



5 VOLT-SURFACE MOUNT

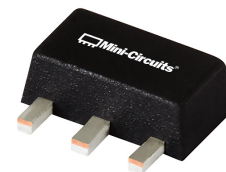
# Monolithic Amplifier

**GVA-81+**

50Ω DC to 6 GHz

## THE BIG DEAL

- Gain, 10 dB typ.
- High Pout, P1dB 19.5 dBm typ.
- High IP3, 41 dBm typ. at 1 GHz
- Ruggedized design
- Fixed 5V operation
- Unconditionally stable
- Excellent ESD Protection
- Transient protected, US patent 6,943,629
- Low additive phase noise, typically -171 dBc/Hz @10 KHz



Generic photo used for illustration purposes only

CASE STYLE: DF782

**+RoHS Compliant**

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

## APPLICATIONS

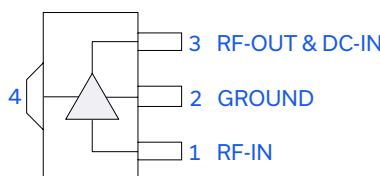
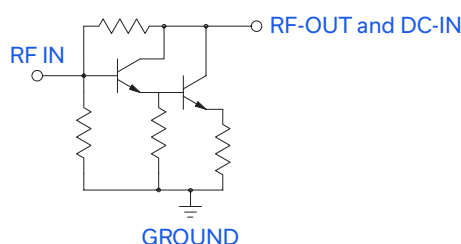
- Base station infrastructure
- Portable Wireless
- CATV & DBS
- MMDS & Wireless LAN
- LTE
- Suitable for low phase noise applications

**LTE Performance**

## PRODUCT OVERVIEW

GVA-81+ (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.

## 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", Fig. 2 |
| 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.                                                                                                                                         |

A. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.

B. The RFMD SBB4089Z part number is used for identification and comparison purposes only.

REV. C  
ECO-010563  
GVA-81+  
240207





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# Monolithic Amplifier

**GVA-81+**

## ELECTRICAL SPECIFICATIONS<sup>(1)</sup> AT 25°C AND 5V, UNLESS NOTED

| Parameter                                                                                 | Condition (GHz) | Min. | Typ.   | Max.  | Units  |
|-------------------------------------------------------------------------------------------|-----------------|------|--------|-------|--------|
| Frequency Range <sup>2</sup>                                                              |                 | DC   |        | 6     | GHz    |
| Gain                                                                                      | 0.1             | 9.5  | 10.5   | 11.5  | dB     |
|                                                                                           | 1.0             | —    | 10.5   | —     |        |
|                                                                                           | 2.0             | 9.0  | 10.0   | 11.0  |        |
|                                                                                           | 3.0             | —    | 9.3    | —     |        |
|                                                                                           | 4.0             | 8.0  | 8.7    | 10.0  |        |
|                                                                                           | 6.0             | —    | 8.1    | —     |        |
| InpMagnitude of Gain Variation versus Temperature <sup>(3)</sup><br>(values are negative) | 0.1             | —    | 0.0005 | —     | dB/°C  |
|                                                                                           | 1.0             | —    | 0.0010 | —     |        |
|                                                                                           | 2.0             | —    | 0.0016 | 0.005 |        |
|                                                                                           | 3.0             | —    | 0.0020 | —     |        |
|                                                                                           | 4.0             | —    | 0.0025 | —     |        |
|                                                                                           | 6.0             | —    | 0.0036 | —     |        |
| Input Return Loss                                                                         | 0.1             | —    | 38.0   | —     | dB     |
|                                                                                           | 1.0             | —    | 27.0   | —     |        |
|                                                                                           | 2.0             | 17   | 20.1   | —     |        |
|                                                                                           | 3.0             | —    | 17.4   | —     |        |
|                                                                                           | 4.0             | —    | 16.9   | —     |        |
|                                                                                           | 6.0             | —    | 18.5   | —     |        |
| Reverse Isolation                                                                         | 2.0             |      | 20.8   |       | dB     |
| Output Power at 1dB Compression                                                           | 0.1             | 18.0 | 19.1   | —     | dBm    |
|                                                                                           | 1.0             | 18.0 | 19.1   | —     |        |
|                                                                                           | 2.0             | 18.0 | 19.7   | —     |        |
|                                                                                           | 3.0             | —    | 20.0   | —     |        |
|                                                                                           | 4.0             | —    | 19.4   | —     |        |
|                                                                                           | 6.0             | —    | 17.7   | —     |        |
| Output IP3                                                                                | 0.1             | —    | 42.0   | —     | dBm    |
|                                                                                           | 1.0             | —    | 41.3   | —     |        |
|                                                                                           | 2.0             | 34   | 36.6   | —     |        |
|                                                                                           | 3.0             | —    | 35.0   | —     |        |
|                                                                                           | 4.0             | —    | 33.2   | —     |        |
|                                                                                           | 6.0             | —    | 31.1   | —     |        |
| Noise Figure                                                                              | 0.1             | —    | 7.3    | 7.9   | dB     |
|                                                                                           | 1.0             | —    | 7.3    | —     |        |
|                                                                                           | 2.0             | —    | 7.4    | 7.9   |        |
|                                                                                           | 3.0             | —    | 7.6    | —     |        |
|                                                                                           | 4.0             | —    | 7.7    | 8.2   |        |
|                                                                                           | 6.0             | —    | 8.3    | —     |        |
| Additive Phase Noise      2 GHz, 10 KHz offset                                            |                 |      | -171   |       | dBc/Hz |
| Group Delay                                                                               | 2.0             |      | 98     |       | psec   |
| Device Operating Voltage                                                                  |                 | 4.8  | 5.0    | 5.2   | V      |
| Device Operating Current                                                                  |                 | 94   | 103    | 112   | mA     |
| Device Current Variation vs. Temperature                                                  |                 |      | 62     |       | μA/°C  |
| Device Current Variation vs Voltage                                                       |                 |      | 0.036  |       | mA/mV  |
| Thermal Resistance, junction-to-ground lead                                               |                 |      | 68     |       | °C/W   |

(1) Measured on Mini-Circuits test board TB-313. See Characterization Test Circuit (Fig. 1)

(2) Guaranteed specification DC\*-7 GHz. \*Low frequency cut off determined by external coupling capacitors and RF Choke (RFC).

