DC/DC Converter

URA_YMD-10WR3 & URB_YMD-10WR3 Series

MORNSUN®

10W isolated DC-DC converter in DIP package
Ultra-wide input and regulated dual/single output

Patent Protection

3 years Warranty

UL60950-1 | EN62368-1 | BS EN62368-1 | IEC60950-1

FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 88%
- No-load power consumption as low as 0.12W
- I/O isolation test voltage1.5k VDC
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Operating ambient temperature range: -40℃ to +85℃
- Meets CISPR32/EN55032 CLASS A, without extra components
- Input reverse polarity protection available with Chassis (A2S) or 35mm DIN-Rail mounting (A4S) version
- Meets EN50155 railway standard
- Industry standard pin-out

URA_YMD-10WR3 & URB_YMD-10WR3 series are isolated 10W DC-DC converter products feature an ultra-wide with 4:1 input voltage with efficiencies of up to 88%, 1500VDC input to output isolation, operating ambient temperature range of -40℃ to +85℃, input under-voltage protection, output short-circuit, over-current, over-voltage protection. They meet CLASS A of CISPR32/EN55032 EMI standards without external components, optional packages are offered for chassis or DIN-rail mounting (A2S, A4S), adding additional input reverse polarity protection and they are widely used in applications such as industrial control, electric power, instruments, communication and railway applications.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency④ (%)Min./Typ.	Capacitive Load⑤ (μF)Max.
		Nominal② (Range)	Max. ③	Voltage(VDC)	Current (mA) Max./Min.		
UL/EN/BS EN/IEC	*URA2405YMD-10WR3	24 (9-36)	40	±5	±1000/0	81/83	1000
	URA2409YMD-10WR3			±9	±555/0	84/86	680
	*URA2412YMD-10WR3			±12	±416/0	85/87	470
	URA2415YMD-10WR3			±15	±333/0	85/87	330
	*URA2424YMD-10WR3			±24	±208/0	85/87	100
	URB2403YMD-10WR3			3.3	2400/0	75/77	2200
	URB2405YMD-10WR3			5	2000/0	80/82	2200
	URB2409YMD-10WR3			9	1111/0	83/85	680
	URB2412YMD-10WR3			12	833/0	84/86	470
	URB2415YMD-10WR3			15	667/0	84/86	330
	URB2424YMD-10WR3			24	416/0	86/88	100
	*URA4805YMD-10WR3	48 (18-75)	80	±5	±1000/0	81/83	1000
	*URA4812YMD-10WR3			±12	±416/0	85/87	470
	*URA4815YMD-10WR3			±15	±333/0	85/87	330
	*URA4824YMD-10WR3			±24	±208/0	85/87	100
	*URB4803YMD-10WR3			3.3	2400/0	77/79	2200
	*URB4805YMD-10WR3			5	2000/0	81/83	2200
	*URB4812YMD-10WR3			12	833/0	85/87	470
	*URB4815YMD-10WR3			15	667/0	85/87	330
	*URB4824YMD-10WR3			24	416/0	86/88	100

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Notes:
① Use "H" suffix for heat sink mounting, "A2S" suffix for chassis mounting and "A4S" suffix for DIN-Rail mounting;
② The A2S and A4S Model's start-up and minimum input voltages are increased by 1VDC due to the input reverse polarity protection circuit;
③ Exceeding the maximum input voltage may cause permanent damage;
④ Efficiency is measured at nominal input voltage and rated output load; efficiencies for A2S and A4S Model's is decreased by 2% due to the input reverse polarity protection circuit;
⑤ The specified maximum capacitive load value for positive and negative output is identical;
⑥ Products marked with "*"need an input capacitor in order to meet conducted specifications of CISPR32/EN55032 CLASS A.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC nominal input series, nominal input voltage	3.3VDC output	--	429/5	440/12	mA
		Others	--	502/5	521/12	
	48VDC nominal input series, nominal input voltage	3.3VDC output	--	190/4	215/8	
		Others	--	251/4	258/8	
Reflected Ripple Current	24VDC nominal input series, nominal input voltage		--	40	--	
	48VDC nominal input series, nominal input voltage		--	30	--	
Surge Voltage (1sec. max.)	24VDC nominal input series		-0.7	--	50	VDC
	48VDC nominal input series		-0.7	--	100	
Start-up Voltage	24VDC nominal input series		--	--	9	
	48VDC nominal input series		--	--	18	
Input Under-voltage Protection	24VDC nominal input series		5.5	6.5	--	VDC
	48VDC nominal input series		12	15.5	--	
Start-up Time	Nominal input voltage & constant resistance load		--	10	--	ms
Input Filter			Pi filter			
Hot Plug			Unavailable			
Ctrl *	Module on		Ctrl pin open or pulled high (3.5-12VDC)			
	Module off		Ctrl pin pulled low to GND (0-1.2VDC)			
	Input current when off		--	6	10	mA

