WIDEBAND

Microwave Amplifier

ZX60-24-S+

50Ω 5 to 20 GHz SMA Female

THE BIG DEAL

- Wideband, 5 to 20 GHz
- Gain, 24 dB typ and flatness, ±1.3 dB typ.
- Output power at 1 dB compression, 18.0 dBm typ.
- Excellent isolation, 62 dB typ.
- Unconditionally stable
- Protected by US patent 6,790,049

Generic photo used for illustration purposes only

Model No.	ZX60-24-S+
Case Style	GC957
Connectors	SMA Female

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

APPLICATIONS

- Military and radar
- DBS
- Wideband isolation amplifier
- Microwave point to point radio
- Satellite systems

PRODUCT OVERVIEW

The ZX60-24-S+ two-stage amplifier provides high gain in a very small package, only 0.75" x 0.74" x 0.46" high. Internal compensating circuitry provides a consistent, flat response over the extra wide bandwidth. Designed for 50 Ω SMA coax systems, the gold-plated package uses convenient 5V DC power, and has a nickel-plated brass cover and unibody construction for extra durability.

KEY FEATURES

Feature	Advantages
Extra Wideband, 5-20 GHz	Wider frequency range supports a wider array of applications, from microwave radio and radar to military communications, satellite communications, and countermeasures
Excellent Gain Flatness	±1.3 dB gain flatness across entire bandwidth minimizes the need for external equalizer networks, making it a great fit for instrumentation, test lab, EW, or any other amplitude sensitive system
High Gain and Excellent Isolation	24-dB gain with reverse isolation of 62 dB (38 dB directivity) prevents leakage, making the ZX60-24-S+ an excellent choice for minimizing interactions between different microwave components. It is an ideal LO driver amplifier and provides designers system flexibility and robustness when integrating cascaded RF components
Unconditionally Stable	No risk of damage to other components from impedance mismatch or internal oscillation

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ZX60-24-S+
MCL NY
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ELECTRICAL SPECIFICATIONS AT 25°C

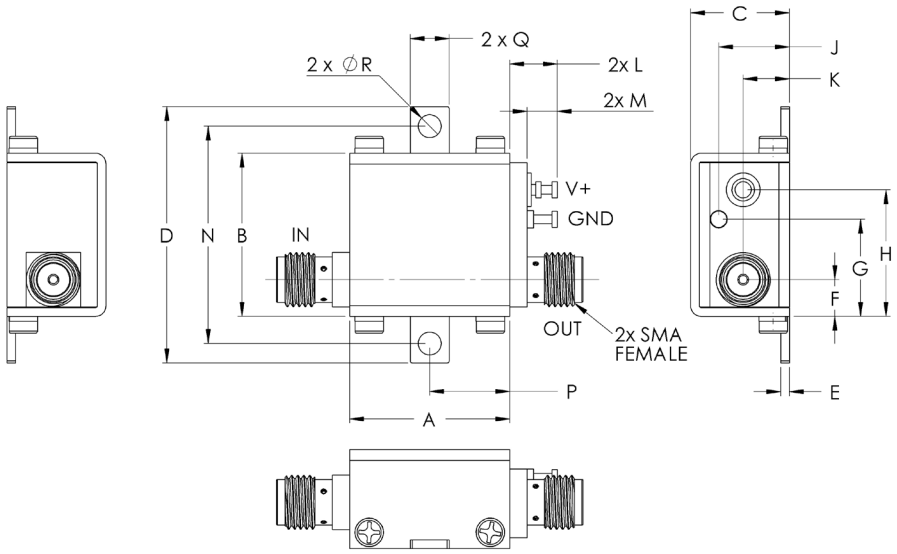
Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		5.0		20.0	GHz
Gain	5.0		24.2		dB
	8.0	18.5	24.3		
	10.0	18.5	23.5		
	12.0		23.5		
	14.0		23.4		
	16.0		22.7		
	18.0	18.5	24.0		
	20.0	18.0	22.8		
Gain Flatness	5.0-20.0		±1.3		dB
Input Return Loss	5.0		16.3		dB
	8.0	10.0	16.5		
	10.0		12.2		
	12.0	10.0	15.7		
	14.0		11.0		
	16.0		11.8		
	18.0		11.0		
	20.0		15.6		
Output Return Loss	5.0		22.2		dB
	8.0	10.0	17.2		
	10.0		13.8		
	12.0	10.0	15.9		
	14.0	10.0	22.8		
	16.0		15.0		
	18.0	10.0	26.6		
	20.0		21.0		
Output IP3	5.0		27.4		dBm
	8.0		27.7		
	10.0		27.9		
	12.0		27.2		
	14.0		26.9		
	16.0		27.1		
	18.0		26.4		
	20.0		24.9		
Output Power @ 1 dB compression	5.0		18.0		dBm
	8.0		18.3		
	10.0	16.0	18.5		
	12.0		18.1		
	14.0		17.6		
	16.0		18.0		
	18.0		18.0		
	20.0		17.9		
Noise Figure	5.0		8.2		dB
	8.0		6.9		
	10.0		6.3		
	12.0		6.9		
	14.0		6.8		
	16.0		6.8		
	18.0		6.5		
	20.0		7.0		
Directivity (Isolation-Gain)			38		dB
DC Voltage			5.0		V
DC Current			260	290	mA

