



# Monolithic Amplifier

**GALI-84+**50 $\Omega$  DC to 6 GHz

## FEATURES

- Frequency Range, DC to 6 GHz
- High Gain, 25.6 dB Typ. at 0.1 GHz
- InGaP HBT Microwave Amplifier
- Miniature SOT-89 Package
- Internally Matched to 50 $\Omega$
- High IP3, +38 dBm Typ.
- High P1dB +21.9 dBm Typ.
- Low Additive Phase Noise, -172 dBc/Hz at 10 KHz Typ.
- Unconditionally Stable
- Transient Protected
- Aqueous Washable
- Protected By US Patent 6,943,629



Generic photo used for illustration purposes only

CASE STYLE: DF782

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

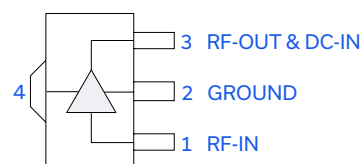
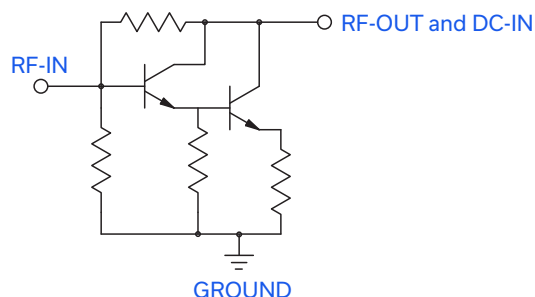
## APPLICATIONS

- Base Station Infrastructure
- Portable Wireless
- CATV & DBS
- MMDS & Wireless LAN
- Suitable for Low Phase Noise Applications

## PRODUCT OVERVIEW

Gali-84+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot, and is enclosed in a SOT-89 package. It uses patented Transient Protected Darlington configuration and is fabricated using InGaP HBT technology. Expected MTTF is 1,200 years at +85°C case temperature. Gali-84+ is designed to be rugged for ESD and supply switch-on transients.

## SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION



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



Mini-Circuits

MMIC SURFACE MOUNT

## Monolithic Amplifier

GALI-84+

50Ω DC to 6 GHz

## ELECTRICAL SPECIFICATIONS AT +25°C AND 100 mA UNLESS NOTED OTHERWISE

| Parameter                                                            | Conditions (GHz) | Min.  | Typ.   | Max.   | Units | Cpk  |
|----------------------------------------------------------------------|------------------|-------|--------|--------|-------|------|
| Frequency Range <sup>1</sup>                                         |                  | DC    |        | 6      | GHz   |      |
| Gain                                                                 | 0.1              | 24.3  | 25.6   | 26.9   | dB    | ≥1.5 |
|                                                                      | 1                | -     | 22.7   | -      |       |      |
|                                                                      | 2                | 18.2  | 19.2   | 20.2   |       |      |
|                                                                      | 3                | -     | 16.7   | -      |       |      |
|                                                                      | 4                | 14.3  | 15.0   | 15.8   |       |      |
|                                                                      | 6                | -     | 11.8   | -      |       |      |
| Magnitude of Gain Variation vs. Temperature<br>(Values Are Negative) | 0.1              | -     | 0.0025 | -      | dB/°C | -    |
|                                                                      | 1                | -     | 0.0036 | -      |       |      |
|                                                                      | 2                | -     | 0.0045 | 0.0090 |       |      |
|                                                                      | 3                | -     | 0.0057 | -      |       |      |
|                                                                      | 4                | -     | 0.0074 | -      |       |      |
|                                                                      | 6                | -     | 0.0148 | -      |       |      |
| Input Return Loss                                                    | 0.1              | -     | 25.8   | -      | dB    | -    |
|                                                                      | 1                | -     | 21.2   | -      |       |      |
|                                                                      | 2                | 14.0  | 18.0   | -      |       |      |
|                                                                      | 3                | -     | 15.6   | -      |       |      |
|                                                                      | 4                | -     | 14.7   | -      |       |      |
|                                                                      | 6                | -     | 16.7   | -      |       |      |
| Output Return Loss                                                   | 0.1              | -     | 16.3   | -      | dB    | -    |
|                                                                      | 1                | -     | 11.0   | -      |       |      |
|                                                                      | 2                | 6.0   | 8.9    | -      |       |      |
|                                                                      | 3                | -     | 9.0    | -      |       |      |
|                                                                      | 4                | -     | 9.7    | -      |       |      |
|                                                                      | 6                | -     | 8.4    | -      |       |      |
| Reverse Isolation                                                    | 2                | 22    | 26.5   | -      | dB    |      |
| Output Power @ 1 dB Compression                                      | 0.1              | +20.8 | +21.9  | -      | dBm   | ≥1.5 |
|                                                                      | 1                | +20.4 | +21.5  | -      |       |      |
|                                                                      | 2                | +20.1 | +21.2  | -      |       |      |
|                                                                      | 3                | -     | +20.9  | -      |       |      |
|                                                                      | 4                | -     | +19.2  | -      |       |      |
|                                                                      | 6                | -     | +15.5  | -      |       |      |
| Saturated Output Power<br>(at 3 dB Compression)                      | 0.1              | -     | +23.0  | -      | dBm   | -    |
|                                                                      | 1                | -     | +22.6  | -      |       |      |
|                                                                      | 2                | -     | +22.1  | -      |       |      |
|                                                                      | 3                | -     | +21.7  | -      |       |      |
|                                                                      | 4                | -     | +20.3  | -      |       |      |
|                                                                      | 6                | -     | +17.1  | -      |       |      |

1. Guaranteed specification DC-6 GHz. Low frequency cut off determined by external coupling capacitors.





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## ELECTRICAL SPECIFICATIONS AT +25°C AND 100 mA UNLESS NOTED OTHERWISE

| Parameter                                          | Conditions (GHz)     | Min.  | Typ.  | Max. | Units  | Cpk  |
|----------------------------------------------------|----------------------|-------|-------|------|--------|------|
| Output IP3                                         | 0.1                  | +33.8 | +37.6 | -    | dBm    | ≥1.5 |
|                                                    | 1                    | +34.0 | +37.8 | -    |        |      |
|                                                    | 2                    | +34.2 | +38.0 | -    |        |      |
|                                                    | 3                    | -     | +37.4 | -    |        |      |
|                                                    | 4                    | -     | +34.7 | -    |        |      |
|                                                    | 6                    | -     | +32.7 | -    |        |      |
| Noise Figure                                       | 0.1                  | -     | 4.2   | -    | dB     | ≥1.5 |
|                                                    | 1                    | -     | 4.4   | -    |        |      |
|                                                    | 2                    | -     | 4.4   | -    |        |      |
|                                                    | 3                    | -     | 4.4   | -    |        |      |
|                                                    | 4                    | -     | 4.3   | -    |        |      |
|                                                    | 6                    | -     | 5.3   | -    |        |      |
| Additive Phase Noise                               | 2 GHz, 10 KHz Offset | -     | -172  | -    | dBc/Hz | -    |
| Group Delay                                        | 2                    | -     | 94    | -    | psec   | -    |
| Recommended Device Operating Current               | -                    | -     | 100   | -    | mA     | -    |
| Device Operating Voltage                           | -                    | +5.4  | +5.8  | +6.2 | V      | ≥1.5 |
| Device Voltage Variation vs. Temperature at 100 mA | -                    | -     | -3.6  | -    | mV/°C  | -    |
| Device Voltage Variation vs. Current at +25°C      | -                    | -     | 3.3   | -    | mV/mA  | -    |
| Thermal Resistance, Junction-to-Case <sup>2</sup>  | -                    | -     | 64    | -    | °C/W   | -    |

2. Case is defined as ground leads.

## ABSOLUTE MAXIMUM RATINGS

| Parameter                          | Ratings         |
|------------------------------------|-----------------|
| Operating Temperature <sup>3</sup> | -45°C to +85°C  |
| Storage Temperature                | -65°C to +150°C |
| Operating Current                  | 160 mA          |
| Power Dissipation                  | 1 W             |
| Input Power                        | +13 dBm         |

3. Based on typical case temperature rise +9°C above ambient.  
Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.



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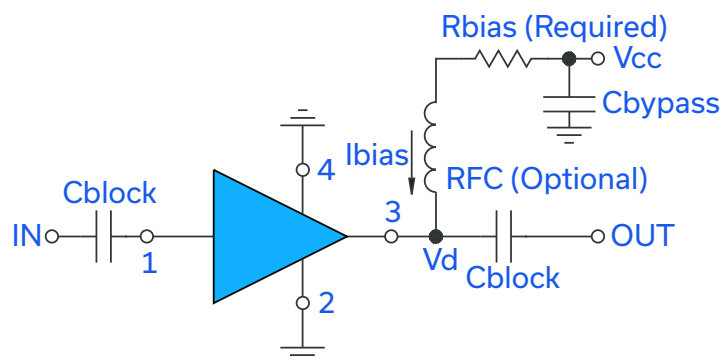
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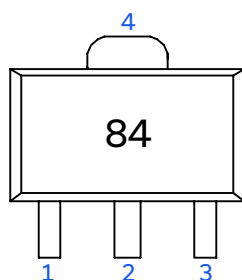
## RECOMMENDED APPLICATION CIRCUIT



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

| R BIAS |                                                |
|--------|------------------------------------------------|
| Vcc    | "1%" Res. Values (Ohms)<br>for Optimum Biasing |
| 8      | 22.1                                           |
| 9      | 32.4                                           |
| 10     | 42.2                                           |
| 11     | 52.3                                           |
| 12     | 61.9                                           |
| 13     | 71.5                                           |
| 14     | 82.5                                           |
| 15     | 93.1                                           |
| 16     | 102                                            |
| 17     | 113                                            |
| 18     | 121                                            |
| 19     | 133                                            |
| 20     | 140                                            |

## PRODUCT MARKING



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





ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. [CLICK HERE](#)

|                                                      |                                                          |
|------------------------------------------------------|----------------------------------------------------------|
| Performance Data & Graphs                            | Data Table                                               |
|                                                      | Swept Graphs                                             |
|                                                      | S-Parameter (S2P Files) Data Set (.zip file)             |
| Case Style                                           | DF782 Plastic package, Lead Finish: Matte-tin            |
| Tape & Reel<br>Standard Quantities Available on Reel | F55<br>7" Reels with 20, 50, 100, 200, 500 or 1K devices |
| Suggested Layout for PCB Design                      | PL-019                                                   |
| Evaluation Board                                     | TB-409-84+                                               |
| Environmental Ratings                                | ENV08T2                                                  |

### ESD RATING

Human Body Model (HBM): Class 1C (1000 V to < 2000 V) in accordance with ANSI/ESD STM 5.1 - 2001

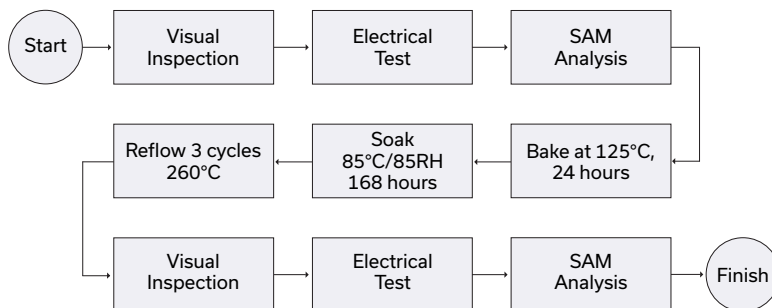
Machine Model (MM): Class M2 (100 V to < 200 V) in accordance with ANSI/ESD STM 5.2 - 1999

### MSL RATING

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

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

### MSL TEST FLOW CHART



### NOTES

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
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## Typical Performance Data

