

Frequency Mixer

TUF-5LH+

Level 10 (LO Power +10dBm) 20 to 1500 MHz



Generic photo used for illustration purposes only

CASE STYLE: B02

+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	4
RF	1
IF	2
GROUND	3
CASE GROUND	3

Features

- low conversion loss, 6.9 dB typ.
- excellent L-R isolation, 42 dB typ.
- wideband, 20 to 1500 MHz
- rugged welded construction

Applications

- VHF/UHF
- satellite distribution
- cellular
- GSM

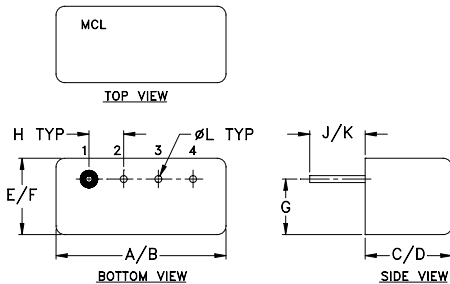
Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			IP3 @ CENTER BAND (dBm)			
		L	M	U	L	M	U				
20-1500	6.9	53	40	42	40	25	30	18	22	8	14

1 dB COMP.: +5 dBm typ.

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

Outline Drawing



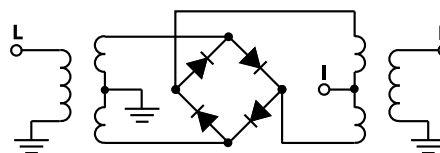
Outline Dimensions (inch/mm)

A	B	C	D	E	F
.480	.500	.240	.255	.210	.230
12.19	12.70	6.10	6.48	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	1.9

Typical Performance Data

Frequency (MHz)	Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
20.00	5.60	62.84	53.91	1.43	2.57
50.00	5.38	57.81	46.30	1.32	2.51
100.00	5.25	52.60	40.86	1.31	2.50
158.75	5.20	49.11	38.29	1.34	2.38
200.00	5.25	47.45	36.98	1.48	2.28
297.50	5.37	44.43	34.13	1.59	2.36
436.25	5.54	42.14	31.89	1.91	2.34
500.00	5.74	41.47	30.68	2.36	2.36
575.00	5.89	40.90	30.02	2.49	2.36
713.75	6.61	40.16	28.61	2.97	2.45
750.00	6.80	39.71	28.48	3.40	2.46
760.00	6.83	39.62	28.42	3.53	2.48
852.50	7.07	39.30	28.00	3.80	2.56
991.25	6.99	38.97	26.26	3.86	2.67
1000.00	7.07	38.98	26.16	3.95	2.70
1130.00	7.19	35.93	24.11	3.91	2.73
1222.50	7.02	38.98	22.14	3.77	2.73
1361.25	6.88	39.21	19.23	3.65	2.77
1453.75	6.78	38.09	16.51	3.54	2.78
1500.00	6.66	37.95	16.08	3.47	2.77

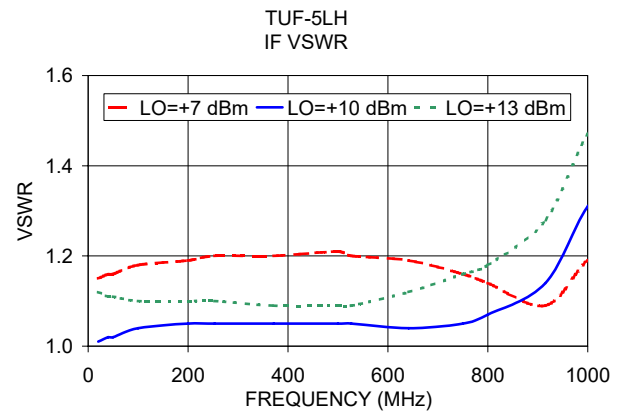
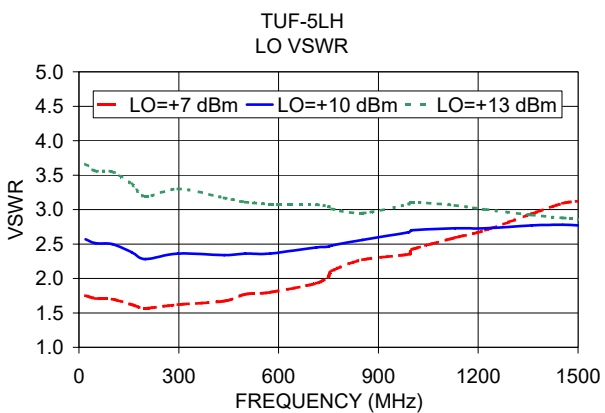
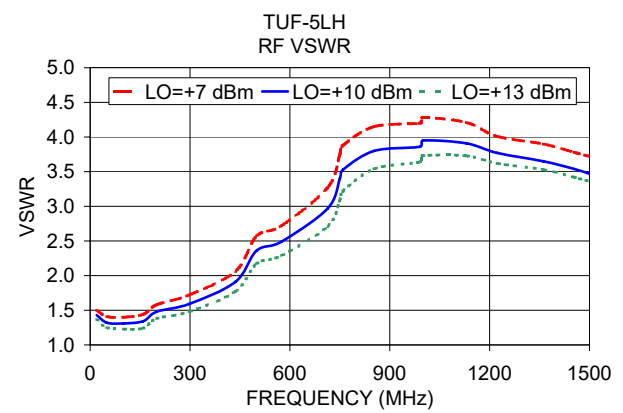
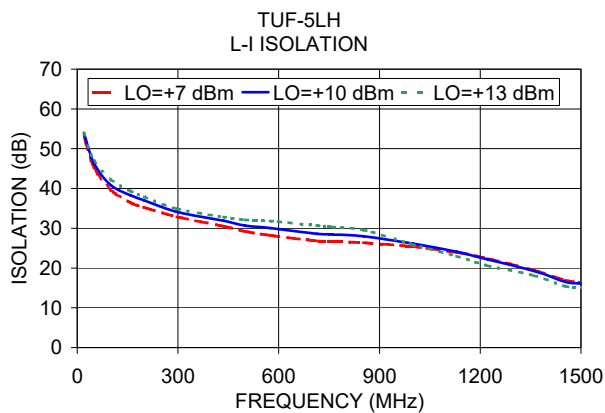
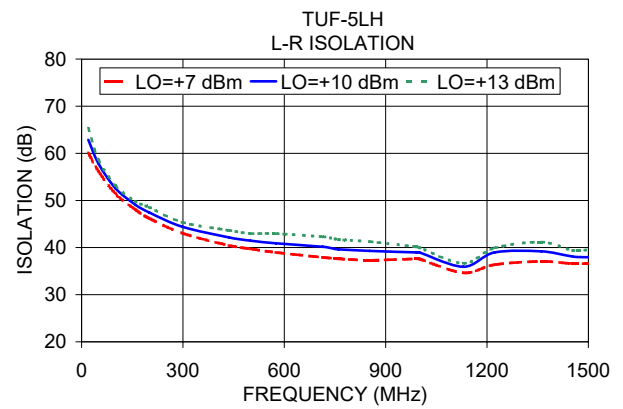
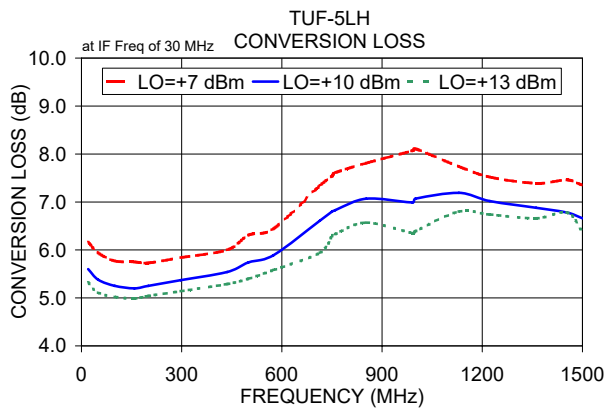
Electrical Schematic



Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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





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Frequency Mixer

TUF-5LH+

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
10.1	40.1	6.53	6.09	5.88	10.1	40.1	16.87	18.73	21.05	10.1	40.1	0.92	0.71	0.55
90.9	120.9	5.97	5.61	5.44	90.9	120.9	18.15	21.01	17.27	90.9	120.9	1.28	1.06	0.79
171.8	201.8	5.98	5.61	5.45	171.8	201.8	16.22	14.62	15.91	171.8	201.8	1.35	1.04	0.78
252.6	282.6	5.98	5.65	5.49	252.6	282.6	12.46	14.25	17.11	252.6	282.6	1.38	0.98	0.74
333.5	363.5	6.06	5.75	5.55	333.5	363.5	12.51	14.39	16.56	333.5	363.5	1.35	0.99	0.78
414.3	444.3	6.14	5.82	5.62	414.3	444.3	12.47	14.12	16.58	414.3	444.3	1.33	1.04	0.81
495.1	525.1	6.29	5.90	5.63	495.1	525.1	11.73	15.25	21.60	495.1	525.1	1.41	1.14	0.93
576.0	606.0	6.43	6.04	5.81	576.0	606.0	12.16	13.94	15.52	576.0	606.0	1.71	1.32	1.09
656.8	686.8	6.72	6.13	5.74	656.8	686.8	11.54	17.55	25.27	656.8	686.8	1.78	1.59	1.36
737.7	767.7	7.22	6.61	6.16	737.7	767.7	10.11	12.18	16.23	737.7	767.7	1.59	1.39	1.32
818.5	848.5	7.69	7.04	6.59	818.5	848.5	11.08	13.29	15.17	818.5	848.5	1.35	1.23	1.15
899.3	929.3	7.84	6.95	6.40	899.3	929.3	10.88	13.00	16.22	899.3	929.3	1.31	1.34	1.30
980.2	1010.2	7.82	6.78	6.32	980.2	1010.2	11.45	13.78	15.43	980.2	1010.2	1.45	1.55	1.37
1061.0	1091.0	7.94	6.99	6.43	1061.0	1091.0	10.52	11.85	13.32	1061.0	1091.0	1.16	1.32	1.26
1141.8	1171.8	7.72	7.12	6.56	1141.8	1171.8	10.74	10.47	11.14	1141.8	1171.8	1.13	1.13	1.12
1202.5	1232.5	7.54	6.99	6.57	1202.5	1232.5	11.08	10.91	10.54	1202.5	1232.5	1.23	1.13	1.06
1283.3	1313.3	7.34	6.91	6.51	1283.3	1313.3	11.59	10.56	10.15	1283.3	1313.3	1.23	1.09	1.02
1343.9	1373.9	7.24	6.80	6.49	1343.9	1373.9	11.45	10.05	9.27	1343.9	1373.9	1.24	1.05	0.98
1424.8	1454.8	7.22	6.80	6.53	1424.8	1454.8	10.79	9.70	9.29	1424.8	1454.8	1.23	0.99	0.90
1485.4	1515.4	7.20	6.77	6.42	1485.4	1515.4	10.34	10.89	14.16	1485.4	1515.4	1.31	1.04	0.91
1566.3	1596.3	7.18	6.50	6.08	1566.3	1596.3	11.30	15.47	15.69	1566.3	1596.3	1.33	1.13	0.86
1626.9	1656.9	6.93	6.24	5.96	1626.9	1656.9	13.83	14.04	15.41	1626.9	1656.9	1.54	1.15	0.74
1707.7	1737.7	6.71	6.14	5.97	1707.7	1737.7	11.74	15.56	18.85	1707.7	1737.7	1.70	0.95	0.61
1768.4	1798.4	6.70	6.21	6.02	1768.4	1798.4	12.81	17.65	19.34	1768.4	1798.4	1.75	0.90	0.61
1849.2	1879.2	6.80	6.33	6.11	1849.2	1879.2	14.66	19.11	20.78	1849.2	1879.2	1.71	0.90	0.62
1909.8	1939.8	7.04	6.46	6.24	1909.8	1939.8	14.71	20.60	22.18	1909.8	1939.8	1.80	1.00	0.70
1990.7	2020.7	7.47	6.63	6.30	1990.7	2020.7	13.19	18.70	24.39	1990.7	2020.7	1.91	1.18	0.85
2051.3	2081.3	7.75	6.75	6.38	2051.3	2081.3	12.97	16.85	19.92	2051.3	2081.3	1.92	1.30	0.95
2132.1	2162.1	8.17	6.76	6.34	2132.1	2162.1	13.73	14.36	17.75	2132.1	2162.1	1.68	1.46	1.07
2192.8	2222.8	9.09	7.09	6.37	2192.8	2222.8	11.44	11.99	16.53	2192.8	2222.8	1.37	1.52	1.21
2273.6	2303.6	9.84	7.53	6.52	2273.6	2303.6	9.75	12.45	13.89	2273.6	2303.6	1.13	1.45	1.32
2334.2	2364.2	9.77	7.63	6.56	2334.2	2364.2	10.86	15.12	14.18	2334.2	2364.2	1.20	1.33	1.28
