

Ultra Low Noise, High IP3

# Monolithic Amplifier

CMA-545+

50Ω      0.05 to 6 GHz

## The Big Deal

- Ceramic, Hermetically sealed, Nitrogen Filled
- Low profile case, .045" high
- Ultra Low Noise Figure, 0.8 dB typ.
- Output Power, +20dBm at 1GHz



CASE STYLE: DL1721

MIL Screening Available  
Please consult Applications Dept.

## Product Overview

Mini-Circuits CMA-545+ delivers a unique combination of ultra low noise and high IP3 performance, ideal for sensitive receiver applications. The E-PHEMT amplifier die is bonded to a multilayer integrated LTCC substrate, and then hermetically sealed under a controlled nitrogen atmosphere with gold-plated covers and eutectic AuSn solder. As a result, this rugged amplifier is 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. The CMA-545+ operates on a single 3V supply and is internally matched to 50Ω, with no external matching components required.

## Key Features

| Feature                                      | Advantages                                                                                                                                                                                                          |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ultra Low Noise:      0.8 dB NF at 1GHz      | Industry Leading Noise Figure, measured in a 50 Ohm environment – without any external matching.                                                                                                                    |
| High IP3:                +35 dBm IP3 at 1GHz | Combining Low Noise and High IP3 makes this MMIC amplifier ideal for Low Noise Receiver Front End (RFE) because it gives the user advantages at both ends of the dynamic range, sensitivity & high level operation. |
| Output Power:        +20 dBm at 1GHz         | The CMA-545+ maintains consistent output power capability over the full operating temperature range making it ideal to be used in remote applications such as LNB's as the L Band driver stage.                     |
| Broad Band:           0.05 to 6.0GHz         | Broadband covering primary wireless communications bands: Cellular, PCS, LTE, WiMAX.                                                                                                                                |
| Internally Matched                           | No external matching elements required to achieve the advertized noise and output power over the full band.                                                                                                         |
| Ceramic Hermetic Package                     | Low Inductance, repeatable performance, excellent reliability.                                                                                                                                                      |
| Max Input Power      +20 dBm                 | Ruggedized design operates up to input powers often seen at Receiver inputs. Can operate up to +20 dBm input without the need of an external limiter.                                                               |
| High Reliability                             | Small signal operating current of 80 mA nominal maintains junction temperatures typically below 130°C at 105°C package terminals.                                                                                   |



Ultra Low Noise, High IP3

# Monolithic Amplifier

0.05-6 GHz

## Product Features

- Ultra Low Noise Figure, 0.8 dB typ. at 1GHz
- High IP3, 35 dBm typ. 1GHz
- Gain, 20dB typ. at 1 GHz
- Output Power, up to +20dBm typ.
- Single Positive Supply Voltage, 3V
- Small size - 3mm x 3mm x 1.14mm
- Ceramic, hermetic, Nitrogen filled



Generic photo used for illustration purposes only

CASE STYLE: DL1721

## CMA-545+

## Typical Applications

- Cellular
- ISM
- GSM
- WCDMA
- LTE
- WiMAX
- WLAN

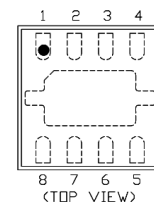
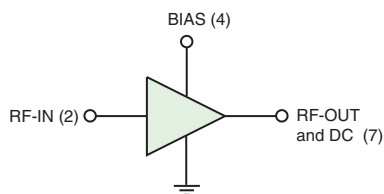
### +RoHS Compliant

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

## General Description

CMA-545+ is a high dynamic range, low noise, high IP3, high output power, monolithic amplifier. Manufactured using E-PHEMT\* technology enables it to work with a single positive supply voltage. Unconditionally stable over the operating frequency. Terminal finish is Ni-pd-Au and it has repeatable performance from lot to lot due to fully automated, tightly controlled semiconductor and assembly processes.

## simplified schematic and pad description



| Function    | Pad Number                      | Description (See Application Circuit, Fig. 2)                                                           |
|-------------|---------------------------------|---------------------------------------------------------------------------------------------------------|
| RF-IN       | 2                               | RF input pad                                                                                            |
| RF-OUT & DC | 7                               | RF output pad (connected to RF-OUT via blocking external cap C2, and Supply voltage Vs via RF Choke L1) |
| BIAS        | 4                               | Bias pad (connected to Vs via Rbias)                                                                    |
| GND         | 1,3,5,6,8, Bottom Center Paddle | Connected to ground                                                                                     |

\*Enhancement mode Pseudomorphic High Electron Mobility Transistor.



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M172011  
CMA-545+  
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200904  
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**Electrical Specifications<sup>(1)</sup> at 25°C,  $Z_0=50\Omega$ , (refer to characterization circuit)**

| Parameter                                           | Condition (GHz) | Min. | Typ.   | Max. | Units |
|-----------------------------------------------------|-----------------|------|--------|------|-------|
| Frequency Range                                     |                 | 0.05 |        | 6.0  | GHz   |
| Noise Figure                                        | 0.05            | —    | 1.3    | —    | dB    |
|                                                     | 0.5             | —    | 0.8    | —    |       |
|                                                     | 1.0             | —    | 0.8    | —    |       |
|                                                     | 2.0             | —    | 1.2    | 1.4  |       |
|                                                     | 3.0             | —    | 1.3    | —    |       |
|                                                     | 4.0             | —    | 1.7    | —    |       |
|                                                     | 5.0             | —    | 2.0    | —    |       |
|                                                     | 6.0             | —    | 2.5    | —    |       |
| Gain                                                | 0.05            | —    | 26.2   | —    | dB    |
|                                                     | 0.5             | —    | 23.4   | —    |       |
|                                                     | 1.0             | —    | 19.7   | —    |       |
|                                                     | 2.0             | 12.7 | 14.8   | 15.6 |       |
|                                                     | 3.0             | —    | 12.0   | —    |       |
|                                                     | 4.0             | —    | 9.7    | —    |       |
|                                                     | 5.0             | —    | 8.4    | —    |       |
|                                                     | 6.0             | —    | 6.6    | —    |       |
| Input Return Loss                                   | 0.05-0.5        |      | 9.0    |      | dB    |
|                                                     | 0.5-6           |      | 7.0    |      |       |
| Output Return Loss                                  | 0.05            |      | 13.0   |      | dB    |
|                                                     | 0.1-3           |      | 14.0   |      |       |
|                                                     | 3-6             |      | 12.0   |      |       |
| Output IP3                                          | 0.05            |      | 32.0   |      | dBm   |
|                                                     | 0.5             |      | 34.0   |      |       |
|                                                     | 1.0             |      | 35.0   |      |       |
|                                                     | 2.0             |      | 37.1   |      |       |
|                                                     | 3.0             |      | 38.0   |      |       |
|                                                     | 4.0             |      | 37.8   |      |       |
|                                                     | 5.0             |      | 38.4   |      |       |
|                                                     | 6.0             |      | 36.6   |      |       |
| Output Power @ 1 dB compression <sup>(2)</sup>      | 0.05            | —    | 19.9   | —    | dBm   |
|                                                     | 0.5             | —    | 19.2   | —    |       |
|                                                     | 1.0             | —    | 19.0   | —    |       |
|                                                     | 2.0             | 18.3 | 20.0   | —    |       |
|                                                     | 3.0             | —    | 20.3   | —    |       |
|                                                     | 4.0             | —    | 20.3   | —    |       |
|                                                     | 5.0             | —    | 21.5   | —    |       |
|                                                     | 6.0             | —    | 21.0   | —    |       |
| DC Voltage ( $V_d$ )                                |                 | 2.8  | 3.0    | 3.2  | V     |
| DC Current ( $I_d$ ) <sup>(2)</sup>                 |                 | 65   | 80     | 98   | mA    |
| DC Current ( $I_{Rbias}$ )                          |                 |      | 5.6    |      | mA    |
| DC Current Variation vs. Temperature <sup>(3)</sup> |                 |      | -0.121 |      | mA/°C |
| Thermal Resistance                                  |                 |      | 116    |      | °C/W  |

**Absolute Maximum Ratings<sup>(4)</sup>**

| Parameter                            | Ratings        |
|--------------------------------------|----------------|
| Operating Temperature <sup>(5)</sup> | -55°C to 105°C |
| Storage Temperature                  | -65°C to 125°C |
| Channel Temperature                  | 150°C          |
| DC Voltage (Pad 7)                   | 5V             |
| Power Dissipation                    | 500mW          |
| DC Current (Pad 6)                   | 160mA          |
| Bias Current (Pad 4)                 | 10mA           |
| Input Power                          | 20dBm          |

<sup>(1)</sup> Measured on Mini-Circuits Characterization test board TB-631+.  
See Characterization Test Circuit (Fig. 1)

<sup>(2)</sup> Current increases at P1dB

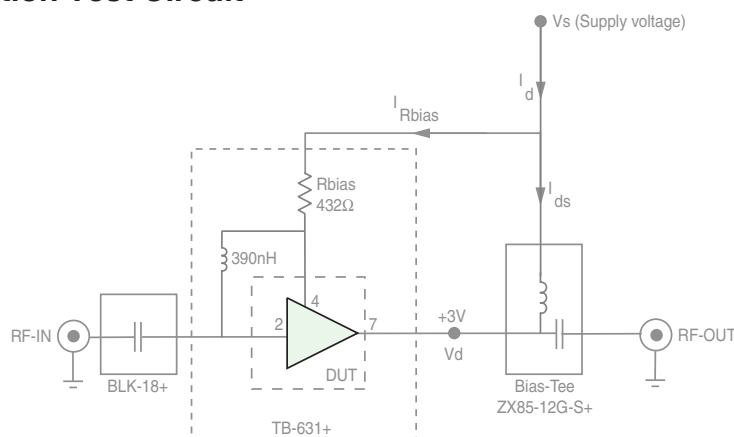
<sup>(3)</sup> (Current at 85°C - Current at -45°C)/130

<sup>(4)</sup> Permanent damage may occur if any of these limits are exceeded.

These maximum ratings are not intended for continuous normal operation.

<sup>(5)</sup> Defined with reference to ground pad temperature.

## Characterization Test Circuit



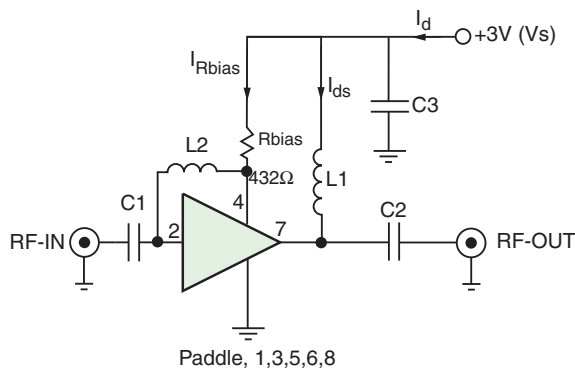
**Fig 1.** Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization Test Board TB-631+) Gain, Output power at 1dB compression (P1dB), Output IP3 (OIP3) are measured using R&S Network Analyzer ZVA-24. Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:

1. Gain: Pin=-25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.
3. Vs adjusted for 3V at device (Vd), compensating loss of bias tee.

