

The Big Deal

- Ultra-low second harmonic (high IP2)
- Built-in reverse-bias protection
- Cost-effective design



Case Style: GA955

Product Overview

This wideband amplifier is a very low-cost, high-performance 500MHz-2.0GHz device based upon a 50-ohm push-pull design. Built within Mini-Circuits's patented unibody construction, this amplifier features exceptionally low second-order harmonic distortion and is unconditionally stable. It is ideal for a wide range of wireless, small-signal, and lab and test equipment designs.

Key Features

Feature	Advantages
Ultra-low distortion	This amplifier features excellent second harmonic performance and typical IP2 of 65dBm.
Wideband versatility	The 500MHz-2.0GHz bandwidth makes this amplifier ideal for a wide range of 50Ω applications, but also suitable as a low-noise amplifier (LNA) for GPS units, wireless cable (MMDS) and wireless LANs, for cellular applications, as well as for lab, instrumentation and test equipment.
Low cost/high value	The patented Mini-Circuits unibody construction design is unique among amplifiers of its class. In addition, it features 19.0dBm (max) output power in a push/pull configuration, extremely low second-order distortion, a wide bandwidth, and a rugged, connectorized case at a very competitive price point.

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



Wideband Amplifier

ZX60-23LM-S+

50Ω

500 to 2000 MHz

Features

- Ultra low harmonic, -65 dBc typ.
- 11V-13V operation
- Good output IP3, 35 dBm typ.
- Unconditionally stable
- Protected by US patent 6,790,049

Applications

- Cellular, CATV,
- LNA for GPS application
- General purpose small signal
- MMDS & Wireless LAN
- Lab
- Instrumentation
- Test Equipment



Case Style: GA955

Connectors	Model
SMA	ZX60-23LM-S+

+RoHS Compliant

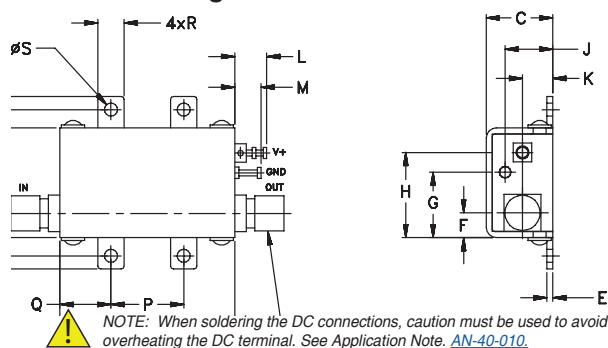
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Electrical Specifications at 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		500		2000	MHz
Gain	500	17.0	18.2	—	dB
	1000	16.5	18.9	—	
	1500	—	18.4	—	
	2000	—	17.4	—	
Output Power at 1dB compression	500	—	19.0	—	dBm
	1000	18.0	19.6	—	
	1500	—	18.8	—	
	2000	—	17.5	—	
Output third order intercept point IP3*	500	—	33	—	dBm
	800	—	35	—	
	1000	—	35	—	
	1500	—	34	—	
	2000	—	31	—	
Output second order intercept point IP2*	500	—	60	—	dBm
	800	—	60	—	
	1000	—	67	—	
	1500	—	60	—	
	2000	—	69	—	
Noise Figure	500-2000	—	4.0	—	dB
Input VSWR	800-2000	—	1.5	—	:1
Output VSWR	800-2000	—	1.4	—	:1
DC Supply Voltage		11.5	12.0	12.5	V
Supply Current		—	125	143	mA

*Two tones, spaced 1 MHz apart, 4 dBm/tone at output.

Outline Drawing



Maximum Ratings

Parameter	Ratings
Operating Temperature	-40°C to 80°C Case
Storage Temperature	-55°C to 100°C
DC Voltage	13V
Input RF Power (no damage)	13dBm

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

Outline Dimensions (inch mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	wt
1.20	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.18	1.00	.50	.35	.18	.09	grams
30.48	19.05	11.68	29.97	1.02	4.32	11.43	14.99	8.38	5.33	5.59	4.57	25.40	12.70	8.89	4.57	2.29	35.00

