Coaxial

Wideband Microwave Amplifier ZX60-02203LPN+

50Ω 2 to 20 GHz

The Big Deal

- Ultra Wideband performance
- Medium power, 15dBm P1dB typ.
- High gain and excellent gain flatness, <1dB, p-p typ.
- Voltage regulated internally and reverse voltage protected
- Excellent directivity, 20 dB typ.
- Suitable for low phase noise applications

CASE STYLE: GC957

Product Overview

Mini-Circuits' ZX60-02203LPN+ is a wideband connectorized amplifier providing a combination of high gain, medium power, and high IP3 over a very wide frequency range, supporting a diverse range of applications and many systems where high performance over a wideband is needed. This design operates on a single 5 V 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 crowded system layouts.

Key Features

Feature	Advantages
Ultra-wideband 2-20 GHz	Enables a single amplifier to be used in a wide range of applications including EW and communication systems instrumentation and more.
High gain, 16 dB typ. across entire band, and excellent gain flatness, <1dB, p-p typ.	Reduces the number of gain stages, lowering component count and overall 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.
Excellent Directivity (Isolation-Gain), 20 dB typ	Ideal for use as a buffer amplifier, minimizing need for adjacent components.
Low additive phase noise, typically -164 dBc/Hz @10 KHz offset	Ideal for low phase noise synthesizer applications.

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Wideband Microwave Amplifier ZX60-02203LPN+

50Ω 2 to 20 GHz

Features

- High Gain, 16 dB typ, over 2 to 18 GHz
- Medium Power, 15 dBm P1dB typ
- Excellent Linearity, 30 dBm typ.
- Excellent Directivity, 20 dB typ

Applications

- Microwave point-to-point radios
- Military EW and radar
- Satellite Systems
- Suitable for low phase noise applications

Generic photo used for illustration purposes only

CASE STYLE: GC957

Connectors	Model
SMA	ZX60-02203LPN+

+RoHS Compliant

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

Electrical Specifications at 25°C and 5V, unless noted

Parameter	Condition (GHz)	V_{DD}=5.0 Min.	V_{DD}=5.0 Typ.	V_{DD}=5.0 Max.	Units
Frequency Range		2.0		20.0	GHz
Gain	2.0-6.0	13.5	16.5		dB
	6.0-10.0	13.5	16.5		
	10.0-14.0	13.5	16.0		
	14.0-18.0	13.5	16.2		
	18.0-20.0	12.5	15.7		
Input Return Loss	2.0-6.0		10.0		dB
	6.0-10.0		15.0		
	10.0-14.0		7.5		
	14.0-18.0		11.5		
	18.0-20.0		8.0		
Output Return Loss	2.0-6.0		13.0		dB
	6.0-10.0		10.0		
	10.0-14.0		14.0		
	14.0-18.0		10.0		
	18.0-20.0		11.5		
Output Power at 1dB Compression (1)	2.0-6.0		19.0		dBm
	6.0-10.0		19.0		
	10.0-14.0		17.0		
	14.0-18.0		15.0		
	18.0-20.0		14.0		
Output IP3[2]	2.0-6.0		32.0		dBm
	6.0-10.0		31.0		
	10.0-14.0		31.0		
	14.0-18.0		30.0		
	18.0-20.0		28.0		
Noise Figure	2.0-6.0		8.0		dB
	6.0-10.0		5.0		
	10.0-14.0		5.0		
	14.0-18.0		5.5		
	18.0-20.0		7.0		
Device Operating Voltage (V_{DD})		4.9	5.0	7.0	V
Device Operating Current (I_{DD})			79	130	mA

