

BC30 SERIES

30 Watts

KEY FEATURES

- Wide Input Voltage range (4:1)
- Efficiency up to 91%(typ.)
- Output Fast Start Up
- Continuous Short Circuit Protection, Auto-recovery
- Input Under Voltage Protection, Output Over Voltage, Short Circuit & Over Current Protections
- Various package options are available:
With Heatsink / Screw Terminal / DIN Rail Mounting Options
- Isolation Voltage 1500VDC
- Operating Temperature: -40°C~+105°C
- Good EMC Performance
- International Standard Pin-Out



ELECTRICAL SPECIFICATIONS

All specifications valid at normal input voltage, full load and +25°C after warm-up time unless otherwise stated

Model No.		BC30-24F-3.3S	BC30-24F-5S	BC30-24F-12S	BC30-24F-15S	BC30-24F-24S
Input Voltage (V.DC.)		24V (9-36V)	24V (9-36V)	24V (9-36V)	24V (9-36V)	24V (9-36V)
Output Voltage (V.DC.)		3.3	5	12	15	24
Current (mA)	Max.	6000	6000	2500	2000	1250
Efficiency (%)	Min.	85	86	89	89	88
	Typ.	87	88	90	90	90
Capacitor Load (μF)	Max.	10000	10000	2000	1500	750

Model No.		BC30-48F-3.3S	BC30-48F-5S	BC30-48F-12S	BC30-48F-15S	BC30-48F-24S
Input Voltage (V.DC.)		48V (18-75V)	48V (18-75V)	48V (18-75V)	48V (18-75V)	48V (18-75V)
Output Voltage (V.DC.)		5	5	12	15	24
Current (mA)	Max.	6000	6000	2500	2000	1250
Efficiency (%)	Min.	85	87	89	89	88
	Typ.	87	88	91	91	90
Capacitor Load (μF)	Max.	10000	10000	2000	1500	750

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ELECTRICAL SPECIFICATIONS

All specifications valid at normal input voltage, full load and +25°C after warm-up time unless otherwise stated

Model No.		BC30-24F-3.3S	BC30-24F-5S	BC30-24F-12S	BC30-24F-15S	BC30-24F-24S
		BC30-48F-3.3S	BC30-48F-5S	BC30-48F-12S	BC30-48F-15S	BC30-48F-24S
Max Output Wattage		30W				
Input	Stand-by Power Consumption (Typ.)	24VDC Output: 0.08W / 48VDC Output: 0.2W / others Output: 1W				
	Voltage	BC30-24F-xS: 24VDC (9-36VDC)				
		BC30-48F-xS: 48VDC (18-75VDC)				
	Input Under Voltage Protection	24VDC Normal Input: Min: 5VDC / Typ: 7VDC / Max: 9VDC				
		48VDC Normal Input: Min: 11VDC / Typ: 13VDC / Max: 18VDC				
	Filter	π type				
Output	Voltage	5VDC	12VDC	15VDC	24VDC	
	Voltage Accuracy (Max.)	$\pm 3\%$				
	Current (Max.)	6000mA	2500mA	2000mA	1250mA	
	Line Regulation (LL-HL) (Typ.)	$\pm 0.5\%$				
	Load Regulation (10-100%) (Max.)	$\pm 1\%$				
	Capacitor Load	10000 μ F	2000 μ F	1500 μ F	750 μ F	
	Ripple & Noise (0-100%) (Max.)	100mVp-p				
	Switching Frequency (Typ.)	280KHz				
	Voltage Adjustable (TRIM) (%Vo)	Min.: 90 / Max.: 110				
	Overshoot (%Vo)	Max.: 10				
Protection	Over Power Protection (%Io)	Min.: 110 / Typ.: 140 / Max.: 260				
	Over Voltage Protection (%Vo)	Min.: 120 / Typ.: 140 / Max.: 200				
	Short Circuit Protection	Hiccup, continuous, Auto-recovery				
Isolation	Voltage	1500VDC (I/P-O/P, Test 1min, Leakage Current<1mA)				
	Capacitance	1000pF (I/P-O/P, 100KHz/0.1V)				
Environment	Operating Temperature	-40°C...+105°C (with derating)				
	Storage Temperature	-55°C...+125°C				
	Max Case Temperature	+105°C				
	Relative Humidity	Min.: 5% RH / Max.: 95% RH				
	MTBF (Min.)	1000K Hrs @ 25°C (MIL-HDBK-217F)				

