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# 5 Watt Psat, 7.5 GHz to 11 GHz, High Power GaAs Amplifier, SMA, 25 dB Gain

## TECHNICAL DATA SHEET PE15A4013

PE15A4013 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 7.5 to 11 GHz frequency range. The amplifier offers 25 dB small signal gain with ±2 dB gain flatness. 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. This Innovative design is characterized by light weight (45 g) and small size (1.5"x1.2"x0.56"). An available finned heatsink (model PE15C5014) is recommended to maintain an optimum baseplate temperature during operation. To prevent damage use Isolator PE8313 on RF output port.

### Features

- 7.5 GHz to 11 GHz Frequency Range
- P1dB Output Power: 33 dBm typ
- Psat: 37 dBm typ
- Small Signal Gain: 25dB typ
- Gain Flatness: ±2 dB typ
- Power Added Effiency @Psat: 30%
- Noise Figure: 10 dB
- 50 Ohm Input and Output Matched
- -40°C to +85°C Operating Temperature
- Unconditionally Stable
- Small Size & Light Weight
- EAR99 (No Export License Required)
- Manual Voltage Sequencing
- Optional Heatsink Available: Model PE15C5014

### Applications

- Telecom Infrastructure
- Fixed Microwave Backhaul
- Microwave Radio Systems
- Military & Space
- Radar & Sensors
- Satellite Communication
- Driver Amplifier
- High Power Output
- General Purpose Amplification

### Electrical Specifications (TA = +25°CVds1,2,3 = +5V , Ids1 + Ids2 = 0.7A , Ids3 = 1.3A , Vgs1,2 = -0.98V, Vgs3 = -0.98V**)

| Description | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|
| Frequency Range | 7.5 | | 11 | GHz |
| Small Signal Gain | 20 | 25 | 30 | dB |
| Gain Flatness | | ±2 | | dB |
| Input Power (CW) | | | +8 | dBm |
| Pout at Sat. | | +37 | | dBm |
| Efficiency Psat | | 30 | | % |
| Output Power at 1 dB Compression Point | | +33 | | dBm |
| Impedance (Input) | | 50 | | Ohms |
| Impedance (Output) | | 50 | | Ohms |
| Input Return Loss | | 10 | | dB |
| Output Return Loss | | 5 | | dB |
| Operating DC Drain Source Voltage | | 5 | | Volts |
| Operating DC Gate Source Voltage | | -1 | | Volts |
| Operating Temperature Range | -40 | | +85 | °C |
| Thermal Resistance | | 3.5 | | °C/W |

Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: 5 Watt Psat, 7.5 GHz to 11 GHz, High Power GaAs Amplifier, SMA, 25 dB Gain PE15A4013

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**Absolute Maximum Rating**

| Parameter | Rating | Units |
|---|---|---|
| Drain Source Voltage, Vds 1,2,3 | +7 | Volts |
| Gate Source Voltage, Vgs 1,2,3 | -3 | Volts |
| Drain Source Current Idsq 1,2 | 1.0 | A |
| Drain Source Current Idsq 1,2 | 3 | A |
| Continuous Dissipation at 25°C | 20 | W |
| Channel Temperature | 175 | °C |
| Operating Temperature (base-plate) | -40 to +85 | °C |
| Storage Temperature | -55° to +135 | °C |

### 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 | 0.108 lbs [48.99 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.

