Ultra Low Noise, High IP3

Monolithic Amplifier PMA2-252LN+

50Ω 1.5 to 2.5 GHz

2mm x 2mm

The Big Deal

- Ultra Low Noise Figure, 0.8 dB
- High Gain, High IP3, +30 dBm
- Adjustable Current, 25 to 80 mA
- May be used as a replacement for MGA-632P8[a,b]

Product Overview

Mini-Circuits PMA2-252LN+ is a E-PHEMT based Ultra-Low Noise MMIC Amplifier with a unique combinations of low noise and high IP3 making this amplifier ideal for sensitive high dynamic range receiver applications. This design operates on a single 3 to 4V supply.

Key Features

Feature	Advantages
Ultra Low Noise, 0.8 dB at 1.8 GHz	Excellent noise figure performance. Increases signal to noise ratio.
High IP3, +30 dBm at 1.8 GHz	Combining 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 at both ends of the dynamic range: sensitivity & two-tone IM performance.
Adjustable Current	Provides users ability to set current consumption over a wide range from 25 to 80 mA.
2mm x 2mm 8 lead MCLP Package	Low Inductance, repeatable transitions, excellent thermal contact to PCB
Max Input Power, +27 dBm	Ruggedized design operates up to high input powers often seen at Receiver inputs eliminating the need for an external limiter.
High Reliability	Low, small signal operating current of 57 mA nominal maintains junction temperatures typically below 100°C at 85°C ground lead temperature.

Notes:
a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
b. The Avago MGA-632P8 part number is used for identification and comparison purposes only.

Ultra Low Noise, High IP3

Monolithic Amplifier

1.5-2.5 GHz

Product Features

- Low Noise figure, 0.8 dB at 1.8 GHz
- High IP3, 30 dBm typ. at 1.8 GHz
- P1dB 17.9 dBm typ. at 1.8 GHz
- Adjustable Current, 25 to 80 mA
- Adjustable Gain, ±1.5 dB
- Active Bias

PMA2-252LN+

CASE STYLE: MC1631

+RoHS Compliant

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

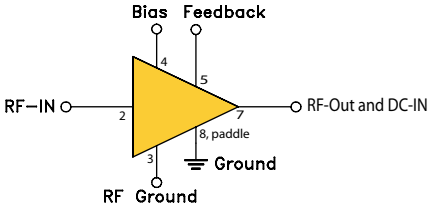
Typical Applications

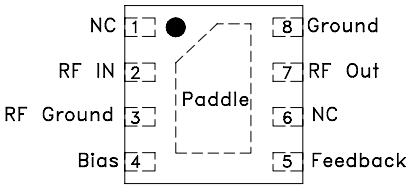
- Base station infrastructure
- Satellite Communication (Inmarsat)
- LTE
- GPS
- Tactical Air Navigation

General Description

The PMA2-252LN+ (RoHS compliant) amplifier is fabricated using E-PHEMT technology and offers extremely high dynamic range with ultra low noise figure and good input and output return loss. It has repeatable performance from lot to lot and is enclosed in a 2mm x 2mmx 0.55mm package for very good thermal performance.

simplified schematic and pad description





Top View

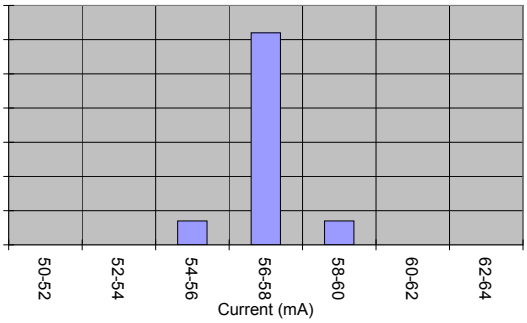
Function	Pad Number	Description (Ref: Figure1)
RF IN	2	Connects to RF input via C1 and Pad 3 via L1
RF-OUT	7	Connects to RF out via C2, Pad 5 via R1 and C3
RF-Ground	3	Connects to ground via C4 and Pad 2 via L1
Bias	4	Connects to Supply voltage (Vs) via Rbias
Feedback	5	Connected to pads via R1 and C3
No Connection	1,6	Not used internally. Pin 1 Connected to ground on test board
Ground	8 & paddle	Connects to ground

