POLYTRON
POWER SUPPLIES

DABURN

DATA SHEET

AC-DC POWER SUPPLIES

UNIVERSAL INPUT RANGE, FULL-BRICK, UP TO 500 WATTS

RUGGED ENVIRONMENTS AND INDUSTRIAL APPLICATIONS

RENUI500 SERIES

APPLICATIONS

- 5G Communication
- ESS
- Defense
- Robotics
- Factory Automation

FEATURES

- Universal Input Range from 85 to 264 Vac
- Output Voltages: 12, 15, 24, 28, 48 and 54 Vdc
- Up to 93% Efficiency
- 3,000Vac Reinforced Insulation
- No Minimum Load Required
- Power Good Signal
- Remote ON/OFF
- Current Share Function
- Low Standby Power
- Over Current Protection
- Over Temperature Protection
- Over Voltage Protection
- Short Circuit Protection
- 5,000m Operating Altitude
- Wide Operating Temperature Range: -40 to 105°C
- OVC III
- Safety Meets: IEC/ EN/ UL 62368-1
- RoHS and REACH Compliant

SELECTION GUIDE All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Range Vac	Output Voltage Vdc	Output Current @ 230VAC Conduction Cooling A	Input Power @ No Load W	Efficiency %	Maximum Capacitor Load µF	Model Number
85 ~ 264	12	42	0.6	91	20,000	RENUI500-12S
85 ~ 264	15	33.5	0.6	91	12,000	RENUI500-15S
85 ~ 264	24	21	0.6	93	4,000	RENUI500-24S
85 ~ 264	28	18	0.6	93	3,000	RENUI500-28S
85 ~ 264	48	10.5	0.6	93	1,000	RENUI500-48S
85 ~ 264	54	9.4	0.6	93	820	RENUI500-54S

LOAD SHARE OPTIONS:

- **None:** Standard-No Suffix
- **Load Share:** Use Suffix "S"

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Input Specifications

Operating input voltage range	85 Min., 264 Max.	AC input
	88 Min., 370 Max.	DC input
Input frequency, Hz	47 Min.	AC input
Input current, A	6.3 Max.	100VAC and Full Load
	2.7 Max.	240VAC and Full Load
No load input factor, W	0.6 Typ.	230VAC
Power factor	0.95 Min.	230VAC and Full Load
Start up time, ms	2,000 Max.	
Rise time, ms	20 Typ.	
Hold up time, ms	16 Typ.	115VAC and Full Load, Cbus:660uF/450V Minimum
Input inrush current, A	30 Typ.	230VAC and Full Load, Thermal Fuse Resistor:12Ω
Input protection	T10A/250VAC	External fuse in line

Output Specifications

Output power, W	500 Max.	Conduction cooling @ 230VAC
Voltage accuracy, %	-1 Min., 1 Max.	230VAC and Full Load
Line regulation, %	-0.2 Min., 0.2 Max.	Low Line to High Line at Full Load
Load regulation, %	-0.5 Min., 0.5 Max.	No Load to Full Load
	-0.4 Min., 0.4 Max.	10% Load to 90% Load
Voltage adjustability, %	-10 Min., 10 Max.	Maximum output deviation is inclusive of remote sense
	-5 Min., 5 Max.	Only For Load Share Models (-S suffix)
Remote sense, %	10 Max.	% of Vout(nom), If remote sense is not being used, Sense pins should be connected to corresponding polarity OUTPUT pins.
Minimum load, %	0 Typ.	
Ripple and noise, mVp-p		Measured by 20MHz bandwidth
	200 Typ.	With a 1μF/50V 1206 X7R MLCC, 12Vout
	200 Typ.	With a 1μF/50V 1206 X7R MLCC, 15Vout
	240 Typ.	With a 1μF/50V 1206 X7R MLCC, 24Vout
	280 Typ.	With a 1μF/50V 1206 X7R MLCC, 28Vout
	480 Typ.	With a 1μF/100V 1206 X7R MLCC, 48Vout
	280 Typ.	With a 1μF/100V 1206 X7R MLCC, 54Vout
Temperature coefficient, %/°C	-0.02 Min, 0.02 Max.	
Transient response peak deviation, μs	3 Typ.	Load step from 50 ~ 75% change at 2.5A/μs
Transient response recovery time, μs	600 Typ.	Recovery within 1% Vout
Over voltage protection, Vdc	115 Min., 135 Max.	% of Vout(nom); Latch mode
Over load protection, %	145 Typ.	% of maximum Iout rated; Hiccup mode
Short circuit protection	Continuous, automatics recovery	
Remote ON/OFF	0 ~ 0.8Vdc or Open	External power supply is required, Output ON
	4.5 ~ 12.5Vdc	Between +Ctrl and -Ctrl, Output OFF
	20mA Max.	Input current
Main output Power Good signal	Low	Referenced to "-Vout" Power good
	Open collector	Power off
Load Share (-S suffix)	Current Share Function	The converter can parallel to increase output current. It has internal load share function in this converter.
Current Share Function (-S suffix), %	4 Typ.	No Load to Full Load
Load Share accuracy (-S suffix), %	20 Typ.	Full Load

