FEATURES

- UltracompactSIPpackage
- Wide2:1inputvoltagerange
- Operatingambienttemperaturerange:-40℃ to +85℃
- I/Oisolationtestvoltage:1.5KVDC
- Lowoutputripple&noise
- Shortcircuitprotection(self-recovery)
- RemoteOn/Off
- Highpowerdensity
- EN60950approved
- Three year warranty

3W isolated DC/DC converter
Wide input voltage and regulated dual/single output

Selection Guide

Certification	Part No.	Input Voltage(VDC)		Output		Full Load Efficiency(%) Min./Typ.	Max.Capacitive Load ②(μF)
		Nominal (Range)	Max.①	Voltage (VDC)	Current(mA) Max./Min.		
	WRA0505S-3WR2	5 (4.5-9)	11	±5	±250/±13	72/74	1000
	WRA0512S-3WR2			±12	±104/±5	75/77	470
	WRA0515S-3WR2			±15	±83/±4	75/77	330
	WRA0524S-3WR2			±24	±52/±3	74/76	220
	WRB0503S-3WR2			3.3	758/38	66/68	1800
	WRB0505S-3WR2			5	500/25	71/73	2200
	WRB0509S-3WR2			9	278/14	72/74	1000
	WRB0512S-3WR2			12	208/10	75/77	680
	WRB0515S-3WR2			15	167/8	72/74	470
	WRB0524S-3WR2			24	104/5	74/76	330
	WRA1205S-3WR2	12 (9-18)	20	±5	±300/±15	76/78	1000
	WRA1209S-3WR2			±9	±167/±8	76/78	680
	WRA1212S-3WR2			±12	±125/±6	77/79	470
	WRA1215S-3WR2			±15	±100/±5	78/80	330
	WRB1203S-3WR2			3.3	758/38	73/75	2700
	WRB1205S-3WR2			5	600/30	74/76	2200
	WRB1206S-3WR2			6	500/25	77/79	1800
	WRB1209S-3WR2			9	333/17	77/79	1000
	WRB1212S-3WR2			12	250/13	80/82	680
	WRB1215S-3WR2			15	200/10	81/83	470
	WRB1224S-3WR2			24	125/6	79/81	330
	WRA2405S-3WR2	24 (18-36)	40	±5	±300/±15	77/79	1000
	WRA2409S-3WR2			±9	±167/±8	79/81	680
	WRA2412S-3WR2			±12	±125/±6	81/83	470
	WRA2415S-3WR2			±15	±100/±5	81/83	330
	WRB2403S-3WR2			3.3	758/38	72/74	2700
	WRB2405S-3WR2			5	600/30	79/81	2200
	WRB2409S-3WR2			9	333/17	81/83	1000
	WRB2412S-3WR2			12	250/13	81/83	680
	WRB2415S-3WR2			15	200/10	81/83	470
	WRB2424S-3WR2			24	125/6	81/83	330

	WRA4805S-3WR2	48 (36-75)	80	±5	±300/±15	77/79	1000
	WRA4812S-3WR2			±12	±125/±6	80/ 82	470
	WRA4815S-3WR2			±15	±100/±5	80/ 82	330
	WRB4803S-3WR2			3.3	758/38	73/ 75	2700
	WRB4805S-3WR2			5	600/30	74/ 76	2200
	WRB4812S-3WR2			12	250/13	78/80	680
	WRB4815S-3WR2			15	200/10	82/84	470
	WRB4824S-3WR2			24	125/6	80/82	330

Notes:
① Exceeding the maximum input voltage may cause permanent damage;
② Th especified maximum capacitive load value for positive and negative output is identical.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current(full load/no-load)	5VDC Input	3.3VOutput	--	735/40	758/85	mA
		Others		805/40	846/85	
	12VDC Input	3.3VOutput	--	278/30	286/40	
		Others		314/30	338/40	
	24VDC Input	3.3V Output	--	140/20	145/40	
		Others		154/20	163/40	
	48VDC Input	3.3V Output	--	69/5	72/15	
		Others		78/5	85/15	
Reflected Ripple Current	5VDC Input		--	20	--	
	12VDC Input		--	20	--	
	24VDC Input		--	55	--	
	48VDC Input		--	55	--	
Surge Voltage(1sec.max.)	5VDC Input		-0.7	--	12	VDC
	12VDC Input		-0.7	--	25	
	24VDC Input		-0.7	--	50	
	48VDC Input		-0.7	--	100	
Start-up Voltage	5VDC Input		--	--	4.5	
	12VDC Input		--	--	9	
	24VDC Input		--	--	18	
	48VDC Input		--	--	36	
Input Filter			Capacitor filter			
Hot Plug			Unavailable			
CNT *	Module on		CNT pin open(high resistance)			
	Module off		CNT pin pulled high (current 5-10mA typ.in to CNT.)			

