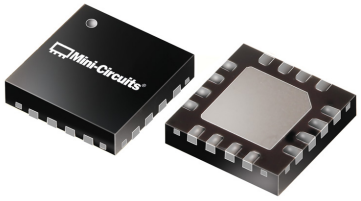
LOW NOISE, HIGH GAIN & IP3

Monolithic Amplifier PMA4-33GLN+

50Ω 0.7 to 3.0 GHz

THE BIG DEAL

- Low noise figure, 0.47 dB typ. at 900 MHz
- High gain, 39 dB typ. at 900 MHz
- High OIP3, +40 dBm typ. at 900 MHz
- High Pout, P1dB 22.6 dBm typ. at 900 MHz



Generic photo used for illustration purposes only

CASE STYLE: DG1886

+RoHS Compliant

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

APPLICATIONS

- Base station infrastructure
- Portable Wireless
- LTE
- GPS
- GSM
- Airborne radar

PRODUCT OVERVIEW

Mini-Circuits PMA4-33GLN+ is an E-PHEMT* based, low noise, dual chip, MMIC amplifier with a unique combination of low noise, high gain and high IP3, making this amplifier ideal for sensitive, high-dynamic-range receiver applications. This design operates on a single 5V supply, is well matched for 50Ω systems, and comes in a 4mm x 4mm, low-profile package accommodating dense circuit board layouts.

KEY FEATURES

Feature	Advantages
Low noise, 0.47 dB at 0.9 GHz	Enables lower system noise figure performance
High Gain • 38.9 dB at 900 MHz • 26.9 dB at 2000 MHz	High gain with low noise minimizes the effect of noise figure reduction resulting from cascading of multiple stages and simplifies circuit design.
High IP3 • +40.4 dBm at 0.9 GHz • +40.2 dBm at 2 GHz	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 & two-tone IM performance at both ends of the dynamic range.
High max input power • +24 dBm	Ruggedized design provides high power handling for input powers common at receiver inputs, eliminating the need for an external limiter in most cases.
4 x 4mm 16-lead MCLP package	Provides low inductance, repeatable transitions, and excellent thermal contact to PCB
High reliability	Low signal operating current of 154 mA nominal maintains junction temperatures typically below 103°C at 85°C ground lead temperature.

*Enhancement mode Pseudomorphic High Electron Mobility Transistor

REV. B
ECO-010881
PMA4-33GLN+
TH/RS/CP
211130

Monolithic Amplifier PMA4-33GLN+

ELECTRICAL SPECIFICATIONS[1] AT 25°C AND 5V, UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		0.7		3.0	GHz
Noise Figure	0.7		0.53	—	dB
	0.9		0.47	0.85	
	1.5		0.66	—	
	2.0		0.91	—	
	3.0		1.79	—	
Gain	0.7	35.0	41.3	—	dB
	0.9		38.9		
	1.5		31.8		
	2.0		26.9		
	3.0		18.0		
Input Return Loss	0.7		9.1		dB
	0.9		12.3		
	1.5		13.0		
	2.0		11.6		
	3.0		9.4		
Output Return Loss	0.7		5.5		dB
	0.9		10.0		
	1.5		12.8		
	2.0		6.7		
	3.0		7.0		
Output Power @1 dB compression[2]	0.7		22.5		dBm
	0.9		22.6		
	1.5		22.6		
	2.0		22.9		
	3.0		20.6		
Output IP3	0.7		35.8		dBm
	0.9		40.4		
	1.5		41.0		
	2.0		40.2		
	3.0		35.7		
Device Operating Voltage			5.0		V
Device Operating Current Q1[2]			55		mA
Device Operating Current Q2[2]			97		
Device Operating Current Total[2]		—	152	186	
Device Current Variation vs. Temperature at 5V[3]			-135		µA/°C
Device Current Variation vs. Voltage at 25°C			0.027		mA/mV
Thermal Resistance, junction-to-ground lead		53 (Q1), 36 (Q2)			°C/W

1. Measured on Mini-Circuits Characterization test board TB-754+. See Characterization Test Circuit (Fig. 1)
2. Current increases at P1dB
3. (Current at 85°C - Current at -45°C)/130

