

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	℃
Storage Temperature				-40	--	+85	
Storage Humidity				--	--	95	%RH
Power Derating		-25℃ to 0℃	150VDC - 280VDC	1.60	--	--	% /℃
		-25℃ to 0℃	280VDC - 1500VDC	1.00	--	--	
		+50℃ to +65℃		2.67	--	--	
		150 - 280VDC		0.38	--	--	% /VDC
		1400 - 1500VDC		0.20	--	--	
		2000m - 5000m		13.3	--	--	
Safety Standard				Design refer to CSA-C22.2 No.107.1-16			
Switching Frequency				--	65	--	kHz
Altitude				--	--	5000	m
MTBF		MIL-HDBK-217F@25℃		≥ 500,000 h			

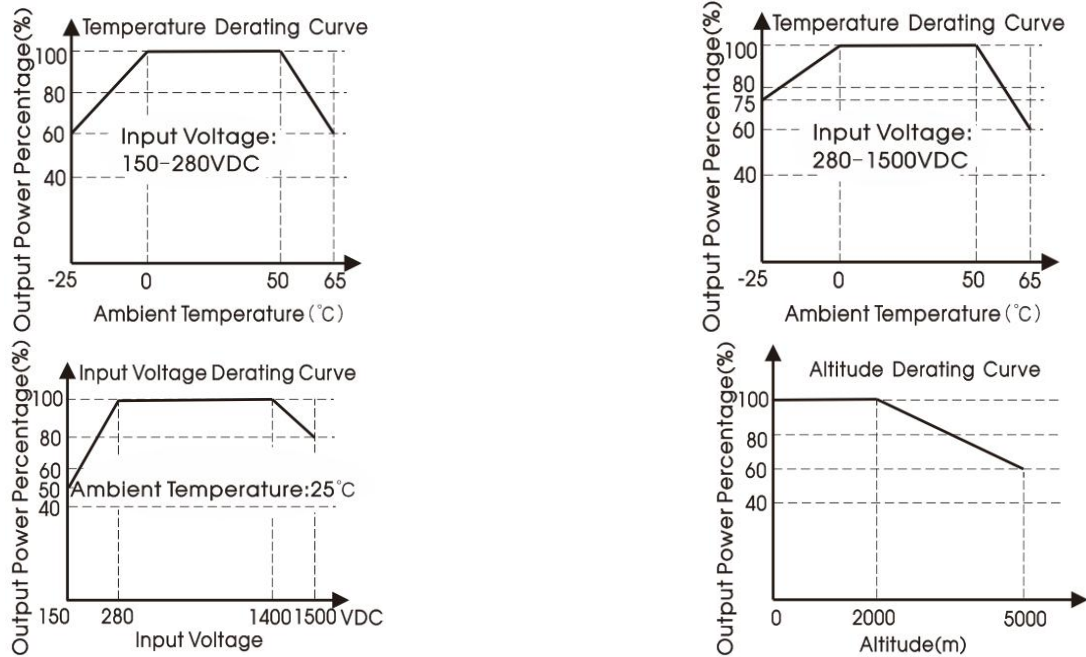
Mechanical Specifications

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

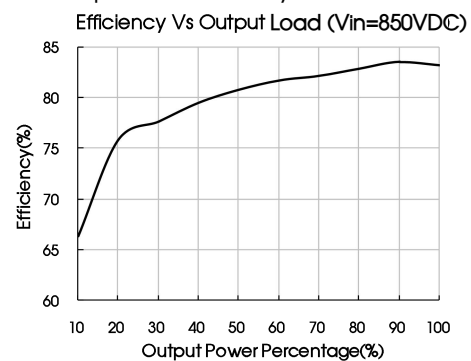
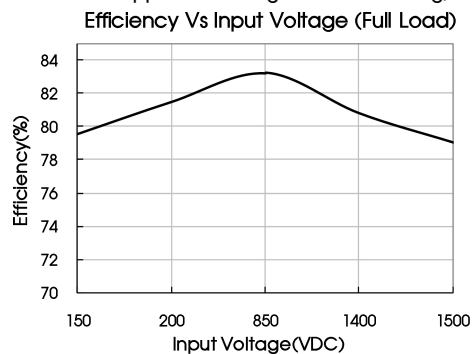
Electromagnetic Compatibility (EMC)

