Plug-In

Frequency Mixer

TFM-15+

Level 10 (LO Power +10 dBm) 10 to 3000 MHz

Generic photo used for illustration purposes only

CASE STYLE: B13

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

Maximum Ratings

Operating Temperature	-55°C to 100°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	2
GROUND	3
CASE GROUND	3

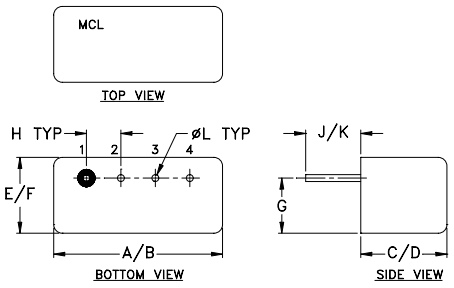
Features

- low conversion loss, 6.75 dB typ.
- excellent L-R isolation, 35 dB typ.
- wideband, 10 to 3000 MHz
- rugged welded construction
- hermetically sealed

Applications

- cellular
- ISM/GSM
- PCN
- MMDS

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F
.480	.500	.390	.405	.210	.230
12.19	12.70	9.91	10.29	5.33	5.84
G	**H**	**J**	**K**	**L**	**wt**
.16	.100	.14	.20	.020	grams
4.06	2.54	3.56	5.08	0.51	2.3

Electrical Specifications

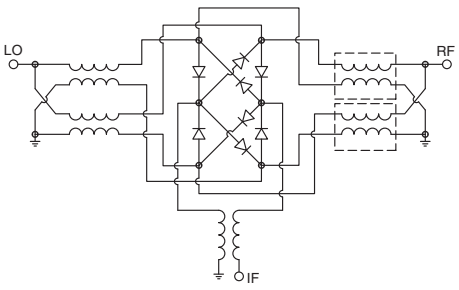
FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)	
		Mid-Band m							
LO/RF f_L-f_U	IF	$\overline{X}$	σ	Max.	Total Range Max.	Typ.	Min.	Typ.	Min.
10-3000	10-800	6.75	0.08	8.0	8.5	35	25	30	20

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

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm
10.00	40.00	6.53	26.10	25.08	1.84	1.71
20.00	50.00	6.60	30.38	29.74	1.54	1.51
100.00	70.00	6.55	35.82	35.93	1.50	1.37
200.00	170.00	6.60	37.35	38.21	1.55	1.44
400.00	370.00	6.74	36.49	39.50	1.72	1.40
500.00	470.00	6.52	35.42	38.00	1.99	1.34
790.00	760.00	6.70	32.94	33.60	2.45	1.33
920.00	890.00	6.76	32.80	33.97	2.70	1.36
1180.00	1150.00	7.30	31.62	32.89	2.85	1.36
1310.00	1280.00	7.30	31.27	34.31	2.75	1.38
1500.00	1470.00	6.54	29.76	32.85	2.28	1.30
1700.00	1670.00	6.91	28.49	30.87	1.94	1.27
1830.00	1800.00	6.97	29.46	28.22	1.44	1.29
2000.00	1970.00	7.07	28.32	27.77	1.25	1.34
2200.00	2170.00	6.97	27.89	27.68	1.42	1.34
2480.00	2450.00	6.93	28.37	24.64	1.97	1.44
2610.00	2580.00	7.08	27.10	23.13	2.18	1.52
2740.00	2710.00	7.45	26.79	21.95	2.37	1.93
2870.00	2840.00	7.56	26.23	21.25	2.09	2.25
3000.00	2970.00	8.31	29.30	20.32	2.18	2.63

Electrical Schematic



Notes
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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.
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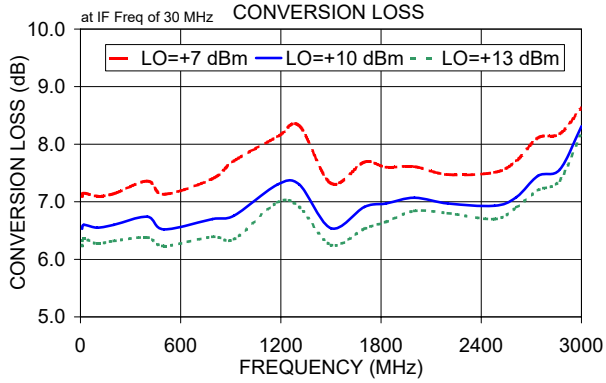
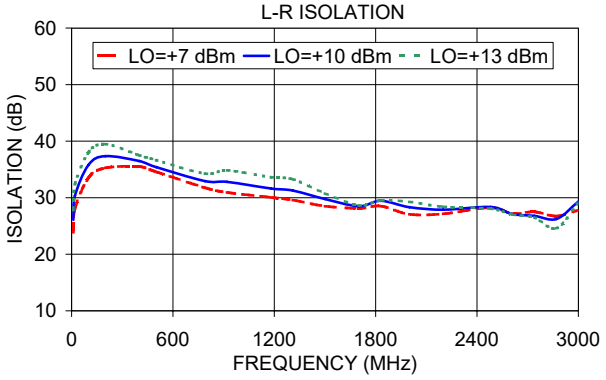
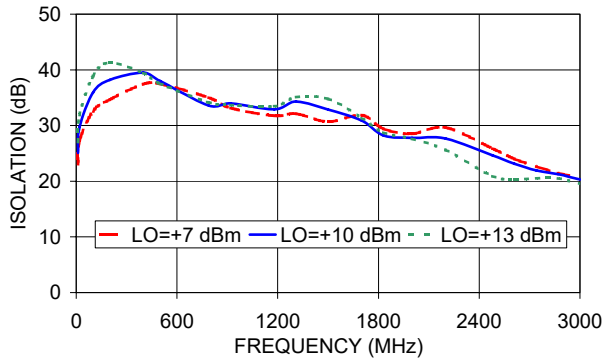
TFM-15
at IF Freq of 30 MHz CONVERSION LOSS



