Ultra High Dynamic Range

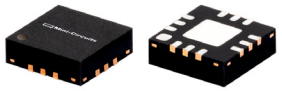
Monolithic Amplifier

LHA-83W+

50Ω 50 MHz to 8 GHz

The Big Deal

- Ultra Wideband, 0.05 - 8GHz
- Flatness 16.8±2.4dB typ.
- High Linearity, +23.3dBm P1dB & +35.1dBm OIP3
- Robust ESD performance (Class 1B)



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

Product Overview

The LHA-83W+ (RoHS compliant) is an advanced wideband amplifier fabricated using PHEMT technology and offers extremely high dynamic range over a broad frequency range and with excellent gain flatness. In addition, the LHA-83W+ has good input and output return loss over a broad frequency range. LHA-83W+ is enclosed in a 3x3mm, 12-lead MCLP package and has very good thermal performance.

Key Features

Feature	Advantages
Ultra Wideband: 50MHz to 8GHz	Broadband covering primary wireless communications bands
Extremely High IP3 35.4dBm typ. at 50 MHz 36.3 dBm typ. at 6 GHz	The LHA-83W+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and PHEMT Structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being approximately 12 dB above the P1dB point. This feature makes this amplifier ideal for use in: • Driver amplifiers for complex waveform up converter paths • Drivers in linearized transmit systems • Secondary amplifiers in ultra-High Dynamic range receivers
Excellent Gain Flatness	Typical ±2.4 dB gain flatness across the entire frequency range minimizes the need for external equalizer networks making it a great fit for instrumentation and EW application.

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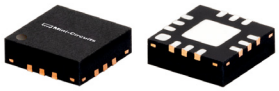
- Robust ESD performance (Class 1B)



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LHA-83W+

CASE STYLE: DQ1225

+RoHS Compliant

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

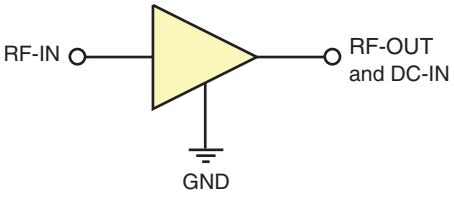
Typical Applications

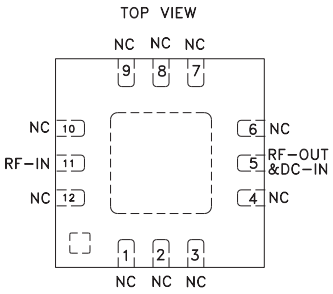
- WiFi
- WLAN
- LTE
- WiMAX
- S-band Radar
- C-Band Satcom

General Description

The LHA-83W+ (RoHS compliant) is an advanced wideband amplifier fabricated using PHEMT technology and offers extremely high dynamic range over a broad frequency range and with excellent gain flatness. In addition, the LHA-83W+ has good input and output return loss over a broad frequency range. LHA-83W+ is enclosed in a 3x3mm, 12-lead MCLP package and has very good thermal performance.

Simplified schematic and Pad description





Function	Pad Number	Description
RF-IN	11	RF input pin.
RF-OUT and DC-IN	5	RF Output and DC Bias
GND	Paddle	Connections to ground.
NC	1-4, 6-10 & 12	No connection, connected to ground externally on test board

Electrical Specifications at 25°C, 50Ω, unless noted

Parameter	Condition (MHz)	V_{DD}=9V[1]			V_{DD}=5V[1]	Vs=9V[2]	Vs=5V[2]	Units
		Min.	Typ.	Max.	Typ.	Typ.	Typ.	
Frequency Range		50		8000	50-8000	50-8000	50-8000	MHz
Gain	50	15	16.7	18.4	15.2	16.4	14.8	dB
	2000	14.9	16.7	18.3	14.8	16.4	14.3	
	4000	14.9	16.8	18.3	14.2	16.4	14	
	6000	15	16.7	18.4	12.7	16.3	12.7	
	8000		11.8		8.2	12.5	8.5	
Gain flatness	50-8000		2.4		3.5	1.95	3.1	dB
Input Return Loss	50		23.8		19.3	15.9	15.1	dB
	2000		25.7		16.4	17.1	12.3	
	4000		23.5		18.5	20.1	15.3	
	6000		13.9		12.2	22.3	15.7	
	8000		2.2		3.4	2.8	4.2	
Output Return Loss	50		17.8		28.8	13.4	18.1	dB
	2000		28.1		19.8	24.8	15.1	
	4000		20.4		15.6	22.4	19.7	
	6000		33.8		10.6	20.4	13.4	
	8000		3.9		4.5	5.7	5.8	
Output Power @1dB compression	50		23.6		15.9	23.2	15.5	dBm
	2000		23.8		16.3	22.8	15.2	
	4000		23.3		16.1	23	15.5	
	6000		22.2		15.8	22.1	16	
	8000		17.5		12.2	17	11.6	
Output IP3 (Pout = 0dBm/Tone)	50		35.4		23	35	22.9	dBm
	2000		35.7		23.5	34.7	22.4	
	4000		35.1		22.9	34.4	22.8	
	6000		36.3		22.7	35	24.3	
	8000		30.6		19.5	30.6	19.7	
Noise Figure	50		3.2		2.8	3.3	2.8	dB
	2000		2.7		2.5	2.8	2.6	
	4000		3.1		2.9	3.1	2.9	
	6000		3.8		3.5	3.8	3.5	
	8000		4.9		4.6	4.9	4.6	
Device Operating Voltage		8.5	9	9.5	5	9	5	V
Device Operating Current			105	127	39.6	104	39	mA
Device Current Variation vs. Temperature[3]			38.5		38.5	38.5	38.5	µA/°C
Device Current Variation vs. Voltage[4]			0.017		0.016	0.017	0.016	mA/mV
Thermal Resistance Junction-To-Ground Lead at 85°C stage temperature			41		41	41	41	°C/W

