



## 5 Watt Psat, 2 GHz to 4.4 GHz, High Power GaAs Amplifier, SMA, 32 dB Gain, 37 dBm IP3, 10 dB NF

### TECHNICAL DATA SHEET

**PE15A4011**

PE15A4011 is a broadband 5 W GaAs PHEMT MMIC-based coaxial power amplifier module designed to be used in a wide range of commercial and defense applications in the 2.0 to 4.4 GHz frequency range. The amplifier offers 32 dB small signal gain with the excellent gain flatness of  $\pm 0.5$  dB. This performance is achieved through the use of advanced GaAs PHEMT MMIC circuitry. The amplifier requires manual voltage sequencing (see pages 4 & 5) and operates over the temperature range of -40°C to 85°C. The Innovative design is characterized by light weight (45 g) and small size (1.5" x 1.2" x 0.56"). An available finned heatsink (model PE15C5014) is recommended to maintain an optimum baseplate temperature during operation.

#### Features

- 2.0 GHz to 4.4 GHz Frequency Range
- P1dB Output Power: 36 dBm
- Psat: 37 dBm
- Small Signal Gain: 32 dB
- Gain Flatness:  $\pm 0.5$  dB
- Power Added Efficiency @Psat: 30%
- 50 Ohm Input and Output Matched
- -40 to +85°C Operating Temperature
- Small Size & Light Weight
- EAR99 (No Export License Required)
- Manual Voltage Sequencing
- Optional Heatsink Available: Model PE15C5014

#### Applications

- Telecom Infrastructure
- Fixed Microwave Backhaul
- Wireless Internet Access
- Wireless Local Loop
- Microwave Radio Systems
- Military & Space
- Radar & Sensors
- Commercial 2-Way Radio
- Driver Amplifier
- High Power Output
- General Purpose Amplification

#### Electrical Specifications (TA = +25°C, Vds1,2,3 = +8V, Idsq1 = 0.1A, Idsq2 = 0.3A, Idsq3 = 1.4A, Vgs1,2 = -0.80V)

| Description                            | Minimum | Typical   | Maximum | Units |
|--|---------|-----------|---------|-------|
| Frequency Range                        | 2       |           | 4.4     | GHz   |
| Small Signal Gain                      | 26      | 32        |         | dB    |
| Gain Flatness                          |         | $\pm 0.5$ |         | dB    |
| Pout at Sat.                           |         | +37       |         | dBm   |
| Efficiency Psat                        |         | 25        |         | %     |
| Output Power at 1 dB Compression Point |         | +36       |         | dBm   |
| Output 3rd Intercept Point             | +35     | +37       |         | dBm   |
| Noise Figure                           |         |           | 10      | dB    |
| Impedance (Input)                      |         | 50        |         | Ohms  |
| Impedance (Output)                     |         | 50        |         | Ohms  |
| Input Return Loss                      | 9       | 15        |         | dB    |
| Output Return Loss                     | 10      | 12        |         | dB    |
| Operating DC Drain Source Voltage      |         | 8         |         | Volts |
| Operating DC Gate Source Voltage       |         | -1        |         | Volts |
| Operating Temperature Range            | -40     |           | +85     | °C    |
| Thermal Resistance                     |         | 4         |         | °C/W  |

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#### Absolute Maximum Rating

| Parameter                          | Rating       | Units |
|------------------------------------|--------------|-------|
| Drain Source Voltage, Vds 1,2,3    | +10          | Volts |
| Gate Source Voltage, Vgs 1,2,3     | -5           | Volts |
| Drain Source Current Idsq 1        | 0.15         | A     |
| Drain Source Current Idsq2         | 0.45         | A     |
| Drain Source Current Idsq2         | 2.1          | A     |
| Continuous Dissipation at 25°C     | 30           | W     |
| Channel Temperature                | 175          | °C    |
| Operating Temperature (base-plate) | -40 to +85   | °C    |
| Storage Temperature                | -55° to +135 | °C    |



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

#### Mechanical Specifications

##### Size

|                  |                     |
|------------------|---------------------|
| Length           | 1.2 in [30.48 mm]   |
| Width            | 1.5 in [38.1 mm]    |
| Height           | 0.56 in [14.22 mm]  |
| Weight           | 0.104 lbs [47.17 g] |
| Input Connector  | SMA Female          |
| Output Connector | SMA Female          |

