*Low Noise, Wideband, High IP3*

# Monolithic Amplifier

# CMA-83LN+

50Ω 0.5 to 8.0 GHz

## The Big Deal

- Ceramic, hermetically sealed, nitrogen filled
- Low profile case, 0.045”
- Flat gain over wideband
- Low noise figure, 1.3 dB
- High IP3, up to +30 dBm

CASE STYLE: DL1721

*MIL Screening Available*
*Please consult Applications Dept.*

## Product Overview

The CMA-83LN+ is a PHEMT based wideband, low noise MMIC amplifier with a unique combination of low noise, high IP3, and flat gain over wideband making it ideal for sensitive, high-dynamic-range receiver applications. This design operates on a single 5V or 6V supply, is well matched for 50Ω and comes in a tiny, low profile package (0.12 x 0.12 x 0.045”), accommodating dense circuit board layouts. The amplifier is bonded to a multilayer integrated LTCC substrate, then hermetically sealed under a controlled Nitrogen atmosphere with gold-plated cover, eutectic Au-Sn solder, and Ni-Pd-Au termination finish. CMA-series amplifiers are capable of meeting MIL requirements for gross leak, fine leak, thermal shock, vibration, acceleration, mechanical shock, and HTOL. The testing can be done if requested.

## Key Features

| Feature | Advantages |
|---|---|
| Hermetically Sealed | Ideal for use anywhere long-term reliability adds bottom-line value: high moisture areas, busy production lines, high-speed distribution centers, heavy industry, outdoor settings, and unmanned facilities, as well as military applications. |
| Low noise, 1.3 dB at 2 GHz | Enables lower system noise figure performance. |
| High IP3<br>• +30 dBm at 2 GHz<br>• +26.7 dBm at 8 GHz | Combination of low noise and high IP3 makes this MMIC amplifier ideal for use in low noise receiver front end (RFE) as it gives the user advantages of sensitivity and two- tone IM performance at both ends of the dynamic range. |
| Low operating voltage, 5V/6V. | Achieves high IP3 using low voltage. |
| Wide bandwidth with flat gain<br>• ±1.2 dB over 0.5 to 7 GHz<br>• ±1.5 dB over 0.5 to 8 GHz | Enables a single amplifier to be used in many wideband applications including defense, instrumentation and more. |
| Ceramic, hermetic package | Low inductance, repeatable performance, outstanding reliability in tough operating con- ditions, and small size (0.12 x 0.12 x 0.045”) |

*Low Noise, Wideband, High IP3*

# Monolithic Amplifier

## 0.5-8.0 GHz

### Product Features

- Ceramic, hermetically sealed, high reliability
- Low profile case, .045” high
- Low Noise figure, 1.3 dB at 2 GHz
- High IP3, 30 dBm typ. at 2 GHz
- High Pout, P1dB 20.3 dBm typ. at 2 GHz and 6V
- Excellent Gain flatness, ±1.2 dB over 0.5 to 7 GHz and 6V

*Generic photo used for illustration purposes only*

CASE STYLE: DL1721

## CMA-83LN+

***+RoHS Compliant***

*The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications*

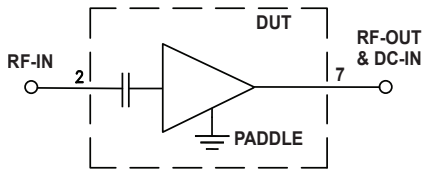
### Typical Applications

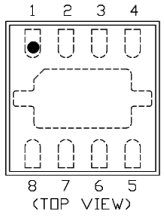
- High Rel Systems
- Defense and Aerospace
- WiFi
- WLAN
- UMTS
- LTE
- WiMAX
- S-band Radar
- C-band Satcom

### General Description

The CMA-83LN+ is a PHEMT based wideband, low noise MMIC amplifier with a unique combination of low noise, high IP3, and flat gain over wideband making it ideal for sensitive, high-dynamic-range receiver applications. This design operates on a single 5V or 6V supply, is well matched for 50Ω and comes in a tiny, low profile package (0.12 x 0.12 x 0.045”), accommodating dense circuit board layouts. The MMIC amplifier is bonded to a multilayer integrated LTCC substrate and then hermetically sealed under a controlled Nitrogen atmosphere with gold plated cover and eutectic Au-Sn solder. Terminal finish is Ni-Pd-Au. It has repeatable lot to lot performance due to tightly controlled semiconductor and assembly processes. These amplifiers are capable of meeting MIL requirements and have been tested for hermeticity.

### *simplified schematic and pad description*




| Function | Pad Number | Description |
|---|---|---|
| RF IN | 2 | Connects to RF input and to ground via L1 (optional blocking capacitor of 100pF may be used) |
| RF-OUT and DC-IN | 7 | Connects to RF out via C3 and VDD via L2 |
| GND | 1, 3, 5, 6, 8, Paddle | Connects to ground |
| NC | 4 | Not used internally. Connected to ground on test board. |

* Enhancement mode pseudomorphic High Electron Mobility Transistor.

## Electrical Specifications[1] at 25°C and 5V/6V, unless noted

| Parameter | Condition (GHz) | $V_{DD}$=6.0 | | | $V_{DD}$=5.0 | | | Units |
|---|---|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| Frequency Range | | 0.5 | | 8.0 | 0.5 | | 8.0 | |
| Noise Figure | 0.5 | — | 1.6 | — | — | 1.6 | — | dB |
| | 2.0 | — | 1.3 | 1.8 | — | 1.3 | — | |
| | 4.0 | — | 1.5 | — | — | 1.5 | — | |
| | 5.0 | — | 1.6 | — | — | 1.6 | 2.2 | |
| | 8.0 | — | 1.8 | — | — | 1.8 | — | |
| Gain | 0.5 | — | 21.2 | — | — | 20.2 | — | dB |
| | 2.0 | 18.5 | 21.5 | 24.4 | — | 20.8 | — | |
| | 4.0 | — | 20.6 | — | — | 19.7 | — | |
| | 5.0 | — | 20.1 | — | 14.9 | 19.3 | — | |
| | 8.0 | — | 19.2 | — | — | 18.7 | — | |
| Input Return Loss | 0.5 | | 12.3 | | | 11.2 | | dB |
| | 2.0 | | 17.2 | | | 16.3 | | |
| | 4.0 | | 10.0 | | | 9.2 | | |
| | 5.0 | | 8.3 | | | 7.7 | | |
| | 8.0 | | 6.5 | | | 6.0 | | |
| Output Return Loss | 0.5 | | 14.4 | | | 15.0 | | dB |
| | 2.0 | | 17.5 | | | 21.4 | | |
| | 4.0 | | 20.1 | | | 17.4 | | |
| | 5.0 | | 13.6 | | | 12.4 | | |
| | 8.0 | | 6.4 | | | 6.3 | | |
| Output Power @1dB compression | 0.5 | | 17.6 | | | 16.0 | | dBm |
| | 2.0 | | 20.3 | | | 19.5 | | |
| | 4.0 | | 18.0 | | | 16.0 | | |
| | 5.0 | | 18.8 | | 13.0 | 16.6 | — | |
| | 8.0 | | 16.9 | | | 16.4 | | |
| Output IP3 | 0.5 | | 29.4 | | | 26.1 | | dBm |
| | 2.0 | | 30.1 | | | 26.6 | | |
| | 4.0 | | 28.1 | | | 24.8 | | |
| | 5.0 | | 27.2 | | 12.3 | 24.0 | — | |
| | 8.0 | | 26.7 | | | 24.5 | | |
| Device Operating Voltage | | | 6.0 | | | 5.0 | | V |
| Device Operating Current | | | 62 | 94 | | 50 | | mA |
| DC Current Variation Vs. Temp. [2] | | | -157 | | | -109 | | µA/°C |
| DC Current Variation Vs. Voltage at 25°C | | | 0.016 | | | 0.016 | | mA/mV |
| Thermal Resistance | | | 70 | | | 70 | | °C/W |

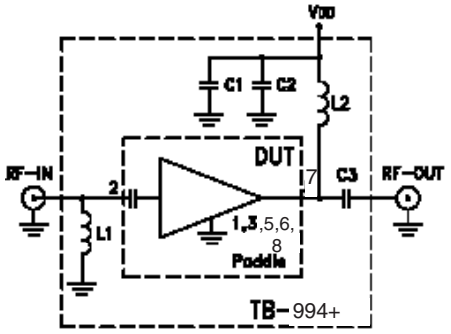
1. Measured on Mini-Circuits Characterization test board TB-994+. See Characterization Test Circuit (Fig. 1)
2. (Current at 125°C - Current at -45°C)/170

## Absolute Maximum Ratings[3]

| Parameter | Ratings |
|---|---|
| Operating Temperature (ground lead) | -40°C to 125°C |
| Storage Temperature | -65°C to 150°C |
| Junction Temperature | 150°C |
| Total Power Dissipation | 0.95 W |
| Input Power (CW), Vd=5,6V[4] | +19 dBm (5 minutes max.)<br>+16 dBm (continuous) |
| DC Voltage | 7 V |

Note:
3. Permanent damage may occur if any of these limits are exceeded.
Electrical maximum ratings are not intended for continuous normal operation.
4. Measured on Mini-Circuits test board, TB-994+

## Recommended Application and Characterization Test Circuit

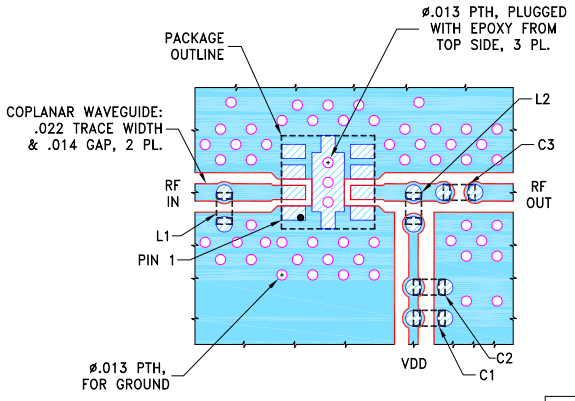



| Component | Vendor | Vendor P/N | Value | Size |
|---|---|---|---|---|
| C1 | Murata | GRM155R71E103KA01D | 0.01µF | 0402 |
| C2 | Murata | GJM1555C1H100JB01D | 10pF | 0402 |
| C3 | Murata | GRM1555C1H101JA01D | 100pF | 0402 |
| L1 | Murata | LQG15HS18NJ02D | 18nH | 0402 |
| L2 | Coilcraft | 0402CS-39NXGLW | 39nH | 0402 |

Fig 1. Application and Characterization Circuit
Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-994+) Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return loss: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.

