EMPOWER RF SYSTEMS, INC.

Solid State Broadband High Power Amplifier

2141 – BBS3C8CQR

100 – 6000 MHz / 400 Watts

The 2141 dual controller, dual amplifier system is suitable for ultra broadband high power linear applications, laboratory, and RFI/EMC susceptibility testing and ruggedized communication applications. The amplifiers utilize high power GaN and LDMOS devices that provide wide frequency response and dynamic range, high gain, low distortions, and excellent 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.

- Solid-state Class AB linear design
- Instantaneous ultra broadband
- Small and lightweight
- Remote control via RS422 / 485
- 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
- Multi-RF outputs @ 100-1000 MHz and 1000-6000 MHz
- Environmentally qualified

ELECTRICAL SPECIFICATIONS @ $115V_{AC}$, 3Φ, 25°C, 50Ω System

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	100		6000	MHz
Output Power CW	P_{SAT}		500; 100-1000MHz 125; 1000-6000MHz		Watt
Output Power @ 1dB Gain Compression	P_{1dB}	400; 100-400MHz 300; 400-1000MHz 120; 1000-2000MHz 100 2000-3000MHz 50; 3000-6000MHz			Watt
Power Gain @ 1dB Gain Compression	G_{1dB}	56; 100-400MHz 54; 400-1000MHz 51; 1000-3000MHz 50; 1000-3000MHz 47; 3000-6000MHz			dB
Input Power for Rated P_{OUT}	P_{IN}		0		dBm
Gain Flatness	ΔG			±1.5; 100-3000MHz ±2.0; 3000-6000MHz	dB
Gain Adjustment Range	FGA	20	25		dB
Input Return Loss	S_{11}			-10	dB
Noise Figure	NF			26	dB
Third Order Intercept Point	IP3	+63; 100-1000MHz +59; 1000-3000MHz +52; 3000-6000MHz			dBm
Harmonics @ Rated P_{1dB}	H			-45; 100-124MHz -55; 124-18000MHz	dBc
Spurious Signals	Spur			-45; 100-124MHz -55; 124-18000MHz	dBc
Operating Voltage (3-phase 400Hz) Delta Connection (Line to Line)	V_{AC}	180		264	Volt
Power Consumption @ Rated P_{SAT}	P_D			2900; 100-1000MHz 1760; 1-3GHz 1880; 3-6GHz	Watt
Filter Type	LPF	Low-pass			
Cut-off Frequency	F_C	174, 250, 415, 700, 1000, 1500, 2000, 3000, 4000, 6000			MHz
AUX input Power	P_{IN}			400; 100-400MHz 300; 400-1000MHz 120; 1000-3000MHz 50; 3000-6000MHz	Watt

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MECHANICAL SPECIFICATIONS

Parameter		Value	Units	Limits
Dimensions W x H x L		19 x 5.25 x 22 each unit (4 unit stack) Depth not includes front handles and rear connectors	Inch	Max
Weight		220	lb.	Max
RF Connectors:	3 x RF Inputs	APC-Type-N, Female		
	1 x AUX Input			
	3 x RF Outputs			
	2 x Load Outputs			
Hardwire Control / Filter interconnect / I/O		DB-15S		
AC Input		Circular Receptacle: Amphenol 97-3102A-20-4P 4-pin, Male		
Remote Controls		DB-9S		
Cooling		Built-in internal forced air cooling system		

QUALIFIED ENVIRONMENTAL CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature (MIL-STD-810F Method 502.4 Proc I & II)	T_A	0		+55	°C
Non-operating Temperature (MIL-STD-810F Method 502.4 Proc I & II)	T_{STG}	-40		+85	°C
Relative Humidity (non-condensing) (MIL-STD-810F Method 507.4)	RH			95	%
Altitude (MIL-STD-810F Method 500.4 Proc I, II)	ALT	11,000 feet operational and 30,000 feet non-operational			Feet
Vibration (MIL-STD-810F Method 514.5 Proc I)	VI	Category 13			
Shock (MIL-STD-810F Method 516.5 Proc 1)	SH	Operational: Acceleration (A) of 10.0g +/- 1.5g with Duration of 11.0ms +/- 1.0ms shock pulse Non-operational: impact shocks of 20g +/- 3.0g with Duration of 11.0ms +/- 1.0ms shock pulse			
EMI/EMC (MIL-STD-461D)	CE-102, CE-106, CS-101, CS-114,CS-115, CS-116, RE-102, RE-103, RS-103				
Endurance Vibration	2 Hrs per Axis, 3.64 G_{RMS}				

