

## Solid State Broadband High Power Amplifier

**2223**
**600 - 6000 MHz / 150 Watts**

The 2223 is suitable for multi-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 a single 5RU drawer including the forced air-cooling. Available operating voltage configurations are single-phase 220 VAC up to 400 Hz and 28 VDC.



REAR CONNECTORS

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 +40°C)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	600		6000	MHz
Power Output CW <sup>(Note 1)</sup>	P <sub>SAT</sub>	150			Watt
Power Gain	G <sub>P</sub>	53			dB
Input Power for Rated P <sub>SAT</sub>	P <sub>IN</sub>		0		dBm
Input Power Range	P <sub>IN</sub>	-5.0		+5.0	dBm
Small Signal Gain Flatness / Leveled ALC	ΔG			±3.5/±1.5	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 Intermodulation Distortion 2-Tone @ 44dBm/Tone, 1MHz Spacing	IM3			-20	dBc
Harmonics @ P <sub>OUT</sub> = 100W	2 <sup>ND</sup>		-20	-15	dBc
	3 <sup>RD</sup>		-25	-20	
Spurious Signals	Spur		-70	-60	dBc
Operating Voltage (1-phase)	V <sub>AC</sub>	180	220	260	Volt
Power Consumption @ 150W CW	P <sub>D</sub>			1500	VA
Switching Speed	T <sub>ON/OFF</sub>		1	2	μSec

Notes: 1. CW measurement performed in MGC Mode (Manual Gain Control)

### MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions W x H x D (excludes connectors, handles and brackets)	17 x 8.75 x 22	Inch
Weight	95	Pound
RF Connectors Input/Output	Type-N, Female	-
RF Sample	Type-SMA, Female	-
Blanking Input	Type-BNC, Female	-
Cooling	Built-in forced air cooling system	-

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## ENVIRONMENTAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature	T <sub>A</sub>	-10		+40	°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 – PA backs-off output power to a safe operating level – no system shutdown, “On Air” time is maximized	-
Thermal – Graceful Degradation	Ambient 40°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, 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 ( $\leq 0.7V$ ), ( <i>Internally Pulled-High</i> )
4	N/C	No Connection (reserved)
5	Shutdown	Amplifier Disable: TTL Logic Low ( $\leq 0.7V$ ), ( <i>Internally Pulled-High</i> )
6	Aux P/S Test Point	+12.0V <sub>DC</sub> $\pm$ 2.0V (resettable 0.5amp fuse)
7	Main P/S Test Point	+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&13	Digital I/O (configurable)	Site management utility (reserved)
14	GND	Ground

## Available Options

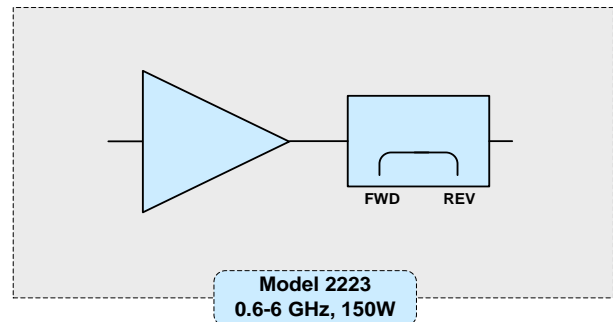
2223-xxx
-001 180-260 VAC, 1-phase, 47-63 Hz, Rear RF Connectors
-002 28 VDC, Rear RF Connectors
-003 208 VAC, 3-phase-Delta, 47-63 Hz, Rear RF Connectors
-004 28 VDC, Front RF Connectors
-006 208 VAC, 3-phase-Delta, 47-63 Hz, Front RF Connectors
-007 180-260 VAC, 1-phase, 47-63 Hz, Front RF Connectors

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

**Standard Feature:**

- LCD Control, Ethernet & Serial Comm
- Main RF Connectors: **Input** [Type-N, F], **Output** [Type-N, F]
- Sample Port: SMA-F [Forward & Reverse]
- Blanking/Gating Port: BNC-F
- Rack Slides, Handles and Rackmount Bracket

## NOTIONAL BLOCK DIAGRAM

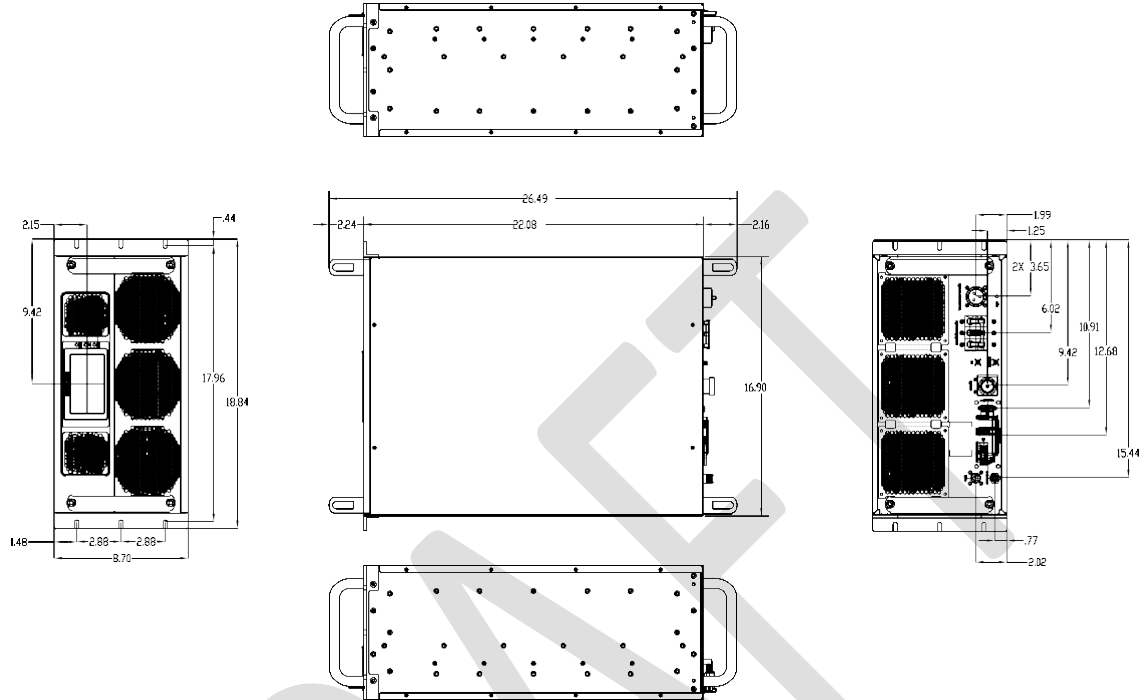


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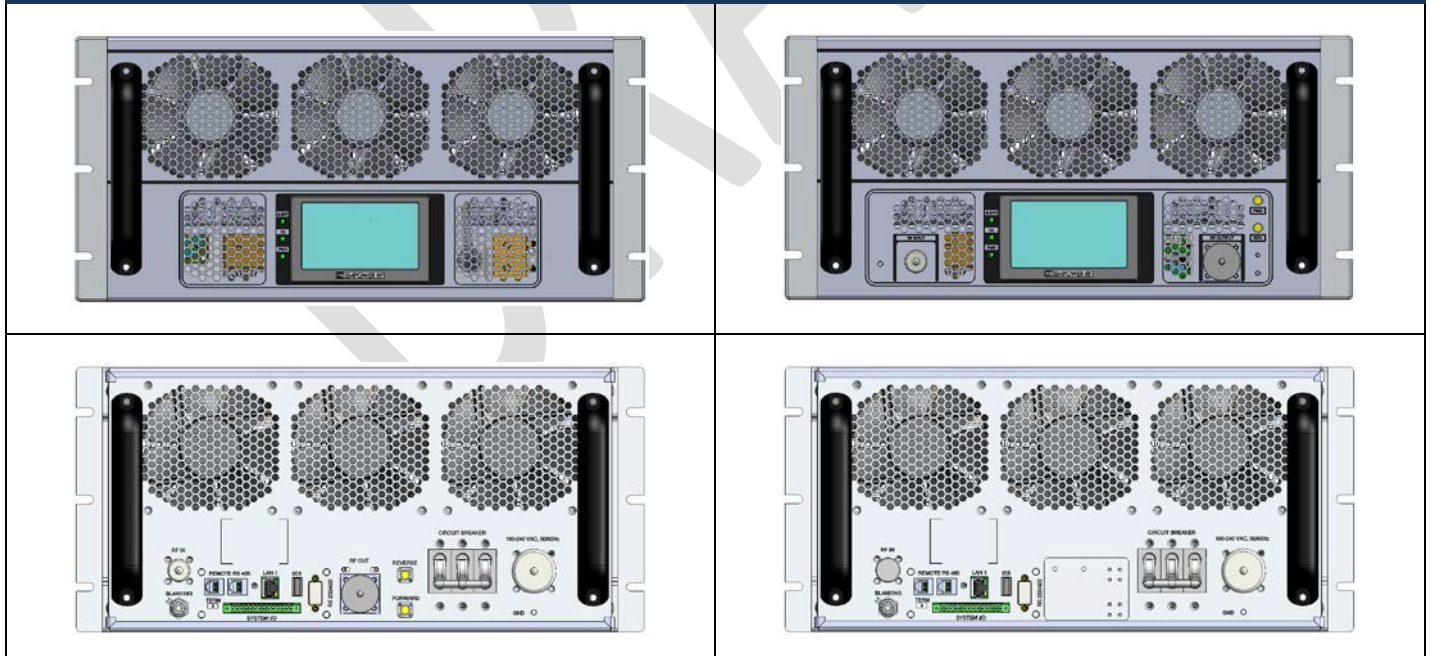
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**OUTLINE DRAWING (Option: 22xx-001)**



2223-001 – Front and Rear View

2223-00X Front and Rear View



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## TYPICAL PERFORMANCE PLOTS

Plot 1 – Small Signal Gain @  $P_{IN} = -30\text{dBm}$

Reference: 65dB, 2dB/div.



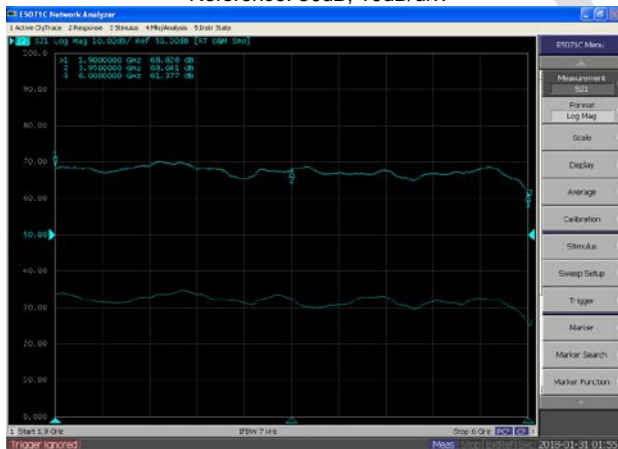
Plot 2 - Leveled ALC Flatness @ 150 watts (51.8dBm)

Reference: 51.8dB, 1dB/div.



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

Top Curve: Maximum Gain  
 Bottom Curve: Minimum Gain  
 Reference: 50dB, 10dB/div.



Plot 4 – Input Return Loss

Reference: -10dB, 10dB/div.

