



FLAT GAIN

Wideband Amplifier

ZVA-403GX+

50Ω 50 KHz to 40 GHz

THE BIG DEAL

- Excellent gain flatness, ±1.5 dB
- Single +5V supply with 100mA typ. current
- Small package

APPLICATIONS

- Fiber optics
- Very wideband test instrumentation
- Lab use
- 5G systems



Generic photo used for illustration purposes only

| | |
|-------------------|--------------|
| Model No. | ZVA-403GX+ |
| Case Style | AV2578 |
| Connectors | 2.9mm Female |

+RoHS Compliant

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

PRODUCT OVERVIEW

Mini-Circuits' ZVA-403GX+ is a coaxial, ultra-wideband amplifier offering flat gain across an extremely wide frequency range from 50 kHz to 40 GHz. This model operates on a single +5V supply with just 100mA typical current consumption, and is capable of delivering up to 20mW output power at 1 dB compression. The amplifier comes in a rugged, compact case (0.84 x 0.96 x 0.36") with 2.92mm RF connectors.

KEY FEATURES

| Feature | Advantages |
|--|--|
| Ultra-wideband, 50 kHz to 40 GHz | Enables a single amplifier to be used in a wide range of applications from 5G to satellite, military systems, fiber-optic equipment, test and measurement, and more. |
| Excellent gain flatness, ±1.5 dB across full frequency range | Provides consistent performance across its operating frequency, minimizing the need for external equalizing networks in wideband applications. |
| Single +5V supply | Avoids the requirement for dual supply voltage common among other amplifiers of similar bandwidth, simplifying system design, saving cost and space. |
| Small package, 0.84 x 0.96 x 0.36" | Saves space in tight system layouts. |

REV. D
ECO-012215
ZVA-403GX+
MCL NY
201022





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Wideband Amplifier

ZVA-403GX+

Mini-Circuits

ELECTRICAL SPECIFICATIONS AT 25°C, VDD=+5.0V, UNLESS NOTED OTHERWISE

| Parameter | Condition (MHz) | Min. | Typ. | Max. | Units |
|---------------------------------|-----------------|-------|-------|-------|-------|
| Frequency Range | | 0.050 | | 40000 | MHz |
| Gain | 50 - 7500 | 10.7 | 12.0 | — | dB |
| | 7500 - 15000 | 10.0 | 11.5 | — | |
| | 15000 - 30000 | 8.2 | 11.0 | — | |
| | 30000 - 40000 | 8.0 | 10.5 | — | |
| Noise Figure | 250 - 2000 | — | 6 | — | dB |
| | 2000 - 7500 | — | 4.5 | — | |
| | 7500 - 26500 | — | 4.0 | — | |
| | 26500 - 40000 | — | 5.5 | — | |
| Input Return Loss | 50 - 5000 | 12.0 | 14.0 | — | dB |
| | 5000 - 15000 | 8.0 | 14.0 | — | |
| | 15000 - 20000 | 8.5 | 16.0 | — | |
| | 20000 - 27500 | 8.0 | 17.0 | — | |
| | 27500 - 40000 | 8.0 | 12.5 | — | |
| Output Return Loss | 50 - 10000 | 7.0 | 10.0 | — | dB |
| | 10000 - 20000 | 8.5 | 16.0 | — | |
| | 20000 - 30000 | 7.5 | 15.0 | — | |
| | 30000 - 40000 | 7.0 | 12.0 | — | |
| Output Power at 1dB Compression | 50 - 15000 | — | 13.0 | — | dBm |
| | 15000 - 30000 | — | 11.0 | — | |
| | 30000 - 40000 | — | 10.0 | — | |
| Output IP3 | 50 - 30000 | — | 22.0 | — | dBm |
| | 30000 - 40000 | — | 21.0 | — | |
| Device Operating Current | | 50.0 | 100.0 | 150.0 | mA |

MAXIMUM RATINGS¹

| Parameter | Ratings |
|---------------------------------------|----------------|
| Operating Temperature (baseplate) | -10°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| Total Power Dissipation | 0.75W |
| Input Power (CW), V _{dd} =5V | +4 dBm |
| DC Voltage | 6V |



