Size: 0.46in x 0.24in x 0.4in
(11.60mm x 6mm x 10.16mm)

FEATURES

- Fixed Input Voltage
- Unregulated Single Output
- Industry Standard Pin-Out
- Compact Package
- Continuous Short Circuit Protection
- RoHS Compliant
- All Models Meet UL62368-1, EN62368-1, and BS EN62368-1 Standards, 12VDC, 15VDC, and 24VDC Input Models also Meet IEC 62368-1 Standards

APPLICATIONS

- Industrial Robotics
- Pure Digital Circuits
- Low Frequency Analog Circuits
- Relay-Driven Circuits
- Data Switching Circuits

DESCRIPTION

The RBAT1 series of DC/DC converters offers 1 watt of output power in a very compact 0.46” x 0.24” x 0.4” SIP package. This series consists unregulated single output models with fixed input voltage. Each model features industry standard pin-out, continuous short circuit protection, and RoHS compliance. All models meet UL62368-1, EN62368-1, and BS EN62368-1 safety standards, while 12VDC, 15VDC, and 24VDC input models also meet IEC 62368-1 standards.

MODEL SELECTION TABLE

Model Number	Input Voltage Range	Output Voltage	Output Current		Ripple & Noise		Efficiency		Maximum Capacitive Load	Output Power	Certifications
			Min Load	Max Load	Typ.	Max.	Min.	Typ.			
RBAT1-05S03	5VDC (4.5-5.5VDC)	3.3VDC	30mA	303mA	30mVp-p	75mVp-p	70%	74%	2400µF	1 Watt	UL/EN/BS EN
RBAT1-05S05		5VDC	20mA	200mA	30mVp-p	75mVp-p	78%	82%	2400µF		
RBAT1-05S09		9VDC	12mA	111mA	30mVp-p	75mVp-p	79%	83%	1000µF		
RBAT1-05S12		12VDC	9mA	84mA	30mVp-p	75mVp-p	79%	83%	560µF		
RBAT1-05S15		15VDC	7mA	67mA	30mVp-p	75mVp-p	79%	83%	560µF		
RBAT1-05S24		24VDC	4mA	42mA	50mVp-p	100mVp-p	81%	85%	220µF		
RBAT1-12S03	12VDC (10.8~13.2VDC)	3.3VDC	30mA	303mA	30mVp-p	75mVp-p	71%	75%	2400µF	1 Watt	UL/EN/BS EN/IEC
RBAT1-12S05		5VDC	20mA	200mA	30mVp-p	75mVp-p	76%	80%	2400µF		
RBAT1-12S09		9VDC	12mA	111mA	30mVp-p	75mVp-p	76%	80%	1000µF		
RBAT1-12S12		12VDC	9mA	83mA	30mVp-p	75mVp-p	76%	80%	560µF		
RBAT1-12S15		15VDC	7mA	67mA	30mVp-p	75mVp-p	77%	81%	560µF		
RBAT1-12S24		24VDC	5mA	42mA	50mVp-p	100mVp-p	77%	81%	220µF		
RBAT1-15S05	15VDC (13.5~16.5VDC)	5VDC	20mA	200mA	30mVp-p	75mVp-p	76%	80%	2400µF	1 Watt	UL/EN/BS EN/IEC
RBAT1-15S09		9VDC	12mA	111mA	30mVp-p	75mVp-p	76%	80%	1000µF		
RBAT1-15S12		12VDC	9mA	83mA	30mVp-p	75mVp-p	76%	80%	560µF		
RBAT1-15S15		15VDC	7mA	67mA	30mVp-p	75mVp-p	77%	81%	560µF		
RBAT1-15S24		24VDC	5mA	42mA	50mVp-p	100mVp-p	77%	81%	220µF		-
RBAT1-24S03	24VDC (21.6~26.4VDC)	3.3VDC	30mA	303mA	30mVp-p	75mVp-p	69%	75%	2400µF	1 Watt	UL/EN/BS EN/IEC
RBAT1-24S05		5VDC	20mA	200mA	30mVp-p	75mVp-p	73%	79%	2400µF		
RBAT1-24S09		9VDC	12mA	111mA	30mVp-p	75mVp-p	74%	80%	1000µF		
RBAT1-24S12		12VDC	9mA	83mA	30mVp-p	75mVp-p	75%	81%	560µF		
RBAT1-24S15		15VDC	7mA	67mA	30mVp-p	75mVp-p	75%	81%	560µF		
RBAT1-24S24		24VDC	5mA	42mA	50mVp-p	100mVp-p	75%	81%	220µF		