Notes

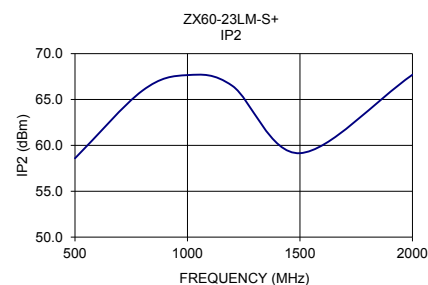
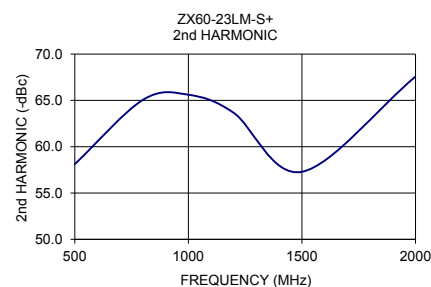
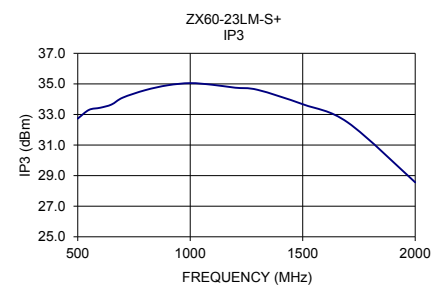
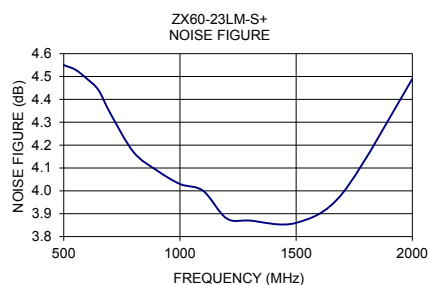
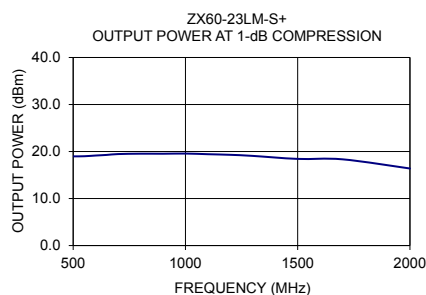
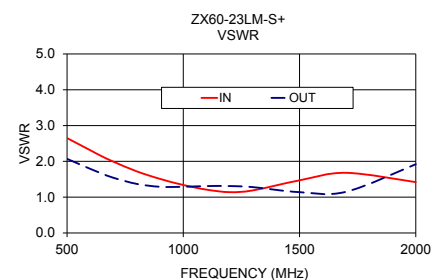
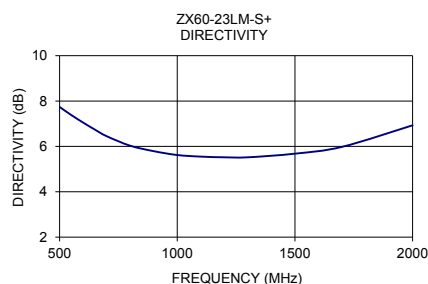
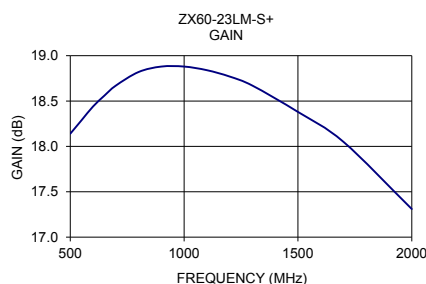
- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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



www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

REV. B
M171494
ED-11699C/2
ZX60-23LM-S+
WZ/CP/AM
181211
Page 2 of 3

FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1)		NOISE FIGURE (dB)	POUT at 1dB COMPR. (dBm)	OUTPUT IP3 (dBm)
	12V	12V	IN	OUT	12V	12V	12V
500	18.14	7.74	2.65	2.07	4.55	18.97	32.73
550	18.29	7.38	2.48	1.93	4.53	19.00	33.30
600	18.44	7.05	2.31	1.79	4.49	19.15	33.44
650	18.56	6.74	2.14	1.66	4.44	19.28	33.65
700	18.67	6.45	1.99	1.54	4.34	19.46	34.10
800	18.82	6.03	1.72	1.37	4.17	19.54	34.59
900	18.88	5.79	1.51	1.29	4.09	19.53	34.91
1000	18.88	5.62	1.34	1.29	4.03	19.57	35.05
1100	18.84	5.55	1.21	1.31	4.00	19.43	34.94
1200	18.77	5.52	1.14	1.31	3.88	19.30	34.75
1300	18.67	5.52	1.19	1.28	3.87	19.07	34.61
1500	18.38	5.68	1.47	1.14	3.86	18.43	33.67
1700	18.05	5.98	1.68	1.15	3.99	18.34	32.48
2000	17.31	6.93	1.42	1.92	4.49	16.39	28.56



