

Coaxial

Frequency Mixer

Level 23 (LO Power +23 dBm) 5 to 500 MHz

ZAY-1+



CASE STYLE: M22

Connectors	Model
BNC	ZAY-1+
BRACKET (OPTION "B")	
BRACKET (OPTION "BR")	

+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	350mW
IF Current	40mA

Permanent damage may occur if any of these limits are exceeded.

Coaxial Connections

LO	1
RF	3
IF	2

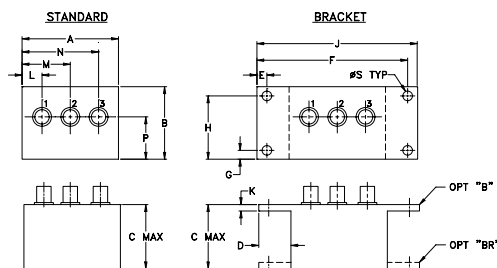
Features

- low conversion loss, 6.57 dB typ.
- high L-R isolation, 40 dB typ. L-R & L-I
- rugged shielded case

Applications

- VHF/UHF
- instrumentation
- federal & defense communication

Outline Drawing



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H
2.25	1.38	1.24	.50	.150	3.100	.138	1.238
57.15	35.05	31.50	12.70	3.81	78.74	3.51	31.45

J	K	L	M	N	P	S	wt
3.25	.10	.40	1.15	1.86	.64	.150	grams
82.55	2.54	10.16	29.21	47.24	16.26	3.81	74.0

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)					
LO/RF	IF	Mid-Band		Total Range		L		M		U		L		M		U	
f_L - f_U		$\bar{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.
5-500	DC-500	6.57	0.9	7.5	8.5	55	45	40	30	30	25	55	45	40	30	30	20

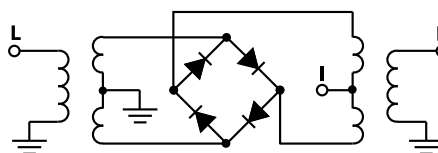
1 dB COMP.: +15 dBm typ.

L = low range [f_L to 10 f_L]M = mid range [10 f_L to f_U]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 +23dBm	LO +23dBm	LO +23dBm	LO +23dBm	LO +23dBm
5.00	35.00	6.52	57.02	82.02	1.29	2.50
10.00	40.00	6.40	56.72	82.32	1.14	2.37
20.00	50.00	6.40	54.48	81.28	1.06	2.33
35.94	65.94	6.43	51.51	75.99	1.05	2.31
50.00	80.00	6.40	48.82	72.57	1.07	2.37
82.35	52.35	6.39	45.62	62.91	1.08	2.20
100.00	70.00	6.36	44.05	58.66	1.10	2.25
144.22	114.22	6.53	41.60	53.71	1.12	2.11
175.16	145.16	6.68	40.04	51.38	1.14	2.25
200.00	170.00	6.69	39.45	50.73	1.16	2.06
221.57	191.57	6.52	36.41	46.45	1.18	2.17
252.50	222.50	6.52	36.33	47.23	1.20	2.04
283.44	253.44	6.64	36.36	47.98	1.22	2.10
314.38	284.38	6.74	36.35	46.73	1.24	1.96
345.32	315.32	6.62	33.85	44.99	1.26	2.04
376.26	346.26	6.50	30.50	41.75	1.29	1.96
407.19	377.19	6.43	32.89	42.28	1.31	1.95
438.13	408.13	6.50	33.81	42.66	1.35	1.90
469.07	439.07	6.81	33.63	41.41	1.38	1.87
500.00	470.00	6.62	34.24	40.42	1.44	1.83

