



LOW NOISE, WIDEBAND, HIGH IP3

# Monolithic Amplifier

# PMA3-83LNW+

50Ω 0.4 to 8.0 GHz

## THE BIG DEAL

- Flat gain over wideband, 0.4 to 8 GHz
- Low noise figure, 1.2 dB at 2 GHz
- High IP3, up to +37 dBm at 2 GHz
- High Pout, P1dB 21.7 dBm typ. at 2 GHz and 6V
- Excellent gain flatness, ±0.6 dB over 0.4 to 7 GHz and 6V



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

### +RoHS Compliant

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

## APPLICATIONS

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

## PRODUCT OVERVIEW

The PMA3-83LNW+ is a PHEMT based wideband, low noise MMIC amplifier with a unique combination of low noise, high IP3, and flat gain over wideband making it ideal for sensitive, high-dynamic-range receiver applications. This design operates on a single 5V or 6V supply, is well matched for 50Ω and comes in a tiny, low profile package (3 x 3 x 0.89mm), accommodating dense circuit board layouts.

## KEY FEATURES

Feature	Advantages
Low noise, 1.2 dB at 2 GHz	Enables lower system noise figure performance.
High IP3 <ul style="list-style-type: none"> <li>• +37 dBm at 2 GHz</li> <li>• +29 dBm at 8 GHz</li> </ul>	Combination of low noise and high IP3 makes this MMIC amplifier ideal for use in low noise receiver front end (RFE) as it gives the user advantages of sensitivity and two-tone IM performance at both ends of the dynamic range.
Low operating voltage, 5V/6V.	Achieves high IP3 using low voltage.
3 x 3mm 12-lead MCLP package	Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.
Wide bandwidth with flat gain <ul style="list-style-type: none"> <li>• ±0.6 dB over 0.4 to 7 GHz</li> <li>• ±1.5 dB over 0.4 to 8 GHz</li> </ul>	Enables a single amplifier to be used in many wideband applications including defense, instrumentation and more.

REV. A  
ECO-010881  
PMA3-83LNW+  
MCL NY  
211201





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Mini-Circuits

## ELECTRICAL SPECIFICATIONS<sup>1</sup> AT 25°C, UNLESS NOTED

Parameter	Condition (GHz)	$V_{DD}=6.0$			$V_{DD}=5.0$			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range		0.4		8.0	0.4		8.0	GHz
Noise Figure	0.4		2.0			2.0		dB
	2.0		1.2			1.2		
	4.0		1.3			1.4		
	5.0		1.5			1.6		
	8.0		2.2			2.2		
Gain	0.4	19.8	22.0	23.9	18.9	21.1	22.9	dB
	2.0		22.6			21.7		
	4.0	19.5	21.8	23.6	18.8	21.0	22.8	
	5.0		21.3			20.6		
	8.0	16.9	19.0	20.5	16.5	18.6	20	
Input Return Loss	0.4		10			10		dB
	2.0		17			18		
	4.0		12			11		
	5.0		11			10		
	8.0		7			7		
Output Return Loss	0.4		22			22		dB
	2.0		14			16		
	4.0		24			24		
	5.0		19			18		
	8.0		10			9		
Output Power at 1dB Compression	0.4		18.8			16.2		dBm
	2.0		21.7			20.5		
	4.0		20.4			18.9		
	5.0		20.2			18.8		
	8.0		18.1			17.3		
Output IP3	0.4		32.2			28.7		dBm
	2.0		37.0			31.1		
	4.0		34.5			30.1		
	5.0		32.0			28.6		
	8.0		29.0			26.8		
Device Operating Voltage ( $V_{DD}$ )		5.75	6	6.75	4.75	5	5.25	V
Device Operating Current ( $I_{DD}$ )			75	94		58		mA
Device Current Variation vs. Temperature <sup>2</sup>			-190			-143		$\mu\text{A}/^\circ\text{C}$
Device Current Variation vs. Voltage			0.017			0.017		mA/mV
Thermal Resistance, junction-to-ground lead			47			47		$^\circ\text{C}/\text{W}$

1. Measured on Mini-Circuits Characterization test board TB-PMA3-83LNW+. See Characterization Test Circuit (Fig. 1)  
 2. (Current at 105°C - Current at -45°C)/130



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# PMA3-83LNW+

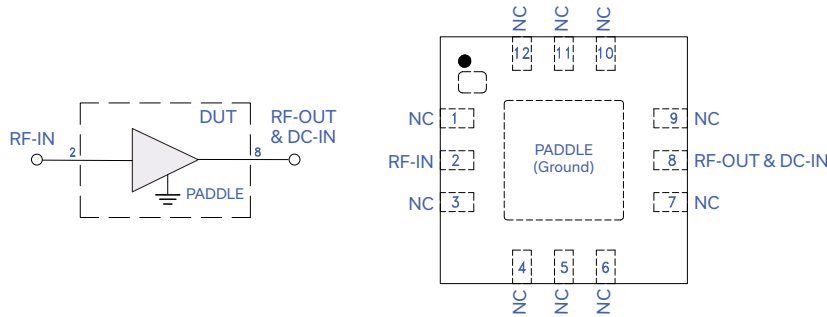
## MAXIMUM RATINGS<sup>3</sup>

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 105°C
Storage Temperature	-65°C to 150°C
Junction Temperature	150°C
Total Power Dissipation	0.95 W
Input Power (CW), Vd=5,6V <sup>4</sup>	+19 dBm (5 minutes max) +9 dBm (continuous, 0.4-0.5 GHz) +16 dBm (continuous, 0.5-8 GHz)
DC Voltage	7 V

