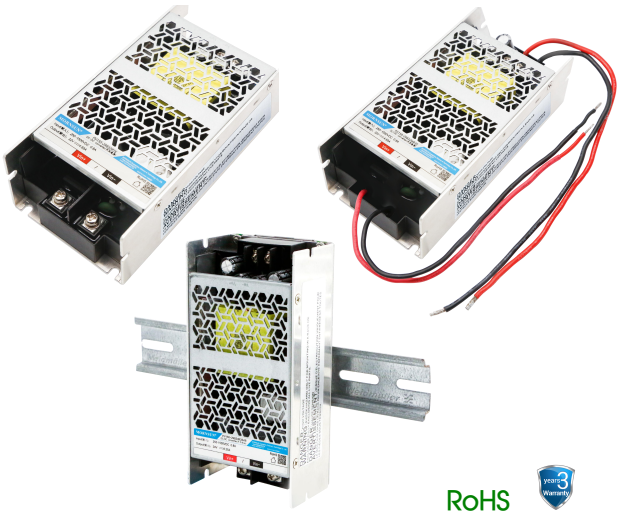
150W isolation DC-DC converter with ultra-wide, ultra-high 250 - 1500VDC input for Renewable Energy



RoHS

FEATURES

- Ultra-wide 250 - 1500VDC input voltage range (Transient 1700VDC last for 10s)
- Operating ambient temperature range: -40℃ to +85℃
- High I/O isolation voltage up to 4000VAC
- High reliability, efficiency up to 92%
- Input under-voltage protection, input reverse polarity protection, output short circuit, over-current, over-voltage protection
- Operating altitude up to 5000m
- Meets Class I (terminal/lead type), Class II (lead type)
- Design refer to UL1741, EN/IEC/BS EN62109

PV150-29BxxR3S is a regulated DC-DC series converter with an ultra-wide and ultra-high DC input of 250-1500VDC, which design based on standard of CSA-C22.2 No.107.1, UL1741, EN/IEC62109. The products feature high efficiency, high reliability, high insulation and a high level of safety protection. It is widely used in renewable energy industries, such as photovoltaic inverter, energy storage systems, charging pile, industrial control. 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 1000VDC (%) Typ.	Capacitive Load (μF) Max.
/	PV150-29B12R3S	120	12V/10.0A	87	3500
	PV150-29B24R3S	150	24V/6.25A	90	2000
	PV150-29B28R3S		28V/5.36A	91	1500
	PV150-29B32R3S		32V/4.69A	91	1500
	PV150-29B36R3S	151.2	36V/4.20A	91	1500
	PV150-29B48R3S	150	48V/3.125A	92	1000

Note: *Use suffix "WR3S" for lead type version and suffix "R3SA6" for terminal DIN-Rail mounting, suffix "WR3SA6" for lead type version DIN-Rail mounting.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	Transient (10s)		--	--	1700	VDC
			250	--	1500	
Input Current	250VDC		--	--	0.8	A
	800VDC		--	--	0.4	
Inrush Current	800VDC	Cold start	--	100	--	
	1500VDC		--	200	--	
Input Under-voltage Protection	Under-voltage protection start		140	170	200	VDC
	Under-voltage protection release		190	210	250	
Input Reverse Polarity Protection			Available			
Start-up Delay Time*			--	1	3	s
External Input Fuse			4A/1500VDC, required (brand: adler, models: A841400b00, Base: BH200)			
Hot Plug			Unavailable			

Note: *Start-up delay time test conditions: full voltage input range, full output load range (the cooling-time between input power-off and power-on again is greater than 10s.)

