COAXIAL

Ultra-Wideband Amplifier

ZX60-83W+

50Ω 50 MHz to 8 GHz SMA Female

KEY FEATURES

- Excellent gain flatness, ±0.8 dB typ. up to 7 GHz
- High output P1dB, +23.0 dBm typ. up to 6 GHz
- High output IP3, +34.0 dBm typ.
- Voltage regulated internally and reverse voltage protected
- Ideal evaluation module for PHA-83W+

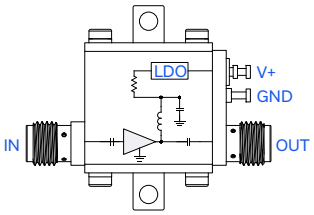


Generic photos used for illustration purposes only

APPLICATIONS

- Test and measurement equipment
- 5G MIMO and back haul radio systems
- SATCOM
- Radar, EW, and ECM defense systems

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

Mini-Circuits' ZX60-83W+ is a Wideband Amplifier utilizing MCL's own pHEMT-based amplifier, PHA-83W+, offering industry-leading performance over its full frequency range from 0.05 to 8.0 GHz. This design operates on a single +10 V supply @ 135 mA and comes in a rugged, compact unibody case (0.74" × 0.75" × 0.46") with integrated SMA female connectors, making it an excellent candidate for demanding operating conditions and crowded system layouts. A compatible heatsink is provided (not installed) for convenient setup and standalone operation.

ELECTRICAL SPECIFICATIONS AT +25 °C BASEPLATE AND V_S = +10 V, UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range	-	0.05	-	8.0	GHz
Gain	0.05	14.0	16.0	-	dB
	2.0	13.5	16.0	-	
	4.0	13.0	15.5	-	
	6.0	13.0	16.0	-	
	8.0	-	13.0	-	
Gain Flatness	0.05–7.0	-	±0.8	-	dB
Input Return Loss	0.05–8.0	-	15.0	-	dB
Output Return Loss	0.05–8.0	-	15.0	-	dB
Directivity	0.05–8.0	-	5.0	-	dB
Output Power at 1 dB Compression (P_{1dB})	0.05	-	22.0	-	dBm
	2.0	-	23.0	-	
	4.0	-	23.0	-	
	6.0	-	23.0	-	
	8.0	-	16.0	-	
Saturated Output Power (P_{SAT})	0.05	-	23.5	-	dBm
	2.0	-	24.1	-	
	4.0	-	24.0	-	
	6.0	-	23.0	-	
	8.0	-	23.6	-	
Output Third Order Intercept Point[1]	0.05	-	31.4	-	dBm
	2.0	-	34.3	-	
	4.0	-	34.0	-	
	6.0	-	34.5	-	
	8.0	-	29.5	-	
Noise Figure	0.05	-	2.9		dB
	2.0	-	2.8		
	4.0	-	3.1		
	6.0	-	3.8		
	8.0	-	5.4		
DC Supply Voltage (V_S)		+9.5	+10	+12	V
DC Current[2]			135	155	mA

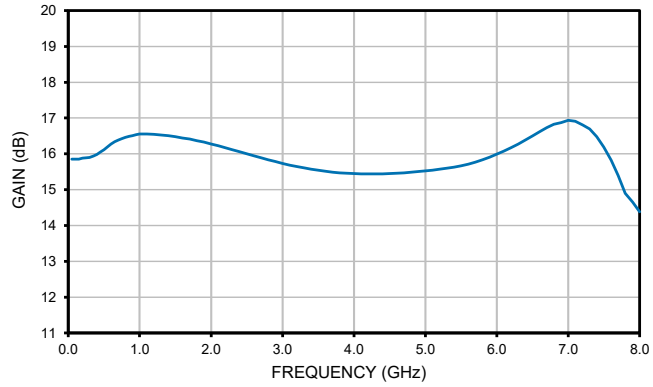
1. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm per tone at output.
2. Typical current measured under small signal conditions. Max DC Current measured at P_{SAT}. DC current increases as amplifier is driven into compression.

