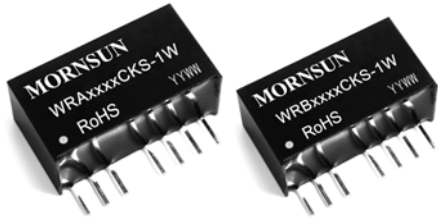


WRA_CKS-1W & WRB_CKS-1W Series 1W, WIDE INPUT, ISOLATED & REGULATED DUAL/SINGLE OUTPUT SIP DC-DC CONVERTER



Patent Protection RoHS

FEATURES

- 2:1 wide input range
- 1500VDC Isolation
- Short circuit protection (automatic recovery)
- Remote ON/OFF control
- High Power Density
- Operating Temperature: -40°C to +85°C
- UL94-V0 Package

APPLICATIONS

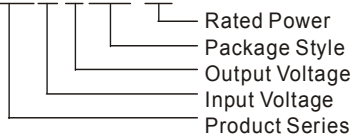
The WRA_CKS-1W & WRB_CKS-1W series are designed for application where a wide input voltage range, isolated output is required from a distributed power system. For these DC-DC converters, You can reduce the design point of failure and save the development of micro power supply's manpower, material and 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 ranges 2:1;
- 2) 1.5KVDC input and output isolation;
- 3) Regulated and low ripple noise is required.

PART NUMBER SYSTEM

WRA2412CKs-1W



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							
WRA0505CKs-1W	5 (4.5-9.0)	11	±5	±100	±10	278	50	35	680	72				
WRA0509CKs-1W			±9	±55	±5	278			470	72				
WRA0512CKs-1W			±12	±42	±4	270			330	74				
WRA0515CKs-1W			±15	±33	±3	274			220	73				
WRB0505CKs-1W			5	200	20	286			1000	70				
WRB0509CKs-1W			9	111	11	282			680	71				
WRB0512CKs-1W			12	83	8	263			470	76				
WRB0515CKs-1W			15	67	7	267			330	75				
WRB0524CKs-1W			24	42	4	278			220	72				
WRA1205CKs-1W			12 (9.0-18)	22	±5	±100			±10	109	20	30	680	76
WRA1209CKs-1W	±9	±55			±5	109	470	76						
WRA1212CKs-1W	±12	±42			±4	113	330	74						
WRA1215CKs-1W	±15	±33			±3	111	220	75						
WRA1224CKs-1W	±24	±21			±2	114	100	73						
WRB1203CKs-1W	3.3	303			30	113	2200	74						
WRB1205CKs-1W	5	200			20	109	1000	76						
WRB1209CKs-1W	9	111			11	107	680	78						
WRB1212CKs-1W	12	83			8	105	470	79						
WRB1215CKs-1W	15	67			7	104	330	80						
WRB1224CKs-1W	24	42			4	116	220	72						
WRA2405CKs-1W	24 (18-36)	40			±5	±100	±10	54	10	55			680	78
WRA2409CKs-1W					±9	±55	±5	55					470	76
WRA2412CKs-1W					±12	±42	±4	54					330	78
WRA2415CKs-1W			±15	±33	±3	55	220	76						

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			
WRB2403CK-1W	24 (18-36)	40	3.3	303	30	58	10	55	2200	70
WRB2405CK-1W			5	200	20	55			1000	72
WRB2409CK-1W			9	111	11	54			680	76
WRB2412CK-1W			12	83	8	52			470	76
WRB2415CK-1W			15	67	7	52			330	80
WRB2424CK-1W			24	42	4	54			220	72
WRA4805CK-1W			48 (36-72)	80	±5	±100			±10	28
WRA4812CK-1W	±12	±42			±4	27	330	77		
WRA4815CK-1W	±15	±33			±3	28	220	75		
WRB4805CK-1W	5	200			20	28	1000	76		
WRB4809CK-1W	9	111			11	27	680	78		
WRB4812CK-1W	12	83			8	26	470	80		
WRB4815CK-1W	15	67			7	26	330	80		

