EMPOWER
RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

2175 – BBS2E4ARR

80 – 1000 MHz / 500 Watts

The BBS2E4ARR (SKU 2175) 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 3RU drawer including the forced air-cooling. The system comes standard to operate from 180-260VAC single phase.

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, IPV6) allows ease of access with the benefit of multi-level 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.

Empower RF's ISO9001 Quality Assurance Program assures consistent performance and the highest reliability.

- Solid-state linear design
- Suitable for CW, AM, FM and pulse (Consult factory for other modulation types)
- Compact Modular design
- 50 ohm input/output impedance
- Built in Control, Monitoring and Protection functions
- High reliability and ruggedness

ELECTRICAL SPECIFICATIONS $220V_{AC}$, @ 25ºC, 50 Ω System

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency *(Note 3)*	BW	80		1000	MHz
Power Output CW *(Note 1)*	P_{SAT}	500			Watt
Power Output @ 1dB Gain Compression *(Note 2)*	P_{1dB}	250			Watt
Power Gain @ 1dB Gain Compression	G_{1dB}	60			dB
Input Power Range	P_{IN}	-3.0	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 20-300MHz/300-1000MHz	NF			20/15	dB
Third Order Intermodulation 2-Tone @ 51dBm/Tone, 1MHz Spacing	IM^3		-20		dBc
Harmonics @ P_{OUT} = 500W (without Harmonic Suppression Filters)	2^{ND}			-20	dBc
	3^{RD}			-10	
Spurious Signals	Spur			-60	dBc
Operating Voltage – (single phase)	V_{AC}	180	220	260	Volt
Power Consumption @ 500W CW	P_D			2900	Watt

Notes:

1. *CW measurement performed in MGC Mode (Manual Gain Control).*
2. *P1dB measurement performed with CCDF Method, IS-95, 1MHz BW.*
3. *Full instantaneous operation down 20MHz – consult factory for details.*

MECHANICAL SPECIFICATIONS

Parameter	Value	Units
Dimensions W x H x D	17.5 x 5.25 x 22	Inc
Weight (Without Harmonic Suppression Filters)	68	lb.
RF Connectors Input/Output	Type-N, Female	
RF Sample Connectors	Type-SMA, Female	
Blanking Input Connector	Type-BNC, Female	
Cooling	Built-in forced air cooling system	

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ENVIRONMENTAL CHARACTERISTICS (Design to meet)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature	T_A	-10		+50	°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	Specifications	Unit
Input Overdrive	+10 dBm	Max
VSWR Protection	At ~3:1 Load – PA backs-off output power to a safe operating level – no system shutdown, "On Air" time is maximized	-
Thermal Shutdown	Above 50ºC ambient	-
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

SYSTEM I/O INTERFACE CONNECTOR – 14-Position

Pin #	Description	Specifications
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 (≤0.7V) (*Internally Pulled-High*)
4	VVA Control (***Optional***)	External Gain Control: Analog Voltage Range 0-5V 0V= Max. Attenuator, 5V= Min. Attenuator
5	Shutdown	Amplifier Disable: TTL Logic Low (≤0.7V) (*Internally Pulled-High*)
6	Aux P/S Test Point	+12.0V_{DC} ±2V (resettable 0.5amp fuse)
7	P/S System Test Point	+44.0V_{DC} ±4.8V (resettable 0.5amp fuse)
8	GND	Ground
9	Open drain control	Site management utility (reserved)
10	Open drain control	Site management utility (reserved)
11	Open drain control	Site management utility (reserved)
12	Digital I/O (configurable)	Site management utility (reserved)
13	Digital I/O (configurable)	Site management utility (reserved)
14	GND	Ground

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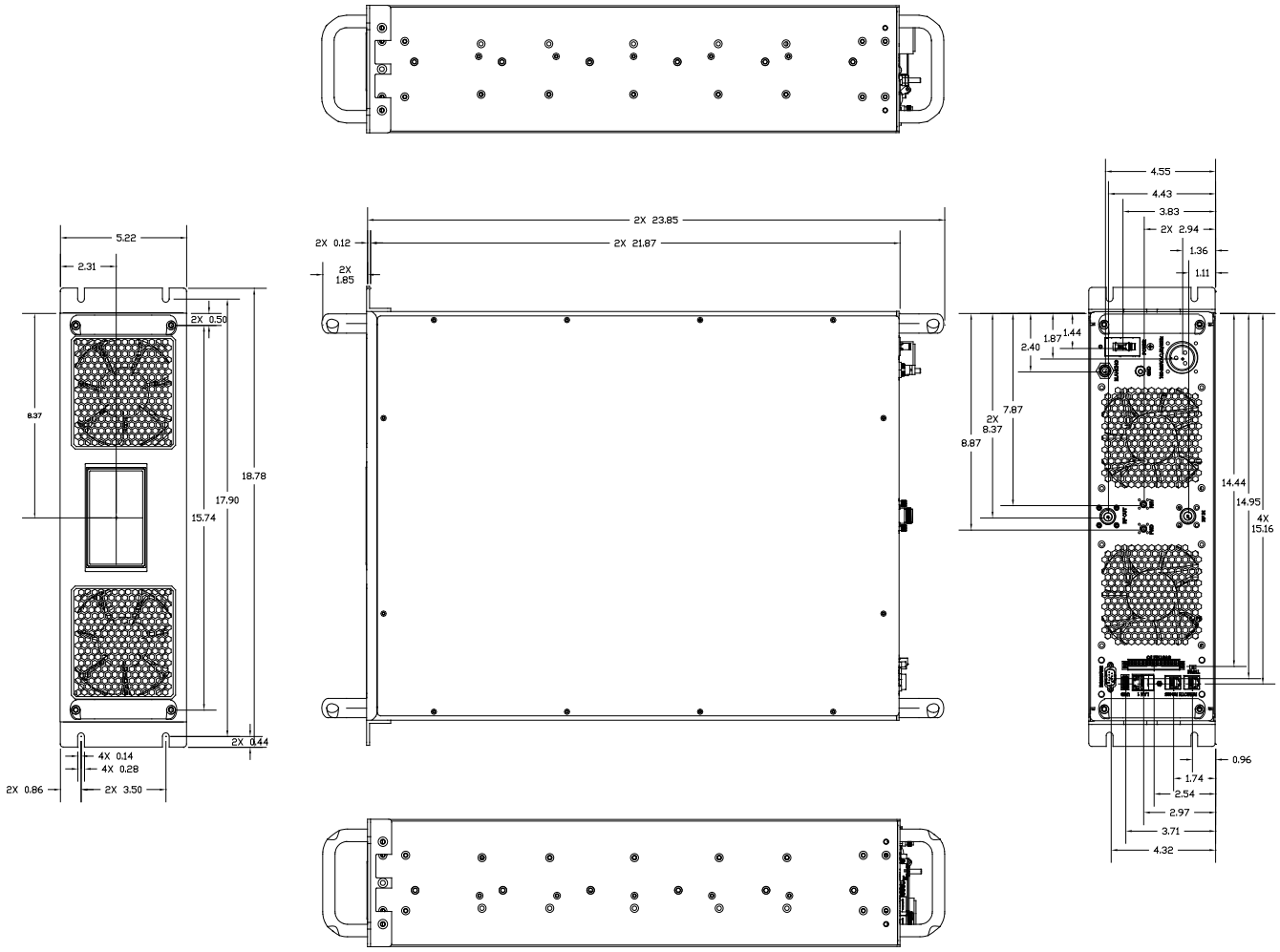
OUTLINE DRAWING



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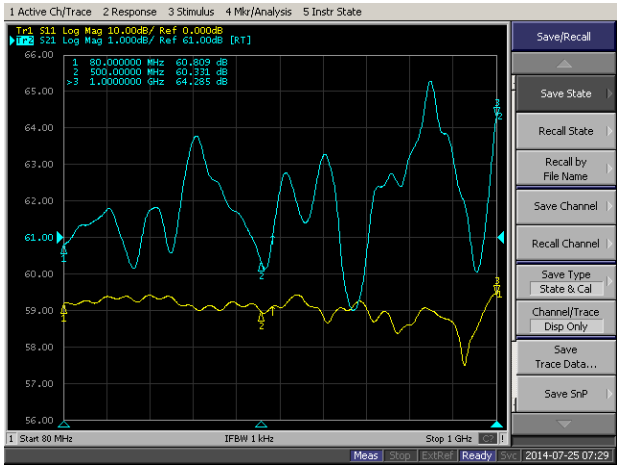
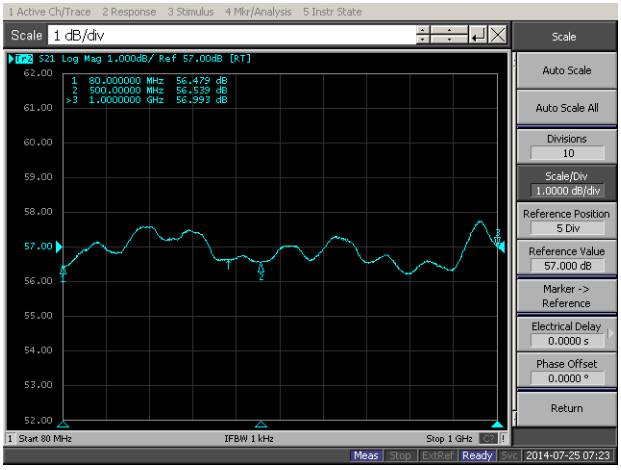
TYPICAL PERFORMANCE

Plot 1 – Small Signal Gain and Flatness
Top Curve: Small Signal Gain @ P_{IN} = -30dBm
Reference: 61dB, 1dB/div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/div.



Plot 2 – Output Power @ 500W Leveled
Top Curve: Mode ALC @ 57dBm, P_{IN} = 0dBm
Reference: 57dB, 1dB/div.



Plot 3 – Gain Adjustment Range
Top Curve: Maximum Gain @ P_{IN} = -30dBm
Middle Curve: Minimum Gain @ P_{IN} = -30dBm
Reference: 30dB, 10dB/div.
Bottom Curve: Input Return Loss @ Minimum Gain
Reference: 0dB, 10dB/div.