

# Ultra High IP3 Amplifier Module

## HXG-242+

50Ω 0.7 to 2.4 GHz



Ceramic Package

### The Big Deal

- Industry leading High IP3, 46 dBm typ.
- Integrated optimization circuits
- Linearity with low current consumption

[LTE Performance](#)

### Product Overview

The HXG-242+ (RoHS compliant) is an advanced amplifier module combining high dynamic range MMIC technology and optimization circuits to provide industry leading linearity over a focused frequency range. It is packaged in a Mini-Circuits System in Package (MSiP) module (6.4mm x 7.0mm x 2.4mm) using a sealed ceramic cover and having gold over Ni for excellent solderability.

### Key Features

Feature	Advantages
Optimized Frequency Range	Covering primary wireless communications bands: Cellular, PCS, LTE
Extremely High IP3 vs. Current 46.6 dBm typ at 1500 MHz versus DC Power Consumption of 146mA	The HXG-242+ offers industry leading IP3 performance relative to device size and power consumption. The combination of the design and E-PHEMT provides enhanced linearity as evidence in the IP3. 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>
No External Matching Components Required	Unlike competing products, Mini-Circuits HXG-242+ provides Input and Output Return Loss of 10 dB up to 1.5 GHz without the need for any external matching components
Low Noise Figure: 2.4dB typ.	A unique feature of the HXG-242+ which separates this design from all competitors is the low noise figure performance in combination with the high dynamic range.

**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](http://www.minicircuits.com/MCLStore/terms.jsp)

# Ultra High IP3 Amplifier Module 0.7-2.4 GHz

## Product Features

- Ultra High IP3, +46 dBm typ. at 1.5 GHz
- Gain, 14.3 dB typ. at 2 GHz
- High Pout, P1dB +23 dBm typ.
- Low noise figure, 2.4 dB
- Internally matched for optimized IP3 performance
- No external matching components required



## HXG-242+

CASE STYLE: LZ1671  
PRICE: \$3.41 ea. QTY. (50)

### +RoHS Compliant

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

## Typical Applications

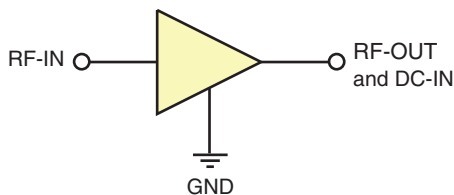
- Base station infrastructure
- Portable Wireless
- LTE

 LTE Performance

## General Description

The HXG-242+ (RoHS compliant) is an advanced amplifier module in a Mini-Circuits System in Package (MSiP) which includes internal matching networks to offer extremely high dynamic range module. It is housed in a ceramic package 6.4mm x 7.0mm x 2.4mm.

## simplified schematic and pin description



Function	Pin Number	Description
RF IN	2	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	5	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit", Fig. 2
GND	1,3,4,6	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

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Electrical Specifications<sup>(1)</sup> at 25°C and 5V, unless noted

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		0.7		2.4	GHz
Gain	0.7		16.0		dB
	0.9		15.9		
	1.2		15.3		
	1.5		14.9		
	1.8	13.0	14.4	15.8	
	2.1		14.0		
Input Return Loss	0.7		17.5		dB
	0.9		15.8		
	1.2		13.7		
	1.5		11.6		
	1.8		9.7		
	2.1		7.8		
Output Return Loss	0.7		19.1		dB
	0.9		18.8		
	1.2		18.2		
	1.5		17.9		
	1.8		16.5		
	2.1		14.7		
Reverse Isolation	2.0		20.0		dB
Output Power @ 1 dB compression	0.7		22.2		dBm
	0.9		22.3		
	1.2		22.6		
	1.5		22.9		
	1.8		23.0		
	2.1		23.2		
Output IP3	0.7		41.3		dBm
	0.9		41.7		
	1.2		44.2		
	1.5	42.0	45.7		
	1.8	42.0	44.4		
	2.1		45.0		
Noise Figure	0.7		2.2		dB
	0.9		2.3		
	1.2		2.3		
	1.5		2.3		
	1.8		2.4		
	2.1		2.5		
Device Operating Voltage (V <sub>o</sub> )		4.8	5.0	5.2	V
Device Operating Current		110	140	180	mA
Device Current Variation vs. Temperature <sup>(2)</sup>			+14		μA/°C
Device Current Variation vs Voltage			0.05		mA/mV
Thermal Resistance, junction-to-ground lead			85		°C/W

