



FLAT GAIN, HIGH IP3

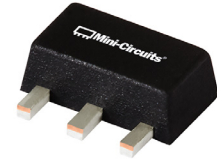
# Monolithic Amplifier

## GVA-60+

50Ω 0.01 to 5 GHz

### THE BIG DEAL

- Excellent Gain Flatness and Return Loss over 50 to 1000 MHz
- High IP3 vs. DC Power consumption
- Broadband High Dynamic Range without external Matching Components
- Gain, 20 dB typ. at 0.4 GHz
- Gain flatness:  $\pm 0.3$  dB over 50-1000 MHz
- Excellent Input Return Loss, up to 2 GHz, 17-24 dB
- High Pout, P1dB +20.0 dBm typ. at 0.4 GHz
- Excellent ESD protection, Class 1C for HBM
- No external matching components required



Generic photo used for illustration purposes only

CASE STYLE: DF782

### +RoHS Compliant

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

### APPLICATIONS

- Base station infrastructure
- Portable Wireless
- CATV & DBS
- MMDS & Wireless LAN
- LTE

### PRODUCT OVERVIEW

GVA-60+ (RoHS compliant) is an wideband amplifier fabricated using HBT technology and offers ultra flat gain over a broad frequency range and with high IP3. In addition, the GVA-60+, has good input and output return loss over a broad frequency range without the need for external matching components and has demonstrated excellent reliability. It has repeatable performance from lot to lot and is enclosed in a SOT-89 package for very good thermal performance.

### KEY FEATURES

| Feature   | Advantages   |
|---|--|
| Broad Band: 0.01 to 5 GHz   | Broadband covering a broad range of IF frequencies and the primary wireless communications bands: Cellular, PCS, LTE, WiMAX  |
| High IP3 vs. DC power Consumption<br>+40 dBm typical at 0.05 GHz<br>+35 dBm typical at 0.85 GHz | The GVA-60+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and HBT Structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being typically 16 dB above the P 1dB point to 0.85 GHz. This feature makes this amplifier ideal for use in: <ul style="list-style-type: none"> <li>• Driver amplifiers for complex waveform up converter paths</li> <li>• Drivers in linearized transmit systems</li> </ul> |
| Outstanding Input Return Loss up to 1 GHz: better than 20 dB.                                   | The GVA-60+ provides excellent input return loss: 20 dB up to 1 GHz and 16.8 dB up to 2 GHz making this amplifier an ideal IF gain block that can be embedded in RF chains that have highly reflective components, and still maintain good system performance  |
| No External Matching Components Required 10-24 dB to 2 GHz                                      | GVA-60+ provides good Input and Output Return Loss without the need for any external matching components   |

REV. B  
ECO-010563  
GVA-60+  
MCL NY  
240801





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# Monolithic Amplifier

**GVA-60+**

Mini-Circuits

50Ω 0.01 to 5 GHz

**ELECTRICAL SPECIFICATIONS<sup>1</sup> AT +25°C AND VCC=+5V, UNLESS NOTED OTHERWISE**

| Parameter   | Condition (GHz) | Min.  | Typ.  | Max. | Units |
|---|-----------------|-------|-------|------|-------|
| Frequency Range                                       |                 | 0.01  |       | 5    | GHz   |
| Gain  | 0.05            | 18.3  | 20.3  | 22.4 | dB    |
|   | 0.4             | —     | 20.1  | —    |       |
|   | 0.85            | —     | 19.8  | —    |       |
|   | 2.0             | 16.6  | 18.4  | 20.3 |       |
|   | 3.0             | —     | 17.0  | —    |       |
|   | 4.0             | —     | 15.4  | —    |       |
| Input Return Loss                                     | 0.05            | —     | 23.1  | —    | dB    |
|   | 0.4             | —     | 24.0  | —    |       |
|   | 0.85            | 16.0  | 21.2  | —    |       |
|   | 2.0             | —     | 16.8  | —    |       |
|   | 3.0             | —     | 11.5  | —    |       |
|   | 4.0             | —     | 8.9   | —    |       |
| Output Return Loss                                    | 0.05            | —     | 11.2  | —    | dB    |
|   | 0.4             | —     | 11.8  | —    |       |
|   | 0.85            | 10.0  | 12.0  | —    |       |
|   | 2.0             | —     | 9.6   | —    |       |
|   | 3.0             | —     | 8.0   | —    |       |
|   | 4.0             | —     | 7.5   | —    |       |
| Reverse Isolation                                     | 2.0             |       | 25.2  |      | dB    |
| Output Power at 1dB Compression                       | 0.05            | +0.05 | +20.1 | —    | dBm   |
|   | 0.4             | +0.4  | +19.9 | —    |       |
|   | 0.85            | +0.85 | +19.5 | —    |       |
|   | 2.0             | —     | +17.9 | —    |       |
|   | 3.0             | —     | +14.6 | —    |       |
|   | 4.0             | —     | +12.1 | —    |       |
| Output IP3  | 0.05            |       | +40.5 |      | dBm   |
|   | 0.4             |       | +39.3 |      |       |
|   | 0.85            |       | +35.6 |      |       |
|   | 2.0             |       | +28.9 |      |       |
|   | 3.0             |       | +24.5 |      |       |
|   | 4.0             |       | +21.5 |      |       |
| Noise Figure  | 0.05            | —     | 3.9   | 5.9  | dB    |
|   | 0.4             | —     | 4.0   | 6.0  |       |
|   | 0.85            | —     | 4.0   | —    |       |
|   | 2.0             | —     | 4.1   | —    |       |
|   | 3.0             | —     | 4.1   | —    |       |
|   | 4.0             | —     | 4.3   | —    |       |
| Device Operating Voltage                              |                 | +4.8  | +5.0  | +5.2 | V     |
| Device Operating Current                              |                 |       | 92.0  | 99.0 | mA    |
| Device Current Variation vs. Temperature <sup>3</sup> |                 |       | 172   |      | μA/°C |
| Device Current Variation vs. Voltage                  |                 |       | 0.041 |      | mA/mW |
| Thermal Resistance, junction-to-ground lead           |                 |       | 37    |      | °C/W  |

(1) Measured on Mini-Circuits Characterization test board TB-313. See Characterization Test Circuit (Fig. 1)

(2) Low Frequency cut-off determined by external coupling capacitors and external bias choke.

(3) Current at 85°C – Current at -45°C/130





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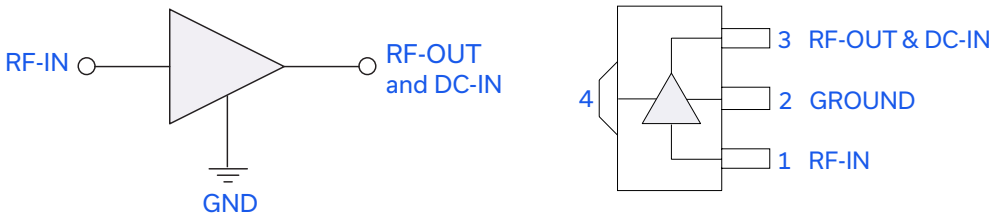
50Ω 0.01 to 5 GHz

## ABSOLUTE MAXIMUM RATINGS

| Parameter                           | Ratings  |
|-------------------------------------|--|
| Operating Temperature (ground lead) | -40°C to +85°C   |
| Storage Temperature                 | -65°C to +150°C  |
| Operating Current at 5V             | 140 mA   |
| Power Dissipation                   | 0.7 W  |
| Input Power (CW)                    | +28 dBm (10-1000 MHz, +5 minutes)<br>+13 dBm (1000-5000 MHz, +5 minutes)<br>+8 dBm (continuous) 28 dBm (10-1000 MHz, +5 minutes) |
| DC Voltage on Pin 3                 | +6 V   |

Permanent damage may occur if any of these limits are exceeded.  
Electrical maximum ratings are not intended for continuous normal operation.  
For continuous operation, do not exceed 5.2V device voltage.

## SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION



| Function         | Pin Number | Description   |
|------------------|------------|---|
| RF IN            | 1          | RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.   |
| RF-OUT and DC-IN | 3          | RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit", Fig. 2 |
| GND              | 2,4        | Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.   |



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## CHARACTERIZATION TEST CIRCUIT

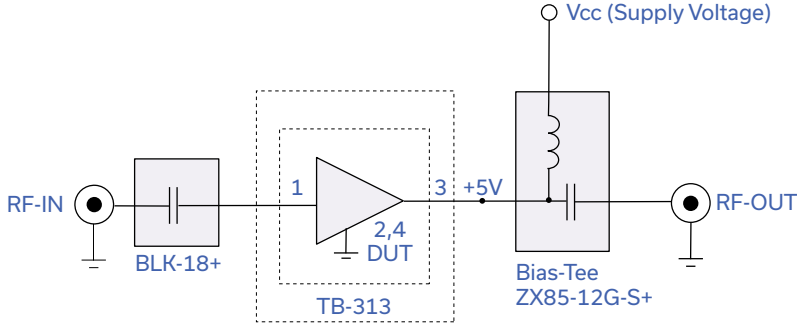


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-313) Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:

1. Gain and Return loss:  $P_{IN} = -25\text{dBm}$
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -18 dBm/ tone at input.

## RECOMMENDED APPLICATION CIRCUIT

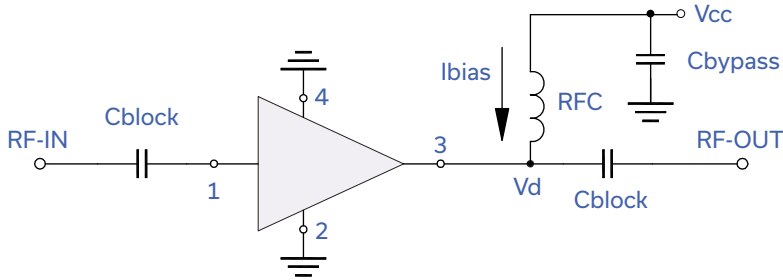
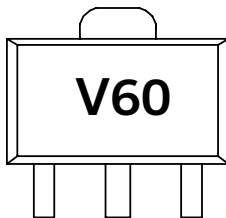


Fig 2. Test Board includes case, connectors, and components soldered to PCB.

## PRODUCT MARKING



Marking may contain other features or characters for internal lot control

Mini-Circuits



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**GVA-60+**

Mini-Circuits

50Ω 0.01 to 5 GHz

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. [CLICK HERE](#)

|  |  |
|--|--|
| Performance Data                                     | Data Table<br>Swept Graphs<br>S-Parameter (S2P Files) Data Set (.zip file) |
| Case Style   | DF782 (SOT 89) Plastic package, exposed paddle lead finish: Matte-tin      |
| Tape & Reel<br>Standard quantities available on reel | F55<br>7" reels with 20, 50, 100, 200, 500 or 1K devices                   |
| Suggested Layout for PCB Design                      | PL-255   |
| Evaluation Board                                     | TB-596-60+   |
| Environmental Ratings                                | ENV08T1  |

## ESD RATING

Human Body Model (HBM): Class 1C (1000 to <2000V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M2 (100 to <200V) in accordance with ANSI/ESD STM5.2-1999

## MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
  - B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
  - C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



