

High IP3

# Low Noise Amplifier

ZRL-2300+

50Ω

1400 to 2300 MHz

## Features

- High IP3, +42 dBm typ.
- Low Noise figure, 2.5 dB typ.
- Broadband flat gain response
- Excellent return loss, 20 dB typ.
- Internal voltage regulated
- Over-voltage and transient protected

## Applications

- High dynamic range
- PCS, UMTS, GSM, cellular, wireless data
- Defense and satellite communications
- High linearity driver amplifier



Generic photo used for illustration purposes only

Case Style: FJ893

| Connectors | Model     |
|------------|-----------|
| SMA        | ZRL-2300+ |

**+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                                 |                            | 1400     |              | 2300         | MHz   |
| Noise Figure                                    | 1400 - 2300<br>1650 - 2150 | —<br>—   | 2.5<br>2.3   | 3.5<br>3.5   | dB    |
| Gain                                            | 1400 - 2300<br>1650 - 2150 | 21<br>22 | 29<br>28     | —<br>—       | dB    |
| Gain Flatness                                   | 1400 - 2300<br>1650 - 2150 | —<br>—   | ±0.5<br>±0.3 | ±1.0<br>±0.8 | dB    |
| Output Power at 1dB compression                 | 1400 - 2300<br>1650 - 2150 | 23<br>23 | 26<br>25     | —<br>—       | dBm   |
| Output Power at 3dB compression                 | 1400 - 2300<br>1650 - 2150 | —<br>—   | 27<br>26     | —<br>—       | dBm   |
| Output third order intercept point <sup>1</sup> | 1400 - 2300<br>1650 - 2150 | —<br>—   | +42<br>+42   | —<br>—       | dBm   |
| Input VSWR                                      | 1400 - 2300<br>1650 - 2150 | —<br>—   | 1.2<br>1.3   | —<br>—       | :1    |
| Output VSWR                                     | 1400 - 2300<br>1650 - 2150 | —<br>—   | 1.16<br>1.13 | —<br>—       | :1    |
| Active Directivity                              | 1400 - 2300<br>1650 - 2150 | —<br>—   | 19<br>17     | —<br>—       | dB    |
| DC Supply Voltage <sup>2</sup>                  |                            | —        | 12           | —            | V     |
| Supply Current                                  |                            | —        | 470          | 575          | mA    |

1. 1 MHz tone spacing.

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

## 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.

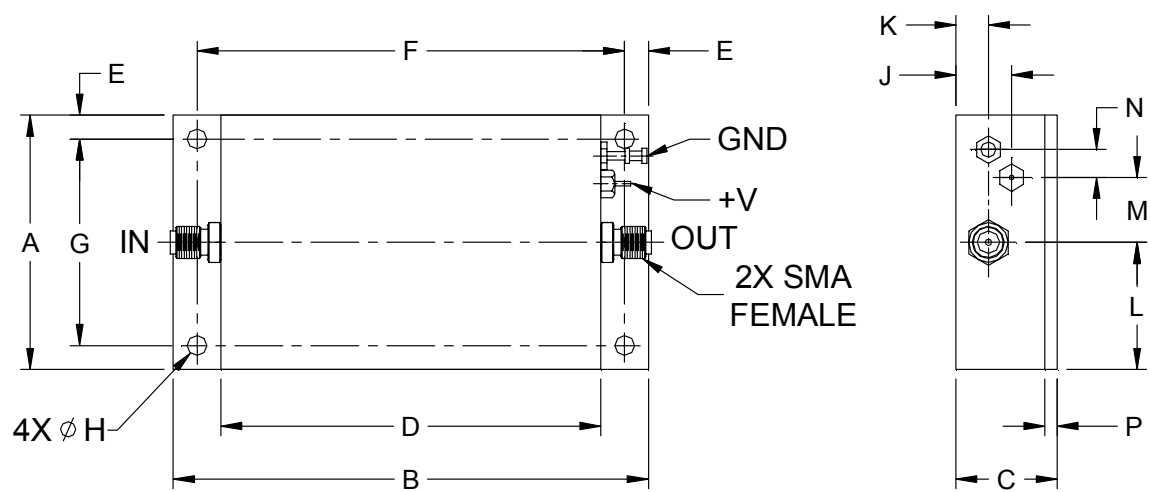
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



