Plug-In

Frequency Mixer

TFM-3H+

Level 17 (LO Power +17 dBm) 0.1 to 250 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	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

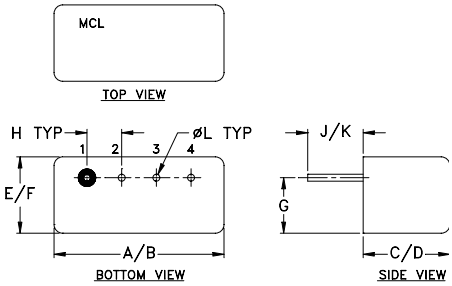
Features

- low conversion loss, 4.58 dB typ.
- good L-R isolation, 40 dB typ.
- rugged welded construction
- hermetically sealed

Applications

- VHF
- aviation
- maritime, defense & federal communications

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

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)					
LO/RF	IF	Mid-Band m			Total Range	L		M		U		L		M		U	
f_L-f_U		$\overline{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.
0.1-250	DC-250	4.58	0.11	7.0	8.5	50	45	40	30	28	23	45	40	35	25	26	20

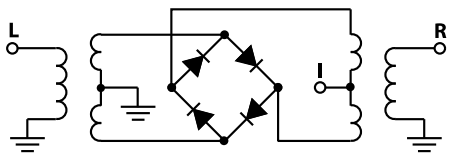
1 dB COMP.: +14 dBm typ.

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]

Typical Performance Data

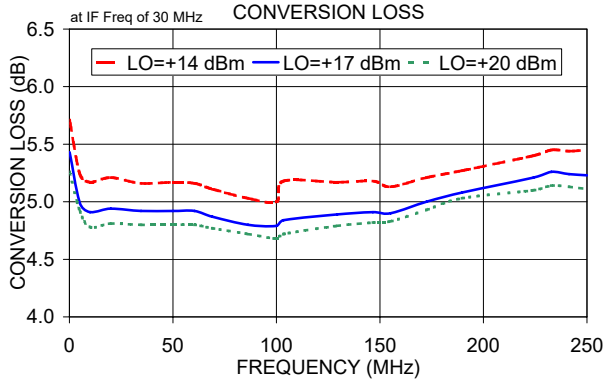
Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm
0.10	30.10	5.43	66.42	66.28	1.40	1.51
5.00	35.00	4.99	61.64	64.07	1.40	1.46
10.00	40.00	4.91	60.33	61.62	1.38	1.52
20.00	50.00	4.94	61.22	60.51	1.39	1.51
34.57	64.57	4.92	57.23	56.07	1.39	1.52
50.00	80.00	4.92	53.98	52.73	1.39	1.48
60.42	90.42	4.92	52.33	50.92	1.38	1.45
69.04	99.04	4.87	51.05	49.22	1.38	1.47
86.27	56.27	4.80	48.52	46.16	1.35	1.43
100.00	70.00	4.79	46.72	44.44	1.35	1.41
103.51	73.51	4.84	46.41	44.07	1.33	1.44
129.36	99.36	4.89	43.29	41.27	1.31	1.45
146.59	116.59	4.91	41.82	40.17	1.30	1.50
155.21	125.21	4.90	41.17	39.68	1.29	1.46
172.44	142.44	5.00	39.95	38.86	1.24	1.46
189.68	159.68	5.08	39.60	38.24	1.22	1.45
224.15	194.15	5.21	37.56	36.93	1.21	1.47
232.76	202.76	5.26	36.71	36.82	1.18	1.52
241.38	211.38	5.24	35.87	36.43	1.16	1.53
250.00	220.00	5.23	35.46	36.00	1.14	1.52