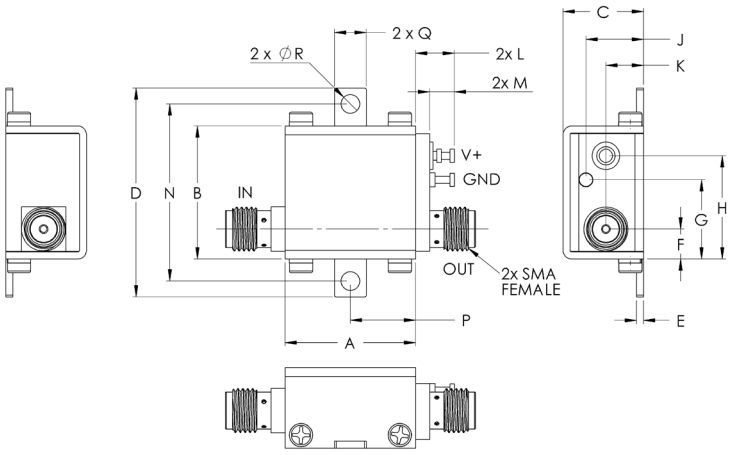
1. Current increases at P1dB
2. OIP3 measured with 0 dBm tones and 1 MHz spacing.

Absolute Maximum Ratings[3]

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Total Power Dissipation	0.9 W
Input Power (CW), Vd=5V	7 dBm
DC Voltage	7V

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

Outline Drawing



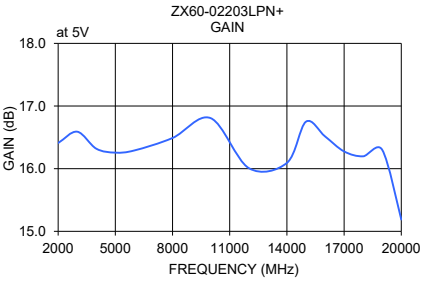
NOTE: When soldering the DC connections, caution must be used to avoid overheating the DC terminal. See Application Note. AN-40-010.

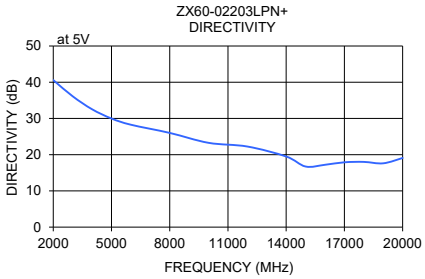
Outline Dimensions (inch / mm)

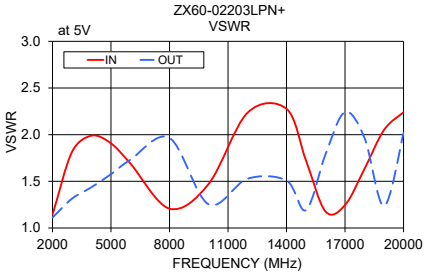
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	wt
.74	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.14	1.00	.37	.18	.106	grams
18.80	19.1	11.68	30.0	1.02	4.32	11.4	14.99	8.38	5.33	5.59	3.56	25.40	9.40	4.57	2.69	23.0

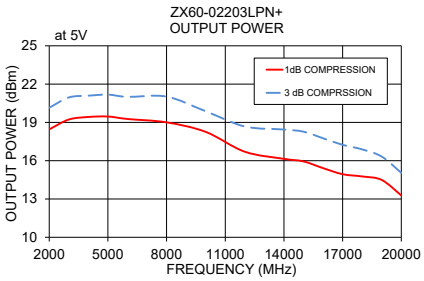
FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1) 5V		POWER OUT @1 dB COM-PR.(dBm)	NF (dB)	IP3 (dBm)	FREQUENCY OFFSET (Hz)	ADDITIVE[4] PHASE NOISE (dBc/Hz)
	5V	5V	IN	OUT	5V	5V	5V		5V
2000	16.41	40.60	1.14	1.11	18.45	11.98	31.01	100	-145
3000	16.59	36.12	1.81	1.31	19.22	9.74	31.32	1K	-156
4000	16.32	32.53	1.99	1.44	19.42	8.09	31.61	10K	-164
5000	16.26	29.98	1.91	1.58	19.46	7.11	31.17	100K	-166
6000	16.29	28.27	1.69	1.73	19.27	5.78	31.40	1M	-167
8000	16.49	26.01	1.21	1.97	19.00	4.62	31.01	10M	-167
10000	16.81	23.27	1.47	1.25	18.26	4.08	31.53		
12000	16.01	22.25	2.23	1.53	16.70	4.77	31.02		
14000	16.09	19.50	2.28	1.51	16.14	5.22	30.40		
15000	16.75	16.73	1.72	1.19	15.94	5.04	30.40		
16000	16.52	17.21	1.18	1.79	15.42	5.19	30.06		
17000	16.28	17.90	1.25	2.24	14.94	5.56	29.93		
18000	16.20	18.01	1.63	1.96	14.77	5.61	29.15		
19000	16.30	17.62	2.05	1.24	14.49	6.11	28.78		
20000	15.19	19.09	2.24	2.02	13.27	7.72	27.08		

