

Frequency Mixer

Level 13 (LO Power +13 dBm) 1 to 250 MHz

TFM-3MH+



Generic photo used for illustration purposes only

CASE STYLE: B02

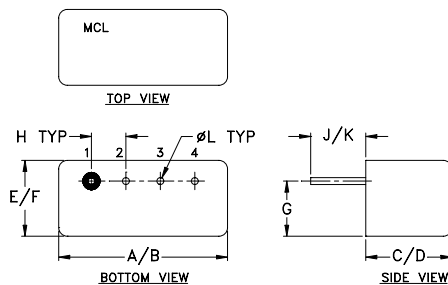
Maximum Ratings

Operating Temperature	-55°C to 100°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	4
RF	1
IF	2
GROUND	3
CASE GROUND	3

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

Features

- low conversion loss, 4.79 dB typ.
- good L-R isolation, 40 dB typ.
- rugged welded construction
- hermetically sealed

Applications

- VHF
- maritime, defense & federal communications

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)					
LO/RF	IF	Mid-Band m				L M U						L M U					
f_L - f_U		$\bar{X}$	σ	Max.	Total Range Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.
1-250	DC-250	4.79	0.23	7.0	8.5	50	45	40	30	28	23	45	40	35	25	26	20

1 dB COMP.: +9 dBm typ.

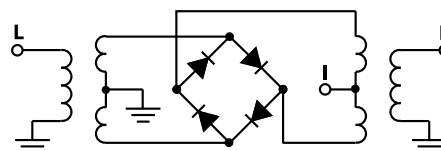
L = low range [f_L to $10 f_L$]
m = mid band [$2f_L$ to $f_U/2$]

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
0.10	30.10	5.15	73.00	60.91	1.33	1.72
1.00	31.00	4.57	73.00	60.66	1.33	1.65
5.00	35.00	4.68	73.00	60.53	1.33	1.74
10.00	40.00	4.73	73.00	60.07	1.32	1.73
20.00	50.00	4.80	65.05	58.37	1.32	1.68
33.42	63.42	4.67	59.52	55.39	1.32	1.67
50.00	80.00	4.68	55.49	52.20	1.32	1.64
58.41	88.41	4.65	53.27	50.21	1.31	1.59
66.74	96.74	4.68	50.90	48.39	1.29	1.64
83.40	53.40	4.66	46.98	45.26	1.29	1.62
100.06	70.06	4.54	44.09	42.57	1.26	1.64
116.72	86.72	4.62	41.59	40.51	1.25	1.63
133.38	103.38	4.69	40.36	38.94	1.23	1.64
150.04	120.04	4.74	38.78	37.88	1.21	1.64
166.70	136.70	4.82	37.43	36.81	1.19	1.63
183.36	153.36	4.90	36.56	35.51	1.16	1.64
200.00	170.00	4.89	36.59	35.86	1.14	1.65
216.68	186.68	4.88	35.77	35.35	1.12	1.65
233.34	203.34	4.84	33.97	33.58	1.09	1.67
250.00	220.00	4.93	33.05	32.71	1.08	1.68

