



COAXIAL

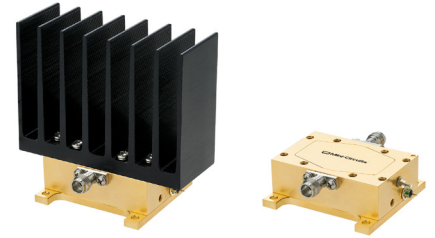
# Low Noise Amplifier

## ZVA-44703LN+ ZVA-44703LNx+

50Ω 44 to 70 GHz NF 2.7 dB 1.85mm Female

### THE BIG DEAL

- Exceptionally High Frequency
- Flat Gain Response, ±2.0 dB Typ.
- Low Noise Figure, 2.7 dB Typ.
- High P<sub>SAT</sub>, +20 dBm Typ.
- Wide DC Operating Voltage, +10 To +15 V
- Over Voltage And Reverse Voltage Protected

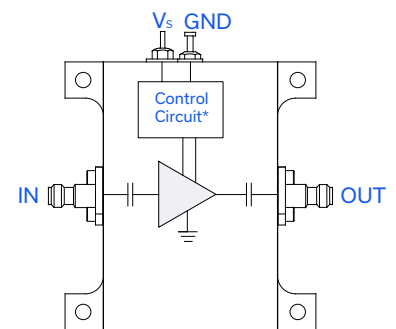


Generic photo used for illustration purposes only

### APPLICATIONS

- 5G-FR2 Millimeter Wave Testing
- Aerospace & Defense
- Test and Measurement
- Q-band, V-band SATCOM
- Wireless Infrastructure
- IEEE 802.11.ad WiGig

### FUNCTIONAL DIAGRAM



\*Voltage Regulation, over-voltage, reverse voltage, and in-rush current protection circuit

### PRODUCT OVERVIEW

Mini-Circuits' ZVA-44703LN+ is a coaxial wideband and low noise amplifier operating from 44 GHz to 70 GHz. The model operates over a positive supply range of +10 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 protection to protect from damage in case of unexpected spikes in voltage during operation. The high frequency operation combined with high gain and low noise figure makes this amplifier an ideal choice for SATCOM applications and 5G testing in millimeter wave bands.

### KEY FEATURES

| Features   | Advantages  |
|--|---|
| Wideband Amplifier, 44 to 70 GHz   | A single broadband covers 5G millimeter wave bands as well as Q-Band and V-Band SATCOM receiver applications with critical noise figure requirements.   |
| Low Noise, 2.7 dB Typ.<br>High P <sub>SAT</sub> , +20 dBm Typ.   | Exceptionally low noise figure and medium output power at extremely high frequencies enables minimal system signal to noise degradation while providing high signal drive power for over-the-air and bench top test applications. |
| Wide DC Operating Voltage, +10 To +15 V  | The device can operate from +10 to +15 V, maintaining constant DC power consumption with no effect on RF performance and facilitating ease of use in test setups with existing established voltage supplies.                      |
| 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 external mishandling or unexpected spikes in voltage that could lead to catastrophic failures in the field.   |





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### ELECTRICAL SPECIFICATIONS AT +25 °C BASEPLATE

| Parameter   | Condition (GHz) | Min. | Typ. | Max.             | Units |
|---|-----------------|------|------|------------------|-------|
| Frequency Range   | -               | 44   | -    | 70               | GHz   |
| Gain  | 44 - 70         | 41   | 45   | -                | dB    |
| Noise Figure  | 44 - 70         | -    | 2.7  | -                | dB    |
| Output Power at 1 dB Compression (P1dB)                     | 44 - 70         | -    | +18  | -                | dBm   |
| Output Power at Saturation (P <sub>SAT</sub> ) <sup>1</sup> | 44 - 70         | -    | +20  | -                | dBm   |
| Output IP3  | 44-70           | -    | +28  | -                | dBm   |
| Input Return Loss   | 44 - 70         | -    | 13   | -                | dB    |
| Output Return Loss  | 44 - 70         | -    | 13   | -                | dB    |
| DC Supply Voltage (V <sub>S</sub> )                         | -               | +10  | -    | +15              | V     |
| DC Current at V <sub>S</sub> = +10V (Without/With Heatsink) | -               | -    | 300  | 400 <sup>2</sup> | mA    |

1. At P<sub>SAT</sub>, P<sub>OUT</sub> changes less than 0.1 dB for a 1 dB change in P<sub>IN</sub>
2. Max DC Current at P<sub>SAT</sub>. DC current increases as amplifier is driven into compression.



