

### Typical Features

- ◆ Wide input voltage range 4:1, Output Power 50W
- ◆ Transfer Efficiency up to 92%
- ◆ Stand-by Power Consumption as low as 0.1W
- ◆ Output fast start up
- ◆ Continuous Short Circuit protection, Self-recovery
- ◆ Protection: Input under voltage, output over voltage, short circuit, over current
- ◆ Isolation Voltage 1500VDC
- ◆ Operating Temperature:-40°C~+105°C
- ◆ Good EMI performance
- ◆ International standard pin-out



**FD50-XXSXXB3R2** is a newly developed DIP standard 2X1 package, 50W output power, wide voltage 4:1 input range, ultra-low standby power consumption, isolated voltage regulated output, DC-DC module power supply, which can be widely used in industrial control, instrumentation, communication, power, Internet of Things and other fields. When the product is used in an environment with relatively harsh electromagnetic compatibility, please refer to the application circuit provided by our company.

### Typical Product List

Part No	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current (mA) (Nominal Voltage)		Max. Capacitive Load (u F)	Ripple & Noise 20MHz (MAX)		Efficiency (%)						
	Nominal	Range	Voltage (V)	Current (A)	Full load (mA)	No Load (mA)		Typ.	Max.	Min	Typ.					
FD50-18S05B3(R)2	24	9-36	5	10	1145	2	18000	170	200	89	91					
FD50-18S12B3(R)2			12	4.167	1133	4						3700	200	250	90	92
FD50-18S15B3(R)2			15	3.333	1133	4						2000	200	250	90	92
*FD50-18S24B3(R)2			24	2.083	1133	3						1000	180	350	90	92
FD50-36S05B3(R)2	48	18-75	5	10	1145	2	18000	170	200	89	91					
*FD50-36S12B3(R)2			12	4.167	1133	4						3700	200	250	90	92
*FD50-36S15B3(R)2			15	3.333	1133	4						2000	200	250	90	92
FD50-36S24B3(R)2			24	2.083	1133	3						1000	180	350	90	92

Note 1: "\*" indicates a model under development; R indicates a model with both control and adjustment pins, C indicates a model with only control function, T indicates a model with only adjustment function, and N indicates a model without control and adjustment functions;

Note 2: -H indicates a model with heat sink, -T (H) indicates a wiring type (with heat sink) package, and -TS (H) indicates a guide rail type (with heat sink) package, with a guide rail width of 35mm;

Note 3: The maximum capacitive load refers to the capacitance capacity allowed to be connected to the output when the power supply is fully

loaded and started. If the capacity exceeds this, the power supply may not start;

Note 4: The above efficiency is measured by the nominal input voltage and the output rated load;

Note 5: Due to limited space, the above is only a partial list of products. If you need products outside the list, please contact our sales department.

**Input Specification**

Item	Condition	Min.	Typ.	Max.	Unit
Standby power consumption	Input voltage range	/	0.1	/	W
Input under-voltage protection	24 nominal input	/	6.5	/	VDC
	48 nominal input	/	14.5	/	
Input Surge Voltage (1Sec)	24 nominal input	-0.7	/	50	
	48 nominal input	-0.7	/	100	
Hot plug	/	Unavailable			
Input Filter	/	Pi filter			
CTRL*	Module turn-on	Suspended or connect to High level(3V-12VDC)			
	Module turn-off	Connect to -Vin or connect to low level (0-1.2VDC)			
	Input current when switched off	100mA(Typ.)			

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

**Output Specification**

Item	Condition	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	Input voltage range	/	±1	±3	%	
Voltage Regulation	Full voltage range, full load	/	±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	
Dynamic Recovery Time	25% of nominal load step, nominal input voltage	/	/	300	500	us
Dynamic Response Deviation		3.3V/5V output	/	±3	±8	%
		Other output	/	±3	±5	%
Start Delay Time	Input nominal voltage	/	10	/	ms	
Output voltage adjustable (Trim)	Input voltage range	90	/	110	%Vo	
Output Over-voltage Protection		110	130	160	%Vo	
Output Over-current Protection		110	150	200	%Io	
Short circuit Protection		Hiccup, continuous, self-recovery				

Note: 0% - 5% load ripple & noise is less than or equal to 5%Vo; the ripple & noise test adopts the twisted pair test method, see the ripple & noise test instructions for details.

