

Typical Features

- ◆ Wide input voltage range (4:1)
- ◆ Efficiency up to 88% (Typ.)
- ◆ Standby power consumption 0.12W (Typ.)
- ◆ Continuous short circuit protection, self-recovery
- ◆ Input under-voltage protection, output short circuit, over current, over voltage protections
- ◆ Isolation Voltage 1500VDC
- ◆ Operating temperature from -40°C to +85°C
- ◆ Excellent EMC Performance
- ◆ Standard International Pin-out Alignment



EN62368-1

Application Field

PFD6-XXS&DXXA3(C)2 series ----- Compact size modular DC-DC converters with 4:1 wide input voltage range, isolation voltage 1500VDC, output short circuit, over current & over voltage protections, operating temperature from -40°C to +85°C & ON/OFF Control function. This series of products can be widely used in the fields of Industrial control, Instrument, Communication, Electricity power & IoT, etc. The additional circuit diagram for EMC is recommended for the application with higher EMC requirement.

Typical Product List

Certificate	Part No.	Input Voltage Range		Output Voltage/Current (Vo/Io)		Input Current (mA) Typ. @Nominal volt.		Max Capacitive Load	Efficiency (%) @Full load, nominal volt.	
		Nominal (VDC)	Range (VDC)	Vo (VDC)	Io (mA)	Full Load	No Load	(μF)	Min	Typ.
CE	PFD6-18S3V3A3(C)2	24	9~36	3.3	1500/0	267	5	2200	75	77
	PFD6-18S05A3(C)2			5	1200/0	301		2200	81	83
	PFD6-18S09A3(C)2			9	667/0	298		1000	82	84
	PFD6-18S12A3(C)2			12	500/0	294		680	83	85
	PFD6-18S15A3(C)2			15	400/0	291		680	84	86
	PFD6-18S24A3(C)2			24	250/0	291		680	84	86
	PFD6-18S40A3(C)2			40	150/0	294		470	84	86
CE	PFD6-18D05A3(C)2	24	9~36	±5	600/0	305	5	1000	80	82
	PFD6-18D09A3(C)2			±9	333/0	298		330	82	84
	PFD6-18D12A3(C)2			±12	250/0	294		330	83	85
	PFD6-18D15A3(C)2			±15	200/0	291		330	84	86
	PFD6-18D24A3(C)2			±24	125/0	291		220	84	86
CE	PFD6-36S3V3A3(C)2	48	18~75	3.3	1500/0	129	4	2200	78	80
	PFD6-36S05A3(C)2			5	1200/0	149		2200	82	84
	PFD6-36S09A3(C)2			9	667/0	147		1000	83	85
CE	PFD6-36S12A3(C)2	48	18~75	12	500/0	144	4	680	85	87

	PFD6-36S15A3(C)2			15	400/0	142		680	86	88
	PFD6-36S24A3(C)2			24	250/0	144		680	85	87
	PFD6-36D05A3(C)2			±5	600/0	151		1000	81	83
	PFD6-36D09A3(C)2			±9	333/0	149		330	82	84
	PFD6-36D12A3(C)2			±12	250/0	144		330	85	87
	PFD6-36D15A3(C)2			±15	200/0	142		330	86	88
	PFD6-36D24A3(C)2			±24	125/0	145		220	84	86

Note 1: The part number letter C indicates the part with ON/OFF Control function, N indicates with NO Control function.

Note 2: The suffix -T indicates the chassis package, -TS indicates the package of DIN Rail which width is 35mm.

Note 3: The typical value of efficiency is tested at nominal input voltage and rated load.

Note 4: The maximum capacitive load is the capacitance allowed to be used when the power supply starts at full load. The converter may not start if the capacitor exceeds this value.

Note 5: The control chip could work at lower frequency at no load or low load to decrease the no load power consumption and improve the efficiency.