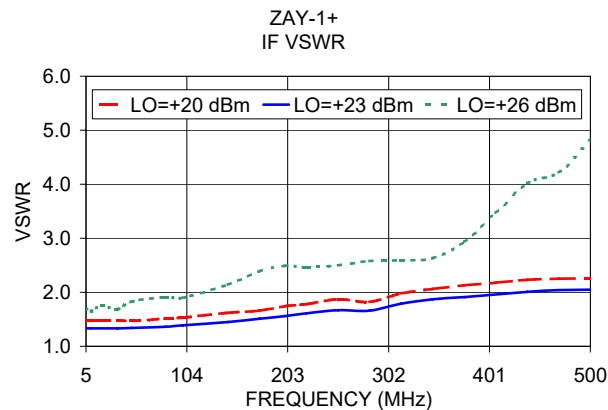
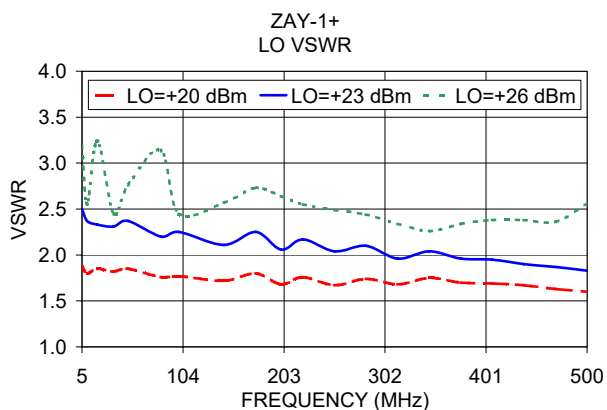
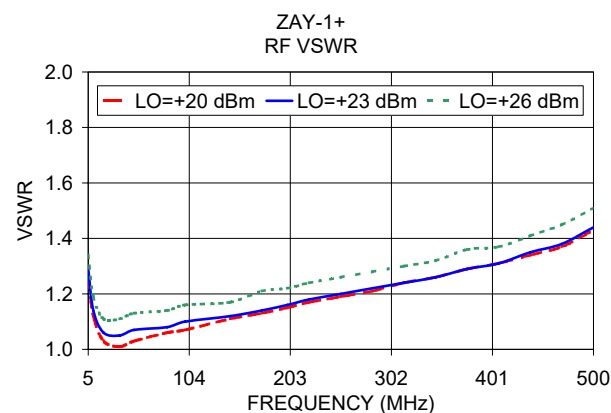
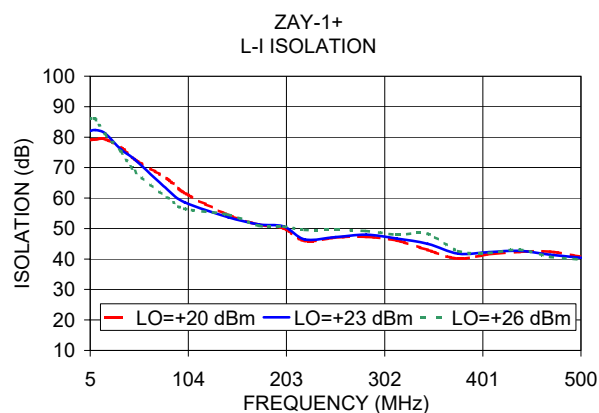
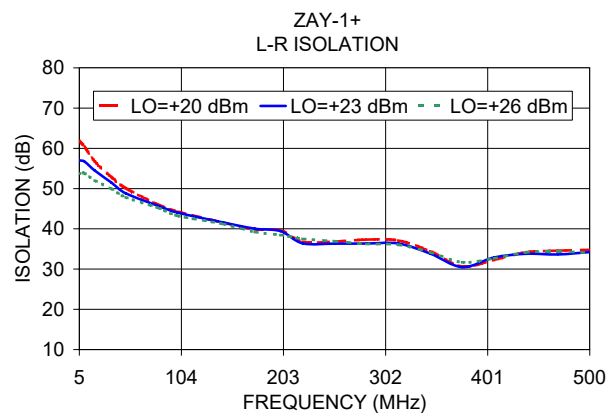
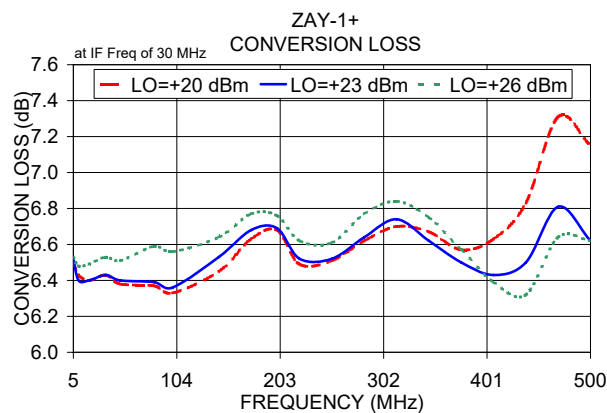
Electrical Schematic



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





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Frequency Mixer

ZAY-1+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+20	+23	+26
5.0	35.0	6.50	6.52	6.53
10.0	40.0	6.60	6.40	6.48
20.1	50.1	5.64	5.52	5.46
30.1	60.1	5.67	5.54	5.48
40.1	70.1	5.69	5.54	5.49
50.1	80.1	5.65	5.53	5.50
60.1	90.1	5.63	5.54	5.51
80.1	110.1	5.66	5.57	5.55
100.1	130.1	5.67	5.60	5.57
120.1	150.1	5.68	5.61	5.58
140.1	170.1	5.70	5.65	5.62
160.1	190.1	5.70	5.64	5.61
180.1	210.1	5.72	5.67	5.64
200.1	230.1	5.76	5.69	5.66
220.1	250.1	5.79	5.72	5.69
240.1	270.1	5.82	5.75	5.71
260.1	290.1	5.89	5.80	5.75
280.1	310.1	5.91	5.84	5.79
300.1	330.1	5.89	5.83	5.80
320.1	350.1	5.92	5.86	5.85
350.1	380.1	6.08	5.96	5.91
380.1	410.1	6.20	6.06	5.94
410.1	440.1	6.37	6.19	6.03
440.1	470.1	6.47	6.22	6.04
470.1	500.1	6.35	6.11	5.96
500.1	530.1	6.39	6.09	5.92
530.1	560.1	6.57	6.24	6.05
560.1	590.1	7.08	6.57	6.34
590.1	620.1	7.39	6.63	6.33
620.1	650.1	7.67	6.94	6.57
650.1	680.1	8.62	7.90	7.30
690.1	720.1	8.44	7.92	7.40
730.1	760.1	8.09	7.77	7.54
810.1	840.1	8.30	8.10	7.90
850.1	880.1	8.40	8.15	7.98
890.1	920.1	8.60	8.30	8.12
930.1	960.1	8.80	8.55	8.40
970.1	1000.1	9.46	9.11	8.86
1010.1	1040.1	10.51	10.05	9.69
1050.1	1080.1	11.85	11.28	10.69