## Suggested PCB Layout (PL-606)



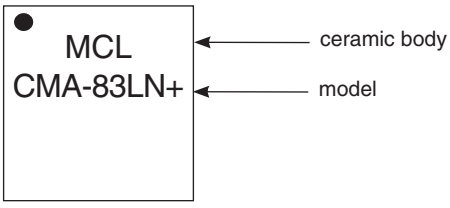

| COMPONENT | SIZE |
|---|---|
| C1–C3, L1–L2 | 0402 |

NOTES:
1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-994+.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

## Product Marking



## Additional Detailed Technical Information

*additional information is available on our dash board. To access this information click here*

| | |
|---|---|
| **Performance Data** | Data Table |
| | Swept Graphs |
| | S-Parameter (S2P Files) Data Set (.zip file) |
| **Case Style** | DL1721<br>*Ceramic package, exposed paddle, Terminal finish: NiPdAu* |
| **Tape & Reel**<br>**Standard quantities available on reel** | F66-1<br>*7" reels with 20, 50, 100, 200, 500 or 1K, 2K devices.* |
| **Suggested Layout for PCB Design** | PL-606 |
| **Evaluation Board** | TB-994+ |
| **Environmental Ratings** | ENV-71 |

## ESD Rating

Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (pass 50V) in accordance with ANSI/ESD STM5.2-1999

## MSL Rating

Moisture Sensitivity: MSL1 (these parts are hermetic, air cavity and therefore, MSL ratings do not strictly apply. For handling purpose, use MSL1)

## Qualification Testing

The table below shows the initial qualification testing performed. If required, parts can be subjected to 100% screening and qualifications testing per MIL standard requirement.

| Test Description | | Test Method/Process | Results |
|---|---|---|---|
| 1 | Hermeticity (fine and gross leak) | MIL-STD-202 Method 112, Cond. C & D | Pass |
| 2 | Acceleration, 30Kg, Y1 Direction | MIL-STD-883 Method 2001 Cond. E | Pass |
| 3 | Vibration , 10-2000Hz sine, 20g, 3 axis | MIL-STD-202 Method 204, Cond. D | Pass |
| 4 | Mechanical shock | MIL-STD-202 Method 213, Cond . A | Pass |
| 5 | PIND 20G's @130 Hz | MIL-STD-750 Method 2052.2 | Pass |
| 6 | Temp Cycle -55C/+125C, 1000 Cycles | MIL-STD-202 Method 107 | Pass |
| 7 | Autoclave, 121C, RH 100%, 15 Psig, 96 hrs | JESD22-A102C | Pass |
| 8 | HTOL, 1000hrs, 105C at rated Voltage condition | MIL-STD-202 Method 108, Cond . D | Pass |
| 9 | Bend Test | JESD22-B113 | Pass |
| 10 | Resistance to soldering heat, 3x reflow, 260C peak | JESD22-B102 | Pass |
| 11 | Drop Test | JESD22-B111 | Pass |
| 12 | Adhesion Strength | Push Test>10 lb | Pass |

### Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

## *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: Vd = 6.00V, Id = 63.81mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 20.35 | 27.43 | 7.98 | 10.15 | 1.15 | 0.79 | 28.74 | 16.96 | 1.91 |
| 600 | 21.48 | 26.16 | 17.85 | 16.16 | 1.11 | 0.66 | 30.38 | 18.47 | 1.44 |
| 800 | 21.68 | 25.90 | 33.38 | 15.28 | 1.10 | 0.59 | 31.43 | 19.76 | 1.31 |
| 1000 | 21.71 | 25.83 | 26.15 | 14.28 | 1.09 | 0.57 | 32.28 | 20.49 | 1.27 |
| 1200 | 21.69 | 25.81 | 22.30 | 13.94 | 1.09 | 0.56 | 33.03 | 20.72 | 1.30 |
| 1400 | 21.65 | 25.82 | 20.58 | 14.03 | 1.09 | 0.57 | 33.17 | 20.95 | 1.29 |
| 1600 | 21.59 | 25.86 | 19.67 | 14.38 | 1.10 | 0.58 | 32.08 | 20.74 | 1.38 |
| 1800 | 21.57 | 25.86 | 18.67 | 14.84 | 1.10 | 0.59 | 31.82 | 20.67 | 1.38 |
| 2000 | 21.51 | 25.89 | 18.05 | 15.63 | 1.10 | 0.61 | 30.54 | 20.49 | 1.34 |
| 2200 | 21.45 | 25.93 | 17.38 | 16.62 | 1.11 | 0.63 | 31.05 | 20.20 | 1.35 |
| 2400 | 21.38 | 25.99 | 16.64 | 17.85 | 1.12 | 0.65 | 31.36 | 20.40 | 1.36 |
| 2600 | 21.28 | 26.07 | 16.00 | 19.39 | 1.13 | 0.68 | 30.01 | 19.89 | 1.37 |
| 2800 | 21.18 | 26.16 | 15.31 | 21.57 | 1.14 | 0.70 | 29.99 | 19.85 | 1.41 |
| 3000 | 21.12 | 26.22 | 14.43 | 24.80 | 1.14 | 0.72 | 28.90 | 19.27 | 1.43 |
| 3200 | 21.07 | 26.26 | 13.57 | 29.73 | 1.14 | 0.74 | 29.55 | 19.48 | 1.42 |
| 3400 | 20.99 | 26.34 | 12.86 | 40.87 | 1.15 | 0.76 | 29.24 | 19.23 | 1.41 |
| 3600 | 20.91 | 26.43 | 12.21 | 35.70 | 1.15 | 0.78 | 29.28 | 19.31 | 1.46 |
| 3800 | 20.82 | 26.53 | 11.59 | 27.72 | 1.16 | 0.80 | 28.60 | 19.07 | 1.42 |
| 4000 | 20.73 | 26.61 | 11.05 | 23.68 | 1.16 | 0.81 | 28.60 | 18.55 | 1.51 |
| 4200 | 20.62 | 26.74 | 10.57 | 20.96 | 1.17 | 0.83 | 28.58 | 18.51 | 1.51 |
| 4400 | 20.52 | 26.90 | 10.02 | 18.66 | 1.18 | 0.84 | 28.21 | 18.25 | 1.52 |
| 4600 | 20.41 | 27.01 | 9.59 | 16.96 | 1.19 | 0.85 | 28.37 | 18.51 | 1.50 |
| 4800 | 20.30 | 27.22 | 9.20 | 15.72 | 1.20 | 0.86 | 27.85 | 18.64 | 1.51 |
| 5000 | 20.21 | 27.38 | 8.85 | 14.48 | 1.21 | 0.87 | 27.48 | 19.11 | 1.54 |
| 5200 | 20.08 | 27.54 | 8.47 | 13.41 | 1.22 | 0.88 | 27.29 | 18.69 | 1.49 |
| 5400 | 19.98 | 27.71 | 8.18 | 12.50 | 1.23 | 0.88 | 27.05 | 18.53 | 1.53 |
| 5600 | 19.90 | 27.93 | 7.92 | 11.71 | 1.24 | 0.88 | 27.79 | 19.05 | 1.56 |
| 5800 | 19.80 | 28.07 | 7.74 | 10.94 | 1.25 | 0.88 | 27.62 | 19.02 | 1.63 |
| 6000 | 19.74 | 28.33 | 7.46 | 10.18 | 1.26 | 0.87 | 26.87 | 18.77 | 1.58 |
| 6200 | 19.66 | 28.59 | 7.25 | 9.54 | 1.27 | 0.87 | 26.56 | 18.35 | 1.58 |
| 6400 | 19.54 | 28.72 | 7.10 | 8.99 | 1.27 | 0.87 | 26.80 | 18.26 | 1.62 |
| 6600 | 19.48 | 29.04 | 6.93 | 8.46 | 1.28 | 0.86 | 27.05 | 18.46 | 1.65 |
| 6800 | 19.27 | 29.26 | 6.85 | 8.27 | 1.31 | 0.87 | 26.44 | 17.94 | 1.68 |
| 7000 | 19.37 | 29.54 | 6.85 | 8.02 | 1.32 | 0.87 | 26.47 | 17.80 | 1.62 |
| 7200 | 19.13 | 29.94 | 6.79 | 7.52 | 1.36 | 0.86 | 26.29 | 17.55 | 1.72 |
| 7400 | 19.17 | 29.88 | 6.41 | 7.06 | 1.28 | 0.86 | 26.17 | 17.28 | 1.70 |
| 7600 | 19.17 | 30.06 | 6.27 | 6.67 | 1.25 | 0.85 | 26.22 | 17.37 | 1.76 |
| 7800 | 19.13 | 30.15 | 6.16 | 6.37 | 1.22 | 0.85 | 25.95 | 17.04 | 1.75 |
| 8000 | 19.03 | 30.19 | 6.02 | 6.14 | 1.18 | 0.86 | 26.20 | 16.77 | 1.88 |

## *Typical Performance Data*

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

TEST CONDITIONS: Vd = 5.00V, Id = 50.75mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 19.43 | 26.71 | 7.48 | 10.32 | 1.16 | 0.81 | 25.58 | 14.58 | 1.93 |
| 600 | 20.61 | 25.39 | 15.77 | 17.89 | 1.11 | 0.68 | 26.81 | 15.82 | 1.48 |
| 800 | 20.84 | 25.10 | 25.49 | 17.71 | 1.10 | 0.62 | 27.45 | 17.04 | 1.35 |
| 1000 | 20.89 | 25.01 | 28.53 | 16.51 | 1.10 | 0.59 | 28.05 | 18.40 | 1.26 |
| 1200 | 20.88 | 25.00 | 24.21 | 16.06 | 1.10 | 0.58 | 28.56 | 18.83 | 1.33 |
| 1400 | 20.85 | 25.01 | 21.59 | 16.18 | 1.10 | 0.59 | 28.57 | 19.21 | 1.31 |
| 1600 | 20.78 | 25.07 | 19.93 | 16.60 | 1.10 | 0.61 | 28.24 | 19.03 | 1.39 |
| 1800 | 20.76 | 25.09 | 18.51 | 17.20 | 1.10 | 0.62 | 27.92 | 19.09 | 1.41 |
| 2000 | 20.70 | 25.13 | 17.47 | 18.24 | 1.11 | 0.64 | 27.16 | 19.18 | 1.34 |
| 2200 | 20.64 | 25.19 | 16.51 | 19.57 | 1.11 | 0.66 | 27.47 | 18.57 | 1.37 |
| 2400 | 20.56 | 25.27 | 15.60 | 21.32 | 1.12 | 0.68 | 27.70 | 18.75 | 1.42 |
| 2600 | 20.47 | 25.37 | 14.85 | 23.65 | 1.13 | 0.71 | 26.68 | 18.09 | 1.46 |
| 2800 | 20.36 | 25.48 | 14.10 | 27.41 | 1.14 | 0.73 | 26.64 | 17.62 | 1.51 |
| 3000 | 20.30 | 25.56 | 13.25 | 35.05 | 1.14 | 0.75 | 25.71 | 17.17 | 1.39 |
| 3200 | 20.25 | 25.62 | 12.45 | 39.28 | 1.14 | 0.77 | 26.25 | 17.38 | 1.52 |
| 3400 | 20.17 | 25.71 | 11.80 | 29.78 | 1.15 | 0.79 | 26.00 | 16.73 | 1.52 |
| 3600 | 20.09 | 25.83 | 11.22 | 25.02 | 1.15 | 0.80 | 26.00 | 16.92 | 1.49 |
| 3800 | 20.01 | 25.94 | 10.67 | 21.93 | 1.16 | 0.82 | 25.47 | 16.64 | 1.46 |
| 4000 | 19.93 | 26.04 | 10.19 | 19.72 | 1.16 | 0.83 | 25.41 | 15.97 | 1.50 |
| 4200 | 19.82 | 26.18 | 9.77 | 17.98 | 1.17 | 0.84 | 25.46 | 15.80 | 1.56 |
| 4400 | 19.72 | 26.36 | 9.28 | 16.36 | 1.18 | 0.86 | 25.11 | 15.33 | 1.54 |
| 4600 | 19.62 | 26.48 | 8.90 | 15.10 | 1.18 | 0.87 | 25.35 | 15.76 | 1.54 |
| 4800 | 19.53 | 26.70 | 8.55 | 14.15 | 1.19 | 0.88 | 24.87 | 15.98 | 1.62 |
| 5000 | 19.44 | 26.86 | 8.24 | 13.17 | 1.20 | 0.88 | 24.42 | 16.58 | 1.63 |
| 5200 | 19.33 | 27.03 | 7.91 | 12.29 | 1.21 | 0.89 | 24.30 | 16.57 | 1.60 |
| 5400 | 19.24 | 27.21 | 7.64 | 11.55 | 1.22 | 0.89 | 24.18 | 16.64 | 1.65 |
| 5600 | 19.17 | 27.43 | 7.42 | 10.89 | 1.23 | 0.89 | 24.89 | 17.61 | 1.62 |
| 5800 | 19.09 | 27.58 | 7.26 | 10.24 | 1.23 | 0.88 | 24.76 | 17.58 | 1.58 |
| 6000 | 19.03 | 27.84 | 7.01 | 9.59 | 1.24 | 0.88 | 24.07 | 17.59 | 1.67 |
| 6200 | 18.97 | 28.10 | 6.82 | 9.06 | 1.25 | 0.88 | 23.65 | 17.21 | 1.64 |
| 6400 | 18.87 | 28.25 | 6.68 | 8.56 | 1.25 | 0.87 | 23.99 | 17.00 | 1.65 |
| 6600 | 18.82 | 28.56 | 6.53 | 8.11 | 1.26 | 0.87 | 24.28 | 17.51 | 1.64 |
| 6800 | 18.63 | 28.79 | 6.45 | 7.95 | 1.28 | 0.88 | 23.73 | 17.02 | 1.77 |
| 7000 | 18.75 | 29.06 | 6.46 | 7.77 | 1.29 | 0.88 | 23.85 | 16.86 | 1.78 |
| 7200 | 18.53 | 29.48 | 6.42 | 7.31 | 1.34 | 0.87 | 23.77 | 16.67 | 2.00 |
| 7400 | 18.58 | 29.46 | 6.02 | 6.89 | 1.26 | 0.87 | 23.76 | 16.45 | 1.81 |
| 7600 | 18.60 | 29.64 | 5.89 | 6.56 | 1.23 | 0.87 | 23.86 | 16.69 | 1.80 |
| 7800 | 18.57 | 29.77 | 5.79 | 6.28 | 1.20 | 0.87 | 23.84 | 16.42 | 1.80 |
| 8000 | 18.49 | 29.85 | 5.64 | 6.07 | 1.17 | 0.87 | 24.32 | 16.11 | 1.86 |

