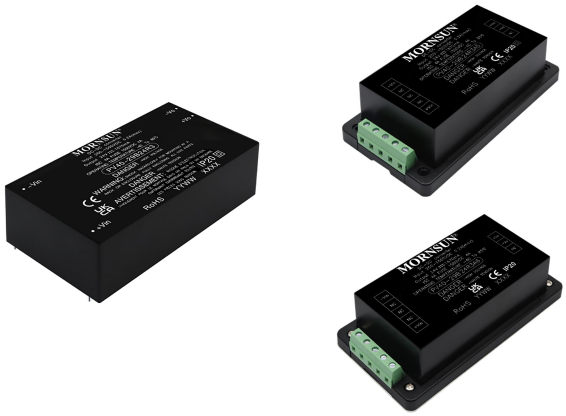
DC/DC Converter

PV40-29BxxR3 Series

MORNSUN®

40W isolated DC-DC converter with ultra-wide, ultra-high 250 - 1500V DC input for renewable energy



CE Report EN62109-1 UKCA BS EN62109-1 RoHS

FEATURES

- Input voltage up to 1700VDC (Transient, duration: 30s)
- Ultra wide input voltage range: 250 - 1500VDC
- Output 50W available under specific input voltage range
- Industrial grade operating temperature: -40℃ to +85℃
- 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
- Reinforced insulation

PV40-29BxxR3 series is regulated DC-DC converters with an ultra-wide DC input of 250-1500VDC. 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

Certification	Part No.*	Output Power (W)	Static Power Margin (W)**	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 800VDC (%) Typ.	Capacitive Load (μF) Max. (Normal temperature full load)
EN	PV40-29B12R3	40	50 (400 - 1100VDC)	12V/3.34A	86	3000
	PV40-29B24R3		50 (400 - 1500VDC)	24V/1.67A	89	820
	PV40-29B28R3			28V/1.43A	89	820
/	PV40-29B48R3			48V/0.833A	91	410

Note: *Use suffix "A5" for chassis mounting and suffix "A6" for DIN-Rail mounting;
**Up to 125% (50W) continuous static power margin at 55℃ under specific input voltage range.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range			250	--	1500	VDC
	Transient (30s)		--	--	1700	
Input Current	300VDC		--	--	0.20	A
	800VDC		--	--	0.08	
Inrush Current	800VDC		--	60	--	
	1500VDC		--	90	--	
Under-voltage Protection	Under-voltage protection start	12V/24V/28V	140	--	240	VDC
		48V	130	--	240	
	Under-voltage protection release		180	--	250	
	Hysteresis voltage typical value		50			
Input Reverse Polarity Protection			Available			
External Input Fuse Required			4A/1500VDC (CCN:JFGA/JFGA7), required			
Hot Plug			Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	All load range	--	±1	±2	%
Line Regulation	Rated load	--	±0.5	--	

Load Regulation	800VDC		--	±0.5	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	--	150	mV
Temperature Coefficient			--	±0.02	--	%/℃
Short Circuit Protection			Hiccup, continuous, self-recovery			
Over-current Protection			⩾110%Io, self-recovery			
Over-voltage Protection	12V		⩽20VDC	Output voltage clamp or hiccup		
	24V		⩽30VDC			
	28V		⩽35VDC			
	48V		⩽60VDC			
Minimum Load			0	--	--	%
Start-up Delay Time**	250 - 1500VDC		--	0.5	1.0	s
Hold-up Time	Room temperature, full load	800VDC input	--	10	--	ms

Note: *The "Tip and barrel method" is used for ripple and noise test, please refer to PV 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., leakage current <3mA		4000	--	--	VAC
Operating Temperature				-40	--	+85	℃
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 -25℃	250 - 300VDC	2.67	--	--	%/℃
		+55℃ to +70℃		2.00	--	--	
		+70℃ to +85℃		3.33	--	--	
		250VDC - 300VDC		0.8	--	--	%/VDC
		2000m - 5000m		6.7	--	--	%/Km
Switching Frequency				--	65	--	kHz
Altitude				--	--	5000	m
Safety Standard				Design refer to UL1741, EN62109-1, BS EN62109-1, CSA-C22.2 No.107.1-16			
MTBF		MIL-HDBK-217F@25℃		⩾ 300,000 h			

