

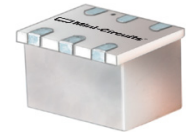
NON-CATALOG

Surface Mount

Frequency Mixer

RMS-1LH

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



CASE STYLE: TT240

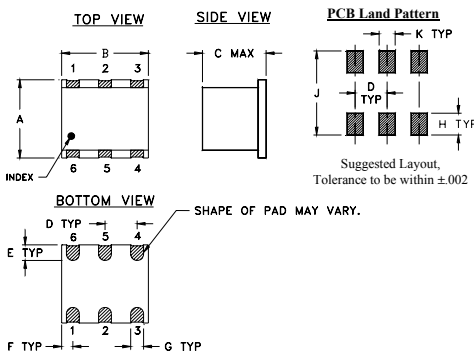
Maximum Ratings

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

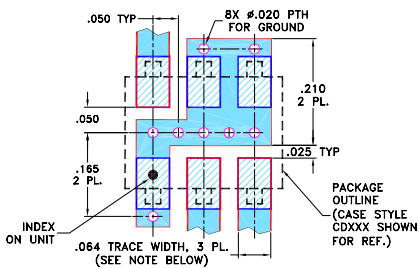
Outline Drawing



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H	J	K	wt
.250	.31	.20	.100	.050	.055					
6.35	7.87	5.08	2.54	1.27	1.40					
										grams
.040	.070	.270	.050							0.50
1.02	1.78	6.86	1.27							

Demo Board MCL P/N: TB-03 Suggested PCB Layout (PL-052)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .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/MCLStore/terms.jsp

Features

- excellent L-R isolation, 44 dB typ.
- conversion loss, 5.68 dB typ.
- small size, 0.25"x0.31"x0.2"

Applications

- HF & VHF communications
- intermediate frequency for down converters

Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			IP3 at center band (dBm)										
		L	M	U	L	M	U											
$f_c - f_u$	\bar{X} σ Max.	Total Range Max.			Typ. Min.	Typ. Min.	Typ. Min.	Typ.										
2-500	DC-500	5.68	0.11	7.0	8.0	58	45	44	25	30	20	55	40	40	25	28	17	15

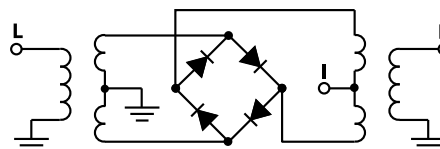
1 dB COMP.: +5 dBm typ.
For phase detection, DC output positive with in-phase RF & LO.

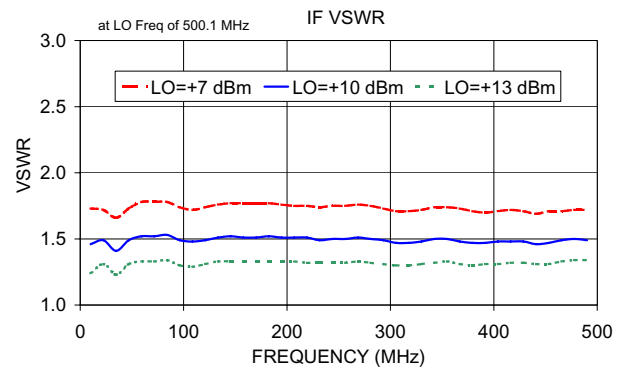
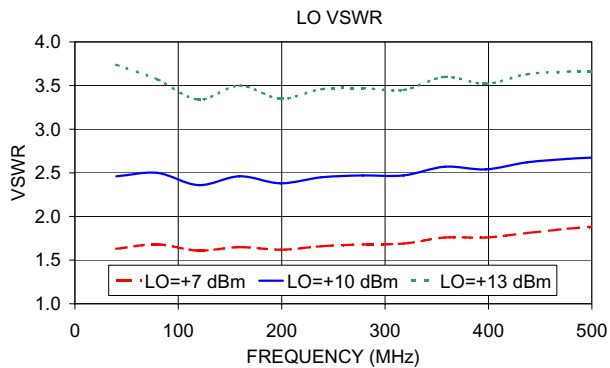
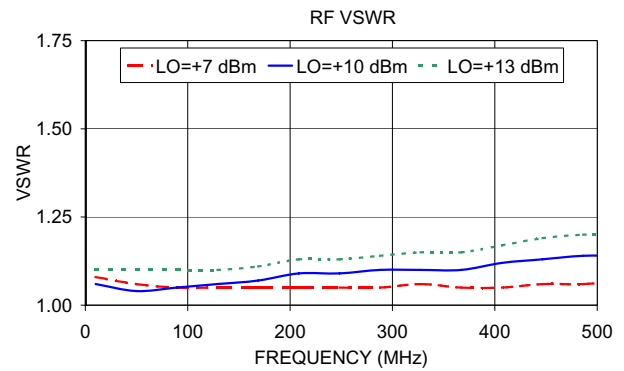
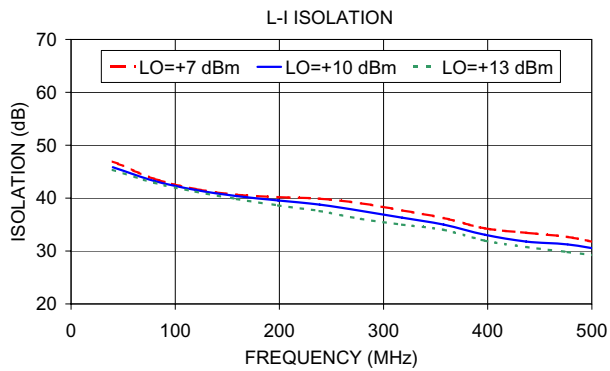
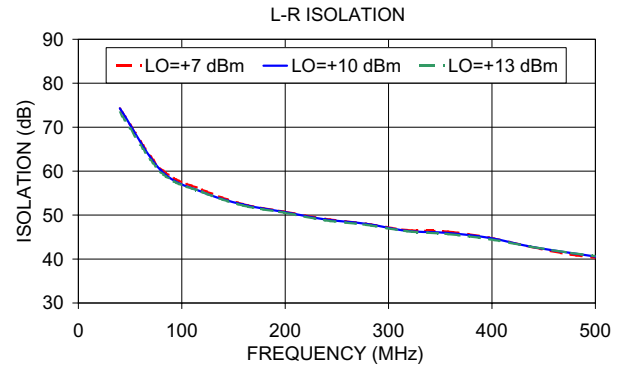
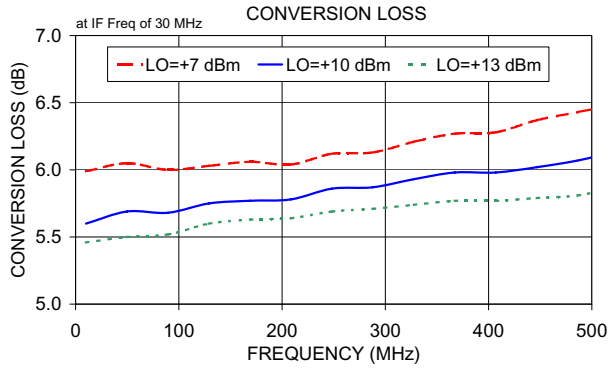
L = low range [f_c to $10 f_c$]
M = mid band [$2 f_c$ to $f_c/2$]
U = upper range [$f_c/2$ to f_c]

