



Low Noise Amplifier

WVA-44603LN+ WVA-44603LNX+

44 to 60 GHz NF 2.5 dB WR19 UG383/U

KEY FEATURES

- WR19 Waveguide RF Interface
- Flat Gain Response, ± 2 dB Typ.
- Low Noise Figure, 2.5 dB Typ.
- High P_{SAT} +21 dBm Typ.
- Wide DC Operating Voltage, +10 To +15 V
- Over Voltage And Reverse Voltage Protected

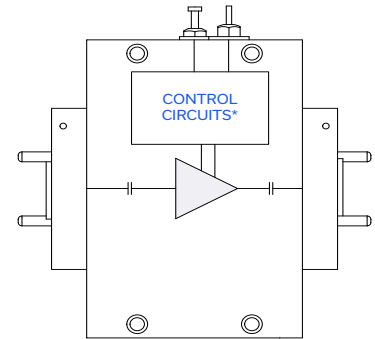


Generic photo used for illustration purposes only

APPLICATIONS

- 5G-FR2 Millimeter Wave Testing
- Aerospace & Defense
- Test and Measurement
- Q-band, V-band SATCOM
- Wireless Infrastructure
- IEEE 802.11.ad WiGig

FUNCTIONAL DIAGRAM



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

PRODUCT OVERVIEW

Mini-Circuits' WVA-44603LN+ is a wideband low noise amplifier, operating from 44 GHz to 60 GHz with a WR19 waveguide interface. 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 consistent 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 low noise figure makes this amplifier an ideal choice for SATCOM applications and 5G testing in millimeter wave bands.

ELECTRICAL SPECIFICATIONS AT +25 °C BASEPLATE

Parameter	Frequency (GHz)	Min.	Typ.	Max.	Units
Frequency Range	-	44	-	60	GHz
Gain	44 - 60	41	46	-	dB
Noise Figure	44 - 60	-	2.5	-	dB
Output Power at 1 dB Compression (P1dB)	44 - 60	-	+19	-	dBm
Output Power at Saturation (P_{SAT}) ¹	44 - 60	-	+21	-	dBm
Output IP3	44 - 60	-	+27	-	dBm
Input Return Loss	44 - 60	-	13	-	dB
Output Return Loss	44 - 60	-	13	-	dB
DC Supply Voltage (Vs)	-	+10	-	+15	V
DC Current at $V_s = +10V$	-	-	275	400 ²	mA

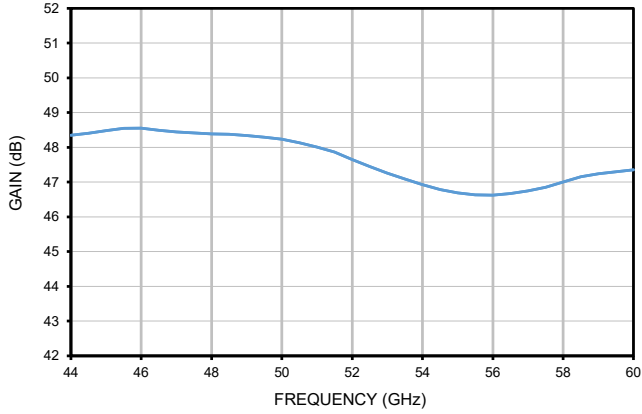
1. 1. At P_{SAT} , P_{OUT} changes less than 0.1 dB for a 1 dB change in P_{IN}

2. Typical current measured under small signal conditions. Max DC current measured at PSAT. DC current increases as amplifier is driven into compression.