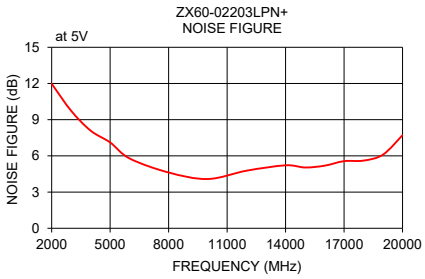
4. Typical Additive Phase Noise @4GHz, 2 dBm Input Power.

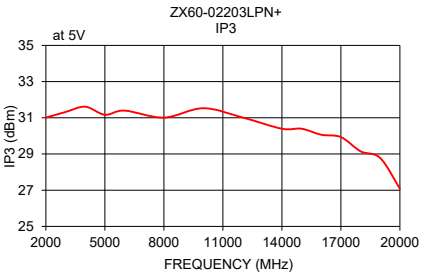


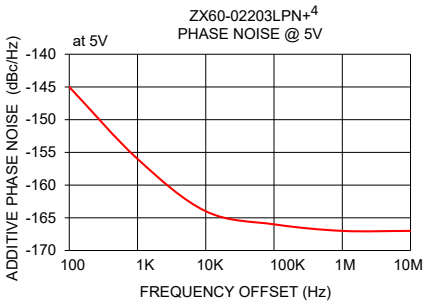












Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

Wideband Microwave Amplifier ZX60-02203LPN+

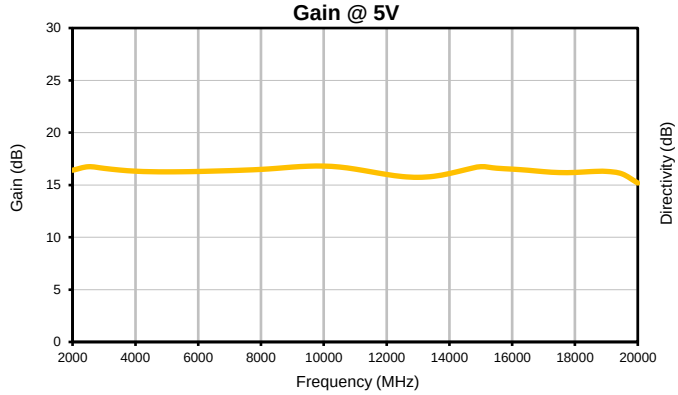
Typical Performance Data

FREQUENCY (MHz)	GAIN (dB) 5V	DIRECTIVITY (dB) 5V	VSWR (:1) IN 5V	VSWR (:1) OUT 5V	NOISE FIGURE (dB) 5V	POUT @ 1 dB COMPRESSION (dBm) 5V	POUT @ 3 dB COMPRESSION (dBm) 5V	OUTPUT IP3 (dBm) 5V
2000	16.41	40.60	1.14	1.11	11.98	18.45	20.15	31.01
2500	16.75	38.22	1.56	1.22	10.52	19.17	20.90	31.20
3000	16.59	36.12	1.81	1.31	9.74	19.22	20.95	31.32
3500	16.43	34.17	1.95	1.38	8.72	19.57	21.35	31.46
4000	16.32	32.53	1.99	1.44	8.09	19.42	21.09	31.61
4500	16.27	31.14	1.97	1.51	7.62	19.44	21.21	31.52
5000	16.26	29.98	1.91	1.58	7.11	19.46	21.17	31.17
5500	16.27	29.05	1.81	1.65	6.31	19.18	20.88	31.32
6000	16.29	28.27	1.69	1.73	5.78	19.27	21.00	31.40
6500	16.33	27.61	1.56	1.82	5.00	19.31	21.05	31.13
7000	16.37	27.06	1.42	1.90	4.89	19.21	21.08	31.05
7500	16.42	26.53	1.30	1.96	4.64	19.15	21.09	30.99
8000	16.49	26.01	1.21	1.97	4.62	19.00	21.02	31.01
8500	16.59	25.40	1.15	1.89	4.56	18.84	20.81	31.25
9000	16.71	24.66	1.17	1.72	4.70	18.74	20.67	31.27