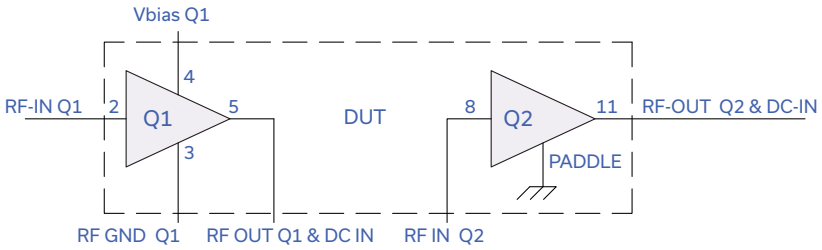
Monolithic Amplifier PMA4-33GLN+

MAXIMUM RATINGS[4]

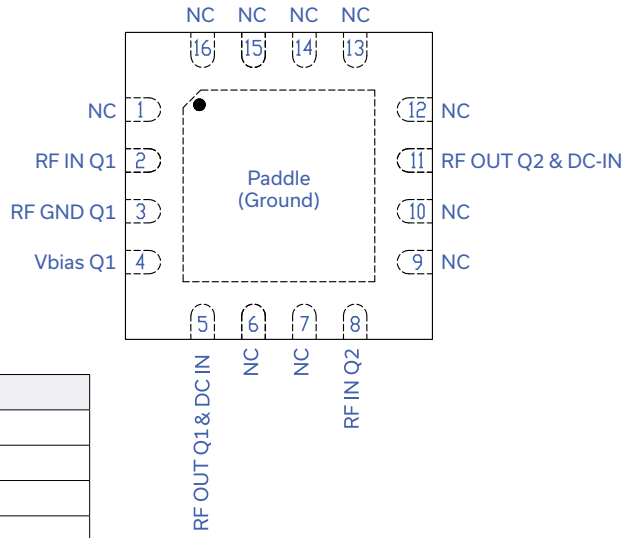
Parameter	Ratings (Q1)	Ratings (Q2)
Operating Temperature (ground lead)	-40°C to 85°C	-40°C to 85°C
Storage Temperature	-65°C to 150°C	-65°C to 150°C
Total Power Dissipation	0.55W	1W
Input Power (CW)	+24dBm (5 minutes max)(Note 5)	+21 dBm (50-2000 MHz) +26 dBm (2000-3000 MHz) (Note 6)
Q1 & Q2 cascade on TB-754+	+24 dBm	
DC Voltage	5.5 V	6V

4. Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.
5. Measured on Mini-Circuits test board, TB-615+
6. Measured on Mini-Circuits test board, TB-313

SIMPLIFIED SCHEMATIC & PAD DESCRIPTION



TOP VIEW



Function	Pad Number	Description (See Figure 1)
RF IN Q1	2	Connects to RF input via C1 and Pad 3 via L1
RF-OUT Q1 & DC IN	5	Connects to RF IN Q2 via C2 and V_S via L2
V Bias Q1	4	Connects to Supply voltage V_S via R1
RF-GND Q1	3	Connects to ground via C4/C5
RF-IN Q2	8	Connects to RF OUT Q1 via C2
RF-OUT Q2 & DC IN	11	Connects to RF OUT via C3 and V_S via L3
Ground	Paddle	Connects to ground
No Connection	1,6,7,9,10,12 to 16	Not used internally. Connected to ground on test board

