SCHMID-M

1 Year Warranty SCHMID-M

RoHS SCHMID-M

SWRF_S - 3WR2 Series

3W,*WIDE INPUT, ISOLATED & REGULATED SINGLE OUTPUT DC-DC CONVERTER*

FEATURES

- Ultra-Miniature SIP Package
- 2:1 wide input voltage range
- Temperature range: -40°C ~ +85°C
- 3KVDC isolation
- Short Circuit Protection(automatic recovery)
- External On/Off control
- High Power Density

APPLICATION

The SWRF_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 ≤2:1;
2) 3KVDC input and output isolation;
3) Regulated and low ripple noise is required,

Such as: industrial control, tele-communications etc.

PART NUMBER SYSTEM

SWRF 1205S- 3WR2

- 3WR2 — Rated Power
- S — Package Style
- 1205 — Output Voltage
- 12 — Input Voltage
- SWRF — Product Series

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(μF)	Efficiency (%, typ.) @Max. Load
	Nominal (Range)	Max**		Max.	Min.	@Max. Load	@No Load			
*SWRF0505S-3WR2	5(4.5-9)	11	5	600	30	800	40	30	2200	75
*SWRF0512S-3WR2			12	250	13	789			680	76
*SWRF0515S-3WR2			15	200	10	769			470	78
SWRF1205S-3WR2	12(9-18)	20	5	600	30	329	15	30	2200	76
*SWRF1209S-3WR2			9	333	17	316			1000	79
*SWRF1212S-3WR2			12	250	13	329			680	75
*SWRF1215S-3WR2			15	200	10	329			470	76
*SWRF2403S-3WR2	24(18-36)	40	3.3	909	45	174	7	110	3000	72
SWRF2405S-3WR2			5	600	30	160			2200	78
*SWRF2412S-3WR2			12	250	13	154			680	81
*SWRF2415S-3WR2			15	200	10	154			470	81
*SWRF2424S-3WR2			24	125	6	152			330	82
*SWRF4805S-3WR2	48(36-75)	80	5	600	30	82	7	40	2200	76
SWRF4812S-3WR2			12	250	13	78			680	80
*SWRF4815S-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	
Short Circuit Input Power		--	1	2.5	W
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 Output Voltage Accuracy	≤5V (Output Voltage)	--	±1.5	±5	
	>5V (Output Voltage)	--	±1.5	±3	
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	--	1.2	3	ms
Transient Response Deviation		--	±3	±5	%
Transient Response Deviation	100% load	--	±0.02	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	--	45	75	mVp-p
Output Power Protection		120	--	--	%
Output Short Circuit Protection		Continuous, automatic recovery			

* 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	3000	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output,100KHz/1V	--	28	50	pF
Switching Frequency	100% load, nominal input voltage	--	250	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours
Case Material		Plastic (UL94-V0)			
Weight		--	4.92	--	g

ENVIRONMENTAL SPECIFICATIONS

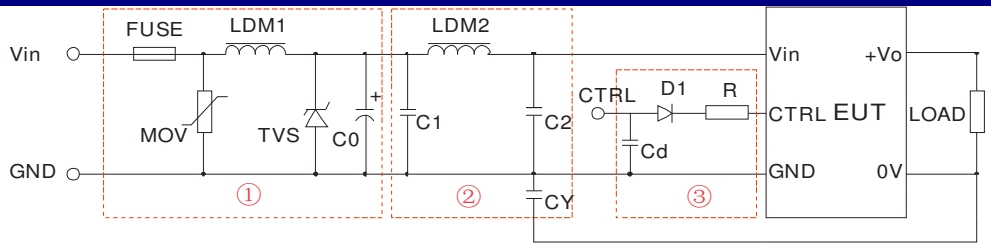
Item	Cooling	Min.	Typ	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above85℃)	-40	--	85	°C
Storage Temperature		-55		125	
Temp. rise at full load	Ta=25°C	--	25	--	
Soldering Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS B（External Circuit Refer to Figure1-②）
	RE	CISPR22/EN55022 CLASS B（External Circuit Refer to Figure1-②）
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 Figure1-①）
	Surge	IEC/EN61000-4-5 ±2KV perf. Criteria B（External Circuit Refer to Figure1-①）
	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: SWRF24xxS-3WR2(Without External Circuit) CTRL pin only can meet ESD Contact±2KV.

