EMPOWER RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

2023 - BBS1C4AHM

1 – 1000 MHz / 50 Watts

The BBS1C4AHM (2023) is suitable for ultra broadband high power applications; this amplifier utilizes high power RF MOSFET devices that provide wide frequency response and dynamic range, high gain, low distortions, and good linearity. Employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, and all qualified components achieve exceptional performance, and high efficiency. The system includes a universal voltage, single phase, 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#: 2023DLRAAXXXX

- Solid-state Class AB design
- Instantaneous ultra broadband
- Small and lightweight, High reliability and ruggedness
- Front panel manual gain adjust or LCD controller
- Suitable for CW, AM, and FM (Consult factory for other modulation types)
- 50 ohm input/output impedance

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

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	1	0.5 – 1000 *	1000	MHz
Output Power CW	P_{SAT}	50	70		Watt
Output Power @ P_{1dB}	P_{1dB}	30	40		Watt
Power Gain @ P_{1dB}	G_{1dB}	46			dB
Input Power for Rated P_{SAT}	P_{IN}		0	3	dBm
Small Signal Gain Flatness	ΔG		±1.5	±2.0	dB
Gain Adjustment Range	FGA	25			dB
Input Return Loss	S_{11}			-10	dB
Noise Figure	NF		10		dB
Third Order Intercept Point 2-Tone @ 37dBm/Tone, 100kHz Spacing	IP3		+51		dBm
Harmonics @ P_{OUT} = 30W	H		-20		dBc
Spurious Signals	Spur		-70	-60	dBc
Operating Voltage (1-phase)	V_{AC}	100		240	Volt
Power Consumption @ P_{OUT} = 50W, CW	P_D		660	750	Watt

*Performance from 0.5-1 MHz can be tested upon request.

MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions	19 x 5.25 x 22	Inch
Weight	50	Pound
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 (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		

LIMITS

Input RF drive level without damage	+10 dBm	Max
Load VSWR @ P_{OUT} = 50W	∞ @ all load phase & amplitude for duration of 1 minute 3:1 @ all load phase & amplitude continuous	-
Thermal Overload	85°C shutdown	Max

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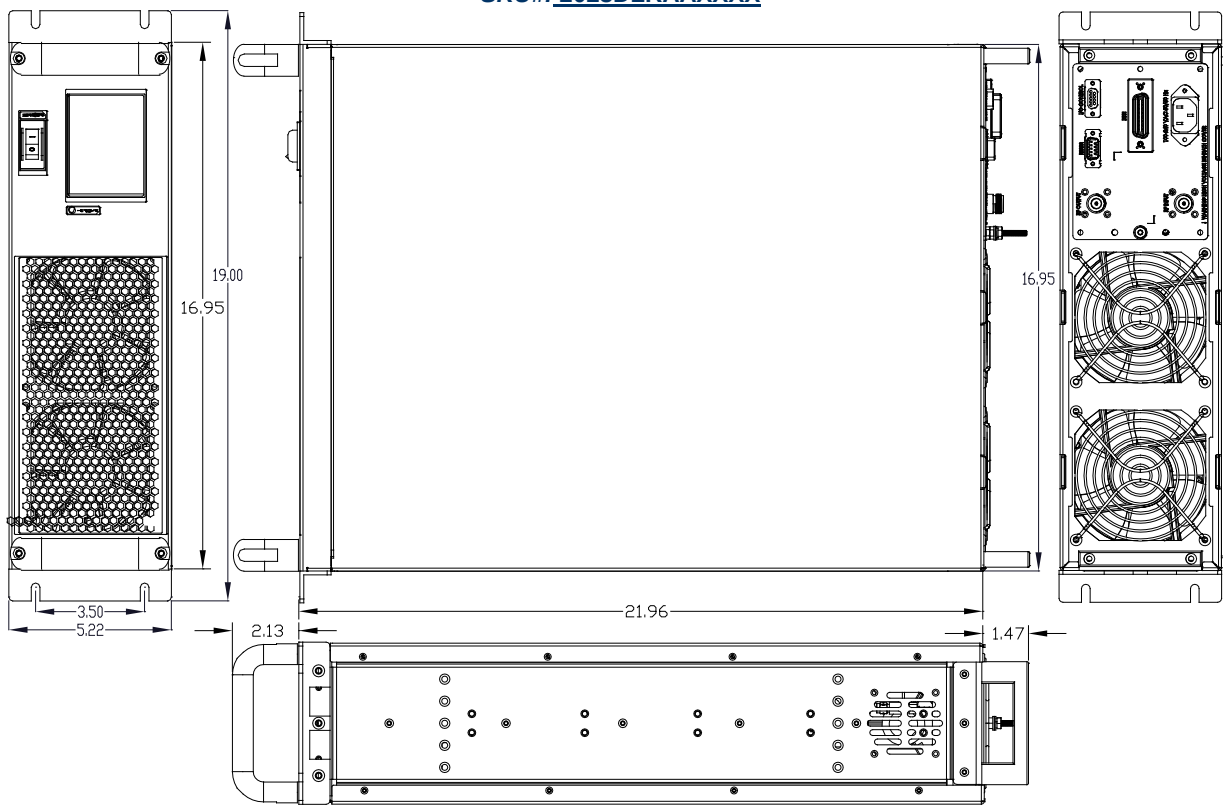
AVAILABLE OPTIONS

