

Solid State Broadband High Power Amplifier

2142 - BBS4A5KRR
1000 – 2500 MHz / 500 Watts

The BBS4A5KRR (SKU 2142) is suitable L & S Bands broadband or band specific high power linear, 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 are achieved by employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, and all qualified components. The amplifier is housed in two 19" rack mountable cabinets (LRU's) and as an option can be supplied in a rack cabinet. The larger LRU (5U) contains the RF power section while the smaller LRU (3U) contains the main power supply and control circuits. The system operates from a single phase power supply and has built in control, monitoring and protection functions and forced air-cooling system. Empower RF's ISO9001 Quality Assurance Program assures consistent performance and the highest reliability.



- Solid-state linear design
- Instantaneous broadband
- Modular LRU design
- Suitable for CW, AM and FM (Consult factory for other modulation types)
- 50 ohm input/output impedance
- High reliability and ruggedness
- Built in Control, Monitoring and Protection Circuits

ELECTRICAL SPECIFICATIONS @ 220V_{AC}, 25°C, 50Ω System

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	1000		2500	MHz
Power Output CW	P _{SAT}	500			Watt
Power Gain @ Rated P _{SAT}	G _P	56			dB
Input Power for Rated P _{SAT}	P _{IN}		0		dBm
Gain Flatness	ΔG		±1.0	±1.5	dB
Gain Adjustment Range	FGA	20	25		dB
Input Return Loss	S ₁₁			-10	dB
Noise Figure	NF		10		dB
Third Order Intercept Point 2-Tone @ 50dBm/Tone, 1MHz Spacing	IP3		+65		dBm
Harmonics @ P _{OUT} = 300W	2 ND /3 RD		-35		dBc
Spurious Signals	Spur		-70	-60	dBc
Switching Time, 1kHz TTL @ 50% Duty Cycle	T _{ON} / T _{OFF}		2	3	μSec
Operating Voltage (Single Phase)	V _{AC}	180	220	260	Volt
Power Consumption @ P _{SAT} = 500W	P _D		2100	3000	Watt

MECHANICAL SPECIFICATIONS

Parameter	Value	Unit	Limit
Dimensions (W x H x D) (2-Drawer Unit)	19 x 5.25 x 22 and 19 x 8.75 x 22	Inch	Typ
Weight	135	lb.	Max
RF Connectors Input / Output	Type-TNC, Female / DIN-7/16, Female		
I/O Control Connector	D-Sub 15-Pin, Male		
Cooling	Built-in forced-air cooling system		

ENVIRONMENTAL CHARACTERISTICS (Design to Meet)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature MIL-STD-810E - Method 503.3 and 500 – Proc II	T _A	-20		+55	°C
Non-operating Temperature	T _{STG}	-40		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude(MIL-STD-810E, Method 500 – Proc II)	ALT			30,000	Feet
Vibration/Shock MIL-STD-810F - Method 514.5/516.5 - Proc I, Cat 6	VI/SH		Airborne		

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RF NOISE QUIETING

Parameter	Max	Unit
Output Noise Level	-90	dBm/MHz
Quieting Mode Time On/Off	20	μS
Pulse Repetition Factor (PRF) Rate	10	kHz
Control	RS-422	
Connector Type	D-Sub 15-Pin, Male	

LIMITS

Input RF drive level without damage	+10 dBm	Max
Load VSWR @ P _{OUT} = 500W	5:1 @ any angle & magnitude	-
Thermal Overload	85°C shutdown	Max

I/O INTERFACE CONNECTOR – D-Sub 15-Pin, Female

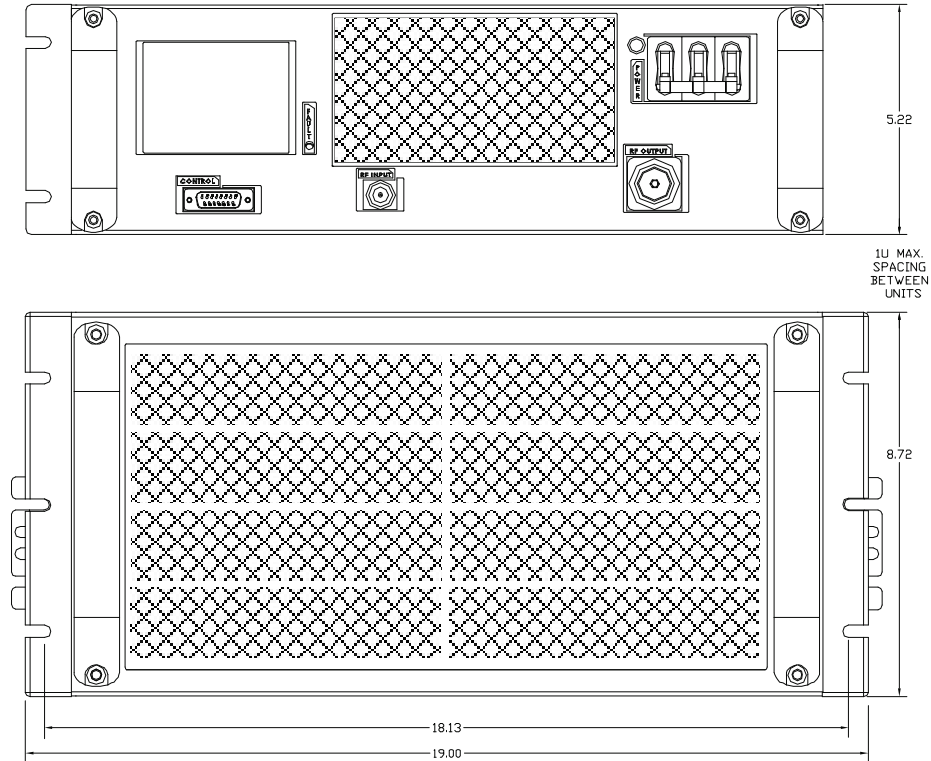
Pin #	Description	Specifications
1	Forward Test Point	Analog Voltage 0-5V _{DC} Test Point relative to Forward Power Level
2	Reverse Test Point	Analog Voltage 0-5V _{DC} Test Point relative to Reverse Power Level
3	N/C	No Connection
4	RS422 In (-) (S/D)	RS422 Serial Port In (-)
5	RS422 In (+) (S/D)	RS422 Serial Port In (+)
6	N/C	No Connection
7	N/C	No Connection
8	5V Test Point	+5.0V _{DC} , ±0.5V
9	GND	Ground
10	12V Test Point	+12.0V _{DC} , ±1.0V
11	RS422 In (+)	RS422 Serial Port Driver In (+) CPU
12	RS422 In (-)	RS422 Serial Port Driver In (-) CPU
13	RS422 Out (+)	RS422 Serial Port Driver Out (+) CPU
14	RS422 Out (-)	RS422 Serial Port Driver Out (-) CPU
15	+28V (TP)	P/S Output Voltage: +28.0V _{DC} , ±2.0V Test Point

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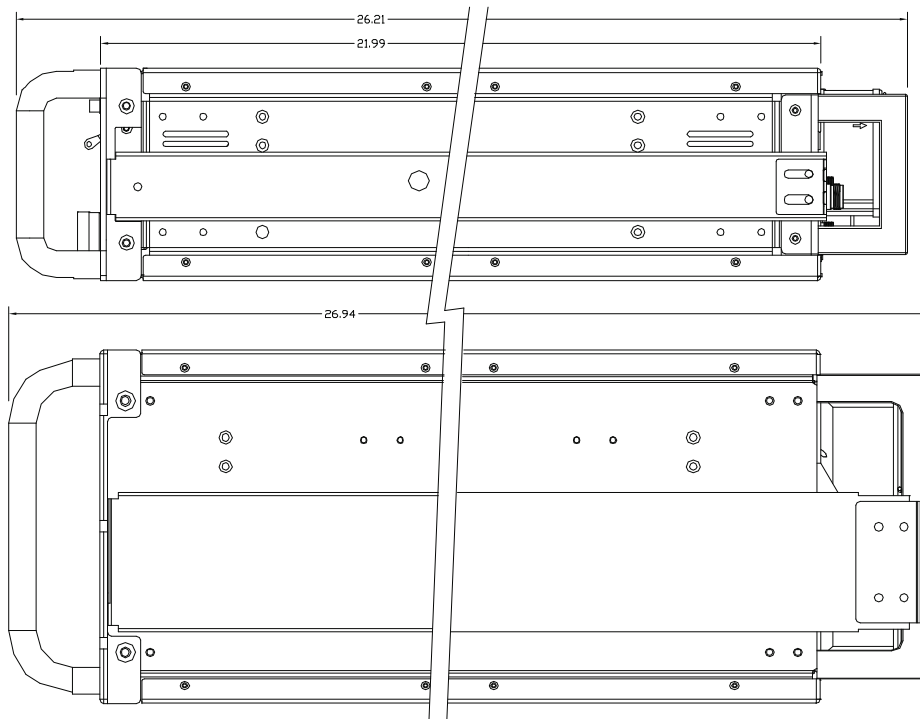
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SYSTEM OUTLINE DRAWING – FRONT VIEW



SYSTEM OUTLINE DRAWING – SIDE VIEW



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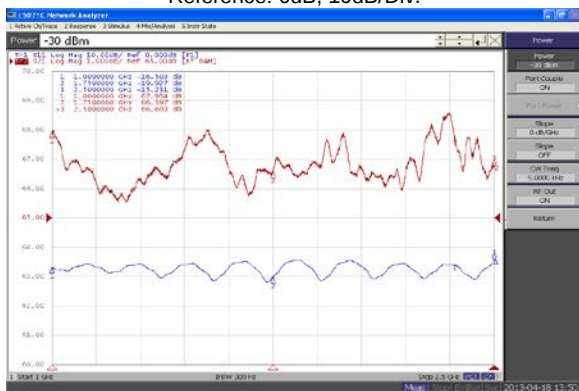
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TYPICAL PERFORMANCE PLOTS

Plot 1 – Small Signal Gain Response

Top Curve: Small Signal Gain @ $P_{IN} = -30\text{dBm}$
 Reference: 65dB, 1dB/Div.
 Bottom Curve: Input Return Loss
 Reference: 0dB, 10dB/Div.



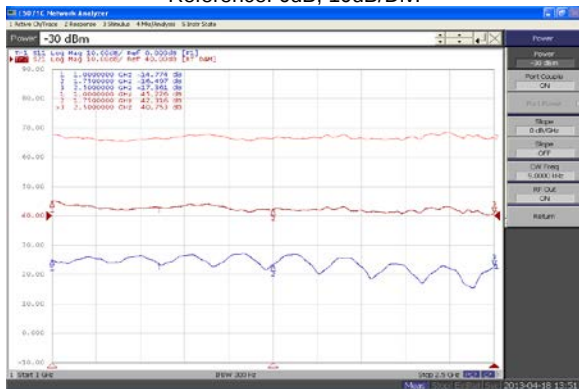
Plot 2 – Output Power @ P_{SAT}

Top Curve: Power Gain @ P_{SAT} @ $P_{IN} = 0.0\text{dBm}$
 Reference: 57dB, 1dB/Div.
 Bottom Curve: Input Return Loss
 Reference: 0dB, 10dB/Div.



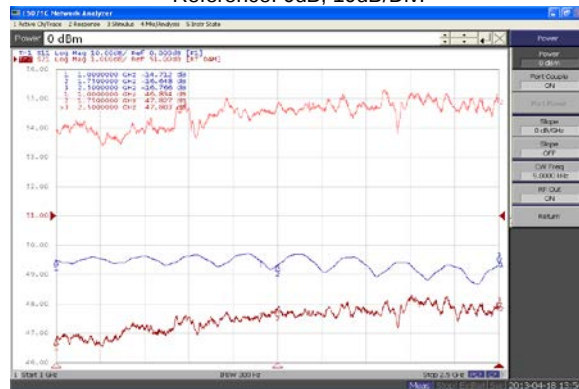
Plot 3 – Gain Adjustment Range

Top Curve: Maximum Gain @ $P_{IN} = -30\text{dBm}$
 Middle Curve: Minimum Gain @ $P_{IN} = -30\text{dBm}$
 Reference: 40dB, 10dB/Div.
 Bottom Curve: Input Return Loss @ Minimum Gain
 Reference: 0dB, 10dB/Div.



Plot 4 – ALC Flatness @ 250W & 50W

Top Curve: ALC @ 250W, $P_{IN} = 0\text{dBm}$
 Bottom Curve: ALC @ 50W, $P_{IN} = 0\text{dBm}$
 Reference: 51dB, 1dB/Div.
 Middle Curve: Input Return Loss
 Reference: 0dB, 10dB/Div.



Plot 6 – Switching Time ON
 Scale: 0.5μs/Div.



Plot 7 – Switching Time OFF
 Scale: 0.1μs/Div.

