

DC/DC Converter

PV40-27BxxR2 Series

MORNSUN®

40W isolated DC-DC converter with ultra-wide, ultra-high 200 - 1200V DC input for renewable energy



CE Report EN62109-1 RoHS

PV40-27BxxR2 series is regulated DC-DC converters with an ultra-wide DC input of 200-1200VDC. 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.

FEATURES

- Input voltage up to 1300VDC (Transient, duration: 30s)
- Ultra-wide input voltage range of 200 - 1200VDC
- Industrial grade operating temperature -40°C to +70°C
- 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
- Safety according to CSA-C22.2 No.107.1

Selection Guide

Certification	Part No.*	Output Power (W)	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 200VDC (%) Typ.	Capacitive Load (μF) Max. (Normal temperature full load)
EN	PV40-27B12R2	40	12V/3.34A	83	2200
	PV40-27B15R2		15V/2.67A	84	1500
	PV40-27B24R2		24V/1.67A	85	820
	PV40-27B28R2		28V/1.43A	85	820
/	PV40-27B32R2		32V/1.25A	85	680

Note: *Use suffix "A5" for chassis mounting and suffix "A6" for DIN-Rail mounting.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range		200	--	1200	VDC
	Transient (30s)	--	--	1300	
Input Current	200VDC	--	--	0.32	A
	600VDC	--	--	0.10	
Inrush Current	600VDC	--	60	--	
	1200VDC	--	100	--	
Under-voltage Protection		Lockout activation range: 140 - 190V Lockout deactivation range: 160 - 200V			
Reverse Input Voltage Protection		Available			
External Input Fuse Required		4A/1500VDC, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±1.0	±2.0	%
Line Regulation	Full load	--	±0.5	--	
Load Regulation	0% - 100% load	--	±0.5	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	100	200	mV
Stand-by Power Consumption	All load range	--	0.5	2	W
Temperature Coefficient		--	±0.02	--	%/°C
Short Circuit Protection		Hiccup, continuous, self-recovery			

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Over-current Protection	12/15/24/28V output	$\geq 110\%I_o$, self-recovery			
	32V output	$\geq 160\%I_o$, self-recovery			
Over-voltage Protection	12V/15V output	$\leq 20VDC$	Output voltage clamp or hiccup		
	24V output	$\leq 30VDC$			
	28V output	$\leq 35VDC$			
	32V output	$\leq 40VDC$			
Minimum Load		0	--	--	%
Start-up Delay Time**	200 - 1200VDC	--	--	2	s
Hold-up Time	Room temperature, full load	600VDC input	--	5	ms

Note: * The "parallel cable" 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 <5mA			
		4000	--	--	VAC
Operating Temperature		-40	--	+70	°C
Storage Temperature		-40	--	+85	
Storage Humidity		--	--	95	%RH
Soldering Temperature	Wave-soldering	260 \pm 5°C; time: 5 - 10s			
	Manual-welding	360 \pm 10°C; time: 3 - 5s			
Power Derating	-40°C to -25°C	2.67	--	--	% / °C
	+50°C to +70°C	2.50	--	--	
	2000m - 5000m	6.70	--	--	%/Km
Switching Frequency		--	65	--	kHz
Altitude		--	--	5000	m
Safety Standard		Designed to meet UL1741, CSA-C22.2 No.107.1, EN62109-1			
MTBF	MIL-HDBK-217F@25°C	$\geq 300,000$ h			

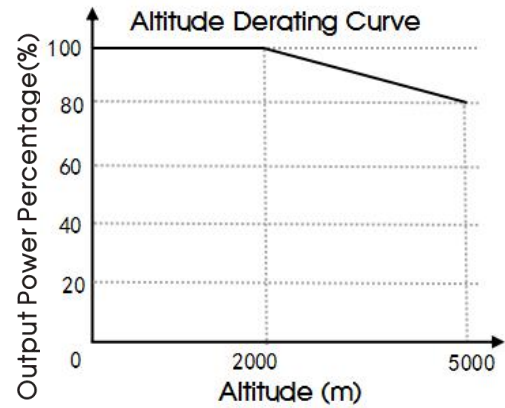
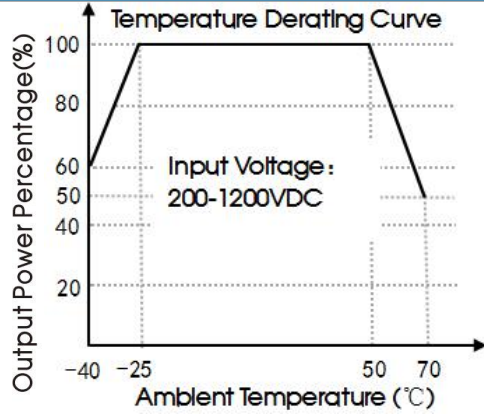
Mechanical Specifications