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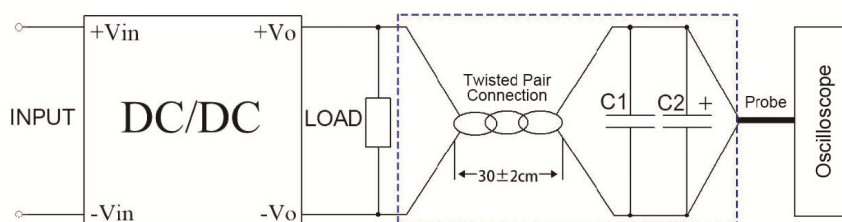
ELECTRICAL SPECIFICATIONS

All specifications valid at normal input voltage, full load and +25°C after warm-up time unless otherwise stated

Model No.				BC30-24F-3.3S	BC30-24F-5S	BC30-24F-12S	BC30-24F-15S	BC30-24F-24S
				BC30-48F-3.3S	BC30-48F-5S	BC30-48F-12S	BC30-48F-15S	BC30-48F-24S
Physical	Dimensions (L x W x H) Tolerance ±0.5 mm	Standard	BC30-xF-xS: 1.0 x 1.0 x 0.492 Inches / 25.4 x 25.4 x 12.5 mm					
		for Option	BC30-xF-xS-X: 1.0 x 1.0 x 0.708 Inches / 25.4 x 25.4 x 18.0 mm					
		for Option	BC30-xF-xS-A2: 2.99 x 1.24 x 0.838 Inches / 76.0 x 31.5 x 21.3 mm					
		for Option	BC30-xF-xS-XA2: 2.99 x 1.24 x 1.023 Inches / 76.0 x 31.5 x 26.0 mm					
		for Option	BC30-xF-xS-A2D: 2.99 x 1.24 x 1.023 Inches / 76.0 x 31.5 x 26.0 mm					
		for Option	BC30-xF-xS-XA2D: 2.99 x 1.24 x 1.212 Inches / 76.0 x 31.5 x 30.8 mm					
	Case Material		Aluminum					
	Weight (Typ.)	Standard	BC30-xF-xS: 18 g					
		for Option	BC30-xF-xS-X: 21 g					
		for Option	BC30-xF-xS-A2: 39 g					
		for Option	BC30-xF-xS-XA2: 42 g					
		for Option	BC30-xF-xS-A2D: 59 g					
		for Option	BC30-xF-xS-XA2D: 62 g					
	Cooling Method		Natural Air Cooling					
CTRL	Module is Turned On		CTRL is left floating or connected to high level (3.3V-12VDC)					
	Module Shutdown		CTRL connected to-Vin or low level (0-1.2VDC)					
	Input Current at Shutdown (Typ.)		2mA					
Parameter	Standards & Level					Performance		
EMC	EMI	Conducti on	EN 55032			Class B (EMC Recommended Circuit)		
		Radation	EN 55032			Class B (EMC Recommended Circuit)		
	EMS	RS	IEC / EN 61000-4-3 10V/m			Perf.Criteria A (EMC Recommended Circuit)		
		CS	IEC / EN 61000-4-6 3Vr.m.s			Perf.Criteria A (EMC Recommended Circuit)		
		ESD	IEC / EN 61000-4-2, Contact ± 6KV			Perf.Criteria B		
		Surage	IEC / EN 61000-4-5 ± 2KV			Perf.Criteria B (EMC Recommended Circuit)		
		EFT	IEC / EN 61000-4-4 ± 2KV			Perf.Criteria B (EMC Recommended Circuit)		