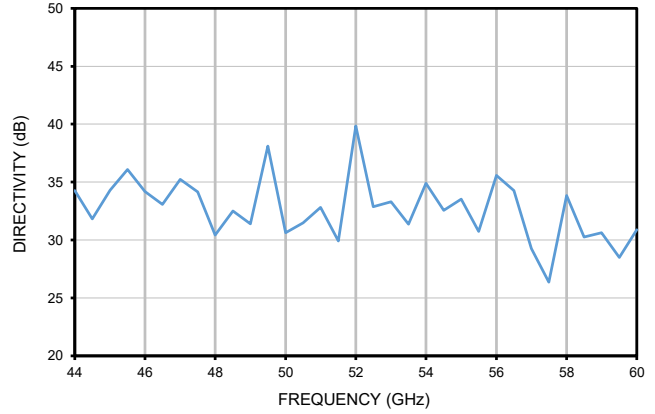


TYPICAL PERFORMANCE GRAPHS

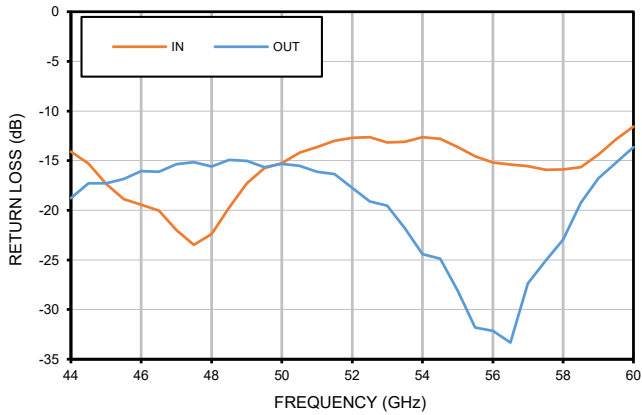
GAIN



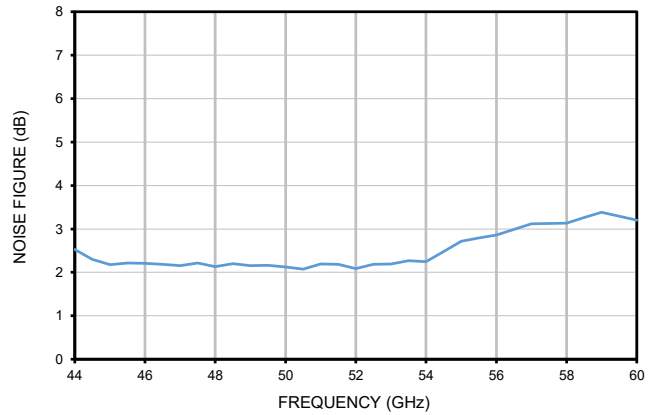
DIRECTIVITY



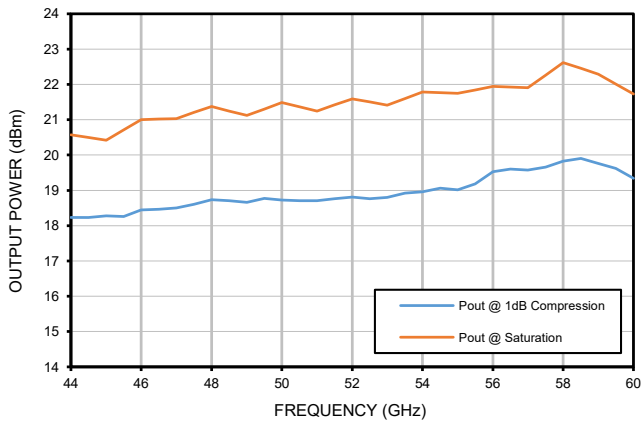
RETURN LOSS



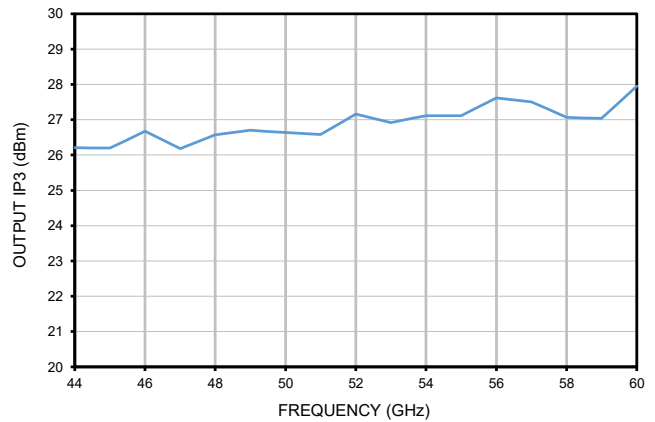
NOISE FIGURE



OUTPUT POWER



OIP3





Low Noise Amplifier

WVA-44603LN+
WVA-44603LNX+

44 to 60 GHz NF 2.5 dB WR19 UG383/U

ABSOLUTE MAXIMUM RATINGS³

Parameter	Ratings
Operating Temperature	WVA-44603LN+ -40 °C to +50 °C Ambient
	WVA-44603LNX+ -40 °C to +60 °C Baseplate
Storage Temperature	-40 °C to +85 °C
Total Power Dissipation	4.5 W
RF Input Power ⁴ (CW)	+15 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.

