

Typical Features

- ◆ Wide Input Voltage Range (4:1), Output power 50W
- ◆ Efficiency up to 92%
- ◆ Standby power consumption 0.3W (Typ.)
- ◆ Output fast start-up
- ◆ Continuous Short Circuit protection, Self-recovery
- ◆ Input under voltage, output over voltage, short circuit, over current protections
- ◆ Isolation Voltage 1500VDC
- ◆ Operating temperature from -40°C to +105°C
- ◆ Good EMC performance
- ◆ Standard pin-out alignment



Application Field

PFD50-XXSXXB3R2 Series ---- DIP mounting standard 2"x1" package DC-DC modular converters with wide input voltage range 4:1, low stand-by power consumption, isolated & regulated single output 50W. This series of products can be widely used in the fields of Industrial control, Instrument, Communication, Electricity power and IoT, etc. The additional EMC circuit diagram is recommended in this data sheet for the application with high EMC requirement.

Typical Product List

Certificate	Part No.	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current (mA)Typ. @Nom. Volt.		Max Capacitive Load	Ripple & Noise (mVp-p)		Efficiency @Full load (%)	
		Nom.	Range	Vo (VDC)	Io (A) Max	Full Load	No Load	uF	Typ.	Max	Min	Typ.
-	PFD50-18S05B3R2	24	9-36	5	10	2289	12	18000	170	200	89	91
-	*PFD50-18S12B3R2	24	9-36	12	4.167	2247	14	3700	200	250	90	92
-	*PFD50-18S15B3R2	24	9-36	15	3.333	2247	14	2000	200	250	90	92
-	PFD50-18S24B3R2	24	9-36	24	2.083	2247	14	1000	180	350	90	92
-	PFD50-36S05B3R2	48	18-75	5	10	1145	6	18000	170	200	89	91
-	*PFD50-36S12B3R2	48	18-75	12	4.167	1133	7	3700	200	250	90	92
-	*PFD50-36S15B3R2	48	18-75	15	3.333	1133	7	2000	200	250	90	92
-	*PFD50-36S24B3R2	48	18-75	24	2.083	1133	7	1000	180	350	90	92

Note 1: The * marked part has been developed in process.

Note 2: The suffix -H indicates the part with Heat sink, -T (H) indicates a kind of chassis package (with heat sink), -TS (H) indicates a kind of package of DIN Rail (with heat sink) which width is 35mm.

Note 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 if the capacitor exceeds this value.

Note 4: The typical value of efficiency is tested at nominal input voltage and rated load.

Note 5: Please contact Aipu sales for other output voltages requirement in this series but not in this table.

Input Specifications

Items	Test Conditions	Min.	Typ.	Max.	Unit
Stand-by Power Consumption	Full input voltage range	/	0.3	/	W
Under-Voltage Protection	24V nominal input series	/	7	/	VDC
	48V nominal input series	/	15	/	
Input Inrush Voltage (1Sec.max.)	24V nominal input series	-0.7	/	50	
	48V nominal input series	-0.7	/	100	
Hot Plug	/	N/A			
Input Filter	/	Pi filter			
Remote Control (Ctrl)	Turn on the converter	No connection or connect to high level (3V-12VDC)			
	Turn off the converter	Connect to -Vin or low level (0-1.2VDC)			
	Current value to turn off the converter	10mA (Typ)			

Note: The voltage of CTRL is relative to -Vin.

Output Specifications

Items	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Full input voltage range, rated load		/	±1	±3	%
Voltage Regulation	Full load, full input voltage range		/	±0.2	±0.5	%
Load Regulation	5%-100% load		/	±0.5	±1	%
Ripple & Noise	5%-100% load, 20MHz bandwidth	3.3V, 5V output	/	170	200	mVp-p
		12V, 15V output	/	200	250	
		24V output	/	180	350	
Transient Recovery Time	25% rated load step, Nominal input voltage	/	/	300	500	uS
Transient Response Deviation		3.3V, 5V output	/	±3	±8	%
		Others	/	±3	±5	%
Turn on Delay Time	Nominal input voltage		/	10	/	mS
O/P voltage adjustment (Trim)	Full input voltage range		90	/	110	%Vo
Over voltage protection			110	130	160	%Vo
Over current protection			110	150	200	%Io
Short circuit protection			Hiccup, continuous, self-recovery			

Note: The Ripple & noise ≤5%Vo at 0% - 5% load, it is tested by the twisted pair test method (refer to the following test instructions)