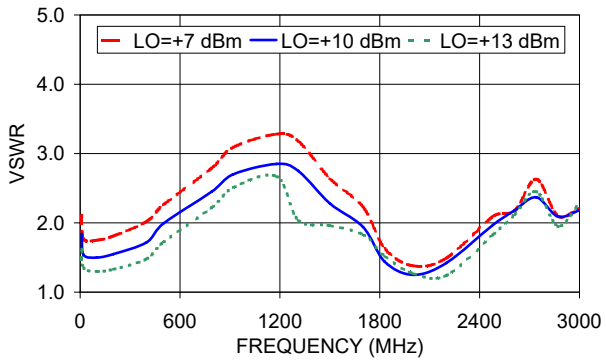
TFM-15
L-R ISOLATION



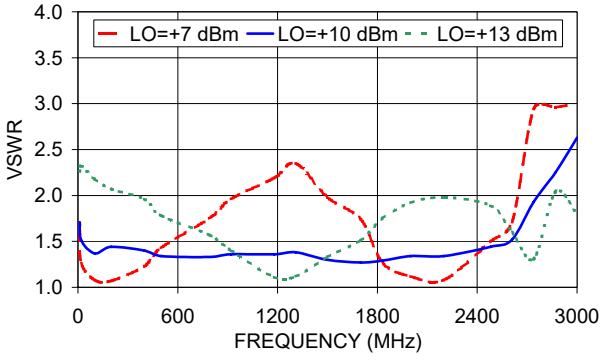
TFM-15
L-I ISOLATION



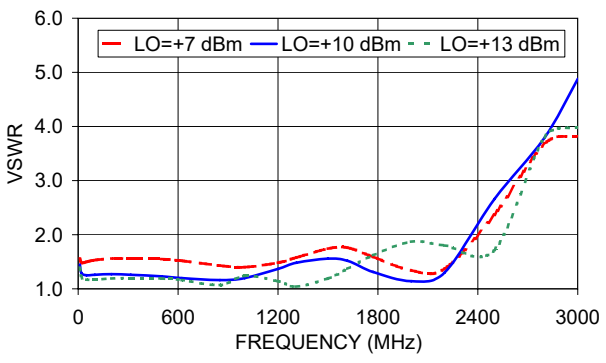
TFM-15
RF VSWR



TFM-15
LO VSWR



TFM-15
IF VSWR



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Frequency Mixer TFM-15+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+7	+10	+13
10.1	40.1	7.24	6.68	6.54
90.6	120.6	7.23	6.78	6.51
171.0	201.0	7.26	6.79	6.55
251.5	281.5	7.56	7.07	6.76
332.0	362.0	7.72	7.20	6.83
412.4	442.4	7.90	7.31	6.87
492.9	522.9	8.13	7.40	6.86
573.4	603.4	8.13	7.32	6.83
653.8	683.8	8.38	7.45	6.92
734.3	764.3	8.43	7.48	6.95
814.8	844.8	8.51	7.54	7.00
915.4	945.4	8.45	7.46	6.99
995.8	1025.8	8.62	7.67	7.17
1096.4	1126.4	8.75	7.86	7.36
1176.9	1206.9	8.66	7.92	7.46
1277.5	1307.5	8.50	7.76	7.35
1357.9	1387.9	8.29	7.54	7.20
1458.5	1488.5	8.41	7.51	7.12
1539.0	1569.0	8.42	7.47	7.03
1639.6	1669.6	8.57	7.59	7.14
1720.0	1750.0	8.51	7.61	7.10
1820.6	1850.6	8.60	7.73	7.28
1901.1	1931.1	8.56	7.63	7.21
2001.7	2031.7	8.47	7.65	7.25
2082.1	2112.1	8.37	7.55	7.11
2182.7	2212.7	8.24	7.47	7.11
2263.2	2293.2	8.20	7.56	7.23
2363.8	2393.8	8.01	7.47	7.19
2444.3	2474.3	8.03	7.52	7.26
2544.8	2574.8	8.09	7.57	7.31
2625.3	2655.3	8.36	7.82	7.57
2725.9	2755.9	8.37	7.86	7.63
2806.4	2836.4	8.60	8.11	7.89
2906.9	2936.9	8.67	8.15	7.90
2987.4	3017.4	9.00	8.36	8.06
3088.0	3118.0	9.16	8.53	8.20
3168.5	3198.5	9.50	8.88	8.56
3269.0	3299.0	9.72	9.15	8.82
3349.5	3379.5	9.99	9.46	9.16
3450.1	3480.1	10.37	9.89	9.64

