



Mini-Circuits

HIGH DIRECTIVITY

# Monolithic Amplifier

**MNA-2W+**

50Ω 0.5 to 4.5 GHz

## THE BIG DEAL

- Integrated matching, DC Blocks and bias circuits
- Excellent Active Directivity, +21 dB typ. at 2.5 GHz and 5V
- Choice of supply voltage, +2.8V to +5V
- Micro-miniature size .120"X.120"
- Output power, +17.5 dBm typ. at 2.5 GHz and 5V
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: DQ849

### +RoHS Compliant

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

## APPLICATIONS

- Buffer amplifier
- Cellular infrastructure
- Communications satellite
- Defense

## PRODUCT OVERVIEW

MNA-2W+ is a wideband PHEMT based MMIC amplifier with high active Directivity. MNA integrates the entire matching network and majority of the bias circuit inside the package, reducing the need for complicated external circuits. This approach makes the MNA amplifier extremely straightforward to use. This design operates on a single 2.8 to 5V supply, is well matched for 50Ω and comes in a tiny, low profile 3x3mm 8-lead MCLP package accommodating dense circuit board layouts. [MNA-2W+ belongs to MNA series of models available in Die and packaged form.](#)

## KEY FEATURES

| Feature                                                    | Advantages                                                                                                                                    |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Excellent Active Directivity (Isolation- Gain)<br>21-36 dB | Ideal for use as a buffer amplifier minimizing interaction of adjacent circuits                                                               |
| Integrates DC blocks and RF choke                          | Minimizes external components, component count and circuit area.                                                                              |
| Single +2.8 to +5V operation                               | Amplifier can be used at low voltage such as +3V or standard +5V.<br>+5V operation results in higher P1dB and OIP3.                           |
| 3 x 3mm 8-lead MCLP package                                | Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB. |





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## Monolithic Amplifier

MNA-2W+

ELECTRICAL SPECIFICATIONS<sup>1</sup> AT 25°C

| Parameter                                               | Condition (GHz) | Min. | Vs=5V<br>Typ.      | Max. | Vs=2.8V<br>Typ.    | Units |
|---------------------------------------------------------|-----------------|------|--------------------|------|--------------------|-------|
| Frequency Range                                         |                 | 0.5  |                    | 4.5  | 0.5-4.5            | GHz   |
| Gain                                                    | 0.5             | —    | 14.1               | —    | 12.4               | dB    |
|                                                         | 1.0             | —    | 15.0               | —    | 13.0               |       |
|                                                         | 2.0             | 13.5 | 15.0               | 16.5 | 12.6               |       |
|                                                         | 2.5             | —    | 14.7               | —    | 12.3               |       |
|                                                         | 3.5             | —    | 12.8               | —    | 10.6               |       |
|                                                         | 4.5             | 9.0  | 9.7                | 11.5 | 7.8                |       |
| Input Return Loss                                       | 0.5             |      | 8                  |      | 8                  | dB    |
|                                                         | 1.0             |      | 16                 |      | 17                 |       |
|                                                         | 2.0             |      | 19                 |      | 22                 |       |
|                                                         | 2.5             |      | 17                 |      | 19                 |       |
|                                                         | 3.5             |      | 14                 |      | 14                 |       |
|                                                         | 4.5             |      | 9                  |      | 9                  |       |
| Output Return Loss                                      | 0.5             |      | 14                 |      | 13                 | dB    |
|                                                         | 1.0             |      | 21                 |      | 18                 |       |
|                                                         | 2.0             |      | 15                 |      | 18                 |       |
|                                                         | 2.5             |      | 14                 |      | 17                 |       |
|                                                         | 3.5             |      | 15                 |      | 19                 |       |
|                                                         | 4.5             |      | 17                 |      | 17                 |       |
| Output Power at P1dB                                    | 0.5             |      | 19.2               |      | 10.3               | dBm   |
|                                                         | 1.0             |      | 19.1               |      | 11.4               |       |
|                                                         | 2.0             |      | 17.9               |      | 11.8               |       |
|                                                         | 2.5             |      | 17.5               |      | 11.8               |       |
|                                                         | 3.5             |      | 15.8               |      | 11.7               |       |
|                                                         | 4.5             |      | 13.9               |      | 11.4               |       |
| Output IP3                                              | 0.5             |      | 32                 |      | 22                 | dBm   |
|                                                         | 1.0             |      | 31                 |      | 23                 |       |
|                                                         | 2.0             |      | 29                 |      | 23                 |       |
|                                                         | 2.5             |      | 29                 |      | 23                 |       |
|                                                         | 3.5             |      | 27                 |      | 23                 |       |
|                                                         | 4.5             |      | 25                 |      | 22                 |       |
| Noise Figure (dB)                                       | 0.5             |      | 5.6                |      | 5.8                | dB    |
|                                                         | 1.0             |      | 5.3                |      | 5.4                |       |
|                                                         | 2.0             |      | 5.3                |      | 5.5                |       |
|                                                         | 2.5             |      | 5.4                |      | 5.6                |       |
|                                                         | 3.5             |      | 5.6                |      | 5.7                |       |
|                                                         | 4.5             |      | 6.3                |      | 6.5                |       |
| Active Directivity<br>(Isolation-Gain)                  | 0.5             |      | 33                 |      | 36                 | dB    |
|                                                         | 1.0             |      | 29                 |      | 28                 |       |
|                                                         | 2.0             |      | 22                 |      | 22                 |       |
|                                                         | 2.5             |      | 21                 |      | 21                 |       |
|                                                         | 3.5             |      | 21                 |      | 21                 |       |
|                                                         | 4.5             |      | 24                 |      | 23                 |       |
| DC Current                                              |                 |      | 84                 | 104  | 79                 | mA    |
| Device Current Variation vs. Temperature <sup>(2)</sup> |                 |      | 32                 |      | 15                 | μA/°C |
| Device Current Variation vs Voltage                     |                 |      | 0.001 <sup>3</sup> |      | 0.003 <sup>4</sup> | mA/mV |
| Thermal resistance at 85°C (Junction to Lead)           |                 |      | 54                 |      | 54                 | °C/W  |

(1) Measured on Mini-Circuits Characterization test board TB-186+. See Characterization Test Circuit (Fig. 1)

(2) (Current at 85°C - Current at -45°C)/130

(3) (Current at 5.25V - Current at 3.9V)/1.35

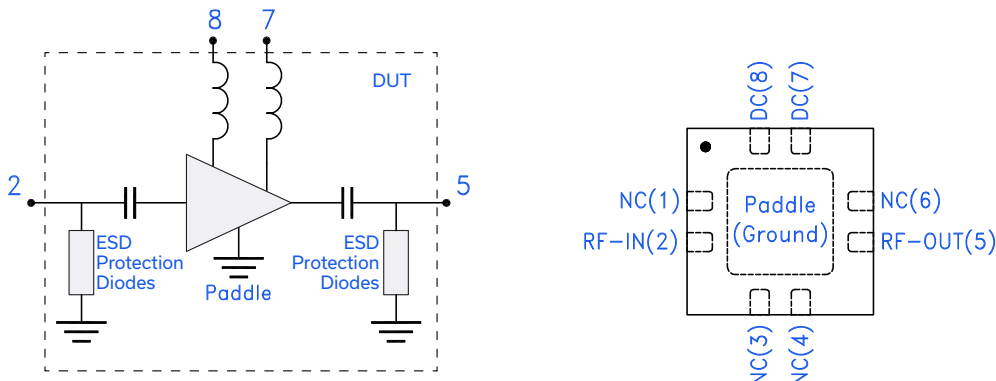
(4) (Current at 3.9V - Current at 2.66V)/1.24

MAXIMUM RATINGS<sup>5</sup>

| Parameter             | Ratings                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------|
| Operating Temperature | -40°C to 85°C                                                                               |
| Storage Temperature   | -55°C to 100°C                                                                              |
| DC Voltage            | 7 V at pin 7 (on TB-186+)<br>1V at pins 2 & 5                                               |
| Power Dissipation     | 800 mW                                                                                      |
| Input Power           | +11 dBm at Vs=+2.8V and<br>+16 dBm at +5V (continuous operation)<br>+23 dBm (5 minutes max) |

5. Permanent damage may occur if any of these limits are exceeded.  
These ratings are not intended for continuous normal operation.

## SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



| Function | Pad Number | Description (See Fig 1)                                                                          |
|----------|------------|--------------------------------------------------------------------------------------------------|
| RF-IN    | 2          | RF input pin                                                                                     |
| RF-OUT   | 5          | RF output pin                                                                                    |
| DC       | 7,8        | DC Bias pads 7,8. Pad 7 connected to ground via 1000 pF. Pad 8 connected to pad 7 via 33.2 ohms. |
| NC       | 1,3,4,6    | Not Connected, connect pad 3 and 4 to ground externally                                          |
| GND      | Paddle     | Ground                                                                                           |
| OPTIONAL | 1,6        | No internal connection; recommended use: per PCB Layout PL-078                                   |



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MNA-2W+

## CHARACTERIZATION & APPLICATION TEST CIRCUIT

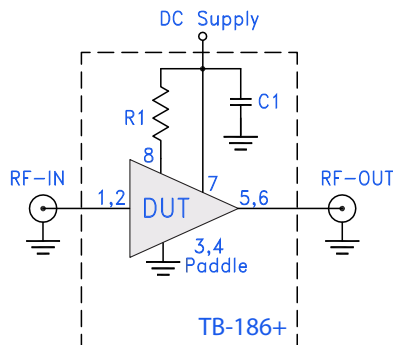


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-186+)

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: Pin = -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.

| Component | Size | Value | Units    |
|-----------|------|-------|----------|
| R1        | 0805 | 33.2  | $\Omega$ |
| C1        | 0402 | 1000  | pF       |

## RECOMMENDED APPLICATION CIRCUIT

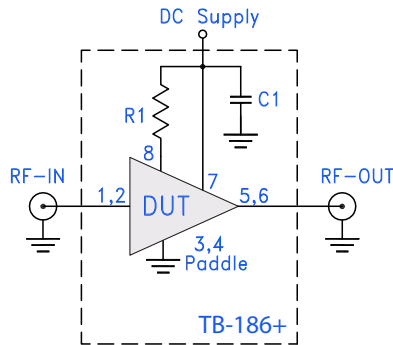
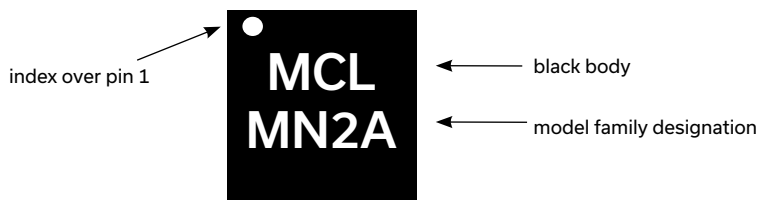


Fig 2. Test Board includes case, connectors, and components soldered to PCB

| Component | Size | Value | Units    |
|-----------|------|-------|----------|
| R1        | 0805 | 33.2  | $\Omega$ |
| C1        | 0402 | 1000  | pF       |

## PRODUCT MARKING



Marking may contain other features or characters for internal lot control





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MNA-2W+

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS [CLICK HERE](#)

|                                                      |                                                                                 |
|------------------------------------------------------|---------------------------------------------------------------------------------|
| Performance Data                                     | Data Table<br>Swept Graphs<br>S-Parameter (S2P Files) Data Set (.zip file)      |
| Case Style                                           | DQ849 3x3x0.9 mm MCLP Plastic package, exposed paddle<br>lead finish: Matte-Tin |
| Tape & Reel<br>Standard quantities available on reel | F104<br>7" reels with 10, 20, 50, 100, 200, 500, 1000 or 2000 devices           |
| Suggested Layout for PCB Design                      | PL-078                                                                          |
| Evaluation Board                                     | TB-186-2W+                                                                      |
| Environmental Ratings                                | ENV08T1                                                                         |