NOTE

1. The voltage of the CTRL is relative to the input –DC IN
2. The above efficiency is tested at Rated input voltage and output rated load.
3. The maximum capacitive load is the capacitance allowed to be used when the power supply operates at full load. The converter may not start up if the capacitor exceeds this value.
4. The chip could operate at reduced switching frequency to decrease the no-load power and improve the efficiency at no-load or light-load condition.
5. It is not recommended to connect the power supply outputs in parallel to achieve a bigger power output.
6. Unless otherwise specified, the above data are measured at $T_a=25^{\circ}\text{C}$, humidity<75%, input nominal voltage and output rated load (pure resistance load).
7. If the product works below the minimum required load, it cannot be guaranteed that the product performance meets all the performance indicators in this manual.
8. If the product works beyond the product load range, it cannot be guaranteed that the product performance meets all the performance indicators in this manual.
9. The products should be used according to the specifications in this manual, otherwise it could be permanently damaged.
10. Please check the derating curve for more details.
11. All values or indicators in this manual had been tested based on ARCH test specifications.
12. The specifications are specially for the parts listed in this manual, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.
13. Product specifications are subject to change without prior notice. Please pay attention to the latest manual published on our official website.
14. ARCH can provide customization service.
15. Ripple & Noise Test (Twisted Pair Method)



Test Conditions:

1. Ripple noise test need 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C1(0.1uF) polypropylene capacitor and C2(10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair.
2. The power supply output connects to the load by the cables. The other side of the twisted pair (length 30cm±2 cm) should be connected in parallel with the load, the polarity of the output and the oscilloscope probe should not be reversed. The test can be started after input power on.

MODEL ENCODING

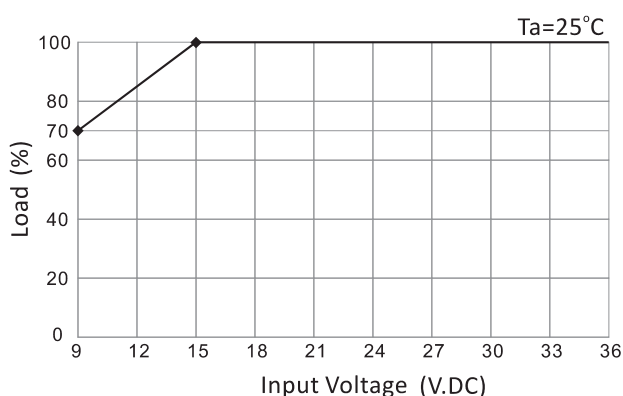
BC30-24F-12S-XA2

① ② ③

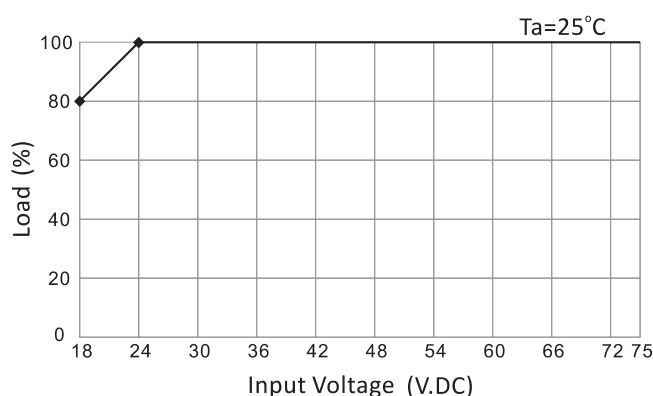
① Input Voltage	② Output Voltage	③ Option
24 = 24 Vdc (9-36 Vdc)	3.3 = 3.3 Vdc	X = Indicates the Part with Heat Sink
48 = 48 Vdc (18-75 Vdc)	5 = 5 Vdc	A2 = Indicates a Kind of Chassis Packaging with Terminals(without Heat Sink)
	12 = 12 Vdc	A2D =Indicates a Kind of Packaging of DIN Rail without Heat Sink
	15 = 15 Vdc	XA2 = Indicates a Kind of Chassis Packaging with Terminals and Heat Sink
	24 = 24 Vdc	XA2D =Indicates a Kind of Packaging of DIN Rail with Heat Sink

DERATING

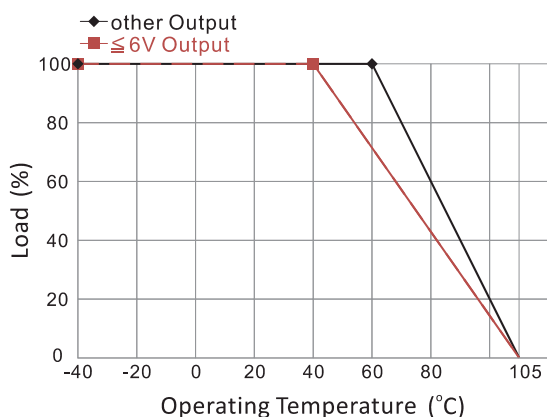
Derating Load versus Input Voltage



Derating Load versus Input Voltage

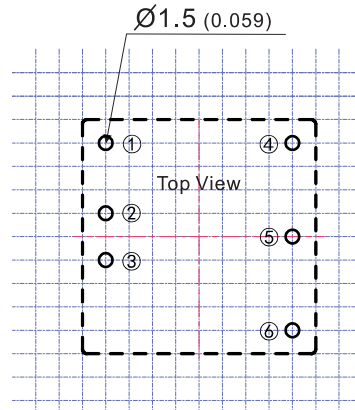
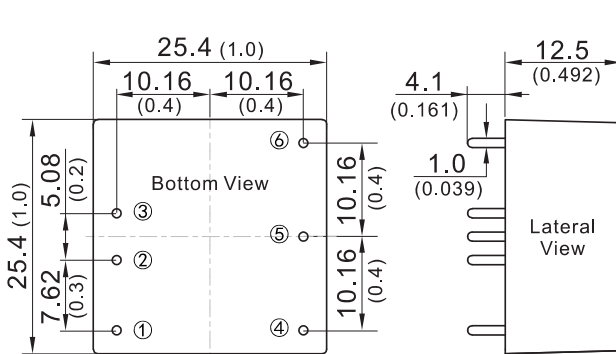


Derating Output Load versus Operating Temperature



Note: During the actual operating, the product can be always judged at a safe condition when its case temperature $\leq 110^{\circ}\text{C}$

MECHANICAL DIMENSIONS



Printed Board Vertical View

PIN#	Single
1	CTRL
2	-DC IN
3	+DC IN
4	-DC OUT
5	TRIM
6	+DC OUT

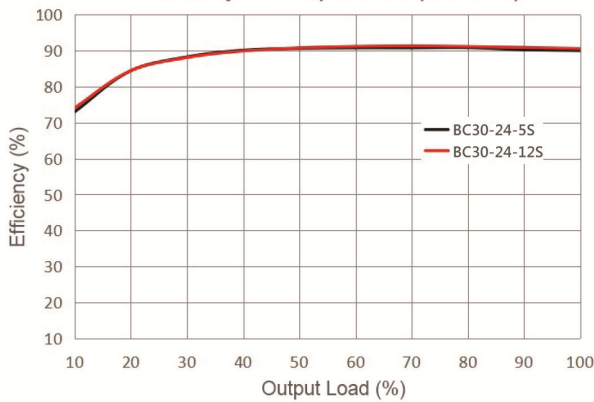
Dimension in mm (inch)

Tolerances: $x.x \pm 0.50$ ($x.xx \pm 0.02$)

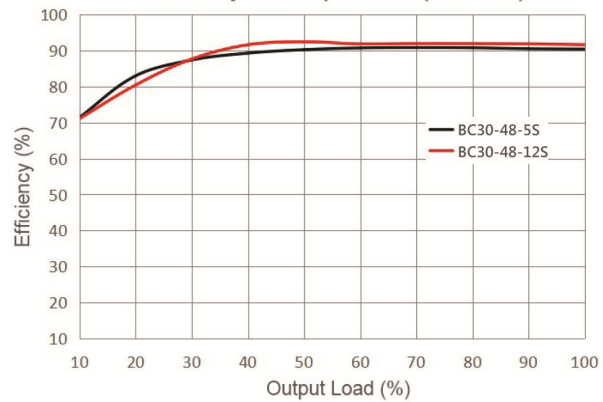
Pin Dimension Tolerance: ± 0.10 (± 0.004)

EFFICIENCY VERSUS LOAD

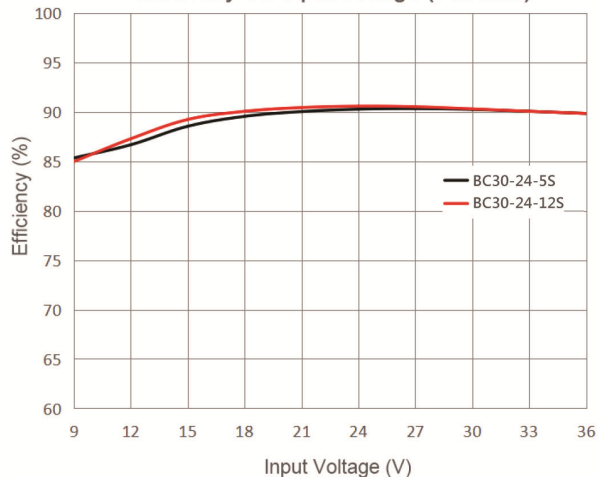
Efficiency VS Output Load (Vin=24V)



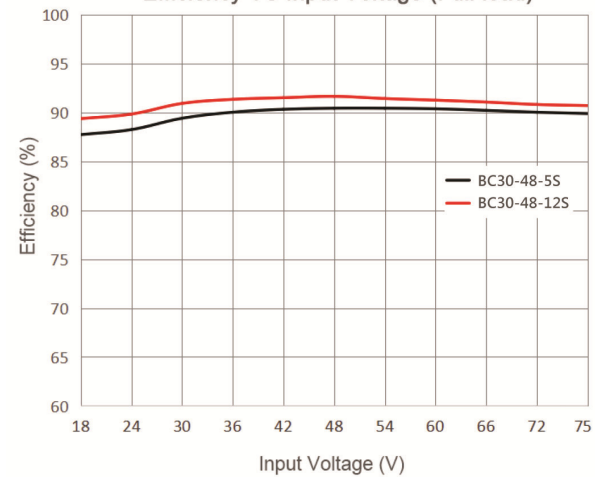
Efficiency VS Output Load (Vin=48V)



Efficiency VS Input Voltage (Full load)

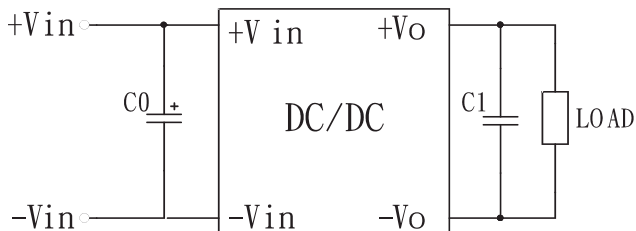


Efficiency VS Input Voltage (Full load)



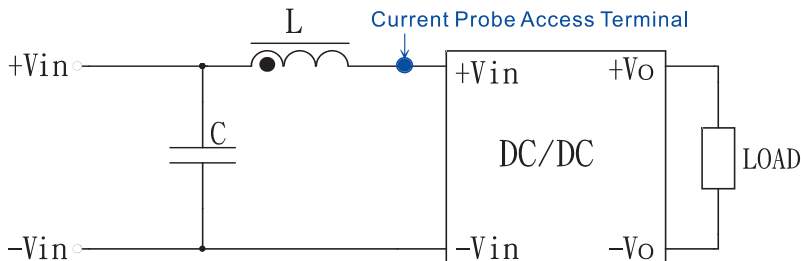
RECOMMENDED CIRCUITS FOR APPLICATION

1. This series of power supplies are tested according to this circuit before shipping. Increasing the capacity of C1 can reduce the output ripple, but the capacity must be less than the maximum capacitive load.



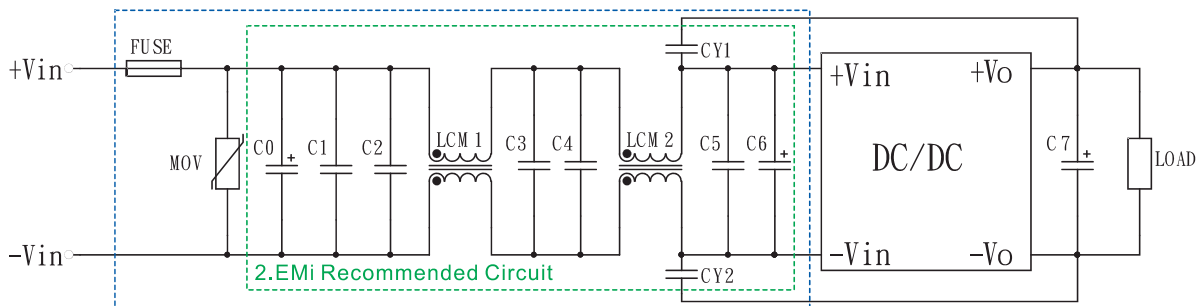
Component	Parameter
C0	100uF/100V
C1	100uF/50V

2. Input reflected ripple current test peripheral circuit.



Component	Parameter
C	220uF/100V
L	4.7uH/15A

3. Recommended EMC circuits



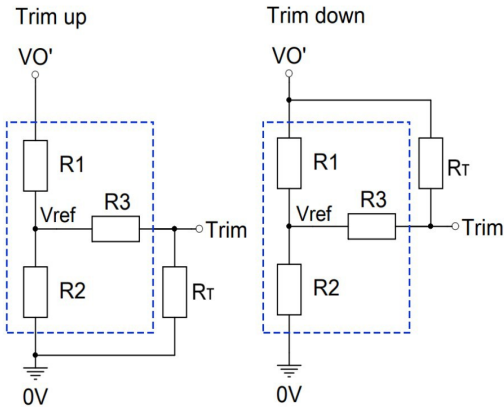
1.EMS Recommended Circuit

Note: Part 1 in the figure is for EMS testing, and part 2 is for EMI filtering, which can be adjusted according to the actual situation.

Component	Vin=24V	Vin=48V
FUSE	Choose according to customer needs	
MOV	14D560K	14D101K
LCM1	5mH	
LCM2	250uH	
C0	1000uF/50V	470uF/100V
C1,C2,C3,C4,C5	10uF/50V	10uF/100V
C6	470uF/50V	470uF/100V
C7	100uF/50V	
CY1,CY2	2.2nF/2KV	

RECOMMENDED CIRCUITS FOR APPLICATION

4. Trim and calculation of Trim resistance



Note: Trim up & down circuits, the components in the dotted area are inside of the convertor.

Calculation formula of Trim resistance:

$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3 \quad \alpha = \frac{V_{ref}}{V_{O'} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3 \quad \alpha = \frac{V_{O'} - V_{ref}}{V_{ref}} \cdot R_2$$

R_T is the Trim resistor, α is a custom parameter, and $V_{O'}$ is the actual voltage of Trim up or Trim down.

Output	Internal circuit parameters for Trim			
Vout (DC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	R1(KΩ)
5	5.1	5.1	20	2.5
12	18	4.75	33	2.5
15	18	3.6	25.5	2.5
24	30	3.48	30	2.5

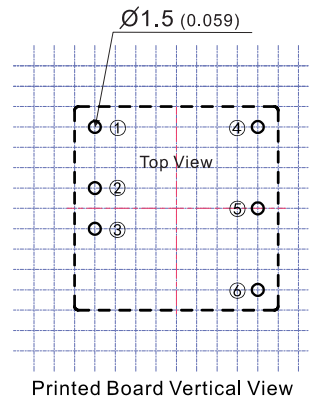
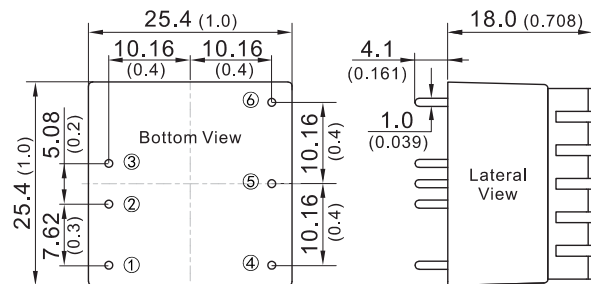
WITH HEATSINK & SCREW TERMINAL & DIN RAIL (for Option)

BC30-xF-xS-X

(with Heatsink)



PIN#	Single
1	CTRL
2	-DC IN
3	+DC IN
4	-DC OUT
5	TRIM
6	+DC OUT



Printed Board Vertical View

Dimension in mm (inch)

Tolerances: x.x ±0.50 (x.xx ±0.02)

Pin Dimension Tolerance: ±0.10 (±0.004)

