



COAXIAL

High Power Amplifier ZHL-16W-43-S+

50Ω 16W 1800 to 4000 MHz

THE BIG DEAL

- High Power, 16 Watt
- Low Current consumption, 3A typ.
- High IP3, +47 dBm typ.
- Usable over 800 to 4200 MHz
- Good Gain Flatness, ±1.5 dB typ.
- No damage with an open or short output load under full CW output power
- Overheat-protection automatic shuts off when base plate temperature exceeds +80°C



Generic photo used for illustration purposes only

APPLICATIONS

- PCN
- GSM
- ISM
- WiMax
- Lab test

| | |
|-------------------|----------------|
| Model No. | ZHL-16W-43-S+ |
| Case Style | BT1344 |
| Connectors | SMA/D-Sub Male |

PRODUCT OVERVIEW

Mini-Circuits' ZHL-16W-43-S+ offers high power (16W) with rugged reliability over a broad frequency range from 1800 to 4000 MHz. This model includes temperature sensing circuits for automatic shutdown and output load protection to operate into a short or an open load making it ideal for use in laboratory or field applications.

KEY FEATURES

| Feature | Advantages |
|------------------------------------|---|
| Combination of Power and Bandwidth | Offering a unique combination of output power over a broad frequency range, the ZHL-16W-43-S+ is ideal for laboratory and other test applications which require a high degree of flexibility to delivery power over a wide array of applications including: <ul style="list-style-type: none"> • PCS, UMTS, LTE and wireless • WiMAX • Radar • Microwave radio and ISM |
| Excellent Input and Output VSWR | With 1.3:1 output VSWR, the ZHL-16W-43-S+ is designed for use in driving circuits with a variety of impedances and still provide consistent, reliable output power. |
| Over Temp Shutdown | The ZHL-16W-43-S+ includes internal temperature monitoring circuits to automatically shut down the amplifier in the event of over temperature operation. Set for approximately +85°C shutdown (with auto recovery at 70°C), this feature ensures that users who have difficulty in controlling their thermal environment or need to operate in a remote mode and cannot monitor the amplifier real time, can function with the security that a thermal run-away condition will be avoided through this self management feature. Furthermore, the ZHL-16W-43-S+ provides a TTL output to indicate thermal shutdown for remote automated systems. |
| Output Load Protection | A high root cause for damage to power amplifiers is the operation into highly reflective loads. The ZHL-16W-43-S+ power amplifier includes circuits to enable the amplifier to operate without damage in the presence of an open or short over all phases. |





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ELECTRICAL SPECIFICATIONS

| Parameter | Min. | Typ. | Max. | Units |
|--|------|------|------|-------|
| Frequency Range | 1800 | | 4000 | MHz |
| Gain | 40 | 45 | 50 | dB |
| Gain Flatness | — | — | ±2.0 | dB |
| Output Power at 1dB compression | +39 | +41 | — | dBm |
| Saturated Output Power at 3 dB compression | +40 | +42 | — | dBm |
| Noise Figure | | 6.0 | | dB |
| Output third order intercept point | | +47 | | dBm |
| Input VSWR | | 1.5 | | :1 |
| Output VSWR | | 1.3 | | :1 |
| DC Supply Voltage | — | 28 | 30 | V |
| Supply Current | — | — | 4.3 | A |

ABSOLUTE MAXIMUM RATINGS

| Parameter | Ratings |
|---|------------------|
| Operating Temperature | -20 °C to 47 °C |
| Storage Temperature | -55 °C to 100 °C |
| Input RF Power (no damage) ¹ | +9 dBm |

1. Peak envelop power. (Refer to Application Note AN-60-037 for PEP calculation). Permanent damage may occur if any of these limits are exceeded.

