EMPOWER RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

2165-BBS3K8CEM - Dual Band	500 - 6000MHz / 25W/10W

The BBS3K8CEM (2165) is a Dual-Band multi-octave ultra broadband high power amplifier. This amplifier utilizes GaN power devices that provide wide frequency response and dynamic range, high gain, low distortions, and excellent linearity. 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 system includes a universal voltage, single phase PFC power supply and a built in forced air-cooling system. Empower RF's ISO9001 Quality Assurance Program assures consistent performance and the highest reliability.

SKU#: 2165CLRAAXLXX

- Solid-state class AB design
- Dual-Band switching for ultra broadband operation
- Small and lightweight
- Standard front panel manual gain adjust
- Suitable for CW, AM, and FM (Consult factory for other modulation types)
- 50 Ohm Input/Output impedance
- High reliability and ruggedness

ELECTRICAL SPECIFICATIONS @ $120V_{AC}$, 25°C, 50Ω system

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW_A	500		2500	MHz
	BW_B	2500		6000	
Output Power CW	$P_{SAT\ A}$	25			Watt
	$P_{SAT\ B}$	10			
Output Power @ 1dB Gain Compression	$P_{1dB\ A}$		10		Watt
	$P_{1dB\ B}$		4		
Power Gain @ P_{1dB}	$G_{1\text{-}dB\ A/dB\ B}$	46/42			dB
Input Power for Rated P_{SAT}	P_{IN}		0	3	dBm
Small Signal Gain Flatness	ΔG			±2.0	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 @ 30dBm/Tone, 100kHz Spacing	$IP3_A/IP3_B$	+45			dBm
Harmonics @ $P_{OUT\ 1/2}$ = 10W/4W	H		-20		dBc
Spurious Signals	Spur		-70	-60	dBc
Operating Voltage (1-phase)	V_{AC}	100		240	Volt
Power Consumption @ rated $P_{SAT\text{-}1\&2}$	P_D		145	250	Watt

MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions (W x H x L)	19 x 3.5 x 18	Inch
Weight	27	lb.
RF Connectors Input / Output	Type-N, Female	
Cooling	Built-in internal forced air cooling system	

ENVIRONMENTAL CHARACTERISTICS (Design to Meet)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature	T_A	0		+50	°C
Non-operating Temperature	T_{STG}	-40		+85	°C
Relative humidity w/o condensation	RH	95			%
Altitude (MIL-STD-810F – Method 500.5)	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	+10dBm	Max
Load VSWR @ Rated P_{SAT}	∞ @ all load phase & amplitude for duration of 1 minute 3:1 @ all load phase & amplitude continuous	–
Thermal Overload	85°C shutdown	Max

