

Coaxial Frequency Mixer

NON-CATALOG

ZLW-1WSH+

Level 17 (LO Power +17 dBm) 5 to 750 MHz

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.

Coaxial Connections

LO	1
RF	3
IF	2

Features

- low conversion loss, 5.83 dB typ.
- high isolation, 40 dB typ. L-R, 35 dB typ. L-I
- rugged shielded case

Applications

- VHF/UHF
- instrumentation
- defense & federal communications



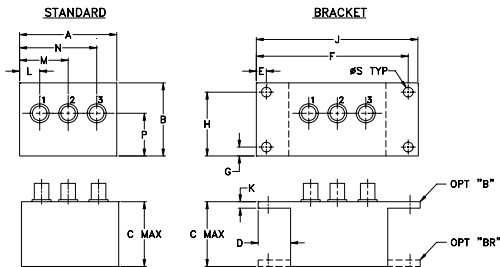
CASE STYLE: M21

Connectors Model
SMA ZLW-1WSH+
BRACKET (OPTION "B")
BRACKET (OPTION "BR")

+RoHS Compliant

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

Outline Drawing



Outline Dimensions (inch)

A	B	C	D	E	F	G	H
1.50	1.13	1.00	.50	.155	2.345	.138	.987
38.10	28.70	25.40	12.70	3.94	59.56	3.51	25.07
J	K	L	M	N	P	S	wt
2.50	.10	.31	.75	1.19	.66	.150	grams
63.50	2.54	7.87	19.05	30.23	16.76	3.81	40.0

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)					
LO/RF	IF	Mid-Band		Total		L		M		U		L		M		U	
		$\bar{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.
5-750	DC-750	5.83	0.07	7.5	9.0	50	45	40	30	30	20	45	40	35	25	30	20

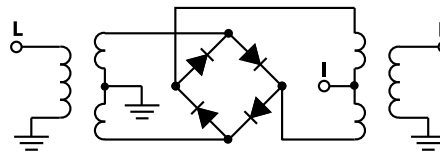
1 dB COMP.: +14 dBm typ.

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
5.00	35.00	5.75	63.53	62.84	1.14	1.53
10.00	40.00	5.93	59.56	57.61	1.06	1.52
20.00	50.00	5.97	51.08	48.85	1.03	1.41
50.00	80.00	5.91	46.53	44.54	1.04	1.54
100.00	70.00	5.77	42.94	41.21	1.05	1.48
125.84	95.84	5.75	40.60	39.07	1.05	1.48
175.77	145.77	5.75	37.40	36.16	1.06	1.43
225.70	195.70	5.81	35.63	34.27	1.08	1.45
250.67	220.67	5.69	35.33	33.54	1.10	1.40
300.60	270.60	5.68	34.13	32.33	1.14	1.51
350.54	320.54	6.07	33.75	30.78	1.19	1.44
400.47	370.47	6.22	33.94	29.35	1.24	1.56
450.41	420.41	6.24	33.76	28.19	1.28	1.60
500.00	470.00	6.26	35.44	29.36	1.32	1.59
525.31	495.31	6.57	33.37	28.37	1.35	1.68
550.27	520.27	6.80	31.48	26.00	1.37	1.74
600.21	570.21	6.81	29.25	22.84	1.39	1.68
650.14	620.14	6.95	29.21	20.68	1.38	1.89
700.08	670.08	7.41	32.78	22.79	1.35	1.94
750.00	720.00	7.73	31.78	24.62	1.29	1.96

