EMPOWER
RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

2202 | 500 - 2500 MHz / 1000 Watts

The 2202 is suitable for multi-octave bandwidth high power CW, modulated, and pulse applications. This amplifier utilizes 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. The amplifier is constructed in 8RU multi-drawer including the forced air-cooling. The system comes standard to operate at 208VAC three phase AC supply, Optional 220VAC single phase or 28VDC.

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, 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 +40ºC)

Parameter		Symbol	Min	Typ	Max	Unit
Operating Frequency		BW	500		2500	MHz
Power Output CW *(Note 1)*		P_{SAT}	1000			Watt
Power Output @ 1dB Gain Compression *(Note 2)*		P_{1dB}	800			Watt
Power Gain @ 1dB Gain Compression		G_{1dB}	63			dB
Input Power for Rated P_{SAT}		P_{IN}		-1		dBm
Input Power Range		P_{IN}	-5.0		+3.0	dBm
Gain Flatness / Leveled ALC		ΔG			±3.5/±1.0	dB
Gain Adjustment Range		VVA	20			dB
Input Return Loss		S_{11}			-10	dB
Noise Figure @ maximum gain		NF		20	25	dB
Third Order Intermodulation 2-Tone @ 54dBm/Tone, 1MHz Spacing		IM3			-20	dBc
Harmonics @ P_{OUT} = 1000W		2^{ND}		-15	-10	dBc
		3^{RD}		-20	-15	
Spurious Signals		Spur			-60	dBc
Operating Voltage	3-ph, Delta (line-to-line)	V_{AC}		208		Volt
	Single phase		180	220	260	
Power Consumption @ 1000W CW		P_D			7	kVA

Notes: ***1. CW measurement performed in MGC Mode (Manual Gain Control)***
2 .P1dB measurement is performed with AM 80% depth of modulation, 1kHz modulation signal.

MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions W x H x D (excludes connectors, handles and brackets)	17 x 14 x 22 (3RU+5RU)	Inch
Weight	150	Pound
RF Connectors Input/Output	Input: N-type, Female Output: 7/16-DIN, Female	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

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ENVIRONMENTAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature	T_A	-10		+40	°C
Non-operating Temperature	T_{STG}	-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 +40ºC	Min
Default Data Recovery	Factory Default Calibration Recovery	

COMMUNICATION INTERFACES:

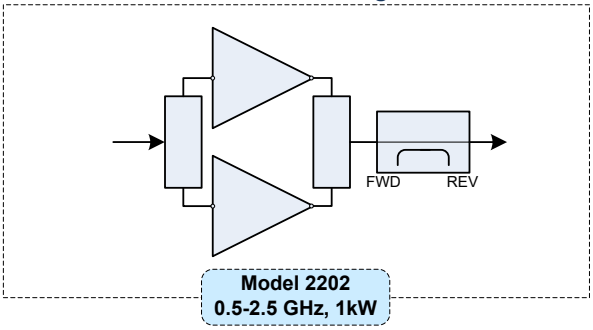
Function	Utility	Connector
Ethernet	Network management of device / web interface	RJ45
USB	Mass storage / Expansion Bus	USB 1.x/2.0 compatible
RS-232 default, (RS-422, factory configurable)	Serial management of device / local operator access	D-Sub 9-position Male

AVAILABLE OPTIONS

2202-00X
-001 208VAC, 3-ph, MIL-STD AC Connector, Rear RF Connectors
-002 180-260VAC, 1-ph,MIL-STD AC Connector, Rear RF Connectors
Contact us for other available options

Standard Features:
-LCD Control, Ethernet & Serial Comm
-Type-N Female Input & 7/16(DIN) Female Output
-Rear SMA-F Sample Ports, Forward & Reverse
-BNC Female Blanking/Gating Port
-Rack Slides, Handles and Rackmount Bracket

Notional Block Diagram



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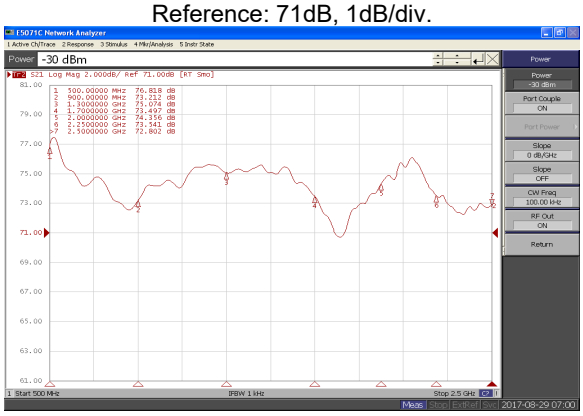
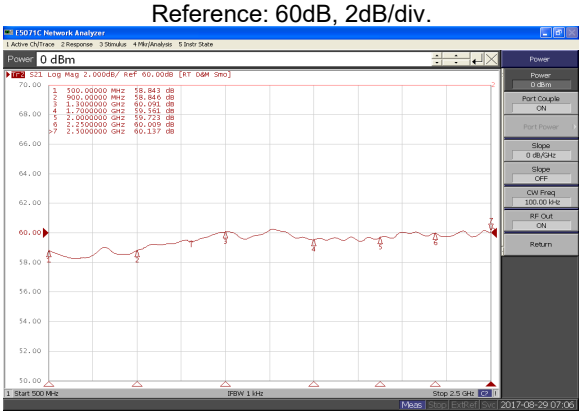
TYPICAL PERFORMANCE PLOTS

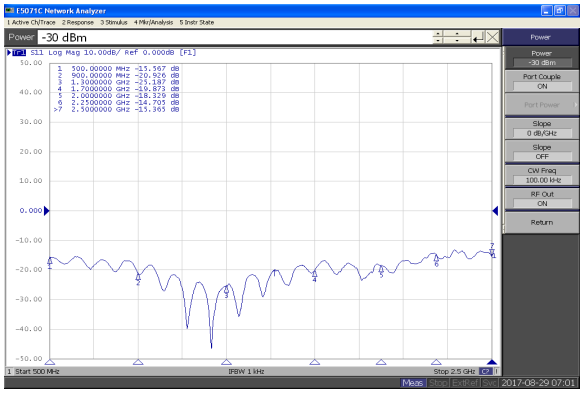
Plot 1 – Small Signal Gain @ P_{IN} – 30dBm
Reference: 71dB, 1dB/div.



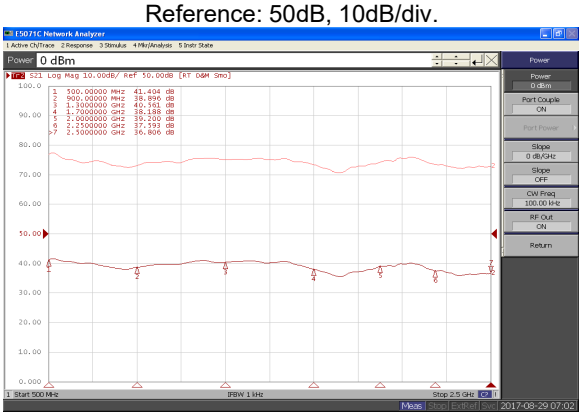
Plot 2 – Leveled ALC Flatness @ 1000W, P_{IN} = 0dBm
Reference: 60dB, 2dB/div.



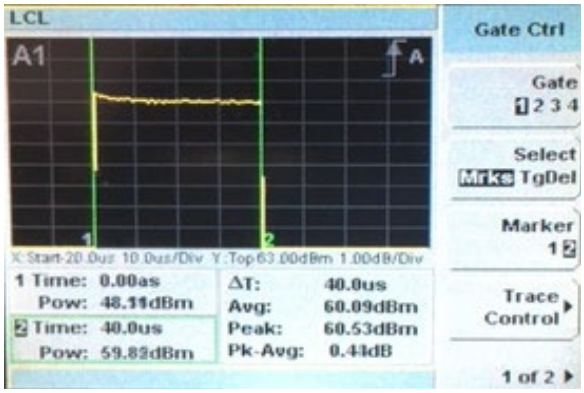
Plot 3 – Input Return Loss @ P_{IN} = -30dBm
Reference: 0dB, 10dB/div.



Plot 4 – Gain Adjustment Range @ P_{IN} -30dBm
Top Curve: Maximum Gain
Bottom Curve: Minimum Gain
Reference: 50dB, 10dB/div.



Plot 5 – Pulse Performance @ 60dBm peak power
Pulse RF = 150µSec period, 66% duty cycle



Plot 6 – Pulse Performance @ 60dBm peak power
Pulse Rise time: 32.4nSec
Pulse Fall time: 59.9nSec