



COAXIAL

# Low Noise Amplifier

## ZX60-63GLN+

Mini-Circuits

50Ω 1.8 to 6 GHz SMA Female

### THE BIG DEAL

- Low Noise Figure, 0.9 dB typ.
- High Gain, up to 29.6 dB typ.
- Protected by US patent 6,790,049

### APPLICATIONS

- 5G
- WiFi
- WLAN
- UMTS
- LTE
- WiMAX
- S-band radar
- C-band Satcom



Generic photo used for illustration purposes only

Model No.	ZX60-63GLN+
Case Style	GC957
Connectors	SMA Female

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

### PRODUCT OVERVIEW

Mini-Circuits' ZX60-G63LN-S+ is a wideband low noise connectorized amplifier providing a unique combination of low noise figure, high IP3 and flat gain over a very wide frequency range, supporting a wide range of sensitive, high-dynamic range receiver applications and many systems where high performance over wideband is needed. This design operates on a single 5V supply and comes in a rugged, compact unibody 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
Low noise, 0.8 dB typ. at 2.5 GHz	Enables lower system noise figure performance.
Wideband with flat gain • ±1.6 dB typ. over 2.5 to 5 GHz	Enables a single amplifier to be used in a wide range of applications including WiFi, LTE, S-Band radar, C-band SATCOM, defense, instrumentation and more.
High gain, 29.8 dB typ. at 2.5 GHz	Reduces the number of gain stages, lowering component count and overall system cost.
High IP3 at +27 dBm at 2.5 GHz	The combination of low noise and high IP3 makes the ZX60-63GLN+ ideal for use in low noise receiver front end (RFE) as it gives the user the advantages of sensitivity and two-tone IM performance at both ends of the dynamic range.
Low operating voltage, +5V	The amplifier achieves high IP3 using low 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.

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 ECO-015740  
 ZX60-63GLN+  
 AG/CP/AM  
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### ELECTRICAL SPECIFICATIONS AT 25°C, Zo=50Ω and +5V, UNLESS NOTED OTHERWISE

Parameter	Condition GHz)	V <sub>DD</sub> +5V			Units
		Min.	Typ.	Max.	
Frequency Range		1.8		6.0	GHz
Noise Figure	1.8		0.9		dB
	2.5		0.8		
	3.5		0.8		
	5.0		1.2		
	6.0		1.5		
Gain	1.8	28	31.5		dB
	2.5		29.6		
	3.5	24.5	27.8		
	5.0		26.3		
	6.0	21.5	24.5		
Input Return Loss	1.8		6		dB
	2.5		8.5		
	3.5		11		
	5.0		11.5		
	6.0		12.5		
Output Return Loss	1.8		10		dB
	2.5		10		
	3.5		10.5		
	5.0		16		
	6.0		21		
Output Power at 1dB Compression	1.8		15		dBm
	2.5		14.6		
	3.5	12.0	13.6		
	5.0		11.1		
	6.0		10.2		
Output IP3 <sup>1</sup>	1.8		27.8		dBm
	2.5		27.7		
	3.5		26		
	5.0		22.8		
	6.0		21.7		
Device Operating Voltage (V <sub>DD</sub> )	—	4.9	5.0	7.0	V
Device Operating Current (I <sub>D</sub> )	—	—	67	80	mA

1. OIP3 measured with 0 dBm tones and 1 MHz spacing.

### ABSOLUTE MAXIMUM RATINGS<sup>2</sup>

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Total Power Dissipation	0.56 W
Input Power (CW), V <sub>d</sub> =5V	+29 dBm (5 minutes max.) +10 dBm (continuous)
DC Voltage	+7V