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	All load range		--	±1.5	--	%
Line Regulation	Rated load		--	±0.5	--	
Load Regulation	1000VDC		--	±0.5	--	
Stand-by Power Consumption	Room temperature, full voltage range		--	3	5	W
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	--	300	mV
Temperature Coefficient			--	±0.02	--	%/℃
Short Circuit Protection			Hiccup, continuous, self-recovery			
Over-current Protection			≥110% Io, hiccup, self-recovery			
Over-voltage Protection	12V		≤20V	Output voltage clamp or hiccup		
	24V		≤32V			
	28V		≤35V			
	32V		≤45V			
	36V		≤48V			
	48V		≤60V			
Minimum Load			0	--	--	%
Hold-up Time	Room temperature, full load	1000VDC 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.

General Specifications

Item		Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input - output	Electric strength test for 1min., leakage current <5mA		4000	--	--	VAC
	Input - Shell			4000	--	--	
	Output - Shell			2000	--	--	
Insulation Resistance	Input - output	Test voltage: 500VDC		100	--	--	MΩ
	Input - Shell						
	Output - Shell						
Operating Temperature				-40	--	+85	℃
Storage Temperature				-40	--	+85	
Storage Humidity		Non-condensing		--	--	95	%RH
Power Derating		Operating temperature derating	-40℃ to -25℃	3.33	--	--	%/℃
			+55℃ to +85℃	2.33	--	--	
		Input voltage derating	250 - 300VDC	0.4	--	--	%/VDC
			300 - 400VDC	0.2	--	--	
			1400 - 1500VDC	0.2	--	--	
		Altitude derating	2000 - 5000m	10	--	--	%/Km
Safety Standard				Design refer to UL1741, EN/IEC/BS EN62109-1			
Safety Class				Class I (terminal/lead type), Class II (lead type)			
MTBF		MIL-HDBK-217F@25℃		≥300,000 h			

Mechanical Specifications

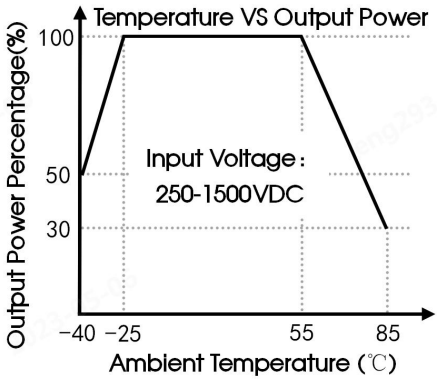
Case Material		Metal
Dimensions	Hrizontal package	140.00 x 70.00 x 42.00mm
	Din-Rail mounting	148.00 x 70.00 x 55.00mm
Weight	Hrizontal package	430g (Typ.)
	Din-Rail mounting	566g (Typ.)
Cooling Method		Free air convection

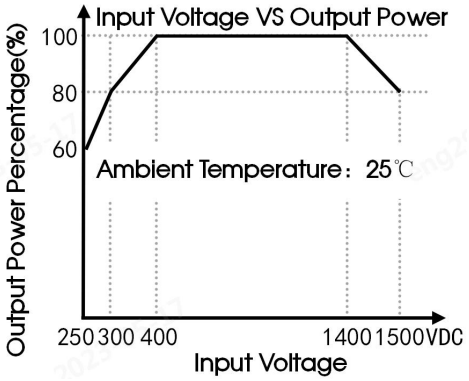
Electromagnetic Compatibility (EMC)

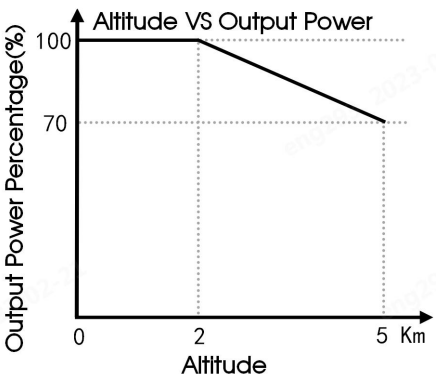
Emissions	CE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
	EN61000-6-4			
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	Perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	Perf. Criteria A
		IEC/EN61000-4-4	±4KV (See Fig. 2 for recommended circuit)	Perf. Criteria A
	Surge	IEC/EN61000-4-5	Line to line ±1KV/ line to Shell ±2KV	Perf. Criteria B
		IEC/EN61000-4-5	Line to line ±1KV Line to Shell ±2KV(See Fig. 2 for recommended circuit)	Perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	Perf. Criteria A
	PFMF	IEC/EN61000-4-8	30A/m	Perf. Criteria A
	EN55035、EN61000-6-2			

Note: PE connection is required for CLASS I (terminal/lead type) application; no PE connection is required for CLASS II (lead type) application.

