



SUPER WIDEBAND, HIGH GAIN

# Monolithic Amplifier

## PMA3-453+

50Ω 10 to 45 GHz

### THE BIG DEAL

- Wideband, 10 to 45 GHz
- Usable down to 9 GHz
- High Gain, 25.5 dB typ. at 20 GHz
- Low NF, 1.6 dB typ. at 20 GHz
- P1dB, 10 dBm typ. at 20 GHz
- OIP3, 22 dBm typ. at 20 GHz
- Built-in Bias Tee and DC Blocks
- Patent Pending



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

### +RoHS Compliant

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

### APPLICATIONS

- 5G
- Lab Instrument
- Satellite

### PRODUCT OVERVIEW

The PMA3-453+ is a PHEMT based wideband, low noise MMIC amplifier with a unique combination of high gain and low noise figure over a very board bandwidth making it ideal for using as the first stage driver amplifier of receiver applications. This design operates on a single 4V supply, is matched to 50 Ohm and comes in a tiny plastic package (3 x 3 x 0.89mm), accommodating dense circuit board layouts.

### KEY FEATURES

| Feature                          | Advantages  |
|----------------------------------|---|
| Low NF (<3.0dB typ.) up to 30GHz | Enables lower system noise figure performance.  |
| High Gain 20dB typ. up to 30GHz  | Enables signal amplification without the need for multiple gain stage, minimizing the effect of subsequent stages on noise figure.            |
| Built-in Bias Tee & DC Blocks    | Minimizes the external component count & PC board space, making it less expensive and user friendly for system designers.                     |
| 3 x 3mm 12-lead MCLP package     | Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB. |

REV. C  
ECO-011519  
PMA3-453+  
GY/RS/CP/AM  
240401





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# Monolithic Amplifier

## PMA3-453+

Mini-Circuits

50Ω 10 to 45 GHz

### ELECTRICAL SPECIFICATIONS<sup>1</sup> AT 25°C, V<sub>s</sub>= +4V AND R<sub>1</sub>=18Ω, UNLESS NOTED OTHERWISE

| Parameter   | Condition (GHz) | V <sub>s</sub> = +4 V |       |       | Units |
|---|-----------------|-----------------------|-------|-------|-------|
|   |                 | Min.                  | Typ.  | Max.  |       |
| Frequency Range                                       | —               | 10                    |       | 45    | GHz   |
| Noise Figure  | 10              |                       | 1.9   |       | dB    |
|   | 20              |                       | 1.6   |       |       |
|   | 30              |                       | 2.4   |       |       |
|   | 40              |                       | 3.8   |       |       |
|   | 45              |                       | 5.2   |       |       |
| Gain  | 10              | 22.5                  | 25.3  | 29.2  | dB    |
|   | 20              | 22.2                  | 25.5  | 31.1  |       |
|   | 30              | 14.5                  | 18.2  | 23.9  |       |
|   | 40              | 10.4                  | 14.1  | 18.1  |       |
|   | 45              | —                     | 9.1   | —     |       |
| Input Return Loss                                     | 10              |                       | 13    |       | dB    |
|   | 20              |                       | 21    |       |       |
|   | 30              |                       | 8     |       |       |
|   | 40              |                       | 5     |       |       |
|   | 45              |                       | 5     |       |       |
| Output Return Loss                                    | 10              |                       | 12    |       | dB    |
|   | 20              |                       | 10    |       |       |
|   | 30              |                       | 9     |       |       |
|   | 40              |                       | 15    |       |       |
|   | 45              |                       | 7     |       |       |
| Output Power @ 1 dB compression                       | 10              |                       | +8.5  |       | dBm   |
|   | 20              |                       | +10.0 |       |       |
|   | 30              |                       | +11.0 |       |       |
|   | 40              |                       | +11.7 |       |       |
|   | 45              |                       | +10.1 |       |       |
| Output IP3  | 10              |                       | +18.6 |       | dBm   |
|   | 20              |                       | +22.0 |       |       |
|   | 30              |                       | +23.4 |       |       |
|   | 40              |                       | +21.9 |       |       |
|   | 45              |                       | +21.4 |       |       |
| Supply Voltage (V <sub>s</sub> )                      |                 | +3.75                 | +4.0  | +4.25 | V     |
| Device Operating Current (I <sub>DD</sub> )           |                 |                       | 68    | 112   | mA    |
| Device Current Variation vs. Temperature <sup>2</sup> |                 |                       | -50   |       | μA/°C |
| Device Current Variation vs. Voltage                  |                 |                       | 0.02  |       | mA/mV |
| Thermal Resistance, junction-to-ground lead           |                 |                       | 106   |       | °C/W  |

1. Measured on Mini-Circuits Characterization test board TB-PMA3-453+ with thru-line loss being deducted. See Characterization Test Circuit (Fig. 1)

2. Device Current Variation vs. Temperature = (Current at 85°C - Current at -45°C)/130°C

### ABSOLUTE MAXIMUM RATINGS<sup>3</sup>

| Parameter                              | Ratings  |
|--|--|
| Operating Temperature (ground lead)    | -40°C to +85°C                                   |
| Storage Temperature                    | -65°C to +150°C                                  |
| Junction Temperature                   | +146°C   |
| Total Power Dissipation                | 0.65W  |
| Input Power (CW), V <sub>s</sub> = +4V | +23 dBm (5 minutes max.)<br>+13 dBm (continuous) |
| DC Voltage at Port 2 & 8               | +2 V   |
| DC Voltage (V <sub>s</sub> )           | +6 V   |

3. Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.





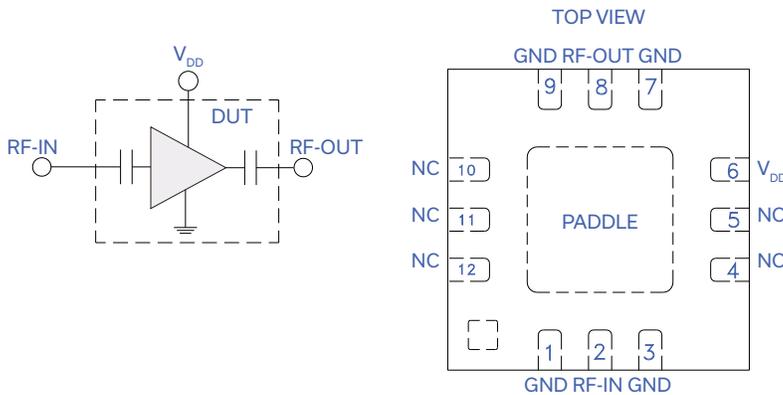
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# Monolithic Amplifier

## PMA3-453+

50Ω 10 to 45 GHz

### SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



| Function        | Pad Number       | Description (Fig. 1)                                      |
|-----------------|------------------|---|
| RF-IN           | 2                | RF Input Pad. Connects to RF input                        |
| RF-OUT          | 8                | RF Output Pad. Connects to RF output                      |
| V <sub>DD</sub> | 6                | DC Power Supply Pad. Connects to Voltage Source Vs via R1 |
| Ground          | 1,3,7,9 & Paddle | Connects to ground  |
| No Connection   | 4,5,10,11& 12    | Not used internally. Connected to ground on test board    |

### RECOMMENDED APPLICATION AND CHARACTERIZATION TEST CIRCUIT

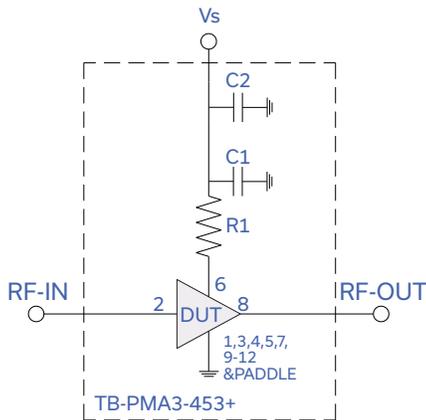


Fig 1. Application and Characterization Circuit

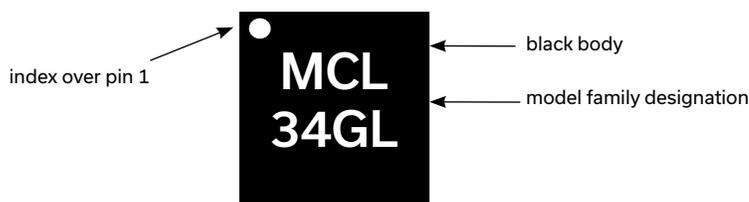
Note: This block diagram is used for characterization. (DUT is soldered on Mini-Circuits Characterization test board TB-PMA3-453+) Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5245A microwave network analyzer.

Conditions:

1. Gain and Return Loss:  $P_{IN} = -25\text{dBm}$
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart,  $-5\text{dBm/}$ tone at output.

| Component | Size | Value  | Part Number        | Manufacturer |
|-----------|------|--------|--------------------|--------------|
| R1        | 0603 | 18 Ohm | SG73G1JTDD18R0C    | KOA          |
| C1        | 0402 | 5 pF   | GJM1555C1H5R0CB01D | Murata       |
| C2        | 0402 | 0.1 uF | GRM155R71C104KA88D | Murata       |

### PRODUCT MARKING



Marking may contain other features or characters for internal lot control





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# Monolithic Amplifier

## PMA3-453+

Mini-Circuits

50Ω 10 to 45 GHz

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

|  |  |
|--|--|
| Performance Data                                     | Data Table<br>graphs, s-parameter data set (.zip file)               |
| Case Style   | DQ1225<br>Plastic package, exposed paddle, lead finish: Matte Tin    |
| Tape & Reel<br>Standard quantities available on reel | F66<br>7" reels with 20, 50, 100, 200, 500, 1K, 2K or 3K devices     |
| Suggested Layout for PCB Design                      | PL-675   |
| Evaluation Board                                     | TB-PMA3-453+ (Without connectors)<br>TB-PMA3-453C+ (With connectors) |
| Environmental Ratings                                | ENV08T1  |

