

# Solid State Broadband High Power Amplifier

## 2247

## 5400 – 5900 MHz / 30kWPK Pulsed

The 2247 is comprised of multi-drawer integrated liquid-cooled sub-systems to produce up to 30kW peak pulsed output power. Each of the amplifier subsystem drawer features multiple 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 achieve by employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, and all qualified components. Each drawer is a full gain PA with integrated single phase power supply and liquid cooling. It features gain and phase control and is fully hot swappable in case of failure.

The amplifier system includes a built-in control and monitoring system, with protection functions which preserve maximum output availability and reliability. The duty cycle and the pulse width protection can be selected to back off the power when any of them violates the maximum limits. The protection will act immediately and back off the output by about 7dB and will stay in this condition until the operation returns to normal for at least 5 pulses, therefore there will be no change in the shape of the pulse after the first detected violation. This feature allows the unit to operate in CW with back-off of the output power. Remote management and diagnostics are via Ethernet port to a LAN. It is performed remotely by a web browser or M2M (machine to machine interface) or locally by a panel computer. The control system runs an embedded OS (Linux), has a built-in non-volatile memory for factory setup.

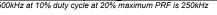
We are delivering more than just RF power, the next generation family of systems provide dynamic adjustments linked to the processing power and digital controls, which focus on maximizing system availability time as well as power output under ALL conditions.

Empower RF's ISO9001:2015 Quality Assurance Program assures consistent performance and the highest reliability.

- Solid-state class AB design
- Suitable for instantaneous pulse operation over the operating band.
- Compact Modular design and scalable architecture
- 50 ohm input/output impedance
- Built-in Control, Monitoring and Protection functions
- High reliability and ruggedness

#### **ELECTRICAL SPECIFICATIONS** over the case temperature conditions

Parameter	Symbol	Min	Typical	Max	Unit	
Operating Frequency	BW	5400		5900	MHz	
Power Output – Peak Pulse, P <sub>3dB</sub>	Psat_pk	30			kW	
Pulse Width @ Duty Cycle 20% (NOTE 1)	Pwidth	0.2		500	μSec	
Duty Cycle	DC	0.5		20	%	
Pulse Repetition Rate Frequency*	PRF			500	kHz	
Power Gain @ Rated Peak Pout	Gрк	76	81		dB	
Modulated Pulse Rise/Fall Time (10% to 90%)	TRISE/TFALL		25/25	30/30	nSec	
Pulse Delay – from Pulse input to RF 90%	PDELAY			900	nSec	
Pulse Width Distortion @ Rated Output	PWDIST			±50	nSec	
Intra-Pulse Isolation	P_iso	60			dB	
Input Power for rated output	Pin		-5	3	dBm	
Power Gain Flatness @ Rated Output	$\Delta G_P$			±2.0	dB	
Small Signal Gain Flatness	Gss			±3.0	dB	
Gain Adjustment Range	VVA	20			dB	
Input Return Loss	S <sub>11</sub>			-10	dB	
Noise Figure	NF			20	dB	
	Enabled			-10		
NPO – Noise Power Output	Disabled			-100	dBm/MHz	
Harmonias @ Dave and - 201/Way	2 <sup>ND</sup>		-40	-20	dBc	
Harmonics @ Pout_Pulse = 30kWpk	3 <sup>RD</sup>		-50	-30		
Spurious Signals	Spur			-60	dBc	
Operating Voltage @ 3-phase (Line-to-Line)	VAC	180	208	260	Volt	
Power Consumption @ 20%DC, Pout = 30kWPK	PD			35	kVA	







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#### INTRAPULSE CHARACTIERISTICS

Parameter	Remark	Min	Тур	Max	Unit
Chirp Mayoform (25MHz)	Phase ripple			± 0.5	0
Chirp Waveform (25MHz)	Amplitude Ripple			± 0.5	dB
	Amplitude			25 (5)*	%
Dulas Drass (25.0 mulas width)*	Phase			40	0
Pulse Droop (25µS pulse width)*	Quadratic phase deviation			20	0
Pulse-Pulse Characteristics	Phase 1	1	<sup>0</sup> (RMS)		
Fuise-Fuise Characteristics	Amplitude			0.2	dB (RMS)

#### MECHANICAL SPECIFICATIONS

Parameter	Value	Unit		
Overall Dimension W x H x D	Single Racks, 40U heigh	-		
Total Weight	TBD	Pound		
RF Connectors Input/Output	Input: N-Type, Fe	RF IN		
RF Connectors input/Output	Output: WR15	Output: WR159		
RF Sample Connectors	System Level: N-type	Forward/Reverse		
RF Sample Connectors	Booster Level: SMA	Level: SMA, Female		
Blanking/Gating Input Connector	BNC, Female		BLANKING	
Cooling System – Liquid	Pressure	25 typical	psi	
	Liquid Flow	85 typical	GPM	

#### **ENVIRONMENTAL CHARACTERISTICS:**

Parameter	Symbol	Min	Тур	Max	Unit
Operating Case Temperature	Tc	0		50	С°
Non-operating Temperature	T <sub>STG</sub>	-40		+70	С°
Relative humidity (non-condensing)	RH			95	%
Altitude (MIL-STD-810F)	ALT	0		6,000	Feet
Shock / Vibration (MIL-STD-810F,	SH / VI				
Shock Method 516.5, Vibration Method 514.5	3H / VI				-

#### PROTECTIONS

Parameter	Specification		
Input Overdrive	≥10 dBm – shutdown		
Load VSWR Protection	The unit disables RF when reverse power exceeds the safe level of 3:1 VSWR or reduces power by 6dB		
Thermal Shutdown	Baseplate ≥50 °C		
Default Data Recovery	Factory Default Calibration Recovery		
RF Safety Interlock	I/O Open-drain logic		

#### **COMMUNICATION INTERFACES:**

Function	Utility	Connector
Ethernet	Network management of device / web interface	RJ45

#### Note:

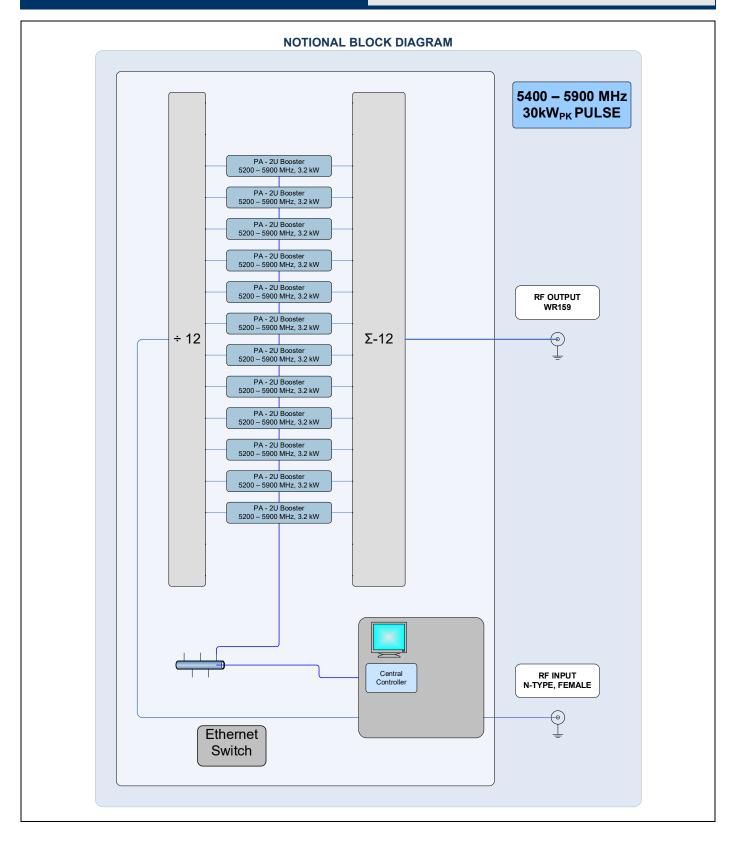
- 1. 200nSec Minimum pulse width.
- 2. CDU (Cooling Distribution Unit) and Heat Exchanger to be specified and quoted separately, if applicable.
- 3. 20% duty cycle configuration can be quoted requires modification and expense for waveguide combiner and isolated load.
- 4. Transmitter can be operated in CW check with factory for profile.



# Solid State Broadband High Power Amplifier

2247

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