

## Product Feature

- ◆ Package Type: DIP24
- ◆ Universal Input: 2:1
- ◆ Operating temperature range: -40°C - +85°C
- ◆ Isolation voltage: 1500VDC
- ◆ High efficiency up to: 86% (Type)
- ◆ Equipped with input undervoltage protection; Output short-circuit protection, overvoltage protection, overcurrent protection mechanism.
- ◆ Fields of application: Industry, Power, Instrumentation, Communication, Rail transit.

## Selection Guide

Part No.	Input Voltage (VDC)		Output		Full Load Efficiency% (Typ.)	Capacitive Load(μF) Max.
	Nominal (Range)	Max.	Voltage (VDC)	Current (mA) Max. /Min.		
SWRB 0505 ZP-3WR4	5 (4.5-9)	11	5	600/30	74	4700
SWRB 0512 ZP-3WR4	5 (4.5-9)	11	12	250/12	77	2700
SWRB 0515 ZP-3WR4	5 (4.5-9)	11	15	200/10	77	2200
SWRA 0505 ZP-3WR4	5 (4.5-9)	11	±5	±300/±15	76	#2200
SWRA 0512 ZP-3WR4	5 (4.5-9)	11	±12	±125/±6	78	#1800
SWRA 0515 ZP-3WR4	5 (4.5-9)	11	±15	±100/±5	78	#1000
SWRB 1203 ZP-3WR4	12 (9-18)	20	3.3	909/46	74	4700
SWRB 1205 ZP-3WR4	12 (9-18)	20	5	600/30	81	4700
SWRB 1212 ZP-3WR4	12 (9-18)	20	12	250/12	83	2700
SWRB 1215 ZP-3WR4	12 (9-18)	20	15	200/10	82	2200
SWRB 1224 ZP-3WR4	12 (9-18)	20	24	125/6	83	1800
SWRA 1205 ZP-3WR4	12 (9-18)	20	±5	±300/±15	81	#2200
SWRA 1209 ZP-3WR4	12 (9-18)	20	±9	±166/±8	84	#2000
SWRA 1212 ZP-3WR4	12 (9-18)	20	±12	±125/±6	84	#1800
SWRA 1215 ZP-3WR4	12 (9-18)	20	±15	±100/±5	85	#1000
SWRB 2403 ZP-3WR4	24 (18-36)	40	3.3	909/46	78	4700
SWRB 2405 ZP-3WR4	24 (18-36)	40	5	600/30	81	4700
SWRB 2409 ZP-3WR4	24 (18-36)	40	9	333/16	81	2700
SWRB 2412 ZP-3WR4	24 (18-36)	40	12	250/12	86	2700
SWRB 2415 ZP-3WR4	24 (18-36)	40	15	200/10	86	2200
SWRB 2424 ZP-3WR4	24 (18-36)	40	24	125/6	85	1800
SWRA 2405 ZP-3WR4	24 (18-36)	40	±5	±300/±15	82	#2200

# SWRA SWRB ZP-3WR4



Part No.	Input Voltage (VDC)		Output		Full Load Efficiency% (Typ.)	Capacitive Load(μF) Max.
	Nominal (Range)	Max.	Voltage (VDC)	Current (mA) Max. /Min.		
SWRA 2412 ZP-3WR4	24 (18-36)	40	±12	±125/±6	84	#1800
SWRA 2415 ZP-3WR4	24 (18-36)	40	±15	±100/±5	84	#1000
SWRB 4803 ZP-3WR4	48 (36-75)	80	3.3	909/46	76	4700
SWRB 4805 ZP-3WR4	48 (36-75)	80	5	600/30	82	4700
SWRB 4812 ZP-3WR4	48 (36-75)	80	12	250/12	86	2700
SWRB 4815 ZP-3WR4	48 (36-75)	80	15	200/10	86	2200
SWRA 4805 ZP-3WR4	48 (36-75)	80	±5	±300/±15	82	#2200
SWRA 4812 ZP-3WR4	48 (36-75)	80	±12	±125/±6	84	#1800
SWRA 4815 ZP-3WR4	48 (36-75)	80	±15	±100/±5	85	#1000 p

#Each out ut

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no load)	5VDC Input	--	789/40	834/45	mA
	12VDC Input	--	316/30	348/35	
	24VDC Input	--	152/15	165/20	
	48VDC Input	--	77/5	85/10	
Reflected Ripple Current	5VDC Input	--	20	--	mA
	12VDC Input	--	30	--	
	24VDC Input	--	30	--	
	48VDC Input	--	30	--	
Input impulse voltage	5VDC Input	-0.7	--	12	VDC
	12VDC Input	-0.7	--	25	
	24VDC Input	-0.7	--	50	
	48VDC Input	-0.7	--	100	
Starting voltage	5VDC Input	--	--	4.5	VDC
	12VDC Input	--	--	9	
	24VDC Input	--	--	18	
	48VDC Input	--	--	36	
Input Filter		Capacitance Filter			
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy		--	±1.0	±3.0	%
Linear Regulation	Input voltage from low limit to high limit, full load	--	±0.2	±0.5	%
Load Regulation	5%- 100% load	--	±0.2	±0.5	%
Ripple & Noise	25% load step change, nominal input voltage				mVp-p
	24V output	--	100	120	
	Others	--	60	100	
Transient Recovery Time	25% load step change	--	0.5	2	%
Transient response deviation	25% load step change	--	±2	±5	%
Temperature Drift Coefficient	Full Load	--	±0.02	±0.03	%/°C
Short-Circuit Protection	Input voltage range	Continuous, Self-Recovery			

## General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output, test time 1 minute, leakage current less than 1mA	1500	--	--	VDC
Insulation Resistance	Input-output, insulated voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	120	--	pF
Operating Temperature	Derating when operating temperature ≥ 85°C, (See Figure 1)	-40	--	85	°C
Storage Temperature		-55	--	125	°C
Case Temperature Rise	Ta=25°C, nominal input, output load	--	25	--	°C
Pin welding can withstand the highest temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	°C
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	250	--	kHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K Hours

## Mechanical Specification

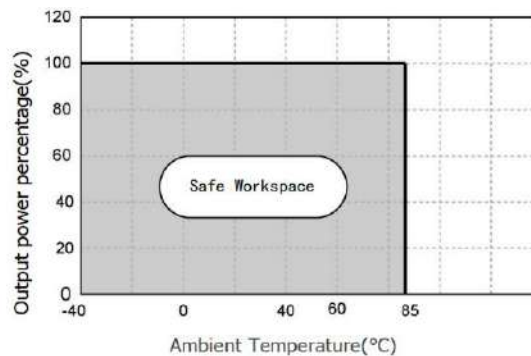
Case Material	Aluminum alloy
Package Dimensions	32.00 × 20.00 × 11.10 mm
Weight	14g(Typ.)
Cooling Method	Free air convection

## EMC Specifications

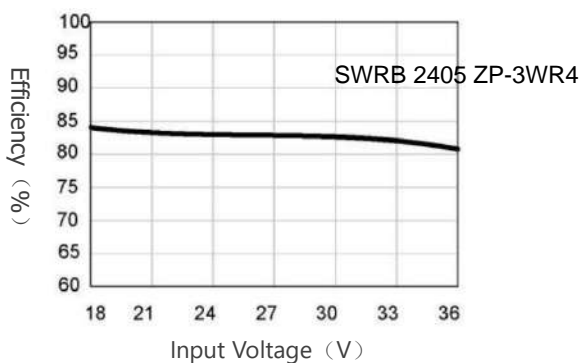
EMI	CE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (Recommended circuit diagram 3-②)	
	RE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (Recommended circuit diagram 3-②)	
EMS	ESD	IEC/EN61000-4-2	Contact $\pm 4KV$ Perf.Criteria B
	RS	IEC/EN61000-4-3	10V/m Perf.Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2KV$ (Recommended circuit diagram 3-①) Perf.Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 2KV$ (Recommended circuit diagram 3-①) Perf.Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s Perf.Criteria A
	Voltage sag, drop, and short-term interruption immunity	IEC/EN61000-4-29	0% , 70% Perf.Criteria B