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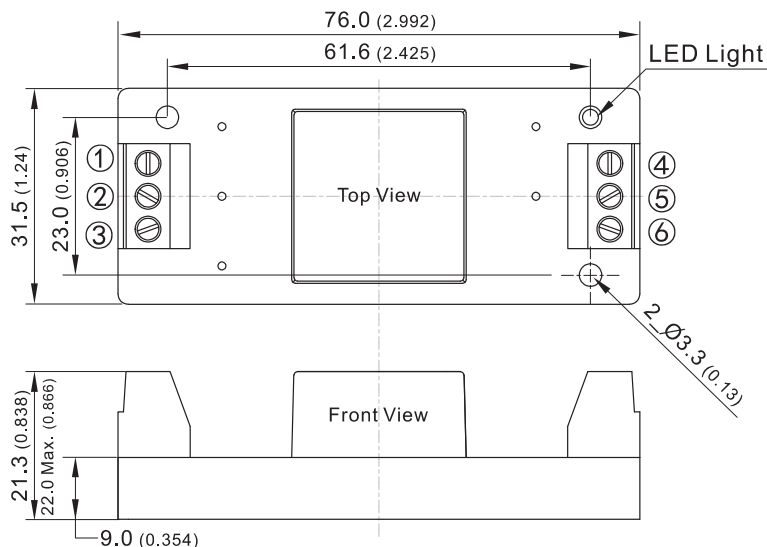
WITH HEATSINK & SCREW TERMINAL & DIN RAIL (for Option)

BC30-**x**F-**x**S-A2

(Screw Terminal for Option without Heatsink)



PIN#	Single
1	CTRL
2	-DC IN
3	+DC IN
4	-DC OUT
5	TRIM
6	+DC OUT



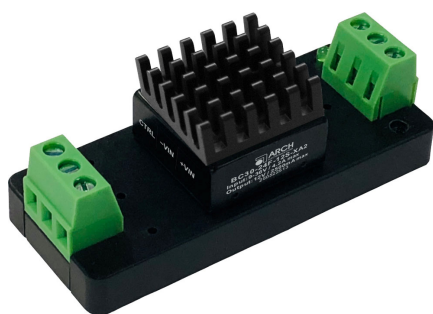
Dimension in mm (inch)

Tolerances: x.x ±0.50 (x.xx ±0.02)

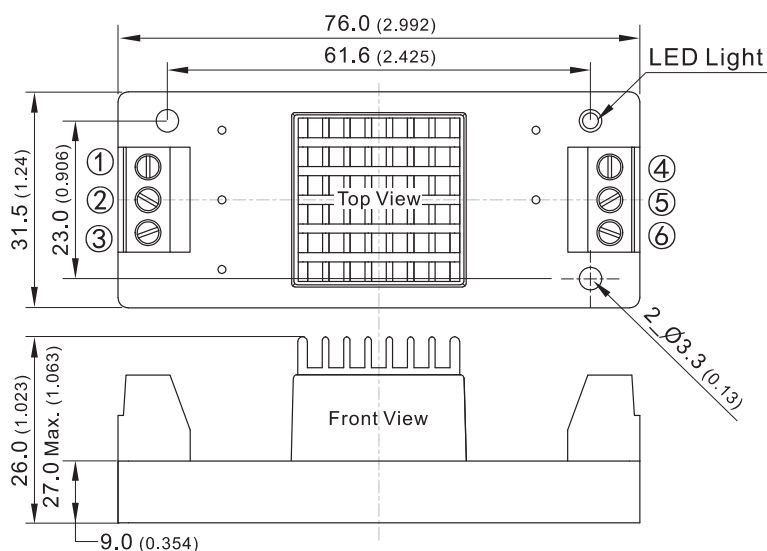
Pin Dimension Tolerance: ±0.10 (±0.004)

BC30-**x**F-**x**S-XA2

(Screw Terminal for Option with Heatsink)



PIN#	Single
1	CTRL
2	-DC IN
3	+DC IN
4	-DC OUT
5	TRIM
6	+DC OUT



Dimension in mm (inch)

Tolerances: x.x ±0.50 (x.xx ±0.02)

Pin Dimension Tolerance: ±0.10 (±0.004)

