WIDEBAND

# Microwave Amplifier ZX60-24A-S+

50Ω 5 to 20 GHz SMA Female

## THE BIG DEAL

- Wideband, 5 to 20 GHz
- Gain, 24 dB typ and flatness, ±2.2 dB typ.
- Output power at 1 dB compression, 18.3 dBm typ.
- Excellent isolation, 67 dB typ.
- Unconditionally stable
- Protected by US patent 6,790,049

*Generic photo used for illustration purposes only*

| | |
|---|---|
| **Model No.** | ZX60-24-S+ |
| **Case Style** | GC957 |
| **Connectors** | SMA Female |

**+RoHS Compliant**
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

## APPLICATIONS

- Military and radar
- DBS
- Wideband isolation amplifier
- Microwave point to point radio
- Satellite systems

## PRODUCT OVERVIEW

The ZX60-24A-S+ two-stage amplifier provides high gain in a very small package, only 0.75" x 0.74" x 0.46" high. Internal compensating circuitry provides a consistent, flat response over the extra wide bandwidth. Designed for 50Ω SMA coax systems, the gold-plated package uses convenient 5V DC power, and has a nickel-plated brass cover and unibody construction for extra durability.

## KEY FEATURES

| Feature | Advantages |
|---|---|
| Extra Wideband, 5-20 GHz | Wider frequency range supports a wider array of applications, from microwave radio and radar to military communications, satellite communications, and countermeasures |
| Excellent Gain Flatness, ±2.2 dB | ±2.2 dB gain flatness across entire bandwidth minimizes the need for external equalizer networks, making it a great fit for instrumentation, test lab, EW, or any other amplitude sensitive system |
| Excellent Isolation, 67 dB typ. | 24-dB gain with reverse isolation of 67 dB typ. (43 dB typ. directivity) minimizes leakage, making the ZX60-24A-S+ an excellent choice for minimizing interactions between different microwave components. It is an ideal LO driver amplifier and provides designers system flexibility and robustness when integrating cascaded RF components. Can replace expensive isollators in many applications. |
| Unconditionally Stable | No risk of oscillation due to impedance mismatch. |

REV. E
ECO-016035
ZX60-24A-S+
MCL NY
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## ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter | Condition (GHz) | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Frequency Range | | 5.0 | | 20.0 | GHz |
| Gain | 5.0 | — | 23.0 | — | dB |
| | 8.0 | 22.4 | 25.8 | 28.3 | |
| | 10.0 | 21.3 | 24.4 | 26.9 | |
| | 12.0 | — | 23.9 | — | |
| | 14.0 | — | 24.0 | — | |
| | 16.0 | — | 25.3 | — | |
| | 18.0 | 22.2 | 25.5 | 28.1 | |
| | 20.0 | 19.3 | 22.2 | 24.4 | |
| Gain Flatness | 5.0 - 20.0 | — | ±2.2 | — | dB |
| Input Return Loss | 5.0 | — | 10.1 | — | dB |
| | 8.0 | 10 | 17.5 | — | |
| | 10.0 | — | 17.4 | — | |
| | 12.0 | 10 | 21.2 | — | |
| | 14.0 | — | 17.0 | — | |
| | 16.0 | — | 15.7 | — | |
| | 18.0 | — | 11.5 | — | |
| | 20.0 | — | 7.6 | — | |
| Output Return Loss | 5.0 | — | 7.5 | — | dB |
| | 8.0 | 10 | 13.3 | — | |
| | 10.0 | — | 11.0 | — | |
| | 12.0 | 10 | 14.2 | — | |
| | 14.0 | — | 14.7 | — | |
| | 16.0 | — | 12.4 | — | |
| | 18.0 | — | 10.7 | — | |
| | 20.0 | — | 14.3 | — | |
| Output IP3 @ Output Power +8 dBm / tone. (Tone spacing, 1 MHz) | 5.0 | | 30.5 | | dBm |
| | 8.0 | | 28.2 | | |
| | 10.0 | | 26.8 | | |
| | 12.0 | | 25.4 | | |
| | 14.0 | | 24.8 | | |
| | 16.0 | | 25.1 | | |
| | 18.0 | | 23.1 | | |
| | 20.0 | | 23.4 | | |
| Output Power @ 1 dB compression | 5.0 | | 17.4 | | dBm |
| | 8.0 | | 18.6 | | |
| | 10.0 | | 19.0 | | |
| | 12.0 | | 18.3 | | |
| | 14.0 | | 18.4 | | |
| | 16.0 | | 18.1 | | |
| | 18.0 | | 19.4 | | |
| | 20.0 | | 18.2 | | |
| Noise Figure | 5.0 | | 9.4 | | dB |
| | 8.0 | | 5.3 | | |
| | 10.0 | | 6.0 | | |
| | 12.0 | | 6.4 | | |
| | 14.0 | | 7.4 | | |
| | 16.0 | | 7.6 | | |
| | 18.0 | | 6.9 | | |
| | 20.0 | | 7.2 | | |
| Directivity (Isolation-Gain) | | — | 43 | — | dB |
| DC Voltage | | — | 5.0 | — | V |
| DC Current | | — | 270 | 295 | mA |

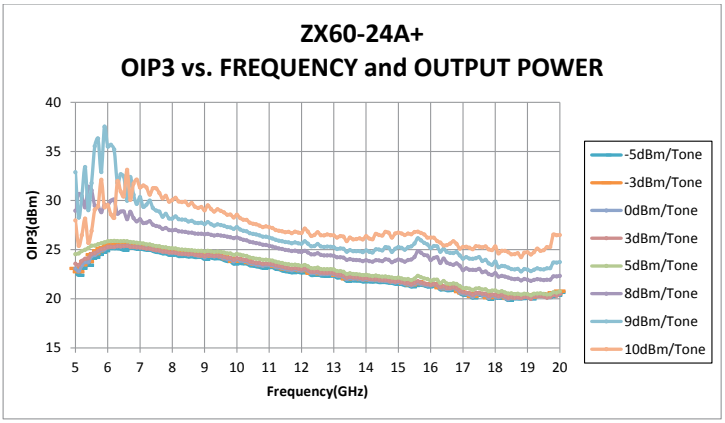
# Microwave Amplifier ZX60-24A-S+

50Ω 5 to 20 GHz SMA Female

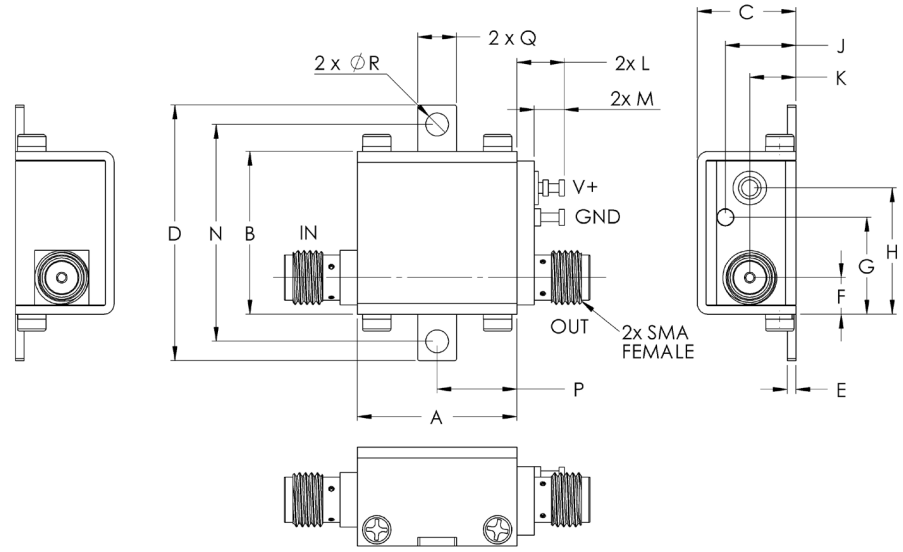
## ABSOLUTE MAXIMUM RATINGS

| Parameter | Ratings |
|---|---|
| Operating Temperature | -20°C to 85°C Base Plate Temp. |
| Storage Temperature | -55°C to 100°C |
| DC Voltage | 5.5 V |
| Input RF Power (no damage) | +20 dBm |
| Power Dissipation | 1.6 W |

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




## OUTLINE DRAWING




NOTE: When soldering the DC connections, caution must be used to avoid overheating the DC terminal. See Application Note AN-40-010.

## OUTLINE DIMENSIONS (Inches / 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 |

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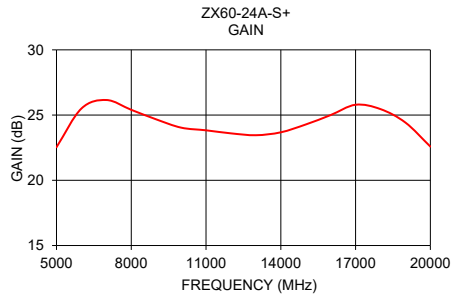
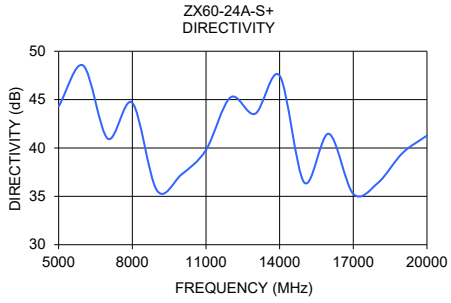
# Microwave Amplifier ZX60-24A-S+

