Coaxial

Power Detector

ZX47-40+
ZX47-40LN+

50Ω, -40dBm to +20dBm, 10 to 8000 MHz

CASE STYLE: HN1173

Connectors	Model
SMA	ZX47-40-S+
SMA	ZX47-40LN-S+

+RoHS Compliant

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

Maximum Ratings

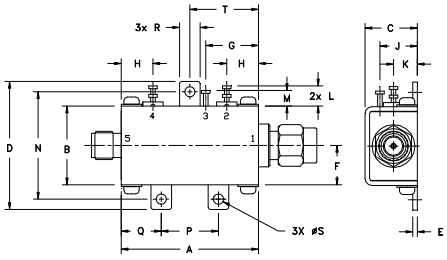
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
DC Power:	
Max. voltage	5.7V
Max. current	120mA
Internal Power Dissipation	0.73W
Input Power	+27dBm

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

Coaxial Connections

RF IN	1
DC OUT	5
Vcc (+5V)	2
TEMPERATURE SENSOR	4
GROUND	3

Outline Drawing



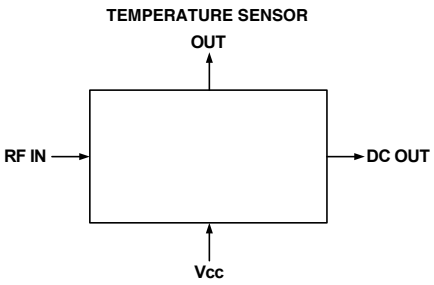
NOTE: When soldering the DC connections, caution must be used to avoid overheating the DC terminals. See Application Note AN-40-10 .

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J	K
1.20	**.69**	**.46**	**1.12**	**.04**	**.34**	**.46**	**.28**	**.33**	**.21**
30.48	17.53	11.68	28.45	1.02	8.64	11.68	7.11	8.38	5.33

L	M	N	P	Q	R	S	T	wt.
.18	**.14**	**.94**	**.50**	**.35**	**.18**	**.106**	**.60**	grams
4.57	3.56	23.88	12.70	8.89	4.57	2.69	15.24	31.8

Simplified Functional Diagram



Features

- Low Noise (Output Ripple) for ZX47-40LN+, 20mVp-p Typ. @ 10MHz
- High Dynamic Range
- Wide Bandwidth
- Single Supply Voltage: +5V
- Stability Over Temperature
- Built-in Temperature Sensor
- Protected by US patent 6,790,049

Applications

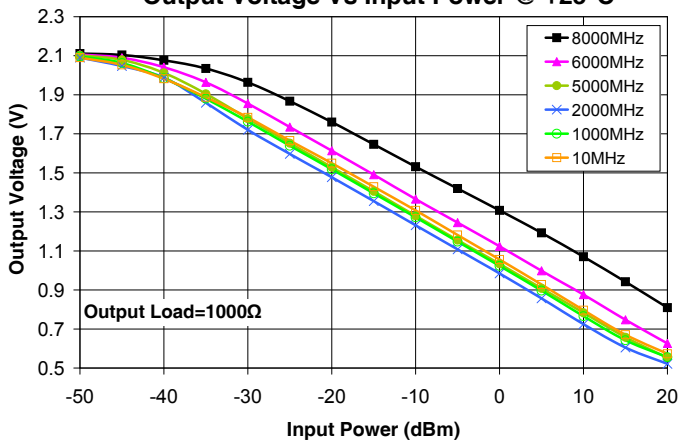
- RF/IF Power Measurements
- Low Cost Power Monitoring System
- RF Leakage Monitors
- Fast feedback Levelling Circuits
- RF Power Control
- Receiver RF/IF Gain Control
- RSSI measurements

Electrical Specifications (T_{AMB} = 25°C)

FREQ. (MHz)		DYNAMIC RANGE AT ±1dB ERROR (dBm)	OUTPUT VOLT. RANGE (V)	SLOPE (mV/dB) (Note 1)	VSWR (:1)	PULSE RESPONSE TIME (nSec) Typ.				TEMP. SENSOR OUTPUT SLOPE (mV/°C) (Note 2)	DC OPERATING POWER			
						ZX47-40+		ZX47-40LN+			Vcc (Volts)			Note 3 Current (mA)
Min.	Max.	Typ.	Typ.	Typ.	Typ.	Rise	Fall	Rise	Fall	Typ.	Min.	Typ.	Max.	Typ.
10	1000	-40 to +20	0.50 - 2.10	-25	1.03	400	10	800	400	2.00	4.5	5.0	5.5	100
1000	5000	-40 to +15			1.10									
5000	6000	-35 to +20			1.20									
6000	8000	-30 to +20			1.40									

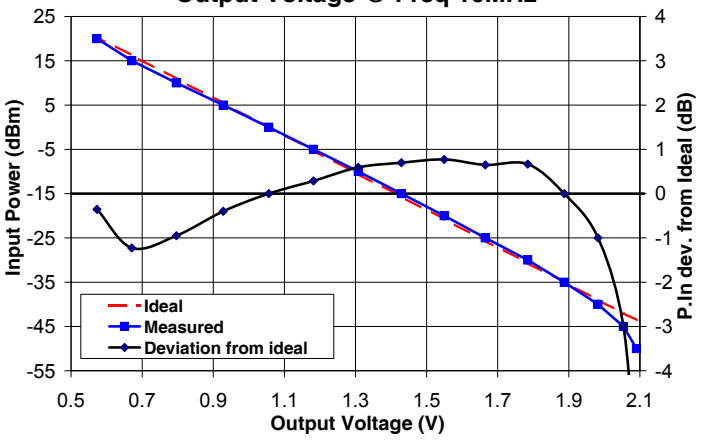
Notes:
1. The negative slope indicates that Output Voltage decreases as Input Power increases. See "Output Voltage vs Input Power" graph below.
2. Temperature sensor output provides a DC Output Voltage which increases linearly with temperature rise. Recommended minimum load for this port is 2 kΩ.
3. Recommended minimum load at DC out port is 100 Ω. See maximum ratings for no damage.