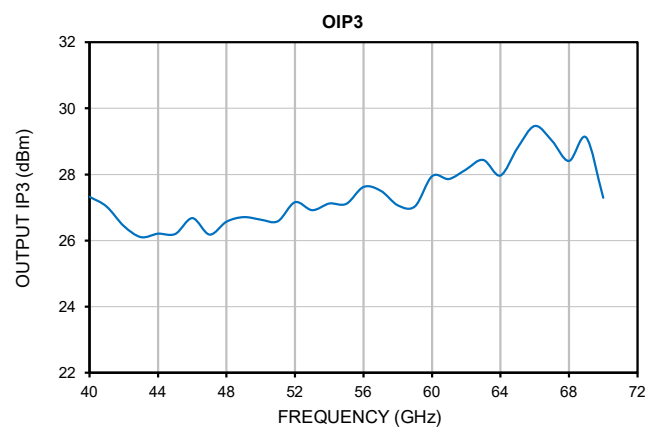
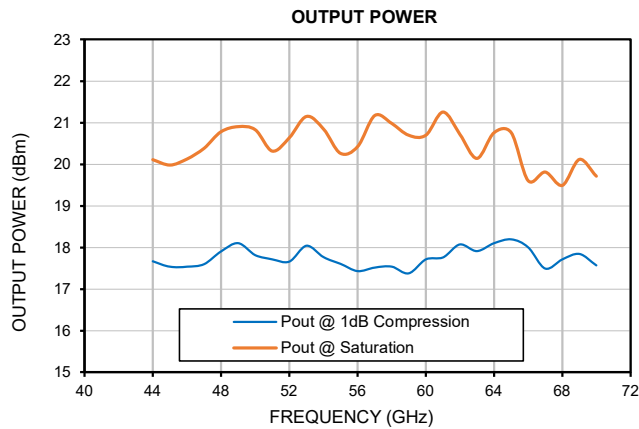
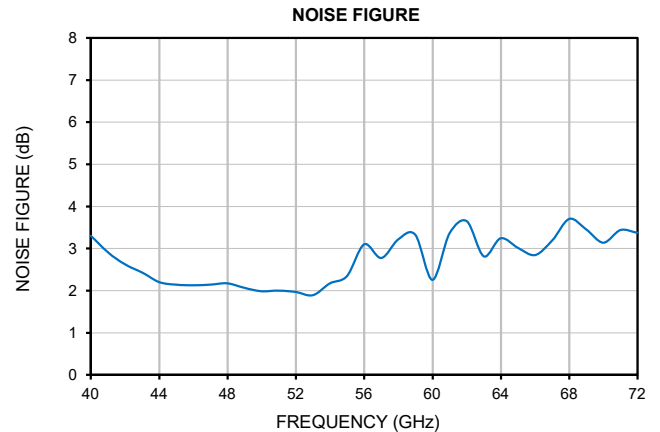
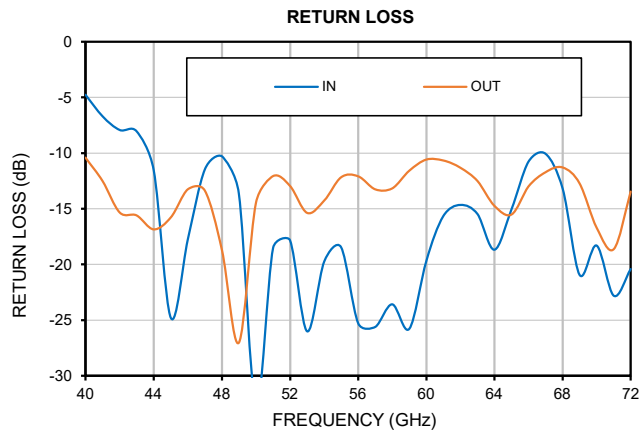
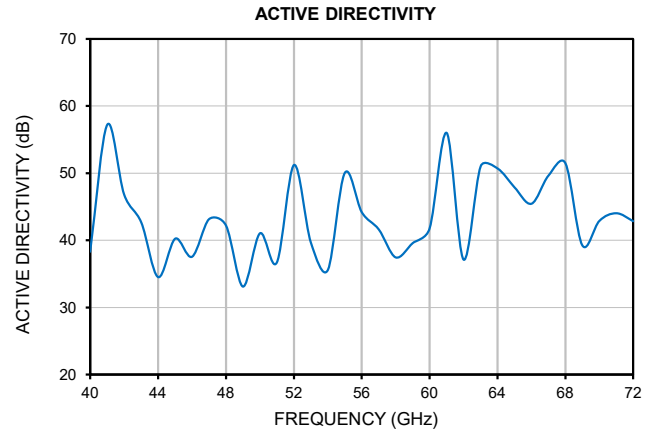
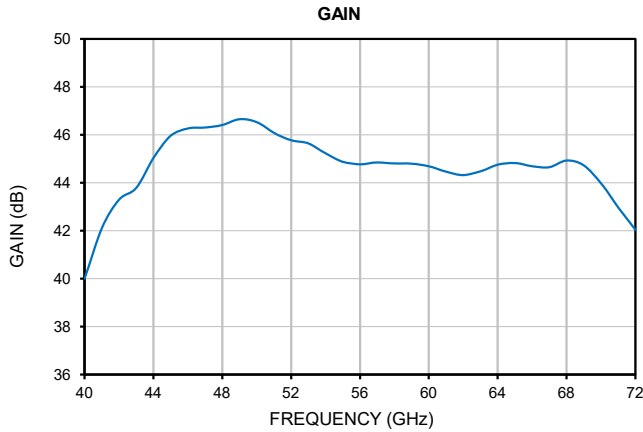
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50Ω 44 to 70 GHz NF 2.7 dB 1.85mm Female

