LO Power +10dBm) 2 to 500 MHz

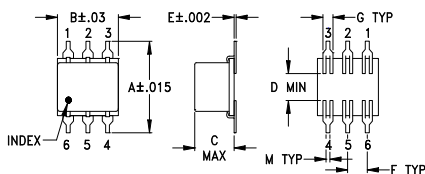
Maximum Ratings

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.	

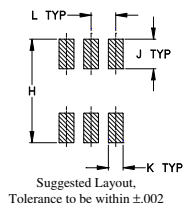
Pin Connections

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

Outline Drawing



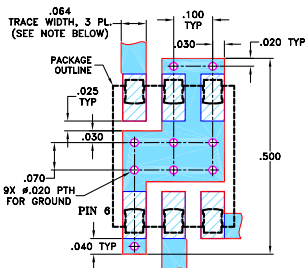
PCB Land Pattern



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.400	.31	.200	.10	.010	.100	.050
10.16	7.87	5.08	2.54	0.25	2.54	1.27
H	J	K	L	M	wt	
.420	.120	.060	.100	.020	grams	
10.67	3.05	1.52	2.54	0.51	0.55	

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.
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
4. 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/MCLStore/terms.jsp

Features

- low conversion loss, 5.36 dB typ.
- excellent L-R isolation, 44 dB typ.

Applications

- HF/VHF/UHF
- instrumentation
- cellular



Generic photo used for illustration purposes only
CASE STYLE: QQQ130

+RoHS Compliant

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



Available Tape and Reel
at no extra cost

Reel Size	Devices/Reel
7"	10, 20, 50, 100, 200
13"	500

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 Max.	L	M		U		L	M		U				
		$\bar{X}$	σ	Max.			Typ.	Min.	Typ.	Min.		Typ.	Min.	Typ.	Min.			
																Typ.	Min.	
f_L - f_U																		
2-500	DC-500	5.80	.08	7.0	8.0	58	45	44	25	30	20	55	40	40	25	28	17	18

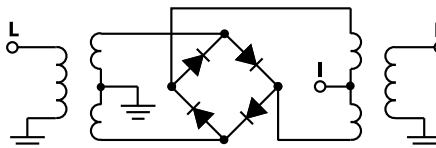
1 dB COMP.: +5 dBm typ.

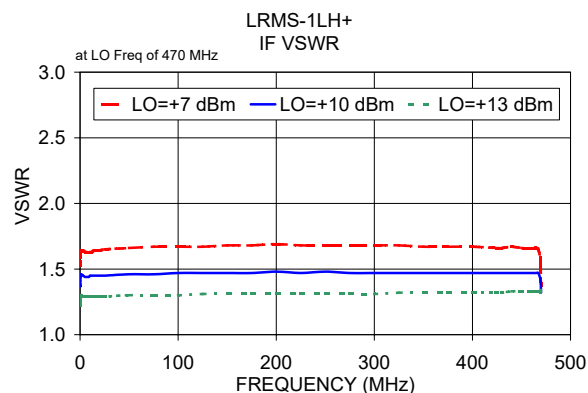
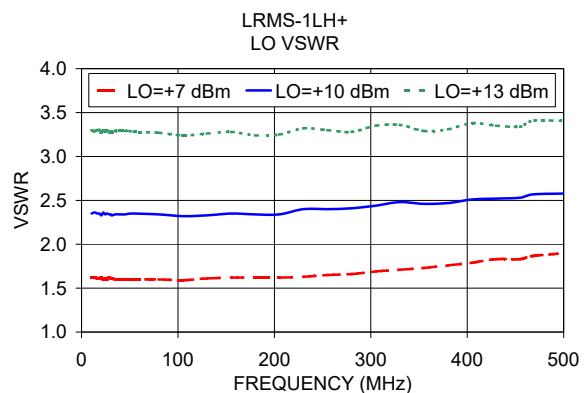
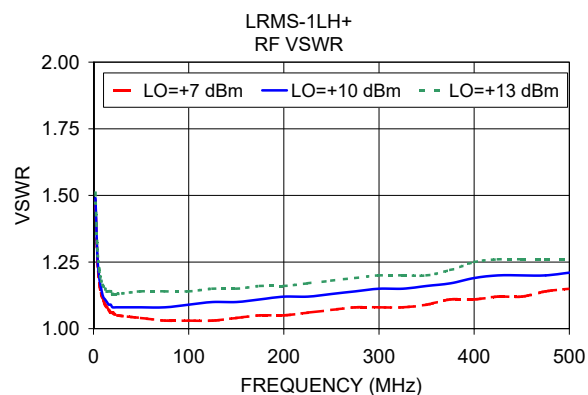
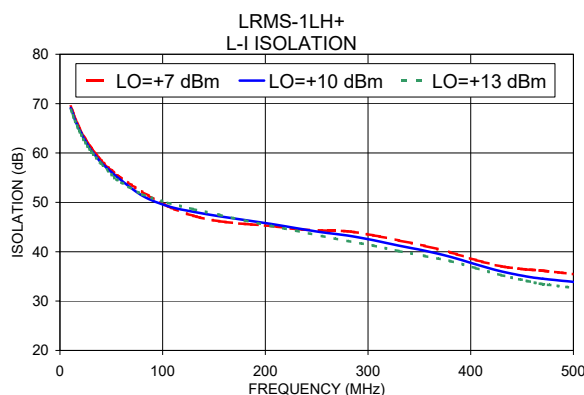
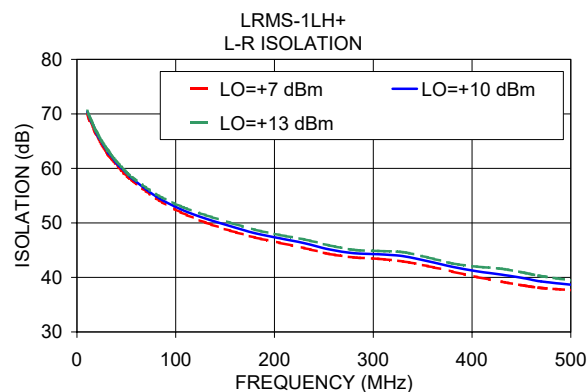
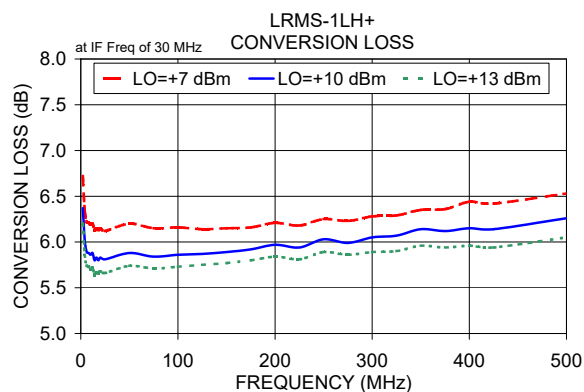
L = low range [f_L to $10 f_L$]
m = mid band [$2 f_L$ to $f_U/2$]
M = mid range [$10 f_L$ to $f_U/2$]
U = upper range [$f_U/2$ to f_U]