2415.1	2445.1	10.13	7.85	6.74	2415.1	2445.1	10.44	14.45	15.97	2415.1	2445.1	1.33	1.31	1.23
2475.7	2505.7	10.81	8.26	7.09	2475.7	2505.7	9.03	13.19	14.39	2475.7	2505.7	1.33	1.47	1.20
2556.5	2586.5	11.28	8.44	7.21	2556.5	2586.5	8.96	12.18	13.95	2556.5	2586.5	1.20	1.57	1.24
2617.2	2647.2	11.36	8.53	7.36	2617.2	2647.2	10.21	11.56	13.06	2617.2	2647.2	1.27	1.56	1.24
2698.0	2728.0	12.34	9.24	7.63	2698.0	2728.0	7.67	12.39	13.25	2698.0	2728.0	1.13	1.60	1.39
2758.6	2788.6	12.84	9.75	7.92	2758.6	2788.6	5.44	11.05	13.85	2758.6	2788.6	0.77	1.45	1.46
2839.5	2869.5	13.08	10.01	8.20	2839.5	2869.5	3.41	8.66	12.86	2839.5	2869.5	0.38	1.25	1.54
2900.1	2930.1	14.48	10.69	8.45	2900.1	2930.1	1.92	6.77	12.16	2900.1	2930.1	-0.43	0.88	1.52



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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)=20.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1500.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+10			+10			+10
710.0	40.1	6.11	10.0	30.1	6.00	1000.0	500.1	7.76
692.1	58.0	6.13	30.2	50.3	5.99	979.8	520.3	7.76
674.1	76.0	6.20	50.4	70.5	6.05	959.6	540.5	7.68
656.2	93.9	6.19	70.6	90.7	6.11	939.4	560.7	7.75
638.2	111.9	6.21	90.8	110.9	6.04	919.2	580.9	7.65
620.3	129.8	6.20	111.0	131.1	6.01	899.0	601.1	7.64
602.3	147.8	6.26	131.2	151.3	6.04	878.8	621.3	7.61
584.4	165.7	6.26	151.4	171.5	6.08	858.6	641.5	7.58
566.4	183.7	6.35	171.6	191.7	6.04	838.4	661.7	7.56
548.5	201.6	6.36	191.8	211.9	6.00	818.2	681.9	7.44
530.5	219.6	6.37	212.0	232.1	6.00	798.0	702.1	7.52
512.6	237.5	6.32	232.2	252.3	5.99	777.8	722.3	7.51
494.6	255.5	6.39	252.4	272.5	6.03	757.6	742.5	7.58
476.7	273.4	6.37	272.7	292.8	6.02	737.3	762.8	7.39
458.7	291.4	6.43	292.9	313.0	6.01	717.1	783.0	7.47
440.8	309.3	6.46	313.1	333.2	6.00	696.9	803.2	7.47
422.8	327.3	6.39	333.3	353.4	6.00	676.7	823.4	7.38
404.9	345.2	6.36	353.5	373.6	6.05	656.5	843.6	7.39
386.9	363.2	6.34	373.7	393.8	6.02	636.3	863.8	7.34
369.0	381.1	6.31	393.9	414.0	6.03	616.1	884.0	7.28
351.0	399.1	6.41	434.3	454.4	6.04	575.7	924.4	7.08
333.1	417.0	6.42	454.5	474.6	6.07	555.5	944.6	7.03
315.1	435.0	6.43	494.9	515.0	6.06	515.1	985.0	6.79
297.2	452.9	6.41	515.1	535.2	6.01	494.9	1005.2	6.72
279.2	470.9	6.41	555.5	575.6	6.11	454.5	1045.6	6.66
261.3	488.8	6.45	575.7	595.8	6.07	434.3	1065.8	6.57
243.3	506.8	6.40	616.1	636.2	6.08	393.9	1106.2	6.54
225.4	524.7	6.46	636.3	656.4	6.14	373.7	1126.4	6.56
207.4	542.7	6.47	676.7	696.8	6.17	333.3	1166.8	6.54
189.5	560.6	6.49	696.9	717.0	6.21	313.1	1187.0	6.62
171.5	578.6	6.48	737.3	757.4	6.40	272.7	1227.4	6.72
153.6	596.5	6.52	757.6	777.7	6.35	252.4	1247.7	6.74
135.6	614.5	6.45	798.0	818.1	6.46	212.0	1288.1	6.81
117.7	632.4	6.46	818.2	838.3	6.46	191.8	1308.3	6.81
99.7	650.4	6.38	858.6	878.7	6.54	151.4	1348.7	6.80
81.8	668.3	6.41	878.8	898.9	6.59	131.2	1368.9	6.79
63.8	686.3	6.37	919.2	939.3	6.58	90.8	1409.3	6.80
45.9	704.2	6.46	939.4	959.5	6.65	70.6	1429.5	6.85
27.9	722.2	6.49	979.8	999.9	6.77	30.2	1469.9	6.82
10.0	740.1	6.59	1000.0	1020.1	6.82	10.0	1490.1	7.03



