

# High Power Amplifier

**ZHL-16W-43+**

50Ω 1800 to 4000 MHz



**ZHL-16W-43+**

## The Big Deal:

- Broadband - High Power, 16 Watt
- Rugged
- Internal Protection from Load and Temperature

## Product Overview:

Mini-Circuits ZHL-16W-43+ 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.

### Summary Performance at 2 GHz

|                                       |     |           |
|---------------------------------------|-----|-----------|
| $P_{OUT}$ @ 3dB ( $P_{SAT}$ )         | 16  | W, typ.   |
| Gain                                  | 45  | dB, typ.  |
| IP3                                   | +47 | dBm, typ. |
| $P_{OUT}$ (at 1dB)                    | +41 | dBm, typ. |
| DC Current (at 28V)                   | 4.3 | A, max.   |
| Operating Frequency: 1800 to 4000 MHz |     |           |

## 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+ 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"><li>• PCS, UMTS, LTE and wireless</li><li>• WiMAX</li><li>• Radar</li><li>• Microwave radio and ISM</li></ul>                                                                                                                                                                                                                                    |
| Excellent Input and Output VSWR    | With 1.3:1 output VSWR, the ZHL-16W-43+ 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+ 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+ 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+ 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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## General Description

Mini-Circuits ZHL-16W-43+, is a wide band High Power Amplifier providing 16W saturated output power over more than an octave up to 4000 MHz. It supports a variety of applications from communication or radar to critical test and measurement systems and includes over-temperature self-protect and alarming circuits as well as internal protection circuits to prevent damage due to operation into an open or short under full RF power.

## Features

- High power, 16 Watt
- Low Current consumption, 3A typ.
- High IP3, +47 dBm typ.
- Usable over 800 to 4200 MHz
- Good gain flatness,  $\pm 1.5$  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

## Applications

- PCN
- GSM
- ISM
- WiMax
- Lab test



CASE STYLE: BT1344

| Connectors     | Model         |
|----------------|---------------|
| SMA/D-Sub Male | ZHL-16W-43-S+ |

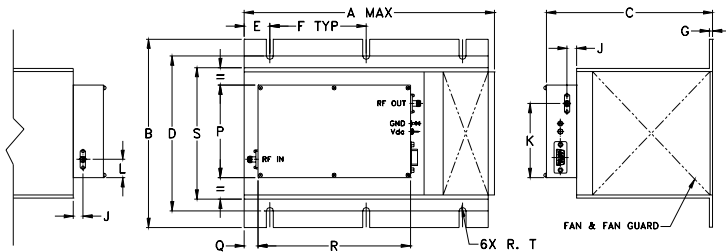
### +RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

## Electrical Specifications

| Parameter                                 | ZHL-16W-43-S+ |      |           | Units |
|-------------------------------------------|---------------|------|-----------|-------|
|                                           | Min.          | Typ. | Max.      |       |
| Frequency Range                           | 1800          |      | 4000      | MHz   |
| Gain                                      | 40            | 45   | 50        | dB    |
| Gain Flatness                             |               |      | $\pm 2.0$ | dB    |
| Output Power at 1dB compression           | +39           | +41  |           | dBm   |
| Saturated Output Power at 3dB 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     |

## Outline 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   |

## Maximum Ratings

| Parameter                               | Ratings        |
|-----------------------------------------|----------------|
| Operating Temperature                   | -20°C to 47°C  |
| Storage Temperature                     | -55°C to 100°C |
| Input RF Power (no damage) <sup>1</sup> | +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 Connections\*\*

| Pin Function                                                                 | Label on unit            | Pin #   | Color  | Gauge  |
|------------------------------------------------------------------------------|--------------------------|---------|--------|--------|
| None                                                                         | N/C1, N/C2<br>N/C4, N/C5 | 1,2,4,5 | None   | None   |
| Thermal Shut-Off Indication:<br>Shut-Off: 2 to 5V<br>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 |

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

| FREQUENCY<br>(MHz) | GAIN<br>(dB) | DIRECTIVITY<br>(dB) | VSWR<br>(:1) |      | NOISE<br>FIGURE<br>(dB) | POUT<br>(dBm)<br>at 28V |                | OUTPUT<br>IP3<br>(dBm) |
|--------------------|--------------|---------------------|--------------|------|-------------------------|-------------------------|----------------|------------------------|
|                    | 28V          | 28V                 | IN           | OUT  |                         | 1 dB<br>Compr.          | 3 dB<br>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                  |