Electrical Specifications[1] at 25°C, unless noted

Parameter	Condition (GHz)	Vs=4V			Vs=3V	
		Min.	Typ.	Max.	Typ.	Units
Frequency Range		1.5		2.5		GHz
Noise Figure	1.5		0.7		0.7	dB
	1.8		0.8		0.8	
	2.0		0.8		0.9	
	2.2		0.8		1.1	
	2.5		1.2		1.1	
Gain	1.5	—	19.5	—	18.8	dB
	1.8	—	18.6	—	17.8	
	2.0	15.8	17.6	19.5	16.8	
	2.2	—	16.5	—	15.7	
	2.5	—	15.7	—	14.8	
Input Return Loss	1.5		21.3		17.5	dB
	1.8		19.9		15.4	
	2.0		18.0		14.4	
	2.2		16.3		13.4	
	2.5		14.9		13.0	
Output Return Loss	1.5		10.0		10.8	dB
	1.8		23.3		28.5	
	2.0		18.2		16.9	
	2.2		12.9		11.9	
	2.5		8.3		7.9	
Output Power @1 dB compression[2]	1.5		18.5		16.2	dBm
	1.8		17.9		15.9	
	2.0		17.8		15.6	
	2.2		17.4		15.3	
	2.5		16.2		13.9	
Output IP3	1.5		31.1		27.1	dBm
	1.8		30.1		25.5	
	2.0		30.0		25.3	
	2.2		29.3		24.8	
	2.5		27.6		23.2	
Device Operating Voltage		3.8	4.0	4.2	3.0	V
Device Operating Current at typical voltage[2]			57	70	41	mA
Device Current variation vs. Temperature at typical voltage[3]			-19.0		-3.4	µA/ºC
Device Current Variation vs Voltage			0.018		0.017	mA/mV
Thermal Resitance			53		53	ºC/W

[1] Measured on Mini-Circuits Characterization test board TB-642+. See Characterization Test Circuit (Fig. 1) R1=825Ω, R_{BIAS}=619Ω
[2] Current increases at P1dB
[3] (Current at 85°C - Current at -45°C)/130

DC Current Histogram at Vs=4V



Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Junction Temperature	150°C
Total Power Dissipation	0.55W
Input Power (CW), Vs=3V or 4V	+25 dBm (5 minutes max), +20 dBm (continuous)
DC Voltage (Vs)	5.5 V

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

Recommended Application and Characterization Test Circuit

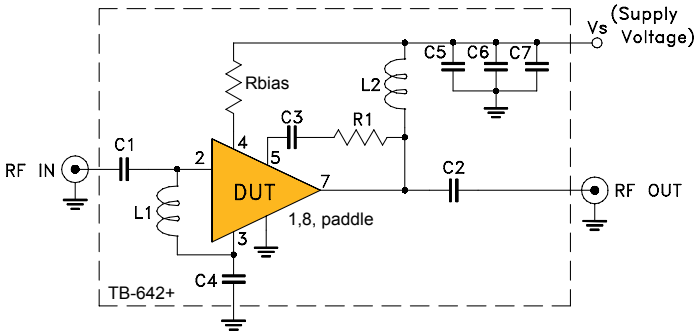
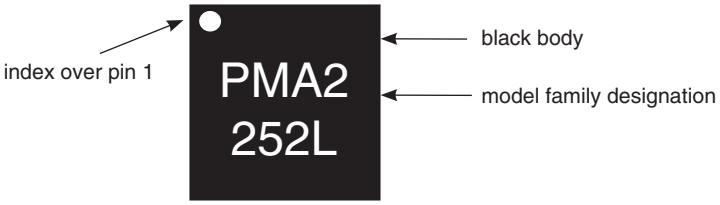


