MMIC SURFACE MOUNT

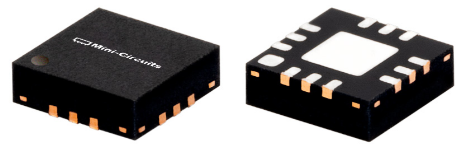
Wideband Amplifier

PMA3-83LP+

50Ω 0.4 to 8 GHz +6V Supply

THE BIG DEAL

- Output P1dB, Typ. +25dBm
- Output IP3, Typ. +34dBm
- Low Noise Figure, Typ. 2.8dB
- Adjustable Supply Current
- 3x3mm 12-Lead QFN-style Package
- Patent Pending

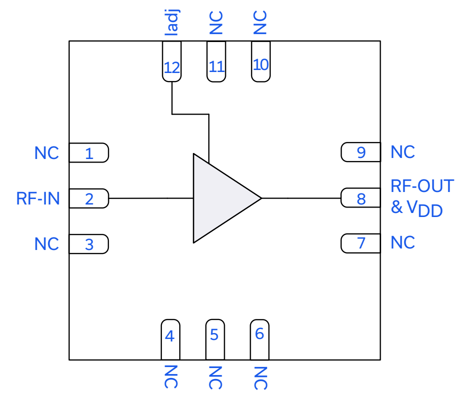


Generic photo used for illustration purposes only

APPLICATIONS

- Wi-Fi 6
- 5G MIMO Radio Systems
- L, S, and C-band Radar
- SATCOM

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

The PMA3-83LP+ is a GaAs pHEMT based wideband, low noise, MMIC amplifier with a unique combination of low noise figure, high OIP3, and high output power. This makes it ideal for sensitive, high-dynamic range receiver applications. The PMA3-83LP+ design operates on a single supply voltage of +6V, is well matched for 50Ω, and comes in a low-profile package (3x3mm 12-Lead), which can accommodate dense circuit board layouts.

KEY FEATURES

Feature	Advantages
Low Noise Figure, 2.8dB Typ	Enables lower system noise figure performance.
High IP3: • +41dBm at 0.4GHz • +34dBm at 2GHz • +34dBm at 4GHz • +34dBm at 6GHz • +34dBm at 8GHz	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.
Output Power at 1dB Compression, +25dBm	Enables usage as a pre-driver or driver amplifier in a variety of transmit and receive applications in commercial, industrial, and defense systems. Adjustable supply current to optimize power efficiency.
3x3mm 12-lead QFN-style 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 • ±1.5dB over 4 to 8GHz	Enables a single amplifier to be used in many wideband applications including defense, instrumentation, and more.

REV. OR
ECO-019260
PMA3-83LP+
MCL NY
230919

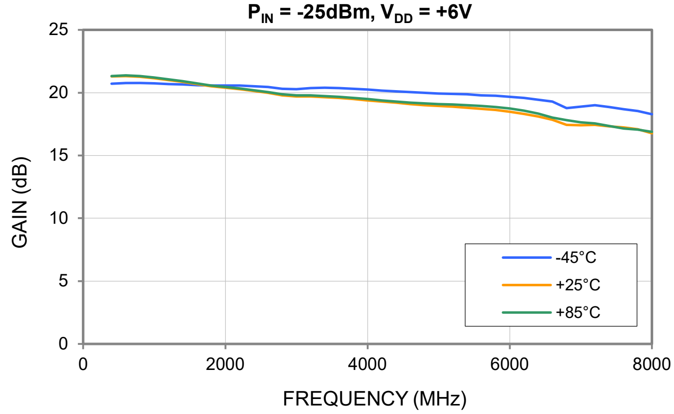
ELECTRICAL SPECIFICATIONS[1] AT 25°C, V_{DD}= +6V, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		400		8000	MHz
Gain	400	20.6	21.3		dB
	2000	19.9	20.5		
	4000	18.6	19.6		
	6000	17.8	18.8		
	8000	16.0	17.3		
Output Power at 1dB Compression (P1dB)	400		+25.0		dBm
	2000		+25.4		
	4000		+25.7		
	6000		+24.3		
	8000		+22.9		
Output Third-Order Intercept (P_{OUT} = +12dBm/Tone)	400		+41		dBm
	2000		+34		
	4000		+34		
	6000		+34		
	8000		+34		
Input Return Loss	400		12		dB
	2000		12		
	4000		12		
	6000		15		
	8000		12		
Output Return Loss	400		8		dB
	2000		13		
	4000		17		
	6000		11		
	8000		9		
Isolation	400-8000		28		dB
Noise Figure	400		3.3		dB
	2000		3.0		
	4000		2.6		
	6000		2.4		
	8000		2.7		
Device Operating Voltage (V_{DD})		+5.5	+6	+6.5	V
Device Operating Current (I_{DD})[2]			150		mA
Voltage at Iadj pin (V_{Iadj})			3.35		V
Current at Iadj pin (I_{adj})			1.21		mA
DC Current Variation vs. Temperature[3]			-0.28		µA/°C
DC Current Variation vs. Voltage[4]			44		mA/mV