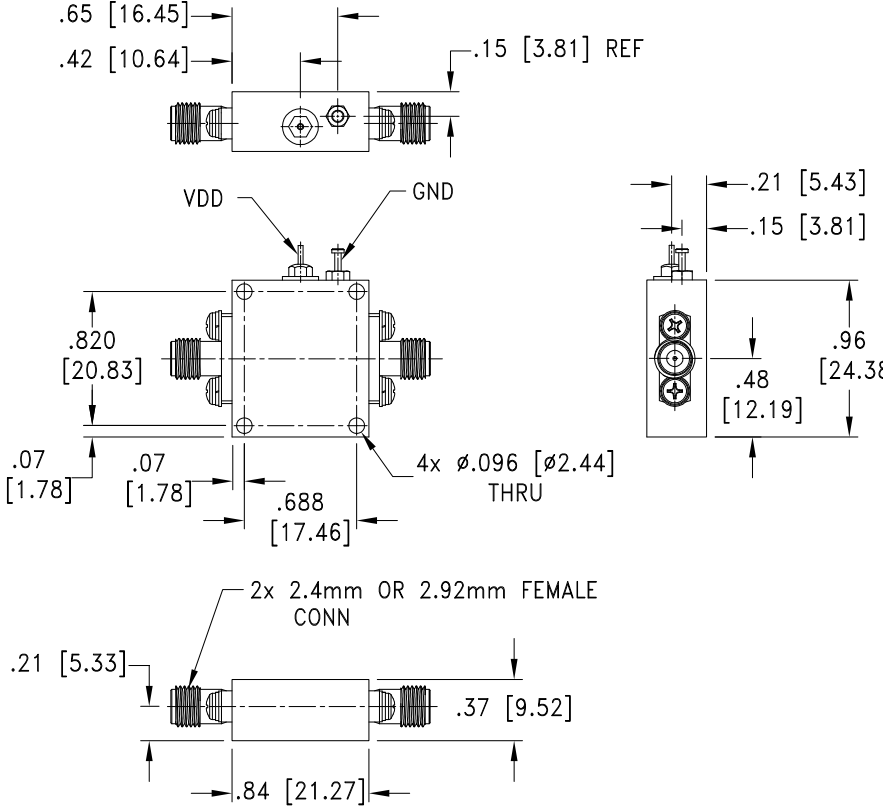


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Wideband Amplifier

ZVA-403GX+

OUTLINE DRAWING



Weight: 45 grams

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

COAXIAL CONNECTIONS

| | |
|----|---------------------|
| J1 | RF IN (DC BLOCKED) |
| J2 | RF OUT (DC BLOCKED) |
| J3 | VDD |
| J4 | GROUND |

OUTLINE DIMENSIONS (Inch/mm)

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | wt |
|-------|-------|------|-------|------|-------|-------|------|------|-------|-------|-------|----|------|------|-------|
| 0.84 | 0.96 | 0.36 | 0.48 | 0.19 | 0.687 | 0.820 | 0.07 | 0.07 | 0.096 | 0.42 | 0.65 | -- | 0.15 | 0.21 | grams |
| 21.27 | 24.38 | 9.27 | 12.19 | 4.93 | 17.46 | 20.83 | 1.78 | 1.78 | 2.44 | 10.64 | 16.51 | -- | 3.81 | 5.43 | 45 |