(3) (Gain at 85°C, Gain at -45°C)/130





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**GVA-81+**

## MAXIMUM RATINGS

| Parameter                           | Ratings        |
|-------------------------------------|----------------|
| Operating Temperature (ground lead) | -40°C to 85°C  |
| Storage Temperature                 | -65°C to 150°C |
| Operating Current at 5V             | 160mA          |
| Power Dissipation                   | 0.855W         |
| Input Power                         | 13dBm          |
| DC Voltage on Pin 3                 | 5.9V           |

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

## CHARACTERIZATION TEST CIRCUIT

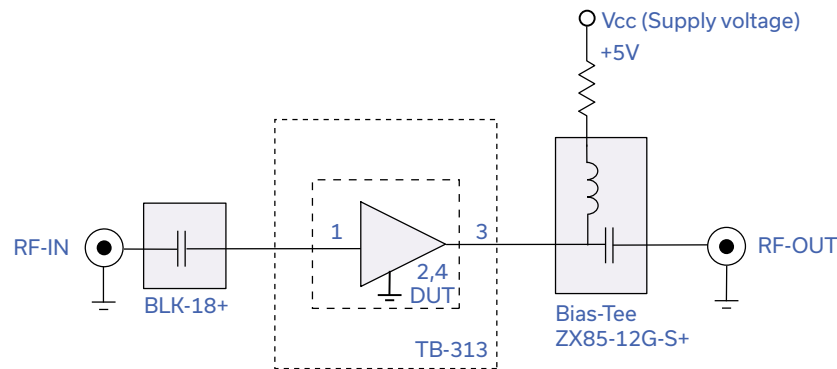


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Test Board TB-313)  
Gain, Output power at 1dB compression (P1 dB) and output IP3 (OIP3) are measured using R&S Network Analyzer ZVA-24. Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:

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

## RECOMMENDED APPLICATION CIRCUIT

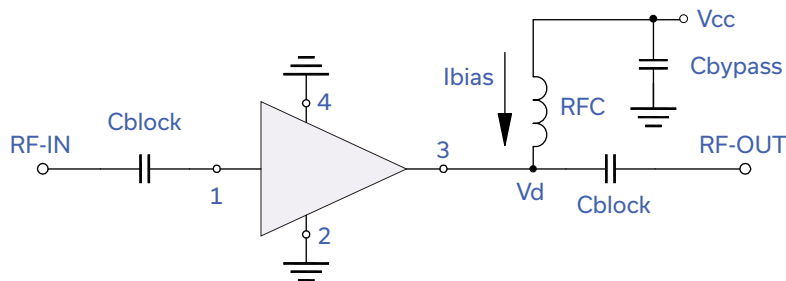
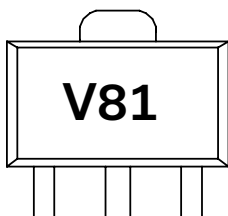


Fig 2. Test Board includes case, connectors, and components soldered to PCB

## PRODUCT MARKING



Marking may contain other features or characters for internal lot control





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# Monolithic Amplifier

**GVA-81+**

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS [CLICK HERE](#)

|                                                      |                                                                          |
|------------------------------------------------------|--------------------------------------------------------------------------|
| Performance Data                                     | Data Table                                                               |
|                                                      | Swept Graphs                                                             |
|                                                      | S-Parameter (S2P Files) Data Set (.zip file)                             |
| Case Style                                           | DF782 (SOT 89)<br>Plastic package, exposed paddle 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-255                                                                   |
| Evaluation Board                                     | TB-410-81+                                                               |
| Environmental Ratings                                | ENV08T1                                                                  |

## ESD RATING

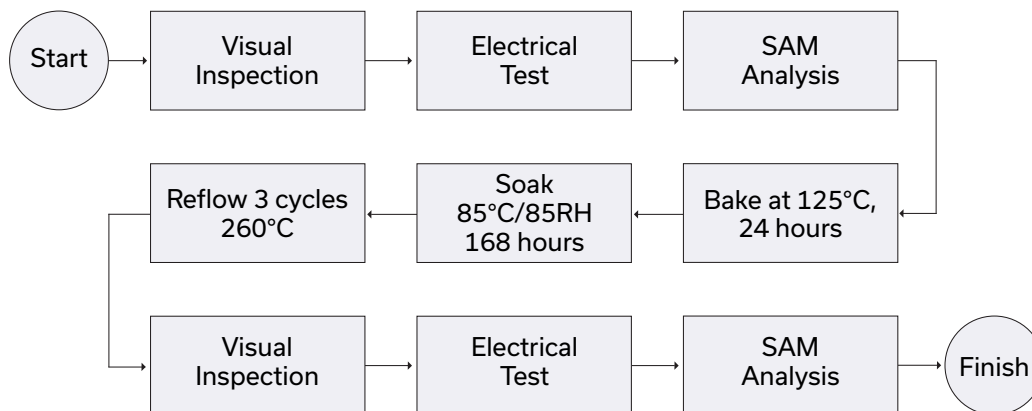
Human Body Model (HBM): Class 1C (1000v to < 2000v) in accordance with ANSI/ESD STM 5.1 - 2001

