60W isolated DC-DC converter in DIP package
Ultra-wide input and regulated single output

Patent Protection

3 years Warranty

CE Report EN62368-1

UKCA Report BS EN62368-1

RoHS

FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 93.8%
- No-load power consumption as low as 0.24W
- I/O isolation test voltage 1.6k VDC
- Input under-voltage protection, output short-circuit, over-current, over–voltage protection
- Operating ambient temperature range: -40℃ to +105℃
- Industry standard pin-out

URB48_LD-60W(H)R3 series of isolated 60W DC-DC converter products with an ultra-wide 4:1 input voltage range. They feature efficiencies up to 93.8%, input to output isolation is tested with 1600VDC and the converter safety operate ambient temperature of -40℃ to +105℃, input under-voltage protection, output short-circuit, over-current, over-voltage protection. They are ideally and widely used in applications such as industrial control, electric power, instruments and communications fields.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency② (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.①	Voltage (VDC)	Current (mA) Max./Min.		
EN/BS EN	URB4805LD-60W(H)R3	48 (18-75)	80	05	12000/0	90/92.5	20000
	URB4812LD-60W(H)R3			12	5000/0	91/93	5000
	URB4815LD-60W(H)R3			15	4000/0	91/93.3	3500
	URB4824LD-60W(H)R3			24	2500/0	91/93.8	2000

Notes:
①Exceeding the maximum input voltage may cause permanent damage;
②Efficiency is measured at nominal input voltage and rated output load.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	--	1345/10	1389/15	mA
Surge Voltage (1sec. max.)		-0.7	--	100	VDC
Start-up Voltage		--	--	18	
Input Filter		PI filter			
Hot Plug		Unavailable			
Ctrl*	Module on	Ctrl pin open or pulled high TTL (3-12VDC)			
	Module off	Ctrl pin pulled low to GND (0-1.2VDC)			

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

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	5%-100% load		--	±1	±2	%
	0%-5% load		--	±2	±5	
Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
Load Regulation	5%-100% load		--	±0.5	±1	
Transient Response Deviation	25% load step change, input voltage range	5V output	--	±3	±10	
		Other output	--	±3	±5	

Transient Recovery Time	25% load step change, nominal input voltage		--	250	500	μs
Ripple & Noise①	20MHz bandwidth, nominal input voltage	5%-100% load	--	100	--	mVp-p
		0%-5% load	--	--	5	%Vo
Over-voltage Protection	Input voltage range		110	140	160	
Over-current Protection			110	140	200	%Io
Short-circuit Protection			Continuous, self-recovery			
Note: ①By measuring method is used for Ripple and Noise test, please refer to Fig. 2. for recommended circuit.						

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.	1600	--	--	VDC
	Input/output-Case Electric Strength Test for 1 minute with a leakage current of 1mA max.	1000	--	--	
Insulation Resistance	Input-output resistance at 500VDC	100	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	2200	--	pF
Operating Temperature	See Fig. 1	-40	--	+105	℃
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		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency①	PWM mode	--	370	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours
Note: ①Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.					

Mechanical Specifications

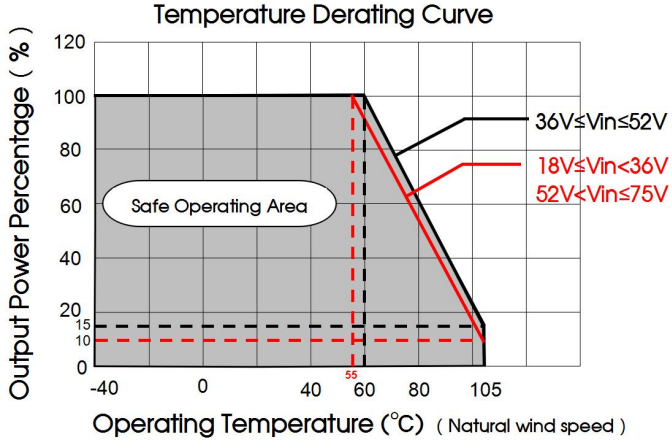
Case Material	Aluminum alloy		
Dimensions	Without heat sink	Horizontal package	50.80 x 25.40 x 11.80 mm
	Heat sink		51.40 x 26.20 x 16.50 mm
Weight	Without heat sink		40.0g
	Heat sink		49.8g
Cooling Method	Free air convection		

Electromagnetic Compatibility (EMC)

