Typical Features

- ◆ Wide input voltage range (4:1), output power 30W
- ◆ Efficiency up to 89% (Typ.)
- ◆ Stand-by power consumption 2W (Typ.)
- ◆ Continuous short circuit protection, self-recovery
- ◆ Input under voltage protection
- ◆ Output over voltage & over current protections
- ◆ Isolation voltage 3000VDC/1500VAC
- ◆ Operating temperature from -40°C to +85°C
- ◆ Good EMC performance
- ◆ Standard pin-out alignment

CE

EN62368-1

Application Field

FD30-110SXXB3C3(-XXX) Series --- DC-DC modular converters with wide input voltage range (4:1), super-fast start up, isolated & regulated single output 30W, and with multi-protection of input under voltage, output over voltage, over current & short circuit, flexible package DIP/Chassis/DIN Rail options. This series of products can be widely used for 72V, 96V and 110V of Industrial control, Electric power, Communication, Train engine, Industrial robot and Railway electronic devices, etc. The additional EMC circuit diagram is recommended for the application with higher EMC requirement.

Typical Product List

Certificate	Part No.	Input Voltage Range		Output Voltage/Current (Vo/Io)		Input Current (mA) Typ. @nominal voltage		Max. Capacitive Load	Efficiency @full load, nominal volt.	
		Nominal (VDC)	Range (VDC)	Vo (VDC)	Io (mA)	Full Load	No Load	(uF)	Min (%)	Typ. (%)
CE	FD30-110S3V3B3C3	110	40-160	3.3	8000	276	25	8000	85	88
CE	FD30-110S05B3C3			5	6000	313	25	6800	86	89
CE	FD30-110S12B3C3			12	2500	313	2	2200	85	87
CE	FD30-110S15B3C3			15	2000	313	2	1000	87	89
CE	FD30-110S24B3C3			24	1250	313	2	680	87	89
CE	FD30-110S48B3C3			48	625	313	2	470	86	89

Note 1: The part number letter C indicates the part with ON/OFF control, N indicates No Control function. The suffix -H indicates the part with Heat sink, -T (H) indicates the chassis package (with heat sink), -TS (H) indicates the package of DIN Rail (with heat sink) which rail width is 35mm.

Note 2: The maximum capacitive load is the capacitance allowed to be used when the power supply starts at full load. The converter may not start if the capacitor exceeds this value.

Note 3: The chip could operate at jitter frequency with no load or light load to decrease no-load power consumption, so no load is not available. ⩾5% load or a high-frequency resistance E-cap(⩾470uF) load is recommended to avoid the output ripple increasing.

Note 4: Please contact Aipu sales for other output voltages requirement of this series but not listed in this table.

Input Specifications

Item	Operating conditions	Min	Typ.	Max	Unit
Standby power consumption	Full input voltage range	/	2	/	W
Input current Max	Full input voltage range	/	/	1.2	A
Start-up voltage	/	/	/	40	VDC
Input under-voltage protection	/	32	35	/	VDC
Input inrush voltage (1sec.max)	/	-0.7	/	160	VDC
Reflected ripple current	Nominal input voltage	/	100	/	mA
Hot plug	/	Unavailable			
Input Filter	/	Pi filter			
ON/OFF Control (Ctrl*)	Turn ON the converter	No connection or connected to High level (3.5V-12VDC)			
	Turn OFF the converter	Connected to -Vin or low level 0-1.2VDC）			
	Current value for switching off	/	1	/	mA

*Note: The voltage of Ctrl is relative to the input -Vin.

Output Specifications

Item	Operating conditions		Min	Typ.	Max	Unit
Output voltage accuracy	Full input voltage range		/	±1	±2	%
Voltage regulation	Full input voltage range, rated load		/	±0.5	±1	%
Load regulation	Nominal input voltage, 10%~100% load		/	±0.5	±1	%
Ripple & Noise	5%-100% load, 20MHz bandwidth	3.3V, 5V output	/	50	100	mVp-p
		Others	/	150	200	
Dynamic recovery time	25% rated load step, full input voltage range		/	300	500	uS
Dynamic response deviation	25% rated load step, nominal input voltage	3.3V, 5V output	/	±5	±8	%
		Others	/	±3	±5	%
Temperature drift coefficient	Full load		/	/	±0.03	%/℃
Turn-on delay time	Nominal input voltage		/	10	/	mS
Output voltage Trim	Full input voltage range		90	/	110	%Vo
Output overshoot			/	/	10	%Vo
Over voltage protection			110	150	190	%Vo
Over current protection			120	150	220	%Io
Short circuit protection			Hiccup, continuous, self-recovery			

Note: Ripple & noise ≤ 5%Vo at 0% - 5% load, it is tested by the Parallel-line method (refer to the following test instruction).

