MEDIUM POWER, HIGH GAIN

Wideband Amplifier

ZVA-543HP+
ZVA-543HPX+

50Ω 18 to 54 GHz 1.85 mm Female

THE BIG DEAL

- High Gain, 31 dB Typ. Over the Entire Operating Band
- Good Gain Flatness, ±2.0 dB Typ.
- +29 dBm P_{SAT} Typ.
- Adjustable DC Voltage, +10 to +15 V
- DC Protected Against Over-Voltage, Reverse Voltage Conditions

Generic photo used for illustration purposes only

Model No.	ZVA-543HP+	ZVA-543HPX+
Option	With Heatsink & Fan	Without Heatsink & Fan
Case Style	VN3071-4	
Connector	1.85 mm female	

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

APPLICATIONS

- Wideband Test and Instrumentation
- 5G mmW
- SATCOM
- Wireless Infrastructure

PRODUCT OVERVIEW

Mini-Circuits' ZVA-543HP(X)+ is a coaxial, medium power, wideband high gain amplifier, operating from 18 to 54 GHz. This model operates over a single 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, 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.

KEY FEATURES

Features	Advantages
Wideband Amplifier, 18 to 54 GHz	A single amplifier serves the need for applications including 5G bands (24 to 54 GHz), SATCOM, Test & Instrumentation, etc.
Integrated Fan Assembly	Model ZVA-543HP+ utilizes two integrated fans, keeping the amplifier cool to the touch during normal operation at room temperature.
High Gain Low VSWR Medium RF Power	The amplifier provides 31 dB (typ.) of gain over the entire operating band, and is capable of delivering over 1 Watt of RF power.
Adjustable DC Supply Voltage	The device is capable of operating from +10 to +15 V with consistent DC power consumption.
DC Protection – Over-Voltage Reverse Voltage In-Rush Current	The internal DC circuitry protects the amplifier from external mishandling that could lead to catastrophic failures in the field.

REV. OR
ECO-014881
ZVA-543HP(X)+
MCL NY
260323

ELECTRICAL SPECIFICATIONS AT +25 °C BASEPLATE

Parameter	Condition (GHz)	ZVA-543HP+ ZVA-543HPX+ Min.	Typ.	Max.	Units
Frequency Range		18		54	GHz
Gain	18-20		29.0		dB
	20-40	29.0	33.0		
	40-54	28.0	31.0		
Output Power at 1 dB Compression	18-20		+27.0		dBm
	20-40	+27.0	+30.0		
	40-54	+24.5	+27.5		
Saturated Output Power	18-20		+28.0		dBm
	20-40	+28.0	+31.0		
	40-54	+26.0	+28.5		
Output IP3 (Output Power = +14 dBm/Tone)	18-54		+37.0		dBm
Input VSWR	18-54		1.5	2.0	:1
Output VSWR	18-54		1.5	2.0	:1
Noise Figure	18-50		6.5		dB
Operating DC Voltage		+10		+15	V
Device Operating Current[1] at +10 V			1500 / 1650	2400 / 2550	mA

1. Typical current measured under small signal conditions. Max. DC current measured at P_{SAT}. DC current increases as amplifier is driven into compression.

ABSOLUTE MAXIMUM RATINGS[2,3]

Parameter	Ratings
Operating Temperature	ZVA-543HP+ -40 °C to +50 °C Ambient ZVA-543HPX+ -40 °C to +60 °C Baseplate
Storage Temperature	-40 °C to +85 °C
Total Power Dissipation	22.5 W
RF Input Power (CW)	+5 dBm
DC Operating Voltage	+16 V

2. Specified under matched load to 50Ω. Open or Short at amplifier output while it is connected to power may cause damage to the unit.
3. 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