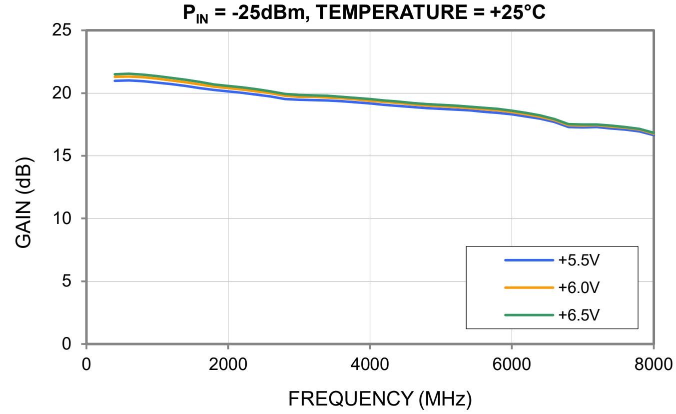
1. Tested on Mini-Circuits Characterization Evaluation Board TB-PMA3-83LPC+. See Figure 2. Board loss de-embedded to the device.
2. Current at P_{IN}= -25dBm. Increases to 178mA at P1dB at room temperature.
3. ((Current at 85°C - Current at -45°C))/(130°C)
4. ((Current at +6.5V in mA) - (Current at +5.5V in mA))/((+6.5V) - (+5.5V)*1000mA/mV)

TYPICAL PERFORMANCE GRAPHS

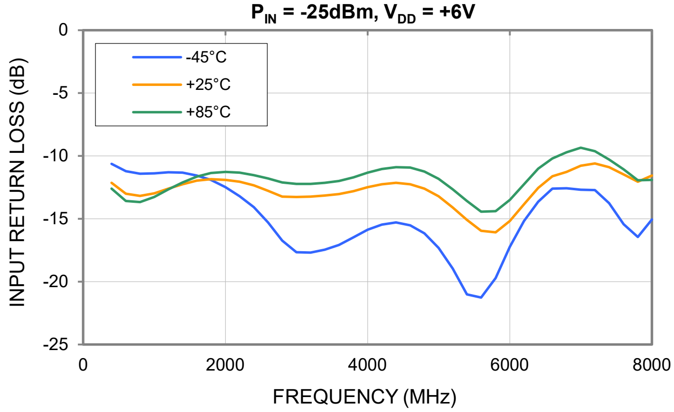
GAIN vs. TEMPERATURE, P_{IN} = -25dBm, V_{DD} = +6V



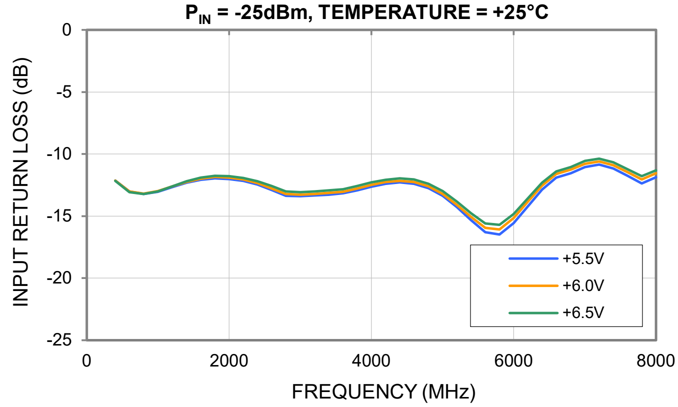
GAIN vs. DEVICE VOLTAGE, P_{IN} = -25dBm, TEMPERATURE = +25°C