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REV. M  
M151107  
ZRL-2300+  
EDB010903/2  
200513  
Page 1 of 3

Outline Drawing



Outline Dimensions (inch mm)

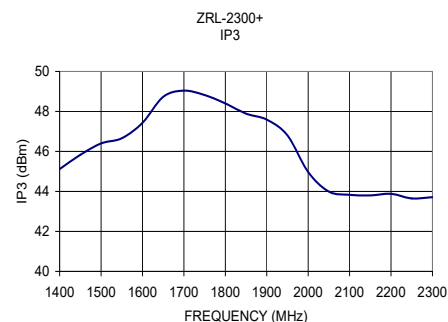
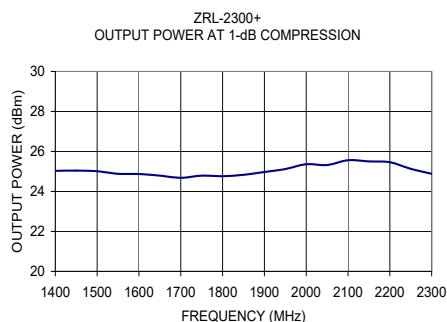
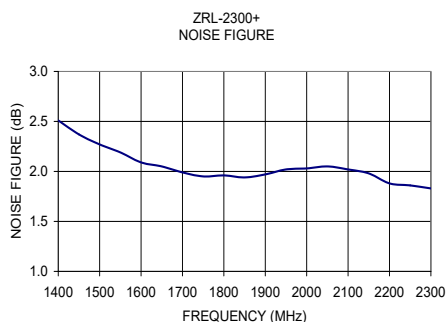
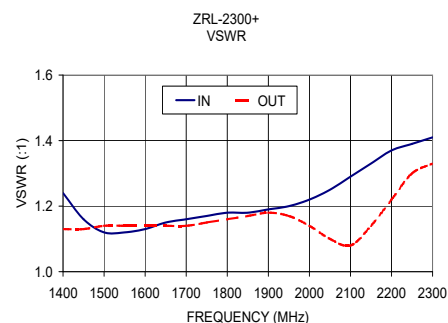
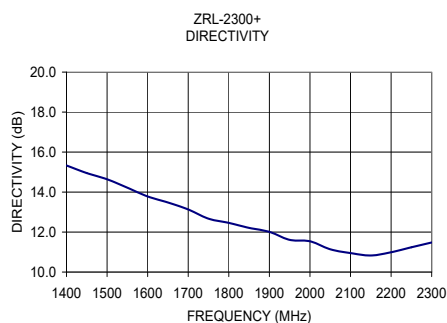
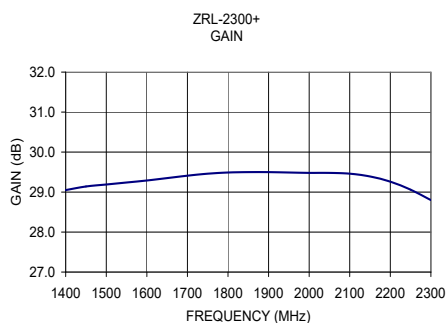
| A     | B     | C     | D     | E    | F     | G     | H     | J     | K    | L     | M     | N    | P    | wt    |
|-------|-------|-------|-------|------|-------|-------|-------|-------|------|-------|-------|------|------|-------|
| 2.00  | 3.75  | 0.80  | 3.00  | 0.19 | 3.374 | 1.624 | 0.156 | 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                    |
| 1400.00            | 29.05        | 15.33               | 1.24         | 1.13 | 2.51                    | 25.03                             | 45.12                  |
| 1450.00            | 29.14        | 14.95               | 1.16         | 1.13 | 2.37                    | 25.04                             | 45.83                  |
| 1500.00            | 29.19        | 14.64               | 1.12         | 1.14 | 2.27                    | 25.01                             | 46.40                  |
| 1550.00            | 29.24        | 14.22               | 1.12         | 1.14 | 2.19                    | 24.88                             | 46.66                  |
| 1600.00            | 29.29        | 13.78               | 1.13         | 1.14 | 2.09                    | 24.87                             | 47.43                  |
| 1650.00            | 29.35        | 13.48               | 1.15         | 1.14 | 2.05                    | 24.79                             | 48.73                  |
| 1700.00            | 29.41        | 13.13               | 1.16         | 1.14 | 1.99                    | 24.68                             | 49.04                  |
| 1750.00            | 29.46        | 12.67               | 1.17         | 1.15 | 1.95                    | 24.79                             | 48.82                  |
| 1800.00            | 29.49        | 12.46               | 1.18         | 1.16 | 1.96                    | 24.76                             | 48.40                  |
| 1850.00            | 29.50        | 12.21               | 1.18         | 1.17 | 1.94                    | 24.83                             | 47.89                  |
| 1900.00            | 29.50        | 12.01               | 1.19         | 1.18 | 1.97                    | 24.97                             | 47.59                  |
| 1950.00            | 29.49        | 11.61               | 1.20         | 1.17 | 2.02                    | 25.12                             | 46.80                  |
| 2000.00            | 29.48        | 11.54               | 1.22         | 1.14 | 2.03                    | 25.36                             | 44.97                  |
| 2050.00            | 29.48        | 11.14               | 1.25         | 1.10 | 2.05                    | 25.32                             | 43.99                  |
| 2100.00            | 29.46        | 10.95               | 1.29         | 1.08 | 2.02                    | 25.56                             | 43.83                  |
| 2150.00            | 29.39        | 10.83               | 1.33         | 1.14 | 1.98                    | 25.50                             | 43.80                  |
| 2200.00            | 29.26        | 10.99               | 1.37         | 1.22 | 1.88                    | 25.46                             | 43.88                  |
| 2250.00            | 29.06        | 11.24               | 1.39         | 1.30 | 1.86                    | 25.13                             | 43.65                  |
| 2300.00            | 28.80        | 11.48               | 1.41         | 1.33 | 1.83                    | 24.88                             | 43.71                  |



