COAXIAL

High Power Amplifier

ZHL-10W-202-S+
ZHL-10W-202X-S+

50Ω 10 W 10 to 2000 MHz SMA Female

THE BIG DEAL

- High Power, 10 Watt at Saturation
- Class AB Amplifier
- Low Current Consumption
- High OIP3, +45 dBm Typ.
- Usable From 10 MHz to 2200 MHz
- Good Gain Flatness, ±2.0 dB Typ.
- No Damage With an Open or Short Output Load While Delivering Up to 10 W
- Shuts Off When Base Plate Temperature Exceeds +85 °C

Generic photo used for illustration purposes only

Model No.	ZHL-10W-202-S+	ZHL-10W-202X-S+▲
Case Style	BT1689-1	
Connectors	SMA female / Solderable Pins	

+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

APPLICATIONS

- Cellular
- PCN
- GSM
- ISM
- Lab Test

PRODUCT OVERVIEW

Mini-Circuits' ZHL-10W-202(X)-S+ is a Class AB, high-power amplifier providing 10 W saturated power over the 10 to 2000 MHz band, ideal for a variety of high-power test setups as well as applications including communications, radar and more. The ruggedly-designed amplifier provides unconditional stability and built-in self-protection against reverse polarity, excessive drive and overheating. The amplifier's output stage is further protected in the event of a fault condition, allowing high power operation into an OPEN or SHORT load (refer to the maximum input power specifications). Housed in a rugged aluminum alloy case measuring 4.3x6.7x1.2", the unit features SMA connectors and an optional heatsink and fan attachment for cooling.

KEY FEATURES

Feature	Advantages
Ultra Wideband, Usable from 10 to 2200 MHz	Suitable for a broad range of high-power, wideband applications, including test setups, communications and defense applications.
High Gain, 50 dB	Enables signal amplification to 10 W output without the need for multiple gain stages.
Built-In Self-Protection	In instances of potentially-damaging excessive drive current, heat buildup within the housing, unshorting of DC supply, and short or open loads at the output, an automatic sensing feature signals the unit to power down.
Unconditional Stability	Provides reliable performance independent of input and load conditions.

REV. A
ECO-017723
ZHL-10W-202(X)-S+
MCL NY
260220

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ELECTRICAL SPECIFICATIONS AT +25 °C

Parameter	ZHL-10W-202-S+ ZHL-10W-202X-S+ ▲			Units
	Min.	Typ.	Max.	
Frequency Range	10		2000	MHz
Gain[1]	44	50	56	dB
Gain Flatness		±2.0	±2.7	dB
Output Power at 3 dB Compression		+40		dBm
Output Power at Saturation	+39	+42		dBm
Noise Figure		10		dB
Output Third Order Intercept Point	+39	+45		dBm
Input VSWR		2.0		:1
Output VSWR		2.0		:1
DC Supply Voltage		+28	+30	V
Supply Current[2]		1.5	5.0	A

1. Small signal input power -50 dBm typ.
2. Power Supply should be capable of delivering 4 A at startup.

▲ Heatsink and fan not included. Alternative heat sinking and heat removal must be provided by the user to limit maximum baseplate temperature to +85 °C, in order to ensure proper performance. For reference, this requires thermal resistance of user's external heatsink to be 0.4 °C/W max.

ABSOLUTE MAXIMUM RATINGS[3]

Parameter	Ratings
Operating Temperature	-20 °C to +60 °C
Storage Temperature	-55 °C to +100 °C
Baseplate Temperature	+85 °C
Input RF Power (No Damage)	+5 dBm[4] -16 dBm[5]

3. Specifications apply to CW signals only. Permanent damage may occur if any of these limits are exceeded.
4. Into 50Ω load.
5. Into open or short load.

