



COAXIAL

Low Phase Noise Amplifier **ZX60-123LPNR+**

50Ω 0.05 to 10 GHz SMA Female

KEY FEATURES

- Ultra-Broadband Performance
- Gain, 16 dB Typ.
- Excellent Gain Flatness, ± 0.8 dB, 0.05 to 6 GHz
- Low Additive Phase Noise, Typically -168 dBc/Hz at 10 kHz
- Voltage Regulated Internally and Reverse Voltage Protected
- Protected by US Patent 6,790,049

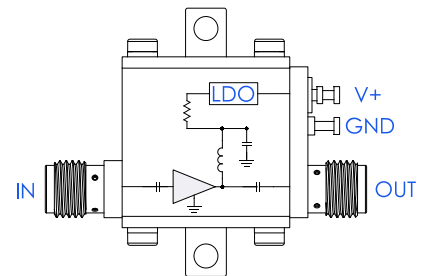


Generic photo used for illustration purposes only

APPLICATIONS

- Low Phase Noise Applications
- Base Station Infrastructure
- Test Instrumentation
- MMDS & Wireless LAN
- Satellite Communications
- Avionics

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

Mini-Circuits' ZX60-123LPNR+ is an advanced ultra-wideband amplifier fabricated using GaAs HBT technology that provides extremely low additive phase noise and offers excellent gain flatness over a broad frequency range. In addition, the ZX60-123LPNR+ exhibits good input and output return loss over the 0.05 to 10 GHz frequency range without the need for external matching components. Housed in a rugged, cost-effective unibody chassis, this amplifier supports a wide variety of applications requiring moderate power output, low distortion, and 50Ω matched input/output ports.

ELECTRICAL SPECIFICATIONS AT +25 °C BASEPLATE AND $V_S = +6$ V

Parameter	Frequency (GHz)	Min.	Typ.	Max.	Units
Frequency Range		0.05		10	GHz
Gain	0.05	-	16.2	-	dB
	2.0	15.2	16.5	-	
	6.0	-	15.5	-	
	8.0	-	15.0	-	
	10.0	-	12.5	-	
Input Return Loss	0.05	-	13.0	-	dB
	2.0	15.0	20.2	-	
	6.0	-	18.0	-	
	8.0	-	15.0	-	
	10.0	-	8.0	-	
Output Return Loss	0.05	-	15.0	-	dB
	2.0	-	22.0	-	
	6.0	-	19.5	-	
	8.0	-	11.5	-	
	10.0	-	7.5	-	



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Parameter	Frequency (GHz)	Min.	Typ.	Max.	Units
Noise Figure	0.05	-	5.8	-	dB
	2.0	-	3.9	-	
	6.0	-	4.3	-	
	8.0	-	4.5	-	
	10.0	-	5.4	-	
Output Power at 1 dB Compression (P1dB)	0.05	-	+17.5	-	dBm
	2.0	-	+16.2	-	
	6.0	-	+13.5	-	
	8.0	-	+10.6	-	
	10.0	-	+8.3	-	
Directivity (Isolation - Gain)	0.05	-	4.7	-	dB
	6.0	-	6.2	-	
	10.0	-	11.9	-	
Output Third Order Intercept Point (OIP3)	0.05	-	+18.0	-	dBm
	2.0	-	+30.0	-	
	6.0	-	+24.0	-	
	8.0	-	+22.0	-	
	10.0	-	+19.0	-	
Additive Phase Noise ¹	2.0	-	-168.0	-	dBc/Hz
DC Supply Voltage (V_S)	-	+5.5	+6.0	+9	V
DC Current ²	-	-	56	70	mA