Output Voltage Vs Input Power @ +25°C

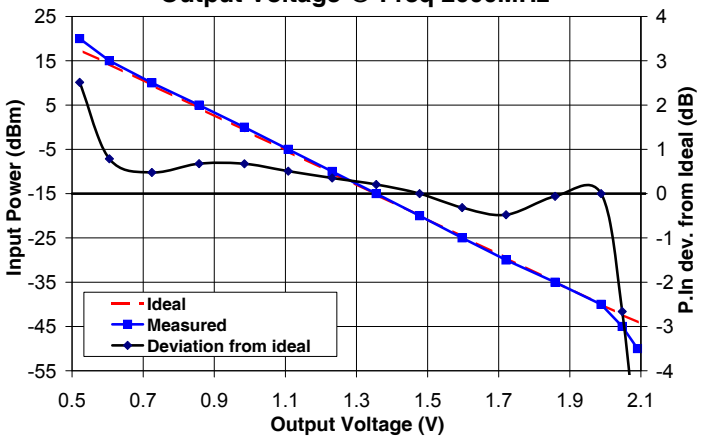


Performance Curves

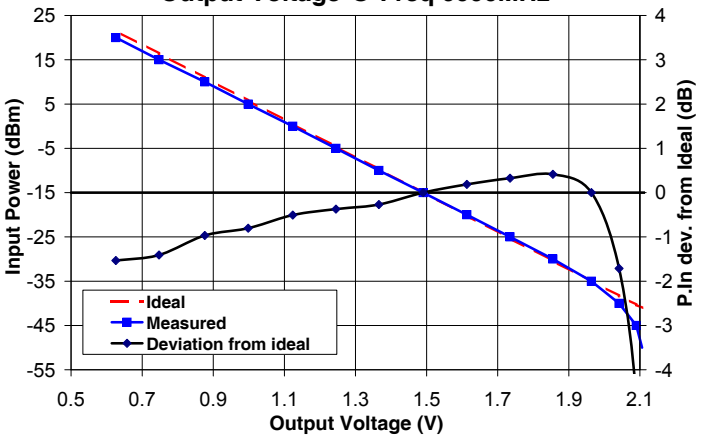
Power Input Deviation from Ideal Vs Output Voltage @ Freq 10MHz



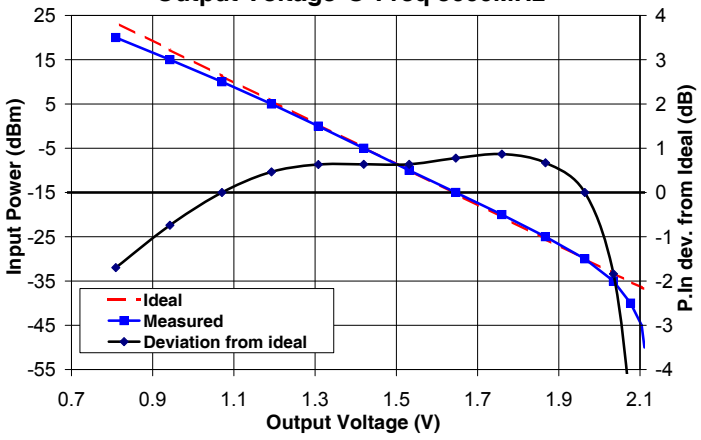
Power Input Deviation from Ideal Vs Output Voltage @ Freq 2000MHz



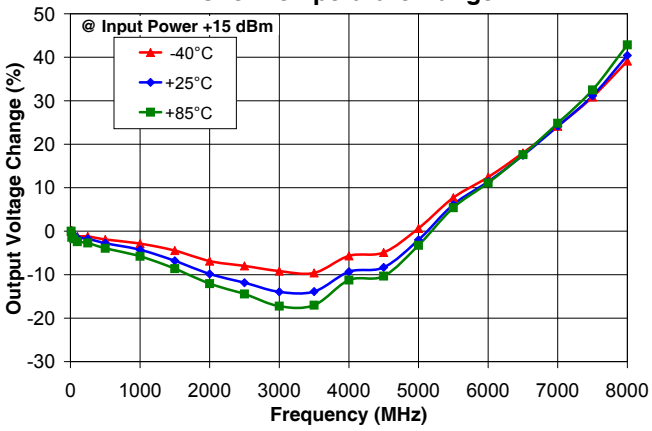
Power Input Deviation from Ideal Vs Output Voltage @ Freq 6000MHz



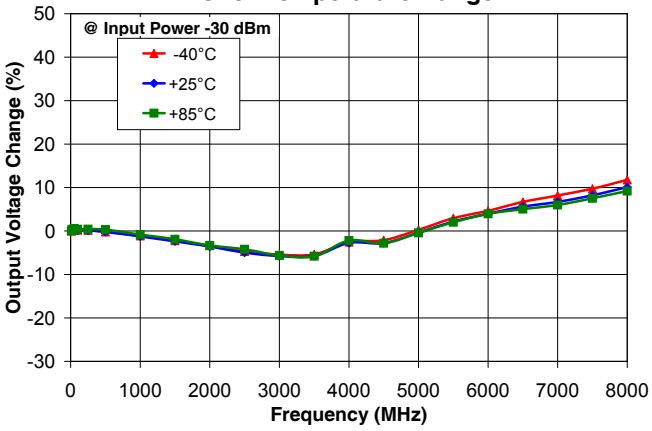
Power Input Deviation from Ideal Vs Output Voltage @ Freq 8000MHz



