

High IP3

# Low Noise Amplifier

ZRL-2400LN+

50Ω

1000 to 2400 MHz

## Features

- High IP3, +39 dBm typ.
- Low Noise figure, 1.2 dB typ.
- Broadband flat gain response
- Internal voltage regulated
- Over-voltage and transient protected

## Applications

- PCS, UMTS, GSM, cellular, wireless data
- Defense communications
- Satellite communications



Generic photo used for illustration purposes only

Case Style: FJ893

| Connectors | Model       |
|------------|-------------|
| SMA        | ZRL-2400LN+ |

**+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                                 |                                           | 1000           |                      | 2400                 | MHz   |
| Noise Figure <sup>3</sup>                       | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | —<br>—<br>—    | 1.2<br>1.0<br>1.2    | 2.0<br>1.4<br>1.4    | dB    |
| Gain                                            | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | 29<br>26<br>24 | 32<br>30<br>28       | —<br>—<br>—          | dB    |
| Gain Flatness                                   | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | —<br>—<br>—    | ±1.1<br>±1.3<br>±1.6 | ±2.0<br>±2.2<br>±2.2 | dB    |
| Output Power at 1dB compression                 | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | 21<br>23<br>23 | 23<br>24<br>24       | —<br>—<br>—          | dBm   |
| Output Power at 3dB compression                 | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | —<br>—<br>—    | 25.3<br>26.0<br>26.0 | —<br>—<br>—          | dBm   |
| Output third order intercept point <sup>1</sup> | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | —<br>—<br>—    | +37<br>+39<br>+40    | —<br>—<br>—          | dBm   |
| Input VSWR                                      | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | —<br>—<br>—    | 1.6<br>1.2<br>1.2    | —<br>—<br>—          | :1    |
| Output VSWR                                     | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | —<br>—<br>—    | 1.4<br>1.2<br>1.2    | —<br>—<br>—          | :1    |
| Active Directivity                              | 1000 - 1400<br>1400 - 1900<br>1900 - 2400 | —<br>—<br>—    | 13<br>16<br>16       | —<br>—<br>—          | dB    |
| DC Supply Voltage <sup>2</sup>                  |                                           | —              | 12                   | —                    | V     |
| Supply Current                                  |                                           | —              | 470                  | 520                  | mA    |

1. 1 MHz tone spacing.

2. Unit is internally voltage regulated for 6.5 to 17VDC input voltage range.

3. 2.2 dB max at frequency 1000-1050 MHz.

## Maximum Ratings

| Parameter                  | Ratings                                    |
|----------------------------|--------------------------------------------|
| Operating Temperature      | -40°C to 80°C case<br>-40°C to 60° ambient |
| Storage Temperature        | -55°C to 100°C                             |
| DC Voltage                 | +17V                                       |
| Input RF Power (no damage) | +10 dBm                                    |

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

## 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.

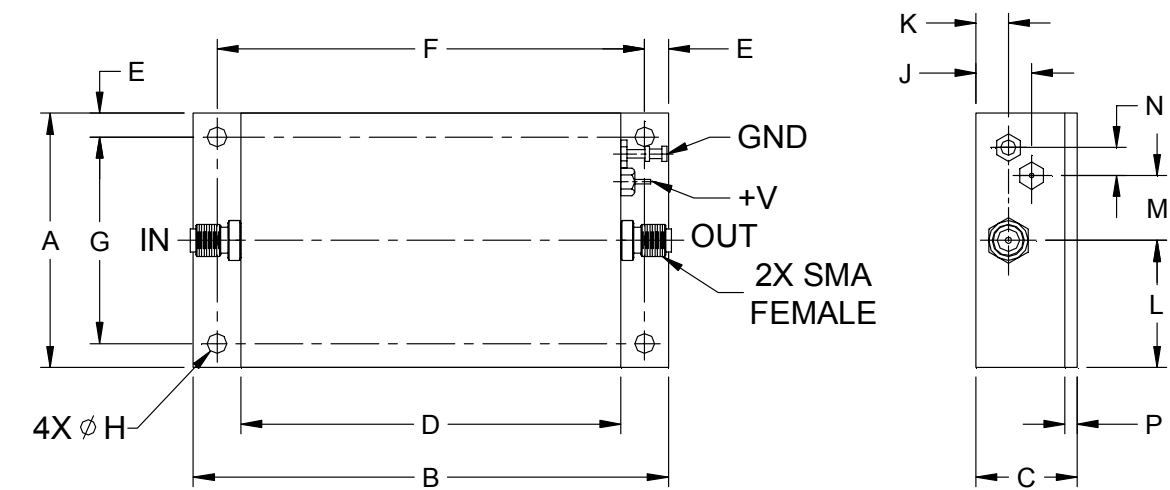
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Page 1 of 3

