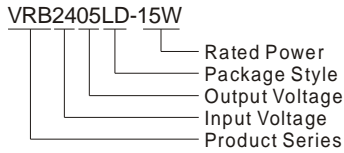


VRA_LD-15W & VRB_LD-15W Series 15W, WIDE INPUT, ISOLATED & REGULATED SINGLE/DUAL OUTPUT DC-DC CONVERTER



Patent Protection RoHS

MODEL SELECTION



PRODUCT FEATURES

- Efficiency up to 86%
- 2:1 wide input voltage range
- No heat sink required
- 1.5KVDC input/output isolation
- Short circuit protection (automatic recovery)
- Operating temperature: -40°C ~ +85°C
- Internal SMD construction
- Metal shielding package
- Industry standard pinout
- MTBF>1,000,000 hours
- RoHS Compliance

APPLICATIONS

The VRA_LD-15W & VRB_LD-15W series offer 15W of output, with 2:1 wide input voltage of 9-18, 18-36 and 36-75VDC, and features 1500VDC isolation, short-circuit and over current protection, as well as six-sided shielding. All models are particularly suited to industrial, tele-communications, electric power, test equipments.

PRODUCT PROGRAM

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			
VRA1205LD-15W	12 (9-18)	20	±5	±1500	±150	1530	45	100	±1020	83
VRA1212LD-15W			±12	±625	±62.5	1475	40		±495	85
VRA1215LD-15W			±15	±500	±50	1470	40		±165	85
VRA1224LD-15W			±24	±315	±32	1505	55		±200	83
VRB1203LD-15W			3.3	4000	400	1370	25		10500	79
VRB1205LD-15W			5	3000	300	1505	30		4020	81
VRB1212LD-15W			12	1250	125	1440	30		1035	85
VRB1215LD-15W			15	1000	100	1450	30		705	83
VRB1224LD-15W			24	625	62.5	1480	45		250	84
VRA2405LD-15W			24 (18-36)	40	±5	±1500	±150		750	25
VRA2412LD-15W	±12	±625			±62.5	720	20	±495	86	
VRA2415LD-15W	±15	±500			±50	720	25	±165	86	
VRA2424LD-15W	±24	±315			±32	760	30	±200	84	
VRB2403LD-15W	3.3	4000			400	690	15	10500	80	
VRB2405LD-15W	5	3000			300	745	15	4020	82	
VRB2412LD-15W	12	1250			125	720	25	1035	85	
VRB2415LD-15W	15	1000			100	710	25	705	85	
VRB2424LD-15W	24	625			62.5	750	30	250	84	
VRA4805LD-15W	48 (36-75)	80			±5	±1500	±150	380	20	200
VRA4812LD-15W			±12	±625	±62.5	365	20	±495	85	
VRA4815LD-15W			±15	±500	±50	365	15	±165	85	
VRB4803LD-15W			3.3	4000	400	345	10	10500	81	
VRB4805LD-15W			5	3000	300	375	20	4020	83	
VRB4809LD-15W			9	1666	167	365	20	2200	84	
VRB4812LD-15W			12	1250	125	360	10	1035	85	
VRB4815LD-15W			15	1000	100	350	10	705	86	

Note: 1.*Input voltage can't exceed this value, or will cause the permanent damage.

2. Add suffix "H" for heat sink mounted, for example VRB2405LD-15WH.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Input Surge Voltage (1000 ms)	12VDC Input Models	-0.7	--	25	VDC
	24VDC Input Models	-0.7	--	50	
	48VDC Input Models	-0.7	--	100	
Start-up Voltage	12VDC Input Models	--	--	9	
	24VDC Input Models	--	--	17.8	
	48VDC Input Models	--	--	35.8	
Under Voltage Shutdown	12VDC Input Models	--	--	9	
	24VDC Input Models	--	--	18	
	48VDC Input Models	--	--	36	
Start-up Time	Nominal input & constant resistance load	--	10	--	ms
Ctrl*	Models ON	3.5 - 40VDC or open circuit			
	Models OFF	0-1.2VDC			
Reverse Polarity Input Current**		--	--	1	A
Internal Power Dissipation**		--	--	4.5	W
Short Circuit Input Power		--	--	3.5	
Input Filter		L Filter			
Note: 1.*The CTRL control pin voltage is referenced to GND.					
2.**If the product reverse did not seek to limit current or work does not limit the maximum power, may result in injury or permanent damage, testing is not recommended.					

