

Through Hole Package



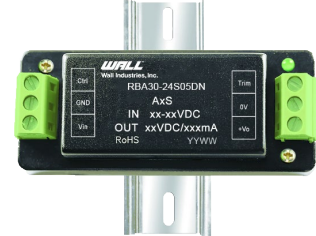
Size: 2 x 1 x 0.47in (50.80 x 25.4 x 11.80mm)

Chassis Mount



Size: 2.99 x 1.24 x 0.84in (76 x 31.5 x 21.2mm)

DIN Rail Mount



Size: 2.99 x 1.24 x 1.02in (76 x 31.5 x 25.8mm)

Through Hole with Heatsink Package



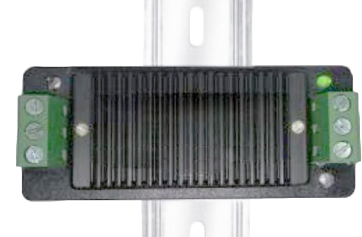
Size: 2 x 1 x 0.64in (50.80 x 25.4 x 16.3mm)

Chassis Mount with Heatsink



Size: 2.99 x 1.24 x 0.99in (76 x 31.5 x 25.1mm)

DIN Rail Mount with Heatsink



Size: 2.99 x 1.24 x 1.17in (76 x 31.5 x 29.7mm)

## OPTIONS

- Package Type
  - Through Hole
  - Chassis Mount
  - DIN Rail
- Heatsink

## FEATURES

- Ultra Wide 4:1 Input Voltage Range
- Isolated & Regulated Single & Dual Output
- High Efficiency
- Through Hole, Chassis Mount, or DIN Rail Package
- Optional Heatsink Available
- Isolation Voltage of 1500VDC
- Six-Sided Shielded Metal Packaging
- RoHS Compliant
- Input Under Voltage Protection
- Over Voltage, Over Current, and Short Circuit Protection
- Reverse Voltage Protection Available for Chassis Mount and DIN Rail Models
- Meets CISPR22/EN55022 Class A Without External Components
- IEC60950, UL60950, and EN60950 Safety Approvals

## APPLICATIONS

- Industrial Robotics

## DESCRIPTION

The RBA30 series of DC/DC converters offers up to 30 watts of output power in either a through hole package, chassis mounted package, or DIN rail mounted package. This series consists of single and dual output models with an ultra-wide 4:1 input voltage range. Features of this series include high efficiency, six-sided shielding, optional heatsink, and input under voltage protection as well as over voltage, over current, and short circuit protection. This series meets CISPR22/EN55022 Class A without external components, is RoHS compliant, and has IEC60950, UL60950, and EN60950 safety approvals. Please contact factory for ordering information.

## MODEL SELECTION TABLE

### Single Output Models

Model Number <sup>(1)</sup>	Input Voltage Range <sup>(2)</sup>	Output Voltage	Output Current		Efficiency <sup>(3)</sup>		Maximum Capacitive Load <sup>(4)</sup>	Ripple & Noise	Output Power	Certification
			Min Load	Max Load	Min.	Typ.				
RBA30-24S03	24VDC (9~36VDC)	3.3VDC	0mA	6000mA	83%	85%	10000µF	50mVp-p	30W	UL/CE/CB
RBA30-24S05		5VDC	0mA	6000mA	86%	88%	10000µF			
RBA30-24S09		9VDC	0mA	3333mA	86%	88%	4700µF			
RBA30-24S12		12VDC	0mA	2500mA	88%	90%	2700µF			
RBA30-24S15		15VDC	0mA	2000mA	88%	90%	1680µF			
RBA30-24S24		24VDC	0mA	1250mA	88%	90%	680µF			
RBA30-48S03	48VDC (18~75VDC)	3.3VDC	0mA	6000mA	84%	86%	10000µF	50mVp-p	30W	UL/CE/CB
RBA30-48S05		5VDC	0mA	6000mA	86%	88%	10000µF			
RBA30-48S12		12VDC	0mA	2500mA	86%	88%	2700µF			
RBA30-48S15		15VDC	0mA	2500mA	87%	89%	1680µF			
RBA30-48S24		24VDC	0mA	1250mA	87%	89%	680µF			

**MODEL SELECTION TABLE**
**Dual Output Models**

Model Number <sup>(1)</sup>	Input Voltage Range <sup>(2)</sup>	Output Voltage	Output Current		Efficiency <sup>(3)</sup>		Maximum Capacitive Load <sup>(4)</sup>	Ripple & Noise	Output Power	Certification
			Min Load	Max Load	Min.	Typ.				
RBA30-24D05	24VDC (9~36VDC)	±5VDC	0mA	±3000mA	84%	86%	2000µF	50mVp-p	30W	CE
RBA30-24D12		±12VDC	0mA	±1250mA	87%	89%	1250µF			
RBA30-24D15		±15VDC	0mA	±1000mA	87%	89%	680µF			
RBA30-24D24		±24VDC	0mA	±625mA	87%	89%	470µF			
RBA30-48D05	48VDC (18~75VDC)	±5VDC	0mA	±3000mA	84%	86%	2000µF	50mVp-p	30W	CE
RBA30-48D12		±12VDC	0mA	±1250mA	86%	88%	1250µF			
RBA30-48D15		±15VDC	0mA	±1000mA	86%	88%	680µF			

