

Surface Mount Frequency Mixer

RMS-5L+

Level 3 (LO Power +3 dBm) 400 to 1400 MHz



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

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
IF Current	40mA
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

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

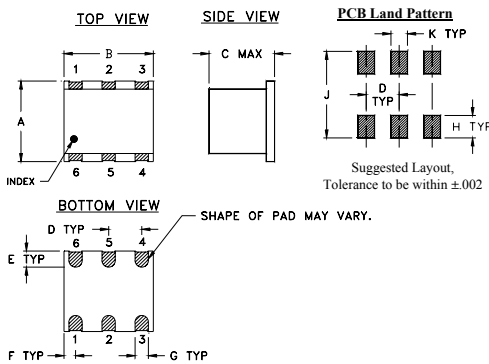
Features

- good conversion loss, 7.0 dB typ.
- small size, 0.25"x0.31"x0.2"
- wide bandwidth, 400-1400 MHz

Applications

- cellular
- ISM/GSM
- satellite distribution

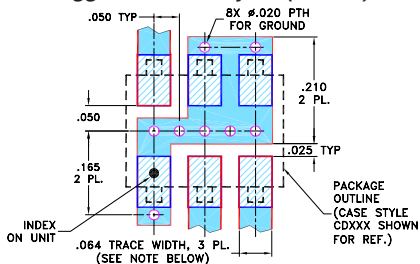
Outline Drawing



Outline Dimensions (inch/mm)

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:
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

Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)	LO-IF ISOLATION (dB)	IP3 at center band (dBm)
LO/RF IF	\bar{X} σ Max.	Typ. Min.	Typ. Min.	Typ.
f_L - f_U				
400-1400	DC-800	7.0 0.2 9.8	22 14	22 6

1 dB COMP.: -3 dBm typ.

For phase detection, DC output positive with in-phase RF & LO.

L = low range [f_L to $10 f_L$]

m = mid band [$2f_L$ to $f_U/2$]

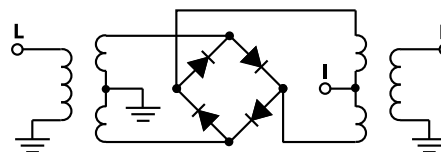
M = mid range [$10 f_U$ to $f_U/2$]

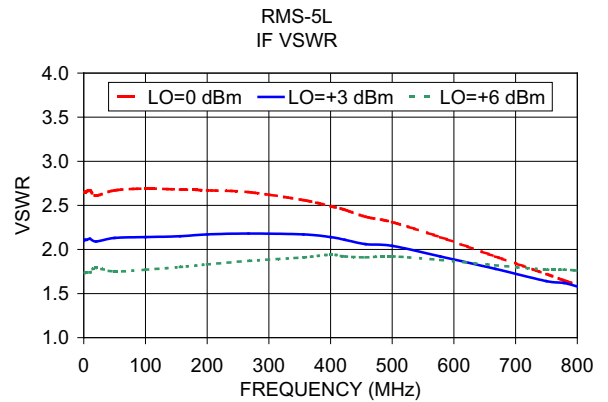
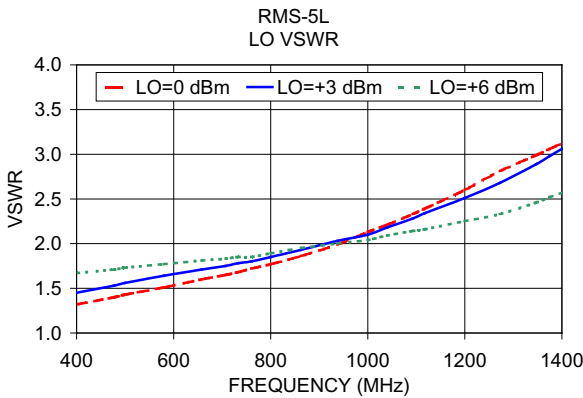
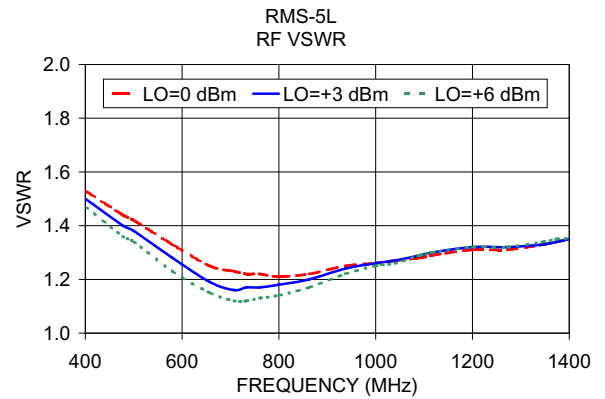
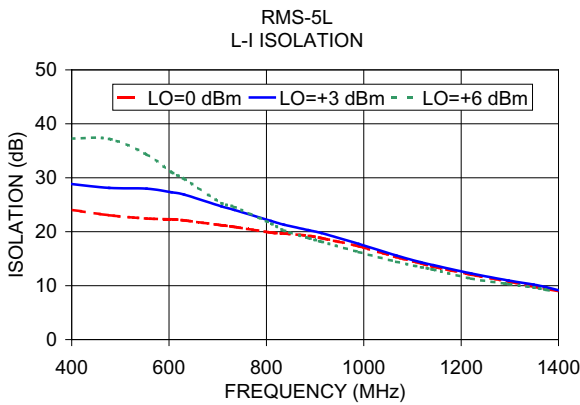
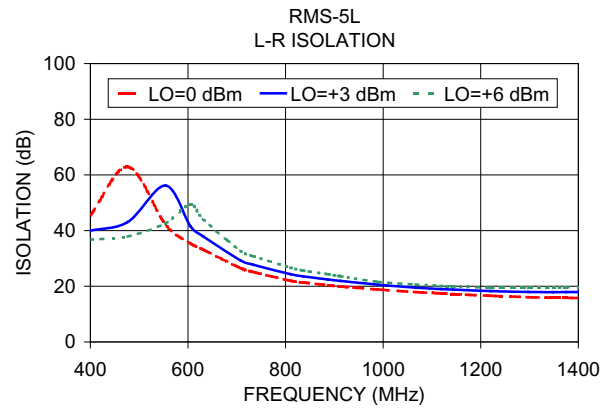
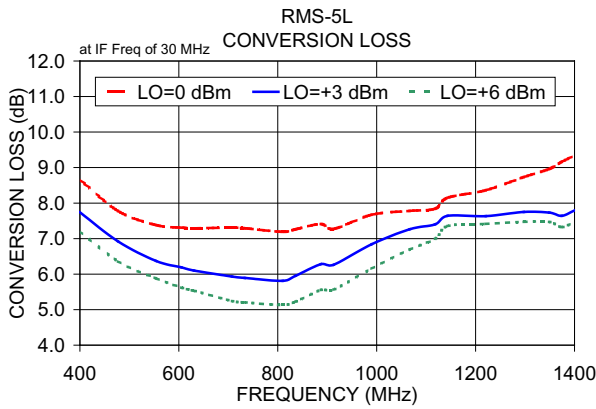
U = upper range [$f_U/2$ to f_U]