*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 (1000 ms)	5VDC Input Models	-0.7	--	12	VDC
	12VDC Input Models	-0.7	--	25	
	24VDC Input Models	-0.7	--	50	
	48VDC Input Models	-0.7	--	100	
Short Circuit Input Power		--	1	--	W
Input Filter		Capacitance Filter			

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Power		0.1	--	1	W
Positive voltage accuracy	Refer to recommended circuit	--	±1	±3	%
Negative voltage accuracy		--	±2	±5	
Output Voltage Balance	Dual Output, Balanced Loads	--	±0.3	±0.5	
Line Regulation	Full load, Input voltage from low to high	--	±0.2	±0.5	
Load Regulation	10% to 100% load (WRA_CKS-1W)	--	±0.5	±1.0	
	10% to 100% load (WRB_CKS-1W)	--	±0.5	±0.75	
Transient Recovery Time	25% load step change	--	8	10	ms
Transient Response Deviation		--	±3	±5	%
Temperature Drift	100% full load	--	--	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	--	25	75	mVp-p
Short Circuit Protection		Continuous, automatic recovery			

Note: Dual output models unbalanced load: ±5%.

*Test ripple and noise 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 1mA max	1500	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output,100KHz/1V	--	35	--	pF
Switching Frequency	Full load, nominal input	--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Case Material		Plastic(UL94-V0)			
Weight		--	5	--	g

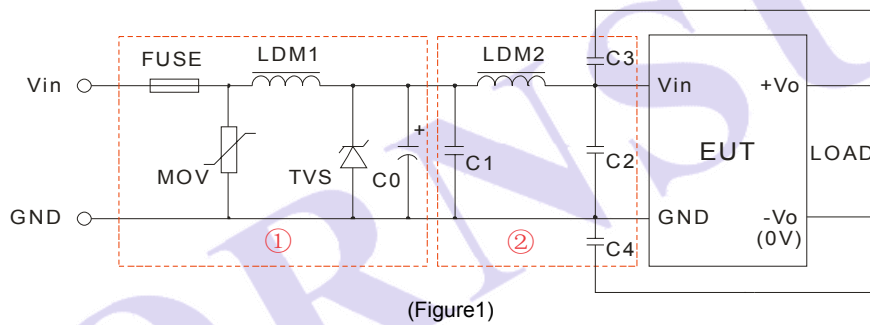
ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 71°C)	-40	--	85	°C
Storage Temperature		-50	--	125	
Temp. rise allowed at full load	Ta=25°C	--	15	35	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022	CLASS A (External Circuit Refer to Figure1-②)		
EMS	ESD	IEC/EN61000-4-2	Contact±6KV	perf. Criteria B	
	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)	

