



MEDIUM POWER, 0.3W

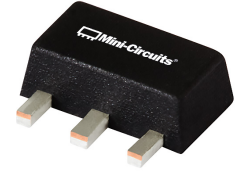
# Monolithic Amplifier

## GVA-92+

50Ω 869 - 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 10-3600 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 web site for RoHS Compliance 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"> <li>• 23.3 dBm over 869 – 960 MHz</li> <li>• 23.8 dBm over 2110 - 2170</li> </ul>	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"> <li>• 21.2 dB typ. at 920 MHz</li> <li>• 15.5 dB typ. at 2140 MHz</li> </ul>	High gain results in fewer amplifier stages and lower system design cost.
Excellent ESD: <ul style="list-style-type: none"> <li>• HBM: class 1C (1000 to &lt;2000V)</li> <li>• MM: class M1 (50 to &lt;100V)</li> </ul>	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.

REV. A  
ECO-010563  
GVA-92+  
TH/RS/CP  
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GVA-92+

Mini-Circuits

## ELECTRICAL SPECIFICATIONS<sup>(1)</sup> AT 25°C AND VCC=5V, 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 <sup>2</sup>	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 <sup>2</sup>			99.1	119			99.1	119	mA
Device Current Variation vs. Temperature <sup>3</sup>			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



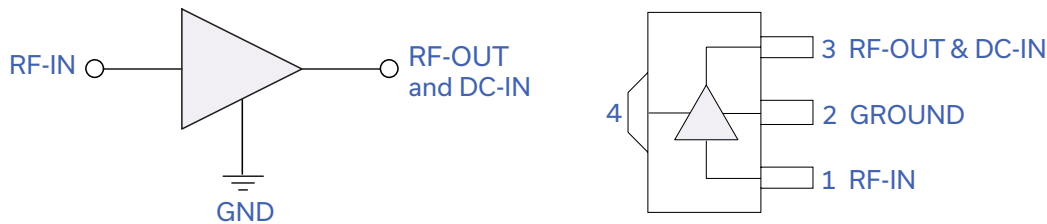
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### MAXIMUM RATINGS<sup>4</sup>

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) <sup>(1)</sup>	900 MHz	Continuous 21 dBm	5 Minutes Max. 30 dBm
	2100 MHz	23 dBm	30 dBm
DC Voltage on Pin 3	6V		

(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.

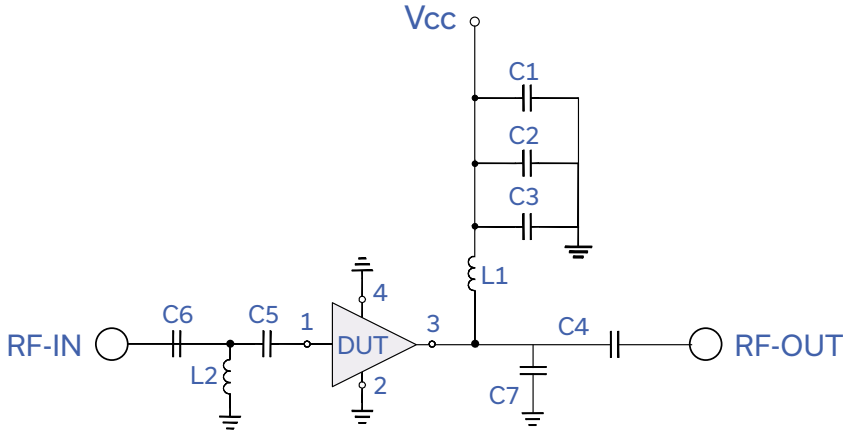


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## GVA-92+

### CHARACTERIZATION TEST AND APPLICATION CIRCUIT



Component	TB-820+ 896-920 MHz		TB-821+ 2110-2170 MHz	
	Value	Size	Value	Size
C1	10.0 $\mu$ F	1206	10.0 $\mu$ F	1206
C2	0.1 $\mu$ F	0603	0.1 $\mu$ F	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: Pin= -25dBm
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



HIGH POWER, 1W

# Monolithic Amplifier

GVA-92+

Mini-Circuits

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

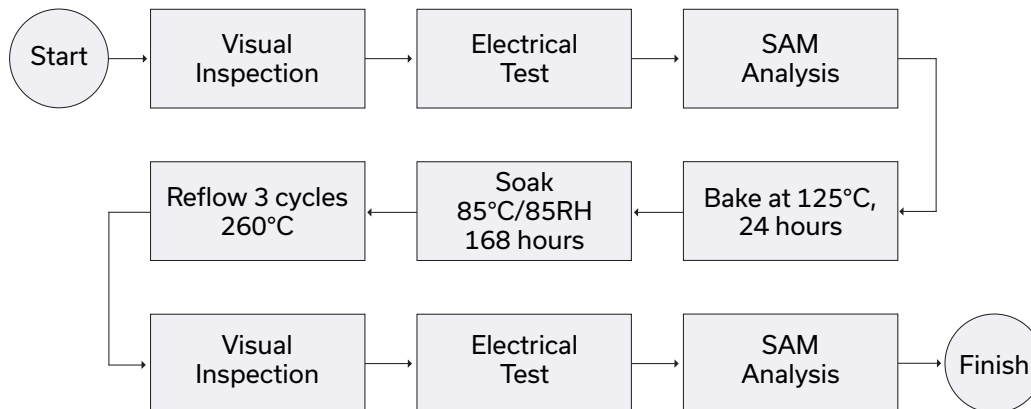
Human Body Model (HBM): Class 1C (1000 to <2000V) in accordance with ANSI/ESD STM 5.1 - 2001

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](http://www.minicircuits.com/MCLStore/terms.jsp)

