MEDIUM POWER, HIGH GAIN

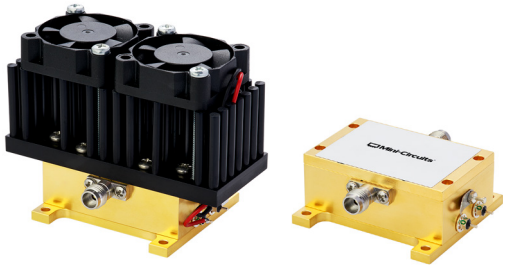
Wideband Amplifier

ZVE-433HP+
ZVE-433HPX+

50Ω 18 to 43.5 GHz 2.92 mm Female

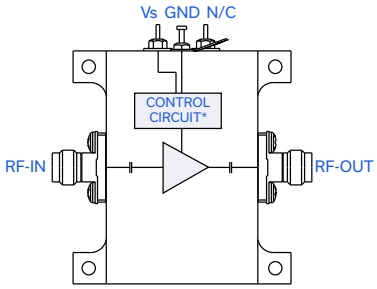
KEY FEATURES

- Wideband Coverage, 18 to 43.5 GHz
- Excellent Gain Flatness, ±2.5 dB Typ.
- Wide Input DC Voltage Range, +10 to +15 V
- Reverse Voltage Protected
- Saturated Output Power, +31 dBm Typ.
- High Directivity, 40 dB Typ.



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM



*Voltage regulation, over-voltage, reverse voltage, and in-rush current protection circuits.

APPLICATIONS

- 5G FR2 Millimeter Wave Testing
- Aerospace and Defense
- Test and Measurement
- Broadband Telecom
- Ka-Band Satcom

PRODUCT OVERVIEW

Mini-Circuits' ZVE-433HP+ is a coaxial, wideband, medium power amplifier, operating from 18 to 43.5 GHz. The model operates over a single 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 limiting, that protect the amplifier from damage if mishandled during operation. The wideband operation combined with high output power makes this amplifier an ideal choice for testing and instrumentation applications.

ELECTRICAL SPECIFICATIONS[1] AT +25 °C BASEPLATE AND V_S = +15 V

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		18		43.5	GHz
Gain	18–30	33	37	–	dB
	30–43.5	35	40	–	
Noise Figure	18–43.5	–	6.0	–	dB
Input Return Loss	18–43.5	–	13.9	10.0	dB
Output Return Loss	18–43.5	–	13.9	10.0	dB
Output Power at 1 dB Compression (P1dB)	18–26	+25.0	+29.0	–	dBm
	26–40	+29.0	+30.5	–	
	40–43.5	+27.5	+30.0	–	
Output Third Order Intercept Point	18–43.5	–	+41.0	–	dBm
DC Supply Voltage (V_S)	–	+10.0	–	+15.0	V
DC Current[2] at V_S = +15 V	–	–	900[3] / 1100[4]	1600[3] / 1800[4]	mA

1. Open and short-circuit loads are not recommended at the amplifier output. Ensure proper 50Ω load before turning the amplifier ON.
2. Typical current measured under small signal conditions. Max DC current measured at P_{SAT}. DC current increases as amplifier is driven into compression.
3. For units without heatsink, limit the maximum baseplate temperature to +60 °C.
4. For units with heatsink, limit ambient temperature to +50 °C.
5. Power supply should be capable of delivering 2.5 A at startup.