Ultra-Wideband Amplifier ZX60-83W+

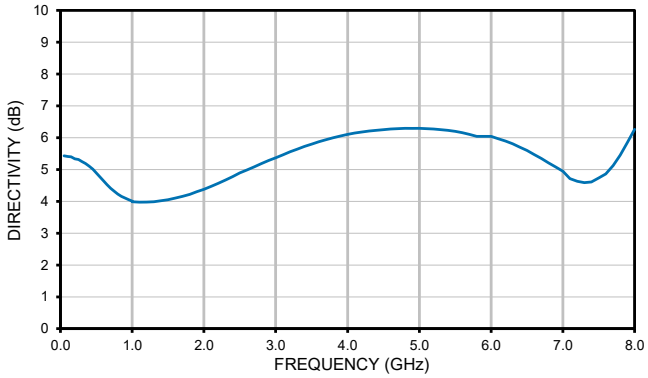
50Ω 50 MHz to 8 GHz SMA Female

TYPICAL PERFORMANCE GRAPHS

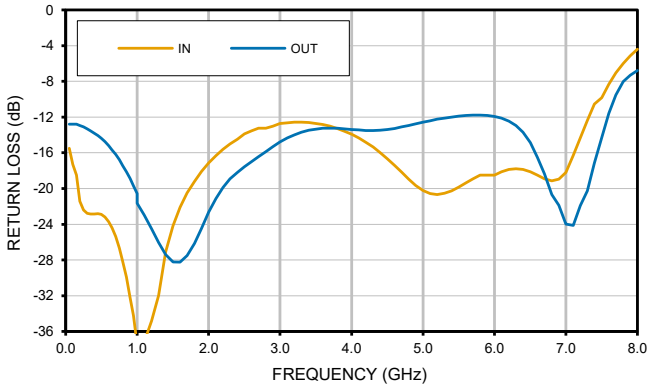
GAIN



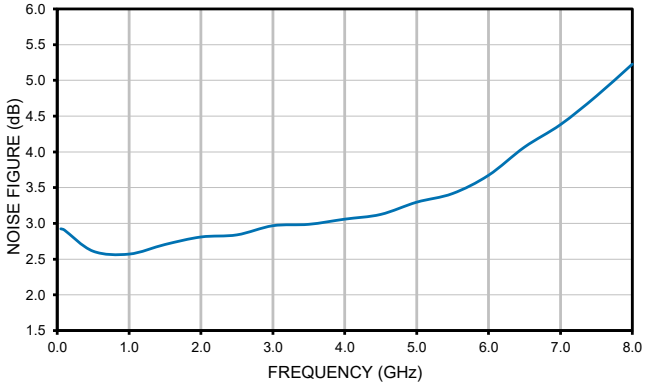
DIRECTIVITY



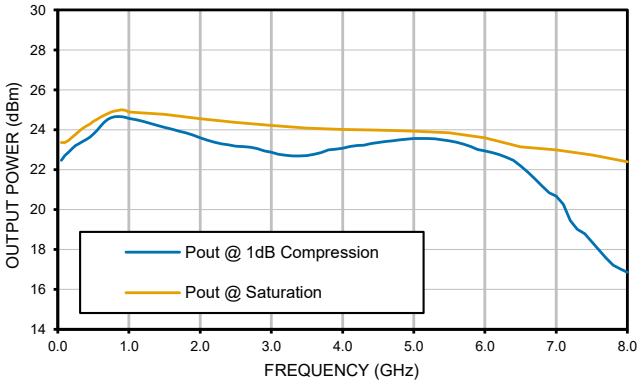
RETURN LOSS



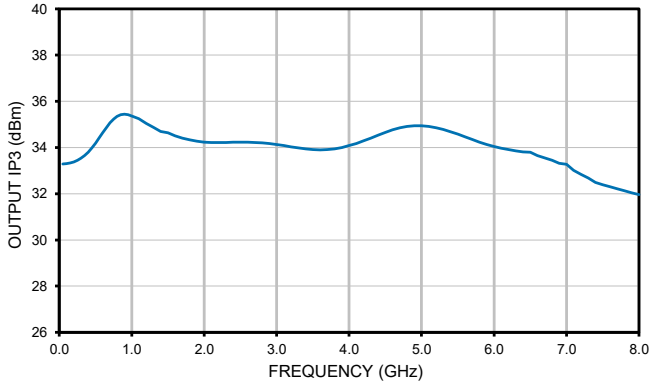
NOISE FIGURE



OUTPUT POWER



OIP3



ABSOLUTE MAXIMUM RATINGS[3,4]

Parameter	Ratings
Operating Temperature	-40 °C to +85 °C Baseplate -40 °C to +65 °C Ambient[5]
Storage Temperature	-55 °C to +100 °C
Total Power Dissipation[5,6]	2.4 W
RF Input Power (CW)	+15 dBm
DC Operating Voltage	+15 V

3. Specified under matched load to 50 ohms.
4. Continuous operation is not recommended at these extremes. Permanent damage may occur if any of these limits are exceeded.
5. Operation is recommended using the supplied heatsink or an alternative heatsink with a thermal resistance ≤ 8.3°C/W.
6. Total power dissipation determined at V_S = +15 V with the amplifier operating in saturation.