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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+7	+10	+13	+7	+10	+13
10.1	66.48	65.32	64.64	56.15	59.28	58.27
90.9	56.08	56.42	56.76	40.10	41.45	42.69
171.8	50.94	51.49	52.07	35.33	37.07	38.39
252.6	47.83	48.74	49.41	33.24	34.73	35.68
333.5	45.81	46.85	47.61	31.37	32.66	33.61
414.3	44.19	45.17	45.87	29.89	31.18	32.21
495.1	43.25	44.32	45.13	28.42	29.91	31.16
576.0	42.54	44.01	45.28	26.90	28.54	30.11
656.8	41.08	42.44	43.59	25.84	27.67	29.24
737.7	40.18	41.81	43.12	24.58	26.39	28.28
818.5	39.52	41.38	42.96	23.95	25.51	27.05
899.3	39.34	41.44	43.30	23.46	24.79	25.99
980.2	38.45	40.29	41.77	22.58	23.50	24.11
1061.0	37.40	38.59	39.65	21.66	22.30	22.59
1141.8	36.81	37.71	38.25	20.70	20.97	20.91
1202.5	36.41	37.09	37.62	20.10	20.21	19.98
1283.3	35.83	36.50	36.82	19.31	19.22	18.81
1343.9	35.44	36.06	36.38	18.80	18.54	17.99
1424.8	34.91	35.40	35.84	18.11	17.84	17.28
1485.4	34.45	34.79	35.03	17.47	17.02	16.33
1566.3	33.64	33.88	34.20	16.14	15.43	14.50
1626.9	33.01	33.47	34.09	15.15	14.33	13.75
1707.7	32.71	33.60	34.34	14.04	13.45	12.85
1768.4	32.88	33.33	34.03	13.38	12.78	12.41
1849.2	32.85	33.29	33.71	12.51	12.23	11.93
1909.8	32.98	33.23	33.55	12.02	11.78	11.55
1990.7	32.89	33.09	33.37	11.44	11.26	11.09
2051.3	32.65	33.01	33.29	10.94	11.02	10.85
2132.1	32.52	32.71	32.98	10.60	10.63	10.73
2192.8	32.51	33.64	34.10	10.31	10.48	10.60
2273.6	32.81	34.60	35.68	10.08	10.20	10.40
2334.2	32.54	34.36	36.32	9.89	10.14	10.41
2415.1	32.75	34.23	36.25	9.75	10.00	10.28
2475.7	33.24	35.17	37.06	9.62	10.02	10.34
2556.5	33.66	36.27	38.69	9.63	10.09	10.51
2617.2	33.73	36.72	40.38	9.53	9.97	10.58
2698.0	34.50	38.17	42.69	9.52	10.05	10.72
2758.6	35.24	39.75	46.59	9.72	10.24	10.86
2839.5	35.79	40.53	49.40	9.83	10.43	11.13
2900.1	36.70	41.00	47.61	9.87	10.50	11.22