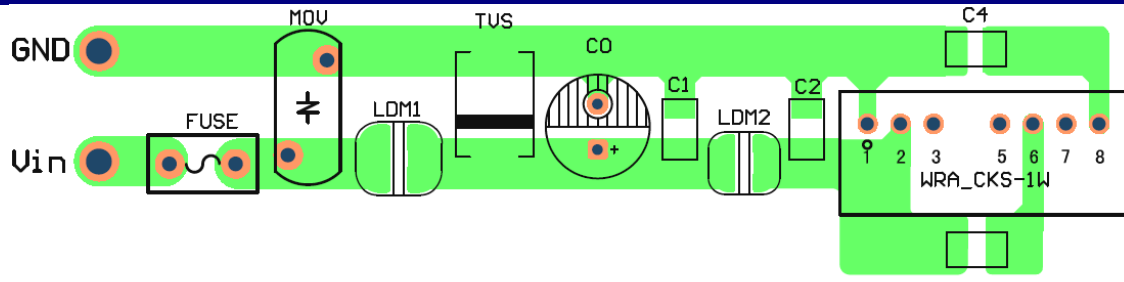
EMC RECOMMENDED CIRCUIT



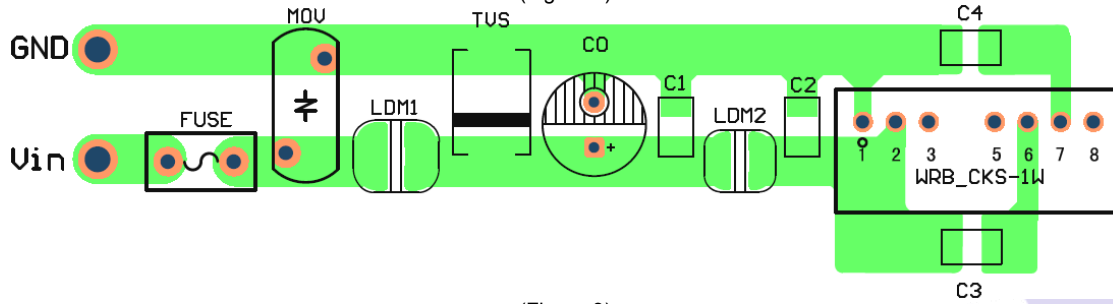
Recommended external circuit parameters	Vin:5V		Vin:12V		Vin:24V		Vin:48V	
	WRA_CKS-1W	WRB_CKS-1W	WRA_CKS-1W	WRB_CKS-1W	WRA_CKS-1W	WRB_CKS-1W	WRA_CKS-1W	WRB_CKS-1W
FUSE	Choose according to practical input current							
MOV	--	--	--	--	10D560K		10D101K	
LDM1	--	--	--	--	56μH			
TVS	SMCJ13A		SMCJ28A		SMCJ48A		SMCJ90A	
C0	680μF/16V		680μF/25V		120μF/50V		120μF/100V	
C1	1μF/50V	4.7μF/50V	1μF/50V	2.2μF/50V	4.7μF/50V		4.7μF/100V	
LDM2	4.7μH	12μH	4.7μH	12μH	12μH			
C2	2.2μF/50V	1μF/50V	2.2μF/50V	1μF/50V	--	1μF/50V	1μF/100V	
C3	--	--	--	--	100pF/2KV	--	100pF/2KV	--
C4	--	100pF/2KV	--	--	--	100pF/2KV		100pF/2KV

- Note: 1. In Figure 1, part ① is EMS Recommended external circuit, part ② is EMI recommended external circuit. Choose according to requirements.
2. If there is no recommended parameters, the model no require the external component.
3. If have higher expectations of WRA12_CKS-1W ESD testing, must be added ESD protection to the CTRL pin ,can be used two chip capacitors and a resistor form π circuit.

EMC RECOMMENDED CIRCUIT PCB LAYOUT

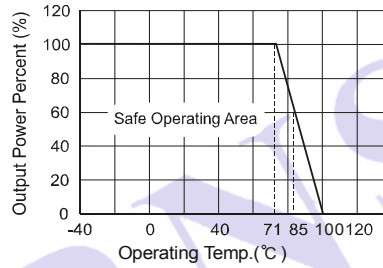


(Figure 2)

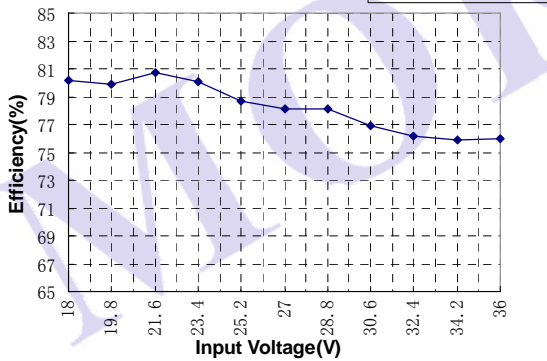


(Figure 3)

