

Frequency Mixer

RMS-5MH+

Level 13 (LO Power +13 dBm) 10 to 1500 MHz

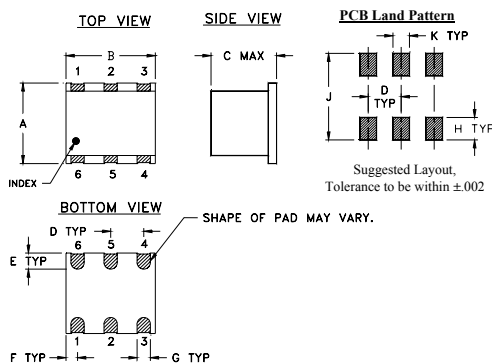
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	200mW
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

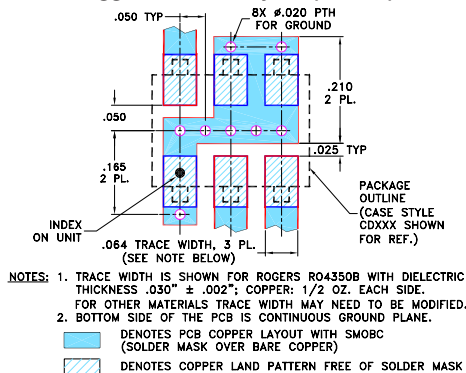


Outline Dimensions (inches)

A	B	C	D	E	F
.250	.31	.20	.100	.050	.055
6.35	7.87	5.08	2.54	1.27	1.40

G	H	J	K	wt
.040	.070	.270	.050	grams
1.02	1.78	6.86	1.27	0.50

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



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, 40 dB typ.
- conversion loss, 5.67 dB typ.
- small size, 0.25"x0.31"x0.2"

Applications

- cellular
- satellite distribution
- GSM
- ISM



Generic photo used for illustration purposes only

CASE STYLE: TT240

+RoHS Compliant

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

Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)	LO-IF ISOLATION (dB)	IP3 at center band (dBm)
LO/RF IF				
$f_L - f_U$	$\bar{X}$ σ Max. Total Range Max.	L M U Typ. Min. Typ. Min. Typ. Min.	L M U Typ. Min. Typ. Min. Typ. Min.	Typ.
10-1500 DC-900	5.67 .09 9.0 9.5	58 40 40 20 26 18	50 30 38 18 17 8	17

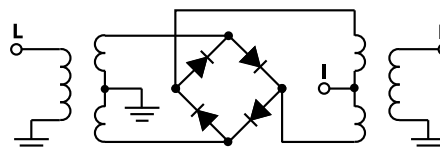
1 dB COMP: +9 dBm typ.
 For phase detection, DC output positive with in-phase RF & LO.

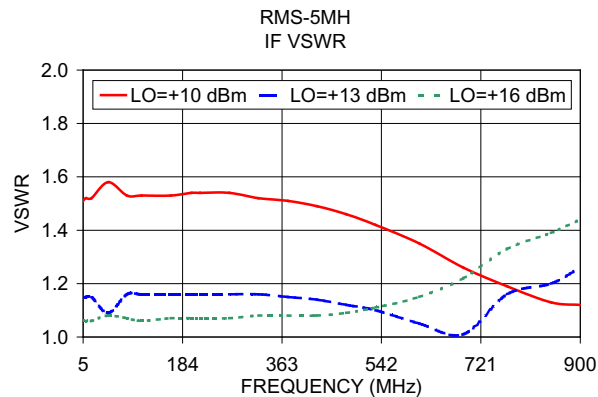
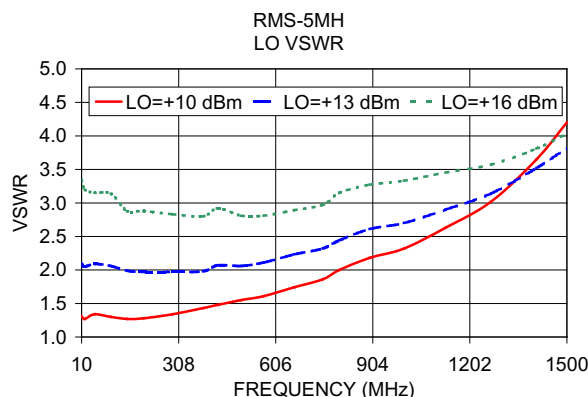
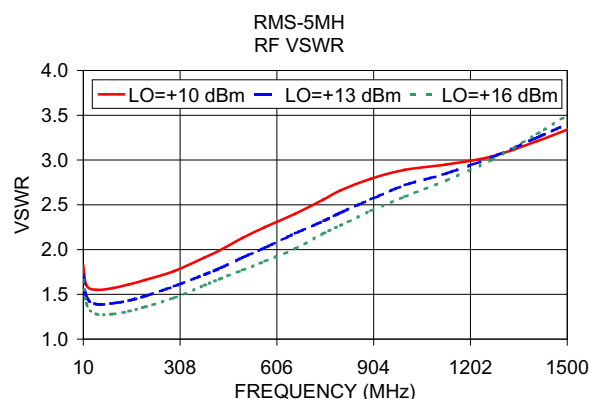
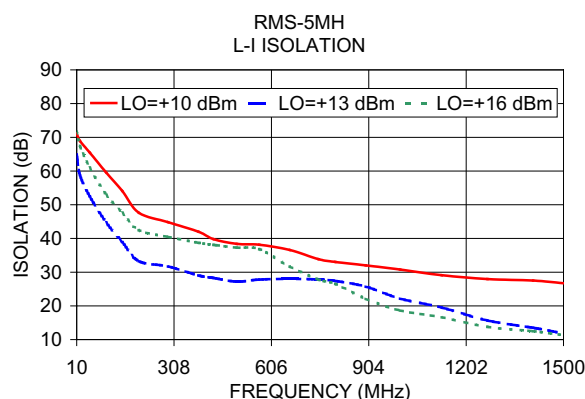
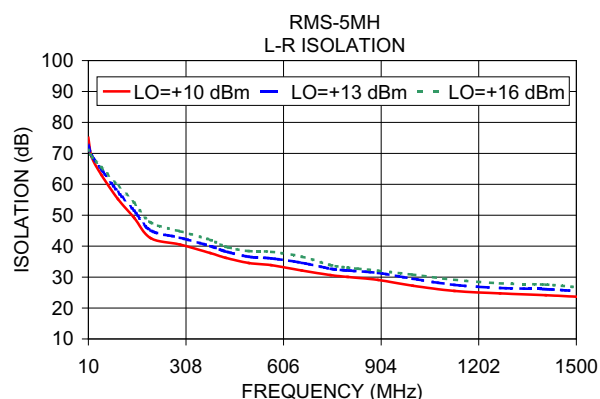
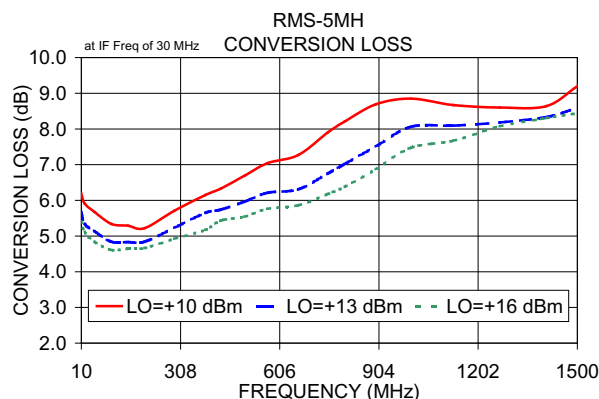
L = low range [f_L to 10 f_L]
 M = mid range [$10 f_L$ to $f_U/2$]
 U = upper range [$f_U/2$ to f_U]