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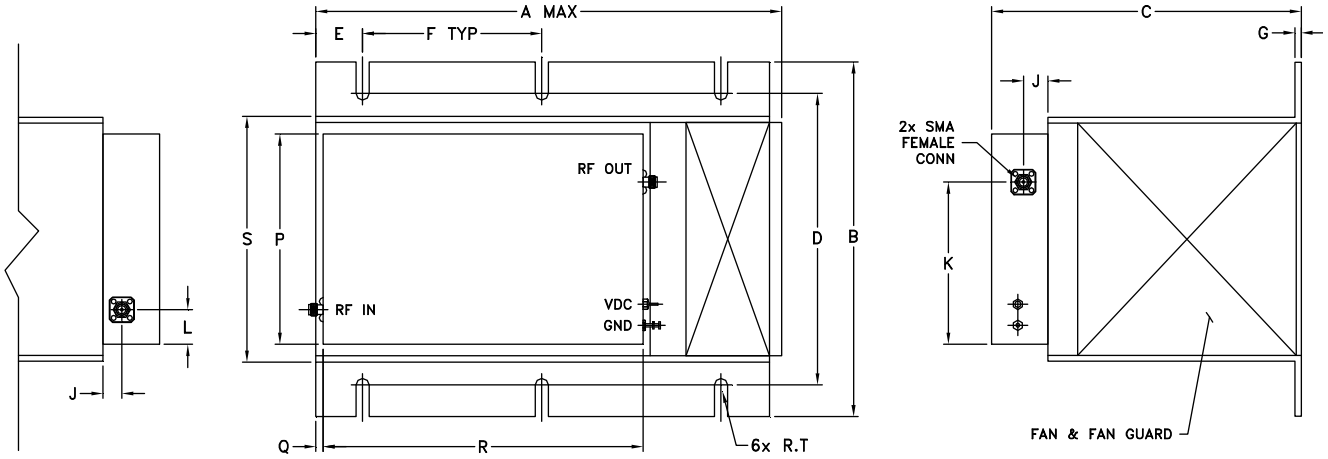
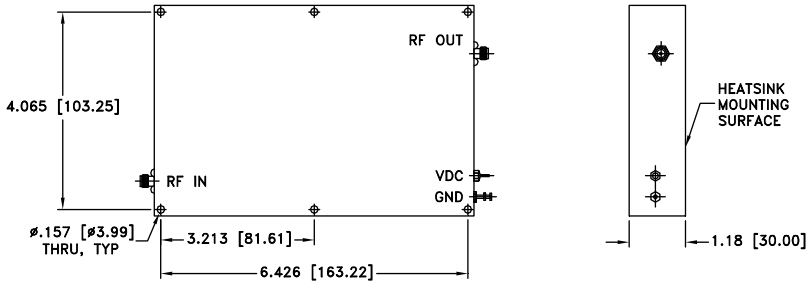
ZHL-10W-202X-S+

50Ω 10 W 10 to 2000 MHz SMA Female

OUTLINE DRAWING FOR MODELS WITH HEATSINK



OUTLINE DRAWING FOR MODELS WITHOUT HEATSINK



OUTLINE DIMENSIONS (Inch / mm)

A	B	C	D	E	F	G	J	K	L	M	P	Q	R	S	T	wt
9.85	7.30	6.50	6.00	0.98	3.75	0.13	0.47	3.34	0.71	--	4.33	0.20	6.69	5.10	0.14	grams*
250.19	185.42	167.64	152.4	24.89	95.25	3.30	12.00	84.80	18.00	--	110.00	5.08	170.00	129.54	3.45	4565