General Specifications

Item	Operating conditions	Min	Typ.	Max	Unit
Switching frequency	Operating mode（PWM）	/	300	/	KHz
Operating temperature	Refer to the temperature derating graph	-40	/	+85	℃
Storage temperature	/	-55	/	+125	
Max case temperature	Within the operating derating range	/	/	+105	℃

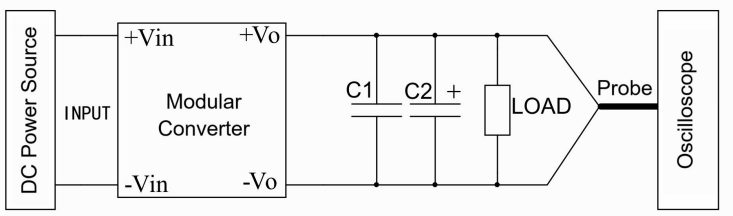
Pin soldering temperature	1.5mm from the case, soldering time 10S	/	/	300	
Relative humidity	No condensation	5	/	95	%RH
Isolation voltage	I/P-O/P, test 1min, leakage current <0.5mA	3000	/	/	VDC
	I/P-O/P, test 1min, leakage current <5mA	1500	/	/	VAC
	I/P&O/P-Case, test 1min, leakage current <1mA	1000	/	/	VDC
Isolation capacitance	I/P-O/P, 100KHz/0.1V	/	2000	/	pF
MTBF	MIL-HDBK-217F@25℃	1000	/	/	K hours
Cooling method	Nature air				
Vibration	10-150Hz, 5G, 0.75mm, along X, Y and Z				
Case material	Aluminum				

Weight & Dimensions	Part No.	Weight (Typ)	Dimensions L x W x H	
	FD30-110SXXB3C3	30g	50.80x25.40x13.00 mm	2.000x1.000x0.511 inch
	FD30-110SXXB3C3-H	42g	50.80x25.40x23.00 mm	2.000x1.000x0.906 inch
	FD30-110SXXB3C3-T	51g	76.00x31.50x22.30 mm	2.992x1.240x0.877 inch
	FD30-110SXXB3C3-TH	63g	76.00x31.50x32.50 mm	2.992x1.240x1.279 inch
	FD30-110SXXB3C3-TS	71g	76.00x31.50x27.00 mm	2.992x1.240x1.063 inch
	FD30-110SXXB3C3-TSH	83g	76.00x31.50x36.50 mm	2.992x1.240x1.437 inch

EMC Performance

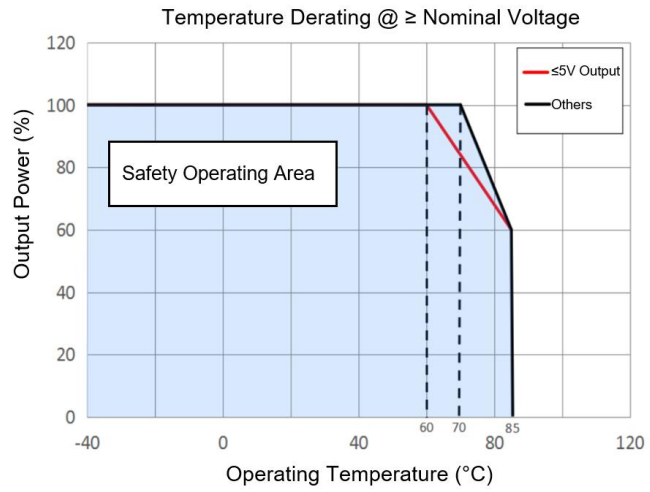
Total Item		Sub Item	Testing standard	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS A (with the Recommended EMC Circuit)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria A (with the Recommended EMC Circuit)
		CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria A (with the Recommended EMC Circuit)
		ESD	IEC/EN61000-4-2	Contact ±4KV Perf.Criteria B
		EFT	IEC/EN61000-4-4	±2KV Perf.Criteria B (with the Recommended EMC Circuit)