Note: *The Ctrl pin voltage is referenced to input GND.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy①	0%-100% load		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.2	±0.5	
		Vo2	--	±0.5	±1	
Load Regulation②	5%-100% load	Vo1	--	±0.5	±1	
		Vo2	--	±0.5	±1.5	
Cross Regulation	Dual output, Vo1 load at 50%, Vo2 load at range of 10%-100%		--	--	±5	
Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
Transient Response Deviation			--	±3	±5	%
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise③	20MHz bandwidth, 5%-100% load		--	40	80	mVp-p
Over-voltage Protection	Input voltage range		110	--	160	%Vo
Over-current Protection			110	140	190	%Io
Short-circuit Protection			Continuous, self-recovery			

Note:
①Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;
②Load regulation for 0%-100% load is ±5%;
③Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

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General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	1000	--	pF
Operating Temperature	See Fig. 1	-40	--	+85	℃
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	℃
Vibration		IEC/EN61373 - Category 1, Grade B			
Switching Frequency *	PWM mode	--	350	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours

Note: *Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

Case Material	Aluminum alloy		
Dimensions	Horizontal package (without heat sink)		25.40 x 25.40 x 11.70 mm
	Horizontal package (with heat sink)		25.40 x 25.40 x 16.20 mm
	A2S chassis mounting		76.00 x 31.50 x 21.20 mm
	A4S DIN-rail mounting		76.00 x 31.50 x 25.80 mm
Weight	without heat sink	Horizontal package/A2S chassis mounting/A4S DIN-Rail mounting	12.5g/36.0g/56.0g (Typ.)
	with heat sink	Horizontal package	17g
Cooling method	Free air convection		

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (Without extra components)/ CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (Without extra components)/ CLASS B (see Fig.3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±4kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig.3-①for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29	0%, 70%	perf. Criteria B

Electromagnetic Compatibility (EMC) (EN50155)

Emissions	CE	EN50121-3-2	150kHz-500kHz	99dBuV	(see Fig.3-② for recommended circuit)	
		EN55016-2-1	500kHz-30MHz	93dBuV	(see Fig.3-② for recommended circuit)	
	RE	EN50121-3-2	30MHz-230MHz	40dBuV/m at 10m	(see Fig.3-② for recommended circuit)	
		EN55016-2-1	230MHz-1GHz	47dBuV/m at 10m	(see Fig.3-② for recommended circuit)	
Immunity	ESD	EN50121-3-2	Contact ±6kV/Air ±8kV			perf. Criteria A
	RS	EN50121-3-2	20V/m			perf. Criteria A
	EFT	EN50121-3-2	±2kV 5/50ns 5kHz		(see Fig.3-① for recommended circuit)	perf. Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω, 0.5μF) (see Fig.3-① for recommended circuit)			perf. Criteria A
	CS	EN50121-3-2	0.15MHz-80MHz	10V r.m.s		perf. Criteria A

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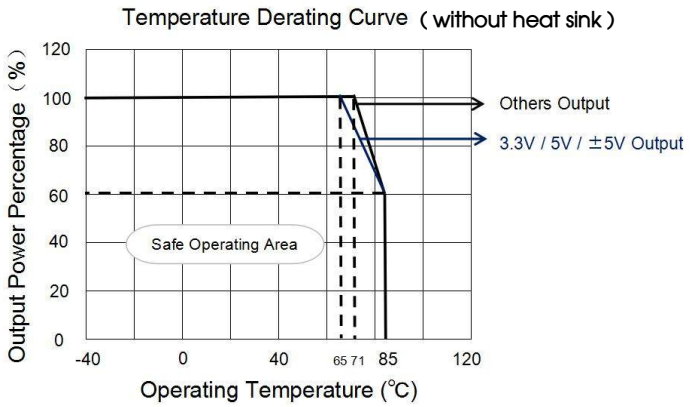
Typical Characteristic Curves



