



SUPER ULTRA

Wideband Amplifier

ZVE-143-S+ ZVE-143X-S+

FEATURES

- Wideband, 8 to 14 GHz
- High Output IP3, +35 dBm typ.
- Rugged Compact Case
- Unconditionally Stable

APPLICATIONS

- Radar and Military
- Test Instrumentation
- Satellite Repeaters
- Communication



Generic photo used for illustration purposes only

| | | |
|-------------------|---------------|------------------|
| Model No. | ZVE-143-S+ | ZVE-143X-S+▲ |
| Option | With heatsink | Without heatsink |
| Case Style | AV243 | |
| Connectors | SMA | |

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

PRODUCT OVERVIEW

Mini-Circuits' ZVE-143-S+ is a Class-A, two-stage, unconditionally stable amplifier providing flat gain over an extremely wide frequency range from 8 to 14 GHz. This model is capable of delivering up to 0.6W output power at P1dB with high output IP3 supporting a wide range of sensitive, high-dynamic range receiver applications and many systems where high performance over wideband is needed. It operates on a +12V supply and features built-in safety features including protection against reverse bias and immunity to accidental open or short loads for 2 minutes. The amplifier comes in a rugged, compact case (1.05 x 1.01 x 0.35") with SMA connectors and an optional heat sink for efficient cooling.

KEY FEATURES

| Feature | Advantages |
|--|--|
| Ultra-wideband, 8 to 14 GHz able to work from 5.0 to 14.5 GHz | Enables a single amplifier to be used in a wide range of applications. |
| Excellent gain flatness, ± 0.8 dB typ. across full frequency range | Provides consistent performance across its operating frequency, minimizing the need for external equalizing networks in wideband applications. |
| High gain, 19 dB typ. | Reduces the number of gain stages, lowering component count and overall system cost. |
| Class A Amplifier | Provides good linearity with low signal distortion. |
| Low Noise and High IP3: • NF, 4.5 dB typ. • OIP3, +35 dBm typ. | The combination of low noise and high IP3 makes the ZVE-143-S+ ideal for use in low noise receiver front end (RFE) as it gives the user the advantages of sensitivity and two-tone IM performance at both ends of the dynamic range. |
| Rugged design | Built-in protection against reverse bias and accidental open and short loads provides added reliability for demanding operating conditions. |



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ZVE-143-S+ ZVE-143X-S+

ELECTRICAL SPECIFICATIONS AT +25°C

| Parameter | Condition (GHz) | ZVE-143-S+ ZVE-143X-S+ [▲] | | | Units |
|----------------------------------|-----------------|--|------------------|------|-------|
| | | Min. | Typ. | Max. | |
| Frequency Range | | 8 | | 14 | GHz |
| Gain | 8 - 14 | 16 | 19 | 22 | dB |
| Gain Flatness | 8 - 14 | — | ±0.8 | ±1.5 | dB |
| Input VSWR | 8 - 14 | — | 1.5 | 2.5 | :1 |
| Output VSWR | 8 - 14 | — | 1.5 | 2.5 | :1 |
| Output Power at 1dB Compression | 8 - 14 | +26 | +28 | — | dBm |
| Output Power at 3 dB Compression | 8 - 14 | — | +35 | — | dBm |
| Noise Figure | 8 - 14 | — | 4.5 | 5.5 | dB |
| DC Supply Voltage | | +10 | +12 ¹ | +17 | V |
| Supply Current | | — | 350 | 450 | mA |

1. Recommended Operating Voltage.

[▲] 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 7.7°C/W max.

ABSOLUTE MAXIMUM RATINGS

| Parameter | Ratings |
|-------------------------------|--|
| Operating Temperature | ZVE-143-S+ -40°C to +54°C ambient ZVE-143X-S+ -40°C to +85°C base plate temp. |
| Storage Temperature | -65°C to +125°C |
| DC Voltage | +17 V |
| CW Input RF Power (no damage) | +15 dBm |

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



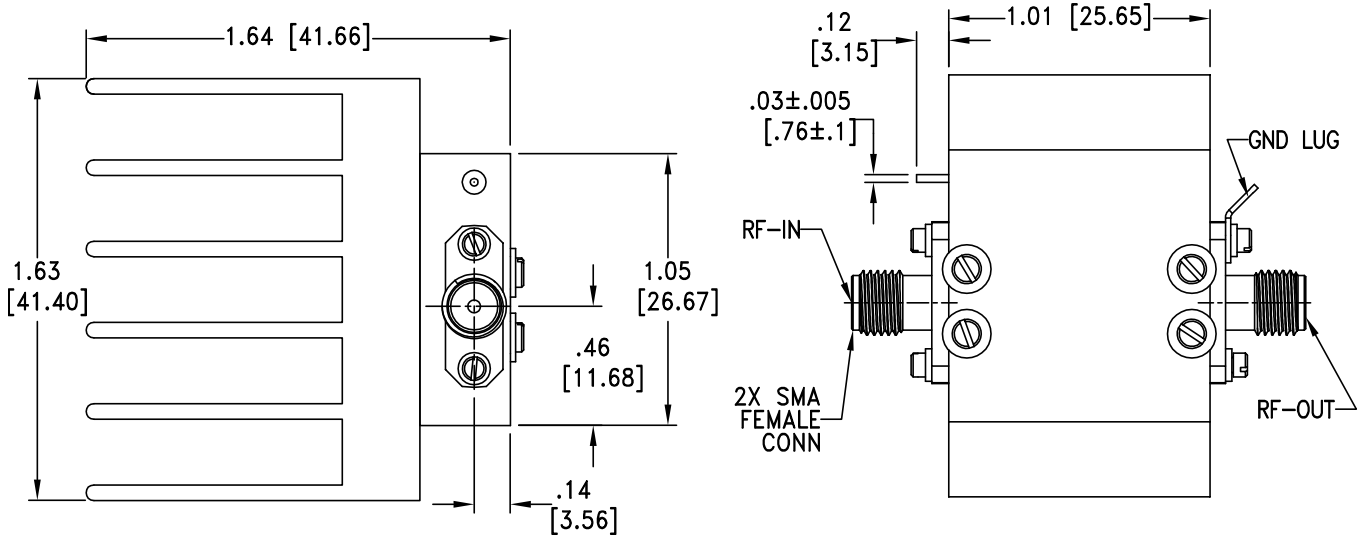


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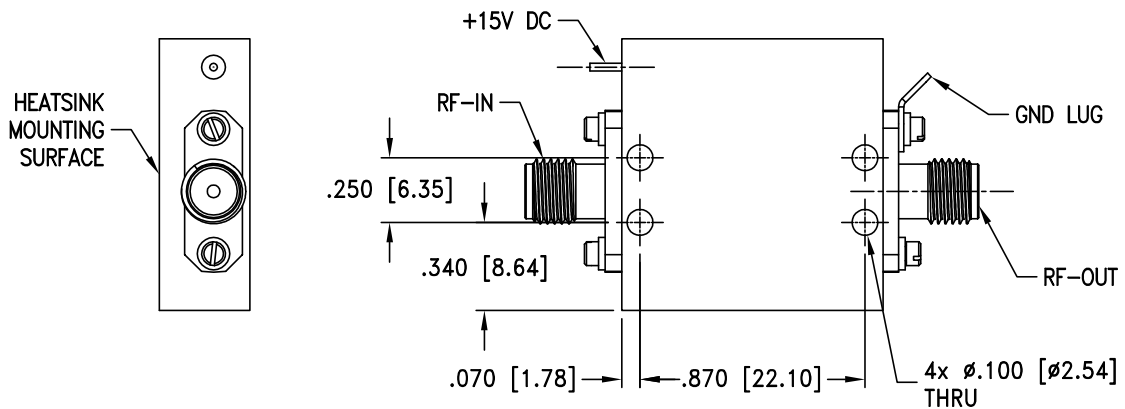
Wideband Amplifier

ZVE-143-S+ ZVE-143X-S+

OUTLINE DRAWING FOR MODELS WITH HEATSINK (ZVE-143-S+)



MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK (ZVE-143X-S+)



Weight: 58 grams; Weight without heatsink: 17 grams

Dimensions are in inches [mm]





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Wideband Amplifier

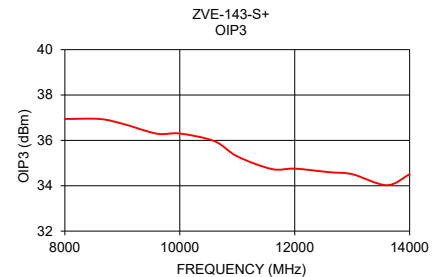
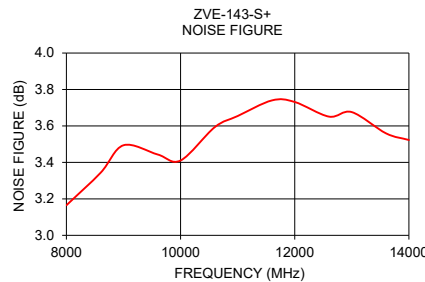
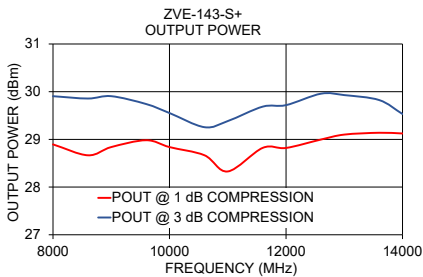
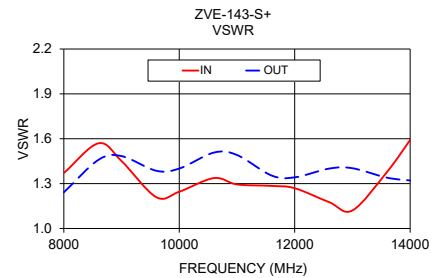
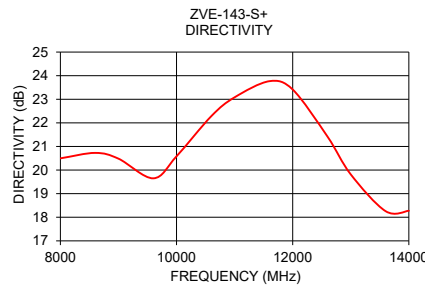
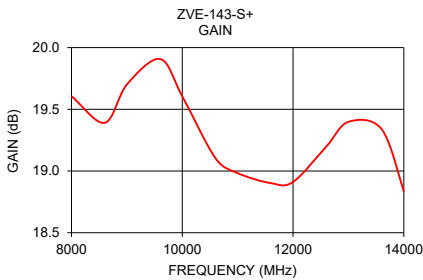
ZVE-143-S+ ZVE-143X-S+

Mini-Circuits

50Ω 8 to 14 GHz

TYPICAL PERFORMANCE DATA/CURVES

| Frequency (MHz) | Gain (dB) | Directivity (dB) | VSWR (:1) | | Pout at 1 dB Compr. (dBm) | Pout at 3 dB Compr. (dBm) | Noise Figure (dB) | OIP3 (dBm) |
|-----------------|-----------|------------------|-----------|------|---------------------------|---------------------------|-------------------|------------|
| | 12V | 12V | IN | OUT | 12V | 12V | 12V | 12V |
| 8000 | 19.61 | 20.50 | 1.37 | 1.24 | 28.89 | 29.91 | 3.16 | 36.94 |
| 8600 | 19.39 | 20.73 | 1.57 | 1.46 | 28.67 | 29.86 | 3.34 | 36.94 |
| 9000 | 19.70 | 20.48 | 1.45 | 1.48 | 28.84 | 29.91 | 3.49 | 36.73 |
| 9600 | 19.91 | 19.65 | 1.21 | 1.39 | 28.98 | 29.74 | 3.44 | 36.30 |
| 10000 | 19.61 | 20.58 | 1.25 | 1.40 | 28.84 | 29.55 | 3.41 | 36.30 |
| 10600 | 19.10 | 22.29 | 1.34 | 1.51 | 28.67 | 29.26 | 3.59 | 35.97 |
| 11000 | 18.98 | 23.08 | 1.29 | 1.49 | 28.33 | 29.38 | 3.65 | 35.29 |
| 11600 | 18.90 | 23.77 | 1.28 | 1.35 | 28.82 | 29.69 | 3.74 | 34.74 |
| 12000 | 18.91 | 23.41 | 1.27 | 1.34 | 28.82 | 29.72 | 3.73 | 34.75 |
| 12600 | 19.20 | 21.42 | 1.18 | 1.40 | 29.00 | 29.96 | 3.65 | 34.60 |
| 13000 | 19.40 | 19.82 | 1.12 | 1.40 | 29.10 | 29.93 | 3.68 | 34.51 |
| 13600 | 19.34 | 18.26 | 1.38 | 1.34 | 29.14 | 29.82 | 3.56 | 34.03 |
| 14000 | 18.83 | 18.28 | 1.59 | 1.32 | 29.12 | 29.53 | 3.52 | 34.51 |



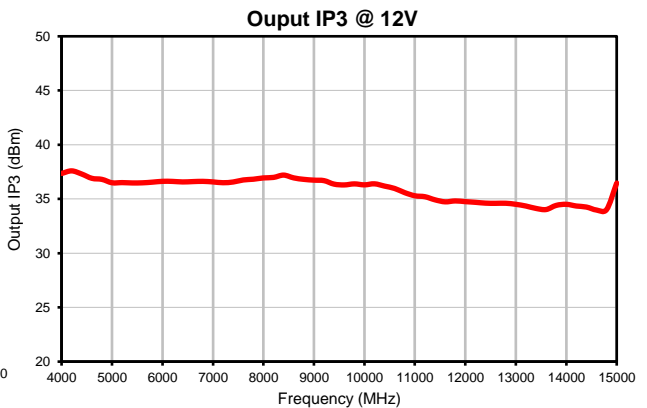
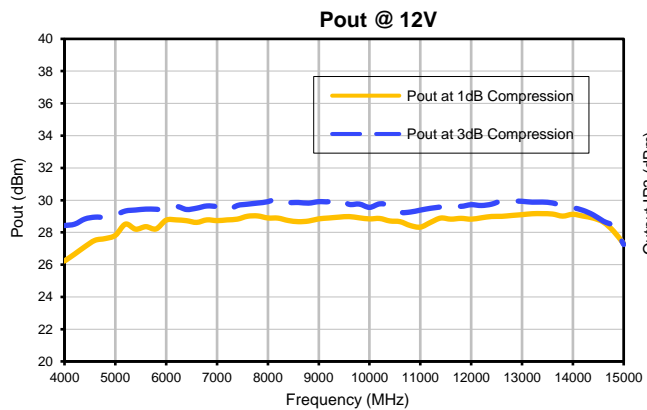
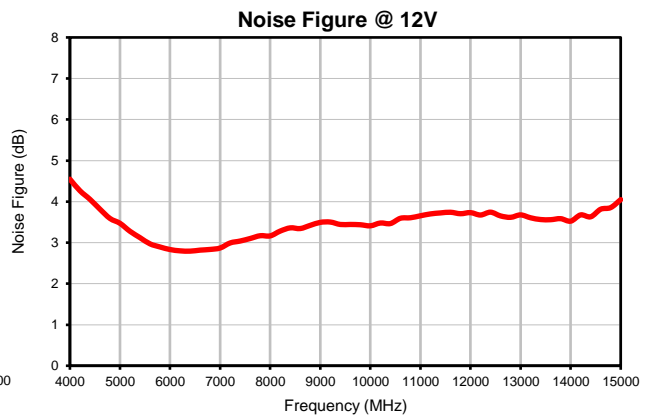
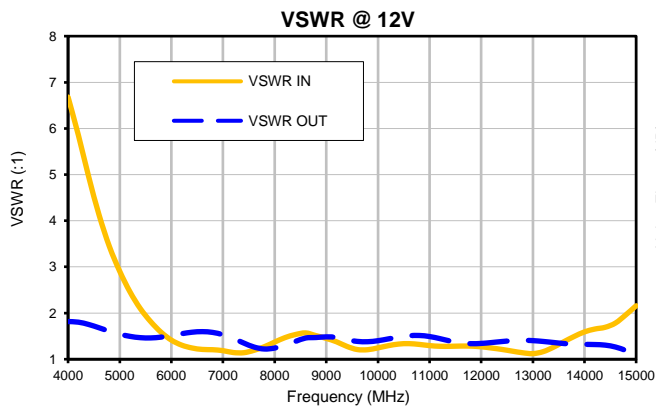
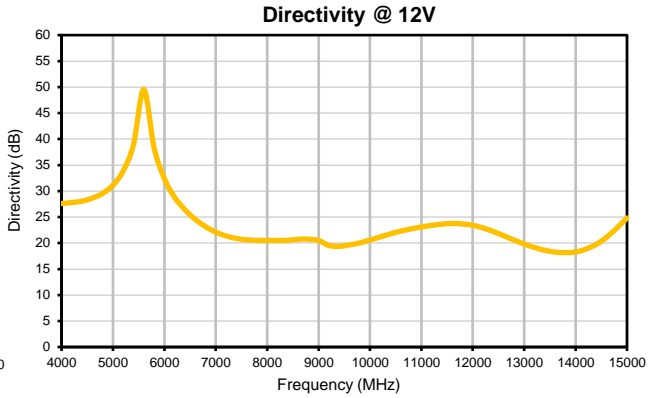
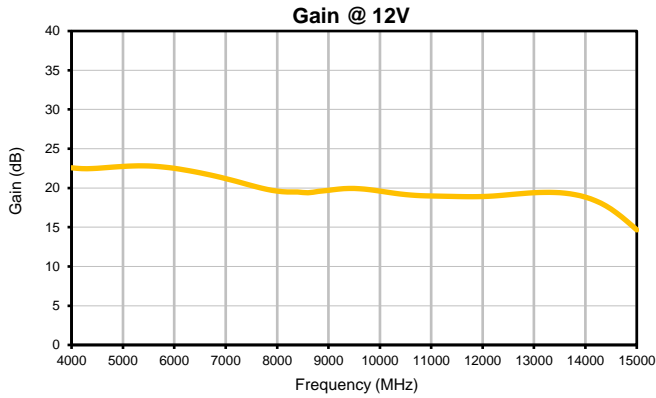
- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
 - B. Electrical specifications and performance data contained in this specification document are based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

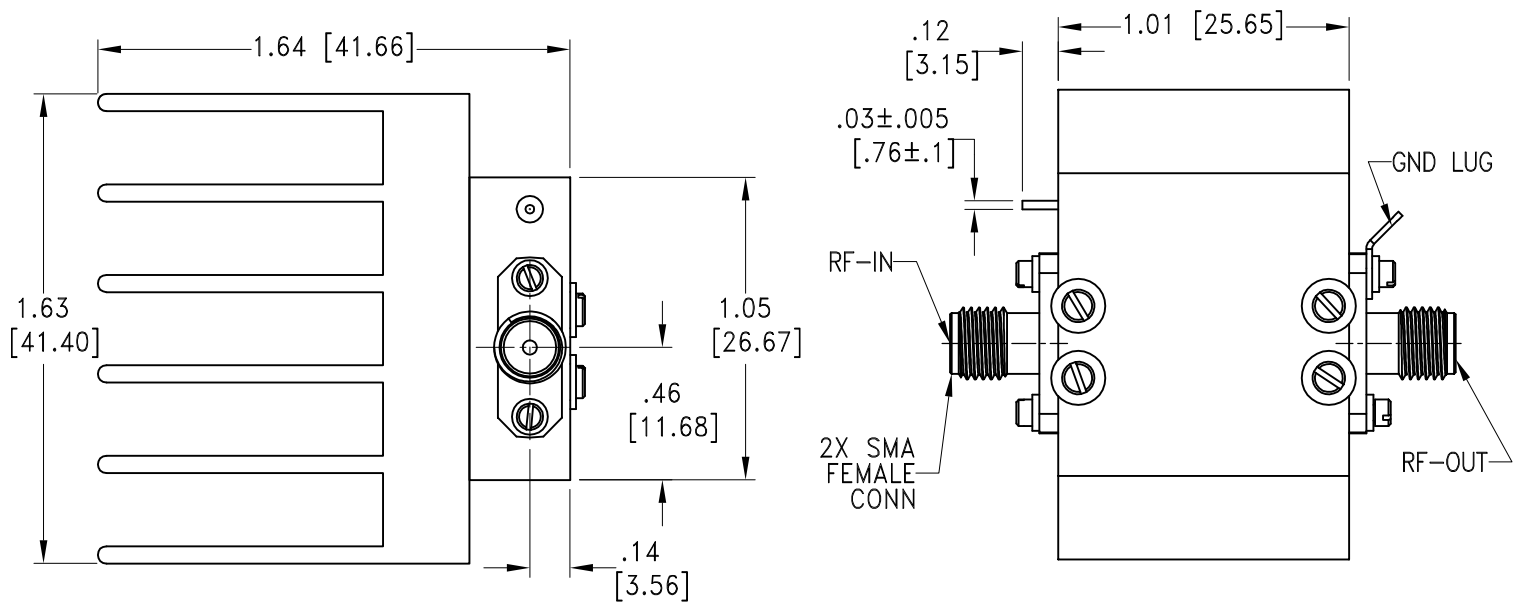
| FREQUENCY (MHz) | GAIN (dB) 12V | DIRECTIVITY (dB) 12V | VSWR (:1) | | NOISE FIGURE (dB) 12V | POUT @ 1 dB COMPRESSION (dBm) 12V | POUT @ 3 dB COMPRESSION (dBm) 12V | OUTPUT IP3 (dBm) 12V |
|--------------------|---------------------|----------------------------|-----------|------------|-----------------------------|--|--|----------------------------|
| | | | IN 12V | OUT 12V | | | | |
| 4000 | 22.57 | 27.59 | 6.68 | 1.82 | 4.55 | 26.22 | 28.42 | 37.35 |
| 4200 | 22.47 | 27.81 | 5.85 | 1.80 | 4.26 | 26.66 | 28.51 | 37.59 |
| 4400 | 22.48 | 28.05 | 4.95 | 1.75 | 4.06 | 27.11 | 28.83 | 37.30 |
| 4600 | 22.56 | 28.64 | 4.13 | 1.68 | 3.81 | 27.51 | 28.95 | 36.90 |
| 4800 | 22.66 | 29.55 | 3.44 | 1.61 | 3.59 | 27.62 | 28.94 | 36.81 |
| 5000 | 22.74 | 31.13 | 2.91 | 1.54 | 3.47 | 27.82 | 29.08 | 36.49 |
| 5200 | 22.81 | 33.89 | 2.46 | 1.50 | 3.28 | 28.51 | 29.33 | 36.51 |
| 5400 | 22.82 | 38.93 | 2.10 | 1.47 | 3.12 | 28.20 | 29.39 | 36.48 |
| 5600 | 22.77 | 49.56 | 1.81 | 1.46 | 2.97 | 28.36 | 29.44 | 36.49 |
| 5800 | 22.66 | 38.33 | 1.59 | 1.48 | 2.89 | 28.21 | 29.44 | 36.55 |
| 6000 | 22.51 | 32.40 | 1.41 | 1.51 | 2.83 | 28.76 | 29.39 | 36.63 |
| 6200 | 22.30 | 28.80 | 1.31 | 1.55 | 2.80 | 28.78 | 29.61 | 36.62 |
| 6400 | 22.06 | 26.41 | 1.24 | 1.58 | 2.79 | 28.73 | 29.42 | 36.57 |
| 6600 | 21.80 | 24.57 | 1.21 | 1.60 | 2.82 | 28.62 | 29.50 | 36.60 |
| 6800 | 21.51 | 23.16 | 1.21 | 1.58 | 2.83 | 28.78 | 29.64 | 36.62 |
| 7000 | 21.19 | 22.09 | 1.19 | 1.53 | 2.87 | 28.73 | 29.59 | 36.57 |
| 7200 | 20.86 | 21.37 | 1.14 | 1.45 | 2.99 | 28.78 | 29.35 | 36.50 |
| 7400 | 20.50 | 20.90 | 1.14 | 1.35 | 3.04 | 28.82 | 29.67 | 36.56 |
| 7600 | 20.14 | 20.63 | 1.19 | 1.26 | 3.10 | 29.00 | 29.75 | 36.75 |
| 7800 | 19.83 | 20.53 | 1.27 | 1.22 | 3.17 | 29.02 | 29.82 | 36.82 |
| 8000 | 19.61 | 20.50 | 1.37 | 1.24 | 3.16 | 28.89 | 29.91 | 36.94 |
| 8200 | 19.49 | 20.50 | 1.47 | 1.31 | 3.28 | 28.89 | 30.11 | 36.99 |
| 8400 | 19.49 | 20.53 | 1.53 | 1.38 | 3.36 | 28.74 | 29.87 | 37.20 |
| 8600 | 19.39 | 20.73 | 1.57 | 1.46 | 3.34 | 28.67 | 29.86 | 36.94 |
| 8800 | 19.56 | 20.75 | 1.51 | 1.47 | 3.42 | 28.70 | 29.82 | 36.81 |
| 9000 | 19.70 | 20.48 | 1.45 | 1.48 | 3.49 | 28.84 | 29.91 | 36.73 |
| 9200 | 19.86 | 19.53 | 1.38 | 1.47 | 3.50 | 28.89 | 29.91 | 36.69 |
| 9400 | 19.94 | 19.37 | 1.28 | 1.42 | 3.44 | 28.95 | 30.07 | 36.37 |
| 9600 | 19.91 | 19.65 | 1.21 | 1.39 | 3.44 | 28.98 | 29.74 | 36.30 |
| 9800 | 19.78 | 20.03 | 1.21 | 1.38 | 3.44 | 28.90 | 29.76 | 36.39 |
| 10000 | 19.61 | 20.58 | 1.25 | 1.40 | 3.41 | 28.84 | 29.55 | 36.30 |
| 10200 | 19.41 | 21.18 | 1.29 | 1.44 | 3.48 | 28.86 | 29.77 | 36.40 |
| 10400 | 19.23 | 21.78 | 1.33 | 1.48 | 3.47 | 28.71 | 29.67 | 36.19 |
| 10600 | 19.10 | 22.29 | 1.34 | 1.51 | 3.59 | 28.67 | 29.26 | 35.97 |
| 10800 | 19.02 | 22.72 | 1.32 | 1.51 | 3.61 | 28.43 | 29.26 | 35.58 |
| 11000 | 18.98 | 23.08 | 1.29 | 1.49 | 3.65 | 28.33 | 29.38 | 35.29 |
| 11200 | 18.96 | 23.40 | 1.28 | 1.45 | 3.70 | 28.62 | 29.50 | 35.21 |
| 11400 | 18.93 | 23.63 | 1.28 | 1.39 | 3.72 | 28.89 | 29.58 | 34.92 |
| 11600 | 18.90 | 23.77 | 1.28 | 1.35 | 3.74 | 28.82 | 29.69 | 34.74 |
| 11800 | 18.89 | 23.67 | 1.28 | 1.34 | 3.70 | 28.87 | 29.62 | 34.82 |
| 12000 | 18.91 | 23.41 | 1.27 | 1.34 | 3.73 | 28.82 | 29.72 | 34.75 |
| 12200 | 18.97 | 22.89 | 1.24 | 1.36 | 3.67 | 28.91 | 29.67 | 34.69 |
| 12400 | 19.08 | 22.23 | 1.21 | 1.38 | 3.74 | 28.99 | 29.75 | 34.61 |
| 12600 | 19.20 | 21.42 | 1.18 | 1.40 | 3.65 | 29.00 | 29.96 | 34.60 |
| 12800 | 19.31 | 20.59 | 1.14 | 1.41 | 3.62 | 29.05 | 29.95 | 34.61 |
| 13000 | 19.40 | 19.82 | 1.12 | 1.40 | 3.68 | 29.10 | 29.93 | 34.51 |
| 13200 | 19.44 | 19.16 | 1.16 | 1.38 | 3.61 | 29.16 | 29.88 | 34.35 |
| 13400 | 19.43 | 18.61 | 1.26 | 1.36 | 3.56 | 29.16 | 29.88 | 34.13 |
| 13600 | 19.34 | 18.26 | 1.38 | 1.34 | 3.56 | 29.14 | 29.82 | 34.03 |
| 13800 | 19.15 | 18.16 | 1.49 | 1.33 | 3.58 | 29.01 | 29.64 | 34.41 |
| 14000 | 18.83 | 18.28 | 1.59 | 1.32 | 3.52 | 29.12 | 29.53 | 34.51 |
| 14200 | 18.36 | 18.83 | 1.65 | 1.32 | 3.68 | 29.01 | 29.37 | 34.35 |
| 14400 | 17.72 | 19.73 | 1.69 | 1.30 | 3.63 | 28.89 | 29.09 | 34.25 |
| 14600 | 16.85 | 21.11 | 1.78 | 1.26 | 3.81 | 28.64 | 28.70 | 33.98 |
| 14800 | 15.81 | 22.87 | 1.96 | 1.19 | 3.85 | 28.08 | 28.35 | 34.02 |
| 15000 | 14.66 | 24.82 | 2.16 | 1.09 | 4.05 | 27.29 | 27.25 | 36.47 |

Typical Performance Curves

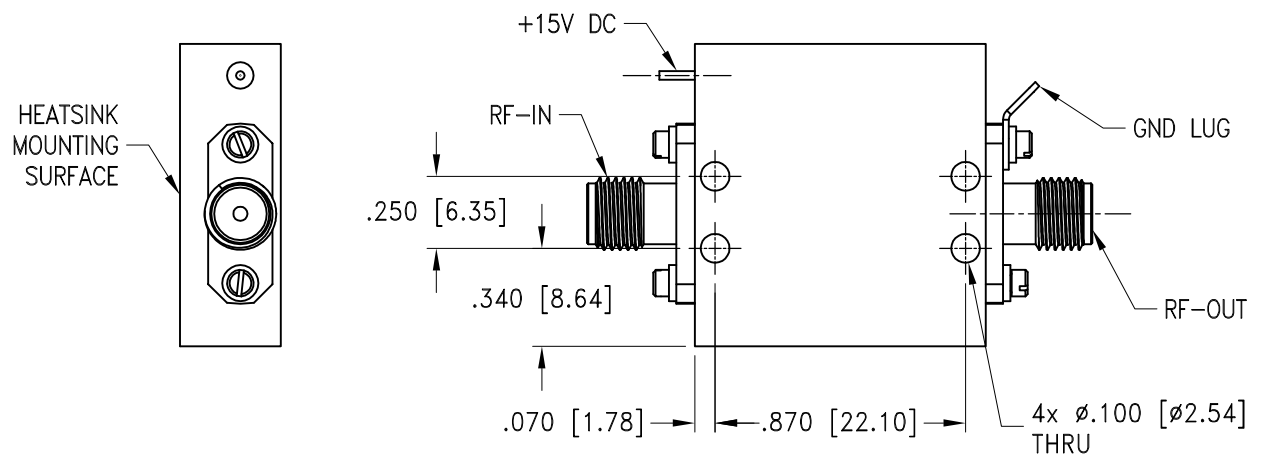


Outline Dimensions

AV243



MOUNTING INFORMATION OF MODEL WITHOUT HEATSINK



Weight: 58 grams; Weight without heatsink: 17 grams

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

Notes:

1. Case material: Aluminum alloy
2. Case finish: Nickel plate.
3. Heat sink finish: Black anodize.

Mini-Circuits
ISO 9001 ISO 14001 CERTIFIED

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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 | -55° to 54° 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 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 |