



COAXIAL

# Medium High Power Amplifier

## ZHL-42+ ZHL-42X+

50Ω 600 to 4200 MHz

### THE BIG DEAL

- Wideband, 600 to 4200 MHz
- High Gain, 38 dB
- Excellent Gain Flatness,  $\pm 0.8$  dB
- High IP3, +44 dBm



Generic photo used for illustration purposes only

### APPLICATIONS

- Communication Systems
- Cellular
- Instrumentation
- Laboratory

|            |         |                       |
|------------|---------|-----------------------|
| Model No.  | ZHL-42+ | ZHL-42X+ <sup>▲</sup> |
| Case Style | U36     |                       |
| Connectors | SMA     |                       |

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

### PRODUCT OVERVIEW

Mini-Circuits' ZHL-42+ is a medium-power connectorized amplifier supporting a wide range of applications from 600 to 4200 MHz, such as test instrumentation, SatCom, and mobile communications systems, including those operating in the new telecom Band 71 allocation (617 to 698 MHz). This model provides +31 dBm output power at saturation and extremely flat gain ( $39 \pm 0.8$  dB) across its full bandwidth, making it ideal for systems where consistent performance across frequency is required. The amplifier operates on a +15V DC supply and comes housed in compact aluminum alloy case (7.00 x 3.25 x 2.13") with SMA connectors, built-in bracket for mounting, and an optional heat sink for efficient cooling.

### KEY FEATURES

| Feature                               | Advantages  |
|---------------------------------------|---|
| Wideband, 600 to 4200 MHz             | One amplifier supports a broad range of system and test lab applications. Extended bandwidth down to 600 MHz supports new telecom Band 71 allocation (617 to 698 MHz) |
| High Gain, 38 dB                      | Reduces the number of gain stages, lowering component count and overall system cost.  |
| Excellent Gain Flatness, $\pm 0.8$ dB | Provides consistent performance across frequency, minimizing the need for external equalizing networks in wideband applications.                                      |
| Medium Output Power, +31 dBm P3dB     | Supports a wide range of power requirements.  |
| High OIP3, +44 dBm                    | Provides highly linear performance with excellent sensitivity and two-tone spur-free dynamic range.   |

REV. C  
 ECO-017731  
 ZHL-42+  
 MCL NY  
 230504





COAXIAL

# Medium High Power Amplifier

# ZHL-42+ ZHL-42X+

50Ω 600 to 4200 MHz

## ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter                          | ZHL-42+<br>ZHL-42X+ <sup>▲</sup> |      |      | Units |
|------------------------------------|----------------------------------|------|------|-------|
|                                    | Min.                             | Typ. | Max. |       |
| Frequency Range                    | 600                              | –    | 4200 | MHz   |
| Gain <sup>1</sup>                  | 35                               | 38   | 42   | dB    |
| Gain Flatness                      | –                                | ±0.8 | ±1.3 | dB    |
| Output Power at 1dB compression    | +28                              | +30  | –    | dBm   |
| Output Power at 3dB compression    | +29                              | +31  | –    | dBm   |
| Noise Figure                       | –                                | 8.5  | –    | dB    |
| Output third order intercept point | –                                | +44  | –    | dBm   |
| Input VSWR                         | –                                | 1.5  | 2.5  | :1    |
| Output VSWR                        | –                                | 2.0  | 2.5  | :1    |
| DC Supply Voltage                  | –                                | +15  | –    | V     |
| Supply Current                     | –                                | –    | 1.0  | A     |

Open load is not recommended, potentially can cause damage. With no load derate max. input power by 20 dB.

<sup>▲</sup> Heat sink not included. Alternative heat sinking and heat removal must be provided by the user to limit maximum base-plate temperature to 65°C, in order to ensure proper performance. For reference, this requires thermal resistance of user's external heat sink to be 1.3°C/W max.

