WAVEGUIDE HIGH FREQUENCY

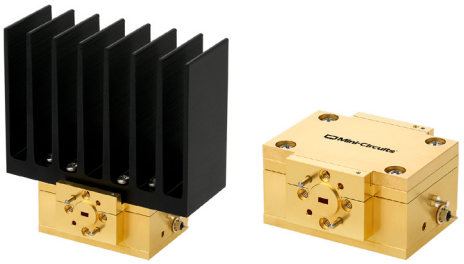
Medium Power Amplifier

WVA-71863HP+
WVA-71863HPX+

71 to 86 GHz P_{SAT} +24.5 dBm WR12

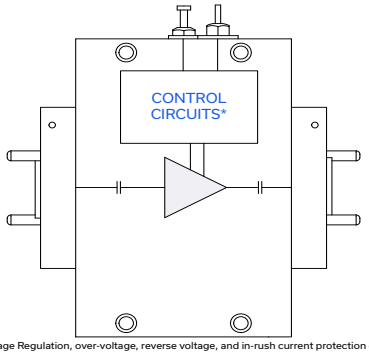
THE BIG DEAL

- WR12 Waveguide RF Interface
- High Gain, 39 dB Typ.
- Excellent Gain Flatness, ±1.5 dB Typ.
- High Saturated Output Power, +24.5 dBm Typ.
- Wide DC Operating Voltage, +10 To +15 V
- Over Voltage And Reverse Voltage Protected



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM



*Voltage Regulation, over-voltage, reverse voltage, and in-rush current protection circuit

APPLICATIONS

- Automotive Radar Testing
- Aerospace & Defense
- Test and Measurement
- E-Band Backhaul
- Imaging

PRODUCT OVERVIEW

Mini-Circuits' WVA-71863HP+ is a medium power high gain amplifier, covering 71 to 86 GHz with WR12 waveguide intefaces. The model operates over a positive supply range of +10 to +15 V, allowing users to choose their desired operating voltage. Internal DC-DC conversion circuitry maintains constant efficiency over the full input voltage range. The amplifier incorporates several DC-protection features such as over-voltage, reverse voltage, and in-rush current protection to protect from damage in case of unexpected spikes in voltage during operation. The high frequency operation combined with high gain and high output power makes this amplifier an ideal choice for automotive, radar/sensing applications, and wireless backhaul testing in E-Band frequency ranges.

KEY FEATURES

Features	Advantages
Wideband amplifier, 71 to 86 GHz	A single amplifier covers the full 71-86 GHz band, eliminating the need for band specific solutions (71-76 GHz, 77-81 GHz, 81-86 GHz).
High Gain Low VSWR High Power	The combination of high gain (39dB typ.) and high output power (+24.5dBm typ. P_{SAT}) makes this an excellent choice for chipset testing, over-the-air validation testing, and other test bench applications that require a high power amplifier at E-Band frequencies.
DC Protection • Over-voltage • Reverse voltage • In-rush current	The internal DC circuitry allows the amplifier to be protected from external mishandling or unexpected spikes in voltage that could lead to catastrophic failures in the field.
Wide DC Operating Voltage	The device is capable of operating on a single supply voltage from +10 to +15 V with consistent DC power consumption, providing ease and when incorporating into test setups and systems.

REV. OR
ECO-018172
WVA-71863HP+
MCL NY
230613

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ELECTRICAL SPECIFICATIONS AT +25 °C BASEPLATE

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range	-	71	-	86	GHz
Gain	71 - 86	34	39	-	dB
Gain Flatness	71 - 86	-	±1.5	-	dB
Output Power at 1dB Compression (P1dB)	71 - 81	+19.5	+22.5	-	dBm
Saturated Output Power (P_{SAT})	71 - 86	+22.0	+24.5	-	dBm
Input Return Loss	71 - 86	-	10	-	dB
Output Return Loss[1]	71 - 86	-	15	-	dB
DC Supply Voltage (Vs)	-	+10	-	+15	V
DC Current at Vs = +10V[2]	-	-	500	1000	mA

1. Open and short-circuit loads are not recommended at the amplifier output. Ensure proper WR12 load before turning the amplifier on.
2. Max DC Current at P_{SAT}. DC current increases as amplifier is driven into compression.