2. 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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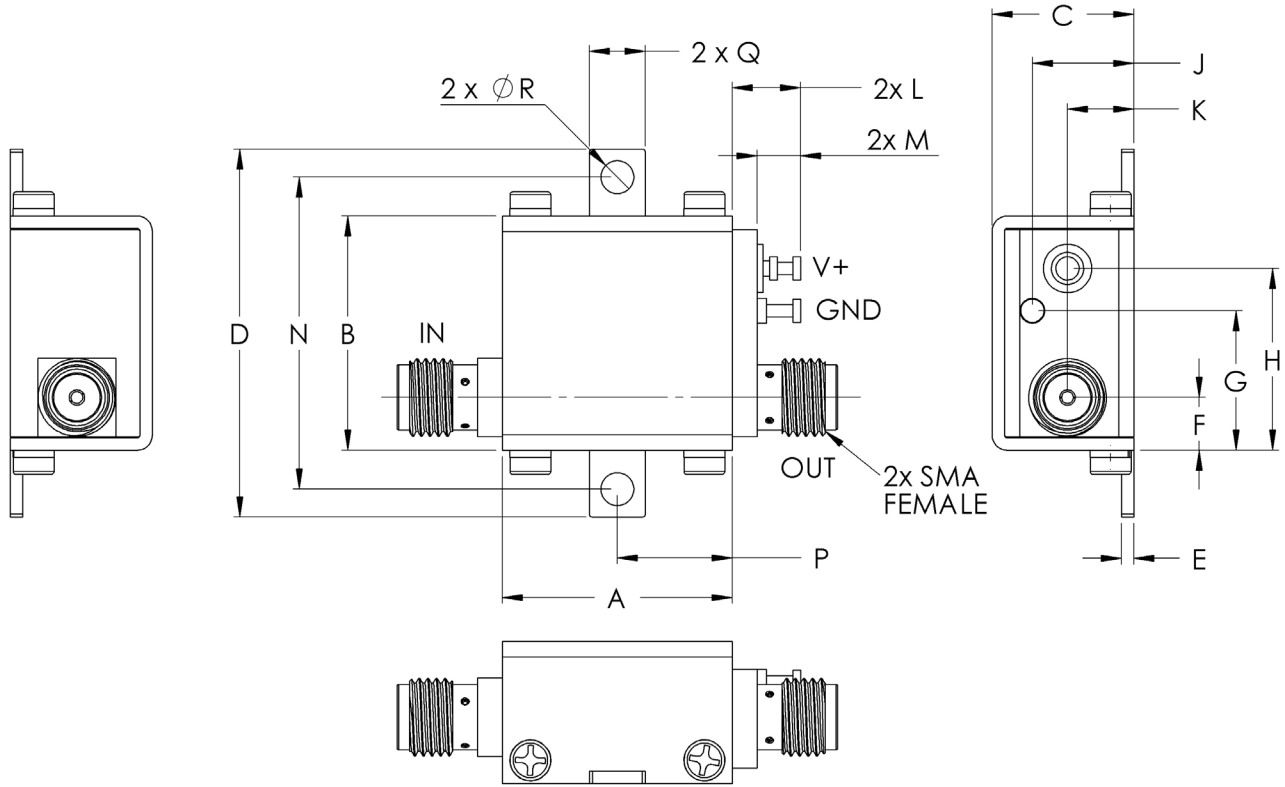
# Low Noise Amplifier

## ZX60-63GLN+

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### 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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# Low Noise Amplifier

