EMPOWER
RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

2135 – BBS3G6QHM

300 – 3800 MHz / 50 Watts

The BBS3G6QHM (SKU 2135) is suitable for ultra broadband high power linear applications, laboratory, and RFI/EMC susceptibility testing. This dual band amplifier utilizes MOSFET/LDMOS Amp for low-band and GaAsFET Amps for high-band frequency. 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.

Shown with Option Package 09

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

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

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency (Dual Band)	BW - Low	300		1000	MHz
	BW - High	800		3800	
Output Power CW	P_{SAT} - Low	80			Watt
	P_{SAT} - High	50			
Output Power @ 1dB Gain Compression	P_{1dB} Low	50			Watt
	P_{1dB} High		50		
Power Gain @ 1dB Gain Compression	G_{1dB}	46	48		dB
Input Power for Rated P_{SAT}	P_{IN}		0		dBm
Gain Flatness	ΔG			±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 @ 42dBm/Tone, 100kHz Spacing	IP3		+56		dBm
Harmonics @ P_{OUT} = 50W	2^{ND} - Low		-40		dBc
	2^{ND} - High		-20		
	3^{RD}		-20		
Spurious Signals	Spur			-73	dBc
Operating Voltage (Single Phase)	V_{AC}	100		240	Volt
Power Consumption @ P_{OUT} = 50W	P_D		600		Watt

MECHANICAL SPECIFICATIONS

Parameter	Value	Units	Limits
Dimensions	19 x 5.25 x 22	Inch	Max
Weight	57	lb.	Max
RF Connectors Input/Output	Type-N, Female		
Cooling	Internal forced-air cooling system		

ENVIRONMENTAL CHARACTERISTICS (Design to Meet)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient 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	+6 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

AVAILABLE OPTIONS (Refer to www.empowerrfr.com for detailed options list)

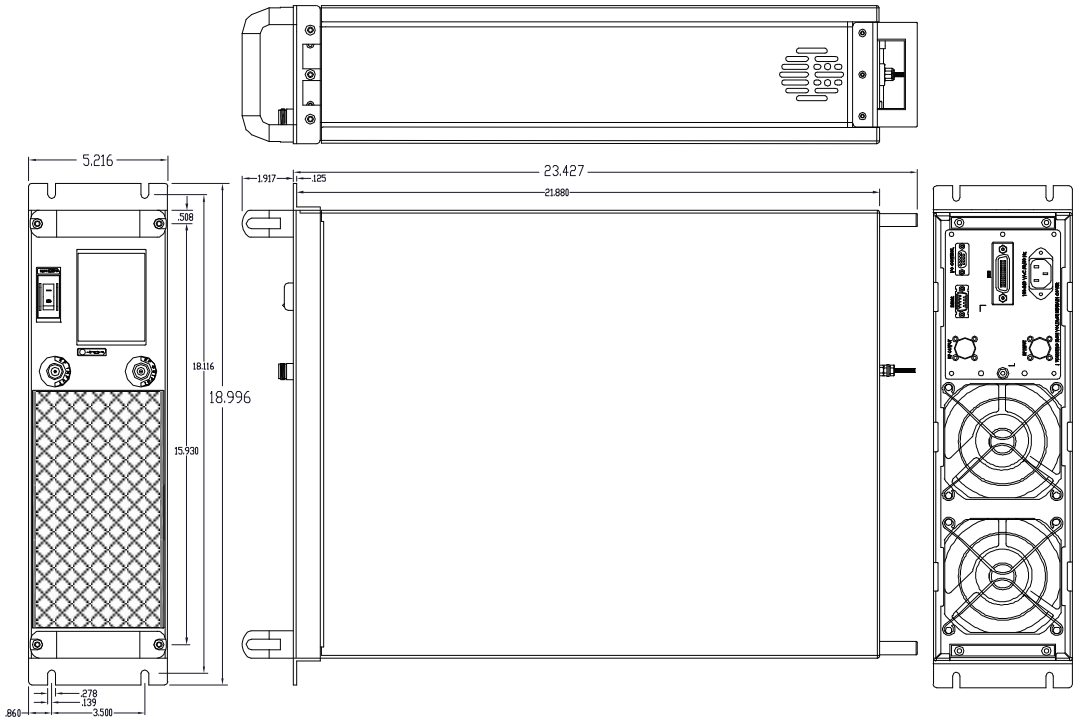
Option	Number	Description	Price
FGA	**061**	Front panel 10 turns manual gain adjustment.	Standard
LCD	**062**	Touchscreen Digital Display, including Fwd/Rev Power indication (dB or Watt scale), Gain Adjustment, ALC Fast/Slow, On/Off, Standby mode, Fault indication, Rear panel HPIB IEEE-488.2 and RS-232 or Full Duplex RS-422 remote Serial Interface. **Note: Output Power is lowered by 0.5 - 0.75 dB with this option.**	Call
FCN	**051**	Front Panel Type-N female	N/C
RCN	**052**	Rear Panel Type-N female	N/C

