Typical Features

- Wide input voltage range (4:1), Output Power 20W
- Transfer Efficiency up to 89%
- Stand-by Power Consumption as low as 0.2W
- Output fast start up
- Continuous Short Circuit protection, Self-recovery
- Input under voltage, output over voltage, short circuit, over current protection
- Isolation Voltage 1500VDC
- Operating Temperature: -40°C~+85°C
- Good EMI performance
- International standard pin-out

Application Field

FD20-XXSXXB1(C)2 *is a newly designed DIP 2X1 packed 20W output power, ultra wide input range 4:1, low stand-by power consumption, isolated regulated output DC-DC converter, could be widely used for industrial control, instrument, communication, power electricity, internet of things field. For harsh EMC environment, the application circuit in the datasheet is strongly recommended.*

Typical Product List

Part No	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current (mA) @ Nominal Voltage		Max. Capacitive Load	Ripple & Noise (mVp-p)		Full Load Efficiency (%)	
	Nominal	Range	Voltage (VDC)	Current (mA) Max./ Min.	Full load (Typ.)	No Load (Typ.)	u F	Typ.	Max.	Min.	Typ.
FD20-18S3V3B1C2	24	9-36	3.3	4000/0	650	50	8000	50	100	82	84
FD20-18S05B1C2	24	9-36	5	4000/0	934	57	6000	50	100	85	87
FD20-18S09B1C2	24	9-36	9	2222/0	936	30	2000	50	100	87	89
FD20-18S12B1C2	24	9-36	12	1667/0	940	5	500	50	100	86	88
FD20-18S15B1C2	24	9-36	15	1333/0	928	7	1000	50	100	87	89
FD20-18S18B1C2	24	9-36	18	1111/0	940	5	500	50	100	87	89
FD20-18S24B1C2	24	9-36	24	833/0	926	2	500	50	100	88	90
FD20-18S28B1C2	24	9-36	28	714/0	950	8	500	50	100	87	89

Note 1: C means with control pin, N means without control pin;

Note 2: -H means with heat sink, -T (H) means wiring type (with heat sink) package, -TS (H) means guide rail type (with heat sink) package, guide rail width is 35mm;

Note 3: Maximum capacitive load refers to the capacitance capacity that the output allows to be connected when the power supply starts at full load. If the capacity is exceeded, the power supply may not start;

Note 4: In order to reduce no-load power consumption and improve light-load efficiency, the IC works in a frequency-jittering state

when no-load and light-load. The output cannot be no-loaded, and at least 15% load or electrolytic capacitor with a high-frequency resistance of more than 470uF must be carried, otherwise the output voltage ripple will increase;

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

Input Specification

Item	Working conditions	Min	Typ.	Max	Unit
Standby power consumption	Input voltage range	/	0.2	/	W
Input under voltage protection	24Vdc Normal Input	5	/	9	VDC
	48Vdc Normal Input	11	/	18	
Input surge voltage (1sec.max)	24Vdc Normal Input	-0.7	/	50	
	48Vdc Normal Input	-0.7	/	100	
Hot Plug	N/A				
Input filter	π filter				
CTRL	Module is turned on	CTRL is left floating or connected to high level (2.5V-12VDC)			
	Module shutdown	CTRL connected to-Vin or low level(0-1.2VDC)			
	Input current at shutdown	5mA (TYP)			

*Ctrl controls the voltage on the pin relative to the input -Vin pin.

Output Specification

Items	Test Conditions		Min	Typ.	Max	Unit
Output Voltage Accuracy	Input voltage range		/	±1	±2	%
Voltage Regulation	Full voltage range, full load		/	±0.2	±0.5	%
Load Regulation	5%~100% load		/	±0.2	±0.5	%
Ripple & Noise	15%-100%load, 20MHz bandwidth		/	50	100	mVp-p
Dynamic Response	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		/	150	/	ms
Output voltage adjustable (Trim)	Input voltage range		Unavailable			
Output over-voltage Protection			110	150	200	%Vo
Output over-current Protection			110	160	220	%Io
Output start-up overshoot voltage			/	/	10	%Vo
Output Short circuit Protection			Continuous, self-recovery			

Note: 0% - 15% 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

Items	Test Conditions	Min	Typ.	Max	Unit
Switching Frequency	Operating mode（PWM）	/	300	/	KHz
Operating Temperature	Refer to temperature derating curve	-40	/	+85	℃
Storage Temperature	/	-55	/	+125	
Max Case Temperature	Refer to product characteristic curve	/	/	+105	
Pin resistance soldering temperature	The distance between the soldering point and the shell is 1.5mm, 10 seconds	/	/	300	

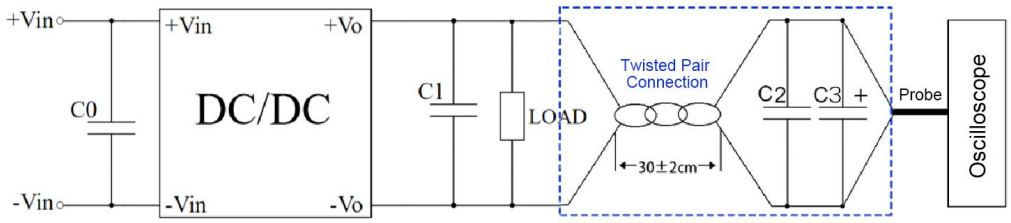
Relative Humidity	No condensation	5	/	95	%RH
Isolation Voltage	I/P-O/P, test for 1min, leakage current is less than 0.5mA	1500	/	/	VDC
MTBF	MIL-HDBK-217F@25℃	1000	/	/	K Hrs
Cooling method	Natural air cooling				
Shell material	Metal Aluminum				

Weight/ Dimension	Model No.	Weight (Typ)	L x W x H	
	FD20-XXSXXB1(C)2	30g	50.8 X 25.4 X 10.5 mm	2.00 X 1.00 X 0.413 inch
	FD20-XXSXXB1(C)2-H	42g	50.8 X 25.4 X 20.5 mm	2.00 X 1.00 X 0.807 inch
	FD20-XXSXXB1(C)2-T	51g	76.0 X 31.5 X 21.3 mm	2.99 X 1.24 X 0.838 inch
	FD20-XXSXXB1(C)2-TH	63g	76.0 X 31.5 X 30.5 mm	2.99 X 1.24 X 1.200 inch
	FD20-XXSXXB1(C)2-TS	71g	76.0 X 31.5 X 26.0 mm	2.99 X 1.24 X 1.023 inch
	FD20-XXSXXB1(C)2-TSH	83g	76.0 X 31.5 X 34.0 mm	2.99 X 1.24 X 1.342 inch

EMC Characteristics

EMI	CE	CISPR32/EN55032	CLASS B	（EMC Recommended Circuit）
	RE	CISPR32/EN55032	CLASS B	（EMC Recommended Circuit）
EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria B	（EMC Recommended Circuit）
	CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria B	（EMC Recommended Circuit）
	ESD	IEC/EN61000-4-2	Contact ±4KV 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）
	Voltage dips and interruptions	IEC/EN61000-4-11	0%~70% Perf.Criteria B	

Ripple & Noise Test (Twisted Pair Method)

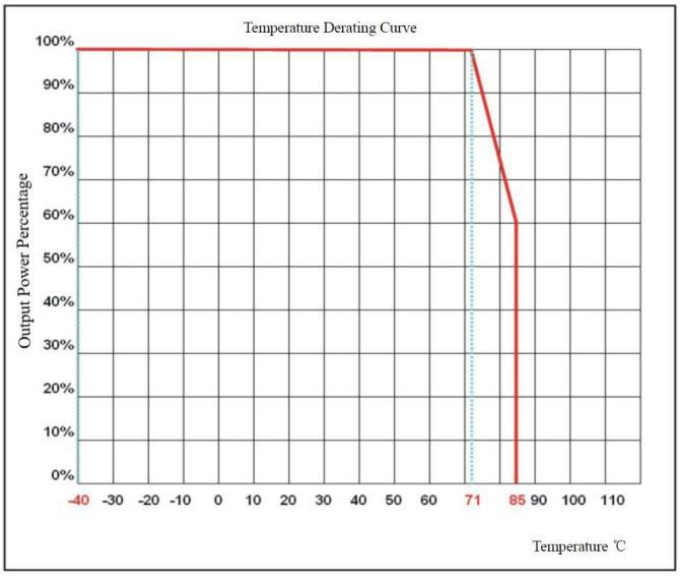


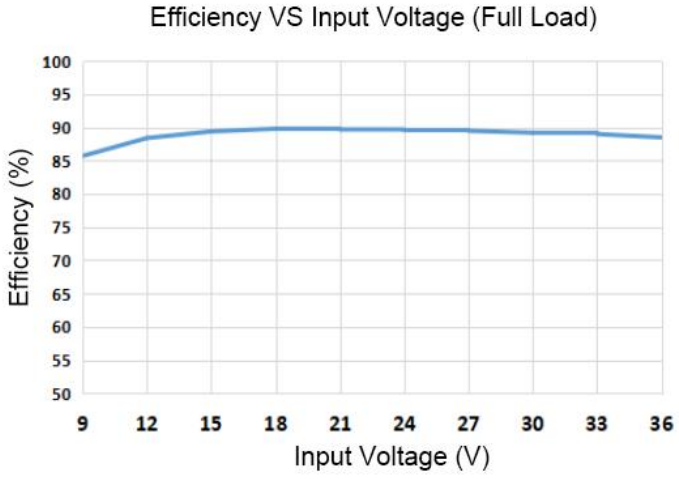
Test conditions:

1. 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;

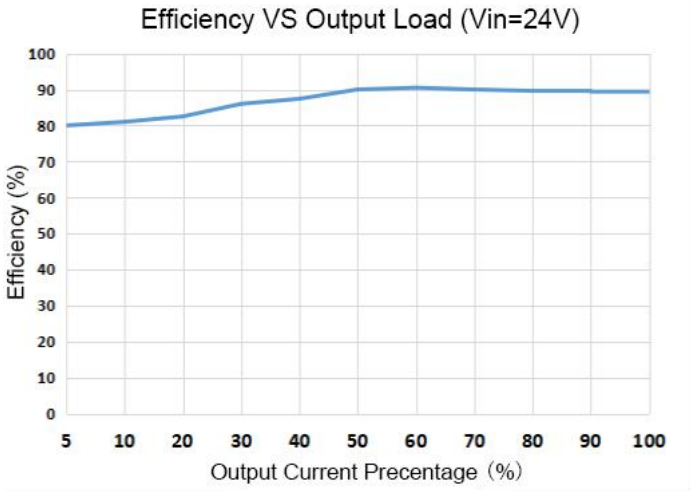
2. Ripple noise test: The module input end (INPUT) is connected to the input power supply, and the power supply output is connected to the electronic load (LOAD) through the power line. The test is sampled from the power supply output port using a 30±2 cm twisted pair cable alone, and connected to the oscilloscope probe according to polarity.

Characteristic Curve





FD20-18S28B1C2

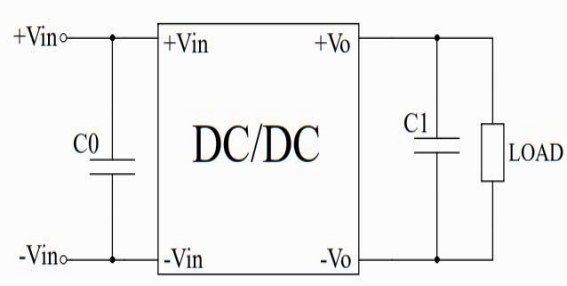


FD20-18S28B1C2

Design and Application Reference

Recommended circuit

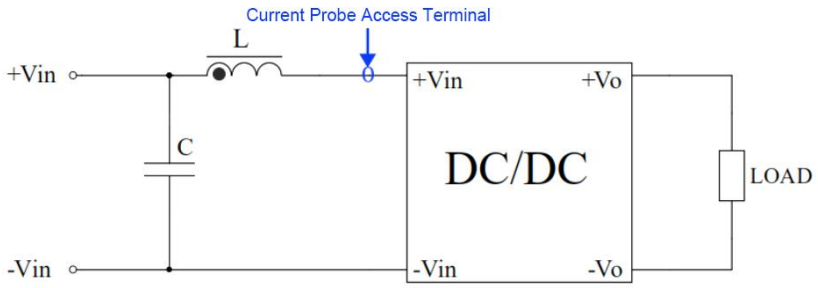
1. This series of module power supplies are tested according to this peripheral circuit before leaving the factory. Increasing the capacity of C0 or C1 can reduce the output ripple, but the output capacity must be less than the maximum capacitive load;



Parameter Description:

Components	Parameter
C0	47-100uF/100V
C1	330uF/50V

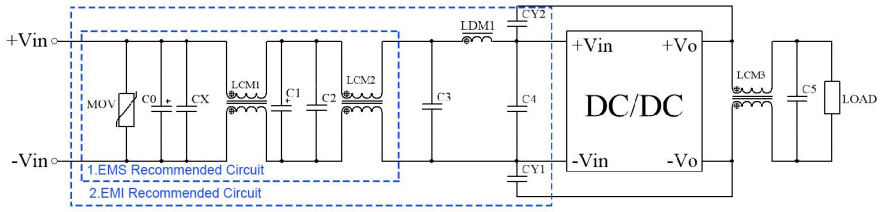
2. Input reflected ripple current test peripheral circuit:



arameter Description:

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

3. Recommended EMC peripheral circuits:



EMC Recommended Circuit

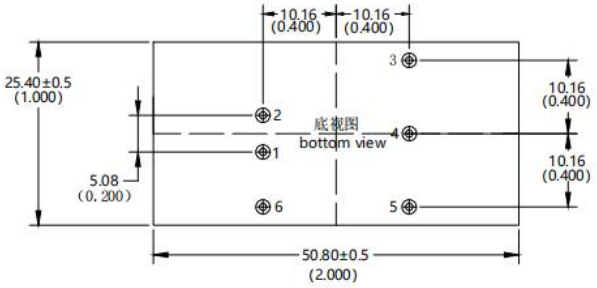
Note: Part 1 in EMC Recommended Circuit is for EMS testing, and part 2 in the figure is for EMI filtering, which can be adjusted according to the situation.

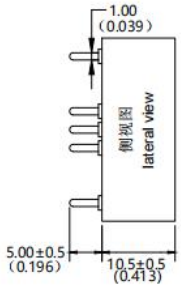
Parameter Description:

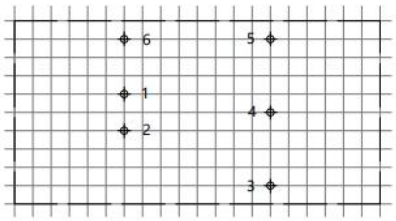
Components	Vin:24VDC	Vin:48VDC
FUSE	Choose according to customer needs	
MOV	14D560K	14D101K
CX	0.47uF	0.47uF
LDM1	56uH	56uH
C0,C1	220uF/50V	220uF/100V
C2,C3,C4	1uF/50V	1uF/100V
C5	10uF/50V	10uF/50V
LCM1	10mH	10mH
LCM2	1mH	1mH
LCM3	50uH	30uH
CY1,CY2	2.2nF/2KV	2.2nF/2KV

B1 Package (without Heat-sink) Dimension

单位（Unit：）：mm
印刷板俯视图（Printed board vertical view）
栅格间距（Lattic spacing）：2.54mm（0.1inch）
Unmarked DimensionTolerance: ±0.50mm
Unmarked Pin Diameter Tolerance: ±0.10mm

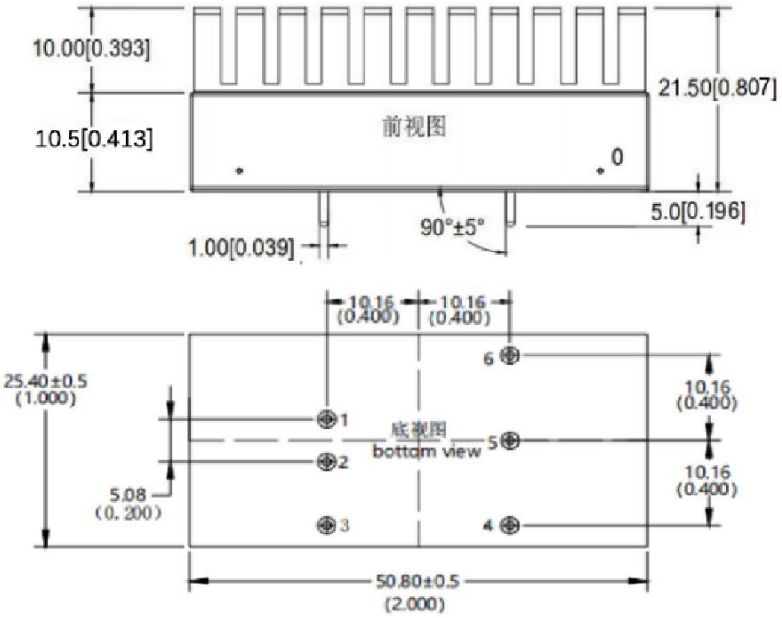


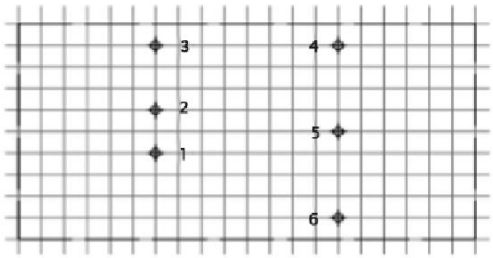




Pin Definition						
FD20-XXSXXB1C	1	2	3	4	5	6
	+Vin	-Vin	Ctrl	GND	NP	+Vo

B1-H Package(with Heat-sink) Dimension



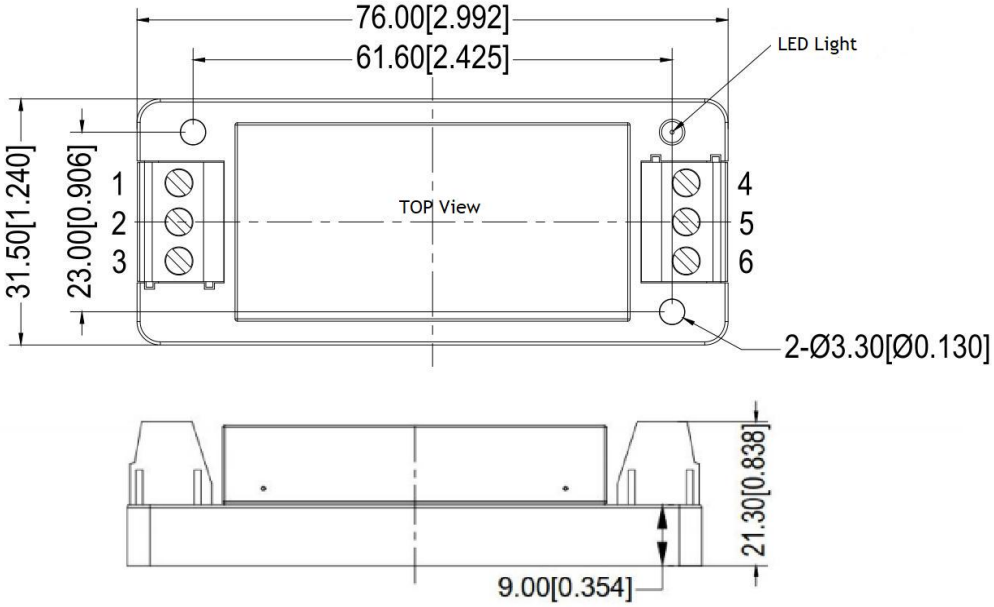


单位（Unit：）：mm
印刷板俯视图（Printed board vertical view）
栅格间距（Lattic spacing）：2.54mm（0.1inch）
Unmarked DimensionTolerance: ±0.50mm
Unmarked Pin Diameter Tolerance: ±0.10mm

Pin Definition

FD20-XXSXXB1C2	1	2	3	4	5	6
	+Vin	-Vin	Ctrl	GND	NP	+Vo

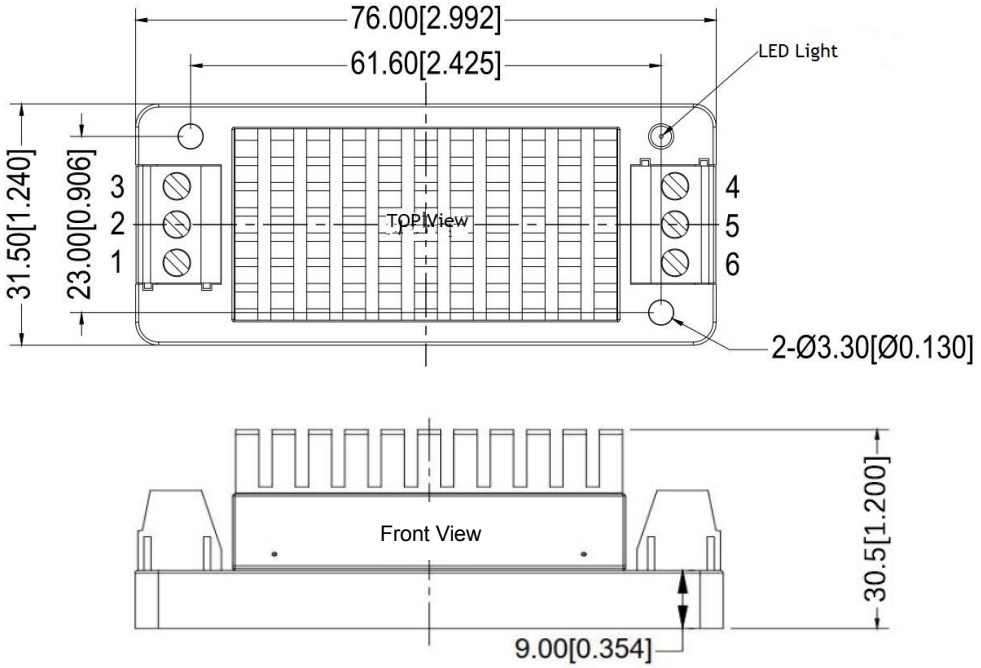
B1-T Package (without Heat-sink) Dimension



Pin Definition

FD20-XXSXXB1C2	1	2	3	4	5	6
	+Vin	-Vin	Ctrl	GND	NP	+Vo

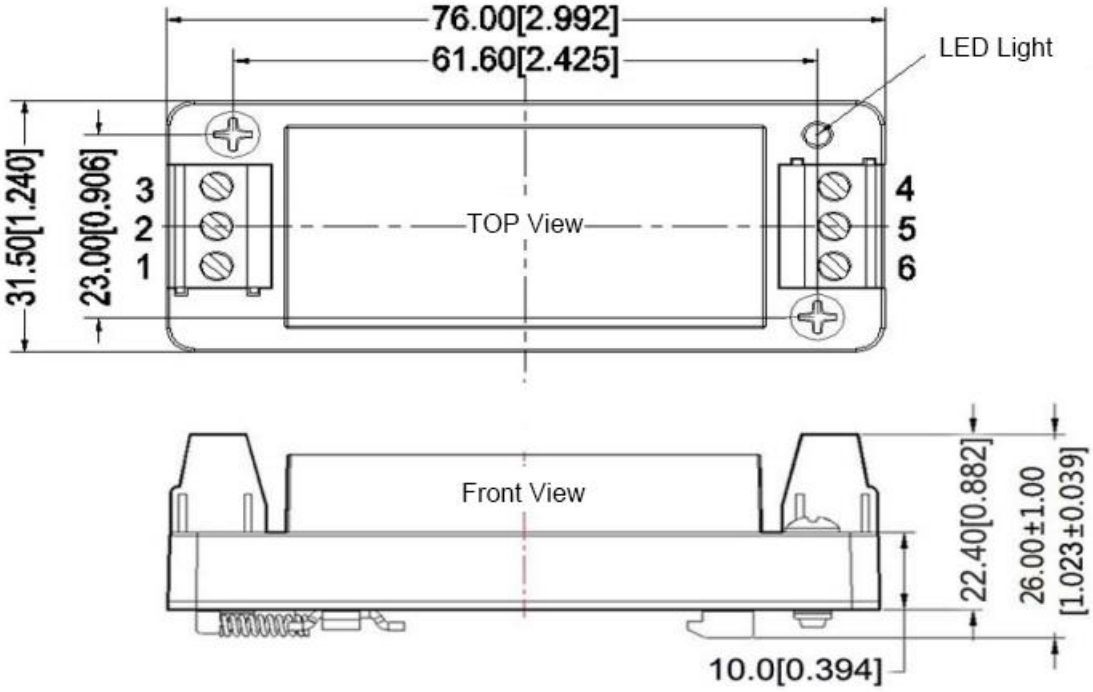
B1-TH(with heat-sink) Package Dimension and Pin Function



Pin Definition

FD20-XXSXXB1C2	1	2	3	4	5	6
	+Vin	-Vin	Ctrl	GND	NP	+Vo

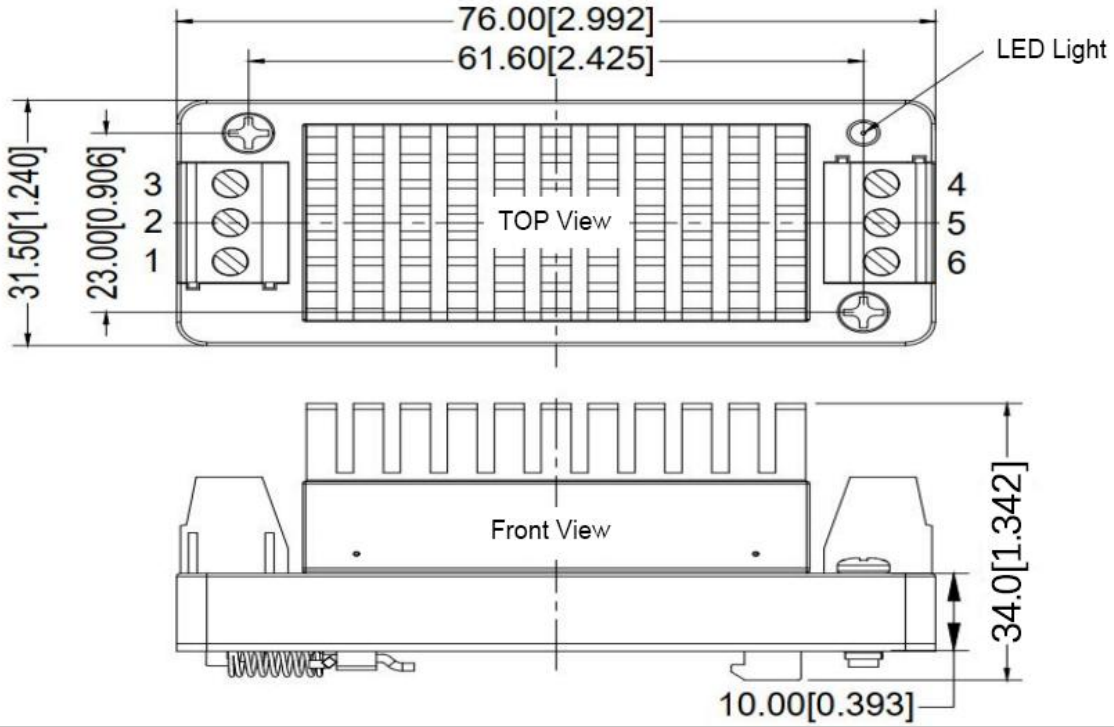
B1-TS Package Dimension



Pin Definition

FD20-XXSXXB1C2	1	2	3	4	5	6
	+Vin	-Vin	Ctrl	GND	NP	+Vo

B1-TSH(with heat-sink) Package Dimension



Pin Definition

FD20-XXSXXB1C2	1	2	3	4	5	6
	+Vin	-Vin	Ctrl	GND	NP	+Vo

Other Models Pin Definition

Pin	1	2	3	4	5	6
FD20-XXSXXB1N2	+Vin	-Vin	NP	GND	NP	+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 Ta=25℃, 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.

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