Product Typical Features

- Wide Input Voltage Range (4:1), Output power 50W
- Efficiency up to 92%
- Standby power consumption as low as 0.1W
- 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: -40°C~+105°C
- Good EMC performance
- International standard pin-out

Application Field

PFD50-XXSXXB3R2 Series ------ *a new designed DIP standard 2"X1" package, 50W output power DC-DC module converter with wide 4:1 input voltage range, ultra-low standby power consumption, isolated and regulated. They can be widely used in industrial control, instrumentation, communication, power, Internet of Things and other fields. The additional circuit for EMC is recommended in this data sheet for the application with higher EMC requirement.*

Typical Product List

Certificate	Part No.	Input Voltage Range (VDC)		Output Voltage/ Current (Vo/Io)		Input Current (mA)Typ. @Rated Voltage		Max Capacitive Load	Ripple & Noise (mVp-p)		Efficiency @ output full load (%)	
		Rated	Range	Vo (Vdc)	Io (A) Max	Full Load	No Load	uF	Typ.	Max.	Min.	Typ.
-	PFD50-18S05B3R2	24	9-36	5	10	2289	2	18000	170	200	89	91
-	*PFD50-18S12B3R2	24	9-36	12	4.167	2264	4	3700	200	250	90	92
-	*PFD50-18S15B3R2	24	9-36	15	3.333	2264	4	2000	200	250	90	92
-	*PFD50-18S24B3R2	24	9-36	24	2.083	2264	3	1000	180	350	90	92
-	PFD50-36S05B3R2	48	18-75	5	10	1145	2	18000	170	200	89	91
-	*PFD50-36S12B3R2	48	18-75	12	4.167	1133	4	3700	200	250	90	92
-	*PFD50-36S15B3R2	48	18-75	15	3.333	1133	4	2000	200	250	90	92
-	*PFD50-36S24B3R2	48	18-75	24	2.083	1133	3	1000	180	350	90	92

Note 1: * 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 packaging (with heat sink), -TS (H) indicates a kind of packaging 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 with 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 Consumption	Input voltage range	/	0.1	/	W
Input Under-Voltage Protection	24V Rated input	/	7	/	VDC
	48V Rated input	/	15	/	
Input Inrush Voltage (1Sec.max.)	24V Rated input	-0.7	/	50	
	48V Rated input	-0.7	/	100	
Hot Plug	/	N/A			
Input Filter	/	Pi filter			
Control Ctrl)	Turn on the power module	No connection or connect to high level (3V-12VDC)			
	Shut off the power module	Connect to -Vin or low level (0-1.2VDC)			
	The current values for shut off	10mA (Typ)			
Note: The voltage of CTRL is relative to -Vin.					

Output Specifications

Items	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Input voltage range, Rated load		/	±1	±3	%
Voltage Regulation	Full load, full voltage range		/	±0.2	±0.5	%
Load Regulation	5%-100% Rated 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, Rated input voltage	/	/	300	500	us
Transient Response Deviation		3.3V/ 5V output	/	±3	±8	%
		Other output	/	±3	±5	%
Turn on Delay Time	Rated input voltage		/	10	/	ms
O/P voltage adjustment (Trim)	Input voltage range		90	/	110	%Vo
O/P Over voltage protection			110	130	160	%Vo
O/P Over current protection			110	150	200	%Io
Short Circuit Protection			Hiccup, continuous, self-recovery			
Note: 0% - 5% load ripple & noise ≤5%Vo, the ripple & noise test is conducted by the twisted pair test method (refer to the test instructions in page 3)						

General Specifications

Items	Test Conditions	Min.	Typ.	Max.	Unit
Switching Frequency	Operating Mode (PWM)	/	300	/	KHz
Operating Temperature	Refer to the Temperature Derating Curve	-40	/	+105	℃
Storage Temperature		-55	/	+125	
Max Case temperature	Within the operating curve	/	/	+105	
Pin Soldering Temperature	1.5mm from the case, 10 seconds	/	/	300	
Relative Humidity	No condensing	5	/	95	%RH
Isolation Voltage	Input to output, test 1min, leakage current <0.5mA	1500	/	/	VDC
	Input & output to Case, test 1min, leakage current<1mA	1000	/	/	

