



MEDIUM POWER, HIGH GAIN

# Wideband Amplifier ZVA-443HGX+

50Ω 10 MHz to 43.5 GHz<sup>1</sup>

## THE BIG DEAL

- High Gain of 33 dB typ.
- Output Power of +11 dBm typ. at saturation
- Operates with a single DC supply of +9 to +15 V
- Over-Voltage and Reverse Voltage protected

## APPLICATIONS

- Wideband Test and Instrumentation
- 5G
- SATCOM
- Optical communications



Generic photo used for illustration purposes only

|            |               |
|------------|---------------|
| Model No.  | ZVA-443HGX+   |
| Case Style | T2704-1       |
| Connectors | 2.92mm Female |

### +RoHS Compliant

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

## PRODUCT OVERVIEW

Mini-Circuits' ZVA-443HGX+ is a Coaxial, High Gain and General-Purpose Wideband amplifier operating from 10 MHz to 43.5 GHz<sup>1</sup>. The model operates over a single positive supply range of +9 to +15 V, allowing users to choose their desired operating voltage. Internal DC-DC conversion circuitry maintains constant efficiency over the full input voltage range. The amplifier incorporates several DC-protection features such as Over-voltage, Reverse voltage and In-rush current that protects the amplifier from damage if mishandled during operation. The Amplifier is capable of delivering over +11 dBm of saturated RF power over the entire band and has a good Noise figure performance of 3.5 dB, typ. up to 26.5 GHz. The Wideband operation combined with a High Gain makes this model an ideal choice for testing and instrumentation applications.

## KEY FEATURES

| Feature  | Advantages   |
|--|--|
| Wide-band amplifier, 10 MHz to 43.5 GHz <sup>1</sup>   | A single amplifier covers applications including Test & instrumentation, Fiber Optics, 5G, SATCOM, etc.  |
| <ul style="list-style-type: none"> <li>• High Gain</li> <li>• Wideband</li> <li>• Low Noise Figure</li> <li>• Medium RF power</li> </ul> | The Amplifier is capable of providing High Gain of about 33 dB typ. combined with low Noise Figure of 3.5 dB typ. The model is capable of delivering Saturated Output Power of over +11 dBm typ. in the entire operating band. |
| Adjustable DC Supply voltage   | The device is capable of operating from +9 to +15 V with constant DC power consumption, with no effect on RF performance.  |
| DC Protection <ul style="list-style-type: none"> <li>• Over-voltage</li> <li>• Reverse voltage</li> <li>• In-rush current</li> </ul>     | The internal DC circuitry allows the amplifier to be protected from any external mishandling that could lead to catastrophic failures in the field.  |

1. Amplifier is usable down to 100 kHz

REV. B  
 ECO-008181  
 ZVA-443HGX+  
 AD/JM/CP/AM  
 210610





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Mini-Circuits

## ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter                                      | Condition (MHz) | Min. | Typ. | Max.  | Units |
|--|-----------------|------|------|-------|-------|
| Frequency Range <sup>1</sup>                   |                 | 10   |      | 43500 | MHz   |
| Gain   | 10 - 18000      | 30   | 37   |       | dB    |
|  | 18000 - 32000   | 25   | 33   |       |       |
|  | 32000 - 40000   | 24   | 30   |       |       |
|  | 40000 - 43500   | 22   | 28   |       |       |
| Input VSWR                                     | 10 - 18000      |      | 1.5  |       | :1    |
|  | 18000 - 32000   |      | 1.3  |       |       |
|  | 32000 - 40000   |      | 1.4  |       |       |
|  | 40000 - 43500   |      | 1.6  |       |       |
| Output VSWR <sup>3</sup>                       | 10 - 18000      |      | 1.5  |       | :1    |
|  | 18000 - 32000   |      | 1.7  |       |       |
|  | 32000 - 40000   |      | 1.9  |       |       |
|  | 40000 - 43500   |      | 1.7  |       |       |
| Output Power at 1dB compression                | 10 - 18000      |      | 12   |       | dBm   |
|  | 18000 - 32000   |      | 10   |       |       |
|  | 32000 - 40000   |      | 9    |       |       |
|  | 40000 - 43500   |      | 8    |       |       |
| Output IP3                                     | 10 - 18000      |      | 20   |       | dBm   |
|  | 18000 - 32000   |      | 18   |       |       |
|  | 32000 - 40000   |      | 18   |       |       |
|  | 40000 - 43500   |      | 18   |       |       |
| Noise Figure                                   | 1000-26500      |      | 3.5  |       | dB    |
|  | 26500-43500     |      | 6.0  |       |       |
| Operating DC Voltage                           |                 | +9   |      | +15   | V     |
| Device Operating Current at +9V <sup>2</sup>   |                 |      |      | 350   | mA    |
| Device Operating Power at Operating DC Voltage |                 |      | 2.6  |       | W     |