## 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 = 5V, Id = 90.89 mA @ Temperature = +25degC

| FREQ<br>(MHz) | Gain<br>(dB) | Isolation<br>(dB) | Input<br>Return<br>Loss<br>(dB) | Output<br>Return<br>Loss<br>(dB) | Stability |         | IP-3<br>Output<br>(dBm) | 1dB<br>Comp.<br>Output<br>(dBm) | Noise<br>Figure<br>(dB) |
|---------------|--------------|-------------------|---------------------------------|----------------------------------|-----------|---------|-------------------------|---------------------------------|-------------------------|
|               |              |                   |                                 |                                  | K         | Measure |                         |                                 |                         |
| 10.0          | 21.16        | 26.10             | 15.22                           | 8.50                             | 1.05      | 0.52    | --                      | 19.38                           | 3.28                    |
| 30.0          | 20.51        | 24.54             | 21.12                           | 10.55                            | 1.05      | 0.50    | 44.38                   | 20.45                           | 3.86                    |
| 50.0          | 20.34        | 24.40             | 23.09                           | 11.20                            | 1.06      | 0.52    | 40.26                   | 20.75                           | 3.83                    |
| 70.0          | 20.30        | 24.29             | 24.13                           | 11.37                            | 1.06      | 0.51    | 41.06                   | 20.66                           | 3.79                    |
| 90.0          | 20.28        | 24.25             | 24.86                           | 11.45                            | 1.06      | 0.51    | 40.87                   | 20.69                           | 3.79                    |
| 100.0         | 20.27        | 24.29             | 24.94                           | 11.51                            | 1.07      | 0.52    | 39.45                   | 20.69                           | 3.83                    |
| 200.0         | 20.21        | 24.29             | 24.99                           | 11.65                            | 1.07      | 0.53    | 39.53                   | 20.90                           | 3.71                    |
| 300.0         | 20.17        | 24.29             | 24.47                           | 11.71                            | 1.07      | 0.53    | 39.81                   | 20.88                           | 3.96                    |
| 400.0         | 20.12        | 24.32             | 23.97                           | 11.78                            | 1.08      | 0.54    | 39.07                   | 20.69                           | 3.95                    |
| 500.0         | 20.07        | 24.39             | 23.35                           | 11.86                            | 1.09      | 0.55    | 37.99                   | 20.67                           | 3.96                    |
| 600.0         | 20.02        | 24.39             | 22.69                           | 11.93                            | 1.09      | 0.55    | 37.41                   | 20.58                           | 3.92                    |
| 700.0         | 19.95        | 24.44             | 22.12                           | 11.99                            | 1.10      | 0.56    | 36.54                   | 20.48                           | 3.95                    |
| 800.0         | 19.87        | 24.51             | 21.54                           | 12.11                            | 1.11      | 0.58    | 35.92                   | 20.39                           | 3.94                    |
| 900.0         | 19.78        | 24.55             | 20.96                           | 12.18                            | 1.12      | 0.59    | 35.86                   | 20.52                           | 3.96                    |
| 1000.0        | 19.69        | 24.61             | 20.50                           | 12.25                            | 1.13      | 0.60    | 35.04                   | 20.40                           | 4.00                    |
| 1200.0        | 19.50        | 24.69             | 19.72                           | 12.29                            | 1.15      | 0.62    | 33.48                   | 19.86                           | 3.97                    |
| 1400.0        | 19.27        | 24.83             | 19.16                           | 12.27                            | 1.17      | 0.65    | 32.83                   | 19.57                           | 3.98                    |
| 1500.0        | 19.16        | 24.86             | 18.89                           | 12.20                            | 1.18      | 0.65    | 32.09                   | 19.33                           | 4.00                    |
| 1600.0        | 19.01        | 24.99             | 18.46                           | 12.17                            | 1.20      | 0.67    | 31.74                   | 18.84                           | 4.02                    |
| 1800.0        | 18.77        | 25.08             | 18.19                           | 11.89                            | 1.22      | 0.69    | 30.77                   | 18.35                           | 4.01                    |
| 2000.0        | 18.49        | 25.19             | 17.70                           | 11.62                            | 1.25      | 0.71    | 30.02                   | 17.94                           | 4.02                    |
| 2100.0        | 18.34        | 25.28             | 17.53                           | 11.47                            | 1.26      | 0.72    | 29.36                   | 17.49                           | 4.02                    |
| 2200.0        | 18.21        | 25.29             | 17.38                           | 11.27                            | 1.27      | 0.73    | 28.71                   | 17.09                           | 4.07                    |
| 2300.0        | 18.08        | 25.28             | 17.12                           | 11.06                            | 1.27      | 0.73    | 28.73                   | 16.86                           | 4.07                    |
| 2400.0        | 17.93        | 25.32             | 16.95                           | 10.88                            | 1.28      | 0.74    | 27.96                   | 16.37                           | 4.02                    |
| 2500.0        | 17.77        | 25.36             | 16.59                           | 10.74                            | 1.30      | 0.75    | 27.80                   | 16.27                           | 4.08                    |
| 2600.0        | 17.61        | 25.36             | 16.44                           | 10.60                            | 1.30      | 0.76    | 27.43                   | 15.76                           | 4.09                    |
| 2700.0        | 17.48        | 25.34             | 16.04                           | 10.34                            | 1.30      | 0.76    | 26.79                   | 15.48                           | 4.19                    |
| 2800.0        | 17.30        | 25.37             | 15.98                           | 10.26                            | 1.32      | 0.77    | 26.64                   | 15.12                           | 4.18                    |
| 2900.0        | 17.18        | 25.37             | 15.51                           | 10.03                            | 1.32      | 0.78    | 26.02                   | 14.83                           | 4.17                    |
| 3000.0        | 17.03        | 25.28             | 15.31                           | 9.84                             | 1.31      | 0.78    | 25.96                   | 14.59                           | 4.09                    |
| 3100.0        | 16.87        | 25.30             | 15.13                           | 9.75                             | 1.32      | 0.79    | 25.70                   | 14.22                           | 4.12                    |
| 3200.0        | 16.65        | 25.46             | 15.09                           | 9.85                             | 1.36      | 0.80    | 25.44                   | 13.98                           | 4.17                    |
| 3300.0        | 16.56        | 25.26             | 14.61                           | 9.50                             | 1.33      | 0.80    | 24.70                   | 13.51                           | 4.23                    |
| 3400.0        | 16.41        | 25.17             | 14.33                           | 9.34                             | 1.32      | 0.80    | 24.73                   | 13.31                           | 4.20                    |
| 3500.0        | 16.27        | 25.05             | 14.11                           | 9.13                             | 1.31      | 0.81    | 24.49                   | 13.15                           | 4.21                    |
| 3600.0        | 16.13        | 25.15             | 13.67                           | 9.07                             | 1.32      | 0.82    | 24.04                   | 12.62                           | 4.23                    |
| 3700.0        | 15.92        | 25.09             | 13.75                           | 9.04                             | 1.33      | 0.82    | 23.90                   | 12.43                           | 4.28                    |
| 3800.0        | 15.81        | 24.88             | 13.44                           | 8.78                             | 1.30      | 0.82    | 23.86                   | 12.06                           | 4.22                    |
| 3900.0        | 15.67        | 25.03             | 13.11                           | 8.73                             | 1.32      | 0.83    | 23.59                   | 11.91                           | 4.25                    |
| 4000.0        | 15.48        | 24.83             | 13.07                           | 8.55                             | 1.31      | 0.83    | 23.41                   | 11.58                           | 4.27                    |
| 4100.0        | 15.27        | 25.17             | 12.97                           | 8.79                             | 1.39      | 0.85    | 23.36                   | 11.43                           | 4.27                    |
| 4200.0        | 15.20        | 24.65             | 12.55                           | 8.30                             | 1.29      | 0.84    | 23.11                   | 11.11                           | 4.24                    |
| 4300.0        | 15.01        | 24.77             | 12.48                           | 8.37                             | 1.32      | 0.85    | 23.01                   | 10.76                           | 4.32                    |
| 4400.0        | 14.85        | 24.68             | 12.31                           | 8.22                             | 1.32      | 0.85    | 22.83                   | 10.66                           | 4.36                    |
| 4500.0        | 14.68        | 24.76             | 12.16                           | 8.24                             | 1.34      | 0.86    | 22.74                   | 10.35                           | 4.33                    |
| 4600.0        | 14.60        | 24.51             | 11.61                           | 7.89                             | 1.28      | 0.86    | 22.49                   | 10.07                           | 4.31                    |
| 4700.0        | 14.35        | 24.40             | 11.86                           | 7.85                             | 1.30      | 0.85    | 22.36                   | 9.71                            | 4.38                    |
| 4800.0        | 14.27        | 24.37             | 11.31                           | 7.64                             | 1.27      | 0.86    | 22.32                   | 9.70                            | 4.34                    |
| 4900.0        | 14.08        | 24.24             | 11.28                           | 7.57                             | 1.27      | 0.86    | 22.55                   | 9.46                            | 4.41                    |
| 5000.0        | 13.88        | 24.26             | 11.32                           | 7.49                             | 1.30      | 0.86    | 22.41                   | 9.49                            | 4.44                    |

## 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 = 81.29 mA @ Temperature = +25degC

| FREQ   | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|--------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|        |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz)  | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 10.0   | 21.08 | 25.17     | 14.64             | 8.01               | 1.01      | 0.42    | --          | 18.67            | 3.17         |
| 30.0   | 20.46 | 24.43     | 20.69             | 10.44              | 1.05      | 0.49    | 40.43       | 19.68            | 3.79         |
| 50.0   | 20.29 | 24.42     | 22.34             | 11.09              | 1.07      | 0.52    | 38.97       | 19.91            | 3.75         |
| 70.0   | 20.26 | 24.30     | 23.55             | 11.27              | 1.06      | 0.51    | 39.10       | 19.85            | 3.71         |
| 90.0   | 20.23 | 24.26     | 24.16             | 11.36              | 1.06      | 0.52    | 39.44       | 19.88            | 3.74         |
| 100.0  | 20.22 | 24.28     | 24.21             | 11.41              | 1.07      | 0.52    | 38.28       | 19.89            | 3.76         |
| 200.0  | 20.16 | 24.26     | 24.27             | 11.55              | 1.07      | 0.52    | 38.60       | 20.06            | 3.66         |
| 300.0  | 20.12 | 24.25     | 23.89             | 11.59              | 1.07      | 0.53    | 37.94       | 20.05            | 3.88         |
| 400.0  | 20.08 | 24.33     | 23.37             | 11.69              | 1.08      | 0.54    | 37.81       | 19.92            | 3.87         |
| 500.0  | 20.02 | 24.34     | 22.84             | 11.77              | 1.09      | 0.55    | 37.45       | 19.92            | 3.93         |
| 600.0  | 19.96 | 24.38     | 22.31             | 11.84              | 1.09      | 0.56    | 36.38       | 19.84            | 3.89         |
| 700.0  | 19.89 | 24.40     | 21.79             | 11.90              | 1.10      | 0.56    | 35.70       | 19.79            | 3.89         |
| 800.0  | 19.81 | 24.46     | 21.23             | 12.01              | 1.11      | 0.58    | 35.17       | 19.71            | 3.84         |
| 900.0  | 19.72 | 24.51     | 20.72             | 12.07              | 1.12      | 0.59    | 35.05       | 19.82            | 3.86         |
| 1000.0 | 19.63 | 24.56     | 20.26             | 12.15              | 1.13      | 0.60    | 34.40       | 19.76            | 3.92         |
| 1200.0 | 19.43 | 24.66     | 19.51             | 12.20              | 1.15      | 0.62    | 32.83       | 19.33            | 3.92         |
| 1400.0 | 19.20 | 24.79     | 18.96             | 12.18              | 1.17      | 0.65    | 32.11       | 19.09            | 3.89         |
| 1500.0 | 19.09 | 24.78     | 18.72             | 12.11              | 1.18      | 0.65    | 31.56       | 18.85            | 3.91         |
| 1600.0 | 18.93 | 24.93     | 18.31             | 12.08              | 1.20      | 0.67    | 31.09       | 18.38            | 3.98         |
| 1800.0 | 18.69 | 24.98     | 18.03             | 11.81              | 1.22      | 0.69    | 30.18       | 17.91            | 3.95         |
| 2000.0 | 18.40 | 25.07     | 17.56             | 11.54              | 1.24      | 0.71    | 29.49       | 17.51            | 3.92         |
| 2100.0 | 18.25 | 25.17     | 17.39             | 11.41              | 1.26      | 0.72    | 28.84       | 17.06            | 3.97         |
| 2200.0 | 18.12 | 25.18     | 17.27             | 11.22              | 1.27      | 0.73    | 28.27       | 16.66            | 3.98         |
| 2300.0 | 17.98 | 25.15     | 17.01             | 11.00              | 1.27      | 0.73    | 28.14       | 16.44            | 3.97         |
| 2400.0 | 17.83 | 25.20     | 16.82             | 10.83              | 1.28      | 0.74    | 27.47       | 15.96            | 3.93         |
| 2500.0 | 17.67 | 25.25     | 16.49             | 10.69              | 1.29      | 0.75    | 27.29       | 15.86            | 4.01         |
| 2600.0 | 17.51 | 25.31     | 16.34             | 10.56              | 1.31      | 0.76    | 27.00       | 15.36            | 4.00         |
| 2700.0 | 17.38 | 25.24     | 15.94             | 10.31              | 1.30      | 0.76    | 26.32       | 15.07            | 4.06         |
| 2800.0 | 17.21 | 25.25     | 15.88             | 10.24              | 1.31      | 0.77    | 26.18       | 14.74            | 4.07         |
| 2900.0 | 17.08 | 25.23     | 15.45             | 10.01              | 1.31      | 0.77    | 25.56       | 14.44            | 4.07         |
| 3000.0 | 16.93 | 25.16     | 15.27             | 9.82               | 1.31      | 0.78    | 25.54       | 14.19            | 3.98         |
| 3100.0 | 16.77 | 25.22     | 15.08             | 9.73               | 1.32      | 0.79    | 25.21       | 13.83            | 3.99         |
| 3200.0 | 16.54 | 25.35     | 15.05             | 9.83               | 1.36      | 0.80    | 25.00       | 13.57            | 4.07         |
| 3300.0 | 16.45 | 25.16     | 14.60             | 9.50               | 1.33      | 0.80    | 24.20       | 13.10            | 4.13         |
| 3400.0 | 16.31 | 25.10     | 14.31             | 9.33               | 1.32      | 0.80    | 24.30       | 12.90            | 4.10         |
| 3500.0 | 16.16 | 24.96     | 14.11             | 9.14               | 1.31      | 0.81    | 24.05       | 12.74            | 4.12         |
| 3600.0 | 16.02 | 25.06     | 13.69             | 9.07               | 1.32      | 0.82    | 23.62       | 12.21            | 4.12         |
| 3700.0 | 15.82 | 25.03     | 13.77             | 9.05               | 1.34      | 0.82    | 23.49       | 12.03            | 4.16         |
| 3800.0 | 15.70 | 24.81     | 13.47             | 8.78               | 1.31      | 0.82    | 23.42       | 11.68            | 4.12         |
| 3900.0 | 15.56 | 24.93     | 13.13             | 8.75               | 1.33      | 0.83    | 23.16       | 11.53            | 4.08         |
| 4000.0 | 15.37 | 24.71     | 13.10             | 8.57               | 1.31      | 0.83    | 22.94       | 11.20            | 4.10         |
| 4100.0 | 15.16 | 25.10     | 13.02             | 8.82               | 1.39      | 0.85    | 22.97       | 11.06            | 4.18         |
| 4200.0 | 15.09 | 24.58     | 12.61             | 8.32               | 1.29      | 0.84    | 22.72       | 10.71            | 4.15         |
| 4300.0 | 14.90 | 24.71     | 12.54             | 8.39               | 1.33      | 0.85    | 22.55       | 10.34            | 4.19         |
| 4400.0 | 14.75 | 24.65     | 12.37             | 8.24               | 1.33      | 0.85    | 22.40       | 10.27            | 4.22         |
| 4500.0 | 14.58 | 24.68     | 12.22             | 8.25               | 1.35      | 0.86    | 22.32       | 9.96             | 4.23         |
| 4600.0 | 14.50 | 24.49     | 11.67             | 7.91               | 1.29      | 0.86    | 22.08       | 9.67             | 4.17         |
| 4700.0 | 14.24 | 24.37     | 11.93             | 7.87               | 1.31      | 0.85    | 21.95       | 9.35             | 4.23         |
| 4800.0 | 14.17 | 24.29     | 11.39             | 7.65               | 1.28      | 0.86    | 21.90       | 9.32             | 4.24         |
| 4900.0 | 13.98 | 24.19     | 11.35             | 7.59               | 1.28      | 0.86    | 22.12       | 9.07             | 4.28         |
| 5000.0 | 13.79 | 24.20     | 11.39             | 7.51               | 1.31      | 0.86    | 22.01       | 9.08             | 4.31         |

