

High Linearity Amplifier

ZX60-2411BM-S+

50Ω 800 MHz to 2400 MHz

Features

- High linearity
- High IP3, +40 dBm typ
- Reverse voltage connection protected
- 4.5V - 5.5V operation
- Small size
- Low cost
- Protected by US patent 6,790,049

Applications

- High linearity drivers
- Buffer amplifier
- Transmit side gain stage
- General purpose small signal
- Lab, instrumentation
- Test equipment



| Connectors | Model |
|------------|----------------|
| SMA | ZX60-2411BM-S+ |

+RoHS Compliant

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

Electrical Specifications at T_{AMB} = 25°C

| MODEL NO. | FREQ. (MHz) | GAIN (dB) | | | | MAXIMUM POWER (dBm) | DYNAMIC RANGE | | VSWR (:1) Typ. | | ACTIVE DIRECTIVITY (dB) Isolation-Gain | DC VOLTAGE @ PIN V+ (V) | DC OPERATING CURRENT @ PIN V+ (mA) | | |
|----------------|-------------|-----------|-------|------|------|---------------------|---------------|-----------|----------------|------|--|-------------------------|------------------------------------|------|------|
| | | Flatness | | | | | NF (dB) | IP3 (dBm) | In | Out | | | Typ. | Typ. | Max. |
| | | Typ. | Min. | Typ. | Max. | | | | | | | | | | |
| ZX60-2411BM-S+ | 800-1300 | 13.50 | 9.00 | ±0.7 | ±1.2 | 22.00 | 3.50 | 42.00 | 1.40 | 1.25 | 7.0 | 5 | 280 | 360 | |
| | 1300-1900 | 14.00 | 10.00 | ±0.4 | ±0.7 | 24.00 | 2.60 | 40.00 | 1.30 | 1.35 | 5.0 | 5 | 280 | 360 | |
| | 1900-2400 | 13.00 | 9.00 | ±0.7 | ±1.5 | 23.00 | 3.00 | 37.00 | 1.55 | 1.70 | 5.0 | 5 | 280 | 360 | |

Maximum Ratings

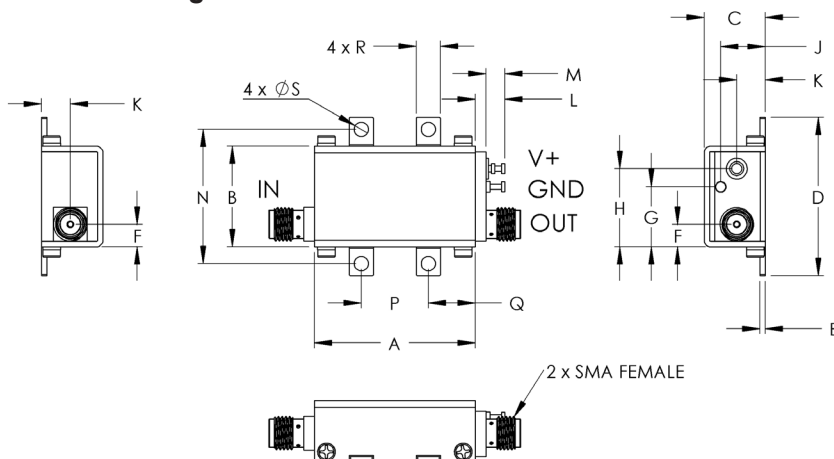
| | |
|------------------------|-----------------------------|
| Operating Temperature | -40°C to 80°C case |
| | -40°C to 50°C ambient at 5V |
| Storage Temperature | -55°C to 100°C |
| DC Voltage | 6V |
| Input Power(no Damage) | +14dBm @ 800-1300MHz |
| | +15dBm @ 1300-1900MHz |
| | +16dBm @ 1900-2400MHz |

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



NOTE: When soldering the DC connections, caution must be used to avoid overheating the DC terminals. See Application Note AN-40-10.