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+7	+10	+13
10.1	40.1	14.89	20.64	19.63
90.6	120.6	20.51	26.61	23.37
171.0	201.0	22.17	19.87	16.55
251.5	281.5	16.16	14.54	14.26
332.0	362.0	12.79	12.87	14.60
412.4	442.4	12.02	12.98	16.12
492.9	522.9	11.57	13.51	17.95
573.4	603.4	11.79	15.30	20.39
653.8	683.8	11.92	15.96	21.11
734.3	764.3	12.93	17.31	20.52
814.8	844.8	14.46	18.41	19.11
915.4	945.4	15.99	18.58	19.07
995.8	1025.8	14.99	17.46	18.28
1096.4	1126.4	13.73	16.10	17.31
1176.9	1206.9	13.42	14.94	16.46
1277.5	1307.5	13.36	14.90	16.60
1357.9	1387.9	14.08	15.13	16.03
1458.5	1488.5	13.43	14.79	16.15
1539.0	1569.0	12.59	14.48	15.55
1639.6	1669.6	12.24	14.16	15.31
1720.0	1750.0	11.83	13.72	15.45
1820.6	1850.6	11.81	12.90	14.40
1901.1	1931.1	11.87	12.96	14.17
2001.7	2031.7	12.34	13.79	14.57
2082.1	2112.1	11.91	13.14	14.71
2182.7	2212.7	12.89	14.14	15.15
2263.2	2293.2	13.48	14.45	15.52
2363.8	2393.8	14.06	14.98	15.98
2444.3	2474.3	14.85	15.51	16.44
2544.8	2574.8	14.83	16.11	16.98
2625.3	2655.3	15.12	16.56	17.59
2725.9	2755.9	14.68	15.85	17.18
2806.4	2836.4	15.14	16.15	17.37
2906.9	2936.9	15.18	16.66	17.77
2987.4	3017.4	15.24	16.23	17.61
3088.0	3118.0	15.96	16.32	17.25
3168.5	3198.5	16.03	16.49	17.25
3269.0	3299.0	16.38	16.78	17.40
3349.5	3379.5	15.72	16.41	17.22
3450.1	3480.1	16.11	16.31	17.05

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+5dBm (dB) @LO (dBm)		
		+7	+10	+13
10.1	40.1	0.52	0.28	0.20
90.6	120.6	0.50	0.26	0.13
171.0	201.0	0.50	0.21	0.09
251.5	281.5	0.34	0.10	0.00
332.0	362.0	0.29	0.04	-0.01
412.4	442.4	0.21	0.03	0.01
492.9	522.9	0.15	0.05	0.07
573.4	603.4	0.15	0.12	0.10
653.8	683.8	0.14	0.15	0.13
734.3	764.3	0.21	0.21	0.14
814.8	844.8	0.34	0.30	0.20
915.4	945.4	0.45	0.40	0.28
995.8	1025.8	0.46	0.42	0.29
1096.4	1126.4	0.36	0.28	0.21
1176.9	1206.9	0.49	0.31	0.21
1277.5	1307.5	0.64	0.42	0.29
1357.9	1387.9	0.80	0.49	0.31
1458.5	1488.5	0.65	0.48	0.31
1539.0	1569.0	0.61	0.48	0.33
1639.6	1669.6	0.47	0.39	0.28
1720.0	1750.0	0.48	0.36	0.28
1820.6	1850.6	0.49	0.30	0.23
1901.1	1931.1	0.55	0.36	0.25
2001.7	2031.7	0.59	0.41	0.28
2082.1	2112.1	0.63	0.38	0.27
2182.7	2212.7	0.78	0.43	0.28
2263.2	2293.2	0.73	0.37	0.25
2363.8	2393.8	0.78	0.39	0.25
2444.3	2474.3	0.70	0.36	0.23
2544.8	2574.8	0.66	0.35	0.23
2625.3	2655.3	0.60	0.31	0.21
2725.9	2755.9	0.63	0.29	0.19
2806.4	2836.4	0.63	0.26	0.15
2906.9	2936.9	0.63	0.29	0.15
2987.4	3017.4	0.59	0.27	0.16
3088.0	3118.0	0.60	0.24	0.13
3168.5	3198.5	0.53	0.23	0.12
3269.0	3299.0	0.36	0.17	0.12
3349.5	3379.5	0.32	0.17	0.13
3450.1	3480.1	0.27	0.13	0.09

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1510.1MHz (dB)
		@LO (dBm)
		+10
1500.1	10.0	7.77
1460.4	49.7	7.93
1420.6	89.5	8.18
1380.9	129.2	8.18
1341.2	168.9	8.26
1301.4	208.7	8.36
1261.7	248.4	8.29
1222.0	288.1	8.26
1182.2	327.9	8.29
1142.5	367.6	8.22
1102.8	407.3	8.22
1063.0	447.1	8.28
1023.3	486.8	8.23
983.6	526.5	8.17
943.8	566.3	8.20
904.1	606.0	8.08
864.4	645.7	7.97
824.6	685.5	7.98
784.9	725.2	8.03
745.2	764.9	7.87
705.4	804.7	7.89
665.7	844.4	7.88
626.0	884.1	7.75
586.2	923.9	7.70
546.5	963.6	7.73
506.8	1003.3	7.72
467.0	1043.1	7.68
427.3	1082.8	7.61
387.6	1122.5	7.57
347.8	1162.3	7.46
308.1	1202.0	7.41
268.4	1241.7	7.42
228.6	1281.5	7.41
188.9	1321.2	7.39
149.2	1360.9	7.37
129.3	1380.8	7.35
89.6	1420.5	7.37
69.7	1440.4	7.37
30.0	1480.1	7.54
10.1	1500.0	7.87

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB)
		@LO (dBm)
		+10
10.0	20.1	7.23
110.0	120.1	6.82
210.0	220.1	6.72
310.0	320.1	6.55
410.0	420.1	6.69
510.0	520.1	6.69
610.0	620.1	6.71
710.0	720.1	6.78
790.0	800.1	6.70
890.0	900.1	6.79
970.0	980.1	6.72
1070.0	1080.1	6.92
1150.0	1160.1	7.02
1250.0	1260.1	7.14
1330.0	1340.1	7.34
1430.0	1440.1	7.57
1510.0	1520.1	7.75
1610.0	1620.1	7.95
1690.0	1700.1	7.81
1790.0	1800.1	8.11
1870.0	1880.1	8.19
1970.0	1980.1	8.38
2050.0	2060.1	8.58
2150.0	2160.1	8.74
2230.0	2240.1	9.09
2330.0	2340.1	9.34
2410.0	2420.1	9.50
2510.0	2520.1	9.65
2590.0	2600.1	10.22
2690.0	2700.1	10.31
2770.0	2780.1	10.51
2870.0	2880.1	10.67
2950.0	2960.1	10.80
3050.0	3060.1	10.73
3130.0	3140.1	11.17
3230.0	3240.1	11.40
3310.0	3320.1	11.56
3410.0	3420.1	11.63
3490.0	3500.1	11.71
3590.0	3600.1	11.65