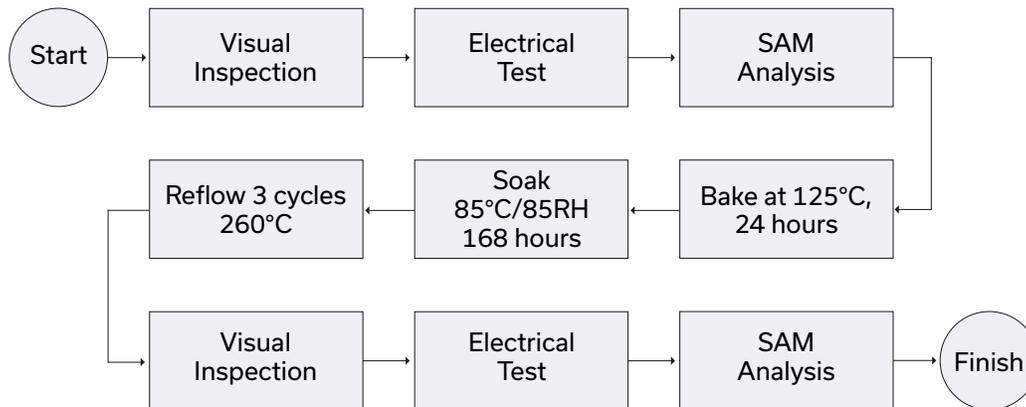
### ESD RATING

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

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.00V, Id = 68mA @ Temperature = +25°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 7.38  | 66.16     | 4.18              | 5.42               | 205.54    | 0.99    | 2.49        | -4.39            | 7.36         |
| 8000  | 19.18 | 62.70     | 9.27              | 9.75               | 63.74     | 1.00    | 13.28       | 3.34             | 3.62         |
| 9000  | 22.92 | 67.81     | 10.44             | 11.99              | 81.23     | 1.02    | 17.62       | 6.34             | 2.23         |
| 10000 | 25.39 | 60.57     | 12.03             | 12.15              | 27.79     | 1.00    | 18.22       | 8.15             | 1.81         |
| 11000 | 27.02 | 60.08     | 10.36             | 12.65              | 21.27     | 1.03    | 19.26       | 8.11             | 1.70         |
| 12000 | 28.20 | 61.13     | 8.44              | 15.64              | 20.35     | 1.11    | 18.58       | 8.65             | 1.77         |
| 13000 | 28.77 | 59.85     | 8.41              | 17.94              | 16.68     | 1.13    | 19.02       | 8.68             | 1.83         |
| 14000 | 28.70 | 56.31     | 10.46             | 12.54              | 11.52     | 1.03    | 19.73       | 8.62             | 1.79         |
| 15000 | 28.20 | 54.41     | 13.69             | 10.53              | 10.07     | 0.95    | 20.49       | 9.15             | 1.69         |
| 16000 | 27.68 | 51.56     | 16.58             | 10.77              | 7.96      | 0.93    | 21.06       | 9.41             | 1.61         |
| 17000 | 27.13 | 50.77     | 16.15             | 11.78              | 7.88      | 0.95    | 21.38       | 9.21             | 1.56         |
| 18000 | 26.59 | 49.29     | 14.63             | 12.22              | 7.08      | 0.96    | 20.90       | 8.94             | 1.57         |
| 19000 | 26.11 | 48.93     | 14.29             | 11.55              | 7.14      | 0.96    | 19.54       | 8.68             | 1.55         |
| 20000 | 25.73 | 47.20     | 15.35             | 10.87              | 6.16      | 0.93    | 20.34       | 9.44             | 1.59         |
| 21000 | 25.16 | 46.32     | 16.74             | 10.38              | 5.95      | 0.92    | 19.21       | 9.91             | 1.51         |
| 22000 | 24.01 | 46.70     | 14.76             | 9.21               | 6.80      | 0.90    | 20.96       | 10.65            | 1.54         |
| 23000 | 23.23 | 47.32     | 12.27             | 8.81               | 7.69      | 0.91    | 22.11       | 10.48            | 1.59         |
| 24000 | 22.43 | 47.48     | 10.86             | 8.69               | 8.39      | 0.92    | 21.63       | 11.05            | 1.65         |
| 25000 | 21.65 | 48.14     | 10.30             | 8.35               | 9.66      | 0.92    | 22.93       | 11.19            | 1.59         |
| 26000 | 20.86 | 48.38     | 9.42              | 7.72               | 10.38     | 0.92    | 21.22       | 11.06            | 1.81         |
| 27000 | 19.97 | 48.01     | 8.52              | 7.20               | 10.41     | 0.92    | 21.83       | 11.15            | 1.99         |
| 28000 | 19.25 | 46.14     | 7.97              | 7.34               | 8.98      | 0.95    | 22.33       | 11.16            | 2.16         |
| 29000 | 18.76 | 45.49     | 7.85              | 8.18               | 9.10      | 0.99    | 21.06       | 10.91            | 2.18         |
| 30000 | 18.34 | 45.90     | 8.17              | 9.27               | 10.56     | 1.02    | 20.56       | 11.16            | 2.27         |
| 31000 | 17.84 | 46.16     | 8.32              | 9.90               | 11.87     | 1.04    | 21.01       | 10.99            | 2.40         |
| 32000 | 17.21 | 46.83     | 7.76              | 9.49               | 13.33     | 1.04    | 21.75       | 10.56            | 2.70         |
| 33000 | 16.37 | 46.96     | 6.41              | 8.85               | 13.55     | 1.08    | 21.03       | 10.36            | 3.01         |
| 34000 | 15.53 | 46.49     | 5.04              | 8.37               | 12.50     | 1.13    | 21.29       | 10.24            | 3.39         |
| 35000 | 14.88 | 46.66     | 4.24              | 8.19               | 12.63     | 1.17    | 20.15       | 10.01            | 3.80         |
| 36000 | 13.96 | 47.31     | 3.78              | 8.01               | 14.28     | 1.19    | 21.30       | 9.83             | 3.98         |
| 37000 | 13.58 | 45.79     | 3.75              | 8.57               | 12.83     | 1.21    | 21.70       | 9.71             | 4.19         |
| 38000 | 13.19 | 44.82     | 4.16              | 9.15               | 12.93     | 1.21    | 22.13       | 10.31            | 4.10         |
| 39000 | 13.20 | 46.60     | 4.69              | 10.53              | 17.57     | 1.22    | 21.22       | 10.79            | 3.97         |
| 40000 | 13.59 | 44.74     | 4.93              | 12.17              | 14.53     | 1.24    | 22.37       | 11.68            | 3.86         |
| 41000 | 13.18 | 44.17     | 4.83              | 11.04              | 14.06     | 1.22    | 22.59       | 10.80            | 3.81         |
| 42000 | 12.05 | 44.69     | 4.50              | 9.22               | 15.66     | 1.19    | 22.72       | 10.40            | 4.16         |
| 43000 | 10.40 | 45.36     | 4.28              | 8.12               | 18.82     | 1.17    | 21.10       | 9.74             | 4.58         |
| 44000 | 8.52  | 52.61     | 4.40              | 7.75               | 53.79     | 1.14    | 21.79       | 9.25             | 5.12         |
| 45000 | 7.88  | 52.63     | 4.07              | 7.87               | 56.17     | 1.17    | 20.48       | 10.27            | 5.12         |
| 46000 | 7.69  | 49.10     | 3.74              | 8.36               | 37.46     | 1.22    | 19.38       | 10.38            | 4.97         |
| 47000 | 8.06  | 47.43     | 3.80              | 8.83               | 31.12     | 1.23    | 20.71       | 9.90             | 5.04         |
| 48000 | 9.73  | 45.19     | 4.53              | 8.03               | 21.64     | 1.14    | 19.56       | 10.44            | 4.73         |
| 49000 | 10.99 | 42.74     | 6.74              | 6.97               | 16.68     | 0.97    | 20.51       | 11.59            | 4.81         |
| 50000 | 10.73 | 42.82     | 12.03             | 6.87               | 20.79     | 0.84    | 20.31       | 12.44            | 5.56         |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.75V, Id = 63mA @ Temperature = +25°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 6.72  | 66.69     | 4.00              | 5.41               | 229.36    | 1.00    | 1.77        | -5.07            | 7.38         |
| 8000  | 18.93 | 64.83     | 9.50              | 9.82               | 84.65     | 1.00    | 12.47       | 2.55             | 3.48         |
| 9000  | 22.62 | 69.03     | 10.61             | 12.09              | 97.34     | 1.02    | 16.77       | 5.68             | 2.29         |
| 10000 | 25.07 | 58.79     | 12.08             | 12.24              | 23.53     | 1.00    | 17.26       | 7.51             | 1.79         |
| 11000 | 26.69 | 60.80     | 10.21             | 12.69              | 23.91     | 1.04    | 18.50       | 7.58             | 1.81         |
| 12000 | 27.87 | 61.71     | 8.21              | 15.65              | 22.40     | 1.12    | 18.09       | 8.12             | 1.84         |
| 13000 | 28.47 | 57.87     | 8.16              | 18.25              | 13.64     | 1.14    | 18.55       | 8.06             | 1.93         |
| 14000 | 28.43 | 54.72     | 10.16             | 12.70              | 9.85      | 1.04    | 19.01       | 8.14             | 1.85         |
| 15000 | 27.95 | 52.49     | 13.35             | 10.63              | 8.31      | 0.95    | 19.76       | 8.69             | 1.75         |
| 16000 | 27.42 | 51.84     | 16.15             | 10.85              | 8.46      | 0.93    | 20.52       | 8.81             | 1.63         |
| 17000 | 26.86 | 49.85     | 15.83             | 11.89              | 7.31      | 0.95    | 20.86       | 8.73             | 1.61         |
| 18000 | 26.32 | 48.56     | 14.38             | 12.32              | 6.72      | 0.97    | 20.19       | 8.45             | 1.59         |
| 19000 | 25.83 | 48.32     | 14.04             | 11.64              | 6.88      | 0.96    | 19.62       | 8.19             | 1.58         |
| 20000 | 25.46 | 46.87     | 15.08             | 10.96              | 6.12      | 0.94    | 19.09       | 8.83             | 1.55         |
| 21000 | 24.91 | 46.06     | 16.61             | 10.48              | 5.95      | 0.92    | 19.04       | 9.31             | 1.54         |
| 22000 | 23.79 | 46.98     | 14.85             | 9.31               | 7.23      | 0.90    | 20.51       | 10.07            | 1.49         |
| 23000 | 23.02 | 47.30     | 12.32             | 8.90               | 7.89      | 0.91    | 21.02       | 9.90             | 1.56         |
| 24000 | 22.22 | 47.73     | 10.87             | 8.78               | 8.86      | 0.93    | 21.33       | 10.47            | 1.65         |
| 25000 | 21.45 | 48.31     | 10.29             | 8.43               | 10.11     | 0.93    | 22.13       | 10.61            | 1.69         |
| 26000 | 20.65 | 47.95     | 9.39              | 7.79               | 10.13     | 0.92    | 20.99       | 10.49            | 1.80         |
| 27000 | 19.77 | 46.74     | 8.51              | 7.24               | 9.25      | 0.92    | 21.02       | 10.58            | 1.95         |
| 28000 | 19.04 | 47.45     | 7.94              | 7.35               | 10.68     | 0.95    | 20.85       | 10.59            | 2.18         |
| 29000 | 18.55 | 45.02     | 7.78              | 8.20               | 8.79      | 1.00    | 21.39       | 10.33            | 2.14         |
| 30000 | 18.13 | 45.16     | 8.08              | 9.29               | 9.91      | 1.03    | 20.69       | 10.58            | 2.25         |
| 31000 | 17.62 | 46.59     | 8.21              | 9.90               | 12.74     | 1.04    | 21.48       | 10.41            | 2.43         |
| 32000 | 16.98 | 47.12     | 7.69              | 9.49               | 14.10     | 1.04    | 20.92       | 9.99             | 2.65         |
| 33000 | 16.14 | 47.52     | 6.33              | 8.81               | 14.75     | 1.08    | 20.86       | 9.89             | 2.96         |
| 34000 | 15.28 | 46.77     | 4.98              | 8.29               | 13.16     | 1.13    | 21.47       | 9.75             | 3.36         |
| 35000 | 14.61 | 46.42     | 4.19              | 8.06               | 12.52     | 1.16    | 21.60       | 9.48             | 3.82         |
| 36000 | 13.69 | 46.42     | 3.74              | 7.89               | 13.15     | 1.18    | 21.00       | 9.42             | 3.95         |
| 37000 | 13.31 | 46.45     | 3.72              | 8.43               | 14.11     | 1.21    | 22.28       | 9.33             | 4.16         |
| 38000 | 12.93 | 45.12     | 4.12              | 9.04               | 13.67     | 1.21    | 20.68       | 9.85             | 4.04         |
| 39000 | 12.97 | 47.36     | 4.66              | 10.44              | 19.57     | 1.22    | 21.20       | 10.33            | 3.94         |
| 40000 | 13.36 | 44.39     | 4.90              | 11.97              | 14.27     | 1.24    | 21.32       | 11.15            | 3.84         |
| 41000 | 12.94 | 45.29     | 4.78              | 10.92              | 16.33     | 1.22    | 21.38       | 10.27            | 3.87         |
| 42000 | 11.81 | 43.80     | 4.46              | 9.13               | 14.42     | 1.19    | 20.57       | 9.89             | 4.25         |
| 43000 | 10.17 | 46.40     | 4.26              | 8.11               | 21.70     | 1.17    | 22.22       | 9.26             | 4.53         |
| 44000 | 8.30  | 54.38     | 4.39              | 7.74               | 67.56     | 1.14    | 20.93       | 8.76             | 4.58         |
| 45000 | 7.68  | 53.78     | 4.06              | 7.86               | 65.49     | 1.17    | 20.43       | 9.97             | 5.07         |
| 46000 | 7.50  | 49.77     | 3.73              | 8.38               | 41.40     | 1.22    | 20.84       | 10.15            | 4.74         |
| 47000 | 7.88  | 49.30     | 3.80              | 8.83               | 39.42     | 1.23    | 20.26       | 9.67             | 5.08         |
| 48000 | 9.54  | 45.75     | 4.56              | 8.06               | 23.72     | 1.14    | 19.04       | 10.11            | 4.79         |
| 49000 | 10.80 | 43.42     | 6.78              | 7.06               | 18.59     | 0.97    | 21.39       | 11.19            | 4.78         |