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+20	+23	+26
10.1	40.1	26.95	26.61	34.09
20.1	50.1	25.12	32.82	27.31
30.1	60.1	25.12	32.54	28.50
40.1	70.1	26.50	26.40	29.08
50.1	80.1	27.57	27.39	29.22
60.1	90.1	25.37	27.97	28.90
80.1	110.1	24.28	27.36	28.18
100.1	130.1	25.74	27.06	27.64
120.1	150.1	25.45	26.70	27.38
140.1	170.1	25.78	26.17	26.89
160.1	190.1	24.74	25.40	26.89
180.1	210.1	24.76	25.73	27.23
200.1	230.1	23.31	24.44	26.59
220.1	250.1	24.65	25.20	26.35
240.1	270.1	25.58	26.50	28.60
260.1	290.1	22.63	24.21	26.98
280.1	310.1	22.70	23.36	25.18
300.1	330.1	23.61	24.49	26.84
320.1	350.1	24.32	25.67	28.50
350.1	380.1	21.75	24.36	27.00
380.1	410.1	17.95	20.48	24.38
410.1	440.1	18.27	19.45	22.03
440.1	470.1	20.01	21.93	24.19
470.1	500.1	23.13	26.20	30.13
500.1	530.1	25.56	29.49	39.10
530.1	560.1	26.74	30.04	32.88
560.1	590.1	26.59	35.14	42.27
590.1	620.1	21.16	31.00	32.66
620.1	650.1	20.19	26.34	29.75
650.1	680.1	19.71	21.44	24.54
690.1	720.1	20.04	21.60	29.25
730.1	760.1	24.02	26.76	27.62
770.1	800.1	24.62	29.29	32.32
810.1	840.1	26.39	34.47	33.29
850.1	880.1	25.50	27.81	31.80
890.1	920.1	25.77	26.75	27.85
930.1	960.1	27.51	28.82	30.01
970.1	1000.1	24.81	26.81	29.82
1010.1	1040.1	20.78	23.04	22.24
1050.1	1080.1	17.98	22.47	19.95

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+15dBm (dB)		
		@LO (dBm)		
		+20	+23	+26
10.1	40.1	0.45	0.30	0.16
20.1	50.1	0.51	0.34	0.19
30.1	60.1	0.55	0.38	0.21
40.1	70.1	0.53	0.35	0.17
50.1	80.1	0.49	0.29	0.12
60.1	90.1	0.42	0.22	0.08
80.1	110.1	0.39	0.19	0.06
100.1	130.1	0.41	0.21	0.08
120.1	150.1	0.41	0.24	0.13
140.1	170.1	0.38	0.24	0.13
160.1	190.1	0.34	0.22	0.12
180.1	210.1	0.28	0.16	0.07
200.1	230.1	0.29	0.19	0.10
220.1	250.1	0.32	0.22	0.15
240.1	270.1	0.35	0.24	0.15
260.1	290.1	0.36	0.26	0.16
280.1	310.1	0.37	0.26	0.14
300.1	330.1	0.51	0.34	0.18
320.1	350.1	0.72	0.48	0.31
350.1	380.1	0.96	0.69	0.44
380.1	410.1	1.08	0.81	0.51
410.1	440.1	1.18	0.93	0.63
440.1	470.1	1.33	1.17	0.91
470.1	500.1	1.22	1.05	0.81
500.1	530.1	1.27	1.08	0.88
530.1	560.1	1.44	1.22	1.01
560.1	590.1	1.29	1.14	0.93
590.1	620.1	0.98	1.11	0.90
620.1	650.1	0.74	0.93	0.77
650.1	680.1	0.43	0.67	0.75
690.1	720.1	0.39	0.56	0.61
730.1	760.1	0.71	0.73	0.54
770.1	800.1	0.68	0.62	0.35
810.1	840.1	0.61	0.51	0.38
850.1	880.1	0.68	0.61	0.51
890.1	920.1	0.59	0.44	0.40
930.1	960.1	0.58	0.33	0.49
970.1	1000.1	0.71	0.33	0.52
1010.1	1040.1	0.96	0.48	0.58
1050.1	1080.1	0.94	0.60	0.51

REV. X2

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IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

