



Mini-Circuits

WIDEBAND

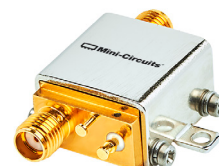
Low Noise Amplifier

ZX60-14LN-S+

50Ω 0.05 to 10 GHz SMA Female

THE BIG DEAL

- Low NF, <2dB Typ. to 7.5 GHz
- Very Flat Gain, 22 ± 0.7 dB Typ. to 8 GHz
- Wideband, 50 MHz to 10 GHz
- Single +6V Supply



Generic photo used for illustration purposes only

APPLICATIONS

- Broadband Telecom
- LTE & 5G MIMO Infrastructure
- WiFi6E, IoT, & UWB
- L, S, C-Band Radar and SATCOM
- Test & Measurement Equipment
- R&D Lab, Production, and OTA Test Systems
- Communications and Radar Defense Systems

Model No.	ZX60-14LN-S+
Case Style	GC957
Connectors	SMA Female

+RoHS Compliant

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

PRODUCT OVERVIEW

Mini-Circuits' ZX60-14LN-S+ is a low-noise amplifier offering industry-leading performance over its full frequency range from 50 MHz to 10 GHz. The internal MMIC amplifier utilizes E-pHEMT technology to achieve excellent noise figure performance in a unique configuration enabling the combination of very wide band performance and flat gain. This design operates on a single 6V supply.

KEY FEATURES

Feature	Advantages
Ultra-wideband: 50 MHz – 10 GHz	Ideal for a wide range of transmitter 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 OIP3, +32 dBm typ., up to 10 GHz	Provides enhanced linearity over a broad frequency range.
High gain, 22 dB typ.	Reduces the number of gain stages, lowering component count and overall system cost.
Rugged unibody construction	Mini-Circuits' unibody construction integrates the RF connectors into the case body, providing high reliability and excellent survivability in critical applications.

REV. OR
ECO-016347
ZX60-14LN-S+
MM/CP/AM
230105





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ELECTRICAL SPECIFICATIONS AT 25°C, $Z_0 = 50\Omega$ AND +6V, UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		0.05		10	GHz
Gain	0.05	21.0	22.0	23.9	dB
	0.8		22.5		
	2.0		22.2		
	3.2		22.0		
	4.0		21.9		
	5.2		21.8		
	8.0		20.6		
	10.0		18.2		
Gain Flatness	0.05-8.0		±1.0		dB
	0.05-10.0		±2.2		
Input Return Loss	0.05		22.2		dB
	0.8		24.0		
	2.0		17.4		
	3.2		14.1		
	4.0		13.2		
	5.2		14.5		
	8.0		18.4		
	10.0		13.7		
Output Return Loss	0.05		16.2		dB
	0.8		20.4		
	2.0		24.5		
	3.2		20.5		
	4.0		19.1		
	5.2		21.2		
	8.0		16.4		
	10.0		24.6		
Output Power at 1dB Compression	0.05		21.7		dBm
	0.8		22.8		
	2.0		22.8		
	3.2		21.3		
	4.0		21.6		
	5.2		21.3		
	8.0		19.6		
	10.0		15.9		
Output IP3	0.5		33.1		dBm
	2.0		32.3		
	4.0		30.8		
	8.0		32.8		
	10.0		33.5		
Noise Figure	0.05		1.81		dB
	0.8		1.07		
	2.0		1.22		
	3.2		1.32		
	4.0		1.40		
	5.2		1.59		
	8.0		2.20		
	10.0		3.62		
Device Operating Voltage (V_{DD})	—	5.75	6.0	6.25	V
Device Operating Current (I_{DD})	—	—	72	96	mA