## Recommended Application Circuit

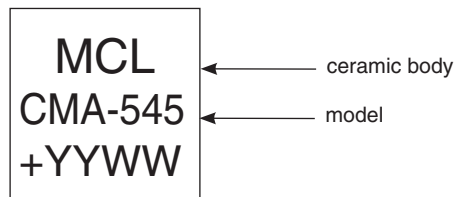
(refer to evaluation board for PCB Layout and component values)



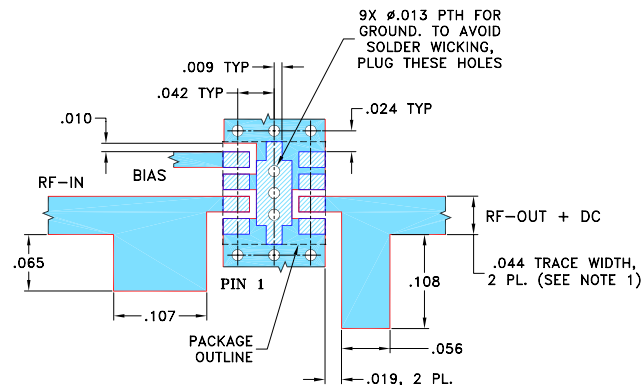
**Fig 2.** Recommended Application Circuit

Note: Resistance of L1, 0.1-0.2Ω typically. For component values, please see evaluation board drawing.

## Product Marking



## Suggested PCB Layout (PL-365)



## NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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

**Additional Detailed Technical Information**

additional information is available on our dash board. To access this information [click here](#)

|                                                                 |                                                                   |
|-----------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Performance Data</b>                                         | Data Table                                                        |
|                                                                 | Swept Graphs                                                      |
|                                                                 | S-Parameter (S2P Files) Data Set (.zip file)                      |
| <b>Case Style</b>                                               | DL1721 Ceramic package, exposed paddle, Terminal finish: Ni,Pd,Au |
| <b>Tape &amp; Reel</b><br>Standard quantities available on reel | F66-1<br>7" reels with 20, 50, 100, 200, 500 or 1K, 2K devices.   |
| <b>Suggested Layout for PCB Design</b>                          | PL-365                                                            |
| <b>Evaluation Board</b>                                         | TB-631+                                                           |
| <b>Environmental Ratings</b>                                    | ENV-68                                                            |

**ESD Rating**

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

Machine Model (MM): Class M1 (<100V) in accordance with ANSI/ESD STM5.2-1999; passes 40V

**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](http://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 = 3V, Id = 79.04 mA @ Temperature = +25degC

| FREQ   | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|--------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz)  | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 40.0   | 26.24 | 32.67     | 10.16                   | 11.85                    | 1.12      | 0.80    | 32.67          | 17.98                  | 1.28            |
| 60.0   | 26.29 | 31.42     | 10.23                   | 14.46                    | 1.04      | 0.77    | 33.91          | 18.49                  | 0.96            |
| 80.0   | 26.28 | 31.53     | 10.24                   | 16.25                    | 1.06      | 0.80    | 33.60          | 18.97                  | 0.84            |
| 200.0  | 25.82 | 30.79     | 9.39                    | 19.53                    | 1.02      | 0.82    | 34.29          | 19.13                  | 0.62            |
| 300.0  | 25.22 | 30.21     | 8.44                    | 19.21                    | 1.01      | 0.84    | 34.11          | 19.01                  | 0.79            |
| 400.0  | 24.50 | 29.86     | 7.66                    | 18.57                    | 1.02      | 0.87    | 33.76          | 18.77                  | 0.80            |
| 500.0  | 23.68 | 29.36     | 7.04                    | 18.17                    | 1.04      | 0.88    | 33.56          | 18.78                  | 0.81            |
| 600.0  | 22.92 | 28.80     | 6.53                    | 17.64                    | 1.06      | 0.89    | 33.82          | 18.79                  | 0.84            |
| 700.0  | 22.13 | 28.47     | 6.17                    | 17.35                    | 1.08      | 0.92    | 34.14          | 18.63                  | 0.85            |
| 800.0  | 21.36 | 28.07     | 5.95                    | 17.29                    | 1.09      | 0.96    | 34.05          | 18.65                  | 0.87            |
| 900.0  | 20.66 | 27.70     | 5.76                    | 16.95                    | 1.09      | 0.99    | 34.67          | 18.94                  | 0.87            |
| 1000.0 | 20.00 | 27.31     | 5.60                    | 16.74                    | 1.08      | 1.03    | 34.22          | 18.97                  | 0.93            |
| 1250.0 | 18.50 | 26.37     | 5.40                    | 16.39                    | 1.04      | 1.11    | 34.27          | 18.79                  | 0.96            |
| 1500.0 | 17.22 | 25.50     | 5.40                    | 16.27                    | 1.03      | 1.16    | 34.78          | 18.91                  | 1.07            |
| 1750.0 | 15.98 | 24.86     | 5.82                    | 16.11                    | 1.10      | 1.16    | 35.14          | 19.25                  | 1.22            |
| 2000.0 | 15.19 | 23.80     | 5.76                    | 15.76                    | 1.08      | 1.14    | 34.67          | 19.23                  | 1.12            |
| 2250.0 | 14.44 | 22.99     | 6.17                    | 15.35                    | 1.14      | 1.09    | 35.18          | 19.41                  | 1.25            |
| 2500.0 | 13.76 | 22.18     | 6.71                    | 14.73                    | 1.20      | 1.02    | 36.58          | 19.84                  | 1.29            |
| 2750.0 | 13.13 | 21.45     | 7.24                    | 13.90                    | 1.27      | 0.95    | 36.40          | 20.05                  | 1.45            |
| 3000.0 | 12.61 | 20.74     | 8.02                    | 13.13                    | 1.30      | 0.88    | 36.85          | 20.24                  | 1.32            |
| 3250.0 | 12.10 | 20.06     | 8.79                    | 12.32                    | 1.30      | 0.84    | 36.21          | 20.24                  | 1.33            |
| 3500.0 | 11.59 | 19.51     | 9.53                    | 11.61                    | 1.27      | 0.84    | 36.89          | 20.51                  | 1.43            |
| 3750.0 | 11.05 | 19.06     | 10.13                   | 10.94                    | 1.22      | 0.86    | 36.41          | 20.41                  | 1.52            |
| 4000.0 | 10.48 | 18.71     | 10.49                   | 10.27                    | 1.18      | 0.90    | 35.92          | 20.27                  | 1.48            |
| 4250.0 | 10.14 | 18.22     | 11.14                   | 10.16                    | 1.17      | 0.88    | 36.49          | 20.53                  | 1.61            |
| 4500.0 | 9.84  | 17.73     | 11.72                   | 10.25                    | 1.22      | 0.83    | 36.18          | 20.83                  | 1.65            |
| 4750.0 | 9.37  | 17.45     | 11.90                   | 10.24                    | 1.30      | 0.79    | 36.15          | 20.69                  | 1.78            |
| 5000.0 | 9.00  | 16.99     | 11.04                   | 10.93                    | 1.33      | 0.78    | 35.33          | 20.72                  | 1.96            |
| 5250.0 | 8.62  | 16.59     | 10.39                   | 11.20                    | 1.33      | 0.79    | 35.60          | 20.75                  | 1.96            |
| 5500.0 | 8.19  | 16.28     | 9.53                    | 11.84                    | 1.29      | 0.85    | 35.18          | 20.58                  | 2.17            |
| 5750.0 | 7.76  | 16.02     | 8.50                    | 13.11                    | 1.24      | 0.94    | 34.16          | 20.51                  | 2.41            |
| 6000.0 | 7.25  | 15.88     | 7.30                    | 14.88                    | 1.20      | 1.05    | 33.44          | 20.41                  | 2.50            |
| 6250.0 | 6.69  | 15.82     | 6.18                    | 16.50                    | 1.17      | 1.13    | 33.05          | 20.10                  | 2.79            |
| 6500.0 | 6.14  | 15.86     | 5.21                    | 16.39                    | 1.13      | 1.22    | 32.11          | 19.68                  | 3.01            |
| 6750.0 | 5.48  | 16.01     | 4.42                    | 14.23                    | 1.06      | 1.29    | 31.82          | 19.12                  | 3.40            |
| 7000.0 | 4.73  | 16.16     | 3.89                    | 12.05                    | 1.02      | 1.33    | 31.43          | 18.41                  | 3.83            |

## 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 = 2.75V, Id =69.01 mA @ Temperature = +25degC

| FREQ   | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|--------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz)  | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 40.0   | 26.05 | 32.30     | 10.02                   | 11.65                    | 1.11      | 0.78    | 33.05          | 17.17                  | 1.24            |
| 60.0   | 26.11 | 31.44     | 10.11                   | 14.22                    | 1.05      | 0.79    | 33.40          | 17.67                  | 0.96            |
| 80.0   | 26.10 | 31.31     | 10.04                   | 16.04                    | 1.05      | 0.80    | 33.75          | 18.13                  | 0.80            |
| 200.0  | 25.65 | 30.59     | 9.22                    | 19.33                    | 1.01      | 0.83    | 33.93          | 18.31                  | 0.59            |
| 300.0  | 25.06 | 30.05     | 8.33                    | 19.02                    | 1.00      | 0.85    | 34.20          | 18.20                  | 0.77            |
| 400.0  | 24.35 | 29.51     | 7.58                    | 18.43                    | 1.00      | 0.86    | 34.04          | 17.94                  | 0.79            |
| 500.0  | 23.54 | 29.15     | 6.97                    | 18.07                    | 1.03      | 0.89    | 33.69          | 17.96                  | 0.86            |
| 600.0  | 22.78 | 28.72     | 6.48                    | 17.52                    | 1.06      | 0.90    | 34.11          | 17.96                  | 0.83            |
| 700.0  | 22.00 | 28.24     | 6.12                    | 17.22                    | 1.07      | 0.92    | 34.94          | 17.80                  | 0.87            |
| 800.0  | 21.23 | 27.88     | 5.90                    | 17.14                    | 1.09      | 0.95    | 34.10          | 17.82                  | 0.89            |
| 900.0  | 20.54 | 27.47     | 5.71                    | 16.80                    | 1.08      | 0.98    | 34.21          | 18.11                  | 0.88            |
| 1000.0 | 19.88 | 27.17     | 5.56                    | 16.62                    | 1.08      | 1.02    | 34.46          | 18.15                  | 0.95            |
| 1250.0 | 18.38 | 26.23     | 5.37                    | 16.22                    | 1.04      | 1.11    | 34.48          | 17.98                  | 0.91            |
| 1500.0 | 17.10 | 25.36     | 5.36                    | 16.10                    | 1.02      | 1.16    | 34.52          | 18.11                  | 1.02            |
| 1750.0 | 15.86 | 24.73     | 5.76                    | 15.92                    | 1.09      | 1.16    | 35.63          | 18.45                  | 1.19            |
| 2000.0 | 15.08 | 23.73     | 5.70                    | 15.54                    | 1.07      | 1.15    | 34.82          | 18.42                  | 1.10            |
| 2250.0 | 14.33 | 22.91     | 6.11                    | 15.16                    | 1.13      | 1.09    | 35.29          | 18.59                  | 1.22            |
| 2500.0 | 13.65 | 22.09     | 6.63                    | 14.55                    | 1.20      | 1.02    | 36.38          | 19.02                  | 1.27            |
| 2750.0 | 13.02 | 21.42     | 7.15                    | 13.76                    | 1.27      | 0.95    | 36.43          | 19.25                  | 1.38            |
| 3000.0 | 12.50 | 20.68     | 7.92                    | 13.03                    | 1.30      | 0.88    | 36.55          | 19.43                  | 1.31            |
| 3250.0 | 12.00 | 20.05     | 8.67                    | 12.25                    | 1.31      | 0.85    | 36.39          | 19.42                  | 1.28            |
| 3500.0 | 11.50 | 19.48     | 9.39                    | 11.57                    | 1.27      | 0.84    | 36.52          | 19.70                  | 1.42            |
| 3750.0 | 10.96 | 19.04     | 9.99                    | 10.91                    | 1.23      | 0.87    | 36.20          | 19.56                  | 1.49            |
| 4000.0 | 10.39 | 18.70     | 10.34                   | 10.27                    | 1.18      | 0.90    | 35.63          | 19.44                  | 1.53            |
| 4250.0 | 10.05 | 18.22     | 10.99                   | 10.15                    | 1.18      | 0.89    | 36.10          | 19.73                  | 1.55            |
| 4500.0 | 9.75  | 17.68     | 11.55                   | 10.25                    | 1.22      | 0.83    | 35.55          | 19.99                  | 1.54            |
| 4750.0 | 9.29  | 17.39     | 11.74                   | 10.27                    | 1.30      | 0.79    | 35.93          | 19.87                  | 1.79            |
| 5000.0 | 8.92  | 16.98     | 10.88                   | 10.95                    | 1.34      | 0.78    | 34.93          | 19.91                  | 1.90            |
| 5250.0 | 8.54  | 16.58     | 10.24                   | 11.24                    | 1.34      | 0.79    | 35.39          | 19.98                  | 1.95            |
| 5500.0 | 8.11  | 16.28     | 9.40                    | 11.90                    | 1.30      | 0.86    | 35.07          | 19.78                  | 2.13            |
| 5750.0 | 7.68  | 16.01     | 8.37                    | 13.19                    | 1.24      | 0.95    | 33.77          | 19.68                  | 2.32            |
| 6000.0 | 7.17  | 15.88     | 7.20                    | 14.98                    | 1.21      | 1.05    | 33.59          | 19.64                  | 2.41            |
| 6250.0 | 6.61  | 15.82     | 6.10                    | 16.59                    | 1.18      | 1.14    | 33.23          | 19.28                  | 2.73            |
| 6500.0 | 6.05  | 15.86     | 5.14                    | 16.41                    | 1.13      | 1.22    | 32.52          | 18.87                  | 3.02            |
| 6750.0 | 5.39  | 16.01     | 4.36                    | 14.22                    | 1.07      | 1.30    | 31.82          | 18.28                  | 3.20            |
| 7000.0 | 4.64  | 16.17     | 3.84                    | 12.02                    | 1.02      | 1.33    | 31.70          | 17.59                  | 3.72            |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.25V, Id = 87.92 mA @ Temperature = +25degC

