



COAXIAL

# High Power Amplifier

## ZHL-15W-422-S+ ZHL-15W-422X-S+

50Ω 15W 600 to 4200 MHz

### THE BIG DEAL

- Saturated Power, 15W
- Wide Bandwidth, 600 to 4200 MHz
- High Gain, 46 dB typ.
- Self-protected against high case temp., reverse polarity and shorting / unshorting
- Withstands short and open circuit at output while delivering up to 10W

### APPLICATIONS

- High Power Test Sets
- Burn-in Setups
- Communications
- Radar

### PRODUCT OVERVIEW

The ZHL-15W-422+ is a Class A, high-power amplifier providing 15W saturated power over the 600 to 4200 MHz band, ideal for a variety of high-power test setups as well as applications including communications, radar and more. The ruggedly-designed amplifier provides unconditional stability and built-in self-protection against reverse polarity, shorting/unshorting and overheating. It is capable of withstanding short and open circuits at output while continuously delivering 10W of power. Housed in a rugged aluminum alloy case measuring 4.3 x 6.7 x 1.2", the unit features SMA connectors and an optional heat sink and fan attachment for cooling.

### KEY FEATURES

Feature	Advantages
Wideband, usable from 500 to 4300 MHz	Suitable for a broad range of high-power, wideband applications, including test setups, communications and defense applications.
High Gain, 46 dB typ.	Enables signal amplification to 15W output without the need for multiple gain stages.
Built-in self-protection	Self-protected against high case temperature, reverse polarity and shorting / unshorting
Unconditional stability	Provides reliable performance independent of input and load conditions.



Generic photo used for illustration purposes only

Model No.	ZHL-15W-422-S+	ZHL-15W-422X-S+ ▲
Case Style	CP2548	
Connectors	IN-SMA, OUT-SMA	

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



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**ZHL-15W-422X-S+**

50Ω 15W 600 to 4200 MHz

## ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Condition (MHz)	ZHL-15W-422-S+ ZHL-15W-422X-S+ ▲			Units
		Min	Typ.	Max.	
Frequency Range		600		4200	MHz
Gain <sup>1</sup>	600 - 4200	41	46	51	dB
Gain Flatness <sup>1</sup>	600 - 4200	—	±2.0	—	dB
Output Power at 1dB Compression	600 - 4200		+39		dBm
Output Power Saturated	600 - 4200		+42		dBm
Noise Figure	600 - 4200		10		dB
Output third order intercept point <sup>2</sup>	600 - 4200		+47		dBm
Input VSWR <sup>1</sup>	600 - 4200		1.3		:1
Output VSWR <sup>1</sup>	600 - 4200		2.0		:1
DC Supply Voltage		26	28 <sup>3</sup>	32	V
Supply Current <sup>1</sup>		—	—	3.5	A

1. Small signal input power -50 dBm typ.

2. Two tones, 27 dBm/tone, 1 MHz spacing.

3. Recommended Operating Voltage.

Power Supply should be capable of delivering 4A at start-up.

▲ Heat sink and fan not included. Alternative heat sinking and heat removal must be provided by the user to limit maximum base-plate temperature to 85°C, in order to ensure proper performance. For reference, this requires thermal resistance of user's external heat sink to be 0.3°C/W max.

## ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-20°C to +50°C
Base Plate Temperature	+85°C
Storage Temperature	-55°C to +100°C
DC Voltage	+32V
Input RF Power (no damage)	+7 dBm

