

# Solid State Broadband High Power Amplifier

**2227**
**100 – 1000 MHz / 1600 Watts**

The 2235 is suitable for multi-octave bandwidth high power CW, modulated, and pulse applications. This amplifier utilizes high power LDMOS devices that provide wide frequency response, high gain, high peak power capability, and low distortions. Exceptional performance, long-term reliability and high efficiency are achieved by employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, and all qualified components. The amplifier is constructed with 11RU multi-drawer system including the forced air-cooling.

The amplifier includes a built-in control and monitoring system, with protection functions which preserve high availability. Remote management and diagnostics are via an embedded web server allowing network managed site status and control simply by connecting the unit's Ethernet port to a LAN. Using a web browser and the unit's IP address (IPv4) allows ease of access with the benefit of multi-level security. The control system core runs an embedded OS (Linux), has a built-in non-volatile memory for event recording, and factory setup recovery features. The extended memory option allows storage of control parameters and event logs.

Empower RF's ISO9001:2015 Quality Assurance Program assures consistent performance and the highest reliability.

- Solid-state, Class AB, compact modular design
- Suitable for CW, AM, FM, Pulse and some linear applications (Consult factory for other modulation types)
- Embedded directional coupler – Eliminates the need for external component
- 50 ohm input/output impedance
- Built-in Control, Monitoring and Protection functions
- High reliability and ruggedness



## ELECTRICAL SPECIFICATIONS over temperature conditions (-10 to +50°C)

| Parameter  | Symbol           | Min  | Typ  | Max       | Unit |
|--|------------------|------|------|-----------|------|
| Operating Frequency  | BW               | 100  |      | 1000      | MHz  |
| Power Output CW <sup>(Note 1)</sup>                                      | P <sub>SAT</sub> | 1600 | 2000 |           | Watt |
| Power Output @ 1dB Gain Compression <sup>(Note 2)</sup>                  | P <sub>1dB</sub> | 1300 |      |           | Watt |
| Power Gain @ 1dB Gain Compression  | G <sub>1dB</sub> | 63   |      |           | dB   |
| Input Power for Rated P <sub>SAT</sub>                                   | P <sub>IN</sub>  |      | 0    |           | dBm  |
| Input Power Range  | P <sub>IN</sub>  | -3.0 |      | +3.0      | dBm  |
| Small Signal Gain / Leveled (ALC) – Flatness                             | ΔG               |      |      | ±3.5/±1.0 | dB   |
| Gain Adjustment Range  | VVA              | 20   |      |           | dB   |
| Input Return Loss  | S <sub>11</sub>  |      |      | -10       | dB   |
| Noise Figure @ maximum gain  | NF               |      |      | 20/15     | dB   |
| Third Order Intermodulation Distortion 2-Tone @ 54dBm/Tone, 1MHz Spacing | IM3              |      | -20  |           | dBc  |
| Harmonics @ P <sub>OUT</sub> = 1600W                                     | 2 <sup>ND</sup>  |      |      | -20       | dBc  |
|  | 3 <sup>RD</sup>  |      |      | -10       |      |
| Spurious Signals   | Spur             |      |      | -60       | dBc  |
| Operating Voltage – 3Phase-Delta, 47-440Hz                               | V <sub>AC</sub>  | 180  | 208  | 260       | Volt |
| Power Consumption @ 1600W CW   | P <sub>D</sub>   |      |      | 10        | kVA  |

Notes: 1. CW measurement performed in MGC Mode (Manual Gain Control)  
 2. P<sub>1dB</sub> measurements performed with AM 80% depth of modulation, 1 kHz modulation signal

## MECHANICAL SPECIFICATIONS

| Parameter  | Value  | Unit                  |
|--|--|-----------------------|
| Dimensions W x H x D<br>(excluding handles, connectors and brackets) | 17.00 x 19.25 x 22.00<br>(3U +5U+3U)               | Inch                  |
| Weight   | 300  | Pound                 |
| RF Connectors Input/Output   | Input: Type-N, Female<br>Output: 7/16-DIN, Female  | RF INPUT<br>RF OUTPUT |
| RF Sample Connectors   | Type-SMA, Female                                   | Forward / Reverse     |
| Blanking/Gating Input Connector                                      | Type-BNC, Female                                   | Blanking              |
| Cooling  | Built-in forced-air cooling system – front to rear | Airflow Direction     |

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## ENVIRONMENTAL CHARACTERISTICS

| Parameter  | Symbol           | Min | Typ | Max | Unit |
|--|------------------|-----|-----|-----|------|
| Operating Ambient Temperature  | T <sub>A</sub>   | -10 |     | +50 | °C   |
| Non-operating Temperature  | T <sub>STG</sub> | -40 |     | +85 | °C   |
| Relative Humidity (non-condensing)   | RH               |     |     | 95  | %    |
| Shock / Vibration - MIL-STD-810F<br>Shock Method 516.5, Vibration Method 514.5 | SH / VI          |     |     |     | -    |

## PROTECTIONS

| Parameter                      | Specification   | Unit |
|--------------------------------|---|------|
| Input Overdrive                | ≥10 dBm   | Max  |
| VSWR Protection                | At 3:1 – PA backs-off output power to a safe operating level – no system shutdown, “On Air” time is maximized | -    |
| Thermal – Graceful Degradation | Ambient 50°C  | Min  |
| Default Data Recovery          | Factory Default Calibration Recovery  | -    |

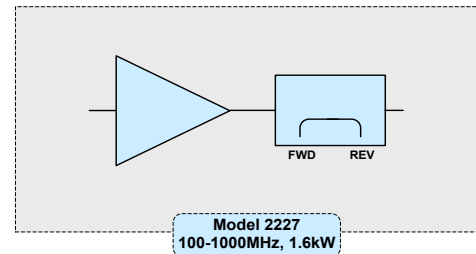
## COMMUNICATION INTERFACES

| Function   | Utility   | Connector              |
|--|---|------------------------|
| Ethernet   | Network Management of Device / Web Interface        | RJ45                   |
| USB  | Mass Storage / Expansion Bus                        | USB 1.x/2.0 compatible |
| RS-232, standard<br>(RS-422, factory configurable) | Serial Management of Device / Local Operator Access | D-Sub 9-position Male  |

## AVAILABLE OPTIONS

|  |
|--|
| <b>2227-00X</b>  |
| <b>-001</b> 180-260 VAC, 3-phase-Delta, 47-440 Hz, Rear RF Connectors                                |
| <b>-002</b> TBD  |
|  |
| Contact us for other available options; <a href="mailto:sales@empowerrf.com">sales@empowerrf.com</a> |
| <b>Standard Feature:</b>   |
| -LCD Control, Ethernet & Serial Comm   |
| -Sample Port: SMA-F [Forward & Reverse]  |
| -Blanking/Gating Port: BNC-Female  |
| -Rack Slides, Handles and Rack Mount Brackets  |

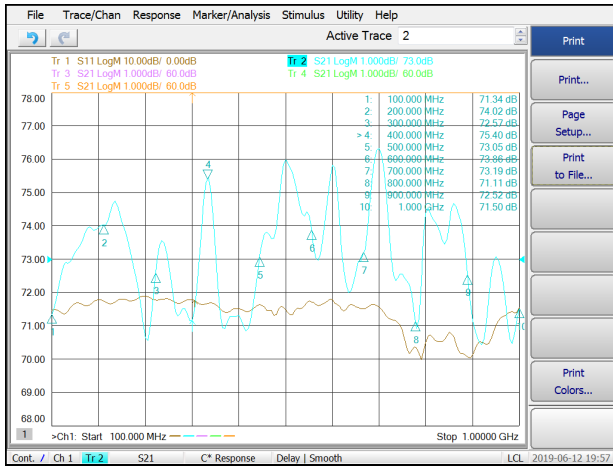
## NOTIONAL BLOCK DIAGRAM



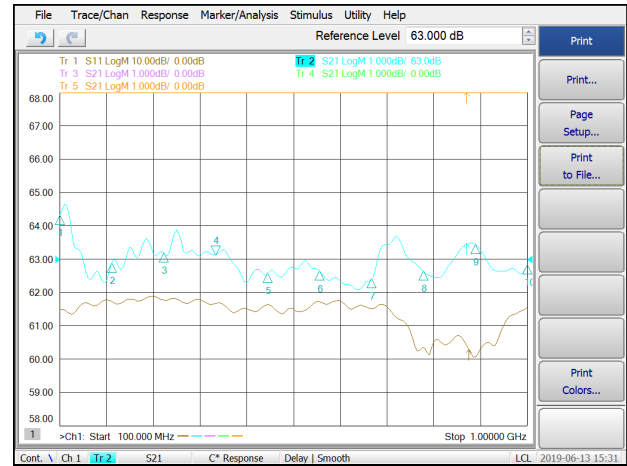
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**TYPICAL PERFORMANCE**
**Plot 1 – Small Signal Gain**

Top Curve: Small Signal Gain @  $P_{IN} = -30\text{dBm}$   
 Reference:  
 Bottom Curve: Input Return Loss  
 Reference:


**Plot 2 – ALC Mode Flatness @ 2000W**

Top Curve: ALC Flatness @  $63\text{dBm}$ ,  $P_{IN} = 0\text{dBm}$   
 Reference:  $63\text{dB}$ ,  $1\text{dB/div}$ .  
 Bottom Curve: Input Return Loss  
 Reference:  $0\text{dB}$ ,  $10\text{dB/div}$ .


**Plot 3 – Gain Adjustment Range @  $P_{IN} = -25\text{dBm}$** 

Top Curve: Maximum Gain  
 Middle Curve: Minimum Gain  
 Reference:  $40\text{dB}$ ,  $10\text{dB/div}$ .  
 Bottom Curve: Input Return Loss @ Minimum Gain  
 Reference:  $0\text{dB}$ ,  $10\text{dB/div}$ .

