WIDEBAND, LOW NOISE, POSITIVE GAIN SLOPE

Monolithic Amplifier Die PMA-183PLN-D+

50Ω 6 to 18GHz

THE BIG DEAL

- Wideband, 6 to 18 GHz
- Excellent Noise Figure, 1.3 dB at 15 GHz
- Positive Gain Slope
- High Directivity, 33dB typ.

Generic photo used for illustration purposes only

+RoHS Compliant

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

SEE ORDERING INFORMATION ON THE LAST PAGE

APPLICATIONS

- Instrumentation
- Cellular Infrastructure
- Defense

PRODUCT OVERVIEW

PMA-183PLN-D+ is a PHEMT based wideband MMIC Amplifier die with an unique combination of high gain with positive gain slope, high directivity and low noise figure, making it ideal for receiver applications. This design operates on a single 2.6V voltage supply, and it is well matched for 50Ω.

KEY FEATURES

Feature	Advantages
High Directivity	With active directivity of 33 dB, PMA-183PLN-D+ is an excellent choice for buffering broadband circuits, eliminating the need for an expensive isolator in most cases.
Positive Gain Slope Vs. Frequency • +0.13 dB/GHz (6-15 GHz) • +0.73 dB/GHz (15-18 GHz)	Useful for compensating negative gain slope of most wideband microwave components and eliminating the need for equalization.
Excellent Noise Figure up to 18 GHz • 1.3 dB Typ. at 18 GHz	Enables lower system noise figure performance
Unpackaged Die	Enables user to integrate it directly into hybrids. Allows for high layout density of circuit boards, while minimizing effects of parasitics.

REV. OR
ECO-009250
PMA-183PLN-D+
GY/CP/PS
210812

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ELECTRICAL SPECIFICATIONS AT 25°C

Parameter[1]	Condition (MHz)	Vs=2.6V Min.	Typ.	Max.	Units
Frequency range		6		18	GHz
Gain	6000		26.3		dB
	10000		26.3		
	15000		27.5		
	18000		29.7		
Input Return loss	6000		10.2		dB
	10000		14.8		
	15000		12.7		
	18000		9.1		
Output Return loss	6000		11.4		dB
	10000		15.3		
	15000		16.9		
	18000		25.0		
Directivity	6000 - 18000		33		dB
Output Power at 1dB Compression	6000		9.8		dBm
	10000		8.6		
	15000		9.6		
	18000		10.2		
Output IP3	6000		25.0		dBm
	10000		22.0		
	15000		22.4		
	18000		21.9		
Noise Figure	6000		1.4		dB
	10000		1.3		
	15000		1.2		
	18000		1.3		
Device Operating Voltage (V_s)		2.3	2.6	2.9	V
Device Operating Current (I_s)			57.2	72	mA
Device Current Variation vs. Temperature[2]			7.69		µA/°C
Device Current Variation vs. Voltage[3]			0.04		mA/mV
Thermal Resistance, junction-to-ground lead			49.5		°C/W

1. Die is packaged in 3.5x2.5mm 16L MCLP and soldered on Mini-Circuits Characterization Test Board TB-PMA-183PLN+. See Characterization Test & Application Circuit (Fig. 1)
2. Device Current Variation vs. Temperature= (Current in mA at 85°C - Current in mA at -45°C)/130°C
3. Device Current Variation vs. Voltage = (Current in mA at 2.9V – Current in mA at 2.3V)/(2.9V- 2.3V)*1000 mA/mV)

MAXIMUM RATINGS

Parameter	Ratings
Operating temperature (ground lead)	-40°C to 85°C
Junction Temperature	131°C
Total power dissipation	0.9W
Input power (CW)	+24 dBm (5 minute Max) +13 dBm (Continuous)
DC voltage at Vs	4V
DC voltage at RF-Ports(RF-IN &RF-OUT)	4V

Permanent damage may occur if any of these limits are exceeded.