## *Typical Performance Data*

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

TEST CONDITIONS: Vd = 6.25V, Id = 67.35mA @ Temperature = +25°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 20.57 | 27.62 | 8.02 | 10.10 | 1.15 | 0.79 | 29.36 | 17.65 | 1.88 |
| 600 | 21.70 | 26.37 | 18.06 | 15.94 | 1.11 | 0.66 | 31.09 | 19.01 | 1.45 |
| 800 | 21.89 | 26.10 | 34.22 | 15.04 | 1.09 | 0.59 | 32.13 | 20.17 | 1.31 |
| 1000 | 21.92 | 26.03 | 25.78 | 14.07 | 1.09 | 0.56 | 33.31 | 20.80 | 1.24 |
| 1200 | 21.89 | 26.01 | 22.08 | 13.75 | 1.09 | 0.56 | 33.89 | 21.08 | 1.29 |
| 1400 | 21.86 | 26.02 | 20.43 | 13.84 | 1.09 | 0.56 | 34.33 | 21.31 | 1.30 |
| 1600 | 21.80 | 26.06 | 19.59 | 14.18 | 1.10 | 0.58 | 32.96 | 21.09 | 1.34 |
| 1800 | 21.77 | 26.06 | 18.64 | 14.64 | 1.10 | 0.59 | 32.61 | 21.02 | 1.38 |
| 2000 | 21.71 | 26.09 | 18.06 | 15.41 | 1.10 | 0.61 | 31.44 | 20.84 | 1.31 |
| 2200 | 21.65 | 26.12 | 17.40 | 16.37 | 1.11 | 0.63 | 31.68 | 20.58 | 1.36 |
| 2400 | 21.57 | 26.18 | 16.69 | 17.57 | 1.12 | 0.65 | 32.14 | 20.75 | 1.40 |
| 2600 | 21.48 | 26.25 | 16.04 | 19.07 | 1.13 | 0.68 | 30.75 | 20.26 | 1.41 |
| 2800 | 21.37 | 26.34 | 15.37 | 21.16 | 1.14 | 0.70 | 30.71 | 20.21 | 1.49 |
| 3000 | 21.31 | 26.40 | 14.50 | 24.22 | 1.14 | 0.72 | 29.62 | 19.64 | 1.39 |
| 3200 | 21.25 | 26.44 | 13.62 | 28.80 | 1.14 | 0.74 | 30.14 | 19.86 | 1.46 |
| 3400 | 21.17 | 26.51 | 12.91 | 38.24 | 1.15 | 0.76 | 29.91 | 19.67 | 1.49 |
| 3600 | 21.08 | 26.61 | 12.25 | 37.93 | 1.15 | 0.78 | 29.81 | 19.68 | 1.47 |
| 3800 | 20.99 | 26.70 | 11.63 | 28.43 | 1.16 | 0.80 | 29.33 | 19.35 | 1.44 |
| 4000 | 20.90 | 26.78 | 11.08 | 24.12 | 1.16 | 0.81 | 29.21 | 18.99 | 1.49 |
| 4200 | 20.78 | 26.91 | 10.61 | 21.28 | 1.17 | 0.83 | 29.17 | 18.94 | 1.55 |
| 4400 | 20.67 | 27.07 | 10.06 | 18.88 | 1.18 | 0.84 | 28.75 | 18.72 | 1.52 |
| 4600 | 20.56 | 27.17 | 9.62 | 17.14 | 1.19 | 0.85 | 28.93 | 18.97 | 1.52 |
| 4800 | 20.45 | 27.38 | 9.23 | 15.86 | 1.20 | 0.86 | 28.48 | 19.09 | 1.62 |
| 5000 | 20.35 | 27.53 | 8.87 | 14.59 | 1.21 | 0.87 | 28.11 | 19.53 | 1.60 |
| 5200 | 20.23 | 27.69 | 8.50 | 13.50 | 1.22 | 0.88 | 27.89 | 19.05 | 1.57 |
| 5400 | 20.12 | 27.86 | 8.21 | 12.57 | 1.23 | 0.88 | 27.59 | 18.86 | 1.58 |
| 5600 | 20.03 | 28.08 | 7.95 | 11.75 | 1.25 | 0.88 | 28.26 | 19.23 | 1.59 |
| 5800 | 19.93 | 28.22 | 7.76 | 10.98 | 1.25 | 0.88 | 28.18 | 19.16 | 1.54 |
| 6000 | 19.86 | 28.48 | 7.49 | 10.21 | 1.26 | 0.88 | 27.42 | 18.89 | 1.62 |
| 6200 | 19.78 | 28.74 | 7.28 | 9.56 | 1.27 | 0.87 | 27.09 | 18.59 | 1.64 |
| 6400 | 19.65 | 28.86 | 7.14 | 9.00 | 1.27 | 0.87 | 27.30 | 18.46 | 1.66 |
| 6600 | 19.58 | 29.17 | 6.97 | 8.46 | 1.29 | 0.86 | 27.59 | 18.60 | 1.62 |
| 6800 | 19.37 | 29.39 | 6.89 | 8.27 | 1.31 | 0.88 | 26.93 | 18.08 | 1.73 |
| 7000 | 19.47 | 29.66 | 6.89 | 8.01 | 1.32 | 0.87 | 26.94 | 17.92 | 1.77 |
| 7200 | 19.23 | 30.04 | 6.83 | 7.51 | 1.36 | 0.86 | 26.70 | 17.68 | 1.96 |
| 7400 | 19.26 | 29.97 | 6.46 | 7.04 | 1.28 | 0.86 | 26.55 | 17.39 | 1.77 |
| 7600 | 19.26 | 30.13 | 6.30 | 6.66 | 1.25 | 0.85 | 26.62 | 17.37 | 1.74 |
| 7800 | 19.21 | 30.20 | 6.20 | 6.35 | 1.21 | 0.85 | 26.36 | 17.11 | 1.80 |
| 8000 | 19.10 | 30.22 | 6.06 | 6.12 | 1.17 | 0.86 | 26.55 | 16.86 | 1.84 |

## *Typical Performance Data*

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

TEST CONDITIONS: Vd = 6.00V, Id = 72.73mA @ Temperature = -45°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 19.97 | 26.72 | 10.33 | 9.01 | 1.13 | 0.71 | 31.81 | 19.31 | 1.46 |
| 600 | 20.86 | 25.70 | 26.69 | 10.71 | 1.10 | 0.57 | 33.13 | 21.34 | 1.13 |
| 800 | 20.92 | 25.56 | 16.30 | 9.77 | 1.09 | 0.51 | 33.83 | 21.91 | 1.05 |
| 1000 | 20.91 | 25.52 | 13.94 | 9.26 | 1.08 | 0.49 | 34.20 | 22.13 | 0.98 |
| 1200 | 20.89 | 25.51 | 13.17 | 9.08 | 1.08 | 0.48 | 32.38 | 22.20 | 1.03 |
| 1400 | 20.84 | 25.52 | 12.52 | 8.84 | 1.08 | 0.48 | 31.85 | 22.30 | 1.02 |
| 1600 | 20.83 | 25.52 | 12.62 | 8.98 | 1.08 | 0.49 | 31.69 | 22.33 | 1.10 |
| 1800 | 20.85 | 25.49 | 12.78 | 9.14 | 1.08 | 0.49 | 32.69 | 22.37 | 1.11 |
| 2000 | 20.87 | 25.45 | 13.28 | 9.53 | 1.08 | 0.50 | 31.81 | 22.12 | 1.02 |
| 2200 | 20.88 | 25.42 | 13.88 | 9.89 | 1.09 | 0.51 | 30.96 | 21.93 | 1.03 |
| 2400 | 20.87 | 25.41 | 14.25 | 10.19 | 1.09 | 0.52 | 31.20 | 22.07 | 1.11 |
| 2600 | 20.85 | 25.42 | 15.08 | 10.71 | 1.10 | 0.53 | 31.76 | 21.90 | 1.12 |
| 2800 | 20.84 | 25.43 | 16.11 | 11.54 | 1.10 | 0.56 | 32.10 | 21.72 | 1.19 |
| 3000 | 20.88 | 25.39 | 17.92 | 12.74 | 1.11 | 0.58 | 31.02 | 20.89 | 1.06 |
| 3200 | 20.94 | 25.33 | 19.20 | 13.60 | 1.10 | 0.58 | 30.92 | 20.83 | 1.11 |
| 3400 | 20.95 | 25.32 | 19.94 | 14.39 | 1.10 | 0.59 | 30.87 | 20.55 | 1.11 |
| 3600 | 20.96 | 25.33 | 20.78 | 15.62 | 1.11 | 0.61 | 30.79 | 20.26 | 1.10 |
| 3800 | 20.96 | 25.34 | 20.63 | 17.24 | 1.11 | 0.62 | 30.26 | 19.44 | 1.06 |
| 4000 | 20.97 | 25.35 | 20.13 | 19.41 | 1.11 | 0.64 | 29.97 | 18.47 | 1.09 |
| 4200 | 20.94 | 25.40 | 19.60 | 21.25 | 1.12 | 0.65 | 29.42 | 18.27 | 1.12 |
| 4400 | 20.92 | 25.47 | 18.56 | 23.48 | 1.12 | 0.66 | 29.32 | 17.78 | 1.08 |
| 4600 | 20.90 | 25.50 | 17.90 | 26.67 | 1.12 | 0.67 | 29.08 | 18.07 | 1.09 |
| 4800 | 20.88 | 25.63 | 16.47 | 33.06 | 1.13 | 0.69 | 28.63 | 17.68 | 1.15 |
| 5000 | 20.86 | 25.71 | 15.41 | 33.75 | 1.13 | 0.70 | 28.83 | 17.96 | 1.15 |
| 5200 | 20.80 | 25.81 | 14.29 | 28.03 | 1.14 | 0.72 | 28.35 | 17.26 | 1.15 |
| 5400 | 20.78 | 25.92 | 13.63 | 23.70 | 1.15 | 0.72 | 27.32 | 16.80 | 1.25 |
| 5600 | 20.76 | 26.09 | 12.70 | 20.58 | 1.15 | 0.73 | 28.62 | 17.91 | 1.15 |
| 5800 | 20.71 | 26.23 | 11.72 | 17.60 | 1.16 | 0.74 | 28.71 | 18.05 | 1.09 |
| 6000 | 20.68 | 26.43 | 10.91 | 15.54 | 1.17 | 0.74 | 27.88 | 17.43 | 1.16 |
| 6200 | 20.66 | 26.67 | 10.29 | 14.07 | 1.18 | 0.74 | 27.73 | 17.05 | 1.16 |
| 6400 | 20.59 | 26.85 | 9.94 | 12.88 | 1.18 | 0.74 | 28.00 | 16.98 | 1.19 |
| 6600 | 20.54 | 27.13 | 9.20 | 11.53 | 1.19 | 0.74 | 28.75 | 18.31 | 1.16 |
| 6800 | 20.42 | 27.36 | 8.99 | 10.70 | 1.21 | 0.74 | 28.00 | 17.85 | 1.25 |
| 7000 | 20.42 | 27.79 | 8.78 | 11.07 | 1.24 | 0.78 | 28.15 | 18.04 | 1.24 |
| 7200 | 20.38 | 28.18 | 8.63 | 9.93 | 1.27 | 0.76 | 28.00 | 17.86 | 1.46 |
| 7400 | 20.49 | 28.27 | 8.39 | 9.16 | 1.25 | 0.74 | 27.66 | 17.58 | 1.28 |
| 7600 | 20.56 | 28.68 | 8.30 | 8.51 | 1.26 | 0.73 | 28.20 | 18.24 | 1.26 |
| 7800 | 20.63 | 29.01 | 8.31 | 8.07 | 1.27 | 0.72 | 27.74 | 18.13 | 1.24 |
| 8000 | 20.68 | 29.30 | 8.22 | 7.77 | 1.27 | 0.72 | 27.86 | 17.74 | 1.31 |