Mechanical Specifications

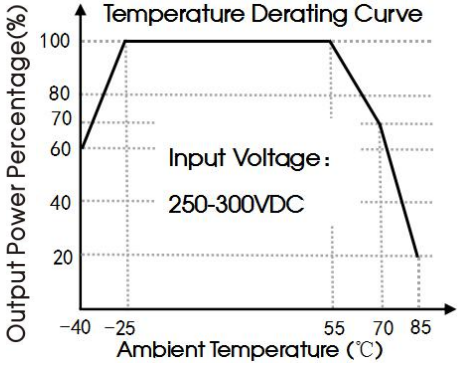
Case Material		Black flame-retardant and heat-resistant plastic (UL94V-0)
Dimensions	Horizontal package	109.00 x 58.50 x 30.00 mm
	A5 chassis mounting	135.00 x 70.00 x 38.50 mm
	A6 DIN-Rail mounting	137.00 x 70.00 x 44.00 mm
Weight	Horizontal package	270g (Typ.)
	A5 chassis mounting	350g (Typ.)
	A6 DIN-Rail mounting	420g (Typ.)
Cooling Method		Free air convection

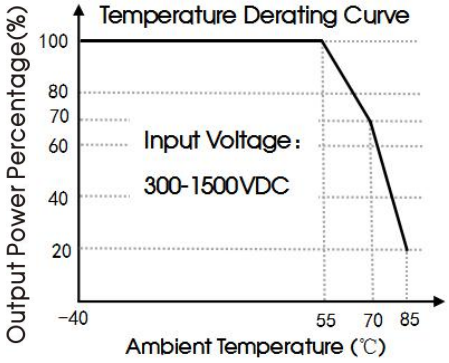
Electromagnetic Compatibility (EMC)

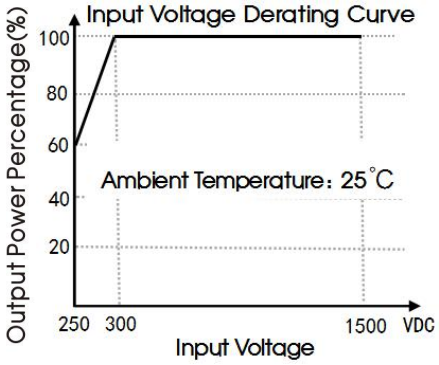
Emissions	CE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	Perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV ±4KV (See Fig. 2 for recommended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

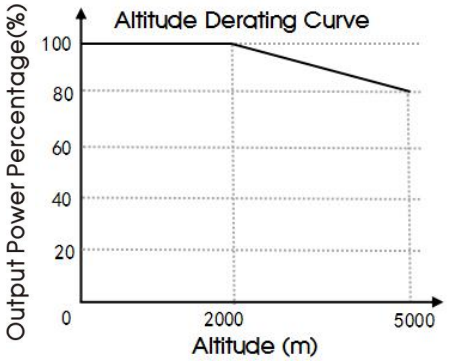
	Surge	IEC/EN61000-4-5	Line to line ±1KV Line to line ±2KV (See Fig. 2 for recommended circuit)	Perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	Perf. Criteria A

Product Characteristic Curve

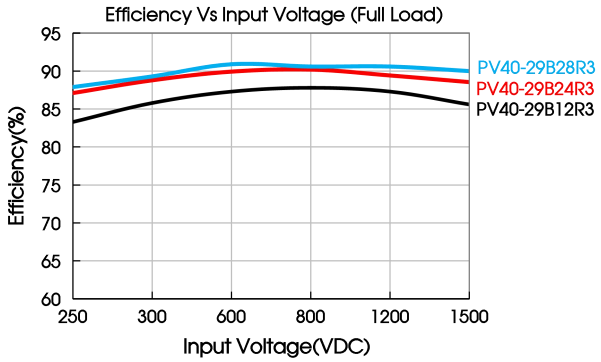


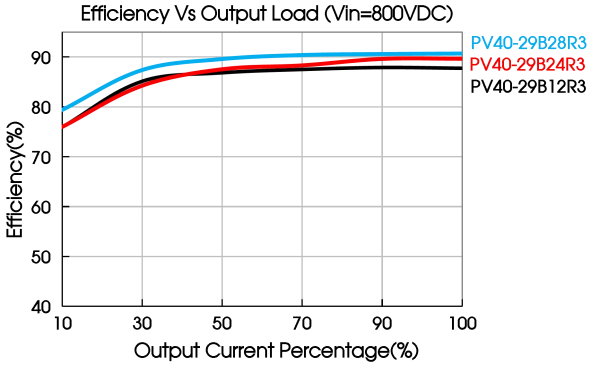






Note: ① With an input between 250-300VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.