*880 grams without heatsink

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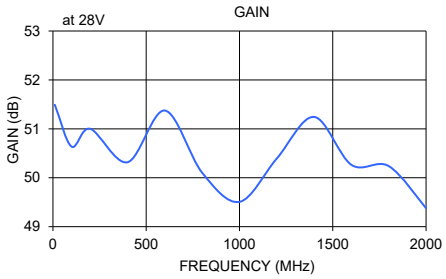
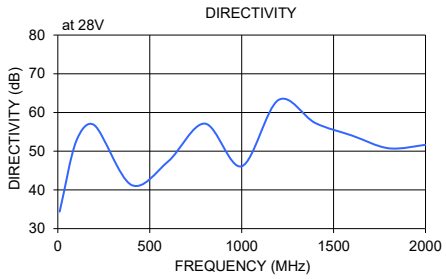
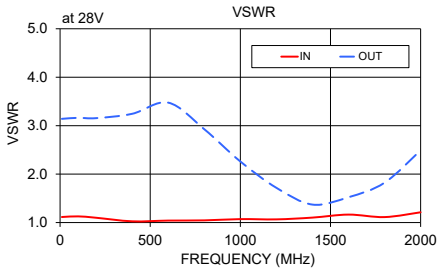
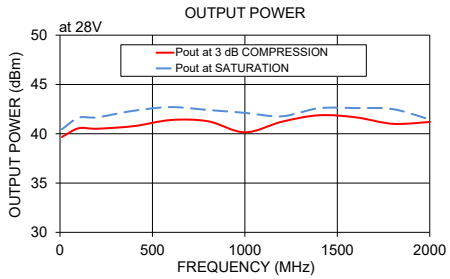
TYPICAL PERFORMANCE DATA/GRAPHS

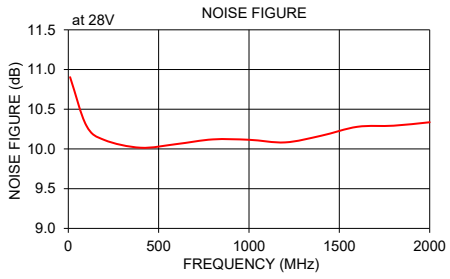
FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1)		NOISE FIGURE (dB)	P_{OUT} at 3 dB COMPR. (dBm)	P_{OUT} at SAT (dBm)	OUTPUT IP3 (dBm)
	+28 V	+28 V	IN	OUT	+28 V	+28 V	+28 V	+28 V
10	51.49	34.40	1.11	3.14	10.90	39.67	40.46	44.92
100	50.64	52.59	1.13	3.16	10.29	40.55	41.62	45.96
200	51.00	56.67	1.10	3.16	10.11	40.51	41.67	46.14
400	50.32	41.29	1.03	3.25	10.02	40.78	42.34	46.90
600	51.37	47.35	1.04	3.48	10.06	41.39	42.71	47.53
800	50.10	57.13	1.05	2.93	10.12	41.27	42.41	47.43
1000	49.51	46.10	1.07	2.26	10.12	40.15	42.12	48.69
1200	50.39	63.23	1.07	1.72	10.08	41.22	41.77	49.66
1400	51.24	57.29	1.10	1.37	10.17	41.88	42.59	50.32
1600	50.26	54.04	1.16	1.52	10.28	41.67	42.60	49.18
1800	50.24	50.75	1.11	1.82	10.29	41.01	42.50	47.71
2000	49.38	51.66	1.21	2.49	10.34	41.20	41.44	46.29