9500	16.79	23.86	1.29	1.50	4.26	18.55	20.28	31.39
10000	16.81	23.27	1.47	1.25	4.08	18.26	19.87	31.53
10500	16.72	22.84	1.68	1.04	4.65	18.08	19.70	31.60
11000	16.52	22.57	1.90	1.16	4.69	17.75	19.27	31.57
11500	16.26	22.42	2.09	1.35	4.67	17.10	18.67	31.18
12000	16.01	22.25	2.23	1.53	4.77	16.70	18.68	31.02
12500	15.81	21.98	2.34	1.67	5.01	16.45	18.58	30.52
13000	15.73	21.45	2.41	1.73	4.97	16.37	18.63	30.58
13500	15.83	20.61	2.40	1.68	5.15	16.24	18.54	30.48
14000	16.09	19.50	2.28	1.51	5.22	16.14	18.44	30.40
14500	16.45	18.20	2.03	1.27	4.94	16.06	18.42	30.35
15000	16.75	16.73	1.72	1.19	5.04	15.94	18.27	30.40
15500	16.60	15.98	1.35	1.48	5.37	15.68	18.05	30.07
16000	16.52	17.21	1.18	1.79	5.19	15.42	17.76	30.06
16500	16.41	17.62	1.15	2.10	5.37	15.21	17.57	30.00
17000	16.28	17.90	1.25	2.24	5.56	14.94	17.24	29.93
17500	16.19	18.05	1.41	2.19	5.65	14.87	17.14	29.30
18000	16.20	18.01	1.63	1.96	5.61	14.77	16.88	29.15
18500	16.28	17.81	1.88	1.62	6.07	14.67	16.64	29.40
19000	16.30	17.62	2.05	1.24	6.11	14.49	16.32	28.78
19500	16.06	17.82	2.11	1.28	7.07	14.05	15.79	28.33
20000	15.19	19.09	2.24	2.02	7.72	13.27	15.04	27.08

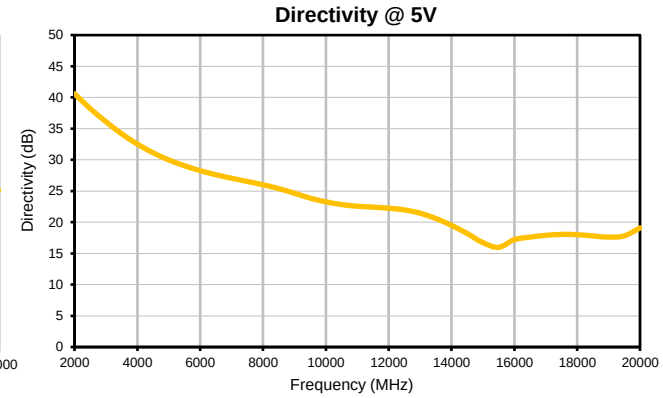
FREQ OFFSET (Hz)	ADDITIVE PHASE NOISE (dBc/Hz)
100	-145
1,000	-156
10,000	-164
100,000	-166
1,000,000	-167
10,000,000	-167