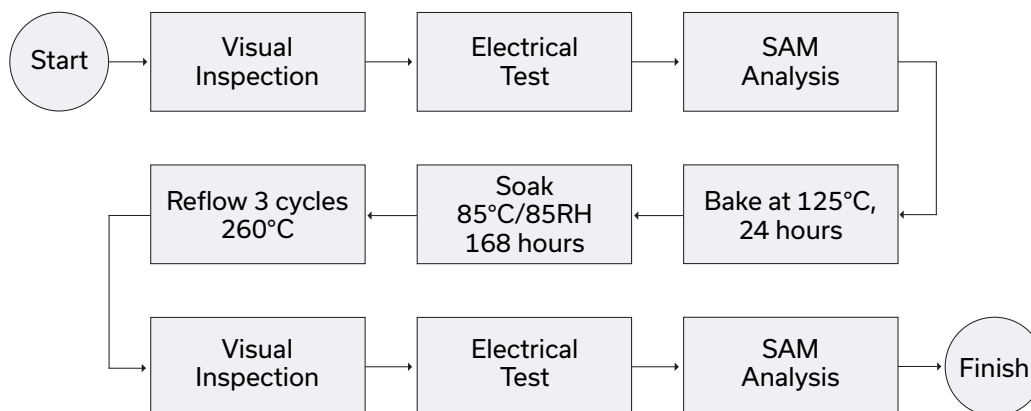
## ESD RATING

Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

## MSL RATING

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

## MSL TEST FLOW CHART



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



## 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 = 3.9V, Id = 84.29 mA @ Temperature = +25degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 200   | 5.33  | 45.80     | 1.06                    | 2.71                     | 4.75      | 0.84    | 21.82          | 10.32                  | 8.59            |
| 300   | 11.15 | 43.00     | 3.26                    | 6.42                     | 7.67      | 1.15    | 26.88          | 15.65                  | 6.87            |
| 400   | 13.09 | 45.69     | 5.85                    | 10.44                    | 14.24     | 1.15    | 28.25          | 17.36                  | 6.47            |
| 500   | 13.83 | 48.10     | 8.26                    | 14.37                    | 21.13     | 1.11    | 28.85          | 17.84                  | 6.48            |
| 600   | 14.19 | 49.15     | 10.40                   | 18.18                    | 25.02     | 1.08    | 28.80          | 18.07                  | 6.17            |
| 700   | 14.42 | 47.93     | 12.34                   | 22.70                    | 22.17     | 1.05    | 28.98          | 18.19                  | 6.09            |
| 800   | 14.53 | 46.27     | 14.15                   | 26.60                    | 18.53     | 1.04    | 29.06          | 18.11                  | 5.93            |
| 900   | 14.63 | 44.68     | 15.86                   | 32.71                    | 15.50     | 1.02    | 29.13          | 18.35                  | 5.90            |
| 1000  | 14.69 | 42.95     | 17.54                   | 35.13                    | 12.73     | 1.02    | 28.80          | 18.18                  | 5.86            |
| 1100  | 14.73 | 42.19     | 19.17                   | 32.35                    | 11.68     | 1.01    | 29.12          | 18.28                  | 5.81            |
| 1200  | 14.75 | 41.19     | 20.74                   | 28.92                    | 10.41     | 1.01    | 29.15          | 18.21                  | 5.78            |
| 1300  | 14.77 | 40.29     | 22.00                   | 26.42                    | 9.38      | 1.00    | 28.95          | 18.25                  | 5.75            |
| 1400  | 14.78 | 39.36     | 22.83                   | 24.32                    | 8.42      | 1.00    | 28.87          | 18.18                  | 5.69            |
| 1500  | 14.77 | 38.90     | 23.27                   | 22.78                    | 7.99      | 1.00    | 28.84          | 18.09                  | 5.64            |
| 1600  | 14.78 | 38.31     | 23.05                   | 21.54                    | 7.44      | 0.99    | 28.71          | 18.11                  | 5.68            |
| 1700  | 14.75 | 37.60     | 22.23                   | 20.66                    | 6.87      | 0.99    | 28.71          | 18.15                  | 5.58            |
| 1800  | 14.70 | 37.03     | 21.42                   | 19.92                    | 6.46      | 0.99    | 28.51          | 18.08                  | 5.61            |
| 1900  | 14.67 | 36.55     | 20.66                   | 19.27                    | 6.12      | 0.99    | 28.51          | 18.19                  | 5.55            |
| 2000  | 14.60 | 36.26     | 19.70                   | 18.68                    | 5.93      | 0.99    | 28.58          | 18.10                  | 5.53            |
| 2100  | 14.55 | 36.03     | 19.07                   | 18.29                    | 5.80      | 0.99    | 28.41          | 17.99                  | 5.51            |
| 2200  | 14.50 | 35.65     | 18.43                   | 17.53                    | 5.56      | 0.99    | 28.43          | 17.97                  | 5.49            |
| 2300  | 14.40 | 35.17     | 17.78                   | 17.56                    | 5.31      | 0.99    | 28.28          | 17.87                  | 5.49            |
| 2400  | 14.31 | 35.08     | 17.33                   | 17.48                    | 5.30      | 0.99    | 28.15          | 17.95                  | 5.45            |
| 2500  | 14.21 | 34.73     | 16.86                   | 17.29                    | 5.13      | 1.00    | 28.04          | 17.88                  | 5.47            |
| 2600  | 14.09 | 35.08     | 16.68                   | 17.63                    | 5.42      | 1.00    | 28.09          | 17.76                  | 5.47            |
| 2700  | 13.94 | 34.19     | 15.96                   | 17.80                    | 4.97      | 1.00    | 27.93          | 17.73                  | 5.46            |
| 2800  | 13.83 | 34.44     | 15.99                   | 17.93                    | 5.18      | 1.00    | 27.75          | 17.61                  | 5.48            |
| 2900  | 13.64 | 33.99     | 15.43                   | 18.48                    | 5.03      | 1.01    | 27.59          | 17.42                  | 5.48            |
| 3000  | 13.53 | 33.43     | 15.05                   | 18.39                    | 4.77      | 1.01    | 27.67          | 17.25                  | 5.43            |
| 3100  | 13.34 | 33.47     | 14.84                   | 19.07                    | 4.90      | 1.01    | 27.60          | 17.25                  | 5.50            |
| 3200  | 13.07 | 34.06     | 14.30                   | 20.55                    | 5.39      | 1.02    | 27.08          | 17.15                  | 5.51            |
| 3300  | 12.97 | 32.89     | 14.12                   | 20.25                    | 4.77      | 1.02    | 26.78          | 16.85                  | 5.55            |
| 3400  | 12.77 | 32.96     | 13.91                   | 21.34                    | 4.92      | 1.02    | 26.87          | 16.88                  | 5.57            |
| 3500  | 12.53 | 32.92     | 13.40                   | 22.91                    | 5.02      | 1.03    | 26.77          | 16.67                  | 5.60            |
| 3600  | 12.28 | 33.17     | 13.21                   | 23.73                    | 5.31      | 1.03    | 26.48          | 16.60                  | 5.62            |
| 3700  | 11.98 | 32.51     | 13.21                   | 25.64                    | 5.10      | 1.03    | 26.26          | 16.28                  | 5.73            |
| 3800  | 11.78 | 33.08     | 12.32                   | 27.45                    | 5.51      | 1.05    | 26.14          | 16.27                  | 5.76            |
| 3900  | 11.53 | 32.58     | 12.06                   | 27.82                    | 5.33      | 1.05    | 25.95          | 16.21                  | 5.80            |
| 4000  | 11.19 | 33.45     | 11.34                   | 30.06                    | 6.05      | 1.07    | 25.89          | 15.80                  | 5.85            |
| 4100  | 10.91 | 33.28     | 10.79                   | 27.83                    | 6.06      | 1.08    | 25.75          | 15.74                  | 5.95            |
| 4200  | 10.62 | 33.01     | 10.25                   | 25.62                    | 5.99      | 1.08    | 25.50          | 15.43                  | 5.99            |
| 4300  | 10.25 | 32.19     | 9.69                    | 22.63                    | 5.59      | 1.09    | 25.45          | 15.24                  | 6.13            |
| 4400  | 10.09 | 33.37     | 9.28                    | 22.49                    | 6.44      | 1.11    | 25.19          | 15.10                  | 6.19            |
| 4500  | 9.82  | 32.25     | 9.06                    | 19.91                    | 5.78      | 1.11    | 25.01          | 14.87                  | 6.25            |
| 4600  | 9.48  | 32.65     | 8.44                    | 19.11                    | 6.14      | 1.12    | 24.86          | 14.79                  | 6.38            |
| 4700  | 9.15  | 31.89     | 8.23                    | 17.54                    | 5.78      | 1.12    | 24.55          | 14.54                  | 6.49            |
| 4800  | 8.86  | 31.95     | 7.93                    | 16.72                    | 5.93      | 1.13    | 24.52          | 14.32                  | 6.55            |
| 4900  | 8.45  | 31.34     | 7.18                    | 16.17                    | 5.58      | 1.15    | 24.16          | 14.11                  | 6.74            |
| 5000  | 8.22  | 33.02     | 7.14                    | 15.78                    | 6.92      | 1.15    | 24.07          | 13.82                  | 6.78            |
| 5100  | 7.82  | 32.70     | 6.96                    | 15.17                    | 6.89      | 1.15    | 23.80          | 13.55                  | 6.89            |
| 5200  | 7.35  | 31.84     | 6.71                    | 14.68                    | 6.48      | 1.16    | 23.50          | 13.34                  | 7.05            |
| 5300  | 6.66  | 31.66     | 6.48                    | 14.56                    | 6.76      | 1.17    | 23.06          | 12.91                  | 7.32            |
| 5400  | 6.18  | 32.61     | 6.06                    | 15.55                    | 7.77      | 1.20    | 22.79          | 12.23                  | 7.44            |
| 5500  | 5.60  | 31.93     | 5.96                    | 15.56                    | 7.62      | 1.21    | 22.27          | 12.14                  | 7.70            |

## 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 = 2.8V, Id = 80.69 mA @ Temperature = +25degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 200   | 4.69  | 45.98     | 1.16                    | 2.82                     | 5.90      | 0.85    | 13.72          | 4.67                   | 8.80            |
| 300   | 10.25 | 44.33     | 3.39                    | 6.55                     | 10.38     | 1.15    | 19.88          | 9.22                   | 7.04            |
| 400   | 12.03 | 47.50     | 6.02                    | 10.20                    | 20.01     | 1.13    | 22.28          | 11.13                  | 6.60            |
| 500   | 12.67 | 48.98     | 8.45                    | 13.18                    | 26.62     | 1.09    | 23.22          | 11.86                  | 6.55            |
| 600   | 12.97 | 49.14     | 10.61                   | 15.29                    | 28.46     | 1.06    | 23.44          | 12.30                  | 6.23            |
| 700   | 13.15 | 46.66     | 12.59                   | 16.80                    | 21.88     | 1.03    | 23.81          | 12.50                  | 6.20            |
| 800   | 13.23 | 44.77     | 14.44                   | 17.47                    | 17.86     | 1.02    | 23.92          | 12.57                  | 5.98            |
| 900   | 13.30 | 43.20     | 16.22                   | 18.00                    | 15.02     | 1.01    | 24.16          | 12.90                  | 6.03            |
| 1000  | 13.34 | 41.92     | 18.03                   | 18.07                    | 13.02     | 1.00    | 23.99          | 12.85                  | 5.92            |
| 1100  | 13.36 | 40.61     | 19.90                   | 18.14                    | 11.24     | 0.99    | 24.32          | 12.93                  | 5.89            |
| 1200  | 13.36 | 39.88     | 21.83                   | 18.17                    | 10.37     | 0.99    | 24.34          | 12.87                  | 5.87            |
| 1300  | 13.36 | 38.96     | 23.75                   | 18.13                    | 9.35      | 0.99    | 24.28          | 12.98                  | 5.81            |
| 1400  | 13.35 | 38.33     | 25.44                   | 17.96                    | 8.73      | 0.98    | 24.20          | 12.98                  | 5.78            |
| 1500  | 13.33 | 37.83     | 26.77                   | 17.92                    | 8.26      | 0.98    | 24.26          | 12.97                  | 5.72            |
| 1600  | 13.32 | 37.08     | 26.97                   | 17.67                    | 7.58      | 0.98    | 24.19          | 12.99                  | 5.75            |
| 1700  | 13.28 | 36.53     | 26.05                   | 17.64                    | 7.15      | 0.98    | 24.25          | 13.08                  | 5.67            |
| 1800  | 13.22 | 36.16     | 24.96                   | 17.65                    | 6.89      | 0.98    | 24.19          | 13.04                  | 5.65            |
| 1900  | 13.18 | 35.65     | 23.83                   | 17.70                    | 6.54      | 0.98    | 24.27          | 13.23                  | 5.61            |
| 2000  | 13.11 | 35.35     | 22.55                   | 17.80                    | 6.36      | 0.98    | 24.30          | 13.09                  | 5.61            |
| 2100  | 13.04 | 34.80     | 21.61                   | 17.86                    | 6.01      | 0.99    | 24.22          | 13.15                  | 5.54            |
| 2200  | 12.98 | 34.79     | 20.75                   | 17.73                    | 6.03      | 0.99    | 24.15          | 13.07                  | 5.59            |
| 2300  | 12.88 | 34.06     | 19.90                   | 18.21                    | 5.61      | 0.99    | 24.15          | 13.14                  | 5.56            |
| 2400  | 12.79 | 33.92     | 19.33                   | 18.55                    | 5.58      | 0.99    | 24.16          | 13.25                  | 5.55            |
| 2500  | 12.69 | 33.79     | 18.65                   | 18.67                    | 5.56      | 0.99    | 24.14          | 13.28                  | 5.55            |
| 2600  | 12.56 | 33.94     | 18.31                   | 19.28                    | 5.73      | 1.00    | 24.18          | 13.28                  | 5.54            |
| 2700  | 12.42 | 33.04     | 17.42                   | 20.27                    | 5.26      | 1.00    | 24.08          | 13.23                  | 5.57            |
| 2800  | 12.30 | 33.32     | 17.23                   | 20.41                    | 5.50      | 1.00    | 24.01          | 13.22                  | 5.60            |
| 2900  | 12.11 | 32.92     | 16.53                   | 22.02                    | 5.37      | 1.01    | 23.85          | 13.15                  | 5.55            |
| 3000  | 11.99 | 32.26     | 16.00                   | 22.47                    | 5.04      | 1.01    | 23.94          | 13.24                  | 5.55            |
| 3100  | 11.81 | 32.35     | 15.57                   | 23.20                    | 5.19      | 1.02    | 23.89          | 13.25                  | 5.61            |
| 3200  | 11.55 | 32.64     | 14.84                   | 24.50                    | 5.49      | 1.02    | 23.44          | 13.26                  | 5.57            |
| 3300  | 11.44 | 31.79     | 14.56                   | 24.92                    | 5.04      | 1.02    | 23.26          | 12.99                  | 5.65            |
| 3400  | 11.24 | 31.88     | 14.18                   | 25.91                    | 5.21      | 1.03    | 23.42          | 13.06                  | 5.70            |
| 3500  | 11.00 | 31.71     | 13.59                   | 25.81                    | 5.21      | 1.03    | 23.37          | 13.08                  | 5.70            |
| 3600  | 10.75 | 32.11     | 13.26                   | 26.08                    | 5.59      | 1.04    | 23.14          | 13.19                  | 5.79            |
| 3700  | 10.46 | 31.35     | 13.08                   | 22.81                    | 5.27      | 1.04    | 23.05          | 12.89                  | 5.83            |
| 3800  | 10.26 | 31.92     | 12.22                   | 23.75                    | 5.69      | 1.05    | 22.96          | 13.02                  | 5.90            |
| 3900  | 10.02 | 31.51     | 11.90                   | 21.96                    | 5.54      | 1.05    | 22.87          | 12.99                  | 5.95            |
| 4000  | 9.69  | 32.18     | 11.17                   | 21.55                    | 6.12      | 1.07    | 22.94          | 12.72                  | 6.01            |
| 4100  | 9.42  | 31.89     | 10.61                   | 20.12                    | 6.03      | 1.07    | 22.82          | 12.69                  | 6.04            |
| 4200  | 9.15  | 31.52     | 10.08                   | 18.90                    | 5.87      | 1.08    | 22.68          | 12.56                  | 6.13            |
| 4300  | 8.80  | 30.86     | 9.56                    | 17.26                    | 5.56      | 1.09    | 22.69          | 12.49                  | 6.24            |
| 4400  | 8.63  | 31.84     | 9.14                    | 17.19                    | 6.26      | 1.10    | 22.51          | 12.43                  | 6.32            |
| 4500  | 8.38  | 30.93     | 8.91                    | 16.00                    | 5.73      | 1.10    | 22.41          | 12.38                  | 6.41            |
| 4600  | 8.06  | 31.18     | 8.34                    | 15.34                    | 5.97      | 1.11    | 22.27          | 12.18                  | 6.53            |
| 4700  | 7.74  | 30.61     | 8.13                    | 14.48                    | 5.72      | 1.11    | 21.99          | 12.20                  | 6.66            |
| 4800  | 7.48  | 30.62     | 7.84                    | 14.03                    | 5.83      | 1.11    | 22.00          | 12.03                  | 6.70            |
| 4900  | 7.08  | 30.17     | 7.16                    | 13.47                    | 5.59      | 1.13    | 21.69          | 11.83                  | 6.87            |
| 5000  | 6.88  | 31.54     | 7.10                    | 13.43                    | 6.66      | 1.13    | 21.65          | 11.69                  | 6.93            |
| 5100  | 6.50  | 31.24     | 6.93                    | 13.10                    | 6.64      | 1.13    | 21.42          | 11.55                  | 7.10            |
| 5200  | 6.08  | 30.55     | 6.70                    | 12.83                    | 6.34      | 1.14    | 21.17          | 11.30                  | 7.22            |
| 5300  | 5.45  | 30.57     | 6.51                    | 12.74                    | 6.75      | 1.15    | 20.73          | 10.95                  | 7.44            |
| 5400  | 5.00  | 31.44     | 6.09                    | 13.59                    | 7.70      | 1.18    | 20.53          | 10.34                  | 7.56            |
| 5500  | 4.42  | 30.60     | 6.01                    | 13.88                    | 7.44      | 1.19    | 19.90          | 10.37                  | 7.85            |