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 +10dBm	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm
10.10	40.10	5.60	74.28	45.84	1.06	2.46
49.80	79.80	5.69	60.16	43.26	1.04	2.50
89.50	119.50	5.68	55.26	41.54	1.05	2.36
129.20	159.20	5.75	52.39	40.39	1.06	2.46
168.90	198.90	5.77	50.72	39.56	1.07	2.38
208.60	238.60	5.78	49.03	38.78	1.09	2.45
248.30	278.30	5.86	48.01	37.59	1.09	2.47
287.90	317.90	5.87	46.41	36.30	1.10	2.47
327.60	357.60	5.93	45.92	34.99	1.10	2.57
367.30	397.30	5.98	44.83	33.07	1.10	2.54
407.00	437.00	5.98	42.83	31.78	1.12	2.62
446.70	476.70	6.02	41.37	31.24	1.13	2.66
486.40	516.40	6.07	40.02	30.07	1.14	2.69
526.10	556.10	6.14	38.49	29.39	1.14	2.78
565.80	595.80	6.18	37.45	27.46	1.15	2.79

Electrical Schematic





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Frequency Mixer

RMS-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
2.0	32.0	7.08	6.73	6.55	10.1	40.1	22.03	24.09	30.14	10.1	40.1	1.06	0.78	0.53
5.0	35.0	6.14	5.87	5.71	49.8	79.8	21.17	22.89	21.43	49.8	79.8	1.25	1.00	0.77
10.0	40.0	6.47	6.17	5.99	89.5	119.5	20.98	19.45	21.98	89.5	119.5	1.18	0.96	0.75
49.8	79.8	6.05	5.69	5.50	129.2	159.2	19.11	20.24	21.21	129.2	159.2	1.22	0.94	0.75
89.5	119.5	6.00	5.68	5.52	168.9	198.9	19.37	19.69	20.10	168.9	198.9	1.20	0.91	0.70
129.2	159.2	6.03	5.75	5.60	208.6	238.6	17.91	18.90	19.08	208.6	238.6	1.22	0.94	0.72
168.9	198.9	6.06	5.77	5.63	248.3	278.3	18.01	19.19	17.85	248.3	278.3	1.18	0.93	0.71
208.6	238.6	6.04	5.78	5.64	287.9	317.9	17.57	16.97	17.40	287.9	317.9	1.19	0.94	0.77
248.3	278.3	6.12	5.86	5.69	327.6	357.6	16.26	16.10	17.35	327.6	357.6	1.19	0.96	0.77
287.9	317.9	6.13	5.87	5.71	367.3	397.3	16.08	15.65	16.86	367.3	397.3	1.22	1.00	0.80
327.6	357.6	6.21	5.93	5.74	407.0	437.0	17.53	16.68	17.05	407.0	437.0	1.33	1.06	0.89
367.3	397.3	6.27	5.98	5.77	446.7	476.7	17.26	17.28	18.66	446.7	476.7	1.38	1.16	0.98
446.7	476.7	6.37	6.02	5.79	486.4	516.4	14.24	16.02	18.53	486.4	516.4	1.46	1.29	1.09
486.4	516.4	6.43	6.07	5.81	526.1	556.1	12.55	13.17	15.68	526.1	556.1	1.47	1.27	1.10
526.1	556.1	6.49	6.14	5.87	565.8	595.8	11.73	12.44	14.98	565.8	595.8	1.58	1.36	1.19
565.8	595.8	6.54	6.18	5.92	585.6	615.6	11.81	12.82	15.08	585.6	615.6	1.60	1.37	1.23
585.6	615.6	6.58	6.20	5.94	625.3	655.3	12.39	14.21	17.64	625.3	655.3	1.82	1.58	1.40
625.3	655.3	6.61	6.18	5.90	645.2	675.2	13.15	15.61	19.52	645.2	675.2	1.82	1.60	1.43
645.2	675.2	6.68	6.21	5.91	684.9	714.9	13.86	19.54	24.38	684.9	714.9	2.05	1.83	1.62
684.9	714.9	6.76	6.19	5.87	704.7	734.7	13.69	20.89	20.35	704.7	734.7	2.06	1.82	1.62
704.7	734.7	6.87	6.22	5.88	744.4	774.4	12.73	17.99	24.15	744.4	774.4	2.01	1.91	1.70
744.4	774.4	7.11	6.34	5.92	764.3	794.3	12.29	18.48	25.42	764.3	794.3	1.97	1.88	1.69
764.3	794.3	7.22	6.40	5.95	803.9	833.9	11.61	16.08	25.66	803.9	833.9	1.77	1.74	1.62
803.9	833.9	7.51	6.67	6.15	823.8	853.8	11.47	15.60	22.56	823.8	853.8	1.80	1.76	1.66
823.8	853.8	7.60	6.80	6.26	863.5	893.5	12.17	16.17	20.57	863.5	893.5	1.63	1.57	1.49
863.5	893.5	7.76	7.07	6.51	883.3	913.3	13.00	16.78	20.23	883.3	913.3	1.72	1.62	1.55
883.3	913.3	7.75	7.13	6.60	923.0	953.0	14.30	18.05	26.63	923.0	953.0	1.63	1.45	1.33
923.0	953.0	7.85	7.34	6.90	942.9	972.9	14.79	17.87	23.78	942.9	972.9	1.67	1.43	1.31
942.9	972.9	7.85	7.40	7.02	982.6	1012.6	14.47	17.84	19.84	982.6	1012.6	1.69	1.38	1.21
982.6	1012.6	7.89	7.50	7.22	1002.4	1032.4	13.82	16.68	18.27	1002.4	1032.4	1.64	1.32	1.12
1002.4	1032.4	7.91	7.56	7.32	1042.1	1072.1	13.45	15.82	17.14	1042.1	1072.1	1.57	1.21	1.05
1061.9	1091.9	8.03	7.76	7.57	1061.9	1091.9	13.49	15.60	16.13	1061.9	1091.9	1.50	1.20	1.01
1101.6	1131.6	8.14	7.89	7.76	1101.6	1131.6	13.62	14.85	15.55	1101.6	1131.6	1.55	1.20	1.03
1121.5	1151.5	8.27	8.03	7.89	1121.5	1151.5	13.56	14.71	15.14	1121.5	1151.5	1.45	1.13	1.01
1161.2	1191.2	8.46	8.25	8.12	1161.2	1191.2	13.19	14.79	15.40	1161.2	1191.2	1.41	1.09	0.99
1181.0	1211.0	8.60	8.41	8.31	1181.0	1211.0	13.32	14.57	15.74	1181.0	1211.0	1.40	1.07	0.98
1220.7	1250.7	8.91	8.75	8.65	1220.7	1250.7	13.97	15.27	16.84	1220.7	1250.7	1.27	0.96	0.95
1240.6	1270.6	9.11	8.95	8.85	1240.6	1270.6	14.18	15.59	17.04	1240.6	1270.6	1.26	0.93	0.91
1280.3	1310.3	9.63	9.48	9.38	1280.3	1310.3	13.17	14.46	16.03	1280.3	1310.3	1.14	0.84	0.87
1300.1	1330.1	9.94	9.76	9.64	1300.1	1330.1	11.85	12.78	14.42	1300.1	1330.1	1.14	0.85	0.89

REV. X2
RMS-1LH
100817
Page 1 of 5



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Frequency Mixer

RMS-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	5.85	10.0	20.1	5.51	490.0	10.1	6.00
234.1	16.0	5.83	22.3	32.4	5.41	477.7	22.4	5.98
228.2	21.9	5.80	34.6	44.7	5.42	465.4	34.7	5.94
222.3	27.8	5.81	46.9	57.0	5.45	453.1	47.0	5.92
216.4	33.7	5.80	59.2	69.3	5.44	440.8	59.3	5.91
210.5	39.6	5.79	71.5	81.6	5.49	428.5	71.6	5.85
204.6	45.5	5.79	83.8	93.9	5.49	416.2	83.9	5.83
198.7	51.4	5.77	96.2	106.3	5.50	403.8	96.3	5.81
192.8	57.3	5.75	108.5	118.6	5.52	391.5	108.6	5.79
186.9	63.2	5.74	120.8	130.9	5.50	379.2	120.9	5.80
181.0	69.1	5.74	133.1	143.2	5.49	366.9	133.2	5.80
175.1	75.0	5.77	145.4	155.5	5.55	354.6	145.5	5.78
169.2	80.9	5.73	157.7	167.8	5.57	342.3	157.8	5.80
163.3	86.8	5.74	170.0	180.1	5.57	330.0	170.1	5.81
157.4	92.7	5.71	182.3	192.4	5.60	317.7	182.4	5.81
151.5	98.6	5.68	194.6	204.7	5.58	305.4	194.7	5.82
145.6	104.5	5.70	206.9	217.0	5.60	293.1	207.0	5.80
139.7	110.4	5.68	219.2	229.3	5.61	280.8	219.3	5.81
133.8	116.3	5.68	231.5	241.6	5.61	268.5	231.6	5.83
127.9	122.2	5.66	243.8	253.9	5.63	256.2	243.9	5.85
122.1	128.0	5.65	256.2	266.3	5.68	243.8	256.3	5.86
116.2	133.9	5.66	268.5	278.6	5.69	231.5	268.6	5.87
110.3	139.8	5.70	280.8	290.9	5.71	219.2	280.9	5.85
104.4	145.7	5.69	293.1	303.2	5.71	206.9	293.2	5.88
98.5	151.6	5.69	305.4	315.5	5.71	194.6	305.5	5.88
92.6	157.5	5.69	317.7	327.8	5.75	182.3	317.8	5.88
86.7	163.4	5.69	330.0	340.1	5.75	170.0	330.1	5.89
80.8	169.3	5.70	342.3	352.4	5.74	157.7	342.4	5.91
74.9	175.2	5.71	354.6	364.7	5.77	145.4	354.7	5.93
69.0	181.1	5.70	366.9	377.0	5.80	133.1	367.0	5.96
63.1	187.0	5.68	379.2	389.3	5.83	120.8	379.3	5.94
57.2	192.9	5.68	391.5	401.6	5.83	108.5	391.6	5.94
51.3	198.8	5.68	403.8	413.9	5.79	96.2	403.9	5.95
45.4	204.7	5.71	416.2	426.3	5.81	83.8	416.3	5.94
39.5	210.6	5.72	428.5	438.6	5.83	71.5	428.6	5.96
33.6	216.5	5.72	440.8	450.9	5.88	59.2	440.9	5.97
27.7	222.4	5.70	453.1	463.2	5.92	46.9	453.2	5.95
21.8	228.3	5.72	465.4	475.5	5.92	34.6	465.5	5.96
15.9	234.2	5.71	477.7	487.8	5.94	22.3	477.8	5.96
10.0	240.1	5.86	490.0	500.1	5.98	10.0	490.1	6.04