## Typical Characteristic Curves

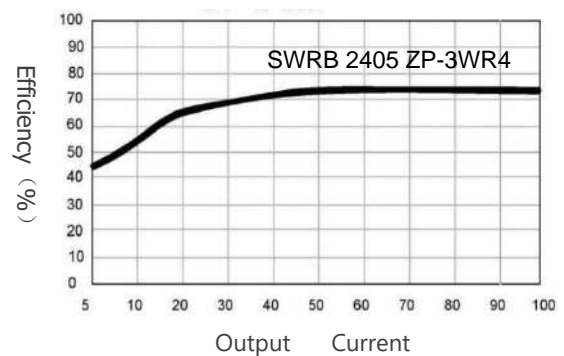
Temperature Derating Curve (Figure 1)



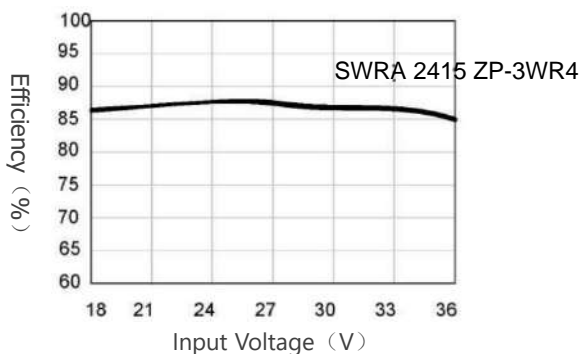
Efficiency VS Input Voltage Curve (Full load)



Efficiency VS Output Load (Vin=24V)



Efficiency VS Input Voltage Curve (Full load)



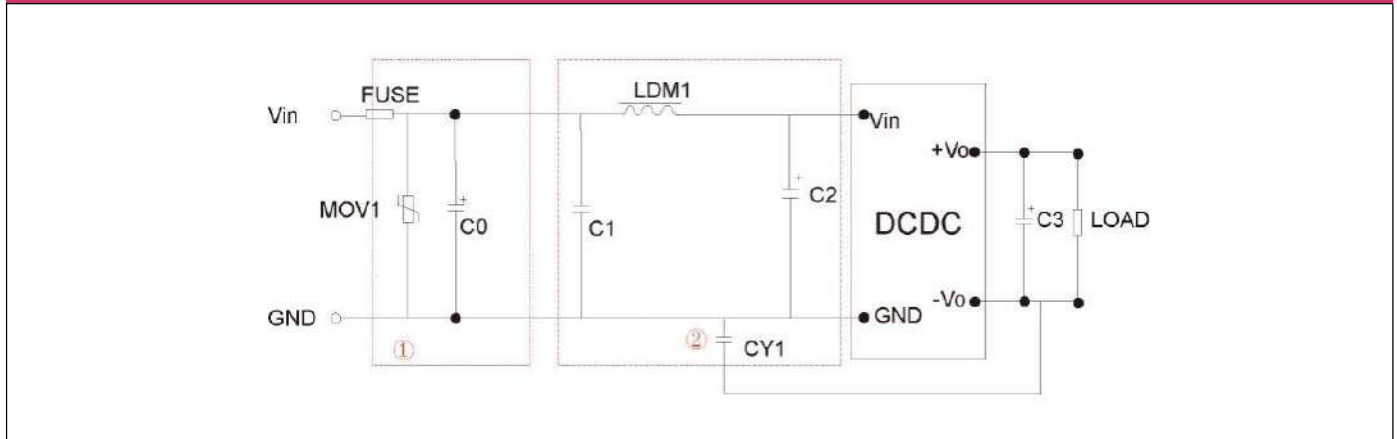
Efficiency VS Output Load (Vin=24V)



