EMPOWER
RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

2125 – BBS3C6ANP

105 – 3000 MHz / 200/150 Watts

The BBS2E3KUT (SKU 2125) is suitable for broadband or band specific high power linear, CW and pulse applications. This amplifier includes 6 bands any 2 of which can operate simultaneously, and utilizes high power, DMOS, LDMOS and 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 constructed of two modular drawers and is housed in an optional rack cabinet. The main LRU includes the RF power section while the second LRU holds the main power supply and control circuits. The system operates from a single phase power supply and has a 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 and modular design
- Instantaneous ultra broadband
- Suitable for CW, AM, and FM (Consult factory for other modulation types)
- 50 ohm input/output impedance
- Built in Control, Monitoring and Protection functions
- High reliability and ruggedness

ELECTRICAL SPECIFICATIONS @ $480V_{AC}$, 3ϕ, 25°C, 50 Ω System

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency for each Band (Bandwidth)	Band A	105		184	MHz
	Band B	184		321	
	Band C	321		561	
	Band D	561		981	
	Band E	981		1700	
	Band F	1700		3000	
Power Output CW	P_{SAT}	105-561MHz = 200 561-3000MHz = 150			Watt
Power Output @ P_{1dB}	P_{1dB}		105-561MHz = 150 561-3000MHz = 100		Watt
Power Gain @ P_{1dB}	G_{1dB}	105-561MHz = 53 561-3000MHz = 52			dB
Input Power for Rated P_{SAT}	P_{IN}		0		dBm
Small Signal Gain Flatness @ P_{IN} = -20 dBm	ΔG			±2.0	dB
Gain Adjustment Range	FGA	20	25		dB
Input Return Loss	S_{11}			-10	dB
Noise Figure @ Maximum Gain	NF		10		dB
Third Order Intercept Point	IP3		+60		dBm
Harmonics @ Rated P_{1dB}	2^{ND} / 3^{RD}		-20		dBc
Spurious Signals	Spur		-80		dBc
Operating Voltage (3 phase)	V_{AC}	365	480	528	Volt
AC Power Consumption @ P_{OUT} = 150/100W	P_D		1000		Watt

MECHANICAL SPECIFICATIONS

Parameter	Value	Units
Dimensions W x H x D	19 x 19.25 x 22 (483 x 489 x 559)	Inc (mm)
Weight (No Enclosure)	150	lb.
RF Connectors, Input/Output	Type-N, Female	-
Cooling	Built in forced-air cooling system	-

ENVIRONMENTAL CHARACTERISTICS (Design to Meet)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_C	0		+50	°C
Non-operating 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 I	VI/SH		Airborne		

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LIMITS

Input RF drive level without damage	+10 dBm	Max
Load VSWR @ Rated P_{1dB}	∞ @ all load phase & amplitude for duration of 1 minute 3:1 @ all load phase & amplitude continuous	-
Thermal Overload	85°C shutdown	Max