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		
Input Current	Full Load	5VDC Input	3.3VDC Output			271	286	mA
			5VDC Output			244	257	
			9VDC/12VDC/15VDC Output			241	254	
			24VDC Output			241	254	
		12VDC Input	3.3VDC Output			112	118	
			5VDC/9VDC/12VDC Output			105	110	
			15VDC/24VDC Output			103	109	
		15VDC Input	5VDC/9VDC/12VDC Output			84	88	
			15VDC/24VDC Output			83	87	
		24VDC Input	3.3VDC Output			56	61	
			5VDC Output			53	58	
			9VDC Output			53	57	
			12VDC/15VDC/24VDC Output			52	56	
	No Load	5VDC Input	3.3VDC Output			5	10	mA
			5VDC Output			5	10	
			9VDC/12VDC/15VDC Output			12	20	
			24VDC Output			18	30	
		12VDC, 15VDC, 24VDC Input	All Models			8	-	
Reflected Ripple Current[1]						15		mA
Surge Voltage (1 sec Max.)	5VDC Input				-0.7		9	VDC
	12VDC Input				-0.7		18	
	15VDC Input				-0.7		21	
	24VDC Input				-0.7		30	
Input Filter						Capacitance Filter		
Hot plug						Unavailable		
OUTPUT SPECIFICATIONS								
Output Voltage						See Table		
Voltage Accuracy						See Output Regulation Curves		
Linear Regulation	Input Voltage Change: ±1%		3.3VDC Output Model				1.5	%
			Other Output Models				1.2	
Load Regulation	10%-100% Load	5VDC Input	3.3VDC Output Model			15	20	%
			5VDC Output Model			10	15	
			9VDC Output Model			8	10	
			12VDC Output Model			7	10	
			15VDC Output Model			6	10	
			24VDC Output Model			6	10	
		12VDC, 15VDC, 24VDC Input	3.3VDC Output Model			8	20	%
			5VDC Output Model			5	15	
			9VDC Output Model			3	10	
			12VDC Output Model			3	10	
			15VDC Output Model			3	10	
			24VDC Output Model			2	10	
Output Power						See Table		
Output Current						See Table		
Maximum Capacitive Load	Tested at input voltage range and full load					See Table		
Ripple & Noise[1]	20MHz Bandwidth					See Table		
Temperature Coefficient	Full Load					±0.02		%/ºC
PROTECTION								
Short Circuit Protection						Continuous, Self-Recovery		
ENVIRONMENTAL SPECIFICATIONS								
Operating Temperature	Derating when operating temperature ≥85ºC				-40		105	ºC
Storage Temperature					-55		125	ºC
Case Temperature Rise	5VDC Input	Ta=25ºC	3.3VDC Output			25		ºC
			Others			15		
	12VDC, 15VDC, 24VDC Input	Ta=25ºC, nominal input, full load output				25		
Storage Humidity	Non-Condensing	5VDC Input			5		95	%RH
		12VDC, 15VDC, 24VDC Input					95	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from the case, 10 seconds						300	ºC
Cooling Method						Free Air Convection		
Vibration	12VDC, 15VDC, 24VDC Input Models					10-150Hz, 5G, 0.75mm, along X, Y, and Z		
MTBF	MIL-HDBK-217F@25ºC				3500			kHours

