*High Gain, High IP3*

# Monolithic Amplifier

# GVA-63+

## 50Ω 0.01 to 6 GHz

## The Big Deal

- High Gain
- Broadband High Dynamic Range without external Matching Components
- May be used as a replacement to RFMD SBB5089Z[a,b]

SOT-89 PACKAGE

## Product Overview

GVA-63+ (RoHS compliant) is an wideband amplifier fabricated using InGap HBT technology and offers high gain over a broad frequency range and with high IP3. In addition, the GVA-63+, has good input and output return loss over a broad frequency range without the need for external matching components and has demonstrated excellent reliability. It has repeatable performance from lot to lot and is enclosed in a SOT-89 package for very good thermal performance.

## Key Features

| Feature | Advantages |
|---|---|
| Broad Band: 0.01 to 6.0 GHz | Broadband covering primary wireless communications bands:<br>Cellular, PCS, LTE, WiMAX |
| Flat gain | High gain reduces number of gain stages, at lower real estate, component count and cost. ±1.7 dB from 50 MHz to 3 GHz |
| High IP3<br>Versus DC power Consumption<br>34 dBm typical at 0.05 GHz<br>35 dBm typical at 0.8 GHz | The GVA-63+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and InGap HBT Structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being typically 16 dB above the P 1dB point to 0.8 GHz. This feature makes this amplifier ideal for use in:<br>• Driver amplifiers for complex waveform up converter paths<br>• Drivers in linearized transmit systems |
| No External Matching Components Required | GVA-63+ provides Input and Output Return Loss of 12-25 dB up to 6 GHz without the need for any external matching components |

Notes:

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 SBB-5089Z part number is used for identification and comparison purposes only.

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*High Gain, High IP3*

# Monolithic Amplifier

## 0.01-6 GHz

### Product Features

- Gain, 21 dB typ. at 0.8 GHz
- Flat Gain, ±1.7, 50 to 4000 MHz
- High Pout, P1dB 19.0 dBm typ. at 0.8 GHz
- High IP3, 35 dBm typ. at at 0.8 GHz
- Excellent ESD protection, Class 1C for HBM
- No external matching components required
- May be used as replacement for RFMD SBB5089Z[a,b]

*Generic photo used for illustration purposes only*

CASE STYLE: DF782

## GVA-63+

***+RoHS Compliant***

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

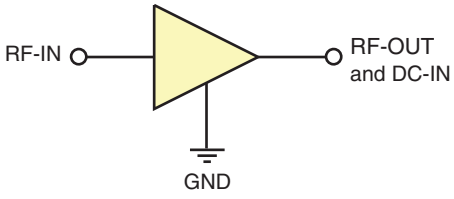
### Typical Applications

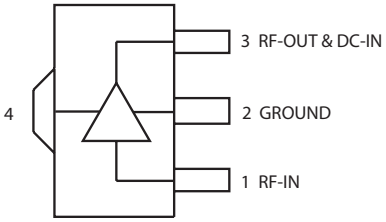
- Base station infrastructure
- Portable Wireless
- CATV & DBS
- MMDS & Wireless LAN
- LTE

### General Description

GVA-63+ (RoHS compliant) is an advanced wideband amplifier fabricated using InGap HBT technology and offers high gain over a broad frequency range and with high IP3. In addition, the GVA-63+ has good input and output return loss over a broad frequency range without the need for external matching components. It has repeatable performance from lot to lot and is enclosed in a SOT-89 package for very good thermal 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. |

Notes:
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 SBB5089Z part number is used for identification and comparison purposes only.

## Electrical Specifications[1,2] at 25°C, unless noted

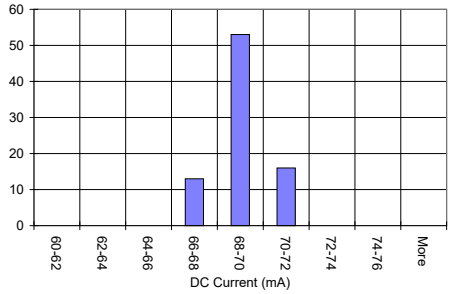
| Parameter | Condition (GHz) | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Frequency Range[2] | | 0.01 | | 6 | GHz |
| Gain | 0.05 | — | 21.9 | — | dB |
| | 0.8 | 19.0 | 21.1 | — | |
| | 2.0 | — | 19.9 | — | |
| | 3.0 | — | 18.5 | — | |
| | 4.0 | — | 17.3 | — | |
| | 6.0 | — | 15.9 | — | |
| Gain Flatness | 0.05 - 3.0 | | ±1.7 | | dB |
| | 0.7 - 2.6 | | ±1.3 | | |
| Input Return Loss | 0.05 | — | 17.6 | — | dB |
| | 0.8 | 14.0 | 19.7 | — | |
| | 2.0 | — | 25.0 | — | |
| | 3.0 | — | 25.8 | — | |
| | 4.0 | — | 20.0 | — | |
| | 6.0 | — | 12.0 | — | |
| Output Return Loss | 0.05 | — | 14.5 | — | dB |
| | 0.8 | 14.0 | 20.6 | — | |
| | 2.0 | — | 16.6 | — | |
| | 3.0 | — | 16.5 | — | |
| | 4.0 | — | 17.1 | — | |
| | 6.0 | — | 13.8 | — | |
| Reverse Isolation | 2.0 | | 23.7 | | dB |
| Output Power @1 dB compression | 0.05 | — | 18.7 | — | dBm |
| | 0.8 | 17.0 | 18.9 | — | |
| | 2.0 | — | 18.6 | — | |
| | 3.0 | — | 16.9 | — | |
| | 4.0 | — | 15.7 | — | |
| | 6.0 | — | 11.8 | — | |
| Output IP3 | 0.05 | | 33.5 | | dB |
| | 0.8 | | 34.8 | | |
| | 2.0 | | 32.2 | | |
| | 3.0 | | 28.6 | | |
| | 4.0 | | 26.6 | | |
| | 6.0 | | 25.0 | | |
| Noise Figure | 0.05 | | 3.6 | | dB |
| | 0.8 | | 3.8 | | |
| | 2.0 | | 3.7 | | |
| | 3.0 | | 3.7 | | |
| | 4.0 | | 4.0 | | |
| | 6.0 | | 4.6 | | |
| Device Operating Voltage | | 4.8 | 5.0 | 5.2 | V |
| Device Operating Current | | 58 | 69 | 78 | mA |
| Device Current Variation vs. Temperature[3] | | | 61 | | µA/°C |
| Device Current Variation vs. Voltage | | | 0.040 | | mA/mV |
| Thermal Resistance, junction-to-ground lead | | | 91 | | °C/W |

(1) Measured on Mini-Circuits Characterization test board TB-313. See Characterization Test Circuit (Fig. 1)
(2) Low Frequency cut-off determined by external coupling capacitors and external bias choke.
(3) Current at 85°C — Current at -45°C)/130

## Absolute Maximum Ratings

| Parameter | Ratings |
|---|---|
| Operating Temperature (ground lead) | -40°C to 85°C |
| Storage Temperature | -65°C to 150°C |
| Operating Current at 5V | 100 mA |
| Power Dissipation | 0.5 W |
| Input Power (CW) | 13 dBm |
| DC Voltage on Pin 3 | 5.7 V |

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

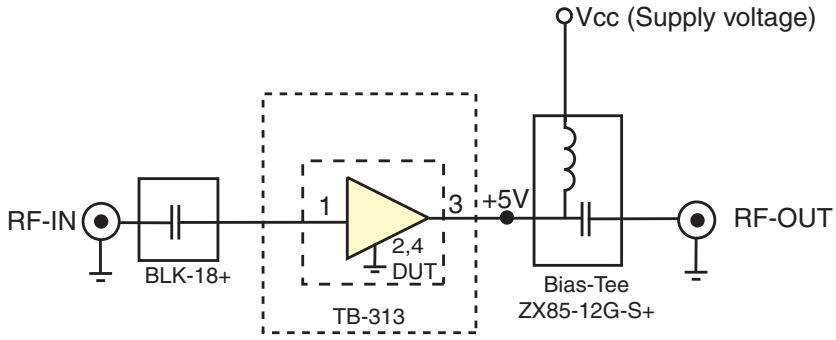



Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-313)

Gain, Return loss, Output power at 1dB compression (P1 dB) , output IP3 (OIP3) and 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

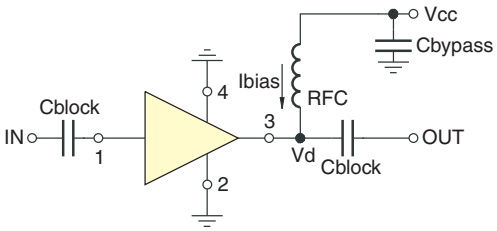
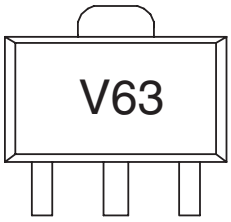



Fig 2. Test Board includes case, connectors, and components soldered to PCB

## Product Marking




Marking may contain other features or characters for internal lot control

| Additional Detailed Technical Information<br>*additional information is available on our dash board. To access this information 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**<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-410-63+ |
| **Environmental Ratings** | ENV08T1 |

## ESD Rating

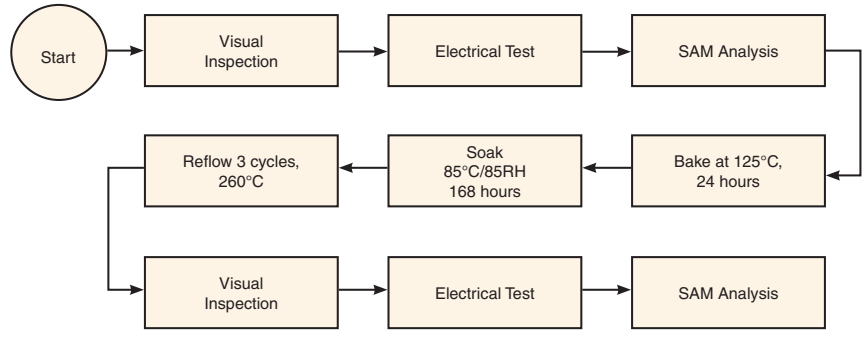
Human Body Model (HBM): Class 1C (1000 to <2000V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M2 (100 to <200V) in accordance with ANSI/ESD STM5.2-1999

## MSL Rating

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

### 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-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

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