LIMITS

Input RF drive level without damage	+10 dBm	Max
Load VSWR @ Rated P_{1dB}	∞ @ all load phase & amplitude for duration of 1 minute 3:1 @ all load phase & amplitude continuous	-
Thermal Overload	Graceful power reduction	Max

AC POWER CONNECTOR

Pin #	Description	Specifications
A	Phase 1	208V_{AC} Line to Line
B	Phase 2	
C	Phase 3	
D	GND	Ground

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Discrete Signals I/O CONNECTOR, D-Sub, -15 Pin Female (J2-23)

Pin #	Description	Specifications
1	Forward Power voltage - Test Point	Analog Voltage 0-5 V relative to Forward Power Level
2	Reversed Power voltage - Test Point	Analog Voltage 0-5 V relative to Reverse Power level
3	GND	Ground return
4	External Shutdown – control PA to shutdown	Control PA to shutdown (+5V)
5	+5V Test Point	5V from PA
6	Load input (Ground Sense enable discrete) (RF Output to load if grounded)	RF output routed to load if grounded
7	D_0 – Band select Filter LSB bit - Test Point	Band Select Filter LSB Bit
8	D_1 – Band select Filter bit - Test Point	Band Select Filter Bit
9	D_2 – Band Select Filter MSB bit - Test Point	Band Select Filter MSB
10	A_1 – Antenna Select LSB bit - Test Point	Antenna 1 Select LSB Bit
11	A_2 – Antenna Select MSB bit - Test Point	Antenna 2 Select MSB Bit
12	ANT1-S (Right antenna select J2-7) – Test Point	Antenna 1 Relay 100-500MHz (Right)
13	ANT2-S (Left antenna select J2-5) - Test Point	Antenna 2 Relay 500-1000MHz (Left)
14	TX Active Low Band (Ground when transmit)	Transmit Active “Low” Band
15	Safety Enable input discrete	When active (ground) the PA will be in transmit mode

Discrete Signals I/O CONNECTOR, D-Sub, -15 Pin Female (J3-25)

Pin #	Description	Specifications
1	Forward Power voltage Test Point	Analog Voltage 0-5 V relative to Forward Power Level
2	Reversed Power voltage Test Point	Analog Voltage 0-5 V relative to Reverse Power Level
3	GND	Ground Return
4	External Shutdown (+5V max) – control PA to shutdown	Control PA to shutdown (+5V)
5	+5V (Test Point)	5V from PA
6	Load input (Ground Sense enable discrete) (RF Output to load if grounded)	RF output routed to load if grounded
7	D_0 – Band select Filter LSB bit Test Point	Band Select Filter LSB Bit
8	D_1- Band select Filter bit Test Point	Band Select Filter Bit
9	D_2 - Band Select Filter MSB bit Test Point	Band Select Filter MSB
10	A_1 - Antenna Select LSB bit Test Point	Antenna 1 Select LSB Bit
11	A_2 - Antenna Select MSB bit Test Point	Antenna 2 Select MSB Bit
12	ANT1-S (Right antenna select J3-13) - Test Point	Antenna 1 Relay 100-500MHz (Right)
13	ANT2-S (Left antenna select J3-15) - Test Point	Antenna 2 Relay 500-1000MHz (Left)
14	TX Active High Band (Ground when transmit)	Transmit Active “High” Band
15	Safety Enable input discrete	When active (ground) the PA will be in transmit mode

Remote CONNECTOR, D-Sub, 9-Pin Female (J2-20, J3-24)

