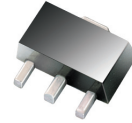


# New Product Announcement!

## Ultra High Dynamic Range MMIC Amplifier

### PHA-1+

Release Date: July, 2009



SOT-89 PACKAGE

### The Big Deal:

- Ultra High IP3
- Broadband High Dynamic Range without external Matching Components
- May be used as a replacement to WJ AH1<sup>a,b</sup>

Pricing: **\$1.49** (QTY 50)

### Product Overview:

PHA-1+ (RoHS compliant) is an advanced wideband amplifier fabricated using E-PHEMT technology and offers extremely high dynamic range over a broad frequency range and with low noise figure. In addition, the PHA-1+, unlike competitive models, has good input and output return loss over a broad frequency range without the need for external matching components and has demonstrated excellent reliability. Lead finish is SnAgNi. It has repeatable performance from lot to lot and is enclosed in a SOT-89 package for very good thermal performance.

### Key Features

Feature	Advantages
<b>Broad Band: 0.05 to 6.0 GHz</b>	Broadband covering primary wireless communications bands: Cellular, PCS, LTE, WiMAX
<b>Extremely High IP3 Versus DC power Consumption 42 dBm typical at 2 GHz</b>	The PHA-1+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and E-PHEMT Structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being typically 20 dB above the P 1dB point. This feature makes this amplifier ideal for use in: <ul style="list-style-type: none"><li>• Driver amplifiers for complex waveform up converter paths</li><li>• Drivers in linearized transmit systems</li><li>• Secondary amplifiers in ultra High Dynamic range receivers</li></ul>
<b>No External Matching Components Required</b>	Unlike competing products, Mini-Circuits PHA-1+ provides Input and Output Return Loss of 10-16 dB up to 4 GHz without the need for any external matching components
<b>Low Noise Figure: &lt;3dB up to 4 GHz &lt;4 dB up to 6 GHz</b>	A unique feature of the PHA-1+ which separates this design from all competitors is the low noise figure performance in combination with the high dynamic range.

Notes:

- 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.
- The WJ AH1 part number is used for identification and comparison purposes only.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