Output Voltage Change Vs Freq Over Temperature Range



Output Voltage Change Vs Freq Over Temperature Range



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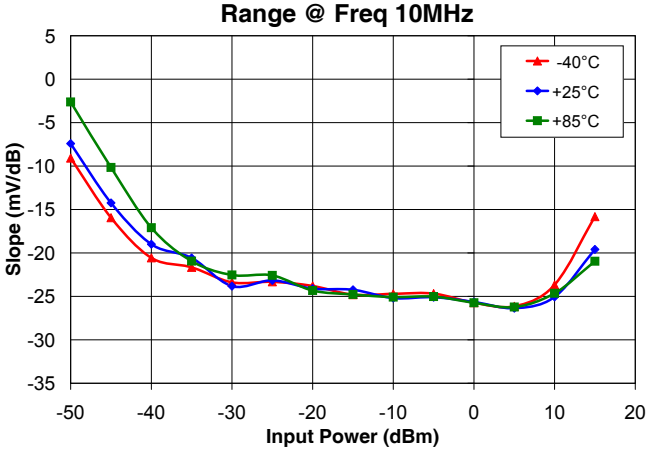
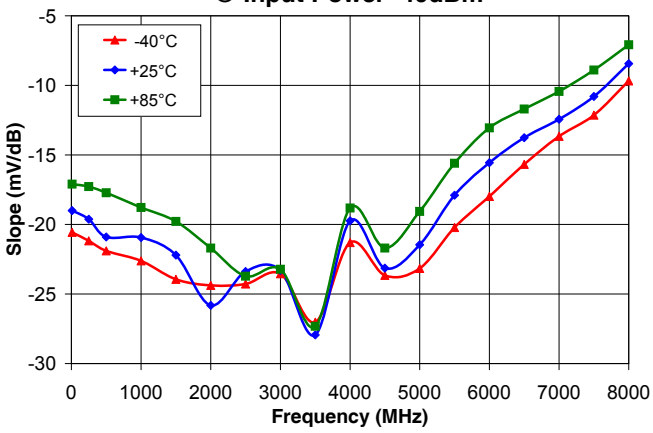
Performance Curves

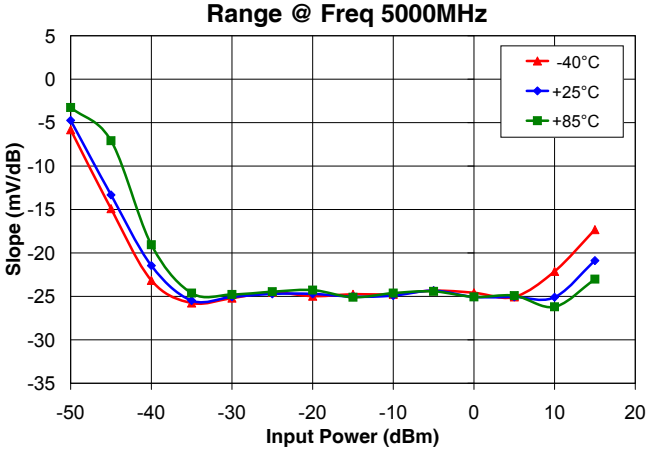
Slope Vs Input Power Over Temperature Range @ Freq 10MHz



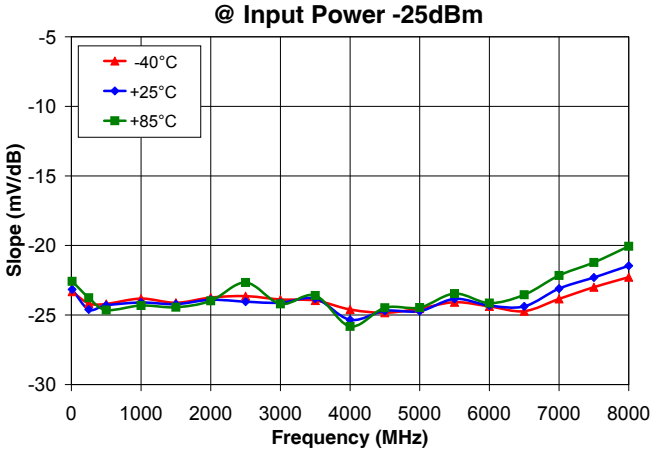
Slope Vs Freq Over Temperature Range @ Input Power -40dBm



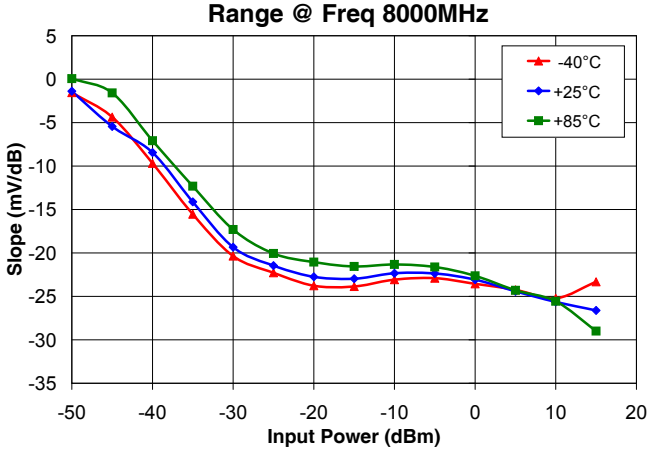
Slope Vs Input Power Over Temperature Range @ Freq 5000MHz



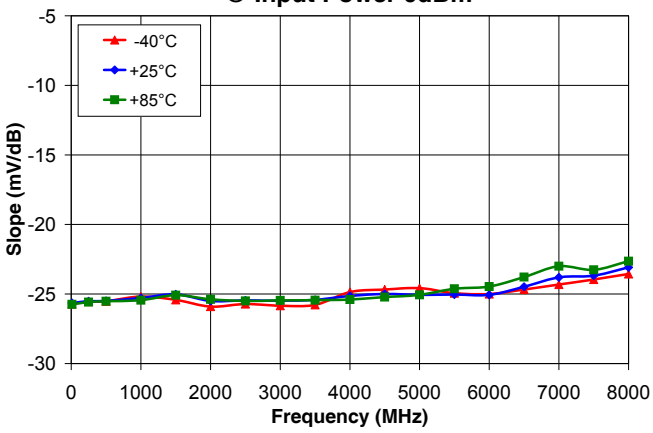
Slope Vs Freq Over Temperature Range @ Input Power -25dBm



