



COAXIAL

Amplifier

ZHL-5W-63-S+ ZHL-5W-63X-S+

50Ω Medium High Power 600 to 6000 MHz

THE BIG DEAL

- Wideband, 600 to 6000 MHz
- High OIP3, +42 dBm typ.
- High Gain, 45 dB typ.



Generic photo used for illustration purposes only

APPLICATIONS

- Communication systems
- Cellular
- Instrumentation
- Laboratory

| | | |
|------------|--------------|-----------------|
| Model No. | ZHL-5W-63-S+ | ZHL-5W-63X-S+ ▲ |
| Case Style | CP2548-2 | |
| Connectors | SMA | |

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

PRODUCT OVERVIEW

Mini-Circuits' ZHL-5W-63-S+ is class AB a medium-power connectorized amplifier with GaN output transistor supporting a wide range of applications from 600 to 6000 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 +37 dBm output power at saturation. The amplifier operates on a +28V DC supply and comes housed in compact aluminum alloy case (6.7 x 4.3 x 1.18") with SMA connectors and an optional heat sink for efficient cooling.

KEY FEATURES

| Feature | Advantages |
|---------------------------------------|---|
| Wideband, usable from 500 to 6100 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, 45 dB | Reduces the number of gain stages, lowering component count and overall system cost. |
| Medium Output Power, +37 dBm | Supports a wide range of power requirements. |
| High OIP3, +42 dBm | Provides highly linear performance with excellent sensitivity and two-tone spur-free dynamic range. |

REV. A
 ECO-017840
 ZHL-5W-63-S+
 MCL NY
 230508





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50Ω Medium High Power 600 to 6000 MHz

ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter | Condition (MHz) | ZHL-5W-63-S+ ZHL-5W-63X-S+ ▲ | | | Units |
|------------------------------------|-----------------|---------------------------------|------|------|-------|
| | | Min. | Typ. | Max. | |
| Frequency Range | | 600 | – | 6000 | MHz |
| Gain | 600-6000 | 36 | 45 | 53 | dB |
| Gain Flatness | 600-6000 | – | ±3.5 | – | dB |
| Output Power at 3dB compression | 600-6000 | – | +35 | – | dBm |
| Output Power at saturation | 600-6000 | +35 | +37 | – | dBm |
| Noise Figure | 600-6000 | – | 12 | – | dB |
| Output third order intercept point | 600-6000 | – | 42 | – | dBm |
| Input VSWR | 600-6000 | – | 2.5 | – | :1 |
| Output VSWR | 600-6000 | – | 3.5 | – | :1 |
| DC Supply Voltage | | – | 28 | 32 | V |
| Supply Current | | – | 3.0 | 3.5 | A |

▲ Heat sink not included. Alternative heat sinking and heat removal must be provided by the user to limit maximum base-plate temperature to 85°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 | 0°C to +60°C |
| Storage Temperature | -55°C to +100°C |
| DC Voltage | +32V |
| Input RF Power (no damage) at load | +7 dBm |
| Input RF power at OPEN / SHORT | -16 dBm |