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

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 100mA, Vd = 5.76V @Temperature = +25degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | FREQ  | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (MHz) | (dBm)         | (dBm)                  | (dB)            |
| 50    | 25.68 | 29.60     | 25.63                   | 16.34                    | 1.08      | 0.63  | 50    | 37.67         | 21.85                  | 4.07            |
| 100   | 25.65 | 29.87     | 25.32                   | 16.02                    | 1.09      | 0.61  | 100   | 37.59         | 21.91                  | 4.22            |
| 200   | 25.50 | 29.53     | 25.84                   | 15.53                    | 1.08      | 0.62  | 200   | 37.76         | 21.70                  | 4.23            |
| 400   | 25.06 | 29.43     | 24.81                   | 14.14                    | 1.08      | 0.59  | 400   | 37.38         | 21.77                  | 4.30            |
| 600   | 24.43 | 29.26     | 24.03                   | 12.67                    | 1.09      | 0.56  | 600   | 37.16         | 21.49                  | 4.30            |
| 800   | 23.72 | 28.96     | 23.13                   | 11.58                    | 1.10      | 0.53  | 800   | 37.58         | 21.49                  | 4.47            |
| 1000  | 22.96 | 28.77     | 22.21                   | 10.75                    | 1.13      | 0.49  | 1000  | 37.79         | 21.53                  | 4.38            |
| 1200  | 22.19 | 28.44     | 21.48                   | 10.12                    | 1.14      | 0.47  | 1200  | 37.63         | 21.12                  | 4.41            |
| 1400  | 21.46 | 28.09     | 20.67                   | 9.64                     | 1.16      | 0.45  | 1400  | 37.30         | 21.10                  | 4.32            |
| 1600  | 20.75 | 27.73     | 19.97                   | 9.30                     | 1.18      | 0.42  | 1600  | 37.71         | 21.17                  | 4.48            |
| 1800  | 20.07 | 27.41     | 19.43                   | 9.03                     | 1.20      | 0.40  | 1800  | 38.26         | 21.06                  | 4.52            |
| 2000  | 19.46 | 27.07     | 18.68                   | 8.85                     | 1.21      | 0.39  | 2000  | 38.03         | 21.16                  | 4.33            |
| 2200  | 18.89 | 26.79     | 18.20                   | 8.85                     | 1.23      | 0.37  | 2200  | 37.73         | 21.26                  | 4.38            |
| 2400  | 18.36 | 26.45     | 17.70                   | 8.85                     | 1.25      | 0.36  | 2400  | 37.43         | 21.26                  | 4.47            |
| 2600  | 17.89 | 26.08     | 16.97                   | 8.85                     | 1.25      | 0.35  | 2600  | 37.13         | 21.14                  | 4.45            |
| 2800  | 17.40 | 25.99     | 16.97                   | 9.01                     | 1.30      | 0.33  | 2800  | 37.29         | 21.03                  | 4.41            |
| 3000  | 17.05 | 25.49     | 16.23                   | 8.95                     | 1.27      | 0.33  | 3000  | 37.35         | 20.88                  | 4.39            |
| 3200  | 16.67 | 25.22     | 16.01                   | 9.06                     | 1.28      | 0.33  | 3200  | 37.32         | 20.70                  | 4.47            |
| 3400  | 16.33 | 25.01     | 15.79                   | 9.17                     | 1.30      | 0.32  | 3400  | 37.16         | 20.45                  | 4.55            |
| 3600  | 16.02 | 24.75     | 15.62                   | 9.20                     | 1.30      | 0.32  | 3600  | 36.60         | 20.22                  | 4.64            |
| 3800  | 15.72 | 24.53     | 15.57                   | 9.25                     | 1.31      | 0.32  | 3800  | 35.47         | 19.78                  | 4.60            |
| 4000  | 15.47 | 24.41     | 15.49                   | 9.28                     | 1.33      | 0.31  | 4000  | 34.65         | 19.23                  | 4.64            |
| 4200  | 15.17 | 24.26     | 15.84                   | 9.21                     | 1.35      | 0.31  | 4200  | 35.11         | 18.81                  | 4.69            |
| 4400  | 14.88 | 24.15     | 16.00                   | 9.15                     | 1.37      | 0.30  | 4400  | 34.83         | 18.52                  | 4.74            |
| 4600  | 14.68 | 23.97     | 15.99                   | 9.00                     | 1.37      | 0.31  | 4600  | 34.50         | 18.14                  | 4.89            |
| 4800  | 14.40 | 23.95     | 16.10                   | 8.73                     | 1.40      | 0.30  | 4800  | 34.24         | 17.67                  | 4.98            |
| 5000  | 14.17 | 23.94     | 16.57                   | 8.56                     | 1.43      | 0.30  | 5000  | 33.96         | 17.23                  | 5.02            |
| 5200  | 13.93 | 23.94     | 16.58                   | 8.37                     | 1.45      | 0.29  | 5200  | 33.96         | 16.89                  | 5.02            |
| 5400  | 13.64 | 23.86     | 16.60                   | 8.08                     | 1.47      | 0.29  | 5400  | 33.36         | 16.66                  | 5.12            |
| 5600  | 13.38 | 23.91     | 17.32                   | 7.97                     | 1.52      | 0.28  | 5600  | 33.19         | 16.42                  | 5.14            |
| 6000  | 12.69 | 24.02     | 17.45                   | 7.64                     | 1.63      | 0.27  | 5800  | 33.07         | 15.95                  | 5.35            |
| 6500  | 11.60 | 24.21     | 16.78                   | 7.33                     | 1.84      | 0.27  | 6000  | 32.75         | 15.50                  | 5.27            |
| 7000  | 10.15 | 24.45     | 14.06                   | 7.05                     | 2.16      | 0.26  | 6200  | 32.89         | 15.08                  | 5.28            |
| 7500  | 8.43  | 24.43     | 11.12                   | 6.71                     | 2.47      | 0.27  | 6400  | 32.80         | 14.65                  | 5.30            |
| 8000  | 6.56  | 23.93     | 9.04                    | 6.40                     | 2.69      | 0.29  | 6600  | 32.24         | 14.35                  | 5.41            |
| 8500  | 4.69  | 23.00     | 7.75                    | 6.12                     | 2.79      | 0.30  | 6800  | 32.31         | 14.18                  | 5.52            |
| 9000  | 3.18  | 21.79     | 6.90                    | 5.86                     | 2.67      | 0.30  | 7000  | 33.07         | 14.00                  | 5.60            |
| 10000 | 0.94  | 18.56     | 6.72                    | 6.11                     | 2.34      | 0.27  | 7200  | 33.50         | 13.57                  | 5.58            |
| 12000 | -1.34 | 11.90     | 7.50                    | 7.28                     | 1.61      | 0.26  | 7500  | 32.55         | 13.06                  | 5.55            |
| 13000 | -1.79 | 7.82      | 9.18                    | 8.78                     | 1.28      | 0.32  | 8000  | 30.07         | 11.61                  | 6.10            |

REV. X1

GALI-84+

120123

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IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

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## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 80mA, Vd=5.72V @Temperature = +25degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |       | FREQ  | IP3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|-------|-------|------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Delta | (MHz) | (dBm)      | (dBm)            | (dB)         |
| 50    | 25.43 | 28.60     | 22.54             | 18.45              | 1.04      | 0.69  | 50    | 33.82      | 19.25            | 4.09         |
| 100   | 25.36 | 29.30     | 22.08             | 18.12              | 1.08      | 0.63  | 100   | 33.63      | 19.34            | 4.21         |
| 200   | 25.21 | 29.11     | 21.97             | 17.33              | 1.07      | 0.63  | 200   | 33.72      | 19.15            | 4.22         |
| 400   | 24.79 | 29.15     | 21.97             | 15.28              | 1.09      | 0.59  | 400   | 33.69      | 18.96            | 4.39         |
| 600   | 24.16 | 28.92     | 21.57             | 13.49              | 1.09      | 0.56  | 600   | 33.79      | 19.05            | 4.32         |
| 800   | 23.47 | 28.60     | 21.25             | 12.13              | 1.10      | 0.53  | 800   | 34.46      | 18.79            | 4.44         |
| 1000  | 22.74 | 28.45     | 20.71             | 11.12              | 1.12      | 0.49  | 1000  | 34.84      | 18.88            | 4.37         |
| 1200  | 22.00 | 28.06     | 20.34             | 10.37              | 1.13      | 0.47  | 1200  | 34.94      | 19.17            | 4.38         |
| 1400  | 21.28 | 27.81     | 19.66             | 9.82               | 1.15      | 0.44  | 1400  | 34.82      | 19.32            | 4.45         |
| 1600  | 20.59 | 27.47     | 19.11             | 9.45               | 1.16      | 0.42  | 1600  | 35.19      | 19.21            | 4.45         |
| 1800  | 19.92 | 27.20     | 18.41             | 9.16               | 1.19      | 0.40  | 1800  | 35.95      | 19.09            | 4.38         |
| 2000  | 19.34 | 26.88     | 17.75             | 8.96               | 1.20      | 0.39  | 2000  | 35.76      | 19.11            | 4.32         |
| 2200  | 18.75 | 26.57     | 17.31             | 8.89               | 1.22      | 0.37  | 2200  | 35.88      | 19.06            | 4.39         |
| 2400  | 18.23 | 26.22     | 16.75             | 8.86               | 1.22      | 0.36  | 2400  | 35.76      | 19.09            | 4.38         |
| 2600  | 17.77 | 25.99     | 16.29             | 8.87               | 1.24      | 0.34  | 2600  | 35.79      | 18.94            | 4.42         |
| 2800  | 17.34 | 25.71     | 15.95             | 8.95               | 1.26      | 0.33  | 2800  | 35.68      | 18.59            | 4.40         |
| 3000  | 16.96 | 25.39     | 15.47             | 8.96               | 1.26      | 0.33  | 3000  | 35.76      | 18.08            | 4.44         |
| 3200  | 16.56 | 25.21     | 15.40             | 9.12               | 1.29      | 0.32  | 3200  | 35.76      | 17.87            | 4.39         |
| 3400  | 16.27 | 24.91     | 15.06             | 9.20               | 1.28      | 0.32  | 3400  | 35.48      | 17.66            | 4.54         |
| 3600  | 15.96 | 24.60     | 14.89             | 9.22               | 1.28      | 0.32  | 3600  | 35.16      | 17.30            | 4.57         |
| 3800  | 15.64 | 24.42     | 14.82             | 9.31               | 1.30      | 0.31  | 3800  | 34.29      | 16.77            | 4.69         |
| 4000  | 15.37 | 24.27     | 14.78             | 9.32               | 1.32      | 0.31  | 4000  | 33.51      | 16.41            | 4.65         |
| 4200  | 15.07 | 24.11     | 14.86             | 9.31               | 1.34      | 0.31  | 4200  | 33.47      | 16.13            | 4.81         |
| 4400  | 14.79 | 24.06     | 14.97             | 9.22               | 1.37      | 0.30  | 4400  | 33.47      | 15.86            | 4.71         |
| 4600  | 14.53 | 23.87     | 15.00             | 9.03               | 1.37      | 0.30  | 4600  | 33.04      | 15.68            | 4.89         |
| 4800  | 14.20 | 23.79     | 15.31             | 8.80               | 1.40      | 0.30  | 4800  | 32.61      | 15.35            | 4.88         |
| 5000  | 13.99 | 23.92     | 15.72             | 8.75               | 1.45      | 0.29  | 5000  | 32.53      | 14.75            | 5.05         |
| 5200  | 13.71 | 23.93     | 15.92             | 8.50               | 1.48      | 0.28  | 5200  | 32.46      | 13.32            | 5.01         |
| 5400  | 13.40 | 23.88     | 16.47             | 8.25               | 1.52      | 0.28  | 5400  | 32.02      | 12.95            | 5.15         |
| 5600  | 13.16 | 23.88     | 17.29             | 8.16               | 1.56      | 0.28  | 5600  | 31.62      | 13.44            | 5.22         |
| 6000  | 12.47 | 24.19     | 16.86             | 7.85               | 1.70      | 0.26  | 5800  | 31.43      | 13.41            | 5.27         |
| 6500  | 11.51 | 24.29     | 16.72             | 7.75               | 1.91      | 0.26  | 6000  | 31.38      | 13.35            | 5.34         |
| 7000  | 10.15 | 24.42     | 14.04             | 7.47               | 2.20      | 0.26  | 6200  | 31.51      | 13.41            | 5.35         |
| 7500  | 8.31  | 24.24     | 11.31             | 7.22               | 2.53      | 0.27  | 6400  | 31.88      | 13.49            | 5.36         |
| 8000  | 6.44  | 24.17     | 9.02              | 6.67               | 2.84      | 0.28  | 6600  | 31.00      | 13.50            | 5.48         |
| 8500  | 4.55  | 23.74     | 7.81              | 6.38               | 3.13      | 0.29  | 6800  | 30.55      | 13.47            | 5.62         |
| 9000  | 2.92  | 21.97     | 7.23              | 6.22               | 2.95      | 0.29  | 7000  | 30.45      | 13.43            | 5.75         |
| 10000 | 0.72  | 18.57     | 6.96              | 6.62               | 2.54      | 0.26  | 7200  | 30.89      | 12.86            | 5.81         |
| 12000 | -1.52 | 12.08     | 7.54              | 7.45               | 1.69      | 0.25  | 7500  | 30.69      | 11.99            | 5.89         |
| 13000 | -1.98 | 7.92      | 9.04              | 8.44               | 1.29      | 0.31  | 8000  | 29.31      | 11.45            | 6.53         |