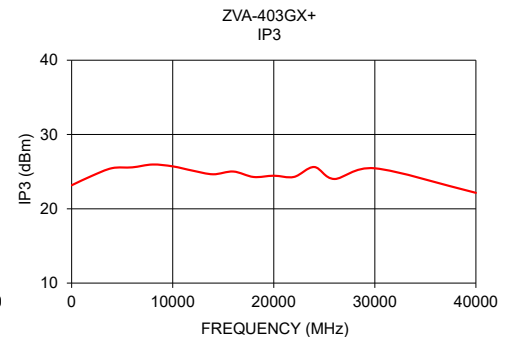
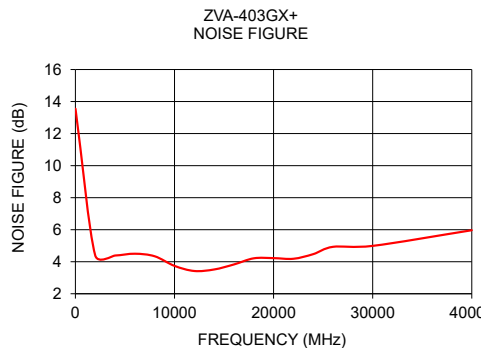
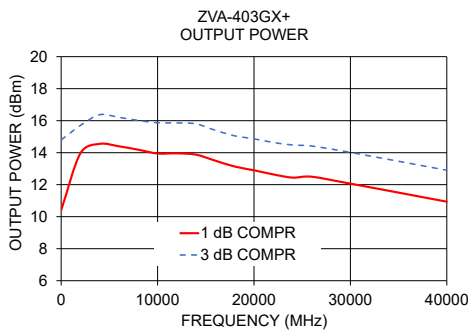
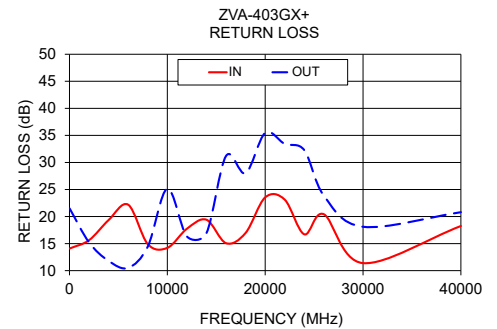
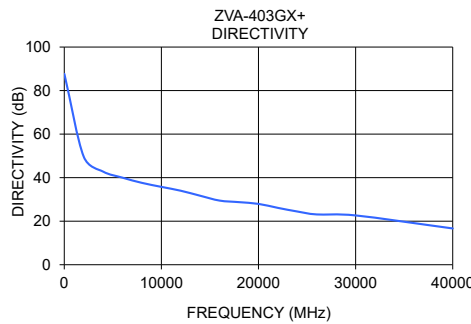
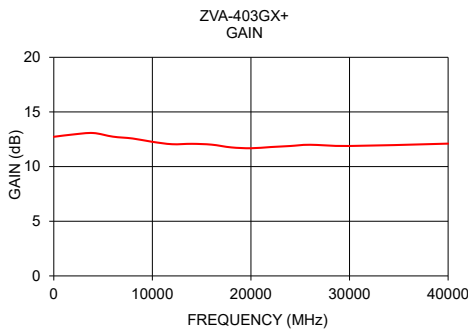
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Wideband Amplifier

ZVA-403GX+

TYPICAL PERFORMANCE DATA/CURVES

| Frequency (MHz) | Gain (dB) | Directivity (dB) | Return Loss (dB) | | POUT at 1 dB COMPR. (dBm) | POUT at 3 dB COMPR. (dBm) | Noise Figure (dB) | IP3 (dBm) |
|-----------------|-----------|------------------|------------------|-------|---------------------------|---------------------------|-------------------|-----------|
| | | | IN | OUT | | | | |
| 10 | 12.73 | 87.68 | 14.08 | 21.51 | 10.43 | 14.80 | 13.55 | 23.17 |
| 2000 | 12.94 | 49.68 | 15.62 | 15.23 | 13.96 | 15.70 | 4.40 | 24.43 |
| 4000 | 13.07 | 42.78 | 19.35 | 11.80 | 14.55 | 16.37 | 4.39 | 25.47 |
| 6000 | 12.74 | 39.99 | 22.19 | 10.51 | 14.40 | 16.21 | 4.50 | 25.58 |
| 8000 | 12.57 | 37.60 | 14.91 | 14.43 | 14.18 | 16.01 | 4.34 | 25.96 |
| 10000 | 12.27 | 35.76 | 14.21 | 25.15 | 13.95 | 15.87 | 3.74 | 25.71 |
| 12000 | 12.05 | 33.99 | 17.74 | 16.32 | 13.96 | 15.86 | 3.42 | 25.13 |
| 14000 | 12.08 | 31.68 | 19.41 | 16.94 | 13.87 | 15.80 | 3.51 | 24.65 |
| 16000 | 12.01 | 29.46 | 15.08 | 31.20 | 13.50 | 15.40 | 3.83 | 25.02 |
| 18000 | 11.76 | 28.75 | 16.97 | 28.01 | 13.13 | 15.05 | 4.21 | 24.28 |
| 20000 | 11.68 | 27.94 | 23.54 | 35.45 | 12.90 | 14.86 | 4.22 | 24.45 |
| 22000 | 11.79 | 26.12 | 23.12 | 33.42 | 12.64 | 14.64 | 4.18 | 24.29 |
| 24000 | 11.89 | 24.45 | 16.71 | 32.27 | 12.44 | 14.48 | 4.47 | 25.62 |
| 26000 | 12.00 | 23.10 | 20.42 | 23.85 | 12.50 | 14.42 | 4.93 | 24.01 |
| 30000 | 11.89 | 22.65 | 11.39 | 18.11 | 12.07 | 14.02 | 4.99 | 25.45 |
| 40000 | 12.10 | 16.67 | 18.25 | 20.80 | 10.94 | 12.90 | 5.97 | 22.15 |