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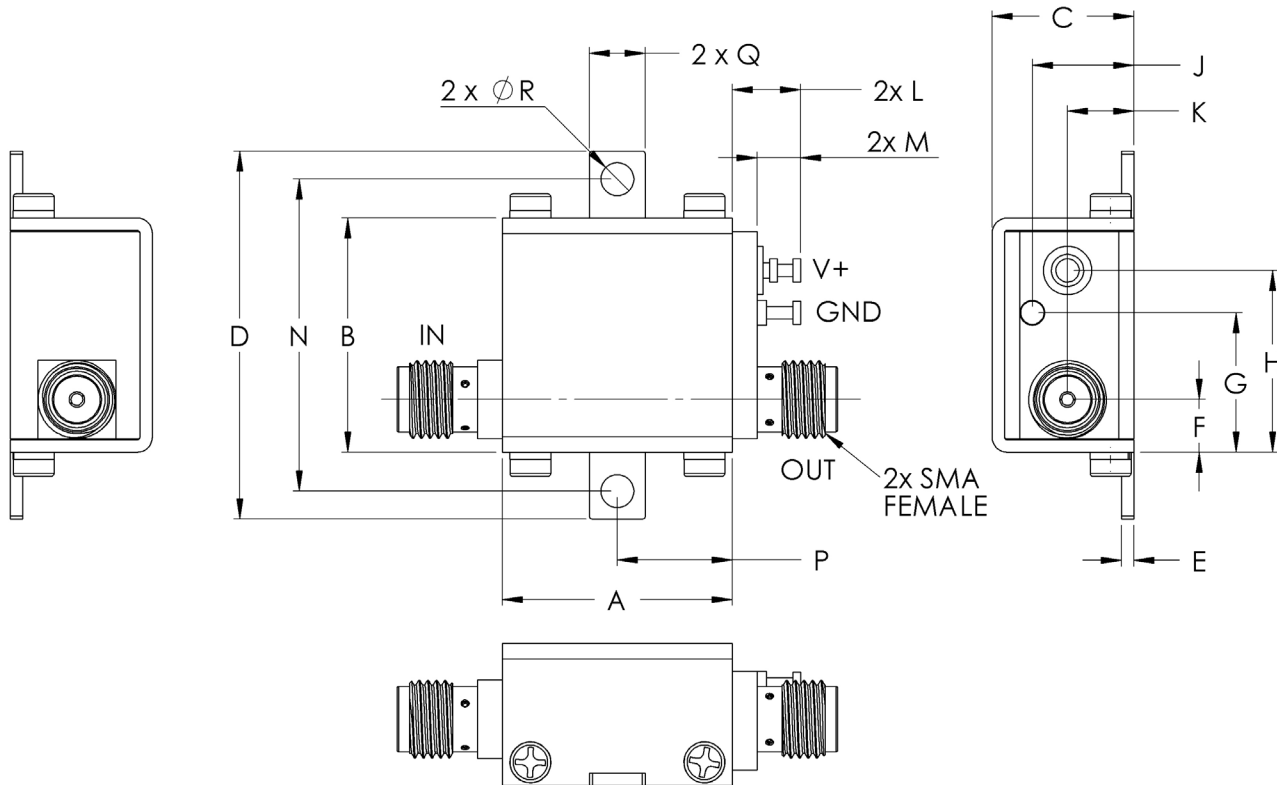
50Ω 0.05 to 10 GHz SMA Female

ABSOLUTE MAXIMUM RATINGS¹

Parameter	Ratings
Operating Temperature (Baseplate)	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Total Power Dissipation	0.6 W
Input Power	+25 dBm (5 minutes max.) +12 dBm (continuous)
DC Voltage Vdd	+7V

1. 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

Frequency (MHz)	Gain (dB)	VSWR (:1)		Power Out @1 dB COMPR. (dBm)	Noise Figure (dB)	Frequency (MHz)	Output IP3 (dBm)
		IN	OUT				
50	21.99	1.2	1.4	21.72	1.81	500	33.06
500	22.49	1.1	1.2	22.46	1.03	2000	32.30
1000	22.41	1.2	1.2	22.91	1.07	4000	30.75
1600	22.25	1.2	1.1	22.65	1.31	8000	32.75
2000	22.19	1.3	1.1	22.83	1.22	10000	33.51
3000	22.06	1.5	1.2	22.40	1.40		
4000	21.92	1.6	1.2	21.57	1.40		
5000	21.79	1.5	1.2	21.54	1.52		
6000	21.61	1.3	1.1	21.10	1.71		
7000	21.35	1.1	1.3	21.07	1.90		
8000	20.62	1.3	1.4	19.63	2.20		
9000	19.53	1.4	1.2	17.08	2.92		
10000	18.21	1.5	1.1	15.94	3.62		