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C Base Plate Temp.
Storage Temperature	-55°C to 100°C
DC Voltage	5.5 V
Input RF Power (no damage)	+20 dBm
Power Dissipation	1.6 W

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

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

COAXIAL

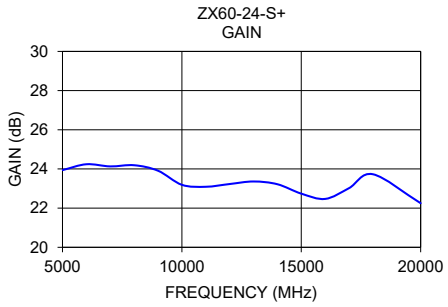
Wideband Amplifier

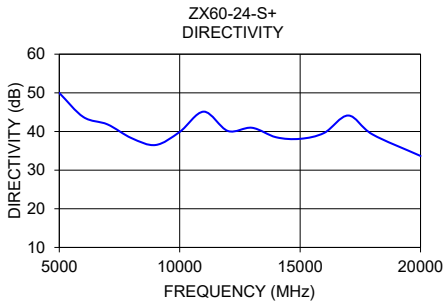
ZX60-24-S+

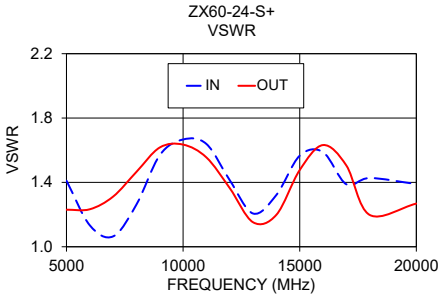
50Ω 5 to 20 GHz

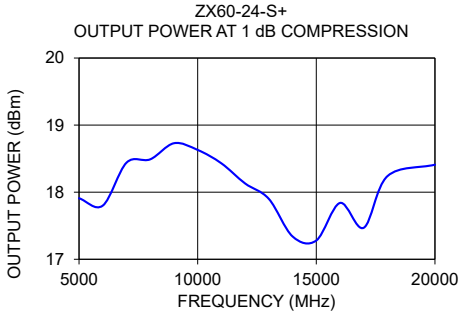
TYPICAL PERFORMANCE DATA/CURVES

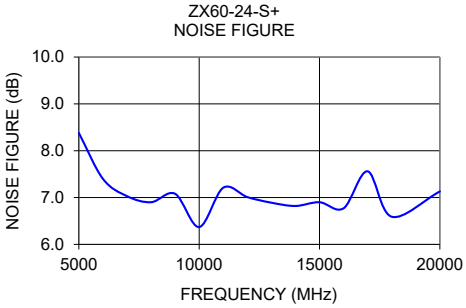
Frequency (MHz)	Gain (dB)	Directivity (dB)	VSVR (:1)		Power Out @1 dB Compr. (dBm)	IP3 (dBm)	NF (dB)
			IN	OUT			
5000.00	23.94	49.97	1.41	1.23	17.91	27.35	8.38
6000.00	24.24	43.74	1.13	1.23	17.80	27.78	7.40
7000.00	24.13	41.84	1.06	1.31	18.44	27.98	7.03
8000.00	24.19	38.28	1.26	1.47	18.49	27.72	6.90
9000.00	23.91	36.50	1.57	1.62	18.73	27.47	7.08
10000.00	23.19	39.89	1.67	1.64	18.63	27.76	6.37
11000.00	23.09	45.13	1.64	1.56	18.43	27.26	7.21
12000.00	23.23	40.13	1.41	1.36	18.13	27.49	7.01
13000.00	23.36	40.96	1.21	1.15	17.90	27.48	6.89
14000.00	23.22	38.51	1.32	1.20	17.34	27.34	6.82
15000.00	22.74	38.10	1.57	1.48	17.28	27.40	6.90
16000.00	22.47	39.63	1.59	1.63	17.84	27.64	6.77
17000.00	23.02	44.13	1.39	1.51	17.47	27.12	7.56
18000.00	23.73	39.26	1.43	1.20	18.24	26.71	6.59
20000.00	22.25	33.67	1.39	1.27	18.41	25.82	7.13