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=3010.1MHz (dB)
		@LO (dBm)
		+10
3000.1	10.0	10.61
2919.8	90.3	10.32
2839.6	170.5	9.91
2759.3	250.8	9.78
2679.0	331.1	9.63
2598.8	411.3	9.41
2518.5	491.6	9.26
2438.2	571.9	9.13
2358.0	652.1	9.04
2277.7	732.4	8.89
2197.4	812.7	8.72
2117.1	893.0	8.55
2036.9	973.2	8.41
1956.6	1053.5	8.31
1876.3	1133.8	8.14
1796.1	1214.0	8.09
1715.8	1294.3	7.94
1635.5	1374.6	7.85
1555.3	1454.8	7.74
1475.0	1535.1	7.60
1394.7	1615.4	7.53
1314.5	1695.6	7.43
1234.2	1775.9	7.46
1153.9	1856.2	7.42
1073.7	1936.4	7.49
993.4	2016.7	7.53
913.1	2097.0	7.51
852.9	2157.2	7.51
772.7	2237.4	7.52
712.4	2297.7	7.50
632.2	2377.9	7.52
572.0	2438.1	7.57
491.7	2518.4	7.67
431.5	2578.6	7.75
351.2	2658.9	7.80
291.0	2719.1	7.83
210.8	2799.3	7.93
150.6	2859.5	7.97
70.3	2939.8	8.18
10.1	3000.0	8.71

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+7	+10	+13	+7	+10	+13
40.1	40.47	45.32	49.67	30.30	33.93	37.26
120.6	50.14	56.77	62.59	32.67	36.69	40.64
201.0	55.07	55.28	55.89	34.12	38.30	41.27
281.5	49.34	50.34	51.33	35.15	38.82	39.36
362.0	45.26	46.72	48.13	37.34	39.03	37.27
442.4	43.36	44.99	46.62	40.43	38.78	35.63
522.9	41.03	42.62	44.26	42.21	37.13	33.97
603.4	39.59	41.23	43.00	44.02	35.75	32.95
683.8	38.63	40.05	41.43	44.06	35.04	31.77
764.3	38.14	39.37	40.50	42.56	34.29	30.85
844.8	37.75	38.64	39.34	40.35	33.94	30.50
945.4	37.83	38.21	38.57	37.00	32.76	29.85
1025.8	37.78	38.04	38.20	35.11	32.67	29.52
1126.4	38.30	38.24	38.08	32.96	31.93	29.25
1206.9	38.50	38.19	37.81	31.61	31.56	29.27
1307.5	38.65	37.65	37.06	30.22	30.95	29.33
1387.9	39.47	38.10	37.27	29.01	30.30	29.38
1488.5	39.78	38.42	36.83	27.69	29.60	29.39
1569.0	39.20	37.92	36.32	26.98	29.29	29.80
1669.6	38.43	37.19	35.44	26.23	28.85	30.24
1750.0	38.03	37.28	35.56	25.35	28.03	30.23
1850.6	35.33	35.16	33.94	28.67	30.89	32.57
1931.1	36.04	34.94	33.75	27.26	30.31	33.89
2031.7	35.82	35.17	33.64	27.11	30.34	34.94
2112.1	36.01	35.47	34.13	27.78	31.25	36.71
2212.7	36.09	35.14	33.99	29.21	33.94	41.23
2293.2	35.12	34.67	34.15	30.88	37.04	43.96
2393.8	33.36	33.25	32.82	34.40	42.51	38.46
2474.3	32.20	32.63	32.65	39.12	42.78	35.26
2574.8	31.26	31.82	32.07	45.85	36.67	32.02
2655.3	30.98	31.20	31.53	39.85	32.90	30.25
2755.9	31.14	31.28	31.44	34.42	30.11	28.31
2836.4	30.99	31.26	31.53	31.72	28.64	27.46
2936.9	31.30	31.75	31.97	29.25	27.55	26.69
3017.4	30.71	31.10	31.85	28.17	26.63	26.03
3118.0	29.37	30.01	30.64	26.56	25.67	25.55
3198.5	28.28	29.30	30.33	26.02	25.42	25.38
3299.0	27.89	28.89	29.88	24.91	24.67	24.92
3379.5	28.29	29.45	30.35	24.43	24.31	24.56
3480.1	28.84	30.61	32.02	23.91	24.01	24.49

