

Ultra-high 200 - 1500VDC input for renewable energy



RoHS



## FEATURES

- Input voltage up to 1700VDC  
(Transient, duration: 10s)
- Ultra wide input voltage range: 200 - 1500VDC
- Industrial grade operating temperature: -40°C to +85°C
- High I/O isolation voltage up to 4000VAC
- High efficiency, low ripple & noise
- Input under-voltage protection, input reverse polarity protection, output short circuit, over-current, over-voltage protection
- OVC II
- Reinforced insulation
- Design refer to UL1741, EN/IEC62109-1, BS EN62109

PV20-29BxxR3S series is regulated DC-DC converters with an ultra-wide DC input of 200-1500VDC. The products feature high efficiency, high reliability, high insulation and high level of safety. This type of power supply is widely used in renewable energy industries such as photovoltaic, power generation, energy storage, inverters and high-voltage DC conversions. 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 800VDC (%) Typ.	Capacitive Load (μF) Max. (Normal temperature full load)
/	PV20-29B05R3S	12.5	5V/2.50A	64	6000
	PV20-29B12R3S	20	12V/1.667A	71	2000
	PV20-29B15R3S		15V/1.333A	80	1200
	PV20-29B24R3S		24V/0.833A	83	470
	PV20-29B32R3S		32V/0.625A	83	470

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	Transient (10s)	--	--	1700	VDC
		200	--	1500	
Input Current	200VDC	--	--	0.120	A
	800VDC	--	--	0.035	
	1500VDC	--	--	0.016	
Inrush Current	200VDC	--	20	--	A
	800VDC	--	50	--	
	1500VDC	--	90	--	
Under-voltage Protection	Under-voltage protection start	120	--	175	VDC
	Under-voltage protection release	155	--	200	
Start-up Delay Time*		--	1	2	s
Input Reverse Polarity Protection		Available			
External Input Fuse Required		4A/1500VDC, required			
Hot Plug		Unavailable			

Note: \*Full input voltage / output load range (The cooling-time between input power-off and power-on again is greater than 15s).

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	All load range	--	±2	--	%

Line Regulation	Rated load	--	±1	--	
Load Regulation	800VDC	5V	--	±2	--
		12V/15V/24V/32V	--	±1	--
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	Tip and barrel method	--	150	200
		Parallel cable	--	250	300
Temperature Coefficient		--	±0.02	--	%/°C
Short Circuit Protection		Hiccup, self-recovery			
Over-current Protection		≥110%Io, self-recovery			
Over-voltage Protection	5V	≤8V	Output voltage clamp or hiccup		
	12V	≤20V			
	15V	≤20V			
	24V	≤30V			
	32V	≤45V			
Minimum Load		0	--	--	%
Hold-up Time	Room temperature, full load	800VDC input	--	10	ms

Note: \*The "Tip and barrel method" or "Parallel cable" method is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.

## General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input - output	Electric Strength Test for 1min., leakage current <5mA	4000	--	--	VAC
Insulation Resistance	Input - output	Test voltage: 500VDC	100	--	--	MΩ
Operating Temperature			-40	--	+85	°C
Storage Temperature			-40	--	+85	
Storage Humidity		Non-condensing	--	--	95	%RH
Power Derating	Operating temperature derating	+55°C to +70°C	2.00	--	--	% / °C
		+70°C to +85°C	2.66	--	--	
	Input voltage derating	200VDC - 300VDC	0.25	--	--	% / VDC
		1000VDC - 1500VDC	0.05	--	--	
	Altitude derating	2000m - 5000m	6.7	--	--	% / Km
Switching Frequency			--	65	--	kHz
Altitude			--	--	5000	m
Safety Standard		Design refer to UL1741, EN/IEC62109-1, BS EN62109				
MTBF		MIL-HDBK-217F@25°C	≥ 300,000 h			