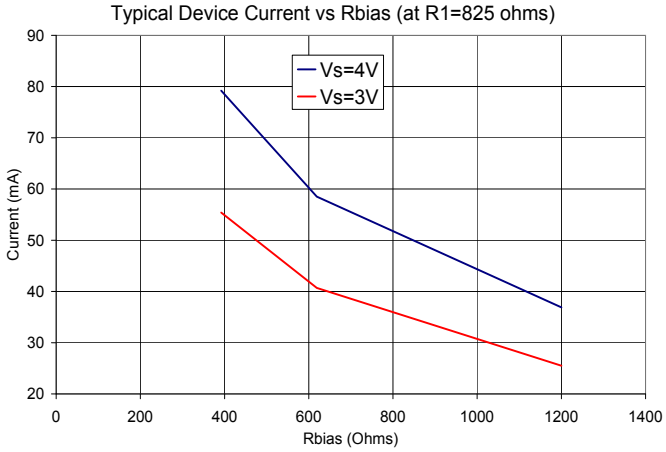
Fig 1. Application and Characterization circuit
Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-642+)

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 2.5 MHz apart, 2 dBm/tone at output.

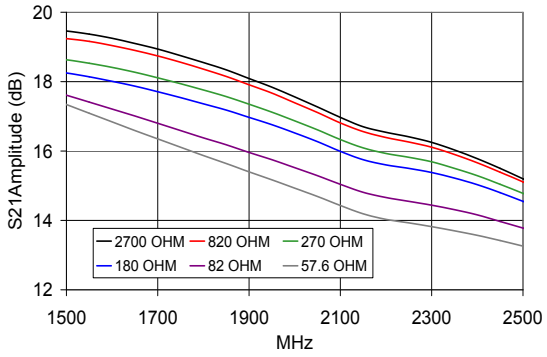
Product Marking



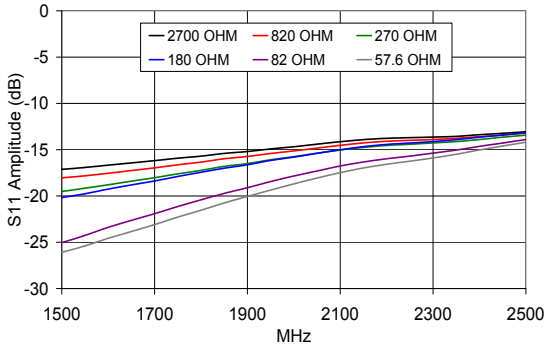


Adjustable Gain Performance (vs. R1) at Vs=4V

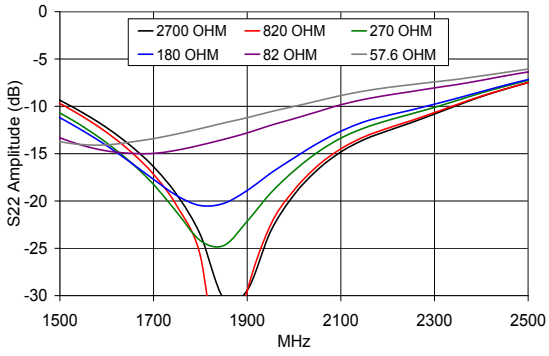
S21 (Amplitude,dB) Vs. Frequency and R1 Values



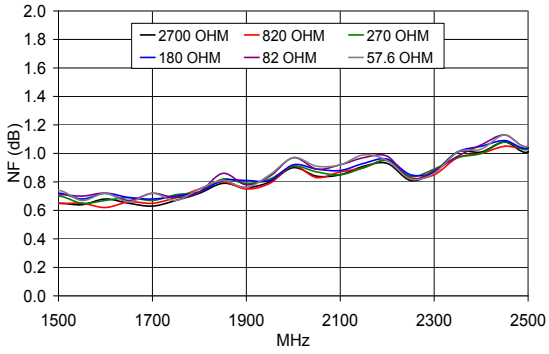
S11 (Amplitude,dB) Vs. Frequency and R1 Values