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

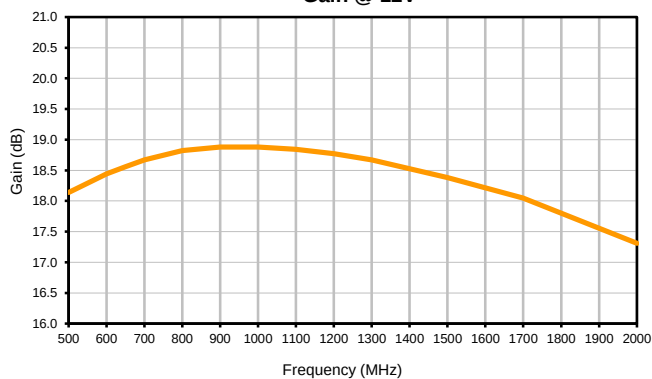


Typical Performance Data

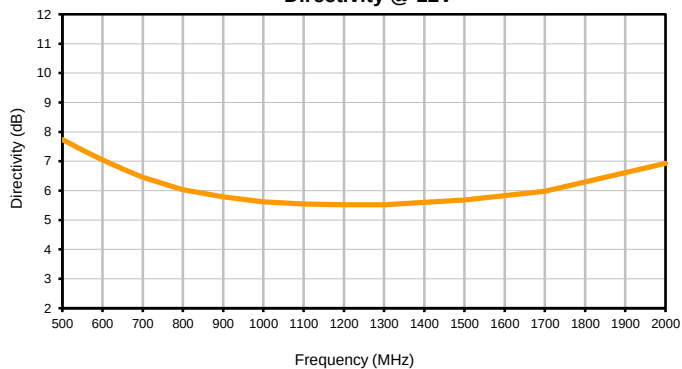
FREQ. (MHz)	GAIN (dB) 12V	DIRECTIVITY (dB) 12V	VSWR (:1)		NOISE FIGURE (dB) 12V	POUT @ 1 dB COMPRESSION (dBm) 12V	2nd HARMONIC (-dBc) 12V	OUTPUT IP2 (dBm) 12V	OUTPUT IP3 (dBm) 12V
			IN 12V	OUT 12V					
500	18.14	7.74	2.65	2.07	4.55	18.97	58.12	58.59	32.73
550	18.29	7.38	2.48	1.93	4.53	19.00	59.74	60.30	33.30
600	18.44	7.05	2.31	1.79	4.49	19.15	60.31	60.74	33.44
650	18.56	6.74	2.14	1.66	4.44	19.28	59.79	60.35	33.65
700	18.67	6.45	1.99	1.54	4.34	19.46	61.52	62.27	34.10
800	18.82	6.03	1.72	1.37	4.17	19.54	65.06	65.97	34.59
900	18.88	5.79	1.51	1.29	4.09	19.53	65.81	67.18	34.91
1000	18.88	5.62	1.34	1.29	4.03	19.57	65.61	67.66	35.05
1100	18.84	5.55	1.21	1.31	4.00	19.43	65.98	68.36	34.94
1200	18.77	5.52	1.14	1.31	3.88	19.30	63.65	66.48	34.75
1300	18.67	5.52	1.19	1.28	3.87	19.07	62.23	64.15	34.61
1500	18.38	5.68	1.47	1.14	3.86	18.43	57.29	59.15	33.67
1700	18.05	5.98	1.68	1.15	3.99	18.34	61.64	63.29	32.48
2000	17.31	6.93	1.42	1.92	4.49	16.39	67.58	67.70	28.56