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
GENERAL SPECIFICATIONS						
Efficiency	@Full Load			See Table		
Switching Frequency	5VDC Input	100% Load, Nominal Input Voltage		270		kHz
	12VDC, 15VDC, 24VDC Input	Full Load, Nominal Input Voltage		260		
Isolation	Input-Output electric strength test for 1 minute with a leakage current of 1mA max.	5VDC Input	1500			VDC
			3000			
		12VDC, 15VDC, 24VDC Input	1500			
Insulation Resistance	Input-Output Resistance at 500VDC		1000			MΩ
Isolation Capacitance	Input-Output Capacitance at 100kHz/0.1V			20		pF
PHYSICAL SPECIFICATIONS						
Weight				0.046oz (1.3g)		
Dimensions (L x W x H)				0.46in x 0.24in x 0.4in (11.60mm x 6mm x 10.16mm)		
Case Material				Black Flame-Retardant and Heat-Resistance Plastic (UL94 V-0)		
SAFETY CHARACTERISTICS						
Safety[3]		All Models		UL62368-1, EN62368-1, BS EN62368-1		
		12VDC, 15VDC, 24VDC Input		IEC 62368-1		
Emissions		CE	CISPR32/EN55032	Class B[4]		
		RE	CISPR32/EN55032	Class B[4]		
Immunity	ESD	IEC/EN61000-4-2	Air ±8kV, Contact ±4KV	Perf. Criteria B		

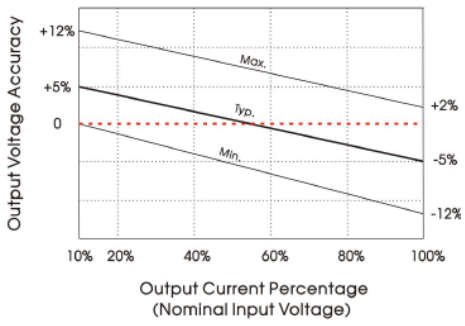
NOTES

1. Contact factory for reflected ripple current testing method.
2. Ripple and noise tested with “parallel cable” method.
3. This product is Listed to applicable standards and requirements by UL
4. See Design Reference: EMC Compliance Circuit for recommended circuit.
5. If product is not operated within required load range, the product’s performance cannot be guaranteed to comply with all parameters in data sheet.
6. Customization service is available, please contact factory.
7. Products classified according to ISO14001 and related environmental laws and regulations and should be handled by qualified units.

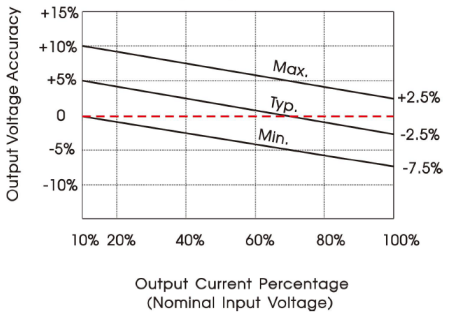
**Due to advances in technology, specifications subject to change without notice.*