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +13dBm	LO +13dBm	LO +13dBm	LO +13dBm	LO +13dBm
10.00	40.00	5.67	72.72	71.62	1.72	2.09
20.00	50.00	5.34	69.32	67.42	1.47	2.05
50.00	80.00	5.13	64.80	61.00	1.39	2.09
100.00	70.00	4.84	57.53	52.99	1.40	2.06
149.69	119.69	4.83	51.47	47.61	1.43	1.99
200.00	170.00	4.84	45.11	42.45	1.48	1.97
289.38	259.38	5.23	42.74	40.45	1.59	1.97
382.50	352.50	5.65	40.00	38.72	1.72	1.98
429.06	399.06	5.74	38.30	38.06	1.79	2.07
500.00	470.00	5.96	36.54	37.26	1.91	2.06
568.75	538.75	6.21	36.02	36.79	2.02	2.11
661.88	631.88	6.31	34.63	31.64	2.18	2.23
750.00	720.00	6.75	32.69	27.81	2.32	2.32
801.56	771.56	7.02	32.12	26.48	2.41	2.44
894.69	864.69	7.51	31.35	22.10	2.56	2.61
1000.00	970.00	8.06	29.45	18.64	2.72	2.70
1127.50	1097.50	8.09	27.46	16.61	2.85	2.90
1267.19	1237.19	8.18	26.47	13.75	3.03	3.14
1406.88	1376.88	8.33	26.08	12.44	3.25	3.52
1500.00	1470.00	8.59	25.44	11.30	3.40	3.82

Electrical Schematic





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Frequency Mixer

RMS-5MH+

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=+9dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+10	+13	+16			+10	+13	+16			+10	+13	+16
10.1	40.1	6.33	5.74	5.46	10.1	40.1	18.79	21.64	24.14	10.1	40.1	0.87	0.58	0.35
69.8	99.8	6.13	5.67	5.34	69.8	99.8	19.97	23.39	28.27	69.8	99.8	1.15	0.77	0.63
129.6	159.6	6.18	5.66	5.37	129.6	159.6	20.07	20.82	18.49	129.6	159.6	1.18	0.83	0.64
189.3	219.3	6.14	5.68	5.43	189.3	219.3	20.38	16.83	18.37	189.3	219.3	1.30	0.87	0.68
249.1	279.1	6.13	5.74	5.47	249.1	279.1	15.94	16.70	18.19	249.1	279.1	1.30	0.85	0.68
308.8	338.8	6.14	5.79	5.50	308.8	338.8	15.02	16.36	18.52	308.8	338.8	1.22	0.83	0.68
368.5	398.5	6.32	5.89	5.58	368.5	398.5	14.85	16.63	19.76	368.5	398.5	1.22	0.88	0.76
428.3	458.3	6.37	5.93	5.62	428.3	458.3	15.22	17.51	19.77	428.3	458.3	1.37	1.04	0.89
488.0	518.0	6.49	6.03	5.66	488.0	518.0	14.48	17.29	21.50	488.0	518.0	1.46	1.15	1.07
547.8	577.8	6.55	6.10	5.76	547.8	577.8	14.94	16.62	17.99	547.8	577.8	1.68	1.26	1.08
607.5	637.5	6.76	6.16	5.75	607.5	637.5	14.46	18.07	19.52	607.5	637.5	1.81	1.51	1.28
667.2	697.2	7.04	6.33	5.79	667.2	697.2	12.59	18.12	22.79	667.2	697.2	1.80	1.63	1.50
727.0	757.0	7.20	6.55	5.97	727.0	757.0	12.62	15.79	22.06	727.0	757.0	1.90	1.60	1.55
786.7	816.7	7.42	6.67	6.11	786.7	816.7	13.39	16.20	18.95	786.7	816.7	1.92	1.58	1.50
846.4	876.4	7.67	6.75	6.09	846.4	876.4	14.13	16.73	19.68	846.4	876.4	1.88	1.65	1.61
906.2	936.2	7.87	6.70	5.99	906.2	936.2	14.99	19.45	22.05	906.2	936.2	1.81	1.81	1.72
965.9	995.9	8.24	6.84	6.10	965.9	995.9	13.95	23.22	23.36	965.9	995.9	1.51	1.85	1.74
1025.7	1055.7	8.51	7.16	6.30	1025.7	1055.7	12.86	17.07	21.74	1025.7	1055.7	1.25	1.67	1.69
1085.4	1115.4	8.52	7.45	6.57	1085.4	1115.4	12.20	14.65	17.89	1085.4	1115.4	1.02	1.34	1.43
1145.1	1175.1	8.44	7.67	6.92	1145.1	1175.1	12.70	13.31	16.84	1145.1	1175.1	0.92	1.00	1.09
1204.9	1234.9	8.27	7.75	7.19	1204.9	1234.9	13.00	12.35	15.47	1204.9	1234.9	0.94	0.81	0.85
1264.6	1294.6	8.17	7.77	7.35	1264.6	1294.6	13.77	11.96	13.81	1264.6	1294.6	0.93	0.74	0.66
1324.4	1354.4	8.14	7.83	7.54	1324.4	1354.4	15.42	13.67	13.87	1324.4	1354.4	0.95	0.63	0.48
1384.1	1414.1	8.09	7.79	7.50	1384.1	1414.1	21.75	19.45	16.50	1384.1	1414.1	1.04	0.65	0.52
1443.8	1473.8	7.99	7.65	7.38	1443.8	1473.8	19.08	19.04	20.65	1443.8	1473.8	1.05	0.70	0.55
1503.6	1533.6	7.96	7.57	7.23	1503.6	1533.6	17.20	17.14	21.09	1503.6	1533.6	1.14	0.75	0.59
1563.3	1593.3	7.94	7.53	7.15	1563.3	1593.3	15.99	16.66	19.90	1563.3	1593.3	1.19	0.75	0.60
1623.1	1653.1	8.04	7.52	7.12	1623.1	1653.1	14.94	15.59	18.50	1623.1	1653.1	1.23	0.79	0.58
1682.8	1712.8	8.20	7.53	7.10	1682.8	1712.8	14.55	14.63	16.33	1682.8	1712.8	1.26	0.82	0.55
1742.5	1772.5	8.40	7.62	7.21	1742.5	1772.5	14.60	16.08	18.38	1742.5	1772.5	1.25	0.83	0.47
1802.3	1832.3	8.64	7.78	7.40	1802.3	1832.3	14.59	18.11	21.59	1802.3	1832.3	1.36	0.80	0.40
1862.0	1892.0	8.91	7.99	7.63	1862.0	1892.0	14.38	19.64	24.64	1862.0	1892.0	1.46	0.79	0.42
1921.8	1951.8	9.07	8.15	7.81	1921.8	1951.8	14.53	20.10	25.33	1921.8	1951.8	1.45	0.78	0.41
1981.5	2011.5	9.69	8.37	7.97	1981.5	2011.5	14.94	20.44	24.67	1981.5	2011.5	1.33	0.77	0.43
2041.2	2071.2	10.33	8.62	8.15	2041.2	2071.2	15.84	19.60	22.86	2041.2	2071.2	1.00	0.70	0.35
2101.0	2131.0	11.39	9.06	8.44	2101.0	2131.0	15.42	22.94	23.85	2101.0	2131.0	0.57	0.64	0.30
2140.8	2170.8	12.17	9.21	8.54	2140.8	2170.8	14.71	20.81	23.93	2140.8	2170.8	0.23	0.78	0.33
2200.5	2230.5	13.19	9.48	8.60	2200.5	2230.5	14.19	19.16	22.69	2200.5	2230.5	-0.48	0.87	0.44
2240.4	2270.4	14.05	9.55	8.62	2240.4	2270.4	14.15	17.88	23.76	2240.4	2270.4	-0.87	0.94	0.48
2300.1	2330.1	15.44	10.01	8.69	2300.1	2330.1	15.20	16.73	24.12	2300.1	2330.1	-1.71	0.83	0.49

