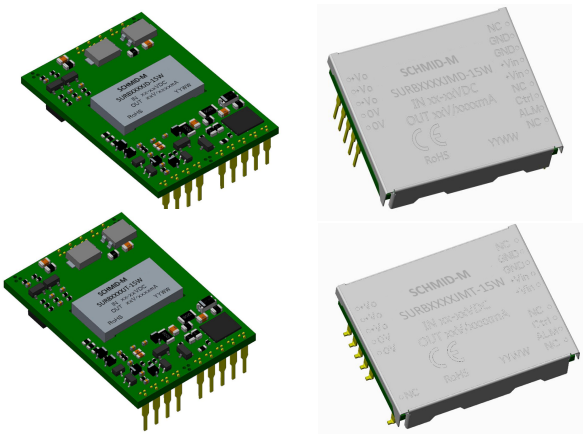
DC/DC Converter
SURB_J(M)D/T-15W Series

15W isolated DC-DC converter in DIP/SMD package, Ultra-wide input and regulated single output



CE Patent Protection RoHS

FEATURES

- Ultra-wide 4:1 input voltage range
- Ultra-thin DIP/SMD Package
- High efficiency up to 89%
- No-load power consumption as low as 0.36W
- I/O isolation test voltage 1.5kVDC
- Operating ambient temperature range -40℃ to +85℃
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- EN62368 approved
- Meets UL62368, IEC62368 standards

SURB_J(M)D/T-15W series are isolated 15W DC-DC converter products with a 4:1 input voltage range. They feature efficiencies up to 89%, 1500VDC I/O isolation, input under-voltage protection, output over-voltage, over-current and short-circuit protection. They are ideally and widely used in applications such as industrial control, electric power, instruments and communications.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency ③ (%)Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max. ②	Voltage (VDC)	Current (mA) (Max./Min.)		
CE	SURB2403J(M)D/T-15W	24 (9-36)	40	3.3	4500/0	86/88	4700
	SURB2405J(M)D/T-15W			5	3000/0	86/88	4700
	SURB2412J(M)D/T-15W			12	1250/0	87/89	1000
	SURB2415J(M)D/T-15W			15	1000/0	87/89	820
	SURB4803J(M)D/T-15W	48 (18-75)	80	3.3	4500/0	86/88	4700
	SURB4805J(M)D/T-15W			5	3000/0	86/88	4700
	SURB4812J(M)D/T-15W			12	1250/0	87/89	1000
	SURB4815J(M)D/T-15W			15	1000/0	87/89	820

Notes:
① SURBxxxxJ(M)D/T-15W contains 4 types of products, include SURBxxxxJD-15W(DIP package without case), SURBxxxxJMD-15W(DIP package with case), SURBxxxxJT-15W(SMD package without case) and SURBxxxxJMT-15W(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	24V input	3.3V, 5V output	--	710/40	727/60	mA
			12V, 15V output	--	702/15	718/30	
		48V input	3.3V, 5V output	--	355/30	363/45	
			12V, 15V output	--	351/10	360/25	
Reflected Ripple Current	Nominal input voltage			--	30	--	
Surge Voltage (1sec. max.)	24V input			-0.7	--	50	VDC
	48V input			-0.7	--	100	
Start-up Voltage	24V input			--	--	9	
	48V input			--	--	18	
Input Under-voltage Protection	24V input			5.5	6.5	--	
	48V input			12	15.5	--	

Start-up Current	24V input	--	--	3000	mA
	48V input	--	--	1500	
Input Filter		Pi filter			
Hot Plug		Unavailable			
Ctrl*	Module on	Ctrl pin open , Ctrl pin pulled low to GND or pulled low (0-1.2VDC)			
	Module off	Ctrl pin pulled high (3.5-12VDC)			
	Input current when off	--	6	15	mA
Alarm	Valm(relative to GND), when under-voltage protection is going to happen and during the over-voltage protection working status.	--	0.2	1.2	VDC
	Valm(relative to GND), other working status	3.5	9	--	

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

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output 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		--	±0.5	±1	
Transient Recovery Time	25% load step change, nominal input		--	300	500	μs
Transient Response Deviation		3.3V, 5V output	--	±3	±8	%
		Other output	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise②	20MHz bandwidth, 5% -100% load		--	50	100	mVp-p
Output Over-voltage Protection	Input voltage range		110	--	160	%Vo
Output Over-current Protection			110	180	230	%Io
Short-circuit Protection			Hiccup, continuous, self-recovery			

Note: ① Load regulation for 0% -100% load increases to ±3%;
②The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information. Ripple & Noise at <5% load is 5%Vo max.

General Specification

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	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 SURB_JMD/JMT-15W series products)	500	--	--	
	Output-case Electric Strength Test for 1 minute with a leakage current of 1mA max.(Only for SURB_JMD/JMT-15W series products)	500	--	--	
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 SURB_JMD/JMT-15W series products)	100	--	--	
	Output-case Resistance at 500VDC, Ta=25℃, humidity=70%RH (Only for SURB_JMD/JMT-15W series products)	100	--	--	
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	1000	--	pF
Operating Temperature	See Fig. 1	-40	--	+85	℃
Storage Temperature	Non-condensing	-55	--	+125	
Storage Humidity		5	--	95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	℃
Reflow soldering Temperature	Only for SURB_J(M)T-15W 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, 60Min. along X, Y and Z			
Switching Frequency *	PWM mode	--	300	--	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.					

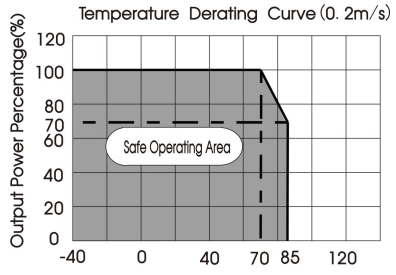
Mechanical Specifications

Case Material		Aluminum alloy
Dimension	SURB_JD-15W series	38.70 x 27.20 x 6.20 mm (3.3V/5V output), 38.70 x 27.20 x 5.80 mm (other output)
	SURB_JT-15W series	39.90 x 27.20 x 6.20 mm (3.3V/5V output), 39.90 x 27.20 x 5.80 mm (other output)
	SURB_JMD-15W series	39.10 x 29.50 x 6.80 mm (3.3V/5V output), 39.10 x 29.50 x 6.40 mm (other output)
	SURB_JMT-15W series	39.90 x 29.50 x 6.80 mm (3.3V/5V output), 39.90 x 29.50 x 6.40 mm (other output)
Weight	SURBxx03/05JD/T-15W series	11.0g(Typ.)
	SURBxx12/15JD/T-15W series	8.8g(Typ.)
	SURBxx03/05JMD/T-15W series	13.8g(Typ.)
	SURBxx12/15JMD/T-15W series	11.5g(Typ.)
Cooling method		Free air convection (20LFM) or forced convection

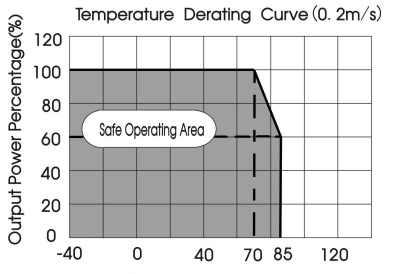
Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	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 Curve

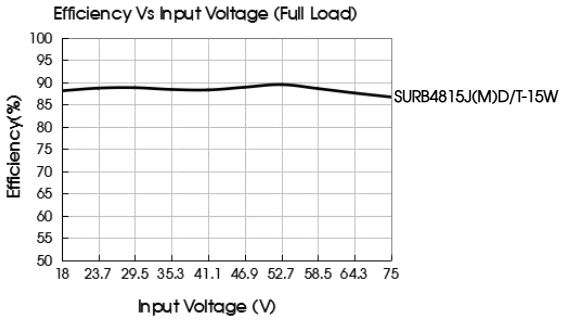


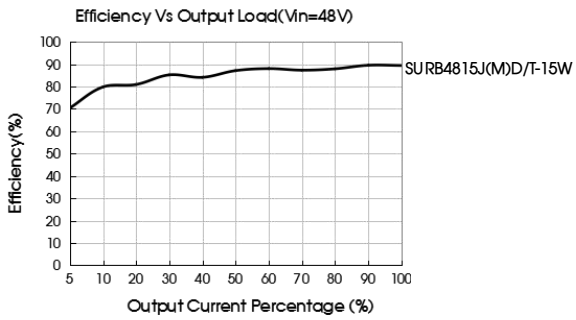
SURBXX12/15J(M)D/T-15W series (Nominal input voltage)



SURBXX03/05J(M)D/T-15W series (Nominal input voltage)

Fig. 1





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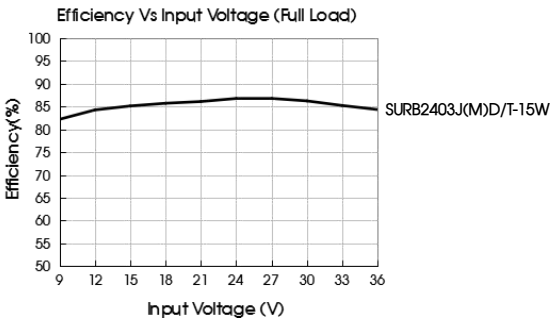
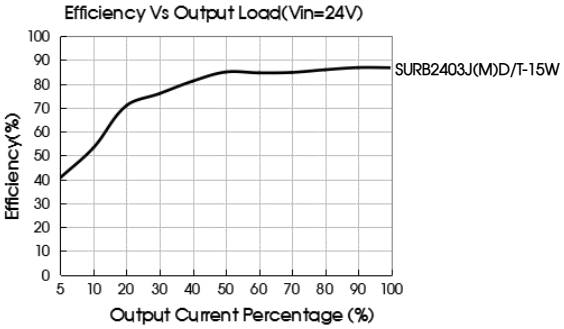




Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

Fig. 2

Vout (VDC)	Cout (μF)	Cin (μF)
3.3/5/12/15	10	100

2. EMC compliance recommended circuit

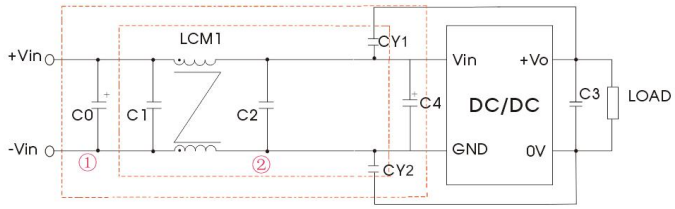


Fig. 3

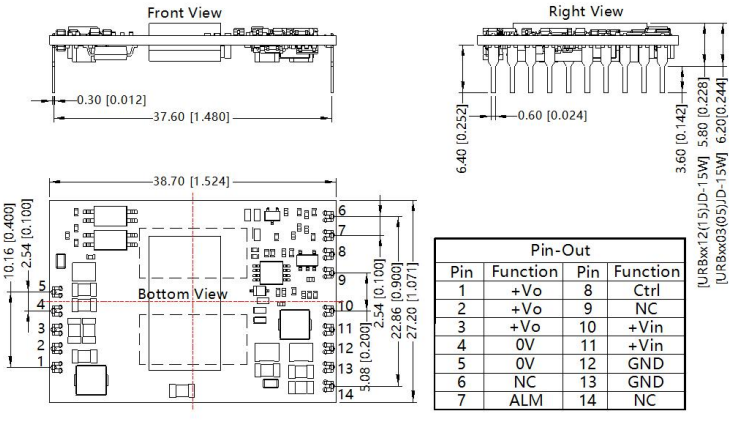
Notes: Part ① in the Fig. 3 is used for immunity test and part ② for emissions filtering. Selecting based on needs.

Parameter description:

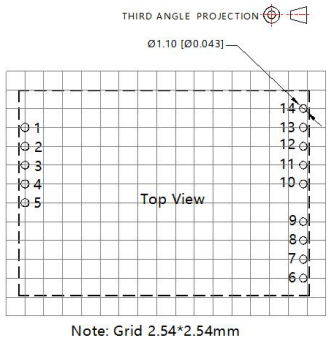
Model	Vin:24V	Vin:48V
FUSE	Choose according to actual input current	
C0	470μF/50V	680μF/100V
C1/C2	4.7μF/50V	4.7μF/100V
C4	330μF/50V	330μF/100V
C3	Refer to the Cout in Fig.2	
LCM1	FL2D-30-472	
CY1/CY2	2000pF/2KV	

Note: *For SURBxxxxJMD/T-15W, the case should be connected to input pin GND when testing EMC performance.

SURB_JD-15W (DIP package without case) Dimensions and Recommended Layout



Pin-Out			
Pin	Function	Pin	Function
1	+Vo	8	Ctrl
2	+Vo	9	NC
3	+Vo	10	+Vin
4	0V	11	+Vin
5	0V	12	GND
6	NC	13	GND
7	ALM	14	NC



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

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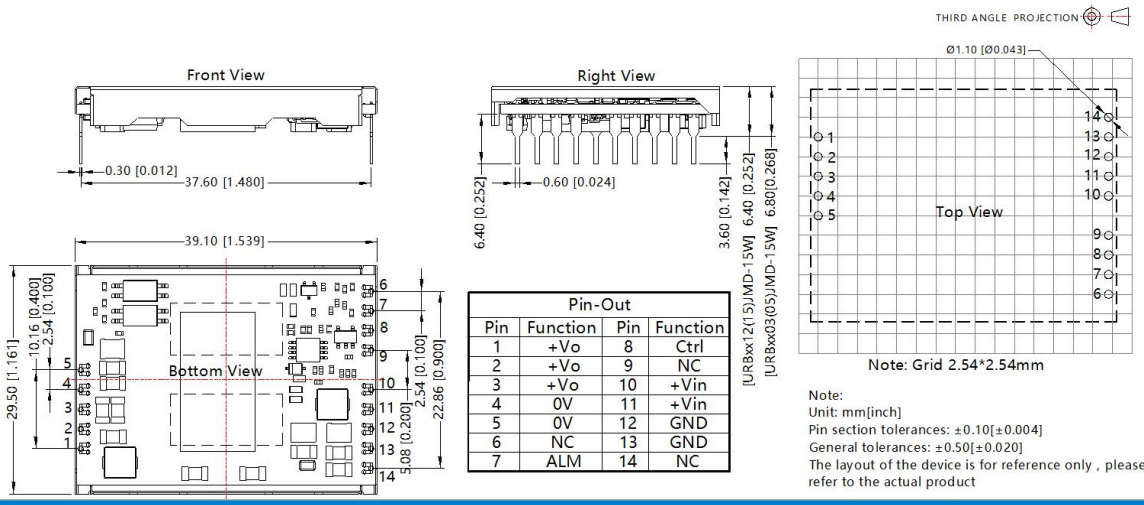
SURB_JMD-15W (DIP package with case) Dimensions and Recommended Layout

