

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-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	IP _{3A} /IP _{3B}	+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-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

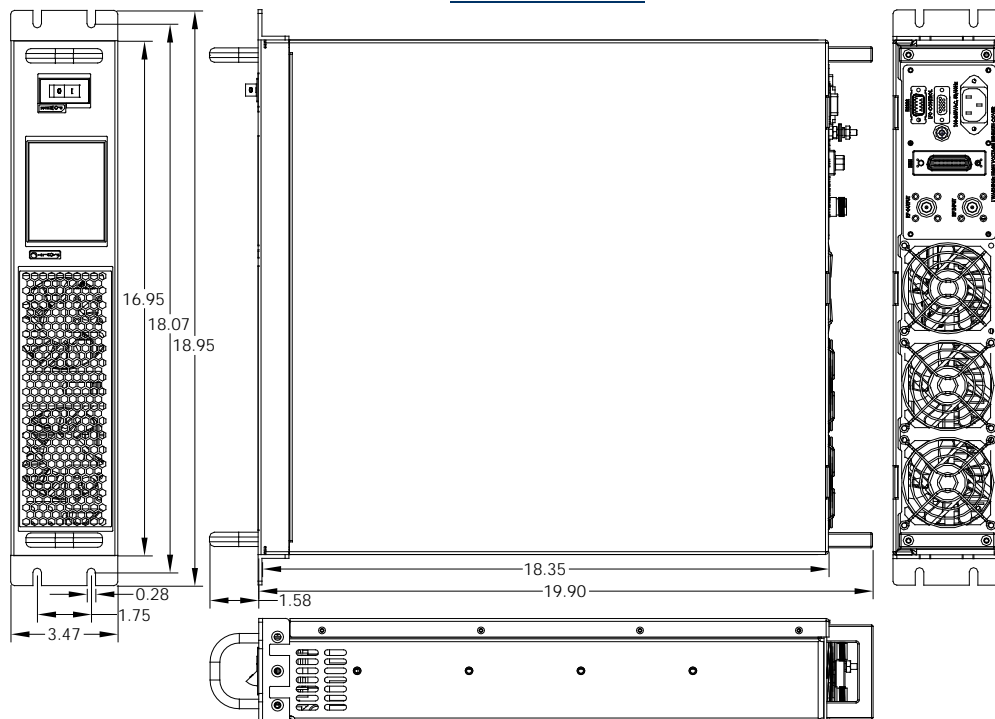
AVAILABLE OPTIONS

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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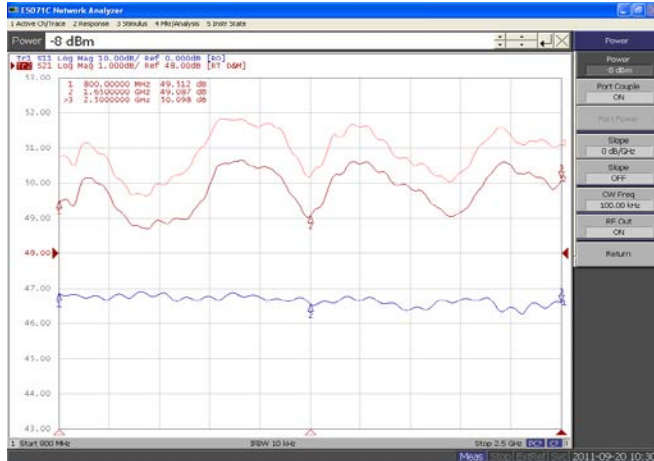
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TYPICAL PERFORMANCE (800-2500MHz) Band A

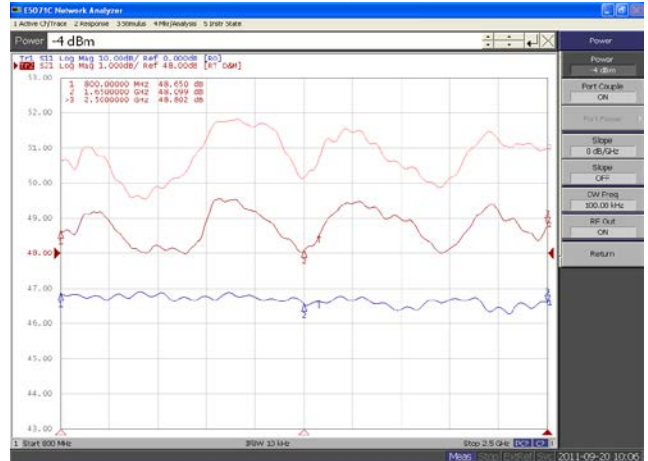
Plot 1 – Small Signal Gain and P_{1dB}

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.



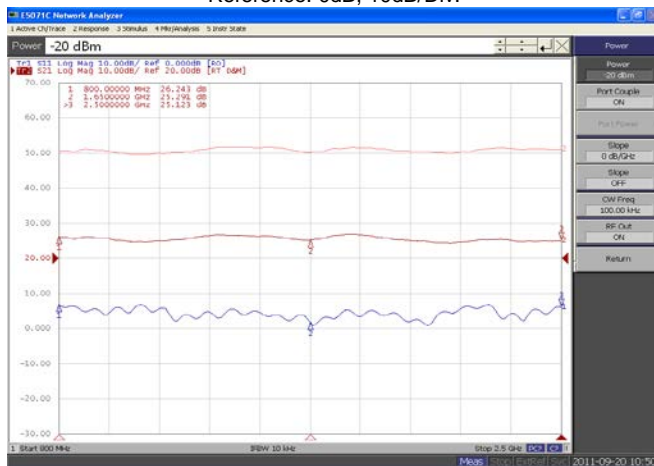
Plot 2 – Small Signal Gain and P_{SAT}

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, $P_{IN} = 0dBm$
 Middle Curve: Input Return Loss
 Reference: 0dB, 10dB/Div.



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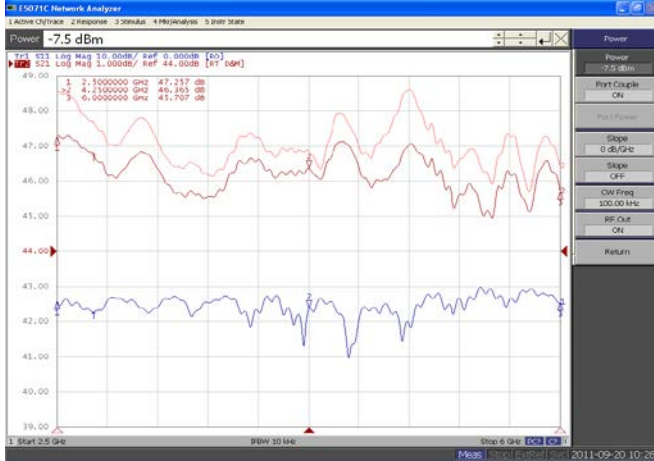
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TYPICAL PERFORMANCE (2500-6000MHz) Band B

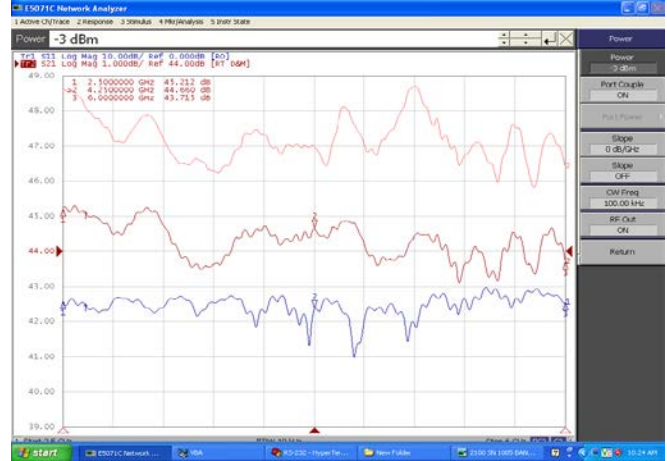
Plot 5 – Small Signal Gain and P_{1dB}

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.



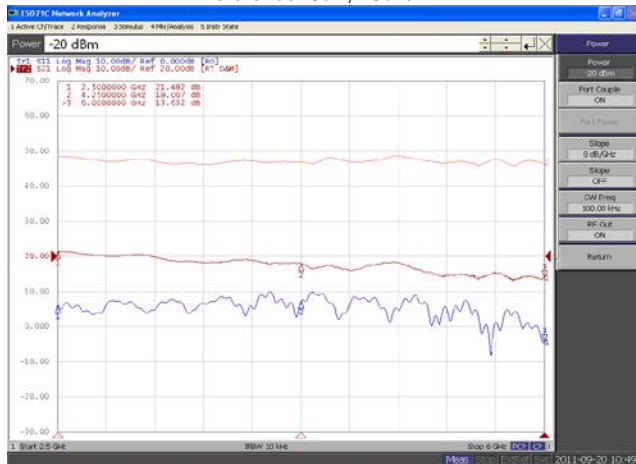
Plot 6 – Small Signal Gain and P_{SAT}

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.