D-SUB MALE CONNECTOR PIN CONNECTIONS²

| Pin Function | Label on unit | Pin # | Color | Gauge |
|---|--------------------------|---------|--------|-----------|
| None | N/C1, N/C2 N/C4, N/C5 | 1,2,4,5 | None | None |
| Thermal Shut-Off Indication: Shut-Off: +2 to +5V Not Shut-Off: 0 to +0.8V | TTL Out | 3 | Orange | 26 AWG |
| DC Input (+) | Vdc | 6,7 | Red | 18 AWG |
| Ground | GND | 8,9 | Black | 18 AWG |

2. Each amplifier will come packaged with an additional D-Sub connector for mating with the amplifier.





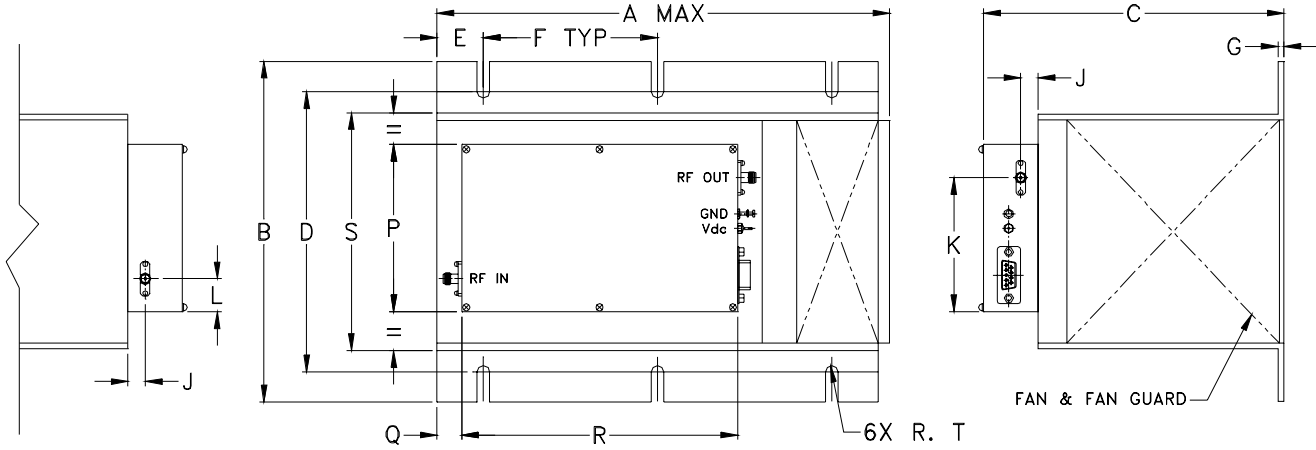
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High Power Amplifier **ZHL-16W-43-S+**

Mini-Circuits

50Ω 16W 1800 to 4000 MHz

CASE STYLE DRAWING



OUTLINE DIMENSIONS (Inch/mm)

| A | B | C | D | E | F | G | J | K | L | P | Q | R | S | T | wt |
|--------|--------|--------|--------|-------|-------|------|------|-------|-------|-------|-------|--------|--------|------|--------|
| 9.85 | 7.3 | 6.5 | 6.00 | 1.00 | 3.75 | .13 | .37 | 2.87 | .71 | 3.58 | .5 | 5.95 | 5.1 | .135 | grams* |
| 250.19 | 185.42 | 165.10 | 152.40 | 25.40 | 95.25 | 3.30 | 9.40 | 72.90 | 18.03 | 90.93 | 12.70 | 151.13 | 129.54 | 3.43 | 4265 |