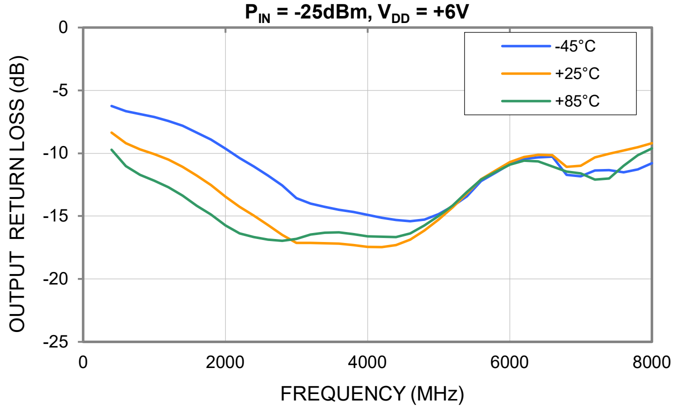
INPUT RETURN LOSS vs.TEMPERATURE, P_{IN} = -25dBm, V_{DD} = +6V



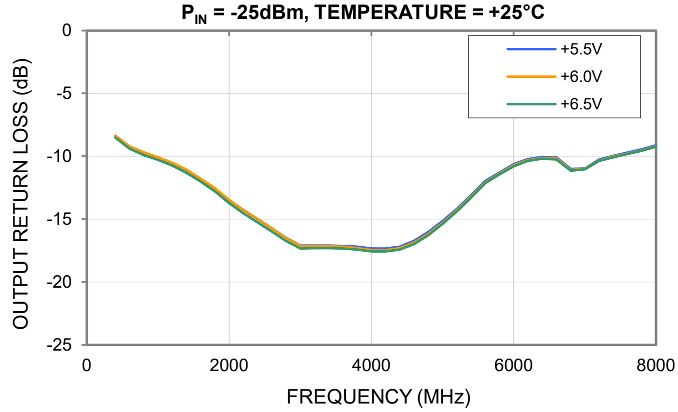
INPUT RETURN LOSS vs. DEVICE VOLTAGE, P_{IN} = -25dBm, TEMPERATURE = +25°C



OUTPUT RETURN LOSS vs. TEMPERATURE, P_{IN} = -25dBm, V_{DD} = +6V



OUTPUT RETURN LOSS vs. DEVICE VOLTAGE, P_{IN} = -25dBm, TEMPERATURE = +25°C



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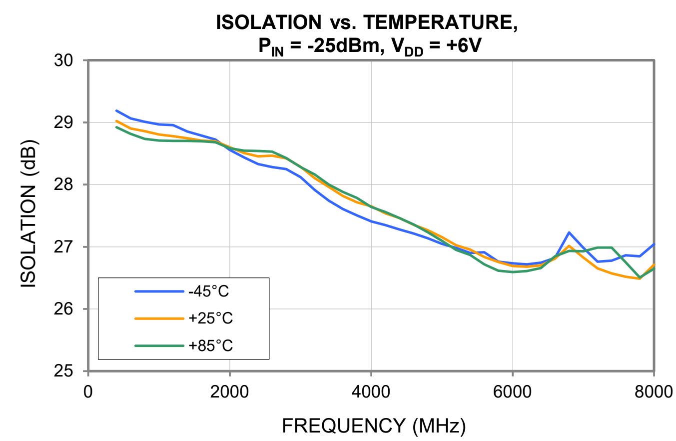

