DC/DC Converter
PV40-29B28

MORNSUN®

40W isolation DC-DC converter with ultra-wide, ultra-high 200 - 1500VDC input for Renewable Energy

RoHS

FEATURES

- Ultra wide input voltage range: 200 - 1500VDC
- Industrial grade operating temperature: -40℃ to +70℃
- 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
- Safety according to UL1741, CSA-C22.2 No.107.1, EN62109

PV40-29B28 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

Part No.	Output Power	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 800VDC (%) Typ.	Capacitive Load (μF) Max. (Normal temperature full load)
PV40-29B28	40W	28V/1430mA	83	470

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range		200	--	1500	VDC
Input Current	200VDC	--	--	320	mA
	800VDC	--	--	80	
	1500VDC	--	--	42	
Inrush Current	200VDC	--	50	--	A
	1500VDC	--	150	--	
Under-voltage Protection		Lockout activation range: 170 - 185V Lockout deactivation range: 180 - 195V			
External Input Fuse Required		4A/1500VDC, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±2	--	%
Line Regulation	Full load	--	±1	--	
Load Regulation	0% - 100% load	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	150	300	mV
Temperature Coefficient		--	±0.02	±0.15	%/℃
Short Circuit Protection		Continuous, self-recovery			
Over-current Protection		≥110%Io, self-recovery			
Over-voltage Protection		≤35VDC			
Minimum Load		0	--	--	%
Start-up Delay Time**	200 - 1500VDC	--	--	3	s

Note: * The "parallel cable" method is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.
** Full input voltage / output load range (The cooling-time between input power-off and power-on again is greater than 15s).

General Specifications

Item		Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input-output	Electric Strength Test for 1min.		4000	--	--	VAC
Operating Temperature				-40	--	+70	℃
Storage Temperature				-40	--	+85	
Storage Humidity				--	--	95	%RH
Soldering Temperature		Wave-soldering		260 ± 5℃; time: 5 - 10s			
		Manual-welding		360 ± 10℃; time: 3 - 5s			
Power Derating		-40℃ to 0℃	200 - 300VDC	1.50	--	--	%/℃
		+50℃ to +70℃		2.50	--	--	
		1200VDC-1500VDC		0.07	--	--	%/VDC
		2000m - 5000m		6.70	--	--	%/Km
Switching Frequency				--	65	--	kHz
Safety Standard				Design refer to UL1741, CSA-C22.2 No.107.1 & EN62109			
Altitude				--	--	5000	m
MTBF				MIL-HDBK-217F@25℃ ⩾ 300,000 h			

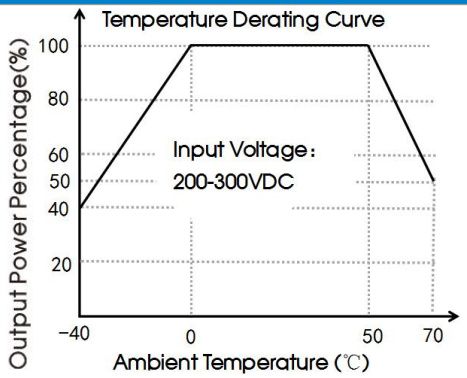
Mechanical Specifications

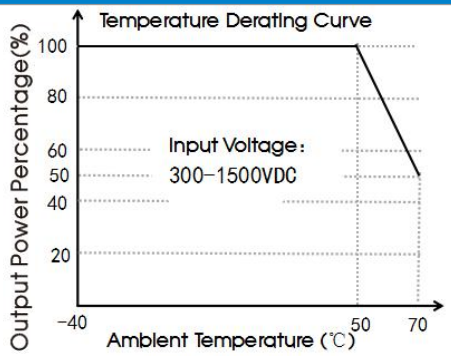
Case Material	Black flame-retardant and heat-resistant plastic (UL94 V-0)
Dimensions	125.00 x 75.00 x 40.00 mm
Weight	434g (Typ.)
Cooling Method	Free air convection

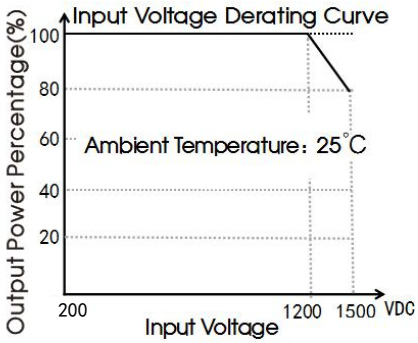
Electromagnetic Compatibility (EMC)

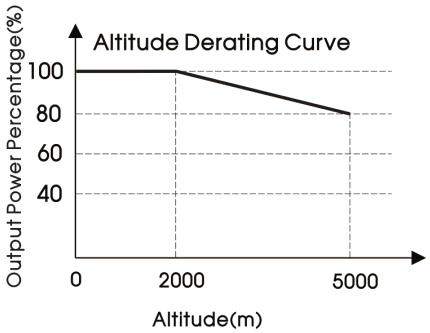
Emissions	CE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV (See Fig. 2 for recommended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

Product Characteristic Curve

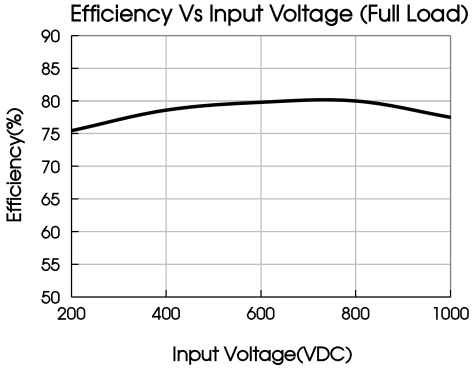


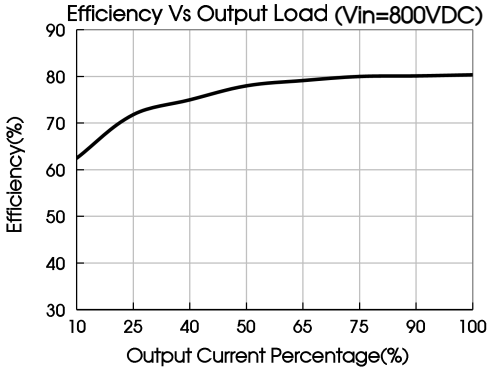






Note:
① With an input between 1200 - 1500VDC, the output power of PV40-29B28 parts must be derated as per temperature derating curves;
② For operation of this converter series in an altitude between 2000 - 5000m above sea level, the output power must be derated as per the altitude derating curve;
③ This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.





Design Reference

1. Typical application

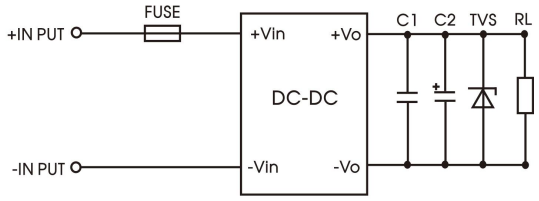


Fig. 1: Typical application circuit

Model	FUSE	C1(μF)	C2(μF)	TVS
PV40-29B28	4A/1500VDC, required	1	68	SMBJ33A

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

2. EMC compliance recommended circuit

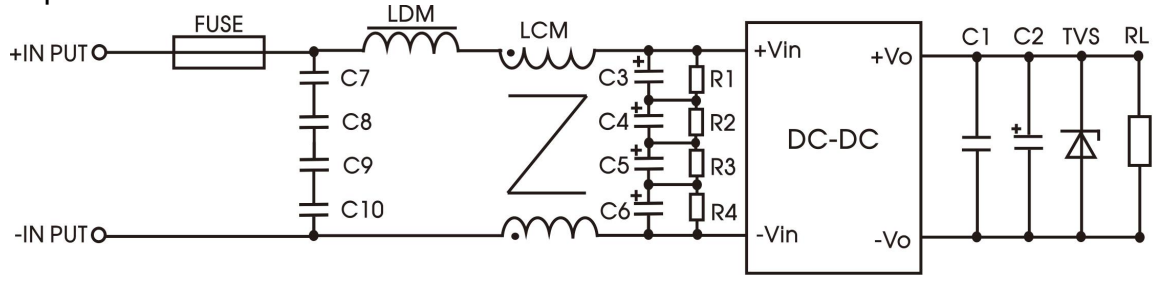
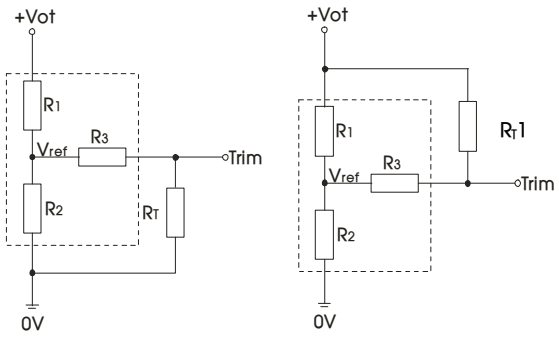


Fig 2: EMC application for higher compliance requirements (output parameters are show in Figure 1)

