ULTRA HIGH DYNAMIC RANGE

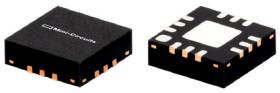
Monolithic Amplifier

LHA-83W+

50Ω 50 MHz to 8 GHz

THE BIG DEAL

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



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

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

APPLICATIONS

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

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, along 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 3x3 mm 12-lead QFN-style package and has very good thermal performance.

KEY FEATURES

Feature	Advantages
Ultra Wideband: 50 MHz to 8 GHz	Broadband covering primary wireless communications bands.
Extremely High IP3 +35.4 dBm 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 upconverter 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 applications.

REV. B
ECO-026525
LHA-83W+
MCL NY
250812

Monolithic Amplifier LHA-83W+

50Ω 50 MHz to 8 GHz

ELECTRICAL SPECIFICATIONS[1] AT +25°C, 50Ω, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	V_{DD} = +9 V[1] Min.	V_{DD} = +9 V[1] Typ.	V_{DD} = +9 V[1] Max.	V_{DD} = +5 V[1] Typ.	V_S = +9 V[2] Typ.	V_S = +5 V[2] Typ.	Units
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 @ 1 dB 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 (P_{OUT} = 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 (V_{DD} or V_S)		+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

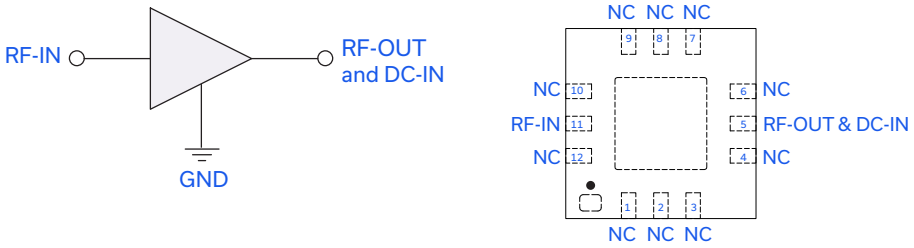
1. Measured on Mini-Circuits Characterization Test Board TB-LHA-83W+. See Characterization Test Circuit (Figure 1).
2. Measured on Mini-Circuits Application Evaluation Board TB-LHA-83WE+. See Application Test Circuit (Figure 2).
3. Device Current Variation vs. Temperature = (Current at +85°C - Current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

ABSOLUTE MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature (Ground Lead)	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Power Dissipation	1.58 W
Input Power (CW)	+18 dBm (continuous) +24 dBm (5 minutes max.)
DC Voltage on Pin 5	+10.5 V

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

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

CHARACTERIZATION TEST CIRCUIT

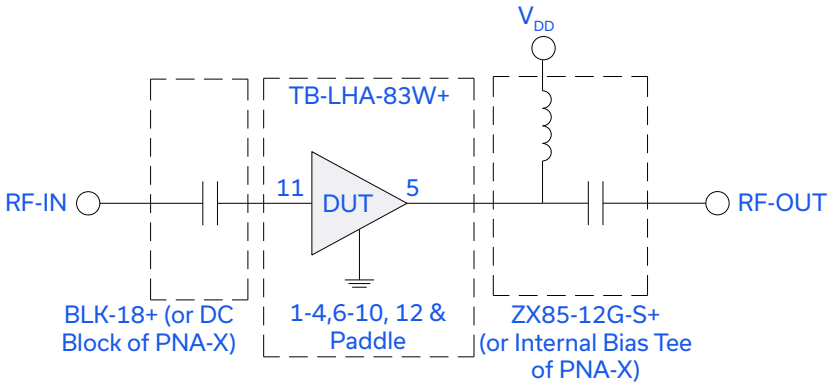
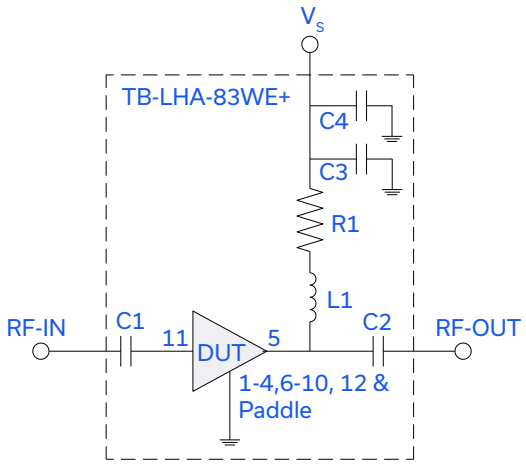


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-LHA-83W+) Gain, Return Loss, Output Power at 1 dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

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

APPLICATION TEST CIRCUIT

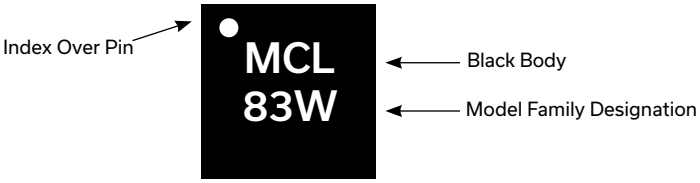


Component	Size	Value	Part Number	Manufacturer
C1	0402	1000pF	GRM1555C1H102JA01D	Murata
C2	0402	180pF	GRM1555C1H181JA01D	Murata
C3	0402	10000pF	GRM155R71E103KA01D	Murata
C4	0402	0.1uF	GRM155R71C104KA88D	Murata
L1	0603	330nH	LQW18CNR33J00D	Murata
R1	0402	20hm	RK73H1ETTP2R00F	Koa

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 at 1 dB Compression (P1dB), 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 dBm
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 IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data	Data Table Swept Graphs
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, 1000, 2000, or 3000 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 <1000 V) in accordance with ANSI/ESD STM 5.1 - 2001

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

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/terms/viewterm.html