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

## MSL RATING

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

## MSL TEST FLOW CHART



## NOTES

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



## 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: I = 100mA, Vd = 5V @Temperature = +25degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (dBm)         | (dBm)                  | (dB)            |
| 20    | 10.57 | 20.80     | 21.06                   | 15.98                    | 1.73      | 0.32  | 38.23         | 17.89                  | 7.24            |
| 100   | 10.47 | 20.47     | 26.74                   | 27.48                    | 1.73      | 0.32  | 40.29         | 18.64                  | 7.53            |
| 220   | 10.49 | 20.46     | 26.73                   | 28.32                    | 1.73      | 0.32  | 39.74         | 18.76                  | 7.61            |
| 300   | 10.48 | 20.48     | 26.73                   | 29.31                    | 1.73      | 0.31  | 39.75         | 18.90                  | 7.66            |
| 420   | 10.39 | 20.55     | 26.60                   | 29.23                    | 1.76      | 0.31  | 39.27         | 18.93                  | 7.70            |
| 620   | 10.38 | 20.51     | 25.33                   | 27.28                    | 1.75      | 0.31  | 38.60         | 18.90                  | 7.74            |
| 820   | 10.29 | 20.57     | 24.68                   | 25.85                    | 1.77      | 0.30  | 38.13         | 18.87                  | 7.76            |
| 1000  | 10.24 | 20.59     | 23.81                   | 24.39                    | 1.78      | 0.30  | 37.75         | 18.59                  | 7.78            |
| 1220  | 10.14 | 20.62     | 22.92                   | 22.84                    | 1.80      | 0.29  | 37.42         | 18.57                  | 7.80            |
| 1420  | 10.04 | 20.67     | 22.40                   | 21.86                    | 1.82      | 0.29  | 37.20         | 18.56                  | 7.80            |
| 1500  | 9.99  | 20.70     | 22.18                   | 21.41                    | 1.83      | 0.29  | 37.09         | 17.45                  | 7.79            |
| 1620  | 9.93  | 20.70     | 21.75                   | 20.74                    | 1.84      | 0.28  | 37.08         | 18.67                  | 7.79            |
| 1820  | 9.83  | 20.78     | 21.33                   | 20.01                    | 1.87      | 0.28  | 36.59         | 19.05                  | 7.79            |
| 2000  | 9.72  | 20.82     | 20.89                   | 19.20                    | 1.89      | 0.27  | 36.32         | 18.60                  | 7.82            |
| 2020  | 9.71  | 20.81     | 20.85                   | 19.10                    | 1.89      | 0.27  | 36.24         | 19.26                  | 7.82            |
| 2220  | 9.60  | 20.87     | 20.51                   | 18.40                    | 1.91      | 0.26  | 36.02         | 19.31                  | 7.84            |
| 2420  | 9.49  | 20.95     | 20.45                   | 17.83                    | 1.94      | 0.26  | 35.71         | 19.12                  | 7.85            |
| 2620  | 9.36  | 20.98     | 20.35                   | 17.39                    | 1.97      | 0.25  | 35.45         | 19.33                  | 7.88            |
| 2820  | 9.25  | 21.04     | 20.15                   | 16.95                    | 2.00      | 0.24  | 35.25         | 19.09                  | 7.91            |
| 3000  | 9.17  | 21.06     | 20.39                   | 16.55                    | 2.02      | 0.24  | 35.01         | 19.02                  | 7.90            |
| 3020  | 9.14  | 21.11     | 20.41                   | 16.52                    | 2.03      | 0.24  | 34.92         | 19.13                  | 7.89            |
| 3420  | 8.96  | 21.17     | 21.16                   | 16.00                    | 2.08      | 0.23  | 34.24         | 18.90                  | 7.88            |
| 3820  | 8.76  | 21.27     | 22.19                   | 15.97                    | 2.15      | 0.22  | 33.98         | 18.87                  | 7.93            |
| 4000  | 8.67  | 21.35     | 22.87                   | 15.99                    | 2.19      | 0.22  | 33.82         | 18.77                  | 7.96            |
| 4020  | 8.68  | 21.34     | 23.06                   | 15.97                    | 2.19      | 0.22  | 33.81         | 18.80                  | 7.96            |
| 4220  | 8.59  | 21.36     | 23.28                   | 15.99                    | 2.22      | 0.22  | 33.60         | 18.41                  | 8.00            |
| 4420  | 8.49  | 21.40     | 22.71                   | 15.79                    | 2.25      | 0.22  | 33.17         | 18.47                  | 8.05            |
| 4620  | 8.39  | 21.45     | 21.37                   | 15.65                    | 2.28      | 0.22  | 32.96         | 18.41                  | 8.12            |
| 4820  | 8.27  | 21.51     | 19.37                   | 15.18                    | 2.31      | 0.22  | 32.52         | 18.29                  | 8.20            |
| 5000  | 8.14  | 21.57     | 17.60                   | 14.62                    | 2.34      | 0.22  | 32.35         | 18.12                  | 8.28            |
| 5220  | 7.95  | 21.68     | 15.44                   | 13.61                    | 2.37      | 0.22  | 31.97         | 17.92                  | 8.38            |
| 5620  | 7.53  | 21.90     | 12.28                   | 11.74                    | 2.42      | 0.23  | 31.45         | 17.40                  | 8.50            |
| 5820  | 7.26  | 22.01     | 11.07                   | 10.98                    | 2.45      | 0.23  | 31.20         | 17.21                  | 8.63            |
| 6000  | 7.01  | 22.18     | 10.03                   | 10.30                    | 2.48      | 0.24  | 30.83         | 16.84                  | 8.73            |
| 6220  | 6.65  | 22.29     | 9.04                    | 9.64                     | 2.50      | 0.24  | 30.57         | 16.35                  | 8.85            |
| 6420  | 6.30  | 22.49     | 8.14                    | 9.13                     | 2.53      | 0.25  | 30.36         | 15.99                  | 8.96            |
| 6620  | 5.92  | 22.63     | 7.48                    | 8.71                     | 2.57      | 0.25  | 29.90         | 15.96                  | 9.08            |
| 6820  | 5.48  | 22.86     | 6.91                    | 8.42                     | 2.64      | 0.25  | 29.90         | 15.67                  | 9.31            |
| 7000  | 5.12  | 23.02     | 6.48                    | 8.16                     | 2.69      | 0.25  | 29.40         | 15.67                  | 9.46            |

REV. X1  
GVA-81+  
110601

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IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

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The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



