

# Solid State High Power Amplifier

**2213**
**2900-3500 MHz / 10 kilowatts Pulsed**

The 2213 is comprised of multi-drawer integrated subsystems to produce a minimum output of 10kW 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 single phase or a three phase AC sources.

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 logs.

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	2900		3500	MHz
Power Output – Peak Pulse	P <sub>SAT_PK</sub>	10			kilowatt
Pulse Width @ Duty Cycle 6%	P <sub>WIDTH</sub>	2		100	µSec
Duty Cycle	DC	0.5		6	%
Pulse Repetition Rate Frequency	PRF	0.6		30	kHz
Power Gain @ Rated Peak P <sub>OUT</sub>	G <sub>PK</sub>	70			dB
Pulse Droop @ rated Peak @100µSec Pulse Width	P <sub>DROOP</sub>		0.7	1.0	dB
Modulated Pulse Rise/Fall Time (10% to 90%)	T <sub>R</sub> / T <sub>F</sub>		70/70	150/150	nSec
Input Power for rated output power	P <sub>IN</sub>		-3.0	1.0	dBm
Input Return Loss	S <sub>11</sub>			-10	dB
NPO – Noise Power Output	Enabled			-10	dBm/MHz
	Disabled			-106	
Harmonics @ P <sub>OUT_PULSE</sub> = 10kW <sub>PK</sub>	2 <sup>ND</sup>		-20		dBc
	3 <sup>RD</sup>		-12		
Spurious Signals	Spur			-60	dBc
Operating Voltage @ 3-phase (Line-to-Line)	V <sub>AC</sub>	180	208	260	Volt
Operating Voltage @ 1-phase		180	220	260	
Power Consumption @ P <sub>OUT</sub> = 10kW <sub>PK</sub>	P <sub>D</sub>			2800	VA

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**MECHANICAL SPECIFICATIONS**

Parameter	Value	Unit
Dimension W x H x D (excludes brackets, handles and connectors)	17 x 22.75 x 22 (13RU) + (2RU Sample Ports Panel)	Inch
Weight (excludes rack cabinet and combiner assembly)	Booster Drawer: 105 lbs. (2x) Control/Power Supply Drawer: 65 lbs.	Pound
RF Connectors Input/Output	Input: N-Type Female Output: WR-284	RF INPUT RF OUTPUT
RF Sample Connectors	Type-N, Female	Forward / Reverse
Blanking/Gating Connector	BNC Female	Blanking
Cooling	Built-in forced-air system – front to rear	Airflow Direction

**ENVIRONMENTAL CHARACTERISTICS:**

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature <i>NOTE 1</i>	T <sub>C</sub>	0		+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				-

*Note:* 1. Call factory for extended operating temperature range.

**PROTECTIONS**

Parameter	Specification	Remark
Input Overdrive	≥10 dBm - shutdown	-
Load VSWR Protection	The unit disables the RF when reverse power level exceeds the safe level @ all load phase & amplitude	-
Thermal Shutdown	Baseplate ≥ 90°C	-
Default Data Recovery	Factory Default Calibration Recovery	-

**COMMUNICATION INTERFACES:**

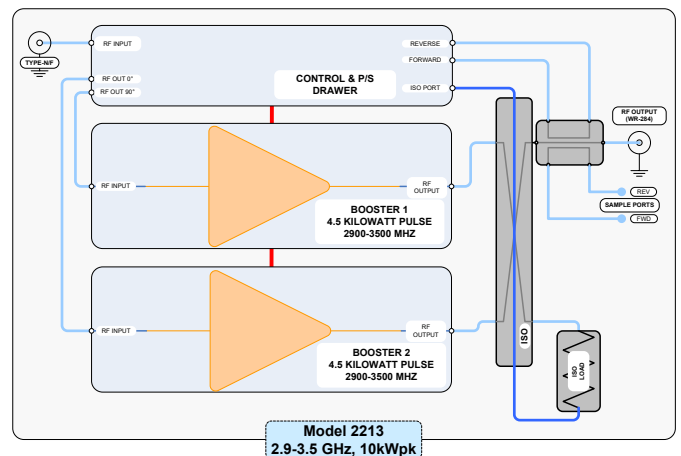
Function	Utility	Connector
Ethernet	Network management of device / web interface	RJ45

**Available Options**
**2213-XXX**
**-001** 180-260 VAC, 3-ph-Delta, 47-63 Hz, Rear RF Connectors

**-002** TBD

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

- LCD Control, Ethernet & Serial Comm
- Sample Port: SMA-F [Forward & Reverse]
- Blanking/Gating Port: BNC-F
- Rack Slides, Handles and Rackmount Brackets

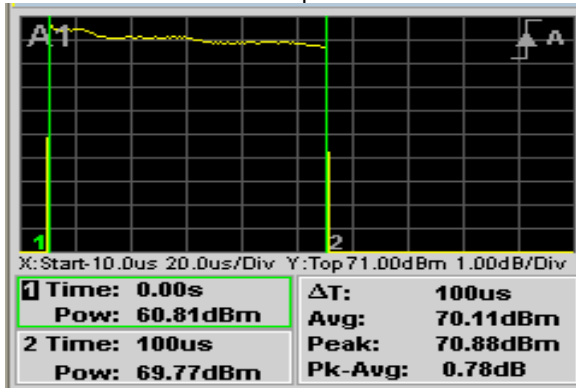
**NOTIONAL BLOCK DIAGRAM**


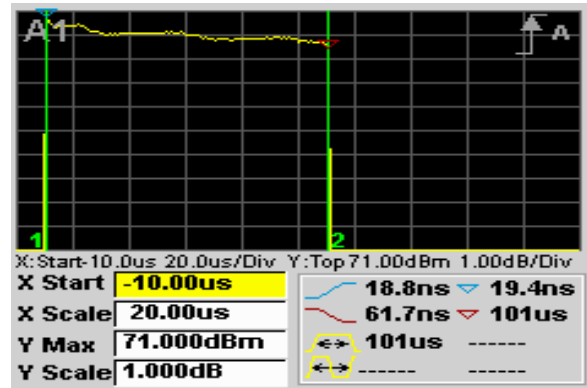
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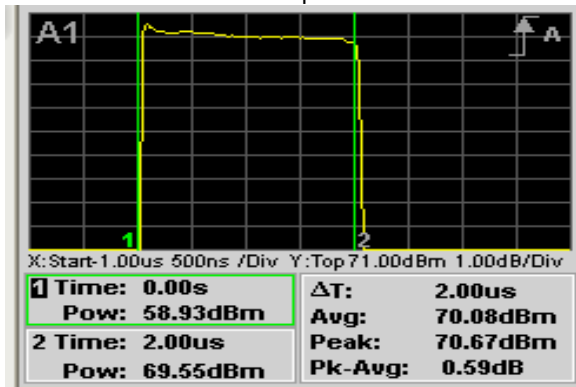
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**TYPICAL PERFORMANCE PLOTS**
**Plot 1 – Gated Pulse Performance @ 100 $\mu$ S**

 Pulse @ 70dBm peak output  
 Pulse Droop: 0.78dB

**Plot 2 – Pulse Rise and Fall Time @ 100  $\mu$ S**

 Rise Time: 18.8nS  
 Fall Time: 61.7nS

**Plot 3 – Gated Pulse Performance @ 2 $\mu$ S**

 Pulse @ 70dBm peak output  
 Pulse Droop: 0.59dB

**Plot 4 – Pulse Rise and Fall Time @ 2 $\mu$ S**

 Rise Time: 21.1nS  
 Fall Time: 51.4nS
