Descriptions

10A non-isolated ultra-wide input and buck single output DC-DC converter



RoHS

3 Years Warranty

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Input voltage range: 9 - 60V
- Output voltage range: 0 - 60V
- Output current range: 0 - 10A
- Both output voltage and current are adjustable
- High efficiency up to 95%
- Input under-voltage protection, output short-circuit protection, over-temperature protection
- Operating ambient temperature range: -40℃ to +105℃
- Industry standard 1/8-Brick package and pin-out

Applications

- Robotic field
- Battery powered systems

Selection Guide

Certification	Part No.①	Input			Output			Full Load Efficiency③ (%) Min./Typ.
		Nominal (Range) (VDC)	Max.② (VDC)	Current Limit (A)Typ.	Nominal (Range) (VDC)	Current Limit (A)Typ.	Current Setting Range(A)	
EN/BS EN	DNUEB10-B4836(F)	48 (9-60)	65	12.5	36 (0-60)	12.5	0-10	93/95
--	DNUEB10-B4836(F)-RS							

Note:
①Use ”F” suffix for heat sink mounting;
②Exceeding the maximum input voltage may cause permanent damage;
③Efficiency is measured at nominal input voltage, nominal output voltage and max. output load;
④Product images are for reference only; the actual product shall prevail.

Specifications

Product Specifications	Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load/no-load)		--	7895/25	8065/50	mA
	Surge Voltage (1sec. max.)		-0.7	--	65	VDC
	Start-up Voltage		--	--	9	
	Input Under-voltage Protection		6	7	--	
	Start-up Time	Nominal input voltage, constant resistance load	--	--	100	ms
	Input Filter		C filter			
	Hot Plug		Unavailable			
	Input Reverse Polarity Protection		Unavailable			
	Ctrl①	Module on	Ctrl pin connected to -Vin or low level (0-0.8VDC)			
		Module off	Ctrl open circuit or connected to TTL high level (1.8-5.0VDC)			
		Input current when off	--	5	15	mA
	Input Current Limit	Input voltage range	11	12.5	14	A
Output Specifications	Voltage Accuracy	Constant voltage model, Input voltage range, nominal output voltage, 0-100% load	--	±1	±3	%
	Current Accuracy	Constant current model, nominal Input voltage, nominal output voltage, 100% load	--	±5	±8	
	Output Voltage Adjustment	Vset setup	See Vset function for output voltage adjustment			
		Adjustable range of output voltage	3.3②	--	60	VDC
	Output Current Adjustment	Iset setup	See Iset function for output current adjustment			
		Adjustable range of output current	0	--	10	A
	Temperature Coefficient	Constant voltage model, nominal input voltage, nominal output voltage,100% load	--	--	±0.03	%/℃
	Ripple & Noise③	20MHz bandwidth, constant voltage model, nominal input voltage, nominal output voltage	--	100	300	mVp-p
	Over-temperature Protection④	Max. Case Temperature	--	120	--	℃
	Output Current Limit	Input voltage range	10.5	12.5	14.5	A
General Specifications	Isolation	Input/output-case. Electric Strength Test for 1 minute with a leakage current of 1mA max	1500	--	--	VDC
	Operating Temperature	See temperature derating curves	-40	--	+105	℃
	Storage Temperature		-55	--	+125	
	Storage Humidity	Non-condensing	5	--	95	%RH
	Pin Soldering Resistance Temperature⑤	Soldering spot is 1.5mm away from the case, 10 seconds max.	--	--	+300	℃
		Wave soldering, maximum 10 seconds	255	260	265	
	Pollution Level		PD 3			
	Shock And Vibration		IEC/EN61373 - Category 1, Grade B			
	Switching Frequency		--	160	--	KHz
	Altitude		Altitude: ≤2000m, atmospheric pressure: 80～110KPa			