Electrical Schematic



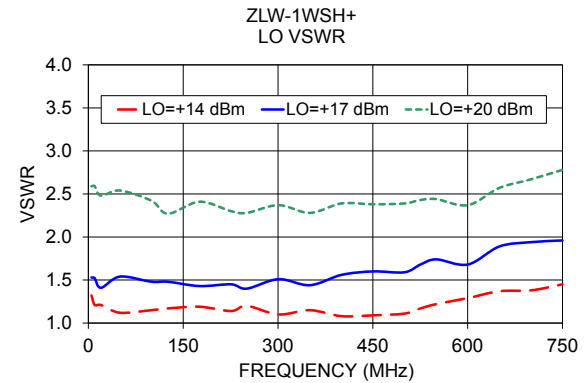
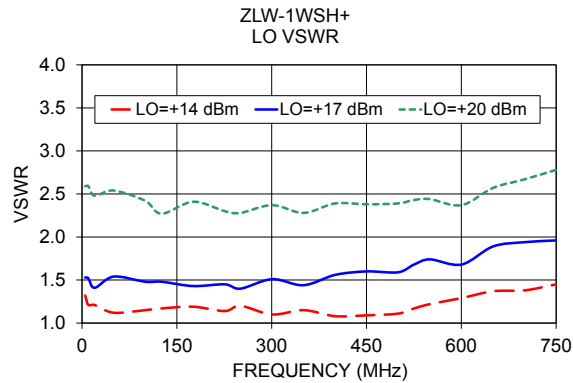
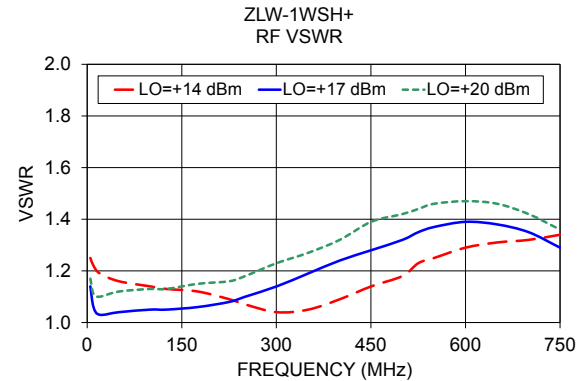
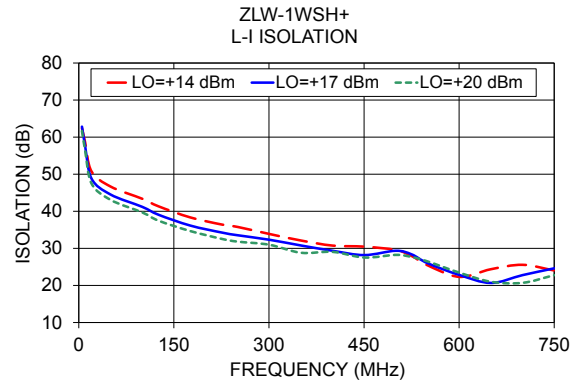
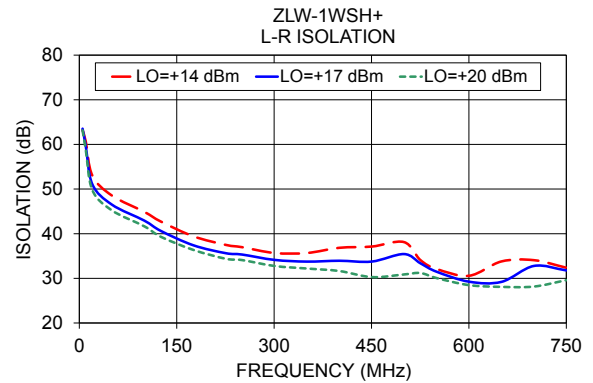
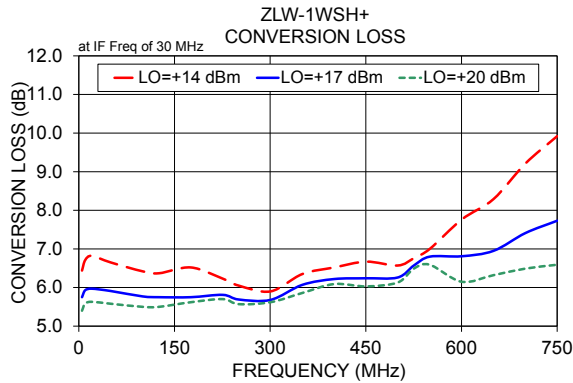
Notes

- 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.
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Frequency Mixer

ZLW-1WSH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+14	+17	+20
5.0	35.0	6.44	5.75	5.40
10.0	40.0	6.71	5.93	5.59
30.4	60.4	7.01	6.23	6.08
50.8	80.8	7.06	6.27	6.14
71.2	101.2	6.96	6.20	6.10
91.6	121.6	7.06	6.23	6.10
112.0	142.0	6.95	6.14	6.10
132.4	162.4	6.82	6.12	6.10
152.8	182.8	6.89	6.15	6.11
173.2	203.2	6.78	6.13	6.12
193.5	223.5	6.68	6.08	6.11
213.9	243.9	6.68	6.10	6.10
234.3	264.3	6.66	6.11	6.13
254.7	284.7	6.65	6.12	6.14
275.1	305.1	6.69	6.16	6.18
295.5	325.5	6.69	6.16	6.20
315.9	345.9	6.77	6.25	6.25
336.3	366.3	6.83	6.34	6.31
356.7	386.7	6.89	6.39	6.37
377.1	407.1	6.91	6.46	6.49
397.5	427.5	6.97	6.50	6.52
417.9	447.9	6.97	6.50	6.52
438.3	468.3	6.97	6.50	6.52
458.7	488.7	6.97	6.50	6.52
479.1	509.1	6.97	6.50	6.52
499.5	529.5	6.97	6.50	6.52
519.9	549.9	6.97	6.50	6.52
540.3	570.3	6.97	6.50	6.52
560.7	590.7	6.97	6.50	6.52
581.1	611.1	6.97	6.50	6.52
601.5	631.5	6.97	6.50	6.52
621.9	651.9	6.97	6.50	6.52
642.3	672.3	6.97	6.50	6.52
662.7	692.7	6.97	6.50	6.52
683.1	713.1	6.97	6.50	6.52
703.5	733.5	6.97	6.50	6.52
723.9	753.9	6.97	6.50	6.52
744.3	774.3	6.97	6.50	6.52
764.7	794.7	6.97	6.50	6.52
785.1	815.1	6.97	6.50	6.52
805.5	835.5	6.97	6.50	6.52
825.9	855.9	6.97	6.50	6.52
846.3	876.3	6.97	6.50	6.52
866.7	896.7	6.97	6.50	6.52
887.1	917.1	6.97	6.50	6.52
907.5	937.5	6.97	6.50	6.52
927.9	957.9	6.97	6.50	6.52
948.3	978.3	6.97	6.50	6.52
968.7	998.7	6.97	6.50	6.52
989.1	1019.1	6.97	6.50	6.52
1009.5	1039.5	6.97	6.50	6.52
1029.9	1059.9	6.97	6.50	6.52
1050.3	1080.3	6.97	6.50	6.52