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## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 120mA, Vd = 5.81V @Temperature = +25degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | FREQ  | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (MHz) | (dBm)         | (dBm)                  | (dB)            |
| 50    | 25.85 | 30.23     | 28.44                   | 15.16                    | 1.10      | 0.60  | 50    | 40.55         | 22.76                  | 4.14            |
| 100   | 25.82 | 29.88     | 28.42                   | 14.89                    | 1.08      | 0.62  | 100   | 40.66         | 22.85                  | 4.31            |
| 200   | 25.66 | 29.82     | 29.12                   | 14.57                    | 1.08      | 0.61  | 200   | 40.70         | 22.72                  | 4.28            |
| 400   | 25.21 | 29.66     | 27.02                   | 13.44                    | 1.09      | 0.59  | 400   | 39.88         | 22.81                  | 4.38            |
| 600   | 24.57 | 29.48     | 25.60                   | 12.25                    | 1.10      | 0.56  | 600   | 39.10         | 22.50                  | 4.38            |
| 800   | 23.85 | 29.23     | 24.38                   | 11.26                    | 1.11      | 0.53  | 800   | 38.91         | 22.50                  | 4.54            |
| 1000  | 23.07 | 28.91     | 23.20                   | 10.53                    | 1.13      | 0.50  | 1000  | 38.85         | 22.54                  | 4.46            |
| 1200  | 22.29 | 28.63     | 22.33                   | 9.95                     | 1.15      | 0.47  | 1200  | 38.61         | 22.34                  | 4.48            |
| 1400  | 21.55 | 28.24     | 21.40                   | 9.50                     | 1.17      | 0.45  | 1400  | 38.23         | 22.32                  | 4.41            |
| 1600  | 20.83 | 27.91     | 20.66                   | 9.19                     | 1.19      | 0.42  | 1600  | 38.46         | 22.35                  | 4.56            |
| 1800  | 20.15 | 27.55     | 20.05                   | 8.94                     | 1.20      | 0.41  | 1800  | 38.81         | 22.23                  | 4.61            |
| 2000  | 19.54 | 27.22     | 19.26                   | 8.78                     | 1.22      | 0.39  | 2000  | 38.42         | 22.20                  | 4.43            |
| 2200  | 18.95 | 26.88     | 18.76                   | 8.79                     | 1.24      | 0.37  | 2200  | 38.04         | 22.15                  | 4.47            |
| 2400  | 18.42 | 26.59     | 18.25                   | 8.80                     | 1.26      | 0.36  | 2400  | 37.75         | 22.01                  | 4.54            |
| 2600  | 17.96 | 26.14     | 17.48                   | 8.80                     | 1.25      | 0.35  | 2600  | 37.35         | 21.92                  | 4.55            |
| 2800  | 17.46 | 26.04     | 17.50                   | 8.95                     | 1.30      | 0.34  | 2800  | 37.45         | 21.81                  | 4.49            |
| 3000  | 17.11 | 25.53     | 16.71                   | 8.89                     | 1.27      | 0.34  | 3000  | 37.51         | 21.68                  | 4.49            |
| 3200  | 16.74 | 25.28     | 16.46                   | 9.00                     | 1.28      | 0.33  | 3200  | 37.45         | 21.36                  | 4.58            |
| 3400  | 16.40 | 25.04     | 16.23                   | 9.10                     | 1.30      | 0.33  | 3400  | 37.50         | 21.07                  | 4.68            |
| 3600  | 16.09 | 24.77     | 16.07                   | 9.12                     | 1.30      | 0.32  | 3600  | 36.88         | 20.83                  | 4.76            |
| 3800  | 15.78 | 24.52     | 16.02                   | 9.15                     | 1.31      | 0.32  | 3800  | 35.94         | 20.37                  | 4.70            |
| 4000  | 15.55 | 24.40     | 15.90                   | 9.18                     | 1.32      | 0.32  | 4000  | 35.12         | 19.77                  | 4.76            |
| 4200  | 15.25 | 24.25     | 16.26                   | 9.10                     | 1.34      | 0.31  | 4200  | 35.13         | 19.34                  | 4.82            |
| 4400  | 14.97 | 24.16     | 16.41                   | 9.00                     | 1.36      | 0.31  | 4400  | 35.53         | 19.09                  | 4.87            |
| 4600  | 14.78 | 24.02     | 16.42                   | 8.83                     | 1.36      | 0.31  | 4600  | 34.96         | 18.73                  | 5.00            |
| 4800  | 14.51 | 23.90     | 16.54                   | 8.57                     | 1.38      | 0.31  | 4800  | 34.73         | 18.22                  | 5.11            |
| 5000  | 14.27 | 23.90     | 17.01                   | 8.37                     | 1.40      | 0.30  | 5000  | 34.34         | 17.76                  | 5.17            |
| 5200  | 14.04 | 23.93     | 16.97                   | 8.16                     | 1.43      | 0.29  | 5200  | 34.28         | 17.47                  | 5.14            |
| 5400  | 13.76 | 23.84     | 17.02                   | 7.86                     | 1.44      | 0.29  | 5400  | 33.80         | 17.24                  | 5.29            |
| 5600  | 13.52 | 23.85     | 17.75                   | 7.74                     | 1.48      | 0.29  | 5600  | 33.47         | 17.04                  | 5.30            |
| 6000  | 12.85 | 24.00     | 17.85                   | 7.39                     | 1.58      | 0.28  | 5800  | 33.13         | 16.56                  | 5.51            |
| 6500  | 11.79 | 24.11     | 17.07                   | 7.03                     | 1.77      | 0.27  | 6000  | 33.20         | 16.12                  | 5.42            |
| 7000  | 10.33 | 24.36     | 14.22                   | 6.76                     | 2.07      | 0.27  | 6200  | 33.51         | 15.56                  | 5.45            |
| 7500  | 8.63  | 24.34     | 11.20                   | 6.44                     | 2.37      | 0.28  | 6400  | 33.36         | 14.98                  | 5.48            |
| 8000  | 6.73  | 23.85     | 9.08                    | 6.15                     | 2.59      | 0.29  | 6600  | 32.53         | 14.79                  | 5.61            |
| 8500  | 4.85  | 22.94     | 7.77                    | 5.91                     | 2.69      | 0.31  | 6800  | 32.46         | 14.52                  | 5.72            |
| 9000  | 3.34  | 21.76     | 6.94                    | 5.66                     | 2.60      | 0.31  | 7000  | 33.32         | 14.46                  | 5.79            |
| 10000 | 1.07  | 18.53     | 6.75                    | 5.93                     | 2.28      | 0.28  | 7200  | 33.43         | 14.12                  | 5.78            |
| 12000 | -1.22 | 11.85     | 7.54                    | 7.16                     | 1.58      | 0.26  | 7500  | 32.64         | 13.50                  | 5.77            |
| 13000 | -1.69 | 7.78      | 9.23                    | 8.69                     | 1.27      | 0.33  | 8000  | 30.18         | 12.01                  | 6.34            |

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## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 100mA, Vd = 6.03V @Temperature = -45degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |       | FREQ  | IP3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|-------|-------|------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Delta | (MHz) | (dBm)      | (dBm)            | (dB)         |
| 50    | 25.81 | 29.75     | 25.09             | 16.07              | 1.07      | 0.63  | 50    | 37.88      | 21.80            | 3.65         |
| 100   | 25.78 | 29.62     | 24.31             | 16.12              | 1.07      | 0.63  | 100   | 37.67      | 21.91            | 3.81         |
| 200   | 25.64 | 29.74     | 23.99             | 15.98              | 1.08      | 0.61  | 200   | 37.77      | 21.65            | 3.80         |
| 400   | 25.22 | 29.48     | 25.86             | 13.79              | 1.08      | 0.60  | 400   | 37.69      | 21.85            | 3.87         |
| 600   | 24.61 | 29.32     | 24.36             | 12.60              | 1.09      | 0.57  | 600   | 37.56      | 21.54            | 3.85         |
| 800   | 23.93 | 29.02     | 23.39             | 11.57              | 1.10      | 0.54  | 800   | 38.00      | 21.57            | 3.98         |
| 1000  | 23.20 | 28.72     | 22.60             | 10.88              | 1.11      | 0.51  | 1000  | 38.36      | 21.56            | 3.90         |
| 1200  | 22.44 | 28.44     | 22.20             | 10.21              | 1.13      | 0.48  | 1200  | 38.39      | 21.15            | 3.91         |
| 1400  | 21.72 | 28.09     | 21.50             | 9.61               | 1.14      | 0.46  | 1400  | 38.26      | 21.16            | 3.82         |
| 1600  | 21.02 | 27.79     | 20.63             | 9.29               | 1.16      | 0.44  | 1600  | 38.68      | 21.27            | 3.98         |
| 1800  | 20.36 | 27.43     | 20.14             | 9.00               | 1.18      | 0.42  | 1800  | 39.96      | 21.19            | 4.04         |
| 2000  | 19.76 | 27.08     | 19.50             | 8.82               | 1.19      | 0.41  | 2000  | 40.16      | 21.27            | 3.80         |
| 2200  | 19.19 | 26.80     | 19.05             | 8.77               | 1.21      | 0.39  | 2200  | 40.22      | 21.50            | 3.82         |
| 2400  | 18.67 | 26.53     | 18.66             | 8.75               | 1.23      | 0.38  | 2400  | 40.36      | 21.59            | 3.92         |
| 2600  | 18.21 | 26.10     | 17.78             | 8.73               | 1.22      | 0.37  | 2600  | 39.93      | 21.50            | 3.88         |
| 2800  | 17.74 | 25.96     | 17.74             | 8.85               | 1.26      | 0.35  | 2800  | 40.07      | 21.41            | 3.85         |
| 3000  | 17.40 | 25.44     | 17.07             | 8.81               | 1.23      | 0.36  | 3000  | 40.53      | 21.34            | 3.80         |
| 3200  | 17.06 | 25.25     | 16.90             | 8.92               | 1.25      | 0.35  | 3200  | 40.68      | 21.24            | 3.91         |
| 3400  | 16.73 | 24.98     | 16.66             | 9.07               | 1.26      | 0.34  | 3400  | 40.90      | 21.14            | 3.96         |
| 3600  | 16.43 | 24.73     | 16.52             | 9.00               | 1.26      | 0.34  | 3600  | 39.77      | 21.06            | 4.01         |
| 3800  | 16.17 | 24.51     | 16.48             | 9.10               | 1.27      | 0.34  | 3800  | 38.27      | 20.75            | 3.96         |
| 4000  | 15.94 | 24.35     | 16.71             | 9.11               | 1.28      | 0.34  | 4000  | 36.92      | 20.28            | 4.02         |
| 4200  | 15.68 | 24.20     | 17.18             | 8.95               | 1.29      | 0.34  | 4200  | 37.85      | 19.92            | 4.07         |
| 4400  | 15.42 | 24.01     | 17.42             | 8.74               | 1.29      | 0.34  | 4400  | 38.86      | 19.59            | 4.08         |
| 4600  | 15.26 | 23.98     | 17.09             | 8.58               | 1.30      | 0.33  | 4600  | 37.94      | 19.28            | 4.26         |
| 4800  | 15.03 | 23.79     | 17.22             | 8.24               | 1.29      | 0.33  | 4800  | 37.78      | 18.88            | 4.28         |
| 5000  | 14.84 | 23.81     | 17.61             | 8.01               | 1.31      | 0.33  | 5000  | 37.09      | 18.47            | 4.32         |
| 5200  | 14.66 | 23.73     | 17.36             | 7.82               | 1.31      | 0.32  | 5200  | 37.47      | 18.07            | 4.30         |
| 5400  | 14.46 | 23.73     | 17.40             | 7.52               | 1.32      | 0.32  | 5400  | 37.24      | 17.80            | 4.43         |
| 5600  | 14.25 | 23.71     | 17.81             | 7.45               | 1.34      | 0.32  | 5600  | 36.27      | 17.64            | 4.39         |
| 6000  | 13.75 | 23.72     | 18.49             | 7.06               | 1.39      | 0.31  | 5800  | 36.45      | 17.32            | 4.61         |
| 6500  | 12.80 | 23.84     | 18.28             | 6.50               | 1.52      | 0.31  | 6000  | 36.22      | 16.93            | 4.49         |
| 7000  | 11.46 | 24.06     | 14.86             | 6.07               | 1.73      | 0.30  | 6200  | 36.27      | 16.15            | 4.51         |
| 7500  | 9.80  | 24.01     | 11.28             | 5.79               | 1.96      | 0.32  | 6400  | 37.27      | 15.35            | 4.53         |
| 8000  | 7.96  | 23.58     | 9.17              | 5.66               | 2.16      | 0.33  | 6600  | 36.34      | 15.02            | 4.61         |
| 8500  | 6.12  | 22.65     | 7.89              | 5.52               | 2.24      | 0.34  | 6800  | 35.42      | 14.89            | 4.70         |
| 9000  | 4.54  | 21.54     | 6.96              | 5.19               | 2.18      | 0.34  | 7000  | 37.18      | 14.77            | 4.79         |
| 10000 | 2.08  | 18.54     | 6.55              | 5.29               | 1.94      | 0.32  | 7200  | 36.90      | 14.21            | 4.76         |
| 12000 | -0.13 | 11.80     | 7.47              | 6.82               | 1.38      | 0.30  | 7500  | 34.77      | 13.81            | 4.71         |
| 13000 | -0.88 | 7.88      | 8.22              | 7.72               | 1.12      | 0.37  | 8000  | 32.29      | 12.76            | 5.32         |