Outline Drawing



Outline Dimensions (inch/mm)

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | wt. |
|-------|-------|-------|-------|------|------|-------|-------|------|------|------|------|-------|-------|------|------|------|-------|
| 1.20 | .75 | .46 | 1.18 | .04 | .17 | .45 | .59 | .33 | .21 | .22 | .14 | 1.00 | .50 | .35 | .18 | .106 | grams |
| 30.48 | 19.05 | 11.68 | 29.97 | 1.02 | 4.32 | 11.43 | 14.99 | 8.38 | 5.33 | 5.59 | 3.56 | 25.40 | 12.70 | 8.89 | 4.57 | 2.69 | 35.0 |

Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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/MCLStore/terms.jsp



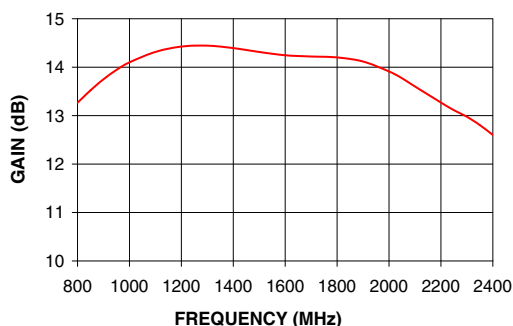
www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

REV. E
M171494
ED-14322
ZX60-2411BM-S+
BLUEC
190226
Page 1 of 2

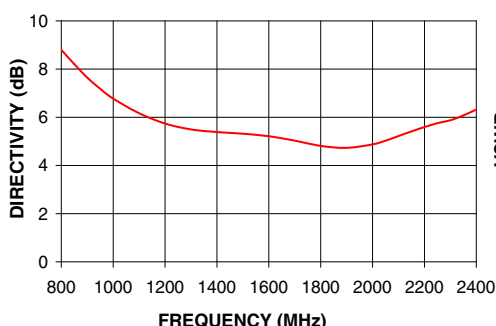
Typical Performance Data & Curves at 25°C ZX60-2411BM-S+

| FREQUENCY (MHz) | GAIN (dB) | DIRECTIVITY (dB) | VSWR IN (:1) | VSWR OUT (:1) | POWER OUT @ 1dB COMPRESSION (dBm) | IP3 (dBm) | NF (dB) |
|-----------------|-----------|------------------|--------------|---------------|-----------------------------------|-----------|---------|
| 800 | 13.27 | 8.80 | 1.39 | 1.30 | 23.49 | 41.56 | 3.73 |
| 850 | 13.52 | 8.21 | 1.29 | 1.29 | 23.64 | 42.81 | 3.45 |
| 900 | 13.75 | 7.65 | 1.20 | 1.29 | 23.79 | 43.25 | 3.19 |
| 950 | 13.94 | 7.18 | 1.13 | 1.27 | 24.19 | 43.06 | 3.05 |
| 1000 | 14.10 | 6.78 | 1.08 | 1.25 | 24.58 | 42.14 | 2.91 |
| 1100 | 14.32 | 6.17 | 1.01 | 1.16 | 25.05 | 42.50 | 2.73 |
| 1200 | 14.43 | 5.74 | 1.09 | 1.04 | 25.38 | 42.23 | 2.57 |
| 1300 | 14.45 | 5.50 | 1.19 | 1.10 | 25.52 | 41.47 | 2.49 |
| 1400 | 14.39 | 5.39 | 1.30 | 1.25 | 25.46 | 41.39 | 2.48 |
| 1500 | 14.31 | 5.32 | 1.38 | 1.37 | 25.40 | 40.69 | 2.45 |
| 1600 | 14.25 | 5.21 | 1.39 | 1.42 | 25.32 | 40.49 | 2.46 |
| 1700 | 14.22 | 5.03 | 1.30 | 1.38 | 25.20 | 40.11 | 2.45 |
| 1800 | 14.20 | 4.81 | 1.15 | 1.30 | 25.50 | 40.04 | 2.54 |
| 1900 | 14.12 | 4.73 | 1.05 | 1.30 | 25.46 | 39.62 | 2.61 |
| 2000 | 13.91 | 4.88 | 1.27 | 1.48 | 25.23 | 38.99 | 2.72 |
| 2050 | 13.77 | 5.03 | 1.38 | 1.61 | 25.02 | 38.56 | 2.77 |
| 2100 | 13.60 | 5.22 | 1.49 | 1.73 | 24.80 | 38.30 | 2.78 |
| 2150 | 13.43 | 5.41 | 1.56 | 1.82 | 24.42 | 37.74 | 3.01 |
| 2200 | 13.27 | 5.60 | 1.59 | 1.88 | 24.03 | 37.47 | 2.88 |
| 2250 | 13.11 | 5.76 | 1.56 | 1.88 | 23.87 | 37.10 | 2.95 |
| 2300 | 12.98 | 5.88 | 1.49 | 1.83 | 23.71 | 36.93 | 3.00 |
| 2350 | 12.80 | 6.08 | 1.37 | 1.74 | 23.36 | 36.22 | 3.07 |
| 2400 | 12.60 | 6.32 | 1.23 | 1.64 | 23.01 | 35.66 | 3.27 |