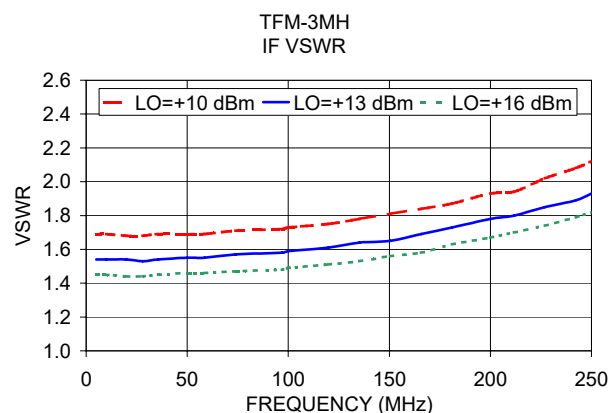
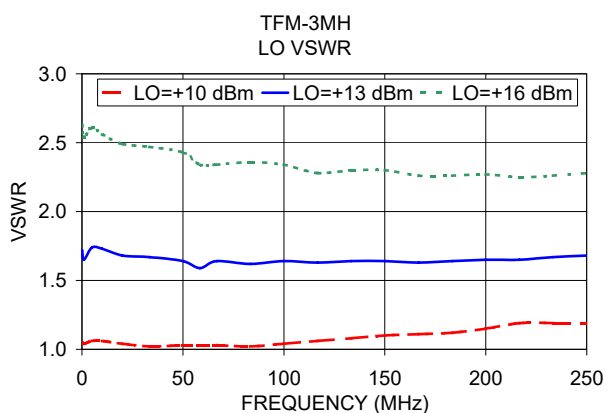
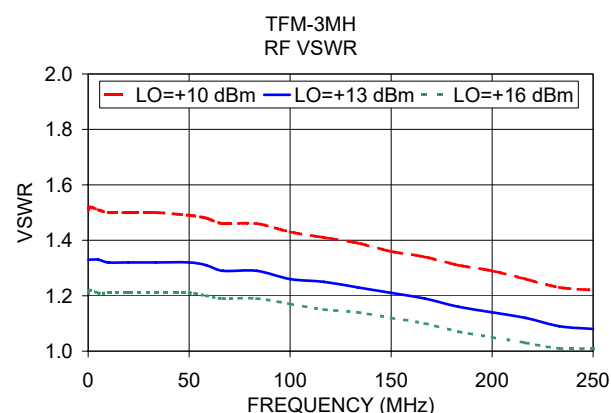
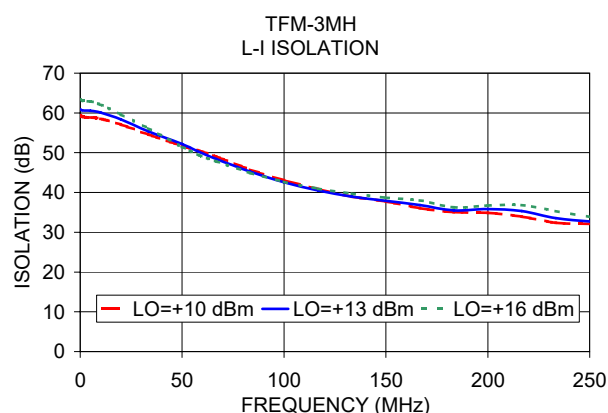
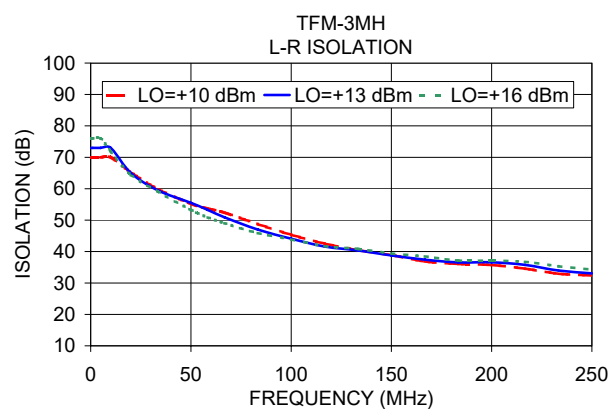
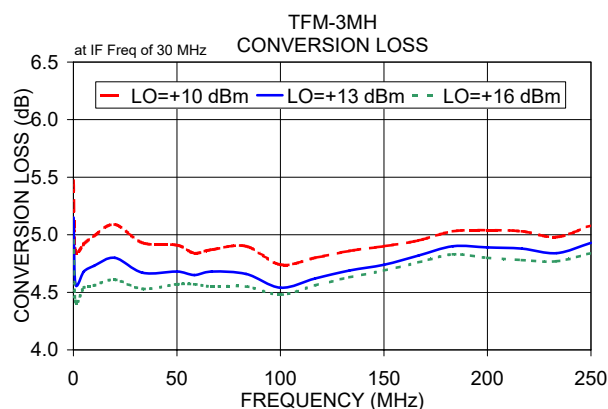
Electrical Schematic



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.
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Frequency Mixer