## 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 = 85.62 mA @ Temperature = +25degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 200   | 5.55  | 45.24     | 1.02              | 2.63               | 4.07      | 0.83    | 23.85       | 11.68            | 8.48         |
| 300   | 11.53 | 42.16     | 3.21              | 6.26               | 6.46      | 1.15    | 29.96       | 17.81            | 6.77         |
| 400   | 13.58 | 44.78     | 5.78              | 10.29              | 11.96     | 1.15    | 31.52       | 20.04            | 6.41         |
| 500   | 14.38 | 46.98     | 8.16              | 14.22              | 17.31     | 1.11    | 32.10       | 20.48            | 6.40         |
| 600   | 14.79 | 49.74     | 10.28             | 17.83              | 24.91     | 1.08    | 32.06       | 20.64            | 6.10         |
| 700   | 15.04 | 49.08     | 12.22             | 21.46              | 23.50     | 1.05    | 32.40       | 20.69            | 6.04         |
| 800   | 15.17 | 47.29     | 14.02             | 23.20              | 19.31     | 1.03    | 32.20       | 20.61            | 5.89         |
| 900   | 15.29 | 46.05     | 15.69             | 23.54              | 16.74     | 1.02    | 32.16       | 20.65            | 5.89         |
| 1000  | 15.37 | 44.15     | 17.28             | 23.32              | 13.45     | 1.01    | 31.97       | 20.46            | 5.81         |
| 1100  | 15.42 | 42.94     | 18.83             | 22.34              | 11.68     | 1.00    | 31.91       | 20.50            | 5.75         |
| 1200  | 15.47 | 42.30     | 20.16             | 21.21              | 10.82     | 1.00    | 31.98       | 20.44            | 5.73         |
| 1300  | 15.50 | 41.30     | 21.18             | 20.16              | 9.62      | 0.99    | 31.88       | 20.39            | 5.69         |
| 1400  | 15.52 | 40.37     | 21.66             | 19.24              | 8.60      | 0.99    | 31.62       | 20.18            | 5.63         |
| 1500  | 15.53 | 40.38     | 21.83             | 18.29              | 8.58      | 0.99    | 31.53       | 20.13            | 5.60         |
| 1600  | 15.55 | 39.39     | 21.57             | 17.59              | 7.62      | 0.99    | 31.43       | 20.12            | 5.64         |
| 1700  | 15.52 | 38.53     | 20.75             | 16.96              | 6.90      | 0.98    | 31.09       | 19.86            | 5.52         |
| 1800  | 15.49 | 38.29     | 20.02             | 16.37              | 6.70      | 0.98    | 31.04       | 19.77            | 5.55         |
| 1900  | 15.46 | 37.79     | 19.36             | 15.81              | 6.32      | 0.98    | 30.76       | 19.74            | 5.47         |
| 2000  | 15.41 | 37.03     | 18.50             | 15.29              | 5.80      | 0.98    | 30.81       | 19.59            | 5.44         |
| 2100  | 15.36 | 36.93     | 17.95             | 14.96              | 5.73      | 0.98    | 30.59       | 19.49            | 5.42         |
| 2200  | 15.32 | 36.77     | 17.39             | 14.33              | 5.61      | 0.98    | 30.68       | 19.49            | 5.43         |
| 2300  | 15.22 | 36.28     | 16.85             | 14.24              | 5.34      | 0.98    | 30.39       | 19.23            | 5.42         |
| 2400  | 15.14 | 35.97     | 16.50             | 14.08              | 5.20      | 0.98    | 30.26       | 19.35            | 5.43         |
| 2500  | 15.05 | 35.93     | 16.15             | 13.94              | 5.21      | 0.98    | 29.93       | 19.07            | 5.40         |
| 2600  | 14.93 | 36.41     | 16.02             | 14.11              | 5.58      | 0.98    | 29.85       | 18.99            | 5.40         |
| 2700  | 14.79 | 35.20     | 15.42             | 14.07              | 4.93      | 0.98    | 29.86       | 18.99            | 5.40         |
| 2800  | 14.68 | 35.47     | 15.56             | 14.17              | 5.16      | 0.98    | 29.65       | 18.81            | 5.44         |
| 2900  | 14.48 | 35.27     | 15.10             | 14.37              | 5.15      | 0.99    | 29.42       | 18.63            | 5.40         |
| 3000  | 14.37 | 34.57     | 14.81             | 14.26              | 4.81      | 0.98    | 29.37       | 18.42            | 5.38         |
| 3100  | 14.18 | 34.49     | 14.72             | 14.74              | 4.89      | 0.99    | 29.31       | 18.38            | 5.45         |
| 3200  | 13.90 | 35.24     | 14.25             | 15.63              | 5.51      | 1.00    | 28.84       | 18.22            | 5.41         |
| 3300  | 13.82 | 33.97     | 14.10             | 15.37              | 4.82      | 1.00    | 28.50       | 17.98            | 5.46         |
| 3400  | 13.61 | 34.01     | 13.96             | 15.98              | 4.97      | 1.00    | 28.66       | 17.90            | 5.49         |
| 3500  | 13.36 | 34.01     | 13.43             | 16.88              | 5.11      | 1.01    | 28.33       | 17.72            | 5.50         |
| 3600  | 13.10 | 34.25     | 13.32             | 17.39              | 5.41      | 1.02    | 28.10       | 17.61            | 5.55         |
| 3700  | 12.80 | 33.21     | 13.31             | 19.02              | 5.01      | 1.02    | 28.00       | 17.31            | 5.63         |
| 3800  | 12.58 | 34.24     | 12.39             | 19.41              | 5.71      | 1.03    | 27.89       | 17.28            | 5.71         |
| 3900  | 12.33 | 33.70     | 12.08             | 20.35              | 5.51      | 1.04    | 27.56       | 17.17            | 5.74         |
| 4000  | 11.97 | 34.62     | 11.38             | 21.76              | 6.31      | 1.06    | 27.63       | 16.74            | 5.81         |
| 4100  | 11.66 | 34.68     | 10.77             | 22.64              | 6.51      | 1.07    | 27.40       | 16.64            | 5.86         |
| 4200  | 11.35 | 34.14     | 10.21             | 23.35              | 6.26      | 1.08    | 27.11       | 16.32            | 5.93         |
| 4300  | 10.97 | 33.51     | 9.59              | 23.68              | 6.00      | 1.10    | 27.10       | 16.13            | 6.03         |
| 4400  | 10.80 | 34.73     | 9.17              | 23.44              | 6.93      | 1.11    | 26.65       | 15.93            | 6.09         |
| 4500  | 10.50 | 33.43     | 8.93              | 21.17              | 6.12      | 1.11    | 26.58       | 15.79            | 6.19         |
| 4600  | 10.14 | 33.91     | 8.29              | 21.11              | 6.58      | 1.13    | 26.49       | 15.56            | 6.29         |
| 4700  | 9.78  | 33.14     | 8.05              | 19.28              | 6.20      | 1.13    | 26.20       | 15.37            | 6.41         |
| 4800  | 9.48  | 32.97     | 7.75              | 18.28              | 6.21      | 1.14    | 26.05       | 15.13            | 6.46         |
| 4900  | 9.04  | 32.51     | 6.97              | 18.18              | 5.95      | 1.17    | 25.67       | 14.93            | 6.64         |
| 5000  | 8.77  | 34.43     | 6.95              | 17.13              | 7.60      | 1.17    | 25.45       | 14.65            | 6.73         |
| 5100  | 8.35  | 34.14     | 6.76              | 16.37              | 7.61      | 1.17    | 25.21       | 14.36            | 6.79         |
| 5200  | 7.83  | 33.08     | 6.48              | 15.79              | 7.00      | 1.18    | 24.92       | 14.14            | 6.96         |
| 5300  | 7.10  | 32.47     | 6.24              | 15.70              | 6.99      | 1.19    | 24.39       | 13.74            | 7.21         |
| 5400  | 6.58  | 33.81     | 5.85              | 16.51              | 8.41      | 1.22    | 23.97       | 13.09            | 7.35         |
| 5500  | 5.99  | 32.98     | 5.75              | 15.78              | 8.08      | 1.23    | 23.78       | 12.99            | 7.62         |