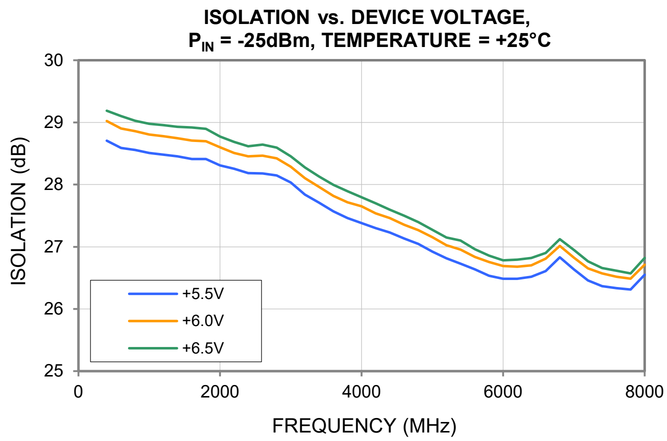

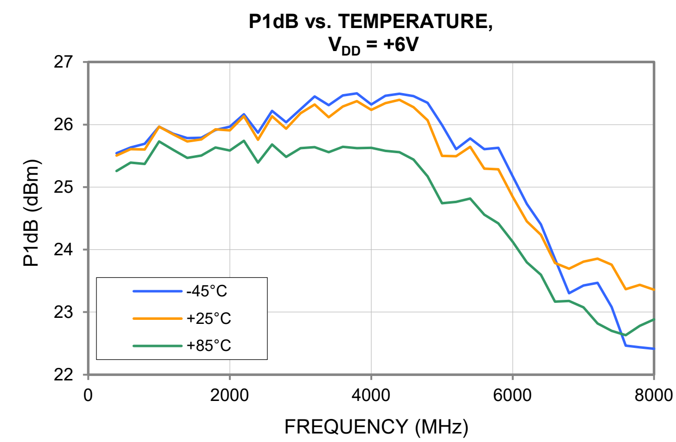

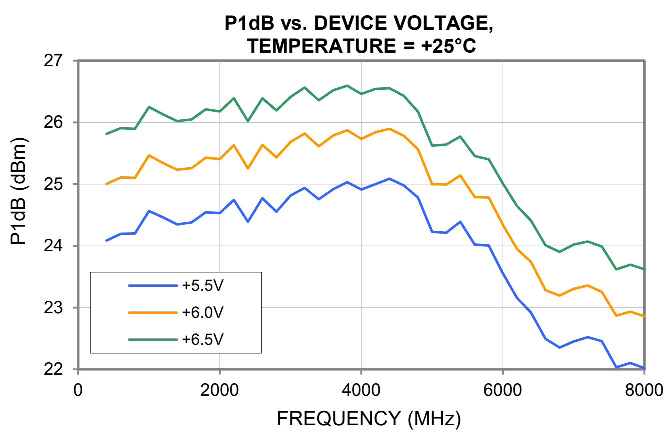

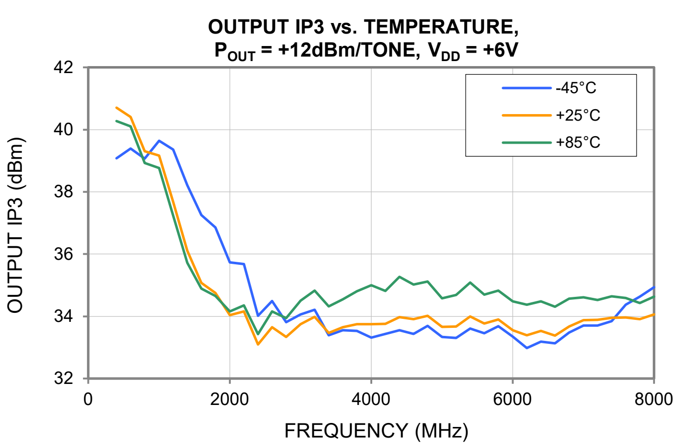

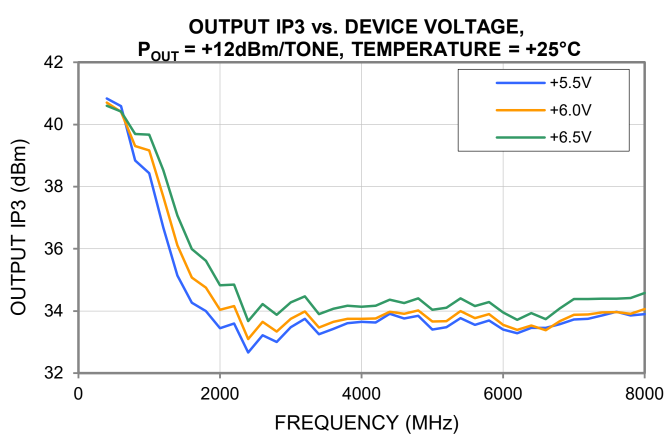

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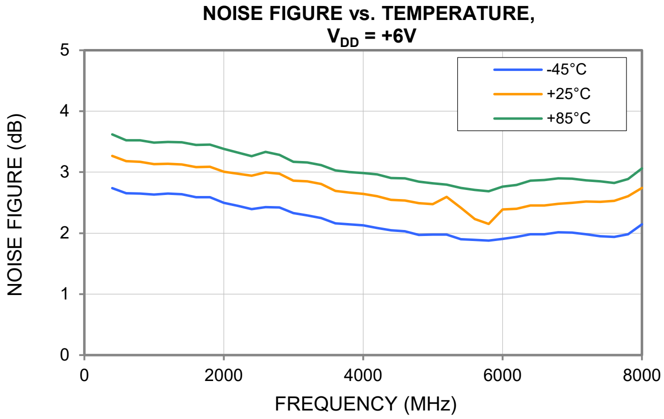

