



MEDIUM POWER, 0.3W

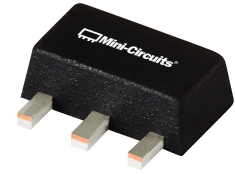
Monolithic Amplifier

GVA-92+

50Ω 869 to 2170 MHz

THE BIG DEAL

- Medium power, +24.1 dBm typ. at 920 MHz at P3dB
- High gain, 21.2 dB typ.
- High power added efficiency, up to 50%
- Usable over 10 to 3600 MHz in balanced amplifiers



Generic photo used for illustration purposes only

CASE STYLE: DF782

APPLICATIONS

- Base station infrastructure
- LTE
- WCDMA

+RoHS Compliant

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

PRODUCT OVERVIEW

Mini-Circuits' GVA-92+ is an advanced wideband amplifier fabricated using GaAs HBT technology. It offers high gain and excellent output power with high Power Added Efficiency (PAE) in application bands. Application circuits may also be developed to achieve outstanding performance significantly beyond the specified operating frequency range (see application note AN-60-066). Housed in an SOT-89 package, it has repeatable performance from lot to lot and very good thermal performance.

KEY FEATURES

| Feature | Advantages |
|---|--|
| Optimized over 869 – 960 MHz and 2110 – 2170 MHz | Matched for best Power Added Efficiency in primary wireless communication bands: cellular and LTE. Application circuit with component values provided to minimize design effort on customer end. |
| Medium power output at P1dB: <ul style="list-style-type: none"> • +23.3 dBm over 869 – 960 MHz • +23.8 dBm over 2110 - 2170 | With a power added efficiency of 45 – 54%, GVA-92+ delivers high power with low DC power consumption. |
| High gain: <ul style="list-style-type: none"> • 21.2 dB typ. at 920 MHz • 15.5 dB typ. at 2140 MHz | High gain results in fewer amplifier stages and lower system design cost. |
| Excellent ESD: <ul style="list-style-type: none"> • HBM: class 1C (1000 to <2000V) • MM: class M1 (50 to <100V) | Built-in ESD protection makes this amplifier a robust product. |
| Usable gain unmatched 10 – 29 dB over 10 to 3600 MHz | Usable over octave bandwidths in balanced amplifiers. Refer to application note AN-60-066. |





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

| Parameter | Condition (MHz) | 900 MHz Match | | | Condition (MHz) | 2100 MHz Match | | | Units |
|---|-----------------|---------------|-------|------|-----------------|----------------|-------|------|-------|
| | | Min. | Typ. | Max. | | Min. | Typ. | Max. | |
| Frequency Range | | 869 | | 960 | | 2110 | | 2170 | MHz |
| Gain | 869 | | 21.6 | | 2110 | | 15.4 | | dB |
| | 920 | 19.1 | 21.2 | 23.3 | 2140 | 14.0 | 15.5 | 17.1 | |
| | 960 | | 20.7 | | 2170 | | 15.5 | | |
| Input Return Loss | 869 | | 10.8 | | 2110 | | 12.6 | | dB |
| | 920 | | 10.6 | | 2140 | | 14.6 | | |
| | 960 | | 9.9 | | 2170 | | 16.8 | | |
| Output Return Loss | 869 | | 10.7 | | 2110 | | 10.8 | | dB |
| | 920 | | 9.7 | | 2140 | | 10.6 | | |
| | 960 | | 9.2 | | 2170 | | 10.4 | | |
| Reverse Isolation | 869 - 920 | | 33.6 | | 2110 - 2170 | | 29.8 | | dB |
| Output Power at 1dB Compression ² | 869 | | +23.2 | | 2110 | | +23.7 | | dBm |
| | 920 | | +23.3 | | 2140 | | +23.8 | | |
| | 960 | | +23.3 | | 2170 | | +23.8 | | |
| Output Power at 3dB Compression | 869 | | +24.1 | | 2110 | | +24.8 | | dBm |
| | 920 | | +24.1 | | 2140 | | +24.9 | | |
| | 960 | | +24.1 | | 2170 | | +24.9 | | |
| Output IP3 | 869 | | +40.9 | | 2110 | | +41.3 | | dBm |
| | 920 | | +42.0 | | 2140 | | +41.1 | | |
| | 960 | | +43.6 | | 2170 | | +41.6 | | |
| Efficiency Power Added at P1dB (PAE) | 869 - 920 | | 45.4 | | 2110 - 2170 | | 50 | | % |
| Noise Figure | 869 | | 6.0 | | 2110 | | 5.5 | | dB |
| | 920 | | 6.0 | | 2140 | | 5.6 | | |
| | 960 | | 6.0 | | 2170 | | 5.3 | | |
| Device Operating Voltage (Vcc) | | +4.8 | +5.0 | +5.2 | | +4.8 | +5.0 | +5.2 | V |
| Device Operating Current ² | | | 99.1 | 119 | | | 99.1 | 119 | mA |
| Device Current Variation vs. Temperature ³ | | | 41 | | | | 66 | | μA/°C |
| Device Current Variation vs. Voltage | | | 0.040 | | | | 0.043 | | mA/mW |
| Thermal Resistance, junction-to-ground lead | | | 94.8 | | | | 94.8 | | °C/W |

1. Measured on Mini-Circuits Characterization test board TB-820+ (900 MHz match) and TB-821+ (2100 MHz match). See Characterization Test Circuit (Fig. 1).