Slope Vs Input Power Over Temperature Range @ Freq 8000MHz



Slope Vs Freq Over Temerature Range @ Input Power 0dBm



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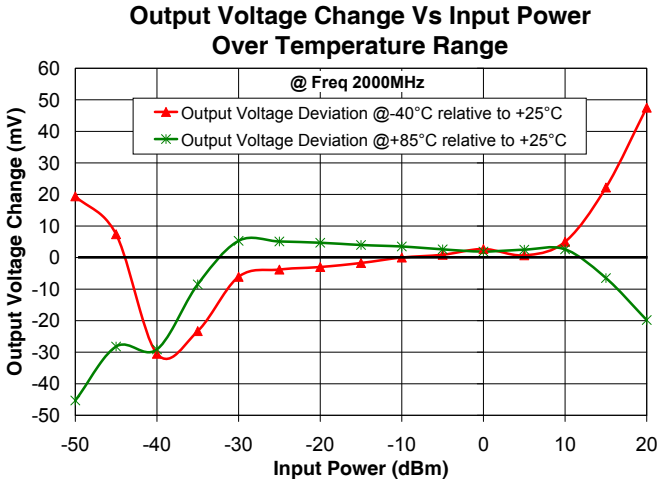
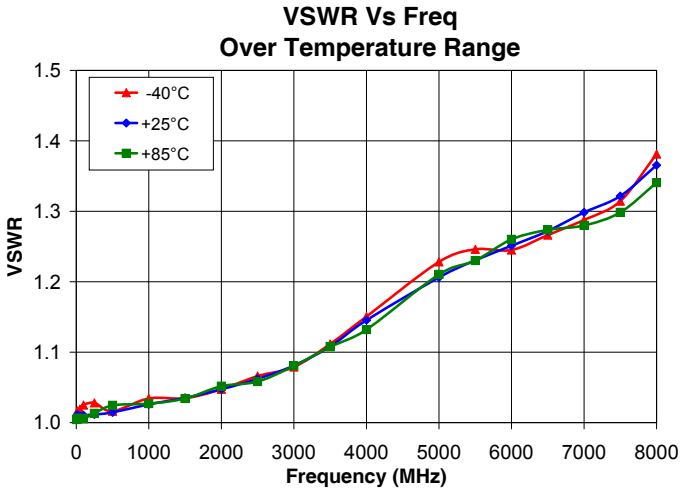
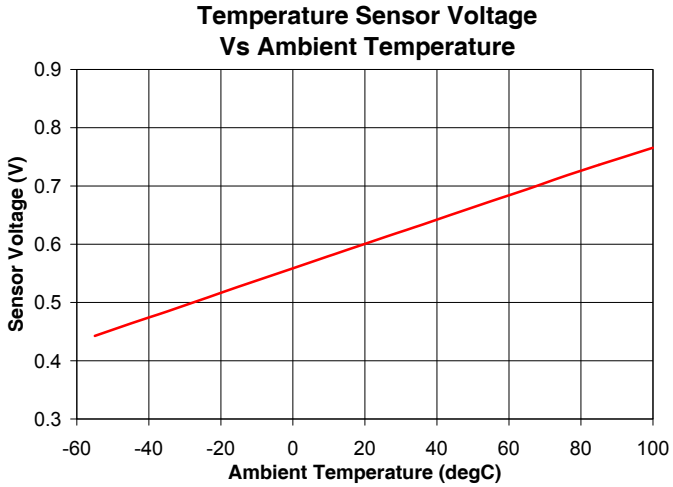
Performance Curves







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Power Detector ZX47-40+

Typical Performance Data

Output Voltage vs. Input Power @+25°C						
POWER IN (dBm)	@10MHz (V)	@1000MHz (V)	@2000MHz (V)	@5000MHz (V)	@6000MHz (V)	@8000MHz (V)
-50	2.09	2.10	2.09	2.10	2.11	2.11
-45	2.05	2.06	2.05	2.08	2.09	2.10
-40	1.98	1.98	1.99	2.01	2.04	2.08
-35	1.89	1.88	1.86	1.91	1.96	2.03
-30	1.78	1.76	1.72	1.78	1.86	1.96
-25	1.67	1.64	1.60	1.65	1.73	1.87
-20	1.55	1.52	1.48	1.53	1.61	1.76
-15	1.43	1.40	1.36	1.41	1.49	1.65
-10	1.31	1.27	1.23	1.28	1.37	1.53
-5	1.18	1.15	1.11	1.16	1.25	1.42
0	1.06	1.02	0.98	1.03	1.12	1.31
5	0.93	0.90	0.86	0.91	1.00	1.19
10	0.80	0.77	0.72	0.78	0.88	1.07
15	0.67	0.64	0.60	0.66	0.75	0.94
20	0.57	0.56	0.52	0.55	0.63	0.81

Output Voltage Change Vs Freq						
FREQ (MHz)	@ Input Power -30 dBm			@ Input Power +15dBm		
	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C
10	0.00	0.00	0.00	0.00	0.00	0.00
20	0.20	0.08	0.37	0.18	-0.34	-1.41
50	0.36	0.29	0.57	-0.71	-0.94	-1.76
100	0.20	0.12	0.40	-1.19	-1.52	-2.42
250	0.18	0.13	0.42	-1.20	-1.73	-2.72
500	-0.20	-0.18	0.32	-1.92	-2.77	-3.94
1000	-1.13	-1.24	-0.82	-2.85	-4.29	-5.77
1500	-2.23	-2.36	-1.91	-4.44	-6.81	-8.61
2000	-3.38	-3.58	-3.32	-6.88	-9.85	-12.08
2500	-4.71	-4.96	-4.21	-7.99	-11.85	-14.44
3000	-5.42	-5.74	-5.62	-9.18	-13.95	-17.23
3500	-5.39	-5.76	-5.80	-9.61	-13.89	-17.03
4000	-2.55	-2.74	-2.20	-5.67	-9.31	-11.23
4500	-2.13	-2.79	-2.81	-4.90	-8.33	-10.33
5000	0.28	-0.38	-0.43	0.64	-2.00	-3.26
5500	2.94	2.15	2.01	7.69	6.10	5.41
6000	4.64	3.97	3.95	12.43	11.39	11.11
6500	6.69	5.62	5.02	18.00	17.45	17.60
7000	8.17	6.70	5.99	24.13	24.13	24.83
7500	9.74	8.20	7.52	30.86	31.13	32.49
8000	11.77	10.07	9.20	39.13	40.43	42.86