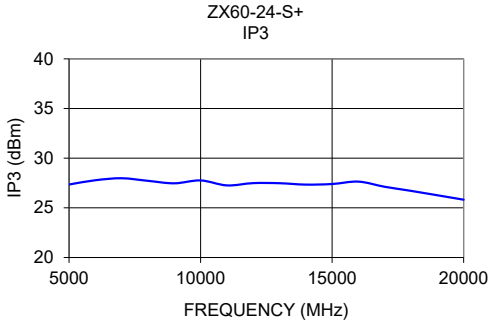












NOTES

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

Coaxial

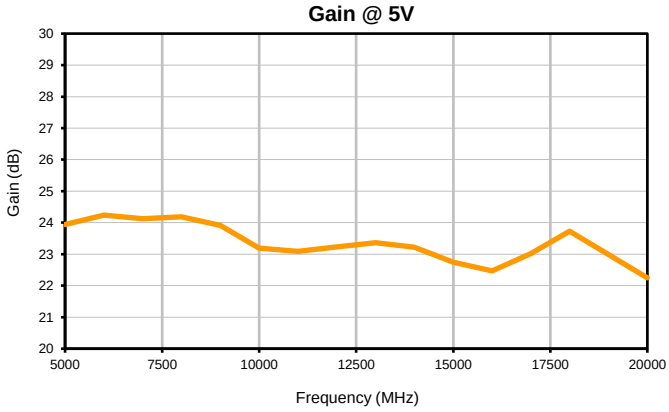
Wideband Microwave Amplifier ZX60-24-S+

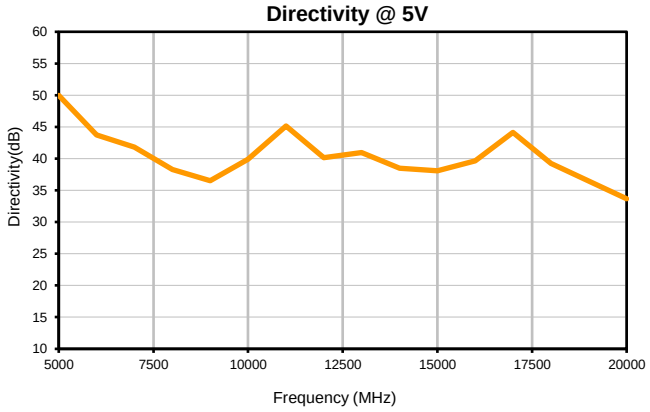
Typical Performance Data

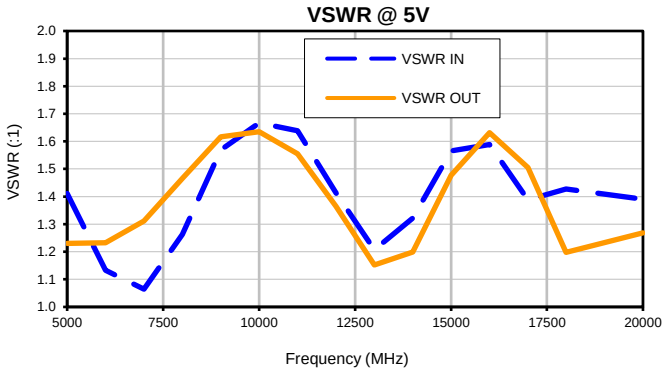
FREQUENCY (MHz)	Gain (dB)	Directivity (dB)	VSWR IN (:1)	VSWR OUT (:1)	Noise Figure (dB)	Pout @ 1dB Compression (dBm)	Output IP3 (dBm)
	5V	5V	5V	5V	5V	5V	5V
5000	23.94	49.97	1.41	1.23	8.38	17.91	27.35
6000	24.24	43.74	1.13	1.23	7.40	17.80	27.78
7000	24.13	41.84	1.06	1.31	7.03	18.44	27.98
8000	24.19	38.28	1.26	1.47	6.90	18.49	27.72
9000	23.91	36.50	1.57	1.62	7.08	18.73	27.47
10000	23.19	39.89	1.67	1.64	6.37	18.63	27.76
11000	23.09	45.13	1.64	1.56	7.21	18.43	27.26
12000	23.23	40.13	1.41	1.36	7.01	18.13	27.49
13000	23.36	40.96	1.21	1.15	6.89	17.90	27.48
14000	23.22	38.51	1.32	1.20	6.82	17.34	27.34
15000	22.74	38.10	1.57	1.48	6.90	17.28	27.40
16000	22.47	39.63	1.59	1.63	6.77	17.84	27.64
17000	23.02	44.13	1.39	1.51	7.56	17.47	27.12
18000	23.73	39.26	1.43	1.20	6.59	18.24	26.71
20000	22.25	33.67	1.39	1.27	7.13	18.41	25.82

