

Product Feature

- ◆ Ultra-wide 4:1 Input voltage range
- ◆ Operating ambient temperature range: -40°C - +85°C
- ◆ Isolation voltage: 1600VDC
- ◆ High efficiency: 88% (Typ.)
- ◆ Output short-circuit protection, over-current protection, and over-voltage protection mechanisms.
- ◆ Application areas: Industry, Power, Instrumentation, Communication, Rail transit.



Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency ^② (%) Typ.	Capacitive Load(μF) Max.
		Nominal (Range)	Max. ^①	Voltage (VDC)	Current(mA) Max.		
--	SURB 1203 ZP-10WR4	12 (4.5-18)	20	3.3	2400	80	1200
	SURB 1205 ZP-10WR4			5	2000	82	1000
	SURB 1206 ZP-10WR4			6	1667	82	820
	SURB 1209 ZP-10WR4			9	1111	82	560
	SURB 1212 ZP-10WR4			12	833	84	470
	SURB 1215 ZP-10WR4			15	667	84	330
	SURB 1224 ZP-10WR4			24	417	84	100
EN	SURB 2403 ZP-10WR4	24 (9-36)	40	3.3	2400	82	1200
	SURB 2405 ZP-10WR4			5	2000	84	1000
	SURB 2406 ZP-10WR4			6	1667	84	820
	SURB 2409 ZP-10WR4			9	1111	86	560
	SURB 2412 ZP-10WR4			12	833	87	470
	SURB 2415 ZP-10WR4			15	667	87	330
	SURB 2424 ZP-10WR4			24	417	88	100
	SURB 4803 ZP-10WR4	48 (18-75)	80	3.3	2400	82	1200
	SURB 4805 ZP-10WR4			5	2000	84	1000
	SURB 4806 ZP-10WR4			6	1667	84	820
	SURB 4809 ZP-10WR4			9	1111	86	560
	SURB 4812 ZP-10WR4			12	833	87	470
	SURB 4815 ZP-10WR4			15	667	87	330
	SURB 4824 ZP-10WR4			24	417	88	100
Note: ①. Exceeding the maximum input voltage may cause permanent damage; ②. Efficiency is measured at nominal input voltage and rated output load.							

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (Full Load/No-Load)	12VDC Nominal input series, nominal input voltage	3.3V Output	--	825/15	846/25	mA
		5V/6V/9V Output	--	1016/15	1042/25	
		Others output	--	992/20	1016/40	
	24VDC Nominal input series, nominal input voltage	3.3V Output	--	402/5	413/10	
		5V/6V Output	--	496/5	508/10	
		Others output	--	484/10	496/20	
	48VDC Nominal input series, nominal input voltage	3.3V Output	--	201/5	206/10	
		5V/6V Output	--	248/5	254/10	
		Others output	--	242/10	248/20	
Reflected Ripple Current	Nominal input series		--	30	--	
Surge Voltage (1sec. max.)	12VDC Nominal input series		-0.7	--	30	VDC
	24VDC Nominal input series		-0.7	--	50	
	48VDC Nominal input series		-0.7	--	100	
Start-Up Voltage	12VDC Nominal input series		--	--	4.5	
	24VDC Nominal input series		--	--	9	
	48VDC Nominal input series		--	--	18	
Input Under-Voltage Protection	12VDC Nominal input series		3.5	4	--	
	24VDC Nominal input series		5.5	6.5	--	
	48VDC Nominal input series		12	15.5	--	
Input Filter			PI filter			
Hot Plug			Unavailable			
Ctrl	Turn on module		Ctrl pin open or pulled high (TTL2.7-12VDC)			
	Turn off module		Ctrl pin pulled low to GND (0-1.2VDC)			
	Input current when off		--	6	10	mA
Note:①. The Ctrl pin voltage is referenced to input pin GND.						

Output Specification

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0%-100% load		--	±1.0	±3.0	%
Linear Regulation	Vin=Min. to Max. @Full Load		--	±0.2	±0.5	
Load Regulation	5%-100% load		--	±0.5	±1.0	
	0%-100% load		--	±3.0	±5.0	
Ripple & Noise ^①	20MHz bandwidth,100% load,parallel cable method		--	40	80	mVp-p
Transient Recovery Time	25% Load step change,nominal input voltage		--	300	500	μs
Transient Response Deviation	25% Load step change, nominal input voltage	3.3V/5V/6V Output	--	±5.0	±8.0	%
		Others output	--	±3.0	±5.0	
Temperature Coefficient	Full load		--	--	±0.03	%/°C
Over-Voltage Protection	Input voltage range		110	--	160	%Vo
Over-Current Protection			110	140	--	%Io
Short-Circuit Protection			Continuous,Self-Recovery			
Note: ①. Under 0%-5% load conditions,ripple & noise does not exceed 5%Vo.						