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Output Power		1.5	--	15	W
Positive voltage accuracy	Refer to recommended circuit	--	±1	±3	%
Negative voltage accuracy		--	±2	±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	10% to 100% load	--	±0.5	±1	
Cross Regulation	Dual output	--	--	±5	
Transient Recovery Time	25%~ 50%~25% load or	--	200	500	µs
Transient Response Deviation	50%~75%~50% load step change	--	±3	±5	%
Temperature Drift	100% full load	--	--	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	--	75	150	mVp-p
Over Current Protection	Full input voltage	120	130	150	%
Short Circuit Protection		Hiccup, continual, auto-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.	Units
Isolation Voltage	Tested for 1 minute and 1mA max	1500	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output, 100KHz/0.1V	--	1000	--	pF
Switching Frequency	Full load, nominal input	--	500	--	KHz
MTBF	MIL-HDBK-217F @25°C	1000	--	--	K hours
Case Material		Plastic(UL94-V0)			
Weight	Without heatsink	--	40	--	g
	With heatsink	--	55	--	

ENVIRONMENTAL SPECIFICATIONS

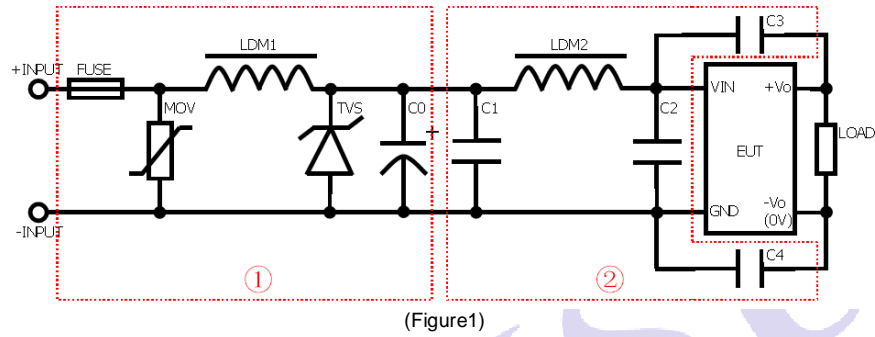
Item	Test Conditions	Min.	Typ.	Max.	Units
Storage Humidity		5	--	95	%

Operating Temperature	See Temperature Derating Curve	-40	--	85	°C
Storage Temperature		-55	--	125	
Temp. rise allowed at full load	Operating Temperature curve range	--	--	105	
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)
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV perf. Criteria B (External Circuit Refer to Figure 1)
	EFT	IEC/EN61000-4-4 ±2KV perf. Criteria B
	Surge	IEC/EN61000-4-5 ±2KV perf. Criteria B