## ABSOLUTE MAXIMUM RATINGS

| Parameter                  | Ratings         |
|----------------------------|-----------------|
| Operating Temperature      | -20°C to +65°C  |
| Storage Temperature        | -55°C to +100°C |
| DC Voltage                 | +20V            |
| Input RF Power (no damage) | +5 dBm          |

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



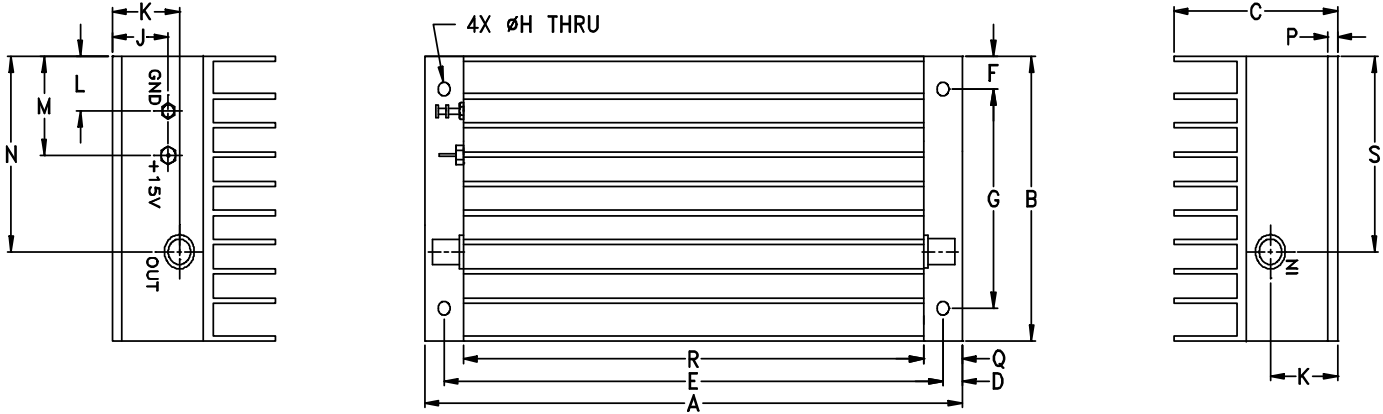
COAXIAL

# Medium High Power Amplifier

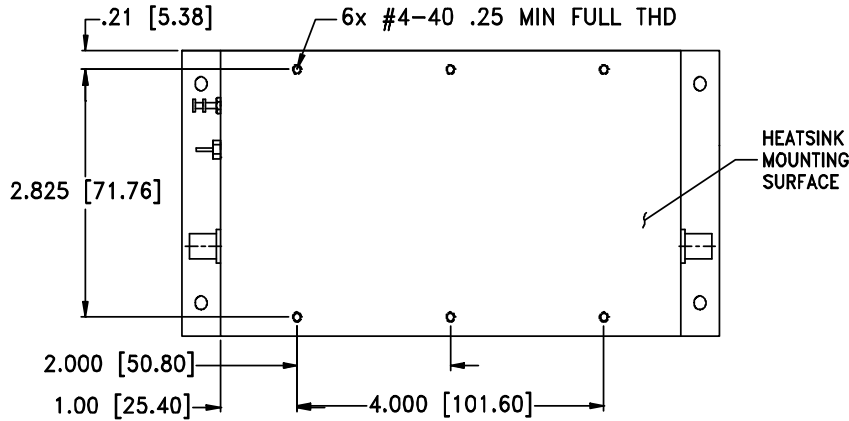
**ZHL-42+**  
**ZHL-42X+**

50Ω 600 to 4200 MHz

## OUTLINE DRAWING FOR MODELS WITH HEATSINK



## MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK



## OUTLINE DIMENSIONS (Inch/mm)

| A      | B     | C     | D    | E      | F    | G     | H    | J     | K     | L     | M     | N     | P    | Q     | R      | S     | wt    |
|--------|-------|-------|------|--------|------|-------|------|-------|-------|-------|-------|-------|------|-------|--------|-------|-------|
| 7.00   | 3.25  | 2.13  | .25  | 6.500  | .38  | 2.500 | .156 | .73   | .88   | .63   | 1.13  | 2.23  | .125 | .50   | 6.00   | 2.23  | grams |
| 177.80 | 82.55 | 54.10 | 6.35 | 165.10 | 9.65 | 63.50 | 3.96 | 18.54 | 22.35 | 16.00 | 28.70 | 56.64 | 3.18 | 12.70 | 152.40 | 56.64 | 900   |