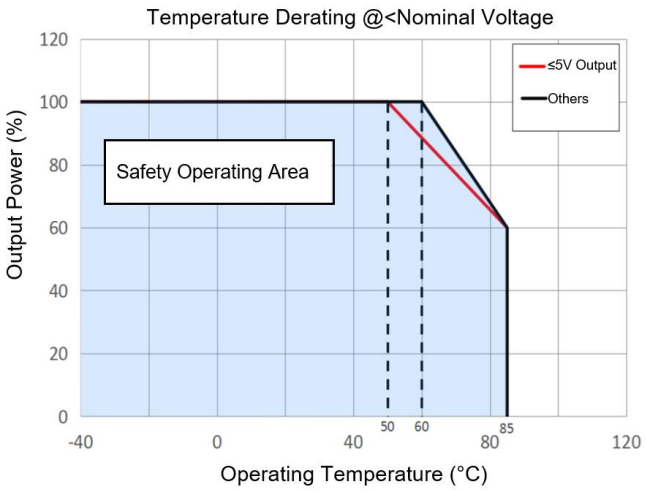
Ripple & Noise Test Instruction (Parallel-line Method, 20MHz Bandwidth)



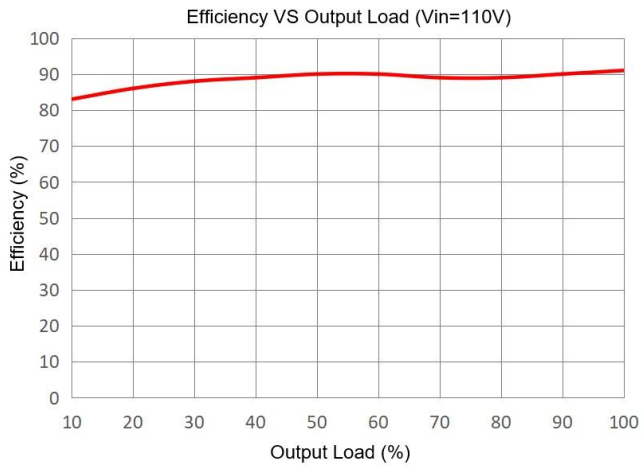
1. The Ripple & Noise test needs the cables in parallel, an oscilloscope that should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. One polypropylene capacitor C1(0.1uF) and one high-frequency low-resistance electrolytic capacitor C2(10uF) are connected in parallel with the probe.
2. Refer to the test diagram, the converter output connects to the electronic load by the jig with cables which size should be defined according to the output current value. The test can start at the converter output terminals after input power on.
3. It is recommended to connect a ≥5% load or a high-frequency low resistance electrolytic capacitor (≥470uF) load at the output to avoid the output ripple increasing.

