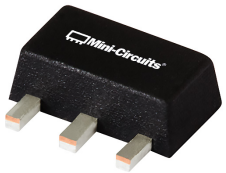
ULTRA HIGH DYNAMIC RANGE

Monolithic Amplifier PHA-23HLN+

50Ω 30 MHz to 2000 MHz

THE BIG DEAL

- High IP3, Typ. +44.4 dBm
- High P1dB, Typ. +28.4 dBm
- Low Noise Figure, Typ. 1.4 dB
- High Gain, Typ. 21.3 dB



Generic photo used for illustration purposes only

CASE STYLE: DF782

+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

APPLICATIONS

- Base Station Infrastructure
- CATV
- Cellular

PRODUCT OVERVIEW

PHA-23HLN+ (RoHS compliant) is an advanced wideband amplifier fabricated using E-pHEMT technology and offers extremely high dynamic range with low noise figure. In addition, the PHA-23HLN+ is well matched over a broad frequency range. PHA-23HLN+ is enclosed in a SOT-89 package and has very good thermal performance.

KEY FEATURES

Feature	Advantages
Broadband: 30 to 2000 MHz	Broadband covering primary wireless communications bands: VHF, UHF, Cellular
High IP3 +40.9 dBm Typical at 30 MHz +44.4 dBm Typical at 1000 MHz	The PHA-23HLN+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the circuit design and E-pHEMT structure provides enhanced linearity over a broad frequency range resulting in an IP3 approximately 14-17 dB above the P1dB point. This feature makes this amplifier ideal for use in: • Driver amplifiers for complex waveform upconverter paths • Drivers in linearized transmit systems • Secondary amplifiers in ultra-high dynamic range receivers
Low Noise Figure 1.4 dB at 1000 MHz	Enables lower system noise figure performance
High P1dB +28.4 dBm at 1000 MHz	High P1dB provides high headroom, preventing amplifier saturation under strong interfering signals. It can also be used to drive mixers requiring high drive levels.

REV. B
ECO-010399
PHA-23HLN+
MCL NY
250904

Monolithic Amplifier PHA-23HLN+

50Ω 30 MHz to 2000 MHz

ELECTRICAL SPECIFICATIONS[1] AT +25°C, 50Ω, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	V_d= +8 V[1] Min.	Typ.	Max.	Units
Frequency Range		30		2000	MHz
Gain	30		23.2		dB
	500		22.1		
	1000	19.2	21.3	23.5	
	1500	18.5	20.6	22.6	
	2000		19.5		
Input Return Loss	30		11.9		dB
	500		11.7		
	1000		9.9		
	1500		10.3		
	2000		9.5		
Output Return Loss	30		14.8		dB
	500		14.5		
	1000		14.2		
	1500		10.6		
	2000		8.2		
Isolation	1000		27.5		dB
Output Power @ 1 dB Compression (P1dB)	30		+26.2		dBm
	500		+28.1		
	1000		+28.4		
	1500		+28.0		
	2000		+27.8		
Output IP3[2]	30		+40.9		dBm
	500		+43.6		
	1000		+44.4		
	1500		+45.8		
	2000		+42.5		
Noise Figure	30		1.3		dB
	500		1.2		
	1000		1.4		
	1500		1.5		
	2000		1.9		
Device Operating Voltage			+8.0		V
Device Operating Current			235	273	mA
Device Current Variation vs. Temperature[3]			-209.8		µA/°C
Device Current Variation vs. Voltage			0.0254		mA/mV
Thermal Resistance, Junction-to-Ground Lead at +85°C Stage Temperature			23.3		°C/W

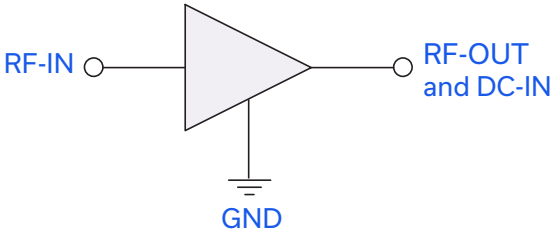
1. Measured on Mini-Circuits Characterization test board TB-951+. See Characterization Test Circuit (Fig. 1).
2. Tested at P_{OUT}= 0 dBm/tone.
3. (Current at +95°C - Current at +40°C)/135

