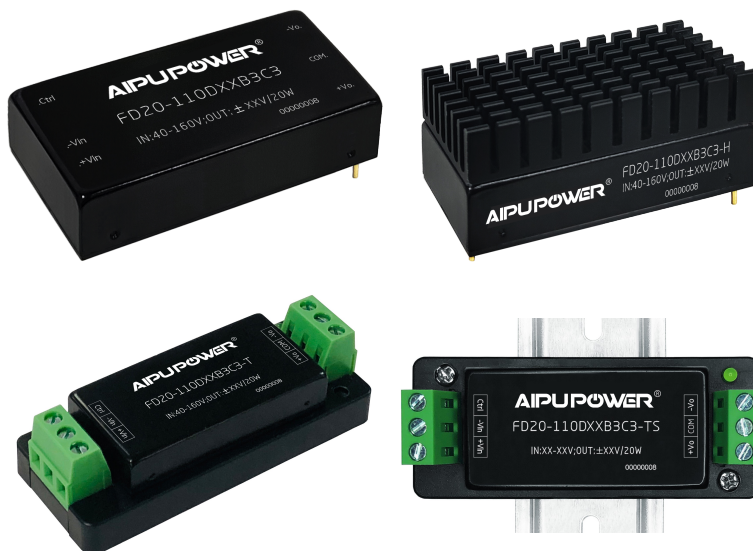


Typical Features

- ◆ Wide input voltage range 4:1, output power 20W
- ◆ Efficiency 87%(Typ.)
- ◆ Stand-by power consumption 0.20W (Typ.)
- ◆ Output fast start up
- ◆ Continuous short circuit protection, self-recovery
- ◆ Input under voltage, output over voltage, short circuit & over current protections
- ◆ Isolation Voltage 3000VDC or 1500VAC
- ◆ Operating Temperature from -40°C to +85°C
- ◆ Good EMI performance
- ◆ International Standard pin-out



Application Field

FD20-110DXXB3(C)3 Series ----- Compact DIP packaging DC-DC modular converters with output power 20W, wide input voltage range 40-160VDC, low standby power consumption, ultra-fast startup, isolated and regulated. This series of products can be widely used in the fields of industrial control, instrumentation, communications, electric power, Internet of Things and railways, etc. The additional circuit for EMC 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. @Rated voltage		Capacitive Load	Ripple & Noise (mVp-p)		Full Load Efficiency (%)	
		Rated	Range	Vo (VDC)	Io(mA) Max/Min	Full load	No Load	(uF) Max	Typ.	Max	Min	Typ.
-	FD20-110D15B3C3	110	40-160	±15	667/0	208	2	470	50	100	85	87
-	FD20-110D24B3C3			±24	417/0	208	2	470	50	100	85	87

Note 1 - In the part numbers C means the part with Remote Control.

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 chip could operate at jitter frequency situation at no load or light load to decrease no-load power consumption, so no load is not available. ≥25% load or a high-frequency resistance E-cap(≥470uF) load is recommended, to avoid the output ripple increasing.

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

Input Specifications

Items	Test Conditions	Min	Typ.	Max	Unit
Standby power consumption	Full input voltage range	/	0.2	/	W
Input under voltage protection	110V rated Input	28	/	40	VDC

Input inrush voltage (1sec.max)	110V rated Input	-0.7	/	180	VDC
Turn-on delay time	/	/	150	/	mS
Hot plug	Unavailable				
Input filter	π filter				
CTRL	Turn-on the converter	No connection or connect to high level (2.5V-12VDC)			
	Shut-off the converter	Connect to -Vin or connect to low level (0-1.2VDC)			
	Current value 5mA (TYP) to shut off the converter				

*Ctrl voltage is relative to the input -Vin.

Output Specifications

Items	Test Conditions		Min	Typ.	Max	Unit
Output Voltage Accuracy	Full input voltage range	Vo1	/	± 1	± 2	%
		Vo2	/	± 1	± 3	%
Voltage Regulation	Full input voltage range, full load	Vo1	/	± 0.2	± 0.5	%
		Vo2		± 0.5	± 1	%
Load Regulation	10%~100% load	Vo1	/	± 0.5	± 1	%
		Vo2		± 1	± 1.5	%
Ripple & Noise	25%-100% load, 20MHz bandwidth		/	50	100	mVp-p
Dynamic Response	25% of rated load step, rated input voltage		/	300	500	μ S
Dynamic response deviation			/	± 3	± 5	%
Turn-on delay time	Input rated voltage		/	150	/	mS
Over-voltage Protection	Full input voltage range		120	140	160	%Vo
Over-current Protection			105	160	250	%Io
Overshoot voltage			/	/	10	%Vo
Short circuit Protection		Continuous, self-recovery				

Note – the Ripple & noise $\leq 5\%V_o$ at 0%-25% load, which is tested by twisted pair test method, please refer to the following Ripple & noise test instructions.

General Specifications

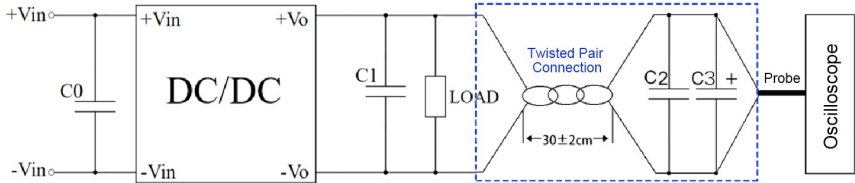
Items	Test Conditions	Min	Typ.	Max	Unit
Switching Frequency	Operating mode (PWM)	/	150	/	KHz
Operating Temperature	Refer to the temperature derating curve	-40	/	+85	°C
Storage Temperature	/	-55	/	+125	
Case Temperature	Within the derating curves	/	/	+105	
Pin Soldering Temperature	1.5mm from the case, 10S	/	/	300	°C
Relative Humidity	No condensation	5	/	95	%RH
Isolation Voltage	I/P-O/P, test 1min, leakage current <1mA	3000	/	/	VDC

	I/P-O/P, test 1min, leakage current < 5mA	1500	/	/	VAC
	I/P&O/P-Case, test 1min, leakage current <1mA	1500	/	/	VDC
MTBF	MIL-HDBK-217F@25°C	1000	/	/	K hours
Cooling method	Nature air				
Case material	Aluminum				
Weight/Dimension	Part No.	Weight (Typ)	Dimensions L x W x H		
	FD20-110DXXB3(C)3	18g	50.80X25.40X13mm	2.00X1.00X0.511inch	
	FD20-110DXXB3(C)3-H	30g	50.80X25.40X23mm	2.00X1.00X0.905inch	
	FD20-110DXXB3(C)3-T	39g	76.0X31.5X22.3mm	2.99X1.24X0.877inch	
	FD20-110DXXB3(C)3-TH	51g	76.0X31.5X32.5mm	2.99X1.24X1.279inch	
	FD20-110DXXB3(C)3-TS	59g	76.0X31.5X27.0mm	2.99X1.24X1.063inch	
	FD20-110DXXB3(C)3-TSH	71g	76.0X31.5X36.5mm	2.99X1.24X1.437inch	

EMC Performance

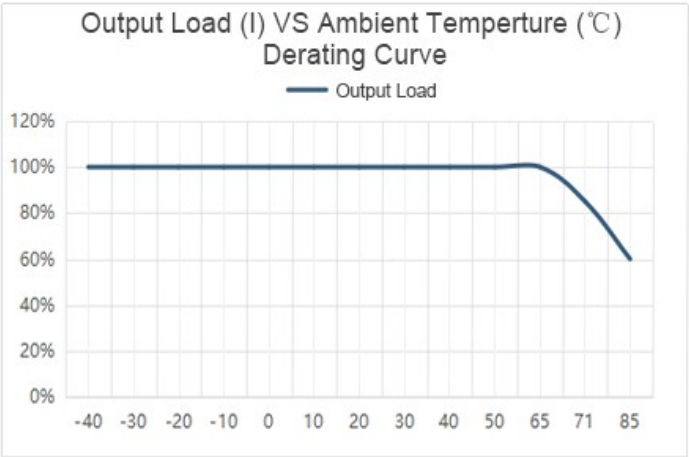
Total Item	Sub item	Test standard	Performance/Class		
EMI	CE	CISPR32/EN55032	CLASS B (with Recommended EMC Circuit)		
EMS	RS	IEC/EN61000-4-3	10V/m	Perf.Criteria B (with Recommended EMC Circuit)	
	CS	IEC/EN61000-4-6	3Vr.m.s	Perf.Criteria B (with Recommended EMC Circuit)	
	ESD	IEC/EN61000-4-2	Contact ±4KV	Air ±6KV	Perf.Criteria B
	Surge	IEC/EN61000-4-5	±2KV	Perf.Criteria B (with Recommended EMC Circuit)	
	EFT	IEC/EN61000-4-4	±2KV	Perf.Criteria B (with Recommended EMC Circuit)	
	Voltage dips and interruptions	IEC/EN61000-4-11	0%~70%	Perf.Criteria B	

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

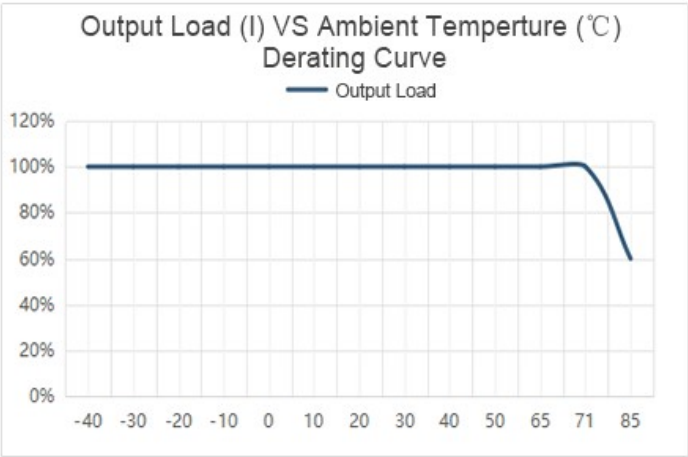


- 1, The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C2(0.1uF) polypropylene capacitor and C3(10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel 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 started after input power on.
- 3, It is recommended to connect a ≥25% load or a high-frequency resistance E-cap(≥470uF) load at output to avoid the output ripple increasing.

Product Performance Curves



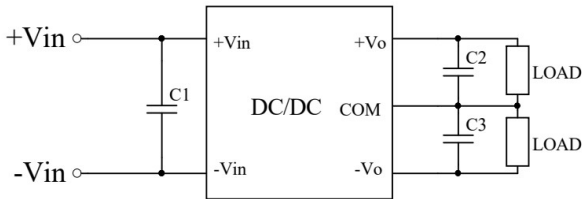
Rated voltage 110VDC input without heat sink



Rated voltage 110VDC input with heat sink

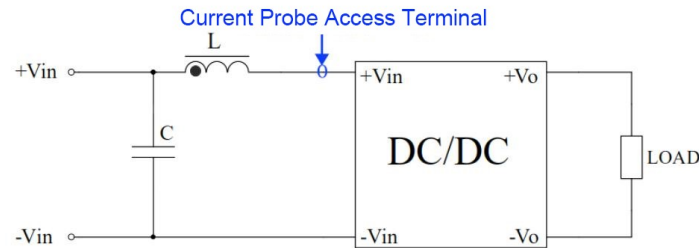
Recommended Circuits for Application

1. This series of supplies will be tested according to this circuit below before shipping. Increasing the capacitances of C1 or C2 & C3 can decrease the output ripple, the capacitances must be less than the maximum capacitive load.



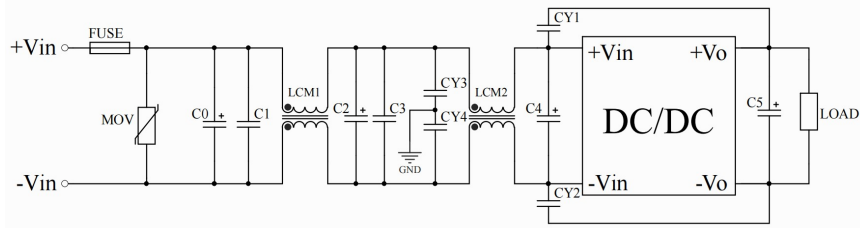
Components	Parameter
C1	47-100uF/200V
C2, C3	100-470uF/50V

2. Input reflected ripple current test circuit



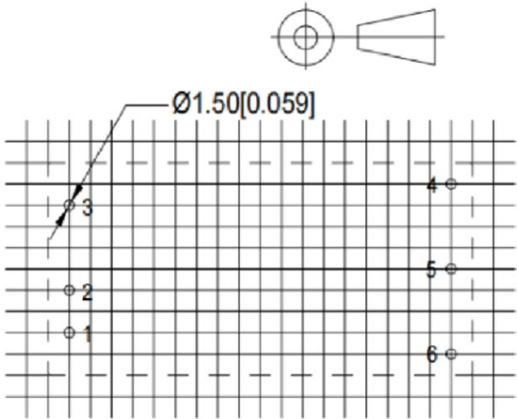
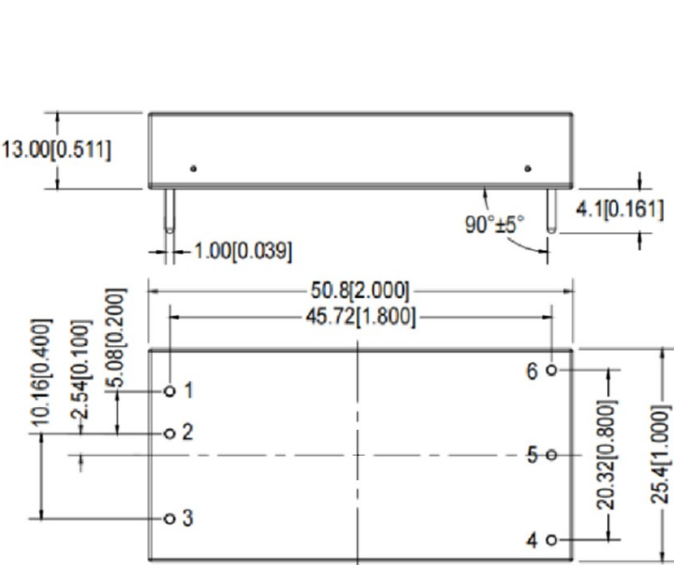
Components	Parameter
C	220uF/200V
L	4.7uH/15A

3. Recommended EMC circuit



Components	110V rated input
FUSE	TBD by customer
MOV	14D201K
C0, C2, C4	330uF/200V
C1, C3	0.22uF/250V
LCM1, LCM2	15mH
C5	330uF/50V
CY1, CY2, CY3, CY4	Y1/222M/400VAC

B3 Packaging Dimensions (without heat-sink)



PCB layout vertical view

Grid 2.54x2.54 [0.10x0.10]

Unit: mm[inch]