## 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 = 101.11 mA @ Temperature = +25degC

| FREQ<br>(MHz) | Gain<br>(dB) | Isolation<br>(dB) | Input<br>Return<br>Loss<br>(dB) | Output<br>Return<br>Loss<br>(dB) | Stability |         | IP-3<br>Output<br>(dBm) | 1dB<br>Comp.<br>Output<br>(dBm) | Noise<br>Figure<br>(dB) |
|---------------|--------------|-------------------|---------------------------------|----------------------------------|-----------|---------|-------------------------|---------------------------------|-------------------------|
|               |              |                   |                                 |                                  | K         | Measure |                         |                                 |                         |
| 10.0          | 21.16        | 24.88             | 14.87                           | 8.14                             | 1.00      | 0.39    | --                      | 19.70                           | 3.40                    |
| 30.0          | 20.53        | 24.52             | 21.33                           | 10.60                            | 1.05      | 0.50    | 44.18                   | 20.99                           | 3.94                    |
| 50.0          | 20.37        | 24.39             | 23.21                           | 11.26                            | 1.06      | 0.51    | 42.01                   | 21.39                           | 3.95                    |
| 70.0          | 20.33        | 24.31             | 24.62                           | 11.45                            | 1.06      | 0.51    | 41.94                   | 21.21                           | 3.88                    |
| 90.0          | 20.30        | 24.36             | 25.42                           | 11.56                            | 1.07      | 0.52    | 42.06                   | 21.25                           | 3.91                    |
| 100.0         | 20.29        | 24.34             | 25.47                           | 11.61                            | 1.07      | 0.52    | 40.73                   | 21.23                           | 3.93                    |
| 200.0         | 20.23        | 24.32             | 25.53                           | 11.75                            | 1.07      | 0.53    | 41.41                   | 21.50                           | 3.85                    |
| 300.0         | 20.19        | 24.34             | 25.00                           | 11.80                            | 1.07      | 0.53    | 40.42                   | 21.46                           | 4.04                    |
| 400.0         | 20.15        | 24.40             | 24.36                           | 11.89                            | 1.08      | 0.54    | 39.43                   | 21.18                           | 4.10                    |
| 500.0         | 20.10        | 24.42             | 23.65                           | 11.95                            | 1.09      | 0.55    | 38.84                   | 21.14                           | 4.09                    |
| 600.0         | 20.04        | 24.45             | 23.04                           | 12.02                            | 1.09      | 0.56    | 37.57                   | 21.02                           | 4.04                    |
| 700.0         | 19.98        | 24.49             | 22.36                           | 12.07                            | 1.10      | 0.57    | 36.98                   | 20.87                           | 4.06                    |
| 800.0         | 19.90        | 24.55             | 21.78                           | 12.18                            | 1.11      | 0.58    | 36.19                   | 20.76                           | 4.05                    |
| 900.0         | 19.82        | 24.60             | 21.16                           | 12.25                            | 1.12      | 0.59    | 36.03                   | 20.89                           | 4.10                    |
| 1000.0        | 19.73        | 24.62             | 20.69                           | 12.32                            | 1.13      | 0.60    | 35.38                   | 20.72                           | 4.11                    |
| 1200.0        | 19.54        | 24.77             | 19.86                           | 12.34                            | 1.15      | 0.62    | 33.89                   | 20.12                           | 4.08                    |
| 1400.0        | 19.33        | 24.84             | 19.26                           | 12.31                            | 1.17      | 0.64    | 33.09                   | 19.85                           | 4.10                    |
| 1500.0        | 19.22        | 24.87             | 19.02                           | 12.25                            | 1.18      | 0.65    | 32.40                   | 19.60                           | 4.13                    |
| 1600.0        | 19.07        | 25.02             | 18.56                           | 12.22                            | 1.20      | 0.67    | 31.93                   | 19.13                           | 4.14                    |
| 1800.0        | 18.84        | 25.15             | 18.27                           | 11.93                            | 1.22      | 0.69    | 31.11                   | 18.63                           | 4.14                    |
| 2000.0        | 18.56        | 25.27             | 17.74                           | 11.64                            | 1.25      | 0.71    | 30.44                   | 18.25                           | 4.17                    |
| 2100.0        | 18.41        | 25.30             | 17.60                           | 11.50                            | 1.26      | 0.72    | 29.74                   | 17.79                           | 4.17                    |
| 2200.0        | 18.28        | 25.30             | 17.43                           | 11.30                            | 1.26      | 0.73    | 29.18                   | 17.39                           | 4.19                    |
| 2300.0        | 18.15        | 25.38             | 17.13                           | 11.07                            | 1.27      | 0.73    | 29.08                   | 17.17                           | 4.23                    |
| 2400.0        | 18.01        | 25.34             | 16.95                           | 10.89                            | 1.28      | 0.74    | 28.41                   | 16.68                           | 4.21                    |
| 2500.0        | 17.85        | 25.43             | 16.54                           | 10.74                            | 1.29      | 0.75    | 28.26                   | 16.59                           | 4.24                    |
| 2600.0        | 17.69        | 25.47             | 16.41                           | 10.60                            | 1.31      | 0.76    | 27.95                   | 16.08                           | 4.22                    |
| 2700.0        | 17.56        | 25.39             | 15.99                           | 10.36                            | 1.30      | 0.76    | 27.30                   | 15.80                           | 4.32                    |
| 2800.0        | 17.39        | 25.44             | 15.91                           | 10.26                            | 1.31      | 0.77    | 27.10                   | 15.45                           | 4.33                    |
| 2900.0        | 17.26        | 25.46             | 15.41                           | 10.03                            | 1.31      | 0.78    | 26.56                   | 15.16                           | 4.32                    |
| 3000.0        | 17.12        | 25.32             | 15.21                           | 9.84                             | 1.30      | 0.78    | 26.49                   | 14.92                           | 4.23                    |
| 3100.0        | 16.95        | 25.35             | 15.00                           | 9.75                             | 1.31      | 0.79    | 26.18                   | 14.56                           | 4.24                    |
| 3200.0        | 16.73        | 25.47             | 14.98                           | 9.85                             | 1.35      | 0.80    | 26.00                   | 14.29                           | 4.34                    |
| 3300.0        | 16.64        | 25.30             | 14.50                           | 9.50                             | 1.32      | 0.80    | 25.21                   | 13.84                           | 4.37                    |
| 3400.0        | 16.49        | 25.20             | 14.18                           | 9.33                             | 1.31      | 0.81    | 25.25                   | 13.62                           | 4.32                    |
| 3500.0        | 16.35        | 25.13             | 13.96                           | 9.11                             | 1.30      | 0.81    | 25.01                   | 13.45                           | 4.35                    |
| 3600.0        | 16.20        | 25.15             | 13.53                           | 9.05                             | 1.31      | 0.82    | 24.59                   | 12.95                           | 4.40                    |
| 3700.0        | 15.99        | 25.12             | 13.61                           | 9.03                             | 1.32      | 0.82    | 24.45                   | 12.75                           | 4.46                    |
| 3800.0        | 15.88        | 24.94             | 13.28                           | 8.76                             | 1.29      | 0.82    | 24.40                   | 12.38                           | 4.38                    |
| 3900.0        | 15.73        | 25.02             | 12.93                           | 8.71                             | 1.31      | 0.83    | 24.11                   | 12.24                           | 4.41                    |
| 4000.0        | 15.55        | 24.79             | 12.89                           | 8.55                             | 1.29      | 0.83    | 23.93                   | 11.93                           | 4.37                    |
| 4100.0        | 15.33        | 25.11             | 12.81                           | 8.78                             | 1.36      | 0.85    | 23.96                   | 11.77                           | 4.45                    |
| 4200.0        | 15.26        | 24.65             | 12.38                           | 8.27                             | 1.27      | 0.84    | 23.68                   | 11.44                           | 4.41                    |
| 4300.0        | 15.06        | 24.76             | 12.31                           | 8.34                             | 1.31      | 0.85    | 23.54                   | 11.08                           | 4.46                    |
| 4400.0        | 14.90        | 24.71             | 12.12                           | 8.20                             | 1.31      | 0.85    | 23.43                   | 11.00                           | 4.50                    |
| 4500.0        | 14.73        | 24.78             | 11.97                           | 8.21                             | 1.33      | 0.86    | 23.34                   | 10.67                           | 4.51                    |
| 4600.0        | 14.64        | 24.48             | 11.44                           | 7.86                             | 1.26      | 0.86    | 23.09                   | 10.40                           | 4.45                    |
| 4700.0        | 14.38        | 24.43             | 11.68                           | 7.83                             | 1.29      | 0.86    | 22.96                   | 10.07                           | 4.51                    |
| 4800.0        | 14.31        | 24.33             | 11.13                           | 7.62                             | 1.25      | 0.86    | 22.93                   | 10.07                           | 4.56                    |
| 4900.0        | 14.11        | 24.21             | 11.08                           | 7.55                             | 1.26      | 0.86    | 23.12                   | 9.83                            | 4.56                    |
| 5000.0        | 13.91        | 24.23             | 11.12                           | 7.48                             | 1.28      | 0.86    | 23.02                   | 9.82                            | 4.61                    |



## 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 = 5V, Id = 73.59 mA @ Temperature = -45degC

| FREQ<br>(MHz) | Gain<br>(dB) | Isolation<br>(dB) | Input<br>Return<br>Loss<br>(dB) | Output<br>Return<br>Loss<br>(dB) | Stability |         | IP-3<br>Output<br>(dBm) | 1dB<br>Comp.<br>Output<br>(dBm) | Noise<br>Figure<br>(dB) |
|---------------|--------------|-------------------|---------------------------------|----------------------------------|-----------|---------|-------------------------|---------------------------------|-------------------------|
|               |              |                   |                                 |                                  | K         | Measure |                         |                                 |                         |
| 10.0          | 21.24        | 25.33             | 17.82                           | 8.88                             | 1.02      | 0.47    | --                      | 18.97                           | 2.58                    |
| 30.0          | 20.59        | 23.91             | 24.75                           | 10.74                            | 1.02      | 0.45    | 34.48                   | 19.77                           | 3.17                    |
| 50.0          | 20.42        | 23.74             | 28.22                           | 11.34                            | 1.02      | 0.45    | 34.24                   | 19.95                           | 3.08                    |
| 70.0          | 20.38        | 23.71             | 29.91                           | 11.44                            | 1.03      | 0.46    | 33.90                   | 19.94                           | 3.03                    |
| 90.0          | 20.35        | 23.74             | 31.54                           | 11.48                            | 1.03      | 0.46    | 34.02                   | 19.95                           | 3.05                    |
| 100.0         | 20.34        | 23.69             | 31.49                           | 11.49                            | 1.03      | 0.46    | 33.51                   | 19.97                           | 3.06                    |
| 200.0         | 20.28        | 23.75             | 29.69                           | 11.51                            | 1.04      | 0.47    | 33.86                   | 20.15                           | 2.91                    |
| 300.0         | 20.26        | 23.71             | 29.60                           | 11.90                            | 1.04      | 0.48    | 33.92                   | 20.17                           | 3.15                    |
| 400.0         | 20.24        | 23.74             | 28.81                           | 12.24                            | 1.04      | 0.49    | 33.89                   | 20.09                           | 3.19                    |
| 500.0         | 20.18        | 23.77             | 26.41                           | 12.30                            | 1.05      | 0.50    | 33.61                   | 20.09                           | 3.22                    |
| 600.0         | 20.13        | 23.80             | 24.88                           | 12.29                            | 1.05      | 0.50    | 33.62                   | 20.04                           | 3.18                    |
| 700.0         | 20.06        | 23.88             | 23.56                           | 12.26                            | 1.06      | 0.52    | 33.64                   | 20.00                           | 3.20                    |
| 800.0         | 19.98        | 23.93             | 22.40                           | 12.28                            | 1.07      | 0.53    | 33.54                   | 19.94                           | 3.12                    |
| 900.0         | 19.89        | 23.95             | 21.56                           | 12.30                            | 1.08      | 0.53    | 33.53                   | 20.02                           | 3.18                    |
| 1000.0        | 19.81        | 24.07             | 20.95                           | 12.39                            | 1.09      | 0.55    | 32.15                   | 20.00                           | 3.20                    |
| 1200.0        | 19.62        | 24.16             | 19.56                           | 12.52                            | 1.11      | 0.58    | 32.38                   | 19.70                           | 3.22                    |
| 1400.0        | 19.39        | 24.30             | 19.01                           | 12.52                            | 1.13      | 0.60    | 31.78                   | 19.55                           | 3.18                    |
| 1500.0        | 19.28        | 24.35             | 18.79                           | 12.47                            | 1.14      | 0.61    | 30.88                   | 19.34                           | 3.18                    |
| 1600.0        | 19.15        | 24.47             | 18.39                           | 12.41                            | 1.16      | 0.63    | 30.56                   | 18.92                           | 3.21                    |
| 1800.0        | 18.91        | 24.62             | 18.13                           | 12.06                            | 1.18      | 0.65    | 29.51                   | 18.56                           | 3.23                    |
| 2000.0        | 18.62        | 24.76             | 17.65                           | 11.76                            | 1.21      | 0.68    | 28.33                   | 18.17                           | 3.23                    |
| 2100.0        | 18.49        | 24.88             | 17.60                           | 11.50                            | 1.22      | 0.69    | 27.75                   | 17.76                           | 3.26                    |
| 2200.0        | 18.34        | 24.90             | 17.51                           | 11.35                            | 1.23      | 0.70    | 27.01                   | 17.40                           | 3.23                    |
| 2300.0        | 18.20        | 24.96             | 17.39                           | 11.10                            | 1.24      | 0.70    | 26.77                   | 17.24                           | 3.25                    |
| 2400.0        | 18.04        | 25.04             | 17.14                           | 10.98                            | 1.26      | 0.72    | 26.25                   | 16.77                           | 3.25                    |
| 2500.0        | 17.90        | 25.07             | 16.90                           | 10.71                            | 1.26      | 0.72    | 26.11                   | 16.70                           | 3.26                    |
| 2600.0        | 17.75        | 25.13             | 16.44                           | 10.48                            | 1.27      | 0.73    | 25.64                   | 16.25                           | 3.26                    |
| 2700.0        | 17.58        | 25.18             | 16.05                           | 10.32                            | 1.29      | 0.74    | 24.97                   | 15.94                           | 3.33                    |
| 2800.0        | 17.43        | 25.22             | 15.57                           | 10.09                            | 1.29      | 0.75    | 24.87                   | 15.69                           | 3.36                    |
| 2900.0        | 17.25        | 25.29             | 15.40                           | 10.06                            | 1.31      | 0.76    | 24.31                   | 15.40                           | 3.38                    |
| 3000.0        | 17.16        | 25.20             | 14.88                           | 9.73                             | 1.29      | 0.76    | 24.13                   | 15.25                           | 3.25                    |
| 3100.0        | 17.02        | 25.11             | 14.87                           | 9.53                             | 1.29      | 0.76    | 23.81                   | 14.89                           | 3.24                    |
| 3200.0        | 16.88        | 25.20             | 14.61                           | 9.42                             | 1.30      | 0.77    | 23.35                   | 14.67                           | 3.29                    |
| 3300.0        | 16.70        | 25.13             | 14.61                           | 9.32                             | 1.30      | 0.78    | 22.85                   | 14.23                           | 3.40                    |
| 3400.0        | 16.53        | 25.16             | 14.38                           | 9.21                             | 1.31      | 0.79    | 22.91                   | 14.01                           | 3.39                    |
| 3500.0        | 16.38        | 25.05             | 14.18                           | 9.04                             | 1.30      | 0.79    | 22.59                   | 13.90                           | 3.36                    |
| 3600.0        | 16.27        | 25.13             | 13.51                           | 8.96                             | 1.30      | 0.81    | 22.29                   | 13.44                           | 3.41                    |
| 3700.0        | 16.10        | 25.04             | 13.32                           | 8.86                             | 1.30      | 0.81    | 22.02                   | 13.29                           | 3.41                    |
| 3800.0        | 15.94        | 24.96             | 13.17                           | 8.72                             | 1.30      | 0.81    | 22.01                   | 12.98                           | 3.40                    |
| 3900.0        | 15.82        | 24.80             | 12.92                           | 8.48                             | 1.27      | 0.81    | 21.78                   | 12.90                           | 3.38                    |
| 4000.0        | 15.59        | 24.90             | 13.07                           | 8.60                             | 1.31      | 0.82    | 21.57                   | 12.59                           | 3.37                    |
| 4100.0        | 15.55        | 24.89             | 12.28                           | 8.41                             | 1.28      | 0.83    | 21.26                   | 12.40                           | 3.38                    |
| 4200.0        | 15.37        | 24.66             | 12.28                           | 8.18                             | 1.26      | 0.83    | 21.31                   | 12.12                           | 3.40                    |
| 4300.0        | 15.21        | 24.60             | 12.07                           | 8.06                             | 1.26      | 0.84    | 21.01                   | 11.78                           | 3.40                    |
| 4400.0        | 15.06        | 24.51             | 11.88                           | 7.88                             | 1.24      | 0.84    | 20.88                   | 11.71                           | 3.45                    |
| 4500.0        | 14.92        | 24.50             | 11.60                           | 7.79                             | 1.24      | 0.84    | 20.71                   | 11.48                           | 3.44                    |
| 4600.0        | 14.70        | 24.52             | 11.76                           | 7.83                             | 1.28      | 0.85    | 20.63                   | 11.16                           | 3.41                    |
| 4700.0        | 14.56        | 24.43             | 11.58                           | 7.71                             | 1.26      | 0.85    | 20.41                   | 10.89                           | 3.46                    |
| 4800.0        | 14.41        | 24.23             | 11.36                           | 7.42                             | 1.23      | 0.84    | 20.34                   | 10.90                           | 3.48                    |
| 4900.0        | 14.27        | 24.08             | 10.95                           | 7.24                             | 1.20      | 0.85    | 20.35                   | 10.68                           | 3.52                    |
| 5000.0        | 14.05        | 24.00             | 11.01                           | 7.14                             | 1.21      | 0.85    | 20.27                   | 10.66                           | 3.56                    |