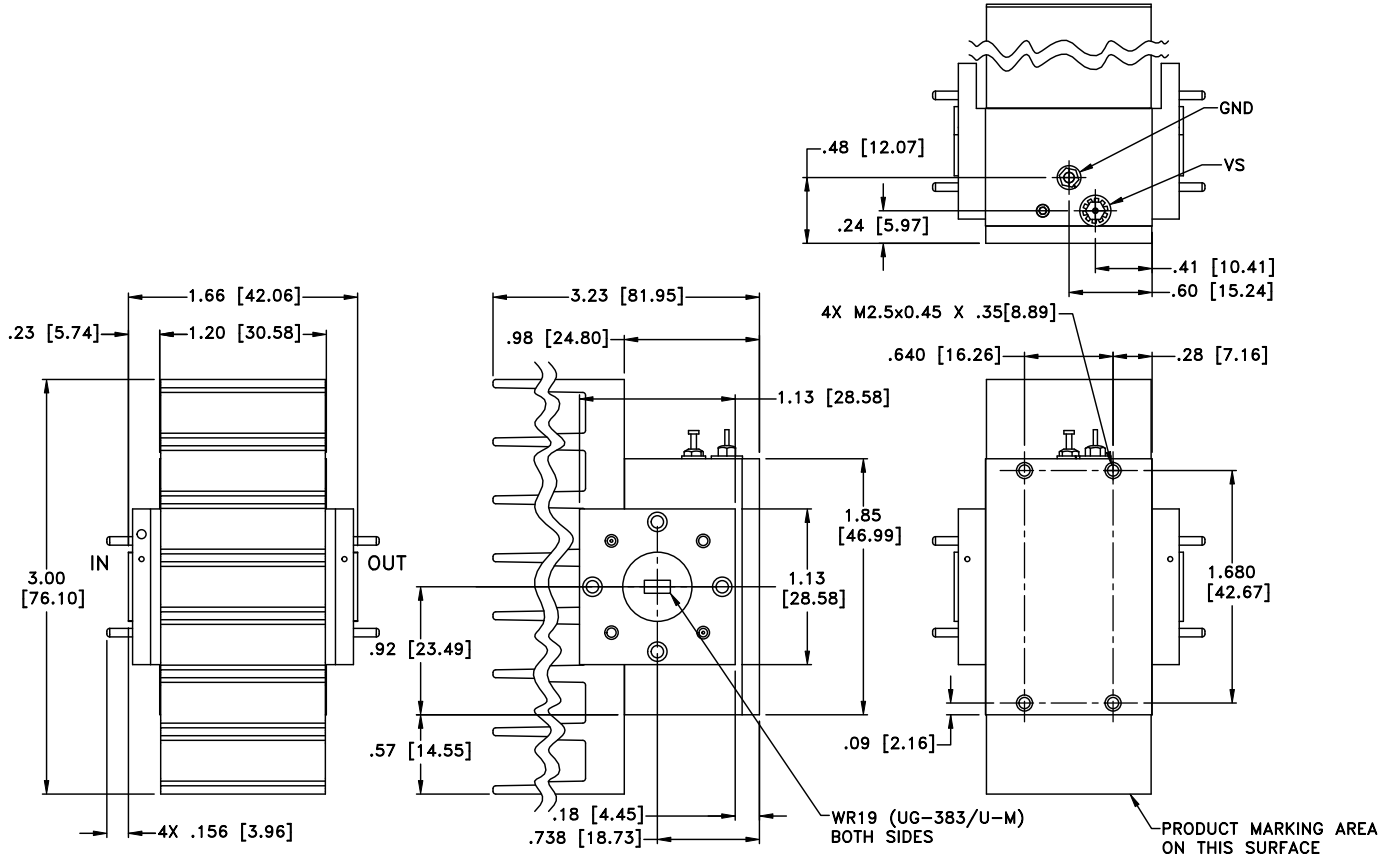
4. Specified under matched WR19 load.