Component	Recommended value
C7/C8/C9/C10	Safety capacitor 104K/275VAC
C3/C4/C5/C6	47uF/450VDC
R1/R2/R3/R4	1MΩ/2W
LDM	330uH/1A
LCM	7mH/1A
FUSE	4A/1500VDC, required

3. Trim Function for Output Voltage Adjustment (open if unused)



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

$$up: R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{Vref}{Vot - Vref}.R_1$$

$$down: R_T1 = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{Vot - Vref}{Vref}.R_2$$

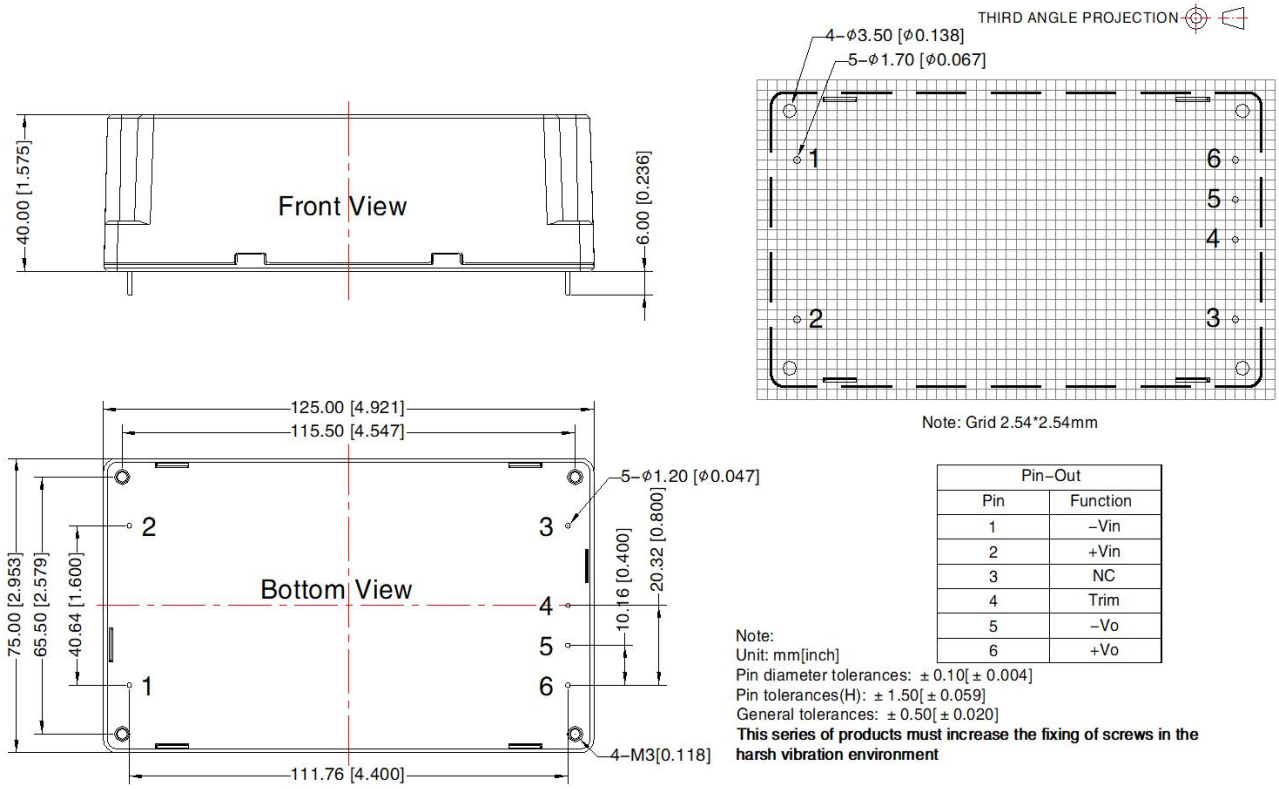
R_T /R_T 1= Trim Resistor value;
a = Self-defined parameter;

Vout	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)	Vot(V)
28V	10	0.97	2	2.5	Resulting trimmed output voltage, range ≤ ±10%

Note: R_T1=150kΩ, output is 26.4V/1.515A.

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

Dimensions and Recommended Layout



Pin–Out	
Pin	Function
1	–Vin
2	+Vin
3	NC
4	Trim
5	–Vo
6	+Vo

Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
Pin tolerances(H): ± 1.50[± 0.059]
General tolerances: ± 0.50[± 0.020]
This series of products must increase the fixing of screws in the harsh vibration environment

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number of Horizontal package: 58020023;
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. 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. It is recommended that the product be locked screw before welding;
6. 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.
7. We can provide product customization service;
8. Products are related to laws and regulations: see "Features" and "EMC";
9. 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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