

30W, wide input isolated & regulated
dual / single output DC/DC converter



UL **CB** **CE** Patent Protection **RoHS**

VRA_LD-30WR2 & VRB_LD-30WR2 series products are of 30W output power, wide range of voltage input of 18-36VDC, 36-75VDC, isolation voltage of 1500VDC, output over-voltage protection and output short circuit protection with the six-sided metal shielding package; these products are widely used in fields such as industrial control, electric power, instruments and communication.

FEATURES

- Wide range of input voltage (2:1)
- Efficiency up to 89%
- Isolation voltage: 1500VDC
- Output over-voltage, over-current and short circuit protection
- Operating temperature range: -40°C to +85°C
- Meet CISPR22/EN55022 CLASS A
- A2S (wiring mounting) and A4S (35mm rail mounting) products featuring anti-reverse connection for input
- IEC60950, UL60950, EN60950 Approval
- International standard pin-out

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency (%,Min./Typ.) @ Full Load	Max. Capacitive Load ^④ (μF)
		Nominal (Range)	Max. ②	Output Voltage (VDC)	Output Current (mA)(Max./Min.)		
UL	VRA2415LD-30WR2	24 (18-36)	40	±15	±1000/±50	87/89	470
UL/CB	VRA2424LD-30WR2			±24	±625/±32	87/89	300
CE	VRB2403LD-30WR2			3.3	6000/600	85/87	6800
	VRB2405LD-30WR2			5	6000/600	86/88	6800
--	VRB2409LD-30WR2			9	3333/333	86/88	680
UL/CE/CB	VRB2412LD-30WR2			12	2500/250	86/88	680
CE	VRB2415LD-30WR2			15	2000/200	87/89	680
--	VRB2424LD-30WR2	48 (36-75)	80	24	1250/125	87/89	470
CE	VRB4803LD-30WR2			3.3	6000/600	85/87	6800
	VRB4805LD-30WR2			5	6000/600	86/88	6800
	VRB4812LD-30WR2			12	2500/250	87/89	680
	VRB4815LD-30WR2			15	2000/200	87/89	680
--	VRB4824LD-30WR2			24	1250/125	86/88	470

Note:

- ① Series with suffix "H" are heat sink mounting, such as VRA2415LD-30WHR2; series with suffix "A2S" are chassis mounting, with suffix "A4S" are DIN-Rail mounting, for example VRA2415LD-30WR2A2S is chassis mounting, VRA2415LD-30WR2A4S is DIN-Rail mounting; If the application has a higher requirement for heat dissipation, you can choose modules with heat sink;
- ② Absolute maximum rating without damage on the converter, but it isn't recommended;
- ③ The efficiency of A2S (wiring type) and A4S (rail type) products is 2% lower than the above-mentioned value due to the reverse connection protection for input;
- ④ The capacitive loads of positive and negative outputs are identical.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC input	3.3V output	--	950/120	971/150	mA
		others	--	1421/20	1454/60	
	48VDC input	3.3V output	--	475/80	486/100	
		others	--	710/20	727/60	
Reflected Ripple Current	Single	24VDC input	--	72	--	
		48VDC input	--	36	--	
	Dual		--	10	--	
Input Impulse Voltage (1sec. max.)	24VDC input		-0.7	--	50	VDC

	48VDC input	-0.7	--	100	
Starting Time	Nominal input & constant resistance load	--	10	--	ms
Input Filter		Pi filter			
Ctrl*	Module switch on	Ctrl suspended or connected to TTL high level (2.5-12VDC)			
	Module switch off	Ctrl pin connected to GND or low level (0-1.2VDC)			
	Input current when switched off	--	1	--	mA
Hot Plug		Unavailable			

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

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Positive output		--	±1	±3	%
	Negative output					
Balance Output Voltage	Dual output, Balance load		--	±0.5	±1	
Line Regulation	Full load, the input voltage is from low voltage to high voltage		--	±0.2	±1	
Cross Regulation	Dual output, main output 50% load, Supplement output from 10% to 100% load		--	±5	±7	
Load Regulation	Single	10%-100% load	--	±0.5	±1	
	Dual	5%-100% load				
Transient Recovery Time	25% load step change		--	300	500	μs
Transient Response Deviation			--	±3	±5	%
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise*	20MHz bandwidth		--	50	120	mV p-p
Trim	Single		--	±10	--	%Vo
Over-voltage Protection	Input voltage range		110	--	140	
Over-current Protection			110	130	160	
Short circuit Protection			Hiccup, continuous			
Note: *Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.						