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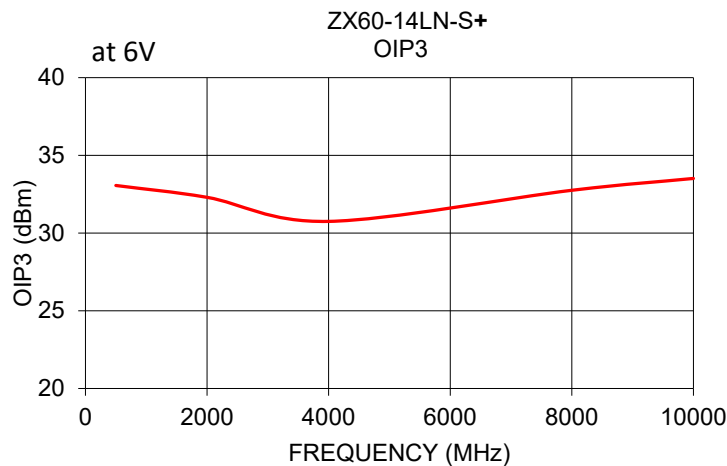
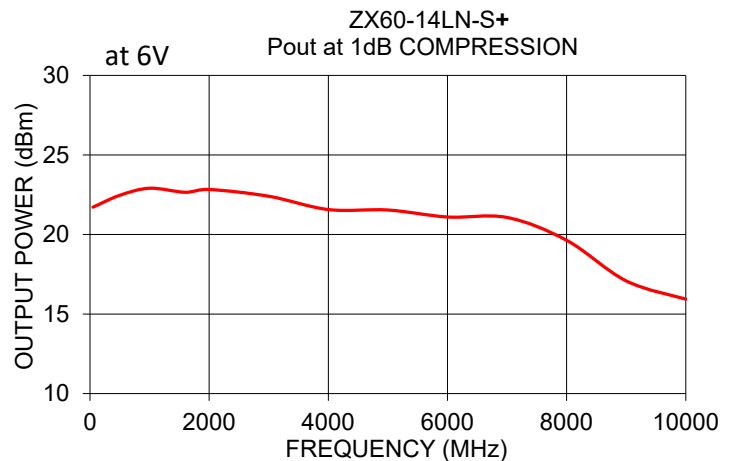
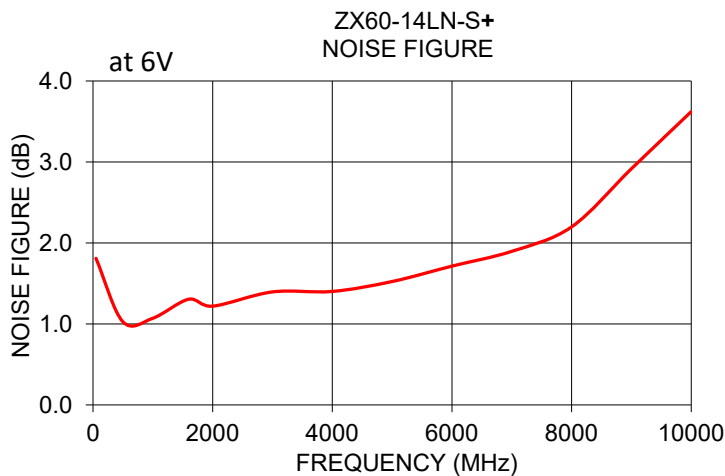
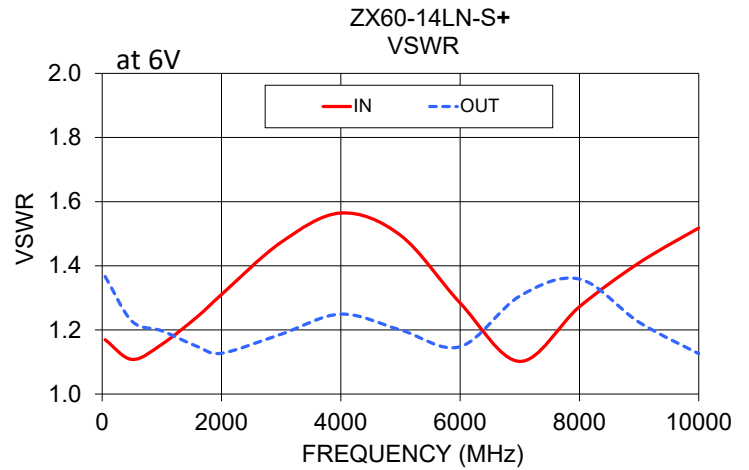
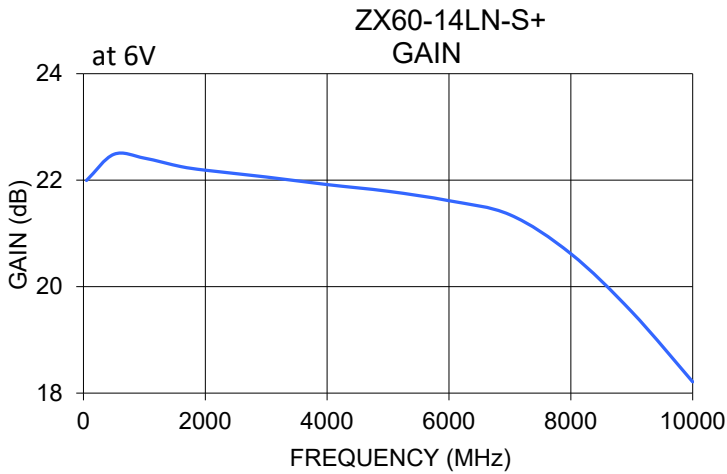
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TYPICAL PERFORMANCE GRAPHS