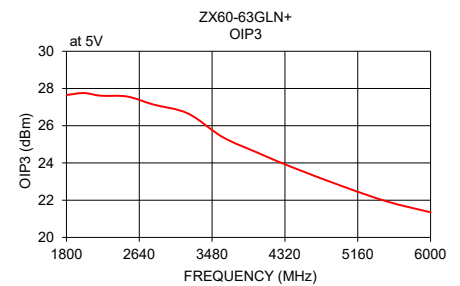
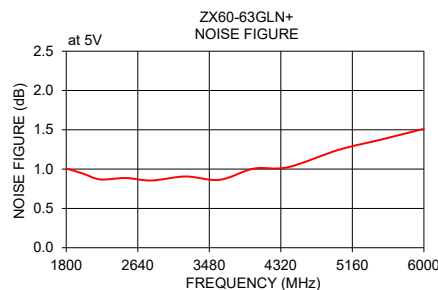
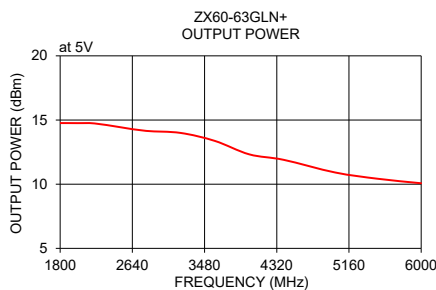
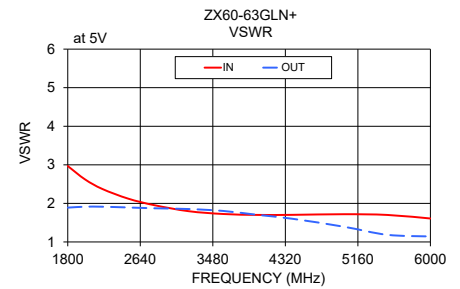
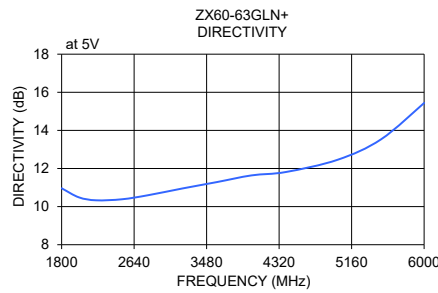
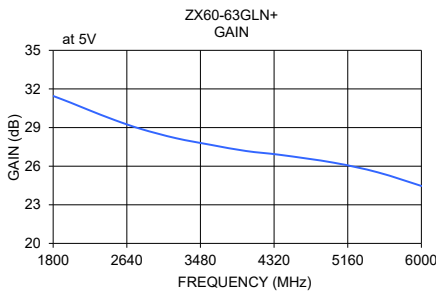
## ZX60-63GLN+

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### TYPICAL PERFORMANCE DATA/CURVES

Frequency (MHz)	Gain (dB)	Directivity (dB)	VSWR (:1)		Power Out @1 dB COMPR. (dBm)	Noise Figure (dB)	IP3 (dBm)
			IN	OUT			
1800	31.45	10.96	2.97	1.89	14.76	1.01	27.65
2000	30.93	10.49	2.62	1.91	14.76	0.94	27.76
2200	30.38	10.33	2.37	1.91	14.73	0.87	27.61
2500	29.59	10.39	2.12	1.89	14.44	0.89	27.57
2800	28.89	10.60	1.95	1.87	14.15	0.86	27.14
3200	28.17	10.95	1.80	1.85	13.99	0.91	26.66
3600	27.65	11.29	1.72	1.80	13.37	0.86	25.39
4000	27.18	11.64	1.70	1.70	12.32	1.01	24.56
4400	26.87	11.82	1.70	1.60	11.90	1.02	23.78
5000	26.27	12.46	1.72	1.39	10.91	1.25	22.72
5500	25.53	13.53	1.70	1.19	10.42	1.38	21.93
6000	24.46	15.44	1.61	1.14	10.07	1.51	21.35



