

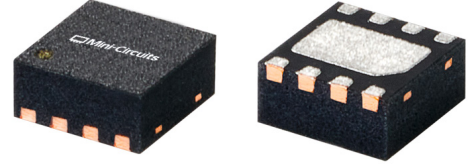


# Low Noise Bypass Amplifier TSS2-53LNB+

50 $\Omega$  500 to 5000 MHz

## THE BIG DEAL

- Wideband, 500 to 5000MHz
- Very Fast Bypass Switching
- Low Noise Figure, Typ. 1.2dB
- High Gain, Typ. 21.7dB
- High IP3 in Bypass, Typ. +47 dBm
- Minimal External Circuitry
- 2x2mm 8-lead QFN-Style Package

*Generic photo used for illustration purposes only*

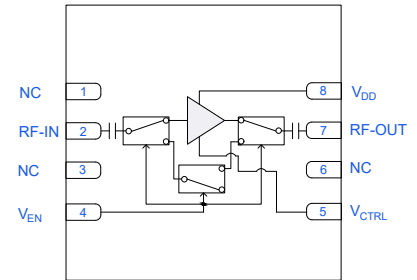
## APPLICATIONS

- 5G MIMO and Back Haul Radio Systems
- Test and Measurement Equipment
- Radar, EW, and ECM Defense Systems

## PRODUCT OVERVIEW

Mini-Circuits' TSS2-53LNB+ is an advanced low noise amplifier, fabricated using E-pHEMT technology and offering extremely high dynamic range over a broad frequency range. It has integrated switches enabling users to bypass the amplifier during high signal conditions. In addition, the TSS2-53LNB+ provides excellent input and output return loss over a broad frequency range using minimal external matching components. It is enclosed in a compact 2x2mm 8-lead QFN-style package with ground paddle for good thermal performance.

## FUNCTIONAL DIAGRAM



## KEY FEATURES

| Features                                                                             | Advantages                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wideband, 500 to 5000MHz                                                             | Ideal for a wide range of receiver applications including defense, communication, and test and measurement equipment. Effective for broadband or multi-band applications. Just one, cost-efficient model required for multiple frequency usage. |
| Minimal External Matching                                                            | Minimizes the need for external matching networks, simplifying circuit designs and enabling the amplifier to operate over multiple bands in a single application circuit.                                                                       |
| High Dynamic Range                                                                   | Low noise figure and high IP3 enable minimal signal degradation in active mode and enhanced linearity in bypass mode under high signal conditions.                                                                                              |
| Internal Bypass Switch Feature                                                       | Unique design handles low to high signal levels with minimal noise distortion.                                                                                                                                                                  |
| Built-in DC Blocking Cap at RF-Out Port & Separate pads for RF-Out & V <sub>DD</sub> | Simplifies biasing and eliminates need for bias-tee at output.                                                                                                                                                                                  |
| Compact Size, 2x2x0.9mm                                                              | Saves space in dense system layouts. Low inductance, repeatable transitions, and excellent thermal contact.                                                                                                                                     |



MMIC SURFACE MOUNT

# Low Noise Bypass Amplifier **TSS2-53LNB+**

50Ω 500 to 5000 MHz

ELECTRICAL SPECIFICATIONS<sup>1</sup> AT +25°C, Z<sub>0</sub> = 50Ω AND V<sub>DD</sub> = +5V; V<sub>CTRL</sub> TIED TO V<sub>EN</sub> THROUGH 3.92KΩ RESISTOR UNLESS NOTED OTHERWISE

| Parameter                                                            | Condition (MHz) | Amplifier-ON<br>V <sub>EN</sub> = +5V |       |       | Units |
|----------------------------------------------------------------------|-----------------|---------------------------------------|-------|-------|-------|
|                                                                      |                 | Min.                                  | Typ.  | Max.  |       |
| Frequency Range                                                      |                 | 500                                   |       | 5000  | MHz   |
| Noise Figure                                                         | 500             |                                       | 1.3   |       | dB    |
|                                                                      | 1000            |                                       | 1.1   |       |       |
|                                                                      | 2000            |                                       | 1.2   |       |       |
|                                                                      | 3000            |                                       | 1.3   |       |       |
|                                                                      | 4000            |                                       | 1.3   |       |       |
|                                                                      | 5000            |                                       | 1.3   |       |       |
| Gain                                                                 | 500             |                                       | 22.6  |       | dB    |
|                                                                      | 1000            |                                       | 22.5  |       |       |
|                                                                      | 2000            |                                       | 21.7  |       |       |
|                                                                      | 3000            |                                       | 20.6  |       |       |
|                                                                      | 4000            |                                       | 19.6  |       |       |
|                                                                      | 5000            |                                       | 18.6  |       |       |
| Input Return Loss                                                    | 500             |                                       | 16.1  |       | dB    |
|                                                                      | 1000            |                                       | 15.5  |       |       |
|                                                                      | 2000            |                                       | 14.0  |       |       |
|                                                                      | 3000            |                                       | 11.5  |       |       |
|                                                                      | 4000            |                                       | 11.9  |       |       |
|                                                                      | 5000            |                                       | 15.4  |       |       |
| Output Return Loss                                                   | 500             |                                       | 12.7  |       | dB    |
|                                                                      | 1000            |                                       | 14.0  |       |       |
|                                                                      | 2000            |                                       | 22.4  |       |       |
|                                                                      | 3000            |                                       | 14.8  |       |       |
|                                                                      | 4000            |                                       | 12.8  |       |       |
|                                                                      | 5000            |                                       | 10.4  |       |       |
| Output Power at 1dB Compression (OP1dB)                              | 500             |                                       | +19.6 |       | dBm   |
|                                                                      | 1000            |                                       | +19.4 |       |       |
|                                                                      | 2000            |                                       | +19.0 |       |       |
|                                                                      | 3000            |                                       | +18.8 |       |       |
|                                                                      | 4000            |                                       | +19.2 |       |       |
|                                                                      | 5000            |                                       | +18.3 |       |       |
| Output Third-Order Intercept Point (P <sub>OUT</sub> = 0dBm/Tone)    | 500             |                                       | +28.7 |       | dBm   |
|                                                                      | 1000            |                                       | +31.6 |       |       |
|                                                                      | 2000            |                                       | +29.3 |       |       |
|                                                                      | 3000            |                                       | +31.2 |       |       |
|                                                                      | 4000            |                                       | +28.9 |       |       |
|                                                                      | 5000            |                                       | +25.0 |       |       |
| Device Operating Voltage (V <sub>DD</sub> )                          |                 | +4.75                                 | +5.0  | +5.25 | V     |
| Device Operating Current (I <sub>DD</sub> ) <sup>2</sup>             |                 |                                       | 80    | 94    | mA    |
| Enable Voltage (V <sub>EN</sub> )                                    |                 | +4.5                                  | +5.0  | +5.5  | V     |
| Enable Current (I <sub>EN</sub> )                                    |                 |                                       | 2.0   |       | mA    |
| Control Voltage (V <sub>CTRL</sub> )                                 |                 |                                       | +1.5  |       | V     |
| Control Current (I <sub>CTRL</sub> )                                 |                 |                                       | 0.9   |       | mA    |
| DC Current (I <sub>DD</sub> ) Variation vs. Temperature <sup>3</sup> |                 |                                       | -77   |       | μA/°C |
| DC Current (I <sub>DD</sub> ) Variation vs. Voltage <sup>4</sup>     |                 |                                       | 0.002 |       | mA/mV |

1. Tested on Mini-Circuits Characterization Test/Evaluation Board TB-TSS2-53LNBC+.

2. Current at P<sub>IN</sub> = -25dBm. Increases to 96mA at P1dB.

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

4. ((Current at +5.25V) - (Current at +4.75V)) / (+5.25V - +4.75V)





MMIC SURFACE MOUNT

# Low Noise Bypass Amplifier **TSS2-53LNB+**

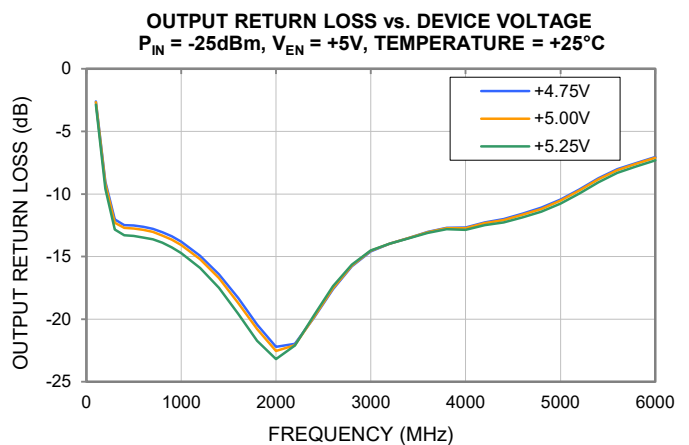
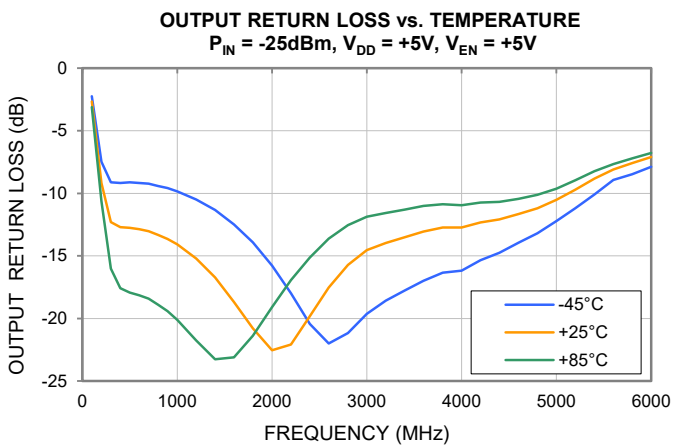
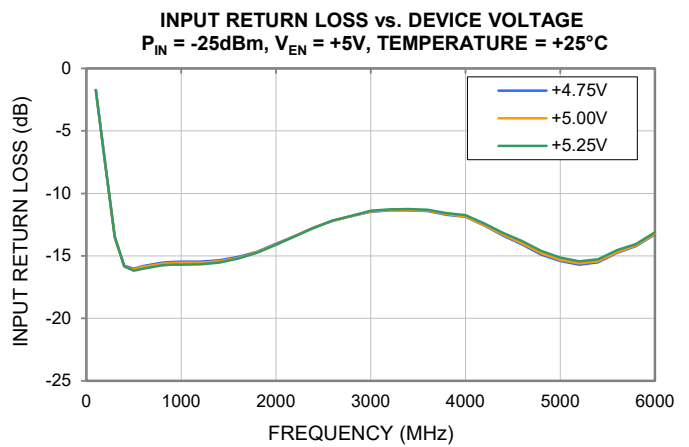
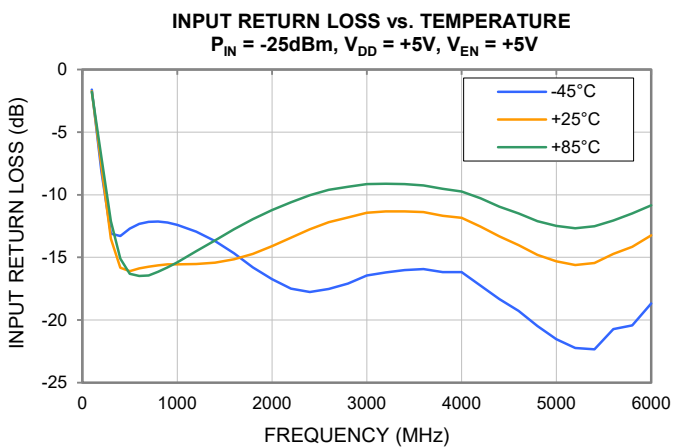
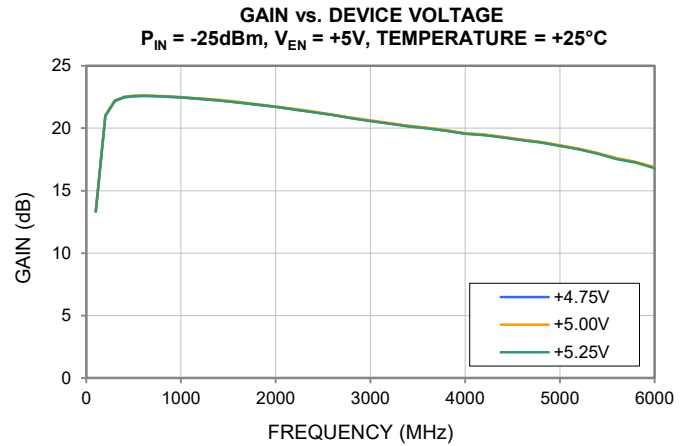
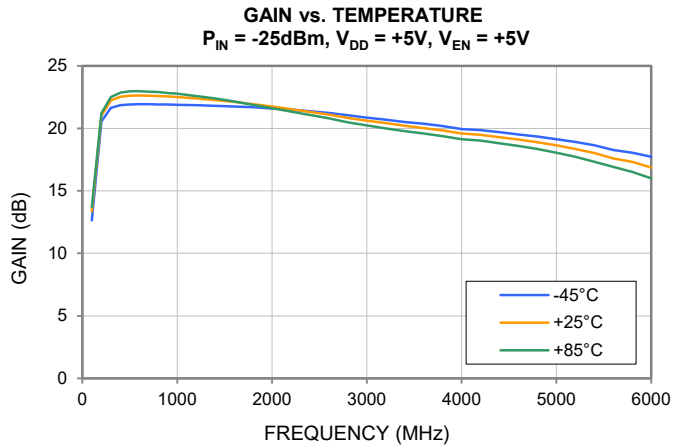
50Ω 500 to 5000 MHz

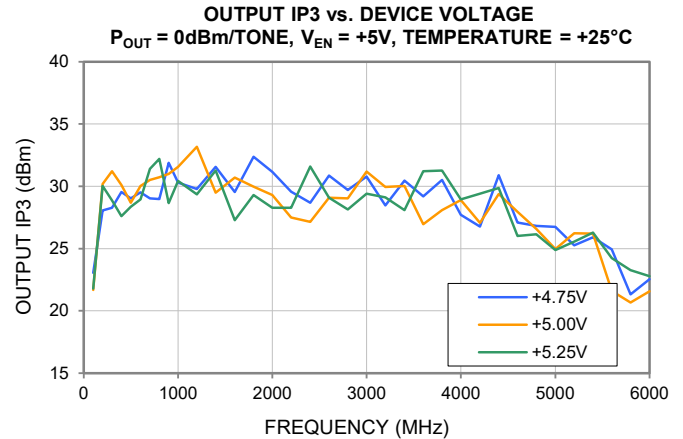
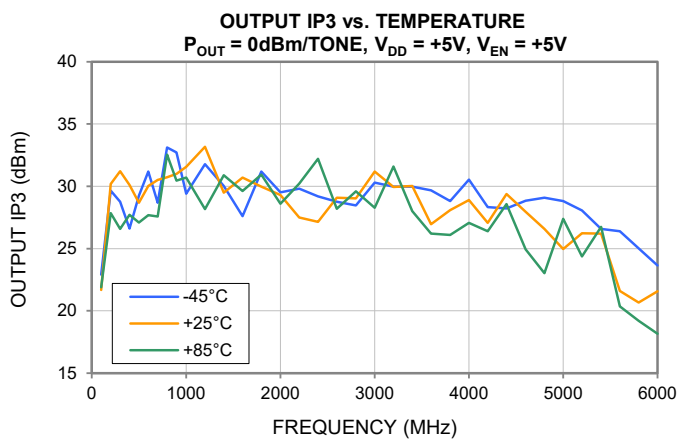
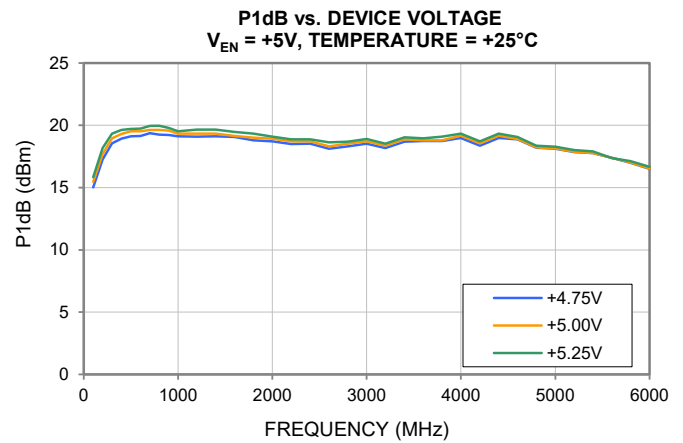
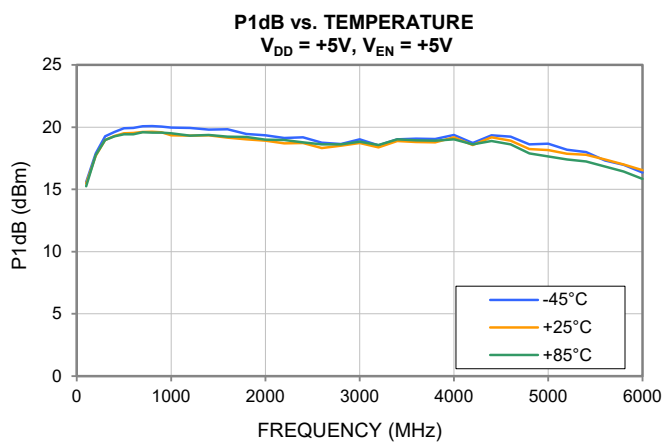
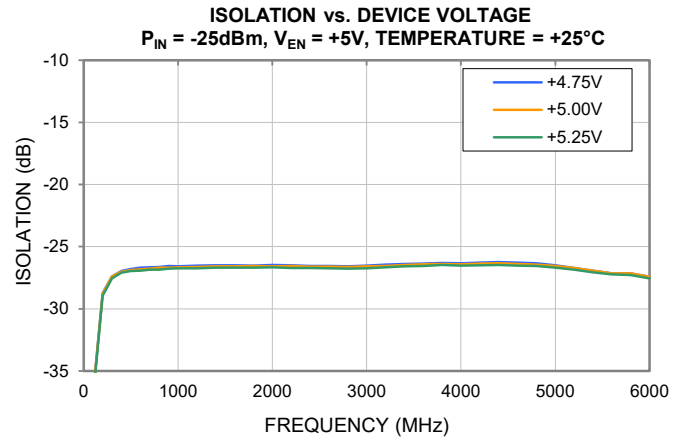
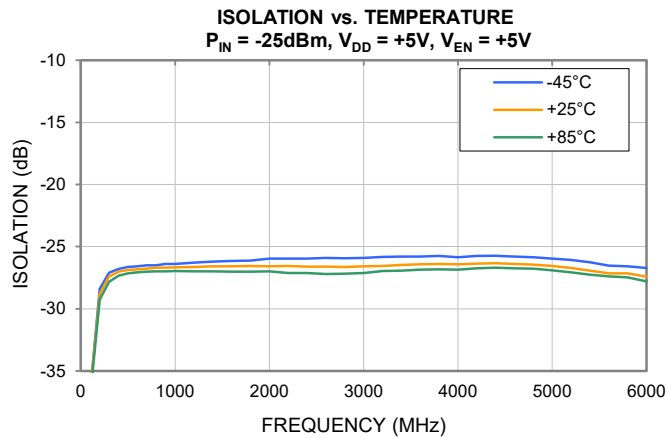
ELECTRICAL SPECIFICATIONS<sup>5</sup> AT +25°C,  $Z_0 = 50\Omega$  AND  $V_{DD} = +5V$ ;  $V_{CTRL}$  TIED TO  $V_{EN}$  THROUGH 3.92KΩ RESISTOR UNLESS NOTED OTHERWISE