Electrical Schematic

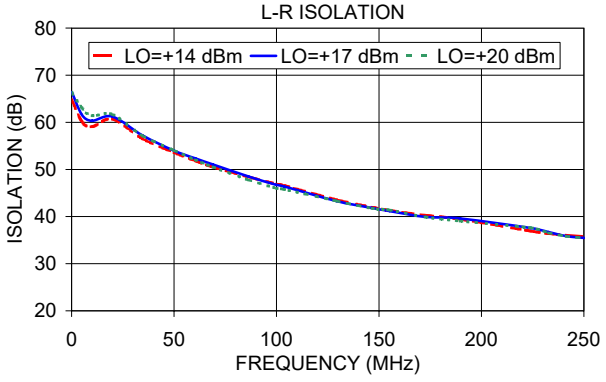


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

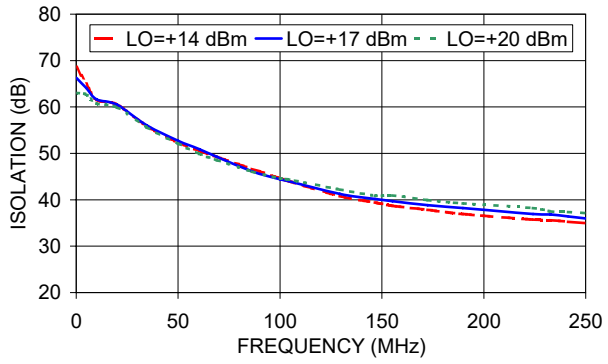
TFM-3H
CONVERSION LOSS
at IF Freq of 30 MHz



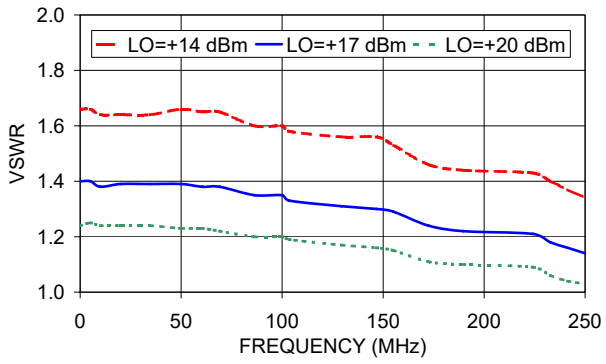
TFM-3H
L-R ISOLATION



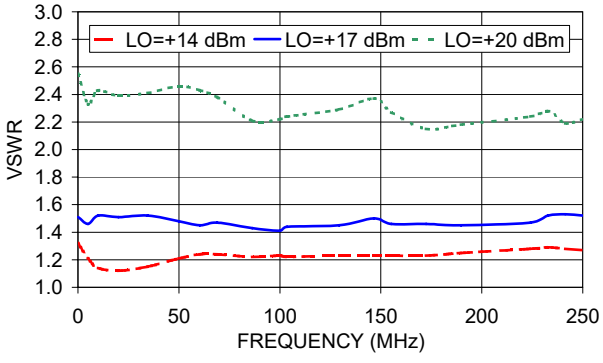
TFM-3H
L-I ISOLATION



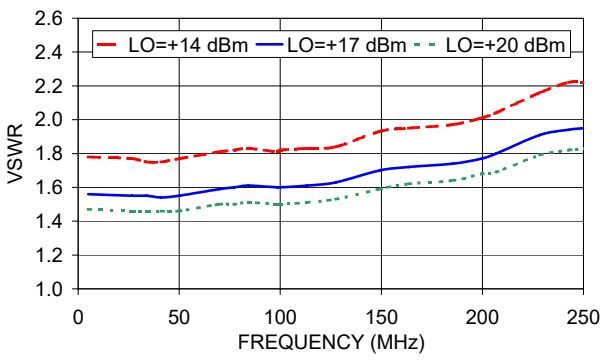
TFM-3H
RF VSWR



TFM-3H
LO VSWR



TFM-3H
IF VSWR



Frequency Mixer TFM-3H+

Typical Performance Data

RF (MHz)	LO (MHz)	CONVERSION LOSS (dB) @LO (dBm)		
		+14	+17	+20
0.1	30.1	5.71	5.43	5.26
5.0	35.0	5.24	4.99	4.92
10.0	40.0	5.17	4.91	4.78
20.0	50.0	5.21	4.94	4.81
34.6	64.6	5.16	4.92	4.80
50.0	80.0	5.17	4.92	4.80
60.4	90.4	5.16	4.92	4.80
69.0	99.0	5.11	4.87	4.77
86.3	56.3	5.03	4.80	4.72
100.0	70.0	5.00	4.79	4.68
103.5	73.5	5.18	4.84	4.72
129.4	99.4	5.17	4.89	4.79
146.6	116.6	5.18	4.91	4.82
155.2	125.2	5.13	4.90	4.83
172.4	142.4	5.21	5.00	4.93
189.7	159.7	5.27	5.08	5.03
224.2	194.2	5.40	5.21	5.10
232.8	202.8	5.45	5.26	5.14
241.4	211.4	5.44	5.24	5.13
250.0	220.0	5.45	5.23	5.11