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+7	+10	+13
10.1	40.1	51.97	57.02	46.63
90.9	120.9	48.39	45.32	44.97
171.8	201.8	42.30	41.64	40.83
252.6	282.6	39.43	38.42	38.15
333.5	363.5	37.19	36.26	35.55
414.3	444.3	34.78	34.16	33.79
495.1	525.1	32.51	31.91	31.80
576.0	606.0	30.99	30.54	30.20
656.8	686.8	29.93	29.25	28.78
737.7	767.7	28.17	27.77	27.26
818.5	848.5	27.19	26.94	26.68
899.3	929.3	27.29	26.88	26.45
980.2	1010.2	28.81	28.23	28.04
1061.0	1091.0	30.47	30.30	30.01
1141.8	1171.8	30.41	30.70	30.78
1202.5	1232.5	29.21	29.57	29.90
1283.3	1313.3	27.18	27.38	27.80
1343.9	1373.9	26.17	26.39	26.67
1424.8	1454.8	24.43	24.90	25.16
1485.4	1515.4	23.63	24.03	24.33
1566.3	1596.3	22.93	23.34	23.49
1626.9	1656.9	22.67	22.97	23.11
1707.7	1737.7	22.30	22.80	23.05
1768.4	1798.4	22.02	22.46	22.83
1849.2	1879.2	21.42	21.87	22.23
1909.8	1939.8	20.86	21.35	21.71
1990.7	2020.7	20.15	20.67	21.06
2051.3	2081.3	19.80	20.42	20.83
2132.1	2162.1	19.45	20.24	20.68
2192.8	2222.8	19.06	20.06	20.64
2273.6	2303.6	19.05	20.07	20.93
2334.2	2364.2	19.39	20.29	21.13
2415.1	2445.1	19.79	20.79	21.52
2475.7	2505.7	19.98	21.20	22.00
2556.5	2586.5	20.69	22.09	23.03
2617.2	2647.2	21.27	22.84	23.82
2698.0	2728.0	21.79	23.37	24.85
2758.6	2788.6	22.41	23.74	25.30
2839.5	2869.5	23.61	24.69	26.11
2900.1	2930.1	24.86	25.72	26.54

Frequency Mixer

TUF-5LH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+7	+10	+13
10.1	40.1	1.89	1.85	1.83
90.9	120.9	1.17	1.07	1.05
171.8	201.8	1.19	1.09	1.07
252.6	282.6	1.26	1.19	1.16
333.5	363.5	1.34	1.28	1.25
414.3	444.3	1.42	1.36	1.32
495.1	525.1	1.54	1.46	1.41
576.0	606.0	1.72	1.64	1.59
656.8	686.8	2.01	1.87	1.77
737.7	767.7	2.41	2.27	2.14
818.5	848.5	2.81	2.65	2.52
899.3	929.3	3.16	2.91	2.73
980.2	1010.2	3.47	3.15	2.98
1061.0	1091.0	3.67	3.37	3.15
1141.8	1171.8	3.53	3.31	3.10
1202.5	1232.5	3.36	3.18	3.00
1283.3	1313.3	3.22	3.06	2.88
1343.9	1373.9	3.18	2.99	2.81
1424.8	1454.8	3.08	2.85	2.61
1485.4	1515.4	2.94	2.66	2.41
1566.3	1596.3	2.65	2.30	2.09
1626.9	1656.9	2.38	2.07	1.93
1707.7	1737.7	2.20	1.96	1.84
1768.4	1798.4	2.17	1.95	1.83
1849.2	1879.2	2.14	1.93	1.81
1909.8	1939.8	2.15	1.94	1.80
1990.7	2020.7	2.21	1.97	1.84
2051.3	2081.3	2.29	2.02	1.88
2132.1	2162.1	2.40	2.06	1.89
2192.8	2222.8	2.51	2.06	1.85
2273.6	2303.6	2.45	2.00	1.74
2334.2	2364.2	2.26	1.90	1.66
2415.1	2445.1	2.20	1.86	1.66
2475.7	2505.7	2.28	1.91	1.71
2556.5	2586.5	2.26	1.85	1.67
2617.2	2647.2	2.12	1.74	1.58
2698.0	2728.0	2.03	1.66	1.49
2758.6	2788.6	2.02	1.67	1.50
2839.5	2869.5	2.09	1.74	1.56
2900.1	2930.1	2.30	1.88	1.60

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+7	+10	+13
10.1	1.65	2.34	3.19
90.9	1.68	2.42	3.35
171.8	1.68	2.39	3.29
252.6	1.70	2.43	3.34
333.5	1.72	2.44	3.32
414.3	1.73	2.42	3.25
495.1	1.75	2.40	3.17
576.0	1.79	2.41	3.15
656.8	1.88	2.47	3.14
737.7	1.93	2.51	3.18
818.5	1.96	2.50	3.14
899.3	1.98	2.45	3.02
980.2	2.06	2.48	3.01
1061.0	2.16	2.59	3.09
1141.8	2.20	2.64	3.11
1202.5	2.21	2.63	3.10
1283.3	2.25	2.65	3.10
1343.9	2.28	2.66	3.08
1424.8	2.27	2.60	3.00
1485.4	2.28	2.58	2.95
1566.3	2.25	2.50	2.87
1626.9	2.22	2.47	2.85
1707.7	2.30	2.55	2.91
1768.4	2.48	2.69	3.02
1849.2	2.75	2.87	3.16
1909.8	2.94	2.97	3.20
1990.7	3.24	3.15	3.29
2051.3	3.47	3.31	3.46
2132.1	3.76	3.50	3.51
2192.8	4.07	3.68	3.62
2273.6	4.35	3.99	3.86
2334.2	4.60	4.23	4.10
2415.1	4.88	4.45	4.35
2475.7	5.16	4.72	4.55
2556.5	5.46	5.00	4.80
2617.2	5.75	5.36	5.04
2698.0	6.11	5.72	5.39
2758.6	6.39	6.03	5.68
2839.5	6.73	6.32	6.03
2900.1	6.94	6.56	6.24

