

Medium Power Amplifier at 2 Watt P1dB Operating From 1 GHz to 2 GHz with 35 dB Gain, 45 dBm IP3 and SMA



SPA-020-27-02-SMA

Features

- 1 GHz to 2 GHz Frequency Range
- P1dB: 33 dBm
- High Small Signal Gain: 35 dB
- Gain Flatness: ± 0.75 dB
- Gain Variation: ± 1.5 dB
- Output IP3: 45 dBm
- Noise Figure: 3.5 dB
- Reverse Isolation: 55 dB
- 50 Ohm Input and Output Matched
- -40 to $+75^{\circ}\text{C}$ Operating Temperature
- Unconditionally Stable
- Single DC Positive Supply
- Built-in Voltage Regulator

Applications

- Laboratory Applications
- R&D Labs
- Radar Systems
- Telecom Infrastructure
- Test Instrumentation
- Military & Space
- Communication Systems
- Satellite Communications
- Wireless Communications
- Microwave Radio Systems
- Power Amplifier
- Low Noise Amplifier
- High Dynamic Range Amplifier
- General Purpose Amplification

Description

The SPA-020-27-02-SMA is a L-band coaxial 2W high dynamic range power amplifier, operating in the 1 to 2 GHz frequency range and designed for low noise and high linearity applications. The amplifier offers 33 dBm of P1dB and high 35 dB small signal gain, with the excellent gain flatness of ± 1.0 dB max, along with an outstanding IP3 performance of 45 dBm and 3.5 dB Noise Figure. This performance is achieved through using hybrid MIC design and advanced GaAs PHEMT devices. This power amplifier requires only a single positive DC supply, Unconditionally stable, and operates over the temperature range of -40°C to 75°C .

Electrical Specifications (TA = $+25^{\circ}\text{C}$, DC Voltage = +12Volts, DC Current = 1A)

| Description | Min | Typ | Max | Unit |
|--|-------|------------|---------|------|
| Frequency Range | 1 | | 2 | GHz |
| Small Signal Gain | 33 | 35 | 37 | dB |
| Gain Flatness | | ± 0.75 | ± 1 | dB |
| Gain Variation | | ± 1.5 | | dB |
| Gain Variation Over Temperature | | 1.5 | | dB |
| Input Power (CW) | | | +10 | dBm |
| Pout at Sat. | +32.5 | +33.5 | | dBm |
| Output Power at 1 dB Compression Point | +32 | +33 | | dBm |
| Output 3rd Intercept Point | +38 | +42 | | dBm |
| Reverse Isolation | 45 | 55 | | dB |
| Noise Figure | | 3.5 | 4 | dB |
| Spurious | | | -60 | dBc |
| Impedance (Input) | | 50 | | Ohms |
| Impedance (Output) | | 50 | | Ohms |
| Input VSWR | | 1.5:1 | 1.8:1 | |

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Electrical Specifications (TA = +25°C, DC Voltage = +12Volts, DC Current = 1A)

| Description | Min | Typ | Max | Unit |
|-----------------------------|-------|-------|-------|-------|
| Output VSWR | | 1.4:1 | 1.6:1 | |
| Operating DC Voltage | +11.5 | +12 | +13 | Volts |
| Operating DC Current | 800 | 1000 | 1200 | mA |
| Operating Temperature Range | -40 | | +75 | °C |

Absolute Maximum Rating

| Parameter | Rating | Units |
|------------------------------------|-------------|-------|
| Source Voltage | +15 | Volts |
| RF input Power | +10 | dBm |
| Operating Temperature (base-plate) | -40 to +75 | °C |
| Storage Temperature | -55 to +125 | °C |



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

Mechanical Specifications

Size

| | |
|------------------|----------------------|
| Length | 2.75 in [69.85 mm] |
| Width | 1.45 in [36.83 mm] |
| Height | 0.5 in [12.7 mm] |
| Weight | 0.1585 lbs [71.89 g] |
| Input Connector | SMA Female |
| Output Connector | SMA Female |

Environmental Specifications

Temperature

| | |
|-----------------|-------------------|
| Operating Range | -40 to +75 deg C |
| Storage Range | -55 to +125 deg C |

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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.

Caution: This Power Amplifier is matched for a 50 ohm input and output load impedance. Applications such as driving a wideband antenna can introduce a load impedance mismatch condition that could result in reflected waves potentially damaging the amplifier output power stage which will void the warranty. Pasternack highly recommends using an Isolator at the output port of the power amplifier where the termination load will absorb any potentially damaging signal reflections.

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Amplifier Power-up Precautions

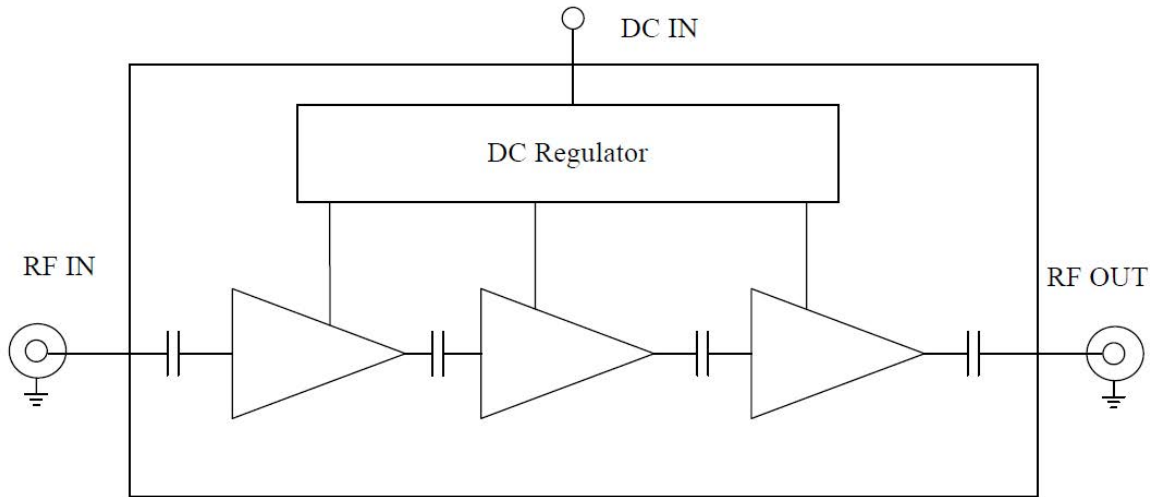
- 1.) Confirm that proper ESD precautions and controls are always in place before handling any Amplifier module.
- 2.) Confirm adequate thermal management is in place to effectively dissipate heat away from the Amplifier package. The Amplifier operational baseplate temperature must be within the operational 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.) 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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Functional Block Diagram

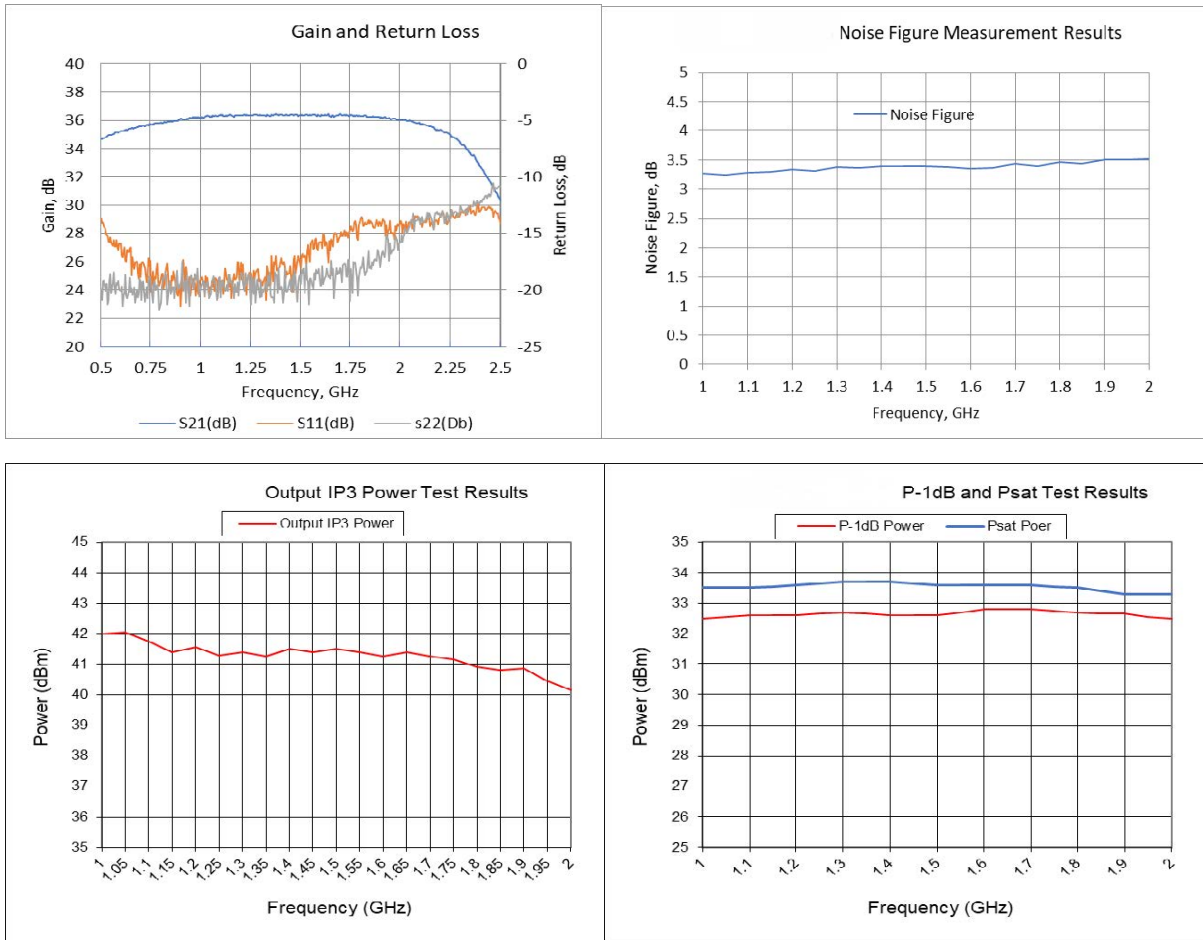


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Typical Performance Data



Medium Power Amplifier at 2 Watt P1dB Operating From 1 GHz to 2 GHz with 35 dB Gain, 45 dBm IP3 and SMA from Fairview Microwave is in-stock and available to ship same-day. All of our RF/microwave products are available off-the-shelf from our ISO 9001:2008 certified facilities in Lewisville, Texas. Fairview Microwave is RF on-demand.

For additional information on this product, please click the following link: [Medium Power Amplifier at 2 Watt P1dB Operating From 1 GHz to 2 GHz with 35 dB Gain, 45 dBm IP3 and SMA SPA-020-27-02-SMA](https://www.fairviewmicrowave.com/medium-power-amplifier-2watt-35db-spa-020-27-02-sma)

URL: <https://www.fairviewmicrowave.com/medium-power-amplifier-2watt-35db-spa-020-27-02-sma-p.aspx>

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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. Fairview Microwave reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Fairview Microwave does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Fairview Microwave does not assume any liability arising out of the use of any part or documentation.

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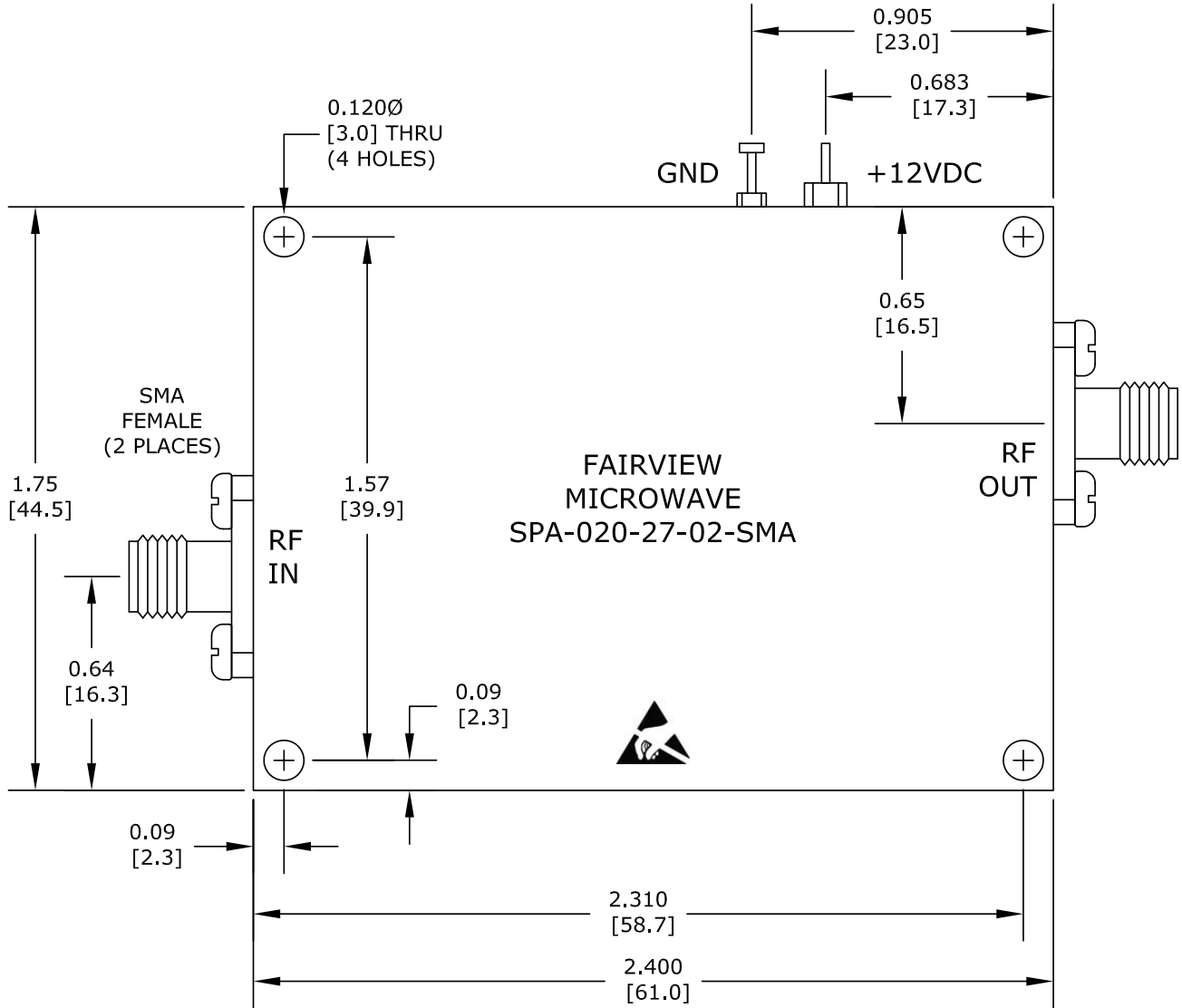
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SPA-020-27-02-SMA CAD Drawing

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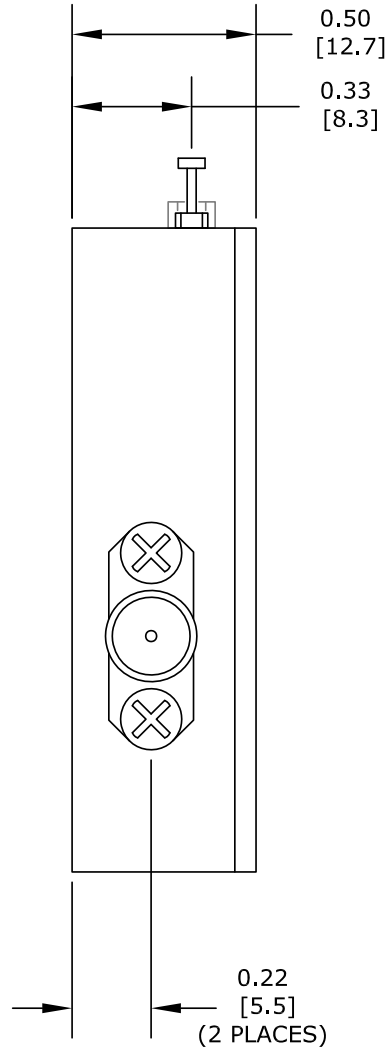


NOTE:
HEAT SINK REQUIRED FOR PROPER OPERATION,
UNIT IS COOLED BY CONDUCTING TO HEAT SINK.

| | | | | | |
|---|----------|---|-------|-----------|------|
| FAIRVIEW MICROWAVE INC. ALLEN, TX 75013 WWW.FAIRVIEWMICROWAVE.COM | | 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]. | | | |
| TITLE | DWG NO | SPA-020-27-02-SMA | | CAGE CODE | |
| | | | | 3FKR5 | |
| | CAD FILE | 092314 | SHEET | SCALE | N/A |
| | | | | SIZE | A |
| | | | | | 2233 |

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