## 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 = 3.9V, Id = 81.32 mA @ Temperature = -45degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 200   | 5.69  | 45.18     | 0.90              | 2.64               | 3.51      | 0.84    | 22.54       | 10.58            | 7.72         |
| 300   | 11.76 | 42.53     | 3.10              | 6.36               | 6.46      | 1.16    | 27.82       | 16.11            | 5.94         |
| 400   | 13.71 | 44.60     | 5.67              | 10.22              | 11.42     | 1.16    | 29.06       | 17.82            | 5.60         |
| 500   | 14.48 | 48.12     | 7.94              | 14.14              | 19.34     | 1.12    | 29.63       | 18.21            | 6.28         |
| 600   | 14.87 | 50.90     | 10.07             | 18.05              | 28.07     | 1.08    | 29.52       | 18.37            | 5.32         |
| 700   | 15.13 | 48.46     | 11.98             | 22.14              | 21.62     | 1.06    | 29.68       | 18.41            | 4.92         |
| 800   | 15.26 | 47.05     | 13.79             | 24.57              | 18.57     | 1.04    | 29.73       | 18.46            | 5.08         |
| 900   | 15.36 | 45.86     | 15.50             | 25.42              | 16.26     | 1.02    | 29.95       | 18.65            | 5.02         |
| 1000  | 15.45 | 44.19     | 17.13             | 25.40              | 13.40     | 1.01    | 29.67       | 18.47            | 5.00         |
| 1100  | 15.50 | 43.05     | 18.67             | 24.40              | 11.74     | 1.01    | 29.97       | 18.57            | 4.96         |
| 1200  | 15.55 | 42.16     | 19.81             | 23.83              | 10.57     | 1.00    | 29.81       | 18.49            | 4.91         |
| 1300  | 15.58 | 41.42     | 20.75             | 22.84              | 9.69      | 1.00    | 29.73       | 18.52            | 4.89         |
| 1400  | 15.60 | 40.27     | 21.65             | 21.50              | 8.47      | 1.00    | 29.54       | 18.45            | 4.82         |
| 1500  | 15.60 | 39.75     | 22.09             | 20.19              | 7.97      | 0.99    | 29.63       | 18.43            | 4.78         |
| 1600  | 15.63 | 38.83     | 21.58             | 19.24              | 7.12      | 0.99    | 29.47       | 18.44            | 4.83         |
| 1700  | 15.60 | 38.13     | 20.91             | 18.30              | 6.57      | 0.99    | 29.48       | 18.45            | 4.71         |
| 1800  | 15.56 | 37.89     | 20.50             | 17.54              | 6.39      | 0.99    | 29.35       | 18.43            | 4.73         |
| 1900  | 15.54 | 37.31     | 19.83             | 16.94              | 5.97      | 0.98    | 29.42       | 18.60            | 4.68         |
| 2000  | 15.49 | 36.87     | 18.87             | 16.43              | 5.68      | 0.98    | 29.47       | 18.50            | 4.64         |
| 2100  | 15.45 | 36.58     | 18.35             | 16.10              | 5.50      | 0.98    | 29.20       | 18.43            | 4.62         |
| 2200  | 15.42 | 36.50     | 18.04             | 15.55              | 5.45      | 0.98    | 29.08       | 18.36            | 4.59         |
| 2300  | 15.33 | 35.70     | 17.54             | 15.26              | 5.01      | 0.98    | 29.01       | 18.38            | 4.60         |
| 2400  | 15.24 | 35.72     | 17.05             | 14.97              | 5.05      | 0.98    | 28.92       | 18.43            | 4.57         |
| 2500  | 15.16 | 35.46     | 16.53             | 14.56              | 4.92      | 0.98    | 28.88       | 18.36            | 4.56         |
| 2600  | 15.04 | 35.66     | 16.33             | 14.73              | 5.10      | 0.98    | 28.88       | 18.28            | 4.57         |
| 2700  | 14.90 | 34.70     | 15.66             | 14.73              | 4.63      | 0.98    | 28.77       | 18.30            | 4.56         |
| 2800  | 14.82 | 35.22     | 15.88             | 14.76              | 4.97      | 0.98    | 28.59       | 18.19            | 4.60         |
| 2900  | 14.60 | 34.89     | 15.07             | 15.12              | 4.90      | 0.99    | 28.41       | 18.09            | 4.58         |
| 3000  | 14.51 | 34.01     | 14.71             | 15.05              | 4.47      | 0.99    | 28.43       | 18.01            | 4.65         |
| 3100  | 14.36 | 33.89     | 14.63             | 15.58              | 4.50      | 0.99    | 28.44       | 17.99            | 4.58         |
| 3200  | 14.08 | 34.77     | 14.10             | 16.85              | 5.15      | 1.01    | 27.85       | 17.84            | 4.58         |
| 3300  | 14.02 | 33.31     | 14.03             | 16.50              | 4.40      | 1.00    | 27.59       | 17.65            | 4.60         |
| 3400  | 13.80 | 33.50     | 13.84             | 17.17              | 4.61      | 1.01    | 27.74       | 17.54            | 4.66         |
| 3500  | 13.59 | 33.30     | 13.39             | 18.05              | 4.62      | 1.01    | 27.58       | 17.42            | 4.67         |
| 3600  | 13.35 | 33.57     | 13.12             | 18.34              | 4.88      | 1.02    | 27.33       | 17.35            | 4.69         |
| 3700  | 12.90 | 34.27     | 12.83             | 22.22              | 5.58      | 1.04    | 27.25       | 17.09            | 4.80         |
| 3800  | 12.83 | 33.59     | 12.39             | 20.94              | 5.16      | 1.04    | 27.05       | 17.03            | 4.79         |
| 3900  | 12.60 | 33.08     | 12.12             | 22.45              | 4.99      | 1.04    | 26.91       | 16.96            | 4.85         |
| 4000  | 12.24 | 34.21     | 11.32             | 24.05              | 5.85      | 1.06    | 26.84       | 16.53            | 4.91         |
| 4100  | 11.94 | 34.08     | 10.72             | 25.15              | 5.89      | 1.07    | 26.65       | 16.45            | 4.97         |
| 4200  | 11.68 | 33.34     | 10.31             | 25.01              | 5.53      | 1.08    | 26.50       | 16.15            | 5.02         |
| 4300  | 11.37 | 33.04     | 9.73              | 24.13              | 5.46      | 1.09    | 26.50       | 15.93            | 5.10         |
| 4400  | 11.18 | 34.05     | 9.44              | 24.20              | 6.19      | 1.10    | 26.19       | 15.79            | 5.16         |
| 4500  | 10.92 | 32.65     | 9.22              | 21.34              | 5.39      | 1.10    | 26.04       | 15.51            | 5.24         |
| 4600  | 10.59 | 33.41     | 8.43              | 21.32              | 5.95      | 1.13    | 25.80       | 15.33            | 5.34         |
| 4700  | 10.25 | 32.37     | 8.26              | 19.25              | 5.44      | 1.12    | 25.62       | 15.12            | 5.44         |
| 4800  | 9.93  | 31.88     | 7.99              | 18.51              | 5.27      | 1.13    | 25.61       | 14.96            | 5.51         |
| 4900  | 9.59  | 32.16     | 7.24              | 18.28              | 5.46      | 1.16    | 25.25       | 14.58            | 5.63         |
| 5000  | 9.41  | 33.64     | 7.10              | 17.33              | 6.52      | 1.16    | 25.04       | 14.34            | 5.67         |
| 5100  | 8.97  | 33.24     | 7.07              | 16.61              | 6.52      | 1.16    | 24.88       | 14.13            | 5.81         |
| 5200  | 8.43  | 31.86     | 6.67              | 15.86              | 5.78      | 1.17    | 24.58       | 13.91            | 5.96         |
| 5300  | 7.86  | 31.87     | 6.34              | 15.45              | 6.04      | 1.18    | 24.15       | 13.46            | 6.18         |
| 5400  | 7.40  | 32.99     | 6.09              | 16.46              | 7.10      | 1.21    | 23.87       | 12.71            | 6.27         |
| 5500  | 6.75  | 33.32     | 5.88              | 16.25              | 7.79      | 1.22    | 23.21       | 12.34            | 6.50         |

## 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 = 2.8V, Id = 78.75 mA @ Temperature = -45degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 200   | 5.10  | 45.64     | 1.02              | 2.76               | 4.68      | 0.85    | 14.73       | 5.66             | 7.96         |
| 300   | 10.92 | 43.69     | 3.26              | 6.60               | 8.69      | 1.16    | 21.40       | 10.36            | 6.15         |
| 400   | 12.71 | 45.64     | 5.85              | 10.40              | 14.78     | 1.15    | 23.01       | 12.04            | 5.73         |
| 500   | 13.38 | 50.14     | 8.17              | 14.00              | 27.93     | 1.11    | 23.65       | 12.68            | 6.39         |
| 600   | 13.73 | 48.97     | 10.30             | 17.29              | 25.71     | 1.07    | 23.73       | 13.00            | 5.39         |
| 700   | 13.94 | 46.82     | 12.26             | 20.38              | 20.53     | 1.05    | 24.03       | 13.23            | 5.58         |
| 800   | 14.04 | 45.62     | 14.11             | 22.22              | 18.14     | 1.03    | 24.09       | 13.29            | 5.18         |
| 900   | 14.11 | 44.35     | 15.92             | 23.95              | 15.77     | 1.02    | 24.41       | 13.62            | 5.22         |
| 1000  | 14.18 | 42.66     | 17.73             | 24.61              | 13.01     | 1.01    | 24.21       | 13.51            | 5.07         |
| 1100  | 14.21 | 41.47     | 19.53             | 24.94              | 11.39     | 1.01    | 24.52       | 13.59            | 5.04         |
| 1200  | 14.23 | 40.53     | 21.11             | 24.31              | 10.23     | 1.00    | 24.41       | 13.56            | 5.00         |
| 1300  | 14.24 | 39.74     | 22.55             | 23.32              | 9.35      | 1.00    | 24.47       | 13.62            | 4.97         |
| 1400  | 14.24 | 38.91     | 24.14             | 22.20              | 8.50      | 0.99    | 24.36       | 13.58            | 4.92         |
| 1500  | 14.23 | 38.39     | 25.53             | 21.70              | 8.02      | 0.99    | 24.47       | 13.58            | 4.87         |
| 1600  | 14.23 | 37.54     | 25.12             | 20.80              | 7.27      | 0.99    | 24.32       | 13.54            | 4.89         |
| 1700  | 14.19 | 37.06     | 24.35             | 20.30              | 6.90      | 0.99    | 24.52       | 13.77            | 4.78         |
| 1800  | 14.14 | 36.67     | 23.89             | 19.97              | 6.62      | 0.99    | 24.45       | 13.74            | 4.80         |
| 1900  | 14.11 | 36.16     | 22.98             | 19.69              | 6.26      | 0.99    | 24.60       | 13.95            | 4.77         |
| 2000  | 14.05 | 35.68     | 21.68             | 19.56              | 5.96      | 0.99    | 24.70       | 13.90            | 4.73         |
| 2100  | 14.00 | 35.20     | 20.95             | 19.28              | 5.66      | 0.99    | 24.60       | 13.86            | 4.69         |
| 2200  | 13.95 | 35.39     | 20.50             | 18.67              | 5.80      | 0.99    | 24.40       | 13.73            | 4.71         |
| 2300  | 13.85 | 34.54     | 19.80             | 18.61              | 5.32      | 0.99    | 24.56       | 13.79            | 4.70         |
| 2400  | 13.76 | 34.41     | 19.11             | 18.52              | 5.28      | 0.99    | 24.49       | 13.96            | 4.66         |
| 2500  | 13.67 | 34.44     | 18.34             | 18.24              | 5.33      | 0.99    | 24.62       | 14.04            | 4.66         |
| 2600  | 13.55 | 34.43     | 17.94             | 18.85              | 5.41      | 1.00    | 24.66       | 14.03            | 4.68         |
| 2700  | 13.42 | 33.54     | 17.13             | 19.48              | 4.96      | 1.00    | 24.48       | 13.92            | 4.68         |
| 2800  | 13.33 | 34.09     | 17.13             | 19.51              | 5.33      | 1.00    | 24.45       | 13.96            | 4.71         |
| 2900  | 13.12 | 33.57     | 16.11             | 20.85              | 5.14      | 1.01    | 24.39       | 13.99            | 4.66         |
| 3000  | 13.02 | 32.81     | 15.57             | 21.16              | 4.76      | 1.01    | 24.53       | 14.04            | 4.75         |
| 3100  | 12.86 | 32.71     | 15.30             | 22.12              | 4.79      | 1.01    | 24.35       | 14.00            | 4.71         |
| 3200  | 12.60 | 33.28     | 14.55             | 24.70              | 5.25      | 1.02    | 23.96       | 13.95            | 4.66         |
| 3300  | 12.51 | 32.12     | 14.39             | 24.18              | 4.64      | 1.02    | 23.78       | 13.80            | 4.71         |
| 3400  | 12.31 | 32.37     | 14.01             | 25.65              | 4.88      | 1.03    | 23.90       | 13.77            | 4.76         |
| 3500  | 12.09 | 32.05     | 13.43             | 27.71              | 4.79      | 1.03    | 23.91       | 13.84            | 4.77         |
| 3600  | 11.85 | 32.32     | 13.05             | 28.82              | 5.06      | 1.04    | 23.62       | 13.81            | 4.82         |
| 3700  | 11.45 | 32.99     | 12.55             | 31.53              | 5.67      | 1.05    | 23.60       | 13.63            | 4.91         |
| 3800  | 11.36 | 32.34     | 12.16             | 32.86              | 5.30      | 1.05    | 23.42       | 13.67            | 4.94         |
| 3900  | 11.14 | 31.95     | 11.81             | 29.20              | 5.17      | 1.06    | 23.46       | 13.76            | 4.97         |
| 4000  | 10.79 | 32.67     | 11.06             | 28.17              | 5.75      | 1.07    | 23.43       | 13.49            | 5.04         |
| 4100  | 10.51 | 32.39     | 10.47             | 24.95              | 5.67      | 1.08    | 23.33       | 13.56            | 5.10         |
| 4200  | 10.26 | 31.86     | 10.05             | 22.57              | 5.43      | 1.09    | 23.26       | 13.27            | 5.18         |
| 4300  | 9.95  | 31.48     | 9.53              | 20.36              | 5.29      | 1.09    | 23.28       | 13.18            | 5.27         |
| 4400  | 9.78  | 32.27     | 9.26              | 20.12              | 5.85      | 1.10    | 23.09       | 13.29            | 5.33         |
| 4500  | 9.55  | 31.24     | 8.99              | 18.31              | 5.28      | 1.10    | 23.05       | 13.16            | 5.40         |
| 4600  | 9.23  | 31.66     | 8.30              | 17.76              | 5.59      | 1.12    | 22.80       | 13.02            | 5.48         |
| 4700  | 8.92  | 31.01     | 8.11              | 16.40              | 5.31      | 1.12    | 22.60       | 12.92            | 5.58         |
| 4800  | 8.62  | 30.59     | 7.86              | 15.78              | 5.18      | 1.12    | 22.65       | 12.77            | 5.65         |
| 4900  | 8.30  | 30.75     | 7.19              | 15.36              | 5.29      | 1.14    | 22.38       | 12.70            | 5.81         |
| 5000  | 8.15  | 31.99     | 7.06              | 15.06              | 6.15      | 1.15    | 22.25       | 12.43            | 5.82         |
| 5100  | 7.75  | 31.63     | 7.02              | 14.57              | 6.14      | 1.14    | 22.18       | 12.37            | 5.93         |
| 5200  | 7.27  | 30.65     | 6.65              | 14.01              | 5.67      | 1.15    | 21.95       | 12.21            | 6.10         |
| 5300  | 6.73  | 30.78     | 6.36              | 13.70              | 5.99      | 1.16    | 21.55       | 11.88            | 6.27         |
| 5400  | 6.32  | 31.62     | 6.11              | 14.67              | 6.83      | 1.19    | 21.50       | 11.38            | 6.39         |
| 5500  | 5.72  | 32.18     | 5.91              | 14.88              | 7.67      | 1.21    | 20.61       | 11.18            | 6.58         |