Outline Drawing

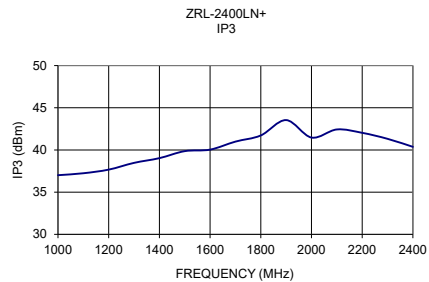
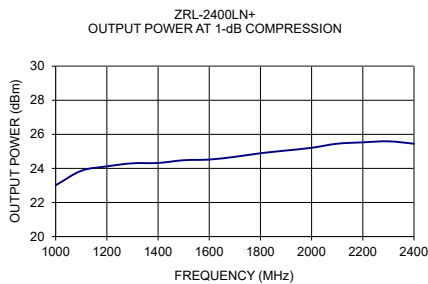
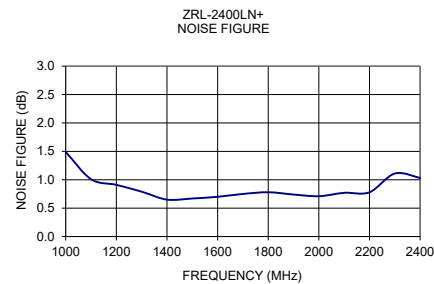
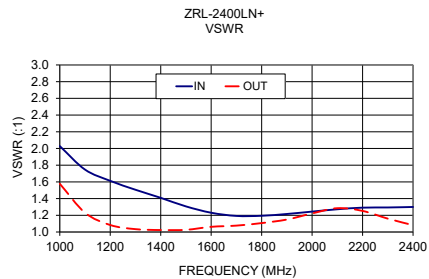
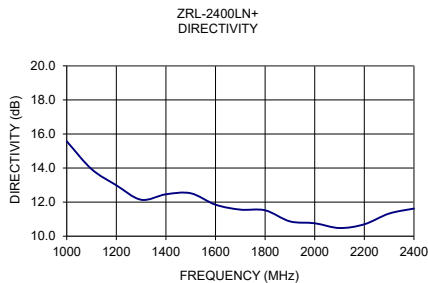
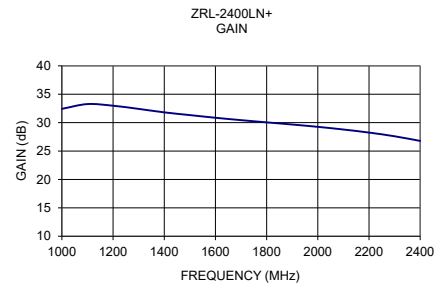


Outline Dimensions (inch mm)

| A     | B     | C     | D     | E    | F     | G     | H     | J     | K    | L     | M     | N    | P    | wt    |
|-------|-------|-------|-------|------|-------|-------|-------|-------|------|-------|-------|------|------|-------|
| 2.00  | 3.75  | 0.80  | 3.00  | 0.19 | 3.374 | 1.624 | 0.156 | 0.44  | 0.26 | 1.00  | 0.51  | 0.22 | 0.10 | grams |
| 50.80 | 95.25 | 20.32 | 76.20 | 4.83 | 85.70 | 41.25 | 3.96  | 11.18 | 6.60 | 25.40 | 12.95 | 5.59 | 2.54 | 135   |

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| FREQUENCY<br>(MHz) | GAIN<br>(dB) | DIRECTIVITY<br>(dB) | VSWR<br>(:1) |      | NOISE<br>FIGURE<br>(dB) | POUT<br>at 1dB<br>COMPR.<br>(dBm) | OUTPUT<br>IP3<br>(dBm) |
|--------------------|--------------|---------------------|--------------|------|-------------------------|-----------------------------------|------------------------|
|                    | 12V          | 12V                 | IN           | OUT  | 12V                     | 12V                               | 12V                    |
| 1000.00            | 32.43        | 15.57               | 2.03         | 1.58 | 1.49                    | 23.01                             | 37.01                  |
| 1100.00            | 33.27        | 13.94               | 1.75         | 1.23 | 1.01                    | 23.86                             | 37.24                  |
| 1200.00            | 32.98        | 12.99               | 1.61         | 1.08 | 0.91                    | 24.12                             | 37.67                  |
| 1300.00            | 32.42        | 12.14               | 1.51         | 1.03 | 0.79                    | 24.30                             | 38.47                  |
| 1400.00            | 31.81        | 12.46               | 1.41         | 1.02 | 0.65                    | 24.32                             | 39.03                  |
| 1500.00            | 31.33        | 12.52               | 1.31         | 1.03 | 0.67                    | 24.48                             | 39.86                  |
| 1600.00            | 30.86        | 11.85               | 1.23         | 1.06 | 0.70                    | 24.52                             | 40.04                  |
| 1700.00            | 30.44        | 11.56               | 1.19         | 1.08 | 0.75                    | 24.68                             | 40.99                  |
| 1800.00            | 30.05        | 11.52               | 1.19         | 1.11 | 0.78                    | 24.89                             | 41.72                  |
| 1900.00            | 29.67        | 10.87               | 1.22         | 1.15 | 0.74                    | 25.05                             | 43.54                  |
| 2000.00            | 29.26        | 10.76               | 1.24         | 1.22 | 0.71                    | 25.21                             | 41.47                  |
| 2100.00            | 28.79        | 10.48               | 1.27         | 1.29 | 0.77                    | 25.45                             | 42.43                  |
| 2200.00            | 28.25        | 10.70               | 1.29         | 1.25 | 0.78                    | 25.53                             | 42.03                  |
| 2300.00            | 27.60        | 11.33               | 1.29         | 1.16 | 1.11                    | 25.59                             | 41.32                  |
| 2400.00            | 26.78        | 11.62               | 1.30         | 1.08 | 1.03                    | 25.45                             | 40.37                  |