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General Specifications

Isolation voltage, Vac	1 minute (Reinforced insulation), Input to Output	3,000 Min.		
	Input to Base-Plate	2,500 Min.		
	Output to Base-Plate	1,500 Min.		
Isolation resistance, GΩ	500Vdc	0.1 Min.		
Switching frequency, kHz	230Vac, Full load		180 Typ.	

Environmental Specifications

Operating base-plate temperature, °C	With derating	-40 Min.		105 Max.
Storage temperature range, °C		-55 Min.		125 Max.
Over temperature protection, °C	Internal thermistor, Hiccup mode		115 Typ.	
Operating altitude, m				5,000 Max.
Thermal shock	MIL-STD-810F			
Shock	MIL-STD-810F			
Vibration	MIL-STD-810F			
Relative humidity	5% to 95% RH			

Physical Specifications

Design meet safety standard	IEC/ EN/ UL 62368-1
Dimensions	4.6 × 2.4 × 0.5 inches (116.8 × 61 × 12.7 mm)
Case material	Aluminum base-plate with plastic case
Potting material	Silicone (UL94 V-0)
Weight	210g (7.40oz)
MTBF	2.500 × 10^5 hrs, MIL-HDBK-217F, Full load

EMC Specifications

Specifications	Conditions		Level
EMI	EN55032 and FCC Part 15, With external components	Conducted	Class B
		Radiated	Class A
Harmonic currents	EN61000-3-2	Full Load	Class D
Voltage flicker	EN61000-3-3		
EMS	EN55035		
ESD	EN61000-4-2		Perf. Criteria A
Radiated immunity	EN61000-4-3	20 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV, With external components	Perf. Criteria A
Surge	EN61000-4-5	DM ± 1kV and CM ± 2kV, With external components	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A
Dip and interruptions	EN61000-4-11		

Note:

1. BASE-PLATE GROUNDING: When connect four screw bolts to shield plane, the EMI could be reduced.
2. The BUS pin only can be connected to capacitor and the components that Polytron Power Supplies advised, please do not connect to load and use for any other purpose.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