### TYPICAL PERFORMANCE GRAPHS





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# Low Noise Amplifier

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50Ω 44 to 70 GHz NF 2.7 dB 1.85mm Female

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

| Parameter                              | Ratings          |                  |           |
|--|------------------|------------------|-----------|
| Operating Temperature                  | ZVA-44703LN+     | -40 °C to +50 °C | Ambient   |
|  | ZVA-44703LNX+    | -40 °C to +60 °C | Baseplate |
| Storage Temperature                    | -40 °C to +85 °C |                  |           |
| Total Power Dissipation                | 4.5 W            |                  |           |
| RF Input Power <sup>4</sup> (CW)       | +15 dBm          |                  |           |
| DC Operating Voltage (V <sub>S</sub> ) | +16 V            |                  |           |

3. Continuous operation is not recommended at these extremes. Permanent damage may occur if any of these limits are exceeded.

4. Specified under matched load to 50 ohms.

### DETERMINING MAXIMUM THERMAL RESISTANCE OF USERS' EXTERNAL HEAT SINK

|                                   |   |  |
|-----------------------------------|---|--|
| <b>MAXIMUM THERMAL RESISTANCE</b> | = | $\frac{\text{MAXIMUM OPERATING CASE TEMP} - \text{MAXIMUM USER AMBIENT TEMP}}{\text{POWER DISSIPATION}}$   |
| <b>Example:</b>                   |   | <p>MAXIMUM OPERATING CASE TEMP = +50 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE)</p> <p>MAXIMUM USER AMBIENT TEMP = +30 °C (USER DEFINED)</p> <p>POWER DISSIPATION = 10 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE)</p> <p>THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 2 °C/W</p> |





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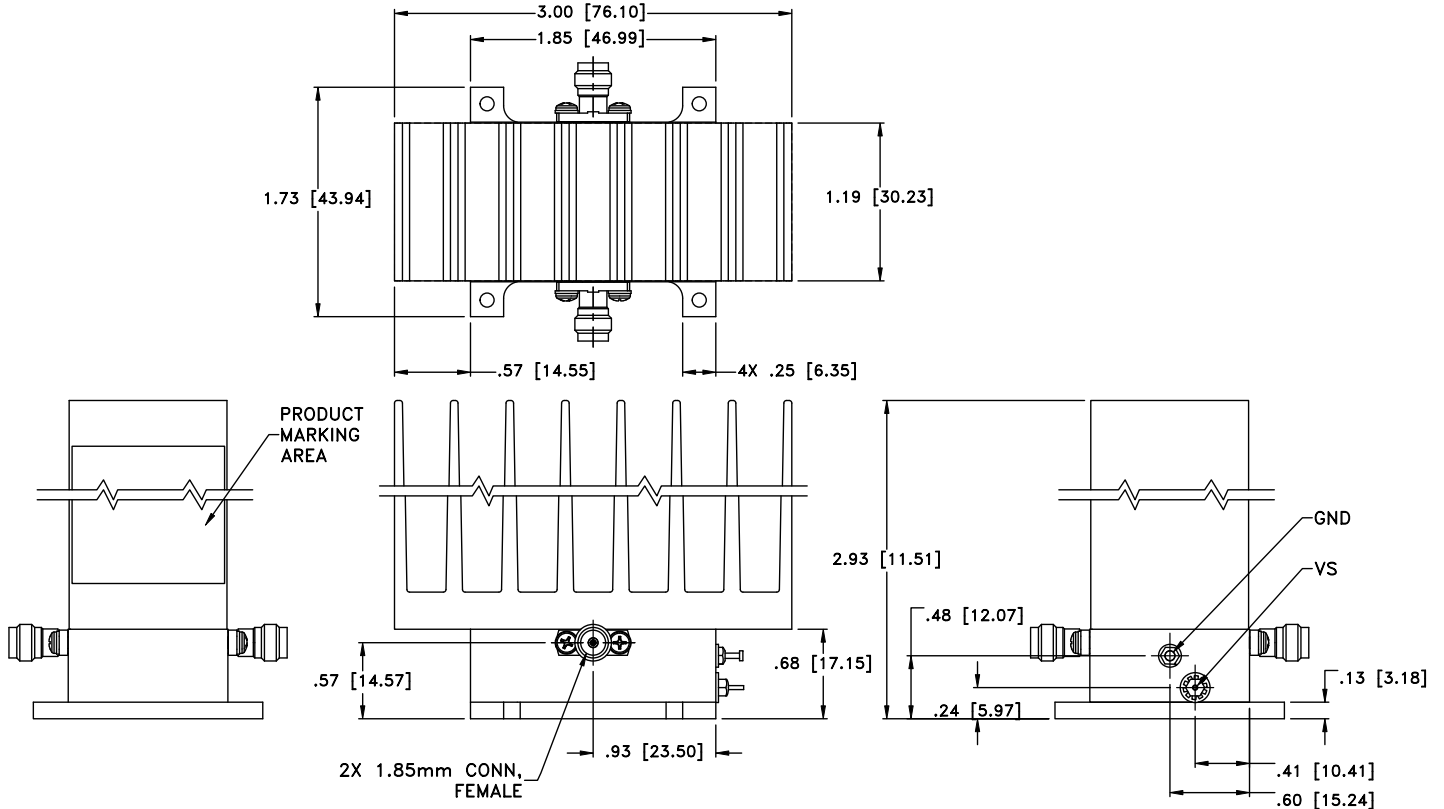
# Low Noise Amplifier