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 +3dBm	LO +3dBm	LO +3dBm	LO +3dBm	LO +3dBm
400.00	430.00	7.74	39.94	28.82	1.50	1.45
476.92	506.92	6.92	43.12	28.11	1.40	1.53
553.85	583.85	6.37	56.16	27.98	1.38	1.56
605.13	635.13	6.19	41.52	27.30	1.28	1.64
630.77	660.77	6.10	37.96	26.89	1.19	1.71
707.69	737.69	5.93	29.29	24.68	1.16	1.75
733.33	763.33	5.89	27.74	24.04	1.17	1.78
810.26	840.26	5.81	24.32	21.96	1.17	1.80
835.90	865.90	5.95	23.55	21.29	1.18	1.85
887.18	917.18	6.28	22.39	20.26	1.20	1.93
912.82	942.82	6.26	21.89	19.74	1.24	2.03
989.74	959.74	6.84	20.56	17.73	1.26	2.10
1066.67	1036.67	7.26	19.47	15.58	1.27	2.18
1117.95	1087.95	7.40	18.97	14.31	1.29	2.28
1143.59	1113.59	7.64	18.77	13.78	1.30	2.34
1220.51	1190.51	7.63	18.25	12.26	1.32	2.51
1297.44	1267.44	7.75	17.96	10.95	1.32	2.68
1348.72	1318.72	7.73	17.87	10.20	1.33	2.89
1374.36	1344.36	7.64	17.90	9.72	1.34	2.98
1400.00	1370.00	7.79	17.92	9.13	1.35	3.06