| Parameter                                                       | Condition (MHz) | Amplifier-Bypass<br>$V_{EN} = 0V$ |       |       | Units |
|-----------------------------------------------------------------|-----------------|-----------------------------------|-------|-------|-------|
|                                                                 |                 | Min.                              | Typ.  | Max.  |       |
| Frequency Range                                                 |                 | 500                               |       | 5000  | MHz   |
| Gain                                                            | 500             |                                   | -0.7  |       | dB    |
|                                                                 | 1000            |                                   | -0.7  |       |       |
|                                                                 | 2000            |                                   | -0.9  |       |       |
|                                                                 | 3000            |                                   | -1.0  |       |       |
|                                                                 | 4000            |                                   | -1.0  |       |       |
|                                                                 | 5000            |                                   | -0.9  |       |       |
| Input Return Loss                                               | 500             |                                   | 23.7  |       | dB    |
|                                                                 | 1000            |                                   | 16.4  |       |       |
|                                                                 | 2000            |                                   | 11.2  |       |       |
|                                                                 | 3000            |                                   | 11.1  |       |       |
|                                                                 | 4000            |                                   | 13.9  |       |       |
|                                                                 | 5000            |                                   | 18.2  |       |       |
| Output Return Loss                                              | 500             |                                   | 21.2  |       | dB    |
|                                                                 | 1000            |                                   | 15.7  |       |       |
|                                                                 | 2000            |                                   | 11.6  |       |       |
|                                                                 | 3000            |                                   | 12.1  |       |       |
|                                                                 | 4000            |                                   | 16.0  |       |       |
|                                                                 | 5000            |                                   | 18.4  |       |       |
| Input Power at 1dB Compression (IP1dB)                          | 500             |                                   | +34.4 |       | dBm   |
|                                                                 | 1000            |                                   | +34.5 |       |       |
|                                                                 | 2000            |                                   | +29.1 |       |       |
|                                                                 | 3000            |                                   | +29.9 |       |       |
|                                                                 | 4000            |                                   | +29.8 |       |       |
|                                                                 | 5000            |                                   | +30.1 |       |       |
| Output Third-Order Intercept Point<br>( $P_{OUT} = 0dBm/Tone$ ) | 500             |                                   | +47.0 |       | dBm   |
|                                                                 | 1000            |                                   | +46.8 |       |       |
|                                                                 | 2000            |                                   | +42.6 |       |       |
|                                                                 | 3000            |                                   | +38.3 |       |       |
|                                                                 | 4000            |                                   | +39.4 |       |       |
|                                                                 | 5000            |                                   | +39.1 |       |       |
| Device Operating Voltage ( $V_{DD}$ )                           |                 |                                   | +5.0  |       | V     |
| Device Operating Current ( $I_{DD}$ )                           |                 |                                   | 2     |       | mA    |
| Enable Voltage ( $V_{EN}$ )                                     |                 | 0                                 | —     | 0.5   | V     |
| Enable Current ( $I_{EN}$ )                                     |                 |                                   | 0     |       | mA    |
| Control Voltage ( $V_{CTRL}$ )                                  |                 |                                   | 0     |       | V     |
| Control Current ( $I_{CTRL}$ )                                  |                 |                                   |       | 0.012 | μA    |

5. Tested on Mini-Circuits Characterization Test/Evaluation Board TB-TSS2-53LNBC+.



TYPICAL PERFORMANCE GRAPHS  
LNA MODE

TYPICAL PERFORMANCE GRAPHS  
LNA MODE

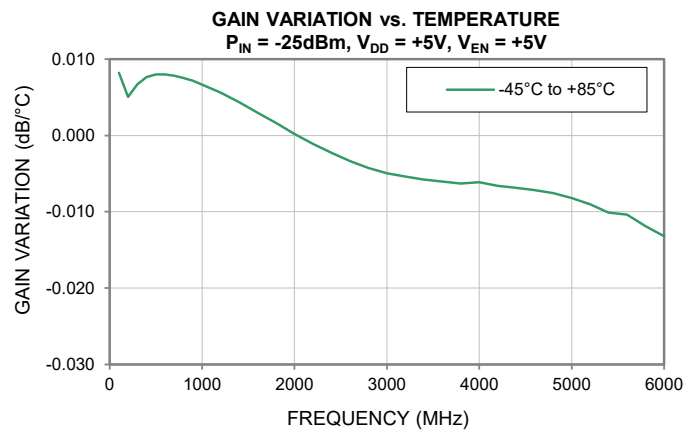
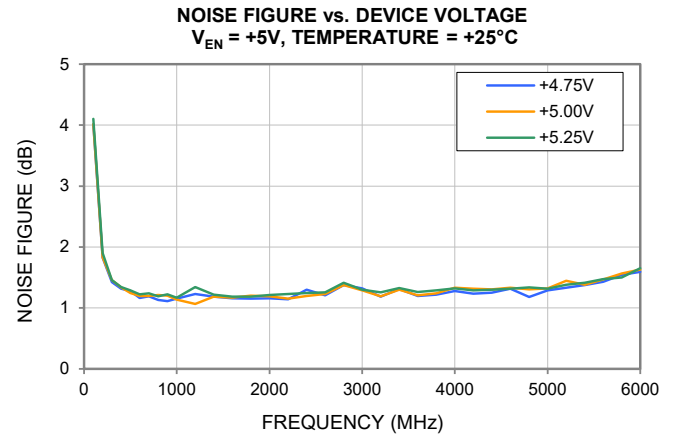
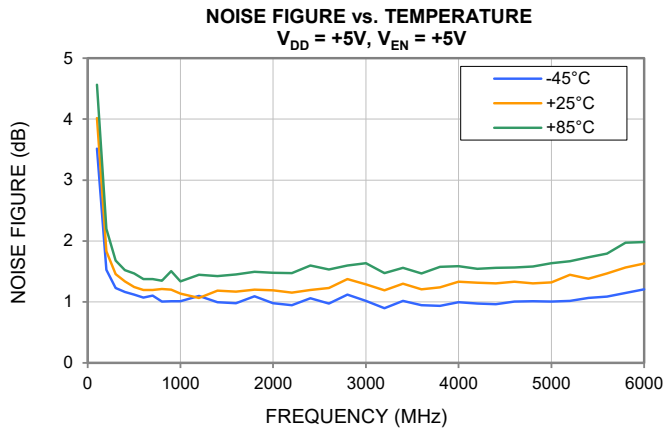


MMIC SURFACE MOUNT

# Low Noise Bypass Amplifier **TSS2-53LNB+**

50Ω 500 to 5000 MHz

## TYPICAL PERFORMANCE GRAPHS LNA MODE



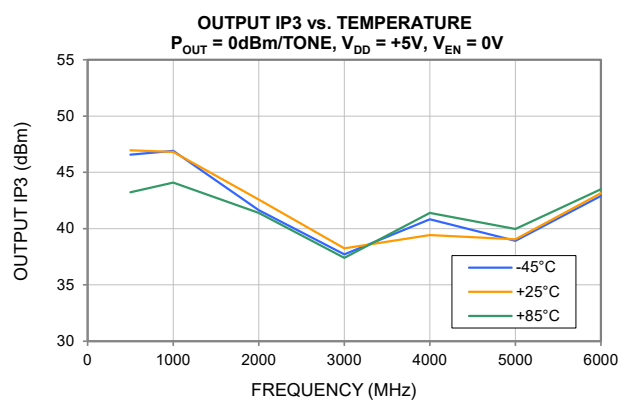
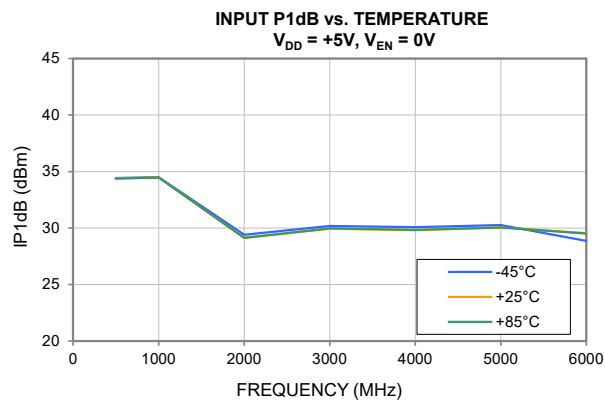
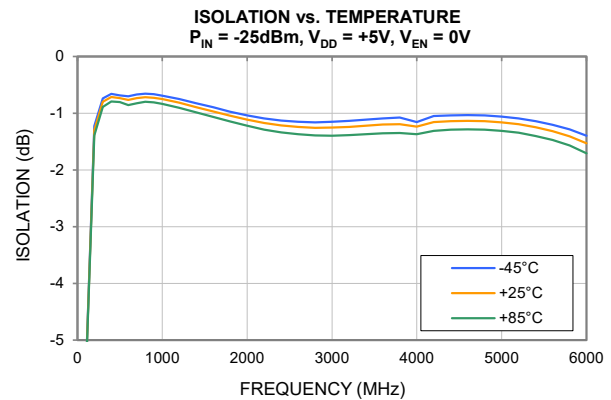
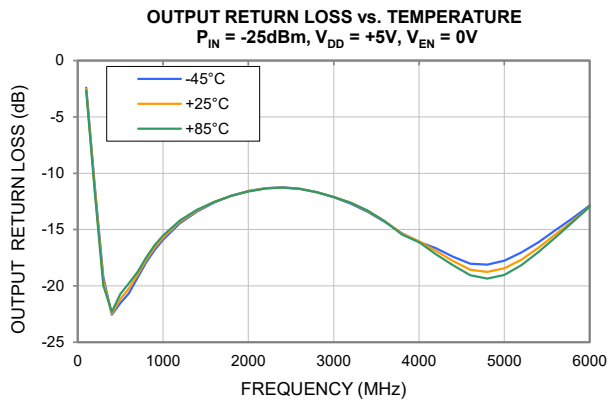
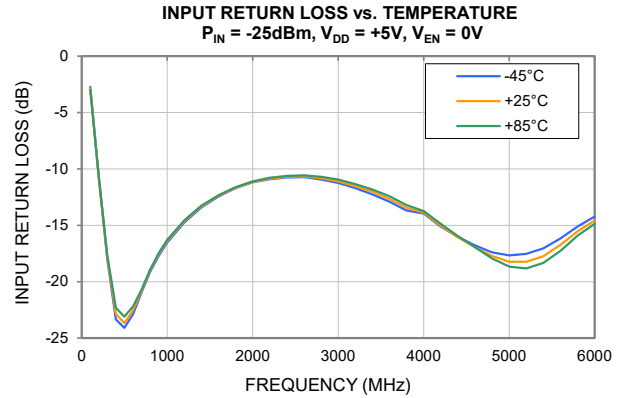
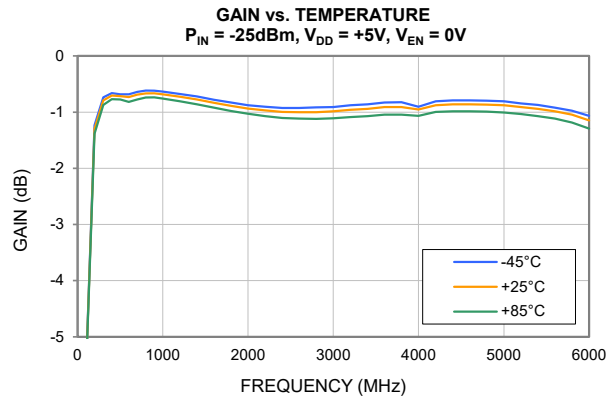


MMIC SURFACE MOUNT

# Low Noise Bypass Amplifier **TSS2-53LNB+**

50Ω 500 to 5000 MHz

## TYPICAL PERFORMANCE GRAPHS BYPASS MODE





## MMIC SURFACE MOUNT

# Low Noise Bypass Amplifier **TSS2-53LNB+**

50Ω 500 to 5000 MHz

### ABSOLUTE MAXIMUM RATINGS<sup>6</sup>

| Parameter                           |                  | Ratings        |
|-------------------------------------|------------------|----------------|
| Operating Temperature (ground lead) |                  | -45°C to 85°C  |
| Storage Temperature                 |                  | -65°C to 150°C |
| Total Power Dissipation             |                  | 0.7W           |
| Input Power                         | Amplifier-ON     | +19dBm         |
|                                     | Amplifier-Bypass | +29dBm         |
| DC Voltage V <sub>DD</sub>          |                  | +7.0V          |
| DC Voltage V <sub>EN</sub>          |                  | +7.0V          |
| DC Voltage V <sub>CTRL</sub>        |                  | +7.0V          |
| DC Voltage on RF-OUT                |                  | +15.0V         |

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

### ENABLE VOLTAGE (V<sub>EN</sub>)

|                  | Min. | Typ. | Max. | Units |
|------------------|------|------|------|-------|
| Amplifier-ON     | +4.5 | +5.0 | +5.5 | V     |
| Amplifier-Bypass | 0    | —    | +0.5 | V     |

### THERMAL RESISTANCE

| Parameter                                          | Ratings  |
|----------------------------------------------------|----------|
| Thermal Resistance (Θ <sub>jc</sub> ) <sup>7</sup> | 53.8°C/W |

7. Θ<sub>jc</sub> = (Hot Spot Temperature on Die - Temperature at Ground Lead)/Dissipated Power

### ESD RATING

|                            | Class | Voltage Range | Reference Standard          |
|----------------------------|-------|---------------|-----------------------------|
| Human Body Model (HBM)     | 1A    | 250V to <500V | ANSI/ESDA/JEDEC JS-001-2017 |
| Charged Device Model (CDM) | C3    | >1000V        | JESD22-C101F                |



ESD HANDLING PRECAUTION: This device is designed to be Class 1A for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure Industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

### MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020E /JEDEC J-STD-033C

### SWITCHING SPECIFICATIONS (RISE/FALL TIME)

| Parameter               | Min.                             | Typ. | Max. | Units |
|-------------------------|----------------------------------|------|------|-------|
| Amplifier ON to Bypass  | OFF TIME (50% Control to 10% RF) | -    | 39   | -     |
|                         | FALL TIME (90% to 10% RF)        | -    | 12   | -     |
| Amplifier Bypass to ON  | ON TIME (50% Control to 90% RF)  | -    | 650  | -     |
|                         | RISE TIME (10% to 90% RF)        | -    | 250  | -     |
| Control Voltage Leakage | -                                | +49  | -    | mV    |





## MMIC SURFACE MOUNT

# Low Noise Bypass Amplifier **TSS2-53LNB+**

50Ω 500 to 5000 MHz

### FUNCTIONAL DIAGRAM

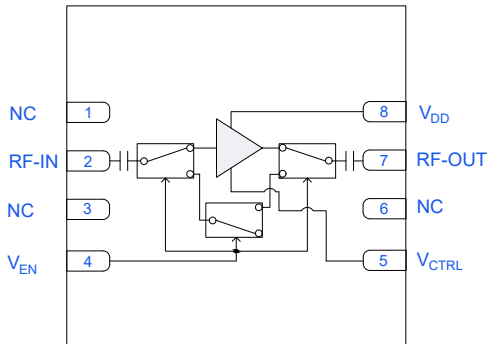


Figure 1. TSS2-53LNB+ Functional Diagram

### PAD DESCRIPTION

| Function          | Pad Number | Application Description (Refer to Figure 2)                                                                                        |
|-------------------|------------|------------------------------------------------------------------------------------------------------------------------------------|
| RF-IN             | 2          | RF-Input pad. Connect to Ground Via L1.                                                                                            |
| RF-OUT            | 7          | RF-Output pad. No external DC blocking capacitor required.                                                                         |
| V <sub>CTRL</sub> | 5          | Voltage Control pad. Voltage level on this pad sets the I <sub>DD</sub> . May be tied to V <sub>EN</sub> through a fixed resistor. |
| V <sub>EN</sub>   | 4          | Voltage Enable Pad. Voltage level on this pad determines if the Amplifier is on or bypassed.                                       |
| V <sub>DD</sub>   | 8          | Supply Voltage Pad. Connect to V <sub>DD</sub> via L2.                                                                             |
| Ground            | Paddle     | Connects to ground.                                                                                                                |
| NC                | 1,3,6      | No internal connection. Recommended to be grounded.                                                                                |

### CHARACTERIZATION TEST CIRCUIT

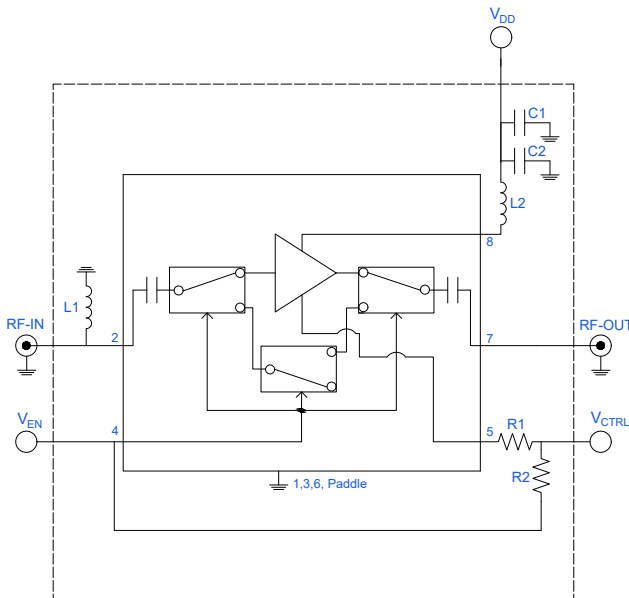


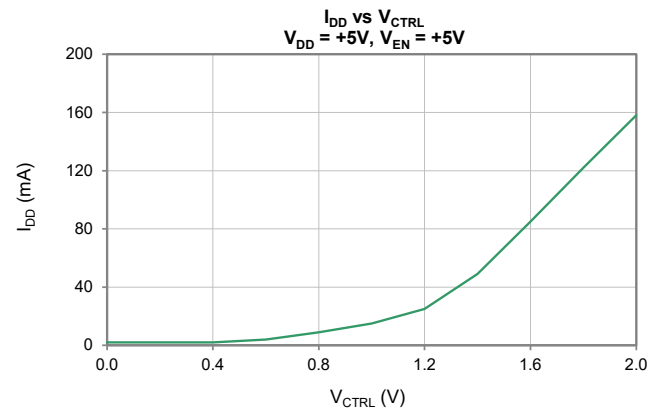
Figure 2. DUT soldered on Mini-Circuits Characterization Test Board: TB-TSS2-53LNBC+.