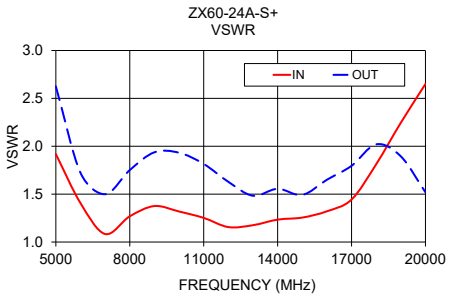
50Ω 5 to 20 GHz SMA Female

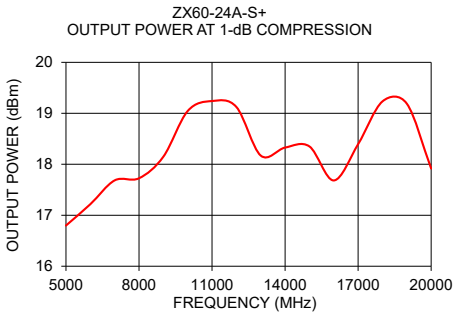
## TYPICAL PERFORMANCE DATA/CURVES

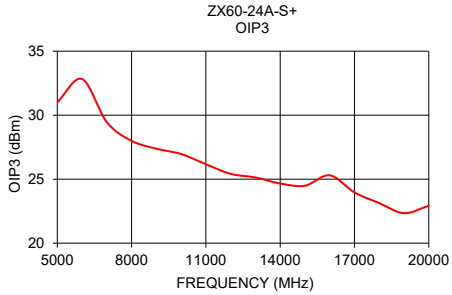
| Frequency (MHz) | Gain (dB) | Directivity (dB) | VSVR (:1) | | Power Out @1 dB Compr. (dBm) | NF (dB) | OIP3 (dBm) |
|---|---|---|---|---|---|---|---|
| | | | IN | OUT | | | |
| 5000 | 22.54 | 44.30 | 1.92 | 2.63 | 16.80 | 9.84 | 31.00 |
| 6000 | 25.50 | 48.52 | 1.41 | 1.72 | 17.22 | 6.47 | 32.82 |
| 7000 | 26.15 | 40.96 | 1.08 | 1.50 | 17.68 | 5.61 | 29.45 |
| 8000 | 25.40 | 44.67 | 1.27 | 1.75 | 17.73 | 5.55 | 27.99 |
| 9000 | 24.67 | 35.62 | 1.38 | 1.94 | 18.15 | 5.90 | 27.38 |
| 10000 | 24.04 | 37.26 | 1.32 | 1.93 | 19.05 | 6.12 | 26.96 |
| 11000 | 23.83 | 39.79 | 1.25 | 1.82 | 19.24 | 6.13 | 26.17 |
| 12000 | 23.60 | 45.23 | 1.16 | 1.63 | 19.12 | 6.26 | 25.41 |
| 13000 | 23.46 | 43.53 | 1.18 | 1.48 | 18.17 | 6.38 | 25.13 |
| 14000 | 23.68 | 47.46 | 1.23 | 1.56 | 18.33 | 6.56 | 24.66 |
| 15000 | 24.28 | 36.43 | 1.26 | 1.49 | 18.35 | 6.72 | 24.49 |
| 16000 | 25.00 | 41.47 | 1.32 | 1.65 | 17.68 | 6.83 | 25.30 |
| 17000 | 25.79 | 35.25 | 1.44 | 1.80 | 18.39 | 6.93 | 23.97 |
| 18000 | 25.46 | 36.38 | 1.81 | 2.02 | 19.23 | 7.14 | 23.13 |
| 19000 | 24.42 | 39.47 | 2.25 | 1.89 | 19.19 | 7.42 | 22.34 |
| 20000 | 22.58 | 41.29 | 2.65 | 1.52 | 17.92 | 7.63 | 22.92 |

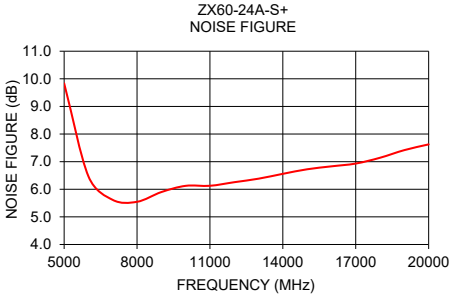



**NOTES**

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

# Wideband Microwave Amplifier ZX60-24A-S+

## *Typical Performance Data*

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

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

TEST CONDITIONS: Vd = 5.00V, Id = 264.47mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 15.74 | 65.63 | 7.74 | 4.29 | 81.60 | 0.73 | 22.50 | 13.26 | 19.59 |
| 4250 | 22.21 | 65.95 | 9.20 | 5.19 | 47.38 | 0.78 | 26.83 | 15.11 | 15.89 |
| 4500 | 21.99 | 65.82 | 9.19 | 5.69 | 50.01 | 0.82 | 27.79 | 16.22 | 13.35 |
| 4750 | 22.05 | 66.15 | 9.47 | 6.25 | 54.27 | 0.85 | 30.39 | 16.76 | 11.40 |
| 5000 | 22.54 | 66.84 | 10.04 | 6.97 | 59.07 | 0.88 | 31.00 | 16.80 | 9.84 |
| 5250 | 23.25 | 67.83 | 10.88 | 7.88 | 65.14 | 0.91 | 30.75 | 17.23 | 8.71 |
| 5500 | 24.05 | 69.33 | 11.99 | 8.96 | 75.11 | 0.93 | 30.63 | 17.66 | 7.76 |
| 5750 | 24.83 | 71.57 | 13.52 | 10.21 | 93.82 | 0.95 | 33.22 | 16.96 | 6.97 |
| 6000 | 25.50 | 74.02 | 15.45 | 11.52 | 120.46 | 0.96 | 32.82 | 17.22 | 6.47 |
| 6500 | 26.17 | 72.43 | 21.58 | 13.77 | 97.77 | 0.96 | 29.88 | 17.65 | 5.85 |
| 7000 | 26.15 | 67.12 | 27.93 | 13.99 | 53.56 | 0.96 | 29.45 | 17.68 | 5.61 |
| 7500 | 25.81 | 67.45 | 22.53 | 12.76 | 56.87 | 0.95 | 28.12 | 18.47 | 5.51 |
| 8000 | 25.40 | 70.07 | 18.53 | 11.27 | 78.08 | 0.94 | 27.99 | 17.73 | 5.55 |
| 8500 | 25.02 | 63.95 | 16.53 | 10.28 | 39.19 | 0.93 | 27.62 | 18.04 | 5.66 |
| 9000 | 24.67 | 60.29 | 16.02 | 9.92 | 26.47 | 0.92 | 27.38 | 18.15 | 5.90 |
| 9500 | 24.25 | 61.01 | 16.89 | 9.91 | 30.34 | 0.92 | 27.24 | 18.80 | 5.97 |
| 10000 | 24.04 | 61.29 | 17.23 | 9.95 | 32.20 | 0.91 | 26.96 | 19.05 | 6.12 |
| 10500 | 23.90 | 62.06 | 17.91 | 10.23 | 36.08 | 0.92 | 26.66 | 19.22 | 6.12 |
| 11000 | 23.83 | 63.62 | 19.02 | 10.76 | 44.18 | 0.93 | 26.17 | 19.24 | 6.13 |
| 11500 | 23.71 | 66.25 | 20.82 | 11.44 | 61.65 | 0.94 | 25.73 | 19.39 | 6.18 |
| 12000 | 23.60 | 68.83 | 22.80 | 12.42 | 85.61 | 0.95 | 25.41 | 19.12 | 6.26 |
| 12500 | 23.52 | 67.59 | 23.60 | 13.34 | 75.87 | 0.96 | 25.49 | 17.70 | 6.33 |
| 13000 | 23.46 | 66.99 | 21.85 | 14.22 | 71.76 | 0.97 | 25.13 | 18.17 | 6.38 |
| 13500 | 23.58 | 65.71 | 21.28 | 14.49 | 61.17 | 0.97 | 24.63 | 19.01 | 6.40 |
| 14000 | 23.68 | 71.14 | 19.60 | 13.25 | 111.29 | 0.96 | 24.66 | 18.33 | 6.56 |
| 14500 | 23.54 | 63.40 | 18.15 | 13.07 | 46.09 | 0.97 | 24.59 | 18.52 | 6.66 |
| 15000 | 24.28 | 60.71 | 18.92 | 14.09 | 31.44 | 0.97 | 24.49 | 18.35 | 6.72 |
| 15500 | 24.67 | 67.42 | 18.33 | 12.61 | 63.91 | 0.96 | 24.81 | 18.45 | 6.81 |
| 16000 | 25.00 | 66.47 | 17.18 | 12.20 | 54.58 | 0.96 | 25.30 | 17.68 | 6.83 |
| 16500 | 25.46 | 63.33 | 16.64 | 11.80 | 35.75 | 0.95 | 24.49 | 17.77 | 6.91 |
| 17000 | 25.79 | 61.04 | 14.82 | 10.92 | 25.76 | 0.95 | 23.97 | 18.39 | 6.93 |
| 17500 | 25.71 | 61.35 | 12.67 | 9.88 | 25.75 | 0.94 | 23.24 | 19.38 | 7.07 |
| 18000 | 25.46 | 61.84 | 10.79 | 9.43 | 26.84 | 0.96 | 23.13 | 19.23 | 7.14 |
| 18500 | 25.04 | 63.19 | 9.48 | 9.61 | 31.98 | 0.99 | 22.82 | 19.14 | 7.32 |
| 19000 | 24.42 | 63.89 | 8.32 | 10.20 | 36.20 | 1.04 | 22.34 | 19.19 | 7.42 |
| 19500 | 23.58 | 65.13 | 7.45 | 11.88 | 45.71 | 1.11 | 22.42 | 18.42 | 7.49 |
| 20000 | 22.58 | 63.87 | 6.90 | 13.71 | 44.08 | 1.15 | 22.92 | 17.92 | 7.63 |
| 20500 | 21.37 | 63.87 | 6.51 | 15.88 | 50.42 | 1.19 | 23.68 | 17.36 | 7.67 |
| 21000 | 19.70 | 64.48 | 6.26 | 17.20 | 64.93 | 1.21 | 24.49 | 17.12 | 7.85 |
| 21500 | 17.83 | 64.98 | 5.93 | 17.37 | 83.31 | 1.23 | 27.51 | 16.30 | 8.12 |
| 22000 | 15.49 | 63.41 | 5.51 | 16.08 | 87.27 | 1.25 | 23.43 | 16.38 | 8.46 |