Input Specifications

Item	Test Conditions	Min.	Typ.	Max.	Unit
Standby power consumption	Full input voltage range	/	0.12	/	W
Input current Max.	Full input voltage range	/	0.9	/	A
Input inrush voltage (1 sec. Max)	Nominal 24VDC input	-0.7	/	50	VDC
	Nominal 48VDC input	-0.7	/	100	
Start-up voltage	Nominal 24VDC input	/	/	9	
	Nominal 48VDC input	/	/	18	
Under voltage protection	Nominal 24VDC input	5.5	6.5	/	
	Nominal 48VDC input	12	15	/	
Reflected ripple current	Nominal input voltage	/	20	/	mA
Hot plug	/	N/A			
Input filter	/	π type filter			
ON/OFF Control (Ctrl)	Turn ON the converter	Ctrl no connection or connected to the high level (3.5-12VDC)			
	Turn OFF the converter	Ctrl connected to -Vin or the low level (0-1.2VDC)			
	Input current for switching OFF	/	3	/	mA

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

Output Specifications

Item	Test Conditions		Min.	Typ.	Max.	Unit
Output voltage accuracy	5%-100% load		/	±1	±3	%
	0%-5% load	Single output	/	±1	±3	
		Dual output	/	±2	±5	
Output voltage balance	Dual outputs, balanced load		/	±0.5	±1.5	%
Voltage regulation	Full input voltage range,	Positive output	/	±0.2	±0.5	%

