DC/DC Converter

PV350-25Bxx Series

MORNSUN®

350W isolated DC-DC converter with ultra-wide, ultra-high 250 -850VDC input for Renewable Energy

RoHS

FEATURES

- Ultra-wide input voltage range of 250 - 850VDC (Transient 880VDC last for 30s, 900VDC last for 3s)
- Output power up to 500W (with aluminum plate)
- Industrial grade operating temperature -40℃ to +85℃
- High I/O isolation voltage up to 4000VAC
- Fanless design
- Input under-voltage protection, input reverse polarity protection, output short circuit, over-current, over-voltage protection
- High efficiency, low ripple & noise
- Operating up to 5000m altitude
- Meets Class I, Class II
- Design refer to CSA-C22.2 No.107.1, UL1741, EN/IEC62109, EN/IEC62477

PV350-25Bxx is a regulated DC-DC series converter with an ultra-wide and ultra-high DC input of 250-850VDC, which design based on standard of CSA-C22.2 No.107.1, UL1741, EN/IEC62109, EN/IEC62477. The products feature high efficiency, high reliability, high insulation and a high level of safety protection. It is widely used in renewable energy industries, such as photovoltaic inverter, mine car systems, energy storage systems, industrial control. The converters provide multiple protection features and guarantee stable and safe operating environments even under abnormal working conditions. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

Selection Guide

Certification	Part No.	Output Power (W)	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 600VDC (%) Typ.	Capacitive Load (μF) Max.
/	PV350-25B24	350.4	24V/14.6A	90	3000
	PV350-25B35	350.0	35V/10.0A	91	2000
	PV350-25B48	350.4	48V/7.3A	91	1500

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	Transient (30s)		--	--	880	VDC
	Transient (3s)		--	--	900	
			250	--	850	
Input Current	400VDC		--	--	1.1	A
	800VDC		--	--	0.55	
Inrush Current	850VDC	Cold start	--	150	170	
Input Under-voltage Protection	Lockout activation range		180	--	230	VDC
	Lockout deactivation range		190	--	250	
Input Reverse Polarity Protection			Available			
External Input Fuse			1000VDC/4A, required (brand: adler models: A831400710 base models: BH100-01)			
Hot Plug			Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	All load range	--	±1	±1.5	%
Line Regulation	Rated load	--	±0.5	--	
Load Regulation	800VDC	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	100	250	mV

Stand-by Power Consumption	400VDC	24V/35V	--	1	3	W
		48V	--	2	4	
	800VDC		--	3	5	
Temperature Coefficient			--	±0.03	--	%/℃
Short Circuit Protection			Hiccup, continuous, self-recovery			
Over-voltage Protection	24V		≤35V	Output voltage hiccup		
	35V		≤45V			
	48V		≤60V			
Over-current Protection	All input voltage range		105% - 350% Io, automatic recover after fault condition is removed			
Minimum Load			0	--	--	%
Hold-up Time	Full load	850VDC	--	10	--	ms
Start-up Delay Time**			--	0.5	3	s

Note: *The "parallel cable" method is used for ripple and noise test,with a 0.1uf & 47uf parallel capacitor, please refer to PV Converter Application Notes for specific information;
**Full input voltage / output load range (The cooling-time between input power-off and power-on again is greater than 15s).

General Specifications

Item		Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input - output	Electric Strength Test for 1min.,leakage current ＜10mA		4000	--	--	VAC
	Input - PE						
	Output - PE	Electric Strength Test for 1min.,leakage current ＜5mA		2000			
Insulation Type				Primary and secondary meet reinforced insulation			
Insulation Resistance	Input - output	Testing voltage: 500VDC		100	--	--	MΩ
	Input - PE						
	Output - PE						
Operating Temperature				-40	--	+85	℃
Storage Temperature				-40	--	+85	
Storage Humidity		Non-condensing		--	--	95	%RH
Output Power Derating*		Operating temperature derating	-40℃ to -25℃	2.66	--	--	%/℃
			+55℃ to +85℃	2.66	--	--	
		Input voltage derating	250-400VDC	0.2	--	--	%/VDC
			800-850VDC	0.4	--	--	
		Altitude derating	3000- 5000m	10	--	--	%/Km
Safety Standard				Design refer to CSA-C22.2 No.107.1-16, UL1741, EN/IEC62109-1, EN/IEC62477			
Safety Class				Class I, Class II			
MTBF		MIL-HDBK-217F@25℃		≥300,000 h			

