

350W isolated DC-DC converter with ultra-wide, ultra-high 300 -1500VDC input for Renewable Energy



## FEATURES

- Input voltage up to 1700VDC (Transient, duration: 10s)
- Ultra-wide input voltage range of 300 - 1500VDC (Minimum start-up voltage 400VDC)
- Industrial grade operating temperature -40°C to +85°C (Work available for transient under full load at +85°C)
- High I/O isolation voltage up to 4000VAC
- High efficiency, low ripple & noise
- High reliability, long lifespan
- Input under-voltage protection, input reverse polarity protection, over-temperature protection, output short circuit, over-current, over-voltage protection
- Operating up to 5000m altitude
- 5 years warranty (Intermittent working)
- Safety according to CSA-C22.2 No.107.1

PV350-29Bxx-TR is a regulated DC-DC series converter with an ultra-wide and ultra-high DC input of 300-1500VDC, which design based on standard of CSA-C22.2 No. 107.1, EN/IEC62109, UL1741. 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 solar tracker system. 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**	Nominal Output Voltage and Current (Vo/Io)	Output Voltage Adjustable Range ADJ (V)	Efficiency at 1100VDC (%) Typ.	Capacitive Load (µF) Max.
UL/EN/IEC	PV350-29B24-TR	350.4W	24V/14.6A	21.6-26.4	92	2200
	PV350-29B28-TR	350.0W	28V/12.5A	25.2-30.8		1500
	PV350-29B32-TR	350.4W	32V/10.95A	28.8-35.2		1500

Note: \*Use suffix "W" for wire output version.

\*\*If need parallel connection to increase the power, please consult Mornsun FAE for solution.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	Transient (10s)	--	--	1700	VDC
	Minimum start-up voltage 400VDC	300	--	1500	
Input Current	300VDC	--	--	2	A
	1100VDC	--	--	0.75	
	1500VDC	--	--	0.6	
Inrush Current	1500VDC	--	300	--	
Input Under-voltage Protection	Lockout activation range	240	--	295	VDC
	Lockout deactivation range	365	--	405	
Input Reverse Polarity Protection		Available			
External Input Fuse		6A/1500VDC, required			
Hot Plug		Unavailable			

Note: \*The minimum start-up voltage of the product is 400VDC. After starting, the input voltage drops to 300VDC and it can work normally.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Full load, constant voltage mode		--	±2	--	%
Line Regulation	Rated load		--	±1	--	
Load Regulation	0% - 100% load		--	±2	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	--	300	mV
Temperature Coefficient			--	±0.02	--	%/°C
Instantaneous overload capability**	Full voltage range, for 1s		150%Io	200%Io	--	--
Over-current Protection	All input voltage range	Normal temperature, high temperature	110% - 300% Io, hiccup, constant current lasts for 1s before turn off, self-recovery			
		Low temperature	≥110% Io, hiccup, constant current lasts for 1s before turn off, self-recovery			
Short Circuit Protection	Recovery time < 15s after the short circuit disappear.		Hiccup, constant current lasts for 1s before turn off, continuous, self-recovery			
Over-voltage Protection	24V output		≤35VDC	Output voltage clamp or hiccup		
	28V output		≤40VDC			
	32V output		≤45VDC			
Over-temperature Protection***			Output voltage turn off, self-recovery			
Minimum Load			0	--	--	%
Hold-up Time	Room temperature, full load	1100VDC input	--	8	--	ms
Start-up Delay Time****	Room temperature	400VDC-1500VDC	--	3	5	s