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	VSWR RF Port (:1)	Frequency (MHz)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR LO Port (:1)
RF	LO						
		LO +10dBm	LO +10dBm		LO +10dBm	LO +10dBm	LO +10dBm
2.10	32.10	6.37	1.49	10.50	70.41	69.11	2.35
4.10	34.10	6.02	1.27	14.50	68.58	66.80	2.36
6.10	36.10	5.89	1.19	20.50	66.18	64.14	2.33
10.10	40.10	5.86	1.12	24.50	65.07	62.56	2.34
14.10	44.10	5.80	1.10	30.50	63.23	60.51	2.34
18.10	48.10	5.80	1.09	35.00	62.19	59.35	2.34
20.10	50.10	5.83	1.08	40.10	60.93	58.03	2.34
25.10	55.10	5.81	1.08	50.10	59.14	56.14	2.35
50.10	80.10	5.88	1.08	80.10	54.86	51.36	2.34
100.10	130.10	5.86	1.09	105.10	52.51	49.23	2.32
125.10	155.10	5.87	1.10	155.10	49.42	47.19	2.35
150.10	180.10	5.89	1.10	205.10	47.19	45.64	2.34
175.10	205.10	5.92	1.11	255.10	45.16	43.93	2.40
200.10	230.10	5.97	1.12	305.10	44.26	42.34	2.44
250.10	280.10	6.03	1.13	330.10	43.91	41.23	2.48
300.10	330.10	6.05	1.15	355.10	42.98	40.21	2.46
350.10	380.10	6.14	1.16	405.10	41.12	37.43	2.51
400.10	430.10	6.15	1.19	430.10	40.51	36.00	2.52
425.10	455.10	6.14	1.20	455.10	39.78	34.95	2.53
500.00	470.00	6.26	1.21	470.00	39.26	34.54	2.57

