



COAXIAL

# Pulse Amplifier

## ZHL-72A+

50Ω Inverting 0.0025 to 700 MHz

### FEATURES

- Wideband, 2.5 kHz - 700 MHz
- High Gain, 25 dB typ. with Excellent Flatness,  $\pm 0.6$  dB typ.
- Can handle wide pulses width (15 $\mu$ s typ.) with excellent rise/fall time (1.1 ns typ.)
- Delay time, 1.5 ns typ.
- Protected by US Patent, 6,943,629



Generic photo used for illustration purposes only

<b>Model No.</b>	ZHL-72A+
<b>Case Style</b>	S32
<b>Connectors</b>	BNC

#### +RoHS Compliant

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

### APPLICATIONS

- Computers
- Digital communication
- Medical Test Setups

### PRODUCT OVERVIEW

Mini-Circuits' ZHL-72A+ utilizes high power LDMOS transistor output stage. Class A operation accept any kind of modulation. The frequency range is so wide (280,000:1) that the amplifier may handle long pulses, 15 $\mu$ sec typ. with very short rise and fall duration 1.1 nsec. typ. Of course it may work as an ordinary RF amplifier within its very wide frequency range.

### KEY FEATURES

Feature	Advantages
Current stabilization circuits.	The design utilizes a patented technology to set and maintain the constant current consumption.
Rugged Design	Extreme load mismatch such as open/short at output are tolerated without damaging the amplifier.
Range of Protections	Reverse polarity protection.





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### ELECTRICAL SPECIFICATIONS

Parameter	Min.	Typ.	Max.	Units
Frequency Range	0.0025		700	MHz
Gain	21	25	—	dB
Gain Flatness	—	—	±1.0	dB
Output Power at 1dB compression	+22	—	—	dBm
Output Third Order Intercept Point (OIP3)	—	+34	—	dBm
Noise Figure**	—	7.7	—	dB
Rise/Fall Time	—	—	1.5	ns
Pulse Width*	6	15	—	µs
Input VSWR	—	2.0	—	:1
Output VSWR	—	2.0	—	:1
DC Supply Voltage	—	+24	—	V
Supply Current	—	—	350	mA

Caution! Transient voltage occurring at RF output upon turn-on is approximately 50% of the applied DC power supply voltage. User should protect equipment fed by this amplifier.

\* Pulse width for less than 10% droop.

\*\* Tested above 10 MHz.

### ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-20°C to +65°C
Storage Temperature	-55°C to +100°C
DC Voltage	+24.5V
Input Power (no damage)	+10 dBm

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





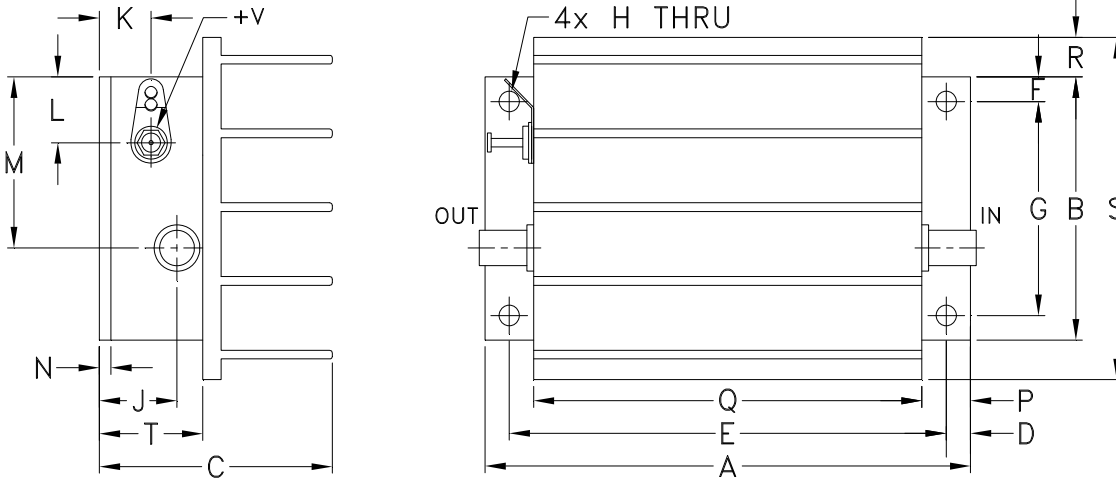
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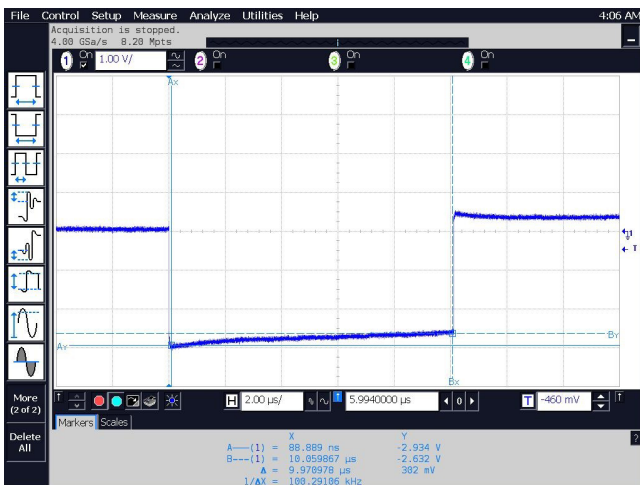
### OUTLINE DRAWING