IF (OUT) (MHz)	IF VSWR @LO=1500.1MHz (:1)		
	@LO (dBm)		
	+7	+10	+13
10.0	1.55	1.33	1.17
30.2	1.45	1.22	1.04
50.4	1.40	1.20	1.08
70.6	1.41	1.21	1.00
90.8	1.43	1.22	1.04
111.0	1.47	1.25	1.04
131.2	1.52	1.30	1.09
151.4	1.47	1.26	1.05
171.6	1.42	1.22	1.03
191.8	1.49	1.27	1.07
212.0	1.53	1.31	1.09
232.2	1.48	1.27	1.07
252.4	1.48	1.27	1.10
272.7	1.51	1.30	1.10
292.9	1.50	1.28	1.07
313.1	1.50	1.29	1.10
333.3	1.55	1.33	1.14
353.5	1.54	1.32	1.12
373.7	1.51	1.29	1.11
393.9	1.55	1.33	1.16
434.3	1.57	1.34	1.15
454.5	1.57	1.35	1.18
494.9	1.64	1.40	1.20
515.1	1.62	1.39	1.20
555.5	1.69	1.45	1.24
575.7	1.68	1.44	1.23
616.1	1.75	1.50	1.29
636.3	1.72	1.47	1.25
676.7	1.81	1.55	1.32
696.9	1.82	1.56	1.33
737.3	1.79	1.54	1.33
757.6	1.84	1.58	1.35
798.0	1.90	1.63	1.41
818.2	1.91	1.65	1.42
858.6	1.88	1.62	1.40
878.8	1.96	1.68	1.45
919.2	1.96	1.70	1.48
939.4	1.92	1.68	1.48
979.8	1.98	1.71	1.49
1000.0	2.02	1.75	1.54

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	10	39	26	46	24	43	38	62	47	79
1	-	21	+0	38	19	44	37	49	49	59	57	69
2	86	74	38	58	38	67	51	70	42	56	55	76
3	>100	49	40	52	36	52	43	53	43	63	55	67
4	>100	83	76	80	50	70	52	71	65	67	64	68
5	>100	65	59	63	53	79	47	83	56	75	56	73
6	>100	77	78	85	79	83	66	79	63	79	78	82
7	>100	82	74	82	72	85	63	71	60	71	69	82
8	>100	>93	>93	>93	83	87	88	91	70	>93	71	88
9	>100	>93	>93	>93	91	92	92	86	80	>93	71	90
10	>100	>93	>93	>93	>93	>93	90	>93	>93	>93	83	>93
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; 0.00 dBm.
 LO IN: 780.01 MHz; +10.00 dBm
 IF OUT: 29.91 MHz; -6.67 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+1	27	15	34	11	31	24	48	37	67
1	-	22	+0	36	20	37	36	46	47	50	53	60
2	>100	74	44	65	44	67	57	68	47	60	66	73
3	>100	74	55	68	50	69	56	76	56	76	62	80
4	>100	>83	>83	>83	81	>83	76	>83	>83	>83	76	>83
5	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
6	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
7	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
8	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
9	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
10	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -10.00 dBm.
 LO IN: 780.01 MHz; +10.00 dBm
 IF OUT: 29.91 MHz; -16.9 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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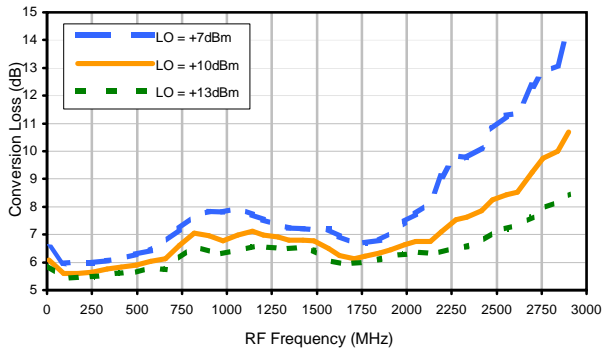


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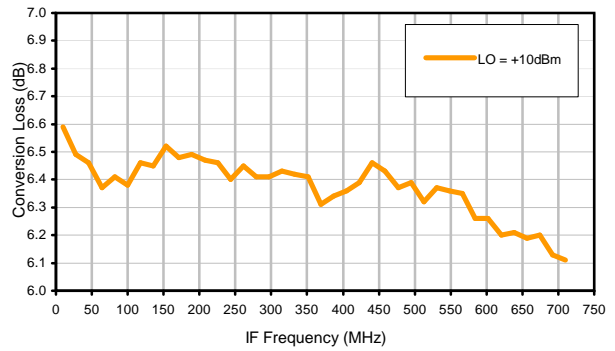