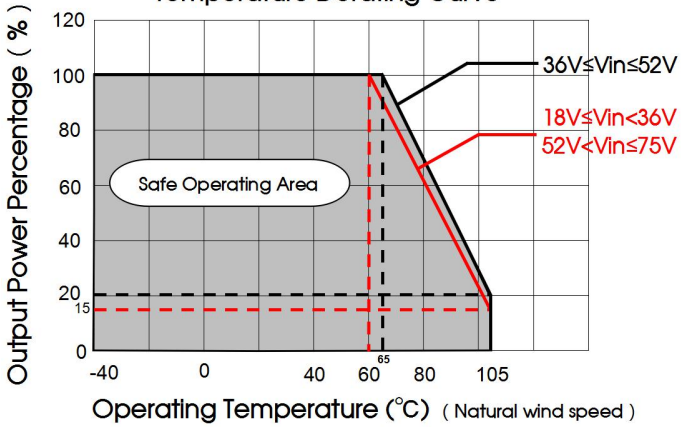
Emissions	CE	CISPR32/EN55032 CLASS A (see Fig. 3-① for recommended circuit) / CLASS B (see Fig. 3-② for recommended circuit)	
	RE	CISPR32/EN55032 CLASS A (see Fig. 3-① for recommended circuit) / CLASS B (see Fig. 3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±6kV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 100kHz ±2kV (see Fig. 3-② for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5 line to line ±2kV (see Fig. 3-② for recommended circuit)	perf. Criteria A
	CS	IEC/EN61000-4-6 10 Vr.m.s	perf. Criteria A

Typical Characteristic Curves

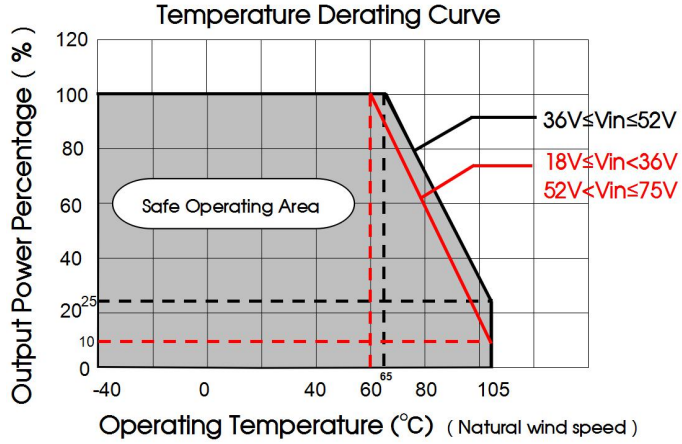
URB4805LD-60WR3
Temperature Derating Curve



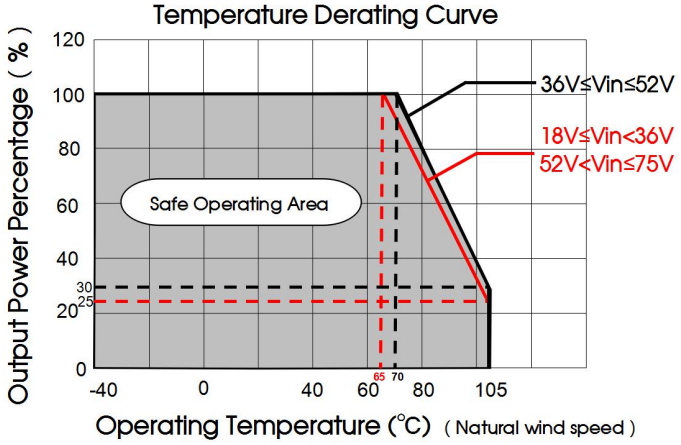
URB4805LD-60WHR3
Temperature Derating Curve



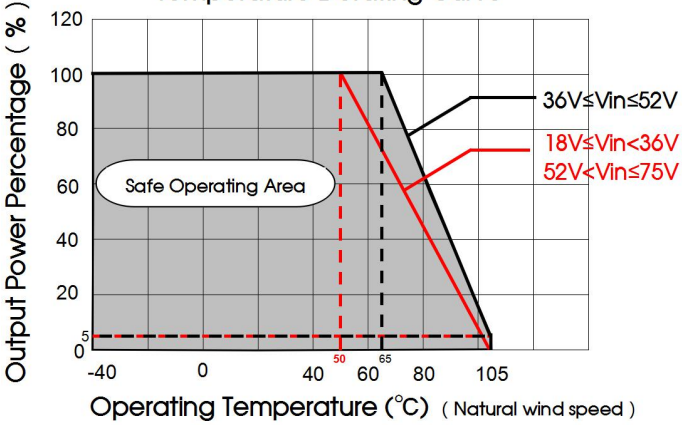
URB4812/15LD-60WR3
Temperature Derating Curve