**SPECIFICATIONS**

All specifications are based on 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	24VDC Nominal Input			9	24	36	VDC
	48VDC Nominal Input			18	48	75	
Absolute Maximum Input <sup>(5)</sup>	24VDC Nominal Input					40	VDC
	48VDC Nomianl Input					80	
Full Load Input Current	24VDC Nominal Input	3.3VDC Output Models			970	993	mA
		5VDC Output Models			1420	1453	
		Other Models			1388	1488	
	48VDC Nominal Input	3.3VDC Output Models			474	485	
		5VDC Output Models			710	726	
		Other Models			702	744	
No Load Input Current	24VDC Nominal Input	3.3VDC Output Models			60	100	mA
		5VDC Output Models			60	100	
		Other Models			6	12	
	48VDC Nominal Input	3.3VDC Output Models			20	30	
		5VDC			20	35	
		Other Models			5	10	
Reflected Ripple Current	Nominal Input Voltage				40		mA
Input Surge Voltage (1sec. max.)	24VDC Nominal Input			-0.7		50	VDC
	48VDC Nominal Input			-0.7		100	
Starting Voltage	24VDC Nominal Input					9	VDC
	48VDC Nominal Input					18	
Shutdown Voltage	24VDC Nominal Input			5.5	6.5		VDC
	48VDC Nominal Input			12.0	15.5		
Input Filter				Pi Filter			
Ctrl <sup>(6)</sup>	Module Switch On, Ctrl suspended or connected to TTL high level			3.5		12	VDC
	Module Switch Off, Ctrl pin connected to GND or low level			0		1.2	VDC
	Input Current when Switched Off				5	8	mA
OUTPUT SPECIFICATIONS							
Output Voltage				See Table			
Voltage Accuracy	5%-100% Load				±1	±3	%
	0%-5% Load				±1	±5	
Line Regulation	Full Load, input voltage from low voltage to high voltage	Positive Output			±0.2	±0.5	%
		Negative Output			±0.5	±1	
Load Regulation <sup>(7)</sup>	5%-100% Load	Positive Output			±0.5	±1	%
		Negative Output			±0.5	±1.5	
Cross Regulation	Dual Output, Main Output 50% load Supplement output from 10% to 100% load					±5	%
Trim					±10		%Vo
Output Power				See Table			
Output Current				See Table			
Maximum Capacitive Load				See Table			
Ripple & Noise (20MHz bandwidth) <sup>(8)</sup>	Nominal Input Voltage, 100% Load	Single Outputs			50	100	mVp-p
		Dual Outputs			50	150	
Transient Recovery Time	25% load step change, nominal input voltage				300	500	µs
Transient Response Deviation	25% load step change, nominal input voltage	3.3VDC, 5VDC, & ±5VDC Outputs			±5	±8	%
		Others			±3	±5	
Starting Time	Nominal Input Voltage & Constant Resistance Load				10		ms
Temperature Coefficient	Full Load					±0.03	%/°C