J20 – Test Point Connector – D-Sub 37-Pin, Female

Pin#	Description	Specifications
1	Forward Voltage 1	3.1V Band F @ P_{1dB}
2	Forward Voltage 2	2.4V Band E @ P_{1dB}
3	Forward Voltage 3	2.7V Band D @ P_{1dB}
4	Forward Voltage 4	3.0V Band C @ P_{1dB}
5	Forward Voltage 5	3.0V Band B @ P_{1dB}
6	Forward Voltage 6	3.0V Band A @ P_{1dB}
7	Reverse Voltage 1	1.1V Band F 3:1 @ P_{1dB}
8	Reverse Voltage 2	1.0V Band E 3:1 @ P_{1dB}
9	Reverse Voltage 3	1.6V Band D 3:1 @ P_{1dB}
10	Reverse Voltage 4	1.8V Band C 3:1 @ P_{1dB}
11	Reverse Voltage 5	1.2V Band B 3:1 @ P_{1dB}
12	Reverse Voltage 6	1.7V Band A 3:1 @ P_{1dB}
13	Current Monitor 1	1.0V Band F @ P_{1dB}
14	Current Monitor 2	0.8V Band E @ P_{1dB}
15	Current Monitor 3	0.7V Band D @ P_{1dB}
16	Current Monitor 4	0.9V Band C @ P_{1dB}
17	Current Monitor 5	0.8V Band B @ P_{1dB}
18	Current Monitor 6	0.8V Band A @ P_{1dB}
19	Temp Sense 1	0.28V @ P_{1dB}
20	Temp Alarm	4.86V @ P_{1dB}
21	Mute 1	4.36V @ P_{1dB}
22	Mute 2	5.98V @ P_{1dB}
23	VSWR Fault	5.41V @ P_{1dB}
24	Ground to Subsystem	Ground
25	Standby	5.15V @ P_{1dB}
26	N/C	No Connection
27	N/C	No Connection
28	N/C	No Connection
29	N/C	No Connection
30	Shutdown 1	4V @ P_{1dB}
31	Shutdown 2	4V @ P_{1dB}
32	N/C	No Connection
33	+5.0Volts_2	5V @ P_{1dB}
34	N/C	No Connection
35	+12.0Volts _2	12V @ P_{1dB}
36	Temp Sense 2	0.68V @ P_{1dB}
37	Ground	Ground

J19 – I/O CONTROL CONNECTOR – Circular 6-Pin, Female (MTV26 CLUTCH-LOK – D38999/20WA35SN)

Pin #	Description	Notes
1	Band A Enable Control: TTL Logic Low (0V)	LCD Controller must be set to the active Band for proper reporting on the display panel.
2	Band B Enable Control: TTL Logic Low (0V)	
3	Band C Enable Control: TTL Logic Low (0V)	
4	Band D Enable Control: TTL Logic Low (0V)	
5	Band E Enable Control: TTL Logic Low (0V)	
6	Band F Enable Control: TTL Logic Low (0V)	

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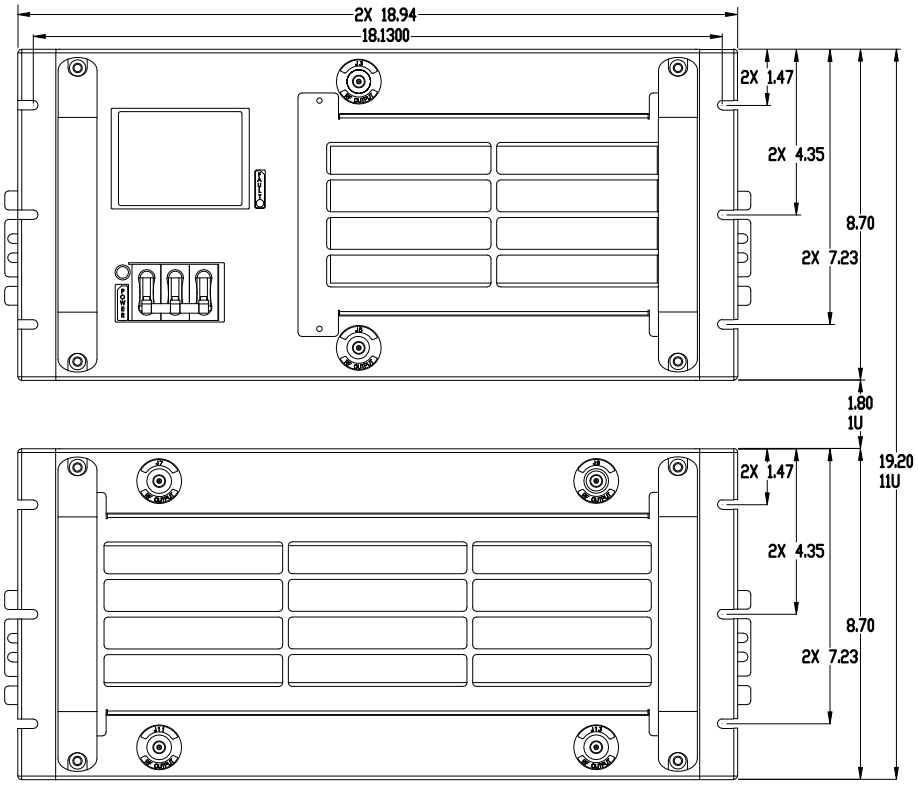
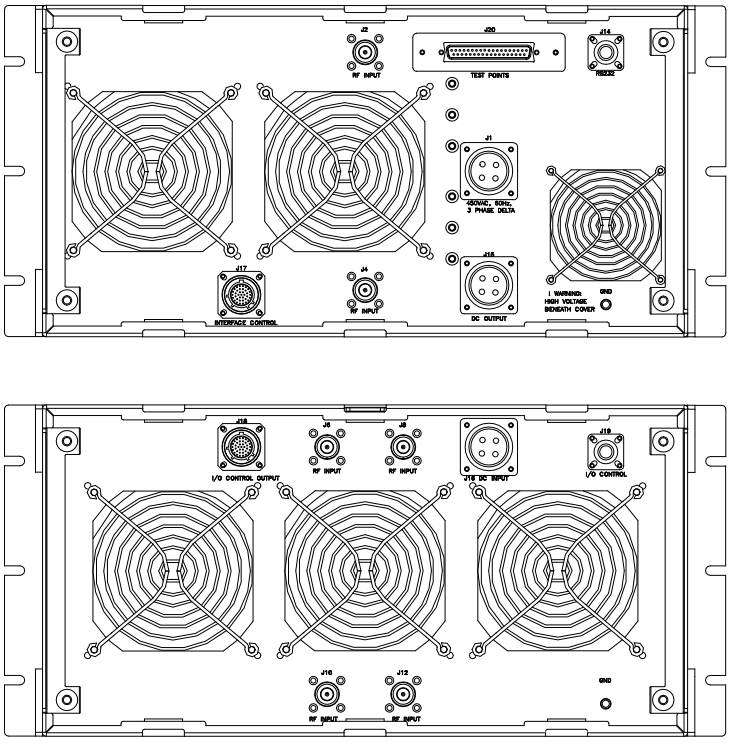
OUTLINE DRAWING - FRONT VIEW



