



# COAXIAL High Power Amplifier

## ZHL-5W-1+ ZHL-5W-1X+

50Ω 5W 5 to 500 MHz

### FEATURES

- High Power, 5 Watt
- Wideband, 5 to 500 MHz
- High Power Output, +37dBm Min.
- High Gain, 40 dB typ.
- Low Noise Figure, 4 dB typ.
- High IP3, +49 dBm typ.

### APPLICATIONS

- VHF
- Instrumentation
- Laboratory



Generic photo used for illustration purposes only

|                   |           |                         |
|-------------------|-----------|-------------------------|
| <b>Model No.</b>  | ZHL-5W-1+ | ZHL-5W-1X+ <sup>▲</sup> |
| <b>Case Style</b> | DDD131    |                         |
| <b>Connectors</b> | SMA       |                         |

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

### ELECTRICAL SPECIFICATIONS

| Parameter                          | Min. | Typ. | Max. | Units |
|------------------------------------|------|------|------|-------|
| Frequency Range                    | 5    | —    | 500  | MHz   |
| Gain                               | 40   | —    | —    | dB    |
| Gain Flatness                      | —    | —    | ±1.7 | dB    |
| Output Power at 1dB compression    | +37  | —    | —    | dBm   |
| Noise Figure                       | —    | 4.0  | —    | dB    |
| Output third order intercept point | —    | +49  | —    | dBm   |
| Input VSWR                         | —    | 2.0  | —    | :1    |
| Output VSWR                        | —    | 2.5  | —    | :1    |
| DC Supply Voltage                  | —    | 24   | 25   | V     |
| Supply Current                     | —    | —    | 3.3  | 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 0.3°C/W max.

### ABSOLUTE MAXIMUM RATINGS

| Parameter                  | Ratings         |
|----------------------------|-----------------|
| Operating Temperature      | -20°C to +65°C  |
| Storage Temperature        | -55°C to +100°C |
| Input RF Power (no damage) | 0 dBm           |

