

Solid State Broadband High Power Amplifier

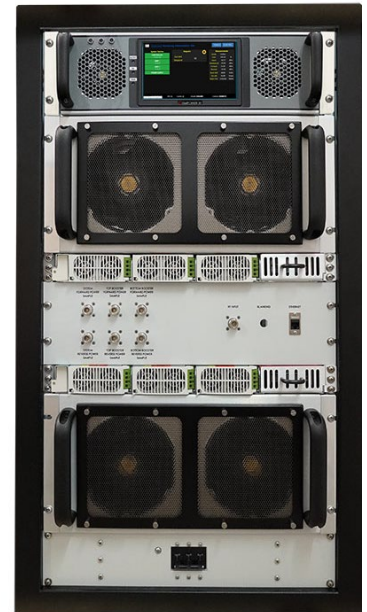
2176
1750 - 2120 MHz / 4000 Watts

The 2176 is suitable for high power modulated, CW, 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 is achieved by employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, and all qualified components. The multiple drawers are constructed in 5RU and 3RU including the forced air-cooling with optional enclosure. The system comes standard to operate at 208VAC line-to-line 3-phase AC supply.

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 design
- Suitable for CW, AM, FM, Pulse and linear applications
- Compact Modular design
- 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) unless specified

Parameter		Symbol	Min	Typ	Max	Unit
Operating Frequency		BW	1750		2120	MHz
Power Output @ 3.5dB PAR (CW) ^{NOTE 2}		P _{OUT}	2000 (4000)			Watt
Peak-to-Average Ratio		PAR		3.5		dB
Power Gain @ Rated output		G _P	68	73	78	dB
Input Power Range	L-Band	P _{IN}	-14	-10	-5	dBm
	S-Band		-13			
Leveled ALC – Flatness		ΔG			±0.3	dB
Gain Slope over any 4 MHz BW		G _{SLOPE4}			±0.25	dB
Gain Flatness over any 4 MHz BW		G _{A4}			±0.25	dB
Gain Adjustment Range (48-63 dBm)		VVA			15	dB
Gain Adjustment Step Size (M2M Only)		VVA _{STEP}	0.1			dB
Gain Stability	24Hr	G _{24H}			±0.5 / ±0.2	dB
Mode ALC & AGC (after 5 minutes)	15 to 30°C	G _{TEMP}			±0.5	dB
HPA Stability Settling Time	-10 to 40°C	T _{STABILITY}		5	10	Minute
Group Delay over any 4 MHz BW		Delay			25	nS
Input Return Loss (equal to 1.3:1 VSWR max.)		S ₁₁			-17.7	dB
Noise Figure @ maximum gain		NF			20	dB
Third Order Intermodulation 2-Tone @ 57dBm/Tone, 100kHz Spacing		IM3	-27			dBc
Harmonics @ P _{OUT} = 2000W _{RMS} (with LPF)		2 ND -5 TH			-72	dBc
Spurious Signals up to 6GHz		Spur			-72	dBc
Noise Power Density		NPD			-90	dBm/Hz
RF Sample Ports (Response Curve Table provided)		RF _{SAMPLE}	-62	-60	-58	dBc
Residual AM		RA			-60	dBc
AM/PM Noise (Power) Conversion		AM/PM			6	Deg/dB
Operating Voltage – (3-phase, line-to-line), 47-66 Hz		V _{AC}	185	208	270	Volt
Power Consumption @ 2000W _{RMS}		P _D			11	kVA
Output Power back-off if one more Pallets drops		P _{BK OFF}	Power Table to be provided			dB
Load VSWR without fold-back/Alarm	P _{OUT}	≤2kW _{RMS}	Load VSWR		2.2 : 1	-
		≤4kW _{CW}			2.0 : 1	

Notes:
 1. CW measurement performed in MGC Mode (Manual Gain Control)
 2. Factory configurable output capability for 2 kilowatts RMS or 4 kilowatts CW.

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MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions W x H x D	22.5 x 74 x 48	Inch
Weight	~400	Pound
Main RF Connectors – Input / Output	Input: Type-N, Female Output: WR430 CPRG	RF IN RF OUT
RF Sample Connectors	Type-N, Female	Forward/Reverse
Blanking Input Connector	Type-BNC, Female	Blanking
Cooling	Built-in forced air cooling system – front to rear	Airflow Direction

ENVIRONMENTAL CHARACTERISTICS (Qualification Data available for review):

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:

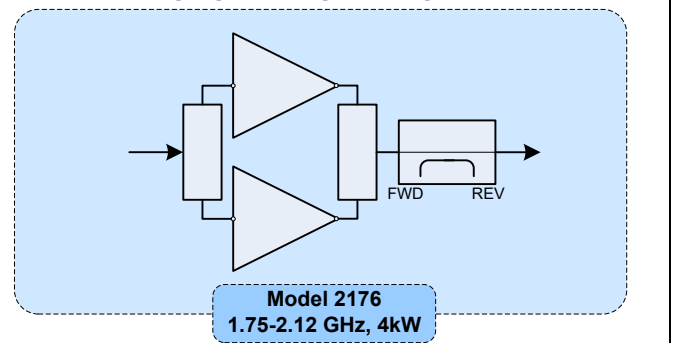
Parameter	Specification	Unit
Input Overdrive	0 dBm	Max
VSWR Protection with Fault Clear	At 3:1 – PA backs-off output power to a safe operating level – no system shutdown, "On Air" time is maximized	-
Thermal Overload with Fault Clear	Ambient 40°C	Min
Default Data Recovery	Factory Default Calibration 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 Standard, RS-422 (optional)	Serial management of device / local operator access	D-Sub 9-position Male