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





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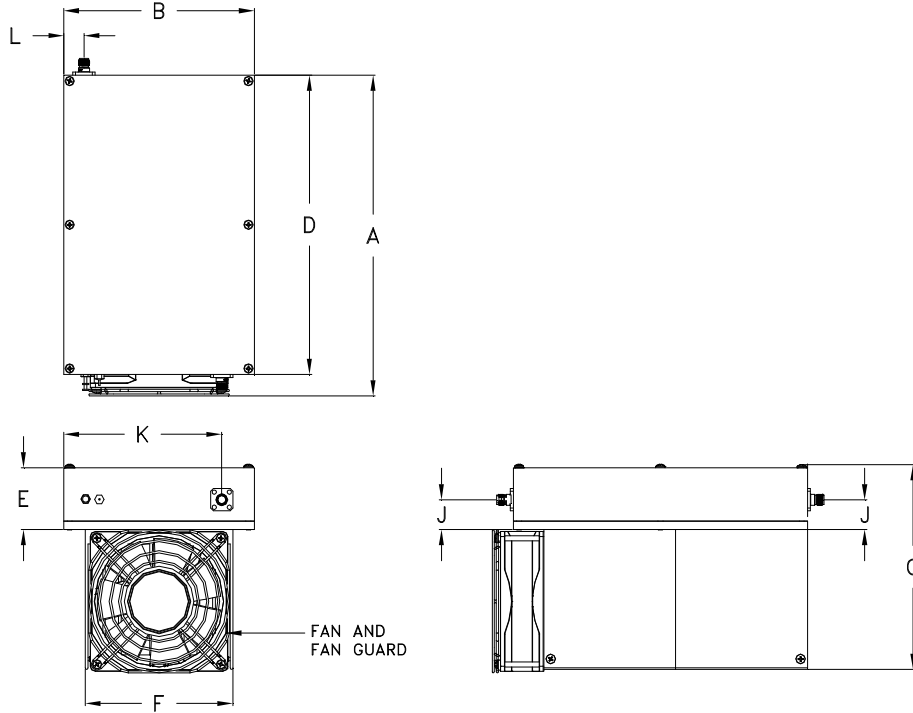
# High Power Amplifier

## ZHL-15W-422-S+ ZHL-15W-422X-S+

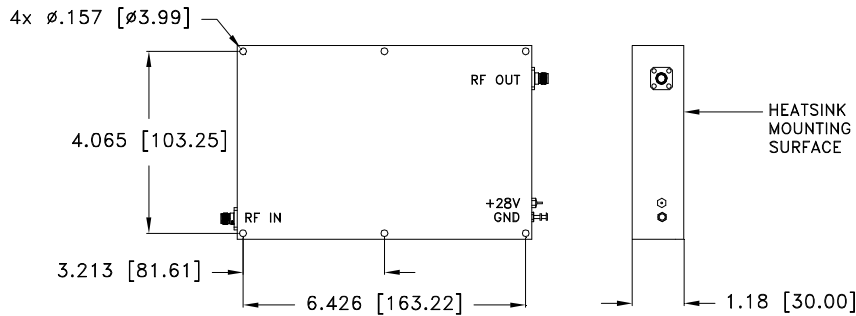
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50Ω 15W 600 to 4200 MHz

### OUTLINE DRAWING FOR MODEL WITH HEATSINK



### MOUNTING INFORMATION OF MODEL WITHOUT HEATSINK



### OUTLINE DIMENSIONS (Inch/mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	wt
7.25	4.33	4.58	6.69	1.38	3.36	--	--	0.67	3.34	0.71	--	--	grams*
184.15	110.00	116.33	170.00	35.05	85.34	--	--	17.05	84.80	18.00	--	--	2041