| FREQ   | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|--------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz)  | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 40.0   | 26.37 | 32.80     | 10.29                   | 11.94                    | 1.13      | 0.80    | 33.26          | 18.79                  | 1.38            |
| 60.0   | 26.42 | 32.26     | 10.29                   | 14.52                    | 1.10      | 0.81    | 33.37          | 19.31                  | 1.02            |
| 80.0   | 26.40 | 31.68     | 10.39                   | 16.33                    | 1.06      | 0.80    | 34.49          | 19.79                  | 0.86            |
| 200.0  | 25.93 | 30.99     | 9.51                    | 19.65                    | 1.03      | 0.83    | 34.38          | 19.93                  | 0.62            |
| 300.0  | 25.32 | 30.40     | 8.52                    | 19.34                    | 1.02      | 0.84    | 33.99          | 19.82                  | 0.79            |
| 400.0  | 24.60 | 29.89     | 7.72                    | 18.73                    | 1.02      | 0.86    | 33.56          | 19.57                  | 0.82            |
| 500.0  | 23.78 | 29.58     | 7.09                    | 18.32                    | 1.06      | 0.89    | 33.65          | 19.59                  | 0.83            |
| 600.0  | 23.01 | 29.09     | 6.57                    | 17.80                    | 1.07      | 0.90    | 34.11          | 19.59                  | 0.87            |
| 700.0  | 22.23 | 28.62     | 6.21                    | 17.54                    | 1.08      | 0.93    | 34.24          | 19.44                  | 0.89            |
| 800.0  | 21.45 | 28.30     | 5.98                    | 17.45                    | 1.10      | 0.96    | 34.13          | 19.48                  | 0.90            |
| 900.0  | 20.75 | 27.83     | 5.78                    | 17.12                    | 1.09      | 0.99    | 34.04          | 19.73                  | 0.89            |
| 1000.0 | 20.08 | 27.47     | 5.62                    | 16.92                    | 1.09      | 1.03    | 34.49          | 19.78                  | 0.95            |
| 1250.0 | 18.58 | 26.51     | 5.43                    | 16.58                    | 1.05      | 1.11    | 34.27          | 19.59                  | 0.94            |
| 1500.0 | 17.30 | 25.54     | 5.43                    | 16.45                    | 1.03      | 1.16    | 34.80          | 19.73                  | 1.07            |
| 1750.0 | 16.06 | 24.93     | 5.85                    | 16.29                    | 1.11      | 1.16    | 35.06          | 20.04                  | 1.24            |
| 2000.0 | 15.27 | 23.85     | 5.79                    | 15.91                    | 1.08      | 1.14    | 34.46          | 20.03                  | 1.17            |
| 2250.0 | 14.52 | 23.01     | 6.21                    | 15.48                    | 1.14      | 1.09    | 34.75          | 20.18                  | 1.26            |
| 2500.0 | 13.83 | 22.23     | 6.76                    | 14.79                    | 1.20      | 1.02    | 36.31          | 20.62                  | 1.32            |
| 2750.0 | 13.20 | 21.51     | 7.30                    | 13.93                    | 1.27      | 0.94    | 36.29          | 20.84                  | 1.44            |
| 3000.0 | 12.68 | 20.79     | 8.09                    | 13.14                    | 1.30      | 0.88    | 36.59          | 21.01                  | 1.37            |
| 3250.0 | 12.16 | 20.11     | 8.86                    | 12.31                    | 1.30      | 0.84    | 36.08          | 21.01                  | 1.39            |
| 3500.0 | 11.65 | 19.57     | 9.62                    | 11.58                    | 1.27      | 0.84    | 36.45          | 21.24                  | 1.51            |
| 3750.0 | 11.11 | 19.12     | 10.23                   | 10.89                    | 1.23      | 0.86    | 35.91          | 21.14                  | 1.59            |
| 4000.0 | 10.53 | 18.73     | 10.58                   | 10.23                    | 1.18      | 0.89    | 35.82          | 20.99                  | 1.56            |
| 4250.0 | 10.19 | 18.30     | 11.25                   | 10.11                    | 1.18      | 0.88    | 36.20          | 21.27                  | 1.63            |
| 4500.0 | 9.89  | 17.77     | 11.84                   | 10.18                    | 1.22      | 0.83    | 36.38          | 21.53                  | 1.72            |
| 4750.0 | 9.42  | 17.47     | 12.03                   | 10.16                    | 1.29      | 0.78    | 35.80          | 21.41                  | 1.82            |
| 5000.0 | 9.05  | 17.01     | 11.14                   | 10.82                    | 1.33      | 0.77    | 35.63          | 21.44                  | 2.02            |
| 5250.0 | 8.67  | 16.64     | 10.49                   | 11.09                    | 1.33      | 0.78    | 35.30          | 21.48                  | 2.00            |
| 5500.0 | 8.24  | 16.30     | 9.61                    | 11.73                    | 1.29      | 0.85    | 34.69          | 21.28                  | 2.27            |
| 5750.0 | 7.81  | 16.04     | 8.57                    | 12.98                    | 1.24      | 0.94    | 33.84          | 21.31                  | 2.49            |
| 6000.0 | 7.30  | 15.92     | 7.37                    | 14.70                    | 1.20      | 1.04    | 33.55          | 21.22                  | 2.57            |
| 6250.0 | 6.74  | 15.86     | 6.24                    | 16.30                    | 1.17      | 1.13    | 32.89          | 20.89                  | 2.90            |
| 6500.0 | 6.19  | 15.89     | 5.26                    | 16.35                    | 1.13      | 1.21    | 32.19          | 20.52                  | 3.18            |
| 6750.0 | 5.54  | 16.03     | 4.46                    | 14.27                    | 1.07      | 1.29    | 31.55          | 19.88                  | 3.50            |
| 7000.0 | 4.80  | 16.18     | 3.92                    | 12.11                    | 1.03      | 1.32    | 31.49          | 19.30                  | 4.00            |