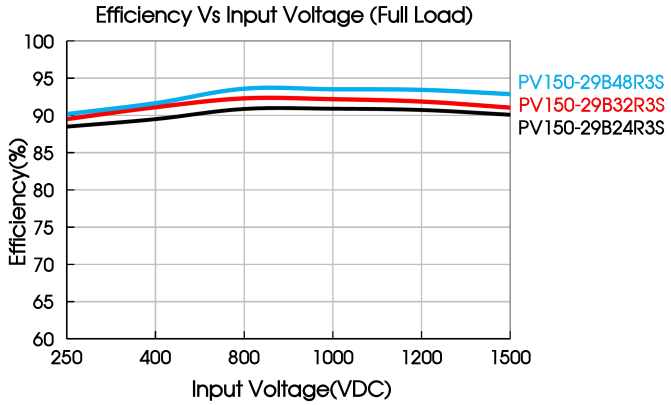
Product Characteristic Curve

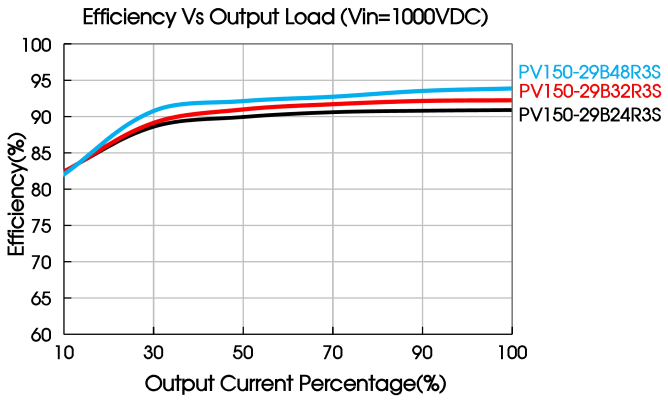






Note:
1. With an DC input between 250-400VDC/1400-1500VDC, the output power must be derated as per temperature derating curves;
2. This product is suitable for applications using natural free air cooling; for applications in closed environment please consult Mornsun FAE.





Design Reference

1. Typical application

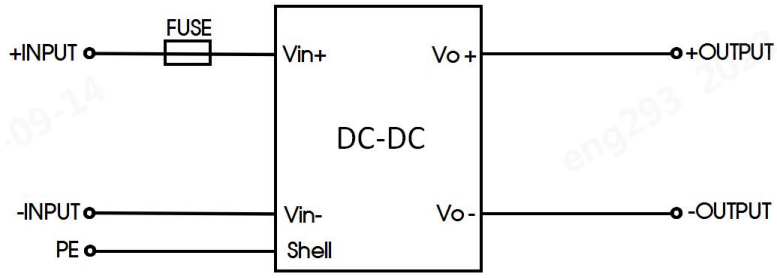


Fig. 1

Part No.	FUSE
PV150-29BxxR3S	4A/1500VDC, required (brand: adler, models: A841400b00, Base: BH200)
Note: No PE connection is required for CLASS II application.	

2. EMC compliance recommended circuit

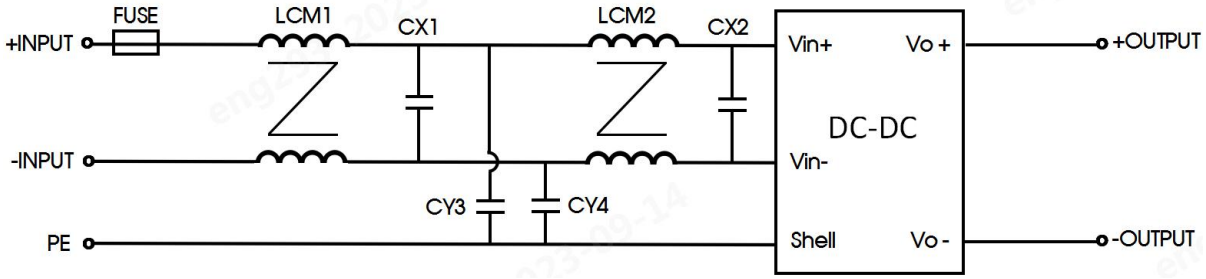


Fig. 2: CLASS I recommended circuit

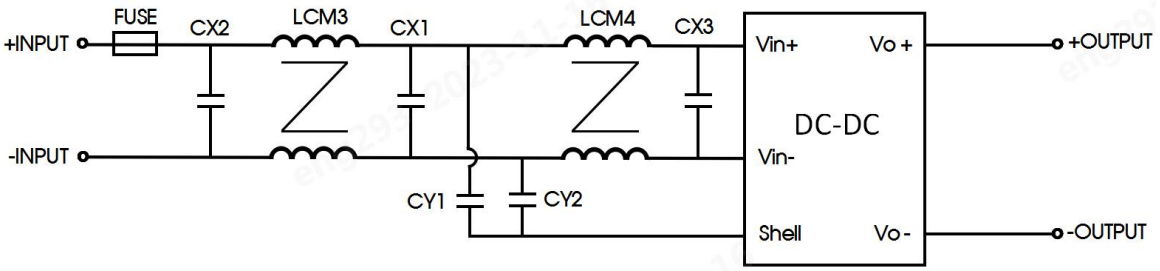


Fig. 3: CLASS II recommended circuit

Part No.	Component	Recommended value
PV150-29B12R3S	FUSE	4A/1500VDC, required
	CX1/CX2/CX3	Safety capacitor 105K/≥1500VDC
	CY1/CY2	471K/1500VDC
	CY3/CY4	222M/1500VDC
	LCM1/LCM3	20mH (recommended to use MORNSUN's FL2D-10-203B)
	LCM2/LCM4	10mH (recommended to use MORNSUN's FL2D-10-103B)
PV150-29B24/28/32/36/48R3S	FUSE	4A/1500VDC, required
	CX1/CX2/CX3	Safety capacitor 105K/≥1500VDC
	CY1/CY2	471K/1500VDC
	CY3/CY4	102M/1500VDC
	LCM1/LCM4	10mH (recommended to use MORNSUN's FL2D-10-103B)
	LCM2/LCM3	20mH (recommended to use MORNSUN's FL2D-10-203B)

Note: 1. Please refer to Fig 1 for common applications;
2. If the electromagnetic compatibility environment is harsh, please refer to Fig 2, Fig 3;
3. This recommened list based on full input voltage, output load range. If it works under other input voltages, please consult FAE for parameter optimization;
4. The PE cable can be connected to any screw on the product housing;
5. No PE connection is required for CLASS II application.

3. IMPORTANT SAFETY INSTRUCTIONS

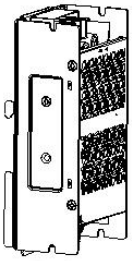
Additional protective devices, such as lightning protector need to be added if there is an transient pulse voltage greater than 6KV at the input of PV products in system applications.