- 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



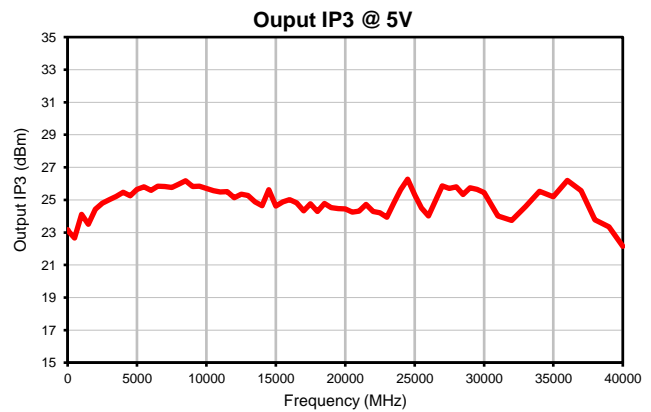
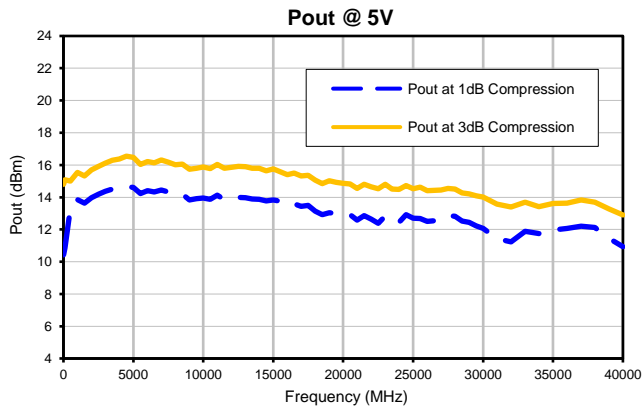
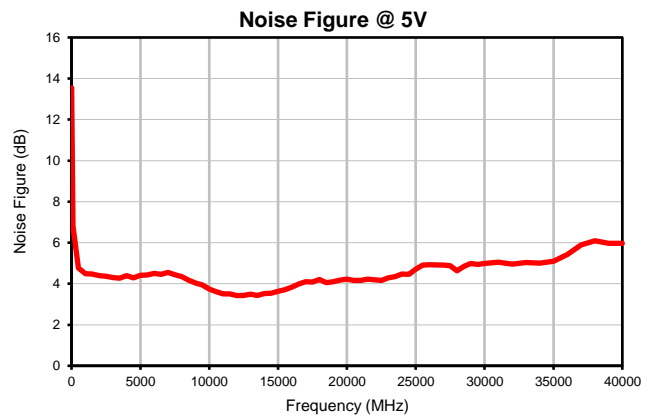
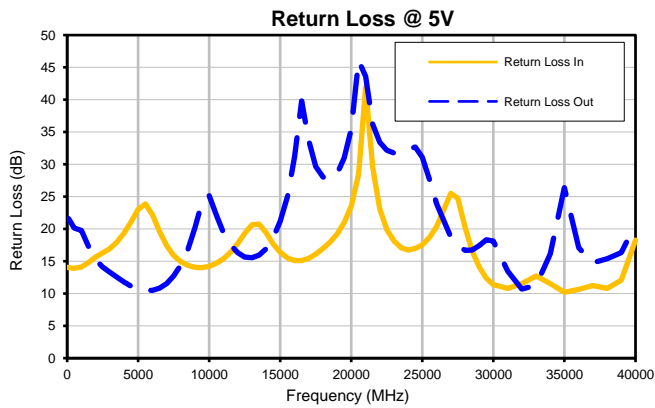
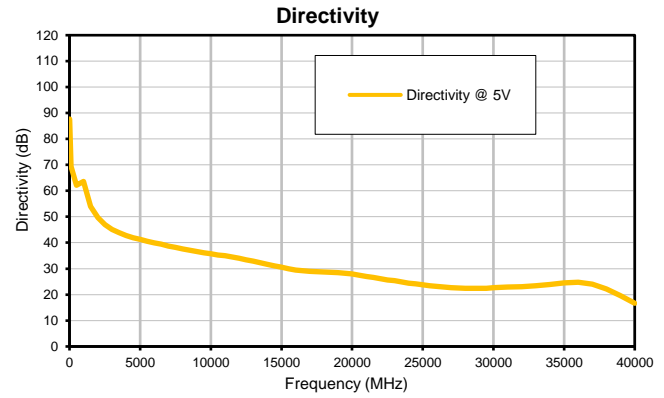
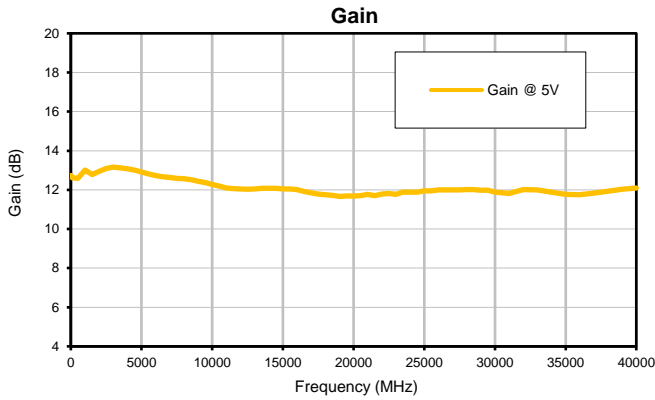
Typical Performance Data