Note:*Foruse of CNT,please refer to the"design reference"in this manual.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	5%-100%load,input volta gerange		--	±1	±3	%
No-load Output Voltage Accuracy	Input volta gerange	WRB1203S-3WR2 WRB4803S-3WR2	--	±5	±8	
		Others	--	±1.5	±5	
Linear Regulation	Input voltage variation from low to high at full load	Main road	--	±0.2	±0.5	
		Side road	--	--	±2	
Load Regulation	5%-100% load	Main road	--	±0.6	±1	
		Side road	--	--	±3	
Transient Recovery Time	25% load step change		--	0.5	3	ms
TransientResponse Deviation			--	±2.5	±5	%

Temperature Coefficient	Full load		--	±0.02	±0.03	%/℃
Ripple/Noise *	20MHz bandwidth	WRB1212S-3WR2 WRB1215S-3WR2 WRB4824S-3WR2	--	70	100	mVp-p
		WRB1224S-3WR2 WRB2415S-3WR2 WRB2424S-3WR2 WRA4805S-3WR2 WRB4803S-3WR2	--	100	150	
		Others	--	40	75	
Short-circuit Protection			Continuous,self-recovery			
Note:*The"parallelcable"method is used for Rippleand Noisetest,please referto DC-DC Converter Application Notes for specific information.						

General Spec ifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Testfor1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	120	--	pF
Operating Temperature	SeeFig.1	-40	--	+85	℃
Storage Temperature		-55	--	+125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from casefor 10 seconds	--	--	+300	
StorageHumidity	Non-condensing	--	--	95	%RH
Switching Frequency(PFM Mode)	Fullload,nominal input voltage	--	250	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

Mechanical Spec ifications

Case Material	Blackplastic;flame-retardantandheat-resistant(UL94-V0)
Dimensions	22.0×9.5×12.0mm
Weight	4.5g(Typ.)
Cooling Method	Free airconve ction

Elec tromagnetic compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B(see Fig.3-②for recommended circuit)	
	RE	CISPR32/EN55032 CLASS B(see Fig.3-②for recommended circuit)	
Immunity	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.3-①for recommended circuit)	perf.Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2KV(see Fig.3-①for recommended circuit)	perf.Criteria B
	CS	IEC/EN61000-4-6 3Vr.m.s	perf.Criteria A
	Voltage dips,short interrup tionsand voltage variation simmunity	IEC/EN61000-4-29 0%,70%	perf.Criteria B