## *Typical Performance Data*

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

TEST CONDITIONS: Vd = 5.00V, Id = 55.19mA @ Temperature = -45°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 19.07 | 25.93 | 9.43 | 9.76 | 1.15 | 0.75 | 26.78 | 14.97 | 1.50 |
| 600 | 20.04 | 24.82 | 31.99 | 12.58 | 1.11 | 0.61 | 28.73 | 17.90 | 1.13 |
| 800 | 20.16 | 24.64 | 20.12 | 11.51 | 1.10 | 0.55 | 30.00 | 19.81 | 1.07 |
| 1000 | 20.17 | 24.60 | 16.60 | 10.88 | 1.09 | 0.53 | 31.31 | 20.21 | 1.00 |
| 1200 | 20.15 | 24.59 | 15.50 | 10.65 | 1.09 | 0.52 | 31.99 | 20.26 | 1.10 |
| 1400 | 20.12 | 24.61 | 14.57 | 10.35 | 1.09 | 0.52 | 32.60 | 20.39 | 1.07 |
| 1600 | 20.10 | 24.63 | 14.56 | 10.51 | 1.09 | 0.53 | 30.54 | 20.41 | 1.16 |
| 1800 | 20.11 | 24.62 | 14.66 | 10.72 | 1.09 | 0.53 | 30.47 | 20.46 | 1.15 |
| 2000 | 20.12 | 24.61 | 15.10 | 11.20 | 1.10 | 0.54 | 28.53 | 20.27 | 1.06 |
| 2200 | 20.12 | 24.61 | 15.64 | 11.65 | 1.10 | 0.55 | 28.70 | 19.84 | 1.06 |
| 2400 | 20.11 | 24.63 | 15.84 | 12.03 | 1.10 | 0.57 | 29.43 | 20.00 | 1.13 |
| 2600 | 20.08 | 24.67 | 16.58 | 12.68 | 1.11 | 0.59 | 28.10 | 19.89 | 1.15 |
| 2800 | 20.05 | 24.72 | 17.32 | 13.72 | 1.12 | 0.61 | 28.17 | 19.67 | 1.19 |
| 3000 | 20.08 | 24.73 | 18.25 | 15.31 | 1.12 | 0.63 | 26.54 | 18.93 | 1.09 |
| 3200 | 20.13 | 24.70 | 18.54 | 16.46 | 1.12 | 0.64 | 27.18 | 18.79 | 1.16 |
| 3400 | 20.13 | 24.72 | 18.37 | 17.54 | 1.12 | 0.65 | 26.92 | 18.23 | 1.11 |
| 3600 | 20.14 | 24.76 | 18.17 | 19.21 | 1.12 | 0.66 | 26.86 | 17.91 | 1.12 |
| 3800 | 20.13 | 24.81 | 17.34 | 21.54 | 1.12 | 0.68 | 26.15 | 16.84 | 1.07 |
| 4000 | 20.13 | 24.85 | 16.61 | 24.71 | 1.12 | 0.69 | 25.99 | 16.00 | 1.13 |
| 4200 | 20.11 | 24.92 | 16.13 | 27.20 | 1.13 | 0.70 | 25.86 | 15.64 | 1.13 |
| 4400 | 20.09 | 25.01 | 15.43 | 28.40 | 1.13 | 0.71 | 25.50 | 15.03 | 1.11 |
| 4600 | 20.07 | 25.07 | 15.02 | 26.42 | 1.14 | 0.72 | 25.64 | 15.46 | 1.10 |
| 4800 | 20.04 | 25.22 | 14.06 | 24.77 | 1.14 | 0.73 | 25.04 | 15.06 | 1.20 |
| 5000 | 20.03 | 25.34 | 13.32 | 22.61 | 1.15 | 0.74 | 24.89 | 15.65 | 1.17 |
| 5200 | 19.98 | 25.46 | 12.51 | 20.71 | 1.15 | 0.75 | 24.56 | 15.11 | 1.16 |
| 5400 | 19.96 | 25.59 | 12.06 | 18.81 | 1.16 | 0.76 | 23.98 | 14.93 | 1.20 |
| 5600 | 19.95 | 25.77 | 11.34 | 17.17 | 1.17 | 0.77 | 25.18 | 16.03 | 1.17 |
| 5800 | 19.90 | 25.93 | 10.57 | 15.25 | 1.17 | 0.77 | 25.11 | 16.16 | 1.12 |
| 6000 | 19.88 | 26.14 | 9.92 | 13.84 | 1.18 | 0.77 | 24.23 | 16.03 | 1.18 |
| 6200 | 19.87 | 26.39 | 9.42 | 12.76 | 1.19 | 0.77 | 23.95 | 15.64 | 1.18 |
| 6400 | 19.82 | 26.58 | 9.13 | 11.81 | 1.19 | 0.77 | 24.21 | 15.56 | 1.19 |
| 6600 | 19.77 | 26.86 | 8.50 | 10.75 | 1.20 | 0.77 | 24.84 | 16.81 | 1.17 |
| 6800 | 19.68 | 27.09 | 8.33 | 10.07 | 1.22 | 0.77 | 24.21 | 16.78 | 1.28 |
| 7000 | 19.70 | 27.49 | 8.15 | 10.50 | 1.25 | 0.80 | 24.32 | 17.29 | 1.28 |
| 7200 | 19.68 | 27.88 | 8.08 | 9.54 | 1.28 | 0.78 | 24.37 | 17.44 | 1.48 |
| 7400 | 19.81 | 27.98 | 7.80 | 8.90 | 1.25 | 0.76 | 24.24 | 17.15 | 1.29 |
| 7600 | 19.90 | 28.37 | 7.69 | 8.33 | 1.26 | 0.76 | 24.73 | 18.17 | 1.26 |
| 7800 | 19.99 | 28.68 | 7.67 | 7.97 | 1.26 | 0.75 | 24.60 | 18.13 | 1.28 |
| 8000 | 20.06 | 28.98 | 7.57 | 7.72 | 1.27 | 0.76 | 25.29 | 17.61 | 1.31 |