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+14	+17	+20
10.0	40.0	25.74	31.37	30.94
30.4	60.4	24.59	28.71	27.86
50.8	80.8	26.67	27.68	26.69
71.2	101.2	28.19	26.30	27.50
91.6	121.6	23.59	24.55	30.46
112.0	142.0	24.14	27.10	33.88
132.4	162.4	24.77	28.01	31.95
152.8	182.8	23.30	27.39	30.97
173.2	203.2	23.69	38.32	28.24
193.5	223.5	24.41	31.23	29.12
213.9	243.9	25.59	30.47	30.47
234.3	264.3	28.16	27.22	28.65
254.7	284.7	26.83	25.27	26.89
275.1	305.1	36.45	24.29	25.68
295.5	325.5	25.91	23.93	24.77
315.9	345.9	26.93	25.17	24.56
336.3	366.3	27.91	28.59	28.53
356.7	386.7	26.21	26.29	25.76
377.1	407.1	24.55	24.98	23.66
397.5	427.5	22.33	24.07	24.07
417.9	447.9	19.60	24.55	28.80
438.3	468.3	18.91	22.88	28.94
458.7	488.7	17.71	19.33	23.63
479.1	509.1	17.12	18.59	21.51
499.5	529.5	16.74	18.58	20.08
519.9	549.9	16.44	18.78	20.28
540.3	570.3	16.87	20.10	23.32
560.7	590.7	18.25	22.23	28.23
581.1	611.1	18.83	25.20	24.12
601.5	631.5	18.05	23.79	22.54
621.9	651.9	17.11	23.53	21.94
642.3	672.3	16.67	24.14	22.63
662.7	692.7	15.95	20.35	22.86
683.1	713.1	16.18	19.33	22.37
703.5	733.5	16.48	17.14	18.75
723.9	753.9	17.16	16.84	17.91
744.3	774.3	19.22	17.83	17.52
764.7	794.7	20.59	19.00	18.09
785.1	815.1	23.37	21.52	20.70
805.5	835.5	23.83	22.77	22.18

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+14dBm (dB)		
		@LO (dBm)		
		+14	+17	+20
10.0	40.0	0.66	0.28	0.16
30.4	60.4	0.68	0.39	0.24
50.8	80.8	0.74	0.45	0.24
71.2	101.2	0.85	0.38	0.23
91.6	121.6	0.72	0.39	0.23
112.0	142.0	0.69	0.37	0.20
132.4	162.4	0.75	0.39	0.21
152.8	182.8	0.85	0.39	0.22
173.2	203.2	0.79	0.37	0.20
193.5	223.5	0.92	0.38	0.21
213.9	243.9	0.92	0.40	0.23
234.3	264.3	0.99	0.43	0.24
254.7	284.7	0.97	0.41	0.25
275.1	305.1	0.92	0.39	0.28
295.5	325.5	0.94	0.41	0.30
315.9	345.9	0.91	0.37	0.27
336.3	366.3	1.00	0.46	0.38
356.7	386.7	1.03	0.47	0.38
377.1	407.1	1.22	0.66	0.50
397.5	427.5	1.36	0.79	0.60
417.9	447.9	1.51	0.98	0.73
438.3	468.3	1.45	0.92	0.70
458.7	488.7	1.72	1.15	0.93
479.1	509.1	1.82	1.23	1.01
499.5	529.5	1.93	1.37	1.17
519.9	549.9	2.00	1.48	1.25
540.3	570.3	1.94	1.52	1.27
560.7	590.7	1.95	1.56	1.26
581.1	611.1	1.76	1.65	1.29
601.5	631.5	1.61	1.63	1.29
621.9	651.9	1.35	1.56	1.31
642.3	672.3	1.21	1.53	1.35
662.7	692.7	1.02	1.37	1.36
683.1	713.1	0.89	1.25	1.28
703.5	733.5	0.71	0.98	0.99
723.9	753.9	0.60	0.81	0.82
744.3	774.3	0.52	0.56	0.56
764.7	794.7	0.43	0.42	0.40
785.1	815.1	0.44	0.31	0.24
805.5	835.5	0.37	0.23	0.15