Case Material	Black flame-retardant and heat-resistant plastic (UL94V-0)	
Dimensions	Horizontal package	89.00 x 63.50 x 25.00 mm
	A5 chassis mounting	135.00 x 70.00 x 33.50 mm
	A6 DIN-Rail mounting	137.00 x 70.00 x 39.00 mm
Weight	Horizontal package	220g (Typ.)
	A5 chassis mounting	300g (Typ.)
	A6 DIN-Rail mounting	370g (Typ.)
Cooling Method	Free air convection	

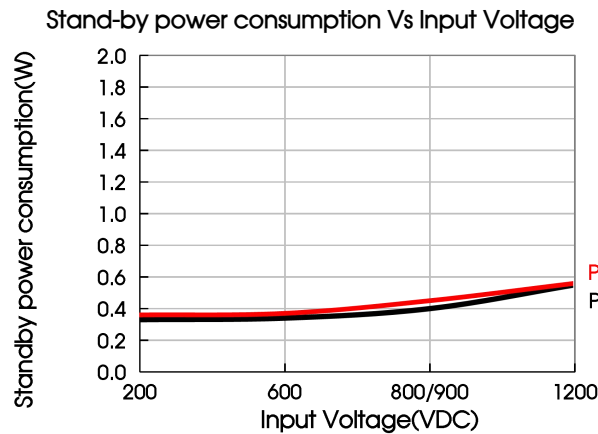
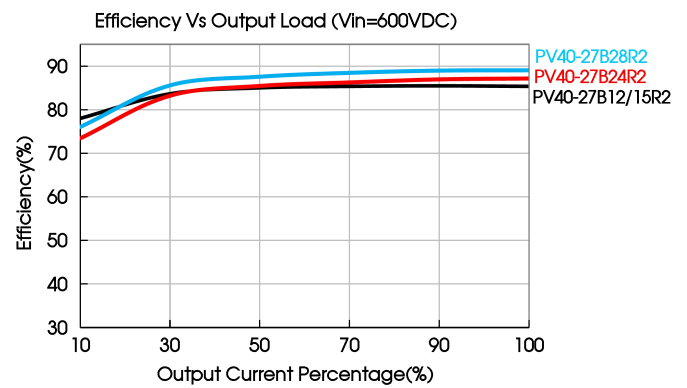
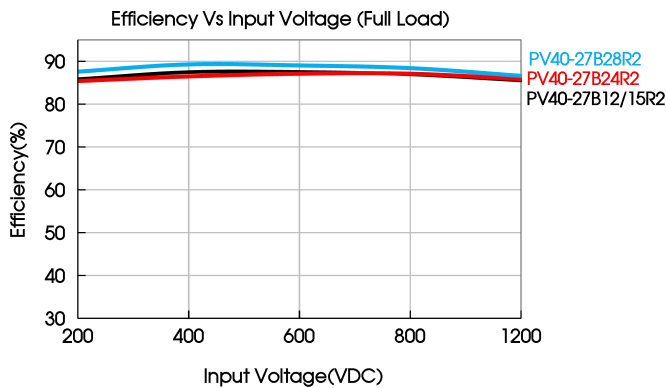
Electromagnetic Compatibility (EMC)

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 $\pm 6KV$ /Air $\pm 8KV$	Perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2KV$ $\pm 4KV$ (See Fig. 2 for recommended circuit)	Perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 1KV$ line to line $\pm 2KV$ (See Fig. 2 for recommended circuit)	Perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	Perf. Criteria A