S22 (Amplitude,dB) Vs. Frequency and R1 Values

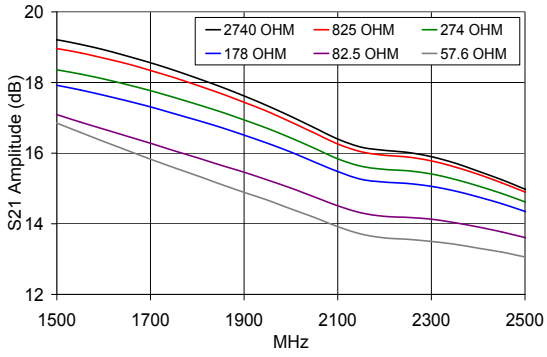


Noise Figure (dB) Vs. Frequency and R1 Values

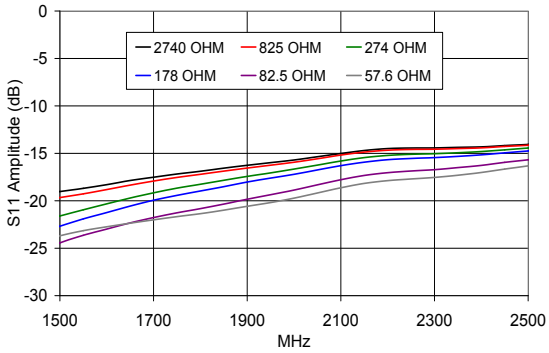


Adjustable Gain Performance (vs. R1) at Vs=3V

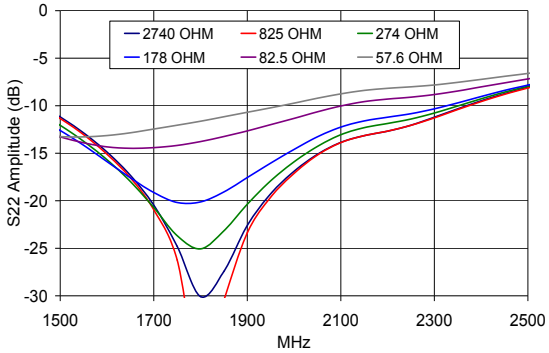
S21 (Amplitude,dB) Vs. Frequency and R1 Values



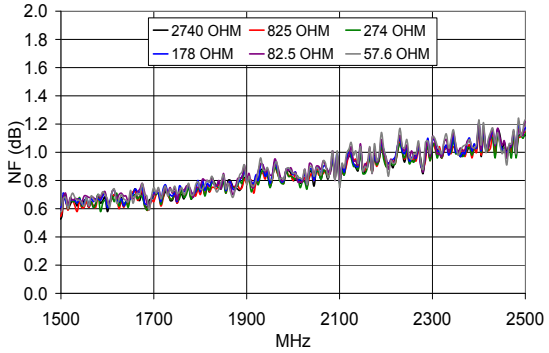
S11 (Amplitude,dB) Vs. Frequency and R1 Values



S22 (Amplitude,dB) Vs. Frequency and R1 Values



Noise Figure (dB) Vs. Frequency and R1 Values



Notes

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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	MC1631 *Plastic package, exposed paddle, lead finish: matte tin*
Tape & Reel **Standard quantities available on reel**	F108 *7" reels with 20, 50, 100, 200, 500,1K or 2K devices*
Suggested Layout for PCB Design	PL-360
Evaluation Board	TB-642+
Environmental Ratings	ENV08T1

ESD Rating

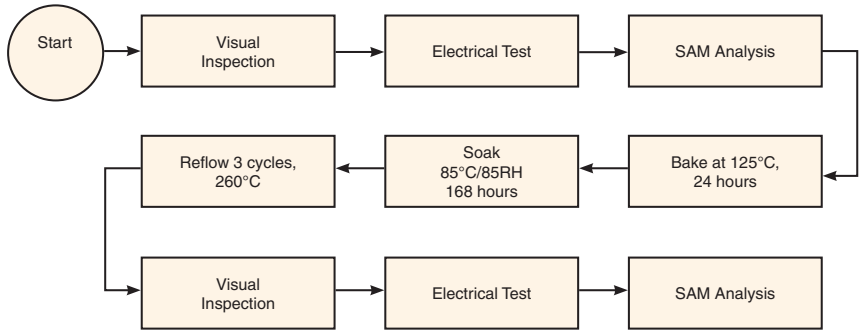
Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (pass 25V) in accordance with ANSI/ESD STM5.2-1999

MSL Rating

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

MSL Test Flow Chart



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