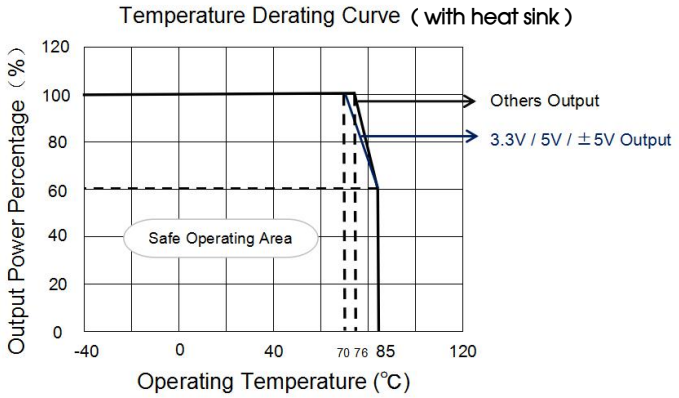
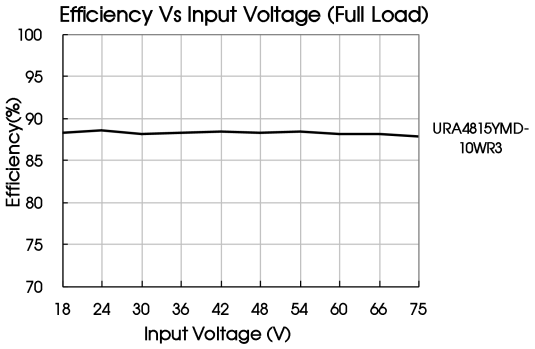
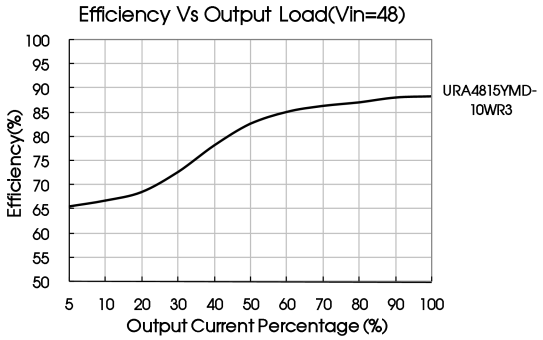
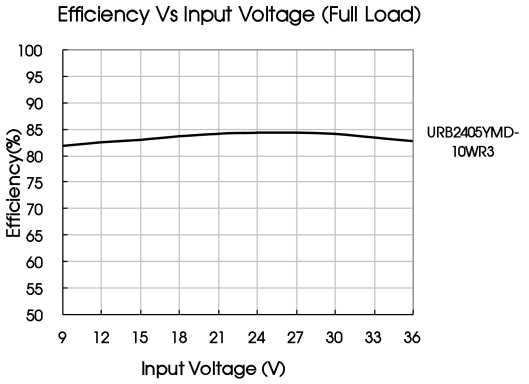
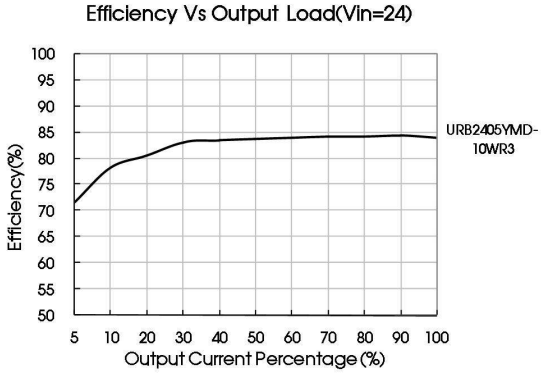


Fig. 1









Design Reference

1. Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.
Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