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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 = 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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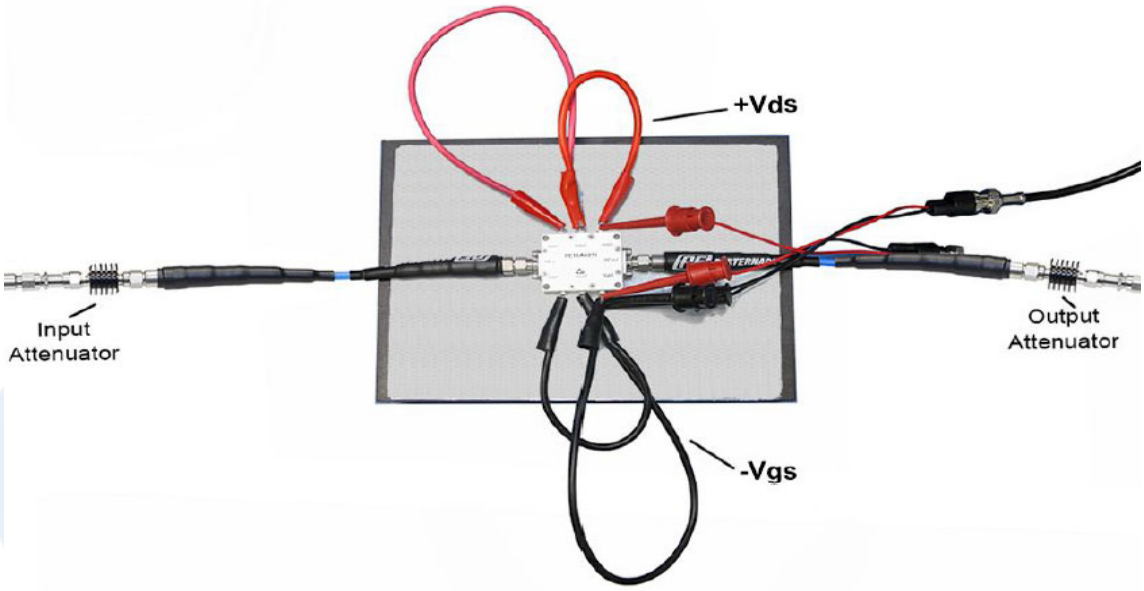
- GaAs PHEMT MMIC-Based Power up sequence

GaAs PHEMT MMIC-Based Power up sequence

1. Connect common ports
   a. Connect single GND lead
   b. Connect all -Vgs ports together
   c. Connect all +Vds 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 -Vgs voltage -1.0 Volts (Always apply -Vgs first).
5. Apply the +Vds +5 Volts (Then apply +Vds second).

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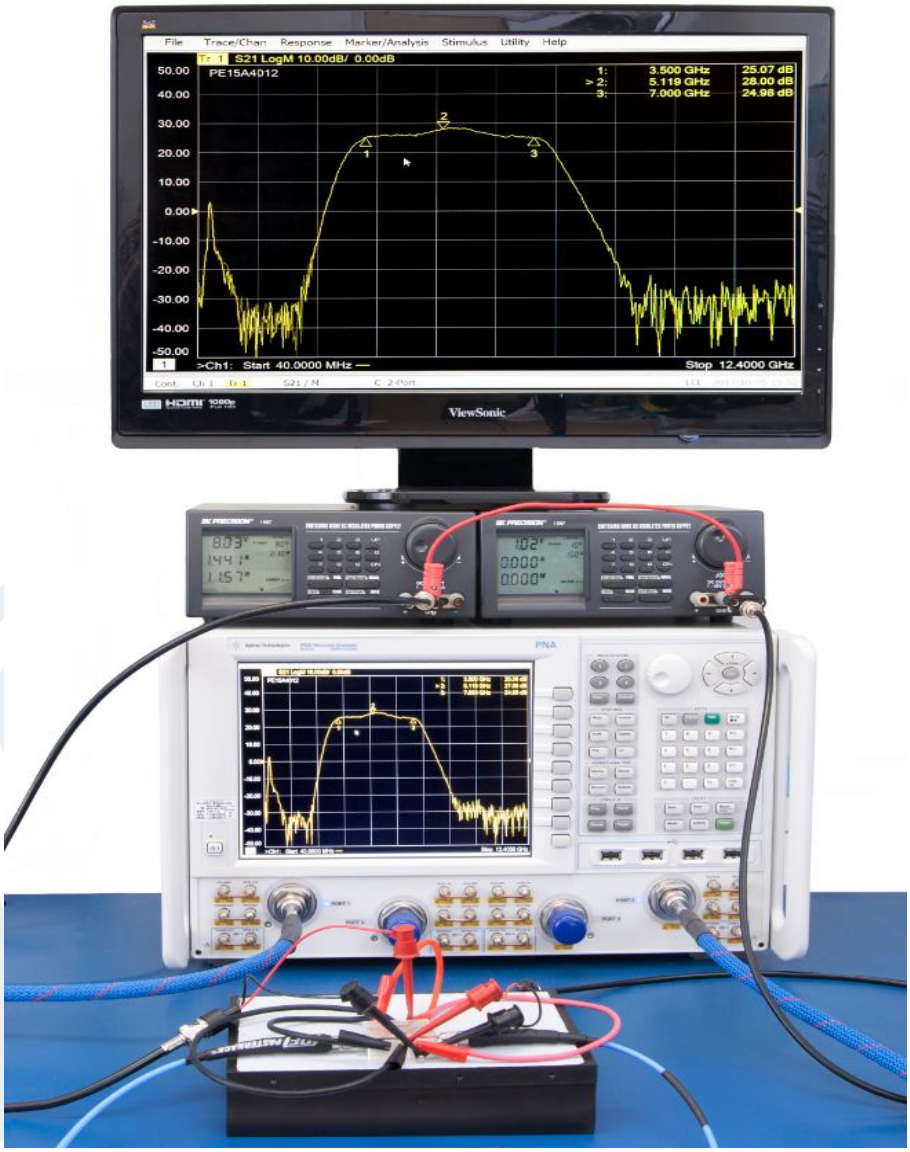
## TECHNICAL DATA SHEET PE15A4013