1. Amplifier is usable down to 100 kHz

2. DC Supply must be able to source at least 400mA DC at startup.

## MAXIMUM RATINGS<sup>3</sup>

| Parameter                       | Ratings         |
|---------------------------------|-----------------|
| Operating Temperature (Ambient) | -10°C to +85°C  |
| Storage Temperature             | -55°C to +100°C |
| Total Power dissipation         | 3W              |
| Input Power (CW)                | +5 dBm          |
| DC Voltage                      | +16V            |

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

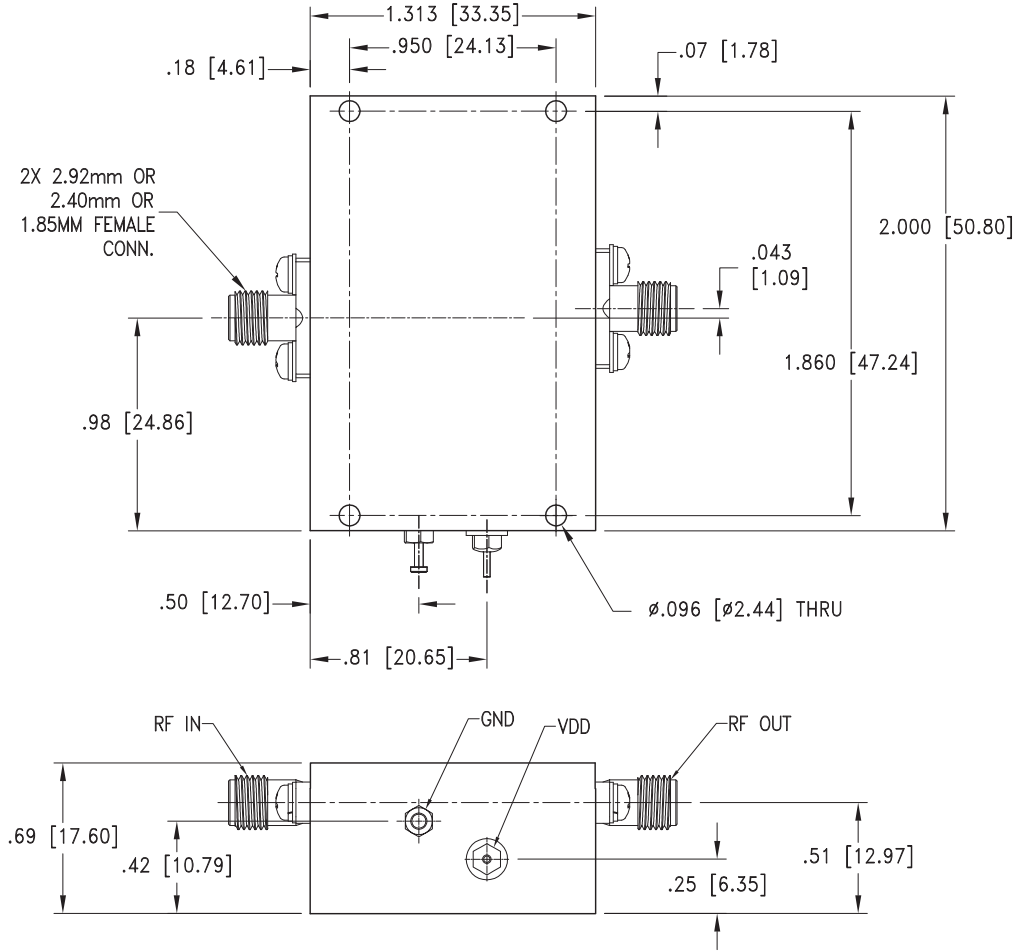




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# Wideband Amplifier ZVA-443HGX+