## *Typical Performance Data*

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

TEST CONDITIONS: Vd = 6.25V, Id = 76.65mA @ Temperature = -45°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 20.14 | 26.85 | 10.47 | 8.91 | 1.13 | 0.70 | 32.60 | 20.25 | 1.44 |
| 600 | 21.01 | 25.85 | 25.52 | 10.52 | 1.10 | 0.57 | 33.37 | 21.83 | 1.13 |
| 800 | 21.07 | 25.71 | 15.89 | 9.59 | 1.08 | 0.51 | 33.16 | 22.38 | 1.05 |
| 1000 | 21.05 | 25.68 | 13.65 | 9.10 | 1.08 | 0.49 | 33.42 | 22.56 | 1.02 |
| 1200 | 21.02 | 25.66 | 12.91 | 8.92 | 1.08 | 0.48 | 31.98 | 22.64 | 1.05 |
| 1400 | 20.98 | 25.68 | 12.30 | 8.69 | 1.08 | 0.47 | 31.59 | 22.74 | 1.02 |
| 1600 | 20.96 | 25.67 | 12.41 | 8.82 | 1.08 | 0.48 | 31.56 | 22.76 | 1.10 |
| 1800 | 20.98 | 25.64 | 12.57 | 8.98 | 1.08 | 0.48 | 32.26 | 22.81 | 1.13 |
| 2000 | 21.00 | 25.59 | 13.09 | 9.36 | 1.08 | 0.49 | 31.87 | 22.57 | 1.03 |
| 2200 | 21.02 | 25.56 | 13.68 | 9.71 | 1.08 | 0.50 | 30.96 | 22.43 | 1.05 |
| 2400 | 21.01 | 25.55 | 14.05 | 10.00 | 1.09 | 0.51 | 31.26 | 22.54 | 1.10 |
| 2600 | 21.00 | 25.55 | 14.89 | 10.52 | 1.09 | 0.53 | 32.12 | 22.42 | 1.08 |
| 2800 | 20.98 | 25.56 | 15.93 | 11.33 | 1.10 | 0.55 | 32.24 | 22.24 | 1.13 |
| 3000 | 21.03 | 25.51 | 17.84 | 12.50 | 1.10 | 0.57 | 31.49 | 21.47 | 1.06 |
| 3200 | 21.09 | 25.45 | 19.19 | 13.33 | 1.10 | 0.57 | 31.40 | 21.39 | 1.09 |
| 3400 | 21.10 | 25.43 | 20.05 | 14.11 | 1.10 | 0.59 | 31.30 | 21.15 | 1.12 |
| 3600 | 21.11 | 25.44 | 21.08 | 15.30 | 1.10 | 0.60 | 31.33 | 20.86 | 1.08 |
| 3800 | 21.11 | 25.44 | 21.09 | 16.87 | 1.11 | 0.62 | 30.83 | 20.17 | 1.05 |
| 4000 | 21.11 | 25.45 | 20.65 | 18.98 | 1.11 | 0.63 | 30.47 | 19.20 | 1.09 |
| 4200 | 21.08 | 25.49 | 20.11 | 20.76 | 1.11 | 0.64 | 30.06 | 18.99 | 1.12 |
| 4400 | 21.06 | 25.56 | 18.98 | 22.92 | 1.12 | 0.66 | 29.87 | 18.51 | 1.07 |
| 4600 | 21.04 | 25.59 | 18.29 | 26.24 | 1.12 | 0.67 | 29.58 | 18.77 | 1.08 |
| 4800 | 21.02 | 25.71 | 16.77 | 33.30 | 1.13 | 0.68 | 29.14 | 18.35 | 1.14 |
| 5000 | 20.99 | 25.80 | 15.64 | 37.18 | 1.13 | 0.70 | 29.35 | 18.61 | 1.15 |
| 5200 | 20.94 | 25.90 | 14.47 | 29.27 | 1.14 | 0.71 | 28.99 | 17.90 | 1.16 |
| 5400 | 20.91 | 26.00 | 13.79 | 24.31 | 1.15 | 0.72 | 27.82 | 17.38 | 1.15 |
| 5600 | 20.89 | 26.17 | 12.84 | 20.89 | 1.15 | 0.73 | 29.18 | 18.42 | 1.15 |
| 5800 | 20.84 | 26.31 | 11.82 | 17.79 | 1.16 | 0.73 | 29.20 | 18.58 | 1.09 |
| 6000 | 20.81 | 26.50 | 10.99 | 15.66 | 1.16 | 0.74 | 28.44 | 17.96 | 1.17 |
| 6200 | 20.78 | 26.74 | 10.37 | 14.14 | 1.17 | 0.74 | 28.36 | 17.50 | 1.15 |
| 6400 | 20.71 | 26.93 | 10.02 | 12.92 | 1.18 | 0.74 | 28.59 | 17.42 | 1.18 |
| 6600 | 20.66 | 27.20 | 9.25 | 11.56 | 1.19 | 0.74 | 29.37 | 18.71 | 1.15 |
| 6800 | 20.53 | 27.44 | 9.04 | 10.71 | 1.21 | 0.74 | 28.55 | 18.12 | 1.25 |
| 7000 | 20.53 | 27.87 | 8.82 | 11.05 | 1.24 | 0.78 | 28.70 | 18.30 | 1.25 |
| 7200 | 20.49 | 28.26 | 8.67 | 9.90 | 1.27 | 0.76 | 28.55 | 18.07 | 1.46 |
| 7400 | 20.60 | 28.35 | 8.44 | 9.13 | 1.25 | 0.73 | 28.22 | 17.81 | 1.26 |
| 7600 | 20.66 | 28.78 | 8.34 | 8.46 | 1.26 | 0.73 | 28.74 | 18.36 | 1.24 |
| 7800 | 20.72 | 29.09 | 8.36 | 8.02 | 1.27 | 0.72 | 28.15 | 18.23 | 1.22 |
| 8000 | 20.77 | 29.39 | 8.26 | 7.72 | 1.27 | 0.72 | 28.14 | 17.81 | 1.28 |

## *Typical Performance Data*

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

TEST CONDITIONS: Vd = 6.00V, Id = 46.88mA @ Temperature = +125°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 20.04 | 28.73 | 5.14 | 8.66 | 1.18 | 0.86 | 25.36 | 18.17 | 2.60 |
| 600 | 21.51 | 27.17 | 8.72 | 14.23 | 1.13 | 0.75 | 26.29 | 18.97 | 1.95 |
| 800 | 21.92 | 26.70 | 11.08 | 18.31 | 1.11 | 0.69 | 26.62 | 19.73 | 1.76 |
| 1000 | 22.01 | 26.55 | 11.85 | 20.16 | 1.10 | 0.68 | 27.02 | 20.43 | 1.70 |
| 1200 | 21.97 | 26.54 | 11.63 | 20.15 | 1.10 | 0.68 | 27.26 | 20.45 | 1.73 |
| 1400 | 21.87 | 26.59 | 10.96 | 19.32 | 1.10 | 0.70 | 27.10 | 20.67 | 1.73 |
| 1600 | 21.71 | 26.69 | 10.19 | 18.62 | 1.10 | 0.73 | 26.91 | 20.51 | 1.80 |
| 1800 | 21.60 | 26.74 | 9.63 | 17.77 | 1.10 | 0.75 | 26.73 | 20.54 | 1.83 |
| 2000 | 21.44 | 26.84 | 9.07 | 16.99 | 1.10 | 0.77 | 26.43 | 20.76 | 1.78 |
| 2200 | 21.27 | 26.93 | 8.62 | 16.41 | 1.11 | 0.80 | 26.80 | 20.25 | 1.83 |
| 2400 | 21.10 | 27.04 | 8.24 | 15.93 | 1.11 | 0.83 | 26.84 | 20.39 | 1.89 |
| 2600 | 20.91 | 27.16 | 7.91 | 15.52 | 1.12 | 0.85 | 26.15 | 20.17 | 1.91 |
| 2800 | 20.71 | 27.30 | 7.59 | 15.03 | 1.13 | 0.88 | 26.05 | 20.05 | 2.01 |
| 3000 | 20.52 | 27.41 | 7.25 | 14.39 | 1.13 | 0.90 | 25.49 | 19.93 | 1.92 |
| 3200 | 20.33 | 27.53 | 6.92 | 13.68 | 1.13 | 0.93 | 26.03 | 19.85 | 2.06 |
| 3400 | 20.11 | 27.67 | 6.63 | 12.97 | 1.14 | 0.95 | 25.78 | 19.50 | 2.05 |
| 3600 | 19.88 | 27.84 | 6.34 | 12.23 | 1.14 | 0.97 | 25.67 | 19.57 | 2.08 |
| 3800 | 19.64 | 28.00 | 5.99 | 11.39 | 1.14 | 0.98 | 25.19 | 19.47 | 2.09 |
| 4000 | 19.38 | 28.17 | 5.68 | 10.68 | 1.14 | 1.00 | 25.20 | 19.02 | 2.14 |
| 4200 | 19.11 | 28.35 | 5.46 | 10.06 | 1.15 | 1.01 | 25.23 | 18.75 | 2.21 |
| 4400 | 18.85 | 28.57 | 5.17 | 9.36 | 1.15 | 1.01 | 24.84 | 18.46 | 2.24 |
| 4600 | 18.60 | 28.70 | 4.95 | 8.85 | 1.16 | 1.02 | 24.89 | 18.17 | 2.26 |
| 4800 | 18.37 | 28.89 | 4.76 | 8.39 | 1.16 | 1.02 | 24.38 | 17.91 | 2.33 |
| 5000 | 18.17 | 29.02 | 4.63 | 7.96 | 1.16 | 1.02 | 23.62 | 17.58 | 2.36 |
| 5200 | 17.97 | 29.07 | 4.55 | 7.64 | 1.16 | 1.01 | 23.59 | 16.96 | 2.36 |
| 5400 | 17.83 | 29.13 | 4.49 | 7.36 | 1.15 | 1.01 | 23.64 | 16.59 | 2.37 |
| 5600 | 17.70 | 29.24 | 4.43 | 7.07 | 1.15 | 1.00 | 23.63 | 16.21 | 2.38 |
| 5800 | 17.57 | 29.14 | 4.46 | 6.84 | 1.13 | 0.99 | 23.29 | 15.71 | 2.30 |
| 6000 | 17.47 | 29.14 | 4.44 | 6.58 | 1.10 | 0.99 | 22.74 | 15.56 | 2.40 |
| 6200 | 17.36 | 29.07 | 4.46 | 6.36 | 1.08 | 0.98 | 22.32 | 15.22 | 2.40 |
| 6400 | 17.22 | 28.93 | 4.52 | 6.21 | 1.06 | 0.97 | 22.41 | 14.72 | 2.42 |
| 6600 | 17.06 | 28.93 | 4.49 | 6.06 | 1.03 | 0.98 | 22.21 | 14.33 | 2.40 |
| 6800 | 16.92 | 28.89 | 4.48 | 6.02 | 1.02 | 0.99 | 21.74 | 14.04 | 2.55 |
| 7000 | 16.74 | 28.71 | 4.63 | 5.75 | 1.00 | 0.97 | 21.56 | 13.71 | 2.63 |
| 7200 | 16.36 | 28.69 | 4.62 | 5.57 | 1.00 | 0.96 | 21.33 | 13.44 | 2.78 |
| 7400 | 16.28 | 28.46 | 4.26 | 5.30 | 0.89 | 0.97 | 21.31 | 13.08 | 2.63 |
| 7600 | 16.07 | 28.18 | 4.17 | 5.09 | 0.83 | 0.97 | 20.81 | 12.89 | 2.67 |
| 7800 | 15.80 | 27.92 | 4.11 | 4.91 | 0.78 | 0.97 | 20.72 | 12.63 | 2.69 |
| 8000 | 15.53 | 27.73 | 4.04 | 4.77 | 0.75 | 0.97 | 20.91 | 12.27 | 2.77 |