## 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: I = 97mA, Vd = 5V @Temperature = -40degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (dBm)         | (dBm)                  | (dB)            |
| 20    | 10.42 | 20.65     | 22.52                   | 17.66                    | 1.75      | 0.32  | 39.20         | 17.84                  | 7.12            |
| 100   | 10.52 | 20.49     | 27.99                   | 26.53                    | 1.73      | 0.32  | 39.77         | 18.74                  | 6.89            |
| 220   | 10.54 | 20.45     | 29.48                   | 25.81                    | 1.72      | 0.32  | 40.28         | 18.69                  | 6.86            |
| 300   | 10.52 | 20.48     | 28.25                   | 27.47                    | 1.73      | 0.32  | 40.24         | 18.76                  | 6.88            |
| 420   | 10.45 | 20.52     | 27.00                   | 30.31                    | 1.74      | 0.31  | 39.87         | 18.81                  | 6.91            |
| 620   | 10.45 | 20.49     | 25.04                   | 27.41                    | 1.74      | 0.31  | 39.12         | 18.79                  | 6.94            |
| 820   | 10.36 | 20.53     | 25.16                   | 25.18                    | 1.75      | 0.31  | 38.64         | 18.79                  | 6.96            |
| 1000  | 10.32 | 20.54     | 24.21                   | 24.12                    | 1.76      | 0.30  | 38.29         | 18.67                  | 6.99            |
| 1220  | 10.23 | 20.56     | 23.49                   | 22.89                    | 1.77      | 0.30  | 37.97         | 18.63                  | 6.99            |
| 1420  | 10.14 | 20.58     | 22.36                   | 22.58                    | 1.79      | 0.29  | 37.75         | 18.69                  | 6.98            |
| 1500  | 10.09 | 20.61     | 22.05                   | 22.18                    | 1.80      | 0.29  | 37.75         | 17.63                  | 6.97            |
| 1620  | 10.03 | 20.63     | 21.51                   | 21.47                    | 1.81      | 0.29  | 37.92         | 18.90                  | 6.98            |
| 1820  | 9.92  | 20.68     | 21.25                   | 20.61                    | 1.83      | 0.28  | 37.22         | 19.09                  | 6.98            |
| 2000  | 9.84  | 20.67     | 21.24                   | 20.02                    | 1.84      | 0.28  | 36.95         | 18.76                  | 6.98            |
| 2020  | 9.82  | 20.69     | 21.26                   | 19.79                    | 1.85      | 0.28  | 36.93         | 19.16                  | 6.98            |
| 2220  | 9.70  | 20.77     | 21.25                   | 18.73                    | 1.88      | 0.27  | 36.75         | 19.22                  | 7.00            |
| 2420  | 9.58  | 20.79     | 20.75                   | 17.86                    | 1.90      | 0.26  | 36.38         | 19.11                  | 7.01            |
| 2620  | 9.46  | 20.89     | 20.64                   | 16.90                    | 1.93      | 0.26  | 36.16         | 19.27                  | 7.04            |
| 2820  | 9.35  | 20.90     | 20.55                   | 16.50                    | 1.95      | 0.25  | 36.06         | 19.10                  | 7.05            |
| 3000  | 9.26  | 20.95     | 20.86                   | 16.22                    | 1.97      | 0.25  | 35.85         | 19.05                  | 6.99            |
| 3020  | 9.25  | 20.96     | 20.87                   | 16.33                    | 1.98      | 0.25  | 35.81         | 19.24                  | 6.98            |
| 3420  | 9.07  | 21.03     | 21.37                   | 16.12                    | 2.03      | 0.24  | 35.11         | 18.98                  | 6.93            |
| 3820  | 8.90  | 21.12     | 21.62                   | 16.89                    | 2.10      | 0.23  | 34.90         | 19.05                  | 6.96            |
| 4000  | 8.83  | 21.14     | 22.47                   | 16.64                    | 2.12      | 0.23  | 34.72         | 19.01                  | 6.99            |
| 4020  | 8.81  | 21.16     | 22.68                   | 16.72                    | 2.13      | 0.23  | 34.71         | 18.99                  | 6.99            |
| 4220  | 8.74  | 21.19     | 23.73                   | 16.58                    | 2.15      | 0.23  | 34.55         | 18.64                  | 7.05            |
| 4420  | 8.65  | 21.22     | 23.42                   | 16.07                    | 2.18      | 0.23  | 34.13         | 18.66                  | 7.12            |
| 4620  | 8.55  | 21.26     | 22.03                   | 15.85                    | 2.20      | 0.23  | 33.97         | 18.60                  | 7.20            |
| 4820  | 8.43  | 21.33     | 19.67                   | 15.19                    | 2.24      | 0.23  | 33.45         | 18.47                  | 7.23            |
| 5000  | 8.29  | 21.42     | 17.75                   | 14.16                    | 2.26      | 0.23  | 33.29         | 18.29                  | 7.29            |
| 5020  | 8.28  | 21.41     | 17.58                   | 14.10                    | 2.26      | 0.23  | 33.10         | 18.26                  | 7.31            |
| 5220  | 8.10  | 21.51     | 14.90                   | 13.24                    | 2.29      | 0.24  | 32.84         | 18.24                  | 7.40            |
| 5620  | 7.71  | 21.70     | 11.87                   | 11.85                    | 2.32      | 0.24  | 32.38         | 17.72                  | 7.56            |
| 5820  | 7.50  | 21.84     | 11.43                   | 10.97                    | 2.36      | 0.24  | 32.04         | 17.66                  | 7.65            |
| 6000  | 7.25  | 21.95     | 10.49                   | 10.13                    | 2.38      | 0.25  | 31.71         | 17.22                  | 7.78            |
| 6020  | 7.22  | 22.01     | 10.38                   | 10.02                    | 2.39      | 0.25  | 31.55         | 17.20                  | 7.78            |
| 6220  | 6.99  | 22.03     | 9.22                    | 9.60                     | 2.36      | 0.26  | 31.36         | 16.72                  | 7.89            |
| 6420  | 6.71  | 22.16     | 8.62                    | 9.30                     | 2.40      | 0.25  | 31.14         | 16.55                  | 7.94            |
| 6620  | 6.42  | 22.27     | 8.05                    | 8.62                     | 2.40      | 0.26  | 30.60         | 16.58                  | 8.09            |
| 6820  | 6.05  | 22.47     | 7.17                    | 8.07                     | 2.41      | 0.27  | 30.45         | 15.95                  | 8.29            |
| 7000  | 5.67  | 22.67     | 6.53                    | 7.73                     | 2.44      | 0.28  | 30.15         | 15.94                  | 8.43            |