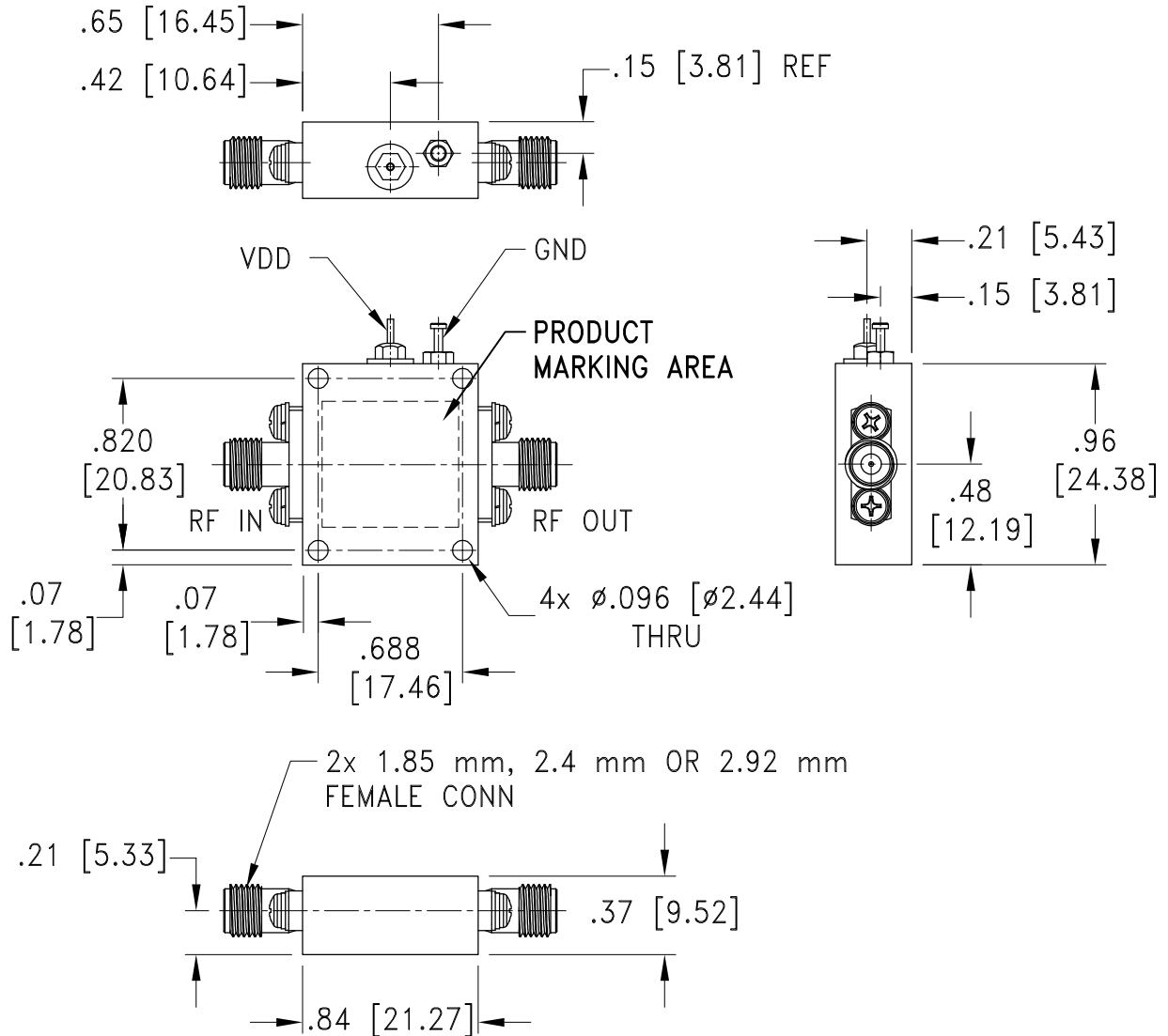
| FREQUENCY (MHz) | GAIN (dB) 5V | DIRECTIVITY (dB) 5V | RETURN LOSS (dB) | | NOISE FIGURE (dB) 5V | POUT @ 1 dB COMPRESSION (dBm) 5V | POUT @ 3 dB COMPRESSION (dBm) 5V | OUTPUT IP3 (dBm) 5V |
|--------------------|--------------------|---------------------------|---------------------|-----------|----------------------------|---|---|---------------------------|
| | | | IN 5V | OUT 5V | | | | |
| 10 | 12.73 | 87.68 | 14.08 | 21.51 | 13.55 | 10.43 | 14.80 | 23.17 |
| 100 | 12.61 | 69.43 | 14.01 | 21.58 | 6.82 | 10.85 | 15.08 | 23.04 |
| 500 | 12.58 | 62.13 | 13.89 | 20.16 | 4.78 | 13.31 | 15.00 | 22.65 |
| 1000 | 13.01 | 63.65 | 14.12 | 19.76 | 4.48 | 13.85 | 15.55 | 24.11 |
| 1500 | 12.79 | 54.05 | 14.80 | 17.29 | 4.47 | 13.63 | 15.32 | 23.51 |
| 2000 | 12.94 | 49.68 | 15.62 | 15.23 | 4.40 | 13.96 | 15.70 | 24.43 |
| 2500 | 13.09 | 46.93 | 16.28 | 14.09 | 4.36 | 14.19 | 15.92 | 24.81 |
| 3000 | 13.16 | 45.14 | 16.95 | 13.30 | 4.30 | 14.37 | 16.12 | 25.01 |
| 3500 | 13.13 | 43.91 | 17.95 | 12.53 | 4.27 | 14.50 | 16.28 | 25.21 |
| 4000 | 13.07 | 42.78 | 19.35 | 11.80 | 4.39 | 14.55 | 16.37 | 25.47 |
| 4500 | 13.00 | 41.90 | 21.09 | 11.15 | 4.29 | 14.66 | 16.55 | 25.24 |
| 5000 | 12.91 | 41.28 | 23.01 | 10.69 | 4.41 | 14.61 | 16.48 | 25.64 |
| 5500 | 12.81 | 40.53 | 23.87 | 10.49 | 4.42 | 14.23 | 16.04 | 25.79 |
| 6000 | 12.74 | 39.99 | 22.19 | 10.51 | 4.50 | 14.40 | 16.21 | 25.58 |
| 6500 | 12.67 | 39.40 | 19.63 | 10.83 | 4.46 | 14.33 | 16.13 | 25.84 |