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# Low Noise Amplifier

# ZRL-2400LN+

## Typical Performance Data

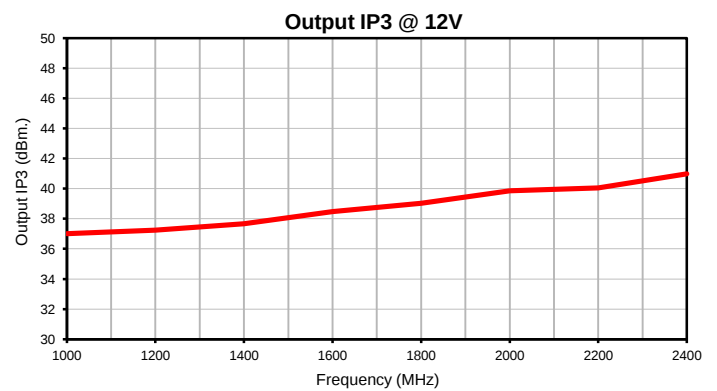
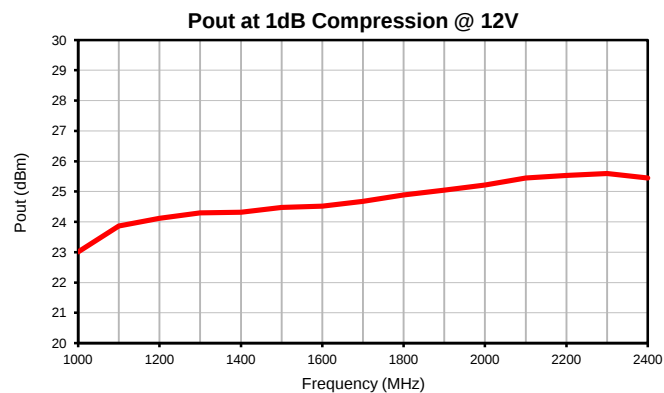
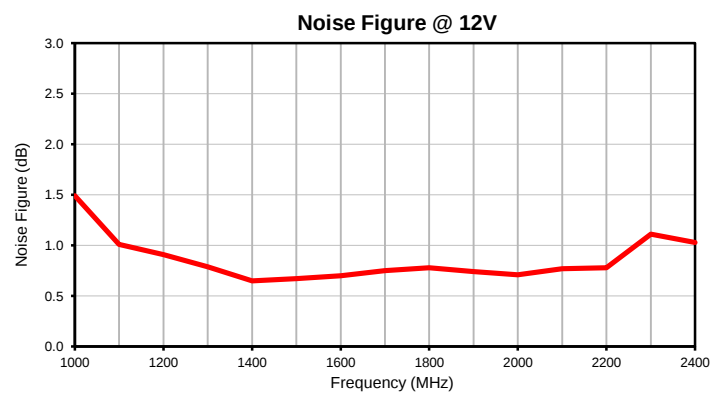
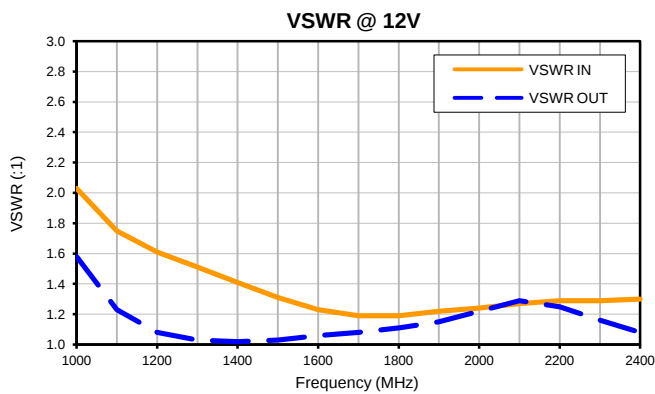
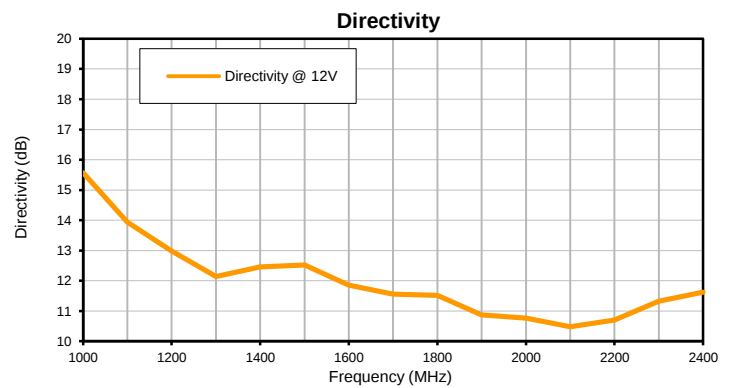
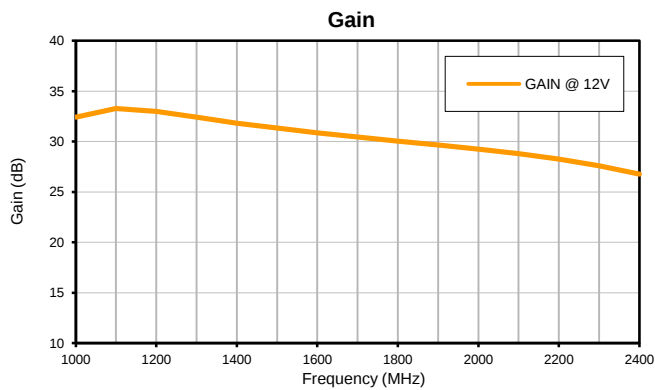
| FREQUENCY<br>(MHz) | GAIN<br>(dB)<br>12V | DIRECTIVITY<br>(dB)<br>12V | VSWR (:1) |            | NOISE<br>FIGURE<br>(dB)<br>12V | POUT @ 1 dB<br>COMPRESSION<br>(dBm)<br>12V | OUTPUT IP3<br>(dBm)<br>12V |
|--------------------|---------------------|----------------------------|-----------|------------|--------------------------------|--------------------------------------------|----------------------------|
|                    |                     |                            | IN<br>12V | OUT<br>12V |                                |                                            |                            |
| 1000.0             | 32.43               | 15.57                      | 2.03      | 1.58       | 1.49                           | 23.01                                      | 37.01                      |
| 1100.0             | 33.27               | 13.94                      | 1.75      | 1.23       | 1.01                           | 23.86                                      | 37.24                      |
| 1200.0             | 32.98               | 12.99                      | 1.61      | 1.08       | 0.91                           | 24.12                                      | 37.67                      |
| 1300.0             | 32.42               | 12.14                      | 1.51      | 1.03       | 0.79                           | 24.30                                      | 38.47                      |
| 1400.0             | 31.81               | 12.46                      | 1.41      | 1.02       | 0.65                           | 24.32                                      | 39.03                      |
| 1500.0             | 31.33               | 12.52                      | 1.31      | 1.03       | 0.67                           | 24.48                                      | 39.86                      |
| 1600.0             | 30.86               | 11.85                      | 1.23      | 1.06       | 0.70                           | 24.52                                      | 40.04                      |
| 1700.0             | 30.44               | 11.56                      | 1.19      | 1.08       | 0.75                           | 24.68                                      | 40.99                      |
| 1800.0             | 30.05               | 11.52                      | 1.19      | 1.11       | 0.78                           | 24.89                                      | 41.72                      |
| 1900.0             | 29.67               | 10.87                      | 1.22      | 1.15       | 0.74                           | 25.05                                      | 43.54                      |
| 2000.0             | 29.26               | 10.76                      | 1.24      | 1.22       | 0.71                           | 25.21                                      | 41.47                      |
| 2100.0             | 28.79               | 10.48                      | 1.27      | 1.29       | 0.77                           | 25.45                                      | 42.43                      |
| 2200.0             | 28.25               | 10.70                      | 1.29      | 1.25       | 0.78                           | 25.53                                      | 42.03                      |
| 2300.0             | 27.60               | 11.33                      | 1.29      | 1.16       | 1.11                           | 25.59                                      | 41.32                      |
| 2400.0             | 26.78               | 11.62                      | 1.30      | 1.08       | 1.03                           | 25.45                                      | 40.37                      |



# Low Noise Amplifier

## ZRL-2400LN+

### Typical Performance Curves



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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)



IF/RF MICROWAVE COMPONENTS



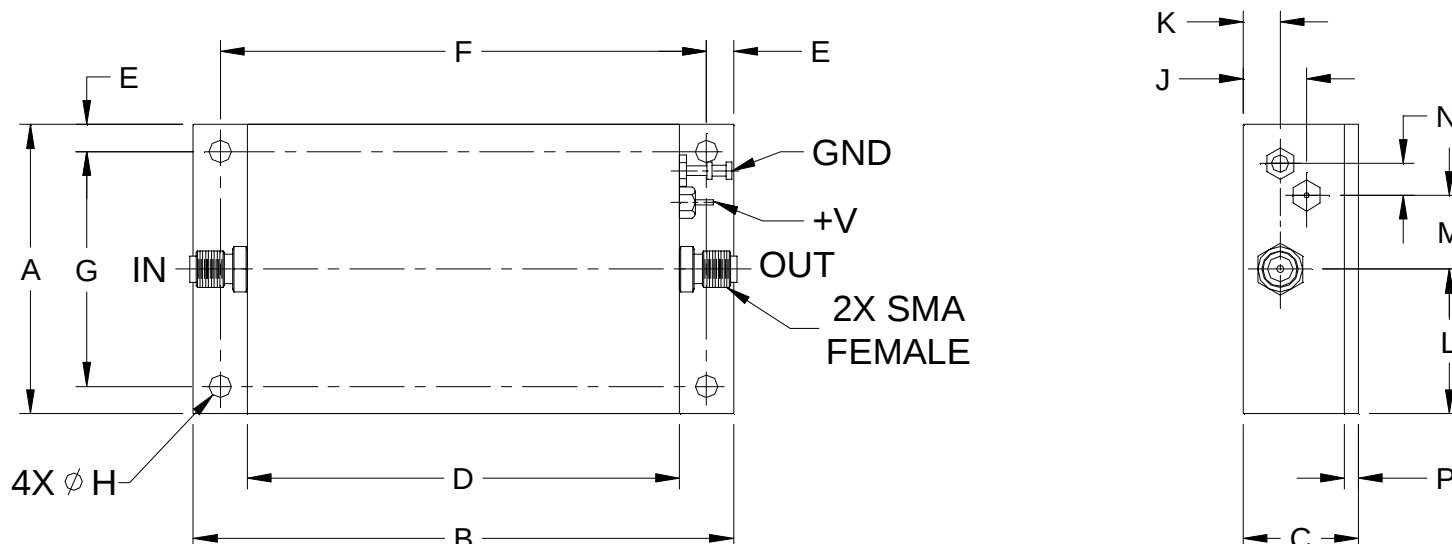
REV. OR  
ZRL-2400LN+  
4/18/2014  
Page 1 of 1

# Case Style

# FJ

## Outline Dimensions

## FJ893



| CASE# | A               | B               | C              | D               | E             | F                | G                | H              | J              | K             | L               | M              | N             | P             | WT. GRAMS |
|-------|-----------------|-----------------|----------------|-----------------|---------------|------------------|------------------|----------------|----------------|---------------|-----------------|----------------|---------------|---------------|-----------|
| FJ893 | 2.00<br>(50.80) | 3.75<br>(95.25) | .80<br>(20.32) | 3.00<br>(76.20) | .19<br>(4.83) | 3.374<br>(85.70) | 1.624<br>(41.25) | .156<br>(3.96) | .44<br>(11.18) | .26<br>(6.60) | 1.00<br>(25.40) | .51<br>(12.95) | .22<br>(5.59) | .10<br>(2.54) | 135       |

Dimensions are in inches (mm). Tolerances: 2PL. +/- .03; 3PL. +/- .015

### Notes:

1. Case material: Aluminum alloy.
2. Case finish:

For RoHS Case Styles:

Clear chemical conversion coating, non-chrome or trivalent chrome based.



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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     | -40° to 60° C<br>Ambient Environment  | Individual Model Data Sheet                        |
| Operating Temperature     | -40° to 80° C<br>Case Temperature     | Individual Model Data Sheet                        |
| Storage Temperature       | -55° to 100° C<br>Ambient Environment | Individual Model Data Sheet                        |
| Stabilization Bake        | (non-operating)<br>125°C, 24 hours    | - - -                                              |
| Burn-in at Elevated Temp. | (DC on)<br>160 hours at 85° C         | MIL-STD-202, Method 108                            |
| Thermal Shock             | -55° to 100°C, 5 cycles               | MIL-STD-202, Method 107, Condition A, except 100°C |