6. Observe the gain and power output

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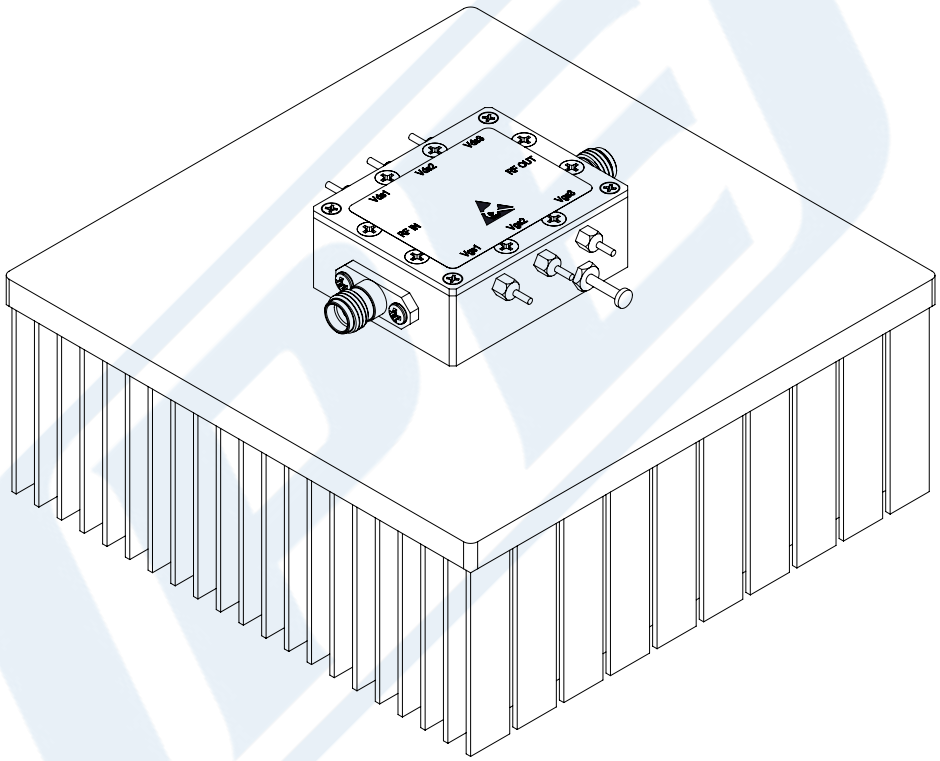

illustration of Amplifier mounted on Heatsink.
Heatsink model PE15C5014 sold separately.
(Picture shown for Reference Only)

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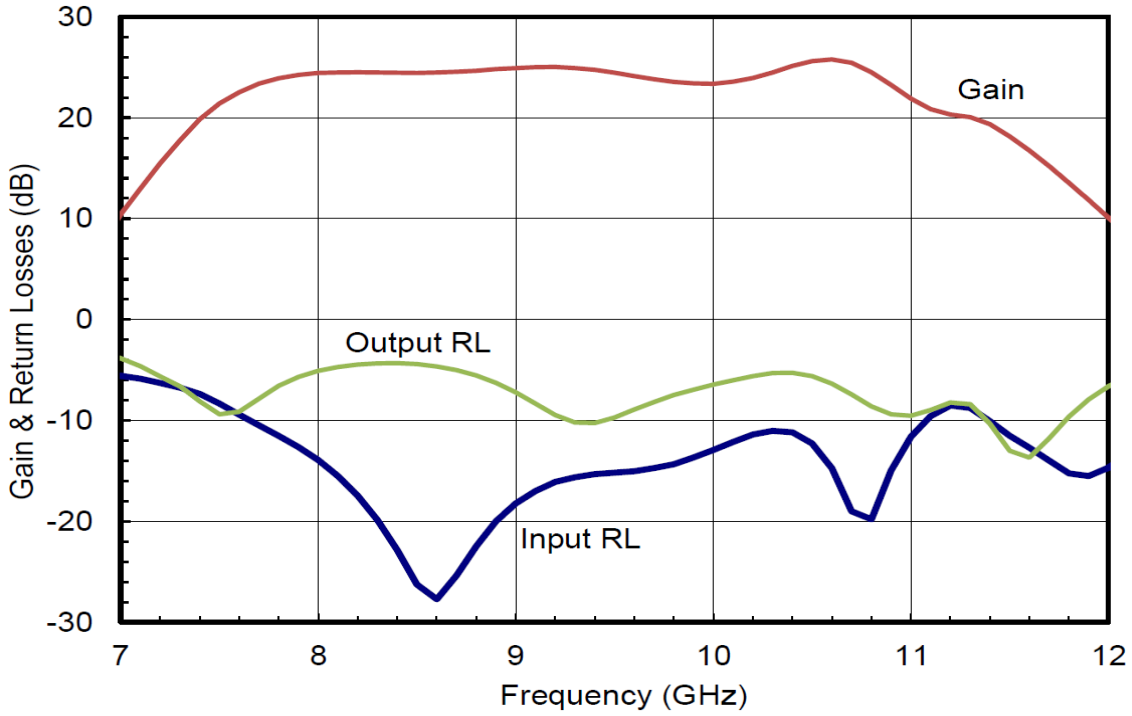
**Typical Performance Data**




* Module could be operated from 4V to 6V without noticeable change in small signal performance. Data shown is for +5V.

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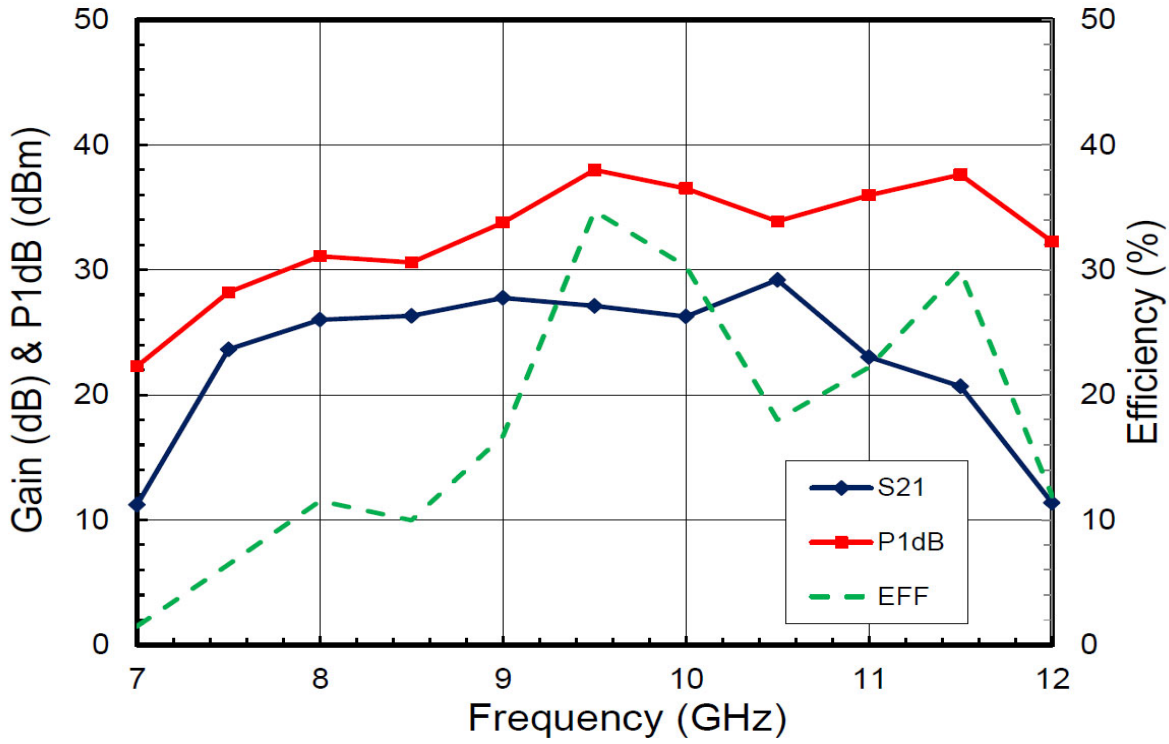


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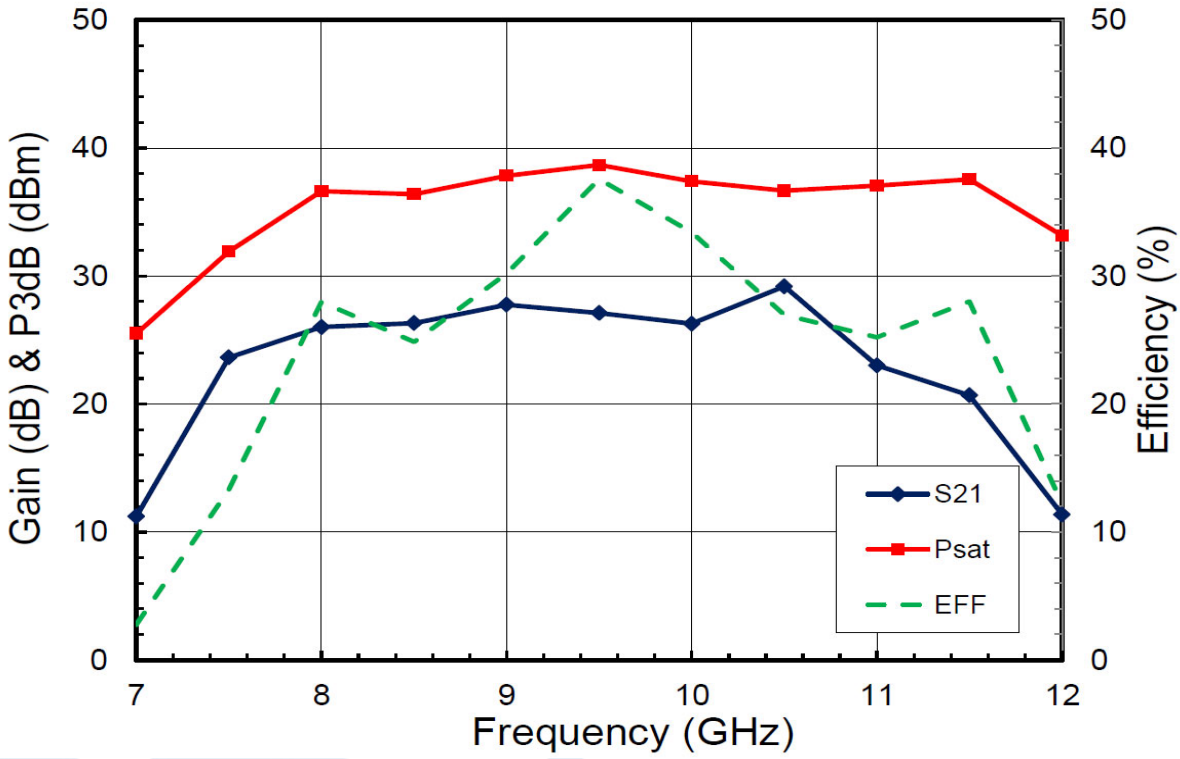


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URL: https://www.pasternack.com/11-ghz-high-power-amplifier-25-db-gain-sma-pe15a4013-p.aspx



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# PE15A4013 CAD Drawing

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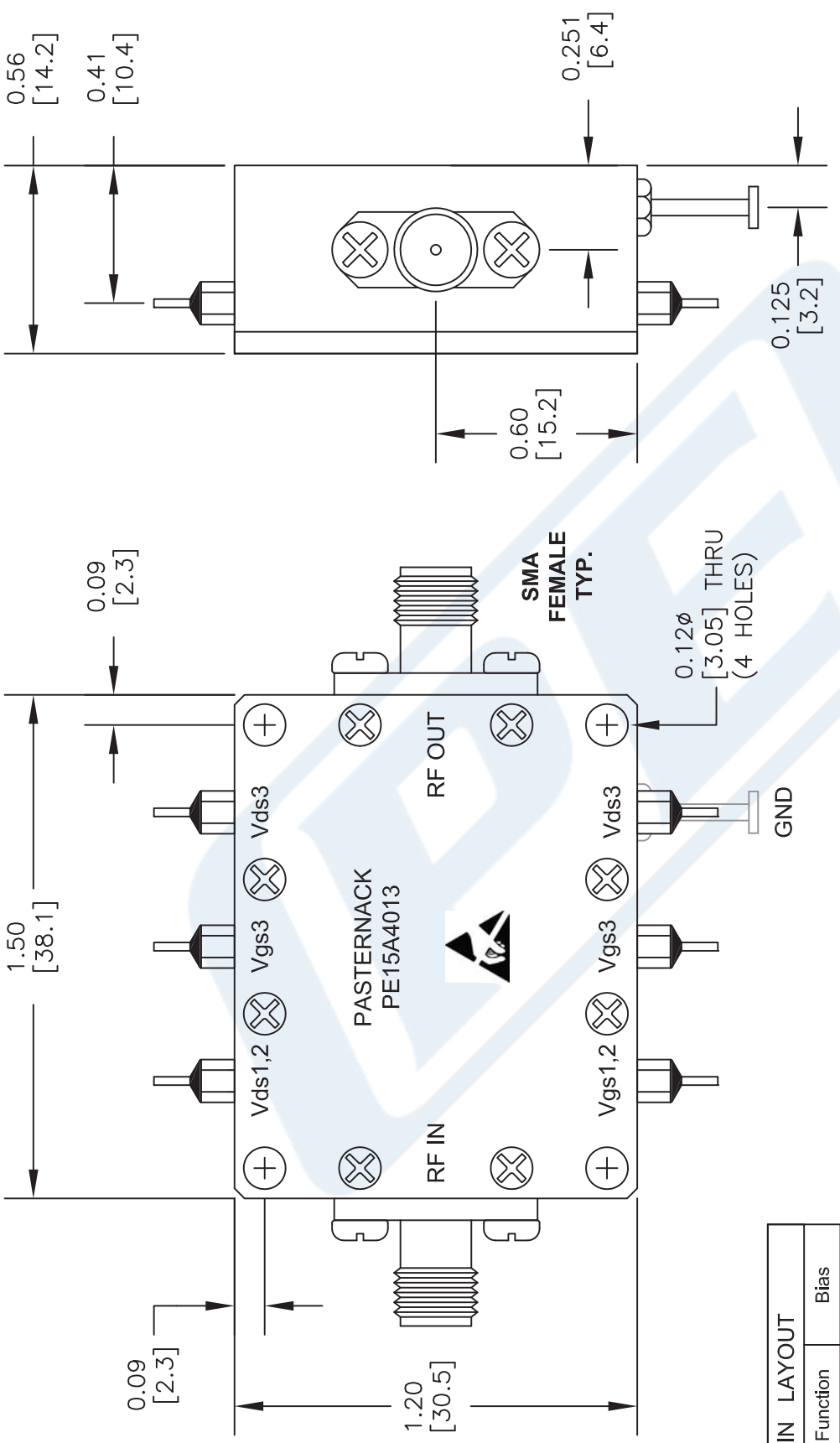


| PIN LAYOUT | | |
|---|---|---|
| Pin No. | Function | Bias |
| 1 | Vgs1,2 | −0.98V |
| 2 | Vgs3 | −0.98V |
| 3 | Vgs3 | −0.98V |
| 4 | Vds3 | +5V |
| 5 | Vgs3 | −0.98V |
| 6 | Vds1,2 | +5V |

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].

DWG TITLE: PE15A4013

CAD FILE 052115 | SCALE N/A | SIZE A | 2233

FSCM NO. 53919


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