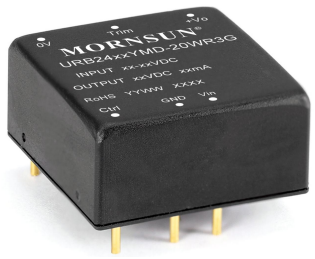
20W isolated DC-DC converter Wide input and regulated single output DIP encapsulation



Patent Protection RoHS

FEATURES

- Wide 4:1 input voltage range
- High efficiency up to 91%
- I/O isolation test voltage 1.5k VDC
- Input under-voltage protection, output short-circuit, over-current, over–voltage protection
- Operating ambient temperature range: -40℃ to +105℃
- Industry standard pin-out
- Meets EN62368 certification standards

URB_YMD-20WR3G series of isolated 20W DC-DC converter products with an ultra-wide 4:1 input voltage range. They feature efficiencies up to 91%, input to output isolation is tested with 1500VDC and the converter safety operate ambient temperature of -40℃ to +105℃, input under-voltage protection, output short-circuit, over-current and over-voltage protection. They are ideally and widely used in applications such as industrial control, electric power, instruments ,communications and railway.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency② (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.①	Voltage (VDC)	Current(mA) Max./Min.		
--	URB2405YMD-20WR3G	24 (9~36)	40	5	4000/0	88/90	10000
	URB2412YMD-20WR3G			12	1667/0	88/90	1600
	URB2415YMD-20WR3G			15	1333/0	87/89	1000
	URB2424YMD-20WR3G			24	833/0	89/91	500
	URB2428YMD-20WR3G			28	714/0	89/91	400

Notes:
① Exceeding the maximum input voltage may cause permanent damage;
② Efficiency is measured in nominal input voltage and rated output load;

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	24VDC Nominal input voltage	5V output	--	926/50	947/80	mA
		Others	--	936/10	957/20	
Reflected Ripple Current	24VDC Nominal input voltage		--	30	--	
Surge Voltage (1sec. max.)	24VDC Nominal input Series		-0.7	--	50	VDC
Start-up Voltage	24VDC Nominal input Series		--	--	9	
Input under-voltage protection	24VDC Nominal input Series		5.5	6.5	--	
Start-up Time	Nominal input voltage & constant resistance load		--	10	--	ms
Input Filter			Pi typ			
Hot Plug			Unavailable			
Ctrl*	Module on		Ctrl pin open or pulled high (TTL 3.5-12VDC)			
	Module off		Ctrl pin pulled low to GND (0-1.2VDC)			
	Input current when off		--	2	7	mA

Note: *The Ctrl pin voltage is referenced to input GND.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy①	5%-100% load		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
Load Regulation②	5%-100% load		--	±0.5	±1	
Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
Transient Response Deviation		5V output	--	--	±8	%
		Others	--	--	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise③	20MHz bandwidth,5%-100% load		--	50	100	mVp-p
Trim	Input voltage range		90	--	110	%Vo
Over-voltage Protection			110	--	160	
Over-current Protection			110	150	190	%Io
Short circuit Protection			打嗝式，可持续，自恢复			

Note:
①Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "parallel lines" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
	Input/output-Shell Electric Strength Test for 1 minute with a leakage current of 1mA max.	1000	--	--	
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	2000	--	pF
Operating Temperature	See Fig. 1	-40	--	+105	℃
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	℃
Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency *	PWM mode	--	--	370	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours

Note: *Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

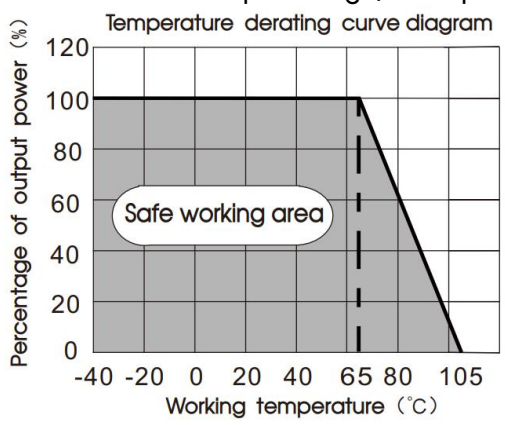
Case Material	Aluminum alloy
Weight	15.0g(Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig.3 for recommended circuit)
	RE	CISPR32/EN55032	CLASS B (see Fig.3 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2	Contact ±6kV, Air ±8kV perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m（see Fig.3 for recommended circuit） perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV（see Fig.3 for recommended circuit） perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±2kV（see Fig.3 for recommended circuit） perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s（see Fig.3 for recommended circuit） perf. Criteria A

Typical Characteristic Curves

Nominal input voltage, 5V output



Nominal input voltage, 12V, 15V, 24V, 28Voutput

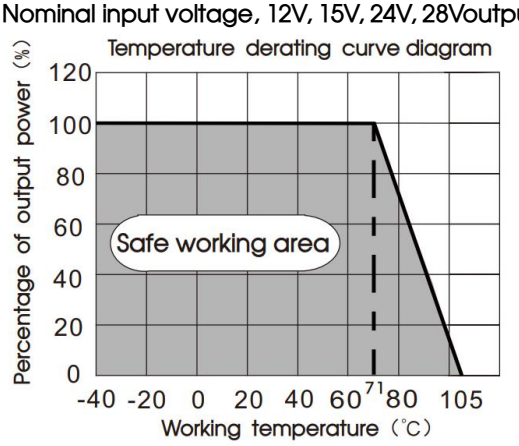
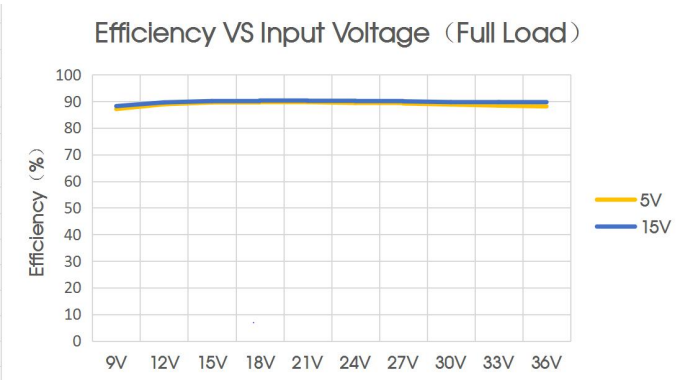
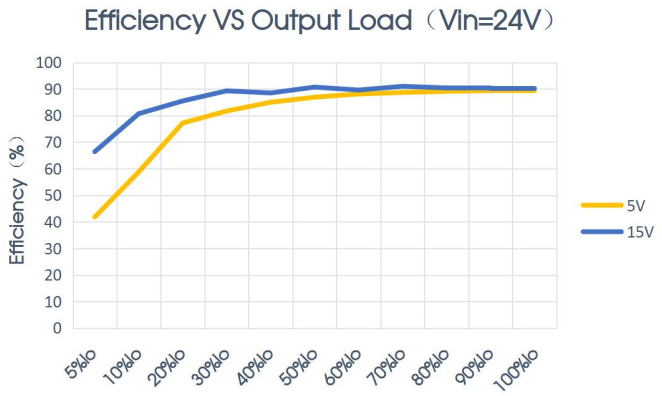


Fig. 1





Design Reference

1. Typical application

All DC-DC converters of this series are tested using paralle lines test circuit before they leave the factory.

Lf further reduction of the input and output ripple is required,it is recommended to increase the output external capacitance with (Figure 2),or to use a capacitor with a small equivalent series impedance value,but the capacitance value cannot be greater than the maximum capacitive load of the product.

