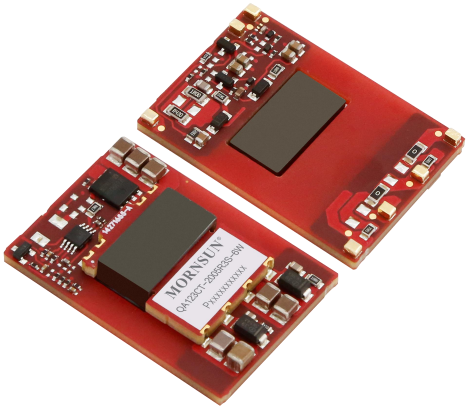
IGBT/SiC/MOSFET driver power supply



patent protection RoHS

FEATURES

- Reinforced insulation
- Ultra-low isolation capacitance: 13pF(typ.)
- I/O isolation test voltage: 5.0kVAC
- Partial Discharge 2kV
- CMTI>200 kV/μs
- Max. Capacitive Load: 1000μF
- High efficiency up to 81%
- Operating ambient temperature range: -40℃ to +105℃
- Continuous short-circuit protection
- SMD package
- Power 6W
- MSL 1
- AEC-Q100 experiment

The QAxx3(C)T-xxxxR3S-6W series is a DC-DC module power supply designed for IGBT/SiC/MOSFET drives, which uses asymmetric voltage output to minimize the drive loss of IGBT/SiC/MOSFET. At the same time with output short circuit protection and self-recovery ability. The product is suitable for:

1.General frequency converter
2.AC servo drive system
3.Arc welder
4.Uninterruptible power supply (UPS)

Selection Guide

Certification	Part No.	Input		Output		Full load efficiency(%) Min./Typ.	Capacitive Load (μF)Max.
		Input voltage (VDC) (Range)	Input Current (mA,Typ.) Full / No load	Voltage(VDC) +Vo/-Vo	Current (mA) +Io/-Io		
--	QA123CT-1505R3S-6W	12 (9-18)	590/30	+15/-5	+300/-300	78/81	1000
	QA123CT-2005R3S-6W	12 (9-18	590/30	+20/-5	+240/-240		470
	QA123T-1510R3S-6W	12 (9-18)	590/30	+15/-10	+240/-240		1000
	QA243CT-1505R3S-6W	24 (18- 36)	310/20	+15/-5	+300/-300		1000
	QA243CT-2005R3S-6W	24 (18- 36)	310/20	+20/-5	+240/-240		220
	QA243T-1510R3S-6W	24 (18- 36)	310/20	+15/-10	+240/-240		680

Note: * The output capacitive load per channel is the same.

Limiting Character

Project	Operating Conditions	Min.	Typ.	Max.	Unit
Reflux welding temperature	--	The peak temperature Tc 245℃, the time above 217℃ is maximum 60s, Refer to the IPC / JEDEC J-STD-020D.1 standard for practical application.			

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Surge Voltage (1sec. max.)	12VDC Nominal input series	--	--	20	VDC
	24VDC Nominal input series	--	--	40	
Input no load current	12VDC Nominal input series	--	30	--	mA
	24VDC Nominal input series	--	20	--	
Reflected Ripple Current	12VDC Nominal input series	--	40	100	
	24VDC Nominal input series	--	50	100	
Activation threshold	12VDC Nominal input series	--	7.2	--	VDC
	24VDC Nominal input series	--	17	--	
Shutdown threshold	12VDC Nominal input series	--	6.3	--	
	24VDC Nominal input series	--	15	--	
Input Filter	Capacitor filtering				
Hot plug	Unavailable				
Ctrl *	Module on	Ctrl suspended or connected to TTL high (2-12VDC)			
	Module off	Ctrl to GND or to TTL low level (0-0.8VDC)			
	Input current when off	--	5	10	mA

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

Output Specifications

Item			Operating Conditions	Min.	Typ.	Max.	Unit
Output voltage	QA123CT-1505R3S-6W	+Vo	Vin=12VDC, Pin3& Pin4 +Io= +300mA	14.70	15.15	15.75	VDC
		-Vo	Vin=12VDC, Pin3& Pin2 -Io= -300mA	-4.65	-4.85	-5.05	
	QA123CT-2005R3S-6W	+Vo	Vin=12VDC, Pin2& Pin4 +Io= +240mA	19.80	20.40	21.00	
		-Vo	Vin=12VDC, Pin2& Pin1 -Io= -240mA	-4.60	-4.80	-5.00	
	QA123T-1510R3S-6W	+Vo	Vin=12VDC, Pin3& Pin4 +Io= +240mA	14.55	15.00	15.45	
		-Vo	Vin=12VDC, Pin3& Pin1 -Io= -240mA	-9.60	-10.00	-10.40	
	QA243CT-1505R3S-6W	+Vo	Vin=24VDC, Pin3& Pin4 +Io= +300mA	14.70	15.15	15.60	
		-Vo	Vin=24VDC, Pin3& Pin2 -Io= -300mA	-4.65	-4.85	-5.05	
	QA243CT-2005R3S-6W	+Vo	Vin=24VDC, Pin2& Pin4 +Io= +240mA	19.80	20.40	21.00	
		-Vo	Vin=24VDC, Pin2& Pin1 -Io= -240mA	-4.60	-4.80	-5.00	
	QA243T-1510R3S-6W	+Vo	Vin=24VDC, Pin3& Pin4 +Io= +240mA	14.55	15.00	15.45	
		-Vo	Vin=24VDC, Pin3& Pin1 -Io= -240mA	-9.60	-10.00	-10.40	
Output Voltage Accuracy			10% -100% of load	See output regulation curve (Figure 2-Figure 13)			%
Linear Regulation		+Vo	Except for QA123CT-1505R3S-6W	--	±0.2	±1.0	%
		-Vo		--	±0.2	±1.0	
		+Vo	QA123CT-1505R3S-6W	--	--	±1.5	
		-Vo		--	--	±1.5	
Load Regulation		+Vo	10% -100% Load	--	3	7	%
		-Vo		--	3	7	
Temperature Coefficient			Full load	--	±0.04	±0.1	%/℃
Ripple & Noise*			20MHz bandwidth	--	50	200	mVp-p
Short-circuit Protection			Continuous, self-recovery				

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

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output, Test for 1 minute with a leakage current of 1mA max	5000	--	--	VAC
Continuous barrier withstand voltage	Input- output	--	2000	--	V
CMTI	Input- output	±200	--	--	kV/μs
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation capacitor	Input- output, capacitor at 100kHz/0.1V	--	13	15	pF
Operating Temperature	Derating when operating temperature≥100℃, (see Fig. 1)	-40	--	105	℃
Storage Temperature		-55	--	125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10s seconds	--	--	300	
Case Temperature Rise	Ta=25℃, nominal input voltage, full load	--	30	60	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	250	--	kHz
Safety Standard		--			
Safety Class		CLASS III			
MTBF	MIL-HDBK-217F@25℃	3500	--	--	k hours

Mechanical Specifications

Dimensions	39.98*27.81*7.60mm
Weight	10.0g (Typ.)
Cooling Method	Natural air cold

Electromagnetic Compatibility (EMC)

Emissions	CE		CISPR32/EN55032 CLASS A (see Table 2. for recommended circuit)
	RE	12V	CISPR32/EN55032 CLASS B (see Table 2. for recommended circuit)
		24V	CISPR32/EN55032 CLASS A (see Table 2. for recommended circuit)
Immunity	ESD		IEC/EN61000-4-2 Contact ±6kV perf. Criteria B