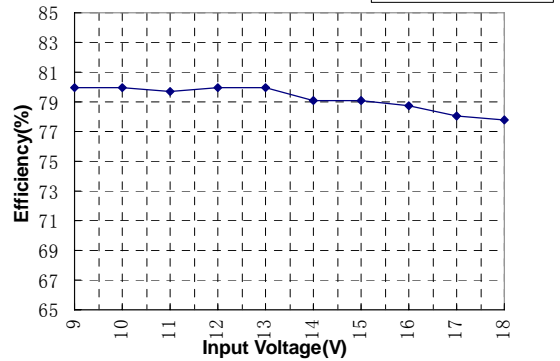
PRODUCT TYPICAL CURVE



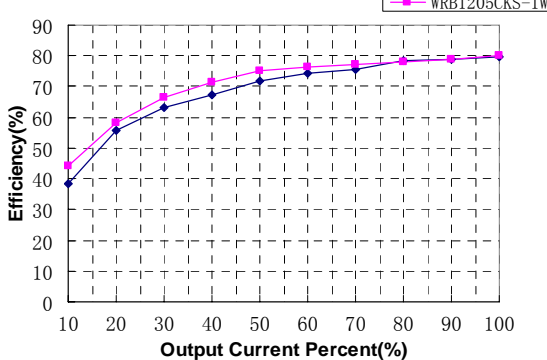
Efficiency VS Input Voltage (Full load) WRA2405CKS-1W



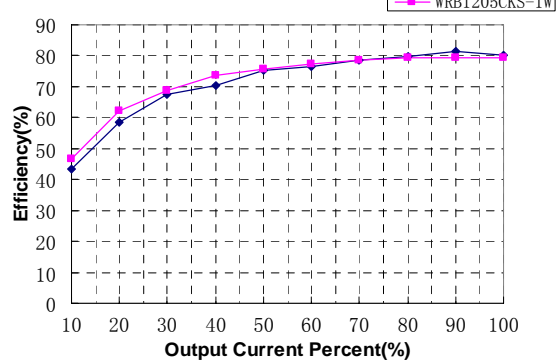
Efficiency VS Input Voltage (Full load) WRB1205CKS-1W



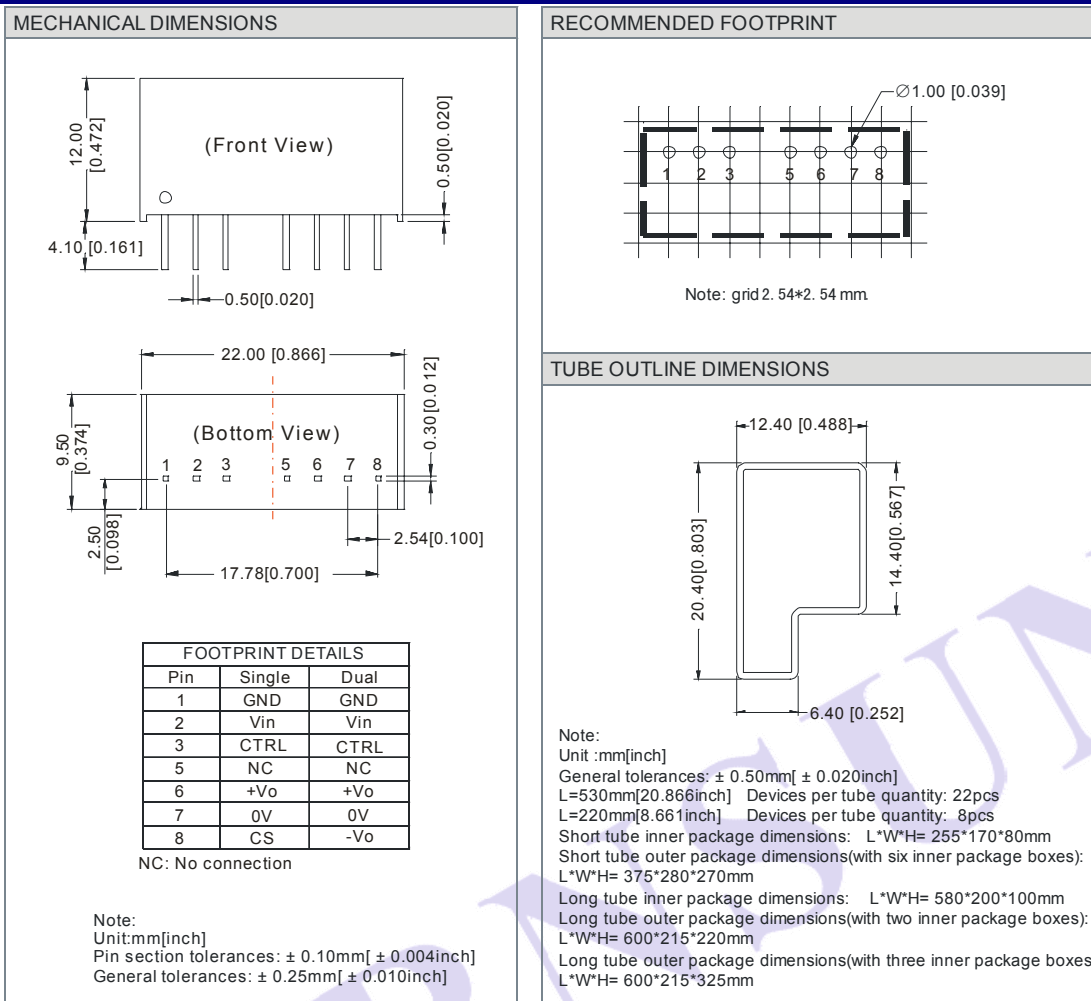
Efficiency VS Output Load curve (Vin=Vin-nominal) WRA2405CKS-1W