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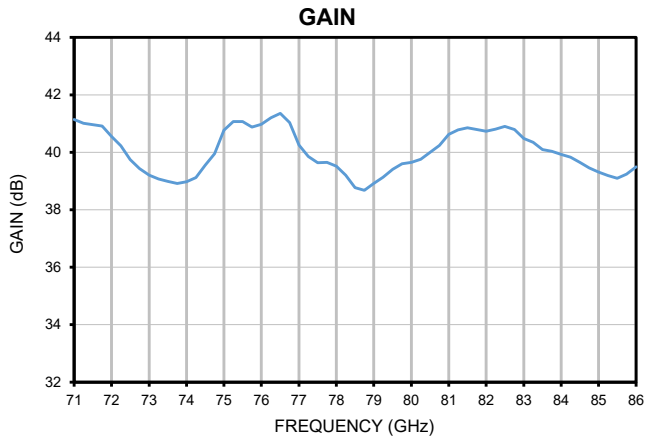
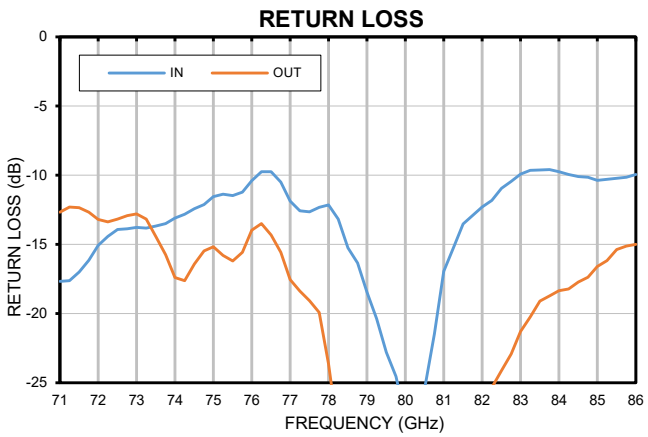
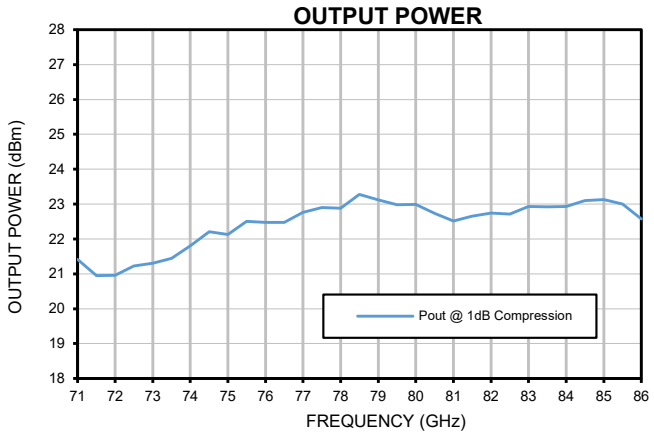
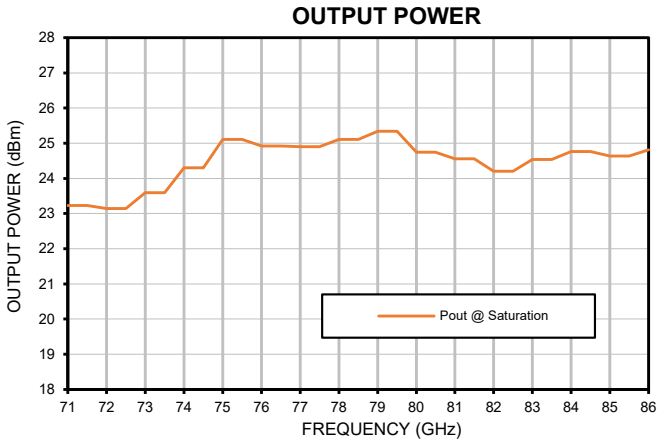
TYPICAL PERFORMANCE GRAPHS









ABSOLUTE MAXIMUM RATINGS[3]

Parameter	Ratings
Operating Temperature	WVA-71863HP+ -40 °C to +50 °C Ambient WVA-71863HPX+ -40 °C to +60 °C Baseplate
Storage Temperature	-40 °C to +85 °C
Total Power Dissipation	10.5 W
RF Input Power[4] (CW)	0 dBm
DC Operating Voltage (Vs)	+16 V

3. Continuous operation is not recommended at these extremes. Permanent damage may occur if any of these limits are exceeded.
4. Specified under matched WR12 load.

