

# Solid State Broadband High Power Amplifier

**2203**
**1 – 30 MHz / 1000 Watts**

The 2203 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 within one single 5RU drawer including the forced air-cooling and standard operating voltage is 3-phase 208VAC line-to-line. Other options and configurations are listed on next page below.



2203-001

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 ISO9001:2015 Quality Assurance Program assures consistent performance and the highest reliability.

- Solid-state Class AB compact modular design
- Suitable for CW, AM, FM and pulse (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
- Optional harmonic and spurious suppression via external switched filter bank (quoted separately)

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

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	1		30	MHz
Power Output CW <i>Note 1</i>	P <sub>SAT</sub>	1000			Watt
Power Output @ 1dB Gain Compression <i>Note 2</i>	P <sub>1dB</sub>	800			Watt
Power Gain @ 1dB Gain Compression	G <sub>1dB</sub>	60			dB
Input Power for Rated P <sub>SAT</sub>	P <sub>IN</sub>		0		dBm
Small Signal Gain Flatness / Leveled ALC	ΔG			±3.0/±1.0	dB
Gain Adjustment Range @ P <sub>IN</sub> = -30dBm	VVA	20			dB
Input Return Loss	S <sub>11</sub>			-10	dB
Noise Figure @ maximum gain	NF		10	15	dB
Third Order Intermodulation Distortion 2-Tone @ 54dBm/Tone, 100kHz Spacing	IM3		-20		dBc
Harmonics @ P <sub>OUT</sub> = 800W	2 <sup>ND</sup>			-20	dBc
	3 <sup>RD</sup>			-10	
Spurious Signals	Spur			-60	dBc
Operating Voltage [1-phase]	V <sub>AC</sub>	180	220	260	Volt
Operating Voltage [3-ph, line-to-line]	V <sub>AC</sub>		208		Volt
Power Consumption @ 1000W CW	P <sub>D</sub>			3500	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, 1kHz modulation signal.

## MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions W x H x D	17.5 x 8.75 x 22	Inch
Weight	95	Pound
RF Connectors Input/Output	Input/Output; N-type, Female (Optional Output: 7/16-DIN/Female or SC/Female)	RF INPUT/RF OUTPUT
RF Sample Connectors	SMA, Female	FWD/REV
Blanking/Gating Input Connector	BNC, Female	Blanking
Cooling	Built-in forced air-cooling system – front to rear	Airflow direction

# Solid State Broadband High Power Amplifier

**2203**
**1 – 30 MHz / 1000 Watts**

## 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>	-20 *		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Shock / Vibration - MIL-STD-810F Shock Method 516.5, Vibration Method 514.5	SH / VI				

**Note:** [ \* ] Consult Empower RF for application conditions below -10°C / -20°C temperatures (Operational / Non-operational).

## PROTECTIONS:

Parameter	Specification	Unit
Input Overdrive	+10 dBm	Max
VSWR protection @ P <sub>OUT</sub> = 1000W	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
RS232, default [RS422, factory configurable]	Serial management of device / local operator access	D-Sub 9-position Male

## SYSTEM I/O CONNECTOR – 14-pin

Pin #	Description	Specification
1	FWD TP	Forward detected power (analog voltage: 0 – 5 Volt)
2	REV TP	Reverse detected power (analog voltage: 0 – 5 Volt)
3	Summary Fault	Summary Fault: Active TTL Logic Low ( $\leq 0.7V$ ) = Fault, ( <i>Internally Pulled-High</i> )
4	Reserved	No Connection
5	Shutdown	Amplifier Disable: TTL Logic Low ( $\leq 0.7V$ ), ( <i>Internally Pulled-High</i> )
6	Aux P/S TP	+12.0V <sub>DC</sub> $\pm 2V$ (resettable 0.5amp fuse)
7	Main P/S TP	+44.0V <sub>DC</sub> $\pm 4.8V$ (resettable 0.5amp fuse)
8	GND	Ground
9-11	Open drain control	Site management utility (reserved)
12-3	Digital I/O (configurable)	Site management utility (reserved)
14	GND	Ground