<sup>(1)</sup> Measured on Mini-Circuits Characterization test board TB-640+. See Characterization Test Circuit (Fig.1)

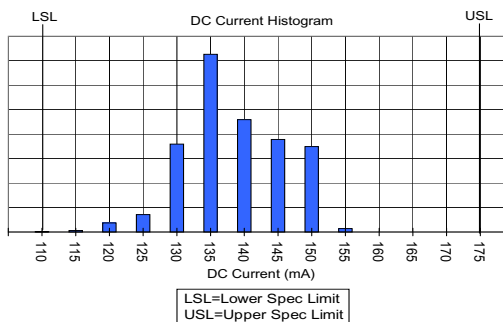
<sup>(2)</sup> Current at 85°C — Current at -45°C/130

Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Operating Current at 5V	210 mA
Power Dissipation	1 W
Input Power (CW)	24 dBm
DC Voltage on Pin 3	6 V

Note:

Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.

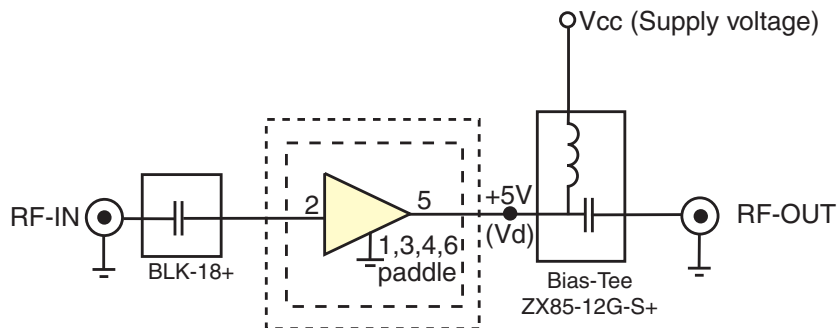


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Characterization Test Circuit

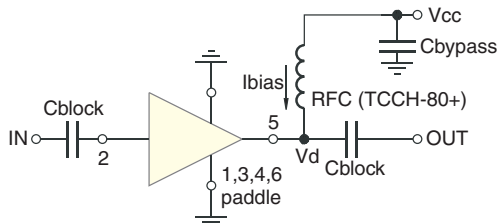


**Fig 1.** Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-640+) Gain, Return loss, Output power at 1dB compression (P1 dB) , output IP3 (OIP3) and noise figure measured using Agilent’s N5242A PNA-X microwave network analyzer.

**Conditions:**

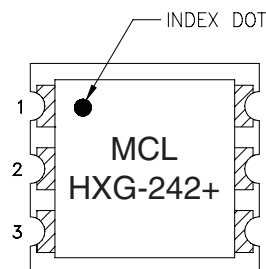
1. Gain and Return loss: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 5 dBm/tone at output.

Recommended Application Circuit



*Fig 2. Test Board includes case, connectors, and components soldered to PCB*

Product Marking



Markings in addition to model number designation may appear for internal quality control purposes.

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<b>Additional Detailed Technical Information</b> <i>additional information is available on our dash board. To access this information <a href="#">click here</a></i>	
<b>Performance Data</b>	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
<b>Case Style</b>	LZ1671 <i>Ceramic package, exposed paddle, lead finish: gold plating over nickel</i>
<b>Tape &amp; Reel</b> Standard quantities available on reel	F78 7" reels with 20, 50, 100, 200 and 13" with 500, or 1K devices.
<b>Suggested Layout for PCB Design</b>	PL-350
<b>Evaluation Board</b>	TB-641-242+
<b>Environmental Ratings</b>	ENV-59

## 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 (<100V) in accordance with ANSI/ESD STM 5.2-1999 passes 25V

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