TFM-3MH+

Typical Performance Data

RF (MHz)	LO (MHz)	CONVERSION LOSS (dB)			LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
		@LO (dBm)				@LO (dBm)			@LO (dBm)		
		+10	+13	+16		+10	+13	+16	+10	+13	+16
0.1	30.1	5.47	5.15	4.95	0.1	70.00	73.00	76.00	59.41	60.91	63.34
1.0	31.0	4.85	4.57	4.42	1.0	70.00	73.00	76.00	59.03	60.66	63.06
5.0	35.0	4.92	4.68	4.54	5.0	70.00	73.00	76.00	58.89	60.53	62.89
10.0	40.0	4.99	4.73	4.56	10.0	70.00	73.00	71.81	58.55	60.07	62.11
20.0	50.0	5.09	4.80	4.61	20.0	65.25	65.05	64.42	57.10	58.37	59.62
33.4	63.4	4.93	4.67	4.53	33.4	59.88	59.52	59.13	54.59	55.39	56.16
50.0	80.0	4.91	4.68	4.57	50.0	55.23	55.49	53.26	51.75	52.20	51.48
58.4	88.4	4.84	4.65	4.57	58.4	53.68	53.27	50.86	50.45	50.21	49.34
66.7	96.7	4.87	4.68	4.55	66.7	52.40	50.90	49.02	49.03	48.39	47.78
83.4	53.4	4.90	4.66	4.55	83.4	48.74	46.98	45.89	45.72	45.26	44.91
100.1	70.1	4.74	4.54	4.48	100.1	45.35	44.09	43.84	43.05	42.57	42.68
116.7	86.7	4.80	4.62	4.56	116.7	42.52	41.59	41.71	40.83	40.51	40.95
133.4	103.4	4.86	4.69	4.63	133.4	40.42	40.36	40.85	38.94	38.94	39.71
150.0	120.0	4.90	4.74	4.69	150.0	38.88	38.78	39.39	37.73	37.88	38.66
166.7	136.7	4.95	4.82	4.76	166.7	36.88	37.43	38.44	36.06	36.81	38.02
183.4	153.4	5.03	4.90	4.83	183.4	36.07	36.56	37.14	35.07	35.51	36.27
200.0	170.0	5.04	4.89	4.80	200.0	35.72	36.59	37.11	34.90	35.86	36.73
216.7	186.7	5.03	4.88	4.78	216.7	34.55	35.77	36.72	33.92	35.35	36.86
233.3	203.3	4.98	4.84	4.77	233.3	32.96	33.97	35.32	32.41	33.58	35.36
250.0	220.0	5.08	4.93	4.84	250.0	32.36	33.05	34.27	32.08	32.71	33.84

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Page 1 of 2



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Typical Performance Data

RF/LO (MHz)	RF VSWR (:1)			LO VSWR (:1)			IF (MHz)	IF VSWR (:1)			LO/RF (MHz)	max. DC output (mV)	DC Offset (mV)
	@LO (dBm)			@LO (dBm)				@LO (dBm)			@LO (dBm)		
	+10	+13	+16	+10	+13	+16		+10	+13	+16	+13		
5.0	1.51	1.33	1.21	1.05	1.72	2.63	5.0	1.69	1.54	1.45	0.10	-549.8	0.00
10.0	1.52	1.33	1.22	1.04	1.65	2.54	10.0	1.69	1.54	1.45	0.50	-571.9	0.01
20.0	1.51	1.33	1.21	1.06	1.74	2.61	20.0	1.68	1.54	1.44	2.00	-572.6	0.02
28.0	1.50	1.32	1.21	1.06	1.73	2.56	28.0	1.68	1.53	1.44	10.00	-572.0	0.03
35.6	1.50	1.32	1.21	1.04	1.68	2.49	35.6	1.69	1.54	1.45	25.95	-567.7	0.03
50.0	1.50	1.32	1.21	1.02	1.67	2.47	50.0	1.69	1.55	1.46	34.57	-565.3	0.03
58.6	1.49	1.32	1.21	1.03	1.64	2.43	58.6	1.69	1.55	1.46	50.00	-562.9	0.01
73.9	1.48	1.31	1.20	1.03	1.59	2.34	73.9	1.71	1.57	1.47	60.42	-567.6	-0.02
96.9	1.46	1.29	1.19	1.03	1.64	2.34	96.9	1.72	1.58	1.48	77.66	-573.0	-0.01
100.0	1.46	1.29	1.19	1.02	1.62	2.36	100.0	1.73	1.59	1.49	94.89	-579.4	-0.07
119.8	1.43	1.26	1.17	1.04	1.64	2.34	119.8	1.75	1.61	1.51	100.00	-581.3	-0.02
135.2	1.41	1.25	1.15	1.06	1.63	2.28	135.2	1.78	1.64	1.53	112.12	-583.1	-0.20
150.5	1.39	1.23	1.14	1.08	1.64	2.30	150.5	1.81	1.65	1.56	129.36	-580.5	-0.15
165.8	1.36	1.21	1.12	1.10	1.64	2.30	165.8	1.84	1.69	1.58	146.59	-575.9	-0.06
181.1	1.34	1.19	1.10	1.11	1.63	2.26	181.1	1.87	1.73	1.63	163.83	-576.5	0.00
200.0	1.31	1.16	1.07	1.12	1.64	2.26	200.0	1.93	1.78	1.67	181.06	-577.4	-0.09
211.7	1.29	1.14	1.05	1.15	1.65	2.27	211.7	1.94	1.80	1.70	200.00	-585.9	0.68
227.0	1.26	1.12	1.03	1.19	1.65	2.25	227.0	2.02	1.85	1.74	206.91	-586.9	0.89
242.4	1.23	1.09	1.01	1.19	1.67	2.26	242.4	2.08	1.89	1.79	224.15	-584.3	1.07
250.0	1.22	1.08	1.01	1.19	1.68	2.28	250.0	2.12	1.93	1.82	250.00	-570.1	0.49

