DC/DC Converter
SU/SVRB_J(M)T/D-3W Series

3W isolated DC-DC converter in DIP/SMD package
Ultra-wide input and regulated single output

CE Patent Protection RoHS

FEATURES

- Ultra-wide input voltage range
- High efficiency up to 82%
- No-load power consumption as low as 0.1W
- 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
- Optional package: DIP/SMD
- 6.8mm ultra-thin package
- EN62368 approved

SU/SVRB_J(M)T/D-3W series of isolated 3W DC-DC converter products have an ultra-wide input voltage and feature efficiencies of to 82%, 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.	Max. Capacitive Load (μF)
		Nominal (Range)	Max.②	Voltage (VDC)	Current (mA) Max./Min.		
CE	SVRB0505J(M)T/D-3W	5 (4.5-9)	12	5	600/0	70/72	470
	SVRB0512J(M)T/D-3W			12	250/0	74/76	220
	SVRB0515J(M)T/D-3W			15	200/0	75/77	100
	SVRB0524J(M)T/D-3W			24	125/0	74/76	47
	SURB2403J(M)T/D-3W	24 (9-36)	40	3.3	600/0	70/72	1000
	SURB2405J(M)T/D-3W			5	600/0	75/77	1000
	SURB2412J(M)T/D-3W			12	250/0	79/81	470
	SURB2415J(M)T/D-3W			15	200/0	80/82	330
	SURB2424J(M)T/D-3W			24	125/0	79/81	100

Notes:
① SU/SVRBxxxxJ(M)D/T-3W contains 4 types of products, include SU/SVRBxxxxJD-3W (DIP package without case), SU/SVRBxxxxJMD-3W (DIP package with case), SU/SVRBxxxxJT-3W (SMD package without case) and SU/SVRBxxxxJMT-3W (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 input	--	833/20	857/45	mA
		24VDC input	--	164/4	169/15	
Reflected Ripple Current	Nominal input voltage		--	100	--	
Surge Voltage (1sec. max.)	5VDC input		-0.7	--	16	VDC
	24VDC input		-0.7	--	50	
Start-up Voltage	SVRB05xxJ(M)D/T-3W series		--	--	4.5	
	SURB24XXJ(M)D/T-3W series		--	--	9	
Shut-down Voltage	SVRB05xxJ(M)D/T-3W series		2.5	--	--	
	SURB24XXJ(M)D/T-3W series		5.5	--	--	
Input Filter	SVRB05xxJ(M)D/T-3W series		LC filter			
	SURB24XXJ(M)D/T-3W series		C filter			

Hot Plug		Unavailable			
Ctrl*	Module on	Ctrl pin pulled low to GND (0-0.3VDC)			
	Module off	Ctrl pin open or pulled high (2-12VDC)			
	Input current when switched off	--	5	10	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	±2	%
Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
Load Regulation①	5% -100% load		--	--	±1	
Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
Transient Response Deviation	25% load step change, nominal input voltage	3.3 VDC output	--	±5	±10	%
		5 VDC output	--	±5	±8	
		others output	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise②	20MHz bandwidth, 5% -100% load		--	50	100	mVp-p
Trim			--	±5	--	%Vo
Over-voltage Protection	Input voltage range		110	--	160	
Over-current Protection			110	160	250	%Io
Short-circuit Protection			Hiccup, continuous, self-recovery			

Note:
①Load regulation for 0%-100% load is ±5%;
②Ripple & Noise at＜5% load is 5%Vo max. 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		500	--	--	
	Output-case		500	--	--	
	Input-output	Electric Strength Test for 1 minute with a leakage current of 1mA max	1500	--	--	VDC
	Input-case		1500	--	--	
	Output-case		1500	--	--	
Insulation Resistance	Input-output	Resistance at 500VDC, 70%RH @25℃	100	--	--	MΩ
	Input-case		100	--	--	
	Output-case		100	--	--	
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V		--	1000	--	pF
Operating Temperature	See Fig. 1		-40	--	+85	℃
Storage Temperature			-55	--	+125	
Storage Humidity	Non-condensing		5	--	95	%RH
Pin Soldering Resistance Temperature	Wave-soldering (soldering time:10 seconds)		--	--	260	℃
	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	
Reflow soldering Temperature	Only for SU/SVRB_J(M)T 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			
Shock			50G, 11ms once each along X, Y and Z axis			
Switching Frequency①	PWM mode		--	330	--	KHz

MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 1			
Note:①Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.					