1. Input power +1 dBm, 2 GHz, 10 kHz offset.

2. Current at $P_{IN} = -25\text{ dBm}$. Increases to 98 mA at P_{SAT} .

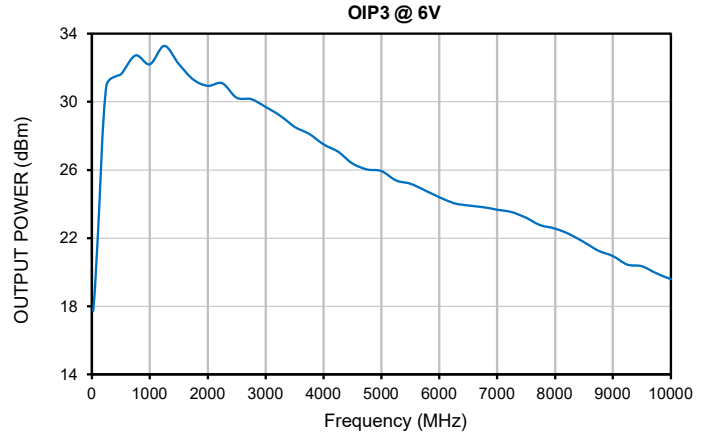
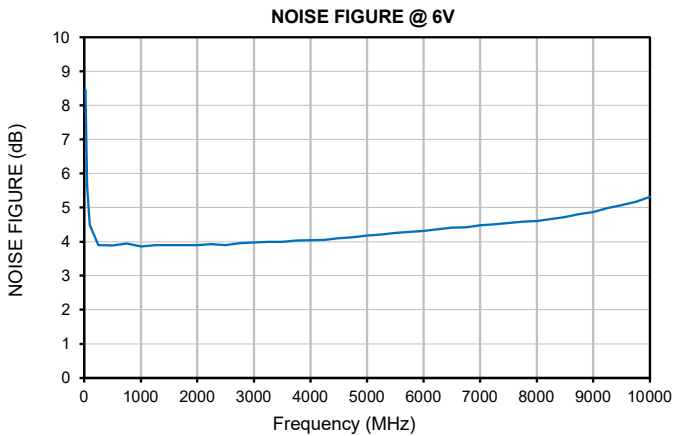
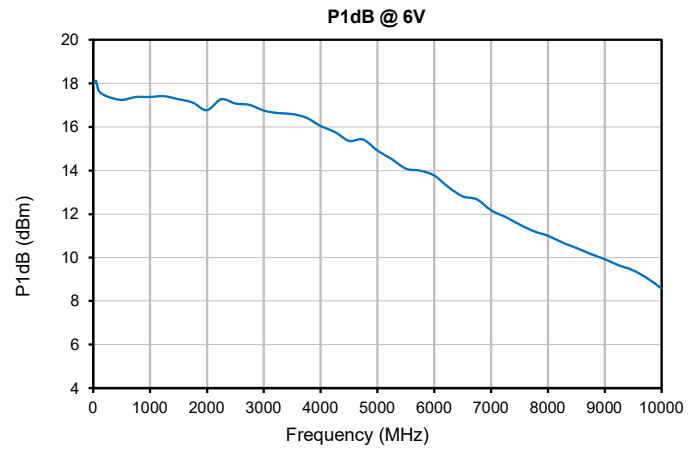
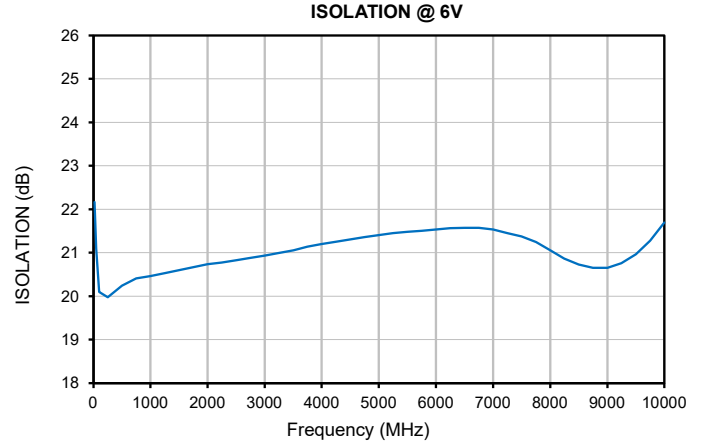
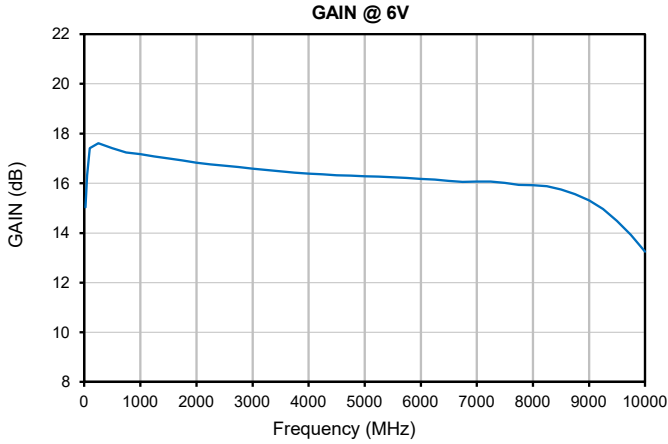


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Low Phase Noise Amplifier **ZX60-123LPCR+**