Typical Performance Curves

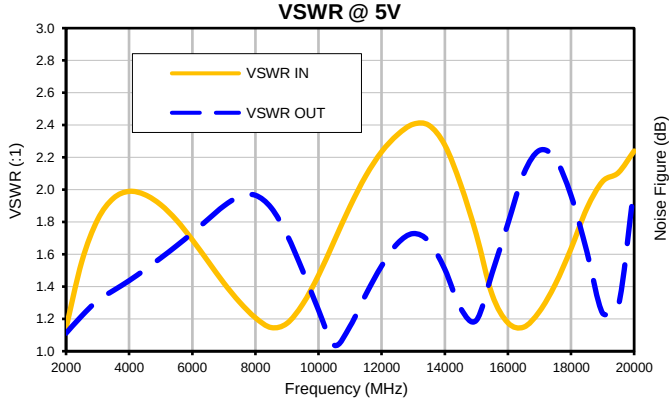
Gain @ 5V



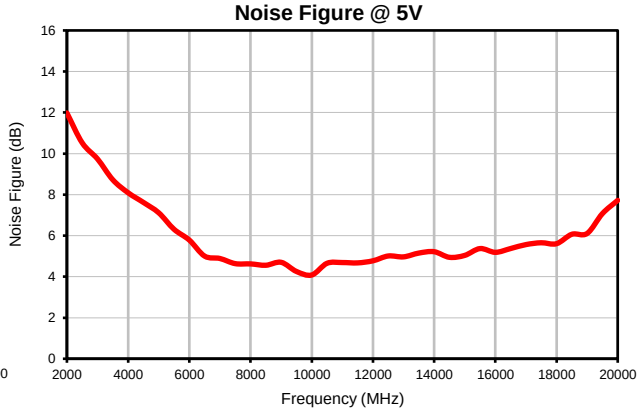
Directivity @ 5V



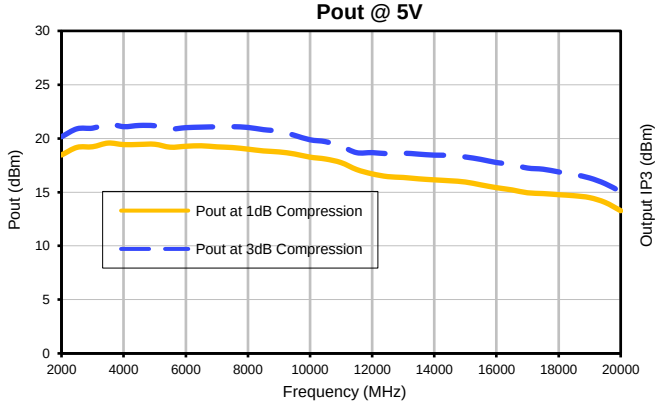
VSWR @ 5V



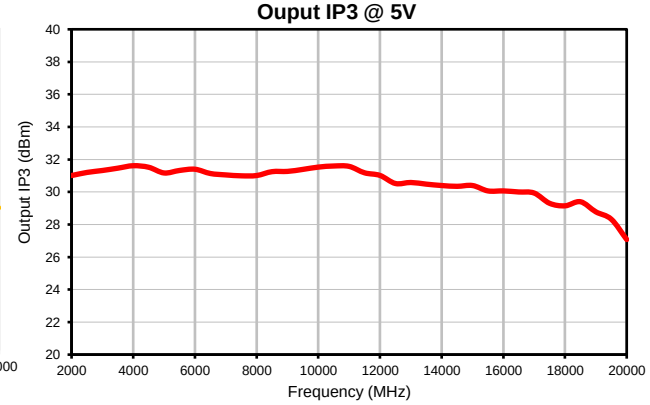
Noise Figure @ 5V



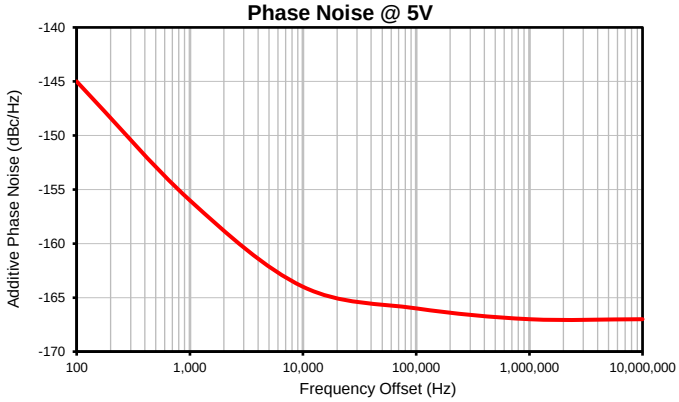
Pout @ 5V



Ouput IP3 @ 5V



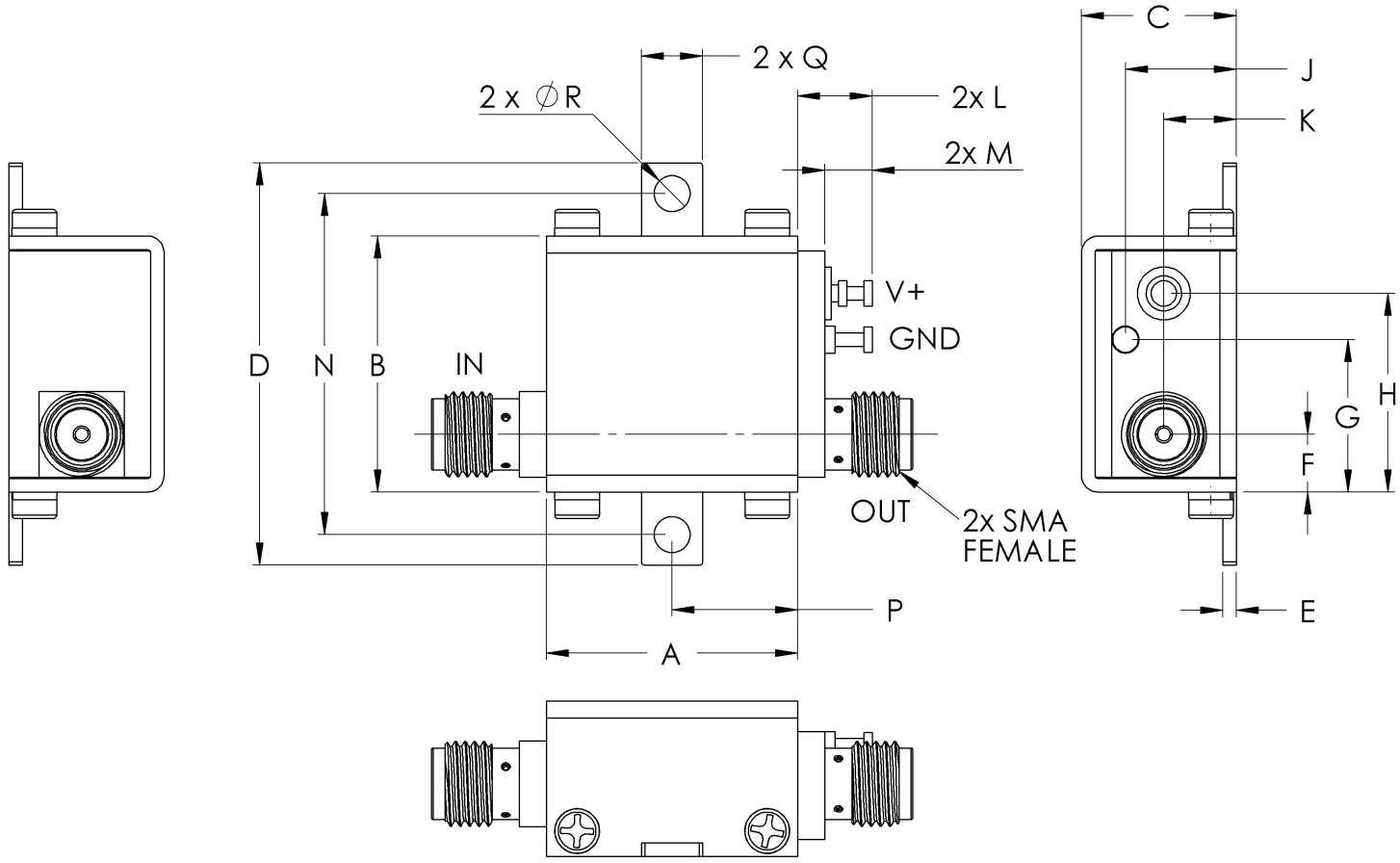
Phase Noise @ 5V



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. ± .03; 3Pl. ± .015
Tolerance on hole size and interaxes dimensions to be ± .005.

Note:

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

Mini-Circuits®
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Mini-Circuits ISO 9001 & ISO 14001 Certified

Mini-Circuits

Environmental Specifications **ENV23T10**

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