| 7000 | 12.63 | 38.75 | 17.44 | 11.55 | 4.56 | 14.44 | 16.31 | 25.82 |
| 7500 | 12.59 | 38.19 | 15.90 | 12.70 | 4.45 | 14.33 | 16.17 | 25.76 |
| 8000 | 12.57 | 37.60 | 14.91 | 14.43 | 4.34 | 14.18 | 16.01 | 25.96 |
| 8500 | 12.51 | 37.08 | 14.33 | 16.89 | 4.17 | 14.18 | 16.05 | 26.18 |
| 9000 | 12.44 | 36.60 | 14.06 | 20.24 | 4.04 | 13.83 | 15.74 | 25.82 |
| 9500 | 12.37 | 36.15 | 14.01 | 24.20 | 3.94 | 13.91 | 15.80 | 25.83 |
| 10000 | 12.27 | 35.76 | 14.21 | 25.15 | 3.74 | 13.95 | 15.87 | 25.71 |
| 10500 | 12.20 | 35.29 | 14.71 | 22.08 | 3.61 | 13.87 | 15.77 | 25.57 |
| 11000 | 12.10 | 34.94 | 15.39 | 19.37 | 3.51 | 14.13 | 16.03 | 25.48 |
| 11500 | 12.07 | 34.46 | 16.40 | 17.51 | 3.51 | 13.86 | 15.80 | 25.50 |
| 12000 | 12.05 | 33.99 | 17.74 | 16.32 | 3.42 | 13.96 | 15.86 | 25.13 |
| 12500 | 12.03 | 33.44 | 19.29 | 15.65 | 3.42 | 13.99 | 15.92 | 25.36 |
| 13000 | 12.05 | 32.87 | 20.63 | 15.54 | 3.49 | 13.97 | 15.89 | 25.26 |
| 13500 | 12.08 | 32.28 | 20.77 | 15.95 | 3.43 | 13.88 | 15.80 | 24.87 |
| 14000 | 12.08 | 31.68 | 19.41 | 16.94 | 3.51 | 13.87 | 15.80 | 24.65 |
| 14500 | 12.08 | 31.07 | 17.70 | 18.61 | 3.54 | 13.78 | 15.64 | 25.62 |
| 15000 | 12.05 | 30.54 | 16.41 | 21.20 | 3.63 | 13.83 | 15.75 | 24.62 |
| 15500 | 12.04 | 30.00 | 15.51 | 25.05 | 3.71 | 13.74 | 15.58 | 24.88 |
| 16000 | 12.01 | 29.46 | 15.08 | 31.20 | 3.83 | 13.50 | 15.40 | 25.02 |
| 16500 | 11.91 | 29.22 | 15.09 | 39.82 | 3.99 | 13.60 | 15.51 | 24.81 |
| 17000 | 11.85 | 29.01 | 15.45 | 33.71 | 4.09 | 13.44 | 15.32 | 24.32 |
| 17500 | 11.78 | 28.85 | 16.07 | 29.66 | 4.08 | 13.50 | 15.37 | 24.75 |
