

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 +40°C)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	500		2500	MHz
Power Output CW <i>Note 1</i>	P _{SAT}	1000			Watt
Power Output @ 1dB Gain Compression <i>Note 2</i>	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 @ P _{IN} = -30dBm	VVA	20			dB
Input Return Loss	S ₁₁			-10	dB
Noise Figure @ maximum gain	NF		20	25	dB
Third Order Intermodulation Distortion 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)		208		Volt
	1-phase	180	220	260	
Power Consumption @ 1000W CW	P _D			7	kVA

Notes: 1. CW measurement performed in MGC Mode (Manual Gain Control)
2. P_{1dB} 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}	-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	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	

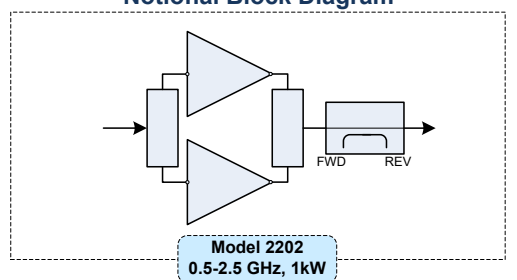
COMMUNICATION INTERFACES:

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

AVAILABLE OPTIONS

2202-00X
-001 - 208VAC, 3-phase, MIL-STD AC Connector, Rear RF Connectors
-002 - 180-260VAC, 1-phase, MIL-STD AC Connector, Rear RF Connectors
Contact Empower RF Systems for other available options
Standard Features:
-LCD Control, Ethernet & Serial Comm
-Main RF Connectors: Input [N-type, Female] Output [7/16(DIN), Female]
-RF Sample Ports: Forward & Reverse [SMA Female]
-Blanking/Gating Port: BNC Female
-Rack Slides, Handles and Rackmount Bracket

Notional Block Diagram

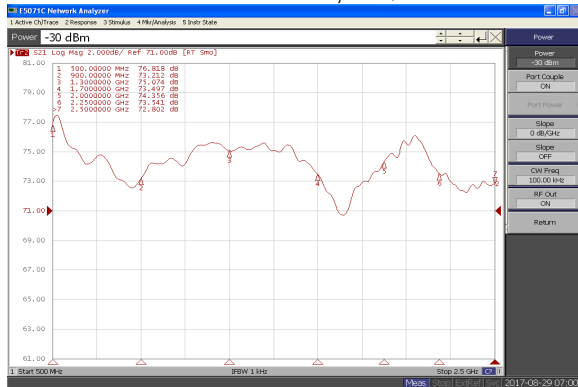


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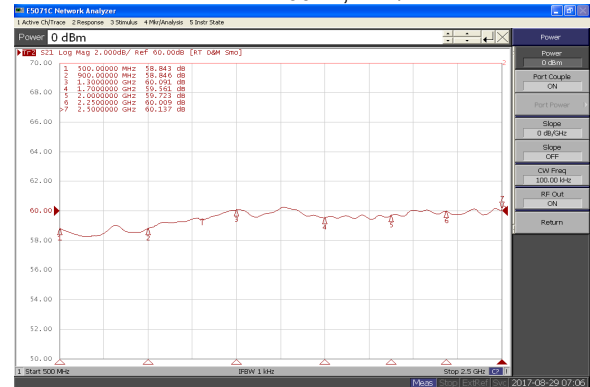
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TYPICAL PERFORMANCE PLOTS

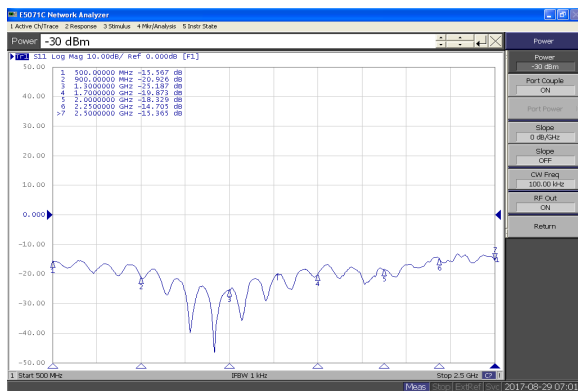
Plot 1 – Small Signal Gain @ $P_{IN} = -30\text{dBm}$
Reference: 71dB, 1dB/div.



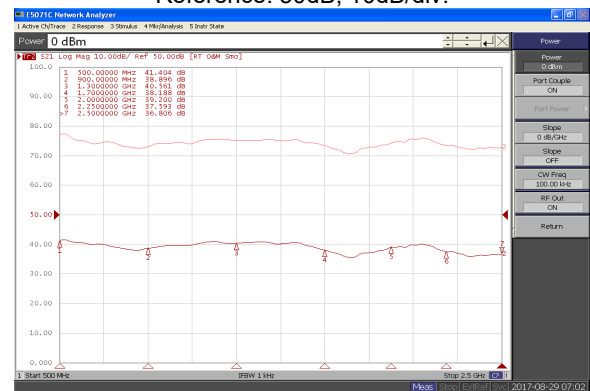
Plot 2 – Leveled ALC Flatness @ 1000W, $P_{IN} = 0\text{dBm}$
Reference: 60dB, 2dB/div.



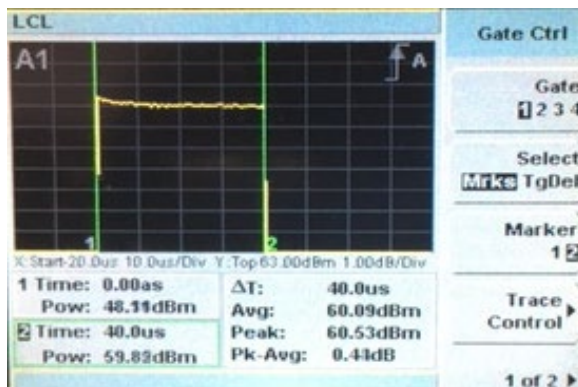
Plot 3 – Input Return Loss @ $P_{IN} = -30\text{dBm}$
Reference: 0dB, 10dB/div.



Plot 4 – Gain Adjustment Range @ $P_{IN} = -30\text{dBm}$
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