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





COAXIAL

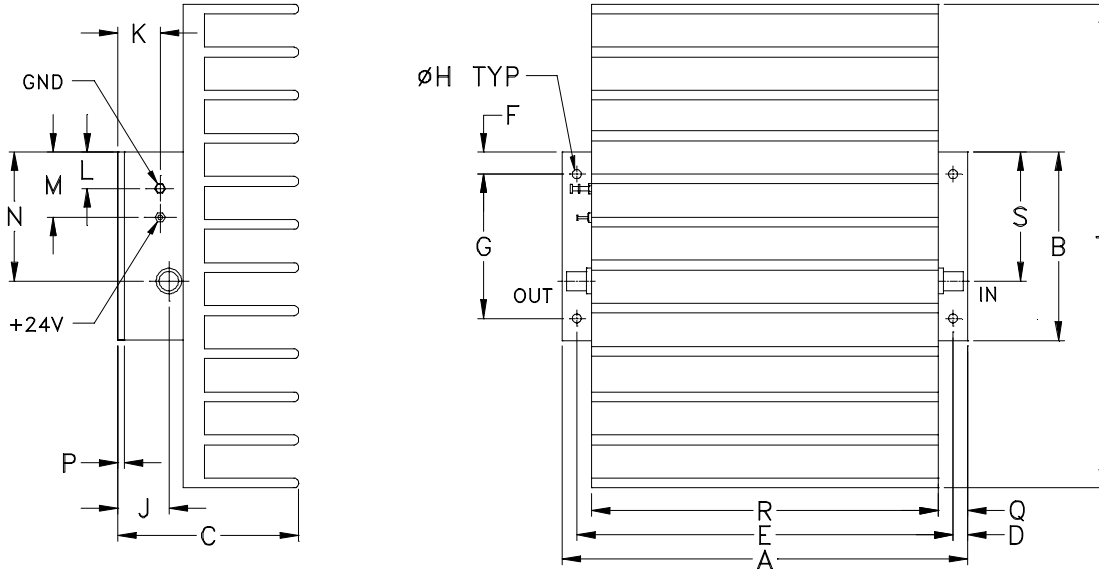
# High Power Amplifier

ZHL-5W-1+  
ZHL-5W-1X+

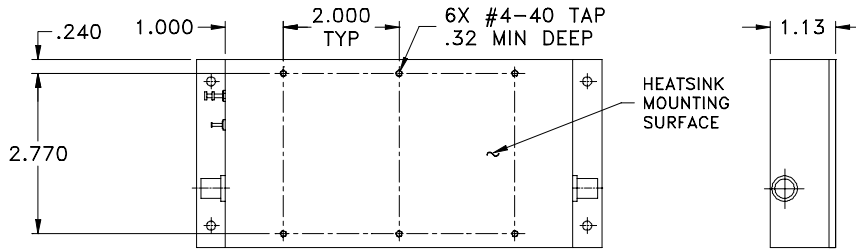
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50Ω 5W 5 to 500 MHz

## OUTLINE DRAWING



## 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     | T      | wt                          |
|--------|-------|-------|------|--------|------|-------|------|-------|-------|-------|-------|-------|------|-------|--------|-------|--------|-----------------------------|
| 7.00   | 3.25  | 3.13  | .25  | 6.500  | .38  | 2.500 | .156 | .88   | .43   | .62   | 1.00  | 2.63  | .125 | .50   | 6.00   | 2.23  | 8.35   | grams*                      |
| 177.80 | 82.55 | 79.50 | 6.35 | 165.10 | 9.65 | 63.50 | 3.96 | 22.35 | 10.92 | 15.75 | 25.40 | 66.80 | 3.18 | 12.70 | 152.40 | 56.64 | 212.09 | 1780                        |
|        |       |       |      |        |      |       |      |       |       |       |       |       |      |       |        |       |        | *510 grams without heatsink |

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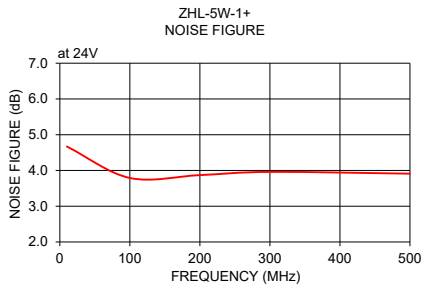
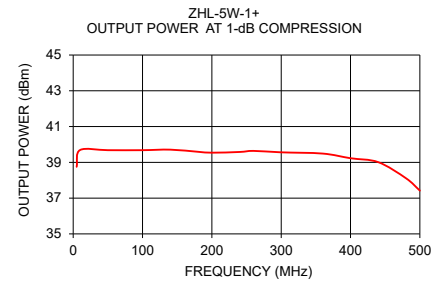
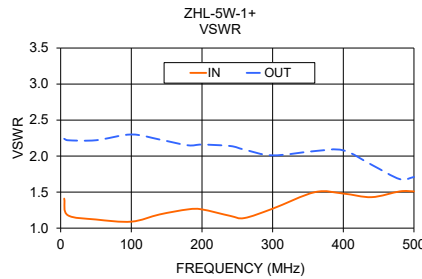
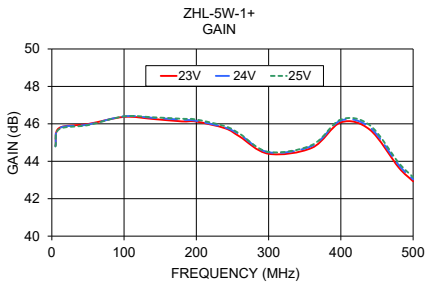
# COAXIAL High Power Amplifier