Typical Characteristic Curves

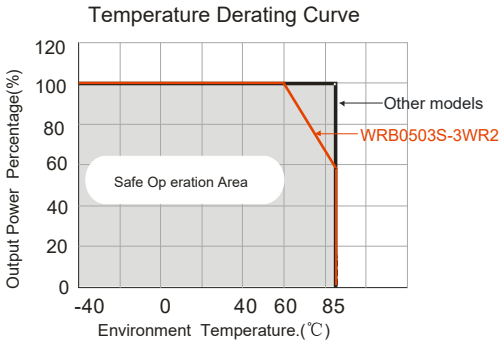
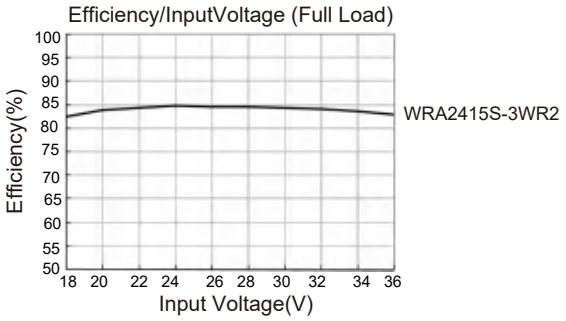
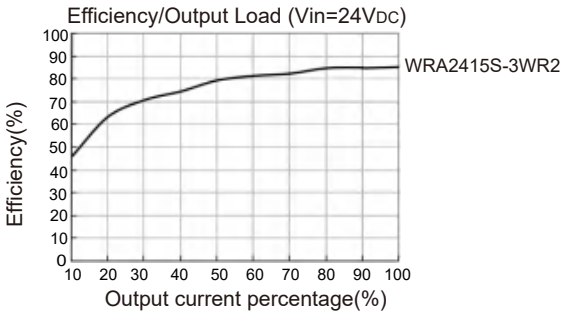
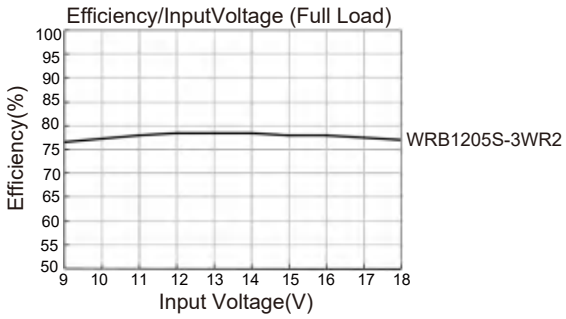
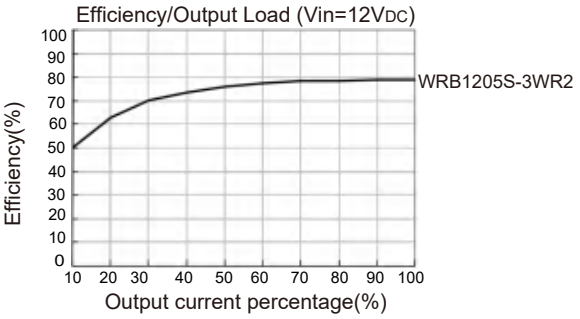


Fig 1









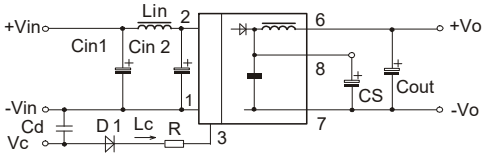
Design Reference

1. Typical application

All 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 Cin1,Cin2,Cs and Cout and/or by selecting capacitors with a low ESR(equivalent series resistance).Cs is used to reduce ripple.No need to add Cs,if ripple meets the demand.Appropriate filter capacitance shall be chosen,start-up problems may be caused if the capacitance is too large.For each output circuit,under the condition of safe and reliable operation,the max.capacity of its filter capacitor should be lower than the max.capacitive load.

Single



Dual

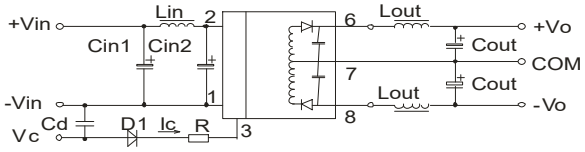


Fig.2

Vin	5VDC/12VDC	24VDC/48VDC
Cin1	100μF/25V	10μF/100V
Cin2	47μF/25V	1μF/100V
Lin	4.7μH-12μH	
Cs	10μF/50V-22μF/50V	
Cout	100μF/50V(Typ.)	
Lout	2.2μH-10μH	
Cd	47nF/100V	

2. EMC compliance circuit

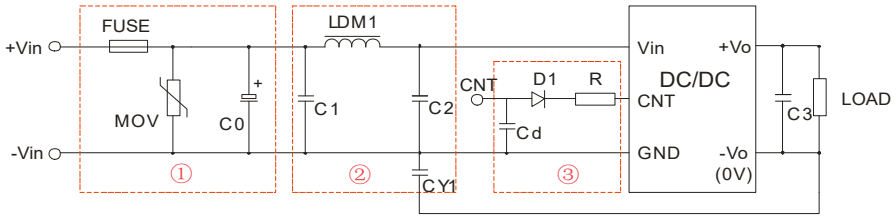


Fig.3

Parameter description:

Model	Vin:5VDC	Vin:12VDC	Vin:24VDC	Vin:48VDC
FUSE	Slow-blow,selecting based on needs			
MOV	--	S14K20	S20K30	S14K60
C0	680μF/25V	680μF/25V	330μF/50V	330μF/100V
C1	4.7μF/50V			4.7μF/100V
LDM1	12μH			
C2	4.7μF/50V			4.7μF/100V
C3	Refer to the Coutin Fig.2			
CY1	1nF/2KV			
D1	B160M-60V/1AR			
R	In accordance with the formula: $R=\frac{V_C-V_D-1.0}{I_C}-300$			
Cd	47nF/100V			

Notes:

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

② V_C is the voltage of the CNT end relative to the GND of the input grounding;V_D is the positive-going conduction pressure drop of D1;I_C is the current flows into the CNT end and its value is generally 5-10mA,see Fig.3-③ for the peripheral circuit of CNT end;

③If there is no recommended parameters,no external component is required.