### OUTLINE DIMENSIONS (Inch mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt
3.75	2.00	1.80	.19	3.375	.19	1.625	.144	.50	.40	.50	1.30	.10	.38	3.00	.30	2.60	.80	grams
95.25	50.80	45.72	4.83	85.73	4.83	41.28	3.66	12.70	10.16	12.70	33.02	2.54	9.65	76.20	7.62	66.04	20.32	220.0

### TYPICAL AMPLIFIER RESPONSE TO A PULSE INPUT





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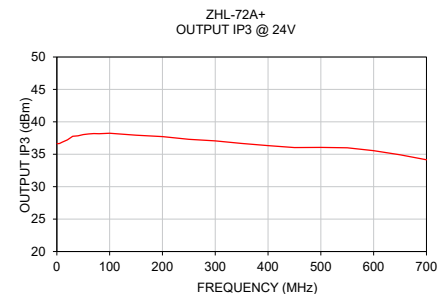
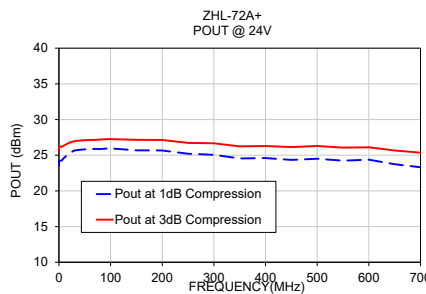
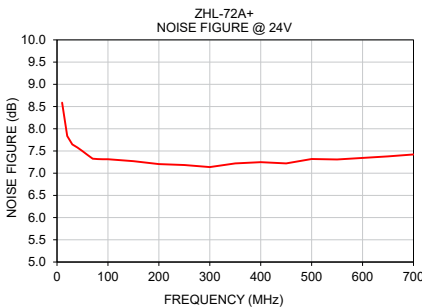
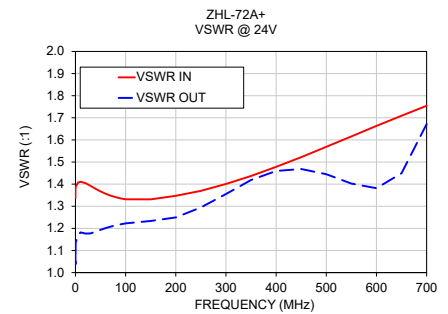
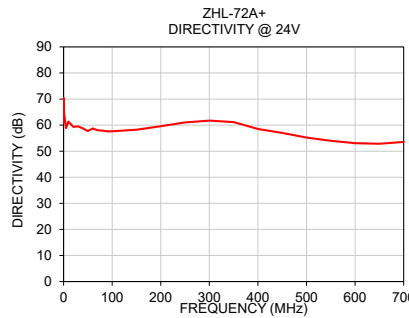
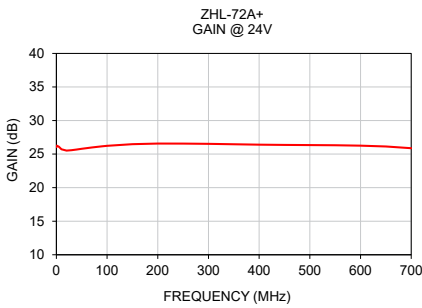
# Pulse Amplifier

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### TYPICAL PERFORMANCE DATA/CURVES

FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1)		NOISE FIGURE (dB)	POUT at 1 dB COMPR. (dBm)	POUT at 3 dB COMPR. (dBm)	OUTPUT IP3 (dBm)
	24V	24V	IN	OUT				
0.0090	26.21	64.42	1.34	1.08	--	23.54	25.74	--
0.01	26.19	69.56	1.34	1.07	--	23.63	25.70	--
0.05	26.03	61.03	1.37	1.04	--	23.74	25.79	--
0.1	26.09	65.10	1.38	1.08	--	23.93	25.96	--
0.5	26.27	70.41	1.39	1.14	--	24.23	26.27	36.67
1	26.25	64.56	1.39	1.14	--	24.22	26.26	36.63
5	26.09	58.85	1.41	1.17	--	24.25	26.17	36.65
10	25.71	61.38	1.41	1.18	8.59	24.64	26.37	36.86
50	25.79	57.75	1.37	1.19	7.50	25.82	27.10	38.03
100	26.23	57.64	1.33	1.22	7.31	25.95	27.26	38.24
200	26.57	59.58	1.35	1.25	7.20	25.66	27.13	37.73
300	26.53	61.75	1.40	1.36	7.14	25.05	26.67	37.07
400	26.41	58.53	1.48	1.46	7.25	24.60	26.29	36.33
500	26.34	55.23	1.57	1.44	7.32	24.51	26.29	36.06
600	26.26	53.08	1.66	1.38	7.34	24.38	26.11	35.55
700	25.87	53.55	1.75	1.67	7.42	23.31	25.36	34.15



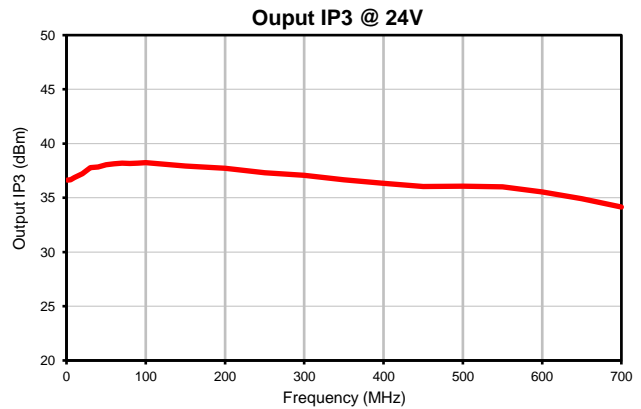
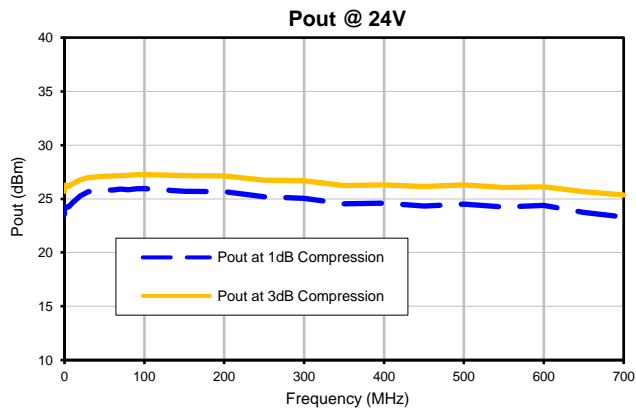
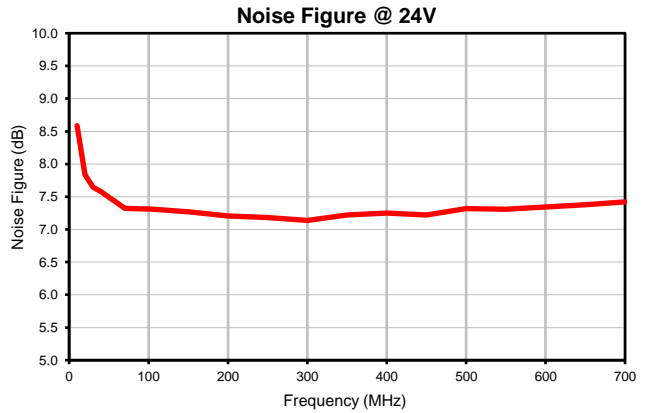
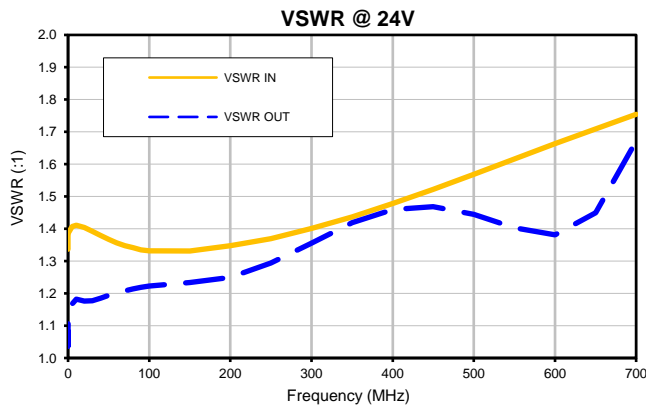
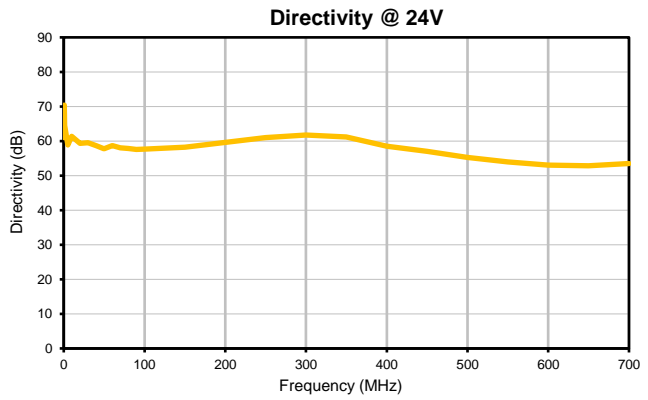
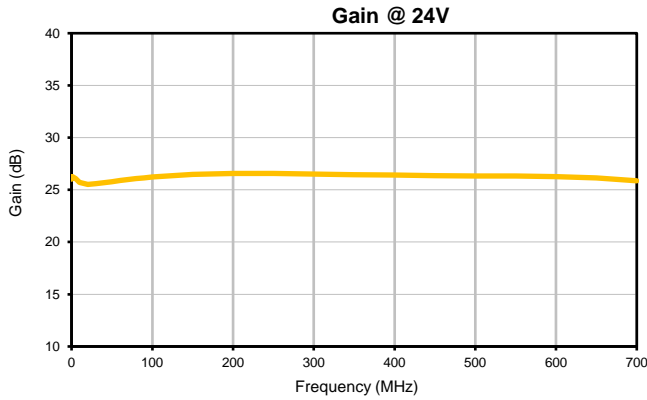
- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
  - B. Electrical specifications and performance data contained in this specification document are based 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)