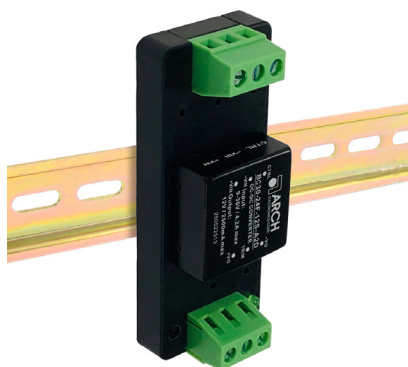
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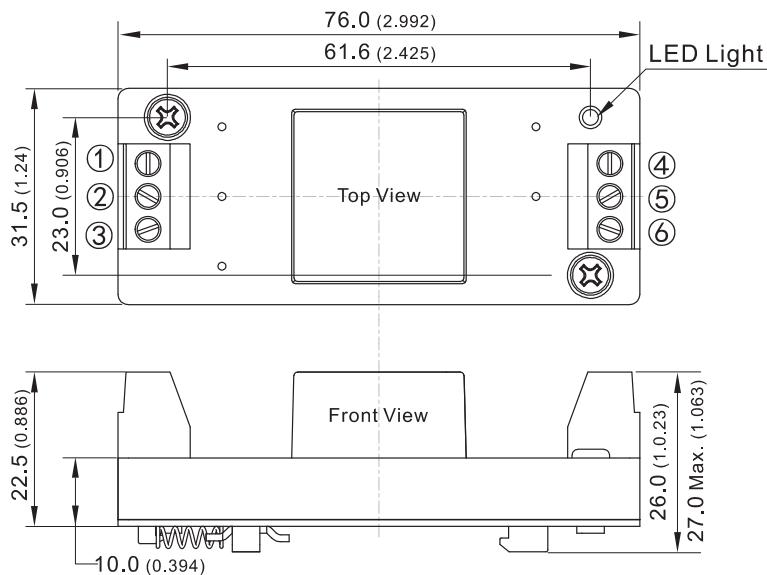
WITH HEATSINK & SCREW TERMINAL & DIN RAIL (for Option)

BC30-xF-xS-A2D

(Din Rail Kit for Option without Heatsink)



PIN#	Single
1	CTRL
2	-DC IN
3	+DC IN
4	-DC OUT
5	TRIM
6	+DC OUT



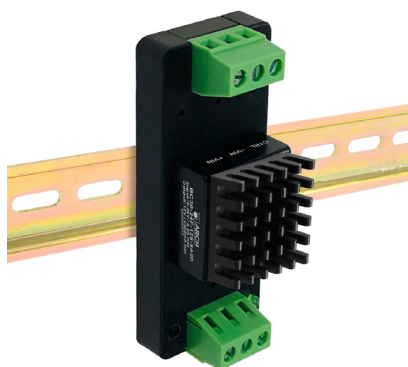
Dimension in mm (inch)

Tolerances: $x.x \pm 0.50$ ($x.xx \pm 0.02$)

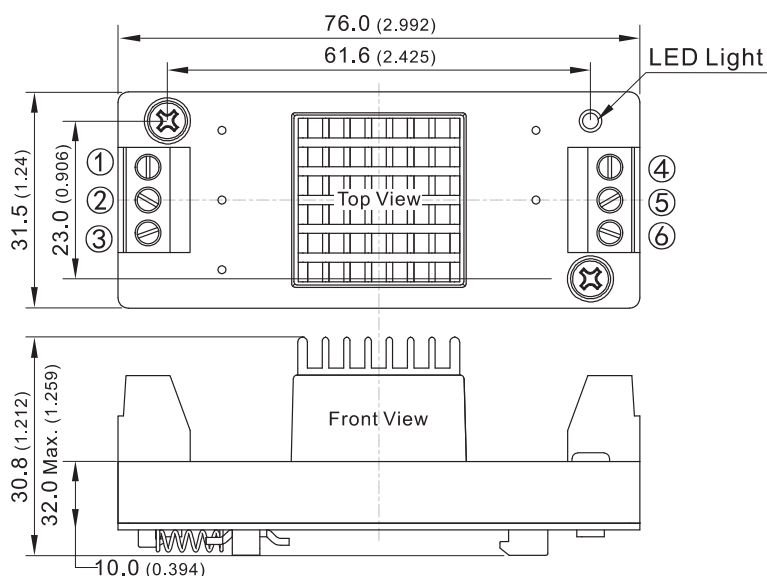
Pin Dimension Tolerance: ± 0.10 (± 0.004)

BC30-xF-xS-XA2D

(Din Rail Kit for Option with Heatsink)



PIN#	Single
1	CTRL
2	-DC IN
3	+DC IN
4	-DC OUT
5	TRIM
6	+DC OUT



Dimension in mm (inch)

Tolerances: $x.x \pm 0.50$ ($x.xx \pm 0.02$)

Pin Dimension Tolerance: ± 0.10 (± 0.004)