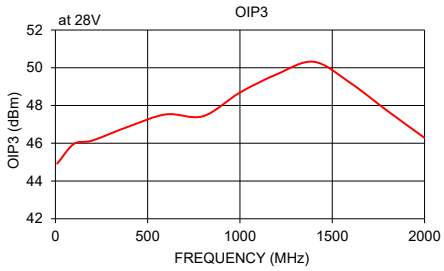












NOTES

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/terms/viewterm.html

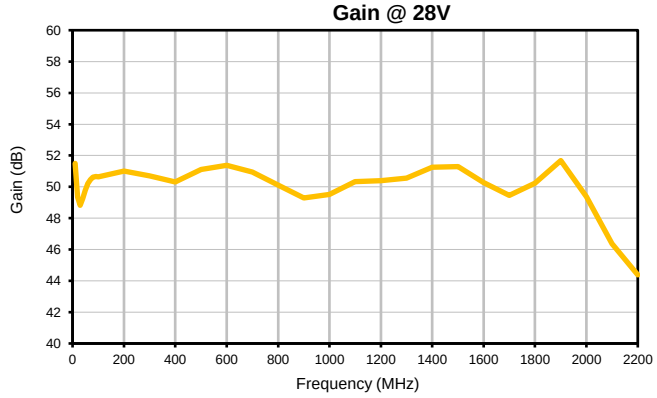
High Power Amplifier ZHL-10W-202-S+

Typical Performance Data

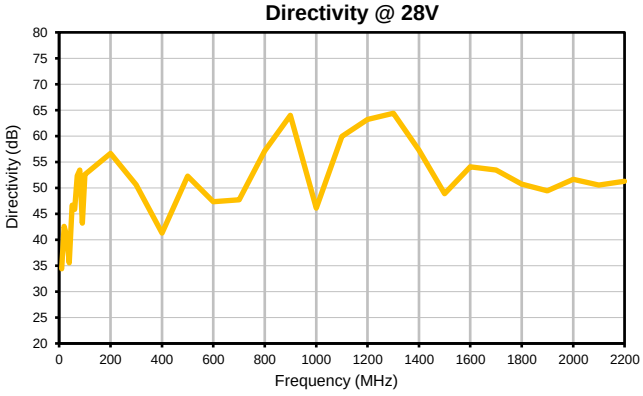
FREQUENCY (MHz)	GAIN (dB) 28V	DIRECTIVITY (dB) 28V	VSWR (:1) IN 28V	VSWR (:1) OUT 28V	NOISE FIGURE (dB) 28V	Pout @ 3 dB COMPRESSION (dBm) 28V	Pout @ SATURATION (dBm) 28V	OUTPUT IP3 (dBm) 28V
10	51.5	34.4	1.11	3.14	10.90	39.67	40.46	44.92
20	49.3	42.6	1.12	2.96	10.51	39.79	40.27	45.38
30	48.8	40.8	1.13	2.87	10.43	39.89	40.39	45.66
40	49.3	35.6	1.13	2.90	10.36	40.15	40.78	46.10
50	49.8	46.6	1.13	2.98	10.35	40.41	41.12	46.38
60	50.2	45.9	1.13	3.08	10.34	40.56	41.38	46.42
70	50.5	52.3	1.13	3.15	10.32	40.60	41.50	46.28
80	50.6	53.4	1.13	3.20	10.32	40.57	41.55	46.22
90	50.7	43.2	1.13	3.17	10.30	40.56	41.59	46.00
100	50.6	52.6	1.13	3.16	10.29	40.55	41.62	45.96
200	51.0	56.7	1.10	3.16	10.11	40.51	41.67	46.14
300	50.7	50.6	1.07	3.21	10.09	40.81	41.91	46.63
400	50.3	41.3	1.03	3.25	10.02	40.78	42.34	46.90
500	51.1	52.3	1.02	3.31	10.07	40.93	42.25	47.06
600	51.4	47.4	1.04	3.48	10.06	41.39	42.71	47.53
700	51.0	47.7	1.03	3.23	10.06	41.14	42.21	46.70
800	50.1	57.1	1.05	2.93	10.12	41.27	42.41	47.43
900	49.3	64.0	1.07	2.57	10.03	40.95	42.03	49.41
1000	49.5	46.1	1.07	2.26	10.12	40.15	42.12	48.69
1100	50.3	59.9	1.06	1.98	10.10	40.27	41.54	48.86
1200	50.4	63.2	1.07	1.72	10.08	41.22	41.77	49.66
1300	50.6	64.4	1.07	1.50	10.18	41.25	42.09	49.89
1400	51.2	57.3	1.10	1.37	10.17	41.88	42.59	50.32
1500	51.3	48.9	1.15	1.39	10.15	42.32	42.83	49.83
1600	50.3	54.0	1.16	1.52	10.28	41.67	42.60	49.18
1700	49.5	53.4	1.14	1.69	10.22	40.88	42.52	47.90
1800	50.2	50.7	1.11	1.82	10.29	41.01	42.50	47.71
1900	51.7	49.4	1.19	2.00	10.38	41.49	42.11	47.80
2000	49.4	51.7	1.21	2.49	10.34	41.20	41.44	46.29
2100	46.4	50.5	1.14	2.89	10.48	40.22	40.50	45.59
2200	44.4	51.3	1.11	3.46	10.52	39.67	40.16	43.03