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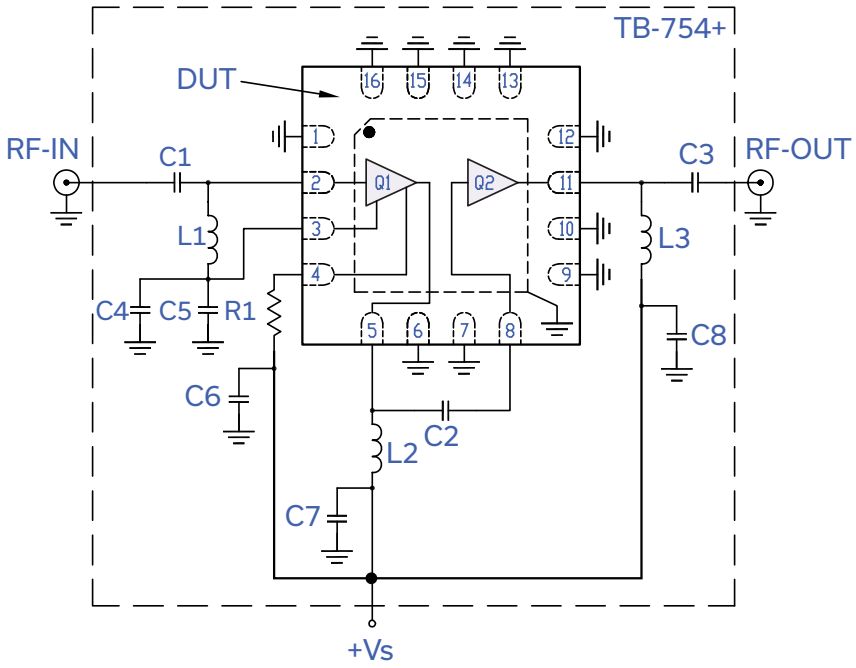
RECOMMENDED APPLICATION AND CHARACTERIZATION TEST CIRCUIT



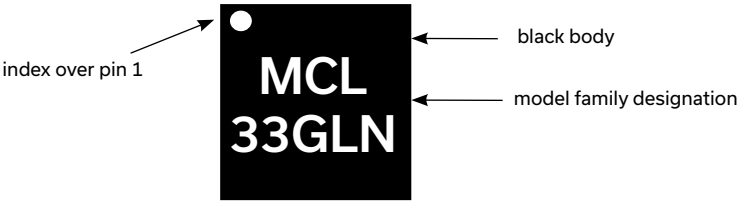
BOM OF TEST BOARD TB-754+

SEQ	Size	Description
DUT	4x4 mm	PMA4-33GLN+ Amplifier
L1	0402	Inductor 15nH
L2	0402	Inductor 5.6nH
L3	0402	Inductor 82nH
C1	0402	Capacitor 56pF
C2	0402	Capacitor 82pF
C3	0402	Capacitor 68pF
C4	0402	Capacitor 1000pF
C5 to C8	0402	Capacitor 0.1µF
R1	0402	Resistor, 1kΩ

Fig 1. Application and Characterization circuit
Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-754+)
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= -40 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 5 dBm/tone at output.

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

Monolithic Amplifier PMA4-33GLN+

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DG1886 Plastic package, exposed paddle, lead finish: tin-silver over nickel
Tape & Reel **Standard quantities available on reel**	F68 7" reels with 20, 50, 100, 200, 500 or 1K devices
Suggested Layout for PCB Design	PL-407
Evaluation Board	TB-754+
Environmental Ratings	ENV08T1

ESD RATING

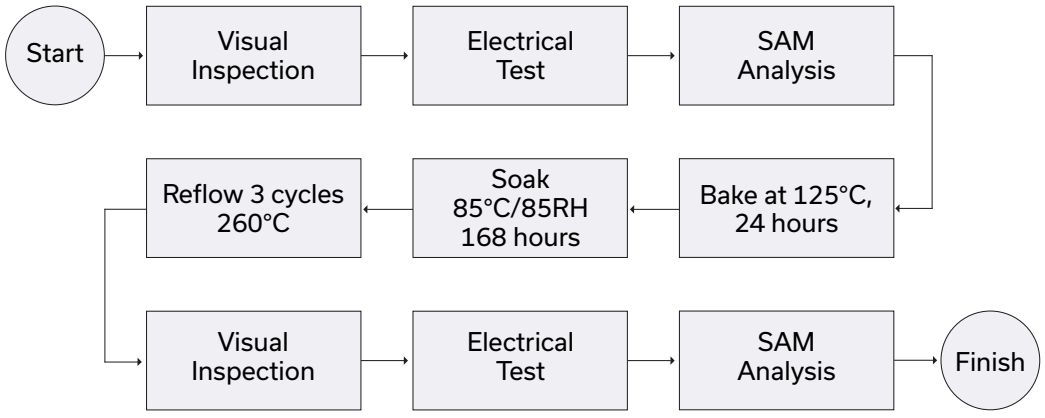
Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

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



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

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