

## Solid State Broadband High Power Amplifier

**2157 - BBS4A5AVT**
**1000 – 2000 MHz / 1300 Watts**

The BBS4A5AVT (2157) is suitable L & S Bands broadband or band specific high power applications. This amplifier utilizes high power GaN devices that provide wide frequency response, high gain, high peak power capability, and low distortions. 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 amplifier is housed in two 19" rack mountable cabinets (LRU's) and as an option can be supplied in a rack cabinet. The larger LRU (5U) contains the RF power section while the smaller LRU (3U) contains the main power supply and control circuits. The system operates from a three phase power supply and has built in control, monitoring and protection functions and forced air-cooling system. Empower RF's ISO9001 Quality Assurance Program assures consistent performance and the highest reliability.

- Solid-state class AB design
- Instantaneous broadband
- Modular LRU design
- 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


**SKU#: 2157JEZCCAZXX**

### ELECTRICAL SPECIFICATIONS @ 208V<sub>AC</sub>, 3Φ, 25°C, 50 Ω System

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	1000		2000	MHz
Power Output CW	P <sub>SAT</sub>	1300			Watt
Gain @ Rated P <sub>SAT</sub>	G <sub>P</sub>	60	62		dB
Input Power for Rated P <sub>SAT</sub>	P <sub>IN</sub>		0	3	dBm
Small Signal Gain Flatness	ΔG <sub>SS</sub>		±1.0	±1.5	dB
Gain Adjustment Range	VVA	20	25		dB
Input Return Loss	S <sub>11</sub>			-10	dB
Noise Figure max. gain	NF		15		dB
Third Order Intercept Point 2-Tone @ 54dBm/Tone, 1MHz Spacing	IP3		+65		dBm
Harmonics @ P <sub>OUT</sub> = 1000W	H		-20		dBc
Spurious Signals	Spur		-70	-60	dBc
Switching Time, 1kHz TTL, P <sub>IN</sub> = 0dBm	T <sub>ON</sub> / T <sub>OFF</sub>		2	5	μSec
Operating Voltage (3-Phase) Delta Connection – Line to Line	V <sub>AC</sub>	180	208	264	Volt
Power Consumption @ P <sub>OUT</sub> = 1300W, CW	P <sub>D</sub>		5400	6500	Watt

### MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions W x H x D	19 x 14 x 27 (handles/brackets included)	Inch
Weight	135.0	Pound
RF Connectors Input / Output	Input: Type-N, Female (Front) Output: Type-DIN-7/16, Female (Front)	-
I/O Control Interface Connector	D-Sub 15-Pin, Male (Front)	-
Cooling	Built-in internal forced-air cooling system (Front to Rear)	-

### AVAILABLE OPTIONS

2157JEZCCAZXX	LCD controller, Front RF IN/OUT connectors, Ethernet, and Rack slides 208V <sub>AC</sub> 3-phase (line-line), 47-63Hz	<b>Local:</b> Front panel touch screen LCD controller including FWD/REV Power indication (dBm or Watt scale), Gain Adjustment, ALC Fast/Slow & On/Off, Standby mode, Fault indication. Rear Panel Half Duplex RS-232 interface. <i>Note:</i> (Output power is lowered by 0.5-0.75dB with this option)
2157JLZCCAZXX	LCD controller, Front RF IN/OUT connectors, GPIB and Rack slides 208V <sub>AC</sub> 3-phase (line-line), 47-63Hz	

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### ENVIRONMENTAL CHARACTERISTICS (Design to Meet)

Parameter	Symbol	Min	Typ	Max	Unit
Operating Ambient Temperature	T <sub>A</sub>	0		+50	°C
Non-operating Temperature	T <sub>STG</sub>	-20		+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	+8dBm	Max
Load VSWR @ P <sub>OUT</sub> = 1000W	3:1 @ any angle & magnitude	-
Thermal Overload	85°C shutdown	Max

### CONTROL CONNECTOR – D-Sub 15-Pin, Female

Pin #	Description	Specification
1	Forward Test Point	Analog Voltage 0-5V <sub>DC</sub> Relative to Forward Power Level
2	Reverse Test Point	Analog Voltage 0-5V <sub>DC</sub> Relative to Reverse Power Level
3	N/C	No Connection
4	RS422 IN (-) (S/D)	(-) Differential Line – RS-422 Serial Port
5	RS422 IN (+) (S/D)	(+) Differential Line – RS-422 Serial Port
		External shutdown control
6	N/C	No Connection
7	N/C	No Connection
8	5V Test Point	+5.0V <sub>DC</sub> ±0.5V
9	GND	Ground
10	12V Test Point	+12.0V <sub>DC</sub> ±0.5V
11	RS-422 IN (+)	RS-422 Serial Port Driver IN (+) CPU
12	RS-422 IN (-)	RS-422 Serial Port Driver IN (-) CPU
13	RS-422 OUT (+)	RS-422 Serial Port Driver OUT (+) CPU
14	RS-422 OUT (-)	RS-422 Serial Port Driver OUT (-) CPU
15	P/S Test Point	+26.0-30.0V <sub>DC</sub>