Note: \*The "Tip and barrel method" is used for ripple and noise test, please refer to PV Converter Application Notes for specific information;  
 \*\*When the output current is less than the trigger point of the over-current protection, the normal output can be maintained. When the output current is greater than the trigger point of the over-current protection, the output voltage will drop with the increase of the current, which belongs to the normal working mode; the over-current can be restored within 1s is normal working state, otherwise it enters the hiccup state of overcurrent protection, which belongs to the normal protection mode. It is suitable for short-term high-current applications such as closing coils and capacitors;  
 \*\*\*Output voltage turn off, self-recovery after fault conditions is removed;  
 \*\*\*\*Input voltage range (400VDC-1500VDC), full 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		4000	--	--	
	Output - PE		4000	--	--	
Insulation Type			Primary and secondary meet reinforced insulation			
Insulation Resistance	Input - output	500VDC	50	--	--	MΩ
Operating Temperature			-40	--	+85	°C
Storage Temperature			-40	--	+85	
Storage Humidity			--	--	95	%RH
Power Derating	-40°C to 0°C	300-400VDC	0.50	--	--	% / °C
	+50°C to +70°C	300-400VDC	2.50	--	--	
	+55°C to +70°C	400-1400VDC	3.33	--	--	
	+50°C to +70°C	1400-1500VDC	2.50	--	--	
	+70°C to +85°C	300-1500VDC	3.00	--	--	% / VDC
	300-400VDC		0.20	--	--	
	1400-1500VDC		0.20	--	--	
3000- 5000m		10.00	--	--	% / Km	
Switching Frequency			--	65	--	kHz
Safety Standard			UL1741, IEC62109-1 safety approved & EN62109-1, BS EN62109-1 (Report); Design refer to CSA-C22.2 No.107.1-16			
MTBF			MIL-HDBK-217F@25°C ≥ 300,000 h			

Mechanical Specifications

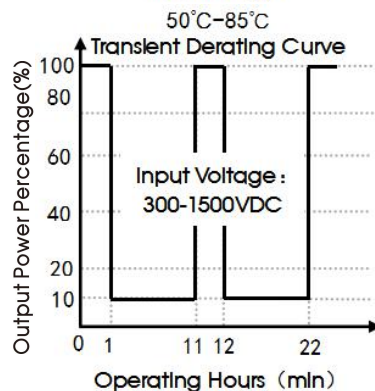
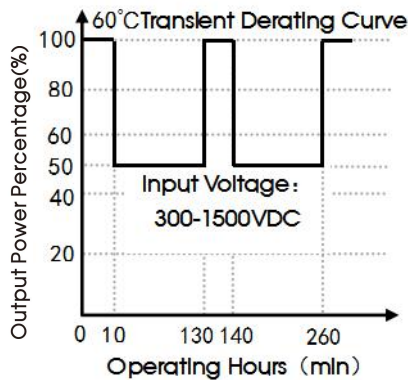
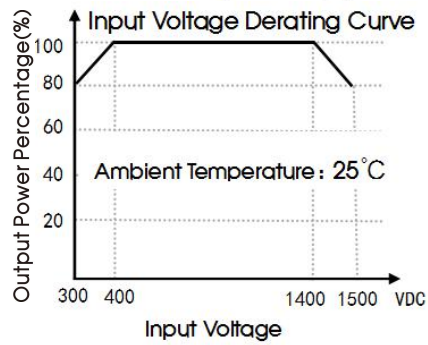
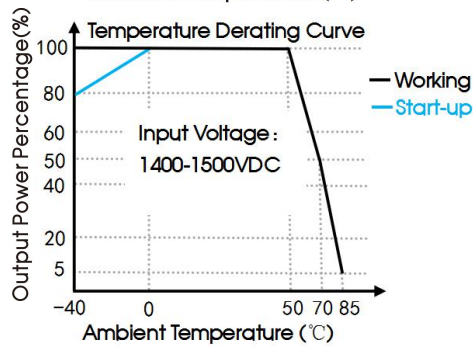
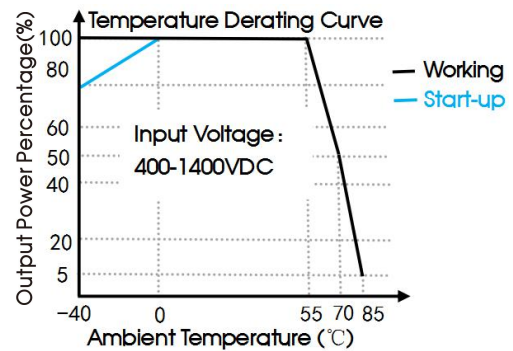
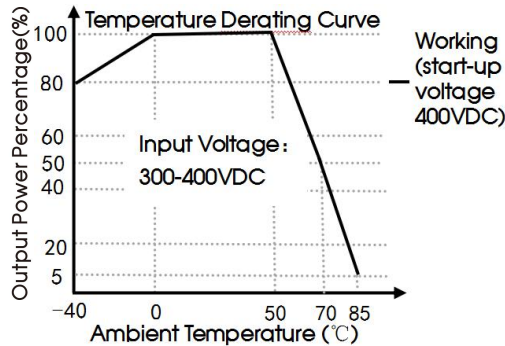
Case Material	Metal
Dimensions	215.00 x 125.00 x 50.00mm
Weight	1500g (Typ.)
Cooling Method	Free air convection

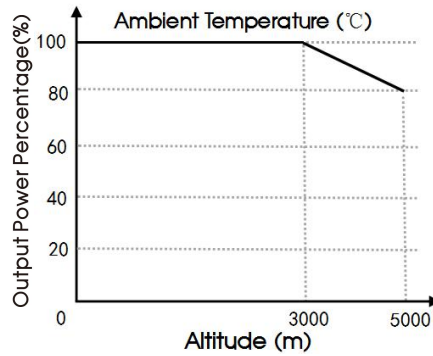
Electromagnetic Compatibility (EMC)

Emissions*	CE	CISPR32/EN55032	CLASS A
	RE	CISPR32/EN55032	CLASS A
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 ground ±2KV Perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s Perf. Criteria A

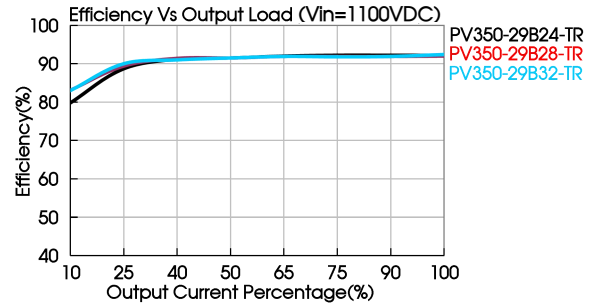
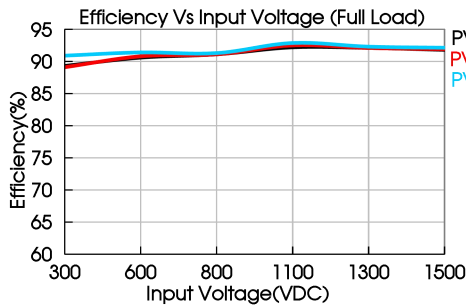
Note:\* During conduction and radiation testing, in order to avoid new interference brought by the input line, it is necessary to cover the input line with a nickel-zinc ferrite or nanocrystalline magnetic ring.

Product Characteristic Curve





- Note: ① With an input between 300 -400VDC/1400 -1500VDC, the output power of PV350-29Bxx parts must be derated as per temperature derating curves;  
 ② This product is suitable for applications using natural air cooling; For applications in closed environment please consult Mornsun FAE.  
 ③ In transient working mode at 60°C: working cycle twice a day, each interval  $\geq 2$ H;  
 ④ In transient working mode, input voltage derating must be performed on the basis of transient derating.