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+14	+17	+20	+14	+17	+20
0.1	64.78	66.42	66.35	68.59	66.28	63.03
5.0	60.18	61.64	63.09	64.99	64.07	62.71
10.0	59.08	60.33	61.40	61.56	61.62	60.74
20.0	60.69	61.22	61.67	60.52	60.51	59.92
34.6	56.53	57.23	57.15	55.92	56.07	55.64
50.0	53.58	53.98	54.04	52.40	52.73	52.09
60.4	51.84	52.33	52.03	50.56	50.92	49.90
69.0	50.53	51.05	50.49	49.22	49.22	48.53
86.3	48.43	48.52	47.80	46.65	46.16	46.07
100.0	46.90	46.72	46.00	44.62	44.44	44.60
103.5	46.59	46.41	45.79	44.11	44.07	44.42
129.4	43.56	43.29	43.30	40.81	41.27	42.21
146.6	41.98	41.82	41.73	39.42	40.17	40.89
155.2	41.30	41.17	41.39	38.71	39.68	40.93
172.4	40.29	39.95	39.91	37.82	38.86	39.95
189.7	39.44	39.60	39.03	36.95	38.24	39.21
224.2	36.93	37.56	37.61	35.74	36.93	38.22
232.8	36.40	36.71	36.55	35.59	36.82	37.49
241.4	36.06	35.87	35.81	35.28	36.43	37.36
250.0	35.77	35.46	35.46	34.98	36.00	37.11

Typical Performance Data

RF/LO (MHz)	RF VSWR (:1) @LO (dBm)			LO VSWR (:1) @LO (dBm)		
	+14	+17	+20	+14	+17	+20
5.0	1.66	1.40	1.24	1.32	1.51	2.55
26.6	1.66	1.40	1.25	1.21	1.46	2.33
33.8	1.64	1.38	1.24	1.14	1.52	2.43
41.0	1.64	1.39	1.24	1.12	1.51	2.39
50.0	1.64	1.39	1.24	1.15	1.52	2.41
69.9	1.66	1.39	1.23	1.21	1.48	2.46
77.1	1.65	1.38	1.23	1.24	1.45	2.43
84.3	1.65	1.38	1.22	1.24	1.47	2.38
98.7	1.60	1.35	1.20	1.22	1.43	2.21
100.0	1.60	1.35	1.20	1.23	1.41	2.22
113.1	1.58	1.33	1.19	1.22	1.44	2.24
127.5	1.56	1.31	1.17	1.23	1.45	2.29
149.1	1.56	1.30	1.16	1.23	1.50	2.37
163.5	1.53	1.29	1.15	1.23	1.46	2.27
185.2	1.46	1.24	1.11	1.23	1.46	2.15
199.6	1.44	1.22	1.10	1.25	1.45	2.18
206.8	1.43	1.21	1.09	1.28	1.47	2.24
228.4	1.40	1.18	1.06	1.29	1.52	2.28
242.8	1.37	1.16	1.04	1.28	1.53	2.19
250.0	1.34	1.14	1.03	1.27	1.52	2.22

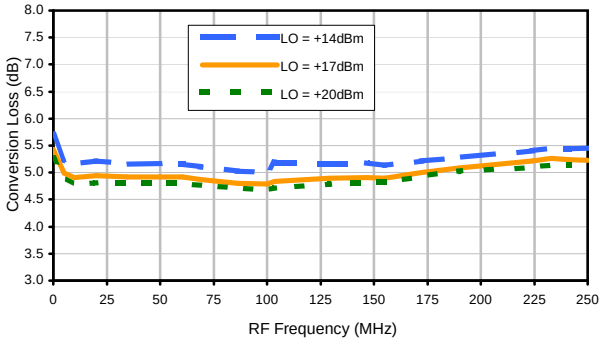
IF (MHz)	IF VSWR (:1) @LO (dBm)		
	+14	+17	+20
5.0	1.78	1.56	1.47
26.6	1.77	1.55	1.46
33.8	1.75	1.55	1.46
41.0	1.75	1.54	1.46
50.0	1.77	1.55	1.46
69.9	1.81	1.59	1.50
77.1	1.82	1.60	1.50
84.3	1.83	1.61	1.51
98.7	1.81	1.60	1.50
100.0	1.82	1.60	1.50
113.1	1.83	1.61	1.51
127.5	1.84	1.63	1.53
149.1	1.93	1.70	1.59
163.5	1.95	1.72	1.62
185.2	1.97	1.74	1.64
199.6	2.01	1.77	1.68
206.8	2.04	1.80	1.69
228.4	2.16	1.91	1.79
242.8	2.22	1.94	1.82
250.0	2.22	1.95	1.83