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## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 80mA, Vd=6.01V @Temperature = -45degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | FREQ  | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (MHz) | (dBm)         | (dBm)                  | (dB)            |
| 50    | 25.59 | 28.77     | 21.83                   | 18.18                    | 1.04      | 0.68  | 50    | 33.93         | 19.08                  | 3.63            |
| 100   | 25.52 | 29.31     | 21.51                   | 18.21                    | 1.07      | 0.64  | 100   | 33.65         | 19.07                  | 3.71            |
| 200   | 25.38 | 29.22     | 21.34                   | 17.60                    | 1.07      | 0.63  | 200   | 33.73         | 18.88                  | 3.76            |
| 400   | 24.99 | 29.36     | 22.77                   | 14.85                    | 1.09      | 0.59  | 400   | 33.91         | 18.83                  | 3.88            |
| 600   | 24.40 | 28.96     | 22.19                   | 13.35                    | 1.08      | 0.57  | 600   | 34.04         | 18.91                  | 3.80            |
| 800   | 23.72 | 28.72     | 21.55                   | 12.01                    | 1.09      | 0.54  | 800   | 34.70         | 18.63                  | 3.91            |
| 1000  | 23.00 | 28.43     | 21.29                   | 11.14                    | 1.10      | 0.51  | 1000  | 35.08         | 18.83                  | 3.83            |
| 1200  | 22.28 | 28.12     | 20.87                   | 10.39                    | 1.12      | 0.49  | 1200  | 35.26         | 19.11                  | 3.83            |
| 1400  | 21.57 | 27.82     | 20.37                   | 9.80                     | 1.13      | 0.46  | 1400  | 35.33         | 19.39                  | 3.88            |
| 1600  | 20.87 | 27.51     | 19.81                   | 9.41                     | 1.15      | 0.44  | 1600  | 35.66         | 19.32                  | 3.88            |
| 1800  | 20.23 | 27.29     | 19.31                   | 9.13                     | 1.17      | 0.42  | 1800  | 36.63         | 19.14                  | 3.77            |
| 2000  | 19.65 | 26.87     | 18.62                   | 8.89                     | 1.17      | 0.41  | 2000  | 36.78         | 19.19                  | 3.74            |
| 2200  | 19.08 | 26.63     | 18.37                   | 8.79                     | 1.20      | 0.39  | 2200  | 37.15         | 19.26                  | 3.77            |
| 2400  | 18.57 | 26.26     | 17.87                   | 8.72                     | 1.20      | 0.38  | 2400  | 37.50         | 19.29                  | 3.78            |
| 2600  | 18.10 | 26.09     | 17.41                   | 8.81                     | 1.23      | 0.36  | 2600  | 37.85         | 19.46                  | 3.78            |
| 2800  | 17.70 | 25.73     | 17.02                   | 8.81                     | 1.23      | 0.36  | 2800  | 37.80         | 19.12                  | 3.75            |
| 3000  | 17.35 | 25.32     | 16.48                   | 8.78                     | 1.21      | 0.35  | 3000  | 38.13         | 18.78                  | 3.80            |
| 3200  | 17.02 | 25.08     | 16.42                   | 8.97                     | 1.23      | 0.35  | 3200  | 38.32         | 18.68                  | 3.73            |
| 3400  | 16.70 | 24.89     | 16.09                   | 8.92                     | 1.24      | 0.34  | 3400  | 38.28         | 18.46                  | 3.87            |
| 3600  | 16.43 | 24.57     | 15.73                   | 9.07                     | 1.24      | 0.34  | 3600  | 38.09         | 18.14                  | 3.86            |
| 3800  | 16.14 | 24.41     | 15.57                   | 9.22                     | 1.25      | 0.34  | 3800  | 36.82         | 17.75                  | 3.97            |
| 4000  | 15.89 | 24.25     | 15.43                   | 9.16                     | 1.26      | 0.33  | 4000  | 35.78         | 17.41                  | 3.91            |
| 4200  | 15.63 | 23.99     | 15.36                   | 8.97                     | 1.25      | 0.34  | 4200  | 35.71         | 17.15                  | 4.10            |
| 4400  | 15.34 | 23.87     | 15.42                   | 8.70                     | 1.26      | 0.33  | 4400  | 36.18         | 16.84                  | 3.96            |
| 4600  | 15.12 | 23.81     | 15.89                   | 8.46                     | 1.28      | 0.33  | 4600  | 35.75         | 16.66                  | 4.11            |
| 4800  | 14.84 | 23.68     | 16.11                   | 8.25                     | 1.29      | 0.33  | 4800  | 35.61         | 16.43                  | 4.05            |
| 5000  | 14.66 | 23.68     | 16.21                   | 7.97                     | 1.30      | 0.32  | 5000  | 35.10         | 15.90                  | 4.22            |
| 5200  | 14.43 | 23.76     | 16.77                   | 7.79                     | 1.33      | 0.31  | 5200  | 34.79         | 14.48                  | 4.21            |
| 5400  | 14.22 | 23.76     | 17.26                   | 7.60                     | 1.35      | 0.31  | 5400  | 34.92         | 14.06                  | 4.35            |
| 5600  | 14.03 | 23.66     | 18.75                   | 7.42                     | 1.37      | 0.31  | 5600  | 33.92         | 14.40                  | 4.38            |
| 6000  | 13.52 | 23.76     | 18.43                   | 7.15                     | 1.44      | 0.31  | 5800  | 33.41         | 14.32                  | 4.44            |
| 6500  | 12.81 | 23.64     | 17.91                   | 6.97                     | 1.54      | 0.32  | 6000  | 33.70         | 14.27                  | 4.45            |
| 7000  | 11.51 | 24.38     | 14.00                   | 6.23                     | 1.80      | 0.31  | 6200  | 33.47         | 14.39                  | 4.46            |
| 7500  | 9.63  | 23.23     | 12.07                   | 6.30                     | 1.93      | 0.32  | 6400  | 33.87         | 14.43                  | 4.48            |
| 8000  | 7.85  | 23.13     | 9.35                    | 5.87                     | 2.12      | 0.32  | 6600  | 33.44         | 14.42                  | 4.53            |
| 8500  | 5.90  | 22.48     | 8.10                    | 5.83                     | 2.34      | 0.33  | 6800  | 32.86         | 14.33                  | 4.69            |
| 9000  | 4.38  | 21.64     | 6.92                    | 5.52                     | 2.31      | 0.34  | 7000  | 32.71         | 14.24                  | 4.84            |
| 10000 | 1.97  | 18.63     | 6.52                    | 5.69                     | 2.06      | 0.31  | 7200  | 32.52         | 13.83                  | 4.88            |
| 12000 | -0.22 | 11.80     | 7.20                    | 7.19                     | 1.41      | 0.30  | 7500  | 32.70         | 13.02                  | 4.93            |
| 13000 | -1.11 | 8.12      | 8.16                    | 7.57                     | 1.13      | 0.33  | 8000  | 31.21         | 12.90                  | 5.61            |

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## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 120mA, Vd = 6.09V @Temperature = -45degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | FREQ  | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (MHz) | (dBm)         | (dBm)                  | (dB)            |
| 50    | 25.96 | 29.97     | 27.92                   | 15.12                    | 1.08      | 0.62  | 50    | 40.80         | 23.04                  | 3.70            |
| 100   | 25.93 | 29.97     | 26.63                   | 15.07                    | 1.08      | 0.62  | 100   | 40.64         | 23.13                  | 3.85            |
| 200   | 25.79 | 29.80     | 26.29                   | 15.08                    | 1.07      | 0.62  | 200   | 40.60         | 22.97                  | 3.85            |
| 400   | 25.35 | 29.73     | 28.00                   | 13.20                    | 1.08      | 0.60  | 400   | 40.17         | 23.10                  | 3.92            |
| 600   | 24.74 | 29.49     | 25.89                   | 12.20                    | 1.09      | 0.57  | 600   | 39.64         | 22.88                  | 3.89            |
| 800   | 24.04 | 29.25     | 24.57                   | 11.25                    | 1.10      | 0.54  | 800   | 39.71         | 22.89                  | 4.03            |
| 1000  | 23.30 | 28.89     | 23.57                   | 10.65                    | 1.11      | 0.51  | 1000  | 39.92         | 22.91                  | 3.95            |
| 1200  | 22.54 | 28.62     | 23.03                   | 10.04                    | 1.14      | 0.48  | 1200  | 39.99         | 22.67                  | 3.96            |
| 1400  | 21.81 | 28.26     | 22.13                   | 9.48                     | 1.15      | 0.46  | 1400  | 39.89         | 22.64                  | 3.88            |
| 1600  | 21.10 | 27.89     | 21.23                   | 9.19                     | 1.17      | 0.44  | 1600  | 40.37         | 22.69                  | 4.02            |
| 1800  | 20.43 | 27.60     | 20.72                   | 8.92                     | 1.19      | 0.42  | 1800  | 41.71         | 22.63                  | 4.09            |
| 2000  | 19.84 | 27.19     | 20.02                   | 8.76                     | 1.20      | 0.41  | 2000  | 41.63         | 22.69                  | 3.88            |
| 2200  | 19.26 | 26.86     | 19.57                   | 8.71                     | 1.21      | 0.40  | 2200  | 41.46         | 22.74                  | 3.91            |
| 2400  | 18.73 | 26.56     | 19.17                   | 8.68                     | 1.23      | 0.38  | 2400  | 41.37         | 22.63                  | 3.98            |
| 2600  | 18.28 | 26.18     | 18.26                   | 8.67                     | 1.23      | 0.37  | 2600  | 40.85         | 22.54                  | 3.97            |
| 2800  | 17.81 | 26.02     | 18.25                   | 8.78                     | 1.26      | 0.36  | 2800  | 40.93         | 22.58                  | 3.95            |
| 3000  | 17.47 | 25.58     | 17.56                   | 8.76                     | 1.24      | 0.36  | 3000  | 41.69         | 22.41                  | 3.90            |
| 3200  | 17.12 | 25.25     | 17.38                   | 8.87                     | 1.24      | 0.35  | 3200  | 41.31         | 22.15                  | 3.99            |
| 3400  | 16.80 | 25.02     | 17.17                   | 9.01                     | 1.26      | 0.35  | 3400  | 41.45         | 21.95                  | 4.03            |
| 3600  | 16.50 | 24.77     | 17.02                   | 8.94                     | 1.26      | 0.34  | 3600  | 40.79         | 21.84                  | 4.09            |
| 3800  | 16.24 | 24.52     | 16.98                   | 9.03                     | 1.26      | 0.34  | 3800  | 38.88         | 21.49                  | 4.03            |
| 4000  | 16.01 | 24.41     | 17.17                   | 9.04                     | 1.28      | 0.34  | 4000  | 38.04         | 20.93                  | 4.11            |
| 4200  | 15.76 | 24.23     | 17.67                   | 8.86                     | 1.28      | 0.34  | 4200  | 39.16         | 20.50                  | 4.16            |
| 4400  | 15.50 | 24.01     | 17.91                   | 8.63                     | 1.28      | 0.34  | 4400  | 40.97         | 20.19                  | 4.18            |
| 4600  | 15.34 | 23.92     | 17.56                   | 8.45                     | 1.28      | 0.34  | 4600  | 39.81         | 19.88                  | 4.33            |
| 4800  | 15.11 | 23.80     | 17.72                   | 8.12                     | 1.28      | 0.34  | 4800  | 40.16         | 19.47                  | 4.36            |
| 5000  | 14.94 | 23.81     | 18.13                   | 7.88                     | 1.30      | 0.33  | 5000  | 39.78         | 19.01                  | 4.41            |
| 5200  | 14.76 | 23.77     | 17.85                   | 7.67                     | 1.30      | 0.33  | 5200  | 39.55         | 18.62                  | 4.38            |
| 5400  | 14.58 | 23.70     | 17.90                   | 7.36                     | 1.30      | 0.33  | 5400  | 39.96         | 18.38                  | 4.53            |
| 5600  | 14.37 | 23.72     | 18.32                   | 7.28                     | 1.32      | 0.32  | 5600  | 38.58         | 18.26                  | 4.49            |
| 6000  | 13.89 | 23.68     | 18.99                   | 6.85                     | 1.36      | 0.32  | 5800  | 39.22         | 17.89                  | 4.73            |
| 6500  | 12.97 | 23.76     | 18.73                   | 6.27                     | 1.47      | 0.31  | 6000  | 39.92         | 17.47                  | 4.62            |
| 7000  | 11.65 | 23.95     | 15.05                   | 5.83                     | 1.66      | 0.32  | 6200  | 40.97         | 16.87                  | 4.66            |
| 7500  | 9.99  | 23.94     | 11.35                   | 5.56                     | 1.88      | 0.33  | 6400  | 42.99         | 16.08                  | 4.68            |
| 8000  | 8.15  | 23.57     | 9.24                    | 5.43                     | 2.09      | 0.34  | 6600  | 39.61         | 15.49                  | 4.79            |
| 8500  | 6.30  | 22.62     | 7.93                    | 5.32                     | 2.17      | 0.34  | 6800  | 39.90         | 15.36                  | 4.85            |
| 9000  | 4.70  | 21.49     | 6.99                    | 5.02                     | 2.11      | 0.35  | 7000  | 43.22         | 15.26                  | 4.92            |
| 10000 | 2.24  | 18.48     | 6.58                    | 5.13                     | 1.88      | 0.32  | 7200  | 39.15         | 14.82                  | 4.89            |
| 12000 | 0.00  | 11.74     | 7.54                    | 6.72                     | 1.36      | 0.30  | 7500  | 35.85         | 14.27                  | 4.87            |
| 13000 | -0.76 | 7.83      | 8.28                    | 7.63                     | 1.10      | 0.38  | 8000  | 32.59         | 13.25                  | 5.49            |