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





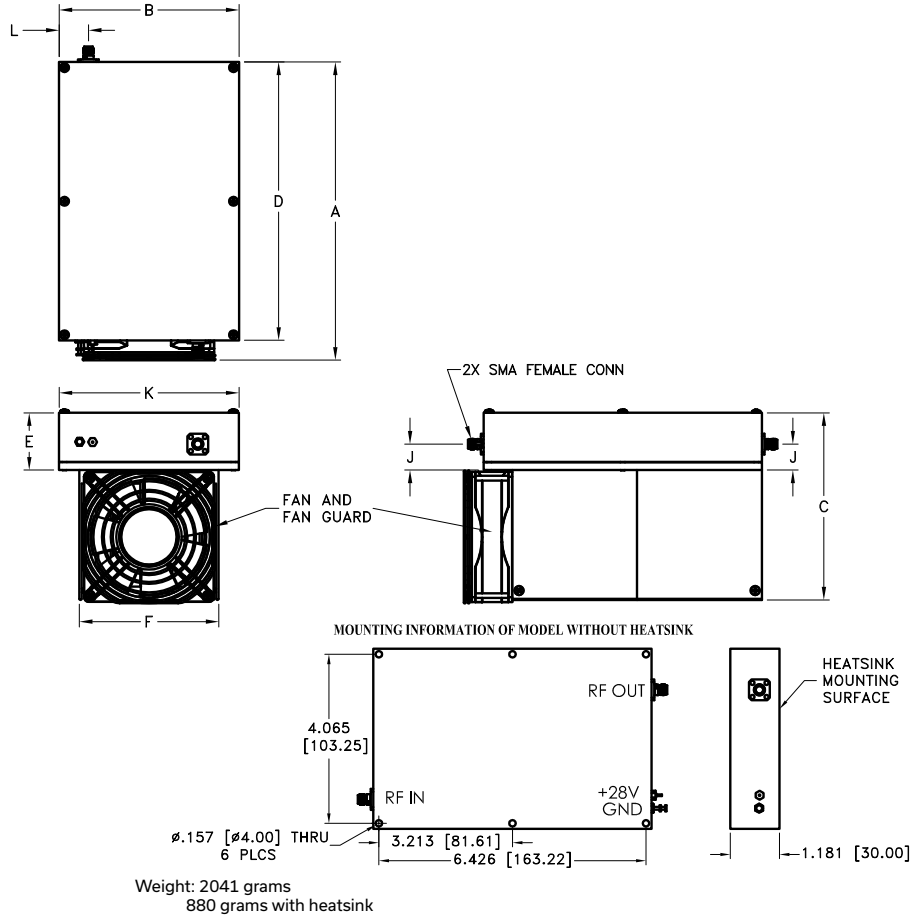
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OUTLINE DRAWING



OUTLINE DIMENSIONS (Inch mm)

| A | B | C | D | E | F | G | H | J | K | L | wt |
|--------|--------|--------|--------|--------|--------|---|---|--------|--------|--------|-----------------------------|
| 7.25 | 4.33 | 4.58 | 6.69 | 1.38 | 3.36 | - | - | 0.62 | 3.34 | 0.71 | grams* |
| 184.15 | 109.98 | 116.33 | 169.93 | 35.052 | 85.344 | - | - | 15.748 | 84.836 | 18.034 | 2041 |
| | | | | | | | | | | | *880 grams without heatsink |





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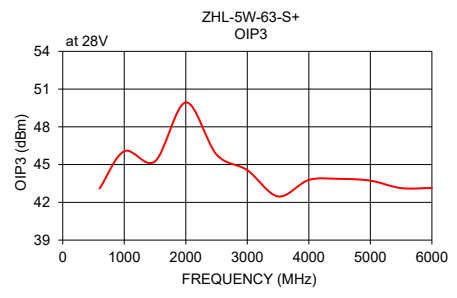
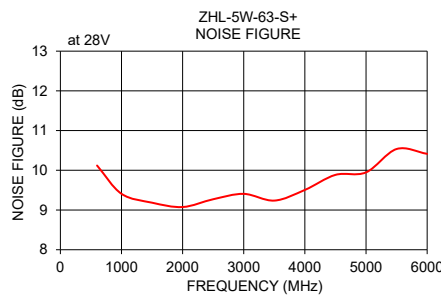
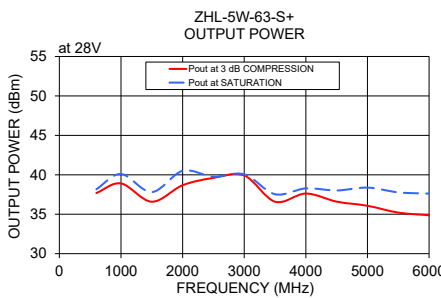
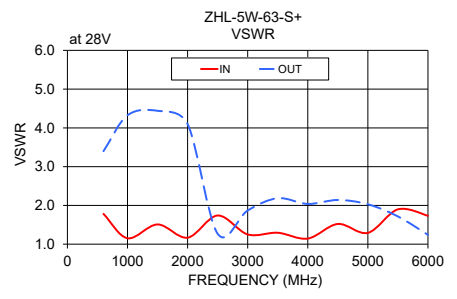
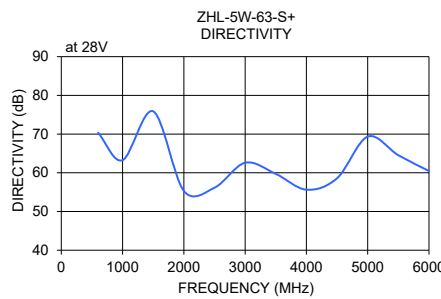
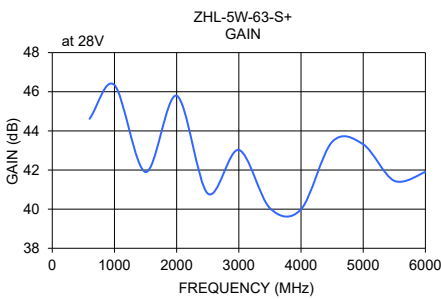
Amplifier

ZHL-5W-63-S+ ZHL-5W-63X-S+

50Ω Medium High Power 600 to 6000 MHz

TYPICAL PERFORMANCE DATA/CURVES

| FREQUENCY (MHz) | GAIN (dB) | DIRECTIVITY (dB) | VSWR (:1) | | NOISE FIGURE (dB) | POUT at 3 dB COMPR. (dBm) | POUT at SATURATION (dBm) | OIP3 (dBm) |
|-----------------|-----------|------------------|-----------|------|-------------------|---------------------------|--------------------------|------------|
| | 28V | 28V | IN | OUT | 28V | 28V | 28V | 28V |
| 600 | 44.62 | 70.36 | 1.78 | 3.40 | 10.12 | 37.69 | 38.17 | 43.10 |
| 1000 | 46.34 | 63.26 | 1.15 | 4.33 | 9.41 | 38.90 | 40.10 | 46.06 |
| 1500 | 41.90 | 75.87 | 1.51 | 4.44 | 9.18 | 36.59 | 37.81 | 45.26 |
| 2000 | 45.80 | 55.31 | 1.17 | 4.10 | 9.07 | 38.68 | 40.50 | 49.94 |
| 2500 | 40.80 | 56.14 | 1.74 | 1.27 | 9.27 | 39.61 | 39.76 | 45.80 |
| 3000 | 43.03 | 62.60 | 1.25 | 1.87 | 9.41 | 39.92 | 40.06 | 44.56 |
| 3500 | 40.05 | 59.72 | 1.29 | 2.19 | 9.24 | 36.59 | 37.54 | 42.47 |
| 4000 | 39.99 | 55.64 | 1.14 | 2.04 | 9.51 | 37.62 | 38.28 | 43.78 |
| 4500 | 43.44 | 58.59 | 1.52 | 2.14 | 9.88 | 36.60 | 38.01 | 43.86 |
| 5000 | 43.31 | 69.35 | 1.29 | 2.03 | 9.95 | 36.07 | 38.38 | 43.72 |
| 5500 | 41.45 | 64.53 | 1.90 | 1.72 | 10.54 | 35.21 | 37.77 | 43.13 |
| 6000 | 41.90 | 60.47 | 1.73 | 1.24 | 10.41 | 34.87 | 37.61 | 43.14 |



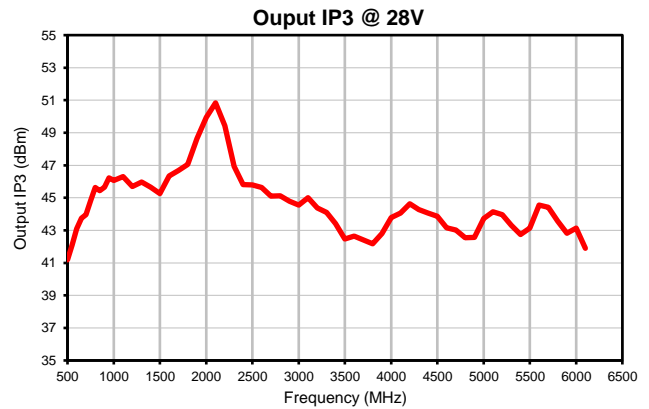
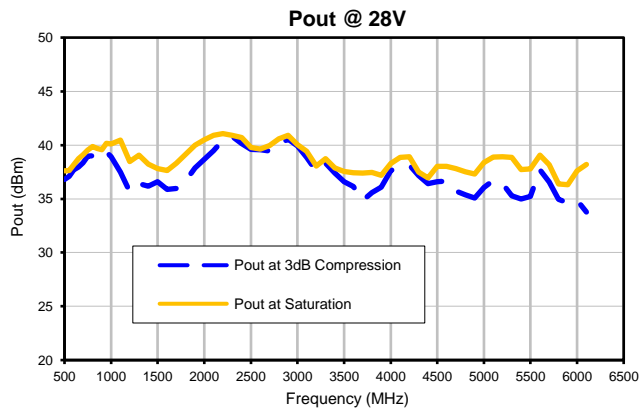
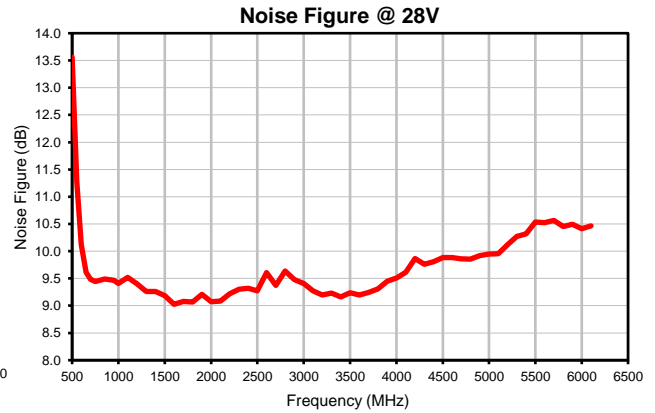
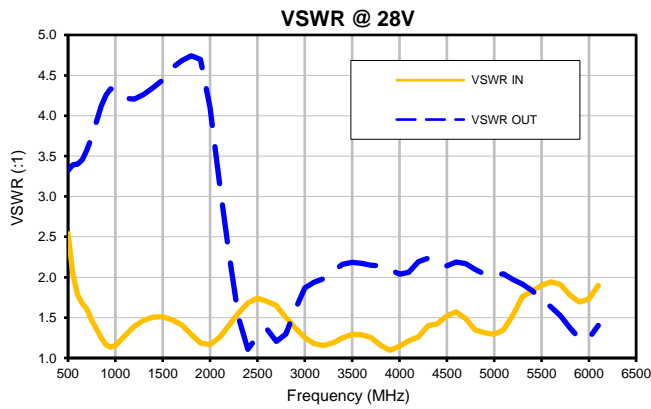
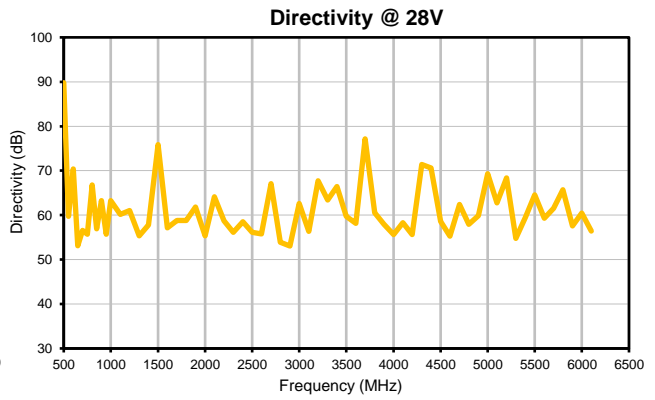
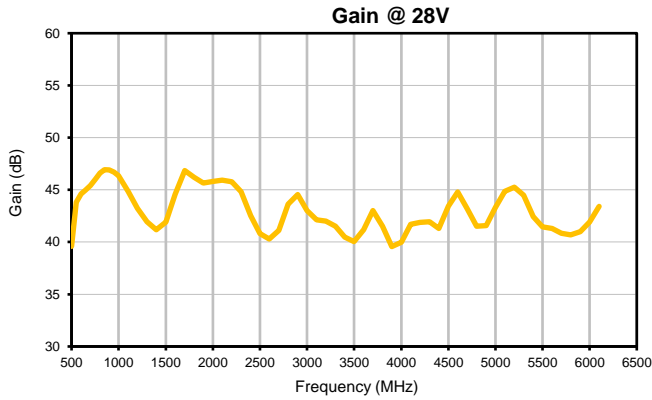
- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
 - B. Electrical specifications and performance data contained in this specification document are based 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



Typical Performance Data

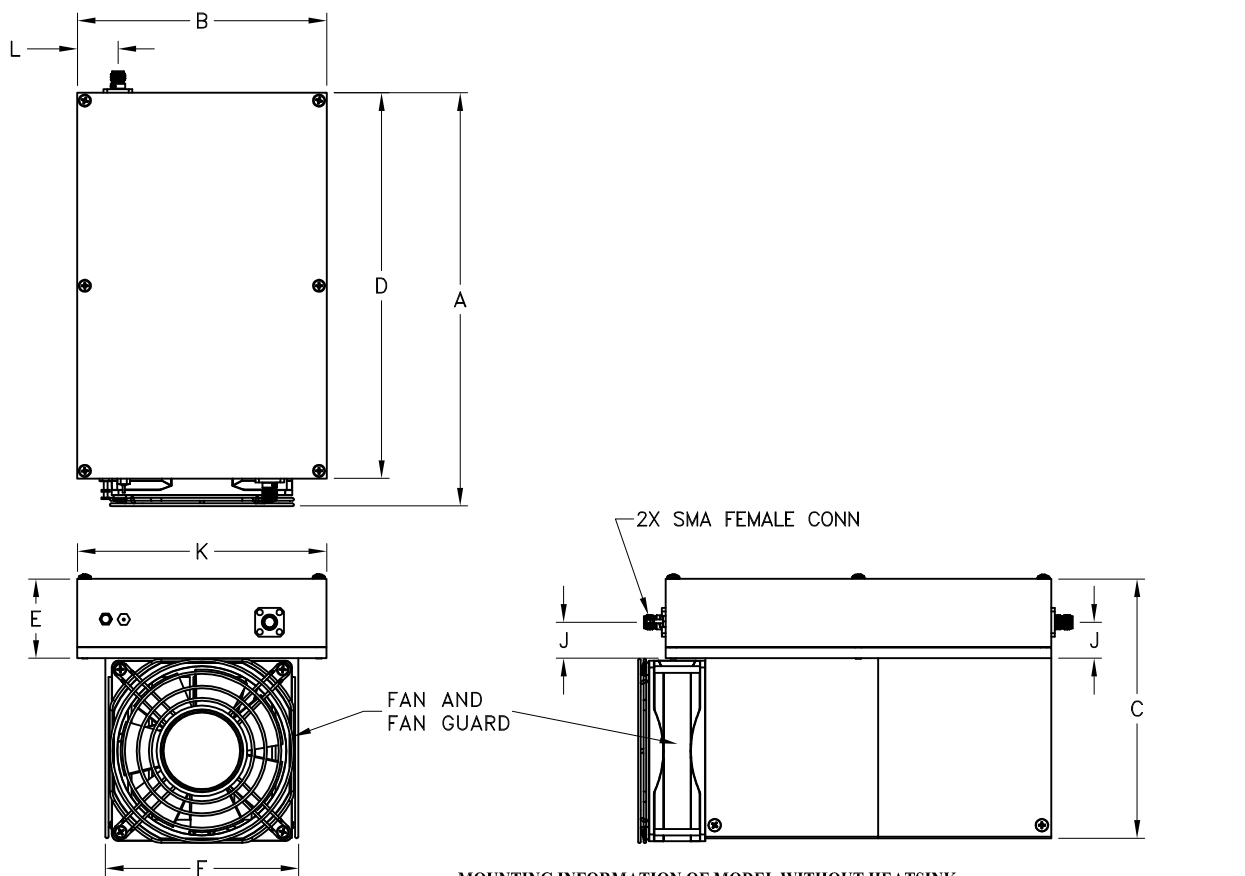
| FREQUENCY (MHz) | GAIN (dB) 28V | DIRECTIVITY (dB) 28V | VSWR (:1) | | NOISE FIGURE (dB) 28V | Pout at 3dB COMPRESSION (dBm) 28V | Pout at SATURATION (dBm) 28V | OUTPUT IP3 (dBm) 28V |
|--------------------|---------------------|----------------------------|-----------|------------|-----------------------------|--|---------------------------------------|----------------------------|
| | | | IN 28V | OUT 28V | | | | |
| 500 | 39.58 | 89.80 | 2.54 | 3.32 | 13.56 | 36.81 | 37.60 | 41.19 |
| 550 | 43.83 | 59.74 | 2.05 | 3.39 | 11.28 | 37.09 | 37.65 | 42.12 |
| 600 | 44.62 | 70.36 | 1.78 | 3.40 | 10.12 | 37.69 | 38.17 | 43.10 |
| 650 | 44.99 | 53.08 | 1.67 | 3.45 | 9.61 | 37.96 | 38.75 | 43.74 |
| 700 | 45.41 | 56.53 | 1.61 | 3.57 | 9.48 | 38.34 | 39.09 | 43.96 |
| 750 | 45.99 | 55.69 | 1.47 | 3.74 | 9.44 | 38.96 | 39.55 | 44.85 |
| 800 | 46.61 | 66.81 | 1.36 | 3.93 | 9.47 | 39.01 | 39.85 | 45.64 |
| 850 | 46.93 | 56.94 | 1.25 | 4.12 | 9.49 | 38.80 | 39.68 | 45.45 |
| 900 | 46.91 | 63.23 | 1.16 | 4.26 | 9.48 | 38.92 | 39.56 | 45.66 |
| 950 | 46.70 | 55.71 | 1.13 | 4.33 | 9.47 | 39.35 | 40.15 | 46.22 |
| 1000 | 46.34 | 63.26 | 1.15 | 4.33 | 9.41 | 38.90 | 40.10 | 46.06 |
| 1100 | 44.85 | 60.14 | 1.28 | 4.22 | 9.52 | 37.50 | 40.45 | 46.31 |
| 1200 | 43.25 | 61.04 | 1.39 | 4.20 | 9.40 | 35.67 | 38.48 | 45.69 |
| 1300 | 41.95 | 55.34 | 1.47 | 4.26 | 9.26 | 36.42 | 39.05 | 45.96 |
| 1400 | 41.18 | 57.76 | 1.51 | 4.35 | 9.26 | 36.18 | 38.23 | 45.65 |
| 1500 | 41.90 | 75.87 | 1.51 | 4.44 | 9.18 | 36.59 | 37.81 | 45.26 |
| 1600 | 44.57 | 57.17 | 1.47 | 4.59 | 9.03 | 35.88 | 37.64 | 46.35 |
| 1700 | 46.86 | 58.80 | 1.41 | 4.68 | 9.08 | 35.98 | 38.33 | 46.68 |
| 1800 | 46.20 | 58.83 | 1.29 | 4.74 | 9.07 | 36.68 | 39.14 | 47.06 |
| 1900 | 45.64 | 61.80 | 1.19 | 4.70 | 9.21 | 37.86 | 39.97 | 48.65 |
| 2000 | 45.80 | 55.31 | 1.17 | 4.10 | 9.07 | 38.68 | 40.50 | 49.94 |
| 2100 | 45.92 | 64.14 | 1.26 | 3.15 | 9.09 | 39.47 | 40.91 | 50.84 |
| 2200 | 45.77 | 58.70 | 1.40 | 2.30 | 9.22 | 40.47 | 41.07 | 49.42 |
| 2300 | 44.83 | 56.16 | 1.56 | 1.50 | 9.30 | 40.81 | 40.92 | 46.92 |
| 2400 | 42.52 | 58.48 | 1.68 | 1.11 | 9.32 | 40.15 | 40.71 | 45.82 |
| 2500 | 40.80 | 56.14 | 1.74 | 1.27 | 9.27 | 39.61 | 39.76 | 45.80 |
| 2600 | 40.29 | 55.80 | 1.70 | 1.35 | 9.61 | 39.57 | 39.64 | 45.63 |
| 2700 | 41.11 | 67.07 | 1.65 | 1.21 | 9.37 | 39.46 | 39.95 | 45.10 |
| 2800 | 43.63 | 53.92 | 1.50 | 1.30 | 9.64 | 40.05 | 40.58 | 45.12 |
| 2900 | 44.55 | 53.05 | 1.37 | 1.60 | 9.48 | 40.55 | 40.90 | 44.80 |
| 3000 | 43.03 | 62.60 | 1.25 | 1.87 | 9.41 | 39.92 | 40.06 | 44.56 |
| 3100 | 42.13 | 56.37 | 1.18 | 1.94 | 9.27 | 38.86 | 39.42 | 45.01 |
| 3200 | 41.99 | 67.76 | 1.15 | 1.98 | 9.20 | 37.57 | 38.06 | 44.38 |
| 3300 | 41.53 | 63.44 | 1.19 | 2.08 | 9.23 | 38.31 | 38.72 | 44.09 |
| 3400 | 40.46 | 66.45 | 1.25 | 2.16 | 9.16 | 37.40 | 37.89 | 43.42 |
| 3500 | 40.05 | 59.72 | 1.29 | 2.19 | 9.24 | 36.59 | 37.54 | 42.47 |
| 3600 | 41.18 | 58.18 | 1.29 | 2.17 | 9.20 | 36.16 | 37.43 | 42.65 |
| 3700 | 43.01 | 77.20 | 1.25 | 2.15 | 9.24 | 34.84 | 37.38 | 42.41 |
| 3800 | 41.50 | 60.50 | 1.16 | 2.14 | 9.31 | 35.58 | 37.46 | 42.18 |
| 3900 | 39.57 | 57.92 | 1.10 | 2.10 | 9.45 | 36.09 | 37.20 | 42.81 |
| 4000 | 39.99 | 55.64 | 1.14 | 2.04 | 9.51 | 37.62 | 38.28 | 43.78 |
| 4100 | 41.71 | 58.26 | 1.21 | 2.06 | 9.61 | 37.95 | 38.86 | 44.06 |
| 4200 | 41.87 | 55.60 | 1.26 | 2.19 | 9.87 | 38.13 | 38.92 | 44.64 |
| 4300 | 41.95 | 71.41 | 1.40 | 2.23 | 9.76 | 37.15 | 37.49 | 44.28 |
| 4400 | 41.29 | 70.57 | 1.42 | 2.18 | 9.81 | 36.42 | 36.95 | 44.06 |
| 4500 | 43.44 | 58.59 | 1.52 | 2.14 | 9.88 | 36.60 | 38.01 | 43.86 |
| 4600 | 44.78 | 55.30 | 1.57 | 2.19 | 9.88 | 36.64 | 38.02 | 43.15 |
| 4700 | 43.16 | 62.39 | 1.49 | 2.17 | 9.86 | 35.73 | 37.81 | 43.01 |
| 4800 | 41.52 | 57.95 | 1.35 | 2.10 | 9.85 | 35.37 | 37.50 | 42.55 |
| 4900 | 41.57 | 59.88 | 1.31 | 2.04 | 9.92 | 35.07 | 37.29 | 42.57 |
| 5000 | 43.31 | 69.35 | 1.29 | 2.03 | 9.95 | 36.07 | 38.38 | 43.72 |
| 5100 | 44.87 | 62.74 | 1.35 | 2.04 | 9.95 | 36.72 | 38.88 | 44.15 |
| 5200 | 45.25 | 68.35 | 1.53 | 1.97 | 10.12 | 36.41 | 38.90 | 43.97 |
| 5300 | 44.49 | 54.78 | 1.76 | 1.91 | 10.27 | 35.27 | 38.85 | 43.31 |
| 5400 | 42.43 | 59.53 | 1.83 | 1.84 | 10.32 | 34.97 | 37.73 | 42.75 |
| 5500 | 41.45 | 64.53 | 1.90 | 1.72 | 10.54 | 35.21 | 37.77 | 43.13 |
| 5600 | 41.29 | 59.28 | 1.94 | 1.63 | 10.52 | 37.68 | 39.05 | 44.55 |
| 5700 | 40.85 | 61.54 | 1.91 | 1.52 | 10.57 | 36.57 | 38.17 | 44.41 |
| 5800 | 40.68 | 65.69 | 1.78 | 1.38 | 10.45 | 34.96 | 36.38 | 43.58 |
| 5900 | 40.98 | 57.55 | 1.69 | 1.24 | 10.49 | 34.62 | 36.31 | 42.83 |
| 6000 | 41.90 | 60.47 | 1.73 | 1.24 | 10.41 | 34.87 | 37.61 | 43.14 |
| 6100 | 43.41 | 56.42 | 1.90 | 1.40 | 10.47 | 33.78 | 38.19 | 41.90 |

Typical Performance Curves

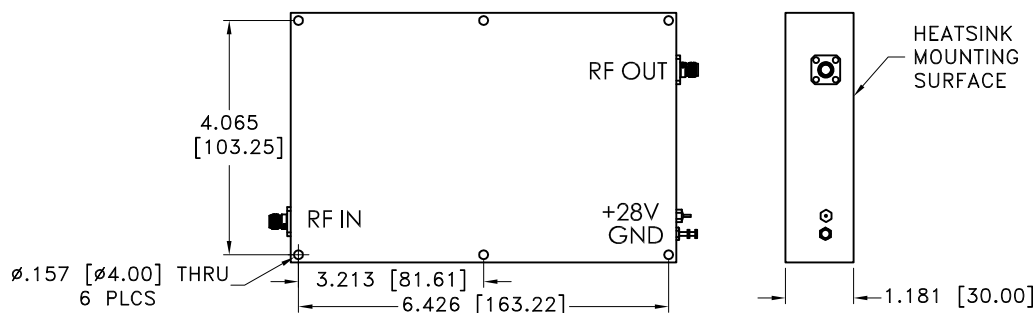


Outline Dimensions

CP2548-2



MOUNTING INFORMATION OF MODEL WITHOUT HEATSINK



| CASE# | A | B | C | D | E | F | G | H | J | K | L | WT. GRAMS | WT. WITHOUT HEATSINK GRAMS |
|----------|------------------|-----------------|------------------|-----------------|-----------------|-----------------|----|----|----------------|-----------------|----------------|-----------|----------------------------|
| CP2548-2 | 7.25 (184.15) | 4.33 (110.0) | 4.58 (116.33) | 6.69 (170.0) | 1.38 (35.05) | 3.36 (85.34) | -- | -- | .62 (15.65) | 3.34 (84.80) | .71 (18.00) | 2041 | 880 |

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

Notes:

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

Mini-Circuits
ISO 9001 ISO 14001 CERTIFIED

ALL NEW
minicircuits.com

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



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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 45°C Ambient Environment | 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 base plate Temperature | MIL-STD-202, Method 108 |
| Thermal Shock | -55° to 100°C, 5 cycles | MIL-STD-202, Method 107, Condition A, except 100°C |