LO/RF (MHz)	max. DC output (mV)	DC Offset (mV)
@LO (dBm)		
+17		
0.10	-950.4	0.18
25.95	-979.2	0.49
34.57	-971.3	0.48
43.19	-970.4	0.47
51.80	-975.4	0.49
69.04	-988.0	0.42
77.66	-992.8	0.37
86.27	-1001.9	0.26
94.89	-1013.6	0.26
100.00	-1026.6	0.14
112.12	-991.1	0.10
129.36	-996.8	-0.04
146.59	-981.4	0.19
163.83	-994.9	0.45
181.06	-993.7	0.36
198.30	-1000.7	0.65
206.91	-1008.6	0.66
224.15	-1013.1	1.34
241.38	-996.1	2.09
250.00	-979.2	2.54

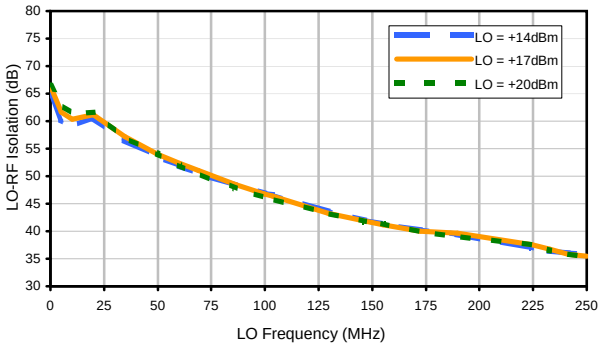
Frequency Mixer TFM-3H+

Typical Performance Curves

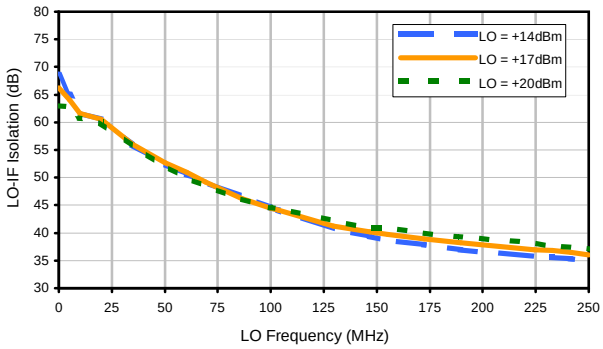
Conversion Loss