REV. X1
TFM-3MH+
060614
Page 2 of 2



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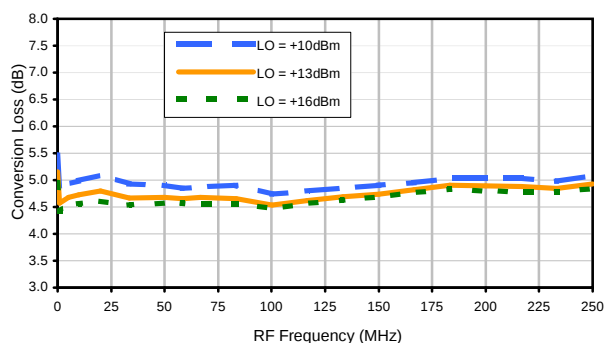


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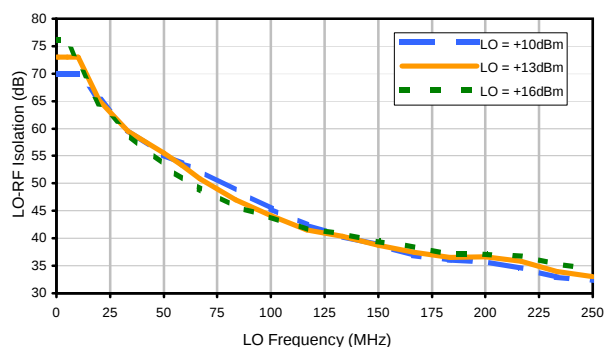


Typical Performance Curves

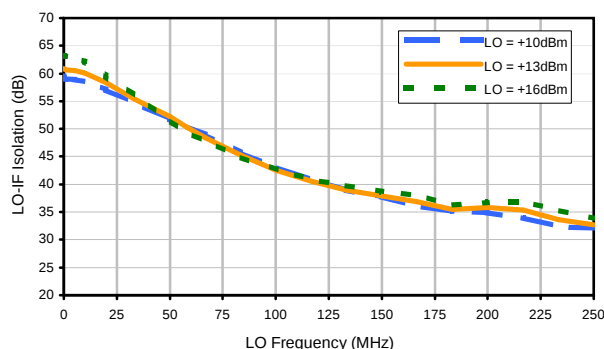
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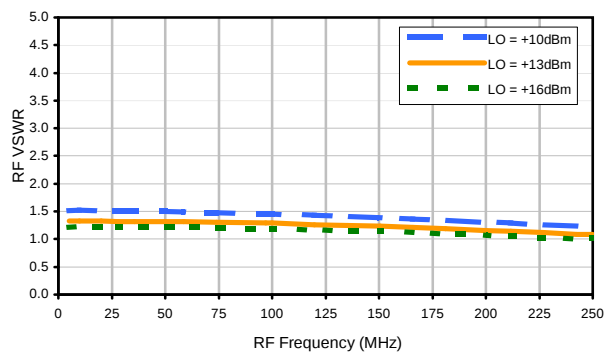
LO-RF Isolation