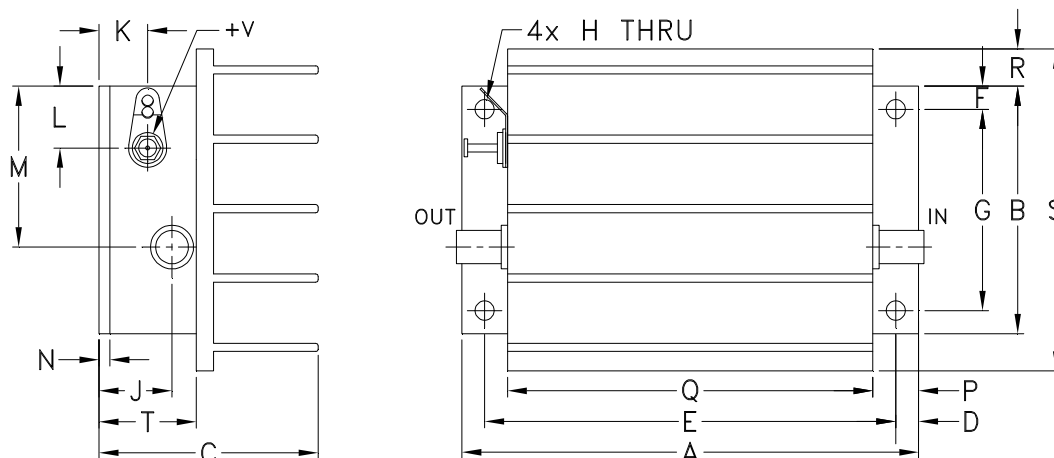
## Typical Performance Data

FREQUENCY (MHz)	GAIN (dB) 24V	DIRECTIVITY (dB) 24V	VSWR (:1)		NOISE FIGURE (dB) 24V	Pout at 1 dB COMPRESSION	Pout at 3 dB COMPRESSION	OUTPUT IP3 (dBm) 24V
			IN 24V	OUT 24V		(dBm) 24V	(dBm) 24V	
0.0090	26.21	64.42	1.34	1.08	--	23.54	25.74	--
0.01	26.19	69.56	1.34	1.07	--	23.63	25.70	--
0.05	26.03	61.03	1.37	1.04	--	23.74	25.79	--
0.1	26.09	65.10	1.38	1.08	--	23.93	25.96	--
0.5	26.27	70.41	1.39	1.14	--	24.23	26.27	36.67
1	26.25	64.56	1.39	1.14	--	24.22	26.26	36.63
5	26.09	58.85	1.41	1.17	--	24.25	26.17	36.65
10	25.71	61.38	1.41	1.18	8.59	24.64	26.37	36.86
20	25.52	59.34	1.40	1.18	7.84	25.28	26.76	37.22
30	25.59	59.53	1.39	1.18	7.65	25.66	26.97	37.77
40	25.68	58.72	1.38	1.19	7.58	25.75	27.05	37.85
50	25.79	57.75	1.37	1.19	7.50	25.82	27.10	38.03
60	25.89	58.73	1.36	1.20	7.41	25.82	27.14	38.13
70	25.99	58.01	1.35	1.21	7.33	25.89	27.15	38.19
80	26.08	57.90	1.34	1.21	7.32	25.86	27.20	38.17
90	26.16	57.62	1.34	1.22	7.31	25.92	27.24	38.20
100	26.23	57.64	1.33	1.22	7.31	25.95	27.26	38.24
150	26.48	58.23	1.33	1.23	7.27	25.69	27.16	37.94
200	26.57	59.58	1.35	1.25	7.20	25.66	27.13	37.73
250	26.57	61.02	1.37	1.29	7.18	25.21	26.73	37.30
300	26.53	61.75	1.40	1.36	7.14	25.05	26.67	37.07
350	26.46	61.15	1.44	1.42	7.22	24.54	26.23	36.67
400	26.41	58.53	1.48	1.46	7.25	24.60	26.29	36.33
450	26.37	57.00	1.52	1.47	7.22	24.34	26.14	36.04
500	26.34	55.23	1.57	1.44	7.32	24.51	26.29	36.06
550	26.31	54.00	1.62	1.40	7.31	24.23	26.07	36.00
600	26.26	53.08	1.66	1.38	7.34	24.38	26.11	35.55
650	26.14	52.86	1.71	1.45	7.38	23.74	25.66	34.92
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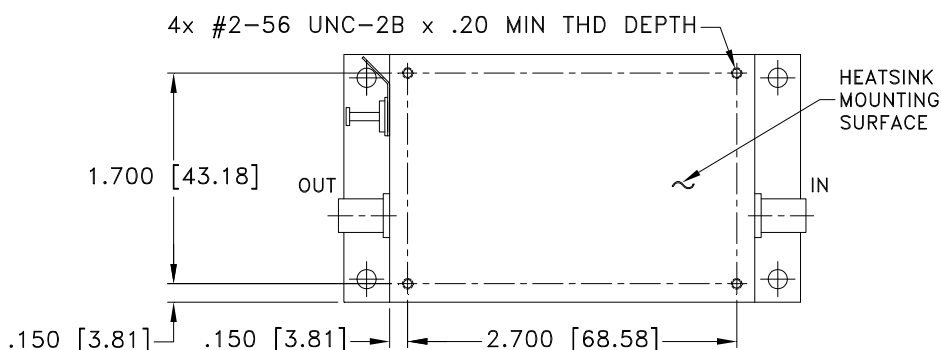
## Typical Performance Curves



### Outline Dimensions



#### MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
S32	3.75 (95.25)	2.00 (50.80)	1.80 (45.72)	.19 (4.83)	3.375 (85.73)	.19 (4.83)	1.625 (41.28)	.144 (3.66)	.50 (12.70)	.40 (10.16)	.50 (12.70)	1.30 (33.02)	.10 (2.54)

CASE#	P	Q	R	S	T	WT. GRAMS	WT. WITHOUT HEATSINK GRAMS
S32	.38 (9.65)	3.00 (76.20)	.30 (7.62)	2.60 (66.04)	.80 (20.32)	220.0	150.0

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

#### Notes:

- Case material: Aluminum alloy.
- Case finish:  
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
- Heat sink finish: Black anodize.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS



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	-20° to 65° C Ambient Environment	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