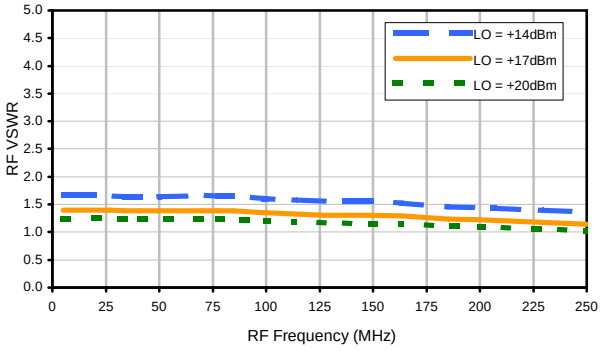
LO-RF Isolation



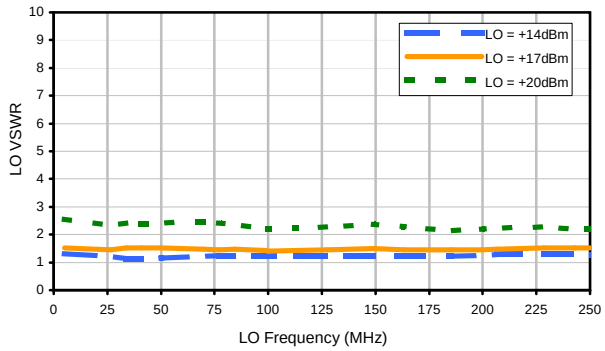
LO-IF Isolation



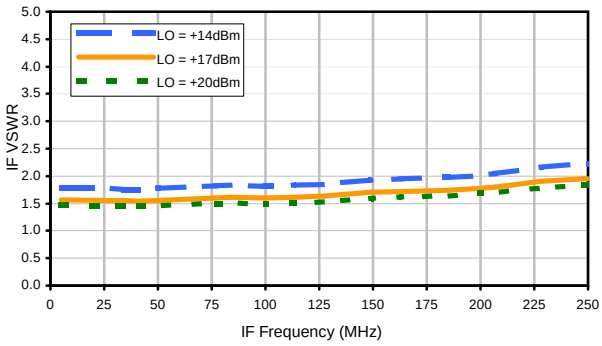
RF VSWR



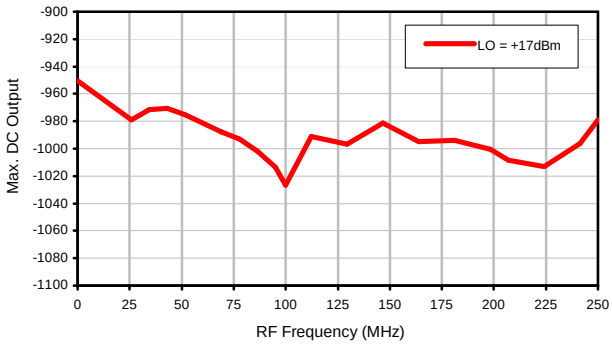
LO VSWR



IF VSWR



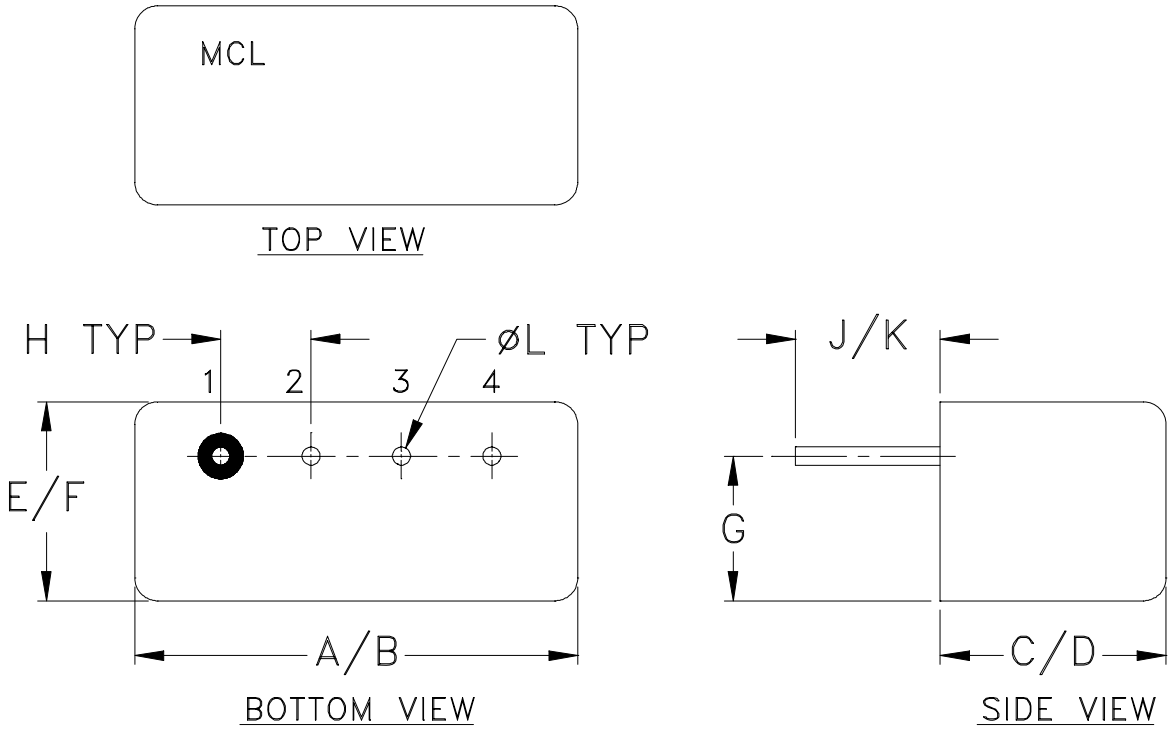
Max. DC Output



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.

Mini-Circuits®
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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

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
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