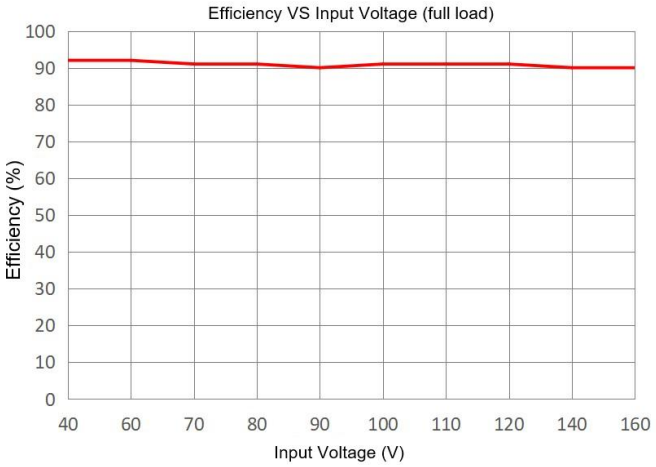
Temperature Derating Graphs





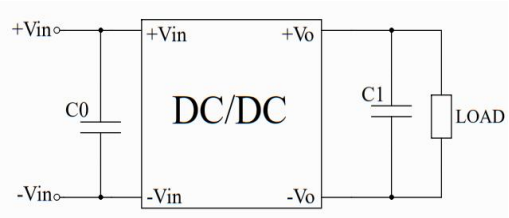
Efficiency Graphs





Recommended Circuits Diagrams for Application

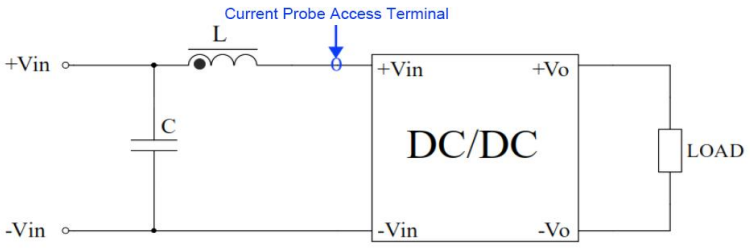
1. DC-DC test circuit diagram



Components	Parameters
C0	47-100uF/200V
C1	470uF/50V

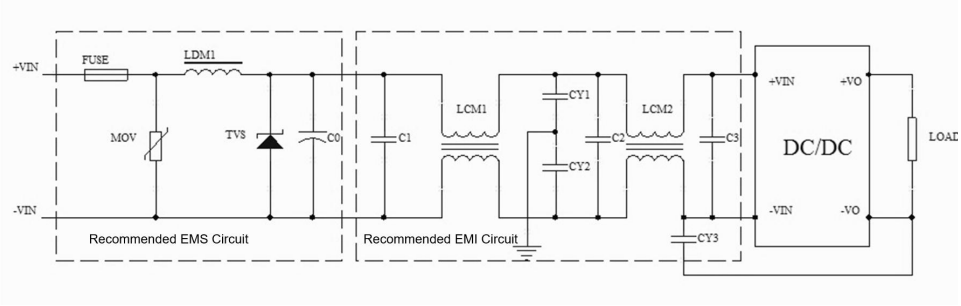
2. Input reflected ripple current test circuit diagram

A low ESR capacitor is recommended for C which withstand voltage should be more than the Max input voltage.



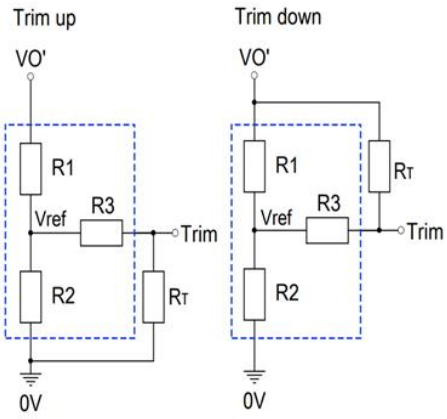
Components	Parameter
C	220uF/200V
L	4.7uH/15A

3. Recommended EMC circuit diagram



Components	110V input series
FUSE	TBD by the customer
MOV	14D201K
LDM1	56uH
TVS	SMCJ170A
C0	560uF/200V
C1, C2, C3	4.7uF/200V
LCM1	15mH
LCM2	56uH
CY1, CY2, CY3	1nF/3KV

4. Trim and Trim resistance calculation



Rrim Resistance calculating fomula

$$up:\ R_T=\frac{aR_2}{R_2-a}-R_3 \qquad a=\frac{Vref}{Vo'-Vref}\cdot R_1$$

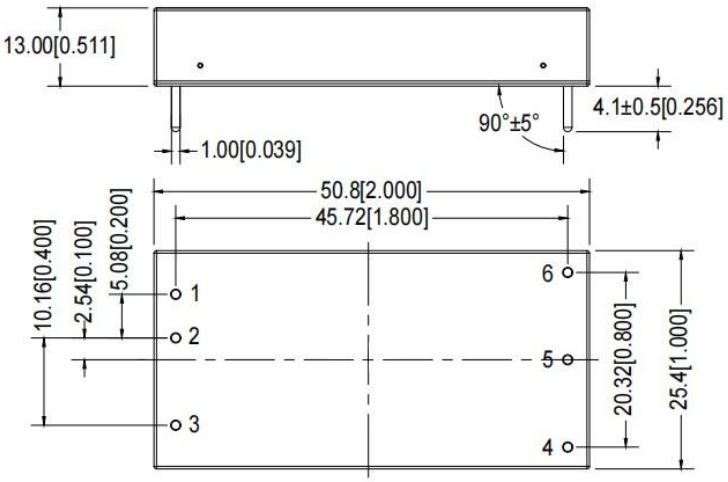
$$down:\ R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{Vo'-Vref}{Vref}\cdot R_2$$