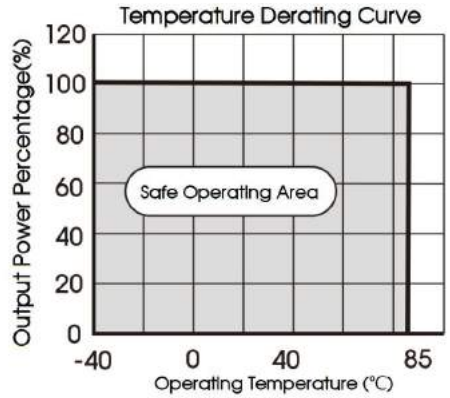
Mechanical Specifications

Case Material	Only for SU/SVRB_JMD/JMT-3W series products	Aluminum alloy
Dimensions	JD series	24.00 x 15.10 x 6.19mm
	JT series	26.20 x 15.10 x 6.19mm
	JMD series	25.00 x 16.40 x 6.80mm
	JMT series	26.20 x 16.40 x 6.80mm
Weight	JD/JT series	2.2g (Typ.)
	JMD/JMT series	3.5g (Typ.)
Cooling method	Free air convection（20LFM）	

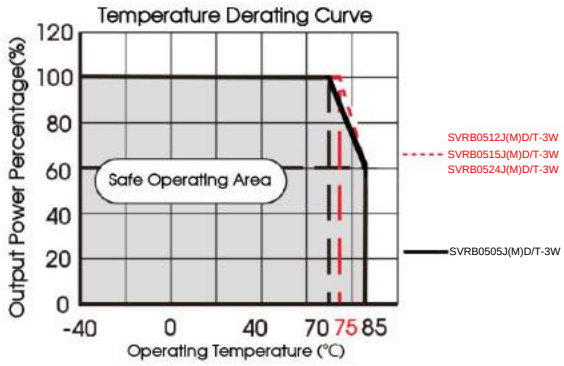
Electromagnetic compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3-② 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.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2KV (see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
Note: For U/VRBxxxxJMD/T-3W series, the case should be connected to input pin GND when testing EMC performance.				

