COAXIAL

# Positive Gain Slope Amplifier ZX60-R5183P+

50Ω 0.5 to 18 GHz SMA Female

## KEY FEATURES

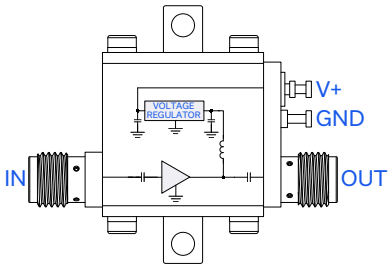
- Ultra Wideband, 0.5 to 18 GHz
- Low Noise Figure, 4.5 dB typ, 5 to 18 GHz
- Positive Gain Slope, 3 dB, typ., 0.5 to 18 GHz
- Protected by US patent 6,790,049

*Generic photo used for illustration purposes only*

## APPLICATIONS

- Microwave point to point radios
- Satellite Communication
- Military EW and Radar
- C-band Satcom

## FUNCTIONAL DIAGRAM




## PRODUCT OVERVIEW

Mini-Circuits' ZX60-R5183P+ is a wideband, positive gain slope, connectorized amplifier, providing a unique combination of low noise figure and positive gain slope, over a very wide frequency range. It supports a wide range of sensitive, high-dynamic range receiver applications and many systems where high performance over wideband is needed. This design operates on a single +5 V supply and comes in a rugged, compact unibody case (0.74 x 0.75 x 0.46") with SMA connectors, making it an excellent candidate for tough operating conditions and crowded system layouts.

## ELECTRICAL SPECIFICATIONS AT +25°C AND +5V, UNLESS NOTED OTHERWISE

| Parameter | Frequency (GHz) | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Frequency Range | | 0.5 | | 18.0 | GHz |
| Gain | 0.5 - 5<br>5 - 10<br>10 - 13<br>13 - 15<br>15 - 18 | -<br>5.0<br>5.2<br>6.0<br>- | 6.5<br>7.1<br>8.2<br>8.8<br>9.5 | | dB |
| Input Return Loss | 0.5 - 5<br>5 - 10<br>10 - 13<br>13 - 15<br>15 - 18 | | 12.0<br>10.8<br>9.8<br>12.5<br>12.2 | | dB |
| Output Return Loss | 0.5 - 5<br>5 - 10<br>10 - 13<br>13 - 15<br>15 - 18 | | 10.2<br>6.2<br>9.5<br>10.6<br>11.2 | | dB |
| Output Power at 1 dB Compression (P1dB) | 0.5 - 5<br>5 - 10<br>10 - 13<br>13 - 15<br>15 - 18 | | +10.2<br>+10.6<br>+11.0<br>+10.8<br>+11.5 | | dBm |
| Output Third Order Intercept Point (OIP3) | 0.5 - 5<br>5 - 10<br>10 - 13<br>13 - 15<br>15 - 18 | | +23.5<br>+20.5<br>+19.2<br>+18.6<br>+17.5 | | dBm |
| Noise Figure | 0.5 - 5<br>5 - 10<br>10 - 13<br>13 - 15<br>15 - 18 | | 6.1<br>4.2<br>4.5<br>4.2<br>4.5 | | dB |
| Device Operating Voltage ($V_{DD}$) | | +4.8 | +5.0 | +5.2 | V |
| Device Operating Current ($I_{DD}$) | | | 48 | 68 | mA |

