

Solid State Broadband High Power Amplifier

2134 - BBS3E3KXU
240-470 MHz / 2000 Watts

The BBS3E3KXU (SKU 2134) is suitable for broadband or band specific high power linear, CW and pulse applications. This amplifier utilizes high power push-pull LDMOS 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 constructed of two modular drawers and is housed in an optional rack cabinet. The main LRU includes the RF power section while the second LRU holds the main power supply and control circuits. The system operates from a single phase power supply and has a 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 linear design
- Instantaneous broadband
- Suitable for most modulation types (contact factory for details)
- Modular design
- 50 ohm input/output impedance
- Built in control, monitoring and protection functions
- High reliability and ruggedness



ELECTRICAL SPECIFICATIONS @ 115 VAC and +28 VDC, 25°C, 50 Ω System

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	BW	240		470	MHz
Power Output PULSE	P _{SAT}	2000			Watt
Power Output @ 1 dB Gain Compression Point PULSE	P _{1dB}		1500		Watt
Pulsewidth	PW	2		50	μs
Repetition Rate	PR			2	kHz
Duty Cycle	DC			10	%
Gain @ 1 dB Gain Compression Point	G _{1dB}	62		65	dB
Input Power for rated output power	P _{IN}		2		dBm
Gain Flatness	ΔG			±1.5	dB
Input Return Loss	S ₁₁			10	dB
Gain control	Gc	20			dB
Noise Figure @ maximum gain	NF			10	dB
Harmonics @ 470 Mhz 1 dB Gain Compression Point	H			-30	dBc
Shutdown speed	Sd			2	μs
Spurious Signals	Spur		-70	-60	dBc
Operating Voltage* (See Note Below)	V _{DC}	24	28	32	Volt
Operating Voltage (Single Phase)	V _{AC}		115		Volt
DC Power Consumption @ 2000 W PULSE	P _D			1000	Watt

*Reduced performance below 28Volts

MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Dimensions W x H x D / Weight w/o enclosure	19 x 14 x 22 (8U)	Inches
Weight	150	Lbs.
RF Connectors Input/Output	SMA Female/ Type N Female	
Cooling	Built in forced-air system	

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ENVIRONMENTAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature	Tc	0		+50	°C
Non-operating Temperature	Tstg	-40		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude (MIL-STD-810F Method 500.4)	Alt	10,000		30,000	Feet
Shock / Vibration (MIL-STD-810F Method 516.5)	SH / VI		Airborne		

PROTECTIONS

Input Overdrive	+10 dBm	Max.
Load VSWR @ rated P1 dB Gain Compression Point	∞ @ any angle & magnitude	Nom.
Thermal Overload	85°C shutdown	Max.

SELECTED AVAILABLE OPTIONS (Refer to www.empowerrf.com for complete options listing)

Option	Number	Description	Price
FGA	061	Front panel manual gain adjustment 10 turns	Standard
LCD	062	Local: Front panel touch screen color LCD controller including Fwd/Rev Power indication (dB or Watt scale), VSWR, RF Gain, Gain Adjustment, ALC Fast/Slow & On/Off, Standby mode, Fault indication, Fault reset. Remote: Rear panel HPIB IEEE-488.2 or full duplex RS232 serial interface. Note: Output Power is lowered by 0.5 - 0.75 dB with this option.	Call
ACC	033	208 VAC, 3-Phase, 50-400 Hz	Call
DCC	043	28 VDC external voltage source, steady state voltage range of 24-29 V _{DC} , ripple (10-1000 Hz) $\pm 2V$ max within above range. To be undamaged by steady state voltage in the range of 18-29 Vdc, over-voltage surges of +80 V _{DC} for 100 mSec, under-voltage surges of +8 V _{DC} for 50 mSec, and voltage spikes of $\pm 600 V$ for μ Sec for both polarities.	Call
INT	063	Rear Panel Interlock function – Blanking via TTL Command	N/C