2. Current with no RF or small signal, decreases by 10% typ with 900 MHz and increases by 10% typ with 2100 MHz match.

3. Current at 85°C — Current at -45°C/130



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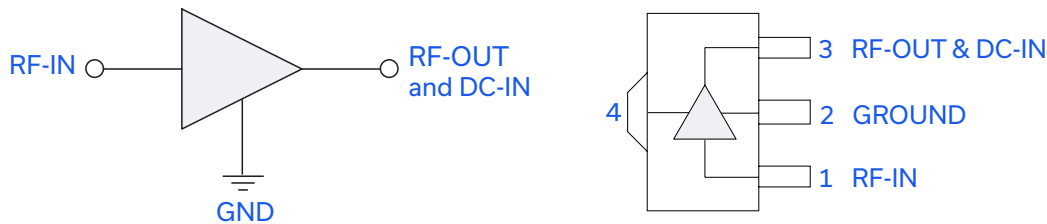
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MAXIMUM RATINGS⁴

| Parameter | Ratings | | |
|-------------------------------------|----------------|------------|----------------|
| Operating Temperature (ground lead) | -40°C to 85°C | | |
| Storage Temperature | -65°C to 150°C | | |
| Power Dissipation | 0.68 W | | |
| Input Power (CW) ⁽¹⁾ | 900 MHz | Continuous | 5 Minutes Max. |
| | 2100 MHz | +14 dBm | +30 dBm |
| DC Voltage on Pin 3 | +21 dBm | +30 dBm | +30 dBm |
| DC Voltage on Pin 3 | +6 V | | |

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

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. |



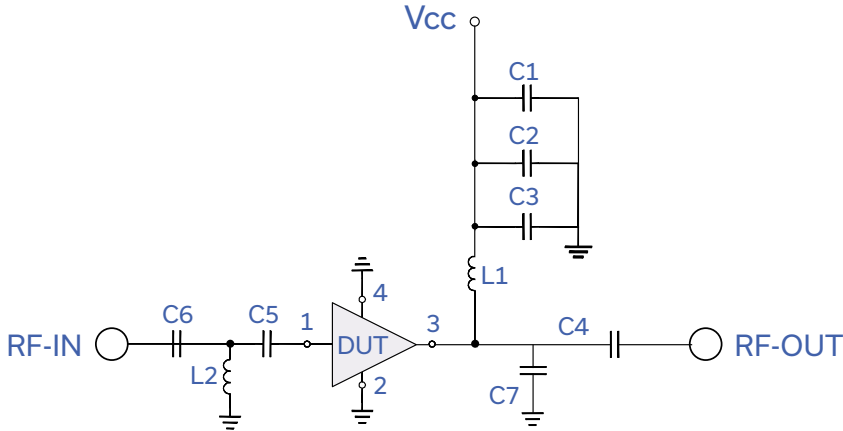
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CHARACTERIZATION TEST AND APPLICATION CIRCUIT



| Component | TB-820+ 896-920 MHz | | TB-821+ 2110-2170 MHz | |
|-----------|------------------------|------|--------------------------|------|
| | Value | Size | Value | Size |
| C1 | 10.0μF | 1206 | 10.0μF | 1206 |
| C2 | 0.1 μF | 0603 | 0.1 μF | 0603 |
| C3 | 10 pF | 0402 | 8.2 pF | 0402 |
| C4 | 100 pF | 0402 | 47 pF | 0402 |
| C5 | 5.6 pF | 0402 | 1.3 pF | 0402 |
| C6 | 100 pF | 0402 | 47 pF | 0402 |
| C7 | Not Used | | 0.5 pF | 0402 |
| L1 | 18 nH | 0603 | 9.5 nH | 0603 |
| L2 | 7.5 nH | 0402 | 2.2 nH | 0402 |

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-820+(869-960 MHz) and TB-821+(2110-2170 MHz)

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: $P_{IN} = -25\text{dBm}$
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 8 dBm/tone at output.

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 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) 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-370 |
| Evaluation Board | TB-820+ (869-960 MHz) TB-821+ (2110-2140 MHz) |
| Environmental Ratings | ENV08T1 |

ESD RATING

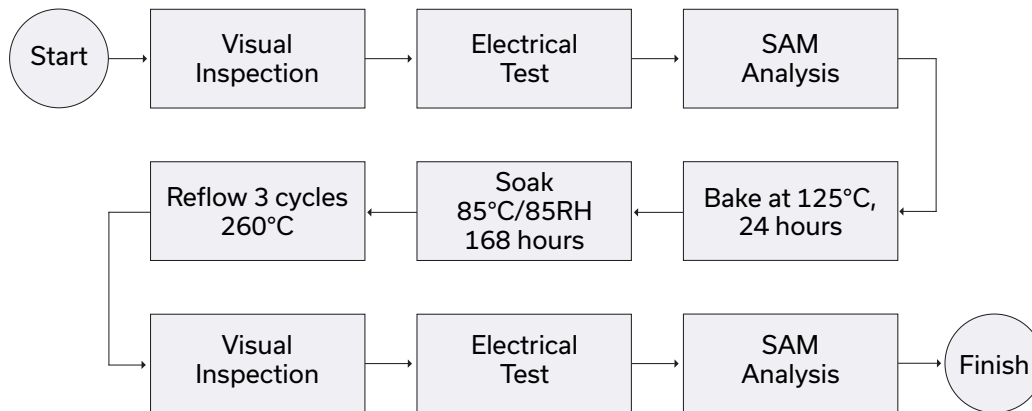
Human Body Model (HBM): Class 1C (1000 to <2000V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (Pass 75V) in accordance with ANSI/ESD STM5.2-2009

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