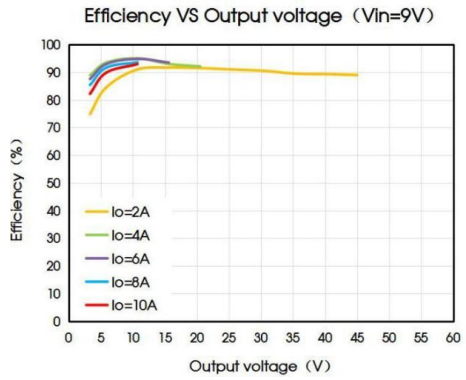
Mechanical Specifications	Dimension	DNUEB10-B4836(-RS)	60.80 × 25.00 × 12.70 mm
		DNUEB10-B4836F(-RS)	60.80 × 36.83 × 12.70 mm
	Weight	DNUEB10-B4836(-RS)	53.0g(Typ.)
		DNUEB10-B4836F(-RS)	58.2g(Typ.)
	Cooling Method	Free air convection (20LFM)	

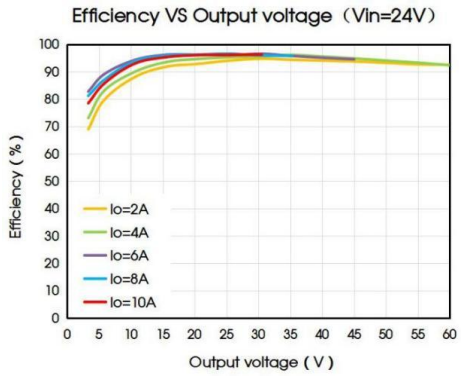
Note:
①The Ctrl pin voltage is referenced to input -Vin. When Pin of Vset and Iset are floating, there will be voltage and current output after power on. Please put the Ctrl pin in a high impedance state or connect to a high level before the product is powered on.
②The "Tip and barrel" method is used for ripple and noise test, please refer to Fig. 6. and DC-DC Converter Application Notes for specific information;
③The product can work in constant current mode when the output voltage at 0-3.3V;
④Over-temperature protection is in the form of product output shutdown;
⑤The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder joints. The actual temperature set by the customer should be determined comprehensively based on factors such as PCB thickness, copper coverage, soldering iron power, and soldering iron tip selection.

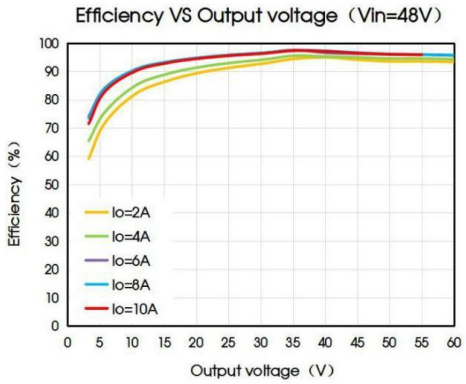
Electromagnetic Compatibility (EMC)

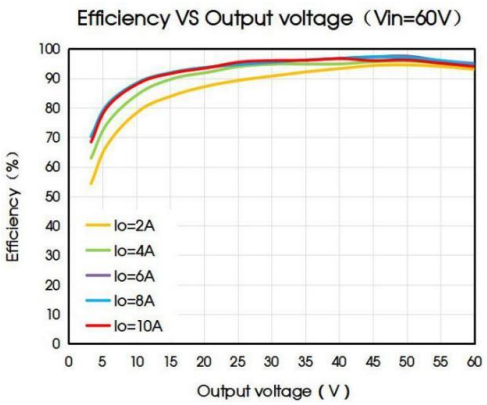
Emissions	CE	CISPR32/EN55032	CLASS A (see Fig. 7 for recommended circuit)
	RE	CISPR32/EN55032	CLASS A (see Fig. 7 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV
	RS	IEC/EN61000-4-3	10V/m
	EFT	IEC/EN61000-4-4	±2KV (see Fig. 7 for recommended circuit)
	Surge	IEC/EN61000-4-5	line to line ±2KV (see Fig. 7 for recommended circuit)
	CS	IEC/EN61000-4-6	10 Vr.m.s

Characteristic Curve

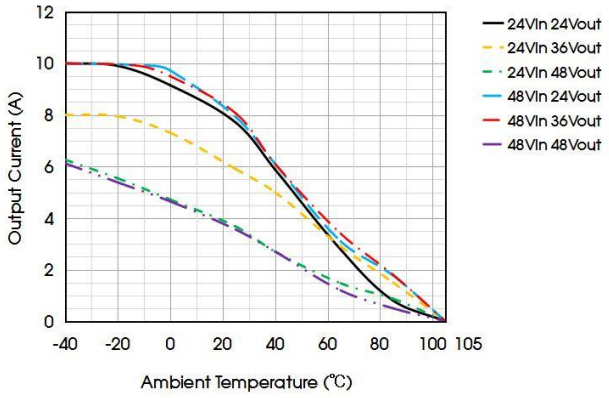




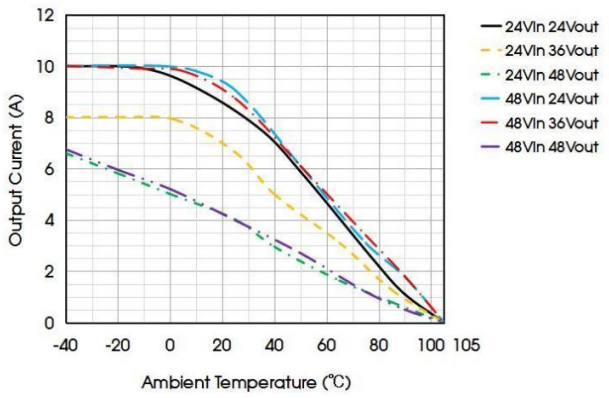




DNUEB10-B4836(-RS) Temperature Derating Curves
(20LFM)

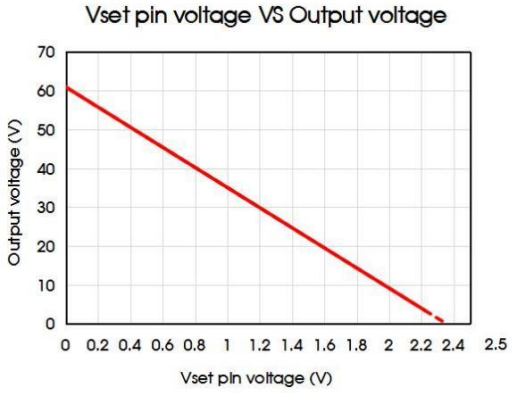


DNUEB10-B4836F(-RS) Temperature Derating Curves
(20LFM)



Vset Function for Output Voltage Adjustment

1. DNUEB10-B4836(F): The Vset pin is connected to the external voltage Vf for adjustment:



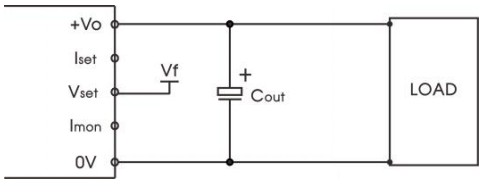


Fig. 1

Calculation formula of output voltage adjustment:

$$Vo = 60.9 - 25.9V_f$$

Notes:

1. Adjustable range of output voltage: 3.3-60V;
2. Vf is the externally supplied voltage which range from 0V to 2.5V. The Vf voltage is referenced to output 0V;
3. Vset pin must not be opened.

2. DNUEB10-B4836(F)-RS: The Vset pin is connected to the external resistance for adjustment:

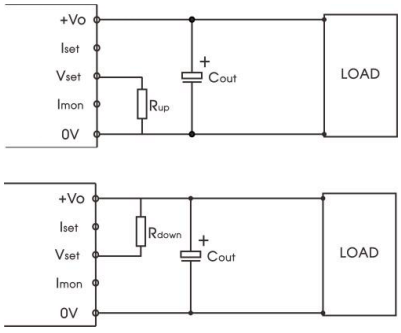


Fig. 2

Calculation formula of output voltage adjustment:

up: $$Vo = 60 - \frac{29.934R_{up}}{2.87 + R_{up}}$$

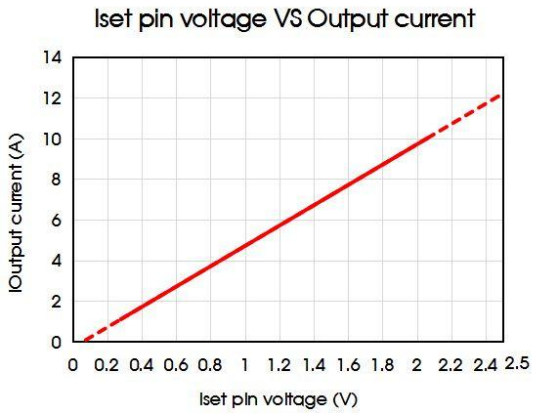
down: $$Vo = \frac{30.066R_{down} + 172.19}{74.046 + R_{down}}$$

Notes:

1. Adjustable range of output voltage: 3.3-60V;
2. When the Vset pin is open, the output voltage of the product is 30V;
3. Rup and Rdown are external resistance, in kΩ.

Iset Function for Output Current Adjustment

1. DNUEB10-B4836(F): The Iset pin is connected to the external voltage Vf for adjustment:



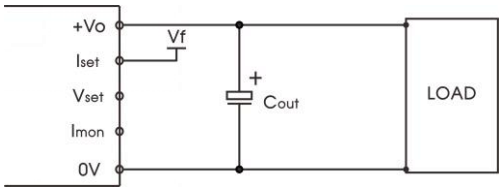


Fig. 3

Calculation formula of output current adjustment:

$$I_o = 5V_f - 0.3$$

Notes:

1. Adjustable range of output current: 0-10A;
2. Vf is the externally supplied voltage which range from 0V to 2.5V. The Vf voltage is referenced to output 0V;
3. Iset pin must not be opened.

2. DNUEB10-B4836(F)-RS: The Iset pin is connected to the external resistance for adjustment:

(1) When the maximum output current is set between 0-10A:

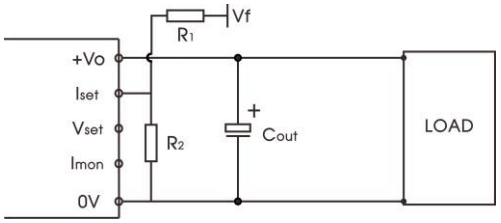


Fig. 4

Recommended Parameter Setting:

1. Vf is 5V;
2. R1 is 10kΩ.

Calculation formula of output current adjustment:

$$I_o = 11.925 - \frac{270.73R_2}{10.59R_2+88.79}$$

Notes:

1. Adjustable range of output current: 0-10A;
2. When using external resistance to adjust Iset current, external auxiliary power supply and regulating resistance are needed. Please ensure that the external resistance meets the power and withstand voltage requirements;
3. R2 is external resistance, in kΩ. When R2 value range is 0-10kΩ, it can meet the requirements of output current regulation range;
4. When the Iset pin is opened, the output current ≤7A.

(2) When the maximum output current is set between 5-10A:

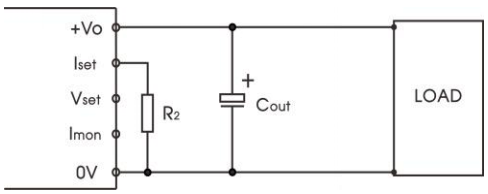


Fig. 5

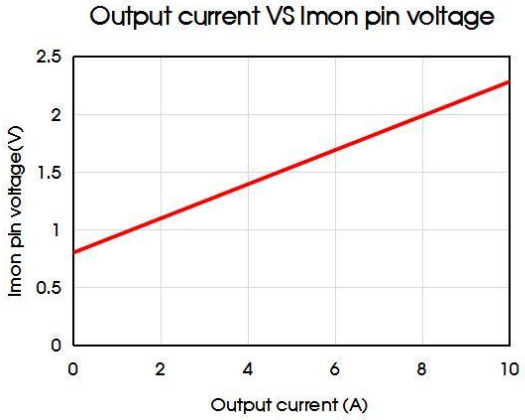
Calculation formula of output current adjustment:

$$I_o = \frac{1209}{3R_2+155.82} + 4.87$$

Notes:

1. Adjustable range of output current: 5-10A;
2. R2 is external resistance, in kΩ;
3. When the Iset pin is opened, the output current ≤7A.