DETERMINING MAXIMUM THERMAL RESISTANCE OF USERS' EXTERNAL HEATSINK

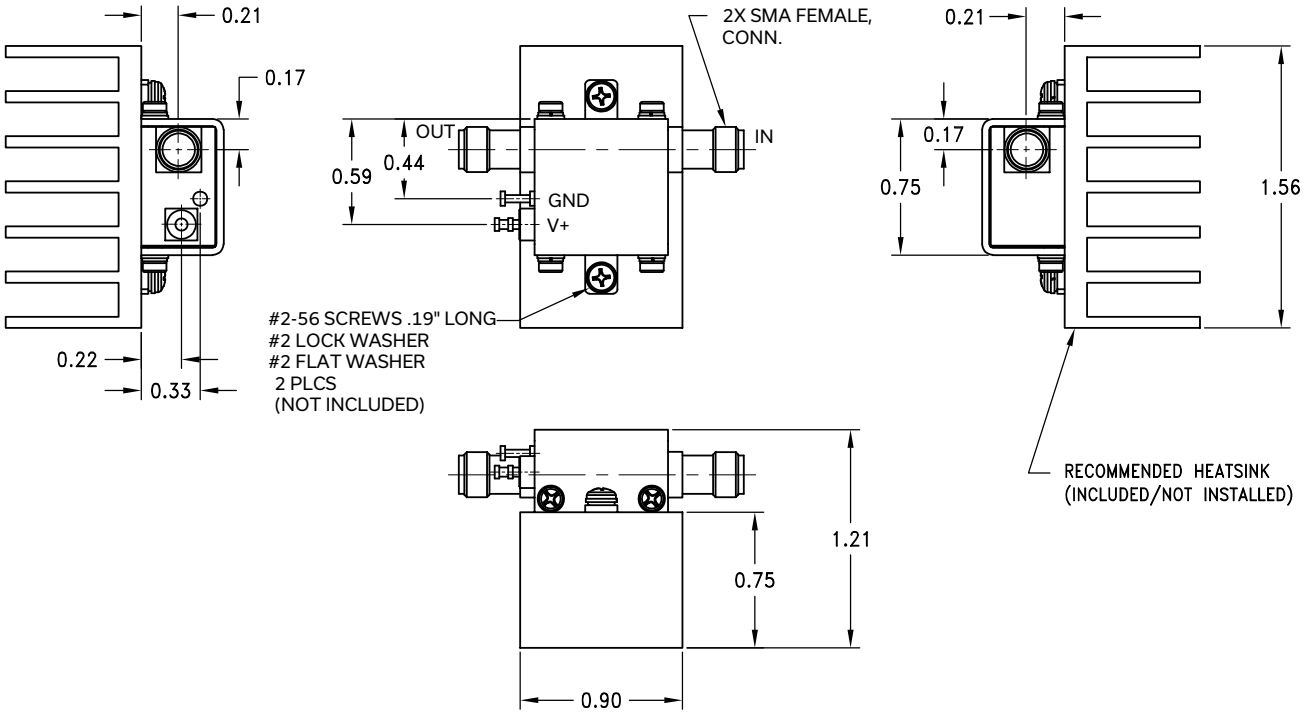
$$\textit{MAXIMUM THERMAL RESISTANCE} = \frac{\textit{MAXIMUM OPERATING CASE TEMP} - \textit{MAXIMUM USER AMBIENT TEMP}}{\textit{POWER DISSIPATION}}$$

Example:	MAXIMUM OPERATING CASE TEMP = +50 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) MAXIMUM USER AMBIENT TEMP = +30 °C (USER DEFINED) POWER DISSIPATION = 10 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = (+50 °C - +30 °C) / 10 W = 2 °C/W