REV. X1  
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110601

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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: I = 102mA, Vd = 5V @Temperature = +85degC

| FREQ  | Gain  | Isolation | Input<br>Return<br>Loss | Output<br>Return<br>Loss | Stability |       | IP3<br>Output | 1dB<br>Comp.<br>Output | Noise<br>Figure |
|-------|-------|-----------|-------------------------|--------------------------|-----------|-------|---------------|------------------------|-----------------|
| (MHz) | (dB)  | (dB)      | (dB)                    | (dB)                     | K         | Delta | (dBm)         | (dBm)                  | (dB)            |
| 20    | 10.04 | 20.90     | 22.37                   | 15.91                    | 1.85      | 0.30  | 37.55         | 17.81                  | 8.52            |
| 100   | 10.40 | 20.46     | 25.45                   | 27.42                    | 1.74      | 0.31  | 39.81         | 18.85                  | 8.31            |
| 220   | 10.43 | 20.45     | 24.27                   | 32.02                    | 1.73      | 0.31  | 39.26         | 18.80                  | 8.31            |
| 300   | 10.41 | 20.47     | 24.68                   | 33.08                    | 1.74      | 0.31  | 39.26         | 18.92                  | 8.35            |
| 420   | 10.33 | 20.52     | 26.03                   | 29.77                    | 1.76      | 0.31  | 38.82         | 18.96                  | 8.39            |
| 620   | 10.32 | 20.49     | 24.71                   | 26.66                    | 1.76      | 0.31  | 38.10         | 18.95                  | 8.42            |
| 820   | 10.22 | 20.57     | 24.40                   | 25.06                    | 1.78      | 0.30  | 37.60         | 18.90                  | 8.45            |
| 1000  | 10.17 | 20.58     | 23.63                   | 24.09                    | 1.79      | 0.30  | 37.20         | 18.57                  | 8.47            |
| 1220  | 10.07 | 20.64     | 22.82                   | 22.73                    | 1.81      | 0.29  | 36.78         | 18.56                  | 8.48            |
| 1420  | 9.98  | 20.67     | 22.57                   | 21.72                    | 1.83      | 0.29  | 36.53         | 18.53                  | 8.48            |
| 1500  | 9.93  | 20.70     | 22.26                   | 21.15                    | 1.84      | 0.28  | 36.42         | 17.44                  | 8.49            |
| 1620  | 9.87  | 20.72     | 21.96                   | 20.58                    | 1.85      | 0.28  | 36.41         | 18.47                  | 8.49            |
| 1820  | 9.76  | 20.77     | 21.43                   | 19.79                    | 1.88      | 0.27  | 35.78         | 18.84                  | 8.51            |
| 2000  | 9.67  | 20.82     | 20.82                   | 19.16                    | 1.90      | 0.27  | 35.44         | 18.63                  | 8.52            |
| 2020  | 9.65  | 20.86     | 20.81                   | 19.03                    | 1.91      | 0.27  | 35.35         | 19.20                  | 8.52            |
| 2220  | 9.53  | 20.90     | 20.42                   | 18.33                    | 1.93      | 0.26  | 35.13         | 19.25                  | 8.55            |
| 2420  | 9.41  | 20.93     | 20.18                   | 17.57                    | 1.95      | 0.25  | 34.77         | 19.06                  | 8.57            |
| 2620  | 9.29  | 21.01     | 19.82                   | 17.15                    | 1.98      | 0.25  | 34.47         | 19.23                  | 8.60            |
| 2820  | 9.18  | 21.04     | 19.42                   | 16.88                    | 2.01      | 0.24  | 34.30         | 18.98                  | 8.63            |
| 3000  | 9.08  | 21.15     | 19.46                   | 16.45                    | 2.05      | 0.23  | 34.02         | 18.92                  | 8.59            |
| 3020  | 9.07  | 21.13     | 19.44                   | 16.58                    | 2.05      | 0.23  | 33.97         | 19.07                  | 8.59            |
| 3420  | 8.85  | 21.28     | 19.97                   | 15.71                    | 2.12      | 0.22  | 33.29         | 18.71                  | 8.55            |
| 3820  | 8.66  | 21.35     | 21.40                   | 15.79                    | 2.18      | 0.22  | 33.00         | 18.70                  | 8.61            |
| 4000  | 8.57  | 21.39     | 22.16                   | 15.50                    | 2.21      | 0.22  | 32.82         | 18.54                  | 8.66            |
| 4020  | 8.56  | 21.40     | 22.39                   | 15.55                    | 2.22      | 0.22  | 32.80         | 18.56                  | 8.66            |
| 4220  | 8.46  | 21.43     | 22.15                   | 15.56                    | 2.25      | 0.21  | 32.66         | 18.13                  | 8.72            |
| 4420  | 8.37  | 21.48     | 21.90                   | 15.32                    | 2.28      | 0.21  | 32.24         | 18.21                  | 8.77            |
| 4620  | 8.26  | 21.51     | 20.60                   | 15.37                    | 2.31      | 0.21  | 31.97         | 18.05                  | 8.84            |
| 4820  | 8.11  | 21.58     | 18.57                   | 14.83                    | 2.35      | 0.21  | 31.60         | 18.01                  | 8.90            |
| 5000  | 7.96  | 21.65     | 16.73                   | 14.36                    | 2.38      | 0.21  | 31.45         | 17.84                  | 8.97            |
| 5020  | 7.95  | 21.66     | 16.57                   | 14.28                    | 2.39      | 0.21  | 31.34         | 17.58                  | 8.98            |
| 5220  | 7.77  | 21.73     | 15.02                   | 13.58                    | 2.42      | 0.21  | 31.08         | 17.51                  | 9.06            |
| 5620  | 7.35  | 21.90     | 12.33                   | 12.09                    | 2.47      | 0.22  | 30.59         | 17.05                  | 9.25            |
| 5820  | 7.06  | 22.05     | 10.81                   | 11.01                    | 2.49      | 0.22  | 30.45         | 16.81                  | 9.40            |
| 6000  | 6.77  | 22.19     | 9.74                    | 10.31                    | 2.52      | 0.23  | 30.02         | 16.38                  | 9.53            |
| 6020  | 6.73  | 22.22     | 9.60                    | 10.11                    | 2.52      | 0.23  | 30.01         | 16.45                  | 9.54            |
| 6220  | 6.40  | 22.36     | 8.83                    | 9.48                     | 2.55      | 0.24  | 29.78         | 16.09                  | 9.68            |
| 6420  | 6.01  | 22.55     | 7.95                    | 8.98                     | 2.59      | 0.24  | 29.59         | 15.62                  | 9.81            |
| 6620  | 5.57  | 22.76     | 7.15                    | 8.31                     | 2.61      | 0.25  | 29.18         | 15.38                  | 10.01           |
| 6820  | 5.11  | 22.94     | 6.48                    | 7.98                     | 2.65      | 0.25  | 29.12         | 15.30                  | 10.21           |
| 7000  | 4.71  | 23.06     | 6.23                    | 7.93                     | 2.74      | 0.25  | 28.84         | 15.04                  | 10.34           |

