



Size: 0.6in x 0.45in x 0.325in (15.24mm x 11.43mm x 8.25mm) 

FEATURES

- Wide Input Voltage
- High Efficiency
- SMD Package
- Output Short Circuit Protection
- RoHS Compliant
- Meets EN62368 Standard

APPLICATIONS

- Industrial Control
- Instrumentation
- Electric Power Applications

DESCRIPTION

The RBR500 series of DC/DC converters offers 500mA output current in an ultra-compact 0.6" x 0.45" x 0.325" SMD package. This series consists of non-isolated and regulated single outputs with wide input voltage. Each model in this series features high efficiency, short circuit protection, and RoHS compliance. This series also has EN62368 standard approval.

MODEL SELECTION TABLE

Model Number	Input Voltage Range ⁽¹⁾	Output Voltage	Max. Output Current	Typ. Efficiency		Maximum Capacitive Load
				Min. Vin	Max. Vin	
RBR500-12S1.5	12VDC (4.75-28VDC)	1.5VDC	500mA	76%	67%	680µF
RBR500-12S1.8		1.8VDC	500mA	76%	69%	680µF
RBR500-12S2.5	12VDC (4.75-32VDC)	2.5VDC	500mA	81%	74%	680µF
RBR500-24S3.3	24VDC (4.75-36VDC)	3.3VDC	500mA	86%	80%	680µF
RBR500-24S05	24VDC (6.5-36VDC)	5VDC	500mA	90%	84%	680µF
RBR500-24S6.5	24VDC (8-36VDC)	6.5VDC	500mA	92%	87%	680µF
RBR500-24S09	24VDC (12-36VDC)	9VDC	500mA	93%	90%	680µF
RBR500-24S12	24VDC (15-36VDC)	12VDC	500mA	94%	91%	680µF
RBR500-24S15	24VDC (19-36VDC)	15VDC	500mA	95%	93%	680µF

SPECIFICATIONS

All specifications are based on Ta=25°C, Humidity <75%RH, Nominal Input Voltage, and Rated Output Load unless otherwise noted. We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
INPUT SPECIFICATIONS						
Input Voltage Range			See Table			
No Load Input Current				0.2	1.5	mA
Input Filter			Capacitor Filter			
Reverse Polarity Input			Avoid/Not Protected			
OUTPUT SPECIFICATIONS						
Output Voltage			See Table			
Voltage Accuracy	Full Load, Input Voltage Range	1.5V, 1.8V, 2.5V, & 3.3V Output Models Other Models		±2 ±2	±4 ±3	%
Line Regulation	Full Load, Input Voltage Range			±0.2	±0.4	%
Load Regulation	Nominal Input Voltage, 10%-100% Load	1.5V, 1.8V, 2.5V, & 3.3V Output Models Other Models		±0.6 ±0.3		%
Voltage Adjustment	Input Voltage Range			±10		%Vo
Output Current			See Table			
Maximum Capacitive Load	Tested under full load conditions and over the input voltage range		See Table			
Ripple & Noise ⁽²⁾	20MHz bandwidth, Nominal Input Voltage	1.5V, 1.8V, 2.5V, & 3.3V Output Models, 20%-100% Load Other Models, 10%-100% Load		20 20	50 50	mVp-p
Transient Response Deviation	Nominal Input Voltage, 25% Load Step Change			50	200	mV
Transient Recovery Time	Nominal Input Voltage, 25% Load Step Change			0.2	1	mS
Temperature Coefficient	Operating Temperature -40°C to +85°C				±0.03	%/°C

