PASTERNACK
an INFINITE brand

3 dB NF Waveguide Low Noise Amplifier, Operating from 27 GHz to 40 GHz with 35 dB Gain, 12 dBm Psat and WR28

TECHNICAL DATA SHEET PE15A1077

The PE15A1077 is an WR28 Waveguide Low Noise Amplifier that operates in the 27 GHz to 40 GHz millimeter wave frequency band. The module utilizes GaAs semiconductor and chip-and-wire technology in the manufacturing process that ensures state-of-the-art performance. Impressive typical performance includes 3 dB noise figure, 35 dB gain, 2.0:1 VSWR, 10 dBm output P1dB, 12 dBm Output Psat, +20 dBm output IP3. Additional typical performance includes 45 dB small signal gain, 1.8:1 VSWR, output P1dB of +22 dBm, output Psat of and output IP3 of +31 dBm. The 50 ohm design has an operational temperature range is -45°C to +85°C and the bias voltage requirement is +12Vdc with 110 mA of DC current. The rugged aluminum Mil Grade package has an epoxy sealed cover and UG599/U waveguide flanges. The model is designed to meet a series of environmental conditions including Altitude, Vibration, Humidity, and Shock.

Features

- WR28 Waveguide Low Noise Amplifier
- GaAs Semiconductor Technology
- Frequency Range 27 to 40 GHz
- Noise Figure 3 dB
- Small Signal Gain 35 dB
- VSWR 2:0:1
- Ouput P1dB +10 dBm
- Outpu Psat +12 dBm
- Output IP3 +20 dBm
- Isolation -50 dB
- DC Voltage +12 Vdc
- DC Current 110 mA
- 50 Ohm Design
- Rugged Mil Grade Aluminum Package Design
- UG599/U Waveguide Flanges
- -45oC to +85oC Operating Temperature

Applications

- Aerospace & Defense
- Microwave Radio
- Military & Commercial Communication
- VSAT
- SATCOM
- Test & Measurement
- Wireless Infrastructure
- Fiber Optics

Electrical Specifications (TA = +25°C, DC Voltage = +12Vdc, DC Current = 110mA)

Description	Minimum	Typical	Maximum	Units
Frequency Range	27		40	GHz
Small Signal Gain	30	35		dB
Gain Flatness		±3		dB
Gain Variance at OTR*		±2		dB
Output at 1 dB Compression Point	+6	+10		dBm
Saturated Output Power (Psat)		+12		dBm
Output 3rd Intercept Point		+20		dBm
Noise Figure		3	4.5	dB
Input VSWR		2:1		
Output VSWR		2:1		
Reverse Isolation		-50		dB
Operating DC Voltage		+12	+15	Volts
Operating DC Current		110	150	mA

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Pasternack Enterprises, Inc. • P.O. Box 16759, Irvine, CA 92623
Phone: (866) 727-8376 or (949) 261-1920 • **Fax:** (949) 261-7451
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Operating Temperature Range	-45	+85	°C

*OTR= Base Plate Operating Temperature Range

Electrical Procedures

Biasing Up Procedure	
Step 1	Connect Ground Pin
Step 2	Connect Input and Output
Step 3	Connect +12 V biasing

Power OFF Procedure	
Step 1	Turn off +12 V Biasing
Step 2	Remove RF Connection
Step 3	Remove Ground

Absolute Maximum Rating

Parameter	Rating	Units
Operating Voltage	+15	Volts
RF input Power @(50 Ω)	-18	dBm

ESD Sensitive Material, Transport material in Approved ESD bags. Handle only in approved ESD Workstation.

Mechanical Specifications

Size	
Length	1.79 in [45.47 mm]
Width	2.48 in [62.99 mm]
Height	0.75 in [19.05 mm]
Weight	0.4 lbs [181.44 g]
Input Connector	WR28
Output Connector	WR28

Environmental Specifications

Temperature	
Operating Range	-45 to +85 deg C
Storage Range	-55 to +125 deg C
Humidity	100% RH at 35°C, 95% RH at 40°C
Shock	20G for 11 ms half sine wave, 3 axis both directions
Vibration	25g RMS (15 degrees 2KHz) endurance, 1 hour per axis
Altitude	30,000 ft. (Epoxy Sealed Controlled Environment)

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Compliance Certifications (see product page for current document)

Plotted and Other Data

Notes:

- Values at +25 °C, sea level

Amplifier Power-up Precautions

1.) Confirm that proper ESD precautions and controls are always in place before handling any Amplifier module.

