

DC/DC Switching Power Supply

PV45-29D1515-15

MORNSUN®

45W isolation DC-DC converter with ultra-wide , ultra-high 150 -1500VDC input for Renewable Energy



RoHS

FEATURES

- 10:1 ultra-wide input voltage range 150 - 1500VDC
- High I/O isolation test voltage of 4000VAC
- Industrial grade operating temperature -40°C to +85°C
- High efficiency, low ripple & noise
- Input under-voltage protection, reverse input voltage protection, output short circuit, over-current, over-voltage protection
- High reliability, long lifespan
- Operating up to 5000m altitude

PV45-29D1515-15 is regulated DC-DC converters with an ultra-wide and ultra-high DC input of 150-1500VDC. 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, 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

Part No.	Output Power	Nominal Output Voltage and Current (Vo/Io)		Efficiency(%) Typ.			Capacitive Load (μF) Max.	
		Vo1/Io1	Vo2/Io2	200VDC	850VDC	1400VDC	Vo1	Vo2
PV45-29D1515-15	45W	15V/1.53A	15V/1.53A	78	78	76	1500	470

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range		150	--	1500	VDC
Input Current	200VDC	--	350	--	mA
	300VDC	--	230	--	
	850VDC	--	90	--	
	1500VDC	--	50	--	
Inrush Current	200VDC	--	30	--	A
	300VDC	--	40	--	
	850VDC	--	100	--	
	1500VDC	--	180	--	
Under-voltage Protection		Lockout activation range: 120 - 140VDC Lockout deactivation range:130 - 150VDC			
Maximum Transients Input Voltage	1600VDC	Duration time: 1s, normal output			
External Input Fuse		4A/1500VDC, slow-blow, 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	10% - 100% load	Vo1	--	--	±2
		Vo2	--	--	±2
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	Vo1	--	--	150
		Vo2	--	--	150
Temperature Coefficient		--	±0.02	--	%/°C
Short Circuit Protection		Hiccup, continuous, self-recovery			

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MORNSUN GUANGZHOU SCIENCE & TECHNOLOGY CO.,LTD.



ES France - Département Composants & Modules
127 rue de Buzenval BP 26 - 92380 Garches



Tél. 01 47 95 99 89
Fax. 01 47 01 16 22





e-mail : comp@es-france.com
Site Web : www.es-france.com

Over-current Protection		$\geq 110\%$ Io, hiccup, self-recovery			
Over-voltage Protection	Vo1	$\leq 25\text{VDC}$ (Output voltage clamp)			
	Vo2	$\leq 25\text{VDC}$ (Output voltage clamp)			
Minimum Load	Vo1	0	--	--	%
	Vo2	0	--	--	
Start-up Delay Time **	150 - 1500VDC	--	2	3	s

Note: * The "Tip and barrel method" is used for ripple and noise test, please refer to PV Converter Application Notes for specific information.
 ** Start-up Delay Time test condition: Full input voltage range, full output load range (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 Test	Input-output	Electric Strength Test for 1min., leakage current $\leq 10\text{mA}$	4000	--	--	VAC
	Input- 		2500	--	--	
	Vo1-Vo2		4000	--	--	
	Output- 		2500	--	--	
Operating Temperature			-40	--	+85	°C
Storage Temperature			-40	--	+85	
Storage Humidity			--	--	95	%RH
Power Derating	-40°C to 0°C (Input Voltage: 150VDC - 200VDC)		1.5	--	--	%/°C
	-40°C to 0°C (Input Voltage: 200VDC - 1500VDC)		1.0	--	--	
	+60°C to +70°C		4.0	--	--	
	+70°C to +85°C		2.0	--	--	
	150 - 200VDC		0.4	--	--	%/VDC
	1400 - 1500VDC		0.2	--	--	
Switching Frequency			--	65	--	kHz
Altitude			--	--	5000	m
MTBF			MIL-HDBK-217F@25°C $\geq 300,000$ h			