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Frequency Mixer

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=375.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=750.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
365.0	10.1	6.86	10.0	20.1	6.26	740.0	10.1	8.62
355.9	19.2	6.81	28.7	38.8	6.13	721.3	28.8	8.52
346.8	28.3	6.77	47.4	57.5	6.22	702.6	47.5	8.41
337.7	37.4	6.62	66.2	76.3	6.23	683.8	66.3	8.30
328.6	46.5	6.63	84.9	95.0	6.25	665.1	85.0	8.24
319.5	55.6	6.53	103.6	113.7	6.20	646.4	103.7	8.12
310.4	64.7	6.52	122.3	132.4	6.20	627.7	122.4	8.08
301.3	73.8	6.50	141.0	151.1	6.30	609.0	141.1	7.93
292.2	82.9	6.39	159.7	169.8	6.35	590.3	159.8	7.84
283.1	92.0	6.40	178.5	188.6	6.30	571.5	178.6	7.84
274.0	101.1	6.29	197.2	207.3	6.28	552.8	197.3	7.84
264.9	110.2	6.24	215.9	226.0	6.34	534.1	216.0	7.85
255.8	119.3	6.21	234.6	244.7	6.39	515.4	234.7	7.78
246.7	128.4	6.12	253.3	263.4	6.45	496.7	253.4	7.84
237.6	137.5	6.14	272.1	282.2	6.41	477.9	272.2	7.72
228.5	146.6	6.07	290.8	300.9	6.43	459.2	290.9	7.77
219.4	155.7	6.05	309.5	319.6	6.46	440.5	309.6	7.83
210.3	164.8	6.08	328.2	338.3	6.56	421.8	328.3	7.78
201.2	173.9	6.09	346.9	357.0	6.52	403.1	347.0	7.73
192.1	183.0	6.06	365.6	375.7	6.69	384.4	365.7	7.72
182.9	192.2	6.10	384.4	394.5	6.73	365.6	384.5	7.83
173.8	201.3	6.12	403.1	413.2	6.73	346.9	403.2	7.70
164.7	210.4	6.14	421.8	431.9	6.90	328.2	421.9	7.72
155.6	219.5	6.14	440.5	450.6	6.93	309.5	440.6	7.71
146.5	228.6	6.16	459.2	469.3	6.99	290.8	459.3	7.71
137.4	237.7	6.18	477.9	488.0	6.87	272.1	478.0	7.68
128.3	246.8	6.17	496.7	506.8	6.92	253.3	496.8	7.70
119.2	255.9	6.19	515.4	525.5	6.86	234.6	515.5	7.67
110.1	265.0	6.23	534.1	544.2	6.81	215.9	534.2	7.74
101.0	274.1	6.28	552.8	562.9	6.79	197.2	552.9	7.72
91.9	283.2	6.28	571.5	581.6	6.64	178.5	571.6	7.67
82.8	292.3	6.31	590.3	600.4	6.60	159.7	590.4	7.66
73.7	301.4	6.36	609.0	619.1	6.54	141.0	609.1	7.60
64.6	310.5	6.38	627.7	637.8	6.51	122.3	627.8	7.58
55.5	319.6	6.38	646.4	656.5	6.50	103.6	646.5	7.48
46.4	328.7	6.39	665.1	675.2	6.48	84.9	665.2	7.50
37.3	337.8	6.43	683.8	693.9	6.52	66.2	683.9	7.39
28.2	346.9	6.45	702.6	712.7	6.55	47.4	702.7	7.44
19.1	356.0	6.45	721.3	731.4	6.71	28.7	721.4	7.37
10.0	365.1	6.51	740.0	750.1	6.88	10.0	740.1	7.42

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+14	+17	+20	+14	+17	+20
5.0	63.21	63.53	63.16	62.44	62.84	61.66
10.0	60.61	59.56	58.73	58.61	57.61	56.43
30.4	66.45	69.82	73.20	50.54	47.99	46.36
50.8	62.41	66.68	71.08	46.56	43.87	42.38
71.2	59.62	63.36	67.95	43.44	41.17	39.48
91.6	57.86	62.06	68.19	41.61	39.02	37.64
112.0	55.90	59.95	66.59	40.04	37.70	36.00
132.4	54.35	59.75	69.88	38.76	36.09	34.84
152.8	53.41	58.49	66.46	37.70	35.23	34.05
173.2	52.08	57.76	68.01	36.73	34.60	33.61
193.5	51.09	57.25	65.99	36.06	34.28	33.39
213.9	50.55	57.70	65.12	35.17	33.61	32.64
234.3	50.11	57.84	60.96	35.05	33.57	32.36
254.7	49.37	56.19	64.96	34.91	33.49	32.03
275.1	49.10	57.58	59.56	33.95	32.80	31.45
295.5	48.63	56.57	60.94	34.43	32.91	31.41
315.9	48.68	57.28	56.40	34.24	32.49	30.83
356.7	47.73	54.69	54.98	33.33	31.14	29.56
377.1	48.18	54.71	54.42	32.52	30.55	28.96
417.9	47.15	52.10	50.64	31.86	29.37	27.97
438.3	47.22	53.60	51.22	31.03	28.60	27.03
499.5	46.25	50.37	45.77	30.34	27.79	25.56
540.2	47.63	50.08	45.01	29.37	27.68	25.30
560.6	47.64	49.04	45.97	28.30	27.10	25.16
601.4	45.89	46.43	43.95	27.48	25.92	23.81
621.8	45.50	46.15	43.62	26.55	24.90	23.07
662.6	43.58	44.55	43.06	26.23	24.05	21.84
683.0	42.36	42.63	41.19	25.83	23.60	21.21
723.8	41.12	42.44	41.13	25.90	23.12	20.36
744.2	40.06	42.50	41.89	25.95	23.49	20.34
785.0	39.76	43.00	42.00	25.39	24.18	21.00
805.4	39.77	44.21	42.10	25.01	24.32	20.88
846.2	38.80	43.17	43.14	23.91	24.24	21.02
866.6	38.21	41.29	41.44	23.67	24.03	20.93
907.3	38.55	40.97	40.46	22.77	23.41	20.48
927.7	38.74	41.46	41.14	22.71	22.96	20.03
968.5	39.73	43.42	40.67	22.13	22.17	19.40
988.9	41.50	45.44	39.62	22.02	21.77	19.03
1029.7	44.18	43.92	37.17	21.70	20.78	18.05
1050.1	45.17	42.81	36.60	21.59	20.45	17.88

