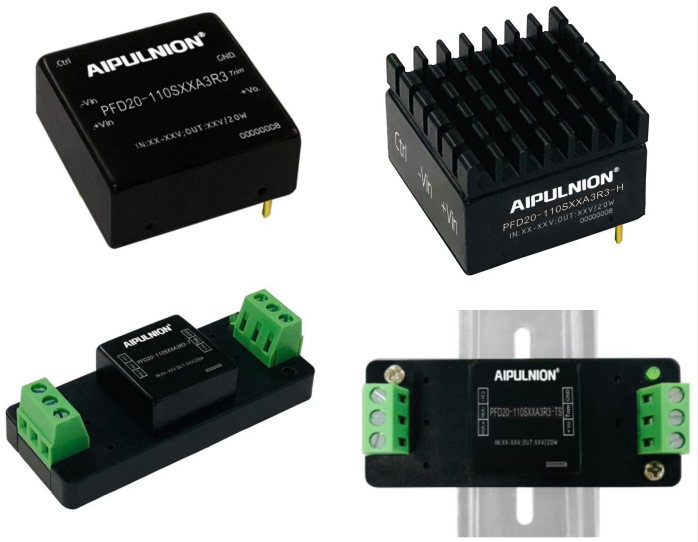
DC/DC Converter
PFD20-110SXXA3R3 Series

Typical Features

- Wide input voltage range 4:1
- Transfer Efficiency up to 89%
- Stand-by Power Consumption as low as 0.2W
- Output super-fast start up as low as 10ms
- Continuous Short Circuit protection, Self-recovery
- Protection: Input under voltage, output over voltage, short circuit, over current
- Isolation Voltage 1500VAC
- Operating Temperature: -40°C~+85°C
- Good EMI performance
- International standard pin-out



Application Field

PFD20-110SXXA3R3, 20W output power, wide voltage 4:1 input range, ultra-low standby power consumption, isolated and stabilized output, DC-DC module power supply, can be widely used in railway, industrial control, instrumentation, communication, power, IOT and other fields. When the product is applied in environments with poor electromagnetic compatibility, it is necessary to refer to the application circuit provided by our company.

Typical Product List

Certificate	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 (V)	Current (A)	Full load Typ	No Load Typ	uF	Typ	Max	Min	Typ
-	PFD20-110S3V3A3R3	110	40-160	3.3	5000/0	174	13	10000	50	100	84	86
-	PFD20-110S05A3R3			5	4000/0	209	13	10000	50	100	85	87
-	PFD20-110S09A3R3			9	2222/0	209	2	4000	50	100	85	87
-	PFD20-110S12A3R3			12	1667/0	207	2	3000	50	100	86	88
-	PFD20-110S15A3R3			15	1333/0	207	2	2200	50	100	86	88
-	PFD20-110S24A3R3			24	833/0	204	2	680	50	100	87	89

Remark:

1. Model description: C with remote control pin, T with output voltage adjustment pin, R with remote control pin and output voltage adjustment pin, N without remote control pin and output voltage adjustment pin;
2. Packaging instructions: The suffix - H is for packaging with heat sinks, - T (H) is for wiring type (with heat sinks) packaging, and - TS (H) is for rail type (with heat sinks) packaging;
3. The above efficiency is measured by the nominal input voltage and output rated load;
4. The maximum capacitive load refers to the maximum capacity allowed by the external output capacitor when the rated load of the power supply is started. If it exceeds this capacity, the power supply may not be able to start;
5. In order to reduce no-load power consumption and improve light load efficiency, the IC will reduce frequency when operating under no-load and light load.
6. The above is only a partial product list. If you need products outside of the list, please contact our sales department.