Typical Performance Data

Sensitivity vs. Input Power @+25°C						
	@10MHz(mV/dB)			@2000MHz(mV/dB)		
Measured	Output Voltage (V)	Ideal	Deviation from idea	Output Voltage (V)	Ideal	Deviation from idea
-50	2.09	-43.56	-6.44	2.09	-44.03	-5.97
-45	2.05	-42.00	-3.00	2.05	-42.34	-2.66
-40	1.98	-39.00	-1.00	1.99	-40.00	0.00
-35	1.89	-35.00	0.00	1.86	-34.94	-0.06
-30	1.78	-30.67	0.67	1.72	-29.52	-0.48
-25	1.67	-25.65	0.65	1.60	-24.68	-0.32
-20	1.55	-20.77	0.77	1.48	-20.00	0.00
-15	1.43	-15.70	0.70	1.36	-15.21	0.21
-10	1.31	-10.59	0.59	1.23	-10.35	0.35
-5	1.18	-5.29	0.29	1.11	-5.51	0.51
0	1.06	0.00	0.00	0.98	-0.67	0.67
5	0.93	5.40	-0.40	0.86	4.32	0.68
10	0.80	10.95	-0.95	0.72	9.52	0.48
15	0.67	16.23	-1.23	0.60	14.21	0.79
20	0.57	20.36	-0.36	0.52	17.49	2.51

Sensitivity vs. Input Power @+25°C						
	@6000MHz(mV/dB)			@8000MHz(mV/dB)		
Measured	Output Voltage (V)	Ideal	Deviation from idea	Output Voltage (V)	Ideal	Deviation from idea
-50	2.11	-41.01	-8.99	2.11	-36.79	-13.42
-45	2.09	-40.34	-4.66	2.10	-36.47	-8.73
-40	2.04	-38.29	-1.71	2.08	-35.22	-4.95
-35	1.96	-35.00	0.00	2.03	-33.26	-1.84
-30	1.86	-30.41	0.41	1.96	-30.00	0.00
-25	1.73	-25.33	0.33	1.87	-25.53	0.67
-20	1.61	-20.19	0.19	1.76	-20.57	0.87
-15	1.49	-15.00	0.00	1.65	-15.31	0.78
-10	1.37	-9.73	-0.27	1.53	-10.00	0.64
-5	1.25	-4.63	-0.37	1.42	-4.83	0.64
0	1.12	0.51	-0.51	1.31	0.34	0.63
5	1.00	5.80	-0.80	1.19	5.67	0.47
10	0.88	10.97	-0.97	1.07	11.32	0.00
15	0.75	16.41	-1.41	0.94	17.25	-0.74
20	0.63	21.53	-1.53	0.81	23.40	-1.70

Power Detector ZX47-40+

Typical Performance Data

POWER IN (dBm)	Slope Vs Input Power Over Temperature								
	Range @ Freq 10MHz			Range @ Freq 5000MHz			Range @ Freq 8000MHz		
	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C
-50	-9.08	-7.42	-2.62	-5.82	-4.74	-3.26	-1.54	-1.38	0.06
-45	-15.94	-14.24	-10.16	-14.90	-13.32	-7.08	-4.36	-5.44	-1.58
-40	-20.56	-19.00	-17.10	-23.16	-21.46	-19.06	-9.68	-8.44	-7.08
-35	-21.66	-20.58	-20.94	-25.76	-25.48	-24.62	-15.54	-14.12	-12.32
-30	-23.38	-23.82	-22.54	-25.20	-25.06	-24.78	-20.36	-19.34	-17.30
-25	-23.32	-23.16	-22.58	-24.54	-24.72	-24.46	-22.28	-21.46	-20.06
-20	-23.80	-24.10	-24.32	-24.98	-24.70	-24.28	-23.78	-22.74	-21.06
-15	-24.80	-24.24	-24.78	-24.76	-25.04	-25.10	-23.86	-22.96	-21.56
-10	-24.70	-25.20	-25.08	-24.76	-24.92	-24.62	-23.08	-22.34	-21.32
-5	-24.68	-25.10	-25.02	-24.34	-24.34	-24.42	-22.90	-22.36	-21.62
0	-25.72	-25.64	-25.74	-24.58	-25.06	-25.06	-23.56	-23.08	-22.64
5	-26.14	-26.36	-26.22	-25.06	-25.06	-24.92	-24.24	-24.42	-24.30
10	-23.68	-25.06	-24.64	-22.12	-25.10	-26.20	-25.22	-25.64	-25.56
15	-15.82	-19.60	-20.96	-17.32	-20.88	-23.02	-23.32	-26.62	-29.00

FREQ (MHz)	Slope Vs Freq Over Temperature Range								
	@ Input Power -40dBm			@ Input Power -25dBm			@ Input Power 0dBm		
	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C	-40°C	+25°C	+85°C
10	-20.56	-19.00	-17.10	-23.32	-23.16	-22.58	-25.72	-25.64	-25.74
250	-21.18	-19.62	-17.28	-24.16	-24.60	-23.76	-25.54	-25.52	-25.58
500	-21.90	-20.90	-17.72	-24.20	-24.30	-24.64	-25.52	-25.50	-25.52
1000	-22.62	-20.94	-18.78	-23.82	-24.10	-24.32	-25.18	-25.28	-25.44
1500	-23.94	-22.20	-19.78	-24.12	-24.22	-24.44	-25.42	-25.02	-25.08
2000	-24.38	-25.82	-21.70	-23.74	-23.90	-23.98	-25.90	-25.50	-25.38
2500	-24.28	-23.38	-23.72	-23.64	-24.04	-22.66	-25.72	-25.46	-25.50
3000	-23.54	-23.30	-23.22	-23.88	-24.12	-24.20	-25.84	-25.48	-25.46
3500	-27.02	-27.94	-27.32	-23.96	-23.82	-23.60	-25.78	-25.42	-25.44
4000	-21.30	-19.74	-18.82	-24.60	-25.34	-25.82	-24.86	-25.14	-25.40
4500	-23.66	-23.14	-21.70	-24.84	-24.70	-24.48	-24.68	-25.00	-25.22
5000	-23.16	-21.46	-19.06	-24.54	-24.72	-24.46	-24.58	-25.06	-25.06
5500	-20.22	-17.90	-15.60	-24.08	-23.84	-23.46	-24.94	-25.04	-24.62
6000	-17.98	-15.56	-13.06	-24.38	-24.32	-24.14	-25.00	-25.06	-24.46
6500	-15.68	-13.76	-11.70	-24.72	-24.38	-23.54	-24.68	-24.48	-23.78
7000	-13.66	-12.44	-10.44	-23.84	-23.10	-22.16	-24.32	-23.80	-23.00
7500	-12.14	-10.80	-8.90	-23.00	-22.30	-21.22	-23.96	-23.68	-23.26
8000	-9.68	-8.44	-7.08	-22.28	-21.46	-20.06	-23.56	-23.08	-22.64