OUTPUT REGULATION CURVES

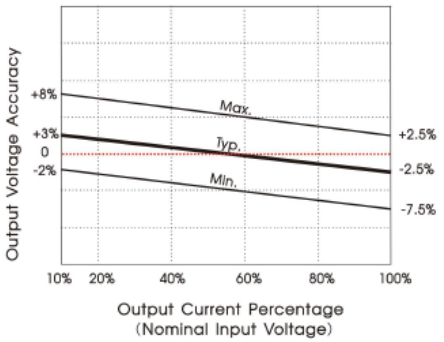
3.3VDC Output, All Inputs



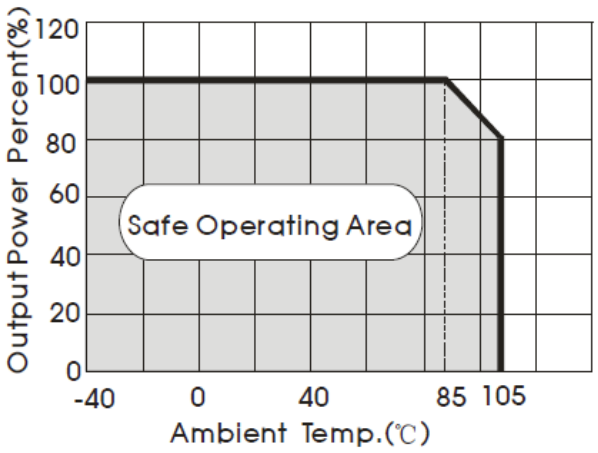
Other Outputs, 5VDC Input



Other Outputs, 12VDC, 15VDC, 24VDC Inputs

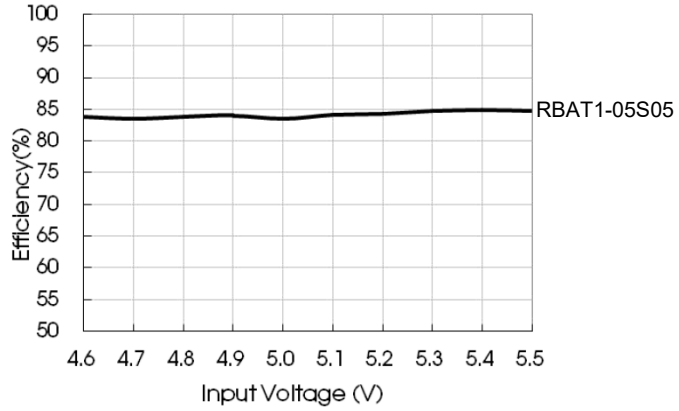


DERATING CURVES

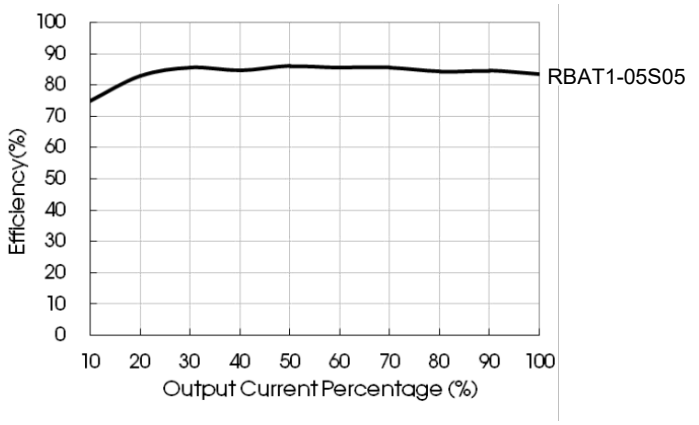


EFFICIENCY GRAPHS

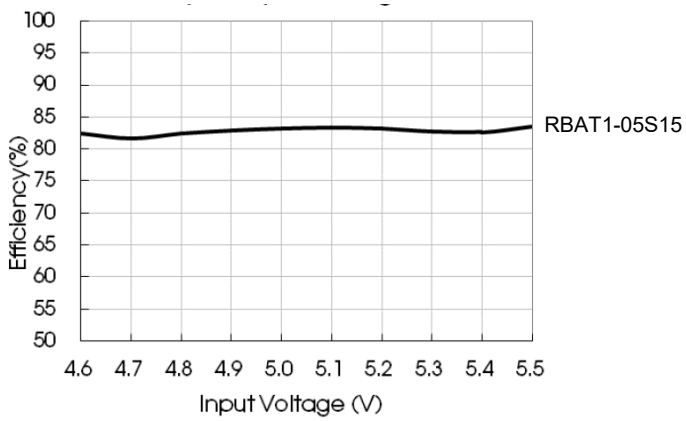
Efficiency vs. Input Voltage (Full Load)



