10W isolated DC-DC converter in DIP/SMD package
Ultra-wide input and regulated single output

Patent Protection

3 years Warranty

c UL us UL62368-1 | CE Report EN62368-1 | UKCA Report BS EN62368-1 | CB RoHS IEC62368-1

FEATURES

- Ultra-wide 4:1 input voltage range
- Ultra-thin DIP/SMD Package
- High efficiency up to 88%
- No-load power consumption as low as 0.096W
- I/O isolation test voltage 500VAC /1500VDC
- Operating ambient temperature range: -40℃ to +85℃
- Input under-voltage protection, output short circuit, over-current, over-voltage protection

URB_J(M)D/T-10W series of isolated 10W DC-DC converter products have an ultra-wide 4:1 input voltage and feature efficiencies of to 88%, input to output isolation is tested with 500VAC / 1500VDC, input under-voltage protection, output over-voltage, over-current, short circuit protection and they are widely used in applications such as industrial control, electricity, instruments and communication fields.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency③ (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.②	Voltage(VDC)	Current (mA) Max./Min.		
UL/EN/BS EN/IEC	URB2405J(M)D/T-10W	24 (9-36)	40	5	2000/0	82/84	2200
	URB2412J(M)D/T-10W			12	833/0	85/87	680
	URB2415J(M)D/T-10W			15	667/0	86/88	470
EN/BS EN	URB2424JMT-10W			24	417/0	85/87	220

Notes:
① URBxxxxJ(M)D/T-10W contains 4 types of products, include URBxxxxJD-10W (DIP package without case), URBxxxxJMD-10W (DIP package with case), URBxxxxJT-10W (SMD package without case) and URBxxxxJMT-10W (SMD package with case);
② Exceeding the maximum input voltage may cause permanent damage;
③ Efficiency is measured In 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	5VDC output	--	496/4	508/40	mA
		12VDC output	--	479/4	490/12	
		15VDC output	--	474/4	485/15	
		24VDC output	--	479/4	490/17	
Reflected Ripple Current	Nominal input voltage		--	40	--	
Surge Voltage (1sec. max.)			-0.7	--	50	VDC
Start-up Voltage			--	--	9	
Input Under-voltage Protection			5.5	6.5	--	
Input Filter			Pi filter			
Hot Plug			Unavailable			
Ctrl*	Operating temperature range	Module on	Ctrl pin pulled low to GND (0-1.2VDC)			
		Module off	Ctrl pin open or pulled high (2.4-12VDC)			
	Normal temperature @25℃	Input current when switched off	--	6	--	mA

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

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy	0% -100% load	--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5	
Load Regulation①	5% -100% load	--	±0.5	±1	%
Transient Recovery Time	25% load step change, nominal input voltage	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Coefficient	Full load	--	--	±0.03	%/℃
Ripple & Noise②	20MHz bandwidth, 5% -100% load	--	50	100	mVp-p
Trim	Nominal input voltage	--	±5	--	%Vo
Over-voltage Protection	Input voltage range	110	--	160	
Over-current Protection		110	140	200	%Io
Short-circuit Protection		Hiccup, continuous, self-recovery			

Note:
①Load regulation for 0%-100% load is ±5%;
②Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specification

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 5mA max		500	--	--	VAC
	Input-case	Electric Strength Test for 1 minute with a leakage current of 5mA max (only for URB_JMD/JMT-10W series products)	500	--	--	
	Output-case		500	--	--	
	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max		1500	--	--	VDC
	Input-case	Electric Strength Test for 1 minute with a leakage current of 1mA max (only for URB_JMD/JMT-10W series products)	1500	--	--	
	Output-case		1500	--	--	
Insulation Resistance	Input-output resistance at 500VDC, Ta=25℃, humidity=70%RH		100	--	--	MΩ
	Input-case	resistance at 500VDC, Ta=25℃, humidity=70%RH (only for URB_JMD/JMT-10W series products)	100	--	--	
	Output-case		100	--	--	
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	1000	--	pF
Operating Temperature	See Fig. 1		-40	--	+85	℃
Storage Humidity	Non-condensing		5	--	95	%RH
Storage Temperature			-55	--	+125	℃
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	+300	
Reflow soldering Temperature	Only for URB_J(M)T-10W series products		Peak temp.≤245℃, maximum duration time≤60s over 217℃. For actual application, please refer to IPC/JEDEC J-STD-020D.1.			
Vibration			10-150Hz, 5G, 90Min. along X, Y and Z			
Switching Frequency *	PWM mode		--	350	--	kHz
MTBF	MIL-HDBK-217F@25℃		1000	--	--	k hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1		Level 1			