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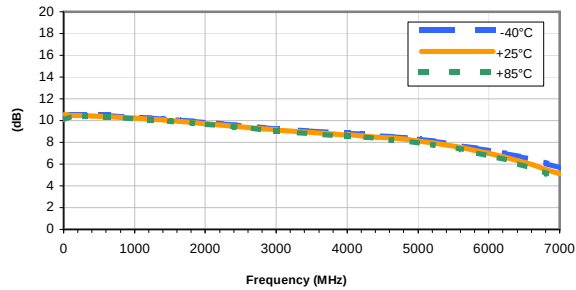
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## Typical Performance Curves

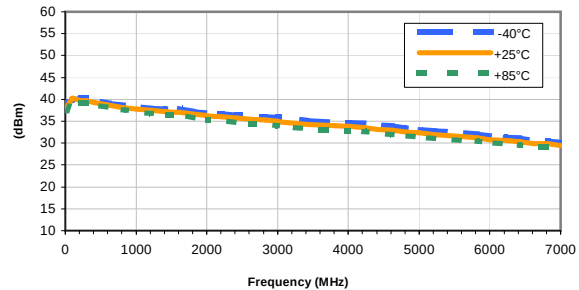
**GAIN vs. FREQUENCY & TEMPERATURE**

INPUT POWER = -25, VOLTAGE = 5V



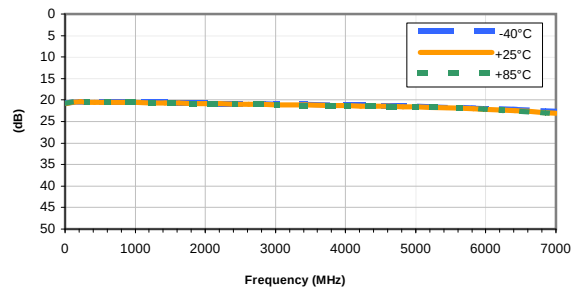
**OUTPUT IP3 vs. FREQUENCY & TEMPERATURE**

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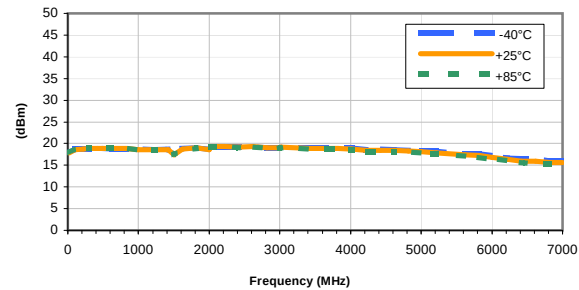
**ISOLATION vs. FREQUENCY & TEMPERATURE**

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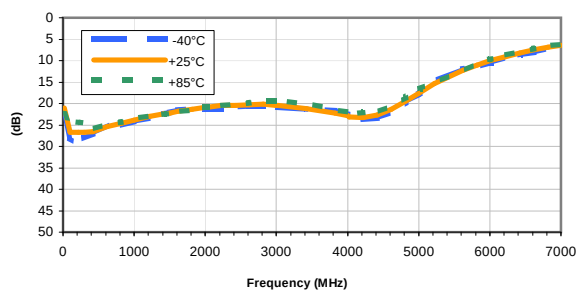
**OUTPUT POWER at 1dB COMPRESSION vs. FREQUENCY & TEMPERATURE**

VOLTAGE = 5V



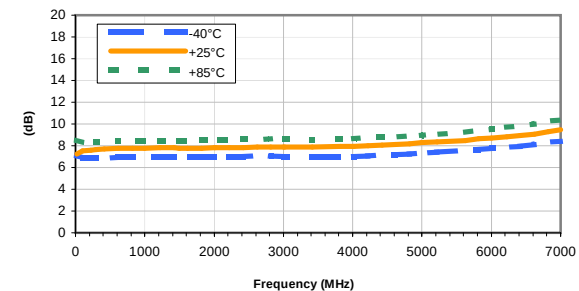
**INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE**

INPUT POWER = -25, VOLTAGE = 5V



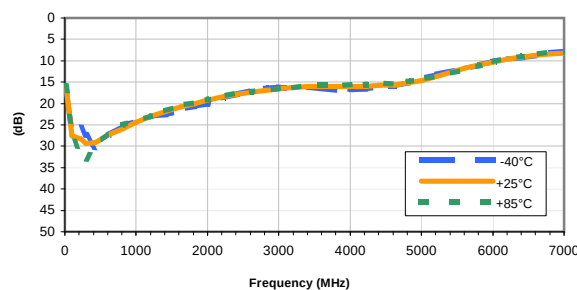
**NOISE FIGURE vs. FREQUENCY & TEMPERATURE**

VOLTAGE = 5V



**OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE**

INPUT POWER = -25, VOLTAGE = 5V



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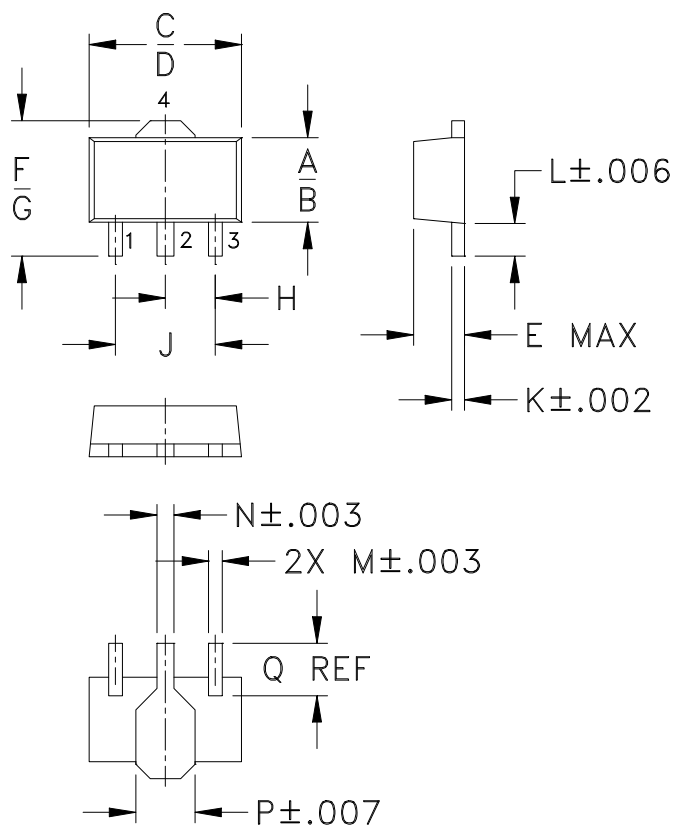