Electrical Schematic





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Frequency Mixer

LRMS-1LH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+5dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
+7	+10	+13	+7	+10	+13	+7	+10	+13	+7	+10	+13			
2.0	32.0	7.08	6.73	6.55	10.1	40.1	24.50	24.45	29.97	10.1	40.1	1.20	0.89	0.64
5.0	35.0	6.14	5.87	5.71	51.1	81.1	22.61	22.90	20.56	51.1	81.1	1.05	0.81	0.56
10.0	40.0	6.47	6.17	5.99	92.0	122.0	22.23	22.42	26.35	92.0	122.0	0.99	0.75	0.51
51.1	81.1	6.13	5.86	5.71	133.0	163.0	20.42	22.49	22.53	133.0	163.0	1.04	0.72	0.51
92.0	122.0	6.19	5.88	5.75	173.9	203.9	20.32	21.37	21.03	173.9	203.9	1.00	0.71	0.49
133.0	163.0	6.19	5.92	5.80	214.9	244.9	19.78	19.49	19.35	214.9	244.9	0.95	0.68	0.50
173.9	203.9	6.19	5.96	5.85	255.8	285.8	19.86	19.58	18.08	255.8	285.8	0.99	0.71	0.52
214.9	244.9	6.23	5.99	5.86	296.8	326.8	18.83	18.25	17.40	296.8	326.8	0.97	0.71	0.52
255.8	285.8	6.29	6.06	5.92	337.7	367.7	17.42	16.31	17.02	337.7	367.7	0.98	0.73	0.57
296.8	326.8	6.30	6.07	5.92	378.7	408.7	19.07	17.20	17.67	378.7	408.7	1.00	0.73	0.57
337.7	367.7	6.40	6.16	5.99	419.6	449.6	17.89	17.13	17.80	419.6	449.6	1.07	0.84	0.66
378.7	408.7	6.43	6.18	6.00	440.1	470.1	16.27	16.25	18.39	440.1	470.1	1.10	0.87	0.71
419.6	449.6	6.51	6.20	6.00	481.1	511.1	14.60	14.14	16.65	481.1	511.1	1.12	0.91	0.74
440.1	470.1	6.51	6.20	5.98	501.5	531.5	14.23	13.80	15.48	501.5	531.5	1.19	0.94	0.78
481.1	511.1	6.60	6.30	6.07	542.5	572.5	13.39	13.79	15.59	542.5	572.5	1.29	1.04	0.89
501.5	531.5	6.59	6.30	6.09	563.0	593.0	13.00	13.58	15.83	563.0	593.0	1.35	1.10	0.93
542.5	572.5	6.69	6.37	6.14	603.9	633.9	13.37	14.84	18.80	603.9	633.9	1.50	1.24	1.07
563.0	593.0	6.71	6.35	6.11	624.4	654.4	13.34	15.35	20.02	624.4	654.4	1.55	1.33	1.14
624.4	654.4	6.90	6.40	6.11	665.3	695.3	13.01	16.88	31.10	665.3	695.3	1.54	1.38	1.19
665.3	695.3	7.06	6.46	6.14	685.8	715.8	13.02	17.03	22.89	685.8	715.8	1.54	1.41	1.22
685.8	715.8	7.14	6.49	6.15	726.8	756.8	12.06	14.87	26.80	726.8	756.8	1.46	1.37	1.24
726.8	756.8	7.40	6.71	6.27	747.2	777.2	11.68	14.30	23.52	747.2	777.2	1.46	1.37	1.26
747.2	777.2	7.47	6.81	6.33	788.2	818.2	12.79	15.03	22.82	788.2	818.2	1.39	1.30	1.24
788.2	818.2	7.63	7.01	6.54	808.7	838.7	13.32	15.82	28.54	808.7	838.7	1.34	1.24	1.20
808.7	838.7	7.73	7.15	6.69	849.6	879.6	13.95	17.25	21.09	849.6	879.6	1.35	1.21	1.19
849.6	879.6	7.79	7.29	6.90	870.1	900.1	14.83	18.30	24.28	870.1	900.1	1.36	1.19	1.17
870.1	900.1	7.82	7.36	7.00	911.1	941.1	16.07	19.97	21.01	911.1	941.1	1.43	1.20	1.15
911.1	941.1	7.76	7.39	7.14	931.5	961.5	15.60	20.34	19.47	931.5	961.5	1.45	1.20	1.14
931.5	961.5	7.73	7.41	7.18	972.5	1002.5	15.74	18.01	18.14	972.5	1002.5	1.55	1.21	1.13
972.5	1002.5	7.69	7.43	7.27	993.0	1023.0	15.59	17.60	17.39	993.0	1023.0	1.52	1.19	1.11
1033.9	1063.9	7.75	7.56	7.49	1033.9	1063.9	15.21	15.98	17.67	1033.9	1063.9	1.56	1.17	1.07
1054.4	1084.4	7.81	7.60	7.54	1054.4	1084.4	14.79	15.89	16.86	1054.4	1084.4	1.61	1.21	1.13
1095.3	1125.3	7.97	7.82	7.78	1095.3	1125.3	13.77	15.39	15.93	1095.3	1125.3	1.62	1.19	1.13
1115.8	1145.8	8.09	7.94	7.92	1115.8	1145.8	13.22	14.97	15.71	1115.8	1145.8	1.61	1.16	1.10
1156.8	1186.8	8.42	8.28	8.27	1156.8	1186.8	11.72	13.60	15.32	1156.8	1186.8	1.58	1.10	1.12
1177.2	1207.2	8.68	8.55	8.56	1177.2	1207.2	11.18	13.08	15.00	1177.2	1207.2	1.50	1.03	1.07
1218.2	1248.2	9.16	9.02	9.00	1218.2	1248.2	10.92	13.27	14.58	1218.2	1248.2	1.49	1.02	1.12
1238.7	1268.7	9.46	9.24	9.22	1238.7	1268.7	10.45	12.67	13.73	1238.7	1268.7	1.58	1.08	1.16
1279.6	1309.6	10.18	9.87	9.86	1279.6	1309.6	10.47	12.77	14.06	1279.6	1309.6	1.64	1.15	1.14
1300.1	1330.1	10.51	10.15	10.11	1300.1	1330.1	9.96	12.35	13.23	1300.1	1330.1	1.74	1.25	1.23

Frequency Mixer

LRMS-1LH+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=250.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+10			+10			+10
240.0	10.1	6.08	10.0	20.1	5.72	490.0	10.1	6.31
234.1	16.0	6.07	22.3	32.4	5.54	477.7	22.4	6.25
228.2	21.9	6.02	34.6	44.7	5.55	465.4	34.7	6.21
222.3	27.8	6.04	46.9	57.0	5.56	453.1	47.0	6.22
216.4	33.7	6.02	59.2	69.3	5.55	440.8	59.3	6.22
210.5	39.6	6.00	71.5	81.6	5.59	428.5	71.6	6.18
204.6	45.5	6.03	83.8	93.9	5.63	416.2	83.9	6.16
198.7	51.4	5.98	96.2	106.3	5.60	403.8	96.3	6.12
192.8	57.3	6.00	108.5	118.6	5.60	391.5	108.6	6.09
186.9	63.2	5.99	120.8	130.9	5.59	379.2	120.9	6.09
181.0	69.1	5.97	133.1	143.2	5.59	366.9	133.2	6.07
175.1	75.0	6.05	145.4	155.5	5.64	354.6	145.5	6.06
169.2	80.9	5.98	157.7	167.8	5.68	342.3	157.8	6.08
163.3	86.8	5.96	170.0	180.1	5.68	330.0	170.1	6.08
157.4	92.7	6.00	182.3	192.4	5.70	317.7	182.4	6.10
151.5	98.6	5.95	194.6	204.7	5.69	305.4	194.7	6.09
145.6	104.5	5.96	206.9	217.0	5.70	293.1	207.0	6.07
139.7	110.4	5.94	219.2	229.3	5.72	280.8	219.3	6.07
133.8	116.3	5.92	231.5	241.6	5.71	268.5	231.6	6.10
127.9	122.2	5.92	243.8	253.9	5.74	256.2	243.9	6.12
122.1	128.0	5.89	256.2	266.3	5.78	243.8	256.3	6.12
116.2	133.9	5.90	268.5	278.6	5.82	231.5	268.6	6.13
110.3	139.8	5.93	280.8	290.9	5.83	219.2	280.9	6.11
104.4	145.7	5.94	293.1	303.2	5.84	206.9	293.2	6.13
98.5	151.6	5.95	305.4	315.5	5.83	194.6	305.5	6.14
92.6	157.5	5.94	317.7	327.8	5.86	182.3	317.8	6.13
86.7	163.4	5.94	330.0	340.1	5.88	170.0	330.1	6.13
80.8	169.3	5.95	342.3	352.4	5.89	157.7	342.4	6.15
74.9	175.2	5.94	354.6	364.7	5.93	145.4	354.7	6.17
69.0	181.1	5.94	366.9	377.0	5.98	133.1	367.0	6.22
63.1	187.0	5.93	379.2	389.3	5.98	120.8	379.3	6.20
57.2	192.9	5.92	391.5	401.6	5.97	108.5	391.6	6.16
51.3	198.8	5.93	403.8	413.9	5.93	96.2	403.9	6.17
45.4	204.7	5.95	416.2	426.3	5.94	83.8	416.3	6.16
39.5	210.6	5.96	428.5	438.6	6.00	71.5	428.6	6.17
33.6	216.5	5.96	440.8	450.9	6.06	59.2	440.9	6.20
27.7	222.4	5.96	453.1	463.2	6.08	46.9	453.2	6.19
21.8	228.3	5.98	465.4	475.5	6.11	34.6	465.5	6.23
15.9	234.2	6.01	477.7	487.8	6.09	22.3	477.8	6.27
10.0	240.1	6.12	490.0	500.1	6.12	10.0	490.1	6.41