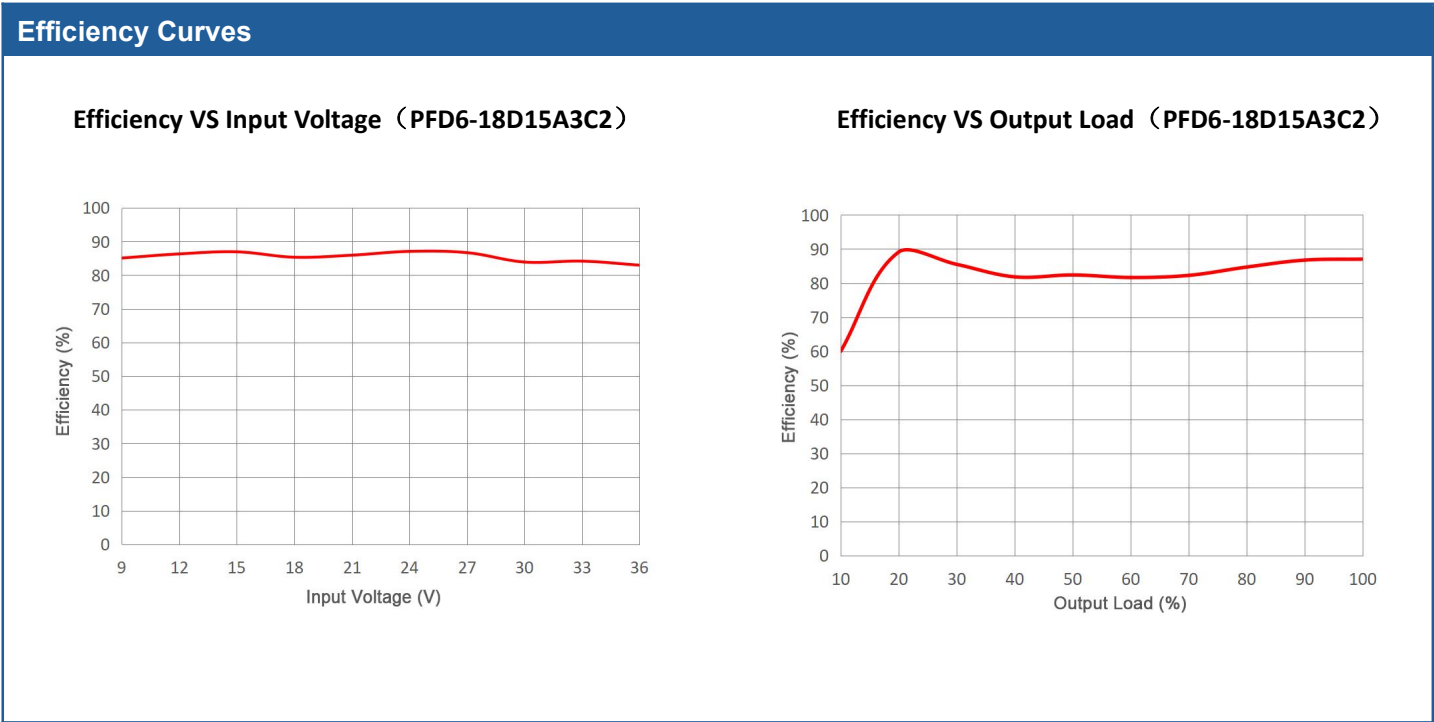
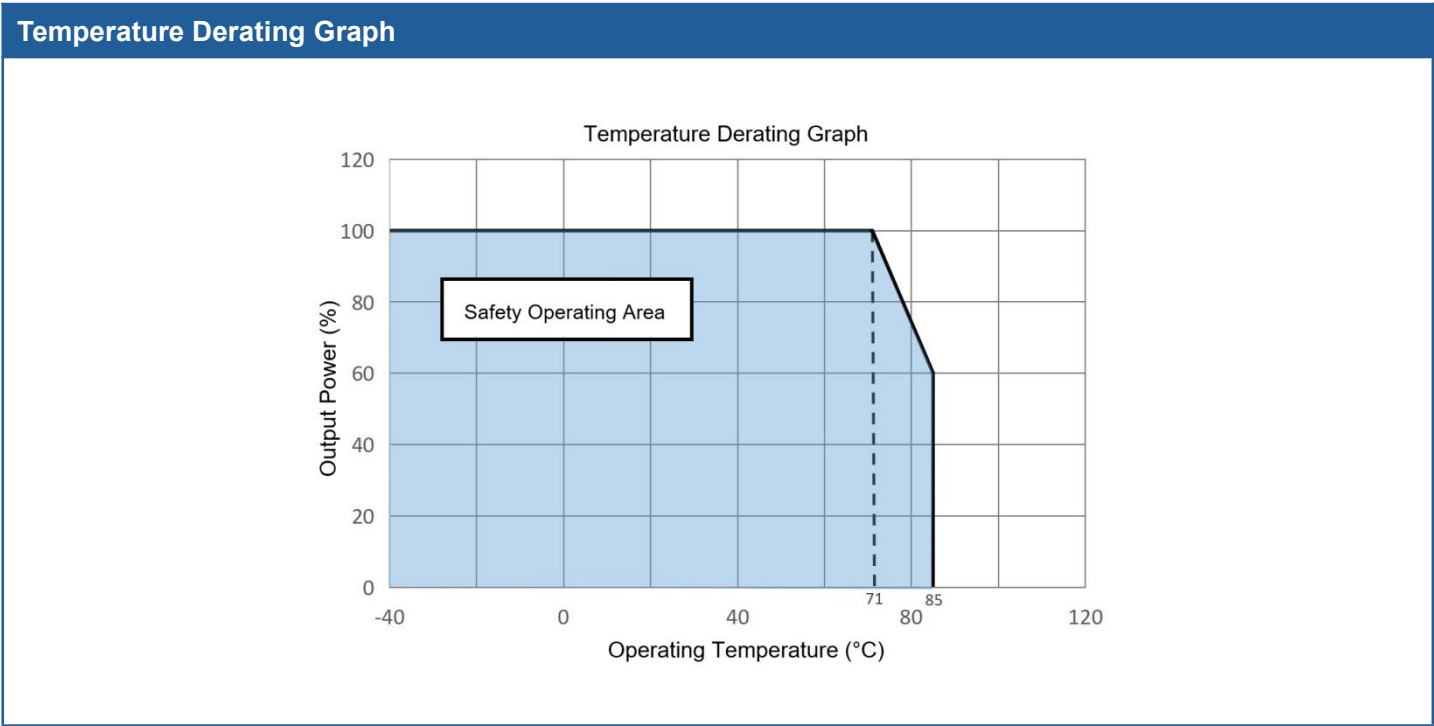
	full load	Negative output	/	±0.5	±1	
Load regulation	5%-100% load	Positive output	/	±0.5	±1	%
		Negative output	/	±0.5	±1.5	
Ripple & Noise	5%-100% load, 20MHz bandwidth		/	50	100	mVp-p
Dynamic response deviation	25% rated load step, nominal input voltage		/	±3	±5	%
Dynamic response time	25% rated load step, full input voltage range		/	250	500	uS
Temperature drift coefficient	/		/	/	±0.03	%/°C
Turn-on delay time	Nominal input voltage		/	10	/	mS
Output overshoot	Full input voltage range		/	/	10	%Vo
Over voltage protection			110	160	230	%Vo
Over current protection			110	150	260	%Io
Short circuit protection			Continuous, self-recovery			

Note: Ripple & noise ≤5%Vo at 0% - 5% load, it is tested by the Parallel cable method (Refer to the following test instruction).

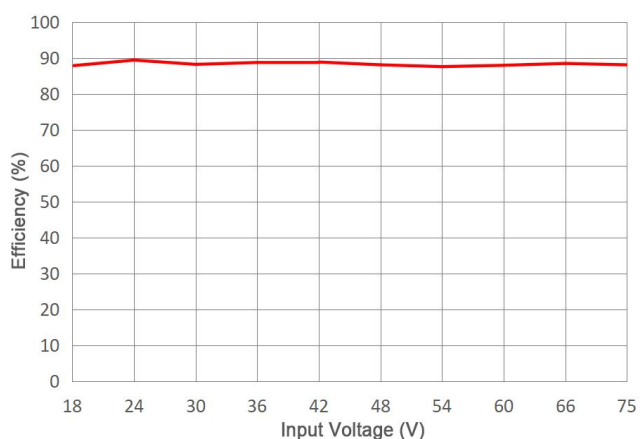
General Specifications

Item	Test Conditions		Min.	Typ.	Max.	Unit
Switching frequency	Operating Mode (PWM)		/	300	/	KHz
Operating temperature	Refer to the Temperature Derating Curve		-40	/	+85	°C
Storage temperature	/		-55	/	+125	
Case temperature Max.	Within the operating derating range		/	/	+105	
Pin soldering temperature	1.5mm from the case, soldering time ≤10S		/	/	300	
Relative humidity	No condensing		5	/	95	%RH
Isolation voltage	I/P-O/P	Dielectric test 1 min, leakage current <1mA	1500	/	/	VDC
	I/P&O/P-Case		1000	/	/	
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°C		1000	/	/	K hours
Cooling method	Natural convention					
Vibration	10-150Hz, 5G, 0.75mm, along X, Y and Z					
Case material	Aluminum					
Weight / Dimensions	Part No.	Weight (Typ.)	Dimensions L x W x H			
	PFD6-XXS&DXXA3(C)2	15g	25.4X25.4X11.0 mm	1.00X1.00X0.433 inch		
	PFD6-XXS&DXXA3(C)2-T	36g	76.0X31.5X21.3 mm	2.99X1.24X0.838 inch		
	PFD6-XXS&DXXA3(C)2-TS	56g	76.0X31.5X26.0 mm	2.99X1.24X1.023 inch		

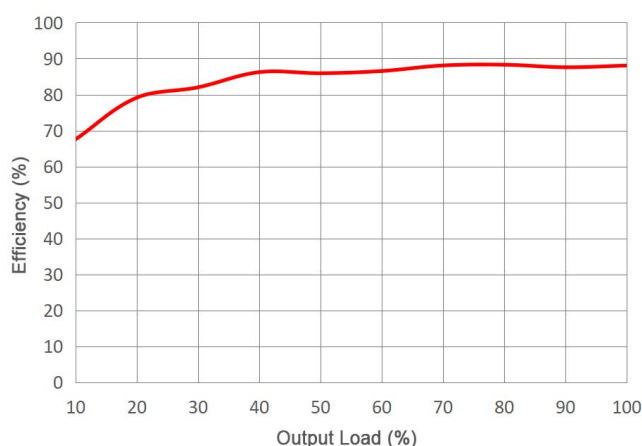
EMC Performance				
Items			Test Standard	Performance/Criteria
EMC	EMI	CE	CISPR32/EN55032	CLASS B (External circuit recommended)
		RE	CISPR32/EN55032	CLASS B (External circuit recommended)
	EMS	CS	IEC/EN61000-4-6	3Vr.m.s Perf. Criteria A
		RS	IEC/EN61000-4-3	10V/m Perf. Criteria A
		ESD	IEC/EN61000-4-2	Contact ±4KV Perf. Criteria B
		Surge	IEC/EN61000-4-5	±2KV Perf. Criteria B (External circuit recommended))
		EFT	IEC/EN61000-4-4	±2KV Perf. Criteria B (External circuit recommended))



Efficiency VS Input Voltage (PFD6-36S12A3C2)

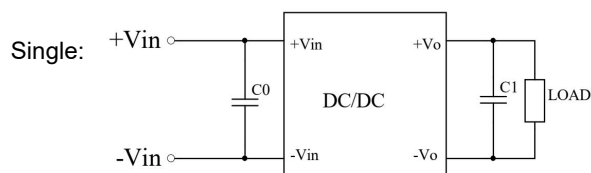


Efficiency VS Output Load (PFD6-36S12A3C2)