DETERMINING MAXIMUM THERMAL RESISTANCE OF USERS' EXTERNAL HEAT SINK

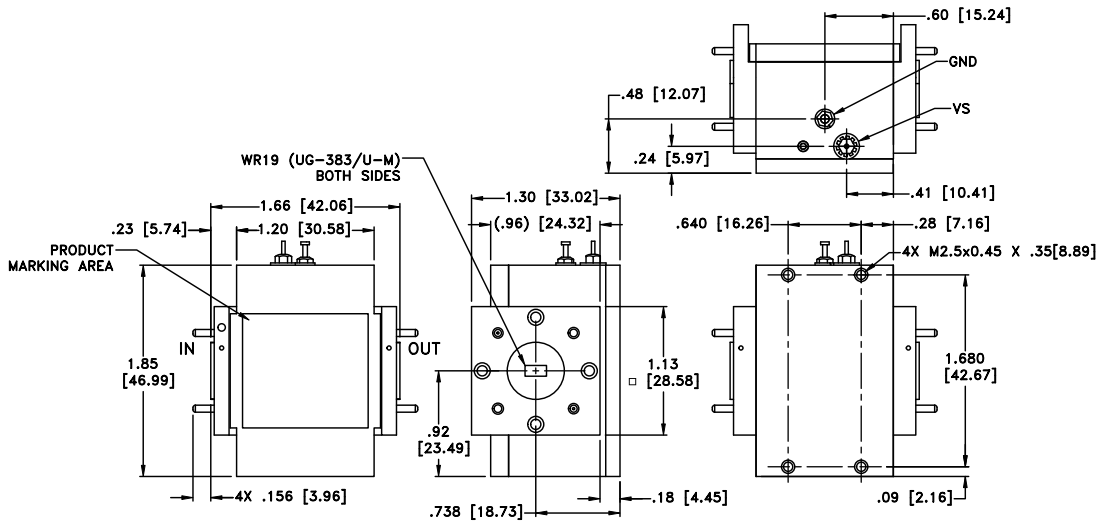
$\text{MAXIMUM THERMAL RESISTANCE} = \frac{\text{MAXIMUM OPERATING CASE TEMP} - \text{MAXIMUM USER AMBIENT TEMP}}{\text{POWER DISSIPATION}}$	
Example:	MAXIMUM OPERATING CASE TEMP = +50 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) MAXIMUM USER AMBIENT TEMP = +30 °C (USER DEFINED) POWER DISSIPATION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



CASE STYLE DRAWING WITH HEATSINK (WVA-44603LN+)



CASE STYLE DRAWING WITHOUT HEATSINK (WVA-44603LNX+)



Weight 200 grams; Without Heatsink 100 grams
Dimensions are in inches [mm]. Tolerances: 2 PL±.03; 3 PL ±.015 inches



Low Noise Amplifier

WVA-44603LN+
WVA-44603LNX+

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	ENV130
Export Information	EAR99

ORDERING INFORMATION

Model No. Links	WVA-44603LN+	WVA-44603LNX+
Option	With heatsink	Without heatsink
Product Marking	WVA-44603LN+	WVA-44603LNX+
Case Style	YS3542	
Connector	WR19 UG383/U	