OUTLINE DRAWING - REAR VIEW



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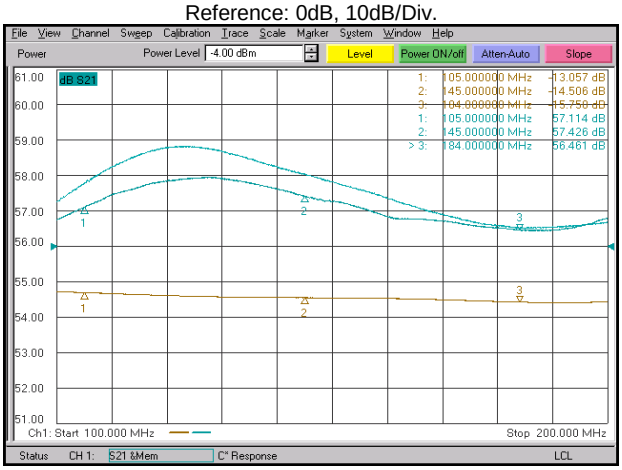
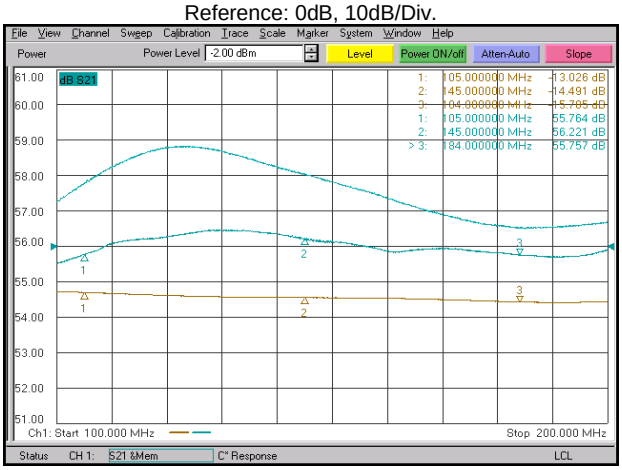
Typical Performance Plots

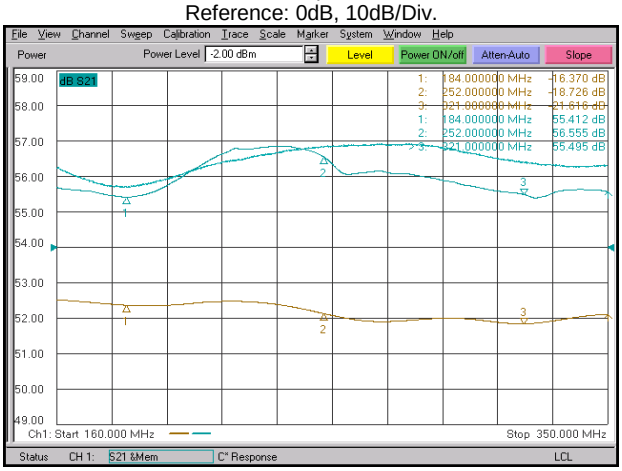
Band A
Plot 1 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -4.0dBm
Reference: 56dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



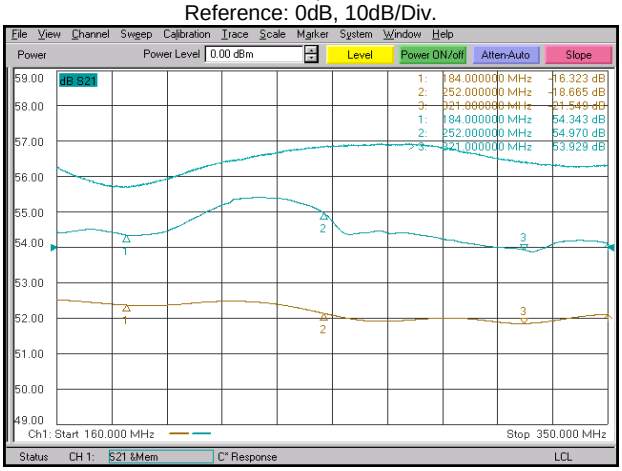
Band A
Plot 2 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @P_{SAT}, P_{IN} = -2.0dBm
Reference: 56dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Band B
Plot 3 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -2.0dBm
Reference: 54dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Band B
Plot 4 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{SAT}, P_{IN} = 0.0dBm
Reference: 54dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



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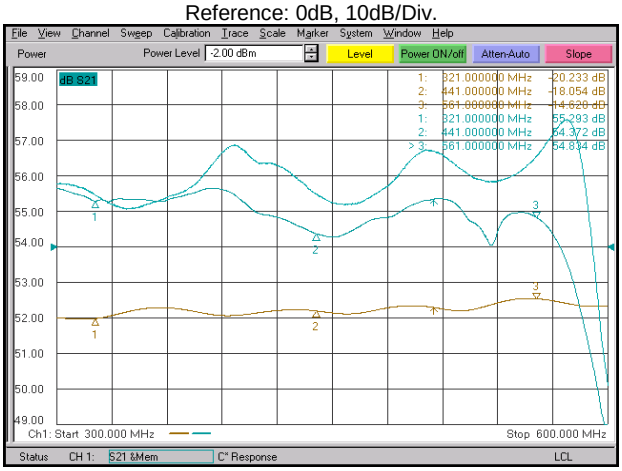
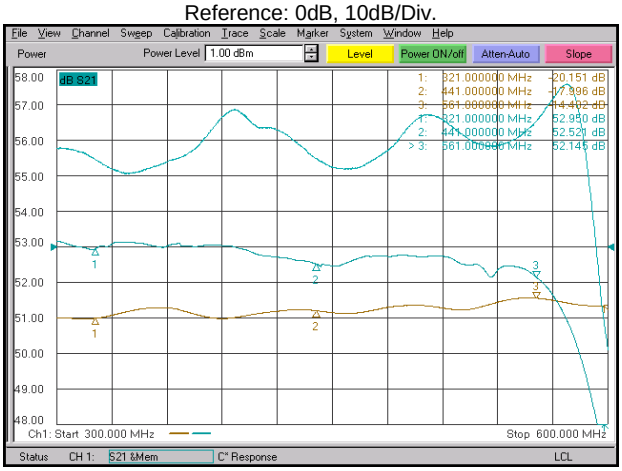
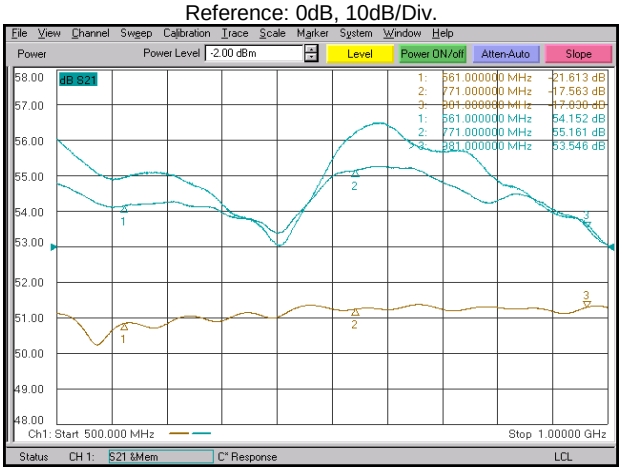
Band C
Plot 5 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -2.0dBm
Reference: 54dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



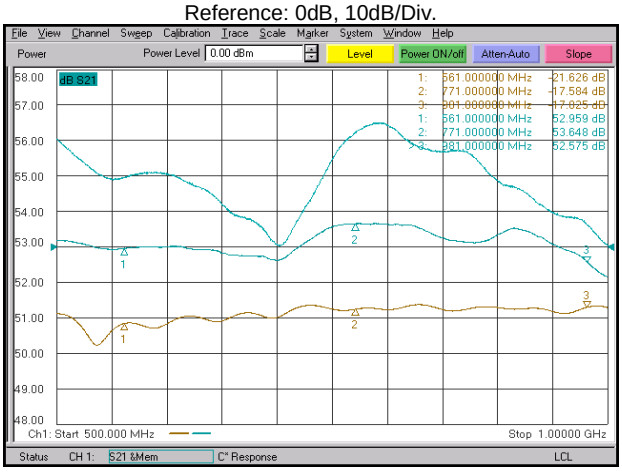
Band C
Plot 6 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{SAT}, P_{IN} = +1.0dBm
Reference: 53dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Band D
Plots 7 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -2.0dBm
Reference: 53dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Band D
Plot 8 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{SAT}, P_{IN} = 0.0dBm
Reference: 53dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



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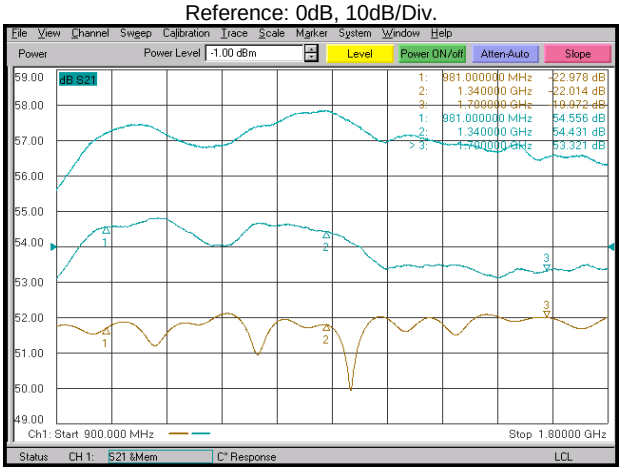
Band E

Plot 9 – Small Signal Gain and Power Gain

Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{IN} = -1.0dBm
Reference: 54dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Band F

Plot 10 – Small Signal Gain and Power Gain

Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{IN} = 0.0dBm
Reference: 54dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.