

# Solid State Broadband High Power Amplifier

**2209**
**150 – 450 MHz / 2000 Watts**

The 2209 is suitable for 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 within a 3RU controller drawer, a 5RU booster drawer and a 3RU combiner/coupler drawer including the forced air-cooling. Standard operating voltage is three-phase 208 VAC line-to-line.

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 supports hardware 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.



SKU#: 2209-001

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

- Solid-state linear design
- Suitable for CW, AM, FM and pulse (Consult factory for other modulation types)
- Compact Modular design
- 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	150		450	MHz
Power Output CW <sup>(Note 1)</sup>	P <sub>SAT</sub>	2000			Watt
Power Output @ 1dB Gain Compression <sup>(Note 2)</sup>	P <sub>1dB</sub>	1600			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
Gain Flatness / Leveled ALC	ΔG			±3/±0.7	dB
Gain Adjustment Range	VVA	20			dB
Input Return Loss	S <sub>11</sub>			-10	dB
Noise Figure @ maximum gain	NF		20		dB
Third Order Intercept Point 2-Tone @ 57dBm/Tone, 1MHz Spacing	IM3		-30	-20	dBc
Harmonics @ P <sub>OUT</sub> = 1600W	2 <sup>ND</sup>			-20	dBc
	3 <sup>RD</sup>			-15	
Spurious Signals	Spur			-60	dBc
Operating Voltage – (3-phase)	V <sub>AC</sub>		208		Volt
Power Consumption @ 2000W CW	P <sub>D</sub>			9000	Watt

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

## MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions W x H x D (3RU + 5RU + 3RU)	19 x 19.25 x 22 (overall dimension)	Inch
Weight	160	Pound
RF Connectors Input/Output	Input: Type-N, Female Output: Type-7/16-DIN, Female	RF IN RF OUT
RF Sample Connectors	Type-SMA, Female	Forward/Reverse
Blanking/Gating Input	Type-BNC, Female	Blanking
Cooling	Built-in forced-air cooling system, front to rear	Airflow Direction

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**ENVIRONMENTAL CHARACTERISTICS (Qualification Data available for review):**

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 Shock Method 516.5, Vibration Method 514.5	SH / VI				

**PROTECTIONS:**

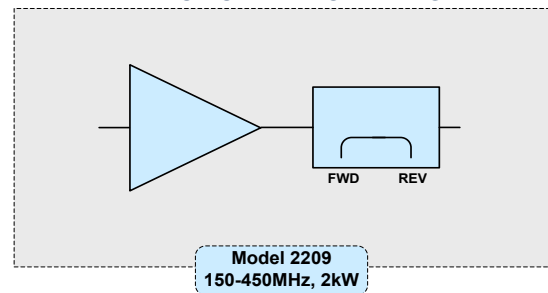
Parameter	Specification	Unit
Input Overdrive	+10 dBm	Max
VSWR protection	At 3:1 or higher – PA backs-off output power to a safe operating level – no system shutdown, “On Air” time is maximized	
Thermal – Graceful Degradation	Ambient 50°C	Min
Default Data Recovery	Factory Default Calibration Recovery	

**COMMUNICATION INTERFACES:**

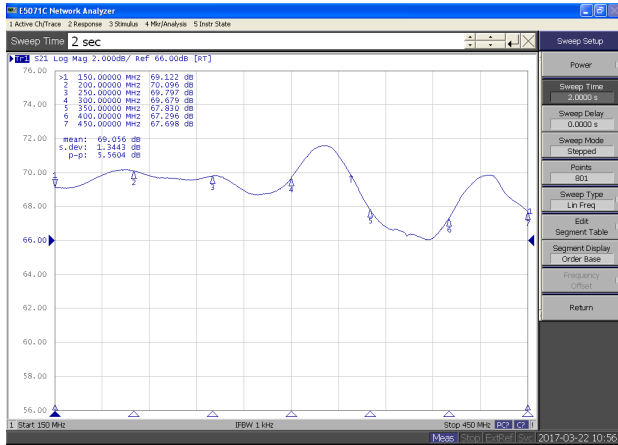
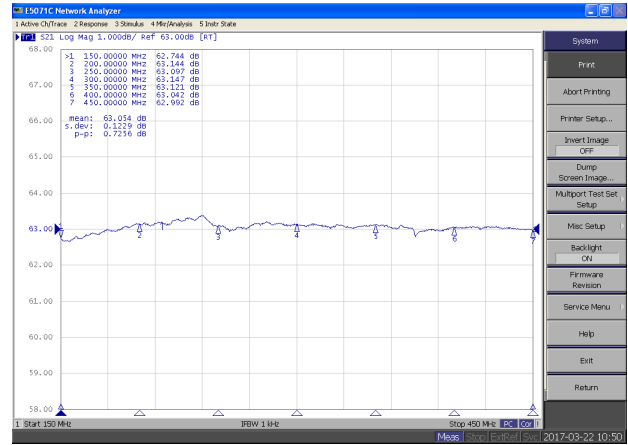
Function	Utility	Connector
Ethernet	Network management of device / web interface	RJ45
USB	Mass storage / Expansion Bus	USB 1.x/2.0 compatible
RS-232 (default) RS-422 (optional)	Serial management of device / local operator access	D-Sub 9-position Male

**Available Options**

2209-00X
-001 208VAC (Line-to-Line) 3-Phase, MIL-STD DC Connector, Rear RF Connectors
-00X TBD
-00X TBD
<b>Standard Features:</b>
-LCD Control, Ethernet & Serial Comm
-Type-N Female Input & 7/16(DIN) Female Output
-Rear SMA Sample Ports, Forward & Reverse
-BNC Female Blanking/Gating Port
-Rack Slides, Handles and Rackmount Bracket

**NOTIONAL BLOCK DIAGRAM**


# Solid State Broadband High Power Amplifier

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**TYPICAL PERFORMANCE**
**Plot 1 – Small Signal Gain @  $P_{IN} = -30\text{dBm}$**   
 Reference: 66dB, 2dB/div.

**Plot 2 – Leveled ALC Flatness @ 2000 Watts**  
 Power Gain @ Constant = 0dBm  
 Reference: 63dB, 1dB/div.

**Plot 3 – Gain Adjustment Range @  $P_{IN} = -30\text{dBm}$**   
 Top Curve: Maximum Gain  
 Bottom Curve: Minimum Gain  
 Reference: 46dB, 10dB/div.

**Plot 4 – Small Signal Gain Input Return Loss**  
 Reference: -10dB, 10dB/div.