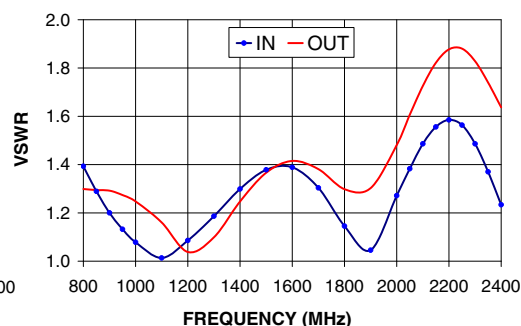
ZX60-2411BM-S+
GAIN



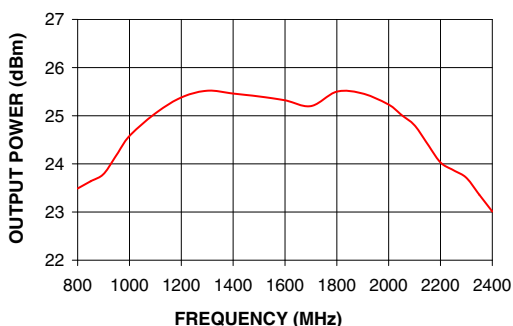
ZX60-2411BM-S+
DIRECTIVITY



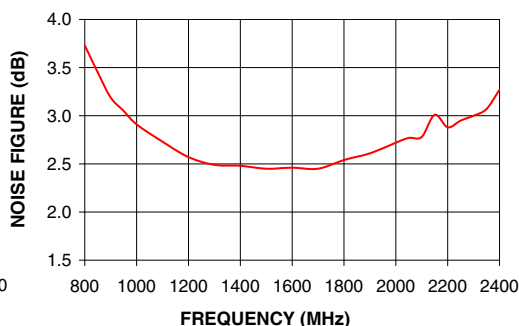
ZX60-2411BM-S+
VSWR



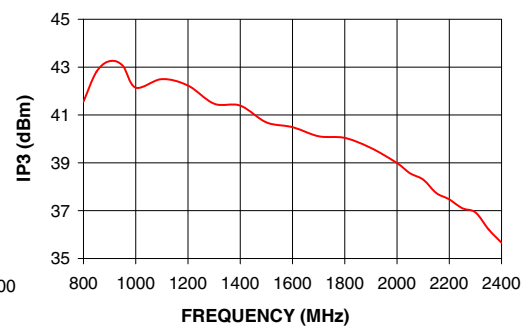
ZX60-2411BM-S+
OUTPUT POWER AT 1dB COMPRESSION