## 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 = 3V, Id = 92.19 mA @ Temperature = -55degC

| FREQ   | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|--------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz)  | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 40.0   | 26.51 | 32.32     | 11.17                   | 11.91                    | 1.07      | 0.77    | 36.02          | 18.17                  | 1.03            |
| 60.0   | 26.37 | 31.28     | 11.69                   | 14.23                    | 1.04      | 0.74    | 36.48          | 18.64                  | 0.69            |
| 80.0   | 26.27 | 31.19     | 11.69                   | 15.76                    | 1.05      | 0.76    | 37.30          | 19.18                  | 0.64            |
| 200.0  | 25.80 | 30.68     | 10.77                   | 18.63                    | 1.05      | 0.77    | 37.11          | 19.34                  | 0.42            |
| 300.0  | 25.26 | 30.38     | 9.75                    | 17.75                    | 1.07      | 0.78    | 35.82          | 19.25                  | 0.60            |
| 400.0  | 24.60 | 29.85     | 8.62                    | 17.13                    | 1.08      | 0.79    | 34.55          | 18.78                  | 0.62            |
| 500.0  | 23.83 | 29.53     | 7.78                    | 16.79                    | 1.10      | 0.82    | 35.12          | 18.81                  | 0.70            |
| 600.0  | 23.12 | 29.05     | 7.10                    | 16.49                    | 1.10      | 0.85    | 34.76          | 18.77                  | 0.65            |
| 700.0  | 22.40 | 28.67     | 6.65                    | 16.41                    | 1.10      | 0.89    | 34.87          | 18.67                  | 0.65            |
| 800.0  | 21.65 | 28.32     | 6.33                    | 16.54                    | 1.09      | 0.94    | 34.68          | 18.64                  | 0.63            |
| 900.0  | 20.98 | 27.86     | 6.14                    | 16.51                    | 1.08      | 0.98    | 35.16          | 18.90                  | 0.66            |
| 1000.0 | 20.37 | 27.45     | 5.93                    | 16.45                    | 1.05      | 1.02    | 35.16          | 18.92                  | 0.65            |
| 1250.0 | 18.87 | 26.53     | 5.57                    | 15.88                    | 1.00      | 1.12    | 34.48          | 18.57                  | 0.65            |
| 1500.0 | 17.61 | 25.56     | 5.50                    | 16.12                    | 0.99      | 1.16    | 35.09          | 18.78                  | 0.82            |
| 1750.0 | 16.43 | 24.81     | 6.11                    | 16.04                    | 1.09      | 1.12    | 35.72          | 19.08                  | 0.83            |
| 2000.0 | 15.63 | 23.79     | 5.86                    | 16.41                    | 1.10      | 1.10    | 35.47          | 19.15                  | 0.82            |
| 2250.0 | 14.89 | 22.88     | 6.32                    | 16.22                    | 1.15      | 1.03    | 35.83          | 19.35                  | 0.87            |
| 2500.0 | 14.27 | 22.00     | 6.95                    | 15.71                    | 1.20      | 0.96    | 37.07          | 19.66                  | 0.95            |
| 2750.0 | 13.64 | 21.27     | 7.58                    | 14.67                    | 1.24      | 0.90    | 36.95          | 19.99                  | 1.09            |
| 3000.0 | 13.13 | 20.54     | 8.36                    | 14.12                    | 1.25      | 0.86    | 37.32          | 20.08                  | 0.89            |
| 3250.0 | 12.60 | 19.89     | 9.02                    | 13.37                    | 1.22      | 0.85    | 37.09          | 20.20                  | 0.95            |
| 3500.0 | 12.09 | 19.33     | 9.84                    | 12.56                    | 1.19      | 0.86    | 37.58          | 20.53                  | 0.89            |
| 3750.0 | 11.55 | 18.86     | 10.45                   | 11.71                    | 1.15      | 0.88    | 37.59          | 20.43                  | 1.08            |
| 4000.0 | 10.88 | 18.56     | 10.59                   | 10.75                    | 1.13      | 0.90    | 36.71          | 20.15                  | 1.16            |
| 4250.0 | 10.62 | 18.04     | 11.49                   | 10.68                    | 1.18      | 0.83    | 37.69          | 20.74                  | 1.11            |
| 4500.0 | 10.39 | 17.44     | 12.56                   | 10.68                    | 1.22      | 0.75    | 38.13          | 20.90                  | 1.02            |
| 4750.0 | 9.94  | 17.11     | 12.81                   | 10.44                    | 1.27      | 0.71    | 36.87          | 20.80                  | 1.19            |
| 5000.0 | 9.47  | 16.77     | 12.00                   | 11.08                    | 1.28      | 0.74    | 36.21          | 20.89                  | 1.35            |
| 5250.0 | 9.12  | 16.37     | 11.20                   | 11.16                    | 1.23      | 0.78    | 36.53          | 20.94                  | 1.43            |
| 5500.0 | 8.71  | 16.03     | 9.99                    | 12.06                    | 1.17      | 0.87    | 35.59          | 20.51                  | 1.46            |
| 5750.0 | 8.23  | 15.80     | 8.67                    | 13.53                    | 1.13      | 0.97    | 34.75          | 20.50                  | 1.70            |
| 6000.0 | 7.72  | 15.67     | 7.38                    | 15.59                    | 1.12      | 1.05    | 34.25          | 20.48                  | 1.85            |
| 6250.0 | 7.20  | 15.62     | 6.22                    | 17.32                    | 1.11      | 1.12    | 34.10          | 20.11                  | 2.03            |
| 6500.0 | 6.63  | 15.61     | 5.19                    | 16.51                    | 1.06      | 1.20    | 32.99          | 19.69                  | 2.35            |
| 6750.0 | 6.01  | 15.70     | 4.41                    | 14.11                    | 1.02      | 1.25    | 32.52          | 19.22                  | 2.39            |
| 7000.0 | 5.31  | 15.82     | 3.84                    | 11.97                    | 1.05      | 1.25    | 32.21          | 18.62                  | 2.78            |

## 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 = 2.75V, Id = 81.69 mA @ Temperature = -55degC

| 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)         |
| 40.0   | 26.32 | 32.11     | 11.03             | 11.84              | 1.07      | 0.77    | 36.83       | 18.17            | 0.98         |
| 60.0   | 26.20 | 31.23     | 11.45             | 14.22              | 1.04      | 0.75    | 36.63       | 18.64            | 0.67         |
| 80.0   | 26.09 | 31.06     | 11.51             | 15.79              | 1.05      | 0.77    | 38.01       | 19.18            | 0.59         |
| 200.0  | 25.64 | 30.49     | 10.66             | 18.83              | 1.05      | 0.78    | 36.26       | 19.34            | 0.37         |
| 300.0  | 25.11 | 30.22     | 9.68              | 17.92              | 1.06      | 0.79    | 35.76       | 19.25            | 0.59         |
| 400.0  | 24.46 | 29.68     | 8.58              | 17.25              | 1.07      | 0.79    | 35.02       | 18.78            | 0.64         |
| 500.0  | 23.70 | 29.30     | 7.76              | 16.84              | 1.09      | 0.82    | 35.51       | 18.81            | 0.69         |
| 600.0  | 23.00 | 28.90     | 7.06              | 16.51              | 1.09      | 0.85    | 35.59       | 18.77            | 0.65         |
| 700.0  | 22.29 | 28.47     | 6.63              | 16.38              | 1.09      | 0.88    | 34.99       | 18.67            | 0.62         |
| 800.0  | 21.54 | 28.11     | 6.31              | 16.51              | 1.09      | 0.93    | 34.80       | 18.64            | 0.58         |
| 900.0  | 20.88 | 27.67     | 6.12              | 16.44              | 1.07      | 0.97    | 35.08       | 18.90            | 0.65         |
| 1000.0 | 20.27 | 27.30     | 5.91              | 16.35              | 1.05      | 1.02    | 35.23       | 18.92            | 0.68         |
| 1250.0 | 18.77 | 26.39     | 5.55              | 15.78              | 0.99      | 1.12    | 34.77       | 18.57            | 0.65         |
| 1500.0 | 17.52 | 25.48     | 5.47              | 15.99              | 0.99      | 1.16    | 34.88       | 18.78            | 0.79         |
| 1750.0 | 16.34 | 24.73     | 6.07              | 15.85              | 1.09      | 1.12    | 36.12       | 19.08            | 0.85         |
| 2000.0 | 15.54 | 23.69     | 5.82              | 16.18              | 1.09      | 1.10    | 35.22       | 19.15            | 0.81         |
| 2250.0 | 14.80 | 22.86     | 6.28              | 16.01              | 1.15      | 1.04    | 35.96       | 19.35            | 0.85         |
| 2500.0 | 14.18 | 22.00     | 6.89              | 15.53              | 1.20      | 0.97    | 37.42       | 19.66            | 0.93         |
| 2750.0 | 13.56 | 21.26     | 7.51              | 14.56              | 1.25      | 0.90    | 37.15       | 19.99            | 1.08         |
| 3000.0 | 13.05 | 20.50     | 8.27              | 14.04              | 1.25      | 0.86    | 37.28       | 20.08            | 0.87         |
| 3250.0 | 12.53 | 19.85     | 8.92              | 13.35              | 1.22      | 0.85    | 37.39       | 20.20            | 0.88         |
| 3500.0 | 12.03 | 19.28     | 9.71              | 12.55              | 1.18      | 0.86    | 37.92       | 20.53            | 0.85         |
| 3750.0 | 11.48 | 18.81     | 10.32             | 11.71              | 1.14      | 0.88    | 37.72       | 20.43            | 1.02         |
| 4000.0 | 10.82 | 18.54     | 10.47             | 10.77              | 1.13      | 0.90    | 36.78       | 20.15            | 1.13         |
| 4250.0 | 10.56 | 18.00     | 11.36             | 10.68              | 1.18      | 0.83    | 37.12       | 20.74            | 1.05         |
| 4500.0 | 10.33 | 17.41     | 12.43             | 10.71              | 1.22      | 0.75    | 38.28       | 20.90            | 1.03         |
| 4750.0 | 9.88  | 17.07     | 12.67             | 10.47              | 1.27      | 0.71    | 36.93       | 20.80            | 1.18         |
| 5000.0 | 9.42  | 16.76     | 11.87             | 11.13              | 1.28      | 0.74    | 37.17       | 20.89            | 1.27         |
| 5250.0 | 9.07  | 16.35     | 11.08             | 11.22              | 1.23      | 0.79    | 36.85       | 20.94            | 1.37         |
| 5500.0 | 8.67  | 15.99     | 9.89              | 12.16              | 1.17      | 0.88    | 35.59       | 20.51            | 1.35         |
| 5750.0 | 8.18  | 15.78     | 8.58              | 13.65              | 1.13      | 0.97    | 35.13       | 20.50            | 1.65         |
| 6000.0 | 7.67  | 15.65     | 7.29              | 15.75              | 1.12      | 1.05    | 34.57       | 20.48            | 1.82         |
| 6250.0 | 7.14  | 15.58     | 6.15              | 17.48              | 1.11      | 1.13    | 34.24       | 20.11            | 2.01         |
| 6500.0 | 6.57  | 15.60     | 5.14              | 16.53              | 1.06      | 1.21    | 33.36       | 19.69            | 2.29         |
| 6750.0 | 5.95  | 15.67     | 4.36              | 14.09              | 1.01      | 1.26    | 32.95       | 19.22            | 2.30         |
| 7000.0 | 5.25  | 15.80     | 3.80              | 11.92              | 1.04      | 1.25    | 32.20       | 18.62            | 2.78         |

