# DC/DC Converter

## PV150-29BxxR3 Series

MORNSUN®

150W isolation DC-DC converter with ultra-wide, ultra-high 250 - 1500VDC input for Renewable Energy

RoHS

## FEATURES

- Ultra-wide 250 - 1500VDC input voltage range (Transient 1700VDC last for 30s)
- Operating ambient temperature range: -40℃ to +85℃
- High I/O isolation voltage up to 4000VAC
- High reliability, efficiency up to 92%
- Input under-voltage protection, input reverse polarity protection, output short circuit, over-current, over-voltage, Over-temperature protection
- Operating altitude up to 5000m
- Safety Class I, Class II
- Design refer to UL1741, EN/IEC62109, EN/IEC62477

*PV150-29BxxR3 is a regulated DC-DC series converter with an ultra-wide and ultra-high DC input of 250-1500VDC, 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, energy storage systems, charging pile, 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) | Output Voltage Adjustable Range ADJ (V) | Efficiency at 1000VDC (%) Typ. | Capacitive Load (μF) Max. |
|---|---|---|---|---|---|---|
| / | PV150-29B12R3 | 120 | 12V/10.0A | 12-15 | 87 | 3500 |
| | PV150-29B24R3 | 150 | 24V/6.25A | 24-28 | 90 | 2000 |
| | PV150-29B28R3 | | 28V/5.36A | 28-32 | 91 | 1500 |
| | PV150-29B32R3 | | 32V/4.69A | 30-36 | 91 | 1500 |
| | PV150-29B48R3 | | 48V/3.125A | 48-58 | 92 | 1000 |

## Input Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input Voltage Range | Transient (30s) | | -- | -- | 1700 | VDC |
| | | | 250 | -- | 1500 | |
| Input Current | 250VDC | | -- | -- | 0.8 | A |
| | 800VDC | | -- | -- | 0.4 | |
| Inrush Current | 800VDC | Cold start | -- | 100 | -- | |
| | 1500VDC | | -- | 200 | -- | |
| Input Under-voltage Protection | Under-voltage protection start | | 200 | -- | 220 | VDC |
| | Under-voltage protection release | | 220 | -- | 240 | |
| Input Reverse Polarity Protection | | | Available | | | |
| Start-up Delay Time* | | | -- | 1 | 3 | s |
| External Input Fuse | | | 4A/1500VDC, required (brand: Adler models: A841400b00 base models: BH200) | | | |
| Hot Plug | | | Unavailable | | | |

Note: *Start-up delay time test conditions: full voltage input range, full output load range (the cooling-time between input power-off and power-on again is greater than 10s.)

## Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Output Voltage Accuracy | All load range | -- | ±1.5 | -- | % |
| Line Regulation | Rated load | -- | ±0.25 | -- | |
| Load Regulation | 1000VDC | -- | ±0.5 | -- | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ripple & Noise* | 20MHz bandwidth (peak-to-peak value) | | -- | -- | 300 | mV |
| Temperature Coefficient | | | -- | ±0.02 | -- | %/℃ |
| Short Circuit Protection | | | Hiccup, continuous, self-recovery | | | |
| Over-current Protection | | | 110% - 330% Io, constant current mode when output voltage > 70%, automatic recover after fault condition is removed | | | |
| Over-voltage Protection | 12V | | ≤20V | | | |
| | 24V | | ≤32V | Output voltage clamp or hiccup | | |
| | 28V | | ≤35V | | | |
| | 32V | | ≤45V | | | |
| | 48V | | ≤62V | | | |
| Over-temperature Protection** | | | Output voltage turn off, self-recovery | | | |
| Minimum Load | | | 0 | -- | -- | % |
| Hold-up Time | Room temperature, full load | 1000VDC input | -- | 10 | -- | ms |

Note: *The "Tip and barrel method" is used for ripple and noise test, for 12V output, add a 47uF/25V electrolytic capacitor to the output side, please refer to PV Converter Application Notes for specific information;
**Output voltage turn off, self-recovery after fault conditions is removed.