Pin #	Description	Specifications
1	RX -	Receive to Remote Host Differential RS-422 Line
2	TX +	Transmit from Remote Host Differential RS-422 Line
3	TX -	Transmit from Remote Host Differential RS-422 Line
4	N/C	Spare
5	GND	Ground
6	N/C	Spare
7	N/C	Spare
8	N/C	Spare
9	RX +	Receive to Remote Host Differential RS-422 Line

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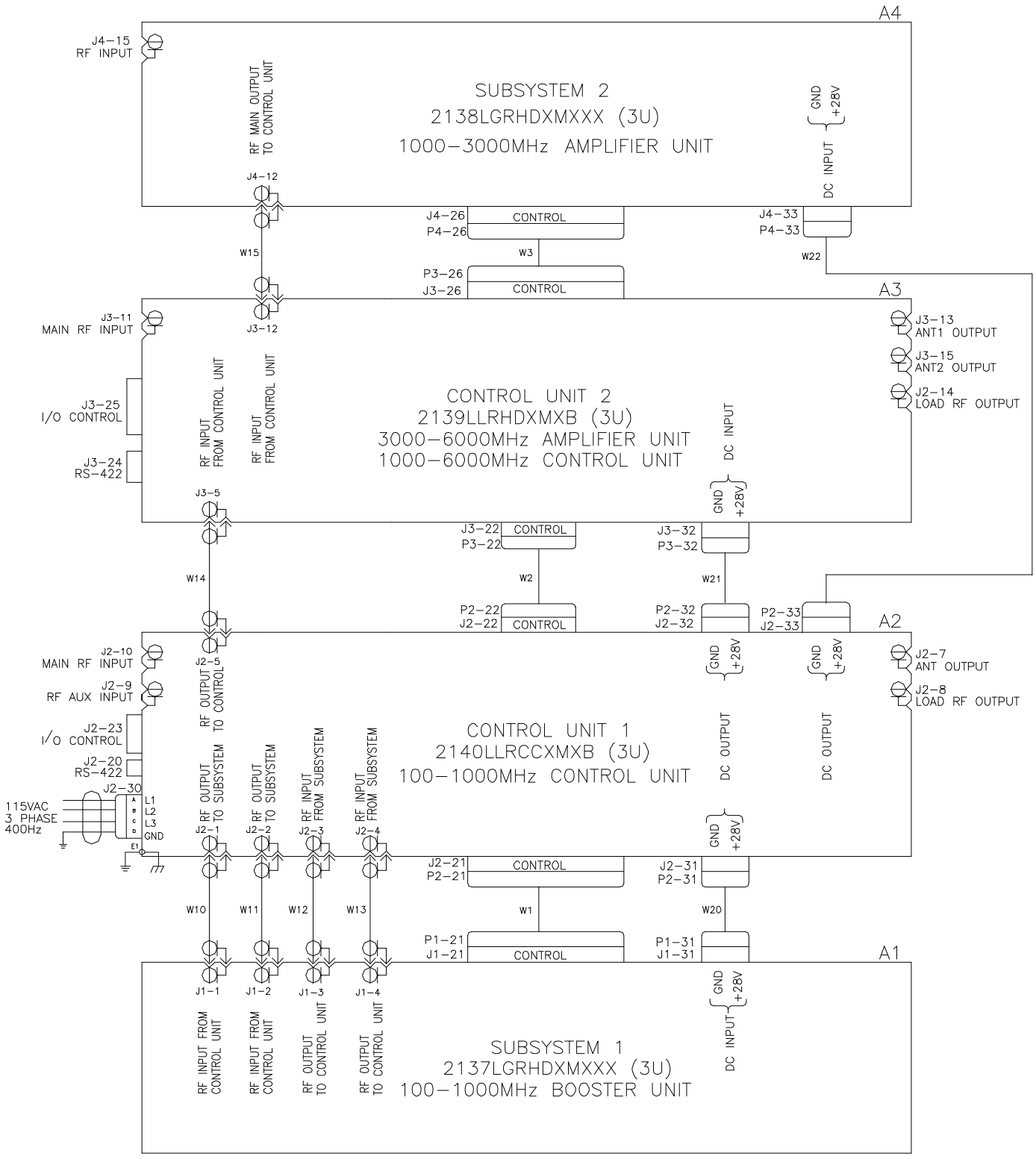
TYPICAL Block Diagram