Available Option Packages: 07, 08, 09, 10

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

Pin #	Description	Specifications	Options FGA	Options LCD
1	FWD Test Point	Analog Voltage 0-5V_{DC} relative to Forward Power Level		√
2	REV 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: TTL Logic High (5V) (*Internally Pulled-Low*)	√	√
6	12V Test Point	+12.0V_{DC} ± 0.5V	√	√
7	P/S1 Test Point	P/S1 Output Voltage +12.0 to +15.0V_{DC}	√	√
8	P/S2 Test Point	P/S2 Output Voltage +26.0 to +30.0V_{DC}	√	√
9	GND	Ground	√	√

SYSTEM OUTLINE SHOWN WITH OPTION PACKAGE 09



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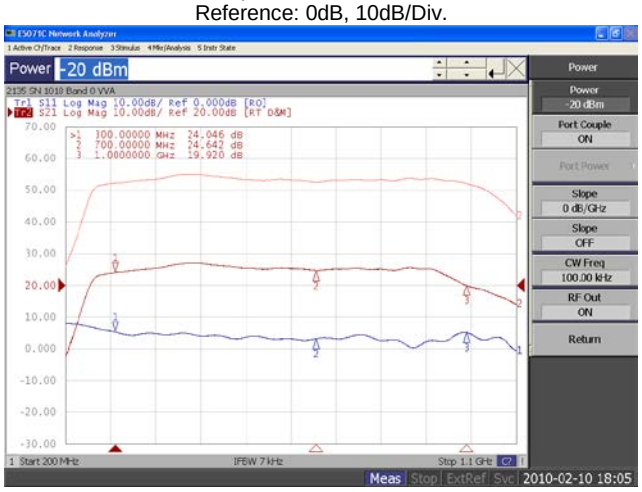
TYPICAL PERFORMANCE PLOTS – LOW BAND

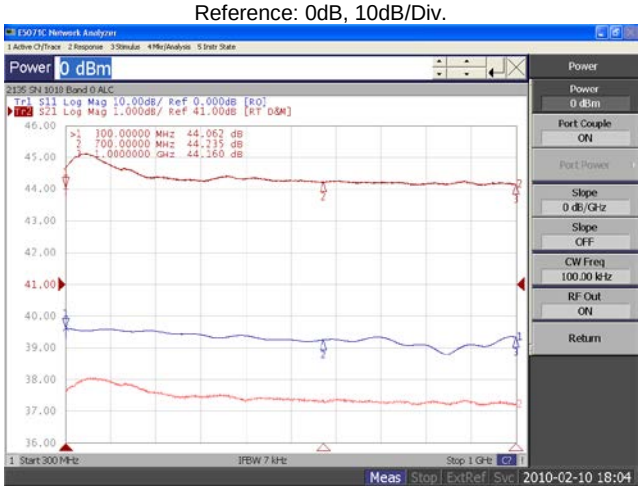
Plot 1 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -4.5dBm
Reference: 51dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.

