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

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

APPLICATIONS

- Base station infrastructure
- LTE
- WCDMA

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: • +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: • 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: • 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 SPECIFICATIONS[1] 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

Monolithic Amplifier GVA-92+

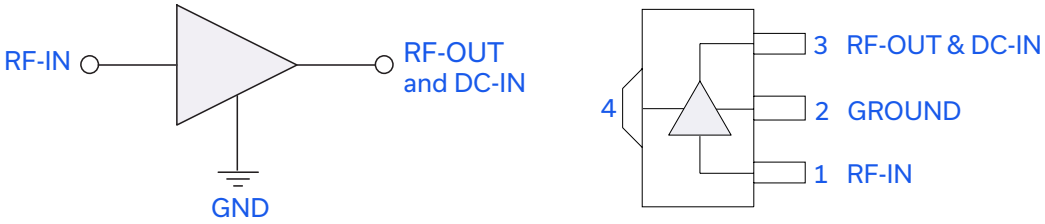
50Ω 869 to 2170 MHz

MAXIMUM RATINGS[4]

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)]		Continuous	5 Minutes Max.
	900 MHz	+14 dBm	+30 dBm
	2100 MHz	+21 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

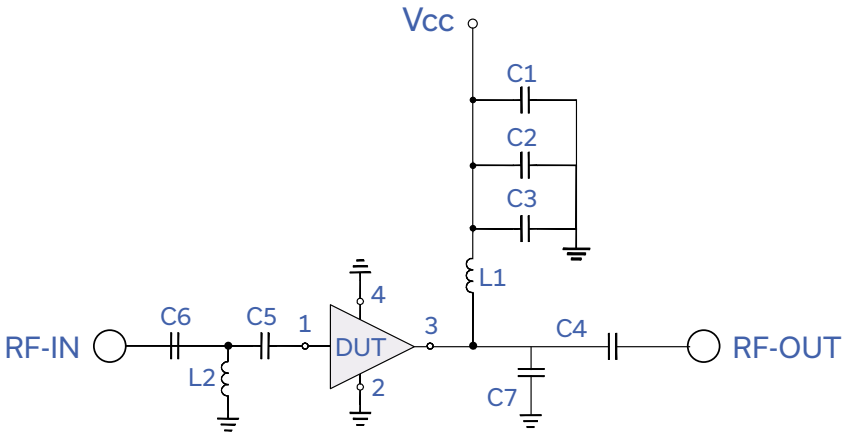


Function	Pin Number	Description
RF-IN	1	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	3	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. 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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50Ω 869 to 2170 MHz

CHARACTERIZATION TEST AND APPLICATION CIRCUIT



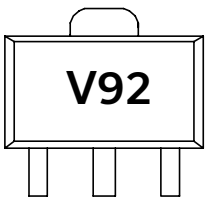
	TB-820+ 896-920 MHz		TB-821+ 2110-2170 MHz	
Component	Value	Size	Value	Size
C1	10.0µF	1206	10.0µF	1206
C2	0.1 µF	0603	0.1 µF	0603
C3	10 pF	0402	8.2 pF	0402
C4	100 pF	0402	47 pF	0402
C5	5.6 pF	0402	1.3 pF	0402
C6	100 pF	0402	47 pF	0402
C7	Not Used		0.5 pF	0402
L1	18 nH	0603	9.5 nH	0603
L2	7.5 nH	0402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

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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

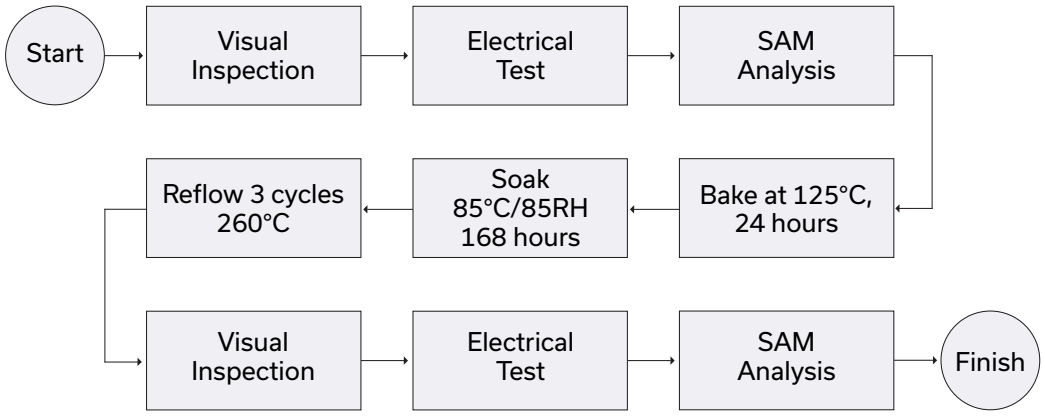
Human Body Model (HBM): Class 1C (1000 to <2000V) in accordance with ANSI/ESD STM 5.1 - 2001

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