\*880 grams without heatsink



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# High Power Amplifier

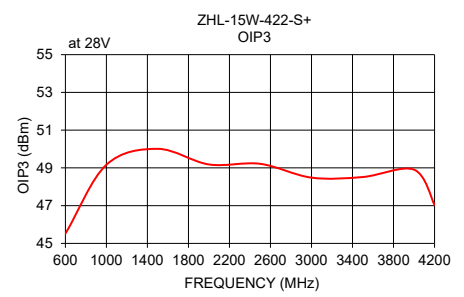
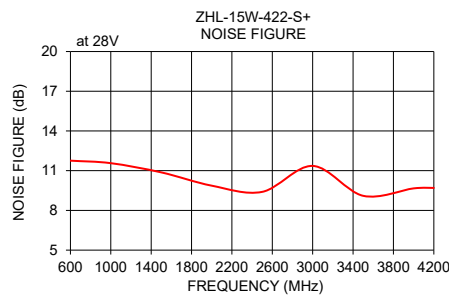
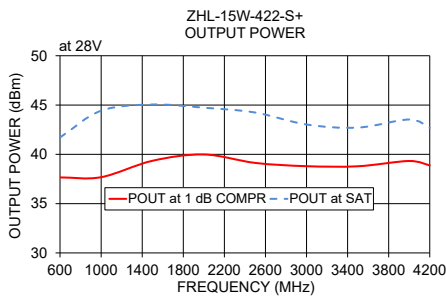
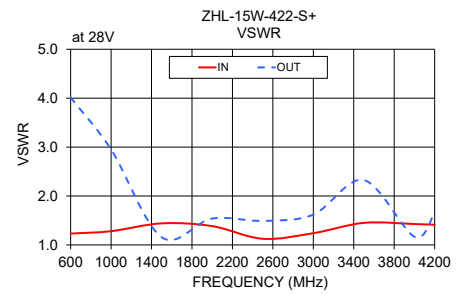
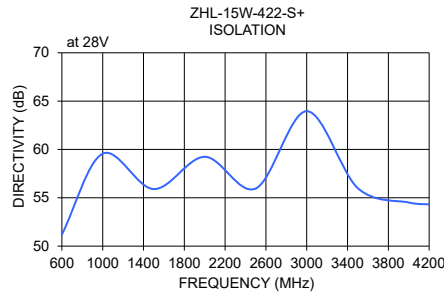
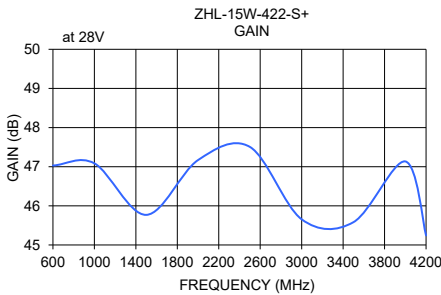
## ZHL-15W-422-S+ ZHL-15W-422X-S+

Mini-Circuits

50Ω 15W 600 to 4200 MHz

### TYPICAL PERFORMANCE DATA/CURVES

FREQUENCY (MHz)	GAIN (dB)	ISOLATION (dB)	VSWR (:1)		POUT at 1 dB COMPR. (dBm)	POUT at SAT (dBm)	NOISE FIGURE (dB)	OUTPUT IP3 (dBm)
	28V	28V	IN	OUT	28V	28V	28V	28V
600	47.03	51.20	1.23	4.01	37.66	41.71	11.76	45.51
1000	47.09	59.56	1.28	2.95	37.68	44.43	11.57	49.17
1500	45.77	55.90	1.44	1.16	39.35	45.05	10.87	50.01
2000	47.17	59.24	1.38	1.54	39.99	44.73	9.87	49.18
2500	47.51	55.96	1.13	1.49	39.13	44.24	9.40	49.22
3000	45.65	63.96	1.24	1.62	38.80	43.03	11.36	48.48
3500	45.58	56.00	1.45	2.33	38.79	42.71	9.10	48.52
4000	47.13	54.51	1.43	1.17	39.33	43.53	9.66	48.91
4200	45.25	54.32	1.41	1.67	38.87	42.70	9.70	47.04



- 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-Circuits' 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)