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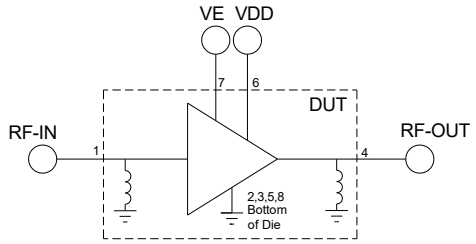
SIMPLIFIED SCHEMATIC



PAD DESCRIPTION

Function	Pad Number	Description (See Figure 1)
RF-IN	1	RF Input Pad
RF-OUT	4	RF Output Pad
VDD	6	Supply Voltage Pad, Connects to Vs via R1
VE	7	Enable Voltage Pad, Connects to VDD via R2
GROUND	2, 3, 5, 8 & Bottom of Die	Connects to Ground

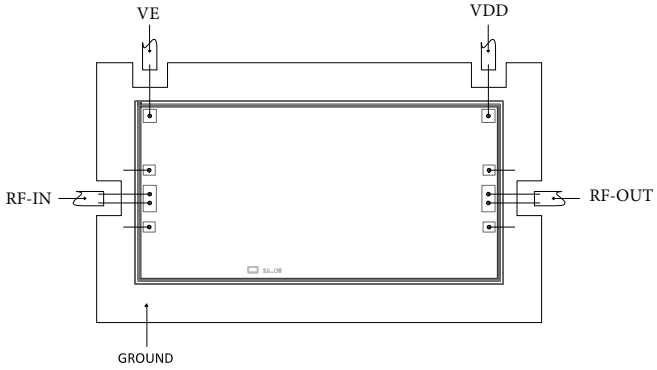
BONDING PAD POSITION

Dimension in µm

L1	L2	L3	H1	H2	H3	H4	H5
75.0	1867.0	1942.0	301.0	451.0	601.0	887.0	965.0

Thickness	Die size	Pad size 1 & 4	Pad size 2, 3, 5 & 8	Pad size 6 & 7
100	1942 x 965	69 x 139	63 x 54	69 x 69

ASSEMBLY DRAWING



CHARACTERIZATION, APPLICATION CIRCUIT

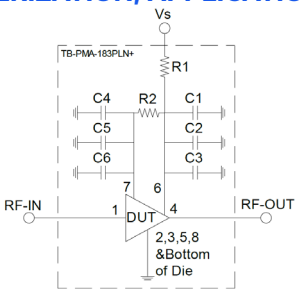


Fig 1. Characterization, Application Circuit & Assembly Drawing
Note: This block diagram is used for characterization. (DUT was packaged in 3.5x2.5mm, 16L MCLP and soldered on Mini-Circuits Characterization Test Board TB-PMA-183PLN+). Gain, Return loss, Output power at 1dB compression (P1dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.
Condition:
1. Gain and Return Loss: Pin = -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -10 dBm/tone at output.

Component	Size	Value	Part Number	Manufacturer
C1, C4	0805	0.33uF	TAJR334K035RNJ	AVX
C2, C5	0603	1000pF	GCM1885C1H102JA16D	Murata
C3, C6	0402	100pF	GRM1555C1H101JA01D	Murata
R1	0603	10Ohm	ESR03EZPF10R0	Rohm Semiconductor
R2	0402	180 Ohm	RK73H1ETTP1800F	Koa Speer

ASSEMBLY PROCEDURE

1. Storage
   Dice should be stored in a dry nitrogen purged desiccators or equivalent.
2. ESD
   MMIC PHEMT amplifier dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be open in clean room conditions at an appropriately grounded anti-static workstation.
3. Die Handling and Attachment
   Devices need careful handling using correctly designed collets, it is recommended to handle the chip along the edges with a custom design collet. The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are Ablestik 84-1 LMISR4 or equivalents. Apply sufficent epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. It is recommended to use anti-static die pick up tools only.
4. Wire Bonding
   Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermo-sonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1mil diameter. Bonds must be made from the bond pads on the die to the packaged or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD.

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set with and without port extension(.zip file)	
Case Style	Die	
Die Ordering and packaging information	Quantity, Package Small, Gel - Pak: 5,10,50,100 KGD* Medium†, Partial wafer: KGD*<936 Full Wafer †Available upon request contact sales representative Refer to AN-60-067	Model No. PMA-183PLN-DG+ PMA-183PLN-DP+ PMA-183PLN-DF+
Environmental Ratings	ENV80	

*Known Good Die ("KGD") means that the dice in question have been subjected to Mini-Circuits DC test performance criteria and measurement instructions and that the parametric data of such dice fall within a predefined range. While DC testing is not definitive, it does provide a higher degree of confidence that die are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

ESD RATING**

Human Body Model (HBM): Class 1C (1000 to <2000V) in accordance with ANSI/ESD STM 5.1 - 2001

**Tested in industry standard MCLP 3.5 x 2.5 mm, 16 lead package

NOTES

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