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

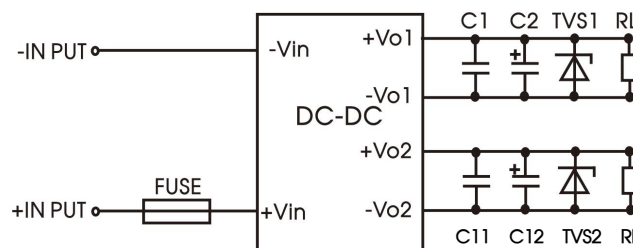


Fig. 1: Typical application circuit

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

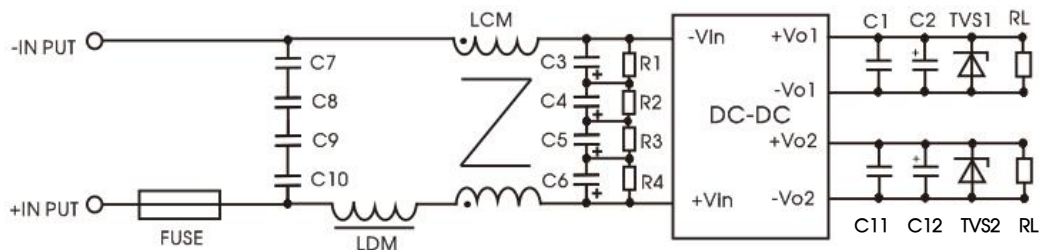
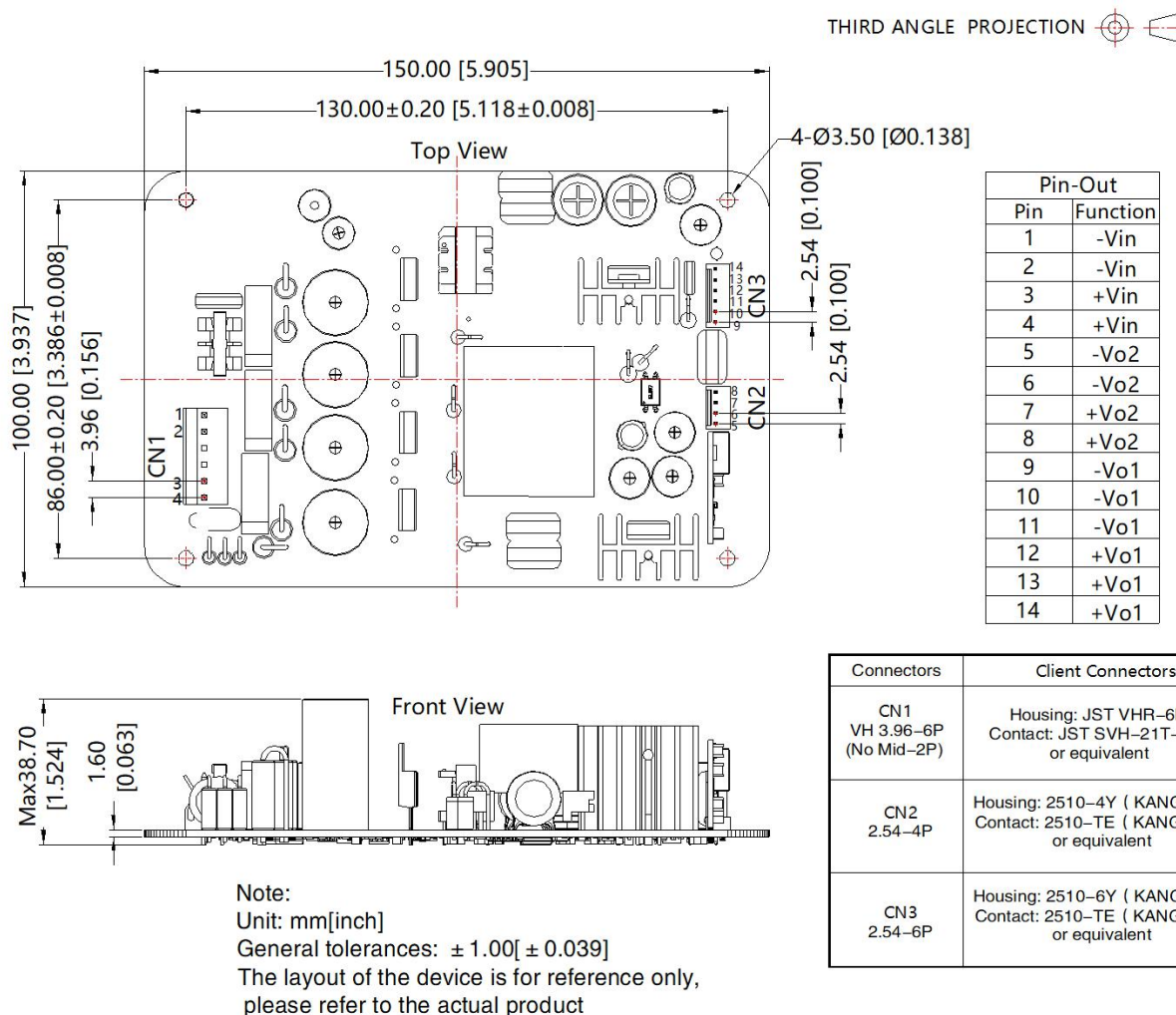


Fig 2.

Element model	Recommended value
C7, C8, C9, C10	104K/275VAC
C3, C4, C5, C6	47uF/450VDC
R1, R2, R3, R4	1M Ω /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:

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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