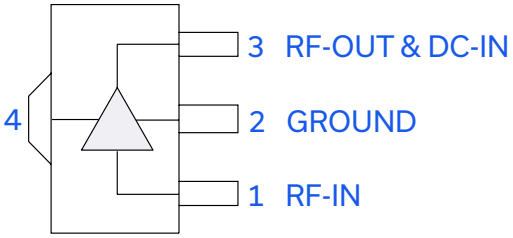
ABSOLUTE MAXIMUM RATINGS[4]

Parameter	Ratings
Operating Temperature (Ground Lead)	-40°C to +95°C
Storage Temperature	-65°C to +150°C
Power Dissipation[5]	3.3 W
Input Power (CW)	+22 dBm (5 minutes max)[6] +11 dBm (continuous) for 0.03-1 GHz +18 dBm (continuous) for 1-2 GHz
DC Voltage on Pin 3	+10 V

4. Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.
5. Up to +85°C, derate linearly to 3 W at +95°C.
6. Up to +85°C, derate linearly to +19 dBm at +95°C.

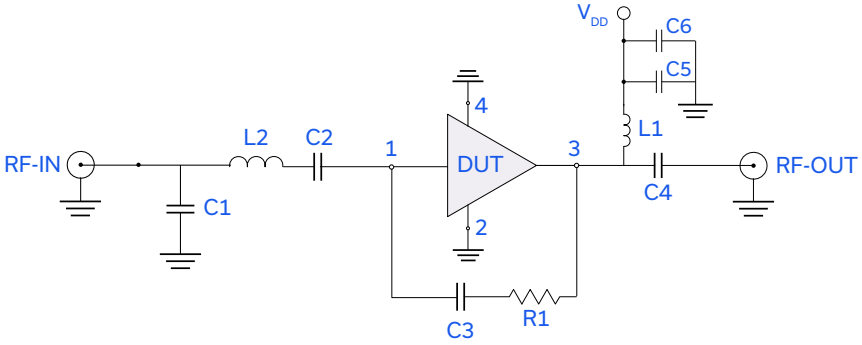
SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION





Function	Pin Number	Description
RF IN	1	RF Input
RF-OUT and DC-IN	3	RF Output and DC Bias
GND	2,4	Connections to ground.

CHARACTERIZATION TEST AND RECOMMENDED APPLICATION CIRCUIT

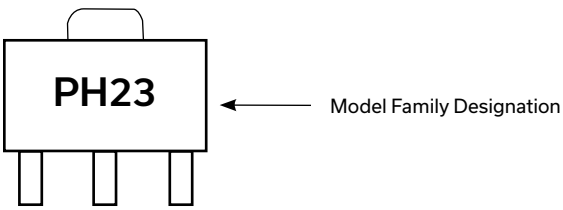


Component	Size	Value	Manufacturer	P/N
C1	0402	1.2pF	Murata	GRM1555C1H1R2WA01D
C2,C3,C6		0.1uF		GRM155R71C104KA88D
C4		0.001uF		GRM1555C1H102JA01D
C5		0.01uF		GRM155R71E103KA01D
R1		1.21KOhm	KOA	RK73H1ETTP1211F
L1	0805	0.68uH	Coilcraft	0805LS-681XJLB
L2	0402	1nH		0402CS-1N0XJLW

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-951+) Gain, Return Loss, Output Power at 1 dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return Loss: P_{IN}= -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.

PRODUCT MARKING



Marking may contain other features or characters for internal lot control.

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DF782 (SOT 89) Plastic package, exposed paddle Lead Finish: Matte-Tin
Tape & Reel **Standard Quantities Available on Reel**	F55 7" Reels with 20, 50, 100, 200, 500, or 1000 devices
Suggested Layout for PCB Design	PL-523
Evaluation Board	TB-951+
Environmental Ratings	ENV08T9

ESD RATING
Human Body Model (HBM): Class 1B (Pass 500 V) in accordance with ANSI/ESD STM 5.1 - 2001

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

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/terms/viewterm.html