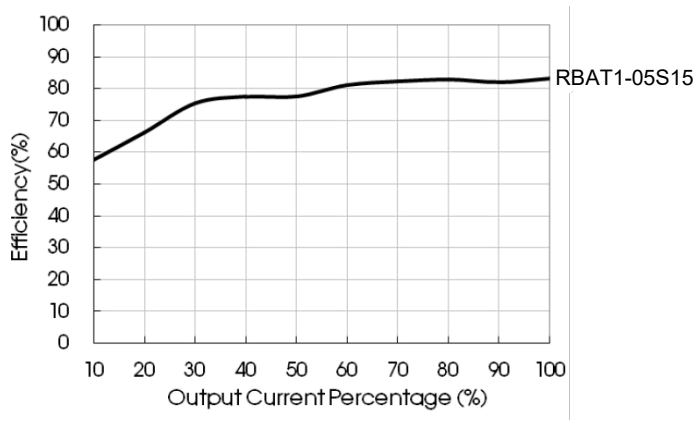
Efficiency vs. Output Load (Vin=5V)



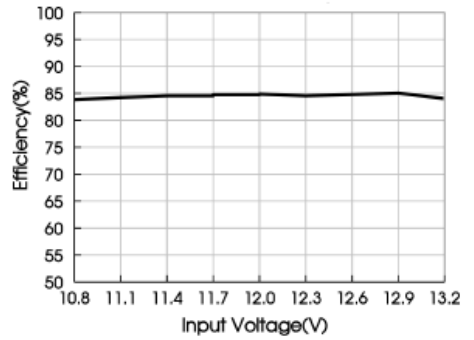
Efficiency vs. Input Voltage (Full Load)



Efficiency vs. Output Load (Vin=24V)

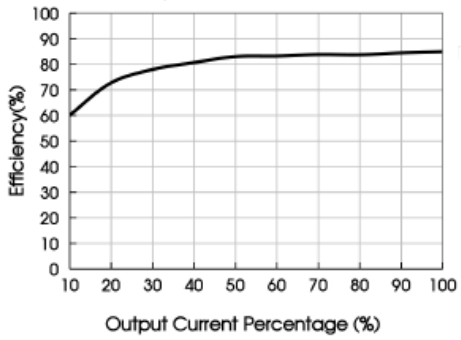


Efficiency vs. Input Voltage (Full Load)



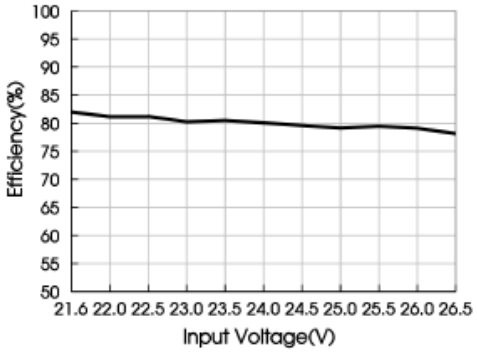
RBAT1-12S05

Efficiency vs. Output Load (Vin=12V)



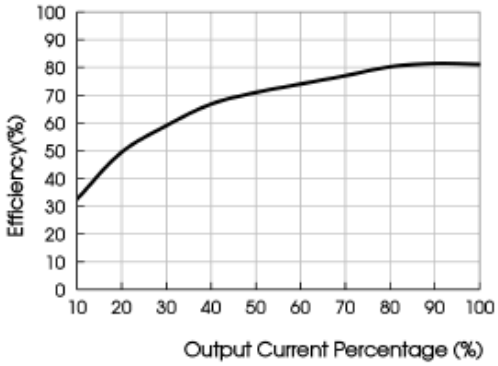
RBAT1-12S05

Efficiency vs. Input Voltage (Full Load)