REV. X2
LRMS-1LH+
100817
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Frequency Mixer

LRMS-1LH+

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)					@LO (dBm)		
	+7	+10	+13	+7	+10	+13			+7	+10	+13
2.0	65.89	68.96	71.56	55.04	58.87	62.73	10.1	40.1	50.02	45.04	45.36
5.0	65.11	67.37	69.67	54.46	56.74	57.76	51.1	81.1	33.32	33.48	33.19
10.0	63.38	65.16	66.06	52.78	52.79	52.34	92.0	122.0	28.99	28.75	29.12
51.1	55.99	55.81	55.99	50.88	49.71	49.08	133.0	163.0	26.34	26.48	26.70
92.0	51.31	51.03	51.20	45.84	44.96	44.60	173.9	203.9	24.66	24.96	25.00
133.0	48.13	48.29	48.36	42.91	42.84	42.29	214.9	244.9	23.60	23.87	23.94
173.9	46.22	46.44	46.35	41.36	41.03	40.70	255.8	285.8	23.00	23.25	23.43
214.9	44.57	44.90	44.77	40.45	39.81	39.04	296.8	326.8	22.70	23.05	23.30
255.8	43.22	43.49	43.55	39.70	38.53	37.72	337.7	367.7	22.35	22.72	23.02
296.8	42.06	42.36	42.36	39.68	37.99	36.67	378.7	408.7	22.26	22.75	23.17
337.7	42.03	42.19	42.21	37.54	36.30	35.11	419.6	449.6	22.47	23.13	23.62
378.7	40.07	40.34	40.60	36.65	35.28	34.11	440.1	470.1	22.72	23.52	24.23
419.6	38.11	38.70	39.02	34.82	33.34	32.26	481.1	511.1	22.98	23.84	24.76
440.1	37.59	38.04	38.30	33.77	32.39	31.37	501.5	531.5	22.76	23.54	24.24
481.1	36.35	36.88	37.19	32.92	31.41	30.27	542.5	572.5	21.47	21.88	22.08
501.5	35.85	36.19	36.48	32.12	30.85	29.64	563.0	593.0	20.51	20.67	20.70
542.5	35.09	35.17	35.26	30.86	29.66	28.62	603.9	633.9	18.63	18.49	18.46
563.0	35.17	35.07	35.03	30.10	29.02	27.99	624.4	654.4	17.67	17.53	17.31
624.4	34.15	33.49	32.88	27.49	26.46	25.41	665.3	695.3	16.37	16.15	15.99
665.3	33.35	32.59	31.86	25.99	25.20	24.31	685.8	715.8	15.94	15.71	15.60
685.8	33.38	32.86	32.30	25.13	24.31	23.49	726.8	756.8	15.07	14.99	14.97
726.8	32.47	31.90	31.46	23.51	22.66	21.99	747.2	777.2	14.72	14.73	14.78
747.2	32.03	31.54	31.03	22.93	22.18	21.48	788.2	818.2	14.09	14.15	14.35
788.2	31.44	31.09	30.74	21.63	20.94	20.17	808.7	838.7	13.74	13.83	14.00
808.7	30.89	30.53	30.25	21.13	20.38	19.61	849.6	879.6	13.13	13.18	13.36
849.6	30.57	30.29	30.07	20.01	19.51	18.62	870.1	900.1	12.89	12.96	13.14
870.1	30.92	30.95	31.18	19.66	19.13	18.29	911.1	941.1	12.39	12.45	12.64
911.1	31.08	31.24	31.52	18.53	17.96	17.07	931.5	961.5	12.29	12.31	12.46
931.5	30.73	30.77	30.87	18.12	17.62	16.64	972.5	1002.5	11.99	12.06	12.14
972.5	31.55	31.66	31.55	17.09	16.51	15.01	993.0	1023.0	11.78	11.84	11.92
1033.9	33.61	33.16	32.21	15.42	14.90	13.96	1033.9	1063.9	11.49	11.50	11.53
1054.4	35.09	33.48	31.71	15.04	14.54	13.68	1054.4	1084.4	11.36	11.33	11.24
1095.3	37.65	32.60	29.76	13.95	13.52	12.68	1095.3	1125.3	10.72	10.58	10.39
1115.8	37.89	31.96	29.05	13.49	13.12	12.30	1115.8	1145.8	10.44	10.29	10.07
1156.8	35.04	29.37	26.75	12.62	12.28	11.56	1156.8	1186.8	9.60	9.47	9.18
1177.2	32.48	27.94	25.73	12.21	11.88	11.26	1177.2	1207.2	9.06	8.87	8.68
1218.2	28.55	25.32	23.71	11.52	11.17	10.61	1218.2	1248.2	8.27	8.11	7.90
1238.7	26.62	24.03	22.57	11.34	10.99	10.45	1238.7	1268.7	7.95	7.79	7.62
1279.6	24.54	22.29	20.94	11.06	10.56	9.90	1279.6	1309.6	7.40	7.21	7.03
1300.1	23.55	21.53	20.33	10.95	10.44	9.86	1300.1	1330.1	7.28	7.10	6.92