\*600 grams without heatsink



COAXIAL

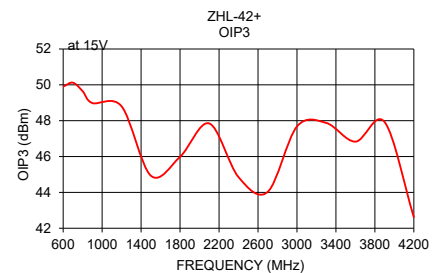
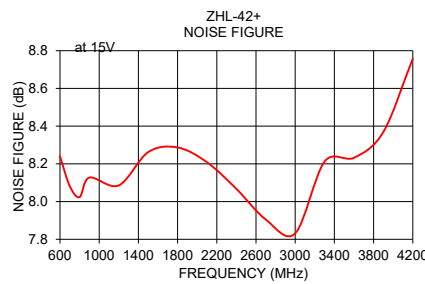
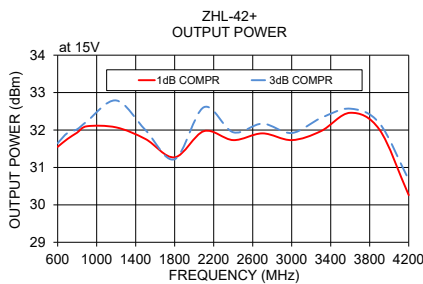
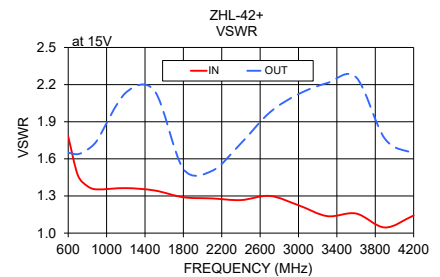
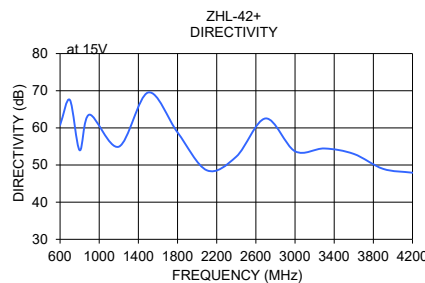
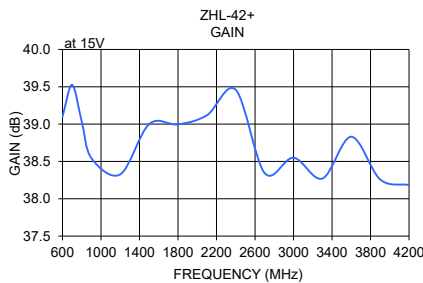
# Medium High Power Amplifier

# ZHL-42+ ZHL-42X+

50Ω 600 to 4200 MHz

### TYPICAL PERFORMANCE DATA / GRAPHS

| FREQUENCY (MHz) | GAIN (dB) | DIRECTIVITY (dB) | VSWR (:1) |      | POUT at 1 dB COMPR. (dBm) | POUT at 3 dB COMPR. (dBm) | NOISE FIGURE (dB) | OUTPUT IP3 (dBm) |
|-----------------|-----------|------------------|-----------|------|---------------------------|---------------------------|-------------------|------------------|
|                 | 15V       | 15V              | IN        | OUT  | 15V                       | 15V                       | 15V               | 15V              |
| 700             | 39.53     | 67.53            | 1.47      | 1.64 | 31.76                     | 31.92                     | 8.08              | 50.12            |
| 800             | 39.03     | 53.97            | 1.38      | 1.67 | 31.93                     | 32.02                     | 8.02              | 49.64            |
| 900             | 38.54     | 63.56            | 1.35      | 1.75 | 32.10                     | 32.23                     | 8.13              | 48.98            |
| 1200            | 38.33     | 54.93            | 1.36      | 2.13 | 32.07                     | 32.79                     | 8.09              | 48.80            |
| 1500            | 39.00     | 69.53            | 1.34      | 2.15 | 31.76                     | 32.00                     | 8.26              | 44.93            |
| 1800            | 39.00     | 58.78            | 1.29      | 1.52 | 31.27                     | 31.22                     | 8.29              | 45.99            |
| 2100            | 39.12     | 48.57            | 1.28      | 1.50 | 31.97                     | 32.61                     | 8.21              | 47.85            |
| 2400            | 39.46     | 52.25            | 1.27      | 1.73 | 31.73                     | 31.94                     | 8.07              | 44.85            |
| 2700            | 38.34     | 62.54            | 1.30      | 1.97 | 31.91                     | 32.17                     | 7.90              | 44.03            |
| 3000            | 38.55     | 53.70            | 1.23      | 2.12 | 31.73                     | 31.92                     | 7.83              | 47.68            |
| 3300            | 38.27     | 54.45            | 1.14      | 2.21 | 31.97                     | 32.32                     | 8.21              | 47.88            |
| 3600            | 38.83     | 52.99            | 1.16      | 2.26 | 32.46                     | 32.57                     | 8.23              | 46.83            |
| 3900            | 38.26     | 48.96            | 1.05      | 1.76 | 32.01                     | 32.18                     | 8.37              | 47.92            |
| 4200            | 38.18     | 47.93            | 1.14      | 1.64 | 30.26                     | 30.67                     | 8.76              | 42.62            |