Typical Performance Curves

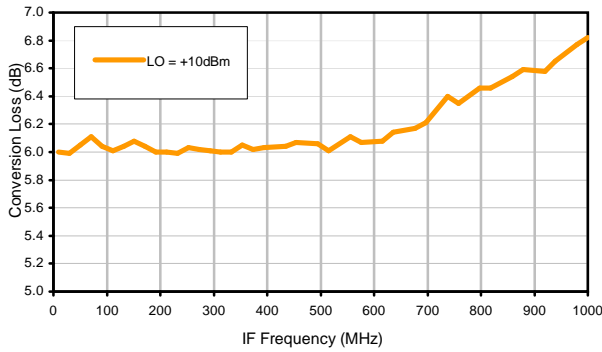
Conversion Loss @ IF=30MHz



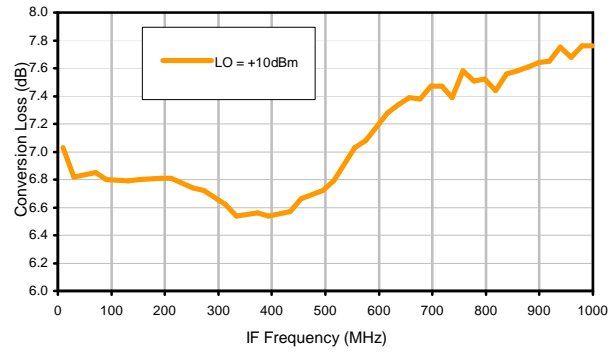
Conversion Loss vs. IF @ RF=750.1MHz



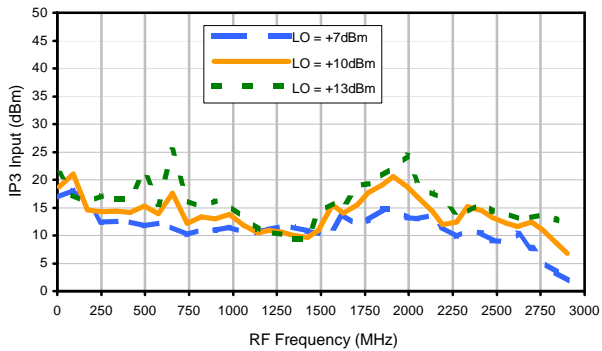
Conversion Loss vs. IF @ RF=20.1MHz



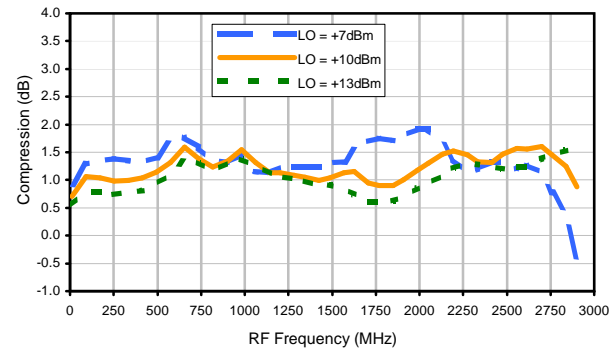
Conversion Loss vs. IF @ RF=1500.1MHz



IP3 Input

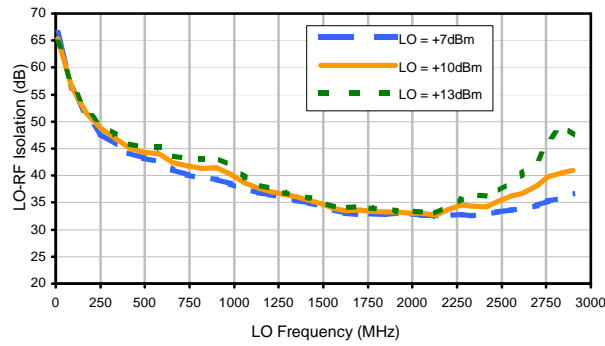


Compression @ RF IN=+5dBm

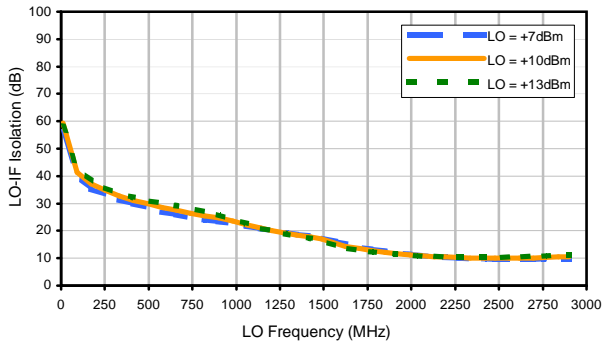


Typical Performance Curves

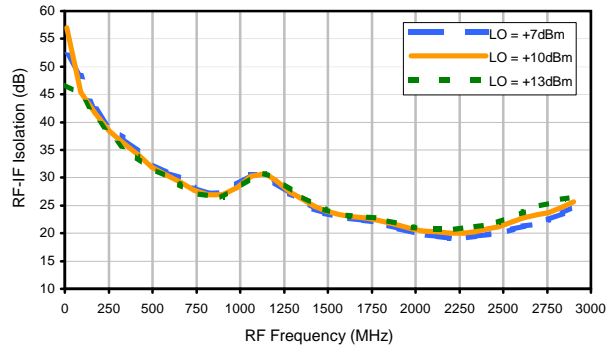
LO-RF Isolation



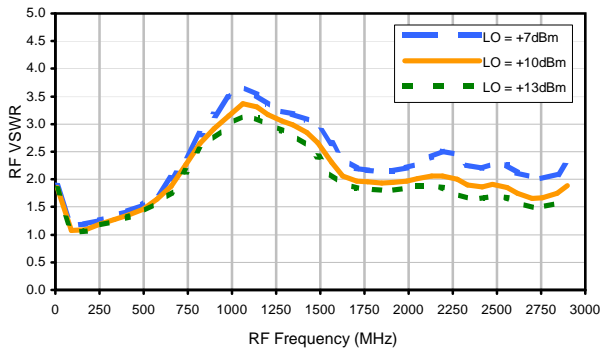
LO-IF Isolation



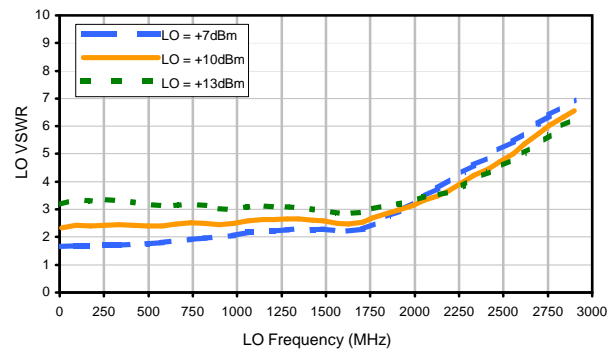
RF-IF Isolation



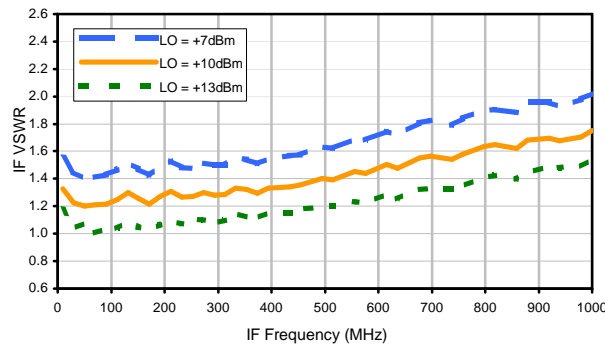
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	10	39	26	46	24	43	38	62	47	79
1	-	21	+0	38	19	44	37	49	49	59	57	69
2	86	74	38	58	38	67	51	70	42	56	55	76
3	>100	49	40	52	36	52	43	53	43	63	55	67
4	>100	83	76	80	50	70	52	71	65	67	64	68
5	>100	65	59	63	53	79	47	83	56	75	56	73
6	>100	77	78	85	79	83	66	79	63	79	78	82
7	>100	82	74	82	72	85	63	71	60	71	69	82
8	>100	>93	>93	>93	83	87	88	91	70	>93	71	88
9	>100	>93	>93	>93	91	92	92	86	80	>93	71	90
10	>100	>93	>93	>93	>93	>93	90	>93	>93	>93	83	>93
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; 0.00 dBm.
 LO IN: 780.01 MHz; +10.00 dBm