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, test time 1 minute, leakage current less than 1mA	1600	--	--	VDC
Insulation Resistance	Input-output, resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	2200	--	pF
Operating Temperature	See Fig. 1	-40	--	+85	°C
Storage Temperature		-55	--	+125	°C
Storage Humidity	Non-condensing	5	--	95	%RH
Soldering Profile	Wave-soldering	260±5°C; time:5 - 10s			
	Manual-welding	360±10°C;time:3 - 5s			
Switching Frequency	PWM	--	300	--	kHz
Vibration	IEC/EN 61373 -Category 1,Grade B				
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K Hours

Mechanical Specifications

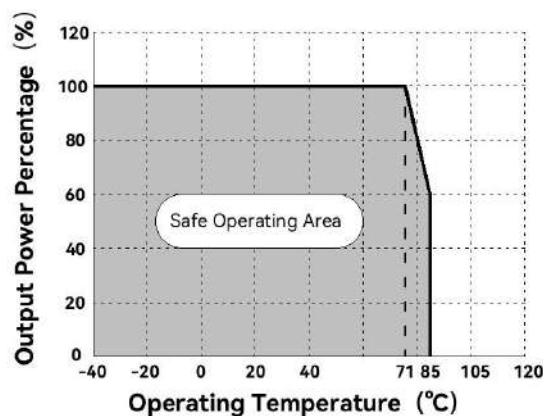
Case Material	Aluminum alloy
Package Dimensions	32.00×20.00×11.10mm
Weight	12.0g (Typ.)
Cooling Method	Free air convection

EMC Specifications

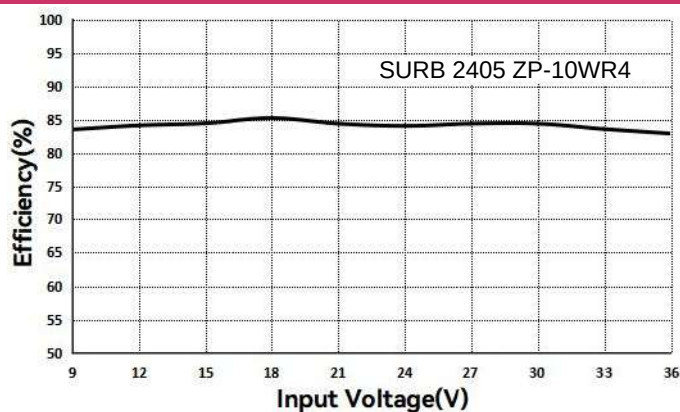
EMI	CE	CISPR32/EN55032 CLASS B (see Fig. 3-② for recommended circuit)	
	RE	CISPR32/EN55032 CLASS B (see Fig. 3-② for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV	Perf.Criteria B
	RS	IEC/EN61000-4-3 10V/m	Perf.Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (see Fig. 3-① for recommended circuit)	Perf.Criteria 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 3Vr.m.s	Perf.Criteria A

Typical Characteristic Curves

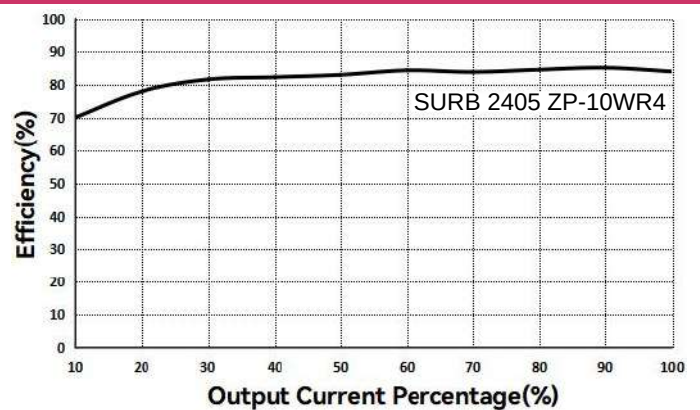
Temperature Derating Curve (Fig. 1)



Efficiency VS Input Voltage (Full load)



Efficiency VS Output Load (Vin=24V)



Typical Circuit Design and Application

Recommended Circuit (Fig. 2)

Recommended Capacitive Load Value Table

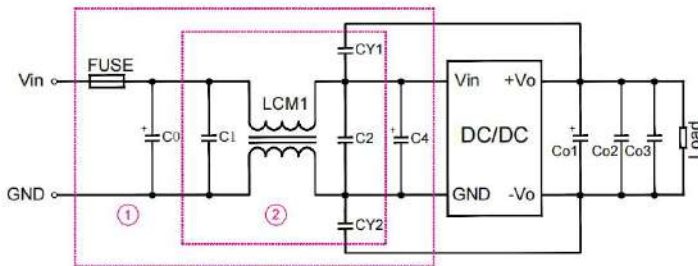
	Vout	C1	Co1	Co2	Co3
	3.3/5/6VDC	100μF/100V	100μF/16V	10μF/50V	0.1μF/16V
	9/12/15VDC	100μF/100V	47μF/25V	10μF/50V	0.1μF/25V
	24VDC	100μF/100V	47μF/50V	10μF/50V	0.1μF/50V

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 C1 and Co1/Co2/Co3 and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

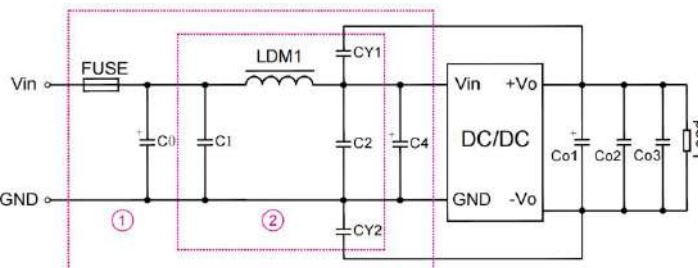
EMC Recommended Circuit (Fig. 3)

EMC Recommended Parameter Table

3.3V,5V,6V Output:



Others output:

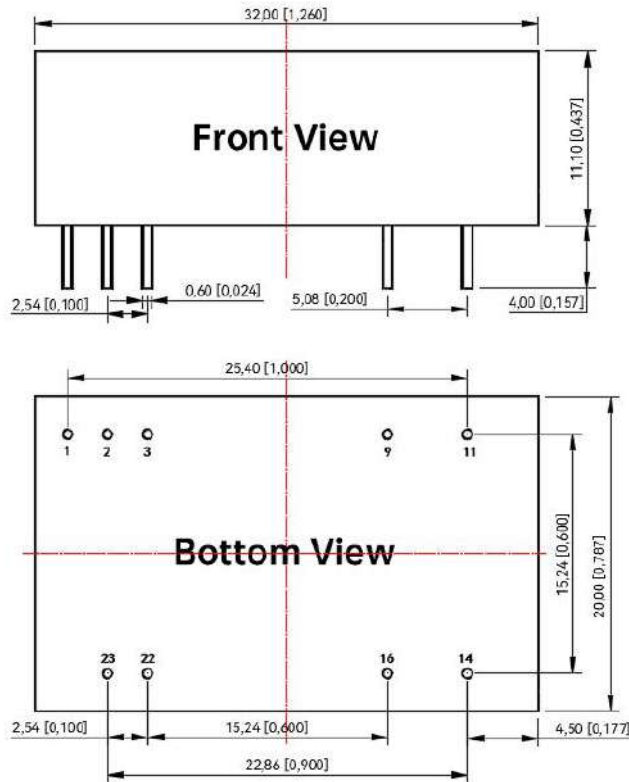


Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Model	Vin:12VDC	Vin:24VDC	Vin:48VDC
FUSE	Select according to the actual input current of the customer		
C0,C4	330μF/50V		330μF/100V
C1,C2	10μF/50V		10μF/100V
LDM1	10μH		
LCM1	1.4-1.7mH		
Co1,Co2,Co3	Refer Figure 2 Capacitive load value table		
CY1,CY2	1nF/2KVDC		

Dimensions and Recommended Layout

Dimensions



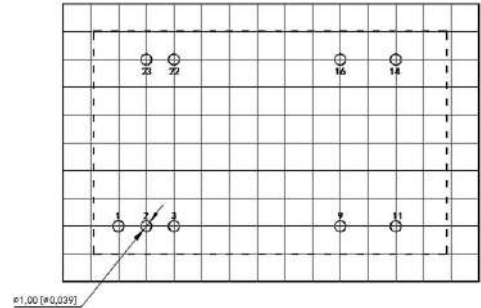
Note:

Unit: mm[inch]

Pin section tolerances: $\pm 0.10 [\pm 0.004]$

General tolerances: $\pm 0.50 [\pm 0.020]$

PCB Printing Layout



Pin Definition Table

Pin	Single
1	Ctrl
2,3	GND
9	No pin
11	NC
14	+Vo
16	-Vo
22,23	Vin

NC: Pin to be isolated from circuit.
No pin: No such pin.

Packaging Instructions

Packaging Information

Product quantity (pcs/ tube)	Electrostatic bag quantity (pcs/ bag)	Inner carton quantity (pcs/ carton)	Outer carton quantity (pcs/ carton)
16	80	320	1280

Note:

- ✧ The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
- ✧ It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
- ✧ The maximum capacitive load is tested within the input voltage range and under full load conditions;
- ✧ Unless otherwise specified, all indicators in this manual are measured at $T_a=25\text{ }^{\circ}\text{C}$, humidity<75% RH, nominal input voltage, and output rated load;
- ✧ All indicator testing methods in this manual are based on our company's corporate standards;
- ✧ Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel;
- ✧ Product specifications are subject to change without prior notice.