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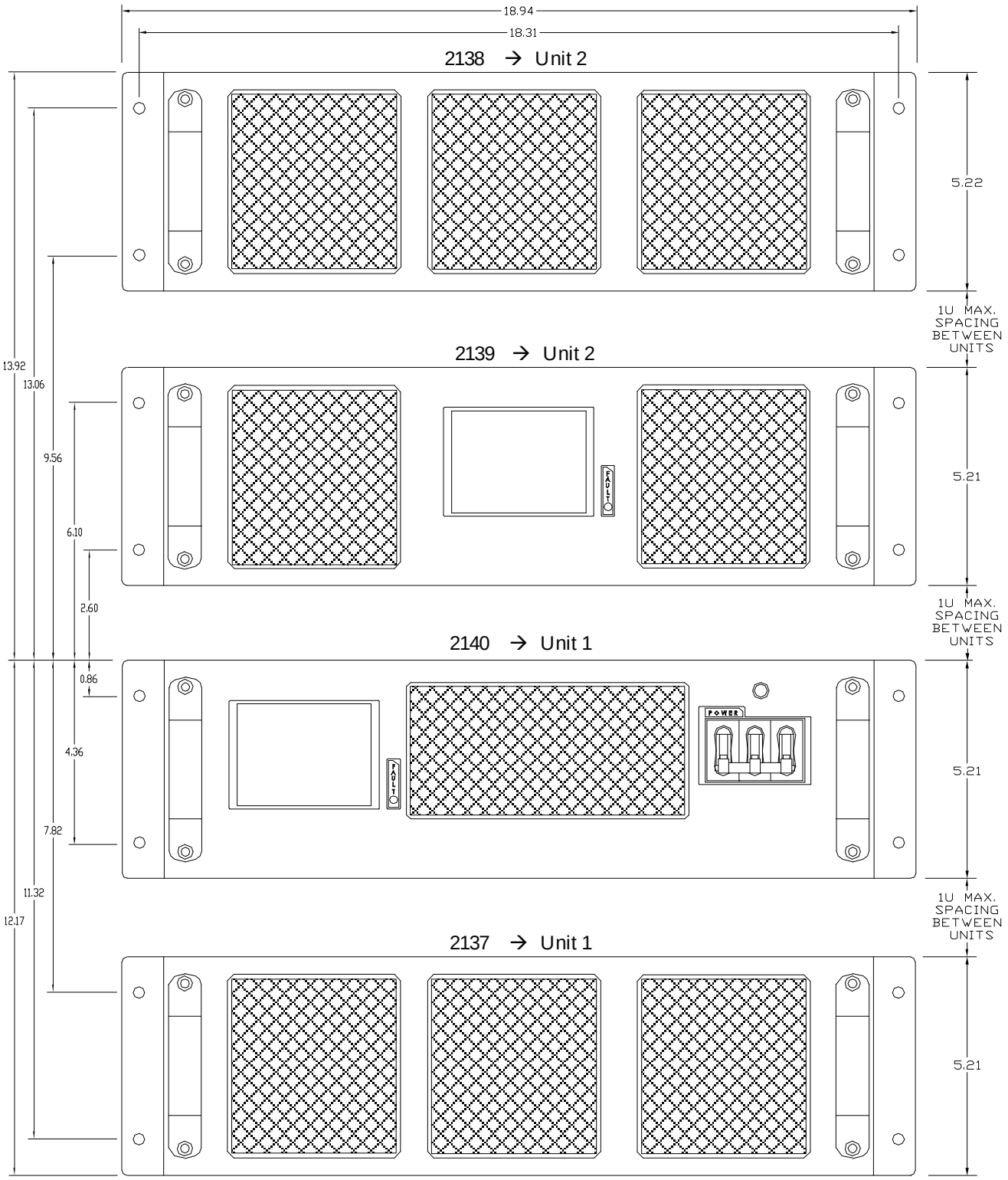
SYSTEM OUTLINE – FRONT



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SYSTEM OUTLINE – REAR