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

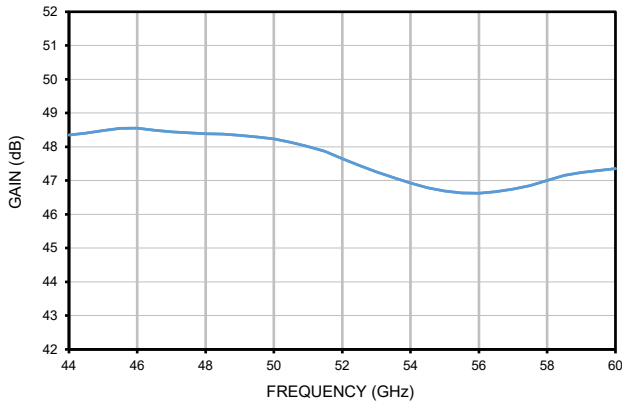
FREQUENCY (GHz)	GAIN (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		Pout @ 1 dB COMPRESSION (dBm)	Pout at SATURATION (dBm)	NOISE FIGURE (dB)	OIP3 (dBm)
			IN	OUT				
44.0	48.35	34.28	14.10	18.77	18.2	20.6	2.5	26.21
44.5	48.41	31.82	15.28	17.29	18.2	20.5	2.3	26.20
45.0	48.48	34.31	17.34	17.27	18.3	20.4	2.2	26.20
45.5	48.55	36.09	18.87	16.86	18.3	20.7	2.2	26.44
46.0	48.55	34.18	19.43	16.05	18.4	21.0	2.2	26.68
46.5	48.49	33.08	20.03	16.12	18.5	21.0	2.2	26.43
47.0	48.44	35.23	21.98	15.35	18.5	21.0	2.2	26.18
47.5	48.42	34.16	23.48	15.15	18.6	21.2	2.2	26.38
48.0	48.39	30.44	22.41	15.58	18.7	21.4	2.1	26.58
48.5	48.37	32.50	19.74	14.93	18.7	21.2	2.2	26.64
49.0	48.34	31.39	17.27	15.03	18.7	21.1	2.2	26.71
49.5	48.29	38.11	15.77	15.67	18.8	21.3	2.2	26.67
50.0	48.23	30.62	15.24	15.31	18.7	21.5	2.1	26.64
50.5	48.13	31.48	14.18	15.54	18.7	21.4	2.1	26.61
51.0	48.01	32.83	13.62	16.13	18.7	21.2	2.2	26.58
51.5	47.86	29.93	13.00	16.34	18.8	21.4	2.2	26.87
52.0	47.65	39.85	12.71	17.75	18.8	21.6	2.1	27.16
52.5	47.45	32.89	12.63	19.10	18.8	21.5	2.2	27.04
53.0	47.26	33.30	13.18	19.53	18.8	21.4	2.2	26.92
53.5	47.09	31.36	13.10	21.81	18.9	21.6	2.3	27.02
54.0	46.93	34.89	12.63	24.42	19.0	21.8	2.2	27.12
54.5	46.79	32.56	12.81	24.89	19.1	21.8	2.5	27.12
55.0	46.69	33.53	13.64	28.11	19.0	21.7	2.7	27.11
55.5	46.64	30.74	14.56	31.82	19.2	21.8	2.8	27.37
56.0	46.63	35.59	15.18	32.14	19.5	21.9	2.9	27.62
56.5	46.67	34.28	15.40	33.32	19.6	21.9	3.0	27.56
57.0	46.75	29.25	15.56	27.36	19.6	21.9	3.1	27.51
57.5	46.85	26.37	15.93	25.09	19.7	22.3	3.1	27.29
58.0	47.01	33.84	15.88	22.96	19.8	22.6	3.1	27.07
58.5	47.15	30.25	15.66	19.24	19.9	22.5	3.3	27.05
59.0	47.24	30.62	14.40	16.78	19.8	22.3	3.4	27.04
59.5	47.30	28.51	12.87	15.22	19.6	22.0	3.3	27.49
60.0	47.36	30.90	11.56	13.64	19.3	21.7	3.2	27.95

WR19 Amplifier

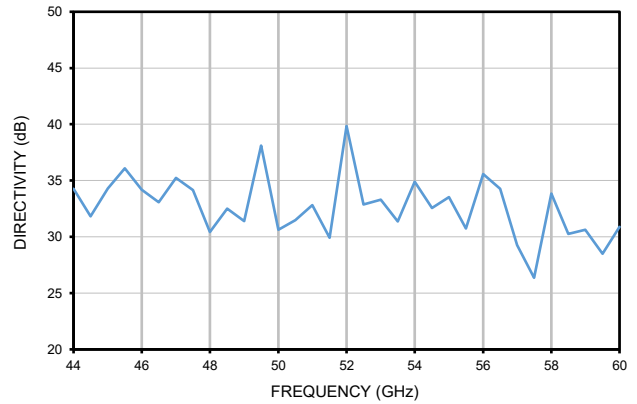
WVA-44603LN(X)+

Typical Performance Curves

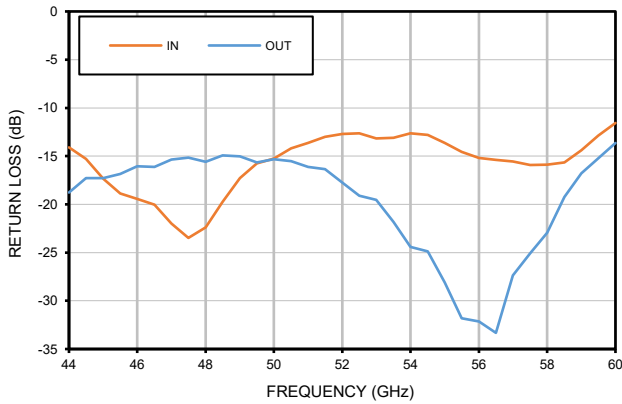
GAIN



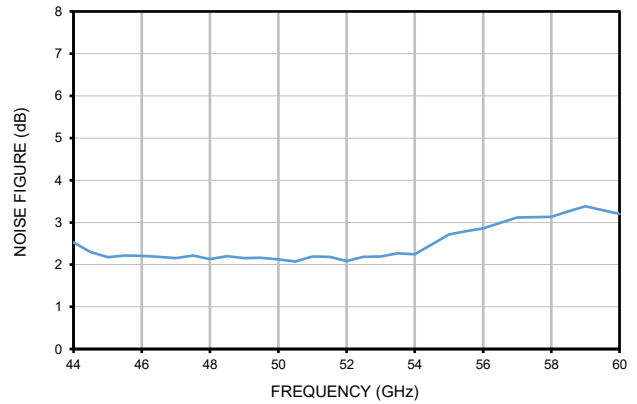
DIRECTIVITY



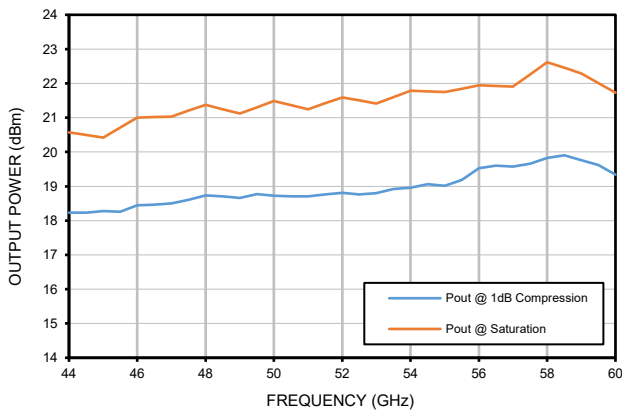
RETURN LOSS



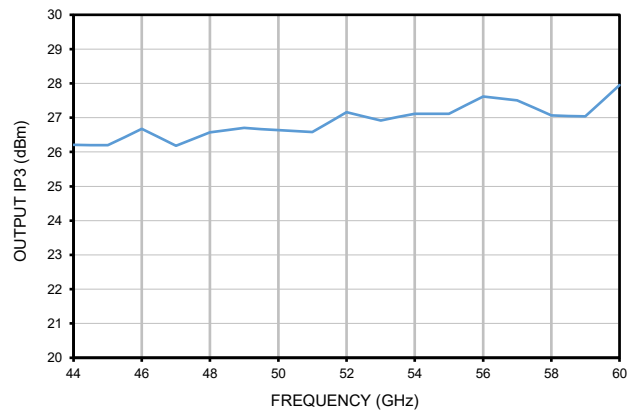
NOISE FIGURE

