

MORNSUN

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



RoHS

FEATURES

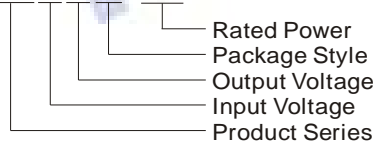
- Efficiency up to 86%
- 2:1 wide input voltage range
- 1.5KVDC input/output isolation
- Short circuit protection (automatic recovery)
- Operating temperature: -40°C ~ +85°C
- Internal SMD construction
- Metal shielding package
- Industry standard pinout
- MTBF>1,000,000 hours
- RoHS Compliance

APPLICATION

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, test equipments power.

MODEL SELECTION

VRB2405LD-15W



MORNSUN America

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PRODUCT PROGRAM

Part Number	Input			Output		Efficiency (% Typ.)	Capacitor Load ⁽³⁾ (Max, µF)
	Voltage (VDC)			Voltage (VDC)	Current ⁽²⁾ (mA)		
	Nominal	Range	Max. ⁽¹⁾				
VRA1205LD-15W	12	9-18	20	±5	±1500	83	±1020
VRA1212LD-15W				±12	±625	85	±495
VRA1215LD-15W				±15	±500	85	±165
VRB1203LD-15W				3.3	4000	79	10500
VRB1205LD-15W				5	3000	81	4020
VRB1212LD-15W				12	1250	85	1035
VRB1215LD-15W				15	1000	83	705
VRA2405LD-15W				24	18-36	40	±5
VRA2412LD-15W	±12	±625	86				±495
VRA2415LD-15W	±15	±500	86				±165
VRB2403LD-15W	3.3	4000	80				10500
VRB2405LD-15W	5	3000	82				4020
VRB2412LD-15W	12	1250	85				1035
VRB2415LD-15W	15	1000	85				705
VRA4805LD-15W	48	36-75	80				±5
VRA4812LD-15W				±12	±625	85	±495
VRA4815LD-15W				±15	±500	85	±165
VRB4803LD-15W				3.3	4000	81	10500
VRB4805LD-15W				5	3000	83	4020
VRB4812LD-15W				12	1250	85	1035
VRB4815LD-15W				15	1000	86	705

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

INPUT SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Start-up time		--	10	--	ms
Start-up voltage	12 Vin models	--	--	9	VDC
	24 Vin models	--	--	17.8	
	48 Vin models	--	--	35.8	
Input filter		L-C			
Ctrl	On	3.5 - 40VDC or open circuit			
	Off	0-1.2VDC			

OUTPUT SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Output voltage accuracy	Refer to recommended circuit	--	±1	±3	%
Load regulation	From 10% to 100% load	--	±0.5	±1	
Line regulation	Input voltage from low to high	--	±0.2	±0.5	
Cross regulation(Dual)		--	--	±5	
Ripple and noise	20MHz Bandwidth	--	75	150	mV
Transient recovery time	25% load step change	--	200	500	us
Transient peak deviation		--	±3	±5	%Vo
Over current protection	Input voltage range	120	130	150	%
Output short circuit	Input voltage range	Hiccup, automatic recovery			
Trim	Single output models	--	±10%Vo	--	VDC
Temperature drift (Vout)		--	±0.02	--	%/°C

COMMON SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Storage humidity		5	--	95	%
Operating temperature		-40	--	85	°C
Storage temperature		-55	--	125	
Temp. rise at full load	Case surface	--	--	50	
Lead temperature	1.5mm from case for 10 seconds	--	--	300	
Isolation voltage	Tested for 1 minute and 1 mA max	1500	--	--	VDC
Isolation resistance	Test at 500VDC	1000	--	--	MΩ
Isolation capacitance	100kHz/0.1V	--	1000	--	pF
Switching frequency	Nominal, full load	--	500	--	kHz
MTBF	M1-HDBK-217F	1000	--	--	k hours
Cooling		Free Air Convection			
Case material		Nickel- coated copper			
Weight		--	40	--	g

2) Recommended capacitance

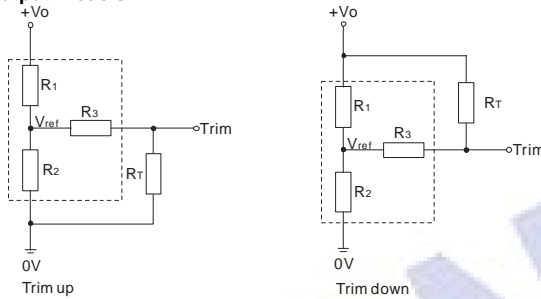
To ensure these series can operate efficiently and reliably, the recommended capacitance of input and output sees the below table.

Output Voltage		Capacitance	Cin(12V,24V, 48V input)
Single	3.3V,5V	220μF	100μF
	12V,15V	100μF	
Dual	±5V	±220μF	
	±12V,±15V	±100μF	

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 R1, R2, R3, and Vref refer to the following table.

R_T: Resistance of Trim

a: User-defined parameter, no actual meaning.

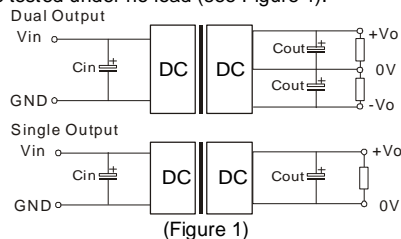
V_{o'}: The trim up/down voltage

Parameter \ V _o	3.3(VDC)	5(VDC)	12(VDC)	15(VDC)
R1(KΩ)	4.801	2.883	10.971	14.497
R2(KΩ)	2.863	2.864	2.864	2.864
R3(KΩ)	15	10	17.8	17.8
Vref(V)	1.24	2.5	2.5	2.5

APPLICATION NOTE

1) 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 1).

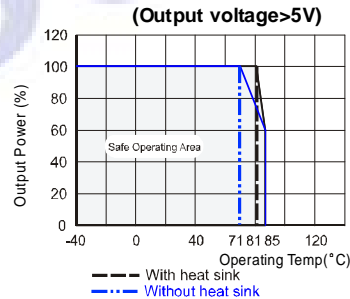
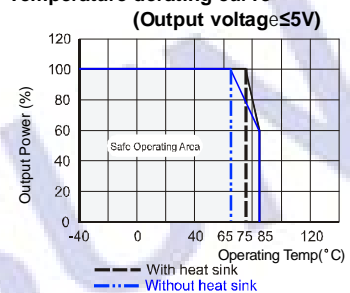


(Figure 1)

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.

DERATING & EFFICIENCY CURVE

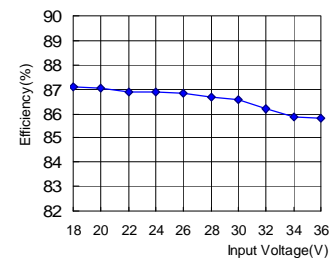
1) Temperature derating curve



2) Efficiency Vs Input voltage

VRA2412LD-15W

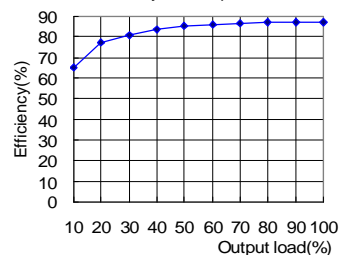
Efficiency VS Input voltage



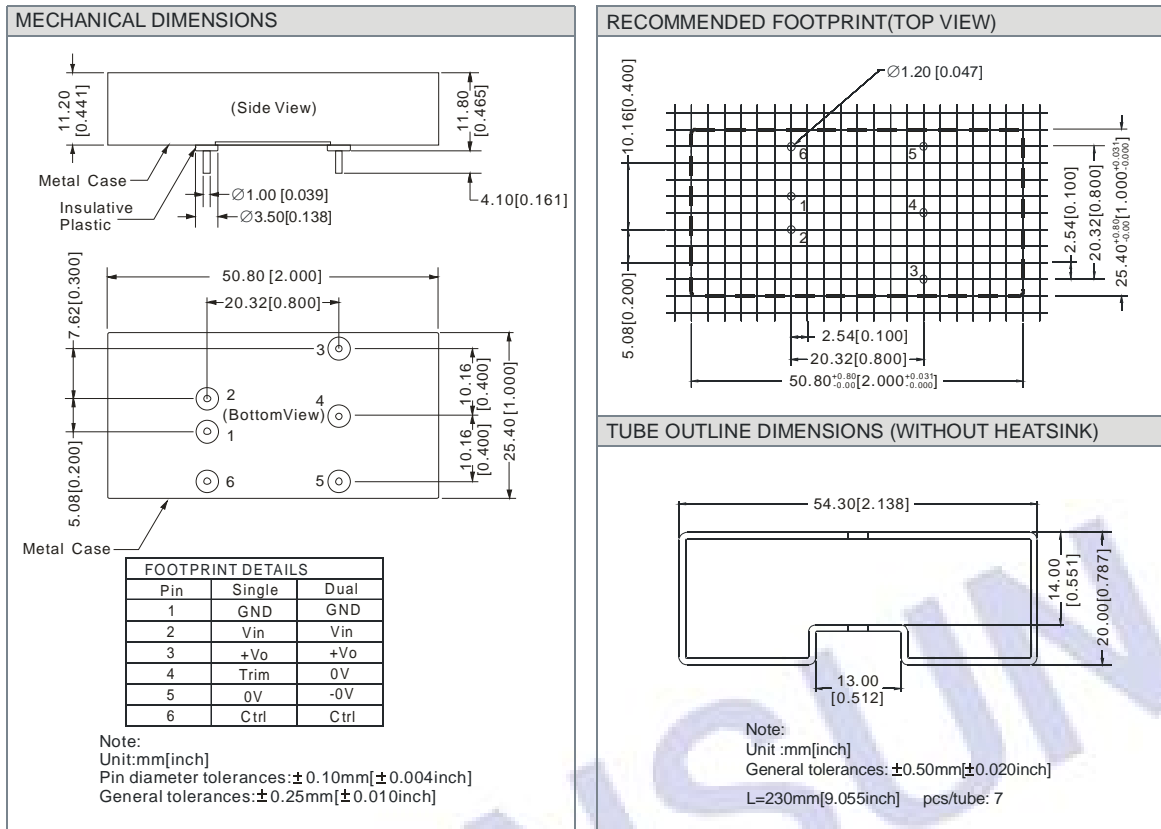
3) Efficiency Vs Output Power

VRA2412LD-15W

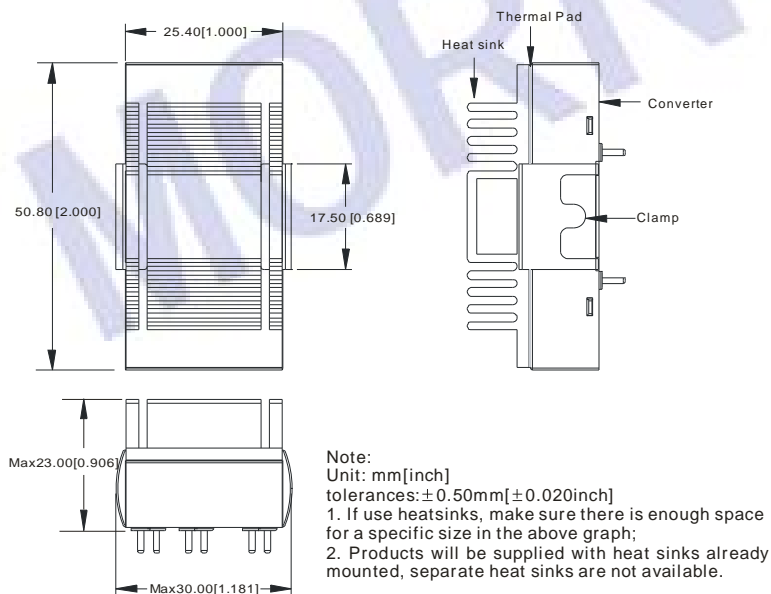
Efficiency VS Output load



OUTLINE DIMENSIONS & FOOTPRINT DETAILS



HEATSINK ASSEMBLY



PACKAGE DIAGRAM(WITH HEATSINK)



Package box:
L*W*H=255*170*80mm
Package quantity: 24pcs

NOTE

1. Input voltage can't exceed this value, or will cause the permanent damage.
2. Minimum operating current is 10% of rated current, if less than 10% rated current, output ripple may increase rapidly, the amplitude $\leq 1V$.
3. Capacitor MAX load tested at nominal input voltage, full load and constant resistive load.
4. The CTRL control pin voltage is referenced to GND.
5. Only typical model listed. Non-standard models will be different from the above, please contact us for more details.
6. All specifications are measured at $T_A=25^\circ C$, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
7. In this datasheet, all the test methods of indications are based on corporate standards.