## ZHL-5W-1+ ZHL-5W-1X+

50Ω 5W 5 to 500 MHz

### TYPICAL PERFORMANCE DATA AND CHARTS

| FREQUENCY (MHz) | GAIN (dB) |       |       | VSWR (:1) |      | POUT at 1 dB COMPR. (dBm)<br>24V | FREQUENCY (MHz) | NOISE FIGURE (dB)<br>24V |
|-----------------|-----------|-------|-------|-----------|------|----------------------------------|-----------------|--------------------------|
|                 | 23V       | 24V   | 25V   | IN        | OUT  |                                  |                 |                          |
| 5.00            | 44.82     | 44.8  | 44.79 | 1.41      | 2.24 | 38.75                            | 10.00           | 4.67                     |
| 10.00           | 45.77     | 45.76 | 45.71 | 1.18      | 2.22 | 39.69                            | 100.00          | 3.79                     |
| 50.00           | 45.99     | 45.96 | 45.93 | 1.12      | 2.22 | 39.68                            | 200.00          | 3.87                     |
| 100.00          | 46.37     | 46.40 | 46.40 | 1.09      | 2.30 | 39.68                            | 300.00          | 3.96                     |
| 140.00          | 46.26     | 46.32 | 46.35 | 1.19      | 2.23 | 39.71                            | 500.00          | 3.91                     |
| 180.00          | 46.13     | 46.22 | 46.27 | 1.26      | 2.15 | 39.59                            |                 |                          |
| 200.00          | 46.12     | 46.16 | 46.23 | 1.26      | 2.16 | 39.54                            |                 |                          |
| 240.00          | 45.76     | 45.80 | 45.87 | 1.17      | 2.14 | 39.58                            |                 |                          |
| 260.00          | 45.32     | 45.43 | 45.47 | 1.14      | 2.09 | 39.64                            |                 |                          |
| 300.00          | 44.40     | 44.48 | 44.50 | 1.27      | 2.01 | 39.56                            |                 |                          |
| 360.00          | 44.72     | 44.82 | 44.87 | 1.50      | 2.07 | 39.49                            |                 |                          |
| 400.00          | 46.08     | 46.18 | 46.23 | 1.48      | 2.08 | 39.23                            |                 |                          |
| 440.00          | 45.69     | 45.81 | 45.93 | 1.43      | 1.88 | 39.01                            |                 |                          |
| 480.00          | 43.67     | 43.80 | 43.92 | 1.51      | 1.68 | 38.11                            |                 |                          |
| 500.00          | 42.93     | 43.03 | 43.15 | 1.51      | 1.71 | 37.42                            |                 |                          |



- 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)



# Amplifier

# ZHL-5W-1+

## Typical Performance Data

| FREQUENCY<br>(MHz) | GAIN  |       |       | VSWR IN<br>(:1)<br>24V | VSWR OUT<br>(:1)<br>24V | Pout at 1dB<br>Comp.<br>(dBm)<br>24V | FREQUENCY<br>(MHz) | NOISE<br>FIGURE<br>(dB)<br>24V |
|--------------------|-------|-------|-------|------------------------|-------------------------|--------------------------------------|--------------------|--------------------------------|
|                    | 23V   | 24V   | 25V   |                        |                         |                                      |                    |                                |
| 5.0                | 44.82 | 44.80 | 44.79 | 1.41                   | 2.24                    | 38.75                                | 10.00              | 4.67                           |
| 10.0               | 45.77 | 45.76 | 45.71 | 1.18                   | 2.22                    | 39.69                                | 100.00             | 3.79                           |
| 50.0               | 45.99 | 45.96 | 45.93 | 1.12                   | 2.22                    | 39.68                                | 200.00             | 3.87                           |
| 100.0              | 46.37 | 46.40 | 46.40 | 1.09                   | 2.30                    | 39.68                                | 300.00             | 3.96                           |
| 140.0              | 46.26 | 46.32 | 46.35 | 1.19                   | 2.23                    | 39.71                                | 500.00             | 3.91                           |
| 180.0              | 46.13 | 46.22 | 46.27 | 1.26                   | 2.15                    | 39.59                                |                    |                                |
| 200.0              | 46.12 | 46.16 | 46.23 | 1.26                   | 2.16                    | 39.54                                |                    |                                |
| 240.0              | 45.76 | 45.80 | 45.87 | 1.17                   | 2.14                    | 39.58                                |                    |                                |
| 260.0              | 45.32 | 45.43 | 45.47 | 1.14                   | 2.09                    | 39.64                                |                    |                                |
| 300.0              | 44.40 | 44.48 | 44.50 | 1.27                   | 2.01                    | 39.56                                |                    |                                |
| 360.0              | 44.72 | 44.82 | 44.87 | 1.50                   | 2.07                    | 39.49                                |                    |                                |
| 400.0              | 46.08 | 46.18 | 46.23 | 1.48                   | 2.08                    | 39.23                                |                    |                                |
| 440.0              | 45.69 | 45.81 | 45.93 | 1.43                   | 1.88                    | 39.01                                |                    |                                |
| 480.0              | 43.67 | 43.80 | 43.92 | 1.51                   | 1.68                    | 38.11                                |                    |                                |
| 500.0              | 42.93 | 43.03 | 43.15 | 1.51                   | 1.71                    | 37.42                                |                    |                                |



