High Directivity

Monolithic Amplifier

VNA-28A+

50Ω 0.5 to 2.5 GHz

The Big Deal

- 2.8 & 5V operation
- High directivity, 14-21 dB
- Footprint compatible with VNA-28

CASE STYLE: DL1020

Not Recommended for New Designs

please refer to PCN# 15-055 and recommended replacement at:

http://www.minicircuits.com/support/product_change.html

or PCN History on Dash Board

Product Overview

VNA-28A+ is a wideband amplifier providing high directivity. It has built-in DC blocks at input and output and a separate lead for DC. It is fabricated using GaAs MESFET technology and enclosed in a 5x6 mm MCLP plastic package.

Key Features

Feature	Advantages
Footprint compatible with VNA-28	Can be used as a replacement for obsolete part VNA-28 without PCB design change. Refer to AN-60-065
High directivity, 14-21 dB	Acts as a low cost isolator, minimizing the interaction of pre and post circuits.
Built-in DC blocks	Eliminates need for external DC blocks, lowering PCB size & cost.
Separate terminal for DC	Eliminates need for output bias-tee, further reducing external component count, cost & PCB size.
DC voltage, 2.8 to +5V	No voltage dropping resistor required, allowing low voltage operation.
5 x 6mm 8-lead MCLP package	Provides low inductance, repeatable transitions, and excellent thermal contact to PCB.
Footprint compatible to SOIC-8 lead package	Can be used in place of obsolete model VNA-28 without PCB redesign.

High Directivity

Monolithic Amplifier 0.5-2.5 GHz

Product Features

- 2.8V & 5V operation
- no external biasing circuit required
- internal DC blocking at RF input and output
- high directivity, 18 dB typ.
- wide bandwidth, 0.5 to 2.5 GHz
- low noise figure, 3.7 dB typ.
- output power, up to +8.7 dBm typ.
- potential replacement for VNA-28 (AN-60-065)
- low cost

150319

VNA-28A+

CASE STYLE: DL1020
PRICE: Contact Sales Dept.

Not Recommended for New Designs

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or PCN History on Dash Board

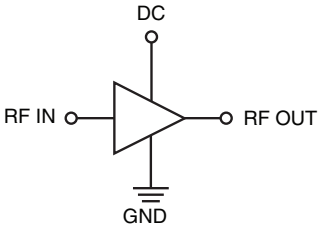
Typical Applications

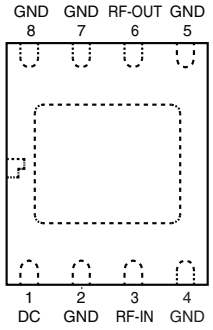
- buffer amplifier
- cellular
- PCN

General Description

VNA-28A+ is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in an 8-lead 5X6 mm MCLP package, footprint compatible with SOIC-8 lead package. VNA-28A+ is fabricated using GaAs MESFET technology. It has a built-in DC blocks at RF-IN and RF-OUT ports and separate lead for DC eliminating the need for bias tee.

simplified schematic and pad description





Pad description

Function	Pad Number	Description
RF-IN	3	RF input pin.
RF-OUT	6	RF output pin.
DC	1	Bias pin
GND	2,4,5,7,8 and paddle	Connections to ground. Use via holes as shown in “Suggested Layout for PCB Design” to reduce ground path inductance for best performance.

Electrical Specifications[1] at 25°C, 50Ω unless noted

Parameter	Condition (GHz)	Min.	Typ.		Max.	Units
Frequency Range		0.5			2.5	GHz
at DC Volts		5.0	5.0	2.8	5.0	V
Gain	0.5 1.0 1.5 2.0 2.5	— — — 18.6 —	16.6 21.2 21.6 20.7 18.0	15.8 20.0 20.2 19.4 16.9		dB
Input Return Loss	0.75 - 2.5		15.4	15.6		dB
Output Return Loss	0.75 - 2.5		14.7	11.8		dB
Output Power @ 1 dB compression	0.5 - 2.5		8.9	7.1		dBm
Output IP3	0.5 - 2.5		18.2	16.4		dBm
Noise Figure	0.5 - 2.5		3.7	3.7		dB
Directivity (Isolation - Gain)	0.5 - 2.5		14-20	15-21		dB
DC Current			27	24	45	mA
Thermal Resistance, junction-to-case[2]				78		°C/W

[1] Measured on Mini-Circuits Characterization test board TB-01. See Characterization Test Circuit (Fig. 1)
[2] Case is defined as ground leads.

Absolute Maximum Ratings[3]

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C
DC Voltage	7V at pad 1 10V at pads 3,6
Power Dissipation	500mW
Input Power	+5 dBm (continuous) +25 dBm (5 minutes max.)

(3) Permanent damage may occur if any of these limits are exceeded.
These ratings are not intended for continuous normal operation.

Characterization Test Circuit

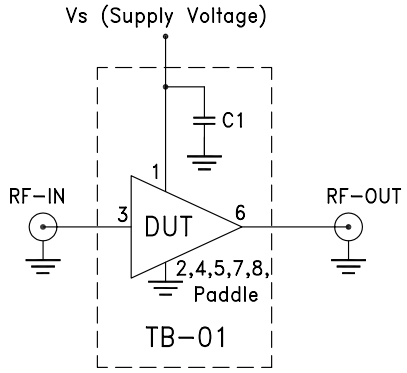


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-01) Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -5 dBm/tone at input.

Recommended Application Circuit

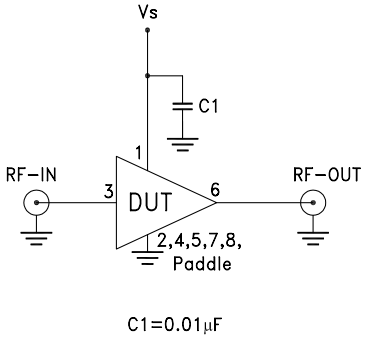


Fig 2. Recommended Application Circuit

Product Marking

Additional Detailed Technical Information *additional information is available on our dash board. To access this information click here*	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DL1020 *Plastic model, 8 lead, 5x6 mm MCLP, tin-silver over nickel*
Tape & Reel **Standard quantities available on reel**	F68 *7" reels with 20, 50, 100, 200, 500 or 1K devices* *13" reels with 2K, 4K devices*
Suggested Layout for PCB Design	PL-077
Evaluation Board	TB-01
Environmental Ratings	ENV08T1

ESD Rating

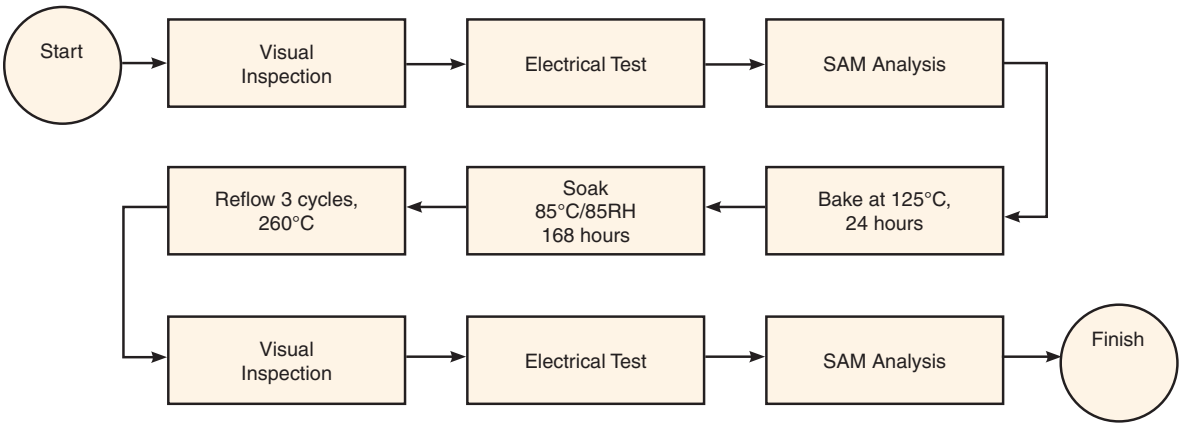
Human Body Model (HBM): Class 1B (500V to <1000V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (Pass 50V) in accordance with ANSI/ESD STM5.2-1999

MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL Test Flow Chart



Additional 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/MCLStore/terms.jsp