MEDIUM POWER, HIGH GAIN

Wideband Amplifier

ZVA-543+
ZVA-543X+

50Ω 18 to 54 GHz 0.5 W 1.85 mm Female

THE BIG DEAL

- High Gain, 34 dB Typ. Over the Entire Operating Band
- Good Gain Flatness, ±2.0 dB Typ.
- +27 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-543+	ZVA-543X+
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-543+ is a coaxial, 1/2-watt 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 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, 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-543+ 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 34 dB (typ.) of gain over the entire operating band, and is capable of delivering over 0.5 W of RF power. Can deliver rated power when connected to most signal generators.
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 allows the amplifier to be protected from external mishandling that could lead to catastrophic failures in the field.

REV. A
ECO-014881
ZVA-543+
MCL NY
260909

Wideband Amplifier

ZVA-543+
ZVA-543X+

50Ω 18 to 54 GHz 0.5 W 1.85 mm Female

ELECTRICAL SPECIFICATIONS AT +25 °C BASEPLATE

Parameter	Condition (GHz)	ZVA-543+[1] ZVA-543X+[2] Min.	Typ.	Max.	Units
Frequency Range		18		54	GHz
Gain	18–20	–	30.0	–	dB
	20–40	29.5	33.0	–	
	40–54	29.5	34.0	–	
Output Power at 1 dB Compression	18–20	–	+25.5	–	dBm
	20–40	+25.5	+27.0	–	
	40–54	+21.0	+24.5	–	
Saturated Output Power[3]	18–20	–	+26.0	–	dBm
	20–40	+27.0	+29.0	–	
	40–54	+24.0	+26.0	–	
Output IP3 (Output Power = +14 dBm/Tone)	18–54	–	+34.0	–	dBm
Input VSWR	18–54	–	1.3	2.0	:1
Output VSWR[4]	18–54	–	1.5	2.0	:1
Noise Figure	18–54	–	6.0	–	dB
Operating DC Voltage (V_{DD})	–	+10	–	+15	V
Device Operating Current at +10 V (ZVA-543X+ / ZVA-543+)[5]	–	–	800[2] / 850[1]	1400[2] / 1500[1]	mA

1. For units with heatsink, limit ambient temperature to +50 °C.
2. For units without heatsink, limit the maximum baseplate temperature to +60 °C.
3. At P_{SAT}, P_{OUT} changes less than 0.1 dB for a 1 dB change in P_{IN}.
4. Open and short-circuit loads are not recommended at the amplifier output. Ensure proper 50Ω load before turning the amplifier "ON".
5. Device operating power based on current when amplifier is in saturation.

ABSOLUTE MAXIMUM RATINGS[6]

Parameter	Ratings
Operating Temperature	ZVA-543+ -40 °C to +50 °C Ambient ZVA-543X+ -40 °C to +60 °C Baseplate
Storage Temperature	-40 °C to +85 °C
Total Power Dissipation	14.0 W
RF Input Power[7] (CW)	+5 dBm
DC Operating Voltage[8]	+16 V

6. Continuous operation is not recommended at these extremes. Permanent damage may occur if any of these limits are exceeded.
7. Specified under matched load to 50Ω.
8. Device operating power based on current when amplifier is 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:

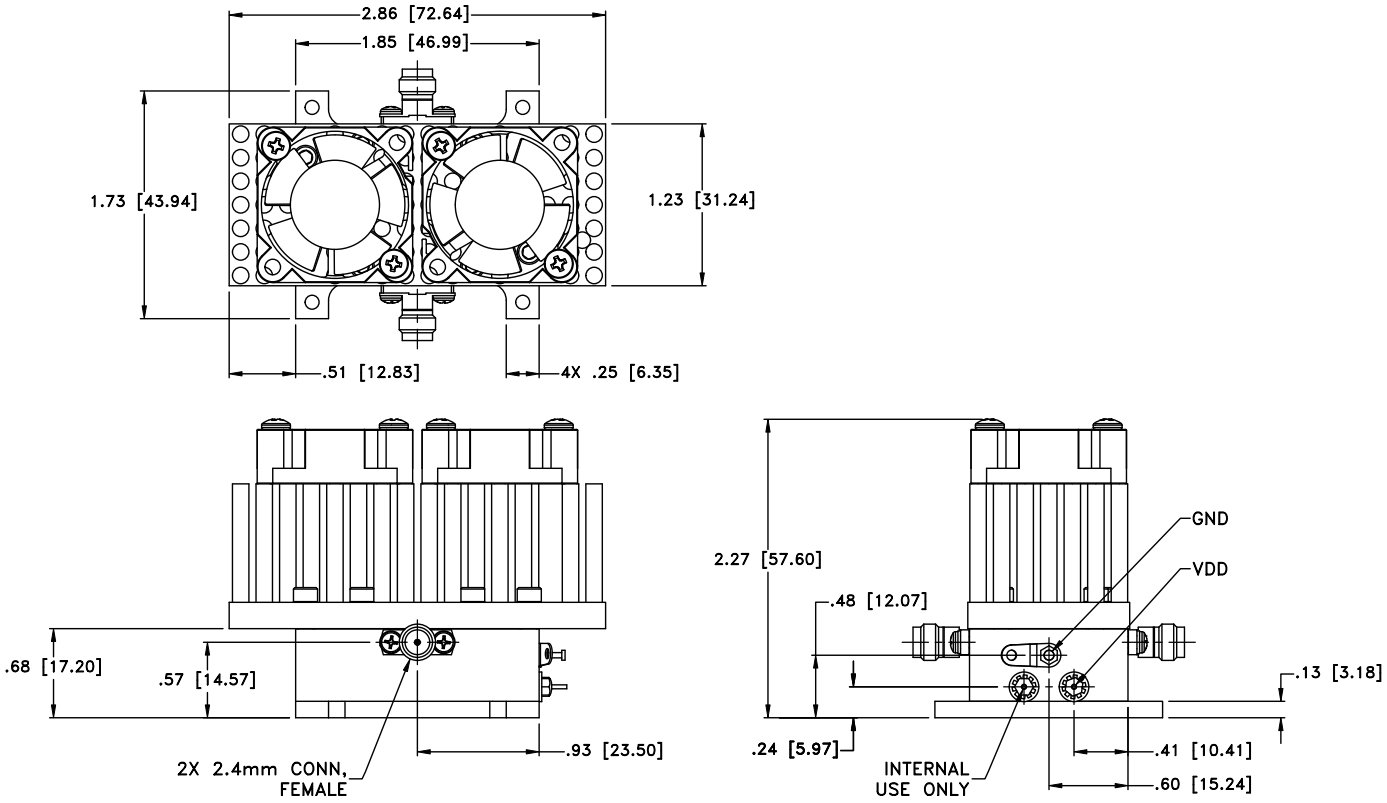
MAXIMUM OPERATING CASE TEMP = +50 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE)
MAXIMUM USER AMBIENT TEMP = +30 °C (USER DEFINED)
POWER DISSIPATION = 10 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE)
THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 2 °C/W