## 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 = 3.25V, Id = 101.39 mA @ Temperature = -55degC

| FREQ   | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|--------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz)  | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 40.0   | 26.65 | 32.16     | 11.31                   | 11.89                    | 1.05      | 0.75    | 35.45          | 19.10                  | 1.08            |
| 60.0   | 26.52 | 32.10     | 11.71                   | 14.13                    | 1.08      | 0.79    | 35.65          | 19.61                  | 0.72            |
| 80.0   | 26.40 | 31.36     | 11.86                   | 15.70                    | 1.05      | 0.76    | 36.85          | 20.17                  | 0.64            |
| 200.0  | 25.92 | 30.76     | 10.89                   | 18.55                    | 1.05      | 0.76    | 36.42          | 20.36                  | 0.43            |
| 300.0  | 25.37 | 30.43     | 9.81                    | 17.66                    | 1.07      | 0.77    | 36.00          | 20.27                  | 0.62            |
| 400.0  | 24.71 | 30.03     | 8.66                    | 17.12                    | 1.08      | 0.79    | 34.84          | 19.79                  | 0.65            |
| 500.0  | 23.92 | 29.64     | 7.82                    | 16.82                    | 1.10      | 0.82    | 34.98          | 19.84                  | 0.67            |
| 600.0  | 23.20 | 29.25     | 7.11                    | 16.57                    | 1.10      | 0.85    | 34.83          | 19.83                  | 0.65            |
| 700.0  | 22.49 | 28.77     | 6.67                    | 16.51                    | 1.10      | 0.89    | 34.49          | 19.71                  | 0.65            |
| 800.0  | 21.73 | 28.39     | 6.35                    | 16.69                    | 1.09      | 0.94    | 34.18          | 19.69                  | 0.64            |
| 900.0  | 21.06 | 27.96     | 6.16                    | 16.67                    | 1.08      | 0.98    | 35.04          | 19.95                  | 0.99            |
| 1000.0 | 20.45 | 27.61     | 5.95                    | 16.64                    | 1.06      | 1.03    | 34.88          | 20.00                  | 0.67            |
| 1250.0 | 18.94 | 26.58     | 5.59                    | 16.07                    | 1.00      | 1.12    | 34.36          | 19.64                  | 0.69            |
| 1500.0 | 17.68 | 25.66     | 5.52                    | 16.34                    | 1.00      | 1.16    | 34.77          | 19.85                  | 0.81            |
| 1750.0 | 16.49 | 24.90     | 6.13                    | 16.25                    | 1.10      | 1.12    | 35.23          | 20.12                  | 0.87            |
| 2000.0 | 15.69 | 23.82     | 5.90                    | 16.60                    | 1.10      | 1.10    | 34.83          | 20.19                  | 0.85            |
| 2250.0 | 14.95 | 22.94     | 6.36                    | 16.37                    | 1.16      | 1.03    | 35.70          | 20.39                  | 0.90            |
| 2500.0 | 14.32 | 22.08     | 6.99                    | 15.78                    | 1.20      | 0.96    | 36.21          | 20.67                  | 0.98            |
| 2750.0 | 13.69 | 21.35     | 7.62                    | 14.70                    | 1.25      | 0.90    | 36.31          | 20.94                  | 1.10            |
| 3000.0 | 13.18 | 20.59     | 8.42                    | 14.10                    | 1.25      | 0.86    | 36.92          | 20.98                  | 0.90            |
| 3250.0 | 12.65 | 19.93     | 9.10                    | 13.33                    | 1.22      | 0.85    | 36.36          | 21.08                  | 0.96            |
| 3500.0 | 12.14 | 19.40     | 9.91                    | 12.47                    | 1.19      | 0.86    | 36.77          | 21.22                  | 0.92            |
| 3750.0 | 11.59 | 18.92     | 10.54                   | 11.62                    | 1.15      | 0.88    | 37.16          | 21.18                  | 1.08            |
| 4000.0 | 10.92 | 18.62     | 10.67                   | 10.67                    | 1.13      | 0.89    | 36.08          | 21.11                  | 1.08            |
| 4250.0 | 10.66 | 18.08     | 11.57                   | 10.59                    | 1.18      | 0.82    | 37.84          | 21.32                  | 1.14            |
| 4500.0 | 10.42 | 17.49     | 12.66                   | 10.59                    | 1.22      | 0.74    | 37.53          | 21.60                  | 1.14            |
| 4750.0 | 9.97  | 17.14     | 12.91                   | 10.35                    | 1.27      | 0.71    | 36.50          | 21.74                  | 1.24            |
| 5000.0 | 9.50  | 16.83     | 12.08                   | 10.96                    | 1.28      | 0.74    | 36.15          | 21.59                  | 1.36            |
| 5250.0 | 9.15  | 16.42     | 11.27                   | 11.03                    | 1.23      | 0.78    | 36.71          | 21.59                  | 1.44            |
| 5500.0 | 8.74  | 16.06     | 10.05                   | 11.92                    | 1.16      | 0.87    | 35.13          | 21.52                  | 1.52            |
| 5750.0 | 8.26  | 15.84     | 8.72                    | 13.34                    | 1.13      | 0.96    | 34.69          | 21.54                  | 1.81            |
| 6000.0 | 7.75  | 15.71     | 7.42                    | 15.35                    | 1.12      | 1.04    | 34.39          | 21.54                  | 1.91            |
| 6250.0 | 7.23  | 15.64     | 6.26                    | 17.11                    | 1.11      | 1.12    | 33.88          | 21.21                  | 2.19            |
| 6500.0 | 6.67  | 15.65     | 5.23                    | 16.52                    | 1.07      | 1.20    | 32.78          | 20.78                  | 2.34            |
| 6750.0 | 6.05  | 15.72     | 4.44                    | 14.19                    | 1.03      | 1.25    | 32.36          | 20.35                  | 2.47            |
| 7000.0 | 5.36  | 15.84     | 3.87                    | 12.05                    | 1.06      | 1.24    | 31.85          | 19.67                  | 2.99            |

## 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 = 3V, Id = 69.21 mA @ Temperature = +105degC

| FREQ   | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|--------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz)  | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 40.0   | 25.61 | 32.76     | 9.28                    | 10.81                    | 1.18      | 0.80    | 31.07          | 18.77                  | 1.98            |
| 60.0   | 25.83 | 31.67     | 9.09                    | 13.09                    | 1.08      | 0.80    | 30.75          | 18.26                  | 1.39            |
| 80.0   | 25.88 | 31.64     | 8.95                    | 14.56                    | 1.07      | 0.82    | 31.25          | 18.55                  | 1.08            |
| 200.0  | 25.49 | 30.72     | 8.39                    | 17.25                    | 0.99      | 0.87    | 32.07          | 18.58                  | 0.81            |
| 300.0  | 24.80 | 30.14     | 7.56                    | 17.18                    | 0.96      | 0.92    | 31.87          | 18.60                  | 0.87            |
| 400.0  | 24.06 | 29.48     | 6.90                    | 17.03                    | 0.95      | 0.94    | 32.18          | 18.41                  | 1.01            |
| 500.0  | 23.25 | 29.04     | 6.44                    | 16.94                    | 0.98      | 0.95    | 32.36          | 18.42                  | 1.17            |
| 600.0  | 22.46 | 28.46     | 6.09                    | 16.66                    | 1.01      | 0.95    | 32.84          | 18.48                  | 1.08            |
| 700.0  | 21.66 | 28.17     | 5.85                    | 16.59                    | 1.05      | 0.96    | 33.22          | 18.35                  | 1.09            |
| 800.0  | 20.89 | 27.77     | 5.69                    | 16.51                    | 1.08      | 0.97    | 32.87          | 18.34                  | 0.99            |
| 900.0  | 20.19 | 27.42     | 5.62                    | 16.43                    | 1.11      | 0.99    | 33.44          | 18.71                  | 0.06            |
| 1000.0 | 19.52 | 27.11     | 5.53                    | 16.30                    | 1.13      | 1.01    | 34.02          | 18.75                  | 1.24            |
| 1250.0 | 18.01 | 26.40     | 5.41                    | 16.08                    | 1.14      | 1.09    | 33.97          | 18.60                  | 1.26            |
| 1500.0 | 16.72 | 25.49     | 5.40                    | 15.92                    | 1.11      | 1.14    | 34.62          | 18.64                  | 1.37            |
| 1750.0 | 15.48 | 24.87     | 5.65                    | 15.54                    | 1.14      | 1.17    | 34.99          | 18.94                  | 1.50            |
| 2000.0 | 14.62 | 24.04     | 5.58                    | 14.96                    | 1.11      | 1.18    | 34.39          | 19.01                  | 1.44            |
| 2250.0 | 13.75 | 23.49     | 6.07                    | 14.55                    | 1.21      | 1.14    | 35.16          | 19.17                  | 1.61            |
| 2500.0 | 13.09 | 22.81     | 6.58                    | 13.77                    | 1.27      | 1.09    | 35.43          | 19.25                  | 1.68            |
| 2750.0 | 12.46 | 22.12     | 7.12                    | 12.82                    | 1.35      | 1.01    | 35.63          | 19.34                  | 1.85            |
| 3000.0 | 12.02 | 21.43     | 7.88                    | 11.91                    | 1.40      | 0.93    | 35.76          | 19.43                  | 1.72            |
| 3250.0 | 11.55 | 20.82     | 8.68                    | 11.12                    | 1.43      | 0.86    | 35.37          | 19.52                  | 1.91            |
| 3500.0 | 11.11 | 20.26     | 9.49                    | 10.48                    | 1.42      | 0.83    | 35.69          | 19.68                  | 1.97            |
| 3750.0 | 10.62 | 19.77     | 10.15                   | 10.01                    | 1.38      | 0.84    | 35.25          | 19.54                  | 1.86            |
| 4000.0 | 10.17 | 19.35     | 10.53                   | 9.64                     | 1.31      | 0.87    | 34.99          | 19.49                  | 1.98            |
| 4250.0 | 9.76  | 18.97     | 10.78                   | 9.48                     | 1.26      | 0.90    | 35.04          | 19.87                  | 2.02            |
| 4500.0 | 9.44  | 18.50     | 11.05                   | 9.56                     | 1.25      | 0.89    | 35.47          | 19.95                  | 2.08            |
| 4750.0 | 8.96  | 18.18     | 11.10                   | 9.68                     | 1.33      | 0.87    | 35.26          | 19.91                  | 2.34            |
| 5000.0 | 8.53  | 17.80     | 10.35                   | 10.30                    | 1.40      | 0.85    | 34.15          | 19.88                  | 2.35            |
| 5250.0 | 8.14  | 17.39     | 9.83                    | 10.56                    | 1.44      | 0.83    | 35.05          | 20.08                  | 2.61            |
| 5500.0 | 7.68  | 17.09     | 9.18                    | 11.21                    | 1.46      | 0.86    | 34.68          | 19.88                  | 2.62            |
| 5750.0 | 7.23  | 16.85     | 8.33                    | 12.30                    | 1.45      | 0.92    | 33.73          | 20.05                  | 2.90            |
| 6000.0 | 6.75  | 16.66     | 7.32                    | 13.74                    | 1.41      | 1.02    | 33.49          | 20.13                  | 3.25            |
| 6250.0 | 6.18  | 16.62     | 6.24                    | 15.30                    | 1.38      | 1.11    | 33.15          | 19.81                  | 3.45            |
| 6500.0 | 5.64  | 16.59     | 5.24                    | 15.80                    | 1.32      | 1.20    | 32.59          | 19.42                  | 3.74            |
| 6750.0 | 4.95  | 16.75     | 4.40                    | 14.50                    | 1.27      | 1.28    | 32.54          | 19.25                  | 4.10            |
| 7000.0 | 4.18  | 17.05     | 3.81                    | 12.51                    | 1.21      | 1.34    | 31.83          | 18.39                  | 4.68            |