# High Power Amplifier

# ZHL-15W-422+

## Typical Performance Data

FREQUENCY (MHz)	GAIN (dB) 28V	DIRECTIVITY (dB) 28V	VSWR (:1)		NOISE FIGURE (dB) 28V	POUT @ 1 dB COMPRESSION (dBm) 28V	POUT AT SATURATION (dBm) 28V	OUTPUT IP3 (dBm) 28V
			IN 28V	OUT 28V				
500	52.20	53.57	1.44	4.87	12.20	37.43	40.65	44.27
600	47.03	51.20	1.23	4.01	11.76	37.66	41.71	45.51
700	45.80	58.52	1.15	3.35	11.71	37.79	43.03	46.89
800	46.37	67.16	1.17	3.09	12.13	37.58	43.90	47.94
900	46.68	63.75	1.22	3.01	12.11	37.59	44.23	48.49
1000	47.09	59.56	1.28	2.95	11.57	37.68	44.43	49.17
1100	48.05	56.04	1.33	2.75	11.44	38.15	45.46	49.74
1200	48.50	52.05	1.37	2.17	11.77	38.98	46.06	50.17
1300	48.09	63.29	1.40	1.64	11.60	39.22	46.02	50.24
1400	47.13	71.70	1.43	1.37	11.38	39.09	45.50	50.20
1500	45.77	55.90	1.44	1.16	10.87	39.35	45.05	50.01
1600	45.05	63.15	1.44	1.08	10.60	39.68	44.59	49.91
1700	45.58	60.60	1.44	1.12	10.93	39.87	44.54	49.74
1800	47.18	56.68	1.43	1.21	10.80	40.02	45.00	49.82
1900	47.81	57.29	1.41	1.37	10.12	40.12	44.86	49.44
2000	47.17	59.24	1.38	1.54	9.87	39.99	44.73	49.18
2100	46.20	64.46	1.35	1.66	10.33	39.81	44.90	49.67
2200	45.51	59.05	1.31	1.70	8.91	39.55	44.77	49.33
2300	45.42	65.06	1.25	1.64	9.36	39.16	44.31	48.84
2400	46.18	60.26	1.19	1.57	9.52	38.86	44.02	48.93
2500	47.51	55.96	1.13	1.49	9.40	39.13	44.24	49.22
2600	48.51	57.91	1.07	1.50	8.34	39.01	43.90	48.53
2700	48.49	59.17	1.06	1.55	9.26	39.15	43.43	48.96
2800	47.63	56.47	1.10	1.59	9.30	39.16	43.55	49.08
2900	46.57	59.43	1.17	1.61	9.17	39.14	43.55	48.49
3000	45.65	63.96	1.24	1.62	11.36	38.80	43.03	48.48
3100	45.29	53.25	1.29	1.62	9.25	38.64	42.80	48.59
3200	45.85	57.00	1.35	1.66	8.88	38.31	42.80	48.27
3300	46.85	51.31	1.39	1.97	9.01	38.70	43.39	48.49
3400	46.59	53.93	1.43	2.40	9.18	38.88	42.98	48.67
3500	45.58	56.00	1.45	2.33	9.10	38.79	42.71	48.52
3600	45.58	71.82	1.44	2.03	9.18	38.33	42.32	48.68
3700	47.11	58.10	1.42	1.80	9.28	38.42	42.57	48.64
3800	47.67	52.33	1.45	1.53	9.47	38.33	42.97	48.10
3900	47.13	59.23	1.45	1.27	9.39	38.48	42.93	48.50
4000	47.13	54.51	1.43	1.17	9.66	39.33	43.53	48.91
4100	46.89	59.01	1.42	1.29	9.33	39.44	43.69	48.03
4200	45.25	54.32	1.41	1.67	9.70	38.87	42.70	47.04
4300	42.13	65.30	1.41	2.29	9.90	36.96	40.21	45.14