Efficiency VS Output Load curve (Vin=Vin-min) WRB1205CKS-1W



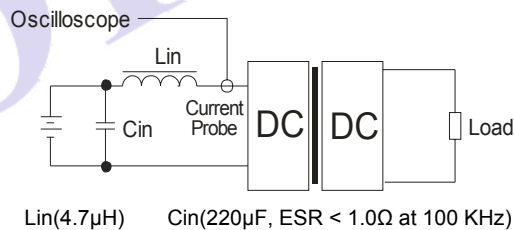
OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING



TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} and C_{in} 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 10% of the full load**. 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) Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is add a circuit breaker to the circuit.

3) Recommended circuit

If you want to further decrease the input/output ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 4).

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.

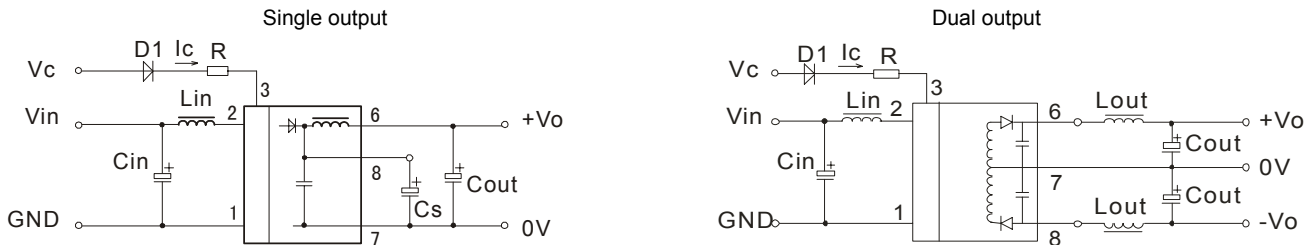
General: C_{in} : 5V,12V 100 μ F;
24V,48V 10 μ F

C_{out} : 47 μ F (Typ.)

L_{in} : 4.7 μ H~120 μ H

L_{out} : 2.2 μ H~10 μ H

C_s : 10 μ F~22 μ F



(Figure 4)

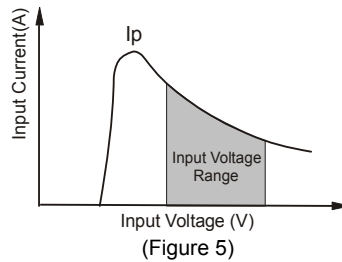
4) CTRL Terminal

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:

$$R = \frac{V_c - V_D - 1.0}{I_c}$$

5) 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 5).
General: $I_p \leq 1.4 \cdot I_{in-max}$



6) Cannot use in parallel and hot swap

Note:

1. The load shouldn't be less than 10%, otherwise ripple will increase dramatically. Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
2. All specifications measured at $T_a=25^\circ\text{C}$, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. In this datasheet, all the test methods of indications are based on corporate standards.
4. Only typical models listed, other models may be different, please contact our technical person for more details.
5. Our company offer custom products.
6. Specifications subject to change without notice.

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