### Electrical Parameters and Conditions

Gain, Return Loss, Output Power at 1dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure measured using N5242A PNA-X Microwave Network Analyzer.

Conditions:

1. Gain and Return Loss: P<sub>IN</sub> = -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1MHz apart, 0dBm/tone at output.
3. Switching Time: P<sub>IN</sub> = -25dBm at 500MHz. V<sub>EN</sub> = 4.5, 5.0, 5.5V at 10kHz. V<sub>DD</sub> = 4.75, 5.0 and 5.25V. V<sub>CTRL</sub> and V<sub>EN</sub> are tied together per Figure 2.
4. If V<sub>CTRL</sub> and V<sub>EN</sub> are tied together, apply +5V (typical) to V<sub>EN</sub> only. After that, a value of +1.5V will be seen at V<sub>CTRL</sub>.
5. If V<sub>CTRL</sub> is used independently of V<sub>EN</sub>, then R2 must be removed and connection between V<sub>CTRL</sub> and V<sub>EN</sub> shall be left opened. Furthermore, R1 0Ω resistor shall be replaced with a 3.92KΩ resistor. This allows for current control of the amplifier through V<sub>CTRL</sub> adjustment per graph below.



| Component | Value  | Size | Part Number       | Manufacturer |
|-----------|--------|------|-------------------|--------------|
| L1        | 47nH   | 0402 | LL1005-FHL47NJ    | Toko         |
| L2        | 56nH   | 0402 | 0402HPH-56NXGLW   | Coilcraft    |
| C1        | 0.1μF  | 0402 | GRM155R71C04KA88D | Murata       |
| C2        | 10pF   | 0402 | GJM1555C1H100JB01 | Murata       |
| R1        | 0Ω     | 0402 | RK73Z1ETTP        | Koa Speer    |
| R2        | 3.92KΩ | 0402 | RK73H1ETTP3921F   | Koa Speer    |



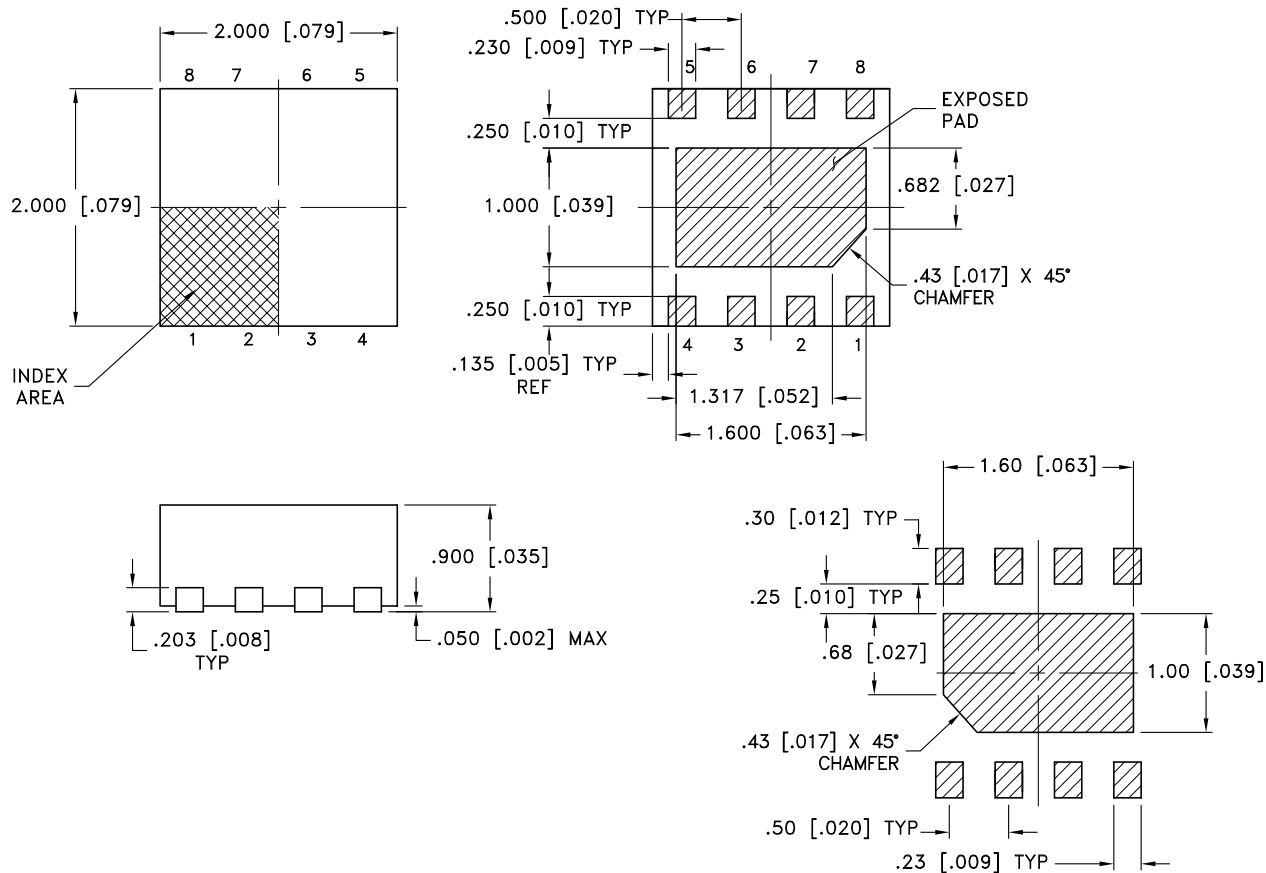
## MMIC SURFACE MOUNT

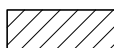
# Low Noise Bypass Amplifier **TSS2-53LNB+**

Mini-Circuits

50Ω 500 to 5000 MHz

### CASE STYLE DRAWING



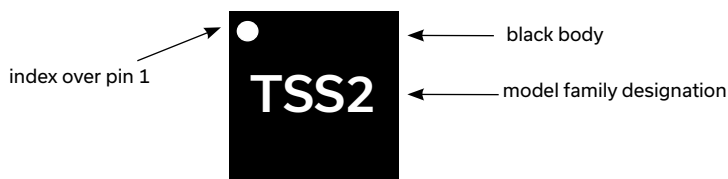
 DENOTES METALLIZATION

Suggested Layout

Weight: .011 grams

Dimensions are in mm [inches]. Tolerances: 3 Pl. ±0.050[0.002] mm [Inches]

### PRODUCT MARKING



Marking may contain other features or characters for internal lot control





Mini-Circuits

MMIC SURFACE MOUNT

# Low Noise Bypass Amplifier **TSS2-53LNB+**

50Ω 500 to 5000 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD

[CLICK HERE](#)

|                                                      |                                                                |
|------------------------------------------------------|----------------------------------------------------------------|
| Performance Data & Graphs                            | Data<br>Graphs<br>S-Parameter (S2P Files) Data Set (.zip file) |
| Case Style                                           | MC3007 Plastic package, exposed paddle, Lead Finish: Matte-Tin |
| RoHs Status                                          | Compliant                                                      |
| Tape & Reel<br>Standard quantities available on reel | F66<br>7" reels with 20, 50, 100, 200, 500, 1K or 2K devices   |
| Suggested Layout for PCB Design                      | PL-760                                                         |
| Evaluation Board                                     | TB-TSS2-53LNBC+                                                |
| Environmental Ratings                                | ENV12T2                                                        |

## NOTES

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



*Typical Performance Data***NOTE: Use PDF Bookmarks to view DATA at required conditions****Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 5.0V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 78mA$  @ Temperature = +25°C

| 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)            |
| 100.00  | 13.4 | 36.7      | 1.7                     | 2.7                      | 1.6       | 0.7     | 21.7           | 15.5                   | 4.0             |
| 200.00  | 21.0 | 28.8      | 7.7                     | 9.2                      | 1.2       | 0.8     | 30.2           | 17.7                   | 1.8             |
| 300.00  | 22.2 | 27.4      | 13.5                    | 12.3                     | 1.1       | 0.7     | 31.2           | 19.0                   | 1.5             |
| 400.00  | 22.5 | 27.0      | 15.8                    | 12.7                     | 1.1       | 0.6     | 30.1           | 19.3                   | 1.3             |
| 500.00  | 22.6 | 26.9      | 16.1                    | 12.8                     | 1.1       | 0.6     | 28.7           | 19.5                   | 1.2             |
| 600.00  | 22.6 | 26.8      | 15.9                    | 12.9                     | 1.1       | 0.6     | 30.0           | 19.5                   | 1.2             |
| 700.00  | 22.6 | 26.8      | 15.8                    | 13.0                     | 1.1       | 0.6     | 30.5           | 19.6                   | 1.2             |
| 800.00  | 22.6 | 26.7      | 15.6                    | 13.3                     | 1.1       | 0.6     | 30.7           | 19.6                   | 1.2             |
| 900.00  | 22.6 | 26.7      | 15.6                    | 13.7                     | 1.1       | 0.6     | 31.0           | 19.6                   | 1.2             |
| 1000.00 | 22.5 | 26.7      | 15.5                    | 14.1                     | 1.1       | 0.6     | 31.6           | 19.3                   | 1.1             |
| 1200.00 | 22.4 | 26.6      | 15.5                    | 15.2                     | 1.1       | 0.6     | 33.2           | 19.3                   | 1.1             |
| 1400.00 | 22.3 | 26.6      | 15.4                    | 16.7                     | 1.1       | 0.6     | 29.5           | 19.3                   | 1.2             |
| 1600.00 | 22.1 | 26.6      | 15.2                    | 18.7                     | 1.1       | 0.7     | 30.7           | 19.2                   | 1.2             |
| 1800.00 | 21.9 | 26.5      | 14.7                    | 20.8                     | 1.1       | 0.7     | 30.0           | 19.0                   | 1.2             |
| 2000.00 | 21.7 | 26.6      | 14.1                    | 22.5                     | 1.1       | 0.7     | 29.3           | 18.9                   | 1.2             |
| 2200.00 | 21.5 | 26.6      | 13.4                    | 22.1                     | 1.1       | 0.8     | 27.5           | 18.7                   | 1.2             |
| 2400.00 | 21.3 | 26.6      | 12.7                    | 19.8                     | 1.1       | 0.8     | 27.1           | 18.7                   | 1.2             |
| 2600.00 | 21.1 | 26.6      | 12.2                    | 17.5                     | 1.1       | 0.8     | 29.1           | 18.3                   | 1.2             |
| 2800.00 | 20.8 | 26.6      | 11.8                    | 15.7                     | 1.2       | 0.8     | 29.0           | 18.5                   | 1.4             |
| 3000.00 | 20.6 | 26.6      | 11.4                    | 14.5                     | 1.2       | 0.8     | 31.2           | 18.7                   | 1.3             |
| 3200.00 | 20.4 | 26.5      | 11.3                    | 14.0                     | 1.2       | 0.8     | 29.9           | 18.4                   | 1.2             |
| 3400.00 | 20.2 | 26.5      | 11.3                    | 13.5                     | 1.2       | 0.8     | 30.0           | 18.9                   | 1.3             |
| 3600.00 | 20.0 | 26.4      | 11.4                    | 13.0                     | 1.2       | 0.8     | 27.0           | 18.8                   | 1.2             |
| 3800.00 | 19.8 | 26.4      | 11.7                    | 12.7                     | 1.2       | 0.8     | 28.1           | 18.8                   | 1.2             |
| 4000.00 | 19.6 | 26.4      | 11.8                    | 12.7                     | 1.2       | 0.8     | 28.9           | 19.2                   | 1.3             |
| 4200.00 | 19.5 | 26.4      | 12.5                    | 12.3                     | 1.2       | 0.8     | 27.1           | 18.6                   | 1.3             |
| 4400.00 | 19.3 | 26.3      | 13.3                    | 12.1                     | 1.3       | 0.8     | 29.4           | 19.2                   | 1.3             |
| 4600.00 | 19.1 | 26.4      | 14.0                    | 11.6                     | 1.3       | 0.8     | 28.0           | 18.9                   | 1.3             |
| 4800.00 | 18.9 | 26.4      | 14.8                    | 11.2                     | 1.3       | 0.8     | 26.6           | 18.2                   | 1.3             |
| 5000.00 | 18.6 | 26.6      | 15.3                    | 10.5                     | 1.3       | 0.8     | 25.0           | 18.1                   | 1.3             |
| 5200.00 | 18.4 | 26.7      | 15.6                    | 9.7                      | 1.3       | 0.8     | 26.2           | 17.9                   | 1.4             |
| 5400.00 | 18.0 | 26.9      | 15.4                    | 8.8                      | 1.4       | 0.8     | 26.2           | 17.8                   | 1.4             |
| 5600.00 | 17.6 | 27.1      | 14.7                    | 8.1                      | 1.4       | 0.8     | 21.6           | 17.4                   | 1.5             |
| 5800.00 | 17.3 | 27.2      | 14.2                    | 7.6                      | 1.4       | 0.8     | 20.7           | 17.0                   | 1.6             |
| 6000.00 | 16.9 | 27.4      | 13.2                    | 7.1                      | 1.5       | 0.8     | 21.6           | 16.5                   | 1.6             |

*Typical Performance Data***Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 4.75V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 77mA$  @ Temperature = +25°C

| 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)            |
| 100.00  | 13.3 | 36.8      | 1.7                     | 2.6                      | 1.6       | 0.7     | 23.1           | 15.0                   | 4.0             |
| 200.00  | 21.0 | 28.7      | 7.7                     | 9.0                      | 1.2       | 0.8     | 28.1           | 17.2                   | 1.8             |
| 300.00  | 22.2 | 27.4      | 13.5                    | 12.0                     | 1.1       | 0.7     | 28.3           | 18.5                   | 1.4             |
| 400.00  | 22.5 | 27.0      | 15.8                    | 12.5                     | 1.1       | 0.6     | 29.5           | 18.9                   | 1.3             |
| 500.00  | 22.6 | 26.8      | 16.0                    | 12.5                     | 1.1       | 0.6     | 29.0           | 19.1                   | 1.3             |
| 600.00  | 22.6 | 26.7      | 15.8                    | 12.6                     | 1.1       | 0.6     | 29.5           | 19.2                   | 1.2             |
| 700.00  | 22.6 | 26.7      | 15.7                    | 12.8                     | 1.1       | 0.6     | 29.0           | 19.4                   | 1.2             |
| 800.00  | 22.5 | 26.6      | 15.6                    | 13.1                     | 1.1       | 0.6     | 29.0           | 19.2                   | 1.1             |
| 900.00  | 22.5 | 26.6      | 15.5                    | 13.4                     | 1.1       | 0.6     | 31.9           | 19.2                   | 1.1             |
| 1000.00 | 22.5 | 26.6      | 15.5                    | 13.8                     | 1.1       | 0.6     | 30.3           | 19.1                   | 1.2             |
| 1200.00 | 22.3 | 26.5      | 15.5                    | 14.9                     | 1.1       | 0.6     | 29.8           | 19.1                   | 1.2             |
| 1400.00 | 22.2 | 26.5      | 15.4                    | 16.4                     | 1.1       | 0.6     | 31.6           | 19.1                   | 1.2             |
| 1600.00 | 22.1 | 26.5      | 15.1                    | 18.3                     | 1.1       | 0.7     | 29.5           | 19.1                   | 1.2             |
| 1800.00 | 21.9 | 26.5      | 14.7                    | 20.4                     | 1.1       | 0.7     | 32.4           | 18.8                   | 1.2             |
| 2000.00 | 21.7 | 26.5      | 14.0                    | 22.2                     | 1.1       | 0.7     | 31.1           | 18.7                   | 1.2             |
| 2200.00 | 21.5 | 26.5      | 13.4                    | 22.0                     | 1.1       | 0.8     | 29.6           | 18.5                   | 1.1             |
| 2400.00 | 21.3 | 26.5      | 12.7                    | 19.9                     | 1.1       | 0.8     | 28.7           | 18.5                   | 1.3             |
| 2600.00 | 21.1 | 26.6      | 12.2                    | 17.6                     | 1.1       | 0.8     | 30.9           | 18.1                   | 1.2             |
| 2800.00 | 20.8 | 26.6      | 11.8                    | 15.8                     | 1.2       | 0.8     | 29.7           | 18.3                   | 1.4             |
| 3000.00 | 20.6 | 26.5      | 11.5                    | 14.6                     | 1.2       | 0.8     | 30.8           | 18.5                   | 1.3             |
| 3200.00 | 20.4 | 26.4      | 11.4                    | 14.0                     | 1.2       | 0.8     | 28.5           | 18.2                   | 1.2             |
| 3400.00 | 20.2 | 26.4      | 11.4                    | 13.5                     | 1.2       | 0.8     | 30.5           | 18.7                   | 1.3             |
| 3600.00 | 20.0 | 26.4      | 11.4                    | 13.0                     | 1.2       | 0.8     | 29.2           | 18.7                   | 1.2             |
| 3800.00 | 19.8 | 26.3      | 11.7                    | 12.7                     | 1.2       | 0.8     | 30.5           | 18.7                   | 1.2             |
| 4000.00 | 19.6 | 26.3      | 11.9                    | 12.7                     | 1.2       | 0.8     | 27.7           | 19.0                   | 1.3             |
| 4200.00 | 19.5 | 26.3      | 12.6                    | 12.3                     | 1.2       | 0.8     | 26.8           | 18.4                   | 1.2             |
| 4400.00 | 19.3 | 26.2      | 13.4                    | 12.0                     | 1.2       | 0.8     | 30.9           | 19.0                   | 1.3             |
| 4600.00 | 19.1 | 26.3      | 14.1                    | 11.6                     | 1.3       | 0.8     | 27.1           | 18.9                   | 1.3             |
| 4800.00 | 18.9 | 26.3      | 14.9                    | 11.1                     | 1.3       | 0.8     | 26.8           | 18.2                   | 1.2             |
| 5000.00 | 18.6 | 26.5      | 15.4                    | 10.4                     | 1.3       | 0.8     | 26.7           | 18.1                   | 1.3             |
| 5200.00 | 18.3 | 26.6      | 15.7                    | 9.6                      | 1.3       | 0.8     | 25.3           | 17.9                   | 1.3             |
| 5400.00 | 18.0 | 26.8      | 15.5                    | 8.8                      | 1.4       | 0.8     | 25.9           | 17.8                   | 1.4             |
| 5600.00 | 17.6 | 27.1      | 14.8                    | 8.0                      | 1.4       | 0.8     | 24.9           | 17.4                   | 1.4             |
| 5800.00 | 17.3 | 27.1      | 14.2                    | 7.5                      | 1.4       | 0.8     | 21.3           | 17.0                   | 1.5             |
| 6000.00 | 16.9 | 27.3      | 13.3                    | 7.0                      | 1.4       | 0.8     | 22.6           | 16.5                   | 1.6             |

*Typical Performance Data***Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 5.25V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 79mA$  @ Temperature = +25°C

| 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)            |
| 100.00  | 13.3 | 37.0      | 1.7                     | 2.9                      | 1.7       | 0.7     | 21.8           | 15.8                   | 4.1             |
| 200.00  | 21.0 | 28.9      | 7.7                     | 9.6                      | 1.2       | 0.8     | 30.0           | 18.2                   | 1.9             |
| 300.00  | 22.2 | 27.5      | 13.5                    | 12.8                     | 1.1       | 0.7     | 28.9           | 19.3                   | 1.5             |
| 400.00  | 22.5 | 27.1      | 15.9                    | 13.3                     | 1.1       | 0.6     | 27.6           | 19.6                   | 1.3             |
| 500.00  | 22.6 | 27.0      | 16.2                    | 13.3                     | 1.1       | 0.6     | 28.3           | 19.7                   | 1.3             |
| 600.00  | 22.6 | 26.9      | 16.0                    | 13.5                     | 1.1       | 0.6     | 29.0           | 19.7                   | 1.2             |
| 700.00  | 22.6 | 26.9      | 15.9                    | 13.6                     | 1.1       | 0.6     | 31.4           | 20.0                   | 1.2             |
| 800.00  | 22.5 | 26.8      | 15.8                    | 13.9                     | 1.1       | 0.6     | 32.2           | 20.0                   | 1.2             |
| 900.00  | 22.5 | 26.8      | 15.7                    | 14.3                     | 1.1       | 0.6     | 28.7           | 19.8                   | 1.2             |
| 1000.00 | 22.5 | 26.8      | 15.7                    | 14.7                     | 1.1       | 0.6     | 30.4           | 19.5                   | 1.2             |
| 1200.00 | 22.4 | 26.7      | 15.7                    | 15.9                     | 1.1       | 0.6     | 29.3           | 19.7                   | 1.3             |
| 1400.00 | 22.2 | 26.7      | 15.5                    | 17.5                     | 1.1       | 0.7     | 31.3           | 19.7                   | 1.2             |
| 1600.00 | 22.1 | 26.7      | 15.2                    | 19.6                     | 1.1       | 0.7     | 27.3           | 19.5                   | 1.2             |
| 1800.00 | 21.9 | 26.7      | 14.8                    | 21.7                     | 1.1       | 0.7     | 29.3           | 19.3                   | 1.2             |
| 2000.00 | 21.7 | 26.7      | 14.1                    | 23.2                     | 1.1       | 0.7     | 28.3           | 19.1                   | 1.2             |
| 2200.00 | 21.5 | 26.7      | 13.4                    | 22.1                     | 1.1       | 0.8     | 28.3           | 18.9                   | 1.2             |
| 2400.00 | 21.3 | 26.7      | 12.8                    | 19.7                     | 1.1       | 0.8     | 31.6           | 18.9                   | 1.2             |
| 2600.00 | 21.1 | 26.7      | 12.2                    | 17.4                     | 1.2       | 0.8     | 29.1           | 18.6                   | 1.3             |
| 2800.00 | 20.8 | 26.8      | 11.8                    | 15.6                     | 1.2       | 0.8     | 28.2           | 18.7                   | 1.4             |
| 3000.00 | 20.6 | 26.8      | 11.4                    | 14.5                     | 1.2       | 0.8     | 29.4           | 18.9                   | 1.3             |
| 3200.00 | 20.4 | 26.7      | 11.3                    | 14.0                     | 1.2       | 0.8     | 29.1           | 18.5                   | 1.3             |
| 3400.00 | 20.2 | 26.6      | 11.3                    | 13.6                     | 1.2       | 0.8     | 28.1           | 19.0                   | 1.3             |
| 3600.00 | 20.0 | 26.6      | 11.3                    | 13.1                     | 1.2       | 0.8     | 31.2           | 19.0                   | 1.3             |
| 3800.00 | 19.8 | 26.5      | 11.6                    | 12.8                     | 1.2       | 0.8     | 31.3           | 19.1                   | 1.3             |
| 4000.00 | 19.6 | 26.5      | 11.7                    | 12.9                     | 1.2       | 0.8     | 29.0           | 19.3                   | 1.3             |
| 4200.00 | 19.4 | 26.5      | 12.4                    | 12.5                     | 1.3       | 0.8     | 29.4           | 18.7                   | 1.3             |
| 4400.00 | 19.2 | 26.5      | 13.2                    | 12.3                     | 1.3       | 0.8     | 29.9           | 19.3                   | 1.3             |
| 4600.00 | 19.0 | 26.5      | 13.8                    | 11.9                     | 1.3       | 0.8     | 26.0           | 19.1                   | 1.3             |
| 4800.00 | 18.8 | 26.5      | 14.6                    | 11.4                     | 1.3       | 0.8     | 26.1           | 18.4                   | 1.3             |
| 5000.00 | 18.6 | 26.7      | 15.1                    | 10.8                     | 1.4       | 0.8     | 24.9           | 18.3                   | 1.3             |
| 5200.00 | 18.3 | 26.9      | 15.4                    | 10.0                     | 1.4       | 0.8     | 25.6           | 18.0                   | 1.4             |
| 5400.00 | 18.0 | 27.1      | 15.3                    | 9.1                      | 1.4       | 0.8     | 26.3           | 17.9                   | 1.4             |
| 5600.00 | 17.5 | 27.2      | 14.5                    | 8.3                      | 1.4       | 0.8     | 24.2           | 17.4                   | 1.5             |
| 5800.00 | 17.2 | 27.3      | 14.0                    | 7.8                      | 1.4       | 0.8     | 23.3           | 17.1                   | 1.5             |
| 6000.00 | 16.8 | 27.5      | 13.1                    | 7.3                      | 1.5       | 0.8     | 22.8           | 16.7                   | 1.7             |

*Typical Performance Data***Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 5.0V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 83mA$  @ Temperature = -45°C

| 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)            |
| 100.00  | 12.6 | 36.8      | 1.6                     | 2.2                      | 1.5       | 0.6     | 22.9           | 15.6                   | 3.5             |
| 200.00  | 20.6 | 28.4      | 8.2                     | 7.5                      | 1.2       | 0.7     | 29.6           | 17.9                   | 1.5             |
| 300.00  | 21.6 | 27.1      | 13.1                    | 9.1                      | 1.1       | 0.6     | 28.8           | 19.3                   | 1.2             |
| 400.00  | 21.9 | 26.8      | 13.3                    | 9.2                      | 1.1       | 0.5     | 26.6           | 19.6                   | 1.2             |
| 500.00  | 21.9 | 26.6      | 12.7                    | 9.1                      | 1.1       | 0.5     | 29.2           | 19.9                   | 1.1             |
| 600.00  | 21.9 | 26.6      | 12.3                    | 9.2                      | 1.1       | 0.5     | 31.2           | 19.9                   | 1.1             |
| 700.00  | 21.9 | 26.5      | 12.2                    | 9.2                      | 1.1       | 0.5     | 28.7           | 20.1                   | 1.1             |
| 800.00  | 21.9 | 26.5      | 12.1                    | 9.4                      | 1.1       | 0.5     | 33.1           | 20.1                   | 1.0             |
| 900.00  | 21.9 | 26.4      | 12.2                    | 9.6                      | 1.1       | 0.5     | 32.7           | 20.1                   | 1.0             |
| 1000.00 | 21.9 | 26.4      | 12.4                    | 9.8                      | 1.1       | 0.5     | 29.4           | 20.0                   | 1.0             |
| 1200.00 | 21.9 | 26.3      | 12.9                    | 10.5                     | 1.1       | 0.5     | 31.8           | 19.9                   | 1.1             |
| 1400.00 | 21.8 | 26.2      | 13.7                    | 11.3                     | 1.1       | 0.6     | 30.0           | 19.8                   | 1.0             |
| 1600.00 | 21.8 | 26.1      | 14.7                    | 12.5                     | 1.1       | 0.6     | 27.6           | 19.8                   | 1.0             |
| 1800.00 | 21.7 | 26.1      | 15.8                    | 13.9                     | 1.1       | 0.6     | 31.2           | 19.5                   | 1.1             |
| 2000.00 | 21.6 | 26.0      | 16.7                    | 15.8                     | 1.1       | 0.6     | 29.5           | 19.3                   | 1.0             |
| 2200.00 | 21.5 | 26.0      | 17.5                    | 18.0                     | 1.1       | 0.7     | 29.8           | 19.1                   | 0.9             |
| 2400.00 | 21.4 | 26.0      | 17.8                    | 20.4                     | 1.1       | 0.7     | 29.2           | 19.2                   | 1.1             |
| 2600.00 | 21.2 | 25.9      | 17.5                    | 22.0                     | 1.1       | 0.7     | 28.8           | 18.7                   | 1.0             |
| 2800.00 | 21.0 | 25.9      | 17.1                    | 21.2                     | 1.1       | 0.7     | 28.5           | 18.6                   | 1.1             |
| 3000.00 | 20.9 | 25.9      | 16.4                    | 19.6                     | 1.1       | 0.7     | 30.3           | 19.0                   | 1.0             |
| 3200.00 | 20.7 | 25.8      | 16.2                    | 18.6                     | 1.2       | 0.7     | 30.0           | 18.5                   | 0.9             |
| 3400.00 | 20.5 | 25.8      | 16.0                    | 17.8                     | 1.2       | 0.7     | 30.0           | 19.0                   | 1.0             |
| 3600.00 | 20.4 | 25.8      | 15.9                    | 17.0                     | 1.2       | 0.7     | 29.7           | 19.1                   | 0.9             |
| 3800.00 | 20.2 | 25.8      | 16.2                    | 16.3                     | 1.2       | 0.7     | 28.8           | 19.0                   | 0.9             |
| 4000.00 | 19.9 | 25.9      | 16.2                    | 16.2                     | 1.2       | 0.8     | 30.5           | 19.4                   | 1.0             |
| 4200.00 | 19.9 | 25.7      | 17.2                    | 15.4                     | 1.2       | 0.7     | 28.3           | 18.7                   | 1.0             |
| 4400.00 | 19.7 | 25.7      | 18.3                    | 14.8                     | 1.2       | 0.7     | 28.2           | 19.3                   | 1.0             |
| 4600.00 | 19.5 | 25.8      | 19.3                    | 13.9                     | 1.2       | 0.7     | 28.9           | 19.2                   | 1.0             |
| 4800.00 | 19.3 | 25.9      | 20.5                    | 13.2                     | 1.3       | 0.7     | 29.1           | 18.6                   | 1.0             |
| 5000.00 | 19.1 | 25.9      | 21.5                    | 12.2                     | 1.3       | 0.7     | 28.8           | 18.7                   | 1.0             |
| 5200.00 | 18.9 | 26.1      | 22.2                    | 11.2                     | 1.3       | 0.7     | 28.1           | 18.2                   | 1.0             |
| 5400.00 | 18.6 | 26.3      | 22.3                    | 10.1                     | 1.3       | 0.7     | 26.6           | 18.0                   | 1.1             |
| 5600.00 | 18.3 | 26.5      | 20.7                    | 8.9                      | 1.3       | 0.7     | 26.4           | 17.3                   | 1.1             |
| 5800.00 | 18.1 | 26.6      | 20.4                    | 8.5                      | 1.3       | 0.7     | 25.0           | 17.0                   | 1.1             |
| 6000.00 | 17.7 | 26.7      | 18.7                    | 7.9                      | 1.4       | 0.7     | 23.7           | 16.4                   | 1.2             |

*Typical Performance Data***Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 4.75V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 81mA$  @ Temperature = -45°C

| 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)            |
| 100.00  | 12.6 | 36.7      | 1.6                     | 2.2                      | 1.5       | 0.6     | 23.2           | 15.2                   | 3.5             |
| 200.00  | 20.5 | 28.4      | 8.2                     | 7.5                      | 1.2       | 0.7     | 28.9           | 17.2                   | 1.5             |
| 300.00  | 21.6 | 27.1      | 13.1                    | 9.1                      | 1.1       | 0.6     | 26.3           | 18.7                   | 1.2             |
| 400.00  | 21.8 | 26.8      | 13.4                    | 9.2                      | 1.1       | 0.5     | 28.0           | 19.2                   | 1.1             |
| 500.00  | 21.9 | 26.6      | 12.8                    | 9.1                      | 1.1       | 0.5     | 30.5           | 19.5                   | 1.1             |
| 600.00  | 21.9 | 26.5      | 12.4                    | 9.2                      | 1.1       | 0.5     | 31.3           | 19.4                   | 1.0             |
| 700.00  | 21.9 | 26.5      | 12.2                    | 9.2                      | 1.1       | 0.5     | 29.3           | 19.6                   | 1.1             |
| 800.00  | 21.9 | 26.4      | 12.2                    | 9.4                      | 1.1       | 0.5     | 30.2           | 19.6                   | 1.0             |
| 900.00  | 21.9 | 26.4      | 12.3                    | 9.6                      | 1.1       | 0.5     | 30.6           | 19.6                   | 1.1             |
| 1000.00 | 21.9 | 26.3      | 12.5                    | 9.8                      | 1.1       | 0.5     | 31.6           | 19.4                   | 1.0             |
| 1200.00 | 21.8 | 26.3      | 13.0                    | 10.5                     | 1.1       | 0.5     | 30.8           | 19.4                   | 1.0             |
| 1400.00 | 21.8 | 26.2      | 13.7                    | 11.4                     | 1.1       | 0.6     | 31.4           | 19.4                   | 0.9             |
| 1600.00 | 21.7 | 26.1      | 14.7                    | 12.5                     | 1.1       | 0.6     | 33.0           | 19.3                   | 1.0             |
| 1800.00 | 21.7 | 26.0      | 15.7                    | 13.9                     | 1.1       | 0.6     | 28.1           | 19.1                   | 1.0             |
| 2000.00 | 21.6 | 26.0      | 16.6                    | 15.8                     | 1.1       | 0.6     | 29.7           | 19.0                   | 0.9             |
| 2200.00 | 21.5 | 25.9      | 17.3                    | 18.0                     | 1.1       | 0.7     | 28.7           | 18.9                   | 0.9             |
| 2400.00 | 21.3 | 25.9      | 17.6                    | 20.3                     | 1.1       | 0.7     | 29.9           | 18.8                   | 1.3             |
| 2600.00 | 21.2 | 25.9      | 17.3                    | 21.8                     | 1.1       | 0.7     | 28.9           | 18.5                   | 0.9             |
| 2800.00 | 21.0 | 25.9      | 16.9                    | 20.8                     | 1.1       | 0.7     | 28.9           | 18.4                   | 1.1             |
| 3000.00 | 20.8 | 25.9      | 16.3                    | 19.3                     | 1.1       | 0.7     | 28.5           | 18.8                   | 1.0             |
| 3200.00 | 20.7 | 25.8      | 16.1                    | 18.4                     | 1.2       | 0.7     | 30.4           | 18.3                   | 0.8             |
| 3400.00 | 20.5 | 25.8      | 15.9                    | 17.5                     | 1.2       | 0.7     | 32.4           | 18.8                   | 1.0             |
| 3600.00 | 20.4 | 25.7      | 15.9                    | 16.8                     | 1.2       | 0.7     | 29.9           | 18.9                   | 0.9             |
| 3800.00 | 20.2 | 25.7      | 16.2                    | 16.1                     | 1.2       | 0.7     | 29.1           | 18.8                   | 0.9             |
| 4000.00 | 19.9 | 25.8      | 16.2                    | 16.0                     | 1.2       | 0.8     | 29.5           | 19.2                   | 1.0             |
| 4200.00 | 19.9 | 25.7      | 17.3                    | 15.2                     | 1.2       | 0.7     | 28.6           | 18.7                   | 1.0             |
| 4400.00 | 19.7 | 25.7      | 18.4                    | 14.6                     | 1.2       | 0.7     | 28.1           | 19.1                   | 1.0             |
| 4600.00 | 19.5 | 25.8      | 19.4                    | 13.8                     | 1.2       | 0.7     | 27.5           | 19.1                   | 1.0             |
| 4800.00 | 19.3 | 25.8      | 20.7                    | 13.0                     | 1.2       | 0.7     | 28.5           | 18.6                   | 1.0             |
| 5000.00 | 19.1 | 26.0      | 21.7                    | 12.1                     | 1.3       | 0.7     | 29.6           | 18.6                   | 1.0             |
| 5200.00 | 18.9 | 26.1      | 22.4                    | 11.1                     | 1.3       | 0.7     | 28.7           | 18.2                   | 1.1             |
| 5400.00 | 18.6 | 26.2      | 22.5                    | 10.0                     | 1.3       | 0.7     | 26.6           | 18.0                   | 1.0             |
| 5600.00 | 18.2 | 26.5      | 20.9                    | 8.8                      | 1.3       | 0.7     | 24.8           | 17.5                   | 1.1             |
| 5800.00 | 18.0 | 26.5      | 20.6                    | 8.4                      | 1.3       | 0.7     | 24.1           | 17.1                   | 1.7             |
| 6000.00 | 17.7 | 26.7      | 18.9                    | 7.8                      | 1.4       | 0.7     | 22.6           | 16.4                   | 1.2             |

*Typical Performance Data***Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 5.25V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 84mA$  @ Temperature = -45°C

| 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)            |
| 100.00  | 12.7 | 36.8      | 1.6                     | 2.3                      | 1.5       | 0.6     | 21.3           | 16.0                   | 3.5             |
| 200.00  | 20.6 | 28.6      | 8.1                     | 7.7                      | 1.2       | 0.7     | 31.7           | 18.2                   | 1.6             |
| 300.00  | 21.7 | 27.2      | 13.1                    | 9.4                      | 1.1       | 0.6     | 27.6           | 19.6                   | 1.2             |
| 400.00  | 21.9 | 26.9      | 13.4                    | 9.4                      | 1.1       | 0.5     | 27.6           | 20.0                   | 1.2             |
| 500.00  | 22.0 | 26.8      | 12.8                    | 9.4                      | 1.1       | 0.5     | 30.5           | 20.2                   | 1.1             |
| 600.00  | 22.0 | 26.7      | 12.4                    | 9.4                      | 1.1       | 0.5     | 29.1           | 20.2                   | 1.1             |
| 700.00  | 22.0 | 26.6      | 12.2                    | 9.5                      | 1.1       | 0.5     | 31.5           | 20.4                   | 1.0             |
| 800.00  | 22.0 | 26.6      | 12.2                    | 9.7                      | 1.1       | 0.5     | 31.1           | 20.4                   | 1.0             |
| 900.00  | 22.0 | 26.6      | 12.3                    | 9.9                      | 1.1       | 0.5     | 30.3           | 20.3                   | 1.5             |
| 1000.00 | 22.0 | 26.5      | 12.4                    | 10.1                     | 1.1       | 0.5     | 29.8           | 20.1                   | 1.0             |
| 1200.00 | 21.9 | 26.4      | 13.0                    | 10.8                     | 1.1       | 0.5     | 29.3           | 20.2                   | 1.1             |
| 1400.00 | 21.9 | 26.4      | 13.8                    | 11.6                     | 1.1       | 0.6     | 30.4           | 20.0                   | 1.0             |
| 1600.00 | 21.8 | 26.3      | 14.7                    | 12.8                     | 1.1       | 0.6     | 28.9           | 19.9                   | 1.0             |
| 1800.00 | 21.8 | 26.2      | 15.8                    | 14.3                     | 1.1       | 0.6     | 29.9           | 19.7                   | 1.0             |
| 2000.00 | 21.7 | 26.1      | 16.8                    | 16.2                     | 1.1       | 0.6     | 28.3           | 19.6                   | 1.0             |
| 2200.00 | 21.6 | 26.1      | 17.4                    | 18.6                     | 1.1       | 0.7     | 29.2           | 19.2                   | 1.0             |
| 2400.00 | 21.4 | 26.1      | 17.7                    | 21.0                     | 1.1       | 0.7     | 29.9           | 19.3                   | 1.9             |
| 2600.00 | 21.3 | 26.1      | 17.4                    | 22.4                     | 1.1       | 0.7     | 30.5           | 18.8                   | 1.0             |
| 2800.00 | 21.1 | 26.1      | 17.0                    | 21.2                     | 1.1       | 0.7     | 30.6           | 18.8                   | 1.1             |
| 3000.00 | 20.9 | 26.0      | 16.3                    | 19.6                     | 1.2       | 0.7     | 29.0           | 19.2                   | 1.0             |
| 3200.00 | 20.8 | 26.0      | 16.1                    | 18.6                     | 1.2       | 0.7     | 29.8           | 18.6                   | 0.9             |
| 3400.00 | 20.6 | 25.9      | 16.0                    | 17.8                     | 1.2       | 0.7     | 30.8           | 19.2                   | 1.0             |
| 3600.00 | 20.4 | 25.9      | 15.9                    | 17.0                     | 1.2       | 0.7     | 29.5           | 19.1                   | 0.8             |
| 3800.00 | 20.2 | 25.8      | 16.1                    | 16.4                     | 1.2       | 0.7     | 27.7           | 19.1                   | 0.9             |
| 4000.00 | 20.0 | 25.9      | 16.1                    | 16.2                     | 1.2       | 0.8     | 30.8           | 19.4                   | 1.0             |
| 4200.00 | 19.9 | 25.8      | 17.2                    | 15.5                     | 1.2       | 0.7     | 32.8           | 18.7                   | 0.9             |
| 4400.00 | 19.7 | 25.8      | 18.3                    | 14.9                     | 1.2       | 0.7     | 29.0           | 19.4                   | 1.0             |
| 4600.00 | 19.6 | 25.9      | 19.2                    | 14.0                     | 1.2       | 0.7     | 28.2           | 19.3                   | 0.9             |
| 4800.00 | 19.4 | 26.0      | 20.4                    | 13.3                     | 1.3       | 0.7     | 30.6           | 18.4                   | 1.0             |
| 5000.00 | 19.2 | 26.0      | 21.4                    | 12.3                     | 1.3       | 0.7     | 27.7           | 18.5                   | 1.0             |
| 5200.00 | 18.9 | 26.2      | 22.0                    | 11.3                     | 1.3       | 0.7     | 27.3           | 17.8                   | 1.0             |
| 5400.00 | 18.7 | 26.3      | 22.2                    | 10.2                     | 1.3       | 0.7     | 26.2           | 17.5                   | 1.0             |
| 5600.00 | 18.3 | 26.6      | 20.6                    | 9.0                      | 1.3       | 0.7     | 23.9           | 16.6                   | 1.1             |
| 5800.00 | 18.1 | 26.7      | 20.4                    | 8.5                      | 1.4       | 0.7     | 23.3           | 16.6                   | 1.5             |
| 6000.00 | 17.7 | 26.9      | 18.6                    | 8.0                      | 1.4       | 0.7     | 22.4           | 15.8                   | 1.2             |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 5.0V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 74mA$  @ Temperature = +85°C

| FREQ    | Gain | Isolation | Input Return Loss | Output Return Loss | Stability |         | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---------|------|-----------|-------------------|--------------------|-----------|---------|-------------|------------------|--------------|
| (MHz)   | (dB) | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)       | (dBm)            | (dB)         |
| 100.00  | 13.7 | 37.1      | 1.8               | 3.1                | 1.7       | 0.8     | 21.9        | 15.2             | 4.6          |
| 200.00  | 21.2 | 29.2      | 7.0               | 10.6               | 1.2       | 0.9     | 27.8        | 17.7             | 2.2          |
| 300.00  | 22.5 | 27.8      | 12.1              | 16.0               | 1.1       | 0.7     | 26.6        | 19.0             | 1.7          |
| 400.00  | 22.9 | 27.3      | 15.1              | 17.6               | 1.1       | 0.7     | 27.7        | 19.3             | 1.5          |
| 500.00  | 23.0 | 27.1      | 16.3              | 17.9               | 1.1       | 0.6     | 27.1        | 19.4             | 1.5          |
| 600.00  | 23.0 | 27.1      | 16.5              | 18.2               | 1.1       | 0.6     | 27.7        | 19.4             | 1.4          |
| 700.00  | 22.9 | 27.0      | 16.4              | 18.4               | 1.1       | 0.6     | 27.6        | 19.6             | 1.4          |
| 800.00  | 22.9 | 27.0      | 16.2              | 18.9               | 1.1       | 0.6     | 32.5        | 19.6             | 1.4          |
| 900.00  | 22.8 | 27.0      | 15.8              | 19.4               | 1.1       | 0.6     | 30.5        | 19.6             | 1.5          |
| 1000.00 | 22.8 | 27.0      | 15.4              | 20.1               | 1.1       | 0.7     | 30.7        | 19.5             | 1.3          |
| 1200.00 | 22.6 | 27.0      | 14.5              | 21.8               | 1.1       | 0.7     | 28.2        | 19.3             | 1.4          |
| 1400.00 | 22.4 | 27.0      | 13.6              | 23.3               | 1.1       | 0.7     | 30.9        | 19.4             | 1.4          |
| 1600.00 | 22.1 | 27.0      | 12.7              | 23.1               | 1.1       | 0.7     | 29.6        | 19.2             | 1.5          |
| 1800.00 | 21.9 | 27.0      | 12.0              | 21.4               | 1.1       | 0.8     | 31.0        | 19.2             | 1.5          |
| 2000.00 | 21.6 | 27.0      | 11.2              | 19.1               | 1.1       | 0.8     | 28.6        | 19.0             | 1.5          |
| 2200.00 | 21.4 | 27.1      | 10.6              | 17.0               | 1.1       | 0.8     | 30.2        | 19.0             | 1.5          |
| 2400.00 | 21.1 | 27.1      | 10.0              | 15.1               | 1.1       | 0.8     | 32.2        | 18.8             | 1.6          |
| 2600.00 | 20.8 | 27.2      | 9.6               | 13.6               | 1.2       | 0.8     | 28.2        | 18.6             | 1.5          |
| 2800.00 | 20.5 | 27.2      | 9.4               | 12.6               | 1.2       | 0.8     | 29.6        | 18.6             | 1.6          |
| 3000.00 | 20.2 | 27.1      | 9.1               | 11.9               | 1.2       | 0.8     | 28.3        | 18.8             | 1.6          |
| 3200.00 | 20.0 | 27.0      | 9.1               | 11.6               | 1.2       | 0.8     | 31.6        | 18.6             | 1.5          |
| 3400.00 | 19.8 | 26.9      | 9.2               | 11.3               | 1.2       | 0.8     | 28.0        | 19.0             | 1.6          |
| 3600.00 | 19.6 | 26.8      | 9.3               | 11.0               | 1.2       | 0.8     | 26.2        | 18.9             | 1.5          |
| 3800.00 | 19.4 | 26.8      | 9.5               | 10.9               | 1.2       | 0.8     | 26.1        | 18.9             | 1.6          |
| 4000.00 | 19.1 | 26.8      | 9.7               | 11.0               | 1.3       | 0.8     | 27.1        | 19.0             | 1.6          |
| 4200.00 | 19.0 | 26.7      | 10.3              | 10.7               | 1.3       | 0.8     | 26.4        | 18.6             | 1.5          |
| 4400.00 | 18.8 | 26.7      | 10.9              | 10.7               | 1.3       | 0.8     | 28.6        | 18.9             | 1.6          |
| 4600.00 | 18.6 | 26.7      | 11.5              | 10.4               | 1.3       | 0.8     | 24.9        | 18.6             | 1.6          |
| 4800.00 | 18.4 | 26.8      | 12.1              | 10.1               | 1.3       | 0.8     | 23.0        | 17.9             | 1.6          |
| 5000.00 | 18.1 | 26.9      | 12.5              | 9.6                | 1.4       | 0.8     | 27.4        | 17.7             | 1.6          |
| 5200.00 | 17.7 | 27.1      | 12.7              | 9.0                | 1.4       | 0.8     | 24.4        | 17.4             | 1.7          |
| 5400.00 | 17.3 | 27.3      | 12.5              | 8.2                | 1.4       | 0.8     | 26.7        | 17.2             | 1.7          |
| 5600.00 | 16.9 | 27.4      | 12.1              | 7.7                | 1.4       | 0.8     | 20.4        | 16.8             | 1.8          |
| 5800.00 | 16.5 | 27.5      | 11.5              | 7.2                | 1.5       | 0.8     | 19.2        | 16.4             | 2.0          |
| 6000.00 | 16.0 | 27.8      | 10.8              | 6.8                | 1.5       | 0.8     | 18.2        | 15.8             | 2.0          |

*Typical Performance Data***Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 4.75V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 72mA$  @ Temperature = +85°C

| 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)            |
| 100.00  | 13.7 | 37.0      | 1.8                     | 3.0                      | 1.7       | 0.8     | 22.5           | 14.8                   | 4.6             |
| 200.00  | 21.2 | 29.2      | 7.0                     | 10.5                     | 1.2       | 0.9     | 27.5           | 17.3                   | 2.1             |
| 300.00  | 22.5 | 27.7      | 12.0                    | 15.8                     | 1.1       | 0.7     | 28.5           | 18.6                   | 1.6             |
| 400.00  | 22.8 | 27.2      | 15.0                    | 17.5                     | 1.1       | 0.7     | 31.3           | 18.9                   | 1.5             |
| 500.00  | 22.9 | 27.1      | 16.2                    | 17.9                     | 1.1       | 0.6     | 29.2           | 19.2                   | 1.4             |
| 600.00  | 22.9 | 27.0      | 16.4                    | 18.1                     | 1.1       | 0.6     | 31.4           | 19.2                   | 1.4             |
| 700.00  | 22.9 | 26.9      | 16.3                    | 18.4                     | 1.1       | 0.6     | 29.7           | 19.4                   | 1.4             |
| 800.00  | 22.9 | 26.9      | 16.0                    | 18.8                     | 1.1       | 0.6     | 29.4           | 19.2                   | 1.3             |
| 900.00  | 22.8 | 26.9      | 15.6                    | 19.4                     | 1.1       | 0.6     | 30.9           | 19.3                   | 1.4             |
| 1000.00 | 22.7 | 26.9      | 15.2                    | 20.1                     | 1.1       | 0.7     | 31.3           | 19.3                   | 1.4             |
| 1200.00 | 22.5 | 26.9      | 14.3                    | 21.7                     | 1.1       | 0.7     | 30.9           | 19.1                   | 1.4             |
| 1400.00 | 22.3 | 26.9      | 13.4                    | 23.1                     | 1.1       | 0.7     | 30.0           | 19.1                   | 1.4             |
| 1600.00 | 22.1 | 26.9      | 12.5                    | 22.9                     | 1.1       | 0.7     | 29.0           | 19.0                   | 1.4             |
| 1800.00 | 21.8 | 26.9      | 11.8                    | 21.1                     | 1.1       | 0.8     | 27.8           | 19.0                   | 1.4             |
| 2000.00 | 21.6 | 26.9      | 11.0                    | 18.8                     | 1.1       | 0.8     | 29.9           | 18.8                   | 1.5             |
| 2200.00 | 21.3 | 27.0      | 10.4                    | 16.8                     | 1.1       | 0.8     | 29.7           | 18.7                   | 1.4             |
| 2400.00 | 21.0 | 27.1      | 9.9                     | 14.9                     | 1.1       | 0.8     | 28.9           | 18.6                   | 1.6             |
| 2600.00 | 20.7 | 27.1      | 9.5                     | 13.5                     | 1.1       | 0.8     | 29.7           | 18.4                   | 1.5             |
| 2800.00 | 20.4 | 27.1      | 9.2                     | 12.4                     | 1.2       | 0.8     | 28.4           | 18.5                   | 1.7             |
| 3000.00 | 20.2 | 27.1      | 9.0                     | 11.7                     | 1.2       | 0.8     | 30.5           | 18.6                   | 1.6             |
| 3200.00 | 19.9 | 26.9      | 9.0                     | 11.4                     | 1.2       | 0.8     | 28.1           | 18.3                   | 1.5             |
| 3400.00 | 19.7 | 26.8      | 9.1                     | 11.2                     | 1.2       | 0.8     | 29.1           | 18.8                   | 1.6             |
| 3600.00 | 19.5 | 26.8      | 9.2                     | 10.9                     | 1.2       | 0.8     | 27.9           | 18.7                   | 1.5             |
| 3800.00 | 19.3 | 26.7      | 9.4                     | 10.7                     | 1.2       | 0.8     | 27.6           | 18.7                   | 1.5             |
| 4000.00 | 19.1 | 26.7      | 9.6                     | 10.8                     | 1.2       | 0.8     | 27.4           | 18.8                   | 1.6             |
| 4200.00 | 18.9 | 26.6      | 10.2                    | 10.5                     | 1.3       | 0.8     | 26.9           | 18.4                   | 1.5             |
| 4400.00 | 18.7 | 26.6      | 10.9                    | 10.5                     | 1.3       | 0.8     | 27.1           | 18.7                   | 1.5             |
| 4600.00 | 18.5 | 26.6      | 11.4                    | 10.2                     | 1.3       | 0.8     | 25.1           | 18.4                   | 1.6             |
| 4800.00 | 18.3 | 26.7      | 12.0                    | 9.9                      | 1.3       | 0.8     | 23.4           | 17.8                   | 1.6             |
| 5000.00 | 18.0 | 26.8      | 12.4                    | 9.4                      | 1.4       | 0.8     | 26.4           | 17.6                   | 1.6             |
| 5200.00 | 17.7 | 27.0      | 12.6                    | 8.8                      | 1.4       | 0.8     | 23.2           | 17.3                   | 1.7             |
| 5400.00 | 17.3 | 27.1      | 12.4                    | 8.0                      | 1.4       | 0.8     | 23.5           | 17.2                   | 1.7             |
| 5600.00 | 16.8 | 27.3      | 11.9                    | 7.5                      | 1.4       | 0.8     | 22.3           | 16.6                   | 1.8             |
| 5800.00 | 16.4 | 27.4      | 11.4                    | 7.1                      | 1.5       | 0.8     | 18.6           | 16.4                   | 1.8             |
| 6000.00 | 15.9 | 27.7      | 10.7                    | 6.6                      | 1.5       | 0.8     | 18.6           | 15.6                   | 2.0             |

*Typical Performance Data***Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = 5.25V$ ,  $V_{EN} = 5.0V$ ,  $I_{DD} = 74mA$  @ Temperature = +85°C

| 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)            |
| 100.00  | 13.6 | 37.3      | 1.8                     | 3.6                      | 1.9       | 0.9     | 22.6           | 15.5                   | 4.7             |
| 200.00  | 21.1 | 29.6      | 6.9                     | 11.5                     | 1.2       | 0.9     | 29.0           | 18.0                   | 2.3             |
| 300.00  | 22.4 | 28.0      | 11.9                    | 17.6                     | 1.2       | 0.8     | 28.1           | 19.1                   | 1.7             |
| 400.00  | 22.8 | 27.6      | 14.8                    | 19.6                     | 1.1       | 0.7     | 27.6           | 19.4                   | 1.6             |
| 500.00  | 22.9 | 27.4      | 16.1                    | 20.1                     | 1.1       | 0.7     | 29.8           | 19.7                   | 1.5             |
| 600.00  | 22.9 | 27.3      | 16.4                    | 20.3                     | 1.1       | 0.7     | 30.1           | 19.7                   | 1.4             |
| 700.00  | 22.9 | 27.3      | 16.4                    | 20.6                     | 1.1       | 0.7     | 28.5           | 19.7                   | 1.5             |
| 800.00  | 22.8 | 27.2      | 16.1                    | 21.2                     | 1.1       | 0.7     | 28.9           | 19.7                   | 1.4             |
| 900.00  | 22.7 | 27.2      | 15.7                    | 21.8                     | 1.1       | 0.7     | 29.0           | 19.7                   | 1.4             |
| 1000.00 | 22.7 | 27.2      | 15.3                    | 22.5                     | 1.1       | 0.7     | 30.2           | 19.6                   | 1.4             |
| 1200.00 | 22.5 | 27.2      | 14.4                    | 24.1                     | 1.1       | 0.7     | 31.1           | 19.4                   | 1.4             |
| 1400.00 | 22.3 | 27.2      | 13.5                    | 24.7                     | 1.1       | 0.7     | 28.8           | 19.4                   | 1.5             |
| 1600.00 | 22.0 | 27.2      | 12.6                    | 23.1                     | 1.1       | 0.8     | 29.0           | 19.3                   | 1.5             |
| 1800.00 | 21.8 | 27.3      | 11.8                    | 20.7                     | 1.1       | 0.8     | 29.6           | 19.3                   | 1.5             |
| 2000.00 | 21.5 | 27.3      | 11.1                    | 18.4                     | 1.1       | 0.8     | 27.6           | 19.1                   | 1.5             |
| 2200.00 | 21.2 | 27.3      | 10.5                    | 16.4                     | 1.2       | 0.8     | 27.2           | 18.9                   | 1.5             |
| 2400.00 | 20.9 | 27.4      | 9.9                     | 14.7                     | 1.2       | 0.8     | 29.6           | 18.8                   | 1.7             |
| 2600.00 | 20.7 | 27.5      | 9.5                     | 13.3                     | 1.2       | 0.9     | 27.9           | 18.7                   | 1.7             |
| 2800.00 | 20.3 | 27.5      | 9.3                     | 12.4                     | 1.2       | 0.9     | 28.9           | 18.7                   | 1.7             |
| 3000.00 | 20.1 | 27.4      | 9.0                     | 11.8                     | 1.2       | 0.9     | 29.8           | 18.9                   | 1.7             |
| 3200.00 | 19.8 | 27.3      | 9.0                     | 11.5                     | 1.2       | 0.9     | 30.1           | 18.6                   | 1.6             |
| 3400.00 | 19.6 | 27.2      | 9.0                     | 11.4                     | 1.2       | 0.9     | 29.3           | 19.0                   | 1.7             |
| 3600.00 | 19.4 | 27.1      | 9.1                     | 11.1                     | 1.3       | 0.8     | 26.7           | 19.0                   | 1.6             |
| 3800.00 | 19.2 | 27.1      | 9.4                     | 11.0                     | 1.3       | 0.8     | 27.1           | 19.0                   | 1.7             |
| 4000.00 | 19.0 | 27.1      | 9.6                     | 11.2                     | 1.3       | 0.9     | 27.1           | 19.0                   | 1.7             |
| 4200.00 | 18.8 | 27.0      | 10.1                    | 11.0                     | 1.3       | 0.8     | 27.6           | 18.5                   | 1.6             |
| 4400.00 | 18.6 | 26.9      | 10.8                    | 11.0                     | 1.3       | 0.8     | 28.5           | 18.9                   | 1.7             |
| 4600.00 | 18.4 | 27.0      | 11.3                    | 10.9                     | 1.4       | 0.8     | 27.5           | 18.6                   | 1.7             |
| 4800.00 | 18.1 | 27.0      | 11.9                    | 10.6                     | 1.4       | 0.8     | 23.3           | 17.9                   | 1.7             |
| 5000.00 | 17.8 | 27.2      | 12.3                    | 10.1                     | 1.4       | 0.8     | 24.1           | 17.6                   | 1.7             |
| 5200.00 | 17.5 | 27.4      | 12.5                    | 9.4                      | 1.5       | 0.8     | 23.2           | 17.2                   | 1.9             |
| 5400.00 | 17.1 | 27.5      | 12.4                    | 8.7                      | 1.5       | 0.8     | 23.4           | 17.0                   | 1.8             |
| 5600.00 | 16.7 | 27.6      | 12.0                    | 8.1                      | 1.6       | 0.8     | 20.5           | 16.6                   | 2.0             |
| 5800.00 | 16.2 | 27.8      | 11.4                    | 7.7                      | 1.6       | 0.8     | 19.6           | 16.4                   | 2.1             |
| 6000.00 | 15.7 | 28.1      | 10.8                    | 7.2                      | 1.7       | 0.8     | 18.0           | 15.8                   | 2.1             |

# MMIC Amplifier

## Typical Performance Data

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

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD}=5.0\text{ V}$ ,  $V_{EN}=0\text{ V}$ ,  $I_{DD}=2\text{ mA}$  @ Temperature = +25°C

| FREQ    | Gain | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | IP-3<br>Output | 1dB<br>Comp.<br>Input |
|---------|------|-----------|-------------------------|--------------------------|----------------|-----------------------|
| (MHz)   | (dB) | (dB)      | (dB)                    | (dB)                     | (dBm)          | (dBm)                 |
| 100.00  | -5.5 | 5.5       | 2.9                     | 2.5                      |                |                       |
| 200.00  | -1.3 | 1.3       | 10.8                    | 11.4                     |                |                       |
| 300.00  | -0.8 | 0.8       | 17.9                    | 19.5                     |                |                       |
| 400.00  | -0.7 | 0.7       | 22.9                    | 22.5                     |                |                       |
| 500.00  | -0.7 | 0.7       | 23.7                    | 21.2                     | 47.0           | 34.4                  |
| 600.00  | -0.7 | 0.8       | 22.5                    | 20.2                     |                |                       |
| 700.00  | -0.7 | 0.7       | 20.8                    | 19.0                     |                |                       |
| 800.00  | -0.7 | 0.7       | 19.0                    | 17.7                     |                |                       |
| 900.00  | -0.7 | 0.7       | 17.6                    | 16.6                     |                |                       |
| 1000.00 | -0.7 | 0.8       | 16.4                    | 15.7                     | 46.8           | 34.5                  |
| 1200.00 | -0.7 | 0.8       | 14.6                    | 14.3                     |                |                       |
| 1400.00 | -0.8 | 0.9       | 13.3                    | 13.3                     |                |                       |
| 1600.00 | -0.8 | 1.0       | 12.4                    | 12.5                     |                |                       |
| 1800.00 | -0.9 | 1.0       | 11.7                    | 12.0                     |                |                       |
| 2000.00 | -0.9 | 1.1       | 11.2                    | 11.6                     | 42.6           | 29.1                  |
| 2200.00 | -1.0 | 1.2       | 10.9                    | 11.3                     |                |                       |
| 2400.00 | -1.0 | 1.2       | 10.7                    | 11.3                     |                |                       |
| 2600.00 | -1.0 | 1.2       | 10.7                    | 11.4                     |                |                       |
| 2800.00 | -1.0 | 1.3       | 10.8                    | 11.7                     |                |                       |
| 3000.00 | -1.0 | 1.3       | 11.1                    | 12.1                     | 38.3           | 29.9                  |
| 3200.00 | -1.0 | 1.2       | 11.5                    | 12.6                     |                |                       |
| 3400.00 | -0.9 | 1.2       | 12.0                    | 13.4                     |                |                       |
| 3600.00 | -0.9 | 1.2       | 12.7                    | 14.3                     |                |                       |
| 3800.00 | -0.9 | 1.2       | 13.5                    | 15.4                     |                |                       |
| 4000.00 | -1.0 | 1.2       | 13.9                    | 16.0                     | 39.4           | 29.8                  |
| 4200.00 | -0.9 | 1.2       | 15.0                    | 16.9                     |                |                       |
| 4400.00 | -0.9 | 1.1       | 16.1                    | 17.8                     |                |                       |
| 4600.00 | -0.9 | 1.1       | 16.9                    | 18.6                     |                |                       |
| 4800.00 | -0.9 | 1.1       | 17.7                    | 18.7                     |                |                       |
| 5000.00 | -0.9 | 1.2       | 18.2                    | 18.4                     | 39.1           | 30.1                  |
| 5200.00 | -0.9 | 1.2       | 18.2                    | 17.7                     |                |                       |
| 5400.00 | -0.9 | 1.2       | 17.7                    | 16.6                     |                |                       |
| 5600.00 | -1.0 | 1.3       | 16.7                    | 15.4                     |                |                       |
| 5800.00 | -1.0 | 1.4       | 15.5                    | 14.2                     |                |                       |
| 6000.00 | -1.1 | 1.5       | 14.6                    | 13.0                     | 43.2           | 29.5                  |

# MMIC Amplifier

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD}=5.0$  V,  $V_{EN}=0$  V,  $I_{DD}=2$  mA @ Temperature = -45°C

| FREQ    | Gain | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | IP-3<br>Output | 1dB<br>Comp.<br>Input |
|---------|------|-----------|-------------------------|--------------------------|----------------|-----------------------|
| (MHz)   | (dB) | (dB)      | (dB)                    | (dB)                     | (dBm)          | (dBm)                 |
| 100.00  | -5.5 | 5.5       | 2.7                     | 2.4                      |                |                       |
| 200.00  | -1.2 | 1.2       | 10.8                    | 11.2                     |                |                       |
| 300.00  | -0.7 | 0.7       | 18.1                    | 19.2                     |                |                       |
| 400.00  | -0.7 | 0.7       | 23.3                    | 22.6                     |                |                       |
| 500.00  | -0.7 | 0.7       | 24.1                    | 21.5                     | 46.6           | 34.4                  |
| 600.00  | -0.7 | 0.7       | 22.9                    | 20.7                     |                |                       |
| 700.00  | -0.6 | 0.7       | 20.9                    | 19.3                     |                |                       |
| 800.00  | -0.6 | 0.7       | 19.1                    | 17.9                     |                |                       |
| 900.00  | -0.6 | 0.7       | 17.7                    | 16.8                     |                |                       |
| 1000.00 | -0.6 | 0.7       | 16.5                    | 15.9                     | 46.9           | 34.5                  |
| 1200.00 | -0.7 | 0.8       | 14.7                    | 14.4                     |                |                       |
| 1400.00 | -0.7 | 0.8       | 13.4                    | 13.4                     |                |                       |
| 1600.00 | -0.8 | 0.9       | 12.4                    | 12.6                     |                |                       |
| 1800.00 | -0.8 | 1.0       | 11.7                    | 12.0                     |                |                       |
| 2000.00 | -0.9 | 1.0       | 11.2                    | 11.6                     | 41.7           | 29.4                  |
| 2200.00 | -0.9 | 1.1       | 10.9                    | 11.3                     |                |                       |
| 2400.00 | -0.9 | 1.1       | 10.7                    | 11.3                     |                |                       |
| 2600.00 | -0.9 | 1.2       | 10.7                    | 11.4                     |                |                       |
| 2800.00 | -0.9 | 1.2       | 10.9                    | 11.7                     |                |                       |
| 3000.00 | -0.9 | 1.2       | 11.2                    | 12.1                     | 37.7           | 30.2                  |
| 3200.00 | -0.9 | 1.1       | 11.7                    | 12.7                     |                |                       |
| 3400.00 | -0.9 | 1.1       | 12.3                    | 13.4                     |                |                       |
| 3600.00 | -0.8 | 1.1       | 12.9                    | 14.3                     |                |                       |
| 3800.00 | -0.8 | 1.1       | 13.7                    | 15.3                     |                |                       |
| 4000.00 | -0.9 | 1.2       | 14.0                    | 16.1                     | 40.8           | 30.1                  |
| 4200.00 | -0.8 | 1.1       | 15.1                    | 16.7                     |                |                       |
| 4400.00 | -0.8 | 1.0       | 16.0                    | 17.4                     |                |                       |
| 4600.00 | -0.8 | 1.0       | 16.8                    | 18.0                     |                |                       |
| 4800.00 | -0.8 | 1.0       | 17.4                    | 18.1                     |                |                       |
| 5000.00 | -0.8 | 1.1       | 17.7                    | 17.8                     | 38.9           | 30.3                  |
| 5200.00 | -0.8 | 1.1       | 17.5                    | 17.0                     |                |                       |
| 5400.00 | -0.9 | 1.1       | 17.1                    | 16.1                     |                |                       |
| 5600.00 | -0.9 | 1.2       | 16.2                    | 15.1                     |                |                       |
| 5800.00 | -1.0 | 1.3       | 15.1                    | 14.0                     |                |                       |
| 6000.00 | -1.1 | 1.4       | 14.2                    | 12.9                     | 42.9           | 28.9                  |

# MMIC Amplifier

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

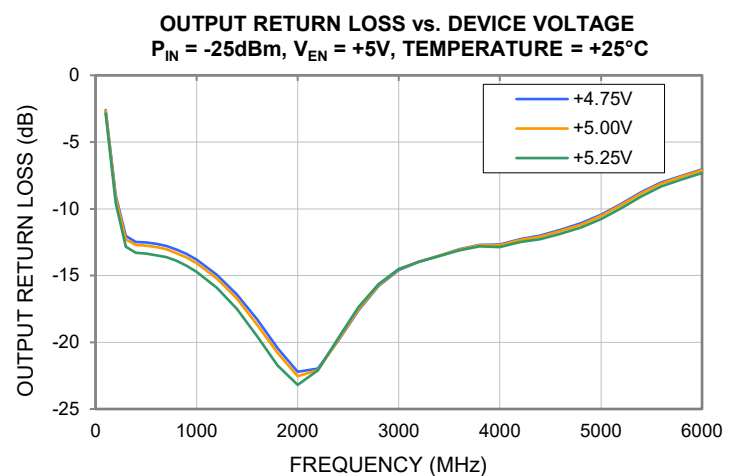
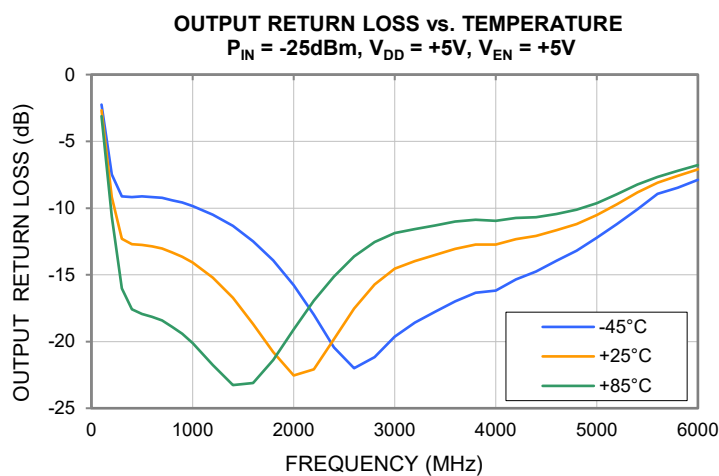
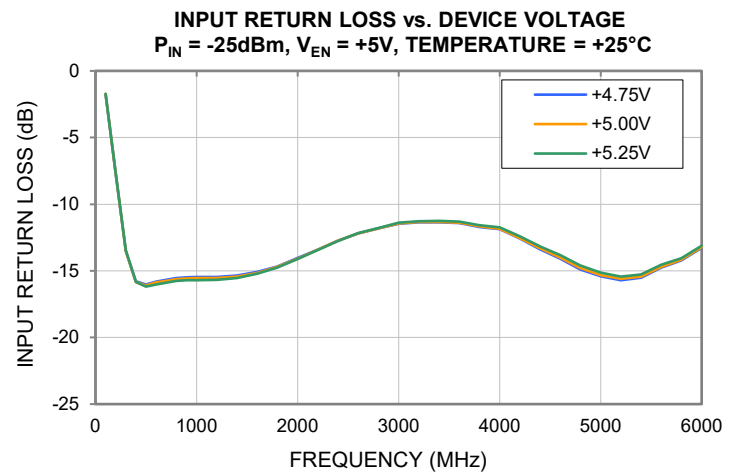
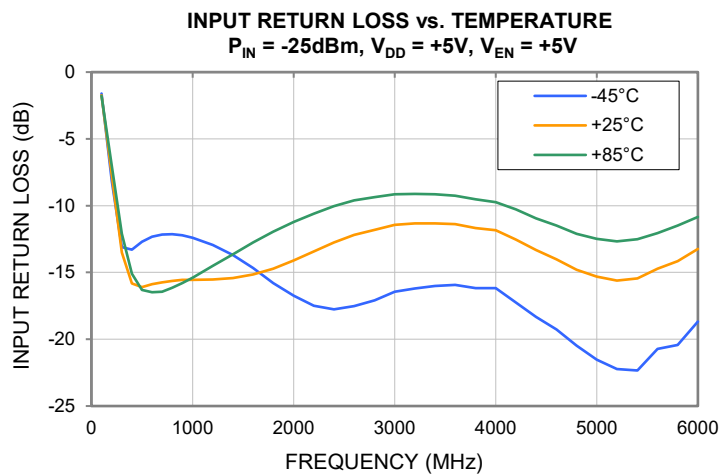
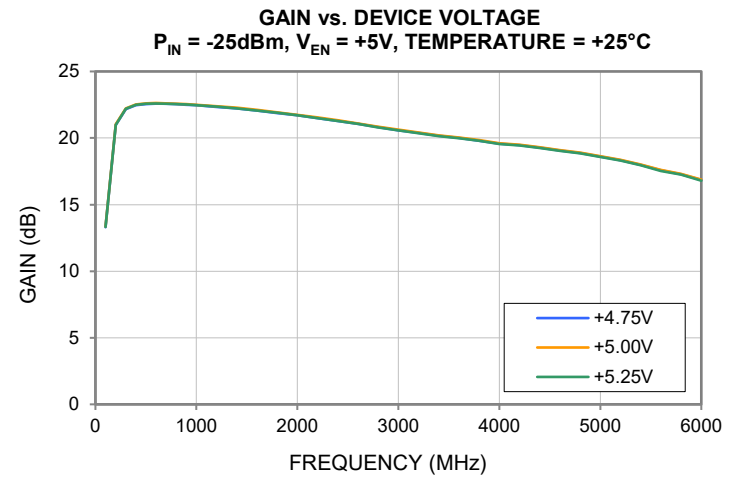
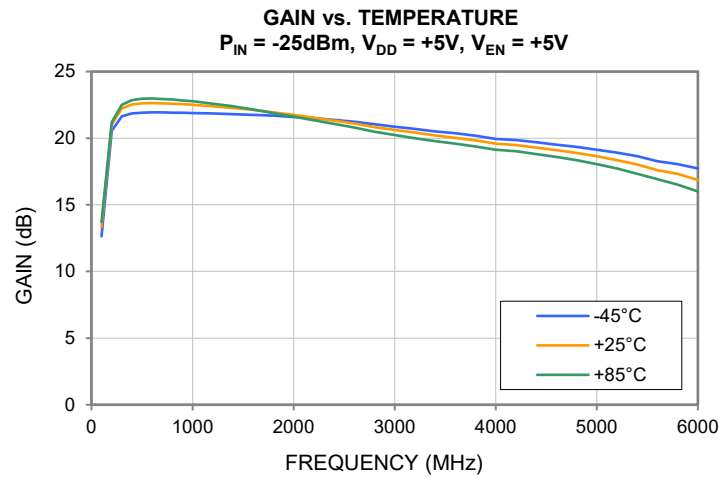
Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

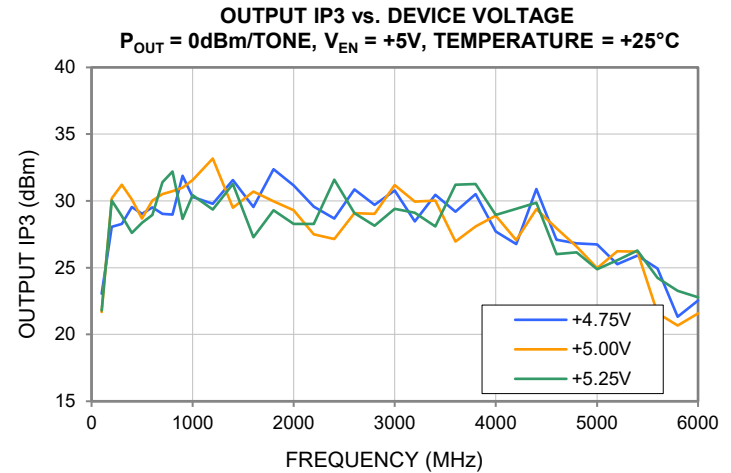
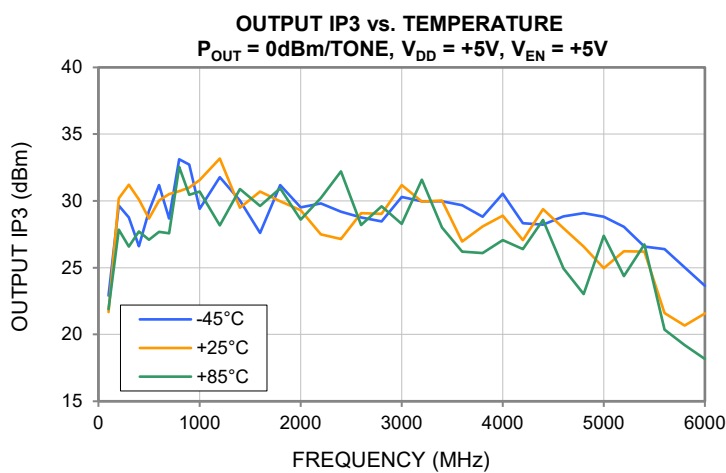
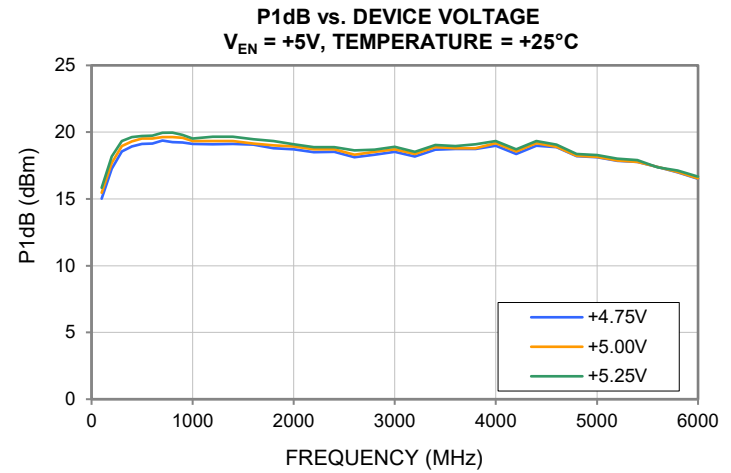
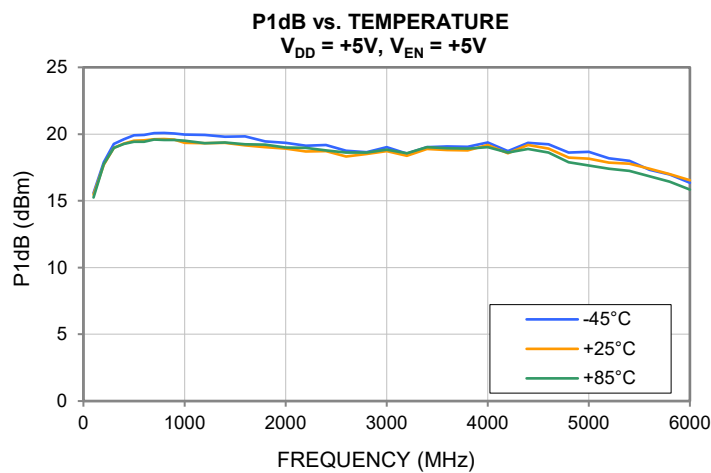
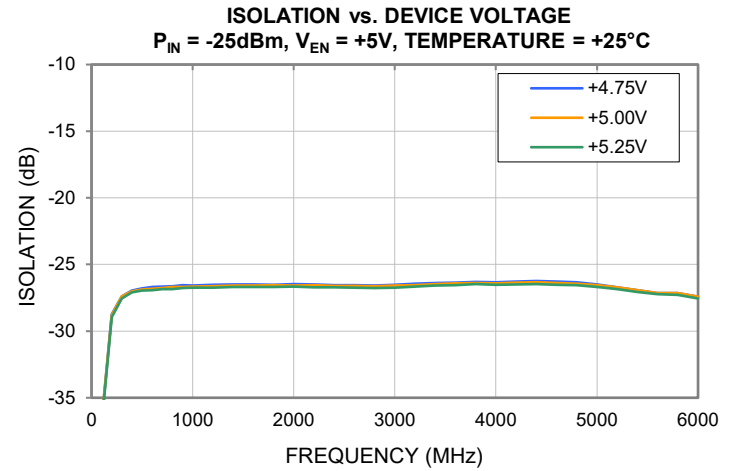
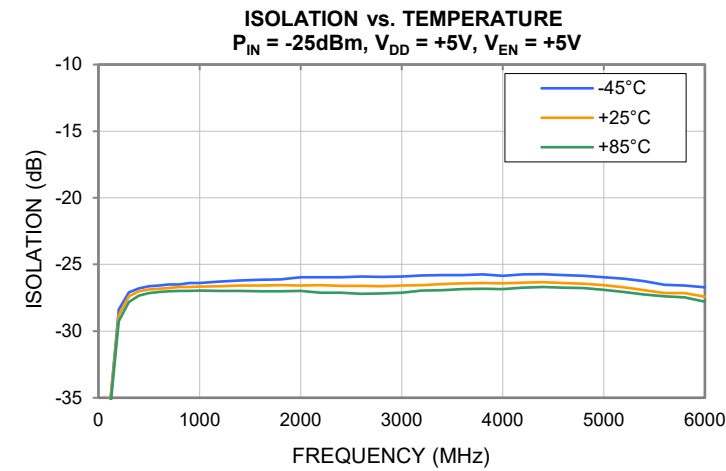
TEST CONDITIONS:  $V_{DD}=5.0$  V,  $V_{EN}=0$  V,  $I_{DD}=2$  mA @ Temperature = +85°C

| FREQ    | Gain | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | IP-3<br>Output | 1dB<br>Comp.<br>Input |
|---------|------|-----------|-------------------------|--------------------------|----------------|-----------------------|
| (MHz)   | (dB) | (dB)      | (dB)                    | (dB)                     | (dBm)          | (dBm)                 |
| 100.00  | -5.6 | 5.6       | 3.0                     | 2.7                      |                |                       |
| 200.00  | -1.4 | 1.4       | 10.8                    | 11.7                     |                |                       |
| 300.00  | -0.9 | 0.9       | 17.7                    | 20.0                     |                |                       |
| 400.00  | -0.8 | 0.8       | 22.3                    | 22.3                     |                |                       |
| 500.00  | -0.8 | 0.8       | 23.1                    | 20.7                     | 43.2           | 34.4                  |
| 600.00  | -0.8 | 0.9       | 22.2                    | 19.8                     |                |                       |
| 700.00  | -0.8 | 0.8       | 20.7                    | 18.8                     |                |                       |
| 800.00  | -0.7 | 0.8       | 18.9                    | 17.5                     |                |                       |
| 900.00  | -0.7 | 0.8       | 17.5                    | 16.4                     |                |                       |
| 1000.00 | -0.8 | 0.8       | 16.3                    | 15.5                     | 44.1           | 34.5                  |
| 1200.00 | -0.8 | 0.9       | 14.5                    | 14.2                     |                |                       |
| 1400.00 | -0.9 | 1.0       | 13.3                    | 13.2                     |                |                       |
| 1600.00 | -0.9 | 1.1       | 12.3                    | 12.5                     |                |                       |
| 1800.00 | -1.0 | 1.1       | 11.6                    | 12.0                     |                |                       |
| 2000.00 | -1.0 | 1.2       | 11.1                    | 11.6                     | 41.4           | 29.1                  |
| 2200.00 | -1.1 | 1.3       | 10.8                    | 11.4                     |                |                       |
| 2400.00 | -1.1 | 1.3       | 10.6                    | 11.3                     |                |                       |
| 2600.00 | -1.1 | 1.4       | 10.6                    | 11.4                     |                |                       |
| 2800.00 | -1.1 | 1.4       | 10.7                    | 11.7                     |                |                       |
| 3000.00 | -1.1 | 1.4       | 10.9                    | 12.1                     | 37.4           | 30.0                  |
| 3200.00 | -1.1 | 1.4       | 11.3                    | 12.6                     |                |                       |
| 3400.00 | -1.1 | 1.4       | 11.8                    | 13.3                     |                |                       |
| 3600.00 | -1.0 | 1.4       | 12.4                    | 14.3                     |                |                       |
| 3800.00 | -1.0 | 1.3       | 13.2                    | 15.5                     |                |                       |
| 4000.00 | -1.1 | 1.4       | 13.8                    | 16.1                     | 41.4           | 29.8                  |
| 4200.00 | -1.0 | 1.3       | 14.9                    | 17.2                     |                |                       |
| 4400.00 | -1.0 | 1.3       | 16.0                    | 18.2                     |                |                       |
| 4600.00 | -1.0 | 1.3       | 16.9                    | 19.0                     |                |                       |
| 4800.00 | -1.0 | 1.3       | 17.9                    | 19.3                     |                |                       |
| 5000.00 | -1.0 | 1.3       | 18.7                    | 19.0                     | 40.0           | 30.1                  |
| 5200.00 | -1.0 | 1.3       | 18.8                    | 18.2                     |                |                       |
| 5400.00 | -1.1 | 1.4       | 18.3                    | 17.0                     |                |                       |
| 5600.00 | -1.1 | 1.5       | 17.3                    | 15.7                     |                |                       |
| 5800.00 | -1.2 | 1.6       | 15.9                    | 14.4                     |                |                       |
| 6000.00 | -1.3 | 1.7       | 14.9                    | 13.0                     | 43.5           | 29.5                  |

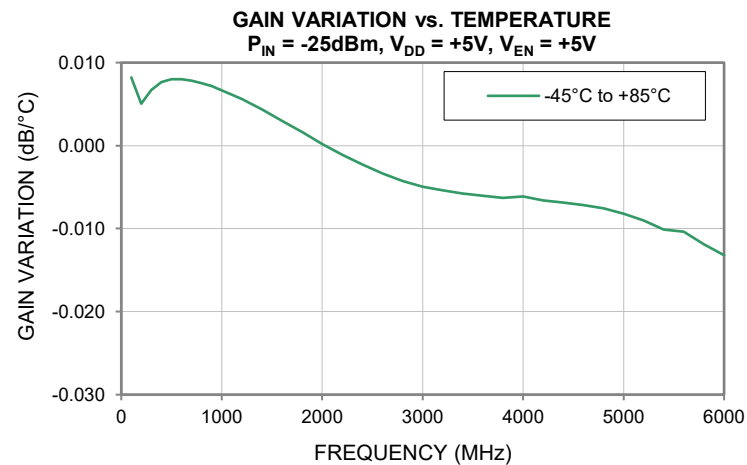
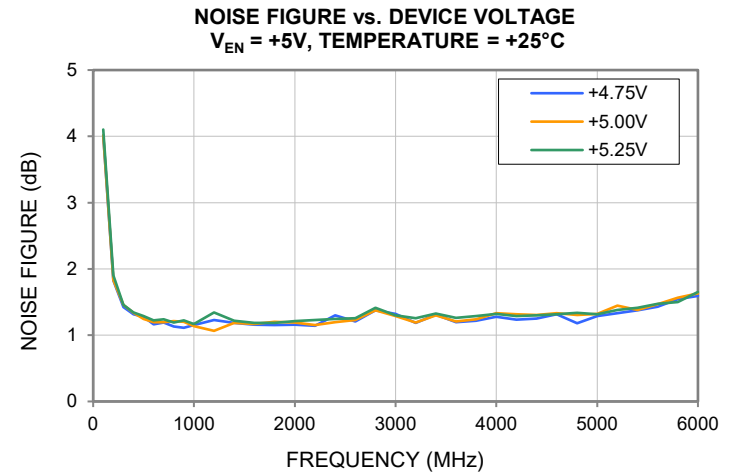
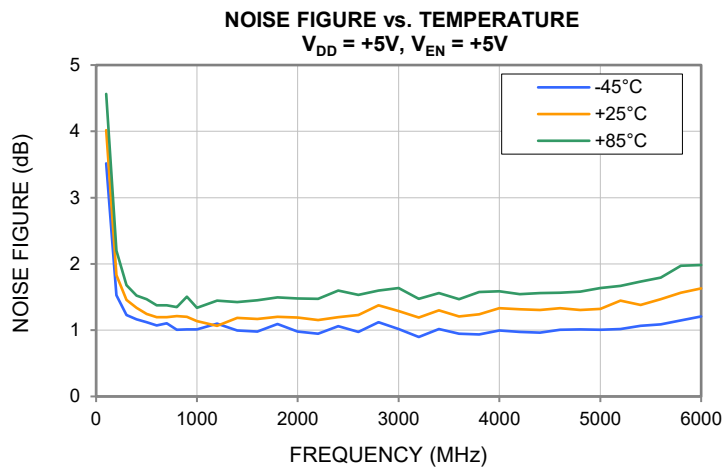
## Typical Performance Curves



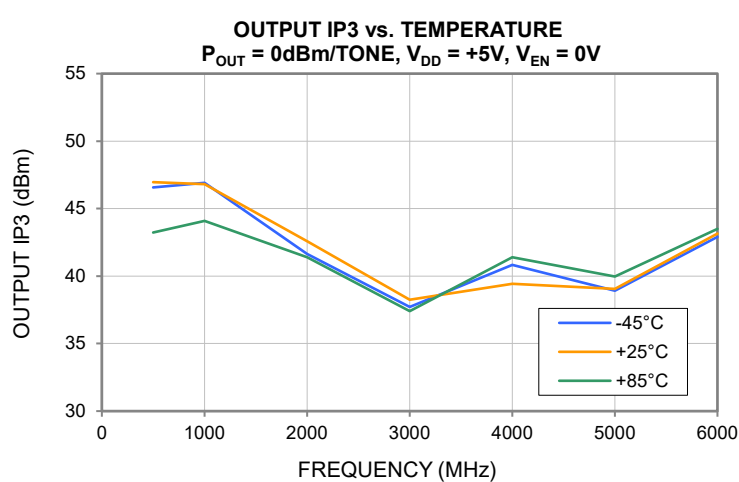
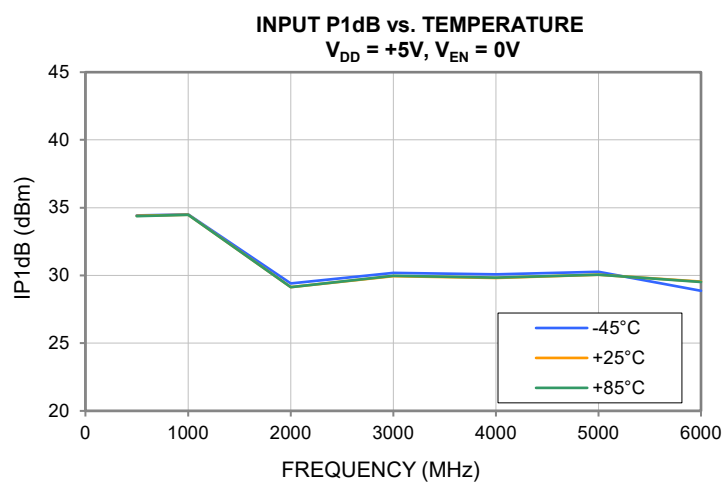
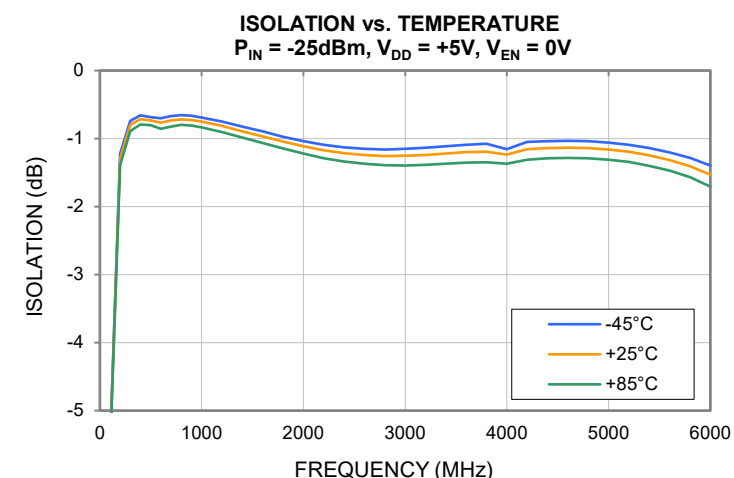
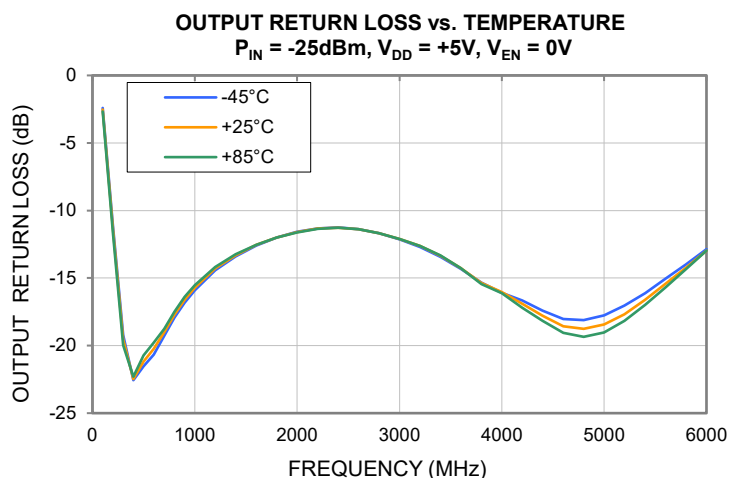
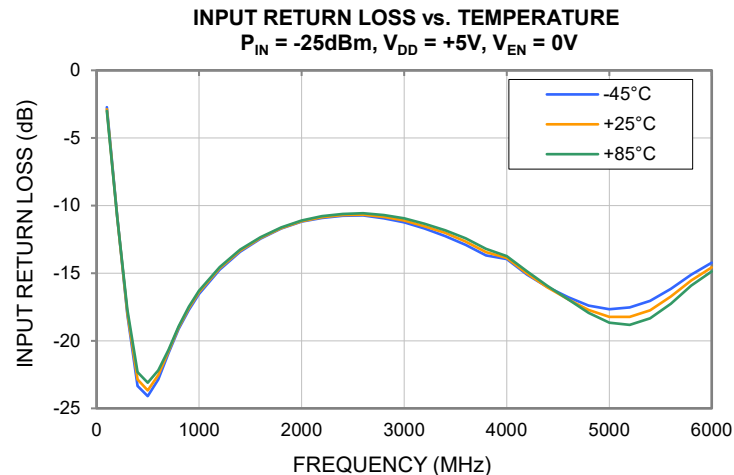
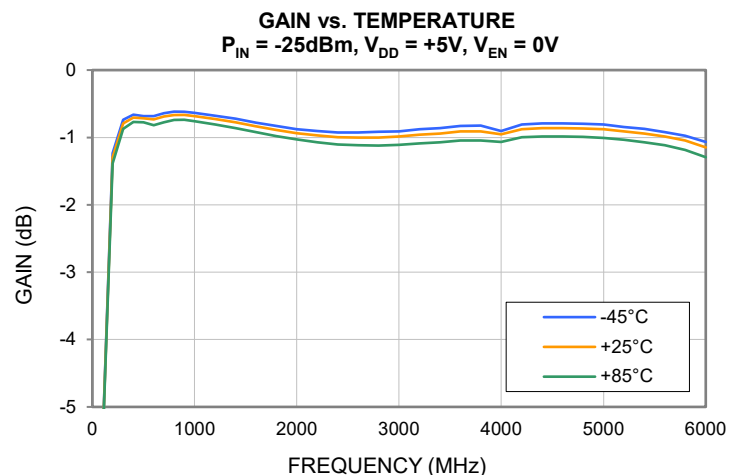
## Typical Performance Curves



## Typical Performance Curves



## Typical Performance Curves

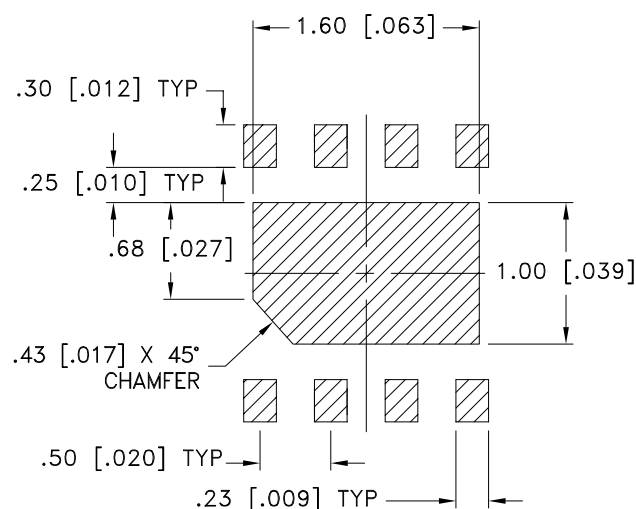
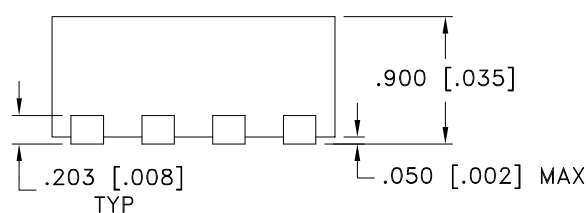
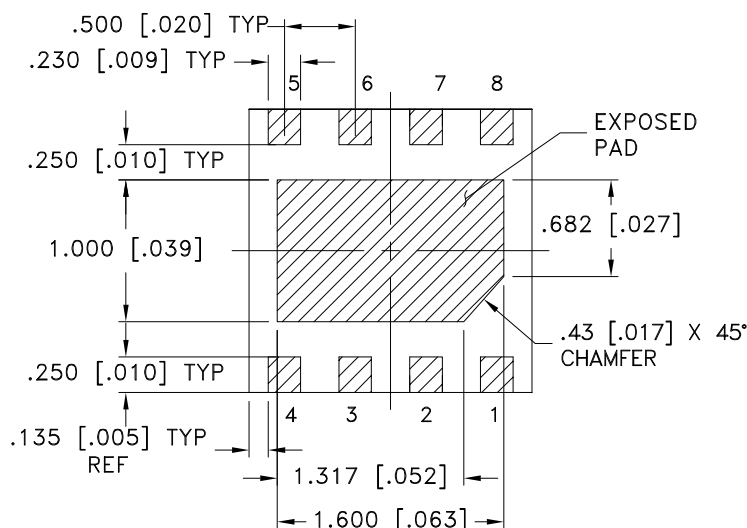
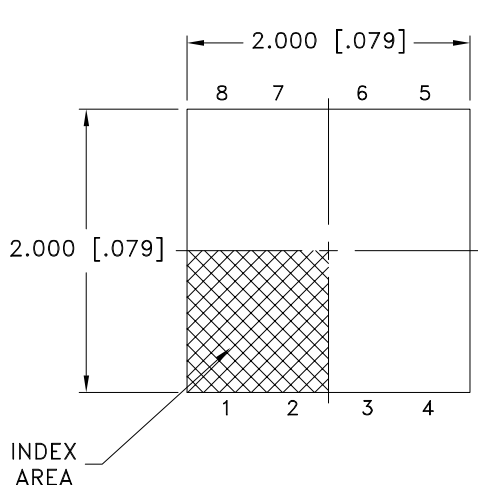


## Outline Dimensions

MC3007

TOP VIEW

BOTTOM VIEW



 DENOTES METALLIZATION

Suggested Layout

Weight: .011 grams

Dimensions are in mm [inches]. Tolerances: 3 Pl.  $\pm 0.050$  [0.002] mm [Inches]

Notes:

1. Case material: Plastic.
2. Termination finish:

For RoHS Case Styles: Tin-Silver over Nickel plated or Matte-Tin plated (See Data sheet).

All models, (+) suffix.

3. Lead #1 identifier shall be located in the cross-hatched area shown.

Identifier may be either a molded or marked feature.

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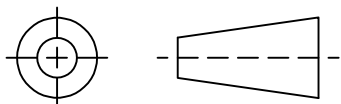
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

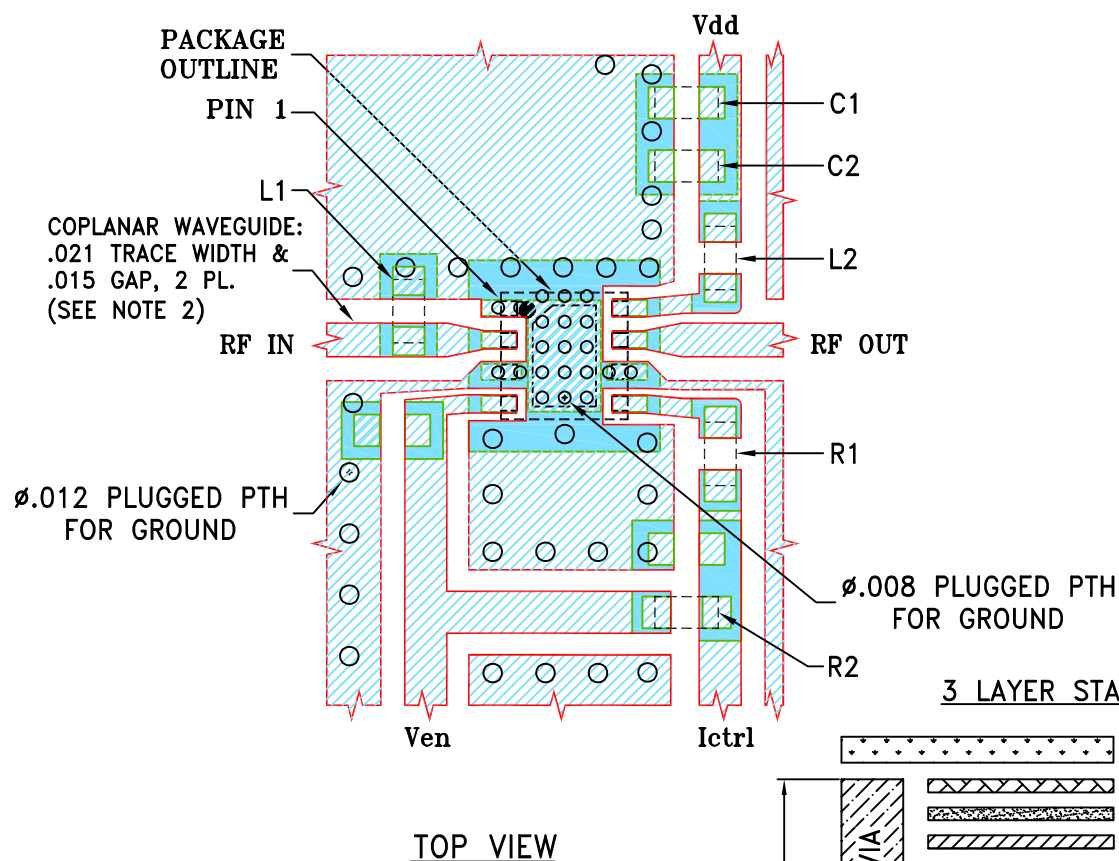
## THIRD ANGLE PROJECTION



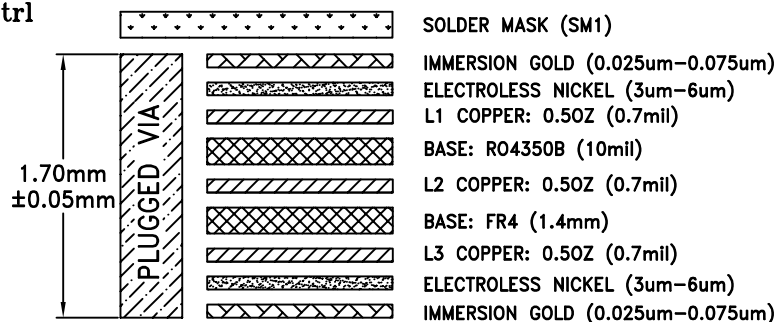
## REVISIONS

| REV | ECN No.    | DESCRIPTION | DATE     | DR  | AUTH |
|-----|------------|-------------|----------|-----|------|
| OR  | ECO-019109 | NEW RELEASE | 09/06/23 | ITG | CC   |
|     |            |             |          |     |      |
|     |            |             |          |     |      |

**SUGGESTED MOUNTING CONFIGURATION FOR  
MC3007/99-02-3007 CASE STYLE**



| COMPONENT | SIZE |
|-----------|------|
| C1,C2     | 0402 |
| L1,L2     | 0402 |
| R1,R2     | 0402 |

**3 LAYER STACKUP DETAIL****NOTES:**

1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"; COPPER: 1/2 OZ. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
3. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-TSS2-53LNBC+.
4. COPPER LAYERS L2 & L3 OF THE PCB ARE CONTINUOUS GROUND PLANES.



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 | 09/06/23 |
| TOLERANCES ON:             | CHECKED  | GF  | 09/06/23 |
| 2 PL DECIMALS ±            | APPROVED | IL  | 09/06/23 |
| 3 PL DECIMALS ± .005       |          |     |          |
| ANGLES ±                   |          |     |          |
| FRACTIONS ±                |          |     |          |

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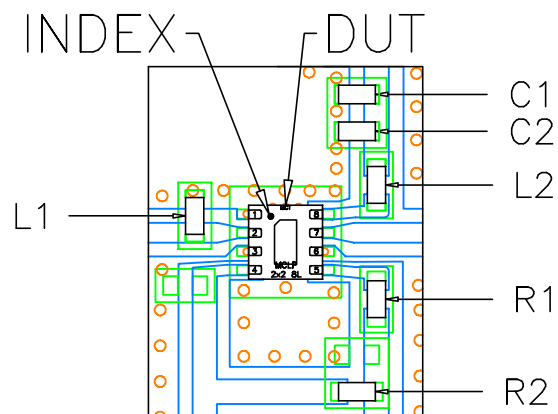
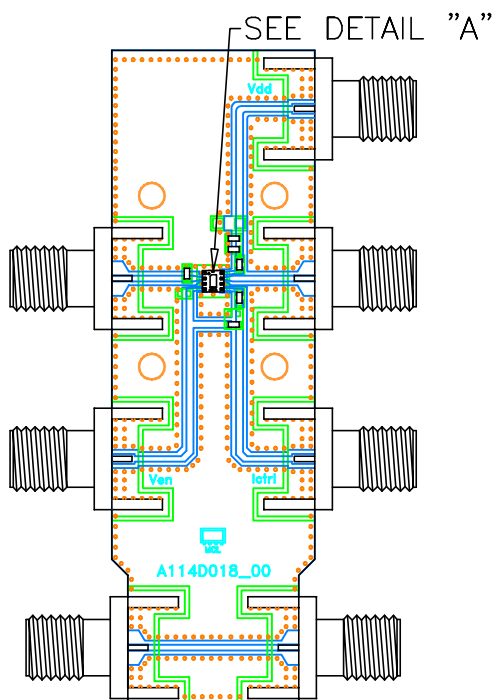
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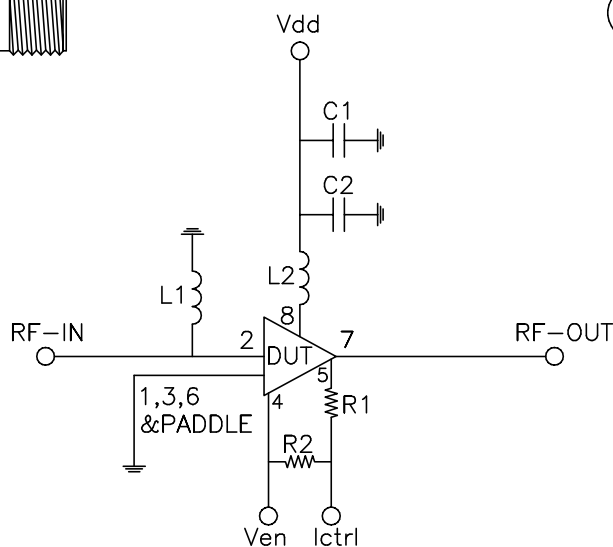
**PL, MC3007, TB-TSS2-53LNBC+**

| SIZE  | CODE IDENT | DRAWING NO: | REV:          |
|-------|------------|-------------|---------------|
| A     | 15542      | 98-PL-760   | OR            |
| FILE: | 98PL760    | SCALE: 8:1  | SHEET: 1 OF 1 |

# Evaluation Board and Circuit



DETAIL "A"  
LOCATION OF COMPONENTS  
ON THE PCB  
(SCALE 3:1)



SCHEMATIC DIAGRAM

| Component | Size | Value    | Part Number        | Manufacturer |
|-----------|------|----------|--------------------|--------------|
| C1        | 0402 | 0.1uF    | GRM155R71C104KA88D | Murata       |
| C2        | 0402 | 10pF     | GJM1555C1H100JB01D | Murata       |
| L1        | 0402 | 47nH     | LL1005-FHL47NJ     | Toko         |
| L2        | 0402 | 56nH     | 0402HPH-56NXGL     | Coilcraft    |
| R1        | 0402 | 00hm     | RK73Z1ETTP         | KOA Speer    |
| R2        | 0402 | 3.92K0hm | RK73H1ETTP3921F    | KOA Speer    |

## Notes:

1. 50 Ohm SMA Female Connectors.
2. PCB Material: Roger R04350B or equivalent,  
Dielectric constant=3.5, Thickness=0.010 inch

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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          | -45° to +85° C                                                                                                           | Individual Model Data Sheet           |
| Storage Temperature            | -65° to 150°C                                                                                                            | Individual Model Data Sheet           |
| Moisture Sensitivity: Level 1  | Bake at 125°C for 24 hours.<br>Reflow 3 cycles at 260°C peak                                                             | J-STD-020D                            |
| Autoclave                      | Temperature: 121°C. RH 100%. Pressure: 29.7 psia<br>Duration: 96 hours                                                   | JESD22-A102E, Test Condition C        |
| Temperature Cycling            | -65°C to +150°C, Dwell Time: 15 mins<br>500 cycles                                                                       | JESD22-A104E, Condition C             |
| HTSL                           | Temperature: 150°C<br>Duration: 1000 hours                                                                               | JESD22-A103E, Test Condition B        |
| HTOL                           | 1000 Hours                                                                                                               | JESD22-A108                           |
| ESD HBM                        | Refer datasheet for classification                                                                                       | JS-001                                |
| ESD CDM                        | Refer datasheet for classification                                                                                       | JESD22-C101                           |
| Vibration (Variable Frequency) | Sinusoidal vibration, 20 - 2000 Hz, 4 min sweeps, 16 min<br>along<br>each of 3 axis, amplitude limits of 20g and 0.06 in | MIL-STD-883, Method 2007, Condition A |
| Bend Test                      | 1mm deflection for 5 seconds.<br>Board thickness: 0.024", Span: 2.75"                                                    | --                                    |
| Solderability                  | 10x magnification                                                                                                        | J-STD-002 Method B, B1                |