## ZVA-44703LN+ ZVA-44703LNX+

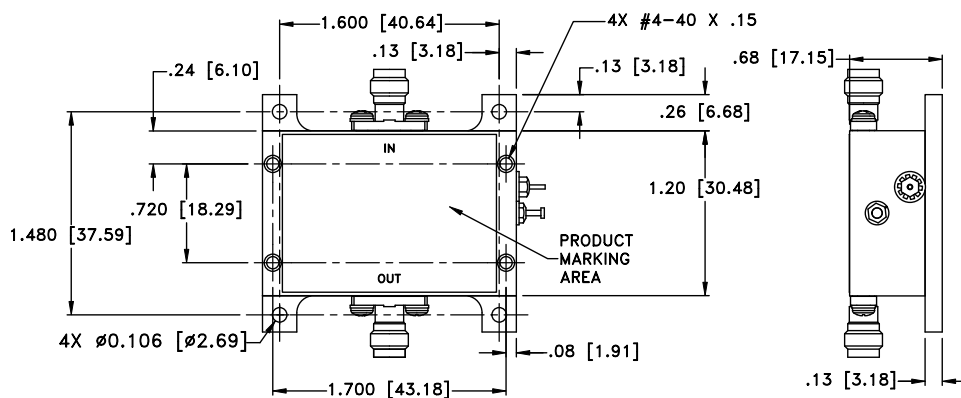
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50Ω 44 to 70 GHz NF 2.7 dB 1.85mm Female

### CASE STYLE DRAWING WITH HEATSINK (ZVA-44703LN+)



### CASE STYLE DRAWING WITHOUT HEATSINK (ZVA-44703LNX+)



Weight: 160 grams; without heatsink: 60 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.03; 3 Pl. ±.015 Inches

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# Low Noise Amplifier

## ZVA-44703LN+ ZVA-44703LNX+

50Ω 44 to 70 GHz NF 2.7 dB 1.85mm Female

### ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

|                       |  |
|-----------------------|--|
| Performance Data      | Data Table                                   |
|                       | Swept Graphs                                 |
|                       | S-Parameter (S2P Files) Data Set (.zip file) |
| RoHs Status           | Compliant                                    |
| Environmental Ratings | ENV130                                       |
| Export Information    | EAR99  |

### ORDERING INFORMATION

|                 |                              |                               |
|-----------------|------------------------------|-------------------------------|
| Model No. Links | <a href="#">ZVA-44703LN+</a> | <a href="#">ZVA-44703LNX+</a> |
| Option          | With heatsink                | Without heatsink              |
| Product Marking | ZVA-44703LN+                 | ZVA-44703LNX+                 |
| Case Style      | WC3071-7                     |                               |
| Connector       | 1.85mm (Female)              |                               |