## Mechanical Specifications

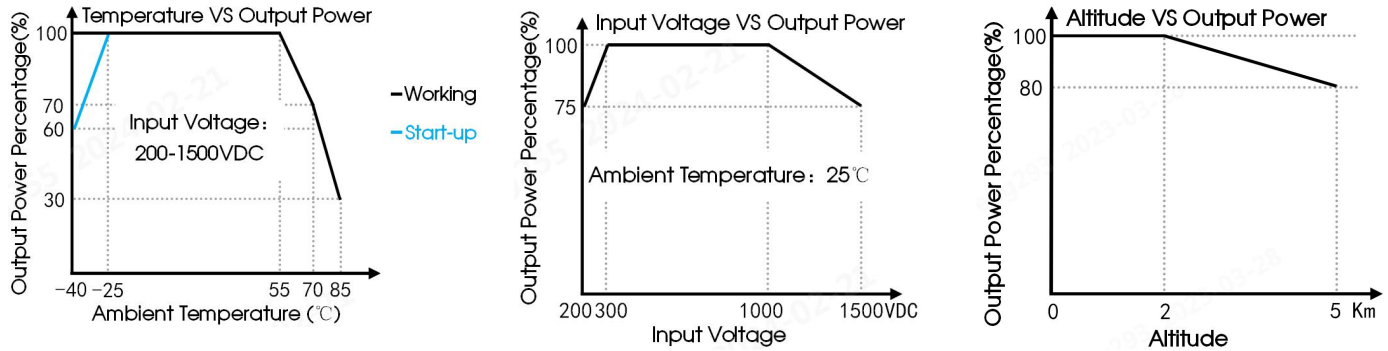
Case Material	Black flame-retardant and heat-resistant plastic (UL94V-0)
Dimensions	70.00 x 48.00 x 23.50 mm
Weight	120g (Typ.)
Cooling Method	Free air convection

## Electromagnetic Compatibility (EMC)

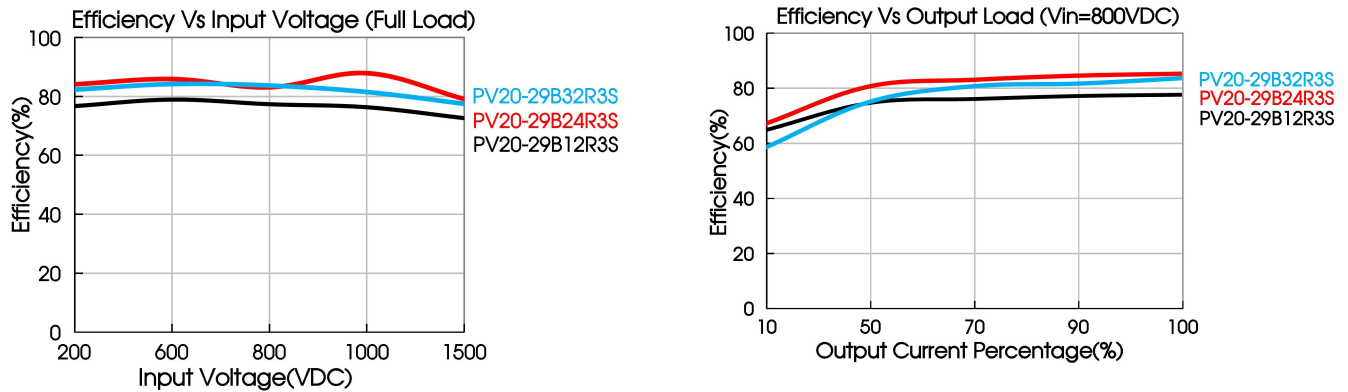
Emissions	CE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)		
	RE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)		
	EN61000-6-4				
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV		Perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m		Perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV ±4KV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

## Product Characteristic Curve



- Note:
- For operation of this converter series in an altitude between 2000 - 5000m above sea level, the output power must be derated as per the altitude derating curve;
  - This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.



## Design Reference

### 1. Typical application

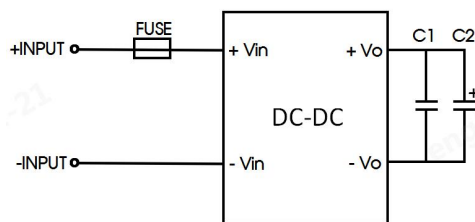


Fig. 1: Typical application circuit

Model	FUSE	C1(μF)	C2(μF)
PV20-29B05R3S	4A/1500VDC, required	1μF/35V	220μF/35V
PV20-29B12R3S			
PV20-29B15R3S			
PV20-29B24R3S			
PV20-29B32R3S			100uF/50V

Note on filter components:

We recommend using an electrolytic capacitor with high frequency and low ESR rating for C2 (refer to manufacture's datasheet). Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1 is a ceramic capacitor, used to filter high-frequency noise. TVS is a recommended suppressor diode to protect the application in case of a converter failure.