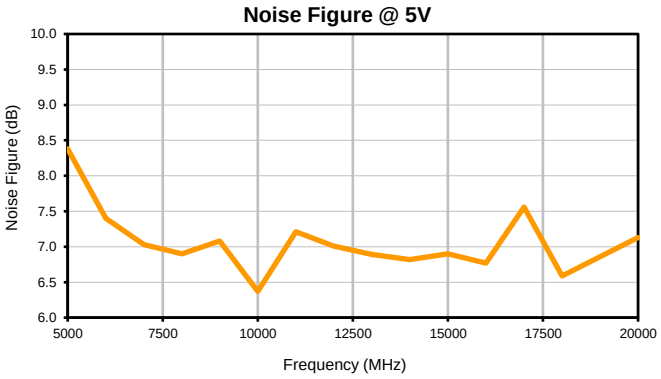
Wideband Microwave Amplifier ZX60-24-S+

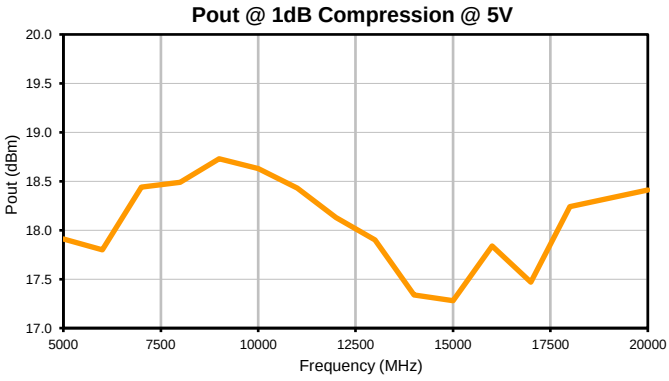
Typical Performance Curves

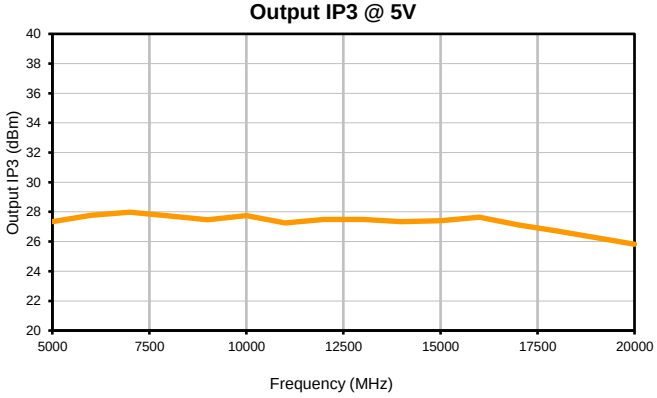








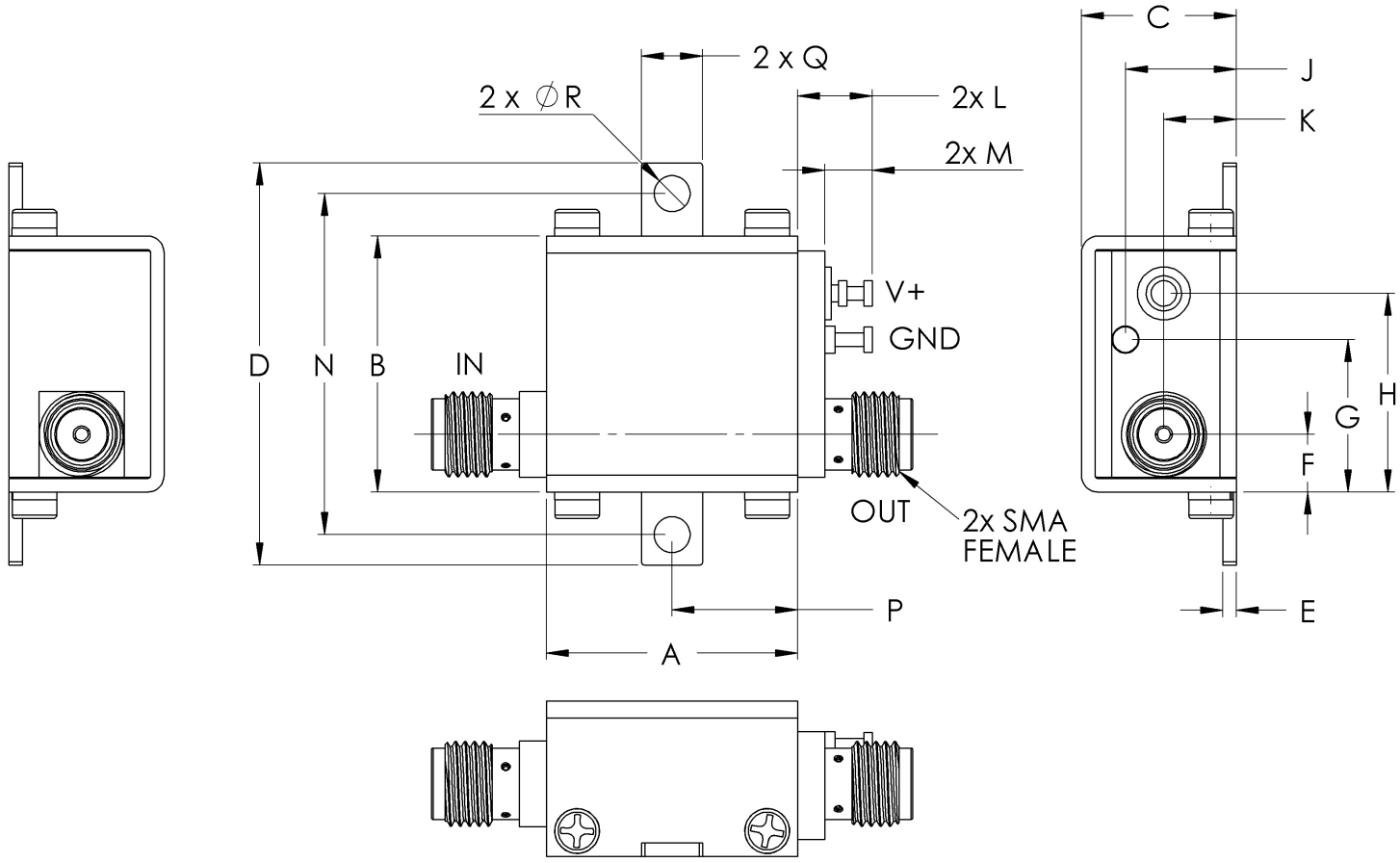




Case Style GC

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

Note:

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

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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