MMIC SURFACE MOUNT

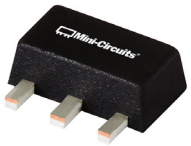
# Monolithic Amplifier

# GALI-6F+

50Ω DC to 4 GHz

## FEATURES

- Frequency Range, DC to 4 GHz
- InGap HBT Microwave Amplifier
- Miniature SOT-89 Package
- Internally Matched to 50Ω
- Output Power, +15.8 dBm Typ.
- Excellent Package for Heat Dissipation, Exposed Metal Bottom
- Low Thermal Resistance for High Reliability
- Aqueous Washable
- Protected By US Patent 6,943,629



*Generic photo used for illustration purposes only*

CASE STYLE: DF782

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

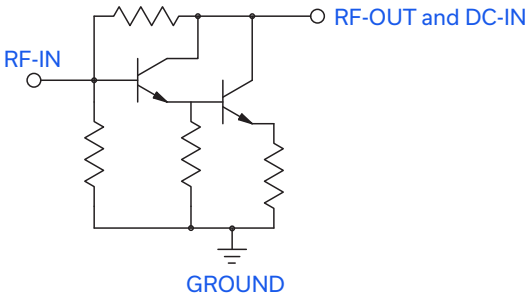
## APPLICATIONS

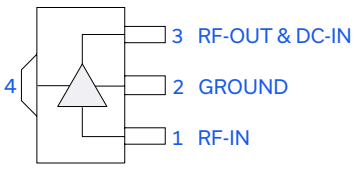
- Cellular
- PCS
- Communication Receivers & Transmitters

## PRODUCT OVERVIEW

Gali-6F+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot, and is enclosed in a SOT-89 package. It uses patented Transient Protected Darlington configuration and is fabricated using InGaP HBT technology. Expected MTTF is 8,000 years at +85°C case temperature. Gali-6F+ is designed to be rugged for ESD and supply switch-on transients.

## SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION




| Function | Pin Number | Description |
|---|---|---|
| RF-IN | 1 | RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation. |
| RF-OUT and DC-IN | 3 | RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit". |
| GND | 2,4 | Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance. |

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ECO-024667
GALI-6F+
MCL NY
250225

# Monolithic Amplifier

## GALI-6F+

50Ω DC to 4 GHz

### ELECTRICAL SPECIFICATIONS AT +25°C AND 50 mA UNLESS NOTED OTHERWISE

| Parameter | Conditions (GHz) | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Frequency Range[1] | | DC | | 4 | GHz |
| Gain | 0.1 | 10 | 12.1 | | dB |
| | 1 | | 12.0 | | |
| | 2 | | 11.6 | | |
| | 3 | | 11.4 | | |
| | 4 | | 10.9 | | |
| | 6 | | 12.3 | | |
| Input Return Loss | DC - 3 | | 14 | | dB |
| | 3 - 4 | | 14 | | |
| Output Return Loss | DC - 3 | | 10 | | dB |
| | 3 - 4 | | 8.5 | | |
| Output Power @ 1 dB Compression | 1 | +14.3 | +15.8 | | dBm |
| Output IP3 | 1 | | +35.5 | | dBm |
| Noise Figure | 1 | | 4.5 | | dB |
| Recommended Device Operating Current | | | 50 | | mA |
| Device Operating Voltage | | +4.2 | +4.8 | +5.4 | V |
| Device Voltage Variation vs. Temperature at 50 mA | | | -3.3 | | mV/°C |
| Device Voltage Variation vs. Current at +25°C | | | 12.5 | | mV/mA |
| Thermal Resistance, Junction-to-Case[2] | | | 93 | | °C/W |

1. Guaranteed specification DC-4 GHz. Low frequency cut off determined by external coupling capacitors.
2. Case is defined as ground leads.

### ABSOLUTE MAXIMUM RATINGS

| Parameter | Ratings |
|---|---|
| Operating Temperature[3] | -45°C to +85°C |
| Storage Temperature | -65°C to +150°C |
| Operating Current | 65 mA |
| Input Power | +20 dBm |

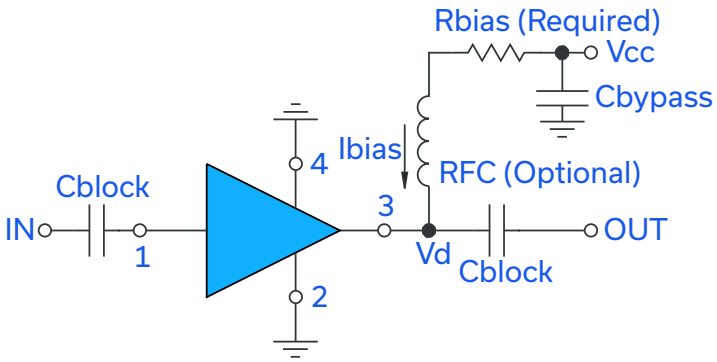
3. Based on typical case temperature rise +4°C above ambient.
Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.

# Monolithic Amplifier

# GALI-6F+

50Ω DC to 4 GHz

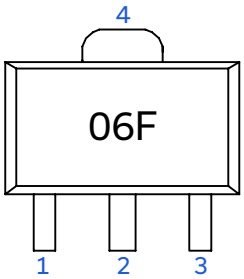
## RECOMMENDED APPLICATION CIRCUIT




Test Board includes case, connectors, and components (in bold) soldered to PCB

| R BIAS | |
|---|---|
| Vcc | "1%" Res. Values (Ohms) for Optimum Biasing |
| 7 | 49.9 |
| 8 | 69.8 |
| 9 | 88.7 |
| 10 | 110 |
| 11 | 127 |
| 12 | 147 |
| 13 | 165 |
| 14 | 187 |
| 15 | 205 |
| 16 | 226 |
| 17 | 249 |
| 18 | 267 |
| 19 | 287 |
| 20 | 309 |

## PRODUCT MARKING




Markings in addition to model number designation may appear for internal quality control purposes.

# Monolithic Amplifier

## GALI-6F+

50Ω DC to 4 GHz

**ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.** CLICK HERE

| | |
|---|---|
| **Performance Data & Graphs** | Data Table<br>Swept Graphs<br>S-Parameter (S2P Files) Data Set (.zip file) |
| **Case Style** | DF782 Plastic package, Lead Finish: Matte-tin |
| **Tape & Reel**<br>**Standard Quantities Available on Reel** | F55<br>7" Reels with 20, 50, 100, 200, 500 or 1K devices |
| **Suggested Layout for PCB Design** | PL019 |
| **Evaluation Board** | TB-409-6F+ |
| **Environmental Ratings** | ENV08T2 |

## ESD RATING

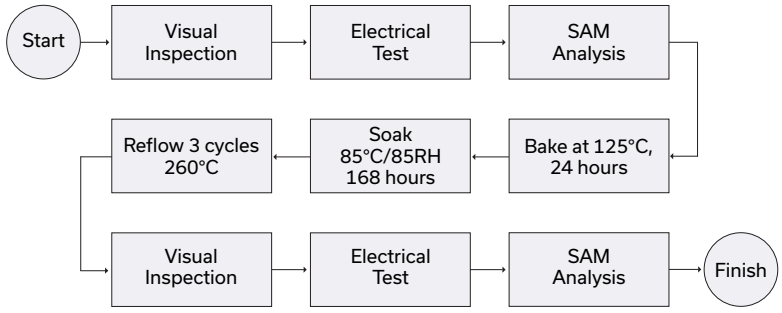
Human Body Model (HBM): Class 1B (500 V to < 1000 V) in accordance with ANSI/ESD STM 5.1 - 2001
Machine Model (MM): Class M1 ( < 100 V) in accordance with ESD STM 5.2 - 1999

## MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDECJ-STD-020C

| No. | Test Required | Condition | Standard | Quantity |
|---|---|---|---|---|
| 1 | Visual Inspection | Low Power Microscope Magnification 40x | MIP-IN-0003 (MCT spec) | 45 units |
| 2 | Electrical Test | Room Temperature | SCD (MCL spec) | 45 units |
| 3 | SAM Analysis | Less than 10% growth in term of delamination | J-Std-020C (Jedec Standard) | 45 units |
| 4 | Moisture Sensitivity Level 1 | Bake at 125°C for 24 hours<br>Soak at 85°C/85%RH for 168 hours<br>Reflow 3 cycles at 260°C peak | J-Std-020C (Jedec Standard) | 45 units |

## MSL TEST FLOW CHART




NOTES

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

# MMIC Amplifier GALI-6F+

## *Typical Performance Data*

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

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

TEST CONDITIONS: Icc = 50mA, Vd = 4.64V @Temperature = +25degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 12.79 | 18.61 | 22.21 | 36.99 | 1.23 | 0.51 | 30.96 | 15.01 | 4.17 |
| 100 | 12.81 | 18.62 | 22.08 | 37.34 | 1.23 | 0.51 | 31.12 | 15.15 | 4.36 |
| 200 | 12.78 | 18.63 | 22.52 | 37.53 | 1.23 | 0.51 | 31.30 | 15.00 | 4.23 |
| 300 | 12.74 | 18.65 | 22.06 | 38.44 | 1.24 | 0.51 | 31.00 | 14.88 | 4.35 |
| 400 | 12.71 | 18.65 | 22.38 | 37.76 | 1.24 | 0.51 | 30.65 | 15.10 | 4.39 |
| 500 | 12.68 | 18.68 | 21.95 | 37.84 | 1.24 | 0.50 | 30.50 | 15.06 | 4.35 |
| 600 | 12.63 | 18.69 | 22.28 | 37.22 | 1.25 | 0.50 | 30.38 | 14.91 | 4.31 |
| 700 | 12.59 | 18.70 | 21.73 | 36.61 | 1.25 | 0.50 | 30.65 | 15.02 | 4.33 |
| 800 | 12.54 | 18.74 | 22.06 | 36.15 | 1.26 | 0.49 | 30.83 | 15.10 | 4.41 |
| 900 | 12.51 | 18.74 | 21.36 | 35.18 | 1.26 | 0.49 | 30.82 | 15.15 | 4.34 |
| 1000 | 12.46 | 18.77 | 21.65 | 34.73 | 1.27 | 0.48 | 30.58 | 15.15 | 4.35 |
| 1100 | 12.42 | 18.81 | 21.19 | 34.22 | 1.28 | 0.48 | 30.37 | 14.93 | 4.28 |
| 1200 | 12.37 | 18.84 | 21.11 | 33.25 | 1.28 | 0.48 | 30.22 | 14.65 | 4.38 |
| 1300 | 12.33 | 18.89 | 20.90 | 32.46 | 1.29 | 0.47 | 30.01 | 14.71 | 4.40 |
| 1400 | 12.28 | 18.93 | 20.35 | 31.79 | 1.30 | 0.47 | 29.67 | 14.71 | 4.41 |
| 1500 | 12.23 | 18.98 | 20.24 | 30.95 | 1.31 | 0.46 | 29.61 | 14.64 | 4.46 |
| 1600 | 12.18 | 19.02 | 19.62 | 29.73 | 1.31 | 0.46 | 30.07 | 14.66 | 4.46 |
| 1700 | 12.14 | 19.08 | 19.60 | 28.86 | 1.32 | 0.45 | 30.44 | 14.80 | 4.45 |
| 1800 | 12.08 | 19.14 | 18.95 | 28.09 | 1.33 | 0.45 | 30.22 | 14.67 | 4.44 |
| 1900 | 12.05 | 19.18 | 18.70 | 27.05 | 1.34 | 0.44 | 29.84 | 14.70 | 4.46 |
| 2000 | 12.03 | 19.26 | 18.13 | 26.08 | 1.35 | 0.44 | 29.70 | 14.59 | 4.39 |
| 2100 | 11.94 | 19.31 | 17.92 | 25.37 | 1.36 | 0.43 | 29.50 | 14.61 | 4.50 |
| 2200 | 11.91 | 19.39 | 17.44 | 24.45 | 1.37 | 0.43 | 29.38 | 14.74 | 4.35 |
| 2300 | 11.85 | 19.44 | 17.07 | 23.59 | 1.38 | 0.42 | 29.25 | 14.83 | 4.51 |
| 2400 | 11.79 | 19.53 | 16.80 | 22.84 | 1.40 | 0.42 | 29.10 | 14.80 | 4.43 |
| 2500 | 11.75 | 19.59 | 16.41 | 22.11 | 1.41 | 0.41 | 28.90 | 14.89 | 4.46 |
| 2600 | 11.67 | 19.69 | 16.08 | 21.40 | 1.42 | 0.40 | 28.62 | 14.80 | 4.47 |
| 2700 | 11.64 | 19.75 | 15.76 | 20.80 | 1.43 | 0.40 | 28.68 | 14.77 | 4.49 |
| 2800 | 11.57 | 19.83 | 15.57 | 20.30 | 1.45 | 0.40 | 28.51 | 14.72 | 4.45 |
| 2900 | 11.54 | 19.91 | 15.28 | 19.77 | 1.46 | 0.39 | 28.36 | 14.59 | 4.53 |
| 3000 | 11.47 | 19.99 | 14.98 | 19.36 | 1.47 | 0.39 | 28.16 | 14.54 | 4.38 |
| 3100 | 11.42 | 20.08 | 14.78 | 18.80 | 1.49 | 0.38 | 27.67 | 14.39 | 4.55 |
| 3200 | 11.39 | 20.16 | 14.49 | 18.33 | 1.50 | 0.38 | 27.47 | 14.49 | 4.41 |
| 3300 | 11.33 | 20.25 | 14.27 | 17.98 | 1.52 | 0.37 | 27.34 | 14.57 | 4.66 |
| 3400 | 11.32 | 20.35 | 14.08 | 17.55 | 1.53 | 0.37 | 27.20 | 14.52 | 4.59 |
| 3500 | 11.25 | 20.43 | 13.85 | 17.25 | 1.55 | 0.37 | 27.11 | 14.45 | 4.46 |
| 3600 | 11.25 | 20.49 | 13.79 | 16.94 | 1.55 | 0.37 | 26.86 | 14.36 | 4.68 |
| 3700 | 11.17 | 20.61 | 13.54 | 16.64 | 1.58 | 0.36 | 26.59 | 14.27 | 4.51 |
| 3800 | 11.16 | 20.66 | 13.44 | 16.43 | 1.58 | 0.36 | 26.40 | 14.01 | 4.63 |
| 4000 | 11.06 | 20.85 | 13.25 | 15.97 | 1.62 | 0.35 | 26.24 | 13.76 | 4.51 |



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## *Typical Performance Data*

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

TEST CONDITIONS: Icc = 40mA, Vd = 4.51V @Temperature = +25degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 12.59 | 18.46 | 20.97 | 30.46 | 1.23 | 0.51 | 26.73 | 12.12 | 4.14 |
| 100 | 12.61 | 18.45 | 20.90 | 30.49 | 1.23 | 0.51 | 26.89 | 12.22 | 4.32 |
| 200 | 12.58 | 18.49 | 21.25 | 30.72 | 1.23 | 0.51 | 27.04 | 12.05 | 4.19 |
| 300 | 12.55 | 18.51 | 20.86 | 31.12 | 1.24 | 0.51 | 26.82 | 11.96 | 4.30 |
| 400 | 12.51 | 18.55 | 21.18 | 30.91 | 1.24 | 0.50 | 26.56 | 12.16 | 4.34 |
| 500 | 12.48 | 18.55 | 20.79 | 31.22 | 1.25 | 0.50 | 26.53 | 12.09 | 4.31 |
| 600 | 12.43 | 18.56 | 21.05 | 31.17 | 1.25 | 0.50 | 26.47 | 12.00 | 4.29 |
| 700 | 12.38 | 18.56 | 20.57 | 30.98 | 1.26 | 0.49 | 26.77 | 12.19 | 4.28 |
| 800 | 12.35 | 18.59 | 20.89 | 30.56 | 1.26 | 0.49 | 27.00 | 12.19 | 4.36 |
| 900 | 12.32 | 18.62 | 20.32 | 30.23 | 1.27 | 0.49 | 27.03 | 12.25 | 4.28 |
| 1000 | 12.27 | 18.63 | 20.51 | 30.10 | 1.27 | 0.48 | 26.81 | 12.29 | 4.31 |
| 1100 | 12.23 | 18.67 | 20.13 | 29.83 | 1.28 | 0.48 | 26.59 | 12.08 | 4.24 |
| 1200 | 12.17 | 18.71 | 20.03 | 29.32 | 1.29 | 0.47 | 26.49 | 11.78 | 4.35 |
| 1300 | 12.15 | 18.74 | 19.84 | 28.80 | 1.29 | 0.47 | 26.35 | 11.93 | 4.32 |
| 1400 | 12.10 | 18.79 | 19.34 | 28.34 | 1.30 | 0.47 | 26.09 | 11.85 | 4.36 |
| 1500 | 12.04 | 18.84 | 19.29 | 27.68 | 1.31 | 0.46 | 26.06 | 11.84 | 4.44 |
| 1600 | 12.00 | 18.90 | 18.70 | 26.95 | 1.32 | 0.45 | 26.47 | 11.82 | 4.39 |
| 1700 | 11.95 | 18.95 | 18.66 | 26.34 | 1.33 | 0.45 | 26.85 | 11.96 | 4.40 |
| 1800 | 11.90 | 19.00 | 18.07 | 25.68 | 1.34 | 0.44 | 26.70 | 11.83 | 4.41 |
| 1900 | 11.87 | 19.07 | 17.86 | 24.88 | 1.34 | 0.44 | 26.43 | 11.85 | 4.37 |
| 2000 | 11.84 | 19.11 | 17.36 | 24.08 | 1.35 | 0.44 | 26.31 | 11.81 | 4.34 |
| 2100 | 11.77 | 19.19 | 17.17 | 23.47 | 1.36 | 0.43 | 26.17 | 11.80 | 4.45 |
| 2200 | 11.73 | 19.26 | 16.74 | 22.73 | 1.37 | 0.43 | 26.15 | 11.93 | 4.32 |
| 2300 | 11.67 | 19.34 | 16.41 | 22.04 | 1.39 | 0.42 | 26.21 | 12.10 | 4.45 |
| 2400 | 11.62 | 19.41 | 16.12 | 21.46 | 1.40 | 0.41 | 26.24 | 12.12 | 4.38 |
| 2500 | 11.57 | 19.46 | 15.75 | 20.83 | 1.41 | 0.41 | 26.20 | 12.22 | 4.43 |
| 2600 | 11.49 | 19.55 | 15.42 | 20.26 | 1.42 | 0.40 | 26.05 | 12.17 | 4.44 |
| 2700 | 11.47 | 19.61 | 15.11 | 19.74 | 1.43 | 0.40 | 26.24 | 12.16 | 4.45 |
| 2800 | 11.41 | 19.69 | 14.93 | 19.26 | 1.45 | 0.40 | 26.15 | 12.04 | 4.39 |
| 2900 | 11.37 | 19.79 | 14.68 | 18.78 | 1.46 | 0.39 | 26.05 | 11.97 | 4.48 |
| 3000 | 11.31 | 19.86 | 14.42 | 18.43 | 1.47 | 0.39 | 25.94 | 12.00 | 4.33 |
| 3100 | 11.25 | 19.93 | 14.21 | 17.97 | 1.48 | 0.38 | 25.54 | 12.07 | 4.49 |
| 3200 | 11.22 | 20.02 | 13.92 | 17.56 | 1.50 | 0.38 | 25.47 | 12.26 | 4.32 |
| 3300 | 11.16 | 20.11 | 13.71 | 17.22 | 1.51 | 0.38 | 25.44 | 12.43 | 4.60 |
| 3400 | 11.15 | 20.20 | 13.56 | 16.82 | 1.52 | 0.37 | 25.37 | 12.44 | 4.52 |
| 3500 | 11.09 | 20.28 | 13.34 | 16.53 | 1.54 | 0.37 | 25.32 | 12.30 | 4.42 |
| 3600 | 11.09 | 20.34 | 13.29 | 16.25 | 1.54 | 0.37 | 25.06 | 12.38 | 4.61 |
| 3700 | 11.00 | 20.48 | 13.06 | 15.99 | 1.57 | 0.36 | 24.77 | 12.31 | 4.43 |
| 3800 | 10.99 | 20.53 | 12.95 | 15.81 | 1.58 | 0.36 | 24.57 | 12.15 | 4.57 |
| 4000 | 10.91 | 20.72 | 12.75 | 15.40 | 1.62 | 0.35 | 24.45 | 11.98 | 4.44 |




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## *Typical Performance Data*

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

TEST CONDITIONS: Icc = 60mA, Vd = 4.76V @Temperature = +25degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 12.90 | 18.58 | 23.17 | 43.90 | 1.22 | 0.52 | 33.77 | 16.68 | 4.26 |
| 100 | 12.94 | 18.68 | 22.87 | 46.57 | 1.22 | 0.52 | 33.93 | 16.73 | 4.42 |
| 200 | 12.88 | 18.74 | 23.36 | 47.40 | 1.23 | 0.51 | 34.17 | 16.72 | 4.29 |
| 300 | 12.86 | 18.72 | 22.85 | 47.46 | 1.23 | 0.51 | 33.74 | 16.65 | 4.43 |
| 400 | 12.81 | 18.74 | 23.24 | 44.92 | 1.24 | 0.51 | 33.34 | 16.82 | 4.42 |
| 500 | 12.78 | 18.76 | 22.75 | 43.95 | 1.24 | 0.50 | 33.05 | 16.72 | 4.41 |
| 600 | 12.73 | 18.76 | 23.06 | 42.28 | 1.25 | 0.50 | 32.89 | 16.66 | 4.38 |
| 700 | 12.69 | 18.78 | 22.46 | 41.32 | 1.25 | 0.50 | 33.08 | 16.75 | 4.41 |
| 800 | 12.65 | 18.82 | 22.85 | 39.97 | 1.26 | 0.49 | 33.16 | 16.78 | 4.46 |
| 900 | 12.62 | 18.83 | 22.11 | 38.55 | 1.26 | 0.49 | 33.08 | 16.72 | 4.39 |
| 1000 | 12.57 | 18.86 | 22.39 | 38.09 | 1.27 | 0.48 | 32.80 | 16.79 | 4.41 |
| 1100 | 12.52 | 18.90 | 21.88 | 37.33 | 1.27 | 0.48 | 32.64 | 16.63 | 4.35 |
| 1200 | 12.48 | 18.92 | 21.79 | 36.10 | 1.28 | 0.48 | 32.45 | 16.42 | 4.44 |
| 1300 | 12.44 | 18.97 | 21.54 | 35.18 | 1.29 | 0.47 | 32.15 | 16.46 | 4.45 |
| 1400 | 12.39 | 19.01 | 20.94 | 34.19 | 1.30 | 0.47 | 31.80 | 16.43 | 4.47 |
| 1500 | 12.33 | 19.06 | 20.85 | 33.15 | 1.31 | 0.46 | 31.70 | 16.40 | 4.53 |
| 1600 | 12.29 | 19.11 | 20.19 | 31.78 | 1.31 | 0.46 | 32.15 | 16.42 | 4.54 |
| 1700 | 12.23 | 19.17 | 20.14 | 30.77 | 1.32 | 0.45 | 32.45 | 16.50 | 4.52 |
| 1800 | 12.19 | 19.19 | 19.45 | 29.72 | 1.33 | 0.45 | 32.14 | 16.42 | 4.53 |
| 1900 | 12.16 | 19.27 | 19.22 | 28.52 | 1.34 | 0.44 | 31.77 | 16.45 | 4.51 |
| 2000 | 12.13 | 19.32 | 18.63 | 27.39 | 1.35 | 0.44 | 31.54 | 16.41 | 4.47 |
| 2100 | 12.05 | 19.39 | 18.44 | 26.53 | 1.36 | 0.43 | 31.34 | 16.39 | 4.55 |
| 2200 | 12.00 | 19.47 | 17.94 | 25.53 | 1.37 | 0.43 | 31.10 | 16.43 | 4.45 |
| 2300 | 11.95 | 19.52 | 17.53 | 24.59 | 1.38 | 0.42 | 30.89 | 16.41 | 4.57 |
| 2400 | 11.88 | 19.60 | 17.24 | 23.77 | 1.40 | 0.42 | 30.59 | 16.36 | 4.51 |
| 2500 | 11.85 | 19.66 | 16.85 | 22.94 | 1.41 | 0.41 | 30.25 | 16.36 | 4.51 |
| 2600 | 11.77 | 19.74 | 16.48 | 22.19 | 1.42 | 0.41 | 29.91 | 16.34 | 4.56 |
| 2700 | 11.74 | 19.83 | 16.14 | 21.53 | 1.43 | 0.40 | 29.89 | 16.32 | 4.53 |
| 2800 | 11.67 | 19.91 | 15.95 | 20.93 | 1.45 | 0.39 | 29.69 | 16.21 | 4.53 |
| 2900 | 11.64 | 19.98 | 15.68 | 20.36 | 1.46 | 0.39 | 29.52 | 16.10 | 4.60 |
| 3000 | 11.57 | 20.07 | 15.38 | 19.92 | 1.48 | 0.39 | 29.27 | 16.04 | 4.45 |
| 3100 | 11.52 | 20.14 | 15.15 | 19.38 | 1.49 | 0.38 | 28.77 | 15.78 | 4.61 |
| 3200 | 11.49 | 20.25 | 14.83 | 18.87 | 1.50 | 0.38 | 28.49 | 15.83 | 4.50 |
| 3300 | 11.43 | 20.33 | 14.62 | 18.45 | 1.52 | 0.37 | 28.39 | 15.78 | 4.72 |
| 3400 | 11.42 | 20.43 | 14.45 | 17.99 | 1.53 | 0.37 | 28.20 | 15.67 | 4.66 |
| 3500 | 11.34 | 20.49 | 14.18 | 17.68 | 1.55 | 0.37 | 28.08 | 15.55 | 4.54 |
| 3600 | 11.34 | 20.55 | 14.14 | 17.34 | 1.55 | 0.36 | 27.83 | 15.40 | 4.77 |
| 3700 | 11.27 | 20.68 | 13.88 | 17.02 | 1.58 | 0.36 | 27.59 | 15.27 | 4.58 |
| 3800 | 11.25 | 20.77 | 13.78 | 16.80 | 1.59 | 0.36 | 27.44 | 14.99 | 4.72 |
| 4000 | 11.17 | 20.94 | 13.56 | 16.33 | 1.62 | 0.35 | 27.24 | 14.65 | 4.60 |




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## *Typical Performance Data*

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

TEST CONDITIONS: Icc = 50mA, Vd = 4.87V @Temperature = -45degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 12.93 | 18.64 | 22.13 | 39.59 | 1.22 | 0.52 | 31.68 | 14.90 | 3.54 |
| 100 | 12.95 | 18.63 | 21.59 | 35.60 | 1.22 | 0.52 | 31.81 | 14.98 | 3.69 |
| 200 | 12.92 | 18.72 | 21.48 | 33.57 | 1.23 | 0.51 | 31.90 | 14.79 | 3.62 |
| 300 | 12.89 | 18.69 | 21.96 | 38.60 | 1.23 | 0.51 | 31.70 | 14.73 | 3.69 |
| 400 | 12.86 | 18.70 | 23.00 | 47.83 | 1.23 | 0.51 | 31.42 | 15.01 | 3.73 |
| 500 | 12.84 | 18.71 | 22.54 | 45.69 | 1.23 | 0.51 | 31.30 | 14.95 | 3.69 |
| 600 | 12.78 | 18.72 | 22.87 | 42.97 | 1.24 | 0.51 | 31.18 | 14.83 | 3.66 |
| 700 | 12.75 | 18.74 | 22.23 | 44.27 | 1.24 | 0.50 | 31.47 | 15.00 | 3.66 |
| 800 | 12.71 | 18.77 | 22.39 | 41.44 | 1.25 | 0.50 | 31.64 | 15.07 | 3.74 |
| 900 | 12.69 | 18.78 | 21.56 | 38.68 | 1.25 | 0.50 | 31.65 | 15.06 | 3.64 |
| 1000 | 12.65 | 18.80 | 21.78 | 39.32 | 1.26 | 0.49 | 31.46 | 15.08 | 3.68 |
| 1100 | 12.59 | 18.82 | 21.37 | 40.20 | 1.26 | 0.49 | 31.25 | 14.84 | 3.61 |
| 1200 | 12.56 | 18.85 | 21.59 | 38.16 | 1.27 | 0.48 | 31.13 | 14.53 | 3.70 |
| 1300 | 12.53 | 18.89 | 21.71 | 36.13 | 1.27 | 0.48 | 30.92 | 14.67 | 3.68 |
| 1400 | 12.48 | 18.94 | 21.10 | 34.88 | 1.28 | 0.48 | 30.64 | 14.64 | 3.70 |
| 1500 | 12.43 | 18.97 | 21.01 | 33.58 | 1.29 | 0.47 | 30.57 | 14.61 | 3.76 |
| 1600 | 12.38 | 19.00 | 20.34 | 31.98 | 1.29 | 0.47 | 30.99 | 14.62 | 3.75 |
| 1700 | 12.34 | 19.08 | 20.26 | 31.19 | 1.31 | 0.46 | 31.33 | 14.71 | 3.73 |
| 1800 | 12.30 | 19.11 | 19.49 | 30.41 | 1.31 | 0.46 | 31.15 | 14.63 | 3.76 |
| 1900 | 12.27 | 19.17 | 19.25 | 29.28 | 1.32 | 0.45 | 30.84 | 14.63 | 3.71 |
| 2000 | 12.23 | 19.22 | 18.73 | 28.37 | 1.33 | 0.45 | 30.74 | 14.61 | 3.69 |
| 2100 | 12.17 | 19.28 | 18.53 | 28.03 | 1.34 | 0.44 | 30.57 | 14.63 | 3.79 |
| 2200 | 12.13 | 19.33 | 18.11 | 27.50 | 1.35 | 0.44 | 30.49 | 14.77 | 3.67 |
| 2300 | 12.07 | 19.40 | 17.75 | 26.52 | 1.36 | 0.43 | 30.37 | 14.87 | 3.76 |
| 2400 | 12.01 | 19.48 | 17.46 | 25.26 | 1.37 | 0.43 | 30.25 | 14.94 | 3.70 |
| 2500 | 11.97 | 19.53 | 16.97 | 24.08 | 1.38 | 0.42 | 29.97 | 15.04 | 3.75 |
| 2600 | 11.90 | 19.61 | 16.55 | 23.19 | 1.39 | 0.42 | 29.70 | 14.99 | 3.74 |
| 2700 | 11.87 | 19.69 | 16.17 | 22.36 | 1.40 | 0.41 | 29.75 | 14.94 | 3.78 |
| 2800 | 11.80 | 19.75 | 15.96 | 21.60 | 1.42 | 0.41 | 29.63 | 14.83 | 3.72 |
| 2900 | 11.76 | 19.82 | 15.67 | 20.93 | 1.43 | 0.40 | 29.52 | 14.73 | 3.79 |
| 3000 | 11.71 | 19.90 | 15.37 | 20.38 | 1.44 | 0.40 | 29.32 | 14.72 | 3.66 |
| 3100 | 11.67 | 19.98 | 15.23 | 19.74 | 1.45 | 0.39 | 28.87 | 14.64 | 3.80 |
| 3200 | 11.63 | 20.05 | 15.02 | 19.22 | 1.46 | 0.39 | 28.67 | 14.72 | 3.68 |
| 3300 | 11.58 | 20.15 | 14.89 | 18.92 | 1.48 | 0.39 | 28.59 | 14.82 | 3.92 |
| 3400 | 11.57 | 20.23 | 14.79 | 18.58 | 1.49 | 0.38 | 28.39 | 14.85 | 3.85 |
| 3500 | 11.51 | 20.28 | 14.57 | 18.31 | 1.50 | 0.38 | 28.37 | 14.81 | 3.77 |
| 3600 | 11.52 | 20.35 | 14.49 | 17.96 | 1.51 | 0.38 | 28.12 | 14.73 | 3.90 |
| 3700 | 11.44 | 20.46 | 14.21 | 17.68 | 1.53 | 0.37 | 27.80 | 14.70 | 3.79 |
| 3800 | 11.43 | 20.50 | 14.10 | 17.44 | 1.54 | 0.37 | 27.67 | 14.50 | 3.84 |
| 4000 | 11.35 | 20.69 | 13.93 | 16.81 | 1.57 | 0.36 | 27.42 | 14.39 | 3.75 |




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## *Typical Performance Data*

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

TEST CONDITIONS: Icc = 40mA, Vd = 4.73V @Temperature = -45degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 12.76 | 18.57 | 21.15 | 32.49 | 1.23 | 0.51 | 27.29 | 11.95 | 3.51 |
| 100 | 12.78 | 18.62 | 20.56 | 30.67 | 1.23 | 0.51 | 27.43 | 12.06 | 3.64 |
| 200 | 12.75 | 18.58 | 20.58 | 29.35 | 1.23 | 0.51 | 27.48 | 11.87 | 3.58 |
| 300 | 12.73 | 18.61 | 20.93 | 32.17 | 1.23 | 0.51 | 27.36 | 11.83 | 3.66 |
| 400 | 12.70 | 18.60 | 21.88 | 35.55 | 1.23 | 0.51 | 27.19 | 12.06 | 3.70 |
| 500 | 12.67 | 18.61 | 21.49 | 35.75 | 1.24 | 0.51 | 27.16 | 12.01 | 3.62 |
| 600 | 12.63 | 18.60 | 21.75 | 34.70 | 1.24 | 0.50 | 27.14 | 11.93 | 3.64 |
| 700 | 12.59 | 18.62 | 21.18 | 35.06 | 1.24 | 0.50 | 27.44 | 12.06 | 3.59 |
| 800 | 12.56 | 18.66 | 21.38 | 34.35 | 1.25 | 0.50 | 27.66 | 12.12 | 3.70 |
| 900 | 12.53 | 18.68 | 20.62 | 33.04 | 1.25 | 0.49 | 27.68 | 12.15 | 3.60 |
| 1000 | 12.48 | 18.67 | 20.79 | 32.91 | 1.26 | 0.49 | 27.50 | 12.16 | 3.64 |
| 1100 | 12.44 | 18.72 | 20.46 | 33.54 | 1.26 | 0.49 | 27.30 | 11.98 | 3.55 |
| 1200 | 12.40 | 18.75 | 20.61 | 33.11 | 1.27 | 0.48 | 27.21 | 11.62 | 3.66 |
| 1300 | 12.38 | 18.78 | 20.71 | 32.10 | 1.28 | 0.48 | 27.07 | 11.87 | 3.64 |
| 1400 | 12.34 | 18.81 | 20.18 | 31.29 | 1.28 | 0.48 | 26.84 | 11.78 | 3.68 |
| 1500 | 12.28 | 18.86 | 20.11 | 30.37 | 1.29 | 0.47 | 26.80 | 11.77 | 3.72 |
| 1600 | 12.24 | 18.90 | 19.49 | 29.08 | 1.30 | 0.47 | 27.17 | 11.80 | 3.69 |
| 1700 | 12.20 | 18.96 | 19.42 | 28.32 | 1.31 | 0.46 | 27.52 | 11.87 | 3.69 |
| 1800 | 12.15 | 19.00 | 18.70 | 27.67 | 1.31 | 0.46 | 27.40 | 11.75 | 3.70 |
| 1900 | 12.12 | 19.04 | 18.51 | 26.90 | 1.32 | 0.45 | 27.15 | 11.81 | 3.69 |
| 2000 | 12.08 | 19.10 | 18.00 | 26.18 | 1.33 | 0.45 | 27.07 | 11.73 | 3.64 |
| 2100 | 12.01 | 19.18 | 17.84 | 25.93 | 1.34 | 0.44 | 26.97 | 11.77 | 3.71 |
| 2200 | 11.98 | 19.23 | 17.45 | 25.53 | 1.35 | 0.44 | 26.99 | 11.99 | 3.62 |
| 2300 | 11.93 | 19.30 | 17.12 | 24.76 | 1.36 | 0.43 | 27.05 | 12.13 | 3.73 |
| 2400 | 11.87 | 19.35 | 16.81 | 23.67 | 1.37 | 0.43 | 27.11 | 12.18 | 3.65 |
| 2500 | 11.83 | 19.41 | 16.36 | 22.70 | 1.38 | 0.42 | 27.03 | 12.35 | 3.69 |
| 2600 | 11.76 | 19.52 | 15.96 | 21.95 | 1.39 | 0.42 | 26.92 | 12.29 | 3.68 |
| 2700 | 11.73 | 19.56 | 15.58 | 21.21 | 1.40 | 0.41 | 27.12 | 12.25 | 3.72 |
| 2800 | 11.66 | 19.64 | 15.37 | 20.55 | 1.41 | 0.41 | 27.02 | 12.21 | 3.66 |
| 2900 | 11.63 | 19.71 | 15.12 | 19.99 | 1.42 | 0.40 | 26.96 | 12.11 | 3.75 |
| 3000 | 11.58 | 19.80 | 14.85 | 19.50 | 1.44 | 0.40 | 26.88 | 12.10 | 3.58 |
| 3100 | 11.53 | 19.89 | 14.70 | 18.90 | 1.45 | 0.40 | 26.46 | 12.11 | 3.74 |
| 3200 | 11.50 | 19.95 | 14.49 | 18.44 | 1.46 | 0.39 | 26.41 | 12.24 | 3.62 |
| 3300 | 11.45 | 20.04 | 14.38 | 18.16 | 1.48 | 0.39 | 26.47 | 12.39 | 3.86 |
| 3400 | 11.44 | 20.11 | 14.30 | 17.88 | 1.49 | 0.38 | 26.32 | 12.52 | 3.75 |
| 3500 | 11.37 | 20.19 | 14.07 | 17.63 | 1.50 | 0.38 | 26.41 | 12.45 | 3.70 |
| 3600 | 11.38 | 20.24 | 14.02 | 17.32 | 1.51 | 0.38 | 26.15 | 12.54 | 3.82 |
| 3700 | 11.31 | 20.34 | 13.76 | 17.07 | 1.52 | 0.37 | 25.76 | 12.49 | 3.72 |
| 3800 | 11.29 | 20.41 | 13.64 | 16.83 | 1.54 | 0.37 | 25.54 | 12.35 | 3.78 |
| 4000 | 11.22 | 20.59 | 13.45 | 16.25 | 1.57 | 0.37 | 25.41 | 12.27 | 3.69 |




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## *Typical Performance Data*

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

TEST CONDITIONS: Icc = 60mA, Vd = 4.99V @Temperature = -45degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 13.02 | 18.68 | 22.84 | 50.10 | 1.22 | 0.52 | 34.64 | 16.83 | 3.61 |
| 100 | 13.05 | 18.74 | 22.15 | 40.76 | 1.22 | 0.52 | 34.81 | 16.91 | 3.74 |
| 200 | 13.01 | 18.77 | 22.15 | 37.62 | 1.22 | 0.52 | 34.89 | 16.81 | 3.66 |
| 300 | 12.99 | 18.74 | 22.64 | 46.77 | 1.22 | 0.52 | 34.51 | 16.75 | 3.75 |
| 400 | 12.95 | 18.78 | 23.74 | 48.88 | 1.23 | 0.51 | 34.12 | 16.96 | 3.76 |
| 500 | 12.92 | 18.77 | 23.25 | 43.80 | 1.23 | 0.51 | 33.85 | 16.89 | 3.73 |
| 600 | 12.89 | 18.80 | 23.58 | 43.68 | 1.24 | 0.51 | 33.75 | 16.80 | 3.72 |
| 700 | 12.85 | 18.80 | 22.83 | 44.63 | 1.24 | 0.50 | 33.97 | 16.90 | 3.72 |
| 800 | 12.80 | 18.82 | 23.04 | 43.08 | 1.24 | 0.50 | 34.07 | 16.91 | 3.80 |
| 900 | 12.77 | 18.85 | 22.16 | 41.42 | 1.25 | 0.50 | 33.96 | 16.92 | 3.70 |
| 1000 | 12.73 | 18.87 | 22.41 | 44.04 | 1.25 | 0.49 | 33.76 | 16.94 | 3.73 |
| 1100 | 12.69 | 18.89 | 21.95 | 43.76 | 1.26 | 0.49 | 33.58 | 16.80 | 3.67 |
| 1200 | 12.64 | 18.92 | 22.20 | 39.77 | 1.27 | 0.49 | 33.45 | 16.52 | 3.73 |
| 1300 | 12.62 | 18.96 | 22.31 | 37.48 | 1.27 | 0.48 | 33.16 | 16.65 | 3.74 |
| 1400 | 12.57 | 19.00 | 21.69 | 36.34 | 1.28 | 0.48 | 32.86 | 16.60 | 3.78 |
| 1500 | 12.51 | 19.03 | 21.57 | 35.36 | 1.29 | 0.47 | 32.78 | 16.57 | 3.82 |
| 1600 | 12.47 | 19.09 | 20.88 | 33.82 | 1.29 | 0.47 | 33.15 | 16.63 | 3.81 |
| 1700 | 12.42 | 19.12 | 20.77 | 33.05 | 1.30 | 0.46 | 33.42 | 16.68 | 3.79 |
| 1800 | 12.38 | 19.18 | 19.99 | 32.24 | 1.31 | 0.46 | 33.16 | 16.60 | 3.81 |
| 1900 | 12.35 | 19.23 | 19.75 | 30.95 | 1.32 | 0.45 | 32.83 | 16.60 | 3.77 |
| 2000 | 12.31 | 19.28 | 19.18 | 29.92 | 1.33 | 0.45 | 32.70 | 16.59 | 3.74 |
| 2100 | 12.24 | 19.35 | 19.01 | 29.57 | 1.34 | 0.44 | 32.55 | 16.54 | 3.82 |
| 2200 | 12.21 | 19.42 | 18.53 | 28.95 | 1.35 | 0.44 | 32.29 | 16.71 | 3.73 |
| 2300 | 12.15 | 19.46 | 18.19 | 27.72 | 1.36 | 0.43 | 32.10 | 16.71 | 3.84 |
| 2400 | 12.09 | 19.53 | 17.86 | 26.31 | 1.37 | 0.43 | 31.82 | 16.72 | 3.77 |
| 2500 | 12.06 | 19.58 | 17.35 | 24.99 | 1.38 | 0.42 | 31.46 | 16.75 | 3.81 |
| 2600 | 11.98 | 19.68 | 16.92 | 24.01 | 1.39 | 0.42 | 31.09 | 16.72 | 3.81 |
| 2700 | 11.95 | 19.74 | 16.54 | 23.10 | 1.40 | 0.41 | 31.08 | 16.68 | 3.84 |
| 2800 | 11.88 | 19.82 | 16.31 | 22.28 | 1.42 | 0.41 | 30.90 | 16.61 | 3.78 |
| 2900 | 11.85 | 19.89 | 16.01 | 21.53 | 1.43 | 0.40 | 30.74 | 16.49 | 3.85 |
| 3000 | 11.80 | 19.95 | 15.73 | 20.95 | 1.44 | 0.40 | 30.54 | 16.44 | 3.73 |
| 3100 | 11.75 | 20.05 | 15.56 | 20.25 | 1.45 | 0.39 | 29.96 | 16.20 | 3.83 |
| 3200 | 11.72 | 20.11 | 15.34 | 19.69 | 1.46 | 0.39 | 29.80 | 16.30 | 3.74 |
| 3300 | 11.65 | 20.21 | 15.23 | 19.39 | 1.48 | 0.39 | 29.60 | 16.33 | 3.99 |
| 3400 | 11.65 | 20.28 | 15.12 | 19.02 | 1.49 | 0.38 | 29.40 | 16.25 | 3.91 |
| 3500 | 11.58 | 20.33 | 14.89 | 18.73 | 1.50 | 0.38 | 29.37 | 16.17 | 3.81 |
| 3600 | 11.58 | 20.40 | 14.83 | 18.36 | 1.51 | 0.38 | 29.13 | 16.10 | 3.96 |
| 3700 | 11.52 | 20.52 | 14.53 | 18.06 | 1.53 | 0.37 | 28.83 | 15.95 | 3.87 |
| 3800 | 11.50 | 20.57 | 14.43 | 17.80 | 1.54 | 0.37 | 28.68 | 15.71 | 3.93 |
| 4000 | 11.42 | 20.75 | 14.23 | 17.14 | 1.57 | 0.36 | 28.47 | 15.44 | 3.80 |




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## *Typical Performance Data*

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

TEST CONDITIONS: Icc = 50mA, Vd = 4.44V @Temperature = +85degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 12.67 | 18.60 | 22.11 | 34.40 | 1.24 | 0.51 | 30.59 | 15.11 | 4.70 |
| 100 | 12.69 | 18.51 | 22.54 | 37.61 | 1.23 | 0.51 | 30.78 | 15.21 | 4.84 |
| 200 | 12.65 | 18.55 | 23.89 | 46.90 | 1.24 | 0.51 | 31.03 | 15.11 | 4.72 |
| 300 | 12.62 | 18.57 | 22.89 | 40.88 | 1.24 | 0.50 | 30.70 | 15.01 | 4.86 |
| 400 | 12.57 | 18.59 | 22.36 | 35.65 | 1.24 | 0.50 | 30.30 | 15.15 | 4.87 |
| 500 | 12.54 | 18.61 | 21.56 | 34.22 | 1.25 | 0.50 | 30.08 | 15.10 | 4.87 |
| 600 | 12.49 | 18.63 | 21.76 | 33.61 | 1.25 | 0.49 | 29.99 | 15.03 | 4.80 |
| 700 | 12.44 | 18.64 | 21.17 | 32.94 | 1.26 | 0.49 | 30.22 | 15.07 | 4.84 |
| 800 | 12.39 | 18.68 | 21.29 | 31.92 | 1.27 | 0.49 | 30.38 | 15.13 | 4.89 |
| 900 | 12.37 | 18.72 | 20.48 | 30.85 | 1.27 | 0.48 | 30.37 | 15.11 | 4.85 |
| 1000 | 12.31 | 18.73 | 20.68 | 30.29 | 1.28 | 0.48 | 30.10 | 15.14 | 4.85 |
| 1100 | 12.26 | 18.79 | 20.23 | 29.86 | 1.29 | 0.47 | 29.87 | 14.95 | 4.83 |
| 1200 | 12.21 | 18.82 | 20.17 | 29.23 | 1.29 | 0.47 | 29.71 | 14.68 | 4.91 |
| 1300 | 12.18 | 18.84 | 20.01 | 28.68 | 1.30 | 0.47 | 29.49 | 14.75 | 4.89 |
| 1400 | 12.13 | 18.90 | 19.51 | 28.41 | 1.31 | 0.46 | 29.17 | 14.74 | 4.95 |
| 1500 | 12.07 | 18.96 | 19.43 | 28.09 | 1.32 | 0.45 | 29.13 | 14.69 | 4.99 |
| 1600 | 12.03 | 19.00 | 18.95 | 27.44 | 1.33 | 0.45 | 29.59 | 14.69 | 4.99 |
| 1700 | 11.98 | 19.07 | 18.97 | 26.90 | 1.34 | 0.44 | 30.02 | 14.80 | 4.99 |
| 1800 | 11.93 | 19.10 | 18.40 | 26.35 | 1.34 | 0.44 | 29.70 | 14.67 | 4.98 |
| 1900 | 11.89 | 19.17 | 18.17 | 25.69 | 1.35 | 0.44 | 29.31 | 14.71 | 4.97 |
| 2000 | 11.85 | 19.26 | 17.65 | 24.96 | 1.37 | 0.43 | 29.14 | 14.63 | 4.93 |
| 2100 | 11.79 | 19.32 | 17.47 | 24.27 | 1.38 | 0.42 | 28.89 | 14.63 | 5.03 |
| 2200 | 11.74 | 19.37 | 17.00 | 23.50 | 1.39 | 0.42 | 28.73 | 14.72 | 4.90 |
| 2300 | 11.69 | 19.46 | 16.63 | 22.74 | 1.40 | 0.41 | 28.57 | 14.81 | 5.04 |
| 2400 | 11.63 | 19.55 | 16.35 | 22.00 | 1.41 | 0.41 | 28.39 | 14.74 | 4.97 |
| 2500 | 11.58 | 19.60 | 15.99 | 21.29 | 1.42 | 0.40 | 28.13 | 14.76 | 4.98 |
| 2600 | 11.50 | 19.71 | 15.66 | 20.65 | 1.44 | 0.40 | 27.80 | 14.73 | 5.06 |
| 2700 | 11.47 | 19.80 | 15.34 | 20.03 | 1.45 | 0.39 | 27.90 | 14.60 | 5.02 |
| 2800 | 11.40 | 19.87 | 15.17 | 19.56 | 1.47 | 0.39 | 27.72 | 14.52 | 5.04 |
| 2900 | 11.36 | 19.94 | 14.87 | 19.09 | 1.48 | 0.38 | 27.55 | 14.38 | 5.06 |
| 3000 | 11.30 | 20.05 | 14.55 | 18.67 | 1.50 | 0.38 | 27.32 | 14.36 | 4.93 |
| 3100 | 11.24 | 20.14 | 14.32 | 18.16 | 1.51 | 0.37 | 26.81 | 14.18 | 5.12 |
| 3200 | 11.20 | 20.22 | 13.99 | 17.66 | 1.53 | 0.37 | 26.62 | 14.26 | 4.96 |
| 3300 | 11.13 | 20.32 | 13.76 | 17.27 | 1.55 | 0.37 | 26.47 | 14.21 | 5.22 |
| 3400 | 11.11 | 20.42 | 13.54 | 16.87 | 1.56 | 0.36 | 26.28 | 14.14 | 5.17 |
| 3500 | 11.04 | 20.51 | 13.29 | 16.56 | 1.58 | 0.36 | 26.20 | 14.02 | 5.05 |
| 3600 | 11.04 | 20.56 | 13.17 | 16.22 | 1.58 | 0.36 | 25.98 | 13.89 | 5.28 |
| 3700 | 10.95 | 20.69 | 12.90 | 15.95 | 1.61 | 0.35 | 25.69 | 13.72 | 5.04 |
| 3800 | 10.94 | 20.78 | 12.78 | 15.70 | 1.62 | 0.35 | 25.55 | 13.47 | 5.25 |
| 4000 | 10.84 | 20.94 | 12.62 | 15.32 | 1.66 | 0.35 | 25.36 | 13.13 | 5.11 |




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## *Typical Performance Data*

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

TEST CONDITIONS: Icc = 40mA, Vd = 4.32V @Temperature = +85degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 12.45 | 18.40 | 20.73 | 29.16 | 1.24 | 0.51 | 26.63 | 12.38 | 4.66 |
| 100 | 12.48 | 18.40 | 21.12 | 30.25 | 1.24 | 0.51 | 26.82 | 12.58 | 4.78 |
| 200 | 12.44 | 18.37 | 22.27 | 33.14 | 1.24 | 0.51 | 27.01 | 12.42 | 4.69 |
| 300 | 12.40 | 18.42 | 21.39 | 32.31 | 1.24 | 0.50 | 26.77 | 12.29 | 4.79 |
| 400 | 12.36 | 18.45 | 21.00 | 29.88 | 1.25 | 0.50 | 26.42 | 12.49 | 4.83 |
| 500 | 12.32 | 18.47 | 20.34 | 29.02 | 1.25 | 0.50 | 26.32 | 12.47 | 4.80 |
| 600 | 12.26 | 18.49 | 20.50 | 28.88 | 1.26 | 0.49 | 26.27 | 12.31 | 4.77 |
| 700 | 12.22 | 18.50 | 20.02 | 28.40 | 1.26 | 0.49 | 26.56 | 12.47 | 4.80 |
| 800 | 12.18 | 18.53 | 20.08 | 27.88 | 1.27 | 0.48 | 26.76 | 12.50 | 4.85 |
| 900 | 12.15 | 18.56 | 19.42 | 27.17 | 1.27 | 0.48 | 26.75 | 12.54 | 4.81 |
| 1000 | 12.10 | 18.59 | 19.55 | 26.87 | 1.28 | 0.48 | 26.55 | 12.59 | 4.83 |
| 1100 | 12.05 | 18.64 | 19.18 | 26.64 | 1.29 | 0.47 | 26.33 | 12.29 | 4.76 |
| 1200 | 12.00 | 18.67 | 19.13 | 26.10 | 1.30 | 0.47 | 26.20 | 12.01 | 4.87 |
| 1300 | 11.97 | 18.71 | 18.98 | 25.72 | 1.30 | 0.46 | 26.03 | 12.18 | 4.87 |
| 1400 | 11.92 | 18.75 | 18.52 | 25.57 | 1.31 | 0.46 | 25.78 | 12.05 | 4.89 |
| 1500 | 11.87 | 18.80 | 18.47 | 25.23 | 1.32 | 0.45 | 25.77 | 12.07 | 4.93 |
| 1600 | 11.81 | 18.87 | 18.05 | 24.94 | 1.33 | 0.45 | 26.21 | 12.08 | 4.93 |
| 1700 | 11.78 | 18.90 | 18.08 | 24.50 | 1.34 | 0.44 | 26.63 | 12.18 | 4.93 |
| 1800 | 11.72 | 18.97 | 17.53 | 24.09 | 1.35 | 0.44 | 26.45 | 12.03 | 4.93 |
| 1900 | 11.69 | 19.01 | 17.33 | 23.58 | 1.36 | 0.44 | 26.14 | 12.10 | 4.93 |
| 2000 | 11.66 | 19.10 | 16.86 | 22.94 | 1.36 | 0.43 | 26.02 | 12.09 | 4.85 |
| 2100 | 11.58 | 19.16 | 16.66 | 22.48 | 1.38 | 0.42 | 25.86 | 12.03 | 4.98 |
| 2200 | 11.54 | 19.24 | 16.24 | 21.87 | 1.39 | 0.42 | 25.83 | 12.23 | 4.84 |
| 2300 | 11.49 | 19.32 | 15.93 | 21.22 | 1.40 | 0.41 | 25.84 | 12.38 | 5.01 |
| 2400 | 11.42 | 19.40 | 15.67 | 20.65 | 1.42 | 0.41 | 25.85 | 12.34 | 4.93 |
| 2500 | 11.37 | 19.47 | 15.32 | 20.06 | 1.43 | 0.40 | 25.78 | 12.47 | 4.93 |
| 2600 | 11.31 | 19.55 | 15.02 | 19.48 | 1.44 | 0.40 | 25.55 | 12.37 | 4.99 |
| 2700 | 11.28 | 19.61 | 14.70 | 18.96 | 1.45 | 0.40 | 25.74 | 12.34 | 4.99 |
| 2800 | 11.20 | 19.71 | 14.53 | 18.54 | 1.47 | 0.39 | 25.60 | 12.23 | 4.95 |
| 2900 | 11.18 | 19.79 | 14.25 | 18.09 | 1.48 | 0.39 | 25.48 | 12.14 | 5.03 |
| 3000 | 11.11 | 19.90 | 13.95 | 17.74 | 1.50 | 0.38 | 25.35 | 12.16 | 4.87 |
| 3100 | 11.04 | 19.99 | 13.77 | 17.29 | 1.51 | 0.38 | 24.92 | 12.06 | 5.06 |
| 3200 | 11.01 | 20.07 | 13.43 | 16.85 | 1.52 | 0.37 | 24.82 | 12.24 | 4.90 |
| 3300 | 10.95 | 20.18 | 13.21 | 16.51 | 1.54 | 0.37 | 24.77 | 12.31 | 5.16 |
| 3400 | 10.92 | 20.27 | 13.02 | 16.13 | 1.55 | 0.37 | 24.65 | 12.31 | 5.10 |
| 3500 | 10.85 | 20.37 | 12.78 | 15.84 | 1.57 | 0.36 | 24.59 | 12.25 | 4.99 |
| 3600 | 10.85 | 20.42 | 12.65 | 15.54 | 1.58 | 0.36 | 24.36 | 12.15 | 5.20 |
| 3700 | 10.76 | 20.54 | 12.41 | 15.32 | 1.60 | 0.36 | 24.08 | 12.09 | 4.98 |
| 3800 | 10.74 | 20.63 | 12.31 | 15.10 | 1.62 | 0.35 | 23.88 | 11.89 | 5.18 |
| 4000 | 10.65 | 20.82 | 12.15 | 14.74 | 1.65 | 0.35 | 23.76 | 11.72 | 5.01 |




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## *Typical Performance Data*

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

TEST CONDITIONS: Icc = 60mA, Vd = 4.57V @Temperature = +85degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 12.79 | 18.74 | 23.04 | 41.62 | 1.24 | 0.50 | 33.38 | 16.46 | 4.76 |
| 100 | 12.82 | 18.61 | 23.55 | 50.13 | 1.23 | 0.51 | 33.57 | 16.50 | 4.90 |
| 200 | 12.77 | 18.65 | 25.01 | 44.30 | 1.23 | 0.51 | 33.81 | 16.54 | 4.78 |
| 300 | 12.74 | 18.69 | 23.86 | 42.01 | 1.24 | 0.50 | 33.38 | 16.50 | 4.89 |
| 400 | 12.69 | 18.69 | 23.32 | 39.84 | 1.24 | 0.50 | 32.90 | 16.65 | 4.93 |
| 500 | 12.65 | 18.69 | 22.39 | 38.49 | 1.25 | 0.50 | 32.58 | 16.60 | 4.93 |
| 600 | 12.60 | 18.72 | 22.58 | 37.53 | 1.25 | 0.50 | 32.38 | 16.51 | 4.87 |
| 700 | 12.56 | 18.73 | 21.91 | 36.54 | 1.26 | 0.49 | 32.54 | 16.58 | 4.93 |
| 800 | 12.52 | 18.78 | 22.10 | 35.00 | 1.27 | 0.49 | 32.65 | 16.62 | 4.97 |
| 900 | 12.49 | 18.80 | 21.23 | 33.62 | 1.27 | 0.48 | 32.52 | 16.57 | 4.90 |
| 1000 | 12.44 | 18.81 | 21.38 | 32.98 | 1.27 | 0.48 | 32.25 | 16.61 | 4.92 |
| 1100 | 12.39 | 18.87 | 20.88 | 32.41 | 1.28 | 0.48 | 32.03 | 16.44 | 4.87 |
| 1200 | 12.34 | 18.90 | 20.84 | 31.59 | 1.29 | 0.47 | 31.87 | 16.25 | 4.95 |
| 1300 | 12.30 | 18.95 | 20.63 | 30.92 | 1.30 | 0.47 | 31.55 | 16.28 | 4.95 |
| 1400 | 12.25 | 18.99 | 20.12 | 30.62 | 1.31 | 0.46 | 31.18 | 16.26 | 5.00 |
| 1500 | 12.20 | 19.04 | 20.08 | 30.13 | 1.32 | 0.46 | 31.11 | 16.21 | 5.06 |
| 1600 | 12.14 | 19.10 | 19.54 | 29.32 | 1.33 | 0.45 | 31.57 | 16.24 | 5.04 |
| 1700 | 12.09 | 19.14 | 19.55 | 28.66 | 1.33 | 0.45 | 31.87 | 16.28 | 5.04 |
| 1800 | 12.04 | 19.21 | 18.93 | 27.98 | 1.35 | 0.44 | 31.45 | 16.23 | 5.03 |
| 1900 | 12.01 | 19.26 | 18.71 | 27.14 | 1.35 | 0.44 | 31.02 | 16.21 | 5.03 |
| 2000 | 11.96 | 19.34 | 18.16 | 26.28 | 1.36 | 0.43 | 30.78 | 16.18 | 4.98 |
| 2100 | 11.90 | 19.41 | 17.99 | 25.49 | 1.38 | 0.42 | 30.54 | 16.15 | 5.10 |
| 2200 | 11.85 | 19.47 | 17.51 | 24.61 | 1.39 | 0.42 | 30.27 | 16.17 | 4.97 |
| 2300 | 11.80 | 19.54 | 17.12 | 23.75 | 1.40 | 0.41 | 29.98 | 16.10 | 5.11 |
| 2400 | 11.74 | 19.63 | 16.83 | 22.92 | 1.41 | 0.41 | 29.66 | 16.01 | 5.06 |
| 2500 | 11.69 | 19.68 | 16.41 | 22.14 | 1.42 | 0.40 | 29.36 | 15.98 | 5.05 |
| 2600 | 11.62 | 19.77 | 16.08 | 21.43 | 1.44 | 0.40 | 28.93 | 15.95 | 5.12 |
| 2700 | 11.59 | 19.86 | 15.74 | 20.77 | 1.45 | 0.39 | 28.95 | 15.90 | 5.11 |
| 2800 | 11.51 | 19.95 | 15.55 | 20.25 | 1.47 | 0.39 | 28.77 | 15.78 | 5.10 |
| 2900 | 11.48 | 20.01 | 15.26 | 19.70 | 1.48 | 0.38 | 28.53 | 15.73 | 5.16 |
| 3000 | 11.41 | 20.11 | 14.96 | 19.25 | 1.50 | 0.38 | 28.28 | 15.58 | 5.00 |
| 3100 | 11.36 | 20.24 | 14.70 | 18.72 | 1.52 | 0.37 | 27.75 | 15.31 | 5.16 |
| 3200 | 11.32 | 20.30 | 14.34 | 18.19 | 1.53 | 0.37 | 27.49 | 15.27 | 5.04 |
| 3300 | 11.25 | 20.40 | 14.10 | 17.76 | 1.55 | 0.37 | 27.33 | 15.21 | 5.31 |
| 3400 | 11.23 | 20.49 | 13.89 | 17.32 | 1.56 | 0.36 | 27.13 | 15.05 | 5.24 |
| 3500 | 11.14 | 20.58 | 13.63 | 16.98 | 1.58 | 0.36 | 27.06 | 14.93 | 5.11 |
| 3600 | 11.14 | 20.64 | 13.50 | 16.63 | 1.58 | 0.36 | 26.82 | 14.79 | 5.36 |
| 3700 | 11.06 | 20.77 | 13.22 | 16.35 | 1.61 | 0.35 | 26.53 | 14.59 | 5.13 |
| 3800 | 11.05 | 20.85 | 13.10 | 16.08 | 1.62 | 0.35 | 26.39 | 14.35 | 5.31 |
| 4000 | 10.95 | 21.04 | 12.91 | 15.67 | 1.66 | 0.34 | 26.15 | 13.94 | 5.19 |




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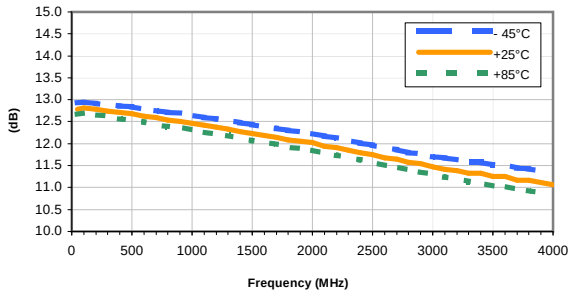
## Typical Performance Curves

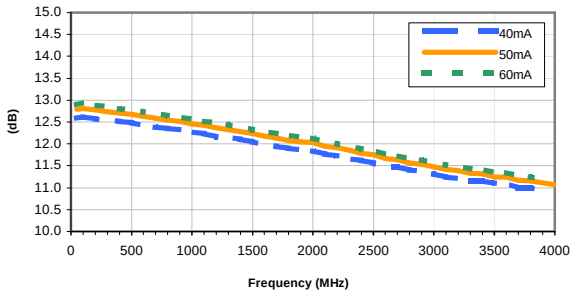
**GAIN vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA



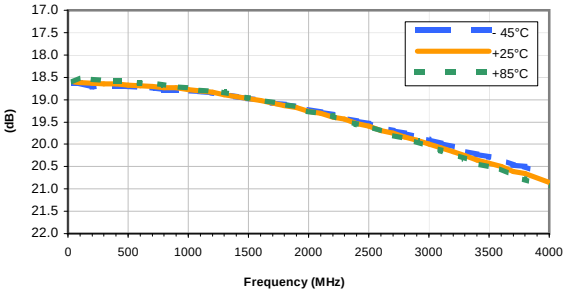

**GAIN vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



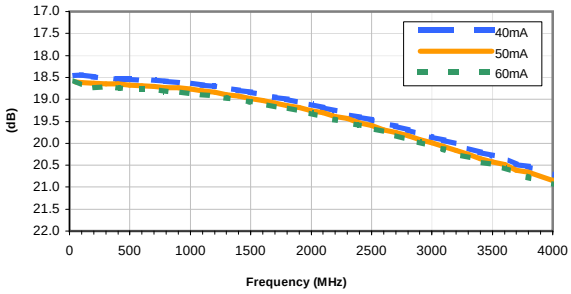

**ISOLATION vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA



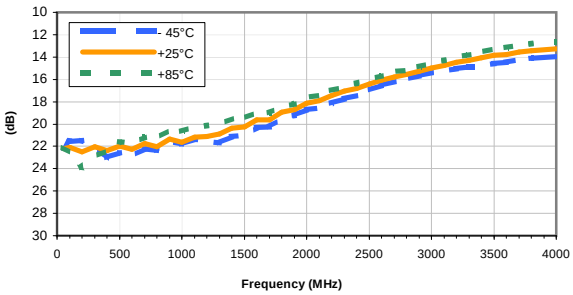

**ISOLATION vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



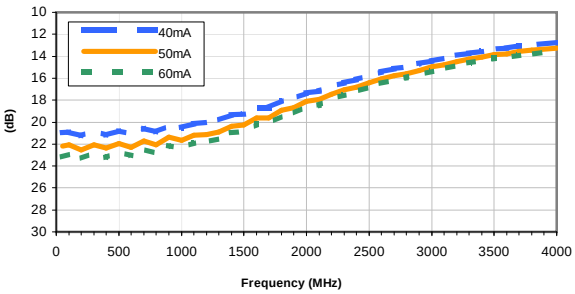

**INPUT RETURN LOSS vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA



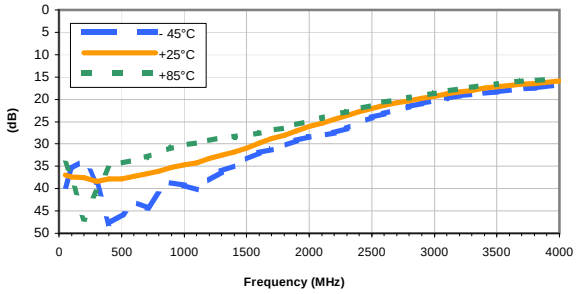

**INPUT RETURN LOSS vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



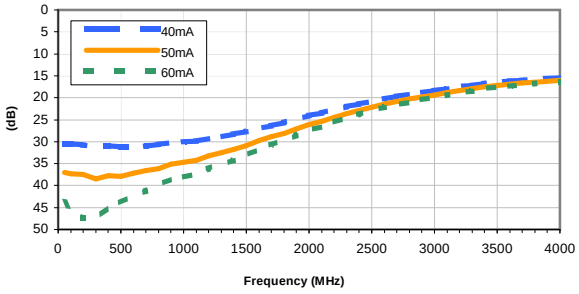

**OUTPUT RETURN LOSS vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA




**OUTPUT RETURN LOSS vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



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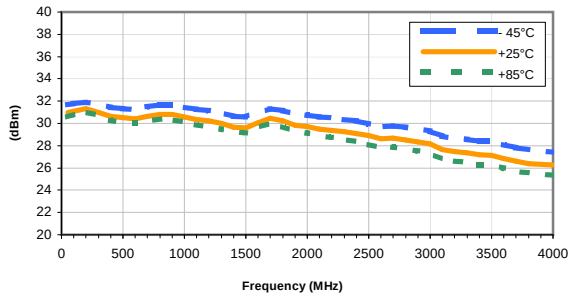
## Typical Performance Curves

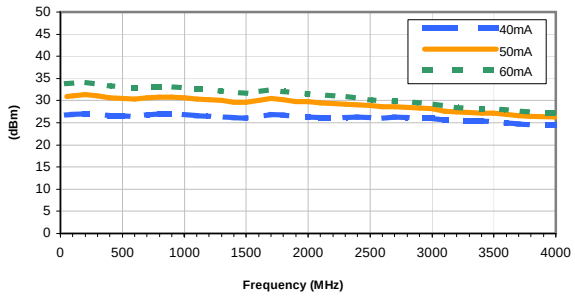
**OUTPUT IP3 vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA



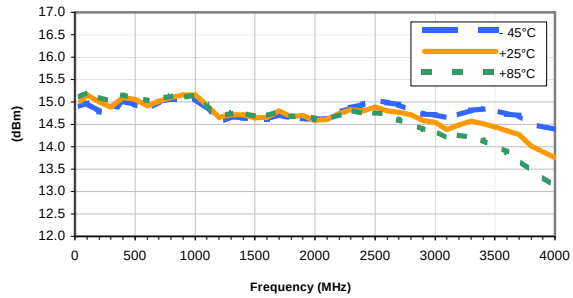

**OUTPUT IP3 vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



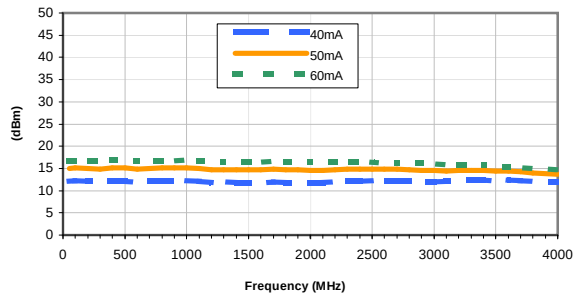

**OUTPUT POWER at 1dB Compression vs. TEMPERATURE**

CURRENT = 50mA



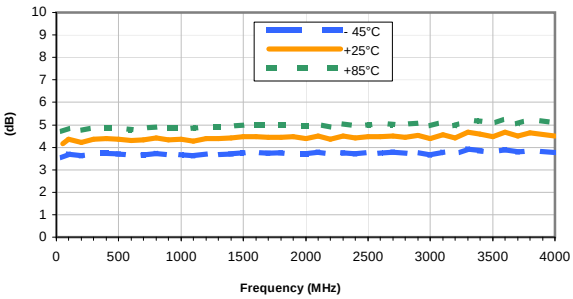

**OUTPUT POWER at 1dB Compression vs. CURRENT**

Temperature = +25°C



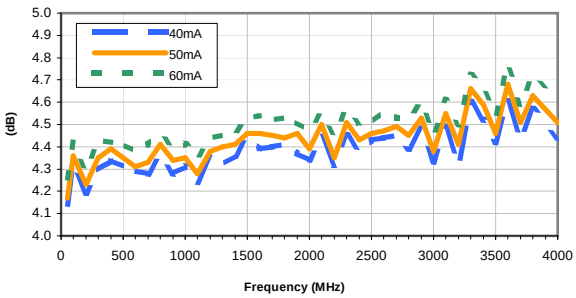

**Noise Figure vs. TEMPERATURE**

CURRENT = 50mA




**Noise Figure vs. CURRENT**

Temperature = +25°C



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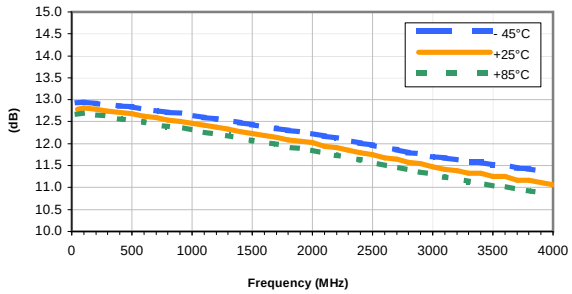
## *Typical Performance Curves*

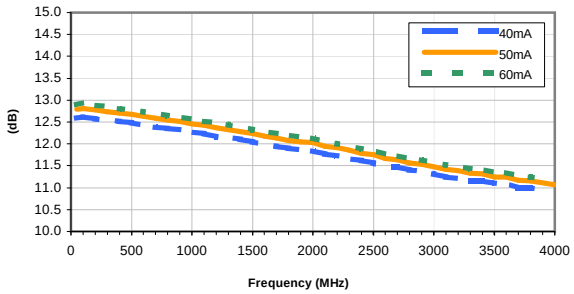
**GAIN vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA



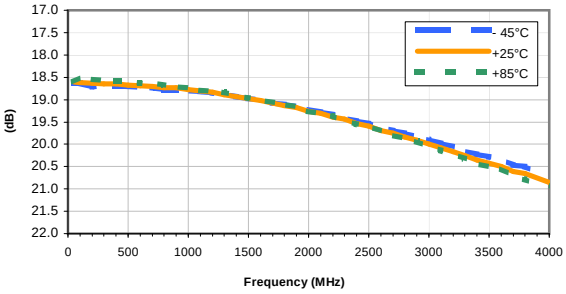

**GAIN vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



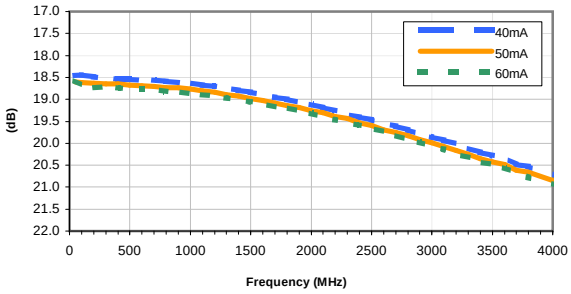

**ISOLATION vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA



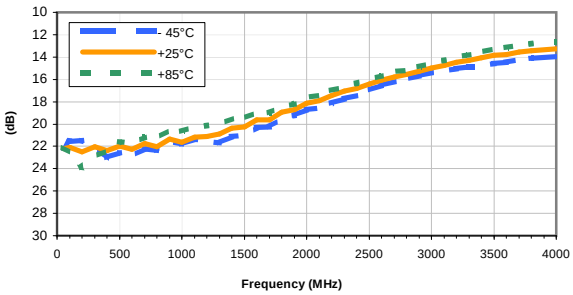

**ISOLATION vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



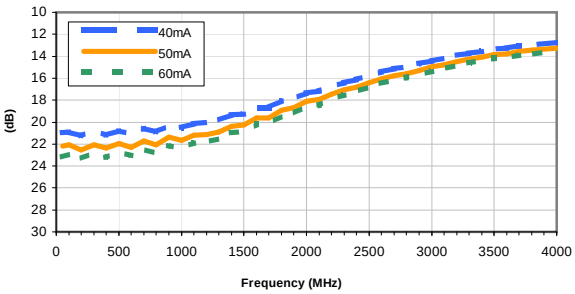

**INPUT RETURN LOSS vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA



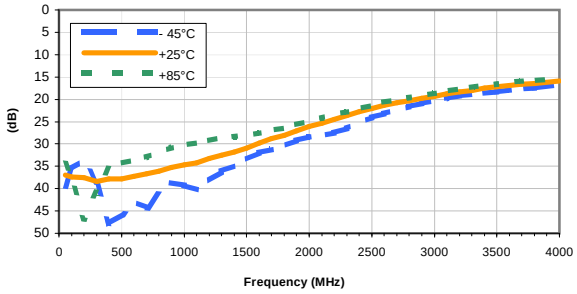

**INPUT RETURN LOSS vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



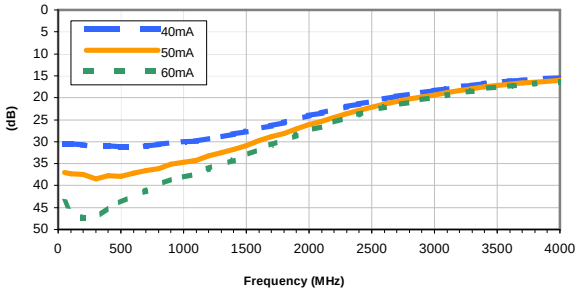

**OUTPUT RETURN LOSS vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA




**OUTPUT RETURN LOSS vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C







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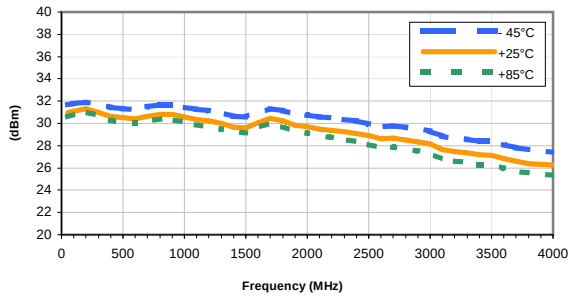
## Typical Performance Curves

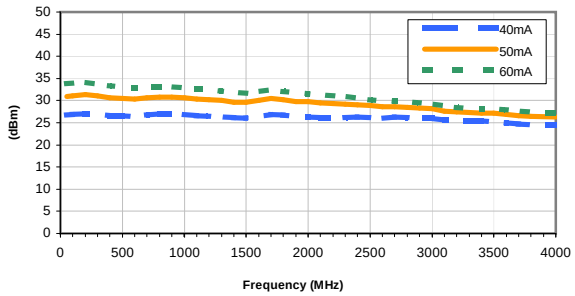
**OUTPUT IP3 vs. TEMPERATURE**

INPUT POWER = -15dBm,, CURRENT = 50mA



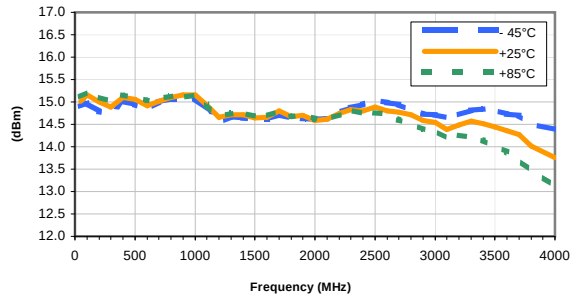

**OUTPUT IP3 vs. CURRENT**

INPUT POWER = -15dBm,, Temperature = +25°C



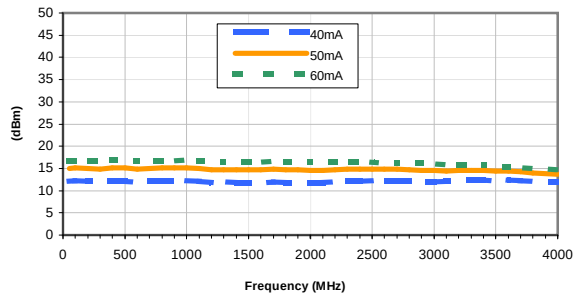

**OUTPUT POWER at 1dB Compression vs. TEMPERATURE**

CURRENT = 50mA



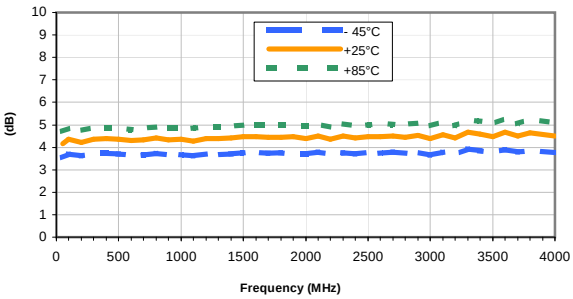

**OUTPUT POWER at 1dB Compression vs. CURRENT**

Temperature = +25°C



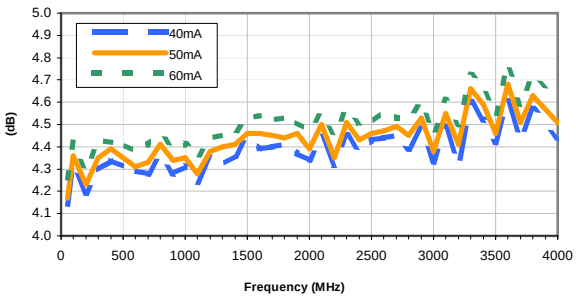

**Noise Figure vs. TEMPERATURE**

CURRENT = 50mA




**Noise Figure vs. CURRENT**

Temperature = +25°C



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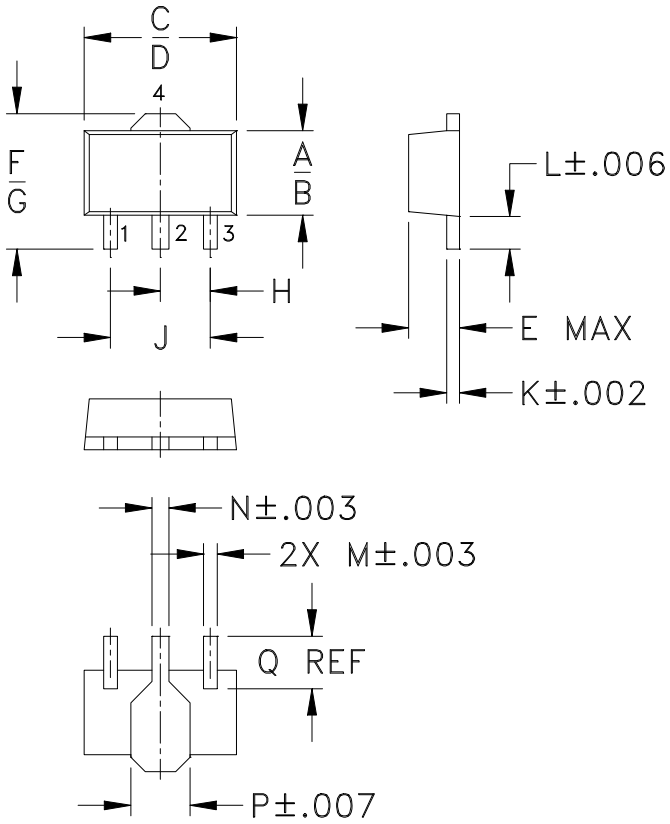
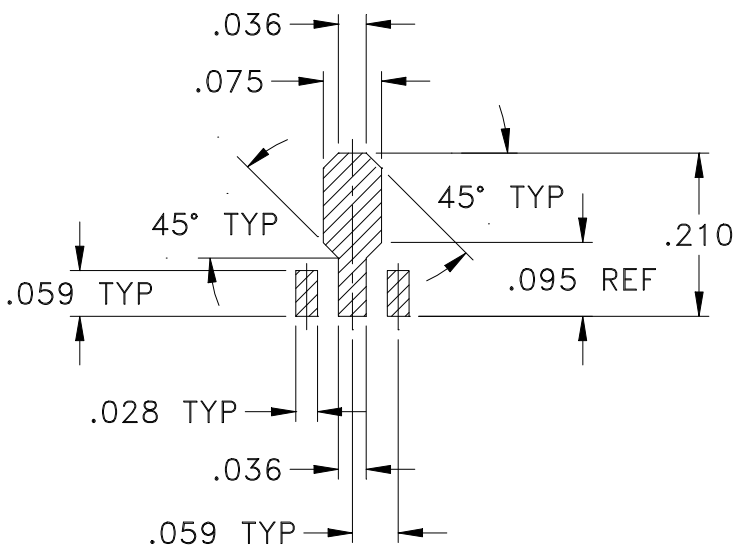
# Case Style DF

**DF782**

## Outline Dimensions




## PCB Land Pattern




Suggested Layout,
Tolerance to be within ±.002

| CASE # | A | B | C | D | E | F | G | H | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DF782 | .102 (2.59) | .090 (2.29) | .181 (4.60) | .173 (4.39) | .063 (1.60) | .167 (4.24) | .155 (3.94) | .059 (1.50) | .118 (3.00) | .015 (0.38) | .041 (1.04) | .016 (0.41) |

| CASE # | N | P | Q | WT. GRAM |
|---|---|---|---|---|
| DF782 | .019 (0.48) | .065 (1.65) | .062 (1.57) | .2 |

**Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3Pl. ± .005**

### Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin.
   All models, (+) suffix. See model Data sheet.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.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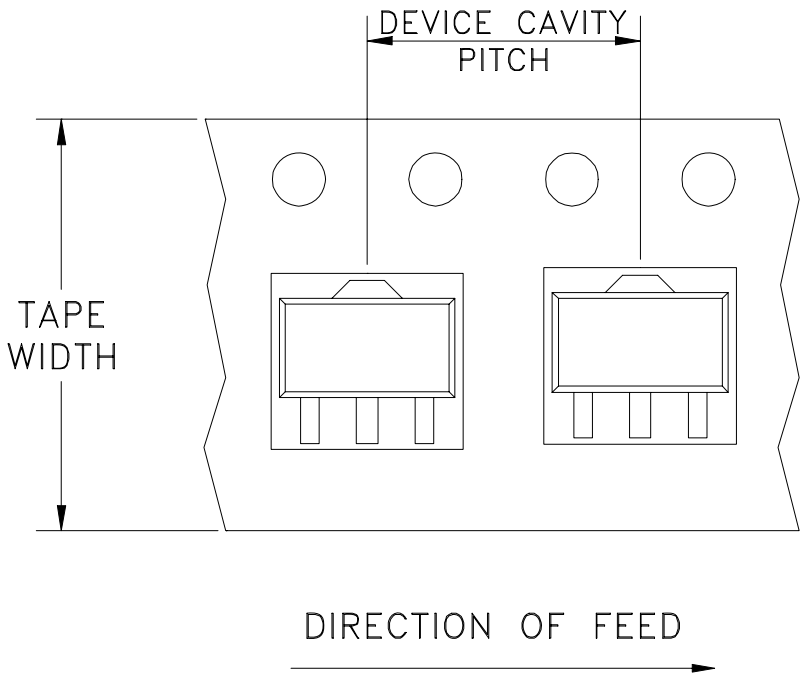
# Tape & Reel Packaging TR-F55

DEVICE ORIENTATION IN T&R




| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel | |
|---|---|---|---|---|
| 12 | 8 | 7 | Small quantity standard (see note) | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | | | 500 |
| | | | Standard | 1000 |

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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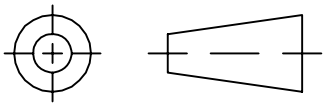
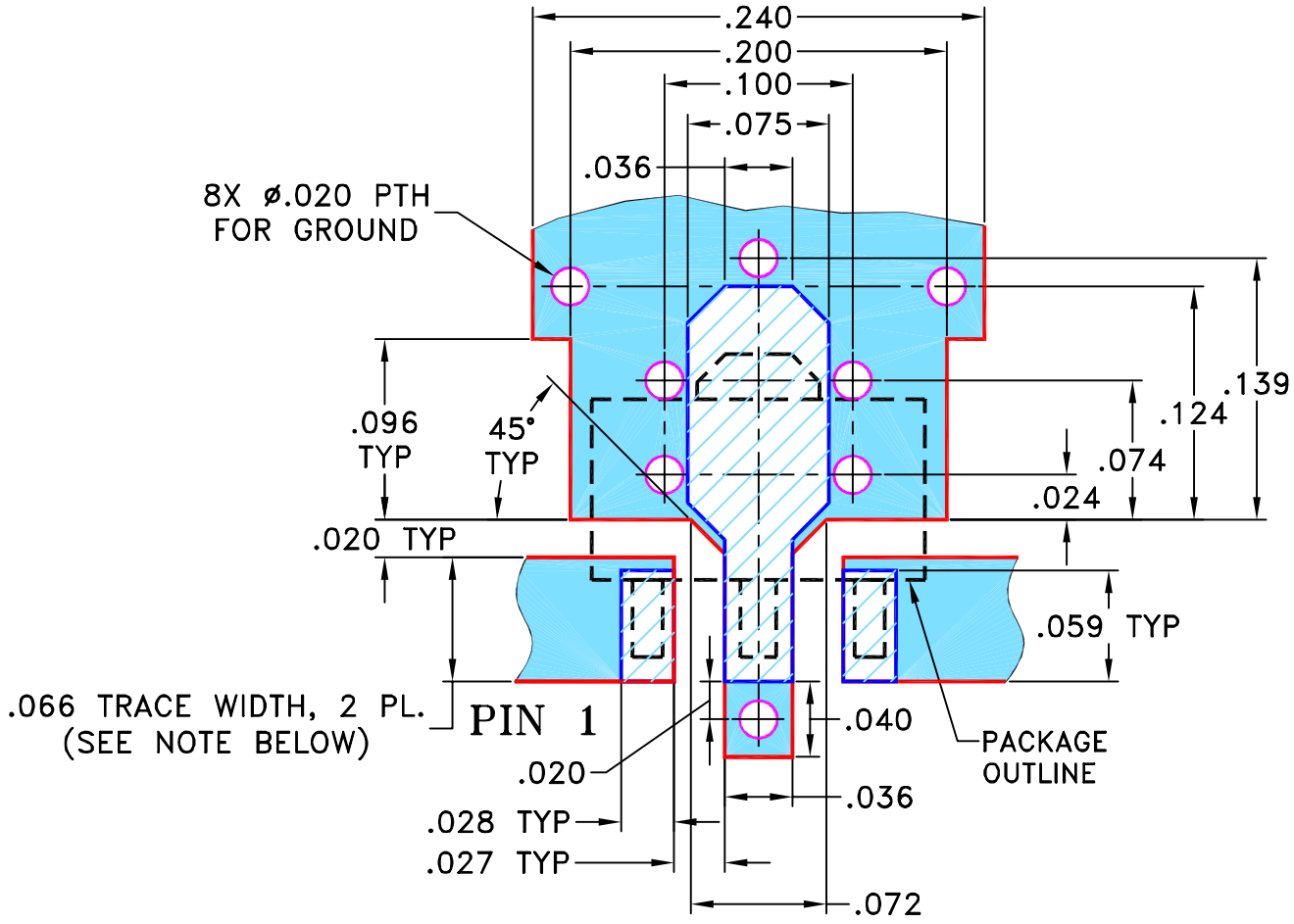
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|---|---|---|---|---|---|
| A | M76190 | CHANGED DISCRIPTION | 04/01 | GF | CT |
| B | M82575 | UPDATED DRAWING | 08/05/02 | AV | LC |
| C | M102713 | ADDED NOTE 2 & "...WITH SMOBC" | 01/17/06 | MMG | IL |
| D | M108434 | UPDATED DRAWING PER TB-409+ | 11/14/06 | PW | IG |

## SUGGESTED MOUNTING CONFIGURATION
## FOR DF782 CASE STYLE, "mz" PIN CONNECTION




NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

| UNLESS OTHERWISE SPECIFIED | | INITIALS | DATE |
|---|---|---|---|
| DIMENSIONS ARE IN INCHES | DRAWN | AV | 01/15/01 |
| TOLERANCES ON: | CHECKED | YB | 01/23/01 |
| 2 PL DECIMALS ± | APPROVED | DB | 01/23/01 |
| 3 PL DECIMALS ± .005 | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |

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

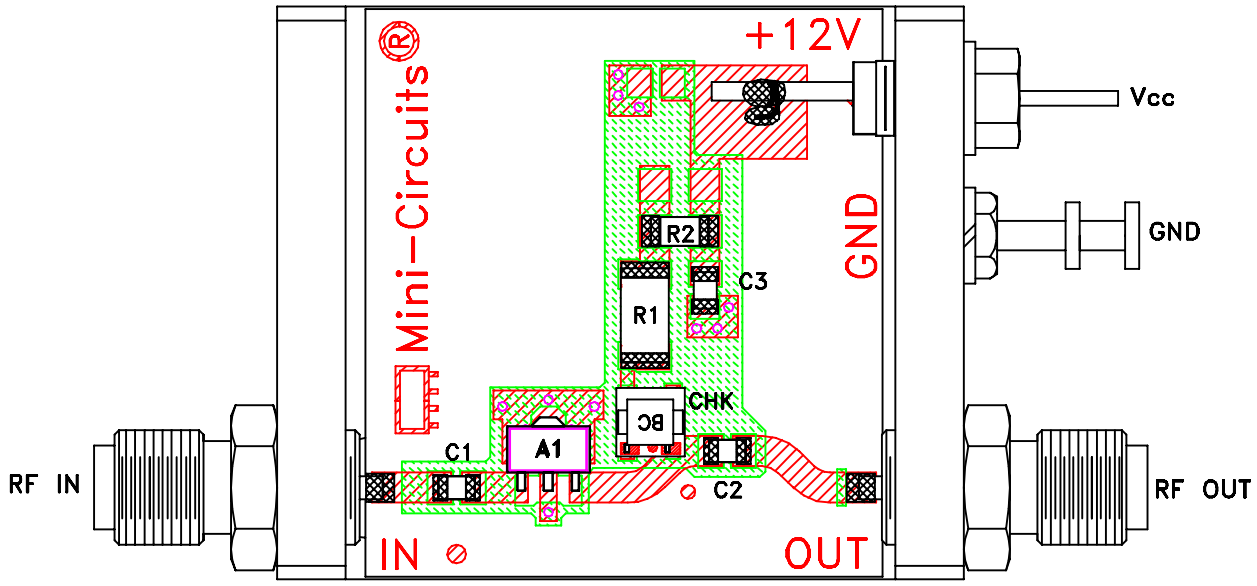
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

# PL, mz, DF782, GALI, TB-409-XXX+

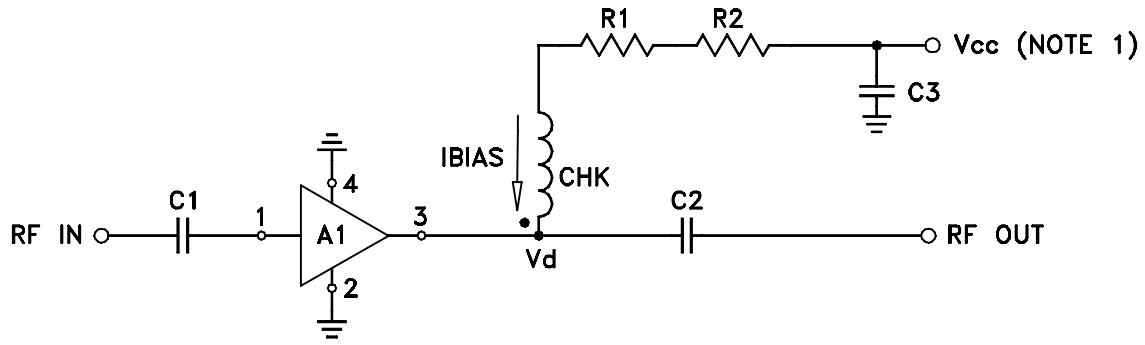
| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-019 | D |

| FILE: | SCALE: | SHEET: |
|---|---|---|
| 98PL019 | 10:1 | 1 OF 1 |

# Evaluation Board and Circuit




TB-409-6F+




| COMPONENT | VALUE |
|---|---|
| A1 | Gali-6F(+) |
| C1 (NOTE 4) | 2400 pF |
| C2 (NOTE 4) | 2400 pF |
| C3 (bypass) | 0.1 uF |
| R1 | 143 Ohms, 0.75W |
| R2 | 0 Ohm, 0.25W |
| CHK | Mini-Circuits TCCH-80+ |

Schematic Diagram

NOTE:

1. Vcc voltage: +12±0.2V.
2. SMA Female connectors.
3. PCB material: Rogers RO4350 or equivalent, dielectric constant=3.5, dielectric thickness=.030 inch.
4. Capacitors, C1 & C2 should be free of resonance up to the highest frequency specified.

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**Environmental Specifications** **ENV08T2**

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| Specification | Test/Inspection Condition | Reference/Spec |
|---|---|---|
| Operating Temperature | -45° to 85°C or -40° to 85°C<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -65° to 150° C<br>Ambient Environment | Individual Model Data Sheet |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Mechanical Shock | 1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only | MIL-STD-883, Method 2002, Condition B, except Y1 direction only |
| Vibration (Variable Frequency) | 50g peak | MIL-STD-883, Method 2007, Condition B |
| Autoclave | 15 psig, 100% RH, 121°C, 96 hours | JESD22-A102, Condition C |
| HAST | 130°C, 85% RH, 96 hours | JESD22-A110 |
| Solderability | 10X Magnification | J-STD-002, Para 4.2.5, Test S, 95% Coverage |
| Solder Reflow Heat | Sn-Pb Eutetic Process: 240°C peak<br>Pb-Free Process: 260°C peak | J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1 |
| Moisture Sensitivity: Level 1 | Bake at 125°C for 24 hours<br>Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak | J-STD-020 |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + | MIL-STD-202, Method 215 |


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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 |
|---|---|---|
| | monoethanolamine at 63°C to 70°C | |


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