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+7	+10	+13
10.1	40.1	21.21	20.69	20.91
90.6	120.6	23.70	23.93	23.59
171.0	201.0	24.68	24.68	24.63
251.5	281.5	25.10	25.02	25.14
332.0	362.0	25.58	25.79	25.84
412.4	442.4	26.31	26.37	26.55
492.9	522.9	26.71	26.79	26.79
573.4	603.4	27.26	27.48	27.35
653.8	683.8	27.91	27.89	27.76
734.3	764.3	28.34	27.74	27.37
814.8	844.8	29.06	28.37	27.84
915.4	945.4	29.16	28.12	27.65
995.8	1025.8	29.67	28.56	28.11
1096.4	1126.4	30.52	29.42	28.98
1176.9	1206.9	31.17	30.33	29.75
1277.5	1307.5	32.87	32.00	31.33
1357.9	1387.9	33.94	32.82	32.43
1458.5	1488.5	35.07	33.84	32.94
1539.0	1569.0	34.56	33.37	32.33
1639.6	1669.6	34.18	32.91	31.73
1720.0	1750.0	32.59	31.92	31.46
1820.6	1850.6	28.14	27.78	27.33
1901.1	1931.1	30.06	29.30	28.33
2001.7	2031.7	28.83	28.55	27.62
2082.1	2112.1	27.40	27.59	27.26
2182.7	2212.7	26.65	26.56	26.81
2263.2	2293.2	26.55	26.30	26.42
2363.8	2393.8	26.53	26.91	27.12
2444.3	2474.3	26.73	27.06	27.59
2544.8	2574.8	27.26	27.82	28.62
2625.3	2655.3	27.45	28.05	28.71
2725.9	2755.9	27.92	28.24	28.53
2806.4	2836.4	28.43	28.88	28.95
2906.9	2936.9	28.03	28.43	28.68
2987.4	3017.4	27.72	28.17	28.32
3088.0	3118.0	27.58	27.82	28.26
3168.5	3198.5	27.81	27.98	28.25
3269.0	3299.0	28.67	28.79	28.91
3349.5	3379.5	29.82	30.05	30.26
3450.1	3480.1	30.82	31.42	31.93

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+7	+10	+13
10.1	40.1	1.43	1.34	1.37
90.6	120.6	1.22	1.09	1.05
171.0	201.0	1.26	1.12	1.03
251.5	281.5	1.35	1.20	1.11
332.0	362.0	1.42	1.27	1.18
412.4	442.4	1.51	1.36	1.27
492.9	522.9	1.65	1.48	1.37
573.4	603.4	1.72	1.55	1.45
653.8	683.8	1.86	1.67	1.55
734.3	764.3	1.98	1.78	1.64
814.8	844.8	2.15	1.93	1.79
915.4	945.4	2.21	1.97	1.83
995.8	1025.8	2.39	2.13	1.97
1096.4	1126.4	2.38	2.15	1.99
1176.9	1206.9	2.41	2.21	2.07
1277.5	1307.5	2.22	2.05	1.94
1357.9	1387.9	2.18	2.00	1.90
1458.5	1488.5	2.04	1.87	1.76
1539.0	1569.0	1.98	1.82	1.71
1639.6	1669.6	1.89	1.73	1.62
1720.0	1750.0	1.77	1.64	1.56
1820.6	1850.6	1.73	1.62	1.55
1901.1	1931.1	1.61	1.53	1.49
2001.7	2031.7	1.63	1.57	1.56
2082.1	2112.1	1.52	1.50	1.50
2182.7	2212.7	1.56	1.58	1.59
2263.2	2293.2	1.45	1.49	1.53
2363.8	2393.8	1.49	1.54	1.60
2444.3	2474.3	1.40	1.43	1.49
2544.8	2574.8	1.44	1.46	1.50
2625.3	2655.3	1.41	1.39	1.40
2725.9	2755.9	1.39	1.37	1.39
2806.4	2836.4	1.41	1.36	1.35
2906.9	2936.9	1.33	1.27	1.26
2987.4	3017.4	1.41	1.31	1.27
3088.0	3118.0	1.30	1.21	1.19
3168.5	3198.5	1.32	1.26	1.24
3269.0	3299.0	1.21	1.21	1.23
3349.5	3379.5	1.35	1.41	1.45
3450.1	3480.1	1.39	1.48	1.55

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+7	+10	+13
40.1	1.13	1.68	2.44
120.6	1.08	1.60	2.28
201.0	1.17	1.55	2.17
281.5	1.25	1.55	2.13
362.0	1.30	1.54	2.09
442.4	1.40	1.55	2.07
522.9	1.45	1.51	1.99
603.4	1.56	1.49	1.92
683.8	1.62	1.46	1.83
764.3	1.71	1.46	1.76
844.8	1.78	1.43	1.68
945.4	1.92	1.44	1.58
1025.8	2.01	1.44	1.51
1126.4	2.09	1.43	1.41
1206.9	2.14	1.43	1.33
1307.5	2.19	1.41	1.24
1387.9	2.19	1.40	1.19
1488.5	2.15	1.37	1.15
1569.0	2.10	1.34	1.13
1669.6	2.01	1.29	1.13
1750.0	1.95	1.25	1.16
1850.6	1.82	1.18	1.22
1931.1	1.79	1.15	1.27
2031.7	1.71	1.13	1.31
2112.1	1.69	1.13	1.35
2212.7	1.65	1.12	1.37
2293.2	1.59	1.09	1.39
2393.8	1.53	1.06	1.40
2474.3	1.47	1.04	1.40
2574.8	1.43	1.04	1.41
2655.3	1.39	1.05	1.40
2755.9	1.36	1.06	1.41
2836.4	1.34	1.07	1.41
2936.9	1.31	1.09	1.41
3017.4	1.30	1.10	1.42
3118.0	1.27	1.13	1.45
3198.5	1.24	1.18	1.49
3299.0	1.20	1.24	1.56
3379.5	1.16	1.30	1.63
3480.1	1.14	1.40	1.74