Electrical Schematic





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Frequency Mixer

RMS-5L+

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=-3dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		0	+3	+6			0	+3	+6			0	+3	+6
400.1	430.1	8.43	7.40	6.89	400.1	430.1	9.93	14.07	15.86	400.1	430.1	0.22	0.11	0.08
440.1	470.1	8.00	7.00	6.48	440.1	470.1	11.15	17.16	18.34	440.1	470.1	0.22	0.08	0.10
480.1	510.1	7.81	6.83	6.31	480.1	510.1	7.91	12.47	15.91	480.1	510.1	0.28	0.12	0.09
520.1	550.1	7.53	6.58	6.05	520.1	550.1	8.65	14.11	14.23	520.1	550.1	0.40	0.16	0.19
560.1	590.1	7.38	6.45	5.95	560.1	590.1	8.22	13.63	12.36	560.1	590.1	0.43	0.22	0.21
600.1	630.1	7.19	6.26	5.76	600.1	630.1	7.26	14.47	11.68	600.1	630.1	0.55	0.33	0.32
640.1	670.1	7.13	6.16	5.66	640.1	670.1	8.61	14.97	9.87	640.1	670.1	0.74	0.47	0.38
680.1	710.1	7.03	6.02	5.50	680.1	710.1	8.15	14.02	9.25	680.1	710.1	0.80	0.54	0.44
720.1	750.1	6.98	5.95	5.40	720.1	750.1	7.21	13.73	10.72	720.1	750.1	0.82	0.51	0.43
760.1	790.1	6.99	5.91	5.34	760.1	790.1	7.69	15.15	10.01	760.1	790.1	0.92	0.60	0.47
800.1	830.1	7.01	5.90	5.31	800.1	830.1	7.17	12.26	9.37	800.1	830.1	0.94	0.68	0.52
840.1	870.1	7.15	6.00	5.35	840.1	870.1	6.52	10.94	10.76	840.1	870.1	1.03	0.77	0.57
880.1	910.1	7.29	6.15	5.42	880.1	910.1	7.24	10.10	10.36	880.1	910.1	0.99	0.77	0.64
920.1	950.1	7.47	6.31	5.55	920.1	950.1	7.82	8.77	10.10	920.1	950.1	1.06	0.81	0.72
960.1	990.1	7.70	6.53	5.73	960.1	990.1	10.22	10.81	10.36	960.1	990.1	0.94	0.78	0.75
1000.1	1030.1	7.87	6.70	5.88	1000.1	1030.1	10.65	16.43	10.94	1000.1	1030.1	0.85	0.74	0.81
1040.1	1070.1	8.17	7.03	6.18	1040.1	1070.1	8.59	13.19	15.45	1040.1	1070.1	0.66	0.62	0.65
1080.1	1110.1	8.41	7.31	6.47	1080.1	1110.1	5.69	9.02	14.03	1080.1	1110.1	0.55	0.51	0.56
1120.1	1150.1	8.57	7.63	6.85	1120.1	1150.1	5.17	7.07	11.87	1120.1	1150.1	0.49	0.32	0.38
1160.1	1190.1	8.65	7.80	7.10	1160.1	1190.1	4.74	5.72	8.26	1160.1	1190.1	0.51	0.27	0.26
1200.1	1230.1	8.63	7.87	7.30	1200.1	1230.1	4.73	5.03	6.92	1200.1	1230.1	0.57	0.20	0.19
1240.1	1270.1	8.63	7.92	7.41	1240.1	1270.1	4.93	5.19	8.04	1240.1	1270.1	0.62	0.27	0.19
1280.1	1310.1	8.63	7.90	7.48	1280.1	1310.1	5.32	5.70	7.52	1280.1	1310.1	0.69	0.29	0.19
1320.1	1350.1	8.69	7.88	7.50	1320.1	1350.1	6.59	5.66	6.77	1320.1	1350.1	0.70	0.37	0.26
1360.1	1390.1	8.72	7.87	7.53	1360.1	1390.1	5.92	5.96	7.24	1360.1	1390.1	0.81	0.39	0.25
1400.1	1430.1	8.75	7.83	7.51	1400.1	1430.1	6.02	6.64	6.56	1400.1	1430.1	0.85	0.56	0.27
1440.1	1470.1	8.82	7.84	7.51	1440.1	1470.1	5.66	5.98	6.52	1440.1	1470.1	0.91	0.57	0.36
1480.1	1510.1	8.91	7.83	7.50	1480.1	1510.1	5.51	6.59	6.55	1480.1	1510.1	1.03	0.66	0.44
1520.1	1550.1	9.06	7.86	7.46	1520.1	1550.1	5.28	5.99	6.86	1520.1	1550.1	1.03	0.71	0.46
1560.1	1590.1	9.24	7.89	7.44	1560.1	1590.1	4.90	6.05	6.43	1560.1	1590.1	1.10	0.80	0.51
1600.1	1630.1	9.43	7.98	7.51	1600.1	1630.1	4.16	5.45	6.07	1600.1	1630.1	1.11	0.88	0.56
1640.1	1670.1	9.60	8.05	7.47	1640.1	1670.1	4.28	5.78	6.30	1640.1	1670.1	1.13	0.89	0.60
1680.1	1710.1	9.86	8.21	7.66	1680.1	1710.1	3.90	4.50	5.46	1680.1	1710.1	1.13	0.96	0.74
1720.1	1750.1	10.10	8.38	7.84	1720.1	1750.1	3.46	3.92	4.19	1720.1	1750.1	1.12	0.90	0.70
1760.1	1790.1	10.61	8.70	8.14	1760.1	1790.1	3.23	3.71	3.73	1760.1	1790.1	1.06	0.95	0.69
1780.1	1810.1	11.04	8.96	8.33	1780.1	1810.1	2.82	2.66	3.25	1780.1	1810.1	1.03	1.00	0.69
1820.1	1850.1	11.56	9.27	8.58	1820.1	1850.1	2.78	2.53	3.89	1820.1	1850.1	0.91	0.91	0.60
1840.1	1870.1	11.89	9.46	8.72	1840.1	1870.1	2.72	2.61	5.27	1840.1	1870.1	0.91	0.96	0.57
1880.1	1910.1	12.68	9.90	8.88	1880.1	1910.1	3.89	2.74	5.74	1880.1	1910.1	0.63	0.98	0.64
1900.1	1930.1	12.75	9.95	8.94	1900.1	1930.1	4.23	2.85	6.36	1900.1	1930.1	0.53	0.91	0.57

Frequency Mixer

RMS-5L+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=900.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=400.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1400.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+3			+3			+3
500.0	400.1	5.05	10.0	410.1	7.19	800.0	600.1	7.72
480.4	419.7	4.98	29.8	429.9	7.39	780.3	619.9	7.66
460.8	439.3	4.96	49.5	449.6	7.51	760.5	639.6	7.53
441.2	458.9	4.99	69.3	469.4	7.61	740.7	659.4	7.51
421.6	478.5	4.98	89.0	489.1	7.68	721.0	679.1	7.46
402.0	498.1	4.95	108.8	508.9	7.74	701.3	698.9	7.44
382.4	517.7	4.98	128.5	528.6	7.83	681.5	718.6	7.45
362.8	537.3	5.06	148.3	548.4	7.89	661.7	738.4	7.43
343.2	556.9	5.13	168.0	568.1	7.93	642.0	758.1	7.48
323.6	576.5	5.19	187.8	587.9	7.95	622.3	777.9	7.49
304.0	596.1	5.27	207.5	607.6	7.93	602.5	797.6	7.56
284.4	615.7	5.34	227.3	627.4	7.94	582.7	817.4	7.55
264.8	635.3	5.44	247.0	647.1	7.97	563.0	837.1	7.62
245.2	654.9	5.52	266.8	666.9	8.00	543.3	856.9	7.77
225.6	674.5	5.64	286.5	686.6	7.92	523.5	876.6	7.85
206.0	694.1	5.67	306.3	706.4	7.95	503.8	896.4	8.05
166.8	733.3	5.83	326.0	726.1	7.91	484.0	916.1	8.11
147.2	752.9	5.94	345.8	745.9	7.95	464.3	935.9	8.26
108.0	792.1	5.98	365.5	765.6	7.96	444.5	955.6	8.41
88.4	811.7	6.01	385.3	785.4	7.87	424.8	975.4	8.53
49.2	850.9	6.12	405.0	805.1	7.93	405.0	995.1	8.51
29.6	870.5	6.15	424.8	824.9	7.98	385.3	1014.9	8.55
10.0	910.1	6.13	444.5	844.6	7.96	365.5	1034.6	8.65
29.6	929.7	6.14	464.3	864.4	7.93	345.8	1054.4	8.62
68.8	968.9	6.13	484.0	884.1	7.97	326.0	1074.1	8.60
88.4	988.5	6.15	503.8	903.9	7.98	306.3	1093.9	8.54
127.6	1027.7	6.16	523.5	923.6	7.93	286.5	1113.6	8.44
147.2	1047.3	6.27	543.3	943.4	8.06	266.8	1133.4	8.41
186.4	1086.5	6.36	563.0	963.1	8.07	247.0	1153.1	8.30
206.0	1106.1	6.41	582.8	982.9	8.15	227.2	1172.9	8.23
245.2	1145.3	6.49	602.5	1002.6	8.20	207.5	1192.6	8.13
264.8	1164.9	6.50	622.3	1022.4	8.26	187.8	1212.4	8.12
304.0	1204.1	6.55	642.0	1042.1	8.30	168.0	1232.1	8.04
323.6	1223.7	6.63	661.8	1061.9	8.30	148.3	1251.9	7.97
362.8	1262.9	6.77	681.5	1081.6	8.38	128.5	1271.6	8.02
382.4	1282.5	6.80	701.3	1101.4	8.35	108.8	1291.4	7.94
421.6	1321.7	6.89	721.0	1121.1	8.38	89.0	1311.1	7.96
441.2	1341.3	6.92	740.8	1140.9	8.37	69.2	1330.9	7.92
480.4	1380.5	6.83	780.2	1180.4	8.39	29.8	1370.4	7.91
500.0	1400.1	6.83	800.0	1200.1	8.33	10.0	1390.1	7.80



Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	0	+3	+6	0	+3	+6
400.1	27.94	27.20	26.50	28.68	32.28	31.88
440.1	27.53	26.78	26.05	28.26	32.00	31.12
480.1	27.84	27.09	26.37	28.22	32.22	30.82
520.1	28.55	27.76	27.03	27.88	32.37	30.34
560.1	28.85	28.06	27.28	27.90	32.47	29.30
600.1	29.26	28.46	27.63	28.13	32.43	28.20
640.1	30.13	29.36	28.51	28.59	31.59	26.56
680.1	31.60	30.96	30.07	28.80	31.27	25.89
720.1	32.86	32.38	31.29	29.47	30.69	25.02
760.1	33.95	33.91	32.55	30.76	30.26	24.34
800.1	35.67	36.58	34.56	32.88	28.84	23.18
840.1	37.14	40.60	37.31	35.10	27.16	22.02
880.1	36.80	45.35	41.96	36.12	25.65	21.18
920.1	35.29	44.56	46.09	32.61	23.18	19.40
960.1	33.36	38.85	41.40	29.94	21.74	18.26
1000.1	31.38	35.11	37.11	27.80	20.61	17.33
1040.1	29.39	32.14	33.76	25.83	19.56	16.50
1080.1	27.82	29.95	31.25	24.37	18.83	15.99
1120.1	26.90	28.67	29.72	22.69	17.90	15.32
1160.1	25.89	27.39	28.34	21.93	17.48	14.94
1200.1	25.01	26.33	27.21	21.02	16.91	14.44
1240.1	24.31	25.49	26.38	20.03	16.34	13.99
1280.1	23.74	24.84	25.75	18.89	15.66	13.45
1320.1	23.25	24.34	25.23	17.80	14.93	12.89
1360.1	22.91	24.10	25.04	16.91	14.40	12.54
1400.1	22.55	23.82	24.82	15.86	13.65	11.93
1440.1	22.34	23.74	24.84	14.95	13.03	11.47
1480.1	21.97	23.55	24.80	14.16	12.45	11.05
1520.1	21.81	23.56	24.98	13.47	11.98	10.68
1560.1	21.66	23.57	25.16	12.72	11.43	10.24
1600.1	21.16	23.27	25.08	12.27	11.18	10.11
1640.1	20.63	22.89	24.87	11.67	10.78	9.79
1680.1	20.50	22.81	24.86	11.15	10.50	9.64
1720.1	19.78	22.04	24.09	10.69	10.26	9.51
1760.1	19.00	21.09	23.07	10.16	9.92	9.27
1780.1	18.93	20.97	22.94	9.85	9.71	9.11
1820.1	18.16	20.08	22.08	9.17	9.19	8.68
1840.1	18.34	20.23	22.25	8.87	8.93	8.46
1880.1	17.64	19.48	21.52	8.06	8.21	7.86
1900.1	17.59	19.38	21.39	7.67	7.87	7.63

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		0	+3	+6
400.1	430.1	17.71	16.65	16.07
440.1	470.1	17.28	16.22	15.72
480.1	510.1	16.85	15.83	15.39
520.1	550.1	16.84	15.75	15.28
560.1	590.1	17.19	16.01	15.40
600.1	630.1	17.82	16.68	15.96
640.1	670.1	18.75	17.80	17.17
680.1	710.1	19.79	19.03	18.46
720.1	750.1	20.90	20.22	19.61
760.1	790.1	21.82	20.89	20.13
800.1	830.1	22.74	21.07	19.97
840.1	870.1	23.90	21.41	19.78
880.1	910.1	24.38	21.82	19.63
920.1	950.1	23.37	21.84	19.85
960.1	990.1	21.31	20.78	19.59
1000.1	1030.1	19.14	19.04	18.55
1040.1	1070.1	17.55	17.61	17.56
1080.1	1110.1	16.31	16.38	16.47
1120.1	1150.1	15.34	15.36	15.49
1160.1	1190.1	14.58	14.63	14.84
1200.1	1230.1	13.99	14.15	14.45
1240.1	1270.1	13.55	13.81	14.22
1280.1	1310.1	13.25	13.58	14.08
1320.1	1350.1	13.10	13.50	14.04
1360.1	1390.1	13.09	13.55	14.13
1400.1	1430.1	13.14	13.68	14.28
1440.1	1470.1	13.29	13.92	14.55
1480.1	1510.1	13.41	14.15	14.82
1520.1	1550.1	13.57	14.45	15.21
1560.1	1590.1	13.71	14.78	15.66
1600.1	1630.1	13.85	15.09	16.16
1640.1	1670.1	13.88	15.34	16.60
1680.1	1710.1	13.75	15.44	16.89
1720.1	1750.1	13.56	15.43	16.97
1760.1	1790.1	13.24	15.22	16.88
1780.1	1810.1	13.06	15.14	16.95
1820.1	1850.1	12.94	15.16	17.19
1840.1	1870.1	12.97	15.26	17.47
1880.1	1910.1	12.95	15.37	17.79
1900.1	1930.1	13.27	15.77	18.28