## 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 = 61.95 mA @ Temperature = -45degC

| FREQ   | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|--------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|        |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz)  | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 10.0   | 21.18 | 24.59     | 17.40             | 8.53               | 0.99      | 0.38    | --          | 17.92            | 2.46         |
| 30.0   | 20.53 | 23.70     | 24.86             | 10.46              | 1.01      | 0.42    | 32.22       | 18.77            | 2.99         |
| 50.0   | 20.37 | 23.48     | 28.27             | 11.05              | 1.01      | 0.43    | 31.76       | 18.89            | 3.01         |
| 70.0   | 20.32 | 23.62     | 30.07             | 11.17              | 1.02      | 0.45    | 31.57       | 18.91            | 2.93         |
| 90.0   | 20.30 | 23.59     | 31.48             | 11.19              | 1.02      | 0.45    | 31.80       | 18.91            | 2.97         |
| 100.0  | 20.28 | 23.57     | 31.55             | 11.20              | 1.02      | 0.45    | 31.35       | 18.94            | 2.96         |
| 200.0  | 20.23 | 23.61     | 29.71             | 11.21              | 1.03      | 0.46    | 31.46       | 19.08            | 2.82         |
| 300.0  | 20.21 | 23.57     | 29.59             | 11.57              | 1.03      | 0.46    | 31.55       | 19.09            | 3.12         |
| 400.0  | 20.18 | 23.57     | 28.68             | 11.91              | 1.03      | 0.47    | 31.52       | 19.07            | 3.08         |
| 500.0  | 20.13 | 23.64     | 26.30             | 11.98              | 1.04      | 0.48    | 31.23       | 19.07            | 3.12         |
| 600.0  | 20.07 | 23.70     | 24.74             | 11.97              | 1.05      | 0.49    | 31.21       | 19.02            | 3.11         |
| 700.0  | 19.99 | 23.72     | 23.50             | 11.95              | 1.05      | 0.50    | 31.19       | 19.00            | 3.13         |
| 800.0  | 19.91 | 23.78     | 22.23             | 11.97              | 1.06      | 0.51    | 31.05       | 18.94            | 3.05         |
| 900.0  | 19.82 | 23.82     | 21.42             | 11.99              | 1.07      | 0.52    | 30.97       | 18.98            | 3.09         |
| 1000.0 | 19.73 | 23.92     | 20.82             | 12.10              | 1.08      | 0.54    | 30.03       | 18.99            | 3.14         |
| 1200.0 | 19.53 | 24.02     | 19.34             | 12.22              | 1.10      | 0.57    | 30.00       | 18.79            | 3.11         |
| 1400.0 | 19.30 | 24.18     | 18.79             | 12.24              | 1.13      | 0.60    | 29.59       | 18.71            | 3.11         |
| 1500.0 | 19.18 | 24.25     | 18.53             | 12.18              | 1.14      | 0.61    | 28.80       | 18.54            | 3.10         |
| 1600.0 | 19.04 | 24.36     | 18.15             | 12.13              | 1.15      | 0.63    | 28.52       | 18.25            | 3.13         |
| 1800.0 | 18.79 | 24.48     | 17.88             | 11.82              | 1.18      | 0.65    | 27.67       | 17.99            | 3.13         |
| 2000.0 | 18.49 | 24.64     | 17.36             | 11.55              | 1.21      | 0.67    | 26.73       | 17.62            | 3.15         |
| 2100.0 | 18.35 | 24.70     | 17.30             | 11.30              | 1.22      | 0.68    | 26.25       | 17.26            | 3.13         |
| 2200.0 | 18.20 | 24.82     | 17.21             | 11.14              | 1.23      | 0.69    | 25.56       | 16.91            | 3.17         |
| 2300.0 | 18.06 | 24.83     | 17.11             | 10.93              | 1.24      | 0.70    | 25.35       | 16.77            | 3.18         |
| 2400.0 | 17.89 | 24.97     | 16.85             | 10.81              | 1.26      | 0.72    | 24.86       | 16.34            | 3.13         |
| 2500.0 | 17.74 | 24.97     | 16.61             | 10.57              | 1.27      | 0.72    | 24.75       | 16.26            | 3.19         |
| 2600.0 | 17.59 | 24.99     | 16.18             | 10.33              | 1.27      | 0.73    | 24.34       | 15.84            | 3.20         |
| 2700.0 | 17.41 | 25.06     | 15.79             | 10.17              | 1.29      | 0.74    | 23.72       | 15.54            | 3.26         |
| 2800.0 | 17.26 | 25.12     | 15.33             | 9.96               | 1.30      | 0.75    | 23.65       | 15.27            | 3.27         |
| 2900.0 | 17.07 | 25.23     | 15.12             | 9.95               | 1.32      | 0.76    | 23.12       | 15.00            | 3.27         |
| 3000.0 | 16.98 | 25.14     | 14.65             | 9.62               | 1.30      | 0.76    | 22.96       | 14.85            | 3.14         |
| 3100.0 | 16.83 | 25.05     | 14.64             | 9.44               | 1.30      | 0.77    | 22.68       | 14.51            | 3.15         |
| 3200.0 | 16.69 | 25.13     | 14.38             | 9.33               | 1.31      | 0.78    | 22.24       | 14.29            | 3.19         |
| 3300.0 | 16.50 | 25.09     | 14.35             | 9.25               | 1.32      | 0.78    | 21.74       | 13.86            | 3.29         |
| 3400.0 | 16.33 | 25.09     | 14.16             | 9.14               | 1.32      | 0.79    | 21.84       | 13.63            | 3.24         |
| 3500.0 | 16.17 | 24.98     | 13.97             | 8.96               | 1.31      | 0.79    | 21.54       | 13.53            | 3.26         |
| 3600.0 | 16.06 | 25.08     | 13.37             | 8.90               | 1.32      | 0.81    | 21.23       | 13.08            | 3.30         |
| 3700.0 | 15.88 | 24.99     | 13.15             | 8.80               | 1.32      | 0.81    | 20.97       | 12.93            | 3.31         |
| 3800.0 | 15.72 | 24.93     | 12.94             | 8.69               | 1.32      | 0.82    | 20.98       | 12.64            | 3.32         |
| 3900.0 | 15.59 | 24.74     | 12.76             | 8.46               | 1.29      | 0.82    | 20.75       | 12.56            | 3.27         |
| 4000.0 | 15.37 | 24.89     | 12.83             | 8.57               | 1.34      | 0.83    | 20.56       | 12.27            | 3.24         |
| 4100.0 | 15.32 | 24.85     | 12.15             | 8.38               | 1.30      | 0.84    | 20.28       | 12.06            | 3.30         |
| 4200.0 | 15.12 | 24.60     | 12.09             | 8.20               | 1.28      | 0.84    | 20.31       | 11.81            | 3.25         |
| 4300.0 | 14.97 | 24.49     | 11.96             | 8.05               | 1.27      | 0.84    | 20.07       | 11.47            | 3.34         |
| 4400.0 | 14.81 | 24.47     | 11.81             | 7.88               | 1.27      | 0.84    | 19.93       | 11.38            | 3.35         |
| 4500.0 | 14.68 | 24.44     | 11.49             | 7.80               | 1.26      | 0.85    | 19.78       | 11.14            | 3.31         |
| 4600.0 | 14.46 | 24.39     | 11.70             | 7.83               | 1.29      | 0.85    | 19.70       | 10.85            | 3.30         |
| 4700.0 | 14.31 | 24.43     | 11.49             | 7.73               | 1.30      | 0.86    | 19.48       | 10.58            | 3.35         |
| 4800.0 | 14.15 | 24.13     | 11.21             | 7.45               | 1.25      | 0.85    | 19.43       | 10.60            | 3.37         |
| 4900.0 | 14.00 | 24.02     | 10.90             | 7.28               | 1.22      | 0.85    | 19.49       | 10.39            | 3.39         |
| 5000.0 | 13.78 | 23.92     | 10.92             | 7.19               | 1.23      | 0.85    | 19.39       | 10.35            | 3.39         |

## 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 = 85.23 mA @ Temperature = -45degC

| FREQ   | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|--------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|        |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz)  | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 10.0   | 21.27 | 25.49     | 17.31             | 9.01               | 1.03      | 0.49    | --          | 19.87            | 2.66         |
| 30.0   | 20.62 | 24.04     | 24.36             | 10.93              | 1.02      | 0.46    | 37.38       | 20.69            | 3.27         |
| 50.0   | 20.46 | 23.83     | 27.31             | 11.54              | 1.03      | 0.46    | 36.41       | 20.92            | 3.17         |
| 70.0   | 20.42 | 23.90     | 29.39             | 11.64              | 1.04      | 0.48    | 36.53       | 20.88            | 3.11         |
| 90.0   | 20.39 | 23.82     | 30.59             | 11.68              | 1.03      | 0.47    | 36.51       | 20.91            | 3.15         |
| 100.0  | 20.38 | 23.84     | 30.55             | 11.69              | 1.04      | 0.47    | 36.11       | 20.92            | 3.17         |
| 200.0  | 20.32 | 23.85     | 29.09             | 11.71              | 1.04      | 0.48    | 35.84       | 21.13            | 3.07         |
| 300.0  | 20.30 | 23.87     | 29.33             | 12.12              | 1.05      | 0.49    | 36.22       | 21.15            | 3.27         |
| 400.0  | 20.27 | 23.90     | 28.77             | 12.45              | 1.05      | 0.50    | 36.16       | 21.03            | 3.29         |
| 500.0  | 20.23 | 23.91     | 26.47             | 12.52              | 1.05      | 0.51    | 35.92       | 21.02            | 3.32         |
| 600.0  | 20.17 | 23.95     | 25.04             | 12.50              | 1.06      | 0.52    | 35.95       | 20.95            | 3.28         |
| 700.0  | 20.11 | 24.01     | 23.71             | 12.47              | 1.07      | 0.53    | 36.22       | 20.89            | 3.26         |
| 800.0  | 20.03 | 24.04     | 22.55             | 12.48              | 1.07      | 0.53    | 35.86       | 20.83            | 3.23         |
| 900.0  | 19.95 | 24.13     | 21.74             | 12.51              | 1.08      | 0.55    | 35.35       | 20.93            | 3.20         |
| 1000.0 | 19.87 | 24.15     | 21.17             | 12.59              | 1.09      | 0.56    | 34.06       | 20.86            | 3.33         |
| 1200.0 | 19.69 | 24.29     | 19.75             | 12.72              | 1.11      | 0.58    | 34.26       | 20.43            | 3.32         |
| 1400.0 | 19.48 | 24.40     | 19.29             | 12.72              | 1.13      | 0.61    | 33.41       | 20.19            | 3.30         |
| 1500.0 | 19.37 | 24.47     | 19.03             | 12.66              | 1.14      | 0.62    | 32.28       | 19.94            | 3.29         |
| 1600.0 | 19.24 | 24.60     | 18.67             | 12.59              | 1.16      | 0.64    | 31.85       | 19.47            | 3.33         |
| 1800.0 | 19.02 | 24.68     | 18.45             | 12.24              | 1.18      | 0.65    | 30.74       | 19.05            | 3.34         |
| 2000.0 | 18.73 | 24.90     | 17.95             | 11.92              | 1.21      | 0.68    | 29.44       | 18.64            | 3.33         |
| 2100.0 | 18.61 | 24.97     | 17.89             | 11.65              | 1.22      | 0.69    | 28.89       | 18.21            | 3.36         |
| 2200.0 | 18.47 | 24.98     | 17.77             | 11.50              | 1.23      | 0.70    | 28.08       | 17.84            | 3.33         |
| 2300.0 | 18.34 | 25.00     | 17.66             | 11.25              | 1.24      | 0.70    | 27.81       | 17.66            | 3.37         |
| 2400.0 | 18.18 | 25.15     | 17.39             | 11.10              | 1.26      | 0.72    | 27.34       | 17.19            | 3.31         |
| 2500.0 | 18.05 | 25.15     | 17.17             | 10.85              | 1.26      | 0.72    | 27.17       | 17.11            | 3.63         |
| 2600.0 | 17.90 | 25.16     | 16.68             | 10.60              | 1.26      | 0.73    | 26.69       | 16.64            | 3.39         |
| 2700.0 | 17.73 | 25.26     | 16.28             | 10.41              | 1.28      | 0.74    | 26.09       | 16.35            | 3.44         |
| 2800.0 | 17.59 | 25.29     | 15.80             | 10.19              | 1.29      | 0.75    | 25.95       | 16.08            | 3.44         |
| 2900.0 | 17.42 | 25.33     | 15.62             | 10.15              | 1.30      | 0.76    | 25.37       | 15.78            | 3.45         |
| 3000.0 | 17.33 | 25.30     | 15.06             | 9.81               | 1.29      | 0.76    | 25.19       | 15.62            | 3.40         |
| 3100.0 | 17.20 | 25.19     | 15.07             | 9.60               | 1.28      | 0.76    | 24.87       | 15.26            | 3.37         |
| 3200.0 | 17.06 | 25.26     | 14.78             | 9.48               | 1.29      | 0.77    | 24.40       | 15.04            | 3.42         |
| 3300.0 | 16.89 | 25.21     | 14.79             | 9.39               | 1.29      | 0.78    | 23.93       | 14.58            | 3.47         |
| 3400.0 | 16.72 | 25.17     | 14.56             | 9.27               | 1.29      | 0.79    | 23.94       | 14.36            | 3.45         |
| 3500.0 | 16.58 | 25.07     | 14.33             | 9.07               | 1.28      | 0.79    | 23.62       | 14.24            | 3.45         |
| 3600.0 | 16.47 | 25.25     | 13.64             | 8.99               | 1.30      | 0.80    | 23.31       | 13.78            | 3.51         |
| 3700.0 | 16.31 | 25.13     | 13.46             | 8.88               | 1.29      | 0.81    | 23.03       | 13.62            | 3.53         |
| 3800.0 | 16.15 | 24.97     | 13.31             | 8.72               | 1.27      | 0.81    | 22.98       | 13.31            | 3.52         |
| 3900.0 | 16.04 | 24.83     | 13.03             | 8.50               | 1.25      | 0.81    | 22.73       | 13.22            | 3.51         |
| 4000.0 | 15.81 | 24.99     | 13.22             | 8.61               | 1.30      | 0.82    | 22.55       | 12.90            | 3.48         |
| 4100.0 | 15.77 | 24.97     | 12.41             | 8.41               | 1.27      | 0.83    | 22.21       | 12.71            | 3.50         |
| 4200.0 | 15.59 | 24.68     | 12.38             | 8.18               | 1.24      | 0.83    | 22.22       | 12.43            | 3.49         |
| 4300.0 | 15.44 | 24.60     | 12.18             | 8.05               | 1.23      | 0.83    | 21.93       | 12.09            | 3.54         |
| 4400.0 | 15.30 | 24.54     | 11.98             | 7.87               | 1.22      | 0.83    | 21.79       | 12.01            | 3.58         |
| 4500.0 | 15.16 | 24.54     | 11.69             | 7.76               | 1.22      | 0.84    | 21.60       | 11.74            | 3.57         |
| 4600.0 | 14.94 | 24.54     | 11.85             | 7.81               | 1.25      | 0.84    | 21.51       | 11.46            | 3.56         |
| 4700.0 | 14.80 | 24.46     | 11.67             | 7.68               | 1.24      | 0.84    | 21.25       | 11.17            | 3.62         |
| 4800.0 | 14.66 | 24.26     | 11.43             | 7.37               | 1.20      | 0.84    | 21.18       | 11.18            | 3.60         |
| 4900.0 | 14.52 | 24.14     | 11.02             | 7.19               | 1.17      | 0.84    | 21.19       | 10.96            | 3.63         |
| 5000.0 | 14.30 | 24.08     | 11.07             | 7.10               | 1.19      | 0.84    | 21.07       | 10.93            | 3.66         |