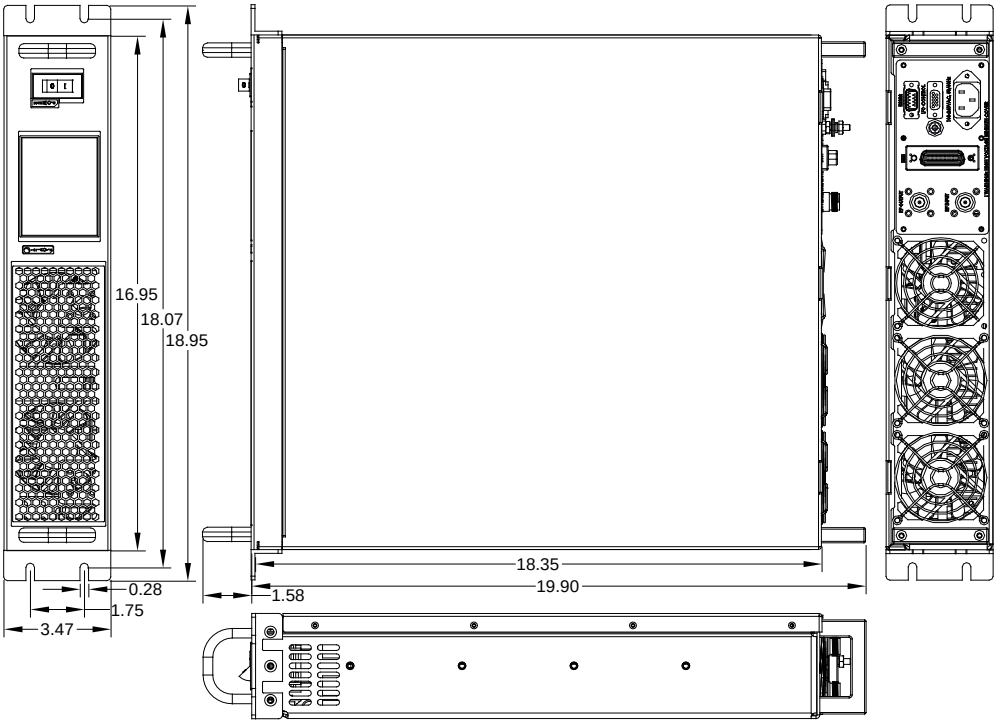
AVAILABLE OPTIONS

SKU Number	Description	LCD Touchscreen
2165CLRAAXLXX	LCD controller, Rear RF connectors 100-240VAC, 50/60Hz.	Touchscreen Digital Display, including FWD/REV Power indication (dBm or Watt scale), Gain Adjustment, ALC Fast/Slow, On/Off, Standby mode, Fault indication, Rear panel GPIB/HPIB IEEE-488.2 and Half Duplex RS232.
Optional	Rack Slides (Call for price)	

I/O INTERFACE CONNECTOR – D-Sub 9-Pin, Female

Pin #	Description	Specifications
1	Forward Test Point	Analog Voltage 0-5V_{DC} relative to Forward Power Level
2	Reverse Test Point	Analog Voltage 0-5V_{DC} relative to Reverse Power Level
3	5V Test Point	+5.0V_{DC} ±0.2V
4	N/C	No Connection
5	EXT Shutdown	Disable: TTL Logic High (5V) (*Internally Pulled-Low*)
6	12V Test Point	+12.0V_{DC} ±0.5V
7	P/S Test Point	+26.0-30.0V_{DC}
8&9	GND	Ground

SYSTEM OUTLINE SHOWN
SKU #: 2165CLRAAXLXX



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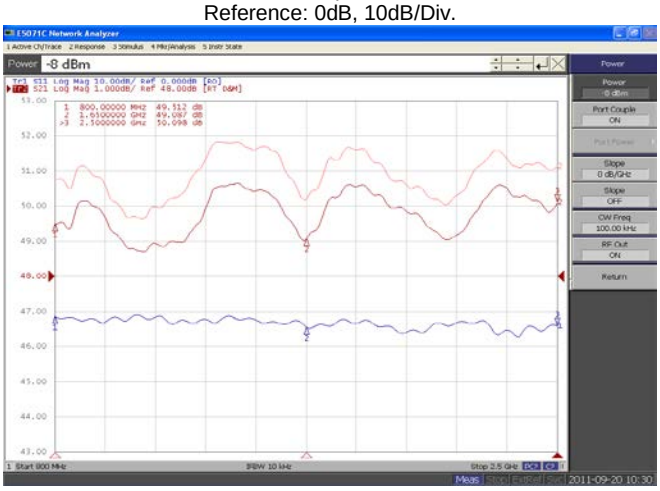
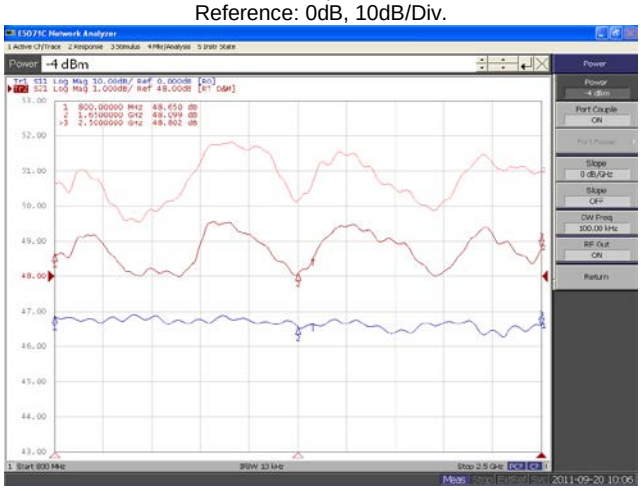
TYPICAL PERFORMANCE (800-2500MHz) Band A

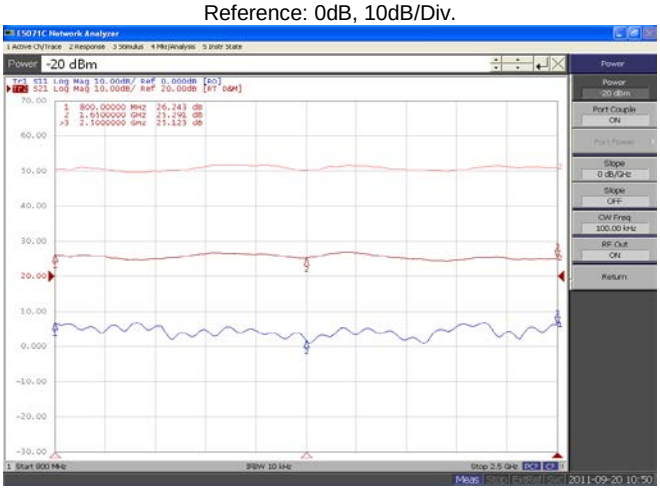
Plot 1 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -8.0dBm
Reference: 48dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



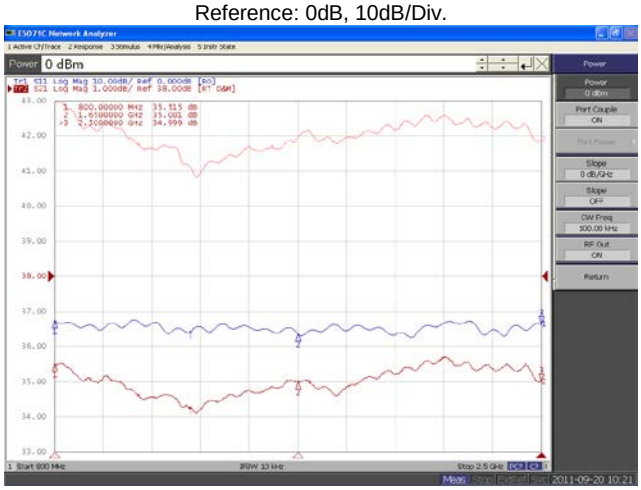
Plot 2 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{SAT}, P_{IN} = -4.0dBm
Reference: 48dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Plot 3 – Gain Adjustment Range
Top Curve: Maximum Gain @ P_{IN} = -20dBm
Middle Curve: Minimum Gain @ P_{IN} = -20dBm
Reference: 20dB, 10dB/Div.
Bottom Curve: Input Return Loss @ Minimum Gain
Reference: 0dB, 10dB/Div.



Plot 4 – ALC Flatness
Top Curve: ALC @ 41 dBm, P_{IN} = 0dBm
Bottom Curve: ALC @ 34 dBm, P_{IN} = 0dBm
Reference: 38dB, 1dB/Div.
Middle Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



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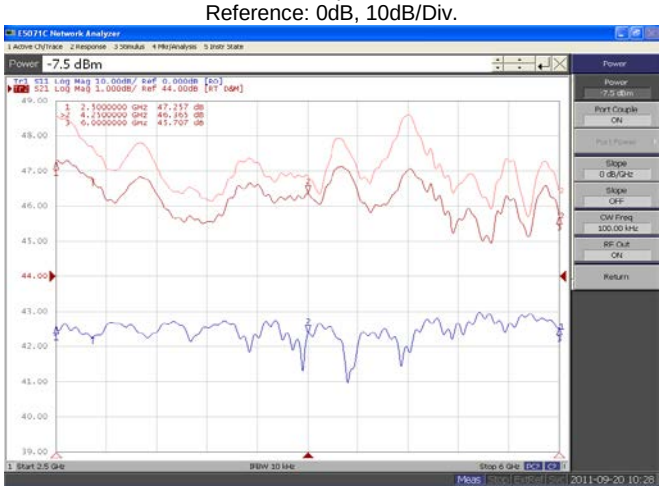
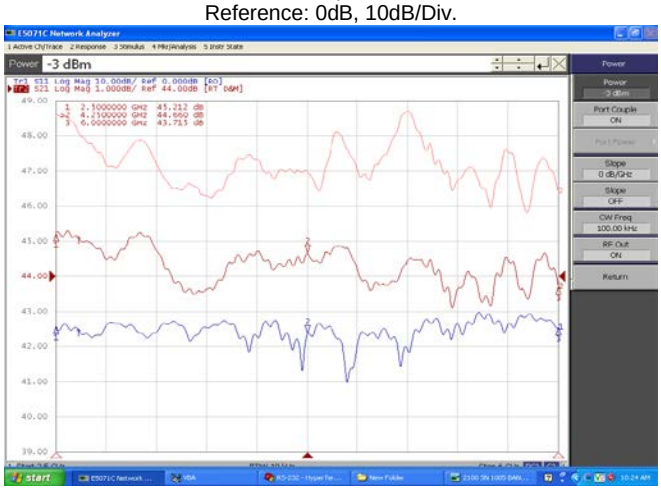
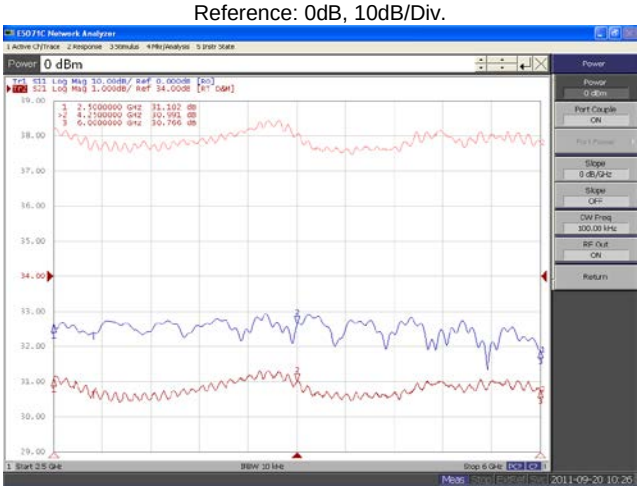
TYPICAL PERFORMANCE (2500-6000MHz) Band B

Plot 5 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -7.5dBm
Reference: 44dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Plot 6 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{SAT}, P_{IN} = -3.0dBm
Reference: 44dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Plot 7 – Gain Adjustment Range
Top Curve: Maximum Gain @ P_{IN} = -20dBm
Middle Curve: Minimum Gain @ P_{IN} = -20dBm
Reference: 20dB, 10dB/Div.
Bottom Curve: Input Return Loss @ Minimum Gain
Reference: 0dB, 10dB/Div.

Plot 8 – ALC Flatness
Top Curve: ALC @ 25W, P_{IN} = 0dBm
Bottom Curve: ALC @ 5W, P_{IN} = 0dBm
Reference: 41dB, 1dB/Div.
Middle Curve: Input Return Loss
Reference: 0dB, 10dB/Div.