## Design Reference

### 1. Typical application circuit

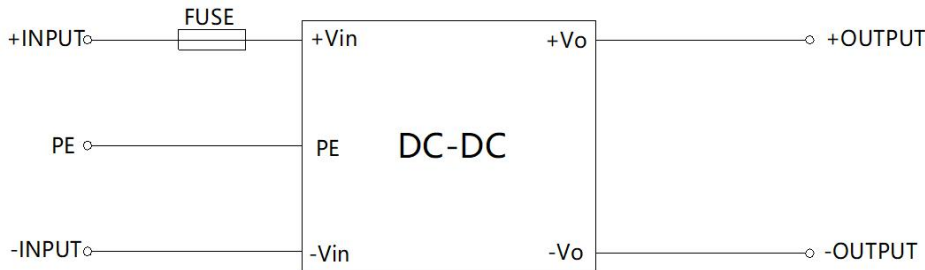


Fig. 1

Model	Recommended value
FUSE	6A/1500VDC, required

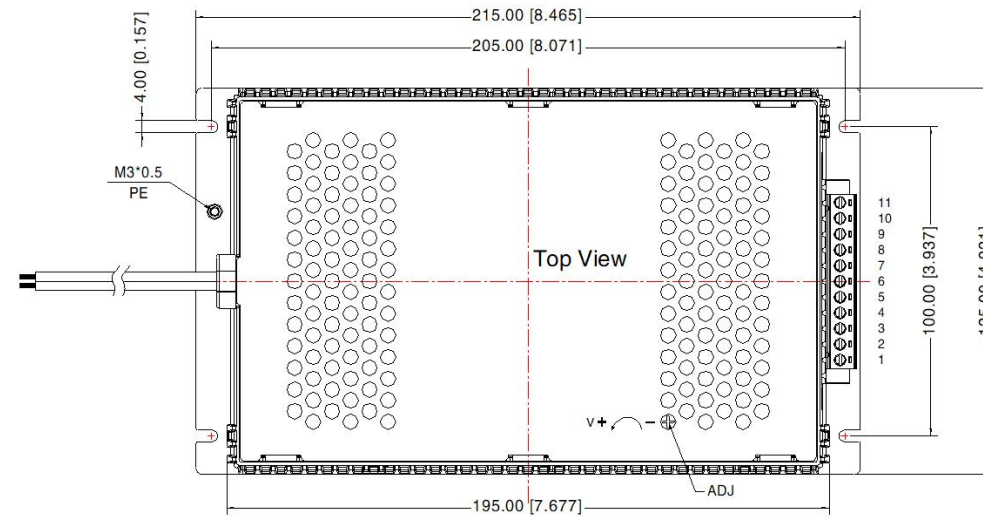
### 2. IMPORTANT SAFETY INSTRUCTIONS

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.

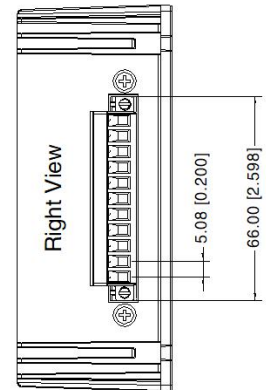
3. For more information Please find the application notes on [www.mornsun-power.com](http://www.mornsun-power.com).



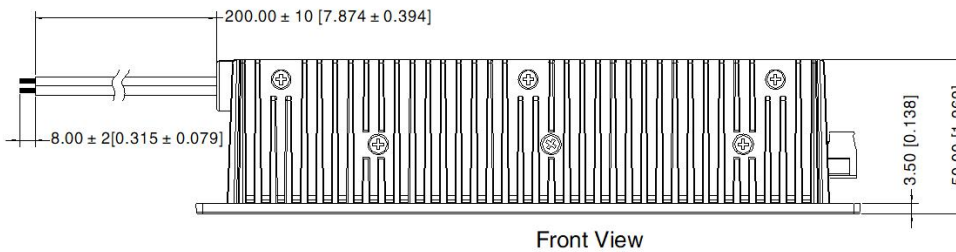
Dimensions and Recommended Layout (PV350-29Bxx-TR)



THIRD ANGLE PROJECTION



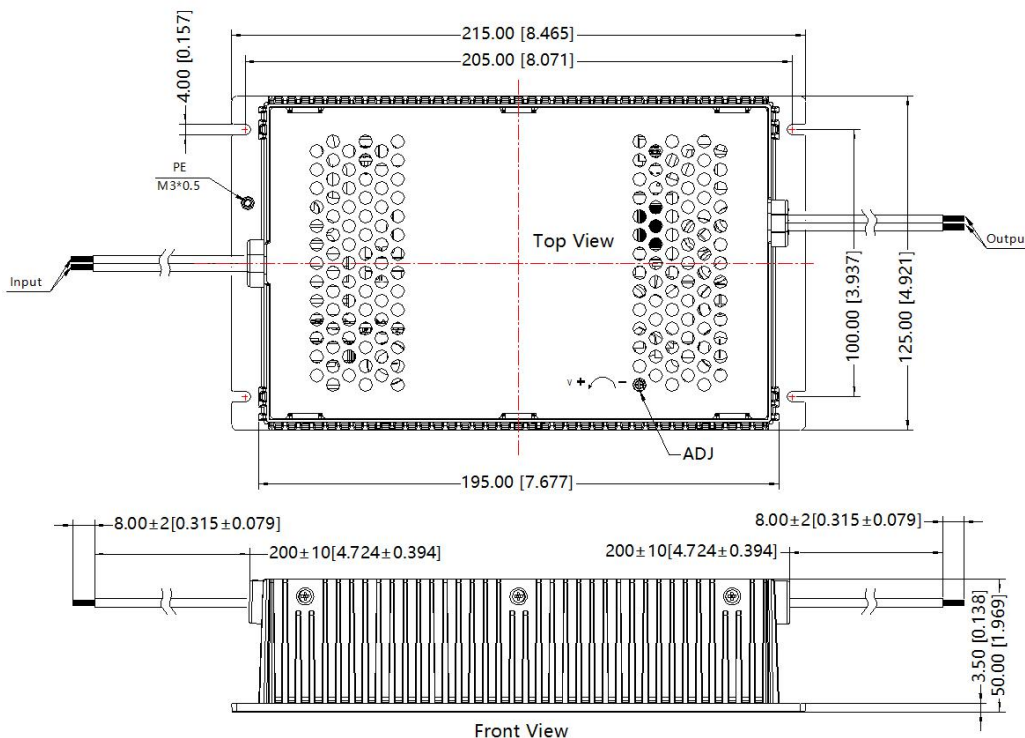
Pin-Out			
Pin	Mark	Pin	Mark
Red Wire(14AWG)	Vin+	6	Vo-
Black Wire(14AWG)	Vin-	7	Vo-
1	NC	8	Vo+
2	NC	9	Vo+
3	NC	10	Vo+
4	Vo-	11	Vo+
5	Vo-		



Note:  
Unit: mm[inch]  
ADJ: Output adjustable resistor  
Wire range: 16-12 AWG(At least 3 pins)  
14-12 AWG(At least 2 pins)  
Connector tightening torque: 0.5 ± 0.05 N · m  
General tolerances: ± 1.00 [± 0.039]  
Tightening torque: Max 0.4 N · m  
The product must be installed in prevent fire and electric shock of enclosure for terminal use.

Dimensions and Recommended Layout (PV350-29Bxx-TRW)

THIRD ANGLE PROJECTION



Pin-Out		
	Pin	Function
Input	Red Wire(14AWG)	Vin+
	Black Wire(14AWG)	Vin-
Output	Red Wire(14AWG)	Vo+
	Black Wire(14AWG)	Vo-

Note:  
Unit: mm[inch]  
Tightening torque: Max 0.4 N · m  
ADJ: Output adjustable resistor  
General tolerances: ± 1.00 [± 0.039]  
The product must be installed in prevent fire and electric shock of enclosure for terminal use.

 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 MÊME CALIBRE ET DE MÊME TYPE QUE LE FUSIBLE D'ORIGINE.
3. DANGER : HAUTE TENSION.

Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220053;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^{\circ}\text{C}$ , 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 1500VDC.

## Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China  
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: [info@mornsun.cn](mailto:info@mornsun.cn) [www.mornsun-power.com](http://www.mornsun-power.com)