EMC RECOMMENDED CIRCUIT

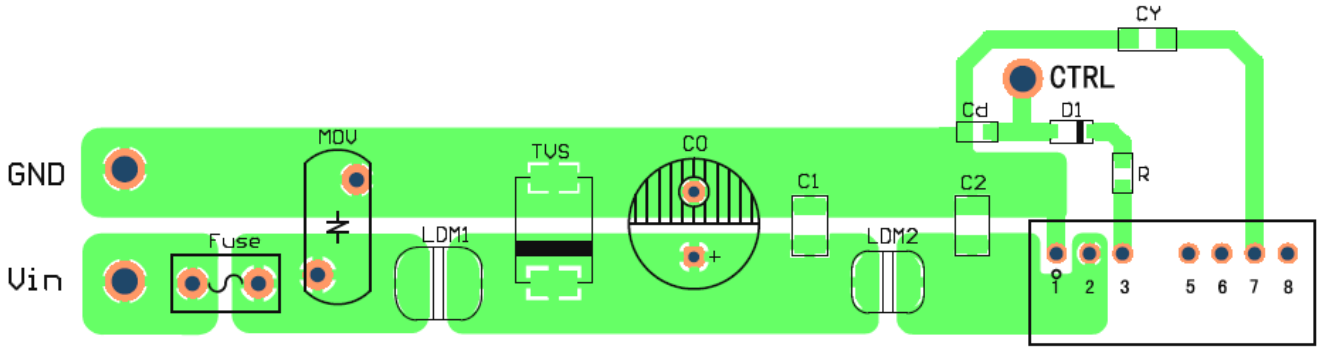


(Figure1)

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	1nF	1nF
D1	RB160M-60/1A			
R	Follows: $R=\frac{V_C-V_D-1.0}{I_C}-300$			
Cd	47nF/50V			

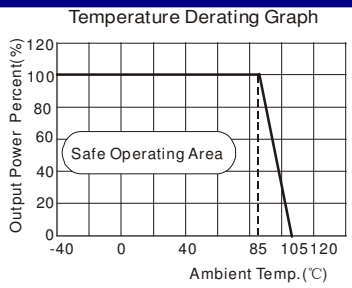
Note: 1.In Figure 1,part①is EMS Recommended external circuit, part②is EMI recommended external circuit. Choose according to requirements.
2. If want to meet ESD Contact±4KV,CTRL pin must connect part③.
3. If there is no recommended parameters, the model no require the external component.

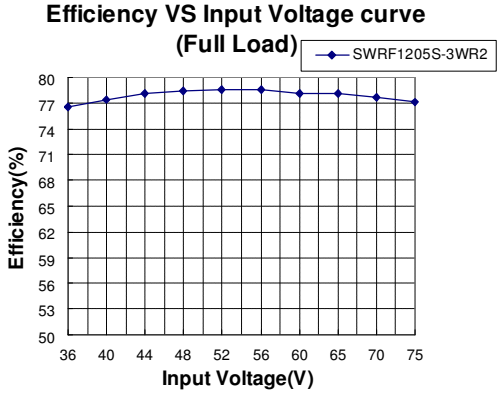
EMC RECOMMENDED CIRCUIT PCB LAYOUT

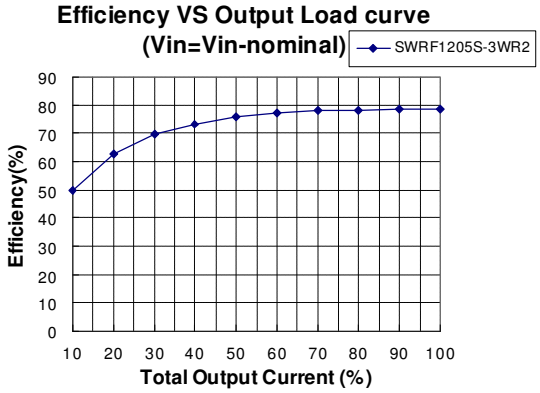


(Figure 2)

