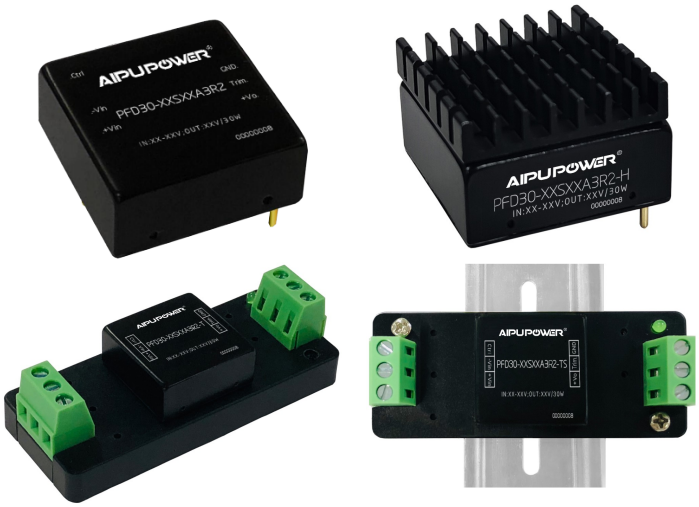
DC/DC Converter
PFD30-XXSXXA3R2 Series

Typical Features

- Wide input voltage range (4:1)
- Efficiency up to 91%(Typ.)
- Output fast start up
- Continuous Short Circuit protection, Self-recovery
- Input under voltage protection, output over voltage, short circuit & over current protections
- Isolation Voltage 1500VDC
- Operating Temperature: -40°C~+105°C
- Good EMC performance
- International standard pin-out



Application Field

PFD30-XXSXXA3R2 *series products are new designed DIP 1"X1" size packaging, 30W output power DC-DC convertors with advantages of wide input range 4:1, low stand-by power consumption, isolated & regulated output. They can be widely used in the fields of industrial control, instrument, communication, power electricity and IoT. The additional circuit for EMC is recommended in this data sheet for the application with higher EMC requirement.*

Typical Product List

Certificate	Part No	Input Voltage Range (VDC)		Output Voltage/Current (VDC/A)		Input Current (mA) @Rated voltage		Max. Capacitive Load(uF)	Ripple & Noise (mVp-p)		Efficiency (%)@full load	
		Rated	Range	Voltage	Current	Full load Typ.	No load Typ.	Max	Typ	Max	Min	Typ
-	PFD30-18S3V3A3R2	24	9-36	3.3	6000/0	948	40	10000	50	100	85	87
-	PFD30-18S05A3R2			5	6000/0	1420	40	10000	50	100	86	88
-	PFD30-18S06A3R2			6	5000/0	1404	40	8000	50	100	87	89
	PFD30-18S09A3R2			9	3333/0	1388	40	3000	50	100	88	90
-	PFD30-18S12A3R2			12	2500/0	1388	40	2000	50	100	89	90
	PFD30-18S15A3R2			15	2000/0	1388	40	1500	50	100	89	90
-	PFD30-18S24A3R2			24	1250/0	1388	3	750	50	100	88	90
-	PFD30-18S48A3R2			48	625/0	1420	8	330	50	100	86	88
-	PFD30-36S3V3A3R2	48	18-75	3.3	6000/0	474	40	10000	50	100	85	87
-	PFD30-36S05A3R2			5	6000/0	710	40	10000	50	100	87	88
-	PFD30-36S09A3R2			9	3333/0	694	40	3000	50	100	88	90
-	PFD30-36S12A3R2			12	2500/0	694	40	2000	50	100	89	91
-	PFD30-36S15A3R2			15	2000/0	694	40	1500	50	100	89	91
-	PFD30-36S24A3R2			24	1250/0	694	2	750	50	100	88	90
-	PFD30-36S48A3R2			48	625/0	710	4	330	50	100	86	88

Note

1. In the part numbers R indicates the part with both Control & Trim functions, C indicates the part with Control function, T indicates with Trim function, N indicates with None of Control or Trim.
2. The suffix -H indicates the part with Heat sink, -T (H) indicates a kind of chassis packaging with terminals(with heat sink), -TS (H) indicates a kind of packaging of DIN Rail (with heat sink).
3. The above efficiency is tested at Rated input voltage and output rated load.
4. The maximum capacitive load is the capacitance allowed to be used when the power supply operates at full load. The converter may not start up if the capacitor exceeds this value.
5.The chip could operate at reduced switching frequency to decrease the no-load power and improve the efficiency at no-load or light-load condition.
6. Please contact with Aipu sales for other output voltages requirement in this series but not in this table.

Input Specifications

Items	Test Conditions	Min.	Typ.	Max.	Unit
Stand-by power Consumption	24V Output	/	0.08	/	W
	48V Output	/	0.2	/	
	Other Output	/	1	/	
Input Under-Voltage Protection	Vin=24V	5	7	9	VDC
	Vin=48V	11	13	18	
Input Filter	/	π filter			
Hot Plug	/	Unavailable			
CTRL*	Turn-on the module	No connection or connect to a high level (3.3-12VDC)			
	Shut off the Module	Connect to -Vin or a low level (0-1.2VDC)			
	The current value to shut off	2mA (TYP)			

*Note: The voltage of the CTRL is relative to the input -Vin.

Output Specifications

Items	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Input voltage range	/	±1	±3	%
Voltage Regulation	Full voltage range, Rated load	/	±0.2	±0.5	
Load Regulation	10%-100% Rated load	/	±0.5	±1	
Ripple & Noise	0%-100% load, Rated voltage (20MHz bandwidth)	/	50	100	mVp-p
Dynamic Response Deviation	25% Rated load step, ≤6V output voltage	/	±5	±8	%
	25% Rated load step, other output voltage	/	±3	±5	
Dynamic Response Time	25% Rated load step, Rated input voltage	/	250	500	uS
O/P voltage adjustable (Trim)	Input voltage range	90	/	110	%Vo
O/P Over voltage protection		120	140	200	
Output overshoot		/	/	10	
O/P Over current protection		110	140	260	%Io
Short Circuit Protection	Input voltage range	Hiccup, continuous, self-recovery			

General Specifications

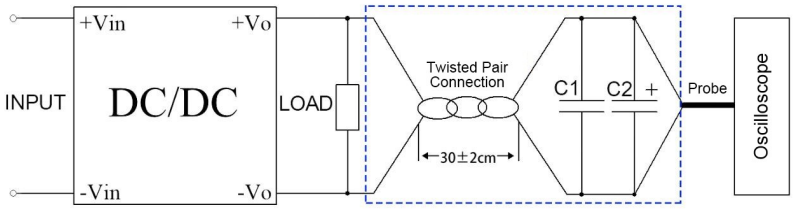
Items	Test Conditions	Min.	Typ.	Max.	Unit
Switching Frequency	Operating Mode (PWM)	/	280	/	KHz
Operating Temperature	Refer to Temperature Derating Curve	-40	/	+105	℃
Storage Temperature	/	-55	/	+125	
Case Temperature	Refer to Product Performance Curve	/	/	+105	
Pin Soldering Temperature	1.5mm from soldering to case, 10 sec.	/	/	300	
Relative Humidity	No condensing	5	/	95	%RH
Isolation Voltage	I/P-O/P, test 1min, leakage current<0.5mA	1500	/	/	VDC
Insulation Resistance	I/P-O/P, @500VDC	1000	/	/	MΩ
Isolation Capacitance	I/P-O/P, 100KHz/0.1V	/	1000	/	pF
MTBF	MIL-HDBK-217F@25℃	1000	/	/	KHrs
Cooling Method	Nature air				
Case Material	Aluminum				

Weight/ Dimension	Part No.	Weight Typ.	L x W x H	
	PFD30-XXSXXA3(R)2	18g	25.4X 25.4X12.5 mm	1.00 X 1.00 X 0.492 inch
	PFD30-XXSXXA3(R)2-H	21g	25.4X25.4X18.0 mm	1.00 X 1.00 X 0.708 inch
	PFD30-XXSXXA3(R)2-T	39g	76X31.5X21.3 mm	2.99 X 1.24 X 0.838 inch
	PFD30-XXSXXA3(R)2-TH	42g	76X31.5X26.0 mm	2.99 X 1.24 X 1.023 inch
	PFD30-XXSXXA3(R)2-TS	59g	76X31.5X26.0 mm	2.99 X 1.24 X 1.023 inch
	PFD30-XXSXXA3(R)2-TSH	62g	76X31.5X30.8 mm	2.99 X 1.24 X 1.212 inch

EMC Performances

Total Items		Sub Items	Test Standard	Performance/Class
EMC	EMI	CE	CISPR22/EN55032	CLASS B (with EMC Recommended Circuit)
		RE	CISPR22/EN55032	CLASS B (with EMC Recommended Circuit)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria A
		CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria A
		ESD	IEC/EN61000-4-2	Contact ±6KV Perf.Criteria B
		Surge	IEC/EN61000-4-5	±2KV Perf.Criteria B (with EMC Recommended Circuit)
		EFT	IEC/EN61000-4-4	±2KV Perf.Criteria B (with EMC Recommended Circuit)

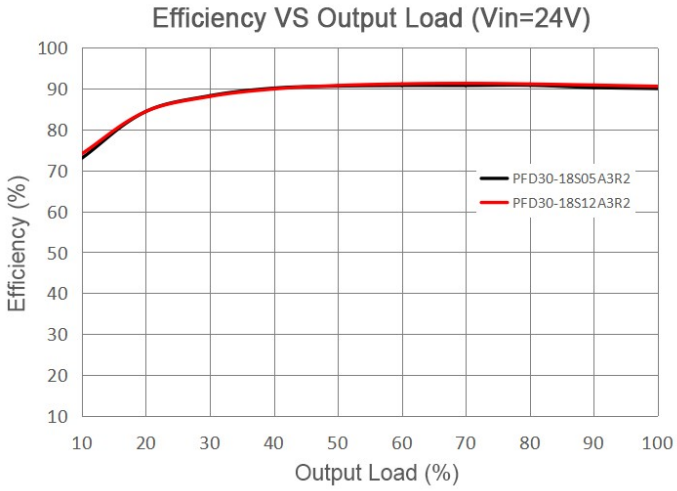
Ripple & Noise Test Instruction (Twisted Pair Method, 20MHZ bandwidth)

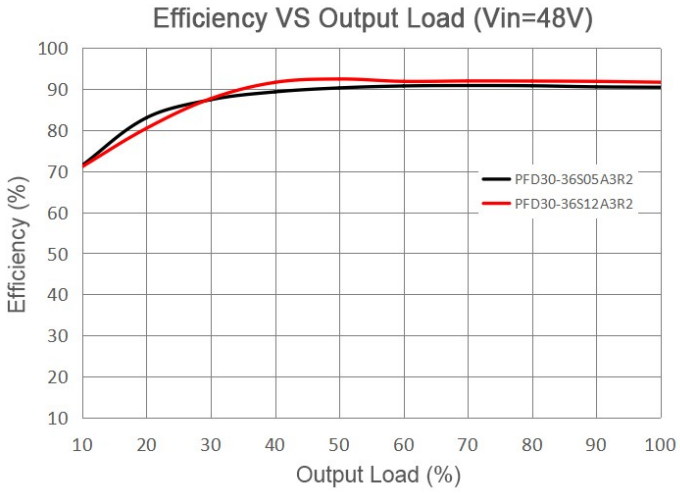


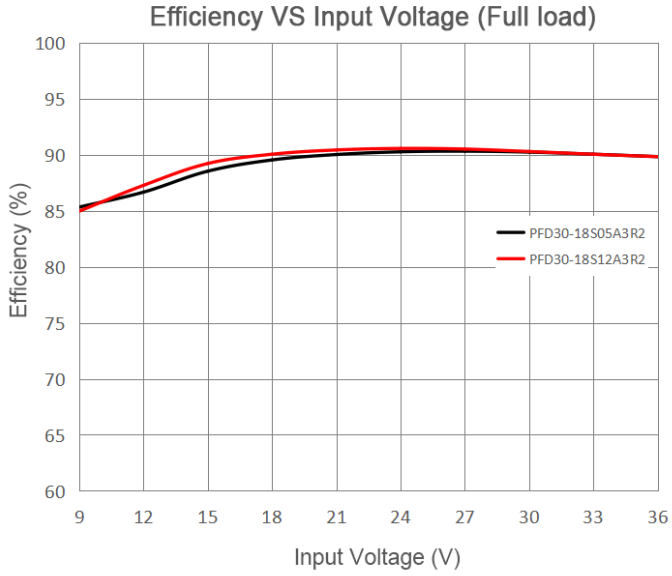
1) Ripple noise test need 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C1(0.1uF) polypropylene capacitor and C2(10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair.

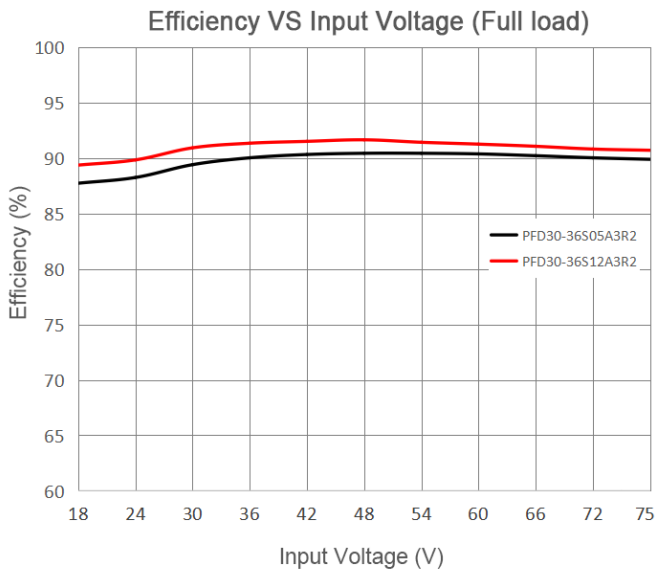
2) The power supply output connects to the load by the cables. The other side of the twisted pair (length 30cm±2 cm) should be connected in parallel with the load, the polarity of the output and the oscilloscope probe should not be reversed. The test can be started after input power on.

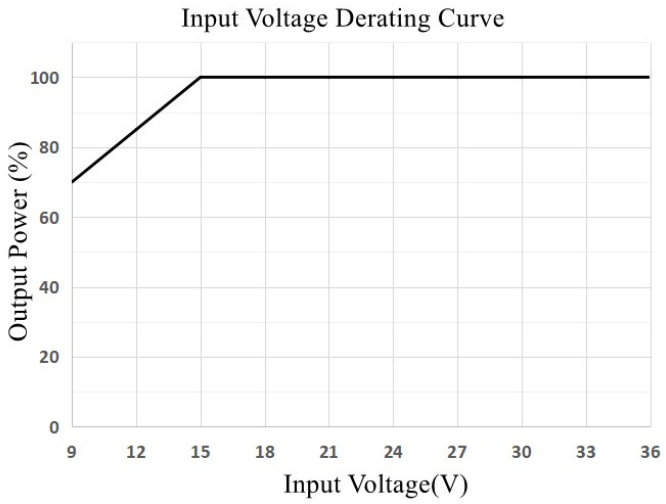
Product Performance Curves

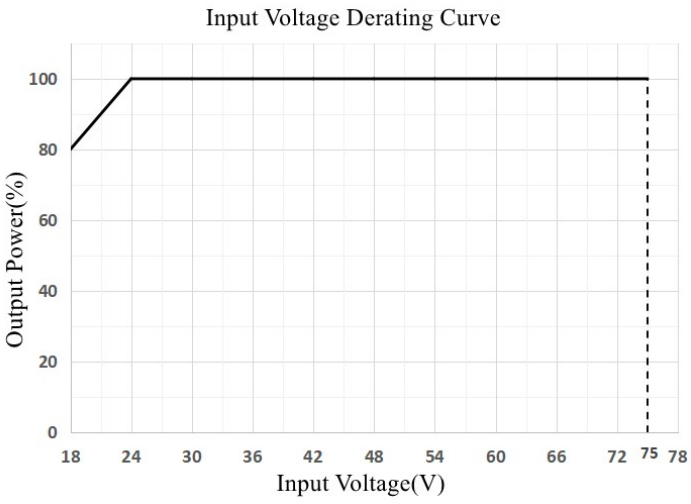


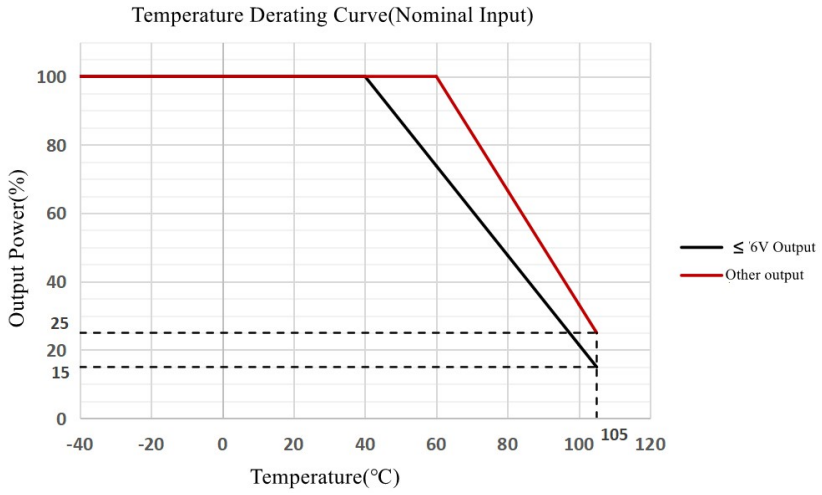








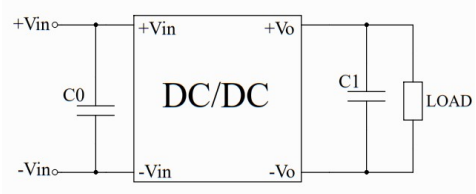




Note: During the actual operating, the product can be always judged at a safe condition when its case temperature ≤110℃.

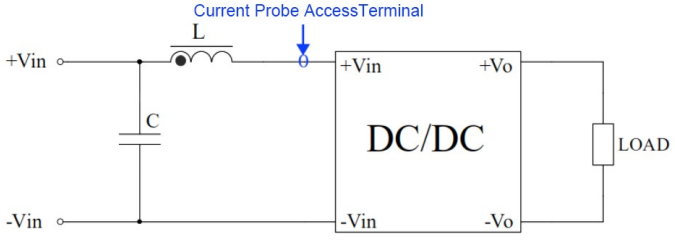
Recommended Circuits for Application

1. This series of power supplies are tested according to this circuit before shipping. Increasing the capacity of C1 can reduce the output ripple, but the capacity must be less than the maximum capacitive load.



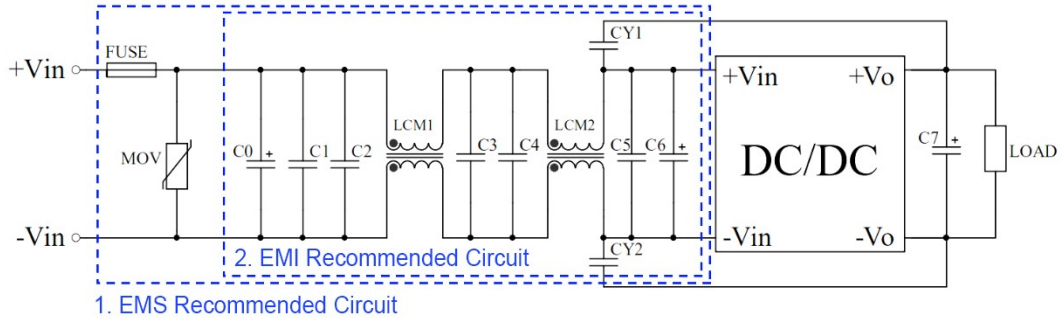
Component	Parameter
C0	100uF/100V
C1	100uF/50V

2. Input reflected ripple current test circuit.



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

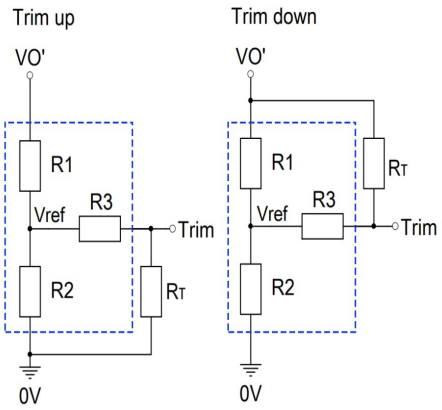
3. Recommended EMC circuits



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

Component	Vin=24V	Vin=48V
FUSE	Choose according to customer needs	
MOV	14D560K	14D101K
LCM1	5mH	
LCM2	250uH	
C0	1000uF/50V	470uF/100V
C1,C2,C3,C4,C5	10uF/50V	10uF/100V
C6	470uF/50V	470uF/100V
C7	100uF/50V	
CY1,CY2	2.2nF/2KV	

4. Trim and calculation of Trim resistance



Note: Trim up & down circuits, the components in the dotted area are inside of the convertor.

Calculation formula of Trim resistance:

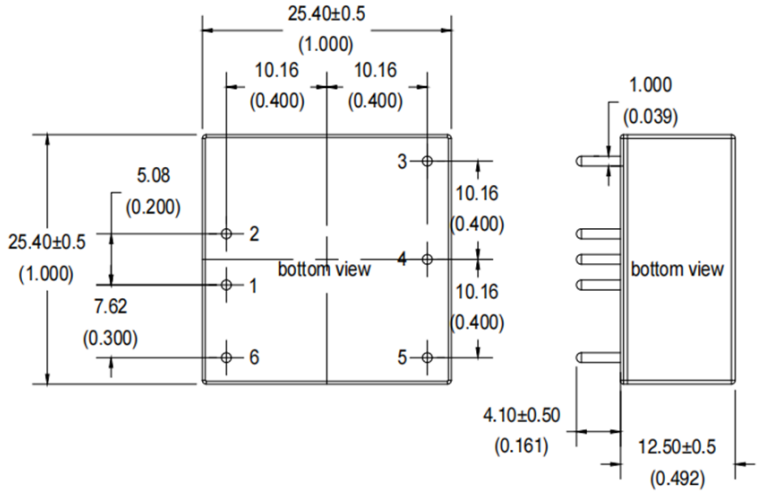
$$\text{up: } R_T = \frac{aR_2}{R_2-a} - R_3 \qquad a = \frac{V_{ref}}{V_o'-V_{ref}} \cdot R_1$$

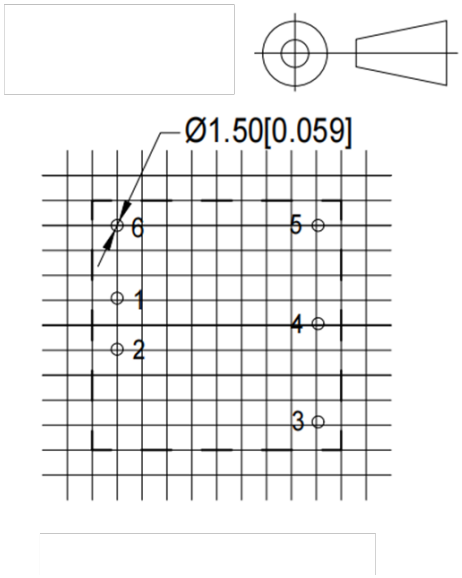
$$\text{down: } R_T = \frac{aR_1}{R_1-a} - R_3 \qquad a = \frac{V_o'-V_{ref}}{V_{ref}} \cdot R_2$$

RT is the Trim resistor, a is a custom parameter, and Vo' is the actual voltage of Trim up or Trim down.

Output Voltage	Internal circuit parameters for Trim			
Vout(DC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.22	2.55	12	1.25
5	5.1	5.1	20	2.5
6	6.2	4.44	20	2.5
9	9.31	3.58	24	2.5
12	18	4.75	33	2.5
15	18	3.6	25.5	2.5
24	30	3.48	30	2.5
48	45.3	2.47	18	2.5

A3 Packaging Dimension (Without Heat Sink)

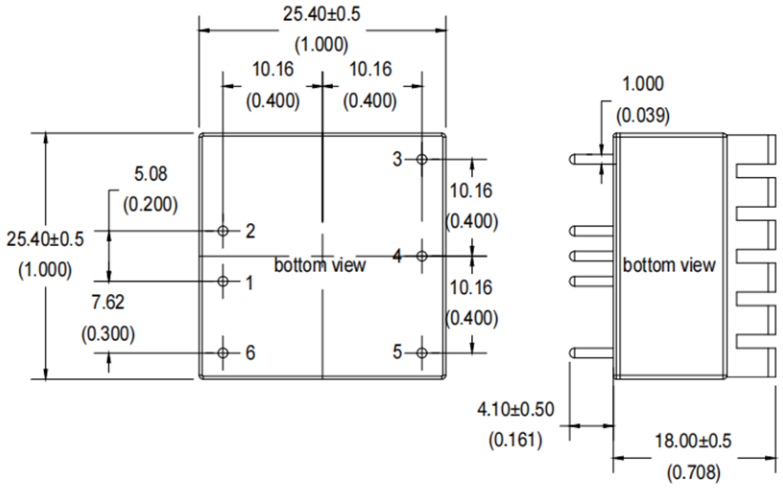


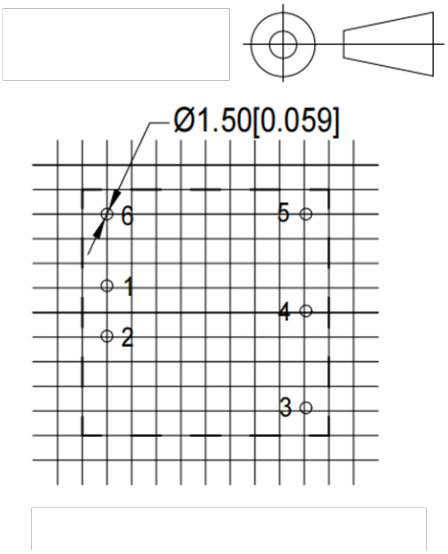


Note:
Grid: 2.54x2.54mm[0.1x0.1inch]
Unit: mm[inch]
Pin diameter tolerance: ±0.10[±0.004]
General tolerance: ±0.50[±0.020]

Pin No.	1	2	3	4	5	6
PFD30-XXSXXA3R2	-Vin	+Vin	+Vout	Trim	GND	Ctrl

A3-H Packaging Dimension (With Heat Sink)

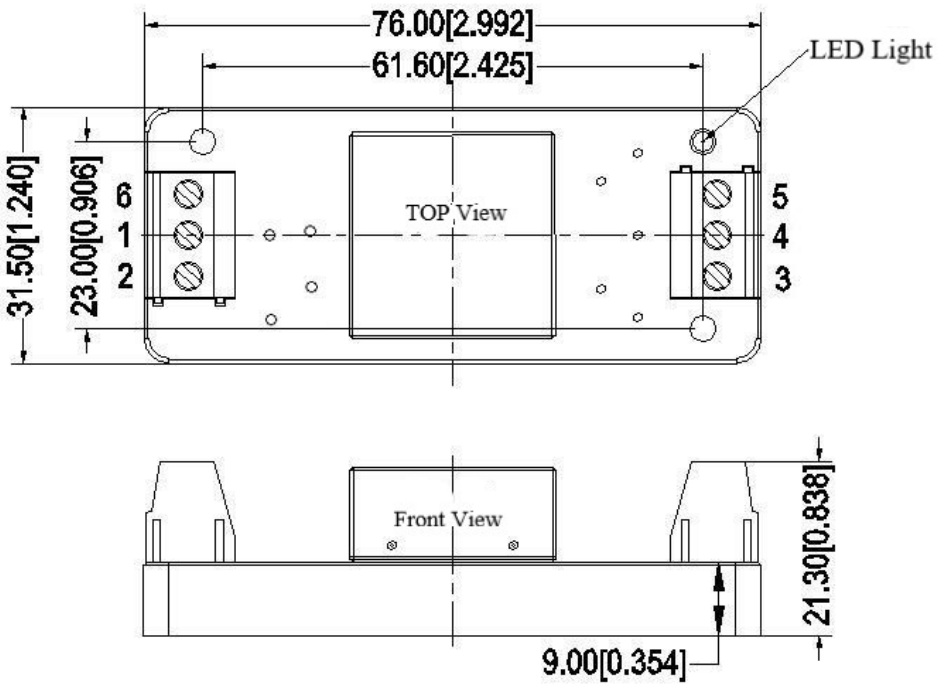




Note:
Grid: 2.54x2.54mm[0.1x0.1inch]
Unit: mm[inch]
Pin diameter tolerance: ±0.10[±0.004]
General tolerance: ±0.50[±0.020]

Pin No.	1	2	3	4	5	6
PFD30-XXSXXA3R2	-Vin	+Vin	+Vout	Trim	GND	Ctrl

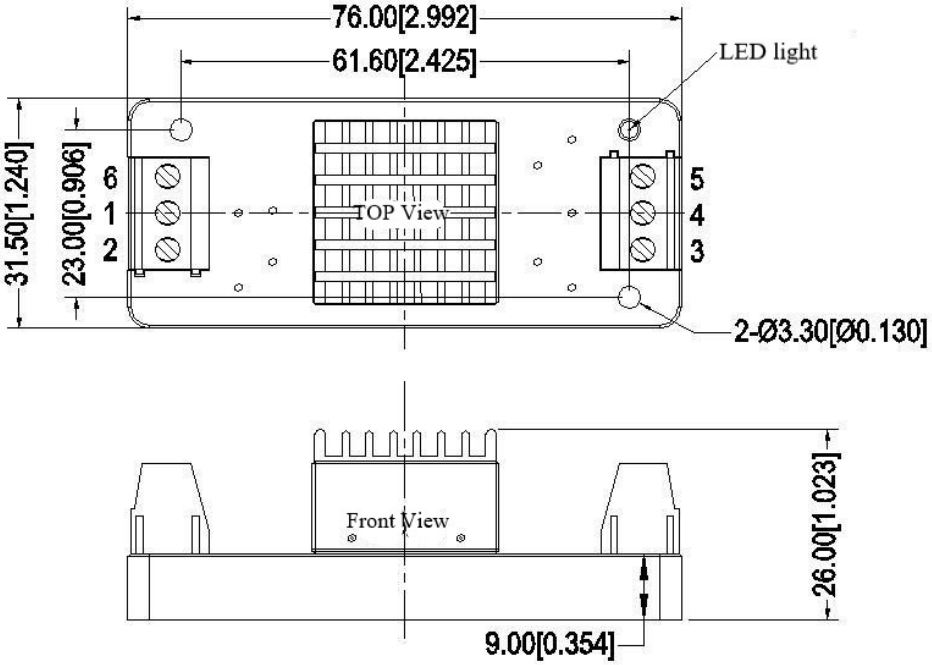
A3-T Packaging Dimension (Without Heat Sink)



Note:
Unit: mm[inch]
General tolerance: ±1.0[±0.04]

Pin No.	1	2	3	4	5	6
PFD30-XXSXXA3R2	-Vin	+Vin	+Vout	Trim	GND	Ctrl

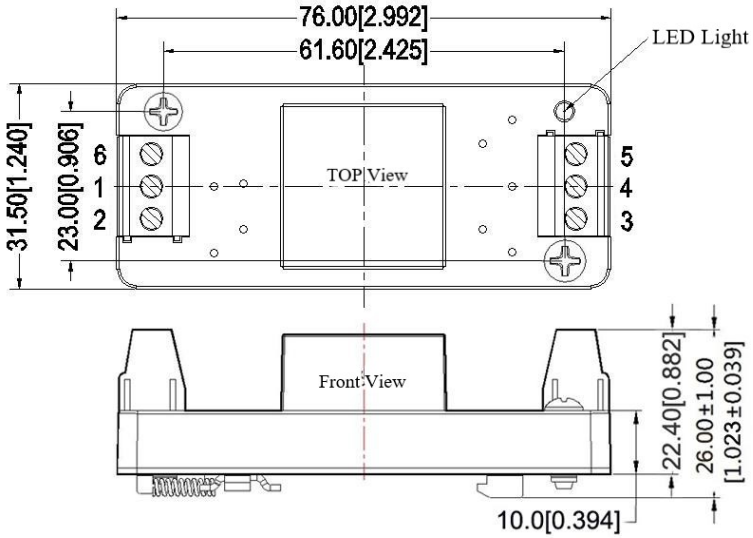
A3-TH Packaging Dimension (With Heat Sink)



Note:
Unit: mm[inch]
General tolerance: ±1.0[±0.04]

Pin No.	1	2	3	4	5	6
PFD30-XXSXXA3R2	-Vin	+Vin	+Vout	Trim	GND	Ctrl

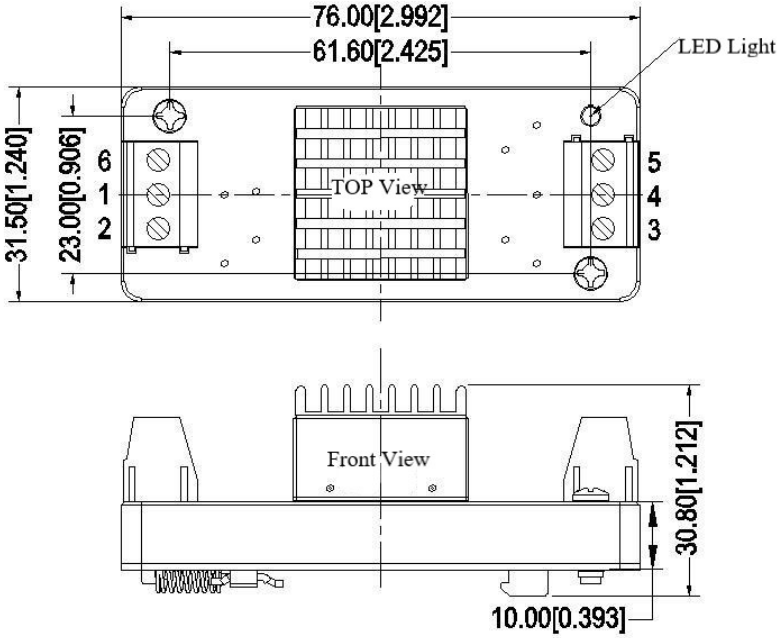
A3-TS Packaging Dimension (Without Heat Sink)



Note:
Unit: mm[inch]
General tolerance: ±1.0[±0.04]

Pin No.	1	2	3	4	5	6
PFD30-XXSXXA3R2	-Vin	+Vin	+Vout	Trim	GND	Ctrl

A3-TSH Packaging Dimension (With Heat Sink)



Note:
Unit: mm[inch]
General tolerance: ±1.0[±0.04]

Pin No.	1	2	3	4	5	6
PFD30-XXSXXA3R2	-Vin	+Vin	+Vout	Trim	GND	Ctrl

Other Models Pin Definition

Pin No.	1	2	3	4	5	6
PFD30-XXSXXA3C2	-Vin	+Vin	+Vout	NC	GND	Ctrl
PFD30-XXSXXA3T2	-Vin	+Vin	+Vout	Trim	GND	NP
PFD30-XXSXXA3N2	-Vin	+Vin	+Vout	NC	GND	NP

Note:

1. The products should be used according to the specifications in this manual, otherwise it could be permanently damaged.
2. It is not recommended to connect the power supply outputs in parallel to achieve a bigger power output.
3. The product performance in this manual cannot be guaranteed if it works at a lower load than the minimum load defined.
4. The product performance in this manual cannot be guaranteed if it works at over-load condition.
5. Unless otherwise specified, all values or indicators in this manual are tested at Ta=25℃, humidity<75%RH, rated input voltage and rated load (pure resistance load).
6. All values or indicators in this manual had been tested based on Aipupower test specifications.
7. The specifications are specially for the parts listed in this manual, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.
8. Aipupower can provide customization service.
9. The product specifications may be modified without prior notice. Please refer to the published data sheet at Aipupower website.

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