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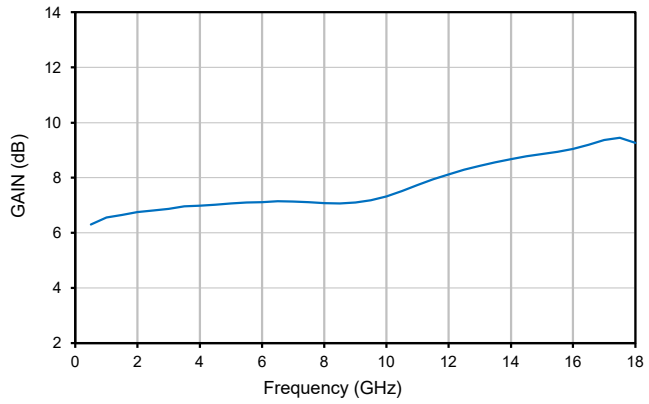
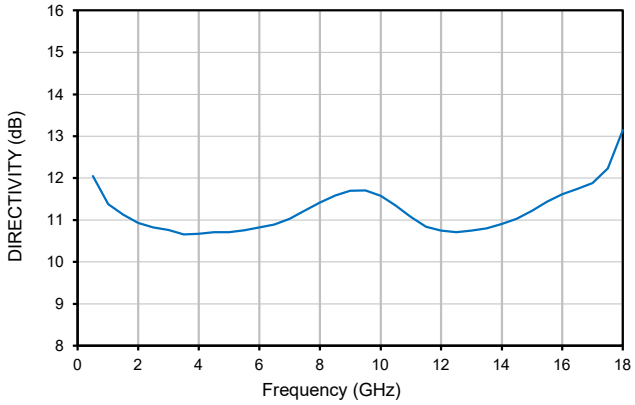
## TYPICAL PERFORMANCE GRAPHS