2.) Confirm adequate thermal management is in place to effectively dissipate heat away from the Amplifier package. The Amplifier operational baseplate temperature must be within the operational temperature range stated in the Amplifier datasheet. Depending on the design and thermal requirements, using a heatsink with cooling fan is always recommended for safe reliable operation. A heat sink without a cooling fan may also be used. Damage caused from overheating will void the warranty.

3.) Confirm adequate system grounding is established. The DC power supply and Amplifier must have a common ground in order to operate properly.

4.) Power Amplifiers may require additional DC Current when initially powered-up. Depending on the design, the input current draw could range from an additional 10% to 100% above the maximum rated DC current of the Amplifier. This varies based on product part number.

5.) Confirm the DC power supply, if limited, is set to allow for additional start-up current that's rated for the Power Amplifier.

6.) Confirm the system is designed and calibrated for 50 ohms. Any impedance mismatch may cause performance issues.

7.) Perform a CALIBRATION (if required) with the loads before connecting the Amplifier to the Network Analyzer to ensure proper performance.

8.) Use a fixed attenuator between the signal source and input port of the Amplifier to optimize the input VSWR match.

9.) Confirm the input power level at the input port of the amplifier does not exceed the maximum rated limit for input power (as stated in the Amplifier datasheet).
P_{in} for Small Signal Gain = P1dB-SSG-10 dB
P_{in} for P1dB = P1dB-SSG+1 dB

10.) Confirm the Network Analyzer is always connected to the Amplifier first before DC power is applied to the Amplifier.

11.) As long as the input and output ports of the amplifier are connected to a 50Ohm load and RF signal power is applied, the Amplifier can be powered up with DC voltage.

12.) Confirm the Amplifier output load is matched for a 50 Ohm impedance and will not exceed the maximum rated VSWR or Return Loss limit for the Amplifier. Exceeding the maximum rated VSWR or Return Loss limit will result in reflected signal power that could damage the Amplifier and void the warranty.

13.) **Power Amplifier connected to an Antenna for signal transmission** - It's strongly recommended to use a high power fixed attenuator pad or an Isolator between the output port of the Amplifier and input port to the antenna. Any reflected signal power due to impedance mismatch will likely damage the Amplifier and void the warranty.

14.) The attenuator or isolator used at the output port of the Amplifier must be rated to handle the output power level and operational frequency band of the amplifier.

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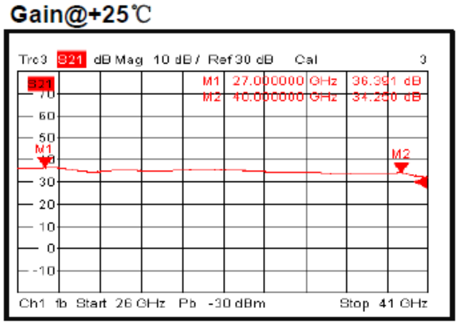
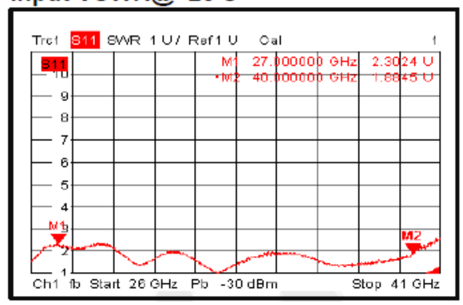
Typical Performance Data