50Ω 0.05 to 10 GHz SMA Female

TYPICAL PERFORMANCE GRAPHS AT +25 °C





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Low Phase Noise Amplifier **ZX60-123LPCR+**

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ABSOLUTE MAXIMUM RATINGS³

Parameter	Ratings
Operating Temperature	-40 °C to +65 °C Baseplate
Storage Temperature	-55 °C to +100 °C
Total Power Dissipation	1.0 W
RF Input Power (CW)	+11 dBm
DC Operating Voltage ⁴	+10.0 V

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

4. No protection against reverse voltage.

DETERMINING MAXIMUM THERMAL RESISTANCE OF USERS' EXTERNAL HEATSINK

$\text{MAXIMUM THERMAL RESISTANCE} = \frac{\text{MAXIMUM OPERATING CASE TEMP} - \text{MAXIMUM USER AMBIENT TEMP}}{\text{POWER DISSIPATION}}$	
Example:	MAXIMUM OPERATING CASE TEMP = +50 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) MAXIMUM USER AMBIENT TEMP = +30 °C (USER DEFINED) POWER DISSIPATION = 10 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 2 °C/W

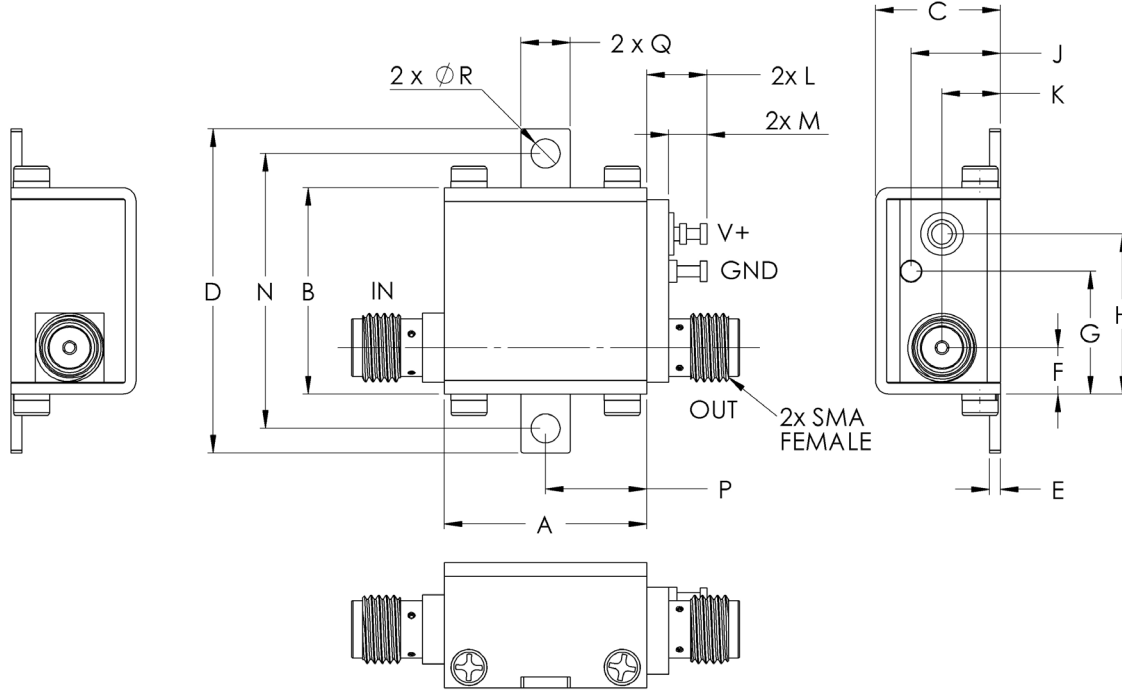


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CASE STYLE DRAWING



 NOTE: When soldering the DC connections, caution must be used to avoid overheating the DC terminal. See Application Note [AN-40-010](#).

OUTLINE DIMENSIONS (Inch/mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	wt
.74	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.14	1.00	.37	.18	.106	grams
18.80	19.15	11.61	30.07	1.02	4.32	11.40	14.86	8.31	5.44	5.59	3.56	25.4	9.40	4.57	2.69	23.0



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50Ω **0.05 to 10 GHz** **SMA Female****ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.**

Performance Data & Graphs	Data
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
RoHS Status	Compliant
Environmental Ratings	ENV23T35
Export Information	ECCN# EAR99

ORDERING INFORMATION

Model No. Link	ZX60-123LPNR+
Product Marking	ZX60-123LPNR+
Case Style	GC957
Connector	IN SMA female / OUT SMA female

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-Circuits' 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