EMPOWER RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

1227-005

5.4 – 5.9 GHz / 300 Watts Peak

The SKU 1227-005 is a 5.4 to 5.9 GHz pulsed amplifier that can deliver up to 300W peak output power and related RF performance under all specified temperature and environmental conditions. This compact module utilizes the latest high power RF GaN on SiC transistors and also features built-in control and monitoring, with protection functions to ensure high availability.

Empower RF's ISO 9001:2015 Quality Assurance Program assures consistent performance and the highest reliability.

- Solid-state Class AB design
- Instantaneous ultra broadband
- Suitable for Pulsed modulation from 500nS to 500us pulse widths and up to 20% duty cycle
- Small, lightweight, high reliability and ruggedness
- 50 ohm input/output impedance
- Built-in control, monitoring and protection circuits
- RS485 serial interface for monitoring and control

ELECTRICAL SPECIFICATIONS @ 50.0V_{DC}, Over Temperature and Environmental Conditions, as specified.

Parameter	Symbol	Unit	Test Condition	Min	Typ	Max
Operating frequency	BW	GHz		5.4		5.9
Peak output power	P_{SAT}	W	100us pulsed input signal, 10% duty cycle.	300	350	
Peak output power	P_{SAT}	W	500us pulsed input signal, 20% duty cycle.		270	
Input for rated output power	P_{IN}	dBm	Variable Attenuator set to nominal attenuation. Pulsed signal source at a peak output power of 300 watts		-5	
Gain, small signal	G_{SS}	dB	Measured with VNA in swept frequency mode at -20dBm. Input power calibrated / measured at the amplifier input port. Variable attenuator set to nominal attenuation.		60	
Gain flatness – small signal	ΔG_{SS}	dB	Test conditions the same as G_{SS}			±2
Gain adjustment range	G_{ADJ}	dB	Test conditions the same as G_{SS}	15		
Gain adjustment step size	G_{STEP}	dB	Test conditions the same as G_{SS}	0.5		
Maximum input power without damage	$P_{IN, Max}$	dBm	Input signal for unlimited duration.			10
Input return loss	IRL	dB	Measured with VNA in swept frequency mode at -20dBm and 0dBm. Input power calibrated / measured at the amplifier input port. Variable attenuator set to nominal attenuation.			-10
Noise figure	NF	dB	Variable attenuator set to nominal attenuation.			20
2nd harmonics	2nd	dBc	Variable attenuator set to nominal attenuation. Pulsed signal source at a peak output power of 250W.			-20
3rd harmonics	3rd	dBc	Variable attenuator set to nominal attenuation. Pulsed signal source at a peak output power of 250W.			-20
Spurious	Spur	dBc	Variable attenuator set to nominal attenuation. Pulsed signal at a peak output power of 250 watts. Spurious is defined as any non-harmonic amplifier output. Spurious measured in a 1kHz resolution bandwidth, 10kHz video bandwidth. Specifications apply at offsets of greater than or equal to +/- 10kHz from the RF carrier. Maximum measurement frequency is 18GHz.			-60
Operating voltage	V_{DC}	V	Note: Output power capabilities and gain will vary with voltage.	42	48	50
Peak Current consumption	I_{DC}	A	Variable attenuator set to nominal attenuation. Measurement at a peak output power of 300W.		20	
PA enable / Disable time	$T_{ON/OFF}$	nSec	Variable attenuator set to nominal attenuation. Measurement with 300 watts peak output. Rise and fall times of amplifier output envelope recorded. Rise and fall times at 10% / 90% of the output power in linear scale. PA Enable / Disable signal set to 400Hz repetition rate (or 20% duty cycle).		250	

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PA PROTECTION / RUGGEDNESS

The PA includes protection circuits for:

- Exceeding 500uS pulse width and/or 20% duty cycle
- Over temperature
- Over voltage
- Reverse polarity
- Over current

ENVIRONMENTAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T_C	-40		+85	°C
Storage Temperature	T_{STG}	-40		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude (MIL-STD-810F Method 500.4)	ALT			30,000	Feet
Vibration/Shock MIL-STD-810F Method 514.5/516.5 – Proc 1	VI/SH		Airborne		

MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimension	7.0 x 4.0 x 1.0	Inch
Weight	1.5	Pound
RF Connectors Input / Output	Type-SMA, Female	J1, J2
DC Interface Connector	Hybrid – D-Sub 17-Pin, Male (17W2)	J3
Cooling	External Heatsink Required (not supplied)	

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DC INTERFACE CONNECTOR

Pin #	Description	Specification
A1	GND	Ground Return
A2	VDD	Supply Voltage: +42.0 – 50.0V_{DC}, 48.0V_{DC} Nominal
1	RS485 (-)	Serial Communication Bus
2	Temperature Reporting	Analog Output Voltage @ 10mV/°C with a 500mV offset (i.e. 0.75V = 25°C)
3	Address 1	Hardware Address 1
4	Address 3	Hardware Address 3
5	Attenuator Setting	Voltage input in the range of 0.5 – 3.0V_{DC}, 0.5V_{DC} corresponds with minimum attenuation, 3.0V_{DC} is maximum attenuation.
6	PA Enable	0/3.3V logic levels: Power Amplifier Enable is a TTL Logic High up to 20% duty cycle *(Internally Pulled-low)*
7	Alarm	Amplifier Alarm indicator: Normally TTL Low A logic High indicates a fault condition, 0/3.3V Logic Levels
8	RS485 (+)	Serial Communication Bus
9	Current Reporting	Analog output voltage range of 1V/10A (i.e. 1.5V = 15A)
10	Address 0	Hardware Address 0 – Least significant bit
11	Address 2	Hardware Address 2
12	Address 4	Hardware Address 4 – Most significant bit
13	Not Used	No Connection
14	Not Used	No Connection
15	Reset	Hardware reset Logic 0 to reset PA and clear latched faults