EMPOWER RF SYSTEMS, INC.

# Solid State Broadband High Power Amplifier

## 2194 — 1000 - 3000 MHz / 250 Watts

The Model 2194 is suitable for octave bandwidth high power CW, modulated, and pulse applications. This amplifier utilizes high power GaN 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 within one single 3RU drawer including the forced air-cooling. Available operating voltage configuration are single phase 100-240 VAC up to 400HZ and 28 VDC.

*SKU#: 2194-001*

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 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 +40ºC)

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Frequency | BW | 1000 | | 3000 | MHz |
| Power Output CW *(Note 1)* | $P_{SAT}$ | 250 | | | Watt |
| Power Output @ 1dB Gain Compression *(Note 2)* | $P_{1dB}$ | 200 | | | Watt |
| Power Gain @ 1dB Gain Compression | $G_{1dB}$ | 54 | | | dB |
| Input Power for Rated $P_{SAT}$ | $P_{IN}$ | | 0 | | dBm |
| Input Power Range | $P_{IN}$ | -5.0 | | +5.0 | dBm |
| Small Signal Gain Flatness / Leveled ALC | $\Delta G$ | | | ±3.5/±1.0 | dB |
| Gain Adjustment Range | VVA | 20 | | | dB |
| Input Return Loss | $S_{11}$ | | | -10 | dB |
| Noise Figure @ maximum gain | NF | | | 20 | dB |
| Third Order Intermodulation Distortion 2-Tone @ 48dBm/Tone, 1MHz Spacing | IM3 | | -28 | | dBc |
| Harmonics @ $P_{OUT}$ = 200W | $2^{ND}$ | | -20 | -15 | dBc |
| | $3^{RD}$ | | -25 | -20 | |
| Spurious Signals | Spur | | | -60 | dBc |
| Operating Voltage – 1-phase | $V_{AC}$ | 100 | | 240 | Volt |
| Power Consumption @ 250W CW | $P_D$ | | | 1500 | VA |

*Notes:* *1. CW measurement performed in MGC Mode (Manual Gain Control)*
*2 .P1dB measurements performed with AM 80% depth of modulation, 1 kHz modulation signal.*

### MECHANICAL SPECIFICATIONS

| Parameter | Value | Unit |
|---|---|---|
| Dimensions W x H x D | 17.5 x 5.25 x 22 | Inch |
| Weight | 68 | Pound |
| RF Connectors Input/Output | Type-N, Female (*Optional Output: Type-SC, Female*) | |
| RF Sample | Type-SMA, Female | |
| Blanking Input | Type-BNC, Female | |
| Cooling | Built-in forced air cooling system | |

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### ENVIRONMENTAL CHARACTERISTICS (Qualification Data available for review)

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Ambient Temperature | $T_A$ | -10 | | +40 | °C |
| Non-operating Temperature | $T_{STG}$ | -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 40ºC | 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, RS-422 (optional) | Serial management of device / local operator access | D-Sub 9-position Male |

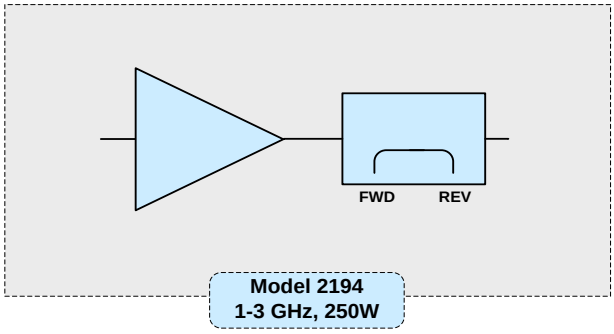
### SYSTEM I/O CONNECTOR – 14-Position

| Pin # | Description | Specification |
|---|---|---|
| 1 | FWD Test Point | Forward detected power (analog voltage: 0-5 Volt) |
| 2 | REV Test Point | Reverse detected power (analog voltage: 0-5 Volt) |
| 3 | Summary Fault | Summary Fault: Active TTL Logic Low (≤0.7V)<br>(*Internally Pulled-High*) |
| 4 | VVA control (***optional***) | VVA Control/Monitor: Analog Voltage Range 0-5V |
| 5 | Shutdown | Amplifier Disable: TTL Logic Low (≤0.7V)<br>(*Internally Pulled-High*) |
| 6 | Aux P/S Test Point | $+12.0V_{DC}$ ±2.0V (resettable 0.5amp fuse) |
| 7 | Main P/S Test Point | $+44.0V_{DC}$ ±4.8V (resettable 0.5amp fuse) |
| 8 | GND | Ground |
| 9-11 | Open drain control | Site management utility (reserved) |
| 12&13 | Digital I/O (configurable) | Site management utility (reserved) |
| 14 | GND | Ground |

### Available Options

| 2194-xxx |
|---|
| **-001** 100-240 VAC, 1-phase, 47-63 Hz, Rear RF Connectors |
| **-002** TBD |
| **-003** TBD |
| **-004** TBD |
| Contact us for other available options; sales@empowerrf.com |
| **Standard Feature:**<br>*-LCD Control, Ethernet & Serial Comm*<br>*-Main RF Connectors: **Input & Output** [Type-N, F]*<br>*-Sample Port: SMA-F [Forward & Reverse]*<br>*-Blanking/Gating Port: BNC-F*<br>*-Rack Slides, Handles and Rackmount Bracket* |

**NOTIONAL BLOCK DIAGRAM**



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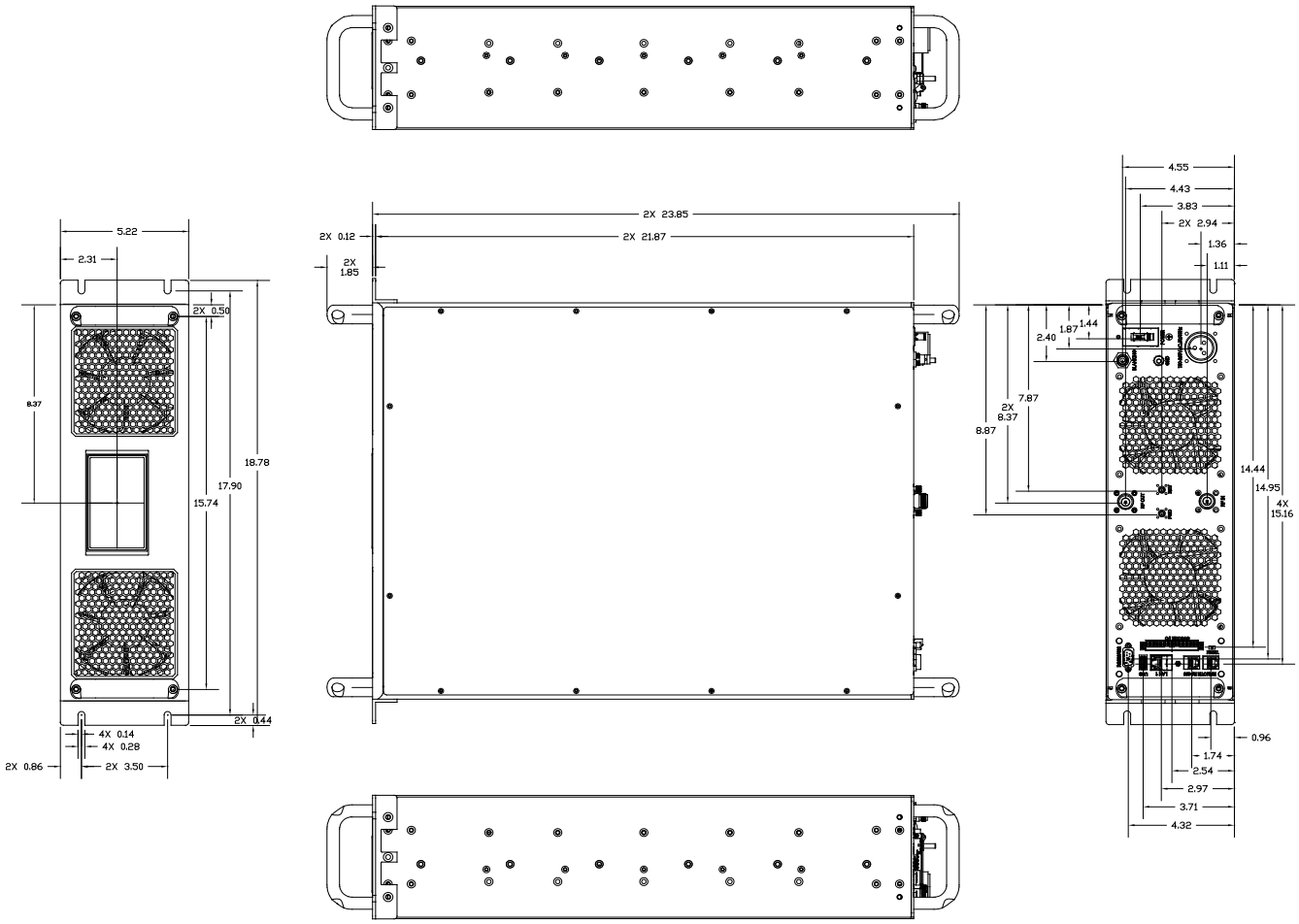
## OUTLINE DRAWING