Frequency Mixer

RMS-5MH+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=750.1MHz (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)=1500.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+13			+13			+13
730.0	20.1	6.26	10.0	20.1	6.02	900.0	600.1	8.81
711.5	38.6	6.19	29.6	39.7	5.83	880.2	619.9	8.70
693.1	57.0	6.19	49.1	59.2	5.90	860.4	639.7	8.71
674.6	75.5	6.20	68.7	78.8	5.90	840.7	659.4	8.69
656.2	93.9	6.16	88.2	98.3	5.89	820.9	679.2	8.67
637.7	112.4	6.12	107.8	117.9	5.86	801.1	699.0	8.69
619.2	130.9	6.09	127.3	137.4	5.83	781.3	718.8	8.68
600.8	149.3	6.09	146.9	157.0	5.87	761.6	738.5	8.75
582.3	167.8	6.12	166.4	176.5	5.84	741.8	758.3	8.46
563.8	186.3	6.16	186.0	196.1	5.82	722.0	778.1	8.57
545.4	204.7	6.20	205.6	215.7	5.79	702.2	797.9	8.50
526.9	223.2	6.22	225.1	235.2	5.76	682.4	817.7	8.45
508.5	241.6	6.24	244.7	254.8	5.78	662.7	837.4	8.42
490.0	260.1	6.27	264.2	274.3	5.82	642.9	857.2	8.34
471.5	278.6	6.26	283.8	293.9	5.80	623.1	877.0	8.29
453.1	297.0	6.28	303.3	313.4	5.79	603.3	896.8	8.18
434.6	315.5	6.28	322.9	333.0	5.83	583.6	916.5	8.13
416.2	333.9	6.26	342.4	352.5	5.81	563.8	936.3	8.10
397.7	352.4	6.24	362.0	372.1	5.86	544.0	956.1	8.02
379.2	370.9	6.16	381.6	391.7	5.88	524.2	975.9	7.99
360.8	389.3	6.25	401.1	411.2	5.85	504.4	995.7	7.90
342.3	407.8	6.23	420.7	430.8	5.88	484.7	1015.4	7.87
323.8	426.3	6.25	440.2	450.3	5.93	464.9	1035.2	7.84
305.4	444.7	6.21	459.8	469.9	5.96	445.1	1055.0	7.81
286.9	463.2	6.23	479.3	489.4	5.94	425.3	1074.8	7.80
268.5	481.6	6.25	498.9	509.0	5.97	405.6	1094.5	7.74
250.0	500.1	6.27	518.4	528.5	6.00	385.8	1114.3	7.76
231.5	518.6	6.28	538.0	548.1	6.00	366.0	1134.1	7.72
213.1	537.0	6.33	577.1	587.2	6.01	326.4	1173.7	7.69
194.6	555.5	6.34	596.7	606.8	6.01	306.7	1193.4	7.66
176.2	573.9	6.33	635.8	645.9	6.06	267.1	1233.0	7.67
157.7	592.4	6.35	655.3	665.4	6.09	247.3	1252.8	7.71
139.2	610.9	6.31	694.4	704.5	6.16	207.8	1292.3	7.76
120.8	629.3	6.31	714.0	724.1	6.21	188.0	1312.1	7.81
102.3	647.8	6.29	753.1	763.2	6.30	148.4	1351.7	7.92
83.8	666.3	6.35	772.7	782.8	6.32	128.7	1371.4	7.90
65.4	684.7	6.37	811.8	821.9	6.34	89.1	1411.0	7.89
46.9	703.2	6.45	831.3	841.4	6.41	69.3	1430.8	7.83
28.5	721.6	6.49	870.4	880.5	6.46	29.8	1470.3	7.72
10.0	740.1	6.70	890.0	900.1	6.47	10.0	1490.1	7.78

REV. X2
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100818
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Frequency Mixer

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+10	+13	+16	+10	+13	+16
10.1	64.40	65.04	65.25	58.95	59.81	62.94
69.8	62.52	63.09	62.74	46.11	53.00	56.39
129.6	60.71	62.00	61.03	40.93	48.06	51.76
189.3	58.73	61.38	60.37	37.69	43.76	49.45
249.1	57.23	61.42	59.48	35.27	41.53	46.58
308.8	57.02	62.52	57.58	33.33	39.89	44.37
368.5	58.32	63.07	55.50	31.85	38.86	42.39
428.3	60.74	61.05	53.67	30.95	38.27	40.03
488.0	67.36	56.56	50.58	30.11	38.05	38.15
547.8	64.75	52.74	48.31	29.93	37.23	35.99
607.5	59.13	49.97	45.56	30.29	38.34	33.57
667.2	56.32	47.03	43.17	29.79	37.86	31.13
727.0	53.97	46.49	42.05	30.03	35.27	29.55
786.7	50.04	44.92	41.34	31.63	34.15	28.74
846.4	46.31	42.77	39.99	35.00	32.65	26.74
906.2	43.90	41.03	39.30	39.50	29.06	24.38
965.9	42.84	40.49	39.35	37.56	26.20	22.37
1025.7	42.33	39.46	38.51	33.30	24.27	20.88
1085.4	43.47	39.63	38.31	30.52	22.99	19.84
1145.1	44.15	41.31	38.88	27.99	22.25	19.01
1204.9	43.61	42.97	40.56	26.38	21.33	18.49
1264.6	42.96	44.21	43.14	25.15	20.64	17.86
1324.4	41.68	44.23	44.43	24.15	19.91	17.33
1384.1	39.47	42.34	43.86	23.02	19.13	16.68
1443.8	37.87	40.57	42.67	21.65	18.03	15.83
1503.6	37.16	39.81	41.38	20.13	16.97	14.93
1563.3	36.79	39.79	41.39	18.68	15.83	14.19
1623.1	36.96	40.57	42.14	17.85	15.18	13.79
1682.8	37.71	41.49	41.95	17.05	14.60	13.42
1742.5	39.14	42.78	41.40	16.49	14.28	13.08
1802.3	40.90	45.07	43.57	16.19	14.23	13.07
1862.0	42.36	46.62	43.87	16.01	14.27	13.07
1921.8	42.52	47.98	46.05	16.06	14.37	13.26
1981.5	42.97	48.23	49.55	15.89	14.52	13.36
2041.2	42.63	46.90	48.91	15.82	14.48	13.48
2101.0	42.14	46.53	48.80	15.70	14.76	13.59
2140.8	41.02	45.02	46.90	15.53	14.87	13.68
2200.5	38.45	41.96	44.21	15.18	15.15	14.13
2240.4	37.31	40.64	42.87	14.93	15.15	14.27
2300.1	35.56	38.44	40.99	14.67	14.89	14.72