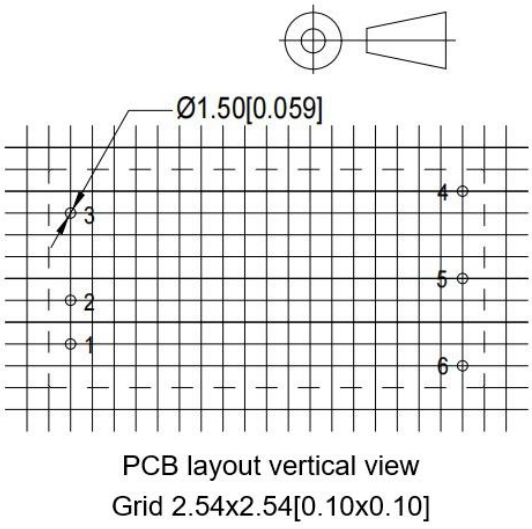
R_T is the Trim resistance
a is a self-defined parameter
Vo' is the required Up-voltage or Down-voltage

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

Output Voltage	Trim internal circuit parameters			
Vo (VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	24	14.53	68	1.25
5	24	24	68	2.5
12	18	4.7	30	2.5
15	24	4.78	30	2.5
24	25.5	2.955	18	2.5
48	75	4.077	11	2.5
Trim works only for above mentioned output voltages.				

B3 Mechanical Dimensions (without Heat Sink)





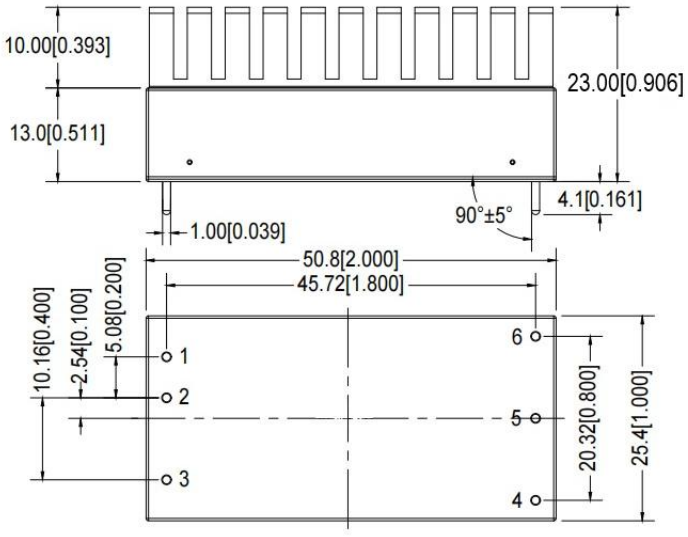
PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

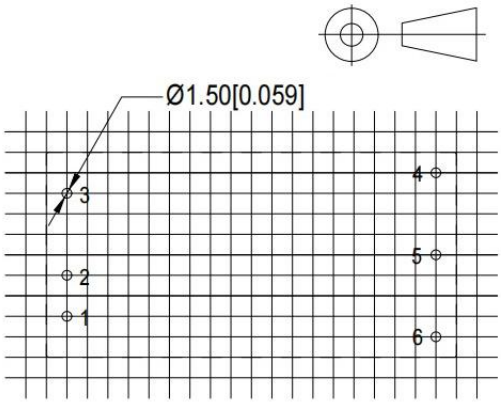
Note:
Unit: mm[inch]
Pin diameter tolerance: ±0.10 [±0.004]
General tolerance: ±0.50 [±0.020]

Pin-out Function Description

Pin No.	1	2	3	4	5	6
FD30-110SXXB3C3	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-H Mechanical Dimensions (with Heat Sink)





