

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



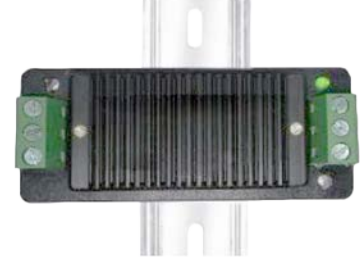
Size: 2 x 1 x 0.64in (50.80 x 25.4 x 16.3mm)

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	
<b>INPUT SPECIFICATIONS</b>						
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 Nominal 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	
<b>OUTPUT SPECIFICATIONS</b>						
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	

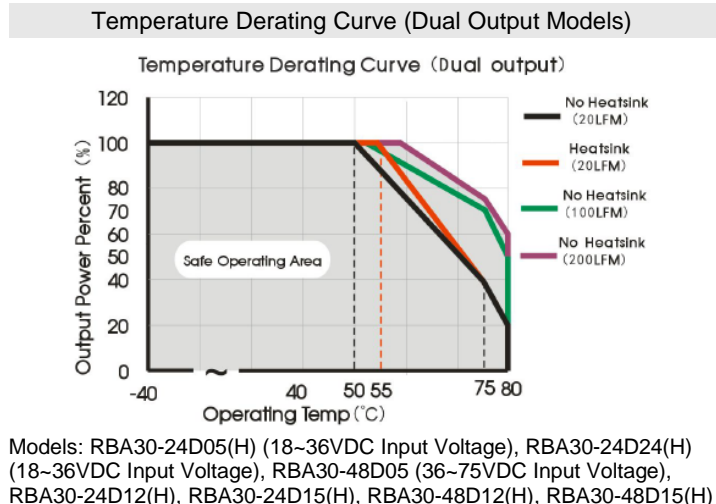
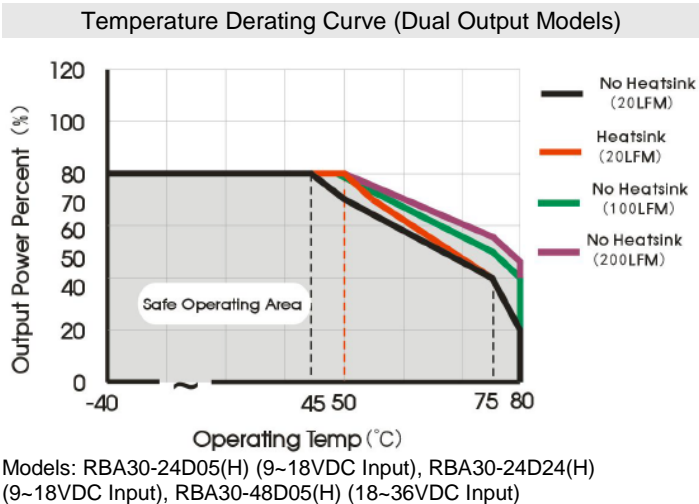
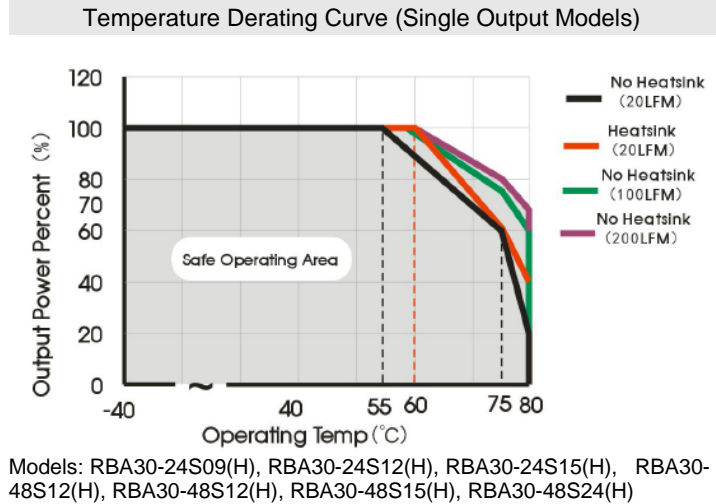
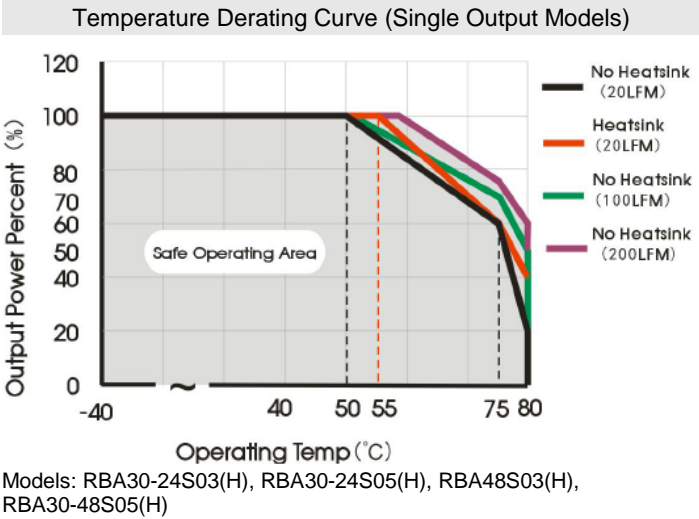
SPECIFICATIONS							
All specifications are based on 25°C, humidity <75%RH, Nominal Input Voltage, and Rated Output Load unless otherwise noted. We reserve the right to change specifications based on technological advances.							
SPECIFICATION	TEST CONDITIONS			Min	Typ	Max	Unit
<b>PROTECTION</b>							
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
<b>ENVIRONMENTAL SPECIFICATIONS</b>							
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
<b>GENERAL SPECIFICATIONS</b>							
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
<b>PHYSICAL SPECIFICATIONS</b>							
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			
<b>SAFETY CHARACTERISTICS</b>							
Safety Approvals	IEC60950, UL60950, & EN60950						
EMI	CE	Single Output		CISPR22/EN55022		Class A (Bare Component)/Class B <sup>(10)</sup>	
		Dual Output		CISPR22/EN55022		Class A (Bare Component)/Class B <sup>(10)</sup>	
	RE	Single Output		CISPR22/EN55022		Class A (Bare Component)/Class B <sup>(10)</sup>	
		Dual Output		CISPR22/EN55022		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.