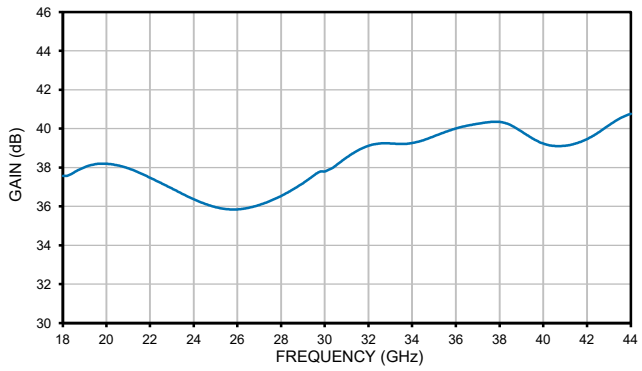
REV. A
ECO-030794
ZVE-433HP(X)+
MCL NY
260821

Wideband Amplifier

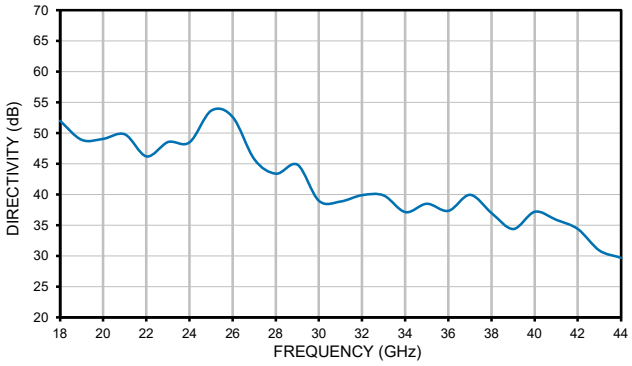
50Ω 18 to 43.5 GHz 2.92 mm Female

TYPICAL PERFORMANCE GRAPHS

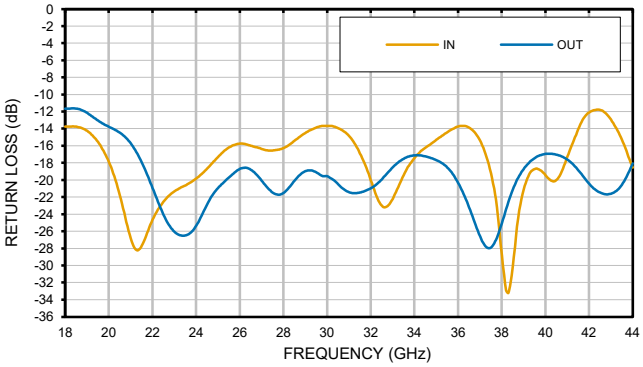
GAIN



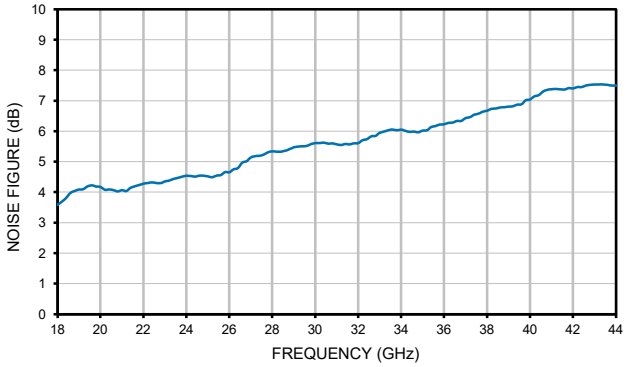
DIRECTIVITY



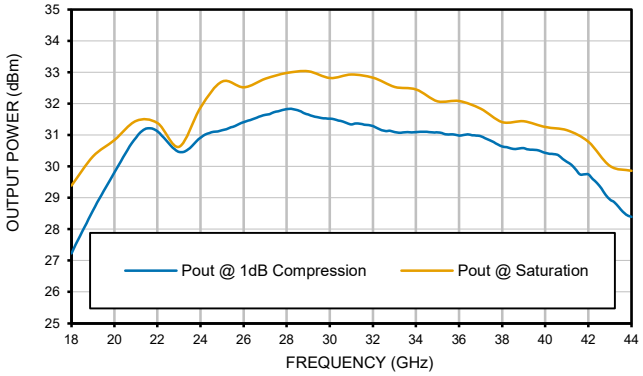
RETURN LOSS



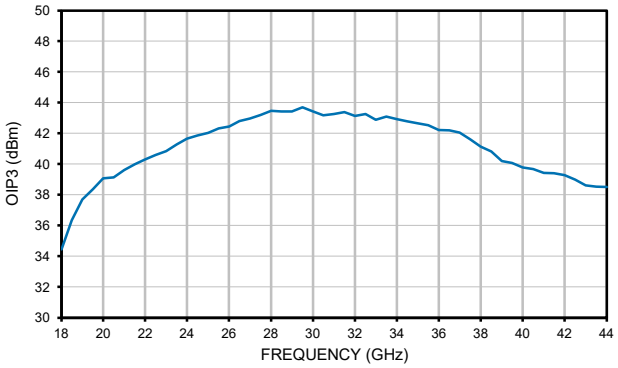
NOISE FIGURE



OUTPUT POWER



OUTPUT IP3



ABSOLUTE MAXIMUM RATINGS[6,7]

Parameter	Ratings
Operating Temperature (Baseplate)	ZVE-433HP+ -40 °C to +50 °C Ambient ZVE-433HPX+ -40 °C to +60 °C Baseplate
Storage Temperature	-40 °C to +85 °C
Total Power Dissipation	24 W
RF Input Power (CW)	+2 dBm
DC Operating Voltage	+16 V

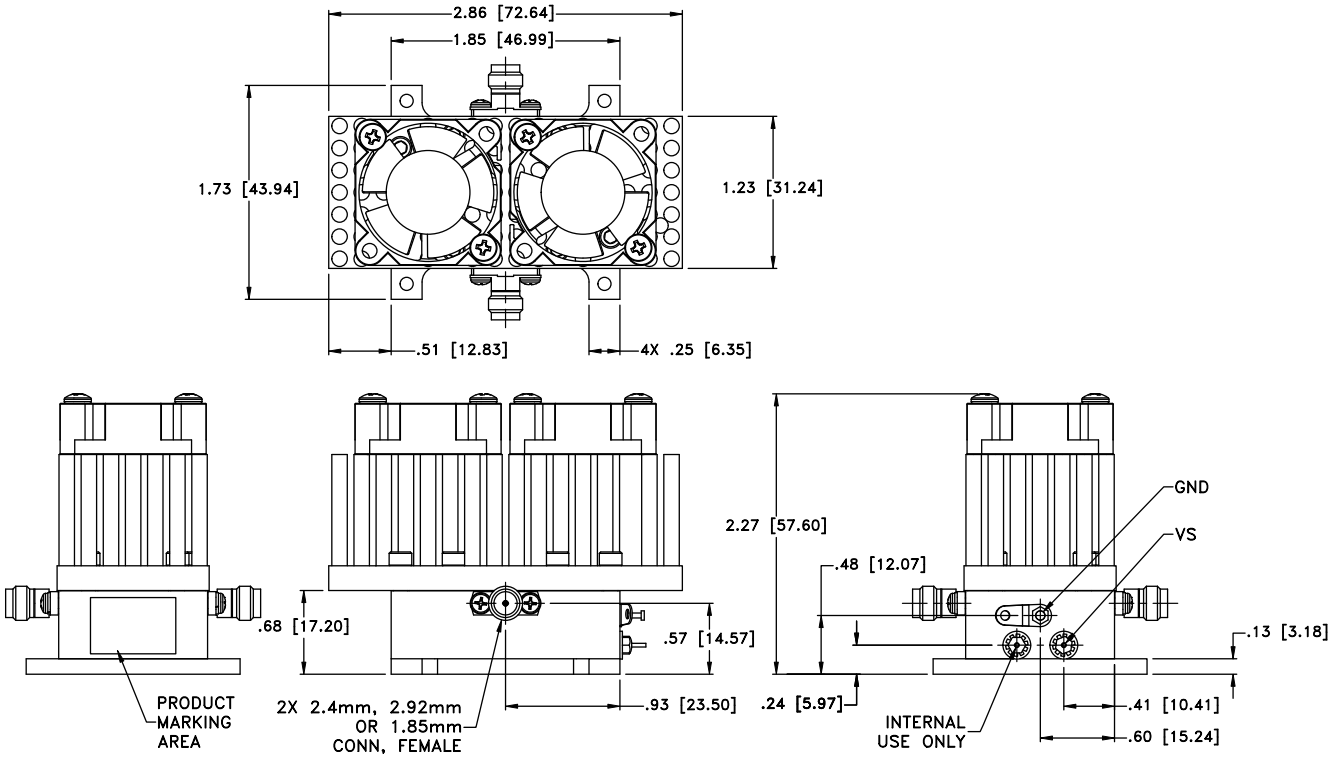
6. Specified under matched load to 50Ω.
7. Continuous operation is not recommended at these extremes. Permanent damage may occur if any of these limits are exceeded.