Wideband Amplifier

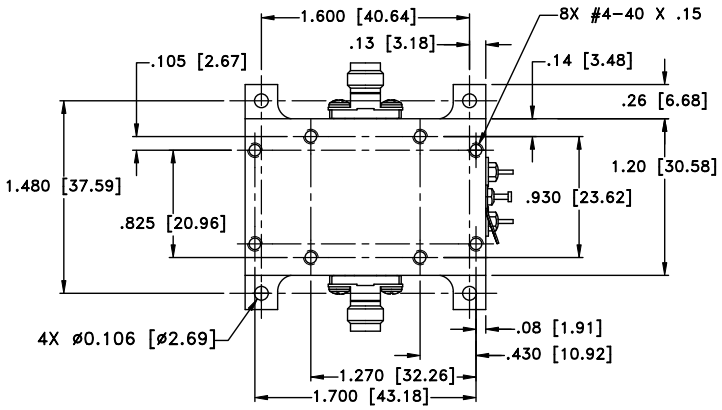
ZVA-543+
ZVA-543X+

50Ω 18 to 54 GHz 0.5 W 1.85 mm Female

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



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



WT. 160 grams; WITHOUT HEATSINK 60 grams
Dimensions are in inches [mm]. Tolerances: 2 Pl. ±0.03; 3 Pl. ±0.015

