

5 Volt-Surface Mount

# Monolithic Amplifier

DC-7 GHz

## Product Features

- High Gain, 24 dB typ. at 100 MHz
- High Pout, P1dB 20.5 dBm typ. at 100 MHz
- High IP3, 37 dBm typ. at 100 MHz
- Ruggedized design
- Fixed 5V operation
- Unconditionally stable
- Excellent ESD Protection
- Transient protected, US patent 6,943,629

## Typical Applications

- Base station infrastructure
- Portable Wireless
- CATV & DBS
- MMDS & Wireless LAN
- LTE

## General Description

GVA-84+ (RoHS compliant) is a wideband amplifier offering high dynamic range. Lead finish is SnAgNi. 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.



## GVA-84+

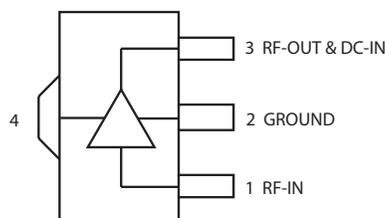
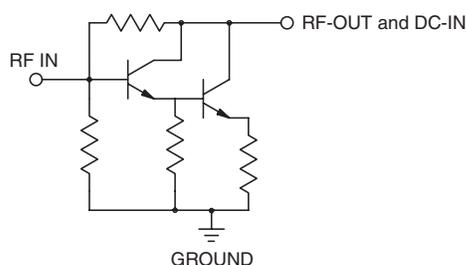
CASE STYLE: DF782  
PRICE: \$1.82 ea. QTY. (30)

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

LTE Performance

## 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.   |

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ISO 9001 ISO 14001 AS 9100 CERTIFIED

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IF/RF MICROWAVE COMPONENTS

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REV. C  
M123356  
GVA-84+  
ED-11756/5E  
091117  
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**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   |        | 7     | GHz   |
| Gain   | 0.1             | 22.9 | 24.1   | 25.3  | dB    |
|  | 1.0             |      | 21.7   |       |       |
|  | 2.0             | 17.4 | 18.4   | 19.9  |       |
|  | 3.0             |      | 16.0   |       |       |
|  | 4.0             | 13.8 | 14.6   | 16.3  |       |
|  | 6.0             |      | 12.5   |       |       |
|  | 7.0             |      | 10.5   |       |       |
| Magnitude of Gain Variation versus Temperature <sup>(3)</sup><br>(values are negative) | 0.1             |      | 0.0004 | 0.006 | dB/°C |
|  | 1.0             |      | 0.0021 |       |       |
|  | 2.0             |      | 0.0032 |       |       |
|  | 3.0             |      | 0.0044 |       |       |
|  | 4.0             |      | 0.0058 |       |       |
|  | 6.0             |      | 0.0131 |       |       |
|  | 7.0             |      | 0.0175 |       |       |
| Input Return Loss  | 0.1             | 15.0 | 22.9   |       | dB    |
|  | 1.0             |      | 20.6   |       |       |
|  | 2.0             |      | 18.5   |       |       |
|  | 3.0             |      | 18.1   |       |       |
|  | 4.0             |      | 19.1   |       |       |
|  | 6.0             |      | 17.9   |       |       |
|  | 7.0             |      | 11.9   |       |       |
| Output Return Loss   | 0.1             | 6.0  | 23.3   |       | dB    |
|  | 1.0             |      | 10.7   |       |       |
|  | 2.0             |      | 7.7    |       |       |
|  | 3.0             |      | 7.1    |       |       |
|  | 4.0             |      | 7.0    |       |       |
|  | 6.0             |      | 6.3    |       |       |
|  | 7.0             |      | 5.6    |       |       |
| Reverse Isolation  | 2.0             |      | 26.5   |       | dB    |
| Output Power @1 dB compression   | 0.1             | 19.4 | 20.4   |       | dBm   |
|  | 1.0             | 19.5 | 20.5   |       |       |
|  | 2.0             | 19.6 | 20.6   |       |       |
|  | 3.0             |      | 21.0   |       |       |
|  | 4.0             |      | 19.9   |       |       |
|  | 6.0             |      | 17.0   |       |       |
|  | 7.0             |      | 15.6   |       |       |
| Saturated Output Power<br>(at 3dB compression)   | 0.1             |      | 21.7   |       | dBm   |
|  | 1.0             |      | 22.3   |       |       |
|  | 2.0             |      | 22.3   |       |       |
|  | 3.0             |      | 22.2   |       |       |
|  | 4.0             |      | 21.0   |       |       |
|  | 6.0             |      | 18.9   |       |       |
|  | 7.0             |      | 17.2   |       |       |
| Output IP3   | 0.1             | 33.0 | 36.7   |       | dBm   |
|  | 1.0             | 32.2 | 35.8   |       |       |
|  | 2.0             | 32.9 | 36.6   |       |       |
|  | 3.0             |      | 35.8   |       |       |
|  | 4.0             |      | 34.9   |       |       |
|  | 6.0             |      | 33.0   |       |       |
|  | 7.0             |      | 32.0   |       |       |
| Noise Figure   | 0.1             |      | 5.5    | 6.5   | dB    |
|  | 1.0             |      | 5.6    |       |       |
|  | 2.0             |      | 5.5    | 6.5   |       |
|  | 3.0             |      | 5.5    |       |       |
|  | 4.0             |      | 5.6    | 6.6   |       |
|  | 6.0             |      | 6.2    |       |       |
|  | 7.0             |      | 6.8    |       |       |
| Group Delay  | 2.0             |      | 94     |       | psec  |
| Device Operating Voltage   |                 | 4.8  | 5.0    | 5.2   | V     |
| Device Operating Current   |                 | 85   | 108    | 130   | mA    |
| Device Current Variation vs. Temperature   |                 |      | 61.8   |       | µA/°C |
| Device Current Variation vs Voltage  |                 |      | 0.058  |       | mA/mV |
| Thermal Resistance, junction-to-ground lead  |                 |      | 64     |       | °C/W  |

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

<sup>(2)</sup> Guaranteed specification DC-7 GHz. Low frequency cut off determined by external coupling capacitors and external bias choke.

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



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IFIRF MICROWAVE COMPONENTS

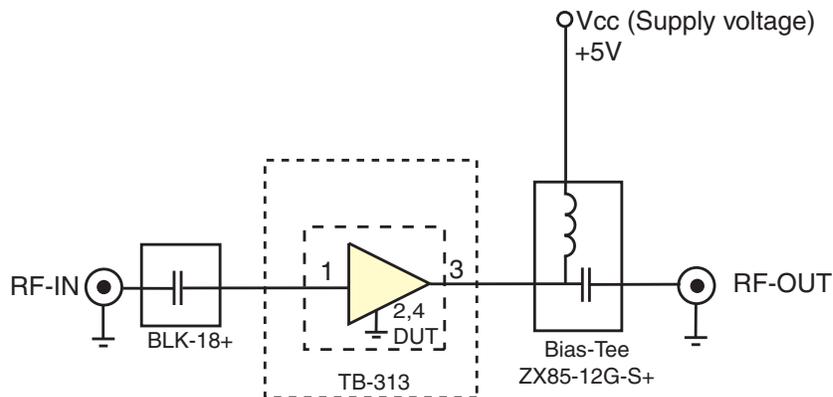
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**Absolute Maximum Ratings**

| Parameter                           | Ratings        |
|-------------------------------------|----------------|
| Operating Temperature (ground lead) | -45°C to 85°C  |
| Storage Temperature                 | -65°C to 150°C |
| Operating Current at 5V             | 160mA          |
| Power Dissipation                   | 1W             |
| Input Power                         | 13 dBm         |
| DC Voltage on Pin 3                 | 5.8V           |

Note:  
 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.

Product Marking



Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Performance data, graphs, s-parameter (S2P FILES) data set (.zip file)

Case Style: DF782 (SOT 89)

Plastic package, exposed paddle, lead finish: tin/silver/nickel

Tape & Reel: F55

Suggested Layout for PCB Design: PL-255

Evaluation Board: TB-410-84+

Environmental Ratings: ENV08T2

Recommended Application Circuit

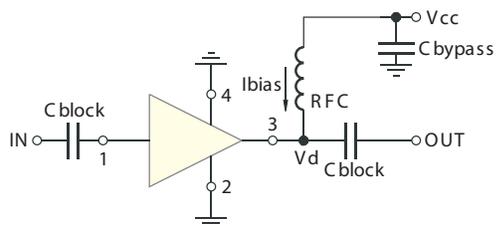


Fig 2. Test Board includes case, connectors, and components soldered to PCB



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**ESD Rating**

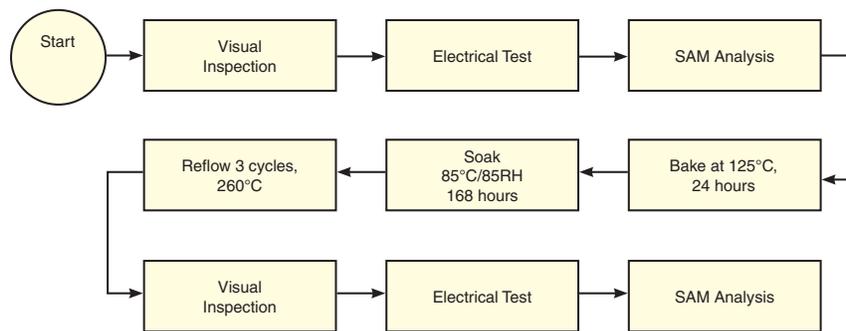
Human Body Model (HBM): Class 1C (1000v to < 2000v) in accordance with ANSI/ESD STM 5.1 - 2001

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-020C

**MSL Test Flow Chart**



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