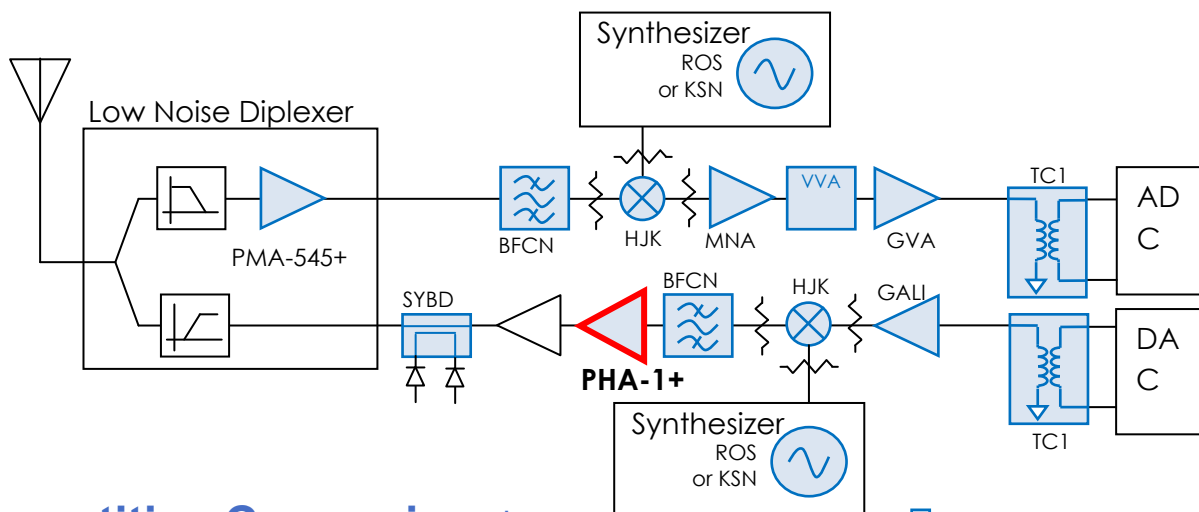


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

IF/RF MICROWAVE COMPONENTS

# New Product Announcement!

## PHA-1+



### Competitive Comparison<sup>b,c</sup> (TYPICAL)

■ Shading defines a Mini-Circuits Model

Parameter	Freq. GHz	units	PHA-1+	WJ: AH1 <sup>b,c</sup>
Operating Frequency		GHz	0.05 to 6.0	0.25 to 4.0
Gain:	0.05	dB	17.2	17.8
	0.8		15.7	14.6
	2.0		13.5	12.1
	3.0		11.8	10.4
	4.0		10.7	--
	6.0		9.7	--
Output IP3:	0.05	dBm	34.0	--
	0.8		41.1	41.0
	2.0		42.0	40.0
	3.0		42.3	41.0
	4.0		43.3	41.0
	6.0		41.0	--
P Out at 1dB	0.05	dBm	22.2	--
	0.8		22.6	21.7
	2.0		22.4	22.0
	3.0		22.7	21.6
	4.0		22.7	21.6
	6.0		21.6	--
Noise Figure	0.05	dB	3.0	--
	0.8		2.4	3.0
	2.0		2.7	3.3
	3.0		2.8	4.8
	4.0		3.0	4.1
	6.0		3.7	--
Input Return loss	<1.0	dB	17.0	8.0
	<6.0		8.5	12.0
Output Return Loss	<1.0	dB	17.0	15.0
	<6.0		9.0	11.0
Operating Voltage		V	5	5
Operating Current (nominal)		mA	152	150
External Matching Requirement			None	YES for each specific band
Thermal Resistance		°C/W	71	59
Max Input RF Power	<1.0	dBm	+12	+10
	<6.0		+15	
Operating Temperature Range		°C	-40 to +85	-40 to +85
Package			SOT-89	SOT-89

Notes: (b) The WJ AH1 part number is used for identification and comparison purposes only.

(c) Data for the WJ AH1 was taken from TriQuint published datasheet, Jan. 2008 (TriQuint is a registered trademark of TriQuint Semiconductor, Inc. and is in no way affiliated with Mini-C).