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	--	--	VDC
Insulation Resistance	Input-output, insulation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	2000	--	pF
Operating Temperature	see Fig. 1	-40	--	+85	°C
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	+300	°C
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			
Switching Frequency	PWM mode	Single	300	--	KHz
		Dual	400	--	
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Physical Specifications

Casing Material	Aluminum alloy				
Package Dimensions	without heat sink	Horizontal package		50.80*25.40*11.80 mm	
		A2S wiring package		76.00*31.50*21.20 mm	
		A4S rail package		76.00*31.50*25.80 mm	
	with heat sink	Horizontal package		50.80*25.40*16.30 mm	
		A2S wiring package		76.00*31.50*25.10 mm	

		A4S rail package	76.00*31.50*29.70 mm
Weight	without heat sink	Horizontal package/A2S wiring package/A4S rail package	28.00g/46.00g/66.00g(Typ.)
	with heat sink	Horizontal package/A2S wiring package/A4S rail package	36.00g/59.00g/79.00g(Typ.)
Cooling Method	Free air convection		

EMC Specifications

EMI	CS	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact $\pm 4\text{KV}$ perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$ (see Fig.3-① for recommended circuit) perf. Criteria B
	Surge	IEC/EN61000-4-5	$\pm 2\text{KV}$ (see Fig.3-① for 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

Product Characteristic Curve

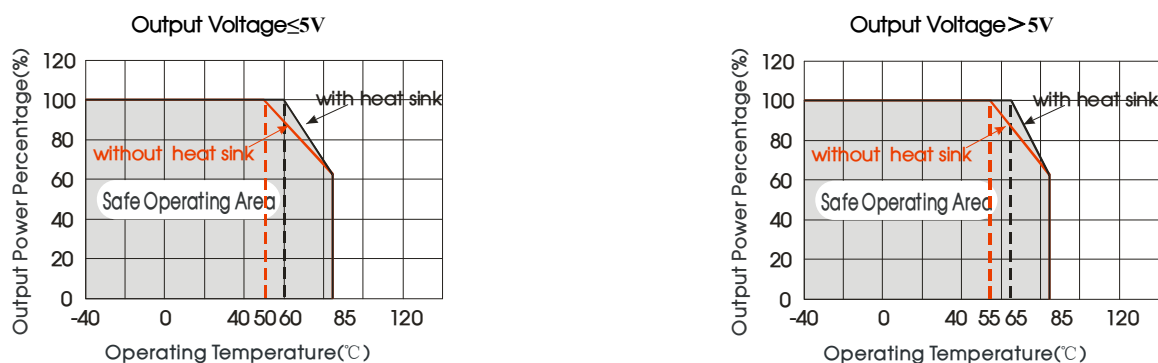
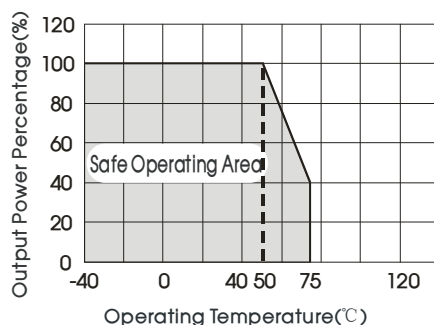
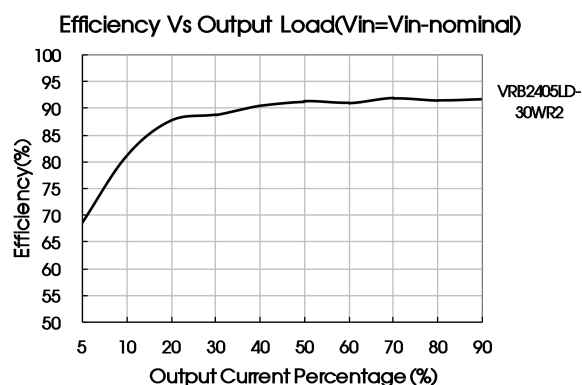
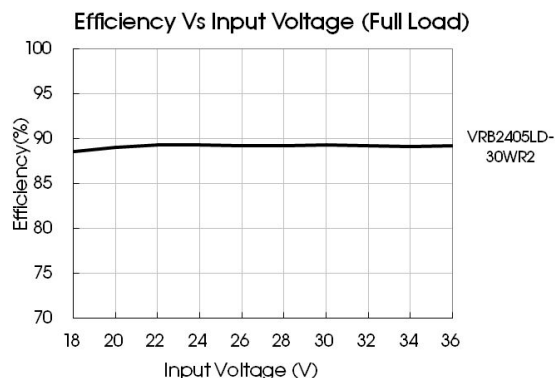


Fig. 1



Note: This figure is only applicable to VRA2424LD-30WR2.



Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.

If a further decrease of the input and output ripple is required, properly increase the input & output of additional capacitors C_{in} and C_{out} or select capacitors of low equivalent impedance, and ensure the capacitance should be lower than the max. capacitive load of the product.

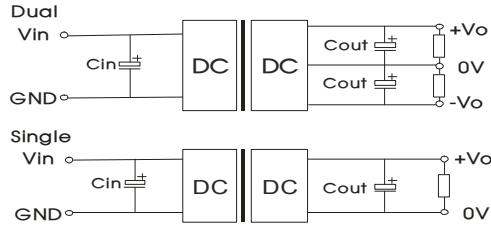


Fig. 2

2. EMC solution-recommended circuit

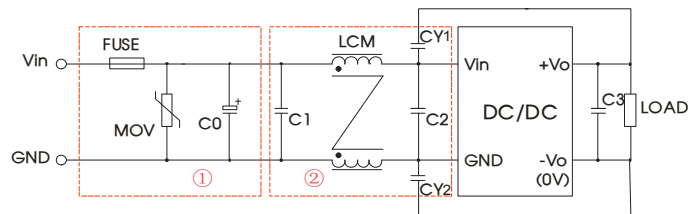


Fig. 3

Notes: Part ① in the Fig. 3 is used for EMS test and part ② for EMI filtering; selected based on needs.

Parameter description

Model	V_{in} :24V	V_{in} :48V
FUSE	Choose according to actual input current	
MOV	S14K35	S14K60
C_0	330 μ F/50V	330 μ F/100V
C_1, C_2	4.7 μ F/50V	2.2 μ F/100V
C_3	Refer to the C_{out} in Fig.2	
LCM	1mH(FL2D-30-102)	
$CY1, CY2$	1nF/2KV	

EMC solution-recommended circuit PCB layout

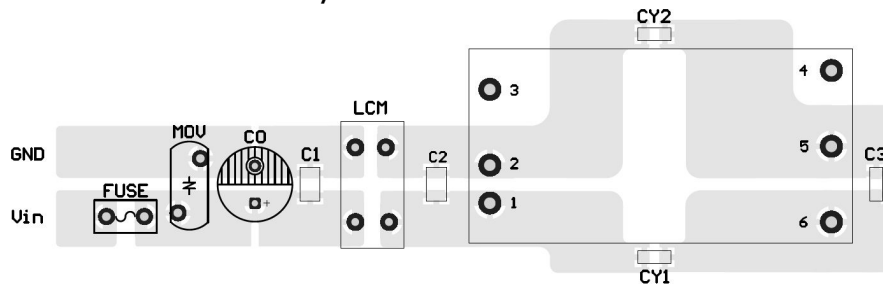
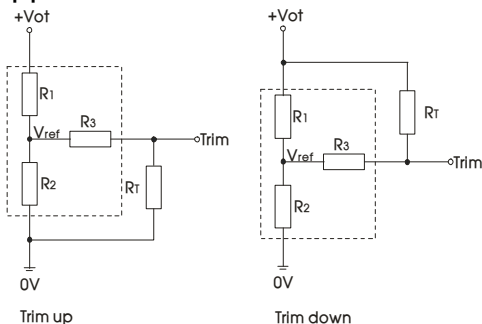


Fig. 4

Note: the min. distance of the bonding pads between input & output isolation capacitors ($CY1/CY2$) shall be ≥ 2 mm.

1. Trim application & Trim resistance



Application circuit for TRIM (Part in broken line is the interior of models)

Note: Leave open if not used. R_T : Resistance of Trim. a : User-defined parameter, no actual meanings.

Calculation formula of Trim resistance:

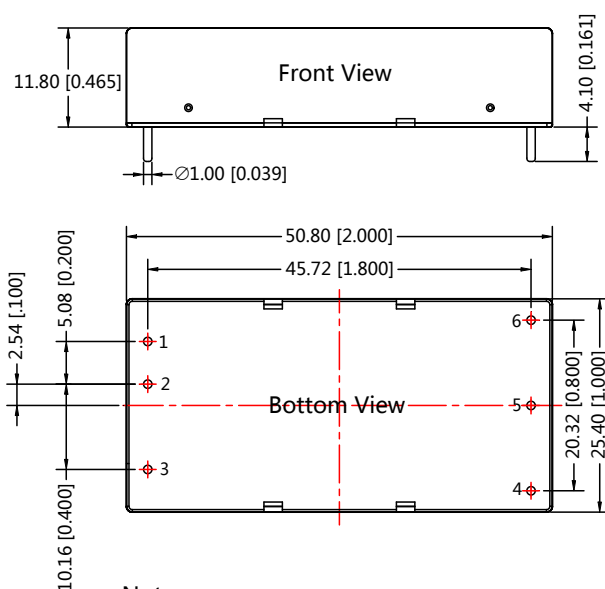
$$\begin{aligned} \text{up: } R_T &= \frac{aR_2}{R_2-a} - R_3 & a &= \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{aR_1}{R_1-a} - R_3 & a &= \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

