

# Solid State Broadband High Power Amplifier

**2221**
**9.0 – 10.0 GHz / 8kW<sub>PK</sub> Pulsed**

The 2221 is comprised of multi-drawer integrated subsystems to produce a minimum output of 8kW peak pulsed power. The amplifier subsystem features multiple high power GaN on SiC 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. Each drawer is constructed within single drawer including the integral forced air-cooling fans. The system comes standard to operate from 180-260VAC 3-phase power source.

The amplifier system includes a built-in control and monitoring system, with protection functions which preserve maximum output capability and reliability. 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 multilevel security. The control system core supports hardware encryption, 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 log.

We are delivering more than just RF power, the next generation family of systems provide dynamic adjustments linked to the processing power and digital controls, which focus on maximizing system availability time as well as power output under ALL conditions.



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

- Solid-state class AB design
- Suitable for instantaneous pulse operation over the operating band.
- Compact Modular design and scalable architecture
- 50 ohm input/output impedance
- Built-in Control, Monitoring and Protection functions
- High reliability and ruggedness

## ELECTRICAL SPECIFICATIONS over temperature conditions (0 to +50°C)

Parameter	Symbol	Min	Typical	Max	Unit
Operating Frequency	BW	9.00		10.00	GHz
Power Output – Peak Pulse	PSAT_PK	7000	8000		Watt
Pulse Width <sup>NOTE 1</sup>	PWIDTH	0.2		500	µSec
Duty Cycle <sup>NOTE 1</sup>	DC	0.5		20	%
Pulse Repetition Rate Frequency	PRF			50	kHz
Power Gain @ Rated Peak P <sub>OUT</sub>	G <sub>PK</sub>	70			dB
Pulse Droop @ Pulse Width	P <sub>DROOP</sub>			2.0	dB
Modulated Pulse Rise/Fall Time (10% to 90%)	T <sub>RISE/FALL</sub>		25/25	35/35	nSec
Input Power for rated output power	P <sub>IN</sub>	-4	0	+2	dBm
Power Gain Flatness @ Pulsed P <sub>SAT</sub>	ΔG <sub>P</sub>			±1	dB
Input Return Loss	S <sub>11</sub>			-10	dB
NPO – Noise Power Output	Enabled			-10	dBm/MHz
	Disabled			-100	
Harmonics @ P <sub>OUT_PULSE</sub> = 8kW <sub>PK</sub>	2 <sup>ND</sup>		-30		dBc
	3 <sup>RD</sup>		-40		
Spurious Signals	Spur			-60	dBc
Operating Voltage @ 3-phase (Line-to-Line)	V <sub>AC</sub>	180	208	260	Volt
Power Consumption @ 20%DC, P <sub>OUT_PULSE</sub> = 8kW <sub>PK</sub>	P <sub>D</sub>		7	12	kVA

NOTE: 1. Refer to Pulse Signal Specification Limits table below for pulse width and duty cycle application reference.

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## PULSE SIGNAL SPECIFICATION LIMITS

Desired RF pulse Width (µS)	On Guard Interval (µS)	Blanking Duration (µS)	Max RF Duty Cycle (%)
0.2	0.6	0.5	5
0.5	0.6	0.8	16
1	0.6	1.3	20
5	0.6	5.3	20
10	0.6	10.3	20
50	0.6	50.3	20
100	0.6	100.3	20
500	0.6	500.3	20

## MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Overall Dimension W x H x D (excludes connectors, handles and brackets)	17.5 x 26.25 x 27.0 5 x 3RU (20RU height)	Inch
Total Weight	~600	Pound
RF Connectors Input/Output	Input: N-Type Female Output: WR-90	RF IN RF OUT
RF Sample Connectors	SMA Female	Forward/Reverse
Blanking/Gating Input Connector	BNC Female	Blanking
Cooling	Built-in forced-air cooling system – front to rear	Airflow Direction

## ENVIRONMENTAL CHARACTERISTICS:

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature	T <sub>C</sub>	-10		+50	°C
Non-operating Temperature	T <sub>STG</sub>	-35		+75	°C
Relative humidity (non-condensing)	RH			95	%
Altitude (MIL-STD-810F)	ALT			10,000	Feet
Shock / Vibration (MIL-STD-810F, Shock Method 516.5 , Vibration Method 514.5)	SH / VI				-

## PROTECTIONS

Parameter	Specification	Unit
Input Overdrive	≥10 dBm – shutdown	-
Load VSWR Protection	The unit disables RF when reverse power exceeds 3:1 VSWR	-
Thermal Shutdown	Baseplate ≥90 °C	-
Default Data Recovery	Factory Default Calibration Recovery	-

## COMMUNICATION INTERFACES:

Function	Utility	Connector
Ethernet	Network management of device / web interface	RJ45

## Available Options

### 2221-00X

**-002** 180-260 VAC, 3-phase-Delta, 47-63 Hz, Rear RF Connectors with standard 19" rack

**-003** TBD

Contact us for other available options; [sales@empowerrf.com](mailto:sales@empowerrf.com)

### Standard Feature:

-LCD Control, Ethernet

-Sample Port: Forward & Reverse (System Level and Booster Drawer)

-Blanking/Gating Port: BNC-F

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NOTIONAL BLOCK DIAGRAM