Note: *Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

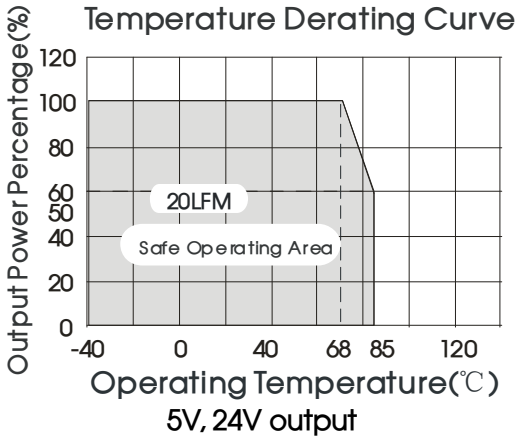
Mechanical Specifications

Case Material	Aluminum alloy	
Dimensions	URB_JD-10W series	39.20 x 20.80 x 6.10mm
	URB_JT-10W series	41.40 x 20.80 x 6.30mm
	URB_JMD-10W series	40.20 x 22.00 x 6.80mm
	URB_JMT-10W series	41.40 x 22.00 x 7.00mm
Weight	URB_JD/JT-10W series	5.7g(Typ.)
	URB_JMD/JMT-10W series	6.7g(Typ.)
Cooling method	Free air convection（20LFM）	

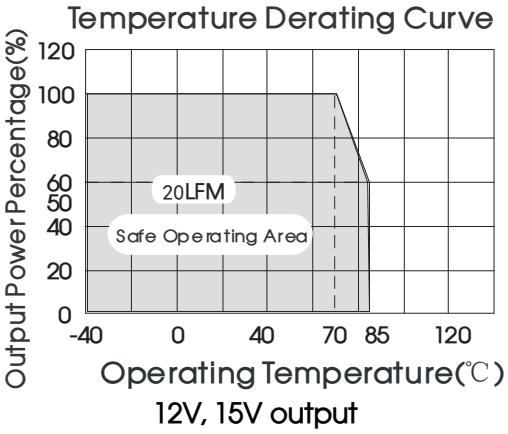
Electromagnetic compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A(without extra components)/CLASS B (see Fig.3-① for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3-① 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	±2kV (see Fig.3-② for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig.3-② for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