## 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 = 5V, Id = 95.9 mA @ Temperature = +85degC

| FREQ<br>(MHz) | Gain<br>(dB) | Isolation<br>(dB) | Input<br>Return<br>Loss<br>(dB) | Output<br>Return<br>Loss<br>(dB) | Stability |         | IP-3<br>Output<br>(dBm) | 1dB<br>Comp.<br>Output<br>(dBm) | Noise<br>Figure<br>(dB) |
|---------------|--------------|-------------------|---------------------------------|----------------------------------|-----------|---------|-------------------------|---------------------------------|-------------------------|
|               |              |                   |                                 |                                  | K         | Measure |                         |                                 |                         |
| 10.0          | 21.01        | 25.19             | 14.75                           | 8.03                             | 1.02      | 0.43    | --                      | 19.15                           | 3.76                    |
| 30.0          | 20.38        | 24.41             | 20.79                           | 10.46                            | 1.05      | 0.50    | 42.26                   | 20.40                           | 4.41                    |
| 50.0          | 20.22        | 24.45             | 22.70                           | 11.14                            | 1.07      | 0.53    | 41.19                   | 20.79                           | 4.39                    |
| 70.0          | 20.18        | 24.20             | 24.13                           | 11.38                            | 1.06      | 0.52    | 41.46                   | 20.60                           | 4.34                    |
| 90.0          | 20.16        | 24.23             | 25.05                           | 11.54                            | 1.07      | 0.52    | 40.93                   | 20.64                           | 4.34                    |
| 100.0         | 20.15        | 24.24             | 25.27                           | 11.62                            | 1.07      | 0.53    | 39.65                   | 20.62                           | 4.38                    |
| 200.0         | 20.10        | 24.19             | 26.34                           | 11.97                            | 1.07      | 0.53    | 39.73                   | 20.85                           | 4.29                    |
| 300.0         | 20.05        | 24.19             | 25.14                           | 11.91                            | 1.08      | 0.54    | 39.46                   | 20.78                           | 4.56                    |
| 400.0         | 20.00        | 24.29             | 23.61                           | 11.81                            | 1.08      | 0.55    | 38.53                   | 20.49                           | 4.52                    |
| 500.0         | 19.94        | 24.31             | 22.46                           | 11.74                            | 1.09      | 0.55    | 37.47                   | 20.48                           | 4.59                    |
| 600.0         | 19.88        | 24.37             | 21.80                           | 11.74                            | 1.10      | 0.56    | 36.56                   | 20.35                           | 4.51                    |
| 700.0         | 19.81        | 24.40             | 21.18                           | 11.77                            | 1.10      | 0.57    | 35.66                   | 20.23                           | 4.56                    |
| 800.0         | 19.74        | 24.44             | 20.46                           | 11.85                            | 1.11      | 0.58    | 35.17                   | 20.10                           | 4.51                    |
| 900.0         | 19.65        | 24.50             | 19.72                           | 11.87                            | 1.12      | 0.59    | 34.75                   | 20.24                           | 4.51                    |
| 1000.0        | 19.56        | 24.58             | 19.17                           | 11.88                            | 1.13      | 0.60    | 33.82                   | 20.05                           | 4.59                    |
| 1200.0        | 19.36        | 24.73             | 18.33                           | 11.90                            | 1.15      | 0.63    | 32.74                   | 19.43                           | 4.61                    |
| 1400.0        | 19.14        | 24.86             | 17.65                           | 11.87                            | 1.18      | 0.65    | 32.02                   | 19.10                           | 4.56                    |
| 1500.0        | 19.02        | 24.94             | 17.42                           | 11.83                            | 1.19      | 0.66    | 31.38                   | 18.86                           | 4.60                    |
| 1600.0        | 18.89        | 25.00             | 17.11                           | 11.82                            | 1.20      | 0.68    | 30.95                   | 18.35                           | 4.65                    |
| 1800.0        | 18.63        | 25.06             | 16.82                           | 11.62                            | 1.22      | 0.70    | 30.32                   | 17.77                           | 4.67                    |
| 2000.0        | 18.33        | 25.24             | 16.34                           | 11.39                            | 1.25      | 0.72    | 29.75                   | 17.35                           | 4.68                    |
| 2100.0        | 18.19        | 25.21             | 16.18                           | 11.16                            | 1.26      | 0.73    | 29.20                   | 16.88                           | 4.66                    |
| 2200.0        | 18.03        | 25.27             | 15.95                           | 11.05                            | 1.27      | 0.74    | 28.71                   | 16.45                           | 4.70                    |
| 2300.0        | 17.88        | 25.21             | 15.70                           | 10.84                            | 1.27      | 0.75    | 28.67                   | 16.19                           | 4.73                    |
| 2400.0        | 17.71        | 25.22             | 15.46                           | 10.69                            | 1.27      | 0.76    | 27.99                   | 15.71                           | 4.66                    |
| 2500.0        | 17.54        | 25.27             | 15.21                           | 10.54                            | 1.29      | 0.77    | 27.89                   | 15.58                           | 4.77                    |
| 2600.0        | 17.37        | 25.26             | 14.92                           | 10.40                            | 1.29      | 0.78    | 27.60                   | 15.08                           | 4.77                    |
| 2700.0        | 17.20        | 25.21             | 14.64                           | 10.19                            | 1.29      | 0.78    | 27.15                   | 14.80                           | 4.85                    |
| 2800.0        | 17.02        | 25.22             | 14.29                           | 10.07                            | 1.30      | 0.79    | 26.90                   | 14.43                           | 4.89                    |
| 2900.0        | 16.82        | 25.17             | 14.14                           | 10.00                            | 1.30      | 0.80    | 26.55                   | 14.13                           | 4.86                    |
| 3000.0        | 16.68        | 25.11             | 13.66                           | 9.77                             | 1.29      | 0.81    | 26.53                   | 13.89                           | 4.82                    |
| 3100.0        | 16.50        | 25.03             | 13.50                           | 9.62                             | 1.29      | 0.81    | 26.20                   | 13.51                           | 4.78                    |
| 3200.0        | 16.31        | 25.03             | 13.18                           | 9.56                             | 1.30      | 0.83    | 26.01                   | 13.27                           | 4.86                    |
| 3300.0        | 16.12        | 24.95             | 13.01                           | 9.42                             | 1.30      | 0.83    | 25.37                   | 12.82                           | 4.95                    |
| 3400.0        | 15.93        | 24.87             | 12.73                           | 9.34                             | 1.30      | 0.84    | 25.49                   | 12.64                           | 4.87                    |
| 3500.0        | 15.74        | 24.74             | 12.60                           | 9.17                             | 1.29      | 0.84    | 25.40                   | 12.44                           | 4.92                    |
| 3600.0        | 15.55        | 24.76             | 12.31                           | 9.16                             | 1.30      | 0.85    | 24.96                   | 11.95                           | 4.95                    |
| 3700.0        | 15.36        | 24.68             | 12.20                           | 9.05                             | 1.31      | 0.86    | 24.84                   | 11.75                           | 4.96                    |
| 3800.0        | 15.18        | 24.58             | 11.95                           | 8.89                             | 1.30      | 0.86    | 24.89                   | 11.41                           | 4.96                    |
| 3900.0        | 15.00        | 24.44             | 11.77                           | 8.74                             | 1.29      | 0.87    | 24.61                   | 11.25                           | 4.95                    |
| 4000.0        | 14.75        | 24.31             | 11.77                           | 8.69                             | 1.29      | 0.87    | 24.52                   | 10.96                           | 4.96                    |
| 4100.0        | 14.57        | 24.45             | 11.56                           | 8.66                             | 1.32      | 0.88    | 24.55                   | 10.82                           | 5.03                    |
| 4200.0        | 14.40        | 24.38             | 11.28                           | 8.57                             | 1.32      | 0.89    | 24.41                   | 10.50                           | 4.99                    |
| 4300.0        | 14.17        | 24.15             | 11.20                           | 8.45                             | 1.31      | 0.89    | 24.24                   | 10.19                           | 5.06                    |
| 4400.0        | 14.00        | 24.15             | 10.99                           | 8.34                             | 1.31      | 0.89    | 24.22                   | 10.11                           | 5.11                    |
| 4500.0        | 13.82        | 24.28             | 10.88                           | 8.36                             | 1.35      | 0.90    | 24.12                   | 9.81                            | 5.14                    |
| 4600.0        | 13.58        | 23.96             | 10.67                           | 8.17                             | 1.32      | 0.90    | 24.05                   | 9.56                            | 5.08                    |
| 4700.0        | 13.39        | 23.92             | 10.50                           | 8.06                             | 1.32      | 0.90    | 23.85                   | 9.25                            | 5.14                    |
| 4800.0        | 13.23        | 23.83             | 10.21                           | 7.90                             | 1.31      | 0.90    | 23.89                   | 9.26                            | 5.16                    |
| 4900.0        | 13.05        | 23.89             | 10.00                           | 7.91                             | 1.33      | 0.91    | 24.09                   | 9.04                            | 5.20                    |
| 5000.0        | 12.78        | 23.63             | 10.11                           | 7.75                             | 1.33      | 0.90    | 24.03                   | 9.01                            | 5.26                    |