| 50000 | 10.51 | 42.55     | 12.09             | 6.98               | 20.83     | 0.84    | 18.84       | 12.01            | 5.69         |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.25V, Id = 73mA @ Temperature = +25°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 7.94  | 72.53     | 4.35              | 5.43               | 411.03    | 0.98    | 2.76        | -3.80            | 7.29         |
| 8000  | 19.39 | 61.47     | 9.09              | 9.68               | 53.60     | 1.00    | 14.08       | 4.07             | 3.47         |
| 9000  | 23.16 | 63.93     | 10.31             | 11.90              | 50.30     | 1.02    | 18.43       | 6.94             | 2.24         |
| 10000 | 25.64 | 64.95     | 11.98             | 12.07              | 44.52     | 1.00    | 18.54       | 8.62             | 1.80         |
| 11000 | 27.30 | 59.77     | 10.49             | 12.61              | 19.91     | 1.03    | 19.54       | 8.58             | 1.75         |
| 12000 | 28.48 | 63.04     | 8.63              | 15.65              | 24.72     | 1.11    | 19.37       | 9.24             | 1.80         |
| 13000 | 29.02 | 60.77     | 8.65              | 17.67              | 18.17     | 1.12    | 19.69       | 9.13             | 1.88         |
| 14000 | 28.92 | 56.45     | 10.72             | 12.39              | 11.46     | 1.02    | 20.17       | 9.04             | 1.79         |
| 15000 | 28.41 | 54.31     | 13.99             | 10.46              | 9.74      | 0.94    | 21.39       | 9.69             | 1.73         |
| 16000 | 27.89 | 51.75     | 16.96             | 10.71              | 7.95      | 0.93    | 21.65       | 9.83             | 1.65         |
| 17000 | 27.35 | 50.42     | 16.43             | 11.71              | 7.38      | 0.95    | 22.03       | 9.77             | 1.54         |
| 18000 | 26.82 | 49.92     | 14.84             | 12.16              | 7.41      | 0.96    | 21.20       | 9.51             | 1.57         |
| 19000 | 26.33 | 48.70     | 14.49             | 11.48              | 6.79      | 0.95    | 21.13       | 9.12             | 1.58         |
| 20000 | 25.95 | 47.19     | 15.60             | 10.79              | 6.00      | 0.93    | 20.60       | 9.86             | 1.59         |
| 21000 | 25.37 | 47.13     | 16.84             | 10.28              | 6.36      | 0.91    | 20.01       | 10.32            | 1.57         |
| 22000 | 24.19 | 46.84     | 14.70             | 9.12               | 6.75      | 0.90    | 21.01       | 11.05            | 1.50         |
| 23000 | 23.41 | 47.58     | 12.22             | 8.73               | 7.74      | 0.91    | 23.43       | 10.87            | 1.53         |
| 24000 | 22.60 | 47.81     | 10.85             | 8.61               | 8.51      | 0.92    | 21.75       | 11.57            | 1.62         |
| 25000 | 21.81 | 47.98     | 10.32             | 8.28               | 9.30      | 0.92    | 22.88       | 11.71            | 1.70         |
| 26000 | 21.02 | 48.09     | 9.44              | 7.65               | 9.84      | 0.91    | 21.31       | 11.59            | 1.82         |
| 27000 | 20.13 | 47.29     | 8.55              | 7.14               | 9.44      | 0.91    | 22.38       | 11.68            | 1.92         |
| 28000 | 19.42 | 46.74     | 8.00              | 7.28               | 9.42      | 0.94    | 22.08       | 11.68            | 2.15         |
| 29000 | 18.93 | 45.56     | 7.90              | 8.17               | 9.00      | 0.99    | 21.89       | 11.45            | 2.21         |
| 30000 | 18.52 | 45.42     | 8.24              | 9.26               | 9.82      | 1.02    | 21.58       | 11.60            | 2.31         |
| 31000 | 18.03 | 45.92     | 8.38              | 9.90               | 11.33     | 1.03    | 21.78       | 11.51            | 2.44         |
| 32000 | 17.40 | 47.07     | 7.84              | 9.53               | 13.47     | 1.04    | 21.35       | 11.10            | 2.68         |
| 33000 | 16.57 | 47.93     | 6.48              | 8.87               | 14.90     | 1.07    | 21.50       | 10.93            | 3.08         |
| 34000 | 15.75 | 46.88     | 5.09              | 8.46               | 12.84     | 1.13    | 21.91       | 10.82            | 3.43         |
| 35000 | 15.12 | 46.16     | 4.27              | 8.34               | 11.72     | 1.17    | 21.20       | 10.54            | 3.78         |
| 36000 | 14.19 | 47.36     | 3.81              | 8.14               | 14.14     | 1.19    | 20.63       | 10.39            | 4.01         |
| 37000 | 13.81 | 45.68     | 3.78              | 8.70               | 12.48     | 1.22    | 23.23       | 10.27            | 4.21         |
| 38000 | 13.40 | 45.63     | 4.18              | 9.23               | 13.93     | 1.21    | 21.24       | 10.85            | 4.10         |
| 39000 | 13.40 | 46.93     | 4.71              | 10.62              | 17.86     | 1.22    | 23.14       | 11.22            | 3.92         |
| 40000 | 13.80 | 45.55     | 4.95              | 12.26              | 15.65     | 1.24    | 22.59       | 12.14            | 3.86         |
| 41000 | 13.39 | 43.19     | 4.84              | 11.17              | 12.30     | 1.22    | 22.62       | 11.26            | 3.90         |
| 42000 | 12.26 | 45.33     | 4.51              | 9.26               | 16.46     | 1.19    | 22.28       | 10.86            | 4.11         |
| 43000 | 10.59 | 46.69     | 4.29              | 8.14               | 21.51     | 1.16    | 24.06       | 10.18            | 4.52         |
| 44000 | 8.71  | 50.95     | 4.42              | 7.75               | 43.54     | 1.14    | 21.75       | 9.68             | 5.08         |
| 45000 | 8.06  | 52.86     | 4.10              | 7.85               | 56.69     | 1.16    | 21.41       | 10.61            | 5.23         |
| 46000 | 7.84  | 48.39     | 3.75              | 8.34               | 33.98     | 1.22    | 20.31       | 10.68            | 4.90         |
| 47000 | 8.22  | 47.10     | 3.80              | 8.81               | 29.34     | 1.23    | 19.94       | 10.11            | 5.06         |
| 48000 | 9.89  | 44.72     | 4.52              | 7.95               | 20.00     | 1.14    | 19.16       | 10.72            | 4.70         |
| 49000 | 11.16 | 43.73     | 6.70              | 6.85               | 18.16     | 0.96    | 22.14       | 11.89            | 4.85         |
| 50000 | 10.92 | 43.53     | 11.89             | 6.75               | 21.88     | 0.84    | 19.89       | 12.92            | 5.48         |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.00V, Id = 73.00mA @ Temperature = -45°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 9.20  | 71.38     | 3.32              | 4.96               | 248.88    | 1.00    | 4.16        | -3.22            | 6.15         |
| 8000  | 20.99 | 60.04     | 8.54              | 9.19               | 36.32     | 1.00    | 14.71       | 4.53             | 2.55         |
| 9000  | 24.56 | 67.03     | 9.90              | 11.46              | 59.59     | 1.02    | 18.84       | 7.31             | 1.54         |
| 10000 | 26.93 | 62.18     | 11.82             | 11.41              | 27.32     | 0.99    | 19.29       | 8.88             | 1.23         |
| 11000 | 28.52 | 61.71     | 10.54             | 11.47              | 21.10     | 1.01    | 20.38       | 8.80             | 1.14         |
| 12000 | 29.70 | 66.80     | 8.43              | 14.11              | 32.12     | 1.10    | 19.93       | 9.35             | 1.24         |
| 13000 | 30.29 | 60.25     | 8.29              | 16.70              | 14.35     | 1.13    | 20.42       | 9.25             | 1.28         |
| 14000 | 30.20 | 58.82     | 10.50             | 11.68              | 12.64     | 1.02    | 21.19       | 9.30             | 1.19         |
| 15000 | 29.67 | 54.55     | 13.79             | 9.83               | 8.41      | 0.93    | 21.85       | 9.85             | 1.08         |
| 16000 | 29.13 | 52.65     | 16.32             | 9.99               | 7.39      | 0.91    | 22.34       | 10.12            | 1.08         |
| 17000 | 28.60 | 50.00     | 16.97             | 10.79              | 5.95      | 0.93    | 22.88       | 9.89             | 0.96         |
| 18000 | 28.11 | 49.46     | 15.20             | 11.50              | 5.94      | 0.95    | 21.67       | 9.48             | 1.00         |
| 19000 | 27.65 | 49.10     | 13.66             | 11.32              | 5.97      | 0.95    | 21.09       | 9.29             | 0.94         |
| 20000 | 27.35 | 47.67     | 14.29             | 10.73              | 5.28      | 0.93    | 21.71       | 9.99             | 0.94         |
| 21000 | 26.90 | 46.07     | 17.57             | 9.94               | 4.66      | 0.90    | 20.88       | 10.36            | 0.96         |
| 22000 | 25.60 | 46.68     | 14.32             | 8.55               | 5.44      | 0.88    | 21.78       | 11.06            | 0.94         |
| 23000 | 24.87 | 47.51     | 11.79             | 8.49               | 6.30      | 0.90    | 23.13       | 10.86            | 0.97         |
| 24000 | 24.15 | 48.08     | 11.19             | 8.57               | 7.27      | 0.91    | 23.02       | 11.52            | 1.07         |
| 25000 | 23.33 | 47.68     | 10.61             | 7.62               | 7.28      | 0.88    | 23.14       | 11.52            | 1.02         |
| 26000 | 22.38 | 48.14     | 8.65              | 6.88               | 7.80      | 0.89    | 21.96       | 11.30            | 1.18         |
| 27000 | 21.64 | 48.26     | 8.11              | 6.84               | 8.41      | 0.91    | 21.46       | 11.54            | 1.31         |
| 28000 | 21.06 | 47.02     | 8.46              | 6.91               | 7.90      | 0.91    | 22.06       | 11.54            | 1.37         |
| 29000 | 20.24 | 45.57     | 7.77              | 6.88               | 7.07      | 0.93    | 22.12       | 11.21            | 1.53         |
| 30000 | 19.73 | 45.30     | 7.57              | 8.25               | 7.66      | 1.01    | 21.93       | 11.47            | 1.69         |
| 31000 | 19.49 | 45.56     | 8.29              | 9.81               | 8.91      | 1.04    | 22.22       | 11.46            | 1.66         |
| 32000 | 18.95 | 46.29     | 8.64              | 8.57               | 10.05     | 0.99    | 22.00       | 10.90            | 1.83         |
| 33000 | 17.84 | 46.85     | 6.23              | 7.37               | 10.15     | 1.02    | 22.19       | 10.58            | 2.35         |
| 34000 | 16.90 | 45.44     | 4.54              | 7.55               | 8.33      | 1.12    | 22.81       | 10.45            | 2.71         |
| 35000 | 16.65 | 46.00     | 4.21              | 8.53               | 9.32      | 1.19    | 22.58       | 10.55            | 2.92         |
| 36000 | 15.68 | 46.22     | 3.89              | 7.82               | 10.12     | 1.17    | 22.13       | 10.28            | 3.01         |
| 37000 | 14.89 | 45.53     | 3.30              | 7.77               | 9.37      | 1.21    | 22.31       | 10.08            | 3.39         |
| 38000 | 14.43 | 45.13     | 3.31              | 8.59               | 9.72      | 1.25    | 21.45       | 10.50            | 3.48         |
| 39000 | 14.54 | 46.83     | 4.21              | 10.17              | 14.06     | 1.24    | 24.20       | 11.16            | 3.15         |
| 40000 | 15.03 | 44.04     | 4.42              | 11.55              | 10.35     | 1.26    | 25.65       | 11.91            | 2.92         |
| 41000 | 14.45 | 43.55     | 4.05              | 10.81              | 9.87      | 1.27    | 25.34       | 11.21            | 3.11         |
| 42000 | 13.78 | 44.70     | 4.21              | 10.44              | 12.42     | 1.25    | 21.15       | 11.36            | 3.17         |
| 43000 | 12.13 | 44.06     | 4.01              | 8.06               | 12.46     | 1.18    | 21.31       | 10.34            | 3.50         |
| 44000 | 9.55  | 51.31     | 3.51              | 6.60               | 32.49     | 1.13    | 23.84       | 9.97             | 4.46         |
| 45000 | 8.81  | 52.65     | 3.27              | 7.30               | 41.40     | 1.20    | 21.79       | 10.98            | 4.55         |
| 46000 | 9.30  | 49.00     | 3.82              | 9.63               | 31.26     | 1.26    | 21.61       | 10.83            | 4.16         |
| 47000 | 9.29  | 46.97     | 3.78              | 9.03               | 24.42     | 1.24    | 21.82       | 10.27            | 3.46         |
| 48000 | 10.22 | 44.76     | 3.25              | 7.20               | 14.48     | 1.20    | 21.59       | 10.74            | 4.73         |
| 49000 | 11.66 | 43.32     | 4.36              | 6.16               | 12.32     | 1.04    | 22.26       | 12.20            | 4.19         |
| 50000 | 12.51 | 41.67     | 9.97              | 6.47               | 13.60     | 0.84    | 20.09       | 13.14            | 3.64         |