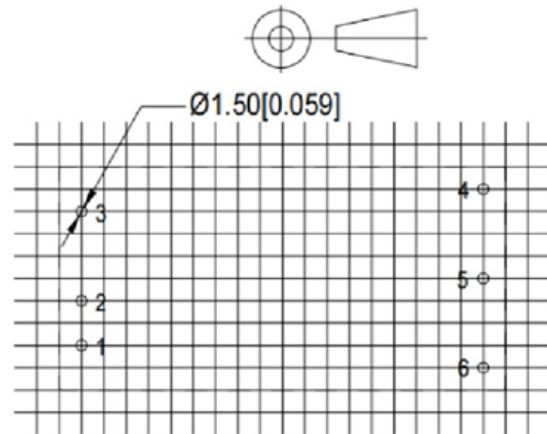
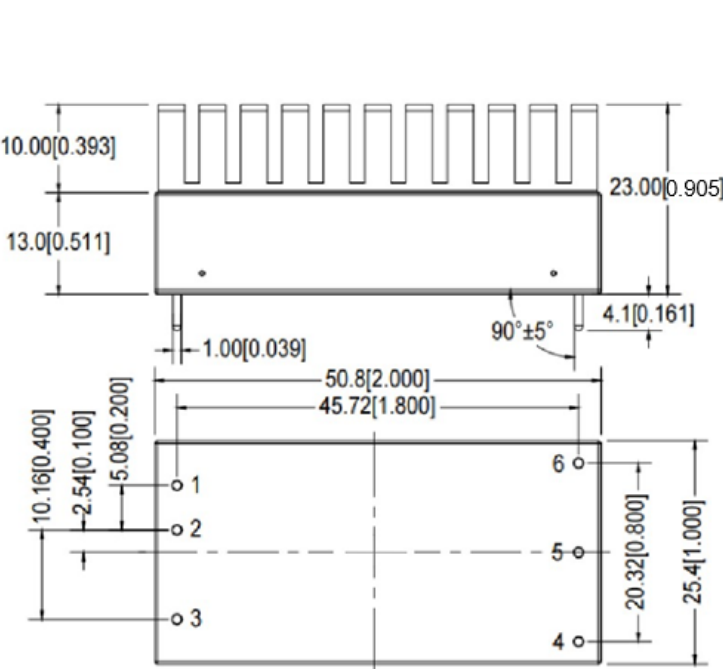
Pin diameter tolerance $\pm 0.10[\pm 0.004]$

General tolerance $\pm 0.50[\pm 0.020]$

Pin Definition

Pin No.	1	2	3	4	5	6
FD20-110DXXB3C3	+Vin	-Vin	Ctrl	-Vo	COM	+Vo

B3-H Packaging Dimensions (with heat-sink)



PCB layout vertical view

Grid 2.54x2.54[0.10x0.10]

Unit: mm[inch]

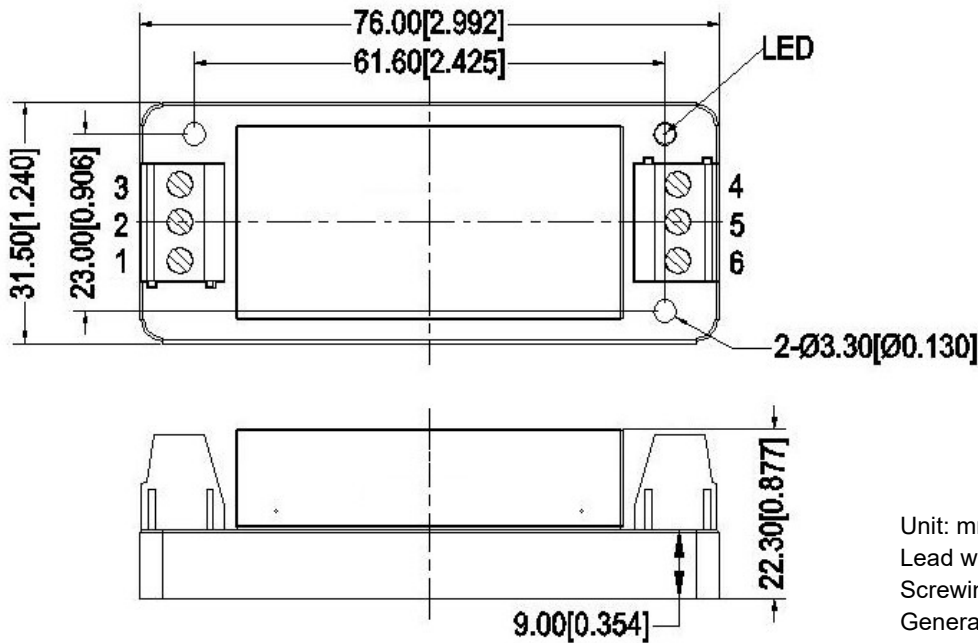
Pin diameter tolerance $\pm 0.10[\pm 0.004]$

General tolerance $\pm 0.50[\pm 0.020]$

Pin Definition

Pin No.	1	2	3	4	5	6
FD20-110DXXB3C3	+Vin	-Vin	Ctrl	-Vo	COM	+Vo

B3-T Packaging Dimensions (without heat-sink)

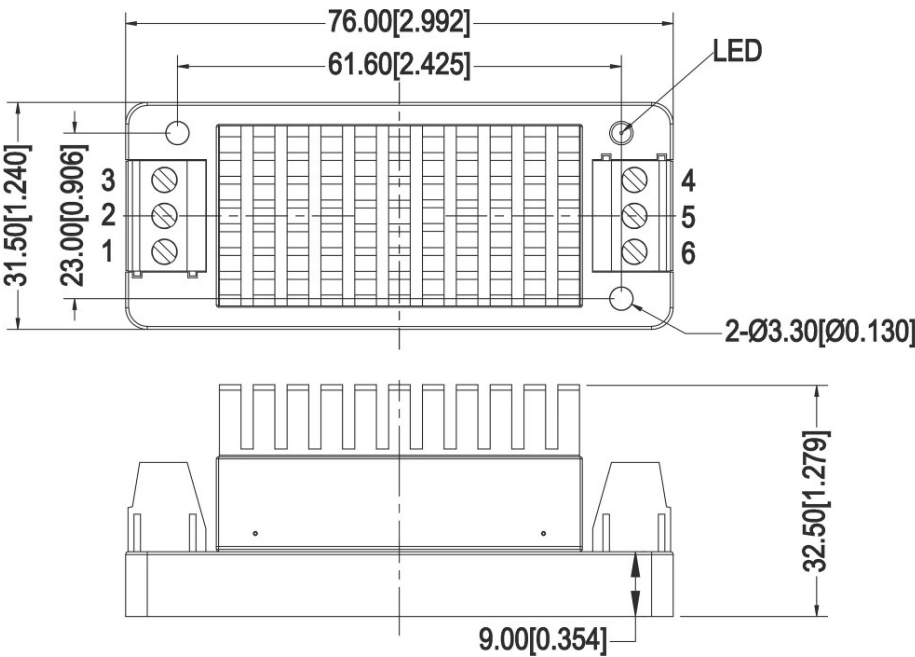


Unit: mm[inch]
Lead wire size 24-12AWG
Screwing torque 0.4N.m Max.
General tolerance $\pm 1.0[\pm 0.039]$

Pin Definition

Pin No.	1	2	3	4	5	6
FD20-110DXXB3C3	+Vin	-Vin	Ctrl	-Vo	COM	+Vo

B3-TH Packaging Dimensions (with heat-sink)

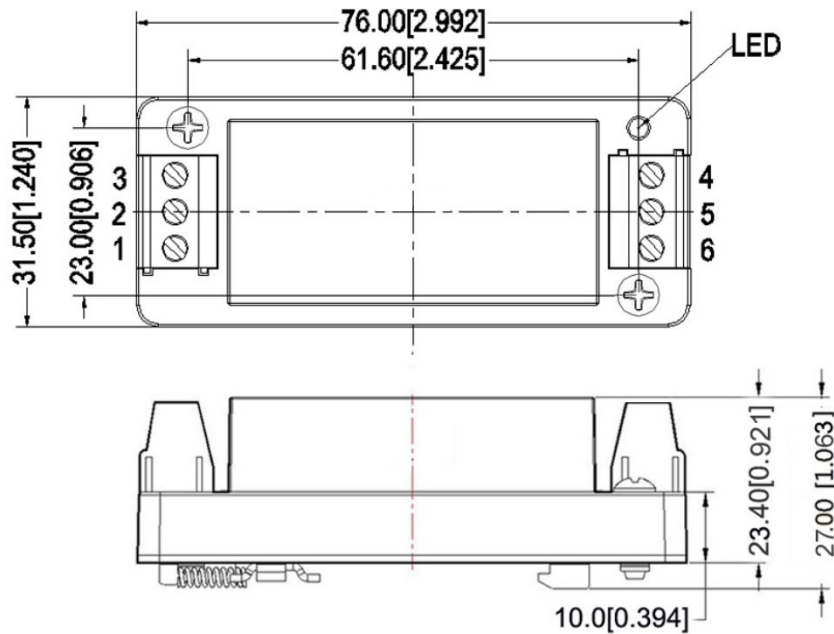


Unit: mm[inch]
Lead wire size 24-12AWG
Screwing torque 0.4N.m Max.
General tolerance $\pm 1.0[\pm 0.039]$

Pin Definition

Pin No.	1	2	3	4	5	6
FD20-110DXXB3C3	+Vin	-Vin	Ctrl	-Vo	COM	+Vo

B3-TS Packaging Dimensions (without heat-sink)

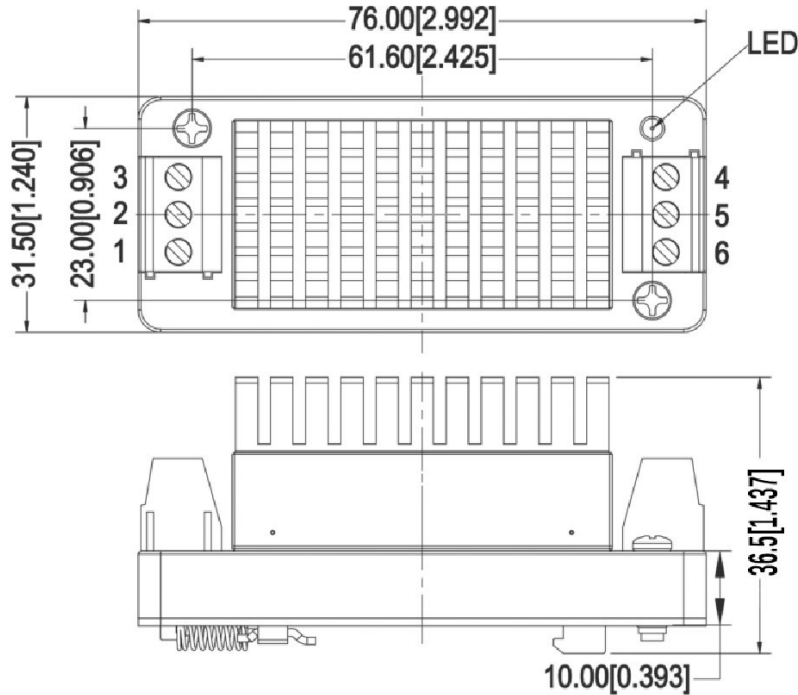


Unit: mm[inch]
Lead wire size 24-12AWG
Screwing torque 0.4N.m Max.
General tolerance $\pm 1.0 [\pm 0.039]$

Pin Definition

Pin No.	1	2	3	4	5	6
FD20-110DXXB3C3	+Vin	-Vin	Ctrl	-Vo	COM	+Vo

B3-TSH Packaging Dimensions (with heat-sink)



Unit: mm[inch]
Lead wire size 24-12AWG
Screwing torque 0.4N.m Max.
General tolerance $\pm 1.0 [\pm 0.039]$

Pin Definition

Pin No.	1	2	3	4	5	6
FD20-110DXXB3C3	+Vin	-Vin	Ctrl	-Vo	COM	+Vo

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 under 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, rated input voltage and rated 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.
8. The product specifications may be modified without prior notice. Please refer to the published data sheet at Aipupower website.

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