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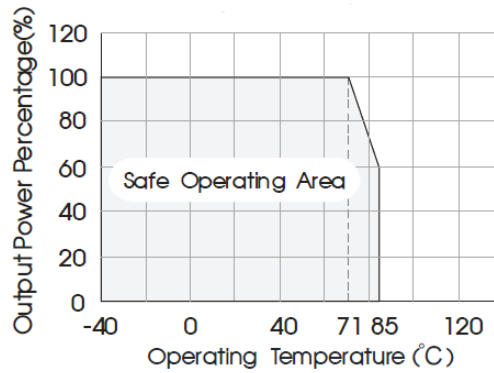
SPECIFICATION		TEST CONDITIONS		Min	Typ	Max	Unit
REMOTE ON/OFF CONTROL⁽³⁾							
Module Switch On				Ctrl Pin Open or Pulled High (TTL 3.5-5.5VDC)			
Module Switch Off				Ctrl pin pulled low to GND (0-0.8VDC)			
Input Current when Switched Off					30	100	µA
PROTECTION							
Short Circuit Protection	Nominal Input Voltage			Continuous, Self-Recovery			
ENVIRONMENTAL SPECIFICATIONS							
Operating Temperature				-40		+85	°C
Storage Temperature				-55		+125	°C
Storage Humidity	Non-Condensing			5		95	%RH
Reflow Soldering Temperature ⁽⁴⁾	Peak Temp				≤245		°C
	Maximum duration time at 217°C				≤60		s
MTBF	MIL-HDBK-217F @25°C			2000			kHours
GENERAL SPECIFICATIONS							
Efficiency	@Full Load			See Table			
Switching Frequency	Full Load, Nominal Input Voltage	RBR500-12S1.5			370		KHz
		Others			700		
PHYSICAL SPECIFICATIONS							
Weight				0.053oz (1.5g)			
Dimensions (L x W x H)				0.6in x 0.45in x 0.325in (15.24mm x 11.40mm x 8.25mm)			
Case Material				Black Flame-Retardant & Heat-Resistant Plastic (UL94 V-0)			
Cooling Method				Free Air Convection			
SAFETY CHARACTERISTICS							
Safety Approvals				EN62368			
EMI		CE		CISPR32/EN55032			Class B ⁽⁶⁾
		RE		CISPR32/EN55032			Class B ⁽⁶⁾
EMS	ESD	IEC/EN 61000-4-2		Contact ±4kV			Perf. Criteria B
	RS	IEC/EN 61000-4-3		10V/m			Perf. Criteria A
	EFT	IEC/EN 61000-4-4		±1kV ⁽⁵⁾			Perf. Criteria B
	Surge	IEC/EN 61000-4-5		Line to Line ±1kV ⁽⁵⁾			Perf. Criteria B
	CS	IEC/EN 61000-4-6		3Vr.m.s			Perf. Criteria A
Certifications				CE			