Frequency Mixer

RMS-5L+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		0	+3	+6
400.1	430.1	4.01	3.57	3.39
440.1	470.1	3.33	2.99	2.86
480.1	510.1	2.85	2.57	2.46
520.1	550.1	2.48	2.23	2.14
560.1	590.1	2.16	1.95	1.87
600.1	630.1	1.95	1.75	1.66
640.1	670.1	1.75	1.55	1.46
680.1	710.1	1.64	1.42	1.31
720.1	750.1	1.55	1.31	1.19
760.1	790.1	1.58	1.31	1.14
800.1	830.1	1.63	1.35	1.18
840.1	870.1	1.81	1.51	1.33
880.1	910.1	2.00	1.69	1.48
920.1	950.1	2.26	1.94	1.72
960.1	990.1	2.52	2.20	1.96
1000.1	1030.1	2.76	2.44	2.19
1040.1	1070.1	3.07	2.75	2.48
1080.1	1110.1	3.27	2.99	2.73
1120.1	1150.1	3.51	3.27	3.04
1160.1	1190.1	3.58	3.43	3.27
1200.1	1230.1	3.62	3.52	3.44
1240.1	1270.1	3.61	3.54	3.53
1280.1	1310.1	3.67	3.58	3.60
1320.1	1350.1	3.65	3.53	3.55
1360.1	1390.1	3.70	3.55	3.57
1400.1	1430.1	3.65	3.47	3.48
1440.1	1470.1	3.70	3.48	3.46
1480.1	1510.1	3.67	3.41	3.35
1520.1	1550.1	3.79	3.45	3.33
1560.1	1590.1	3.73	3.33	3.15
1600.1	1630.1	3.78	3.30	3.08
1640.1	1670.1	3.74	3.20	2.92
1680.1	1710.1	3.84	3.25	2.91
1720.1	1750.1	3.88	3.26	2.87
1760.1	1790.1	3.94	3.32	2.89
1780.1	1810.1	4.14	3.45	2.97
1820.1	1850.1	4.11	3.42	2.92
1840.1	1870.1	4.12	3.42	2.91
1880.1	1910.1	4.56	3.71	3.11
1900.1	1930.1	4.44	3.60	3.01

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	0	+3	+6
400.1	1.26	1.66	2.28
440.1	1.27	1.70	2.32
480.1	1.30	1.72	2.34
520.1	1.30	1.74	2.37
560.1	1.32	1.78	2.40
600.1	1.35	1.82	2.44
640.1	1.39	1.88	2.50
680.1	1.41	1.88	2.49
720.1	1.44	1.92	2.52
760.1	1.46	1.94	2.53
800.1	1.51	1.98	2.57
840.1	1.55	2.03	2.61
880.1	1.58	2.06	2.62
920.1	1.64	2.13	2.70
960.1	1.68	2.15	2.70
1000.1	1.71	2.19	2.72
1040.1	1.75	2.22	2.74
1080.1	1.77	2.23	2.73
1120.1	1.85	2.30	2.81
1160.1	1.88	2.32	2.81
1200.1	1.93	2.36	2.85
1240.1	2.00	2.43	2.90
1280.1	2.04	2.45	2.90
1320.1	2.10	2.48	2.92
1360.1	2.15	2.50	2.91
1400.1	2.20	2.52	2.91
1440.1	2.26	2.57	2.93
1480.1	2.32	2.59	2.93
1520.1	2.38	2.63	2.94
1560.1	2.43	2.64	2.92
1600.1	2.49	2.66	2.92
1640.1	2.54	2.67	2.90
1680.1	2.57	2.68	2.88
1720.1	2.64	2.71	2.89
1760.1	2.67	2.72	2.88
1780.1	2.68	2.71	2.87
1820.1	2.73	2.75	2.90
1840.1	2.76	2.76	2.89
1880.1	2.74	2.75	2.85
1900.1	2.78	2.77	2.86

IF (OUT) (MHz)	IF VSWR @LO=1400.1MHz (:1)		
	@LO (dBm)		
	0	+3	+6
10.0	2.07	1.75	1.48
29.8	1.88	1.46	1.18
49.5	1.81	1.41	1.15
69.3	1.79	1.37	1.11
89.0	1.78	1.44	1.13
108.8	1.84	1.45	1.13
128.5	1.83	1.44	1.13
148.3	1.80	1.42	1.14
168.0	1.80	1.41	1.14
187.8	1.85	1.44	1.16
207.5	1.84	1.45	1.16
227.3	1.83	1.43	1.15
247.0	1.84	1.43	1.14
266.8	1.81	1.41	1.12
286.5	1.80	1.40	1.12
306.3	1.80	1.39	1.12
326.0	1.80	1.39	1.11
345.8	1.77	1.37	1.10
365.5	1.77	1.37	1.09
385.3	1.76	1.35	1.08
405.0	1.75	1.35	1.07
424.8	1.74	1.34	1.07
444.5	1.73	1.32	1.07
464.3	1.73	1.32	1.06
484.0	1.72	1.31	1.05
503.8	1.70	1.29	1.04
523.5	1.69	1.28	1.04
543.3	1.68	1.27	1.05
563.0	1.66	1.26	1.05
582.8	1.64	1.26	1.06
602.5	1.62	1.24	1.08
622.3	1.62	1.23	1.09
642.0	1.60	1.23	1.11
661.8	1.60	1.23	1.12
681.5	1.59	1.21	1.13
701.3	1.57	1.21	1.14
721.0	1.53	1.20	1.17
740.8	1.53	1.20	1.20
780.3	1.50	1.19	1.22
800.0	1.47	1.18	1.24