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	50.24	53.31	49.70
69.8	99.8	42.59	40.85	40.29
129.6	159.6	37.38	36.43	35.80
189.3	219.3	34.61	33.85	33.42
249.1	279.1	33.19	32.60	32.18
308.8	338.8	32.40	31.74	31.35
368.5	398.5	31.78	30.95	30.34
428.3	458.3	30.61	30.02	29.73
488.0	518.0	29.71	29.28	28.93
547.8	577.8	28.36	28.59	28.61
607.5	637.5	26.79	26.53	26.25
667.2	697.2	25.23	24.69	24.34
727.0	757.0	24.09	23.77	23.19
786.7	816.7	22.83	22.63	22.29
846.4	876.4	21.71	21.61	21.54
906.2	936.2	21.19	21.22	21.28
965.9	995.9	21.00	21.06	21.24
1025.7	1055.7	20.72	20.86	20.93
1085.4	1115.4	20.53	20.88	21.04
1145.1	1175.1	20.50	20.90	21.13
1204.9	1234.9	20.47	20.85	20.98
1264.6	1294.6	20.41	20.80	21.24
1324.4	1354.4	20.23	20.74	21.41
1384.1	1414.1	20.04	20.80	21.71
1443.8	1473.8	20.28	21.23	22.08
1503.6	1533.6	20.74	21.73	22.62
1563.3	1593.3	21.47	22.55	23.38
1623.1	1653.1	22.25	23.58	24.63
1682.8	1712.8	22.97	24.55	25.67
1742.5	1772.5	23.55	25.15	25.99
1802.3	1832.3	23.57	24.82	25.35
1862.0	1892.0	23.09	24.06	24.53
1921.8	1951.8	22.35	23.09	23.60
1981.5	2011.5	21.48	22.16	22.63
2041.2	2071.2	20.91	21.55	21.88
2101.0	2131.0	20.21	20.98	21.27
2140.8	2170.8	19.82	20.58	20.99
2200.5	2230.5	19.48	20.19	20.49
2240.4	2270.4	19.35	20.02	20.33
2300.1	2330.1	19.15	19.71	19.97

Frequency Mixer

RMS-5MH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=1500.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+10	+13	+16		+10	+13	+16		+10	+13	+16
10.1	40.1	1.74	1.62	1.59	10.1	1.32	1.85	2.73	10.1	1.87	1.61	1.32
69.8	99.8	1.37	1.21	1.13	69.8	1.36	2.00	2.79	29.9	1.74	1.53	1.34
129.6	159.6	1.34	1.17	1.09	129.6	1.34	1.99	2.82	49.7	1.58	1.40	1.27
189.3	219.3	1.32	1.15	1.09	189.3	1.33	1.95	2.73	69.4	1.50	1.35	1.26
249.1	279.1	1.30	1.16	1.10	249.1	1.35	2.00	2.79	89.2	1.59	1.42	1.30
308.8	338.8	1.30	1.17	1.12	308.8	1.35	1.99	2.80	109.0	1.67	1.47	1.32
368.5	398.5	1.31	1.20	1.15	368.5	1.38	2.01	2.78	128.8	1.64	1.44	1.29
428.3	458.3	1.33	1.23	1.18	428.3	1.42	2.07	2.86	148.5	1.62	1.43	1.29
488.0	518.0	1.36	1.26	1.21	488.0	1.44	2.07	2.82	168.3	1.62	1.43	1.31
547.8	577.8	1.41	1.32	1.27	547.8	1.50	2.13	2.87	188.1	1.64	1.44	1.30
607.5	637.5	1.52	1.41	1.34	607.5	1.55	2.16	2.87	207.9	1.66	1.45	1.29
667.2	697.2	1.67	1.55	1.45	667.2	1.60	2.20	2.89	227.7	1.68	1.45	1.29
727.0	757.0	1.84	1.72	1.61	727.0	1.65	2.25	2.93	247.4	1.64	1.43	1.28
786.7	816.7	2.03	1.89	1.79	786.7	1.69	2.27	2.94	267.2	1.62	1.41	1.26
846.4	876.4	2.23	2.05	1.91	846.4	1.76	2.31	2.94	287.0	1.66	1.44	1.27
906.2	936.2	2.41	2.17	2.01	906.2	1.82	2.34	2.94	306.8	1.68	1.44	1.27
965.9	995.9	2.58	2.30	2.13	965.9	1.90	2.39	2.95	326.5	1.66	1.42	1.24
1025.7	1055.7	2.69	2.44	2.25	1025.7	1.98	2.48	3.01	346.3	1.64	1.40	1.23
1085.4	1115.4	2.69	2.51	2.35	1085.4	2.02	2.53	3.08	366.1	1.65	1.41	1.24
1145.1	1175.1	2.63	2.52	2.42	1145.1	2.07	2.59	3.12	385.9	1.66	1.42	1.24
1204.9	1234.9	2.55	2.49	2.43	1204.9	2.09	2.58	3.13	405.7	1.68	1.43	1.23
1264.6	1294.6	2.48	2.42	2.38	1264.6	2.15	2.63	3.15	425.4	1.70	1.43	1.24
1324.4	1354.4	2.44	2.38	2.34	1324.4	2.18	2.63	3.13	445.2	1.68	1.41	1.22
1384.1	1414.1	2.41	2.34	2.31	1384.1	2.23	2.64	3.13	465.0	1.66	1.40	1.21
1443.8	1473.8	2.38	2.31	2.29	1443.8	2.29	2.67	3.11	484.8	1.69	1.43	1.23
1503.6	1533.6	2.37	2.28	2.25	1503.6	2.33	2.65	3.07	504.5	1.73	1.45	1.25
1563.3	1593.3	2.36	2.27	2.22	1563.3	2.41	2.67	3.05	524.3	1.71	1.43	1.23
1623.1	1653.1	2.38	2.25	2.17	1623.1	2.47	2.66	3.01	544.1	1.69	1.40	1.21
1682.8	1712.8	2.41	2.25	2.14	1682.8	2.54	2.67	3.04	583.7	1.71	1.42	1.21
1742.5	1772.5	2.43	2.24	2.14	1742.5	2.65	2.73	3.11	603.4	1.71	1.42	1.21
1802.3	1832.3	2.46	2.26	2.18	1802.3	2.77	2.81	3.17	643.0	1.73	1.43	1.23
1862.0	1892.0	2.52	2.32	2.27	1862.0	2.97	2.97	3.30	662.8	1.71	1.41	1.21
1921.8	1951.8	2.58	2.40	2.35	1921.8	3.27	3.15	3.40	702.3	1.77	1.46	1.25
1981.5	2011.5	2.73	2.51	2.43	1981.5	3.57	3.30	3.51	722.1	1.77	1.46	1.26
2041.2	2071.2	2.87	2.62	2.51	2041.2	4.03	3.56	3.65	761.7	1.79	1.46	1.28
2101.0	2131.0	3.03	2.71	2.59	2101.0	4.51	3.73	3.75	781.4	1.80	1.47	1.27
2140.8	2170.8	3.13	2.75	2.63	2140.8	4.83	3.95	3.86	821.0	1.83	1.50	1.32
2200.5	2230.5	3.22	2.77	2.68	2200.5	5.27	4.21	3.99	840.8	1.85	1.52	1.35
2240.4	2270.4	3.28	2.77	2.71	2240.4	5.51	4.43	4.10	880.3	1.84	1.51	1.34
2300.1	2330.1	3.43	2.85	2.75	2300.1	5.72	4.79	4.33	900.1	1.86	1.54	1.37