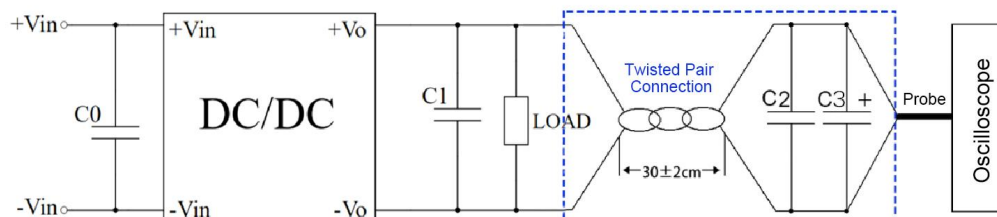
General Specifications

Items	Test Conditions	Min.	Typ.	Max.	Unit
Switching Frequency	Operating Mode (PWM)	/	300	/	KHz
Operating Temperature	Refer to the Temperature Derating Graph	-40	/	+105	°C
Storage Temperature	/	-55	/	+125	°C
Max Case temperature	Within the temperature derating range	/	/	+105	°C
Pin Soldering Temperature	1.5mm from the case, 10 seconds	/	/	300	°C
Relative Humidity	No condensing	5	/	95	%RH
Isolation Voltage	I/P – O/P, test 1min, leakage current <0.5mA	1500	/	/	VDC
	I/P&O/P - Case, test 1min, leakage current<1mA	1000	/	/	
Isolation Capacitance	Input to output, 100KHz/0.1V	1000	/	/	pF
Insulation Resistance	Input to output, @ 500VDC	100	/	/	MΩ
MTBF	MIL-HDBK-217F@25°C	1000	/	/	K hours
Vibration	/	10-150Hz, 5G, 0.75mm. Along X, Y and Z			
Cooling Method	Nature air				
Case Material	Aluminum				
Weight/Dimensions	Part No.	Weight Typ.	L x W x H		
	PFD50-XXSXXB3R2	36g	50.8 X 25.4 X 11.8 mm		2.00 X 1.00 X 0.464 inch
	PFD50-XXSXXB3R2-H	48g	50.8 X 25.4 X 21.8 mm		2.00 X 1.00 X 0.858 inch
	PFD50-XXSXXB3R2-T	57g	76.0 X 31.5 X 21.3 mm		2.99 X 1.24 X 0.838 inch
	PFD50-XXSXXB3R2-TH	69g	76.0 X 31.5 X 31.0 mm		2.99 X 1.24 X 1.220 inch
	PFD50-XXSXXB3R2-TS	77g	76.0 X 31.5 X 26.0 mm		2.99 X 1.24 X 1.023 inch
	PFD50-XXSXXB3R2-TSH	89g	76.0 X 31.5 X 35.5 mm		2.99 X 1.24 X 1.397 inch

EMC Performances

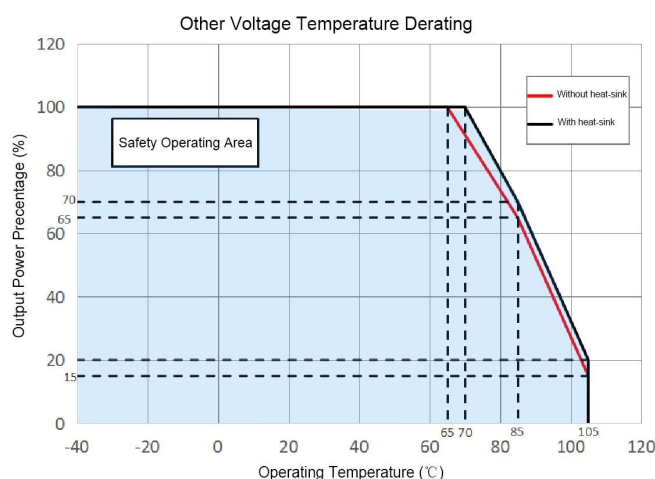
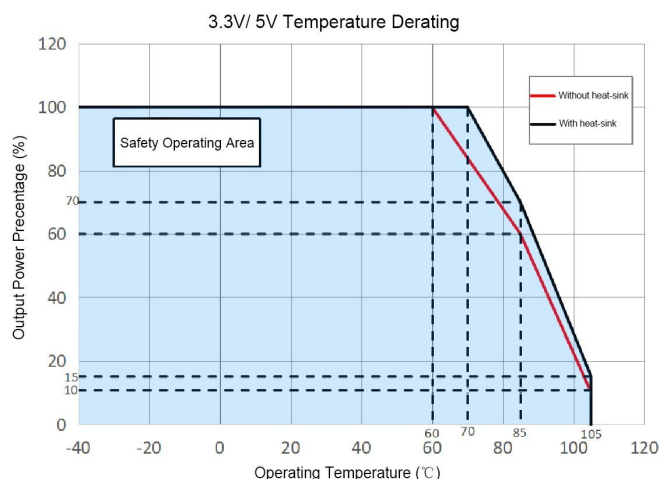
Total Item		Sub Item	Test Standard	Performance/Class	
EMC	EMI	CE	CISPR32/EN55032	CLASS B (with the Recommended EMC circuit)	
		RE	CISPR32/EN55032	CLASS B (with the Recommended EMC circuit)	
	EMS	RS	IEC/EN61000-4-3	10V/m	Perf.Criteria A (with the Recommended EMC circuit)
		CS	IEC/EN61000-4-6	10Vr.m.s	Perf.Criteria A (with the Recommended EMC circuit)
		ESD	IEC/EN61000-4-2	Contact ±6KV	Perf.Criteria B
		Surge	IEC/EN61000-4-5	±2KV	Perf.Criteria B (with the Recommended EMC circuit)
		EFT	IEC/EN61000-4-4	±2KV	Perf.Criteria B (with the Recommended EMC circuit)