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+5	4	11	21	22	39	40	54	50	60
1	-	15	+0	25	19	38	39	43	51	55	70	67
2	112	43	33	48	35	47	55	57	72	70	71	85
3	117	76	59	61	59	65	66	73	83	73	89	84
4	116	91	94	83	78	77	74	88	87	87	93	91
5	115	96	95	102	85	90	77	91	92	110	97	99
6	109	105	111	94	100	89	90	77	84	90	95	100
7	108	100	99	100	97	97	105	89	92	83	92	100
8	120	97	99	108	98	98	99	103	92	85	86	103
9	109	98	102	95	112	102	99	100	94	88	95	94
10	124	94	102	92	106	107	94	106	100	102	88	86
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 900.1 MHz; -18.00 dBm.
 LO IN: 930.01 MHz; +3.00 dBm
 IF OUT: 29.91 MHz; -24.36 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	4	16	22	35	33	52	53	64	66	73
1	-	15	+0	26	21	41	43	54	56	68	72	77
2	99	33	25	38	26	38	49	50	64	71	72	85
3	116	54	41	40	43	59	48	58	61	59	75	73
4	111	58	65	61	63	53	60	56	66	68	83	83
5	110	69	67	73	57	55	58	59	69	68	86	72
6	107	88	79	69	86	75	61	65	67	68	81	80
7	122	101	89	86	82	97	73	73	69	74	82	80
8	105	103	111	99	94	84	93	89	75	76	81	81
9	113	109	103	124	98	94	87	97	88	82	81	89
10	107	113	108	109	110	106	108	108	111	97	94	87
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 900.1 MHz; -8.00 dBm.
 LO IN: 930.01 MHz; +3.00 dBm
 IF OUT: 29.91 MHz; -14.49 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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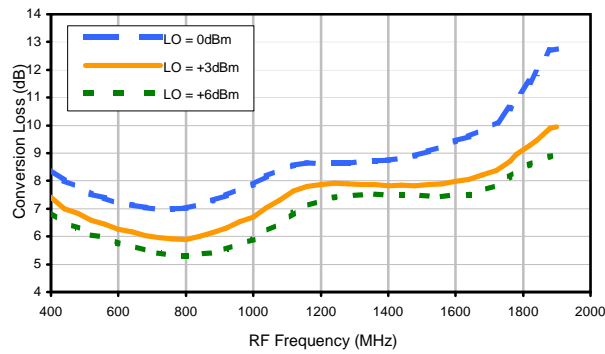


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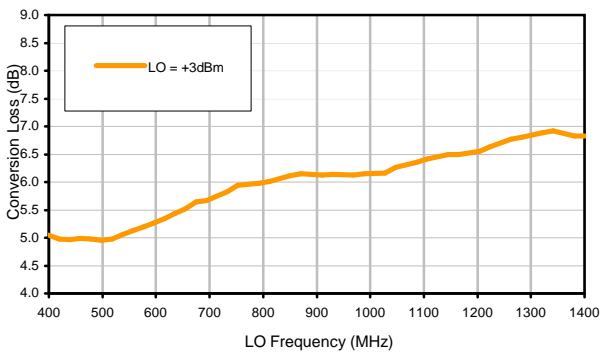


