WIDEBAND

# Low Noise Amplifier

# ZX60-53LN+

50Ω 0.5 to 5 GHz SMA Female

## THE BIG DEAL

- Very wideband, 500 MHz – 5 GHz
- Ultra-flat gain, ±0.7 dB from 500 to 2000 MHz
- Low NF over entire frequency band
- Protected by US patent 6,790,049

*Generic photo used for illustration purposes only*

| | |
|---|---|
| **Model No.** | ZX60-53LN+ |
| **Case Style** | GC957 |
| **Connectors** | SMA Female |

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

## APPLICATIONS

- Wireless Base Station Systems
- Test and Measurement Systems
- Multi-Band Receivers

## PRODUCT OVERVIEW

Mini-Circuits ZX60-53LN+ is a low-noise amplifier offering industry-leading performance over its full frequency range from 500 MHz to 5 GHz. The internal MMIC amplifier ZX60-53LN+ utilizes E-PHEMT technology to achieve excellent noise figure performance in a unique cascade configuration enabling the combination of very wide band performance and flat gain. This design operates on a single 5V supply and comes in a rugged, compact unobody case (0.74 x 0.75 x 0.46") with SMA connectors, making it an excellent candidate for tough operating conditions and crowded system layouts.

## KEY FEATURES

| Feature | Advantages |
|---|---|
| Ultra-wideband: 500 MHz – 5 GHz | Ideal for a wide range of receiver applications including military, commercial wireless, and instrumentation. |
| Very flat gain | Ideal for broadband or multi-band applications. Just one, cost-efficient model required for multiple frequency usage. |
| High IP3, +32 dBm typ. | Provides enhanced linearity over broad frequency range. |
| High gain, 25 dB typ. | Reduces the number of gain stages, lowering components count and overalll system cost. |
| Low operating voltage, +5V | The amplifier features low operating voltage. |
| Rugged unibody construction | Mini-Circuits unibody construction integrates the RF connector into the case body, providing high reliability and excellent survivability in critical applications. |

REV. B
ECO-015740
ZX60-53LN+
ED-15070802
AG/CP/AM
221107

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## ELECTRICAL SPECIFICATIONS AT 25°C, Zo=50Ω AND 5V, UNLESS NOTED OTHERWISE

| Parameter | Condition GHz) | $V_{DD}$=5V | | | Units |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Frequency Range | | 0.5 | | 5 | GHz |
| Noise Figure | 0.5 | | 1.20 | | dB |
| | 1.0 | | 1.25 | | |
| | 2.0 | | 1.45 | | |
| | 3.0 | | 1.50 | | |
| | 4.0 | | 1.60 | | |
| | 5.0 | | 1.90 | | |
| Gain | 0.5 | 19.5 | 22.0 | 23.9 | dB |
| | 1.0 | | 22.0 | | |
| | 2.0 | | 21.0 | | |
| | 3.0 | | 20.0 | | |
| | 4.0 | | 19.0 | | |
| | 5.0 | | 18.0 | | |
| Gain Flatness | 0.5-2.0 | | ±0.7 | | dB |
| Input Return Loss | 0.5 | | 16.0 | | dB |
| | 1.0 | | 16.5 | | |
| | 2.0 | | 15.0 | | |
| | 3.0 | | 13.0 | | |
| | 4.0 | | 17.0 | | |
| | 5.0 | | 14.0 | | |
| Output Return Loss | 0.5 | | 13.0 | | dB |
| | 1.0 | | 15.0 | | |
| | 2.0 | | 20.0 | | |
| | 3.0 | | 15.0 | | |
| | 4.0 | | 15.0 | | |
| | 5.0 | | 12.0 | | |
| Output Power at 1dB Compression[1] | 0.5 | | 19.2 | | dBm |
| | 1.0 | | 19.1 | | |
| | 2.0 | | 18.9 | | |
| | 3.0 | | 19.1 | | |
| | 4.0 | | 19.5 | | |
| | 5.0 | | 18.2 | | |
| Output IP3 | 0.5 | | 32.8 | | dBm |
| | 1.0 | | 35.0 | | |
| | 2.0 | | 31.5 | | |
| | 3.0 | | 31.0 | | |
| | 4.0 | | 32.0 | | |
| | 5.0 | | 30.9 | | |
| Active Directivity (Isolation-Gain) | — | — | 4.5 | | dB |
| Device Operating Voltage (Vdd) | — | 4.9 | 5.0 | 7.0 | V |
| Device Operating Current (Id) | — | — | 80 | 105 | mA |

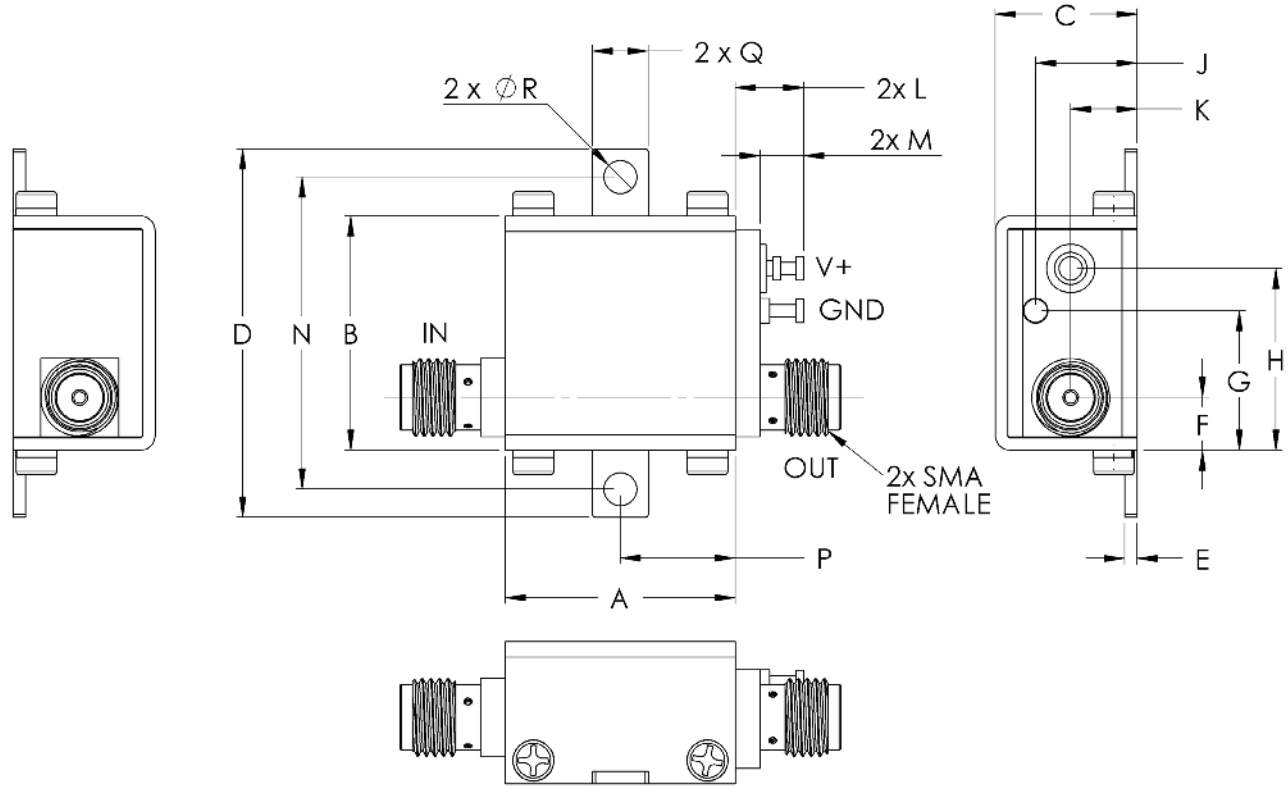
1. Current increases at P1dB.

## ABSOLUTE MAXIMUM RATINGS[2]

| Parameter | Ratings |
|---|---|
| Operating Temperature (ground lead) | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| Total Power Dissipation | 0.7 W |
| Input Power | +19 dBm (5 minutes max.)<br>+8 dBm (continuous) |
| DC Voltage Vdd | +7V |

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

## OUTLINE 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 (Inches / 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 | 19.1 | 11.68 | 30.0 | 1.02 | 4.32 | 11.4 | 14.99 | 8.38 | 5.33 | 5.59 | 3.56 | 25.40 | 9.40 | 4.57 | 2.69 | 23.0 |

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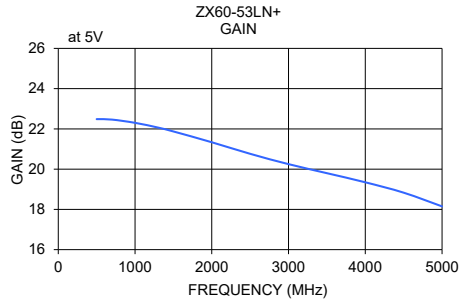
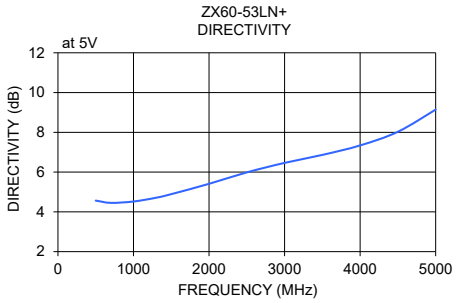
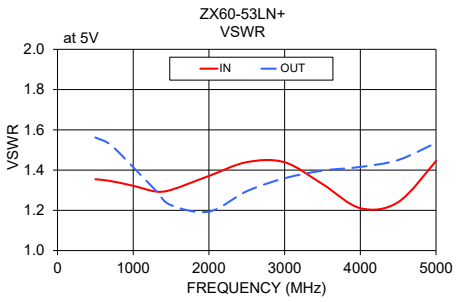
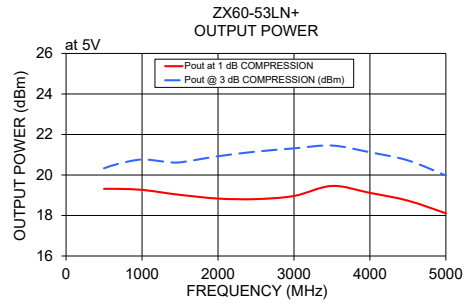
## TYPICAL PERFORMANCE DATA/CURVES

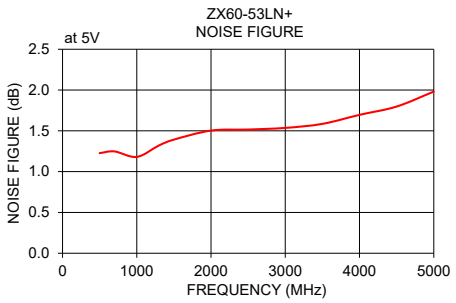
| Frequency (MHz) | Gain (dB) | Directivity (dB) | VSVR (:1) | | Power Out @1 dB COMPR. (dBm) | Noise Figure (dB) | IP3 (dBm) |
|---|---|---|---|---|---|---|---|
| | | | IN | OUT | | | |
| 500 | 22.49 | 4.57 | 1.35 | 1.56 | 19.32 | 1.23 | 35.04 |
| 700 | 22.46 | 4.45 | 1.35 | 1.53 | 19.31 | 1.25 | 36.42 |
| 1000 | 22.30 | 4.52 | 1.32 | 1.41 | 19.27 | 1.18 | 36.53 |
| 1300 | 22.06 | 4.71 | 1.29 | 1.30 | 19.12 | 1.32 | 36.03 |
| 1500 | 21.87 | 4.89 | 1.30 | 1.23 | 19.02 | 1.39 | 36.51 |
| 2000 | 21.34 | 5.41 | 1.37 | 1.19 | 18.84 | 1.50 | 34.34 |
| 2500 | 20.76 | 5.99 | 1.44 | 1.30 | 18.81 | 1.52 | 33.34 |
| 3000 | 20.25 | 6.46 | 1.44 | 1.36 | 18.96 | 1.54 | 32.15 |
| 3500 | 19.80 | 6.86 | 1.33 | 1.40 | 19.46 | 1.59 | 32.43 |
| 4000 | 19.35 | 7.34 | 1.21 | 1.42 | 19.12 | 1.70 | 32.88 |
| 4500 | 18.83 | 8.03 | 1.24 | 1.45 | 18.73 | 1.80 | 32.57 |
| 5000 | 18.15 | 9.14 | 1.45 | 1.54 | 18.11 | 1.98 | 32.05 |

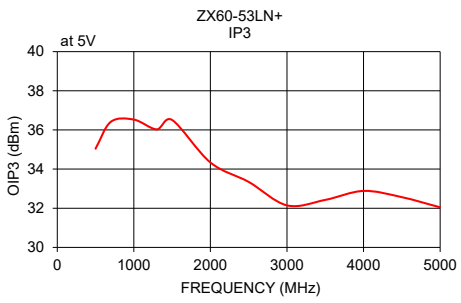



NOTES

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