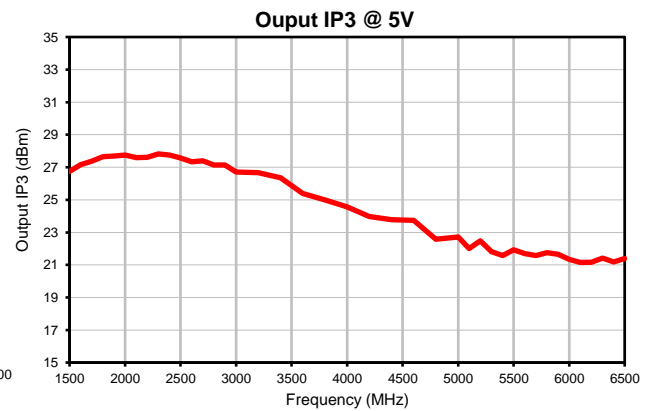
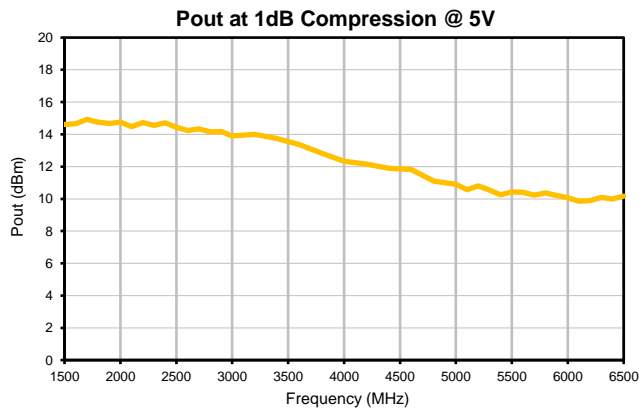
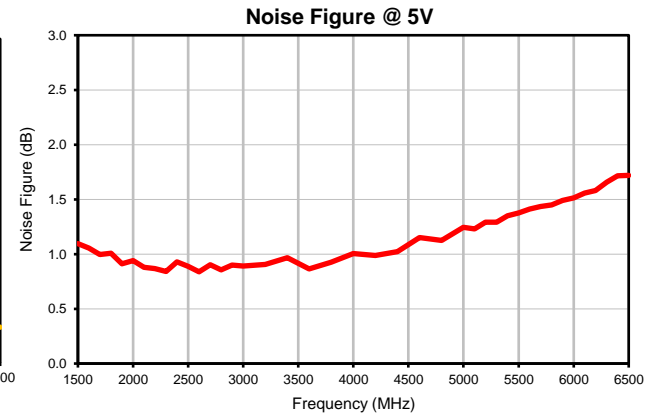
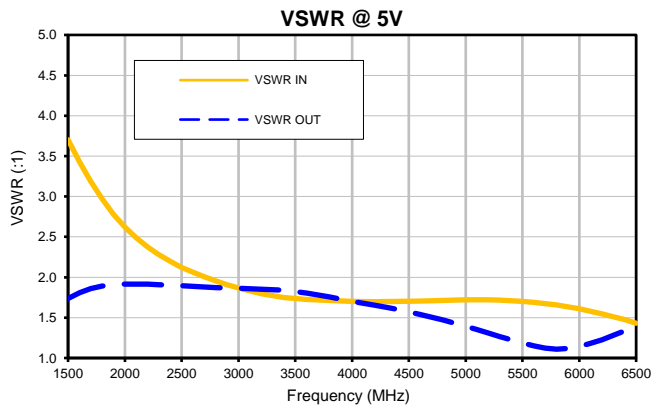
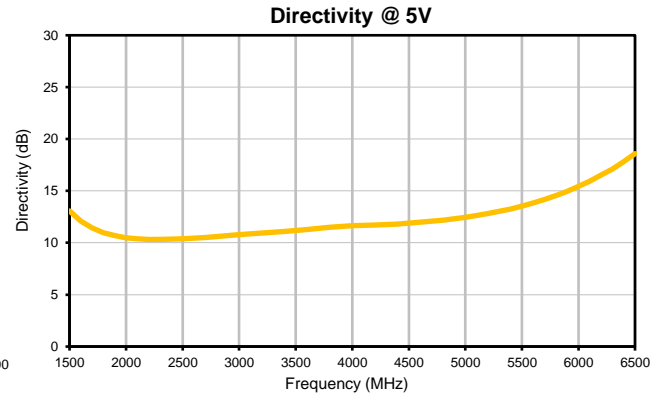
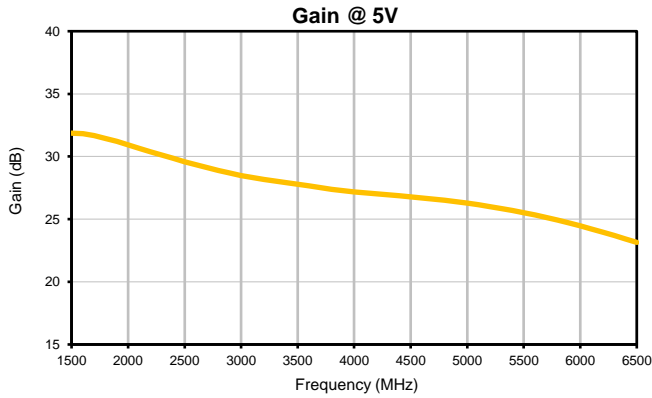
- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
  - B. Electrical specifications and performance data contained in this specification document are based 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](http://www.minicircuits.com/terms/viewterm.html)