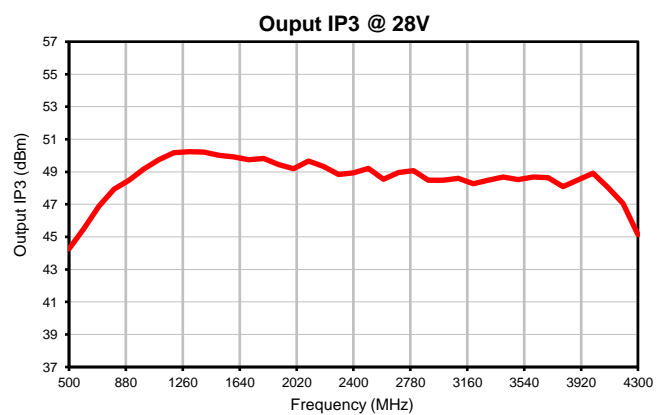
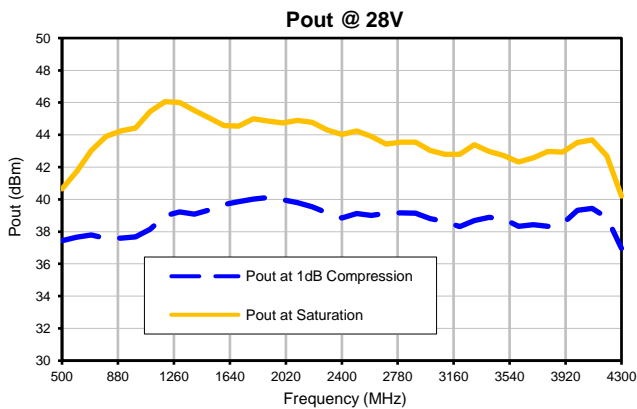
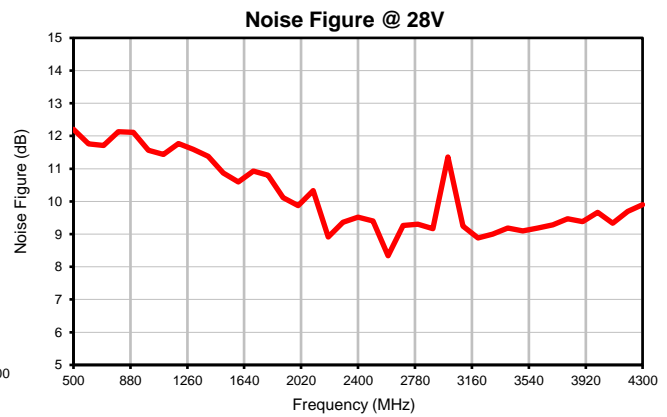
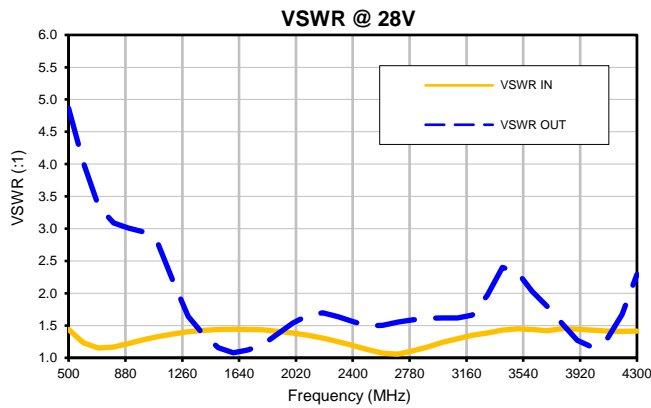
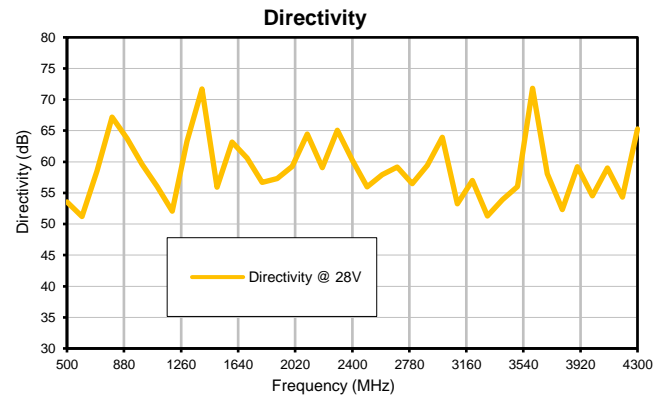
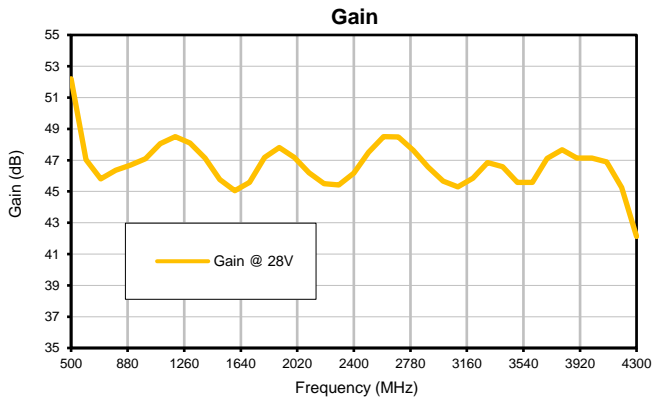
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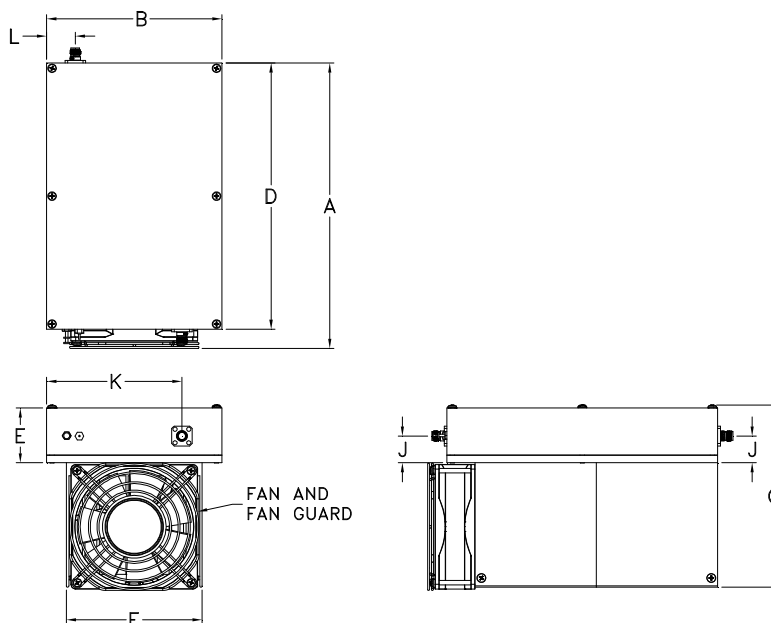
# High Power Amplifier