## 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 = 3.75V, Id = 68mA @ Temperature = -45°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 8.59  | 64.46     | 3.20              | 4.96               | 117.39    | 1.01    | 4.41        | -3.91            | 6.18         |
| 8000  | 20.78 | 63.57     | 8.71              | 9.27               | 56.32     | 1.00    | 13.88       | 3.75             | 2.63         |
| 9000  | 24.29 | 68.38     | 10.06             | 11.57              | 72.23     | 1.02    | 18.06       | 6.53             | 1.60         |
| 10000 | 26.64 | 60.10     | 11.91             | 11.49              | 22.32     | 0.99    | 18.48       | 8.37             | 1.20         |
| 11000 | 28.22 | 60.24     | 10.42             | 11.54              | 18.42     | 1.01    | 19.43       | 8.15             | 1.13         |
| 12000 | 29.39 | 63.00     | 8.24              | 14.12              | 21.33     | 1.11    | 19.81       | 8.81             | 1.25         |
| 13000 | 30.00 | 61.84     | 8.06              | 16.95              | 17.67     | 1.13    | 19.66       | 8.74             | 1.32         |
| 14000 | 29.94 | 57.13     | 10.18             | 11.83              | 10.67     | 1.02    | 20.48       | 8.82             | 1.15         |
| 15000 | 29.43 | 54.66     | 13.49             | 9.90               | 8.73      | 0.93    | 20.82       | 9.38             | 1.14         |
| 16000 | 28.89 | 52.91     | 16.03             | 10.06              | 7.82      | 0.92    | 21.78       | 9.65             | 1.03         |
| 17000 | 28.35 | 50.53     | 16.52             | 10.85              | 6.48      | 0.93    | 22.93       | 9.28             | 0.98         |
| 18000 | 27.86 | 49.51     | 14.94             | 11.58              | 6.15      | 0.95    | 21.57       | 8.87             | 1.01         |
| 19000 | 27.39 | 48.48     | 13.51             | 11.39              | 5.72      | 0.96    | 21.92       | 8.65             | 0.99         |
| 20000 | 27.10 | 47.24     | 14.16             | 10.80              | 5.18      | 0.93    | 21.76       | 9.36             | 1.00         |
| 21000 | 26.66 | 46.22     | 17.15             | 10.05              | 4.87      | 0.90    | 20.23       | 9.75             | 1.00         |
| 22000 | 25.40 | 46.51     | 14.49             | 8.68               | 5.48      | 0.88    | 21.22       | 10.47            | 0.94         |
| 23000 | 24.67 | 47.37     | 11.86             | 8.57               | 6.37      | 0.90    | 24.75       | 10.28            | 0.98         |
| 24000 | 23.95 | 47.39     | 11.16             | 8.64               | 6.88      | 0.92    | 21.00       | 10.93            | 0.97         |
| 25000 | 23.14 | 47.71     | 10.54             | 7.71               | 7.46      | 0.89    | 23.96       | 10.94            | 1.02         |
| 26000 | 22.21 | 47.45     | 8.75              | 6.96               | 7.41      | 0.89    | 22.02       | 10.70            | 1.16         |
| 27000 | 21.45 | 46.18     | 8.11              | 6.89               | 6.78      | 0.91    | 23.52       | 10.86            | 1.27         |
| 28000 | 20.84 | 45.81     | 8.32              | 6.96               | 7.03      | 0.91    | 20.85       | 10.96            | 1.29         |
| 29000 | 20.05 | 45.43     | 7.78              | 6.95               | 7.13      | 0.94    | 22.12       | 10.53            | 1.54         |
| 30000 | 19.54 | 45.04     | 7.59              | 8.26               | 7.60      | 1.01    | 21.37       | 10.77            | 1.68         |
| 31000 | 19.27 | 45.55     | 8.21              | 9.81               | 9.09      | 1.04    | 23.11       | 10.76            | 1.67         |
| 32000 | 18.73 | 46.14     | 8.46              | 8.61               | 10.08     | 0.99    | 22.40       | 10.30            | 1.82         |
| 33000 | 17.63 | 47.89     | 6.25              | 7.38               | 11.78     | 1.02    | 23.86       | 10.00            | 2.32         |
| 34000 | 16.68 | 46.78     | 4.54              | 7.49               | 9.96      | 1.12    | 22.58       | 9.86             | 2.74         |
| 35000 | 16.37 | 44.99     | 4.16              | 8.38               | 8.45      | 1.18    | 20.76       | 9.86             | 2.87         |
| 36000 | 15.40 | 46.02     | 3.83              | 7.71               | 10.03     | 1.17    | 21.32       | 9.74             | 3.02         |
| 37000 | 14.66 | 45.35     | 3.31              | 7.66               | 9.40      | 1.20    | 21.81       | 9.45             | 3.24         |
| 38000 | 14.22 | 44.61     | 3.34              | 8.50               | 9.42      | 1.24    | 20.49       | 10.00            | 3.46         |
| 39000 | 14.30 | 46.35     | 4.19              | 10.09              | 13.61     | 1.24    | 21.19       | 10.56            | 3.13         |
| 40000 | 14.78 | 45.03     | 4.42              | 11.40              | 11.88     | 1.26    | 30.04       | 11.30            | 3.00         |
| 41000 | 14.25 | 44.74     | 4.06              | 10.69              | 11.56     | 1.27    | 22.93       | 10.73            | 3.00         |
| 42000 | 13.53 | 45.47     | 4.18              | 10.33              | 13.86     | 1.25    | 23.10       | 10.76            | 3.19         |
| 43000 | 11.92 | 44.45     | 4.02              | 8.07               | 13.42     | 1.18    | 22.80       | 9.87             | 3.51         |
| 44000 | 9.39  | 50.77     | 3.58              | 6.65               | 31.53     | 1.13    | 24.03       | 9.52             | 4.29         |
| 45000 | 8.64  | 52.23     | 3.30              | 7.32               | 40.58     | 1.20    | 21.60       | 10.47            | 4.45         |
| 46000 | 9.03  | 48.79     | 3.70              | 9.56               | 30.78     | 1.27    | 20.41       | 10.34            | 3.87         |
| 47000 | 9.09  | 47.65     | 3.76              | 9.05               | 26.96     | 1.25    | 20.83       | 9.81             | 3.65         |
| 48000 | 10.13 | 45.43     | 3.37              | 7.29               | 16.35     | 1.20    | 19.98       | 10.22            | 3.92         |
| 49000 | 11.55 | 43.23     | 4.51              | 6.31               | 12.72     | 1.04    | 22.37       | 11.70            | 3.72         |
| 50000 | 12.31 | 42.28     | 10.01             | 6.63               | 15.08     | 0.85    | 19.25       | 12.63            | 3.97         |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.25V, Id = 78mA @ Temperature = -45°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 9.76  | 64.96     | 3.45              | 4.95               | 114.18    | 0.99    | 5.18        | -2.76            | 6.13         |
| 8000  | 21.18 | 64.80     | 8.35              | 9.13               | 60.90     | 1.01    | 15.54       | 5.26             | 2.61         |
| 9000  | 24.79 | 64.81     | 9.78              | 11.38              | 44.71     | 1.03    | 19.35       | 7.92             | 1.50         |
| 10000 | 27.17 | 63.81     | 11.76             | 11.31              | 31.96     | 0.99    | 19.73       | 9.47             | 1.19         |
| 11000 | 28.78 | 60.47     | 10.63             | 11.42              | 17.78     | 1.01    | 20.56       | 9.27             | 1.15         |
| 12000 | 29.97 | 62.74     | 8.59              | 14.13              | 19.61     | 1.10    | 20.93       | 9.95             | 1.20         |
| 13000 | 30.54 | 60.98     | 8.51              | 16.49              | 15.28     | 1.12    | 20.71       | 9.71             | 1.31         |
| 14000 | 30.42 | 58.50     | 10.77             | 11.55              | 11.92     | 1.01    | 21.53       | 9.86             | 1.22         |
| 15000 | 29.87 | 54.38     | 14.08             | 9.77               | 8.07      | 0.92    | 22.01       | 10.39            | 1.02         |
| 16000 | 29.33 | 52.34     | 16.62             | 9.92               | 6.97      | 0.91    | 23.27       | 10.68            | 0.97         |
| 17000 | 28.81 | 50.54     | 17.37             | 10.71              | 6.17      | 0.92    | 24.00       | 10.45            | 0.97         |
| 18000 | 28.33 | 50.69     | 15.51             | 11.41              | 6.65      | 0.95    | 22.47       | 10.05            | 0.95         |
| 19000 | 27.87 | 48.97     | 13.82             | 11.26              | 5.73      | 0.95    | 22.71       | 9.87             | 0.92         |
| 20000 | 27.57 | 47.98     | 14.47             | 10.66              | 5.33      | 0.93    | 22.16       | 10.56            | 0.95         |
| 21000 | 27.10 | 46.51     | 17.91             | 9.84               | 4.78      | 0.89    | 20.92       | 10.91            | 0.97         |
| 22000 | 25.78 | 46.48     | 14.19             | 8.46               | 5.19      | 0.87    | 22.57       | 11.60            | 1.00         |
| 23000 | 25.04 | 47.75     | 11.75             | 8.42               | 6.33      | 0.90    | 23.01       | 11.41            | 0.93         |
| 24000 | 24.33 | 48.46     | 11.22             | 8.50               | 7.42      | 0.91    | 23.31       | 12.08            | 1.01         |
| 25000 | 23.50 | 48.05     | 10.62             | 7.53               | 7.41      | 0.88    | 23.44       | 12.06            | 1.05         |
| 26000 | 22.54 | 47.91     | 8.61              | 6.82               | 7.43      | 0.89    | 22.55       | 11.93            | 1.21         |
| 27000 | 21.82 | 47.56     | 8.12              | 6.81               | 7.59      | 0.90    | 24.06       | 12.07            | 1.31         |
| 28000 | 21.24 | 46.60     | 8.54              | 6.88               | 7.38      | 0.90    | 21.35       | 12.08            | 1.37         |
| 29000 | 20.41 | 46.14     | 7.82              | 6.85               | 7.41      | 0.93    | 21.46       | 11.74            | 1.57         |
| 30000 | 19.91 | 45.36     | 7.59              | 8.26               | 7.57      | 1.01    | 21.55       | 12.03            | 1.70         |
| 31000 | 19.69 | 45.60     | 8.37              | 9.85               | 8.78      | 1.04    | 22.83       | 12.01            | 1.80         |
| 32000 | 19.16 | 46.73     | 8.75              | 8.51               | 10.34     | 0.98    | 22.43       | 11.44            | 1.81         |
| 33000 | 18.04 | 47.18     | 6.24              | 7.35               | 10.30     | 1.02    | 21.61       | 11.10            | 2.24         |
| 34000 | 17.12 | 45.44     | 4.53              | 7.64               | 8.12      | 1.13    | 22.13       | 11.03            | 2.75         |
| 35000 | 16.91 | 45.30     | 4.27              | 8.71               | 8.47      | 1.19    | 21.53       | 11.05            | 2.86         |
| 36000 | 15.94 | 46.15     | 3.93              | 7.97               | 9.84      | 1.17    | 22.13       | 10.79            | 3.06         |
| 37000 | 15.12 | 45.86     | 3.28              | 7.86               | 9.46      | 1.22    | 22.07       | 10.55            | 3.39         |
| 38000 | 14.64 | 45.55     | 3.29              | 8.64               | 9.92      | 1.26    | 21.26       | 11.02            | 3.48         |
| 39000 | 14.76 | 45.98     | 4.22              | 10.27              | 12.49     | 1.24    | 23.28       | 11.80            | 3.05         |
| 40000 | 15.25 | 43.59     | 4.43              | 11.69              | 9.63      | 1.26    | 24.01       | 12.37            | 2.93         |
| 41000 | 14.66 | 42.90     | 4.01              | 10.93              | 8.93      | 1.28    | 22.59       | 11.67            | 3.10         |
| 42000 | 14.02 | 42.88     | 4.23              | 10.56              | 9.87      | 1.25    | 22.11       | 11.81            | 3.17         |
| 43000 | 12.34 | 45.64     | 4.00              | 8.08               | 14.58     | 1.18    | 23.02       | 10.77            | 3.49         |
| 44000 | 9.71  | 51.52     | 3.45              | 6.54               | 32.13     | 1.13    | 23.13       | 10.34            | 4.41         |
| 45000 | 8.99  | 51.59     | 3.23              | 7.27               | 35.61     | 1.20    | 21.87       | 11.33            | 4.44         |
| 46000 | 9.53  | 47.80     | 3.85              | 9.69               | 26.65     | 1.26    | 20.79       | 11.17            | 4.18         |
| 47000 | 9.47  | 47.05     | 3.74              | 8.97               | 23.90     | 1.25    | 20.59       | 10.59            | 3.48         |
| 48000 | 10.33 | 45.32     | 3.14              | 7.14               | 14.88     | 1.21    | 22.06       | 11.07            | 4.74         |
| 49000 | 11.79 | 43.80     | 4.24              | 6.07               | 12.51     | 1.04    | 19.72       | 12.62            | 4.46         |
| 50000 | 12.70 | 42.30     | 9.91              | 6.35               | 14.16     | 0.84    | 17.65       | 13.64            | 3.97         |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.00V, Id = 65mA @ Temperature = +85°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 5.57  | 66.61     | 4.83              | 5.80               | 300.74    | 0.98    | 0.90        | -5.67            | 8.40         |
| 8000  | 17.61 | 61.73     | 10.07             | 10.24              | 71.13     | 0.99    | 12.20       | 2.23             | 4.35         |
| 9000  | 21.52 | 75.40     | 11.12             | 12.64              | 236.03    | 1.02    | 16.60       | 5.42             | 2.88         |
| 10000 | 24.07 | 59.56     | 12.40             | 12.85              | 29.39     | 1.00    | 17.28       | 7.31             | 2.45         |
| 11000 | 25.72 | 61.37     | 10.18             | 13.58              | 29.03     | 1.05    | 18.27       | 7.30             | 2.35         |
| 12000 | 26.90 | 60.85     | 8.28              | 17.42              | 23.16     | 1.13    | 17.77       | 7.97             | 2.40         |
| 13000 | 27.53 | 60.61     | 8.37              | 18.92              | 21.25     | 1.13    | 18.35       | 7.92             | 2.43         |
| 14000 | 27.47 | 55.28     | 10.61             | 12.90              | 11.99     | 1.03    | 18.99       | 8.00             | 2.39         |
| 15000 | 27.04 | 53.77     | 13.45             | 11.28              | 10.92     | 0.96    | 19.84       | 8.58             | 2.28         |
| 16000 | 26.52 | 50.76     | 16.04             | 11.61              | 8.47      | 0.95    | 20.83       | 8.72             | 2.22         |
| 17000 | 25.97 | 49.89     | 15.67             | 12.36              | 8.27      | 0.96    | 20.53       | 8.63             | 2.13         |
| 18000 | 25.40 | 49.14     | 14.37             | 12.69              | 8.11      | 0.97    | 19.84       | 8.34             | 2.12         |
| 19000 | 24.89 | 49.32     | 14.15             | 11.94              | 8.74      | 0.97    | 19.63       | 8.19             | 2.12         |
| 20000 | 24.45 | 47.38     | 15.95             | 11.01              | 7.41      | 0.94    | 19.94       | 8.91             | 2.07         |
| 21000 | 23.79 | 46.20     | 16.88             | 10.24              | 6.92      | 0.91    | 19.06       | 9.31             | 2.12         |
| 22000 | 22.70 | 46.97     | 14.28             | 9.39               | 8.26      | 0.91    | 20.55       | 10.11            | 2.11         |
| 23000 | 22.00 | 47.54     | 12.40             | 9.47               | 9.40      | 0.93    | 21.72       | 9.84             | 2.15         |
| 24000 | 21.25 | 48.18     | 11.40             | 9.51               | 10.92     | 0.95    | 21.30       | 10.58            | 2.22         |
| 25000 | 20.38 | 48.17     | 10.77             | 8.73               | 11.66     | 0.93    | 22.23       | 10.67            | 2.28         |
| 26000 | 19.56 | 47.81     | 9.55              | 7.96               | 11.64     | 0.93    | 20.93       | 10.55            | 2.41         |
| 27000 | 18.70 | 46.85     | 8.46              | 7.63               | 10.94     | 0.94    | 21.61       | 10.66            | 2.58         |
| 28000 | 18.01 | 46.53     | 7.86              | 7.87               | 11.23     | 0.97    | 20.05       | 10.85            | 2.59         |
| 29000 | 17.55 | 46.11     | 7.87              | 8.72               | 11.68     | 1.01    | 20.28       | 10.40            | 2.83         |
| 30000 | 17.16 | 45.65     | 8.06              | 10.21              | 12.27     | 1.05    | 21.26       | 10.71            | 3.00         |
| 31000 | 16.76 | 46.09     | 8.55              | 11.18              | 14.17     | 1.06    | 21.29       | 10.70            | 3.15         |
| 32000 | 16.08 | 46.81     | 8.01              | 10.30              | 16.01     | 1.06    | 21.80       | 10.22            | 3.31         |
| 33000 | 15.14 | 47.85     | 6.34              | 9.04               | 17.78     | 1.08    | 21.61       | 10.05            | 3.78         |
| 34000 | 14.34 | 47.43     | 4.96              | 8.60               | 16.41     | 1.14    | 20.59       | 9.93             | 4.19         |
| 35000 | 13.70 | 47.57     | 4.19              | 8.64               | 16.62     | 1.19    | 20.73       | 9.77             | 4.58         |
| 36000 | 12.94 | 48.09     | 3.97              | 8.61               | 18.90     | 1.20    | 21.08       | 9.44             | 4.79         |
| 37000 | 12.53 | 45.24     | 4.09              | 8.99               | 14.83     | 1.21    | 21.79       | 9.21             | 4.97         |
| 38000 | 12.14 | 45.65     | 4.58              | 9.39               | 17.46     | 1.19    | 21.67       | 9.79             | 4.90         |
| 39000 | 12.40 | 45.55     | 5.14              | 11.19              | 18.66     | 1.20    | 22.46       | 10.38            | 4.78         |
| 40000 | 12.68 | 46.01     | 5.33              | 12.24              | 20.00     | 1.21    | 23.15       | 11.29            | 4.71         |
| 41000 | 12.11 | 45.13     | 5.04              | 10.64              | 18.49     | 1.20    | 22.56       | 10.50            | 4.75         |
| 42000 | 10.86 | 46.94     | 4.70              | 9.05               | 24.18     | 1.17    | 21.14       | 10.44            | 5.20         |
| 43000 | 9.23  | 46.92     | 4.65              | 7.90               | 27.43     | 1.13    | 21.33       | 9.16             | 5.54         |
| 44000 | 7.49  | 56.56     | 4.78              | 7.37               | 101.08    | 1.09    | 21.10       | 8.82             | 6.35         |
| 45000 | 7.11  | 53.24     | 4.42              | 7.81               | 70.97     | 1.14    | 20.06       | 9.23             | 5.80         |
| 46000 | 6.98  | 50.62     | 4.19              | 9.05               | 54.76     | 1.21    | 21.11       | 9.24             | 5.75         |
| 47000 | 7.42  | 48.47     | 4.35              | 9.44               | 42.91     | 1.21    | 21.02       | 8.78             | 6.47         |
| 48000 | 8.97  | 46.09     | 5.06              | 7.90               | 28.50     | 1.10    | 21.36       | 9.79             | 5.55         |
| 49000 | 10.01 | 44.04     | 7.25              | 6.90               | 23.03     | 0.94    | 20.54       | 10.85            | 5.83         |
| 50000 | 9.69  | 44.81     | 12.18             | 6.94               | 30.86     | 0.84    | 22.03       | 11.51            | 6.62         |