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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)=250.1MHz (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)=500.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+23			+23			+23
0.5	249.6	5.80	0.5	10.6	5.58	0.5	499.6	6.18
1.0	249.1	5.72	0.8	10.9	5.53	0.8	499.4	6.11
1.5	248.6	5.71	1.0	11.1	5.51	1.0	499.1	6.09
2.0	248.1	5.70	2.0	12.1	5.49	2.0	498.1	6.10
2.5	247.6	5.70	3.0	13.1	5.49	3.0	497.1	6.10
3.0	247.1	5.69	4.0	14.1	5.50	4.0	496.1	6.11
4.0	246.1	5.69	5.0	15.1	5.50	5.0	495.1	6.12
5.0	245.1	5.70	6.0	16.1	5.50	6.0	494.1	6.13
6.0	244.1	5.70	8.0	18.1	5.50	8.0	492.1	6.14
8.0	242.1	5.69	10.0	20.1	5.51	10.0	490.1	6.17
10.0	240.1	5.69	15.0	25.1	5.52	15.0	485.1	6.24
15.0	235.1	5.71	20.0	30.1	5.53	20.0	480.1	6.30
20.0	230.1	5.70	25.0	35.1	5.55	25.0	475.1	6.34
25.0	225.1	5.70	30.0	40.1	5.55	30.0	470.1	6.38
30.0	220.1	5.71	35.0	45.1	5.55	35.0	465.1	6.45
35.0	215.1	5.72	40.0	50.1	5.52	40.0	460.1	6.50
40.0	210.1	5.70	45.0	55.1	5.50	45.0	455.1	6.54
45.0	205.1	5.72	50.0	60.1	5.54	50.0	450.1	6.55
50.0	200.1	5.74	70.0	80.1	5.52	70.0	430.1	6.52
55.0	195.1	5.75	90.0	100.1	5.53	90.0	410.1	6.43
60.0	190.1	5.74	110.0	120.1	5.55	110.0	390.1	6.35
65.0	185.1	5.74	130.0	140.1	5.58	130.0	370.1	6.27
70.0	180.1	5.75	150.0	160.1	5.57	150.0	350.1	6.32
80.0	170.1	5.75	170.0	180.1	5.60	170.0	330.1	6.38
90.0	160.1	5.76	190.0	200.1	5.61	190.0	310.1	6.50
100.0	150.1	5.77	210.0	220.1	5.60	210.0	290.1	6.44
110.0	140.1	5.78	230.0	240.1	5.66	230.0	270.1	6.46
120.0	130.1	5.77	250.0	260.1	5.66	250.0	250.1	6.28
130.0	120.1	5.75	270.0	280.1	5.70	270.0	230.1	6.48
140.0	110.1	5.76	290.0	300.1	5.72	290.0	210.1	6.50
150.0	100.1	5.77	310.0	320.1	5.72	310.0	190.1	6.50
160.0	90.1	5.77	330.0	340.1	5.74	330.0	170.1	6.54
170.0	80.1	5.76	350.0	360.1	5.72	350.0	150.1	6.53
180.0	70.1	5.75	370.0	380.1	5.75	370.0	130.1	6.52
190.0	60.1	5.76	390.0	400.1	5.76	390.0	110.1	6.49
200.0	50.1	5.77	410.0	420.1	5.71	410.0	90.1	6.47
210.0	40.1	5.82	430.0	440.1	5.77	430.0	70.1	6.46
220.0	30.1	5.86	450.0	460.1	5.74	450.0	50.1	6.44
230.0	20.1	5.89	470.0	480.1	5.73	470.0	30.1	6.52
240.0	10.1	5.93	490.0	500.1	5.70	490.0	10.1	6.54

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+20	+23	+26	+20	+23	+26
5.0	61.85	57.02	53.70	79.05	82.02	86.00
10.0	60.36	56.72	53.82	79.25	82.32	86.00
20.1	77.12	77.40	83.55	66.09	65.11	58.40
30.1	74.00	74.22	80.80	64.92	64.16	58.60
40.1	72.01	72.07	77.47	62.98	63.52	57.90
50.1	70.45	70.64	73.52	61.98	59.85	57.43
60.1	68.79	68.97	71.28	59.17	57.44	56.61
80.1	68.19	68.21	66.55	53.20	55.19	54.72
100.1	67.07	67.10	64.58	51.25	53.50	52.90
120.1	67.22	66.90	63.35	49.41	51.65	51.59
140.1	64.03	63.79	65.62	48.02	50.41	50.91
160.1	63.29	62.98	62.21	47.35	49.27	49.80
180.1	63.35	63.07	60.17	45.58	47.31	47.55
200.1	61.19	61.02	59.61	44.67	45.95	45.44
220.1	65.32	64.97	58.86	43.99	44.71	43.79
240.1	63.07	62.94	59.87	41.67	43.06	43.29
260.1	64.10	63.71	56.72	41.90	42.66	42.35
280.1	78.04	73.63	54.92	39.60	40.51	40.54
300.1	60.08	59.64	56.39	39.81	40.04	38.83
320.1	57.09	56.78	63.96	37.74	37.70	36.68
350.1	54.22	54.18	47.00	35.85	35.62	35.21
380.1	58.13	58.41	51.64	35.15	34.52	34.13
410.1	53.94	54.28	61.42	34.03	33.27	31.50
440.1	50.54	52.13	44.08	32.65	31.90	30.41
470.1	52.89	54.13	43.32	30.71	29.70	29.32
500.1	45.57	47.79	47.95	27.77	26.97	26.65
530.1	44.93	45.56	41.03	25.36	24.34	23.90
560.1	47.31	42.72	40.94	25.18	24.01	24.09
590.1	44.69	42.71	43.58	25.51	23.80	23.26
620.1	41.70	37.43	37.50	24.24	21.79	20.91
650.1	44.77	37.30	37.51	23.07	20.26	19.24
690.1	43.92	37.72	38.76	24.11	21.93	20.87
730.1	39.42	33.93	31.55	20.43	18.30	17.81
810.1	35.55	31.20	29.24	17.16	15.58	16.02
850.1	32.71	28.09	26.93	13.34	12.22	13.04
890.1	32.87	28.57	28.24	13.87	12.89	14.14
930.1	31.94	27.43	25.86	13.58	12.66	13.92
970.1	29.40	25.38	24.12	11.23	10.24	11.65
1010.1	30.04	26.98	24.97	13.33	12.27	13.68
1050.1	27.79	25.26	23.14	11.85	10.84	12.30