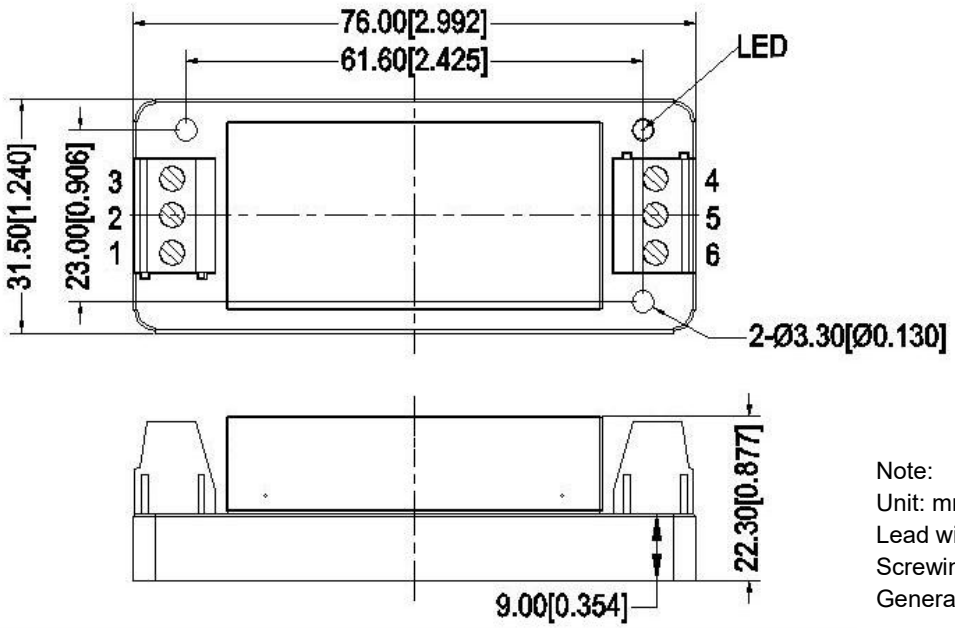
PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

Note:
Unit: mm[inch]
Pin diameter tolerance: ±0.10 [±0.004]
General tolerance: ±0.50 [±0.020]

Pin-out Function Description

Pin No.	1	2	3	4	5	6
FD30-110SXXB3C3	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-T Mechanical Dimensions (without Heat Sink)

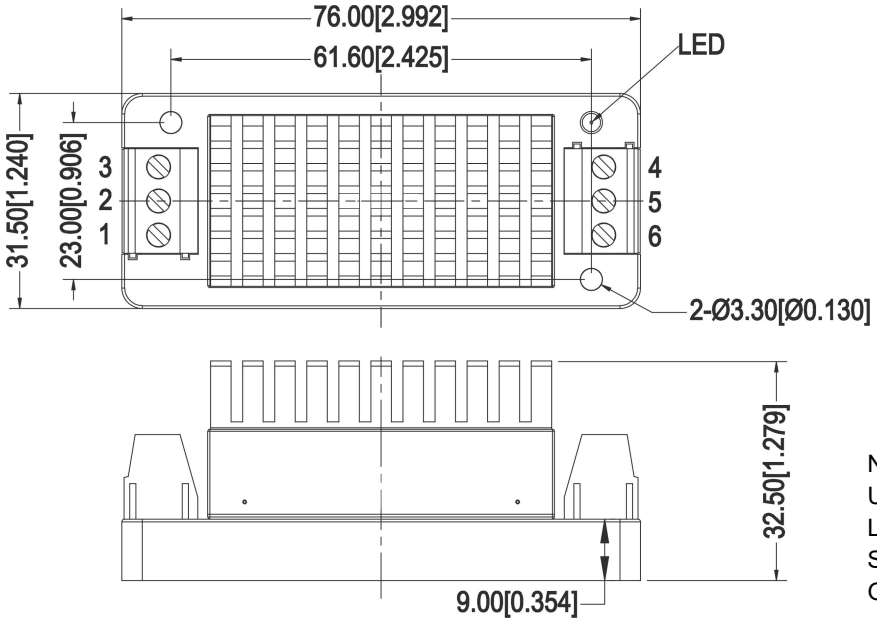


Note:
Unit: mm[inch]
Lead wires gauge: 24-12AWG
Screwing torque: 0.4 N.m Max
General tolerance: ±1.00 [±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6
FD30-110SXXB3C3	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-TH Mechanical Dimensions (with Heat Sink)

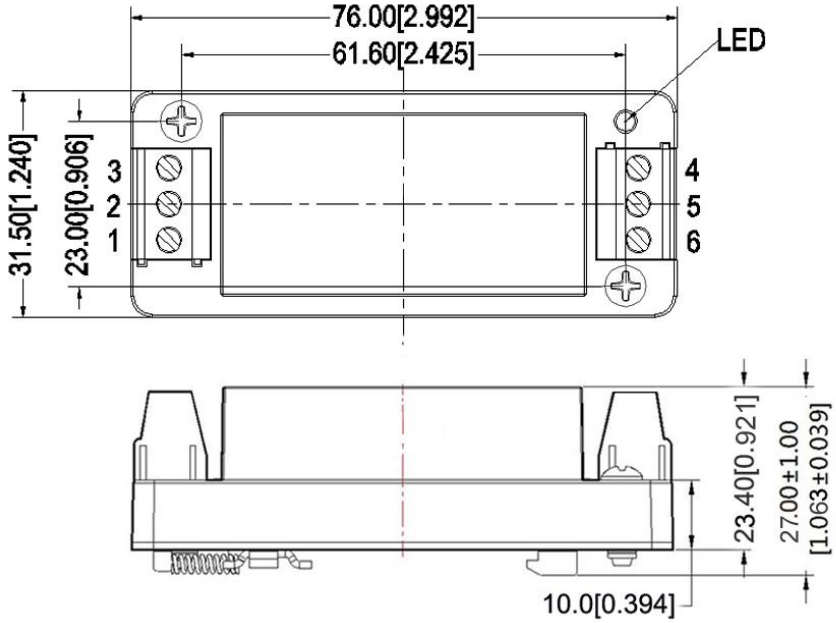


Note:
Unit: mm[inch]
Lead wires gauge: 24-12AWG
Screwing torque: 0.4 N.m Max
General tolerance: ±1.00 [±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6
FD30-110SXXB3C3	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-TS Mechanical Dimensions (without Heat Sink)

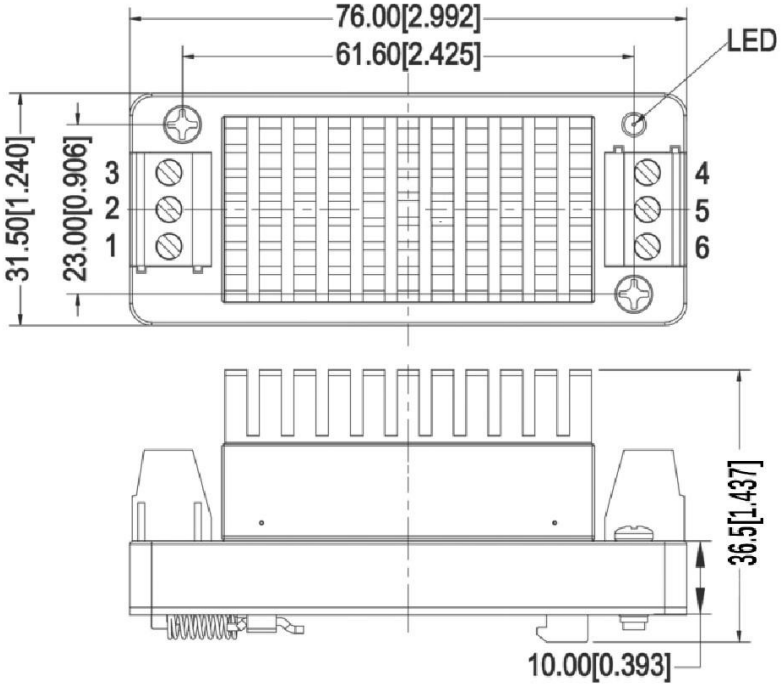


Note:
Unit: mm[inch]
Lead wires gauge: 24-12AWG
Screwing torque: 0.4 N.m Max
General tolerance: ±1.00 [±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6
FD30-110SXXB3C3	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-TSH Mechanical Dimensions (with Heat Sink)



Note:
Unit: mm[inch]
Lead wires gauge: 24-12AWG
Screwing torque: 0.4 N.m Max
General tolerance: ±1.00 [±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6
FD30-110SXXB3C3	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

Other Models Pin-out Function Description						
Pin/Terminal No.	1	2	3	4	5	6
FD30-110SXXB3N3	+Vin	-Vin	No Pin	Trim	-Vo	+Vo

Application Notice

1.The product should be used according to the specification, otherwise it could be permanently damaged.

2. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.

3. The product performance cannot be guaranteed if it works at over-load condition.

4. Unless otherwise specified, all values or indicators on this datasheet are tested at Ta=25℃, humidity<75%RH, nominal input voltage and rated load (pure resistance load).

5. All values or indicators on this datasheet have been tested based on Aipupower test specifications.

6.The specifications are specially for the parts listed on this datasheet, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.

7. Aipupower can provide customization service.

Guangzhou Aipu Electron Technology Co., Ltd

Address: Building 4, HEDY Park, No.63, Punan Road, Huangpu Dist, Guangzhou, China.

Tel: 86-20-84206763 Fax: 86-20-84206762 HOTLINE: 400-889-8821

E-mail: sales@aipu-elec.com Website: https://www.aipupower.com