### RS-232 Serial Comm – D-Sub 9-Pin, Male

Pin #	Description	Specification
1	N/C	No Connection
2	RX	Receive Data
3	TX	Transmit Data
4	N/C	No Connection
5	GND	Signal Ground
6	N/C	No Connection
7	RTS	Request to Send
8	CTS	Clear to Send
9	N/C	No Connection

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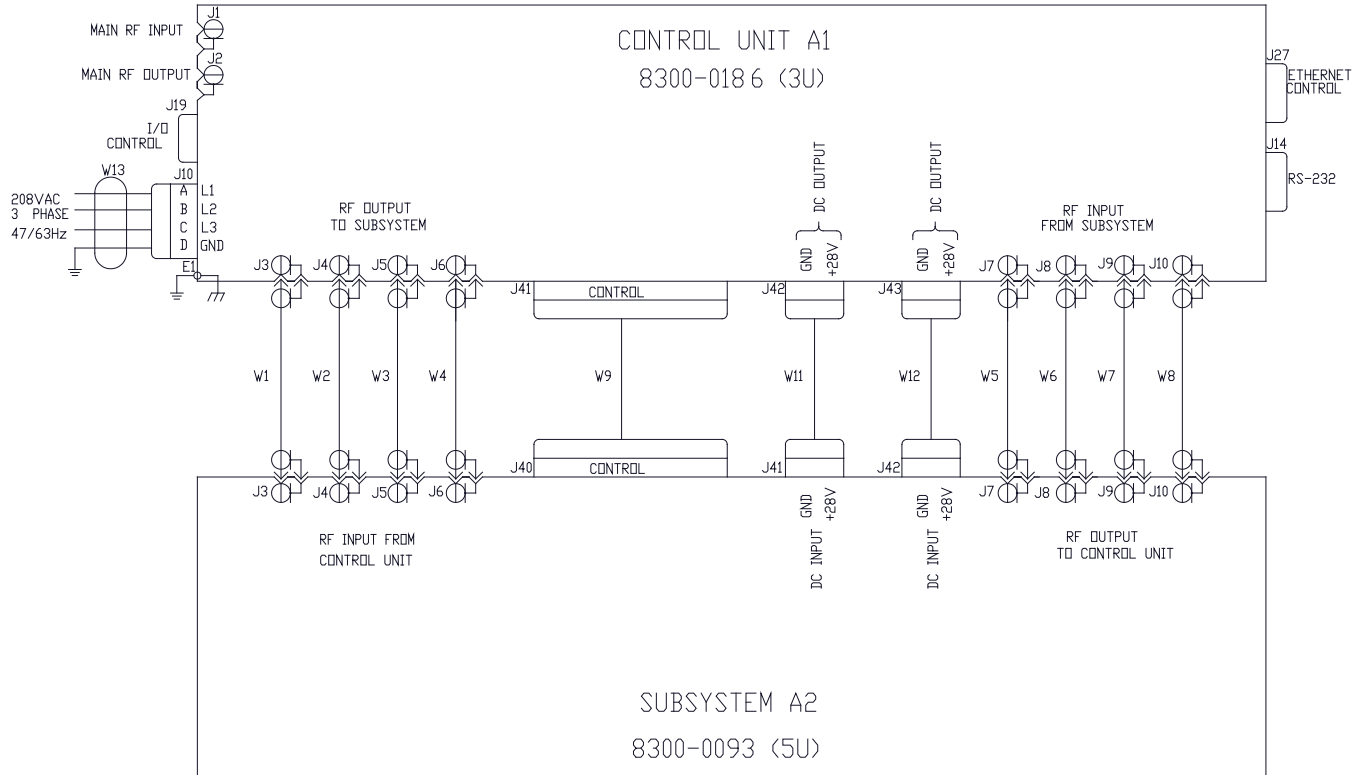
### AC INPUT CONNECTOR – Circular 4-Pin, Male

Pin #	Description	Specification
A	Phase 1	208V <sub>AC</sub> (line-to-line)
B	Phase 2	
C	Phase 3	
D	GND	Ground

### IEEE/GPIB-488.2

Pin #	Description	Specification	Pin #	Description	Specification
1	DIO 1	Data Input/Output Bit	13	DIO5	Data Input/Output Bit
2	DIO 2	Data Input/Output Bit	14	DIO6	Data Input/Output Bit
3	DIO 3	Data Input/Output Bit	15	DIO7	Data Input/Output Bit
4	DIO 4	Data Input/Output Bit	16	DIO8	Data Input/Output Bit
5	EOI	End or Identity	17	REN	Remote Enable
6	DAV	Data Valid	18	GND	Ground (DAV)
7	NFRD	Not Ready For Data	19	GND	Ground (NFRD)
8	NDAC	Not Data Accepted	20	GND	Ground (NDAC)
9	IFC	Interface Clear	21	GND	Ground (IFC)
10	SRQ	Service Request	22	GND	Ground (SRQ)
11	ATN	Attention	23	GND	Ground (ATN)
12	SHIELD	Shield	24	GND	Signal Ground

### SYSTEM BLOCK DIAGRAM



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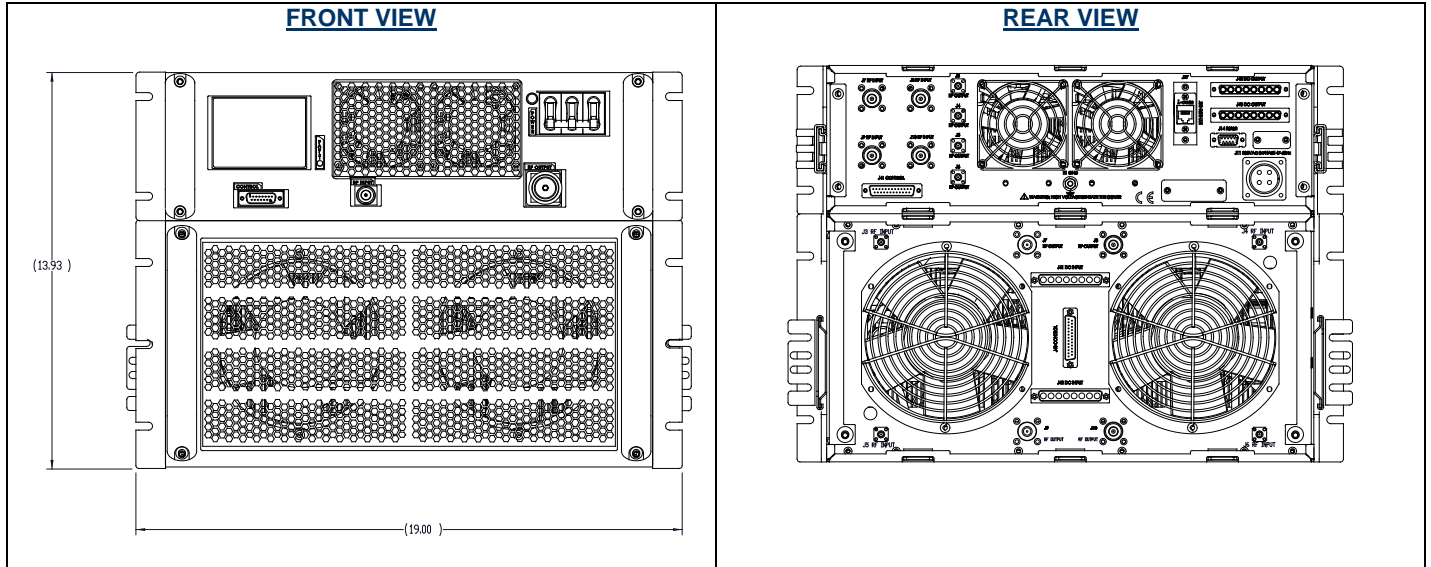
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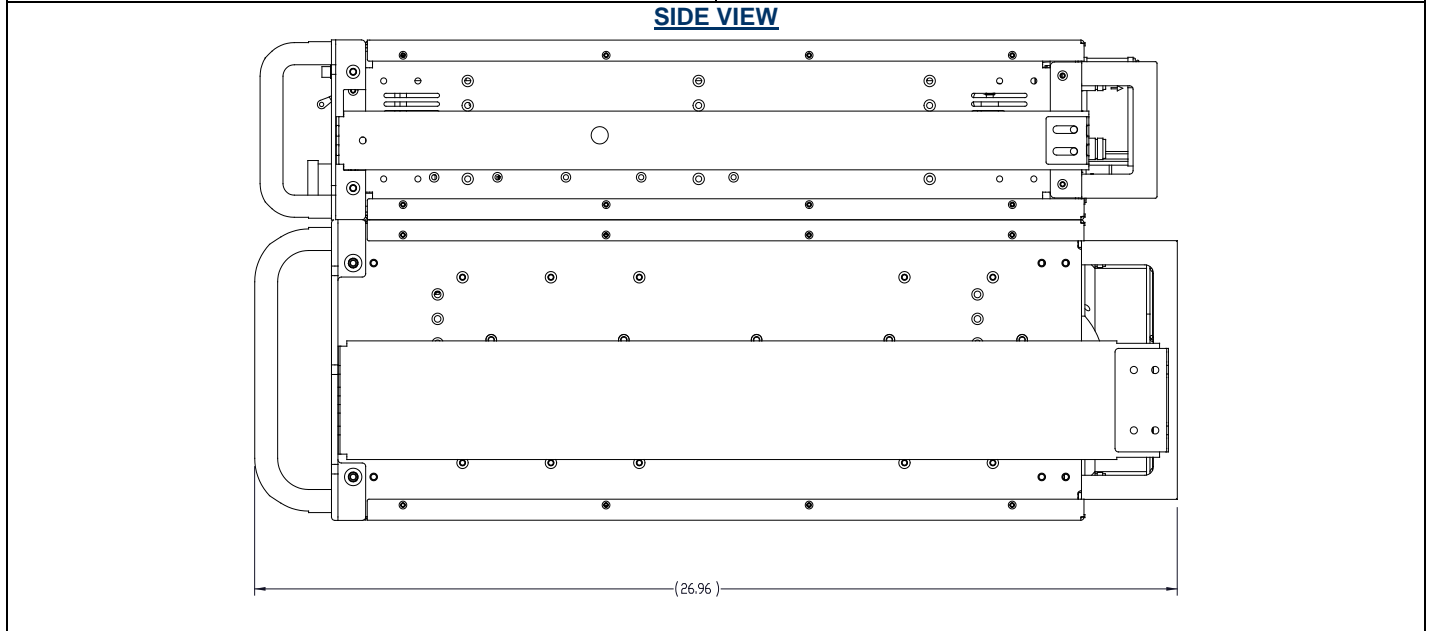
SYSTEM OUTLINES SHOWN: *SKU #:* 2157JEZCCAZXX

**FRONT VIEW**

**REAR VIEW**



**SIDE VIEW**



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## PERFORMANCE PLOTS

**Plot 1 – Small Signal Gain and P<sub>1dB</sub>**

Top Curve: Small Signal Gain @ P<sub>IN</sub> = -20dBm  
 Middle Curve: Power Gain @ P<sub>1dB</sub>, P<sub>IN</sub> = -14dBm  
 Reference: 64dB, 1dB/Div.  
 Bottom Curve: Input Return Loss  
 Reference: 0dB, 10dB/Div.



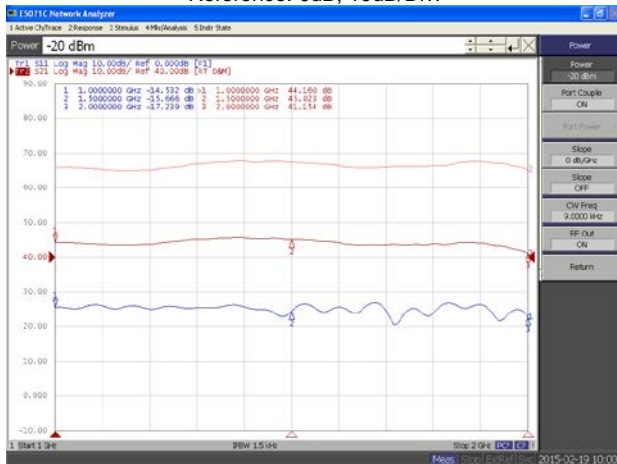
**Plot 2 – Small Signal Gain and P<sub>SAT</sub>**

Top Curve: Small Signal Gain @ P<sub>IN</sub> = -20dBm  
 Bottom Curve: Power Gain @ P<sub>SAT</sub>, P<sub>IN</sub> = 0.0dBm  
 Reference: 64dB, 1dB/Div.  
 Middle Curve: Input Return Loss  
 Reference: 0dB, 10dB/Div.



**Plot 3 – Gain Adjustment Range**

Top Curve: Maximum Gain @ P<sub>IN</sub> = -20dBm  
 Middle Curve: Minimum Gain @ P<sub>IN</sub> = -20dBm  
 Reference: 40dB, 10dB/Div.  
 Bottom Curve: Input Return Loss  
 Reference: 0dB, 10dB/Div.



**Plot 4 – ALC Flatness @ 100W & 200W**

Top Curve: ALC @ 100W, P<sub>IN</sub> = 0dBm  
 Bottom Curve: ALC @ 200W, P<sub>IN</sub> = 0dBm  
 Reference: 57dB, 1dB/Div.  
 Middle Curve: Input Return Loss  
 Reference: 0dB, 10dB/Div.