# Wideband Microwave Amplifier ZX60-24A-S+

## *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 = 4.75V, Id = 262.22mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 16.16 | 65.49 | 7.73 | 4.32 | 76.67 | 0.74 | 20.98 | 12.86 | 19.51 |
| 4250 | 22.89 | 65.97 | 9.31 | 5.23 | 44.25 | 0.78 | 23.55 | 14.67 | 15.80 |
| 4500 | 22.57 | 66.08 | 9.23 | 5.71 | 48.35 | 0.82 | 24.63 | 15.72 | 13.24 |
| 4750 | 22.53 | 66.35 | 9.47 | 6.26 | 52.55 | 0.85 | 26.80 | 16.14 | 11.29 |
| 5000 | 22.97 | 66.64 | 10.03 | 6.97 | 54.86 | 0.88 | 27.10 | 16.11 | 9.76 |
| 5250 | 23.65 | 67.70 | 10.84 | 7.87 | 61.20 | 0.91 | 32.36 | 16.55 | 8.62 |
| 5500 | 24.42 | 68.86 | 11.93 | 8.96 | 68.08 | 0.93 | 33.75 | 16.96 | 7.68 |
| 5750 | 25.19 | 71.21 | 13.43 | 10.21 | 86.41 | 0.95 | 31.09 | 16.24 | 6.89 |
| 6000 | 25.84 | 73.75 | 15.32 | 11.55 | 112.22 | 0.96 | 32.03 | 16.48 | 6.40 |
| 6500 | 26.51 | 72.51 | 21.37 | 13.95 | 95.13 | 0.97 | 34.98 | 16.93 | 5.74 |
| 7000 | 26.49 | 67.42 | 28.53 | 14.25 | 53.48 | 0.96 | 33.61 | 16.94 | 5.54 |
| 7500 | 26.16 | 67.93 | 23.02 | 12.96 | 57.88 | 0.95 | 29.74 | 17.77 | 5.44 |
| 8000 | 25.77 | 71.26 | 18.80 | 11.45 | 86.20 | 0.94 | 29.92 | 17.01 | 5.47 |
| 8500 | 25.40 | 63.89 | 16.72 | 10.37 | 37.37 | 0.93 | 29.20 | 17.32 | 5.60 |
| 9000 | 25.06 | 60.69 | 16.17 | 10.02 | 26.58 | 0.92 | 28.63 | 17.46 | 5.84 |
| 9500 | 24.64 | 61.35 | 17.07 | 9.98 | 30.23 | 0.92 | 28.28 | 18.09 | 5.90 |
| 10000 | 24.43 | 61.46 | 17.41 | 10.05 | 31.48 | 0.92 | 27.95 | 18.34 | 6.06 |
| 10500 | 24.29 | 61.92 | 17.99 | 10.32 | 34.05 | 0.92 | 27.51 | 18.56 | 6.09 |
| 11000 | 24.23 | 63.70 | 18.88 | 10.87 | 42.67 | 0.93 | 26.93 | 18.59 | 6.08 |
| 11500 | 24.12 | 66.26 | 20.33 | 11.57 | 58.96 | 0.94 | 26.42 | 18.75 | 6.12 |
| 12000 | 24.03 | 69.11 | 21.92 | 12.57 | 84.30 | 0.95 | 26.13 | 18.47 | 6.17 |
| 12500 | 23.96 | 67.49 | 22.44 | 13.55 | 71.30 | 0.96 | 26.56 | 16.99 | 6.24 |
| 13000 | 23.91 | 66.93 | 20.97 | 14.43 | 67.67 | 0.97 | 26.08 | 17.49 | 6.32 |
| 13500 | 24.06 | 65.77 | 20.74 | 14.72 | 58.28 | 0.97 | 25.41 | 18.31 | 6.30 |
| 14000 | 24.20 | 70.54 | 19.44 | 13.31 | 97.87 | 0.96 | 25.69 | 17.62 | 6.49 |
| 14500 | 24.06 | 62.99 | 18.16 | 13.03 | 41.34 | 0.96 | 25.67 | 17.84 | 6.56 |
| 15000 | 24.83 | 60.57 | 18.86 | 14.17 | 29.05 | 0.97 | 25.71 | 17.64 | 6.65 |
| 15500 | 25.28 | 67.04 | 18.73 | 12.68 | 57.12 | 0.96 | 26.17 | 17.73 | 6.66 |
| 16000 | 25.63 | 66.13 | 17.47 | 12.29 | 48.90 | 0.96 | 26.08 | 16.98 | 6.76 |
| 16500 | 26.14 | 63.17 | 17.11 | 11.96 | 32.62 | 0.95 | 25.35 | 17.09 | 6.82 |
| 17000 | 26.54 | 60.74 | 15.39 | 11.06 | 22.99 | 0.95 | 25.21 | 17.62 | 6.87 |
| 17500 | 26.53 | 60.93 | 13.06 | 9.92 | 22.48 | 0.94 | 24.24 | 18.78 | 6.95 |
| 18000 | 26.29 | 61.55 | 11.02 | 9.28 | 23.62 | 0.95 | 24.13 | 18.79 | 7.07 |
| 18500 | 25.91 | 62.66 | 9.63 | 9.39 | 27.14 | 0.98 | 23.90 | 18.60 | 7.21 |
| 19000 | 25.32 | 63.34 | 8.43 | 9.95 | 30.57 | 1.03 | 23.33 | 18.57 | 7.30 |
| 19500 | 24.50 | 64.44 | 7.47 | 11.67 | 37.92 | 1.10 | 23.72 | 17.70 | 7.35 |
| 20000 | 23.52 | 63.53 | 6.94 | 13.88 | 38.21 | 1.15 | 24.85 | 17.28 | 7.49 |
| 20500 | 22.35 | 63.58 | 6.54 | 16.68 | 43.88 | 1.20 | 26.72 | 16.70 | 7.53 |
| 21000 | 20.66 | 63.81 | 6.29 | 18.66 | 54.25 | 1.22 | 29.31 | 16.43 | 7.72 |
| 21500 | 18.77 | 65.01 | 5.87 | 18.98 | 75.07 | 1.24 | 28.45 | 15.57 | 7.96 |
| 22000 | 16.35 | 63.37 | 5.43 | 16.97 | 78.55 | 1.26 | 29.16 | 15.63 | 8.33 |

# Wideband Microwave Amplifier ZX60-24A-S+

## *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 = 5.25V, Id = 264.98mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 15.65 | 65.62 | 7.71 | 4.27 | 81.92 | 0.73 | 23.36 | 13.60 | 19.68 |
| 4250 | 21.93 | 65.62 | 9.11 | 5.14 | 46.79 | 0.78 | 33.60 | 15.47 | 16.01 |
| 4500 | 21.73 | 65.70 | 9.12 | 5.65 | 50.51 | 0.82 | 30.38 | 16.63 | 13.45 |
| 4750 | 21.82 | 66.08 | 9.41 | 6.21 | 55.04 | 0.85 | 29.34 | 17.23 | 11.48 |
| 5000 | 22.33 | 66.78 | 10.00 | 6.92 | 59.84 | 0.88 | 29.85 | 17.35 | 9.92 |
| 5250 | 23.07 | 67.66 | 10.85 | 7.83 | 65.04 | 0.90 | 28.59 | 17.79 | 8.76 |
| 5500 | 23.89 | 69.16 | 11.95 | 8.90 | 74.73 | 0.93 | 28.72 | 18.20 | 7.82 |
| 5750 | 24.70 | 71.29 | 13.49 | 10.13 | 92.11 | 0.94 | 29.45 | 17.52 | 7.05 |
| 6000 | 25.38 | 74.11 | 15.43 | 11.43 | 123.13 | 0.95 | 29.38 | 17.75 | 6.54 |
| 6500 | 26.08 | 73.23 | 21.58 | 13.71 | 108.29 | 0.96 | 28.43 | 18.21 | 5.90 |
| 7000 | 26.06 | 67.55 | 27.68 | 13.95 | 56.84 | 0.96 | 28.10 | 18.22 | 5.67 |
| 7500 | 25.72 | 67.84 | 22.20 | 12.70 | 60.09 | 0.95 | 27.52 | 19.01 | 5.58 |
| 8000 | 25.29 | 69.97 | 18.28 | 11.21 | 77.97 | 0.94 | 27.26 | 18.26 | 5.61 |
| 8500 | 24.90 | 63.82 | 16.35 | 10.23 | 39.02 | 0.93 | 27.03 | 18.56 | 5.73 |
| 9000 | 24.55 | 60.25 | 15.86 | 9.90 | 26.67 | 0.92 | 26.91 | 18.71 | 5.97 |
| 9500 | 24.13 | 61.44 | 16.68 | 9.83 | 32.19 | 0.91 | 26.84 | 19.33 | 6.03 |
| 10000 | 23.92 | 61.24 | 17.08 | 9.87 | 32.37 | 0.91 | 26.60 | 19.56 | 6.18 |
| 10500 | 23.78 | 62.07 | 17.76 | 10.13 | 36.52 | 0.92 | 26.33 | 19.77 | 6.18 |
| 11000 | 23.70 | 63.61 | 18.92 | 10.65 | 44.66 | 0.93 | 25.88 | 19.78 | 6.22 |
| 11500 | 23.57 | 66.31 | 20.84 | 11.33 | 62.99 | 0.93 | 25.49 | 19.91 | 6.25 |
| 12000 | 23.45 | 68.47 | 23.17 | 12.31 | 83.49 | 0.95 | 25.15 | 19.68 | 6.31 |
| 12500 | 23.35 | 67.18 | 24.15 | 13.27 | 73.73 | 0.96 | 25.05 | 18.29 | 6.38 |
| 13000 | 23.28 | 66.64 | 22.25 | 14.12 | 70.39 | 0.97 | 24.75 | 18.77 | 6.48 |
| 13500 | 23.40 | 65.37 | 21.68 | 14.37 | 60.07 | 0.97 | 24.35 | 19.52 | 6.44 |
| 14000 | 23.47 | 70.71 | 19.75 | 13.10 | 108.31 | 0.96 | 24.26 | 18.88 | 6.62 |
| 14500 | 23.32 | 63.43 | 18.38 | 12.94 | 47.37 | 0.96 | 24.15 | 19.06 | 6.76 |
| 15000 | 24.04 | 60.59 | 19.05 | 13.91 | 31.83 | 0.97 | 23.94 | 18.90 | 6.80 |
| 15500 | 24.41 | 67.09 | 18.12 | 12.51 | 63.29 | 0.96 | 24.13 | 18.96 | 6.87 |
| 16000 | 24.73 | 66.74 | 16.80 | 12.18 | 57.94 | 0.96 | 24.53 | 18.27 | 6.90 |
| 16500 | 25.16 | 63.44 | 16.01 | 11.83 | 37.39 | 0.96 | 23.83 | 18.38 | 7.01 |
| 17000 | 25.44 | 60.94 | 14.13 | 10.96 | 26.39 | 0.95 | 23.34 | 18.89 | 7.04 |
| 17500 | 25.33 | 61.36 | 12.08 | 9.94 | 26.76 | 0.95 | 22.80 | 19.82 | 7.15 |
| 18000 | 25.04 | 62.08 | 10.33 | 9.39 | 28.64 | 0.96 | 22.66 | 19.71 | 7.24 |
| 18500 | 24.60 | 63.47 | 9.13 | 9.49 | 34.25 | 1.00 | 22.35 | 19.64 | 7.41 |
| 19000 | 23.98 | 64.24 | 8.10 | 9.95 | 39.04 | 1.04 | 21.95 | 19.72 | 7.52 |
| 19500 | 23.15 | 65.43 | 7.29 | 11.44 | 48.95 | 1.10 | 21.92 | 19.00 | 7.58 |
| 20000 | 22.19 | 64.24 | 6.84 | 13.31 | 47.74 | 1.15 | 22.12 | 18.58 | 7.75 |
| 20500 | 21.03 | 64.12 | 6.48 | 15.68 | 53.81 | 1.19 | 22.49 | 18.03 | 7.80 |
| 21000 | 19.37 | 64.48 | 6.25 | 17.36 | 67.47 | 1.21 | 22.79 | 17.82 | 7.98 |
| 21500 | 17.53 | 64.48 | 5.83 | 17.74 | 80.82 | 1.24 | 23.99 | 16.99 | 8.25 |
| 22000 | 15.19 | 62.87 | 5.41 | 16.04 | 84.15 | 1.26 | 21.70 | 17.09 | 8.61 |