## Typical Performance Data

FREQUENCY (MHz)	GAIN (dB) 5V	DIRECTIVITY (dB) 5V	VSWR (:1)		NOISE FIGURE (dB) 5V	POUT @ 1 dB COMPRESSION (dBm) 5V	OUTPUT IP3 (dBm) 5V
			IN 5V	OUT 5V			
1500	31.86	13.08	3.70	1.74	1.10	14.62	26.75
1600	31.81	12.10	3.43	1.81	1.05	14.66	27.16
1700	31.66	11.42	3.19	1.86	1.00	14.93	27.37
1800	31.45	10.96	2.97	1.89	1.01	14.76	27.65
1900	31.20	10.68	2.78	1.91	0.91	14.67	27.68
2000	30.93	10.49	2.62	1.91	0.94	14.76	27.76
2100	30.66	10.38	2.49	1.91	0.88	14.47	27.60
2200	30.38	10.33	2.37	1.91	0.87	14.73	27.61
2300	30.11	10.33	2.28	1.91	0.84	14.56	27.82
2400	29.85	10.34	2.20	1.90	0.93	14.72	27.74
2500	29.59	10.39	2.12	1.89	0.89	14.44	27.57
2600	29.34	10.44	2.06	1.89	0.84	14.25	27.33
2700	29.11	10.51	2.00	1.88	0.90	14.33	27.39
2800	28.89	10.60	1.95	1.87	0.86	14.15	27.14
2900	28.68	10.68	1.91	1.87	0.90	14.18	27.15
3000	28.49	10.79	1.87	1.86	0.89	13.89	26.71
3200	28.17	10.95	1.80	1.85	0.91	13.99	26.66
3400	27.92	11.10	1.75	1.84	0.97	13.74	26.35
3600	27.65	11.29	1.72	1.80	0.86	13.37	25.39
3800	27.39	11.49	1.71	1.75	0.93	12.83	25.00
4000	27.18	11.64	1.70	1.70	1.01	12.32	24.56
4200	27.03	11.71	1.70	1.65	0.99	12.16	23.97
4400	26.87	11.82	1.70	1.60	1.02	11.90	23.78
4600	26.70	11.98	1.71	1.54	1.15	11.81	23.74
4800	26.50	12.18	1.71	1.47	1.13	11.10	22.58
5000	26.27	12.46	1.72	1.39	1.25	10.91	22.72
5100	26.15	12.63	1.72	1.35	1.23	10.56	22.01
5200	26.01	12.82	1.72	1.31	1.29	10.80	22.47
5300	25.86	13.03	1.72	1.27	1.29	10.55	21.80
5400	25.70	13.26	1.71	1.22	1.35	10.25	21.57
5500	25.53	13.53	1.70	1.19	1.38	10.42	21.93
5600	25.34	13.83	1.69	1.15	1.41	10.40	21.70
5700	25.14	14.19	1.67	1.12	1.44	10.23	21.57
5800	24.93	14.55	1.66	1.11	1.45	10.37	21.75
5900	24.70	14.96	1.63	1.12	1.49	10.22	21.65
6000	24.46	15.44	1.61	1.14	1.51	10.07	21.35
6100	24.22	15.95	1.58	1.18	1.56	9.85	21.15
6200	23.96	16.51	1.55	1.23	1.58	9.89	21.17
6300	23.69	17.12	1.51	1.28	1.66	10.10	21.41
6400	23.42	17.82	1.47	1.34	1.72	9.99	21.18
6500	23.15	18.59	1.43	1.40	1.72	10.17	21.40