Vout(V)	R1(K Ω)	R2(K Ω)	R3(K Ω)	Vref(V)
3.3	4.801	2.863	12	1.24
5	2.883	2.864	10	2.5
9	7.500	2.864	15	2.5
12	10.971	2.864	15	2.5
15	14.497	2.864	15	2.5
24	24.872	2.863	20	2.5

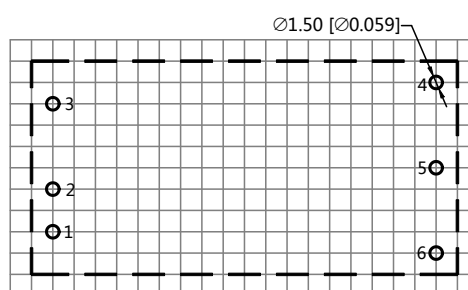
- It is not allowed to connect modules output in parallel to enlarge the power
- For more information about Mornsun EMC Filter products, please visit www.mornsun-power.com to download the Selection Guide of EMC Filter

Horizontal Package Dimensions and Recommended Layout (without heat sink)

THIRD ANGLE PROJECTION 



Note:
Unit :mm[inch]
Pin diameter tolerances : $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$

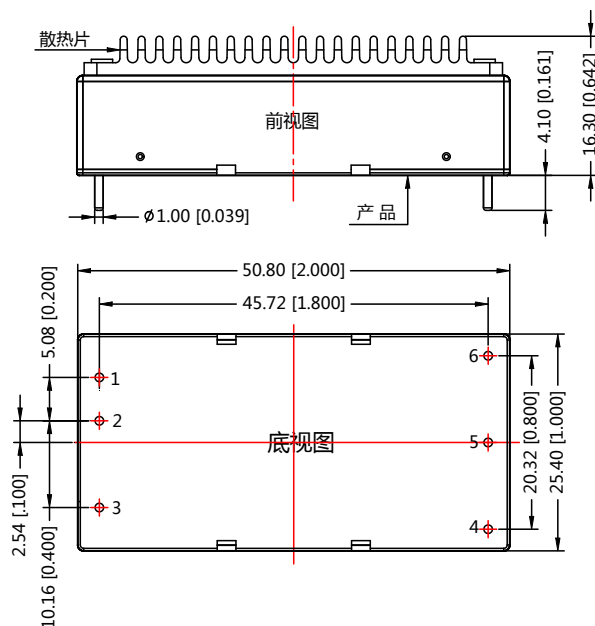


Note : Grid 2.54*2.54mm

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

Horizontal Package Dimensions (with heat sink)

第三角投影

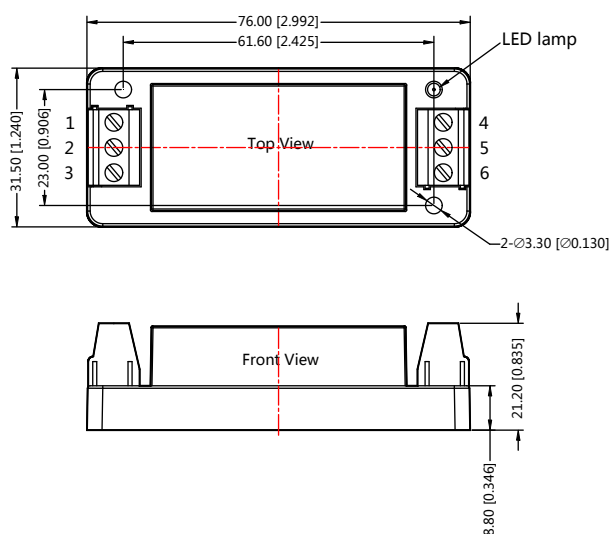


引脚方式		
引脚	单路	双路
1	Vin	Vin
2	GND	GND
3	Ctrl	Ctrl
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo

注：
尺寸单位:mm[inch]
未标注公差:±0.50[±0.020]
如选用散热片，请确定有足够的空间，具体尺寸如图所示

A2S Dimensions (without heat sink)

THIRD ANGLE PROJECTION

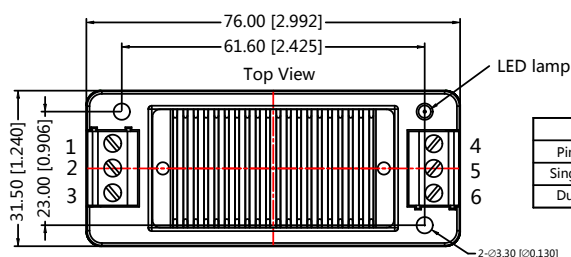


Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	Trim	0V	+Vo
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo

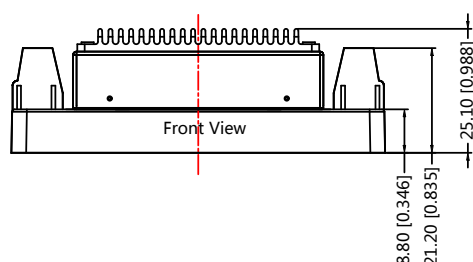
Note:
Unit:mm[inch]
Wire range : 24~12 AWG
General tolerances:±0.50[±0.020]

A2S Dimensions (with heat sink)

THIRD ANGLE PROJECTION



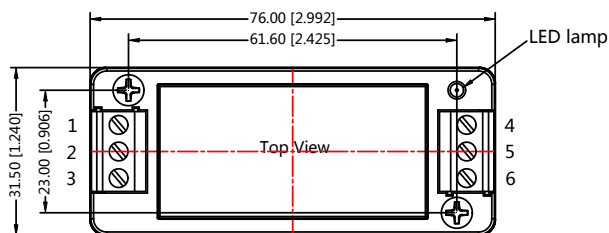
Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	Trim	0V	+Vo
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo



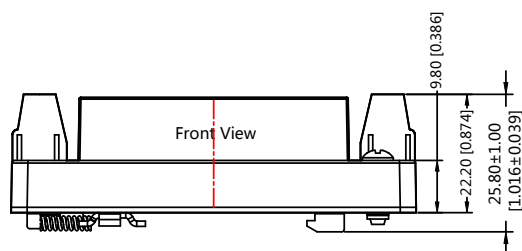
Note:
Unit:mm[inch]
Wire range:24~12 AWG
General tolerances:±0.50[±0.020]

A4S Dimensions (without heat sink)

THIRD ANGLE PROJECTION



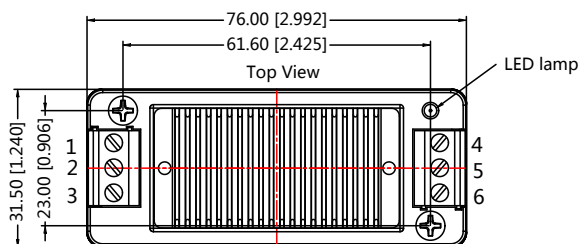
Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	Trim	0V	+Vo
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo



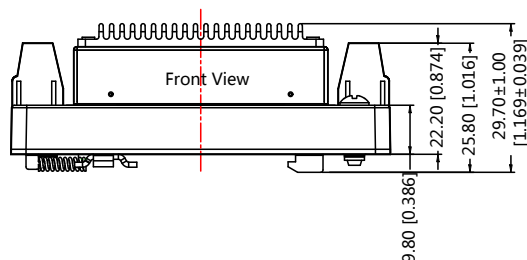
Note:
Unit:mm[inch]
Wire range : 24~12 AWG
General tolerances:±0.50[±0.020]

A4S Dimensions (with heat sink)

THIRD ANGLE PROJECTION



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



Note:
Unit:mm[inch]
Wire range:24~12 AWG
General tolerances:±0.50[±0.020]

Notes:

1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com. Horizontal Packing Bag Number : 58200035(without heatsink), 58200051 (with heatsink), A2S/A4S Packing Bag Number: 58220022;
2. Recommended single product used in more than 10%(dual 5%) load, if the load is lower than 10%(dual 5%), then the ripple index of the product may exceed the specification, but does not affect the reliability of the product;
3. The recommended unbalance degree of the dual output module load is $\leq \pm 5\%$; if the degree exceeds $\pm 5\%$, than the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
4. The maximum capacitive load offered were tested at nominal input voltage and full load;
5. 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;
6. All index testing methods in this datasheet are based on our Company's corporate standards;
7. The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
8. We can provide product customization service;
9. Specifications are subject to change without prior notice.

Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Luogang District, Guangzhou, P. R. China
Tel: 86-20-38601850-8801 Fax: 86-20-38601272 E-mail: info@mornsun.cn