# Wideband Microwave Amplifier ZX60-24A-S+

## *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 = 5.00V, Id = 256.72mA @ Temperature = -20°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 17.63 | 65.56 | 7.42 | 4.15 | 62.69 | 0.73 | 21.83 | 13.10 | 19.11 |
| 4250 | 26.19 | 66.08 | 9.91 | 5.31 | 31.47 | 0.77 | 23.83 | 14.82 | 15.11 |
| 4500 | 25.07 | 66.09 | 9.42 | 5.73 | 36.58 | 0.81 | 26.35 | 16.03 | 12.57 |
| 4750 | 24.57 | 65.87 | 9.46 | 6.17 | 39.06 | 0.84 | 29.42 | 16.73 | 10.64 |
| 5000 | 24.74 | 66.35 | 9.84 | 6.79 | 42.64 | 0.87 | 30.90 | 16.88 | 9.12 |
| 5250 | 25.27 | 67.21 | 10.57 | 7.67 | 47.25 | 0.90 | 35.79 | 17.42 | 7.92 |
| 5500 | 25.94 | 68.53 | 11.58 | 8.63 | 54.09 | 0.92 | 36.65 | 17.68 | 6.96 |
| 5750 | 26.63 | 70.28 | 12.78 | 9.74 | 64.45 | 0.94 | 37.35 | 17.14 | 6.28 |
| 6000 | 27.27 | 72.93 | 14.58 | 11.13 | 85.50 | 0.96 | 37.09 | 17.14 | 5.71 |
| 6500 | 27.95 | 73.67 | 19.92 | 13.96 | 91.86 | 0.97 | 38.17 | 17.89 | 5.16 |
| 7000 | 27.95 | 68.67 | 29.76 | 14.90 | 52.49 | 0.97 | 38.15 | 17.56 | 4.91 |
| 7500 | 27.63 | 67.56 | 25.61 | 13.24 | 47.12 | 0.96 | 36.17 | 18.44 | 4.81 |
| 8000 | 27.27 | 69.13 | 20.05 | 11.36 | 56.85 | 0.94 | 35.06 | 17.71 | 4.90 |
| 8500 | 26.95 | 64.67 | 17.72 | 10.39 | 34.32 | 0.92 | 35.31 | 18.02 | 4.97 |
| 9000 | 26.68 | 61.03 | 17.02 | 10.03 | 23.04 | 0.92 | 36.17 | 18.50 | 5.15 |
| 9500 | 26.27 | 60.82 | 17.90 | 10.22 | 23.80 | 0.92 | 36.89 | 18.77 | 5.24 |
| 10000 | 26.06 | 61.58 | 18.25 | 10.30 | 26.71 | 0.92 | 35.78 | 18.89 | 5.35 |
| 10500 | 25.90 | 61.51 | 17.96 | 10.45 | 27.07 | 0.92 | 35.25 | 19.45 | 5.44 |
| 11000 | 25.82 | 63.42 | 17.57 | 10.52 | 34.01 | 0.93 | 33.83 | 19.55 | 5.48 |
| 11500 | 25.76 | 66.22 | 18.26 | 11.24 | 48.02 | 0.94 | 32.41 | 19.50 | 5.50 |
| 12000 | 25.72 | 68.78 | 18.63 | 12.19 | 65.87 | 0.95 | 31.80 | 19.33 | 5.53 |
| 12500 | 25.75 | 67.79 | 18.72 | 13.96 | 59.85 | 0.97 | 31.58 | 18.06 | 5.59 |
| 13000 | 25.75 | 66.98 | 18.18 | 15.51 | 55.11 | 0.99 | 31.26 | 18.59 | 5.70 |
| 13500 | 25.92 | 65.88 | 19.26 | 15.02 | 47.58 | 0.98 | 30.46 | 18.56 | 5.67 |
| 14000 | 26.16 | 69.70 | 19.64 | 12.63 | 70.30 | 0.96 | 30.26 | 18.30 | 5.78 |
| 14500 | 26.07 | 63.33 | 18.61 | 11.85 | 33.65 | 0.95 | 29.61 | 18.43 | 5.84 |
| 15000 | 26.79 | 60.01 | 18.01 | 14.07 | 21.65 | 0.98 | 29.12 | 18.26 | 5.92 |
| 15500 | 27.56 | 65.43 | 18.07 | 13.20 | 36.65 | 0.97 | 29.31 | 17.97 | 5.95 |
| 16000 | 27.91 | 65.96 | 15.60 | 13.46 | 37.06 | 0.98 | 28.26 | 17.88 | 5.98 |
| 16500 | 28.58 | 62.68 | 14.94 | 13.51 | 23.42 | 0.99 | 28.29 | 18.10 | 6.20 |
| 17000 | 29.26 | 60.22 | 14.77 | 11.99 | 15.98 | 0.97 | 28.36 | 17.41 | 6.29 |
| 17500 | 29.46 | 60.31 | 12.84 | 9.59 | 14.78 | 0.93 | 27.65 | 18.33 | 6.48 |
| 18000 | 29.19 | 60.85 | 11.04 | 7.34 | 14.51 | 0.87 | 27.34 | 19.56 | 6.46 |
| 18500 | 29.01 | 61.80 | 10.05 | 6.87 | 15.70 | 0.87 | 26.90 | 19.33 | 6.57 |
| 19000 | 28.72 | 61.90 | 9.27 | 7.48 | 16.48 | 0.92 | 26.17 | 19.05 | 6.47 |
| 19500 | 28.30 | 62.50 | 8.22 | 9.61 | 19.27 | 1.03 | 25.89 | 18.25 | 6.53 |
| 20000 | 27.68 | 61.94 | 7.93 | 16.15 | 21.08 | 1.13 | 25.88 | 18.56 | 6.48 |
| 20500 | 26.68 | 61.51 | 7.60 | 30.64 | 22.76 | 1.17 | 26.28 | 17.90 | 6.55 |
| 21000 | 24.85 | 62.41 | 6.75 | 22.08 | 29.56 | 1.20 | 26.69 | 17.50 | 6.85 |
| 21500 | 22.68 | 64.35 | 5.56 | 17.36 | 42.90 | 1.26 | 28.86 | 16.80 | 7.22 |
| 22000 | 19.95 | 64.37 | 4.89 | 14.35 | 54.12 | 1.28 | 30.48 | 16.91 | 7.64 |

# Wideband Microwave Amplifier ZX60-24A-S+

## *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 = 4.75V, Id = 254.10mA @ Temperature = -20°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 18.57 | 65.59 | 7.39 | 4.22 | 56.90 | 0.74 | 20.28 | 12.50 | 19.07 |
| 4250 | 27.90 | 66.47 | 10.33 | 5.52 | 27.84 | 0.78 | 21.80 | 13.98 | 15.08 |
| 4500 | 26.48 | 65.90 | 9.53 | 5.81 | 30.76 | 0.82 | 23.69 | 15.02 | 12.53 |
| 4750 | 25.76 | 65.89 | 9.47 | 6.20 | 34.25 | 0.85 | 25.74 | 15.65 | 10.61 |
| 5000 | 25.80 | 66.38 | 9.81 | 6.80 | 37.88 | 0.87 | 26.61 | 15.78 | 9.10 |
| 5250 | 26.23 | 67.12 | 10.49 | 7.66 | 41.76 | 0.90 | 29.03 | 16.37 | 7.87 |
| 5500 | 26.85 | 68.34 | 11.47 | 8.62 | 47.52 | 0.92 | 29.26 | 16.65 | 6.98 |
| 5750 | 27.49 | 70.20 | 12.61 | 9.73 | 57.64 | 0.94 | 29.17 | 16.13 | 6.28 |
| 6000 | 28.10 | 71.88 | 14.33 | 11.12 | 68.66 | 0.96 | 28.83 | 16.13 | 5.69 |
| 6500 | 28.74 | 73.39 | 19.46 | 13.99 | 81.10 | 0.97 | 31.50 | 16.87 | 5.15 |
| 7000 | 28.74 | 68.74 | 29.27 | 15.01 | 48.41 | 0.97 | 30.92 | 16.57 | 4.88 |
| 7500 | 28.44 | 67.43 | 27.12 | 13.36 | 42.38 | 0.96 | 32.33 | 17.48 | 4.80 |
| 8000 | 28.11 | 69.02 | 20.84 | 11.44 | 51.09 | 0.94 | 32.32 | 16.76 | 4.87 |
| 8500 | 27.82 | 64.69 | 18.22 | 10.44 | 31.24 | 0.92 | 32.03 | 16.99 | 4.94 |
| 9000 | 27.57 | 61.25 | 17.42 | 10.05 | 21.39 | 0.92 | 31.82 | 17.47 | 5.14 |
| 9500 | 27.15 | 60.86 | 18.46 | 10.28 | 21.67 | 0.92 | 31.67 | 17.67 | 5.22 |
| 10000 | 26.92 | 61.66 | 18.89 | 10.38 | 24.49 | 0.92 | 31.96 | 17.80 | 5.31 |
| 10500 | 26.76 | 61.77 | 18.40 | 10.54 | 25.35 | 0.92 | 31.84 | 18.48 | 5.41 |
| 11000 | 26.68 | 63.63 | 17.63 | 10.62 | 31.62 | 0.93 | 32.10 | 18.65 | 5.48 |
| 11500 | 26.63 | 66.42 | 17.85 | 11.33 | 44.48 | 0.94 | 32.09 | 18.59 | 5.47 |
| 12000 | 26.59 | 69.21 | 17.76 | 12.28 | 62.51 | 0.96 | 32.05 | 18.40 | 5.51 |
| 12500 | 26.64 | 67.99 | 17.59 | 14.05 | 55.09 | 0.98 | 32.27 | 17.08 | 5.56 |
| 13000 | 26.65 | 67.51 | 17.00 | 15.64 | 52.62 | 0.99 | 31.87 | 17.59 | 5.65 |
| 13500 | 26.83 | 66.44 | 17.86 | 15.20 | 45.60 | 0.99 | 31.60 | 17.55 | 5.65 |
| 14000 | 27.14 | 69.28 | 18.39 | 12.69 | 59.69 | 0.96 | 31.03 | 17.23 | 5.76 |
| 14500 | 27.06 | 63.12 | 17.46 | 11.76 | 29.16 | 0.95 | 30.39 | 17.31 | 5.80 |
| 15000 | 27.77 | 59.69 | 16.31 | 14.17 | 18.55 | 0.98 | 30.17 | 17.09 | 5.90 |
| 15500 | 28.66 | 65.16 | 16.80 | 13.40 | 31.19 | 0.97 | 29.37 | 16.72 | 5.96 |
| 16000 | 29.01 | 65.93 | 14.70 | 13.48 | 32.35 | 0.99 | 26.36 | 16.53 | 5.98 |
| 16500 | 29.73 | 62.36 | 14.36 | 13.62 | 19.69 | 0.99 | 28.12 | 16.80 | 6.19 |
| 17000 | 30.58 | 59.78 | 15.17 | 12.21 | 13.12 | 0.97 | 27.68 | 16.07 | 6.26 |
| 17500 | 31.00 | 59.75 | 14.27 | 9.63 | 11.79 | 0.92 | 29.47 | 16.91 | 6.48 |
| 18000 | 30.88 | 60.17 | 12.37 | 7.10 | 11.18 | 0.84 | 29.79 | 18.43 | 6.41 |
| 18500 | 30.86 | 60.79 | 11.29 | 6.45 | 11.35 | 0.82 | 29.38 | 18.32 | 6.53 |
| 19000 | 30.72 | 60.85 | 10.29 | 7.00 | 11.62 | 0.88 | 29.66 | 18.01 | 6.40 |
| 19500 | 30.49 | 61.25 | 8.83 | 9.32 | 13.15 | 1.00 | 29.80 | 17.19 | 6.46 |
| 20000 | 29.93 | 60.74 | 8.28 | 16.78 | 14.44 | 1.13 | 30.60 | 17.55 | 6.42 |
| 20500 | 28.96 | 60.51 | 7.88 | 27.13 | 15.79 | 1.16 | 32.15 | 16.87 | 6.46 |
| 21000 | 27.18 | 61.64 | 6.98 | 19.10 | 20.83 | 1.19 | 31.18 | 16.39 | 6.74 |
| 21500 | 24.97 | 63.60 | 5.70 | 17.31 | 30.60 | 1.25 | 28.02 | 15.69 | 7.09 |
| 22000 | 22.11 | 64.89 | 4.98 | 15.41 | 45.64 | 1.28 | 27.46 | 15.77 | 7.47 |