## 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 = 85.76 mA @ Temperature = +85degC

| FREQ<br>(MHz) | Gain<br>(dB) | Isolation<br>(dB) | Input<br>Return<br>Loss<br>(dB) | Output<br>Return<br>Loss<br>(dB) | Stability |         | IP-3<br>Output<br>(dBm) | 1dB<br>Comp.<br>Output<br>(dBm) | Noise<br>Figure<br>(dB) |
|---------------|--------------|-------------------|---------------------------------|----------------------------------|-----------|---------|-------------------------|---------------------------------|-------------------------|
|               |              |                   |                                 |                                  | K         | Measure |                         |                                 |                         |
| 10.0          | 20.99        | 25.96             | 14.78                           | 8.27                             | 1.06      | 0.51    | --                      | 18.73                           | 3.69                    |
| 30.0          | 20.35        | 24.46             | 20.49                           | 10.39                            | 1.05      | 0.50    | 39.63                   | 19.82                           | 4.26                    |
| 50.0          | 20.19        | 24.32             | 22.12                           | 11.07                            | 1.07      | 0.52    | 38.91                   | 20.11                           | 4.27                    |
| 70.0          | 20.15        | 24.18             | 23.51                           | 11.27                            | 1.06      | 0.51    | 39.03                   | 20.01                           | 4.25                    |
| 90.0          | 20.13        | 24.15             | 24.40                           | 11.43                            | 1.06      | 0.52    | 39.23                   | 20.03                           | 4.24                    |
| 100.0         | 20.12        | 24.12             | 24.57                           | 11.50                            | 1.06      | 0.52    | 38.34                   | 20.03                           | 4.27                    |
| 200.0         | 20.07        | 24.15             | 25.58                           | 11.85                            | 1.07      | 0.53    | 38.81                   | 20.23                           | 4.16                    |
| 300.0         | 20.02        | 24.17             | 24.60                           | 11.82                            | 1.08      | 0.53    | 38.26                   | 20.19                           | 4.49                    |
| 400.0         | 19.97        | 24.18             | 23.17                           | 11.70                            | 1.08      | 0.54    | 37.50                   | 19.97                           | 4.41                    |
| 500.0         | 19.90        | 24.27             | 22.13                           | 11.63                            | 1.09      | 0.55    | 37.00                   | 19.96                           | 4.43                    |
| 600.0         | 19.84        | 24.32             | 21.48                           | 11.64                            | 1.09      | 0.56    | 35.85                   | 19.85                           | 4.42                    |
| 700.0         | 19.77        | 24.38             | 20.93                           | 11.69                            | 1.10      | 0.57    | 35.14                   | 19.77                           | 4.46                    |
| 800.0         | 19.69        | 24.41             | 20.23                           | 11.76                            | 1.11      | 0.58    | 34.62                   | 19.66                           | 4.43                    |
| 900.0         | 19.60        | 24.48             | 19.55                           | 11.77                            | 1.12      | 0.59    | 34.50                   | 19.82                           | 4.43                    |
| 1000.0        | 19.51        | 24.54             | 19.00                           | 11.80                            | 1.13      | 0.60    | 33.66                   | 19.68                           | 4.49                    |
| 1200.0        | 19.31        | 24.68             | 18.21                           | 11.82                            | 1.15      | 0.62    | 32.46                   | 19.11                           | 4.45                    |
| 1400.0        | 19.07        | 24.81             | 17.55                           | 11.80                            | 1.18      | 0.65    | 31.76                   | 18.79                           | 4.48                    |
| 1500.0        | 18.96        | 24.84             | 17.33                           | 11.76                            | 1.19      | 0.66    | 31.23                   | 18.54                           | 4.50                    |
| 1600.0        | 18.82        | 24.93             | 17.06                           | 11.75                            | 1.20      | 0.67    | 30.77                   | 18.03                           | 4.53                    |
| 1800.0        | 18.56        | 25.04             | 16.76                           | 11.56                            | 1.23      | 0.70    | 30.02                   | 17.47                           | 4.55                    |
| 2000.0        | 18.25        | 25.15             | 16.32                           | 11.32                            | 1.25      | 0.72    | 29.41                   | 17.04                           | 4.55                    |
| 2100.0        | 18.12        | 25.14             | 16.16                           | 11.08                            | 1.25      | 0.73    | 28.78                   | 16.56                           | 4.55                    |
| 2200.0        | 17.95        | 25.19             | 15.95                           | 10.98                            | 1.27      | 0.74    | 28.34                   | 16.14                           | 4.59                    |
| 2300.0        | 17.81        | 25.19             | 15.71                           | 10.78                            | 1.27      | 0.75    | 28.29                   | 15.88                           | 4.61                    |
| 2400.0        | 17.64        | 25.21             | 15.49                           | 10.62                            | 1.28      | 0.76    | 27.66                   | 15.39                           | 4.52                    |
| 2500.0        | 17.47        | 25.17             | 15.24                           | 10.48                            | 1.28      | 0.76    | 27.52                   | 15.26                           | 4.60                    |
| 2600.0        | 17.29        | 25.21             | 14.99                           | 10.33                            | 1.29      | 0.77    | 27.23                   | 14.76                           | 4.63                    |
| 2700.0        | 17.13        | 25.18             | 14.73                           | 10.13                            | 1.29      | 0.78    | 26.73                   | 14.46                           | 4.72                    |
| 2800.0        | 16.95        | 25.20             | 14.37                           | 10.02                            | 1.30      | 0.79    | 26.55                   | 14.11                           | 4.70                    |
| 2900.0        | 16.76        | 25.14             | 14.22                           | 9.94                             | 1.31      | 0.80    | 26.10                   | 13.81                           | 4.72                    |
| 3000.0        | 16.61        | 25.10             | 13.76                           | 9.72                             | 1.30      | 0.81    | 26.02                   | 13.56                           | 4.65                    |
| 3100.0        | 16.44        | 24.99             | 13.62                           | 9.57                             | 1.29      | 0.81    | 25.78                   | 13.19                           | 4.63                    |
| 3200.0        | 16.25        | 25.03             | 13.30                           | 9.51                             | 1.31      | 0.82    | 25.58                   | 12.96                           | 4.69                    |
| 3300.0        | 16.06        | 24.84             | 13.13                           | 9.37                             | 1.30      | 0.83    | 24.89                   | 12.49                           | 4.79                    |
| 3400.0        | 15.88        | 24.86             | 12.87                           | 9.29                             | 1.31      | 0.84    | 25.02                   | 12.30                           | 4.75                    |
| 3500.0        | 15.69        | 24.70             | 12.74                           | 9.11                             | 1.29      | 0.84    | 24.93                   | 12.10                           | 4.76                    |
| 3600.0        | 15.51        | 24.73             | 12.46                           | 9.10                             | 1.31      | 0.85    | 24.48                   | 11.62                           | 4.79                    |
| 3700.0        | 15.32        | 24.68             | 12.34                           | 9.01                             | 1.31      | 0.85    | 24.36                   | 11.40                           | 4.82                    |
| 3800.0        | 15.15        | 24.59             | 12.12                           | 8.84                             | 1.31      | 0.86    | 24.39                   | 11.07                           | 4.77                    |
| 3900.0        | 14.97        | 24.42             | 11.93                           | 8.68                             | 1.29      | 0.86    | 24.13                   | 10.93                           | 4.80                    |
| 4000.0        | 14.74        | 24.27             | 11.94                           | 8.62                             | 1.29      | 0.86    | 24.04                   | 10.60                           | 4.82                    |
| 4100.0        | 14.55        | 24.40             | 11.72                           | 8.58                             | 1.32      | 0.87    | 24.03                   | 10.46                           | 4.87                    |
| 4200.0        | 14.38        | 24.32             | 11.49                           | 8.52                             | 1.32      | 0.88    | 23.85                   | 10.14                           | 4.83                    |
| 4300.0        | 14.17        | 24.12             | 11.39                           | 8.38                             | 1.31      | 0.88    | 23.74                   | 9.85                            | 4.91                    |
| 4400.0        | 14.01        | 24.15             | 11.14                           | 8.26                             | 1.31      | 0.88    | 23.66                   | 9.75                            | 4.96                    |
| 4500.0        | 13.82        | 24.31             | 11.06                           | 8.30                             | 1.36      | 0.89    | 23.60                   | 9.45                            | 4.94                    |
| 4600.0        | 13.60        | 23.94             | 10.83                           | 8.10                             | 1.31      | 0.89    | 23.54                   | 9.22                            | 4.92                    |
| 4700.0        | 13.41        | 23.87             | 10.67                           | 7.98                             | 1.32      | 0.89    | 23.32                   | 8.87                            | 4.97                    |
| 4800.0        | 13.26        | 23.82             | 10.36                           | 7.82                             | 1.30      | 0.90    | 23.38                   | 8.86                            | 4.97                    |
| 4900.0        | 13.08        | 23.91             | 10.17                           | 7.86                             | 1.33      | 0.91    | 23.55                   | 8.65                            | 5.00                    |
| 5000.0        | 12.81        | 23.61             | 10.26                           | 7.66                             | 1.32      | 0.90    | 23.57                   | 8.61                            | 5.05                    |

## Typical Performance Data

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

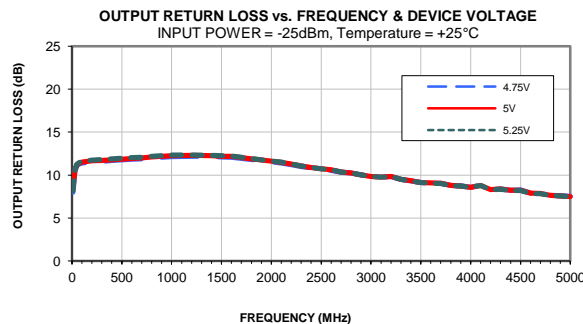
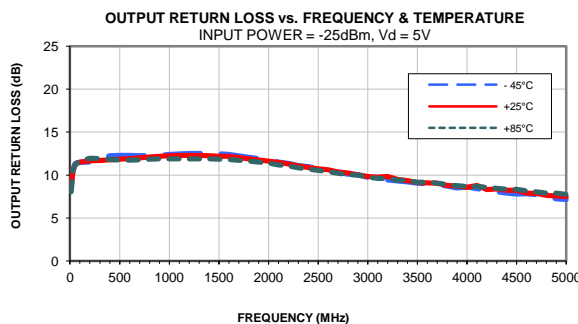
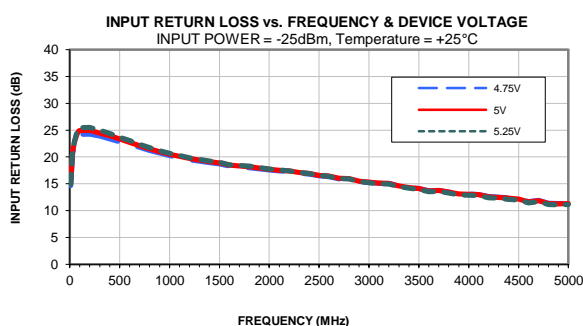
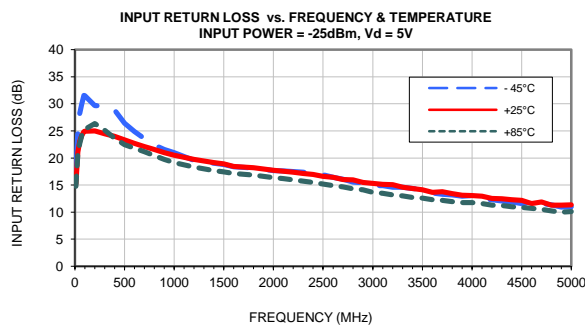
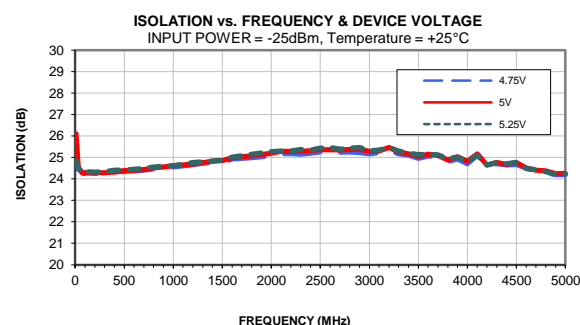
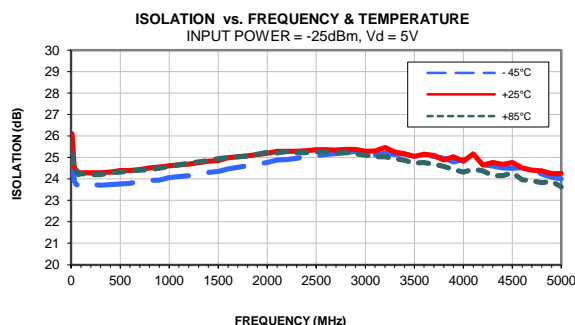
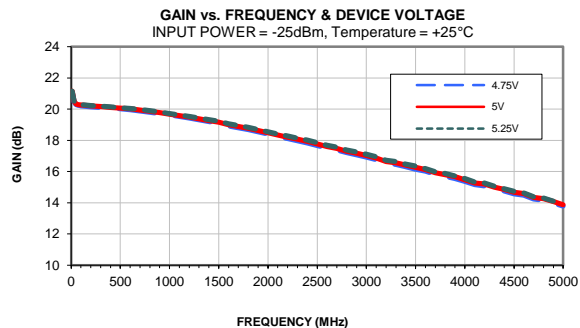
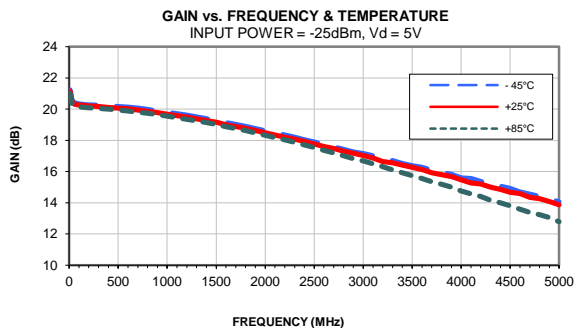
TEST CONDITIONS: Vd = 5.25V, Id = 107.84 mA @ Temperature = +85degC