Typical Performance Curves

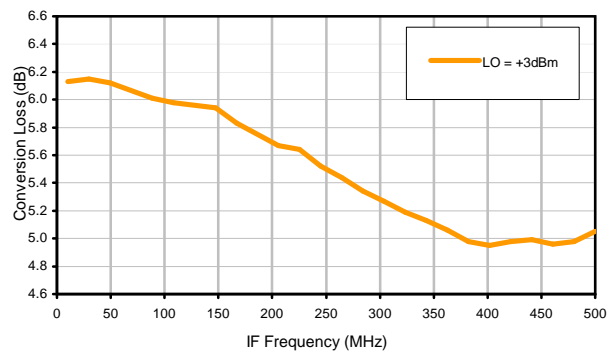
Conversion Loss @ IF=30MHz



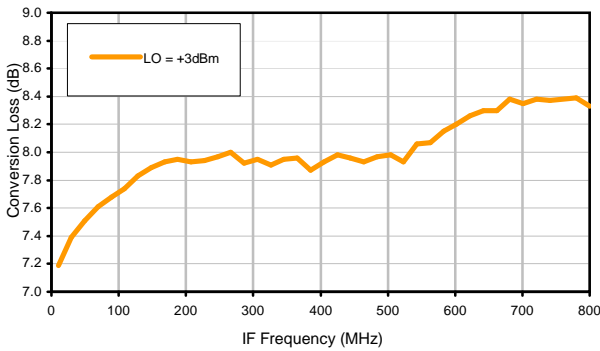
Conversion Loss vs. LO @ RF=900.1MHz



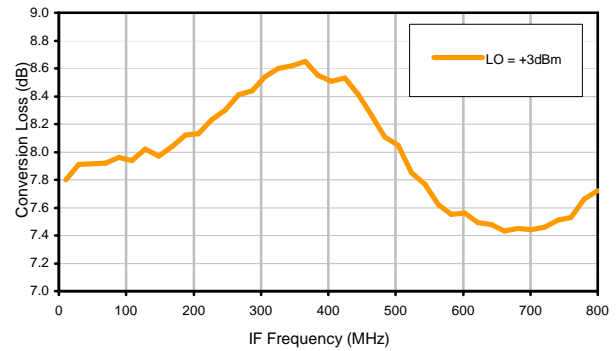
Conversion Loss vs. IF @ RF=900.1MHz



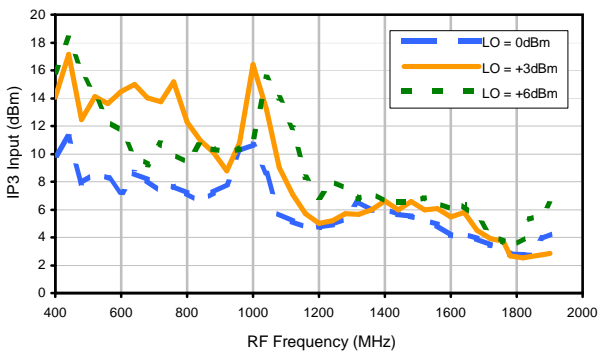
Conversion Loss vs. IF @ RF=400.1MHz



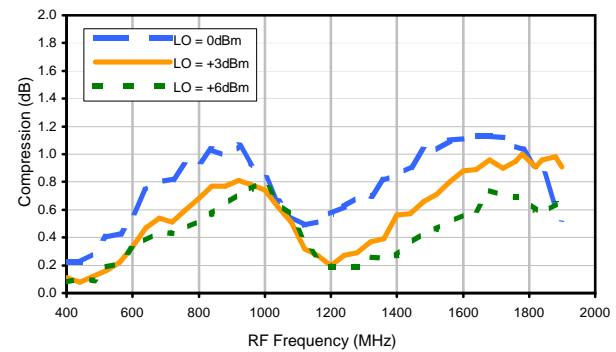
Conversion Loss vs. IF @ RF=1400.1MHz



IP3 Input

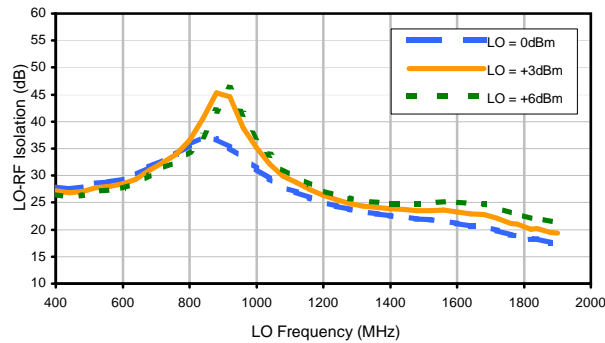


Compression @ RF IN=-3dBm

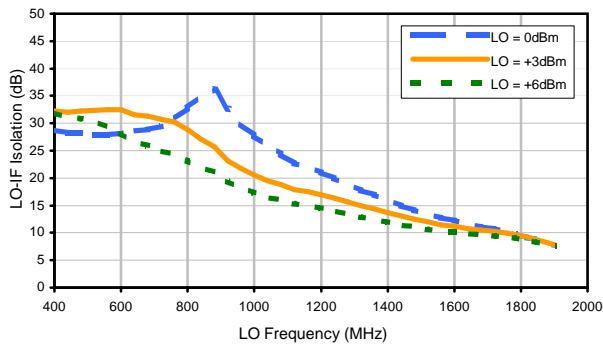


Typical Performance Curves

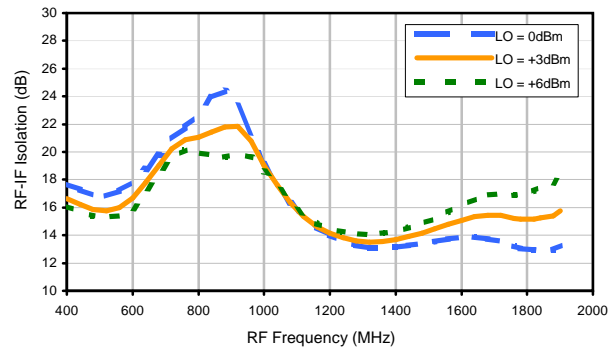
LO-RF Isolation



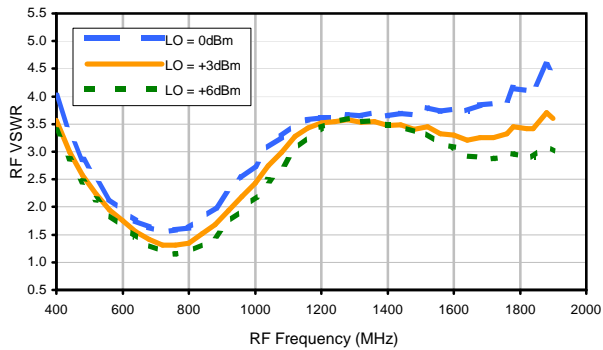
LO-IF Isolation



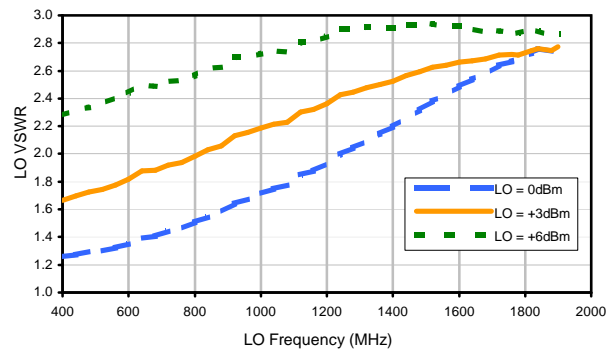
RF-IF Isolation



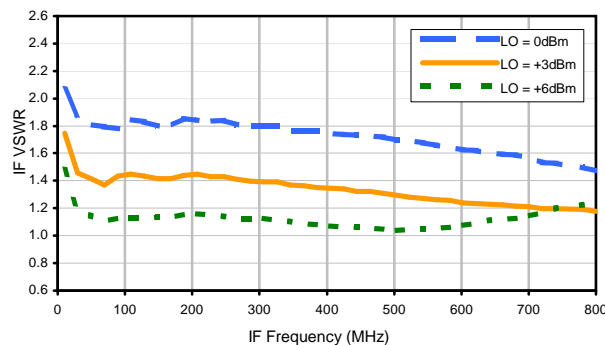
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+5	4	11	21	22	39	40	54	50	60
1	-	15	+0	25	19	38	39	43	51	55	70	67
2	112	43	33	48	35	47	55	57	72	70	71	85
3	117	76	59	61	59	65	66	73	83	73	89	84
4	116	91	94	83	78	77	74	88	87	87	93	91
5	115	96	95	102	85	90	77	91	92	110	97	99
6	109	105	111	94	100	89	90	77	84	90	95	100
7	108	100	99	100	97	97	105	89	92	83	92	100
8	120	97	99	108	98	98	99	103	92	85	86	103
9	109	98	102	95	112	102	99	100	94	88	95	94
10	124	94	102	92	106	107	94	106	100	102	88	86
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 900.1 MHz; -18.00 dBm.
 LO IN: 930.01 MHz; +3.00 dBm
 IF OUT: 29.91 MHz; -24.36 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	4	16	22	35	33	52	53	64	66	73