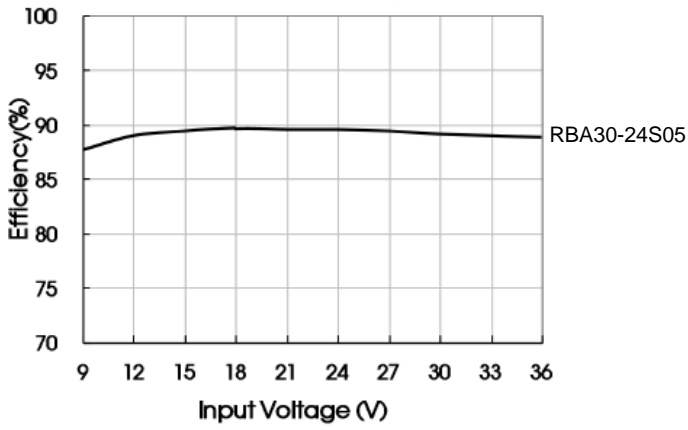
*\*Due to advances in technology, specifications subject to change without notice.*

**DERATING CURVES**

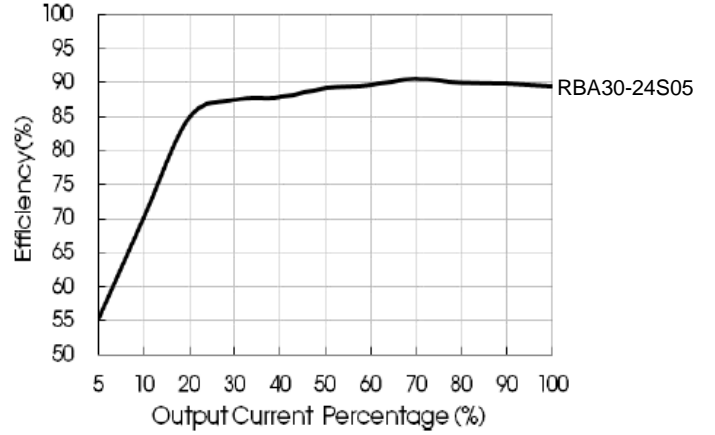


EFFICIENCY GRAPHS

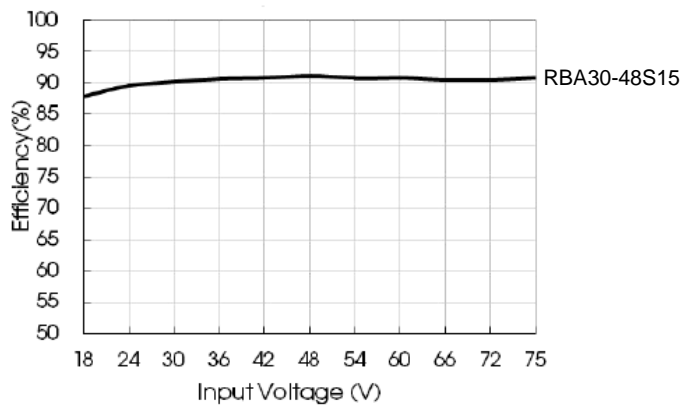
Efficiency vs. Input (Full Load)



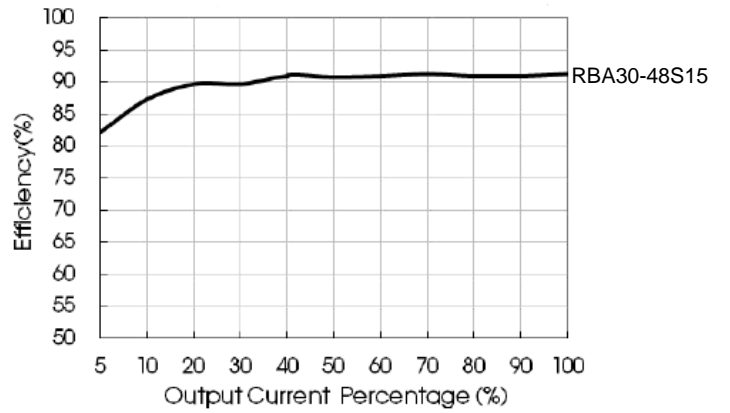
Efficiency vs. Output Load (24Vin)



Efficiency vs. Input (Full Load)

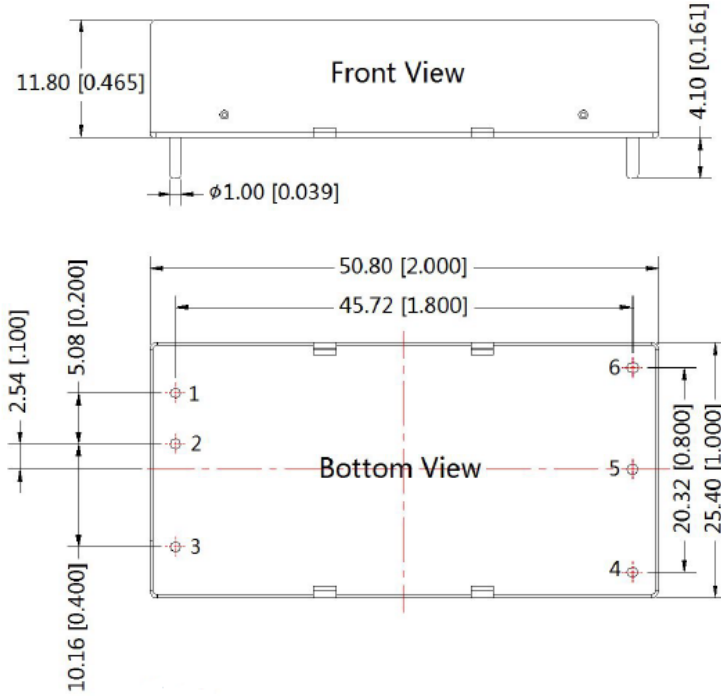


Efficiency vs. Output Load (48Vin)