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

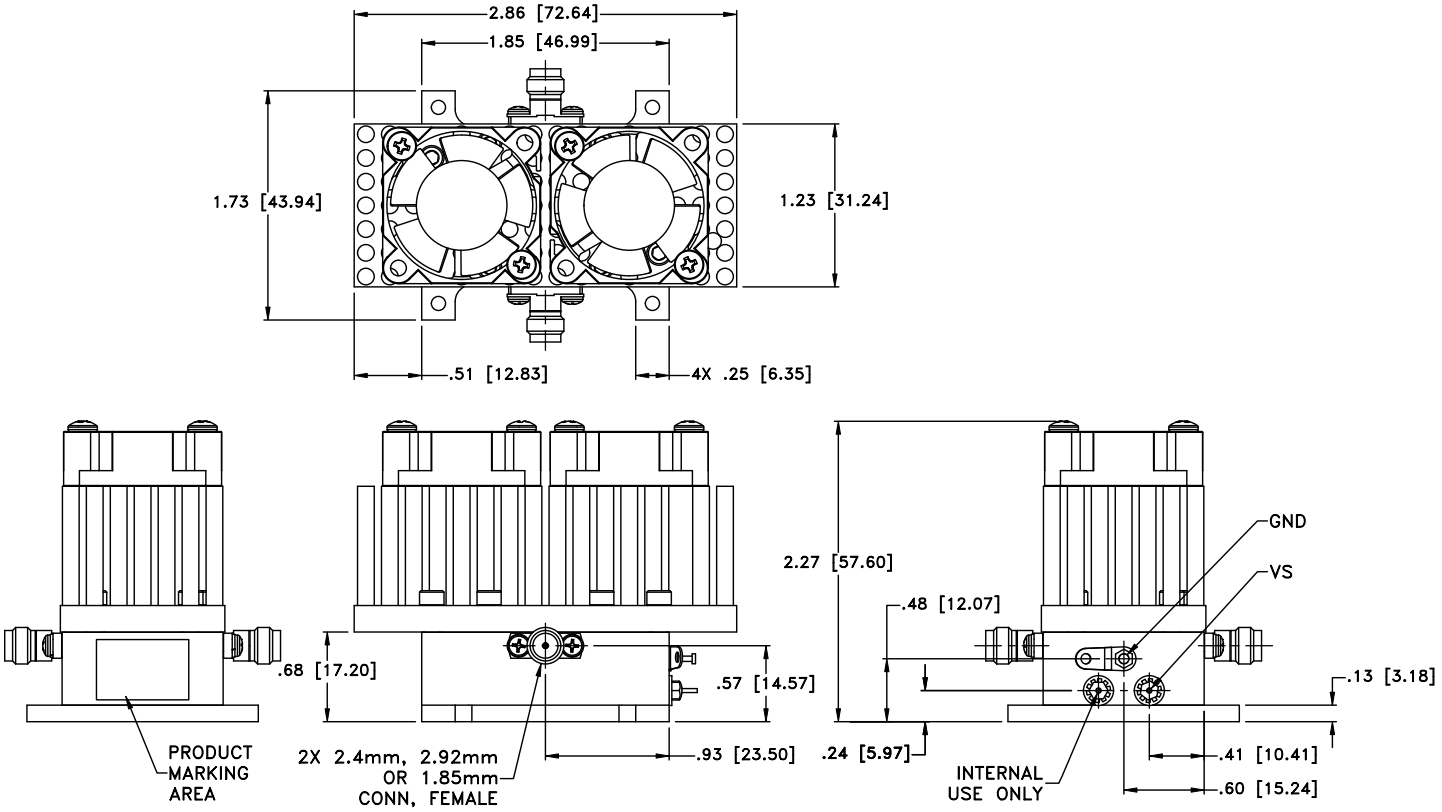
Example:	MAXIMUM OPERATING CASE TEMP = +50 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) MAXIMUM USER AMBIENT TEMP = +30 °C (USER DEFINED) POWER DISSIPATION = 10 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 2 °C/W