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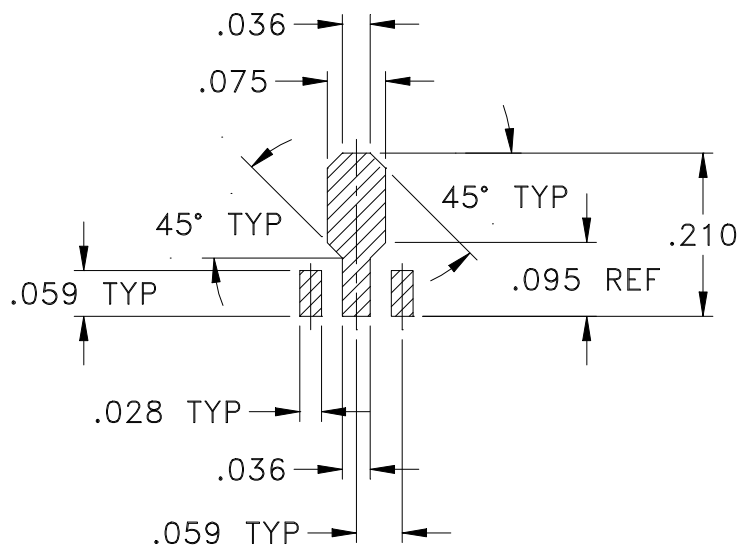




### Outline Dimensions



### 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.



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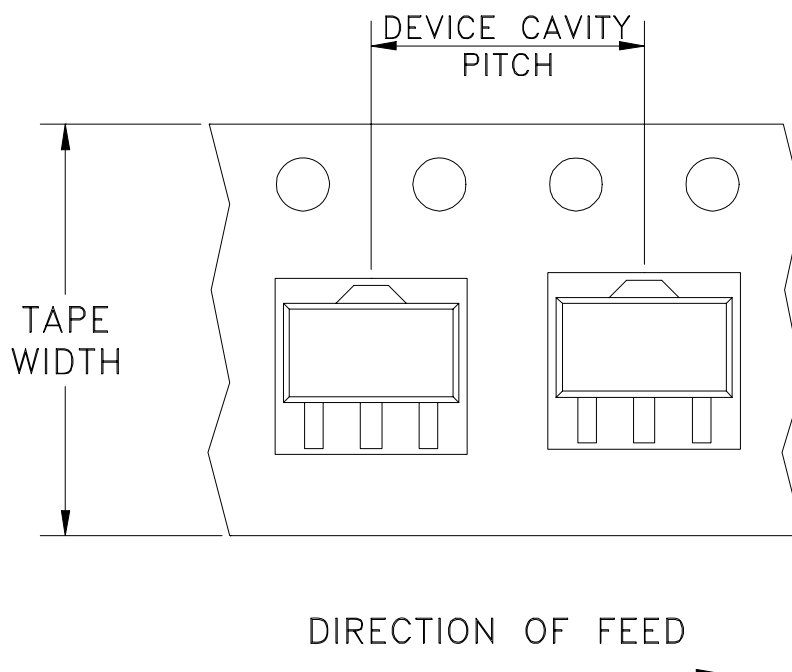
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# Tape & Reel Packaging TR-F55

## 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.

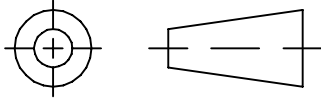
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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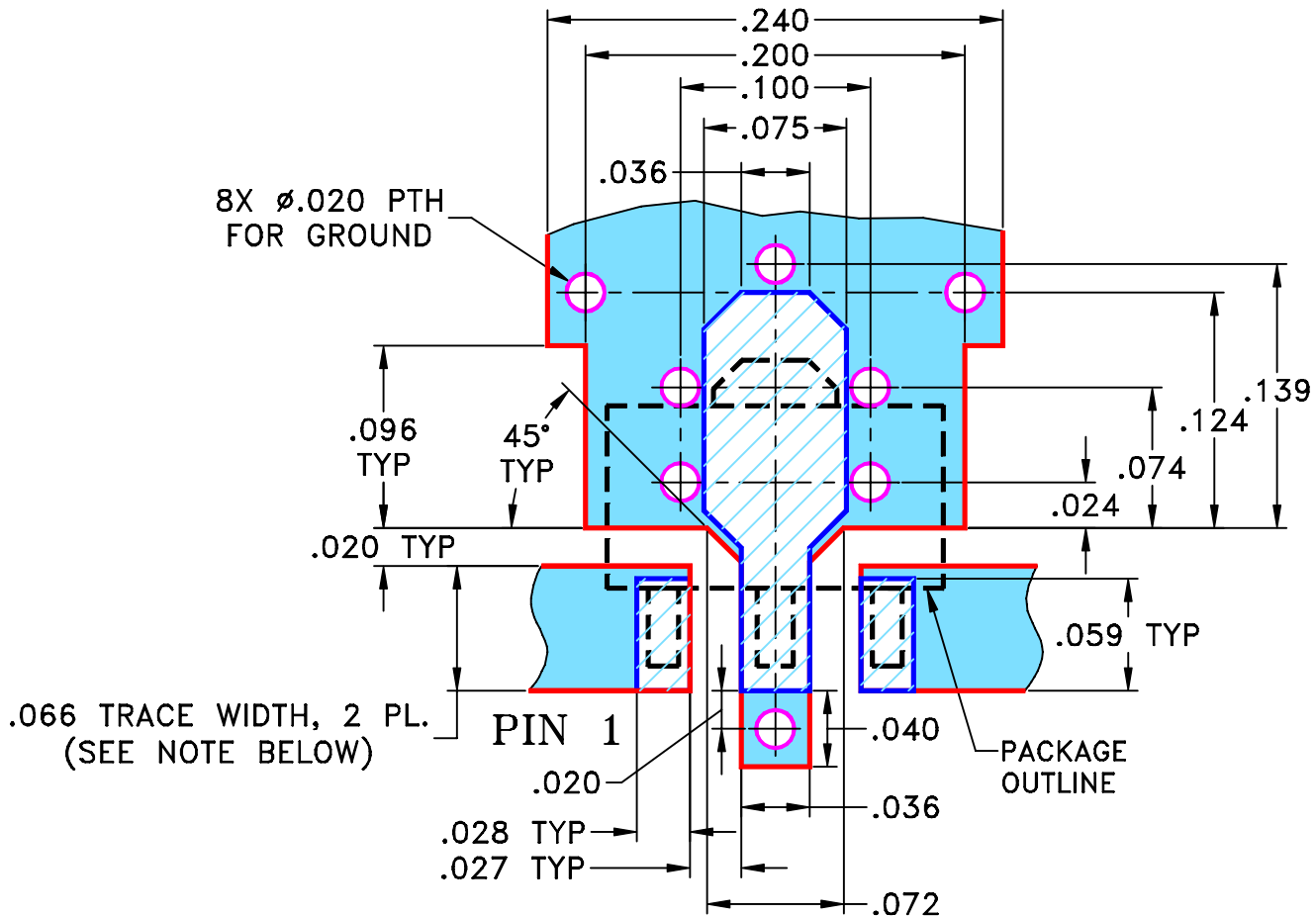
## THIRD ANGLE PROJECTION