DETERMINING MAXIMUM THERMAL RESISTANCE OF USERS' EXTERNAL HEAT SINK

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

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 = 2 °C/W

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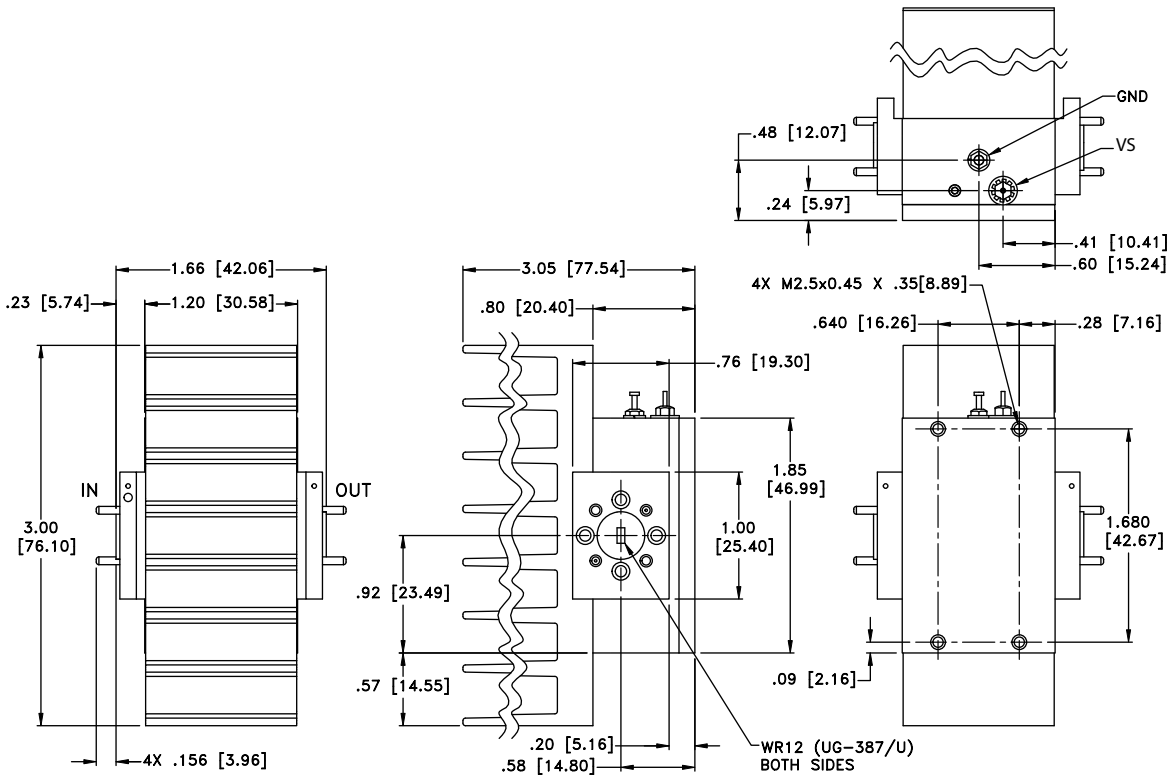
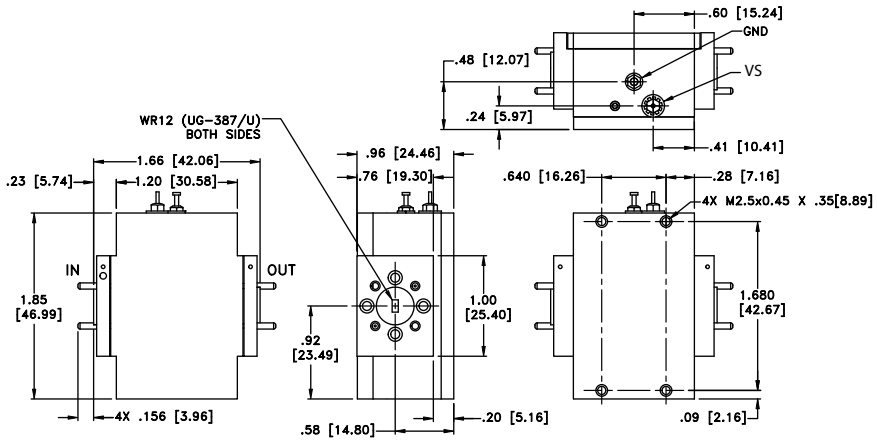
CASE STYLE DRAWING WITH HEATSINK (WVA-71863HP+)



CASE STYLE DRAWING WITHOUT HEATSINK (WVA-71863HPX+)



Weight 200 grams; Without Heatsink 100 grams

Dimensions are in inches [mm]. Tolerances: 2 PL±.03; 3 PL ±.015 INCHES

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ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
RoHs Status	Compliant
Environmental Ratings	ENV130
Export Information	ECCN #3A001.B.4 This item will require an export license when shipped to certain countries

ORDERING INFORMATION

Model No. Links	WVA-71863HP+	WVA-71863HPX+
Option	With heatsink	Without heatsink
Product Marking	WVA-71863HP+	WVA-71863HPX+
Case Style	YS3481	
Connector	WR12	

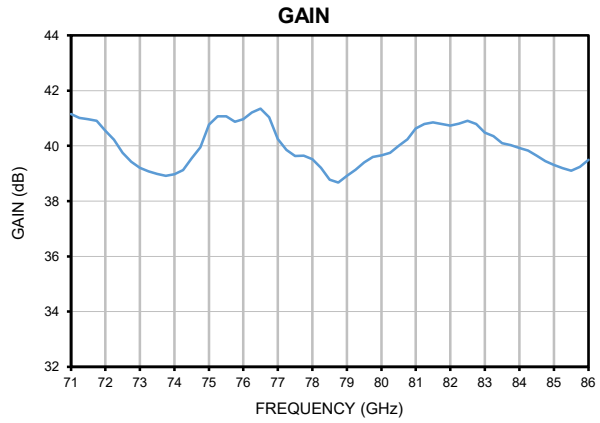
NOTES

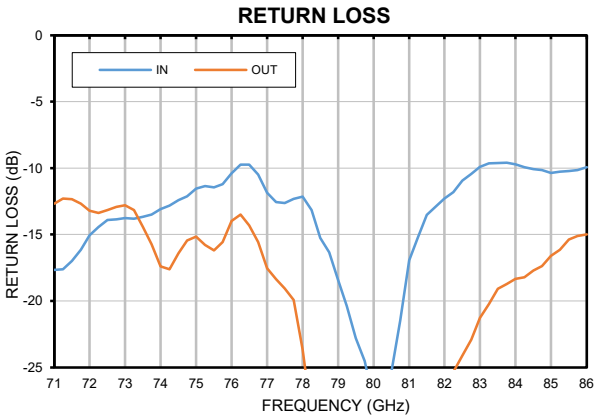
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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