IF (OUT) (MHz)	IF VSWR @LO=3000MHz (:1) @LO (dBm)		
	+7	+10	+13
10.0	1.53	1.42	1.37
50.0	1.57	1.39	1.28
90.0	1.55	1.36	1.24
130.0	1.62	1.42	1.29
170.0	1.58	1.38	1.26
210.0	1.61	1.40	1.27
250.0	1.61	1.40	1.28
310.0	1.63	1.41	1.28
350.0	1.62	1.41	1.28
410.0	1.62	1.41	1.27
450.0	1.58	1.37	1.24
510.0	1.62	1.40	1.27
550.0	1.57	1.35	1.22
610.0	1.62	1.40	1.26
650.0	1.56	1.35	1.22
710.0	1.58	1.36	1.23
750.0	1.54	1.33	1.20
810.0	1.53	1.32	1.20
850.0	1.49	1.28	1.16
910.0	1.49	1.29	1.17
950.0	1.45	1.25	1.14
1010.0	1.43	1.24	1.14
1050.0	1.40	1.21	1.11
1110.0	1.35	1.17	1.10
1150.0	1.33	1.15	1.08
1210.0	1.28	1.13	1.11
1250.0	1.25	1.11	1.10
1310.0	1.23	1.13	1.14
1350.0	1.22	1.13	1.16
1410.0	1.16	1.15	1.21
1450.0	1.16	1.17	1.24
1510.0	1.17	1.25	1.34
1550.0	1.18	1.28	1.39
1610.0	1.24	1.36	1.46
1650.0	1.26	1.40	1.51
1710.0	1.32	1.47	1.59
1750.0	1.36	1.51	1.63
1810.0	1.48	1.65	1.78
1850.0	1.43	1.60	1.73
1910.0	1.55	1.72	1.85

Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	+3	28	10	29	10	28	21	38	25	35
1	-	25	+0	42	17	54	20	36	43	35	37	41
2	83	65	55	66	64	68	>68	59	51	>68	54	60
3	>90	>68	>68	>68	66	>68	>68	>68	68	>68	>68	>68
4	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
5	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
6	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
7	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
8	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
9	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
10	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1500 MHz; -14.00 dBm.
LO IN: 1530 MHz; +10.00 dBm
IF OUT: 30 MHz; -21.89 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	8	39	20	38	21	38	33	59	39	48
1	-	25	+0	43	17	50	20	39	42	38	38	45
2	64	56	46	61	55	60	68	54	42	65	47	53
3	>90	72	52	62	47	60	58	66	50	56	72	56
4	>90	73	76	>78	71	70	>78	>78	77	67	66	>78
5	>90	>78	75	>78	>78	78	71	>78	>78	>78	70	73
6	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
7	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
8	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
9	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
10	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

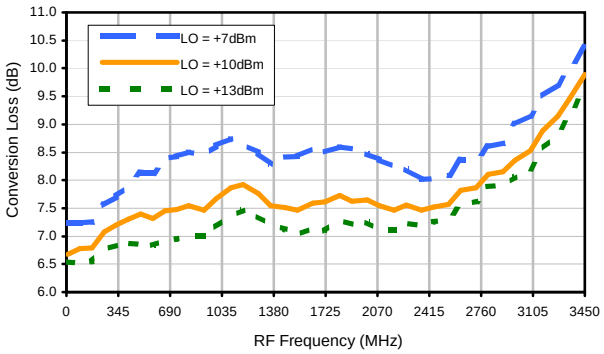
Test conditions: RF IN: 1500 MHz; -4.00 dBm.
LO IN: 1530 MHz; +10.00 dBm
IF OUT: 30 MHz; -11.74 dBm

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.

