



+5 VOLT SURFACE MOUNT

Monolithic Amplifier

GVA-84+

50Ω DC to 7 GHz

FEATURES

- High Gain, 24 dB typ. at 100 MHz
- High P_{OUT} , 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



Generic photo used for illustration purposes only

CASE STYLE: DF782

+RoHS Compliant

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

LTE Performance

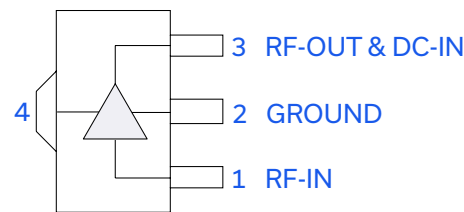
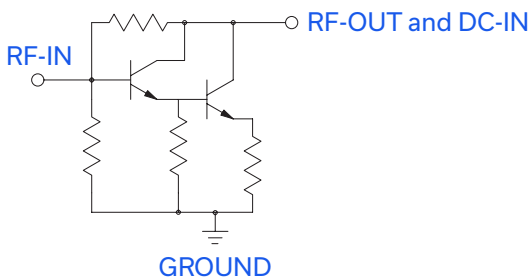
APPLICATIONS

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

PRODUCT OVERVIEW

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.

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. |

REV. E
ECO-010314
GVA-84+
MCL NY
240801





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Mini-Circuits

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ELECTRICAL SPECIFICATIONS¹ AT +25°C AND +5V, UNLESS NOTED OTHERWISE

| Parameter | Condition (GHz) | Min. | Typ. | Max. | Units |
|--|-----------------|-------|--------|-------|-------|
| Frequency Range ² | | 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 ³ (values are negative) | 0.1 | — | 0.0004 | — | dB/°C |
| | 1.0 | — | 0.0021 | — | |
| | 2.0 | — | 0.0032 | 0.006 | |
| | 3.0 | — | 0.0044 | — | |
| | 4.0 | — | 0.0058 | — | |
| | 6.0 | — | 0.0131 | — | |
| | 7.0 | — | 0.0175 | — | |
| Input Return Loss | 0.1 | — | 22.9 | — | dB |
| | 1.0 | — | 20.6 | — | |
| | 2.0 | 15.0 | 18.5 | — | |
| | 3.0 | — | 18.1 | — | |
| | 4.0 | — | 19.1 | — | |
| | 6.0 | — | 17.9 | — | |
| | 7.0 | — | 11.9 | — | |
| Output Return Loss | 0.1 | — | 23.3 | — | dB |
| | 1.0 | — | 10.7 | — | |
| | 2.0 | 6.0 | 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 (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 | — | |



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ELECTRICAL SPECIFICATIONS¹ AT +25°C AND +5V, UNLESS NOTED OTHERWISE CONTINUED

| Parameter | Condition (GHz) | Min. | Typ. | Max. | Units |
|---|-----------------|------|-------|------|-------|
| 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 |

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 external bias choke.
3. (Gain at 85°C - Gain at -45°C)/130

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 | 160 mA |
| Power Dissipation | 1 W |
| Input Power | +13 dBm |
| DC Voltage on Pin 3 | +5.8 V |

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

CHARACTERIZATION TEST CIRCUIT

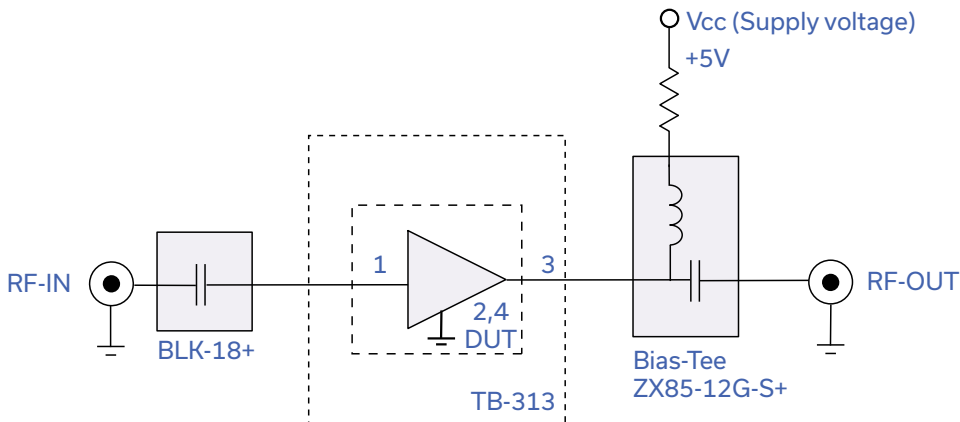


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Test Board TB-313)

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: $P_{IN} = -25\text{dBm}$
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.





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RECOMMENDED APPLICATION CIRCUIT

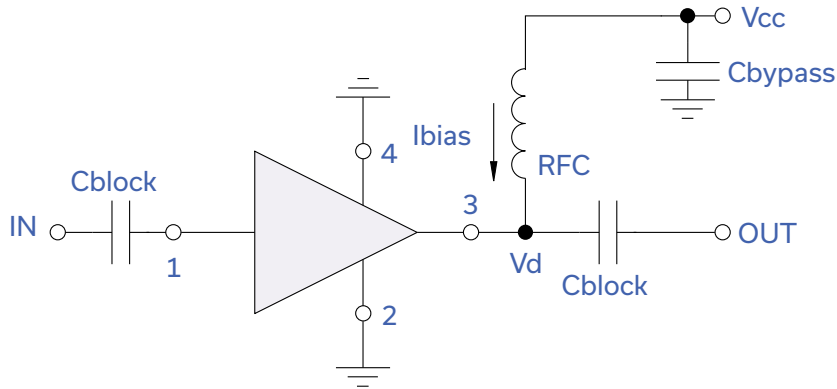
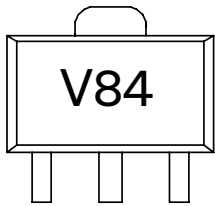


Fig 2. Test Board includes case, connectors, and components soldered to PCB.

PRODUCT MARKING



Marking may contain other features or characters for internal lot control



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

| | |
|--|--|
| Performance Data | Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file) |
| Case Style | DF782 (SOT 89) Plastic package, exposed paddle lead finish: matte-tin |
| Tape & Reel Standard quantities available on reel | F55 7" reels with 20, 50, 100, 200, 500 or 1K devices |
| Suggested Layout for PCB Design | PL-255 |
| Evaluation Board | TB-410-84+ |
| 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

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