#### 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)



# Coaxial Amplifier

ZVA-44703LN(X)+

## Typical Performance Data

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

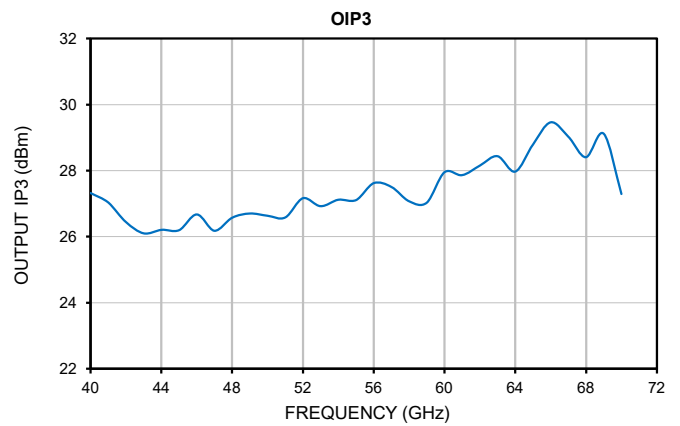
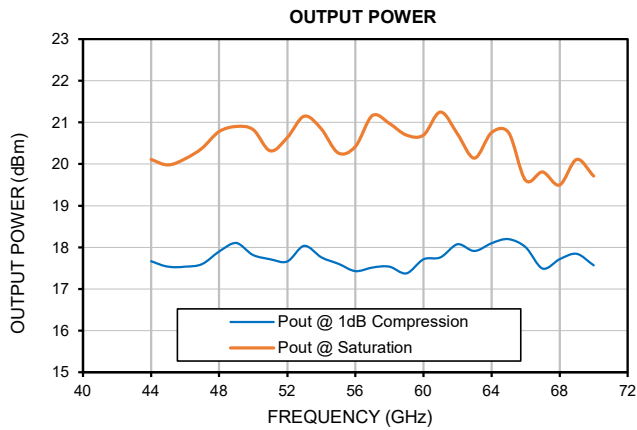
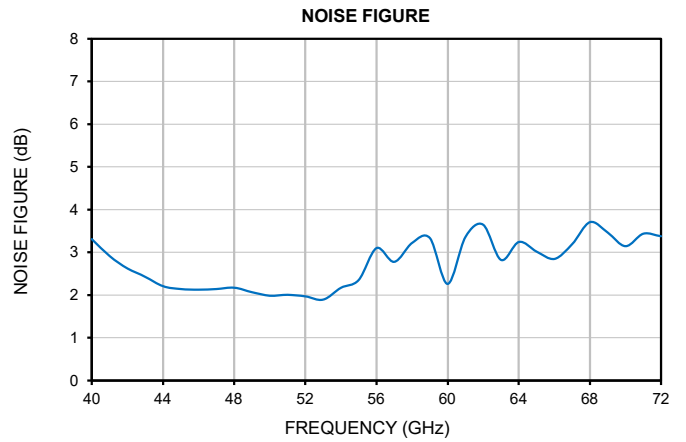
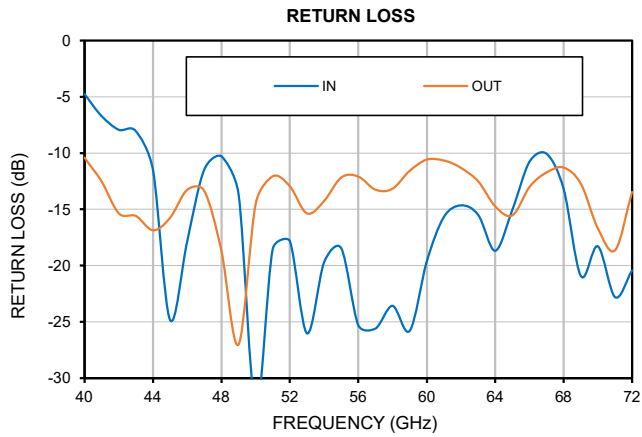
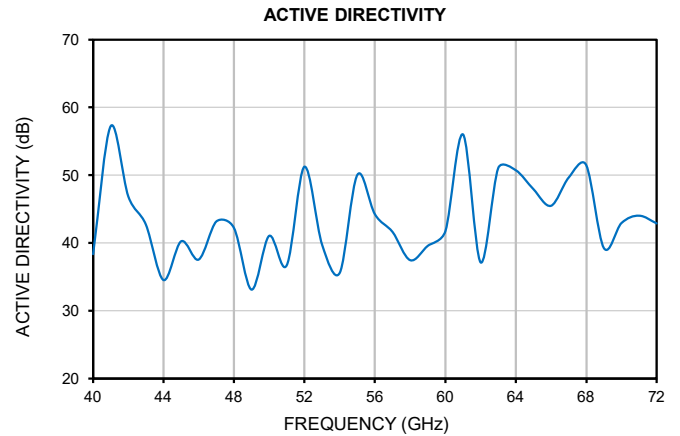
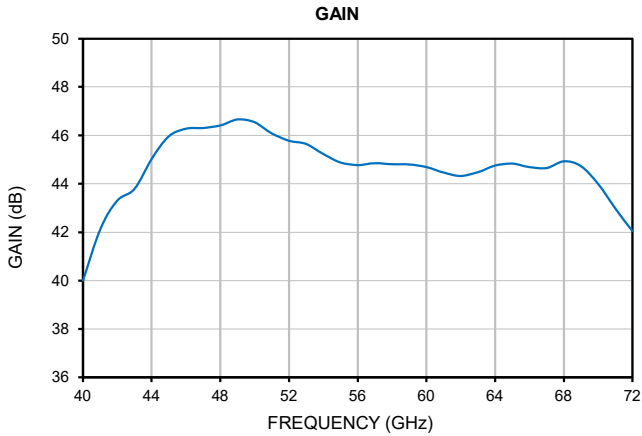
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 10V, Id = 289mA @ Temperature = +25°C