Frequency Mixer

LRMS-1LH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=500.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+7	+10	+13		+7	+10	+13		+7	+10	+13
5.0	35.0	1.15	1.16	1.18	5.0	1.61	2.42	3.53	5.0	1.31	1.18	1.08
10.0	40.0	1.09	1.08	1.11	10.0	1.58	2.33	3.49	10.0	1.31	1.18	1.08
51.1	81.1	1.04	1.05	1.10	51.1	1.69	2.50	3.52	22.6	1.80	1.60	1.39
92.0	122.0	1.02	1.06	1.12	92.0	1.60	2.30	3.19	35.1	1.69	1.49	1.32
133.0	163.0	1.01	1.07	1.12	133.0	1.67	2.47	3.45	47.7	1.65	1.44	1.28
173.9	203.9	1.02	1.08	1.13	173.9	1.62	2.34	3.23	60.3	1.62	1.42	1.24
214.9	244.9	1.03	1.08	1.13	214.9	1.68	2.44	3.38	72.8	1.62	1.42	1.25
255.8	285.8	1.03	1.09	1.13	255.8	1.69	2.44	3.35	85.4	1.66	1.45	1.29
296.8	326.8	1.04	1.10	1.15	296.8	1.70	2.44	3.34	97.9	1.69	1.49	1.31
337.7	367.7	1.03	1.10	1.14	337.7	1.77	2.54	3.47	110.5	1.71	1.50	1.33
378.7	408.7	1.05	1.11	1.16	378.7	1.77	2.50	3.38	123.1	1.71	1.49	1.33
419.6	449.6	1.05	1.12	1.18	419.6	1.86	2.62	3.54	135.6	1.70	1.49	1.31
440.1	470.1	1.05	1.13	1.19	440.1	1.89	2.63	3.54	148.2	1.68	1.46	1.29
481.1	511.1	1.06	1.13	1.19	481.1	1.90	2.64	3.52	160.8	1.65	1.45	1.28
501.5	531.5	1.08	1.14	1.20	501.5	1.95	2.71	3.60	173.3	1.65	1.44	1.28
542.5	572.5	1.09	1.16	1.21	542.5	1.99	2.74	3.62	185.9	1.65	1.45	1.28
563.0	593.0	1.10	1.17	1.22	563.0	2.00	2.73	3.61	198.5	1.65	1.45	1.28
603.9	633.9	1.12	1.18	1.23	603.9	2.08	2.82	3.71	211.0	1.66	1.46	1.29
624.4	654.4	1.13	1.18	1.23	624.4	2.12	2.85	3.73	223.6	1.67	1.47	1.30
665.3	695.3	1.18	1.22	1.27	665.3	2.17	2.88	3.73	236.2	1.69	1.48	1.31
685.8	715.8	1.21	1.25	1.30	685.8	2.23	2.94	3.79	248.7	1.69	1.48	1.31
726.8	756.8	1.31	1.33	1.38	726.8	2.31	3.03	3.86	261.3	1.70	1.49	1.32
747.2	777.2	1.37	1.39	1.43	747.2	2.33	3.05	3.87	273.8	1.69	1.49	1.31
788.2	818.2	1.51	1.52	1.55	788.2	2.39	3.12	3.94	286.4	1.69	1.48	1.31
808.7	838.7	1.56	1.57	1.60	808.7	2.42	3.15	3.96	299.0	1.67	1.47	1.30
849.6	879.6	1.66	1.68	1.70	849.6	2.43	3.14	3.93	311.5	1.65	1.45	1.29
870.1	900.1	1.70	1.73	1.76	870.1	2.45	3.15	3.93	324.1	1.64	1.43	1.27
911.1	941.1	1.81	1.85	1.89	911.1	2.49	3.17	3.91	336.7	1.62	1.42	1.26
931.5	961.5	1.88	1.93	1.98	931.5	2.49	3.16	3.87	349.2	1.63	1.44	1.27
972.5	1002.5	2.05	2.10	2.15	972.5	2.51	3.13	3.79	361.8	1.65	1.45	1.28
993.0	1023.0	2.11	2.17	2.22	993.0	2.51	3.12	3.76	374.4	1.67	1.47	1.30
1033.9	1063.9	2.26	2.32	2.37	1033.9	2.52	3.09	3.68	386.9	1.66	1.47	1.30
1054.4	1084.4	2.31	2.36	2.41	1054.4	2.53	3.07	3.64	399.5	1.65	1.45	1.29
1095.3	1125.3	2.41	2.46	2.50	1095.3	2.51	3.00	3.50	412.1	1.64	1.44	1.28
1115.8	1145.8	2.48	2.53	2.57	1115.8	2.53	2.98	3.47	424.6	1.61	1.42	1.27
1156.8	1186.8	2.56	2.61	2.65	1156.8	2.53	2.94	3.37	437.2	1.61	1.42	1.26
1177.2	1207.2	2.60	2.65	2.69	1177.2	2.52	2.89	3.31	449.7	1.62	1.43	1.28
1218.2	1248.2	2.67	2.71	2.74	1218.2	2.51	2.86	3.22	462.3	1.65	1.46	1.31
1238.7	1268.7	2.67	2.70	2.73	1238.7	2.51	2.83	3.17	474.9	1.69	1.49	1.33
1279.6	1309.6	2.68	2.69	2.72	1279.6	2.46	2.75	3.07	487.4	1.71	1.52	1.35
1300.1	1330.1	2.67	2.67	2.69	1300.1	2.42	2.72	3.00	500.0	1.45	1.37	1.35

