

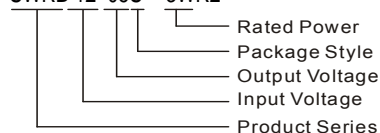


SWRA_S - 3WR2 & SWRB_S - 3WR2 Series

**3W, WIDE INPUT, ISOLATED & REGULATED
DUAL/SINGLE OUTPUT SIP PACKAGING, DC-DC
CONVERTER**

PART NUMBER SYSTEM

SWRB 12 05S- 3WR2



FEATURES

- Ultra-Miniature SIP Package
- 2:1 wide input voltage range
- Temperature range: -40°C ~ +85°C
- 1.5KVDC isolation
- Short Circuit Protection(automatic recovery)
- External On/Off control
- High Power Density
- Without overshoot when turning On/Off

APPLICATION

The SWRA_S-3WR2 & SWRB_S-3WR2 Series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board. For these DC-DC converters, You can reduce the design point of failure and save the development of micro power supply's manpower, material and time costs, also better ensure product quality stability, protect safety and reliability of the end of products.

These products apply to where:

- 1) Input voltage range $\leq 2:1$;
- 2) 1.5KVDC input and output isolation;
- 3) Regulated and low ripple noise is required.

Such as: industrial control, tele-communications etc.

SELECTION GUIDE

Model Number	Input Voltage(VDC)		Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(Typ.)		Reflected Ripple Current (mA, Typ.)	Max. Capacitive Load(μ F)	Efficiency (% , Typ.) @Max. Load
	Nominal (Range)	Max**		Max.	Min.	@Max. Load	@No Load			
SWRA0505S-3WR2	5 (4.5-9)	11	± 5	± 250	± 13	715	40	30	1000	70
SWRA0512S-3WR2			± 12	± 104	± 5	705			470	71
SWRA0515S-3WR2			± 15	± 83	± 4	705			330	71
SWRB0505S-3WR2			5	500	25	725			2200	69
SWRB0512S-3WR2			12	208	11	715			680	70
SWRB0515S-3WR2			15	166	9	715			470	70
SWRA1205S-3WR2	12 (9-18)	20	± 5	± 300	± 15	325	20	30	1000	77
SWRA1212S-3WR2			± 12	± 125	± 6	317			470	79
SWRA1215S-3WR2			± 15	± 100	± 5	313			330	80
SWRB1205S-3WR2			5	600	30	329			2200	76
SWRB1212S-3WR2			12	250	13	329			680	76
SWRB1215S-3WR2			15	200	10	329			470	76
SWRA2405S-3WR2	24 (18-36)	40	± 5	± 300	± 15	163	7	110	1000	77
SWRA2412S-3WR2			± 12	± 125	± 6	157			470	80
SWRA2415S-3WR2			± 15	± 100	± 5	154			330	81
SWRB2405S-3WR2			5	600	30	160			2200	78
SWRB2412S-3WR2			12	250	13	154			680	81
SWRB2415S-3WR2			15	200	10	154			470	81
SWRB2424S-3WR2			24	125	6	152			330	82
SWRB4805S-3WR2	48 (36-75)	80	5	600	30	82	7	45	2200	76
SWRB4812S-3WR2			12	250	13	78			680	80
SWRB4815S-3WR2			15	200	10	76			470	82

Note:1. Designing.

2.**Input voltage can't exceed this value, or will cause the permanent damage.

INPUT SPECIFICATIONS					
Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	5V input	-0.7	--	12	VDC
	12V input	-0.7	--	25	
	24V input	-0.7	--	50	
	48V input	-0.7	--	100	
Start-up Voltage	5V input	3.5	4	4.5	
	12V input	4.5	8	9	
	24V input	11	16	18	
	48V input	24	33	36	
Input Filter		C Filter			

OUTPUT SPECIFICATIONS					
Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Power		0.15	--	3	W
Output Voltage Accuracy	5% to 100% load	--	±1	±3	%
	No load	--	±1.5	±5	
Output Voltage Balance	Dual output, balanced loads	--	±0.5	±1	
Line Regulation	Full load, Input voltage from low to high	--	±0.2	±0.5	
Load Regulation	5% to 100% load	--	±0.6	±1	
Transient Recovery Time	25% load step change	--	0.5	3	ms
Transient Response Deviation		--	±2.5	±5	%
Transient Response Deviation	100% load	--	±0.02	±0.03	%/°C
Ripple*	20MHz Bandwidth	--	30	45	mVp-p
Noise*		--	35	75	
Output Power Protection		120	--	--	%
Output Short Circuit Protection		Continuous, automatic recovery			
Note: Dual output models unbalanced load: ±5%. * Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.					