#### Environmental Specifications

##### Temperature

|                 |                   |
|-----------------|-------------------|
| Operating Range | -40 to +85 deg C  |
| Storage Range   | -55 to +135 deg C |

#### Compliance Certifications (see [product page](#) for current document)

#### Plotted and Other Data

##### Notes:

- Values at +25 °C, sea level
- ESD Sensitive Material, Transport material in Approved ESD bags. Handle only in approved ESD Workstation.
- Heat Sink Required for Proper Operation, Unit is cooled by conduction to heat sink. The amplifier module has 4 screw slots for mounting to a heat sink.
- DO NOT apply Vds without proper negative voltage on Vgs pins.



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#### 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.) Preform 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 =  $P_{1dB-SSG}-10$  dB  
 $P_{in}$  for  $P_{1dB}$  =  $P_{1dB-SSG}+1$  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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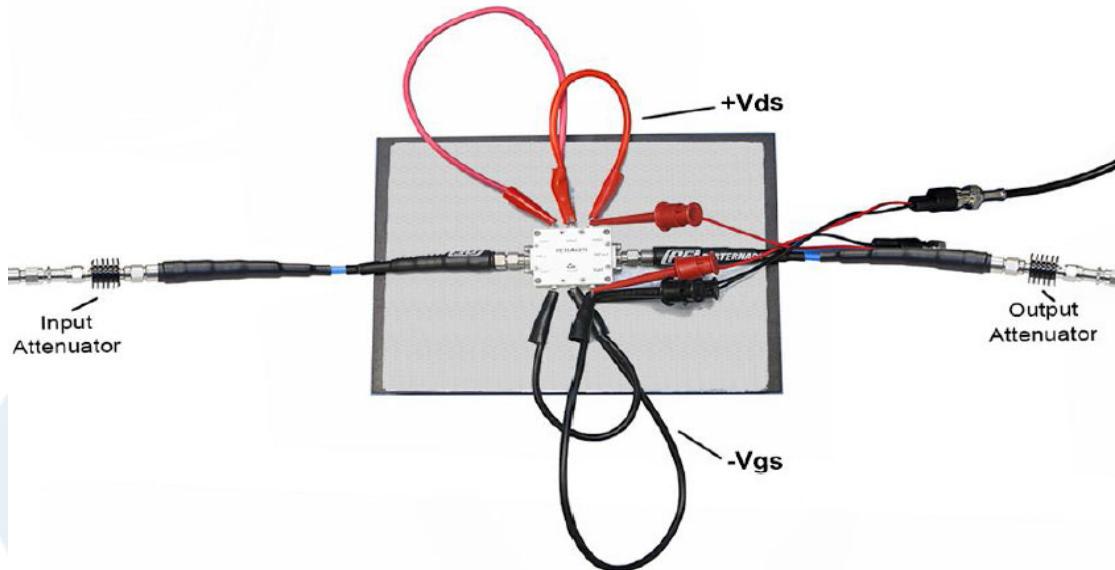
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- GaAs PHEMT MMIC-Based Power up sequence

## GaAs PHEMT MMIC-Based Power up sequence

1. Connect common ports
  - a. Connect single GND lead
  - b. Connect all  $-V_{gs}$  ports together
  - c. Connect all  $+V_{ds}$  ports together
2. Connect the load, attenuator to protect the VNA.
3. Connect the input port, may have an attenuator at the input (perform the CAL with the loads before connecting the amplifier to the VNA).



4. Apply the  $-V_{GS}$  voltage -1.0 Volts (Always apply  $-V_{GS}$  first).
5. Apply the  $+V_{DS}$  +8 Volts (Then apply  $+V_{DS}$  second).
6. Suggested to add an Isolator on Output to prevent damage to Amplifier. Refer to PE8327 as a possible Isolator for PE15A4011.

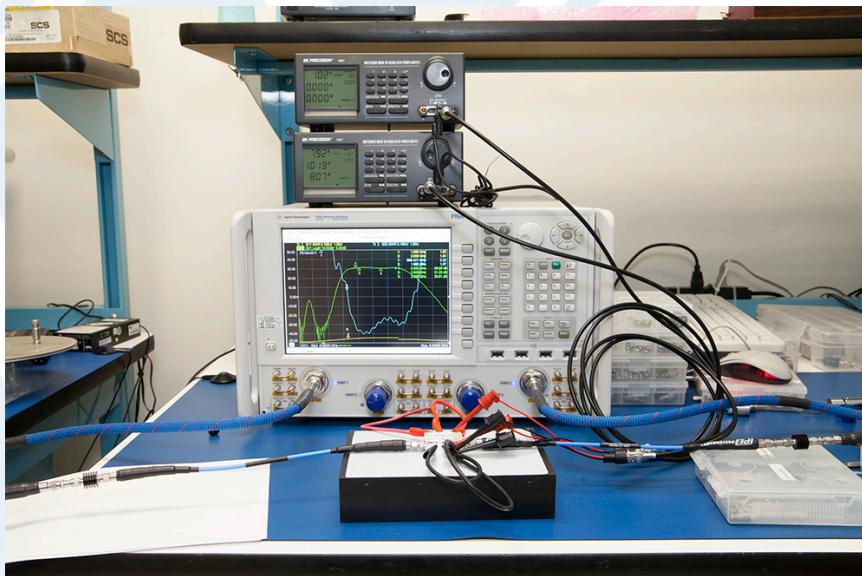
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6. Observe the gain and power output

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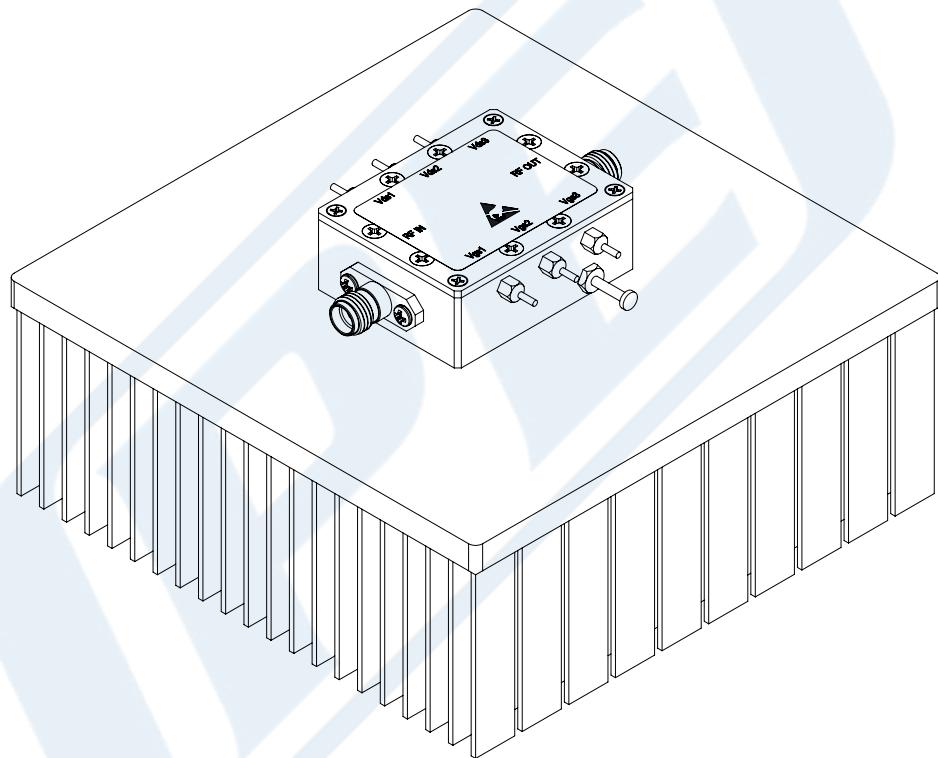


illustration of Amplifier mounted on Heatsink.  
Heatsink model **PE15C5014** sold separately.  
(Picture shown for Reference Only)