Product Characteristic Curve

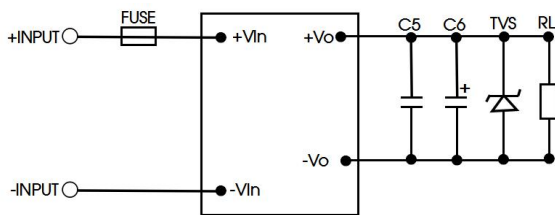


- Note:
- ① For operation of this converter series in an altitude between 2000 - 5000m above sea level, the output power must be derated as per the altitude derating curve;
 - ② This product is suitable for applications using natural air cooling; for applications in closed environment please consult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



Design Reference

1. Typical application



Model	FUSE	C5	C6	TVS
PV40-27B12R2	4A/1500VDC, required	1μF/35V	220μF/35V	SMBJ20A
PV40-27B15R2				SMBJ30A
PV40-27B24R2			120μF/35V	SMBJ35A
PV40-27B28R2		1μF/50V	120μF/50V	SMBJ43A
PV40-27B32R2				

Note on filter components:

We recommend using an electrolytic capacitor with high frequency and low ESR rating for C6 (refer to manufacture's datasheet). Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C5 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

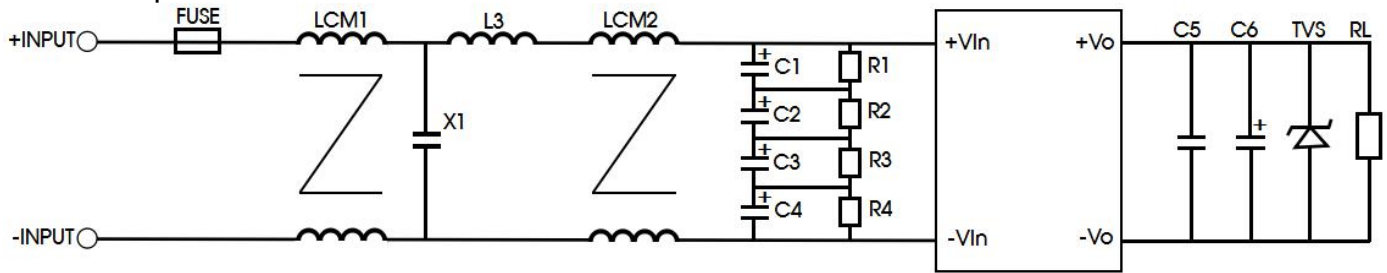


Fig 2: EMC application for higher compliance requirements (output parameters are show in Figure 1)

Element model	Recommended value
FUSE	4A/1500VDC, required
LCM1	1mH (recommended to use MORNSUN's FL2D-10-102B)
LCM2	7mH (recommended to use MORNSUN's FL2D-10-702B)
L3	1.2mH/>0.5A
X1	224M/760VAC
C1, C2, C3, C4	10μF/450V
R1, R2, R3, R4	1MΩ/2W

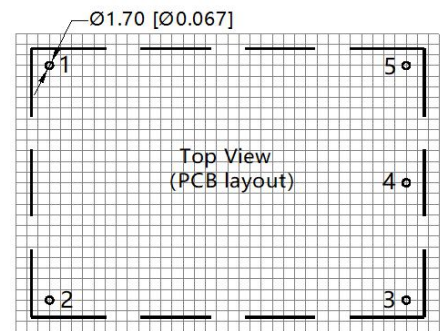
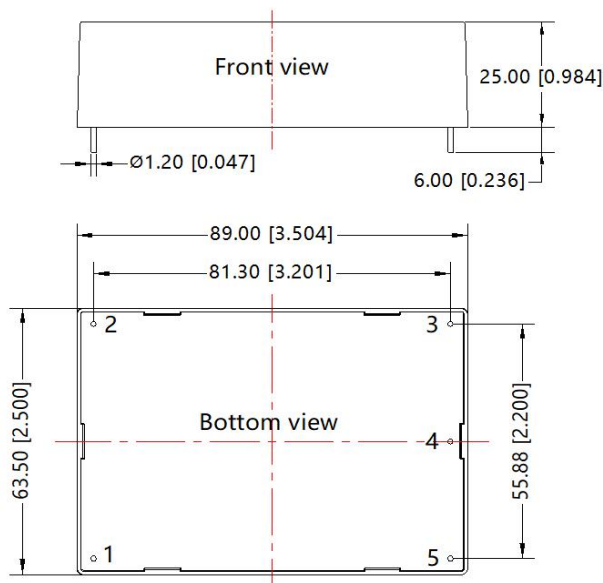
3. IMPORTANT SAFETY INSTRUCTIONS