## General Specifications

| Item | | Operating Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Isolation | Input - output | Electric strength test for 1min., leakage current <5mA | | 4000 | -- | -- | VAC |
| | Input - Shell | | | 4000 | -- | -- | |
| | Output - Shell | | | 2000 | -- | -- | |
| Insulation Resistance | Input - output | Test voltage: 500VDC | | 100 | -- | -- | MΩ |
| | Input - Shell | | | | | | |
| | Output - Shell | | | | | | |
| Operating Temperature | | | | -40 | -- | +85 | ℃ |
| Storage Temperature | | | | -40 | -- | +85 | |
| Storage Humidity | | Non-condensing | | -- | -- | 95 | %RH |
| Power Derating | | Operating temperature derating | -40℃ to -25℃ | 3.33 | -- | -- | %/℃ |
| | | | +55℃ to +85℃ | 2.33 | -- | -- | |
| | | Input voltage derating | 250 - 300VDC | 0.4 | -- | -- | %/VDC |
| | | | 300 - 400VDC | 0.2 | -- | -- | |
| | | | 1400 - 1500VDC | 0.2 | -- | -- | |
| | | Altitude derating | 2000 - 5000m | 10 | -- | -- | %/Km |
| Safety Standard | | | | Design refer to UL1741, EN/IEC/BS EN62109-1, EN/IEC62477 | | | |
| Safety Class | | | | Class I, Class II | | | |
| MTBF | | MIL-HDBK-217F@25℃ | | ≥300,000 h | | | |

## Mechanical Specifications

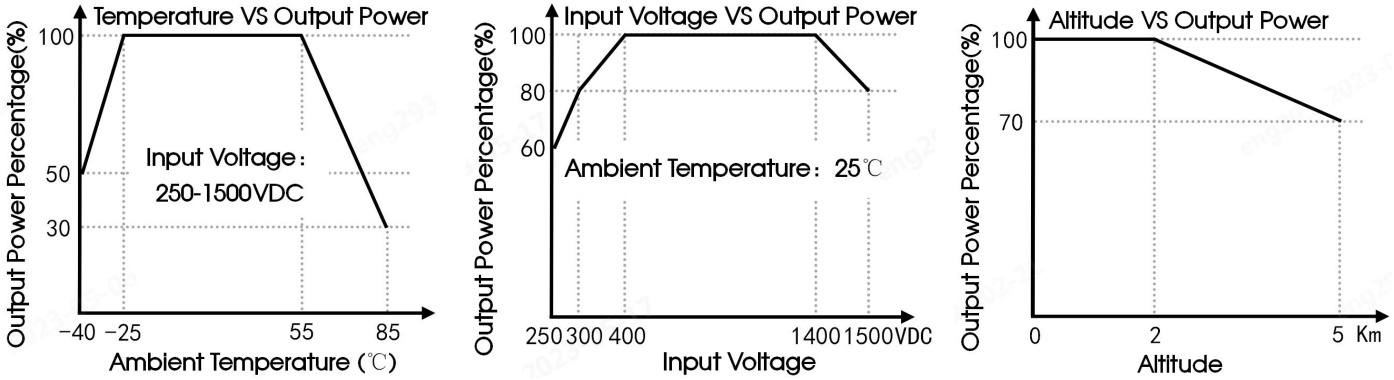
| | |
|---|---|
| Case Material | Metal |
| Dimensions | 171.00 x 70.00 x 42.00mm |
| Weight | 550g (Typ.) |
| Cooling Method | Free air convection |