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
10.0	40.0	51.44	46.25	46.49
30.4	60.4	41.05	41.09	41.67
50.8	80.8	36.94	37.46	37.59
71.2	101.2	34.43	34.78	34.98
91.6	121.6	32.64	33.19	33.42
112.0	142.0	31.32	31.78	32.08
132.4	162.4	30.36	30.82	30.95
152.8	182.8	29.49	29.96	30.26
173.2	203.2	28.95	29.38	29.56
193.5	223.5	28.71	29.12	29.33
213.9	243.9	28.26	28.81	29.08
234.3	264.3	28.04	28.85	29.20
254.7	284.7	27.91	28.63	29.17
275.1	305.1	27.45	28.30	28.86
295.5	325.5	27.69	28.46	28.94
315.9	345.9	27.63	28.19	28.56
356.7	386.7	28.17	28.74	28.98
377.1	407.1	28.15	28.82	29.29
417.9	447.9	27.83	28.65	29.42
438.3	468.3	27.48	28.30	28.84
479.1	509.1	26.16	26.95	27.30
499.5	529.5	25.44	26.21	26.50
540.2	570.2	24.03	24.63	25.06
560.6	590.6	23.52	24.03	24.43
601.4	631.4	22.58	22.36	22.14
621.8	651.8	22.27	21.89	21.54
662.6	692.6	22.33	21.92	21.44
683.0	713.0	22.47	22.20	21.78
723.8	753.8	23.11	23.32	23.53
744.2	774.2	23.45	23.49	23.45
785.0	815.0	23.34	22.59	21.57
805.4	835.4	23.03	21.88	20.81
846.2	876.2	22.24	20.70	19.54
866.6	896.6	22.01	20.46	19.15
907.3	937.3	21.38	20.37	19.28
927.7	957.7	21.02	20.35	19.45
968.5	998.5	20.16	19.90	19.37
988.9	1018.9	19.50	19.36	19.00
1029.7	1059.7	18.29	18.18	18.00
1050.1	1080.1	17.67	17.54	17.45

Frequency Mixer

ZLW-1WSH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=750.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
5.0	35.0	1.25	1.14	1.17	5.0	1.32	1.53	2.59	5.0	2.14	1.81	1.60
10.0	40.0	1.22	1.06	1.11	10.0	1.21	1.52	2.59	10.0	2.14	1.81	1.60
30.4	60.4	1.21	1.06	1.02	30.4	1.03	1.62	2.39	29.0	2.52	1.87	1.57
50.8	80.8	1.17	1.05	1.04	50.8	1.04	1.61	2.36	47.9	2.44	1.80	1.50
71.2	101.2	1.16	1.03	1.07	71.2	1.01	1.54	2.22	66.9	2.38	1.76	1.48
91.6	121.6	1.16	1.04	1.09	91.6	1.02	1.53	2.21	85.9	2.47	1.83	1.55
112.0	142.0	1.14	1.05	1.13	112.0	1.02	1.54	2.23	104.9	2.60	1.95	1.65
132.4	162.4	1.12	1.06	1.14	132.4	1.01	1.58	2.31	123.8	2.57	1.92	1.64
152.8	182.8	1.14	1.06	1.14	152.8	1.03	1.57	2.27	142.8	2.54	1.90	1.62
173.2	203.2	1.11	1.08	1.17	173.2	1.02	1.53	2.20	161.8	2.61	1.96	1.68
193.5	223.5	1.09	1.11	1.19	193.5	1.01	1.54	2.20	180.8	2.71	2.05	1.77
213.9	243.9	1.09	1.11	1.21	213.9	1.03	1.58	2.27	199.7	2.69	2.04	1.77
234.3	264.3	1.08	1.13	1.22	234.3	1.03	1.60	2.30	218.7	2.71	2.04	1.77
254.7	284.7	1.07	1.14	1.23	254.7	1.05	1.59	2.26	237.7	2.77	2.10	1.82
275.1	305.1	1.07	1.13	1.23	275.1	1.06	1.59	2.25	256.7	2.73	2.08	1.82
295.5	325.5	1.07	1.15	1.24	295.5	1.06	1.59	2.25	275.6	2.73	2.08	1.82
315.9	345.9	1.08	1.17	1.24	315.9	1.09	1.63	2.30	294.6	2.80	2.13	1.86
356.7	386.7	1.10	1.20	1.29	356.7	1.12	1.64	2.28	313.6	2.86	2.18	1.91
377.1	407.1	1.11	1.22	1.31	377.1	1.14	1.64	2.27	332.6	2.82	2.15	1.88
417.9	447.9	1.12	1.25	1.34	417.9	1.17	1.70	2.34	351.5	2.80	2.13	1.86
438.3	468.3	1.13	1.27	1.36	438.3	1.20	1.71	2.34	370.5	2.90	2.21	1.92
479.1	509.1	1.11	1.25	1.32	479.1	1.23	1.71	2.32	389.5	2.92	2.23	1.94
499.5	529.5	1.12	1.23	1.30	499.5	1.26	1.75	2.35	408.5	2.87	2.18	1.89
540.2	570.2	1.06	1.15	1.21	540.2	1.30	1.78	2.37	427.4	2.90	2.20	1.89
560.6	590.6	1.04	1.12	1.17	560.6	1.32	1.78	2.35	446.4	2.96	2.24	1.92
601.4	631.4	1.07	1.07	1.13	601.4	1.36	1.82	2.39	465.4	2.96	2.24	1.91
621.8	651.8	1.12	1.10	1.14	621.8	1.39	1.83	2.39	484.4	2.92	2.20	1.86
662.6	692.6	1.24	1.21	1.23	662.6	1.43	1.84	2.37	503.3	2.96	2.23	1.87
683.0	713.0	1.32	1.29	1.30	683.0	1.46	1.86	2.38	522.3	2.97	2.23	1.87
723.8	753.8	1.52	1.47	1.47	723.8	1.51	1.90	2.39	541.3	2.94	2.20	1.82
744.2	774.2	1.63	1.56	1.56	744.2	1.53	1.92	2.39	560.3	2.97	2.22	1.82
785.0	815.0	1.89	1.78	1.75	785.0	1.57	1.96	2.43	579.2	3.00	2.23	1.82
805.4	835.4	2.01	1.88	1.83	805.4	1.59	1.98	2.46	598.2	2.97	2.22	1.79
846.2	876.2	2.31	2.13	2.03	846.2	1.62	2.00	2.46	617.2	2.89	2.15	1.73
866.6	896.6	2.46	2.27	2.15	866.6	1.64	2.01	2.48	636.2	2.95	2.20	1.76
907.3	937.3	2.78	2.60	2.48	907.3	1.67	2.04	2.51	655.1	3.03	2.26	1.80
927.7	957.7	2.95	2.78	2.66	927.7	1.71	2.07	2.53	674.1	3.00	2.23	1.77
968.5	998.5	3.27	3.13	3.00	968.5	1.73	2.07	2.52	693.1	2.97	2.23	1.77
988.9	1018.9	3.40	3.27	3.16	988.9	1.76	2.08	2.53	712.1	2.96	2.23	1.78
1029.7	1059.7	3.67	3.55	3.45	1029.7	1.82	2.11	2.54	731.0	2.98	2.25	1.80
1050.1	1080.1	3.77	3.66	3.57	1050.1	1.85	2.13	2.53	750.0	2.35	1.69	1.29