## SPECIFICATIONS

All specifications are based on 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	
PROTECTION									
Short Circuit Protection		Input Voltage Range			Hiccup, Continuous, Self-Recovery				
Over Current Protection		Input Voltage Range			110		190	%Io	
Over Voltage Protection		Input Voltage Range			110		160	%Vo	
ENVIRONMENTAL SPECIFICATIONS									
Operating Temperature					-40		+80	°C	
Storage Temperature					-55		+125	°C	
Storage Humidity		Non-Condensing			5		95	%RH	
Pin Welding Resistance Temperature		Welding spot is 1.5mm away from the casing, 10 seconds					+300	°C	
Vibration					10-55Hz, 10G, 30 Min. along X, Y, and Z				
MTBF (MIL-HDBK-217F)		25°C, Full Load (Ground, Benign, Controlled Environment)			1000			kHours	
GENERAL SPECIFICATIONS									
Efficiency		@Full Load			See Table				
Switching Frequency <sup>(9)</sup>		PWM mode				300		KHz	
Insulation Voltage		Input-Output, with test time of 1 minute & leak current <1mA			1500			VDC	
Insulation Resistance		Input-Output, Insulation voltage 500VDC/60sec., Ta=25°C, humidity=75%RH			1000			MΩ	
Isolation Capacitance		Input-Output, 100KHz/0.1V				2000		pF	
PHYSICAL SPECIFICATIONS									
Weight		Without Heatsink		Through Hole Package		0.92oz (26g)			
				Chassis Mount		1.69oz (48g)			
				DIN Rail Mount		2.40oz (68g)			
		With Heatsink		Through Hole Package		1.20oz (34g)			
				Chassis Mount		1.98oz (56g)			
				DIN Rail Mount		2.68oz (76g)			
Dimensions (L x W x H)		Without Heatsink		Through Hole Package		2in x 1in x 0.47in (50.80mm x 25.4mm x 11.80mm)			
				Chassis Mount		2.99in x 1.24in x 0.84in (76mm x 31.5mm x 21.2mm)			
				DIN Rail Mount		2.99in x 1.24in x 1.02in (76mm x 31.5mm x 25.8mm)			
		With Heatsink		Through Hole Package		2in x 1in x 0.64in (50.80mm x 25.4mm x 16.3mm)			
				Chassis Mount		2.99in x 1.24in x 0.99in (76mm x 31.5mm x 25.1mm)			
				DIN Rail Mount		2.99in x 1.24in x 1.17in (76mm x 31.5mm x 29.7mm)			
Cooling Method					Free Air Convection				
Shielding					Six-Sided				
SAFETY CHARACTERISTICS									
Safety Approvals		IEC60950, UL60950 <sup>(12)</sup> , & EN60950							
EMI		CE		Single Output		Class A (Bare Component)/Class B <sup>(10)</sup>			
				Dual Output		Class A (Bare Component)/Class B <sup>(10)</sup>			
		RE		Single Output		Class A (Bare Component)/Class B <sup>(10)</sup>			
				Dual Output		Class A (Bare Component)/Class B <sup>(10)</sup>			
EMS		ESD	IEC/EN61000-4-2	Contact ±4kV		Perf. Criteria B			
		RS	IEC/EN61000-4-3	10V/m		Perf. Criteria A			
		EFT	IEC/EN61000-4-4	Single Output		±2kV <sup>(10)</sup>			Perf. Criteria B
				Dual Output		±2kV <sup>(10)</sup>			Perf. Criteria B
		Surge	IEC/EN61000-4-5	Single Output		Line to Line ±2kV <sup>(10)</sup>			Perf. Criteria B
				Dual Output		Line to Line ±2kV <sup>(10)</sup>			Perf. Criteria B
		CS	IEC/EN61000-4-6	Single Output		3Vr.m.s			Perf. Criteria A
				Dual Output		10Vr.m.s			Perf. Criteria A

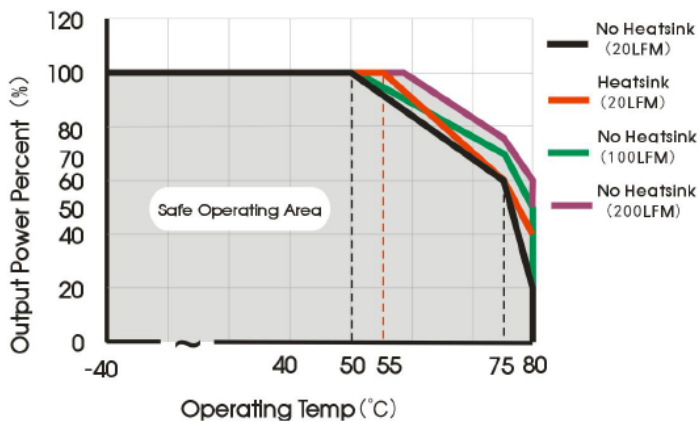
## NOTES

1. Chassis Mount, DIN Rail Mount, and Heatsink are available options for this series. To indicate chassis mount, add "C" to model number. To indicate DIN Rail Mount, add "DN" to model number. To indicate Heatsink, add "H" to model number.
2. Due to input reverse polarity protection function, chassis mount & DIN rail mount models minimum value input voltage range and starting voltage is higher than 1VDC DIP package.
3. Efficiency is measured in nominal input voltage and rated output load. Due to input reverse polarity protection, minimum efficiency of chassis mount and DIN rail mount models greater than min. -2 is qualified.
4. The capacitive loads of positive and negative outputs are identical. Maximum capacitive load offered were tested at input voltage range and full load.
5. This is the absolute maximum rating the converter can operate at without damage, but it isn't recommended.
6. The voltage of Ctrl pin is relative to input pin GND.
7. When testing from 0%-100% load working conditions, load regulation index of  $\pm 5\%$ .
8. Ripple & Noise are measured by "parallel cable" method. See application notes for specific operation.
9. This series of products using reduced frequency technology, the switching frequency is test value of full load. When the load is reduced to below 50%, the switching frequency decreases with decreasing load.
10. See EMC solution-recommended circuit for recommended circuit.
11. Customization is available.
12. This product is Listed to applicable standards and requirements by UL.