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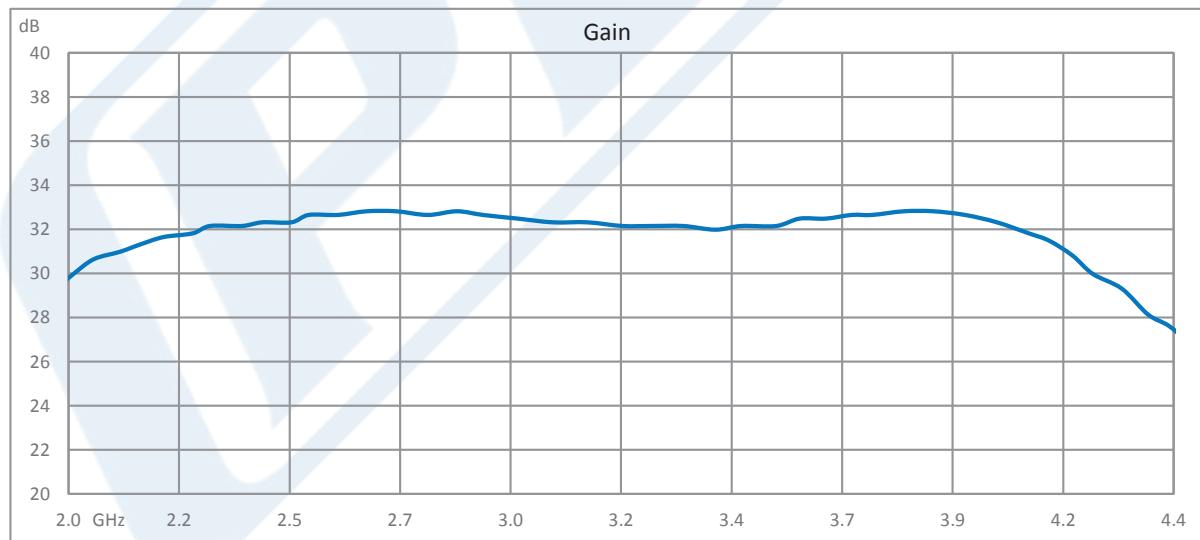
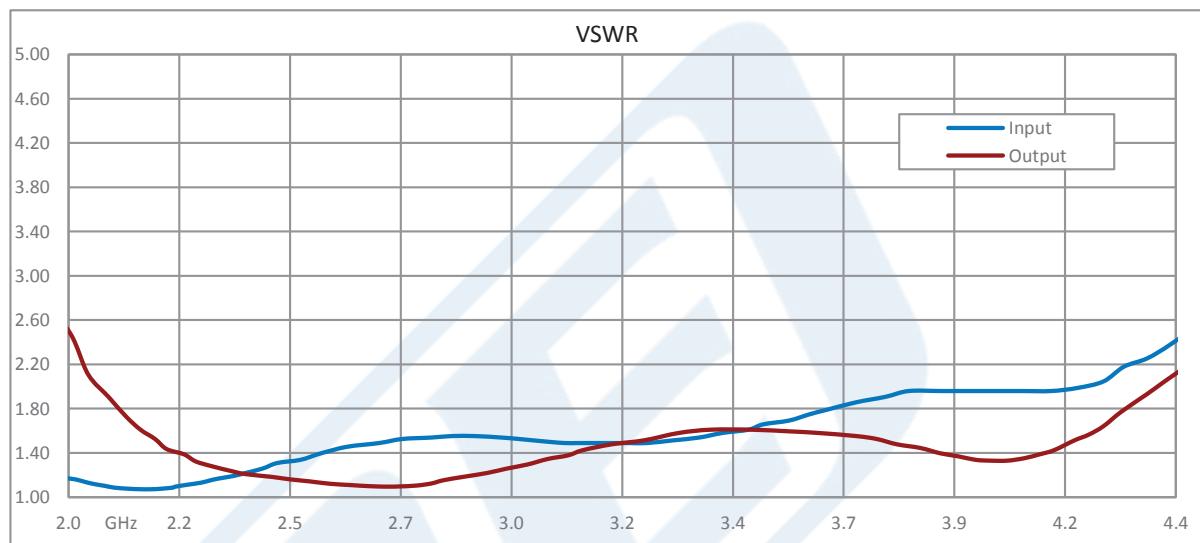