**General Specification**

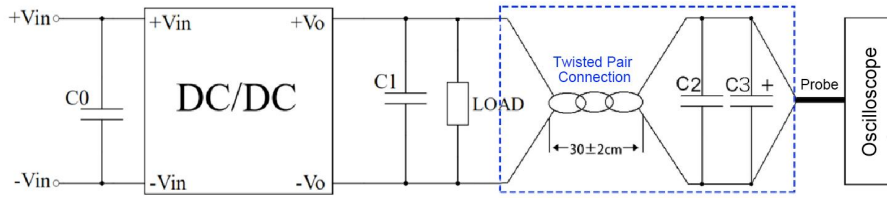
Item	Condition	Min.	Typ.	Max.	Unit
Switching Frequency	Working mode (PWM)	/	220	/	KHz
Operating Temperature	Refer to temperature derating curve	-40	/	+105	°C
Storage Temperature	/	-55	/	+125	
Max Case Temperature	Within the working curve	/	/	+105	
Pin withstand soldering temp	The distance between the soldering point and the shell is 1.5mm, 10 seconds	/	/	300	
Relative Humidity	No condensation	5	/	95	%RH
Isolation Voltage	Input to output, test for 1min, leakage current is less than 0.5mA	1500	/	/	VDC
	Input/output to case, test for 1 minute, leakage current is less than 1mA	1000	/	/	VDC
Isolation Capacitor	Input-output, 100KHz/0.1V	1000	/	/	pF
Insulation resistance	Input-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	Natural air cooling				
Case Material	Aluminum				
Weight/ Dimension	Model	Weight Typ.	L x W x H		
	FD50-XXSXXB3R2	39g	50.8 X 25.4 X 11.8 mm		2.00 X 1.00 X 0.464 inch
	FD50-XXSXXB3R2-H	51g	50.8 X 25.4 X 21.8 mm		2.00 X 1.00 X 0.858 inch
	FD50-XXSXXB3R2-T	60g	76.0 X 31.5 X 21.3 mm		2.99 X 1.24 X 0.838 inch
	FD50-XXSXXB3R2-TH	72g	76.0 X 31.5 X 31.0 mm		2.99 X 1.24 X 1.220 inch
	FD50-XXSXXB3R2-TS	80g	76.0 X 31.5 X 26.0 mm		2.99 X 1.24 X 1.023 inch
	FD50-XXSXXB3R2-TSH	92g	76.0 X 31.5 X 35.5 mm		2.99 X 1.24 X 1.397 inch

**EMC Characteristics**

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

Surge	IEC/EN61000-4-5	±2KV	Perf.Criteria B (EMC Recommended Circuit)
EFT	IEC/EN61000-4-4	±2KV	Perf.Criteria B (EMC Recommended Circuit)