## 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 = 2.75V, Id = 61.46 mA @ Temperature = +105degC

| FREQ   | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|--------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz)  | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 40.0   | 25.43 | 32.53     | 9.05                    | 10.59                    | 1.16      | 0.80    | 30.47          | 18.01                  | 1.83            |
| 60.0   | 25.67 | 32.15     | 8.84                    | 12.76                    | 1.12      | 0.84    | 30.68          | 17.53                  | 1.33            |
| 80.0   | 25.72 | 31.56     | 8.68                    | 14.19                    | 1.07      | 0.83    | 30.98          | 17.82                  | 1.02            |
| 200.0  | 25.35 | 30.60     | 8.15                    | 16.81                    | 0.99      | 0.88    | 31.71          | 17.88                  | 0.73            |
| 300.0  | 24.66 | 29.96     | 7.39                    | 16.82                    | 0.95      | 0.93    | 31.33          | 17.88                  | 0.91            |
| 400.0  | 23.93 | 29.45     | 6.78                    | 16.65                    | 0.94      | 0.96    | 32.19          | 17.71                  | 0.98            |
| 500.0  | 23.12 | 28.91     | 6.33                    | 16.64                    | 0.97      | 0.96    | 32.19          | 17.72                  | 1.12            |
| 600.0  | 22.34 | 28.40     | 6.01                    | 16.39                    | 1.00      | 0.96    | 32.55          | 17.77                  | 1.06            |
| 700.0  | 21.54 | 27.97     | 5.78                    | 16.32                    | 1.04      | 0.96    | 33.38          | 17.65                  | 1.04            |
| 800.0  | 20.77 | 27.58     | 5.62                    | 16.28                    | 1.07      | 0.97    | 33.03          | 17.64                  | 1.02            |
| 900.0  | 20.07 | 27.20     | 5.55                    | 16.18                    | 1.10      | 0.98    | 33.17          | 18.01                  | 13.08           |
| 1000.0 | 19.41 | 26.90     | 5.47                    | 16.07                    | 1.12      | 1.01    | 33.98          | 18.05                  | 1.17            |
| 1250.0 | 17.90 | 26.25     | 5.37                    | 15.89                    | 1.13      | 1.08    | 33.88          | 17.87                  | 1.24            |
| 1500.0 | 16.62 | 25.35     | 5.35                    | 15.70                    | 1.10      | 1.14    | 34.59          | 17.92                  | 1.36            |
| 1750.0 | 15.37 | 24.79     | 5.59                    | 15.35                    | 1.13      | 1.17    | 34.54          | 18.21                  | 1.47            |
| 2000.0 | 14.52 | 23.95     | 5.52                    | 14.76                    | 1.10      | 1.19    | 34.23          | 18.26                  | 1.40            |
| 2250.0 | 13.64 | 23.42     | 6.00                    | 14.37                    | 1.20      | 1.15    | 35.33          | 18.43                  | 1.58            |
| 2500.0 | 12.98 | 22.75     | 6.49                    | 13.60                    | 1.27      | 1.09    | 35.21          | 18.48                  | 1.66            |
| 2750.0 | 12.36 | 22.10     | 7.03                    | 12.67                    | 1.35      | 1.01    | 35.53          | 18.55                  | 1.83            |
| 3000.0 | 11.92 | 21.39     | 7.77                    | 11.79                    | 1.40      | 0.93    | 35.46          | 18.64                  | 1.68            |
| 3250.0 | 11.46 | 20.81     | 8.58                    | 11.02                    | 1.44      | 0.86    | 34.94          | 18.75                  | 1.86            |
| 3500.0 | 11.02 | 20.23     | 9.36                    | 10.42                    | 1.43      | 0.83    | 34.77          | 18.88                  | 1.93            |
| 3750.0 | 10.54 | 19.74     | 10.02                   | 9.95                     | 1.38      | 0.84    | 34.85          | 18.76                  | 1.86            |
| 4000.0 | 10.09 | 19.31     | 10.39                   | 9.61                     | 1.31      | 0.88    | 34.41          | 18.66                  | 1.94            |
| 4250.0 | 9.68  | 18.94     | 10.63                   | 9.46                     | 1.26      | 0.91    | 34.22          | 19.09                  | 1.96            |
| 4500.0 | 9.36  | 18.47     | 10.90                   | 9.57                     | 1.25      | 0.90    | 34.65          | 19.14                  | 2.01            |
| 4750.0 | 8.88  | 18.16     | 10.91                   | 9.71                     | 1.33      | 0.87    | 34.71          | 19.08                  | 2.26            |
| 5000.0 | 8.46  | 17.79     | 10.18                   | 10.34                    | 1.40      | 0.86    | 33.82          | 19.11                  | 2.42            |
| 5250.0 | 8.06  | 17.38     | 9.67                    | 10.62                    | 1.44      | 0.84    | 34.35          | 19.33                  | 2.47            |
| 5500.0 | 7.60  | 17.07     | 9.04                    | 11.28                    | 1.47      | 0.86    | 34.39          | 19.16                  | 2.53            |
| 5750.0 | 7.15  | 16.81     | 8.22                    | 12.36                    | 1.45      | 0.93    | 33.54          | 19.30                  | 2.80            |
| 6000.0 | 6.67  | 16.63     | 7.22                    | 13.82                    | 1.41      | 1.02    | 33.74          | 19.32                  | 3.18            |
| 6250.0 | 6.11  | 16.58     | 6.16                    | 15.40                    | 1.38      | 1.12    | 32.99          | 19.11                  | 3.34            |
| 6500.0 | 5.56  | 16.58     | 5.19                    | 15.88                    | 1.33      | 1.20    | 32.24          | 18.69                  | 3.68            |
| 6750.0 | 4.88  | 16.74     | 4.35                    | 14.55                    | 1.27      | 1.28    | 32.38          | 18.55                  | 3.94            |
| 7000.0 | 4.11  | 17.04     | 3.77                    | 12.56                    | 1.21      | 1.34    | 31.83          | 17.61                  | 4.38            |

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

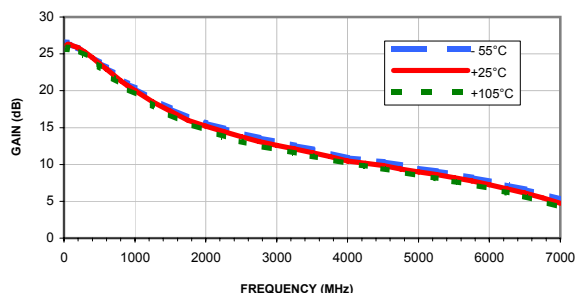
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.25V, Id = 77.02 mA @ Temperature = +105degC

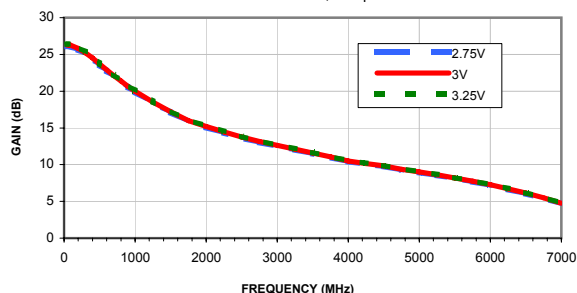
| FREQ   | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |         | IP-3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|--------|-------|-----------|-------------------------|--------------------------|-----------|---------|----------------|------------------------|-----------------|
| (MHz)  | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Measure | (dBm)          | (dBm)                  | (dB)            |
| 40.0   | 25.73 | 32.94     | 9.51                    | 10.91                    | 1.19      | 0.80    | 30.65          | 19.50                  | 2.20            |
| 60.0   | 25.94 | 31.92     | 9.34                    | 13.29                    | 1.10      | 0.80    | 30.89          | 18.98                  | 1.54            |
| 80.0   | 25.98 | 31.74     | 9.24                    | 14.74                    | 1.08      | 0.82    | 31.23          | 19.27                  | 1.19            |
| 200.0  | 25.58 | 30.87     | 8.63                    | 17.50                    | 1.01      | 0.87    | 32.12          | 19.26                  | 0.89            |
| 300.0  | 24.89 | 30.24     | 7.74                    | 17.45                    | 0.97      | 0.91    | 32.38          | 19.27                  | 0.97            |
| 400.0  | 24.14 | 29.68     | 7.03                    | 17.26                    | 0.97      | 0.94    | 32.22          | 19.08                  | 1.08            |
| 500.0  | 23.33 | 29.22     | 6.54                    | 17.19                    | 0.99      | 0.95    | 32.27          | 19.10                  | 1.18            |
| 600.0  | 22.53 | 28.70     | 6.18                    | 16.88                    | 1.02      | 0.95    | 32.98          | 19.17                  | 1.14            |
| 700.0  | 21.74 | 28.27     | 5.92                    | 16.77                    | 1.06      | 0.96    | 33.09          | 19.04                  | 1.12            |
| 800.0  | 20.96 | 27.96     | 5.75                    | 16.72                    | 1.10      | 0.98    | 32.94          | 19.04                  | 1.07            |
| 900.0  | 20.26 | 27.62     | 5.67                    | 16.63                    | 1.12      | 0.99    | 33.17          | 19.42                  | 1.20            |
| 1000.0 | 19.59 | 27.22     | 5.57                    | 16.49                    | 1.13      | 1.01    | 33.86          | 19.47                  | 1.25            |
| 1250.0 | 18.08 | 26.56     | 5.45                    | 16.26                    | 1.14      | 1.09    | 33.89          | 19.29                  | 1.33            |
| 1500.0 | 16.80 | 25.61     | 5.43                    | 16.08                    | 1.11      | 1.14    | 34.63          | 19.34                  | 1.42            |
| 1750.0 | 15.55 | 25.01     | 5.68                    | 15.70                    | 1.15      | 1.17    | 34.82          | 19.66                  | 1.53            |
| 2000.0 | 14.69 | 24.10     | 5.62                    | 15.08                    | 1.12      | 1.18    | 34.59          | 19.72                  | 1.51            |
| 2250.0 | 13.82 | 23.52     | 6.11                    | 14.66                    | 1.21      | 1.14    | 35.35          | 19.89                  | 1.66            |
| 2500.0 | 13.15 | 22.83     | 6.62                    | 13.84                    | 1.27      | 1.08    | 36.32          | 19.98                  | 1.73            |
| 2750.0 | 12.53 | 22.14     | 7.18                    | 12.85                    | 1.35      | 1.00    | 35.86          | 20.06                  | 1.89            |
| 3000.0 | 12.08 | 21.47     | 7.95                    | 11.93                    | 1.40      | 0.92    | 35.99          | 20.16                  | 1.77            |
| 3250.0 | 11.62 | 20.86     | 8.78                    | 11.12                    | 1.43      | 0.86    | 35.76          | 20.26                  | 1.95            |
| 3500.0 | 11.16 | 20.30     | 9.59                    | 10.46                    | 1.42      | 0.83    | 36.37          | 20.37                  | 2.02            |
| 3750.0 | 10.67 | 19.82     | 10.25                   | 9.98                     | 1.38      | 0.84    | 35.93          | 20.27                  | 1.95            |
| 4000.0 | 10.22 | 19.39     | 10.64                   | 9.61                     | 1.31      | 0.87    | 35.16          | 20.20                  | 2.02            |
| 4250.0 | 9.81  | 19.01     | 10.88                   | 9.45                     | 1.26      | 0.90    | 35.69          | 20.56                  | 2.03            |
| 4500.0 | 9.48  | 18.52     | 11.16                   | 9.52                     | 1.25      | 0.89    | 35.67          | 20.65                  | 2.16            |
| 4750.0 | 9.00  | 18.20     | 11.18                   | 9.64                     | 1.33      | 0.86    | 35.45          | 20.55                  | 2.33            |
| 5000.0 | 8.57  | 17.83     | 10.43                   | 10.24                    | 1.40      | 0.85    | 35.01          | 20.55                  | 2.50            |
| 5250.0 | 8.18  | 17.44     | 9.90                    | 10.51                    | 1.44      | 0.83    | 35.32          | 20.71                  | 2.67            |
| 5500.0 | 7.71  | 17.12     | 9.24                    | 11.14                    | 1.47      | 0.85    | 34.58          | 20.63                  | 2.68            |
| 5750.0 | 7.27  | 16.86     | 8.40                    | 12.19                    | 1.45      | 0.92    | 33.97          | 20.74                  | 3.01            |
| 6000.0 | 6.79  | 16.67     | 7.37                    | 13.63                    | 1.40      | 1.01    | 33.90          | 20.84                  | 3.26            |
| 6250.0 | 6.22  | 16.62     | 6.28                    | 15.17                    | 1.37      | 1.11    | 33.31          | 20.58                  | 3.55            |
| 6500.0 | 5.68  | 16.58     | 5.29                    | 15.71                    | 1.32      | 1.20    | 32.57          | 20.17                  | 3.93            |
| 6750.0 | 5.00  | 16.75     | 4.44                    | 14.52                    | 1.27      | 1.28    | 32.52          | 19.93                  | 4.19            |
| 7000.0 | 4.24  | 17.04     | 3.84                    | 12.56                    | 1.20      | 1.34    | 31.91          | 18.98                  | 4.60            |

## Typical Performance Curves

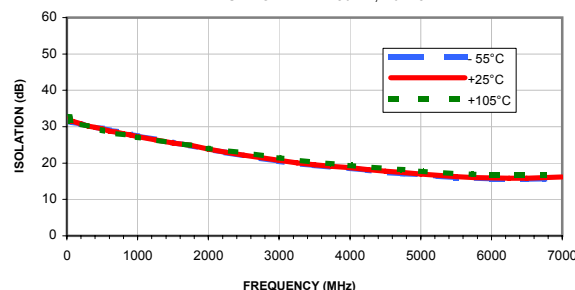
**GAIN vs. FREQUENCY & TEMPERATURE**  
INPUT POWER = -25dBm, Vd = 3V



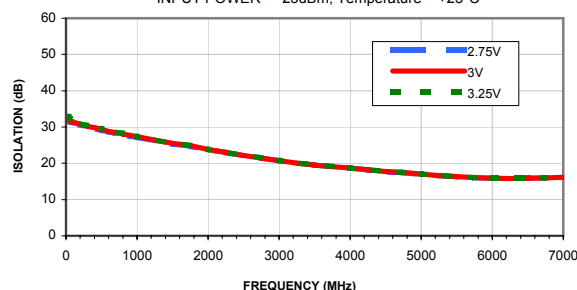
**GAIN vs. FREQUENCY & DEVICE VOLTAGE**  
INPUT POWER = -25dBm, Temperature = +25°C



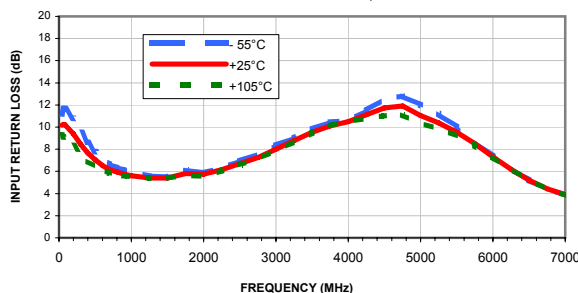
**ISOLATION vs. FREQUENCY & TEMPERATURE**  
INPUT POWER = -25dBm, Vd = 3V



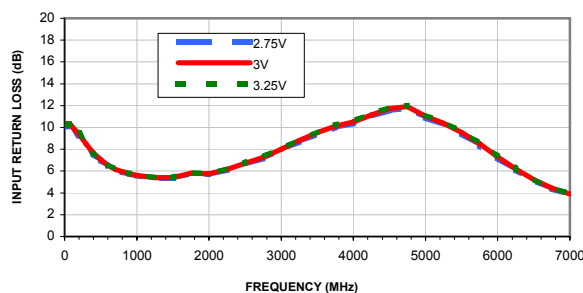
**ISOLATION vs. FREQUENCY & DEVICE VOLTAGE**  
INPUT POWER = -25dBm, Temperature = +25°C



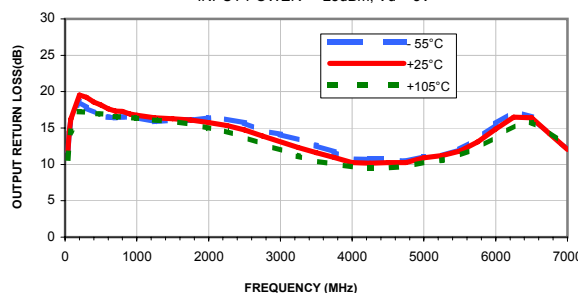
**INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE**  
INPUT POWER = -25dBm, Vd = 3V



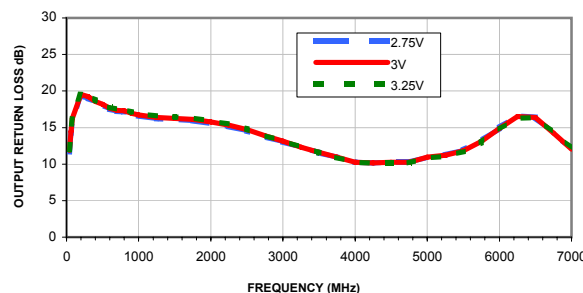
**INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE**  
INPUT POWER = -25dBm, Temperature = +25°C



**OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE**  
INPUT POWER = -25dBm, Vd = 3V



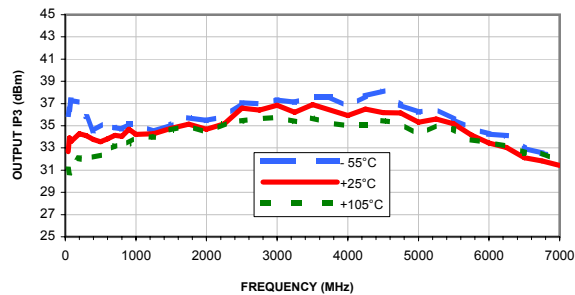
**OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE**  
INPUT POWER = -25dBm, Temperature = +25°C



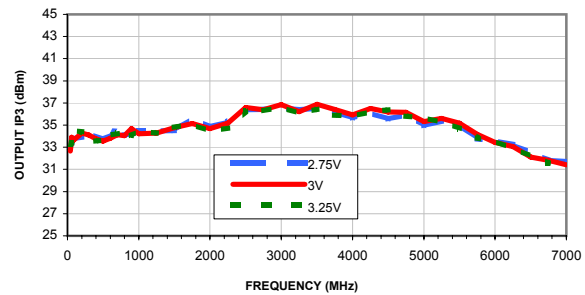


## Typical Performance Curves

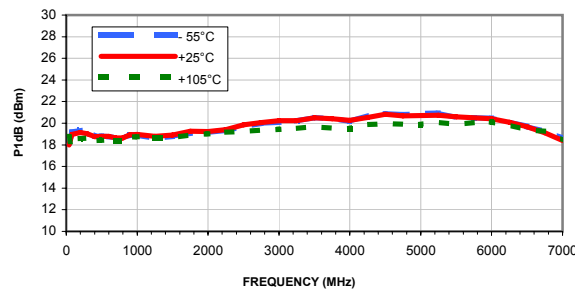
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE  
OUTPUT POWER = 0 dBm/100mW, Vd = 3V



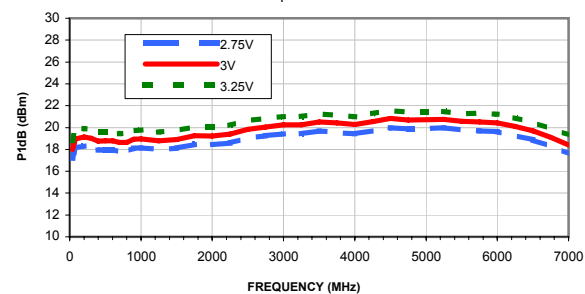
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE  
OUTPUT POWER = 0 dBm/100mW, Temperature = +25°C



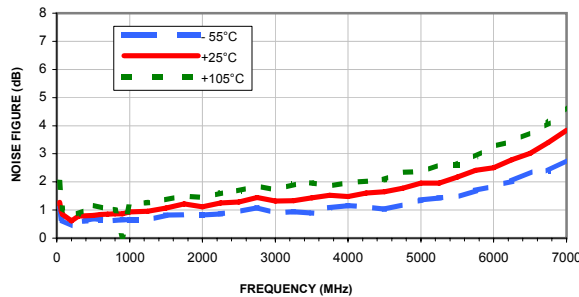
P1dB vs. FREQUENCY & TEMPERATURE  
Vd = 3V



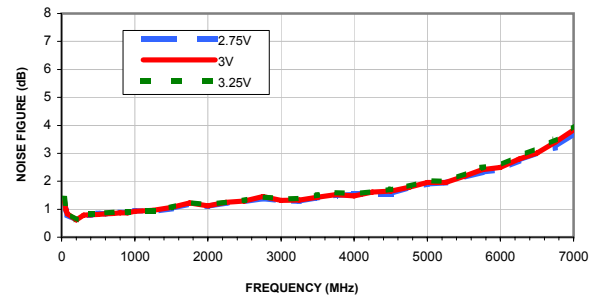
P1dB vs. FREQUENCY & DEVICE VOLTAGE  
Temperature = +25°C



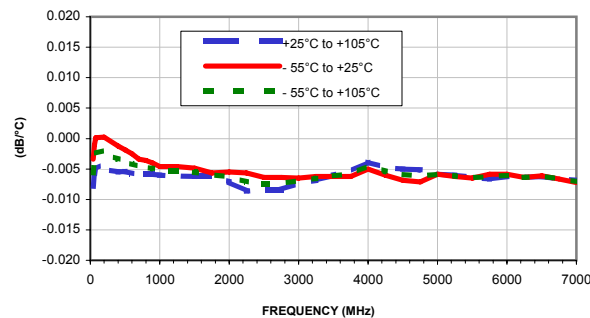
NOISE FIGURE vs. FREQUENCY & TEMPERATURE  
Vd = 3V



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

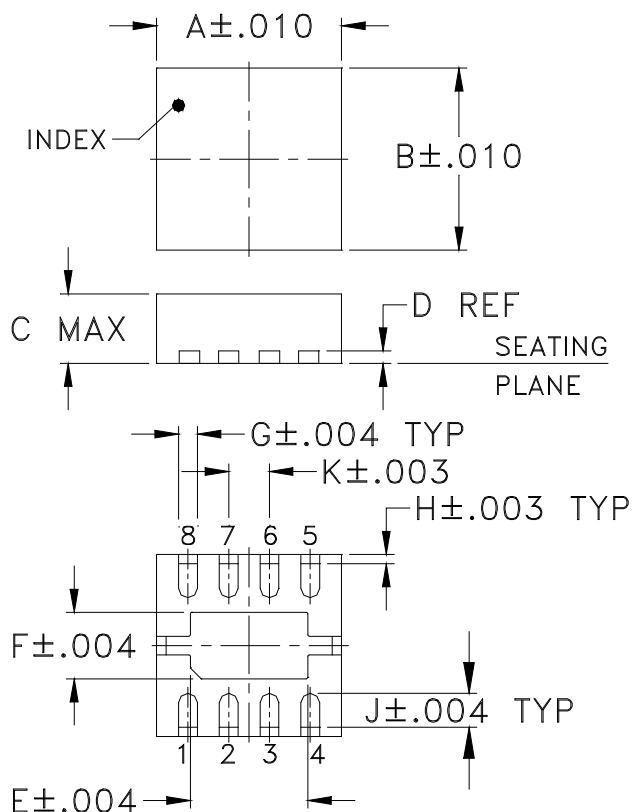


GAIN VARIATION vs. FREQUENCY & TEMPERATURE  
INPUT POWER = -25dBm, Vd = 3V

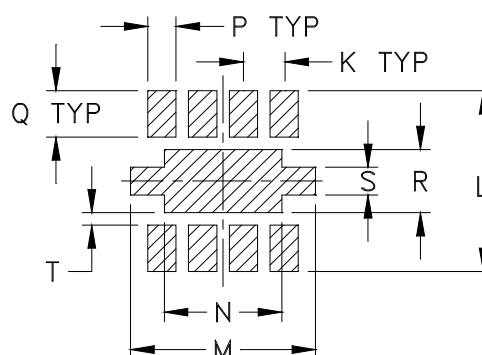




### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

| CASE # | A              | B              | C              | D              | E              | F              | G              | H              | J              | K              | L              | M              | N              |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| DL1721 | .118<br>(3.00) | .118<br>(3.00) | .045<br>(1.14) | .008<br>(0.20) | .075<br>(1.91) | .043<br>(1.09) | .012<br>(0.30) | .006<br>(0.15) | .022<br>(0.56) | .026<br>(0.66) | .117<br>(2.97) | .118<br>(3.00) | .075<br>(1.91) |

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

Dimensions are in inches (mm). Tolerances: 3Pl.  $\pm .004$ , unless otherwise specified.