# Wideband Microwave Amplifier ZX60-24A-S+

## *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 = 5.25V, Id = 259.05mA @ Temperature = -20°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 17.12 | 65.45 | 7.44 | 4.13 | 65.55 | 0.73 | 23.24 | 13.48 | 19.20 |
| 4250 | 25.25 | 66.07 | 9.64 | 5.25 | 34.53 | 0.77 | 26.80 | 15.26 | 15.19 |
| 4500 | 24.33 | 65.81 | 9.32 | 5.70 | 38.36 | 0.81 | 31.11 | 16.52 | 12.65 |
| 4750 | 23.96 | 66.05 | 9.44 | 6.16 | 42.71 | 0.84 | 35.89 | 17.25 | 10.70 |
| 5000 | 24.21 | 66.52 | 9.86 | 6.79 | 46.27 | 0.87 | 34.44 | 17.49 | 9.21 |
| 5250 | 24.78 | 67.25 | 10.61 | 7.66 | 50.22 | 0.90 | 32.33 | 18.04 | 7.96 |
| 5500 | 25.49 | 68.61 | 11.65 | 8.63 | 57.55 | 0.92 | 32.53 | 18.28 | 7.06 |
| 5750 | 26.21 | 70.77 | 12.90 | 9.74 | 71.62 | 0.94 | 32.01 | 17.76 | 6.36 |
| 6000 | 26.87 | 72.56 | 14.74 | 11.14 | 85.84 | 0.95 | 32.20 | 17.76 | 5.76 |
| 6500 | 27.58 | 73.11 | 20.25 | 13.95 | 89.88 | 0.97 | 31.08 | 18.52 | 5.22 |
| 7000 | 27.58 | 68.19 | 29.72 | 14.85 | 51.83 | 0.97 | 30.64 | 18.17 | 4.95 |
| 7500 | 27.26 | 67.74 | 24.53 | 13.18 | 50.14 | 0.96 | 30.47 | 19.03 | 4.86 |
| 8000 | 26.88 | 69.20 | 19.48 | 11.31 | 59.75 | 0.94 | 29.93 | 18.33 | 4.95 |
| 8500 | 26.55 | 64.66 | 17.29 | 10.37 | 35.81 | 0.93 | 29.93 | 18.64 | 5.01 |
| 9000 | 26.27 | 61.06 | 16.65 | 10.03 | 24.21 | 0.92 | 30.20 | 19.13 | 5.22 |
| 9500 | 25.85 | 60.73 | 17.47 | 10.21 | 24.67 | 0.92 | 30.32 | 19.39 | 5.30 |
| 10000 | 25.65 | 61.52 | 17.85 | 10.28 | 27.77 | 0.92 | 30.00 | 19.50 | 5.45 |
| 10500 | 25.49 | 61.67 | 17.65 | 10.44 | 28.85 | 0.92 | 29.95 | 20.02 | 5.49 |
| 11000 | 25.40 | 63.60 | 17.59 | 10.50 | 36.40 | 0.93 | 29.44 | 20.10 | 5.56 |
| 11500 | 25.33 | 66.08 | 18.65 | 11.22 | 49.73 | 0.94 | 28.84 | 20.04 | 5.54 |
| 12000 | 25.28 | 68.80 | 19.41 | 12.20 | 69.57 | 0.95 | 28.45 | 19.90 | 5.59 |
| 12500 | 25.29 | 67.42 | 19.71 | 13.99 | 60.67 | 0.97 | 28.14 | 18.70 | 5.63 |
| 13000 | 25.28 | 66.94 | 19.10 | 15.51 | 58.13 | 0.98 | 27.97 | 19.23 | 5.75 |
| 13500 | 25.43 | 65.49 | 20.30 | 14.97 | 48.28 | 0.98 | 27.50 | 19.20 | 5.72 |
| 14000 | 25.62 | 69.71 | 20.49 | 12.62 | 74.99 | 0.95 | 27.31 | 18.98 | 5.84 |
| 14500 | 25.52 | 63.52 | 19.40 | 11.91 | 36.79 | 0.95 | 27.06 | 19.10 | 5.86 |
| 15000 | 26.22 | 60.06 | 19.37 | 14.07 | 23.36 | 0.97 | 26.58 | 18.96 | 5.97 |
| 15500 | 26.91 | 65.97 | 18.85 | 13.19 | 42.11 | 0.96 | 26.54 | 18.70 | 6.02 |
| 16000 | 27.25 | 66.30 | 16.00 | 13.56 | 41.75 | 0.98 | 26.97 | 18.62 | 6.07 |
| 16500 | 27.85 | 63.05 | 14.96 | 13.54 | 26.57 | 0.99 | 26.03 | 18.84 | 6.26 |
| 17000 | 28.40 | 60.40 | 13.99 | 11.94 | 17.89 | 0.97 | 25.91 | 18.21 | 6.32 |
| 17500 | 28.44 | 60.73 | 11.77 | 9.62 | 17.19 | 0.95 | 25.28 | 19.12 | 6.52 |
| 18000 | 28.07 | 61.32 | 10.13 | 7.49 | 17.19 | 0.90 | 25.05 | 20.05 | 6.50 |
| 18500 | 27.79 | 62.56 | 9.28 | 7.12 | 19.54 | 0.90 | 24.68 | 19.85 | 6.63 |
| 19000 | 27.41 | 62.75 | 8.69 | 7.74 | 20.95 | 0.95 | 24.07 | 19.68 | 6.56 |
| 19500 | 26.93 | 63.54 | 7.85 | 9.74 | 25.17 | 1.04 | 23.80 | 18.95 | 6.59 |
| 20000 | 26.29 | 62.65 | 7.71 | 15.84 | 26.57 | 1.14 | 23.62 | 19.26 | 6.61 |
| 20500 | 25.27 | 62.08 | 7.41 | 28.96 | 28.30 | 1.18 | 23.76 | 18.61 | 6.68 |
| 21000 | 23.43 | 62.95 | 6.56 | 23.22 | 36.66 | 1.22 | 23.76 | 18.25 | 7.01 |
| 21500 | 21.29 | 64.90 | 5.44 | 17.17 | 53.06 | 1.26 | 24.35 | 17.56 | 7.40 |
| 22000 | 18.63 | 64.36 | 4.80 | 13.90 | 62.04 | 1.28 | 24.88 | 17.70 | 7.83 |