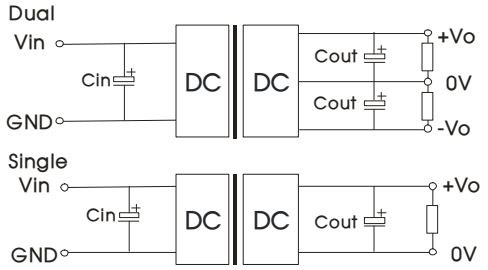


Fig. 2

Vin(VDC)	Vout(VDC)	Cin	Cout
24	3.3/5/±5	100μF/50V	10μF/16V
	9/12/15/±9/±12/±15		10μF/25V
	24/±24		10μF/50V
48	3.3/5/±5	10μF - 47μF/100V	10μF/16V
	9/12/15/±9/±12/±15		10μF/25V
	24/±24		10μF/50V

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2. EMC compliance circuit

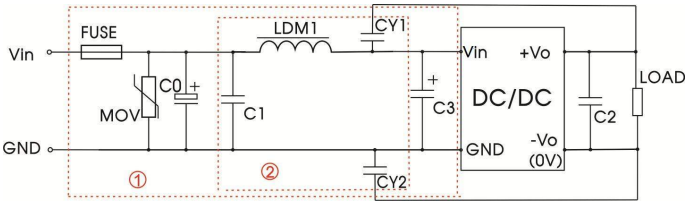


Fig. 3

Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

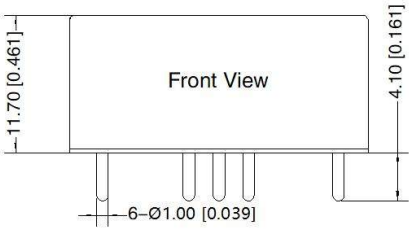
Parameter description:

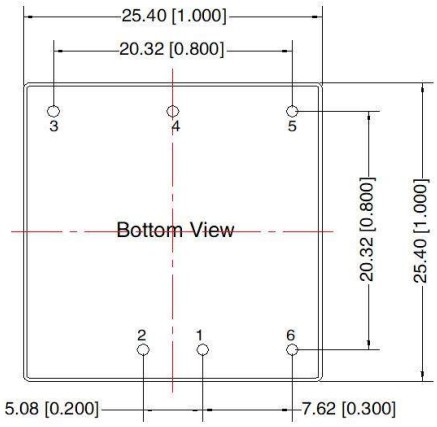
Model	Vin: 24VDC	Vin: 48VDC
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0, C3	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7μH	
CY1, CY2	1nF/2kV	

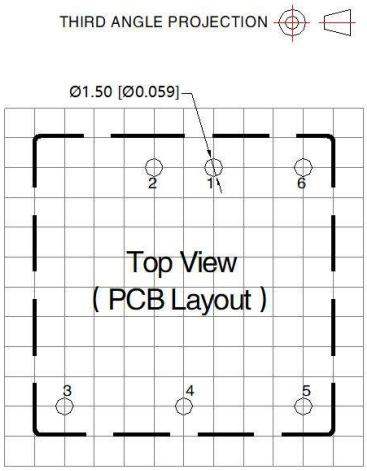
3. The products do not support parallel connection of their output

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

Horizontal Package (without heat sink) Dimensions and Recommended Layout







Note: Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	No Pin	0V
5	0V	-Vo
6	Ctrl	Ctrl

Note:
Unit: mm[inch]
PIN1/2/3/4/5/6: ϕ 1.0mm
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