## OUTLINE DRAWING



Weight: 220 grams

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

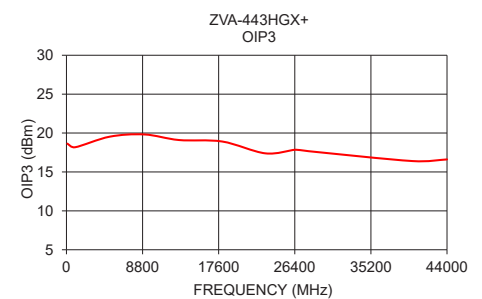
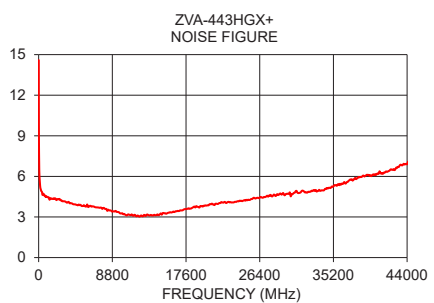
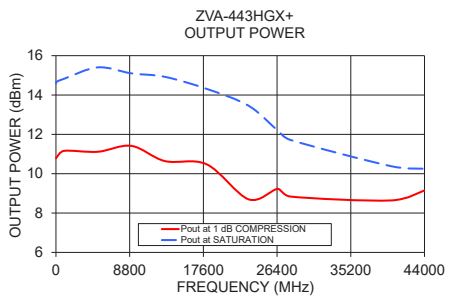
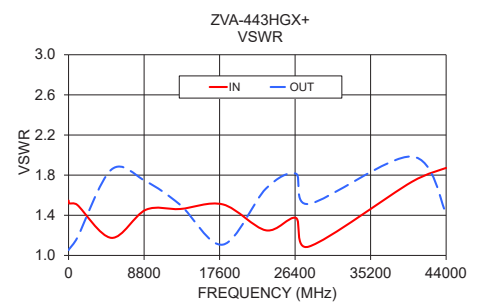
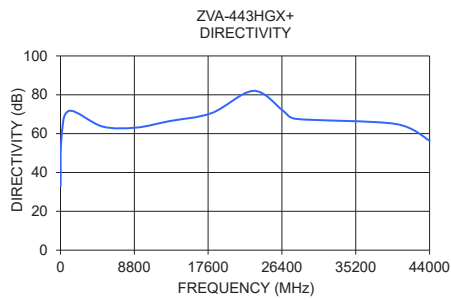
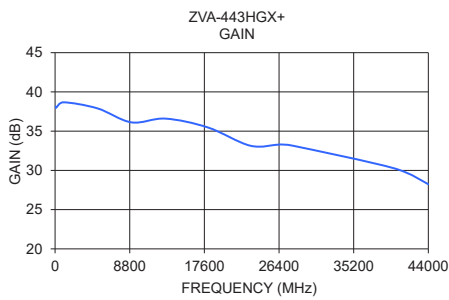


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## TYPICAL PERFORMANCE DATA/CURVES

| Frequency (MHz) | Gain (dB) | Directivity (dB) | VSWR (:1) |      | NOISE FIGURE (dB) | POUT at 1 dB COMPR. (dBm) | POUT at SATURATION (dBm) | OIP3 (dBm) |
|-----------------|-----------|------------------|-----------|------|-------------------|---------------------------|--------------------------|------------|
|                 |           |                  | IN        | OUT  |                   |                           |                          |            |
| 10              | 38.17     | 32.97            | 1.55      | 1.05 | 14.59             | 10.79                     | 14.59                    | --         |
| 100             | 37.96     | 56.78            | 1.52      | 1.07 | 5.39              | 10.84                     | 14.68                    | 18.64      |
| 1000            | 38.68     | 71.68            | 1.50      | 1.17 | 4.48              | 11.16                     | 14.83                    | 18.18      |
| 5000            | 37.90     | 63.65            | 1.17      | 1.86 | 3.90              | 11.12                     | 15.40                    | 19.53      |
| 9000            | 36.12     | 63.10            | 1.45      | 1.74 | 3.42              | 11.42                     | 15.10                    | 19.82      |
| 13000           | 36.60     | 66.44            | 1.46      | 1.50 | 3.18              | 10.64                     | 14.92                    | 19.10      |
| 18000           | 35.48     | 70.54            | 1.51      | 1.11 | 3.60              | 10.48                     | 14.31                    | 18.91      |
| 23000           | 33.15     | 82.02            | 1.25      | 1.67 | 4.08              | 8.70                      | 13.46                    | 17.39      |
| 26500           | 33.30     | 71.95            | 1.37      | 1.81 | 4.49              | 9.23                      | 12.18                    | 17.86      |
| 28000           | 33.15     | 67.64            | 1.09      | 1.51 | 4.59              | 8.84                      | 11.72                    | 17.67      |
| 40000           | 30.26     | 64.94            | 1.73      | 1.99 | 6.15              | 8.64                      | 10.38                    | 16.40      |
| 44000           | 28.23     | 56.33            | 1.87      | 1.42 | 6.90              | 9.15                      | 10.25                    | 16.61      |



### NOTES

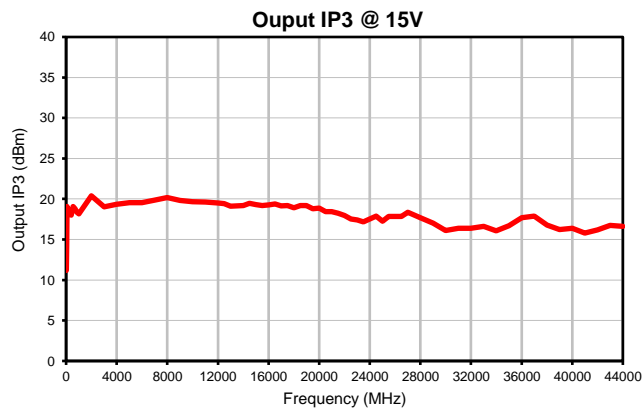
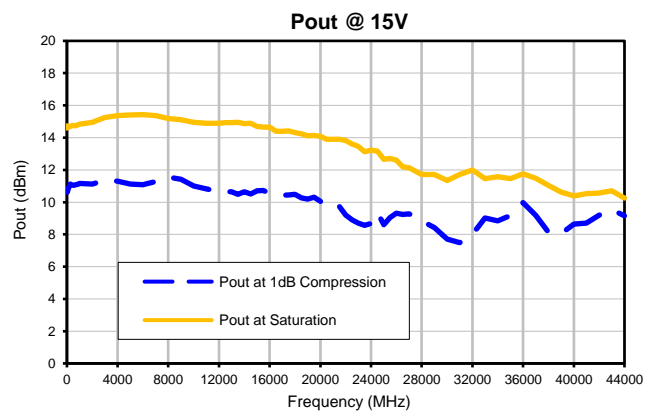
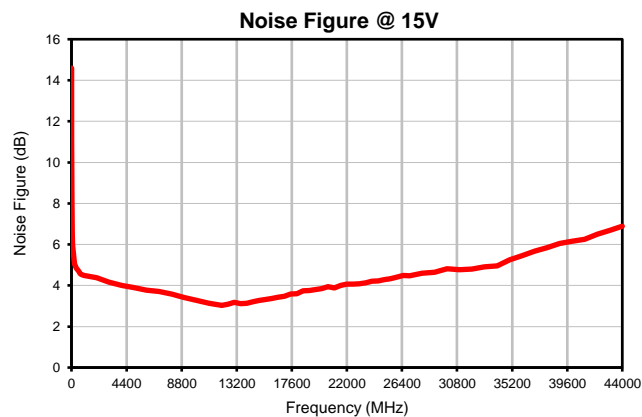
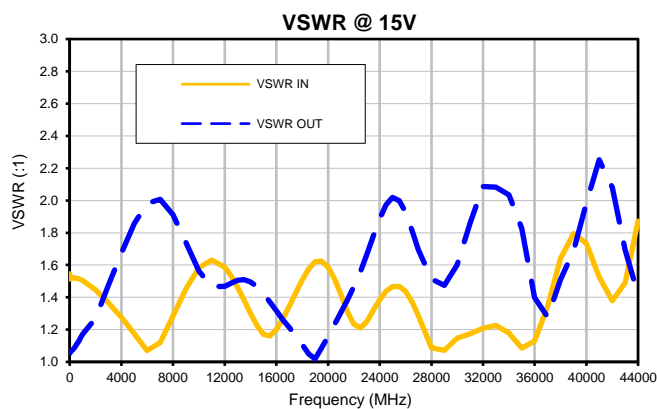
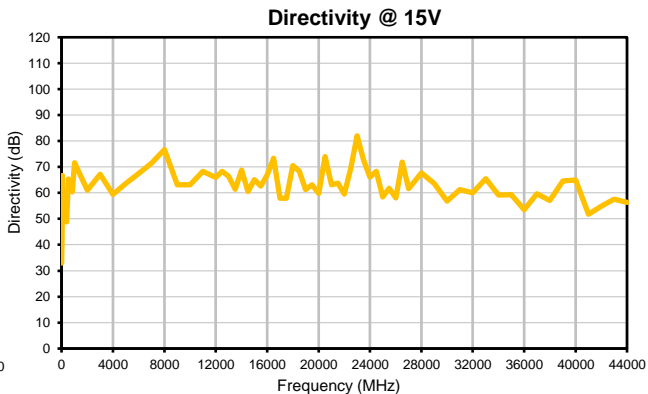
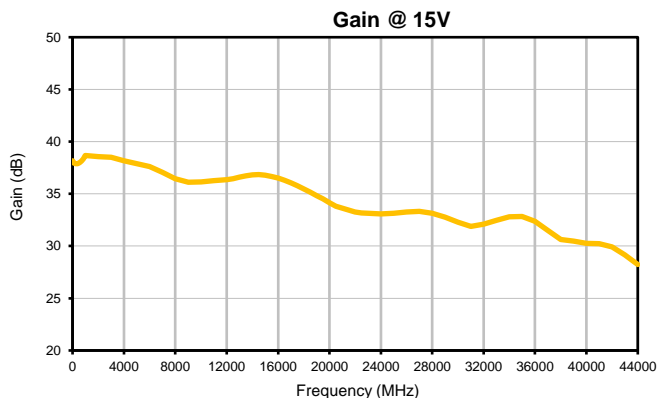
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## Typical Performance Data

| 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 @<br>SATURATION<br>(dBm)<br>15V | OUTPUT IP3<br>(dBm)<br>15V |
|--------------------|---------------------|----------------------------|-----------|------------|-----------------------------|--|--------------------------------------|----------------------------|
|                    |                     |                            | IN<br>15V | OUT<br>15V |                             |  |                                      |                            |
| 10                 | 38.17               | 32.97                      | 1.55      | 1.05       | 14.59                       | 10.79                                      | 14.59                                | --                         |
| 20                 | 38.12               | 36.38                      | 1.51      | 1.06       | 11.11                       | 10.75                                      | 14.67                                | 11.18                      |
| 40                 | 38.08               | 43.64                      | 1.52      | 1.06       | 8.19                        | 10.63                                      | 14.73                                | 14.40                      |
| 70                 | 38.02               | 66.72                      | 1.52      | 1.06       | 6.53                        | 10.71                                      | 14.72                                | 19.05                      |
| 100                | 37.96               | 56.78                      | 1.52      | 1.07       | 5.96                        | 10.84                                      | 14.68                                | 18.64                      |
| 250                | 37.88               | 51.02                      | 1.52      | 1.08       | 5.06                        | 11.13                                      | 14.70                                | 18.68                      |
| 400                | 37.89               | 48.82                      | 1.52      | 1.09       | 4.84                        | 11.06                                      | 14.76                                | 17.98                      |
| 550                | 37.98               | 65.40                      | 1.52      | 1.11       | 4.72                        | 11.04                                      | 14.74                                | 19.09                      |
| 700                | 38.12               | 63.74                      | 1.51      | 1.13       | 4.56                        | 11.08                                      | 14.73                                | 18.78                      |
| 850                | 38.36               | 60.41                      | 1.51      | 1.15       | 4.53                        | 11.11                                      | 14.80                                | 18.36                      |
| 1000               | 38.68               | 71.68                      | 1.50      | 1.17       | 4.48                        | 11.16                                      | 14.83                                | 18.18                      |
| 2000               | 38.58               | 60.98                      | 1.45      | 1.27       | 4.38                        | 11.12                                      | 14.94                                | 20.39                      |
| 3000               | 38.50               | 67.16                      | 1.37      | 1.47       | 4.16                        | 11.36                                      | 15.26                                | 19.03                      |
| 4000               | 38.16               | 59.48                      | 1.28      | 1.67       | 4.00                        | 11.30                                      | 15.37                                | 19.35                      |
| 5000               | 37.90               | 63.65                      | 1.17      | 1.86       | 3.90                        | 11.12                                      | 15.40                                | 19.53                      |
| 6000               | 37.62               | 67.43                      | 1.07      | 1.98       | 3.77                        | 11.08                                      | 15.43                                | 19.52                      |
| 7000               | 37.05               | 71.38                      | 1.12      | 2.01       | 3.71                        | 11.27                                      | 15.36                                | 19.87                      |
| 8000               | 36.43               | 76.73                      | 1.28      | 1.91       | 3.58                        | 11.56                                      | 15.19                                | 20.17                      |
| 9000               | 36.12               | 63.10                      | 1.45      | 1.74       | 3.42                        | 11.42                                      | 15.10                                | 19.82                      |
| 10000              | 36.15               | 63.14                      | 1.58      | 1.56       | 3.27                        | 11.00                                      | 14.95                                | 19.66                      |
| 11000              | 36.26               | 68.29                      | 1.63      | 1.47       | 3.13                        | 10.81                                      | 14.90                                | 19.64                      |
| 12000              | 36.36               | 65.95                      | 1.59      | 1.47       | 3.03                        | 10.67                                      | 14.89                                | 19.50                      |
| 12500              | 36.46               | 68.32                      | 1.53      | 1.49       | 3.08                        | 10.64                                      | 14.94                                | 19.43                      |
| 13000              | 36.60               | 66.44                      | 1.46      | 1.50       | 3.18                        | 10.64                                      | 14.92                                | 19.10                      |
| 13500              | 36.74               | 61.36                      | 1.38      | 1.51       | 3.11                        | 10.49                                      | 14.94                                | 19.17                      |
| 14000              | 36.83               | 68.84                      | 1.30      | 1.50       | 3.13                        | 10.64                                      | 14.88                                | 19.18                      |
| 14500              | 36.86               | 60.50                      | 1.22      | 1.47       | 3.22                        | 10.51                                      | 14.88                                | 19.47                      |
| 15000              | 36.80               | 65.07                      | 1.17      | 1.42       | 3.27                        | 10.70                                      | 14.69                                | 19.30                      |
| 15500              | 36.67               | 62.64                      | 1.16      | 1.37       | 3.32                        | 10.72                                      | 14.66                                | 19.19                      |
| 16000              | 36.50               | 66.93                      | 1.20      | 1.32       | 3.37                        | 10.58                                      | 14.65                                | 19.28                      |
| 16500              | 36.28               | 73.34                      | 1.27      | 1.26       | 3.42                        | 10.52                                      | 14.39                                | 19.39                      |
| 17000              | 36.04               | 57.96                      | 1.35      | 1.21       | 3.48                        | 10.43                                      | 14.40                                | 19.13                      |
| 17500              | 35.77               | 57.99                      | 1.43      | 1.16       | 3.59                        | 10.44                                      | 14.42                                | 19.20                      |
| 18000              | 35.48               | 70.54                      | 1.51      | 1.11       | 3.60                        | 10.48                                      | 14.31                                | 18.91                      |
| 18500              | 35.16               | 68.41                      | 1.58      | 1.05       | 3.74                        | 10.27                                      | 14.23                                | 19.19                      |
| 19000              | 34.83               | 61.23                      | 1.62      | 1.02       | 3.75                        | 10.19                                      | 14.12                                | 19.18                      |
| 19500              | 34.52               | 63.19                      | 1.62      | 1.09       | 3.80                        | 10.32                                      | 14.13                                | 18.78                      |
| 20000              | 34.15               | 59.84                      | 1.59      | 1.16       | 3.84                        | 10.04                                      | 14.08                                | 18.89                      |
| 20500              | 33.83               | 73.97                      | 1.51      | 1.23       | 3.95                        | 9.79                                       | 13.90                                | 18.43                      |
| 21000              | 33.62               | 63.08                      | 1.42      | 1.31       | 3.88                        | 9.91                                       | 13.89                                | 18.42                      |
| 21500              | 33.43               | 63.70                      | 1.31      | 1.38       | 4.00                        | 9.73                                       | 13.90                                | 18.25                      |
| 22000              | 33.26               | 59.57                      | 1.23      | 1.47       | 4.07                        | 9.19                                       | 13.82                                | 17.97                      |
| 22500              | 33.17               | 69.47                      | 1.21      | 1.56       | 4.07                        | 8.90                                       | 13.61                                | 17.52                      |
| 23000              | 33.15               | 82.02                      | 1.25      | 1.67       | 4.08                        | 8.70                                       | 13.46                                | 17.39                      |
| 23500              | 33.11               | 72.70                      | 1.32      | 1.78       | 4.12                        | 8.55                                       | 13.12                                | 17.18                      |
| 24000              | 33.08               | 66.08                      | 1.39      | 1.89       | 4.21                        | 8.67                                       | 13.23                                | 17.51                      |
| 24500              | 33.11               | 68.36                      | 1.44      | 1.97       | 4.23                        | 9.36                                       | 13.18                                | 17.90                      |
| 25000              | 33.14               | 58.44                      | 1.47      | 2.02       | 4.28                        | 8.61                                       | 12.65                                | 17.26                      |
| 25500              | 33.20               | 61.81                      | 1.47      | 2.00       | 4.33                        | 9.03                                       | 12.70                                | 17.85                      |
| 26000              | 33.26               | 58.04                      | 1.44      | 1.93       | 4.40                        | 9.32                                       | 12.62                                | 17.85                      |
| 26500              | 33.30               | 71.95                      | 1.37      | 1.81       | 4.49                        | 9.23                                       | 12.18                                | 17.86                      |
| 27000              | 33.32               | 61.60                      | 1.29      | 1.69       | 4.46                        | 9.27                                       | 12.14                                | 18.37                      |
| 28000              | 33.15               | 67.64                      | 1.09      | 1.51       | 4.59                        | 8.84                                       | 11.72                                | 17.67                      |
| 29000              | 32.77               | 63.64                      | 1.07      | 1.47       | 4.65                        | 8.43                                       | 11.71                                | 17.02                      |
| 30000              | 32.28               | 56.81                      | 1.15      | 1.60       | 4.81                        | 7.72                                       | 11.35                                | 16.09                      |
| 31000              | 31.89               | 61.22                      | 1.17      | 1.86       | 4.77                        | 7.49                                       | 11.71                                | 16.38                      |
| 32000              | 32.10               | 60.06                      | 1.21      | 2.09       | 4.80                        | 8.00                                       | 12.00                                | 16.37                      |
| 33000              | 32.48               | 65.53                      | 1.23      | 2.08       | 4.91                        | 9.01                                       | 11.47                                | 16.62                      |
| 34000              | 32.79               | 59.18                      | 1.18      | 2.04       | 4.96                        | 8.84                                       | 11.59                                | 16.06                      |
| 35000              | 32.82               | 59.25                      | 1.08      | 1.83       | 5.25                        | 9.17                                       | 11.46                                | 16.68                      |
| 36000              | 32.38               | 53.47                      | 1.13      | 1.40       | 5.46                        | 9.97                                       | 11.76                                | 17.67                      |
| 37000              | 31.47               | 59.66                      | 1.35      | 1.28       | 5.67                        | 9.17                                       | 11.47                                | 17.89                      |
| 38000              | 30.64               | 57.09                      | 1.64      | 1.51       | 5.85                        | 8.14                                       | 11.05                                | 16.77                      |
| 39000              | 30.48               | 64.60                      | 1.80      | 1.69       | 6.04                        | 8.04                                       | 10.62                                | 16.21                      |
| 40000              | 30.26               | 64.94                      | 1.73      | 1.99       | 6.15                        | 8.64                                       | 10.38                                | 16.40                      |
| 41000              | 30.23               | 51.76                      | 1.53      | 2.25       | 6.25                        | 8.70                                       | 10.52                                | 15.77                      |
| 42000              | 29.93               | 54.90                      | 1.38      | 2.08       | 6.50                        | 9.20                                       | 10.56                                | 16.17                      |
| 43000              | 29.15               | 57.58                      | 1.49      | 1.69       | 6.69                        | 9.54                                       | 10.70                                | 16.72                      |
| 44000              | 28.23               | 56.33                      | 1.87      | 1.42       | 6.90                        | 9.15                                       | 10.25                                | 16.61                      |

## Typical Performance Curves

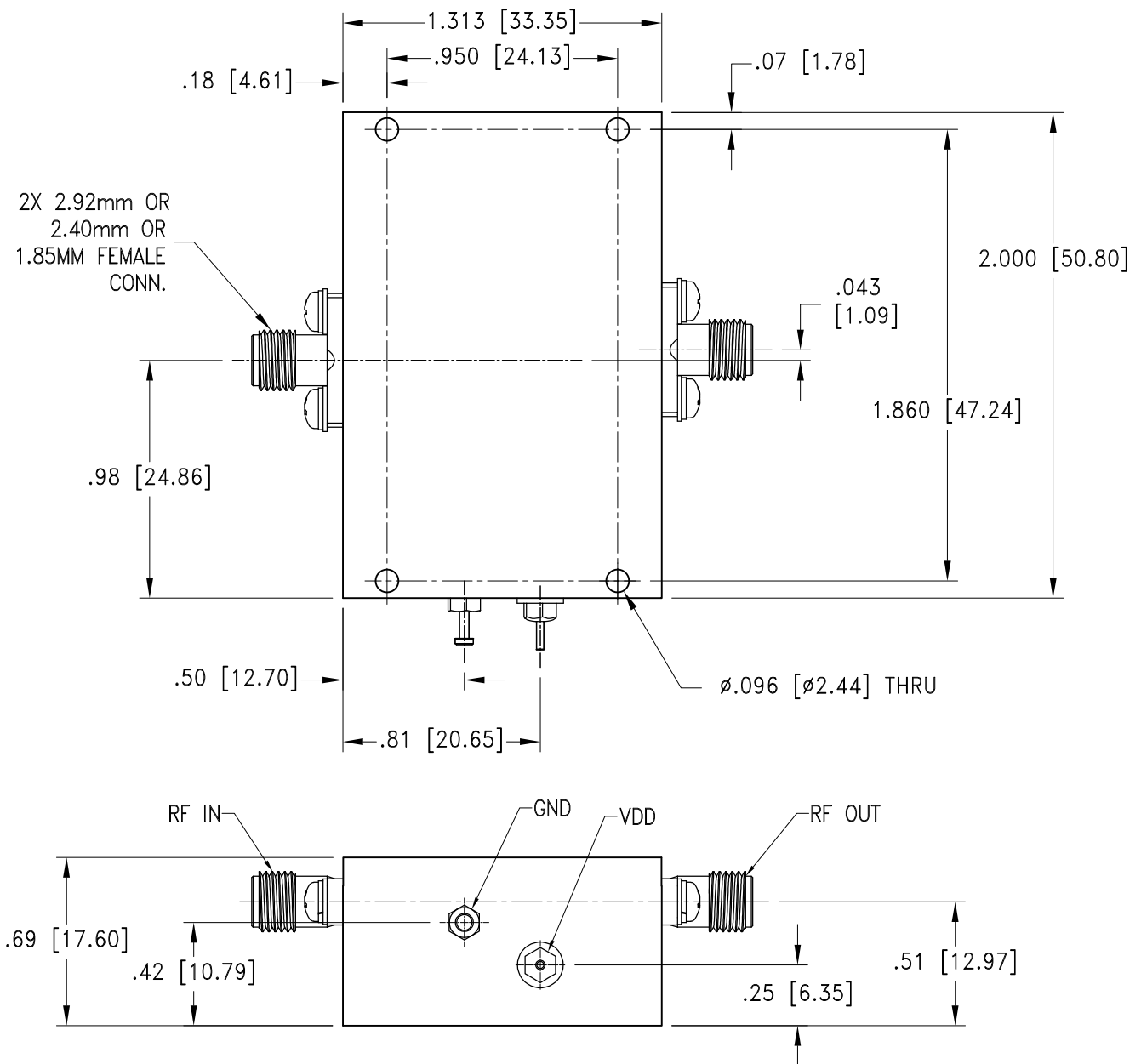


# Case Style

# T

## Outline Dimensions

### T2704-1



Weight: 220 grams;

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

### Notes:

1. Case Material: Brass Alloy
2. Case Finish: Gold Plating

**Mini-Circuits**  
ISO 9001 ISO 14001 CERTIFIED

ALL NEW  
minicircuits.com

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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 | -10° to +85° C<br>Case Temperature or Ambient Temperature | Individual Model Data Sheet |
| Storage Temperature   | -55° to 100° C<br>Ambient Environment                     | Individual Model Data Sheet |