## 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 = 82.75 mA @ Temperature = -45degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 200   | 5.86  | 44.97     | 0.86                    | 2.60                     | 3.15      | 0.83    | 24.14          | 11.47                  | 7.67            |
| 300   | 12.02 | 41.72     | 3.05                    | 6.25                     | 5.55      | 1.16    | 30.70          | 17.76                  | 5.90            |
| 400   | 14.04 | 44.24     | 5.59                    | 10.02                    | 10.40     | 1.16    | 32.51          | 20.15                  | 5.59            |
| 500   | 14.85 | 47.69     | 7.87                    | 13.74                    | 17.50     | 1.12    | 33.21          | 20.54                  | 6.27            |
| 600   | 15.26 | 49.30     | 10.01                   | 17.09                    | 22.19     | 1.08    | 33.87          | 20.72                  | 5.28            |
| 700   | 15.54 | 49.57     | 11.92                   | 19.70                    | 23.28     | 1.05    | 33.68          | 20.81                  | 5.22            |
| 800   | 15.68 | 48.65     | 13.73                   | 20.57                    | 21.13     | 1.03    | 33.31          | 20.70                  | 5.08            |
| 900   | 15.80 | 46.85     | 15.44                   | 20.43                    | 17.20     | 1.02    | 33.30          | 20.65                  | 5.12            |
| 1000  | 15.90 | 44.77     | 17.02                   | 20.14                    | 13.50     | 1.01    | 33.19          | 20.51                  | 4.98            |
| 1100  | 15.97 | 43.33     | 18.43                   | 19.55                    | 11.40     | 1.00    | 33.00          | 20.54                  | 4.94            |
| 1200  | 16.03 | 42.48     | 19.40                   | 19.26                    | 10.29     | 1.00    | 33.01          | 20.54                  | 4.92            |
| 1300  | 16.08 | 41.75     | 20.18                   | 18.81                    | 9.42      | 0.99    | 32.77          | 20.45                  | 4.88            |
| 1400  | 16.12 | 40.72     | 20.83                   | 18.09                    | 8.32      | 0.99    | 32.41          | 20.21                  | 4.81            |
| 1500  | 16.13 | 40.12     | 21.00                   | 17.24                    | 7.73      | 0.99    | 32.21          | 20.18                  | 4.77            |
| 1600  | 16.17 | 39.55     | 20.43                   | 16.63                    | 7.18      | 0.98    | 32.19          | 20.15                  | 4.82            |
| 1700  | 16.16 | 38.74     | 19.77                   | 15.94                    | 6.52      | 0.98    | 31.77          | 19.82                  | 4.70            |
| 1800  | 16.14 | 38.43     | 19.33                   | 15.36                    | 6.28      | 0.98    | 31.59          | 19.72                  | 4.70            |
| 1900  | 16.13 | 37.79     | 18.72                   | 14.85                    | 5.81      | 0.98    | 31.26          | 19.66                  | 4.67            |
| 2000  | 16.08 | 37.32     | 17.83                   | 14.44                    | 5.49      | 0.97    | 31.48          | 19.55                  | 4.64            |
| 2100  | 16.06 | 37.23     | 17.44                   | 14.17                    | 5.43      | 0.97    | 31.04          | 19.48                  | 4.59            |
| 2200  | 16.03 | 37.06     | 17.12                   | 13.69                    | 5.31      | 0.97    | 31.29          | 19.53                  | 4.58            |
| 2300  | 15.95 | 36.44     | 16.75                   | 13.46                    | 4.98      | 0.97    | 30.71          | 19.27                  | 4.57            |
| 2400  | 15.87 | 36.08     | 16.32                   | 13.20                    | 4.80      | 0.97    | 30.57          | 19.34                  | 4.56            |
| 2500  | 15.79 | 36.21     | 15.93                   | 12.86                    | 4.88      | 0.97    | 30.19          | 18.98                  | 4.58            |
| 2600  | 15.68 | 36.33     | 15.81                   | 12.98                    | 5.01      | 0.97    | 30.31          | 18.94                  | 4.55            |
| 2700  | 15.55 | 35.34     | 15.26                   | 12.94                    | 4.53      | 0.97    | 30.25          | 19.08                  | 4.54            |
| 2800  | 15.48 | 35.72     | 15.54                   | 12.93                    | 4.79      | 0.97    | 29.90          | 18.86                  | 4.57            |
| 2900  | 15.25 | 35.56     | 14.83                   | 13.25                    | 4.82      | 0.97    | 29.77          | 18.79                  | 4.57            |
| 3000  | 15.16 | 34.71     | 14.59                   | 13.18                    | 4.42      | 0.97    | 29.67          | 18.56                  | 4.62            |
| 3100  | 15.01 | 34.65     | 14.63                   | 13.65                    | 4.49      | 0.98    | 29.73          | 18.52                  | 4.56            |
| 3200  | 14.71 | 35.72     | 14.12                   | 14.75                    | 5.27      | 0.99    | 29.13          | 18.40                  | 4.52            |
| 3300  | 14.66 | 34.10     | 14.09                   | 14.39                    | 4.41      | 0.99    | 28.81          | 18.19                  | 4.58            |
| 3400  | 14.44 | 34.00     | 13.95                   | 14.95                    | 4.49      | 0.99    | 29.07          | 18.13                  | 4.64            |
| 3500  | 14.21 | 33.98     | 13.44                   | 15.63                    | 4.60      | 1.00    | 28.64          | 17.81                  | 4.62            |
| 3600  | 13.96 | 34.01     | 13.21                   | 16.04                    | 4.75      | 1.01    | 28.62          | 17.84                  | 4.66            |
| 3700  | 13.50 | 34.74     | 12.84                   | 19.04                    | 5.47      | 1.03    | 28.47          | 17.55                  | 4.75            |
| 3800  | 13.43 | 34.27     | 12.38                   | 18.11                    | 5.18      | 1.03    | 28.27          | 17.51                  | 4.77            |
| 3900  | 13.19 | 33.78     | 12.05                   | 19.20                    | 5.03      | 1.04    | 28.00          | 17.39                  | 4.81            |
| 4000  | 12.80 | 34.75     | 11.26                   | 20.65                    | 5.80      | 1.06    | 27.96          | 16.86                  | 4.87            |
| 4100  | 12.47 | 34.69     | 10.61                   | 21.73                    | 5.92      | 1.07    | 27.68          | 16.78                  | 4.93            |
| 4200  | 12.17 | 34.15     | 10.15                   | 22.13                    | 5.70      | 1.08    | 27.46          | 16.43                  | 5.00            |
| 4300  | 11.84 | 33.87     | 9.48                    | 22.36                    | 5.63      | 1.10    | 27.39          | 16.26                  | 5.06            |
| 4400  | 11.65 | 34.85     | 9.20                    | 22.32                    | 6.39      | 1.11    | 27.06          | 16.09                  | 5.14            |
| 4500  | 11.35 | 33.61     | 8.92                    | 20.52                    | 5.68      | 1.11    | 26.97          | 15.92                  | 5.20            |
| 4600  | 10.99 | 34.34     | 8.12                    | 20.92                    | 6.23      | 1.14    | 26.82          | 15.72                  | 5.31            |
| 4700  | 10.63 | 33.14     | 7.92                    | 19.13                    | 5.61      | 1.14    | 26.51          | 15.59                  | 5.40            |
| 4800  | 10.29 | 32.77     | 7.63                    | 18.50                    | 5.51      | 1.14    | 26.49          | 15.27                  | 5.47            |
| 4900  | 9.92  | 32.91     | 6.89                    | 18.56                    | 5.62      | 1.18    | 26.08          | 15.06                  | 5.64            |
| 5000  | 9.69  | 34.59     | 6.76                    | 17.42                    | 6.90      | 1.18    | 25.92          | 14.68                  | 5.61            |
| 5100  | 9.23  | 34.18     | 6.71                    | 16.70                    | 6.90      | 1.18    | 25.72          | 14.49                  | 5.80            |
| 5200  | 8.66  | 32.61     | 6.31                    | 16.04                    | 6.00      | 1.19    | 25.40          | 14.10                  | 5.94            |
| 5300  | 8.04  | 32.46     | 5.98                    | 15.71                    | 6.17      | 1.21    | 24.86          | 13.77                  | 6.17            |
| 5400  | 7.55  | 33.74     | 5.73                    | 16.67                    | 7.40      | 1.23    | 24.51          | 13.13                  | 6.24            |
| 5500  | 6.87  | 34.08     | 5.52                    | 16.24                    | 8.12      | 1.24    | 23.94          | 12.87                  | 6.44            |

## 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 = 3.9V, Id = 84.35 mA @ Temperature = +85degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 200   | 5.04  | 45.05     | 1.19              | 2.75               | 5.09      | 0.84    | 21.42       | 10.06            | 9.16         |
| 300   | 10.71 | 43.17     | 3.39              | 6.37               | 8.46      | 1.14    | 26.70       | 15.14            | 7.51         |
| 400   | 12.67 | 45.26     | 5.92              | 10.43              | 14.28     | 1.15    | 28.33       | 16.90            | 7.07         |
| 500   | 13.45 | 48.19     | 8.29              | 14.52              | 22.36     | 1.11    | 28.78       | 17.52            | 7.29         |
| 600   | 13.82 | 49.08     | 10.46             | 18.48              | 25.94     | 1.08    | 28.89       | 17.71            | 6.74         |
| 700   | 14.04 | 47.34     | 12.43             | 23.13              | 21.67     | 1.05    | 28.95       | 17.79            | 6.75         |
| 800   | 14.16 | 46.31     | 14.31             | 28.03              | 19.47     | 1.04    | 29.03       | 17.83            | 6.49         |
| 900   | 14.26 | 44.67     | 16.20             | 35.40              | 16.20     | 1.02    | 29.14       | 18.04            | 6.49         |
| 1000  | 14.32 | 42.95     | 18.14             | 34.67              | 13.31     | 1.01    | 28.86       | 17.85            | 6.42         |
| 1100  | 14.35 | 42.06     | 20.07             | 30.22              | 12.03     | 1.01    | 29.15       | 17.94            | 6.41         |
| 1200  | 14.38 | 40.84     | 21.98             | 27.04              | 10.46     | 1.00    | 29.09       | 17.88            | 6.38         |
| 1300  | 14.39 | 40.26     | 23.65             | 24.83              | 9.78      | 1.00    | 29.02       | 17.96            | 6.33         |
| 1400  | 14.39 | 39.37     | 24.50             | 23.23              | 8.82      | 1.00    | 28.79       | 17.84            | 6.29         |
| 1500  | 14.37 | 38.88     | 24.53             | 21.93              | 8.35      | 0.99    | 28.84       | 17.85            | 6.26         |
| 1600  | 14.38 | 38.11     | 23.89             | 20.76              | 7.61      | 0.99    | 28.72       | 17.85            | 6.30         |
| 1700  | 14.33 | 37.71     | 22.71             | 20.05              | 7.30      | 0.99    | 28.63       | 17.88            | 6.20         |
| 1800  | 14.28 | 37.13     | 21.66             | 19.37              | 6.84      | 0.99    | 28.55       | 17.76            | 6.18         |
| 1900  | 14.24 | 36.59     | 20.75             | 18.79              | 6.43      | 0.99    | 28.48       | 17.90            | 6.17         |
| 2000  | 14.17 | 36.00     | 19.78             | 18.23              | 6.05      | 0.99    | 28.46       | 17.83            | 6.11         |
| 2100  | 14.11 | 35.98     | 19.18             | 17.84              | 6.05      | 0.99    | 28.29       | 17.68            | 6.10         |
| 2200  | 14.05 | 35.74     | 18.65             | 17.28              | 5.91      | 0.99    | 28.28       | 17.67            | 6.09         |
| 2300  | 13.95 | 35.04     | 18.02             | 17.10              | 5.50      | 0.99    | 28.26       | 17.57            | 6.10         |
| 2400  | 13.85 | 34.85     | 17.58             | 16.99              | 5.43      | 0.99    | 27.99       | 17.66            | 6.09         |
| 2500  | 13.76 | 35.22     | 17.28             | 16.85              | 5.71      | 0.99    | 27.87       | 17.60            | 6.08         |
| 2600  | 13.64 | 34.63     | 17.01             | 16.85              | 5.40      | 0.99    | 27.92       | 17.50            | 6.08         |
| 2700  | 13.49 | 34.02     | 16.43             | 17.23              | 5.13      | 1.00    | 27.73       | 17.39            | 6.08         |
| 2800  | 13.35 | 34.59     | 16.55             | 17.40              | 5.57      | 1.00    | 27.58       | 17.24            | 6.11         |
| 2900  | 13.17 | 34.03     | 15.95             | 17.86              | 5.33      | 1.00    | 27.42       | 17.04            | 6.10         |
| 3000  | 13.04 | 33.51     | 15.61             | 17.86              | 5.09      | 1.00    | 27.43       | 16.98            | 6.06         |
| 3100  | 12.85 | 33.60     | 15.37             | 18.52              | 5.26      | 1.01    | 27.28       | 16.96            | 6.15         |
| 3200  | 12.57 | 34.15     | 14.85             | 19.81              | 5.79      | 1.01    | 26.77       | 16.71            | 6.12         |
| 3300  | 12.46 | 33.16     | 14.76             | 19.85              | 5.24      | 1.01    | 26.51       | 16.51            | 6.17         |
| 3400  | 12.25 | 33.07     | 14.29             | 20.70              | 5.30      | 1.02    | 26.60       | 16.50            | 6.24         |
| 3500  | 12.00 | 32.99     | 13.92             | 22.36              | 5.40      | 1.02    | 26.40       | 16.21            | 6.25         |
| 3600  | 11.80 | 32.75     | 13.51             | 22.84              | 5.36      | 1.03    | 26.15       | 16.17            | 6.29         |
| 3700  | 11.47 | 32.86     | 13.32             | 25.18              | 5.63      | 1.03    | 25.98       | 15.81            | 6.36         |
| 3800  | 11.26 | 33.17     | 12.51             | 26.44              | 5.91      | 1.05    | 25.84       | 15.84            | 6.39         |
| 3900  | 11.00 | 32.77     | 12.31             | 26.75              | 5.80      | 1.05    | 25.56       | 15.82            | 6.47         |
| 4000  | 10.65 | 33.46     | 11.40             | 28.34              | 6.44      | 1.06    | 25.53       | 15.28            | 6.55         |
| 4100  | 10.29 | 33.38     | 10.82             | 26.48              | 6.57      | 1.07    | 25.42       | 15.23            | 6.64         |
| 4200  | 10.08 | 33.09     | 10.28             | 24.50              | 6.43      | 1.08    | 25.17       | 15.04            | 6.67         |
| 4300  | 9.62  | 32.46     | 9.65              | 22.04              | 6.18      | 1.10    | 25.11       | 14.76            | 6.83         |
| 4400  | 9.45  | 33.12     | 9.14              | 21.31              | 6.70      | 1.11    | 24.84       | 14.72            | 6.91         |
| 4500  | 9.21  | 32.60     | 8.96              | 19.48              | 6.42      | 1.11    | 24.65       | 14.47            | 7.00         |
| 4600  | 8.84  | 32.23     | 8.38              | 18.19              | 6.28      | 1.12    | 24.50       | 14.26            | 7.07         |
| 4700  | 8.49  | 31.87     | 8.04              | 17.11              | 6.16      | 1.13    | 24.19       | 14.03            | 7.22         |
| 4800  | 8.22  | 32.29     | 7.81              | 16.35              | 6.59      | 1.13    | 24.10       | 13.87            | 7.29         |
| 4900  | 7.68  | 30.86     | 7.12              | 15.31              | 5.73      | 1.15    | 23.77       | 13.64            | 7.51         |
| 5000  | 7.54  | 33.37     | 7.15              | 15.13              | 7.74      | 1.15    | 23.70       | 13.43            | 7.54         |
| 5100  | 7.03  | 32.54     | 6.92              | 14.66              | 7.36      | 1.15    | 23.37       | 13.13            | 7.69         |
| 5200  | 6.58  | 31.44     | 6.47              | 14.70              | 6.66      | 1.17    | 22.96       | 12.86            | 7.88         |
| 5300  | 5.95  | 32.25     | 6.41              | 14.34              | 7.78      | 1.17    | 22.54       | 12.33            | 8.01         |
| 5400  | 5.43  | 33.51     | 6.12              | 14.72              | 9.36      | 1.19    | 22.31       | 11.78            | 8.29         |
| 5500  | 4.93  | 33.94     | 5.91              | 14.13              | 10.20     | 1.20    | 22.08       | 11.77            | 8.55         |