The Output Current Detection Imon



Calculation formula of the Imon pin voltage and output current:

$$V_{Imon} = \frac{3.64 + 0.676Io}{4.568}$$

Notes:
1. VImon is the Imon pin voltage, in V. The VImon voltage is referenced to output 0V.
2. Io is the output current, in A.

Design Reference

1. Typical application

1.During testing and application, please follow the recommended test circuit (Figure 6); Be sure to connect an electrolytic capacitor Cin (≥ 220μF) at the input to suppress the surge voltage that may be generated at the input terminal, and connect an electrolytic capacitor Cout(≥ 220μF) at the output, used for output filtering.

2. If the input terminal of the product is connected in parallel with a circuit with large transient energy (such as a parallel motor drive circuit), it may cause the input voltage of the product to be pulled down. Please pay attention to the fluctuation of the input voltage of the product, and it is recommended to increase the electrolytic capacitor at the input terminal appropriately. The capacitance value of Cin is to ensure the stability of the input terminal voltage and avoid the situation that the input voltage is lower than the undervoltage protection point and the product restarts repeatedly.

3. If the output terminal of the product is an inductive load (such as a relay, a motor), it is recommended to increase the value of the output capacitor Cout and add a TVS to filter out the voltage spikes.

4. 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).

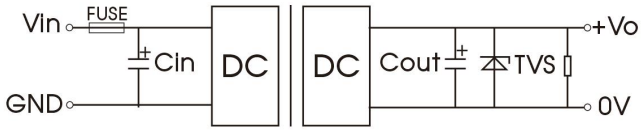


Fig. 6

FUSE	Cin	Cout	TVS
20A, slow	220μF/100V	220μF/100V	85V

Note:

①Please pay attention to the ambient temperature of the product when using an external capacitor, increase the electrolytic capacitor values to at least 1.5 times the original parameter if the ambient temperature is low.

2. EMC solution-recommended circuit

We recommended using the circuit shown in Fig.7 during product EMC testing and application.