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

4. Measured on Mini-Circuits test board, TB-PMA3-83LNW+

## SIMPLIFIED SCHEMATIC & PAD DESCRIPTION



Function	Pad Number	Description (Fig. 1)
RF-IN	2	Connects to RF input and to ground via L1 (optional blocking capacitor of 100pF may be used)
RF-OUT & DC-IN	8	Connects to RF out via C3 and V <sub>DD</sub> via L2
Ground	Paddle	Connects to ground
No Connection	1,3 to 7, 9 to 12	Not used internally. Connected to ground on test board (except 11 and 12)



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## PMA3-83LNW+

### RECOMMENDED APPLICATION AND CHARACTERIZATION TEST CIRCUIT

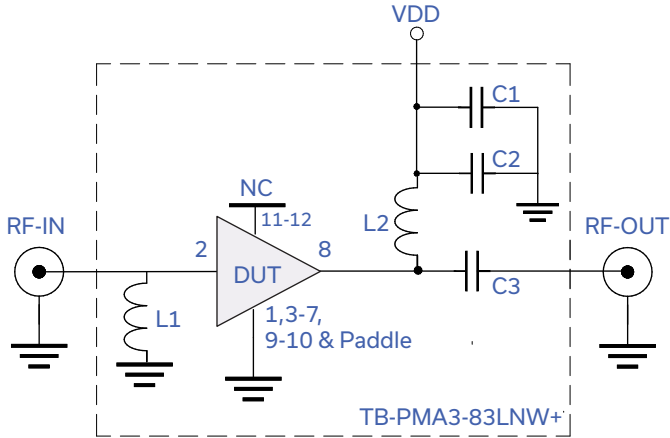


Fig 1. Application and Characterization Circuit

Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-PMA3-83LNW+)

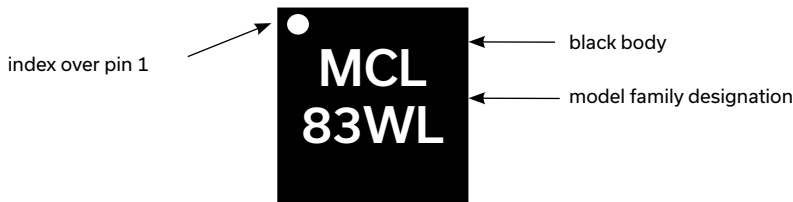
Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:

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

Component	Size	Value	Part Number	Manufacturer
L1	0402	18nH	LQP15MN18NJ02D	Murata
L2	0402	39nH	0402CS-39NXGLW	Coilcraft
C1	0402	0.01uF	GRM155R71E103KA01D	Murata
C2	0402	10pF	GJM1555C1H100JB01D	Murata
C3	0402	100pF	GRM1555C1H101JA01D	Murata

### PRODUCT MARKING



Marking may contain other features or characters for internal lot control



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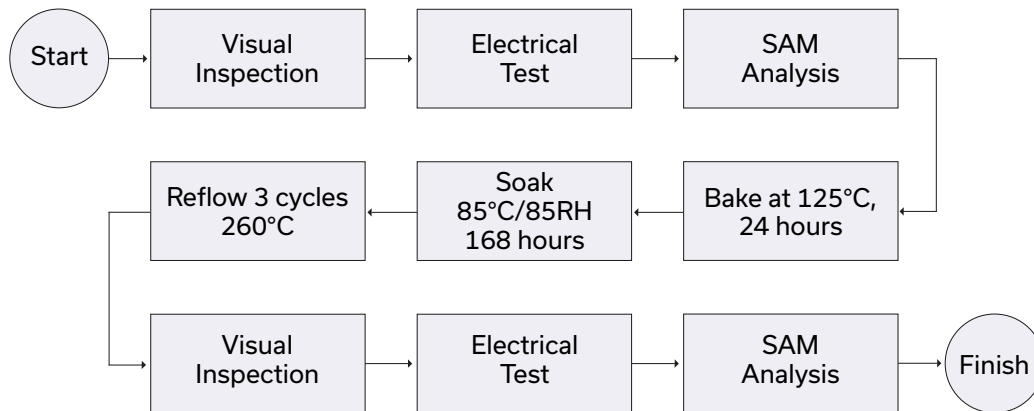
ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS [CLICK HERE](#)

Performance Data	Data Table graphs, s-parameter 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-628
Evaluation Board	TB-PMA3-83LNW+
Environmental Ratings	ENV08T1

### ESD RATING

Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

### 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)