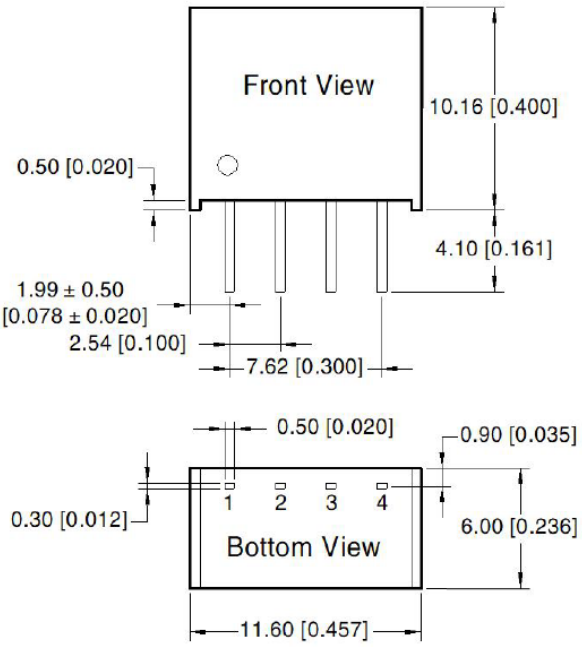
RBAT1-24S05

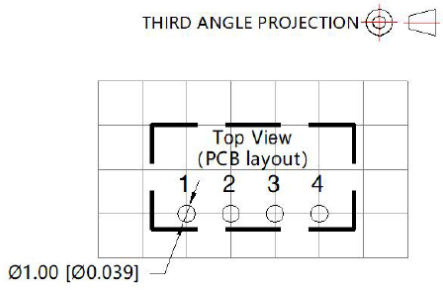
Efficiency vs. Output Load (Vin=24V)



RBAT1-24S05

MECHANICAL DRAWINGS





Note: Grid 2.54*2.54mm

Pin Out

Pin	Function
1	GND
2	Vin
3	0V
4	+Vo

Note:
Unit: mm [inch]
Pin Section Tolerances: ±0.10 [±0.004]
General Tolerances: ±0.25 [±0.010]

DESIGN REFERENCE

1. Typical Application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown below. Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. Recommended input and output capacitor values in table below.

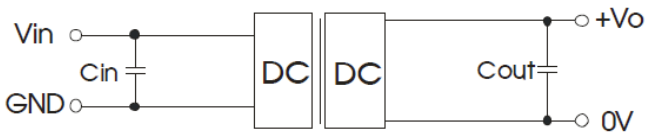


Fig. 1

Table 1: Recommended Input and Output Capacitor Values

Vin	Cin	Vo	Cout
5VDC	4.7µF/16V	3.3VDC/5VDC	10µF/16V
		9VDC/12VDC	2.2µF/25V
		15VDC/24VDC	1µF/50V
12VDC	2.2µF/25V	3.3VDC	10µF/16V
15VDC	2.2µF/25V	5VDC	10µF/16V
24VDC	1µF/50V	9VDC	2.2µF/16V
-	-	12VDC	2.2µF/25V
-	-	15VDC	1µF/25V
-	-	24VDC	1µF/50V

2. EMC Compliance Circuit

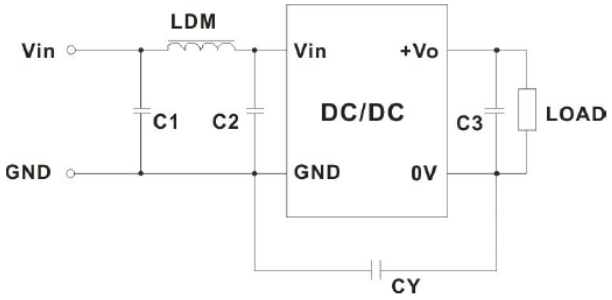


Fig. 2

Table 2: EMC Recommended Circuit Value Table

5Vin

Output Voltage		3.3/5/9VDC	12/15/24VDC
Emissions	C1/C2	4.7µF/25V	4.7µF/25V
	CY	-	1nF/4kVDC Contact factory for recommendations
	C3	Refer to Cout in Table 1	
	LDM	6.8µH	6.8µH

Note: In the case of actual use, the requirements for EMI are high. It is subject to CY.

12Vin, 15Vin, 24Vin

Emissions	C1/C2	4.7µF/50V
	C3	Refer to Cout in Fig. 1
	LDM	6.8µH
	CY	270pF/2kV

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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