NOTES

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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



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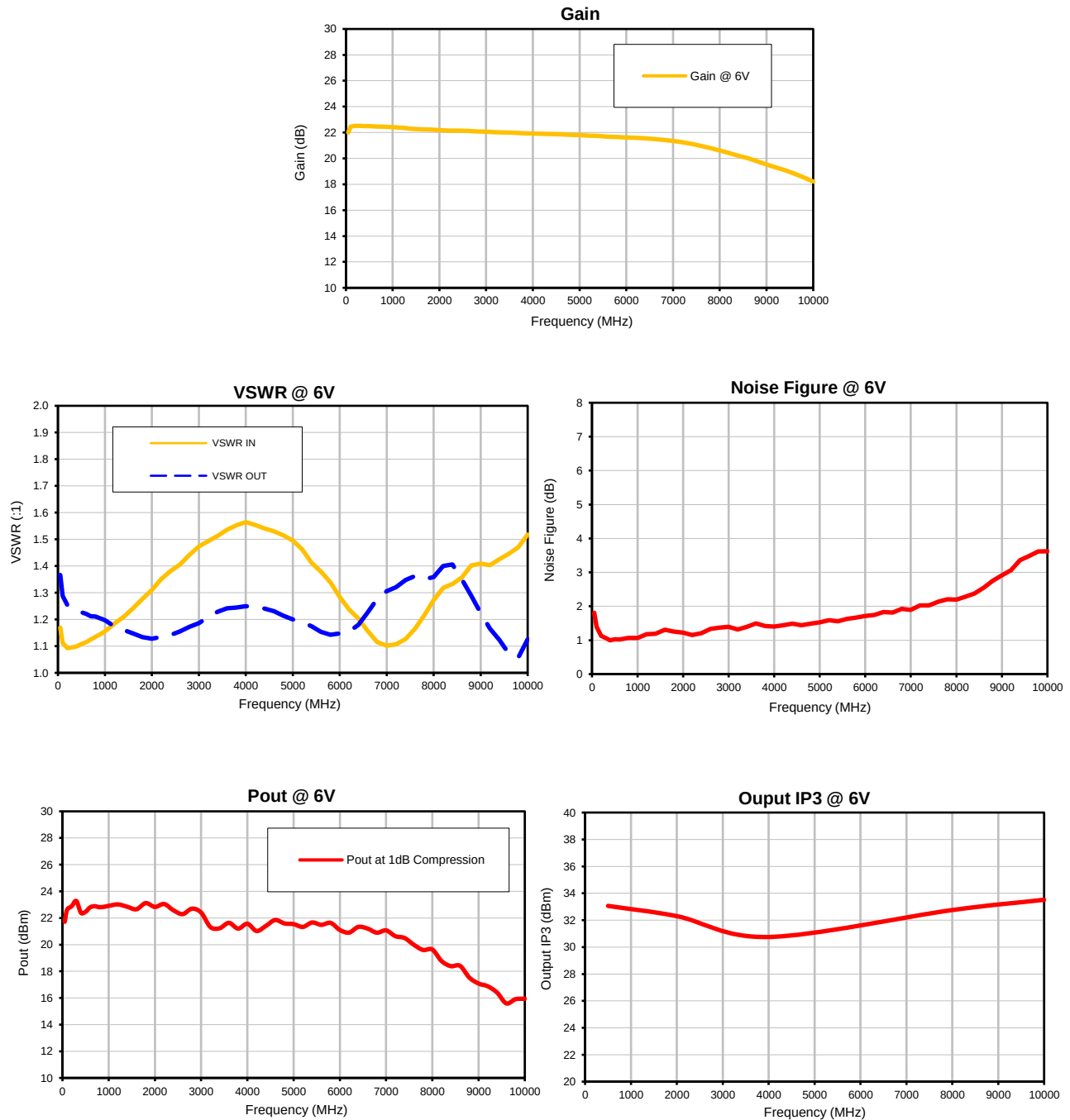
Typical Performance Data