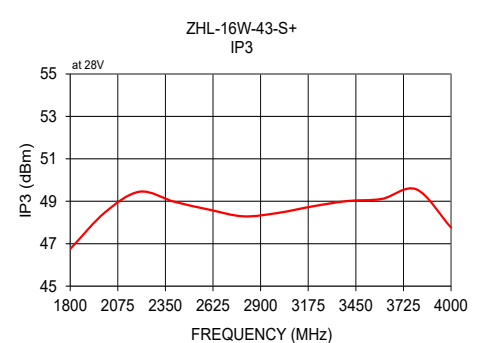
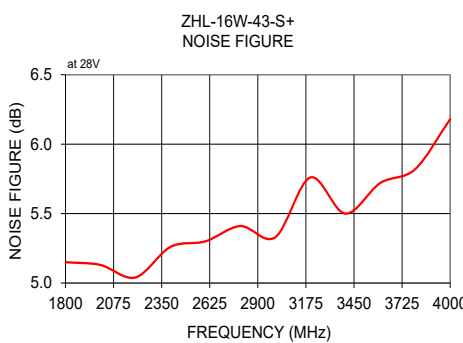
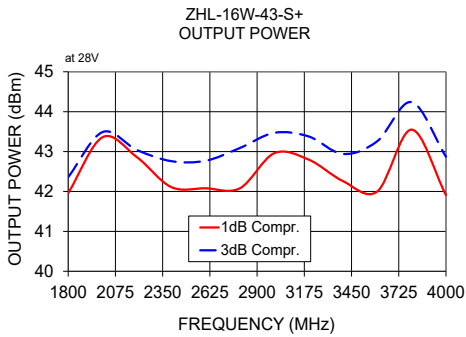
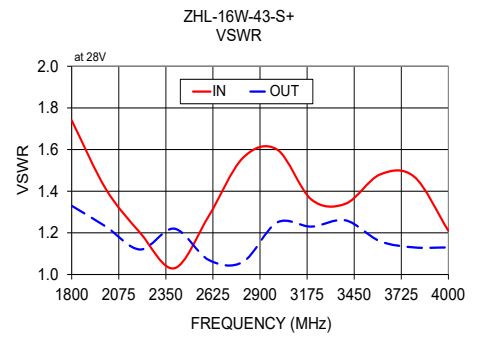
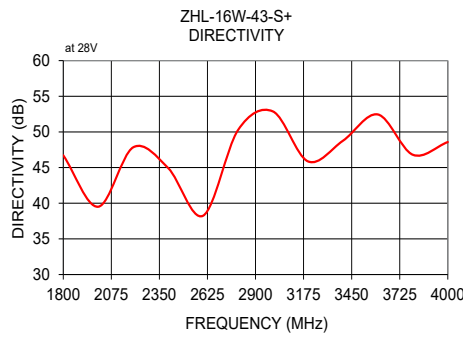
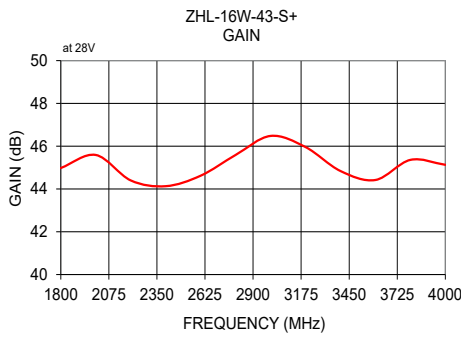
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TYPICAL PERFORMANCE DATA / GRAPHS

| Frequency (MHz) | Gain (dB) | Directivity (dB) | VSWR (:1) | | Noise Figure (dB) | POUT (dBm) at 28V | | Output IP3 (dBm) |
|-----------------|-----------|------------------|-----------|------|-------------------|-------------------|-------------|------------------|
| | 28V | 28V | IN | OUT | 28V | 1 dB Compr. | 3 dB Compr. | 28V |
| 1800.00 | 44.98 | 46.72 | 1.74 | 1.33 | 5.15 | 41.96 | 42.36 | 46.75 |
| 2000.00 | 45.59 | 39.51 | 1.41 | 1.23 | 5.13 | 43.36 | 43.49 | 48.47 |
| 2200.00 | 44.40 | 47.84 | 1.20 | 1.12 | 5.04 | 42.86 | 43.04 | 49.45 |
| 2400.00 | 44.13 | 44.94 | 1.03 | 1.22 | 5.26 | 42.11 | 42.76 | 48.98 |
| 2600.00 | 44.62 | 38.25 | 1.28 | 1.07 | 5.30 | 42.08 | 42.77 | 48.61 |
| 2800.00 | 45.59 | 50.27 | 1.56 | 1.06 | 5.41 | 42.08 | 43.09 | 48.29 |
| 3000.00 | 46.48 | 52.87 | 1.60 | 1.25 | 5.33 | 42.96 | 43.47 | 48.45 |
| 3200.00 | 45.96 | 45.87 | 1.36 | 1.23 | 5.76 | 42.80 | 43.38 | 48.76 |
| 3400.00 | 44.84 | 48.76 | 1.34 | 1.26 | 5.50 | 42.26 | 42.94 | 49.01 |
| 3600.00 | 44.42 | 52.45 | 1.48 | 1.16 | 5.72 | 42.00 | 43.26 | 49.11 |
| 3800.00 | 45.36 | 46.80 | 1.47 | 1.13 | 5.82 | 43.55 | 44.24 | 49.56 |
| 4000.00 | 45.13 | 48.58 | 1.21 | 1.13 | 6.18 | 41.91 | 42.87 | 47.76 |



Coaxial Amplifier

ZHL-16W-43+

Typical Performance Data

| FREQ. (MHz) | GAIN (dB) 28V | DIRECTIVITY (dB) 28V | VSWR (:1) | | NOISE FIGURE (dB) 28V | POUT @ 1 dB COMPRESSION (dBm) 28V | POUT @ 3 dB COMPRESSION (dBm) 28V | OUTPUT IP3 (dBm) 28V |
|----------------|---------------------|----------------------------|-----------|------------|--------------------------------|--|--|----------------------------|
| | | | IN 28V | OUT 28V | | | | |
| 1800.0 | 44.98 | 46.72 | 1.74 | 1.33 | 5.15 | 41.96 | 42.36 | 46.75 |
| 2000.0 | 45.59 | 39.51 | 1.41 | 1.23 | 5.13 | 43.36 | 43.49 | 48.47 |
| 2200.0 | 44.40 | 47.84 | 1.20 | 1.12 | 5.04 | 42.86 | 43.04 | 49.45 |
| 2400.0 | 44.13 | 44.94 | 1.03 | 1.22 | 5.26 | 42.11 | 42.76 | 48.98 |
| 2600.0 | 44.62 | 38.25 | 1.28 | 1.07 | 5.30 | 42.08 | 42.77 | 48.61 |
| 2800.0 | 45.59 | 50.27 | 1.56 | 1.06 | 5.41 | 42.08 | 43.09 | 48.29 |
| 3000.0 | 46.48 | 52.87 | 1.60 | 1.25 | 5.33 | 42.96 | 43.47 | 48.45 |
| 3200.0 | 45.96 | 45.87 | 1.36 | 1.23 | 5.76 | 42.80 | 43.38 | 48.76 |
| 3400.0 | 44.84 | 48.76 | 1.34 | 1.26 | 5.50 | 42.26 | 42.94 | 49.01 |
| 3600.0 | 44.42 | 52.45 | 1.48 | 1.16 | 5.72 | 42.00 | 43.26 | 49.11 |
| 3800.0 | 45.36 | 46.80 | 1.47 | 1.13 | 5.82 | 43.55 | 44.24 | 49.56 |
| 4000.0 | 45.13 | 48.58 | 1.21 | 1.13 | 6.18 | 41.91 | 42.87 | 47.76 |



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IF/RF MICROWAVE COMPONENTS

REV. X1

ZHL-16W-43+

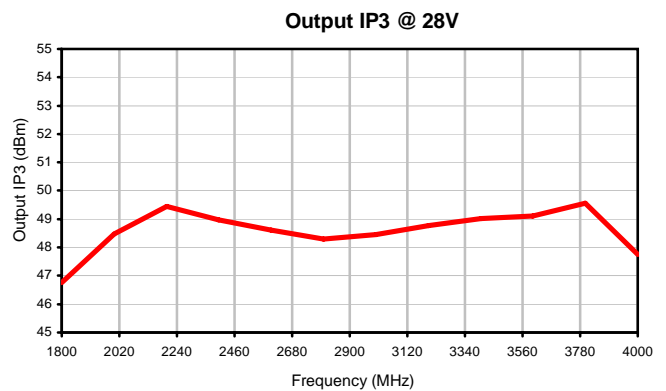
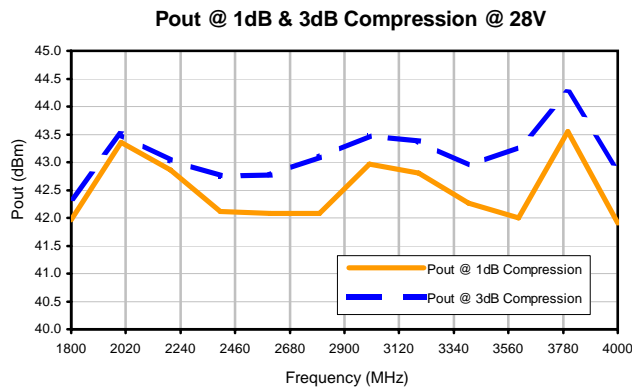
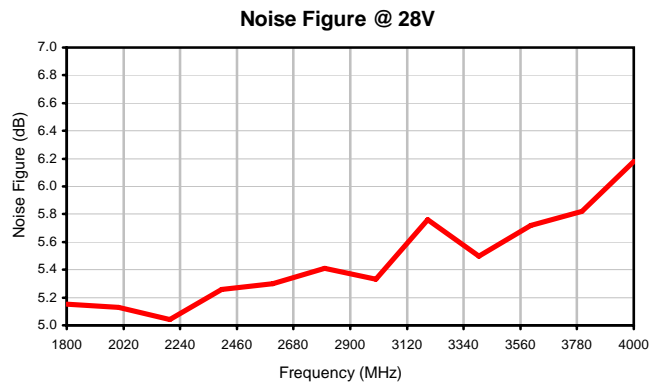
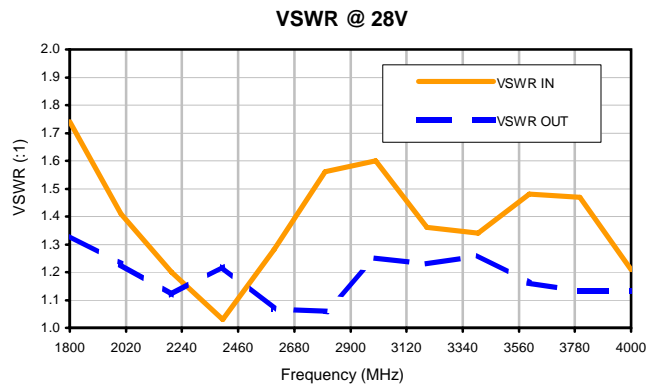
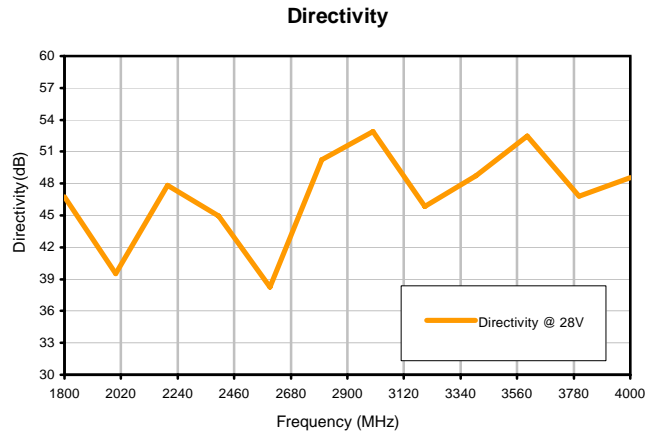
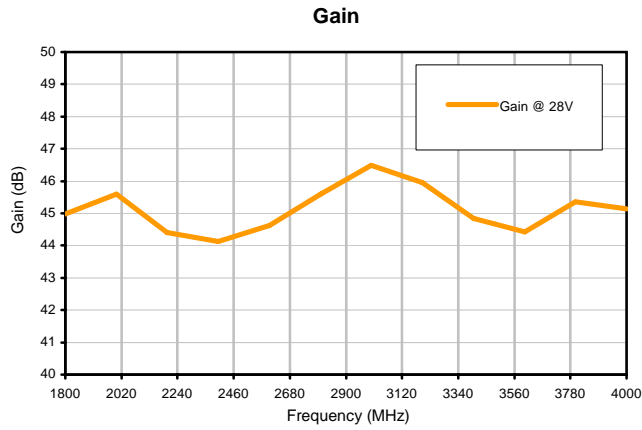
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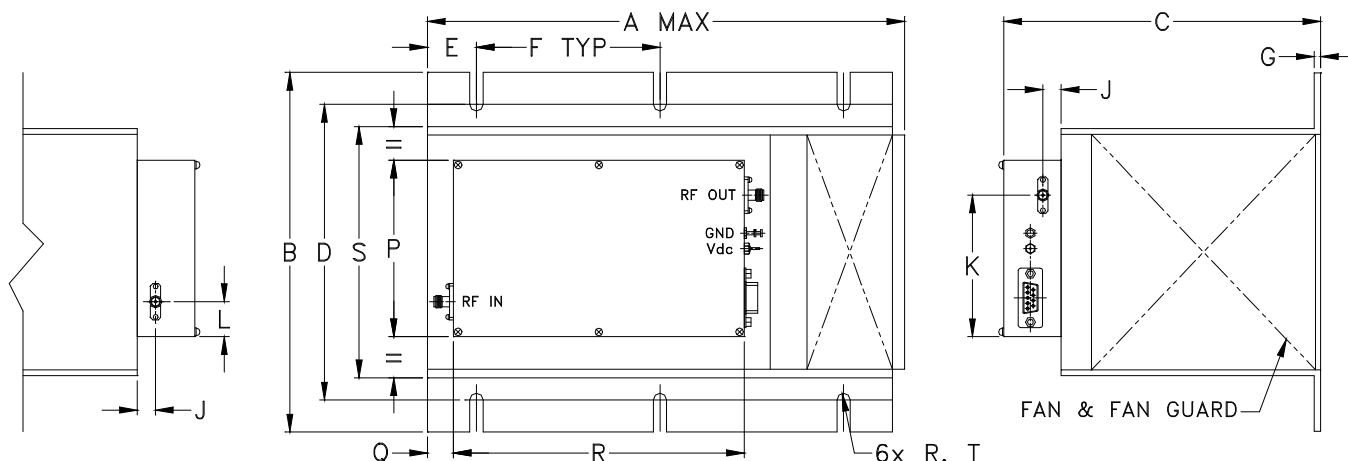
Coaxial Amplifier

ZHL-16W-43+

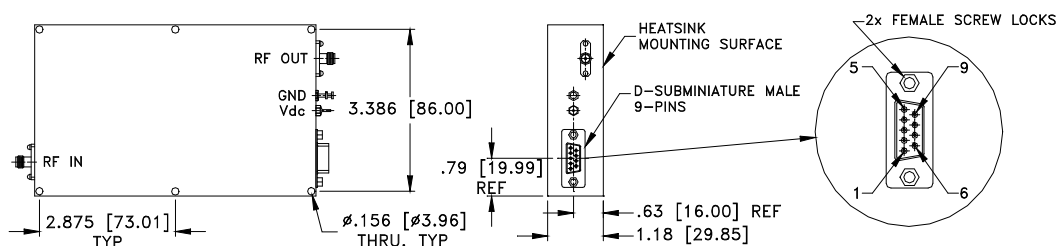
Typical Performance Curves



Outline Dimensions



MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK.



| CASE# | A | B | C | D | E | F | G | H | J | K | L | M | N |
|--------|------------------|-----------------|-----------------|------------------|-----------------|-----------------|---------------|---|---------------|-----------------|----------------|---|---|
| BT1344 | 9.85 (250.19) | 7.3 (185.42) | 6.5 (165.10) | 6.00 (152.40) | 1.00 (25.40) | 3.75 (95.25) | .13 (3.30) | - | .37 (9.40) | 2.87 (72.90) | .71 (18.03) | - | - |

| CASE# | P | Q | R | S | T | WT, GRAM | WT WITHOUT HEATSINK, GRAM |
|--------|-----------------|---------------|------------------|-----------------|----------------|----------|---------------------------|
| BT1344 | 3.58 (90.93) | .5 (12.70) | 5.95 (151.13) | 5.1 (129.54) | .135 (3.43) | 4265 | 580 |

Dimensions are in inches (mm). Tolerances: 1 Pl. $\pm .1$; 2 Pl. $\pm .03$; 3 Pl. $\pm .015$

Notes:

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



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RF/IF MICROWAVE COMPONENTS



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 60°C Base Plate Temperature | 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 | MIL-STD-202, Method 108 |
| Thermal Shock | -55° to 100°C, 5 cycles | MIL-STD-202, Method 107, Condition A, except 100°C |