COMMON SPECIFICATIONS					
Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Tested for 1 minute and leakage current less than 1 mA	1500	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output, 100KHz/1V	--	120	--	pF
Switching Frequency	100% load, Stand Input voltage	--	250	--	KHz
MTBF	MIL-HDBK-217F@25	1000	--	--	K hours
Case Material		Plastic (UL94-V0)			
Weight		--	4.92	--	g

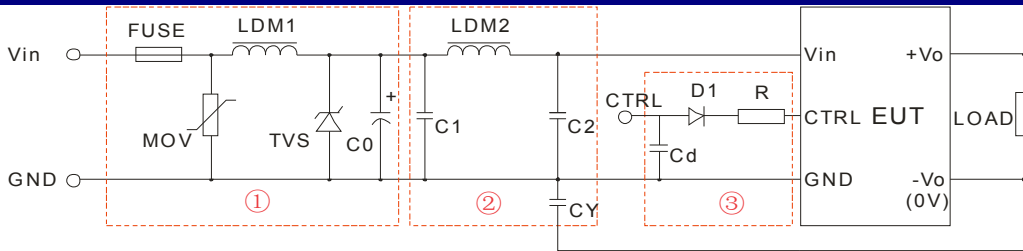
ENVIRONMENTAL SPECIFICATIONS					
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85°C)	-40	--	85	°C
Storage Temperature		-55	--	125	
Temp. rise at full load	Ta=25°C	--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022	CLASS B (External Circuit Refer to Figure1-□ or Figure 3)	
	RE	CISPR22/EN55022	CLASS B (External Circuit Refer to Figure1-□ or Figure 3)	
EMS	ESD*	IEC/EN61000-4-2	Contact ±4KV/ Air ±8KV perf. Criteria B	
	RS	IEC/EN61000-4-3	10V/m perf. Criteria A	
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B (External Circuit Refer to Figure1-□)
		IEC/EN61000-4-4	±4KV	perf. Criteria B (External Circuit Refer to Figure 3)
	Surge	IEC/EN61000-4-5	±2KV	perf. Criteria B (External Circuit Refer to Figure1-□ or Figure 3)
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
Voltage dips, short and interruptions immunity		IEC/EN61000-4-29	0%-70% perf. Criteria B	

Note: *SWRA/B24xxS-3WR2(Without External Circuit) CTRL pin only can meet ESD Contact±2KV.

EMC RECOMMENDED CIRCUIT



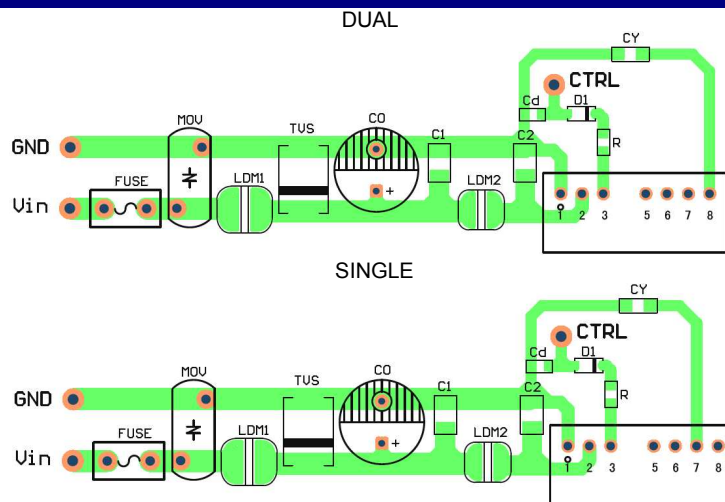
(Figure 1)

Recommended external circuit parameters:

Model	Vin: 5V(designing)	Vin:12V	Vin:24V	Vin:48V
FUSE	Choose according to practical input current			
MOV		--	10D560	10D101
LDM1		--	56μH	56μH
TVS		SMCJ28A	SMCJ48A	SMCJ90A
C0		680μF/25V	120μF/50V	120μF/100V
C1		4.7μF/50V	4.7μF/50V	4.7μF/100V
LDM2		12μH	12μH	12μH
C2		4.7μF/50V	4.7μF/50V	4.7μF/100V
CY		1nF/2KV	1nF/2KV	1nF/2KV
D1	RB160M-60/1A			
R	Follows: $R = \frac{V_C - V_D - 1.0}{I_C} - 300$			
Cd	47nF/100V			

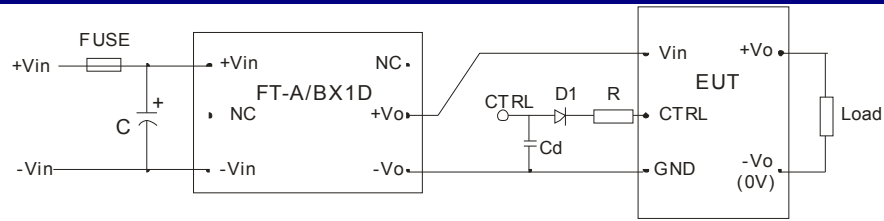
- Note: 1. In Figure 1, part is EMS recommended external circuit, part □ is EMI recommended external circuit. Choose according to requirements.
 2. If want to meet ESD Contact±4KV, CTRL pin must connect part □.
 3. If there is no recommended parameters, the model no require the external component.

EMC RECOMMENDED CIRCUIT PCB LAYOUT



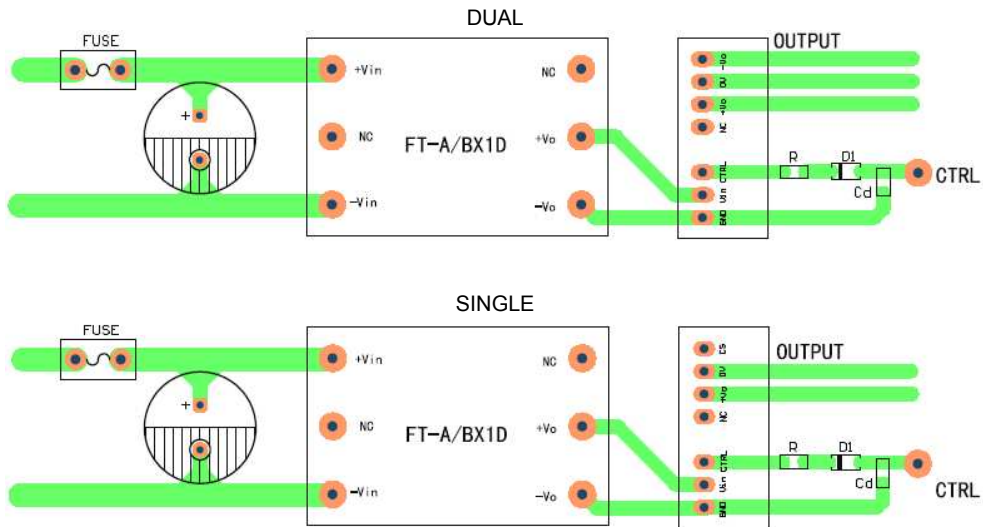
(Figure 2)

EMC MODULE RECOMMENDED CIRCUIT



Nominal Voltage < 48V, $C \geq 330\mu\text{F}/50\text{V}$
 Nominal Voltage = 48V, $C \geq 330\mu\text{F}/100\text{V}$
 (Figure 3)

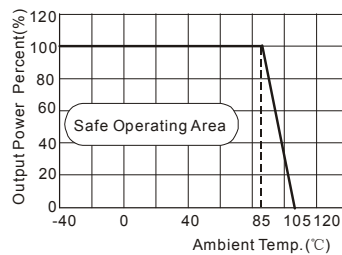
EMC MODULE RECOMMENDED CIRCUIT PCB LAYOUT



