

## 35 dB min Gain, Temperature Compensated Low Noise Amplifier, 22 dBm P1dB Operating from 2 GHz to 8 GHz with SMA and Heatsink

The FMAM5104F is a temperature compensated RF amplifier with an integrated heatsink assembly that covers a broadband frequency from 2 GHz to 8 GHz. The GaAs FET design utilizes PIN diode compensation circuitry that adjusts gain levels as the device is exposed to temperature variations. At high temperatures, the gain level will be about 1 to 1.5 dB lower and at low temperatures the gain level will be about 1 to 1.5 dB higher. The gain level will always be higher than the minimum specified gain level of 35 dB over the full operational temperature range of -55°C to +85°C. Impressive typical performance for the 50 ohm design includes 3.8 dB Noise Figure, +22dBm P1dB, and 1.4:1 VSWR. DC Bias Voltage ranges from +12V to +15V with 350 mA DC current. The rugged and compact Mil Grade aluminum package supports SMA female spark plug connectors, and is designed to meet a series of Mil-STD-202 environmental test conditions including Altitude, Vibration, Humidity, and Shock.

### Electrical Specifications

(TA = +25°C)

| Description                 | Min | Typ   | Max  | Unit  |
|-----------------------------|-----|-------|------|-------|
| Frequency Range             | 2   |       | 8    | GHz   |
| Small Signal Gain           | 35  | 39    |      | dB    |
| Gain Flatness               |     | ±1    | ±1.5 | dB    |
| P1dB                        | +20 | +22   |      | dBm   |
| Noise Figure                |     | 3.8   | 5    | dB    |
| Impedance (Input)           |     | 50    |      | Ohms  |
| Impedance (Output)          |     | 50    |      | Ohms  |
| Input VSWR                  |     | 1.4:1 | 2:1  |       |
| Output VSWR                 |     | 1.4:1 | 2:1  |       |
| Operating DC Voltage        | +12 |       | +15  | Volts |
| Operating DC Current        |     | 350   |      | mA    |
| Operating Temperature Range | -55 |       | +85  | °C    |

Electrical Specification Notes: \*Minimum Gain Guaranteed over -55°C to +85°C

### Mechanical Specifications

| Size             |                     |
|------------------|---------------------|
| Length           | 2.756 in [70 mm]    |
| Width            | 2.756 in [70 mm]    |
| Height           | 1.187 in [30.15 mm] |
| Weight           | 0.9 lbs [408.23 g]  |
| Input Connector  | SMA Female          |
| Output Connector | SMA Female          |

### Environmental Specifications

| Temperature     |  |
|-----------------|--|
| Operating Range | -55 to +85 deg C                       |
| Storage Range   | -40 to +100 deg C                      |
| Humidity        | MIL-STD-202F, Method 103B, Condition B |



### Features:

- Temperature Compensated GaAs FET Amplifier Design with Integrated Heatsink
- Frequency Range 2 GHz to 8 GHz
- PIN Diode Compensation Circuitry
- Small Signal Gain 39 dB typ
- Operational Temperature Range -55°C to +85°C
- Noise Figure 3.8 dB typ
- Output P1dB +22 dBm typ
- VSWR 1.4:1 typ
- DC Voltage +12 to +15 Vdc
- DC Current 350 mA
- SMA Female Connectors
- Rugged Mil Grade Aluminum Package Design
- Designed to meet MIL-STD-202 environmental test conditions

### Applications:

- Aerospace & Defense
- Test & Measurement
- Microwave Radio Systems
- Military & Commercial Communication Systems
- Research & Development
- RF Front Ends
- SATCOM
- Wireless Communications
- Unmanned Systems

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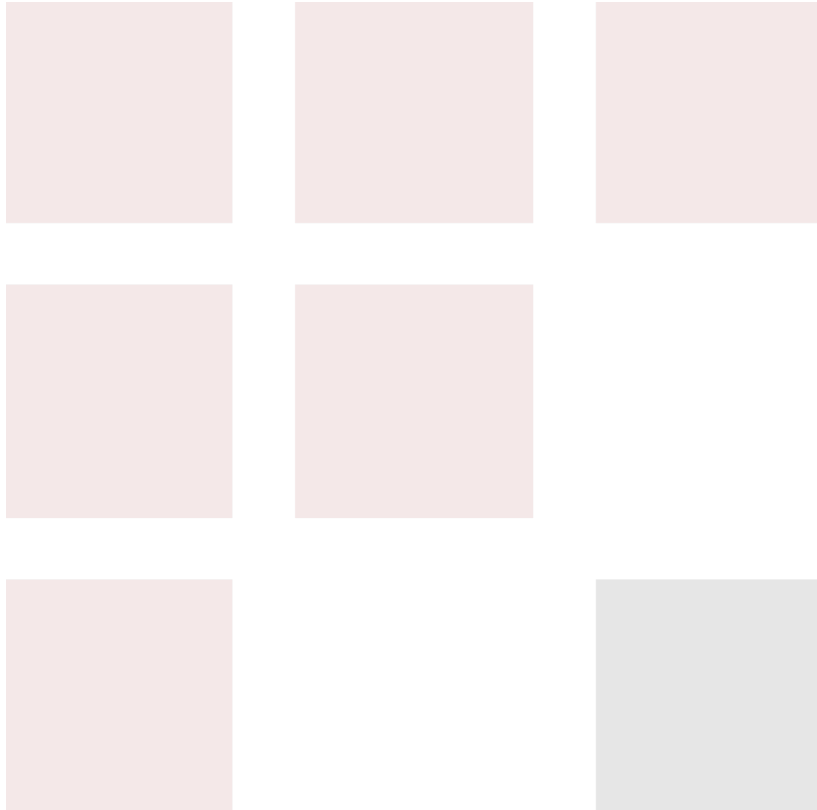
|           |  |
|-----------|--|
| Shock     | MIL-STD-202F, Method 213B, Condition B |
| Vibration | MIL-STD-202F, Method 204D, Condition B |
| Altitude  | MIL-STD-202F, Method 105C, Condition B |

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

**Plotted and Other Data**

Notes:

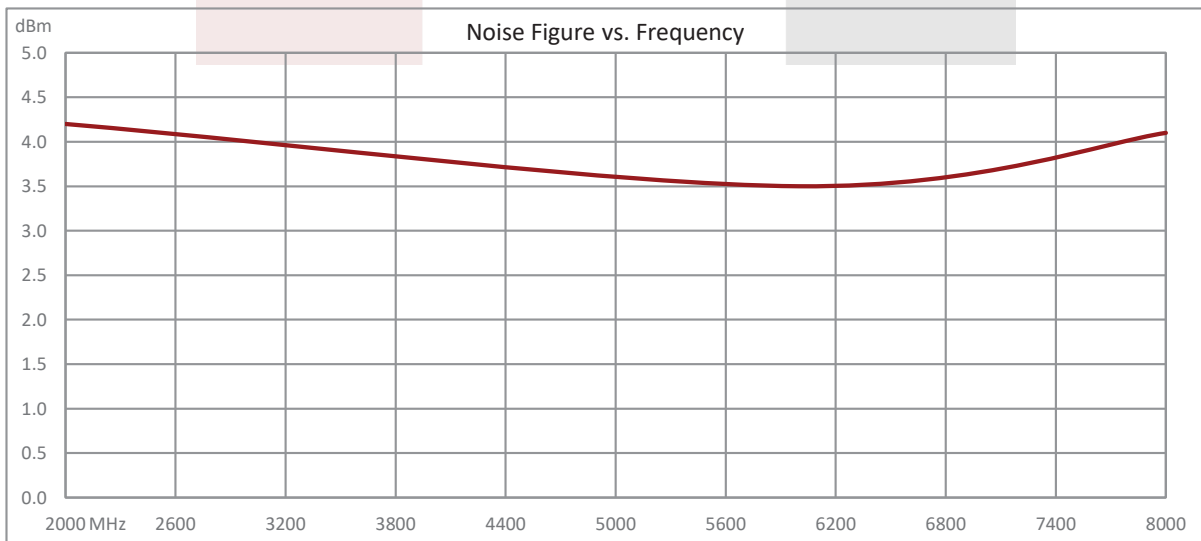
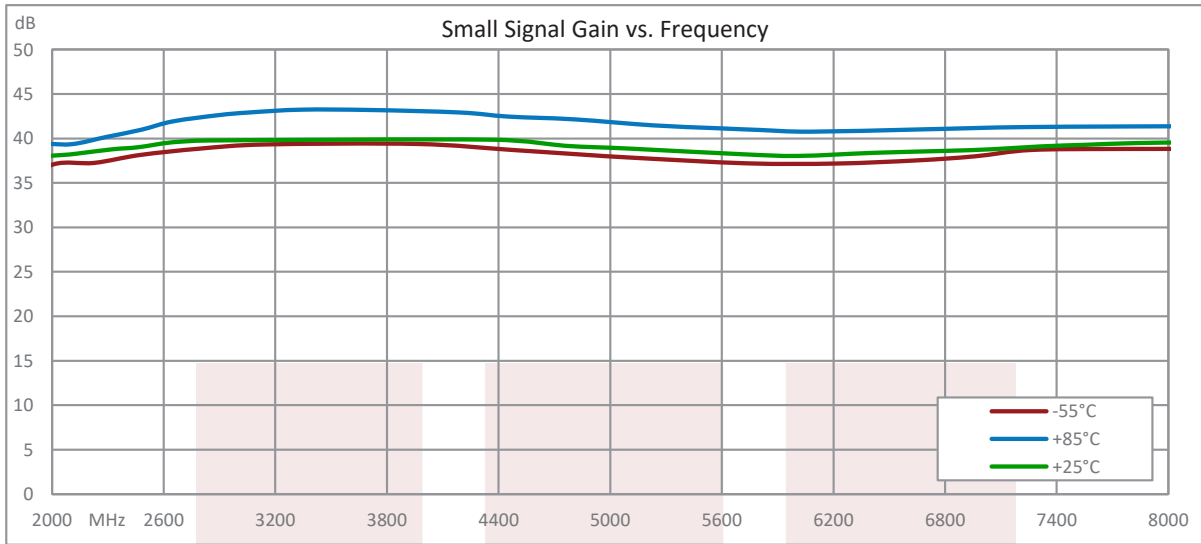
- Values at 25 °C, sea level
- ESD Sensitive Material, Transport material in Approved ESD bags. Handle only in approved ESD Workstation.//Heat Sink Required for Proper Operation, Unit is cooled by conduction to heat sink.

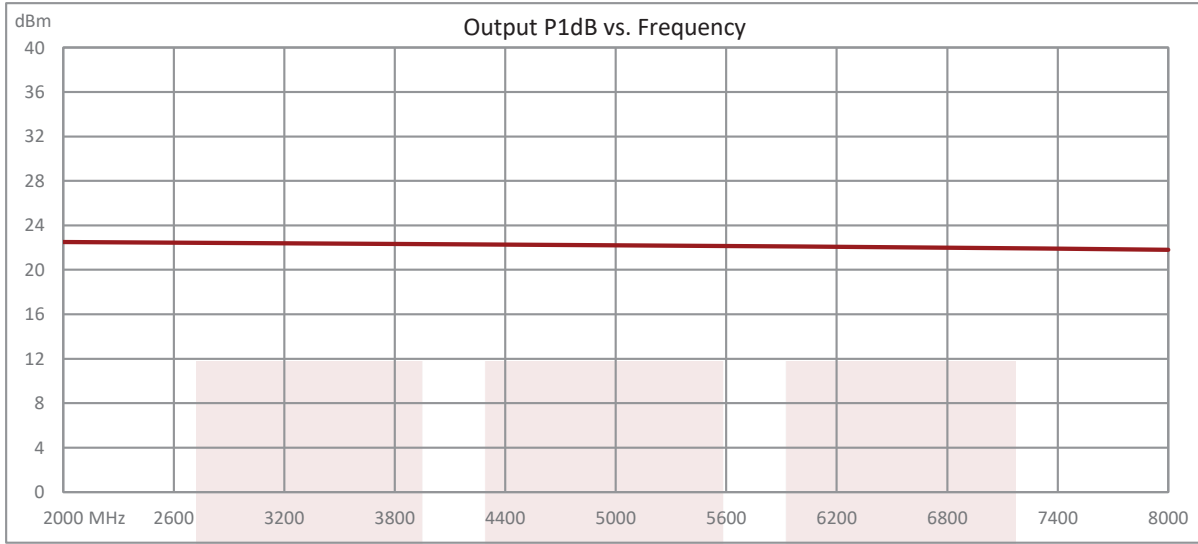


## Amplifier Power-up Precautions

- 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.

## Typical Performance Data





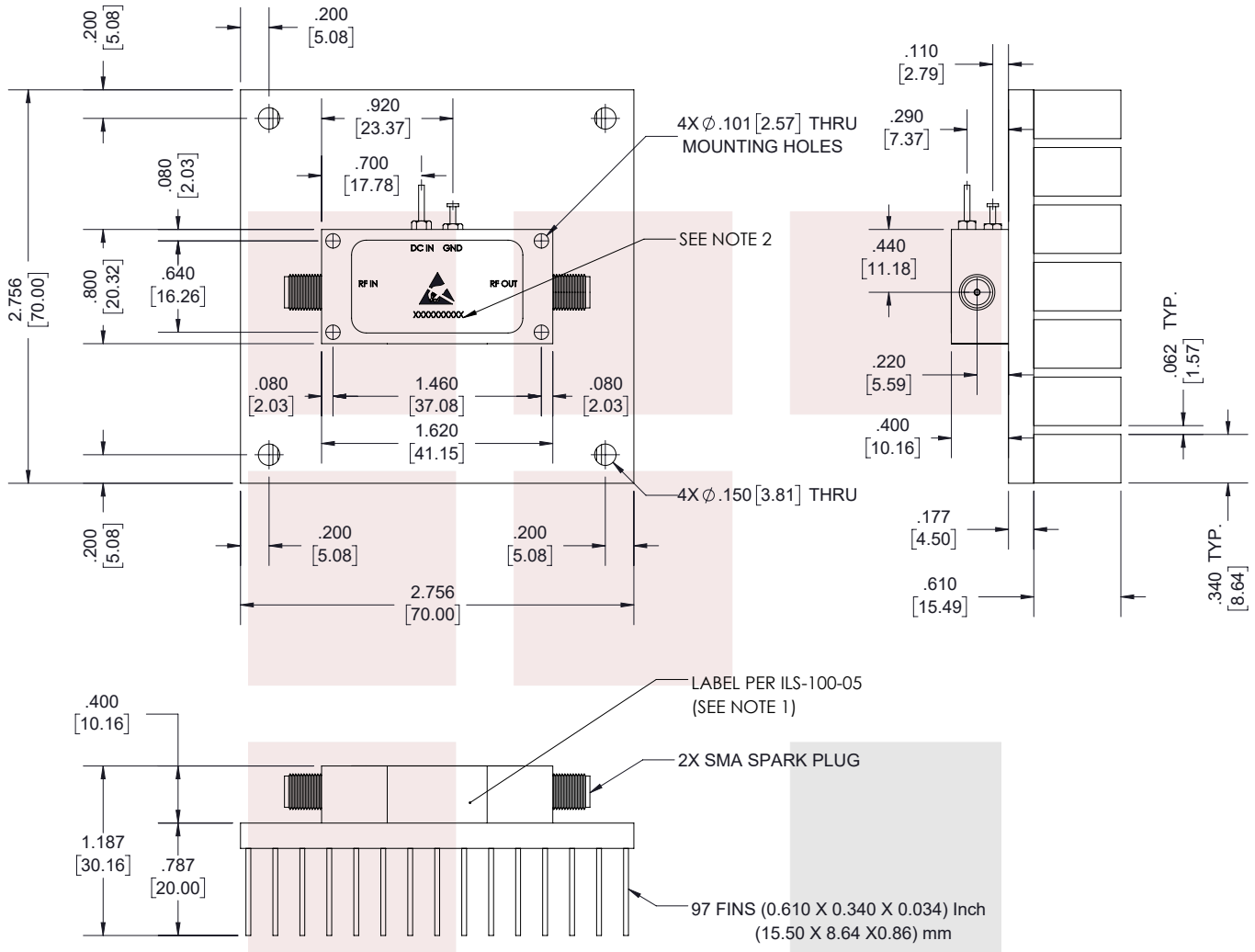
35 dB min Gain, Temperature Compensated Low Noise Amplifier, 22 dBm P1dB Operating from 2 GHz to 8 GHz with SMA and Heatsink from Fairview Microwave is in-stock and available to ship same-day. All of our RF/microwave products are available off-the-shelf from our ISO 9001:2008 certified facilities in Lewisville, Texas. Fairview Microwave is RF on-demand.

For additional information on this product, please click the following link: [35 dB min Gain, Temperature Compensated Low Noise Amplifier, 22 dBm P1dB Operating from 2 GHz to 8 GHz with SMA and Heatsink FMAM5104F](#)

URL: <https://www.fairviewmicrowave.com/medium-power-amplifier-20dbm-35db-fmam5104f-p.aspx>

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| REVISIONS |                 |            |          |
|-----------|-----------------|------------|----------|
| REV.      | DESCRIPTION     | DATE       | APPROVED |
| A         | INITIAL RELEASE | 05/20/2021 | TGALLA   |



**NOTES:**

- LABEL PER ILS-100-05. FOR INTERNAL REFERENCE ONLY. LABEL LOCATION SHOULD BE SAME AS SHOWN.
- SERIAL NUMBER AND DATE CODE ARE COMBINED. EX: 202008280001.

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|---|--|---|-----------------------------|-----------------------------|-----------------|--------|---|-------------------|-------------|--|---|--------------------------------------|---|--|--|----------------------------|--|
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|   | .X ± .2 [5.08]   | FRACTIONS                                   | L ≤ 12 [305] = +1 [25] / -0 |                             |                 |        |   |                   |             |  |   |                                      |   |  |  |                            |  |
| .XX ± .02 [.51]   | ± 1/32   | 12 [305] < L ≤ 60 [1524] = +2 [51] / -0     |                             |                             |                 |        |   |                   |             |  |   |                                      |   |  |  |                            |  |
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| <p>TITLE</p> <p><b>35 dB min Gain, Temperature Compensated Low Noise Amplifier, 22 dBm P1dB Operating from 2 GHz to 8 GHz with SMA and Heatsink</b></p> | <p>ALL DIMENSIONS SHOWN ARE FOR REFERENCE ONLY.</p> <table border="1"> <tr> <td>SIZE</td> <td>CAGE CODE</td> <td>DRAWN BY</td> <td>ITEM NO.</td> <td>REV</td> </tr> <tr> <td>A</td> <td>3FKR5</td> <td>MVEERAPPAN</td> <td>FMAM5104F</td> <td>A</td> </tr> </table>  | SIZE  | CAGE CODE                   | DRAWN BY                    | ITEM NO.        | REV    | A                                       | 3FKR5             | MVEERAPPAN  | FMAM5104F                                  | A | <p>SHEET 1 OF 1</p> <p>SCALE N/A</p> |   |  |  |                            |  |
| SIZE  | CAGE CODE  | DRAWN BY                                    | ITEM NO.                    | REV                         |                 |        |   |                   |             |  |   |                                      |   |  |  |                            |  |
| A   | 3FKR5  | MVEERAPPAN                                  | FMAM5104F                   | A                           |                 |        |   |                   |             |  |   |                                      |   |  |  |                            |  |

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