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	43	18	36	21	54	31	57	40	62
1	-	15	+0	35	21	39	39	50	40	52	41	56
2	78	42	31	41	28	60	39	47	42	53	44	75
3	>100	50	38	41	38	43	53	56	41	60	49	59
4	>100	53	60	52	43	49	45	55	58	55	50	70
5	>100	55	54	58	56	65	47	67	58	71	59	64
6	>100	74	62	63	68	68	48	66	46	70	56	60
7	>100	79	67	68	62	83	63	65	72	63	69	69
8	>100	93	84	86	68	69	76	63	60	60	64	69
9	>100	94	89	85	74	83	79	82	72	69	71	67
10	>100	93	94	93	86	80	73	73	96	78	67	85
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; 4.00 dBm.
LO IN: 780.01 MHz; +13.00 dBm
IF OUT: 29.91 MHz; -2.59 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	8	32	7	26	7	42	20	41	31	44
1	-	16	+0	30	20	36	30	42	30	46	35	50
2	96	47	34	44	32	52	57	48	49	62	50	63
3	>100	77	51	56	47	56	54	75	54	66	61	66
4	>100	>87	>87	77	61	70	58	75	70	77	67	71
5	>100	>87	82	>87	73	76	69	75	75	84	78	>87
6	>100	>87	>87	>87	>87	85	80	80	77	>87	>87	>87
7	>100	>87	>87	>87	>87	>87	>87	>87	85	>87	>87	>87
8	>100	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
9	>100	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
10	>100	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -6.00 dBm.
LO IN: 780.01 MHz; +13.00 dBm
IF OUT: 29.91 MHz; -12.77 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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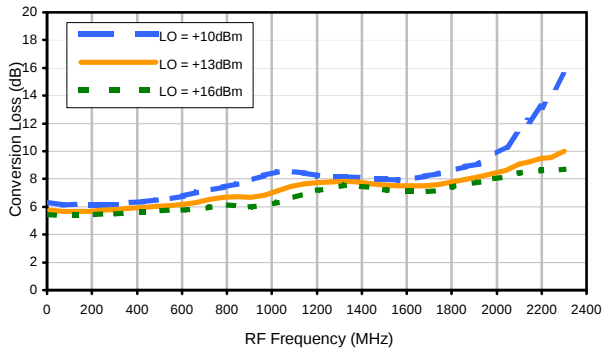