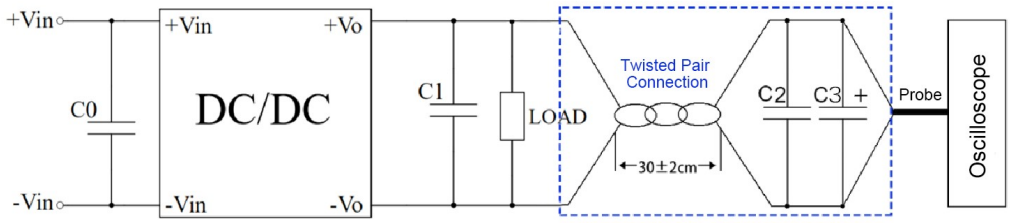
Isolation Capacitance	Input to output, 100KHz/0.1V	1000	/	/	pF
Insulation Resistance	Input to output, @ 500VDC	100	/	/	MΩ
MTBF	MIL-HDBK-217F@25℃	1000	/	/	K hours
Vibration	/	10-150Hz, 5G, 0.75mm. Along X, Y and Z			
Cooling Method	Nature air				
Case Material	Aluminum				

Weight / Dimension	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 Performance

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

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

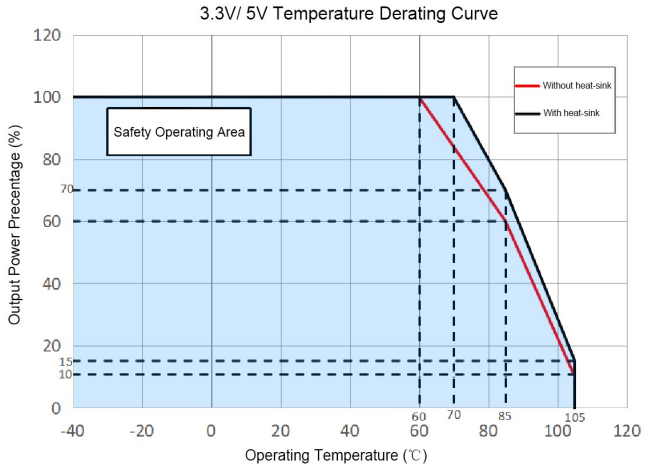


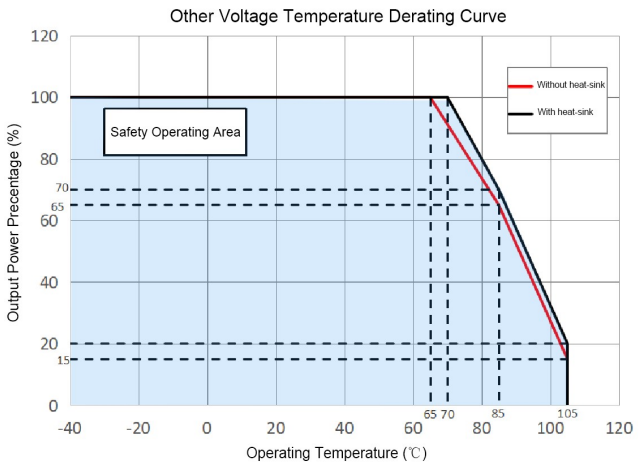
1) Ripple noise test need 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C2(0.1uF) polypropylene capacitor and C3(10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel with 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 started after input power on.

3) It is recommended to connect a ⩾5% load or a high-frequency resistance E-cap(⩾470uF) load at output to avoid the output ripple increasing.

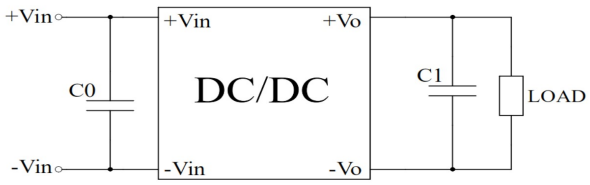
Product Performance Curve





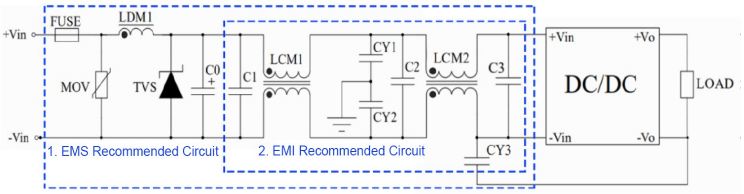
Application Circuits

1. DC/DC test circuit



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

2. Recommended external circuit for EMC



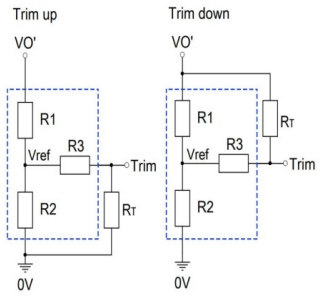
EMC Recommended Circuit

Note:

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

Component	Vin:24VDC	Vin:48VDC
FUSE	TBD by customer	
MOV	14D470K	14D101K
LDM1	56uH	56uH
TVS	SMCJ40A	SMCJ80A
C0	680uF/50V	680uF/100V
C1,C2,C3	4.7uF/50V	4.7uF/100V
LCM1	15mH	15mH
LCM2	56uH	56uH
CY1,CY2,CY3	1nF/2KV	1nF/2KV

3. Trim and calculation of Trim resistance



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

Rrim resistance calculating fomula

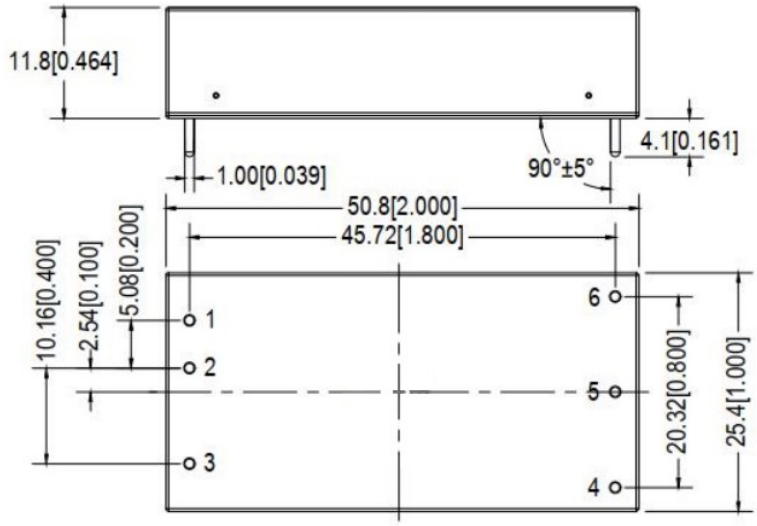
up: $R_T = \frac{aR_2}{R_2-a} - R_3$ $\quad a = \frac{Vref}{Vo'-Vref} \cdot R_1$

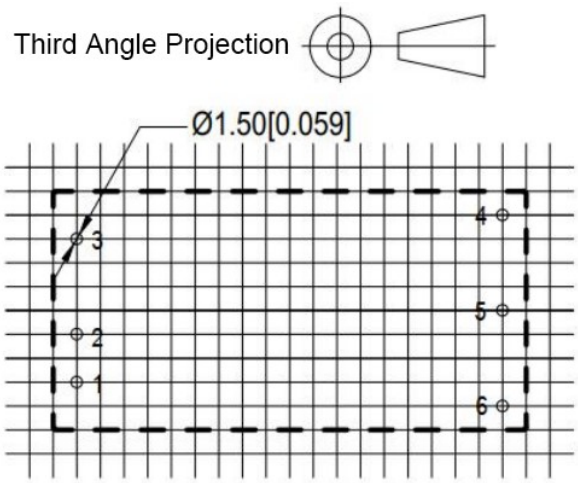
down: $R_T = \frac{aR_1}{R_1-a} - R_3$ $\quad a = \frac{Vo'-Vref}{Vref} \cdot R_2$

RT is the Trim resistor, a is a custom parameter,
Vo' 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) Packaging Dimensions

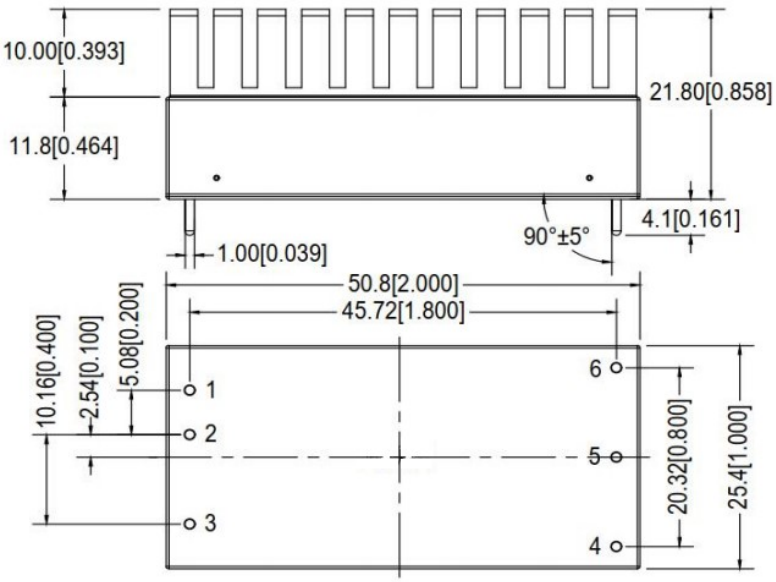


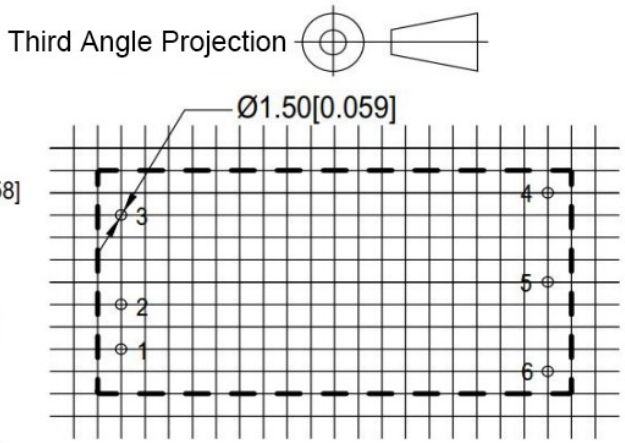


Note:
Lattic spacing 2.4*2.54mm
Unit: mm[inch]
Terminal diameter tolerance ±0.10[±0.004]
General tolerance ±0.50[±0.020]

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

B3-H (With heat-sink) Packaging Dimensions

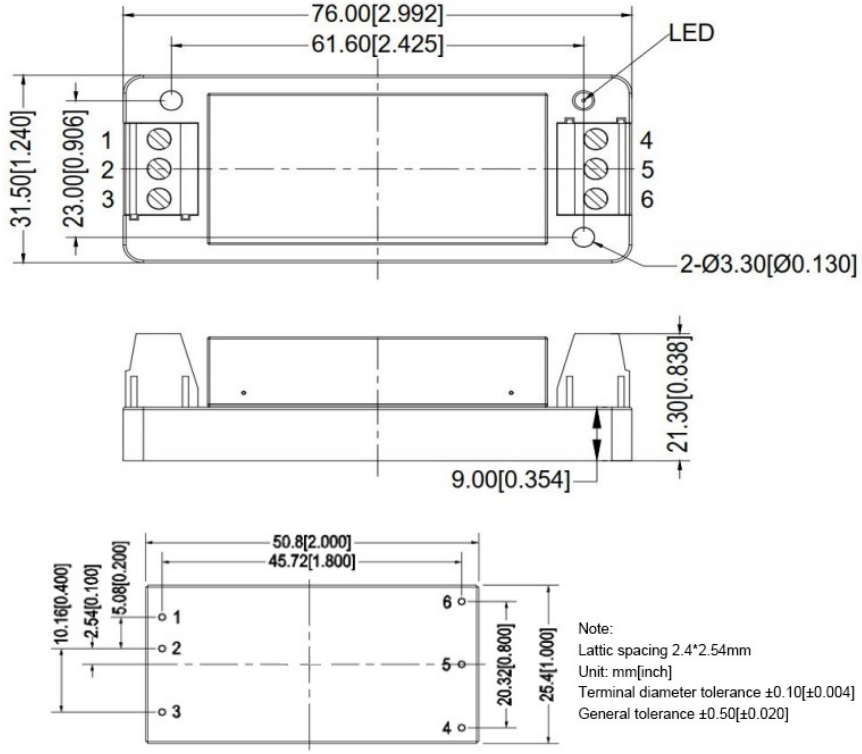




Note:
Lattic spacing 2.4*2.54mm
Unit: mm[inch]
Terminal diameter tolerance ±0.10[±0.004]
General tolerance ±0.50[±0.020]

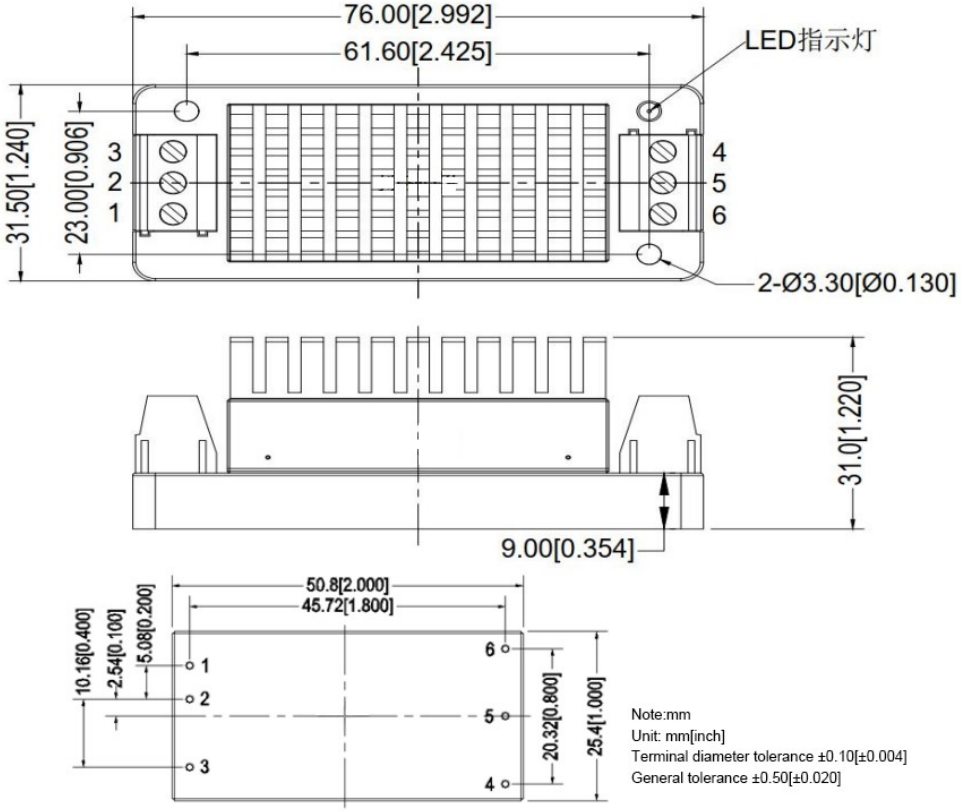
Pin No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-T (Without heat-sink) Packaging Dimensions



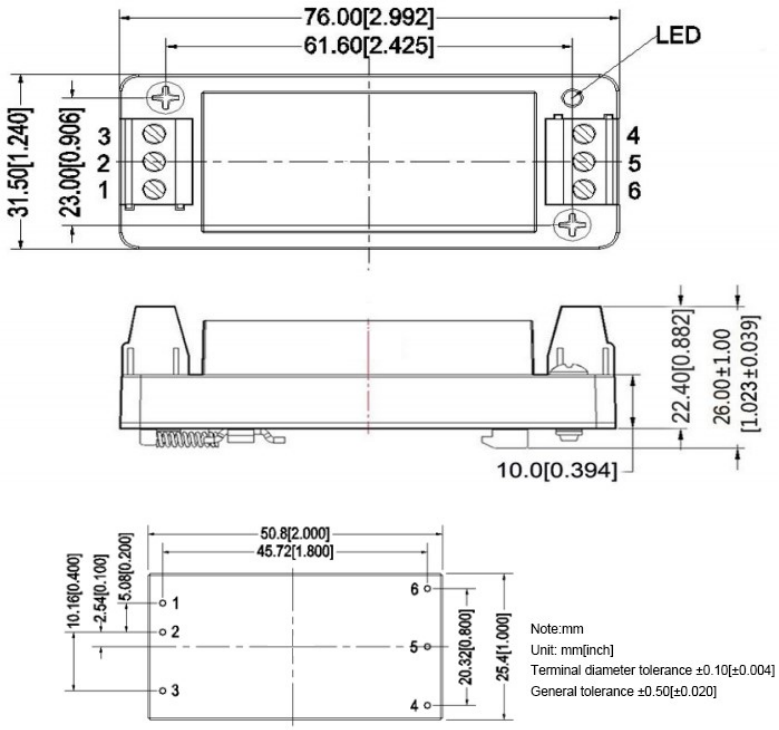
Pin No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-TH (With heat-sink) Packaging Dimensions



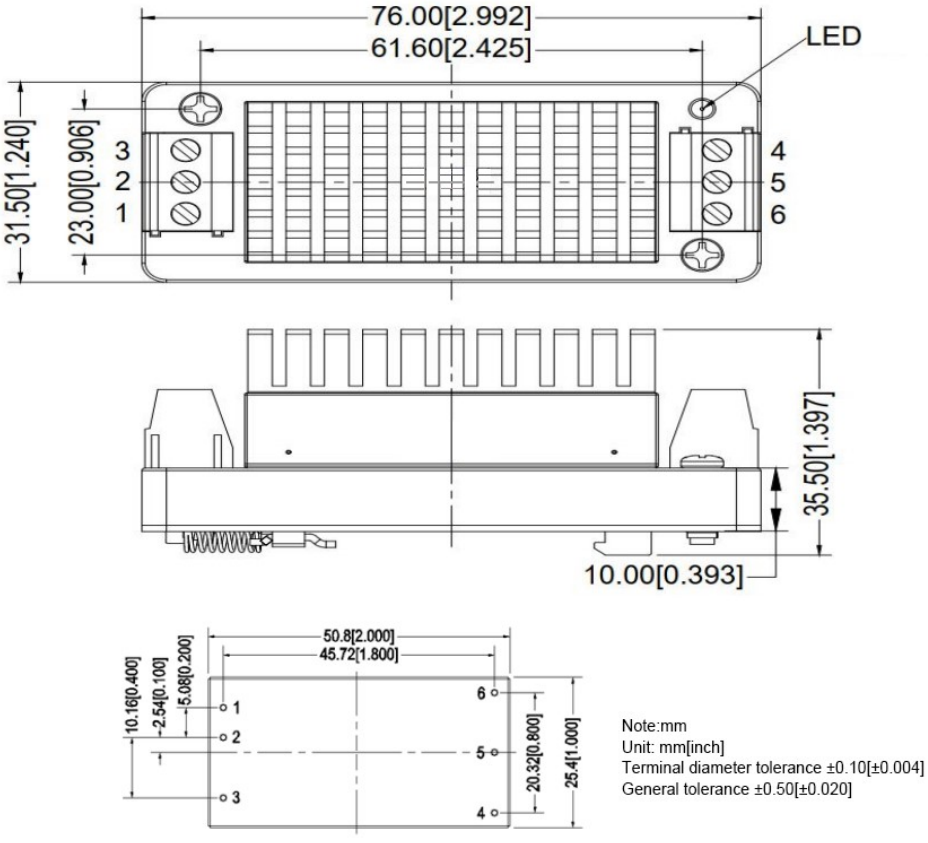
Pin No.	1	2	3	4	5	6
PFD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-TS (Without heat-sink) Packaging Dimensions



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

B3-TSH (With heat-sink) Packaging Dimensions



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

Application Notice

1.The products should be used according to the specifications in this manual, otherwise it could be permanently damaged.

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

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

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

5. All values or indicators in this manual had been tested based on Aipupower test specifications.

6.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.

7. Aipupower can provide customization service.

8. The product specifications may be modified without prior notice. Please refer to the published data sheet at Aipupower website.

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