| FREQ<br>(MHz) | Gain<br>(dB) | Isolation<br>(dB) | Input<br>Return<br>Loss<br>(dB) | Output<br>Return<br>Loss<br>(dB) | Stability |         | IP-3<br>Output<br>(dBm) | 1dB<br>Comp.<br>Output<br>(dBm) | Noise<br>Figure<br>(dB) |
|---------------|--------------|-------------------|---------------------------------|----------------------------------|-----------|---------|-------------------------|---------------------------------|-------------------------|
|               |              |                   |                                 |                                  | K         | Measure |                         |                                 |                         |
| 10.0          | 21.06        | 25.97             | 15.20                           | 8.29                             | 1.05      | 0.51    | --                      | 19.35                           | 3.93                    |
| 30.0          | 20.41        | 24.45             | 21.18                           | 10.55                            | 1.05      | 0.50    | 42.43                   | 20.68                           | 4.60                    |
| 50.0          | 20.25        | 24.44             | 23.30                           | 11.25                            | 1.07      | 0.53    | 42.82                   | 21.21                           | 4.50                    |
| 70.0          | 20.21        | 24.25             | 24.68                           | 11.47                            | 1.06      | 0.52    | 41.64                   | 20.91                           | 4.46                    |
| 90.0          | 20.19        | 24.21             | 25.71                           | 11.62                            | 1.07      | 0.52    | 41.85                   | 20.95                           | 4.50                    |
| 100.0         | 20.18        | 24.24             | 25.98                           | 11.71                            | 1.07      | 0.53    | 40.48                   | 20.93                           | 4.49                    |
| 200.0         | 20.13        | 24.18             | 27.15                           | 12.05                            | 1.07      | 0.53    | 40.68                   | 21.22                           | 4.40                    |
| 300.0         | 20.09        | 24.24             | 25.71                           | 12.02                            | 1.08      | 0.54    | 39.49                   | 21.13                           | 4.71                    |
| 400.0         | 20.03        | 24.32             | 23.97                           | 11.89                            | 1.08      | 0.55    | 39.22                   | 20.78                           | 4.66                    |
| 500.0         | 19.97        | 24.35             | 22.79                           | 11.83                            | 1.09      | 0.55    | 37.23                   | 20.75                           | 4.74                    |
| 600.0         | 19.92        | 24.36             | 22.08                           | 11.83                            | 1.09      | 0.56    | 36.06                   | 20.58                           | 4.66                    |
| 700.0         | 19.85        | 24.45             | 21.41                           | 11.87                            | 1.10      | 0.57    | 35.48                   | 20.44                           | 4.66                    |
| 800.0         | 19.78        | 24.52             | 20.64                           | 11.93                            | 1.11      | 0.58    | 34.83                   | 20.30                           | 4.64                    |
| 900.0         | 19.69        | 24.55             | 19.87                           | 11.93                            | 1.12      | 0.59    | 34.72                   | 20.48                           | 4.71                    |
| 1000.0        | 19.60        | 24.62             | 19.29                           | 11.97                            | 1.13      | 0.60    | 33.79                   | 20.25                           | 4.74                    |
| 1200.0        | 19.42        | 24.76             | 18.39                           | 11.98                            | 1.15      | 0.62    | 32.72                   | 19.60                           | 4.72                    |
| 1400.0        | 19.19        | 24.90             | 17.69                           | 11.97                            | 1.18      | 0.65    | 32.07                   | 19.30                           | 4.72                    |
| 1500.0        | 19.08        | 24.93             | 17.44                           | 11.92                            | 1.19      | 0.66    | 31.57                   | 19.07                           | 4.72                    |
| 1600.0        | 18.95        | 25.04             | 17.15                           | 11.92                            | 1.20      | 0.68    | 31.06                   | 18.56                           | 4.76                    |
| 1800.0        | 18.70        | 25.16             | 16.80                           | 11.72                            | 1.23      | 0.70    | 30.36                   | 17.98                           | 4.77                    |
| 2000.0        | 18.39        | 25.28             | 16.30                           | 11.47                            | 1.25      | 0.72    | 29.96                   | 17.60                           | 4.80                    |
| 2100.0        | 18.26        | 25.24             | 16.15                           | 11.25                            | 1.25      | 0.73    | 29.35                   | 17.13                           | 4.85                    |
| 2200.0        | 18.10        | 25.27             | 15.92                           | 11.14                            | 1.26      | 0.74    | 28.95                   | 16.72                           | 4.84                    |
| 2300.0        | 17.95        | 25.34             | 15.61                           | 10.94                            | 1.27      | 0.75    | 28.95                   | 16.45                           | 4.91                    |
| 2400.0        | 17.78        | 25.29             | 15.38                           | 10.78                            | 1.28      | 0.76    | 28.30                   | 15.98                           | 4.89                    |
| 2500.0        | 17.60        | 25.32             | 15.11                           | 10.63                            | 1.28      | 0.77    | 28.20                   | 15.86                           | 4.91                    |
| 2600.0        | 17.43        | 25.31             | 14.83                           | 10.47                            | 1.29      | 0.78    | 27.98                   | 15.35                           | 4.90                    |
| 2700.0        | 17.26        | 25.22             | 14.53                           | 10.28                            | 1.28      | 0.79    | 27.48                   | 15.09                           | 5.00                    |
| 2800.0        | 17.07        | 25.25             | 14.16                           | 10.17                            | 1.29      | 0.80    | 27.30                   | 14.73                           | 5.02                    |
| 2900.0        | 16.87        | 25.19             | 13.99                           | 10.10                            | 1.30      | 0.81    | 26.97                   | 14.44                           | 5.04                    |
| 3000.0        | 16.73        | 25.14             | 13.50                           | 9.86                             | 1.29      | 0.81    | 26.89                   | 14.19                           | 4.98                    |
| 3100.0        | 16.54        | 25.02             | 13.34                           | 9.71                             | 1.28      | 0.82    | 26.57                   | 13.84                           | 4.94                    |
| 3200.0        | 16.34        | 25.07             | 13.01                           | 9.64                             | 1.30      | 0.83    | 26.45                   | 13.60                           | 5.00                    |
| 3300.0        | 16.15        | 24.95             | 12.83                           | 9.50                             | 1.29      | 0.84    | 25.81                   | 13.14                           | 5.11                    |
| 3400.0        | 15.96        | 24.93             | 12.55                           | 9.44                             | 1.30      | 0.85    | 25.97                   | 12.95                           | 5.05                    |
| 3500.0        | 15.76        | 24.70             | 12.42                           | 9.26                             | 1.28      | 0.85    | 25.87                   | 12.77                           | 5.08                    |
| 3600.0        | 15.57        | 24.75             | 12.13                           | 9.26                             | 1.30      | 0.86    | 25.44                   | 12.29                           | 5.12                    |
| 3700.0        | 15.36        | 24.66             | 12.00                           | 9.14                             | 1.30      | 0.87    | 25.35                   | 12.07                           | 5.16                    |
| 3800.0        | 15.19        | 24.56             | 11.76                           | 8.98                             | 1.29      | 0.87    | 25.37                   | 11.74                           | 5.13                    |
| 3900.0        | 14.99        | 24.41             | 11.56                           | 8.85                             | 1.28      | 0.87    | 25.13                   | 11.61                           | 5.15                    |
| 4000.0        | 14.74        | 24.31             | 11.58                           | 8.81                             | 1.29      | 0.88    | 25.14                   | 11.33                           | 5.20                    |
| 4100.0        | 14.55        | 24.42             | 11.36                           | 8.78                             | 1.32      | 0.89    | 25.02                   | 11.19                           | 5.22                    |
| 4200.0        | 14.39        | 24.32             | 11.05                           | 8.67                             | 1.31      | 0.89    | 24.87                   | 10.87                           | 5.20                    |
| 4300.0        | 14.14        | 24.09             | 10.98                           | 8.55                             | 1.30      | 0.89    | 24.74                   | 10.56                           | 5.29                    |
| 4400.0        | 13.97        | 24.18             | 10.78                           | 8.46                             | 1.32      | 0.90    | 24.64                   | 10.48                           | 5.34                    |
| 4500.0        | 13.78        | 24.29             | 10.66                           | 8.47                             | 1.36      | 0.91    | 24.57                   | 10.19                           | 5.33                    |
| 4600.0        | 13.53        | 23.94             | 10.50                           | 8.30                             | 1.32      | 0.91    | 24.56                   | 9.95                            | 5.34                    |
| 4700.0        | 13.34        | 23.90             | 10.31                           | 8.19                             | 1.33      | 0.91    | 24.39                   | 9.62                            | 5.34                    |
| 4800.0        | 13.17        | 23.79             | 10.02                           | 8.02                             | 1.31      | 0.91    | 24.44                   | 9.62                            | 5.37                    |
| 4900.0        | 12.98        | 23.86             | 9.82                            | 8.03                             | 1.34      | 0.92    | 24.56                   | 9.42                            | 5.44                    |
| 5000.0        | 12.70        | 23.69             | 9.94                            | 7.90                             | 1.35      | 0.92    | 24.55                   | 9.41                            | 5.49                    |

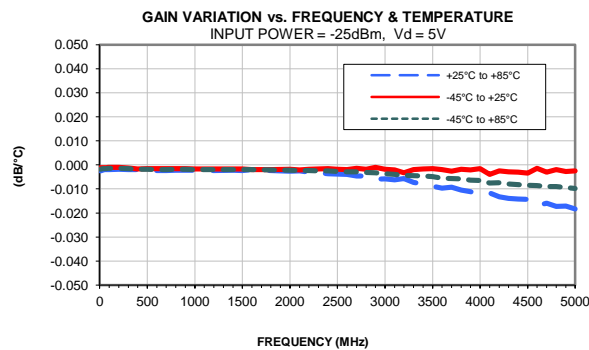
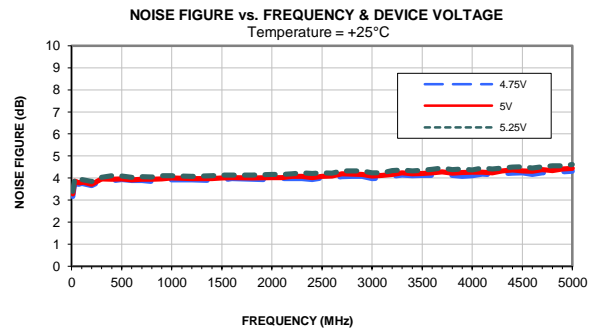
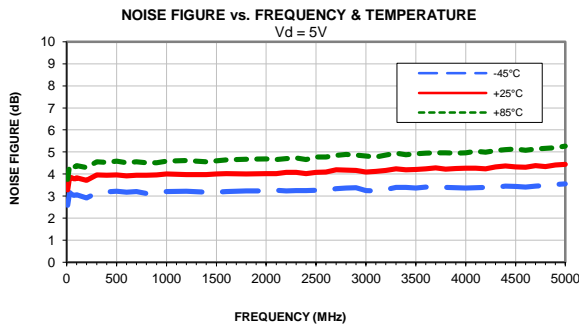
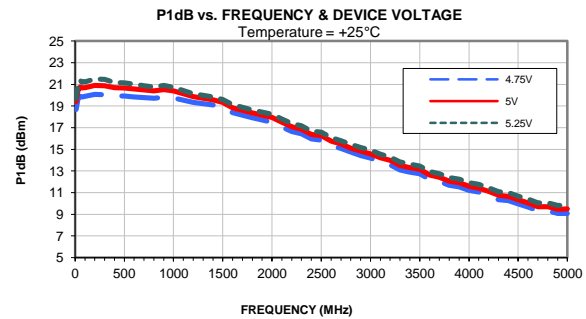
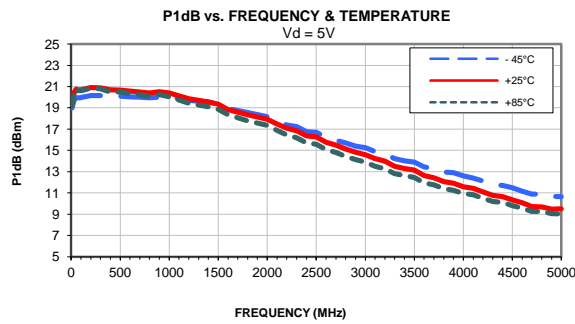
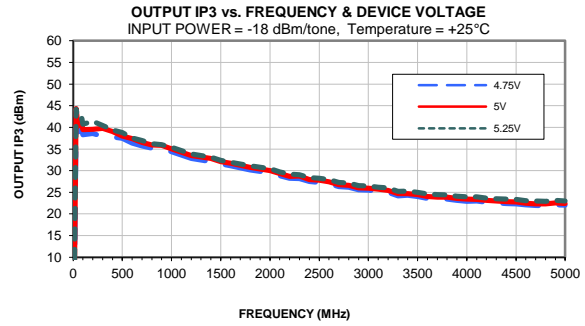
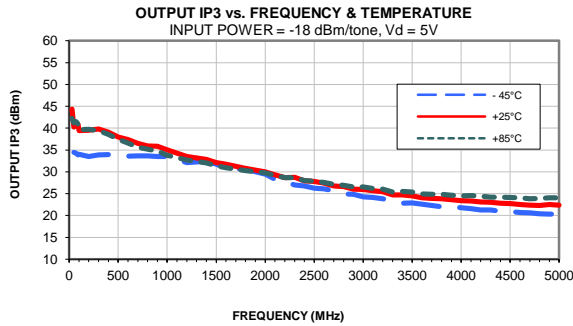




## Typical Performance Curves

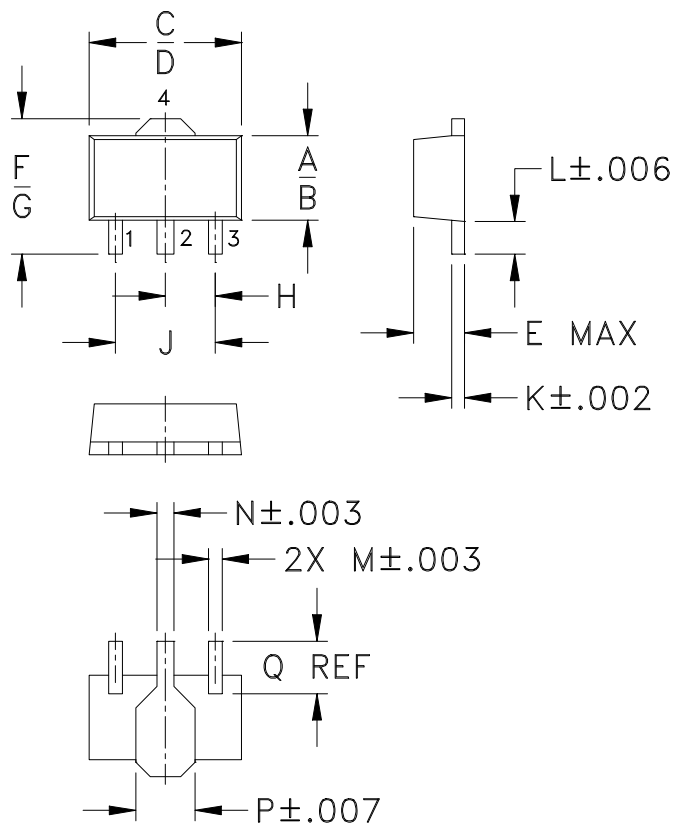


## Typical Performance Curves

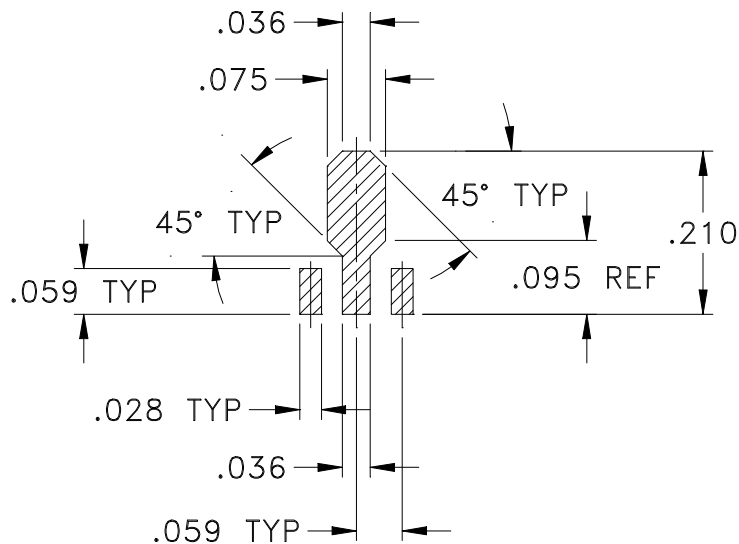




### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

| CASE # | A              | B              | C              | D              | E              | F              | G              | H              | J              | K              | L              | M              |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| DF782  | .102<br>(2.59) | .090<br>(2.29) | .181<br>(4.60) | .173<br>(4.39) | .063<br>(1.60) | .167<br>(4.24) | .155<br>(3.94) | .059<br>(1.50) | .118<br>(3.00) | .015<br>(0.38) | .041<br>(1.04) | .016<br>(0.41) |

| CASE # | N              | P              | Q              | WT. GRAM |
|--------|----------------|----------------|----------------|----------|
| DF782  | .019<br>(0.48) | .065<br>(1.65) | .062<br>(1.57) | .2       |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .01$ ; 3Pl.  $\pm .005$