Frequency Mixer

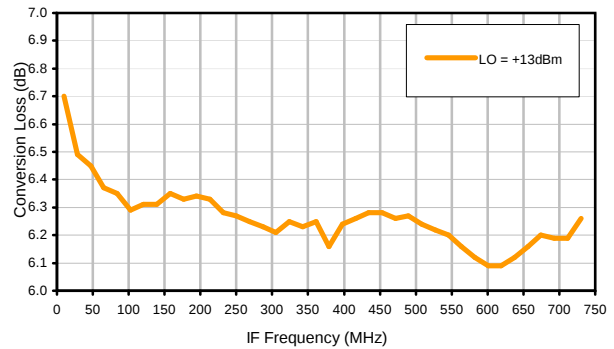
RMS-5MH+

Typical Performance Curves

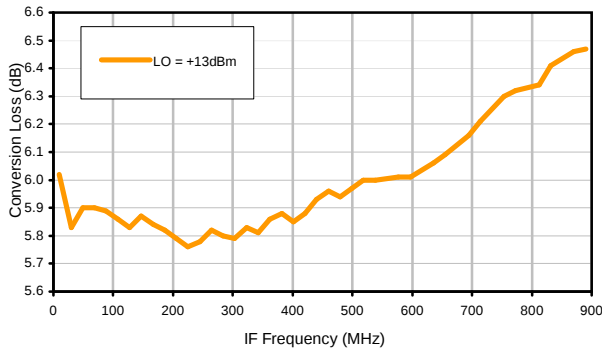
Conversion Loss @ IF=30MHz



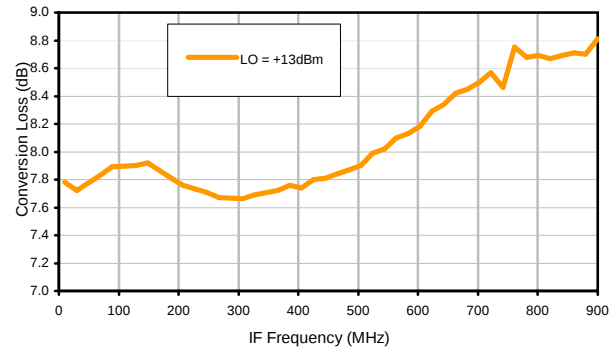
Conversion Loss vs. IF @ RF=750.1MHz



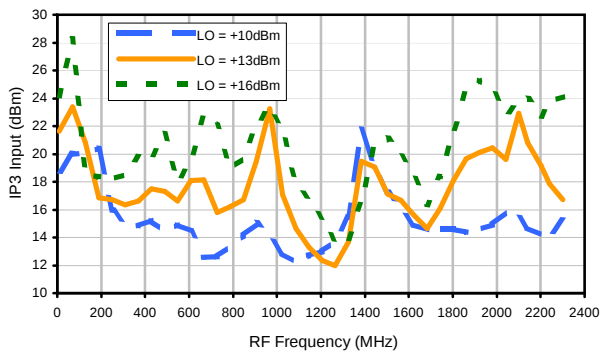
Conversion Loss vs. IF @ RF=10.1MHz



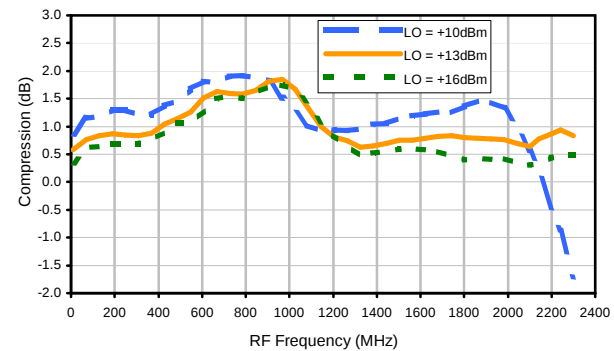
Conversion Loss vs. IF @ RF=1500.1MHz



IP3 Input

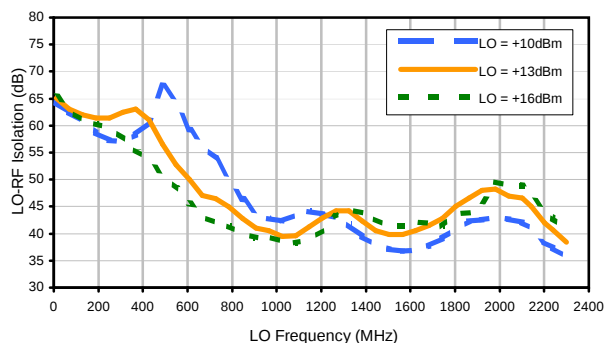


Compression @ RF IN=+9dBm

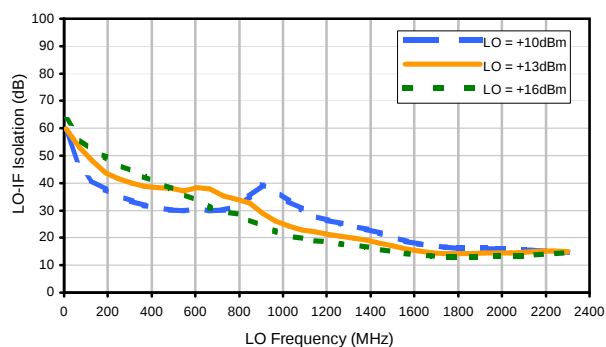


Typical Performance Curves

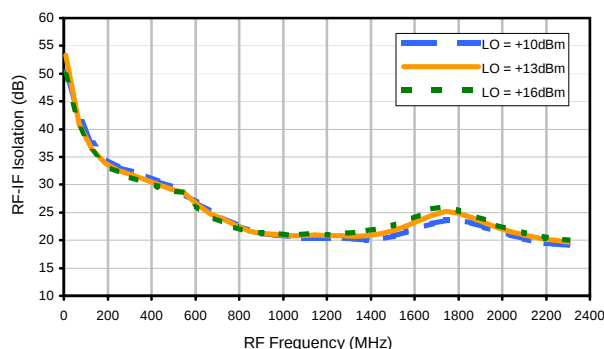
LO-RF Isolation



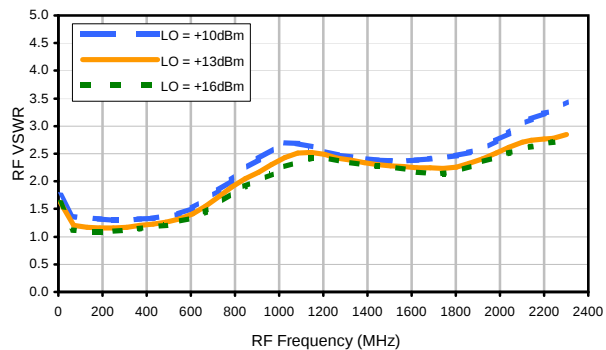
LO-IF Isolation



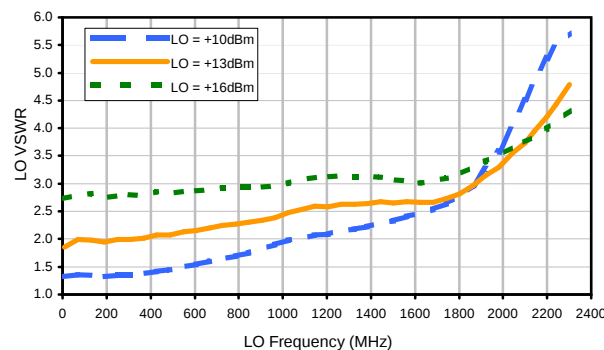
RF-IF Isolation



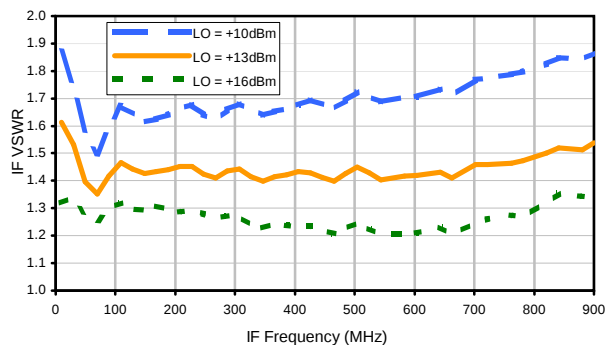
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	43	18	36	21	54	31	57	40	62
1	-	15	+0	35	21	39	39	50	40	52	41	56
2	78	42	31	41	28	60	39	47	42	53	44	75
3	>100	50	38	41	38	43	53	56	41	60	49	59
4	>100	53	60	52	43	49	45	55	58	55	50	70
5	>100	55	54	58	56	65	47	67	58	71	59	64
6	>100	74	62	63	68	68	48	66	46	70	56	60
7	>100	79	67	68	62	83	63	65	72	63	69	69
8	>100	93	84	86	68	69	76	63	60	60	64	69
9	>100	94	89	85	74	83	79	82	72	69	71	67
10	>100	93	94	93	86	80	73	73	96	78	67	85
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; 4.00 dBm.
LO IN: 780.01 MHz; +13.00 dBm
IF OUT: 29.91 MHz; -2.59 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	8	32	7	26	7	42	20	41	31	44
1	-	16	+0	30	20	36	30	42	30	46	35	50
2	96	47	34	44	32	52	57	48	49	62	50	63
3	>100	77	51	56	47	56	54	75	54	66	61	66
4	>100	>87	>87	77	61	70	58	75	70	77	67	71
5	>100	>87	82	>87	73	76	69	75	75	84	78	>87
6	>100	>87	>87	>87	>87	85	80	80	77	>87	>87	>87
7	>100	>87	>87	>87	>87	>87	>87	>87	85	>87	>87	>87
8	>100	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
9	>100	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
10	>100	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