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## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 100mA, Vd = 5.56V @Temperature = +85degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | FREQ  | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (MHz) | (dBm)         | (dBm)                  | (dB)            |
| 50    | 25.54 | 29.58     | 25.38                   | 16.87                    | 1.08      | 0.62  | 50    | 37.33         | 21.73                  | 4.43            |
| 100   | 25.50 | 29.41     | 25.77                   | 16.32                    | 1.07      | 0.63  | 100   | 37.35         | 21.81                  | 4.59            |
| 200   | 25.35 | 29.33     | 27.16                   | 15.52                    | 1.08      | 0.62  | 200   | 37.59         | 21.65                  | 4.60            |
| 400   | 24.89 | 29.44     | 24.27                   | 14.33                    | 1.09      | 0.58  | 400   | 36.96         | 21.71                  | 4.71            |
| 600   | 24.25 | 29.12     | 23.07                   | 12.94                    | 1.10      | 0.56  | 600   | 36.51         | 21.39                  | 4.71            |
| 800   | 23.52 | 28.90     | 22.14                   | 11.75                    | 1.11      | 0.52  | 800   | 36.72         | 21.36                  | 4.88            |
| 1000  | 22.75 | 28.61     | 21.22                   | 10.95                    | 1.13      | 0.49  | 1000  | 36.70         | 21.40                  | 4.82            |
| 1200  | 21.96 | 28.31     | 20.60                   | 10.29                    | 1.15      | 0.46  | 1200  | 36.39         | 21.00                  | 4.84            |
| 1400  | 21.22 | 27.98     | 19.90                   | 9.75                     | 1.17      | 0.43  | 1400  | 35.91         | 21.03                  | 4.79            |
| 1600  | 20.49 | 27.64     | 19.26                   | 9.37                     | 1.19      | 0.41  | 1600  | 36.09         | 21.06                  | 4.92            |
| 1800  | 19.80 | 27.38     | 18.67                   | 9.11                     | 1.21      | 0.39  | 1800  | 36.24         | 20.98                  | 4.99            |
| 2000  | 19.17 | 26.99     | 17.97                   | 8.93                     | 1.22      | 0.37  | 2000  | 35.92         | 20.96                  | 4.80            |
| 2200  | 18.57 | 26.77     | 17.43                   | 8.91                     | 1.26      | 0.35  | 2200  | 35.42         | 20.98                  | 4.89            |
| 2400  | 18.04 | 26.40     | 16.97                   | 8.93                     | 1.27      | 0.34  | 2400  | 35.24         | 20.90                  | 4.98            |
| 2600  | 17.56 | 26.08     | 16.27                   | 8.93                     | 1.28      | 0.33  | 2600  | 34.65         | 20.81                  | 4.97            |
| 2800  | 17.05 | 25.88     | 16.21                   | 9.09                     | 1.32      | 0.32  | 2800  | 34.65         | 20.64                  | 4.92            |
| 3000  | 16.67 | 25.47     | 15.59                   | 9.05                     | 1.30      | 0.32  | 3000  | 34.51         | 20.41                  | 4.93            |
| 3200  | 16.28 | 25.28     | 15.34                   | 9.18                     | 1.33      | 0.31  | 3200  | 34.19         | 20.08                  | 5.01            |
| 3400  | 15.92 | 25.04     | 15.05                   | 9.34                     | 1.35      | 0.30  | 3400  | 33.98         | 19.79                  | 5.11            |
| 3600  | 15.58 | 24.82     | 14.82                   | 9.45                     | 1.36      | 0.29  | 3600  | 33.51         | 19.50                  | 5.21            |
| 3800  | 15.25 | 24.58     | 14.81                   | 9.58                     | 1.38      | 0.29  | 3800  | 32.65         | 19.03                  | 5.14            |
| 4000  | 14.98 | 24.42     | 14.71                   | 9.67                     | 1.39      | 0.29  | 4000  | 32.13         | 18.40                  | 5.22            |
| 4200  | 14.67 | 24.31     | 15.02                   | 9.67                     | 1.43      | 0.28  | 4200  | 31.94         | 18.01                  | 5.26            |
| 4400  | 14.36 | 24.24     | 15.17                   | 9.62                     | 1.46      | 0.28  | 4400  | 31.76         | 17.78                  | 5.31            |
| 4600  | 14.11 | 24.11     | 15.20                   | 9.46                     | 1.48      | 0.28  | 4600  | 31.27         | 17.37                  | 5.48            |
| 4800  | 13.80 | 24.07     | 15.30                   | 9.21                     | 1.51      | 0.27  | 4800  | 30.95         | 16.84                  | 5.61            |
| 5000  | 13.51 | 24.08     | 15.72                   | 9.04                     | 1.56      | 0.27  | 5000  | 30.70         | 16.42                  | 5.64            |
| 5200  | 13.20 | 24.16     | 15.59                   | 8.86                     | 1.61      | 0.26  | 5200  | 30.48         | 16.14                  | 5.64            |
| 5400  | 12.87 | 24.09     | 15.73                   | 8.62                     | 1.64      | 0.26  | 5400  | 29.92         | 15.88                  | 5.75            |
| 5600  | 12.55 | 24.16     | 16.26                   | 8.56                     | 1.71      | 0.25  | 5600  | 29.61         | 15.61                  | 5.80            |
| 6000  | 11.75 | 24.33     | 16.65                   | 8.35                     | 1.89      | 0.24  | 5800  | 29.44         | 15.12                  | 6.04            |
| 6500  | 10.56 | 24.50     | 16.19                   | 8.18                     | 2.18      | 0.23  | 6000  | 29.38         | 14.72                  | 5.99            |
| 7000  | 9.05  | 24.71     | 13.75                   | 7.98                     | 2.58      | 0.23  | 6200  | 29.32         | 14.23                  | 6.00            |
| 7500  | 7.33  | 24.67     | 11.10                   | 7.61                     | 2.96      | 0.24  | 6400  | 29.21         | 13.85                  | 6.02            |
| 8000  | 5.44  | 24.13     | 8.98                    | 7.08                     | 3.19      | 0.26  | 6600  | 29.00         | 13.52                  | 6.12            |
| 8500  | 3.58  | 23.25     | 7.60                    | 6.58                     | 3.28      | 0.27  | 6800  | 28.85         | 13.43                  | 6.23            |
| 9000  | 2.11  | 22.01     | 6.82                    | 6.24                     | 3.13      | 0.28  | 7000  | 28.62         | 13.32                  | 6.36            |
| 10000 | 0.04  | 18.65     | 6.78                    | 6.63                     | 2.69      | 0.24  | 7200  | 28.77         | 12.95                  | 6.35            |
| 12000 | -2.32 | 12.04     | 7.50                    | 7.45                     | 1.83      | 0.24  | 7500  | 28.03         | 12.56                  | 6.34            |
| 13000 | -2.60 | 7.89      | 9.53                    | 9.21                     | 1.42      | 0.29  | 8000  | 26.61         | 11.02                  | 6.87            |

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## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 80mA, Vd=5.54V @Temperature = +85degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | FREQ  | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (MHz) | (dBm)         | (dBm)                  | (dB)            |
| 50    | 25.27 | 29.19     | 21.34                   | 19.43                    | 1.08      | 0.63  | 50    | 33.74         | 19.42                  | 4.46            |
| 100   | 25.19 | 29.34     | 22.03                   | 18.68                    | 1.09      | 0.61  | 100   | 33.65         | 19.53                  | 4.57            |
| 200   | 25.04 | 28.96     | 22.85                   | 17.40                    | 1.08      | 0.63  | 200   | 33.82         | 19.42                  | 4.58            |
| 400   | 24.60 | 28.96     | 21.39                   | 15.50                    | 1.09      | 0.59  | 400   | 33.56         | 19.10                  | 4.76            |
| 600   | 23.98 | 28.81     | 20.71                   | 13.72                    | 1.10      | 0.55  | 600   | 33.52         | 19.16                  | 4.71            |
| 800   | 23.27 | 28.46     | 20.24                   | 12.25                    | 1.10      | 0.53  | 800   | 34.04         | 18.88                  | 4.83            |
| 1000  | 22.53 | 28.27     | 19.77                   | 11.30                    | 1.12      | 0.49  | 1000  | 34.30         | 18.97                  | 4.78            |
| 1200  | 21.78 | 28.02     | 19.45                   | 10.51                    | 1.14      | 0.46  | 1200  | 34.25         | 19.20                  | 4.80            |
| 1400  | 21.04 | 27.65     | 18.90                   | 9.92                     | 1.15      | 0.44  | 1400  | 33.98         | 19.31                  | 4.87            |
| 1600  | 20.32 | 27.42     | 18.48                   | 9.51                     | 1.18      | 0.41  | 1600  | 34.26         | 19.19                  | 4.89            |
| 1800  | 19.66 | 27.11     | 17.82                   | 9.22                     | 1.20      | 0.39  | 1800  | 34.73         | 18.94                  | 4.77            |
| 2000  | 19.06 | 26.84     | 17.18                   | 9.00                     | 1.21      | 0.37  | 2000  | 34.43         | 18.88                  | 4.74            |
| 2200  | 18.47 | 26.53     | 16.65                   | 8.97                     | 1.23      | 0.35  | 2200  | 34.32         | 18.77                  | 4.81            |
| 2400  | 17.94 | 26.22     | 16.07                   | 8.94                     | 1.25      | 0.34  | 2400  | 34.01         | 18.65                  | 4.85            |
| 2600  | 17.47 | 25.90     | 15.53                   | 9.03                     | 1.26      | 0.33  | 2600  | 33.81         | 18.40                  | 4.87            |
| 2800  | 17.01 | 25.69     | 15.20                   | 9.05                     | 1.28      | 0.32  | 2800  | 33.62         | 18.00                  | 4.87            |
| 3000  | 16.61 | 25.34     | 14.71                   | 9.04                     | 1.28      | 0.31  | 3000  | 33.54         | 17.44                  | 4.91            |
| 3200  | 16.22 | 25.15     | 14.50                   | 9.24                     | 1.31      | 0.30  | 3200  | 33.22         | 17.19                  | 4.86            |
| 3400  | 15.88 | 24.90     | 14.26                   | 9.32                     | 1.32      | 0.30  | 3400  | 33.00         | 16.94                  | 5.03            |
| 3600  | 15.54 | 24.66     | 14.20                   | 9.46                     | 1.34      | 0.29  | 3600  | 32.56         | 16.57                  | 5.09            |
| 3800  | 15.22 | 24.54     | 14.15                   | 9.63                     | 1.37      | 0.29  | 3800  | 31.76         | 15.99                  | 5.20            |
| 4000  | 14.93 | 24.37     | 14.07                   | 9.72                     | 1.39      | 0.28  | 4000  | 31.26         | 15.57                  | 5.14            |
| 4200  | 14.60 | 24.16     | 14.21                   | 9.70                     | 1.41      | 0.28  | 4200  | 31.00         | 15.34                  | 5.34            |
| 4400  | 14.29 | 24.05     | 14.42                   | 9.63                     | 1.44      | 0.28  | 4400  | 30.88         | 15.07                  | 5.24            |
| 4600  | 13.97 | 24.01     | 14.65                   | 9.48                     | 1.48      | 0.28  | 4600  | 30.43         | 14.83                  | 5.42            |
| 4800  | 13.64 | 23.94     | 14.74                   | 9.29                     | 1.51      | 0.27  | 4800  | 30.20         | 14.57                  | 5.42            |
| 5000  | 13.35 | 24.02     | 14.78                   | 9.12                     | 1.56      | 0.26  | 5000  | 29.98         | 13.99                  | 5.60            |
| 5200  | 13.02 | 24.10     | 14.88                   | 8.93                     | 1.62      | 0.26  | 5200  | 29.64         | 12.64                  | 5.58            |
| 5400  | 12.70 | 24.17     | 15.18                   | 8.83                     | 1.69      | 0.25  | 5400  | 29.29         | 12.46                  | 5.73            |
| 5600  | 12.37 | 24.28     | 15.64                   | 8.78                     | 1.77      | 0.24  | 5600  | 28.87         | 12.90                  | 5.82            |
| 6000  | 11.60 | 24.47     | 16.06                   | 8.51                     | 1.95      | 0.23  | 5800  | 28.72         | 12.88                  | 5.87            |
| 6500  | 10.50 | 24.56     | 16.69                   | 8.57                     | 2.24      | 0.22  | 6000  | 28.55         | 12.85                  | 5.98            |
| 7000  | 9.08  | 25.20     | 13.61                   | 8.21                     | 2.73      | 0.22  | 6200  | 28.54         | 12.96                  | 6.01            |
| 7500  | 7.23  | 24.34     | 11.21                   | 8.12                     | 2.96      | 0.24  | 6400  | 28.22         | 13.01                  | 6.04            |
| 8000  | 5.42  | 24.12     | 8.89                    | 7.41                     | 3.24      | 0.25  | 6600  | 28.06         | 13.02                  | 6.15            |
| 8500  | 3.55  | 23.17     | 7.85                    | 6.87                     | 3.35      | 0.26  | 6800  | 27.75         | 12.98                  | 6.28            |
| 9000  | 1.94  | 22.14     | 7.24                    | 6.58                     | 3.40      | 0.27  | 7000  | 27.71         | 12.92                  | 6.41            |
| 10000 | -0.16 | 18.75     | 7.04                    | 7.01                     | 2.90      | 0.24  | 7200  | 27.19         | 12.45                  | 6.49            |
| 12000 | -2.30 | 11.93     | 7.67                    | 7.59                     | 1.83      | 0.23  | 7500  | 27.63         | 11.64                  | 6.58            |
| 13000 | -2.79 | 8.08      | 9.78                    | 8.88                     | 1.46      | 0.27  | 8000  | 26.29         | 10.57                  | 7.20            |