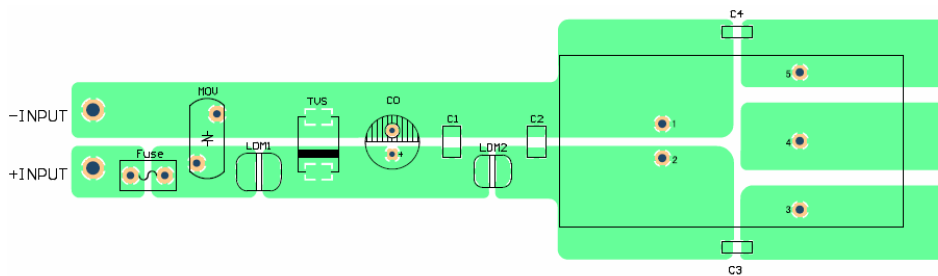
EMC RECOMMENDED CIRCUIT

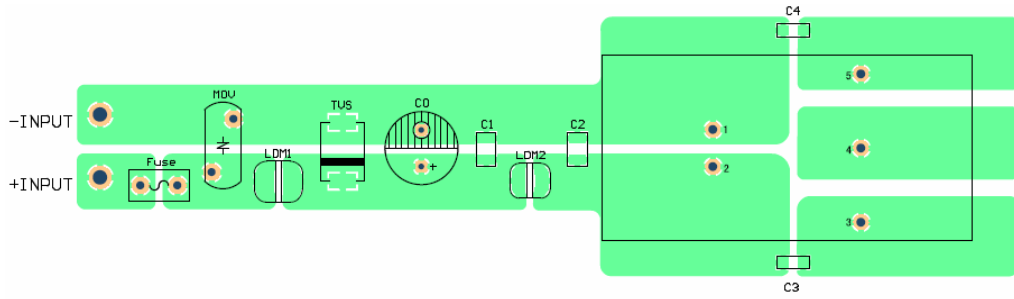


Recommended external circuit parameters		VRA/B12_LD-15W	VRA/B24_LD-15W	VRA/B48_LD-15W
EMS	FUSE	Choose according to load		
	MOV	--	10D560K	10D121K
	LDM1	--	82μH	CD53
	TVS	SMCJ28A	SMCJ48A	SMCJ100A
	C0	680μF/25V	120μF/50V	120μF/100V
EMI	C1	1μF/50V	1210	1μF/100V 1210
	LDM2	12μH CD43		
	C2	4.7μF/50V	1210	4.7μF/100V 1210
	C3	--	--	100pF/2KV 1206
	C4	--	--	100pF/2KV 1206