# Wideband Microwave Amplifier ZX60-24A-S+

## *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 = 5.00V, Id = 264.90mA @ Temperature = +85°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 14.41 | 65.63 | 7.87 | 4.35 | 96.44 | 0.74 | 21.44 | 13.04 | 20.43 |
| 4250 | 19.88 | 65.67 | 8.90 | 5.11 | 58.86 | 0.78 | 25.74 | 14.91 | 16.89 |
| 4500 | 20.14 | 65.83 | 9.07 | 5.68 | 61.59 | 0.82 | 26.29 | 15.89 | 14.35 |
| 4750 | 20.48 | 66.30 | 9.49 | 6.34 | 66.64 | 0.85 | 28.60 | 16.33 | 12.41 |
| 5000 | 21.14 | 66.99 | 10.13 | 7.15 | 71.52 | 0.89 | 28.72 | 16.32 | 10.86 |
| 5250 | 21.96 | 68.07 | 10.99 | 8.13 | 78.68 | 0.91 | 36.04 | 16.71 | 9.68 |
| 5500 | 22.83 | 69.81 | 12.20 | 9.26 | 92.45 | 0.93 | 35.21 | 17.27 | 8.75 |
| 5750 | 23.65 | 72.00 | 13.79 | 10.51 | 114.16 | 0.95 | 35.80 | 16.58 | 7.91 |
| 6000 | 24.32 | 74.40 | 15.84 | 11.74 | 145.06 | 0.96 | 39.36 | 17.02 | 7.42 |
| 6500 | 24.97 | 72.39 | 22.02 | 13.49 | 111.61 | 0.96 | 32.34 | 17.15 | 6.78 |
| 7000 | 24.94 | 67.04 | 28.23 | 13.68 | 60.85 | 0.96 | 30.74 | 17.49 | 6.57 |
| 7500 | 24.58 | 68.76 | 22.35 | 12.55 | 75.97 | 0.95 | 29.10 | 18.13 | 6.50 |
| 8000 | 24.13 | 70.30 | 17.96 | 11.01 | 92.15 | 0.94 | 28.93 | 17.52 | 6.53 |
| 8500 | 23.68 | 63.51 | 15.89 | 9.93 | 42.88 | 0.92 | 28.26 | 17.85 | 6.67 |
| 9000 | 23.30 | 60.43 | 15.40 | 9.60 | 31.12 | 0.92 | 27.96 | 17.62 | 6.94 |
| 9500 | 22.89 | 61.13 | 16.24 | 9.55 | 35.46 | 0.91 | 27.48 | 18.36 | 6.99 |
| 10000 | 22.70 | 61.68 | 16.90 | 9.71 | 38.95 | 0.91 | 27.01 | 18.79 | 7.12 |
| 10500 | 22.56 | 62.11 | 18.09 | 10.13 | 42.20 | 0.92 | 26.66 | 18.69 | 7.14 |
| 11000 | 22.48 | 64.00 | 20.24 | 10.74 | 54.05 | 0.92 | 26.15 | 18.64 | 7.14 |
| 11500 | 22.31 | 66.79 | 23.02 | 11.25 | 77.11 | 0.93 | 25.71 | 18.89 | 7.20 |
| 12000 | 22.15 | 69.11 | 26.00 | 12.07 | 104.22 | 0.94 | 25.46 | 18.52 | 7.28 |
| 12500 | 22.03 | 67.39 | 28.85 | 12.65 | 87.54 | 0.95 | 25.57 | 17.43 | 7.37 |
| 13000 | 21.96 | 66.73 | 25.73 | 13.37 | 82.40 | 0.96 | 25.35 | 17.60 | 7.45 |
| 13500 | 22.06 | 65.84 | 23.30 | 13.51 | 73.43 | 0.96 | 24.69 | 18.75 | 7.44 |
| 14000 | 22.11 | 71.59 | 20.40 | 13.05 | 140.25 | 0.96 | 24.88 | 18.10 | 7.62 |
| 14500 | 22.00 | 62.91 | 17.99 | 13.46 | 52.17 | 0.97 | 24.98 | 18.12 | 7.70 |
| 15000 | 22.71 | 60.84 | 17.85 | 14.24 | 38.16 | 0.98 | 24.92 | 17.98 | 7.80 |
| 15500 | 22.98 | 67.36 | 16.41 | 12.74 | 76.62 | 0.97 | 25.13 | 18.28 | 7.92 |
| 16000 | 23.28 | 65.95 | 15.72 | 12.03 | 62.00 | 0.96 | 25.25 | 17.24 | 7.96 |
| 16500 | 23.60 | 63.25 | 14.95 | 10.72 | 42.53 | 0.94 | 24.76 | 17.03 | 8.08 |
| 17000 | 23.75 | 61.28 | 13.54 | 9.79 | 32.26 | 0.93 | 23.65 | 18.58 | 8.06 |
| 17500 | 23.57 | 61.61 | 12.44 | 8.65 | 32.58 | 0.91 | 23.20 | 18.98 | 8.09 |
| 18000 | 23.32 | 62.05 | 11.44 | 8.97 | 35.04 | 0.94 | 23.55 | 18.28 | 8.15 |
| 18500 | 22.98 | 63.17 | 10.42 | 9.87 | 41.65 | 0.98 | 23.19 | 18.41 | 8.31 |
| 19000 | 22.39 | 63.98 | 8.99 | 12.32 | 49.34 | 1.06 | 22.92 | 18.58 | 8.49 |
| 19500 | 21.46 | 65.08 | 7.89 | 15.27 | 61.60 | 1.13 | 23.09 | 18.24 | 8.63 |
| 20000 | 20.19 | 64.21 | 6.72 | 16.11 | 60.94 | 1.18 | 24.97 | 16.99 | 8.90 |
| 20500 | 18.60 | 64.25 | 6.00 | 14.77 | 69.31 | 1.21 | 26.31 | 16.54 | 9.17 |
| 21000 | 16.62 | 65.26 | 5.50 | 12.98 | 92.17 | 1.22 | 28.98 | 16.12 | 9.48 |
| 21500 | 14.70 | 64.90 | 5.54 | 11.62 | 108.61 | 1.19 | 25.72 | 15.50 | 9.70 |
| 22000 | 12.37 | 62.85 | 5.50 | 10.95 | 110.53 | 1.18 | 24.60 | 15.35 | 10.06 |

# Wideband Microwave Amplifier ZX60-24A-S+

## *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 = 4.75V, Id = 264.33mA @ Temperature = +85°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 14.57 | 65.58 | 7.87 | 4.38 | 94.53 | 0.74 | 20.42 | 12.63 | 20.34 |
| 4250 | 20.24 | 66.00 | 8.97 | 5.16 | 59.12 | 0.78 | 23.34 | 14.46 | 16.82 |
| 4500 | 20.52 | 66.11 | 9.12 | 5.73 | 61.31 | 0.82 | 23.82 | 15.33 | 14.27 |
| 4750 | 20.83 | 66.46 | 9.53 | 6.39 | 65.43 | 0.86 | 25.32 | 15.66 | 12.33 |
| 5000 | 21.45 | 66.99 | 10.15 | 7.21 | 69.26 | 0.89 | 25.39 | 15.61 | 10.78 |
| 5250 | 22.24 | 68.02 | 11.00 | 8.21 | 76.01 | 0.92 | 29.05 | 16.00 | 9.61 |
| 5500 | 23.08 | 69.60 | 12.20 | 9.37 | 88.06 | 0.94 | 31.84 | 16.58 | 8.67 |
| 5750 | 23.87 | 71.51 | 13.79 | 10.68 | 105.63 | 0.95 | 28.31 | 15.88 | 7.87 |
| 6000 | 24.50 | 74.24 | 15.83 | 11.97 | 139.88 | 0.96 | 29.98 | 16.34 | 7.36 |
| 6500 | 25.13 | 72.46 | 22.03 | 13.86 | 110.80 | 0.96 | 31.83 | 16.45 | 6.69 |
| 7000 | 25.10 | 67.07 | 28.96 | 14.07 | 60.17 | 0.96 | 32.31 | 16.83 | 6.50 |
| 7500 | 24.77 | 68.44 | 22.93 | 12.88 | 71.99 | 0.95 | 30.30 | 17.47 | 6.43 |
| 8000 | 24.35 | 70.33 | 18.32 | 11.28 | 90.77 | 0.94 | 30.23 | 16.89 | 6.49 |
| 8500 | 23.93 | 63.51 | 16.14 | 10.15 | 41.97 | 0.93 | 29.22 | 17.21 | 6.64 |
| 9000 | 23.56 | 60.33 | 15.62 | 9.80 | 30.06 | 0.92 | 28.74 | 16.94 | 6.87 |
| 9500 | 23.15 | 61.26 | 16.48 | 9.76 | 35.22 | 0.91 | 28.14 | 17.69 | 6.93 |
| 10000 | 22.96 | 61.85 | 17.09 | 9.95 | 38.84 | 0.92 | 27.64 | 18.15 | 7.06 |
| 10500 | 22.83 | 62.21 | 18.19 | 10.40 | 41.67 | 0.92 | 27.27 | 18.01 | 7.08 |
| 11000 | 22.76 | 63.98 | 20.24 | 11.06 | 52.49 | 0.93 | 26.72 | 17.94 | 7.06 |
| 11500 | 22.62 | 67.07 | 22.87 | 11.57 | 77.25 | 0.94 | 26.22 | 18.22 | 7.12 |
| 12000 | 22.49 | 69.38 | 25.47 | 12.39 | 103.86 | 0.95 | 26.04 | 17.81 | 7.20 |
| 12500 | 22.39 | 67.77 | 27.48 | 12.95 | 88.04 | 0.95 | 26.46 | 16.75 | 7.26 |
| 13000 | 22.35 | 67.33 | 24.66 | 13.67 | 84.64 | 0.96 | 26.20 | 16.88 | 7.36 |
| 13500 | 22.48 | 66.51 | 22.52 | 13.82 | 75.74 | 0.96 | 25.30 | 18.08 | 7.32 |
| 14000 | 22.58 | 71.29 | 20.11 | 13.32 | 128.68 | 0.96 | 25.77 | 17.42 | 7.52 |
| 14500 | 22.49 | 62.60 | 17.81 | 13.69 | 47.65 | 0.97 | 25.91 | 17.43 | 7.61 |
| 15000 | 23.23 | 60.77 | 17.83 | 14.63 | 35.76 | 0.98 | 25.83 | 17.27 | 7.72 |
| 15500 | 23.55 | 66.99 | 16.74 | 12.99 | 69.02 | 0.97 | 25.93 | 17.61 | 7.78 |
| 16000 | 23.88 | 65.53 | 16.13 | 12.19 | 55.43 | 0.96 | 25.78 | 16.53 | 7.85 |
| 16500 | 24.24 | 62.95 | 15.44 | 10.77 | 38.37 | 0.94 | 25.16 | 16.29 | 7.96 |
| 17000 | 24.43 | 60.92 | 13.89 | 9.79 | 28.74 | 0.93 | 24.35 | 17.95 | 7.93 |
| 17500 | 24.26 | 61.10 | 12.65 | 8.57 | 28.38 | 0.91 | 23.80 | 18.37 | 7.96 |
| 18000 | 24.01 | 61.40 | 11.60 | 8.89 | 30.05 | 0.93 | 24.40 | 17.59 | 8.02 |
| 18500 | 23.66 | 62.55 | 10.53 | 9.93 | 35.98 | 0.98 | 24.20 | 17.70 | 8.16 |
| 19000 | 23.04 | 63.27 | 9.02 | 12.74 | 42.46 | 1.07 | 23.93 | 17.84 | 8.32 |
| 19500 | 22.05 | 64.43 | 7.88 | 16.22 | 53.68 | 1.14 | 24.36 | 17.50 | 8.47 |
| 20000 | 20.72 | 63.72 | 6.67 | 17.09 | 54.29 | 1.19 | 28.70 | 16.20 | 8.75 |
| 20500 | 19.08 | 64.26 | 5.94 | 15.42 | 65.67 | 1.22 | 31.72 | 15.73 | 9.00 |
| 21000 | 17.01 | 65.01 | 5.41 | 13.39 | 85.37 | 1.23 | 28.39 | 15.29 | 9.31 |
| 21500 | 15.05 | 65.02 | 5.47 | 11.85 | 105.57 | 1.20 | 30.72 | 14.67 | 9.52 |
| 22000 | 12.67 | 62.96 | 5.46 | 11.09 | 108.07 | 1.18 | 29.26 | 14.48 | 9.87 |