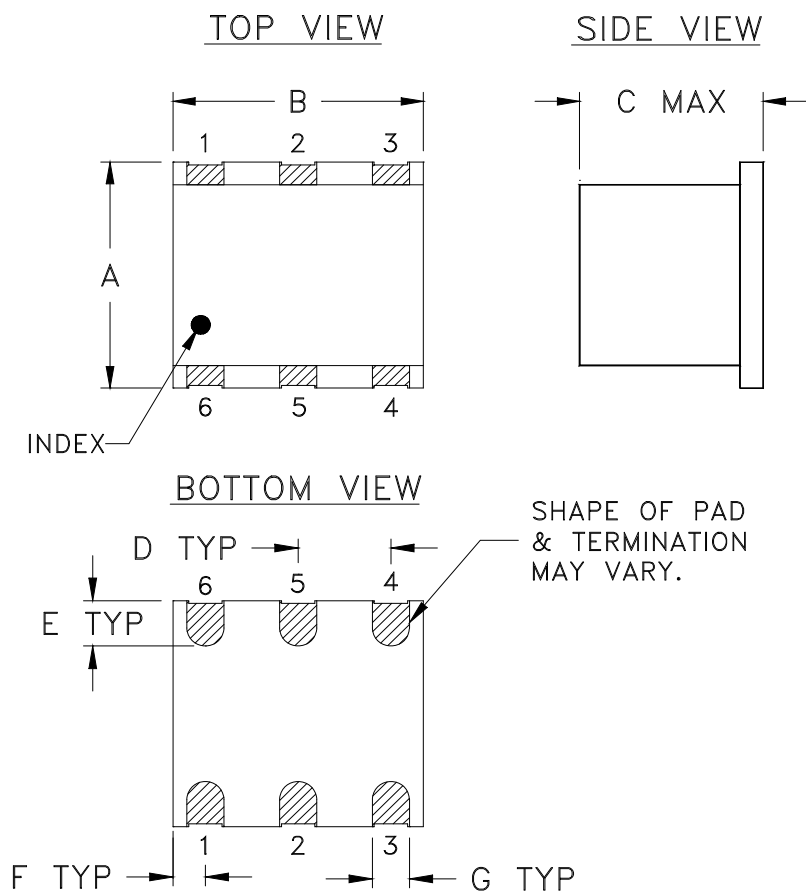
Test conditions: RF IN: 750.1 MHz; -6.00 dBm.
LO IN: 780.01 MHz; +13.00 dBm
IF OUT: 29.91 MHz; -12.77 dBm

- 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.

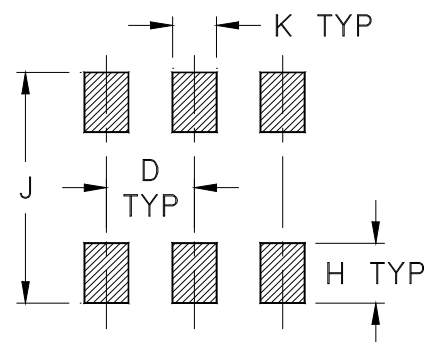
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Outline Dimensions



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.



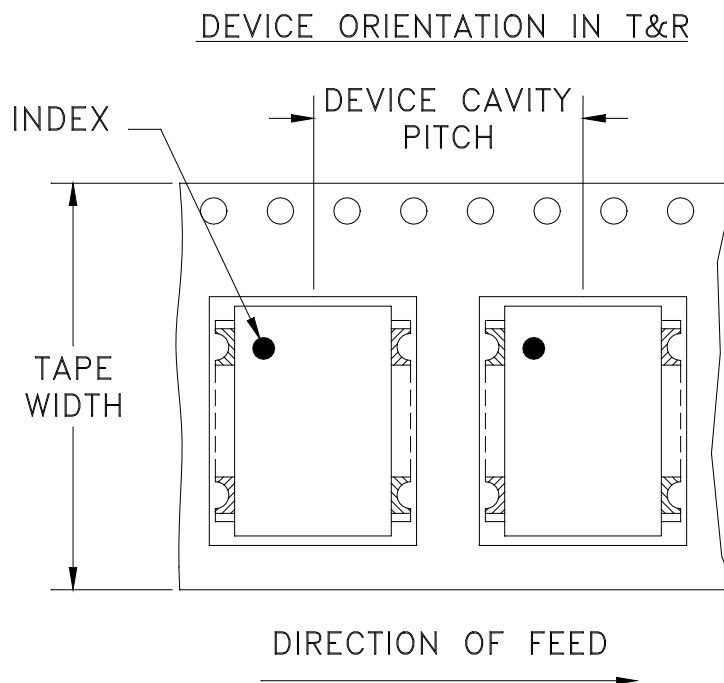
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

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
			1000

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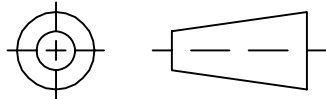
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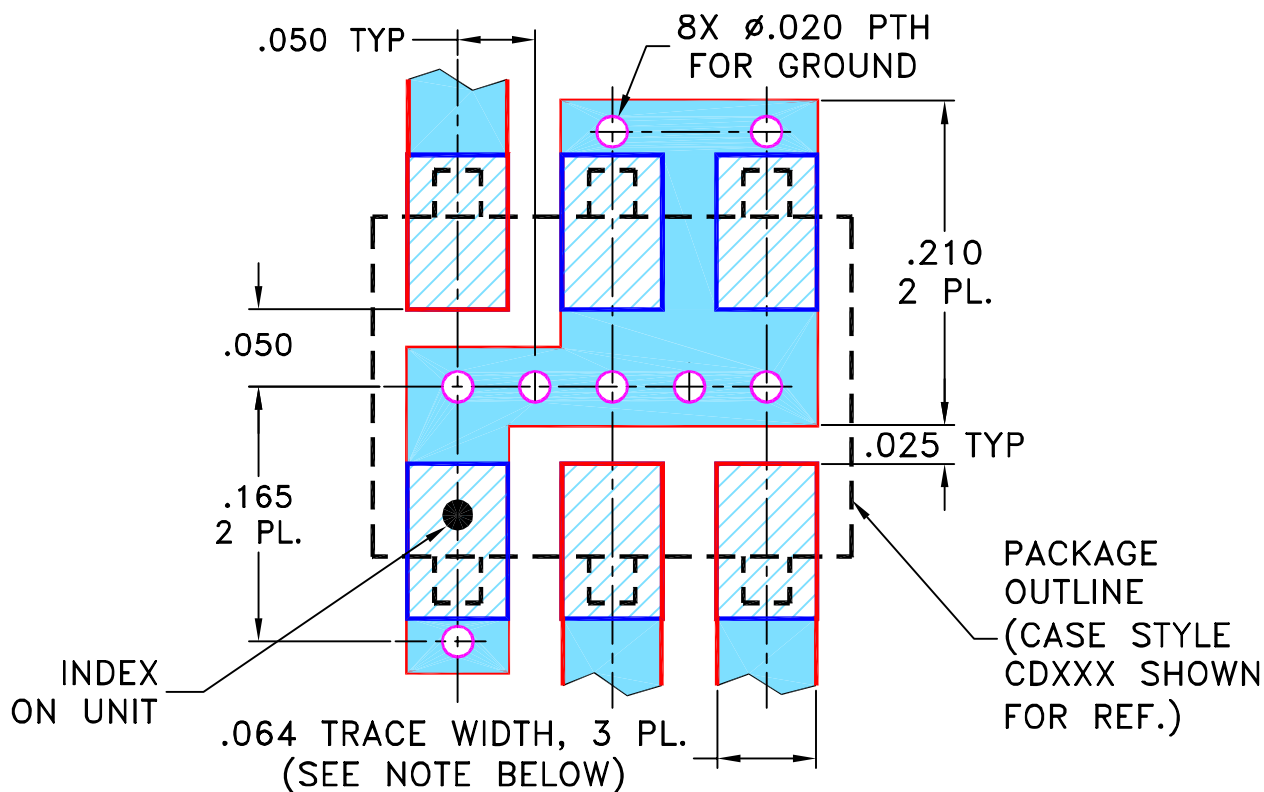
THIRD ANGLE PROJECTION