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## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Icc = 120mA, Vd = 5.62V @Temperature = +85degC

| FREQ  | Gain  | Isolation | Input Return Loss | Output Return Loss | Stability |       | FREQ  | IP3 Output | 1dB Comp. Output | Noise Figure |
|-------|-------|-----------|-------------------|--------------------|-----------|-------|-------|------------|------------------|--------------|
| (MHz) | (dB)  | (dB)      | (dB)              | (dB)               | K         | Delta | (MHz) | (dBm)      | (dBm)            | (dB)         |
| 50    | 25.72 | 29.34     | 28.39             | 15.50              | 1.06      | 0.65  | 50    | 39.92      | 22.57            | 4.52         |
| 100   | 25.68 | 29.56     | 29.19             | 15.09              | 1.07      | 0.63  | 100   | 40.11      | 22.64            | 4.73         |
| 200   | 25.52 | 29.65     | 31.19             | 14.43              | 1.08      | 0.62  | 200   | 40.20      | 22.47            | 4.69         |
| 400   | 25.04 | 29.61     | 26.51             | 13.60              | 1.09      | 0.58  | 400   | 39.15      | 22.55            | 4.80         |
| 600   | 24.39 | 29.30     | 24.73             | 12.45              | 1.10      | 0.56  | 600   | 38.17      | 22.20            | 4.80         |
| 800   | 23.65 | 29.16     | 23.41             | 11.42              | 1.12      | 0.51  | 800   | 37.80      | 22.20            | 5.00         |
| 1000  | 22.86 | 28.85     | 22.26             | 10.70              | 1.14      | 0.48  | 1000  | 37.54      | 22.25            | 4.90         |
| 1200  | 22.07 | 28.46     | 21.50             | 10.10              | 1.16      | 0.46  | 1200  | 37.14      | 22.03            | 4.95         |
| 1400  | 21.31 | 28.16     | 20.66             | 9.61               | 1.18      | 0.43  | 1400  | 36.63      | 21.99            | 4.89         |
| 1600  | 20.57 | 27.82     | 19.96             | 9.27               | 1.20      | 0.41  | 1600  | 36.69      | 21.98            | 5.03         |
| 1800  | 19.88 | 27.52     | 19.35             | 9.03               | 1.22      | 0.39  | 1800  | 36.61      | 21.83            | 5.12         |
| 2000  | 19.25 | 27.15     | 18.57             | 8.85               | 1.24      | 0.37  | 2000  | 36.25      | 21.78            | 4.93         |
| 2200  | 18.65 | 26.83     | 17.98             | 8.86               | 1.26      | 0.36  | 2200  | 35.77      | 21.64            | 5.00         |
| 2400  | 18.11 | 26.52     | 17.47             | 8.88               | 1.28      | 0.34  | 2400  | 35.50      | 21.50            | 5.09         |
| 2600  | 17.63 | 26.15     | 16.76             | 8.87               | 1.28      | 0.34  | 2600  | 34.94      | 21.40            | 5.10         |
| 2800  | 17.12 | 25.97     | 16.70             | 9.04               | 1.33      | 0.32  | 2800  | 34.77      | 21.26            | 5.09         |
| 3000  | 16.74 | 25.55     | 16.02             | 9.00               | 1.31      | 0.32  | 3000  | 34.72      | 21.05            | 5.06         |
| 3200  | 16.34 | 25.36     | 15.76             | 9.12               | 1.34      | 0.31  | 3200  | 34.39      | 20.66            | 5.17         |
| 3400  | 15.99 | 25.10     | 15.49             | 9.25               | 1.35      | 0.30  | 3400  | 34.27      | 20.33            | 5.24         |
| 3600  | 15.65 | 24.81     | 15.24             | 9.38               | 1.36      | 0.30  | 3600  | 33.63      | 20.03            | 5.35         |
| 3800  | 15.33 | 24.62     | 15.21             | 9.47               | 1.38      | 0.30  | 3800  | 32.92      | 19.57            | 5.33         |
| 4000  | 15.07 | 24.41     | 15.08             | 9.53               | 1.38      | 0.29  | 4000  | 32.28      | 18.92            | 5.40         |
| 4200  | 14.74 | 24.29     | 15.41             | 9.52               | 1.42      | 0.29  | 4200  | 32.07      | 18.50            | 5.44         |
| 4400  | 14.45 | 24.24     | 15.54             | 9.45               | 1.45      | 0.29  | 4400  | 31.92      | 18.27            | 5.48         |
| 4600  | 14.20 | 24.13     | 15.57             | 9.28               | 1.47      | 0.28  | 4600  | 31.49      | 17.88            | 5.64         |
| 4800  | 13.89 | 24.01     | 15.67             | 9.03               | 1.49      | 0.28  | 4800  | 31.14      | 17.35            | 5.80         |
| 5000  | 13.62 | 24.06     | 16.05             | 8.85               | 1.53      | 0.27  | 5000  | 30.90      | 16.93            | 5.80         |
| 5200  | 13.32 | 24.12     | 15.92             | 8.64               | 1.57      | 0.27  | 5200  | 30.60      | 16.59            | 5.82         |
| 5400  | 12.99 | 24.05     | 16.03             | 8.39               | 1.61      | 0.26  | 5400  | 29.96      | 16.42            | 5.97         |
| 5600  | 12.67 | 24.11     | 16.57             | 8.31               | 1.67      | 0.26  | 5600  | 29.74      | 16.17            | 6.02         |
| 6000  | 11.90 | 24.27     | 16.95             | 8.09               | 1.84      | 0.24  | 5800  | 29.52      | 14.82            | 6.23         |
| 6500  | 10.71 | 24.47     | 16.40             | 7.88               | 2.12      | 0.24  | 6000  | 29.29      | 15.24            | 6.19         |
| 7000  | 9.21  | 24.66     | 13.85             | 7.68               | 2.50      | 0.23  | 6200  | 29.47      | 14.85            | 6.21         |
| 7500  | 7.48  | 24.62     | 11.15             | 7.33               | 2.87      | 0.24  | 6400  | 28.95      | 14.52            | 6.23         |
| 8000  | 5.58  | 24.09     | 9.00              | 6.84               | 3.10      | 0.26  | 6600  | 28.93      | 13.89            | 6.32         |
| 8500  | 3.71  | 23.24     | 7.62              | 6.37               | 3.20      | 0.28  | 6800  | 28.60      | 13.81            | 6.48         |
| 9000  | 2.22  | 21.95     | 6.84              | 6.07               | 3.04      | 0.29  | 7000  | 28.57      | 13.74            | 6.63         |
| 10000 | 0.15  | 18.60     | 6.81              | 6.47               | 2.62      | 0.25  | 7200  | 28.61      | 13.38            | 6.62         |
| 12000 | -2.23 | 11.96     | 7.53              | 7.36               | 1.79      | 0.24  | 7500  | 27.67      | 12.94            | 6.63         |
| 13000 | -2.52 | 7.85      | 9.56              | 9.15               | 1.41      | 0.29  | 8000  | 27.18      | 11.34            | 7.17         |

REV. X1

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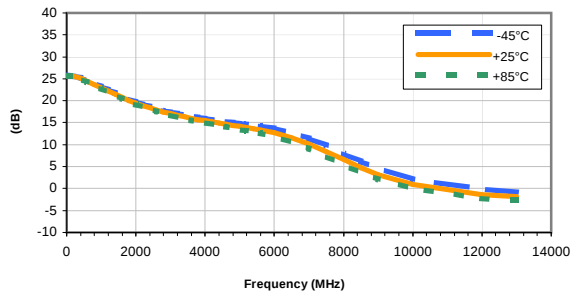
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## Typical Performance Curves

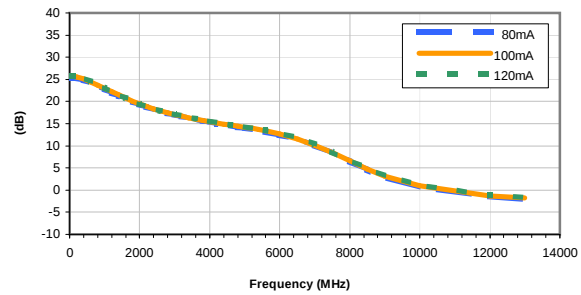
**GAIN vs. TEMPERATURE**

INPUT POWER = -25dBm, CURRENT = 100mA



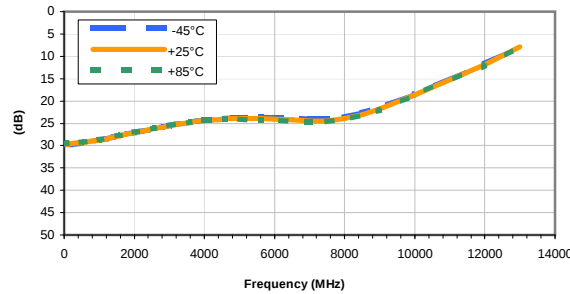
**GAIN vs. CURRENT**

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



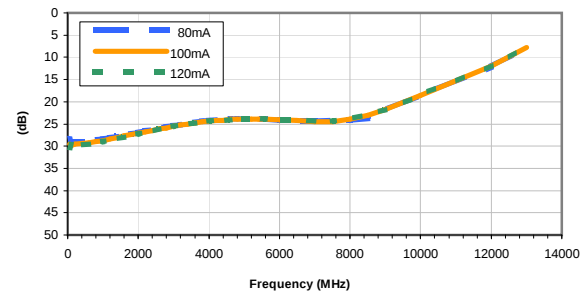
**ISOLATION vs. TEMPERATURE**

INPUT POWER = -25dBm, CURRENT = 100mA



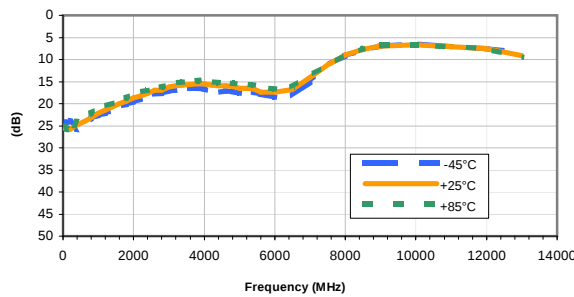
**ISOLATION vs. CURRENT**

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



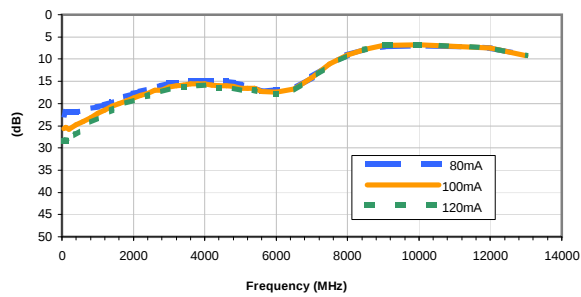
**INPUT RETURN LOSS vs. TEMPERATURE**

INPUT POWER = -25dBm, CURRENT = 100mA



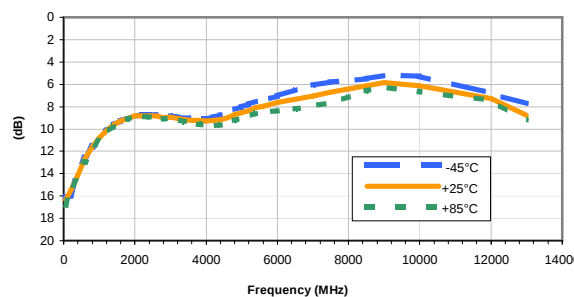
**INPUT RETURN LOSS vs. CURRENT**

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



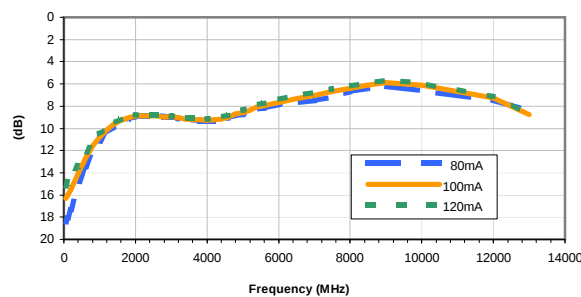
**OUTPUT RETURN LOSS vs. TEMPERATURE**

INPUT POWER = -25dBm, CURRENT = 100mA



**OUTPUT RETURN LOSS vs. CURRENT**

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



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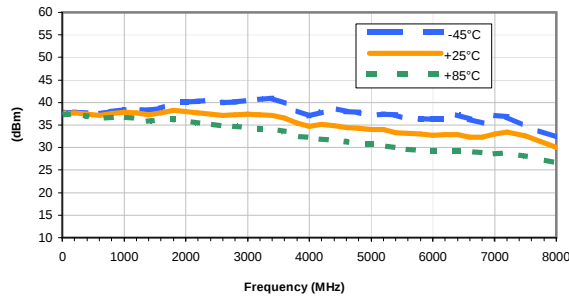
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## Typical Performance Curves