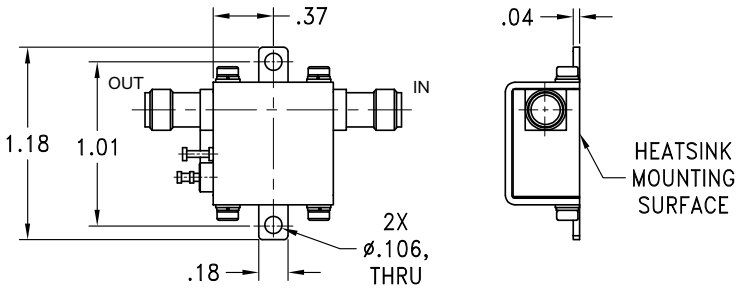
Ultra-Wideband Amplifier ZX60-83W+

50Ω 50 MHz to 8 GHz SMA Female

CASE STYLE DRAWING



MOUNTING INFORMATION OF MODEL WITHOUT HEATSINK



Weight: 43 grams; without heatsink 23 grams.
Dimensions are in inches [mm]. Tolerances: 2 Pl.±.03; 3 Pl. ±.015 inches

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

ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

Performance Data & Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file)
RoHS Status	Compliant
Environmental Ratings	ENV23T10
Export Information	ECCN# EAR99

ORDERING INFORMATION

Model No. Link	ZX60-83W+
Case Style	GC957-3
Connector	IN: SMA Female OUT: SMA Female

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

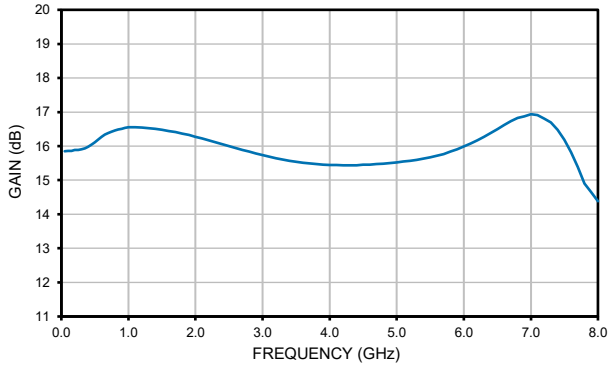
Typical Performance Data

FREQUENCY (GHz)	GAIN (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		Pout @ 1 dB COMPRESSION (dBm)	NOISE FIGURE (dB)	OIP3 dBm
			IN	OUT			
0.05	15.85	5.43	15.48	12.80	22.5	2.9	33.28
0.1	15.85	5.41	17.29	12.80	22.7	2.9	33.31
0.5	16.12	4.84	22.89	14.37	23.8	2.6	34.18
1.0	16.55	3.97	37.48	20.57	24.6	2.6	35.35
1.5	16.48	4.06	24.18	28.21	24.1	2.7	34.64
2.0	16.28	4.41	17.14	22.67	23.6	2.8	34.23
2.5	16.00	4.96	13.87	17.58	23.2	2.8	34.23
3.0	15.73	5.42	12.73	14.79	22.9	3.0	34.13
3.5	15.54	5.85	12.70	13.35	22.7	3.0	33.91
4.0	15.45	6.13	13.92	13.39	23.1	3.1	34.08
4.5	15.45	6.27	16.65	13.38	23.4	3.1	34.65
5.0	15.52	6.29	20.23	12.58	23.6	3.3	34.94
5.5	15.67	6.20	19.83	11.89	23.4	3.4	34.57
6.0	15.99	5.86	18.48	11.94	22.9	3.7	34.04
6.5	16.50	5.29	18.13	14.84	22.2	4.1	33.79
7.0	16.94	4.52	18.21	23.98	20.7	4.4	33.27
7.5	16.19	5.14	9.82	14.30	18.4	4.8	32.39
8.0	14.38	7.42	4.40	6.78	16.9	5.2	31.96