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	NC
4	-Vo
5	+Vo

Note:

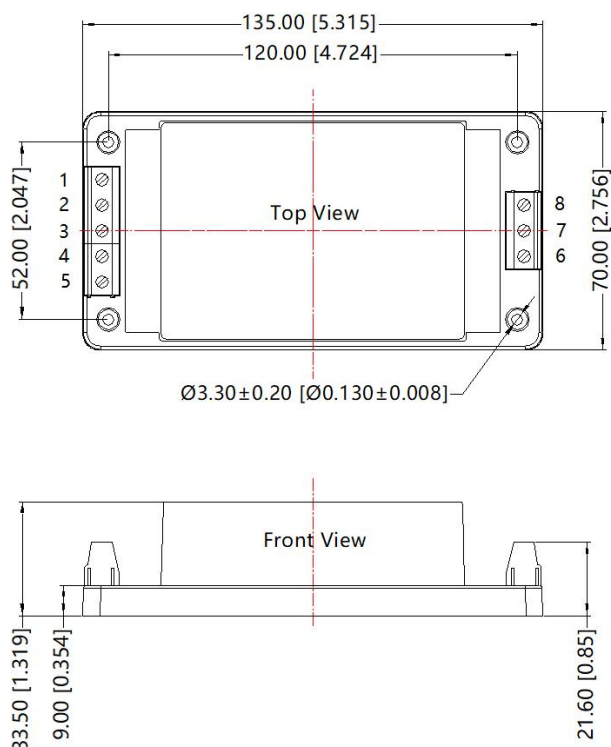
Unit: mm[inch]

Pin diameter tolerances: $\pm 0.10[\pm 0.004]$

General tolerances: $\pm 0.50[\pm 0.020]$

A5 Chassis Package Dimensions

THIRD ANGLE PROJECTION 

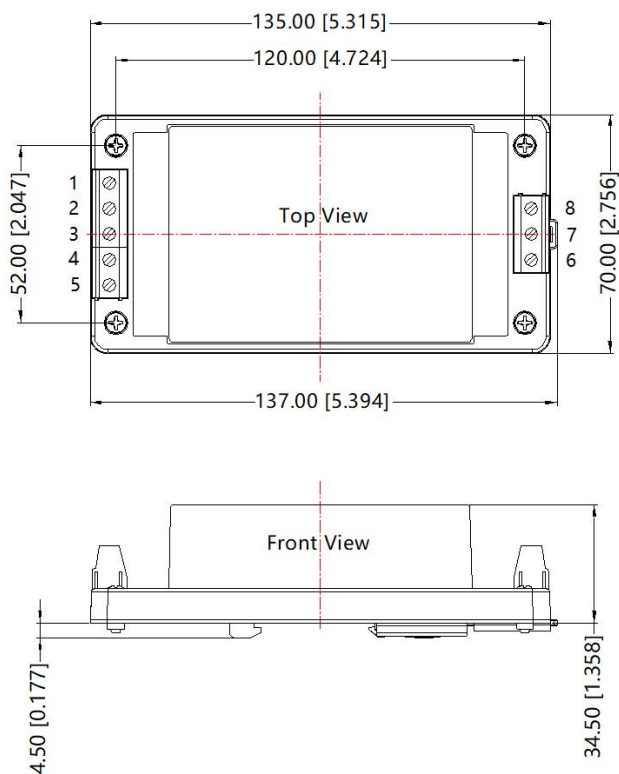


Pin	Mark
1	-Vin
2	NC
3	NC
4	NC
5	+Vin
6	NC
7	-Vo
8	+Vo

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

A6 DIN-Rail Package 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: $\pm 1.00[\pm 0.040]$



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 MÊME CALIBRE ET DE MÊME TYPE QUE LE FUSIBLE D'ORIGINE.
3. DANGER : HAUTE TENSION.

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220021 (Horizontal package), 58220031 (A5/A6 package);
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 $T_a=25^{\circ}\text{C}$, 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. 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;
6. We can provide product customization service;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
9. 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 1200VDC.

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