

LIQUID
COOLED

POWER AMPLIFIER
SYSTEMS

THE MOST FLEXIBLE POWER AMPLIFIER SYSTEM AVAILABLE

SCALABLE SOLID STATE
HF to X-Band,
CW & Pulse



A unique design architecture from Empower RF Systems is yielding unprecedented performance and scalability for liquid cooled SSPA's delivering hundreds of kilowatts of pulse and CW power.

This breakthrough design is being fielded using both LDMOS and GaN on SiC devices for user applications that include:

EW

RADAR

SATCOM

Directed Energy

EMC

Space EW



EMPOWER
RF SYSTEMS

www.EmpowerRF.com



FEATURES

Liquid Cooled Scalable Power Architecture in CW or Pulse Configurations

- ★ No Single Point of RF Failure
- ★ Distributed Power Supplies
- ★ Fast Field Replaceable Modular Design with 15 Minute MTTR
- ★ Only Fractional System Spares Needed for Complete Back up System
*Only Spare a Couple of 2U Amplifier Drawers and One Controller
The Controller is Common Across the Portfolio*
- ★ System will Remain Operational and “On the Air” with Graceful Power Degradation
*In the Event of an RF Component Failure or High VSWR Condition
Loss of an Amplifier Drawer is Only a Fractional Reduction of Output Power*
- ★ Asymmetrical and Random Pulse Width and Duty Cycle Operation
- ★ Short and Long Pulse Capabilities - 200ns up to 500usec
500KHz PRF's and 20% Duty Cycles
- ★ Full Digital Peak and RMS Detection for Accurate Metering
- ★ No External Cabling, Full Back Plane Implementation Ensures Electromagnetic Compatibility
- ★ Ethernet Rapid Spanning Tree Architecture for Network Redundancy
- ★ Performance Monitoring and Systems Reporting – Current, Voltage, Temperature down to the Pallet and Device Level
- ★ Web API or SCPI for M2M Interface
- ★ Continuous BIT, Down to the Device Level, Web AP or SCPI for
- ★ Each 2U Amplifier “Building Block” is Digitally Set for Phase and Gain

PATENTED RF TECHNOLOGY

Empower RF Systems proudly announces the recent granting of several additional U.S. and international patents that further strengthen its position at the forefront of innovative amplifier technology. The technical team at Empower RF Systems now has seven recognized patent awards.

This award winning technology is integral to the company's high performance standard product and configured systems portfolio. The hardware and software architectures driven by these innovations are implemented across a next generation product portfolio that is yielding industry leading power densities and RF performance in support of mission critical customer applications.

“BUILDING BLOCK”

Each amplifier “building block” includes an integrated power supply in its 2U chassis. This arrangement improves pulse droop performance while eliminating the risk of a single power supply failure taking the entire amplifier offline.

Narrow and broadband configurations are available from UHF to X Band CW or Pulsed. The architecture is the same regardless of frequency – RF configurations driven by output power requirements. Each amplifier drawer is fully “hot swappable” with proven driplless technology.

You can increase output power to an existing amplifier by adding 2U amplifier building blocks (in even numbers) or adding additional complete racks.



MAXIMUM FLEXIBILITY

Empower’s Next Generation liquid cooled amplifier is designed to stay ahead of the increasing complexities of the signal environment. The combination of embedded firmware, software, and real time processing/control allows for maximum flexibility and operation in any application. This single architecture is capable of user selectable multimode operation and can be dynamically configured. CW Amplifiers offer the same pulse performance as our pulsed amplifiers with no limit on duty cycle and the Pulsed amplifiers allow CW operation 7dB below rated peak power.

PRODUCTS and APPLICATIONS

Frequency	Power	Pulse Width (Microseconds)	Duty Cycle (%)	Uses
406 to 450 MHz	180 KW pulse / 18 KW CW	500 ms	10% (or CW)	IOT replacement - production test
1 to 1.4 GHz	8 KW pulse	500 ms	20%	Open Air Range – EW signals environment
1 to 2 GHz	40 KW pulse	200 ns to 500 ms	10%	Electromagnetic Environmental Effects (E3)
1.75 to 2.12 GHz	4 KW peak/ 2.5 KW RMS			SATCOM Uplink
1.75 to 2.12 GHz	7 KW peak/ 3.5 KW RMS			SATCOM Uplink
2.8 to 3.5 GHz	120 KW pulse / 10 KW CW	500 ms	10%	Electromagnetic Environmental Effects (E3)
2 to 4 GHz	12 KW pulse	1 ms	20%	Electromagnetic Environmental Effects (E3)
2.5 to 4 GHz	P1dB - 4 KW CW			Open Air Range – EW signals environment
5.2 to 5.9 GHz	90 KW pulse	500 ms	20%	Open Air Radar Range Testing
5.4 to 5.9 GHz	30 KW pulse / 6 KW CW	500 ms	20%	Open Air Range – EW signals environment
1.9 to 2.5 GHz	4 KW average w/AWGN			SATCOM and Space EW

SCALABLE UPGRADE PATHS

PLANNING FOR AN UNCERTAIN FUTURE

Empower's scalable solutions offer an affordable upgrade path for future power needs by adding hardware to an existing system.

Our solutions provides three levels of scalability which can be exercised independently or in any combination:



- ★ Increased number of 2U amplifier drawers per rack
 - ⚙ *For racks not fully populated, 2U amplifier drawers can be added in pairs*
 - ⚙ *A partial system contains an even number of 2U amplifier drawers (A full rack contains 16)*
- ★ Increase number of racks
 - ⚙ *Full racks can be combined with additional 1, 2,3, or 5 racks*
 - ⚙ *For racks not fully populated, "like populated" racks can be combined*
- ★ Increase the amplifier's duty cycle for pulsed systems - consult factory



INSTALLATION AND ENGINEERING SUPPORT

Empower offers liquid cooling system design support and installation for both closed loop systems or integration into existing facility chiller systems. In addition, we offer on-site acceptance testing support and user training of the complete amplifier system.

- ★ Scalable cooling systems available
- ★ Easily integrated into existing facility chillers
- ★ Closed loop heat exchangers adaptable to your site
- ★ External pump or integrated into rack
- ★ Redundant pump systems optional
- ★ Redundant cooling pumps and auto changeover optional

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