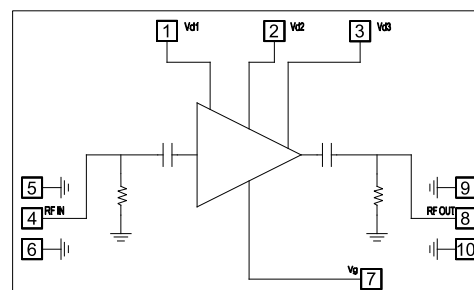


**THE BIG DEAL**

- High P1dB, Typ. +23.8 dBm
- High OIP3, Typ. +36 dBm
- Supply Voltage, +6 V at 160 mA

**APPLICATIONS**

- Test and Measurement Equipment
- Satellite Communications
- Radar, EW, and ECM Defense Systems
- 5G mmWave, MIMO Wireless Infrastructure Systems
- Microwave Radio & VSAT

**FUNCTIONAL DIAGRAM**

SEE ORDERING INFORMATION ON THE LAST PAGE

**PRODUCT OVERVIEW**

The AVA-17303-D+ is a GaAs MMIC Medium Power Amplifier operating from 17 to 31.5 GHz. This amplifier provides typical 19.2 dB of gain, +23.8 dBm P1dB, and +36 dBm OIP3 while operating from a +6 V power supply at 160 mA. The device is matched to 50 $\Omega$  and comes as a die suitable for chip and wire assemblies. These characteristics make it ideally suited as a driver amplifier in point-to-point radios and communications systems requiring high output power while maintaining low distortion characteristics.

**KEY FEATURES**

| Features                                             | Advantages                                                                                                                                                                       |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Gain, Typ. 19.2 dB<br>High P1dB, Typ. +23.8 dBm | High gain and output power make this device excellent for wideband systems from 17 to 31.5 GHz that require at least 0.2 W of operating output power over the full band.         |
| High OIP3, Typ. +36 dBm                              | High operating OIP3 provides very low in-band distortion products, enabling minimal signal degradation in high fidelity measurement systems and demanding communication systems. |
| Unpackaged Die                                       | Enables integration into hybrid chip and wire assemblies.                                                                                                                        |



MMIC DIE

## Medium Power Amplifier

AVA-17303-D+

Mini-Circuits

50Ω 17 to 31.5 GHz High Linearity Driver

ELECTRICAL SPECIFICATIONS<sup>1</sup> AT +25°C,  $V_{DD} = +6$  V, AND  $Z_0 = 50\Omega$ , UNLESS NOTED OTHERWISE

| Parameter                                                         | Condition (GHz) | Min. | Typ.  | Max. | Units                 |
|-------------------------------------------------------------------|-----------------|------|-------|------|-----------------------|
| Frequency Range                                                   |                 | 17   |       | 31.5 | GHz                   |
| Gain                                                              | 17              |      | 19.7  |      | dB                    |
|                                                                   | 20              |      | 19.1  |      |                       |
|                                                                   | 24              |      | 19.2  |      |                       |
|                                                                   | 27              |      | 21.7  |      |                       |
|                                                                   | 30              |      | 22.8  |      |                       |
|                                                                   | 31.5            |      | 18.7  |      |                       |
| Input Return Loss                                                 | 17              |      | 8     |      | dB                    |
|                                                                   | 20              |      | 12    |      |                       |
|                                                                   | 24              |      | 9     |      |                       |
|                                                                   | 27              |      | 10    |      |                       |
|                                                                   | 30              |      | 13    |      |                       |
|                                                                   | 31.5            |      | 12    |      |                       |
| Output Return Loss                                                | 17              |      | 14    |      | dB                    |
|                                                                   | 20              |      | 11    |      |                       |
|                                                                   | 24              |      | 13    |      |                       |
|                                                                   | 27              |      | 11    |      |                       |
|                                                                   | 30              |      | 22    |      |                       |
|                                                                   | 31.5            |      | 24    |      |                       |
| Isolation                                                         | 17 - 31.5       |      | 54    |      | dB                    |
| Output Power at 1 dB Compression ( $P_{1dB}$ )                    | 17              |      | +23.6 |      | dBm                   |
|                                                                   | 20              |      | +23.2 |      |                       |
|                                                                   | 24              |      | +23.8 |      |                       |
|                                                                   | 27              |      | +25.0 |      |                       |
|                                                                   | 30              |      | +23.3 |      |                       |
|                                                                   | 31.5            |      | +21.2 |      |                       |
| Output Power at Saturation ( $P_{SAT}$ ) <sup>2</sup>             | 17              |      | +25.3 |      | dBm                   |
|                                                                   | 20              |      | +24.5 |      |                       |
|                                                                   | 24              |      | +24.5 |      |                       |
|                                                                   | 27              |      | +25.2 |      |                       |
|                                                                   | 30              |      | +23.6 |      |                       |
|                                                                   | 31.5            |      | +21.4 |      |                       |
| Output Third-Order Intercept (OIP3)<br>( $P_{OUT} = +6$ dBm/Tone) | 17              |      | +32   |      | dBm                   |
|                                                                   | 20              |      | +33   |      |                       |
|                                                                   | 24              |      | +36   |      |                       |
|                                                                   | 27              |      | +38   |      |                       |
|                                                                   | 30              |      | +39   |      |                       |
|                                                                   | 31.5            |      | +34   |      |                       |
| Noise Figure                                                      | 17              |      | 6.5   |      | dB                    |
|                                                                   | 20              |      | 4.8   |      |                       |
|                                                                   | 24              |      | 3.6   |      |                       |
|                                                                   | 27              |      | 3.0   |      |                       |
|                                                                   | 30              |      | 3.5   |      |                       |
|                                                                   | 31.5            |      | 3.8   |      |                       |
| Device Operating Voltage ( $V_{DD}$ ) <sup>3</sup>                |                 | +5   | +6    | +7   | V                     |
| Device Operating Current ( $I_{DD}$ ) <sup>4</sup>                |                 |      | 160   |      | mA                    |
| Gate Voltage ( $V_G$ )                                            |                 |      | -0.59 |      | V                     |
| Gate Current ( $I_G$ ) <sup>5</sup>                               |                 |      | 57    |      | $\mu$ A               |
| Device Current Variation vs. Temperature <sup>6</sup>             |                 |      | -3.6  |      | $\mu$ A/ $^{\circ}$ C |

1. Tested in Mini-Circuits Die Characterization Test Board. See Figure 2. Trace and connector losses are de-embedded. Specifications include the effect of bond wires.

2. Defined as output power at which change is 0.1 per 1 dB change in input power.

3.  $V_{DD} = V_{d1} = V_{d2} = V_{d3}$ 4. Current at  $P_{IN} = -25$  dBm. Increases to 250 mA at P1dB.  $I_{DD} = I_{d1} + I_{d2} + I_{d3}$ .5. Current at  $P_{IN} = -25$  dBm. Increases to 300  $\mu$ A at P1dB.6. (Current at +85°C - Current at -55°C)/(140°C).  $V_G$  held constant over temperature.



MMIC DIE

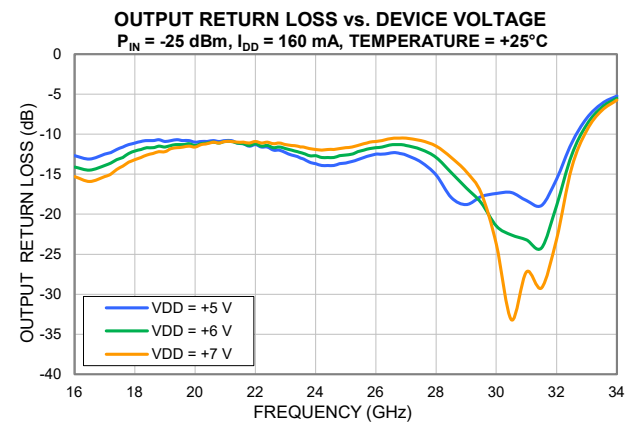
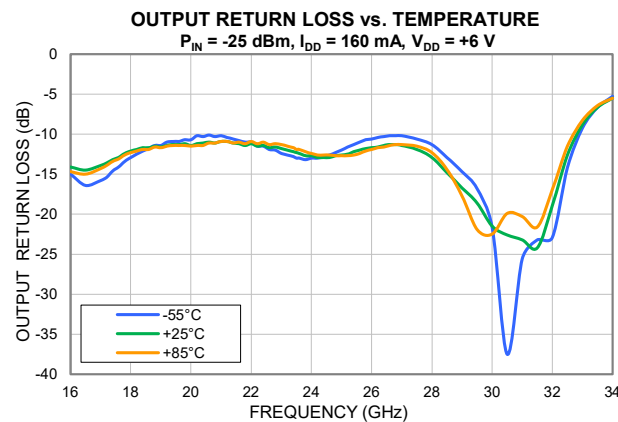
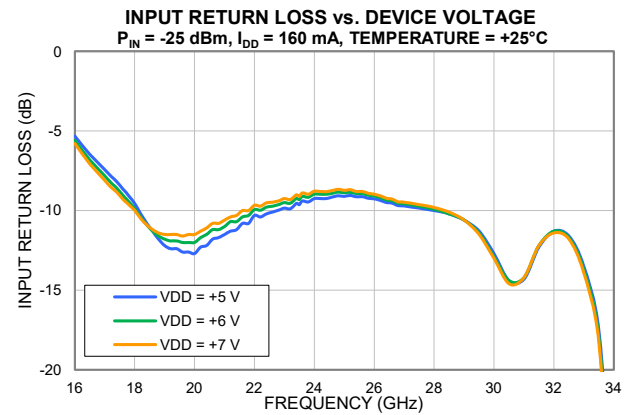
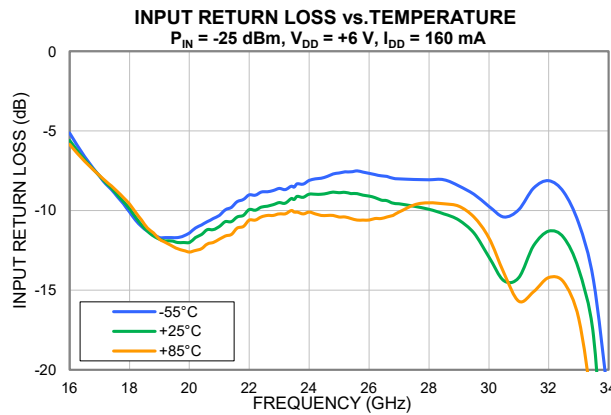
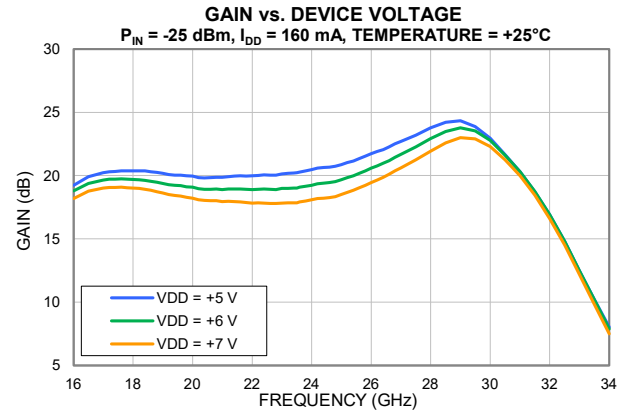
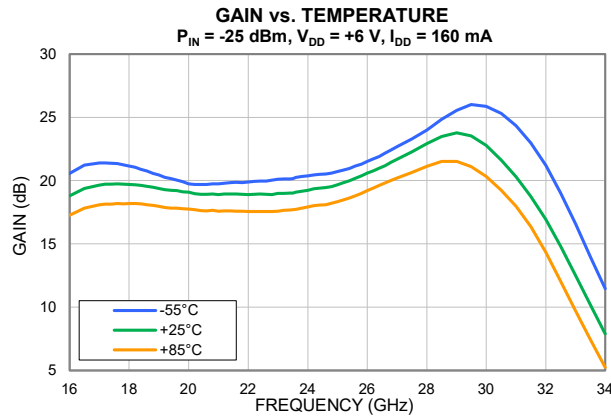
# Medium Power Amplifier

AVA-17303-D+

Mini-Circuits

50Ω 17 to 31.5 GHz High Linearity Driver

## TYPICAL PERFORMANCE GRAPHS





MMIC DIE

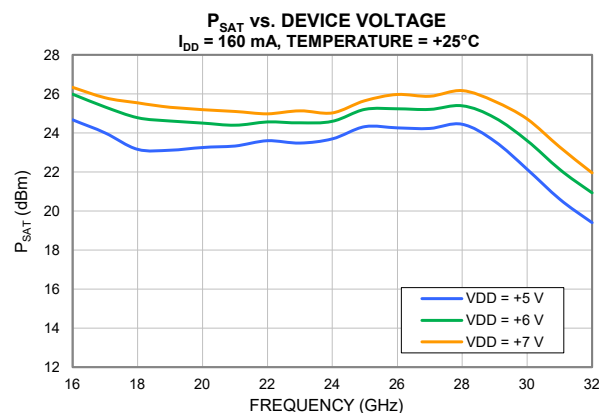
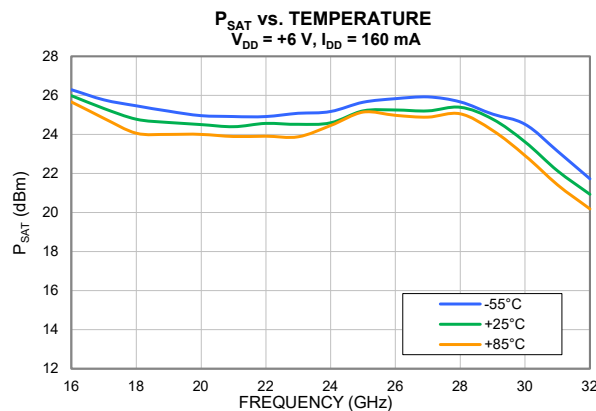
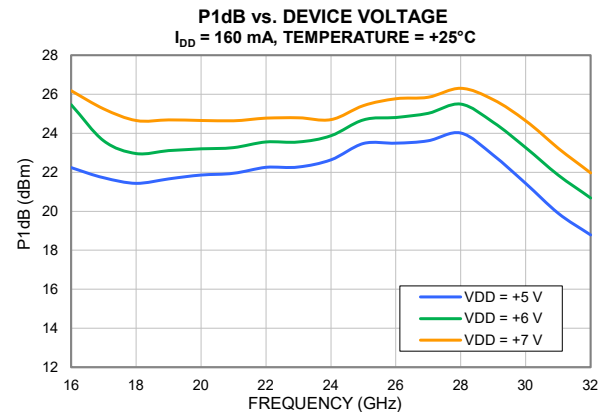
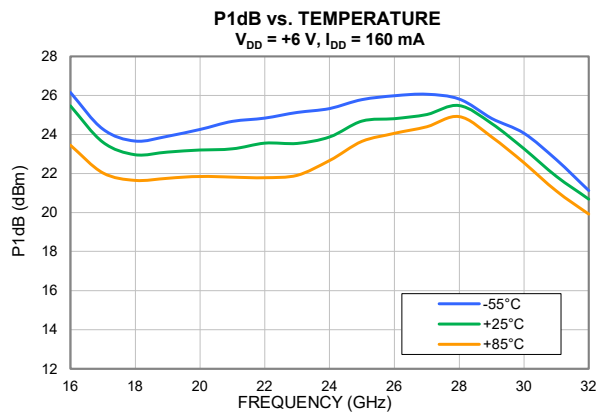
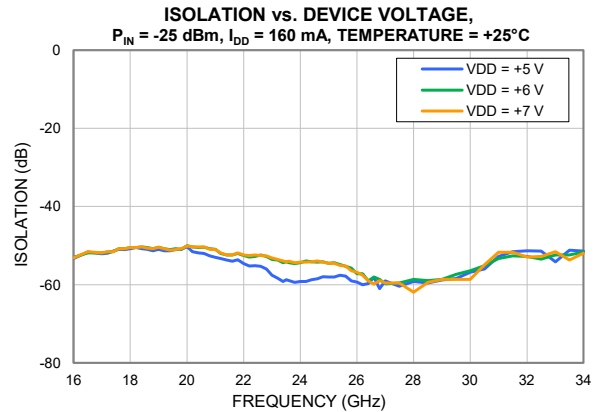
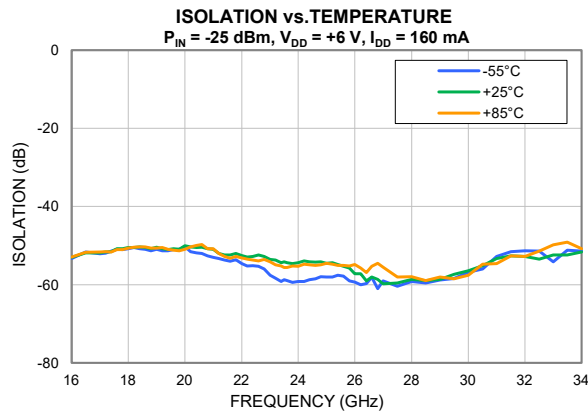
# Medium Power Amplifier

AVA-17303-D+

Mini-Circuits

50Ω 17 to 31.5 GHz High Linearity Driver

## TYPICAL PERFORMANCE GRAPHS





MMIC DIE

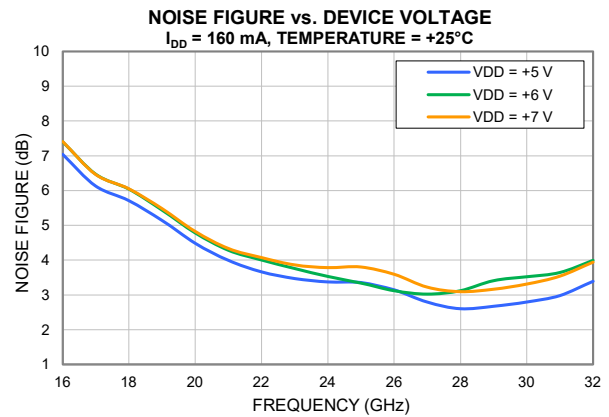
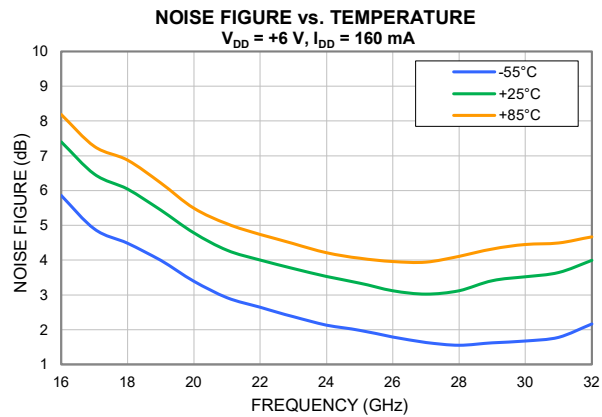
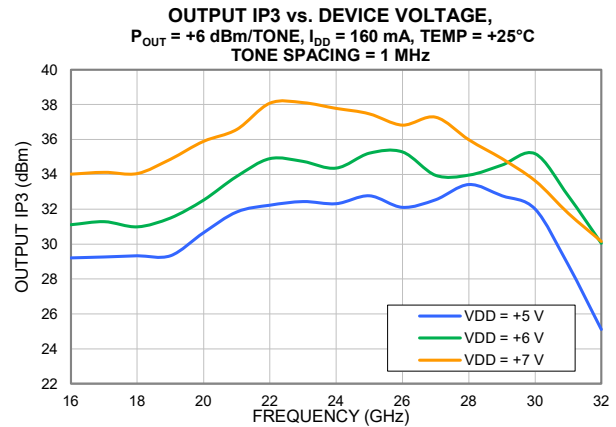
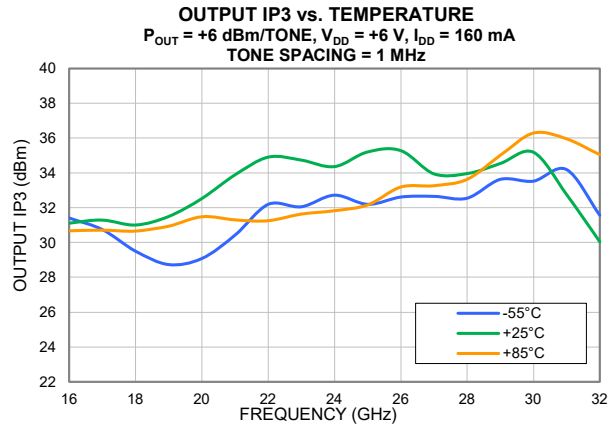
# Medium Power Amplifier

AVA-17303-D+

Mini-Circuits

50Ω 17 to 31.5 GHz High Linearity Driver

## TYPICAL PERFORMANCE GRAPHS





MMIC DIE

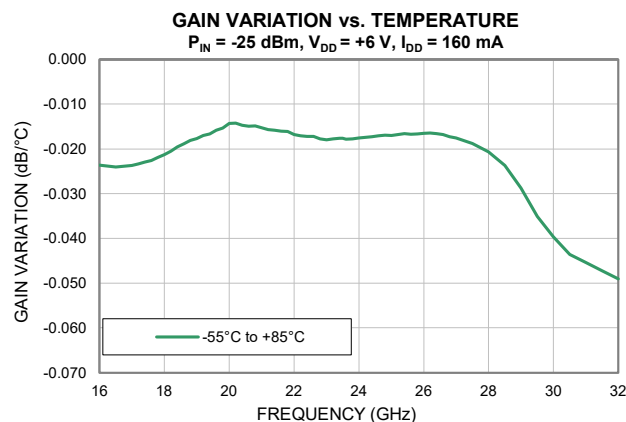
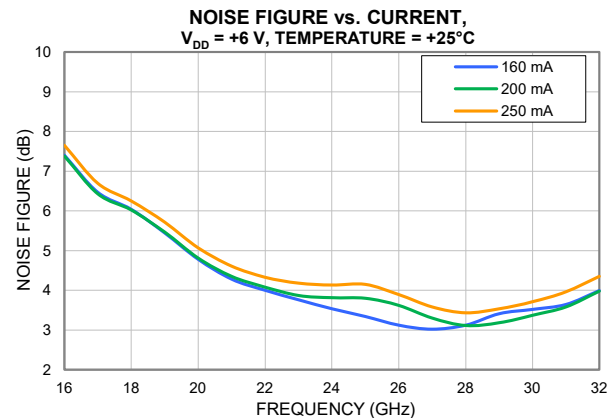
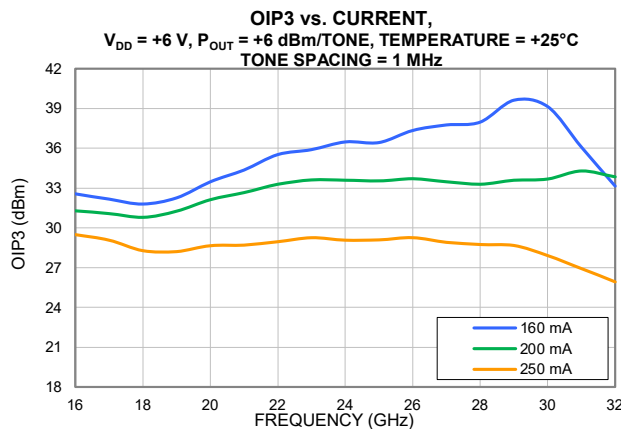
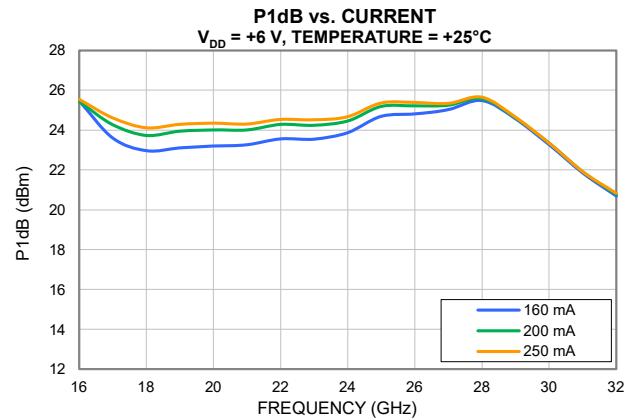
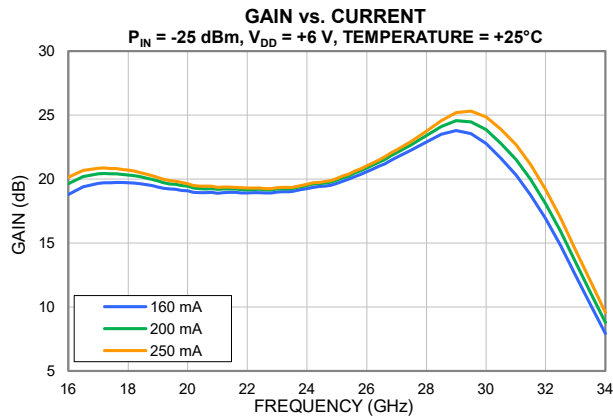
# Medium Power Amplifier

AVA-17303-D+

Mini-Circuits

50Ω 17 to 31.5 GHz High Linearity Driver

## TYPICAL PERFORMANCE GRAPHS



Mini-Circuits



MMIC DIE

# Medium Power Amplifier

**AVA-17303-D+**

50Ω 17 to 31.5 GHz High Linearity Driver

## ABSOLUTE MAXIMUM RATINGS<sup>7</sup>

| Parameter                                     | Ratings         |
|-----------------------------------------------|-----------------|
| Operating Temperature <sup>8</sup>            | -55°C to +85°C  |
| Storage Temperature <sup>9</sup>              | -65°C to +150°C |
| Junction Temperature <sup>10</sup>            | +175°C          |
| Total Power Dissipation                       | 1.8 W           |
| Input Power (CW), $V_{DD} = +6$ V             | +25 dBm         |
| DC Voltage on RF-OUT & $V_{DD}$ <sup>11</sup> | +9 V            |
| DC Drain Current $I_{DD}$ <sup>12</sup>       | 500 mA          |
| DC Voltage at RF-IN                           | +9 V            |
| DC Voltage at RF-OUT                          | +9 V            |
| DC Gate Voltage $V_g$                         | -6 V to +1 V    |
| DC Gate Current $I_g$                         | 8 mA            |

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

8. Bottom of Die.

9. For die shipped in Gel-Pak see ENV80 (limited by packaging).

10. Peak temperature on Top of Die.

11.  $V_{DD} = V_{d1} = V_{d2} = V_{d3}$ .

12.  $I_{DD} = I_{d1} + I_{d2} + I_{d3}$ .

## THERMAL RESISTANCE

| Parameter                                          | Ratings  |
|----------------------------------------------------|----------|
| Thermal Resistance ( $\Theta_{JC}$ ) <sup>13</sup> | 46.9°C/W |

13.  $\Theta_{JC} = (\text{Hot Spot Temperature on Die} - \text{Temperature at Ground Lead}) / \text{Dissipated Power}$

## ESD RATING<sup>14</sup>

|     | Class | Voltage Range    | Reference Standard          |
|-----|-------|------------------|-----------------------------|
| HBM | 1A    | 250 V to < 500 V | ANSI/ESDA/JEDEC JS-001-2023 |
| CDM | C2A   | 500 V to < 750 V | ANSI/ESDA/JEDEC JS-002-2022 |



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.

14. Tested in 4x4mm 20-lead QFN-Style Package



MMIC DIE

# Medium Power Amplifier

**AVA-17303-D+**

Mini-Circuits

50Ω 17 to 31.5 GHz High Linearity Driver

## FUNCTIONAL DIAGRAM

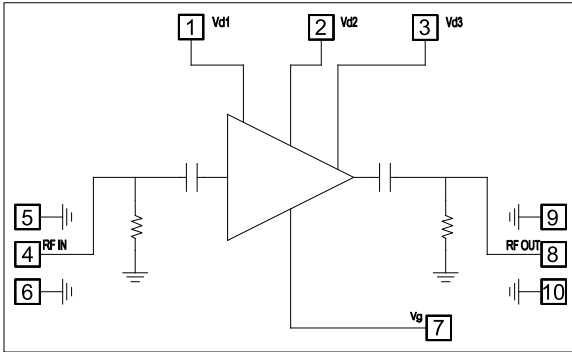


Figure 1. AVA-17303-D+ Functional Diagram

## PAD DESCRIPTION

| Function | Pad Number                 | Description (Refer to Fig 1)                                               |
|----------|----------------------------|----------------------------------------------------------------------------|
| RF IN    | 4                          | RF Input Port                                                              |
| RF OUT   | 8                          | RF Output Port                                                             |
| $V_{d1}$ | 1                          | Drain Voltage Input Port 1                                                 |
| $V_{d2}$ | 2                          | Drain Voltage Input Port 2                                                 |
| $V_{d3}$ | 3                          | Drain Voltage Input Port 3                                                 |
| $V_g$    | 7                          | Gate Voltage Input                                                         |
| GND      | 5, 6, 9, 10, Bottom of Die | Connected to die backside through vias. Bond wires to ground are optional. |

## DIE OUTLINE: inches [mm], Typical

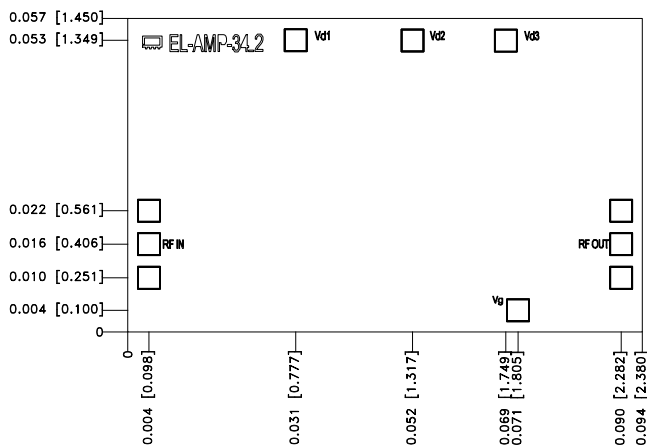


Figure 2. AVA-17303-D+ Die Outline

## DIMENSIONS: inches [mm], Typical

|                                |                               |
|--------------------------------|-------------------------------|
| Die Size                       | 0.094 x 0.057 [2.38 x 1.45]   |
| Die Thickness                  | 0.0040 [0.100]                |
| Bond Pad Sizes:                | 0.004 x 0.004 [0.100 x 0.100] |
| Plating (Pads & Bottom of Die) | Gold                          |

Mini-Circuits





MMIC DIE

# Medium Power Amplifier

AVA-17303-D+

50Ω 17 to 31.5 GHz High Linearity Driver

## CHARACTERIZATION AND APPLICATION CIRCUIT

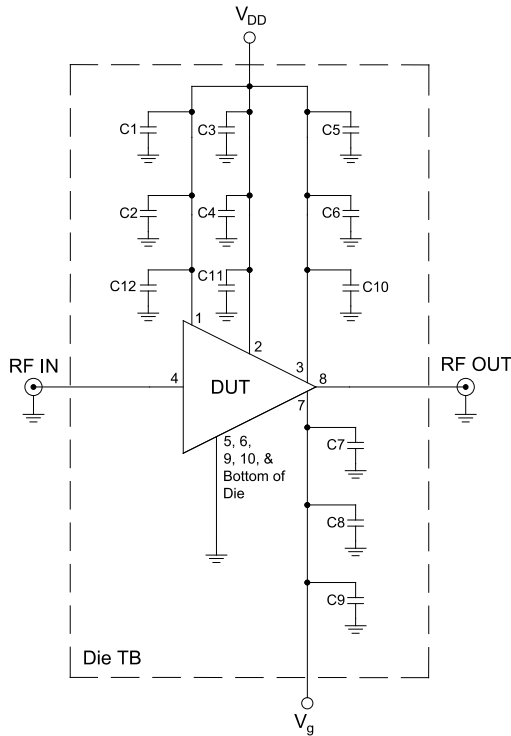


Figure 3. AVA-17303-D+ Evaluation and Application Circuit

### Electrical Parameters and Conditions

Gain, Return Loss, Output Power at 1 dB Compression (P1dB), Output IP3 (OIP3), and Noise Figure measured using N5245B PNA-X Microwave Network Analyzer.

#### Conditions:

1. Gain and Return Loss:  $P_{IN} = -25$  dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, +6 dBm/Tone at output.

#### Power ON/Power OFF Sequence

Caution: Permanent damage to the device will occur if the Power ON and Power OFF sequences are not followed.

#### POWER ON:

1. Set  $V_g = -1.2$  V and Turn ON.
2. Set  $V_{DD} = +6$  V and Turn ON.
3. Increase  $V_g$  to desired nominal  $I_{DD} = 160$  mA.
4. Turn ON RF signal.

#### POWER OFF:

1. Turn OFF RF signal.
2. Decrease  $V_g$  to -1.2 V
3. Turn OFF  $V_{DD}$
4. Turn OFF  $V_g$

| Component      | Value       | Size          | Part Number        | Manufacturer    |
|----------------|-------------|---------------|--------------------|-----------------|
| C1, C3, C5, C9 | 10 $\mu$ F  | 1206          | CL31B106KBHNNNE    | SAMSUNG         |
| C2, C4, C6, C8 | 0.1 $\mu$ F | 0603          | 06035C104KAT2A     | AVX CORPORATION |
| C7             | 100 pF      | 0603          | GRM1885C1H101GA01D | MURATA          |
| C10, C11, C12  | 100 pF      | 0.22" x 0.22" | MA4M3100           | MACOM           |



## ASSEMBLY DIAGRAM

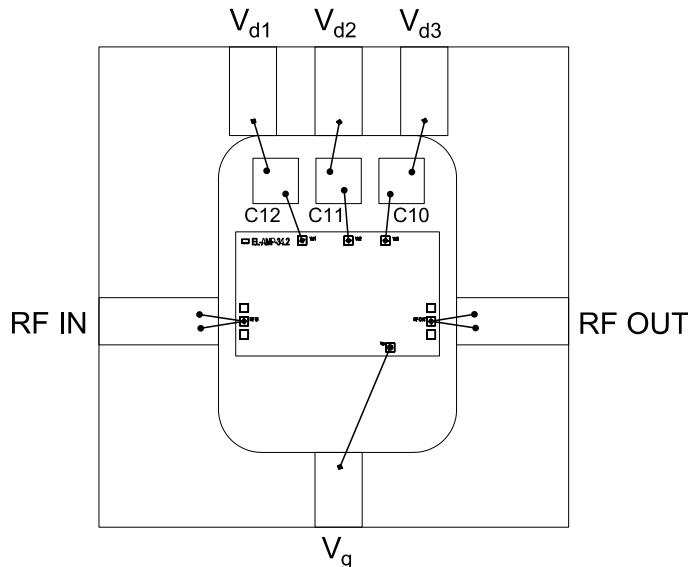


Figure 4. AVA-17303-D+ Assembly Diagram

- Refer to the table in Figure 3. for more details on the passive components
- Bond wire diameter: 1 mil
- Bond wire lengths from Die Pad to PCB at RF IN & RF OUT ports:  $18 \pm 2$  mils
- Bond wire lengths from Die Pad to C10, C11, & C12:  $28 \pm 2$  mils
- Bond wire lengths from C10, C11, & C12 to PCB at  $V_{d1}$ ,  $V_{d2}$ , and  $V_{d3}$  ports:  $24 \pm 2$  mils
- Bond wire lengths from Die Pad to PCB at  $V_g$  port:  $59 \pm 2$  mils
- Typical Gap from Die edge to PCB edge: 3 mils
- PCB thickness and material: 10 mil Rogers RO4350 (Thickness: 1 oz copper on each side)

## ASSEMBLY AND HANDLING PROCEDURE

1. Storage  
Die should be stored in a dry nitrogen purged desiccator or equivalent.
2.  ESD Precautions  
MMIC pHEMT amplifier die are susceptible to electrostatic and mechanical damage. Die are supplied in anti-static protected material, which should be opened only in clean room conditions at an appropriately grounded anti-static workstation.
3. Die Handling and Attachment  
Devices require careful handling using tools appropriate for manipulating semiconductor chips. It is recommended to handle the chips along the edges with a custom designed collet. The surface of the chip has exposed air bridges and should not be touched with a vacuum collet, tweezers or fingers. The die mounting surface must be clean and flat. Using conductive silver-filled epoxy, apply sufficient adhesive to meet the required bond line thickness, fillet height and coverage around the total periphery of the device. The recommended epoxy is Unimec H9890-6A or equivalent. Parts should be cured in a nitrogen-filled atmosphere per manufacturer's recommended cure profile.
4. Wire Bonding  
Openings in the surface passivation above the gold bond pads are provided to allow wire bonding to the die. Thermosonic bonding is recommended with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. The suggested interconnect is pure gold, 1 mil diameter wire. Bonds are recommended to be made from the bond pads on the die to the package or substrate. All bond wire length and bond wire height should be kept as short as possible, unless specified by design, to minimize performance degradation due to undesirable series inductance.



MMIC DIE

# Medium Power Amplifier

AVA-17303-D+

Mini-Circuits

50Ω 17 to 31.5 GHz High Linearity Driver

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD

[CLICK HERE](#)

|                                                                                          |                                              |               |
|------------------------------------------------------------------------------------------|----------------------------------------------|---------------|
| Performance Data & Graphs                                                                | Data                                         |               |
|                                                                                          | Graphs                                       |               |
|                                                                                          | S-Parameter (S2P Files) Data Set (.zip file) |               |
| Case Style                                                                               | Die                                          |               |
| RoHS Status                                                                              | Compliant                                    |               |
| Die Ordering and Packaging Information                                                   | Quantity, Package                            | Model No.     |
|                                                                                          | Gel - Pak: 5, 10, 50, 100 KGD*               | AVA-17303-DG+ |
|                                                                                          | Medium†, Partial wafer: KGD*<630             | AVA-17303-DP+ |
|                                                                                          | Full wafer†                                  | AVA-17303-DF+ |
| †Available upon request contact sales representative. Refer to <a href="#">AN-60-067</a> |                                              |               |
| Die Marking                                                                              | EL-AMP-34_2                                  |               |
| Environmental Ratings                                                                    | ENV80                                        |               |

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

## Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
- 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)
- Mini-Circuits does not warrant the accuracy or completeness of the information, text, graphics and other items contained within this document and same are provided as an accommodation and on an as is basis, with all faults.
- Purchasers of this part are solely responsible for proper storing, handling, assembly and processing of known good die (KGD) (including, without limitation, proper ESD preventative measures, die preparation, die attach, wire bonding and related assembly and test activities), and Mini-Circuits assumes no responsibility therefor or for environmental effects on KGD.
- Mini-Circuits and the Mini-Circuits logo are registered trademarks of Scientific Components Corporation d/b/a Mini-Circuits. All other third-party trademarks are the property of their respective owners. A reference to any third-party trademark does not constitute or imply any endorsement, affiliation, sponsorship, or recommendation by any such third-party of Mini-Circuits or its products.



## Typical Performance Data

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

Input Return Loss = S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = S12 (dB)

Output Return Loss = S22 (dB)

TEST CONDITIONS:  $V_{DD} = +5\text{ V}$ ,  $I_{DD} = 160\text{ mA}$  @ Temperature = +25°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | 1dB Comp. Output | Psat Output | IP-3 Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|------------------|-------------|-------------|--------------|
| (GHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)            | (dBm)       | (dBm)       | (dB)         |
| 16.0  | 19.25 | 53.20     | 5.32              | 12.70              | 16.71     | 1.22    | 22.24            | 24.67       | 29.22       | 7.04         |
| 16.5  | 19.92 | 51.70     | 6.46              | 13.10              | 14.47     | 1.16    | 22.00            | 24.54       | 29.41       | 6.47         |
| 17.0  | 20.23 | 51.90     | 7.43              | 12.50              | 14.86     | 1.11    | 21.72            | 24.01       | 29.27       | 6.13         |
| 17.2  | 20.30 | 51.60     | 7.83              | 12.30              | 14.51     | 1.09    | 21.60            | 23.74       | 29.00       | 6.02         |
| 17.4  | 20.33 | 51.30     | 8.18              | 11.90              | 14.14     | 1.07    | 21.52            | 23.54       | 29.19       | 5.95         |
| 17.6  | 20.38 | 50.70     | 8.64              | 11.60              | 13.32     | 1.05    | 21.48            | 23.38       | 28.82       | 5.87         |
| 17.8  | 20.37 | 50.80     | 9.06              | 11.30              | 13.64     | 1.03    | 21.42            | 23.21       | 28.85       | 5.80         |
| 18.0  | 20.38 | 50.20     | 9.57              | 11.10              | 12.87     | 1.02    | 21.44            | 23.16       | 29.33       | 5.71         |
| 18.2  | 20.39 | 50.30     | 10.20             | 10.90              | 13.11     | 1.00    | 21.44            | 23.09       | 29.09       | 5.59         |
| 18.4  | 20.37 | 50.20     | 10.80             | 10.80              | 13.09     | 0.99    | 21.46            | 23.05       | 29.13       | 5.50         |
| 18.6  | 20.31 | 50.20     | 11.30             | 10.80              | 13.35     | 0.98    | 21.54            | 23.09       | 29.15       | 5.40         |
| 18.8  | 20.26 | 50.30     | 11.80             | 10.70              | 13.56     | 0.97    | 21.57            | 23.06       | 28.94       | 5.29         |
| 19.0  | 20.19 | 50.20     | 12.20             | 10.90              | 13.63     | 0.97    | 21.66            | 23.12       | 29.34       | 5.14         |
| 19.2  | 20.09 | 50.40     | 12.40             | 10.80              | 14.18     | 0.97    | 21.74            | 23.18       | 29.52       | 5.00         |
| 19.4  | 20.04 | 51.00     | 12.40             | 10.70              | 15.17     | 0.97    | 21.77            | 23.18       | 29.71       | 4.87         |
| 19.6  | 20.04 | 50.80     | 12.60             | 10.80              | 14.92     | 0.97    | 21.85            | 23.26       | 29.99       | 4.73         |
| 19.8  | 19.98 | 50.80     | 12.60             | 10.80              | 15.04     | 0.97    | 21.85            | 23.26       | 29.97       | 4.60         |
| 20.0  | 19.96 | 50.10     | 12.70             | 11.00              | 14.00     | 0.97    | 21.86            | 23.26       | 30.66       | 4.48         |
| 20.2  | 19.84 | 50.10     | 12.30             | 10.90              | 14.12     | 0.98    | 21.90            | 23.31       | 30.98       | 4.37         |
| 20.4  | 19.82 | 50.20     | 12.20             | 10.90              | 14.23     | 0.98    | 21.87            | 23.27       | 31.06       | 4.24         |
| 20.6  | 19.84 | 50.50     | 11.80             | 10.80              | 14.55     | 0.98    | 21.89            | 23.30       | 31.49       | 4.14         |
| 20.8  | 19.89 | 51.20     | 11.70             | 10.90              | 15.64     | 0.98    | 21.93            | 23.34       | 31.69       | 4.05         |
| 21.0  | 19.85 | 50.90     | 11.50             | 10.80              | 15.21     | 0.99    | 21.95            | 23.34       | 31.84       | 3.99         |
| 21.2  | 19.91 | 52.20     | 11.30             | 10.80              | 17.38     | 0.99    | 22.04            | 23.42       | 32.35       | 3.93         |
| 21.4  | 19.95 | 52.50     | 11.20             | 11.10              | 18.00     | 1.00    | 22.11            | 23.48       | 32.22       | 3.86         |
| 21.6  | 19.98 | 52.50     | 10.80             | 11.20              | 17.85     | 1.00    | 22.15            | 23.52       | 32.08       | 3.80         |
| 21.8  | 19.97 | 52.20     | 10.80             | 11.50              | 17.35     | 1.01    | 22.25            | 23.61       | 32.50       | 3.72         |
| 22.0  | 19.97 | 52.50     | 10.30             | 11.30              | 17.70     | 1.01    | 22.25            | 23.60       | 32.24       | 3.66         |
| 22.2  | 20.02 | 52.80     | 10.40             | 11.60              | 18.49     | 1.02    | 22.28            | 23.61       | 32.13       | 3.63         |
| 22.4  | 20.06 | 52.60     | 10.20             | 11.60              | 17.89     | 1.02    | 22.32            | 23.63       | 32.57       | 3.59         |
| 22.6  | 20.05 | 52.80     | 10.10             | 12.00              | 18.26     | 1.03    | 22.25            | 23.53       | 32.67       | 3.54         |
| 22.8  | 20.05 | 52.70     | 9.98              | 12.00              | 18.02     | 1.03    | 22.29            | 23.53       | 32.90       | 3.51         |
| 23.0  | 20.13 | 53.70     | 9.85              | 12.30              | 20.16     | 1.04    | 22.26            | 23.49       | 32.44       | 3.47         |
| 23.2  | 20.19 | 53.80     | 9.89              | 12.60              | 20.39     | 1.04    | 22.22            | 23.42       | 32.59       | 3.42         |
| 23.4  | 20.21 | 54.40     | 9.56              | 12.80              | 21.69     | 1.05    | 22.28            | 23.46       | 32.65       | 3.40         |
| 23.5  | 20.22 | 54.50     | 9.62              | 13.00              | 22.01     | 1.05    | 22.29            | 23.44       | 32.62       | 3.37         |
| 23.6  | 20.29 | 54.60     | 9.39              | 13.10              | 22.00     | 1.06    | 22.38            | 23.51       | 32.57       | 3.36         |
| 23.8  | 20.38 | 54.60     | 9.46              | 13.50              | 21.91     | 1.06    | 22.52            | 23.62       | 32.30       | 3.37         |
| 24.0  | 20.47 | 54.60     | 9.24              | 13.70              | 21.54     | 1.07    | 22.63            | 23.70       | 32.32       | 3.37         |
| 24.2  | 20.58 | 54.20     | 9.25              | 13.90              | 20.28     | 1.07    | 22.87            | 23.89       | 32.49       | 3.37         |
| 24.4  | 20.63 | 54.30     | 9.24              | 13.90              | 20.44     | 1.07    | 22.97            | 23.97       | 32.44       | 3.38         |
| 24.6  | 20.67 | 54.30     | 9.15              | 13.90              | 20.30     | 1.07    | 23.06            | 24.02       | 32.63       | 3.39         |
| 24.8  | 20.73 | 54.10     | 9.07              | 13.70              | 19.64     | 1.07    | 23.25            | 24.16       | 32.26       | 3.35         |
| 25.0  | 20.87 | 54.80     | 9.10              | 13.60              | 20.91     | 1.07    | 23.47            | 24.32       | 32.77       | 3.35         |
| 25.2  | 21.03 | 54.50     | 9.05              | 13.40              | 19.85     | 1.07    | 23.57            | 24.38       | 32.12       | 3.34         |
| 25.4  | 21.16 | 55.20     | 9.13              | 13.20              | 21.16     | 1.07    | 23.61            | 24.40       | 32.49       | 3.31         |
| 25.6  | 21.36 | 54.90     | 9.12              | 12.90              | 19.96     | 1.06    | 23.65            | 24.41       | 31.43       | 3.28         |
| 25.8  | 21.52 | 55.90     | 9.22              | 12.70              | 21.87     | 1.06    | 23.54            | 24.32       | 32.20       | 3.21         |
| 26.0  | 21.72 | 57.00     | 9.26              | 12.50              | 24.29     | 1.05    | 23.49            | 24.26       | 32.11       | 3.14         |
| 26.2  | 21.90 | 57.30     | 9.36              | 12.50              | 24.73     | 1.05    | 23.48            | 24.24       | 31.90       | 3.06         |
| 26.4  | 22.07 | 59.10     | 9.49              | 12.40              | 29.94     | 1.05    | 23.40            | 24.16       | 32.53       | 2.98         |
| 26.6  | 22.27 | 57.80     | 9.53              | 12.30              | 25.04     | 1.04    | 23.49            | 24.20       | 31.42       | 2.90         |
| 26.8  | 22.51 | 59.10     | 9.69              | 12.40              | 28.58     | 1.04    | 23.57            | 24.23       | 32.64       | 2.81         |
| 27.0  | 22.71 | 57.60     | 9.71              | 12.60              | 23.59     | 1.04    | 23.61            | 24.24       | 32.55       | 2.79         |
| 27.5  | 23.21 | 60.30     | 9.85              | 13.50              | 30.50     | 1.05    | 23.93            | 24.40       | 32.30       | 2.68         |
| 28.0  | 23.76 | 60.70     | 10.00             | 15.10              | 30.70     | 1.07    | 24.02            | 24.45       | 33.42       | 2.60         |
| 28.5  | 24.22 | 58.50     | 10.20             | 17.90              | 22.97     | 1.08    | 23.62            | 24.21       | 32.66       | 2.62         |
| 29.0  | 24.34 | 57.60     | 10.60             | 18.80              | 20.64     | 1.07    | 22.88            | 23.58       | 32.77       | 2.67         |
| 29.5  | 23.88 | 59.20     | 11.30             | 17.80              | 26.45     | 1.06    | 22.13            | 22.86       | 32.44       | 2.67         |
| 30.0  | 22.96 | 57.20     | 12.70             | 17.40              | 24.12     | 1.03    | 21.43            | 22.15       | 32.00       | 2.79         |
| 30.5  | 21.67 | 55.60     | 14.40             | 17.30              | 23.46     | 1.02    | 20.67            | 21.39       | 31.08       | 2.87         |
| 31.0  | 20.30 | 54.70     | 14.30             | 18.30              | 24.89     | 1.02    | 19.90            | 20.62       | 28.79       | 2.98         |
| 31.5  | 18.74 | 52.90     | 12.30             | 18.90              | 23.78     | 1.04    | 19.22            | 19.89       | 27.03       | 3.15         |
| 32.0  | 16.92 | 53.70     | 11.30             | 15.60              | 31.12     | 1.04    | 18.79            | 19.40       | 25.12       | 3.39         |
| 32.5  | 14.81 | 52.90     | 11.60             | 11.10              | 34.69     | 0.99    |                  |             |             |              |
| 33.0  | 12.50 | 51.80     | 13.50             | 8.01               | 37.26     | 0.88    |                  |             |             |              |
| 33.5  | 10.22 | 52.00     | 17.50             | 6.17               | 45.79     | 0.77    |                  |             |             |              |
| 34.0  | 8.04  | 51.00     | 29.40             | 5.22               | 49.16     | 0.70    |                  |             |             |              |

## Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions

## Definitions:

Input Return Loss = S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = S12 (dB)

Output Return Loss = S22 (dB)

TEST CONDITIONS: V<sub>DD</sub> = +6 V, I<sub>DD</sub> = 160 mA @ Temperature = +25°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | 1dB Comp. Output | Psat Output | IP-3 Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|------------------|-------------|-------------|--------------|
| (GHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)            | (dBm)       | (dBm)       | (dB)         |
| 16.0  | 18.79 | 53.00     | 5.59              | 14.10              | 17.95     | 1.22    | 25.46            | 25.99       | 31.11       | 7.40         |
| 16.5  | 19.40 | 51.80     | 6.81              | 14.50              | 15.94     | 1.16    | 24.51            | 25.56       | 32.00       | 6.83         |
| 17.0  | 19.66 | 51.80     | 7.82              | 13.90              | 16.28     | 1.11    | 23.61            | 25.33       | 31.29       | 6.47         |
| 17.2  | 19.71 | 51.60     | 8.24              | 13.60              | 16.01     | 1.10    | 23.35            | 25.23       | 31.25       | 6.38         |
| 17.4  | 19.71 | 51.50     | 8.58              | 13.20              | 16.02     | 1.08    | 23.18            | 25.14       | 31.05       | 6.28         |
| 17.6  | 19.74 | 50.70     | 9.04              | 12.90              | 14.79     | 1.06    | 23.08            | 25.01       | 30.98       | 6.20         |
| 17.8  | 19.71 | 50.80     | 9.43              | 12.40              | 15.00     | 1.05    | 22.98            | 24.85       | 31.12       | 6.13         |
| 18.0  | 19.70 | 50.50     | 9.89              | 12.10              | 14.64     | 1.03    | 22.96            | 24.78       | 31.00       | 6.04         |
| 18.2  | 19.68 | 50.50     | 10.40             | 11.90              | 14.89     | 1.02    | 22.95            | 24.69       | 31.41       | 5.94         |
| 18.4  | 19.63 | 50.30     | 10.90             | 11.70              | 14.70     | 1.01    | 22.95            | 24.63       | 31.29       | 5.83         |
| 18.6  | 19.56 | 50.50     | 11.30             | 11.70              | 15.25     | 1.00    | 23.02            | 24.65       | 31.34       | 5.71         |
| 18.8  | 19.48 | 50.70     | 11.60             | 11.50              | 15.72     | 0.99    | 23.04            | 24.60       | 31.21       | 5.56         |
| 19.0  | 19.39 | 50.40     | 11.80             | 11.60              | 15.35     | 0.99    | 23.11            | 24.62       | 31.50       | 5.44         |
| 19.2  | 19.28 | 50.70     | 11.90             | 11.40              | 16.12     | 0.99    | 23.17            | 24.63       | 31.38       | 5.32         |
| 19.4  | 19.22 | 51.00     | 11.90             | 11.30              | 16.74     | 0.99    | 23.17            | 24.59       | 31.91       | 5.16         |
| 19.6  | 19.20 | 50.80     | 12.00             | 11.30              | 16.41     | 0.99    | 23.22            | 24.61       | 31.96       | 5.02         |
| 19.8  | 19.12 | 50.90     | 12.00             | 11.20              | 16.78     | 0.99    | 23.21            | 24.56       | 32.07       | 4.88         |
| 20.0  | 19.08 | 50.00     | 12.00             | 11.40              | 15.27     | 0.99    | 23.20            | 24.51       | 32.52       | 4.78         |
| 20.2  | 18.96 | 50.30     | 11.70             | 11.20              | 15.91     | 0.99    | 23.23            | 24.51       | 32.77       | 4.66         |
| 20.4  | 18.93 | 50.50     | 11.50             | 11.10              | 16.11     | 0.99    | 23.19            | 24.43       | 32.98       | 4.52         |
| 20.6  | 18.93 | 50.40     | 11.20             | 11.00              | 15.89     | 0.99    | 23.21            | 24.42       | 33.26       | 4.44         |
| 20.8  | 18.95 | 50.80     | 11.20             | 11.10              | 16.62     | 0.99    | 23.25            | 24.42       | 33.27       | 4.34         |
| 21.0  | 18.90 | 50.90     | 11.00             | 10.90              | 16.84     | 1.00    | 23.26            | 24.40       | 33.88       | 4.28         |
| 21.2  | 18.93 | 52.00     | 10.70             | 10.90              | 18.93     | 1.00    | 23.35            | 24.46       | 33.66       | 4.21         |
| 21.4  | 18.95 | 52.40     | 10.70             | 11.10              | 19.85     | 1.00    | 23.41            | 24.50       | 34.63       | 4.17         |
| 21.6  | 18.95 | 52.40     | 10.40             | 11.20              | 19.69     | 1.01    | 23.46            | 24.51       | 34.30       | 4.10         |
| 21.8  | 18.92 | 52.00     | 10.30             | 11.40              | 18.95     | 1.02    | 23.56            | 24.57       | 34.87       | 4.06         |
| 22.0  | 18.90 | 52.50     | 9.93              | 11.20              | 19.78     | 1.02    | 23.56            | 24.57       | 34.90       | 4.00         |
| 22.2  | 18.93 | 52.90     | 9.98              | 11.50              | 20.80     | 1.02    | 23.58            | 24.60       | 34.84       | 3.94         |
| 22.4  | 18.94 | 52.70     | 9.78              | 11.40              | 20.20     | 1.03    | 23.62            | 24.62       | 34.60       | 3.88         |
| 22.6  | 18.91 | 52.40     | 9.72              | 11.70              | 19.75     | 1.03    | 23.54            | 24.57       | 35.12       | 3.85         |
| 22.8  | 18.91 | 52.70     | 9.63              | 11.60              | 20.41     | 1.03    | 23.57            | 24.59       | 35.15       | 3.79         |
| 23.0  | 18.97 | 53.50     | 9.50              | 11.80              | 22.00     | 1.04    | 23.55            | 24.52       | 34.73       | 3.76         |
| 23.2  | 19.01 | 53.70     | 9.54              | 12.00              | 22.58     | 1.04    | 23.50            | 24.44       | 34.12       | 3.72         |
| 23.4  | 19.02 | 54.30     | 9.25              | 12.20              | 24.12     | 1.05    | 23.55            | 24.45       | 35.12       | 3.69         |
| 23.5  | 19.03 | 54.10     | 9.31              | 12.30              | 23.47     | 1.05    | 23.55            | 24.40       | 34.62       | 3.64         |
| 23.6  | 19.08 | 54.30     | 9.11              | 12.40              | 23.77     | 1.06    | 23.63            | 24.45       | 34.44       | 3.60         |
| 23.8  | 19.17 | 54.60     | 9.16              | 12.70              | 24.52     | 1.06    | 23.77            | 24.53       | 35.11       | 3.57         |
| 24.0  | 19.26 | 54.40     | 8.97              | 12.70              | 23.59     | 1.07    | 23.87            | 24.59       | 34.36       | 3.53         |
| 24.2  | 19.36 | 53.90     | 8.98              | 12.90              | 22.21     | 1.07    | 24.10            | 24.77       | 34.92       | 3.48         |
| 24.4  | 19.41 | 54.10     | 8.98              | 12.90              | 22.63     | 1.07    | 24.20            | 24.84       | 35.54       | 3.46         |
| 24.6  | 19.45 | 54.20     | 8.91              | 12.90              | 22.76     | 1.07    | 24.28            | 24.89       | 35.28       | 3.44         |
| 24.8  | 19.52 | 54.10     | 8.84              | 12.70              | 22.23     | 1.07    | 24.47            | 25.04       | 35.03       | 3.39         |
| 25.0  | 19.67 | 54.50     | 8.88              | 12.60              | 22.77     | 1.06    | 24.69            | 25.21       | 35.21       | 3.34         |
| 25.2  | 19.83 | 54.40     | 8.85              | 12.50              | 22.13     | 1.06    | 24.79            | 25.29       | 33.76       | 3.31         |
| 25.4  | 19.98 | 54.80     | 8.93              | 12.20              | 22.68     | 1.06    | 24.86            | 25.35       | 34.23       | 3.26         |
| 25.6  | 20.19 | 55.30     | 8.93              | 12.00              | 23.32     | 1.05    | 24.91            | 25.37       | 33.35       | 3.22         |
| 25.8  | 20.37 | 55.70     | 9.03              | 11.80              | 24.06     | 1.05    | 24.84            | 25.29       | 33.88       | 3.15         |
| 26.0  | 20.58 | 57.20     | 9.09              | 11.70              | 27.68     | 1.04    | 24.81            | 25.25       | 35.28       | 3.12         |
| 26.2  | 20.77 | 57.20     | 9.19              | 11.60              | 27.37     | 1.04    | 24.83            | 25.22       | 33.53       | 3.08         |
| 26.4  | 20.97 | 59.00     | 9.34              | 11.40              | 32.74     | 1.03    | 24.78            | 25.14       | 33.88       | 3.06         |
| 26.6  | 21.19 | 58.00     | 9.38              | 11.30              | 28.46     | 1.03    | 24.88            | 25.18       | 33.29       | 3.02         |
| 26.8  | 21.45 | 58.60     | 9.54              | 11.30              | 29.77     | 1.03    | 24.97            | 25.20       | 33.55       | 2.97         |
| 27.0  | 21.68 | 59.80     | 9.58              | 11.40              | 33.37     | 1.03    | 25.03            | 25.21       | 33.95       | 3.02         |
| 27.5  | 22.26 | 59.60     | 9.73              | 11.90              | 30.80     | 1.03    | 25.36            | 25.37       | 34.64       | 3.03         |
| 28.0  | 22.91 | 58.60     | 9.92              | 12.90              | 26.05     | 1.05    | 25.49            | 25.40       | 33.95       | 3.12         |
| 28.5  | 23.49 | 58.90     | 10.20             | 14.80              | 25.77     | 1.06    | 25.20            | 25.20       | 34.64       | 3.31         |
| 29.0  | 23.78 | 58.60     | 10.60             | 16.70              | 24.51     | 1.06    | 24.56            | 24.79       | 34.54       | 3.41         |
| 29.5  | 23.53 | 57.30     | 11.40             | 18.60              | 22.40     | 1.06    | 23.89            | 24.26       | 35.14       | 3.42         |
| 30.0  | 22.78 | 56.40     | 12.90             | 21.50              | 22.67     | 1.04    | 23.26            | 23.61       | 35.18       | 3.52         |
| 30.5  | 21.61 | 55.10     | 14.40             | 22.60              | 22.73     | 1.03    | 22.58            | 22.89       | 34.84       | 3.50         |
| 31.0  | 20.30 | 53.30     | 14.20             | 23.20              | 21.49     | 1.03    | 21.85            | 22.14       | 32.76       | 3.64         |
| 31.5  | 18.75 | 52.60     | 12.20             | 24.20              | 23.11     | 1.06    | 21.15            | 21.42       | 31.31       | 3.84         |
| 32.0  | 16.92 | 52.70     | 11.30             | 18.90              | 28.28     | 1.06    | 20.69            | 20.93       | 30.05       | 3.99         |
| 32.5  | 14.81 | 53.40     | 11.70             | 12.60              | 37.68     | 1.01    |                  |             |             |              |
| 33.0  | 12.48 | 52.30     | 13.70             | 8.79               | 40.82     | 0.90    |                  |             |             |              |
| 33.5  | 10.16 | 52.40     | 17.90             | 6.63               | 49.64     | 0.80    |                  |             |             |              |
| 34.0  | 7.90  | 51.60     | 30.80             | 5.51               | 55.04     | 0.72    |                  |             |             |              |

## Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions

## Definitions:

Input Return Loss = S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = S12 (dB)

Output Return Loss = S22 (dB)

TEST CONDITIONS:  $V_{DD} = +7\text{ V}$ ,  $I_{DD} = 160\text{ mA}$  @ Temperature =  $+25^{\circ}\text{C}$ 

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | 1dB Comp. Output | Psat Output | IP-3 Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|------------------|-------------|-------------|--------------|
| (GHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)            | (dBm)       | (dBm)       | (dB)         |
| 16.0  | 18.19 | 53.10     | 5.79              | 15.30              | 20.09     | 1.22    | 26.17            | 26.34       | 34.00       | 7.41         |
| 16.5  | 18.77 | 51.50     | 7.06              | 15.90              | 17.11     | 1.16    | 25.58            | 25.89       | 34.11       | 6.83         |
| 17.0  | 19.02 | 51.80     | 8.10              | 15.30              | 18.01     | 1.12    | 25.25            | 25.81       | 34.12       | 6.46         |
| 17.2  | 19.06 | 51.50     | 8.52              | 15.00              | 17.41     | 1.10    | 25.12            | 25.82       | 33.99       | 6.38         |
| 17.4  | 19.06 | 51.50     | 8.84              | 14.40              | 17.61     | 1.09    | 25.00            | 25.82       | 33.97       | 6.29         |
| 17.6  | 19.09 | 50.80     | 9.28              | 14.00              | 16.40     | 1.07    | 24.85            | 25.74       | 34.04       | 6.21         |
| 17.8  | 19.05 | 50.70     | 9.62              | 13.50              | 16.40     | 1.06    | 24.69            | 25.62       | 34.02       | 6.12         |
| 18.0  | 19.03 | 50.50     | 10.00             | 13.20              | 16.15     | 1.04    | 24.65            | 25.54       | 34.05       | 6.05         |
| 18.2  | 18.99 | 50.50     | 10.50             | 12.90              | 16.22     | 1.03    | 24.59            | 25.43       | 34.20       | 5.96         |
| 18.4  | 18.93 | 50.30     | 10.90             | 12.60              | 16.11     | 1.02    | 24.57            | 25.37       | 34.34       | 5.84         |
| 18.6  | 18.83 | 50.60     | 11.20             | 12.40              | 16.88     | 1.01    | 24.63            | 25.37       | 34.49       | 5.74         |
| 18.8  | 18.74 | 50.70     | 11.40             | 12.20              | 17.22     | 1.01    | 24.62            | 25.31       | 34.70       | 5.62         |
| 19.0  | 18.63 | 50.40     | 11.50             | 12.20              | 16.88     | 1.01    | 24.69            | 25.32       | 34.87       | 5.48         |
| 19.2  | 18.50 | 50.70     | 11.50             | 11.80              | 17.62     | 1.00    | 24.73            | 25.33       | 35.08       | 5.32         |
| 19.4  | 18.43 | 51.10     | 11.50             | 11.70              | 18.54     | 1.00    | 24.71            | 25.31       | 35.26       | 5.20         |
| 19.6  | 18.38 | 51.00     | 11.60             | 11.60              | 18.55     | 1.00    | 24.76            | 25.34       | 35.46       | 5.06         |
| 19.8  | 18.29 | 50.80     | 11.50             | 11.50              | 18.11     | 1.00    | 24.69            | 25.25       | 35.67       | 4.93         |
| 20.0  | 18.23 | 50.10     | 11.50             | 11.60              | 16.91     | 1.00    | 24.65            | 25.20       | 35.89       | 4.82         |
| 20.2  | 18.09 | 50.30     | 11.30             | 11.30              | 17.49     | 1.00    | 24.67            | 25.18       | 35.99       | 4.71         |
| 20.4  | 18.04 | 50.30     | 11.10             | 11.20              | 17.53     | 1.00    | 24.60            | 25.11       | 36.08       | 4.60         |
| 20.6  | 18.02 | 50.30     | 10.80             | 11.00              | 17.32     | 1.00    | 24.62            | 25.12       | 36.24       | 4.51         |
| 20.8  | 18.02 | 50.90     | 10.80             | 11.10              | 18.62     | 1.00    | 24.64            | 25.13       | 36.42       | 4.42         |
| 21.0  | 17.95 | 51.00     | 10.60             | 10.90              | 18.89     | 1.00    | 24.64            | 25.10       | 36.57       | 4.33         |
| 21.2  | 17.96 | 51.80     | 10.40             | 10.90              | 20.61     | 1.00    | 24.69            | 25.09       | 36.66       | 4.27         |
| 21.4  | 17.95 | 52.30     | 10.30             | 11.00              | 21.72     | 1.01    | 24.72            | 25.06       | 37.19       | 4.22         |
| 21.6  | 17.93 | 52.40     | 10.00             | 11.00              | 21.88     | 1.01    | 24.71            | 25.01       | 37.34       | 4.15         |
| 21.8  | 17.88 | 51.80     | 10.00             | 11.10              | 20.62     | 1.02    | 24.75            | 25.00       | 37.52       | 4.13         |
| 22.0  | 17.85 | 52.30     | 9.66              | 10.90              | 21.48     | 1.02    | 24.77            | 24.99       | 38.07       | 4.07         |
| 22.2  | 17.85 | 52.50     | 9.72              | 11.10              | 22.23     | 1.02    | 24.82            | 25.04       | 38.00       | 4.02         |
| 22.4  | 17.84 | 52.30     | 9.51              | 11.00              | 21.55     | 1.02    | 24.87            | 25.09       | 38.03       | 3.99         |
| 22.6  | 17.81 | 52.50     | 9.47              | 11.20              | 22.17     | 1.03    | 24.86            | 25.13       | 38.39       | 3.94         |
| 22.8  | 17.79 | 52.60     | 9.39              | 11.10              | 22.50     | 1.03    | 24.89            | 25.19       | 38.22       | 3.87         |
| 23.0  | 17.84 | 53.10     | 9.25              | 11.30              | 23.70     | 1.03    | 24.80            | 25.14       | 38.11       | 3.86         |
| 23.2  | 17.86 | 53.50     | 9.31              | 11.40              | 24.91     | 1.03    | 24.73            | 25.09       | 38.17       | 3.84         |
| 23.4  | 17.87 | 53.90     | 9.02              | 11.50              | 25.66     | 1.04    | 24.69            | 25.06       | 37.83       | 3.82         |
| 23.5  | 17.87 | 54.10     | 9.11              | 11.60              | 26.35     | 1.04    | 24.60            | 24.97       | 37.76       | 3.81         |
| 23.6  | 17.92 | 54.00     | 8.89              | 11.60              | 26.01     | 1.05    | 24.63            | 25.00       | 37.71       | 3.78         |
| 23.8  | 18.00 | 54.30     | 8.97              | 11.80              | 26.69     | 1.05    | 24.65            | 25.01       | 37.78       | 3.76         |
| 24.0  | 18.08 | 54.20     | 8.78              | 11.90              | 26.03     | 1.06    | 24.69            | 25.03       | 37.78       | 3.78         |
| 24.2  | 18.19 | 54.20     | 8.80              | 12.00              | 25.76     | 1.06    | 24.87            | 25.17       | 37.77       | 3.81         |
| 24.4  | 18.23 | 54.10     | 8.81              | 11.90              | 25.29     | 1.06    | 24.92            | 25.22       | 37.71       | 3.82         |
| 24.6  | 18.27 | 53.90     | 8.74              | 11.90              | 24.64     | 1.06    | 24.99            | 25.27       | 37.67       | 3.82         |
| 24.8  | 18.36 | 54.20     | 8.67              | 11.80              | 25.04     | 1.06    | 25.19            | 25.44       | 37.61       | 3.77         |
| 25.0  | 18.50 | 54.50     | 8.73              | 11.70              | 25.55     | 1.05    | 25.42            | 25.65       | 37.47       | 3.80         |
| 25.2  | 18.67 | 54.50     | 8.69              | 11.60              | 24.91     | 1.05    | 25.57            | 25.82       | 37.14       | 3.79         |
| 25.4  | 18.83 | 55.00     | 8.80              | 11.40              | 26.15     | 1.05    | 25.71            | 25.96       | 37.09       | 3.74         |
| 25.6  | 19.04 | 55.20     | 8.80              | 11.20              | 25.90     | 1.04    | 25.79            | 26.03       | 36.98       | 3.69         |
| 25.8  | 19.23 | 56.40     | 8.91              | 11.00              | 28.96     | 1.04    | 25.77            | 26.00       | 36.86       | 3.62         |
| 26.0  | 19.45 | 56.80     | 8.98              | 10.90              | 29.54     | 1.03    | 25.77            | 25.98       | 36.83       | 3.59         |
| 26.2  | 19.65 | 57.60     | 9.07              | 10.80              | 31.85     | 1.03    | 25.76            | 25.94       | 36.93       | 3.50         |
| 26.4  | 19.87 | 59.00     | 9.23              | 10.60              | 36.50     | 1.02    | 25.71            | 25.85       | 37.12       | 3.41         |
| 26.6  | 20.10 | 59.80     | 9.28              | 10.50              | 38.89     | 1.02    | 25.77            | 25.88       | 37.09       | 3.34         |
| 26.8  | 20.37 | 58.90     | 9.45              | 10.50              | 34.06     | 1.01    | 25.79            | 25.86       | 37.19       | 3.26         |
| 27.0  | 20.61 | 59.60     | 9.47              | 10.50              | 36.23     | 1.01    | 25.84            | 25.88       | 37.28       | 3.22         |
| 27.5  | 21.24 | 59.60     | 9.62              | 10.80              | 33.87     | 1.02    | 26.09            | 26.06       | 36.82       | 3.14         |
| 28.0  | 21.94 | 61.90     | 9.81              | 11.50              | 41.33     | 1.03    | 26.31            | 26.17       | 35.98       | 3.09         |
| 28.5  | 22.59 | 59.40     | 10.10             | 12.90              | 29.48     | 1.04    | 26.20            | 26.01       | 35.36       | 3.11         |
| 29.0  | 22.99 | 58.60     | 10.60             | 14.70              | 26.47     | 1.05    | 25.72            | 25.63       | 34.90       | 3.16         |
| 29.5  | 22.90 | 58.60     | 11.50             | 17.40              | 27.77     | 1.05    | 25.19            | 25.22       | 34.27       | 3.19         |
| 30.0  | 22.30 | 58.60     | 13.00             | 23.80              | 30.75     | 1.04    | 24.64            | 24.72       | 33.64       | 3.31         |
| 30.5  | 21.24 | 54.90     | 14.60             | 33.20              | 23.14     | 1.03    | 23.99            | 24.06       | 32.78       | 3.42         |
| 31.0  | 19.99 | 51.70     | 14.20             | 27.20              | 18.50     | 1.04    | 23.24            | 23.29       | 31.77       | 3.54         |
| 31.5  | 18.44 | 51.70     | 12.20             | 29.20              | 21.57     | 1.06    | 22.48            | 22.51       | 30.84       | 3.73         |
| 32.0  | 16.62 | 52.90     | 11.40             | 23.10              | 30.27     | 1.07    | 21.96            | 21.96       | 30.16       | 3.94         |
| 32.5  | 14.52 |           |                   |                    | 36.80     | 1.02    |                  |             |             |              |
| 33.0  | 12.19 |           |                   |                    | 39.14     | 0.92    |                  |             |             |              |
| 33.5  | 9.83  |           |                   |                    | 61.72     | 0.81    |                  |             |             |              |
| 34.0  | 7.51  |           |                   |                    | 60.66     | 0.73    |                  |             |             |              |

## 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:  $V_{DD} = +6\text{ V}$ ,  $I_{DD} = 160\text{ mA}$  @ Temperature =  $-55^{\circ}\text{C}$ 

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | 1dB Comp. Output | Psat Output | IP-3 Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|------------------|-------------|-------------|--------------|
| (GHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)            | (dBm)       | (dBm)       | (dB)         |
| 16.0  | 20.58 | 53.30     | 5.12              | 15.00              | 14.55     | 1.26    | 26.16            | 26.29       | 31.41       | 5.86         |
| 16.5  | 21.22 | 51.60     | 6.61              | 16.40              | 12.77     | 1.19    | 25.21            | 25.86       | 31.35       | 5.28         |
| 17.0  | 21.41 | 52.10     | 7.84              | 15.80              | 13.99     | 1.13    | 24.27            | 25.78       | 30.74       | 4.89         |
| 17.2  | 21.42 | 51.90     | 8.32              | 15.40              | 13.86     | 1.11    | 24.01            | 25.77       | 29.97       | 4.80         |
| 17.4  | 21.37 | 51.40     | 8.68              | 14.60              | 13.28     | 1.09    | 23.84            | 25.76       | 30.54       | 4.72         |
| 17.6  | 21.34 | 50.90     | 9.15              | 14.10              | 12.81     | 1.07    | 23.76            | 25.68       | 29.75       | 4.63         |
| 17.8  | 21.24 | 51.00     | 9.58              | 13.40              | 13.06     | 1.05    | 23.65            | 25.53       | 29.66       | 4.57         |
| 18.0  | 21.16 | 50.70     | 10.10             | 12.90              | 12.93     | 1.04    | 23.66            | 25.47       | 29.50       | 4.48         |
| 18.2  | 21.06 | 50.50     | 10.60             | 12.50              | 12.82     | 1.02    | 23.66            | 25.36       | 29.22       | 4.42         |
| 18.4  | 20.90 | 50.80     | 11.00             | 12.10              | 13.60     | 1.01    | 23.65            | 25.27       | 29.31       | 4.30         |
| 18.6  | 20.75 | 50.90     | 11.30             | 11.80              | 13.99     | 1.00    | 23.78            | 25.28       | 29.24       | 4.22         |
| 18.8  | 20.58 | 51.30     | 11.50             | 11.40              | 14.83     | 0.99    | 23.80            | 25.20       | 28.49       | 4.10         |
| 19.0  | 20.44 | 50.90     | 11.70             | 11.40              | 14.37     | 0.99    | 23.91            | 25.19       | 28.73       | 3.99         |
| 19.2  | 20.27 | 51.30     | 11.70             | 11.00              | 15.18     | 0.99    | 24.05            | 25.20       | 28.53       | 3.87         |
| 19.4  | 20.16 | 51.30     | 11.70             | 10.90              | 15.33     | 0.98    | 24.08            | 25.12       | 28.56       | 3.74         |
| 19.6  | 20.05 | 51.00     | 11.70             | 10.90              | 14.99     | 0.98    | 24.20            | 25.13       | 28.87       | 3.62         |
| 19.8  | 19.93 | 50.90     | 11.60             | 10.70              | 15.04     | 0.98    | 24.25            | 25.04       | 28.70       | 3.48         |
| 20.0  | 19.76 | 50.20     | 11.40             | 10.70              | 14.10     | 0.98    | 24.26            | 24.97       | 29.08       | 3.39         |
| 20.2  | 19.69 | 51.50     | 11.10             | 10.20              | 16.13     | 0.98    | 24.39            | 24.97       | 29.21       | 3.29         |
| 20.4  | 19.69 | 51.80     | 10.90             | 10.30              | 16.78     | 0.98    | 24.40            | 24.89       | 29.20       | 3.18         |
| 20.6  | 19.70 | 52.00     | 10.70             | 10.10              | 16.99     | 0.98    | 24.48            | 24.90       | 30.06       | 3.09         |
| 20.8  | 19.73 | 52.60     | 10.50             | 10.30              | 18.09     | 0.99    | 24.62            | 24.93       | 30.41       | 2.97         |
| 21.0  | 19.74 | 53.00     | 10.30             | 10.20              | 18.83     | 0.99    | 24.67            | 24.92       | 30.42       | 2.92         |
| 21.2  | 19.81 | 53.30     | 9.95              | 10.40              | 19.29     | 1.00    | 24.77            | 24.94       | 31.60       | 2.86         |
| 21.4  | 19.83 | 53.70     | 9.80              | 10.60              | 20.03     | 1.01    | 24.85            | 24.94       | 30.91       | 2.82         |
| 21.6  | 19.85 | 54.00     | 9.44              | 10.80              | 20.72     | 1.02    | 24.80            | 24.90       | 31.67       | 2.74         |
| 21.8  | 19.84 | 53.60     | 9.31              | 11.00              | 19.72     | 1.03    | 24.82            | 24.92       | 31.78       | 2.70         |
| 22.0  | 19.90 | 54.60     | 9.01              | 11.00              | 21.83     | 1.04    | 24.83            | 24.92       | 32.19       | 2.64         |
| 22.2  | 19.95 | 55.20     | 9.04              | 11.50              | 23.62     | 1.05    | 24.86            | 24.96       | 31.84       | 2.58         |
| 22.4  | 19.97 | 55.10     | 8.84              | 11.50              | 23.18     | 1.05    | 24.97            | 25.05       | 32.28       | 2.54         |
| 22.6  | 19.97 | 55.30     | 8.81              | 11.90              | 23.84     | 1.06    | 24.99            | 25.04       | 32.37       | 2.49         |
| 22.8  | 20.03 | 55.90     | 8.74              | 12.00              | 25.16     | 1.06    | 25.10            | 25.11       | 32.31       | 2.40         |
| 23.0  | 20.11 | 57.60     | 8.61              | 12.40              | 30.50     | 1.07    | 25.13            | 25.08       | 32.06       | 2.37         |
| 23.2  | 20.14 | 58.30     | 8.68              | 12.60              | 32.96     | 1.07    | 25.06            | 25.00       | 32.42       | 2.34         |
| 23.4  | 20.15 | 59.10     | 8.47              | 12.80              | 36.11     | 1.08    | 25.15            | 25.03       | 32.64       | 2.30         |
| 23.5  | 20.16 | 58.70     | 8.52              | 13.00              | 34.59     | 1.08    | 25.16            | 24.99       | 32.56       | 2.25         |
| 23.6  | 20.24 | 58.90     | 8.32              | 13.00              | 34.66     | 1.09    | 25.20            | 25.04       | 32.87       | 2.22         |
| 23.8  | 20.32 | 59.40     | 8.33              | 13.20              | 36.36     | 1.09    | 25.33            | 25.15       | 32.68       | 2.17         |
| 24.0  | 20.39 | 59.10     | 8.11              | 13.00              | 34.59     | 1.10    | 25.33            | 25.17       | 32.72       | 2.13         |
| 24.2  | 20.46 | 59.10     | 8.01              | 13.00              | 34.13     | 1.10    | 25.43            | 25.30       | 32.34       | 2.10         |
| 24.4  | 20.48 | 58.70     | 7.97              | 12.80              | 32.26     | 1.10    | 25.49            | 25.36       | 32.82       | 2.09         |
| 24.6  | 20.51 | 58.50     | 7.85              | 12.60              | 31.18     | 1.10    | 25.53            | 25.40       | 32.64       | 2.08         |
| 24.8  | 20.59 | 57.90     | 7.70              | 12.30              | 28.56     | 1.10    | 25.61            | 25.50       | 32.49       | 2.04         |
| 25.0  | 20.72 | 58.00     | 7.64              | 12.00              | 28.45     | 1.10    | 25.79            | 25.66       | 32.20       | 1.98         |
| 25.2  | 20.83 | 58.00     | 7.57              | 11.60              | 27.89     | 1.09    | 25.93            | 25.76       | 31.89       | 1.93         |
| 25.4  | 20.96 | 57.60     | 7.57              | 11.30              | 26.07     | 1.09    | 26.00            | 25.82       | 32.50       | 1.89         |
| 25.6  | 21.14 | 57.80     | 7.51              | 11.00              | 25.99     | 1.08    | 26.07            | 25.88       | 32.39       | 1.84         |
| 25.8  | 21.32 | 59.00     | 7.58              | 10.70              | 29.07     | 1.07    | 26.03            | 25.84       | 33.09       | 1.80         |
| 26.0  | 21.51 | 59.30     | 7.66              | 10.60              | 29.32     | 1.07    | 25.98            | 25.83       | 32.61       | 1.79         |
| 26.2  | 21.71 | 60.00     | 7.74              | 10.40              | 30.99     | 1.06    | 26.01            | 25.86       | 32.95       | 1.75         |
| 26.4  | 21.93 | 59.70     | 7.82              | 10.30              | 29.32     | 1.05    | 25.95            | 25.82       | 33.00       | 1.73         |
| 26.6  | 22.17 | 58.10     | 7.86              | 10.20              | 23.70     | 1.05    | 26.03            | 25.89       | 32.24       | 1.70         |
| 26.8  | 22.44 | 61.00     | 7.97              | 10.20              | 32.50     | 1.05    | 26.10            | 25.94       | 32.62       | 1.64         |
| 27.0  | 22.67 | 59.00     | 8.01              | 10.20              | 25.01     | 1.04    | 26.06            | 25.92       | 32.65       | 1.63         |
| 27.5  | 23.28 | 60.40     | 8.04              | 10.60              | 27.57     | 1.05    | 26.05            | 25.93       | 33.84       | 1.61         |
| 28.0  | 24.01 | 59.10     | 8.06              | 11.30              | 22.30     | 1.07    | 25.82            | 25.67       | 32.55       | 1.55         |
| 28.5  | 24.84 | 59.50     | 8.06              | 12.90              | 21.75     | 1.10    | 25.36            | 25.27       | 33.58       | 1.59         |
| 29.0  | 25.55 | 58.80     | 8.45              | 14.70              | 19.00     | 1.11    | 24.83            | 25.04       | 33.62       | 1.62         |
| 29.5  | 26.02 | 58.40     | 8.98              | 16.80              | 17.76     | 1.10    | 24.43            | 24.90       | 33.39       | 1.61         |
| 30.0  | 25.88 | 56.80     | 9.72              | 21.60              | 15.65     | 1.10    | 24.06            | 24.53       | 33.53       | 1.67         |
| 30.5  | 25.31 | 55.90     | 10.40             | 37.50              | 15.42     | 1.09    | 23.51            | 23.91       | 34.08       | 1.69         |
| 31.0  | 24.33 | 52.80     | 9.94              | 25.60              | 11.85     | 1.10    | 22.70            | 23.14       | 34.19       | 1.78         |
| 31.5  | 22.97 | 51.50     | 8.59              | 23.20              | 11.49     | 1.13    | 21.73            | 22.32       | 33.46       | 1.92         |
| 32.0  | 21.19 | 51.30     | 8.12              | 22.90              | 13.46     | 1.15    | 21.12            | 21.73       | 31.56       | 2.16         |
| 32.5  | 19.03 | 51.40     | 8.84              | 14.20              | 17.50     | 1.08    |                  |             |             |              |
| 33.0  | 16.55 | 54.10     | 10.80             | 9.23               | 30.55     | 0.95    |                  |             |             |              |
| 33.5  | 13.97 | 51.10     | 14.40             | 6.65               | 27.04     | 0.81    |                  |             |             |              |
| 34.0  | 11.47 | 51.40     | 22.00             | 5.28               | 34.81     | 0.71    |                  |             |             |              |

## 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:  $V_{DD} = +6\text{ V}$ ,  $I_{DD} = 160\text{ mA}$  @ Temperature = +85°C

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |         | 1dB Comp. Output | Psat Output | IP-3 Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|---------|------------------|-------------|-------------|--------------|
| (GHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Measure | (dBm)            | (dBm)       | (dBm)       | (dB)         |
| 16.0  | 17.27 | 52.90     | 5.84              | 14.70              | 21.66     | 1.21    | 23.45            | 25.67       | 30.67       | 8.19         |
| 16.5  | 17.85 | 51.70     | 6.90              | 15.00              | 19.02     | 1.16    | 22.54            | 25.27       | 30.68       | 7.63         |
| 17.0  | 18.09 | 51.60     | 7.79              | 14.30              | 19.13     | 1.12    | 22.04            | 24.83       | 30.71       | 7.27         |
| 17.2  | 18.14 | 51.50     | 8.15              | 13.90              | 19.11     | 1.10    | 21.89            | 24.63       | 30.73       | 7.17         |
| 17.4  | 18.16 | 51.60     | 8.46              | 13.40              | 19.33     | 1.09    | 21.78            | 24.46       | 30.71       | 7.10         |
| 17.6  | 18.18 | 51.00     | 8.82              | 13.10              | 18.26     | 1.07    | 21.72            | 24.30       | 30.67       | 7.02         |
| 17.8  | 18.17 | 51.00     | 9.18              | 12.60              | 18.31     | 1.06    | 21.66            | 24.14       | 30.66       | 6.95         |
| 18.0  | 18.18 | 50.60     | 9.60              | 12.30              | 17.55     | 1.04    | 21.64            | 24.07       | 30.66       | 6.87         |
| 18.2  | 18.18 | 50.40     | 10.10             | 12.10              | 17.33     | 1.03    | 21.64            | 24.00       | 30.69       | 6.76         |
| 18.4  | 18.16 | 50.30     | 10.60             | 11.90              | 17.25     | 1.01    | 21.64            | 23.96       | 30.71       | 6.63         |
| 18.6  | 18.11 | 50.30     | 11.10             | 11.90              | 17.57     | 1.01    | 21.69            | 23.99       | 30.79       | 6.54         |
| 18.8  | 18.04 | 50.60     | 11.40             | 11.60              | 18.34     | 1.00    | 21.71            | 23.97       | 30.86       | 6.38         |
| 19.0  | 17.96 | 50.60     | 11.80             | 11.70              | 18.70     | 0.99    | 21.76            | 24.01       | 30.94       | 6.22         |
| 19.2  | 17.89 | 50.50     | 12.00             | 11.50              | 18.50     | 0.99    | 21.80            | 24.03       | 31.11       | 6.06         |
| 19.4  | 17.83 | 50.90     | 12.20             | 11.40              | 19.69     | 0.99    | 21.82            | 24.03       | 31.23       | 5.88         |
| 19.6  | 17.83 | 51.20     | 12.40             | 11.40              | 20.32     | 0.98    | 21.85            | 24.06       | 31.33       | 5.72         |
| 19.8  | 17.78 | 51.30     | 12.50             | 11.40              | 20.76     | 0.98    | 21.85            | 24.03       | 31.41       | 5.60         |
| 20.0  | 17.75 | 50.90     | 12.60             | 11.50              | 19.92     | 0.98    | 21.85            | 24.01       | 31.48       | 5.49         |
| 20.2  | 17.69 | 50.30     | 12.50             | 11.40              | 18.56     | 0.98    | 21.85            | 24.01       | 31.46       | 5.39         |
| 20.4  | 17.63 | 49.90     | 12.40             | 11.40              | 17.90     | 0.98    | 21.83            | 23.95       | 31.44       | 5.25         |
| 20.6  | 17.61 | 49.70     | 12.10             | 11.10              | 17.33     | 0.98    | 21.84            | 23.94       | 31.45       | 5.17         |
| 20.8  | 17.65 | 50.80     | 12.00             | 11.10              | 19.64     | 0.98    | 21.83            | 23.93       | 31.39       | 5.06         |
| 21.0  | 17.60 | 50.80     | 11.80             | 10.90              | 19.48     | 0.98    | 21.81            | 23.90       | 31.29       | 5.04         |
| 21.2  | 17.61 | 52.00     | 11.60             | 10.90              | 22.37     | 0.98    | 21.82            | 23.93       | 31.26       | 4.98         |
| 21.4  | 17.62 | 52.80     | 11.50             | 11.10              | 24.52     | 0.99    | 21.81            | 23.93       | 31.23       | 4.91         |
| 21.6  | 17.60 | 53.20     | 11.10             | 11.00              | 25.59     | 0.99    | 21.81            | 23.93       | 31.19       | 4.85         |
| 21.8  | 17.57 | 52.80     | 11.00             | 11.20              | 24.56     | 1.00    | 21.81            | 23.97       | 31.28       | 4.78         |
| 22.0  | 17.55 | 53.10     | 10.60             | 10.90              | 25.04     | 1.00    | 21.78            | 23.92       | 31.25       | 4.74         |
| 22.2  | 17.56 | 53.40     | 10.60             | 11.20              | 26.06     | 1.01    | 21.80            | 23.91       | 31.37       | 4.69         |
| 22.4  | 17.56 | 53.70     | 10.40             | 11.00              | 26.78     | 1.01    | 21.81            | 23.92       | 31.41       | 4.61         |
| 22.6  | 17.56 | 53.90     | 10.30             | 11.30              | 27.52     | 1.01    | 21.82            | 23.85       | 31.40       | 4.58         |
| 22.8  | 17.55 | 53.50     | 10.30             | 11.20              | 26.33     | 1.01    | 21.88            | 23.90       | 31.49       | 4.52         |
| 23.0  | 17.60 | 54.10     | 10.20             | 11.30              | 27.90     | 1.02    | 21.91            | 23.88       | 31.63       | 4.47         |
| 23.2  | 17.65 | 54.90     | 10.20             | 11.50              | 30.65     | 1.02    | 22.00            | 23.90       | 31.56       | 4.41         |
| 23.4  | 17.68 | 55.20     | 10.00             | 11.70              | 31.68     | 1.02    | 22.07            | 23.99       | 31.65       | 4.38         |
| 23.5  | 17.69 | 55.60     | 10.10             | 11.90              | 33.16     | 1.02    | 22.16            | 24.03       | 31.71       | 4.34         |
| 23.6  | 17.74 | 55.60     | 10.10             | 11.90              | 33.05     | 1.03    | 22.31            | 24.18       | 31.74       | 4.30         |
| 23.8  | 17.84 | 55.20     | 10.20             | 12.20              | 31.51     | 1.03    | 22.46            | 24.32       | 31.75       | 4.27         |
| 24.0  | 17.93 | 55.30     | 10.10             | 12.40              | 31.56     | 1.03    | 22.66            | 24.46       | 31.82       | 4.21         |
| 24.2  | 18.02 | 54.70     | 10.20             | 12.60              | 29.37     | 1.03    | 22.91            | 24.68       | 31.87       | 4.19         |
| 24.4  | 18.06 | 54.90     | 10.30             | 12.60              | 29.73     | 1.03    | 23.02            | 24.76       | 31.90       | 4.18         |
| 24.6  | 18.11 | 55.00     | 10.30             | 12.60              | 30.09     | 1.03    | 23.14            | 24.83       | 31.95       | 4.15         |
| 24.8  | 18.22 | 54.90     | 10.30             | 12.70              | 29.42     | 1.03    | 23.41            | 24.99       | 31.97       | 4.12         |
| 25.0  | 18.34 | 54.50     | 10.40             | 12.70              | 27.63     | 1.03    | 23.65            | 25.14       | 32.16       | 4.05         |
| 25.2  | 18.48 | 54.70     | 10.40             | 12.70              | 28.03     | 1.03    | 23.82            | 25.19       | 32.40       | 4.02         |
| 25.4  | 18.64 | 55.00     | 10.50             | 12.60              | 28.26     | 1.03    | 23.95            | 25.20       | 32.63       | 3.98         |
| 25.6  | 18.80 | 55.00     | 10.60             | 12.40              | 27.70     | 1.02    | 24.04            | 25.18       | 32.84       | 3.95         |
| 25.8  | 18.98 | 55.20     | 10.60             | 12.10              | 27.92     | 1.02    | 24.04            | 25.06       | 33.03       | 3.95         |
| 26.0  | 19.20 | 54.80     | 10.60             | 11.90              | 25.90     | 1.01    | 24.05            | 24.98       | 33.18       | 3.96         |
| 26.2  | 19.40 | 55.70     | 10.50             | 11.70              | 27.96     | 1.01    | 24.10            | 24.93       | 33.19       | 3.95         |
| 26.4  | 19.60 | 56.90     | 10.50             | 11.60              | 31.17     | 1.01    | 24.09            | 24.84       | 33.10       | 3.95         |
| 26.6  | 19.81 | 55.30     | 10.40             | 11.40              | 25.00     | 1.01    | 24.20            | 24.87       | 33.17       | 3.95         |
| 26.8  | 20.01 | 54.50     | 10.30             | 11.30              | 22.36     | 1.01    | 24.31            | 24.89       | 33.23       | 3.95         |
| 27.0  | 20.21 | 55.50     | 10.10             | 11.30              | 24.44     | 1.01    | 24.40            | 24.89       | 33.26       | 3.94         |
| 27.5  | 20.65 | 58.00     | 9.64              | 11.50              | 30.51     | 1.03    | 24.78            | 25.05       | 33.40       | 4.04         |
| 28.0  | 21.11 | 57.90     | 9.51              | 12.30              | 29.03     | 1.05    | 24.92            | 25.06       | 33.63       | 4.11         |
| 28.5  | 21.51 | 58.90     | 9.58              | 14.40              | 31.72     | 1.07    | 24.57            | 24.76       | 34.43       | 4.26         |
| 29.0  | 21.53 | 58.00     | 9.72              | 17.70              | 29.04     | 1.09    | 23.88            | 24.21       | 35.00       | 4.32         |
| 29.5  | 21.10 | 58.50     | 10.40             | 21.90              | 33.43     | 1.08    | 23.20            | 23.58       | 35.58       | 4.40         |
| 30.0  | 20.32 | 57.60     | 11.70             | 22.50              | 33.82     | 1.06    | 22.54            | 22.92       | 36.28       | 4.45         |
| 30.5  | 19.22 | 54.70     | 13.90             | 19.90              | 28.08     | 1.03    | 21.84            | 22.19       | 36.32       | 4.49         |
| 31.0  | 17.98 | 54.60     | 15.70             | 20.30              | 32.82     | 1.02    | 21.10            | 21.42       | 35.95       | 4.49         |
| 31.5  | 16.36 | 52.60     | 15.10             | 21.60              | 31.24     | 1.02    | 20.40            | 20.69       | 35.14       | 4.55         |
| 32.0  | 14.33 | 52.80     | 14.20             | 16.90              | 39.35     | 1.02    | 19.92            | 20.19       | 35.04       | 4.67         |
| 32.5  | 12.06 | 51.40     | 14.50             | 11.50              | 41.40     | 0.96    |                  |             |             |              |
| 33.0  | 9.71  | 49.80     | 16.80             | 8.25               | 41.84     | 0.87    |                  |             |             |              |
| 33.5  | 7.44  | 49.10     | 23.10             | 6.40               | 46.32     | 0.78    |                  |             |             |              |
| 34.0  | 5.25  | 50.70     | 32.50             | 5.49               | 67.37     | 0.72    |                  |             |             |              |



## Typical Performance Data

## Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = +6\text{ V}$ ,  $I_{DD} = 160\text{ mA}$  @ Temperature =  $+25^{\circ}\text{C}$ 

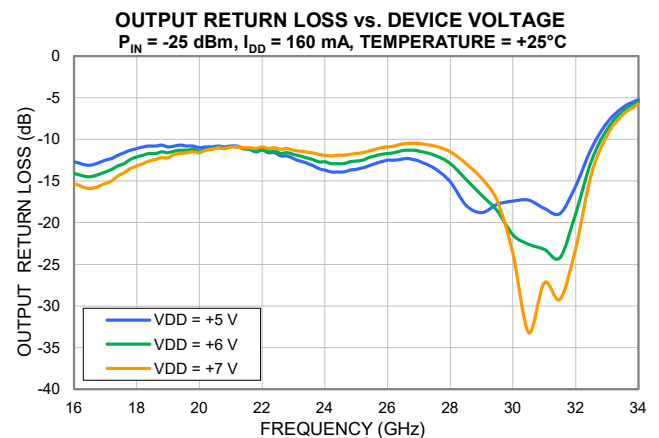
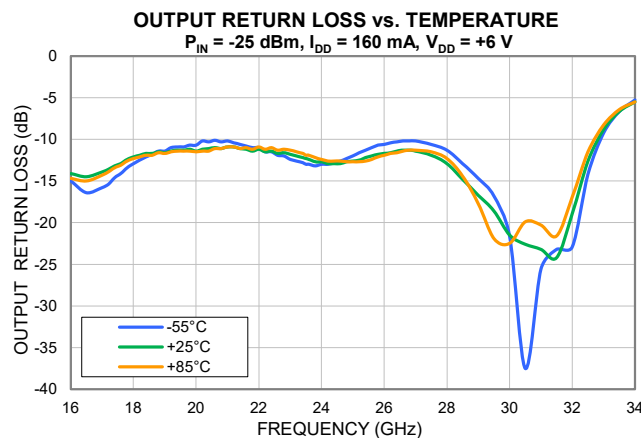
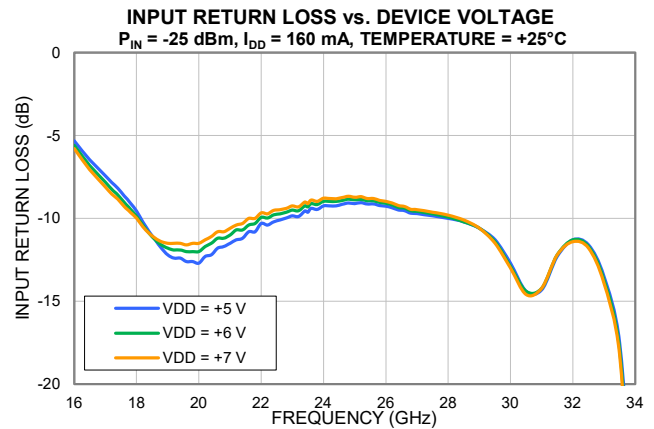
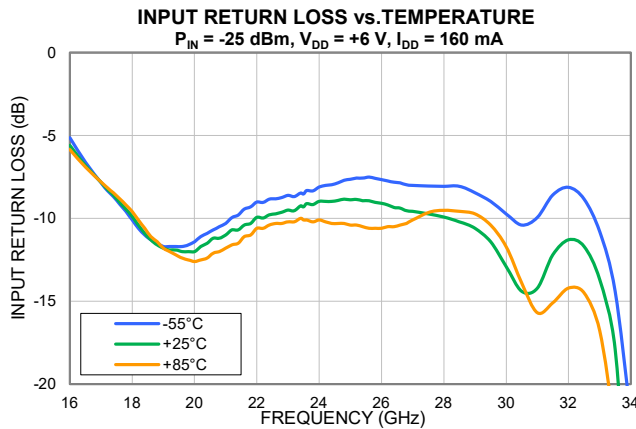
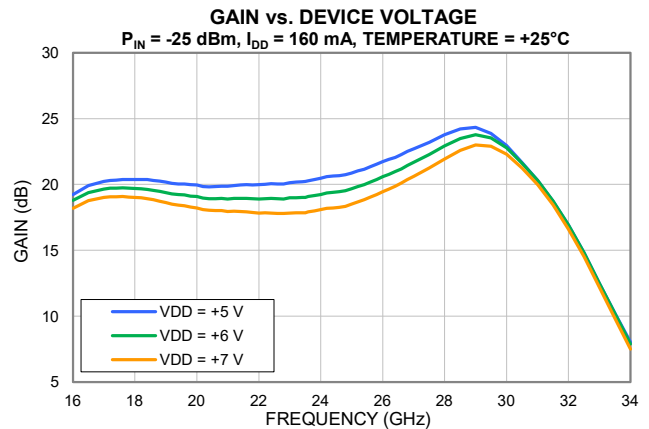
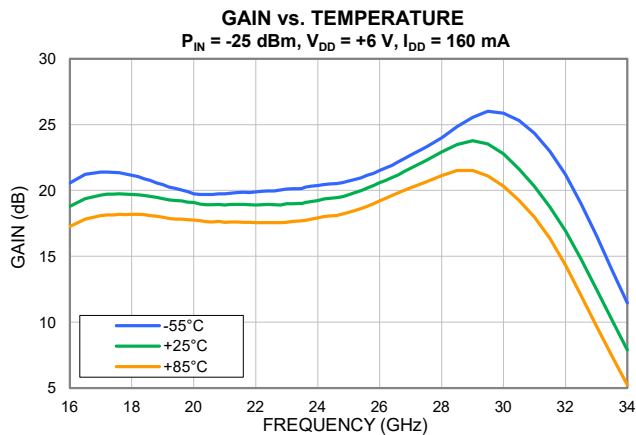
| Power | $P_{OUT}$<br>(@17 GHz) | $P_{OUT}$<br>(@24 GHz) | $P_{OUT}$<br>(@30 GHz) | $P_{OUT}$<br>(@32 GHz) | $I_{DD}$<br>(@17 GHz) | $I_{DD}$<br>(@24 GHz) | $I_{DD}$<br>(@30 GHz) | $I_{DD}$<br>(@32 GHz) | Gain<br>(@17 GHz) | Gain<br>(@24 GHz) | Gain<br>(@30 GHz) | Gain<br>(@32 GHz) |
|-------|------------------------|------------------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|
| (dBm) | (dBm)                  | (dBm)                  | (dBm)                  | (dBm)                  | (mA)                  | (mA)                  | (mA)                  | (mA)                  | (dBm)             | (dBm)             | (dBm)             | (dBm)             |
| -10   | 8.6                    | 8.91                   | 10.76                  | 5.68                   | 162.54                | 162.46                | 162.67                | 160.74                | 20.92             | 20.80             | 23.82             | 18.25             |
| -9    | 9.62                   | 9.92                   | 11.78                  | 6.65                   | 163.1                 | 163.04                | 163.47                | 160.91                | 20.92             | 20.79             | 23.83             | 18.23             |
| -8    | 10.61                  | 10.93                  | 12.79                  | 7.63                   | 163.82                | 163.75                | 164.49                | 161.18                | 20.91             | 20.80             | 23.84             | 18.22             |
| -7    | 11.61                  | 11.94                  | 13.8                   | 8.61                   | 164.72                | 164.64                | 165.83                | 161.54                | 20.91             | 20.80             | 23.86             | 18.21             |
| -6    | 12.61                  | 12.93                  | 14.83                  | 9.61                   | 165.91                | 165.81                | 167.56                | 162                   | 20.90             | 20.79             | 23.88             | 18.21             |
| -5    | 13.62                  | 13.92                  | 15.86                  | 10.6                   | 167.42                | 167.28                | 169.78                | 162.62                | 20.90             | 20.78             | 23.91             | 18.21             |
| -4    | 14.61                  | 14.91                  | 16.91                  | 11.59                  | 169.36                | 169.16                | 172.6                 | 163.56                | 20.89             | 20.78             | 23.94             | 18.20             |
| -3    | 15.6                   | 15.91                  | 18                     | 12.58                  | 171.8                 | 171.5                 | 176.11                | 164.87                | 20.88             | 20.78             | 24.02             | 18.19             |
| -2    | 16.59                  | 16.92                  | 19.13                  | 13.59                  | 174.9                 | 174.39                | 180.58                | 166.71                | 20.88             | 20.80             | 24.13             | 18.17             |
| -1    | 17.6                   | 17.95                  | 20.29                  | 14.57                  | 178.77                | 177.93                | 186.19                | 168.98                | 20.89             | 20.85             | 24.24             | 18.15             |
| 0     | 18.63                  | 19                     | 21.4                   | 15.54                  | 183.48                | 182.17                | 193.31                | 171.92                | 20.92             | 20.91             | 24.33             | 18.12             |
| 1     | 19.67                  | 20.16                  | 22.34                  | 16.5                   | 189.13                | 187.75                | 203.02                | 175.82                | 20.95             | 20.98             | 24.23             | 18.09             |
| 1.2   | 19.88                  | 20.38                  | 22.49                  | 16.69                  | 190.39                | 188.87                | 205.35                | 176.78                | 20.95             | 20.99             | 24.17             | 18.09             |
| 1.4   | 20.08                  | 20.58                  | 22.62                  | 16.88                  | 191.68                | 190.01                | 207.77                | 177.79                | 20.94             | 20.99             | 24.10             | 18.08             |
| 1.6   | 20.28                  | 20.78                  | 22.74                  | 17.08                  | 193.01                | 191.17                | 210.3                 | 178.85                | 20.93             | 20.99             | 24.02             | 18.08             |
| 1.8   | 20.53                  | 20.97                  | 22.84                  | 17.27                  | 194.72                | 192.36                | 212.9                 | 179.97                | 20.91             | 20.98             | 23.92             | 18.07             |
| 2     | 20.73                  | 21.16                  | 22.93                  | 17.47                  | 196.11                | 193.6                 | 215.61                | 181.18                | 20.89             | 20.96             | 23.81             | 18.07             |
| 2.2   | 20.91                  | 21.33                  | 23.01                  | 17.67                  | 197.54                | 194.86                | 218.37                | 182.44                | 20.85             | 20.93             | 23.69             | 18.07             |
| 2.4   | 21.09                  | 21.5                   | 23.08                  | 17.87                  | 198.94                | 196.16                | 221.19                | 183.75                | 20.81             | 20.90             | 23.56             | 18.07             |
| 2.6   | 21.27                  | 21.66                  | 23.14                  | 18.08                  | 200.35                | 197.5                 | 224.06                | 185.11                | 20.77             | 20.86             | 23.42             | 18.08             |
| 2.8   | 21.44                  | 21.81                  | 23.19                  | 18.28                  | 201.7                 | 198.87                | 226.99                | 186.55                | 20.72             | 20.80             | 23.27             | 18.08             |
| 3     | 21.59                  | 21.95                  | 23.24                  | 18.48                  | 203.04                | 200.29                | 229.92                | 188.1                 | 20.66             | 20.74             | 23.11             | 18.09             |
| 3.2   | 21.74                  | 22.08                  | 23.28                  | 18.69                  | 204.31                | 201.79                | 232.78                | 189.75                | 20.60             | 20.66             | 22.96             | 18.10             |
| 3.4   | 21.89                  | 22.2                   | 23.31                  | 18.9                   | 205.6                 | 203.34                | 235.5                 | 191.49                | 20.52             | 20.59             | 22.79             | 18.11             |
| 3.6   | 22.03                  | 22.31                  | 23.35                  | 19.11                  | 206.89                | 204.98                | 238.06                | 193.36                | 20.44             | 20.50             | 22.55             | 18.12             |
| 3.8   | 22.16                  | 22.42                  | 23.38                  | 19.31                  | 208.25                | 206.71                | 240.43                | 195.37                | 20.36             | 20.40             | 22.32             | 18.12             |
| 4     | 22.29                  | 22.51                  | 23.41                  | 19.51                  | 209.67                | 208.53                | 242.6                 | 197.48                | 20.27             | 20.29             | 21.77             | 18.12             |
| 4.2   | 22.41                  | 22.61                  |                        | 19.7                   | 211.17                | 210.47                |                       | 199.7                 | 20.18             | 20.17             |                   | 18.11             |
| 4.4   | 22.53                  | 22.69                  |                        | 19.88                  | 212.81                | 212.51                |                       | 201.97                | 20.10             | 20.05             |                   | 18.09             |
| 4.6   | 22.64                  | 22.77                  |                        | 20.04                  | 214.58                | 214.69                |                       | 203.89                | 20.01             | 19.93             |                   | 18.05             |
| 4.8   | 22.75                  | 22.85                  |                        | 20.17                  | 216.45                | 216.97                |                       | 205.61                | 19.92             | 19.80             |                   | 17.99             |
| 5     | 22.86                  | 22.92                  |                        | 20.29                  | 218.44                | 219.39                |                       | 207.3                 | 19.83             | 19.67             |                   | 17.91             |
| 5.2   | 22.97                  | 22.99                  |                        | 20.38                  | 220.52                | 221.93                |                       | 208.96                | 19.73             | 19.54             |                   | 17.81             |
| 5.4   | 23.07                  | 23.05                  |                        | 20.46                  | 222.69                | 224.63                |                       | 210.58                | 19.63             | 19.47             |                   | 17.69             |
| 5.6   | 23.17                  | 23.11                  |                        | 20.53                  | 224.95                | 227.47                |                       | 212.13                | 19.53             | 19.22             |                   | 17.56             |
| 5.8   | 23.26                  |                        |                        | 20.66                  | 227.29                |                       |                       | 213.67                | 19.42             |                   |                   | 17.48             |
| 6     | 23.35                  |                        |                        | 20.70                  | 229.69                |                       |                       | 215.32                | 19.31             |                   |                   | 17.32             |
| 6.2   |                        |                        |                        | 20.73                  |                       |                       |                       | 216.91                |                   |                   |                   | 17.15             |
| 6.4   |                        |                        |                        | 20.69                  |                       |                       |                       | 217.86                |                   |                   |                   | 16.93             |
| 6.6   |                        |                        |                        | 20.91                  |                       |                       |                       | 219.35                |                   |                   |                   | 17.01             |
| 6.8   |                        |                        |                        | 20.71                  |                       |                       |                       | 221.31                |                   |                   |                   | 16.59             |
| 7     |                        |                        |                        |                        |                       |                       |                       |                       |                   |                   |                   | 16.41             |
| 7.2   |                        |                        |                        |                        |                       |                       |                       |                       |                   |                   |                   | 16.08             |

## Typical Performance Data

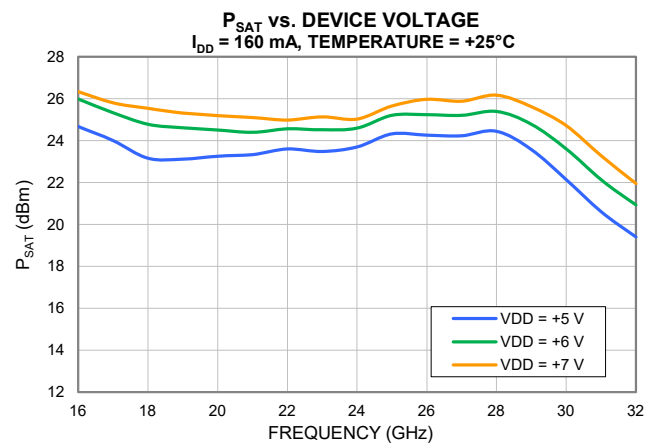
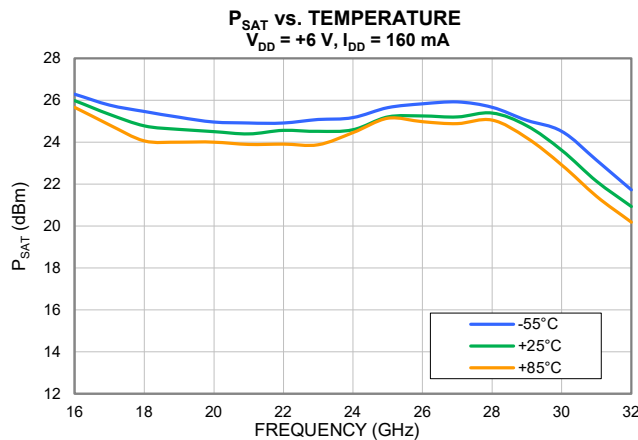
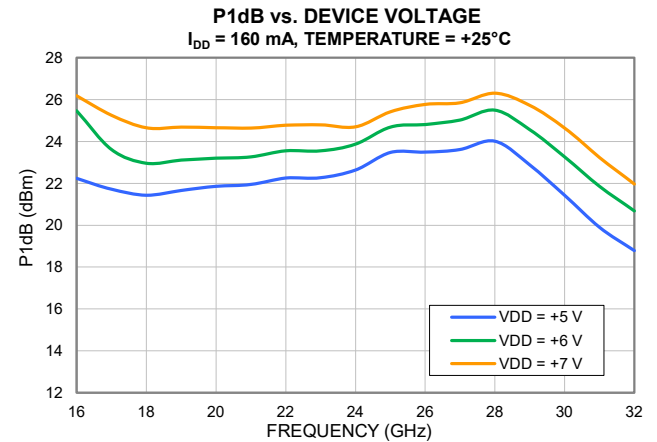
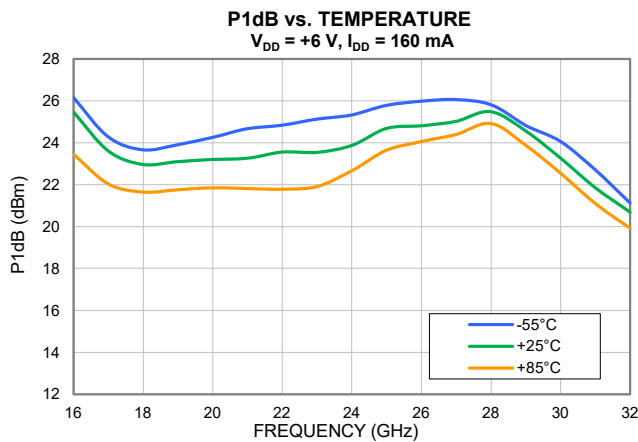
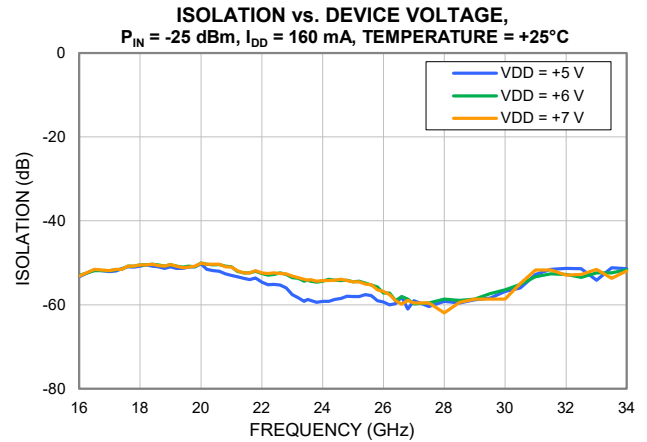
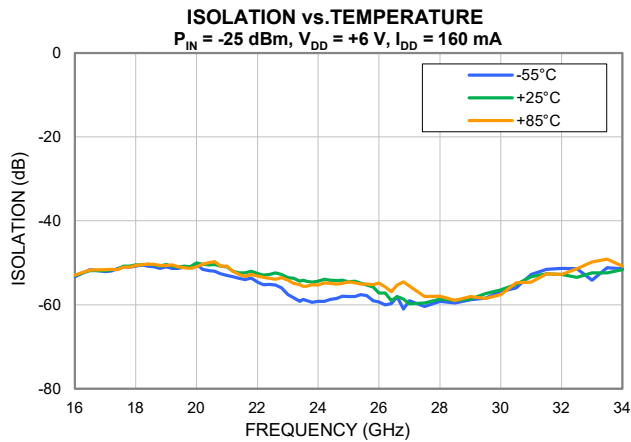
TEST CONDITIONS:  $V_{DD} = +6\text{ V}$ ,  $I_{DD} = 160\text{ mA}$ ,  $200\text{ mA}$ ,  $250\text{ mA}$  @ Temperature =  $+25^{\circ}\text{C}$ 

| FREQ  | Gain @ 160 mA | Gain @ 200 mA | Gain @ 250 mA | 1dB Comp. Output @ 160 mA | 1dB Comp. Output @ 200 mA | 1dB Comp. Output @ 250 mA | OIP3 @ 160 mA | OIP3 @ 200 mA | OIP3 @ 250 mA | Noise Figure @ 160 mA | Noise Figure @ 200 mA | Noise Figure @ 250 mA |
|-------|---------------|---------------|---------------|---------------------------|---------------------------|---------------------------|---------------|---------------|---------------|-----------------------|-----------------------|-----------------------|
| (GHz) | (dB)          | (dB)          | (dB)          | (dBm)                     | (dBm)                     | (dBm)                     | (dBm)         | (dBm)         | (dBm)         | (dB)                  | (dB)                  | (dB)                  |
| 16.0  | 18.79         | 19.64         | 20.14         | 25.46                     | 25.44                     | 25.54                     | 32.56         | 31.29         | 29.50         | 7.40                  | 7.38                  | 7.65                  |
| 16.5  | 19.40         | 20.20         | 20.67         | 24.51                     | 24.86                     | 25.08                     | 32.38         | 31.24         | 29.39         | 6.83                  | 6.81                  | 7.06                  |
| 17.0  | 19.66         | 20.41         | 20.85         | 23.61                     | 24.28                     | 24.61                     | 32.16         | 31.08         | 29.08         | 6.47                  | 6.43                  | 6.69                  |
| 17.2  | 19.71         | 20.43         | 20.86         | 23.35                     | 24.06                     | 24.43                     | 32.04         | 30.97         | 28.89         | 6.38                  | 6.35                  | 6.58                  |
| 17.4  | 19.71         | 20.41         | 20.83         | 23.18                     | 23.92                     | 24.31                     | 31.97         | 30.92         | 28.73         | 6.28                  | 6.27                  | 6.52                  |
| 17.6  | 19.74         | 20.42         | 20.82         | 23.08                     | 23.83                     | 24.22                     | 31.89         | 30.88         | 28.60         | 6.20                  | 6.19                  | 6.43                  |
| 17.8  | 19.71         | 20.36         | 20.75         | 22.98                     | 23.73                     | 24.10                     | 31.79         | 30.80         | 28.41         | 6.13                  | 6.11                  | 6.35                  |
| 18.0  | 19.70         | 20.32         | 20.69         | 22.96                     | 23.73                     | 24.12                     | 31.79         | 30.79         | 28.28         | 6.04                  | 6.02                  | 6.25                  |
| 18.2  | 19.68         | 20.27         | 20.62         | 22.95                     | 23.72                     | 24.09                     | 31.81         | 30.81         | 28.18         | 5.94                  | 5.94                  | 6.16                  |
| 18.4  | 19.63         | 20.19         | 20.52         | 22.95                     | 23.73                     | 24.10                     | 31.83         | 30.86         | 28.10         | 5.83                  | 5.83                  | 6.07                  |
| 18.6  | 19.56         | 20.07         | 20.39         | 23.02                     | 23.83                     | 24.20                     | 31.93         | 30.95         | 28.09         | 5.71                  | 5.73                  | 5.96                  |
| 18.8  | 19.48         | 19.96         | 20.26         | 23.04                     | 23.85                     | 24.21                     | 32.09         | 31.12         | 28.15         | 5.56                  | 5.59                  | 5.84                  |
| 19.0  | 19.39         | 19.84         | 20.13         | 23.11                     | 23.94                     | 24.29                     | 32.25         | 31.26         | 28.21         | 5.44                  | 5.46                  | 5.71                  |
| 19.2  | 19.28         | 19.71         | 19.97         | 23.17                     | 24.01                     | 24.36                     | 32.49         | 31.46         | 28.34         | 5.32                  | 5.29                  | 5.57                  |
| 19.4  | 19.22         | 19.62         | 19.88         | 23.17                     | 24.01                     | 24.35                     | 32.74         | 31.63         | 28.45         | 5.16                  | 5.18                  | 5.43                  |
| 19.6  | 19.20         | 19.58         | 19.82         | 23.22                     | 24.06                     | 24.41                     | 33.04         | 31.80         | 28.54         | 5.02                  | 5.05                  | 5.30                  |
| 19.8  | 19.12         | 19.49         | 19.72         | 23.21                     | 24.04                     | 24.38                     | 33.24         | 31.97         | 28.60         | 4.88                  | 4.93                  | 5.17                  |
| 20.0  | 19.08         | 19.43         | 19.65         | 23.20                     | 24.01                     | 24.35                     | 33.46         | 32.13         | 28.66         | 4.78                  | 4.81                  | 5.07                  |
| 20.2  | 18.96         | 19.29         | 19.50         | 23.23                     | 24.03                     | 24.36                     | 33.69         | 32.24         | 28.68         | 4.66                  | 4.71                  | 4.97                  |
| 20.4  | 18.93         | 19.25         | 19.45         | 23.19                     | 23.97                     | 24.29                     | 33.78         | 32.33         | 28.69         | 4.52                  | 4.60                  | 4.86                  |
| 20.6  | 18.93         | 19.24         | 19.43         | 23.21                     | 23.98                     | 24.30                     | 33.99         | 32.47         | 28.70         | 4.44                  | 4.51                  | 4.73                  |
| 20.8  | 18.95         | 19.25         | 19.43         | 23.25                     | 24.01                     | 24.32                     | 34.24         | 32.60         | 28.73         | 4.34                  | 4.42                  | 4.65                  |
| 21.0  | 18.90         | 19.20         | 19.37         | 23.26                     | 24.01                     | 24.31                     | 34.36         | 32.66         | 28.71         | 4.28                  | 4.35                  | 4.61                  |
| 21.2  | 18.93         | 19.22         | 19.39         | 23.35                     | 24.11                     | 24.39                     | 34.53         | 32.79         | 28.70         | 4.21                  | 4.29                  | 4.55                  |
| 21.4  | 18.95         | 19.23         | 19.39         | 23.41                     | 24.18                     | 24.45                     | 34.84         | 32.95         | 28.76         | 4.17                  | 4.24                  | 4.49                  |
| 21.6  | 18.95         | 19.22         | 19.37         | 23.46                     | 24.21                     | 24.47                     | 35.05         | 33.03         | 28.77         | 4.10                  | 4.16                  | 4.45                  |
| 21.8  | 18.92         | 19.18         | 19.32         | 23.56                     | 24.30                     | 24.54                     | 35.27         | 33.14         | 28.85         | 4.06                  | 4.11                  | 4.39                  |
| 22.0  | 18.90         | 19.16         | 19.29         | 23.56                     | 24.29                     | 24.53                     | 35.52         | 33.28         | 28.95         | 4.00                  | 4.08                  | 4.33                  |
| 22.2  | 18.93         | 19.18         | 19.31         | 23.58                     | 24.30                     | 24.56                     | 35.63         | 33.36         | 29.07         | 3.94                  | 4.02                  | 4.31                  |
| 22.4  | 18.94         | 19.19         | 19.31         | 23.62                     | 24.34                     | 24.60                     | 35.65         | 33.41         | 29.12         | 3.88                  | 3.97                  | 4.26                  |
| 22.6  | 18.91         | 19.15         | 19.27         | 23.54                     | 24.26                     | 24.54                     | 35.77         | 33.50         | 29.16         | 3.85                  | 3.94                  | 4.23                  |
| 22.8  | 18.91         | 19.15         | 19.25         | 23.57                     | 24.29                     | 24.57                     | 35.81         | 33.54         | 29.21         | 3.79                  | 3.89                  | 4.20                  |
| 23.0  | 18.97         | 19.21         | 19.31         | 23.55                     | 24.25                     | 24.51                     | 35.89         | 33.61         | 29.25         | 3.76                  | 3.87                  | 4.18                  |
| 23.2  | 19.01         | 19.24         | 19.35         | 23.50                     | 24.17                     | 24.44                     | 36.06         | 33.65         | 29.19         | 3.72                  | 3.84                  | 4.17                  |
| 23.4  | 19.02         | 19.25         | 19.35         | 23.55                     | 24.22                     | 24.47                     | 36.22         | 33.67         | 29.19         | 3.69                  | 3.83                  | 4.16                  |
| 23.5  | 19.03         | 19.25         | 19.35         | 23.55                     | 24.19                     | 24.43                     | 36.30         | 33.66         | 29.17         | 3.64                  | 3.80                  | 4.14                  |
| 23.6  | 19.08         | 19.31         | 19.41         | 23.63                     | 24.26                     | 24.50                     | 36.42         | 33.66         | 29.15         | 3.60                  | 3.79                  | 4.12                  |
| 23.8  | 19.17         | 19.40         | 19.50         | 23.77                     | 24.39                     | 24.60                     | 36.48         | 33.62         | 29.08         | 3.57                  | 3.79                  | 4.13                  |
| 24.0  | 19.26         | 19.49         | 19.59         | 23.87                     | 24.46                     | 24.67                     | 36.47         | 33.59         | 29.08         | 3.53                  | 3.81                  | 4.13                  |
| 24.2  | 19.36         | 19.60         | 19.70         | 24.10                     | 24.66                     | 24.86                     | 36.40         | 33.55         | 29.05         | 3.48                  | 3.81                  | 4.15                  |
| 24.4  | 19.41         | 19.65         | 19.75         | 24.20                     | 24.75                     | 24.94                     | 36.38         | 33.53         | 29.05         | 3.46                  | 3.82                  | 4.16                  |
| 24.6  | 19.45         | 19.69         | 19.80         | 24.28                     | 24.82                     | 25.00                     | 36.41         | 33.54         | 29.06         | 3.44                  | 3.83                  | 4.17                  |
| 24.8  | 19.52         | 19.77         | 19.88         | 24.47                     | 24.99                     | 25.17                     | 36.29         | 33.49         | 29.03         | 3.39                  | 3.83                  | 4.16                  |
| 25.0  | 19.67         | 19.92         | 20.04         | 24.69                     | 25.19                     | 25.37                     | 36.43         | 33.53         | 29.09         | 3.34                  | 3.80                  | 4.15                  |
| 25.2  | 19.83         | 20.10         | 20.22         | 24.79                     | 25.28                     | 25.47                     | 36.54         | 33.55         | 29.16         | 3.31                  | 3.80                  | 4.14                  |
| 25.4  | 19.98         | 20.26         | 20.39         | 24.86                     | 25.33                     | 25.53                     | 36.91         | 33.64         | 29.21         | 3.26                  | 3.78                  | 4.07                  |
| 25.6  | 20.19         | 20.47         | 20.61         | 24.91                     | 25.37                     | 25.55                     | 37.05         | 33.65         | 29.23         | 3.22                  | 3.76                  | 4.03                  |
| 25.8  | 20.37         | 20.66         | 20.81         | 24.84                     | 25.26                     | 25.45                     | 37.22         | 33.68         | 29.24         | 3.15                  | 3.70                  | 3.97                  |
| 26.0  | 20.58         | 20.89         | 21.04         | 24.81                     | 25.21                     | 25.38                     | 37.35         | 33.70         | 29.26         | 3.12                  | 3.62                  | 3.89                  |
| 26.2  | 20.77         | 21.09         | 21.26         | 24.83                     | 25.19                     | 25.35                     | 37.34         | 33.67         | 29.18         | 3.08                  | 3.56                  | 3.83                  |
| 26.4  | 20.97         | 21.30         | 21.48         | 24.78                     | 25.10                     | 25.25                     | 37.30         | 33.60         | 29.08         | 3.06                  | 3.47                  | 3.77                  |
| 26.6  | 21.19         | 21.53         | 21.72         | 24.88                     | 25.17                     | 25.29                     | 37.51         | 33.59         | 29.06         | 3.02                  | 3.41                  | 3.71                  |
| 26.8  | 21.45         | 21.81         | 22.01         | 24.97                     | 25.22                     | 25.32                     | 37.69         | 33.51         | 28.98         | 2.97                  | 3.35                  | 3.62                  |
| 27.0  | 21.68         | 22.06         | 22.28         | 25.03                     | 25.25                     | 25.34                     | 37.75         | 33.47         | 28.91         | 3.02                  | 3.30                  | 3.58                  |
| 27.5  | 22.26         | 22.68         | 22.95         | 25.36                     | 25.49                     | 25.57                     | 37.80         | 33.35         | 28.86         | 3.03                  | 3.21                  | 3.50                  |
| 28.0  | 22.91         | 23.41         | 23.75         | 25.49                     | 25.57                     | 25.65                     | 37.98         | 33.29         | 28.74         | 3.12                  | 3.11                  | 3.43                  |
| 28.5  | 23.49         | 24.11         | 24.58         | 25.20                     | 25.27                     | 25.32                     | 38.93         | 33.42         | 28.74         | 3.31                  | 3.16                  | 3.49                  |
| 29.0  | 23.78         | 24.56         | 25.20         | 24.56                     | 24.61                     | 24.65                     | 39.61         | 33.58         | 28.66         | 3.41                  | 3.18                  | 3.53                  |
| 29.5  | 23.53         | 24.48         | 25.31         | 23.89                     | 23.96                     | 23.98                     | 39.68         | 33.58         | 28.35         | 3.42                  | 3.22                  | 3.58                  |
| 30.0  | 22.78         | 23.87         | 24.87         | 23.26                     | 23.34                     | 23.35                     | 39.14         | 33.68         | 27.91         | 3.52                  | 3.37                  | 3.71                  |
| 30.5  | 21.61         | 22.79         | 23.89         | 22.58                     | 22.66                     | 22.66                     | 38.03         | 33.99         | 27.44         | 3.50                  | 3.47                  | 3.83                  |
| 31.0  | 20.30         | 21.53         | 22.69         | 21.85                     | 21.92                     | 21.92                     | 36.08         | 34.29         | 26.93         | 3.64                  | 3.58                  | 3.96                  |
| 31.5  | 18.75         | 19.96         | 21.12         | 21.15                     | 21.21                     | 21.24                     | 34.06         | 34.26         | 26.35         | 3.84                  | 3.77                  | 4.15                  |
| 32.0  | 16.92         | 18.09         | 19.19         | 20.69                     | 20.76                     | 20.83                     | 33.15         | 33.84         | 25.93         | 3.99                  | 3.98                  | 4.35                  |
| 32.5  | 14.81         | 15.91         | 16.94         |                           |                           |                           |               |               |               |                       |                       |                       |
| 33.0  | 12.48         | 13.51         | 14.46         |                           |                           |                           |               |               |               |                       |                       |                       |
| 33.5  | 10.16         | 11.12         | 11.99         |                           |                           |                           |               |               |               |                       |                       |                       |
| 34.0  | 7.90          | 8.78          | 9.56          |                           |                           |                           |               |               |               |                       |                       |                       |

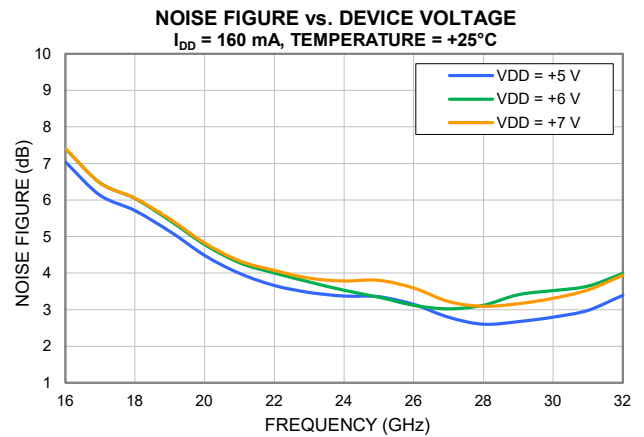
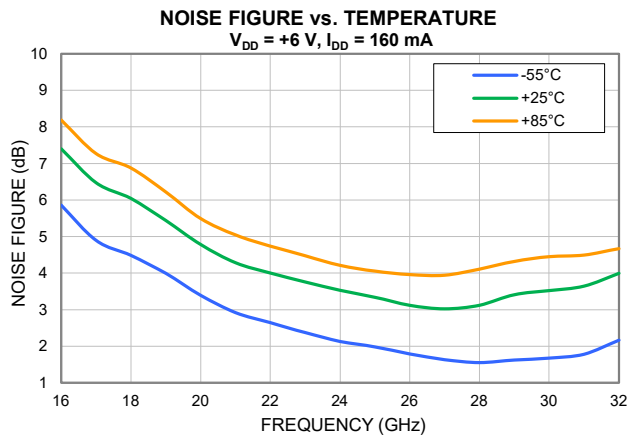
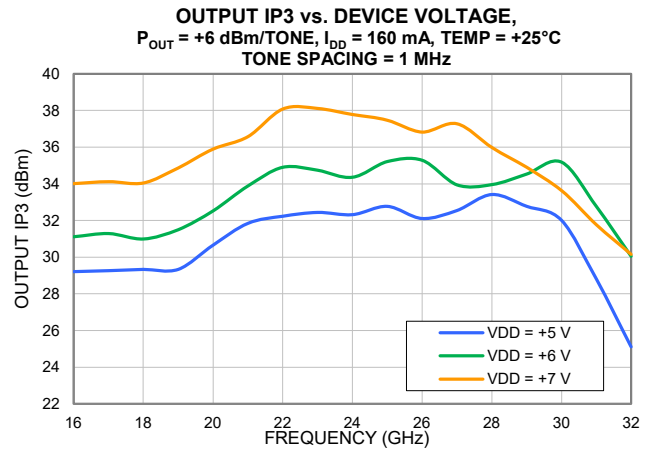
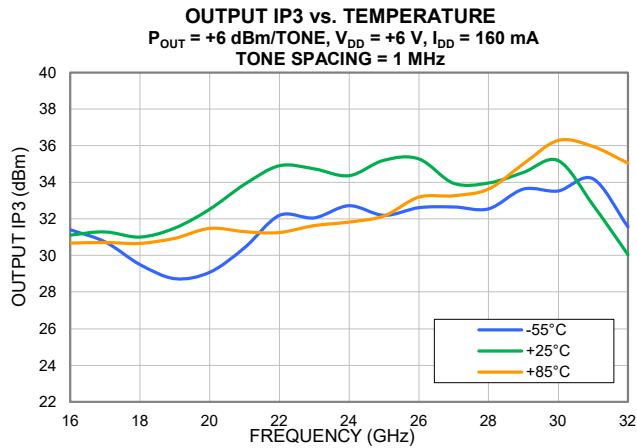
## Typical Performance Curves



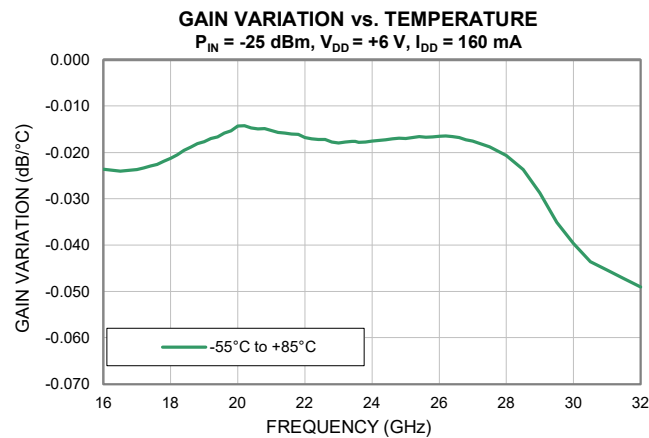
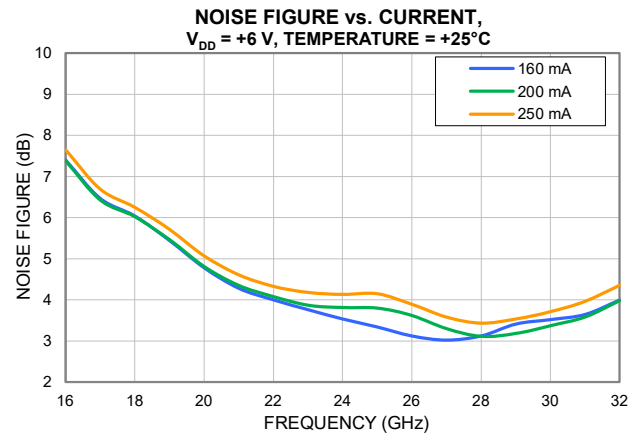
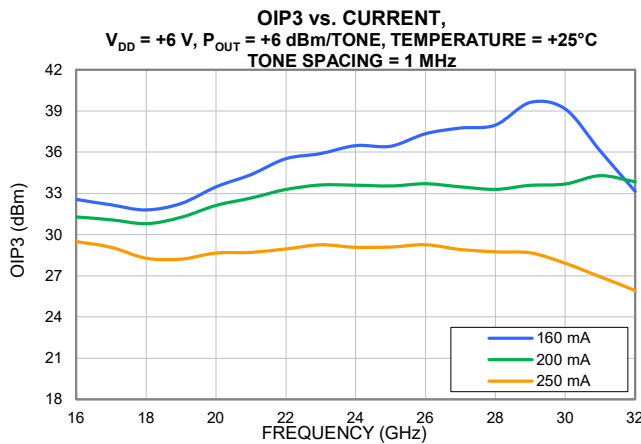
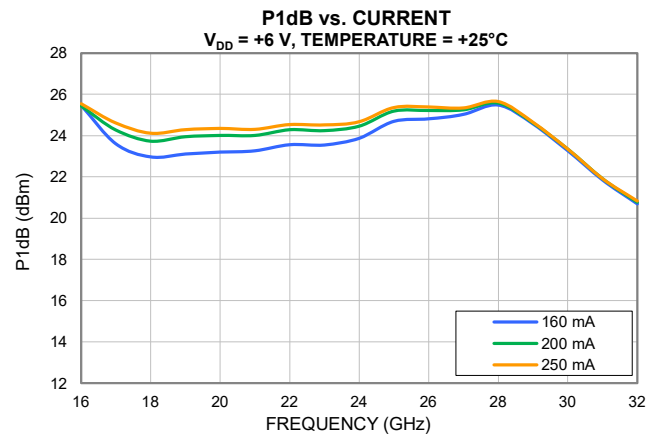
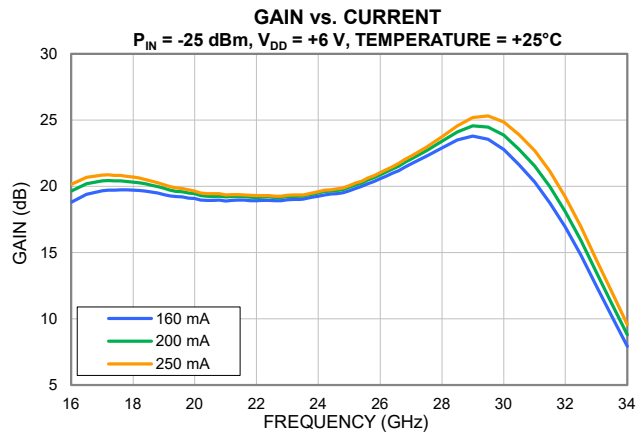
## Typical Performance Curves



## Typical Performance Curves

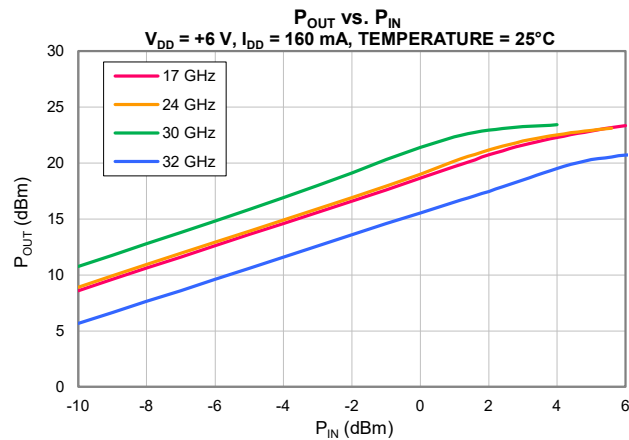
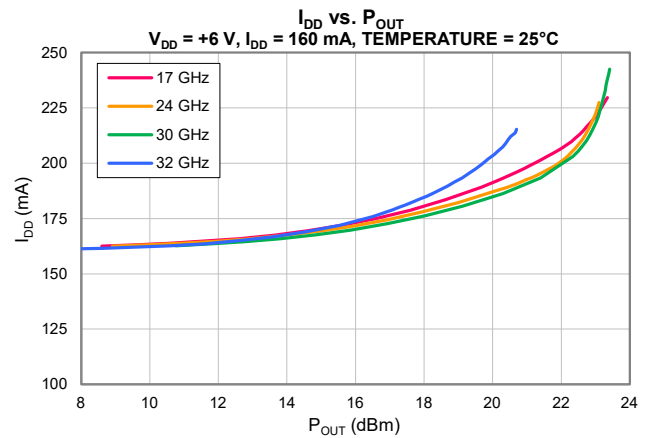
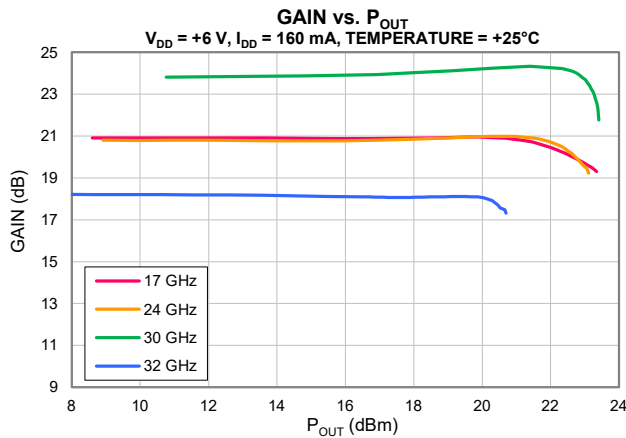


## Typical Performance Curves



## Typical Performance Curves

Note: All data on this page represents the Die attached in a 4x4 mm 20-Lead QFN-style package measured on Mini-Circuits Characterization Test Board TB-AVA-17303C+





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)                           |                                      |