Typical Performance Curves

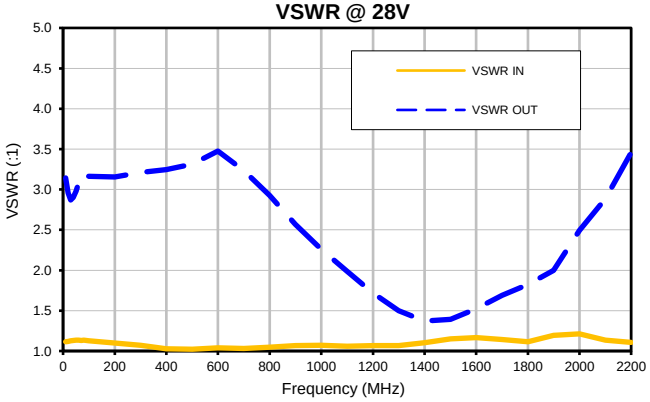
Gain @ 28V



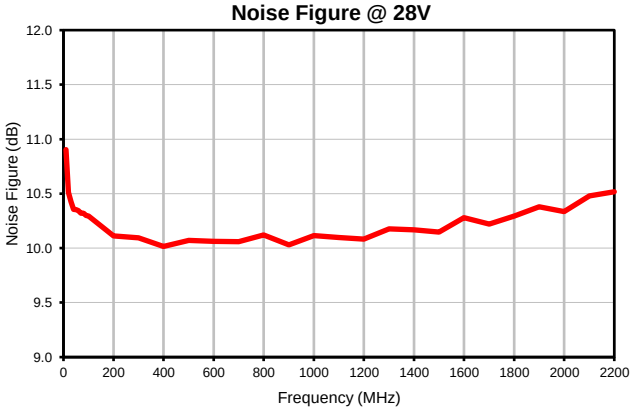
Directivity @ 28V



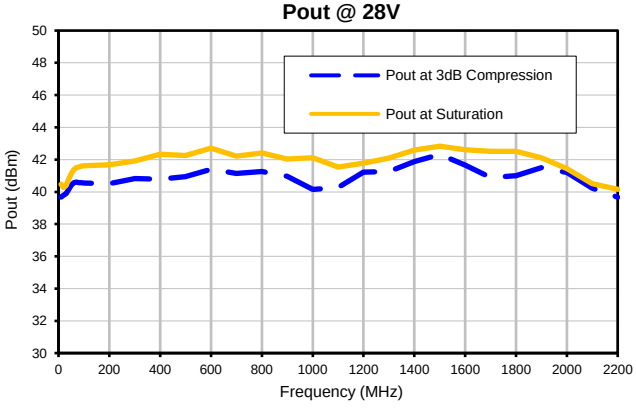
VSWR @ 28V



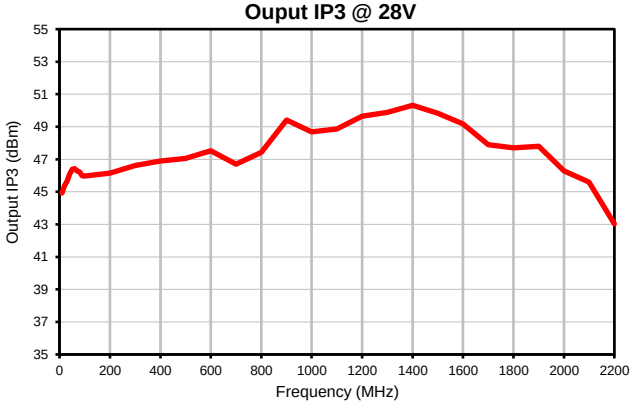
Noise Figure @ 28V



Pout @ 28V



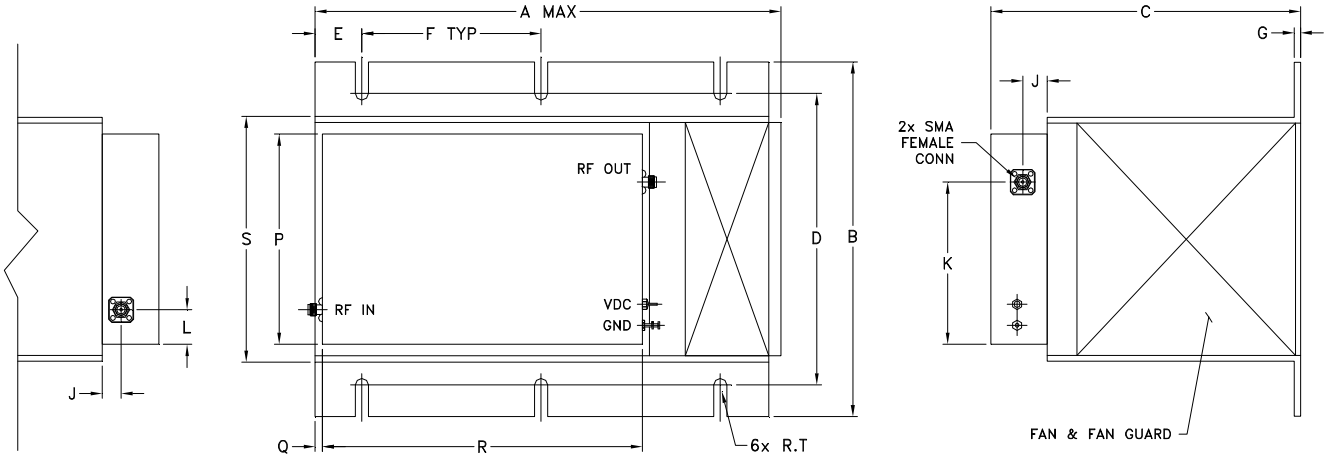
Ouput IP3 @ 28V



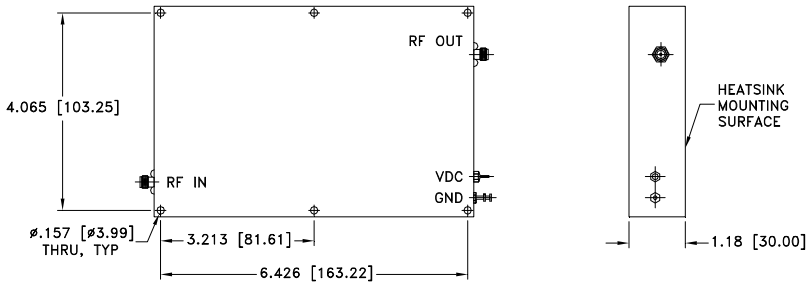
Case Style BT

BT1689-1

Outline Dimensions



MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
BT1689-1	9.85 (250.19)	7.3 (185.42)	6.5 (165.10)	6.00 (152.40)	.98 (24.89)	3.75 (95.25)	.13 (3.30)	- -	.47 (12.0)	3.34 (84.8)	.71 (18.0)	- -	- -

CASE#	P	Q	R	S	T	WT, GRAM	WT WITHOUT HEATSINK, GRAM
BT1689-1	4.33 (110.00)	.2 (5.08)	6.69 (170.00)	5.1 (129.54)	.136 (3.45)	4565	880

Dimensions in inches (mm). Tolerances: 1 Pl. ± .1; 2Pl. ± .03; 3 Pl. ± .015

Notes:

1. Case material: Aluminum alloy.
2. Finish:
   For RoHS Case Styles: Clear Chemical conversion coating, non-chrome or trivalent chrome based.
3. Heatsink finish: Black anodize.
4. Refer to the individual model data sheet for the type of connectors available.
5. Recommended screws for mounting model without heat sink on 3/32” thick sheet: #6-32, 1.50” Length.
6. Shape of connector flange may vary.

Mini-Circuits

Environmental Specifications **ENV23T19**

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	-20° to 45°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Stabilization Bake	(non-operating) 125°C, 24 hours	- - -
Burn-in at Elevated Temp.	(DC on) 160 hours at 60° C base plate Temperature	MIL-STD-202, Method 108
Thermal Shock	-55° to 100°C, 5 cycles	MIL-STD-202, Method 107, Condition A, except 100°C