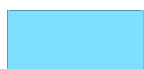
## REVISIONS

| REV | ECN No. | DESCRIPTION                             | DATE     | DR  | AUTH |
|-----|---------|-----------------------------------------|----------|-----|------|
| OR  | M108433 | NEW RELEASE                             | 11/14/06 | PW  | IG   |
| A   | M124803 | "04AM03" WAS "mz", MODIFIED TB IN TITLE | 10/23/09 | MMG | DJ   |
|     |         |                                         |          |     |      |
|     |         |                                         |          |     |      |

**SUGGESTED MOUNTING CONFIGURATION  
FOR DF782 CASE STYLE, "04AM03" PIN CONNECTION**



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030"  $\pm$  .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

PW

11/14/06

TOLERANCES ON:

CHECKED

IL

11/14/06

2 PL DECIMALS  $\pm$  .005

APPROVED

IG

11/14/06

ANGLES  $\pm$ FRACTIONS  $\pm$ 

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



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Brooklyn NY 11235

PL, 04AM03, DF782, GVA, TB-410-XX+

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-255

REV:

A

FILE: 98PL255

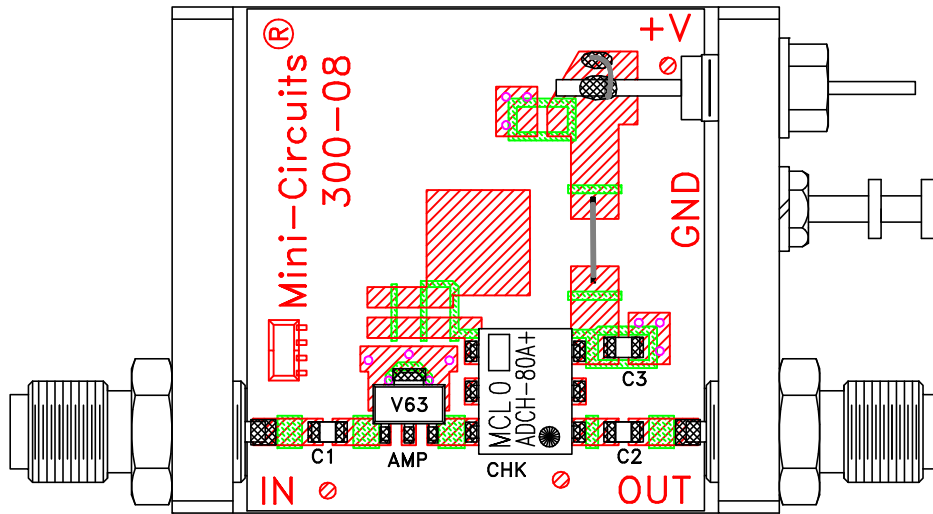
SCALE:

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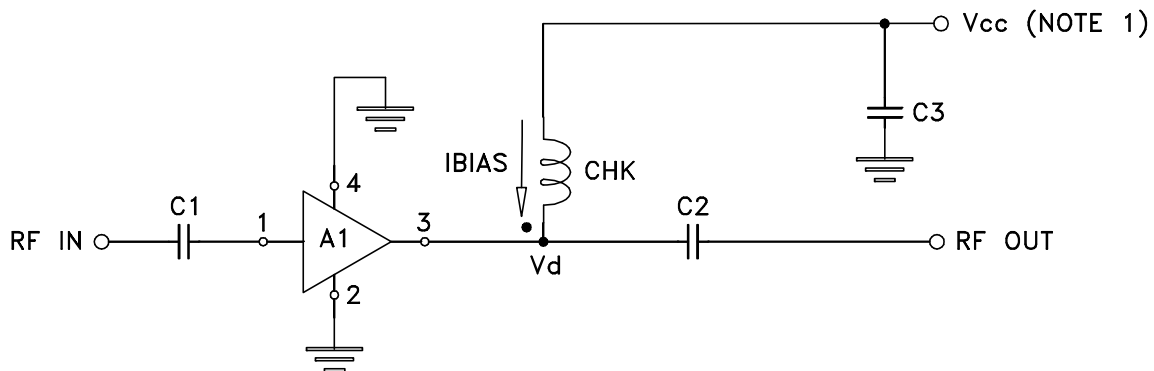
SHEET:

1 OF 1

# Evaluation Board and Circuit



TB-410-81+



| COMPONENT   | VALUE                   |
|-------------|-------------------------|
| A1          | GVA-81+                 |
| C1 (NOTE 4) | 2400 pF                 |
| C2 (NOTE 4) | 2400 pF                 |
| C3 (bypass) | 0.1 uF                  |
| CHK         | Mini-Circuits ADCH-80A+ |

Schematic Diagram

## NOTE:

1. Vcc voltage:  $+5 \pm 0.2V$ .
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.

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| Specification                  | Test/Inspection Condition                                                                                                      | Reference/Spec                                                  |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Operating Temperature          | -40° to 85°C or -45° to 85°C<br>Ambient Environment                                                                            | Individual Model Data Sheet                                     |
| Storage Temperature            | -55° to 100° C or -65° to 150°<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 |                |