URB4812/15LD-60WHR3
Temperature Derating Curve



URB4824LD-60WR3
Temperature Derating Curve



URB4824LD-60WHR3
Temperature Derating Curve

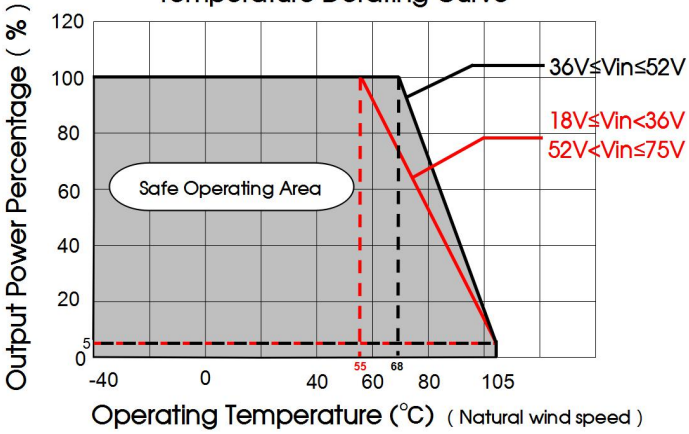


Fig. 1

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.

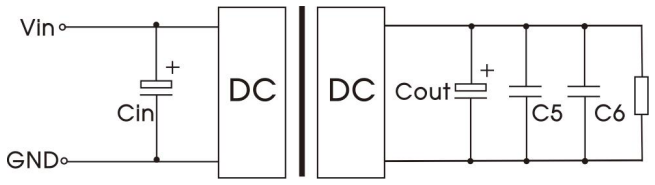


Fig. 2

Vout (VDC)	Cin	Cout	C5	C6
5	100μF/ 100V	330μF/50V	1μF/16V	10μF/16V
12			1μF/25V	10μF/25V
15		100μF/50V	1μF/25V	10μF/25V
24			1μF/50V	10μF/50V

2. EMC compliance circuit

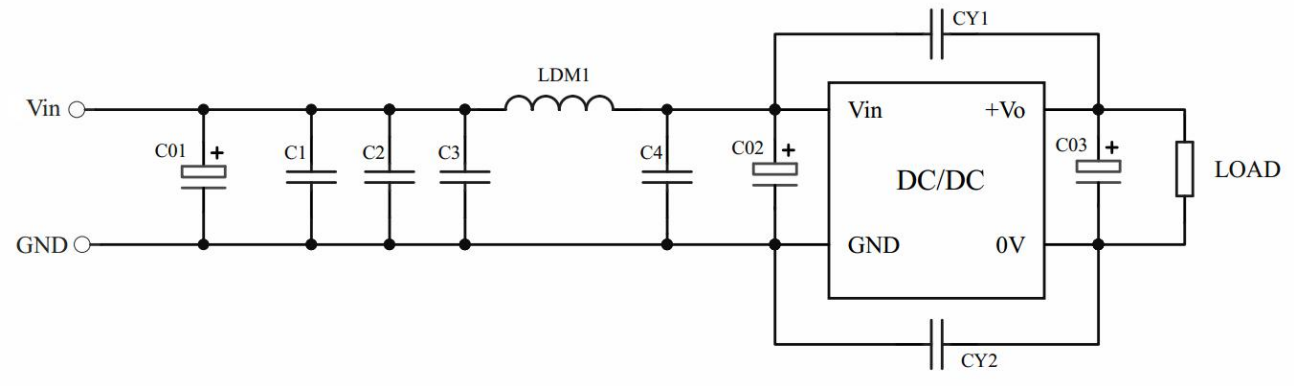


Fig. 3-①

Table 1：recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7μF	100V
C3/C4	20μF	100V
C01	1000μF	100V
C02	470μF	100V
C03	330μF	50V
CY1/CY2	2.2nF	1808/3000VDC
LDM1	2.2uH	/