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

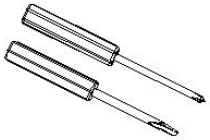
Installation Diagram

Bill Of Material		
1	Product	1 PCS
2	Phillips screwdriver Slotted screwdriver	1 PCS
3	TS35/7.5 or TS35/15	1 PCS

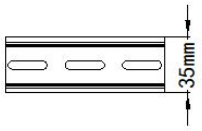
All above is only for reference, the actual connecting wire and locking torque refer to the appearance size diagram



Product

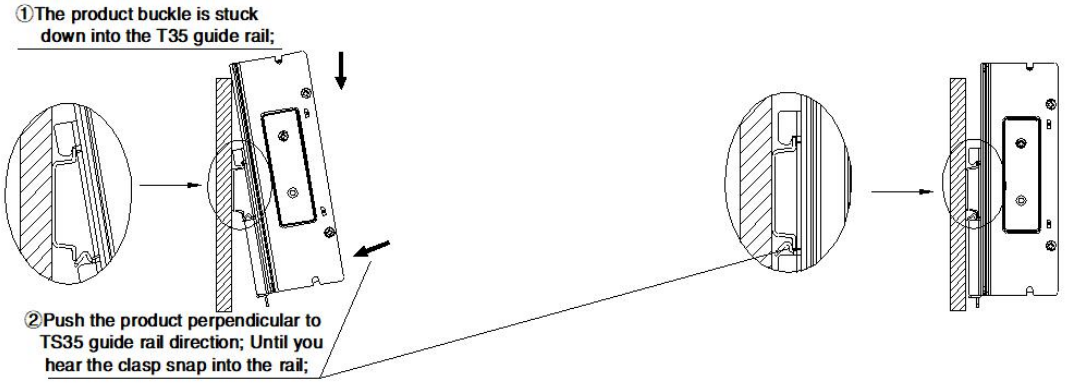


Phillips screwdriver
Slotted screwdriver
Diameter of the cutting tools: 3mm

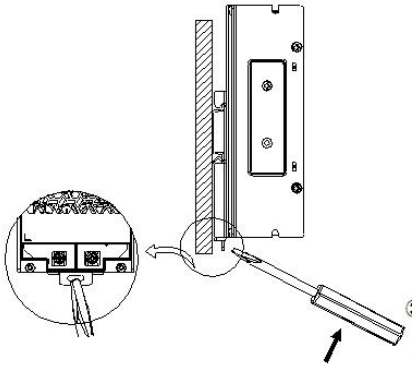


TS35/7.5 or TS35/15

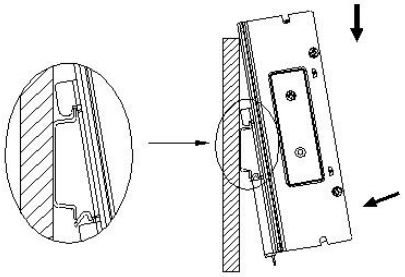
Installation procedure ①–②



Remove the step ③–④



③Insert the Slotted screwdriver into the square slot at the bottom of the buckle, and push the slider part of the buckle down to the top in the direction shown;



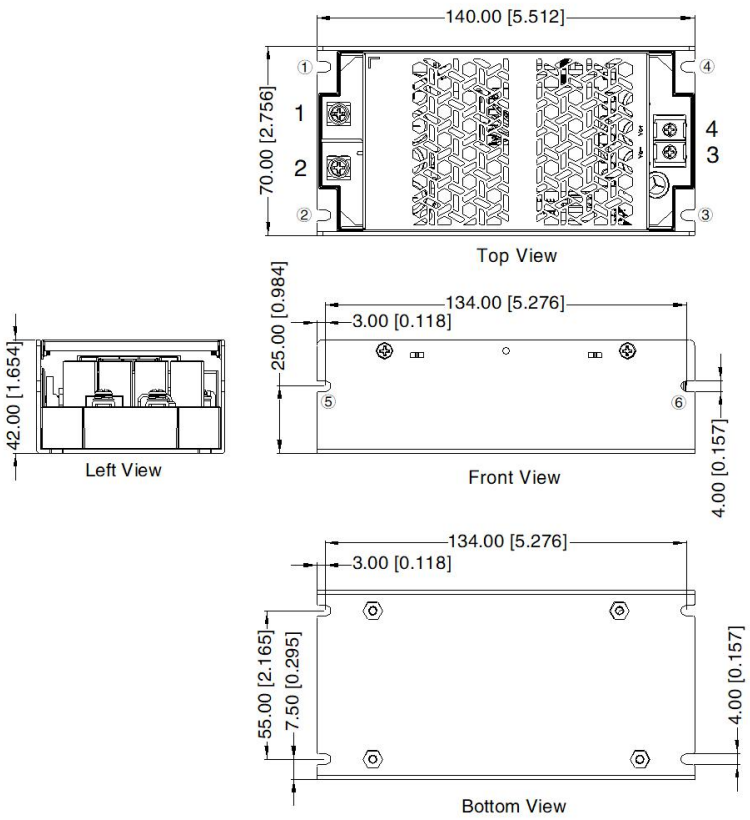
④Then the third step, first push the bottom of the product outward, and then lift it up, you can take the product out of the guide rail;

Note: Keep the following installation clearances: 20mm on top, 20mm on the bottom, 5mm on the left and right sides are recommended when the device is loaded permanently with more than 50% of the rated power. Increase this clearance to 15mm in case the adjacent device is a heat source (e.g. another power supply).

Dimensions and Recommended Layout

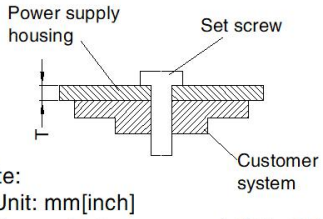
PV150-29BxxR3S Series

THIRD ANGLE PROJECTION



Pin–Out	
Pin	Mark
1	Vin+
2	Vin–
3	Vo–
4	Vo+
Mounting hole	Shell

Installation position	Suggestion screw	T	Torsion (Max)
①–⑥	M3	1.5mm	0.4N・m

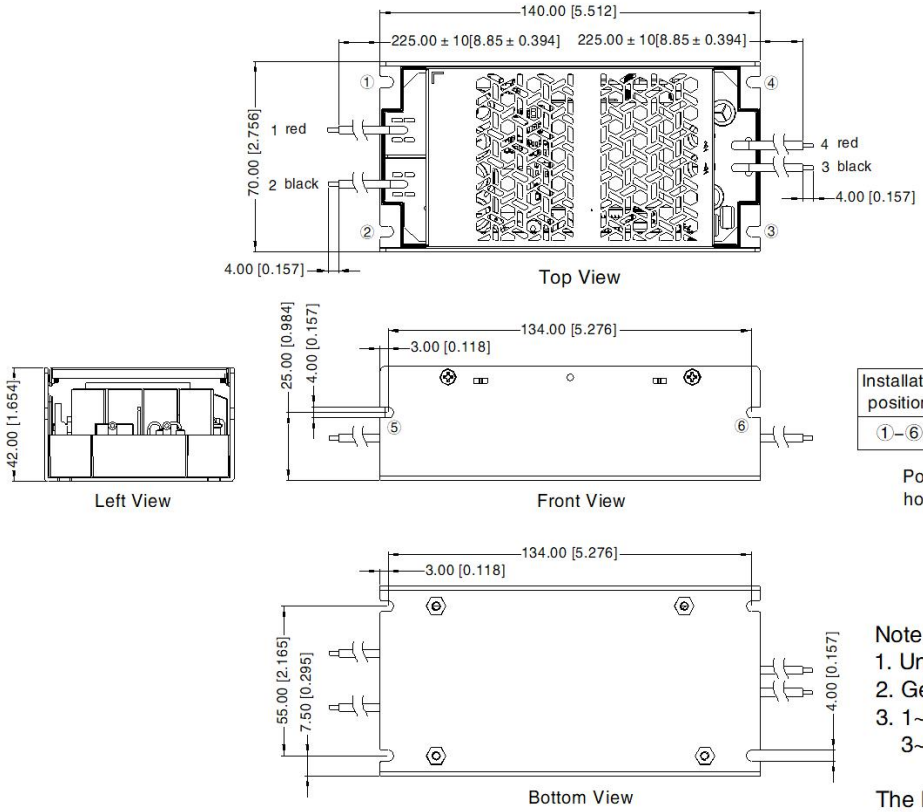


Note:
1. Unit: mm[inch]
2. General tolerances: ± 1.00[± 0.040]
3. Connection range: Input: 20–12 AWG
   Output: 16–12AWG
4. Input terminal torque: M4, 0.9N・m(Max)
   Torque of output terminal: M3, 0.4N・m(Max)

The layout of the device is for reference only, please refer to the actual product

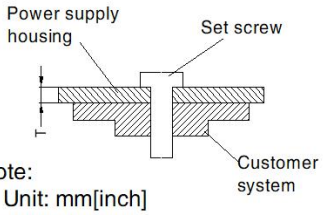
PV150-29BxxWR3S Series

THIRD ANGLE PROJECTION



Pin–Out	
Pin	Mark
1	Vin+
2	Vin–
3	Vo–
4	Vo+
Mounting hole	Shell (Class Ⅰ)
	NC (Class Ⅱ)

Installation position	Suggestion screw	T	Torsion (Max)
①–⑥	M3	1.5mm	0.4N・m

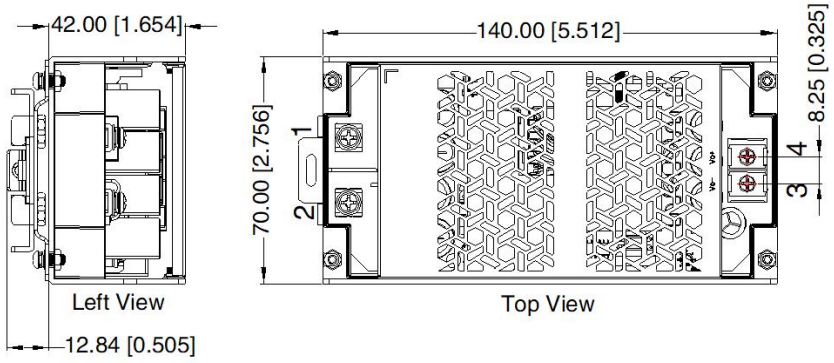


Note:
1. Unit: mm[inch]
2. General tolerances: ± 1.00[± 0.040]
3. 1~2 wire spec.: UL3239 18AWG
   3~4 wire spec.: UL1015 14AWG

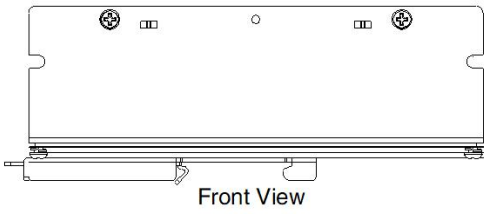
The layout of the device is for reference only, please refer to the actual product