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

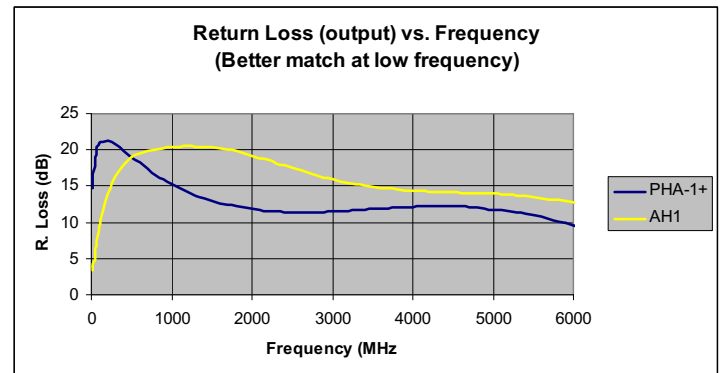
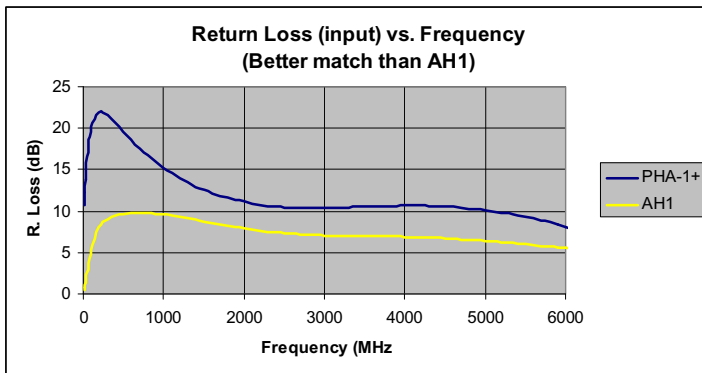
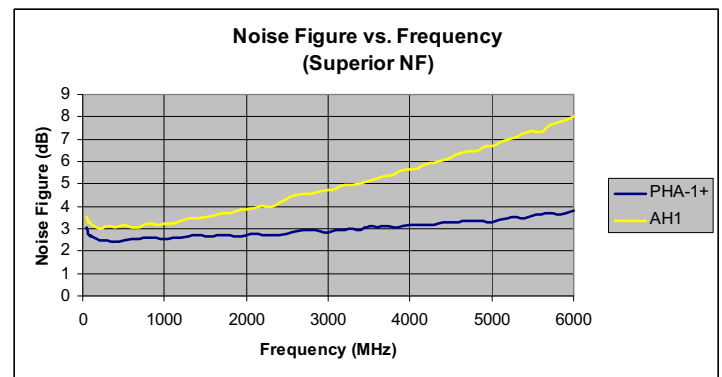
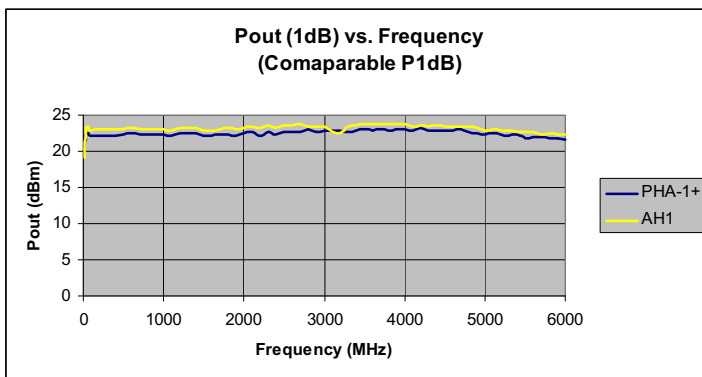
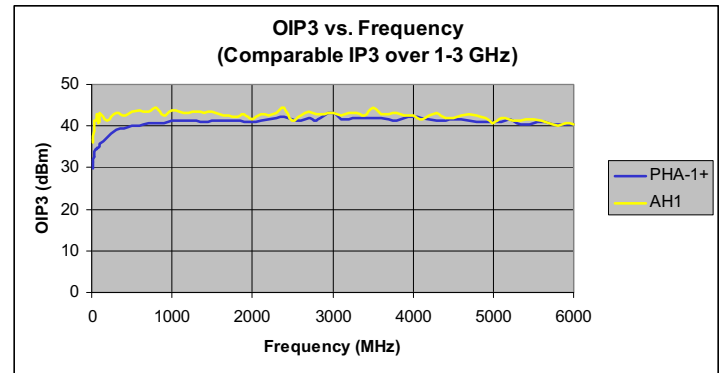
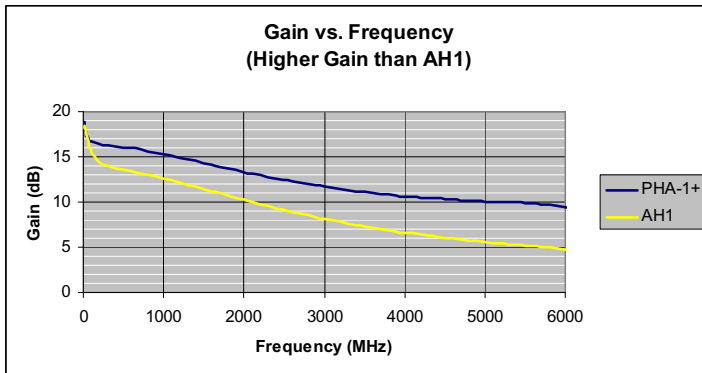
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

IFIRF MICROWAVE COMPONENTS

# New Product Announcement!

## PHA-1+


### Performance Comparison to AH1<sup>b,c,d</sup>



Notes: (b) The WJ AH1 part number is used for identification and comparison purposes only.  
 (c) Data for the WJ AH1 was taken from TriQuint published datasheet, Jan. 2008 (TriQuint is a registered trademark of TriQuint Semiconductor, Inc. and is in no way affiliated with Mini-Circuits.)  
 (d) Measured in Mini-Circuits test fixture 90-6-20-26



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

 The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

IFIRF MICROWAVE COMPONENTS