## 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 = 2.8V, Id = 80.82 mA @ Temperature = +85degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 200   | 4.37  | 46.26     | 1.30              | 2.85               | 7.17      | 0.85    | 13.22       | 3.77             | 9.45         |
| 300   | 9.79  | 44.03     | 3.53              | 6.48               | 10.83     | 1.13    | 18.71       | 8.47             | 7.71         |
| 400   | 11.59 | 46.63     | 6.08              | 10.19              | 19.14     | 1.13    | 21.37       | 10.44            | 7.23         |
| 500   | 12.27 | 49.59     | 8.48              | 13.39              | 29.99     | 1.09    | 22.46       | 11.07            | 7.43         |
| 600   | 12.59 | 49.38     | 10.66             | 15.64              | 30.68     | 1.06    | 22.81       | 11.48            | 6.85         |
| 700   | 12.77 | 46.62     | 12.63             | 17.19              | 22.83     | 1.04    | 23.21       | 11.80            | 6.76         |
| 800   | 12.85 | 44.42     | 14.51             | 18.04              | 17.98     | 1.02    | 23.36       | 11.90            | 6.62         |
| 900   | 12.92 | 43.14     | 16.41             | 18.70              | 15.63     | 1.01    | 23.59       | 12.08            | 6.75         |
| 1000  | 12.96 | 41.60     | 18.41             | 18.85              | 13.15     | 1.00    | 23.47       | 12.09            | 6.50         |
| 1100  | 12.98 | 40.75     | 20.58             | 18.94              | 11.98     | 0.99    | 23.78       | 12.23            | 6.52         |
| 1200  | 12.98 | 39.82     | 22.89             | 18.97              | 10.81     | 0.99    | 23.81       | 12.21            | 6.47         |
| 1300  | 12.98 | 38.95     | 25.46             | 18.94              | 9.80      | 0.99    | 23.77       | 12.28            | 6.42         |
| 1400  | 12.97 | 38.26     | 27.81             | 18.72              | 9.08      | 0.99    | 23.67       | 12.30            | 6.37         |
| 1500  | 12.94 | 37.82     | 29.42             | 18.69              | 8.67      | 0.98    | 23.75       | 12.31            | 6.35         |
| 1600  | 12.92 | 37.26     | 29.05             | 18.34              | 8.13      | 0.98    | 23.65       | 12.28            | 6.38         |
| 1700  | 12.87 | 36.48     | 27.39             | 18.24              | 7.48      | 0.98    | 23.65       | 12.39            | 6.28         |
| 1800  | 12.81 | 36.18     | 25.72             | 18.23              | 7.27      | 0.98    | 23.66       | 12.34            | 6.28         |
| 1900  | 12.76 | 35.51     | 24.33             | 18.20              | 6.76      | 0.98    | 23.67       | 12.50            | 6.24         |
| 2000  | 12.68 | 35.07     | 22.92             | 18.21              | 6.48      | 0.99    | 23.73       | 12.46            | 6.23         |
| 2100  | 12.61 | 34.86     | 22.06             | 18.15              | 6.37      | 0.99    | 23.65       | 12.36            | 6.21         |
| 2200  | 12.54 | 34.79     | 21.29             | 18.08              | 6.36      | 0.99    | 23.60       | 12.40            | 6.19         |
| 2300  | 12.43 | 34.16     | 20.41             | 18.33              | 5.99      | 0.99    | 23.61       | 12.48            | 6.18         |
| 2400  | 12.33 | 33.83     | 19.82             | 18.64              | 5.83      | 0.99    | 23.54       | 12.62            | 6.19         |
| 2500  | 12.23 | 33.94     | 19.28             | 18.60              | 5.96      | 0.99    | 23.54       | 12.65            | 6.16         |
| 2600  | 12.10 | 33.63     | 18.79             | 19.22              | 5.84      | 1.00    | 23.58       | 12.53            | 6.18         |
| 2700  | 11.95 | 33.10     | 17.98             | 20.09              | 5.59      | 1.00    | 23.53       | 12.62            | 6.17         |
| 2800  | 11.81 | 33.38     | 17.89             | 20.41              | 5.87      | 1.00    | 23.43       | 12.59            | 6.23         |
| 2900  | 11.63 | 32.99     | 17.07             | 21.81              | 5.73      | 1.01    | 23.36       | 12.53            | 6.21         |
| 3000  | 11.50 | 32.27     | 16.55             | 22.14              | 5.35      | 1.01    | 23.39       | 12.58            | 6.19         |
| 3100  | 11.30 | 32.40     | 16.01             | 22.99              | 5.54      | 1.01    | 23.36       | 12.66            | 6.26         |
| 3200  | 11.04 | 32.89     | 15.31             | 24.40              | 6.01      | 1.02    | 22.88       | 12.53            | 6.27         |
| 3300  | 10.92 | 32.12     | 15.10             | 25.08              | 5.59      | 1.02    | 22.75       | 12.40            | 6.31         |
| 3400  | 10.71 | 31.98     | 14.43             | 26.49              | 5.60      | 1.03    | 22.96       | 12.51            | 6.36         |
| 3500  | 10.46 | 32.04     | 13.94             | 26.21              | 5.78      | 1.03    | 22.87       | 12.56            | 6.39         |
| 3600  | 10.26 | 31.68     | 13.40             | 26.44              | 5.64      | 1.04    | 22.66       | 12.55            | 6.41         |
| 3700  | 9.93  | 31.82     | 13.09             | 24.26              | 5.92      | 1.04    | 22.58       | 12.39            | 6.53         |
| 3800  | 9.73  | 31.94     | 12.29             | 24.25              | 6.07      | 1.05    | 22.52       | 12.51            | 6.58         |
| 3900  | 9.48  | 31.69     | 12.02             | 22.76              | 6.04      | 1.05    | 22.41       | 12.50            | 6.63         |
| 4000  | 9.14  | 32.27     | 11.10             | 21.79              | 6.59      | 1.07    | 22.45       | 11.97            | 6.72         |
| 4100  | 8.81  | 31.92     | 10.56             | 20.08              | 6.49      | 1.07    | 22.38       | 12.22            | 6.79         |
| 4200  | 8.61  | 31.77     | 10.06             | 19.08              | 6.43      | 1.08    | 22.21       | 11.92            | 6.84         |
| 4300  | 8.17  | 30.93     | 9.53              | 17.24              | 6.02      | 1.09    | 22.20       | 11.87            | 7.01         |
| 4400  | 8.00  | 31.63     | 8.99              | 16.86              | 6.53      | 1.10    | 22.06       | 12.11            | 7.07         |
| 4500  | 7.78  | 31.20     | 8.81              | 15.99              | 6.31      | 1.10    | 21.94       | 11.81            | 7.14         |
| 4600  | 7.43  | 30.90     | 8.29              | 15.07              | 6.20      | 1.11    | 21.86       | 11.93            | 7.31         |
| 4700  | 7.09  | 30.46     | 8.01              | 14.27              | 6.04      | 1.11    | 21.55       | 11.70            | 7.43         |
| 4800  | 6.84  | 30.91     | 7.72              | 13.94              | 6.44      | 1.11    | 21.59       | 11.60            | 7.46         |
| 4900  | 6.34  | 29.81     | 7.18              | 13.16              | 5.82      | 1.12    | 21.27       | 11.49            | 7.66         |
| 5000  | 6.22  | 31.73     | 7.10              | 13.17              | 7.32      | 1.13    | 21.30       | 11.28            | 7.69         |
| 5100  | 5.75  | 31.14     | 6.92              | 12.85              | 7.13      | 1.13    | 21.00       | 10.98            | 7.91         |
| 5200  | 5.29  | 30.06     | 6.51              | 12.85              | 6.50      | 1.15    | 20.65       | 10.82            | 8.07         |
| 5300  | 4.74  | 31.10     | 6.48              | 12.80              | 7.76      | 1.15    | 20.25       | 10.53            | 8.25         |
| 5400  | 4.28  | 31.91     | 6.14              | 13.32              | 8.82      | 1.17    | 20.15       | 10.07            | 8.48         |
| 5500  | 3.74  | 32.39     | 5.97              | 13.21              | 9.76      | 1.18    | 19.72       | 9.95             | 8.72         |

## Typical Performance Data

## Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

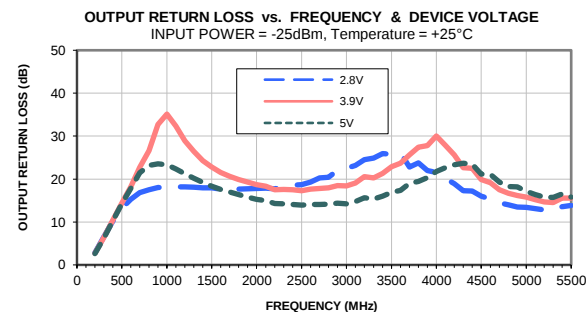
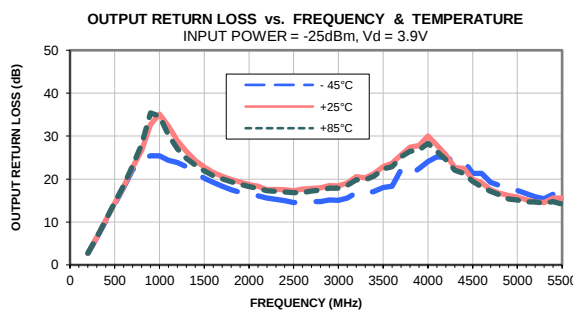
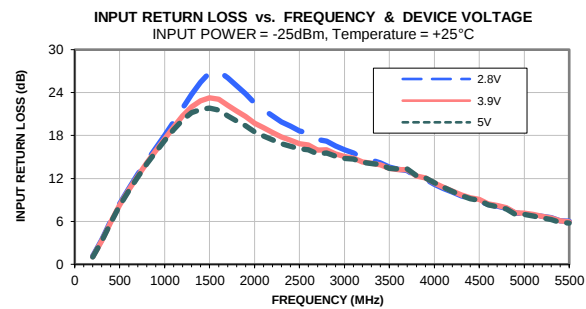
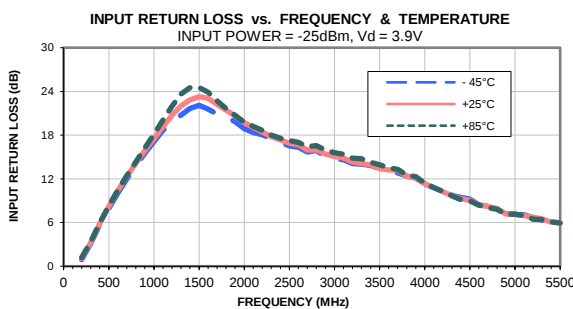
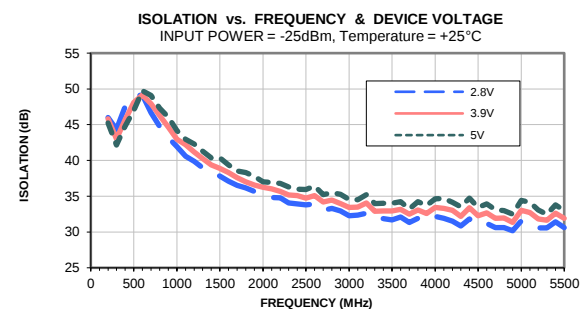
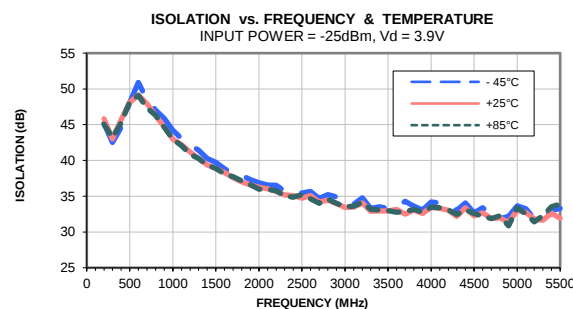
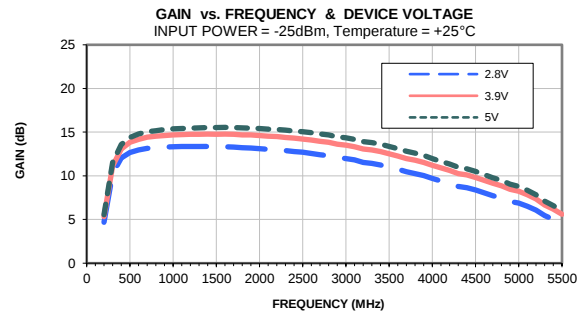
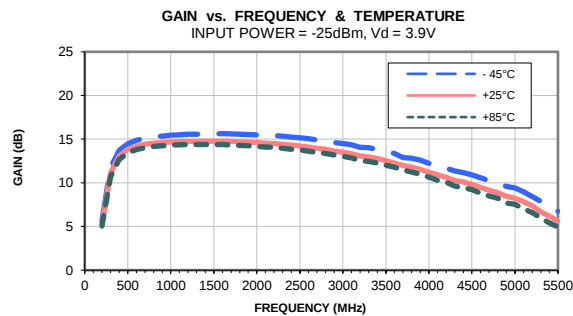
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

