EMPOWER
RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

1133 – BBM2E4AEM	20 – 1000 MHz, 25 Watts

The BBM2E4AEM (SKU 1133) is suitable for ultra broadband or band specific high power linear applications. This amplifier utilizes advanced high power GaN devices that provide high gain, wide dynamic range, low distortions and good linearity. Exceptional performance, long term reliability and high efficiency are achieved by employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, machined housings and qualified components. Empower RF's ISO9001 Quality Assurance Program assures consistent performance and the highest reliability.

- Solid-state linear design
- Instantaneous ultra broadband
- Small and lightweight
- Suitable for CW, AM and FM (Contact factory for other modulation types)
- 50 ohm input/output impedance
- High reliability and ruggedness
- Built-in control, monitoring and protection circuits

ELECTRICAL SPECIFICATIONS @ +28V_{DC}, 25 °C, 50 Ω System

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	20		1000	MHz
Output Power CW	P_{SAT}	25			Watt
Output Power @ P_{1dB} Gain Compression	P_{1dB}		5		Watt
Power Gain @ P_{1dB}	G_{1dB}	44			dB
Input Power for Rated P_{SAT}	P_{IN}		0		dBm
Small Signal Gain Flatness	ΔG		±1.5	±2.0	dB
Gain Adjustment Range	VVA	25	30		dB
Input Return Loss	S_{11}			-10	dB
Noise Figure @ Minimum Attenuation	NF			10	dB
Third Order Intercept Point 2-Tone @ 33dBm/Tone, 100kHz Spacing	IP3		+52		dBm
Harmonics @ P_{OUT} = 5W	H		-20		dBc
Spurious Signals	Spur			-60	dBc
Operating Voltage	VDC	26	28	30	Volt
Supply Current @ P_{OUT} = 25W	I_{DD}			3.5	Amp
Current Consumption @ Shutdown	I_{SD}		100		mA
Switching Time @ 1kHz TTL, P_{IN} = -3dBm	T_{ON}/T_{OFF}			5	µs

MECHANICAL SPECIFICATIONS

Parameter	Value	Units	Limits
Dimensions	6.0 x 3.0 x 1.0	Inch	Max
Weight	1.0	lb.	Max
RF Connectors Input/Output	Type-SMA, Female		
DC Interface Connector	D-Sub 9-Pin, Male		
Cooling	External Heatsink (not supplied)		

ENVIRONMENTAL CHARACTERISTICS (Design to Meet*)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T_C	-20		+75	°C
Storage 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 1	VI/SH		Airborne		

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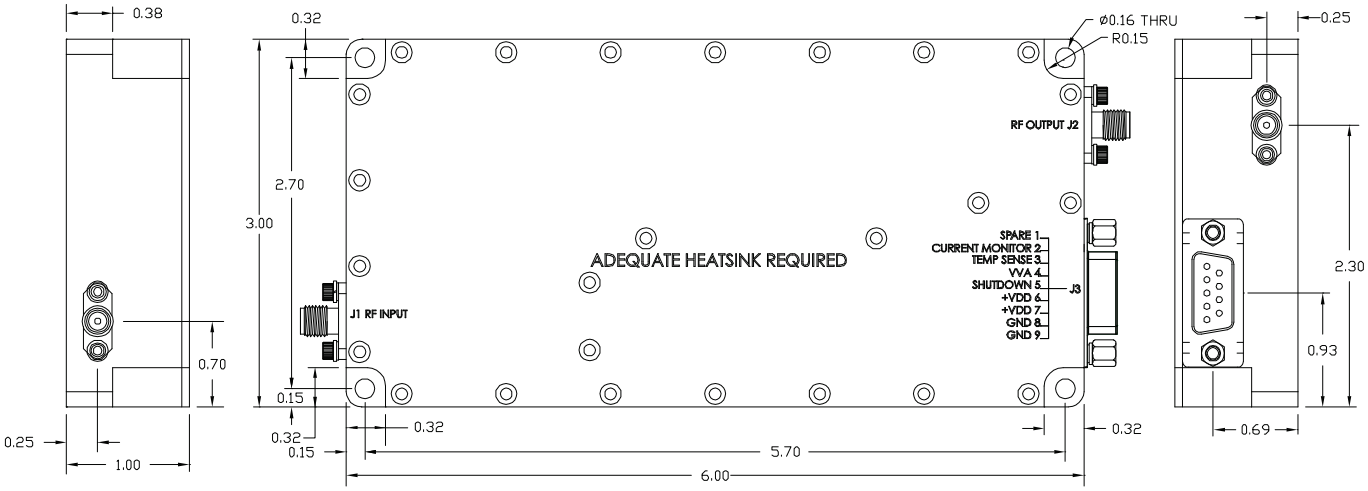
LIMITS

