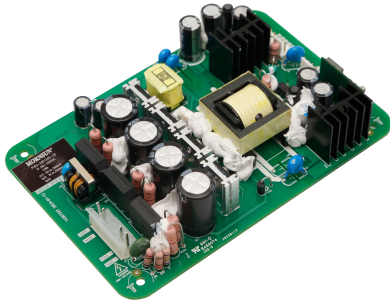


50W isolation DC-DC converter with ultra-wide, ultra-high 150-1500V DC input for Renewable Energy



RoHS



FEATURES

- Ultra-wide input voltage range of 150 - 1500VDC
- Operating ambient temperature range: -25°C to +65°C
- High I/O isolation test voltage of 4000VAC
- High efficiency, low ripple & noise
- High reliability
- Input under-voltage protection, input reverse polarity protection, output short circuit, over-current, over-voltage protection
- Operating up to 5000m altitude
- 10 years working life at room temperature

PV50-29D1505-20 is a regulated DC-DC converter with an ultra-wide and ultra-high DC input of 150-1500VDC, which design to meet standards of CSA-C22.2 No. 107.1. The products feature high efficiency, high reliability, high insulation and a high level of safety protection. This type of power supply is widely used in renewable energy industries such as SVG, photovoltaic power generation 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

| Part No. | Output Power | Nominal Output Voltage and Current | | Efficiency at 850VDC(%) Typ. | Capacitive Load (μF) Max. | |
|-----------------|--------------|------------------------------------|---------|---------------------------------|---------------------------|------|
| | | Vo1/Io1 | Vo2/Io2 | | Vo1 | Vo2 |
| PV50-29D1505-20 | 50W | 15V/2.66A | 5V/2A | 78 | 1000 | 1000 |

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|----------------------------|---|------|------|------|
| Input Voltage Range | | 150 | -- | 1500 | VDC |
| Input Current | 280VDC | -- | 350 | -- | mA |
| | 850VDC | -- | 120 | -- | |
| | 1500VDC | -- | 70 | -- | |
| Inrush Current | 280VDC | -- | 50 | -- | A |
| | 850VDC | -- | 150 | -- | |
| | 1500VDC | -- | 250 | -- | |
| Under-voltage Protection | Lockout activation range | 125 | -- | 145 | VDC |
| | Lockout deactivation range | 130 | -- | 150 | |
| Maximum Transient Input Voltage | 1600VDC | The product works normally without damage (the maximum transient input voltage interval is 15s) | | | |
| External Input Fuse | | 4A/1500VDC, required | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|--------------------------|--|-----------------------------------|-------|------|------|----|
| Output Voltage Accuracy | All load range | Vo1 | -- | ±2 | -- | % |
| | | Vo2 | -- | ±2 | -- | |
| Line Regulation | Full load | Vo1 | -- | ±1 | -- | |
| | | Vo2 | -- | ±1 | -- | |
| Load Regulation | Rated input voltage, 10% - 100% load (balanced load) | Vo1 | -- | ±1 | -- | |
| | | Vo2 | -- | ±2 | -- | |
| Ripple & Noise* | 20MHz bandwidth (peak-to-peak value), room temperature | Vo1 | -- | -- | 200 | mV |
| | | Vo2 | -- | -- | 150 | |
| Temperature Coefficient | | -- | ±0.02 | -- | %/°C | |
| Short Circuit Protection | | Hiccup, continuous, self-recovery | | | | |
| Over-current Protection | | ≥110%Io, hiccup, self-recovery | | | | |

| | | | | | |
|---------------------------|--------------------------|------|-----|-----|-----|
| Over-voltage Protection** | Vo1 | 15.3 | -- | 18 | VDC |
| Minimum Load | Vo1 | 10 | -- | -- | % |
| | Vo2 | 10 | -- | -- | |
| Overshoot Amplitude | Room temperature, 850VDC | -- | -- | ±5 | |
| Dynamic Recovery time | Vo1 | -- | 2.5 | 3 | ms |
| | Vo2 | -- | 1.2 | 3 | |
| Output Rise Time | Vo2 | -- | -- | 100 | |
| Start-up Delay Time*** | 150 - 1500VDC | -- | -- | 2 | s |

Note: *The "Tip and barrel method" is used for ripple and noise test, please refer to PV Converter Application Notes for specific information.
 **The Vo2 adopts precise voltage regulation circuit, and the output voltage is the nominal value.
 *** Test condition for startup delay time: full input voltage range, full output load range (At room temperature, the cooling-time between input power-off and power-on again is greater than 2s.)

General Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit |
|-----------------------|----------------------|---|---------------------------------------|------|------|-------|
| Isolation | Input - output | Electric Strength Test for 1min, leakage current ≤10mA | 4000 | -- | -- | VAC |
| | Vo1 - Vo2 | | 2500 | -- | -- | |
| Insulation Resistance | 500VDC | | 50 | -- | -- | MΩ |
| Operating Temperature | | | -25 | -- | +65 | °C |
| Storage Temperature | | | -40 | -- | +85 | |
| Storage Humidity | | | -- | -- | 95 | %RH |
| Power Derating | -25°C to 0°C | 150VDC - 280VDC | 1.60 | -- | -- | %/°C |
| | -25°C to 0°C | 280VDC - 1500VDC | 1.00 | -- | -- | |
| | +50°C to +65°C | | 2.67 | -- | -- | |
| | 150 - 280VDC | | 0.38 | -- | -- | %/VDC |
| | 1400 - 1500VDC | | 0.20 | -- | -- | |
| 2000m - 5000m | | 13.3 | -- | -- | %/Km | |
| Safety Standard | | | Design refer to CSA-C22.2 No.107.1-16 | | | |
| Switching Frequency | | | -- | 65 | -- | kHz |
| Altitude | | | -- | -- | 5000 | m |
| MTBF | MIL-HDBK-217F@25°C | | ≥ 500,000 h | | | |

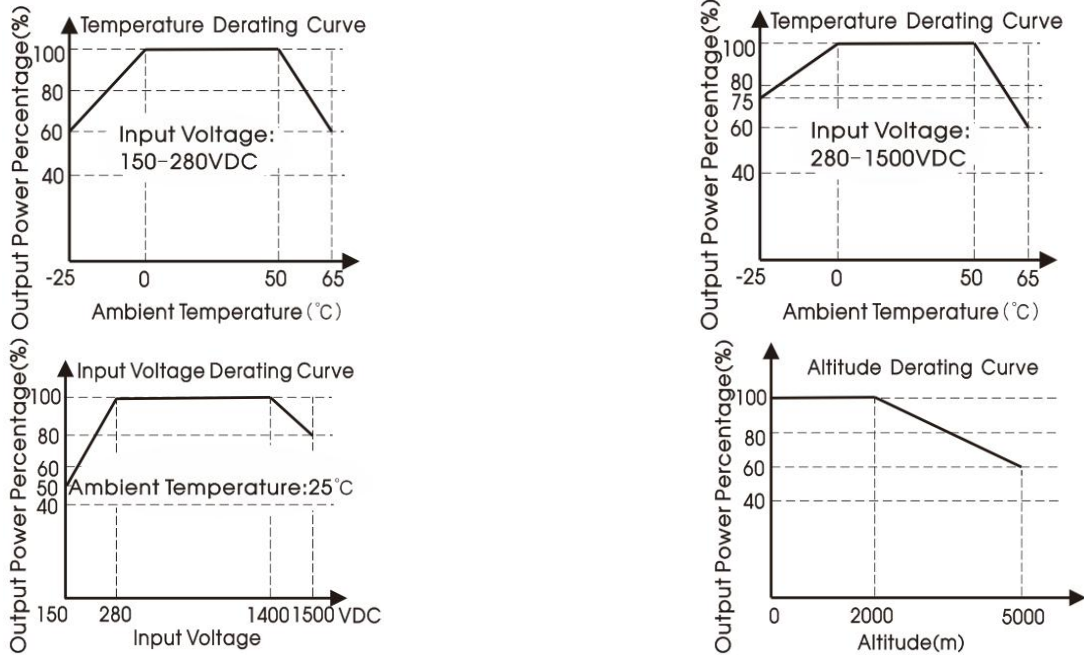
Mechanical Specifications

| | |
|----------------|---------------------------|
| Dimensions | 150.00 x 100.00 x 38.70mm |
| Weight | 250g (Typ.) |
| Cooling Method | Free air convection |