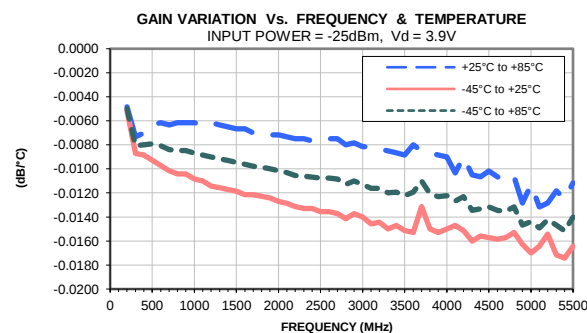
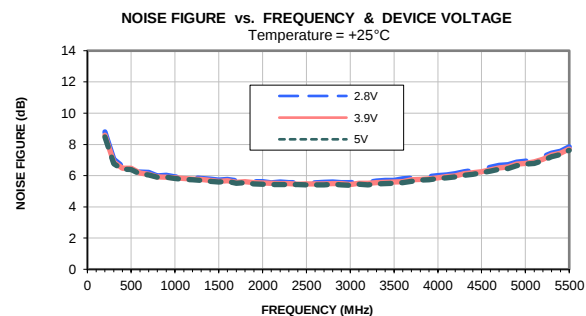
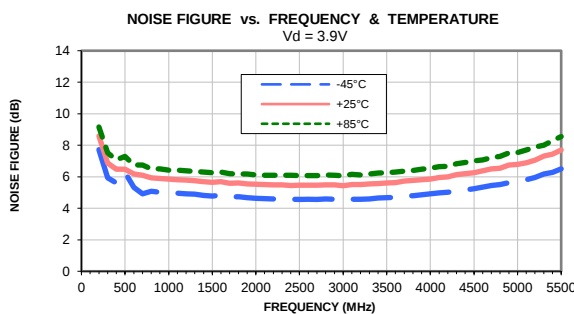
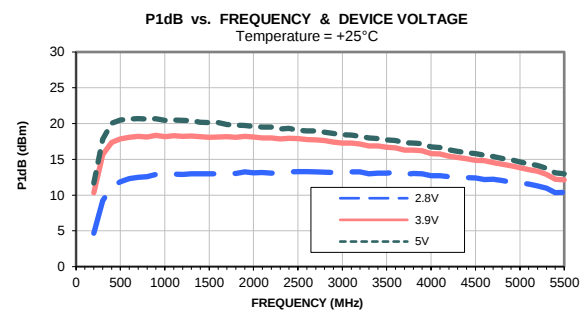
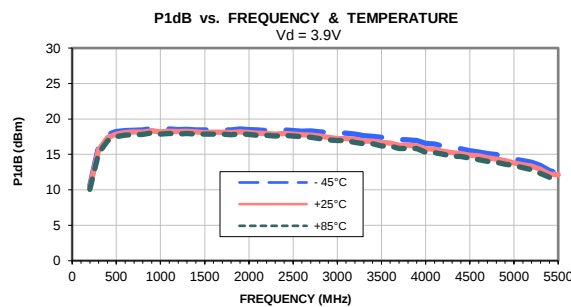
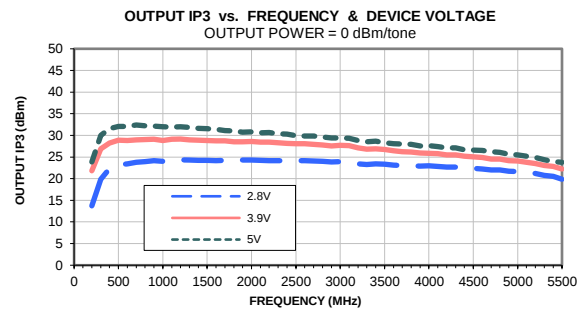
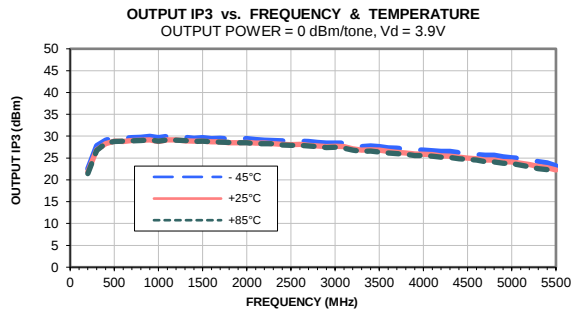
TEST CONDITIONS: Vd = 5V, Id = 87.01 mA @ Temperature = +85degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 200   | 5.26  | 45.02     | 1.15              | 2.67               | 4.68      | 0.82    | 23.66       | 11.66            | 9.12         |
| 300   | 11.07 | 42.63     | 3.34              | 6.23               | 7.41      | 1.13    | 29.53       | 17.69            | 7.43         |
| 400   | 13.15 | 43.94     | 5.85              | 10.31              | 11.48     | 1.15    | 31.37       | 19.92            | 7.05         |
| 500   | 13.99 | 48.02     | 8.21              | 14.38              | 20.49     | 1.11    | 31.82       | 20.36            | 7.27         |
| 600   | 14.41 | 50.40     | 10.35             | 18.11              | 28.14     | 1.08    | 31.69       | 20.51            | 6.73         |
| 700   | 14.66 | 48.02     | 12.30             | 21.78              | 21.78     | 1.05    | 31.99       | 20.60            | 6.63         |
| 800   | 14.79 | 47.23     | 14.17             | 23.57              | 20.06     | 1.03    | 31.98       | 20.55            | 6.50         |
| 900   | 14.91 | 45.55     | 16.03             | 23.29              | 16.55     | 1.02    | 31.73       | 20.58            | 6.52         |
| 1000  | 14.98 | 43.96     | 17.86             | 22.41              | 13.77     | 1.01    | 31.65       | 20.39            | 6.45         |
| 1100  | 15.03 | 43.00     | 19.70             | 21.24              | 12.32     | 1.00    | 31.86       | 20.44            | 6.37         |
| 1200  | 15.07 | 42.03     | 21.38             | 20.01              | 10.98     | 0.99    | 31.75       | 20.43            | 6.33         |
| 1300  | 15.09 | 41.45     | 22.67             | 19.00              | 10.23     | 0.99    | 31.55       | 20.32            | 6.33         |
| 1400  | 15.11 | 40.42     | 23.13             | 18.27              | 9.06      | 0.99    | 31.29       | 20.17            | 6.26         |
| 1500  | 15.10 | 40.03     | 22.99             | 17.44              | 8.65      | 0.98    | 31.16       | 20.07            | 6.23         |
| 1600  | 15.12 | 39.18     | 22.35             | 16.79              | 7.79      | 0.98    | 31.18       | 20.11            | 6.28         |
| 1700  | 15.08 | 38.47     | 21.32             | 16.28              | 7.18      | 0.98    | 30.86       | 19.86            | 6.17         |
| 1800  | 15.05 | 38.03     | 20.35             | 15.78              | 6.82      | 0.98    | 30.75       | 19.77            | 6.15         |
| 1900  | 15.02 | 37.44     | 19.59             | 15.28              | 6.37      | 0.98    | 30.49       | 19.76            | 6.10         |
| 2000  | 14.95 | 37.02     | 18.72             | 14.85              | 6.08      | 0.98    | 30.61       | 19.56            | 6.11         |
| 2100  | 14.90 | 37.10     | 18.22             | 14.53              | 6.14      | 0.98    | 30.34       | 19.46            | 6.11         |
| 2200  | 14.85 | 36.70     | 17.77             | 14.10              | 5.87      | 0.97    | 30.25       | 19.48            | 6.07         |
| 2300  | 14.76 | 36.24     | 17.21             | 13.87              | 5.60      | 0.97    | 30.07       | 19.28            | 6.08         |
| 2400  | 14.66 | 35.82     | 16.84             | 13.67              | 5.38      | 0.97    | 30.11       | 19.31            | 6.05         |
| 2500  | 14.57 | 36.04     | 16.63             | 13.59              | 5.56      | 0.97    | 29.56       | 19.05            | 6.05         |
| 2600  | 14.46 | 35.78     | 16.44             | 13.51              | 5.46      | 0.97    | 29.60       | 18.91            | 6.05         |
| 2700  | 14.30 | 35.14     | 15.97             | 13.66              | 5.17      | 0.98    | 29.51       | 18.91            | 6.04         |
| 2800  | 14.17 | 35.59     | 16.20             | 13.80              | 5.54      | 0.98    | 29.26       | 18.70            | 6.06         |
| 2900  | 13.98 | 35.19     | 15.71             | 13.98              | 5.41      | 0.98    | 29.12       | 18.54            | 6.06         |
| 3000  | 13.86 | 34.50     | 15.48             | 13.93              | 5.06      | 0.98    | 28.98       | 18.32            | 6.02         |
| 3100  | 13.66 | 34.63     | 15.34             | 14.38              | 5.28      | 0.98    | 28.91       | 18.23            | 6.11         |
| 3200  | 13.38 | 35.45     | 14.89             | 15.26              | 6.01      | 0.99    | 28.38       | 18.04            | 6.11         |
| 3300  | 13.27 | 34.13     | 14.86             | 15.20              | 5.24      | 0.99    | 28.18       | 17.77            | 6.12         |
| 3400  | 13.05 | 34.06     | 14.47             | 15.68              | 5.34      | 1.00    | 28.27       | 17.74            | 6.19         |
| 3500  | 12.80 | 34.26     | 14.11             | 16.70              | 5.63      | 1.01    | 27.91       | 17.44            | 6.23         |
| 3600  | 12.59 | 34.05     | 13.72             | 16.99              | 5.62      | 1.01    | 27.75       | 17.43            | 6.27         |
| 3700  | 12.25 | 33.78     | 13.54             | 18.63              | 5.69      | 1.02    | 27.54       | 17.05            | 6.31         |
| 3800  | 12.03 | 34.29     | 12.68             | 19.12              | 6.13      | 1.03    | 27.43       | 17.03            | 6.36         |
| 3900  | 11.76 | 33.88     | 12.45             | 19.95              | 6.02      | 1.04    | 27.15       | 16.97            | 6.43         |
| 4000  | 11.39 | 34.88     | 11.46             | 21.35              | 6.95      | 1.06    | 27.09       | 16.50            | 6.52         |
| 4100  | 11.01 | 34.59     | 10.84             | 22.65              | 6.94      | 1.07    | 26.93       | 16.36            | 6.60         |
| 4200  | 10.78 | 34.33     | 10.29             | 22.54              | 6.83      | 1.08    | 26.59       | 16.11            | 6.64         |
| 4300  | 10.31 | 33.70     | 9.58              | 23.80              | 6.60      | 1.10    | 26.62       | 15.93            | 6.81         |
| 4400  | 10.12 | 34.43     | 9.09              | 22.96              | 7.22      | 1.11    | 26.22       | 15.83            | 6.88         |
| 4500  | 9.87  | 33.72     | 8.90              | 20.95              | 6.79      | 1.11    | 26.10       | 15.50            | 6.96         |
| 4600  | 9.47  | 33.50     | 8.29              | 20.31              | 6.77      | 1.13    | 26.02       | 15.37            | 7.07         |
| 4700  | 9.12  | 33.10     | 7.94              | 19.19              | 6.63      | 1.14    | 25.64       | 15.26            | 7.19         |
| 4800  | 8.82  | 33.50     | 7.70              | 18.06              | 7.08      | 1.14    | 25.54       | 14.96            | 7.27         |
| 4900  | 8.26  | 31.88     | 6.95              | 17.27              | 6.04      | 1.17    | 25.20       | 14.68            | 7.49         |
| 5000  | 8.09  | 34.76     | 7.03              | 16.42              | 8.54      | 1.16    | 25.01       | 14.36            | 7.53         |
| 5100  | 7.54  | 33.87     | 6.78              | 15.91              | 8.08      | 1.17    | 24.71       | 14.03            | 7.70         |
| 5200  | 7.06  | 32.62     | 6.33              | 15.95              | 7.19      | 1.19    | 24.34       | 13.72            | 7.83         |
| 5300  | 6.39  | 33.24     | 6.25              | 15.29              | 8.25      | 1.19    | 23.89       | 13.28            | 8.05         |
| 5400  | 5.82  | 34.61     | 6.00              | 15.25              | 10.09     | 1.21    | 23.58       | 12.85            | 8.28         |
| 5500  | 5.32  | 35.27     | 5.80              | 13.99              | 11.20     | 1.21    | 23.54       | 12.92            | 8.58         |