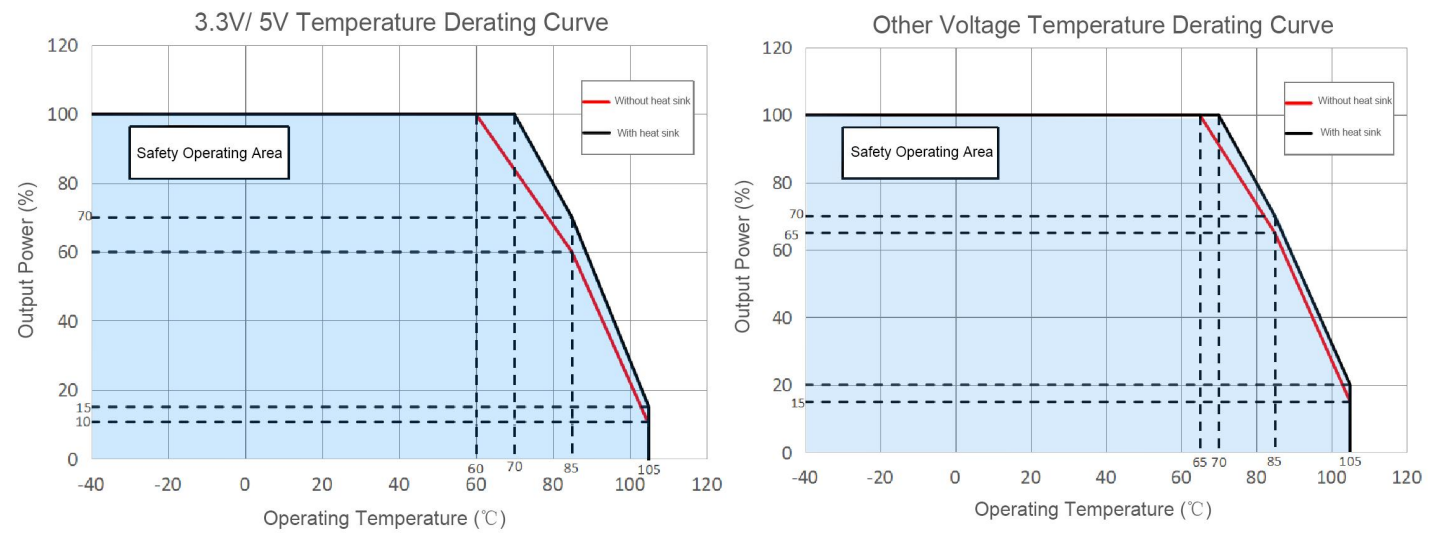
**Ripple & Noise Test (Twisted Pair Method 20MHz Bandwidth)**



Test conditions:

- Ripple noise is connected using 12# twisted pair cable, oscilloscope sampling uses sampling mode, oscilloscope bandwidth is set to 20MHz, 100M bandwidth probe is used, probe cap and ground clip are removed; and C2 (0.1uF) polypropylene capacitor and C3 (10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel at the probe end of the twisted pair cable, and the capacitance values of C0 and C1 refer to the design application circuit data;
- Ripple noise test: The module input end (INPUT) is connected to the input power supply, and the power supply output is connected to the electronic load (LOAD) through the power line. The test is sampled from the power supply output port using a 30±2 cm twisted pair cable alone, and connected to the oscilloscope probe according to polarity.
- It is recommended to output a minimum 5% load or connect an electrolytic capacitor with a high-frequency resistance of more than 470uF, otherwise the output voltage ripple will increase;

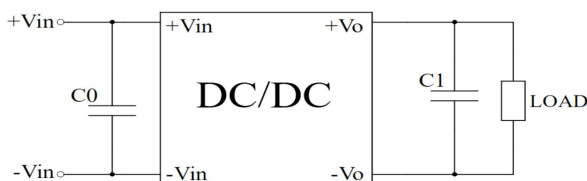
**Product Characteristic Curve**



**Design and Application Reference**

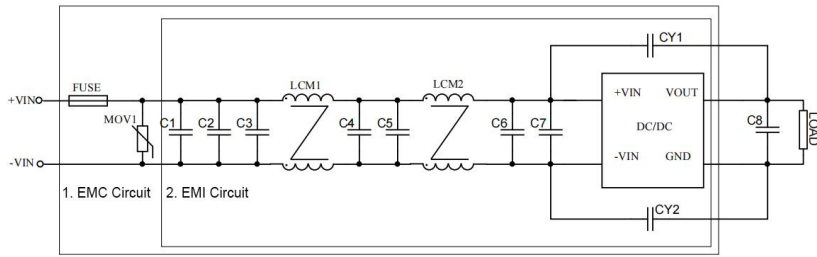
Recommended circuit

1. DC/DC test circuit:



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

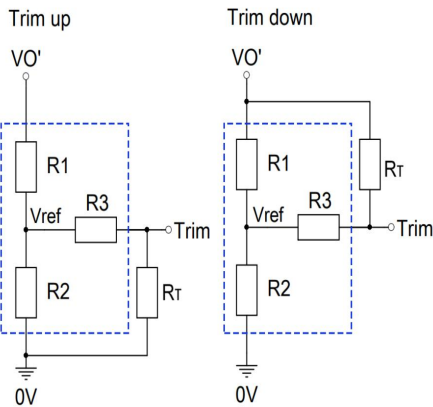
**2. Recommended EMC peripheral circuits**



Component	Vin:24VDC	Vin:48VDC
FUSE	Choose according to customer needs	
MOV1	14D560K	14D101K
C1	1000uF/50V	470uF/100V
C7	470uF/50V	470uF/100V
C2/C3/C4/C5/C6	10uF/50V	10uF/100V
LCM1	5mH	5mH
LCM2	250uH	250uH
C8	100uF/50V	100uF/100V
CY1,CY2	2.2nF/2000V	

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

**3. Use of Trim and calculation of Trim resistance**



Trim resistance calculation formula:

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

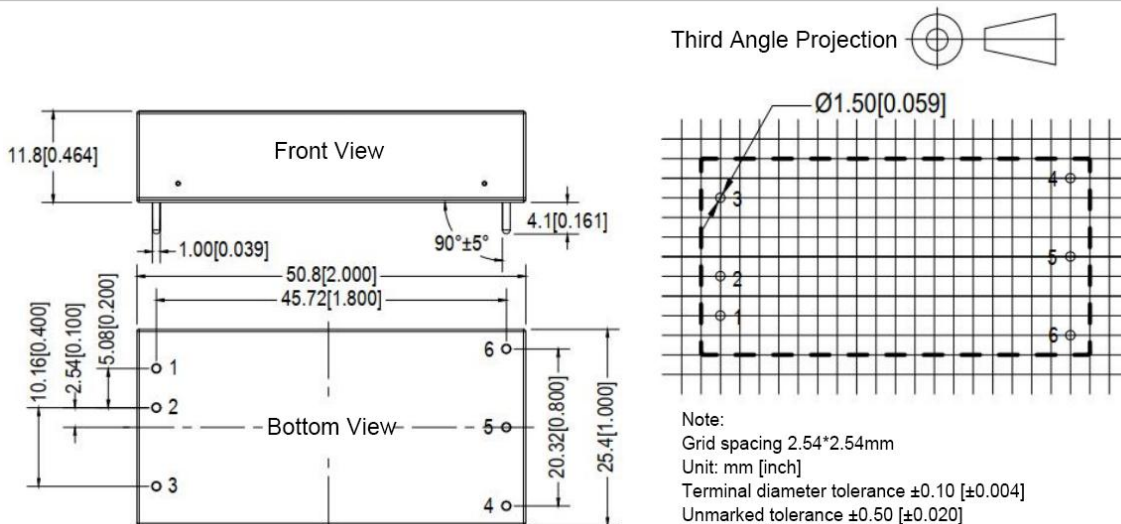
$$\text{down: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3 \quad \alpha = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2$$

RT is the Trim resistor, a is a custom parameter, and Vo' is the actual voltage that needs to be adjusted up or down.

Note: Trim uses circuits, and the dotted box area is the interior of the product

Output Voltage	Trim uses internal circuit parameters			
	Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(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

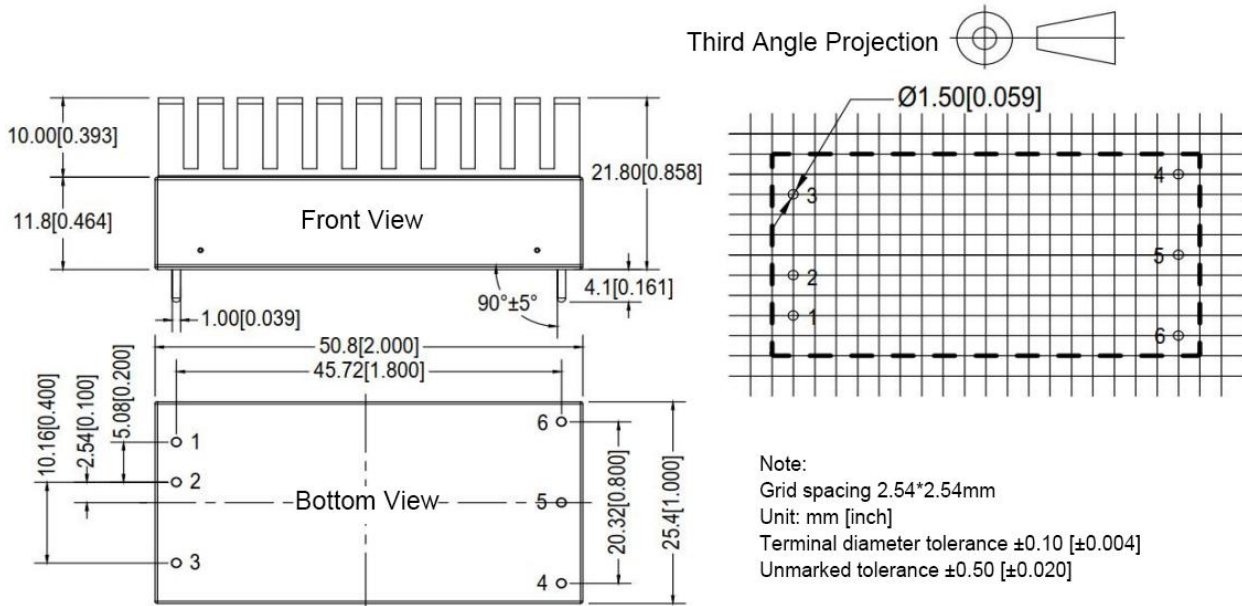
**B3 Package (without Heat Sink)**





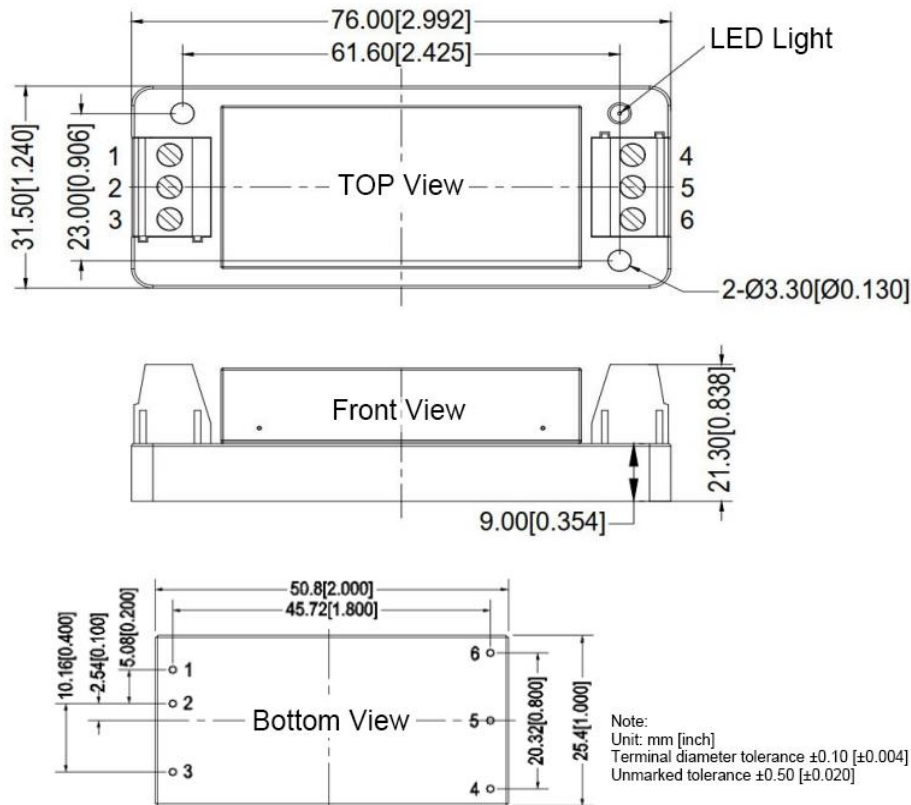
Pin	1	2	3	4	5	6
FD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

**B3-H Package (with Heat Sink)**



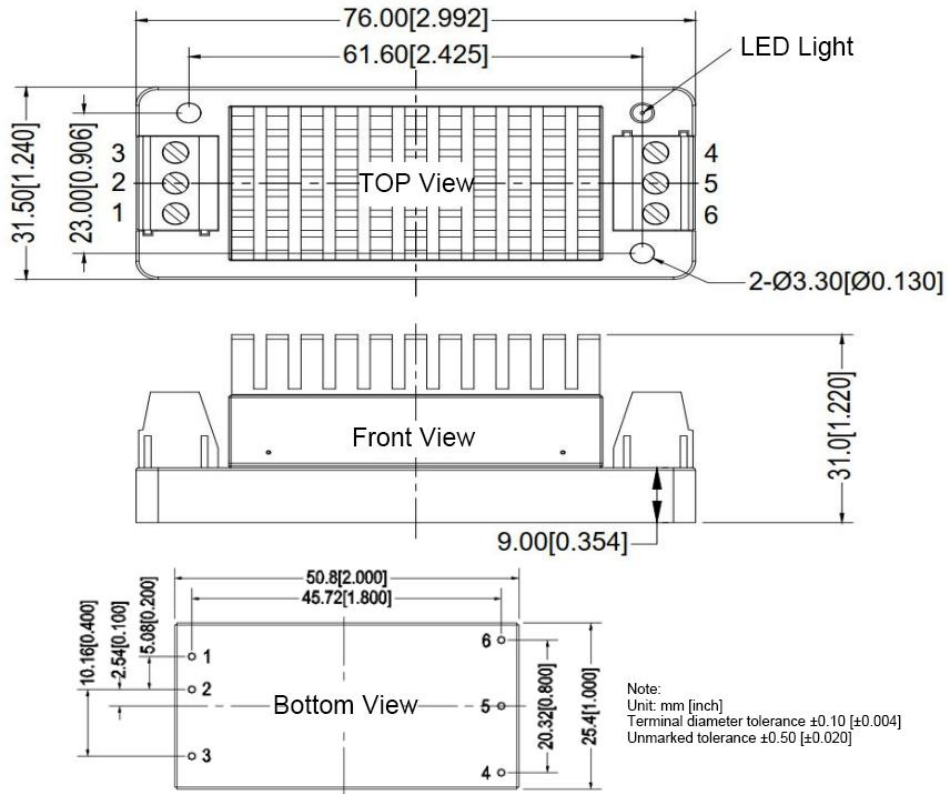
Pin	1	2	3	4	5	6
FD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

**B3-T Package (without Heat Sink)**



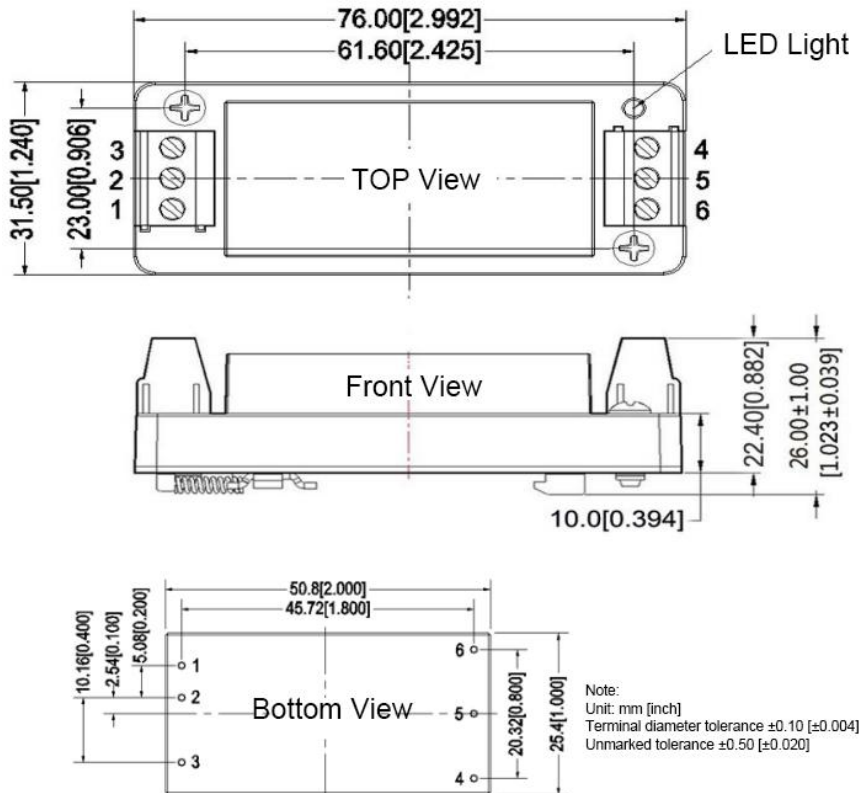
Pin	1	2	3	4	5	6
FD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

**B3-TH Package(with Heat Sink)**



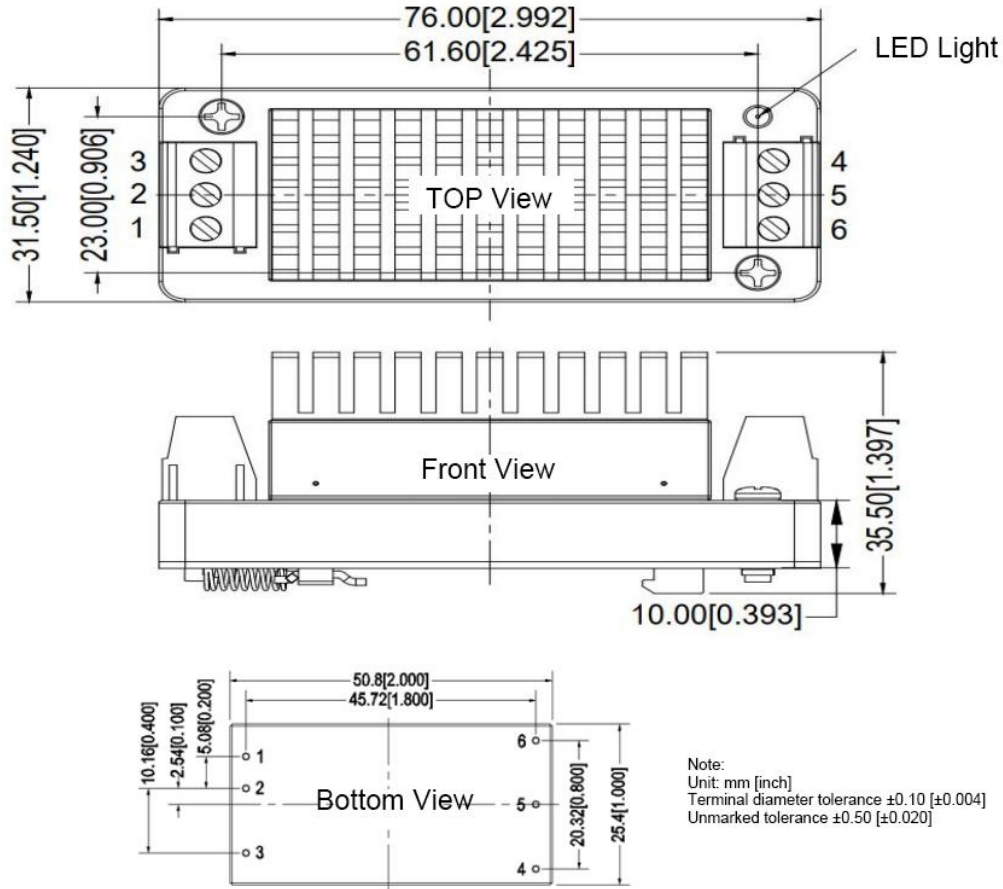
Pin	1	2	3	4	5	6
FD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

**B3-TS Package(without Heat Sink)**



Pin	1	2	3	4	5	6
FD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

**B3-TSH Package(with Heat Sink) Dimension**



Pin	1	2	3	4	5	6
FD50-XXSXXB3R2	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

**Package Description**

Packing Code	1	2	3	4	5	6
FD50-XXSXXB3C2	+Vin	-Vin	Ctrl	NC	-Vo	+Vo
FD50-XXSXXB3T2	+Vin	-Vin	NC	Trim	-Vo	+Vo
FD50-XXSXXB3N2	+Vin	-Vin	NC	NC	-Vo	+Vo



**Note:**

1. The product should be used within the specification range, otherwise it will cause permanent damage to the product;
2. 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;
3. 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;
4. 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);
5. All the above index test methods are based on our company's standards;
6. The above are the performance indicators of the product models listed in this manual. Some indicators of non-standard model products will exceed the above requirements. For specific circumstances, please contact our technical personnel directly;
7. Our company can provide product customization;
8. Product specifications are subject to change without prior notice. Please pay attention to the latest manual published on our official website.

**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>