Typical Performance Data

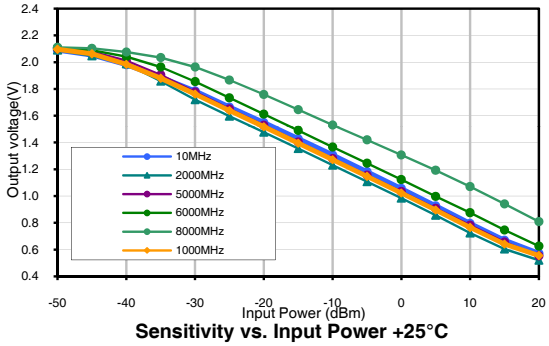
Output Voltage Change Vs Input Power		
POWER IN (dBm)	**Output Voltage Deviation @-40°C relative to +25°C**	**Output Voltage Deviation @+85°C relative to +25°C**
-50	19.40	-45.30
-45	7.40	-28.20
-40	-30.50	-29.10
-35	-23.30	-8.50
-30	-6.10	5.30
-25	-3.80	5.10
-20	-3.00	4.70
-15	-1.70	4.00
-10	0.00	3.50
-5	0.90	2.60
0	2.70	1.90
5	0.70	2.50
10	5.00	2.60
15	22.20	-6.50
20	47.50	-19.80

VSWR Vs Freq			
FREQ (MHz)	**-40dBm**	**+25dBm**	**+85dBm**
10	1.01	1.01	1.00
20	1.02	1.01	1.01
50	1.02	1.01	1.01
100	1.03	1.01	1.01
250	1.03	1.01	1.01
500	1.02	1.01	1.02
1000	1.03	1.03	1.03
1500	1.04	1.04	1.03
2000	1.05	1.05	1.05
2500	1.07	1.06	1.06
3000	1.08	1.08	1.08
3500	1.11	1.11	1.11
4000	1.15	1.15	1.13
5000	1.23	1.21	1.21
5500	1.25	1.23	1.23
6000	1.25	1.25	1.26
6500	1.27	1.27	1.27
7000	1.29	1.30	1.28
7500	1.31	1.32	1.30
8000	1.38	1.37	1.34

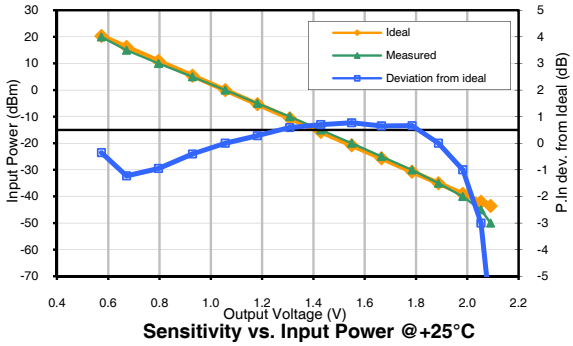
Temperature Sensor Voltage Vs Ambient	
Temp (°C)	**Voltage @ 8000MHz**
-55	0.44
-45	0.46
-35	0.48
-25	0.51
-15	0.53
0	0.56
10	0.58
20	0.60
27	0.62
35	0.63
45	0.65
55	0.67
65	0.69
75	0.72
85	0.74
100	0.77

Typical Performance Curves

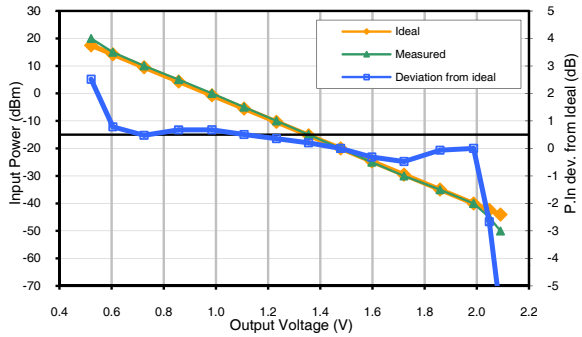
Output Power vs. Input Power @+25°C



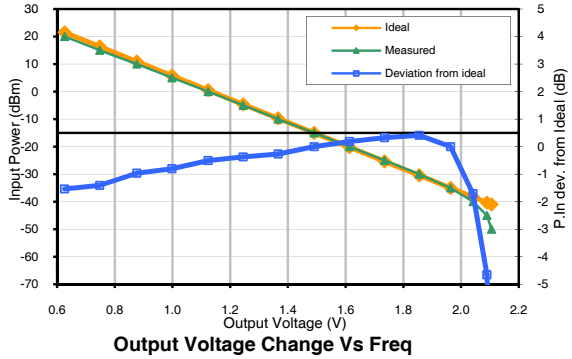
Sensitivity vs. Input Power +25°C
Output Voltage@Freg 10MHz



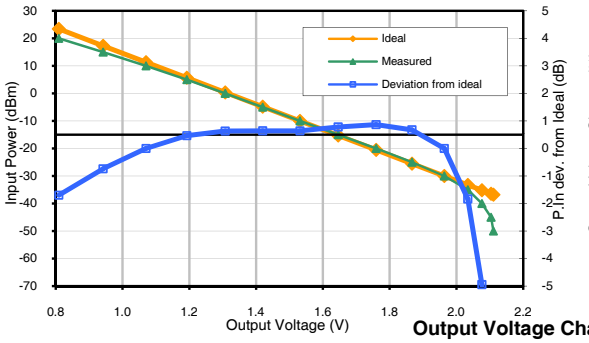
Sensitivity vs. Input Power +25°C
Output Voltage@Freg 2000MHz