MEDIUM POWER, HIGH GAIN

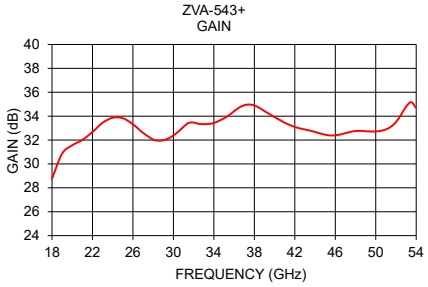
Wideband Amplifier

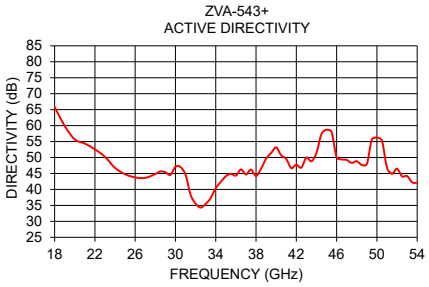
ZVA-543+
ZVA-543X+

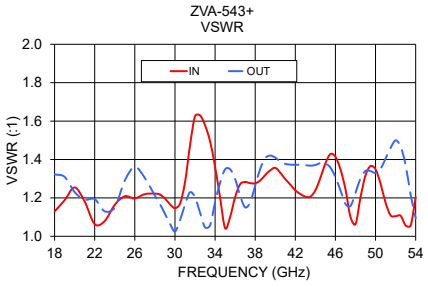
50Ω 18 to 54 GHz 0.5 W 1.85 mm Female

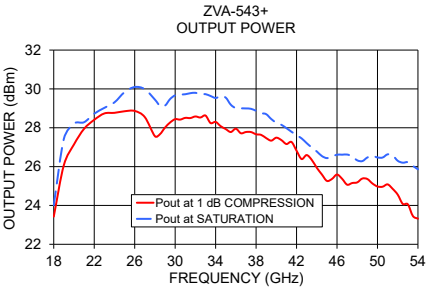
TYPICAL PERFORMANCE DATA/GRAPHS

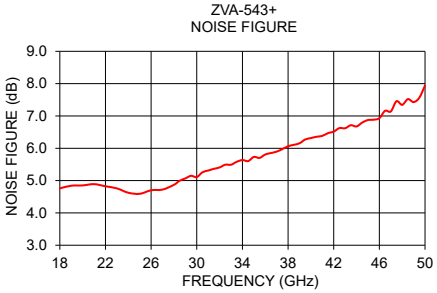
Frequency (GHz)	Gain (dB)	Active Directivity (dB)	VSWR (:1) 10V		P_{OUT} at 1 dB Compression (dBm)	P_{OUT} at Saturation (dBm)	Output IP3 (dBm)	Noise Figure (dB)
	+10 V	+10 V	IN	OUT	+10 V	+10 V	+10 V	+10 V
18.0	28.76	65.88	1.13	1.32	23.42	24.01	25.74	4.76
20.0	31.56	55.68	1.25	1.23	27.14	28.22	31.01	4.85
22.0	32.67	52.57	1.06	1.19	28.41	28.72	33.22	4.82
24.0	33.87	46.75	1.16	1.15	28.77	29.31	33.78	4.62
26.0	33.32	43.77	1.20	1.36	28.86	30.10	35.04	4.70
28.0	32.05	44.83	1.22	1.21	27.57	29.45	34.19	4.87
30.0	32.38	47.11	1.15	1.02	28.44	29.67	34.56	5.11
32.0	33.47	35.52	1.63	1.20	28.58	29.80	34.88	5.41
34.0	33.42	40.42	1.36	1.18	28.30	29.54	34.49	5.64
36.0	34.42	44.33	1.20	1.30	27.95	29.01	34.27	5.81
38.0	34.90	44.22	1.28	1.26	27.67	28.87	34.04	6.06
40.0	33.92	53.17	1.36	1.41	27.49	28.26	34.85	6.32
42.0	33.10	47.74	1.24	1.37	26.82	27.62	35.46	6.52
44.0	32.68	51.50	1.24	1.37	25.94	26.78	36.82	6.68
46.0	32.40	50.07	1.41	1.31	25.59	26.61	35.25	6.93
48.0	32.75	48.84	1.06	1.23	25.19	26.32	34.51	7.34
50.0	32.72	56.23	1.35	1.33	24.98	26.47	34.44	7.94
52.0	33.51	46.51	1.10	1.50	24.56	26.30	34.24	–
54.0	34.68	42.09	1.20	1.09	23.32	25.86	31.48	–

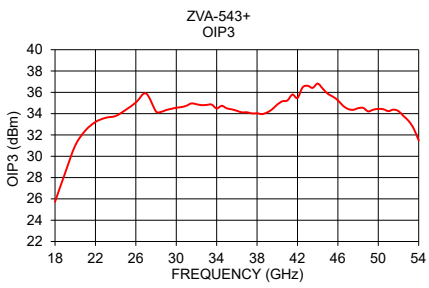












NOTES

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

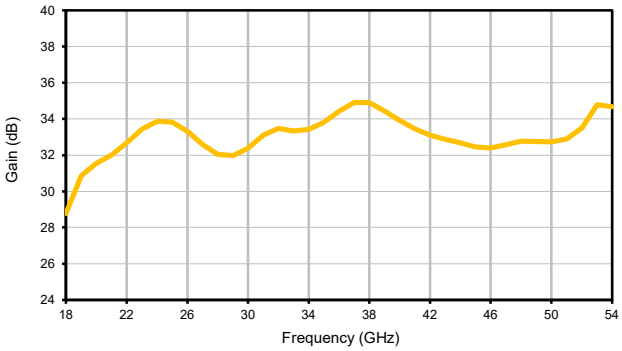
Coaxial Amplifier ZVA-543(X)+

Typical Performance Data

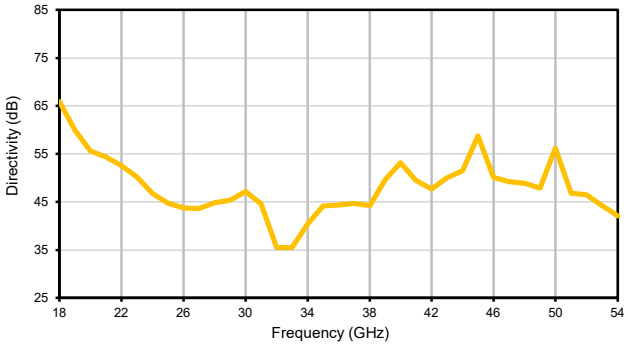
FREQUENCY (GHz)	GAIN (dB) 10V	DIRECTIVITY (dB) 10V	VSWR (:1) IN 10V	VSWR (:1) OUT 10V	Pout @ 1 dB COMPRESSION (dBm) 10V	OIP3 (dBm) 10V	Pout at SATURATION (dBm) 10V	Noise Figure (dB) 10V
18.0	28.76	65.88	1.13	1.32	23.42	25.74	24.0	4.76
19.0	30.87	59.86	1.19	1.31	26.08	28.43	27.4	4.84
20.0	31.56	55.68	1.25	1.23	27.14	31.01	28.2	4.85
21.0	32.01	54.38	1.18	1.19	27.95	32.41	28.3	4.89
22.0	32.67	52.57	1.06	1.19	28.41	33.22	28.7	4.82
23.0	33.45	50.21	1.08	1.13	28.74	33.61	29.0	4.76
24.0	33.87	46.75	1.16	1.15	28.77	33.78	29.3	4.62
25.0	33.83	44.76	1.21	1.29	28.85	34.36	29.8	4.59
26.0	33.32	43.77	1.20	1.36	28.86	35.04	30.1	4.70
27.0	32.60	43.63	1.22	1.30	28.55	35.90	30.0	4.72
28.0	32.05	44.83	1.22	1.21	27.57	34.19	29.4	4.87
29.0	31.98	45.37	1.20	1.12	28.01	34.34	29.1	5.07
30.0	32.38	47.11	1.15	1.02	28.44	34.56	29.7	5.11
31.0	33.11	44.62	1.28	1.16	28.51	34.74	29.7	5.31
32.0	33.47	35.52	1.63	1.20	28.58	34.88	29.8	5.41
33.0	33.33	35.47	1.58	1.05	28.63	34.82	29.7	5.49
34.0	33.42	40.42	1.36	1.18	28.30	34.49	29.5	5.64
35.0	33.82	44.16	1.04	1.35	27.93	34.50	29.6	5.73
36.0	34.42	44.33	1.20	1.30	27.95	34.27	29.0	5.81
37.0	34.91	44.69	1.28	1.15	27.78	34.13	29.0	5.90
38.0	34.90	44.22	1.28	1.26	27.67	34.04	28.9	6.06
39.0	34.42	49.66	1.32	1.41	27.47	34.12	28.7	6.15
40.0	33.92	53.17	1.36	1.41	27.49	34.85	28.3	6.32
41.0	33.45	49.54	1.30	1.38	27.16	35.23	28.0	6.38
42.0	33.10	47.74	1.24	1.37	26.82	35.46	27.6	6.52
43.0	32.88	50.01	1.21	1.37	26.59	36.62	27.2	6.62
44.0	32.68	51.50	1.24	1.37	25.94	36.82	26.8	6.68
45.0	32.45	58.70	1.38	1.38	25.26	35.87	26.4	6.87
46.0	32.40	50.07	1.41	1.31	25.59	35.25	26.6	6.93
47.0	32.57	49.24	1.25	1.17	25.07	34.44	26.6	7.14
48.0	32.75	48.84	1.06	1.23	25.19	34.51	26.3	7.34
49.0	32.74	47.93	1.32	1.34	25.36	34.21	26.5	7.43
50.0	32.72	56.23	1.35	1.33	24.98	34.44	26.5	7.94
51.0	32.89	46.85	1.17	1.41	25.08	34.23	26.6	-
52.0	33.51	46.51	1.10	1.50	24.56	34.24	26.3	-
53.0	34.78	44.19	1.06	1.37	24.06	33.32	26.2	-
54.0	34.68	42.09	1.20	1.09	23.32	31.48	25.9	-

Typical Performance Curves

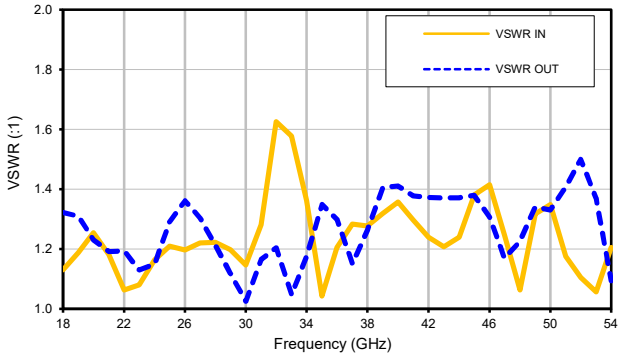
GAIN @10V



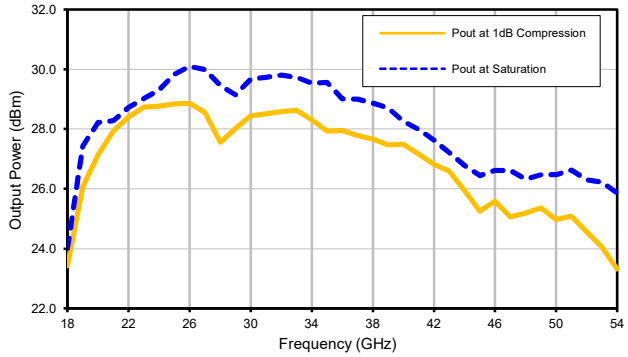
DIRECTIVITY @10V



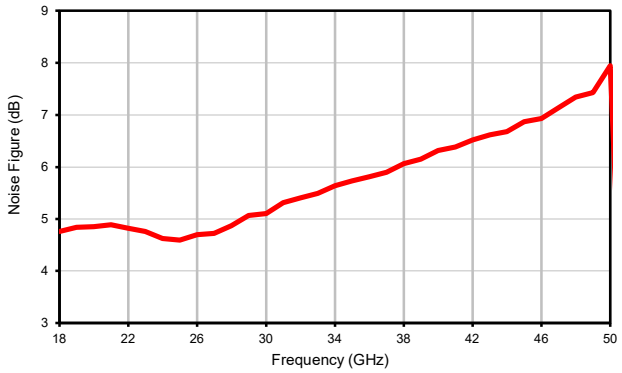
VSWR @10V



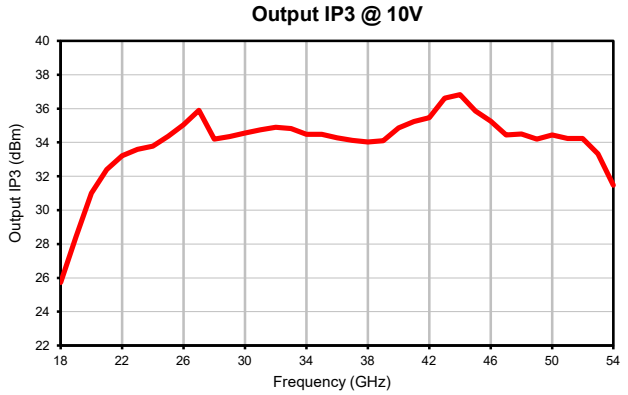
Pout @10V



Noise Figure @ 10V

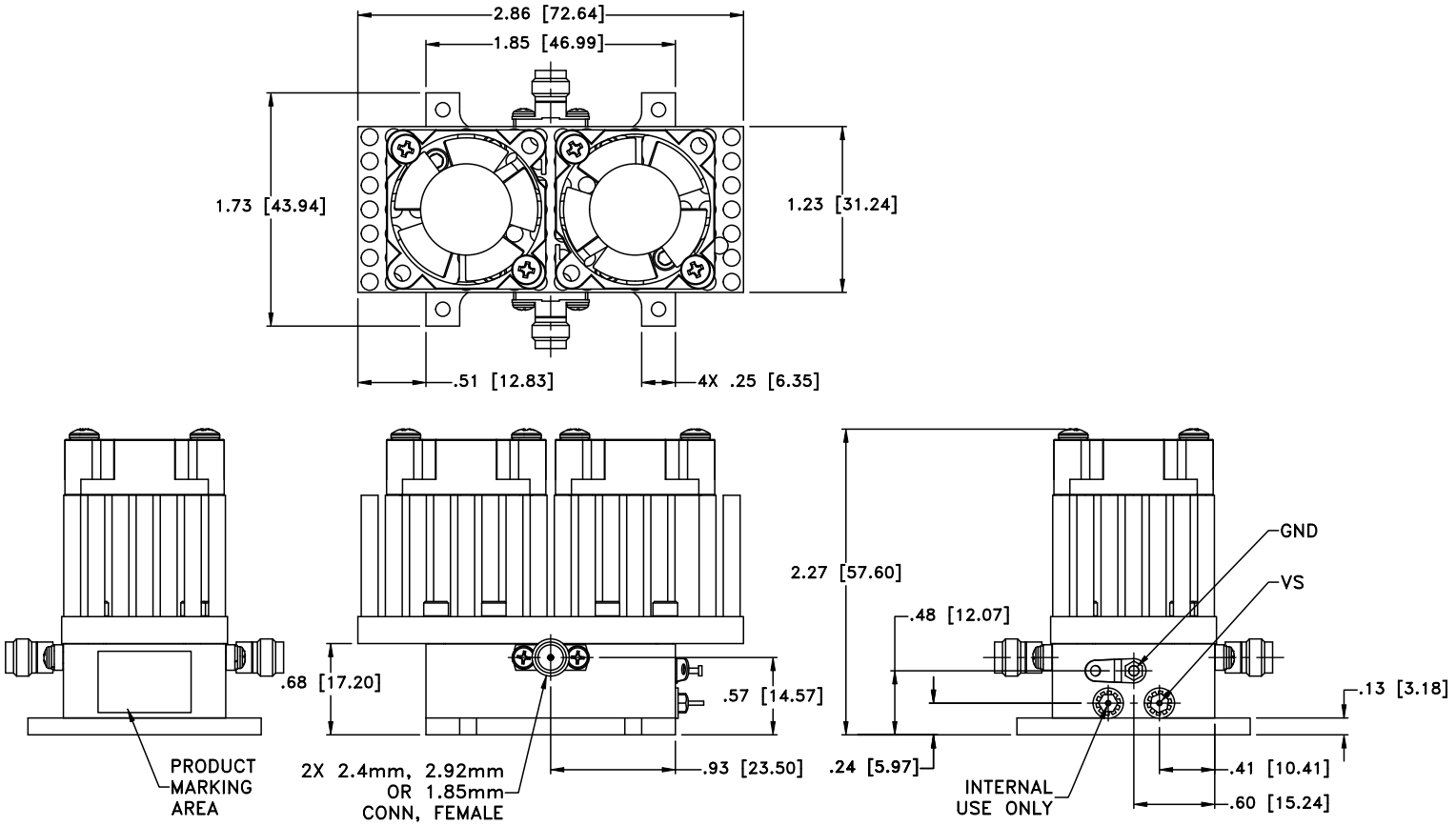


Output IP3 @ 10V

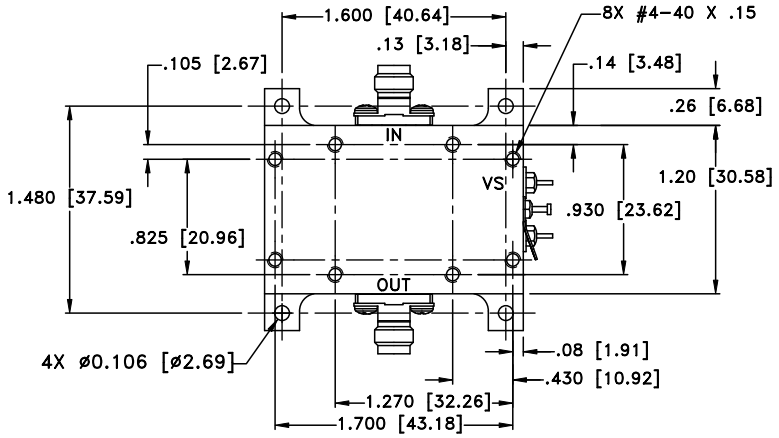


Case Style VN

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.

Mini-Circuits®
ISO 9001 ISO 14001 CERTIFIED
ALL NEW minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site
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

This document and its contents are the property of Mini-Circuits.