NOTES

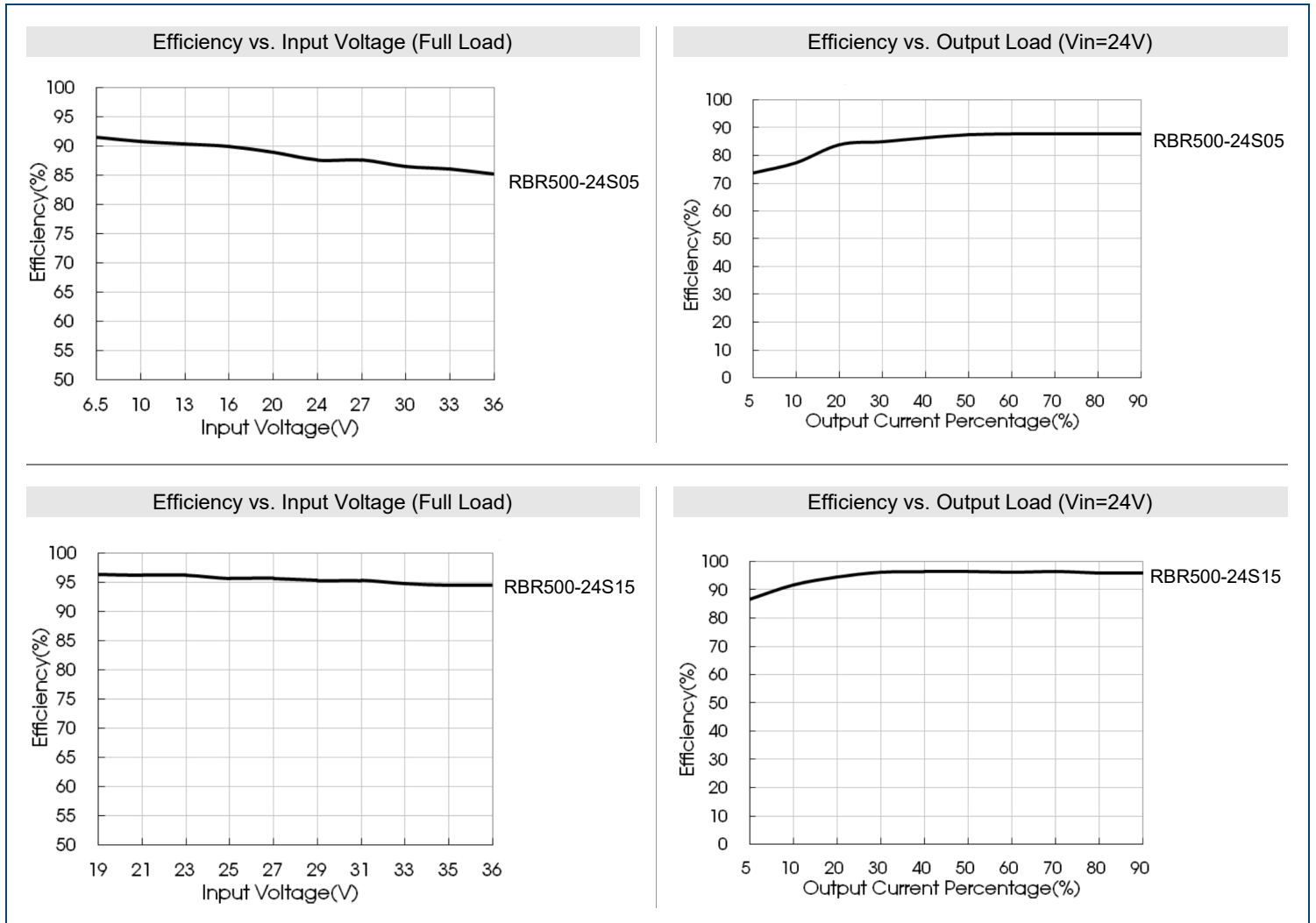
- For input voltage higher than 30VDC, a 22µF/50V input capacitor is required.
- Ripple and noise tested with "parallel cable" method.
 With load at or below 20%, the maximum ripple and noise of 1.5V, 1.8V, 2.5V, & 3.3V output models will be 100mVp-p. With load lower than 10%, 5V, 6.5V, 9V, 12V, & 15V output models will be 150mVp-p.
- The voltage of Remote ON/OFF pin is relative to pin GND.
- For actual application, please refer to IPC/JEDEC J-STD-020D.1
- See Fig. 3-① for recommended circuit.
- See Fig. 3-② for recommended circuit.
- Performance indexes of product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements. Please contact factory for more information.
- Our products shall be classified according to ISO 14001 and related environmental laws and regulations and should be handled by qualified units.

*Due to advances in technology, specifications subject to change without notice.