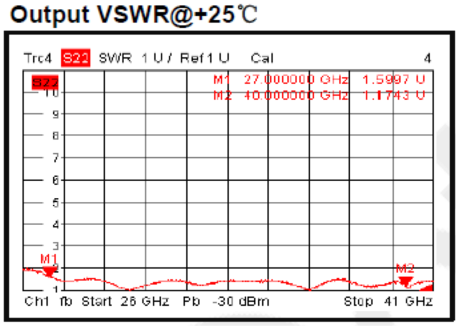
Gain@+25℃



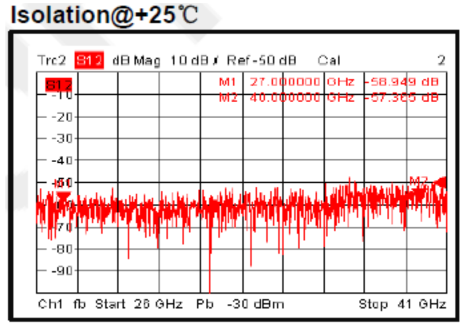
Input VSWR@+25℃



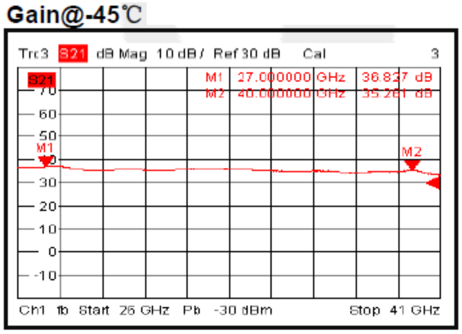
Output VSWR@+25℃



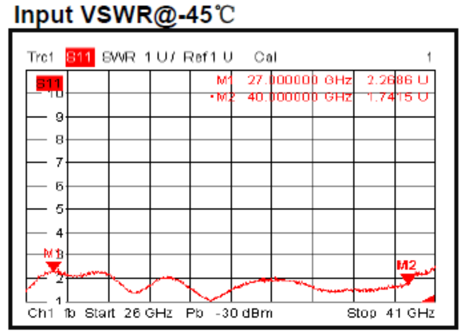
Isolation@+25℃



Gain@-45℃



Input VSWR@-45℃



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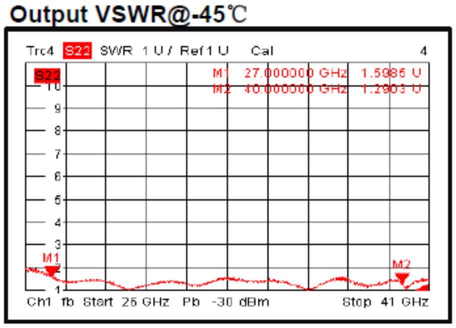
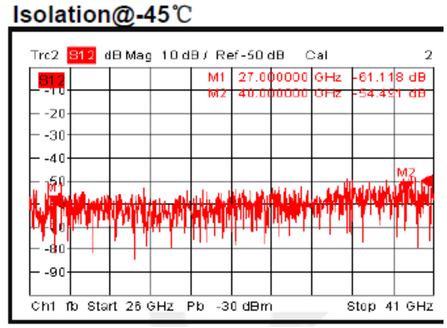
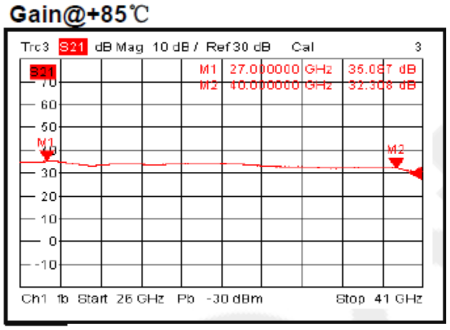
Output VSWR@-45℃