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+20	+23	+26
10.1	40.1	34.65	32.88	30.61
20.1	50.1	33.51	31.73	29.00
30.1	60.1	33.26	31.59	29.32
40.1	70.1	32.87	31.67	31.04
50.1	80.1	32.32	31.70	31.73
60.1	90.1	31.77	31.29	31.62
80.1	110.1	30.87	30.44	30.58
100.1	130.1	29.93	29.53	29.16
120.1	150.1	28.92	28.47	27.01
140.1	170.1	28.61	28.61	28.05
160.1	190.1	28.51	28.61	28.82
180.1	210.1	28.35	28.53	28.82
200.1	230.1	28.20	28.32	28.36
220.1	250.1	28.11	28.14	27.64
240.1	270.1	28.62	28.72	28.57
260.1	290.1	28.50	28.78	29.14
280.1	310.1	29.11	29.45	29.88
300.1	330.1	29.37	30.08	30.72
320.1	350.1	29.72	30.60	31.20
350.1	380.1	28.71	29.85	30.78
380.1	410.1	27.71	28.78	29.07
410.1	440.1	25.98	26.86	28.32
440.1	470.1	24.83	25.12	25.88
470.1	500.1	24.61	24.79	24.76
500.1	530.1	23.76	24.05	24.45
530.1	560.1	23.44	23.86	24.85
560.1	590.1	24.00	24.00	23.97
590.1	620.1	24.46	24.33	24.08
620.1	650.1	24.65	25.22	25.24
650.1	680.1	24.15	23.87	23.28
690.1	720.1	23.45	23.39	23.05
730.1	760.1	23.08	22.33	21.62
770.1	800.1	22.75	22.16	21.51
810.1	840.1	22.21	21.94	21.70
850.1	880.1	21.40	21.00	20.55
890.1	920.1	20.84	20.49	20.17
930.1	960.1	19.94	19.47	19.01
970.1	1000.1	19.53	19.31	19.08
1010.1	1040.1	17.84	17.61	17.13
1050.1	1080.1	17.43	17.54	17.49

Frequency Mixer

ZAY-1+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+20	+23	+26
5.0	35.0	1.26	1.29	1.34
10.0	40.0	1.12	1.14	1.19
20.1	50.1	1.16	1.07	1.02
30.1	60.1	1.16	1.07	1.01
40.1	70.1	1.16	1.05	1.01
50.1	80.1	1.11	1.04	1.02
60.1	90.1	1.09	1.04	1.04
80.1	110.1	1.10	1.05	1.05
100.1	130.1	1.09	1.06	1.06
120.1	150.1	1.10	1.07	1.07
140.1	170.1	1.10	1.08	1.08
160.1	190.1	1.09	1.08	1.09
180.1	210.1	1.09	1.08	1.09
200.1	230.1	1.09	1.08	1.09
220.1	250.1	1.09	1.08	1.09
240.1	270.1	1.09	1.08	1.10
260.1	290.1	1.08	1.08	1.09
280.1	310.1	1.06	1.06	1.08
300.1	330.1	1.05	1.07	1.09
320.1	350.1	1.04	1.06	1.08
350.1	380.1	1.03	1.00	1.02
380.1	410.1	1.09	1.06	1.04
410.1	440.1	1.18	1.15	1.12
440.1	470.1	1.26	1.23	1.21
470.1	500.1	1.33	1.30	1.28
500.1	530.1	1.48	1.44	1.40
530.1	560.1	1.51	1.47	1.44
560.1	590.1	1.76	1.70	1.66
590.1	620.1	1.80	1.72	1.69
620.1	650.1	2.01	1.93	1.89
650.1	680.1	2.24	2.15	2.10
690.1	720.1	2.31	2.28	2.22
730.1	760.1	2.62	2.61	2.57
810.1	840.1	3.67	3.59	3.51
850.1	880.1	4.07	3.95	3.89
890.1	920.1	4.87	4.69	4.54
930.1	960.1	5.95	5.70	5.56
970.1	1000.1	7.60	7.34	7.14
1010.1	1040.1	8.27	8.05	7.87
1050.1	1080.1	10.02	9.79	9.90

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+20	+23	+26
5.0	1.88	2.50	3.19
10.0	1.80	2.37	2.55
20.1	1.49	2.09	2.67
30.1	1.43	1.91	2.21
40.1	1.41	1.84	2.08
50.1	1.41	1.87	2.16
60.1	1.48	2.01	2.40
80.1	1.59	2.38	3.34
100.1	1.54	2.27	3.13
120.1	1.43	1.90	2.16
140.1	1.42	1.85	2.15
160.1	1.54	2.15	2.77
180.1	1.62	2.39	3.38
200.1	1.52	2.10	2.52
220.1	1.46	1.89	2.13
240.1	1.53	2.01	2.36
260.1	1.70	2.42	3.37
280.1	1.70	2.40	3.06
300.1	1.60	2.08	2.32
320.1	1.57	2.00	2.31
350.1	1.80	2.51	3.42
380.1	1.78	2.35	2.71
410.1	1.70	2.13	2.46
440.1	1.94	2.61	3.42
470.1	1.92	2.48	2.88
500.1	1.82	2.27	2.63
530.1	2.02	2.63	3.34
560.1	2.10	2.67	3.09
590.1	2.02	2.49	2.84
620.1	2.21	2.75	3.29
650.1	2.36	2.94	3.37
690.1	2.28	2.75	3.08
730.1	2.48	3.04	3.53
810.1	2.42	2.86	3.25
850.1	2.82	3.47	4.01
890.1	2.33	2.69	2.97
930.1	2.95	3.56	4.01
970.1	2.47	2.81	3.01
1010.1	2.92	3.33	3.55
1050.1	2.89	3.31	3.67