Note: *1.When equipped with aluminum plates for auxiliary heat dissipation, the power can be expanded to 500W, and the output power derating is consistent with 350W;
2.In order to optimize the heat dissipation performance, when the aluminum plate is used for auxiliary heat dissipation, please note: 1. The size of the aluminum plate is 400mm x 400mm x 3mm; 2. The surface of the aluminum plate must be coated with thermal grease; 3. The product must be tightly attached to the aluminum plate.

Mechanical Specifications

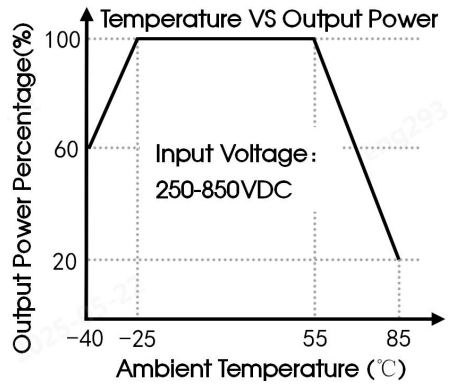
Case Material	Metal
Dimensions	234.50 x 81.00 x 42.00mm
Weight	1050g (Typ.)
Cooling Method	Free air convection

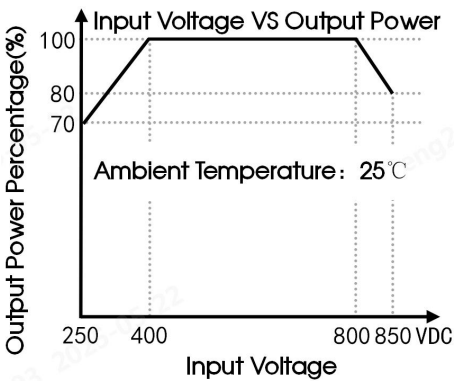
Electromagnetic Compatibility (EMC)

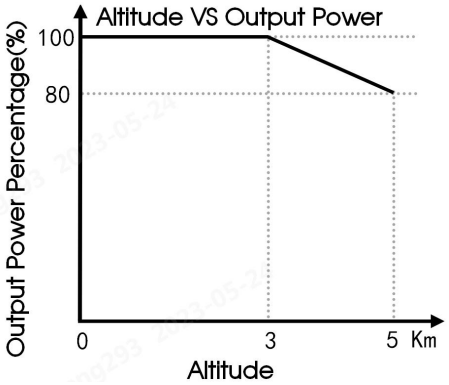
Emissions	CE	CISPR32/EN55032 CLASS A		
	RE	CISPR32/EN55032 CLASS A		
	EN61000-6-4			
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	Perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4	±4KV	Perf. Criteria A
	Surge	IEC/EN61000-4-5	Line to line ±1KV/line to PE ±2KV	Perf. Criteria A
		IEC/EN61000-4-5	Line to line ±2KV/ Line to PE ±4KV (See Fig. 2 for recommended circuit)	Perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	Perf. Criteria A
	PFMF	IEC/EN61000-4-8	30A/m	Perf. Criteria A
	EN55035、EN61000-6-2			

Note: PE connection is required for CLASS I application; no PE connection is required for CLASS II application.

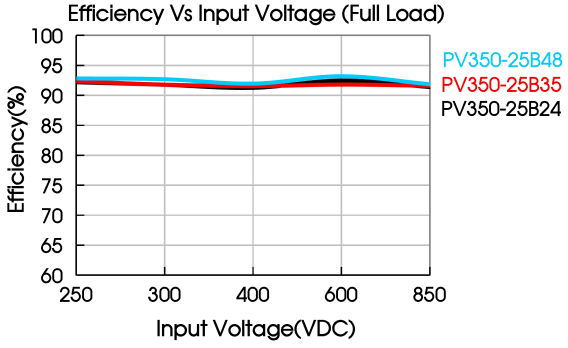
Product Characteristic Curve

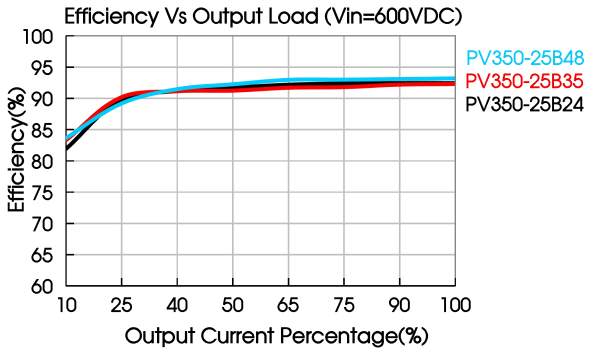






Note: 1.With an DC input between 250-400VDC/800 - 850VDC, the output power must be derated as per temperature derating curves;
2.This product is suitable for applications using natural free air cooling; for applications in closed environment please consult Mornsun FAE.





Design Reference

1. Typical application

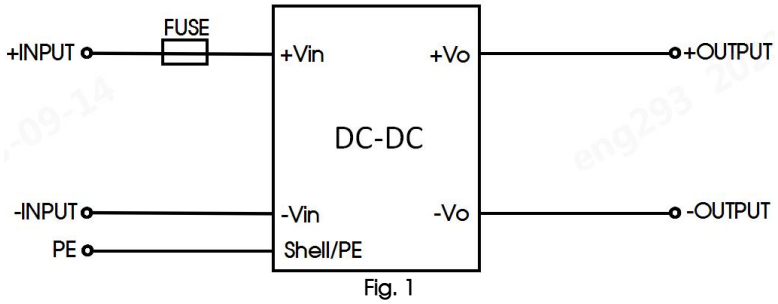


Fig. 1

Part No.	FUSE
PV350-25Bxx	1000VDC/4A, required (brand: adler models: A831400710 base models: BH100-01)
Note: No PE connection is required for CLASS II application.	