1. Measured on Mini-Circuits Characterization Test Board TB-LHA-83W+. See Characterization Test Circuit (Figure 1).
2. Measured on Mini-Circuits Application Evaluation Board TB-LHA-83WE+. See Application Test Circuit (Figure 2).
3. Device Current Variation vs. Temperature= (Current at 85°C - Current at -45°C)/130
4. Device Current Variation vs. Voltage = (Current at 9.5V - Current at 8.5V) / ((9.5V-8.5V)*1000 mV/V)

Absolute Maximum Ratings[5]

Parameter	Ratings
Operating temperature (ground lead)	-40°C to 85°C
Storage temperature	-65°C to 150°C
Power dissipation	1.58W
Input power (CW)	18 dBm (continuous) 24 dBm (5 minutes max)
DC voltage on Pin 5	10.5V

5. Permanent damage may occur if any of these limits are exceeded.

Characterization Test Circuit

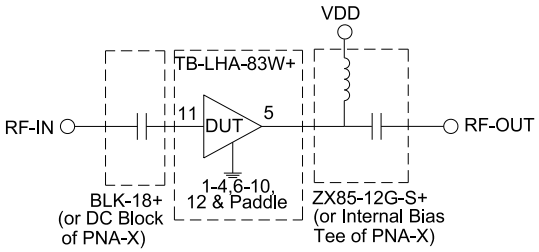
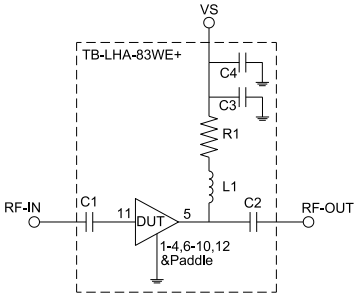


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-LHA-83W+)
Gain, Return loss, Output power at 1dB compression (P1dB) , output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return loss: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.

Application Test Circuit

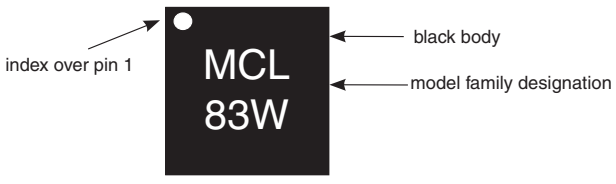


Component	Size	Value	Part Number	Manufacturer
C1	0402	1000pF	GRM1555C1H102JA01D	Murata
C2	0402	180pF	GRM1555C1H181JA01D	Murata
C3	0402	10000pF	GRM155R71E103KA01D	Murata
C4	0402	0.1uF	GRM155R71C104KA88D	Murata
L1	0603	330nH	LQW18CNR33J00D	Murata
R1	0402	20hm	RK73H1ETTP2R00F	Koa

Fig 2. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Application test board TB-LHA-83WE+)
Gain, Return loss, Output power at1dB compression (P1dB), 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.

Product Marking



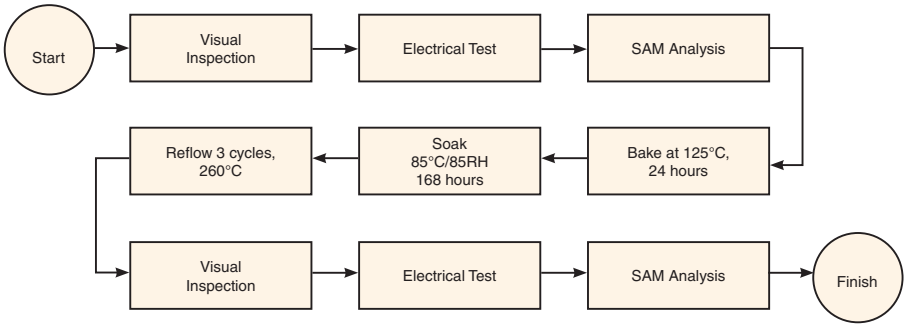
Marking may contain other features or characters for internal lot control

Additional Detailed Technical Information *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	DQ1225 *Plastic package, exposed paddle, lead finish: Matte-Tin*
Tape & Reel **Standard quantities available on reel**	F66 *7" reels with 20, 50, 100, 200, 500,1K or 2K devices*
Suggested Layout for PCB Design	PL-660
Evaluation Board	TB-LHA-83WE+
Environmental Ratings	ENV08T1

ESD Rating

Human Body Model (HBM): Class 1B(500 to <1000V) in accordance with ANSI/ESD STM 5.1 - 2001

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

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LHA-83W+