## Electromagnetic Compatibility (EMC)

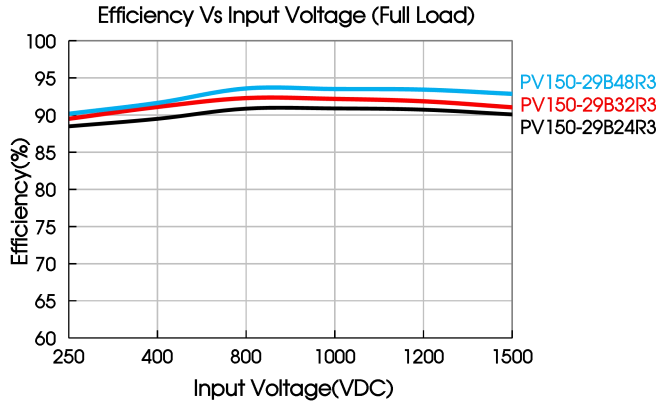
| | | | | |
|---|---|---|---|---|
| Emissions | CE | CISPR32/EN55032 | CLASS A | |
| | RE | CISPR32/EN55032 | CLASS A | |
| | EN61000-6-4 | | | |
| Immunity | ESD | IEC/EN61000-4-2 | Contact ±6KV/Air ±8KV | Perf. Criteria A |
| | RS | IEC/EN61000-4-3 | 10V/m | Perf. Criteria A |
| | EFT | IEC/EN61000-4-4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

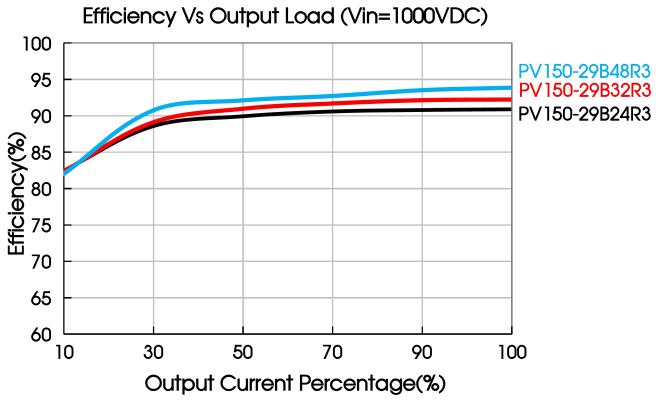
Note: *CLASS II applications do not need to test the line to shell.

## Product Characteristic Curve




Note: 1.With an DC input between 250-400VDC/1400-1500VDC, 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

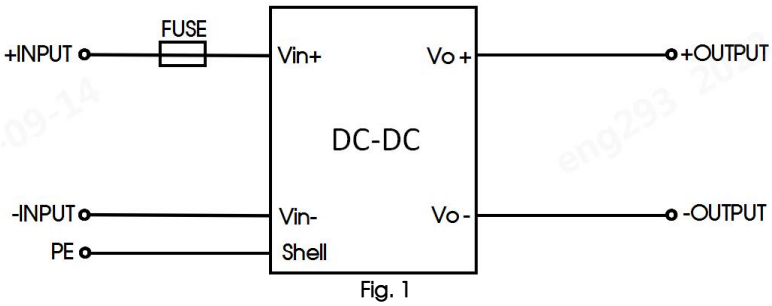



Fig. 1

| Part No. | FUSE |
|---|---|
| PV150-29BxxR3 | 4A/1500VDC, required<br>(brand: Adler models: A841400b00 base models: BH200) |
| Note: No PE connection is required for CLASS II application. | |