#### Notes:

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



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

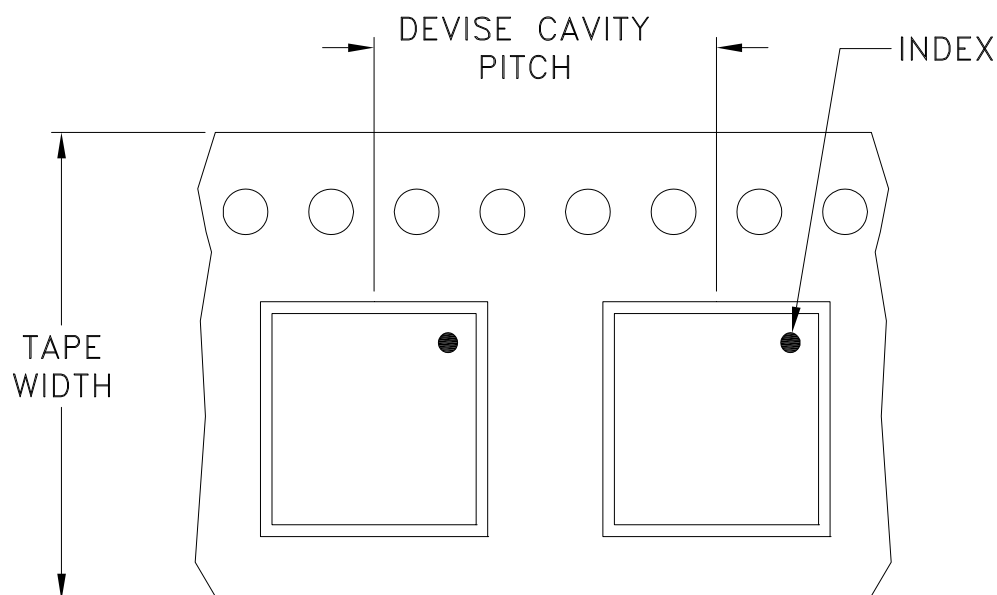


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RF/IF MICROWAVE COMPONENTS



# Tape & Reel Packaging TR-F66-1



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

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

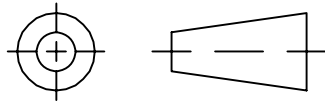
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



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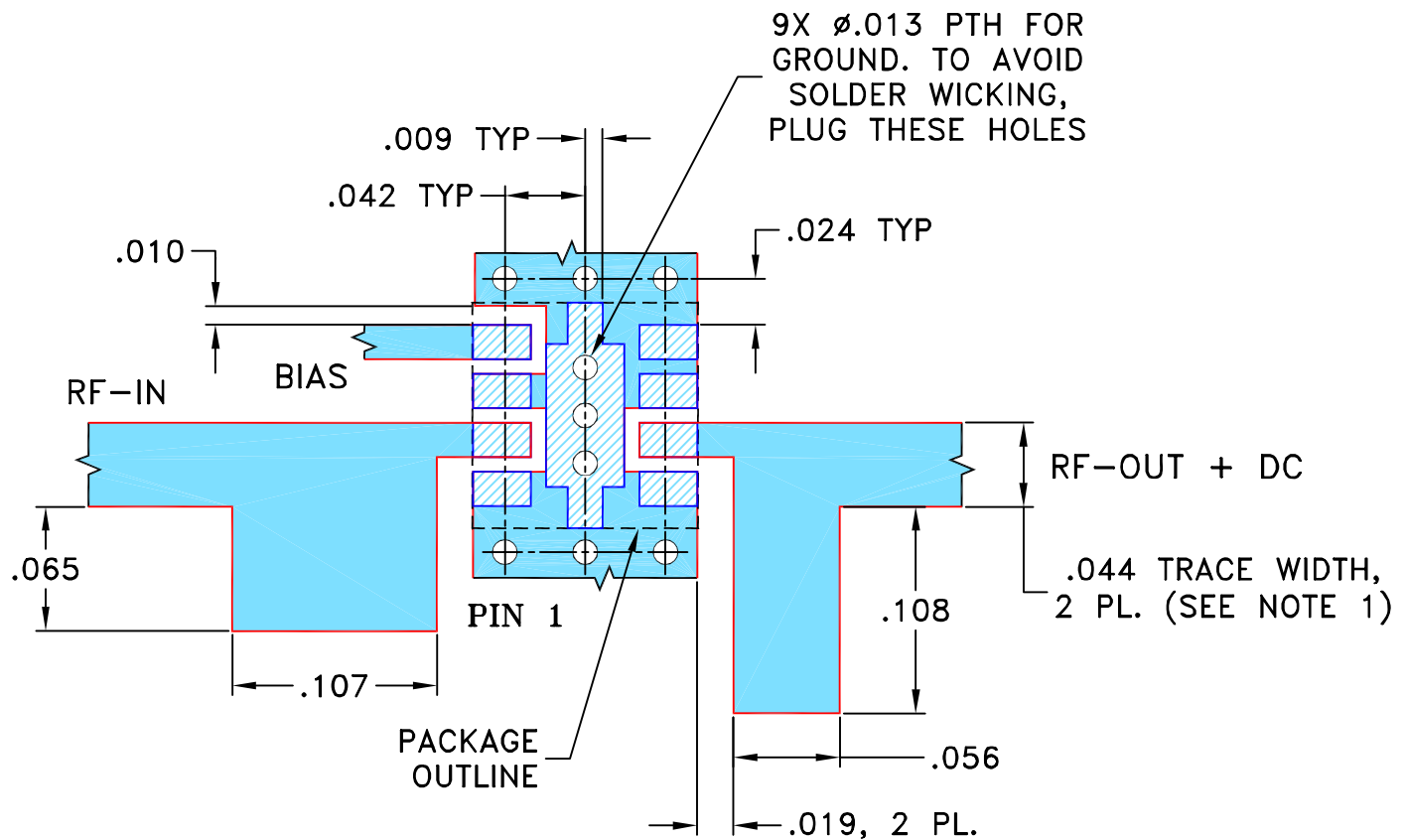
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION | DATE     | DR | AUTH |
|-----|---------|-------------|----------|----|------|
| OR  | M136376 | NEW RELEASE | 06/12/12 | PW | DJ   |
|     |         |             |          |    |      |
|     |         |             |          |    |      |

### SUGGESTED MOUNTING CONFIGURATION FOR DL1721 CASE STYLE, "08AM10" PIN CONNECTION



## NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020"  $\pm$  .0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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

PW

05/18/12

TOLERANCES ON:

CHECKED

IL

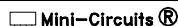
06/05/12

2 PL DECIMALS  $\pm$ 

APPROVED

DJ

06/12/12

3 PL DECIMALS  $\pm$  .005ANGLES  $\pm$ FRACTIONS  $\pm$ 

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



Mini-Circuits®

13 Neptune Avenue  
Brooklyn NY 11235

PL, 08AM10, DL1721, CMA TB-631+

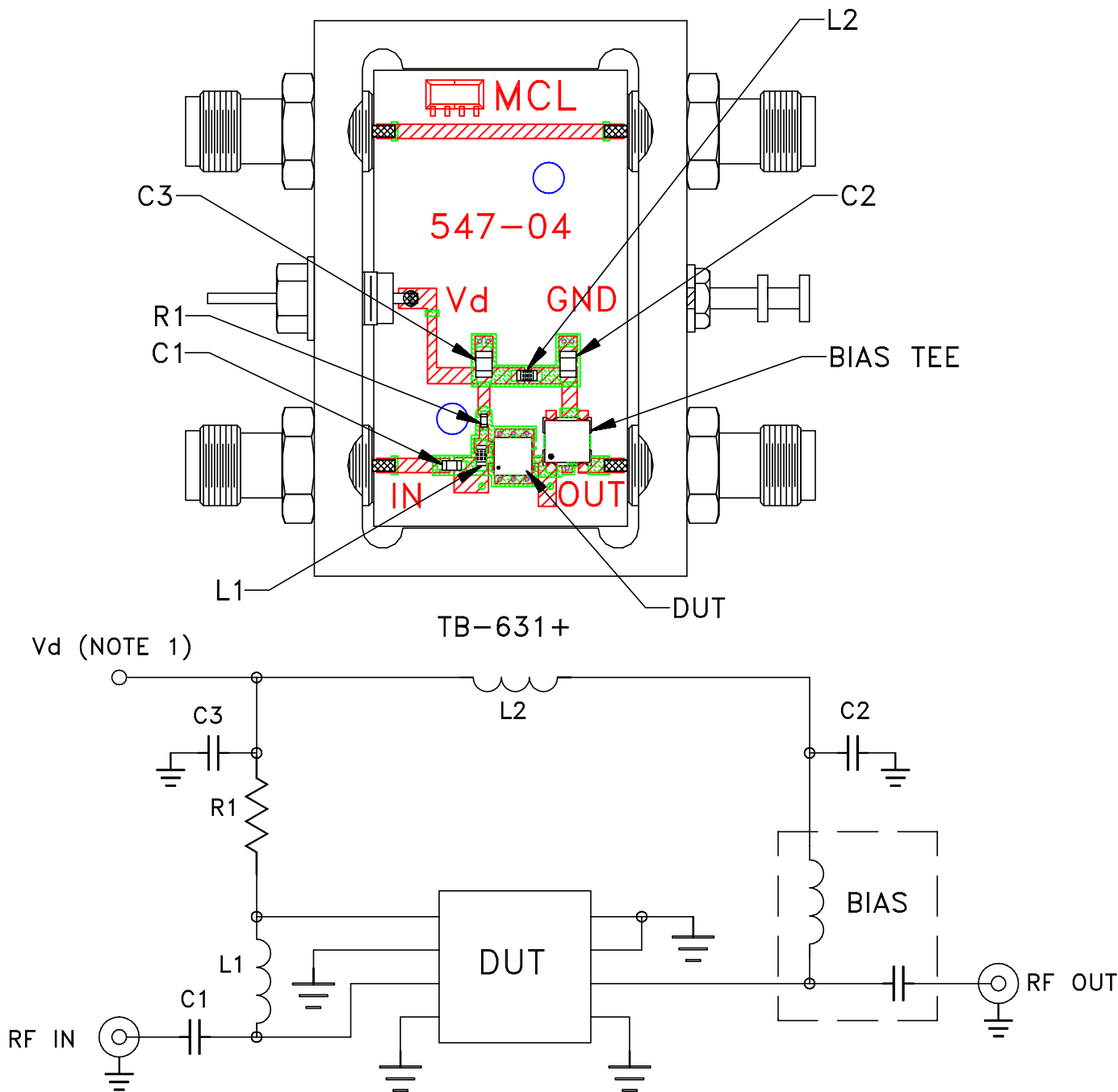
SIZE  
ACODE IDENT  
15542DRAWING NO:  
98-PL-365REV:  
OR

FILE: 98PL365

SCALE: 10:1

SHEET: 1 OF 1

# Evaluation Board and Circuit



| COMPONENT | DESCRIPTION            |
|-----------|------------------------|
| DUT       | CMA-545+ (NIKKO)       |
| C1        | 2.2 nF                 |
| C2,C3     | 0.1 uF                 |
| L1        | 390 nH                 |
| L2        | 30 nH                  |
| R1        | 432 Ohms               |
| BIAS TEE  | Mini-Circuits TCBT-14+ |

## NOTES:

1. Vd voltage: +3V.
2. SMA Female connectors.
3. PCB material: Rogers R04350 or equivalent, dielectric constant=3.5, dielectric thickness=.020 inch.

## Schematic Diagram

 **Mini-Circuits®**



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 |