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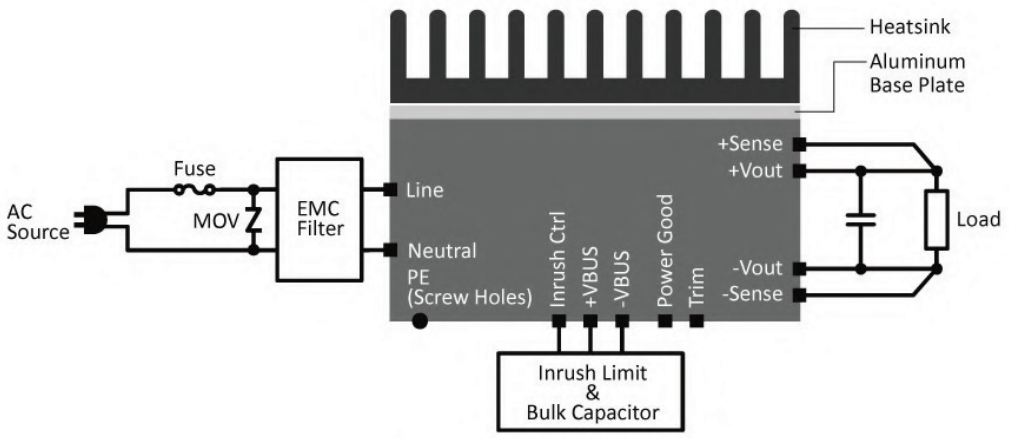
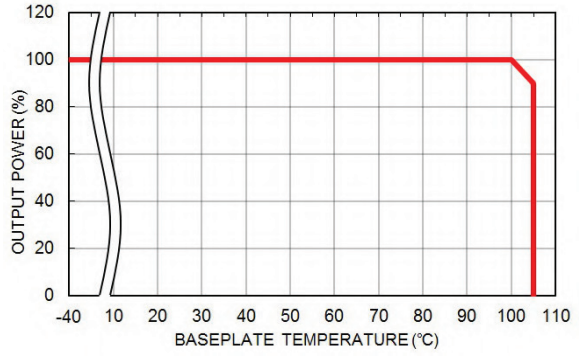
Typical Application

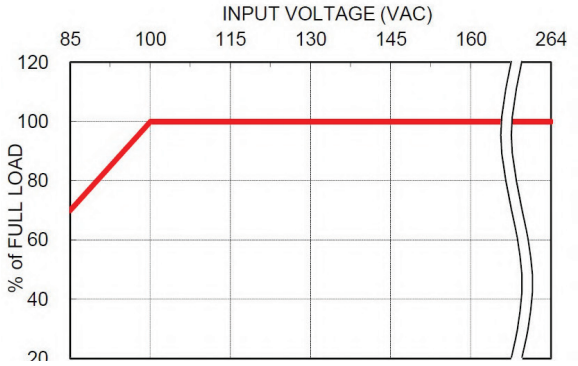


RENUI500

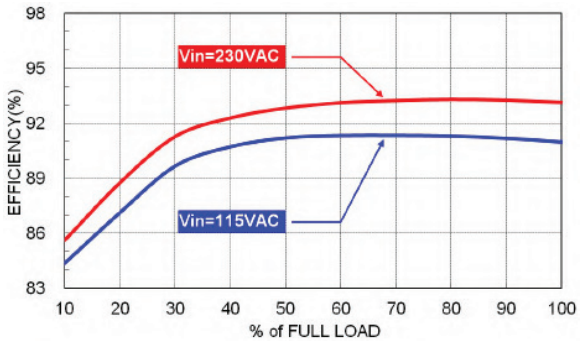
Characteristic Curve



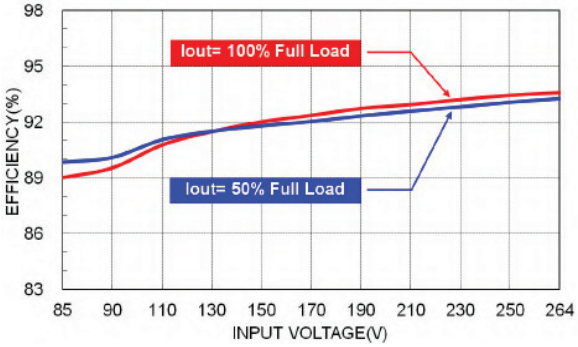
Derating Curve vs. Baseplate Temperature