Typical Characteristic Curves

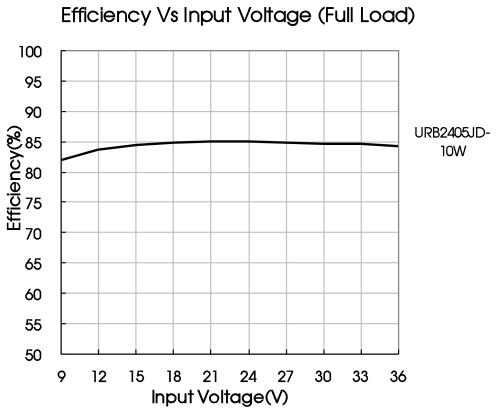


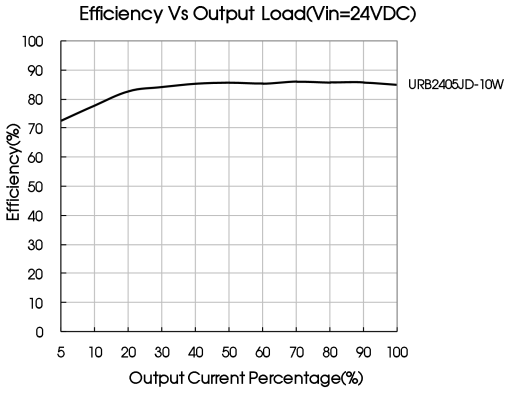
5V, 24V output

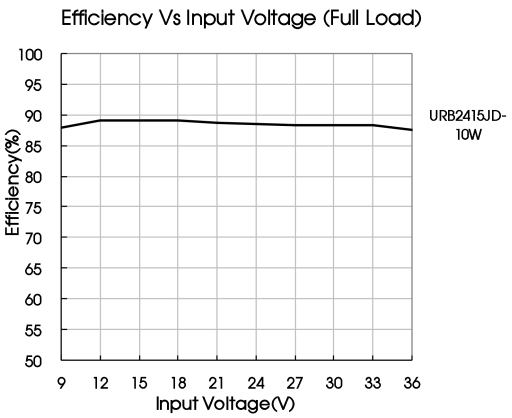


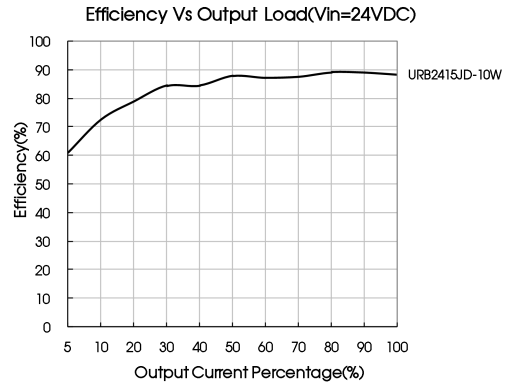
12V, 15V output

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 max. capacitive load value of the product.

Fig. 2

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

2. EMC compliance circuit

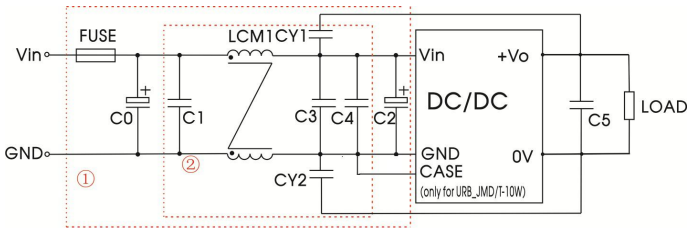


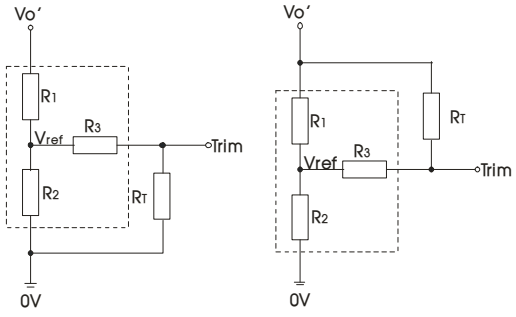
Fig. 3
Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

lists of components:

Model	Vin: 24VDC
FUSE	Choose according to actual input current
C0	680μF/100V
C1/C3/C4	4.7μF/50V
C2	470μF/100V
C5	10μF/25V
LCM1	3.3mH
CY1/CY2	1000pF/≥2000VDC

Note: *For URBxxxxJMD/T-10W, the case should be connected to input pin GND when testing EMC performance