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

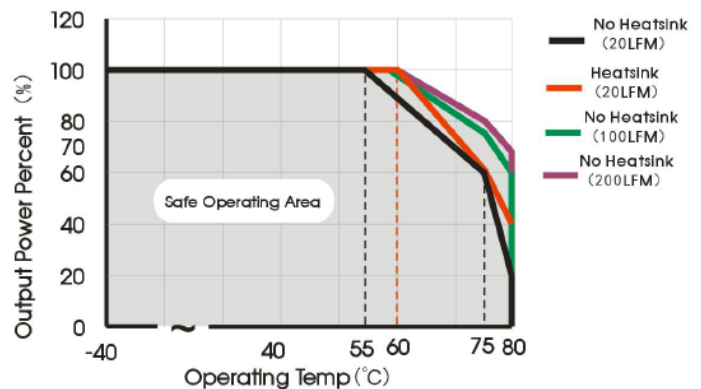
## DERATING CURVES

Temperature Derating Curve (Single Output Models)



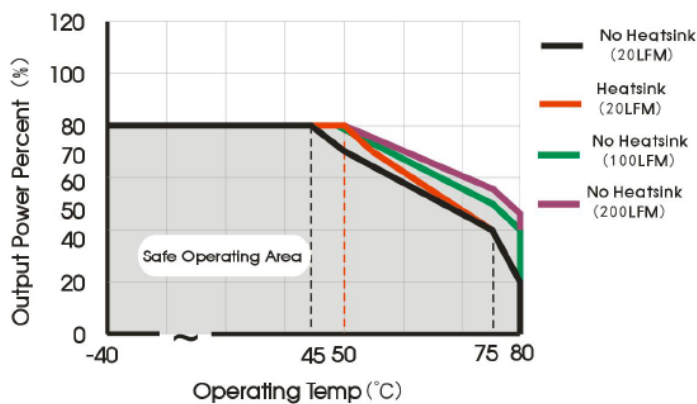
Models: RBA30-24S03(H), RBA30-24S05(H), RBA48S03(H), RBA30-48S05(H)

Temperature Derating Curve (Single Output Models)



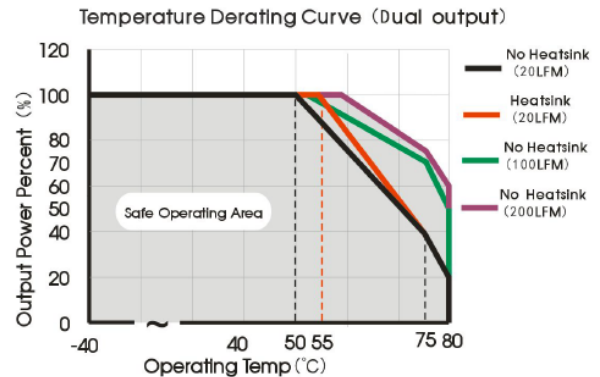
Models: RBA30-24S09(H), RBA30-24S12(H), RBA30-24S15(H), RBA30-48S12(H), RBA30-48S15(H), RBA30-48S24(H)

Temperature Derating Curve (Dual Output Models)



Models: RBA30-24D05(H) (9~18VDC Input), RBA30-24D24(H) (9~18VDC Input), RBA30-48D05(H) (18~36VDC Input)

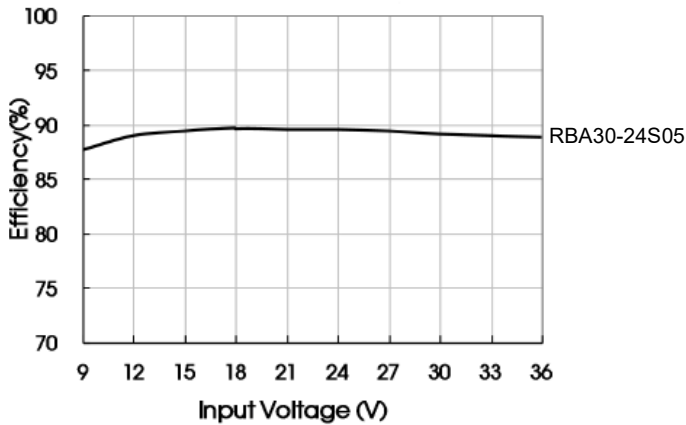
Temperature Derating Curve (Dual Output Models)



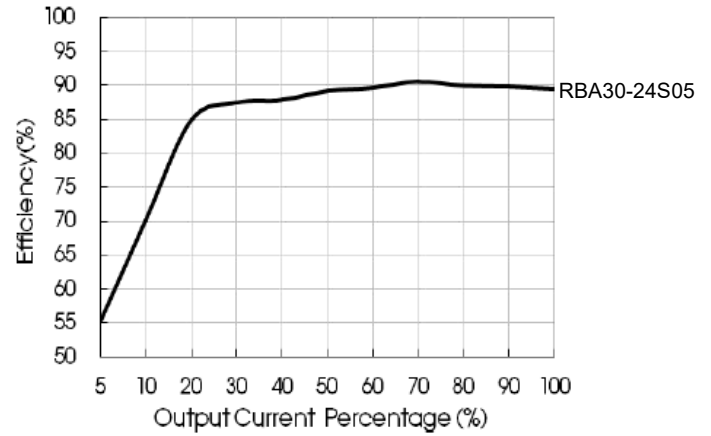
Models: RBA30-24D05(H) (18~36VDC Input Voltage), RBA30-24D24(H) (18~36VDC Input Voltage), RBA30-48D05 (36~75VDC Input Voltage), RBA30-24D12(H), RBA30-24D15(H), RBA30-48D12(H), RBA30-48D15(H)

EFFICIENCY GRAPHS

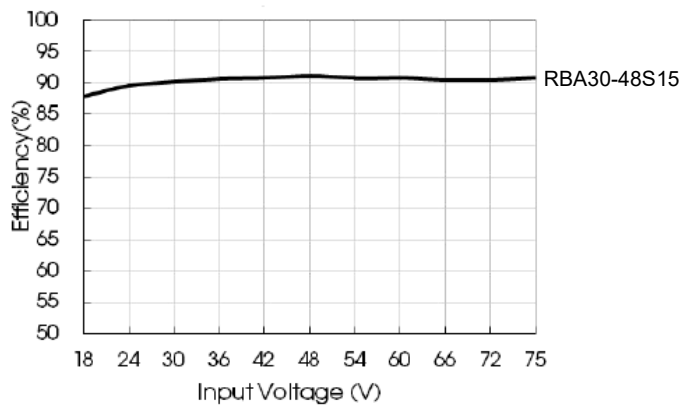
Efficiency vs. Input (Full Load)



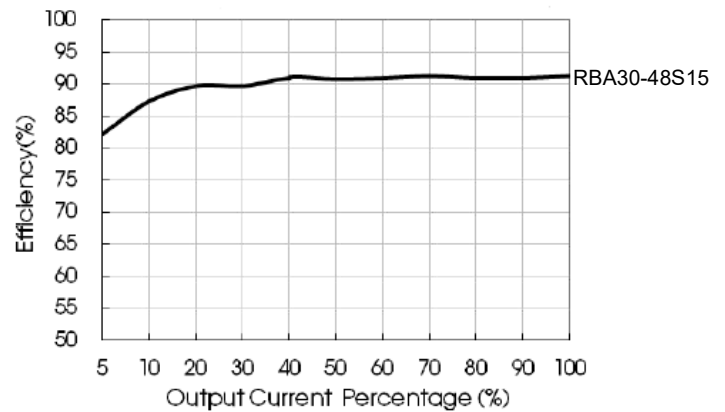
Efficiency vs. Output Load (24Vin)



Efficiency vs. Input (Full Load)

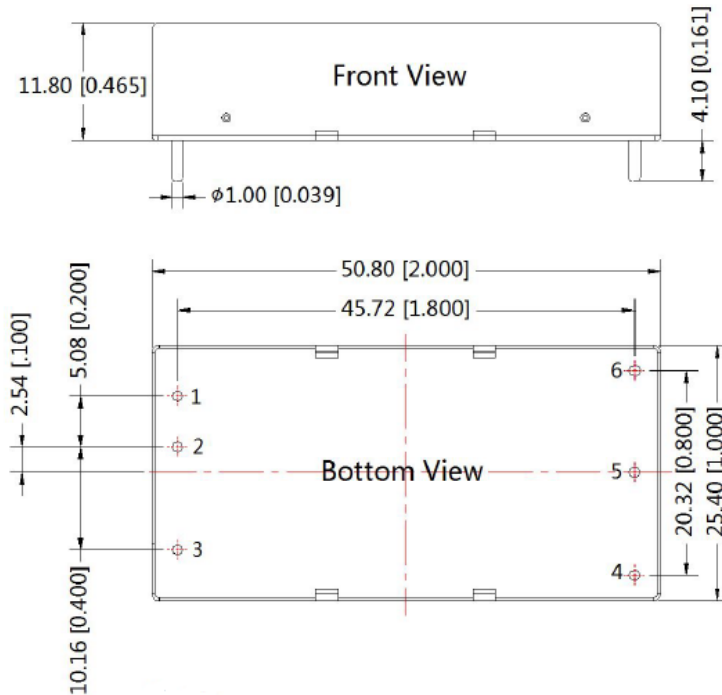


Efficiency vs. Output Load (48Vin)

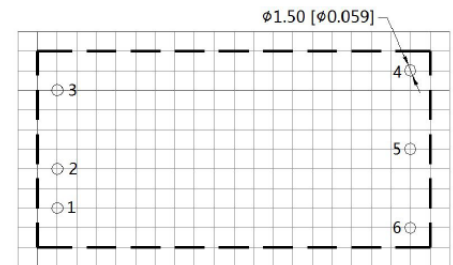


MECHANICAL DRAWINGS

Through Hole Package



THIRD ANGLE PROJECTION

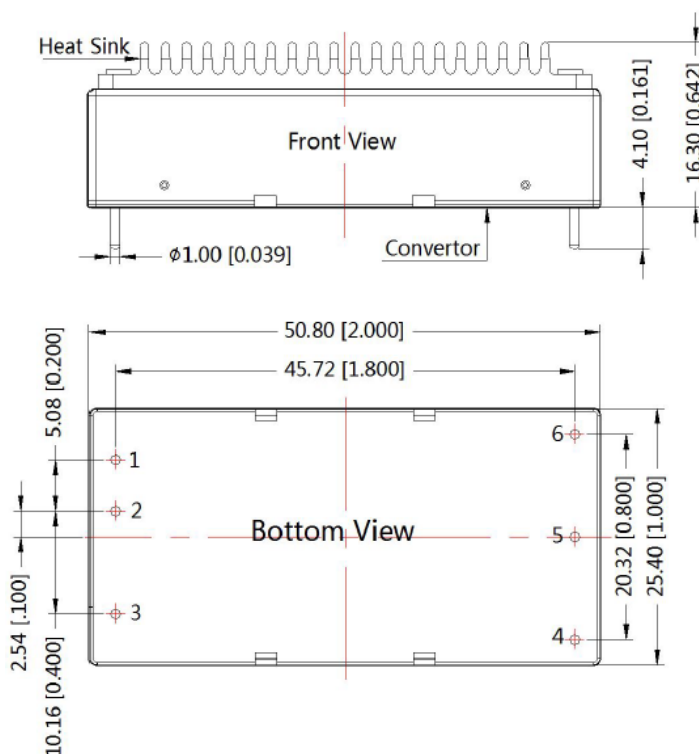


Note: Grid 2.54\*2.54mm  
Pin Out

Pin	Single	Dual
1	Vin	Vin
2	GND	GND
3	Ctrl	Ctrl
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo

Note:  
Unit: mm[inch]  
Pin diameter tolerances:  $\pm 0.10$  [ $\pm 0.004$ ]  
General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]

Through Hole Package with Heatsink ("H" Suffix)



THIRD ANGLE PROJECTION

Pin Out

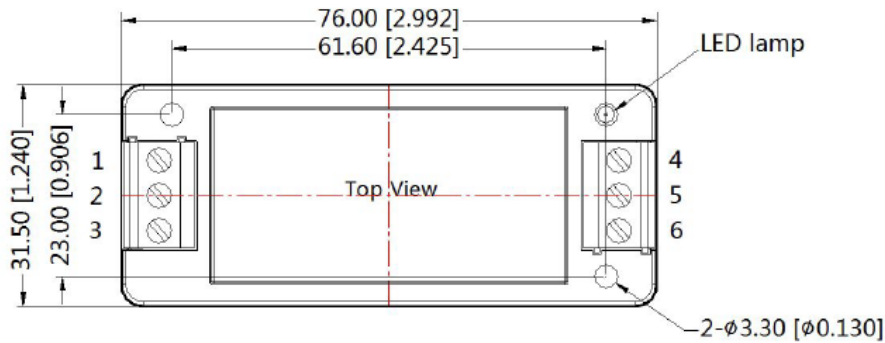
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
3	Ctrl	Ctrl
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo

Note:  
Unit: mm[inch]  
General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]  
If heatsinks are being used, make sure there is enough space for a special size in above graph



Chassis Mount ("C" Suffix)