Derating Curve vs. Input Voltage

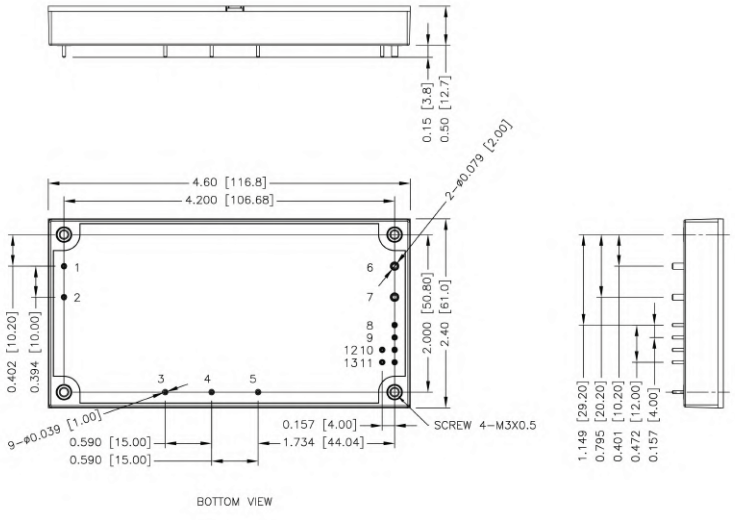


Efficiency vs. Output Load



Efficiency vs. Input Voltage

Mechanical Drawing

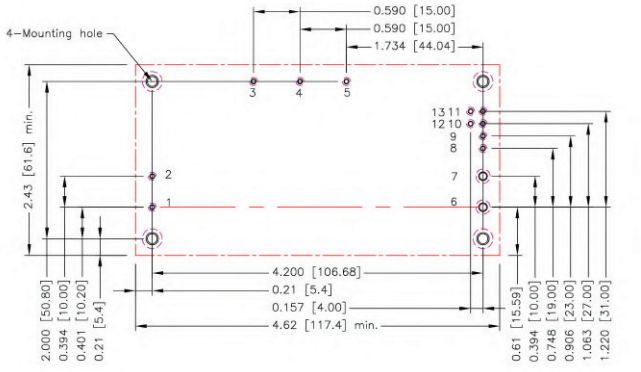


PIN CONNECTION

PIN	DEFINE
1	AC Input (Neutral)
2	AC Input (Line)
3	Inrush Control
4	+VBUS
5	-VBUS
6	-Vout
7	+Vout
8	-V Sense
9	+V Sense
10	Trim
11	PG
12	+Ctrl
13	-Ctrl

1. **All dimensions in inches (mm)**
2. **Tolerance :x.xx±0.02 (x.x±0.5)**
   x.xxx±0.01 (x.xx±0.25)
3. **The screw locked torque: MAX 6.6Kgf-cm/0.65N-m**
4. **Baseplate can be connected to FG through M3 mounting screw holes.**

Recommended Pad Layout



1. **All dimensions in inch[mm]**
2. **Pad size(lead free recommended)**
3. **Through hole 1.2.3.4.5.8.9.10.11.12.13:∅0.051[1.30]**
4. **Through hole 6.7:∅0.091[2.30]**
5. **Through hole of mounting:∅0.126[3.20]**
6. **Top view pad 1.2.3.4.5.8.9.10.11.12.13:∅0.064[1.63]**
7. **Top view pad 6.7:∅0.113[2.88]**
8. **Top view pad of mounting:∅0.157[4.00]**
9. **Bottom view pad 1.2.3.4.5.8.9.10.11.12.13:∅0.102[2.60]**
10. **Bottom view pad 6.7:∅0.181[4.60]**
11. **Bottom view pad of mounting:∅0.252[6.40]**

Output Voltage Adjustment

Output voltage is adjustable for 10% trim up or -10% trim down of nominal output voltage by connecting an external resistor between the Trim pin and either the +Sense or -Sense pins.

With an external resistor between the Trim and +Sense pin, the output voltage set point decreases.

With an external resistor between the Trim and -Sense pin, the output voltage set point increases.

Maximum output deviation is +10% inclusive of remote sense.