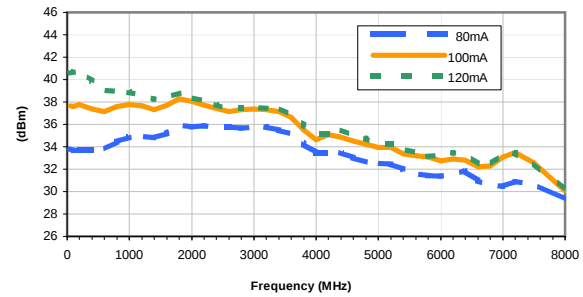
OUTPUT IP3 vs. TEMPERATURE

INPUT POWER = -25dBm, CURRENT = 100mA



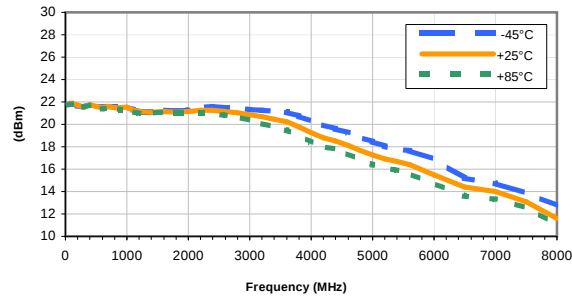
OUTPUT IP3 vs. CURRENT

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



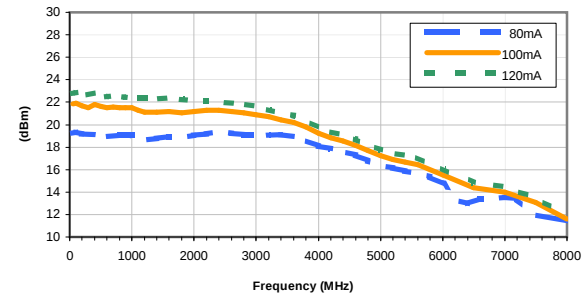
OUTPUT POWER at 1dB Compression vs. TEMPERATURE

CURRENT = 100mA



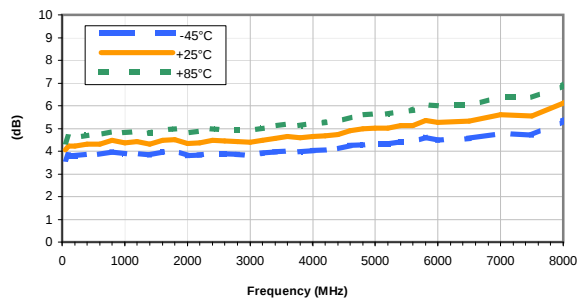
OUTPUT POWER at 1dB Compression vs. CURRENT

Temperature = +25°C



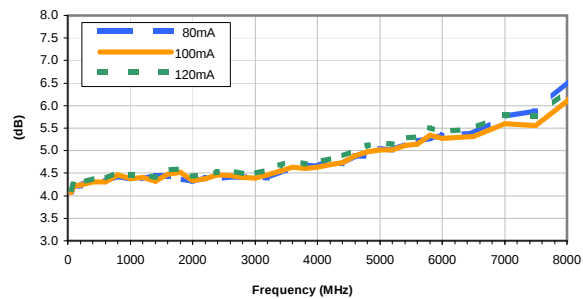
Noise Figure vs. TEMPERATURE

CURRENT = 100mA



Noise Figure vs. CURRENT

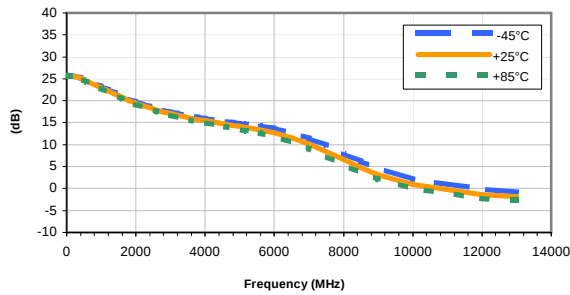
Temperature = +25°C



## Typical Performance Curves

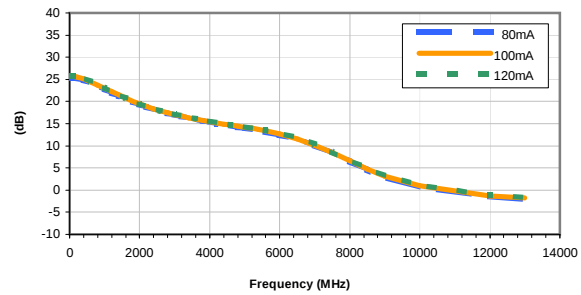
**GAIN vs. TEMPERATURE**

INPUT POWER = -25dBm, CURRENT = 100mA



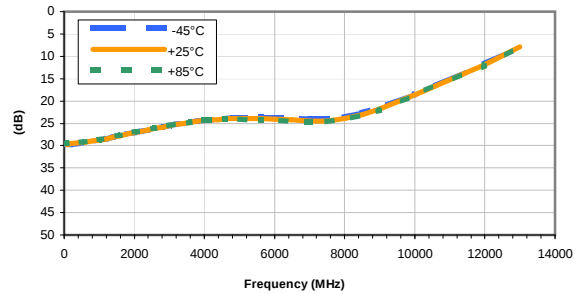
**GAIN vs. CURRENT**

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



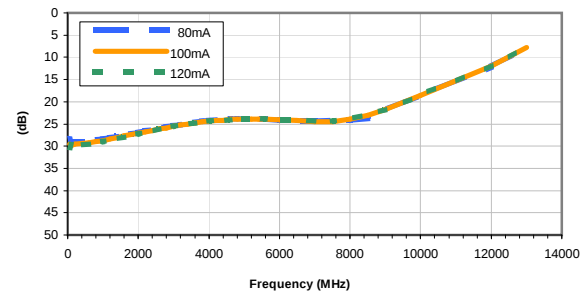
**ISOLATION vs. TEMPERATURE**

INPUT POWER = -25dBm, CURRENT = 100mA



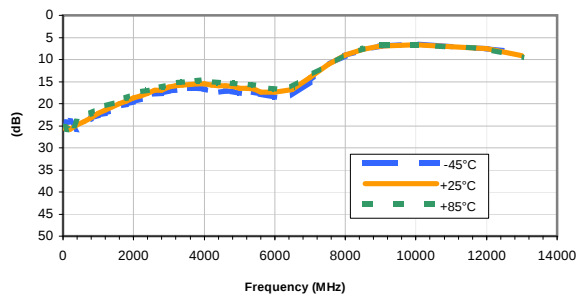
**ISOLATION vs. CURRENT**

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



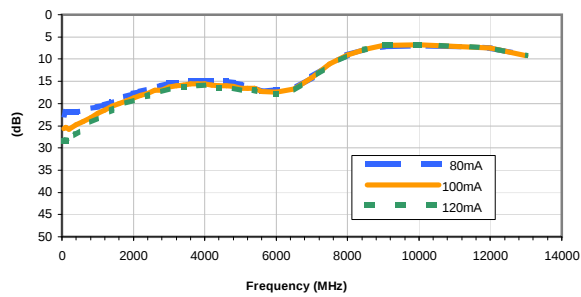
**INPUT RETURN LOSS vs. TEMPERATURE**

INPUT POWER = -25dBm, CURRENT = 100mA



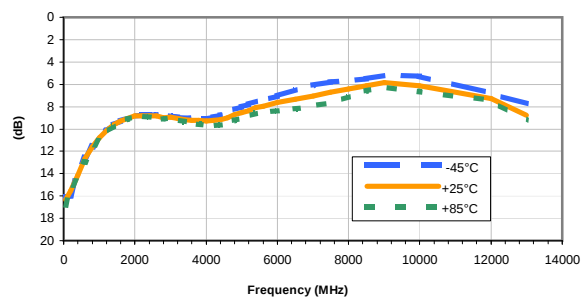
**INPUT RETURN LOSS vs. CURRENT**

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



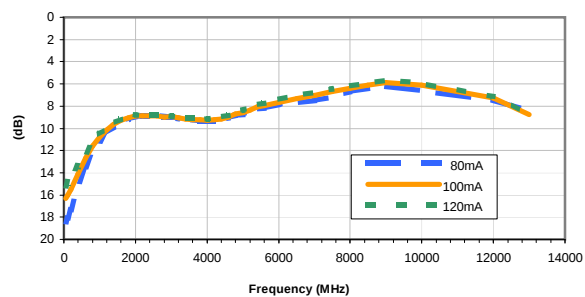
**OUTPUT RETURN LOSS vs. TEMPERATURE**

INPUT POWER = -25dBm, CURRENT = 100mA



**OUTPUT RETURN LOSS vs. CURRENT**

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



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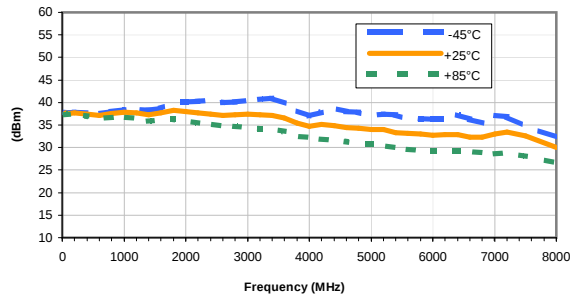
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## Typical Performance Curves

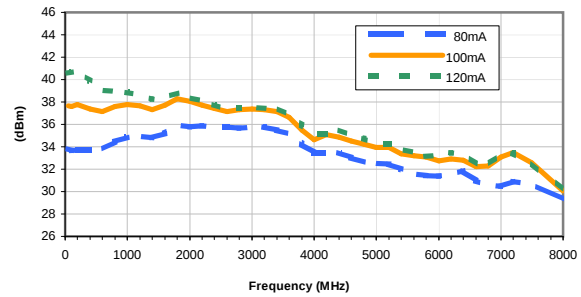
OUTPUT IP3 vs. TEMPERATURE

INPUT POWER = -25dBm, CURRENT = 100mA



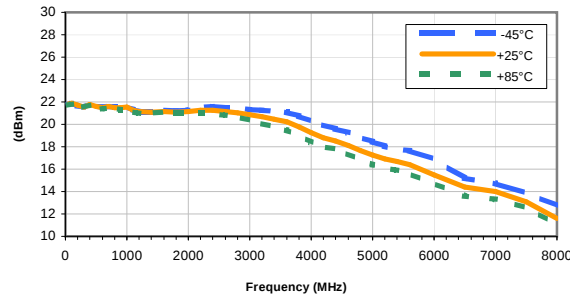
OUTPUT IP3 vs. CURRENT

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



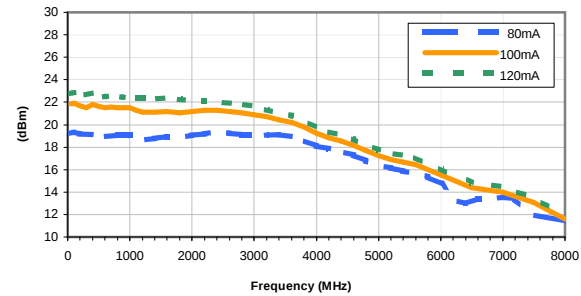
OUTPUT POWER at 1dB Compression vs. TEMPERATURE

CURRENT = 100mA



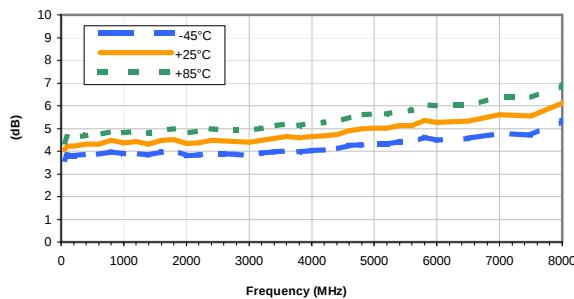
OUTPUT POWER at 1dB Compression vs. CURRENT