## 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 = 3.75V, Id = 60mA @ Temperature = +85°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 4.93  | 70.49     | 4.64              | 5.79               | 494.67    | 0.99    | -0.98       | -6.18            | 8.51         |
| 8000  | 17.35 | 62.79     | 10.33             | 10.30              | 83.56     | 0.99    | 11.46       | 1.57             | 4.15         |
| 9000  | 21.22 | 66.65     | 11.27             | 12.74              | 89.59     | 1.02    | 16.30       | 4.77             | 2.99         |
| 10000 | 23.76 | 61.99     | 12.42             | 12.92              | 40.37     | 1.00    | 16.60       | 6.81             | 2.44         |
| 11000 | 25.39 | 59.15     | 10.02             | 13.63              | 23.26     | 1.05    | 17.66       | 6.79             | 2.31         |
| 12000 | 26.57 | 60.81     | 8.07              | 17.37              | 23.73     | 1.14    | 17.52       | 7.47             | 2.46         |
| 13000 | 27.23 | 59.82     | 8.12              | 19.31              | 19.89     | 1.14    | 17.75       | 7.44             | 2.51         |
| 14000 | 27.21 | 54.43     | 10.31             | 13.10              | 11.15     | 1.04    | 18.31       | 7.55             | 2.39         |
| 15000 | 26.80 | 53.32     | 13.11             | 11.38              | 10.64     | 0.97    | 19.27       | 8.15             | 2.28         |
| 16000 | 26.27 | 50.97     | 15.64             | 11.67              | 8.93      | 0.95    | 19.73       | 8.28             | 2.23         |
| 17000 | 25.71 | 50.01     | 15.38             | 12.46              | 8.64      | 0.97    | 19.92       | 8.18             | 2.13         |
| 18000 | 25.14 | 49.07     | 14.15             | 12.81              | 8.28      | 0.98    | 19.38       | 7.89             | 2.13         |
| 19000 | 24.62 | 48.33     | 13.91             | 12.05              | 8.04      | 0.97    | 19.10       | 7.61             | 2.13         |
| 20000 | 24.20 | 47.16     | 15.66             | 11.11              | 7.44      | 0.94    | 19.14       | 8.33             | 2.17         |
| 21000 | 23.56 | 45.86     | 16.78             | 10.37              | 6.86      | 0.92    | 18.58       | 8.87             | 2.13         |
| 22000 | 22.50 | 46.44     | 14.36             | 9.51               | 7.99      | 0.91    | 19.61       | 9.55             | 2.17         |
| 23000 | 21.80 | 47.22     | 12.41             | 9.57               | 9.30      | 0.93    | 20.32       | 9.29             | 2.10         |
| 24000 | 21.05 | 47.08     | 11.43             | 9.59               | 9.89      | 0.95    | 20.69       | 10.03            | 2.43         |
| 25000 | 20.20 | 47.98     | 10.75             | 8.83               | 11.68     | 0.94    | 21.96       | 10.13            | 2.31         |
| 26000 | 19.37 | 48.10     | 9.54              | 8.04               | 12.31     | 0.93    | 20.58       | 10.01            | 2.42         |
| 27000 | 18.52 | 47.54     | 8.46              | 7.67               | 12.11     | 0.94    | 21.61       | 10.21            | 2.57         |
| 28000 | 17.82 | 46.91     | 7.84              | 7.91               | 12.01     | 0.98    | 22.38       | 10.19            | 2.78         |
| 29000 | 17.35 | 46.67     | 7.81              | 8.76               | 12.74     | 1.02    | 20.48       | 9.85             | 2.90         |
| 30000 | 16.96 | 46.38     | 7.97              | 10.18              | 13.61     | 1.05    | 20.09       | 10.15            | 2.99         |
| 31000 | 16.55 | 46.88     | 8.44              | 11.12              | 15.81     | 1.06    | 20.55       | 10.13            | 3.10         |
| 32000 | 15.88 | 47.28     | 7.93              | 10.28              | 17.23     | 1.06    | 20.50       | 9.56             | 3.36         |
| 33000 | 14.91 | 48.08     | 6.28              | 8.98               | 18.60     | 1.09    | 21.33       | 9.39             | 3.77         |
| 34000 | 14.10 | 48.07     | 4.91              | 8.51               | 17.99     | 1.14    | 21.38       | 9.35             | 4.26         |
| 35000 | 13.45 | 47.05     | 4.14              | 8.47               | 15.93     | 1.19    | 21.36       | 9.17             | 4.62         |
| 36000 | 12.69 | 46.80     | 3.92              | 8.42               | 16.60     | 1.20    | 20.91       | 8.97             | 4.79         |
| 37000 | 12.28 | 45.62     | 4.04              | 8.84               | 15.74     | 1.20    | 21.34       | 8.75             | 5.13         |
| 38000 | 11.90 | 45.75     | 4.54              | 9.33               | 17.96     | 1.19    | 20.97       | 9.35             | 5.00         |
| 39000 | 12.17 | 45.38     | 5.09              | 11.08              | 18.63     | 1.20    | 21.15       | 9.85             | 4.79         |
| 40000 | 12.46 | 44.14     | 5.29              | 12.13              | 16.50     | 1.21    | 23.23       | 10.88            | 4.76         |
| 41000 | 11.88 | 44.28     | 5.03              | 10.54              | 17.18     | 1.20    | 20.63       | 9.99             | 4.71         |
| 42000 | 10.64 | 45.26     | 4.67              | 8.96               | 20.30     | 1.17    | 20.51       | 9.92             | 5.20         |
| 43000 | 9.02  | 47.79     | 4.61              | 7.88               | 30.91     | 1.13    | 21.71       | 8.81             | 5.54         |
| 44000 | 7.30  | 54.06     | 4.74              | 7.37               | 77.07     | 1.09    | 20.57       | 8.64             | 5.44         |
| 45000 | 6.93  | 52.65     | 4.39              | 7.81               | 67.53     | 1.14    | 19.44       | 8.93             | 6.24         |
| 46000 | 6.80  | 49.89     | 4.18              | 9.03               | 51.38     | 1.21    | 19.44       | 8.95             | 5.76         |
| 47000 | 7.25  | 47.65     | 4.34              | 9.45               | 39.80     | 1.22    | 21.69       | 8.58             | 6.55         |
| 48000 | 8.80  | 45.73     | 5.07              | 7.96               | 27.97     | 1.10    | 22.33       | 9.50             | 5.79         |
| 49000 | 9.83  | 44.34     | 7.31              | 6.99               | 24.53     | 0.95    | 19.24       | 10.55            | 6.19         |
| 50000 | 9.48  | 44.82     | 12.23             | 7.03               | 31.86     | 0.85    | 21.36       | 11.18            | 6.18         |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