Input RF drive level without damage	+6 dBm	Max
Load VSWR @ P_{OUT} = 25W	∞ @ all load phase & amplitude for duration of 1 minute 3:1 @ all load phase & amplitude continuous	-
Thermal Overload	Graceful degradation	-

DC INTERFACE CONNECTOR – D-Sub 9-Pin, Male

Pin #	Description	Specifications
1	N/C	No Connection
2	Current Monitor	Analog voltage relative to I_{DD} @ 50mV/100mA
3	Temp Sense	Analog voltage relative to module temperature @ 10mV/°C
4	VVA	Continuous Analog 0 – $5V_{DC}$ Levels Max Gain = $0V_{DC}$, Min Gain = $5V_{DC}$
5	Shutdown	Amplifier Disable: TTL Logic High (5V) (*Internally Pulled-Low*)
6, 7	VDD	+28.0V_{DC} ±2V
8, 9	GND	Ground

OUTLINE DRAWING



Features:

a. Built-in gain adjustment (VVA)
b. Fast-switching mute function
c. Reverse polarity protection
d. Over-temperature protection
e. Temperature indication
f. Current limit protection
g. Current consumption indicator

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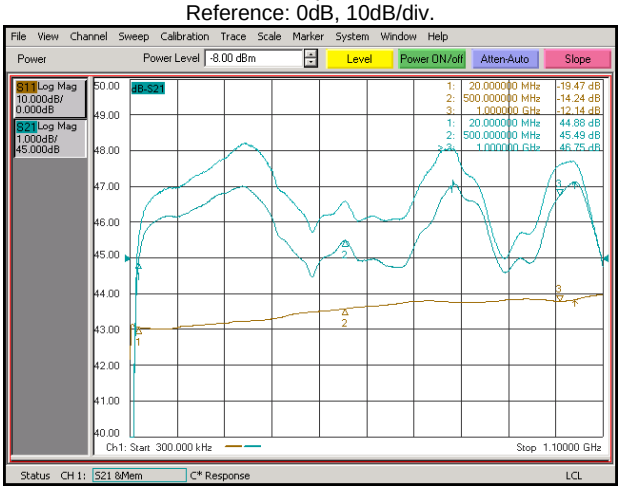
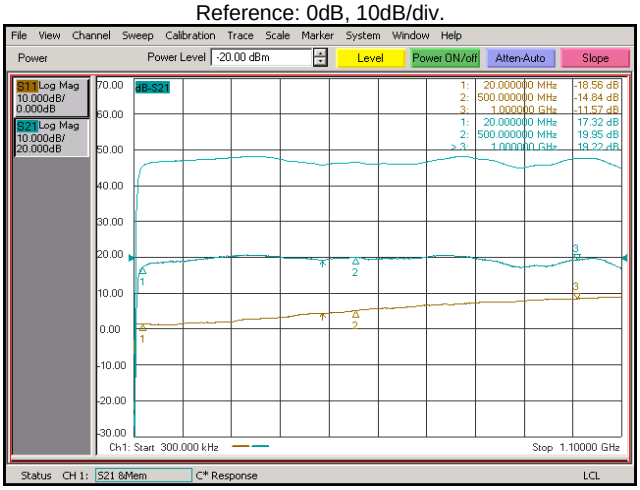
TYPICAL PERFORMANCE PLOTS

Plot 1 – Small Signal Gain and P_{1dB}
Top Curve Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -8.0dBm
Reference: 45dB, 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} = 3.0dBm
Reference: 45dB, 1dB/div
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/div.

Plot 3 – Gain Adjustment Range
Top Curve: Max Gain @ VVA_{CTRL} = 0.0V, P_{IN} = -20dBm
Middle Curve: Min Gain @ VVA_{CTRL} = 5.0V, P_{IN} = -20dBm
Reference: 20dB, 10dB/div.
Bottom Curve: Input Return Loss @ Minimum Gain
Reference: 0dB, 10dB/div.



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