## Available Options

### 2203-00X

**-001** - 180-260VAC, 1-ph, MIL-STD AC Connector, Rear RF Connectors

**-002** - 208VAC, 3-ph, MIL-STD AC Connector, Rear RF Connectors

**-003** - 180-260VAC, 1-ph, MIL-STD AC Connector, Front RF Connectors

**-004** - 208VAC, 3-ph, MIL-STD AC Connector, Front RF Connectors

Contact us for other available options

### Standard Features:

-LCD Control, Ethernet & Serial Comm

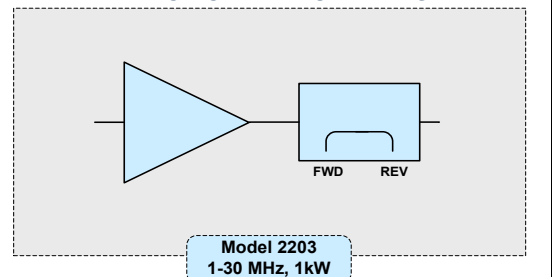
-Main RF Connectors: **Input & Output** [N-type Female]

-RF Sample Ports: Forward & Reverse [SMA Female]

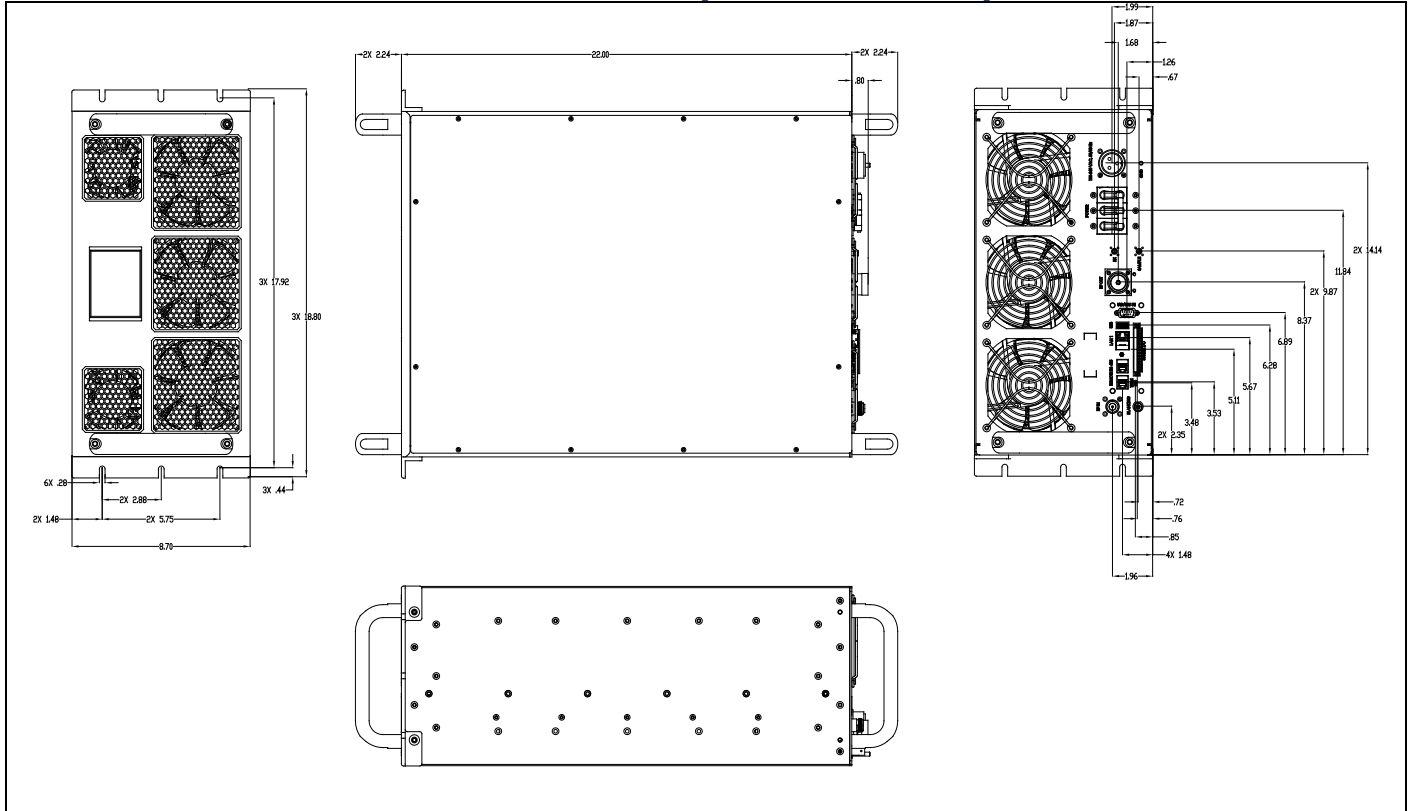
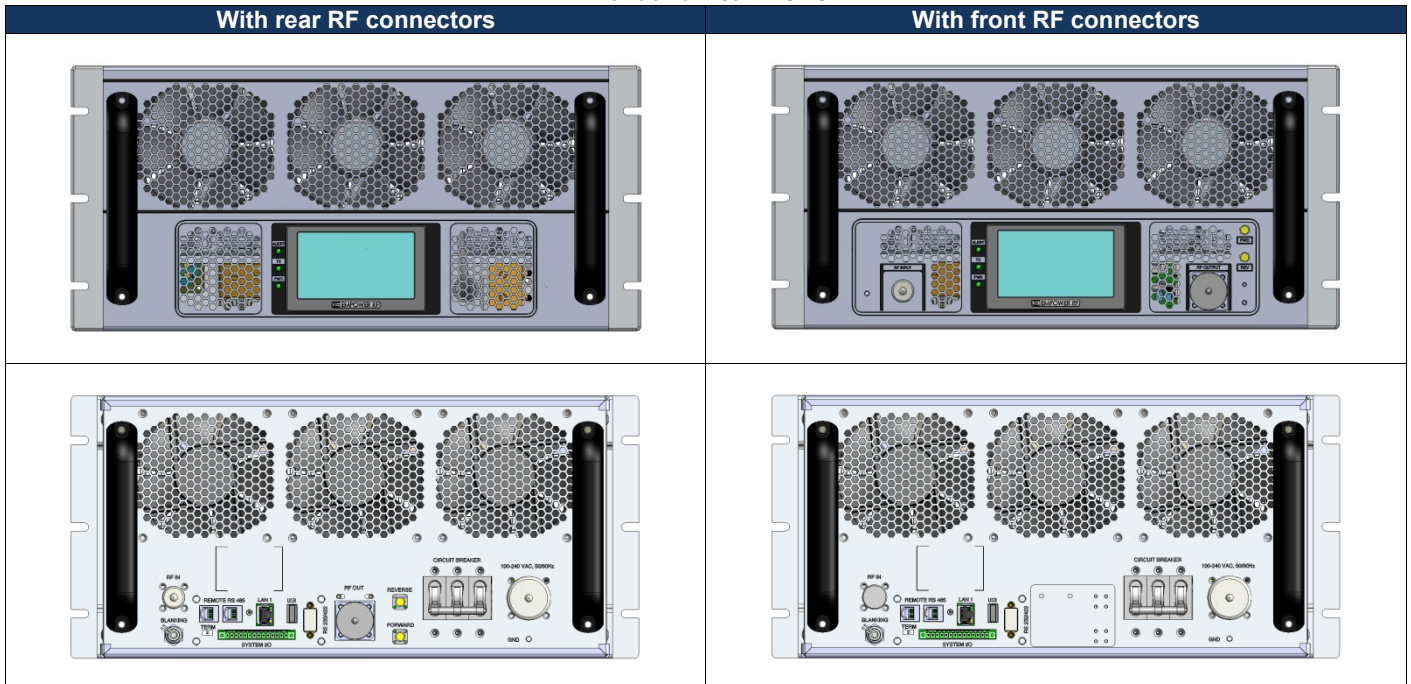
-Blanking/Gating Port: BNC Female

-Rack Slides, Handles and Rackmount Bracket

## NOTIONAL BLOCK DIAGRAM



# Solid State Broadband High Power Amplifier

**2203**
**1 – 30 MHz / 1000 Watts**
**MECHANICAL OUTLINE [with rear RF connectors]**

**Front and Rear Views**


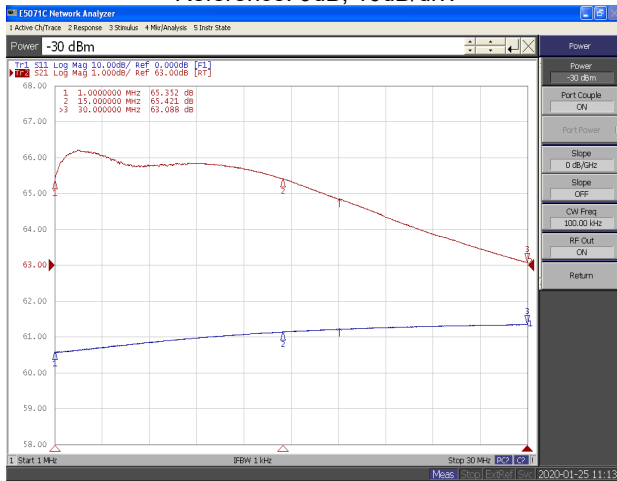
# Solid State Broadband High Power Amplifier

**2203**
**1 – 30 MHz / 1000 Watts**

## TYPICAL PERFORMANCE

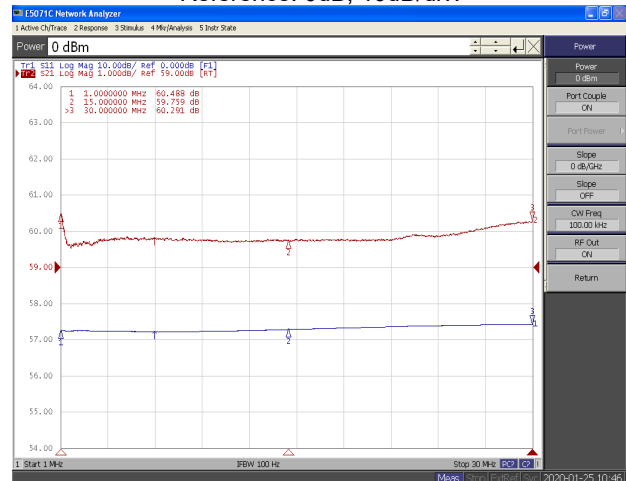
### Plot 1 – Small Signal Gain

Top Curve: Small Signal Gain @  $P_{IN} = -30\text{dBm}$   
Reference: 63dB, 1dB/div.  
Bottom Curve: Input Return Loss  
Reference: 0dB, 10dB/div.



### Plot 2 – Leveled ALC Flatness @ 1000W

Top Curve: Mode ALC @ 60dBm,  $P_{IN} = 0\text{dBm}$   
Reference: 60dB, 1dB/div.  
Bottom Curve: Input Return Loss  
Reference: 0dB, 10dB/div.



### Plot 3 – Gain Adjustment Range @ $P_{IN} = -30\text{dBm}$

Top Curve: Maximum Gain  
Middle Curve: Minimum Gain  
Reference: 30dB, 10dB/div.  
Bottom Curve: Input Return Loss @ Minimum Gain  
Reference: 0dB, 10dB/div.

