

Low Noise, Wideband, Low Current

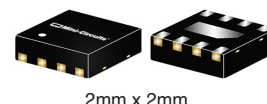
# Monolithic Amplifier

PMA2-123LN5+

50Ω 0.5 to 12 GHz

## The Big Deal

- Ultra wideband, 0.5 to 12 GHz
- Excellent noise figure, 1.8 dB at 12 GHz
- Low Current, 30mA
- Usable up to 18 GHz



## Product Overview

The PMA2-123LN5+ is a E-PHEMT based wideband, low noise MMIC amplifier with a unique combination of low noise, high IP3, and low current making it ideal for sensitive, high-dynamic-range receiver applications. This design operates on a single 5V supply, is well matched for 50Ω and comes in a tiny, low profile package (2 x 2 mm, 8 lead MCLP), accommodating dense circuit board layouts.

## Key Features

Feature	Advantages
Excellent Noise Figure up to 18 GHz <ul style="list-style-type: none"><li>• 1.8 dB typ. at 12GHz</li><li>• 2.4 dB typ. at 18 GHz</li></ul>	Enables lower system noise figure performance.
High IP3 <ul style="list-style-type: none"><li>• +24 dBm at 0.5 GHz</li><li>• +24.1 dBm at 12 GHz</li></ul>	Combination of low noise figure 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 & current 5V & 30mA	Low voltage & current consumption is ideal for use in amplifier chain.
2 x 2mm 8-lead MCLP package	Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.



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### Typical Applications

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



Generic photo used for illustration purposes only

CASE STYLE: MC1631

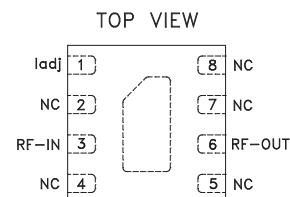
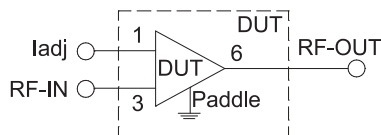
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### General Description

The PMA2-123LN5+ is a E-PHEMT based wideband, low noise MMIC amplifier with a unique combination of low noise, high IP3, and low current making it ideal for sensitive, high-dynamic-range receiver applications. This design operates on a single 5V supply, is well matched for 50Ω and comes in a tiny, low profile package (2 x 2 mm, 8 lead MCLP), accommodating dense circuit board layouts.

### simplified schematic & pad description



Function	Pad Number	Description (See Figure 1)
RF-IN	3	Connects to RF input via a blocking capacitor.
RF-OUT & DC-IN	6	Connects to RF out and $V_{DD}$ via Bias-Tee & 68.1 Ohm resistor
Ground	Paddle	Connects to ground
No Connection	2,4,5,7,8	Not used internally. Connected to ground on Test Board.
Iadj	1	Current adjust pad. This pad connects to ground on test board.

Electrical Specifications<sup>1</sup> at 25°C, unless noted

Parameter	Condition (GHz)	V <sub>DD</sub> =5.0			Units
		Min.	Typ.	Max.	
Frequency Range		0.5		12	GHz
Noise Figure	0.5		1.4		dB
	5		1.2		
	10		1.6		
	12		1.8		
	18		2.4		
Gain	0.5	16.0	17.7	19.5	dB
	5	—	15.1	—	
	10	9.7	11.6	13.4	
	12	9.0	10.7	12.5	
	18	—	7.6	—	
Reverse Isolation	10	—	24.4	—	dB
Input Return Loss	0.5		6		dB
	5		10		
	10		10		
	12		10		
	18		7		
Output Return Loss	0.5		12		dB
	5		17		
	10		12		
	12		11		
	18		6		
Output Power at 1dB Compression <sup>2</sup>	0.5		12.3		dBm
	5		12.2		
	10		11.6		
	12		11.5		
	18		9.6		
Output IP3	0.5		24.0		dBm
	5		23.4		
	10		23.5		
	12		24.1		
	18		21.6		
Device Operating Voltage (V <sub>DD</sub> )			5		V
Device Operating Current (I <sub>DD</sub> )		—	30	47	mA
Device Current Variation vs. Temperature <sup>2</sup>			7.69		μA/°C
Device Current Variation vs. Voltage			0.008		mA/mV
Thermal Resistance, junction-to-junction			69.8		°C/W

1. Measured on Mini-Circuits Characterization Test Board TB-PMA2-123LN5+. See Characterization Test Circuit (Fig. 1)

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

Absolute Maximum Ratings<sup>3</sup>

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Junction Temperature	131°C
Total Power Dissipation	0.65W
Input Power (CW), V <sub>d</sub> =5V <sup>4</sup>	+24 dBm (5 minutes max.) +7 dBm (continuous)
DC Voltage	7V