## Typical Performance Curves

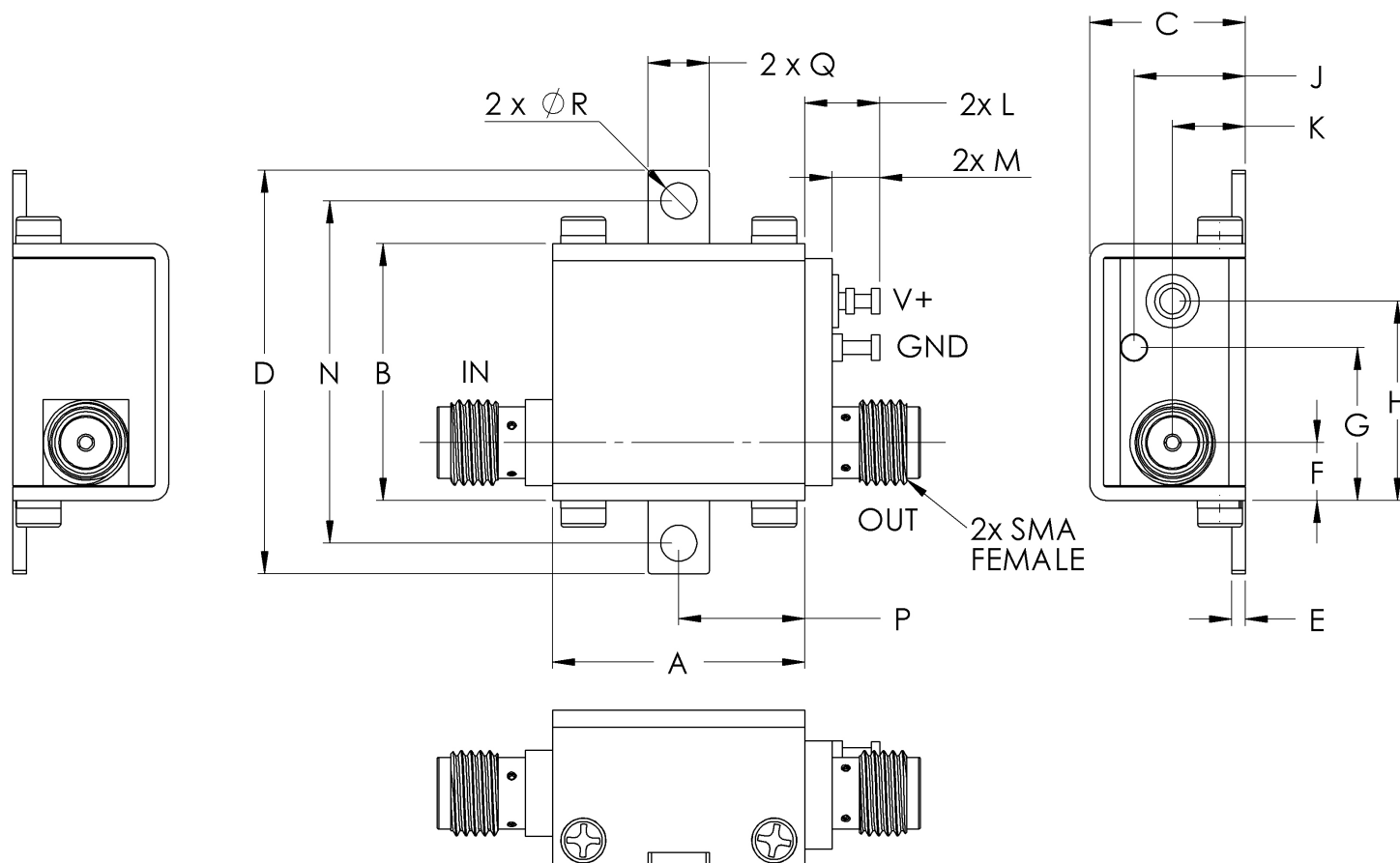


# Case Style

# GC

## Outline Dimensions

## GC957



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N
GC957	.74 (18.80)	.75 (19.15)	.46 (11.61)	1.18 (30.07)	.04 (1.02)	.17 (4.32)	.45 (11.40)	.59 (14.86)	.33 (8.31)	.21 (5.44)	.22 (5.59)	.14 (3.56)	1.00 (25.4)

CASE #.	P	Q	R	WT GRAMS
GC957	.37 (9.40)	.18 (4.57)	.106 (2.69)	23.0

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .03$ ; 3Pl.  $\pm .015$   
Tolerance on hole size and interaxes dimensions to be  $\pm .005$ .

### Note:

1. Case material: Brass
2. Case finish: Nickel plate

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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D
Humidity	90% RH, 65°C Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103
Thermal Shock	-65° to 125°C, 5 cycles	MIL-STD-202, Method 107, Condition B
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition I