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 RoHS

EN62109-1

FEATURES

- Input voltage up to 1300VDC (Transient, duration: 30s)
- Ultra-wide input voltage range of 200 - 1200VDC
- 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
- Reinforced insulation
- Safety according to UL1741, CSA-C22.2 No.107.1

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.

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

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
Temperature Coefficient		--	±0.02	--	%/℃
Short Circuit Protection		Hiccup, continuous, self-recovery			

Over-current Protection			≥110%Io, self-recovery			
Over-voltage Protection	12V/15V output		≤20VDC	Output voltage clamp or hiccup		
	24V output		≤30VDC			
	28V output		≤35VDC			
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	℃
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℃	2.67	--	--	%/℃
		+50℃ to +70℃	2.50	--	--	
		2000m - 5000m	6.70	--	--	%/Km
Switching Frequency			--	65	--	kHz
Altitude			--	--	5000	m
Safety Standard			EN62109-1 (Report); Designed to meet UL1741, CSA-C22.2 No.107.1			
MTBF			MIL-HDBK-217F@25℃ ≥ 300,000 h			

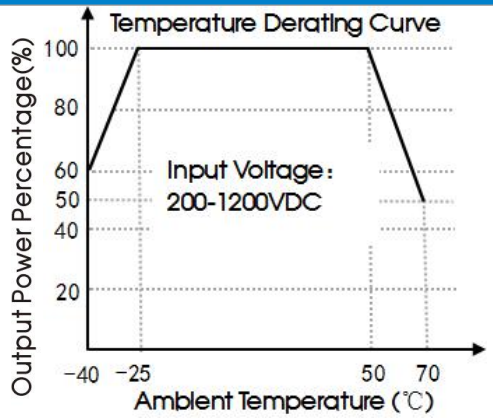
Mechanical Specifications

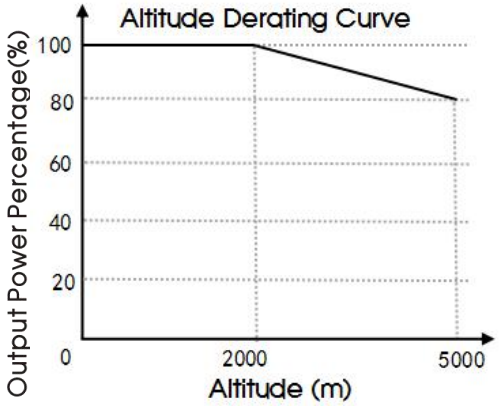
Case Material		Black flame-retardant and heat-resistant plastic (UL94V-0)
Dimensions	Horizontal package	89.00 x 63.50 x 25.00 mm
	A5 chassis mounting	135.00 x 70.00 x 33.50 mm
	A6 DIN-Rail mounting	137.00 x 70.00 x 39.00 mm
Weight	Horizontal package	220g (Typ.)
	A5 chassis mounting	300g (Typ.)
	A6 DIN-Rail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

Electromagnetic Compatibility (EMC)

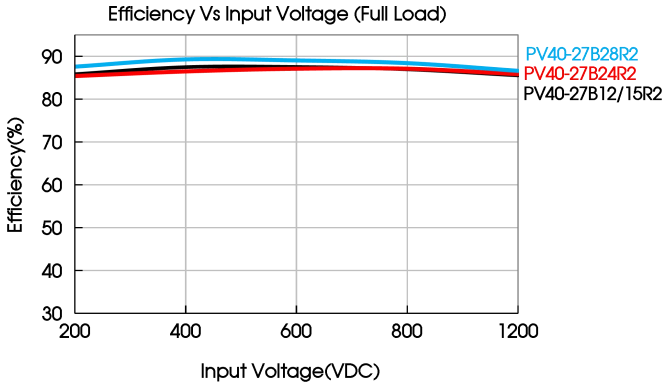
Emissions	CE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	Perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV ±4KV (See Fig. 2 for recommended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

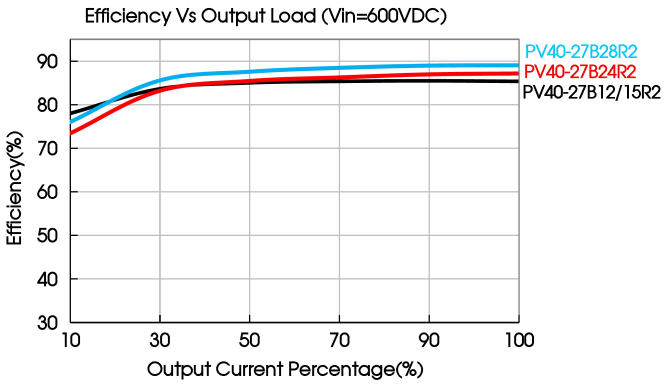
Product Characteristic Curve





Note:
① 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

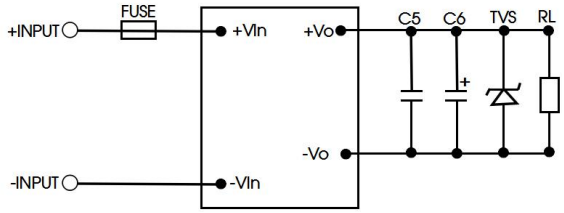


Fig. 1: Typical application circuit

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

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

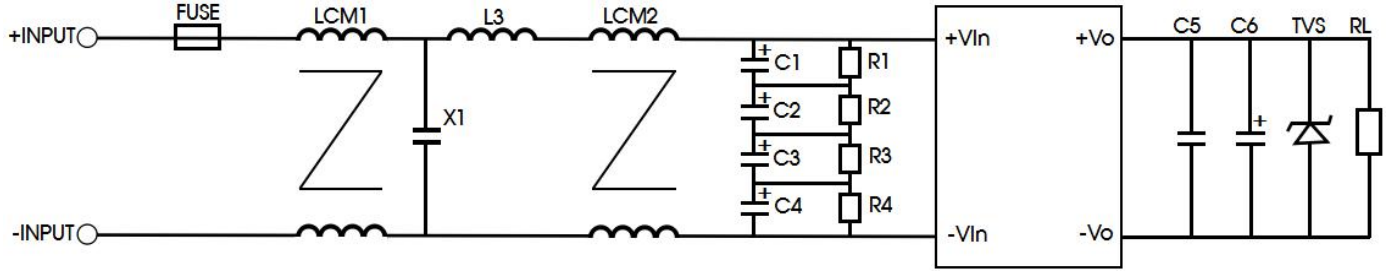


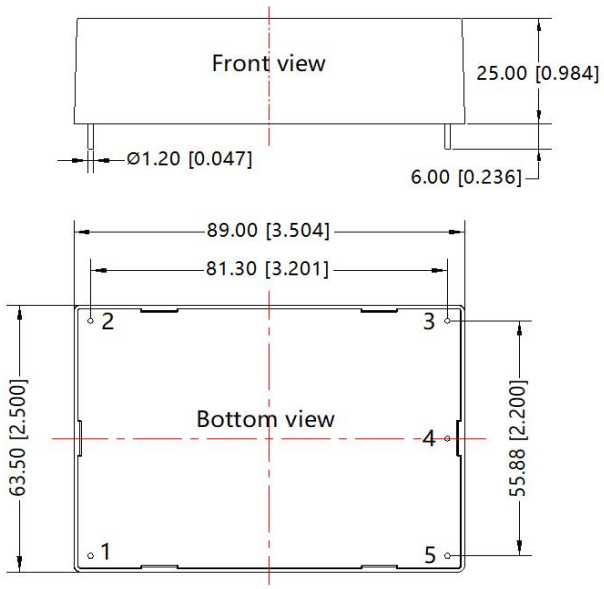
Fig 2: EMC application for higher compliance requirements (output parameters are show in Figure 1)