IF (OUT) (MHz)	IF VSWR @LO=500.1MHz (:1)		
	@LO (dBm)		
	+20	+23	+26
0.5	1.32	1.31	1.33
0.8	1.22	1.13	1.11
1.0	1.29	1.16	1.09
2.0	1.39	1.25	1.16
3.0	1.38	1.24	1.15
4.0	1.36	1.22	1.13
5.0	1.34	1.20	1.12
6.0	1.32	1.19	1.11
8.0	1.31	1.17	1.09
10.0	1.30	1.17	1.09
15.0	1.30	1.17	1.09
20.0	1.31	1.17	1.09
25.0	1.31	1.18	1.09
30.0	1.32	1.18	1.10
35.0	1.33	1.19	1.10
40.0	1.33	1.19	1.11
45.0	1.34	1.20	1.12
50.0	1.35	1.20	1.12
70.0	1.37	1.23	1.15
90.0	1.38	1.24	1.17
110.0	1.40	1.27	1.19
130.0	1.43	1.29	1.22
150.0	1.45	1.31	1.24
170.0	1.48	1.34	1.27
190.0	1.50	1.36	1.29
210.0	1.52	1.38	1.30
230.0	1.55	1.40	1.32
250.0	1.57	1.42	1.33
270.0	1.60	1.44	1.35
290.0	1.61	1.45	1.36
310.0	1.62	1.46	1.36
330.0	1.64	1.47	1.36
350.0	1.66	1.48	1.37
370.0	1.66	1.48	1.37
390.0	1.66	1.48	1.36
410.0	1.66	1.48	1.36
430.0	1.66	1.47	1.35
450.0	1.67	1.48	1.35
470.0	1.67	1.48	1.35
490.0	1.65	1.46	1.33

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	12	27	14	30	17	38	25	32	25	38
1	-	27	+0	32	11	36	23	41	29	47	41	47
2	98	70	49	66	49	66	51	66	62	74	62	74
3	109	76	60	79	60	82	60	78	68	86	69	85
4	>123	95	87	98	85	95	85	94	86	100	94	103
5	>122	112	99	103	95	102	94	103	94	103	103	111
6	>124	>123	115	>118	105	116	105	114	104	113	108	120
7	>123	>124	>122	>124	>121	118	>122	>121	>122	>120	>123	>123
8	>123	>122	>122	>125	>122	>123	117	>122	119	>122	118	>124
9	>123	>121	>123	>123	>124	>122	>123	>123	>120	>123	>121	>122
10	>123	>122	>121	>123	>124	>123	>123	>123	>122	>122	>122	>121
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; .02.00 dBm.
LO IN: 280.01 MHz; +23.00 dBm
IF OUT: 29.91 MHz; -5.65 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	21	36	26	41	28	50	37	43	37	50
1	-	27	+0	32	11	37	24	43	30	48	40	51
2	85	68	43	66	43	64	44	59	56	65	53	60
3	98	59	48	66	46	67	45	60	54	63	62	72
4	118	81	63	85	62	77	61	73	63	80	74	82
5	>122	75	66	72	61	73	59	72	57	70	62	73
6	>123	88	84	82	86	80	77	82	74	90	76	91
7	>124	91	83	88	74	99	74	100	77	103	86	98
8	123	115	93	106	91	94	84	89	87	89	90	91
9	>124	108	101	106	95	114	84	97	81	95	81	98
10	123	108	109	111	109	110	104	105	95	112	94	106
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; 10.00 dBm.
LO IN: 280.01 MHz; +23.00 dBm
IF OUT: 29.91 MHz; 4.37 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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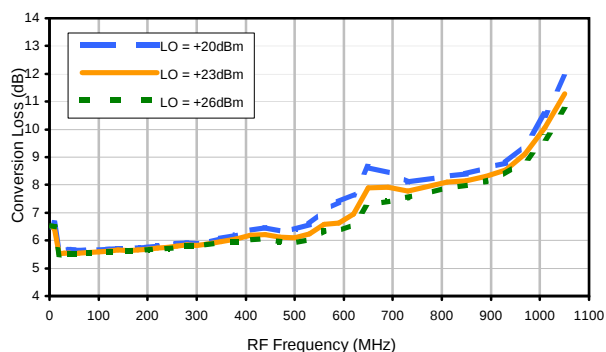


Frequency Mixer

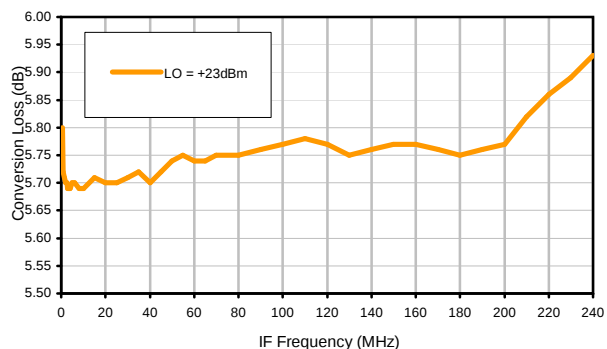
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Typical Performance Curves