#### Notes:

- Case material: Plastic.
- Termination finish:  
For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin.  
All models, (+) suffix. See model Data sheet.  
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



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

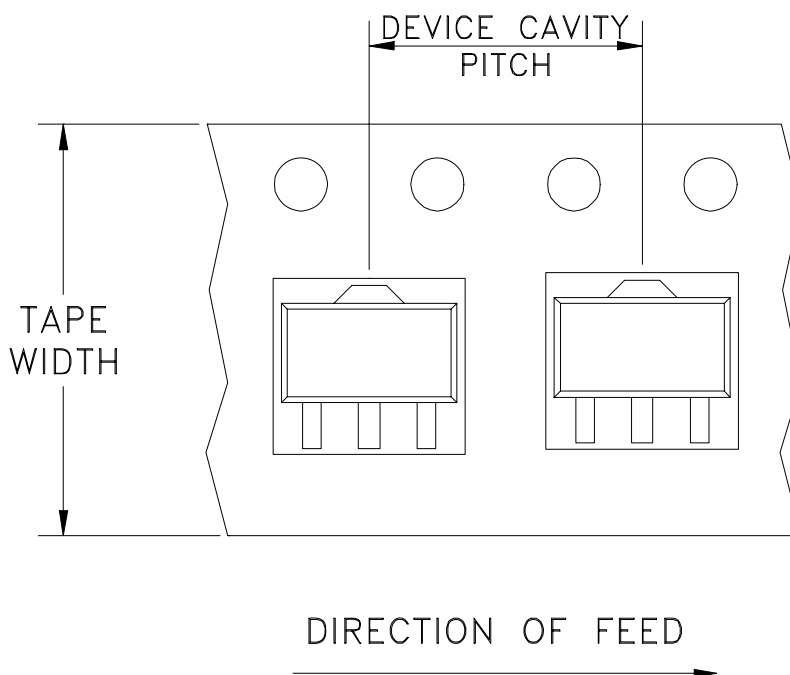
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# Tape & Reel Packaging TR-F55

## DEVICE ORIENTATION IN T&R



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel                   |      |
|----------------|-------------------------|-------------------|------------------------------------|------|
| 12             | 8                       | 7                 | Small quantity standard (see note) | 20   |
|                |                         |                   |                                    | 50   |
|                |                         |                   |                                    | 100  |
|                |                         |                   |                                    | 200  |
|                |                         |                   |                                    | 500  |
|                |                         |                   | Standard                           | 1000 |

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



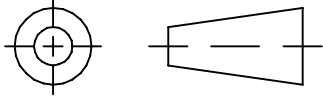
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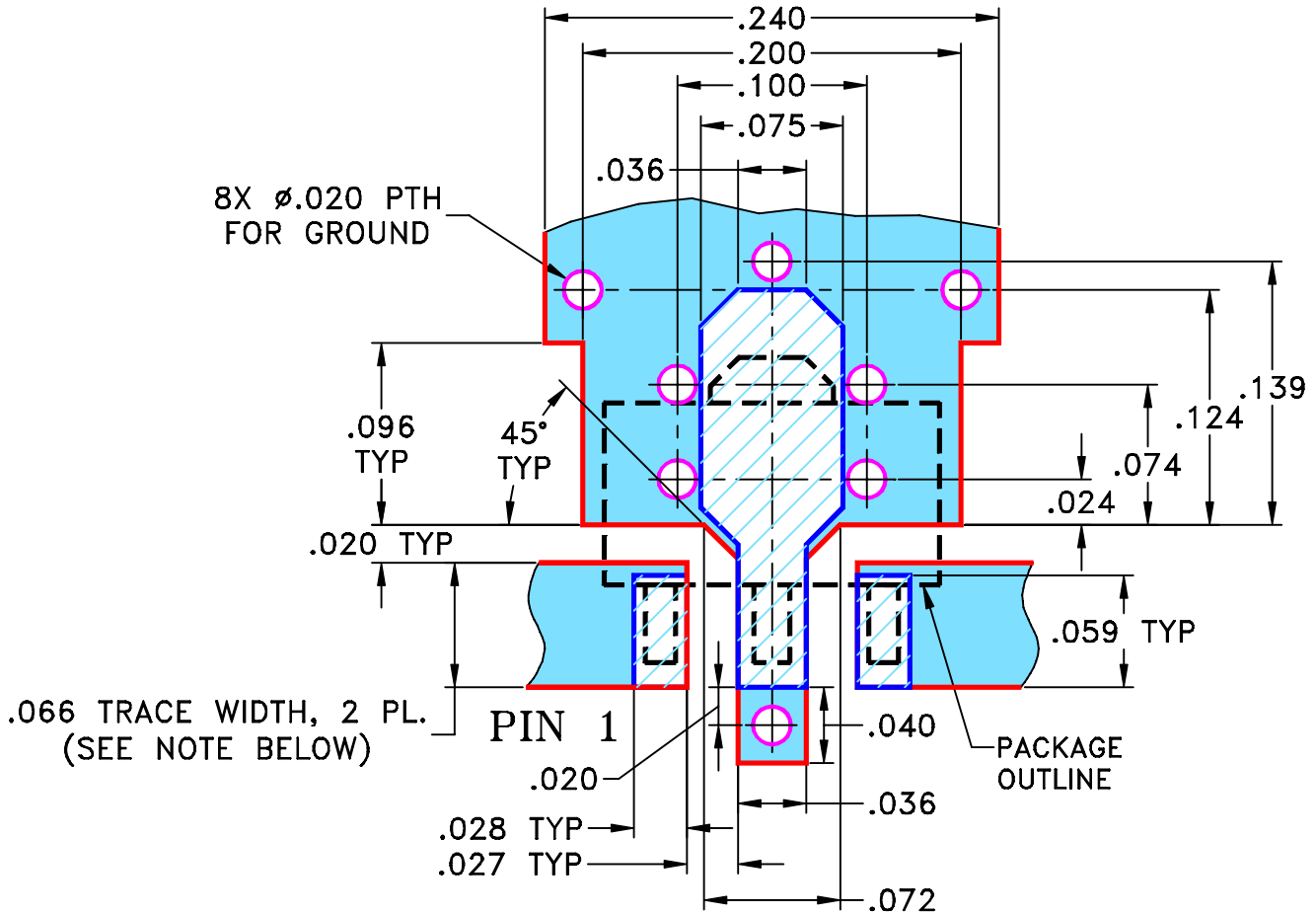
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION                             | DATE     | DR  | AUTH |
|-----|---------|---|----------|-----|------|
| OR  | M108433 | NEW RELEASE                             | 11/14/06 | PW  | IG   |
| A   | M124803 | "04AM03" WAS "mz", MODIFIED TB IN TITLE | 10/23/09 | MMG | DJ   |
|     |         |   |          |     |      |

**SUGGESTED MOUNTING CONFIGURATION  
FOR DF782 CASE STYLE, "04AM03" PIN CONNECTION**



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

| UNLESS OTHERWISE SPECIFIED | INITIALS    | DATE     |
|----------------------------|-------------|----------|
| DIMENSIONS ARE IN INCHES   | DRAWN PW    | 11/14/06 |
| TOLERANCES ON:             | CHECKED IL  | 11/14/06 |
| 2 PL DECIMALS ±            | APPROVED IG | 11/14/06 |
| 3 PL DECIMALS ± .005       |             |          |
| ANGLES ±                   |             |          |
| FRACTIONS ±                |             |          |



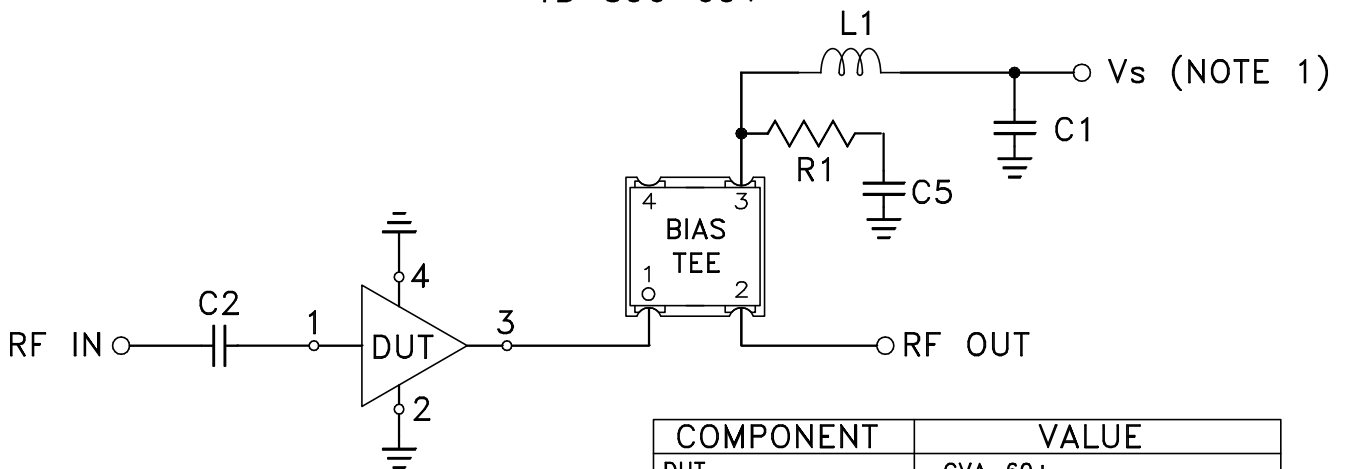
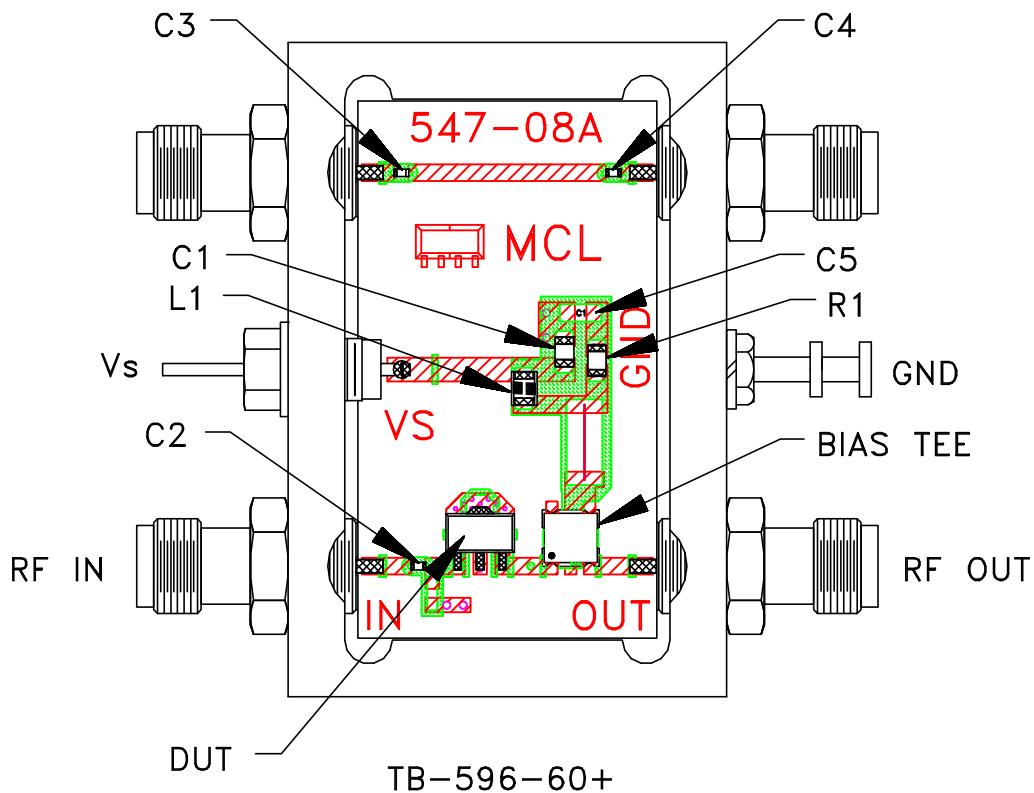
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Brooklyn NY 11235

PL, 04AM03, DF782, GVA, TB-410-XX+

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| SIZE  | CODE IDENT | DRAWING NO: | REV:          |
|-------|------------|-------------|---------------|
| A     | 15542      | 98-PL-255   | A             |
| FILE: | 98PL255    | SCALE: 10:1 | SHEET: 1 OF 1 |

# Evaluation Board and Circuit




| COMPONENT      | VALUE                  |
|----------------|------------------------|
| DUT            | GVA-60+                |
| C1,C5          | 0.1 uF(size 0805)      |
| C2-C4 (Note 4) | 0.001 uF(size 0402)    |
| R1             | 33.2 Ohm               |
| L1             | 43 nH                  |
| BIAS TEE       | Mini-Circuits TCBT-14+ |

## NOTES:

1. Vs voltage:  $+5 \pm 0.2V$ .
2. SMA Female connectors.
3. PCB material: Rogers R04350 or equivalent, dielectric constant=3.5, dielectric thickness=.020 inch.
4. Capacitor C2-C4 should be free of resonance up to the highest frequency specified.

## Schematic Diagram

 **Mini-Circuits®**

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| Specification                  | Test/Inspection Condition  | Reference/Spec  |
|--------------------------------|--|---|
| Operating Temperature          | -40° to 85°C or -45° to 85°C<br>Ambient Environment  | Individual Model Data Sheet                                     |
| Storage Temperature            | -55° to 100° C or -65° to 150°<br>Ambient Environment  | Individual Model Data Sheet                                     |
| Thermal Shock                  | -55° to 100°C, 100 cycles  | MIL-STD-202, Method 107, Condition A-3, except +100°C           |
| Mechanical Shock               | 1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only   | MIL-STD-883, Method 2002, Condition B, except Y1 direction only |
| Vibration (Variable Frequency) | 50g peak   | MIL-STD-883, Method 2007, Condition B                           |
| Autoclave                      | 15 psig, 100% RH, 121°C, 96 hours  | JESD22-A102, Condition C  |
| HAST                           | 130°C, 85% RH, 96 hours  | JESD22-A110   |
| Solderability                  | 10X Magnification  | J-STD-002, Para 4.2.5, Test S, 95% Coverage                     |
| Solder Reflow Heat             | Sn-Pb Eutetic Process: 240°C peak<br>Pb-Free Process: 260°C peak   | J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1                   |
| Moisture Sensitivity: Level 1  | Bake at 125°C for 24 hours<br>Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak                                 | J-STD-020   |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + | MIL-STD-202, Method 215   |



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| <b>Specification</b> | <b>Test/Inspection Condition</b> | <b>Reference/Spec</b> |
|----------------------|----------------------------------|-----------------------|
|                      | monoethanolamine at 63°C to 70°C |                       |