Input Specification

Items	Conditions	Min.	Typ.	Max.	Unit
Stand-by Power Consumption	Output Voltage 3.3v/5v	/	1.4	/	W
	Output Voltage others	/	0.2	/	
I/P impulse voltage (1Sec.max)	/	-0.7	/	180	VDC
Start up Voltage	/	/	/	40	
Input Under Voltage Protection	/	26	31	/	
Hot Plug	/	N/A			
Input Filter	/	Π filter			
CTRL	Module turn-on	Suspended or connect to High level(3.5V-12VDC)			
	Module turn-off	Connect to -Vin or low level (0-1.2VDC)			
	Input current when switched off	2mA(Typ.)			
Reflected Ripple Current	Recommended peripheral circuits for reference, nominal input voltage	25mA(Typ)			

Output Specification

Items	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Input voltage range, 0% -100% load	/	±1	±3	%
Voltage regulation rate	Full voltage range, full load	/	±0.2	±0.5	%
Load regulation rate	5%~100% nominal load	/	±0.5	±1	%
Ripple & Noise	5%-100% load, 20MHz bandwidth	/	50	100	mVp-p
Dynamic response deviation	25% nominal load step ,3.3v/5v output	/	±3	±8	%
	25% nominal load step , other output	/	±3	±5	
Dynamic response time	25% nominal load step , input voltage range	/	300	500	us
Turn on Delay Time	Nominal input voltage and constant resistance load	/	10	/	ms
Adjustable output voltage (Trim)	Input voltage range	90	/	110	%Vo
Output Over-voltage Protection		110	160	200	%Vo
Output Short circuit Protection		110	150	220	%Io
Output overshoot		/	/	10	%Vo
Short circuit Protection		Continuous, self-recovery			

Note: 0% -5% load ripple&noise less than or equal to 5% Vo; The ripple and noise testing adopts the twisted pair testing method, as detailed in the ripple and noise testing instructions.

General Specification

Items	Conditions	Min.	Typ.	Max.	Unit
Switching Frequency	Operating mode(PWM)	/	280	/	KHz
Operating Temperature	Refer to Temperature Derating Curve	-40	/	+85	℃
Storage Temperature	/	-55	/	+125	
引脚耐焊接温度	Distance to case 1.5mm, 10S	/	/	300	
Relative Humidity	No condensing	5	/	95	%RH
Isolation Voltage	Input to Output, test 1min, leakage current <1mA	1500	/	/	VAC
		2250	/	/	VDC
	Input/output to casing, tested for 1 minute, leakage current less than 1mA	1600	/	/	

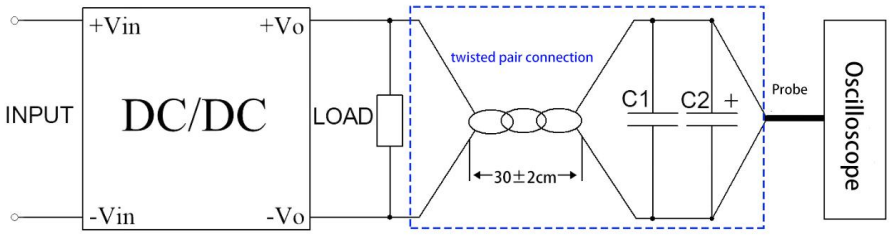
Isolation capacitor	Input-Output, 100KHz/0.1V	/	2200	/	pF
Insulation resistance	Input-Output, Voltage 500VDC	1000	/	/	MΩ
MTBF	MIL-HDBK-217F@25℃	1000	/	/	K hours
Vibration	IEC61373 Vehicle Class 1B				
Cooling Method	natural air cooling				
Case Materials	Aluminum				

Weight/Dimension	Package	Weight Typ	Dimension(L x W x H)	
	FD20-110SXXA3R3	15g	25.4X 25.4X12.5 mm	1X1X0.492inch
	FD20-110SXXA3R3-H	19g	25.4X25.4X18.0mm	1X1X0.708inch
	FD20-110SXXA3R3-T	37g	76X31.5X21.3mm	2.99X1.24X0.838inch
	FD20-110SXXA3R3-TH	40g	76X31.5X26.0mm	2.99X1.24X1.023inch
	FD20-110SXXA3R3-TS	57g	76X31.5X26mm	2.99X1.24X1.023inch
	FD20-110SXXA3R3-TSH	60g	76X31.5X30.8mm	2.99X1.24X1.212inch