1	-	15	+0	26	21	41	43	54	56	68	72	77
2	99	33	25	38	26	38	49	50	64	71	72	85
3	116	54	41	40	43	59	48	58	61	59	75	73
4	111	58	65	61	63	53	60	56	66	68	83	83
5	110	69	67	73	57	55	58	59	69	68	86	72
6	107	88	79	69	86	75	61	65	67	68	81	80
7	122	101	89	86	82	97	73	73	69	74	82	80
8	105	103	111	99	94	84	93	89	75	76	81	81
9	113	109	103	124	98	94	87	97	88	82	81	89
10	107	113	108	109	110	106	108	108	111	97	94	87
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 900.1 MHz; -8.00 dBm.
 LO IN: 930.01 MHz; +3.00 dBm
 IF OUT: 29.91 MHz; -14.49 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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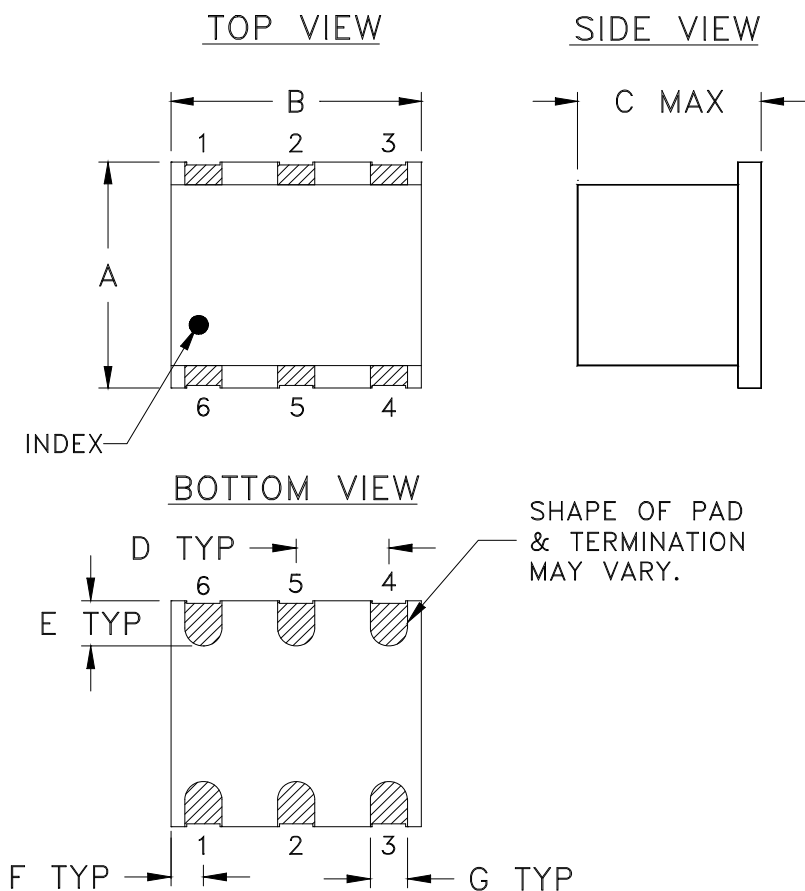


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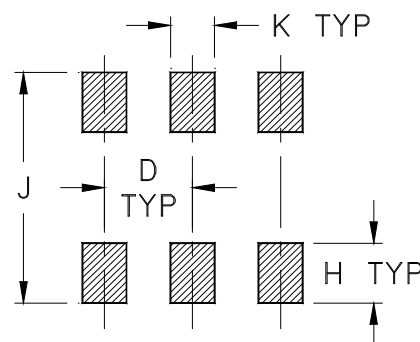


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Outline Dimensions



PCB Land Pattern



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

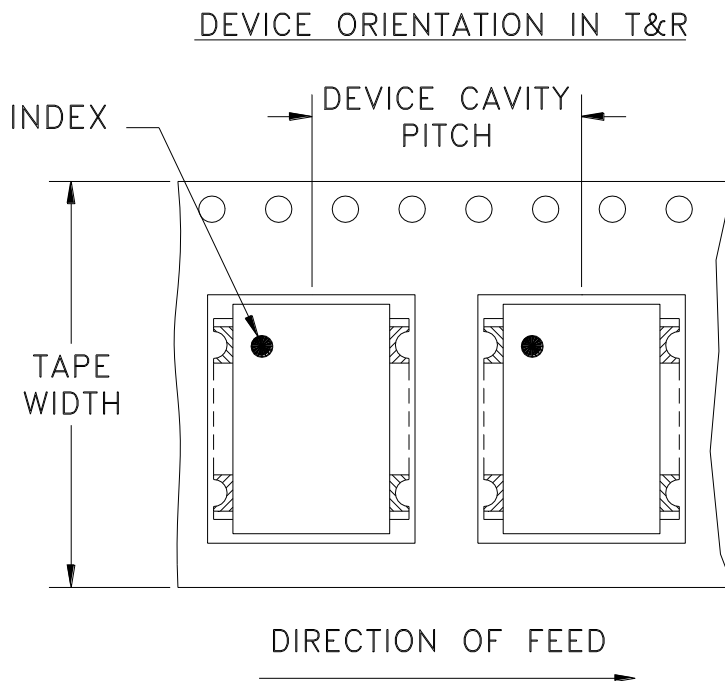
CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAM
TT240	.250 (6.35)	.31 (7.87)	.20 (5.08)	.100 (2.54)	.050 (1.27)	.055 (1.40)	.040 (1.02)	.070 (1.78)	.270 (6.86)	.050 (1.27)	.50

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 ±		

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 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



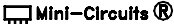
NOTES:

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

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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