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Frequency Mixer

LRMS-1LH+

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	9	19	11	25	11	31	18	37	20	39
1	-	17	+0	27	12	35	19	42	31	45	42	46
2	>100	69	48	69	49	67	49	74	53	76	68	71
3	>100	74	79	76	68	77	62	>80	64	>80	68	>80
4	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
5	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
6	>100	>80	>80	>80	>80	>80	79	>80	>80	>80	>80	>80
7	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
8	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
9	>100	>80	>80	>80	>80	>80	>80	>80	>80	68	>80	>80
10	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	64	>80
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -14.00 dBm.
LO IN: 280.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -20.13 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	29	22	36	22	42	28	47	31	48
1	-	17	+0	27	12	35	19	42	30	46	39	47
2	>100	60	41	61	42	57	42	68	45	65	62	70
3	>100	57	56	62	54	68	46	61	49	74	56	67
4	>100	76	61	85	61	83	64	77	63	87	69	89
5	>100	80	71	79	70	75	66	72	63	78	64	82
6	>100	>90	84	>90	84	>90	>90	>90	89	86	80	>90
7	>100	>90	>90	88	88	87	82	>90	79	85	80	>90
8	>100	>90	>90	>90	>90	>90	>90	>90	81	>90	87	>90
9	>100	>90	>90	>90	>90	>90	>90	>90	>90	69	>90	>90
10	>100	>90	>90	>90	>90	>90	>90	>90	>90	>90	77	>90
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -4.00 dBm.
LO IN: 280.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -10.25 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.

2. + entry denotes harmonics are in (dBc) above IF OUTPUT.

3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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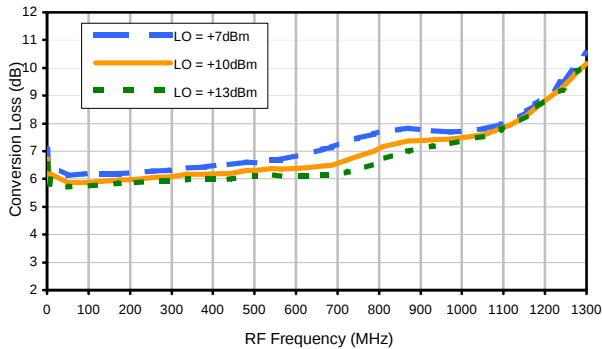


Frequency Mixer

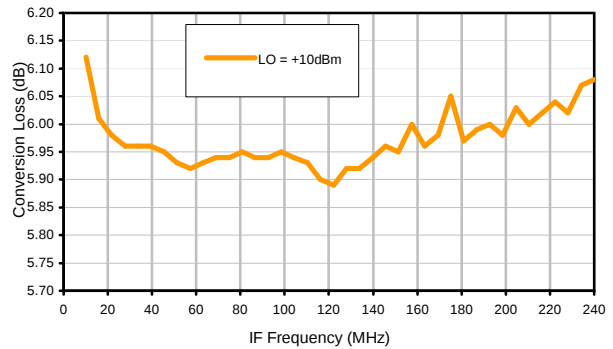
LRMS-1LH+

Typical Performance Curves

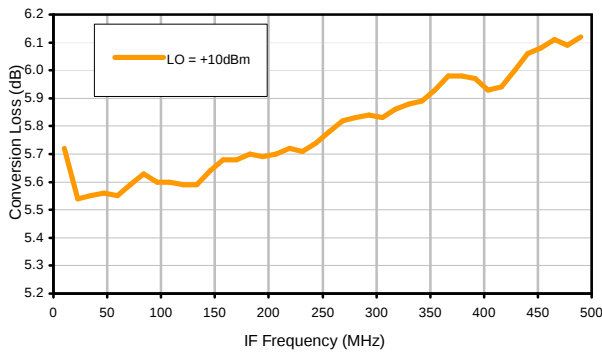
Conversion Loss @ IF=30MHz



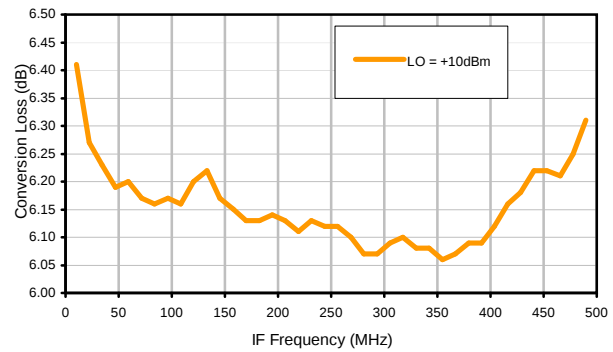
Conversion Loss vs. IF @ RF=250.1MHz



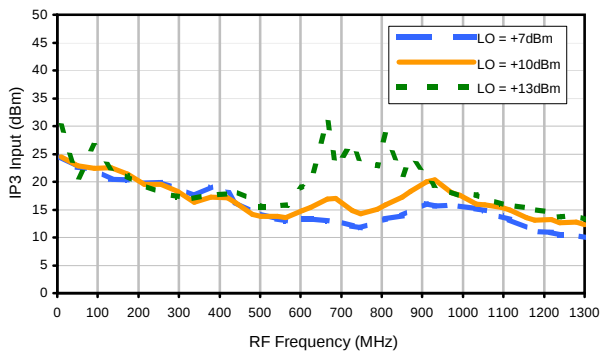
Conversion Loss vs. IF @ RF=10.1MHz



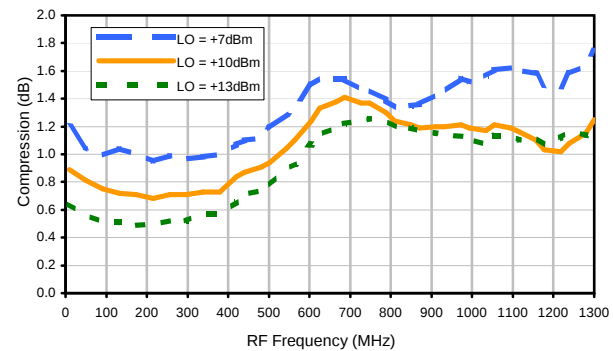
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input