Typical Characteristic Curves

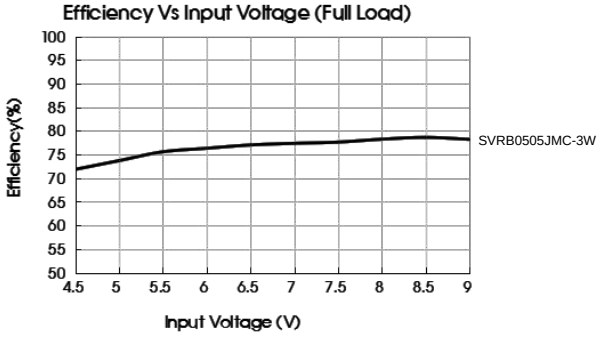


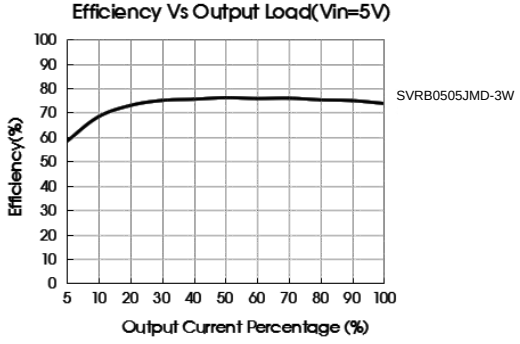
SURB24xxJ(M)T/D-3W

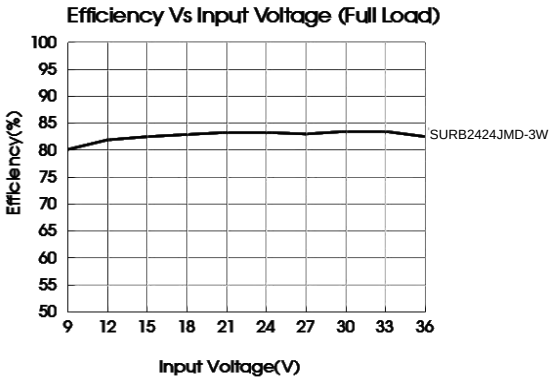


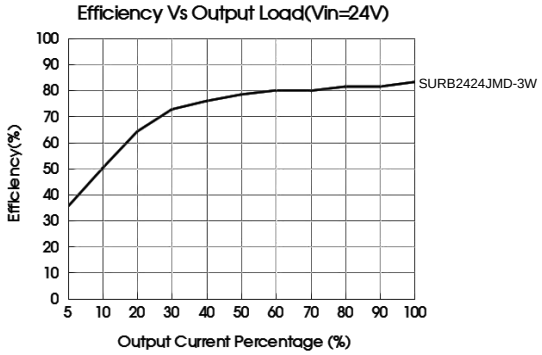
SVRB05xxJ(M)T/D-3W

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)	Cout (μF)	Cin (μF)
3.3	10	100
5		
12		
15		
24		

2. EMC compliance circuit

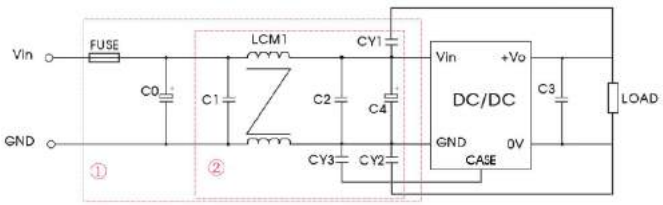


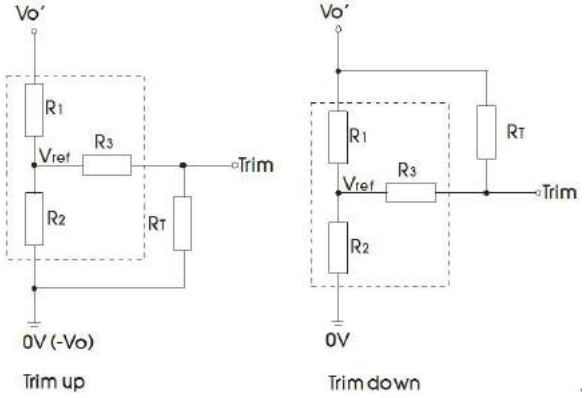
Fig. 3

Notes:
1. For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.
2. CASE pin only refer to SU/SVRBxxxxJMD/T-3W.

lists of components:

Model	Vin: 5VDC	Vin: 24VDC
FUSE	Choose according to actual input current	
C0	2200μF/35V	1000μF/50V
C1	4.7μF/50V	
C2	4.7μF/50V	
C4	100μF/50V	220μF/50V
C3	Refer to the Cout in Fig.2	
LCM1	2.2mH, recommended to use SCHMID-M P/N: SFL2D-30-222	
CY1/CY2/CY3	2.2nF/2KV	

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



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

up: $R_T = \frac{aR_2}{R_2-a} - R_3$ $\quad a = \frac{Vref}{Vo'-Vref} \cdot R_1$

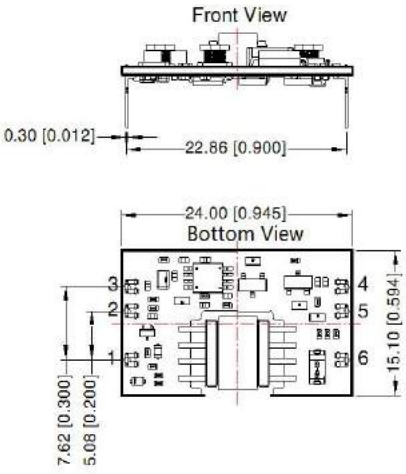
down: $R_T = \frac{aR_1}{R_1-a} - R_3$ $\quad a = \frac{Vo'-Vref}{Vref} \cdot R_2$

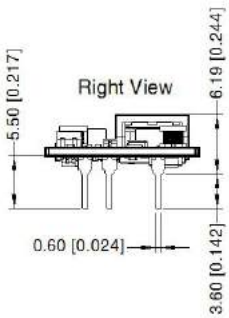
R_T= Trim Resistor value;
a= self-defined parameter;
Vo'=desired output voltage.
SU/SVRBxxxxJMD-3W Trim up need to connect to"0V".

