15W, AC-DC converter



CE Report EN62368-1 UKCA Report BS EN 62368-1 RoHS

FEATURES

- Universal 85-264VAC or 100-370VDC input voltage
- Operating ambient temperature range -40℃ to +70℃
- High I/O isolation test voltage up to 4000VAC
- Regulated output, low output ripple & noise
- Output short circuit, over-current, over-voltage protection
- High efficiency, high reliability
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32/EN55032 CLASS B

LHE15-20A/C/Dxx series is one of Mornsun's compact size multi-output power converters. They feature universal AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability and reinforced isolation. It offers good EMC performance and is widely used in industrial, office and civil applications. 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	Nominal Output Voltage and Current		Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.	
			(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
EN/BS EN	LHE15-20A05**	15W	+5V/1500mA	-5V/1500mA	76	12800	12800
	LHE15-20A12**		+12V/650mA	-12V/650mA	80	2600	2600
	LHE15-20A15**		+15V/500mA	-15V/500mA	81	2400	2400
--	LHE15-20C0505-05		5V/2000mA	±5V/500mA	75	11000	2200
	LHE15-20C0512-02		5V/2000mA	±12V/200mA	77	11000	800
	LHE15-20C0515-02		5V/1800mA	±15V/200mA	78	6000	370
EN/BS EN	LHE15-20D0505-08		5V/2000mA	5V/800mA	76	15000	3000
	LHE15-20D0512-04		5V/2000mA	12V/400mA	78	12000	1800
	LHE15-20D0524-02		5V/2000mA	24V/200mA	78	13000	800
	LHE15-20D0524-04		5V/1000mA	24V/400mA	80	3000	1600

Note: 1. * Use suffix "A2" for chassis mounting and suffix "A4" for DIN-Rail mounting.
2. ** Only LHE15-20Axx series use both outputs(positive and negative) as sampling feedback, the others use Vo1 and defined as first output.
3. The product picture is for reference only. For details, please refer to the actual product.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	264	VAC
	DC input	100	--	370	VDC
Input Frequency		47	--	63	Hz
Input Current	115VAC	--	--	0.37	A
	230VAC	--	--	0.22	
Inrush Current	115VAC	--	20	--	
	230VAC	--	30	--	
Recommended External Input Fuse		2A/250V, slow-blow, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Vo1		--	±2	--	%
	Vo2	LHE15-20Axx	--	±2	--	
		LHE15-20C/Dxx	--	±10	--	

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Line Regulation	Full load	Vo1		--	±0.5	--	
		Vo2	LHE15-20Axx	--	±0.5	--	
			LHE15-20C/Dxx	--	±1.5	--	
Load Regulation	10%-100% load (balanced load)	Vo1		--	±2	--	
		Vo2	LHE15-20Axx	--	±2	--	
			LHE15-20C/Dxx	--	±5	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	Vo1		--	50	100	mV
		Vo2	LHE15-20Axx	--	--	100	
			LHE15-20C/Dxx	--	--	200	
Temperature Coefficient	Vo1			--	±0.02	--	%/℃
Short Circuit Protection				Continuous, self-recovery			
Over-current Protection				150% - 300% Io, self-recovery			
Over-voltage Protection	Vo1	5VDC Output		≤7.5VDC			
		12VDC Output		≤20VDC			
		15VDC Output		≤22VDC			
Minimum Load				10	--	--	%
Hold-up Time	115VAC input			--	8	--	ms
	230VAC input			--	50	--	

Note: * The "parallel cable" method is used for Ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.

General Specifications

Item		Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input-output	LHE15-20A/C/Dxx	Electric Strength Test for 1min., leakage current <5mA	4000	--	--	VAC
	Input-⏚	LHE15-20A/C/Dxx		2000	--	--	
	Vo1-Vo2	LHE15-20C/Dxx		500	--	--	VDC
Operating Temperature				-40	--	+70	℃
Storage Temperature				-40	--	+85	
Storage Humidity				--	--	95	%RH
Soldering Temperature		Wave-soldering, Max. 10 seconds		255	260	265	℃
		Manual-welding, Max. 5 seconds		350	360	370	
Switching Frequency				--	65	--	kHz
Power Derating		-40℃ to -25℃		2.67	--	--	%/℃
		+50℃ to +70℃	LHE15-20C/Dxx	2.5	--	--	
		+55℃ to +70℃	LHE15-20Axx	3.33	--	--	
		85VAC-100VAC	LHE15-20A/C/Dxx	1.0	--	--	%/VAC
		240VAC-264VAC	LHE15-20A/Cxx	0.83	--	--	
Safety Standard		LHE15-20A/Dxx		EN/BS EN 62368-1(report) safety approved; Design refer to IEC/UL62368-1			
		LHE15-20Cxx		Design refer to IEC/UL/EN62368-1			
Safety Class				CLASS I			
MTBF				MIL-HDBK-217F@25℃ > 300,000 h			

Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	62.00 x 45.00 x 22.50 mm
	A2 chassis mounting	96.10 x 54.00 x 31.00 mm
	A4 Din-Rail mounting	96.10 x 54.00 x 35.60 mm
Weight	Horizontal package	90g(Typ.)
	A2 chassis mounting	140g(Typ.)
	A4 Din-Rail mounting	180g(Typ.)
Cooling method	Free air convection	

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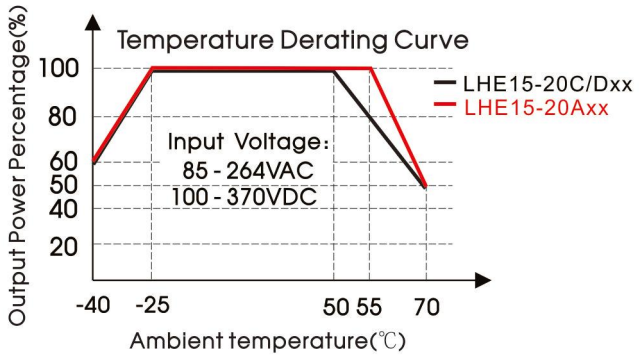
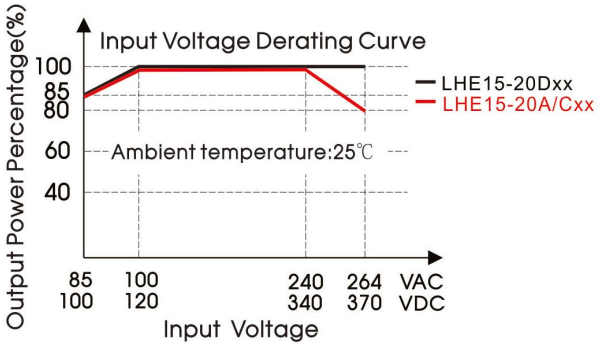
Electromagnetic Compatibility (EMC)

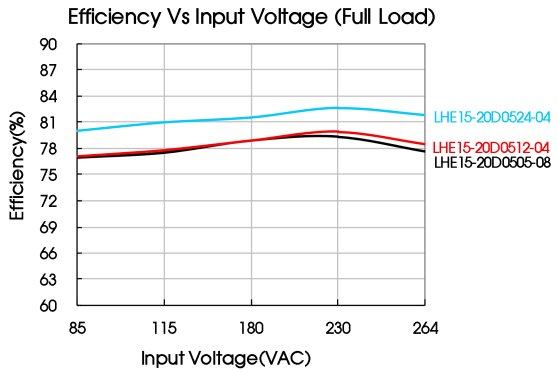
Emissions	CE	CISPR32/EN55032 CLASS B		
	RE	CISPR32/EN55032 CLASS B		
Immunity	ESD	IEC/EN 61000-4-2	Contact ±6KV/Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B
		IEC/EN61000-4-4	±4KV (See Fig. 4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±1KV/line to PE ±2KV	perf. Criteria B
		IEC/EN61000-4-5	line to line ±2KV/line to PE ±4KV (See Fig. 4 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	Voltage variation	IEC/EN61000-4-11	70% Un, 25/30 cycle(50/60Hz) 40% Un, 10/12 cycle(50/60Hz) 0% Un, 1 cycle (Un is the maximum input nominal voltage)	perf. Criteria B

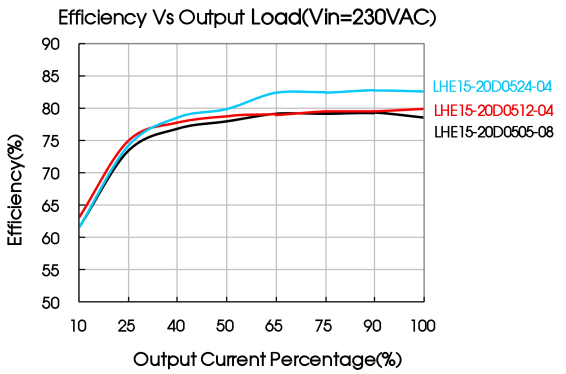
Product Characteristic Curve

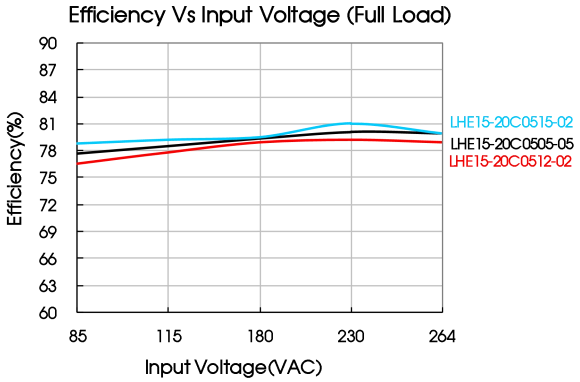


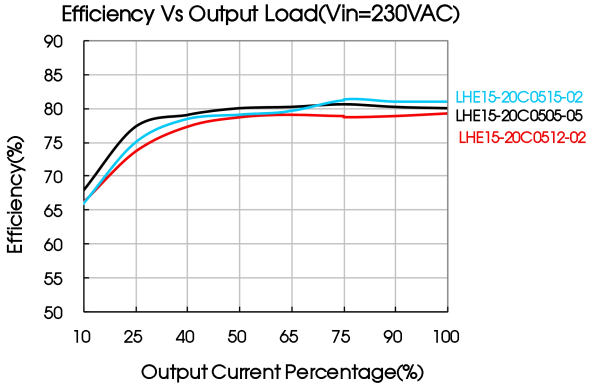


Note: ① With an AC input between 85-100V/240-264VAC and a DC input between 100-120V/340-370VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.









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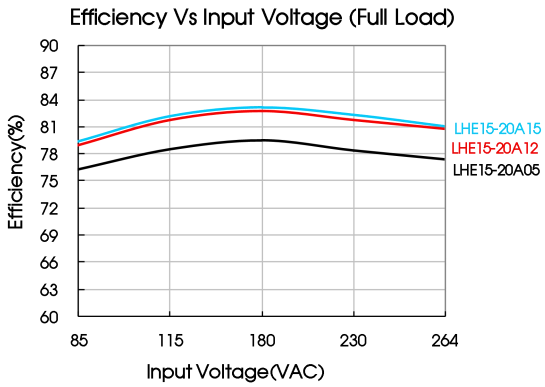

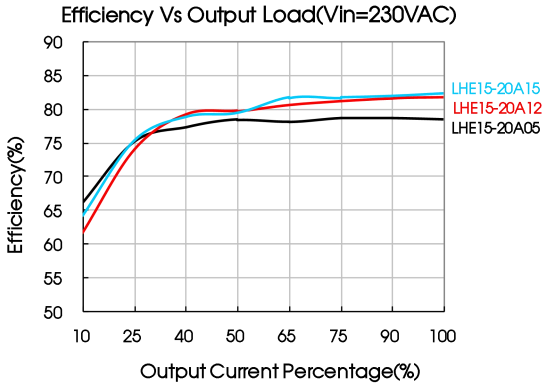

Design Reference

1. Typical application

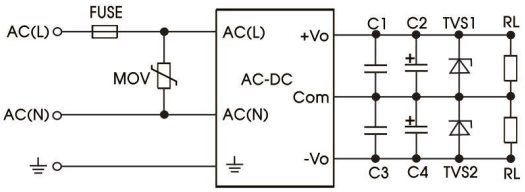

Fig. 1: LHE15-20Axx series typical circuit diagram

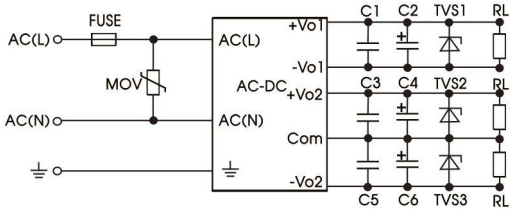

Fig. 2: LHE15-20Cxx series typical circuit diagram

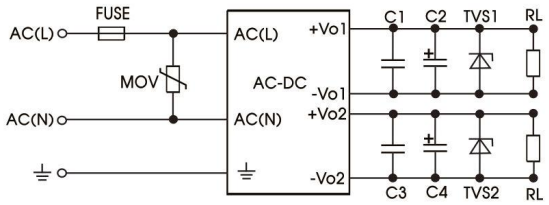

Fig. 3: LHE15-20Dxx series typical circuit diagram

Part No.	FUSE	MOV	C1/C3/C5	C2(uF)	C4(uF)	C6(uF)	TVS1	TVS2	TVS3
LHE15-20A05	2A/250V, slow-blow, required	S14K300	1uF/50V	470	470	--	SMBJ7.0A	SMBJ7.0A	--
LHE15-20A12				220	220	--	SMBJ20A	SMBJ20A	--
LHE15-20A15				120	120	--	SMBJ20A	SMBJ20A	--
LHE15-20C0505-05				470	220	220	SMBJ7.0A	SMBJ7.0A	SMBJ7.0A
LHE15-20C0512-02				470	120	120	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE15-20C0515-02				470	120	120	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE15-20D0505-08				470	470	--	SMBJ7.0A	SMBJ7.0A	--
LHE15-20D0512-04					220	--	SMBJ7.0A	SMBJ20A	--
LHE15-20D0524-02					120	--	SMBJ7.0A	SMBJ30A	--
LHE15-20D0524-04					47	--	SMBJ7.0A	SMBJ30A	--

Output Filter Components:
We recommend using an electrolytic capacitor with high frequency, and low ESR rating for C2, C4 (refer to manufacture's datasheet). Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1, C3 is a ceramic capacitor used for filtering high-frequency noise and TVS is a recommended suppressor diode to protect the application in case of a converter failure.

2. EMC compliance recommended circuit

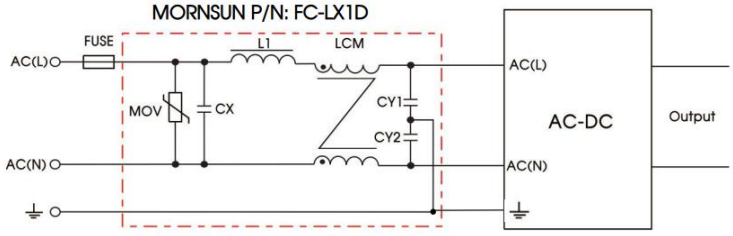

Fig. 4: EMC circuit for harsh requirements

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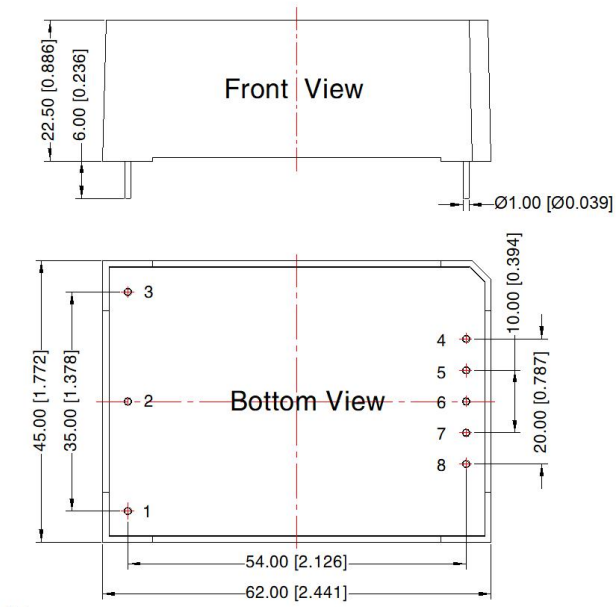
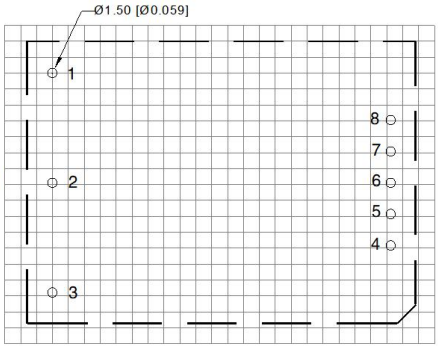
Component	Recommended value
MOV	S14K300
CY1/CY2	1000pF/400VAC
CX	0.1uF/275VAC
LCM	10mH, P/N: FL2D-Z5-103 (MORNSUN) is recommended
L1	4.7uH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	2A/250V, slow-blow, required

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

Dimensions and Recommended Layout



THIRD ANGLE PROJECTION



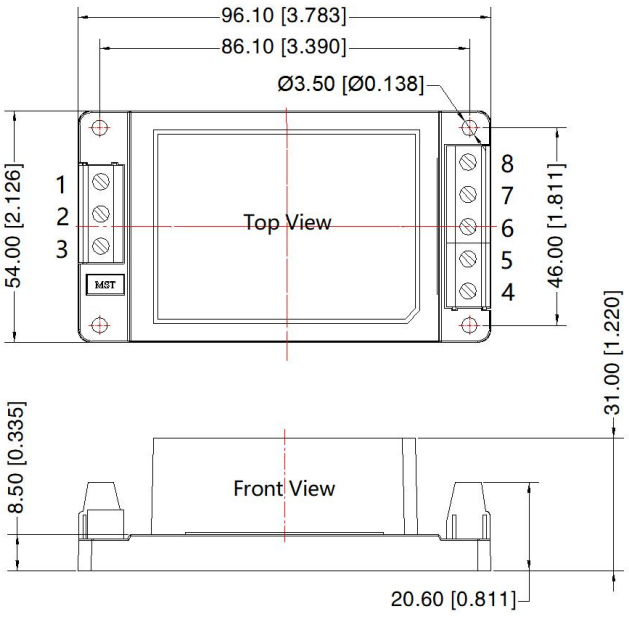
Note: Grid 2.54*2.54mm

Pin-Out			
Pin	LHE15-20A	LHE15-20C	LHE15-20D
1	⏚	⏚	⏚
2	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)
4	+Vo	+Vo2	+Vo2
5	No Pin	COM	-Vo2
6	COM	-Vo2	No Pin
7	No Pin	+Vo1	+Vo1
8	-Vo	-Vo1	-Vo1

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

A2 Dimensions

THIRD ANGLE PROJECTION



Pin-Out			
Pin	LHE15-20A	LHE15-20C	LHE15-20D
1	⏚	⏚	⏚
2	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)
4	+Vo	+Vo2	+Vo2
5	NC	COM	-Vo2
6	COM	-Vo2	NC
7	NC	+Vo1	+Vo1
8	-Vo	-Vo1	-Vo1

Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: 0.4 N · m ± 10%
General tolerances: ± 1.00[± 0.039]

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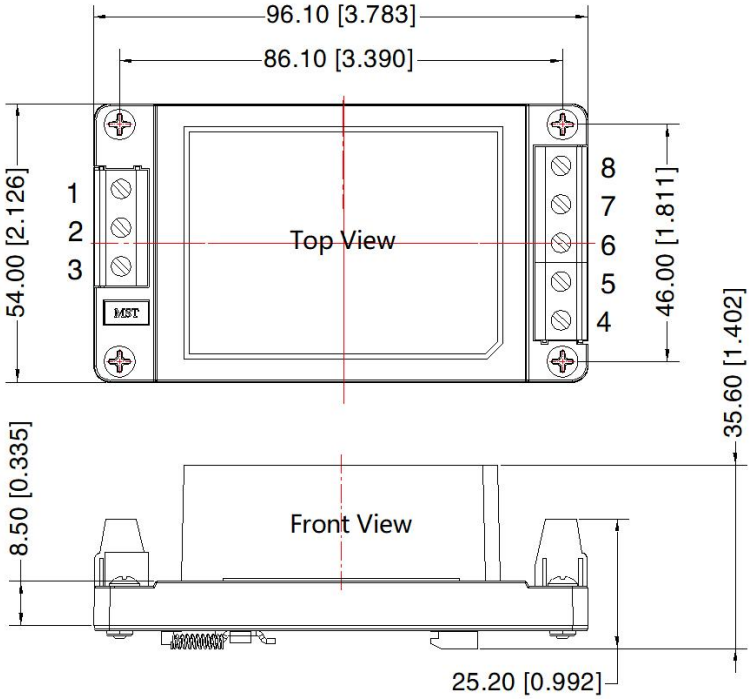
A4 Dimensions

THIRD ANGLE PROJECTION



Pin–Out			
Pin	LHE15–20A	LHE15–20C	LHE15–20D
1	⏚	⏚	⏚
2	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)
4	+Vo	+Vo2	+Vo2
5	NC	COM	–Vo2
6	COM	–Vo2	NC
7	NC	+Vo1	+Vo1
8	–Vo	–Vo1	–Vo1

Note:
Unit: mm[inch]
Mounting rail: TS35, rail needs to connect safety ground
Wire range: 24–12 AWG
Tightening torque: 0.4 N · m ± 10%
General tolerances: ± 1.00[± 0.039]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220006 (Horizontal package); 58220010 (A2/A4 package);
2. 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;
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. 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.

Mornsun Guangzhou Science & Technology Co., Ltd.
Address: No.8 Nanyun 4th Road, Huangpu District, Guangzhou, China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com

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