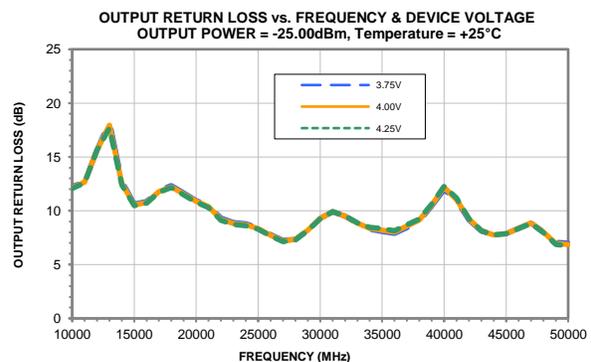
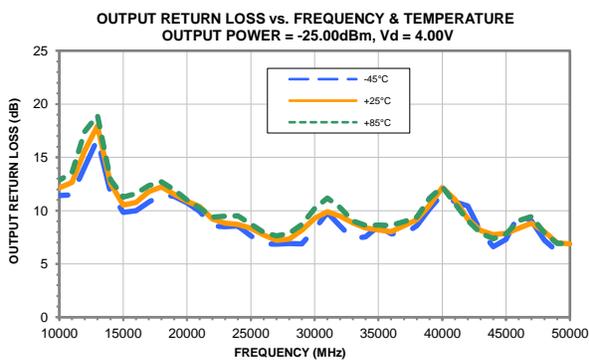
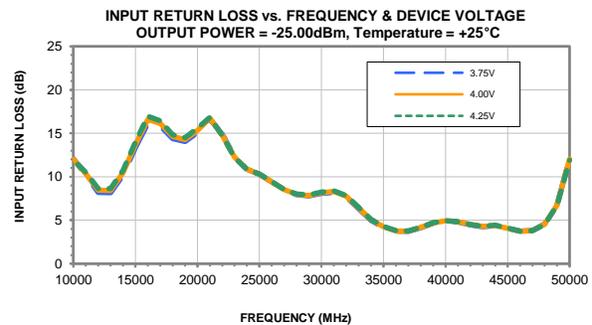
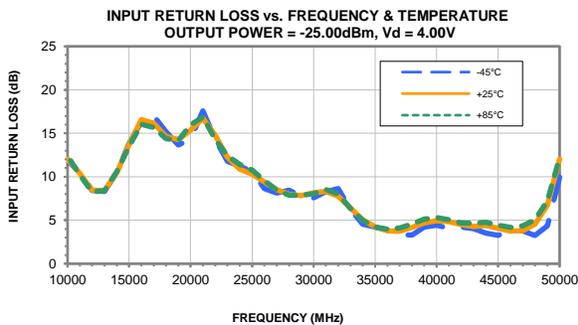
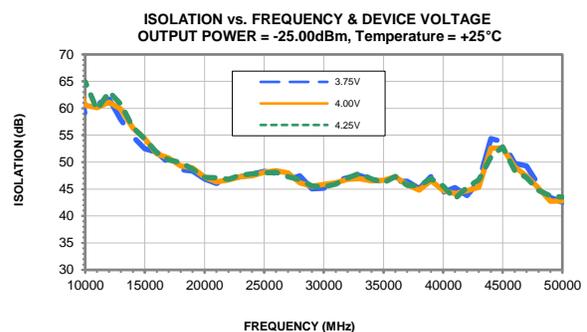
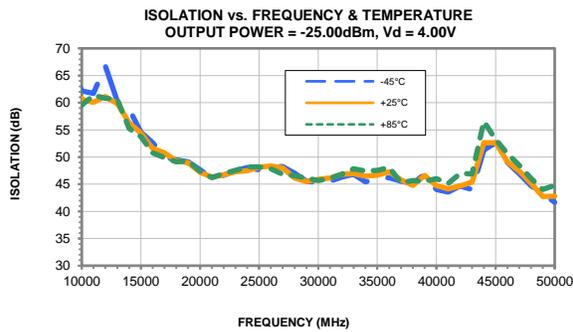
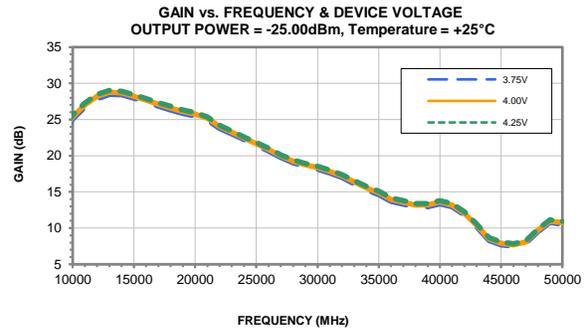
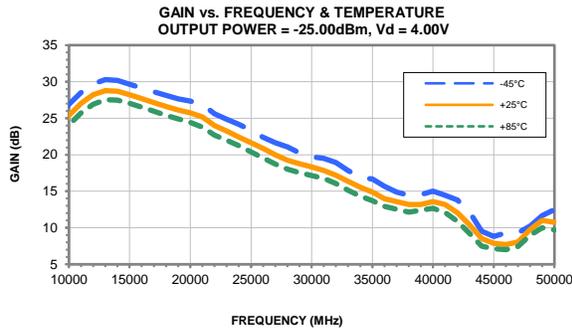
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