2. EMC compliance recommended circuit

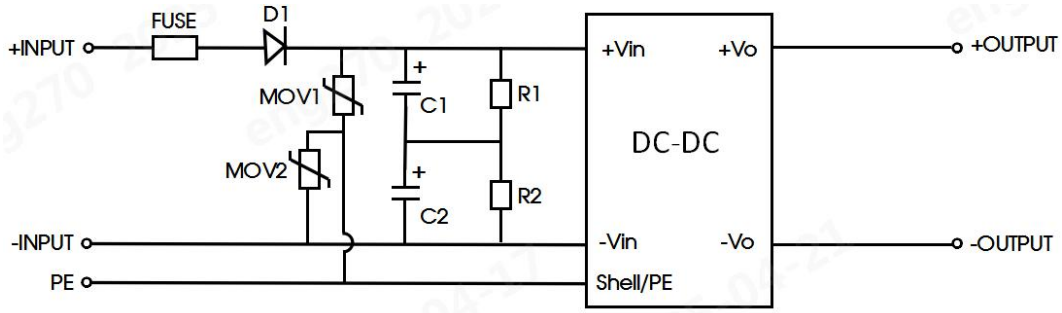


Fig. 2

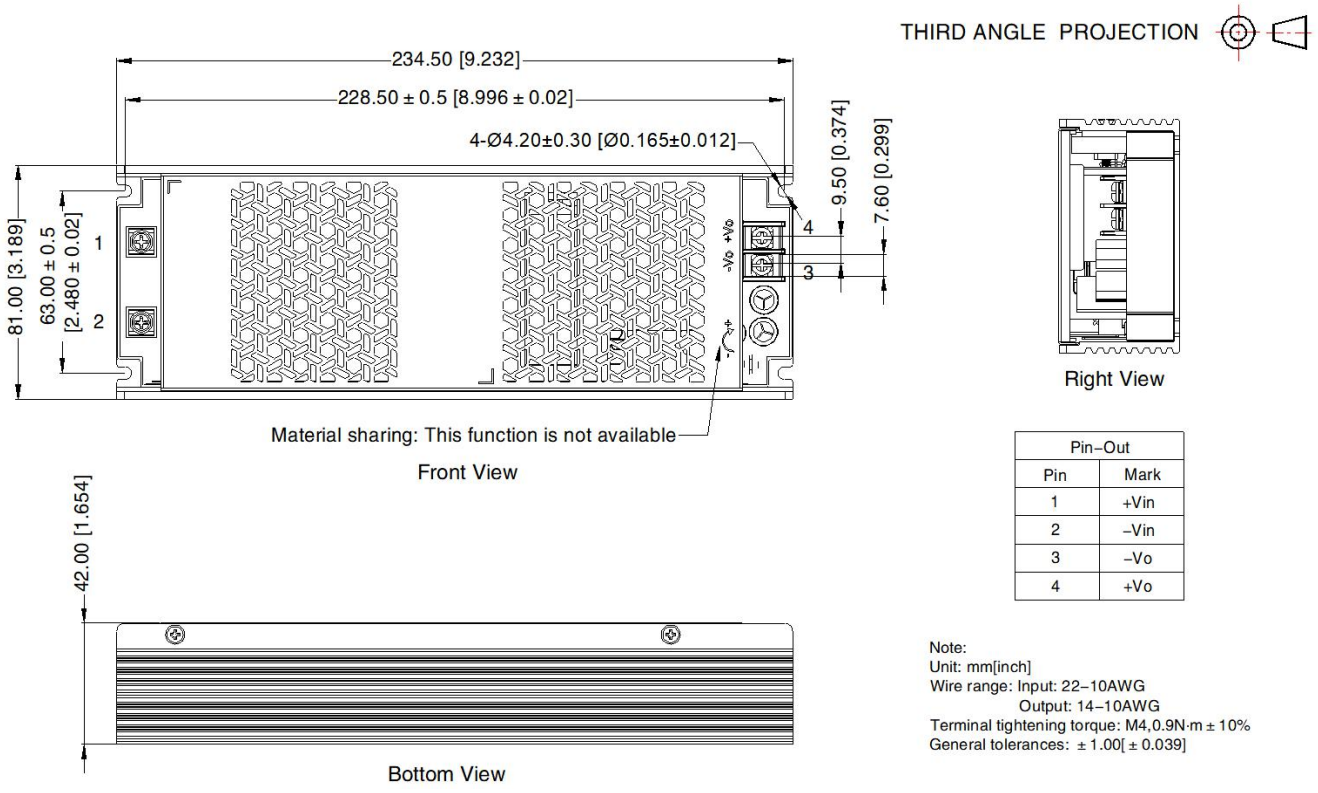
Model	Recommended value
FUSE	1000VDC/4A, required (brand: adler models: A831400710 base models: BH100-01)
D1	4000V/20A (two 1000V/20A rectifier bridges in series)
C1/C2	100μF/450VDC
R1/R2	1MΩ/2W
MOV1/MOV2	S14K550
Note: 1.For CLASS II application, no need to connect PE; 2.Test the withstand voltage(input/output to PE), need to remove the varistor (MOV1/MOV2).	

3. IMPORTANT SAFETY INSTRUCTIONS

Additional protective devices, such as lightning protector need to be added if there is an transient pulse voltage greater than 6KV at the Input of PV products in system applications.

4. For more information Please find the application notes on www.mornsun-power.com.

Dimensions and Recommended Layout



Pin-Out	
Pin	Mark
1	+Vin
2	–Vin
3	–Vo
4	+Vo

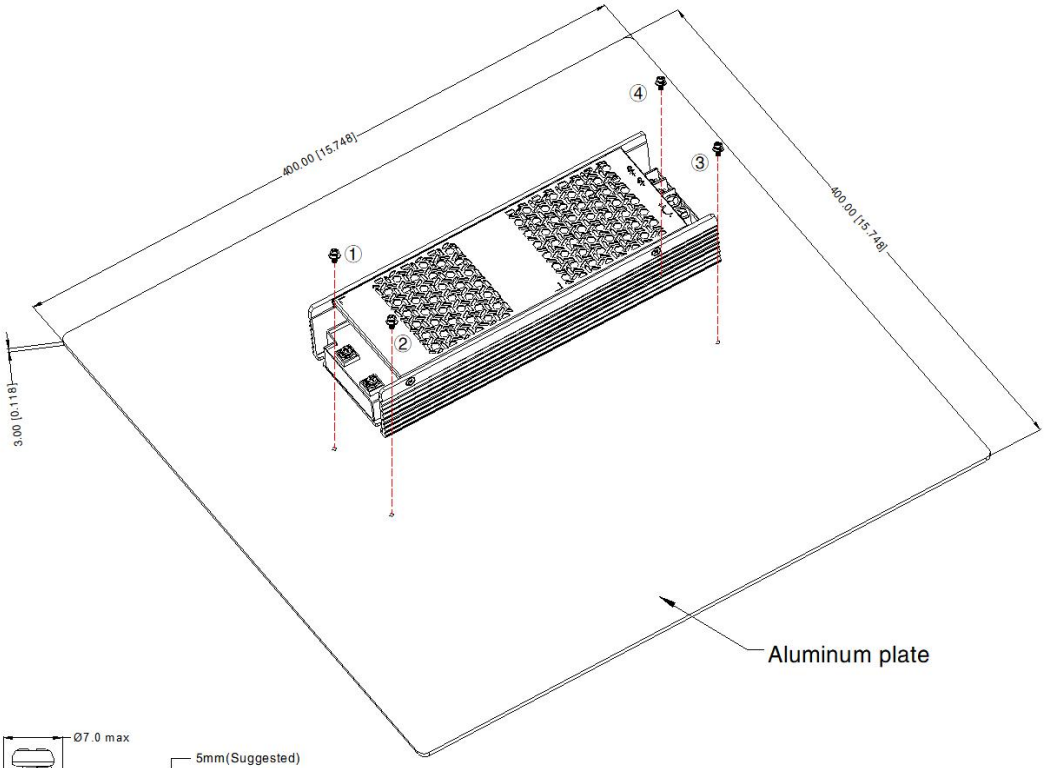
Note:
Unit: mm[inch]
Wire range: Input: 22–10AWG
Output: 14–10AWG
Terminal tightening torque: M4,0.9N·m ± 10%
General tolerances: ± 1.00[± 0.039]

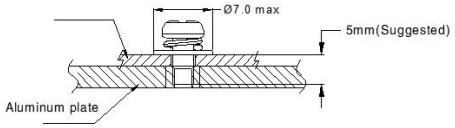
Installation method

Add aluminum plates as follows

In order to comply with the "derating curve" and "static characteristic curve", the PV350-25Bxx series is expanded to 500W, it must be mounted on an aluminum plate (or a case of the same size), the size of the aluminum plate is 400mm*400mm*3mm, Installation is shown below:

Note in order to optimize the heat dissipation performance, The surface of the aluminum plate must be smooth (or evenly coated with thermal grease), and the power module must be installed in the center of the aluminum plate.





Position	Screw Spec.	L(Suggested)	Torque
① – ④	M3	5MM	0.4N · m ± 10%

Note: 1. The product testing must be installed onto an aluminum plate. The size of the suggested aluminum plate is shown as above. And for optimizing thermal performance, it is necessary to apply thermal grease on the bottom of the product.
2. It is suggested to install the product with M3 x 6 combination screws, and the product must be firmly installed at the center of the aluminum plate.

⚠WARNING:
1. CAUTION: "To reduce the risk of fire, connect only to a circuit provided with 4 amperes maximum branch-circuit over-current protection in accordance with the National Electrical Code, ANSI/NFPA70."
2. WARNING: REPLACE ONLY WITH THE SAME RATINGS AND TYPE OF FUSE.
3. DANGER — HIGH VOLTAGE.

AVERTISSEMENT:
1. Avertissement: Pour réduire le risque d'incendie, veuillez connecter uniquement à des circuits de dérivation avec protection contre les surintensités conformes au code électrique national ANSI/ NFPA 70.
2. AVERTISSEMENT : N'UTILISER QUE DES FUSIBLES DE MÊMECALIBRE ET DE MÊME TYPE QUE LE FUSIBLE DORIGINE.
3. DANGER ： HAUTE TENSION.

Note:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220778;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
7. If the final product application is connected to a photovoltaic array, the array needs to be grounded and the voltage between the positive and negative poles of the product shall not be greater than 850VDC.

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