#### NOTES

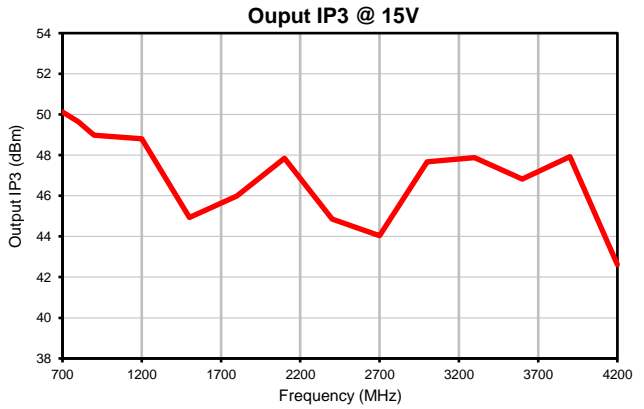
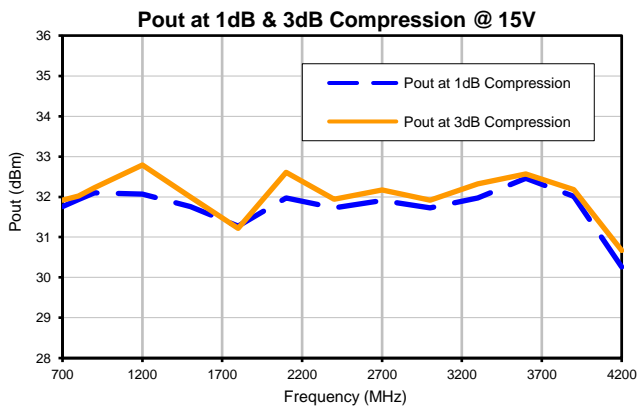
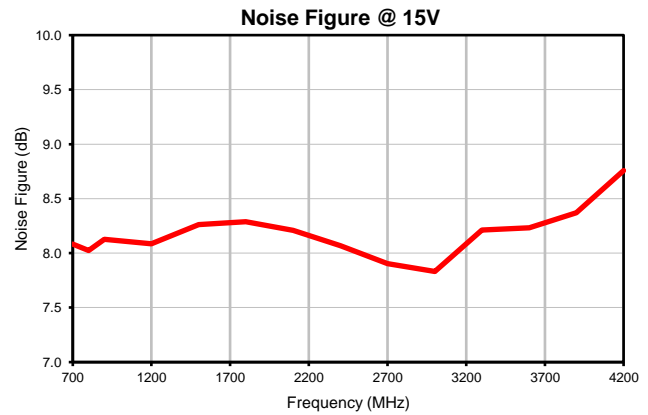
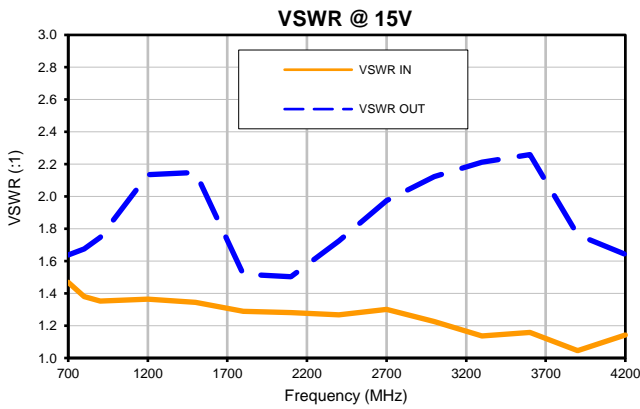
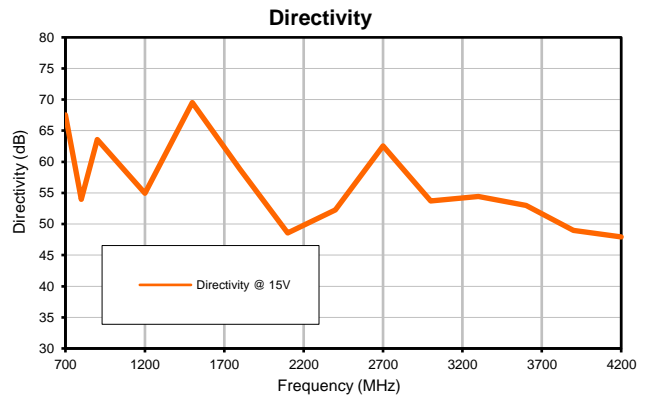
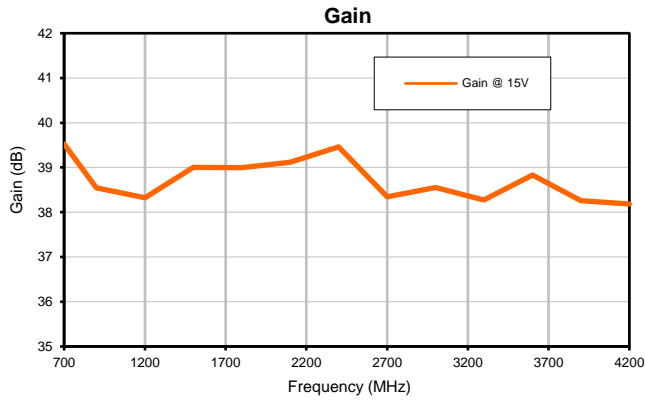
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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](http://www.minicircuits.com/terms/viewterm.html)

