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 super-fast start up
- Continuous Short Circuit protection, Self-recovery
- Input under voltage, output over voltage, short circuit, over current protection
- Isolation Voltage 5000VDC
- Operating Temperature: -40°C~+85°C
- Good EMI performance
- International standard pin-out

Application Field

FD20-110SXXB3C5 *series products have an output power of 20W, ultra-wide voltage input of 40-160VDC, low standby power consumption, ultra-fast startup, isolated and regulated single output, DIP package, DC-DC module power supply, which can be widely used in industrial control, instrumentation, communication, power, Internet of Things, railway 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	Ripple & Noise (mVp-p)		Efficiency (%)@ output full load	
	Nominal	Range	Voltage (VDC)	Current (mA)	Full load typ.	No Load typ.	uF	Typ.	Max.	Min.	Typ.
*FD20-110S3V3B3C5	110	40-160	3.3	5000	176	30	10000	50	100	83	85
*FD20-110S05B3C5	110	40-160	5	4000	209	30	8000	50	100	85	87
*FD20-110S09B3C5	110	40-160	9	2222	207	30	4000	50	100	86	88
FD20-110S12B3C5	110	40-160	12	1667	207	1	2000	50	100	86	88
FD20-110S15B3C5	110	40-160	15	1333	204	1	1000	50	100	85	87
FD20-110S24B3C5	110	40-160	24	833	204	1	600	50	100	87	89
*FD20-110S40B3C5	110	40-160	40	500	207	1	600	50	100	86	88

Note 1: "*" indicates a model under development; C indicates a model with a control pin, and N indicates a model without a control pin;

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

Note 3: The maximum capacitive load refers to the capacitance allowed to be connected to the output when the power supply is fully loaded and started. If the capacitance exceeds this value, the power supply may not start;

Note 4: In order to reduce no-load power consumption and improve light-load efficiency, the IC operates in a frequency-jittering state when no-load and light-load, and the output cannot be no-loaded. It must carry at least 20% load or an electrolytic capacitor with a high-frequency resistance of more than 330uF, otherwise the output voltage ripple will increase;

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	Working conditions	Min	Typ.	Max	Unit
Standby power consumption	Input voltage range	/	0.2	/	W
Input under voltage protection	110Vdc Normal Input	32	/	40	VDC
Input surge voltage (1sec.max)	110Vdc Normal Input	-0.7	/	180	
Start-up Time	/	/	40	/	ms
Hot Plug	N/A				
Input filter	Pi filter				
Reflected Ripple Current	110V nominal input series	30mA (Typ)			
CTRL	Module is turned on	CTRL is left floating or connected to high level（3.5V-12VDC）			
	Module shutdown	CTRL connected to-Vin or low level（0-1.2VDC）			
	Input current at shutdown	3mA (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	10%~100% load		/	±0.5	±1	%
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	/	±5	±8	%
		Other output	/	±3	±5	%
Start delay time	Input nominal voltage		/	40	/	ms
Output voltage adjustable (Trim)	Input voltage range		/	/	10	%Vo
Output over-voltage Protection			110	150	200	%Vo
Output over-current Protection			110	150	220	%Io
Output Short circuit Protection			Continuous, self-recovery			

Note: 0% - 20% 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

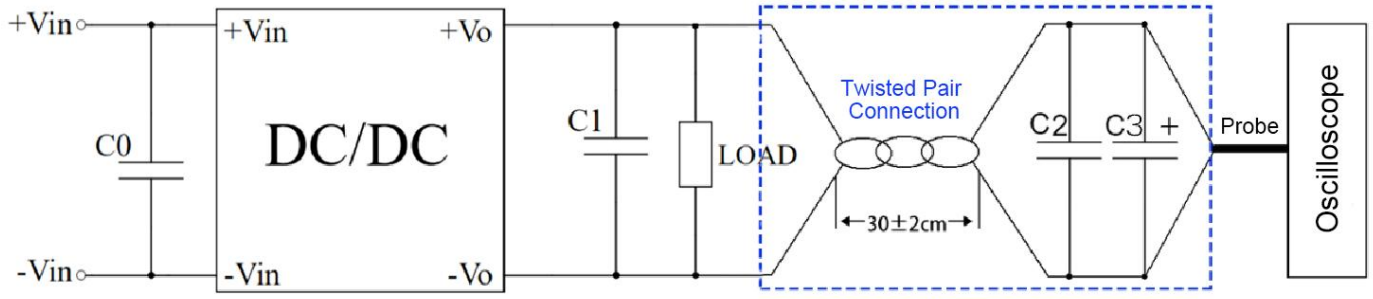
Items	Test Conditions	Min	Typ.	Max	Unit
Switching Frequency	Operating mode（PWM）	/	230	/	KHz
Operating Temperature	Refer to temperature derating curve	-40	/	+85	℃
Storage Temperature	/	-55	/	+125	
Max Case Temperature	Refer to product characteristic curve	/	/	+105	
Pin resistance soldering temperature	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	5000	/	/	VDC
Isolation Capacitor	Typical value	/	2200	/	pF
MTBF	MIL-HDBK-217F@25℃	1000	/	/	K hours
Cooling method	Natural air cooling				
Shell material	Metal Aluminum				

Weight/ Dimension	Model No.	Weight (Typ)	L x W x H	
	FD20-110SXXB3(C)5	28g	50.80X25.40X13mm	2.00X1.00X0.511inch
	FD20-110SXXB3(C)5-H	40g	50.80X25.40X23mm	2.00X1.00X0.905inch
	FD20-110SXXB3(C)5-T	49g	76X31.5X22.3mm	2.99X1.24X0.877inch
	FD20-110SXXB3(C)5-TH	61g	76X31.5X32.5mm	2.99X1.24X1.279inch
	FD20-110SXXB3(C)5-TS	69g	76X31.5X27mm	2.99X1.24X1.063inch
	FD20-110SXXB3(C)5-TSH	81g	76X31.5X37.2mm	2.99X1.24X1.464inch

EMC Characteristics

Total Items		Sub Items	Test Standard	Class
EMC	EMI	CE	CISPR32/EN55032	CLASS B (EMC Recommended Circuit)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria A (EMC Recommended Circuit)
		CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria A (EMC Recommended Circuit)
		ESD	IEC/EN61000-4-2	Contact ±4KV Air ±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)
		Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11	0%~70% Perf.Criteria B

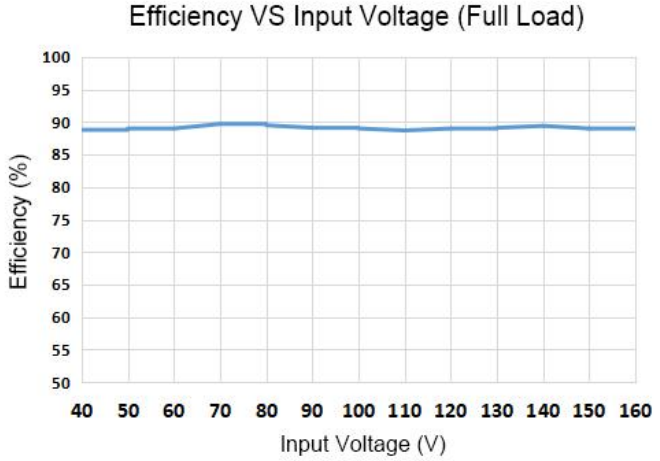
Ripple & Noise Test Description (Twisted Pair Method 20MHz Bandwidth)

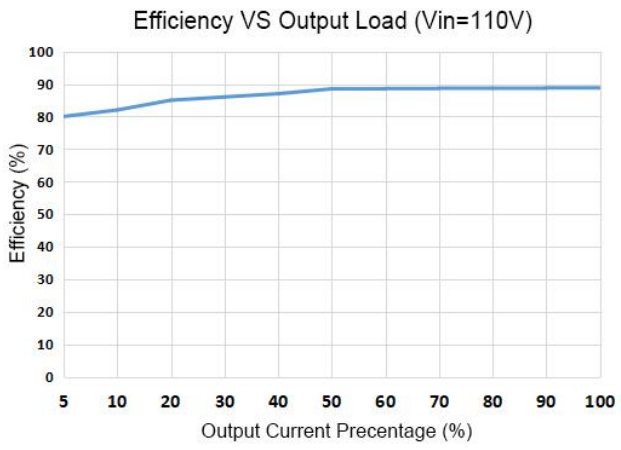


Test conditions:

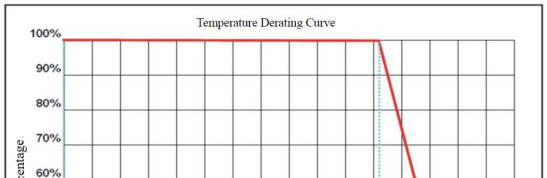
1. Ripple noise is connected using 12# twisted pair cable, oscilloscope sampling uses sampling mode, oscilloscope bandwidth is set to 20MHz, 100M bandwidth probe is used, probe cap and ground clip are removed; and C2 (0.1uF) polypropylene capacitor and C3 (10uF) high-frequency low-resistance electrolytic 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.
3. It is recommended to output a minimum 20% load or connect an electrolytic capacitor with a high-frequency resistance of more than 330uF, otherwise the output voltage ripple will increase;

Product Characteristic Curve





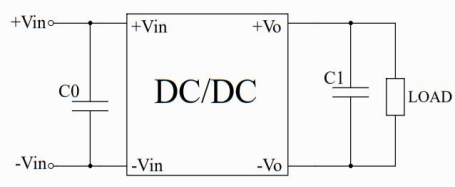
FD20-110S24B3C5



Design Reference Applications

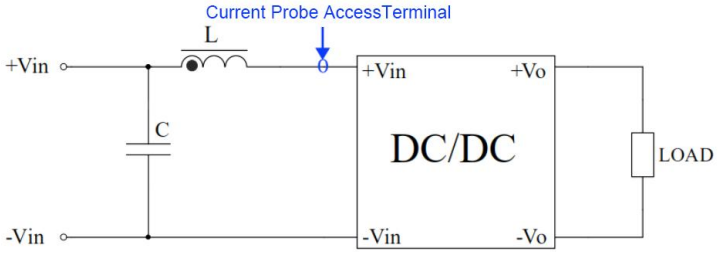
Recommended circuit

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;



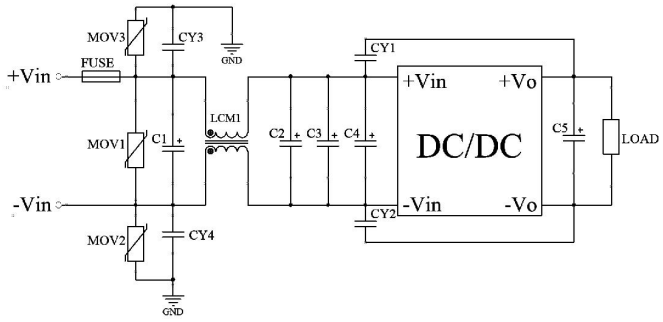
Component	Parameter
C0	47-100uF/200V
C1	330uF/50V

2. Input reflected ripple current test peripheral circuit:



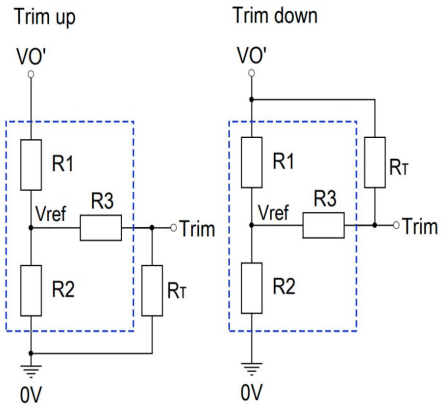
Component	Parameter
C	220uF/200V
L	4.7uH/15A

3. Recommended EMC peripheral circuits:



Component	110V standard voltage input series
FUSE	Choose according to customer needs
MOV1、MOV2、MOV3	14D201K
C1、C2、C3	100uF/200V
LCM1	15mH
C4	47uF/200V
C5	100uF/35V
CY1,CY2,CY3,CY4	2.2nF/2KV

4. Use of Trim and calculation of Trim resistance



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

Trim resistance calculation formula:

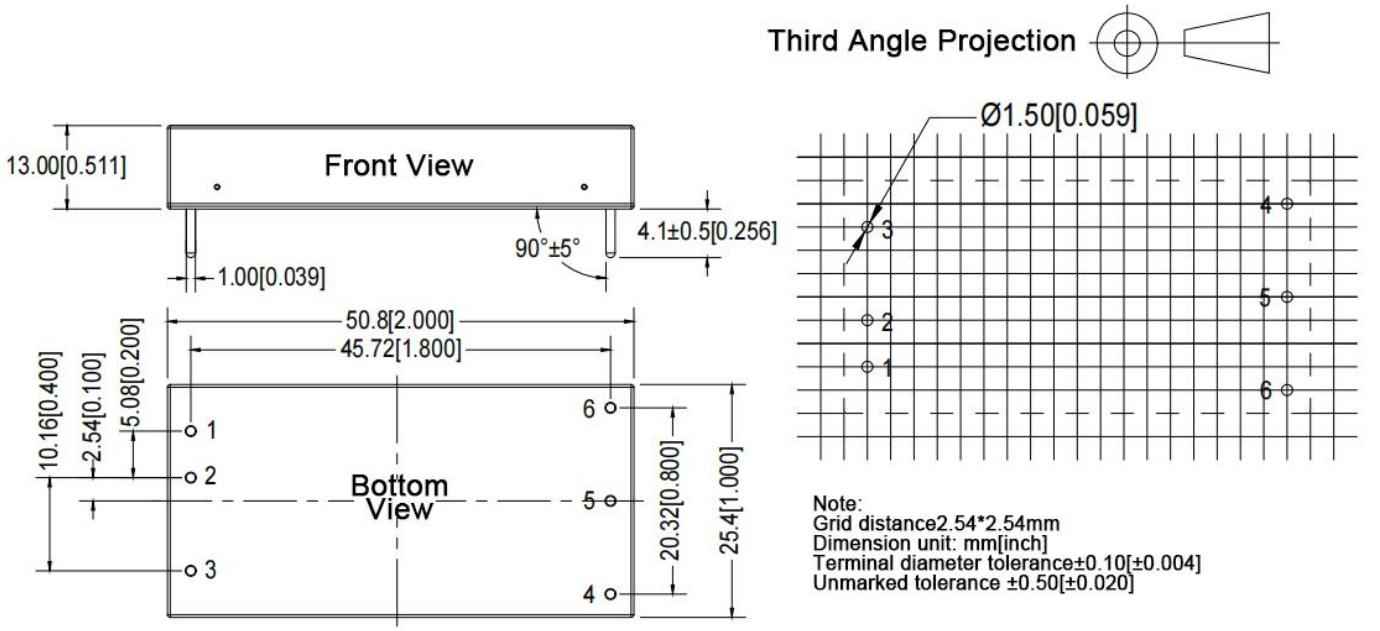
$$up:\ R_T=\frac{aR_2}{R_2-a}-R_3 \qquad a=\frac{Vref}{Vo'-Vref}\cdot R_1$$

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

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

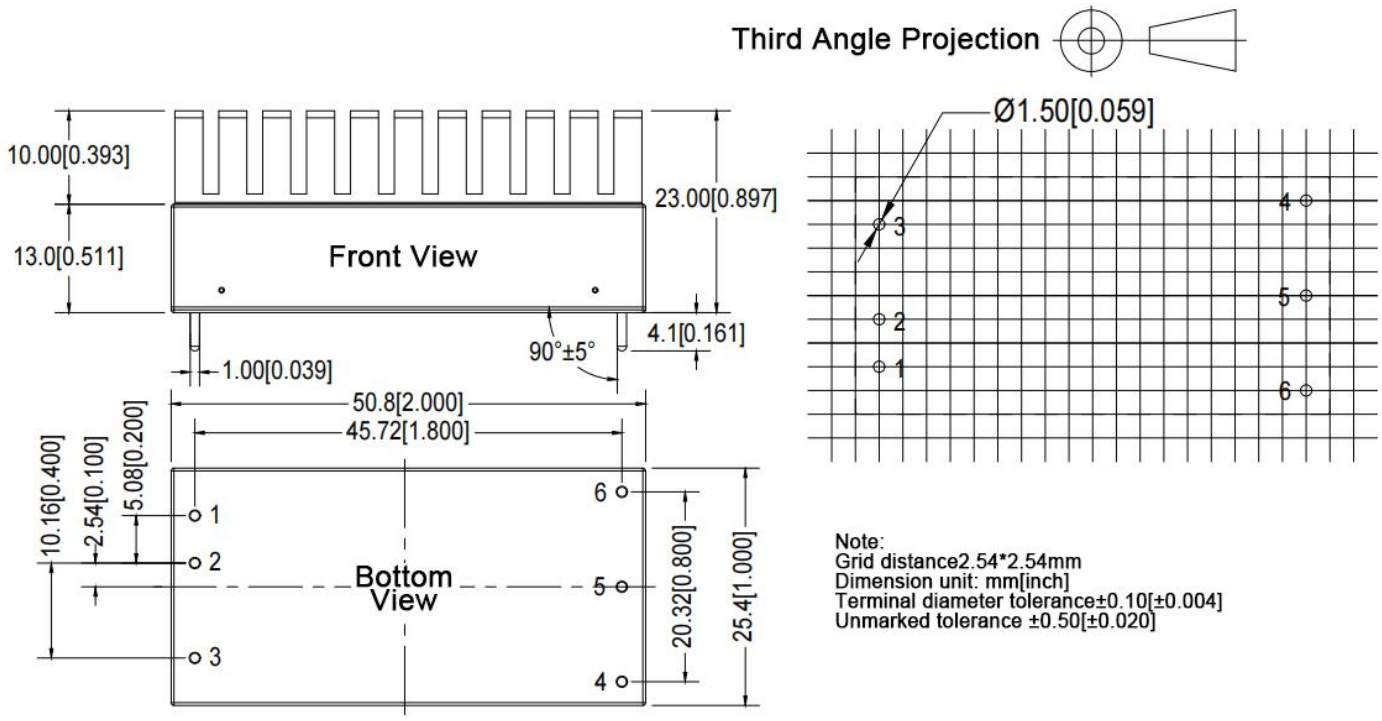
Output Voltage	Trim uses internal circuit parameters			
Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	24	14.53	68	1.25
5	20	20	68	2.5
9	25.5	9.79	30	2.5
12	18	4.7	30	2.5
15	25.5	5.1	30	2.5
24	25.5	2.95	18	2.5

B3 Packing Dimension



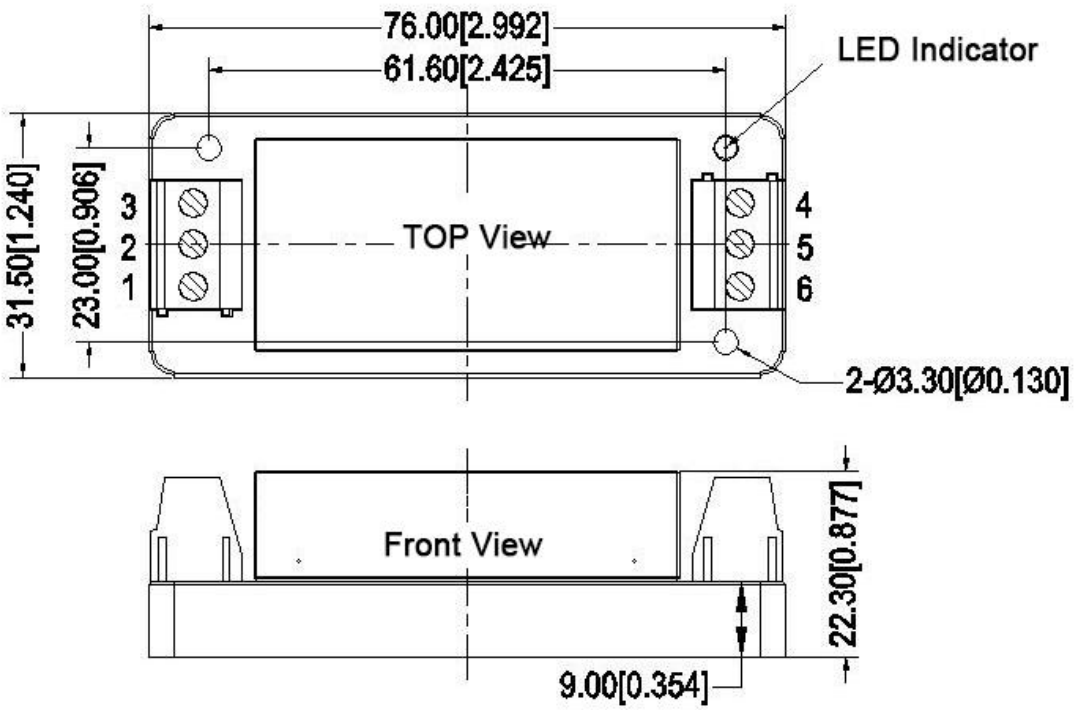
Pin	1	2	3	4	5	6
FD20-110SXXB3C5	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-H Packing Dimension



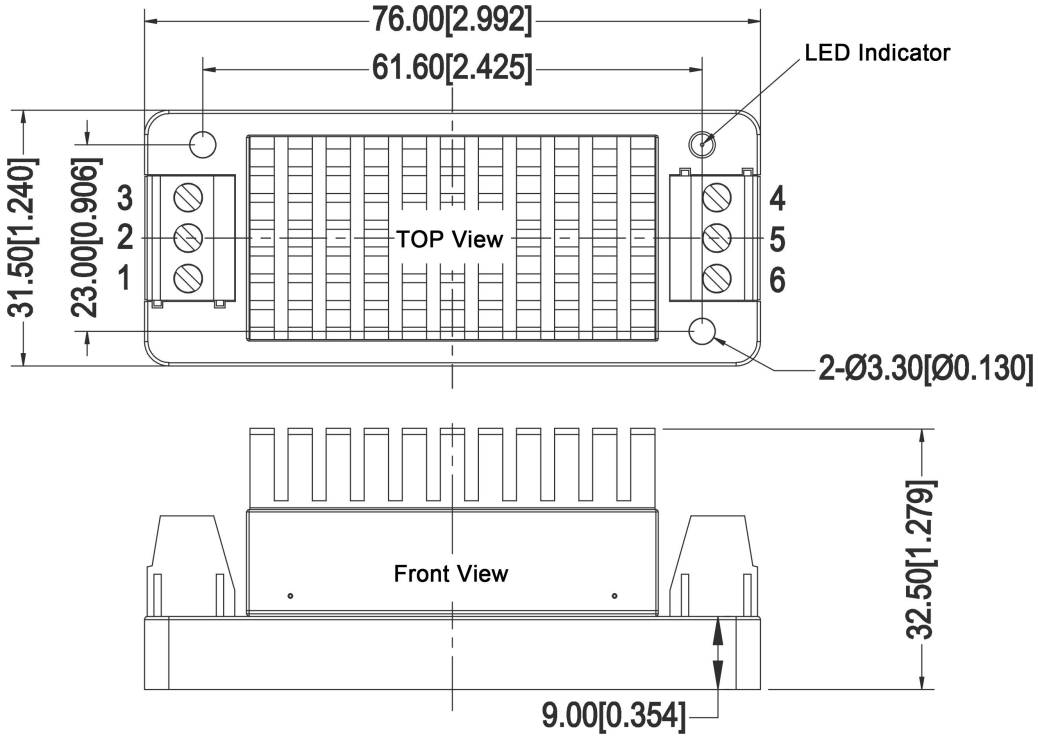
Pin	1	2	3	4	5	6
FD20-110SXXB3C5	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-T Packing Dimension



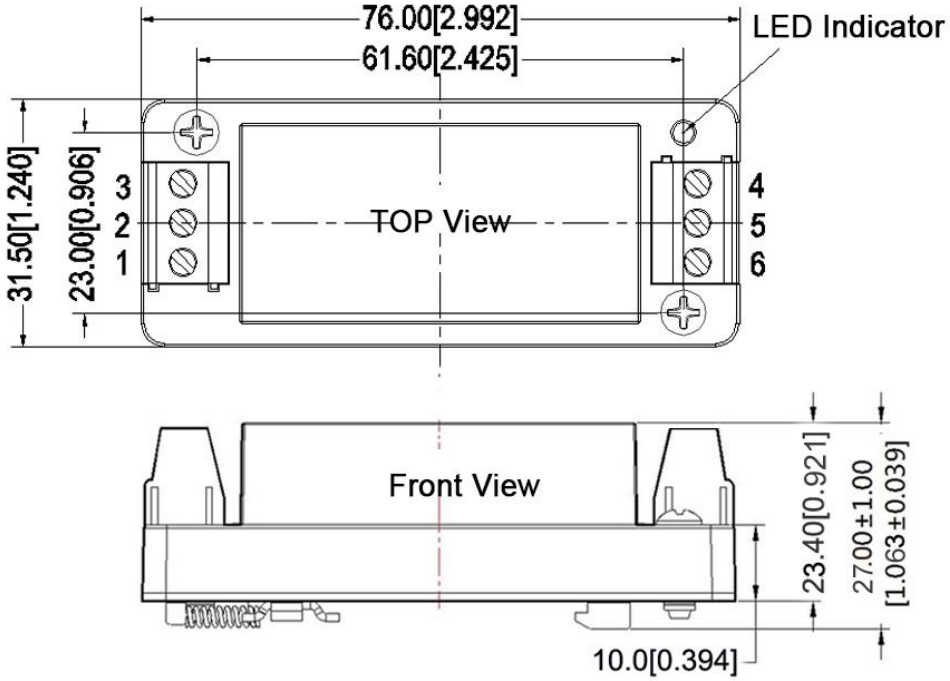
Pin	1	2	3	4	5	6
FD20-110SXXB3C5	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-TH Packing Dimension



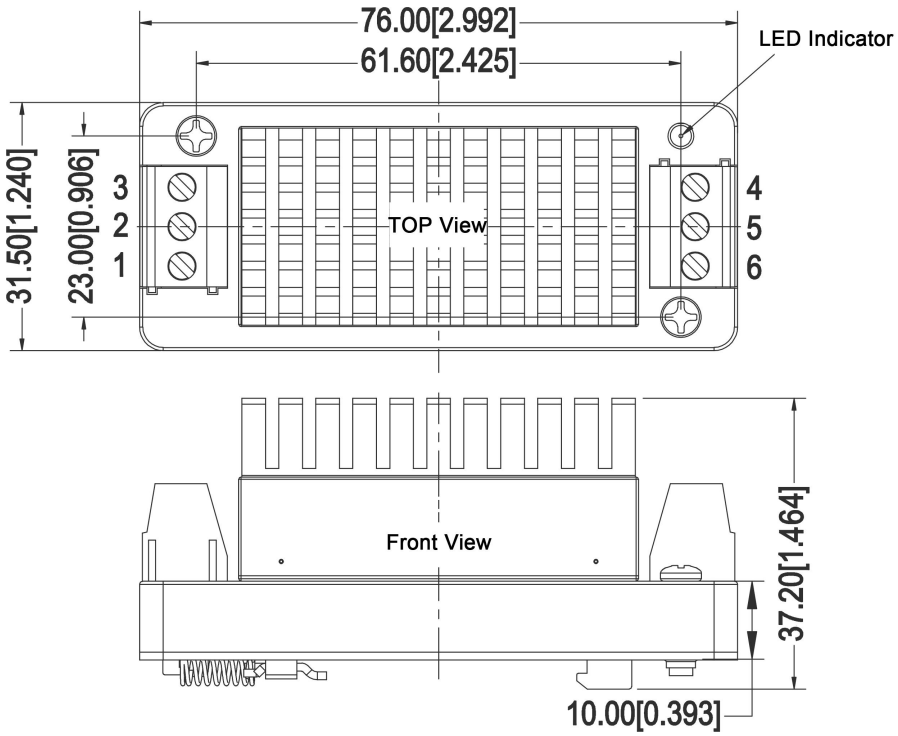
Pin	1	2	3	4	5	6
FD20-110SXXB3C5	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-TS Packing Dimension



Pin	1	2	3	4	5	6
FD20-110SXXB3C5	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

B3-TSH Packing Dimension



Pin	1	2	3	4	5	6
FD20-110SXXB3C5	+Vin	-Vin	Ctrl	Trim	-Vo	+Vo

Other Models Pin Definition

Pin	1	2	3	4	5	6
FD20-110SXXB3N5	+Vin	-Vin	NP	Trim	-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 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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