Temperature = +25°C



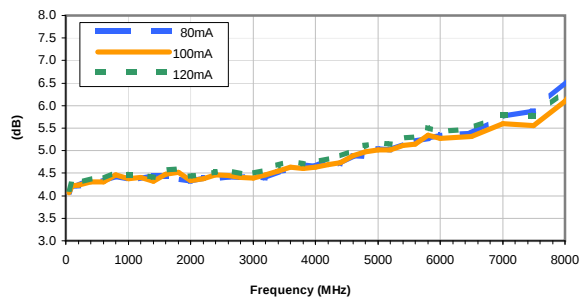
Noise Figure vs. TEMPERATURE

CURRENT = 100mA

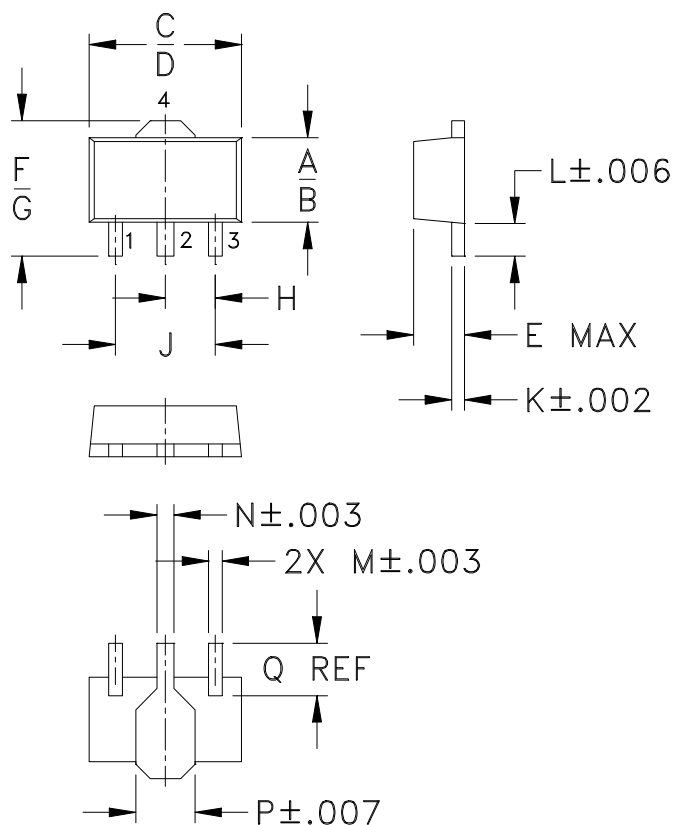


Noise Figure vs. CURRENT

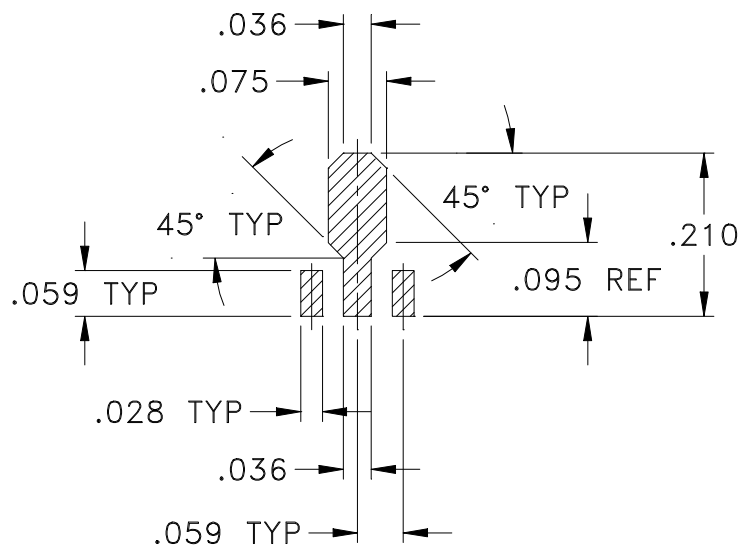
Temperature = +25°C



### 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              |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| DF782  | .102<br>(2.59) | .090<br>(2.29) | .181<br>(4.60) | .173<br>(4.39) | .063<br>(1.60) | .167<br>(4.24) | .155<br>(3.94) | .059<br>(1.50) | .118<br>(3.00) | .015<br>(0.38) | .041<br>(1.04) | .016<br>(0.41) |

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

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .01$ ; 3Pl.  $\pm .005$

### Notes:

- Case material: Plastic.
- Termination finish:  
For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin.  
All models, (+) suffix. See model Data sheet.  
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



INTERNET <http://www.minicircuits.com>

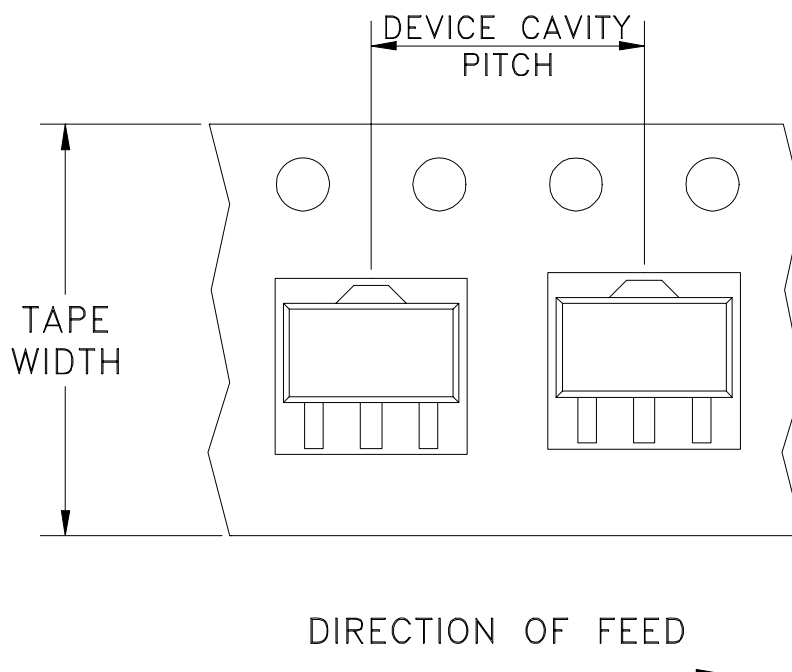
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# Tape & Reel Packaging TR-F55

## DEVICE ORIENTATION IN T&R



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

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

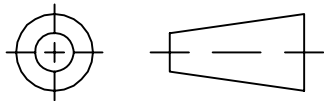
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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



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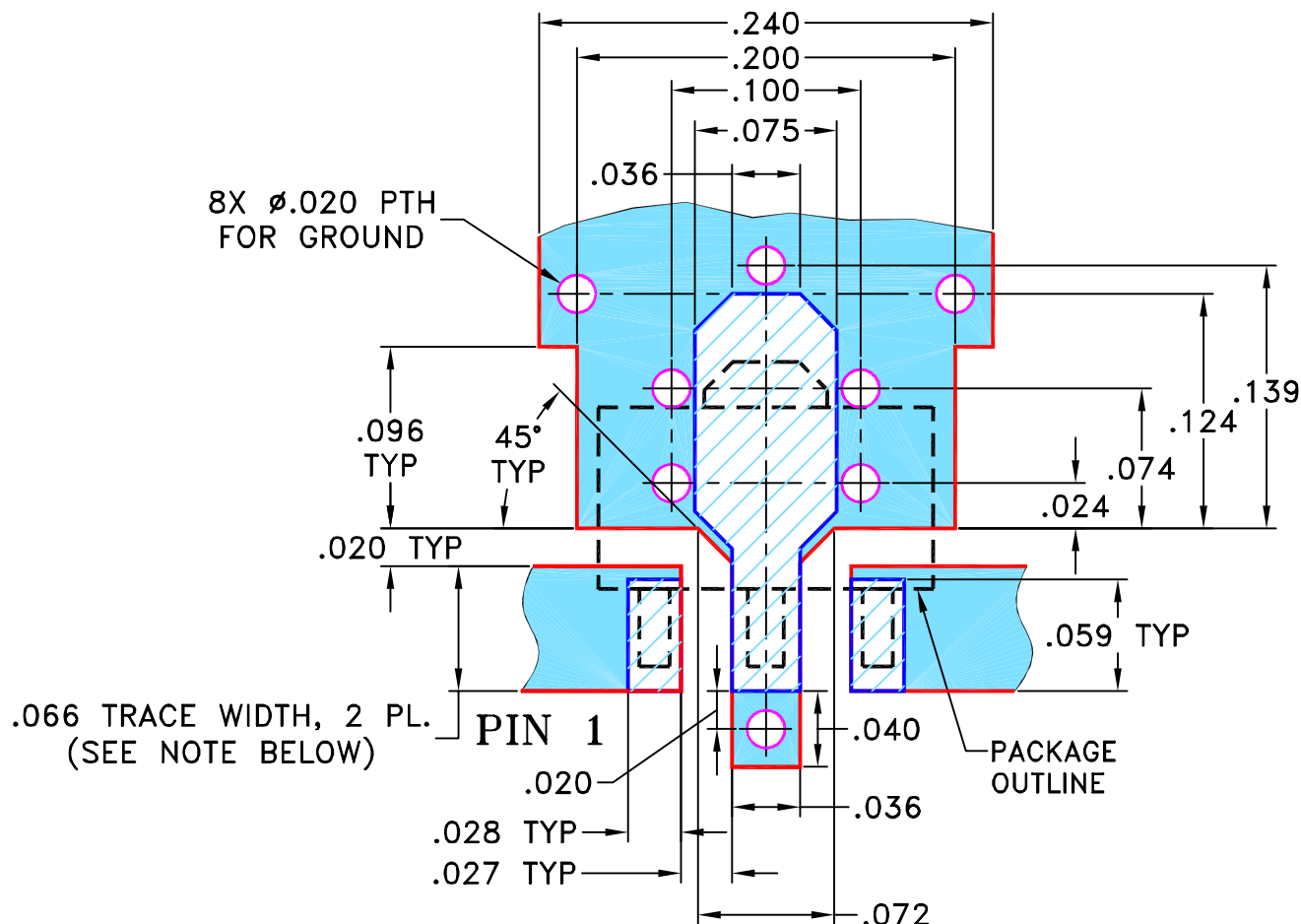
## THIRD ANGLE PROJECTION



## REVISIONS

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

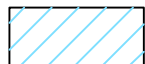
**SUGGESTED MOUNTING CONFIGURATION  
FOR DF782 CASE STYLE, "mz" PIN CONNECTION**



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



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



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

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

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

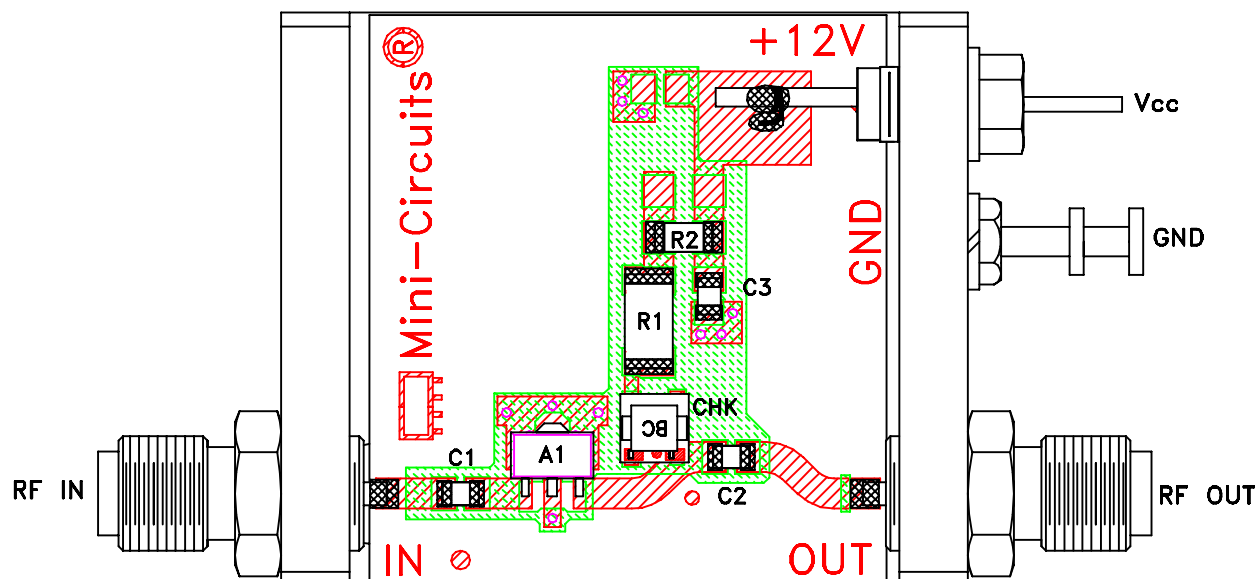


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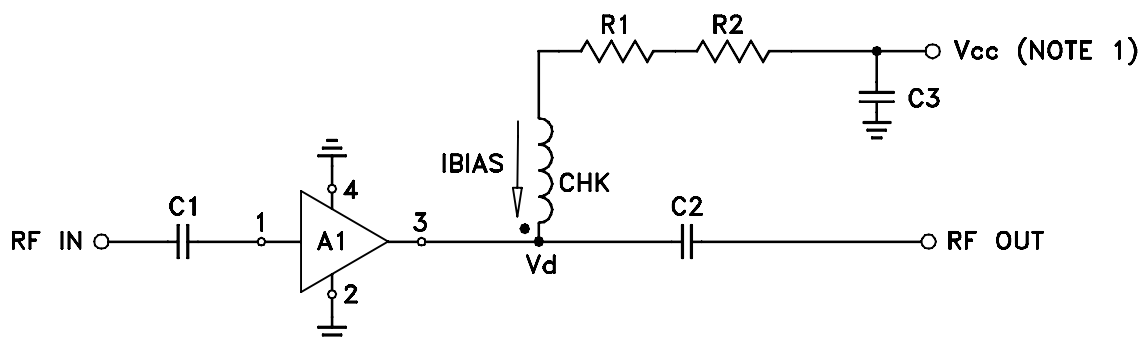
PL, mz, DF782, GALI, TB-409-XXX+

| SIZE  | CODE IDENT | DRAWING NO: | REV:   |
|-------|------------|-------------|--------|
| A     | 15542      | 98-PL-019   | D      |
| FILE: | 98PL019    | SCALE:      | 10:1   |
|       |            | SHEET:      | 1 OF 1 |

# Evaluation Board and Circuit



TB-409-84+



| COMPONENT   | VALUE                  |
|-------------|------------------------|
| A1          | Gali-84(+)             |
| C1 (NOTE 4) | 2400 pF                |
| C2 (NOTE 4) | 2400 pF                |
| C3 (bypass) | 0.1 uF                 |
| R1          | 47.5 Ohms, 0.75W       |
| R2          | 15 Ohms, 0.25W         |
| CHK         | Mini-Circuits TCCH-80+ |

Schematic Diagram

## NOTE:

1. Vcc voltage:  $+12 \pm 0.2V$ .
2. SMA Female connectors.
3. PCB material: Rogers R04350 or equivalent, dielectric constant=3.5, dielectric thickness=.030 inch.
4. Capacitors, C1 & C2 should be free of resonance up to the highest frequency specified.

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



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| Specification | Test/Inspection Condition        | Reference/Spec |
|---------------|----------------------------------|----------------|
|               | monoethanolamine at 63°C to 70°C |                |