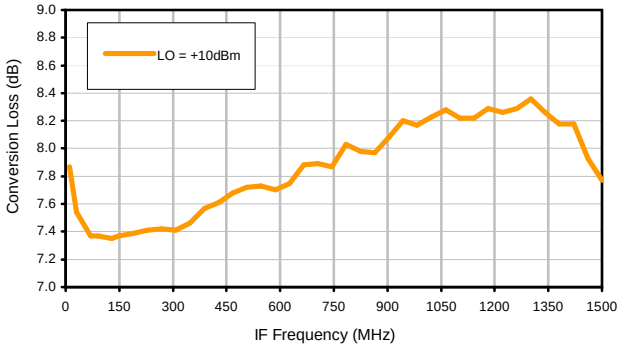
Frequency Mixer TFM-15+

Typical Performance Curves

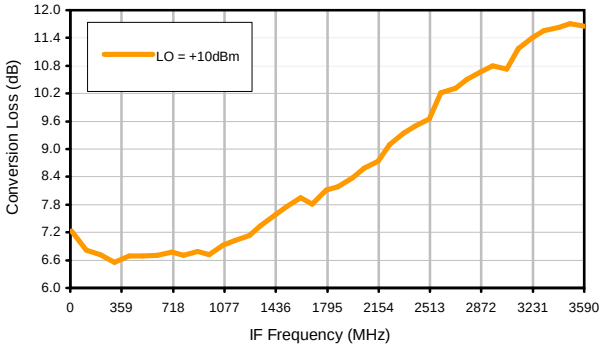
Conversion Loss @ IF=30MHz



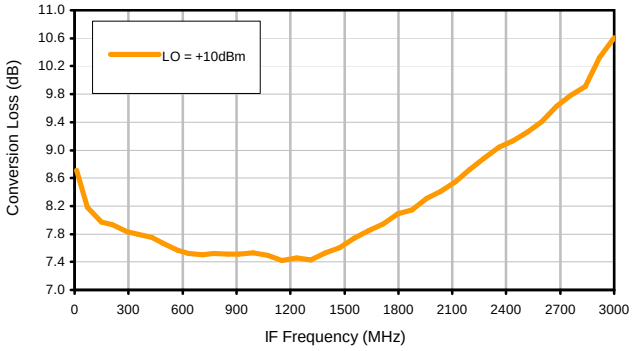
Conversion Loss vs. IF @ RF=1510.1MHz



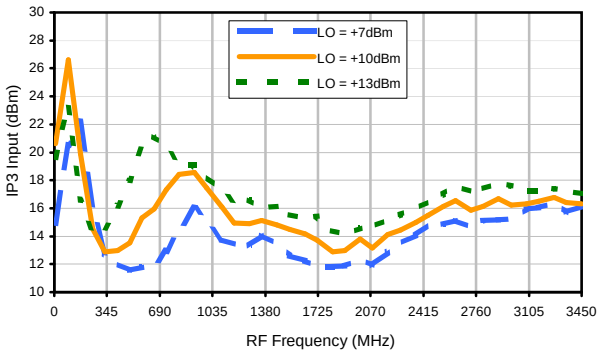
Conversion Loss vs. IF @ RF=10.1MHz



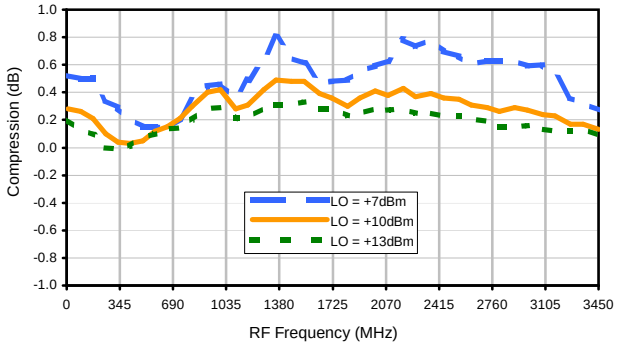
Conversion Loss vs. IF @ RF=3010.1MHz



IP3 Input

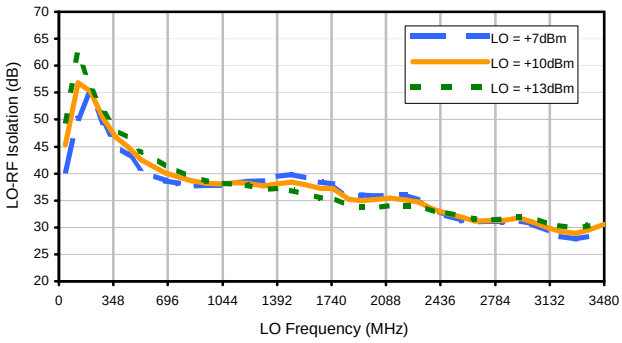


Compression @ RF IN=+5dBm

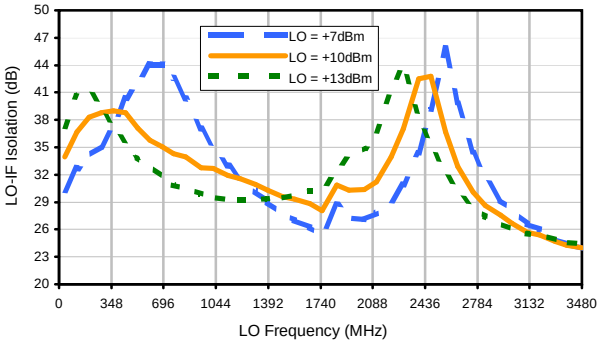


Typical Performance Curves

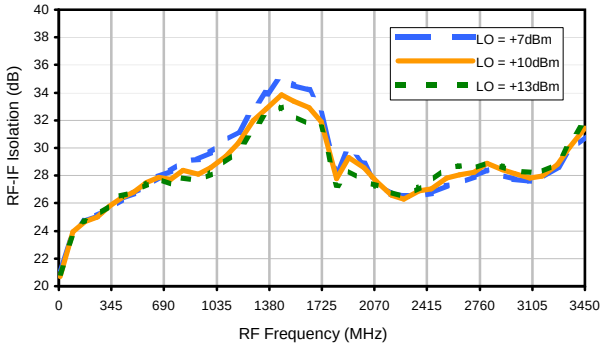
LO-RF Isolation



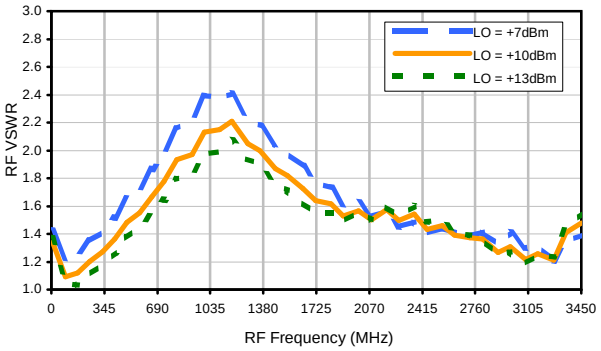
LO-IF Isolation



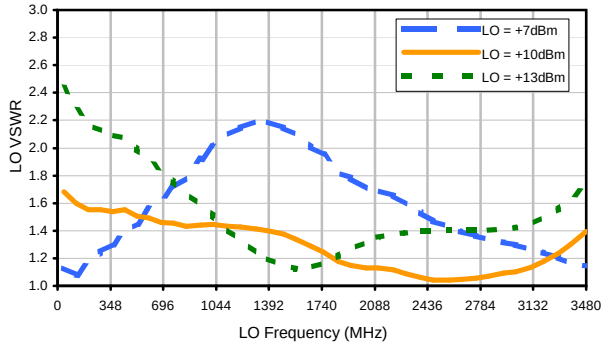
RF-IF Isolation



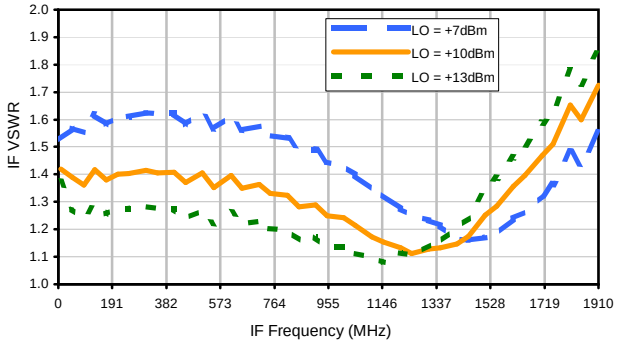
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	+3	28	10	29	10	28	21	38	25	35
1	-	25	+0	42	17	54	20	36	43	35	37	41
2	83	65	55	66	64	68	>68	59	51	>68	54	60
3	>90	>68	>68	>68	66	>68	>68	>68	68	>68	>68	>68
4	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
5	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
6	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
7	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
8	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
9	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
10	>90	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68	>68
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 1500 MHz; -14.00 dBm.
LO IN: 1530 MHz; +10.00 dBm
IF OUT: 30 MHz; -21.89 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	8	39	20	38	21	38	33	59	39	48
1	-	25	+0	43	17	50	20	39	42	38	38	45
2	64	56	46	61	55	60	68	54	42	65	47	53
3	>90	72	52	62	47	60	58	66	50	56	72	56
4	>90	73	76	>78	71	70	>78	>78	77	67	66	>78
5	>90	>78	75	>78	>78	78	71	>78	>78	>78	70	73
6	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
7	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
8	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
9	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
10	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

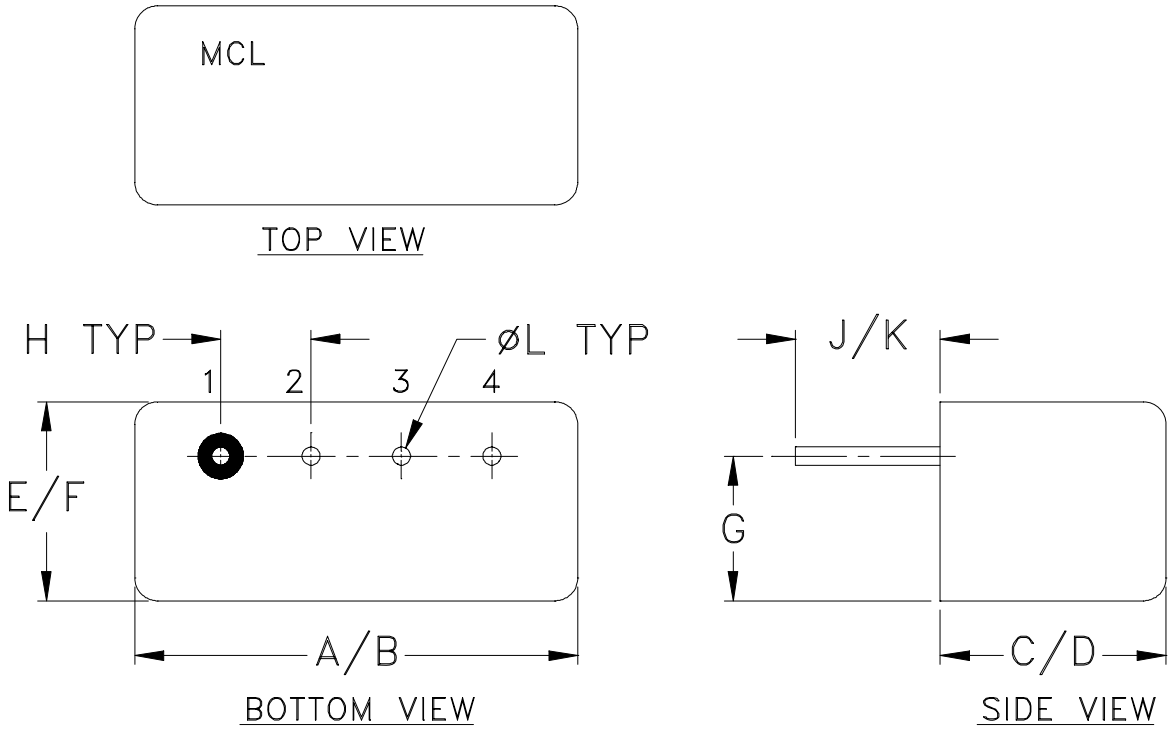
Test conditions:
RF IN: 1500 MHz; -4.00 dBm.
LO IN: 1530 MHz; +10.00 dBm
IF OUT: 30 MHz; -11.74 dBm

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.

Case Style B

B02
B13

Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	L	WT, GRAM
B02	.480 (12.19)	.500 (12.70)	.240 (6.10)	.255 (6.48)	.210 (5.33)	.230 (5.84)	.16 (4.06)	.100 (2.54)	.14 (3.56)	.20 (5.08)	.020 (.51)	1.9
B13			.390 (9.91)	.405 (10.29)								2.3

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3 Pl. ± .015

Notes:

1. Header material: C.R.S.
   Pin material: #52 alloy.
   Cover material: Cupro-Nickel.
2. Pin finish: Electro Tin-Silver.
3. Tolerance on pin diameter +/-.005 inch.
4. Glass meniscus 0.015 inch max.
5. Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.

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Mini-Circuits ISO 9001 & ISO 14001 Certified

Mini-Circuits

Environmental Specifications ENV01

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	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
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
Moisture Resistance	10 cycles, 24 hours per cycle	MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours
Solderability	10X Magnification	J-STD-002, 95% Coverage
Resistance to Solder Heat	260°C for 10 seconds	MIL-STD-202, Method 210, Condition B
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
Terminal Strength	4 1/2 Pound Pull	MIL-STD-202, Method 211, Condition A

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Specification	Test/Inspection Condition	Reference/Spec
Gross Leak	125°C Bubble Test	MIL-STD-202, Method 112, Condition D
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D