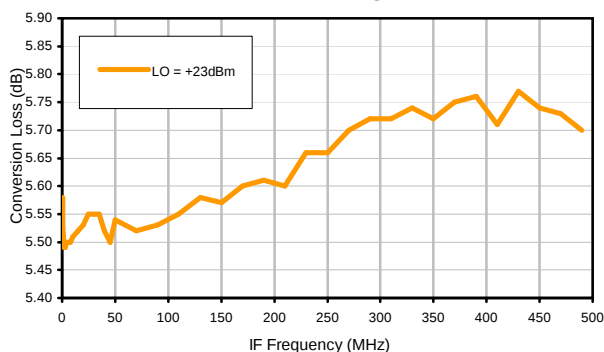
Conversion Loss @ IF=30MHz



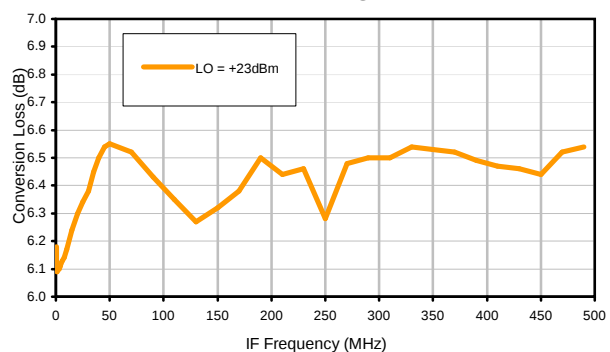
Conversion Loss vs. IF @ RF=250.1MHz



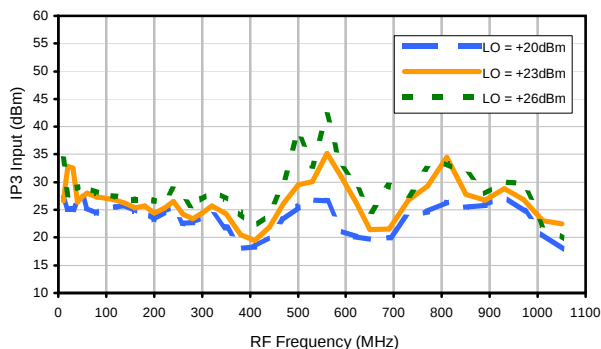
Conversion Loss vs. IF @ RF=10.1MHz



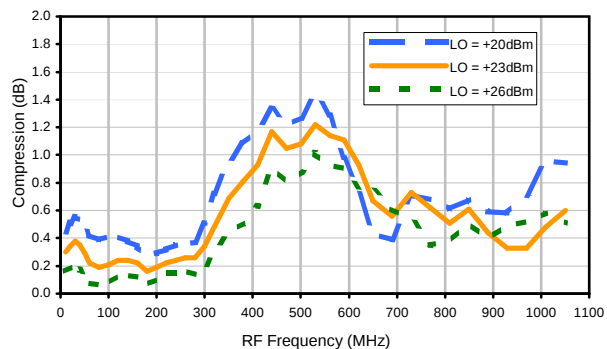
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input



Compression @ RF IN=+15dBm



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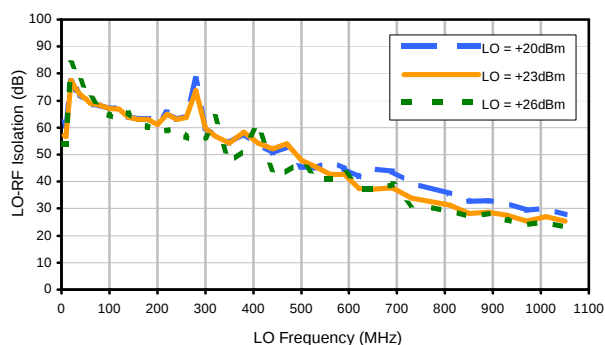


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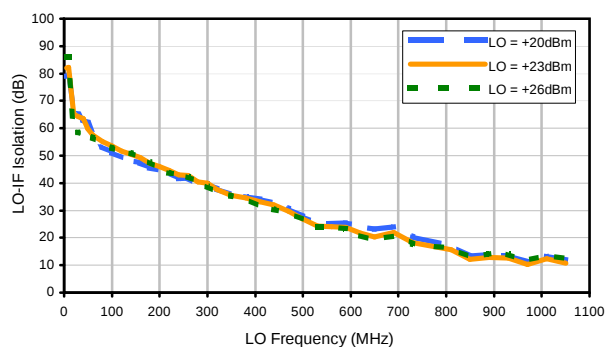