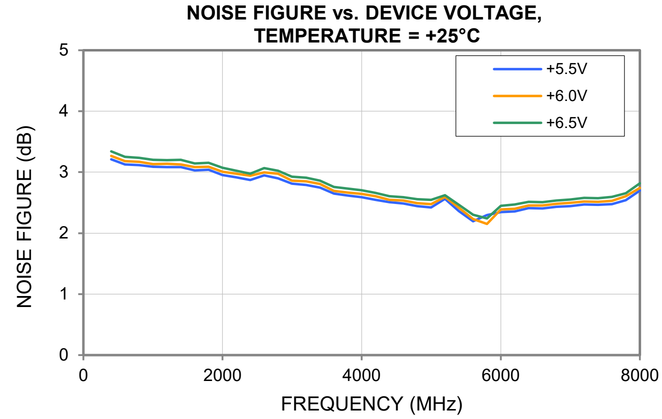

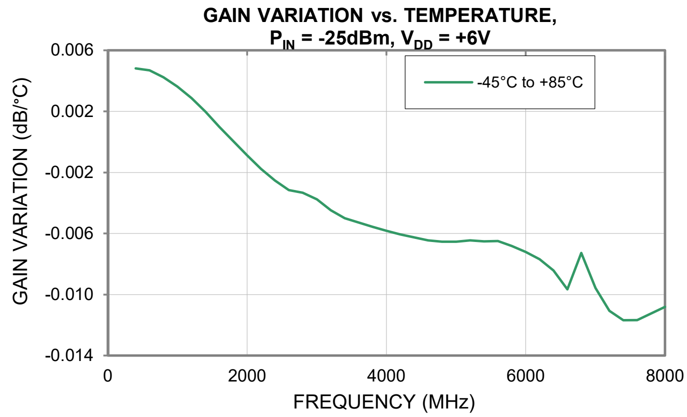

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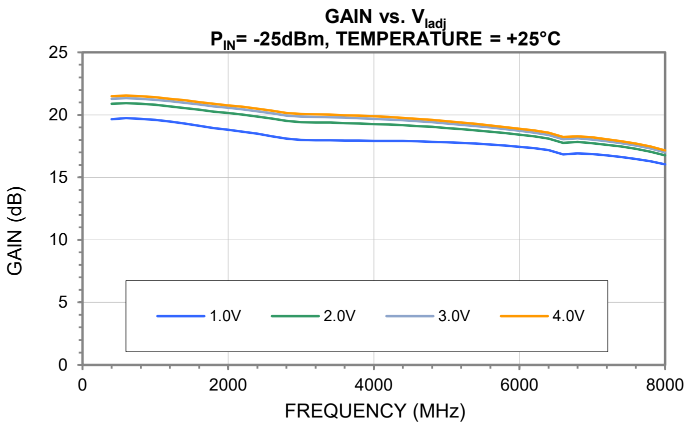