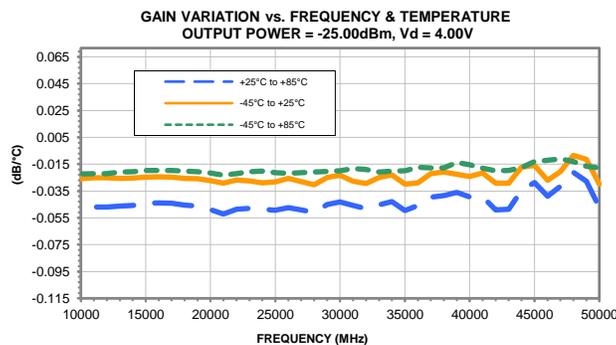
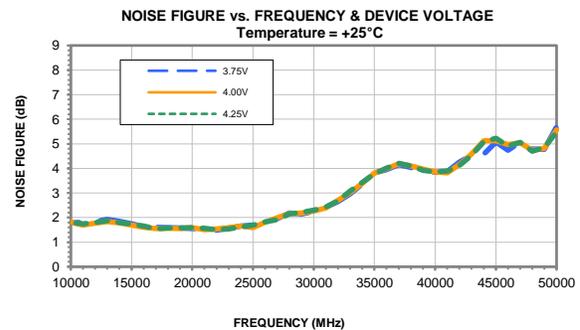
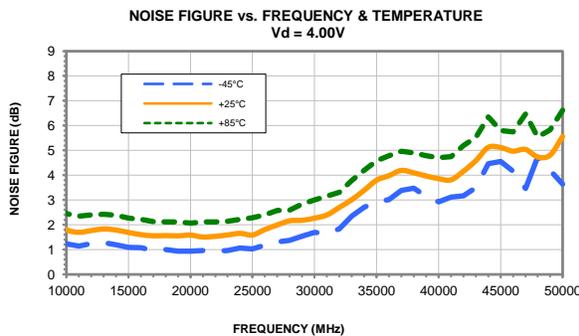
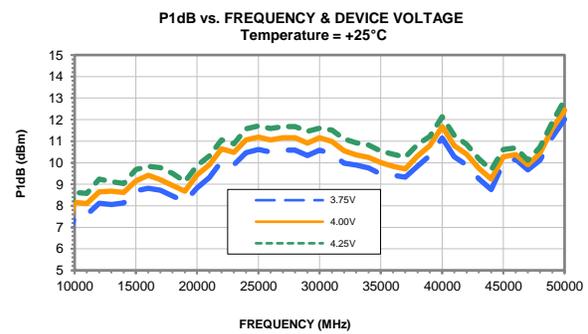
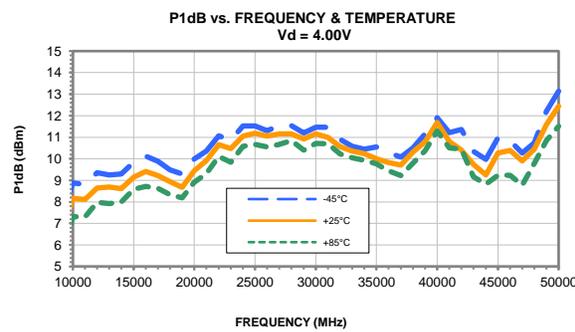
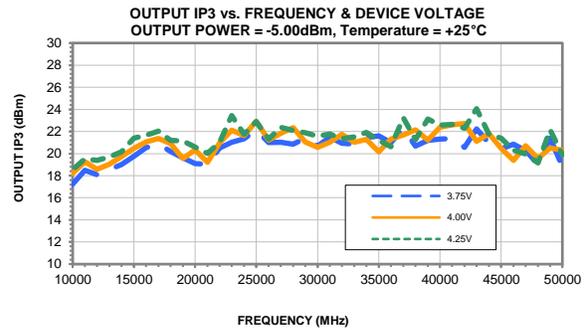
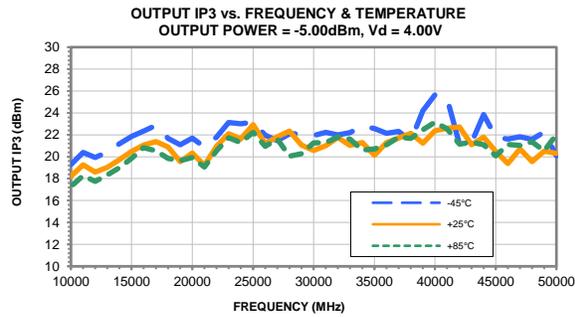
TEST CONDITIONS: Vd = 4.25V, Id = 69mA @ Temperature = +85°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
|       |       |           |                   |                    | K         | Measure |             |                  |              |
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 7000  | 6.12  | 71.20     | 5.02              | 5.80               | 489.76    | 0.97    | 2.88        | -5.10            | 8.32         |
| 8000  | 17.83 | 63.89     | 9.85              | 10.17              | 88.41     | 1.00    | 13.18       | 2.96             | 4.24         |
| 9000  | 21.77 | 64.96     | 10.97             | 12.54              | 68.57     | 1.02    | 17.19       | 6.02             | 2.88         |
| 10000 | 24.34 | 60.01     | 12.38             | 12.74              | 29.97     | 1.00    | 17.64       | 7.76             | 2.45         |
| 11000 | 26.00 | 59.24     | 10.31             | 13.57              | 22.07     | 1.05    | 18.85       | 7.75             | 2.30         |
| 12000 | 27.17 | 60.87     | 8.48              | 17.46              | 22.65     | 1.12    | 18.67       | 8.42             | 2.36         |
| 13000 | 27.78 | 59.41     | 8.59              | 18.63              | 18.12     | 1.12    | 18.94       | 8.34             | 2.40         |
| 14000 | 27.68 | 56.75     | 10.90             | 12.77              | 13.93     | 1.02    | 19.55       | 8.39             | 2.39         |
| 15000 | 27.25 | 54.19     | 13.76             | 11.20              | 11.20     | 0.96    | 20.41       | 8.85             | 2.31         |
| 16000 | 26.73 | 51.64     | 16.37             | 11.52              | 9.16      | 0.95    | 21.41       | 9.11             | 2.22         |
| 17000 | 26.18 | 49.83     | 15.93             | 12.27              | 8.02      | 0.96    | 21.46       | 9.02             | 2.14         |
| 18000 | 25.62 | 49.53     | 14.59             | 12.60              | 8.27      | 0.97    | 20.71       | 8.87             | 2.13         |
| 19000 | 25.10 | 48.88     | 14.34             | 11.87              | 8.11      | 0.96    | 20.66       | 8.60             | 2.11         |
| 20000 | 24.65 | 47.36     | 16.21             | 10.92              | 7.21      | 0.93    | 20.34       | 9.31             | 2.15         |
| 21000 | 23.98 | 46.71     | 16.94             | 10.15              | 7.17      | 0.91    | 19.57       | 9.69             | 2.08         |
| 22000 | 22.87 | 47.27     | 14.20             | 9.30               | 8.35      | 0.91    | 20.77       | 10.48            | 2.03         |
| 23000 | 22.17 | 47.40     | 12.34             | 9.40               | 9.06      | 0.93    | 22.55       | 10.20            | 2.12         |
| 24000 | 21.40 | 48.18     | 11.40             | 9.45               | 10.71     | 0.94    | 21.17       | 11.08            | 2.23         |
| 25000 | 20.53 | 48.09     | 10.79             | 8.66               | 11.34     | 0.93    | 22.24       | 11.17            | 2.27         |
| 26000 | 19.71 | 48.71     | 9.57              | 7.90               | 12.66     | 0.92    | 20.98       | 11.06            | 2.44         |
| 27000 | 18.85 | 47.80     | 8.51              | 7.60               | 11.98     | 0.94    | 22.78       | 11.26            | 2.61         |
| 28000 | 18.17 | 45.80     | 7.88              | 7.83               | 10.11     | 0.97    | 22.39       | 11.26            | 2.91         |
| 29000 | 17.70 | 46.56     | 7.95              | 8.71               | 12.14     | 1.01    | 20.95       | 10.91            | 2.90         |
| 30000 | 17.32 | 46.93     | 8.13              | 10.21              | 14.01     | 1.05    | 21.13       | 11.21            | 2.93         |
| 31000 | 16.93 | 47.55     | 8.61              | 11.18              | 16.49     | 1.06    | 21.34       | 11.20            | 2.96         |
| 32000 | 16.26 | 47.62     | 8.09              | 10.31              | 17.29     | 1.05    | 21.18       | 10.73            | 3.34         |
| 33000 | 15.32 | 48.60     | 6.39              | 9.08               | 19.08     | 1.08    | 20.29       | 10.60            | 3.68         |
| 34000 | 14.54 | 46.56     | 5.01              | 8.72               | 14.62     | 1.14    | 22.64       | 10.39            | 4.25         |
| 35000 | 13.93 | 47.34     | 4.24              | 8.81               | 15.98     | 1.19    | 20.90       | 10.11            | 4.60         |
| 36000 | 13.16 | 47.49     | 4.01              | 8.78               | 17.43     | 1.21    | 20.30       | 9.87             | 4.76         |
| 37000 | 12.75 | 46.19     | 4.13              | 9.10               | 16.27     | 1.21    | 21.07       | 9.61             | 5.03         |
| 38000 | 12.33 | 46.24     | 4.61              | 9.48               | 18.37     | 1.19    | 21.52       | 10.28            | 4.88         |
| 39000 | 12.59 | 46.41     | 5.19              | 11.27              | 20.32     | 1.20    | 22.63       | 10.42            | 4.67         |
| 40000 | 12.88 | 45.66     | 5.36              | 12.32              | 18.87     | 1.21    | 22.34       | 11.73            | 4.60         |
| 41000 | 12.30 | 45.42     | 5.09              | 10.70              | 18.82     | 1.20    | 21.75       | 10.87            | 4.66         |
| 42000 | 11.06 | 44.51     | 4.73              | 9.04               | 17.94     | 1.17    | 21.41       | 10.76            | 5.18         |
| 43000 | 9.42  | 47.41     | 4.67              | 7.90               | 28.51     | 1.13    | 22.09       | 9.46             | 5.49         |
| 44000 | 7.66  | 54.92     | 4.80              | 7.34               | 82.03     | 1.09    | 20.21       | 9.09             | 6.21         |
| 45000 | 7.27  | 53.43     | 4.42              | 7.79               | 71.31     | 1.14    | 21.70       | 9.48             | 5.95         |
| 46000 | 7.13  | 49.77     | 4.20              | 9.06               | 48.93     | 1.21    | 20.56       | 9.39             | 5.85         |
| 47000 | 7.56  | 48.96     | 4.36              | 9.42               | 44.71     | 1.21    | 20.62       | 9.01             | 6.69         |
| 48000 | 9.11  | 46.45     | 5.04              | 7.86               | 29.09     | 1.10    | 19.04       | 10.01            | 6.47         |
| 49000 | 10.17 | 44.56     | 7.20              | 6.79               | 23.76     | 0.94    | 21.55       | 11.07            | 6.12         |
| 50000 | 9.87  | 44.31     | 12.09             | 6.82               | 28.32     | 0.84    | 21.67       | 11.82            | 5.76         |

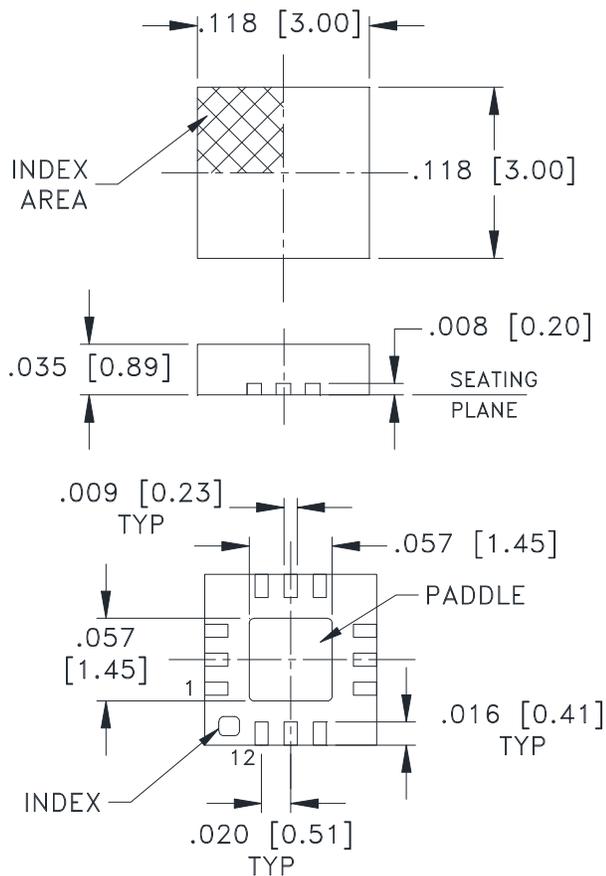
## Typical Performance Curves



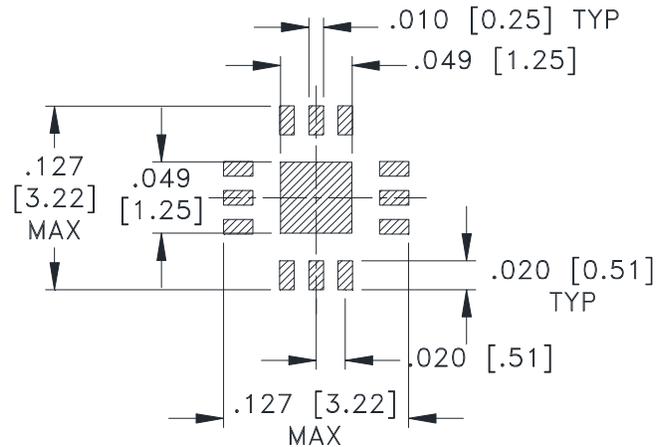
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