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	5	36	10	34	17	52	31	42	32	50
1	-	23	+0	33	12	38	29	48	32	42	36	55
2	98	56	37	56	38	55	38	58	50	64	49	65
3	>100	70	61	72	62	67	58	72	68	82	60	73
4	>100	78	67	73	66	71	69	71	70	83	87	81
5	>100	>92	91	>92	>92	>92	84	88	84	88	92	>92
6	>100	>92	>92	>92	>92	>92	>92	89	>92	89	>92	>92
7	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
8	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
9	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
10	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 370.1 MHz; -1.00 dBm.
LO IN: 400.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -7.53 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	47	26	48	32	60	47	51	47	65
1	-	23	+0	32	13	39	29	49	38	49	46	67
2	86	60	33	69	34	57	34	53	43	66	50	63
3	>100	58	43	58	44	56	41	71	61	63	47	59
4	>100	70	49	66	47	68	49	67	48	67	60	69
5	>100	82	68	76	59	73	56	65	53	67	66	79
6	>100	80	70	74	59	68	59	67	60	67	63	79
7	>100	86	82	93	77	>102	78	97	75	86	73	92
8	>100	89	84	92	82	82	72	77	71	74	70	74
9	>100	>102	>102	101	89	>102	80	88	83	86	81	86
10	>100	>102	96	96	102	101	101	87	91	84	82	79
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 370.1 MHz; 9.00 dBm.
LO IN: 400.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; 2.38 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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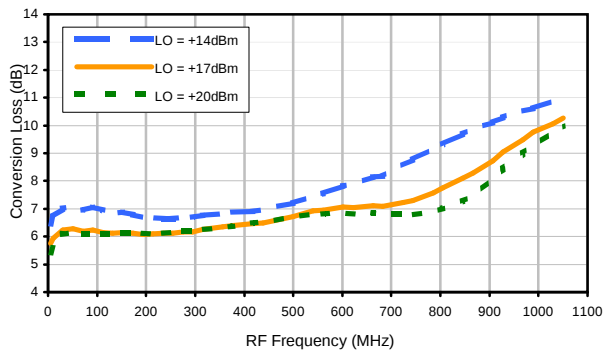


Frequency Mixer

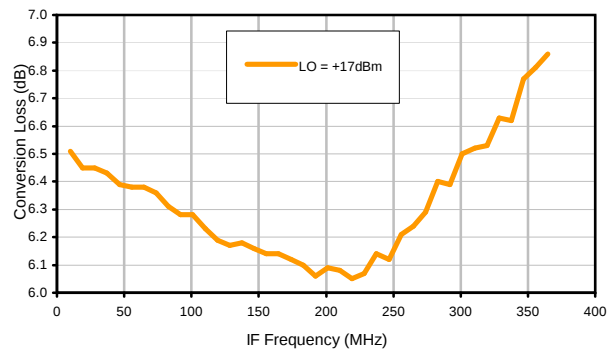
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Typical Performance Curves