PRODUCT TYPICAL CURVE

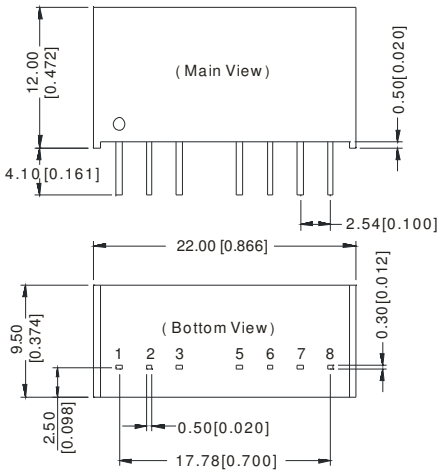






OUTLINE DIMENSIONS、RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

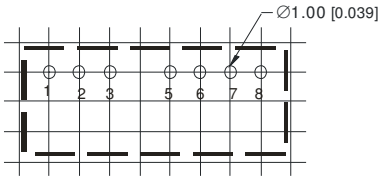


Note:
Unit: mm[inch]
Pin section tolerances:±0.10mm[±0.004inch]
General tolerances ±0.25mm[±0.010inch]

FOOTPRINT DETAILS	
Pin	Function
1	GND
2	Vin
3	CTRL
5	NC
6	+Vo
7	0V
8	CS

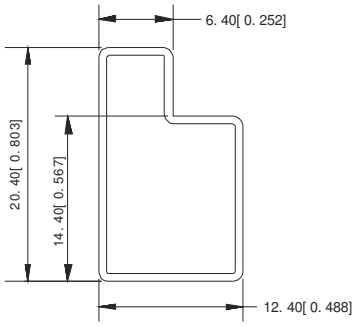
NC: No connection.

RECOMMENDED FOOTPRINT



Note: grid 2.54*2.54mm

TUBE OUTINE DIMENSIONS

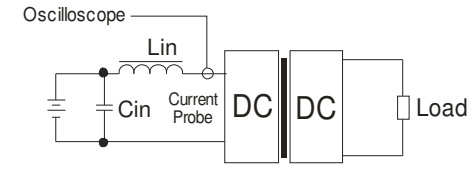


Note:
Unit: mm[inch]
General tolerances ±0.50mm[±0.020inch]
L=530mm[20.866inch] Devices per tube quantity: 22pcs
L=220mm[8.661inch] Devices per tube quantity: 8pcs
Short tube inner packaging dimensions: L*W*H=255*170*80mm;
Short tube outer packaging dimensions(with six inner packaging boxes): L*W*H=375*280*270mm;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



Lin(4.7μH) Cin(220μF, ESR < 1.0Ω at 100 KHz)

DESIGN CONSIDERATIONS

1) Requirement on output load

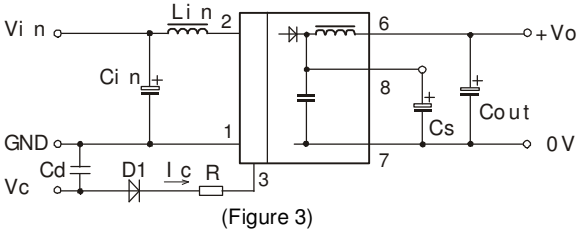
To ensure this module can operate efficiently and reliably, During operation, the minimum output load ***could not be less than 5% of the full load.*** otherwise ripple maybe increase dramatically. If the actual output power is very small, please connect a resistor with proper resistance at the output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

2) Recommended circuit

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

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: 47μF(Typ.)



(Figure 3)

3) CTRL Terminal

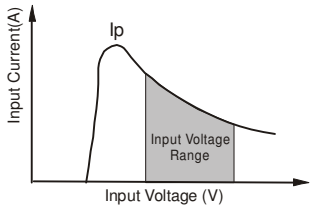
When open or high impedance, the converter work well; When this pin is 'high'; the converter shutdown; It should be note that the input current should between 5-10mA,exceeding the maximum 20mA will cause permanence damage to the converter. The value of R can be derived as follows:

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

4) Input current

Nominal input voltage range.The input current of the power supply must be sufficient to the startup current (Ip) of the DC/DC module(Figure 4).

General: Vin:5V Ip =1333mA
Vin:12V Ip =465mA
Vin:24V Ip =280mA
Vin:48V Ip =130mA



(Figure 4)

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.