Mechanical Specifications

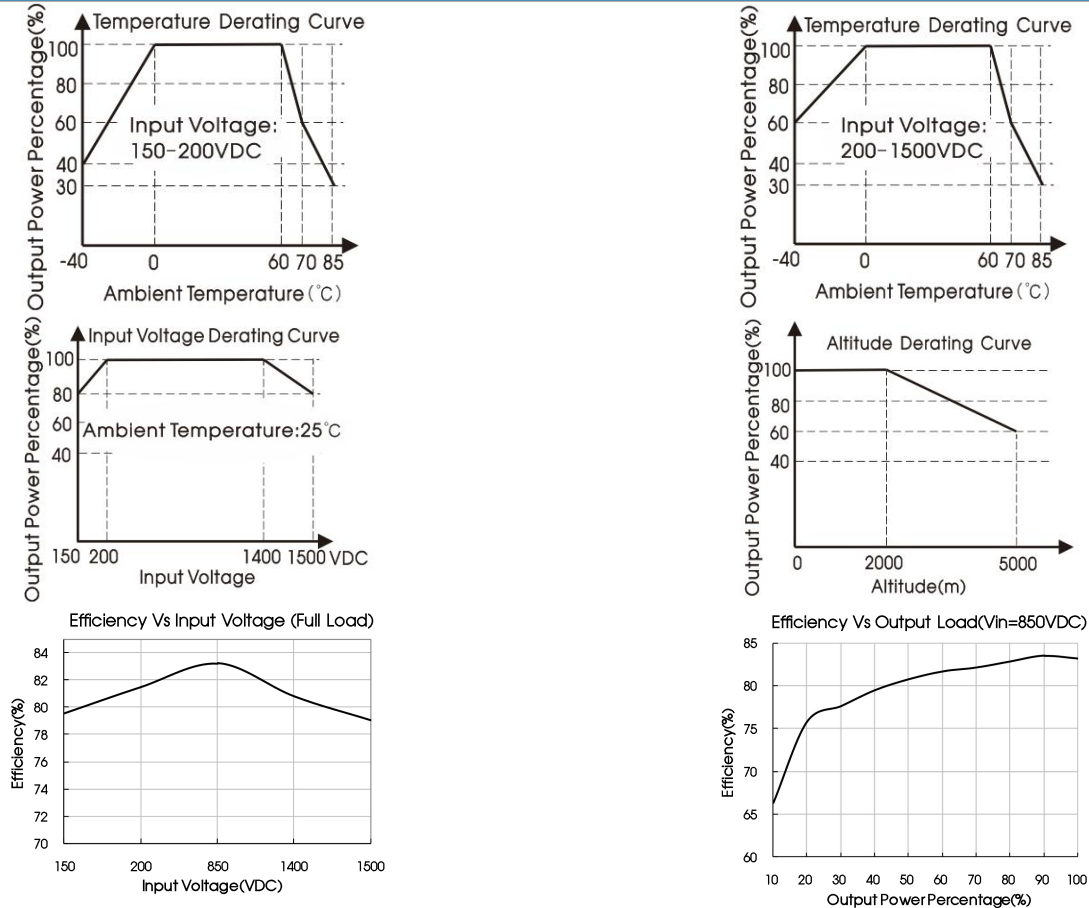
Case Material	Metal
Dimensions	144.50 x 105.00 x 40.00 mm
Weight	420g (Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A	
Immunity	ESD	IEC/EN61000-4-2	Contact $\pm 6\text{KV}$ /Air $\pm 8\text{KV}$	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 4\text{KV}$	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ / line to ground $\pm 4\text{KV}$	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s (See Fig. 2 for recommended circuit)	perf. Criteria A
	Voltage dips, short and interruptions immunity	IEC/EN61000-4-29	0%, 70%	perf. Criteria B



Product Characteristic Curve



Note: ① With an input between 150 - 200VDC/1400 - 1500VDC, the output power of PV45-29D1515-15 parts 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 Electrolytic capacitor having a constant period of use, its life depends on the actual ambient temperature, in the harsh operating environment will affect the life of the product and shorten the life of the product, the product is not recommended for long-term work in high temperature environment of more than 70°C;
 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

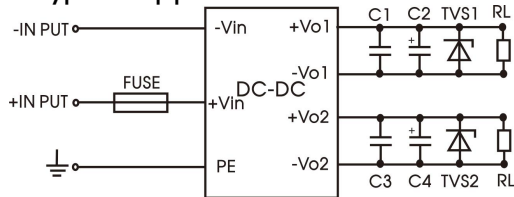


Fig.1: Typical circuit diagram

Model	C1、C3(μF)	C2、C4(μF)	TVS1、TVS2	FUSE
PV45-29D1515-15	1	100	SMBJ20A	4A/1500VDC, slow-blow, required

Note on filter components:

We recommend using an electrolytic capacitor with high frequency and low ESR rating for C2, C4 (refer to manufacture's datasheet). Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1, C3 are ceramic capacitors, 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

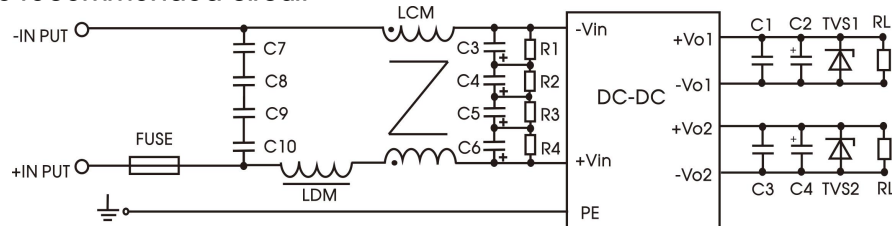



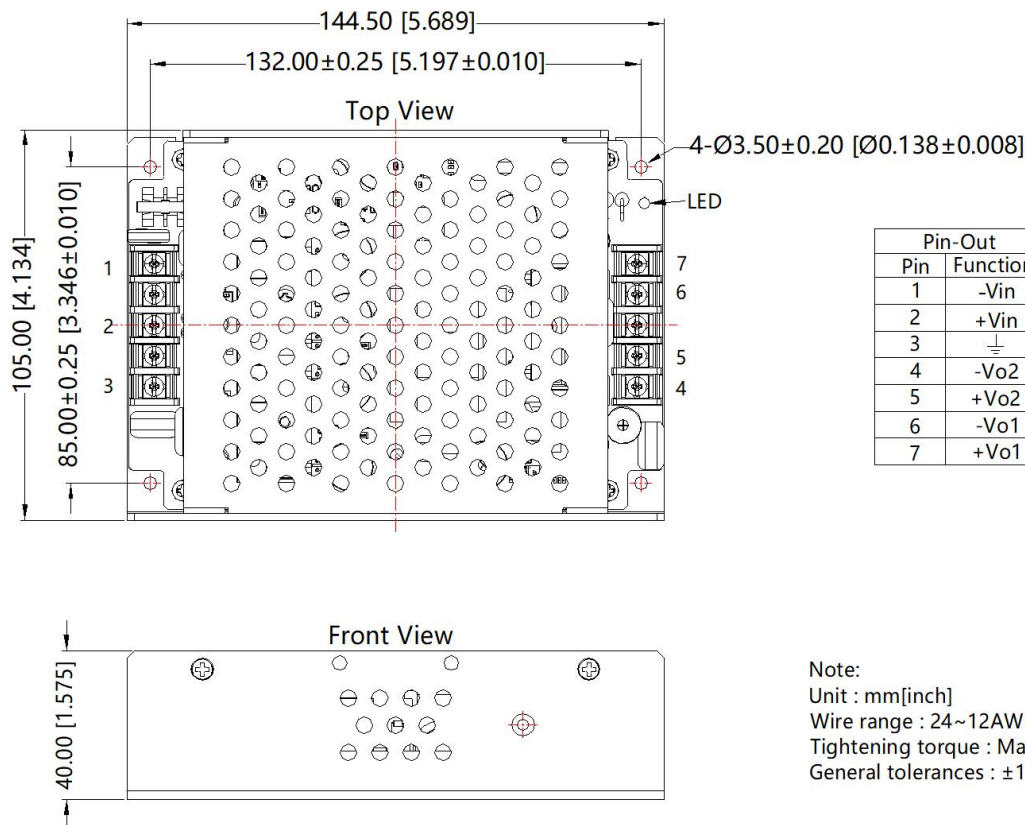
Fig. 2: EMC Recommended circuit (for output components also refer to typical application)

Component	Recommended value
C7, C8, C9, C10	104K/275VAC
C3, C4, C5, C6	47 μ F/450VDC
R1, R2, R3, R4	1M Ω /2W
LDM	330uH/0.38A
LCM	7mH/1A
FUSE	4A/1500VDC, slow-blow, required

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

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Note:
Unit : mm[inch]
Wire range : 24~12AWG
Tightening torque : Max 0.4N·m
General tolerances : $\pm 1.00[\pm 0.039]$

Note:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220039;
- 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;
- All index testing methods in this datasheet are based on our company corporate standards;
- In order to improve the conversion efficiency, when the product is working high voltage, the module may have certain audio noise, but does not affect the reliability of the product;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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 www.mornsun-power.com