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### Typical Performance Data



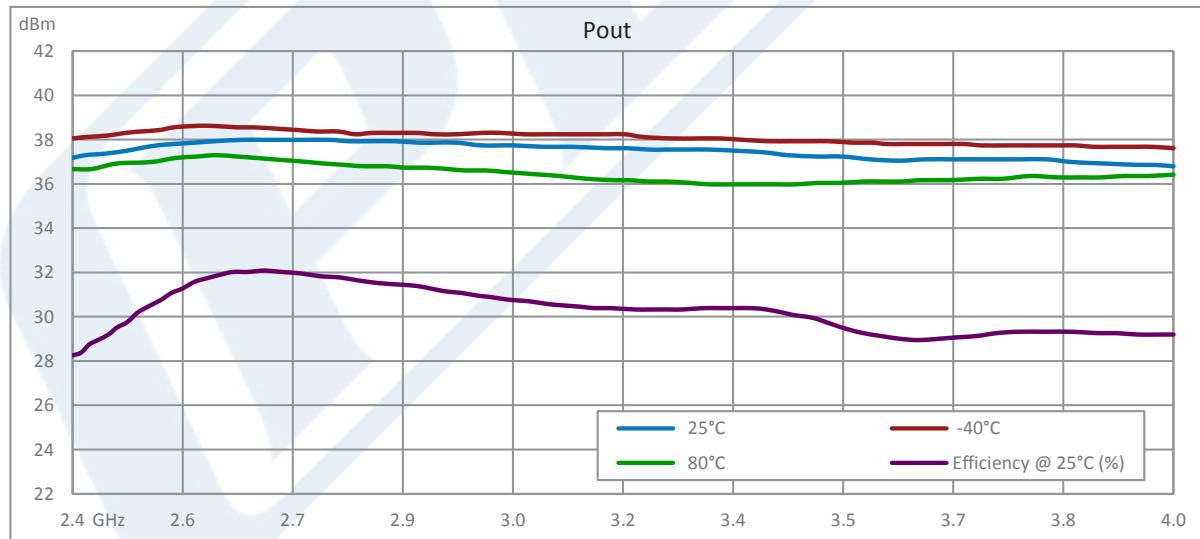
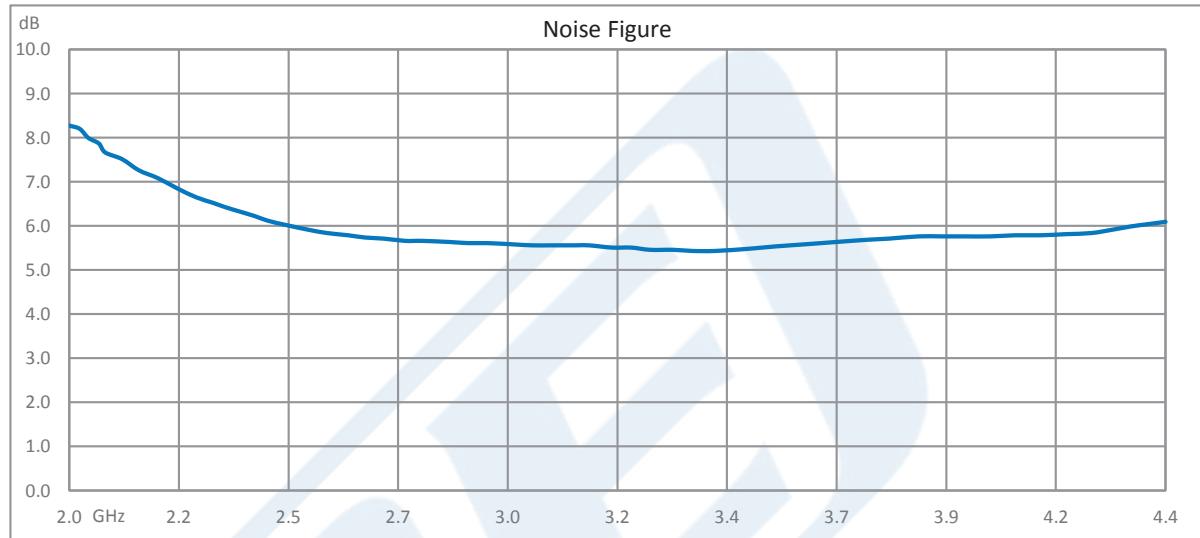
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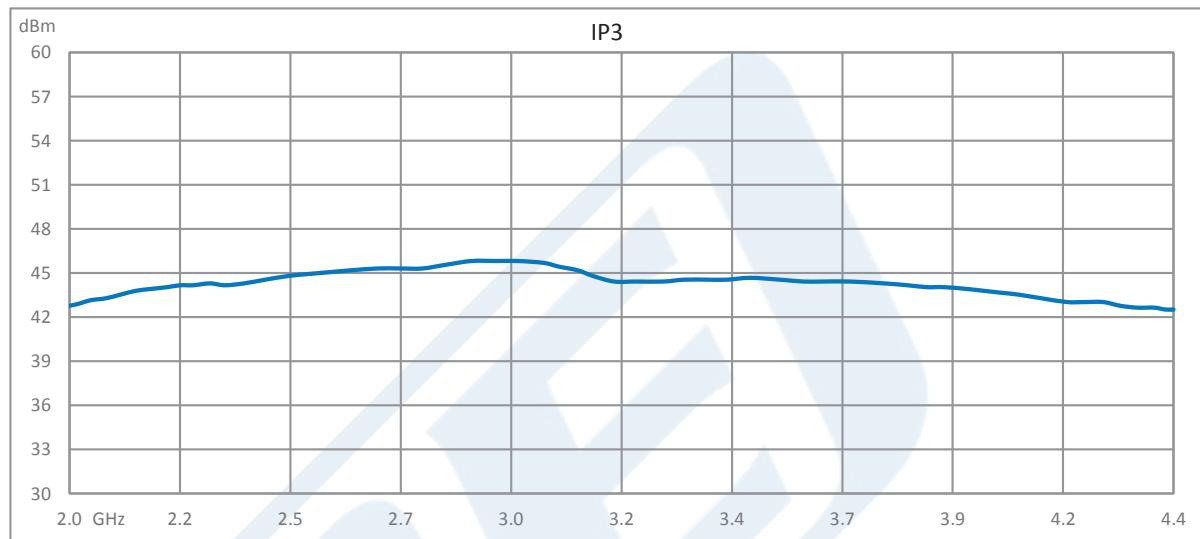