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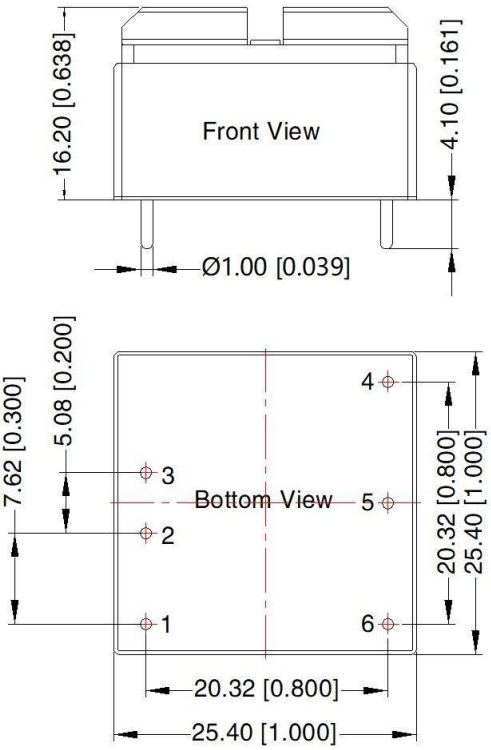
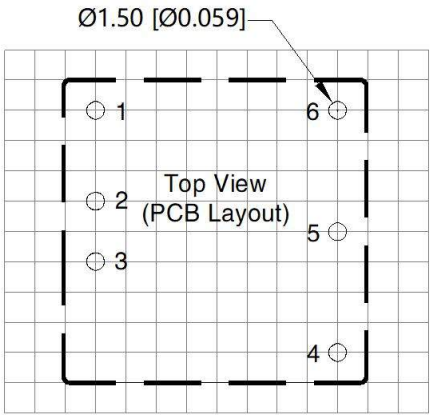
Horizontal Package (with heat sink) Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





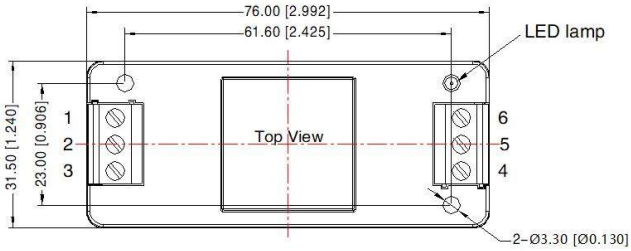
Note: Grid 2.54*2.54mm

Pin–Out		
Pin	Single	Double
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	+Vo	+Vo
5	No Pin	0V
6	0V	–V0

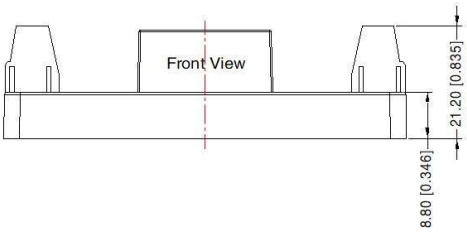
Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]

URA_YMD-10WR3A2S & URB_YMD-10WR3A2S Dimensions

THIRD ANGLE PROJECTION



Pin–Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	NC	0V
Dual	Ctrl	GND	Vin	+Vo	0V	–Vo



Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N ▪ m
General tolerances: ± 1.00[± 0.039]

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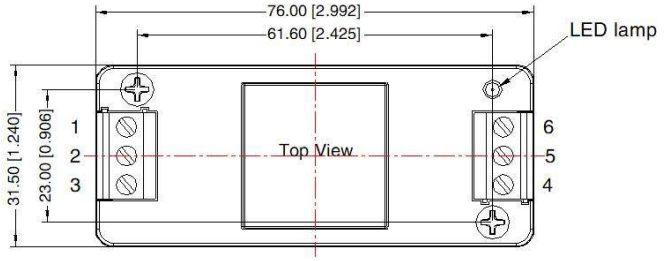
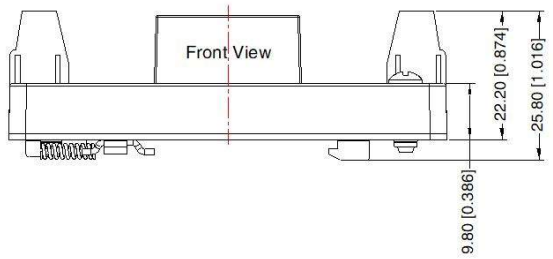
URA_YMD-10WR3A4S & URB_YMD-10WR3A4S Dimensions

THIRD ANGLE PROJECTION



Pin–Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	NC	0V
Dual	Ctrl	GND	Vin	+Vo	0V	–Vo



Note:
Unit: mm[inch]
Mounting rail: TS35
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N ▪ m
General tolerances: ± 1.00[± 0.039]

Note:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210003 (DIP), 58220022(A2S/A4S package);
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. 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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