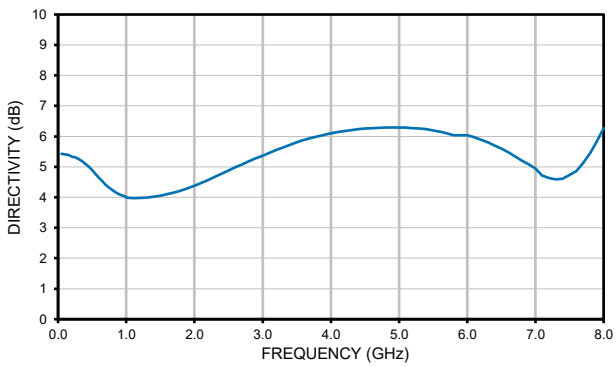
Coaxial Amplifier ZX60-83W+

Typical Performance Curves

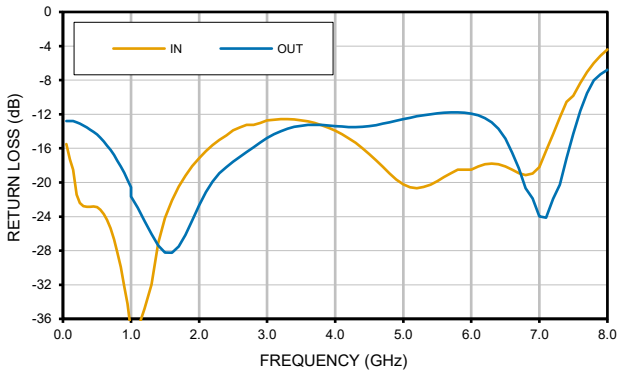
GAIN



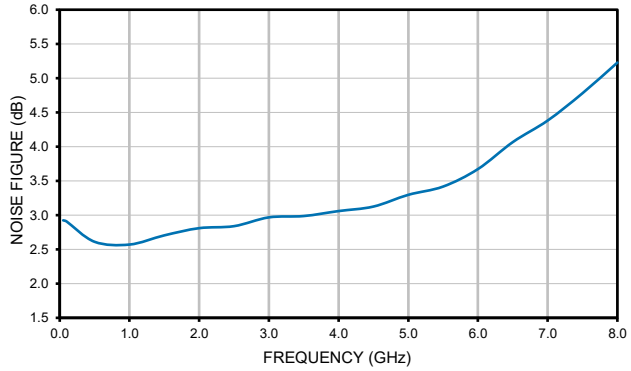
DIRECTIVITY



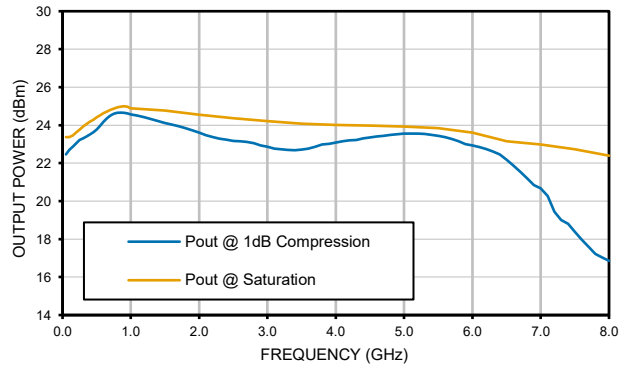
RETURN LOSS



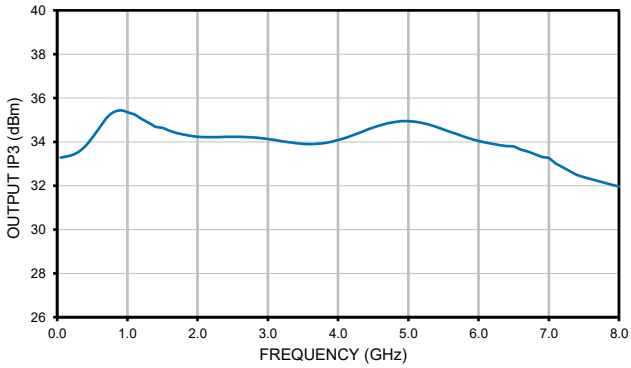
NOISE FIGURE



OUTPUT POWER

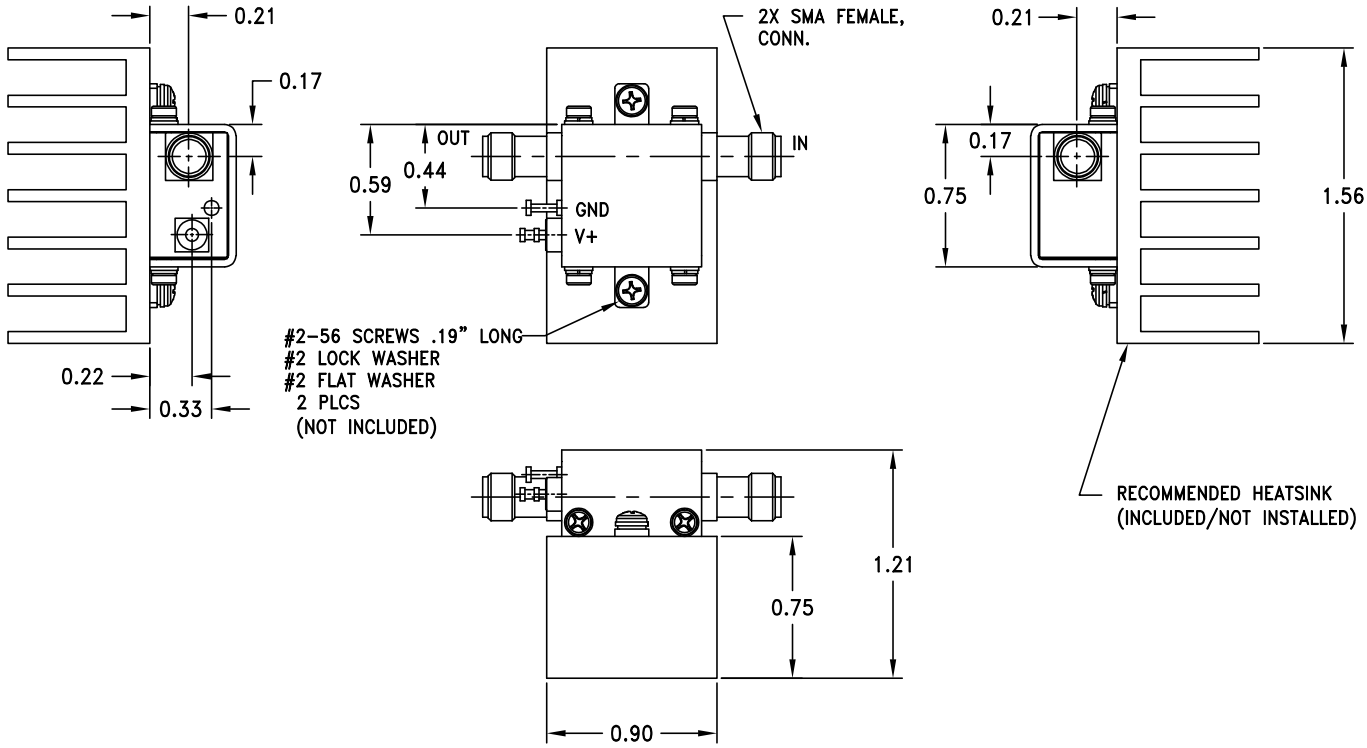


OIP3

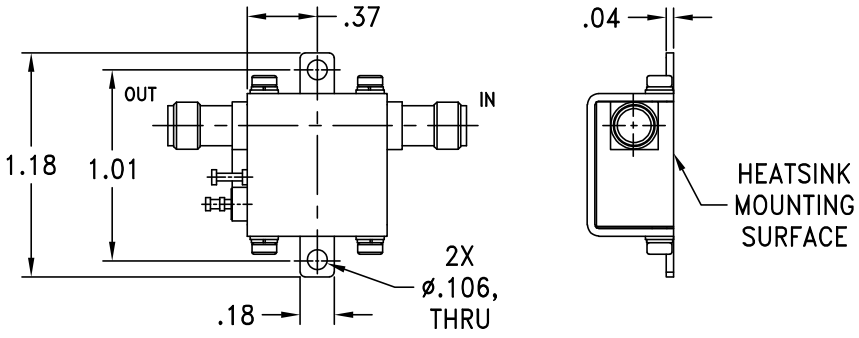


Case Style GC

Outline Dimensions GC957-3



MOUNTING INFORMATION OF MODEL WITHOUT RECOMMENDED HEATSINK



Weight: 43 grams; without heatsink 23 grams.
Dimensions are in inches [mm]. Tolerances: 2 Pl.±.03; 3 Pl. ±.015 inches

Notes:
1. Case Material: Brass.
2. Case Finish: Nickel plate.
3. Heatsink Finish: Black anodize.

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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

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