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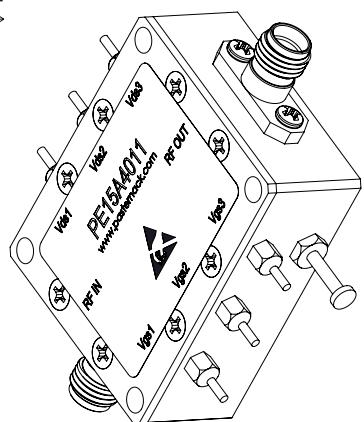
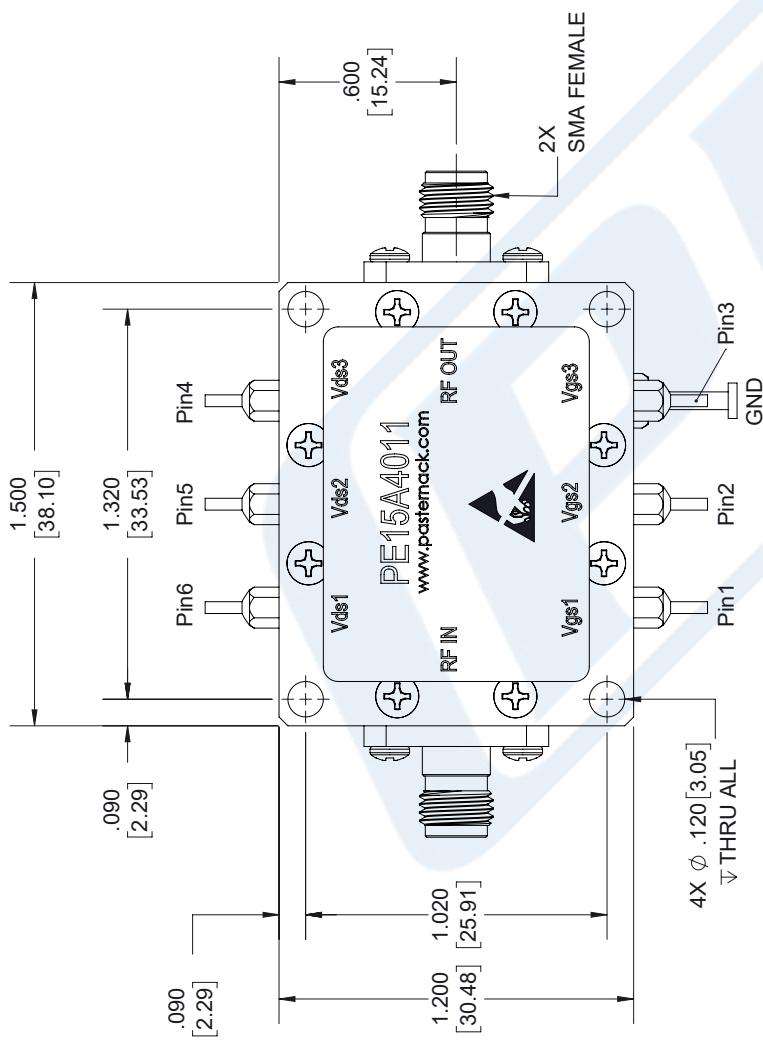
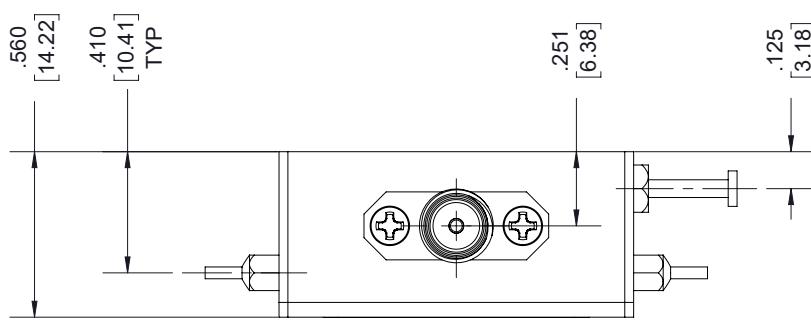
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URL: <https://www.pasternack.com/4.4-ghz-high-power-amplifier-32.5-db-gain-45-dbm-ip3-5.5-db-sma-pe15a4011-p.aspx>