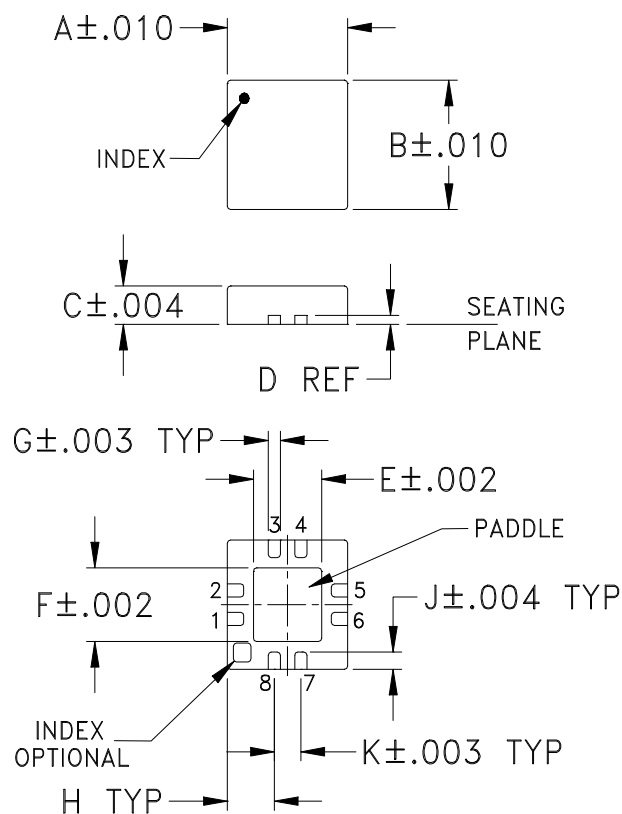
## Typical Performance Curves



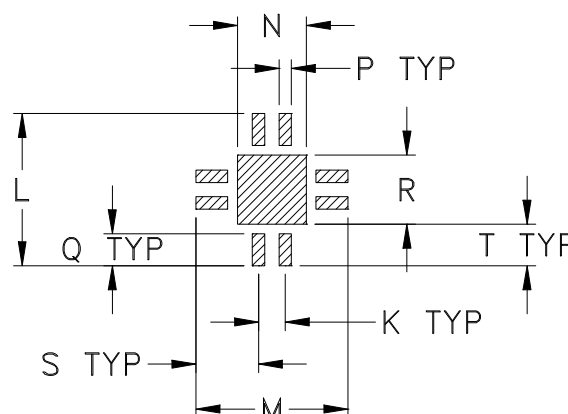
## Typical Performance Curves



### 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              | N              |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| DQ849  | .118<br>(3.00) | .118<br>(3.00) | .035<br>(0.89) | .008<br>(0.20) | .067<br>(1.70) | .067<br>(1.70) | .012<br>(0.30) | .046<br>(1.17) | .016<br>(0.41) | .026<br>(0.66) | .148<br>(3.76) | .148<br>(3.76) | .067<br>(1.70) |

| CASE # | P              | Q              | R              | S              | T              | WT. GRAM |
|--------|----------------|----------------|----------------|----------------|----------------|----------|
| DQ849  | .012<br>(0.30) | .031<br>(0.79) | .067<br>(1.70) | .061<br>(1.55) | .041<br>(1.04) | .02      |

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm.01$ ; 3 Pl.  $\pm.004$

### Notes:

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



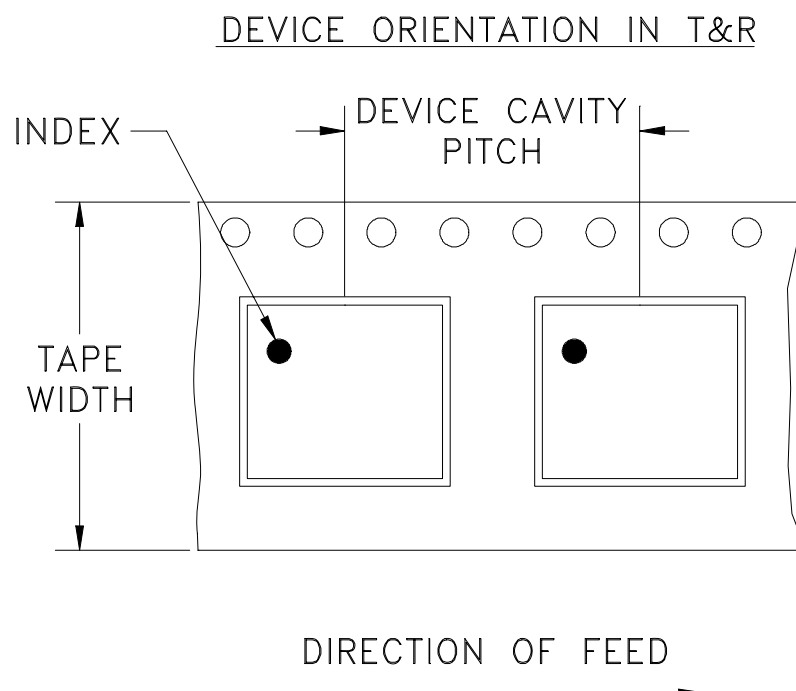
INTERNET <http://www.minicircuits.com>

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

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Mini-Circuits ISO 9001 & ISO 14001 Certified

# Tape & Reel Packaging TR-F104



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel                    |      |
|----------------|-------------------------|-------------------|-------------------------------------|------|
| 8              | 4                       | 7                 | Small quantity standards (see note) | 20   |
|                |                         |                   |                                     | 50   |
|                |                         |                   |                                     | 100  |
|                |                         |                   |                                     | 200  |
|                |                         |                   |                                     | 500  |
|                |                         |                   |                                     | 1000 |
|                |                         | 7                 | Standard                            | 2000 |

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)

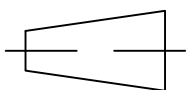


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| REV | ECN No.    | DESCRIPTION                                         | DATE     | DR  | AUTH |
|-----|------------|-----------------------------------------------------|----------|-----|------|
| OR  | M82272     | NEW RELEASE                                         | 08/05/02 | GF  | DJ   |
| A   | M82598     | MODIFIED LAYOUT                                     | 08/12/02 | GF  | MM   |
| B   | M102713    | ADDED "...WITH SMOBC"                               | 01/14/06 | GF  | IL   |
| C   | ECO-003400 | REMOVED COMP. VALUE, ADDED NOTE REF. TO EVAL. BOARD | 07/23/20 | ITG | IL   |

.049  
 TRACE WIDTH  
 (SEE NOTE BELOW)  
 .039  
 .037  
 .040  
 6 X  $\phi$ .015 PTH,  
 FOR GROUND  
 .024  
 .020  
 .040  
 .020  
 .119  
 .084  
 .069  
 47° TYP  
 R1  
 C1  
 .051  
 .041  
 .012  
 .113  
 .061  
 .015 TYP  
 .067  
 PIN 1  
 2 PL.  
 E WIDTH  
 TE BELOW)  
 PACKAGE  
 OUTLINE

NOTES:

1. LINE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020±.0015";  
COPPER: 1/2 OZ. FOR OTHER MATERIALS LINE WIDTH MAY NEED TO BE MODIFIED.
2. FOR "R1" & "C1" VALUES REFER TO THE CORRESPONDING EVALUATION BOARD TB-186-XX+.
3. 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    | GF | 07/19/02 |
| TOLERANCES ON:             | CHECKED  | LC | 08/01/02 |
| 2 PL DECIMALS ±            | APPROVED | DJ | 08/05/02 |
| 3 PL DECIMALS ± .005       |          |    |          |
| ANGLES ±                   |          |    |          |
| FRACTIONS ±                |          |    |          |

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ASHEETA1.DWG REV:A DATE:01/12/95

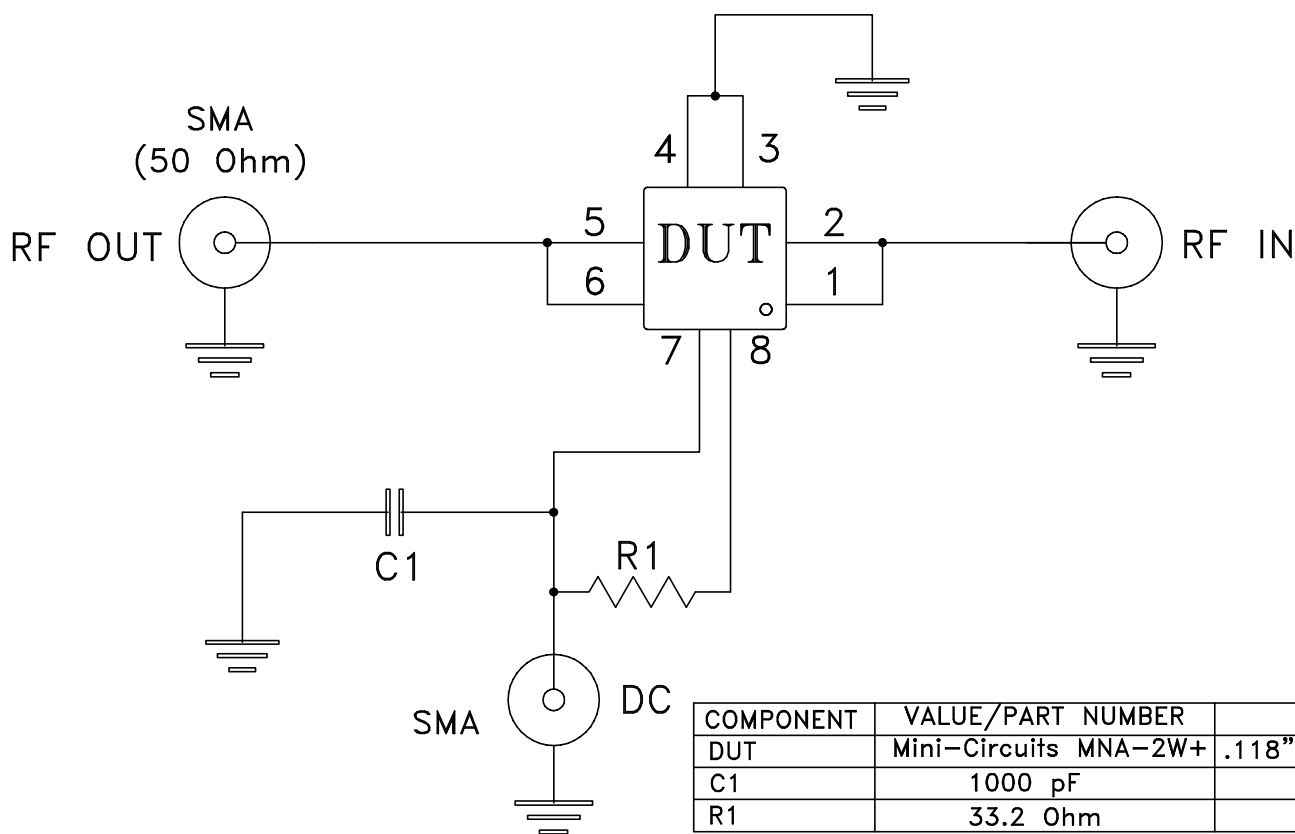
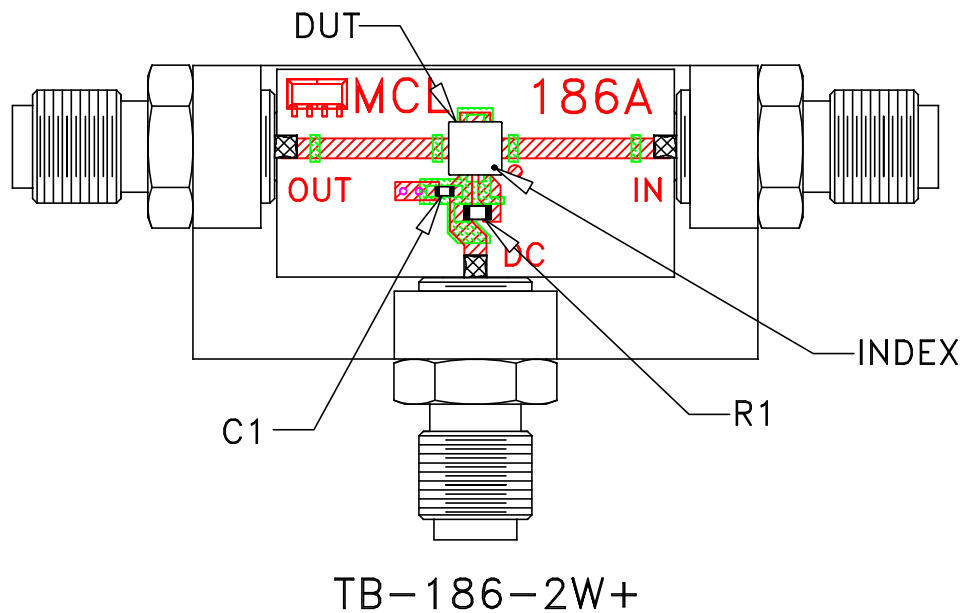


Mini-Circuits® 13 Neptune Avenue  
Brooklyn NY 11235

PL, DQ849, TB-186-XX+

|               |                     |                          |               |           |
|---------------|---------------------|--------------------------|---------------|-----------|
| SIZE<br>A     | CODE IDENT<br>15542 | DRAWING NO:<br>98-PL-078 |               | REV:<br>C |
| FILE: 98PL078 |                     | SCALE: 15:1              | SHEET: 1 OF 1 |           |

# Evaluation Board and Circuit



| COMPONENT | VALUE/PART NUMBER     | SIZE               |
|-----------|-----------------------|--------------------|
| DUT       | Mini-Circuits MNA-2W+ | .118"X.118"(3X3MM) |
| C1        | 1000 pF               | 0603               |
| R1        | 33.2 Ohm              | 0805               |

Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.
3. Pins 1 and 6 have no internal connecton.
4. Paddle underneath DUT must be grounded.

 **Mini-Circuits®**



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

| Specification                  | Test/Inspection Condition                                                                                                      | Reference/Spec                                                  |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Operating Temperature          | -40° to 85°C 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                                         |



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