| FREQUENCY<br>(GHz) | GAIN<br>(dB) | ACTIVE<br>DIRECTIVITY<br>(dB) | RETURN LOSS (dB) |      | STABILITY |         | P <sub>OUT</sub> @ 1 dB<br>COMPRESSION<br>(dBm) | P <sub>SAT</sub><br>(dBm) | OIP3<br>(dBm) | NOISE FIGURE<br>(dB) |
|--------------------|--------------|-------------------------------|------------------|------|-----------|---------|---|---------------------------|---------------|----------------------|
|                    |              |                               | IN               | OUT  | K         | MEASURE |   |                           |               |                      |
| 40                 | 40.0         | 38.3                          | 4.8              | 10.4 | 25        | 1.22    | -   | -                         | 27.3          | 3.3                  |
| 41                 | 42.1         | 57.2                          | 6.7              | 12.5 | 270       | 1.15    | -   | -                         | 27.0          | 2.9                  |
| 42                 | 43.3         | 46.8                          | 7.9              | 15.3 | 89        | 1.13    | -   | -                         | 26.4          | 2.6                  |
| 43                 | 43.8         | 42.7                          | 8.0              | 15.6 | 56        | 1.12    | -   | -                         | 26.1          | 2.4                  |
| 44                 | 45.0         | 34.5                          | 11.5             | 16.9 | 24        | 1.05    | 17.7  | 20.1                      | 26.2          | 2.2                  |
| 45                 | 46.0         | 40.2                          | 24.8             | 15.8 | 50        | 0.98    | 17.5  | 20.0                      | 26.2          | 2.1                  |
| 46                 | 46.3         | 37.6                          | 17.8             | 13.3 | 35        | 0.97    | 17.5  | 20.1                      | 26.7          | 2.1                  |
| 47                 | 46.3         | 43.2                          | 11.5             | 13.4 | 64        | 1.02    | 17.6  | 20.4                      | 26.2          | 2.1                  |
| 48                 | 46.4         | 42.2                          | 10.3             | 18.7 | 58        | 1.08    | 17.9  | 20.8                      | 26.6          | 2.2                  |
| 49                 | 46.7         | 33.1                          | 13.6             | 27.0 | 22        | 1.04    | 18.1  | 20.9                      | 26.7          | 2.1                  |
| 50                 | 46.5         | 41.0                          | 32.7             | 14.5 | 54        | 0.96    | 17.8  | 20.8                      | 26.6          | 2.0                  |
| 51                 | 46.1         | 36.7                          | 18.5             | 12.1 | 32        | 0.95    | 17.7  | 20.3                      | 26.6          | 2.0                  |
| 52                 | 45.8         | 51.2                          | 17.8             | 12.9 | 170       | 0.96    | 17.7  | 20.6                      | 27.2          | 2.0                  |
| 53                 | 45.6         | 39.7                          | 26.0             | 15.4 | 47        | 0.97    | 18.0  | 21.2                      | 26.9          | 1.9                  |
| 54                 | 45.2         | 35.6                          | 19.7             | 14.3 | 29        | 0.97    | 17.8  | 20.8                      | 27.1          | 2.2                  |
| 55                 | 44.9         | 50.1                          | 18.5             | 12.2 | 148       | 0.95    | 17.6  | 20.3                      | 27.1          | 2.3                  |
| 56                 | 44.8         | 44.2                          | 25.3             | 12.1 | 76        | 0.94    | 17.4  | 20.4                      | 27.6          | 3.1                  |
| 57                 | 44.9         | 41.6                          | 25.6             | 13.3 | 57        | 0.96    | 17.5  | 21.2                      | 27.5          | 2.8                  |
| 58                 | 44.8         | 37.5                          | 23.6             | 13.2 | 35        | 0.96    | 17.5  | 21.0                      | 27.1          | 3.2                  |
| 59                 | 44.8         | 39.6                          | 25.8             | 11.6 | 44        | 0.93    | 17.4  | 20.7                      | 27.0          | 3.3                  |
| 60                 | 44.7         | 41.7                          | 19.6             | 10.6 | 55        | 0.92    | 17.7  | 20.7                      | 28.0          | 2.3                  |
| 61                 | 44.5         | 56.0                          | 15.7             | 10.7 | 281       | 0.94    | 17.8  | 21.3                      | 27.9          | 3.4                  |
| 62                 | 44.3         | 37.1                          | 14.6             | 11.3 | 32        | 0.96    | 18.1  | 20.7                      | 28.2          | 3.6                  |
| 63                 | 44.5         | 51.0                          | 15.5             | 12.5 | 164       | 0.97    | 17.9  | 20.1                      | 28.4          | 2.8                  |
| 64                 | 44.8         | 50.7                          | 18.7             | 14.7 | 164       | 0.98    | 18.1  | 20.8                      | 28.0          | 3.2                  |
| 65                 | 44.8         | 47.9                          | 15.0             | 15.5 | 117       | 1.00    | 18.2  | 20.8                      | 28.8          | 3.0                  |
| 66                 | 44.7         | 45.5                          | 10.8             | 13.0 | 82        | 1.03    | 18.0  | 19.6                      | 29.5          | 2.8                  |
| 67                 | 44.7         | 49.6                          | 10.1             | 11.7 | 127       | 1.02    | 17.5  | 19.8                      | 29.0          | 3.2                  |
| 68                 | 44.9         | 51.5                          | 13.2             | 11.3 | 165       | 0.97    | 17.7  | 19.5                      | 28.4          | 3.7                  |
| 69                 | 44.7         | 39.3                          | 20.9             | 12.7 | 43        | 0.95    | 17.8  | 20.1                      | 29.1          | 3.5                  |
| 70                 | 44.0         | 42.9                          | 18.3             | 16.7 | 67        | 0.99    | 17.6  | 19.7                      | 27.3          | 3.1                  |
| 71                 | 43.0         | 44.0                          | 22.8             | 18.6 | 78        | 0.99    | -   | -                         | -             | 3.4                  |
| 72                 | 42.0         | 42.9                          | 20.4             | 13.5 | 66        | 0.96    | -   | -                         | -             | 3.4                  |