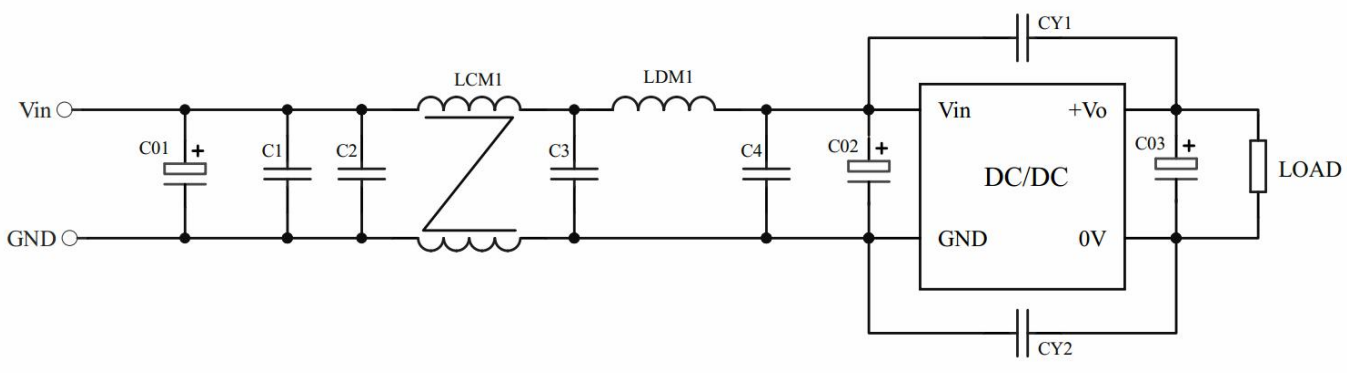
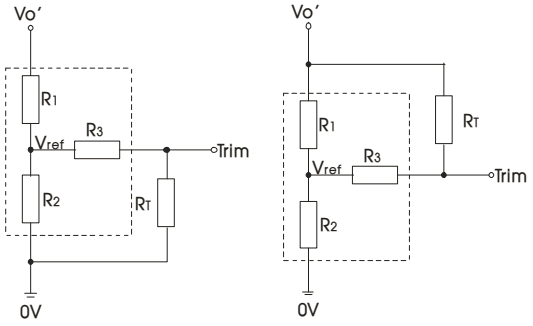


Fig. 3-②

Table 2：recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7μF	100V
C3/C4	20μF	100V
C01	1000μF	100V
C02	470μF	100V
C03	330μF	50V
CY1/CY2	2.2nF	1808/3000VDC
LCM1	10mH	10.0mH Min/180mΩ Max
LDM1	2.2uH	/

3. Trim Function for Output Voltage Adjustment (open if unused)



Trim up　　Trim down

Trim resistor connections (dashed line shows internal resistor network)

Calculating Trim resistor values:

$$\text{up: } R_T = \frac{aR_2}{R_2-a} - R_3 \qquad a = \frac{V_{ref}}{V_o'-V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1-a} - R_3 \qquad a = \frac{V_o'-V_{ref}}{V_{ref}} \cdot R_2$$

RT = Trim Resistor value
a = self-defined parameter
Vo' = desired output voltage

Vout(VDC)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
05	2.97	2.87	8.1	2.5
12	10.91	2.87	15	2.5
15	14.35	2.87	12.1	2.5
24	24.77	2.87	6.1	2.5

4. Recommended solution for thermal testing

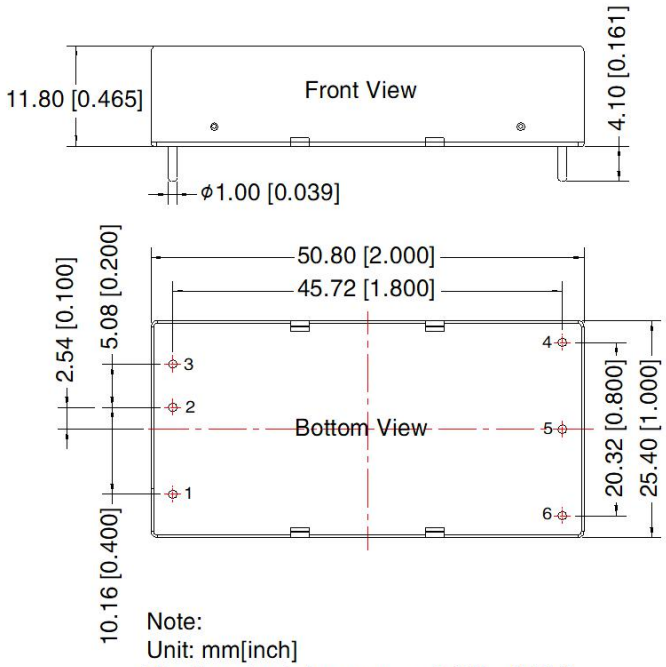
During the application process, the thermal design of the product can be evaluated in combination with the temperature derating curve of the product, or it can be determined by testing the temperature at point A, it is an safe operating area if the temperature lower than 100℃.