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



Trim up Trim down

TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

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

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

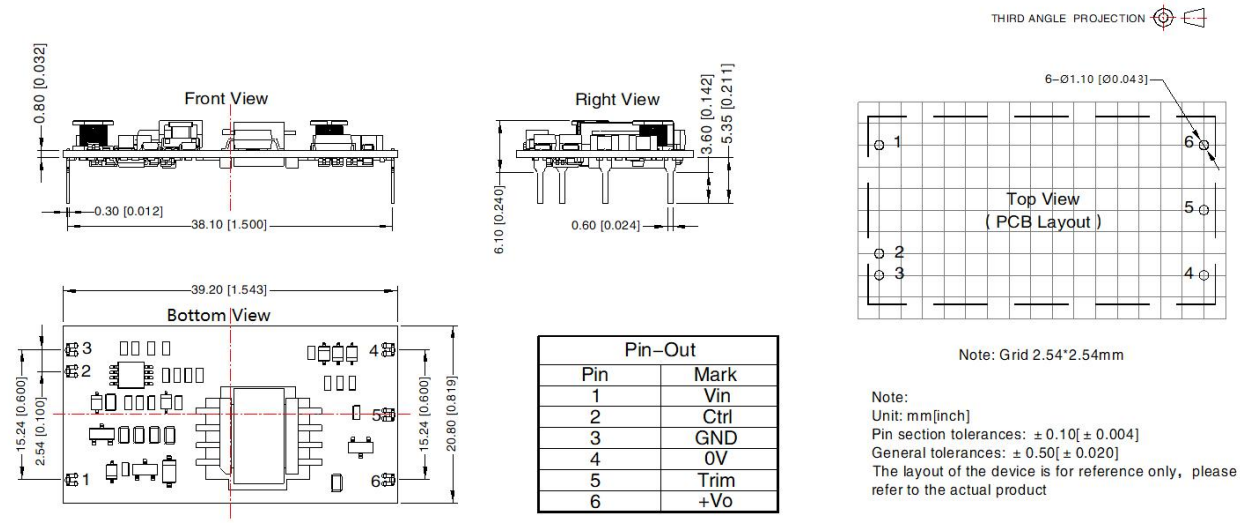
R_T= Trim Resistor value;
a= self-defined parameter;
Vo'=desired output voltage.

Vout(VDC)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
5	2.94	2.87	15	2.5
12	11	2.87	17.4	2.5
15	14.5	2.87	15	2.5
24	24.87	2.87	15	2.5

4. It is not allowed to connect modules output in parallel to enlarge the power

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

URB_JD-10W（DIP package without case）Dimensions and Recommended Layout

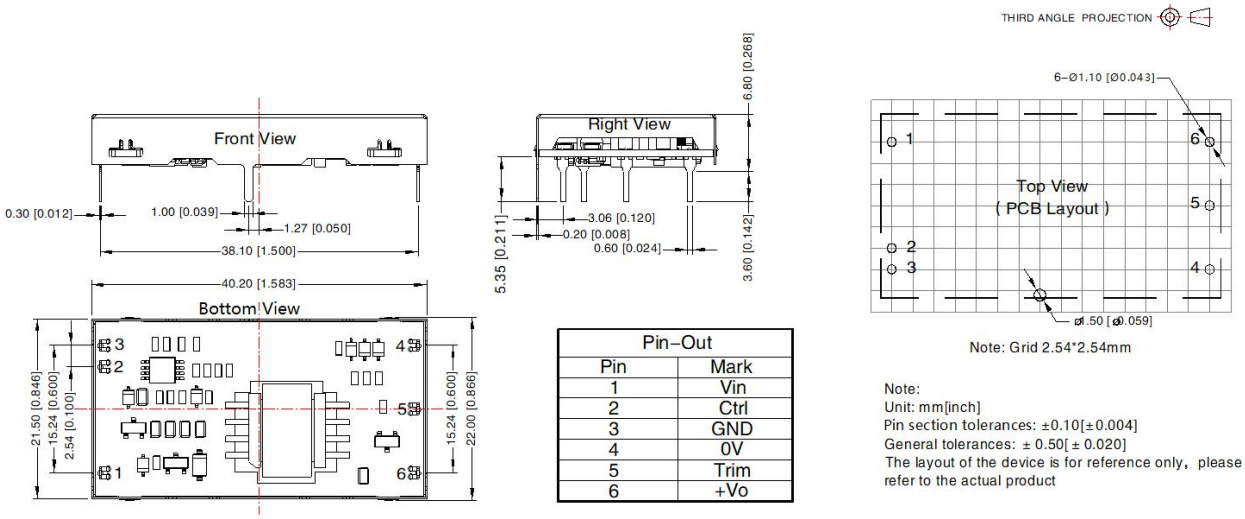


Pin-Out	
Pin	Mark
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo

Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section 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