Compression @ RF IN=+5dBm

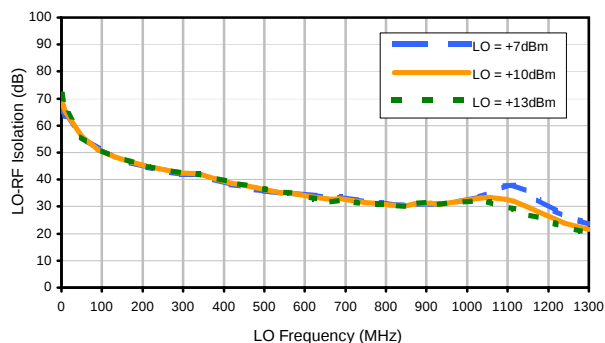


Frequency Mixer

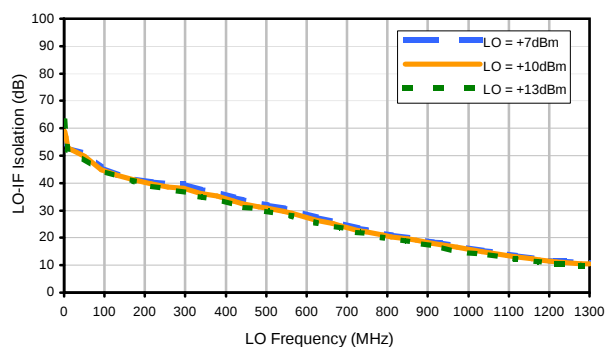
LRMS-1LH+

Typical Performance Curves

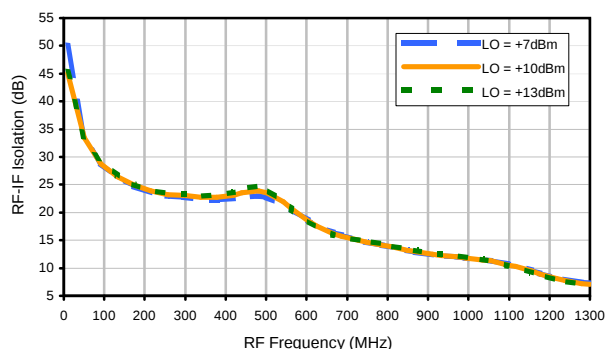
LO-RF Isolation



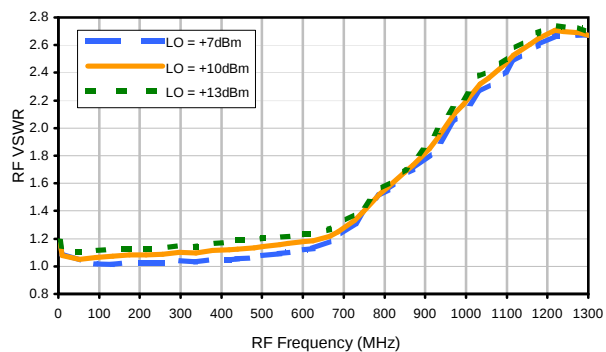
LO-IF Isolation



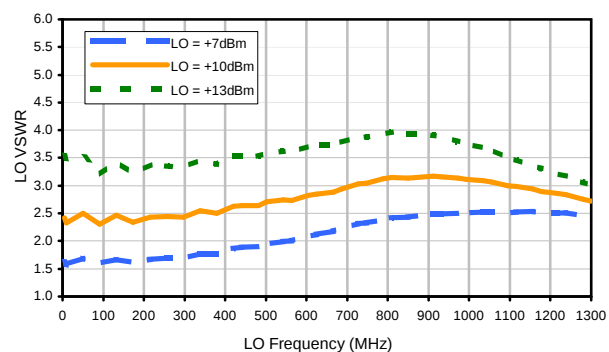
RF-IF Isolation



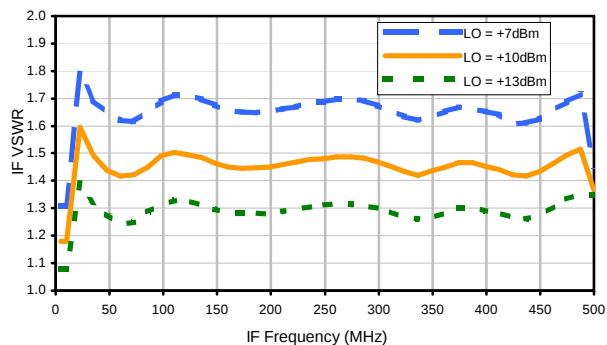
RF VSWR



LO VSWR



IF VSWR



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Frequency Mixer

LRMS-1LH+

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	9	19	11	25	11	31	18	37	20	39
1	-	17	+0	27	12	35	19	42	31	45	42	46
2	>100	69	48	69	49	67	49	74	53	76	68	71
3	>100	74	79	76	68	77	62	>80	64	>80	68	>80
4	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
5	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
6	>100	>80	>80	>80	>80	>80	79	>80	>80	>80	>80	>80
7	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
8	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
9	>100	>80	>80	>80	>80	>80	>80	>80	>80	68	>80	>80
10	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	64	>80
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -14.00 dBm.
LO IN: 280.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -20.13 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	29	22	36	22	42	28	47	31	48
1	-	17	+0	27	12	35	19	42	30	46	39	47
2	>100	60	41	61	42	57	42	68	45	65	62	70
3	>100	57	56	62	54	68	46	61	49	74	56	67
4	>100	76	61	85	61	83	64	77	63	87	69	89
5	>100	80	71	79	70	75	66	72	63	78	64	82
6	>100	>90	84	>90	84	>90	>90	>90	89	86	80	>90
7	>100	>90	>90	88	88	87	82	>90	79	85	80	>90
8	>100	>90	>90	>90	>90	>90	>90	>90	81	>90	87	>90
9	>100	>90	>90	>90	>90	>90	>90	>90	>90	69	>90	>90
10	>100	>90	>90	>90	>90	>90	>90	>90	>90	>90	77	>90
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -4.00 dBm.
LO IN: 280.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -10.25 dBm

- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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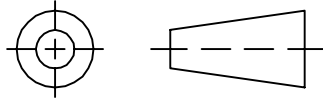
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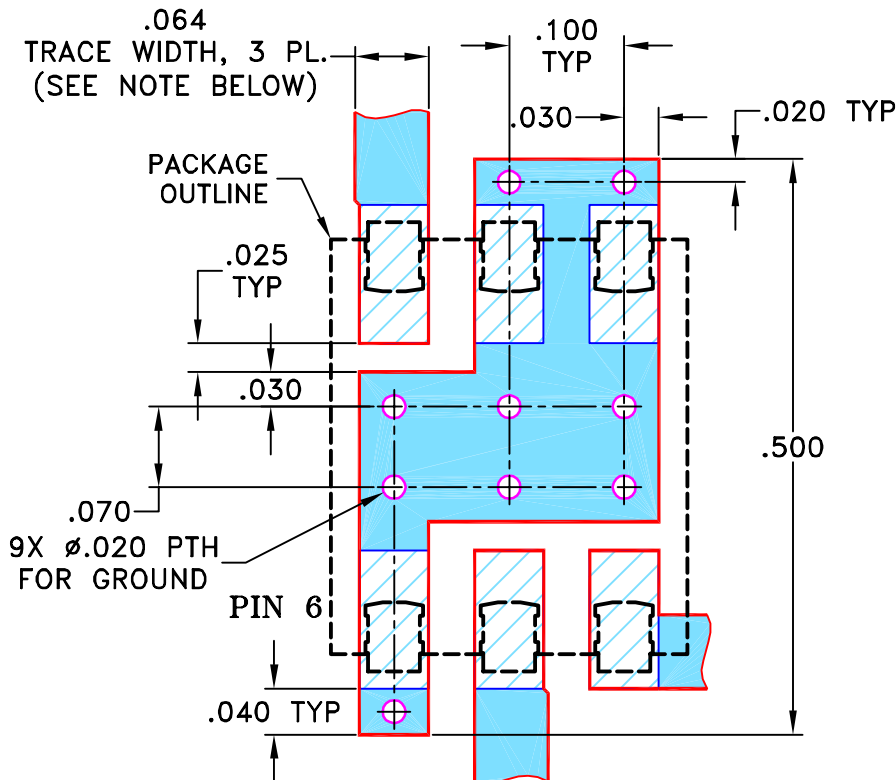
THIRD ANGLE PROJECTION



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" $\pm$ 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

DRAWN

AV

07/19/02

TOLERANCES ON:

CHECKED

WL

08/02/02

2 PL DECIMALS $\pm$.005

APPROVED

DJ

08/02/02

ANGLES $\pm$

FRACTIONS $\pm$

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

SIZE

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DRAWING NO:

98-PL-083

REV:

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FILE:

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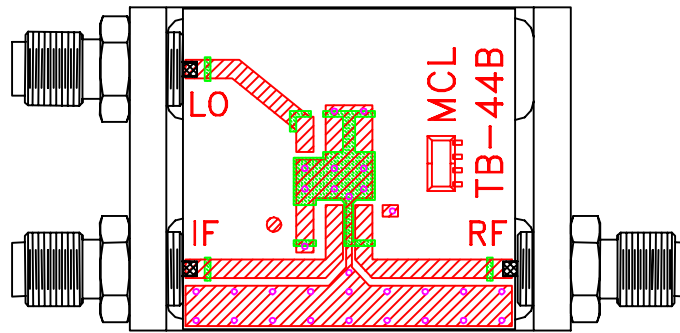
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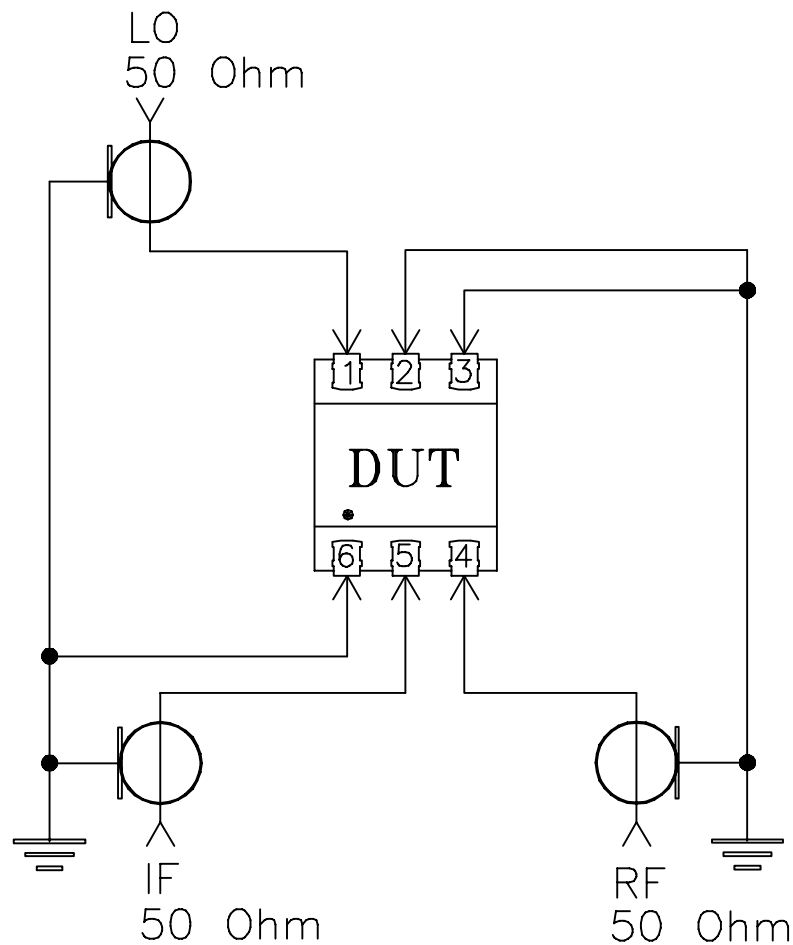
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1 OF 1

Evaluation Board and Circuit



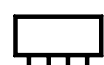
TB-44+



Schematic Diagram

Notes:

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

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