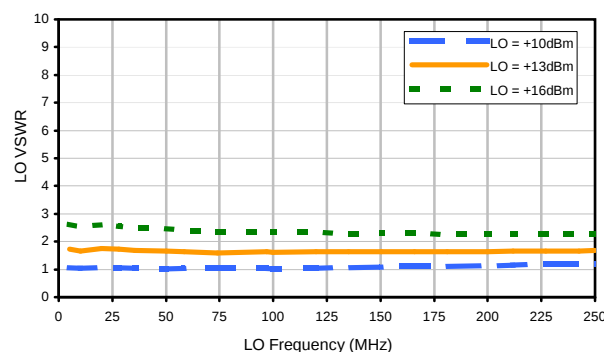
LO-IF Isolation



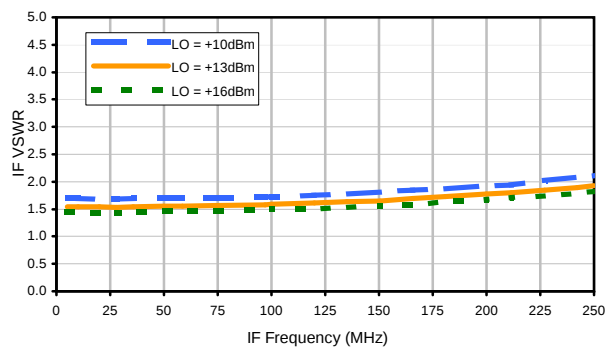
RF VSWR



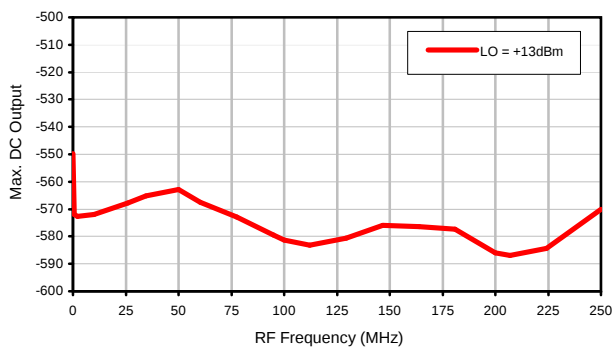
LO VSWR



IF VSWR



Max. DC Output



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Page 1 of 1



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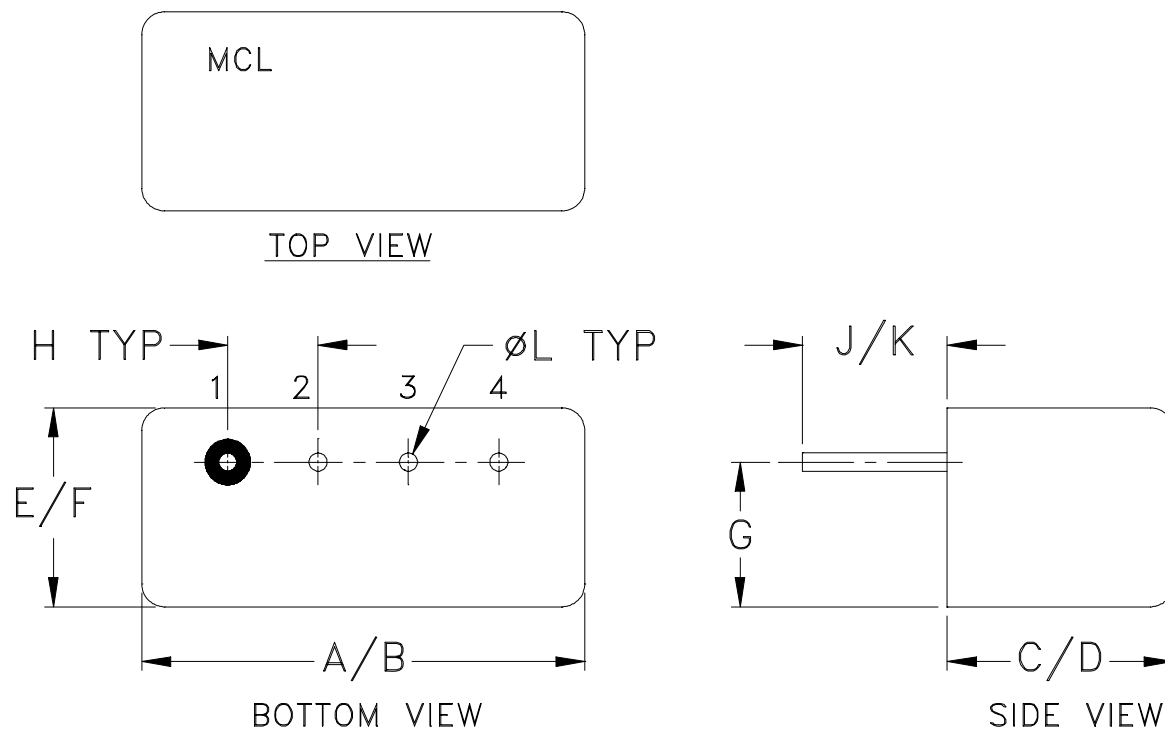
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B02

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. $\pm .03$; 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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Mini-Circuits ISO 9001 & ISO 14001 Certified



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