ZX60-2411BM-S+
NOISE FIGURE



ZX60-2411BM-S+
IP3



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/MCLStore/terms.jsp



Amplifier

ZX60-2411BM-S+

Typical Performance Data

| FREQUENCY (MHz) | GAIN (dB) 5V | DIRECTIVITY (dB) 5V | VSWR IN (:1) 5V | VSWR OUT (:1) 5V | Output IP3 (dBm) 5V | NOISE FIGURE (dB) 5V | Pout at 1dB Comp. (dBm) 5V |
|--------------------|--------------------|---------------------------|--------------------------|---------------------------|------------------------------|-------------------------------|-------------------------------------|
| 800 | 13.27 | 8.80 | 1.39 | 1.30 | 41.56 | 3.73 | 23.49 |
| 850 | 13.52 | 8.21 | 1.29 | 1.29 | 42.81 | 3.45 | 23.64 |
| 900 | 13.75 | 7.65 | 1.20 | 1.29 | 43.25 | 3.19 | 23.79 |
| 950 | 13.94 | 7.18 | 1.13 | 1.27 | 43.06 | 3.05 | 24.19 |
| 1000 | 14.10 | 6.78 | 1.08 | 1.25 | 42.14 | 2.91 | 24.58 |
| 1100 | 14.32 | 6.17 | 1.01 | 1.16 | 42.50 | 2.73 | 25.05 |
| 1200 | 14.43 | 5.74 | 1.09 | 1.04 | 42.23 | 2.57 | 25.38 |
| 1300 | 14.45 | 5.50 | 1.19 | 1.10 | 41.47 | 2.49 | 25.52 |
| 1400 | 14.39 | 5.39 | 1.30 | 1.25 | 41.39 | 2.48 | 25.46 |
| 1500 | 14.31 | 5.32 | 1.38 | 1.37 | 40.69 | 2.45 | 25.40 |
| 1600 | 14.25 | 5.21 | 1.39 | 1.42 | 40.49 | 2.46 | 25.32 |
| 1700 | 14.22 | 5.03 | 1.30 | 1.38 | 40.11 | 2.45 | 25.28 |
| 1800 | 14.20 | 4.81 | 1.15 | 1.30 | 40.04 | 2.54 | 25.50 |
| 1900 | 14.12 | 4.73 | 1.05 | 1.30 | 39.62 | 2.61 | 25.46 |
| 2000 | 13.91 | 4.88 | 1.27 | 1.48 | 38.99 | 2.72 | 25.23 |
| 2050 | 13.77 | 5.03 | 1.38 | 1.61 | 38.56 | 2.77 | 25.02 |
| 2100 | 13.60 | 5.22 | 1.49 | 1.73 | 38.30 | 2.78 | 24.80 |
| 2150 | 13.43 | 5.41 | 1.56 | 1.82 | 37.74 | 3.01 | 24.42 |
| 2200 | 13.27 | 5.60 | 1.59 | 1.88 | 37.47 | 2.88 | 24.03 |
| 2250 | 13.11 | 5.76 | 1.56 | 1.88 | 37.10 | 2.95 | 23.87 |
| 2300 | 12.98 | 5.88 | 1.49 | 1.83 | 36.93 | 3.00 | 23.71 |
| 2350 | 12.80 | 6.08 | 1.37 | 1.74 | 36.22 | 3.07 | 23.36 |
| 2400 | 12.60 | 6.32 | 1.23 | 1.64 | 35.66 | 3.27 | 23.01 |

Notes

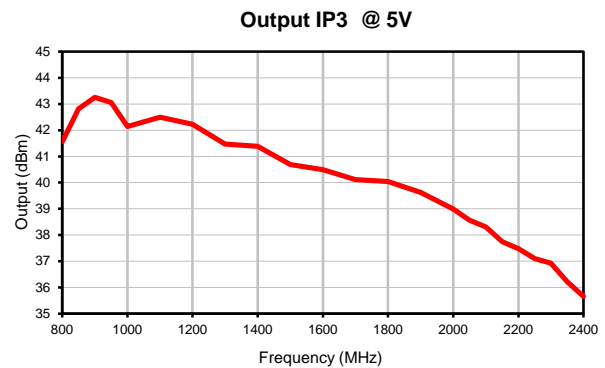
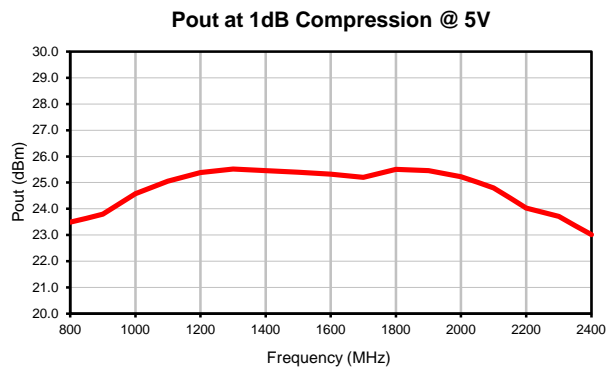
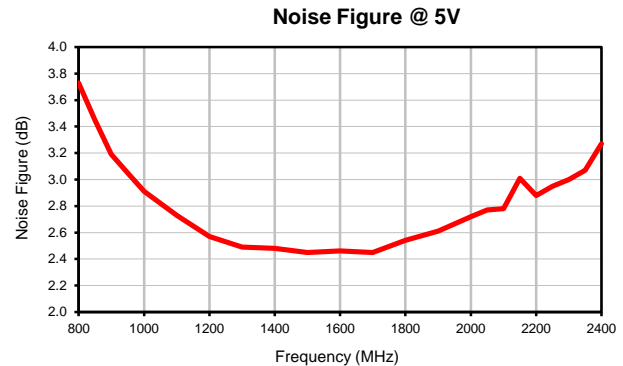
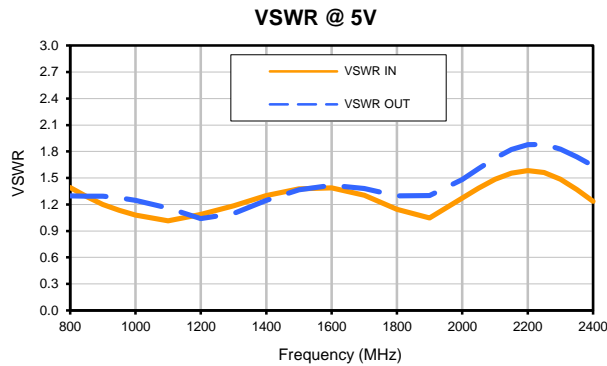
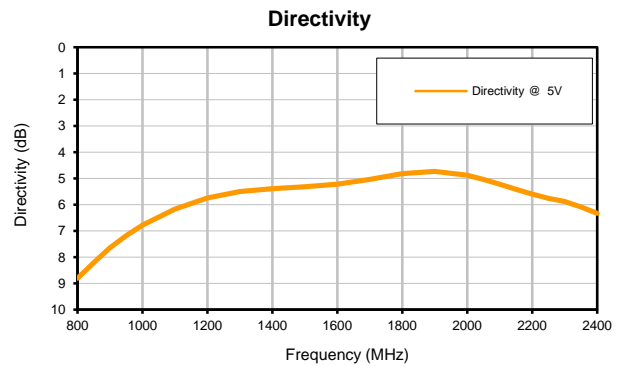
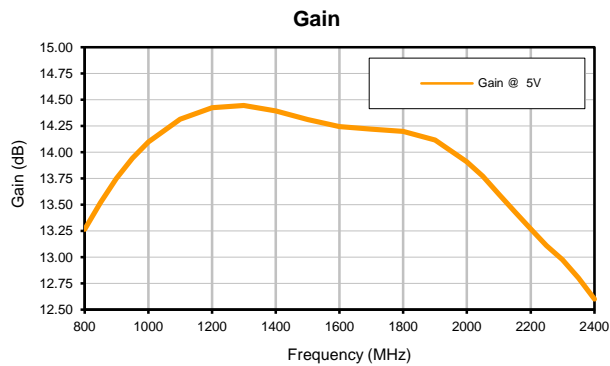
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuit's 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-Circuit's website at www.minicircuits.com/MCStore/terms.jsp



Amplifier

ZX60-2411BM-S+

Typical Performance Curves



Notes

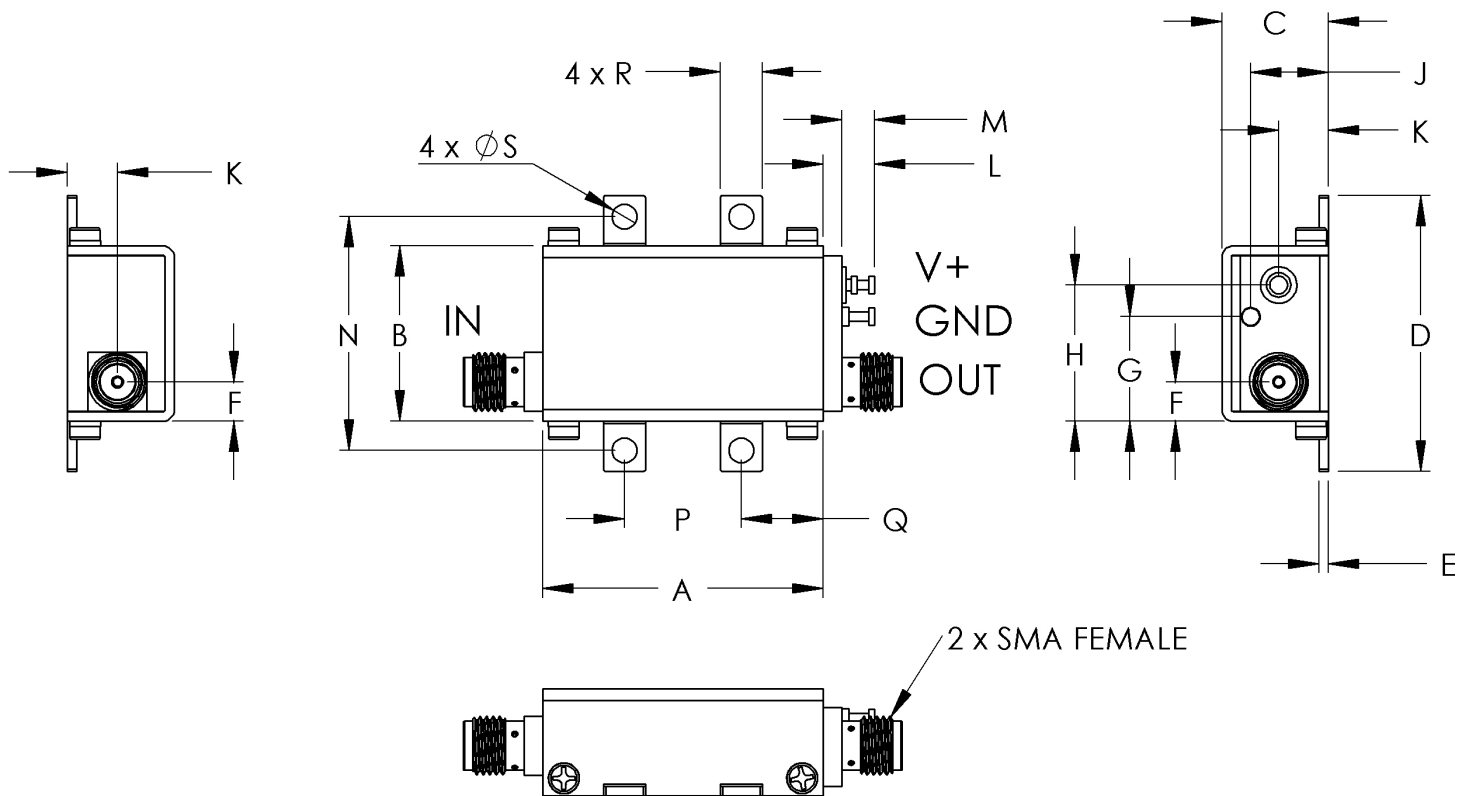
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuit's 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-Circuit's website at www.minicircuits.com/MCStore/terms.jsp

Case Style

GA

Outline Dimensions

GA955



| CASE #. | A | B | C | D | E | F | G | H | J | K | L | M | N |
|---------|-----------------|----------------|----------------|-----------------|---------------|---------------|----------------|----------------|---------------|---------------|---------------|---------------|-----------------|
| GA955 | 1.20 (30.48) | .75 (19.05) | .46 (11.61) | 1.18 (29.97) | .04 (1.02) | .17 (4.27) | .45 (11.35) | .58 (14.81) | .33 (8.46) | .21 (5.44) | .22 (5.59) | .14 (3.56) | 1.000 (25.4) |

| CASE #. | P | Q | R | S | WT GRAMS |
|---------|-----------------|---------------|---------------|----------------|----------|
| GA955 | .500 (12.70) | .35 (8.89) | .18 (4.57) | .106 (2.69) | 35.0 |

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

Note:

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

Mini-Circuits®

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified

INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



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 50° C Ambient Environment | Individual Model Data Sheet |
| Operating Temperature | -40° to 80° C Case Temperature | 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 Case | MIL-STD-202, Method 108 |
| Thermal Shock | -55° to 100°C, 5 cycles | MIL-STD-202, Method 107, Condition A, except 100°C |