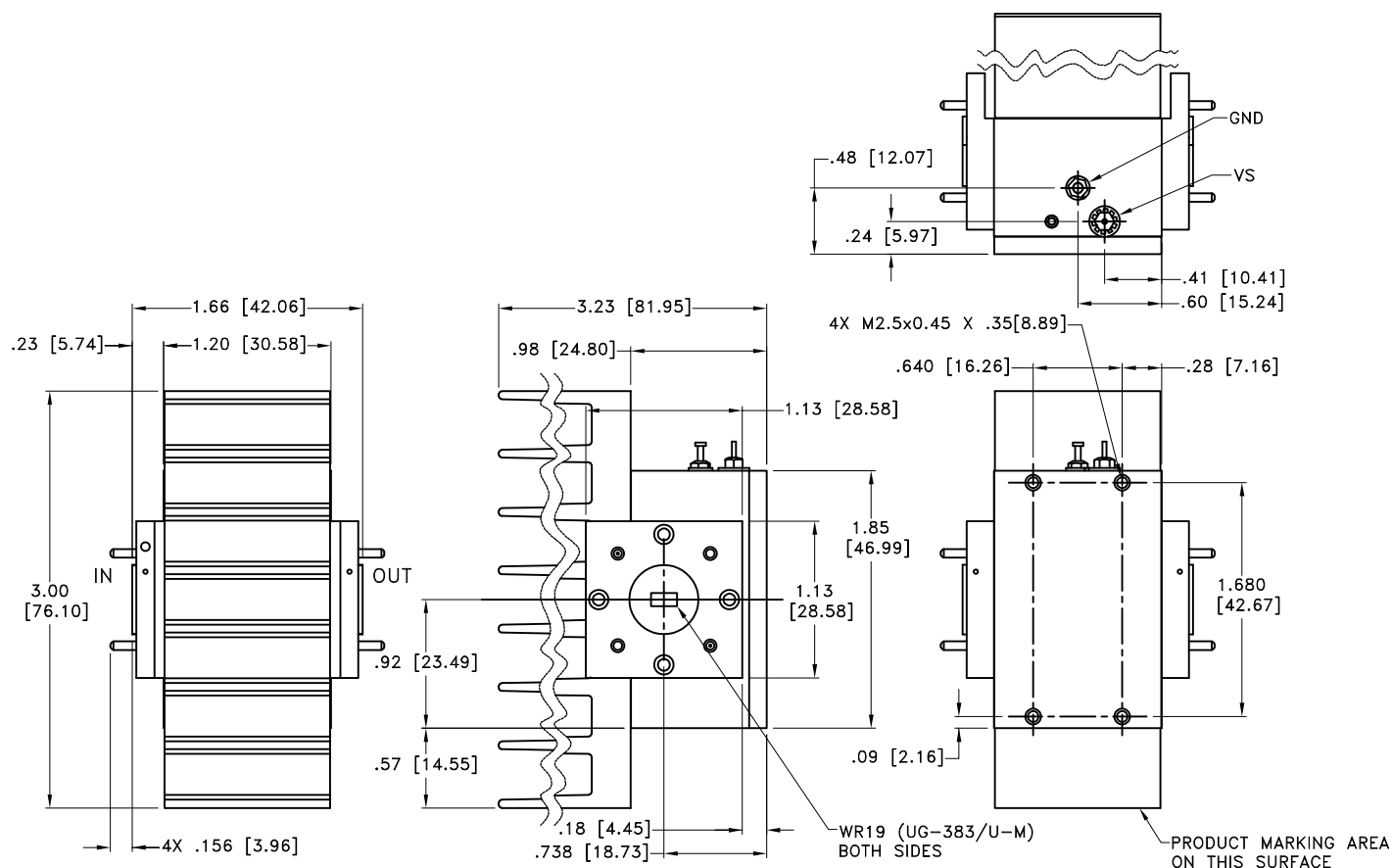


OUTPUT POWER

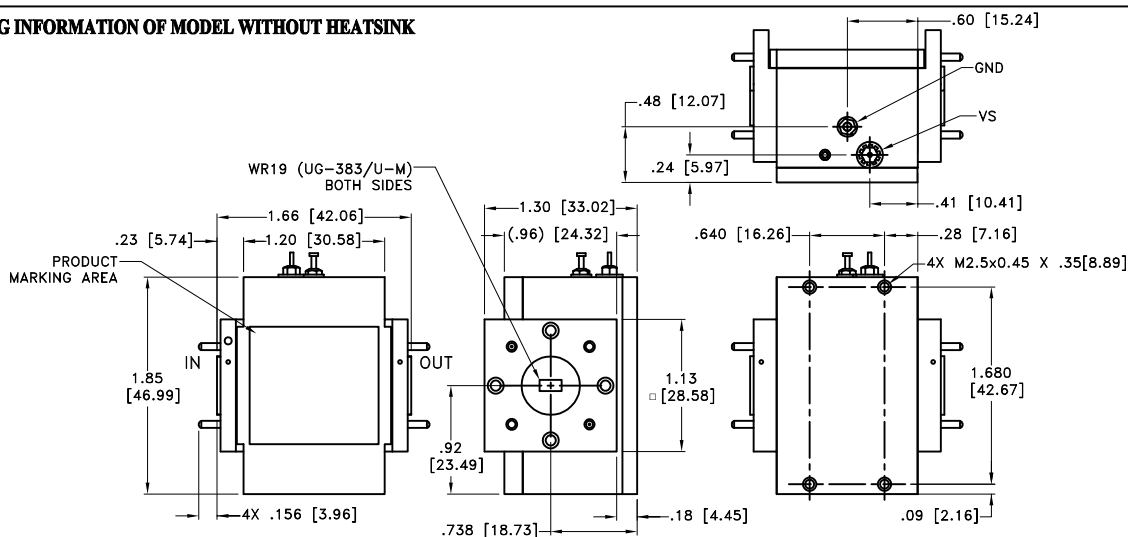


OIP3





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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RFIIF 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	-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