Available Options

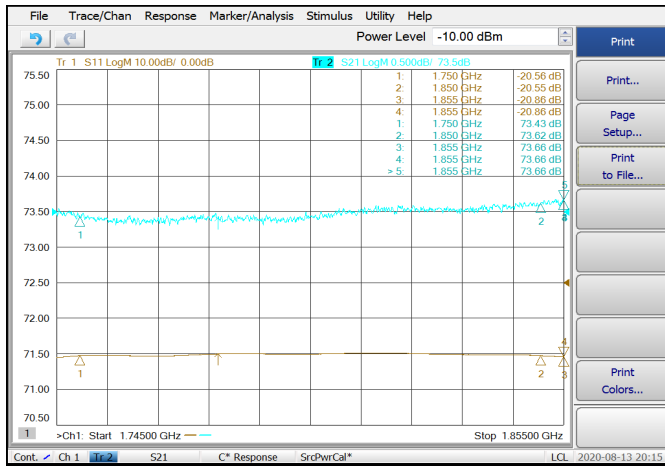
2176-xxx
-001 208 VAC, 3-phase-Delta, 47-66 Hz, Rack Assy System
-002 TBD
Contact us for other available options; sales@empowerrf.com
Standard Feature:
-LCD Control, Ethernet & Serial Comm
-RF Input Connector: N-Type, Female
-RF Sample Connectors: N-Type, Female
-Blanking/Gating Port: BNC-F
-Rack Slides, Handles and Rackmount Brackets

NOTIONAL BLOCK DIAGRAM


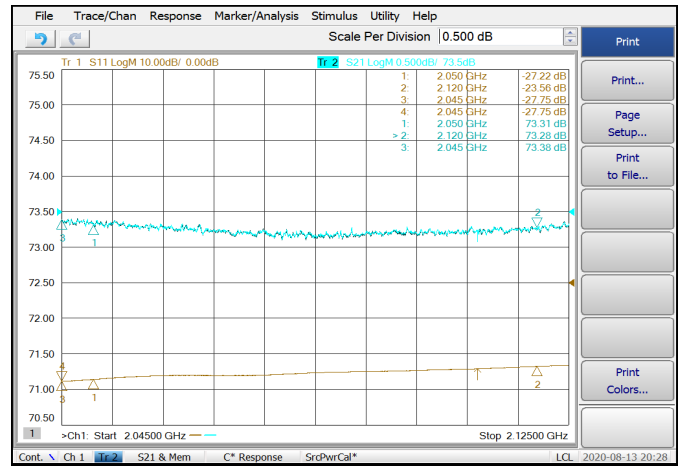
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TYPICAL PERFORMANCE PLOTS

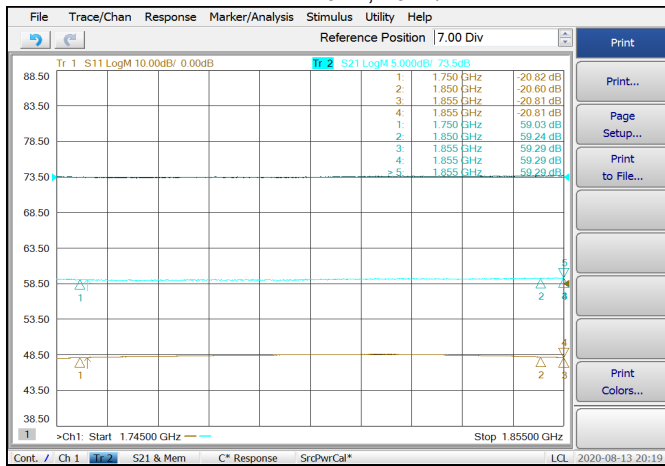
Plot 1 – Leveled ALC Flatness @ 2kW; 1750-1850MHz
 Top Curve: Power Gain @ $P_{IN} = -10\text{dBm}$
 Reference: 73.5dB, 0.5dB/div.
 Bottom Curve: Input Return Loss
 Reference: 0dB, 10dB/div.



Plot 2 – Leveled ALC Flatness @ 2kW; 1850-2120MHz
 Top Curve: Power Gain @ $P_{IN} = -10\text{dBm}$
 Reference: 73.5dB, 0.5dB/div.
 Bottom Curve: Input Return Loss
 Reference: 0dB, 10dB/div.



Plot 3 – Gain Adjustment Range @ $P_{IN} = -15\text{dBm}$
 (1750-1850MHz)
 Top Curve: Setpoint @ 63dBm
 Middle Curve: Setpoint @ 48dBm
 Reference: 73.5dB, 5dB/div.
 Bottom Curve: Input Return Loss @ 48dBm
 Reference: 0dB, 10dB/div.



Plot 4 – Gain Adjustment Range @ $P_{IN} = -15\text{dBm}$
 (1850-2120MHz)
 Top Curve: Setpoint @ 63dBm
 Middle Curve: Setpoint @ 48dBm
 Reference: 73.5dB, 5dB/div.
 Bottom Curve: Input Return Loss @ 48dBm
 Reference: 0dB, 10dB/div.

