

Solid State Broadband High Power Amplifier

1213
1 – 30 MHz / 50 Watts

The 1213 is suitable for HF broadband and specific high power linear applications. This amplifier utilizes the latest push-pull LDMOS power devices that provide high gain, wide dynamic range, low distortions, and good linearity. The amplifier utilizes a device specific for HF Communications and Transmitters, capable of withstanding extremely high load VSWR. Exceptional performance, long term reliability and high efficiency are achieved by employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, machined housings and qualified components. Empower RF's ISO9001 Quality Assurance Program assures consistent performance and the highest reliability.



- Solid-state Class AB linear design
- Instantaneous ultra broadband
- Suitable for CW, AM, FM and pulse (Consult factory for other modulation types)
- Small and lightweight
- 50 ohm input/output impedance
- High reliability and ruggedness
- Built-in control, monitoring and protection circuits
- RS485 serial interface for monitoring and control

ELECTRICAL SPECIFICATIONS @ +48V_{DC}, +25°C, 50 Ω System

Parameter	Symbol	Unit	Test Condition	Min	Typ	Max
Operating frequency	BW	MHz		1		30
Peak output power	P _{SAT}	W	Measured with an IS-95, 9 channel forward link waveform without clipping. Channel bandwidth ~1.25MHz and PAR 10dB at 0.01% probability.	50	60	
Gain, small signal	G _{SS}	dB	Measured with VNA in swept frequency mode at -10dBm CW. Input power calibrated / measured at the amplifier input port. Variable attenuator set to nominal attenuation.	50	53	56
Gain flatness small signal	ΔG _{SS}	dB	Test conditions the same as G _{SS}			±3.0
Gain adjustment range	G _{ADJ}	dB	Test conditions the same as G _{SS}	15	20	
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	CW input signal for unlimited duration.			20
Input return loss	IRL	dB	Measured with VNA in swept frequency mode at -10dBm and 0dBm CW. Input power calibrated / measured at the PA input port. Variable attenuator set to nominal attenuation.			-10
Noise figure	NF	dB	Variable attenuator set to nominal attenuation.		7	10
Harmonics	2 ND	dBc	Variable attenuator set to nominal attenuation. CW signal source at an output power of 50W.			-20
	3 RD					-10
Spurious	Spur	dBc	Variable attenuator set to nominal attenuation. CW signal source of 0dBm at the input of the PA. Spurious 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 1GHz.		-70	-60
Operating voltage	V _{DC}	V	Note: Output power capabilities and gain will vary with voltage.	42	48	52
Current consumption	I _{DC}	A	Variable attenuator set to nominal attenuation. Measurement at an output power of 50W with a CW source.			4.5

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PA enable / disable time	T _{ON/OFF}	uSec	Variable attenuator set to nominal attenuation. Measurement with 0dBm CW signal presented to the input of the amplifier. 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 10kHz repetition rate and 50% duty cycle.			1
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PA PROTECTION / RUGGEDNESS

The PA includes protection circuits for:

- Over temperature
- Over voltage
- Reverse polarity
- Over current

In addition to protection circuits, the PA will withstand full reflection at the RF output port at any angle for up to 1 minute at P3dB.

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 1.12	Inch
Weight	1.5	Pound
RF Connectors	Input/Output: Type-SMA, Female	
DC Interface Connector	Hybrid – D-Sub 17-Pin, Male (17W2)	
Cooling	External Heat-sink/Fan Required (not supplied, sold separately)	

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DC INTERFACE CONNECTOR

Pin #	Description	Specification
A1	GND	Ground Return
A2	VDD	Supply Voltage: +46.0 – 50.0V _{DC} , 48.0V _{DC} Nominal
1	RS485 (-)	Serial Communication Bus
2	Temperature Reporting	Analog Output Voltage @ 10 mV/°C with a 500 mV 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. Leave pin open or grounded to utilize RS-485 interface.
6	PA Enable	0/3.3V logic levels: Power Amplifier disable is a TTL Logic Low (0V), (<i>Internally Pulled-High 3.3V</i>) Leave pin open or pulled high to utilize RS-485 interface.
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/10 A (i.e. 1.0V = 10A)
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

OUTLINE DRAWING