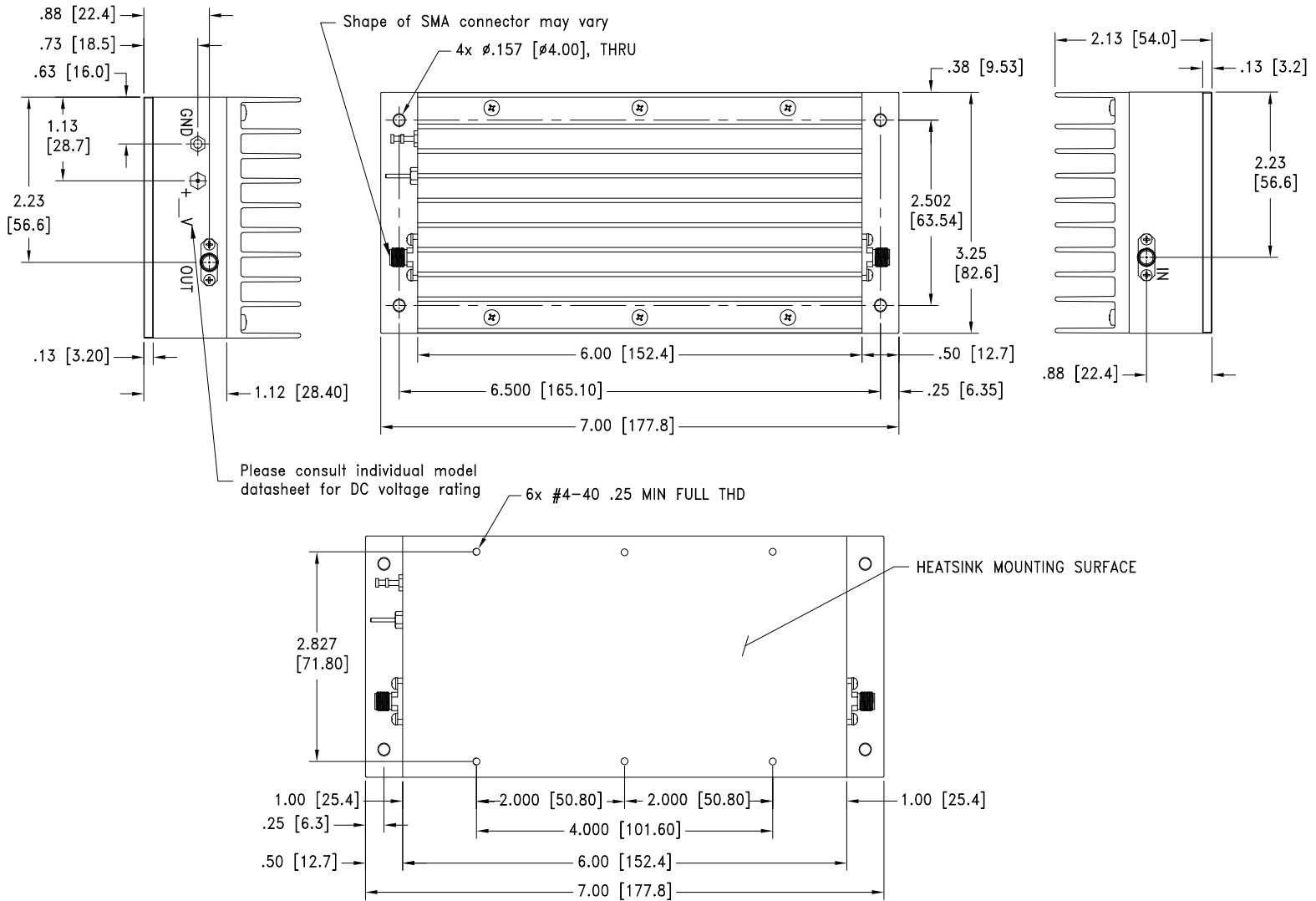


## Typical Performance Data

| FREQUENCY<br>(MHz) | GAIN<br>(dB)<br>15V | DIRECTIVITY<br>(dB)<br>15V | VSWR (:1) |            | NOISE FIGURE<br>(dB)<br>15V | POUT @ 1 dB<br>COMPRESSION<br>(dBm)<br>15V | POUT @ 3 dB<br>COMPRESSION<br>(dBm)<br>15V | OUTPUT IP3<br>(dBm)<br>15V |
|--------------------|---------------------|----------------------------|-----------|------------|-----------------------------|--|--|----------------------------|
|                    |                     |                            | IN<br>15V | OUT<br>15V |                             |  |  |                            |
| 700                | 39.53               | 67.53                      | 1.47      | 1.64       | 8.08                        | 31.76                                      | 31.92                                      | 50.12                      |
| 800                | 39.03               | 53.97                      | 1.38      | 1.67       | 8.02                        | 31.93                                      | 32.02                                      | 49.64                      |
| 900                | 38.54               | 63.56                      | 1.35      | 1.75       | 8.13                        | 32.10                                      | 32.23                                      | 48.98                      |
| 1200               | 38.33               | 54.93                      | 1.36      | 2.13       | 8.09                        | 32.07                                      | 32.79                                      | 48.80                      |
| 1500               | 39.00               | 69.53                      | 1.34      | 2.15       | 8.26                        | 31.76                                      | 32.00                                      | 44.93                      |
| 1800               | 39.00               | 58.78                      | 1.29      | 1.52       | 8.29                        | 31.27                                      | 31.22                                      | 45.99                      |
| 2100               | 39.12               | 48.57                      | 1.28      | 1.50       | 8.21                        | 31.97                                      | 32.61                                      | 47.85                      |