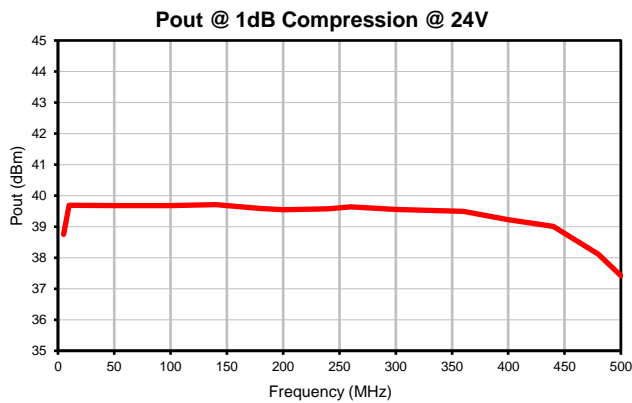
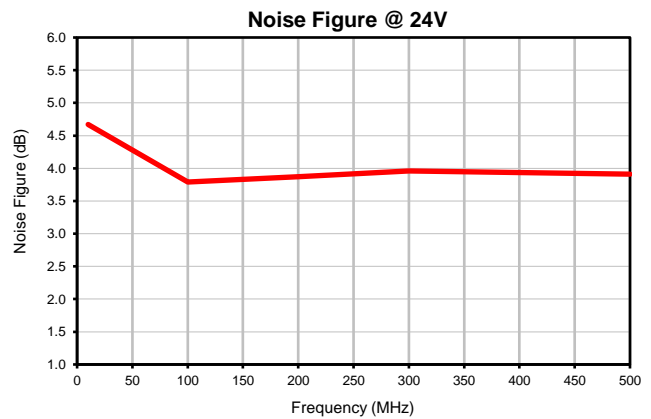
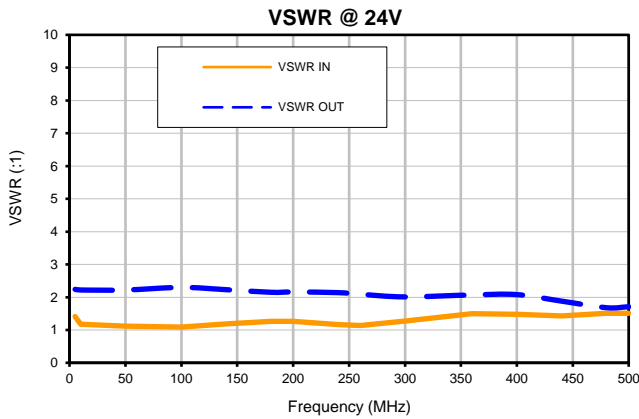
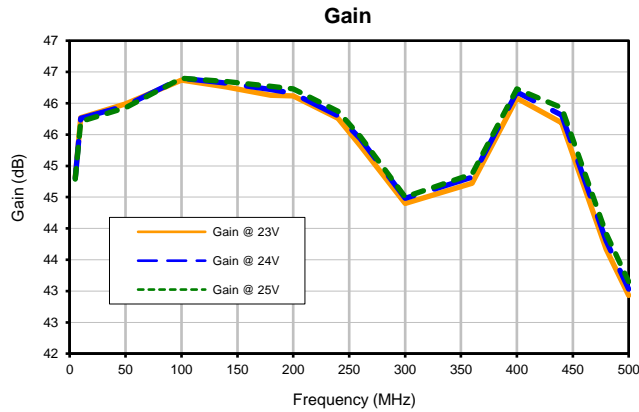
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site  
 The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)