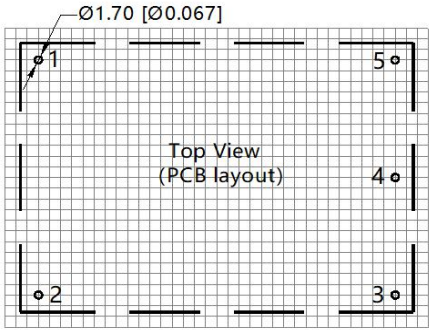
Element model	Recommended value
FUSE	4A/1500VDC, required
LCM1	0.9mH, recommended to use MORNSUN's 52105212
LCM2	7mH, recommended to use MORNSUN's 52105220
L3	1.2mH, recommended to use MORNSUN's12050314
X1	224M, recommended to use MORNSUN's 30040050
C1, C2, C3, C4	10μF/450V
R1, R2, R3, R4	1MΩ/2W

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

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





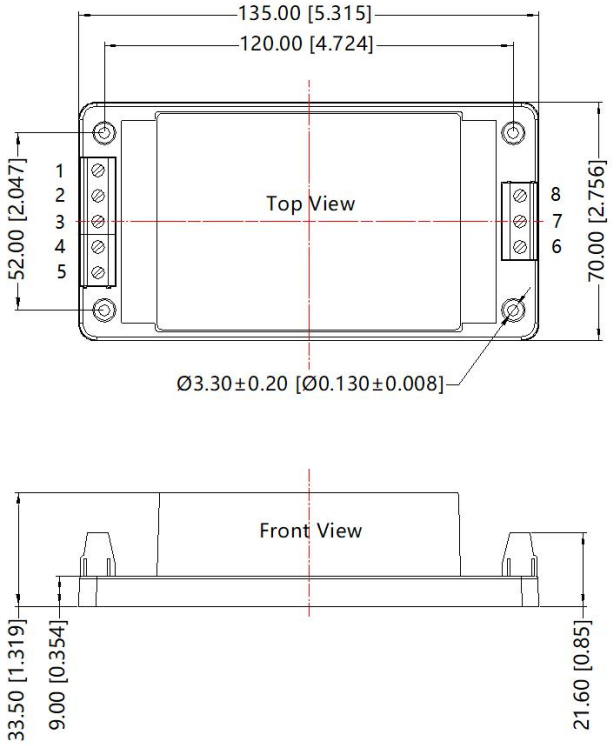
Note: Grid 2.54*2.54mm

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

Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

A5 Chassis Package Dimensions

THIRD ANGLE PROJECTION

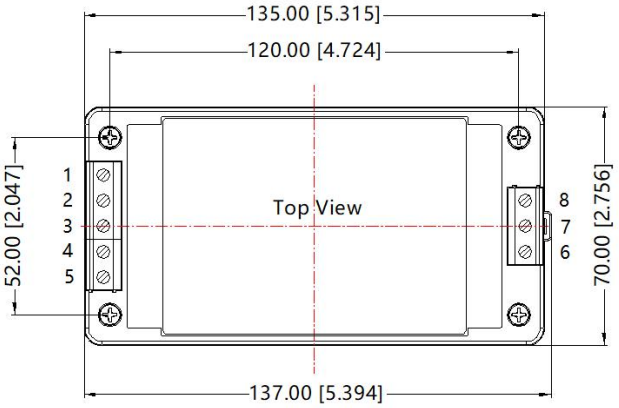


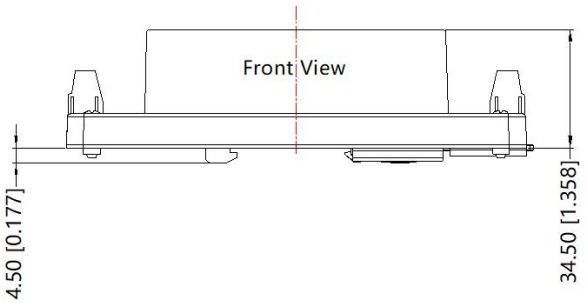
Pin	Mark
1	-Vin
2	NC
3	NC
4	NC
5	+Vin
6	NC
7	-Vo
8	+Vo

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

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 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. 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.

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