Typical Characteristic Curves

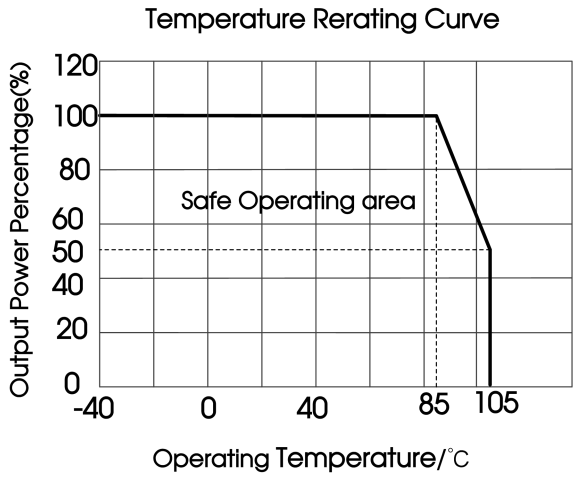


Figure 1

QA123CT-2005R3S-6W
+Vo Output Regulation Curve

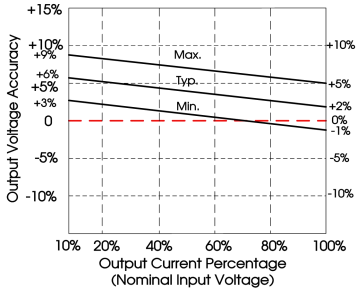


Figure 2

QA123CT-2005R3S-6W
-Vo Output Regulation Curve

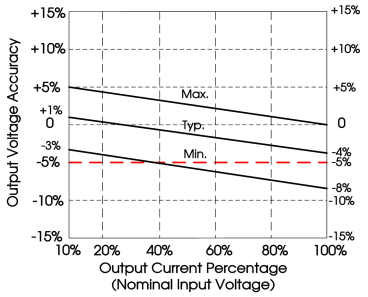


Figure 3

QA123CT-1505R3S-6W
+Vo Output Regulation Curve

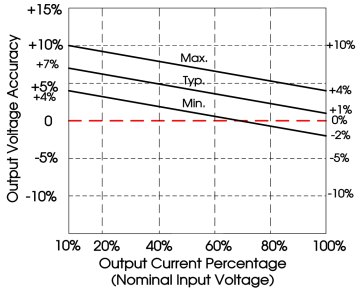


Figure 4

QA123CT-1505R3S-6W
-Vo Output Regulation Curve

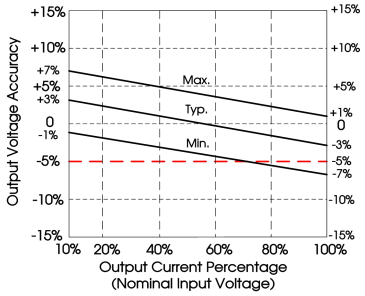


Figure 5

QA123T-1510R3S-6W
+Vo Output Regulation Curve

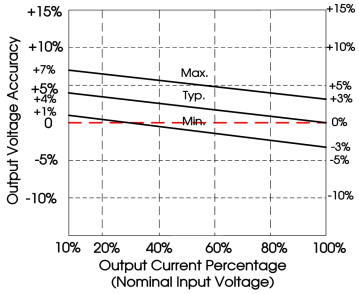


Figure 6

QA123T-1510R3S-6W
-Vo Output Regulation Curve

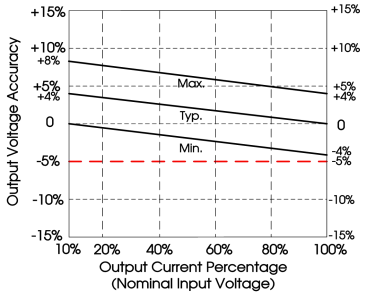


Figure 7

QA243CT-2005R3S-6W
+Vo Output Regulation Curve

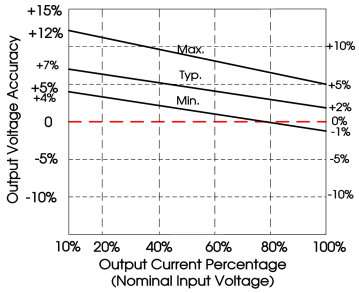


Figure 8

QA243CT-2005R3S-6W
-Vo Output Regulation Curve

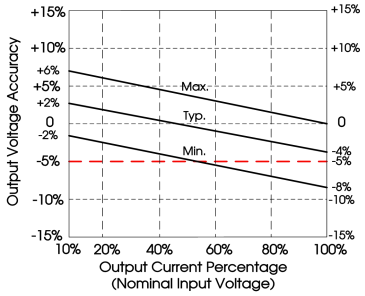


Figure 9

QA243CT-1505R3S-6W
+Vo Output Regulation Curve

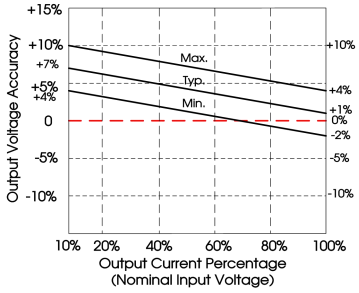


Figure 10

QA243CT-1505R3S-6W
-Vo Output Regulation Curve

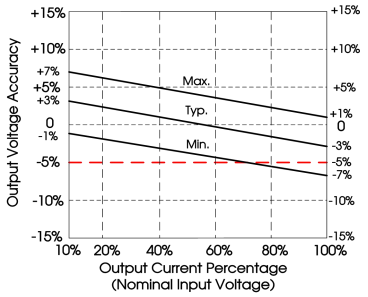


Figure 11

QA243T-1510R3S-6W
+Vo Output Regulation Curve

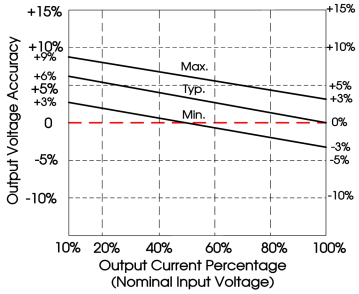


Figure 12

QA243T-1510R3S-6W
-Vo Output Regulation Curve

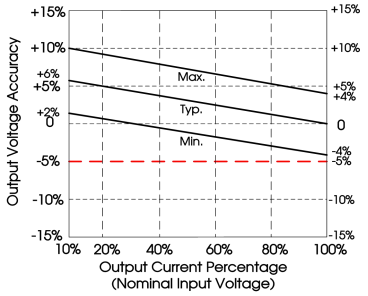


Figure 13

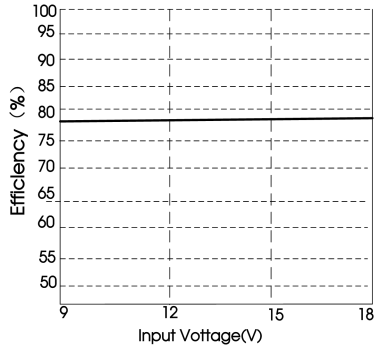


Figure 14

Efficiency Vs Output Load(Vin=12V)

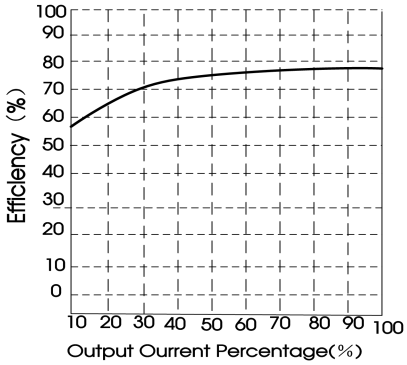


Figure 15

Note: Take QA123CT-2005R3S-6W as an example, other models can be corresponding reference

Design Reference

1. Test configurations

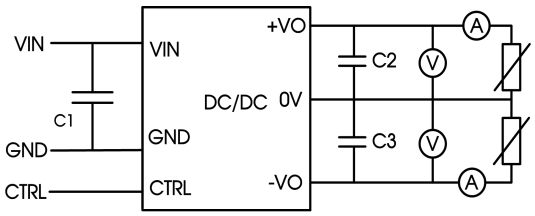


Figure 16

Note: C1, C2, and C3, respectively, are 100 μF / 35V (low internal resistance capacitance)

2. Typical applications

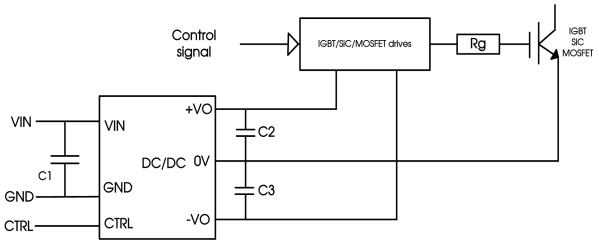


Figure 17

Table 1.

C1/C2/C3
100 μ F / 35V (low internal resistance capacitor)

3. EMC typical recommended circuit

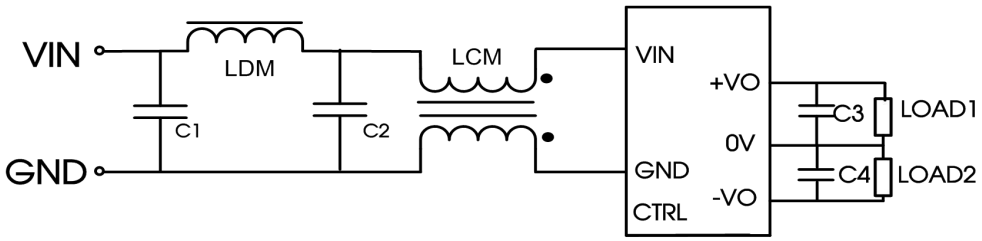


Figure 18

Table 2

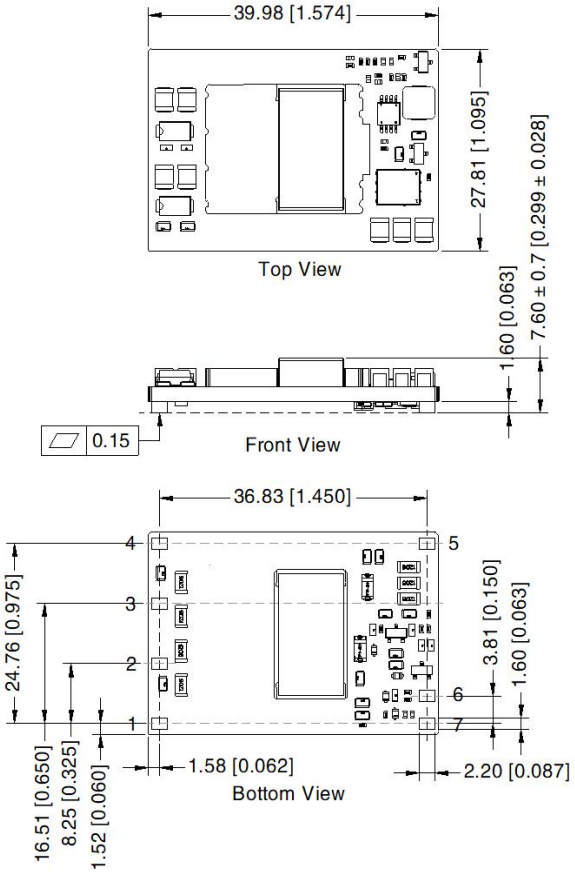
Part No.	Recommended circuit	C1	C2	C3	C4	LDM1	LDM2
QA123CT-1505R3S-6W	Figure 18	10μF/50V	10μF/50V	100μF/35V	100μF/35V	10μH	138uH, nickel-zinc material
QA123CT-2005R3S-6W							
QA123T-1510R3S-6W							
QA243CT-1505R3S-6W							
QA243CT-2005R3S-6W							
QA243T-1510R3S-6W							

4. Electrolytic capacitors are recommended for external capacitors at the input or output of the product. Tantalum capacitors are not, otherwise there is a risk of failure.

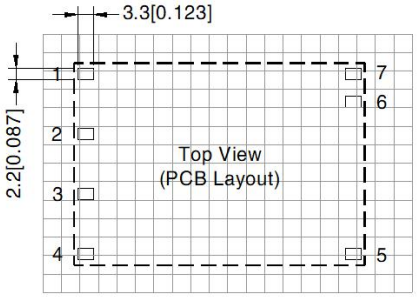
5. The products do not support parallel connection of their output for power expansion purpose or hot-plug.

6. For more information please find the application notes on www.mornsun-power.com

Dimensions and Recommended Layout



THIRD ANGLE PROJECTION

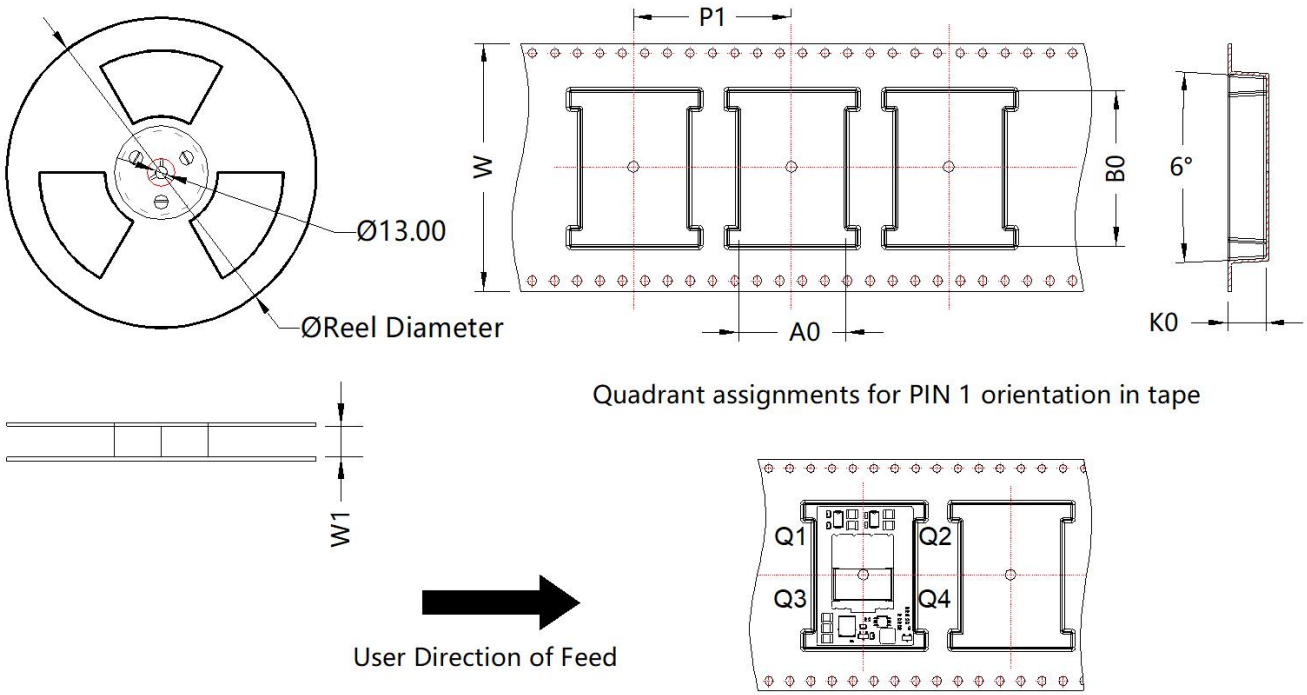


Note: Grid 2.54*2.54mm

Pin–Out	QAXX3CT–1505R3S–6W	QAXX3T–1510R3S–6W	QAXX3CT–2005R3S–6W
Pin	Mark	Mark	Mark
1	NC	–V0	–V0
2	–Vo	NC	0V
3	0V	0V	NC
4	+Vo	+Vo	+Vo
5	VCC	VCC	VCC
6	GND	GND	GND
7	CTRL	CTRL	CTRL

Note:
Unit: mm[inch]
Pin size tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]
The layout of the device is for reference only, please refer to the actual product

Package diagram:



Device	MPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
QAxx3(C)T-xxR3S-6W	160	180.0	56.5	28.9	41.2	8.6	40.0	56.0	Q2

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58070023;
2. The leads for the module and IGBT/SiC/MOSFET drives are as short as possible;
3. The output filtering capacitor should be as close as possible to the power supply module and IGBT/SiC/MOSFET driver;
4. The peak of the IGBT/SiC/MOSFET driver gate drive current is high, so low internal resistance electrolytic capacitor is recommended to be used for the power supply module output filter capacitor;
5. The average output power of the driver must be lower than that of the power supply module;
6. Consider fixing with glue near the module if being used in vibration occasion;
7. The maximum capacitive load offered were tested at nominal input voltage and full load;
8. 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;
9. All index testing methods in this datasheet are based on company corporate standards;
10. He above are the performance indicators of the product models listed in this datasheet. Some indicators of non-standard models will exceed The above requirements. For details, please contact our technical staff;
11. Products are related to laws and regulations: see "Features" and "EMC".
12. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.
13. We can provide product customization service, please contact our technicians directly for specific information;

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