DETERMINING MAXIMUM THERMAL RESISTANCE OF USERS' EXTERNAL HEATSINK

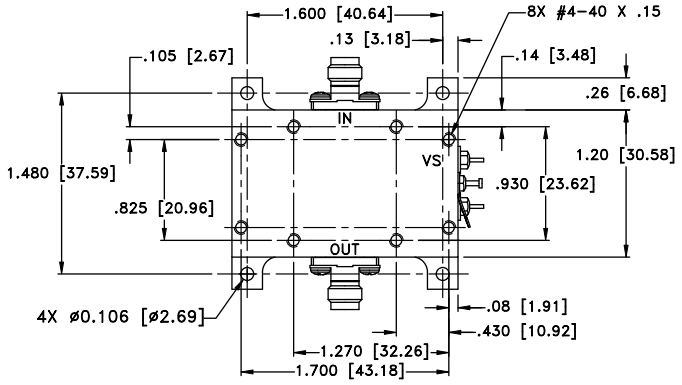
$$\textit{MAXIMUM THERMAL RESISTANCE} = \frac{\textit{MAXIMUM OPERATING BASEPLATE TEMP} - \textit{MAXIMUM USER AMBIENT TEMP}}{\textit{POWER DISSIPATION}}$$

Example:	MAXIMUM OPERATING BASEPLATE 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 FOR MODELS WITH HEATSINK (ZVE-433HP+)



CASE STYLE DRAWING FOR MODELS WITHOUT HEATSINK (ZVE-433HPX+)



Weight: 160 grams; Without Heatsink: 60 grams
Dimensions are in inches [mm]. Tolerances: 2 Pl.±.03; 3Pl.±.015

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	ECCN# 3A001.B.4

ORDERING INFORMATION

Model No. Links	ZVE-433HP+	ZVE-433HPX+
Option	With Heatsink	Without Heatsink
Product Marking	ZVE-433HP+	ZVE-433HPX+
Case Style	VN3071-4	
Connector	2.92 mm Female	

NOTES

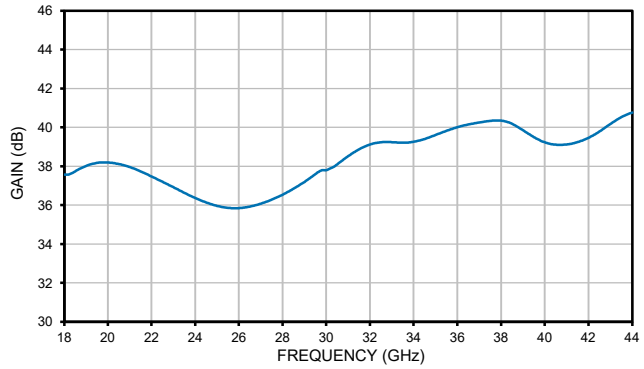
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits'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

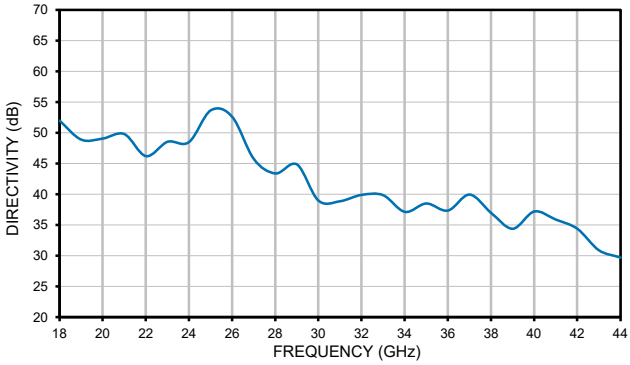
FREQUENCY (GHz)	GAIN (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		Pout @ 1 dB COMPRESSION (dBm)	NOISE FIGURE (dB)	OIP3 dBm
			IN	OUT			
18.0	37.58	52.00	13.75	11.64	27.2	3.6	34.45
19.0	38.02	48.90	14.24	12.12	28.6	3.9	37.69
20.0	38.20	49.07	17.88	13.77	29.8	4.1	38.98
21.0	37.96	49.79	26.81	15.66	30.9	3.9	39.67
22.0	37.48	46.20	24.64	20.91	31.1	4.2	40.39
23.0	36.93	48.54	21.31	26.09	30.5	4.3	41.59
24.0	36.37	48.49	19.81	25.41	30.9	4.7	39.90
25.0	35.97	53.64	17.29	20.89	31.2	4.5	41.21
26.0	35.85	52.64	15.74	18.66	31.4	4.5	42.16
27.0	36.08	45.74	16.36	20.06	31.6	4.9	45.70
28.0	36.55	43.41	16.26	21.57	31.8	5.4	43.17
29.0	37.20	44.86	14.48	18.91	31.7	5.6	44.08
30.0	37.80	38.96	13.66	19.67	31.5	5.5	45.18
31.0	38.53	38.85	14.84	21.56	31.3	5.7	43.60
32.0	39.13	39.91	20.01	20.64	31.3	5.5	41.31
33.0	39.24	39.85	22.18	18.01	31.1	5.7	45.94
34.0	39.27	37.13	17.41	17.08	31.1	6.2	41.22
35.0	39.62	38.53	15.29	17.90	31.1	5.7	44.17
36.0	40.02	37.33	13.73	21.32	31.0	6.2	44.93
37.0	40.26	39.97	15.37	27.72	31.0	6.3	44.62
38.0	40.35	37.00	28.78	23.33	30.6	6.6	42.60
39.0	39.86	34.40	21.13	18.06	30.6	6.8	40.67
40.0	39.23	37.19	19.43	16.89	30.4	6.8	42.00
41.0	39.13	35.91	17.28	17.98	30.2	7.4	38.56
42.0	39.47	34.40	12.08	21.00	29.7	7.5	36.91
43.0	40.18	30.90	12.94	21.39	28.9	7.5	38.71
44.0	40.77	29.72	18.52	16.87	28.4	7.5	40.05