## Typical Performance Curves

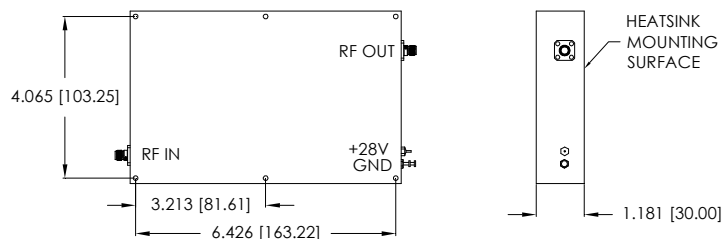
ZHL-15W-422+



### Outline Dimensions



#### MOUNTING INFORMATION OF MODEL WITHOUT HEATSINK



CASE#	A	B	C	D	E	F	G	H	J	K	L
CP2548	7.25 (184.15)	4.33 (110.0)	4.58 (116.33)	6.69 (170.0)	1.38 (35.05)	3.36 (85.34)	--	--	.67 (17.05)	3.34 (84.80)	.71 (18.00)

CASE#	M	N	WT. GRAMS	WT. WITHOUT HEATSINK GRAMS
CP2548	--	--	2041	880

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

#### Notes:

1. Case material: Aluminum alloy.
2. Finish:  
For RoHS Case Styles: Clear Chemical conversion coating, non-chrome or trivalent chrome based.
3. Heat sink finish: Black anodize.
4. Refer to the individual model data sheet for the type of connectors available.
5. Recommended screws for mounting model without heat sink on 3/32" thick sheet: #6-32, 1.50" Length.
6. Shape of connector flange may vary.



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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 45°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 60° C base plate Temperature	MIL-STD-202, Method 108
Thermal Shock	-55° to 100°C, 5 cycles	MIL-STD-202, Method 107, Condition A, except 100°C