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

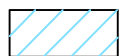
SUGGESTED MOUNTING CONFIGURATION
FOR BH292, CD541/542/636/637, TT100/240 CASE
STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" $\pm$.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

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

DRAWN

MMG

07/17/02

CHECKED

WL

08/02/02

APPROVED

DJ

08/05/02



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

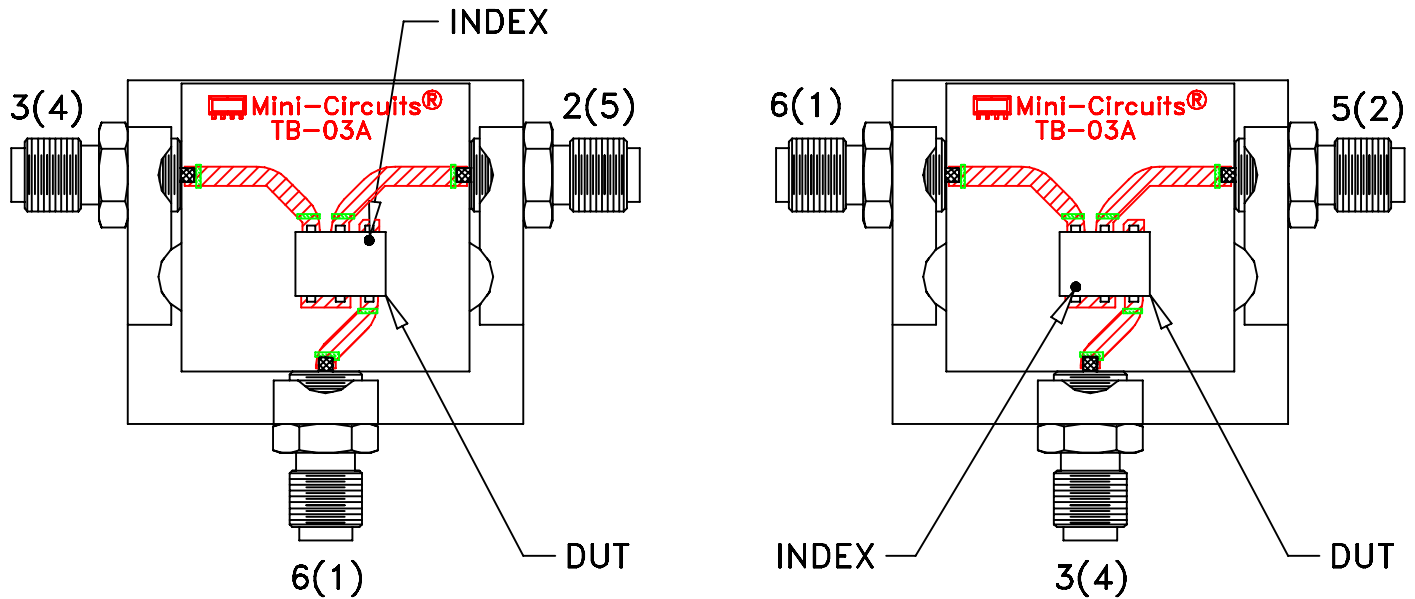
Mini-Circuits®

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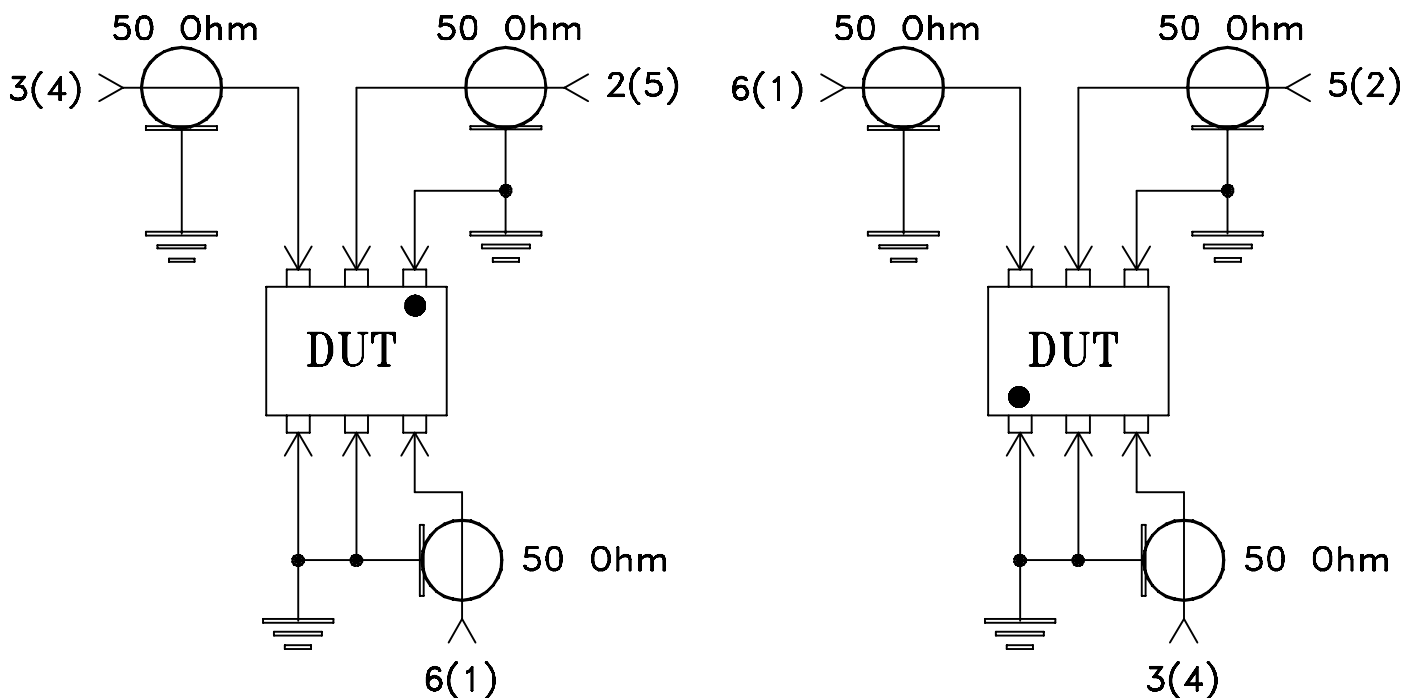
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Evaluation Board and Circuit

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