Typical Performance Curves

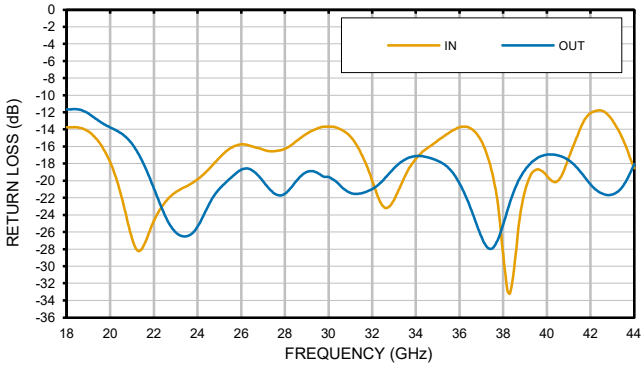
GAIN



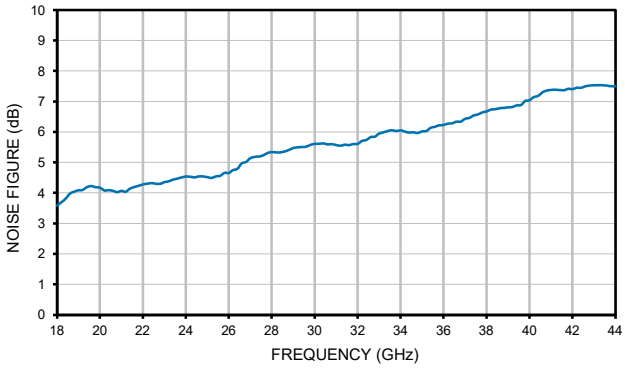
DIRECTIVITY



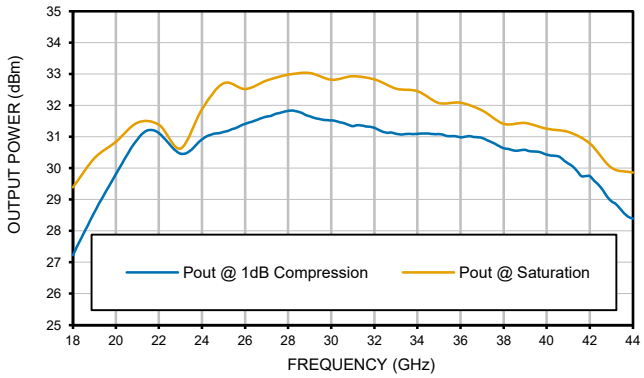
RETURN LOSS



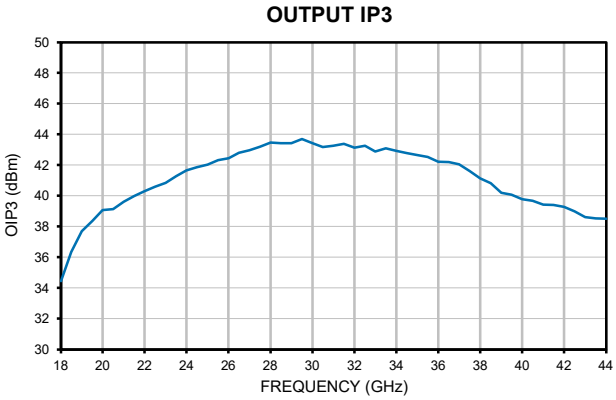
NOISE FIGURE



OUTPUT POWER

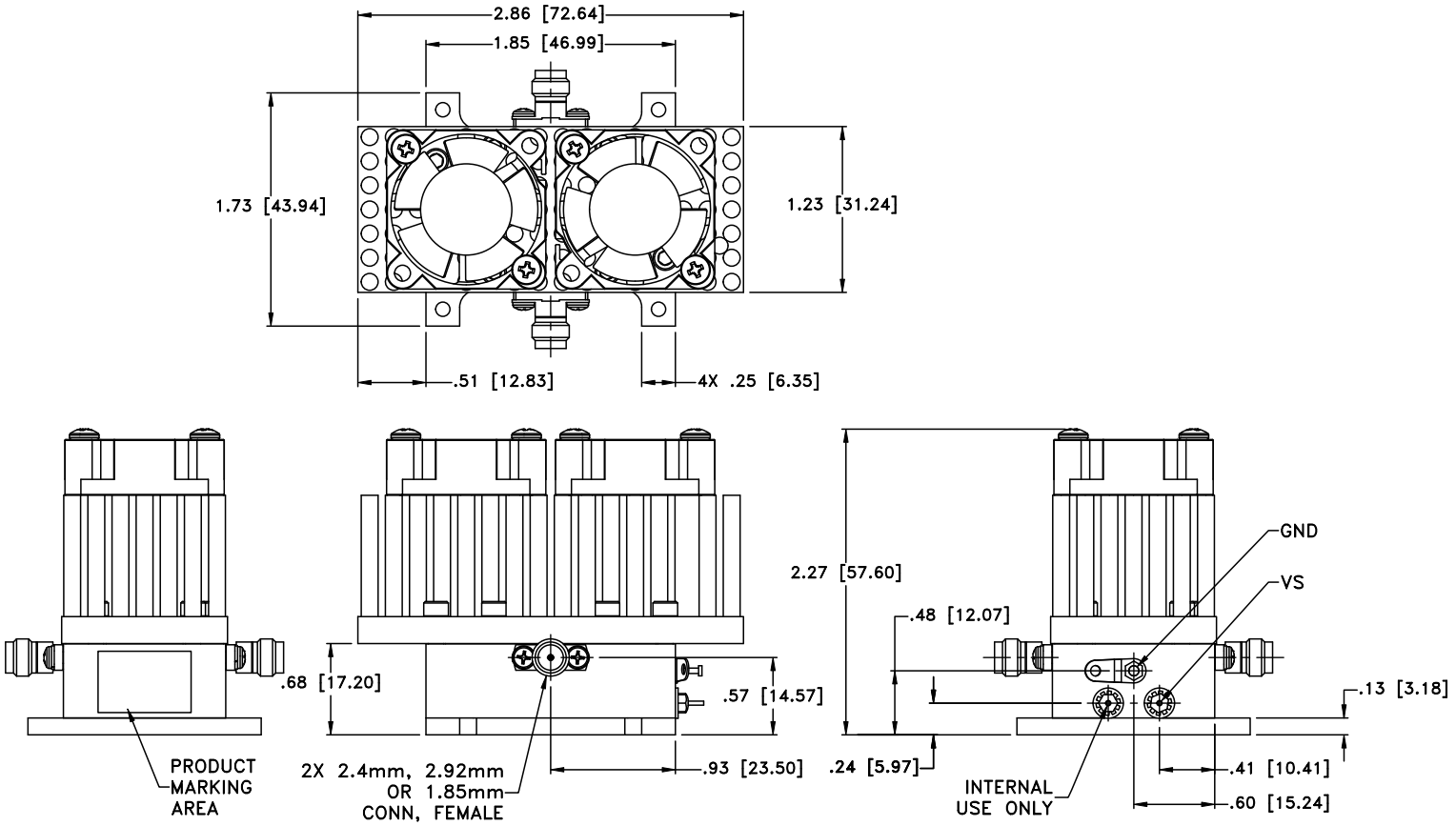


OUTPUT IP3

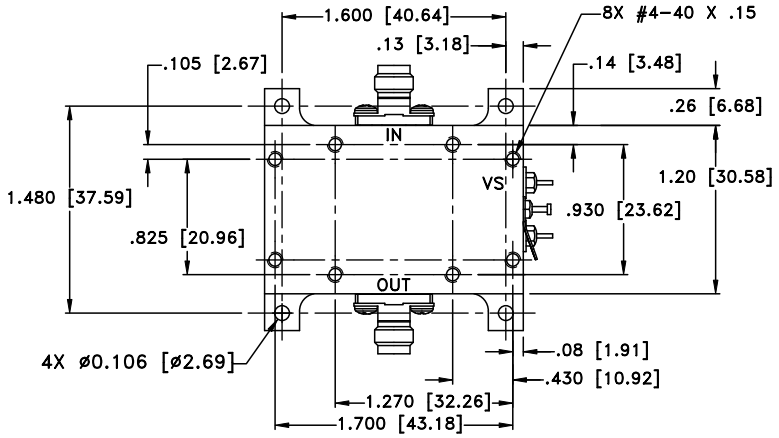


Case Style VN

Outline Dimensions VN3071-4



MOUNTING INFORMATION OF MODEL WITHOUT HEATSINK



WT. WT. GRAMS 160 grams; WITHOUT HEATSINK GRAMS 60 grams

Dimensions are in inches (mm). Tolerances: 2 Pl.Ñ03; 3 Pl. Ñ015

Notes:
1. Case material: Aluminum.
2. Case finish: Gold plating;
3. Heat sink finish: Black anodize.
4. Refer to the individual model data sheet for the type of connectors available.
5. Shape of connector flange may vary.

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RF/IF MICROWAVE COMPONENTS

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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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