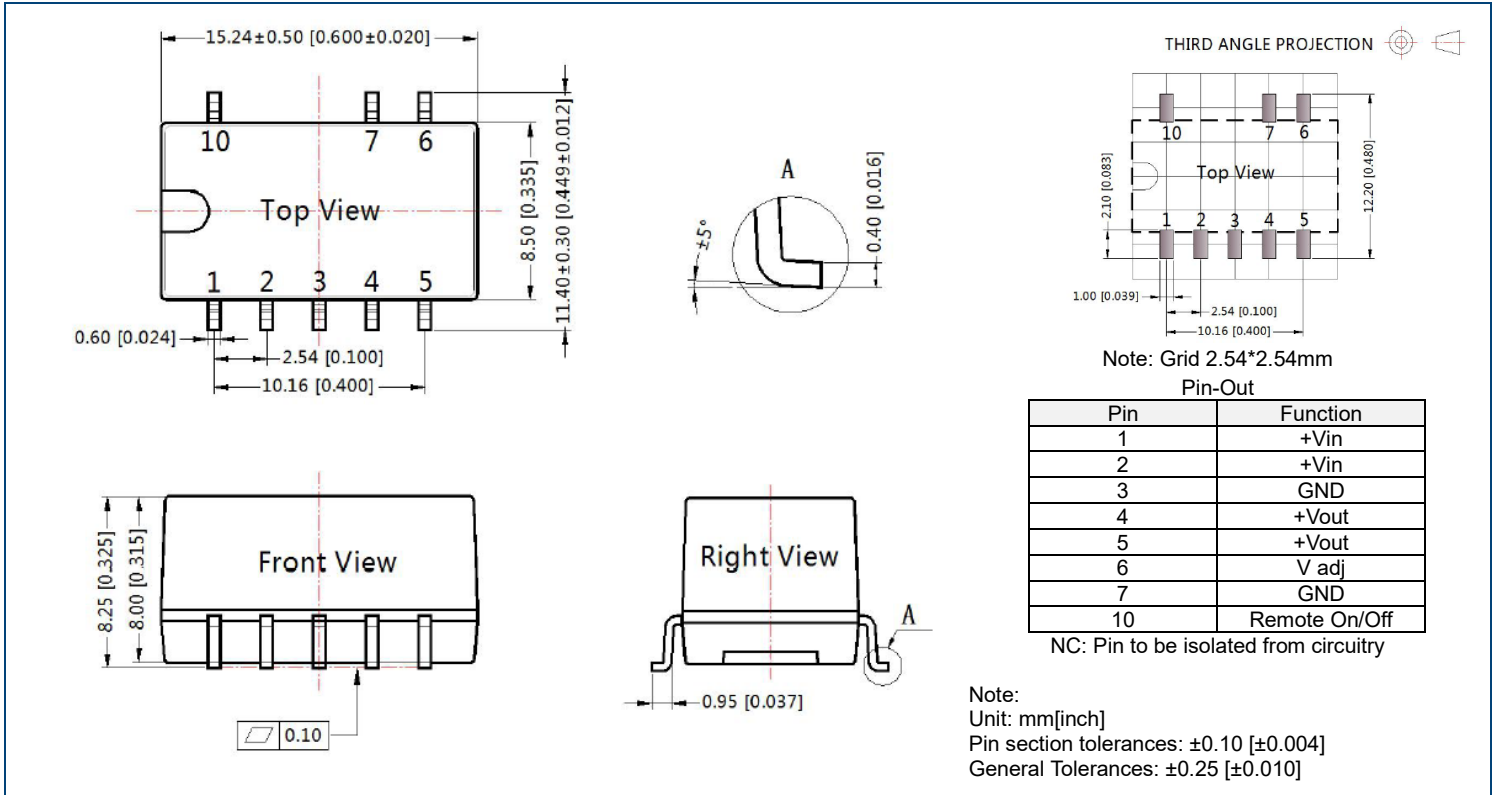
DERATING CURVES



EFFICIENCY GRAPHS



MECHANICAL DRAWINGS



DESIGN REFERENCE

1. Typical Application Circuit

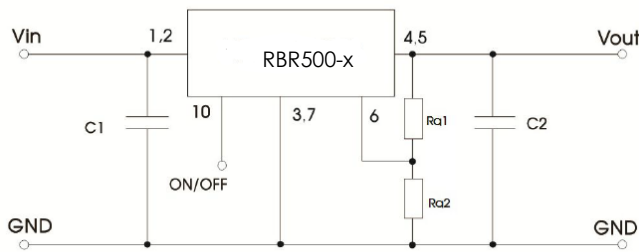


Fig. 1

Part Number	C1 (ceramic capacitor)	C2 (ceramic capacitor)	Ra1/Ra2 (Vadj resistance)
RBR500-12S1.5	10µF/50V	22µF/10V	Refer to Vadj resistance calculation
RBR500-12S1.8		22µF/10V	
RBR500-12S2.5		22µF/10V	
RBR500-12S3.3		22µF/10V	
RBR500-12S05		22µF/16V	
RBR500-12S6.5		22µF/16V	
RBR500-12S09		22µF/25V	
RBR500-12S12		22µF/25V	
RBR500-12S15		22µF/25V	