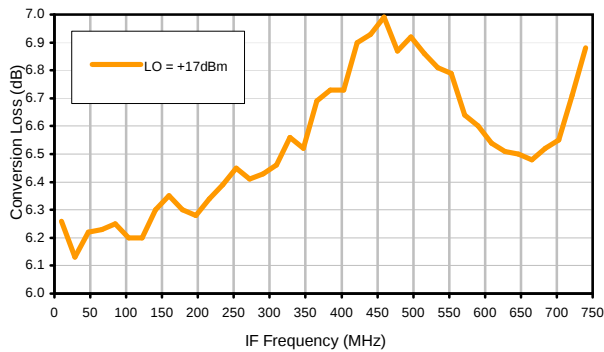
Conversion Loss @ IF=30MHz



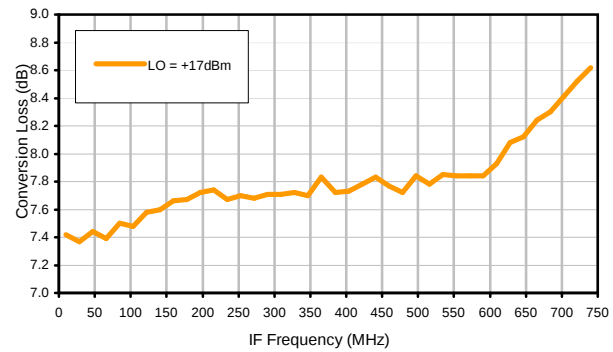
Conversion Loss vs. IF @ RF=375.1MHz



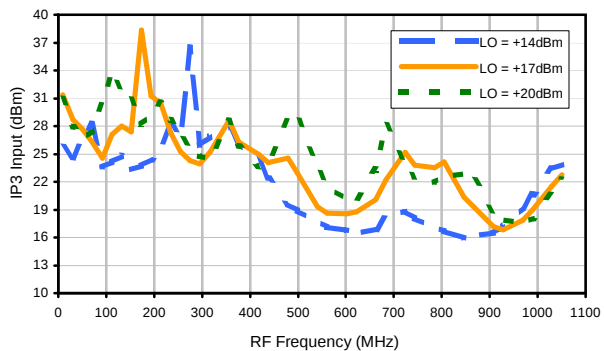
Conversion Loss vs. IF @ RF=10.1MHz



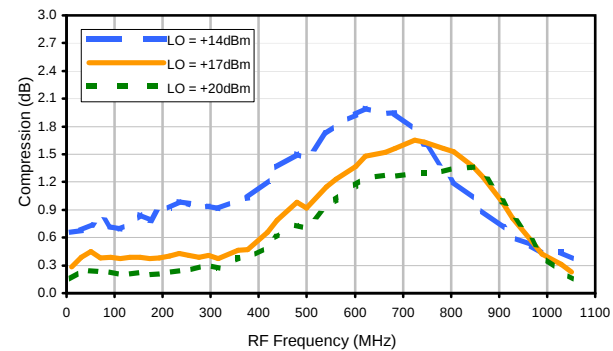
Conversion Loss vs. IF @ RF=750.1MHz



IP3 Input

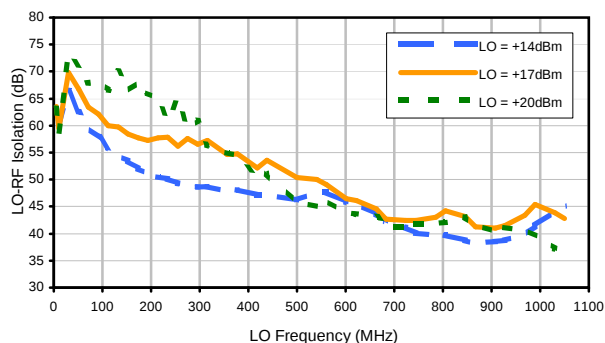


Compression @ RF IN=+14dBm

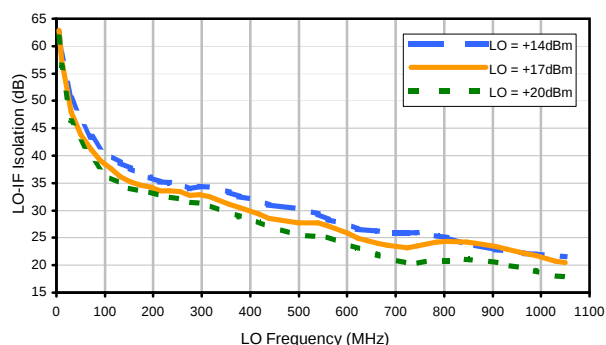


Typical Performance Curves

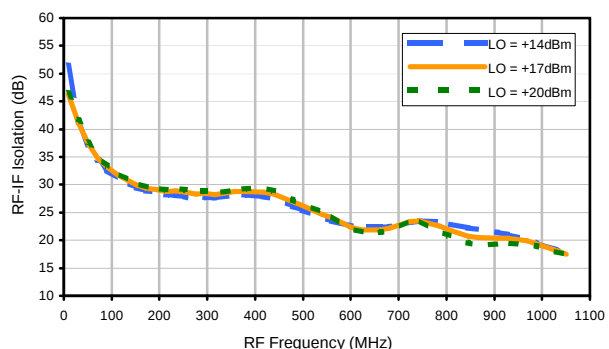
LO-RF Isolation



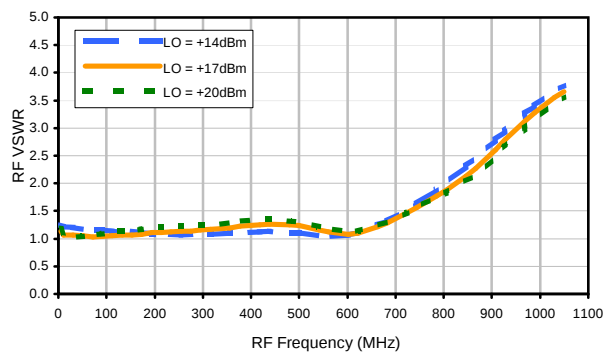
LO-IF Isolation



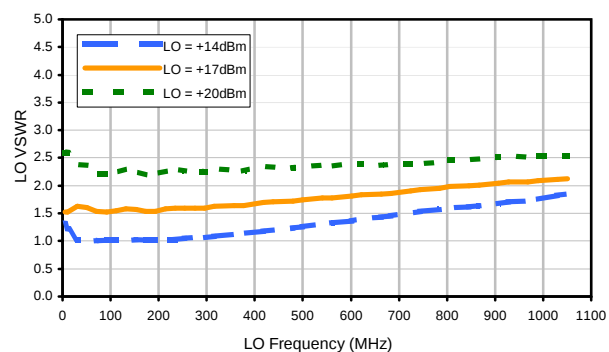
RF-IF Isolation



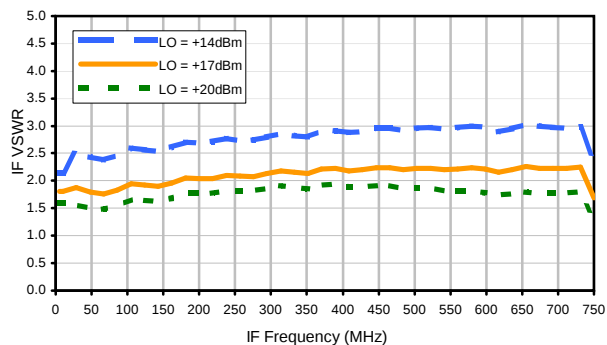
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	5	36	10	34	17	52	31	42	32	50
1	-	23	+0	33	12	38	29	48	32	42	36	55
2	98	56	37	56	38	55	38	58	50	64	49	65
3	>100	70	61	72	62	67	58	72	68	82	60	73
4	>100	78	67	73	66	71	69	71	70	83	87	81
5	>100	>92	91	>92	>92	>92	84	88	84	88	92	>92
6	>100	>92	>92	>92	>92	>92	>92	89	>92	89	>92	>92
7	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
8	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
9	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
10	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 370.1 MHz; -1.00 dBm.

LO IN: 400.01 MHz; +17.00 dBm

IF OUT: 29.91 MHz; -7.53 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	47	26	48	32	60	47	51	47	65
1	-	23	+0	32	13	39	29	49	38	49	46	67
2	86	60	33	69	34	57	34	53	43	66	50	63
3	>100	58	43	58	44	56	41	71	61	63	47	59
4	>100	70	49	66	47	68	49	67	48	67	60	69
5	>100	82	68	76	59	73	56	65	53	67	66	79
6	>100	80	70	74	59	68	59	67	60	67	63	79
7	>100	86	82	93	77	>102	78	97	75	86	73	92
8	>100	89	84	92	82	82	72	77	71	74	70	74
9	>100	>102	>102	101	89	>102	80	88	83	86	81	86
10	>100	>102	96	96	102	101	101	87	91	84	82	79
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 370.1 MHz; 9.00 dBm.

LO IN: 400.01 MHz; +17.00 dBm