## Typical Circuit Design and Application

Application circuit (Figure 2)		Recommended Capacitive Load Value Table								
<p><b>Single</b></p>	<table border="1"> <tr> <td>Vin</td> <td>5V, 12V</td> <td>24V, 48V</td> </tr> <tr> <td>Cin</td> <td>100uF</td> <td>10-47uF</td> </tr> <tr> <td>Cout</td> <td colspan="2">10uF</td> </tr> </table>	Vin	5V, 12V	24V, 48V	Cin	100uF	10-47uF	Cout	10uF	
Vin		5V, 12V	24V, 48V							
Cin		100uF	10-47uF							
Cout	10uF									
<p><b>Dual</b></p>										

### EMC Solutions - Recommended Circuits (Figure 3)



### EMI Recommended Parameters Table

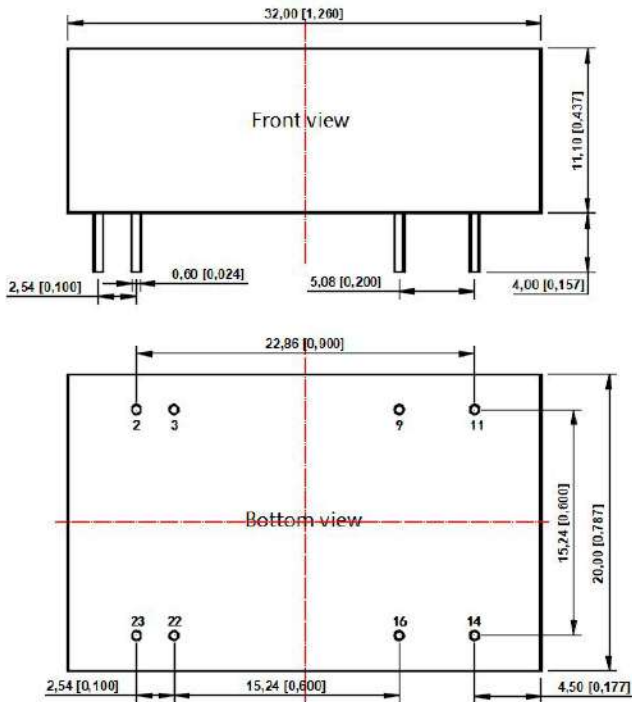
型号	Vin : 5V	Vin : 12V	Vin: 24V	Vin: 48V
FUSE	Select based on the actual input current of the customer			
MOV	--	14D330K	20D470K	14D101K
LDM1	12uH			
C0	1000uF/16V	1000uF/25V	330uF/50V	330 μ F/100V
C1	4.7 μ F/50V			4.7 μ F/ 100V
C2	4.7 μ F/50V			4.7 μ F/ 100V
C3	10uF			
CY1	1nF/2KV			

#### Application circuit description:

1. All DC/DC converters in this series are tested according to the recommended testing circuit (Figure 2) before leaving the factory.
2. If further reduction of input and output ripple is required, the external capacitance C in can be connected to the input and output. Cout increases or selects capacitors with small series equivalent impedance values, but the capacitance value cannot exceed the maximum capacitive load of the product.

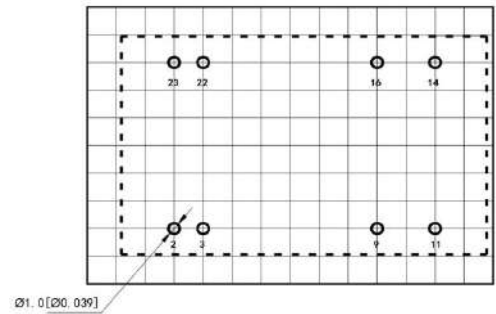
## Dimensions and Recommended Layout

### 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	Dual
2	-Vin	-Vin
3	-Vin	-Vin
9	No pin	Com
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	Com
22	+Vin	+Vin
23	+Vin	+Vin

NC: Pin to be isolated from circuitry

### 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;
- ✦ Suggested dual output module load imbalance:  $\leq \pm 5\%$ . If it exceeds  $\pm 5\%$ , it cannot be guaranteed that the product performance meets all performance indicators in this manual;
- ✦ 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.