## 2. EMC compliance recommended circuit

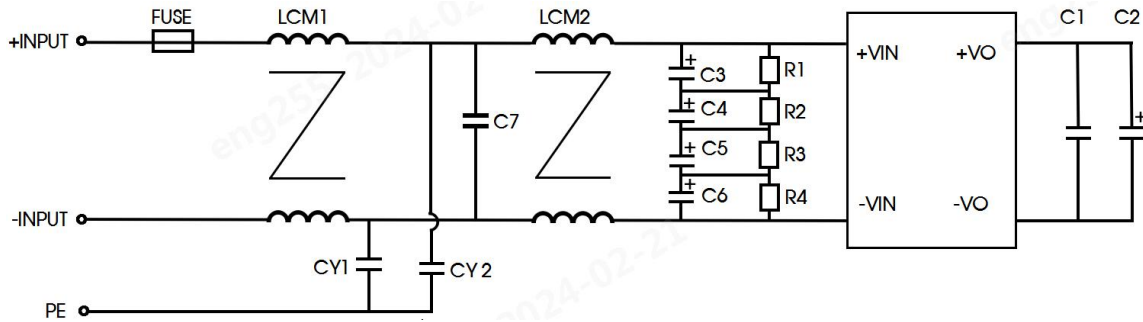
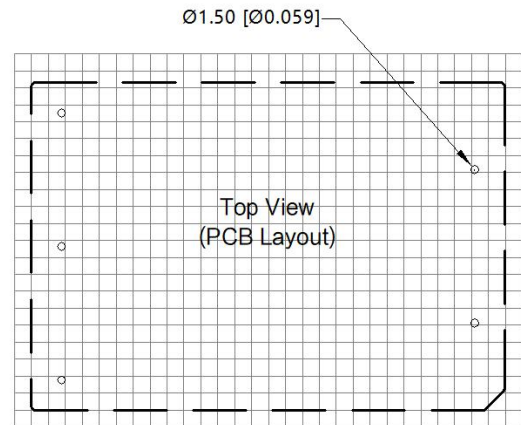
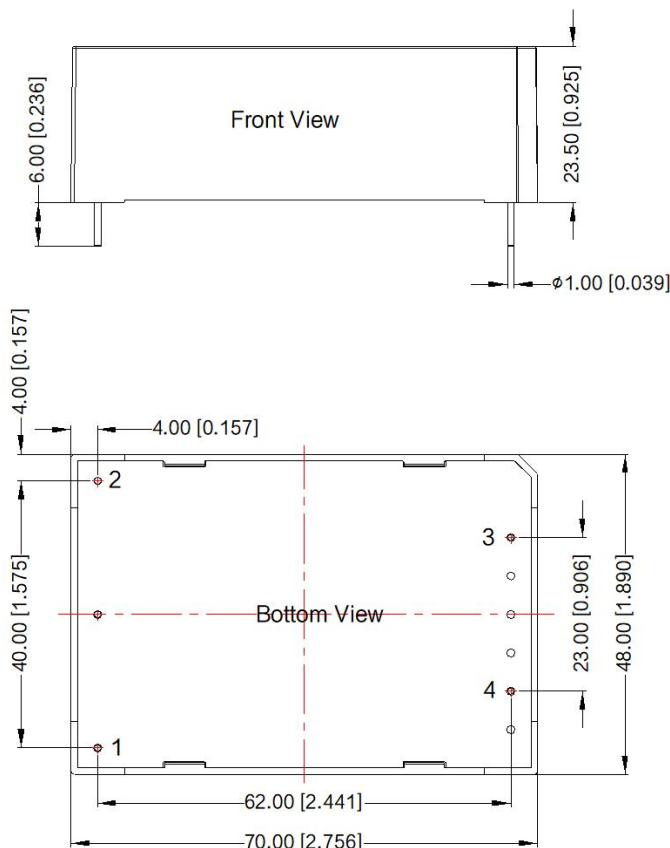


Fig 2: EMC application for higher compliance requirements (output parameters are show in Figure 1)

Component	Recommended value
FUSE	4A/1500VDC, required
LCM1	7mH (recommended to use MORNSUN's FL2D-10-702B)
LCM2	20mH (recommended to use MORNSUN's FL2D-10-203B)
C7	Safety capacitor 105K/ $\geq 1500$ VDC
C3/C4/C5/C6	10uF/450V
R1/R2/R3/R4	1M $\Omega$ /2W
CY1/CY2	102M/1500VDC

## Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note: Grid 2.54\*2.54mm

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

Note:  
Unit: mm[inch]  
Pin diameter tolerances:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$



**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: 58220006;
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. In order to improve the efficiency, there will be audible noise generated when working at input voltage higher than 1000 VDC, but it does not affect product performance and reliability;
5. The above are the performance indicators of the product models listed in this datasheet. Some indicators of non-standard models will exceed the above requirements. For details, please contact our technical staff;
6. We can provide product customization service;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
9. 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;
10. Input short circuit current Max. 4A.

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