Frequency Mixer

RMS-1LH

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+7	+10	+13	+7	+10	+13
2.0	65.89	68.96	71.56	55.04	58.87	62.73
5.0	65.11	67.37	69.67	54.46	56.74	57.76
10.0	63.38	65.16	66.06	52.78	52.79	52.34
49.8	60.59	60.16	59.79	52.26	50.84	49.94
89.5	55.82	55.26	55.26	46.92	45.84	45.37
129.2	52.50	52.39	52.19	43.66	43.26	42.91
168.9	50.80	50.72	50.56	41.72	41.54	41.25
208.6	49.16	49.03	48.82	40.65	40.39	39.83
248.3	48.02	48.01	47.79	40.20	39.56	38.63
287.9	46.60	46.41	46.33	39.90	38.78	37.57
327.6	46.24	45.92	45.68	39.03	37.59	36.08
367.3	44.87	44.83	44.54	37.70	36.30	35.01
446.7	41.01	41.37	41.40	34.30	33.07	31.96
486.4	39.90	40.02	40.15	33.45	31.78	30.78
526.1	38.50	38.49	38.30	32.68	31.24	29.81
565.8	37.79	37.45	37.06	31.23	30.07	28.92
585.6	37.47	37.00	36.52	30.62	29.39	28.29
625.3	36.50	35.78	35.08	28.58	27.46	26.44
645.2	36.33	35.59	34.94	27.80	26.67	25.63
684.9	35.49	34.72	33.88	26.17	25.13	24.07
704.7	35.07	34.01	33.16	25.49	24.22	23.33
744.4	34.45	33.55	32.85	24.42	22.96	22.13
764.3	33.79	33.06	32.31	23.97	22.66	21.60
803.9	33.20	32.52	31.95	23.10	21.67	20.52
823.8	33.23	32.88	32.44	22.69	21.46	20.14
863.5	33.14	32.93	32.96	22.09	20.89	19.62
883.3	33.00	32.89	32.86	21.63	20.66	19.36
923.0	33.23	33.65	34.09	20.66	19.82	18.59
942.9	33.43	34.14	34.82	20.32	19.53	18.28
982.6	34.24	35.50	36.38	19.35	18.54	17.18
1002.4	35.36	37.20	38.29	18.90	17.97	16.81
1061.9	38.85	40.25	38.37	17.48	16.47	15.38
1101.6	44.54	39.02	35.24	16.37	15.49	14.44
1121.5	47.97	37.96	34.02	15.94	15.11	13.98
1161.2	42.58	34.19	31.12	15.15	14.38	13.35
1181.0	38.66	32.46	29.73	14.74	14.05	13.04
1220.7	34.28	29.90	27.63	14.00	13.39	12.45
1240.6	32.44	28.76	26.71	13.71	13.14	12.22
1280.3	29.47	26.53	24.98	13.09	12.47	11.74
1300.1	28.33	25.75	24.33	12.86	12.29	11.61

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+7	+10	+13
10.1	40.1	49.78	45.15	43.06
49.8	79.8	35.91	35.70	35.65
89.5	119.5	31.02	31.38	31.12
129.2	159.2	28.62	28.87	28.86
168.9	198.9	27.04	27.19	27.15
208.6	238.6	25.87	26.08	26.20
248.3	278.3	25.15	25.37	25.57
287.9	317.9	24.86	25.17	25.40
327.6	357.6	24.49	24.86	25.27
367.3	397.3	24.26	24.70	25.12
407.0	437.0	24.59	25.14	25.69
446.7	476.7	25.13	26.06	26.83
486.4	516.4	25.12	26.00	26.59
526.1	556.1	23.41	23.83	24.20
565.8	595.8	21.16	21.17	21.18
585.6	615.6	20.04	19.92	19.88
625.3	655.3	18.33	18.13	17.97
645.2	675.2	17.57	17.38	17.20
684.9	714.9	16.68	16.48	16.34
704.7	734.7	16.34	16.13	16.07
744.4	774.4	15.76	15.70	15.76
764.3	794.3	15.52	15.54	15.74
803.9	833.9	15.07	15.16	15.36
823.8	853.8	14.89	14.93	15.15
863.5	893.5	14.43	14.56	14.85
883.3	913.3	14.26	14.36	14.61
923.0	953.0	13.86	14.01	14.23
942.9	972.9	13.66	13.82	14.01
982.6	1012.6	13.25	13.39	13.51
1002.4	1032.4	12.99	13.08	13.15
1042.1	1072.1	12.39	12.44	12.40
1061.9	1091.9	12.10	12.09	12.00
1101.6	1131.6	11.46	11.38	11.24
1121.5	1151.5	11.13	10.99	10.84
1161.2	1191.2	10.49	10.31	10.12
1181.0	1211.0	10.11	9.89	9.69
1220.7	1250.7	9.41	9.19	8.99
1240.6	1270.6	9.02	8.85	8.68
1280.3	1310.3	8.29	8.15	8.03
1300.1	1330.1	7.96	7.85	7.77

Frequency Mixer

RMS-1LH

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+7	+10	+13
5.0	35.0	1.15	1.16	1.18
10.0	40.0	1.09	1.08	1.11
49.8	79.8	1.06	1.04	1.10
89.5	119.5	1.05	1.05	1.10
129.2	159.2	1.05	1.06	1.10
168.9	198.9	1.05	1.07	1.11
208.6	238.6	1.05	1.09	1.13
248.3	278.3	1.05	1.09	1.13
287.9	317.9	1.05	1.10	1.14
327.6	357.6	1.06	1.10	1.15
367.3	397.3	1.05	1.10	1.15
407.0	437.0	1.05	1.12	1.17
446.7	476.7	1.06	1.13	1.19
486.4	516.4	1.06	1.14	1.20
526.1	556.1	1.07	1.14	1.20
565.8	595.8	1.08	1.15	1.20
585.6	615.6	1.09	1.15	1.20
625.3	655.3	1.10	1.16	1.21
645.2	675.2	1.11	1.17	1.22
684.9	714.9	1.17	1.21	1.26
704.7	734.7	1.21	1.25	1.30
744.4	774.4	1.32	1.34	1.38
764.3	794.3	1.39	1.40	1.44
803.9	833.9	1.53	1.53	1.55
823.8	853.8	1.61	1.60	1.62
863.5	893.5	1.75	1.74	1.76
883.3	913.3	1.83	1.83	1.84
923.0	953.0	1.99	2.02	2.04
942.9	972.9	2.08	2.11	2.14
982.6	1012.6	2.25	2.30	2.34
1002.4	1032.4	2.31	2.36	2.41
1042.1	1072.1	2.46	2.52	2.57
1061.9	1091.9	2.53	2.59	2.65
1101.6	1131.6	2.66	2.71	2.77
1121.5	1151.5	2.73	2.79	2.84
1161.2	1191.2	2.84	2.87	2.91
1181.0	1211.0	2.88	2.92	2.95
1220.7	1250.7	2.96	2.99	3.01
1240.6	1270.6	2.98	3.00	3.02
1280.3	1310.3	3.04	3.06	3.08
1300.1	1330.1	3.04	3.06	3.07