## *Typical Performance Data*

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

TEST CONDITIONS: Vd = 5.00V, Id = 37.29mA @ Temperature = +125°C

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 18.87 | 27.97 | 4.84 | 8.23 | 1.19 | 0.86 | 23.06 | 18.11 | 2.70 |
| 600 | 20.38 | 26.36 | 8.09 | 12.88 | 1.14 | 0.76 | 23.91 | 19.07 | 2.01 |
| 800 | 20.82 | 25.87 | 10.20 | 15.95 | 1.12 | 0.70 | 24.17 | 19.81 | 1.84 |
| 1000 | 20.93 | 25.71 | 10.89 | 17.21 | 1.11 | 0.68 | 24.56 | 20.16 | 1.72 |
| 1200 | 20.90 | 25.70 | 10.72 | 17.18 | 1.10 | 0.69 | 24.73 | 20.01 | 1.79 |
| 1400 | 20.81 | 25.75 | 10.14 | 16.60 | 1.10 | 0.71 | 24.62 | 20.16 | 1.80 |
| 1600 | 20.66 | 25.87 | 9.47 | 16.11 | 1.10 | 0.74 | 24.47 | 20.11 | 1.87 |
| 1800 | 20.56 | 25.92 | 8.98 | 15.50 | 1.10 | 0.76 | 24.27 | 20.30 | 1.89 |
| 2000 | 20.41 | 26.02 | 8.48 | 14.92 | 1.10 | 0.78 | 23.95 | 20.35 | 1.84 |
| 2200 | 20.25 | 26.13 | 8.06 | 14.49 | 1.11 | 0.81 | 24.33 | 19.81 | 1.88 |
| 2400 | 20.08 | 26.24 | 7.71 | 14.13 | 1.11 | 0.83 | 24.38 | 19.89 | 1.95 |
| 2600 | 19.91 | 26.37 | 7.42 | 13.82 | 1.12 | 0.86 | 23.69 | 20.22 | 1.98 |
| 2800 | 19.71 | 26.51 | 7.13 | 13.45 | 1.12 | 0.88 | 23.59 | 19.99 | 2.08 |
| 3000 | 19.53 | 26.64 | 6.81 | 12.94 | 1.12 | 0.91 | 23.05 | 20.05 | 2.00 |
| 3200 | 19.36 | 26.76 | 6.50 | 12.34 | 1.12 | 0.93 | 23.58 | 19.46 | 2.10 |
| 3400 | 19.15 | 26.92 | 6.24 | 11.76 | 1.13 | 0.95 | 23.30 | 19.35 | 2.09 |
| 3600 | 18.93 | 27.09 | 5.96 | 11.13 | 1.13 | 0.96 | 23.23 | 19.30 | 2.13 |
| 3800 | 18.69 | 27.27 | 5.64 | 10.42 | 1.13 | 0.98 | 22.75 | 19.41 | 2.13 |
| 4000 | 18.45 | 27.44 | 5.35 | 9.81 | 1.13 | 0.99 | 22.78 | 18.84 | 2.19 |
| 4200 | 18.19 | 27.63 | 5.14 | 9.27 | 1.14 | 1.00 | 22.89 | 18.46 | 2.28 |
| 4400 | 17.94 | 27.86 | 4.87 | 8.66 | 1.13 | 1.00 | 22.49 | 18.31 | 2.30 |
| 4600 | 17.69 | 28.00 | 4.67 | 8.20 | 1.14 | 1.00 | 22.56 | 18.08 | 2.31 |
| 4800 | 17.48 | 28.20 | 4.48 | 7.81 | 1.14 | 1.01 | 22.13 | 17.83 | 2.45 |
| 5000 | 17.29 | 28.34 | 4.36 | 7.43 | 1.13 | 1.00 | 21.35 | 17.82 | 2.44 |
| 5200 | 17.11 | 28.40 | 4.28 | 7.15 | 1.13 | 1.00 | 21.44 | 17.14 | 2.44 |
| 5400 | 16.98 | 28.47 | 4.22 | 6.91 | 1.13 | 0.99 | 21.61 | 16.76 | 2.42 |
| 5600 | 16.87 | 28.58 | 4.17 | 6.66 | 1.12 | 0.99 | 21.63 | 16.26 | 2.43 |
| 5800 | 16.75 | 28.50 | 4.19 | 6.44 | 1.10 | 0.98 | 21.28 | 15.92 | 2.40 |
| 6000 | 16.67 | 28.51 | 4.17 | 6.22 | 1.07 | 0.97 | 20.80 | 15.84 | 2.45 |
| 6200 | 16.58 | 28.47 | 4.19 | 6.03 | 1.05 | 0.97 | 20.42 | 15.37 | 2.47 |
| 6400 | 16.45 | 28.34 | 4.24 | 5.91 | 1.03 | 0.96 | 20.58 | 14.74 | 2.46 |
| 6600 | 16.31 | 28.37 | 4.22 | 5.77 | 1.01 | 0.97 | 20.37 | 14.11 | 2.49 |
| 6800 | 16.19 | 28.35 | 4.21 | 5.76 | 0.99 | 0.98 | 19.97 | 13.82 | 2.61 |
| 7000 | 16.02 | 28.21 | 4.36 | 5.51 | 0.98 | 0.96 | 19.85 | 13.49 | 2.69 |
| 7200 | 15.65 | 28.23 | 4.36 | 5.35 | 0.99 | 0.95 | 19.66 | 13.19 | 2.85 |
| 7400 | 15.59 | 28.04 | 4.01 | 5.11 | 0.88 | 0.96 | 19.69 | 12.78 | 2.68 |
| 7600 | 15.39 | 27.80 | 3.92 | 4.92 | 0.82 | 0.96 | 19.22 | 12.63 | 2.76 |
| 7800 | 15.14 | 27.59 | 3.87 | 4.76 | 0.78 | 0.96 | 19.17 | 12.34 | 2.74 |
| 8000 | 14.88 | 27.43 | 3.81 | 4.63 | 0.75 | 0.96 | 19.39 | 11.94 | 2.85 |

## *Typical Performance Data*

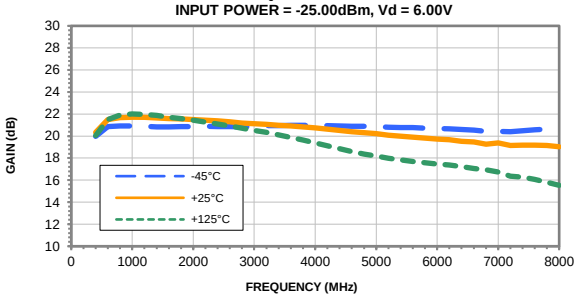
**Definitions:**
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 6.25V, Id = 49.61mA @ Temperature = +125°C

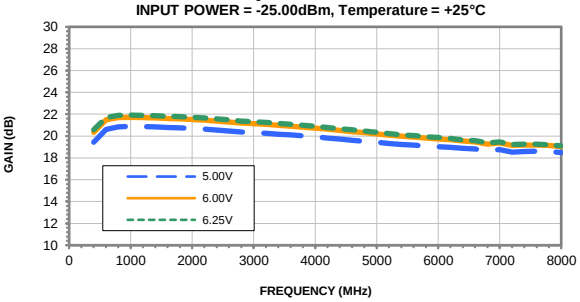
| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Measure | (dBm) | (dBm) | (dB) |
| 400 | 20.29 | 28.90 | 5.21 | 8.76 | 1.18 | 0.86 | 25.90 | 18.33 | 2.59 |
| 600 | 21.75 | 27.34 | 8.87 | 14.56 | 1.13 | 0.75 | 26.89 | 19.13 | 1.95 |
| 800 | 22.15 | 26.88 | 11.29 | 18.92 | 1.11 | 0.69 | 27.21 | 19.81 | 1.77 |
| 1000 | 22.23 | 26.74 | 12.08 | 20.96 | 1.10 | 0.67 | 27.62 | 20.36 | 1.67 |
| 1200 | 22.19 | 26.73 | 11.83 | 20.97 | 1.10 | 0.68 | 27.85 | 20.42 | 1.71 |
| 1400 | 22.09 | 26.77 | 11.14 | 20.04 | 1.10 | 0.70 | 27.71 | 20.69 | 1.71 |
| 1600 | 21.93 | 26.87 | 10.35 | 19.29 | 1.10 | 0.73 | 27.47 | 20.56 | 1.81 |
| 1800 | 21.82 | 26.92 | 9.78 | 18.35 | 1.10 | 0.75 | 27.33 | 20.58 | 1.82 |
| 2000 | 21.66 | 27.01 | 9.22 | 17.51 | 1.10 | 0.77 | 27.00 | 20.77 | 1.78 |
| 2200 | 21.49 | 27.11 | 8.75 | 16.90 | 1.11 | 0.80 | 27.45 | 20.32 | 1.82 |
| 2400 | 21.31 | 27.21 | 8.35 | 16.39 | 1.11 | 0.83 | 27.48 | 20.40 | 1.88 |
| 2600 | 21.12 | 27.33 | 8.02 | 15.95 | 1.12 | 0.85 | 26.71 | 20.17 | 1.91 |
| 2800 | 20.91 | 27.46 | 7.70 | 15.43 | 1.13 | 0.88 | 26.61 | 19.92 | 2.01 |
| 3000 | 20.72 | 27.58 | 7.35 | 14.75 | 1.13 | 0.90 | 26.07 | 19.80 | 1.92 |
| 3200 | 20.53 | 27.69 | 7.01 | 14.00 | 1.13 | 0.93 | 26.57 | 19.81 | 2.05 |
| 3400 | 20.31 | 27.83 | 6.73 | 13.27 | 1.14 | 0.95 | 26.34 | 19.47 | 2.00 |
| 3600 | 20.08 | 28.00 | 6.43 | 12.49 | 1.14 | 0.97 | 26.25 | 19.52 | 2.07 |
| 3800 | 19.83 | 28.16 | 6.07 | 11.63 | 1.14 | 0.98 | 25.75 | 19.37 | 2.05 |
| 4000 | 19.57 | 28.32 | 5.76 | 10.89 | 1.15 | 1.00 | 25.73 | 19.09 | 2.17 |
| 4200 | 19.30 | 28.50 | 5.54 | 10.24 | 1.16 | 1.01 | 25.76 | 18.85 | 2.22 |
| 4400 | 19.04 | 28.71 | 5.24 | 9.52 | 1.16 | 1.02 | 25.35 | 18.50 | 2.23 |
| 4600 | 18.78 | 28.85 | 5.02 | 8.99 | 1.16 | 1.02 | 25.35 | 18.27 | 2.24 |
| 4800 | 18.55 | 29.03 | 4.83 | 8.52 | 1.17 | 1.02 | 24.87 | 17.86 | 2.35 |
| 5000 | 18.35 | 29.16 | 4.69 | 8.08 | 1.16 | 1.02 | 24.10 | 17.45 | 2.36 |
| 5200 | 18.15 | 29.21 | 4.61 | 7.75 | 1.17 | 1.01 | 24.06 | 17.01 | 2.32 |
| 5400 | 18.00 | 29.27 | 4.55 | 7.46 | 1.16 | 1.01 | 24.07 | 16.67 | 2.36 |
| 5600 | 17.87 | 29.36 | 4.50 | 7.17 | 1.15 | 1.00 | 24.10 | 16.22 | 2.35 |
| 5800 | 17.73 | 29.27 | 4.52 | 6.92 | 1.13 | 0.99 | 23.74 | 15.84 | 2.28 |
| 6000 | 17.62 | 29.26 | 4.51 | 6.66 | 1.11 | 0.99 | 23.16 | 15.68 | 2.38 |
| 6200 | 17.52 | 29.18 | 4.53 | 6.43 | 1.08 | 0.98 | 22.74 | 15.31 | 2.42 |
| 6400 | 17.37 | 29.04 | 4.59 | 6.28 | 1.06 | 0.97 | 22.83 | 14.85 | 2.41 |
| 6600 | 17.20 | 29.03 | 4.57 | 6.12 | 1.04 | 0.98 | 22.60 | 14.46 | 2.39 |
| 6800 | 17.07 | 28.99 | 4.55 | 6.08 | 1.02 | 0.99 | 22.11 | 14.15 | 2.54 |
| 7000 | 16.88 | 28.81 | 4.70 | 5.80 | 1.00 | 0.97 | 21.94 | 13.85 | 2.62 |
| 7200 | 16.49 | 28.77 | 4.69 | 5.62 | 1.01 | 0.96 | 21.68 | 13.56 | 2.77 |
| 7400 | 16.41 | 28.54 | 4.32 | 5.35 | 0.90 | 0.97 | 21.64 | 13.19 | 2.62 |
| 7600 | 16.20 | 28.24 | 4.23 | 5.13 | 0.83 | 0.97 | 21.15 | 12.99 | 2.65 |
| 7800 | 15.93 | 27.98 | 4.17 | 4.95 | 0.79 | 0.97 | 21.06 | 12.77 | 2.69 |
| 8000 | 15.65 | 27.77 | 4.09 | 4.80 | 0.75 | 0.97 | 21.22 | 12.39 | 2.75 |

## *Typical Performance Curves*

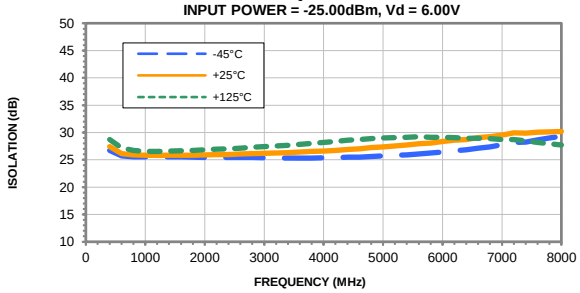
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 6.00V



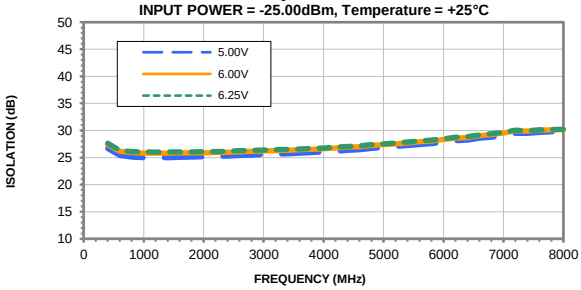

GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



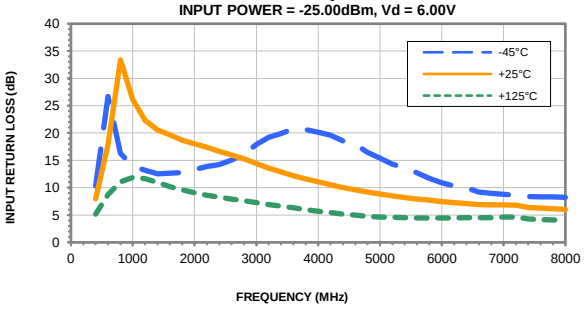

ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 6.00V



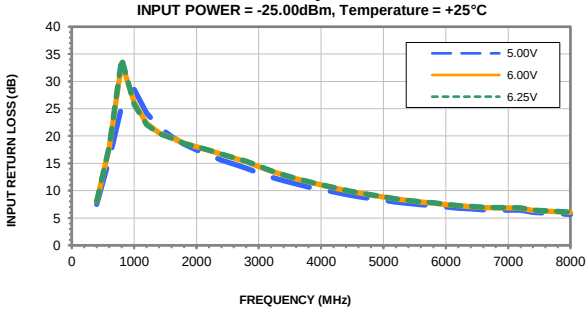

ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



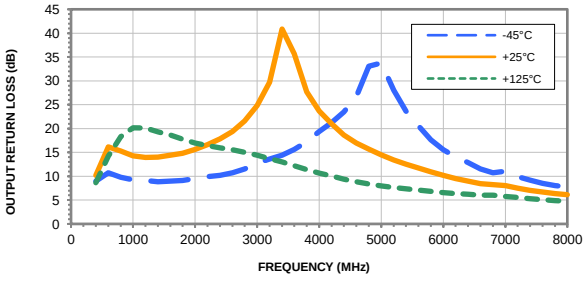

INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 6.00V



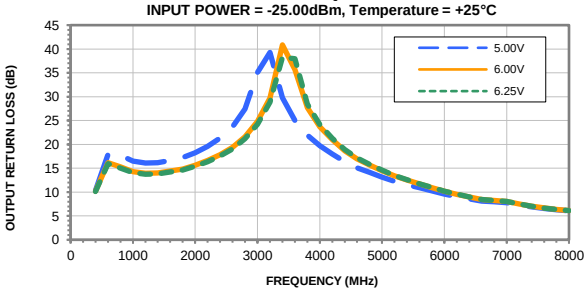

INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C




OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 6.00V

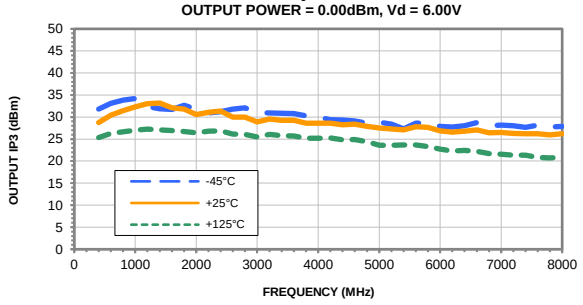



OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

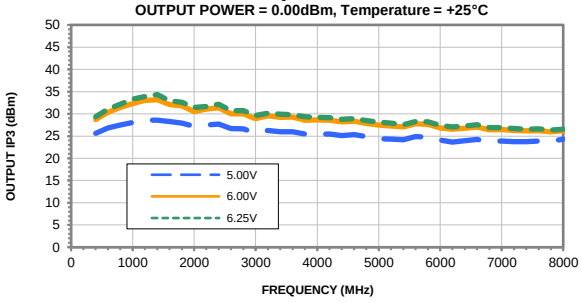


## *Typical Performance Curves*

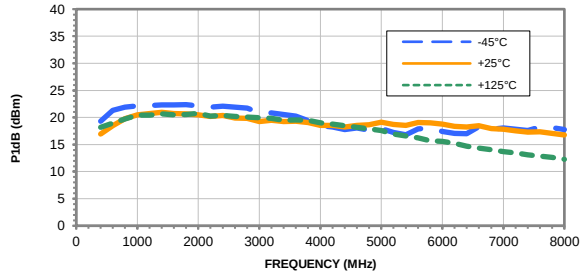
**OUTPUT IP3 vs. FREQUENCY & TEMPERATURE**
**OUTPUT POWER = 0.00dBm, Vd = 6.00V**



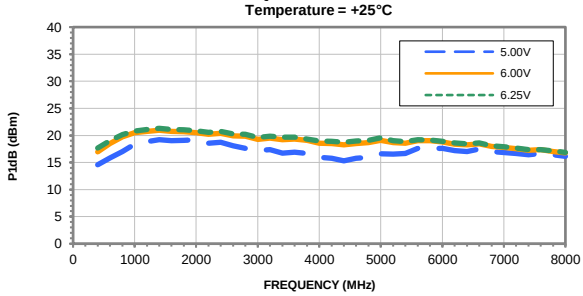

**OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE**
**OUTPUT POWER = 0.00dBm, Temperature = +25°C**



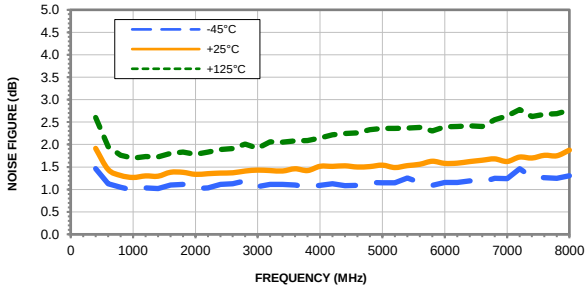

**P1dB vs. FREQUENCY & TEMPERATURE**
**Vd = 6.00V**



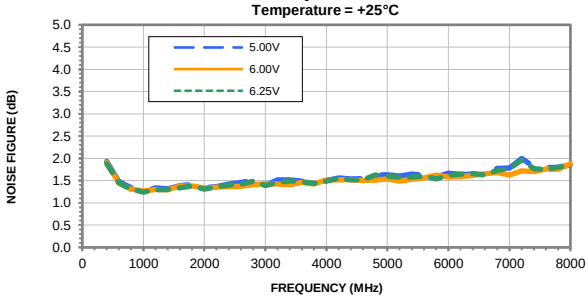

**P1dB vs. FREQUENCY & DEVICE VOLTAGE**
**Temperature = +25°C**



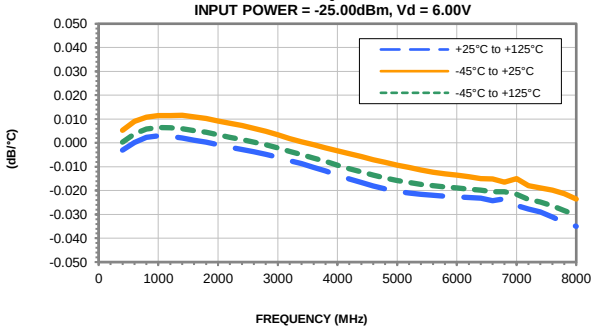

**NOISE FIGURE vs. FREQUENCY & TEMPERATURE**
**Vd = 6.00V**




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

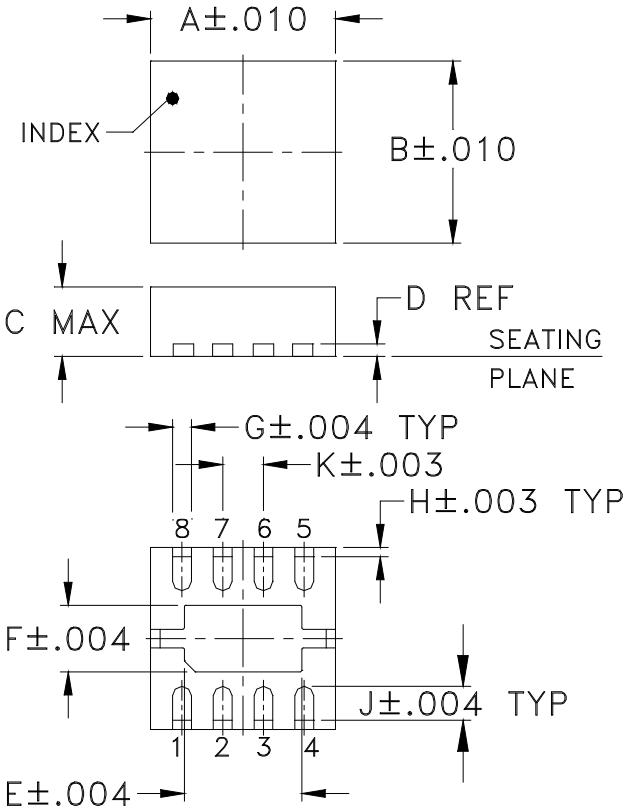



**GAIN VARIATION vs. FREQUENCY & TEMPERATURE**
**INPUT POWER = -25.00dBm, Vd = 6.00V**

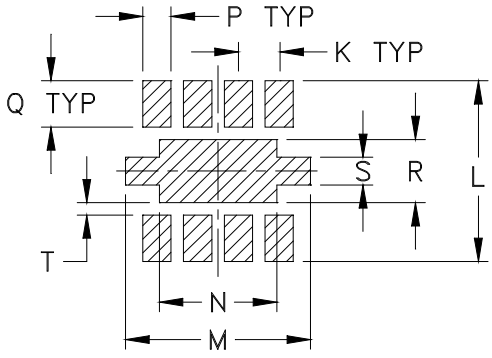


**DL1721**

## 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 | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DL1721 | .118 (3.00) | .118 (3.00) | .045 (1.14) | .008 (0.20) | .075 (1.91) | .043 (1.09) | .012 (0.30) | .006 (0.15) | .022 (0.56) | .026 (0.66) | .117 (2.97) | .118 (3.00) | .075 (1.91) |

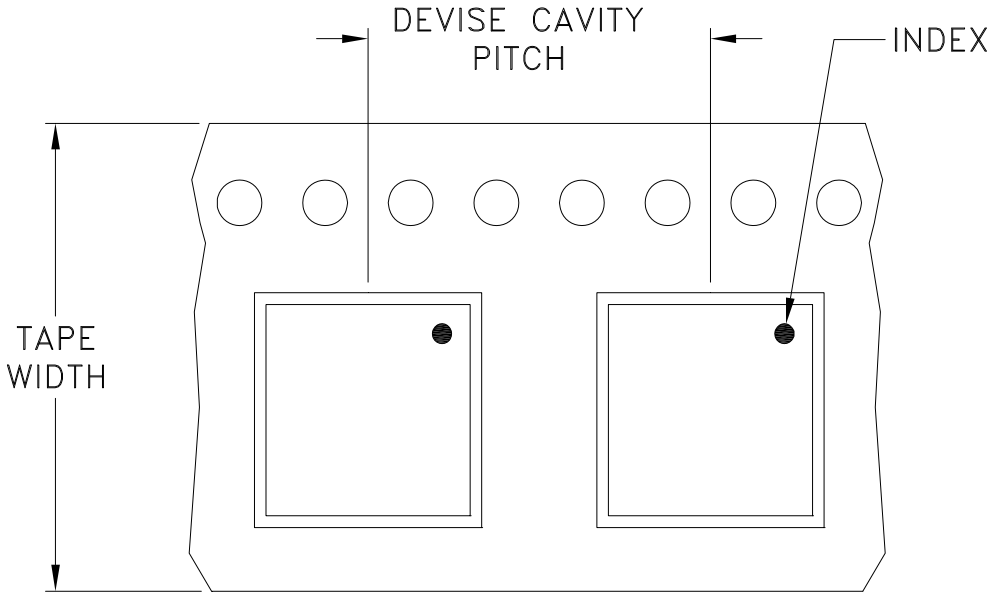
| CASE # | P | Q | R | S | T | WT. GRAM |
|---|---|---|---|---|---|---|
| DL1721 | .018 (0.46) | .030 (0.76) | .041 (1.04) | .018 (0.46) | .008 (0.20) | .02 |

**Dimensions are in inches (mm). Tolerances: 3Pl. ± .004, unless otherwise specified.**

**Notes:**

1. Case material: LTCC.
2. Termination finish: Nickel-Palladium-Gold plating.

# Tape & Reel Packaging TR-F66-1




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

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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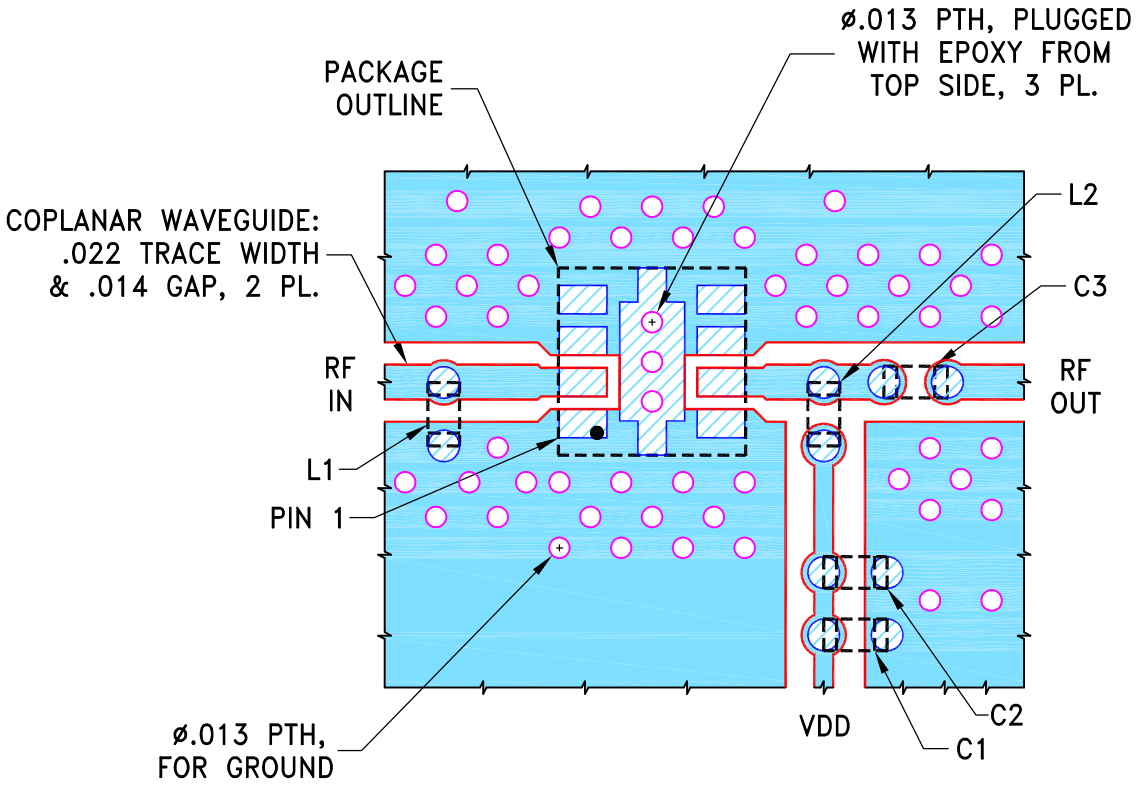
THIRD ANGLE PROJECTION

REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|---|---|---|---|---|---|
| OR | M169377 | NEW RELEASE | 08/08/18 | GF | DL |
| | | | | | |
| | | | | | |
| | | | | | |

# SUGGESTED MOUNTING CONFIGURATION FOR DL1721 CASE STYLE, "08AM20" PIN CODE




| COMPONENT | SIZE |
|---|---|
| C1–C3, L1–L2 | 0402 |

NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-994+.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

| UNLESS OTHERWISE SPECIFIED | | INITIALS | DATE |
|---|---|---|---|
| DIMENSIONS ARE IN INCHES | DRAWN | GF | 08/03/18 |
| TOLERANCES ON: | CHECKED | IL | 08/08/18 |
| 2 PL DECIMALS ± | APPROVED | DL | 08/08/18 |
| 3 PL DECIMALS ± .005 | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |



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

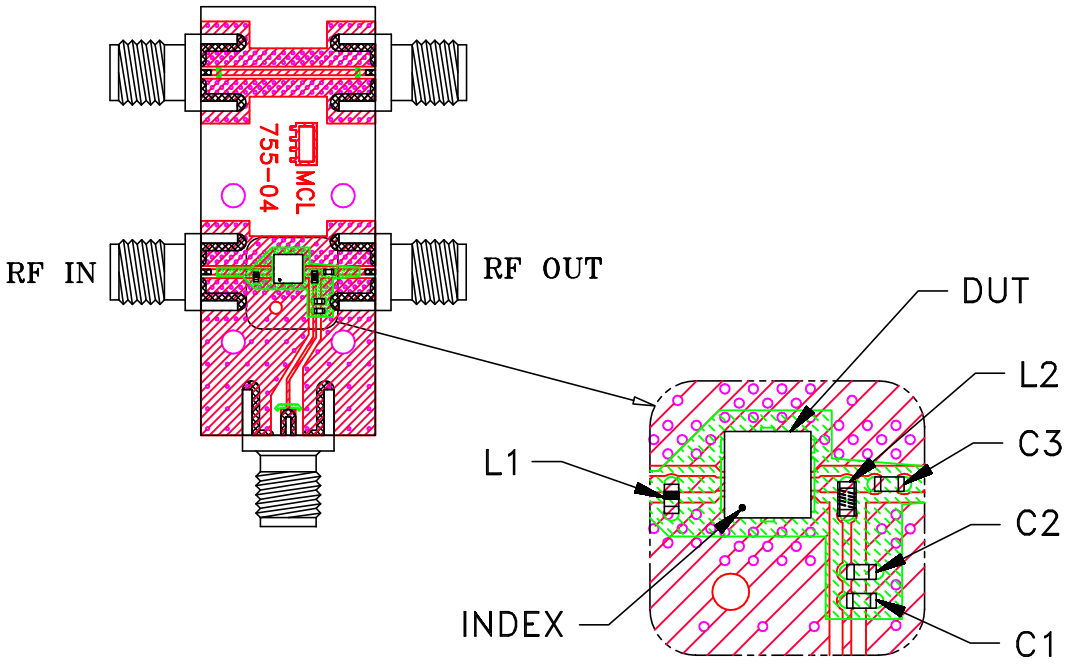
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 08AM20, DL1721, TB-994+

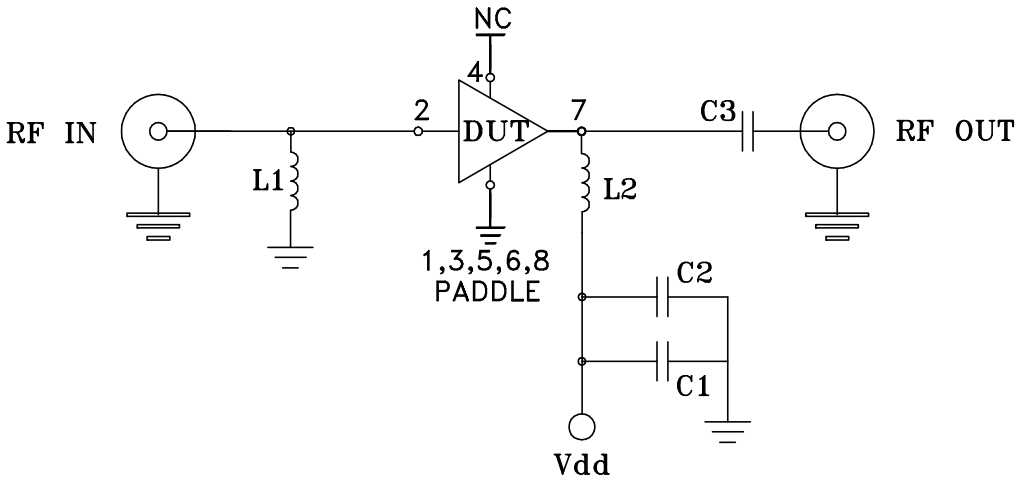
| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-606 | OR |

| FILE: | SCALE: | SHEET: |
|---|---|---|
| 98PL606 | 8:1 | 1 OF 1 |

# Evaluation Board and Circuit




TB-994+




| COMPONENT | VALUE | SIZE |
|---|---|---|
| DUT | CMA-83LN+ | 3X3 MM |
| C1 | 0.1 uF | 0402 |
| C2 | 10 pF | |
| C3 | 100 pF | |
| L1 | 18 nH | |
| L2 | 39 nH | |

Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.010 inch.

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# Environmental Specifications ENV68

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 | -55° to 105°C | Individual Model Data Sheet |
| Storage Temperature | -65° to 125° C | Individual Model Data Sheet |
| Thermal Shock (device level) | -55° to 125°C, 100 cycles | MIL-STD-202, Method 107 |
| Thermal Shock (board level) | -55° to 125°C, 1000 cycles | MIL-STD-202, Method 107 |
| Constant Acceleration | Y1 plane only, 30 Kg | MIL-STD-883, Method 2001, Cond. E |
| Vibration | 10-2000MHz sine, 20g, 3 axis | MIL-STD-202, Method 204, Cond. D |
| Mechanical Shock | Y1 plane, 5 pulses, .5ms, 1.5 Kg | MIL-STD-202, Method 213, Cond. A |
| PIND | 20G's @130 Hz | MIL-STD-750, Method 2052.2 |
| Resistance to Soldering Heat | 3X Reflow, Peak Temperature 260°C, electrical End points | JESD22-B102 |
| Resistance to Solvent | 15 pieces, 5 pieces each solvent, marking permanency | MIL-STD-202, Method 215 |
| Moisture Sensitivity Level | Hermetic device, MSL-1 by construction | JESD22-A113, MSL1/260 |
| Hermeticity | Fine Leak, Gross Leak | MIL-STD-202, Method 112, Cond. C&D |

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| Specification | Test/Inspection Condition | Reference/Spec |
|---|---|---|
| Autoclave | 15 psig, 100% RH, 121°C, 96 hours | JEDEC-STD-22-B, Method A102 |