Design Reference

1. Typical application

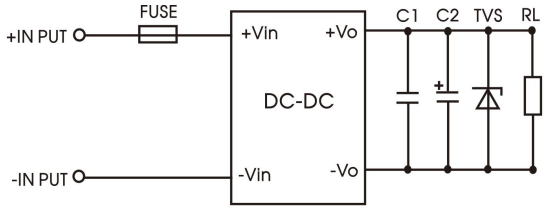


Fig. 1: Typical application circuit

Model	FUSE	C1(μF)	C2(μF)	TVS
PV40-29B12R3	4A/1500VDC (CCN:JFGA/JFGA7), required	1μF/35V	120μF/25V	SMBJ20A
PV40-29B24R3			68μF/35V	SMBJ30A
PV40-29B28R3			68μF/50V	SMBJ36A
PV40-29B48R3		1μF/100V	47μF/63V	SMBJ58A

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

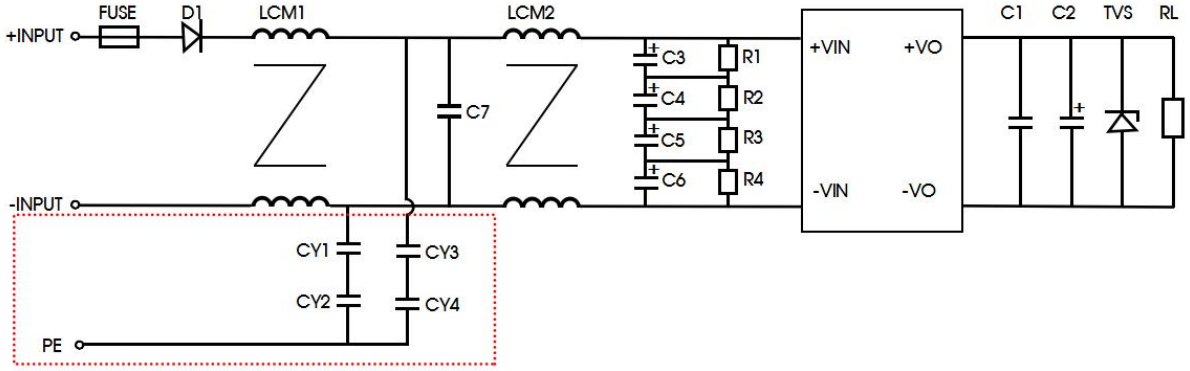


Fig 2: EMC application for higher compliance requirements (output parameters are show in Figure 1)

Component	Recommended value
C7	Safety capacitor 474K/＞1500VDC
C3、C4、C5、C6	10uF/450VDC
R1、R2、R3、R4	1MΩ/2W
LCM1、LCM2	20mH (recommended to use MORNSUN's FL2D-10-203B)
CY1、CY2、CY3、CY4	102M/1500VDC
FUSE	4A/1500VDC (CCN:JFGA/JFGA7), required
D1	4A/3000V
Note: ① Adding D1 if there is a requirement of input reverse polarity protection for C3-C6; ② Move off red part if there is no requirement for emissions.	

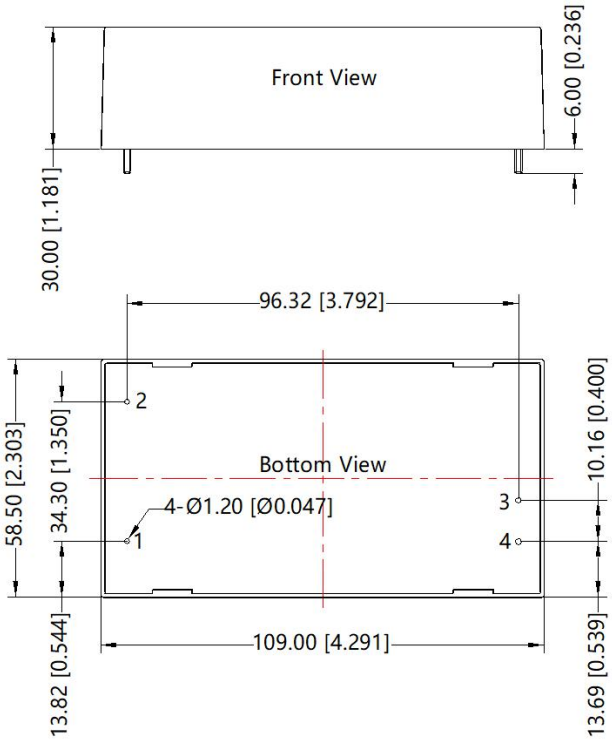
3. IMPORTANT SAFETY INSTRUCTIONS

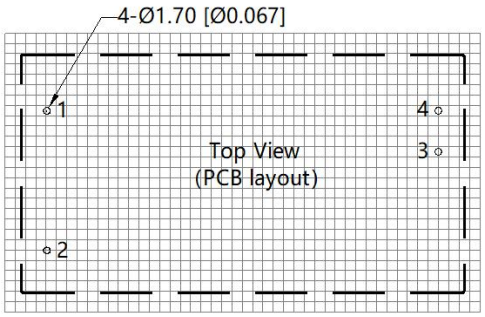
Additional protective devices, such as lightning protector need to be added if there is an transient pulse voltage greater than 6KV at the input of PV products in system applications.