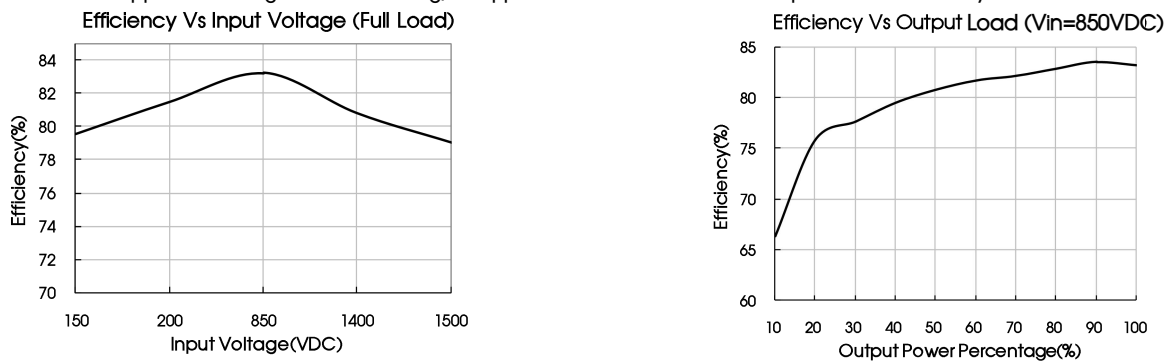
Electromagnetic Compatibility (EMC)

| | | | | |
|----------|-------|-----------------|---|------------------|
| Immunity | ESD | IEC/EN61000-4-2 | Contact ±6KV/Air ±8KV | Perf. Criteria B |
| | RS | IEC/EN61000-4-3 | 10V/m | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 | ±2KV | perf. Criteria B |
| | Surge | IEC/EN61000-4-5 | line to line ±2KV | perf. Criteria B |
| | CS | IEC/EN61000-4-6 | 10Vr.m.s (See Fig. 2 for recommended circuit) | perf. Criteria A |

Product Characteristic Curve



- Note:
- ① With a DC input between 150-280VDC/1400-1500VDC, the output power must be derated as per temperature derating curves;
 - ② 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;
 - ③ The electrolytic capacitors have a constant lifetime, the service life depends on the actual ambient temperature, operating in harsh environments can affect the life of a product, shorten the service life of the product, it's not recommended that the product work in high temperature environment above 65°C for a long time.
 - ④ This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.



Design Reference

1. Typical application

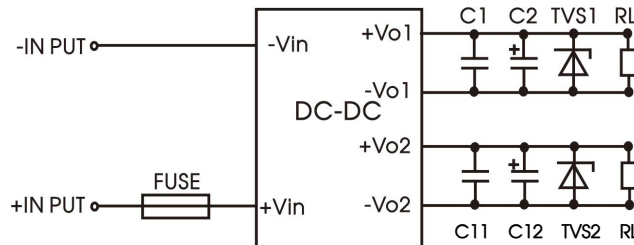


Fig. 1: Typical application circuit

| Model | C1, C11 | C2, C12 | TVS1 | TVS2 | FUSE |
|-----------------|---------|---------|---------|----------|----------------------|
| PV50-29D1505-20 | 1μF | 100μF | SMBJ20A | SMBJ7.0A | 4A/1500VDC, required |

Note on filter components:

We recommend using an electrolytic capacitor with high frequency and low ESR rating for C2, C12 (refer to manufacture's datasheet). Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1, C11 are a 1uF 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

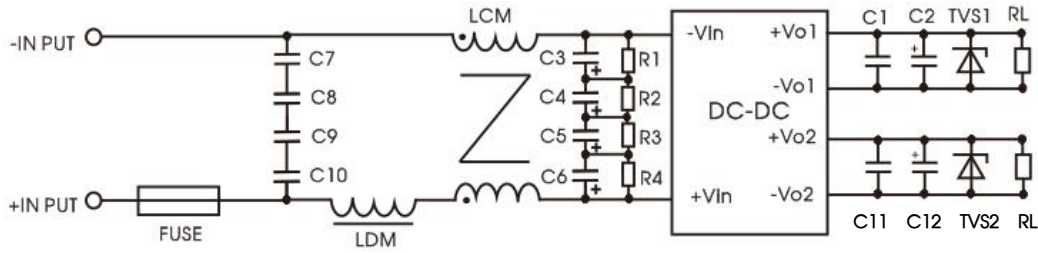
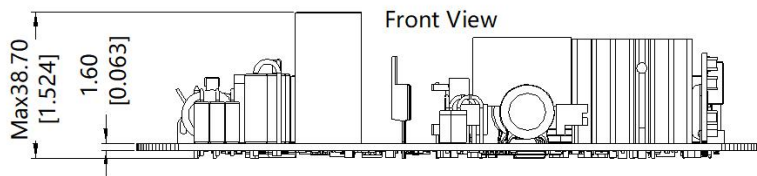
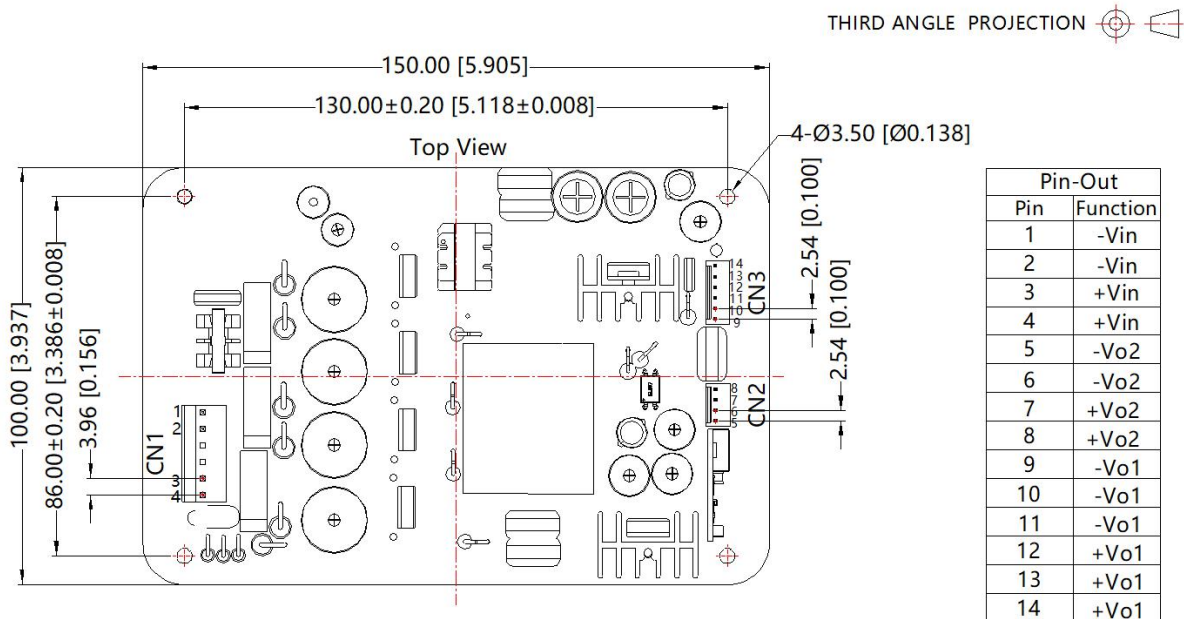


Fig 2.

| Element model | Recommended value |
|-----------------|---|
| C7, C8, C9, C10 | 104K/275VAC |
| C3, C4, C5, C6 | 47uF/450VDC |
| R1, R2, R3, R4 | 1MΩ/2W |
| LDM | 330uH/0.38A |
| LCM | 7mH (recommended to use MORNSUN's FL2D-10-702B) |
| FUSE | 4A/1500VDC, slow-blow, required |

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

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
General tolerances: ± 1.00 [± 0.039]
The layout of the device is for reference only,
please refer to the actual product

| Connectors | Client Connectors |
|----------------------------------|---|
| CN1 VH 3.96-6P (No Mid-2P) | Housing: JST VHR-6N Contact: JST SVH-21T-P1.1 or equivalent |
| CN2 2.54-4P | Housing: 2510-4Y (KANGDAO) Contact: 2510-TE (KANGDAO) or equivalent |
| CN3 2.54-6P | Housing: 2510-6Y (KANGDAO) Contact: 2510-TE (KANGDAO) or equivalent |

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220062;
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 1000VDC, but it does not affect product performance and reliability;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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