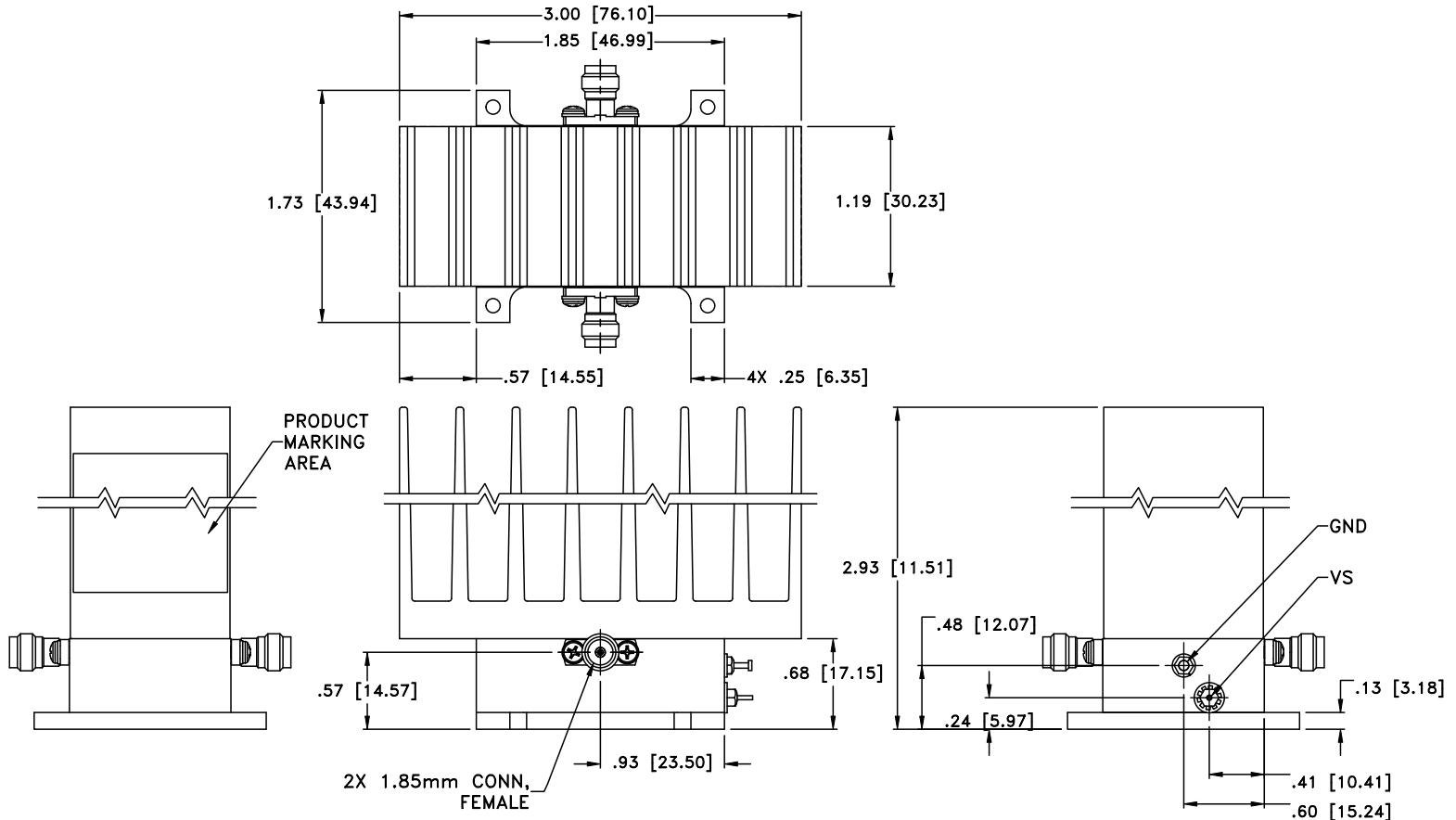
## Typical Performance Curves



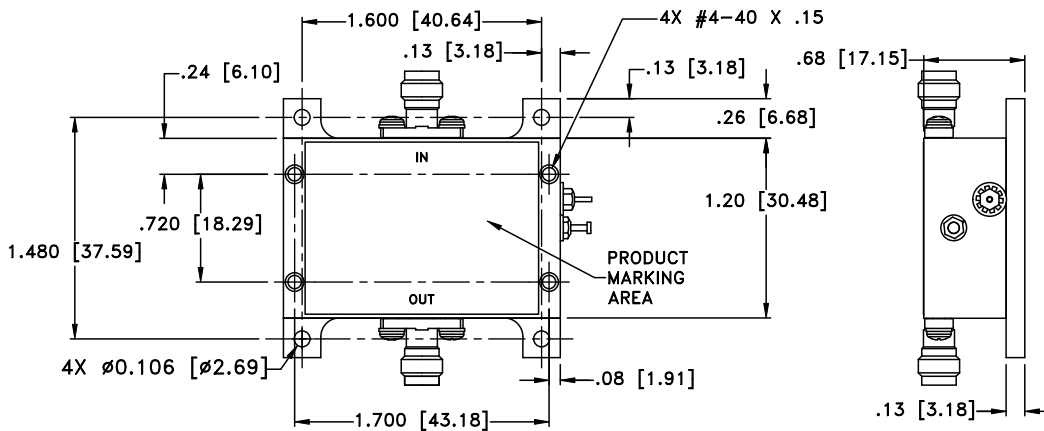


## Outline Dimensions

WC3071-7



### MOUNTING INFORMATION OF MODEL WITHOUT HEATSINK



WT. WT. GRAMS 160 grams; WITHOUT HEATSINK GRAMS 60 grams

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

#### Notes:

1. Case material: Aluminum.
2. Case finish: Gold plating;
3. Heat sink finish: Black anodize.
4. Refer to the individual model data sheet for the type of connectors available.
5. Shape of connector flange may vary.

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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.

| <b>Specification</b>  | <b>Test/Inspection Condition</b>      | <b>Reference/Spec</b>                          |
|-----------------------|---------------------------------------|--|
| Operating Temperature | -40° to +60° C<br>Baseplate Temp      | Individual Model Data Sheet                    |
| Storage Temperature   | -40° to +85° C<br>Ambient Environment | Individual Model Data Sheet                    |
| Burn-in               | (DC on)<br>72 hours at 25°C           | ----   |
| Thermal Shock         | -40° C to +85°C, 100 cycles           | Transition time = 5 mins, Dwell time = 30 mins |
| Vibration             | Random Vibration<br>(non-operating)   | MIL-STD-883K, Method 2025, Cond. 1A            |