THIRD ANGLE PROJECTION

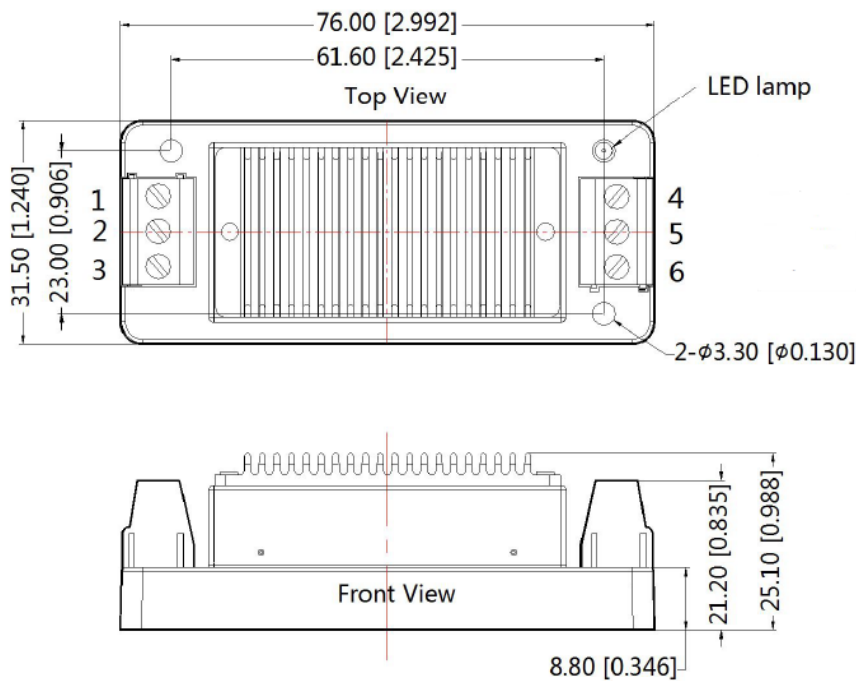


Pin Out		
Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo

Note:  
Unit: mm[inch]  
Wire range: 24-12AWG  
Tightening torque: Max 0.4 N·m  
General tolerances:  $\pm 0.50$

Chassis Mount with Heatsink ("CH" Suffix)

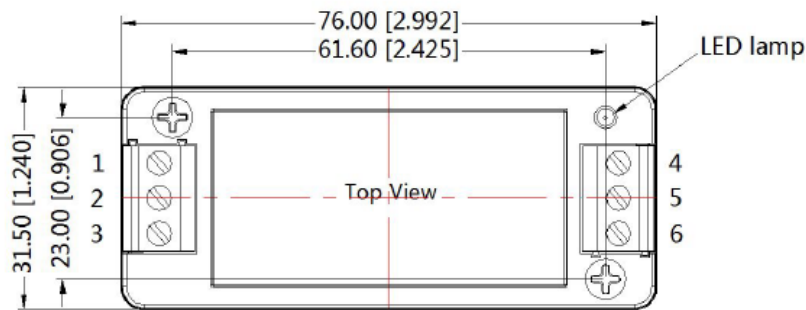
THIRD ANGLE PROJECTION



Pin Out		
Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo

Note:  
Unit: mm[inch]  
Wire range: 24-12AWG  
Tightening Torque: Max 0.4N·m  
General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]

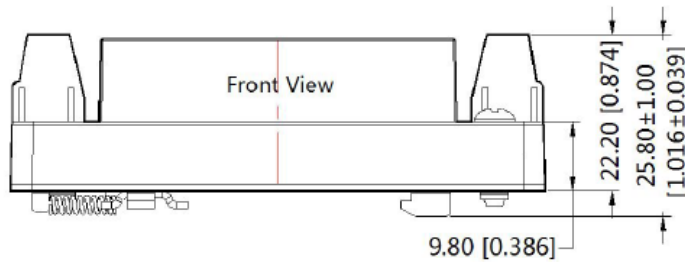
DIN Rail Mount ("DN" Suffix)



THIRD ANGLE PROJECTION

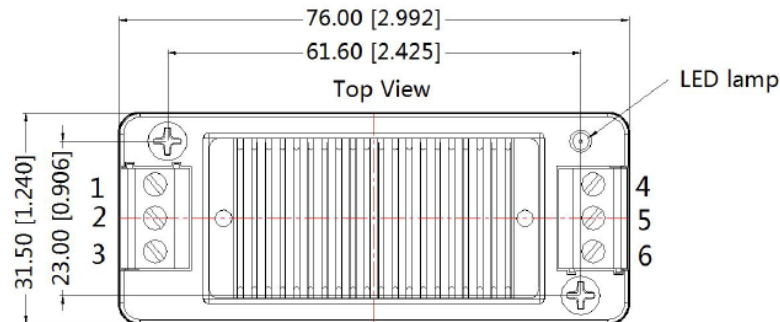
Pin-Out

Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo



Note:  
Unit: mm[inch]  
Wire range: 24-12AWG  
Tightening torque: Max 0.4N·m  
General tolerances: ±0.50[±0.020]

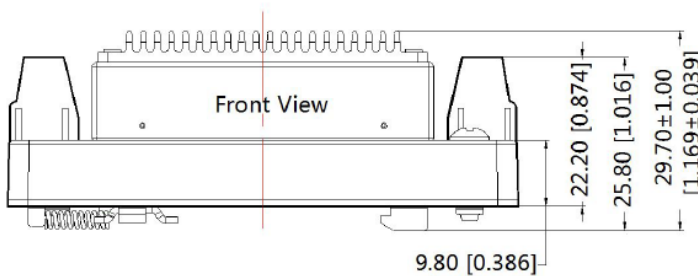
DIN Rail Mount with Heatsink ("DNH" Suffix)



THIRD ANGLE PROJECTION

Pin Out

Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo



Note:  
Unit: mm[inch]  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
General tolerances: ±0.50 [±0.020]