| 18000 | 11.76 | 28.75 | 16.97 | 28.01 | 4.21 | 13.13 | 15.05 | 24.28 |
| 18500 | 11.73 | 28.62 | 17.97 | 27.69 | 4.04 | 12.92 | 14.85 | 24.78 |
| 19000 | 11.66 | 28.50 | 19.19 | 28.59 | 4.10 | 13.03 | 15.02 | 24.52 |
| 19500 | 11.68 | 28.26 | 21.00 | 30.99 | 4.17 | 12.99 | 14.93 | 24.46 |
| 20000 | 11.68 | 27.94 | 23.54 | 35.45 | 4.22 | 12.90 | 14.86 | 24.45 |
| 20500 | 11.70 | 27.51 | 28.49 | 46.05 | 4.16 | 12.92 | 14.83 | 24.24 |
| 21000 | 11.76 | 27.03 | 41.92 | 43.64 | 4.16 | 12.57 | 14.55 | 24.31 |
| 21500 | 11.71 | 26.62 | 29.55 | 36.21 | 4.22 | 12.87 | 14.80 | 24.72 |
| 22000 | 11.79 | 26.12 | 23.12 | 33.42 | 4.18 | 12.64 | 14.64 | 24.29 |
| 22500 | 11.81 | 25.68 | 19.92 | 32.21 | 4.16 | 12.38 | 14.52 | 24.21 |
| 23000 | 11.77 | 25.38 | 18.11 | 31.72 | 4.28 | 12.83 | 14.80 | 23.94 |
| 23500 | 11.89 | 24.87 | 17.09 | 31.82 | 4.35 | 12.58 | 14.50 | 24.82 |
| 24000 | 11.89 | 24.45 | 16.71 | 32.27 | 4.47 | 12.44 | 14.48 | 25.62 |
| 24500 | 11.89 | 24.16 | 16.99 | 32.66 | 4.45 | 12.92 | 14.73 | 26.27 |
| 25000 | 11.95 | 23.72 | 17.55 | 31.10 | 4.70 | 12.70 | 14.52 | 25.31 |
| 25500 | 11.95 | 23.38 | 18.70 | 27.60 | 4.90 | 12.67 | 14.62 | 24.51 |
| 26000 | 12.00 | 23.10 | 20.42 | 23.85 | 4.93 | 12.50 | 14.42 | 24.01 |
| 27000 | 11.99 | 22.66 | 25.48 | 18.76 | 4.91 | 12.58 | 14.44 | 25.86 |
| 27500 | 12.00 | 22.56 | 24.77 | 17.38 | 4.88 | 12.86 | 14.54 | 25.70 |
| 28000 | 12.02 | 22.41 | 20.18 | 16.71 | 4.63 | 12.81 | 14.51 | 25.81 |
| 28500 | 12.01 | 22.41 | 16.57 | 16.74 | 4.85 | 12.53 | 14.27 | 25.32 |