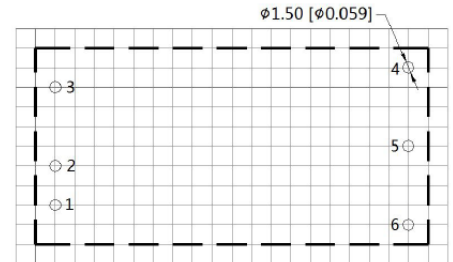


MECHANICAL DRAWINGS

Through Hole Package



THIRD ANGLE PROJECTION

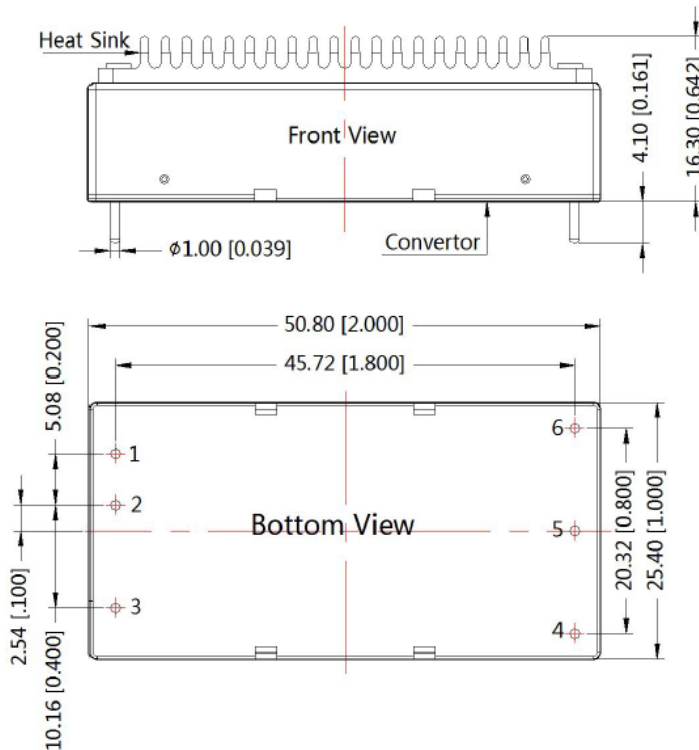


Note: Grid 2.54\*2.54mm  
Pin Out

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

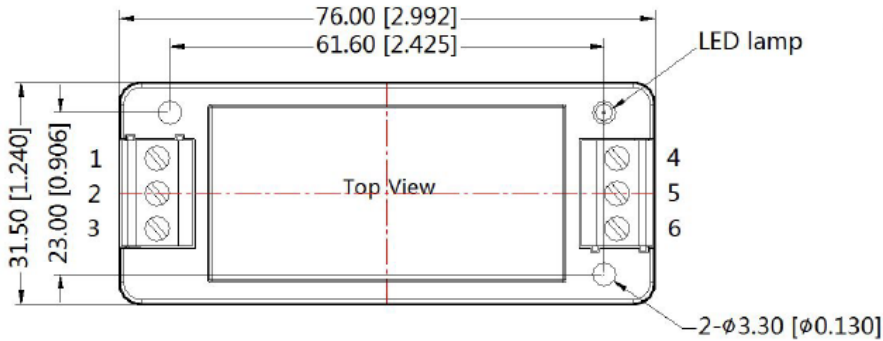
Pin Out

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 

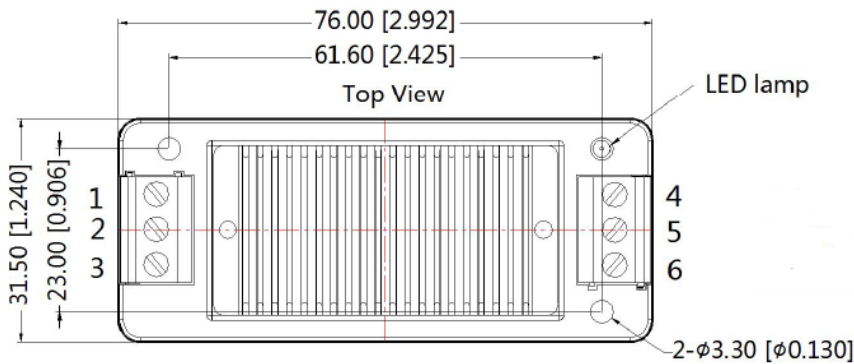


Pin Out		
Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo

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

Chassis Mount with Heatsink ("CH" Suffix)

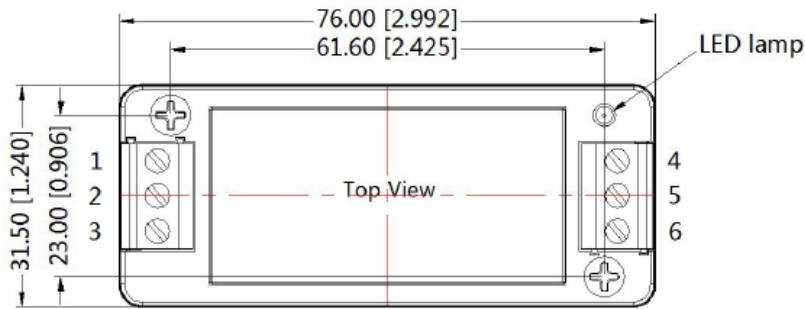
THIRD ANGLE PROJECTION 



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: ±0.50 [±0.020]