# Wideband Microwave Amplifier ZX60-24A-S+

## *Typical Performance Data*

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

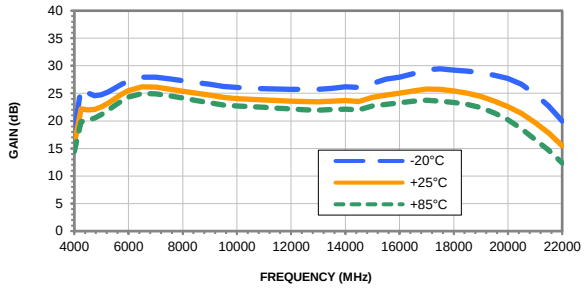
TEST CONDITIONS: Vd = 5.25V, Id = 265.19mA @ Temperature = +85°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 4000 | 14.20 | 65.44 | 7.87 | 4.32 | 96.25 | 0.73 | 22.13 | 13.35 | 20.50 |
| 4250 | 19.50 | 65.87 | 8.83 | 5.06 | 62.41 | 0.78 | 29.02 | 15.27 | 16.98 |
| 4500 | 19.77 | 65.81 | 9.01 | 5.64 | 63.77 | 0.82 | 30.15 | 16.30 | 14.44 |
| 4750 | 20.14 | 66.23 | 9.46 | 6.30 | 68.39 | 0.85 | 32.49 | 16.83 | 12.50 |
| 5000 | 20.83 | 66.81 | 10.10 | 7.11 | 72.33 | 0.88 | 33.12 | 16.90 | 10.93 |
| 5250 | 21.69 | 67.98 | 10.98 | 8.09 | 80.14 | 0.91 | 31.88 | 17.28 | 9.77 |
| 5500 | 22.59 | 69.67 | 12.20 | 9.20 | 93.48 | 0.93 | 31.16 | 17.86 | 8.83 |
| 5750 | 23.43 | 71.79 | 13.81 | 10.44 | 114.11 | 0.95 | 33.26 | 17.18 | 8.02 |
| 6000 | 24.12 | 74.33 | 15.87 | 11.61 | 146.88 | 0.96 | 31.90 | 17.63 | 7.49 |
| 6500 | 24.79 | 72.82 | 22.01 | 13.22 | 119.22 | 0.96 | 30.33 | 17.71 | 6.84 |
| 7000 | 24.76 | 67.06 | 27.54 | 13.37 | 62.10 | 0.96 | 29.43 | 18.08 | 6.65 |
| 7500 | 24.38 | 68.89 | 21.86 | 12.31 | 78.61 | 0.95 | 28.63 | 18.67 | 6.58 |
| 8000 | 23.90 | 70.76 | 17.70 | 10.87 | 99.41 | 0.93 | 28.32 | 18.09 | 6.62 |
| 8500 | 23.44 | 63.46 | 15.69 | 9.83 | 43.67 | 0.92 | 27.87 | 18.41 | 6.76 |
| 9000 | 23.04 | 60.24 | 15.23 | 9.51 | 31.20 | 0.91 | 27.62 | 18.16 | 7.03 |
| 9500 | 22.63 | 61.17 | 16.04 | 9.43 | 36.54 | 0.91 | 27.24 | 18.91 | 7.07 |
| 10000 | 22.44 | 61.59 | 16.73 | 9.58 | 39.53 | 0.91 | 26.77 | 19.39 | 7.22 |
| 10500 | 22.31 | 61.92 | 18.01 | 9.98 | 42.38 | 0.91 | 26.39 | 19.27 | 7.22 |
| 11000 | 22.20 | 63.81 | 20.33 | 10.59 | 54.40 | 0.92 | 25.90 | 19.19 | 7.24 |
| 11500 | 22.02 | 66.82 | 23.40 | 11.06 | 79.72 | 0.93 | 25.52 | 19.42 | 7.31 |
| 12000 | 21.84 | 68.56 | 26.98 | 11.85 | 101.16 | 0.94 | 25.22 | 19.05 | 7.36 |
| 12500 | 21.68 | 67.19 | 30.94 | 12.38 | 88.68 | 0.94 | 25.12 | 18.06 | 7.45 |
| 13000 | 21.59 | 66.39 | 27.32 | 13.05 | 82.43 | 0.95 | 24.93 | 18.19 | 7.56 |
| 13500 | 21.66 | 65.56 | 24.11 | 13.17 | 74.24 | 0.96 | 24.46 | 19.28 | 7.54 |
| 14000 | 21.69 | 72.09 | 20.63 | 12.87 | 155.80 | 0.96 | 24.48 | 18.67 | 7.70 |
| 14500 | 21.56 | 62.93 | 18.02 | 13.41 | 54.95 | 0.97 | 24.47 | 18.66 | 7.79 |
| 15000 | 22.24 | 60.96 | 17.56 | 14.19 | 40.79 | 0.98 | 24.37 | 18.53 | 7.92 |
| 15500 | 22.47 | 67.16 | 15.89 | 12.70 | 79.08 | 0.97 | 24.55 | 18.82 | 7.99 |
| 16000 | 22.74 | 66.42 | 15.11 | 12.03 | 69.33 | 0.97 | 24.63 | 17.86 | 8.06 |
| 16500 | 23.02 | 63.59 | 14.27 | 10.60 | 46.93 | 0.95 | 24.26 | 17.62 | 8.18 |
| 17000 | 23.13 | 61.65 | 13.01 | 9.67 | 35.82 | 0.93 | 23.29 | 19.15 | 8.15 |
| 17500 | 22.93 | 62.07 | 12.11 | 8.48 | 36.57 | 0.91 | 22.92 | 19.39 | 8.20 |
| 18000 | 22.69 | 62.38 | 11.29 | 8.74 | 38.70 | 0.93 | 23.15 | 18.72 | 8.27 |
| 18500 | 22.38 | 63.46 | 10.40 | 9.59 | 45.80 | 0.97 | 22.79 | 18.94 | 8.43 |
| 19000 | 21.84 | 64.40 | 9.02 | 12.07 | 54.98 | 1.06 | 22.55 | 19.13 | 8.60 |
| 19500 | 20.96 | 65.50 | 7.97 | 15.03 | 68.58 | 1.12 | 22.58 | 18.91 | 8.76 |
| 20000 | 19.73 | 64.49 | 6.77 | 16.15 | 66.54 | 1.18 | 23.65 | 17.60 | 9.05 |
| 20500 | 18.16 | 64.88 | 6.03 | 14.51 | 78.36 | 1.21 | 24.27 | 17.15 | 9.34 |
| 21000 | 16.18 | 65.20 | 5.47 | 12.52 | 95.53 | 1.21 | 25.21 | 16.73 | 9.63 |
| 21500 | 14.29 | 64.93 | 5.51 | 11.07 | 112.92 | 1.18 | 23.30 | 16.17 | 9.88 |
| 22000 | 11.99 | 62.72 | 5.47 | 10.42 | 112.15 | 1.17 | 23.25 | 16.01 | 10.25 |

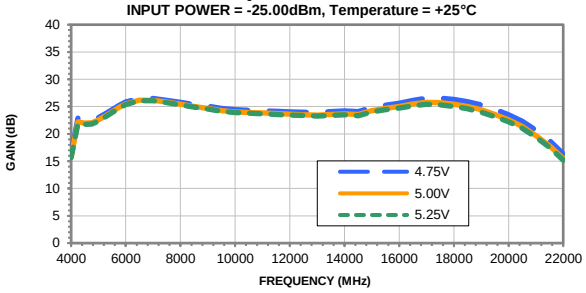
# Wideband Microwave Amplifier ZX60-24A-S+

## *Typical Performance Curves*

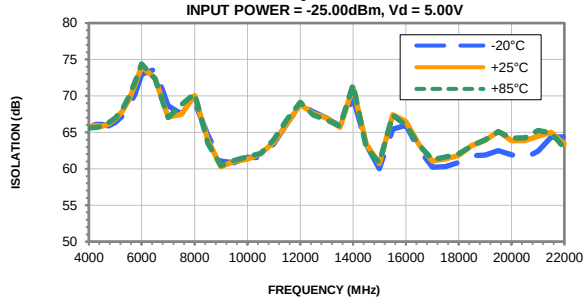
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



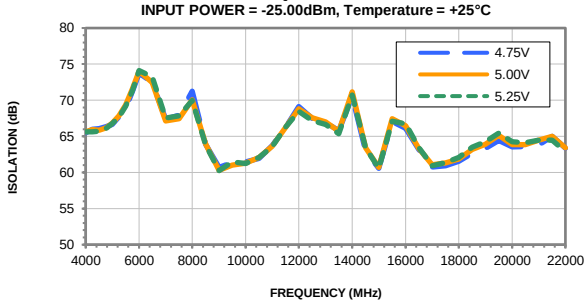

GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



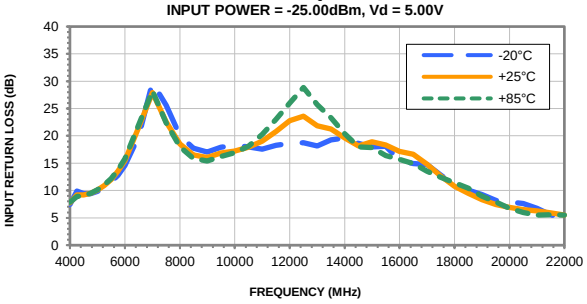

ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



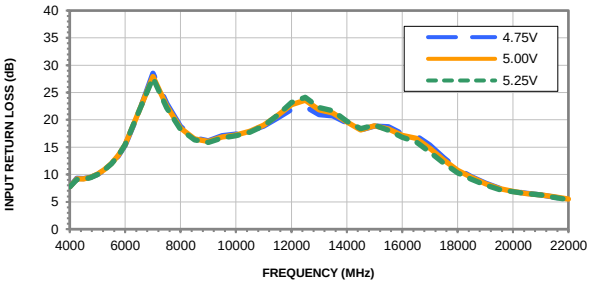

ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



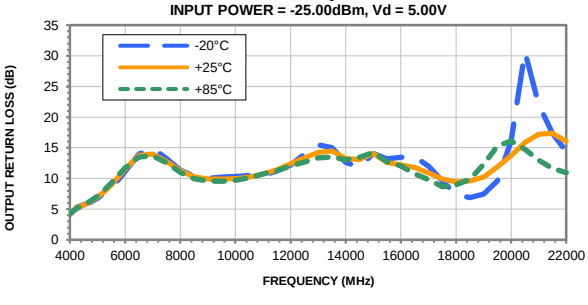

INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



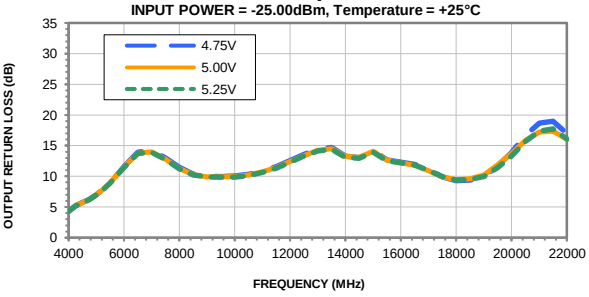

INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C




OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V

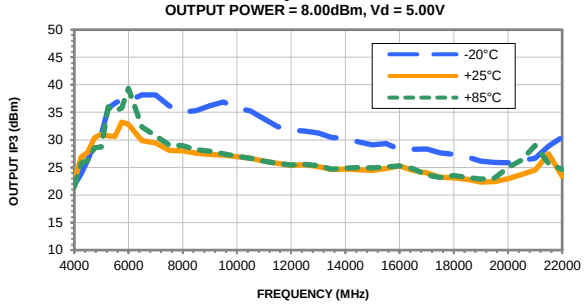



OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

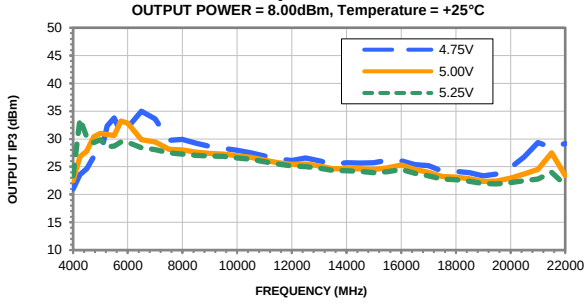


## *Typical Performance Curves*

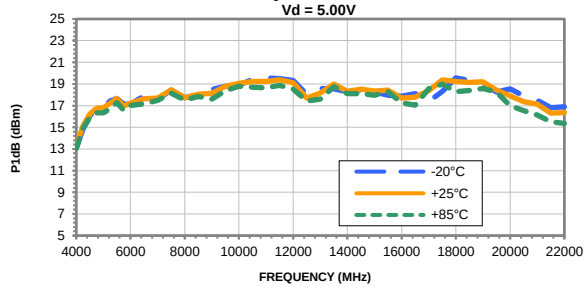
**OUTPUT IP3 vs. FREQUENCY & TEMPERATURE**
**OUTPUT POWER = 8.00dBm, Vd = 5.00V**



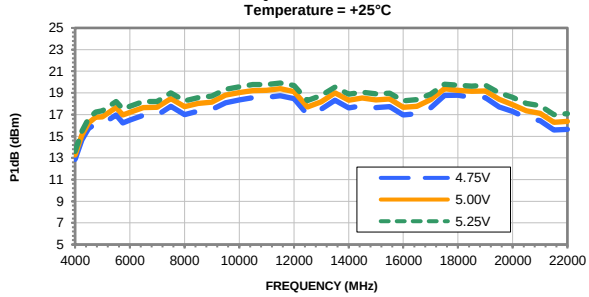

**OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE**
**OUTPUT POWER = 8.00dBm, Temperature = +25°C**



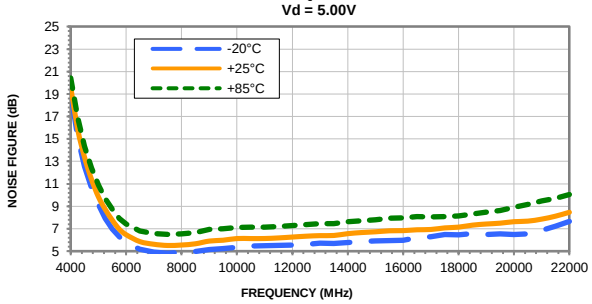

**P1dB vs. FREQUENCY & TEMPERATURE**
**Vd = 5.00V**



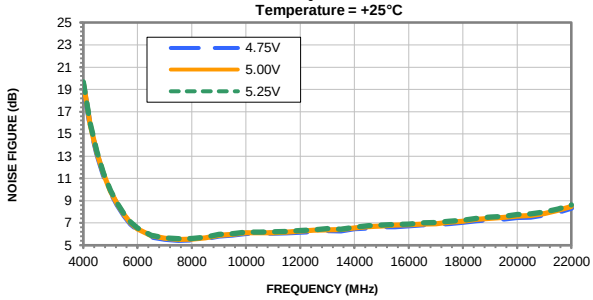

**P1dB vs. FREQUENCY & DEVICE VOLTAGE**
**Temperature = +25°C**



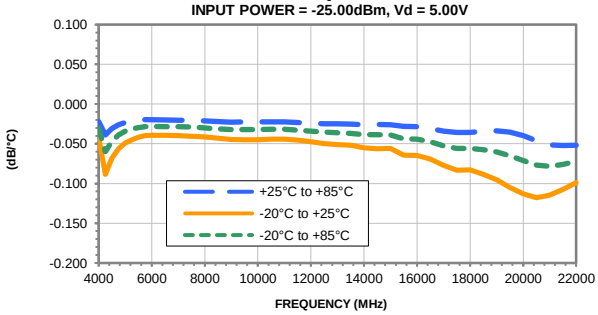

**NOISE FIGURE vs. FREQUENCY & TEMPERATURE**
**Vd = 5.00V**




**NOISE FIGURE vs. FREQUENCY & DEVICE VOLTAGE**
**Temperature = +25°C**



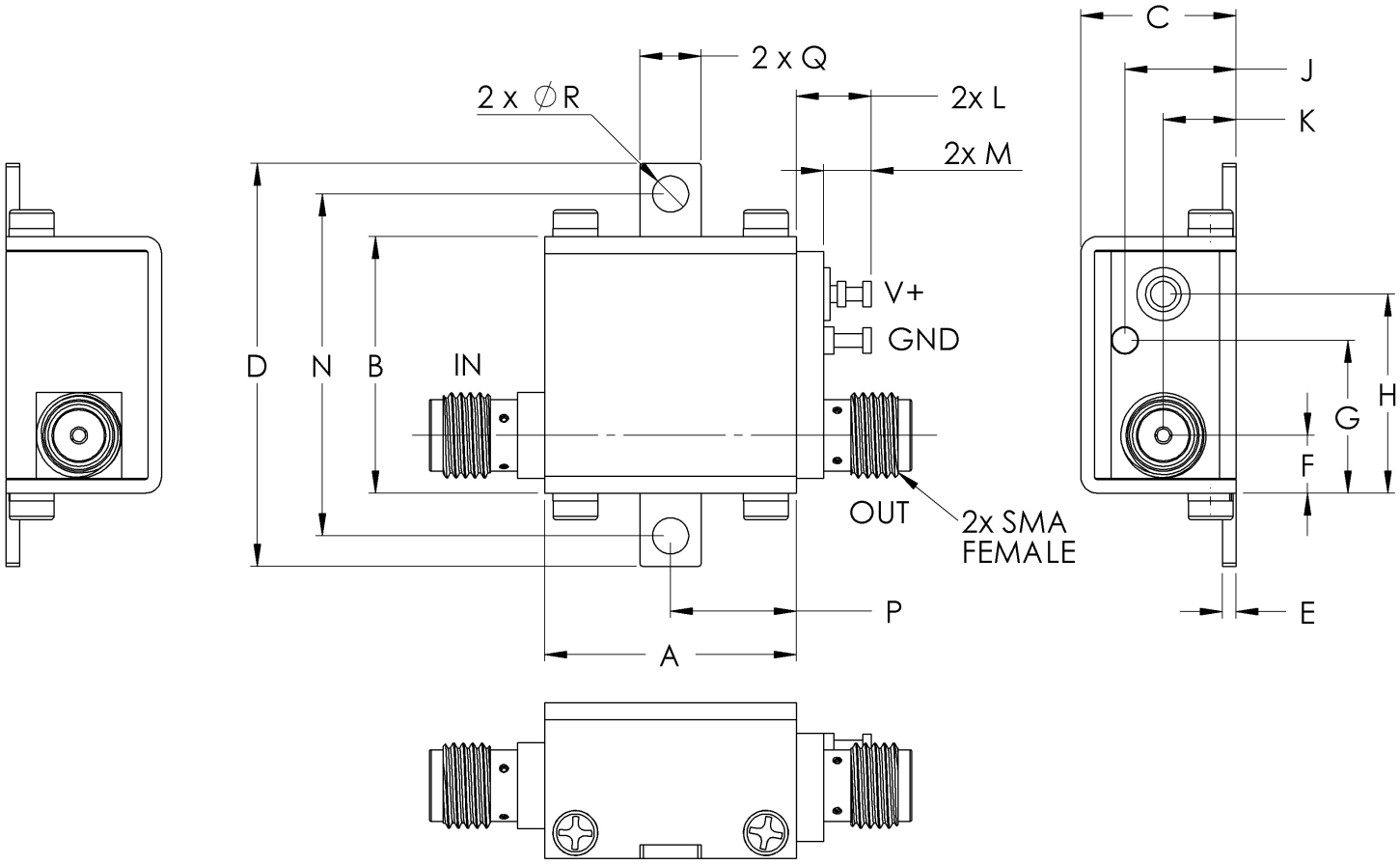

**GAIN VARIATION vs. FREQUENCY & TEMPERATURE**
**INPUT POWER = -25.00dBm, Vd = 5.00V**



# 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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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 |