Plot 2 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{SAT}, P_{IN} = -0.5dBm
Reference: 50dB, 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
Reference: 20dB, 10dB/Div.
Bottom Curve: Input Return Loss @ Minimum Gain
Reference: 0dB, 10dB/Div.



Plot 4 – 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.



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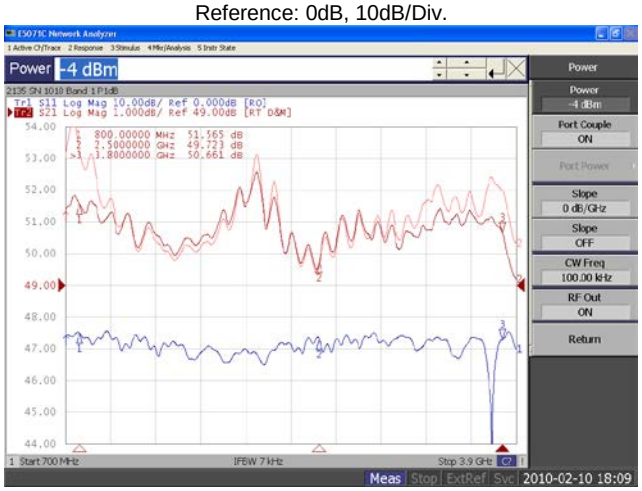
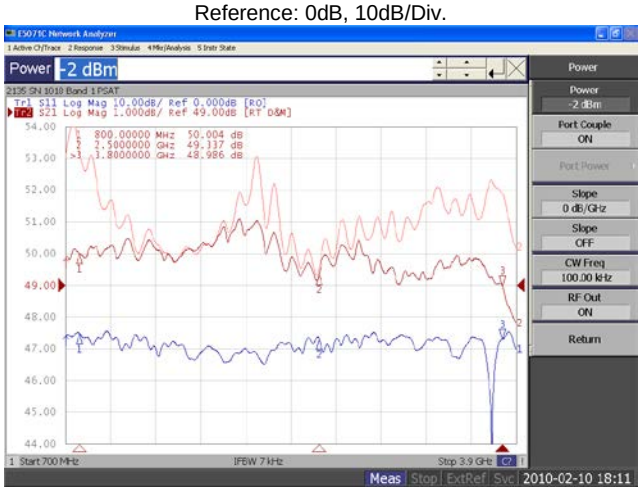
TYPICAL PERFORMANCE PLOTS – HIGH BAND

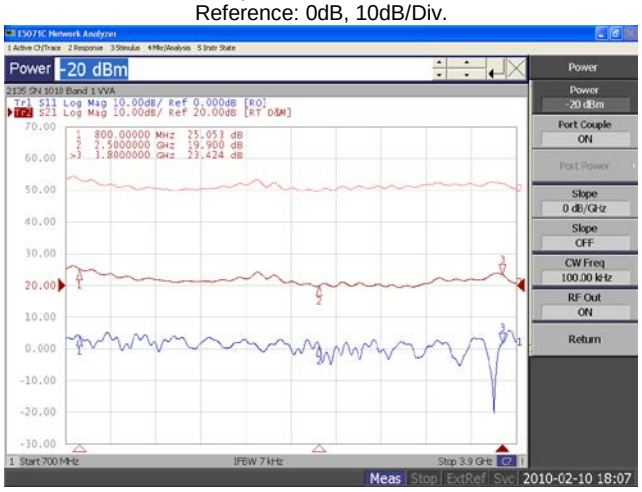
Plot 5 – Small Signal Gain and P_{1dB}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{1dB}, P_{IN} = -4dBm
Reference: 49dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 0dB, 10dB/Div.



Plot 6 – Small Signal Gain and P_{SAT}
Top Curve: Small Signal Gain @ P_{IN} = -20dBm
Middle Curve: Power Gain @ P_{SAT}, P_{IN} = -2dBm
Reference: 49dB, 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
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.