Note: 1. In Figure 1, part①is EMS Recommended external circuit, part②is EMI recommended external circuit. Choose according to requirements.
2. If there is no recommended parameters, the model no require the external component.

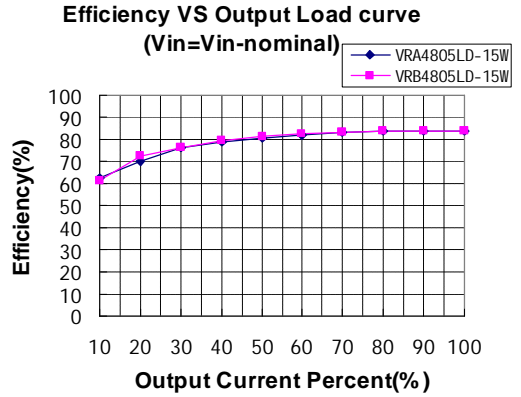
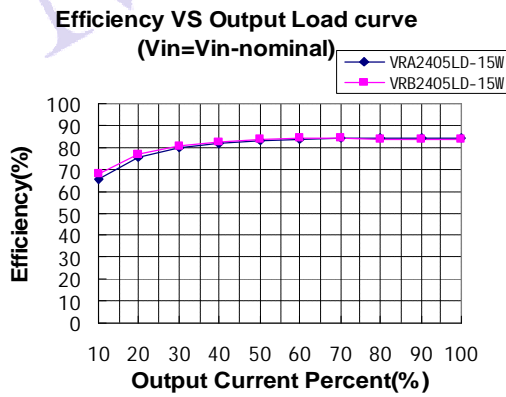
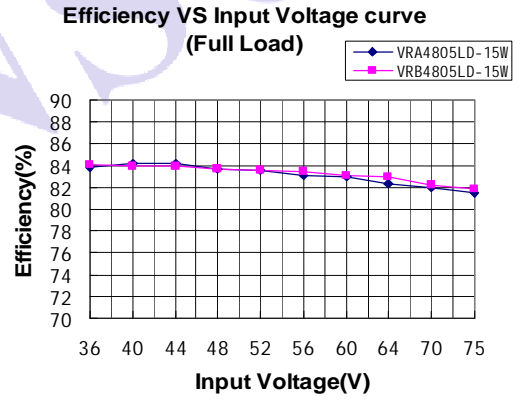
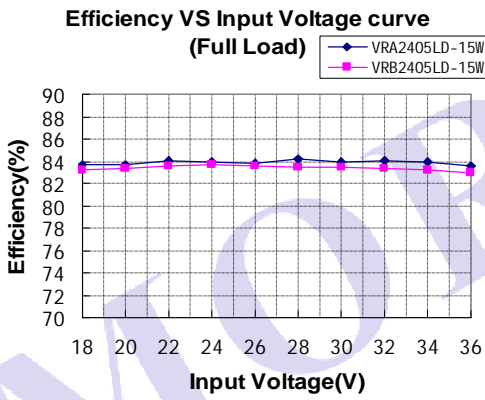
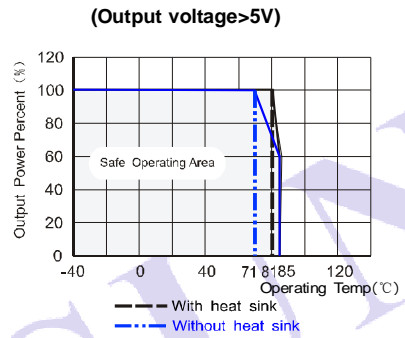
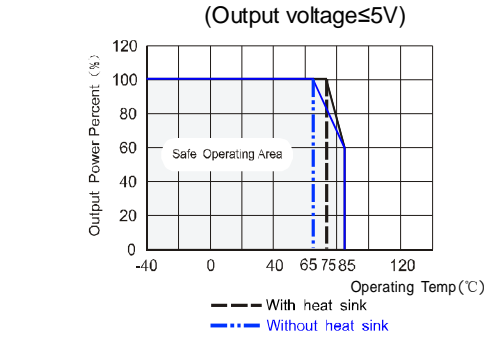
EMC RECOMMENDED CIRCUIT PCB LAYOUT





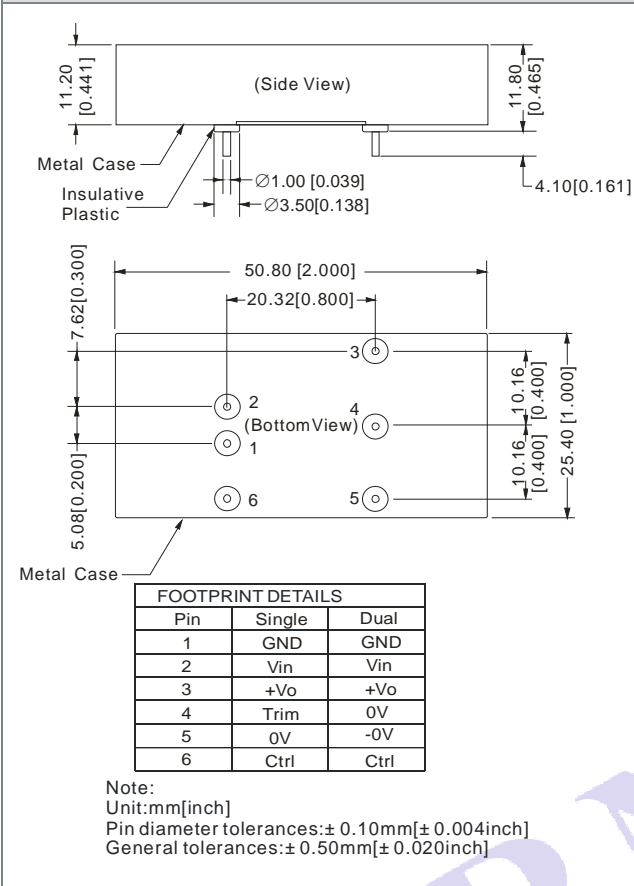
(Figure 3) $V_{in}=48V$

PRODUCT TYPICAL CURVE

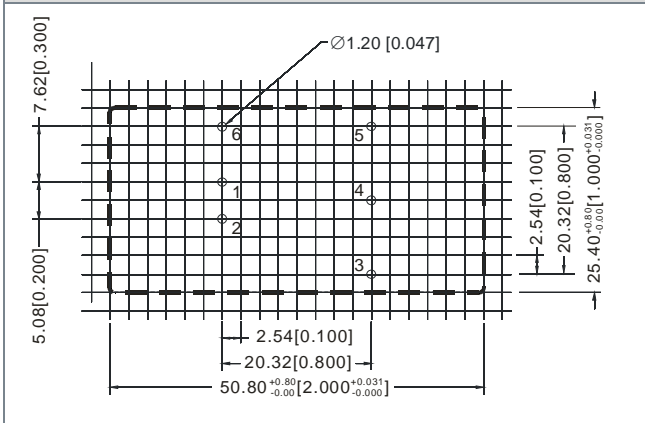


OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

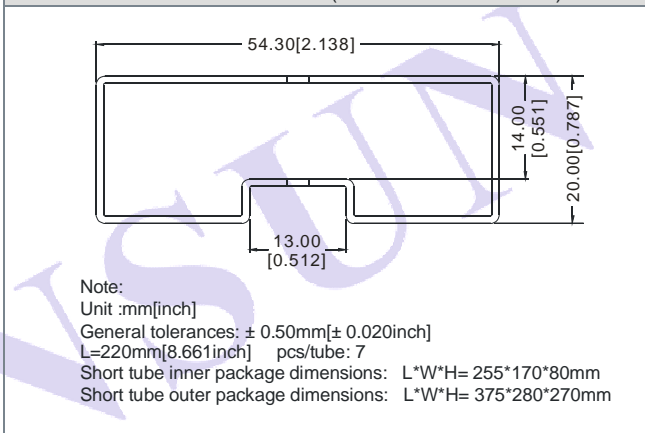
MECHANICAL DIMENSIONS



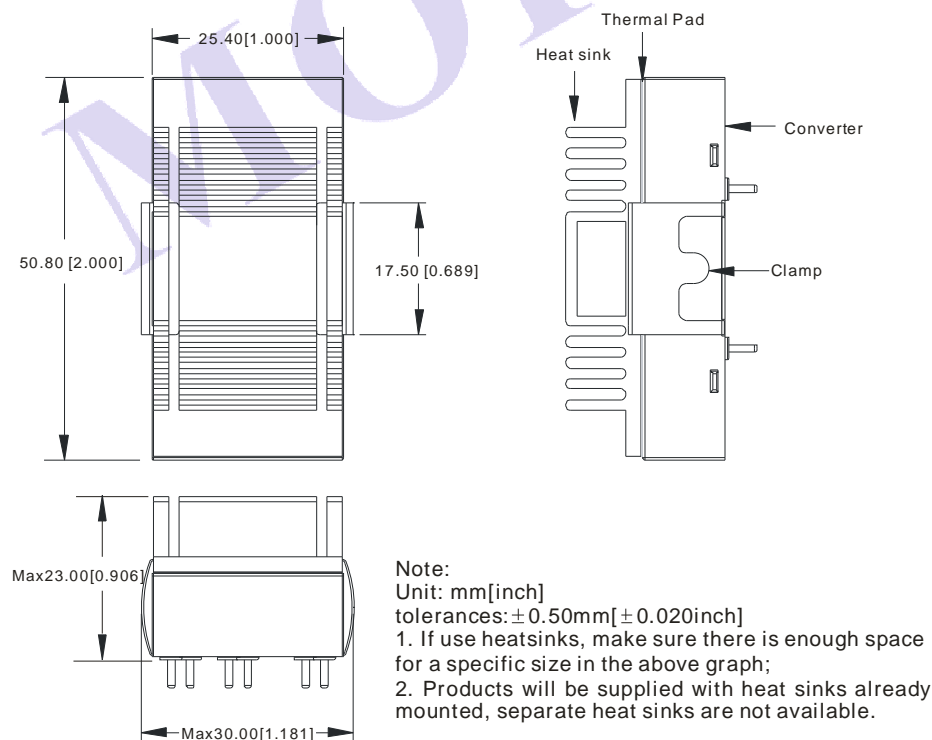
RECOMMENDED FOOTPRINT(TOP VIEW)



TUBE OUTLINE DIMENSIONS (WITHOUT HEATSINK)



HEATSINK ASSEMBLY & PACKAGE DIAGRAM

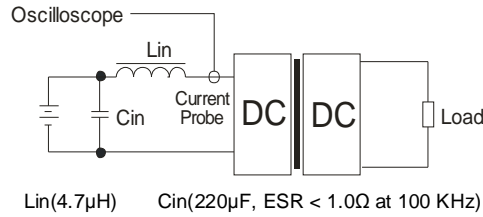


Inner packaging box dimensions:
L*W*H=255*170*80mm
Packaging quantity:24pcs
Outer packaging carton dimensions:
L*W*H=375*280*270mm
Packaging quantity:144pcs

TEST CONFIGURATIONS

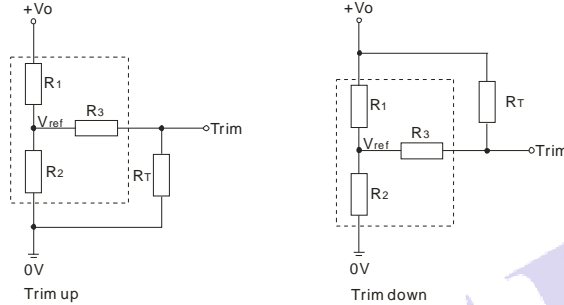
Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} and C_{in} to simulate source impedance.



TRIM APPLICATION & TRIM RESISTANCE

Application circuit for TRIM (Part in broken line is the interior of models)——Single output models



Formula for resistance of Trim

$$\begin{aligned} \text{up: } R_T &= \frac{aR_2}{R_2-a} - R_3 & a &= \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{aR_1}{R_1-a} - R_3 & a &= \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

Note: Value for R_1 , R_2 , R_3 , and V_{ref} refer to the following table.

R_T : Resistance of Trim

a : User-defined parameter, no actual meaning.

V_o' : The trim up/down voltage

V_o Parameter	3.3(VDC)	5(VDC)	9(VDC)	12(VDC)	15(VDC)	24(VDC)
$R_1(K\Omega)$	4.801	2.883	7.5	10.971	14.497	24.872
$R_2(K\Omega)$	2.863	2.864	2.864	2.864	2.864	2.864
$R_3(K\Omega)$	15	10	15	17.8	17.8	20
$V_{ref}(V)$	1.24	2.5	2.5	2.5	2.5	2.5

DESIGN & APPLY CONSIDERATIONS

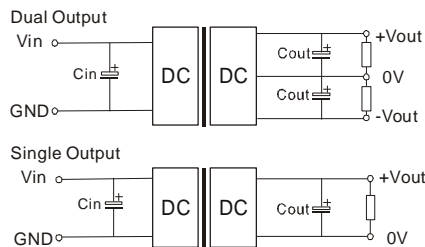
1) Requirement on output load

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.

2) Recommended circuit

All the VRA_LD-15W & VRB_LD-15W series have been tested according to the following recommended testing circuit before leaving factory. This series should be tested under load. Never be tested under no load (see Figure 3).

If you want to further decrease the output ripple, you can increase capacitance properly or choose capacitors with low ESR. However, the capacitance can't exceed the maximum capacitor load in the list (Table 1).



(Figure 3)

EXTERNAL CAPACITOR TABLE (TABLE 1)

Output Voltage	Capacitance	Cout(μ F)	Cin(μ F) (12V,24V, 48V input)
Single	3.3V,5V	470	100
	9V,12V,15V	220	
	24V	100	
Dual	\pm 5V	220	
	\pm 9V, \pm 12V, \pm 15	100	
	\pm 24V	47	

3) No parallel connection or plug and play

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, and that will reduce the life of product.
2. Max. Capacitive Load tested at nominal input voltage, full load and constant resistive 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 corporate standards.
5. Only typical models listed, other models may be different, please contact our technical person for more details.
6. Our company offer custom products.
7. Specifications subject to change without notice.

MORNSUN Science & Technology Co.,Ltd.

Address: No. 5, Kehui St. 1, Kehui development center, Science Ave., Guangzhou Science City, Luogang district, Guangzhou,P.R.China.

Tel: 86-20-28203030

Fax:86-20-28203068

[Http://www.mornsun-power.com](http://www.mornsun-power.com)