URB_JMD-10W（DIP package with case）Dimensions and Recommended Layout

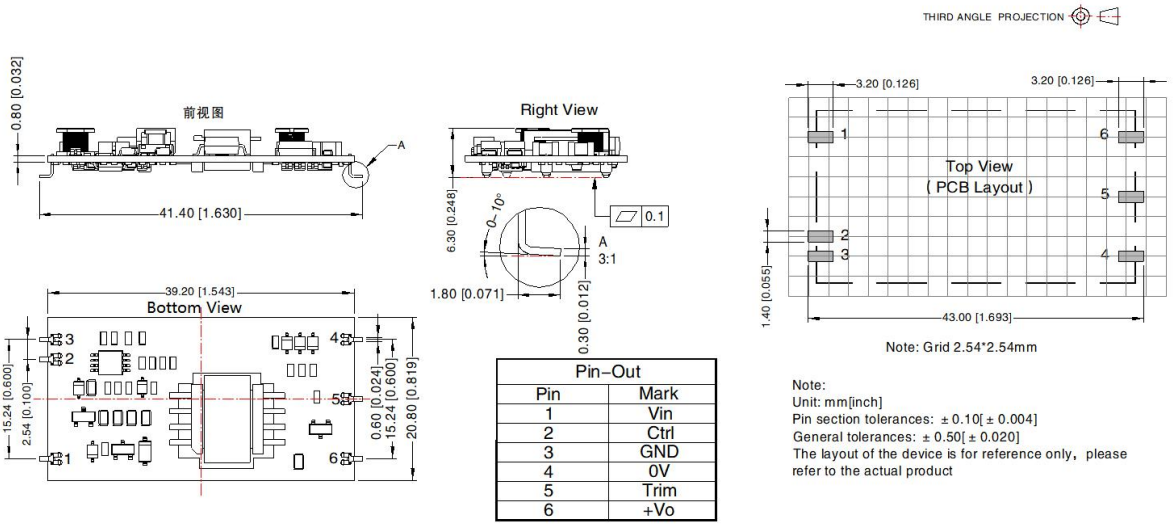


Pin-Out	
Pin	Mark
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo

Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section 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

URB_JT-10W（SMD package without case）Dimensions and Recommended Layout

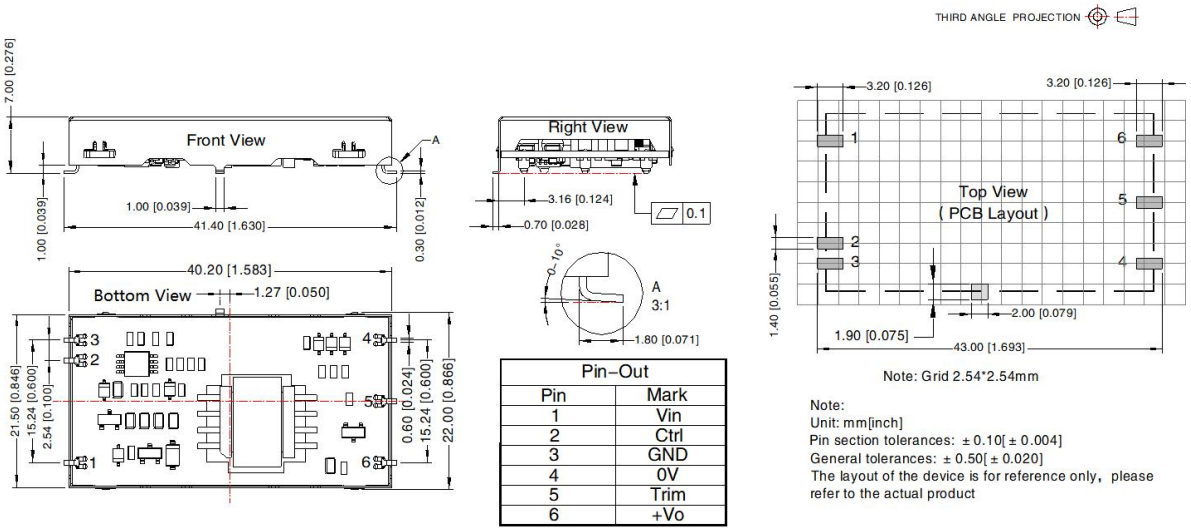


Pin-Out	
Pin	Mark
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo

Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section 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

URB_JMT-10W（SMD package with case）Dimensions and Recommended Layout



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

Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section 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

Note:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number :58210124;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on 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.

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