Sheet 1

- Note:
- C1 and C2 are required and should be connected as close as possible to the pin terminal of the module.
 - The capacitance of C1 & C2 refer to sheet 1, it can be increased properly if required, and tantalum or low ESR electrolytic capacitors may also suffice.
 - Cannot be used in parallel for output and hot swap.

To reduce output ripple further, it is suggested to connect an "LC" filter at the output terminal. Recommended value of L is 10µH-47µH.

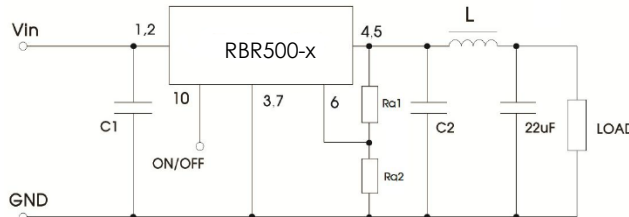


Fig. 2 "LC" Filter Application Circuit

2. EMC Solution-Recommended Circuit

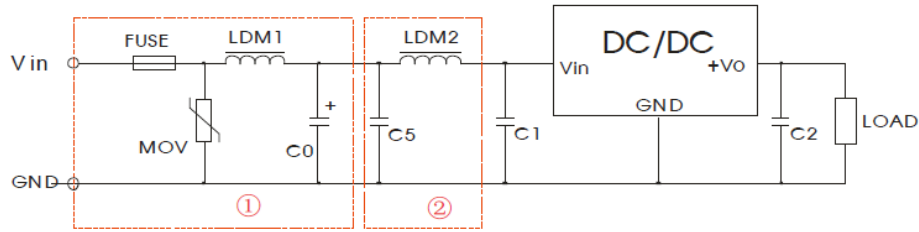
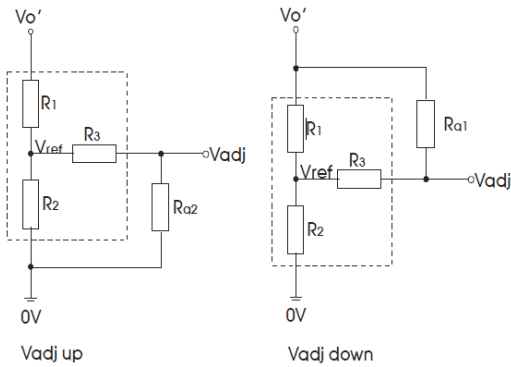


Fig. 3 EMC Recommended Circuit

FUSE	MOV	LDM1	C0	C1/C2	C5	LDM2
Selected based on actual input current from customer	S20K30	82μH	680μF/50V	Refer to Sheet 1	4.7μF/50V	12μH

Note: Part ① in Fig. 3 shows immunity compliance filter and part ② is for Emission compliance; depending on requirements, both filters ① and ② can be used in series as shown.

3. Trim Function for Output Voltage Adjustment (Open is Unused)



Calculation formula of Vadj resistance:

$$\text{Up: } Ra_2 = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{Down: } Ra_1 = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

Ra₁, Ra₂ = Trim Resistor Value
a = is a self-defined parameter
Vo' = desired output voltage

Fig. 4 Circuit diagram of Vadj up and down (dashed line shows internal part of module)

Vout (V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
1.5	7.5	7.5	15	0.75
1.8	35.7	26.29	100	0.765
2.5	27	11.858	51	0.765
3.3	33	9.9	47	0.765
5	75	13.5	75	0.765
6.5	75	10	51	0.765
9	51	4.7	27	0.765
12	75	5.1	27	0.765
15	82	4.423	27	0.765

Note: The 1.5VDC output model only supports Vadj up. It does not support Vadj down.

COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001: 2015 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

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