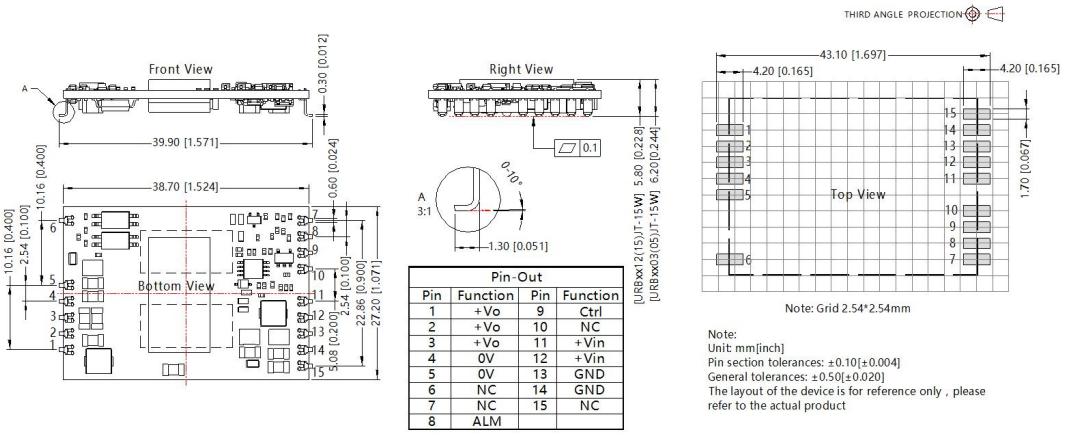


Pin-Out			
Pin	Function	Pin	Function
1	+Vo	8	Ctrl
2	+Vo	9	NC
3	+Vo	10	+Vin
4	0V	11	+Vin
5	0V	12	GND
6	NC	13	GND
7	ALM	14	NC

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

SURB_JT-15W (SMD package without case) Dimensions and Recommended Layout

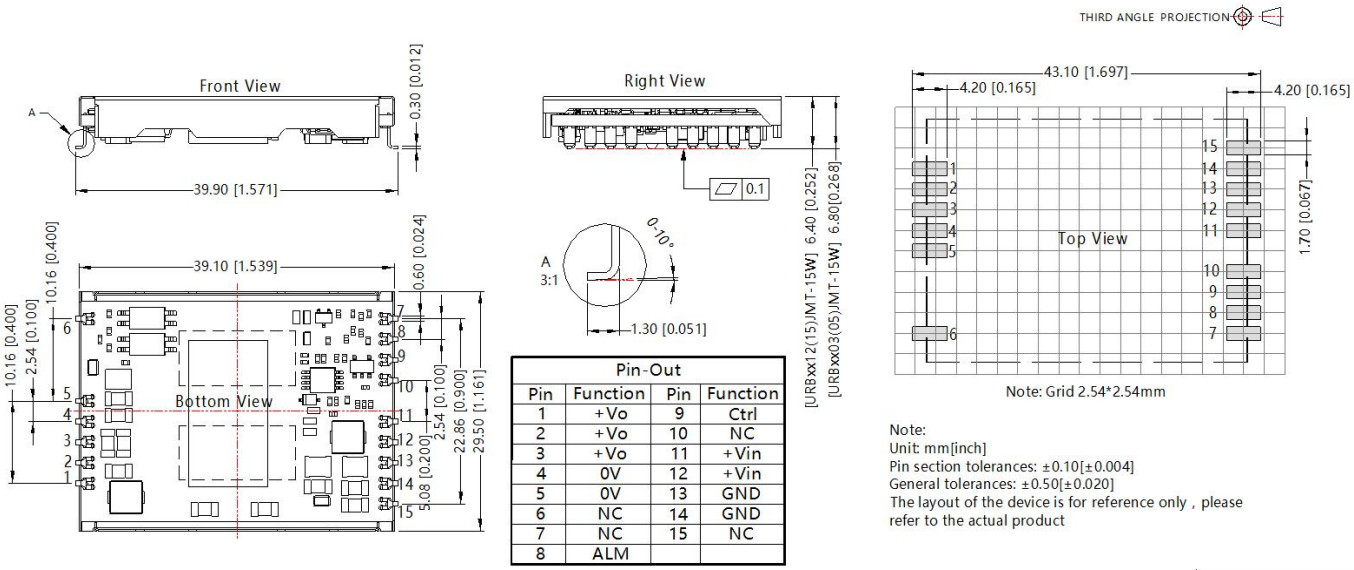


Pin-Out			
Pin	Function	Pin	Function
1	+Vo	9	Ctrl
2	+Vo	10	NC
3	+Vo	11	+Vin
4	0V	12	+Vin
5	0V	13	GND
6	NC	14	GND
7	NC	15	NC
8	ALM		

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

SURB_JMT-15W (SMD package with case) Dimensions and Recommended Layout



Pin-Out			
Pin	Function	Pin	Function
1	+Vo	9	Ctrl
2	+Vo	10	NC
3	+Vo	11	+Vin
4	0V	12	+Vin
5	0V	13	GND
6	NC	14	GND
7	NC	15	NC
8	ALM		

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. 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. 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.