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.

# PE15A4011 CAD Drawing

5 Watt Psat, 2 GHz to 4.4 GHz, High Power GaAs Amplifier,  
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| Pin Layout |           |        |  |
|------------|-----------|--------|--|
| Pin No.    | Functions | Bias   |  |
| 1          | Vgs1      | -0.80V |  |
| 2          | Vgs2      | -0.80V |  |
| 3          | Vgs3      | -0.80V |  |
| 4          | Vds3      | +8V    |  |
| 5          | Vds2      | +8V    |  |
| 6          | Vds1      | +8V    |  |

NOTES:  
1. RECOMMENDED CURRENT BIASES ARE 100mA, 300mA & 1400mA FOR THE FIRST,  
SECOND AND THIRD STAGES RESPECTIVELY.  
2. DO NOT APPLY Vds1, Vds2 & Vds3 WITHOUT PROPER NEGATIVE VOLTAGES ON Vgs1,  
Vgs2 & Vgs3.  
3. THE CURRENTS FLOWING OUT OF THE Vgs1, Vgs2 & Vgs3 PINS ARE LESS THAN 100µA,  
600µA & 12mA AT P1dB.

NOTES:  
1. UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE NOMINAL.  
2. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE AT ANY TIME.  
3. DIMENSIONS ARE IN INCHES [mm].

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| DWG TITLE | CAGE CODE | CAD FILE | SCALE N/A | SIZE A |
|-----------|-----------|----------|-----------|--------|
| PE15A4011 | 53919     | 05/21/18 |           | 7316   |

单击下面可查看定价, 库存, 交付和生命周期等信息

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