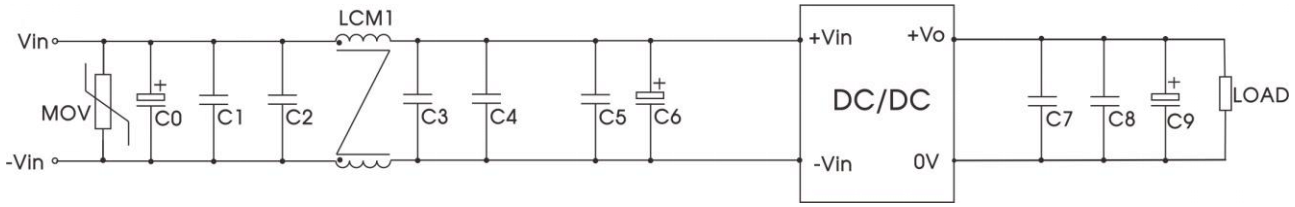


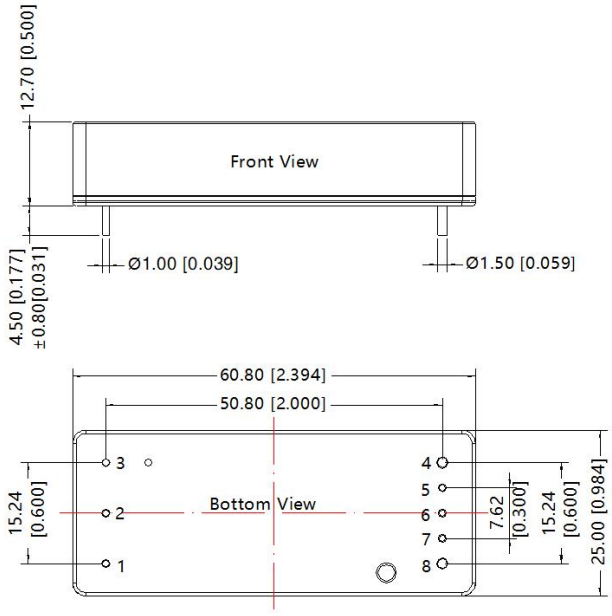
Fig. 7

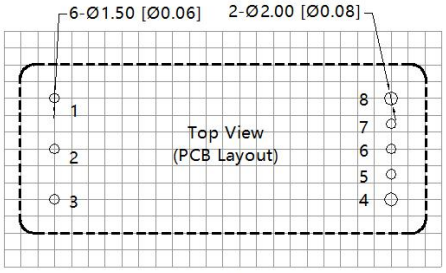
Components	Recommended Component Value
MOV	S14K60 (Varistor)
C0	680μF/100V electrolytic capacitor
C6	470μF/100V electrolytic capacitor
C9	470uF/100V electrolytic capacitor
C1, C2, C3, C4, C5, C7, C8	4.7μF/100V ceramic capacitor
LCM1	T24 x 23.5 x 19/4mH/35mΩmax

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

DNUEB10-B4836(-RS) Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



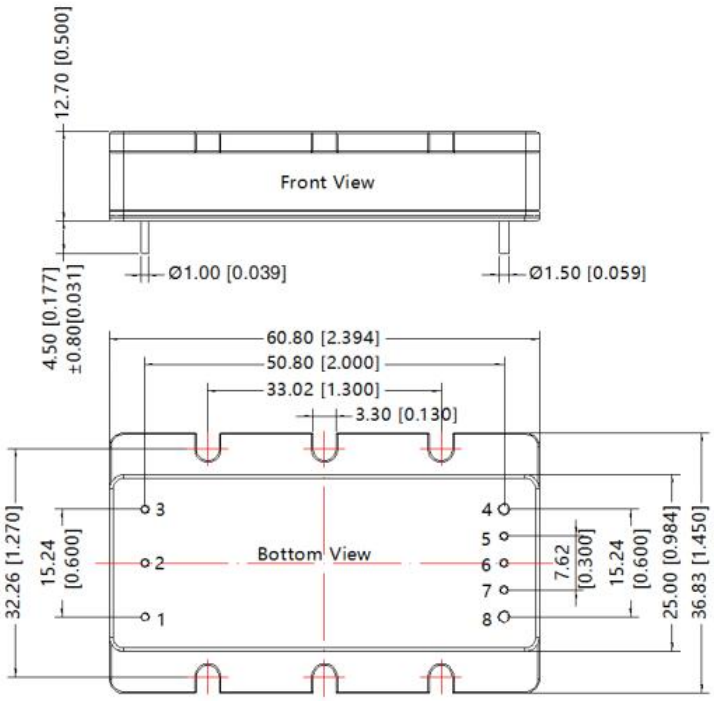


Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin1,2,3,5,6,7 diameter: 1.00[0.039]
Pin4,8 diameter: 1.50[0.059]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

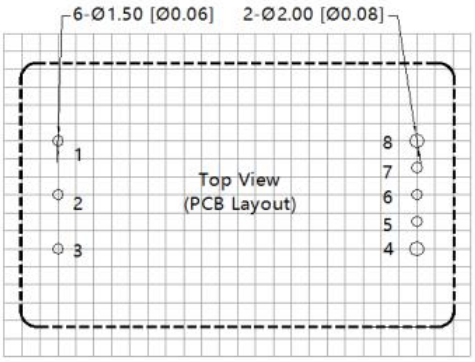
Pin-Out			
Pin	Mark	Pin	Mark
1	+Vin	5	Iset
2	Ctrl	6	Vset
3	-Vin	7	Imon
4	0V	8	+Vo

DNUEB10-B4836F(-RS) Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin1,2,3,5,6,7 diameter: 1.00[0.039]
Pin4,8 diameter: 1.50[0.059]
Pin diameter tolerances: ±0.10[±0.004]
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THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

Pin-Out			
Pin	Mark	Pin	Mark
1	+Vin	5	Iset
2	Ctrl	6	Vset
3	-Vin	7	Imon
4	0V	8	+Vo

Note:

1. 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;
2. 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;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. Products are related to laws and regulations: see "Features" and "EMC";
5. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
6. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.