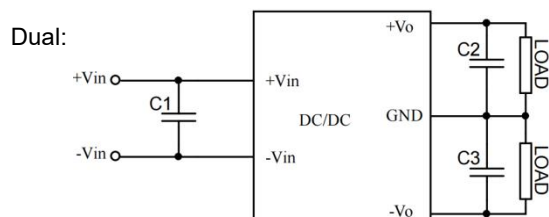


Recommended Circuits for Application

1. DC-DC test circuit diagrams



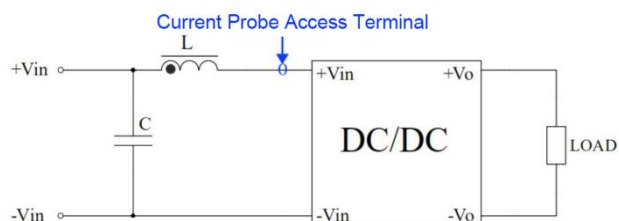
Single output	
Component	Parameter
C0	100μF/100V
C1	10μF/50V



Dual outputs	
Component	Parameter
C1	100μF/100V
C2, C3	10μF/50V

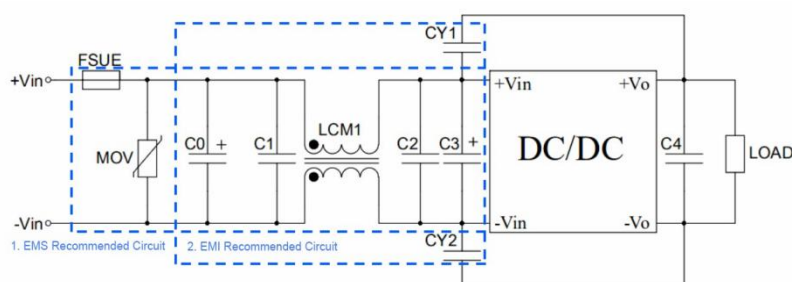
2. Input reflected ripple current test circuit diagram

Low ESR capacitor is recommended for C which withstand voltage should be more than the maximum input voltage.



Component	Parameter
C	220μF/100V
L	4.7μH/15A

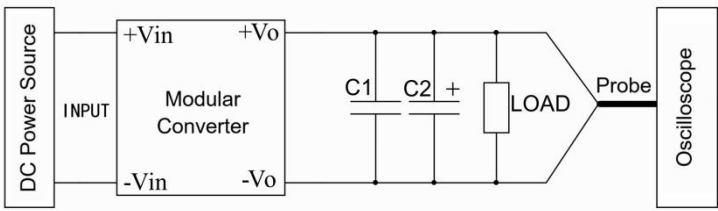
3. Recommended circuit diagram for EMC



Components	24VDC Input	48VDC Input
FUSE	TBD by the customer	
MOV	10D470K	10D101K
C0, C3	330μF/50V	100μF/100V
C1, C2, C4	10μF/50V	10μF/100V
LCM1	10mH	
CY1, CY2	1nF/3KV	

Note: The part 1 circuit is for EMS test and part 2 is for EMI filtering, both can be adjusted according to the actual situation.

Ripple & Noise Test Instruction (Parallel-line Method, 20MHZ bandwidth)

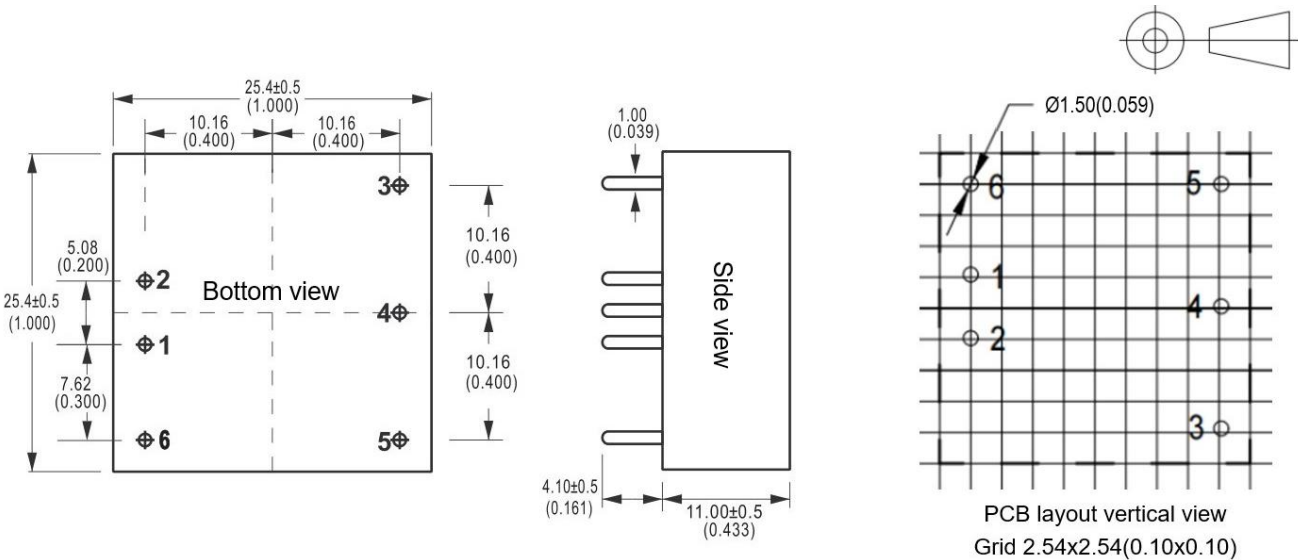


1. Test Method: > Ripple and noise are measured using the parallel cable method with the oscilloscope bandwidth limited to 20MHz (using a 100MHz bandwidth scope). Remove the probe cap and ground clip. Connect a 0.1μF ceramic capacitor (C1) and a 10μF high-frequency low-ESR electrolytic capacitor (C2) in parallel at the probe tip. Set the oscilloscope to Sample mode.
2. Test Setup: > Connect the module input to the power source and the output to an electronic load via a test fixture. Measure the output ripple directly at the output terminals using a dedicated sampling cable. Ensure the power cable gauge (insulated wire) is appropriately selected based on the output current.

Application Notes:

1. Max. Capacitive Load: > Measured under full resistive load conditions.
2. Minimum Load Requirement: > A minimum load of 5% or an external 470μF high-frequency low-ESR electrolytic capacitor is recommended. Operating below this limit may lead to increased output ripple and noise.
3. Balanced Loading (Dual Output): > For dual-output products, it is recommended to maintain a load imbalance of less than ±5%.

Mechanical Dimensions (Without Heat Sink)

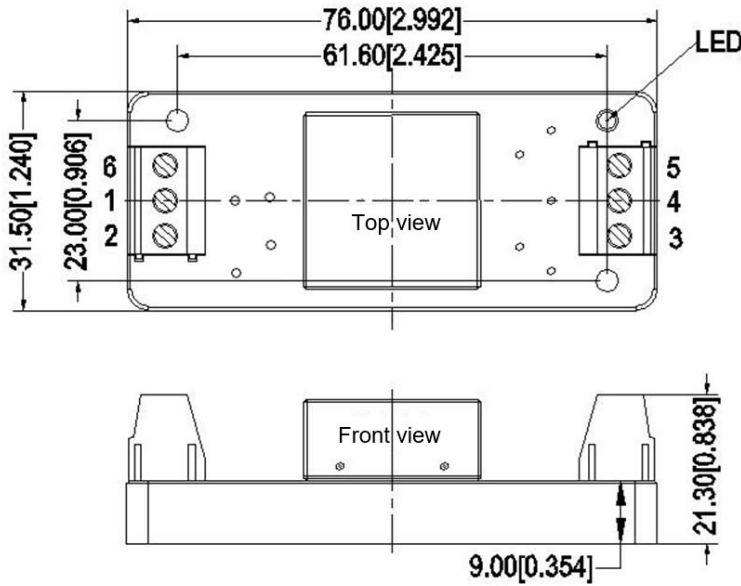


Unit: mm(inch)
General tolerance: ±0.50(±0.020)
Pin diameter tolerance: ±0.10(±0.004)

Pin-out Function Description

Pin No.	1	2	3	4	5	6
PFD6-XXDXXA3C2	-Vin	+Vin	+Vo	COM	-Vo	Ctrl
	Input Negative	Input Positive	Output Positive	Output Common	Output Negative	Remote Control
PFD6-XXSXXA3C2	-Vin	+Vin	+Vo	NP	GND	Ctrl
	Input Negative	Input Positive	Output Positive	No Pin	Output Negative	Remote Control

-T Package Mechanical Dimensions(Without Heat Sink)

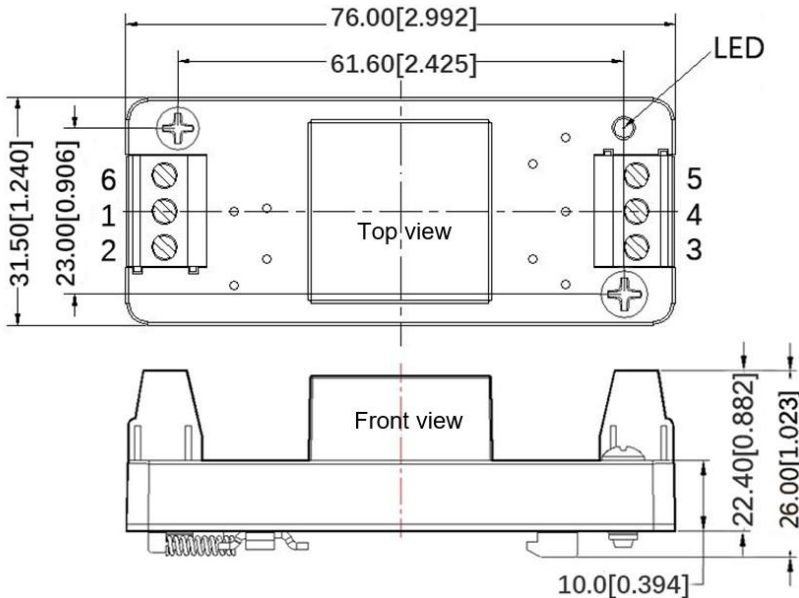


Unit: mm [inch]
Lead wires gauge: 24-12AWG
Screwing torque: 0.4N.m Max
General tolerance: ±1.00 [±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6
PFD6-XXDXXA3C2	-Vin	+Vin	+Vo	COM	-Vo	Ctrl
	Input Negative	Input Positive	Output Positive	Output Common	Output Negative	Remote Control
PFD6-XXSXXA3C2	-Vin	+Vin	+Vo	NP	GND	Ctrl
	Input Negative	Input Positive	Output Positive	No Pin	Output Negative	Remote Control

-TS Package Mechanical Dimensions(Without Heat Sink)



Unit: mm [inch]
Lead wires gauge: 24-12AWG
Screwing torque: 0.4N.m Max
General tolerance: ±1.00 [±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6
PFD6-XXDXXA3C2	-Vin	+Vin	+Vo	COM	-Vo	Ctrl
	Input Negative	Input Positive	Output Positive	Output Common	Output Negative	Remote Control
PFD6-XXSXXA3C2	-Vin	+Vin	+Vo	NP	GND	Ctrl
	Input Negative	Input Positive	Output Positive	No Pin	Output Negative	Remote Control

Other Models Pin-out Function Description

Pin No.	1	2	3	4	5	6
PFD6-XXSXXA3N2	-Vin	+Vin	+Vo	NP	GND	NP
	Input Negative	Input Positive	Output Positive	No Pin	Output Negative	No Pin
PFD6-XXDXXA3N2	-Vin	+Vin	+Vo	COM	-Vo	NP
	Input Negative	Input Positive	Output Positive	Output Common	Output Negative	No Pin

Application Notice

1. The product should be used according to the specification, otherwise it could be permanently damaged.
2. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.
3. The product performance cannot be guaranteed if it works under over-load condition.
4. Unless otherwise specified, all values or indicators on this datasheet are tested at $T_a=25^{\circ}\text{C}$, humidity<75%RH, nominal input voltage and rated load (pure resistance load).
5. All values or indicators on this datasheet have been tested based on Aipupower test specifications.
6. The specifications above apply to standard models only. For non-standard models, certain parameters may vary. Please contact our technical support for details.
7. Aipupower can provide customization service.
8. This product is designed for natural convection cooling. For applications in enclosed environments, please consult Aipu's technical team.

Guangzhou Aipu Electron Technology Co., Ltd

Address: Building 4, HEDY Park, No.63, Punan Road, Huangpu Dist, Guangzhou, China.

Tel: 86-20-84206763 Fax: 86-20-84206762 HOTLINE: 400-889-8821

E-mail: sales@aipu-elec.com Website: <https://www.aipupower.com>