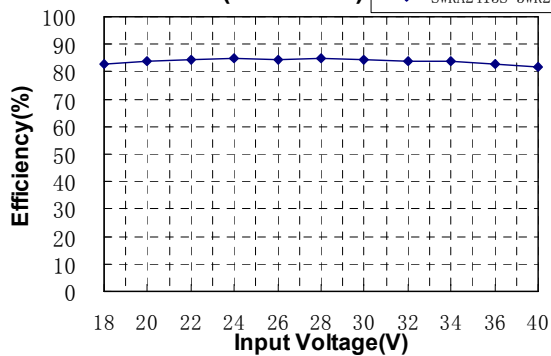
(Figure 4)

PRODUCT TYPICAL CURVE

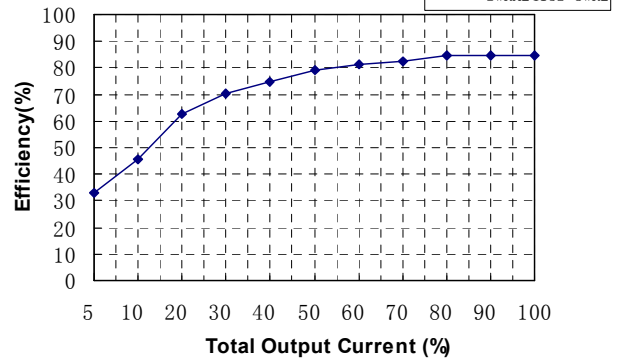
Temperature Derating Graph



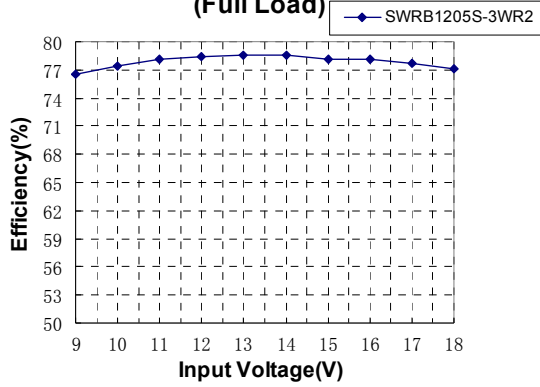
Efficiency VS Input Voltage curve
 (Full Load)



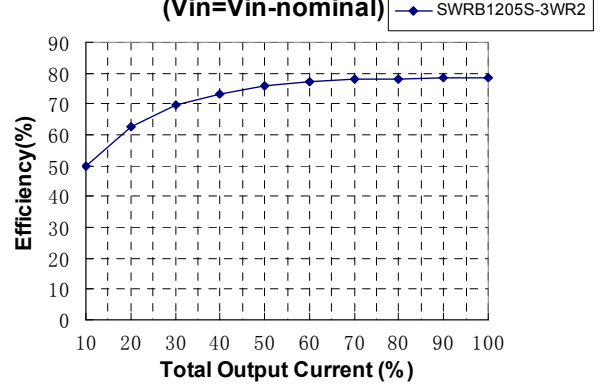
Efficiency VS Output Load curve
 (Vin=Vin-nominal)



Efficiency VS Input Voltage curve (Full Load)



Efficiency VS Output Load curve (Vin=Vin-nominal)



OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

Bottom View Dimensions:
 Pin 1: 9.50 [0.374]
 Pin 2: 2.50 [0.098]
 Pin 3: 0.50 [0.020]
 Pin 5: 0.50 [0.020]
 Pin 6: 0.50 [0.020]
 Pin 7: 0.50 [0.020]
 Pin 8: 0.30 [0.012]
 Total width: 17.78 [0.700]
 Total length: 22.00 [0.866]

Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	CTRL	CTRL
5	NC	NC
6	+Vo	+Vo
7	0V	0V
8	CS	-Vo

NC: No connection

Note:
 Unit:mm[inch]
 Pin section tolerances: ± 0.10mm[± 0.004inch]
 General tolerances: ± 0.25mm[± 0.010inch]