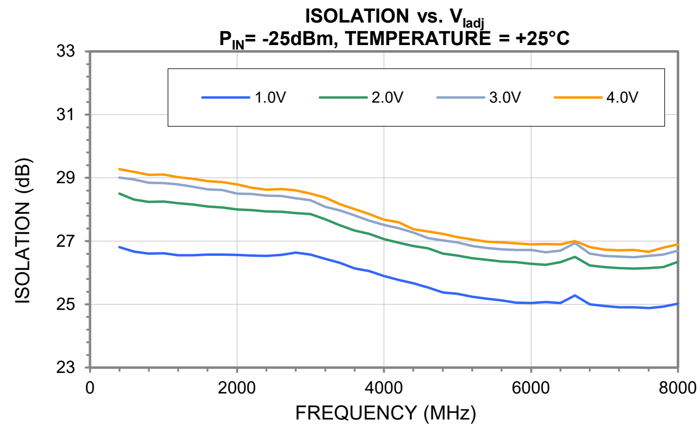

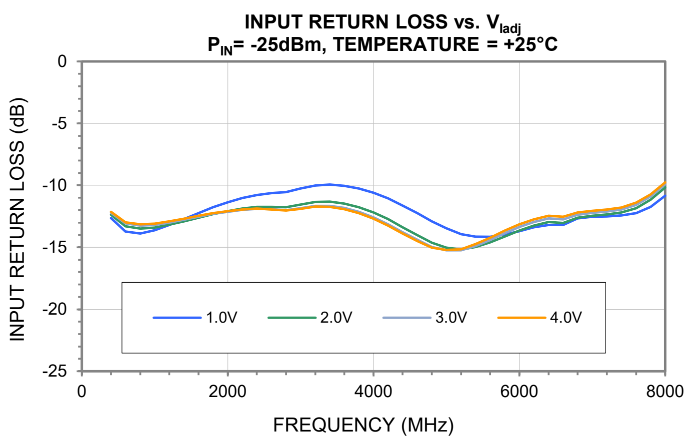

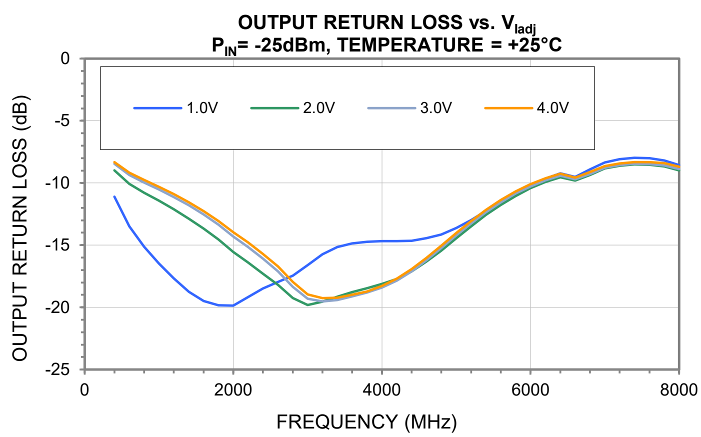

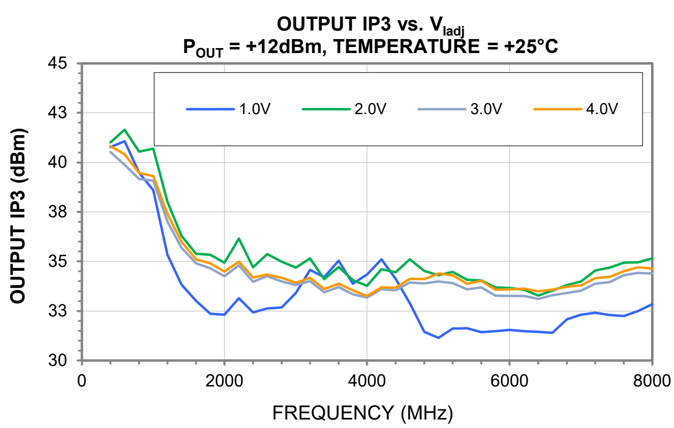

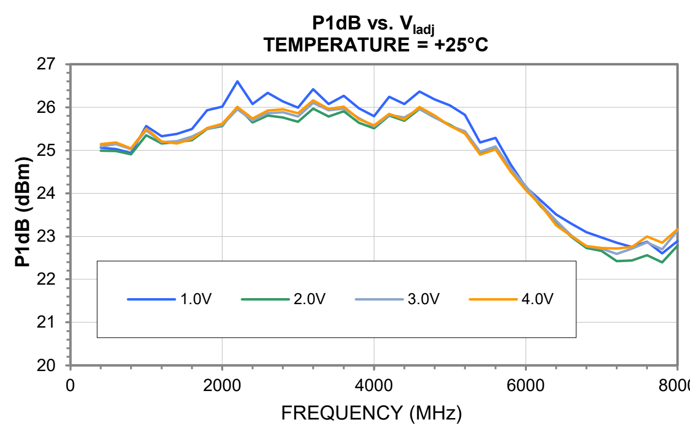

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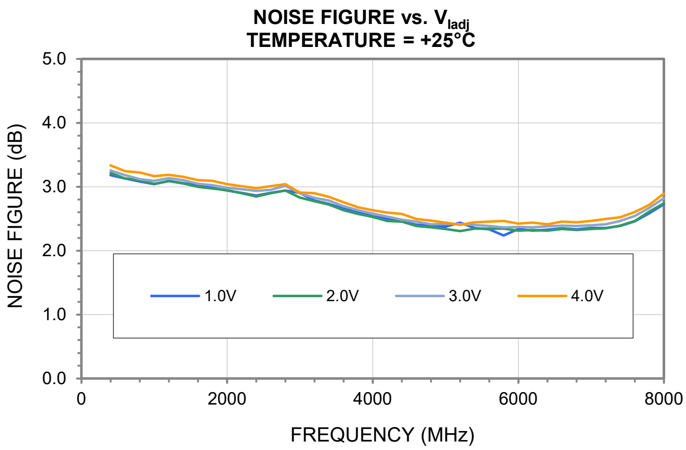
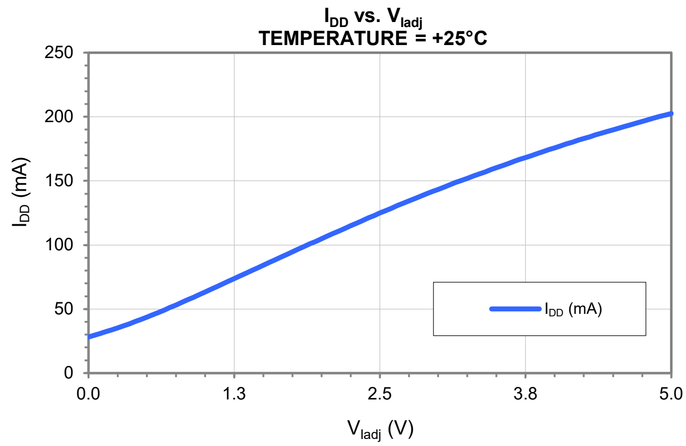