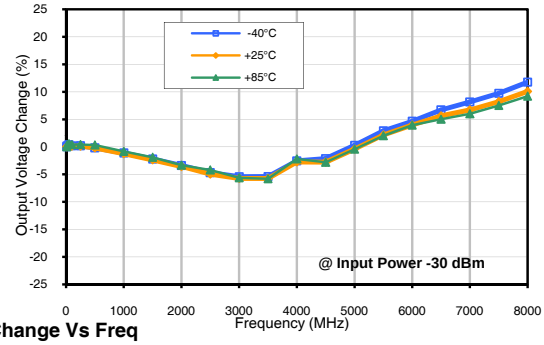
Sensitivity vs. Input Power @+25°C
Output Voltage@Freg 6000MHz



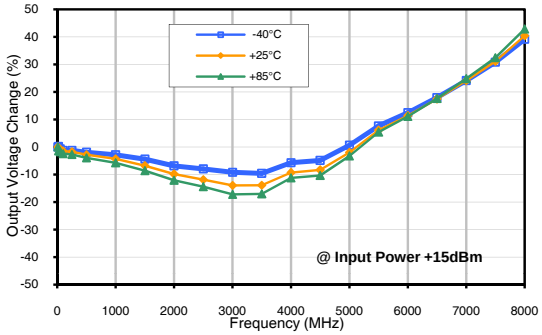
Sensitivity vs. Input Power @+25°C
Output Voltage@Freg 8000MHz



Output Voltage Change Vs Freq
Over Temperature Range

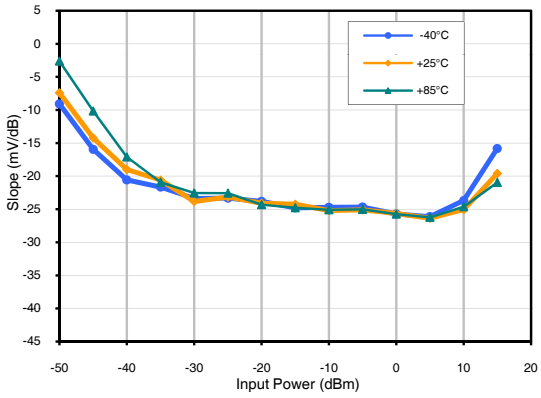


Output Voltage Change Vs Freq
Over Temperature Range

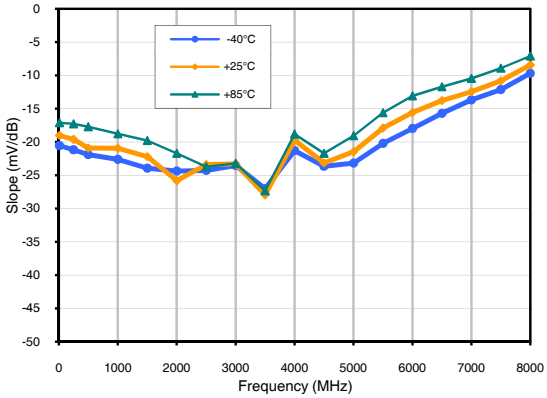


Typical Performance Curves

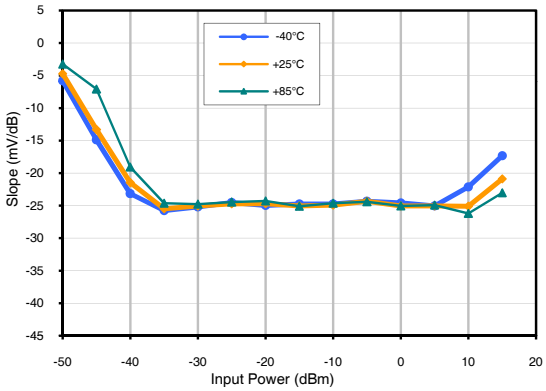
Slope Vs Input Power Over Temperature Range @ Freq 10MHz



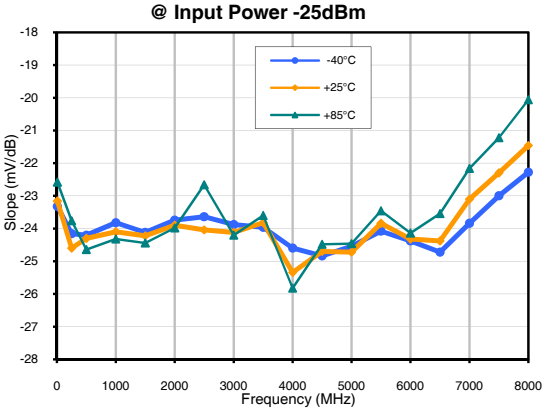
Slope Vs Freq Over Temperature Range @ Input Power -40dBm



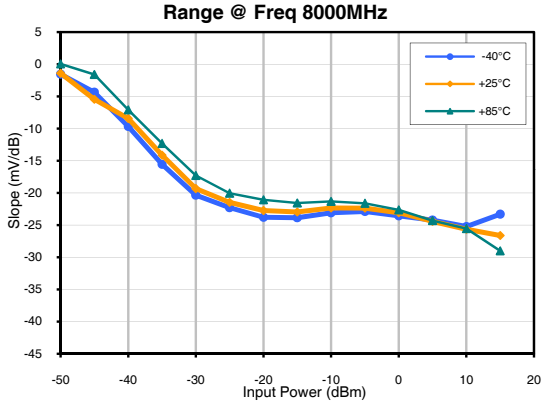
Slope Vs Input Power Over Temperature Range @ Freq 5000MHz



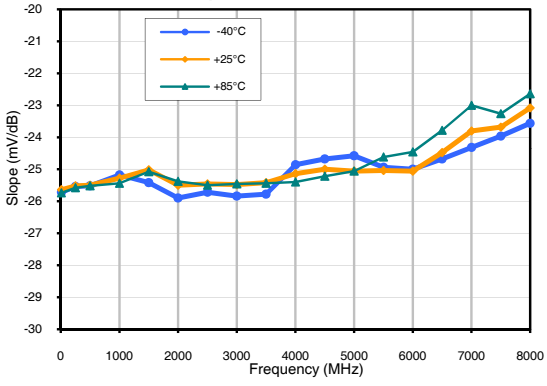
Slope Vs Freq Over Temperature Range @ Input Power -25dBm