Typical Performance Curves

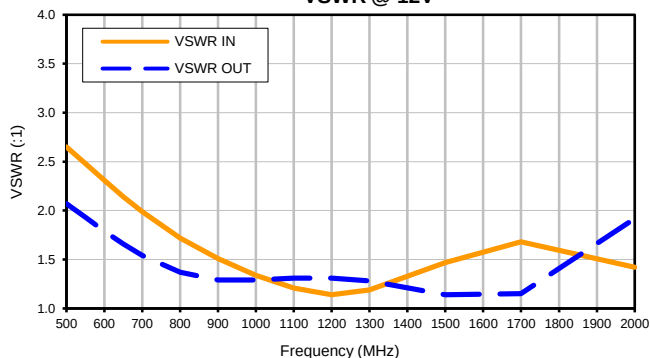
Gain @ 12V



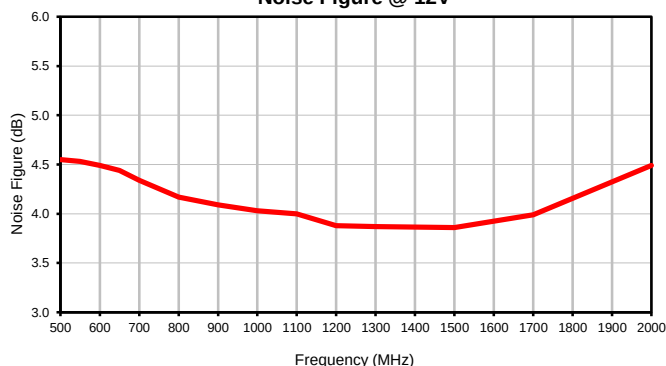
Directivity @ 12V



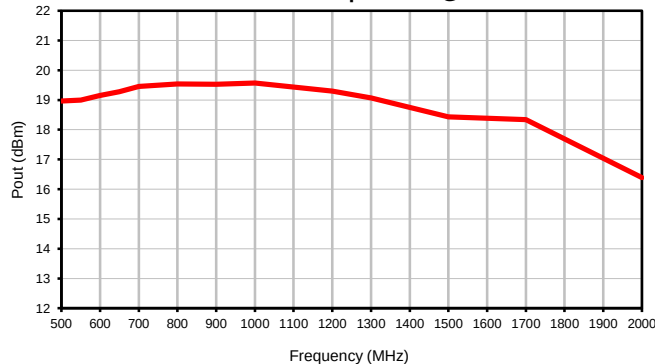
VSWR @ 12V



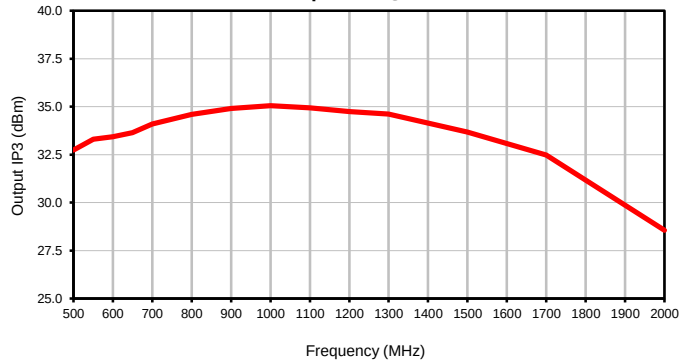
Noise Figure @ 12V



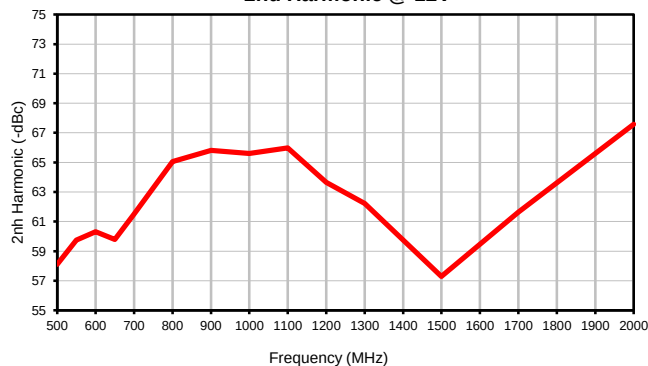
Pout at 1dB Compression @ 12V



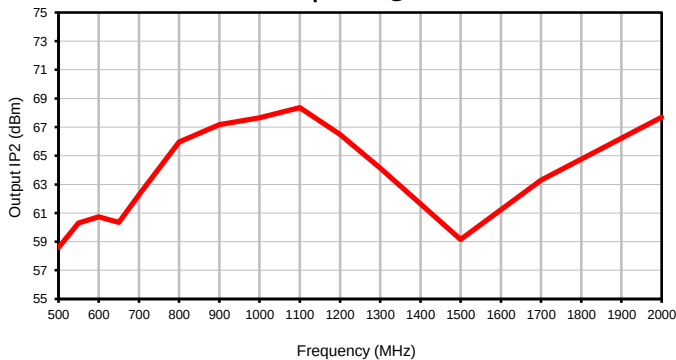
Output IP3 @ 12V



2nd Harmonic @ 12V



Output IP2 @ 12V

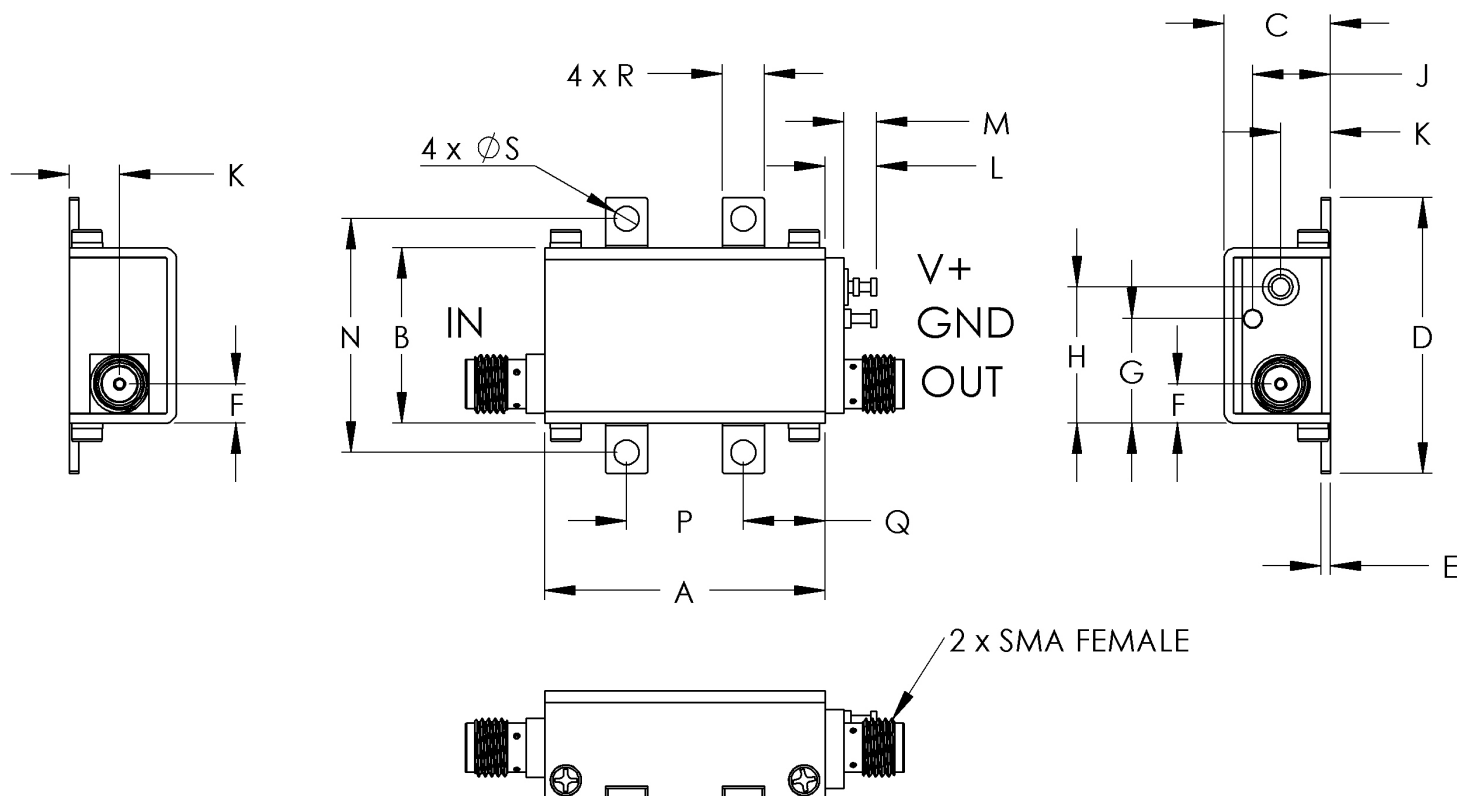


Case Style

GA

Outline Dimensions

GA955



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N
GA955	1.20 (30.48)	.75 (19.05)	.46 (11.61)	1.18 (29.97)	.04 (1.02)	.17 (4.27)	.45 (11.35)	.58 (14.81)	.33 (8.46)	.21 (5.44)	.22 (5.59)	.14 (3.56)	1.000 (25.4)

CASE #.	P	Q	R	S	WT GRAMS
GA955	.500 (12.70)	.35 (8.89)	.18 (4.57)	.106 (2.69)	35.0

Dimensions are in inches (mm). Tolerances: 2Pl. $\pm .03$; 3Pl. $\pm .015$
Tolerance on hole size and interaxes dimensions to be $\pm .005$.

Note:

- Case material: Brass
- Case finish: Nickel plate



INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

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	-40° to 85°C	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