IF OUT: 29.91 MHz; 2.38 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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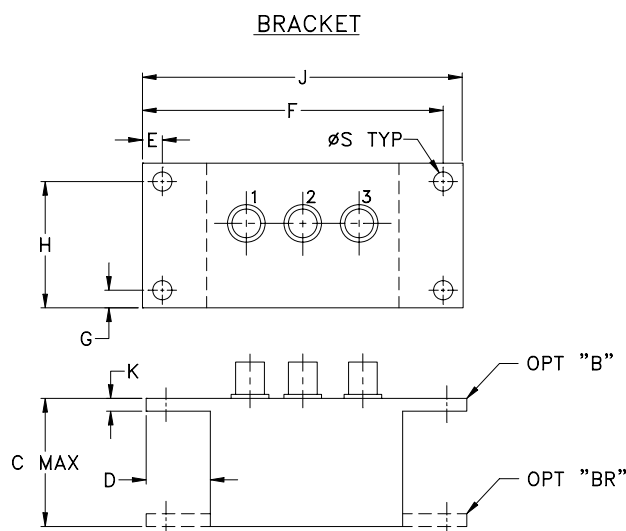
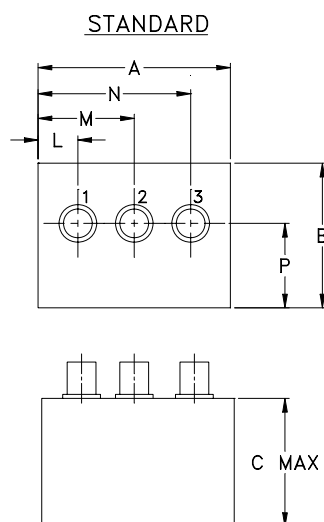


Outline Dimensions

M21

M22

M23



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
M21	1.50 (38.10)	1.13 (28.70)	1.00 (25.40)	.50 (12.70)	.155 (3.94)	2.345 (59.56)	.138 (3.51)	.987 (25.07)	2.50 (63.50)	.10 (2.54)	.31 (7.87)	.75 (19.05)	1.19 (30.23)
M22	2.25 (57.15)	1.38 (35.05)	1.24 (31.50)		.150 (3.81)	3.100 (78.74)		1.238 (31.45)	3.25 (82.55)		.40 (10.16)	1.15 (29.21)	1.86 (47.24)
M23	2.25 (57.15)	1.38 (35.05)	1.24 (31.50)		.150 (3.81)	3.100 (78.74)		1.238 (31.45)	3.25 (82.55)		.63 (16.00)	1.06 (26.92)	1.63 (41.40)

CASE#	P	Q	R	S	WT. GRAMS
M21	.66 (16.76)	--	--	.150 (3.81)	40.0
M22	.64 (16.26)	--	--		74.0
M23	.69 (17.53)	--	--		70.0

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

Notes:

- Case material: Aluminum alloy.
- Case finish:
 - For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
 - For Non-RoHS Case Styles: Yellow hexavalent chrome based conversion coating.

Due to transition from non-RoHS to RoHS, models will be supplied with either case style finish until the non-RoHS case inventory is depleted.
- Mounting bracket available on request. For bracket mounted on connector end add suffix B to part number and add \$5.00 to unit cost. For bracket mounted on the rear, add suffix BR to part number and add \$1.50 to unit cost.



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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
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D
Humidity	90% RH, 65°C Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103
Thermal Shock	-65° to 125°C, 5 cycles	MIL-STD-202, Method 107, Condition B
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	100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition I