MMIC DIE

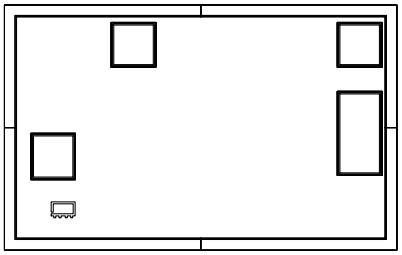
# Wide Band Amplifier

# PMA3-14LN-D+

50Ω 0.05 to 10 GHz

## THE BIG DEAL

- Flat Gain, 22.6 ± 0.7 dB up to 10 GHz
- P1dB, +22 dBm Typ. vs. OIP3, +30.4 dBm Typ. up to 8 GHz
- Low Noise Figure, 1.8 dB Typ.
- Patent Pending



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

SEE ORDERING INFORMATION ON THE LAST PAGE

## APPLICATIONS

- 5G Infrastructure
- Wi-Fi 6E & IoT
- SatCom
- L, S, C Band Radar
- Test and Measurement Equipment

## PRODUCT OVERVIEW

The PMA3-14LN-D+ is a GaAs PHEMT based wide band, low noise MMIC amplifier die with a unique combination of low Noise Figure, high IP3, and high Output Power, over a wide band making it ideal for sensitive, high-dynamic range receiver applications. This design operates on a single supply of +6V, is well matched for 50Ω.

## KEY FEATURES

| Feature | Advantages |
|---|---|
| Low Noise, 1.8 dB Typ. up to 10 GHz | Enables lower system Noise Figure performance. |
| High Dynamic Range<br>• OIP3 +30.4 dBm Typ. up to 8 GHz<br>• P1dB +22 dBm Typ. up to 8 GHz | The PMA3-14LN-D+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and PHEMT structure provides enhanced linearity over a board frequency range as evidence in the IP3 being approximately 9-11 dB above the P1dB point. This feature makes this amplifier ideal for use in:<br>• Driver Amplifiers for complex waveform up converter paths<br>• Drivers in linearized transmit systems<br>• Secondary amplifiers in ultra-high dynamic range receivers |
| Unpackaged Die | Enables user to integrate it directly into hybrids. |
| Wide bandwidth with flat Gain<br>• ±0.7 dB up to 10 GHz | Enables a single amplifier to be used in many wide band applications including defense, instrumentation and more. |

# Wide Band Amplifier

## PMA3-14LN-D+

## ELECTRICAL SPECIFICATIONS[1] AT 25°C, Zo=50Ω AND +6V, UNLESS NOTED OTHERWISE

| Parameter | Condition (MHz) | VDD = +6V | | | Units |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Frequency Range | | 50 | | 10000 | MHz |
| Gain | 50<br>2000<br>4000<br>8000<br>10000 | | 22.4<br>22.6<br>22.6<br>23.1<br>21.6 | | dB |
| Input Return Loss | 50<br>2000<br>4000<br>8000<br>10000 | | 20.0<br>16.0<br>14.0<br>20.0<br>13.0 | | dB |
| Isolation | 50-10000 | | 27.4 | | dB |
| Output Return Loss | 50<br>2000<br>4000<br>8000<br>10000 | | 17.0<br>20.0<br>18.0<br>16.0<br>18.0 | | dB |
| Output Power at 1 dB Compression | 50<br>2000<br>4000<br>8000<br>10000 | | 22.0<br>22.9<br>22.0<br>19.8<br>16.6 | | dBm |
| Output Third-Order Intercept<br>Pout = -5 dBm/Tone | 50<br>2000<br>4000<br>8000<br>10000 | | 31.2<br>31.8<br>30.7<br>28.7<br>26.0 | | dBm |
| Noise Figure | 50<br>2000<br>4000<br>8000<br>10000 | | 1.8<br>1.0<br>1.1<br>1.2<br>2.1 | | dB |
| Device Operating Voltage (VDD) | | +5.75 | +6.0 | +6.25 | V |
| Device Operating Current (IDD) | | | 67 | 90 | mA |
| Device Current Variation vs. Temperature[2] | | | -23.1 | | µA/°C |
| Device Current Variation vs Voltage[3] | | | 0.032 | | mA/mV |
| Thermal Resistance, Junction-to-Ground Lead | | | 53.9 | | °C/W |

1. Die is soldered in 3x3 mm 12L MCLP and measured on Mini-Circuits Characterization Test Board TB-PMA3-14LN+.
2. Device Current Variation vs. Temperature= (Current in mA at 85°C - Current in mA at -45°C)/130°C
3. Device Current Variation vs. Voltage = (Current in mA at +6.25V – Current in mA at +5.75V) / ((+6.25V-+5.75V) *1000 mA/mV)

## MAXIMUM RATINGS[4]

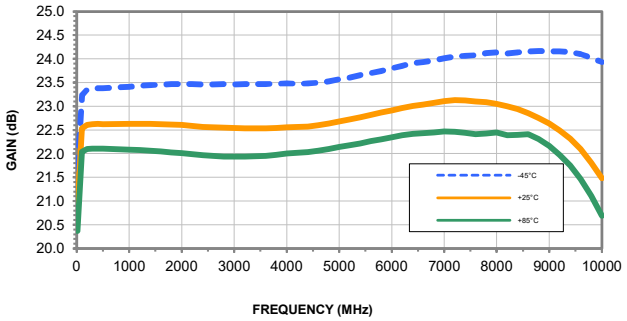
| Parameter | Ratings |
|---|---|
| Operating Temperature (ground lead) | -40°C to 85°C |
| Junction Temperature | 150°C[5] |
| Total Power Dissipation | 1.2 W |
| Input Power (CW) | +25 dBm (5 minutes max.)<br>+12 dBm (continuous) |
| DC Voltage at VDD | +8V |

4. Permanent damage may occur if any of those limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.
5. Tj = 85˚C + (VDD)*(IDD)*(ΘJC) = 106˚C. Keeping Tj below 106°C will ensure MTTF >100 Years.

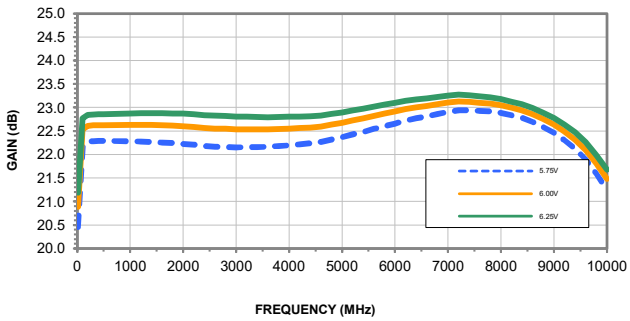
# Wide Band Amplifier

## PMA3-14LN-D+

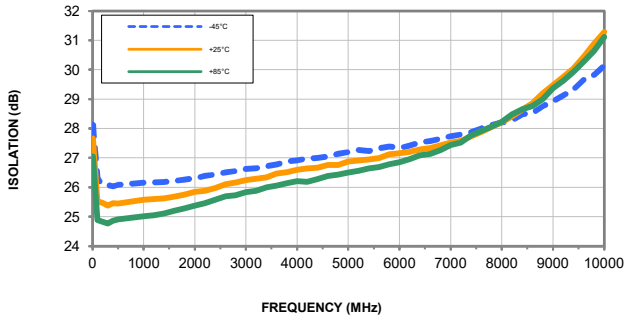
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, VDD = +6V



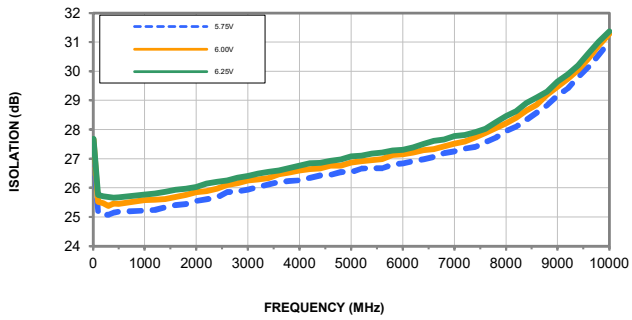

GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



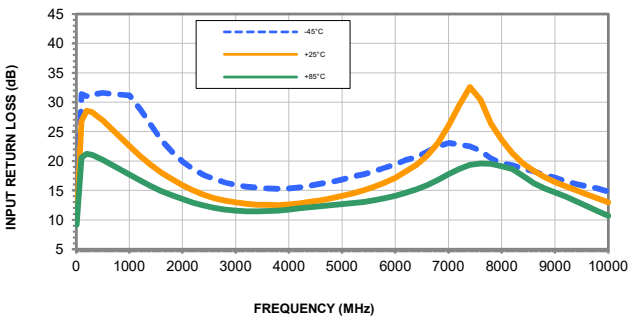

ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, VDD = +6V



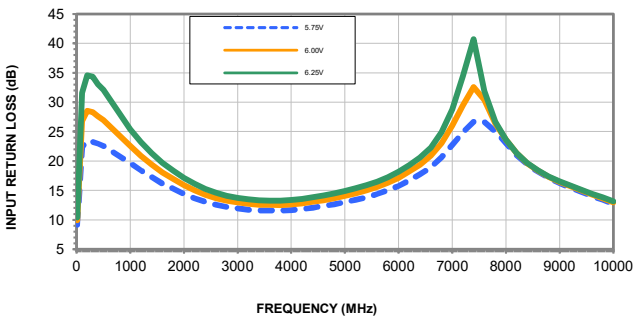

ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



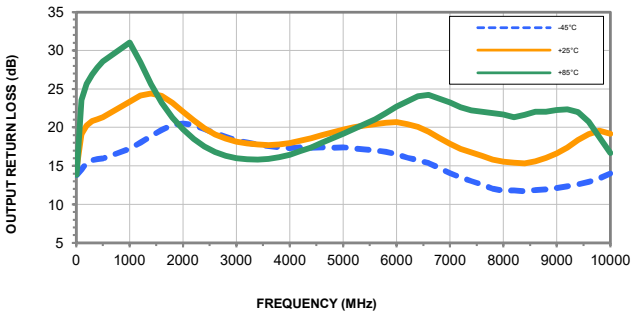

INPUT RETURN LOSS vs. FREQ. & TEMP.
INPUT POWER = -25.00dBm, VDD = +6V



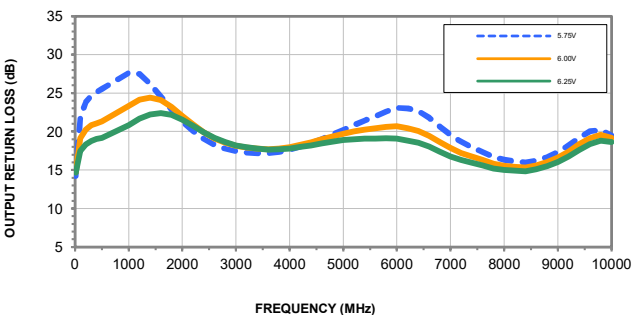

INPUT RETURN LOSS vs. FREQ. & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



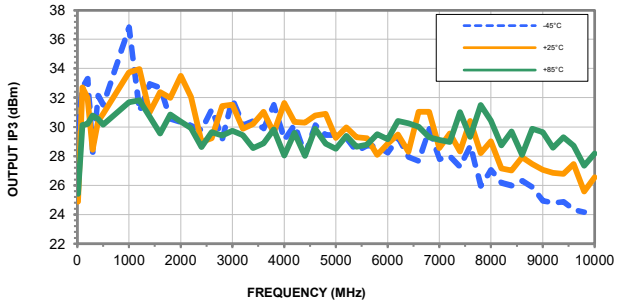

OUTPUT RETURN LOSS vs. FREQ. & TEMP.
INPUT POWER = -25.00dBm, VDD = +6V



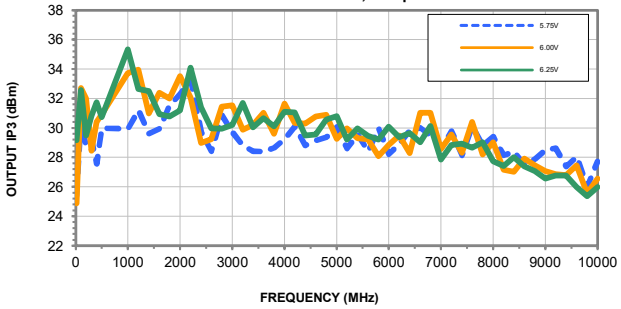

OUTPUT RETURN LOSS vs. FREQ. & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



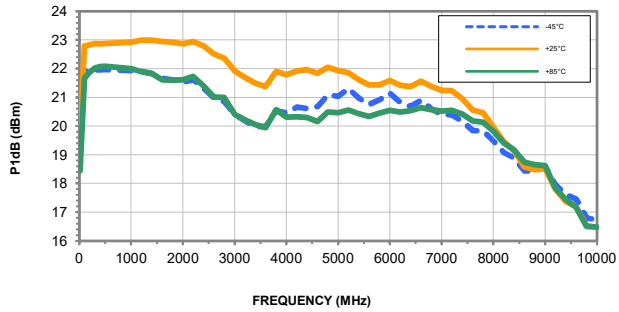
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTPUT POWER = -5.00dBm, VDD = +6V