IF/RF MICROWAVE COMPONENTS

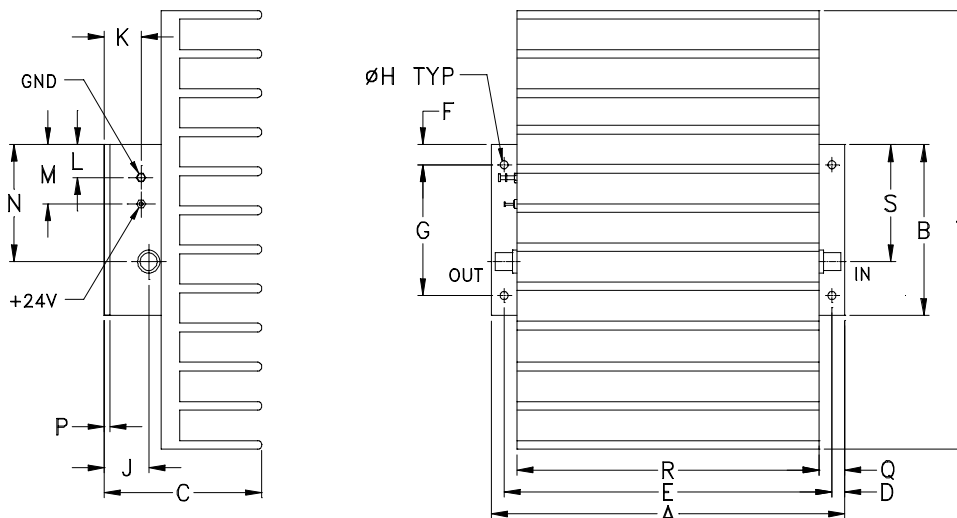
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 ZHL-5W-1+  
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## Typical Performance Curves

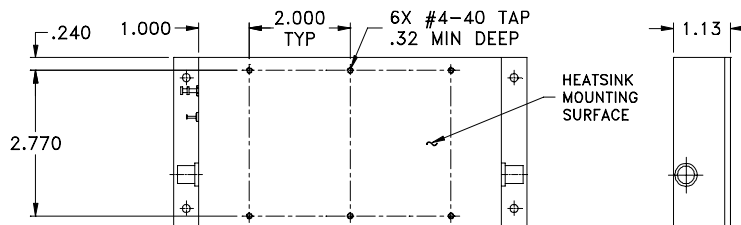


## Outline Dimensions

DDD131



### MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK



| CASE#  | A                | B               | C               | D             | E                 | F             | G                | H              | J              | K              | L              | M               | N               |
|--------|------------------|-----------------|-----------------|---------------|-------------------|---------------|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|
| DDD131 | 7.00<br>(177.80) | 3.25<br>(82.55) | 3.13<br>(79.50) | .25<br>(6.35) | 6.500<br>(165.10) | .38<br>(9.65) | 2.500<br>(63.50) | .156<br>(3.96) | .88<br>(22.35) | .43<br>(10.92) | .62<br>(15.75) | 1.00<br>(25.40) | 2.63<br>(66.68) |

| CASE#  | P              | Q              | R                | S               | T                | WT. GRAMS | WT. WITHOUT HEATSINK GRAMS |
|--------|----------------|----------------|------------------|-----------------|------------------|-----------|----------------------------|
| DDD131 | .125<br>(3.18) | .50<br>(12.70) | 6.00<br>(152.40) | 2.23<br>(56.64) | 8.35<br>(212.09) | 1780      | 510                        |

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

### Notes:

- Case material: Aluminum alloy.
- Case finish:  
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
- Heatsink finish: Black anodize if supplied with heatsink.
- Refer to the individual model data sheet for the type of connectors available.



INTERNET <http://www.minicircuits.com>

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Mini-Circuits ISO 9001 & ISO 14001 Certified



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 |