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+7	+10	+13
5.0	1.61	2.42	3.53
10.0	1.58	2.33	3.49
49.8	1.68	2.50	3.57
89.5	1.61	2.36	3.34
129.2	1.65	2.46	3.50
168.9	1.62	2.38	3.35
208.6	1.66	2.45	3.46
248.3	1.68	2.47	3.47
287.9	1.69	2.47	3.45
327.6	1.76	2.57	3.60
367.3	1.76	2.54	3.52
407.0	1.81	2.62	3.63
446.7	1.86	2.66	3.66
486.4	1.90	2.69	3.67
526.1	1.96	2.78	3.78
565.8	1.99	2.79	3.78
585.6	2.01	2.82	3.80
625.3	2.07	2.86	3.83
645.2	2.10	2.88	3.84
684.9	2.17	2.95	3.90
704.7	2.21	2.99	3.94
744.4	2.29	3.06	3.98
764.3	2.33	3.11	4.04
803.9	2.40	3.19	4.11
823.8	2.42	3.20	4.10
863.5	2.46	3.26	4.17
883.3	2.48	3.28	4.19
923.0	2.50	3.26	4.12
942.9	2.50	3.26	4.10
982.6	2.53	3.27	4.10
1002.4	2.53	3.26	4.06
1042.1	2.53	3.20	3.95
1061.9	2.53	3.20	3.94
1101.6	2.53	3.15	3.85
1121.5	2.52	3.12	3.79
1161.2	2.55	3.12	3.76
1181.0	2.56	3.11	3.73
1220.7	2.58	3.08	3.65
1240.6	2.60	3.08	3.64
1280.3	2.63	3.09	3.60
1300.1	2.63	3.06	3.54

IF (OUT) (MHz)	IF VSWR @LO=500.1MHz (:1)		
	@LO (dBm)		
	+7	+10	+13
5.0	1.31	1.18	1.08
10.0	1.31	1.18	1.08
22.4	1.72	1.49	1.31
34.7	1.66	1.41	1.23
47.0	1.73	1.49	1.31
59.3	1.78	1.52	1.33
71.6	1.78	1.52	1.33
83.9	1.78	1.53	1.34
96.3	1.74	1.49	1.30
108.6	1.72	1.48	1.29
120.9	1.74	1.49	1.31
133.2	1.76	1.51	1.33
145.5	1.77	1.52	1.33
157.8	1.77	1.51	1.33
170.1	1.77	1.51	1.33
182.4	1.77	1.52	1.33
194.7	1.76	1.51	1.33
207.0	1.75	1.51	1.33
219.3	1.75	1.51	1.32
231.6	1.74	1.49	1.32
243.9	1.75	1.50	1.32
256.3	1.75	1.50	1.32
268.6	1.76	1.51	1.33
280.9	1.75	1.50	1.32
293.2	1.73	1.49	1.31
305.5	1.71	1.47	1.30
317.8	1.71	1.47	1.30
330.1	1.72	1.48	1.31
342.4	1.74	1.50	1.32
354.7	1.74	1.50	1.33
367.0	1.73	1.48	1.31
379.3	1.71	1.47	1.30
391.6	1.70	1.47	1.31
403.9	1.71	1.48	1.31
416.3	1.72	1.48	1.32
428.6	1.71	1.48	1.32
440.9	1.69	1.46	1.31
453.2	1.71	1.47	1.31
465.5	1.71	1.49	1.33
477.8	1.72	1.50	1.34
490.1	1.72	1.49	1.34

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	21	35	30	45	29	58	36	55	40	51
1	-	20	+0	31	12	36	19	42	32	53	40	51
2	95	62	41	61	41	61	42	62	45	68	59	79
3	>100	48	47	53	53	59	43	53	42	69	56	59
4	>100	78	57	74	56	71	56	65	53	74	56	78
5	>100	65	58	60	53	63	51	61	49	67	50	71
6	>100	84	68	88	67	84	70	79	72	75	67	91
7	>100	87	70	>94	67	76	77	77	80	74	69	74
8	>100	>94	84	90	85	92	83	94	86	84	80	80
9	>100	86	87	90	74	81	71	79	77	74	82	81
10	>100	>94	>94	>94	>94	>94	91	>94	90	92	92	91
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; 0.00 dBm.
 LO IN: 280.01 MHz; +10.00 dBm
 IF OUT: 29.91 MHz; -6.07 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	13	25	16	32	16	45	24	44	29	39
1	-	20	+0	30	12	35	18	41	31	45	42	44
2	>100	71	44	67	45	67	45	67	48	76	61	68
3	>100	74	64	71	60	70	55	>84	57	74	64	72
4	>100	>84	76	>84	76	>84	84	>84	81	>84	>84	>84
5	>100	>84	>84	>84	>84	>84	>84	>84	80	>84	82	>84
6	>100	>84	>84	>84	>84	>84	83	>84	>84	>84	>84	>84
7	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
8	>100	>84	>84	>84	>84	>84	>84	>84	80	>84	>84	>84
9	>100	>84	>84	>84	>84	>84	>84	>84	>84	69	>84	>84
10	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	73	>84
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -10.00 dBm.
 LO IN: 280.01 MHz; +10.00 dBm
 IF OUT: 29.91 MHz; -15.98 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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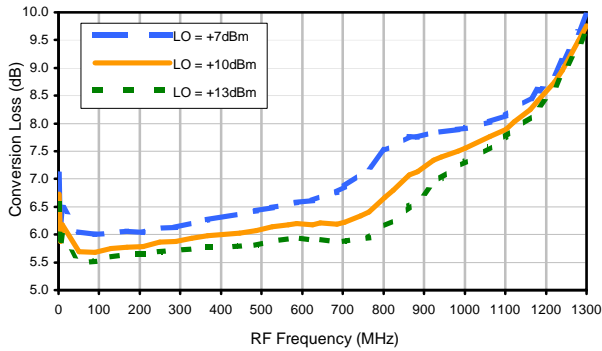


Frequency Mixer

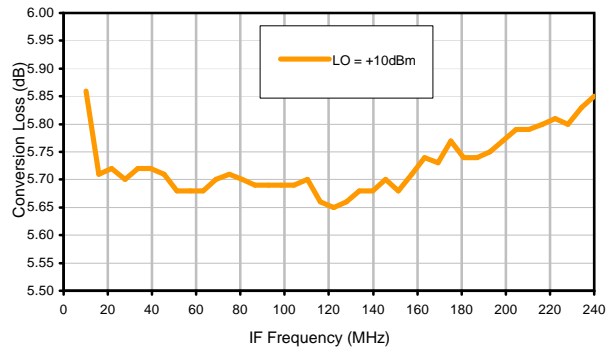
RMS-1LH

Typical Performance Curves

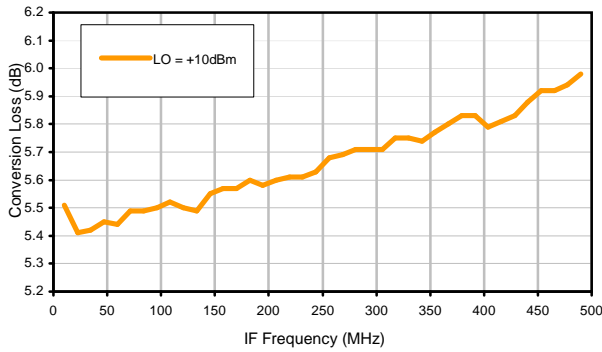
Conversion Loss @ IF=30MHz



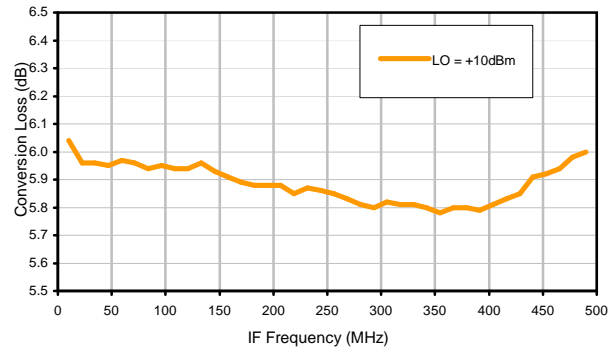
Conversion Loss vs. IF @ RF=250.1MHz



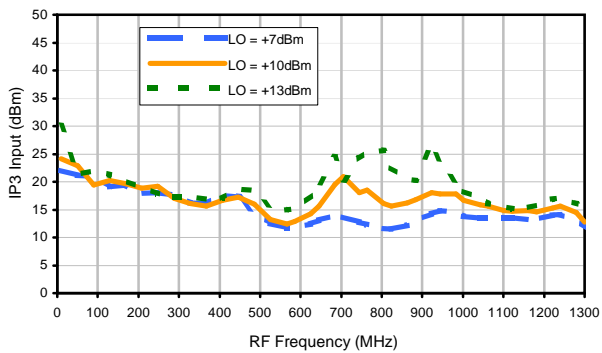
Conversion Loss vs. IF @ RF=10.1MHz



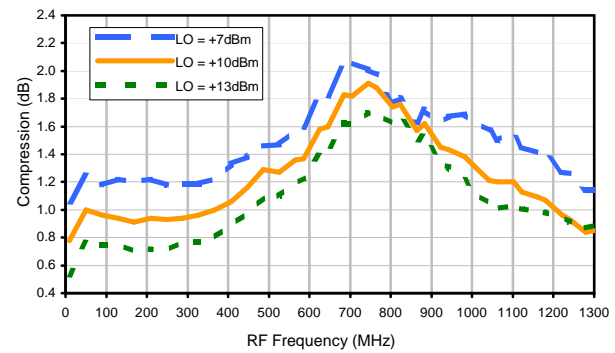
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input



Compression @ RF IN=+5dBm



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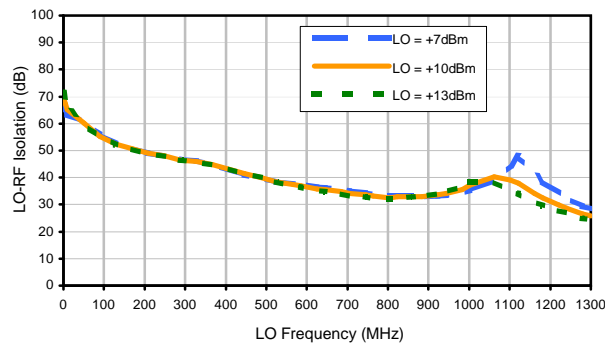


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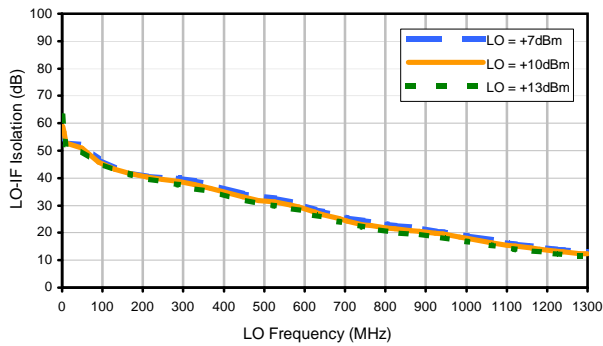


Typical Performance Curves

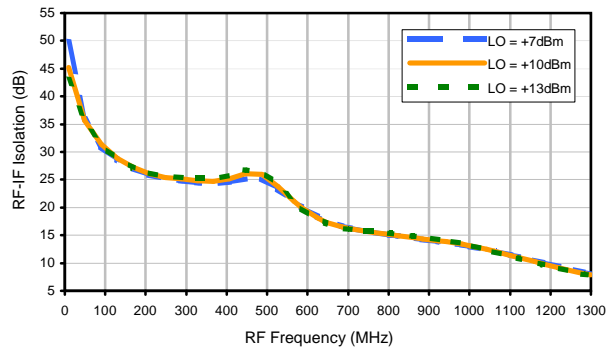
LO-RF Isolation



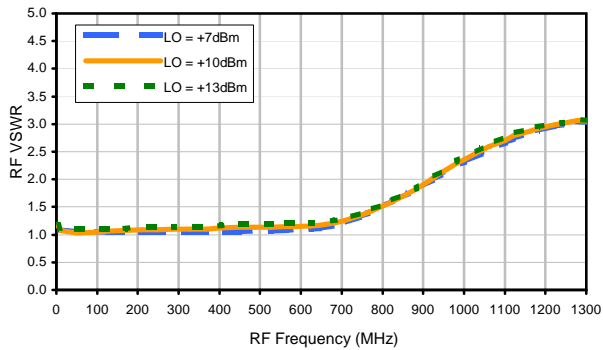
LO-IF Isolation



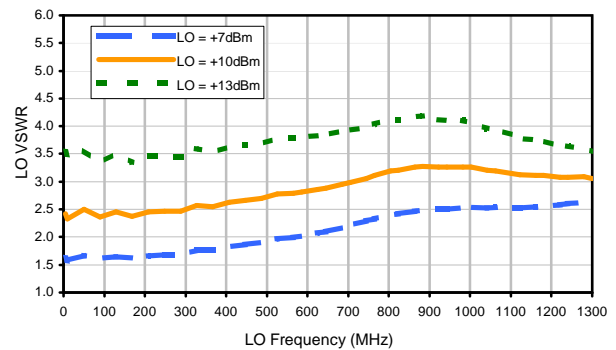
RF-IF Isolation



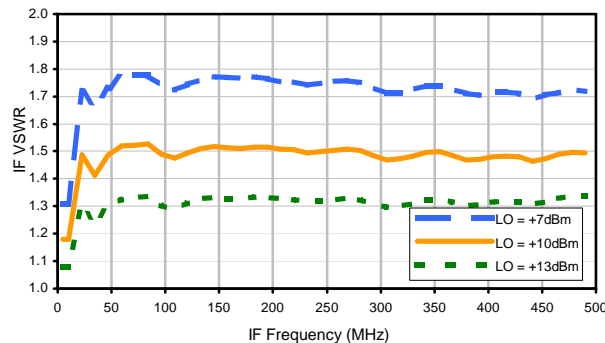
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	21	35	30	45	29	58	36	55	40	51
1	-	20	+0	31	12	36	19	42	32	53	40	51
2	95	62	41	61	41	61	42	62	45	68	59	79
3	>100	48	47	53	53	59	43	53	42	69	56	59
4	>100	78	57	74	56	71	56	65	53	74	56	78
5	>100	65	58	60	53	63	51	61	49	67	50	71
6	>100	84	68	88	67	84	70	79	72	75	67	91
7	>100	87	70	>94	67	76	77	77	80	74	69	74
8	>100	>94	84	90	85	92	83	94	86	84	80	80
9	>100	86	87	90	74	81	71	79	77	74	82	81
10	>100	>94	>94	>94	>94	>94	91	>94	90	92	92	91
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; 0.00 dBm.
 LO IN: 280.01 MHz; +10.00 dBm
 IF OUT: 29.91 MHz; -6.07 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	13	25	16	32	16	45	24	44	29	39
1	-	20	+0	30	12	35	18	41	31	45	42	44
2	>100	71	44	67	45	67	45	67	48	76	61	68
3	>100	74	64	71	60	70	55	>84	57	74	64	72
4	>100	>84	76	>84	76	>84	84	>84	81	>84	>84	>84
5	>100	>84	>84	>84	>84	>84	>84	>84	80	>84	82	>84
6	>100	>84	>84	>84	>84	>84	83	>84	>84	>84	>84	>84
7	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
8	>100	>84	>84	>84	>84	>84	>84	>84	80	>84	>84	>84
9	>100	>84	>84	>84	>84	>84	>84	>84	>84	69	>84	>84
10	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	73	>84
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -10.00 dBm.
 LO IN: 280.01 MHz; +10.00 dBm
 IF OUT: 29.91 MHz; -15.98 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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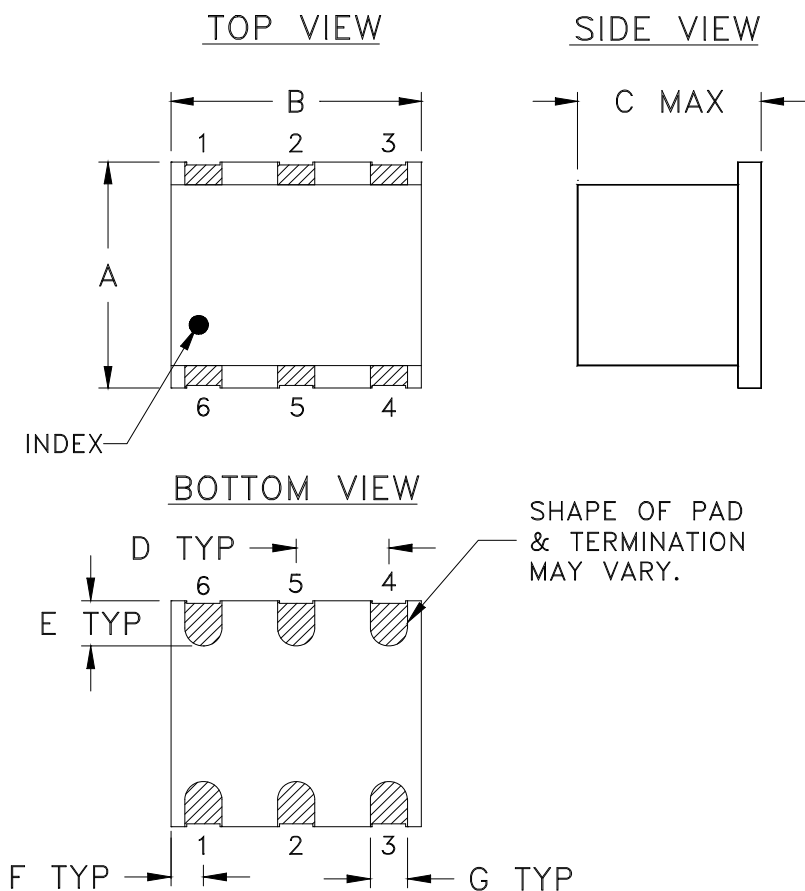
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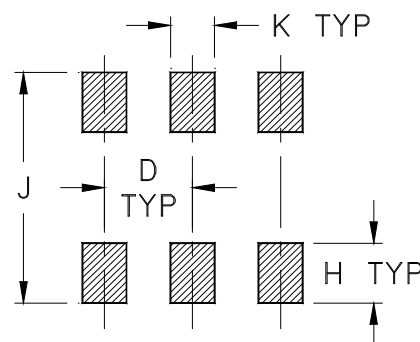
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Outline Dimensions



PCB Land Pattern



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

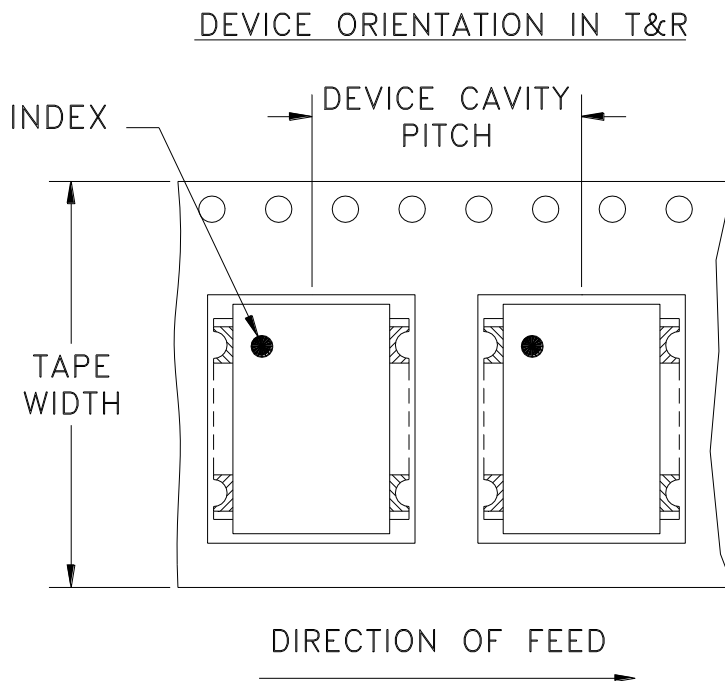
CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAM
TT240	.250 (6.35)	.31 (7.87)	.20 (5.08)	.100 (2.54)	.050 (1.27)	.055 (1.40)	.040 (1.02)	.070 (1.78)	.270 (6.86)	.050 (1.27)	.50

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

Notes:

- Case material: Ceramic.
- Termination finish:
 - For RoHS Case Styles: 2-10 μ inch (.05-.25 microns) Gold plate over 100-300 μ inch (2.54-7.62 microns) Nickel plate. All models, (+) suffix.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Tape & Reel Packaging TR-F2



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel See note
16	12	7	10
			20
			50
			100
		200	
		13	500

Note: Please consult individual model data sheet to determine device per reel availability

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.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



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THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M101143	ADDED "gk" PIN CONNECTION, TT100 CASE STYLE & NOTE 2	10/10/05	MMG	DJ
B	M102713	ADDED "...WITH SMOBC"	01/17/06	MMG	IL
C	M108637	REMOVED "PIN 1", ADDED INDEX ON UNIT	12/01/06	MYG	FL

SUGGESTED MOUNTING CONFIGURATION
FOR BH292, CD541/542/636/637, TT100/240 CASE
STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .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	MMG	07/17/02
TOLERANCES ON:	WL	08/02/02
2 PL DECIMALS ±	DJ	08/05/02
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

Mini-Circuits® 13 Neptune Avenue
 Brooklyn NY 11235

PL, gk/ht/hu/nd/w, BH292,
 CD541/542/636/637, TT100/240, TB-03

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-052	REV: C
FILE: 98PL052	SCALE: 8:1	SHEET: 1 OF 1	

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THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
E	M119737	UPDATED PCB	10.08	MF	AD
F	M127659	UPDATED CARR	06.10	SW	SG
G	M127846	UPDATED SCHEMATIC DIAGRAM	06.10	SW	SG
H	M131840	UPDATED DWG	05.11	MF	AD



NOTES:

1. REFER TO -09 PAGE FOR ITEM DESCRIPTIONS.
DESIGNATION NUMBERS ON -20 PAGE CORRESPOND TO THE NUMBERS ON -09 PAGE.
2. FOR TEXT HEIGHT & STYLE ON THE LABEL REFER TO: D3-G209.

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± ANGLES ± FRACTIONS ±	DRAWN	S.WOLYNSKI 06.29.99
	CHECKED	SG 07.06.99
	APPROVED	MG 07.10.99

 **Mini-Circuits®** 13 Neptune Avenue
Brooklyn NY 11235

TB,ADE,CD542/636,06MX01,50

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SIZE A	CODE IDENT 15542	DRAWING NO: TB-03-20	REV: H
FILE: WTB-03	SCALE: 1.5:1	SHEET: 1 OF 2	

Evaluation Board and Circuit

For Pin Connections and DUT Orientation Refer to
Data Sheet of the DUT



TB-03



Schematic Diagram

Notes:

1. 50 Ohm 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