Fig.4

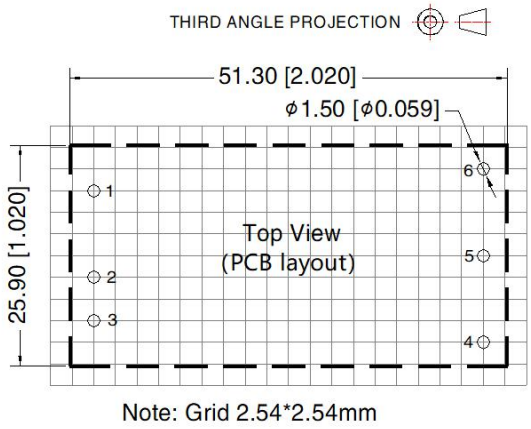
5. The products do not support parallel connection of their output

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

URB48_LD-60WR3 Dimensions and Recommended Layout



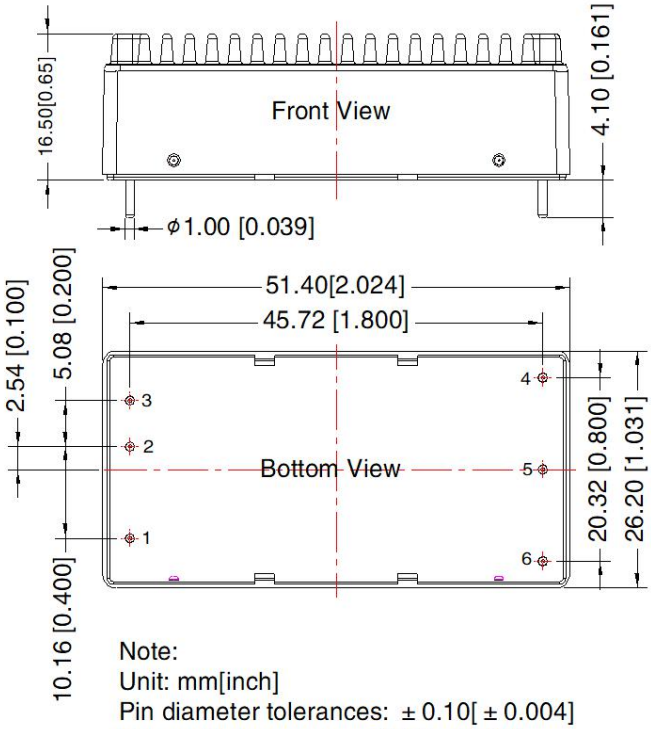
Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]



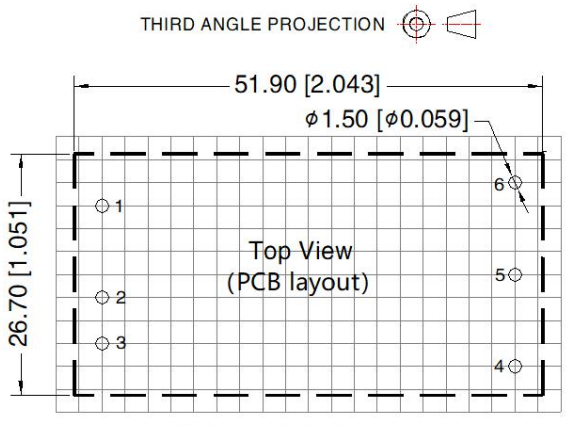
Note: Grid 2.54*2.54mm

Pin–Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

URB48_LD-60WHR3 Dimensions and Recommended Layout



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



Note: Grid 2.54*2.54mm

Pin–Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging number: 58200035(without heat sink), 58200051(with heat sink);
2. Recommended used in more than 5% load, if the load is lower than 5%, then the ripple index of the product may exceed the specification, but does not affect the reliability of the product;
3. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
4. The maximum capacitive load offered were tested at input voltage range and full load;
5. 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;
6. All index testing methods in this datasheet are based on company corporate standards;
7. We can provide product customization service, please contact our technicians directly for specific information;
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.

Mornsun Guangzhou Science & Technology Co., Ltd.
Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com