| 29000 | 11.98 | 22.43 | 14.09 | 17.44 | 4.98 | 12.44 | 14.21 | 25.75 |
| 29500 | 11.98 | 22.36 | 12.40 | 18.33 | 4.94 | 12.23 | 14.08 | 25.65 |
| 30000 | 11.89 | 22.65 | 11.39 | 18.11 | 4.99 | 12.07 | 14.02 | 25.45 |
| 31000 | 11.81 | 22.94 | 10.77 | 13.45 | 5.05 | 11.43 | 13.57 | 24.01 |
| 32000 | 12.01 | 23.02 | 11.55 | 10.69 | 4.95 | 11.23 | 13.39 | 23.73 |
| 33000 | 11.99 | 23.40 | 12.72 | 11.27 | 5.04 | 11.88 | 13.68 | 24.60 |
| 34000 | 11.89 | 23.90 | 11.54 | 16.15 | 5.00 | 11.74 | 13.41 | 25.52 |
| 35000 | 11.77 | 24.57 | 10.20 | 26.39 | 5.10 | 11.96 | 13.60 | 25.20 |
| 36000 | 11.75 | 24.76 | 10.67 | 17.09 | 5.42 | 12.07 | 13.62 | 26.20 |
| 37000 | 11.83 | 24.08 | 11.24 | 14.74 | 5.90 | 12.20 | 13.83 | 25.57 |
| 38000 | 11.94 | 22.18 | 10.81 | 15.39 | 6.09 | 12.13 | 13.70 | 23.79 |
| 39000 | 12.03 | 19.59 | 12.06 | 16.33 | 5.97 | 11.44 | 13.28 | 23.35 |
| 40000 | 12.10 | 16.67 | 18.25 | 20.80 | 5.97 | 10.94 | 12.90 | 22.15 |

Wideband Amplifier

Typical Performance Curves

ZVA-403GX+





Weight: 45 grams

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

Notes:

1. Case material: Brass alloy
2. Case finish: Gold plating 20 μinches, over Nickel plating 100 μinches.
3. Refer to the individual Model Data Sheet for all Type of Connectors available.

Mini-Circuits®
ISO 9001 ISO 14001 CERTIFIED

ALL NEW
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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 Case Temperature or Ambient Temperature | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |