

Dual Matched High Dynamic Range

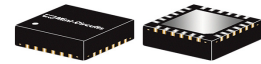
Monolithic Amplifier

MPGA-152+

50Ω 30 to 1500 MHz

The Big Deal

- High IP3
- High IP2
- 1.3W Output Power



4x4mm 24-lead, MCLP package

Product Overview

MPGA-152+ (RoHS compliant) is an advanced wideband dual amplifier fabricated using E-PHEMT* technology and offers extremely high dynamic range over a broad frequency range and with low noise figure and flat gain. In addition, the MPGA-152+ has excellent input and output return loss when used per suggested application circuit over a broad frequency range. It is enclosed in a 4x4mm, 24 lead MCLP package for very good thermal performance.

Key Features

Feature	Advantages
Broad Band: 0.03 to 1.5 GHz	Covers VHF, UHF bands
High IP3 Versus DC power Consumption: 48 dBm typical at 0.5 GHz	The MPGA-152+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and E-PHEMPT structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being typically 14-19 dB above the P 1dB point. This feature makes this amplifier ideal for use in CATV applications.
High IP2, 67 dBm at 0.5 GHz	Suppresses second order product on wideband applications such as CATV
Low Noise Figure, 2.7 dB at 0.5 GHz	Low noise figure performance in combination with the high output IP3 results in high dynamic range.



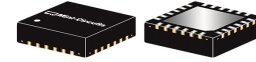
Dual Matched High Dynamic Range Monolithic Amplifier

MPGA-152+

50Ω 30 to 1500 MHz

Product Features

- High IP3, 48 dBm typ. at 0.5 GHz
- Gain, 14.9 dB typ. at 0.5 GHz
- High Pout, P1dB 31 dBm typ. at 0.5 GHz
- Low Noise Figure, 2.7 dB at 0.5 GHz
- Usable over 30-1800 MHz



Generic photo used for illustration purposes only

CASE STYLE: DG1847

+RoHS Compliant
The +Suffix Identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

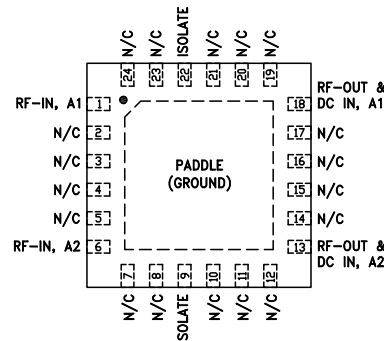
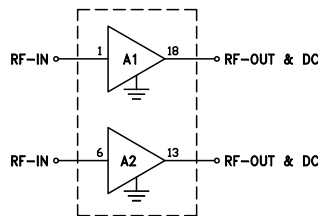
Typical Applications

- CATV
- Instrumentation
- Cellular infrastructure
- Military mobile
- VHF/UHF

General Description

MPGA-152+ (RoHS compliant) is an advanced wideband dual amplifier fabricated using E-PHEMT* technology and offers extremely high dynamic range over a broad frequency range and with low noise figure and flat gain. In addition, the MPGA-152+ has excellent input and output return loss when used per suggested application circuit over a broad frequency range. It is enclosed in a 4x4mm, 24 lead MCLP package for very good thermal performance.

simplified schematic and pad description



Function	Pad Number	Description
RF IN, A1	1	RF input pad. This pad requires the use of an external DC blocking capacitor
RF IN, A2	6	RF input pad. This pad requires the use of an external DC blocking capacitor
RF-OUT and DC-IN, A1	18	RF output and bias pad. DC voltage is present on this pad; 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. 1
RF-OUT and DC-IN, A2	13	RF output and bias pad. DC voltage is present on this pad; 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. 1
GND	Paddle	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.
N/C	2-5, 7, 8 10-12, 14-17, 19-21 23-24	No connection. Ground externally
Do not use	9, 22	Isolate on PCB trace

*Enhanced mode pseudomorphic High Electron Mobility Transistor.



Electrical Specifications¹ at 25°C, 50Ω unless noted

Parameter	Condition (GHz)	V _{DD} =9V (Note 1)			V _{DD} =8V (Note 1)			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency range		0.03		1.5	0.03		1.5	GHz
Gain	0.03		14.3			14.3		dB
	0.5		14.9			14.9		
	0.86	13.2	14.6	16.1	13.1	14.6	16.0	
	1.25	12.2	13.5	14.9	12.1	13.4	14.8	
	1.5		13.2			13.1		
Input return loss	0.03		11.7			11.7		dB
	0.5		26.5			26.4		
	0.86		20.5			20.5		
	1.25		10.7			10.5		
	1.5		9.9			9.8		
Output return loss	0.03		16.4			16.4		dB
	0.5		25.1			24.5		
	0.86		19.8			19.2		
	1.25		9.0			8.9		
	1.5		8.3			8.2		
Reverse isolation	1.0		22.4			22.4		dB
Output power @ 1dB compression	0.05		30.3			29.3		dBm
	0.5		30.9			29.9		
	0.85		29.6			28.4		
	1.25		28.3			27.1		
	1.5		28.5			27.3		
Output IP3 ²	0.05		47.3			48.5		dBm
	0.5		47.6			46.1		
	0.85		43.6			42.3		
	1.25		49.1			46.5		
	1.5		49.8			48.5		
Output IP2 ³	0.05		77.1			75.4		dBm
	0.5		66.8			67.5		
	0.85		71.0			65.3		
	1.25		71.6			67.6		
	1.5		59.5			57.5		
Noise figure	0.05		2.7			2.6		dB
	0.5		2.7			2.7		
	0.85		3.2			3.1		
	1.25		3.7			3.6		
	1.5		4.1			4.1		
Device operating voltage			9.0 ^[Note 5]			8.0 ^[Note 5A]		V
Supply operating current (Total)			-	407	450	358		mA
Device current variation vs temperature ⁴				56.7		64.9		μA/°C
Device current variation vs voltage				0.04892		0.04896		mA/mV
Thermal resistance, junction-to-ground lead				8.6		8.6		°C/W

1. Measured on Mini-Circuits Characterization Test board TB-MPGA-152+. PCB material Rogers 4350B. See Characterization Test Circuit (Fig. 1).

2. Measurements performed with P_{out}=5 dBm/tones, tones spaced 1 MHz apart.

3. Output IP2 measured at sum frequency of the two tones (f means= f1+f2).

4. (Current at 85°C - Current at -45°C)/130

5. Supply Voltage [V+]=12V

5A. V_{DD} applied at location indicated in Figure 1, bypassing rest of the circuit.

Absolute Maximum Ratings⁶

Parameter	Ratings
Operating Temperature (ground lead) ⁷	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Operating Current at 9.0V ⁷	464 mA
Power Dissipation ⁸	8.5 W
Input Power (CW) at 9V ⁸	+28 dBm (5 minutes) +25 dBm (continuous)
DC Voltage on Pad 13 & 18 ⁸	12V

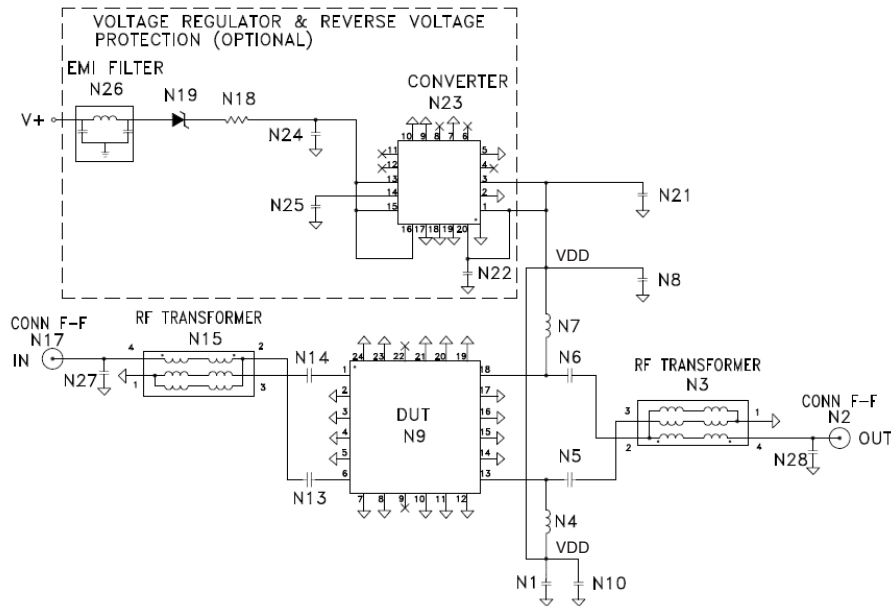
6. Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.

7. Max ratings measured on Mini-Circuits characterization test board MB012.

8. Max rating measured on Mini-Circuits characterization test fixture MF012.



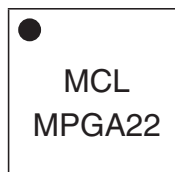
Application Circuit



Component	Value	Size	Manufacturer's P/N(s)
N9 (DUT)	Mini-Circuits MPGA-152+	4x4 mm	Mini-Circuits MPGA-152+
N1,N21,N24	Capacitor 10 μF	1206	MURATA P/N GRM31CR71E106KA12L
N3,N15	Mini-Circuits TRS1.5-182+	7.11x6.35 mm	Mini-Circuits TRS1.5-182+
N4,N7	Inductor 390 nH	0805	COILCRAFT P/N 0805CS-391XGLC
N5,N6,N13,N14	Capacitor 220 pF	0402	MURATA P/N GRM1555C1H221JA01D OR AVX 04025A221JAT2A
N8,N10	Capacitor .01 μF		MURATA P/N GRM155R71E103KA01D
N18	Resistor 4.32 Ohms, 1W	2512	KOA SPEER P/N RK73H3ATTE4R32F
N19	Diode Schottky SMA 40V MSL1	5.21x2.60 mm	ON SEMI P/N MBRA340T3G
N22	Capacitor 10 μF	1210	MURATA P/N GRM32ER7YA106KA12L
N23	Voltage Regulator QFN20 ADJ MSL2	5x5 mm	TEXAS INSTRUMENT P/N TPS7A4700RG-WT
N25	Capacitor 1 μF	0603	AVX P/N 0603YC105KAT2A
N26	EMI Filter	-	TUSONIX P/N 4201-601LF
N27,N28	Capacitor .50 pF	0402	MURATA P/N GJM1555C1HR50WB01D

Fig 1. Block Diagram of Application Circuit (DUT soldered on TB-MPGA-152+) due to 3V drop at the voltage regulator and reversed voltage protection circuit, V+=12V is needed to get 9V at DUT.

Product Marking



Marking may contain other features or characters for internal lot control

Additional Detailed Technical Information <i>additional information is available on our dash board. To access this information click here</i>	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DG1847 <i>Plastic package, exposed paddle lead finish: matt-tin</i>
Tape & Reel Standard quantities available on reel	F68 <i>7" reels with 20, 50, 100, 200, 500 or 1K devices</i>
Suggested Layout for PCB Design	PL-671
Evaluation Board	TB-MPGA-152+
Environmental Ratings	ENV08T1

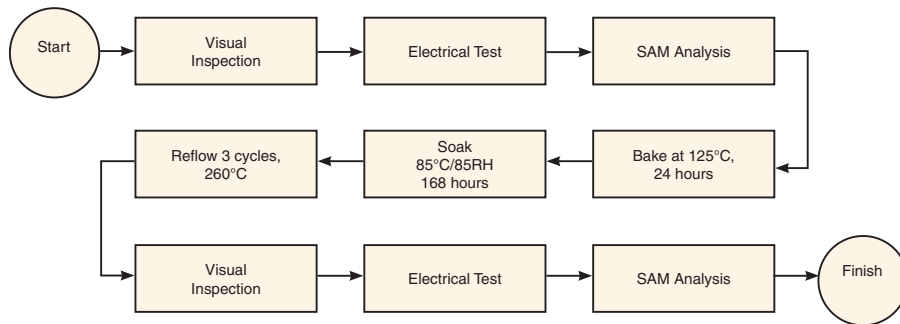
ESD Rating

Human Body Model (HBM): Class 1A (Pass 250V) in accordance with ANSI/ESD STM 5.1 - 2001

MSL Rating

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

MSL Test Flow Chart



Additional 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