3.CNT end

The modules are of normal output when the CNT end is suspended or of high resistance;the modules turn off when connecting with high level(relative to the inputgrounding);notice that the current flows into the pin shallbe 5-10mA,the modules will be permanently damaged if the currentex ceedsitsmax.value(20mA in general).

The value of R can be derived as follows:

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

For detailed parameter,please refer to EMC compliancecir cuit in this manual.

4.Input current

When the electricity is provided by the unstable power supply,please make sure that the range of the output voltage fluctuation and the ripple voltage of the power supply do not exceed the indicators of the modules.Input current of power supply should afford the flash start up current of this kind of DC/DC module(seeFig.4).

Generally: Vin=5Vseries Iave=1296mA
Vin=12Vseries Iave=631mA
Vin=24Vseries Iave=303mA
Vin=48Vseries Iave=157mA

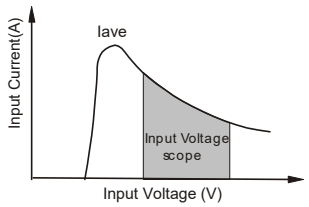


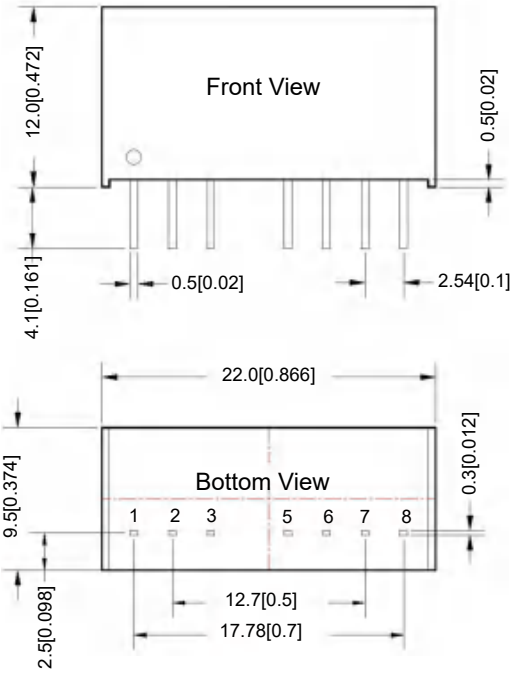
Fig.4

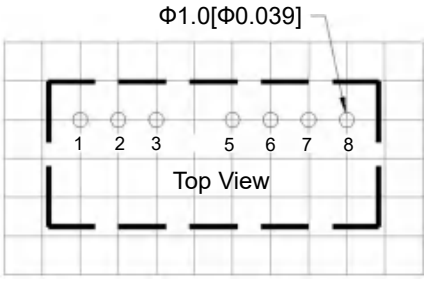
5. Output load requirements

When using,the minimum load of the module output should not be less than 5% of the nominal load.In order to meet the performance parameters of this datasheet,please connecta 5% dummy load in parallel at the outputend,the dummy load is generally a resistor,please note that the resistor needs to be used in derating.

Dimensions and Recommended Layout

Third angle projection





Note:Grid 2.54*2.54mm

Pin	Single	Dual
1	GND	GND
2	+Vin	+Vin
3	CNT	CNT
5	NC	NC
6	+Vo	+Vo1
7	-Vo	COM
8	CS	-Vo2

NC:No Connection

Note:
Unit:mm[inch]
Pin section tolerances:±0.1[±0.004]
General tolerances:±0.25[±0.01]

Note:

1.The recommended unbalance degree of the dual output module load is ≤±5%;if the degree exceeds ±5%,than the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
2. The maximum capacitive load offered were tested at nominal input voltage and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃,humidity<75% with nominal input voltage and rated output load;
4.All index testing methods in this datasheet are based on our Company's corporate standards;
5.The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
6.Specifications are subject to change without prior notice.

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