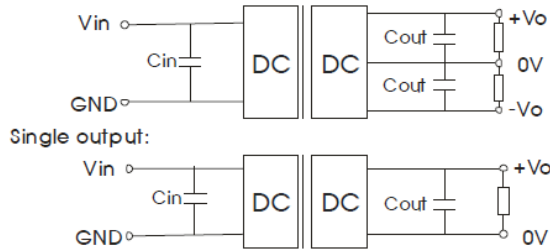


## DESIGN REFERENCE

### 1. Typical Application

All the DC/DC converters of this series are tested below according to the recommended circuit below. If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

Dual output:



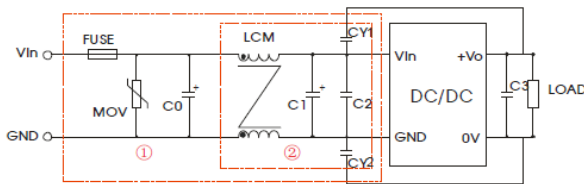
Single output:



Single Output Voltage (VDC)	Cout (μF)	Cin (μF)	Dual Output Voltage (VDC)	Cout (μF)	Cin (μF)
3.3/5/9	220	100	±5/±12/±15	220	100
12/15/24	100		±24	100	

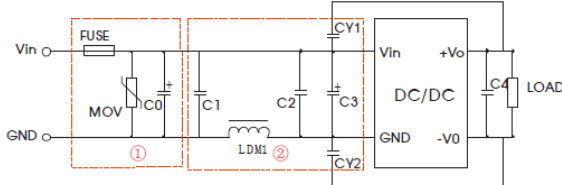
### 2. EMC Solution-Recommended Circuit

Single output:



Note: Part ① in the figure above is used for EMS test and part ② for EMI filtering; selected based on needs.

Dual output:



Notes: Part ① in the figure above is used for EMS test and part ② for EMI filtering; selected based on needs.

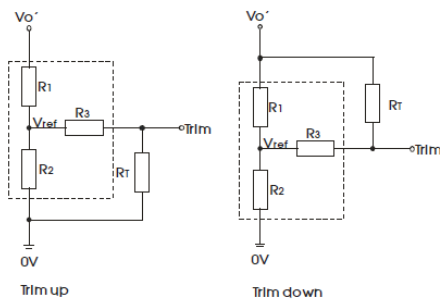
Parameter Description

Model	24Vin	48Vin
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680μF/50V	330μF/100V
C1	330μF/50V	330μF/100V
C2	4.7μF/50V	2.2μF/100V
C3	Refer to Cout in Typical Application Figure	
LCM	1mH, contact factory for recommendation	
CY1, CY2	1nF/2KV	

Parameter Description

Model	24Vin	48Vin
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680μF/50V	330μF/100V
C1	2.2μF/50V	2.2μF/100V
C2	2.2μF/50V	2.2μF/100V
C3	330μF/50V	330μF/100V
C4	Refer to Cout in Typical Application Figure	
LDMI	3.3μH	
CY1, CY2	2.2nF/400VAC Safety Y Capacitor	

### 3. Application of Trim and Calculation of Trim Resistance



Applied circuit of Trim (part in broken line is the interior of models)

Calculation formula of Trim resistance:

$$\begin{aligned} \text{up: } R_T &= \frac{aR_2}{R_2-a} - R_3 & a &= \frac{V_{ref}}{V_o - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{aR_1}{R_1-a} - R_3 & a &= \frac{V_o - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

$R_T$  is Trim resistance,  $a$  is a self-defined parameter, with no real meaning.  
 $V_o'$  for the actual needs of the up or down regulated voltage

Vout (VDC)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Vref (V)
3.3	4.801	2.87	12.4	1.24
5	2.883	2.87	10	2.5
9	7.500	2.87	15	2.5
12	11.000	2.87	15	2.5
15	14.494	2.87	15	2.5
24	24.872	2.87	17.8	2.5

### 4. Models cannot be connected in parallel to increase power.

## MODEL NUMBER SETUP

RBA	30	-	12	S	12	C	H
Series Name	Output Power		Input Voltage	Output Quantity	Output Voltage	Package	Heatsink
			<b>24:</b> 24VDC <b>48:</b> 48VDC	<b>S:</b> Single       <b>D:</b> Dual	<b>3.3:</b> 3.3VDC <b>5:</b> 5VDC <b>9:</b> 9VDC <b>12:</b> 12VDC <b>15:</b> 15VDC <b>24:</b> 24VDC  <b>5:</b> ±5VDC <b>12:</b> ±12VDC <b>15:</b> ±15VDC <b>24:</b> ±24VDC	<b>Blank:</b> Through Hole <b>C:</b> Chassis Mount <b>DN:</b> DIN Rail Mount	<b>Blank:</b> No Heatsink <b>H:</b> Heatsink

## 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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