SKU #	Description	LCD Touchscreen
2023DLFAAXXXX	LCD controller, Front 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. *Note: (Output power is lowered by 0.5-0.75dB with this option)*
2023DLRAAXXXX	LCD controller, Rear RF connectors 100-240VAC, 50/60Hz.	
2023DFFAAXXXX	FGA (Front Gain Adjust), Front RF connectors, 100-240VAC, 50/60Hz	
Optional	Rack Slides (Call for price)	

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

Pin #	Description	Specification	Option FGA	Option LCD
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	VVA Test Point	VVA Gain Control +5.6V_{DC} ±0.2V	√	
5	EXT Shutdown	Disable Amplifier: 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	√	√

OUTLINE DRAWING Shown
***SKU#:* 2023DLRAAXXXX**



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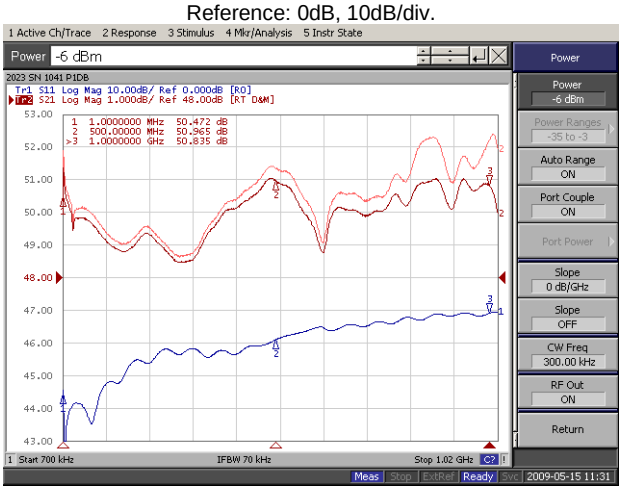
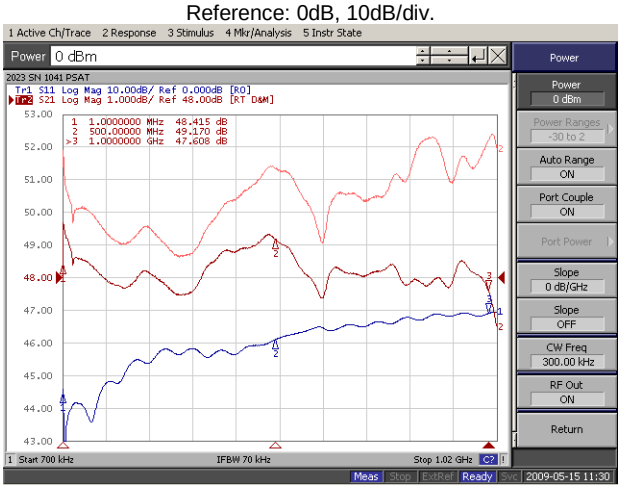
TYPICAL PERFORMANCE PLOTS

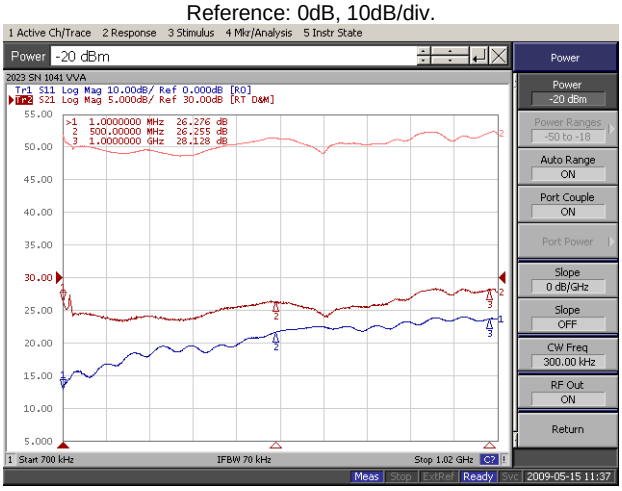
Plot 1 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -6.0dBm
Reference: 48dB, 1dB/div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/div.



Plot 2 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{SAT}, @ P_{IN} = 0.0dBm
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: 30dB, 10dB/div.
Bottom Curve: Input Return Loss @ Minimum Gain
Reference: 0dB, 10dB/div.



Plot 4 – ALC Flatness @ 25W & 5W
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.