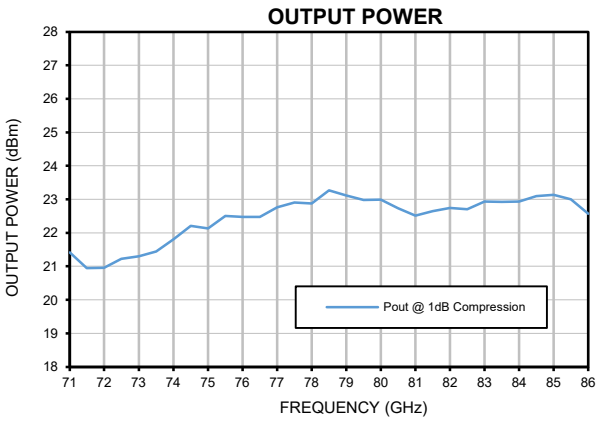
Typical Performance Data

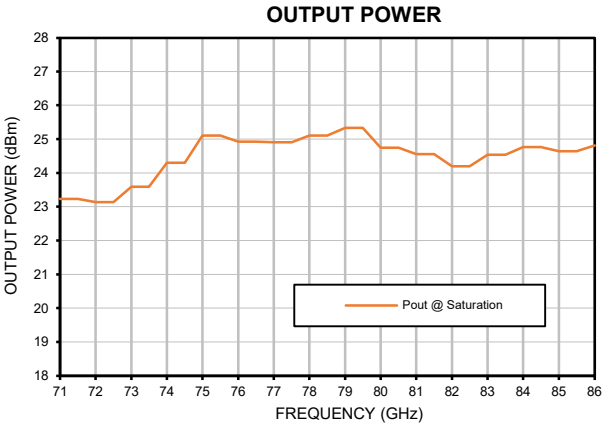
FREQUENCY (GHz)	GAIN (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB) IN	RETURN LOSS (dB) OUT	Pout @ 1 dB COMPRESSION (dBm)	Pout at SATURATION (dBm)
71.0	41.15	34.23	17.66	12.68	21.4	23.2
71.5	40.96	33.38	17.00	12.35	20.9	23.2
72.0	40.55	31.75	15.06	13.21	21.0	23.1
72.5	39.74	36.61	13.91	13.17	21.2	23.1
73.0	39.21	38.86	13.77	12.80	21.3	23.6
73.5	38.99	34.85	13.67	14.44	21.4	23.6
74.0	38.98	35.51	13.08	17.39	21.8	24.3
74.5	39.55	37.93	12.42	16.42	22.2	24.3
75.0	40.77	38.42	11.54	15.16	22.1	25.1
75.5	41.07	37.30	11.46	16.19	22.5	25.1
76.0	40.97	34.68	10.41	13.98	22.5	24.9
76.5	41.35	30.27	9.75	14.32	22.5	24.9
77.0	40.25	30.15	11.87	17.55	22.8	24.9
77.5	39.64	33.03	12.65	19.07	22.9	24.9
78.0	39.51	33.13	12.15	23.65	22.9	25.1
78.5	38.77	38.21	15.25	41.18	23.3	25.1
79.0	38.92	39.96	18.44	39.42	23.1	25.3
79.5	39.41	38.14	22.79	31.29	23.0	25.3
80.0	39.66	56.03	27.63	27.16	23.0	24.7
80.5	40.00	43.93	25.40	27.04	22.7	24.7
81.0	40.63	47.55	16.95	26.69	22.5	24.6
81.5	40.85	44.59	13.52	27.21	22.6	24.6
82.0	40.73	36.89	12.30	26.37	22.7	24.2
82.5	40.90	40.44	10.95	24.12	22.7	24.2
83.0	40.48	35.30	9.92	21.28	22.9	24.5
83.5	40.09	41.32	9.62	19.09	22.9	24.5
84.0	39.92	34.99	9.73	18.35	22.9	24.8
84.5	39.65	47.22	10.08	17.72	23.1	24.8
85.0	39.31	39.92	10.36	16.61	23.1	24.6
85.5	39.10	42.80	10.23	15.38	23.0	24.6
86.0	39.49	40.19	9.94	14.99	22.6	24.8