 IF OUT: 29.91 MHz; -6.67 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+1	27	15	34	11	31	24	48	37	67
1	-	22	+0	36	20	37	36	46	47	50	53	60
2	>100	74	44	65	44	67	57	68	47	60	66	73
3	>100	74	55	68	50	69	56	76	56	76	62	80
4	>100	>83	>83	>83	81	>83	76	>83	>83	>83	76	>83
5	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
6	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
7	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
8	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
9	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
10	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -10.00 dBm.
 LO IN: 780.01 MHz; +10.00 dBm
 IF OUT: 29.91 MHz; -16.9 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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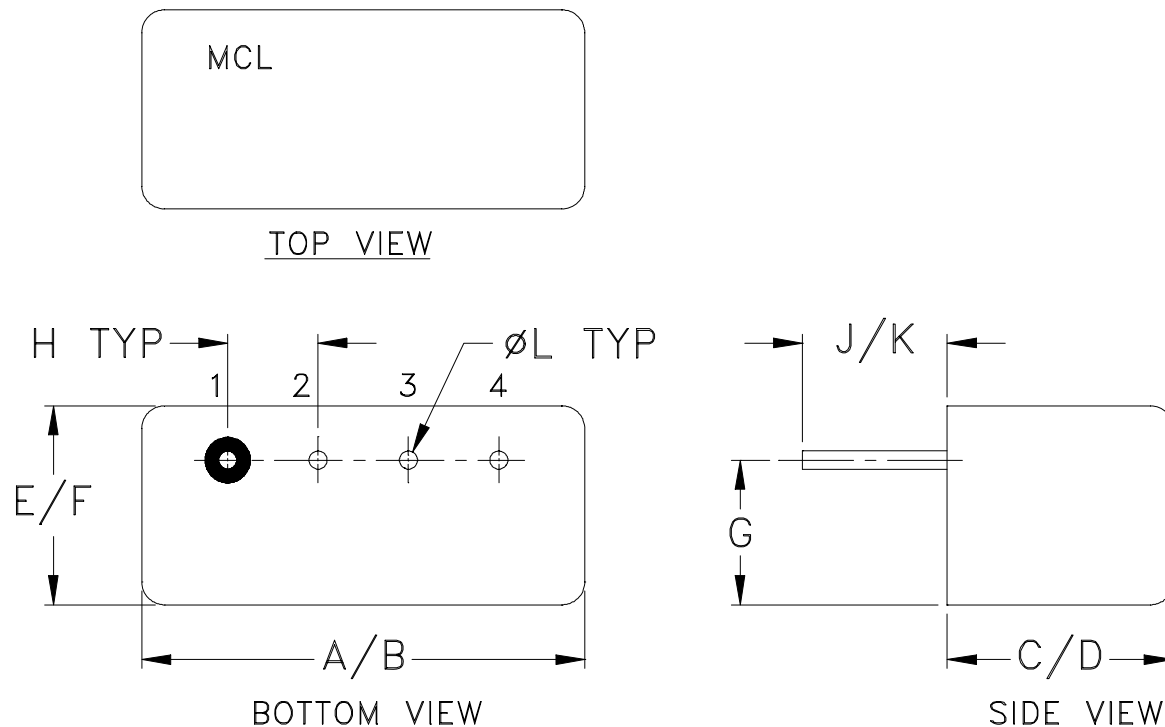


Case Style

B

B02
B13

Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	L	WT, GRAM
B02	.480	.500	.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	(12.19)	(12.70)	.390 (9.91)	.405 (10.29)								2.3

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

Notes:

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

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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
---------------	---------------------------	----------------

Barometric Pressure

100,000 Feet

MIL-STD-202, Method 105, Condition D