Wideband Amplifier

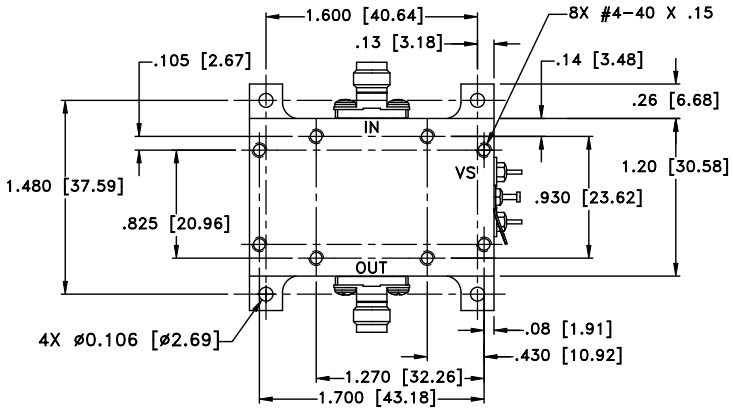
ZVA-543HP+
ZVA-543HPX+

50Ω 18 to 54 GHz 1.85 mm Female

OUTLINE DRAWING FOR MODELS WITH HEATSINK (ZVA-543HP+)



MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK (ZVA-543HPX+)