INPUT-OUTPUT Connector – DB-15, Female

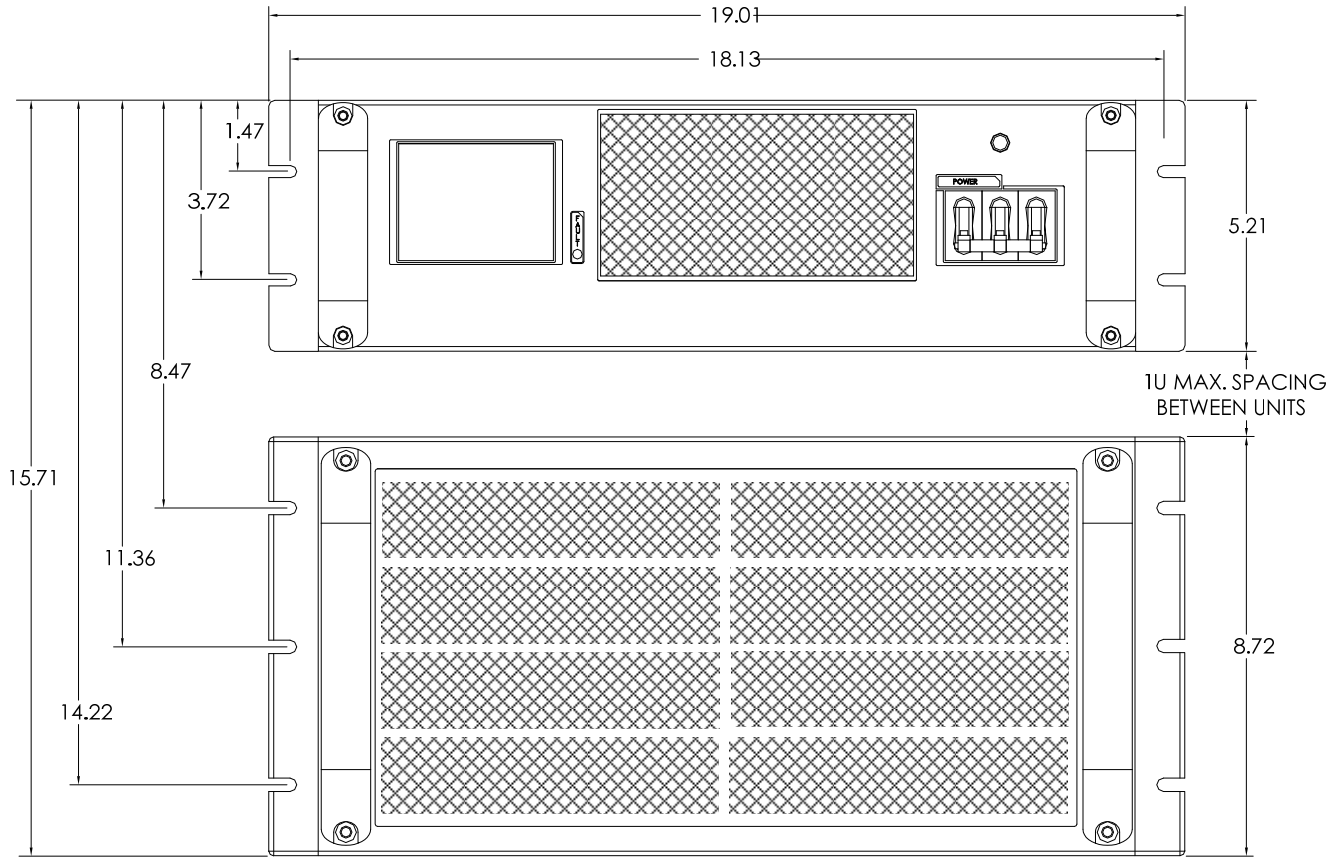
Pin#	Description	Specifications
1	FWD (TP)	Forward detected power (analog voltage: 0 – 5 Volt)
2	REV (TP)	Reverse detected power (analog voltage: 0 – 5 Volt)
3	5V (TP)	5V Test Point
4	GND	Ground
5	Ext. Shutdown	Amplifier Enable: TTL Low (0 V) or Open or Ground Amplifier Disable: TTL High (5 V)
6	12V (TP)	12 ± 0.5 V _{DC} Test Point
7	PS+ (TP)	32 ± 2 V _{DC} Test Point
8	Fault 1	AMP1 Fault Indicator TP (Test Point) - OK = 5.0 V ± 0.5 V; FAULT = 0.0 V to 0.7 V
9	Fault 2	AMP2 Fault Indicator TP (Test Point) - OK = 5.0 V ± 0.5 V; FAULT = 0.0 V to 0.7 V
10	Fault 3	AMP3 Fault Indicator TP (Test Point) - OK = 5.0 V ± 0.5 V; FAULT = 0.0 V to 0.7 V
11	Fault 4	AMP4 Fault Indicator TP (Test Point) - OK = 5.0 V ± 0.5 V; FAULT = 0.0 V to 0.7 V
12	Fault 5	AMP5 Fault Indicator TP (Test Point) - OK = 5.0 V ± 0.5 V; FAULT = 0.0 V to 0.7 V
13	Fault 6	AMP6 Fault Indicator TP (Test Point) - OK = 5.0 V ± 0.5 V; FAULT = 0.0 V to 0.7 V
14	Fault 7	AMP7 Fault Indicator TP (Test Point) - OK = 5.0 V ± 0.5 V; FAULT = 0.0 V to 0.7 V
15	Fault 8	AMP8 Fault Indicator TP (Test Point) - OK = 5.0 V ± 0.5 V; FAULT = 0.0 V to 0.7 V

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OUTLINE DRAWING - FRONT VIEW

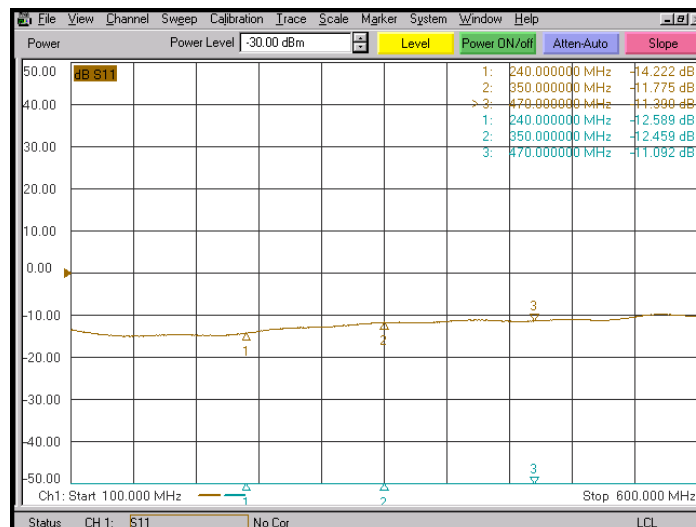


TYPICAL PERFORMANCE PLOTS

Plot 1 – Input Return Loss

$P_{IN} = -30\text{dBm}$

Reference: 0dB, 10dB/Div.



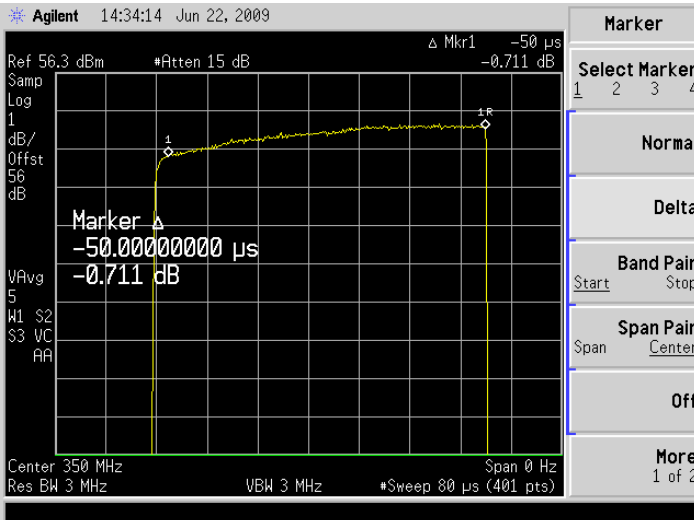
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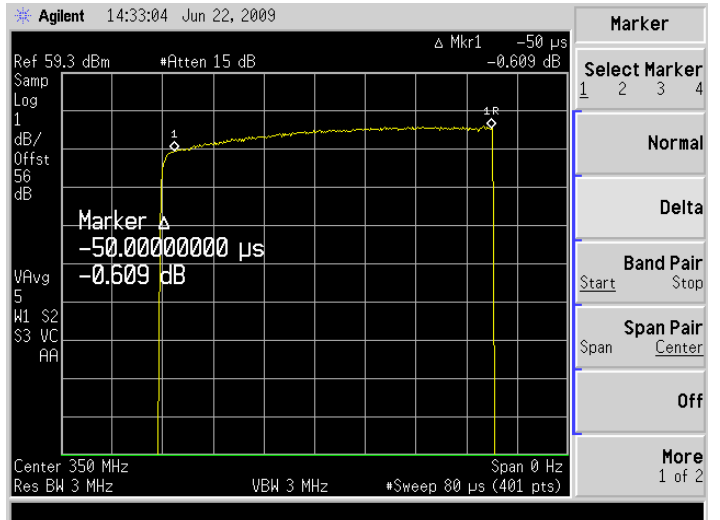
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Performance Plots @ 350MHz, Pulse trigger open.

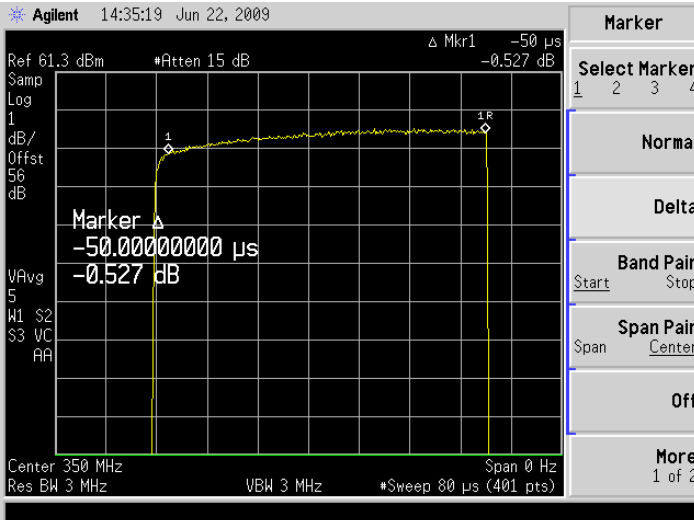
Plot 2 - 50µSec Pulse Characteristic @ 500W_{pk}
 Center Freq.: 350MHz
 Duty Cycle: 10%
 Scale: 1dB/Div.



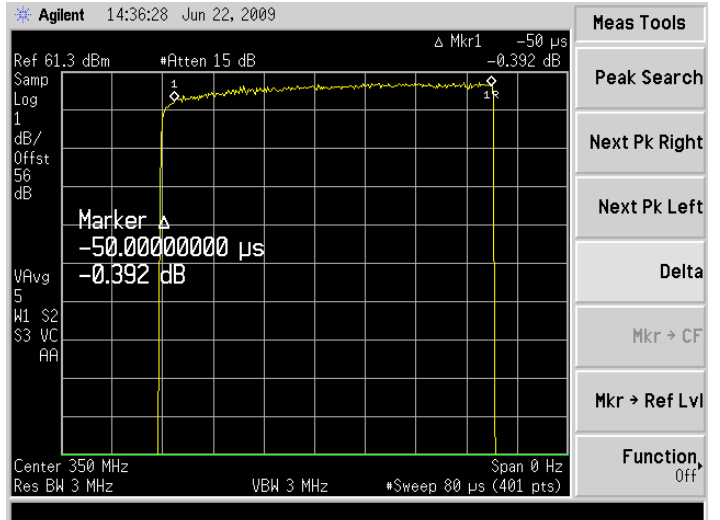
Plot 3 - 50µSec Pulse Characteristic @ 1000W_{pk}
 Center Freq.: 350MHz
 Duty Cycle: 10%
 Scale: 1dB/Div.



Plot 4 - 50µSec Pulse Characteristic @ 1500W_{pk}
 Center Freq.: 350MHz
 Duty Cycle: 10%
 Scale: 1dB/Div.



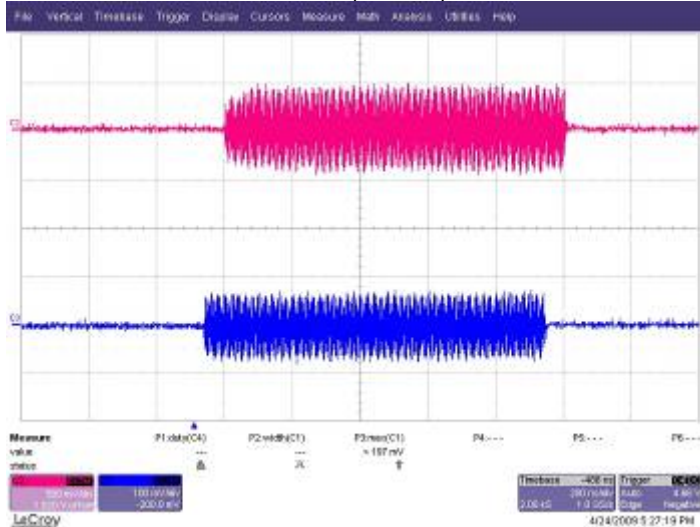
Plot 5 - 50µSec Pulse Characteristic @ 2000W_{pk}
 Center Freq.: 350MHz
 Duty Cycle: 10%
 Scale: 1dB/Div.



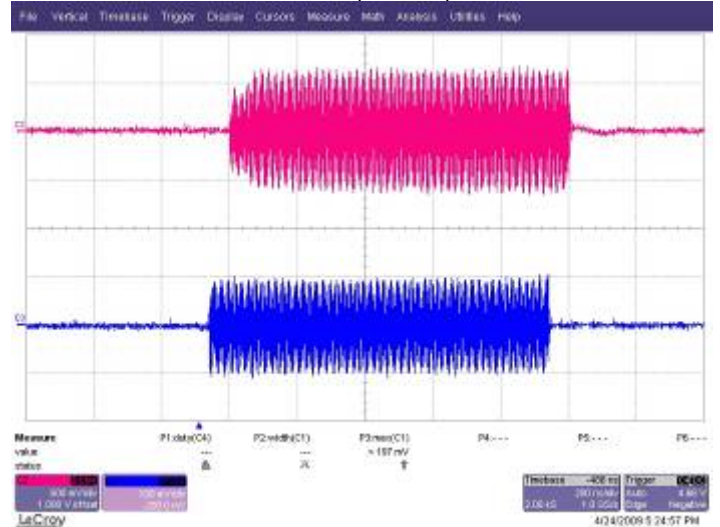
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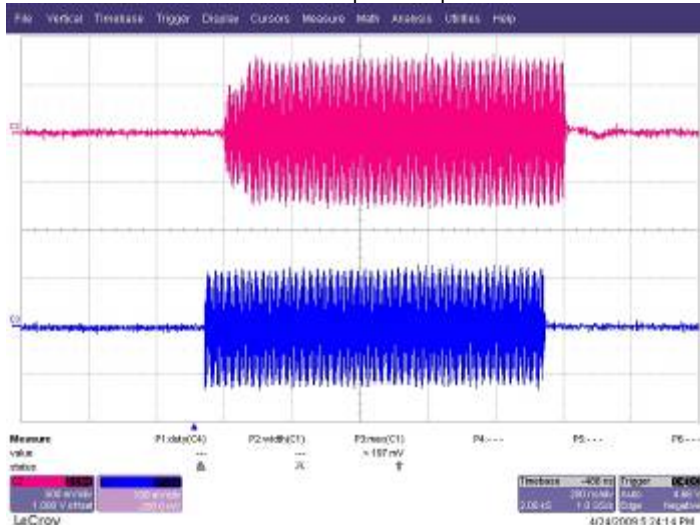
Plot 6 - 50 μ Sec Pulse Characteristic @ 500W_{pk}
 Pulse Width: 1 μ S, 10% Duty Cycle
 Center Freq.: 350MHz
 Horizontal Scale: 200nS/Div.
 Top Graph: RF Output
 Bottom Graph: RF Input



Plot 7 - 50 μ Sec Pulse Characteristic @ 1000W_{pk}
 Pulse Width: 1 μ S, 10% Duty Cycle
 Center Freq.: 350MHz
 Horizontal Scale: 200nS/Div.
 Top Graph: RF Output
 Bottom Graph: RF Input



Plot 8 - 50 μ Sec Pulse Characteristic @ 1500W_{pk}
 Pulse Width: 1 μ S, 10% Duty Cycle
 Center Freq.: 350MHz
 Horizontal Scale: 200nS/Div.
 Top Graph: RF Output
 Bottom Graph: RF Input



Plot 9 - 50 μ Sec Pulse Characteristic @ 2000W_{pk}
 Pulse Width: 1 μ S, 10% Duty Cycle
 Center Freq.: 350MHz
 Horizontal Scale: 200nS/Div.
 Top Graph: RF Output
 Bottom Graph: RF Input