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

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





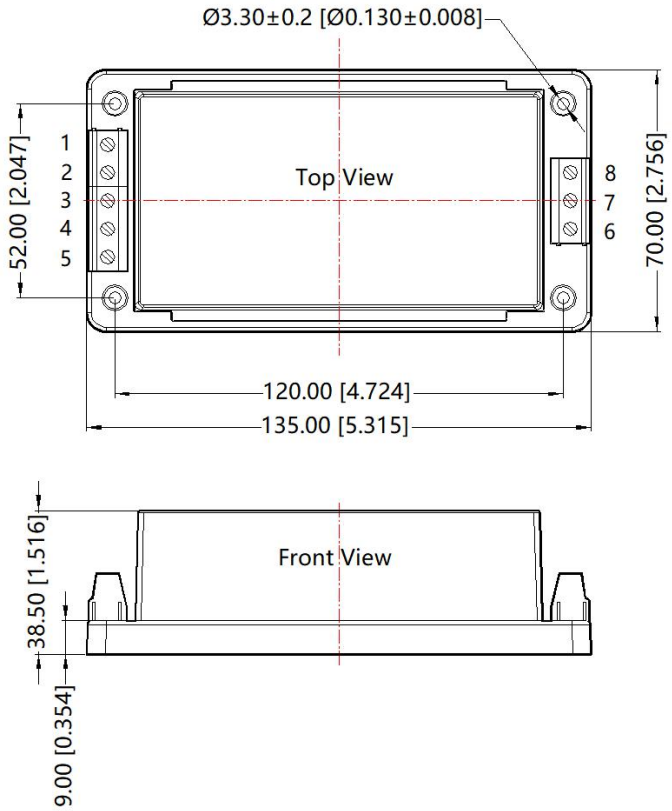
Note: Grid 2.54*2.54mm

Pin	Mark
1	-Vin
2	+Vin
3	+Vo
4	-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]

A5 Chassis Mounting Dimensions

THIRD ANGLE PROJECTION

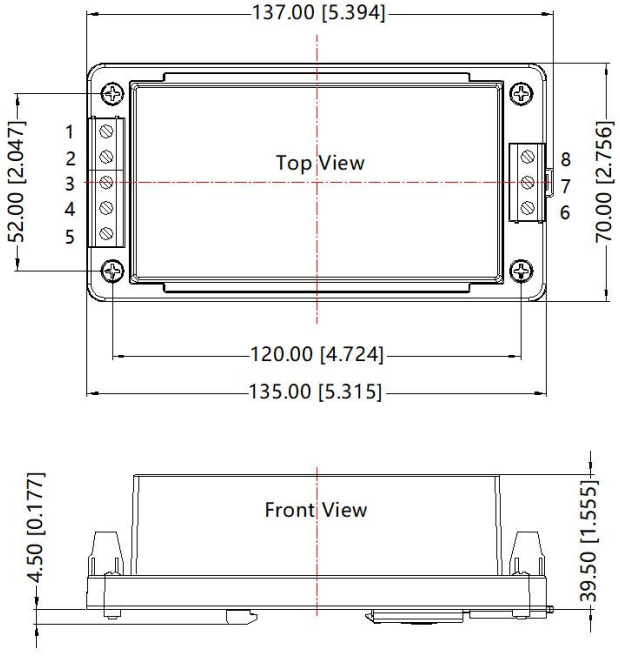


Pin	Mark
1	-Vin
2	NC
3	NC
4	NC
5	+Vin
6	NC
7	-Vo
8	+Vo

Note:
Unit: mm[inch]
Wire range: 24~12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.040]

A6 Din-Rail Mounting Dimensions

THIRD ANGLE PROJECTION



Pin	Mark
1	-Vin
2	NC
3	NC
4	NC
5	+Vin
6	NC
7	-Vo
8	+Vo

Note:
Unit: mm[inch]
Mounting rail: TS35, rail needs to connect safety ground
Wire range: 24~12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.040]

⚠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 of Horizontal package: 58220020; the packaging bag number of A5/A6 package: 58220031;
2. Unless otherwise specified, A5/A6 products performance are consistent with Horizontal package products;
3. 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;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. In order to improve the efficiency, there will be audible noise generated when working at input voltage higher than 1500 VDC, but it does not affect product performance and reliability;
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;
10. 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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