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# Low Noise Amplifier

## ZRL-2300+

### Typical Performance Data

| FREQUENCY<br>(MHz) | GAIN<br>(dB)<br>12V | DIRECTIVITY<br>(dB)<br>12V | VSWR (:1) |            | NOISE 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 |                             |                                            |                            |
| 1400.0             | 29.05               | 15.33                      | 1.24      | 1.13       | 2.51                        | 25.03                                      | 45.12                      |
| 1450.0             | 29.14               | 14.95                      | 1.16      | 1.13       | 2.37                        | 25.04                                      | 45.83                      |
| 1500.0             | 29.19               | 14.64                      | 1.12      | 1.14       | 2.27                        | 25.01                                      | 46.40                      |
| 1550.0             | 29.24               | 14.22                      | 1.12      | 1.14       | 2.19                        | 24.88                                      | 46.66                      |
| 1600.0             | 29.29               | 13.78                      | 1.13      | 1.14       | 2.09                        | 24.87                                      | 47.43                      |
| 1650.0             | 29.35               | 13.48                      | 1.15      | 1.14       | 2.05                        | 24.79                                      | 48.73                      |
| 1700.0             | 29.41               | 13.13                      | 1.16      | 1.14       | 1.99                        | 24.68                                      | 49.04                      |
| 1750.0             | 29.46               | 12.67                      | 1.17      | 1.15       | 1.95                        | 24.79                                      | 48.82                      |
| 1800.0             | 29.49               | 12.46                      | 1.18      | 1.16       | 1.96                        | 24.76                                      | 48.40                      |
| 1850.0             | 29.50               | 12.21                      | 1.18      | 1.17       | 1.94                        | 24.83                                      | 47.89                      |
| 1900.0             | 29.50               | 12.01                      | 1.19      | 1.18       | 1.97                        | 24.97                                      | 47.59                      |
| 1950.0             | 29.49               | 11.61                      | 1.20      | 1.17       | 2.02                        | 25.12                                      | 46.80                      |
| 2000.0             | 29.48               | 11.54                      | 1.22      | 1.14       | 2.03                        | 25.36                                      | 44.97                      |
| 2050.0             | 29.48               | 11.14                      | 1.25      | 1.10       | 2.05                        | 25.32                                      | 43.99                      |
| 2100.0             | 29.46               | 10.95                      | 1.29      | 1.08       | 2.02                        | 25.56                                      | 43.83                      |
| 2150.0             | 29.39               | 10.83                      | 1.33      | 1.14       | 1.98                        | 25.50                                      | 43.80                      |
| 2200.0             | 29.26               | 10.99                      | 1.37      | 1.22       | 1.88                        | 25.46                                      | 43.88                      |
| 2250.0             | 29.06               | 11.24                      | 1.39      | 1.30       | 1.86                        | 25.13                                      | 43.65                      |
| 2300.0             | 28.80               | 11.48                      | 1.41      | 1.33       | 1.83                        | 24.88                                      | 43.71                      |