Typical Performance Curves

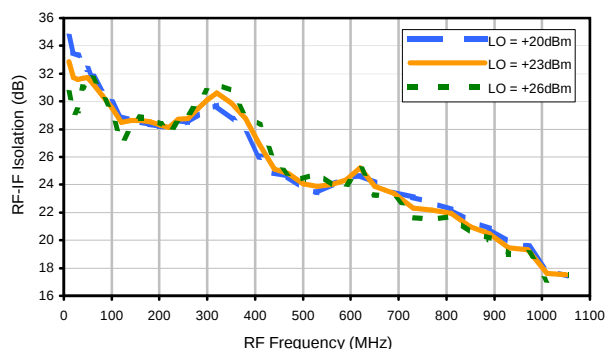
LO-RF Isolation



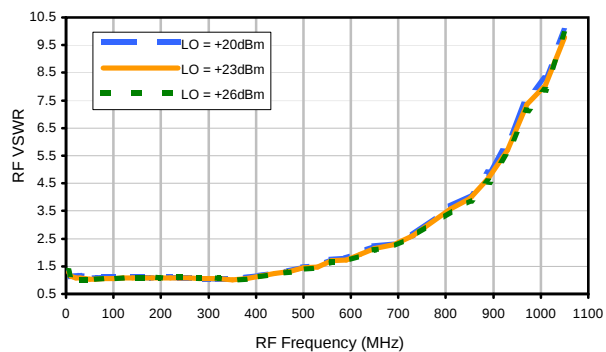
LO-IF Isolation



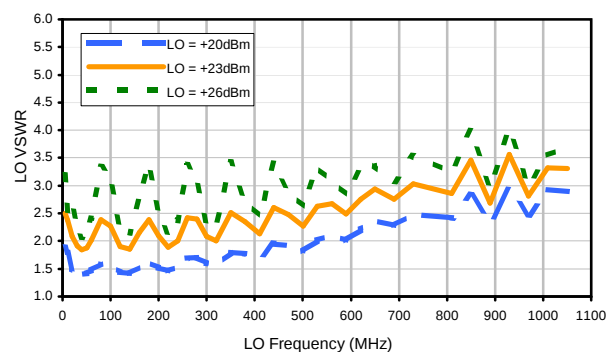
RF-IF Isolation



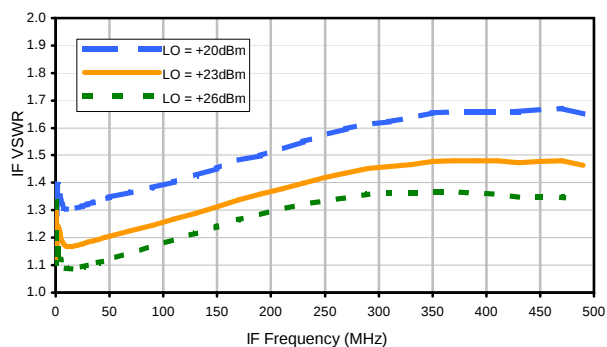
RF VSWR



LO VSWR



IF VSWR



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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	12	27	14	30	17	38	25	32	25	38
1	-	27	+0	32	11	36	23	41	29	47	41	47
2	98	70	49	66	49	66	51	66	62	74	62	74
3	109	76	60	79	60	82	60	78	68	86	69	85
4	>123	95	87	98	85	95	85	94	86	100	94	103
5	>122	112	99	103	95	102	94	103	94	103	103	111
6	>124	>123	115	>118	105	116	105	114	104	113	108	120
7	>123	>124	>122	>124	>121	118	>122	>121	>122	>120	>123	>123
8	>123	>122	>122	>125	>122	>123	117	>122	119	>122	118	>124
9	>123	>121	>123	>123	>124	>122	>123	>123	>120	>123	>121	>122
10	>123	>122	>121	>123	>124	>123	>123	>123	>122	>122	>122	>121
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; .02.00 dBm.

LO IN: 280.01 MHz; +23.00 dBm

IF OUT: 29.91 MHz; -5.65 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	21	36	26	41	28	50	37	43	37	50
1	-	27	+0	32	11	37	24	43	30	48	40	51
2	85	68	43	66	43	64	44	59	56	65	53	60
3	98	59	48	66	46	67	45	60	54	63	62	72
4	118	81	63	85	62	77	61	73	63	80	74	82
5	>122	75	66	72	61	73	59	72	57	70	62	73
6	>123	88	84	82	86	80	77	82	74	90	76	91
7	>124	91	83	88	74	99	74	100	77	103	86	98
8	123	115	93	106	91	94	84	89	87	89	90	91
9	>124	108	101	106	95	114	84	97	81	95	81	98
10	123	108	109	111	109	110	104	105	95	112	94	106
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; 10.00 dBm.

LO IN: 280.01 MHz; +23.00 dBm

IF OUT: 29.91 MHz; 4.37 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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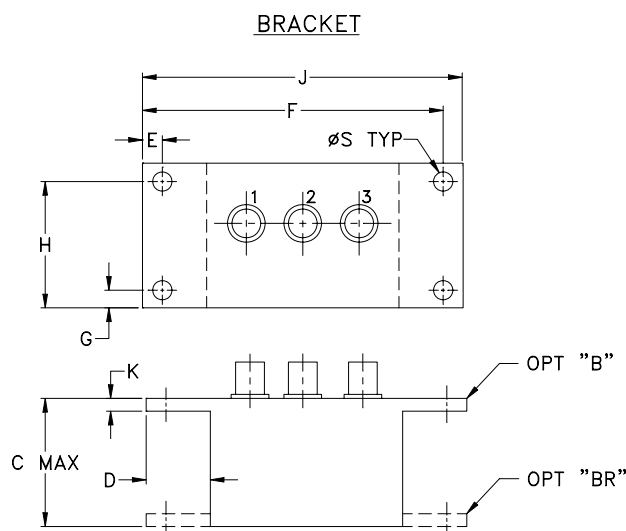
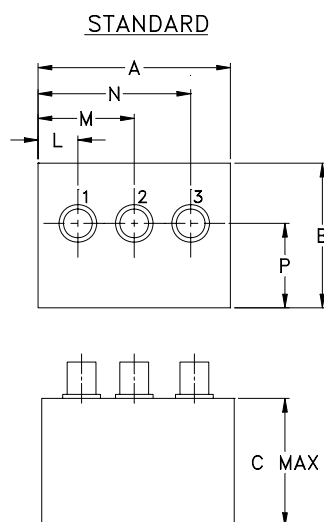


Outline Dimensions

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