SUGGESTED LAYOUT,  
TOLERANCE TO BE WITHIN  $\pm .002$

**Weight: .02 Grams**

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

#### Notes:

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

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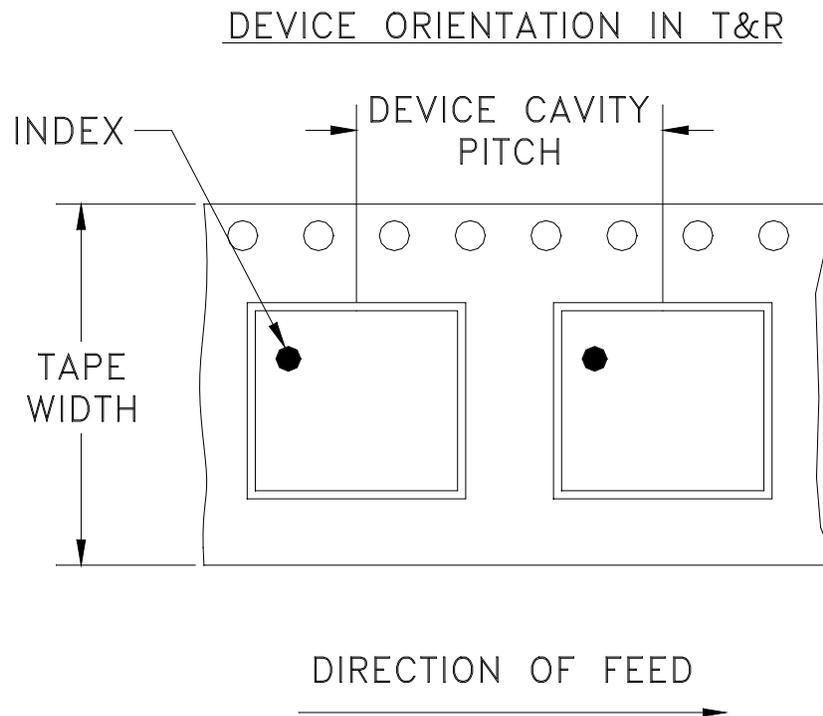
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P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

# Tape & Reel Packaging TR-F66



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel<br>see note |                  |
|----------------|-------------------------|-------------------|------------------------------|------------------|
| 8              | 4                       | 7                 | Small quantity standard      | 20               |
|                |                         |                   |                              | 50               |
|                |                         |                   |                              | 100              |
|                |                         |                   |                              | 200              |
|                |                         |                   |                              | 500              |
|                |                         | 7                 | Standard                     | 1000, 2000, 3000 |

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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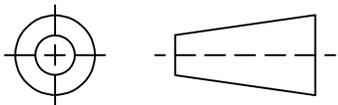
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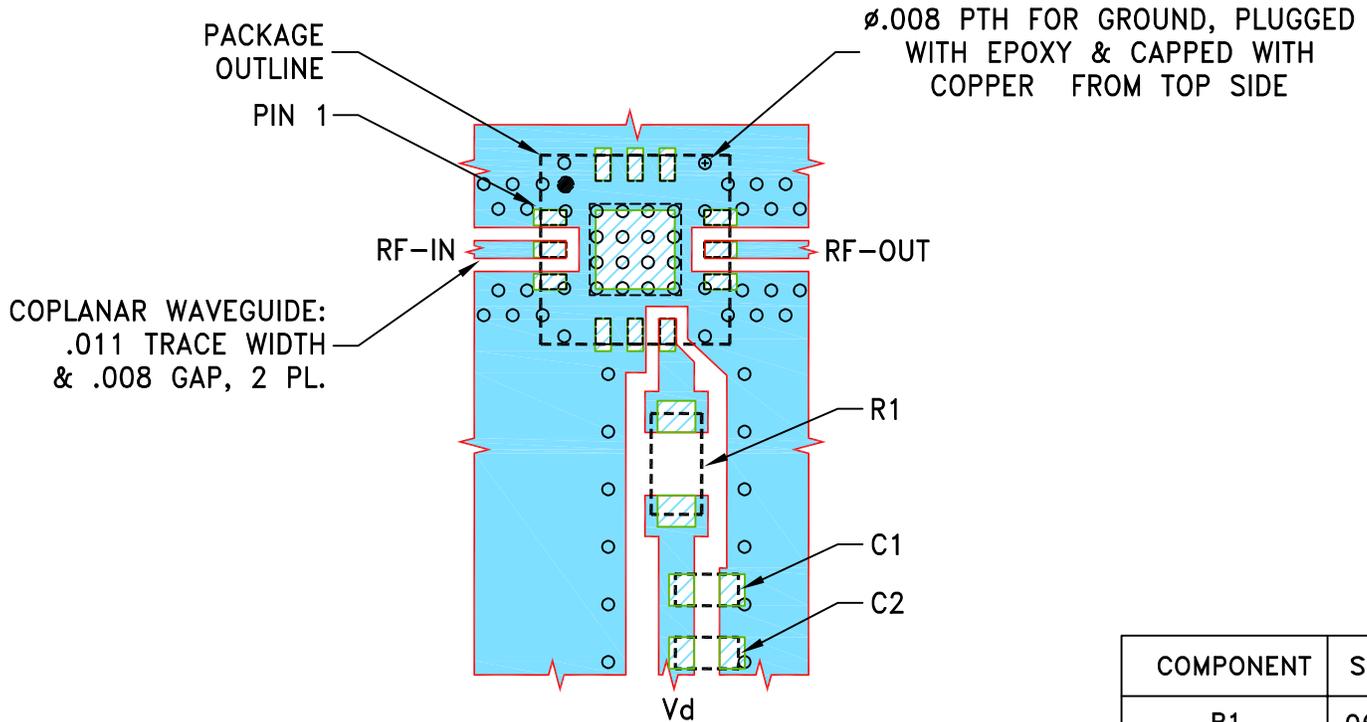
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No.    | DESCRIPTION                    | DATE     | DR  | AUTH |
|-----|------------|--------------------------------|----------|-----|------|
| OR  | ECO-002696 | NEW RELEASE                    | 05/27/20 | ITG | CC   |
| A   | ECO-011382 | UPDATED LAYOUT AND NEW R1 SIZE | 01/12/22 | ITG | IL   |
|     |            |                                |          |     |      |
|     |            |                                |          |     |      |

SUGGESTED MOUNTING CONFIGURATION  
FOR DQ1225 CASE STYLE



| COMPONENT | SIZE |
|-----------|------|
| R1        | 0603 |
| C2,C2     | 0402 |

NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .0066"±.0007". COPPER: 1 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-PMA3-453C+.
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 ITG   | 05/27/20 |
| TOLERANCES ON:             | CHECKED GF  | 05/27/20 |
| 2 PL DECIMALS ±            | APPROVED CC | 05/27/20 |
| 3 PL DECIMALS ± .005       |             |          |
| ANGLES ±                   |             |          |
| FRACTIONS ±                |             |          |



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13 Neptune Avenue  
Brooklyn NY 11235

PL, DQ1225, TB-PMA3-453C+

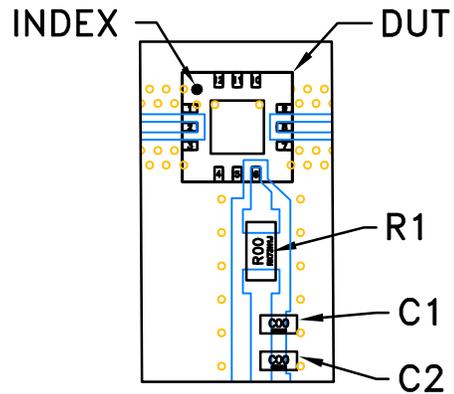
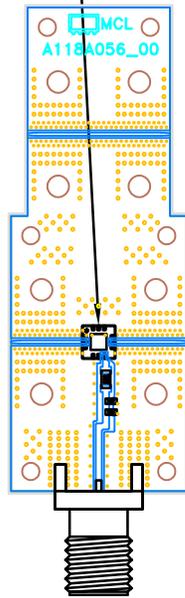
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|-------|------------|-------------|---------------|
| A     | 15542      | 98-PL-675   | A             |
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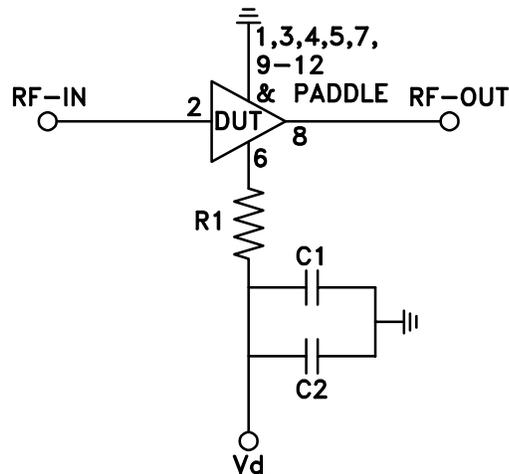
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# Evaluation Board and Circuit

SEE DETAIL "A"



DETAIL "A"  
(SCALE 3:1)



SCHEMATIC DIAGRAM

| Component | Size | Value | Part Number        | Manufacturer |
|-----------|------|-------|--------------------|--------------|
| R1        | 0603 | 180hm | SG73G1JT18R0C      | Koa Speer    |
| C1        | 0402 | 5pF   | GJM1555C1H5R0CB01D | Murata       |
| C2        | 0402 | 0.1uF | GRM155R71C104KA88D | Murata       |

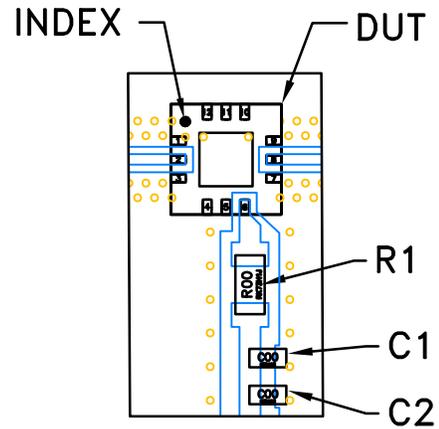
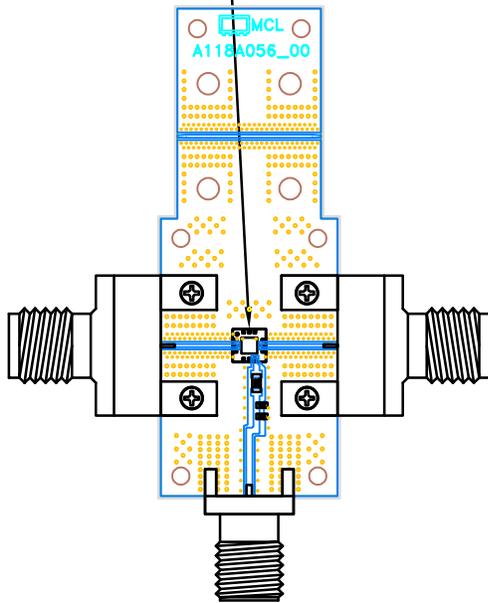
## Notes:

1. 2.4mm Female Connectors,
2. PCB Material: Roger R04350B or equivalent,  
Dielectric constant=3.5, Thickness=0.0066 inch.

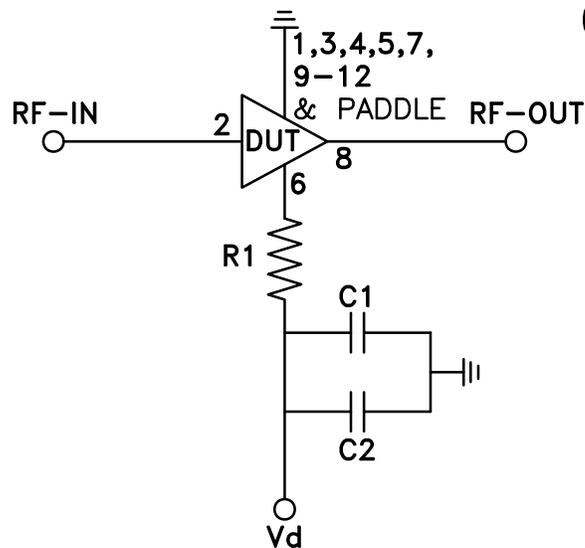
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# Evaluation Board and Circuit

SEE DETAIL "A"



DETAIL "A"  
(SCALE 3:1)



SCHEMATIC DIAGRAM

| Component | Size | Value | Part Number        | Manufacturer |
|-----------|------|-------|--------------------|--------------|
| R1        | 0603 | 180hm | SG73G1JTDD18R0C    | Koa Speer    |
| C1        | 0402 | 5pF   | GJM155C1H5R0CB01D  | Murata       |
| C2        | 0402 | 0.1uF | GRM155R71C104KA88D | Murata       |

## Notes:

- 2.4mm Female Connectors,
- PCB Material: Roger R04350B or equivalent,  
Dielectric constant=3.5, Thickness=0.0066 inch.

 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   |



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

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