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-PMA2-123LN5+



Characterization Test Circuit

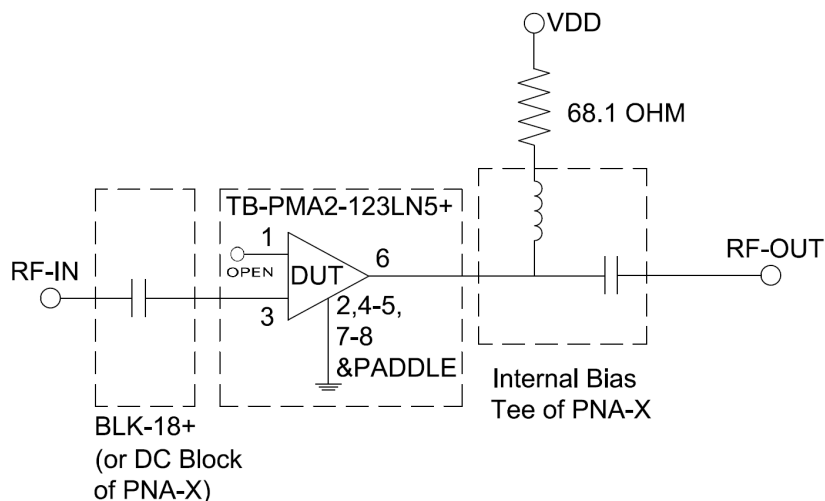


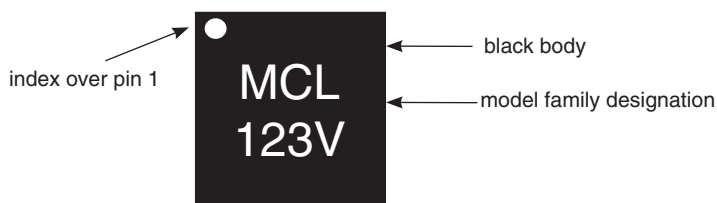
Fig 1. Application and Characterization Circuit

Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-PMA2-123LN5+) 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, -5dBm/tone at output.

Product Marking



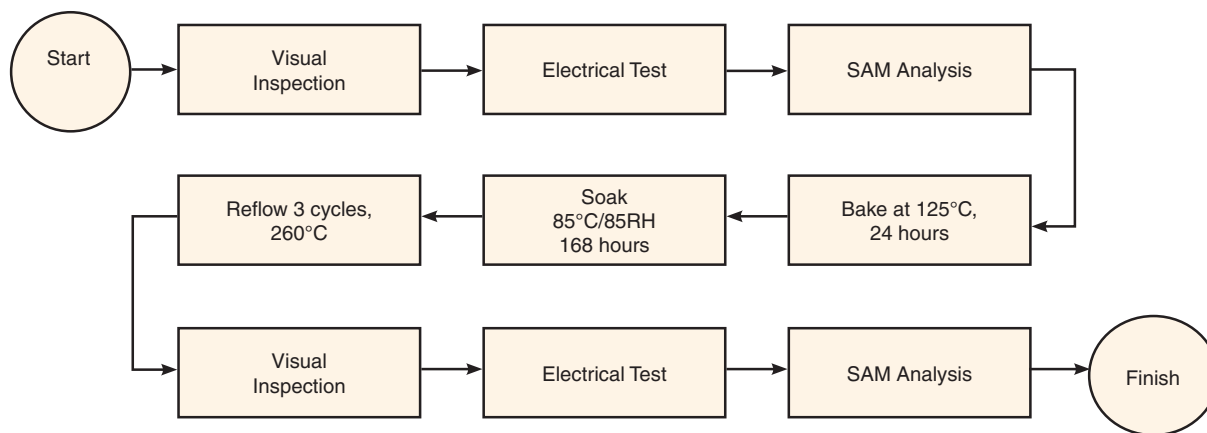
Marking may contain other features or characters for internal lot control

Additional Detailed Technical Information	
<i>additional information is available on our dash board. To access this information <a href="#">click here</a></i>	
<b>Performance Data</b>	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
<b>Case Style</b>	MC1631-1 <i>Plastic package, exposed paddle, lead finish: Matte-Tin</i>
<b>Tape &amp; Reel</b> Standard quantities available on reel	F66 <i>7" reels with 20, 50, 100, 200, 500, 1K or 2K devices</i>
<b>Suggested Layout for PCB Design</b>	PL-626
<b>Evaluation Board</b>	TB-PMA2-123LN5+
<b>Environmental Ratings</b>	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



### 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.
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