The external TRIM resistor needs to be at least 1/8W of rated power.

Trim Up Equation

$$R_U = \left[\frac{G \times L}{(V_{o,up} - L - K)} - H \right] \Omega$$

Trim Down Equation

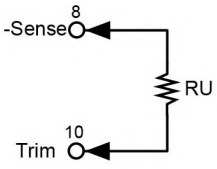
$$R_D = \left[\frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H \right] \Omega$$

TRIM CONSTANTS

MODEL	G	H	K	L
RENUI500-12S	51000	2000	9.5	2.5
RENUI500-15S	51000	2000	12.5	2.5
RENUI500-24S	120000	2000	21.5	2.5
RENUI500-28S	140000	2000	25.5	2.5
RENUI500-48S	240000	2000	45.5	2.5
RENUI500-54S	300000	2000	51.5	2.5

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.



12S

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20
RU	(kΩ)	1060.500	529.250	352.167	263.625	210.500	175.083	149.786	130.813	116.056	104.250

15S

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50
RU	(kΩ)	848.000	423.000	281.333	210.500	168.000	139.667	119.429	104.250	92.444	83.00

24S

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	24.24	24.48	24.72	24.96	25.20	25.44	25.68	25.92	26.16	26.40
RU	(kΩ)	1248.000	623.000	414.667	310.500	248.000	206.333	176.571	154.250	136.889	123.000

28S

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	28.28	28.56	28.84	29.12	29.40	29.68	29.96	30.24	30.52	30.80
RU	(kΩ)	1248.000	623.000	414.667	310.500	248.000	206.333	176.571	154.250	136.889	123.000

48S

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	48.48	48.96	49.44	49.92	50.40	50.88	51.36	51.84	52.32	52.80
RU	(kΩ)	1248.000	623.000	414.667	310.500	248.000	206.333	176.571	154.250	136.889	123.000

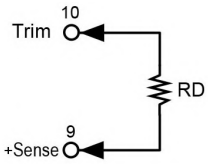
54S

△V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	54.54	55.08	55.62	56.16	56.7	57.24	57.78	58.32	58.86	59.4
RU	(kΩ)	1386.889	692.444	460.963	345.222	275.778	229.481	196.413	171.611	152.321	136.889

Output Voltage Adjustment (Continued)

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.



12S

Δ V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	11.88	11.76	11.64	11.52	11.4	11.28	11.16	11.04	10.92	10.8
RD	(kΩ)	3984.500	1965.750	1292.833	956.375	754.500	619.917	523.786	451.688	395.611	350.750

15S

Δ V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	14.85	14.7	14.55	14.4	14.25	14.1	13.95	13.8	13.65	13.5
RD	(kΩ)	4197.000	2072.000	1363.667	1009.500	797.000	655.333	554.143	478.250	419.222	372.000

24S

Δ V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	23.76	23.52	23.28	23.04	22.8	22.56	22.32	22.08	21.84	21.6
RD	(kΩ)	10628.000	5253.000	3461.333	2565.500	2028.000	1669.667	1413.714	1221.750	1072.444	953.000

28S

Δ V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	27.72	27.44	27.16	26.88	26.6	26.32	26.04	25.76	25.48	25.2
RD	(kΩ)	12608.000	6233.000	4108.000	3045.500	2408.000	1983.000	1679.429	1451.750	1274.667	1133.000

48S

Δ V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	47.52	47.04	46.56	46.08	45.6	45.12	44.64	44.16	43.68	43.2
RD	(kΩ)	22508.000	11133.000	7341.333	5445.500	4308.000	3549.667	3008.000	2601.750	2285.778	2033.000

54S

Δ V	(%)	1	2	3	4	5	6	7	8	9	10
Vout	(V)	53.46	52.92	52.38	51.84	51.3	50.76	50.22	49.68	49.14	48.6
RD	(kΩ)	28309.111	14003.556	9235.037	6850.778	5420.222	4466.519	3785.302	3274.389	2877.012	2559.111