RECOMMENDED FOOTPRINT

Note: grid 2.54*2.54 mm

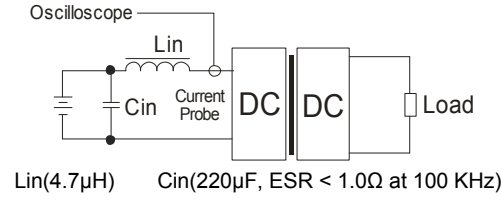
TUBE OUTLINE DIMENSIONS

Note:
 Unit :mm[inch]
 General tolerances: ± 0.50mm[± 0.020inch]
 L=530mm[20.866inch] Devices per tube quantity: 22pcs
 L=220mm[8.661inch] Devices per tube quantity: 8pcs
 Short tube inner package dimensions: L*W*H= 255*170*80mm
 Short tube outer package dimensions: L*W*H= 375*280*270mm
 Long tube inner package dimensions: L*W*H= 580*200*100mm
 Long tube outer package dimensions(with two inner package boxes):
 L*W*H= 600*215*220mm
 Long tube outer package dimensions(with three inner package boxes):
 L*W*H= 600*215*325mm

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor Lin and Capacitor Cin to simulate source impedance.



DESIGN CONSIDERATIONS

1) Requirement on output load

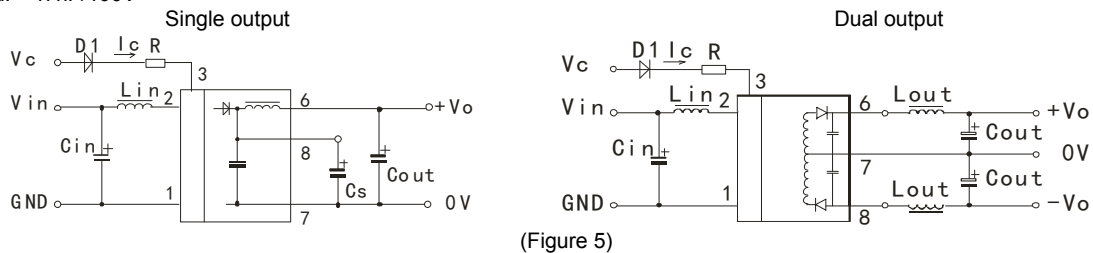
To ensure this module can operate efficiently and reliably, During operation, the minimum output load could not be less than 5% of the full load, otherwise ripple maybe increase dramatically. If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, suppose to use the resistance of 5% rated power, or use our company's products with a lower rated output power.

2) Recommended circuit

All the SWRA_S-3WR2 & SWRB_S-3WR2 Series have been tested according to the following recommended testing circuit before leaving factory (see Figure 5).

If you want to further decrease the input/output ripple, you can increase a capacitance properly or choose capacitors with low ESR. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor must less than the Max. Capacitive Load.

General: Cin: 5V&12V 100μF
 24V&48V 10μF
 Lin: 4.7μH~120μH
 Cs: 10μF~22μF
 Cout: 100μF(Typ.)
 Lout: 2.2μH~10μH
 Cd: 47nF/100V



(Figure 5)

3) CTRL Terminal

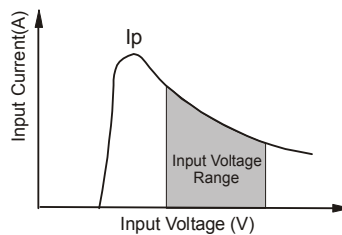
When open or high impedance, the converter work well; When this pin is 'high'; the converter shutdown; It should be note that the input current should between 5-10mA, exceeding the maximum 20mA will cause permanence damage to the converter. The value of R can be derived as follows:

$$R = \frac{V_C - V_D - 1.0}{I_C} - 300$$

4) Input current

When it is used in unregulated power supply, be sure that the fluctuating range of the power supply and the rippled voltage do not exceed the module standard. Input current of power supply should afford the flash startup current of this kind of DC/DC module (Figure 6).

General: Vin:5V Ip =1200mA
 Vin:12V Ip =650mA
 Vin:24V Ip =310mA
 Vin:48V Ip =160mA



(Figure 6)

5) Cannot use in parallel and hot swap

Note:

1. Min. load shouldn't be less than 5%, otherwise ripple maybe increase dramatically. Operation under minimum load will not damage the converter, however, they may not meet all specification listed.
2. Max. Capacitive Load tested at input voltage range and full load.
3. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. All characteristics are for listed model, non-standard models may perform differently, please contact our technical person for more detail.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.