ABSOLUTE MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature (ground lead)	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Junction Temperature[6]	+150°C
Total Power Dissipation	1.4W
Input Power (CW)	+23dBm
DC Voltage at V_{DD}	+9V
DC Voltage at Vladj	+6V

5. Permanent damage may occur if any of these limits are exceeded. Maximum ratings are not intended for continuous normal operation.
6. Peak temperature on top of Die.

THERMAL RESISTANCE

Parameter	Ratings
Thermal Resistance (Θ_{jc})[7]	46.3°C/W

7. Θ_{jc}= (Hot Spot Temperature on Die - Temperature at Ground Lead)/Dissipated Power

ESD RATING

	Class	Voltage Range	Reference Standard
Human Body Model (HBM)	1A	250V to <500V	ANSI/ESDA/JEDEC JS-001-2017

ESD HANDLING PRECAUTION: This device is designed to be Class 1A for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure Industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020E/JEDEC J-STD-033C

FUNCTIONAL DIAGRAM

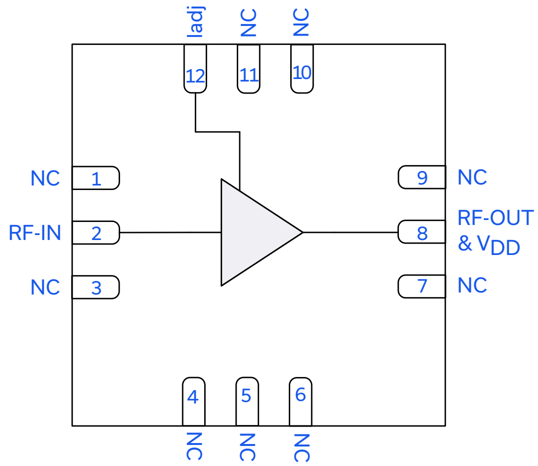


Figure 1. PMA3-83LP+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description (Refer to Figure 2)
RF-IN	2	Connects to RF Input Pad via C1.
RF-OUT & V_{DD}	8	Connects to RF Output Pad via C2 and connects to V_{DD} via L1.
Iadj	12	Connects to Current Adjust Pad. Connects to V_{DD} via R1.
NC	1, 3-7, 9-11	Not used internally. Connected to ground on Test Board.
GND	Paddle, Index	Paddle connected to ground on Test Board. (Paddle & Index connected internally.)