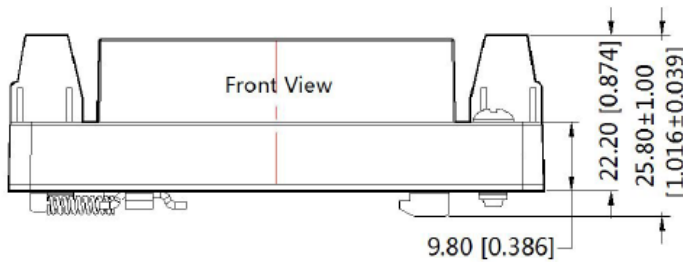
DIN Rail Mount ("DN" Suffix)



THIRD ANGLE PROJECTION

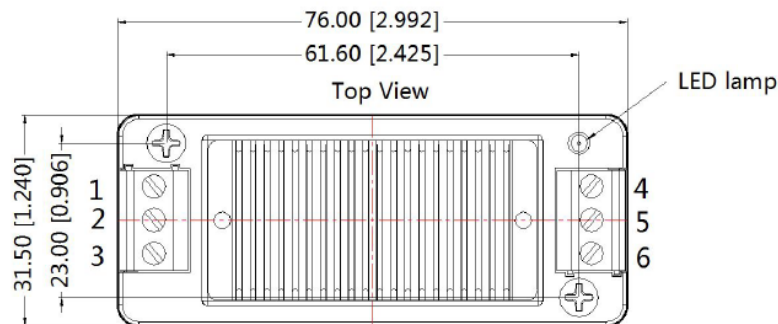
Pin-Out

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]

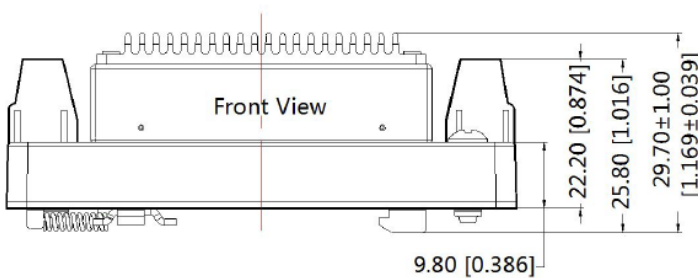
DIN Rail Mount with Heatsink ("DNH" Suffix)



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



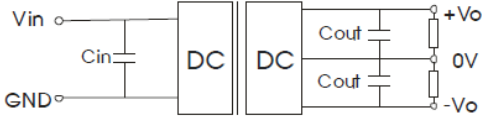
Note:  
Unit: mm[inch]  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
General tolerances: ±0.50 [±0.020]

**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:



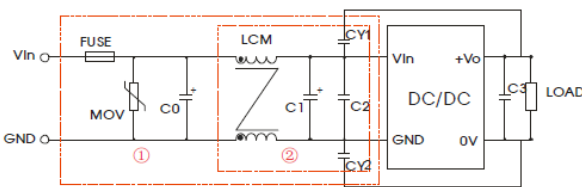
Single output:



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:

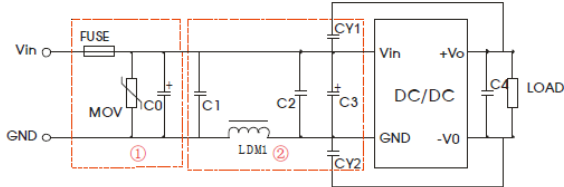


Note: Part ① in the figure above is used for EMS test and part ② for EMI filtering; selected based on needs.

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	

Dual output:

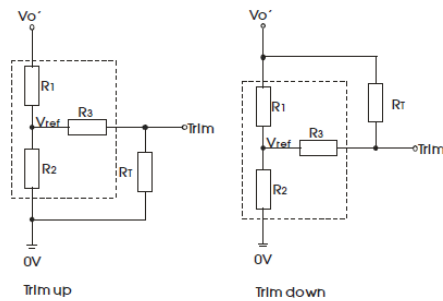


Notes: Part ① in the figure above is used for EMS test and part ② for EMI filtering; selected based on needs.

Parameter Description

Model	24Vin	48Vin
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680μF/50V	330μF/100V
C1	2.2μF/50V	2.2μV/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:

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

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

RT is Trim resistance, a is a self-defined parameter, with no real meaning. Vo' 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.**