Slope Vs Input Power Over Temperature Range @ Freq 8000MHz

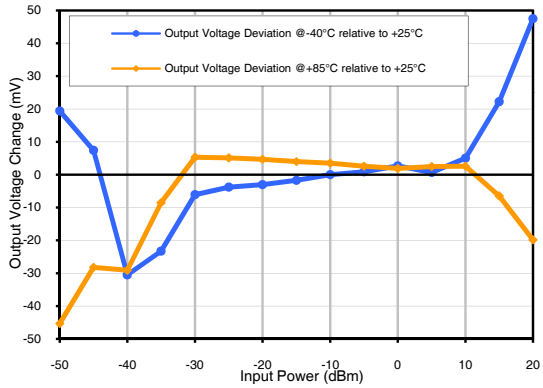


Slope Vs Freq Over Temerature Range @ Input Power 0dBm

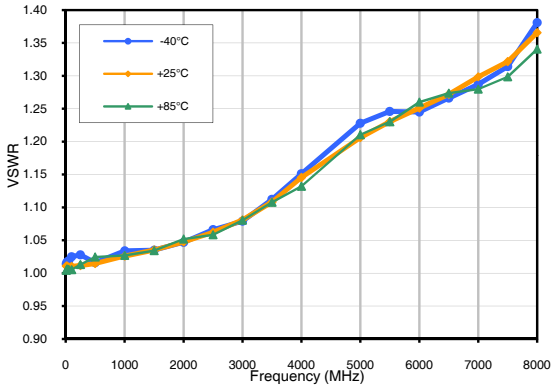


Typical Performance Curves

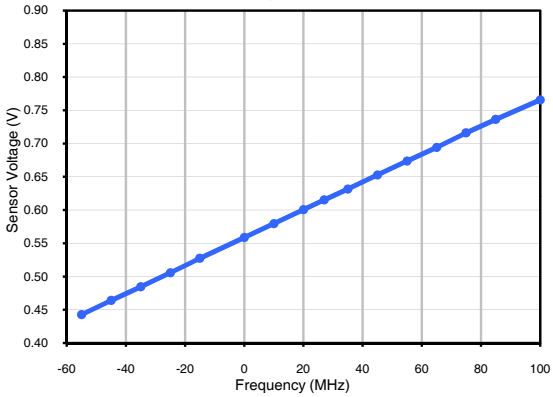
Output Voltage Change Vs Input Power Over Temperature Range



VSWR Vs Freq Over Temperature Range



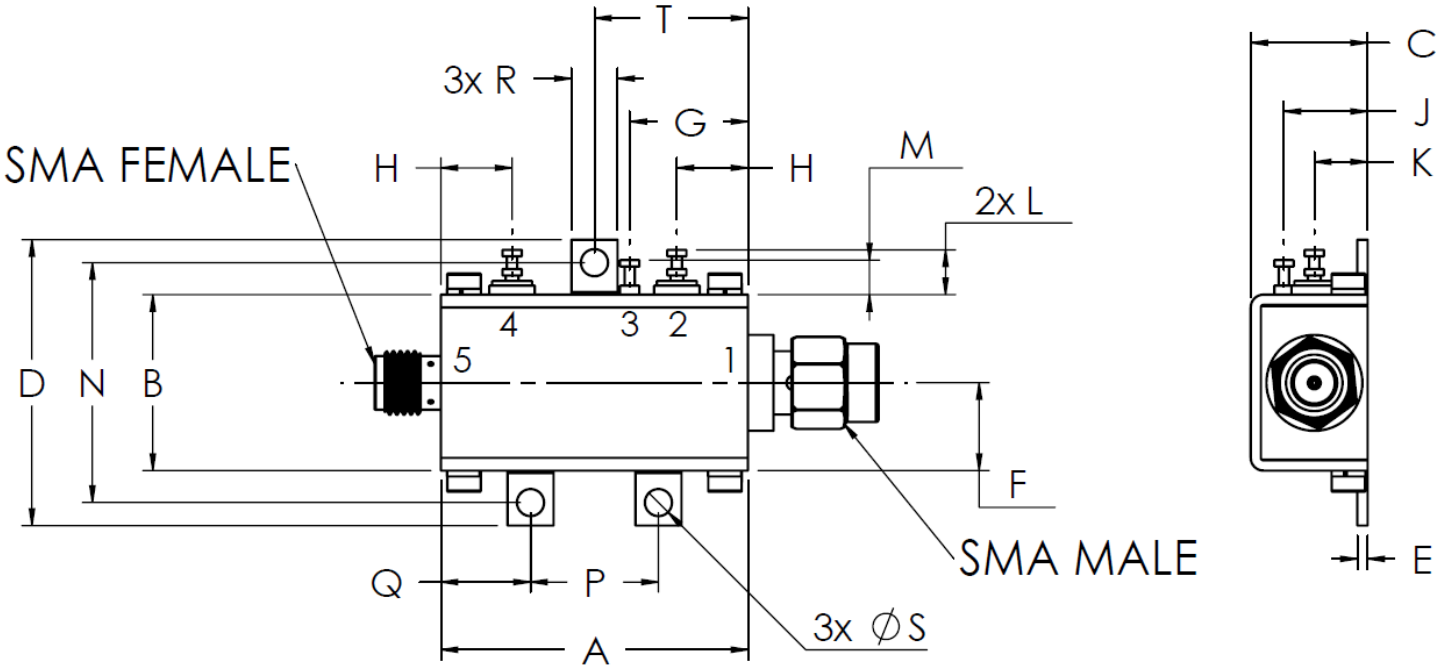
Temperature Sensor Voltage Vs Ambient Temperature



Case Style HN

Outline Dimensions

HN1173



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N
HN1173	1.20 (30.48)	.69 (17.53)	.46 (11.68)	1.12 (28.45)	.04 (1.02)	.34 (8.64)	.46 (11.68)	.28 (7.11)	.35 (8.89)	.21 (5.28)	.18 (4.57)	.14 (3.56)	.94 (23.88)

CASE #.	P	Q	R	S	T	WT GRAMS
HN1173	.50 (12.70)	.35 (8.89)	.18 (4.57)	.106 (2.69)	.60 (15.24)	31.8

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

Note:

1. Case material: Brass
2. Case finish: Nickel plate

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Environmental Specifications **ENV28T5**

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