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.80	2.87	10	1.25
5	2.87	2.87	10	2.5
12	10.91	2.87	15	2.5
15	14.35	2.87	15	2.5
24	24.77	2.87	17.4	2.5

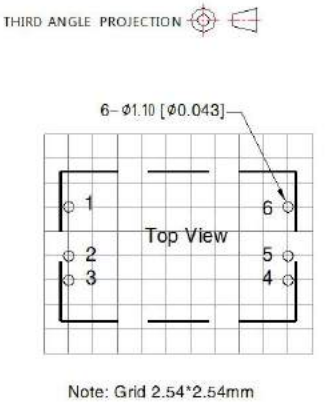
3. It is not allowed to connect modules output in parallel to enlarge the power

SU/SVRB_JD-3W Dimensions and Recommended Layout



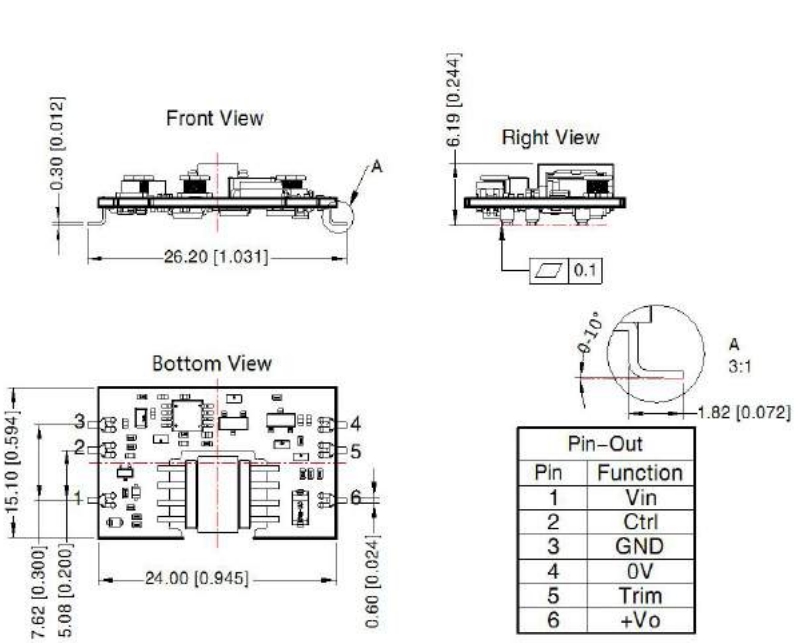


Pin-Out	
Pin	Function
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo

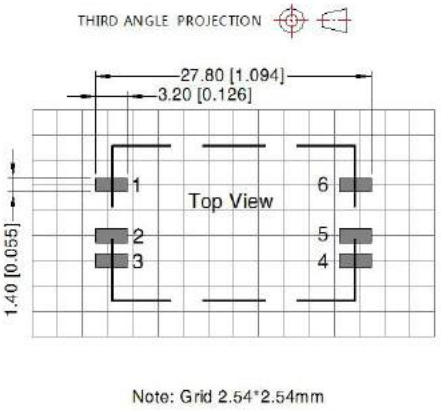


Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
The layout of the device is for reference only , please refer to the actual product

SU/SVRB_JT-3W Dimensions and Recommended Layout



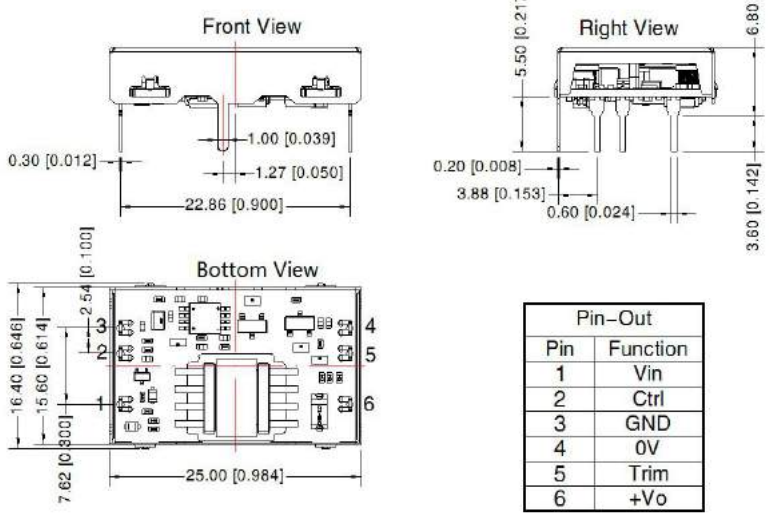
Pin-Out	
Pin	Function
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo



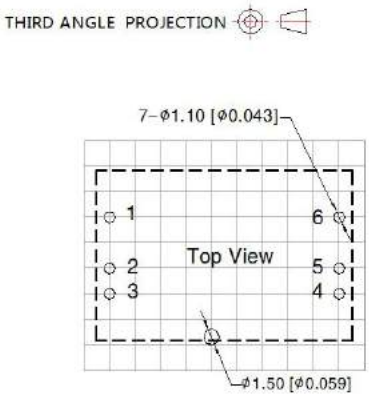
Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin diameter 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

SU/SVRB_JMD-3W Dimensions and Recommended Layout



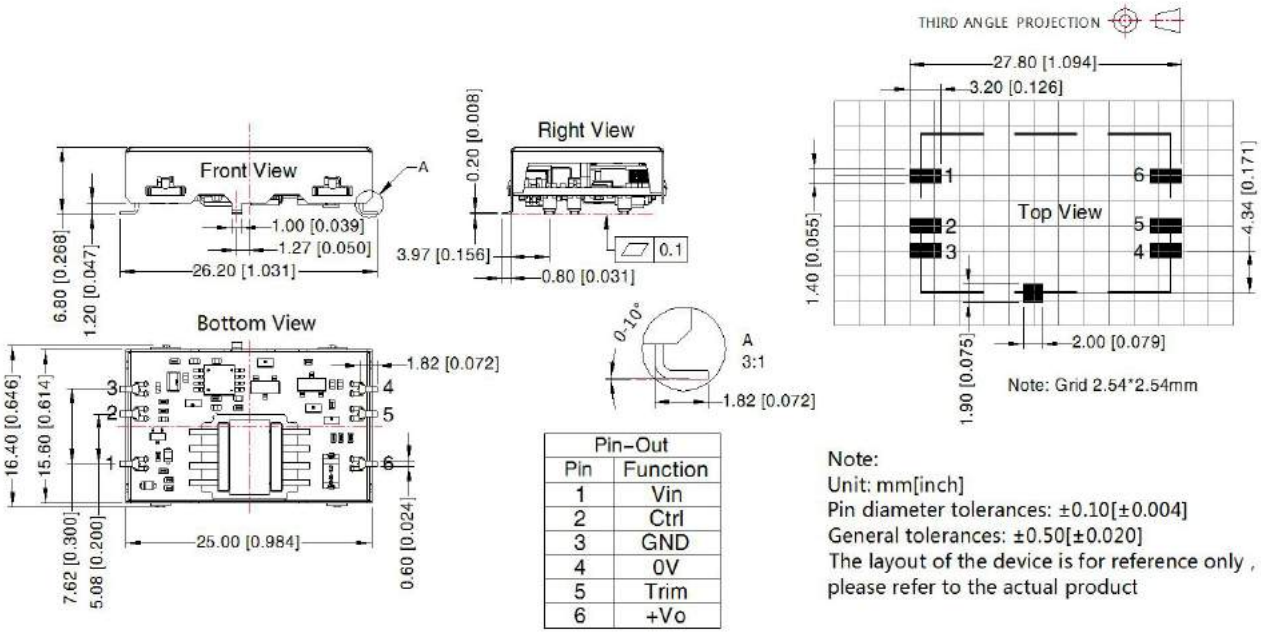
Pin-Out	
Pin	Function
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo



Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin diameter 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

SU/SVRB_JMT-3W Dimensions and Recommended Layout



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

Note:
Unit: mm[inch]
Pin diameter 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. The maximum capacitive load offered were tested at input voltage range and full load;
2. 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;
3. All index testing methods in this datasheet are based on company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.