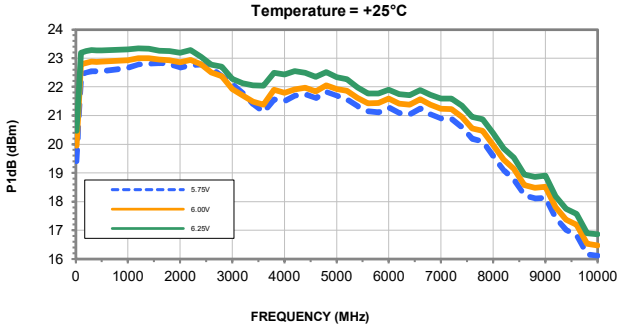

OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTPUT POWER = -5.00dBm, Temperature = +25°C



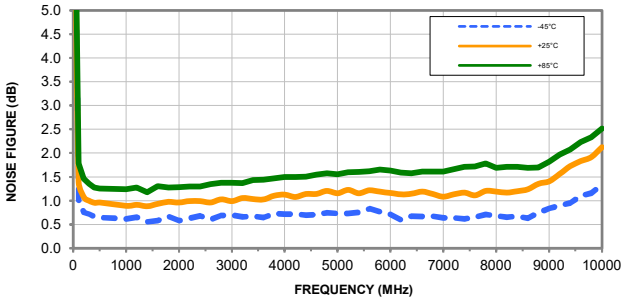

P1dB vs. FREQUENCY & TEMPERATURE
VDD = +6V




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

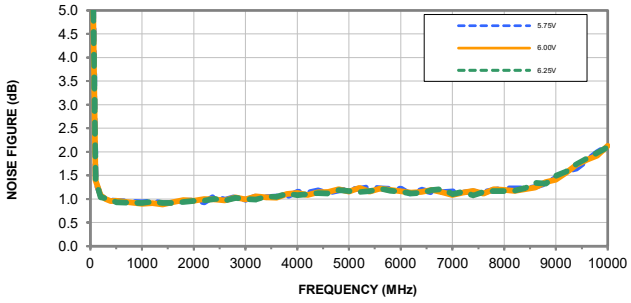



NOISE FIGURE vs. FREQUENCY & TEMPERATURE
VDD = +6V



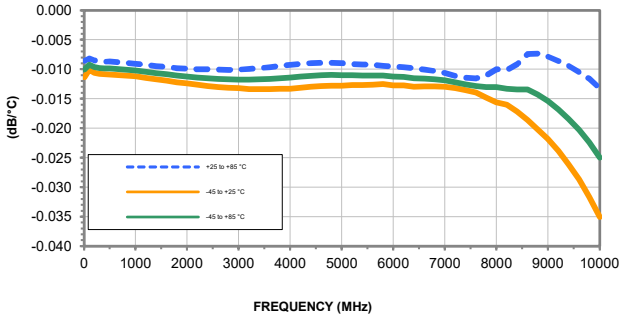

*Typical Noise Figure 1.8dB at 50MHz

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



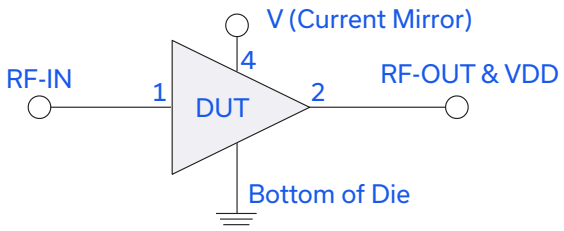

*Typical Noise Figure 1.8dB at 50MHz

GAIN VARIATION VS FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, VDD = +6V



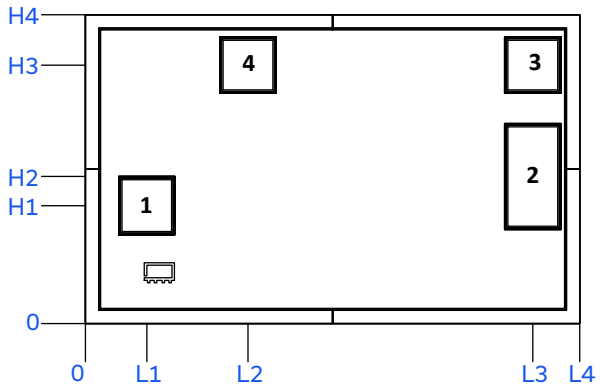
# Wide Band Amplifier PMA3-14LN-D+

## SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION




| Function | Pad Number | Description |
|---|---|---|
| RF-IN | 1 | RF-Input Pad. Connects to RF-IN port via C1. |
| RF-OUT & DC-IN | 2 | RF Output Pad and DC Pad. Connects to VDD via L2 & connects to RF-OUT Port via blocking capacitor C2. |
| NC | 3 | Keep the pad floating for normal operation. |
| V (Current Mirror) | 4 | Current Mirror Pad. Connects to RF-IN port via L1 |
| Ground | Bottom of Die | Ground pad on the bottom of the die does not require any wire-bond connections. |

## BONDING PAD POSITION

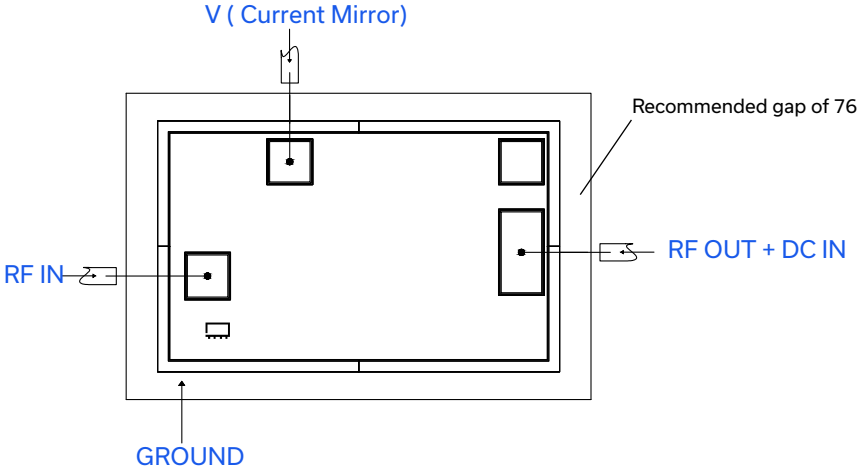



## DIMENSION IN µm, TYP.

| L1 | L2 | L3 | L4 | H1 | H2 | H3 | H4 |
|---|---|---|---|---|---|---|---|
| 93 | 245 | 675 | 746 | 178 | 222 | 290 | 466 |

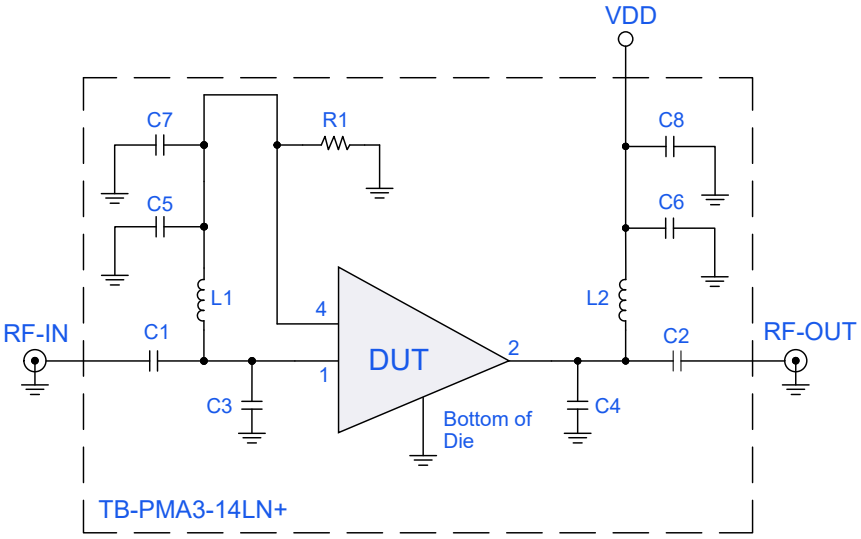
| Thickness | Die size | Pad size 1 | Pad size 2 | Pad Size 3 & 4 |
|---|---|---|---|---|
| 100 | 746 x 466 | 75 x 78 | 75 x 150 | 75 x 75 |

## ASSEMBLY DIAGRAM




1. Recommended bond length for RF-IN: 635 µm
2. Recommended bond length for V (Current Mirror): 838 µm
3. Recommended bond length for RF OUT + DC IN: 1168 µm

## CHARACTERIZATION, APPLICATION CIRCUIT & ASSEMBLY DRAWING




| Component | Size | Value | Part Number | Manufacturer |
|---|---|---|---|---|
| C1 & C2 | 0402 | 0.01uF | GRM155R71H103KA88D | Murata |
| C3 | 0402 | 0.2pF | GJM1555C1HR20WB01D | Murata |
| C4 | 0402 | 0.1pF | GJM1555C1HR10WB01D | Murata |
| C5 & C6 | 0402 | 100pF | GRM1555C1H101JA01D | Murata |
| C7 & C8 | 0402 | 0.1uF | GRM155R71H104KE14J | Murata |
| L1 & L2 | 0402 | 900nH | 0402DF-901XJRU | Coilcraft |
| R1 | 0402 | 510Ω | RK73H1ETTP5100F | KOA |

Fig 1. Application and Characterization Circuit
Note: This block diagram is used for characterization.
(DUT is soldered onto a 3x3 12L MCLP and measured on Mini-Circuits Characterization test board TB-PMA3-14LN+) Gain, Return Loss, Output Power at 1dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure are measured using Agilent's N5242A PNA-X Microwave Network Analyzer.

Conditions:
1. VDD=+6V
2. Gain and Return loss: Pin= -25 dBm
3. Output IP3 (OIP3): Two Tones, Spaced 1 MHz apart, -5 dBm/Tone at Output

## ASSEMBLY PROCEDURE

1. Storage
   Dice should be stored in a dry nitrogen purged desiccators or equivalent.
2. ESD
   MMIC PHEMT amplifier dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be open in clean room conditions at an appropriately grounded anti-static workstation.
3. Die Handling and Attachment
   Devices need careful handling using correctly designed collets, it is recommended to handle the chip along the edges with a custom design collet. The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are Ablestik 84-1 LMISR4 or equivalents. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition.
4. Wire Bonding
   Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermo-sonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1mil diameter. Bonds must be made from the bond pads on the die to the packaged or substrate. All bond wire length and bond wire height should be kept as short as possible unless specified by the Assembly Drawing to minimize performance degredation due to undesirable series inductance.

# Wide Band Amplifier PMA3-14LN-D+

## ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD.

| | |
|---|---|
| **Performance Data** | Data Table<br><br>Swept Graphs<br><br>S-Parameter (S2P Files) Data Set with and without port extension(.zip file) |
| **Case Style** | Die |
| **Die Ordering and packaging information** | Quantity, Package — Model No.<br><br>Gel – Pak: 5, 10, 50, 100, 200, — PMA3-14LN-DG+<br>Medium†, Partial wafer: KGD*<2565 — PMA3-14LN-DP+<br>Full Wafer — PMA3-14LN-DF+<br><br>†Available upon request contact sales representative<br>Refer to AN-60-067 |
| **Die Marking** | IEY06A2 |
| **Environmental Ratings** | ENV80 |

*Known Good Die ('KGD') means that the dice in question have been subjected to Mini-Circuits DC test performance criteria and measurement instructions and that the parametric data of such dice fall within a predefined range. While DC testing is not definitive, it does provide a higher degree of confidence that die are capable of meeting typical RF electrical performance specified by Mini-Circuits.

## ESD RATING**

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

**Tested in 3x3 12L MCLP Package

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.

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## Typical Performance Data

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

TEST CONDITIONS: VDD = +5.75V, Id = 64mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 10 | 20.46 | 27.17 | 9.18 | 14.25 | 1.15 | 0.87 | 25.43 | 19.41 | 8.92 |
| 100 | 22.20 | 25.13 | 22.46 | 21.95 | 1.05 | 0.50 | 30.65 | 22.45 | 1.37 |
| 200 | 22.28 | 25.07 | 23.42 | 23.85 | 1.04 | 0.48 | 28.68 | 22.50 | 1.06 |
| 300 | 22.29 | 25.08 | 23.27 | 24.74 | 1.05 | 0.49 | 29.17 | 22.55 | 1.02 |
| 400 | 22.29 | 25.15 | 22.98 | 25.12 | 1.05 | 0.50 | 27.58 | 22.54 | 0.97 |
| 500 | 22.29 | 25.19 | 22.58 | 25.57 | 1.05 | 0.50 | 29.99 | 22.55 | 0.96 |
| 1000 | 22.28 | 25.22 | 19.66 | 27.67 | 1.05 | 0.52 | 29.94 | 22.67 | 0.94 |
| 1200 | 22.28 | 25.25 | 18.42 | 27.51 | 1.05 | 0.52 | 31.22 | 22.78 | 0.96 |
| 1400 | 22.27 | 25.35 | 17.29 | 26.20 | 1.06 | 0.54 | 29.62 | 22.80 | 0.91 |
| 1600 | 22.26 | 25.42 | 16.20 | 24.55 | 1.06 | 0.55 | 29.97 | 22.83 | 0.94 |
| 1800 | 22.25 | 25.45 | 15.30 | 22.84 | 1.06 | 0.55 | 31.54 | 22.80 | 0.96 |
| 2000 | 22.23 | 25.55 | 14.44 | 21.32 | 1.06 | 0.57 | 32.31 | 22.68 | 0.97 |
| 2200 | 22.21 | 25.62 | 13.69 | 20.06 | 1.07 | 0.58 | 33.26 | 22.75 | 0.93 |
| 2400 | 22.18 | 25.67 | 13.06 | 19.05 | 1.07 | 0.58 | 29.73 | 22.78 | 1.07 |
| 2600 | 22.17 | 25.86 | 12.58 | 18.29 | 1.08 | 0.60 | 28.43 | 22.65 | 0.98 |
| 2800 | 22.16 | 25.88 | 12.19 | 17.80 | 1.08 | 0.61 | 30.87 | 22.38 | 1.05 |
| 3000 | 22.16 | 25.94 | 11.94 | 17.47 | 1.08 | 0.62 | 29.72 | 22.10 | 0.99 |
| 3200 | 22.16 | 26.04 | 11.74 | 17.30 | 1.08 | 0.63 | 28.81 | 21.77 | 1.06 |
| 3400 | 22.16 | 26.12 | 11.63 | 17.22 | 1.09 | 0.64 | 28.42 | 21.40 | 1.04 |
| 3600 | 22.16 | 26.20 | 11.60 | 17.21 | 1.09 | 0.64 | 28.39 | 21.13 | 1.06 |
| 3800 | 22.18 | 26.24 | 11.60 | 17.36 | 1.09 | 0.65 | 28.66 | 21.56 | 1.05 |
| 4000 | 22.20 | 26.27 | 11.70 | 17.64 | 1.09 | 0.65 | 29.25 | 21.51 | 1.16 |
| 4200 | 22.22 | 26.35 | 11.87 | 18.05 | 1.10 | 0.66 | 30.11 | 21.70 | 1.14 |
| 4400 | 22.24 | 26.42 | 12.10 | 18.50 | 1.10 | 0.67 | 28.80 | 21.74 | 1.19 |
| 4600 | 22.27 | 26.45 | 12.36 | 19.04 | 1.10 | 0.67 | 29.16 | 21.61 | 1.14 |
| 4800 | 22.32 | 26.55 | 12.67 | 19.61 | 1.11 | 0.68 | 29.37 | 21.83 | 1.19 |
| 5000 | 22.37 | 26.55 | 13.02 | 20.26 | 1.11 | 0.68 | 30.08 | 21.69 | 1.21 |
| 5200 | 22.43 | 26.66 | 13.44 | 20.86 | 1.12 | 0.69 | 28.61 | 21.57 | 1.22 |
| 5400 | 22.48 | 26.67 | 13.87 | 21.44 | 1.12 | 0.68 | 29.58 | 21.33 | 1.27 |
| 5600 | 22.55 | 26.67 | 14.42 | 21.98 | 1.12 | 0.68 | 28.42 | 21.15 | 1.23 |
| 5800 | 22.61 | 26.80 | 15.06 | 22.61 | 1.12 | 0.69 | 29.99 | 21.12 | 1.22 |
| 6000 | 22.66 | 26.85 | 15.80 | 23.09 | 1.13 | 0.69 | 28.20 | 21.28 | 1.22 |
| 6200 | 22.73 | 26.92 | 16.75 | 23.01 | 1.13 | 0.69 | 28.94 | 21.09 | 1.10 |
| 6400 | 22.77 | 26.98 | 17.74 | 22.66 | 1.14 | 0.69 | 29.82 | 21.04 | 1.20 |
| 6600 | 22.81 | 27.06 | 19.02 | 21.83 | 1.15 | 0.69 | 30.01 | 21.24 | 1.14 |
| 6800 | 22.86 | 27.19 | 20.71 | 20.64 | 1.16 | 0.70 | 29.50 | 21.05 | 1.15 |
| 7000 | 22.91 | 27.25 | 22.82 | 19.57 | 1.16 | 0.70 | 28.62 | 20.90 | 1.17 |
| 7200 | 22.94 | 27.35 | 24.91 | 18.68 | 1.17 | 0.70 | 29.79 | 20.90 | 1.14 |
| 7400 | 22.94 | 27.41 | 26.72 | 17.99 | 1.18 | 0.70 | 28.14 | 20.60 | 1.16 |
| 7600 | 22.93 | 27.57 | 26.69 | 17.33 | 1.20 | 0.71 | 30.13 | 20.20 | 1.15 |
| 7800 | 22.92 | 27.73 | 25.02 | 16.70 | 1.22 | 0.72 | 28.81 | 20.10 | 1.19 |
| 8000 | 22.89 | 27.96 | 23.01 | 16.34 | 1.25 | 0.74 | 29.42 | 19.59 | 1.23 |
| 8200 | 22.84 | 28.11 | 20.99 | 16.14 | 1.27 | 0.75 | 28.14 | 19.10 | 1.23 |
| 8400 | 22.78 | 28.34 | 19.42 | 16.02 | 1.30 | 0.77 | 28.40 | 18.78 | 1.23 |
| 8600 | 22.70 | 28.59 | 18.18 | 16.27 | 1.34 | 0.79 | 27.50 | 18.22 | 1.25 |
| 8800 | 22.59 | 28.83 | 17.09 | 16.71 | 1.39 | 0.82 | 27.89 | 18.12 | 1.33 |
| 9000 | 22.46 | 29.19 | 16.24 | 17.37 | 1.45 | 0.84 | 28.51 | 18.14 | 1.45 |
| 9200 | 22.31 | 29.42 | 15.50 | 18.23 | 1.51 | 0.87 | 28.63 | 17.44 | 1.59 |
| 9400 | 22.13 | 29.81 | 14.75 | 19.22 | 1.60 | 0.89 | 27.39 | 17.01 | 1.65 |
| 9600 | 21.89 | 30.15 | 14.06 | 20.07 | 1.69 | 0.92 | 28.06 | 16.83 | 1.83 |
| 9800 | 21.59 | 30.58 | 13.41 | 20.21 | 1.80 | 0.94 | 26.04 | 16.17 | 2.00 |
| 10000 | 21.25 | 31.03 | 12.70 | 19.46 | 1.94 | 0.96 | 27.73 | 16.12 | 2.14 |

## Typical Performance Data

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

TEST CONDITIONS: VDD = +6V, Id = 73mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 10 | 20.89 | 27.66 | 9.92 | 14.72 | 1.16 | 0.87 | 24.88 | 19.95 | 8.89 |
| 100 | 22.53 | 25.52 | 26.78 | 19.12 | 1.05 | 0.49 | 32.71 | 22.79 | 1.40 |
| 200 | 22.61 | 25.47 | 28.52 | 20.23 | 1.05 | 0.48 | 32.00 | 22.83 | 1.07 |
| 300 | 22.62 | 25.39 | 28.32 | 20.81 | 1.04 | 0.47 | 28.43 | 22.87 | 1.00 |
| 400 | 22.62 | 25.46 | 27.58 | 21.06 | 1.05 | 0.49 | 30.39 | 22.86 | 0.96 |
| 500 | 22.62 | 25.45 | 26.99 | 21.32 | 1.05 | 0.49 | 30.91 | 22.87 | 0.96 |
| 1000 | 22.63 | 25.58 | 22.54 | 23.32 | 1.05 | 0.51 | 33.73 | 22.92 | 0.90 |
| 1200 | 22.63 | 25.59 | 20.87 | 24.16 | 1.05 | 0.52 | 33.97 | 23.00 | 0.92 |
| 1400 | 22.63 | 25.62 | 19.43 | 24.41 | 1.06 | 0.52 | 30.98 | 23.00 | 0.89 |
| 1600 | 22.62 | 25.68 | 18.05 | 24.10 | 1.06 | 0.54 | 32.38 | 22.95 | 0.94 |
| 1800 | 22.61 | 25.75 | 16.93 | 23.22 | 1.06 | 0.55 | 31.99 | 22.92 | 0.98 |
| 2000 | 22.60 | 25.84 | 15.88 | 22.03 | 1.06 | 0.56 | 33.50 | 22.86 | 0.96 |
| 2200 | 22.59 | 25.88 | 14.99 | 20.91 | 1.06 | 0.57 | 32.07 | 22.94 | 1.00 |
| 2400 | 22.57 | 25.97 | 14.25 | 19.87 | 1.07 | 0.58 | 28.97 | 22.79 | 0.99 |
| 2600 | 22.55 | 26.10 | 13.68 | 19.10 | 1.07 | 0.59 | 29.22 | 22.50 | 0.97 |
| 2800 | 22.55 | 26.16 | 13.24 | 18.54 | 1.07 | 0.60 | 31.43 | 22.36 | 1.03 |
| 3000 | 22.54 | 26.25 | 12.94 | 18.14 | 1.08 | 0.61 | 31.52 | 21.92 | 0.99 |
| 3200 | 22.54 | 26.29 | 12.70 | 17.92 | 1.08 | 0.61 | 29.87 | 21.69 | 1.06 |
| 3400 | 22.54 | 26.34 | 12.57 | 17.77 | 1.08 | 0.62 | 30.20 | 21.49 | 1.04 |
| 3600 | 22.53 | 26.47 | 12.53 | 17.70 | 1.09 | 0.63 | 31.03 | 21.37 | 1.03 |
| 3800 | 22.54 | 26.52 | 12.52 | 17.77 | 1.09 | 0.64 | 29.60 | 21.90 | 1.11 |
| 4000 | 22.55 | 26.60 | 12.64 | 17.97 | 1.09 | 0.65 | 31.64 | 21.79 | 1.13 |
| 4200 | 22.56 | 26.64 | 12.81 | 18.27 | 1.10 | 0.66 | 30.33 | 21.91 | 1.08 |
| 4400 | 22.57 | 26.66 | 13.07 | 18.59 | 1.10 | 0.66 | 30.28 | 21.97 | 1.14 |
| 4600 | 22.60 | 26.76 | 13.34 | 19.01 | 1.11 | 0.67 | 30.77 | 21.83 | 1.15 |
| 4800 | 22.63 | 26.76 | 13.69 | 19.35 | 1.11 | 0.67 | 30.89 | 22.05 | 1.21 |
| 5000 | 22.68 | 26.87 | 14.07 | 19.72 | 1.11 | 0.68 | 29.24 | 21.93 | 1.16 |
| 5200 | 22.72 | 26.91 | 14.51 | 20.03 | 1.11 | 0.68 | 29.97 | 21.86 | 1.23 |
| 5400 | 22.77 | 26.95 | 14.99 | 20.26 | 1.12 | 0.68 | 29.29 | 21.62 | 1.16 |
| 5600 | 22.82 | 26.99 | 15.59 | 20.43 | 1.12 | 0.68 | 29.23 | 21.43 | 1.22 |
| 5800 | 22.87 | 27.12 | 16.29 | 20.59 | 1.13 | 0.69 | 28.08 | 21.43 | 1.19 |
| 6000 | 22.91 | 27.15 | 17.12 | 20.67 | 1.13 | 0.69 | 28.84 | 21.59 | 1.16 |
| 6200 | 22.96 | 27.21 | 18.22 | 20.40 | 1.14 | 0.69 | 29.49 | 21.42 | 1.13 |
| 6400 | 23.00 | 27.29 | 19.35 | 20.07 | 1.14 | 0.69 | 28.29 | 21.37 | 1.15 |
| 6600 | 23.03 | 27.33 | 20.91 | 19.43 | 1.15 | 0.69 | 31.02 | 21.56 | 1.20 |
| 6800 | 23.07 | 27.42 | 23.06 | 18.62 | 1.16 | 0.69 | 31.03 | 21.38 | 1.14 |
| 7000 | 23.10 | 27.52 | 26.02 | 17.86 | 1.17 | 0.69 | 28.56 | 21.24 | 1.09 |
| 7200 | 23.13 | 27.58 | 29.47 | 17.22 | 1.17 | 0.69 | 29.56 | 21.23 | 1.14 |
| 7400 | 23.12 | 27.73 | 32.61 | 16.76 | 1.19 | 0.70 | 28.31 | 20.95 | 1.17 |
| 7600 | 23.10 | 27.88 | 30.41 | 16.31 | 1.21 | 0.71 | 30.40 | 20.55 | 1.11 |
| 7800 | 23.08 | 28.05 | 26.39 | 15.83 | 1.23 | 0.72 | 28.20 | 20.47 | 1.21 |
| 8000 | 23.05 | 28.21 | 23.62 | 15.56 | 1.25 | 0.74 | 29.02 | 19.97 | 1.19 |
| 8200 | 23.00 | 28.41 | 21.35 | 15.43 | 1.28 | 0.75 | 27.16 | 19.46 | 1.17 |
| 8400 | 22.94 | 28.65 | 19.60 | 15.34 | 1.32 | 0.77 | 27.01 | 19.14 | 1.20 |
| 8600 | 22.85 | 28.86 | 18.37 | 15.61 | 1.35 | 0.79 | 27.92 | 18.58 | 1.24 |
| 8800 | 22.75 | 29.19 | 17.29 | 16.02 | 1.41 | 0.82 | 27.46 | 18.48 | 1.36 |
| 9000 | 22.63 | 29.47 | 16.42 | 16.61 | 1.47 | 0.84 | 27.06 | 18.51 | 1.41 |
| 9200 | 22.49 | 29.74 | 15.72 | 17.39 | 1.53 | 0.86 | 26.86 | 17.80 | 1.56 |
| 9400 | 22.31 | 30.04 | 14.99 | 18.35 | 1.60 | 0.89 | 26.79 | 17.37 | 1.73 |
| 9600 | 22.09 | 30.44 | 14.31 | 19.15 | 1.70 | 0.91 | 27.46 | 17.19 | 1.83 |
| 9800 | 21.81 | 30.88 | 13.66 | 19.56 | 1.82 | 0.94 | 25.57 | 16.53 | 1.92 |
| 10000 | 21.48 | 31.29 | 12.98 | 19.18 | 1.95 | 0.96 | 26.56 | 16.48 | 2.13 |

## Typical Performance Data

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

TEST CONDITIONS: VDD = +6.25V, Id = 82mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 10 | 21.19 | 27.68 | 10.44 | 14.65 | 1.14 | 0.86 | 29.15 | 20.47 | 8.86 |
| 100 | 22.77 | 25.75 | 31.56 | 17.49 | 1.05 | 0.48 | 32.57 | 23.19 | 1.39 |
| 200 | 22.84 | 25.71 | 34.55 | 18.33 | 1.05 | 0.47 | 29.47 | 23.25 | 1.04 |
| 300 | 22.85 | 25.68 | 34.35 | 18.78 | 1.04 | 0.47 | 30.81 | 23.28 | 1.01 |
| 400 | 22.86 | 25.67 | 33.07 | 19.02 | 1.04 | 0.47 | 31.73 | 23.27 | 0.99 |
| 500 | 22.86 | 25.68 | 32.09 | 19.15 | 1.05 | 0.48 | 30.72 | 23.27 | 0.93 |
| 1000 | 22.87 | 25.77 | 25.40 | 20.85 | 1.05 | 0.50 | 35.34 | 23.30 | 0.92 |
| 1200 | 22.88 | 25.81 | 23.22 | 21.68 | 1.05 | 0.51 | 32.63 | 23.34 | 0.95 |
| 1400 | 22.88 | 25.86 | 21.35 | 22.22 | 1.06 | 0.52 | 32.51 | 23.32 | 0.92 |
| 1600 | 22.88 | 25.94 | 19.69 | 22.43 | 1.06 | 0.53 | 30.94 | 23.26 | 0.92 |
| 1800 | 22.87 | 25.97 | 18.33 | 22.16 | 1.06 | 0.54 | 30.77 | 23.24 | 0.94 |
| 2000 | 22.87 | 26.03 | 17.14 | 21.55 | 1.06 | 0.55 | 31.18 | 23.18 | 0.97 |
| 2200 | 22.85 | 26.15 | 16.10 | 20.74 | 1.07 | 0.56 | 34.08 | 23.28 | 0.97 |
| 2400 | 22.84 | 26.20 | 15.24 | 19.89 | 1.07 | 0.57 | 31.38 | 23.04 | 1.00 |
| 2600 | 22.82 | 26.25 | 14.61 | 19.16 | 1.07 | 0.58 | 29.96 | 22.77 | 0.97 |
| 2800 | 22.82 | 26.34 | 14.08 | 18.63 | 1.07 | 0.59 | 29.95 | 22.70 | 1.03 |
| 3000 | 22.81 | 26.40 | 13.73 | 18.20 | 1.07 | 0.60 | 30.20 | 22.28 | 1.01 |
| 3200 | 22.81 | 26.49 | 13.48 | 17.98 | 1.08 | 0.61 | 31.69 | 22.12 | 0.99 |
| 3400 | 22.80 | 26.55 | 13.33 | 17.78 | 1.08 | 0.61 | 30.03 | 22.05 | 1.06 |
| 3600 | 22.79 | 26.60 | 13.27 | 17.66 | 1.08 | 0.62 | 30.66 | 22.03 | 1.05 |
| 3800 | 22.80 | 26.67 | 13.27 | 17.68 | 1.09 | 0.63 | 30.11 | 22.49 | 1.11 |
| 4000 | 22.80 | 26.76 | 13.38 | 17.79 | 1.09 | 0.64 | 31.10 | 22.43 | 1.09 |
| 4200 | 22.81 | 26.85 | 13.54 | 18.00 | 1.10 | 0.65 | 31.04 | 22.55 | 1.11 |
| 4400 | 22.81 | 26.86 | 13.83 | 18.20 | 1.10 | 0.65 | 29.49 | 22.49 | 1.13 |
| 4600 | 22.83 | 26.92 | 14.11 | 18.47 | 1.10 | 0.66 | 29.56 | 22.34 | 1.12 |
| 4800 | 22.86 | 26.98 | 14.47 | 18.69 | 1.11 | 0.66 | 30.55 | 22.51 | 1.20 |
| 5000 | 22.89 | 27.07 | 14.88 | 18.89 | 1.11 | 0.67 | 30.80 | 22.34 | 1.17 |
| 5200 | 22.94 | 27.10 | 15.35 | 19.01 | 1.11 | 0.67 | 29.21 | 22.27 | 1.15 |
| 5400 | 22.97 | 27.18 | 15.86 | 19.08 | 1.12 | 0.68 | 29.97 | 21.98 | 1.17 |
| 5600 | 23.02 | 27.21 | 16.51 | 19.10 | 1.12 | 0.68 | 29.46 | 21.77 | 1.22 |
| 5800 | 23.06 | 27.28 | 17.26 | 19.12 | 1.12 | 0.68 | 29.21 | 21.77 | 1.18 |
| 6000 | 23.10 | 27.31 | 18.16 | 19.10 | 1.13 | 0.68 | 30.09 | 21.90 | 1.16 |
| 6200 | 23.14 | 27.38 | 19.31 | 18.79 | 1.13 | 0.68 | 29.37 | 21.74 | 1.12 |
| 6400 | 23.17 | 27.50 | 20.56 | 18.54 | 1.14 | 0.69 | 29.64 | 21.70 | 1.13 |
| 6600 | 23.19 | 27.61 | 22.28 | 18.03 | 1.15 | 0.69 | 29.02 | 21.88 | 1.19 |
| 6800 | 23.22 | 27.65 | 24.93 | 17.40 | 1.16 | 0.69 | 30.14 | 21.72 | 1.21 |
| 7000 | 23.26 | 27.78 | 28.78 | 16.77 | 1.17 | 0.69 | 27.84 | 21.59 | 1.11 |
| 7200 | 23.27 | 27.81 | 34.48 | 16.29 | 1.18 | 0.69 | 28.84 | 21.59 | 1.16 |
| 7400 | 23.26 | 27.91 | 40.72 | 15.94 | 1.19 | 0.70 | 28.92 | 21.34 | 1.07 |
| 7600 | 23.24 | 28.03 | 31.93 | 15.58 | 1.21 | 0.71 | 28.65 | 20.95 | 1.16 |
| 7800 | 23.22 | 28.25 | 26.68 | 15.21 | 1.23 | 0.72 | 29.03 | 20.87 | 1.17 |
| 8000 | 23.18 | 28.46 | 23.63 | 15.00 | 1.26 | 0.74 | 27.72 | 20.39 | 1.17 |
| 8200 | 23.12 | 28.62 | 21.35 | 14.94 | 1.29 | 0.75 | 27.41 | 19.86 | 1.18 |
| 8400 | 23.07 | 28.91 | 19.63 | 14.85 | 1.33 | 0.77 | 28.00 | 19.54 | 1.24 |
| 8600 | 22.99 | 29.11 | 18.42 | 15.10 | 1.37 | 0.79 | 27.38 | 18.94 | 1.35 |
| 8800 | 22.89 | 29.30 | 17.36 | 15.49 | 1.41 | 0.81 | 27.06 | 18.86 | 1.33 |
| 9000 | 22.78 | 29.65 | 16.51 | 16.06 | 1.47 | 0.84 | 26.56 | 18.91 | 1.49 |
| 9200 | 22.64 | 29.89 | 15.84 | 16.76 | 1.53 | 0.86 | 26.75 | 18.18 | 1.59 |
| 9400 | 22.47 | 30.20 | 15.13 | 17.61 | 1.60 | 0.88 | 26.77 | 17.75 | 1.75 |
| 9600 | 22.26 | 30.61 | 14.45 | 18.36 | 1.70 | 0.91 | 25.97 | 17.57 | 1.87 |
| 9800 | 21.99 | 31.02 | 13.82 | 18.81 | 1.81 | 0.93 | 25.38 | 16.90 | 1.99 |
| 10000 | 21.68 | 31.37 | 13.16 | 18.63 | 1.93 | 0.95 | 25.97 | 16.87 | 2.10 |

## Typical Performance Data

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

TEST CONDITIONS: VDD = +5.75V, Id = 73mA @ Temperature = -45°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) |
| 10 | 21.43 | 27.97 | 10.37 | 14.21 | 1.13 | 0.86 | 27.48 | 18.56 | 8.41 |
| 100 | 23.03 | 26.02 | 31.19 | 15.66 | 1.04 | 0.47 | 29.11 | 21.26 | 0.93 |
| 200 | 23.14 | 25.83 | 34.00 | 16.68 | 1.04 | 0.44 | 32.57 | 21.28 | 0.71 |
| 300 | 23.17 | 25.90 | 35.38 | 17.12 | 1.04 | 0.45 | 33.38 | 21.29 | 0.70 |
| 400 | 23.18 | 25.71 | 34.52 | 17.25 | 1.03 | 0.43 | 32.67 | 21.30 | 0.69 |
| 500 | 23.17 | 25.82 | 34.35 | 17.39 | 1.04 | 0.45 | 27.90 | 21.32 | 0.67 |
| 1000 | 23.20 | 25.90 | 28.31 | 18.87 | 1.04 | 0.47 | 31.67 | 21.32 | 0.72 |
| 1200 | 23.21 | 25.95 | 25.68 | 19.83 | 1.04 | 0.48 | 32.24 | 21.31 | 0.68 |
| 1400 | 23.22 | 25.99 | 23.52 | 20.82 | 1.05 | 0.49 | 32.21 | 21.26 | 0.56 |
| 1600 | 23.23 | 25.96 | 21.39 | 21.67 | 1.04 | 0.49 | 29.78 | 21.08 | 0.58 |
| 1800 | 23.24 | 26.06 | 19.77 | 22.21 | 1.05 | 0.50 | 33.22 | 21.03 | 0.60 |
| 2000 | 23.24 | 26.11 | 18.38 | 22.02 | 1.05 | 0.51 | 35.44 | 20.94 | 0.64 |
| 2200 | 23.23 | 26.13 | 17.24 | 21.39 | 1.05 | 0.52 | 30.29 | 20.98 | 0.60 |
| 2400 | 23.22 | 26.21 | 16.43 | 20.56 | 1.05 | 0.53 | 30.60 | 20.71 | 0.67 |
| 2600 | 23.22 | 26.28 | 15.82 | 19.80 | 1.05 | 0.54 | 31.11 | 20.31 | 0.65 |
| 2800 | 23.23 | 26.34 | 15.32 | 19.25 | 1.05 | 0.54 | 30.14 | 20.18 | 0.61 |
| 3000 | 23.23 | 26.39 | 14.95 | 18.68 | 1.06 | 0.55 | 30.50 | 19.67 | 0.63 |
| 3200 | 23.24 | 26.48 | 14.68 | 18.41 | 1.06 | 0.56 | 30.60 | 19.29 | 0.69 |
| 3400 | 23.24 | 26.54 | 14.58 | 18.16 | 1.06 | 0.56 | 30.34 | 18.96 | 0.61 |
| 3600 | 23.25 | 26.58 | 14.46 | 17.96 | 1.06 | 0.57 | 28.39 | 18.84 | 0.68 |
| 3800 | 23.25 | 26.67 | 14.43 | 17.85 | 1.06 | 0.58 | 29.35 | 19.51 | 0.68 |
| 4000 | 23.27 | 26.74 | 14.49 | 17.82 | 1.07 | 0.59 | 30.75 | 19.38 | 0.74 |
| 4200 | 23.27 | 26.77 | 14.65 | 17.98 | 1.07 | 0.59 | 29.50 | 19.56 | 0.74 |
| 4400 | 23.28 | 26.78 | 14.96 | 18.08 | 1.07 | 0.59 | 30.51 | 19.56 | 0.74 |
| 4600 | 23.30 | 26.91 | 15.27 | 18.24 | 1.07 | 0.61 | 28.36 | 19.67 | 0.74 |
| 4800 | 23.34 | 26.95 | 15.59 | 18.28 | 1.07 | 0.61 | 29.10 | 20.10 | 0.78 |
| 5000 | 23.39 | 26.99 | 15.92 | 18.37 | 1.07 | 0.61 | 28.24 | 20.12 | 0.74 |
| 5200 | 23.43 | 27.02 | 16.41 | 18.31 | 1.07 | 0.61 | 28.37 | 20.46 | 0.74 |
| 5400 | 23.49 | 27.13 | 16.79 | 18.27 | 1.08 | 0.62 | 28.47 | 20.16 | 0.76 |
| 5600 | 23.54 | 27.14 | 17.29 | 18.16 | 1.07 | 0.62 | 27.89 | 20.07 | 0.79 |
| 5800 | 23.59 | 27.21 | 17.87 | 17.97 | 1.08 | 0.62 | 28.58 | 20.31 | 0.75 |
| 6000 | 23.65 | 27.21 | 18.44 | 17.66 | 1.07 | 0.62 | 28.50 | 20.59 | 0.79 |
| 6200 | 23.72 | 27.28 | 19.26 | 17.13 | 1.07 | 0.62 | 28.50 | 20.31 | 0.62 |
| 6400 | 23.77 | 27.31 | 19.84 | 16.79 | 1.07 | 0.61 | 28.52 | 20.22 | 0.64 |
| 6600 | 23.81 | 27.39 | 20.93 | 16.25 | 1.08 | 0.62 | 28.77 | 20.44 | 0.68 |
| 6800 | 23.85 | 27.47 | 22.13 | 15.51 | 1.08 | 0.61 | 27.62 | 20.15 | 0.66 |
| 7000 | 23.90 | 27.51 | 23.20 | 14.76 | 1.08 | 0.60 | 28.66 | 19.96 | 0.71 |
| 7200 | 23.95 | 27.61 | 23.62 | 14.10 | 1.08 | 0.60 | 26.90 | 19.97 | 0.66 |
| 7400 | 23.97 | 27.72 | 23.70 | 13.57 | 1.09 | 0.60 | 28.00 | 19.74 | 0.64 |
| 7600 | 23.99 | 27.82 | 23.16 | 13.03 | 1.10 | 0.60 | 26.92 | 19.41 | 0.65 |
| 7800 | 24.04 | 27.98 | 21.81 | 12.46 | 1.11 | 0.60 | 27.76 | 19.40 | 0.65 |
| 8000 | 24.06 | 28.02 | 20.78 | 12.14 | 1.11 | 0.60 | 27.44 | 19.03 | 0.65 |
| 8200 | 24.05 | 28.19 | 20.42 | 12.13 | 1.13 | 0.61 | 26.78 | 18.63 | 0.63 |
| 8400 | 24.07 | 28.29 | 19.69 | 12.01 | 1.14 | 0.62 | 26.52 | 18.45 | 0.70 |
| 8600 | 24.09 | 28.36 | 19.16 | 12.13 | 1.15 | 0.62 | 26.06 | 18.00 | 0.74 |
| 8800 | 24.11 | 28.54 | 18.43 | 12.21 | 1.16 | 0.64 | 26.50 | 17.99 | 0.76 |
| 9000 | 24.10 | 28.73 | 17.86 | 12.39 | 1.19 | 0.66 | 26.44 | 18.12 | 0.80 |
| 9200 | 24.10 | 28.91 | 17.22 | 12.61 | 1.21 | 0.68 | 25.95 | 17.51 | 0.94 |
| 9400 | 24.09 | 29.19 | 16.66 | 12.84 | 1.24 | 0.70 | 26.09 | 17.14 | 0.99 |
| 9600 | 24.05 | 29.50 | 16.26 | 13.17 | 1.27 | 0.73 | 25.45 | 16.98 | 1.06 |
| 9800 | 23.98 | 29.72 | 15.85 | 13.62 | 1.31 | 0.76 | 24.21 | 16.34 | 1.17 |
| 10000 | 23.89 | 29.93 | 15.24 | 14.19 | 1.35 | 0.78 | 24.86 | 16.26 | 1.32 |

## Typical Performance Data

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

TEST CONDITIONS: VDD = +6V, Id = 81mA Temperature = -45°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) |
| 10 | 21.68 | 28.13 | 10.89 | 13.85 | 1.12 | 0.85 | 26.60 | 19.21 | 8.37 |
| 100 | 23.24 | 26.29 | 31.41 | 14.54 | 1.04 | 0.47 | 29.94 | 21.92 | 0.99 |
| 200 | 23.35 | 26.09 | 31.05 | 15.43 | 1.03 | 0.44 | 32.75 | 21.95 | 0.76 |
| 300 | 23.38 | 26.08 | 31.58 | 15.79 | 1.04 | 0.44 | 33.31 | 21.95 | 0.72 |
| 400 | 23.38 | 26.04 | 31.48 | 15.89 | 1.03 | 0.43 | 28.26 | 21.96 | 0.67 |
| 500 | 23.39 | 26.09 | 31.60 | 16.00 | 1.04 | 0.44 | 32.15 | 21.97 | 0.65 |
| 1000 | 23.41 | 26.16 | 31.16 | 17.25 | 1.04 | 0.46 | 31.53 | 21.94 | 0.62 |
| 1200 | 23.43 | 26.17 | 28.82 | 18.06 | 1.04 | 0.47 | 36.84 | 21.91 | 0.66 |
| 1400 | 23.45 | 26.18 | 26.28 | 18.90 | 1.04 | 0.48 | 31.09 | 21.84 | 0.56 |
| 1600 | 23.46 | 26.22 | 23.61 | 19.71 | 1.04 | 0.48 | 32.96 | 21.67 | 0.58 |
| 1800 | 23.47 | 26.27 | 21.66 | 20.34 | 1.05 | 0.50 | 32.68 | 21.61 | 0.67 |
| 2000 | 23.47 | 26.32 | 19.96 | 20.53 | 1.05 | 0.50 | 30.55 | 21.54 | 0.59 |
| 2200 | 23.47 | 26.39 | 18.63 | 20.35 | 1.05 | 0.52 | 30.33 | 21.62 | 0.64 |
| 2400 | 23.46 | 26.44 | 17.63 | 19.78 | 1.05 | 0.52 | 30.10 | 21.31 | 0.69 |
| 2600 | 23.46 | 26.52 | 16.94 | 19.26 | 1.05 | 0.53 | 29.77 | 20.98 | 0.61 |
| 2800 | 23.47 | 26.56 | 16.37 | 18.83 | 1.05 | 0.54 | 31.23 | 20.86 | 0.69 |
| 3000 | 23.46 | 26.63 | 15.93 | 18.30 | 1.06 | 0.54 | 29.21 | 20.42 | 0.70 |
| 3200 | 23.47 | 26.65 | 15.64 | 18.06 | 1.06 | 0.55 | 31.91 | 20.18 | 0.66 |
| 3400 | 23.47 | 26.72 | 15.48 | 17.79 | 1.06 | 0.55 | 30.13 | 19.99 | 0.68 |
| 3600 | 23.47 | 26.78 | 15.35 | 17.59 | 1.06 | 0.56 | 30.41 | 19.99 | 0.65 |
| 3800 | 23.48 | 26.88 | 15.31 | 17.41 | 1.06 | 0.57 | 29.90 | 20.53 | 0.73 |
| 4000 | 23.48 | 26.92 | 15.35 | 17.34 | 1.06 | 0.58 | 31.53 | 20.46 | 0.72 |
| 4200 | 23.48 | 26.98 | 15.52 | 17.42 | 1.07 | 0.59 | 29.13 | 20.66 | 0.72 |
| 4400 | 23.48 | 27.00 | 15.85 | 17.38 | 1.07 | 0.59 | 30.16 | 20.62 | 0.70 |
| 4600 | 23.50 | 27.05 | 16.21 | 17.44 | 1.07 | 0.60 | 28.10 | 20.69 | 0.72 |
| 4800 | 23.53 | 27.15 | 16.50 | 17.40 | 1.07 | 0.61 | 30.12 | 21.09 | 0.75 |
| 5000 | 23.57 | 27.20 | 16.89 | 17.42 | 1.07 | 0.61 | 29.46 | 21.04 | 0.73 |
| 5200 | 23.61 | 27.27 | 17.43 | 17.27 | 1.07 | 0.61 | 29.46 | 21.31 | 0.73 |
| 5400 | 23.66 | 27.24 | 17.79 | 17.18 | 1.07 | 0.61 | 29.24 | 20.98 | 0.75 |
| 5600 | 23.70 | 27.33 | 18.31 | 17.04 | 1.07 | 0.62 | 28.36 | 20.76 | 0.84 |
| 5800 | 23.74 | 27.40 | 18.89 | 16.83 | 1.07 | 0.62 | 28.73 | 20.93 | 0.77 |
| 6000 | 23.80 | 27.35 | 19.46 | 16.53 | 1.07 | 0.61 | 28.69 | 21.15 | 0.71 |
| 6200 | 23.86 | 27.43 | 20.21 | 16.09 | 1.07 | 0.61 | 28.24 | 20.83 | 0.60 |
| 6400 | 23.91 | 27.53 | 20.70 | 15.79 | 1.07 | 0.62 | 29.29 | 20.69 | 0.68 |
| 6600 | 23.93 | 27.58 | 21.63 | 15.36 | 1.08 | 0.61 | 27.95 | 20.90 | 0.67 |
| 6800 | 23.97 | 27.66 | 22.50 | 14.75 | 1.08 | 0.61 | 27.66 | 20.60 | 0.68 |
| 7000 | 24.01 | 27.75 | 23.09 | 14.07 | 1.08 | 0.61 | 29.86 | 20.41 | 0.64 |
| 7200 | 24.05 | 27.80 | 22.88 | 13.53 | 1.09 | 0.60 | 27.81 | 20.39 | 0.64 |
| 7400 | 24.07 | 27.88 | 22.48 | 13.05 | 1.09 | 0.60 | 28.00 | 20.17 | 0.62 |
| 7600 | 24.08 | 28.01 | 21.76 | 12.59 | 1.10 | 0.60 | 27.27 | 19.85 | 0.66 |
| 7800 | 24.12 | 28.13 | 20.44 | 12.06 | 1.11 | 0.60 | 28.73 | 19.83 | 0.71 |
| 8000 | 24.14 | 28.22 | 19.61 | 11.81 | 1.11 | 0.60 | 25.98 | 19.48 | 0.68 |
| 8200 | 24.12 | 28.28 | 19.31 | 11.83 | 1.13 | 0.61 | 27.06 | 19.08 | 0.66 |
| 8400 | 24.14 | 28.50 | 18.68 | 11.73 | 1.14 | 0.62 | 26.17 | 18.89 | 0.68 |
| 8600 | 24.16 | 28.53 | 18.27 | 11.87 | 1.15 | 0.63 | 25.99 | 18.44 | 0.64 |
| 8800 | 24.17 | 28.76 | 17.62 | 11.97 | 1.17 | 0.65 | 26.32 | 18.44 | 0.75 |
| 9000 | 24.16 | 28.94 | 17.17 | 12.17 | 1.19 | 0.67 | 25.88 | 18.58 | 0.84 |
| 9200 | 24.16 | 29.12 | 16.59 | 12.39 | 1.22 | 0.68 | 24.94 | 17.96 | 0.90 |
| 9400 | 24.14 | 29.33 | 16.09 | 12.64 | 1.24 | 0.71 | 24.80 | 17.61 | 0.96 |
| 9600 | 24.10 | 29.66 | 15.74 | 12.97 | 1.28 | 0.74 | 24.89 | 17.46 | 1.11 |
| 9800 | 24.02 | 29.83 | 15.38 | 13.40 | 1.31 | 0.76 | 24.34 | 16.80 | 1.16 |
| 10000 | 23.93 | 30.14 | 14.83 | 14.02 | 1.36 | 0.79 | 24.17 | 16.74 | 1.34 |

## Typical Performance Data

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

TEST CONDITIONS: VDD = +6.25V, Id = 89mA @ Temperature = -45°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) |
| 10 | 21.87 | 27.96 | 11.20 | 13.62 | 1.10 | 0.83 | 26.74 | 19.86 | 8.39 |
| 100 | 23.40 | 26.43 | 29.08 | 13.82 | 1.04 | 0.46 | 31.35 | 22.54 | 0.95 |
| 200 | 23.51 | 26.32 | 27.69 | 14.56 | 1.04 | 0.44 | 30.27 | 22.55 | 0.76 |
| 300 | 23.53 | 26.25 | 27.89 | 14.89 | 1.03 | 0.43 | 32.28 | 22.56 | 0.68 |
| 400 | 23.55 | 26.21 | 27.90 | 15.00 | 1.03 | 0.43 | 32.74 | 22.57 | 0.68 |
| 500 | 23.54 | 26.25 | 28.09 | 15.07 | 1.04 | 0.43 | 32.89 | 22.60 | 0.67 |
| 1000 | 23.58 | 26.30 | 30.50 | 16.19 | 1.04 | 0.45 | 35.24 | 22.56 | 0.67 |
| 1200 | 23.60 | 26.33 | 30.31 | 16.93 | 1.04 | 0.46 | 30.96 | 22.52 | 0.63 |
| 1400 | 23.61 | 26.36 | 28.31 | 17.68 | 1.04 | 0.47 | 35.63 | 22.44 | 0.57 |
| 1600 | 23.63 | 26.40 | 25.42 | 18.47 | 1.04 | 0.48 | 32.49 | 22.27 | 0.62 |
| 1800 | 23.64 | 26.43 | 23.23 | 19.13 | 1.05 | 0.49 | 30.76 | 22.24 | 0.65 |
| 2000 | 23.65 | 26.45 | 21.25 | 19.45 | 1.05 | 0.49 | 33.32 | 22.20 | 0.60 |
| 2200 | 23.65 | 26.54 | 19.76 | 19.43 | 1.05 | 0.51 | 30.89 | 22.27 | 0.64 |
| 2400 | 23.64 | 26.58 | 18.67 | 19.01 | 1.05 | 0.51 | 31.79 | 21.93 | 0.59 |
| 2600 | 23.64 | 26.64 | 17.88 | 18.64 | 1.05 | 0.52 | 29.92 | 21.60 | 0.59 |
| 2800 | 23.64 | 26.72 | 17.24 | 18.24 | 1.05 | 0.53 | 35.14 | 21.54 | 0.66 |
| 3000 | 23.64 | 26.76 | 16.75 | 17.77 | 1.05 | 0.54 | 31.62 | 21.16 | 0.59 |
| 3200 | 23.65 | 26.77 | 16.42 | 17.56 | 1.05 | 0.54 | 30.69 | 21.00 | 0.64 |
| 3400 | 23.65 | 26.86 | 16.23 | 17.27 | 1.06 | 0.55 | 30.72 | 20.88 | 0.67 |
| 3600 | 23.64 | 26.88 | 16.10 | 17.07 | 1.06 | 0.55 | 30.72 | 20.93 | 0.62 |
| 3800 | 23.64 | 26.97 | 16.03 | 16.90 | 1.06 | 0.56 | 29.10 | 21.41 | 0.68 |
| 4000 | 23.65 | 27.05 | 16.07 | 16.77 | 1.06 | 0.57 | 30.31 | 21.39 | 0.72 |
| 4200 | 23.64 | 27.12 | 16.27 | 16.80 | 1.07 | 0.58 | 29.51 | 21.61 | 0.72 |
| 4400 | 23.64 | 27.21 | 16.59 | 16.72 | 1.07 | 0.59 | 29.83 | 21.59 | 0.68 |
| 4600 | 23.65 | 27.19 | 16.96 | 16.72 | 1.07 | 0.59 | 29.99 | 21.61 | 0.73 |
| 4800 | 23.68 | 27.29 | 17.27 | 16.64 | 1.07 | 0.60 | 29.30 | 21.94 | 0.80 |
| 5000 | 23.71 | 27.33 | 17.65 | 16.58 | 1.07 | 0.60 | 29.02 | 21.86 | 0.74 |
| 5200 | 23.75 | 27.38 | 18.19 | 16.44 | 1.07 | 0.61 | 28.60 | 22.06 | 0.76 |
| 5400 | 23.79 | 27.40 | 18.56 | 16.34 | 1.07 | 0.61 | 29.00 | 21.68 | 0.77 |
| 5600 | 23.83 | 27.43 | 19.07 | 16.19 | 1.07 | 0.61 | 29.01 | 21.40 | 0.83 |
| 5800 | 23.87 | 27.51 | 19.60 | 15.98 | 1.07 | 0.61 | 28.28 | 21.54 | 0.74 |
| 6000 | 23.92 | 27.56 | 20.16 | 15.73 | 1.07 | 0.61 | 27.41 | 21.68 | 0.73 |
| 6200 | 23.97 | 27.63 | 20.82 | 15.32 | 1.07 | 0.61 | 28.28 | 21.36 | 0.76 |
| 6400 | 24.02 | 27.67 | 21.25 | 15.10 | 1.07 | 0.61 | 27.91 | 21.19 | 0.65 |
| 6600 | 24.04 | 27.70 | 22.05 | 14.71 | 1.07 | 0.61 | 28.63 | 21.36 | 0.71 |
| 6800 | 24.07 | 27.79 | 22.69 | 14.17 | 1.08 | 0.61 | 27.50 | 21.05 | 0.68 |
| 7000 | 24.11 | 27.89 | 22.89 | 13.59 | 1.08 | 0.61 | 28.29 | 20.84 | 0.72 |
| 7200 | 24.14 | 27.96 | 22.41 | 13.10 | 1.09 | 0.60 | 27.17 | 20.81 | 0.68 |
| 7400 | 24.15 | 27.99 | 21.80 | 12.70 | 1.09 | 0.60 | 28.11 | 20.59 | 0.69 |
| 7600 | 24.15 | 28.13 | 20.99 | 12.29 | 1.10 | 0.60 | 27.45 | 20.26 | 0.63 |
| 7800 | 24.19 | 28.31 | 19.76 | 11.82 | 1.11 | 0.60 | 26.51 | 20.25 | 0.69 |
| 8000 | 24.21 | 28.34 | 18.94 | 11.59 | 1.12 | 0.60 | 26.88 | 19.89 | 0.69 |
| 8200 | 24.18 | 28.40 | 18.66 | 11.62 | 1.13 | 0.61 | 25.99 | 19.49 | 0.67 |
| 8400 | 24.20 | 28.61 | 18.08 | 11.55 | 1.15 | 0.62 | 26.12 | 19.30 | 0.63 |
| 8600 | 24.21 | 28.67 | 17.69 | 11.71 | 1.16 | 0.63 | 25.60 | 18.84 | 0.72 |
| 8800 | 24.22 | 28.82 | 17.09 | 11.81 | 1.17 | 0.64 | 26.22 | 18.85 | 0.76 |
| 9000 | 24.21 | 29.10 | 16.69 | 12.04 | 1.20 | 0.67 | 25.43 | 19.00 | 0.79 |
| 9200 | 24.20 | 29.32 | 16.15 | 12.24 | 1.22 | 0.69 | 24.70 | 18.39 | 0.93 |
| 9400 | 24.18 | 29.57 | 15.67 | 12.48 | 1.25 | 0.72 | 24.74 | 18.04 | 0.98 |
| 9600 | 24.14 | 29.79 | 15.33 | 12.82 | 1.29 | 0.74 | 24.42 | 17.88 | 1.08 |
| 9800 | 24.06 | 30.08 | 15.01 | 13.25 | 1.33 | 0.77 | 23.08 | 17.24 | 1.24 |
| 10000 | 23.96 | 30.27 | 14.48 | 13.82 | 1.37 | 0.79 | 23.58 | 17.17 | 1.35 |

## Typical Performance Data

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

TEST CONDITIONS: VDD = +5.75V, Id = 60mA @ 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) |
| 10 | 19.99 | 26.69 | 8.62 | 13.26 | 1.14 | 0.86 | 24.80 | 18.03 | 9.37 |
| 100 | 21.73 | 24.58 | 18.36 | 26.72 | 1.04 | 0.50 | 28.73 | 21.34 | 1.81 |
| 200 | 21.78 | 24.52 | 18.81 | 31.01 | 1.04 | 0.49 | 31.82 | 21.54 | 1.45 |
| 300 | 21.79 | 24.55 | 18.67 | 33.59 | 1.04 | 0.49 | 30.85 | 21.71 | 1.39 |
| 400 | 21.79 | 24.62 | 18.33 | 35.38 | 1.05 | 0.50 | 31.77 | 21.74 | 1.27 |
| 500 | 21.79 | 24.59 | 18.07 | 35.87 | 1.05 | 0.50 | 31.64 | 21.76 | 1.30 |
| 1000 | 21.76 | 24.71 | 16.10 | 28.03 | 1.05 | 0.53 | 30.00 | 21.72 | 1.26 |
| 1200 | 21.74 | 24.78 | 15.27 | 25.06 | 1.05 | 0.54 | 30.33 | 21.65 | 1.28 |
| 1400 | 21.72 | 24.87 | 14.50 | 22.77 | 1.06 | 0.55 | 29.20 | 21.61 | 1.19 |
| 1600 | 21.70 | 24.97 | 13.76 | 20.87 | 1.06 | 0.56 | 29.33 | 21.41 | 1.29 |
| 1800 | 21.67 | 25.03 | 13.13 | 19.39 | 1.07 | 0.57 | 28.69 | 21.38 | 1.29 |
| 2000 | 21.66 | 25.13 | 12.55 | 18.14 | 1.07 | 0.58 | 28.65 | 21.37 | 1.35 |
| 2200 | 21.63 | 25.24 | 12.01 | 17.11 | 1.07 | 0.59 | 30.66 | 21.49 | 1.38 |
| 2400 | 21.61 | 25.34 | 11.57 | 16.34 | 1.08 | 0.60 | 30.46 | 21.27 | 1.26 |
| 2600 | 21.59 | 25.42 | 11.24 | 15.75 | 1.08 | 0.61 | 27.92 | 20.95 | 1.36 |
| 2800 | 21.58 | 25.50 | 10.99 | 15.37 | 1.08 | 0.62 | 28.39 | 20.86 | 1.36 |
| 3000 | 21.58 | 25.60 | 10.83 | 15.15 | 1.09 | 0.63 | 27.60 | 20.26 | 1.37 |
| 3200 | 21.59 | 25.69 | 10.72 | 15.06 | 1.09 | 0.64 | 28.49 | 19.94 | 1.43 |
| 3400 | 21.60 | 25.75 | 10.72 | 15.09 | 1.09 | 0.64 | 28.19 | 19.60 | 1.44 |
| 3600 | 21.61 | 25.82 | 10.77 | 15.22 | 1.10 | 0.65 | 28.26 | 19.35 | 1.43 |
| 3800 | 21.64 | 25.89 | 10.85 | 15.50 | 1.10 | 0.66 | 28.74 | 20.00 | 1.52 |
| 4000 | 21.67 | 25.92 | 11.00 | 15.90 | 1.10 | 0.66 | 27.78 | 19.71 | 1.51 |
| 4200 | 21.69 | 25.99 | 11.18 | 16.43 | 1.11 | 0.67 | 29.01 | 19.71 | 1.59 |
| 4400 | 21.72 | 26.06 | 11.40 | 17.00 | 1.11 | 0.68 | 27.37 | 19.69 | 1.51 |
| 4600 | 21.75 | 26.16 | 11.56 | 17.65 | 1.12 | 0.69 | 26.92 | 19.62 | 1.55 |
| 4800 | 21.80 | 26.22 | 11.73 | 18.28 | 1.12 | 0.70 | 28.39 | 20.00 | 1.59 |
| 5000 | 21.84 | 26.27 | 11.89 | 19.01 | 1.13 | 0.71 | 28.56 | 20.01 | 1.58 |
| 5200 | 21.89 | 26.32 | 12.06 | 19.76 | 1.13 | 0.71 | 28.64 | 20.13 | 1.59 |
| 5400 | 21.94 | 26.37 | 12.24 | 20.50 | 1.13 | 0.72 | 28.05 | 20.04 | 1.68 |
| 5600 | 21.99 | 26.48 | 12.48 | 21.32 | 1.14 | 0.73 | 27.39 | 20.00 | 1.64 |
| 5800 | 22.04 | 26.49 | 12.78 | 22.43 | 1.14 | 0.73 | 27.54 | 20.12 | 1.65 |
| 6000 | 22.09 | 26.63 | 13.15 | 23.68 | 1.15 | 0.74 | 28.53 | 20.25 | 1.63 |
| 6200 | 22.15 | 26.67 | 13.67 | 25.08 | 1.16 | 0.74 | 29.09 | 20.18 | 1.59 |
| 6400 | 22.19 | 26.79 | 14.17 | 26.49 | 1.17 | 0.75 | 28.72 | 20.22 | 1.59 |
| 6600 | 22.21 | 26.91 | 14.82 | 27.60 | 1.18 | 0.75 | 29.06 | 20.34 | 1.63 |
| 6800 | 22.25 | 26.97 | 15.60 | 27.32 | 1.19 | 0.76 | 29.16 | 20.26 | 1.62 |
| 7000 | 22.28 | 27.16 | 16.51 | 26.58 | 1.22 | 0.77 | 28.93 | 20.19 | 1.65 |
| 7200 | 22.28 | 27.30 | 17.24 | 25.52 | 1.24 | 0.78 | 29.47 | 20.21 | 1.66 |
| 7400 | 22.26 | 27.46 | 17.88 | 24.77 | 1.26 | 0.79 | 29.89 | 20.06 | 1.74 |
| 7600 | 22.24 | 27.62 | 18.16 | 24.30 | 1.29 | 0.80 | 28.67 | 19.83 | 1.69 |
| 7800 | 22.25 | 27.85 | 18.17 | 23.86 | 1.32 | 0.81 | 29.16 | 19.77 | 1.74 |
| 8000 | 22.28 | 27.94 | 17.98 | 23.60 | 1.34 | 0.82 | 29.36 | 19.41 | 1.68 |
| 8200 | 22.23 | 28.11 | 17.68 | 22.96 | 1.38 | 0.83 | 29.85 | 18.97 | 1.67 |
| 8400 | 22.22 | 28.39 | 16.77 | 23.18 | 1.42 | 0.85 | 29.22 | 18.70 | 1.72 |
| 8600 | 22.24 | 28.51 | 15.71 | 23.57 | 1.44 | 0.86 | 29.14 | 18.24 | 1.68 |
| 8800 | 22.15 | 28.69 | 14.90 | 23.54 | 1.48 | 0.88 | 28.81 | 18.16 | 1.75 |
| 9000 | 21.99 | 28.99 | 14.29 | 23.72 | 1.54 | 0.90 | 29.60 | 18.11 | 1.88 |
| 9200 | 21.79 | 29.28 | 13.64 | 23.59 | 1.61 | 0.92 | 28.55 | 17.35 | 1.93 |
| 9400 | 21.56 | 29.59 | 12.84 | 22.77 | 1.68 | 0.94 | 30.81 | 16.95 | 2.05 |
| 9600 | 21.26 | 29.96 | 12.06 | 20.99 | 1.77 | 0.96 | 28.40 | 16.69 | 2.21 |
| 9800 | 20.89 | 30.39 | 11.26 | 18.65 | 1.88 | 0.98 | 27.82 | 16.03 | 2.35 |
| 10000 | 20.45 | 30.97 | 10.41 | 16.47 | 2.03 | 1.00 | 27.88 | 16.00 | 2.57 |

## Typical Performance Data

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

TEST CONDITIONS: VDD = +6V, Id = 67mA @ 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) |
| 10 | 20.38 | 27.05 | 9.21 | 13.86 | 1.15 | 0.86 | 25.43 | 18.44 | 9.33 |
| 100 | 22.04 | 24.88 | 20.60 | 23.55 | 1.04 | 0.49 | 30.13 | 21.67 | 1.78 |
| 200 | 22.10 | 24.83 | 21.22 | 25.66 | 1.04 | 0.48 | 30.19 | 21.87 | 1.46 |
| 300 | 22.10 | 24.77 | 21.02 | 26.86 | 1.04 | 0.48 | 30.77 | 22.02 | 1.35 |
| 400 | 22.10 | 24.86 | 20.61 | 27.75 | 1.04 | 0.49 | 30.56 | 22.07 | 1.27 |
| 500 | 22.10 | 24.91 | 20.21 | 28.57 | 1.05 | 0.50 | 30.16 | 22.09 | 1.26 |
| 1000 | 22.08 | 25.02 | 17.72 | 31.05 | 1.05 | 0.52 | 31.69 | 22.00 | 1.24 |
| 1200 | 22.07 | 25.05 | 16.71 | 28.45 | 1.05 | 0.53 | 31.84 | 21.89 | 1.27 |
| 1400 | 22.06 | 25.10 | 15.80 | 25.62 | 1.06 | 0.54 | 30.72 | 21.83 | 1.18 |
| 1600 | 22.05 | 25.20 | 14.92 | 23.21 | 1.06 | 0.55 | 29.54 | 21.61 | 1.30 |
| 1800 | 22.02 | 25.28 | 14.22 | 21.29 | 1.06 | 0.56 | 30.85 | 21.60 | 1.28 |
| 2000 | 22.01 | 25.38 | 13.53 | 19.74 | 1.07 | 0.57 | 30.35 | 21.61 | 1.29 |
| 2200 | 21.99 | 25.46 | 12.92 | 18.48 | 1.07 | 0.58 | 29.92 | 21.73 | 1.30 |
| 2400 | 21.97 | 25.58 | 12.42 | 17.53 | 1.08 | 0.59 | 28.62 | 21.40 | 1.29 |
| 2600 | 21.95 | 25.69 | 12.05 | 16.80 | 1.08 | 0.60 | 29.63 | 21.01 | 1.35 |
| 2800 | 21.94 | 25.72 | 11.76 | 16.32 | 1.08 | 0.61 | 29.41 | 20.99 | 1.37 |
| 3000 | 21.93 | 25.84 | 11.58 | 16.01 | 1.09 | 0.62 | 29.73 | 20.40 | 1.37 |
| 3200 | 21.94 | 25.88 | 11.47 | 15.86 | 1.09 | 0.62 | 29.44 | 20.21 | 1.37 |
| 3400 | 21.95 | 26.00 | 11.46 | 15.82 | 1.09 | 0.64 | 28.54 | 20.05 | 1.43 |
| 3600 | 21.96 | 26.05 | 11.50 | 15.90 | 1.10 | 0.64 | 28.87 | 19.94 | 1.44 |
| 3800 | 21.98 | 26.13 | 11.58 | 16.11 | 1.10 | 0.65 | 29.82 | 20.57 | 1.47 |
| 4000 | 22.00 | 26.21 | 11.74 | 16.45 | 1.10 | 0.66 | 28.03 | 20.31 | 1.50 |
| 4200 | 22.02 | 26.19 | 11.95 | 16.92 | 1.10 | 0.66 | 29.58 | 20.32 | 1.50 |
| 4400 | 22.04 | 26.28 | 12.17 | 17.40 | 1.11 | 0.68 | 28.02 | 20.30 | 1.51 |
| 4600 | 22.06 | 26.38 | 12.34 | 18.00 | 1.12 | 0.69 | 29.87 | 20.15 | 1.54 |
| 4800 | 22.10 | 26.43 | 12.52 | 18.57 | 1.12 | 0.69 | 28.85 | 20.49 | 1.57 |
| 5000 | 22.14 | 26.50 | 12.68 | 19.17 | 1.12 | 0.70 | 28.50 | 20.47 | 1.55 |
| 5200 | 22.18 | 26.56 | 12.86 | 19.82 | 1.13 | 0.71 | 29.38 | 20.56 | 1.59 |
| 5400 | 22.22 | 26.64 | 13.05 | 20.41 | 1.13 | 0.71 | 28.65 | 20.43 | 1.60 |
| 5600 | 22.26 | 26.68 | 13.31 | 21.05 | 1.14 | 0.72 | 28.78 | 20.34 | 1.62 |
| 5800 | 22.30 | 26.78 | 13.64 | 21.84 | 1.15 | 0.72 | 29.51 | 20.45 | 1.65 |
| 6000 | 22.34 | 26.85 | 14.06 | 22.72 | 1.15 | 0.73 | 29.16 | 20.54 | 1.64 |
| 6200 | 22.39 | 26.96 | 14.61 | 23.37 | 1.16 | 0.74 | 30.40 | 20.49 | 1.59 |
| 6400 | 22.41 | 27.09 | 15.17 | 24.04 | 1.18 | 0.74 | 30.25 | 20.53 | 1.57 |
| 6600 | 22.43 | 27.14 | 15.89 | 24.21 | 1.19 | 0.75 | 30.02 | 20.64 | 1.61 |
| 6800 | 22.45 | 27.26 | 16.79 | 23.74 | 1.20 | 0.75 | 29.30 | 20.58 | 1.61 |
| 7000 | 22.47 | 27.44 | 17.78 | 23.22 | 1.23 | 0.76 | 29.11 | 20.52 | 1.61 |
| 7200 | 22.46 | 27.52 | 18.62 | 22.63 | 1.24 | 0.77 | 28.97 | 20.54 | 1.66 |
| 7400 | 22.44 | 27.77 | 19.33 | 22.23 | 1.28 | 0.79 | 31.01 | 20.41 | 1.71 |
| 7600 | 22.41 | 27.92 | 19.58 | 22.04 | 1.31 | 0.80 | 29.32 | 20.18 | 1.71 |
| 7800 | 22.42 | 28.06 | 19.49 | 21.86 | 1.33 | 0.81 | 31.51 | 20.14 | 1.78 |
| 8000 | 22.45 | 28.22 | 19.14 | 21.70 | 1.36 | 0.82 | 30.43 | 19.83 | 1.69 |
| 8200 | 22.39 | 28.48 | 18.66 | 21.33 | 1.41 | 0.84 | 28.74 | 19.41 | 1.71 |
| 8400 | 22.39 | 28.66 | 17.49 | 21.63 | 1.44 | 0.85 | 29.69 | 19.18 | 1.71 |
| 8600 | 22.41 | 28.76 | 16.25 | 22.03 | 1.45 | 0.86 | 28.08 | 18.74 | 1.69 |
| 8800 | 22.31 | 29.00 | 15.34 | 22.02 | 1.50 | 0.88 | 29.87 | 18.66 | 1.70 |
| 9000 | 22.16 | 29.38 | 14.64 | 22.24 | 1.57 | 0.90 | 29.64 | 18.62 | 1.82 |
| 9200 | 21.97 | 29.61 | 13.95 | 22.34 | 1.64 | 0.92 | 28.58 | 17.84 | 1.97 |
| 9400 | 21.75 | 29.92 | 13.13 | 22.01 | 1.71 | 0.94 | 29.29 | 17.44 | 2.07 |
| 9600 | 21.46 | 30.28 | 12.32 | 20.72 | 1.80 | 0.96 | 28.72 | 17.18 | 2.23 |
| 9800 | 21.11 | 30.63 | 11.52 | 18.73 | 1.90 | 0.98 | 27.34 | 16.51 | 2.33 |
| 10000 | 20.69 | 31.12 | 10.67 | 16.68 | 2.03 | 0.99 | 28.18 | 16.49 | 2.52 |

## Typical Performance Data

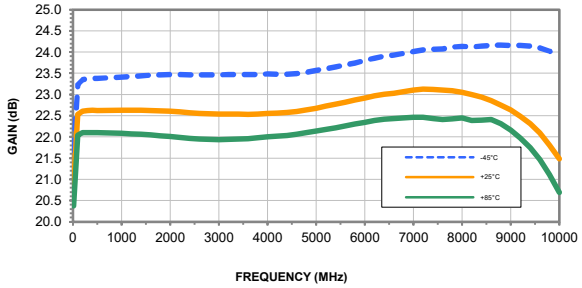
**Definitions:**
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +6.25V, Id = 75mA @ Temperature = +85°C

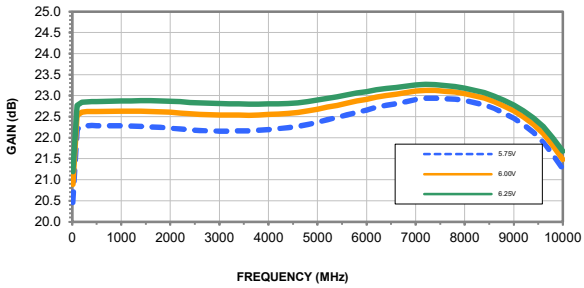
| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 10 | 20.68 | 26.96 | 9.63 | 14.19 | 1.12 | 0.84 | 25.28 | 18.79 | 9.29 |
| 100 | 22.29 | 25.10 | 23.01 | 21.20 | 1.04 | 0.48 | 29.55 | 21.98 | 1.84 |
| 200 | 22.35 | 25.12 | 23.80 | 22.47 | 1.04 | 0.48 | 30.16 | 22.18 | 1.48 |
| 300 | 22.35 | 25.06 | 23.49 | 23.19 | 1.04 | 0.48 | 30.79 | 22.32 | 1.30 |
| 400 | 22.35 | 25.13 | 22.95 | 23.80 | 1.04 | 0.49 | 29.96 | 22.37 | 1.27 |
| 500 | 22.35 | 25.08 | 22.44 | 24.34 | 1.04 | 0.49 | 30.28 | 22.39 | 1.30 |
| 1000 | 22.34 | 25.25 | 19.28 | 28.13 | 1.05 | 0.52 | 30.66 | 22.28 | 1.27 |
| 1200 | 22.33 | 25.28 | 18.07 | 28.36 | 1.05 | 0.53 | 31.06 | 22.16 | 1.26 |
| 1400 | 22.32 | 25.35 | 17.03 | 26.72 | 1.06 | 0.54 | 33.02 | 22.10 | 1.18 |
| 1600 | 22.31 | 25.43 | 16.02 | 24.54 | 1.06 | 0.55 | 31.62 | 21.86 | 1.29 |
| 1800 | 22.29 | 25.53 | 15.18 | 22.54 | 1.06 | 0.56 | 31.24 | 21.86 | 1.28 |
| 2000 | 22.28 | 25.58 | 14.42 | 20.86 | 1.07 | 0.57 | 31.03 | 21.89 | 1.23 |
| 2200 | 22.26 | 25.67 | 13.75 | 19.44 | 1.07 | 0.58 | 32.01 | 22.01 | 1.27 |
| 2400 | 22.25 | 25.75 | 13.18 | 18.33 | 1.07 | 0.59 | 30.07 | 21.66 | 1.29 |
| 2600 | 22.23 | 25.87 | 12.77 | 17.53 | 1.08 | 0.60 | 29.83 | 21.28 | 1.30 |
| 2800 | 22.22 | 25.92 | 12.44 | 16.96 | 1.08 | 0.60 | 31.20 | 21.29 | 1.40 |
| 3000 | 22.21 | 25.99 | 12.23 | 16.55 | 1.08 | 0.61 | 32.76 | 20.76 | 1.34 |
| 3200 | 22.22 | 26.09 | 12.11 | 16.34 | 1.09 | 0.62 | 29.31 | 20.65 | 1.37 |
| 3400 | 22.22 | 26.15 | 12.08 | 16.23 | 1.09 | 0.63 | 30.23 | 20.62 | 1.39 |
| 3600 | 22.22 | 26.22 | 12.13 | 16.24 | 1.09 | 0.64 | 28.89 | 20.60 | 1.42 |
| 3800 | 22.24 | 26.27 | 12.21 | 16.37 | 1.09 | 0.64 | 29.57 | 21.13 | 1.45 |
| 4000 | 22.26 | 26.36 | 12.39 | 16.63 | 1.10 | 0.65 | 29.45 | 20.92 | 1.49 |
| 4200 | 22.27 | 26.46 | 12.59 | 17.01 | 1.11 | 0.66 | 29.37 | 20.92 | 1.53 |
| 4400 | 22.28 | 26.47 | 12.83 | 17.41 | 1.11 | 0.67 | 28.08 | 20.86 | 1.47 |
| 4600 | 22.31 | 26.51 | 13.02 | 17.87 | 1.11 | 0.68 | 29.08 | 20.69 | 1.53 |
| 4800 | 22.34 | 26.61 | 13.20 | 18.37 | 1.12 | 0.69 | 29.90 | 20.96 | 1.52 |
| 5000 | 22.37 | 26.69 | 13.36 | 18.83 | 1.12 | 0.69 | 30.19 | 20.90 | 1.59 |
| 5200 | 22.40 | 26.74 | 13.53 | 19.34 | 1.13 | 0.70 | 30.06 | 20.96 | 1.54 |
| 5400 | 22.43 | 26.80 | 13.74 | 19.76 | 1.13 | 0.70 | 30.65 | 20.79 | 1.57 |
| 5600 | 22.47 | 26.91 | 14.01 | 20.24 | 1.14 | 0.71 | 28.92 | 20.65 | 1.65 |
| 5800 | 22.51 | 27.00 | 14.36 | 20.75 | 1.15 | 0.72 | 30.82 | 20.75 | 1.68 |
| 6000 | 22.54 | 27.09 | 14.78 | 21.34 | 1.16 | 0.73 | 28.84 | 20.80 | 1.61 |
| 6200 | 22.58 | 27.14 | 15.39 | 21.67 | 1.16 | 0.73 | 29.36 | 20.76 | 1.54 |
| 6400 | 22.59 | 27.25 | 16.00 | 21.93 | 1.18 | 0.74 | 29.95 | 20.81 | 1.56 |
| 6600 | 22.60 | 27.41 | 16.79 | 21.98 | 1.20 | 0.75 | 30.19 | 20.91 | 1.57 |
| 6800 | 22.61 | 27.49 | 17.80 | 21.61 | 1.21 | 0.75 | 28.92 | 20.86 | 1.61 |
| 7000 | 22.63 | 27.65 | 18.91 | 21.20 | 1.23 | 0.76 | 29.54 | 20.82 | 1.65 |
| 7200 | 22.61 | 27.78 | 19.85 | 20.80 | 1.25 | 0.77 | 28.27 | 20.84 | 1.67 |
| 7400 | 22.58 | 27.98 | 20.66 | 20.63 | 1.29 | 0.78 | 29.64 | 20.74 | 1.63 |
| 7600 | 22.55 | 28.16 | 20.89 | 20.54 | 1.32 | 0.80 | 28.69 | 20.50 | 1.73 |
| 7800 | 22.57 | 28.36 | 20.66 | 20.47 | 1.35 | 0.81 | 29.31 | 20.47 | 1.75 |
| 8000 | 22.59 | 28.45 | 20.16 | 20.36 | 1.37 | 0.82 | 28.60 | 20.21 | 1.75 |
| 8200 | 22.52 | 28.74 | 19.47 | 20.12 | 1.42 | 0.83 | 28.13 | 19.84 | 1.69 |
| 8400 | 22.54 | 28.89 | 18.06 | 20.55 | 1.45 | 0.85 | 28.41 | 19.64 | 1.76 |
| 8600 | 22.56 | 29.01 | 16.67 | 20.86 | 1.47 | 0.86 | 28.34 | 19.23 | 1.65 |
| 8800 | 22.46 | 29.26 | 15.66 | 20.89 | 1.52 | 0.88 | 28.53 | 19.14 | 1.74 |
| 9000 | 22.31 | 29.57 | 14.89 | 21.13 | 1.58 | 0.90 | 28.52 | 19.12 | 1.80 |
| 9200 | 22.13 | 29.84 | 14.18 | 21.30 | 1.65 | 0.91 | 26.87 | 18.36 | 1.96 |
| 9400 | 21.92 | 30.07 | 13.34 | 21.17 | 1.71 | 0.93 | 27.33 | 17.95 | 2.10 |
| 9600 | 21.64 | 30.46 | 12.51 | 20.27 | 1.80 | 0.95 | 27.04 | 17.70 | 2.21 |
| 9800 | 21.30 | 30.82 | 11.71 | 18.56 | 1.90 | 0.97 | 27.46 | 17.00 | 2.38 |
| 10000 | 20.89 | 31.21 | 10.84 | 16.70 | 2.01 | 0.99 | 26.75 | 17.01 | 2.47 |

## Typical Performance Curves

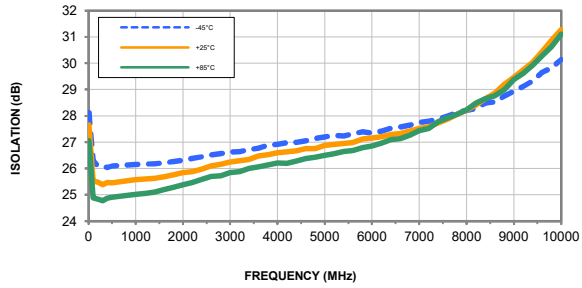
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, VDD = +6V



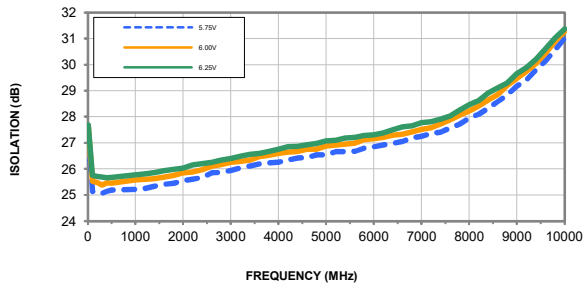

GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



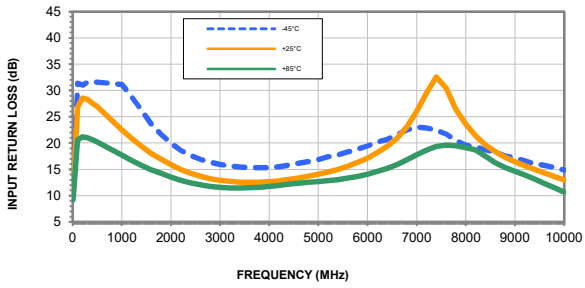

ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, VDD = +6V



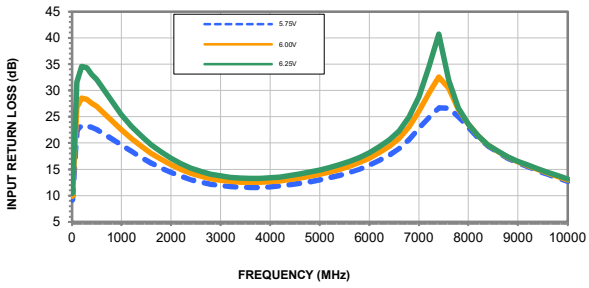

ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



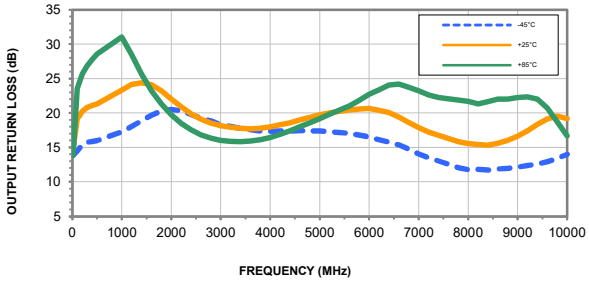

INPUT RETURN LOSS vs. FREQ. & TEMP.
INPUT POWER = -25.00dBm, VDD = +6V



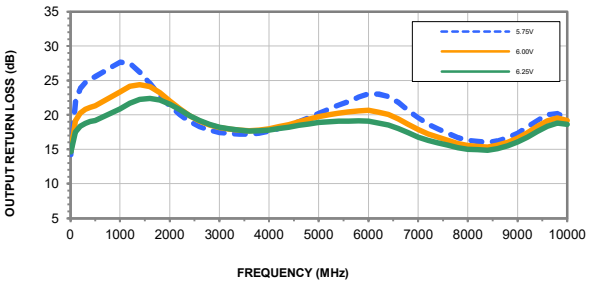

INPUT RETURN LOSS vs. FREQ. & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C




OUTPUT RETURN LOSS vs. FREQ. & TEMP.
INPUT POWER = -25.00dBm, VDD = +6V

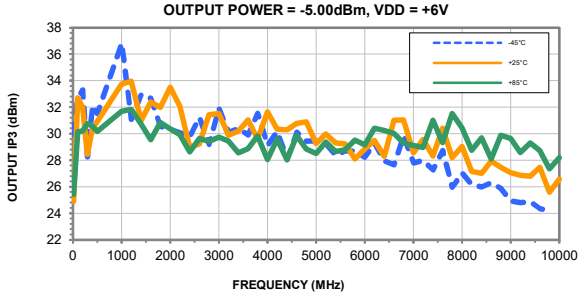



OUTPUT RETURN LOSS vs. FREQ. & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

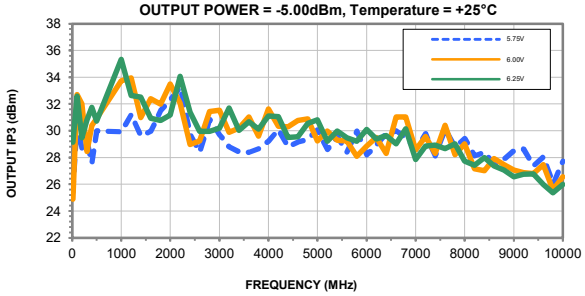


## *Typical Performance Curves*

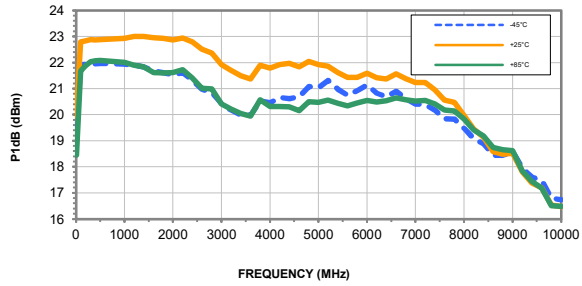
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTPUT POWER = -5.00dBm, VDD = +6V



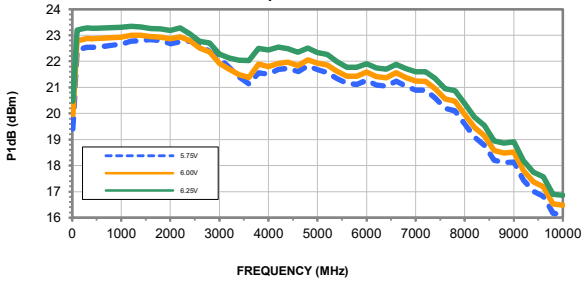

OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTPUT POWER = -5.00dBm, Temperature = +25°C



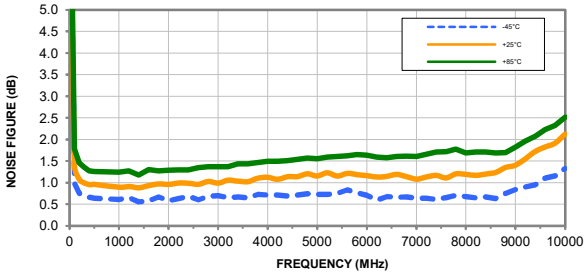

P1dB vs. FREQUENCY & TEMPERATURE
VDD = +6V




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

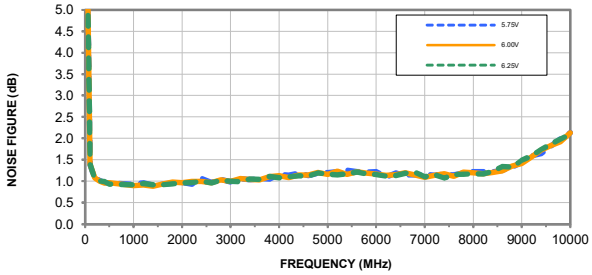



NOISE FIGURE vs. FREQUENCY & TEMPERATURE
VDD = +6V



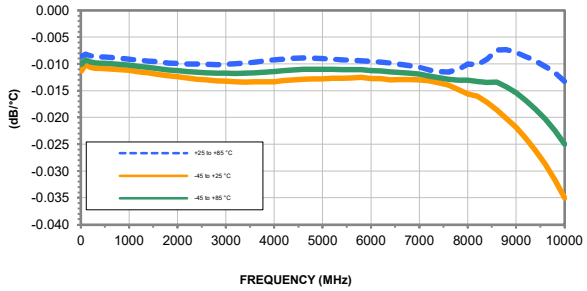

*Typical Noise Figure 1.8dB at 50MHz

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




*Typical Noise Figure 1.8dB at 50MHz

GAIN VARIATION VS FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, VDD = +6V



Mini-Circuits

# Environmental Specifications ENV80

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

| Specification | Test/Inspection Condition | Reference/Spec |
|---|---|---|
| Operating Temperature | -40° to 85° C or -40° to 105° C or -55° to 105° C or -45° to 105° C<br>Ambient Environment | Refer to Individual Model Data Sheet |
| Storage Environment (Die) | -65° to 150°C | Individual Model Data Sheet |
| Storage Environment(Packaging) | -40° to 70°C and 40 to 60% humidity (In Factory Shipped Package) | |