2. EMC compliance recommended circuit

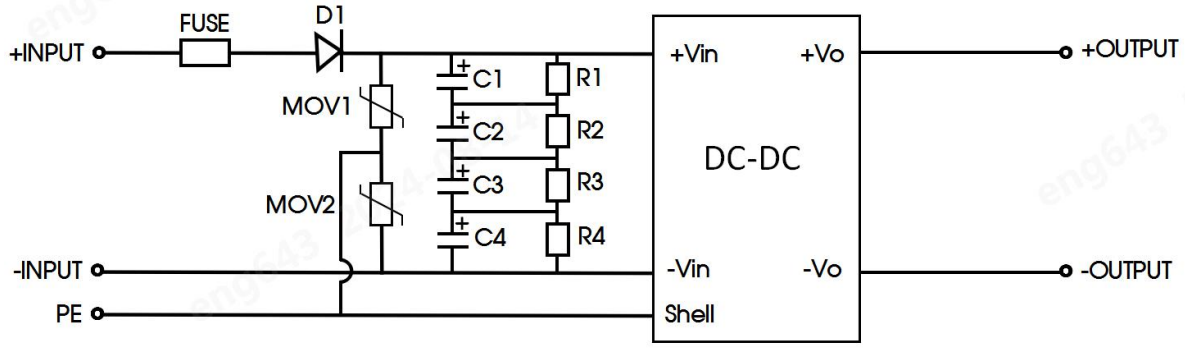


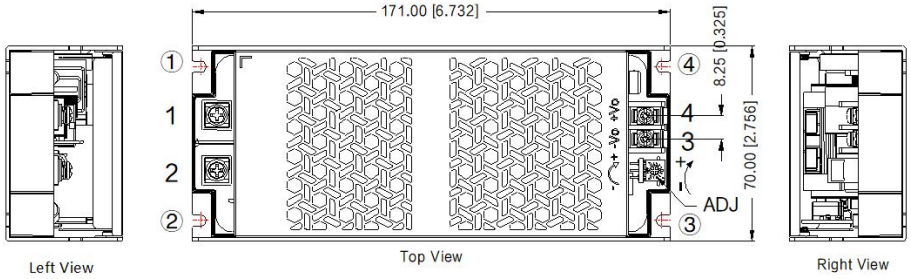

Fig. 2

| Model | Recommended value |
|---|---|
| FUSE | 1500VDC/4A, required<br>(brand: Adler models: A841400b00 base models: BH200) |
| D1 | 4000V/10A (two 1000V/10A rectifier bridges in series) |
| C1/C2/C3/C4 | 100μF/450VDC |
| R1/R2/R3/R4 | 1MΩ/2W |
| MOV1/MOV2 | 182K/4500A/14D |
| Note:1.For CLASS II application, no need to connect PE and no need to add the varistor (MOV1/MOV2);<br>2.Test the withstand voltage (input/output to PE), need to remove the varistor (MOV1/MOV2). | |

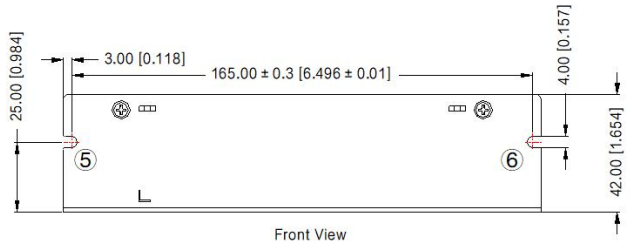
3. For additional information please refer to application notes on www.mornsun-power.com.

## Dimensions and Recommended Layout

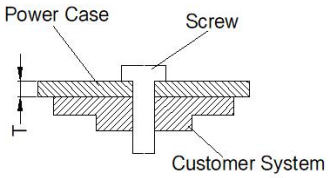
THIRD ANGLE PROJECTION

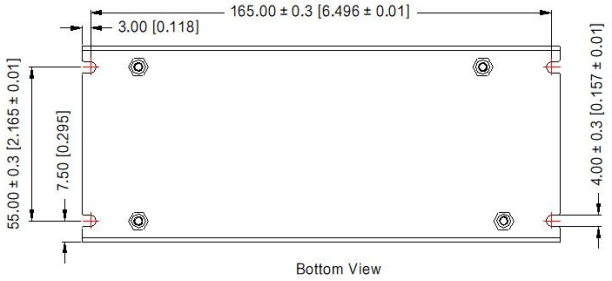



| Pin-Out | |
|---|---|
| Pin | Mark |
| 1 | +Vin |
| 2 | -Vin |
| 3 | -Vo |
| 4 | +Vo |
| ①-⑥ | Shell |




| Position | Screw Spec. | T | Torque(max) |
|---|---|---|---|
| ①-⑥ | M3 | 1.5mm | 0.4N・m |




Note:
1. Unit: mm[inch]
2. General tolerances: ± 1.00 [ ± 0.040]
3. ADJ: Output voltage adjustable resistor
4. Wire range: Input: 20-12AWG
   Output: 16-12AWG
5. Input connector tightening torque: M4, 0.9N・m(Max)
   Output connector tightening torque: M3, 0.4N・m(Max)

⚠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: 58220706;
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. The output voltage can be adjusted by the ADJ, clockwise to increase;
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
8. 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.

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