Typical Performance Curves



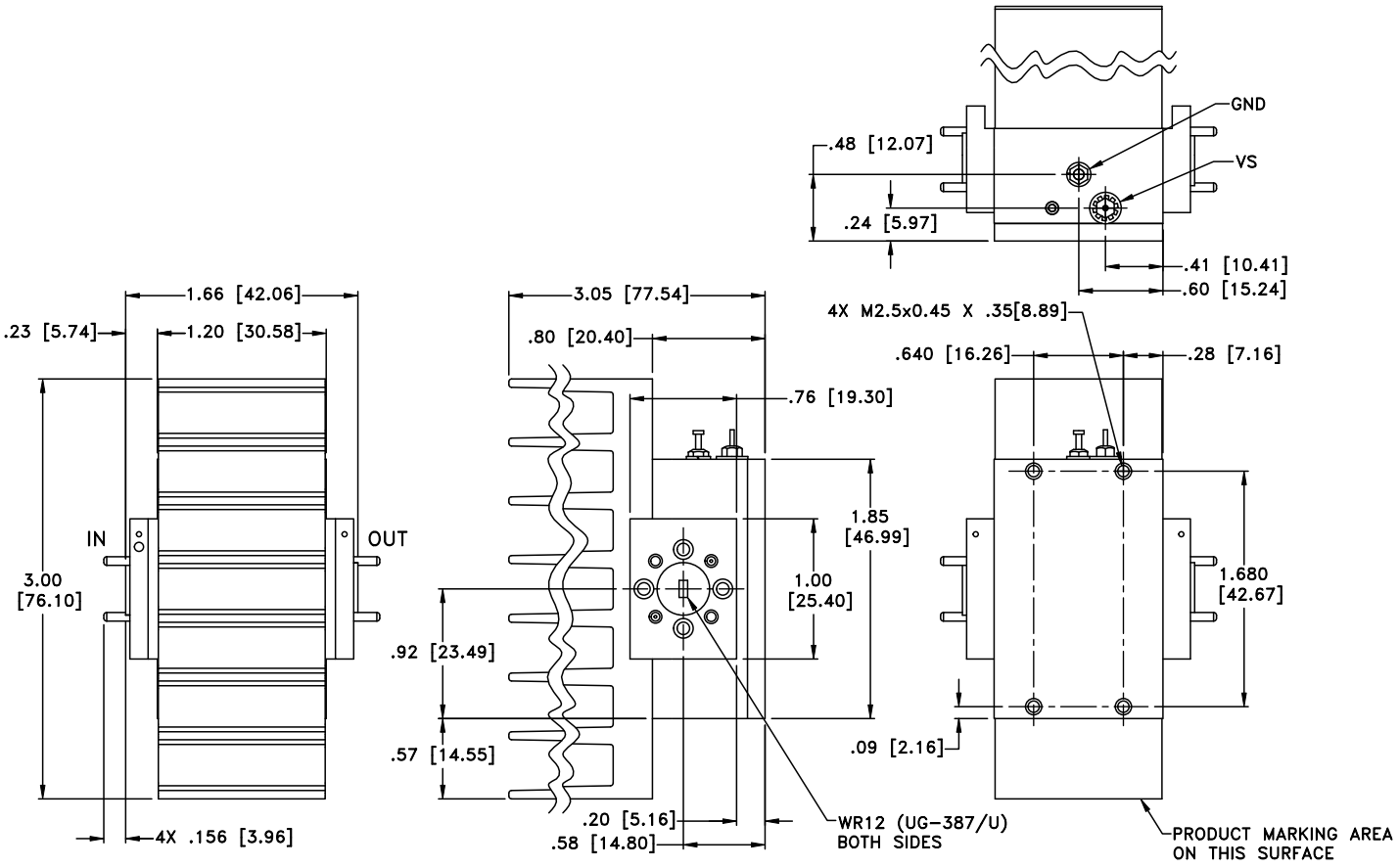




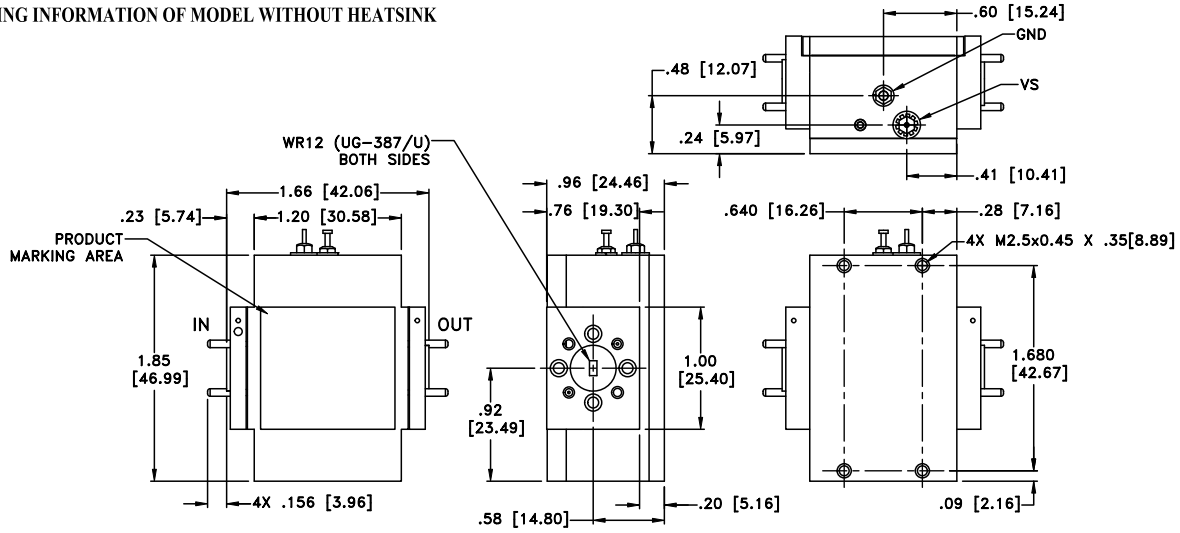


Case Style YS

Outline Dimensions YS3481



MOUNTING INFORMATION OF MODEL WITHOUT HEATSINK



Notes:
1. Case material: Aluminum
2. Case finish: Gold plating
3. Heat sink finish: Black anodize

Weight: 200 grams; Without Heatsink 100 grams

Dimensions are in inches [mm]. Tolerances: 2 PL±.03; 3 PL ±.015 INCHES

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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com
RF/IF MICROWAVE COMPONENTS

Mini-Circuits

Environmental Specifications ENV130

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 +60° C Baseplate Temp	Individual Model Data Sheet
Storage Temperature	-40° to +85° C Ambient Environment	Individual Model Data Sheet
Burn-in	(DC on) 72 hours at 25°C	----
Thermal Shock	-40° C to +85°C, 100 cycles	Transition time = 5 mins, Dwell time = 30 mins
Vibration	Random Vibration (non-operating)	MIL-STD-883K, Method 2025, Cond. 1A

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