FREQUENCY	GAIN	VSWR (:1)		NOISE FIGURE	POUT @ 1 dB COMPRESSION	FREQUENCY	OUTPUT IP3
(MHz)	(dB) 6V	IN 6V	OUT 6V	(dB) 6V	(dBm) 6V	(MHz)	(dBm) 6V
50	21.99	1.17	1.37	1.81	21.72	500	33.06
100	22.45	1.11	1.29	1.40	22.61	2000	32.30
200	22.52	1.09	1.25	1.13	22.88	4000	30.75
300	22.51	1.09	1.24	1.07	23.28	8000	32.75
400	22.50	1.10	1.23	1.00	22.39	10000	33.51
500	22.49	1.11	1.23	1.03	22.46		
600	22.47	1.12	1.22	1.02	22.80		
700	22.46	1.13	1.21	1.04	22.88		
800	22.45	1.13	1.21	1.07	22.81		
900	22.43	1.14	1.20	1.07	22.84		
1000	22.41	1.16	1.20	1.07	22.91		
1200	22.37	1.18	1.17	1.18	23.02		
1400	22.30	1.21	1.16	1.19	22.84		
1600	22.25	1.24	1.15	1.31	22.65		
1800	22.23	1.28	1.13	1.25	23.12		
2000	22.19	1.31	1.13	1.22	22.83		
2200	22.15	1.35	1.13	1.15	23.05		
2400	22.14	1.38	1.14	1.21	22.58		
2600	22.12	1.41	1.16	1.33	22.29		
2800	22.09	1.44	1.17	1.37	22.70		
3000	22.06	1.47	1.19	1.40	22.40		
3200	22.03	1.49	1.21	1.32	21.32		
3400	22.00	1.51	1.23	1.40	21.23		
3600	21.97	1.54	1.24	1.50	21.64		
3800	21.95	1.55	1.24	1.42	21.20		
4000	21.92	1.56	1.25	1.40	21.57		
4200	21.90	1.55	1.25	1.44	21.02		
4400	21.89	1.54	1.24	1.49	21.40		
4600	21.85	1.53	1.23	1.44	21.85		
4800	21.82	1.51	1.21	1.49	21.59		
5000	21.79	1.50	1.20	1.52	21.54		
5200	21.76	1.46	1.19	1.59	21.33		
5400	21.73	1.41	1.17	1.56	21.66		
5600	21.68	1.38	1.15	1.63	21.49		
5800	21.65	1.34	1.14	1.67	21.63		
6000	21.61	1.28	1.15	1.71	21.10		
6200	21.59	1.24	1.15	1.75	20.90		
6400	21.55	1.20	1.18	1.83	21.33		
6600	21.48	1.16	1.23	1.81	21.20		
6800	21.42	1.11	1.28	1.92	20.89		
7000	21.35	1.10	1.31	1.90	21.07		
7200	21.25	1.11	1.32	2.02	20.64		
7400	21.12	1.13	1.35	2.03	20.50		
7600	20.96	1.16	1.36	2.14	19.99		
7800	20.80	1.22	1.35	2.20	19.60		
8000	20.62	1.27	1.36	2.20	19.63		
8200	20.41	1.32	1.40	2.28	18.76		
8400	20.21	1.33	1.41	2.38	18.39		
8600	20.01	1.36	1.35	2.55	18.41		
8800	19.77	1.40	1.29	2.75	17.53		
9000	19.53	1.41	1.22	2.92	17.08		
9200	19.31	1.40	1.16	3.07	16.87		
9400	19.07	1.43	1.12	3.36	16.40		
9600	18.81	1.45	1.07	3.48	15.59		
9800	18.52	1.47	1.06	3.62	15.91		
10000	18.21	1.52	1.13	3.62	15.94		