CHARACTERIZATION TEST BOARD

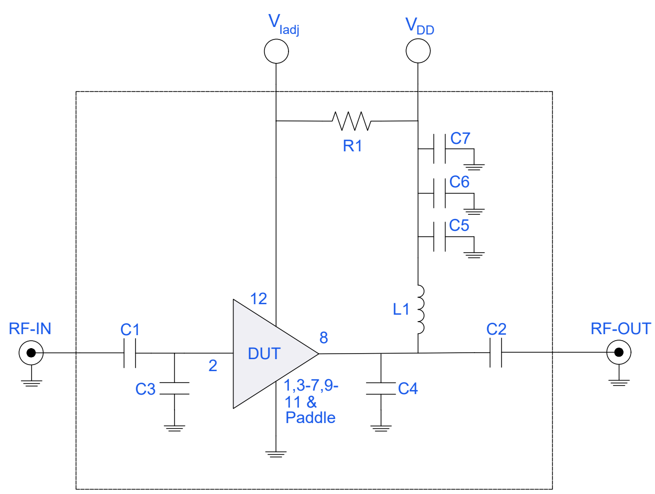


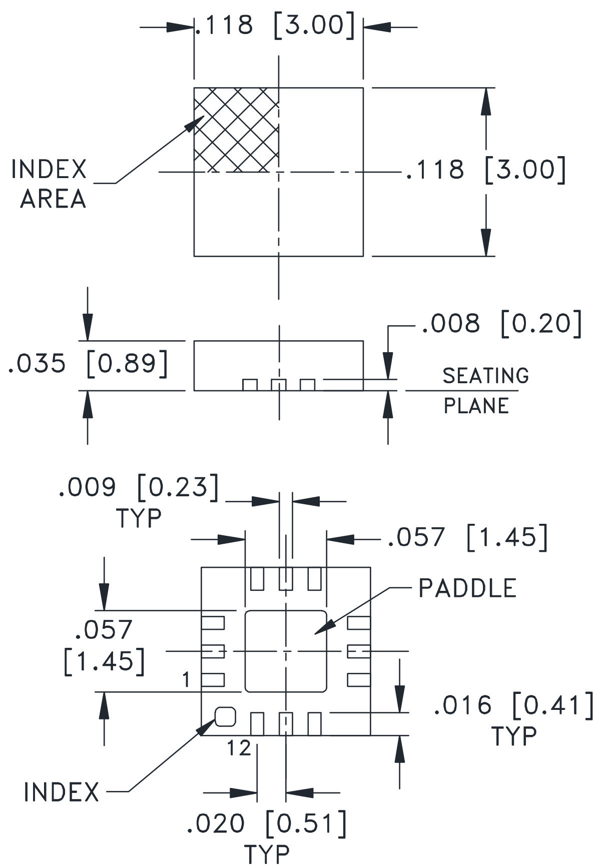
Figure 2. DUT soldered on Mini-Circuits Characterization Test Board: TB-PMA3-83LPC+. If V_{Iadj} is used independently of V_{DD} then R1 needs to be removed from the circuit.

Electrical Parameters and Conditions
Gain, Return Loss, Output Power at 1dB Compression (P1dB), Output IP3 (OIP3), and Noise Figure measured using N5242A PNA-X microwave network analyzer.

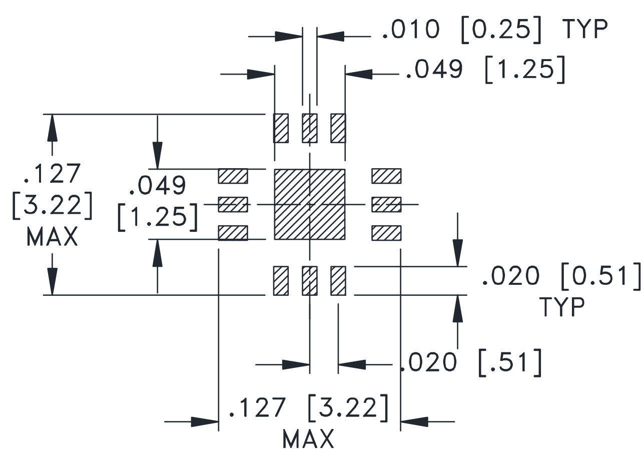
Conditions:
1. Gain and Return Loss: P_{IN}= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1MHz apart, +12dBm/tone at output.
3. V_{DD} = +6V

Component	Vendor	Vendor P/N	Value	Size
C1, C2	Murata	GRM1555C1H101JA01D	100pF	0402
C3	Murata	GJM1555C1HR40WB01D	0.4pF	0402
C4	Murata	GJM1555C1HR10WB01D	0.1pF	0402
C5	Murata	GRM1555C1H100JA01D	10pF	0402
C6	Murata	GRM155C71A105KE11D	1uF	0402
C7	Murata	GRM188D71A106MA73J	10uF	0603
L1	Coilcraft	0603CS-33NXJEW	33nH	0603
R1	KOA Speer	RK73H1ETTP2201F	2.2kΩ	0402

CASE STYLE DRAWING



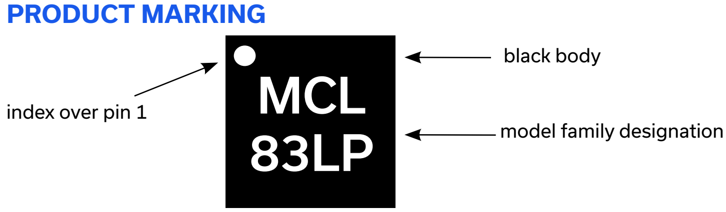
PCB Land Pattern



SUGGESTED LAYOUT,
TOLERANCE TO BE WITHIN ±.002

Weight: .02 Grams
Dimensions are in inches [mm]. 2 Pl. ±.01; 3 Pl.±.004

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD

CLICK HERE

Performance Data	Data Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DQ1225 Plastic package, exposed paddle, Lead Finish: Matte-Tin
RoHs Status	Compliant
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-757
Evaluation Board	TB-PMA3-83LPC+ Gerber File
Environmental Ratings	ENV08T1