| 2400               | 39.46               | 52.25                      | 1.27      | 1.73       | 8.07                        | 31.73                                      | 31.94                                      | 44.85                      |
| 2700               | 38.34               | 62.54                      | 1.30      | 1.97       | 7.90                        | 31.91                                      | 32.17                                      | 44.03                      |
| 3000               | 38.55               | 53.70                      | 1.23      | 2.12       | 7.83                        | 31.73                                      | 31.92                                      | 47.68                      |
| 3300               | 38.27               | 54.45                      | 1.14      | 2.21       | 8.21                        | 31.97                                      | 32.32                                      | 47.88                      |
| 3600               | 38.83               | 52.99                      | 1.16      | 2.26       | 8.23                        | 32.46                                      | 32.57                                      | 46.83                      |
| 3900               | 38.26               | 48.96                      | 1.05      | 1.76       | 8.37                        | 32.01                                      | 32.18                                      | 47.92                      |
| 4200               | 38.18               | 47.93                      | 1.14      | 1.64       | 8.76                        | 30.26                                      | 30.67                                      | 42.62                      |

## Typical Performance Curves





#### MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK

Weight: 900.0 grams      Weight without heatsink: 600.0 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl. ±0.03; ; 3 Pl. ±.015 Inch

#### Notes:

1. Case material: Aluminum alloy.
2. Case finish and mounting bracket finish:  
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.

For Non-RoHS Case Styles: Yellow hexavalent chrome based conversion coating.  
Due to transition from non-RoHS to RoHS, models will be supplied with either case style finish until the non-RoHS case inventory is depleted.

3. Heat sink finish: Black anodize.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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

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 65° C<br>Ambient Environment  | 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 |