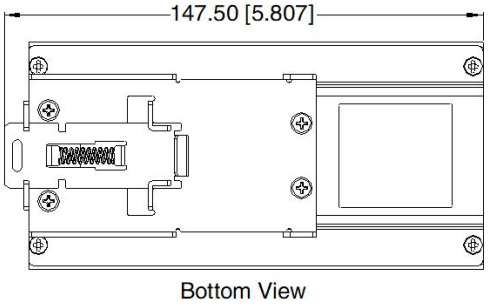
PV150-29BxxR3SA6 Series

THIRD ANGLE PROJECTION



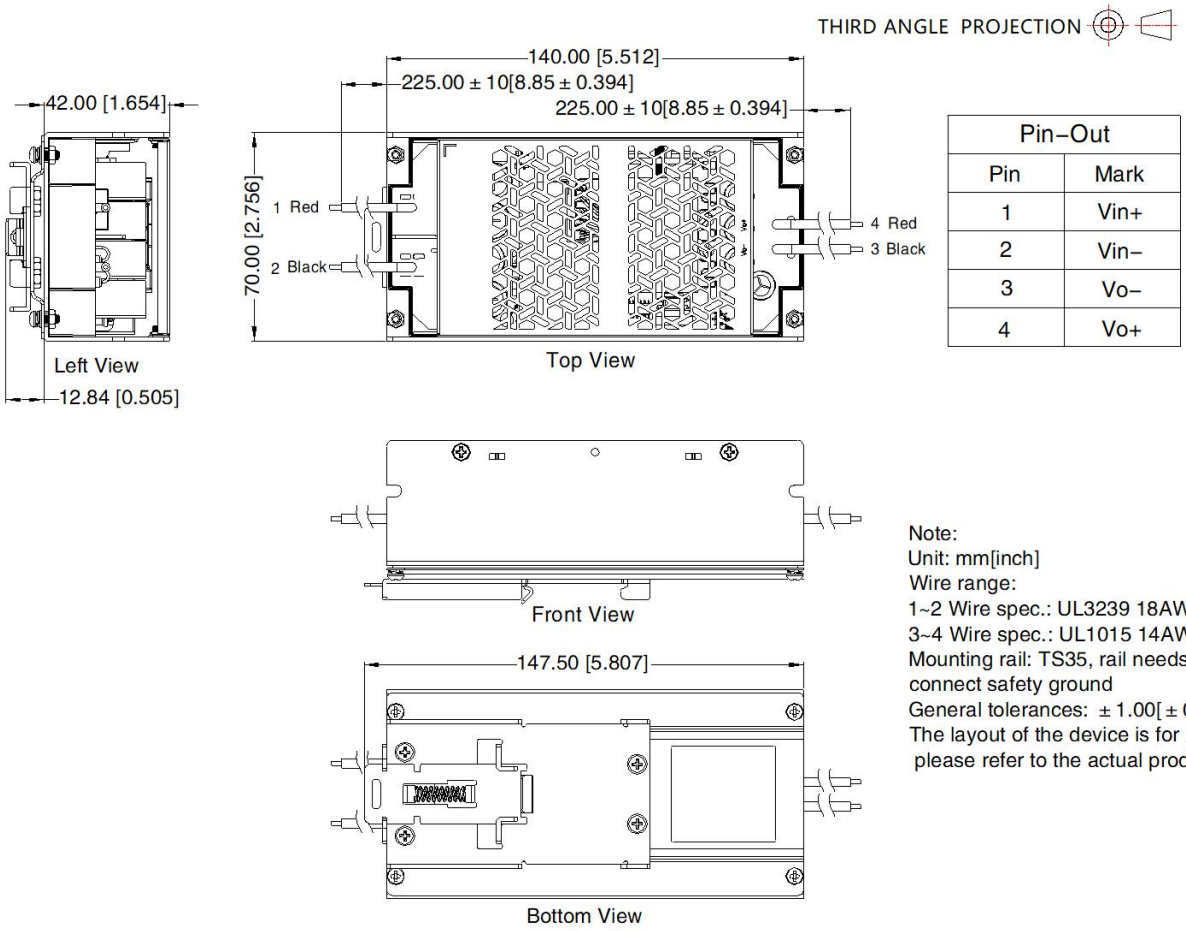
Pin–Out	
Pin	Mark
1	Vin+
2	Vin–
3	Vo–
4	Vo+





Note:
Unit: mm[inch]
Wire range:
Input: 22–14AWG
Output: 18–12AWG
Terminal torque:
Input: M4, Max0.9N・m
Output: M3, Max0.4N・m
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ±1.00[±0.039]
The layout of the device is for reference only, please refer to the actual product

PV150-29BxxWR3SA6 Series



Pin–Out	
Pin	Mark
1	Vin+
2	Vin–
3	Vo–
4	Vo+

Note:
Unit: mm[inch]
Wire range:
1~2 Wire spec.: UL3239 18AWG
3~4 Wire spec.: UL1015 14AWG
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ± 1.00[± 0.039]
The layout of the device is for reference only, please refer to the actual product

⚠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: 58220276(horizontal package), 58220690(din-Rail mounting);
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. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
7. 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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