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

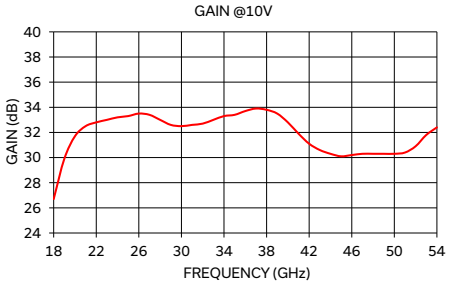
Wideband Amplifier

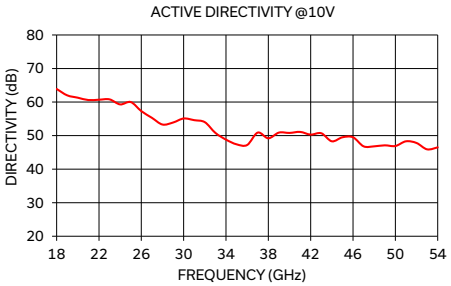
ZVA-543HP+
ZVA-543HPX+

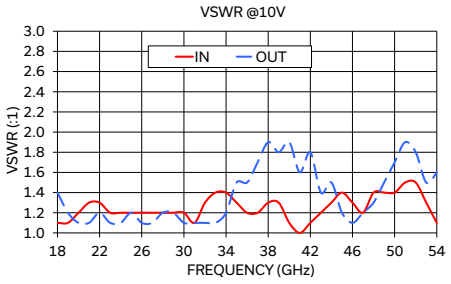
50Ω 18 to 54 GHz 1.85 mm Female

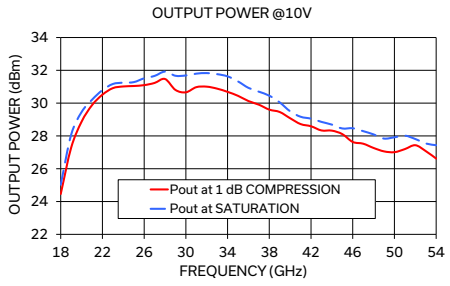
TYPICAL PERFORMANCE DATA/GRAPHS

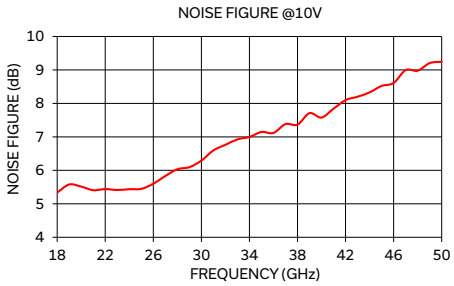
Frequency (GHz)	Gain (dB)	Active Directivity (dB)	VSWR (:1)		P_{OUT} at 1 dB Compression (dBm)	P_{OUT} at Saturation (dBm)	Output IP3 (dBm)	Noise Figure (dB)
			+10 V					
	+10 V	+10 V	IN	OUT	+10 V	+10 V	+10 V	+10 V
18	26.7	63.9	1.1	1.4	24.5	25.0	27.4	5.3
20	31.7	61.3	1.2	1.1	28.9	29.5	32.2	5.5
22	32.8	60.7	1.3	1.2	30.5	30.8	34.6	5.4
24	33.2	59.3	1.2	1.1	31.0	31.2	35.6	5.4
26	33.5	57.3	1.2	1.1	31.1	31.5	36.0	5.6
28	33.0	53.3	1.2	1.2	31.5	31.9	37.2	6.0
30	32.5	55.1	1.2	1.1	30.7	31.7	36.0	6.3
32	32.7	54.0	1.3	1.1	31.0	31.8	37.0	6.8
34	33.3	48.8	1.4	1.2	30.7	31.6	36.9	7.0
36	33.7	47.2	1.2	1.5	30.1	30.9	35.7	7.1
38	33.8	49.2	1.3	1.9	29.6	30.5	35.9	7.4
40	32.8	50.8	1.1	1.9	29.1	29.5	38.2	7.6
42	31.1	50.3	1.1	1.8	28.6	29.1	36.4	8.1
44	30.3	48.3	1.3	1.5	28.3	28.7	37.7	8.3
46	30.2	49.5	1.3	1.1	27.6	28.5	37.1	8.6
48	30.3	46.8	1.4	1.3	27.3	28.1	35.2	9.0
50	30.3	46.9	1.4	1.7	27.0	27.9	34.1	9.2
52	30.9	47.8	1.5	1.8	27.4	27.8	33.8	
54	32.4	46.5	1.1	1.6	26.6	27.4	35.1	

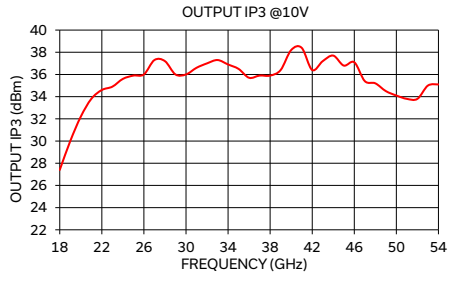












NOTES

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

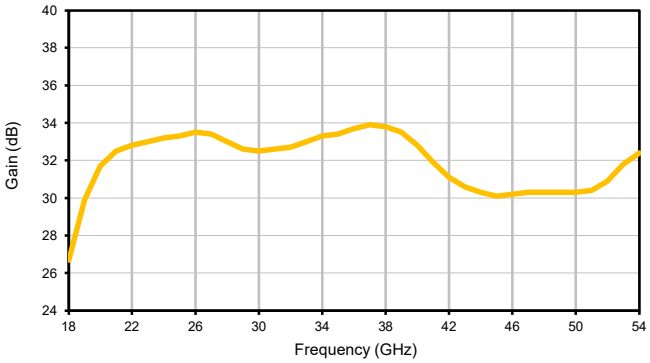
Coaxial Amplifier ZVA-543HP(X)+

Typical Performance Data

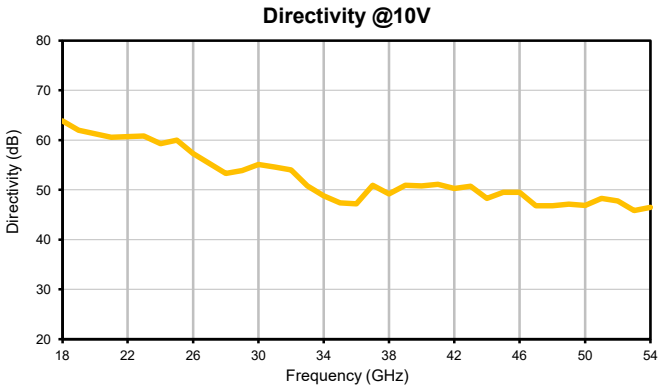
FREQUENCY (GHz)	GAIN (dB) 10V	DIRECTIVITY (dB) 10V	VSWR (:1) IN 10V	VSWR (:1) OUT 10V	OIP3 (dBm) 10V	Pout @ 1 dB COMPRESSION (dBm) 10V	Pout at SATURATION (dBm) 10V	Noise Figure (dB) 10V
18.0	26.7	63.9	1.1	1.4	27.4	24.5	25.0	5.3
19.0	29.9	62.0	1.1	1.2	30.0	27.3	28.1	5.6
20.0	31.7	61.3	1.2	1.1	32.2	28.9	29.5	5.5
21.0	32.5	60.6	1.3	1.1	33.8	29.9	30.2	5.4
22.0	32.8	60.7	1.3	1.2	34.6	30.5	30.8	5.4
23.0	33.0	60.8	1.2	1.1	34.9	30.9	31.2	5.4
24.0	33.2	59.3	1.2	1.1	35.6	31.0	31.2	5.4
25.0	33.3	60.0	1.2	1.2	35.9	31.0	31.3	5.4
26.0	33.5	57.3	1.2	1.1	36.0	31.1	31.5	5.6
27.0	33.4	55.3	1.2	1.1	37.3	31.2	31.7	5.8
28.0	33.0	53.3	1.2	1.2	37.2	31.5	31.9	6.0
29.0	32.6	53.9	1.2	1.2	36.0	30.8	31.7	6.1
30.0	32.5	55.1	1.2	1.1	36.0	30.7	31.7	6.3
31.0	32.6	54.6	1.1	1.1	36.6	31.0	31.8	6.6
32.0	32.7	54.0	1.3	1.1	37.0	31.0	31.8	6.8
33.0	33.0	50.8	1.4	1.1	37.3	30.9	31.8	6.9
34.0	33.3	48.8	1.4	1.2	36.9	30.7	31.6	7.0
35.0	33.4	47.4	1.3	1.5	36.5	30.4	31.3	7.1
36.0	33.7	47.2	1.2	1.5	35.7	30.1	30.9	7.1
37.0	33.9	50.9	1.2	1.7	35.9	29.9	30.7	7.4
38.0	33.8	49.2	1.3	1.9	35.9	29.6	30.5	7.4
39.0	33.5	50.9	1.3	1.8	36.4	29.5	30.0	7.7
40.0	32.8	50.8	1.1	1.9	38.2	29.1	29.5	7.6
41.0	31.9	51.1	1.0	1.6	38.4	28.7	29.2	7.8
42.0	31.1	50.3	1.1	1.8	36.4	28.6	29.1	8.1
43.0	30.6	50.7	1.2	1.4	37.2	28.3	28.9	8.2
44.0	30.3	48.3	1.3	1.5	37.7	28.3	28.7	8.3
45.0	30.1	49.5	1.4	1.2	36.8	28.1	28.5	8.5
46.0	30.2	49.5	1.3	1.1	37.1	27.6	28.5	8.6
47.0	30.3	46.8	1.2	1.2	35.4	27.5	28.3	9.0
48.0	30.3	46.8	1.4	1.3	35.2	27.3	28.1	9.0
49.0	30.3	47.1	1.4	1.5	34.5	27.1	27.8	9.2
50.0	30.3	46.9	1.4	1.7	34.1	27.0	27.9	9.2
51.0	30.4	48.3	1.5	1.9	33.8	27.2	28.0	-
52.0	30.9	47.8	1.5	1.8	33.8	27.4	27.8	-
53.0	31.8	45.9	1.3	1.5	35.0	27.1	27.5	-
54.0	32.4	46.5	1.1	1.6	35.1	26.6	27.4	-

Typical Performance Curves

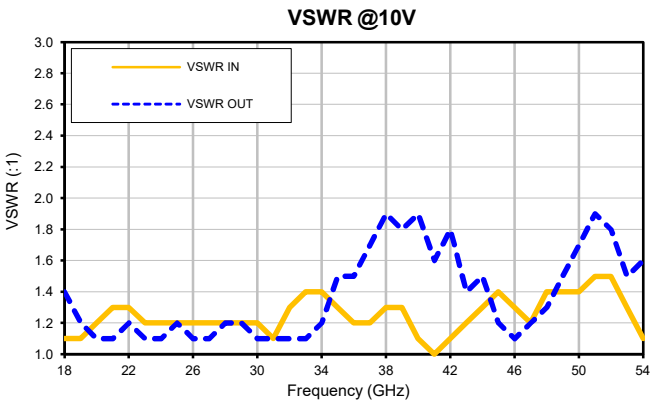
GAIN @10V



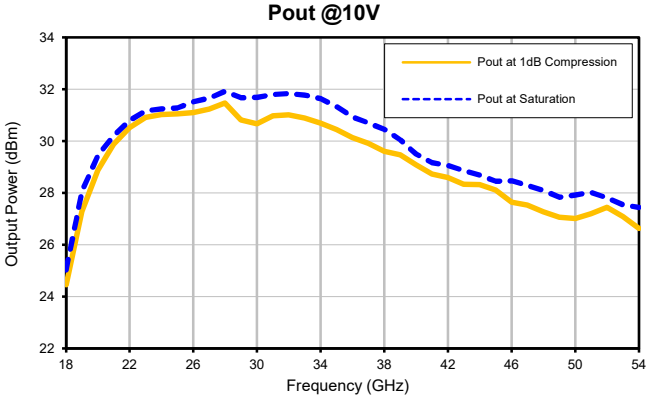
Directivity @10V



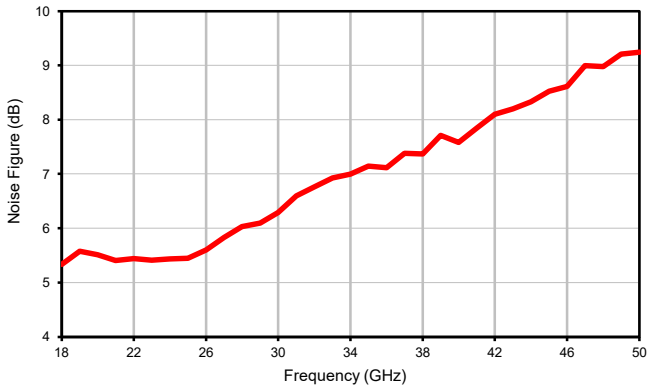
VSWR @10V



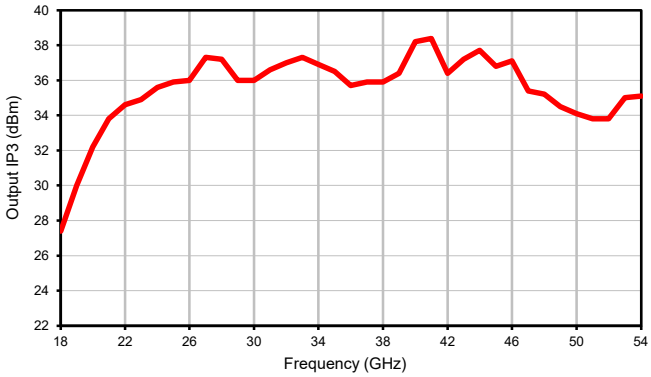
Pout @10V



Noise Figure @ 10V

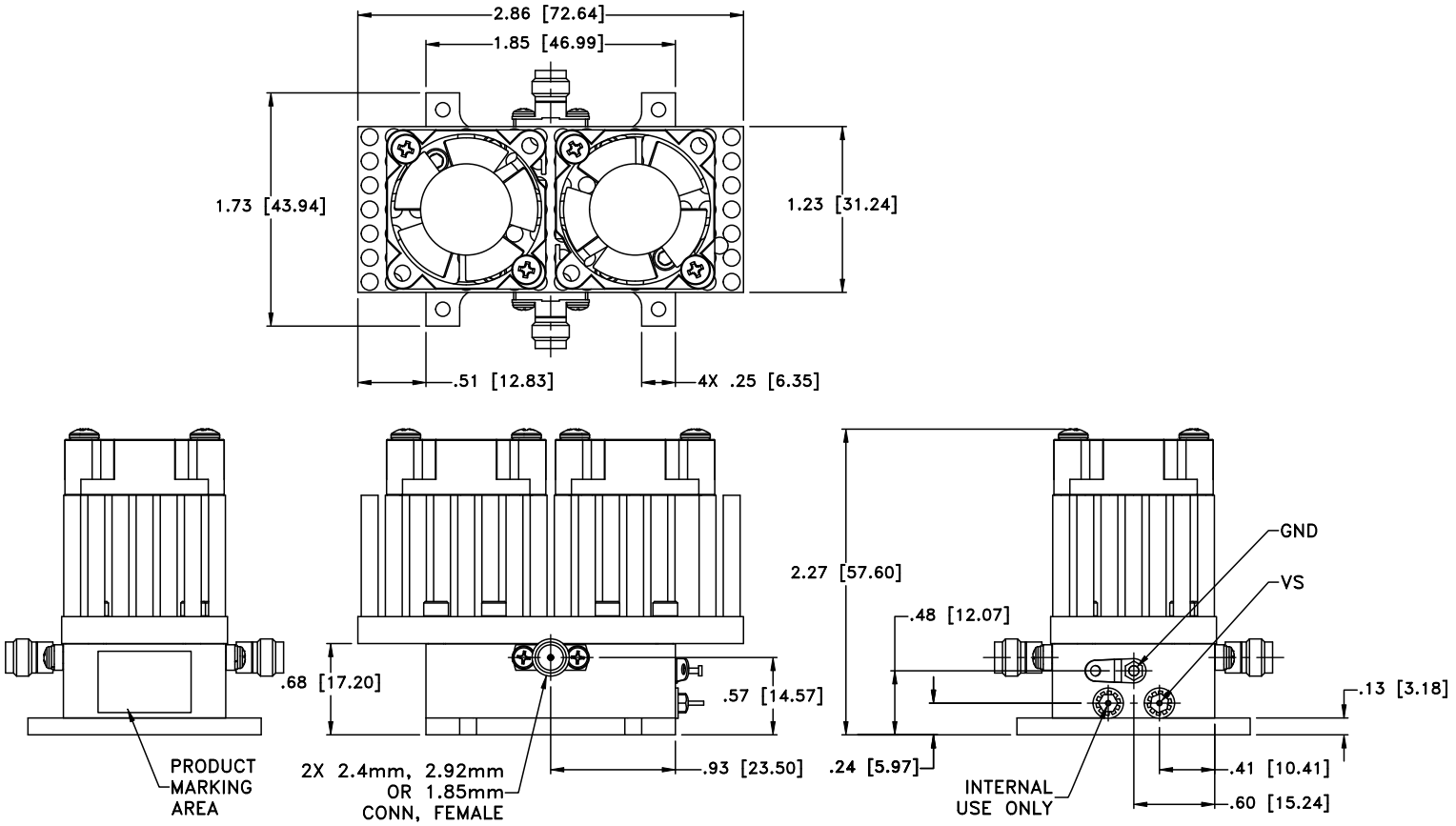


Output IP3 @ 10V

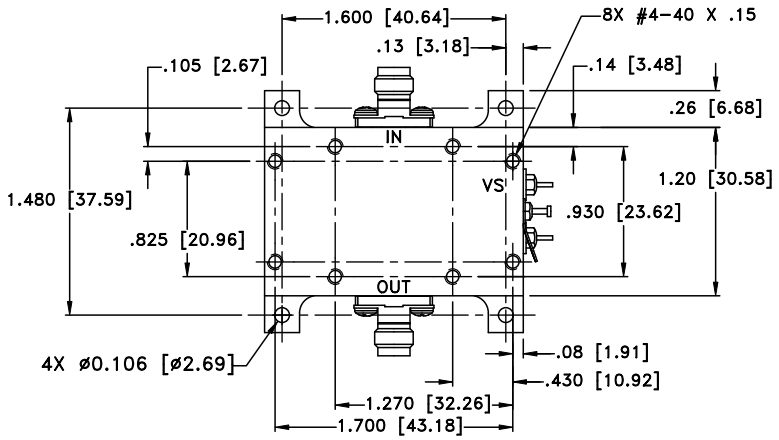


Outline Dimensions

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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