Electromagnetic Compatibility (EMC)

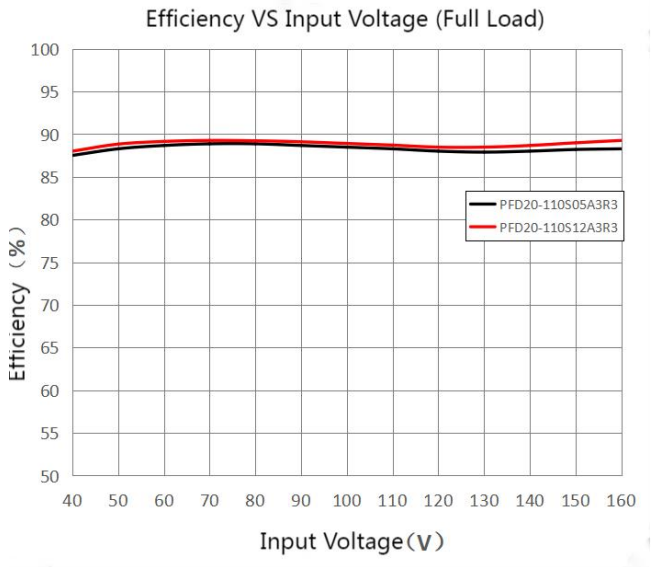
Total Items		Sub Items	Standard	Class	
EMC	EMI	conduction emission (CE)	CISPR32/EN55032	Class B (EMC recommended circuit)	
		Radiated Emission (RE)	CISPR32/EN55032	Class B (EMC recommended circuit)	
	EMS	Radiate Susceptibility (RS)	IEC/EN61000-4-3	10V/m	Perf.Criteria A
		conducted sensitivity (CS)	IEC/EN61000-4-6	10Vr.m.s	Perf.Criteria A
		electrostatic discharge (ESD)	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	Perf.Criteria B
		Surge	IEC/EN61000-4-5	line to line ±2kV (EMC recommended circuit) Line to ground ±4KV (EMC recommended circuit)	Perf.Criteria B
		Electrical Fast Transient (EFT)	IEC/EN61000-4-4	±4KV (EMC recommended circuit)	Perf.Criteria B

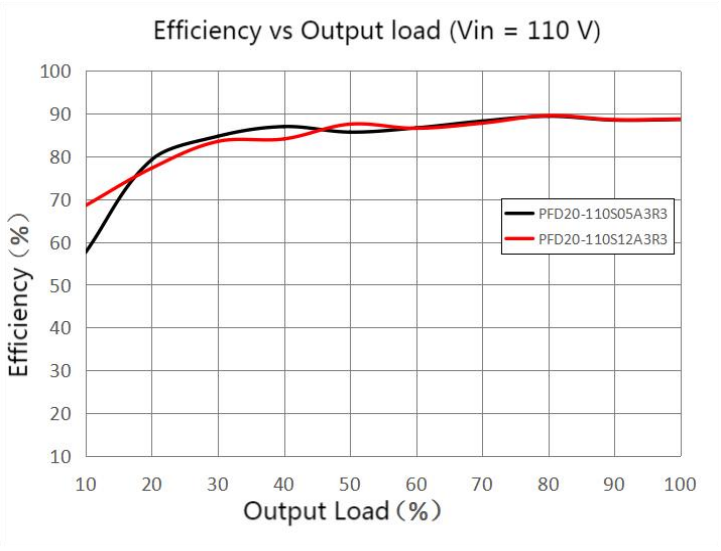
Ripple & Noise Test (Twisted Pair Method 20MHz Bandwidth)

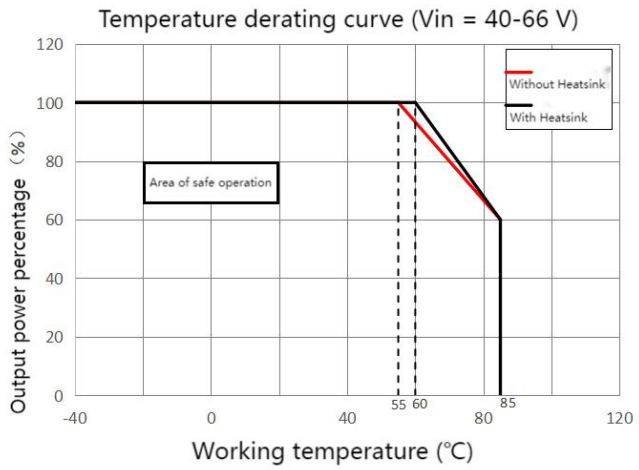


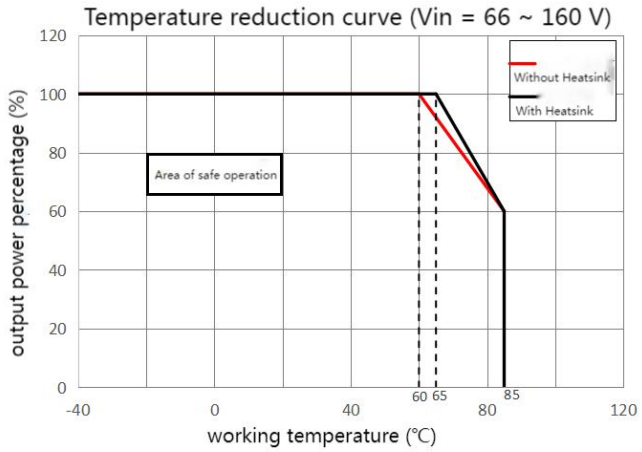
1. Ripple &noise is connected by 12# twisted pair, the oscilloscope uses (Sample) sampling mode, oscilloscope bandwidth is set to 20MHz. A probe with a bandwidth of 100M , remove the probe cap and ground clamp, and the probe end is connected to the twisted pair by C1 (0.1uF) polypropylene capacitor and C2 (10uF) high-frequency low-resistance electrolytic capacitor in parallel, the capacitor voltage must> the output voltage.
2. Ripple noise test: The module input terminal (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 uses a 30±2 cm sampling line to sample from the power supply output port, and connect to the oscilloscope probe according to polarity;
3. It is recommended to output a minimum load of 5% or connect a high-frequency low-resistance electrolytic capacitor above 470uF, otherwise the output voltage ripple & noise will increase.

Product Characteristic Curve





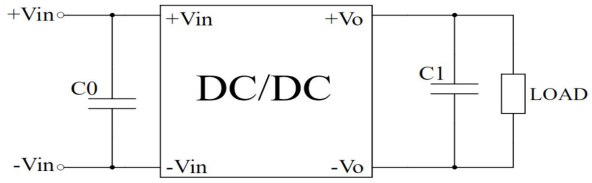




Design and Application Reference

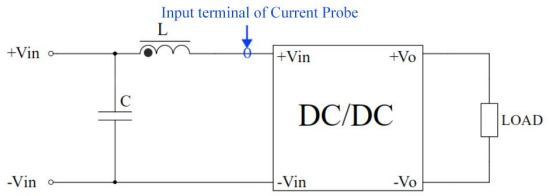
Recommended circuit

1. The module is tested according to this peripheral circuit before deliver. Increasing the C1 capacity can reduce output ripple, but the output capacity needs to be less than the maximum capacitive load.



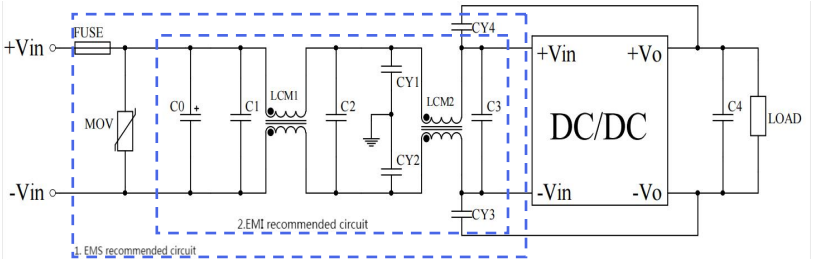
Component	Specs
C0	100uF/200V
C1	100uF/50V

2. Input reflection ripple current test peripheral circuit



Component	Specs
C	100uF/200V
L	4.7uH

3. Recommended EMC peripheral circuits:



Components	Vin:110VDC
FUSE	According to customer needs
MOV1	14D201K
LCM1	5mH
LCM2	0.5mH
C0,C3	100uF/200V
C1,C2	0.22uF/250V
C4	100uF/50V
CY1,CY2,CY3,CY4	2.2nF/400VAC

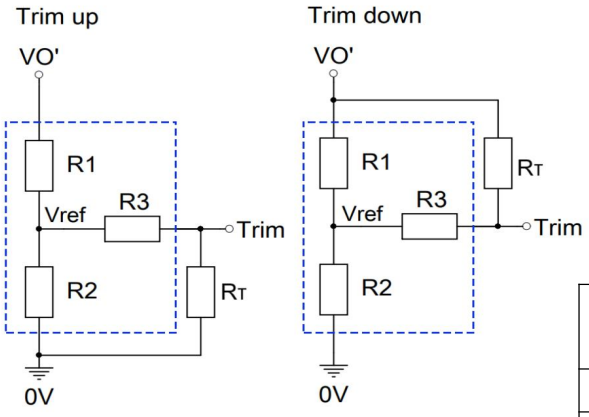
Note:

Figure 1 is used for EMS testing,

Figure 2 is used for EMI filtering,

which can be adjusted according to the situation.

4. The use of Trim and the calculation of Trim resistance



Trim resistor values:

$$up{:}R_T=\frac{aR2}{R2-a}-R3 \qquad a=\frac{Vref}{Vo\ '-Vref}\cdot R1$$

$$down{:}R_T=\frac{aR1}{R1-a}-R3 \qquad a=\frac{Vo\ '-Vref}{Vref}\cdot R1$$

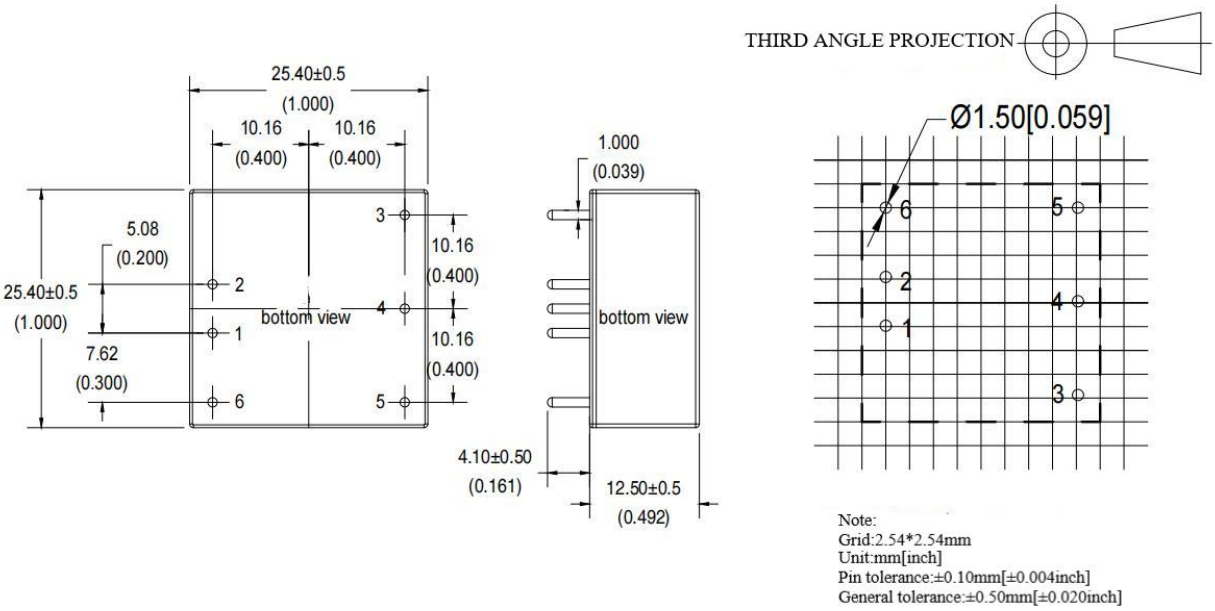
R_T is Trim resistor, a=self-defined parameter, Vo' is the actual voltage to increase or decrease

Output Voltage	The usage circuit of the Trim circuit			
Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.22	2.55	18	1.25
5	5.1	5.1	20	2.5
9	9.31	3.58	24	2.5
12	18	4.75	33	2.5
15	18	3.6	30	2.5
24	30	3.48	30	2.5

Note: Trim uses circuits,

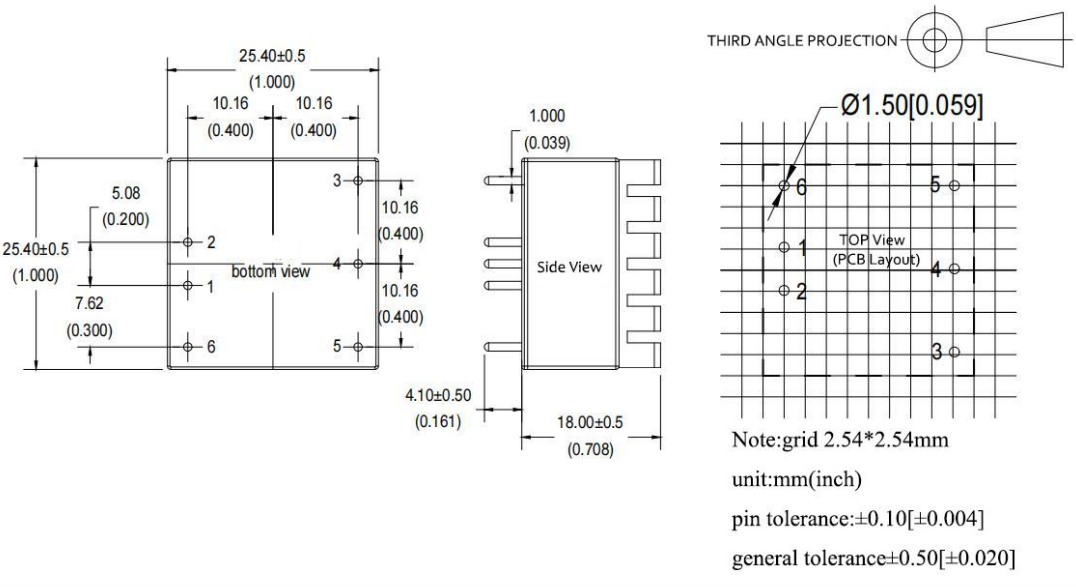
and the dashed box area represents the interior of the product

A3 Package(without Heat Sink)



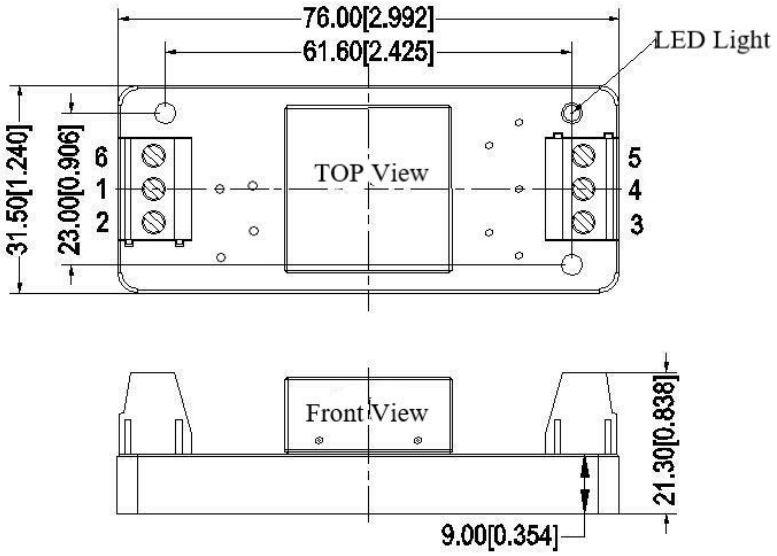
Pin-Function						
Pin	1	2	3	4	5	6
Function	-Vin	+Vin	+Vout	Trim	GND	Ctrl

A3-H (with Heat Sink)



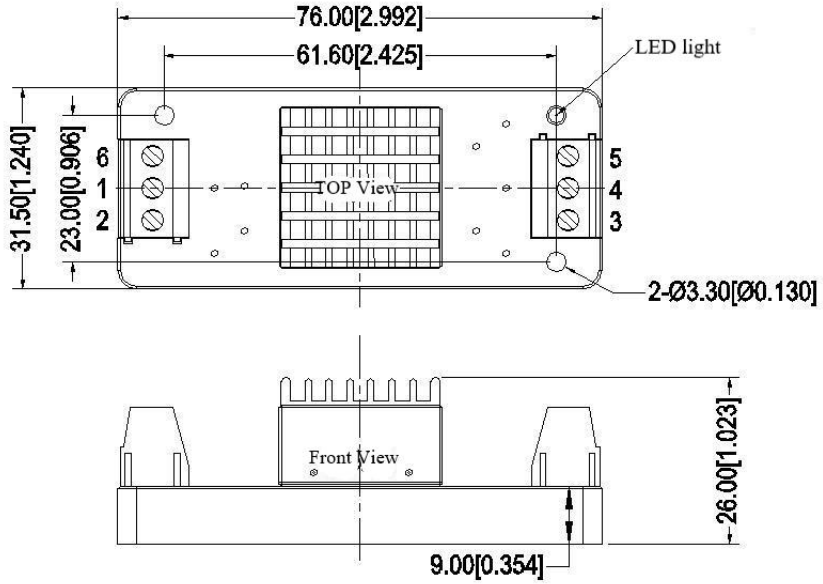
Pin-Function						
Pin	1	2	3	4	5	6
Function	-Vin	+Vin	+Vout	Trim	GND	Ctrl

A3-T Package(Chassis mount without Heat Sink)



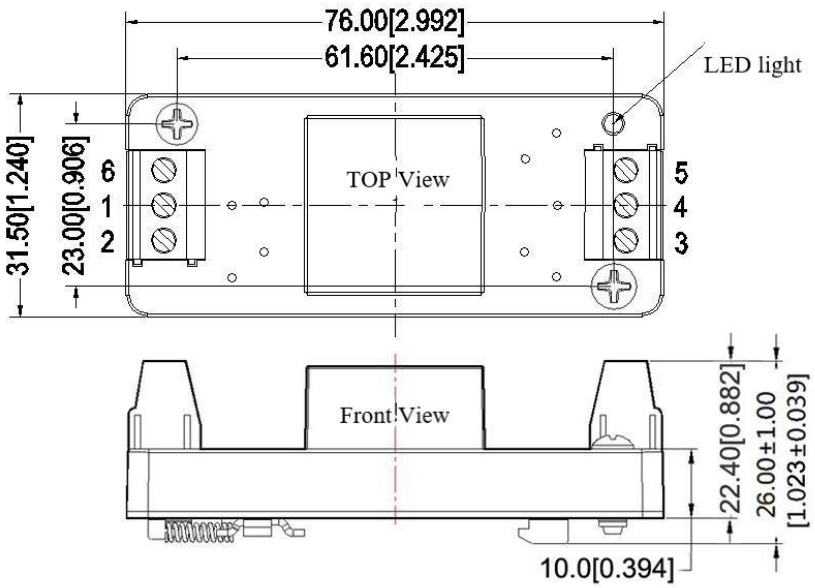
Pin-Function						
Pin	1	2	3	4	5	6
Function	-Vin	+Vin	+Vout	Trim	GND	Ctrl

A3-TH Package(Chassis mount with Heat Sink)



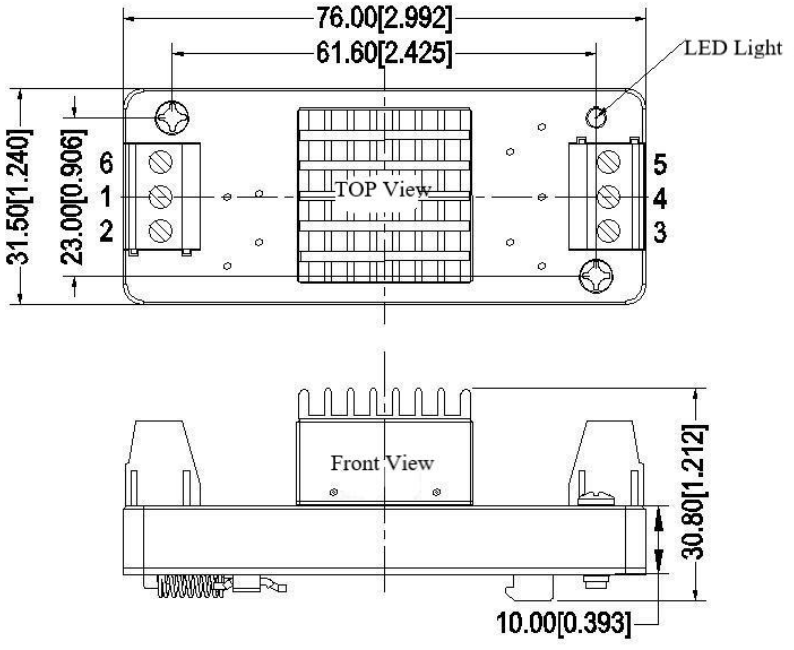
Pin-Function						
Pin	1	2	3	4	5	6
Function	-Vin	+Vin	+Vout	Trim	GND	Ctrl

A3-TS Package(Din rail mount without Heat Sink)



Pin-Function						
Pin	1	2	3	4	5	6
Function	-Vin	+Vin	+Vout	Trim	GND	Ctrl

A3-TSH Package(Din rail mount with Heat Sink)



Pin-Function						
Pin	1	2	3	4	5	6
Function	-Vin	+Vin	+Vout	Trim	GND	Ctrl

Application Reference：

1. The product should be used under the specification range, otherwise it will cause permanent damage to it.
2. The product does not support output parallel connection to increase power;
3. If the product worked beyond the load range or below the minimum load, we cannot ensure that the performance of product is in accordance with all the indexes in this manual;
4. Unless otherwise specified, data in this datasheet should be tested under conditions of Ta=25℃, humidity<75% when inputting nominal voltage and outputting rated load(pure resistance load);
5. All index testing methods in this datasheet are based on our Company's corporate standards.
6. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technician for specific information;
7. We can provide customized product service;
8. The product specification may be changed at any time without prior notice.

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