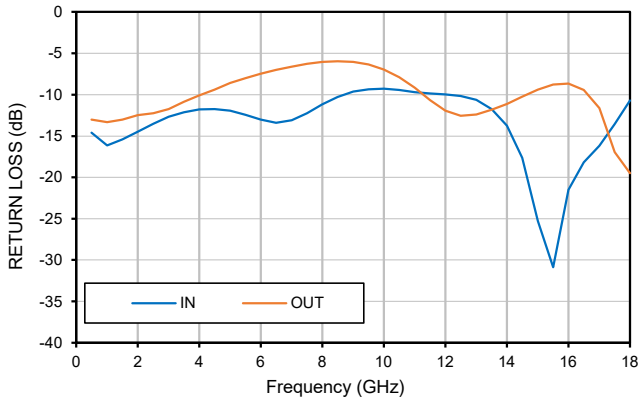
GAIN



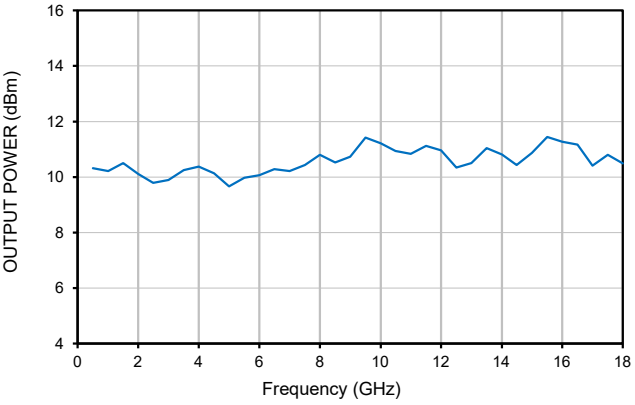

DIRECTIVITY



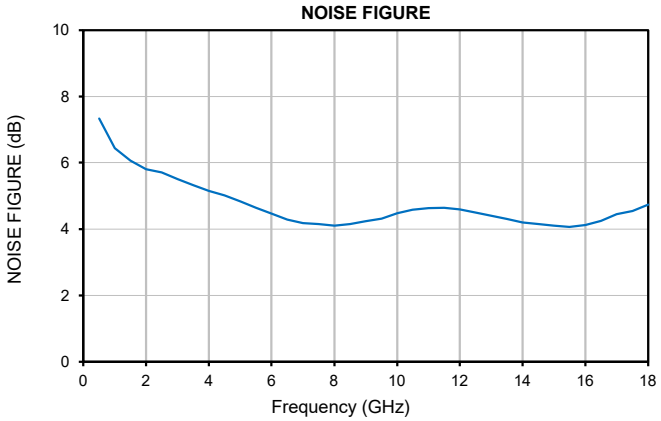

RETURN LOSS



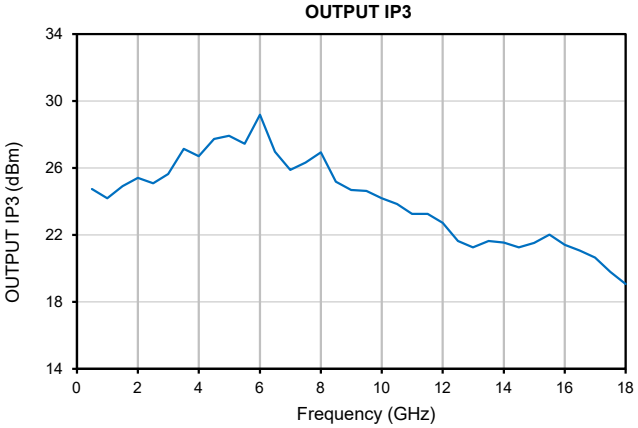

OUTPUT POWER AT 1dB COMPRESSION




NOISE FIGURE




OUTPUT IP3



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## ABSOLUTE MAXIMUM RATINGS[3]

| Parameter | Ratings |
|---|---|
| Operating Temperature | -40°C to +85 °C |
| Storage Temperature | -55 °C to +100 °C |
| Total Power Dissipation | 0.8 W |
| RF Input Power (CW) | +22 dBm (5 minutes, max.)<br>+13 dBm (continuous) |
| DC Operating Voltage | +8.5 V |

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

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

$$\textit{MAXIMUM THERMAL RESISTANCE} = \frac{\textit{MAXIMUM OPERATING CASE TEMP} - \textit{MAXIMUM USER AMBIENT TEMP}}{\textit{POWER DISSIPATION}}$$

| | |
|---|---|
| **Example:** | MAXIMUM OPERATING CASE TEMP = +50 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE)<br>MAXIMUM USER AMBIENT TEMP = +30 °C (USER DEFINED)<br>POWER DISSIPATION = 10 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE)<br>THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 2 °C/W |