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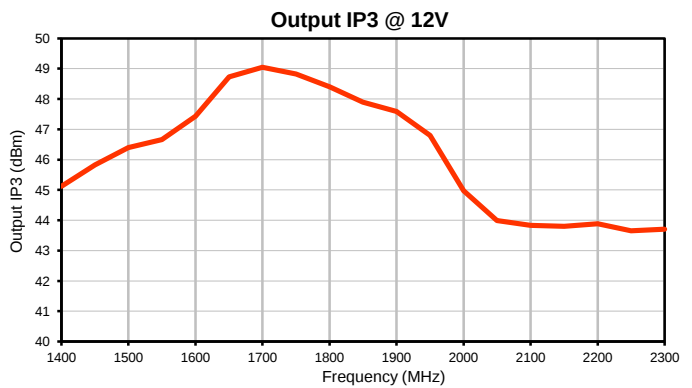
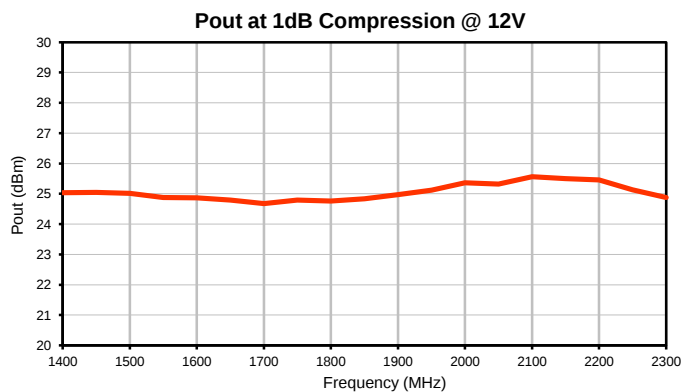
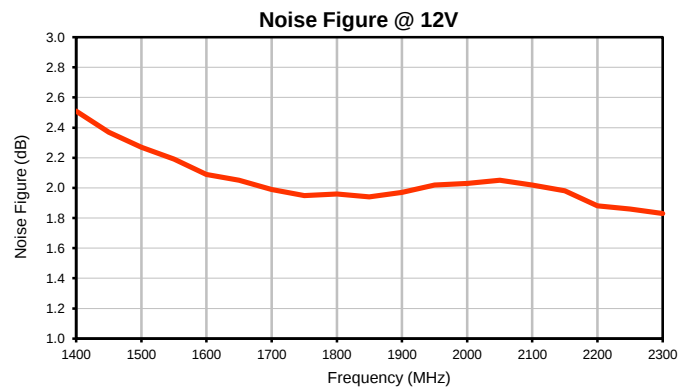
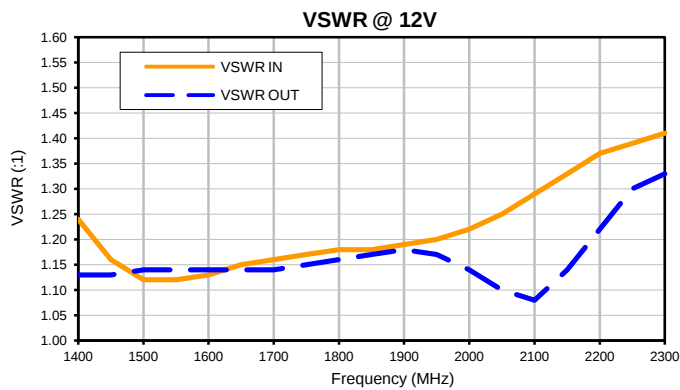
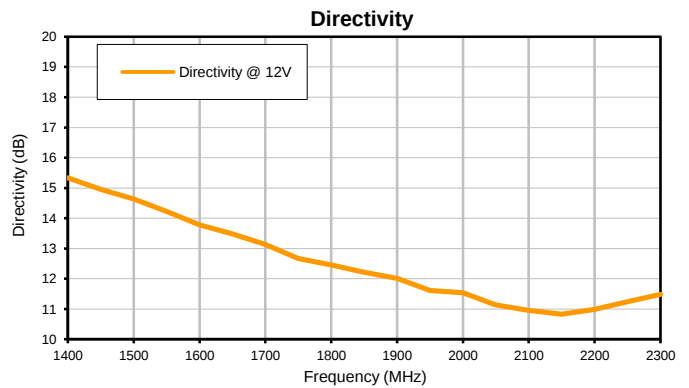
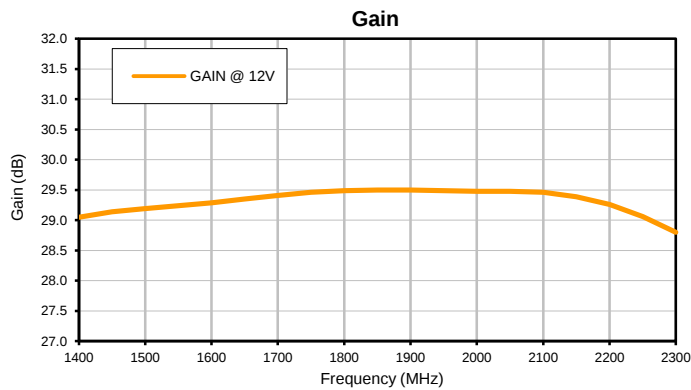


IF/RF MICROWAVE COMPONENTS



REV. OR  
ZRL-2300+  
4/18/2014  
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## Typical Performance Curves

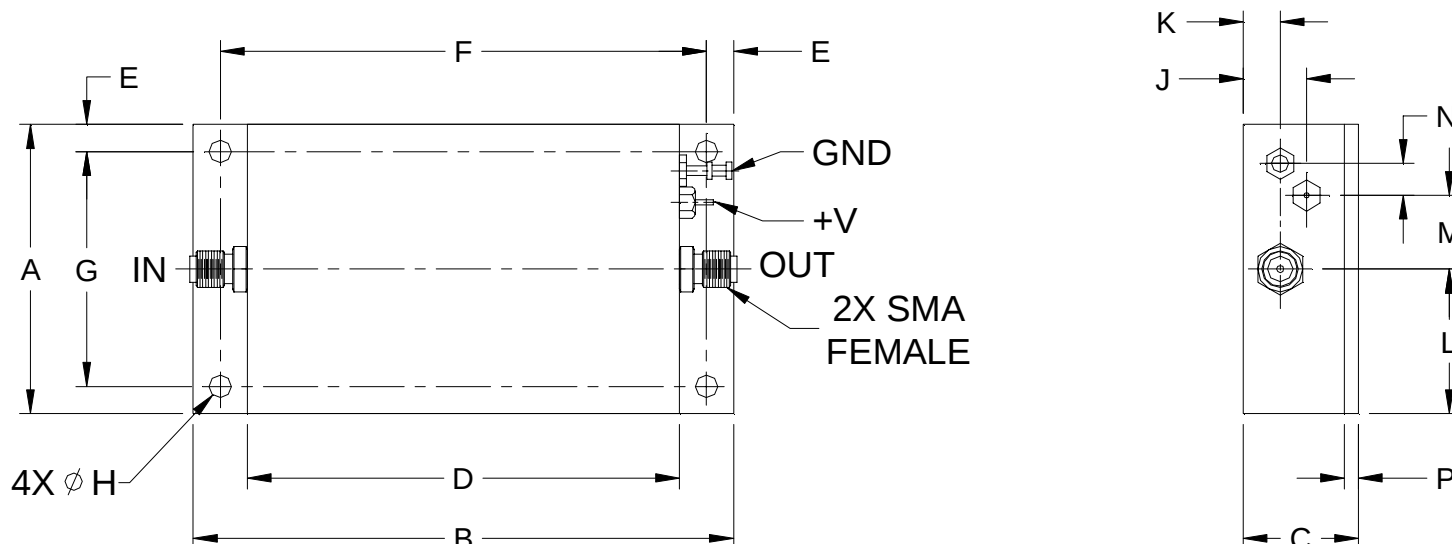


# Case Style

# 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 |