Low Noise Amplifier

Typical Performance Curves

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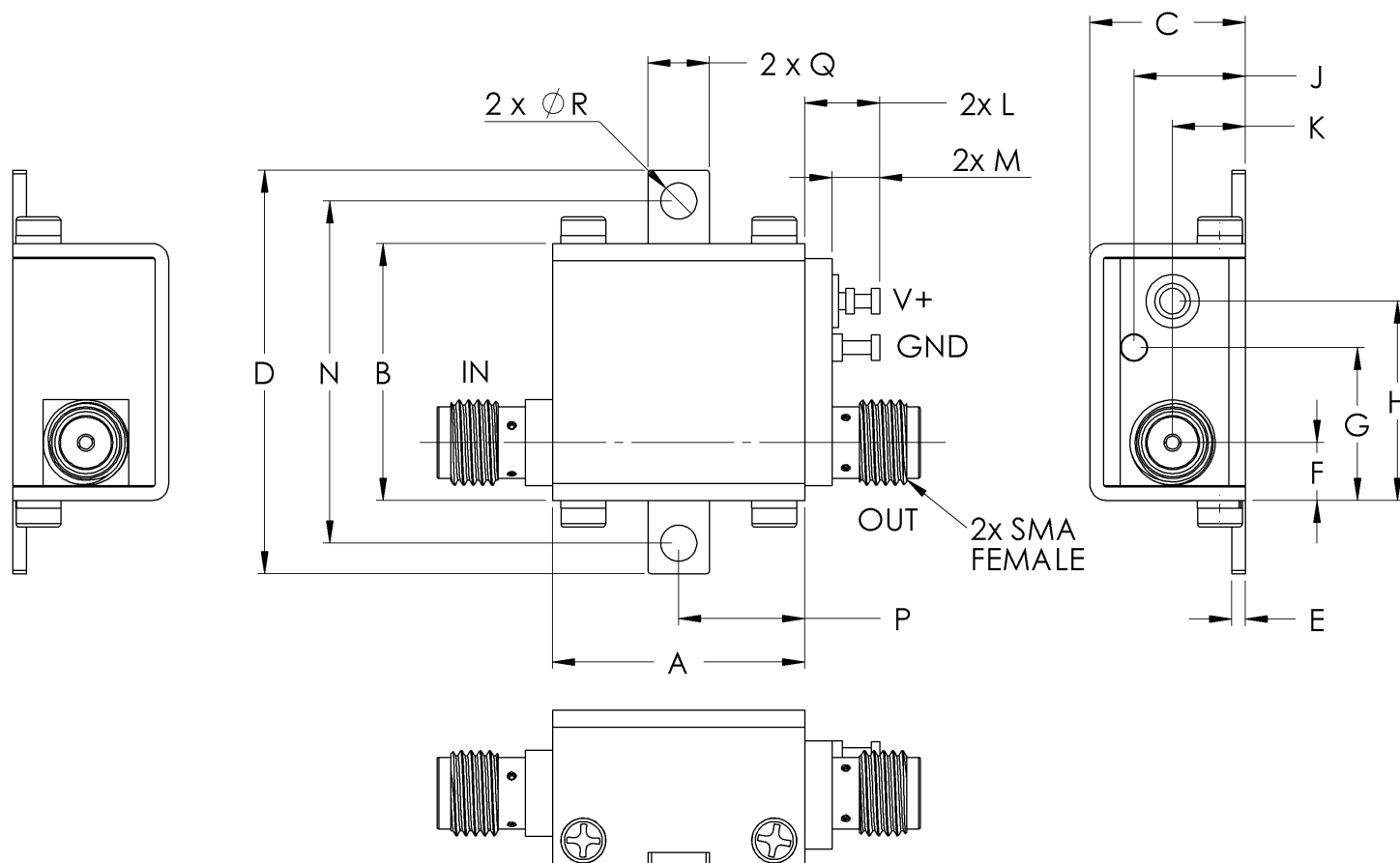


Case Style

Outline Dimensions

GC

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

Mini-Circuits®

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Mini-Circuits ISO 9001 & ISO 14001 Certified

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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	-40° to 85° C Case Temperature	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Stabilization Bake	(non-operating) 125°C, 24 hours	- - -
Burn-in at Elevated Temp.	(DC on) 160 hours at 85° C	MIL-STD-202, Method 108
Thermal Shock	-55° to 100°C, 5 cycles	MIL-STD-202, Method 107, Condition A, except 100°C