# Positive Gain Slope Amplifier ZX60-R5183P+

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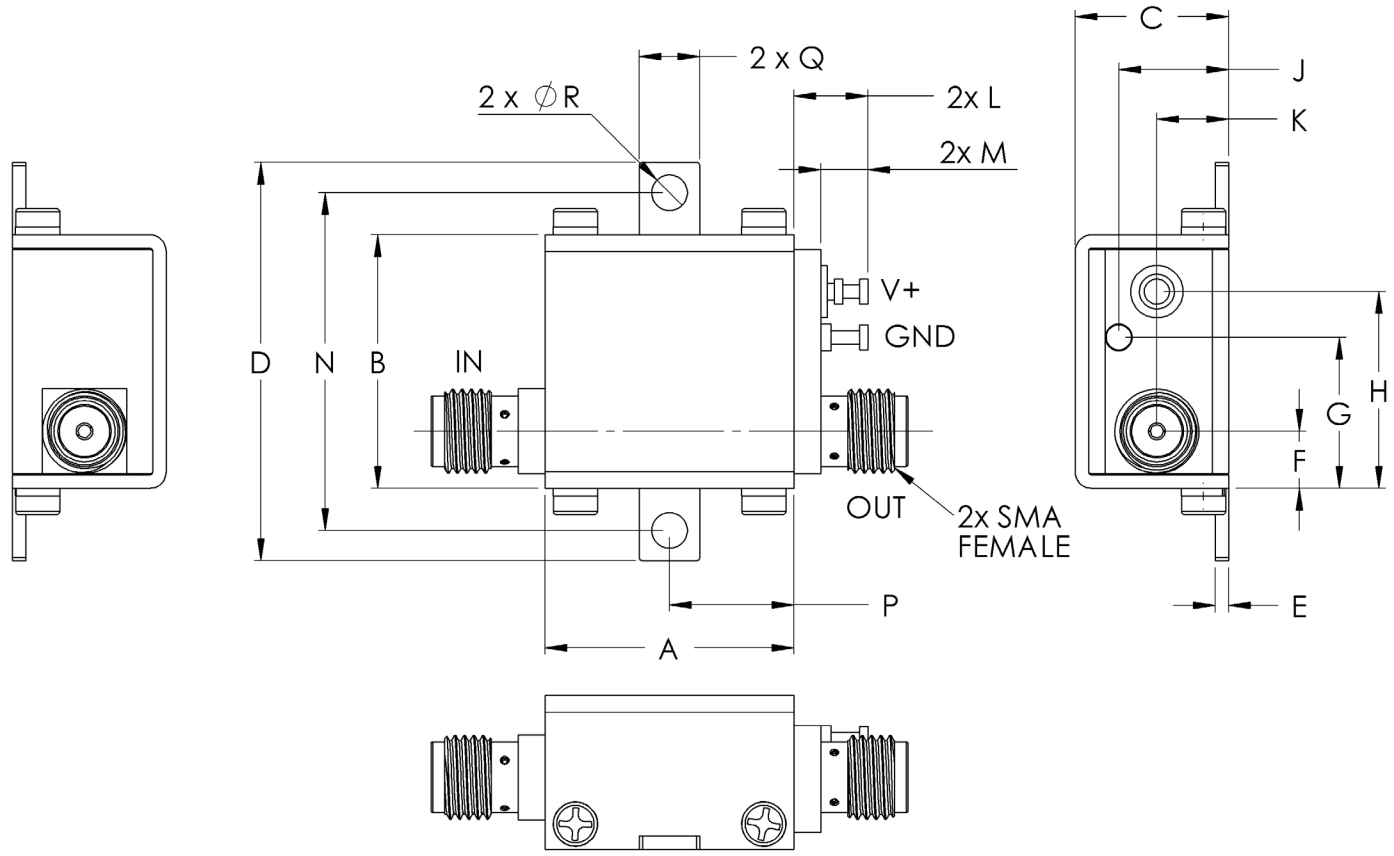
## CASE STYLE DRAWING




## OUTLINE DIMENSIONS ( inch / mm )

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | wt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .74 | .75 | .46 | 1.18 | .04 | .17 | .45 | .59 | .33 | .21 | .22 | .14 | 1.00 | .37 | .18 | .106 | grams |
| 18.80 | 19.1 | 11.68 | 30.0 | 1.02 | 4.32 | 11.4 | 14.99 | 8.38 | 5.33 | 5.59 | 3.56 | 25.40 | 9.40 | 4.57 | 2.69 | 23.0 |

# Positive Gain Slope Amplifier ZX60-R5183P+

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## ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

| | |
|---|---|
| **Performance Data & Graphs** | Data<br>Graphs<br>S-Parameter (S2P Files) Data Set (.zip file) |
| **RoHs Status** | Compliant |
| **Environmental Ratings** | ENV23T10 |

## ORDERING INFORMATION

| | |
|---|---|
| **Model No. Links** | ZX60-R5183P+ |
| **Case Style** | GC957 |
| **Connector** | IN SMA/Female / OUT SMA/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

# Coaxial Amplifier ZX60-R5183P+

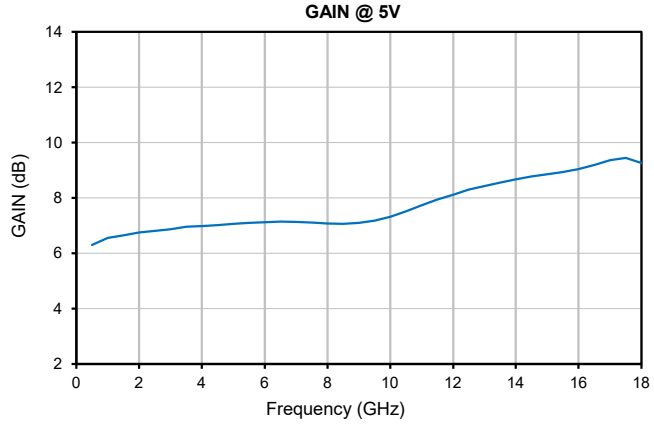
## *Typical Performance Data*

**Definitions:**
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

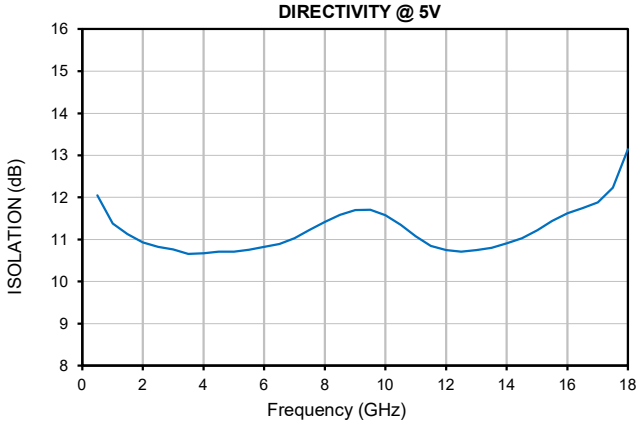
| FREQUENCY (GHz) | GAIN (dB) 5V | DIRECTIVITY (dB) 5V | RETURN LOSS (dB) IN 5V | RETURN LOSS (dB) OUT 5V | Pout @ 1 dB COMPRESSION (dBm) 5V | OIP3 (dBm) 5V | NOISE FIGURE (dB) 5V |
|---|---|---|---|---|---|---|---|
| 0.5 | 6.30 | 12.04 | 14.6 | 13.0 | 10.3 | 24.74 | 7.33 |
| 1.0 | 6.55 | 11.38 | 16.1 | 13.3 | 10.2 | 24.18 | 6.43 |
| 1.5 | 6.65 | 11.13 | 15.4 | 13.0 | 10.5 | 24.91 | 6.07 |
| 2.0 | 6.75 | 10.93 | 14.5 | 12.5 | 10.1 | 25.42 | 5.81 |
| 2.5 | 6.82 | 10.82 | 13.5 | 12.2 | 9.8 | 25.09 | 5.71 |
| 3.0 | 6.87 | 10.76 | 12.7 | 11.8 | 9.9 | 25.64 | 5.50 |
| 3.5 | 6.96 | 10.66 | 12.1 | 10.9 | 10.2 | 27.13 | 5.33 |
| 4.0 | 6.99 | 10.67 | 11.8 | 10.1 | 10.4 | 26.70 | 5.15 |
| 4.5 | 7.02 | 10.71 | 11.7 | 9.4 | 10.1 | 27.73 | 5.02 |
| 5.0 | 7.07 | 10.70 | 11.9 | 8.6 | 9.7 | 27.93 | 4.83 |
| 5.5 | 7.09 | 10.75 | 12.5 | 8.0 | 10.0 | 27.43 | 4.64 |
| 6.0 | 7.12 | 10.82 | 13.0 | 7.5 | 10.1 | 29.17 | 4.46 |
| 6.5 | 7.14 | 10.89 | 13.4 | 7.0 | 10.3 | 26.97 | 4.29 |
| 7.0 | 7.14 | 11.03 | 13.1 | 6.6 | 10.2 | 25.88 | 4.18 |
| 7.5 | 7.11 | 11.22 | 12.3 | 6.3 | 10.4 | 26.31 | 4.16 |
| 8.0 | 7.08 | 11.42 | 11.2 | 6.0 | 10.8 | 26.93 | 4.11 |
| 8.5 | 7.07 | 11.58 | 10.3 | 5.9 | 10.5 | 25.17 | 4.14 |
| 9.0 | 7.10 | 11.69 | 9.6 | 6.0 | 10.7 | 24.68 | 4.24 |
| 9.5 | 7.18 | 11.70 | 9.3 | 6.4 | 11.4 | 24.61 | 4.31 |
| 10.0 | 7.32 | 11.57 | 9.3 | 7.0 | 11.2 | 24.18 | 4.49 |
| 10.5 | 7.52 | 11.34 | 9.44 | 7.91 | 10.94 | 23.85 | 4.58 |
| 11.0 | 7.74 | 11.08 | 9.71 | 9.18 | 10.84 | 23.26 | 4.63 |
| 11.5 | 7.95 | 10.84 | 9.87 | 10.66 | 11.12 | 23.25 | 4.64 |
| 12.0 | 8.12 | 10.74 | 9.97 | 11.94 | 10.95 | 22.73 | 4.59 |
| 12.5 | 8.30 | 10.71 | 10.18 | 12.55 | 10.34 | 21.64 | 4.50 |
| 13.0 | 8.44 | 10.74 | 10.61 | 12.40 | 10.49 | 21.25 | 4.40 |
| 13.5 | 8.55 | 10.81 | 11.74 | 11.82 | 11.04 | 21.65 | 4.30 |
| 14.0 | 8.67 | 10.91 | 13.77 | 11.10 | 10.81 | 21.54 | 4.20 |
| 14.5 | 8.78 | 11.03 | 17.63 | 10.22 | 10.43 | 21.25 | 4.14 |
| 15.0 | 8.86 | 11.21 | 25.28 | 9.38 | 10.87 | 21.52 | 4.10 |
| 15.5 | 8.93 | 11.44 | 30.88 | 8.78 | 11.44 | 22.01 | 4.07 |
| 16.0 | 9.04 | 11.62 | 21.49 | 8.67 | 11.27 | 21.40 | 4.12 |
| 16.5 | 9.19 | 11.74 | 18.19 | 9.44 | 11.17 | 21.05 | 4.24 |
| 17.0 | 9.37 | 11.88 | 16.21 | 11.66 | 10.41 | 20.64 | 4.45 |
| 17.5 | 9.44 | 12.23 | 13.54 | 16.94 | 10.80 | 19.77 | 4.55 |
| 18.0 | 9.26 | 13.15 | 10.67 | 19.48 | 10.49 | 19.05 | 4.73 |

*Typical Performance Curves*

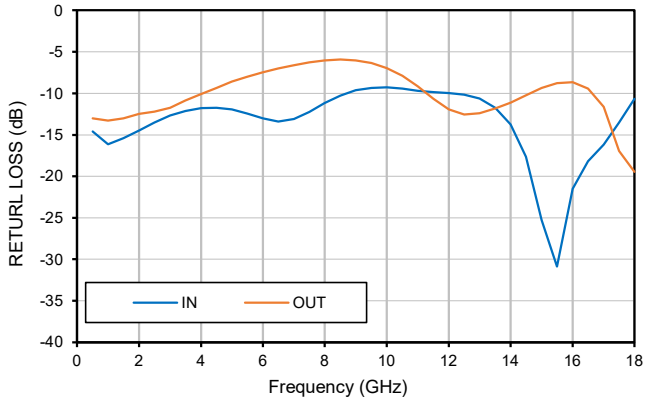
**GAIN @ 5V**



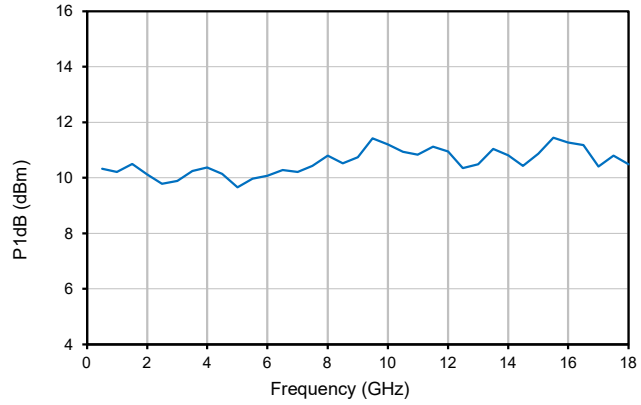

**DIRECTIVITY @ 5V**



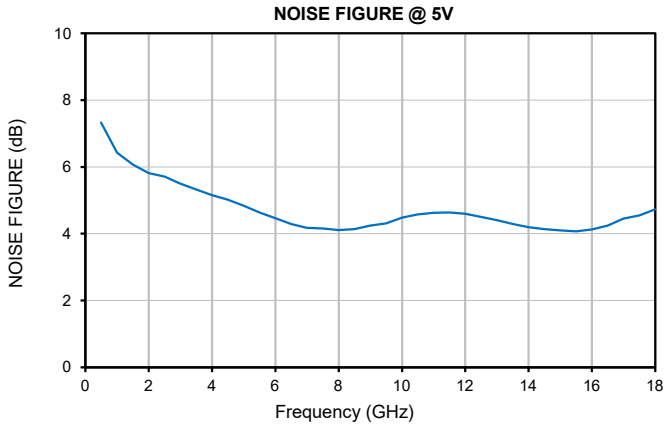

**RETURN LOSS @ 5V**



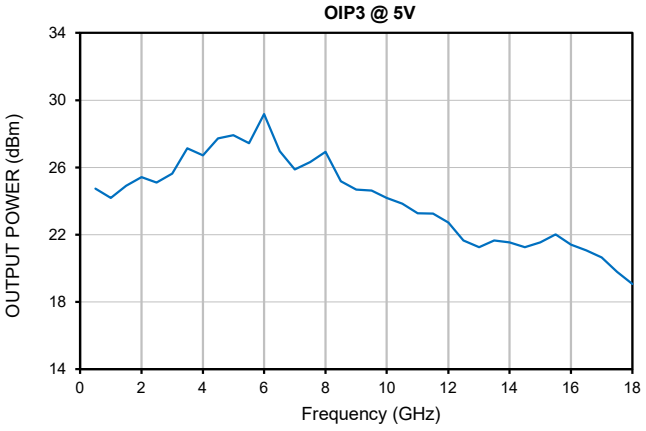

**P1dB @ 5V**




**NOISE FIGURE @ 5V**



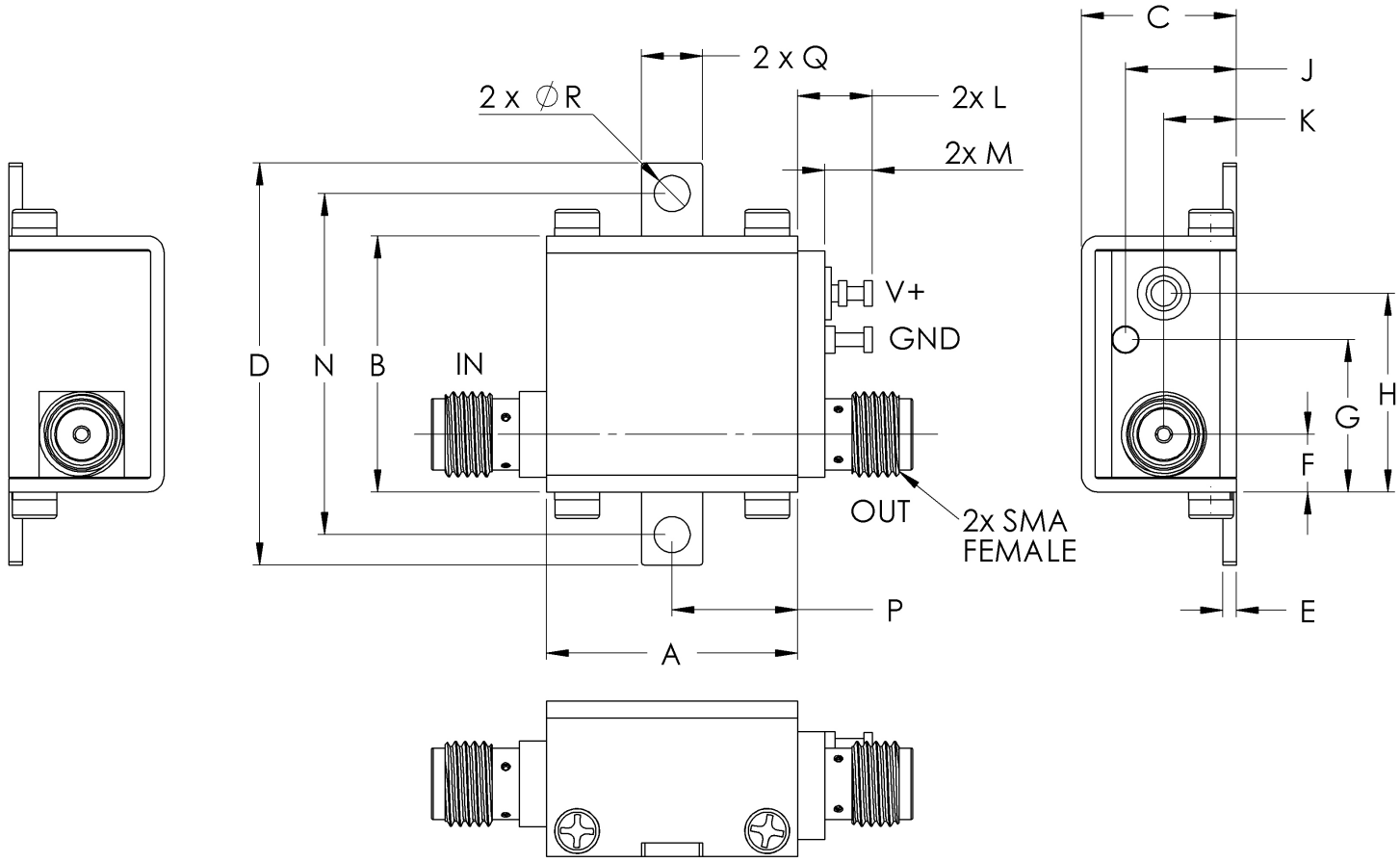

**OIP3 @ 5V**



# Case Style GC

## Outline Dimensions

GC957




| CASE #. | A | B | C | D | E | F | G | H | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GC957 | .74 (18.80) | .75 (19.15) | .46 (11.61) | 1.18 (30.07) | .04 (1.02) | .17 (4.32) | .45 (11.40) | .59 (14.86) | .33 (8.31) | .21 (5.44) | .22 (5.59) | .14 (3.56) | 1.00 (25.4) |

| CASE #. | P | Q | R | WT GRAMS |
|---|---|---|---|---|
| GC957 | .37 (9.40) | .18 (4.57) | .106 (2.69) | 23.0 |

**Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015**
**Tolerance on hole size and interaxes dimensions to be ± .005.**

**Note:**

1. Case material: Brass
2. Case finish: Nickel plate


Mini-Circuits®
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# Environmental Specifications ENV23T10

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 | -40° to 85° C<br>Case Temperature | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C<br>Ambient Environment | Individual Model Data Sheet |
| Stabilization Bake | (non-operating)<br>125°C, 24 hours | - - - |
| Burn-in at Elevated Temp. | (DC on)<br>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 |