Ripple & Noise Test Instruction (Twisted Pair Method, 20MHZ bandwidth)



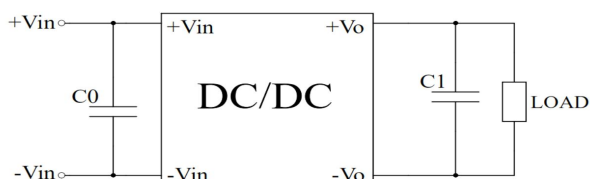
- 1) The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C2(0.1uF) polypropylene capacitor and C3(10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair. C0 & C1 refer to the application circuit recommended.
- 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 start after input power on.
- 3) It is recommended to connect a ≥5% load or a high-frequency low resistance E-cap(≥470uF) load at output to avoid the output ripple increasing.

Product Characteristics Graphs



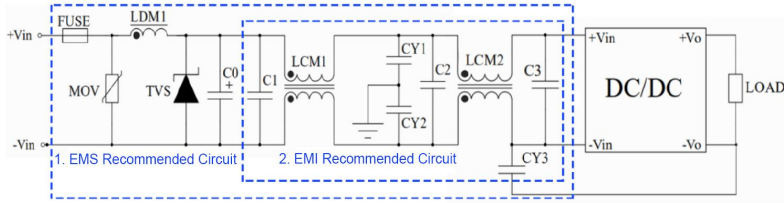
Recommended Circuits Diagrams for Application

1. DC/DC test circuit diagram



Output Voltage	C0	C1
3.3V	200uF/100V	470uF/10V
5V		470uF/10V
12/15V	100uF/100V	100uF/25V
24V		47uF/50V

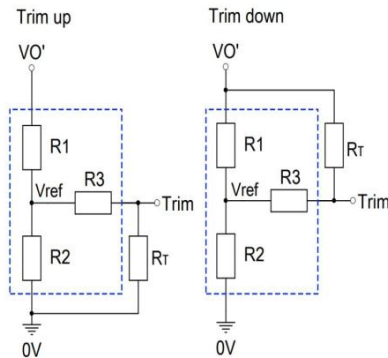
2. Recommended circuit diagram for EMC



Note:

Part 1 in the circuit diagram is for EMS test, part 2 for EMI filtering, both can be adjusted according to the actual situation.

3. Trim and calculation of Trim resistance



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

Trim resistance calculating fomula

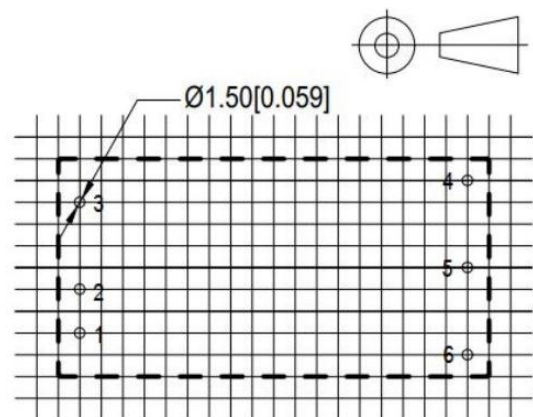
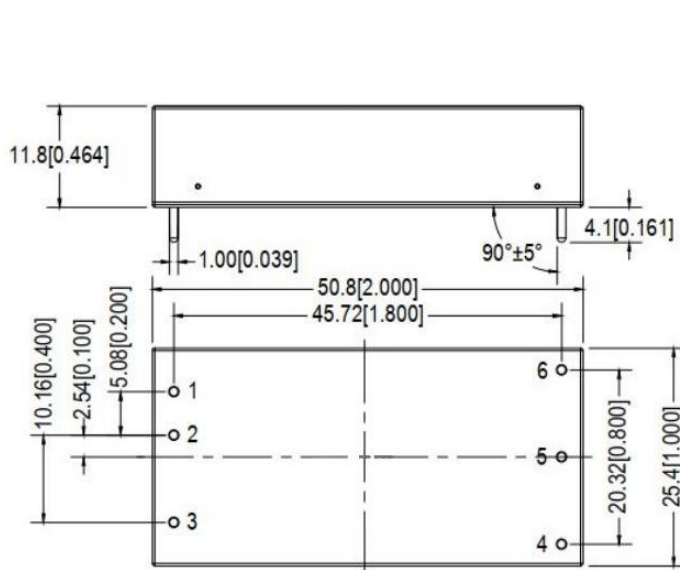
$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3 \quad \alpha = \frac{V_{ref}}{V_{O'} - V_{ref}} \cdot R_1$$

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

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

Input Volt	The internal circuit parameters for Trim			
Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	24	14.53	68	1.25
5	24	24	68	2.5
12	75	19.73	30	2.5
15	24	4.78	30	2.5
24	68	7.89	30	2.5

B3 (Without heat-sink) Package Dimensions

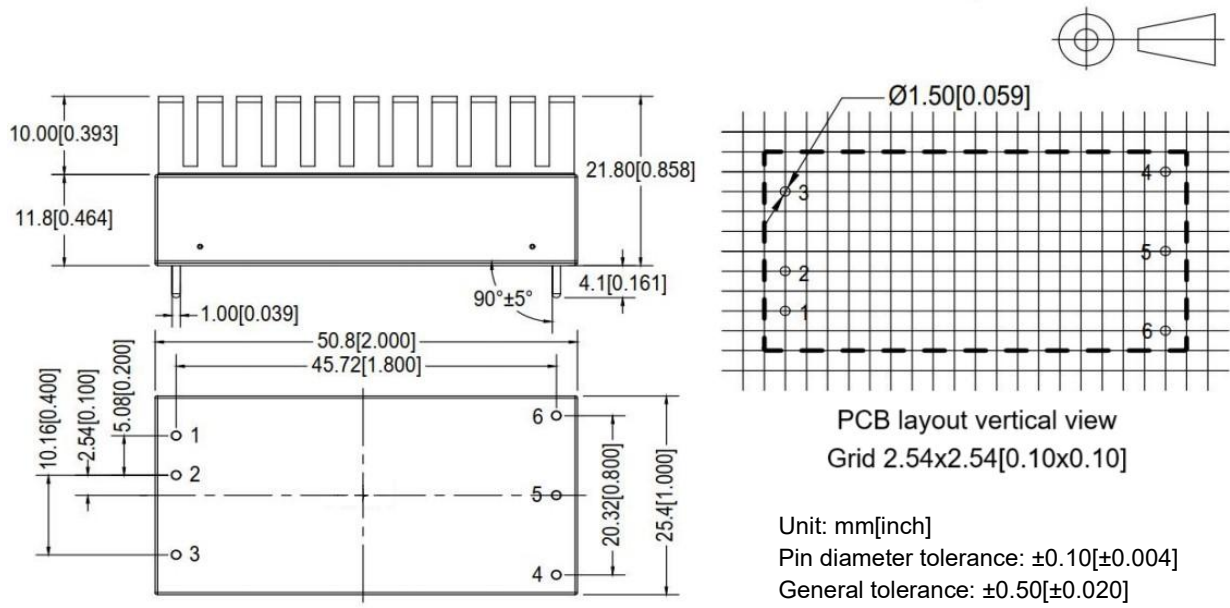


PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

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

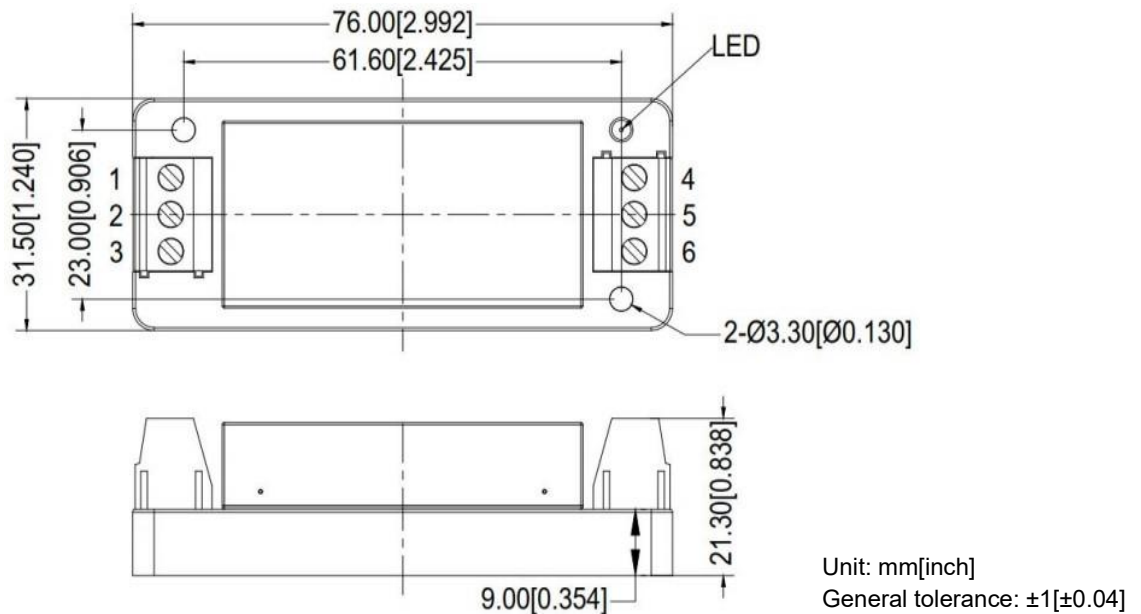
Pin No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vout	+Vout

B3-H (With heat-sink) Package Dimensions



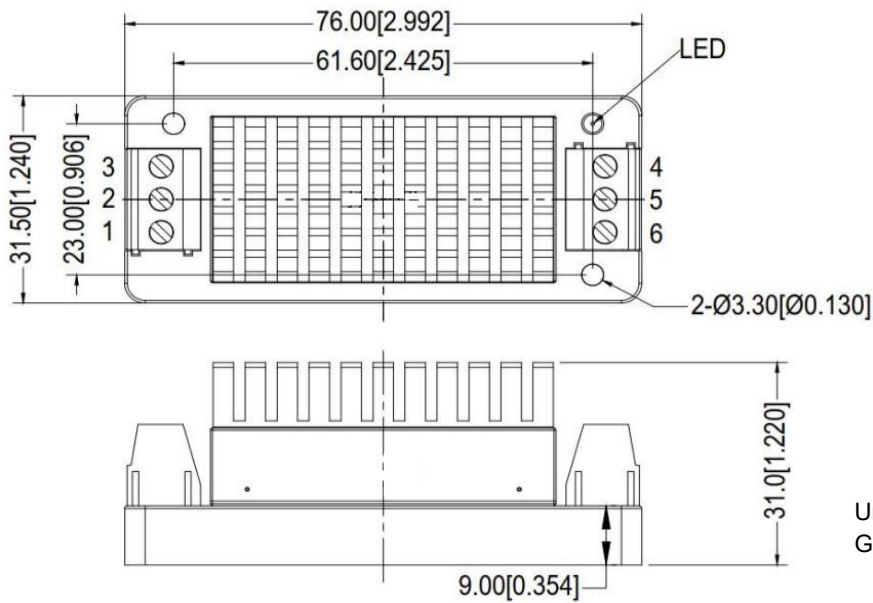
Pin No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vout	+Vout

B3-T (Without heat-sink) Package Dimensions



Terminal No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vout	+Vout

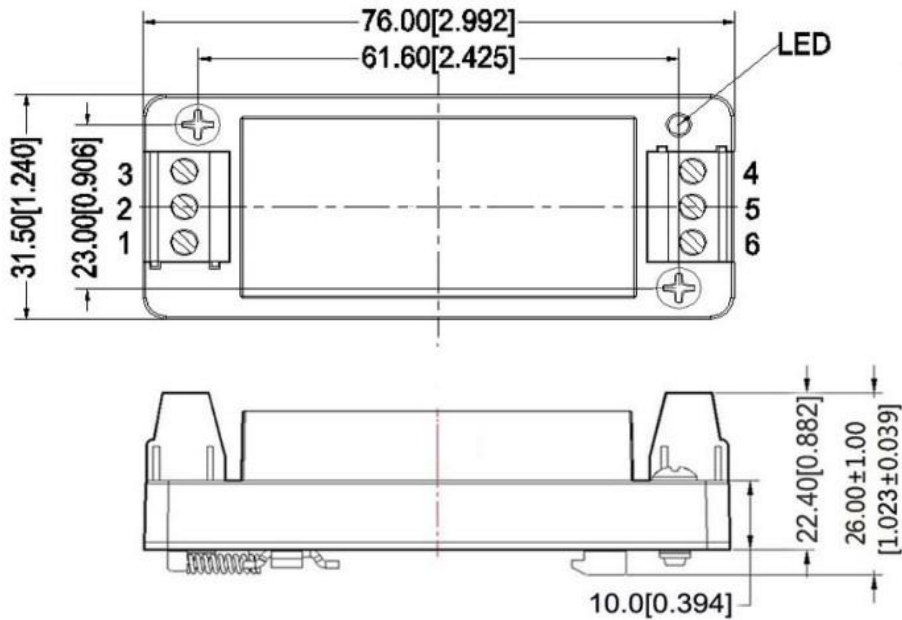
B3-TH (With heat-sink) Package Dimensions



Unit: mm[inch]
General tolerance: $\pm 1[\pm 0.04]$

Terminal No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vout	+Vout

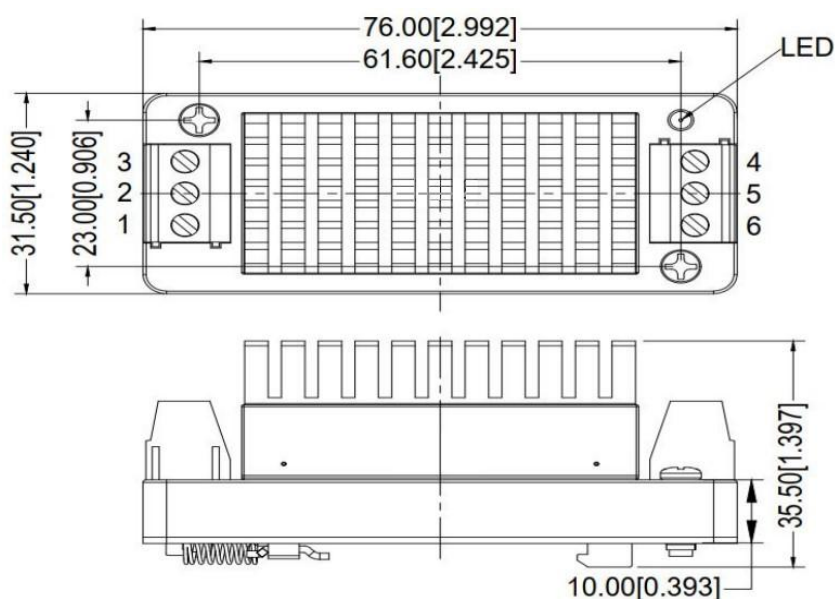
B3-TS (Without heat-sink) Package Dimensions



Unit: mm[inch]
General tolerance: $\pm 1[\pm 0.04]$

Terminal No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vout	+Vout

B3-TSH (With heat-sink) Package Dimensions



Terminal No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vout	+Vout

Application Notice

1. The products should be used according to the specifications in this datasheet, otherwise it could be permanently damaged.
2. The product performance in this datasheet cannot be guaranteed if it works at a lower load than the minimum load defined.
3. The product performance in this datasheet cannot be guaranteed if it works at over-load condition.
4. Unless otherwise specified, all values or indicators in this datasheet are tested at $T_a=25^{\circ}\text{C}$, humidity<75%RH, nominal input voltage and rated load (pure resistance load).
5. All values or indicators in this datasheet had been tested based on Aipupower test specifications.
6. The specifications are specially for the parts listed in 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>