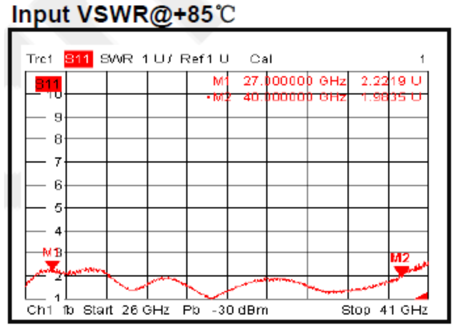
Isolation@-45℃



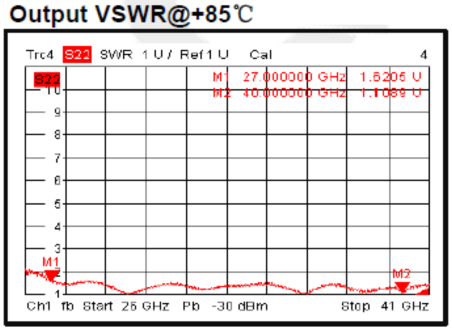
Gain@+85℃



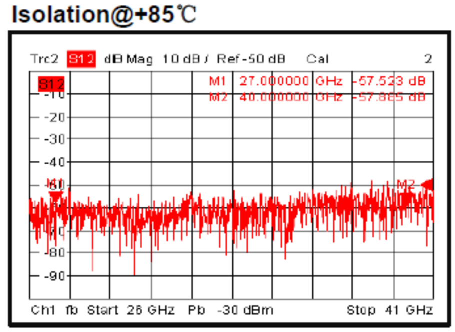
Input VSWR@+85℃



Output VSWR@+85℃



Isolation@+85℃



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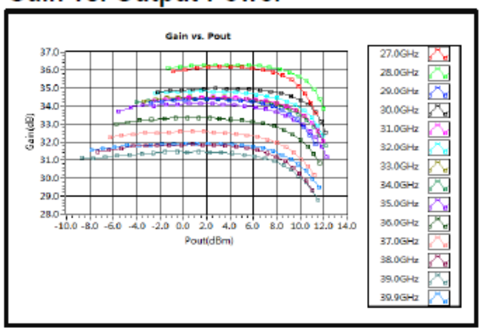
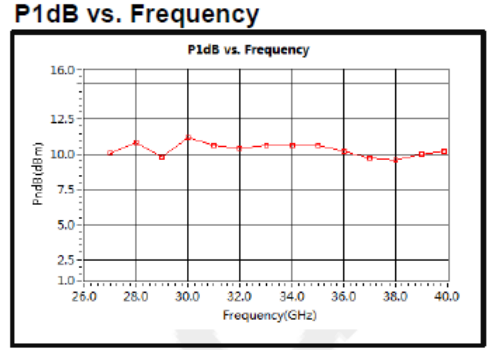
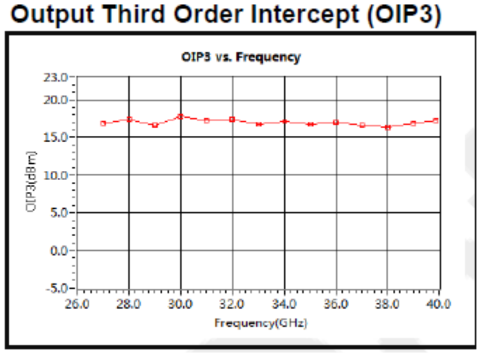
Gain vs. Output Power



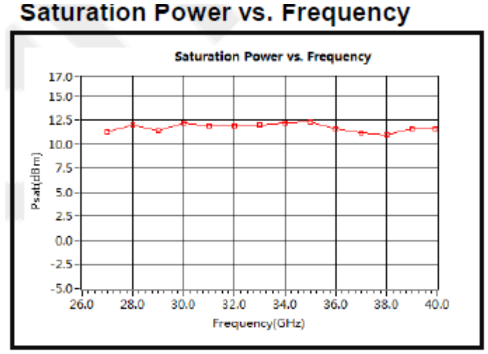
P1dB vs. Frequency



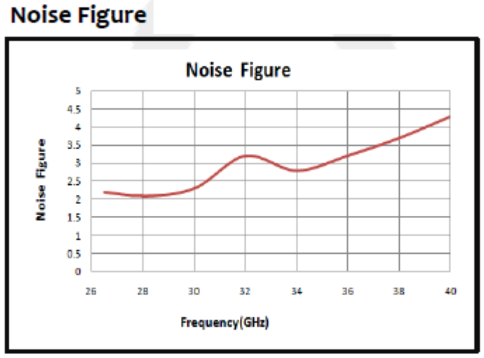
Output Third Order Intercept (OIP3)



Saturation Power vs. Frequency



Noise Figure



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PE15A1077 CAD Drawing

3 dB NF Waveguide Low Noise Amplifier, Operating from 27 GHz to 40 GHz with 35 dB Gain, 12 dBm Psat and WR28