Fig. 2

Vin (VDC)	Vout (VDC)	Cin	Cout
24	5	100μF/50V	100μF/16V
	12/15		100μF/25V
	24		47μF/50V

2. EMC compliance circuit

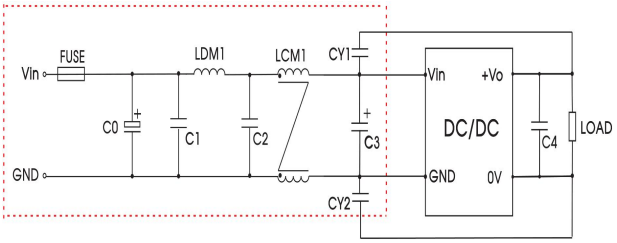


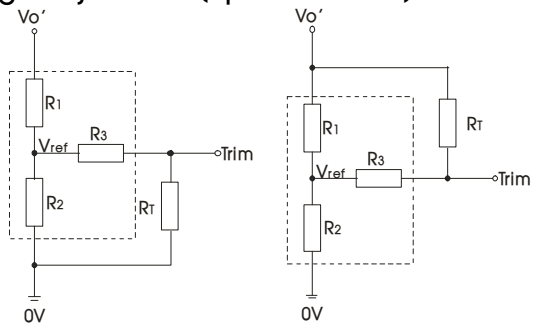
Fig. 3

Notes:The red box section in Figure 3 is used for Immunity testing and Emissions testing.

Parameter description：

Components	Vin: 24VDC
FUSE	Choose according to actual input current
C0、C3	330μF/50V
C1、C2	4.7μF/50V
C4	Refer to the Cout parameter in Fig.2
LDM1	2.2μH/4A
LCM1	1mH（Recommend use Mornsun P/N,FL2D-30-102）
CY1、CY2	4.7nF/2kV

3. Trim Function for Output Voltage Adjustment (open if unused)



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

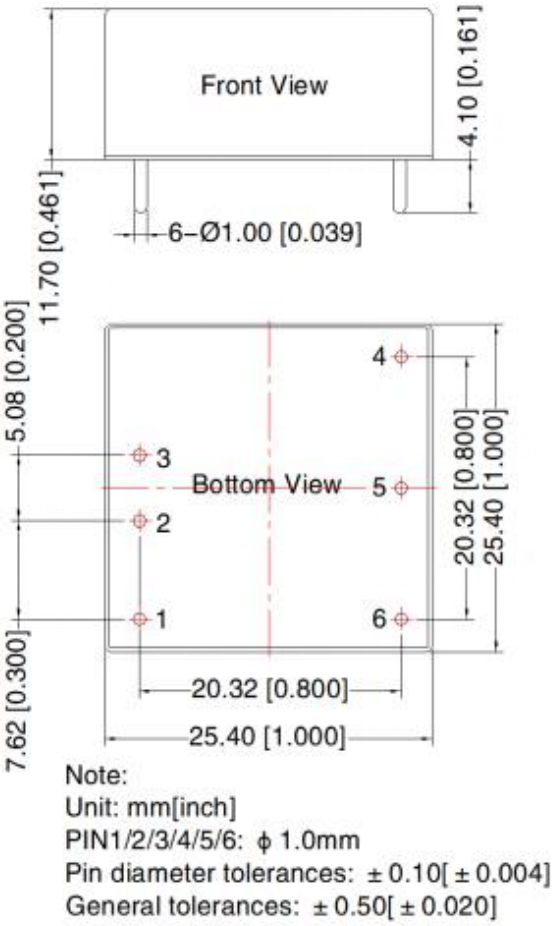
R_T is Trim resistance
a is a self-defined parameter, with no real meaning.

Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
5	8.7	2.87	10	1.24
12	11.000	2.87	17.4	2.5
15	14.494	2.87	17.4	2.5
24	24.872	2.87	20	2.5
28	29.411	2.87	12	2.5

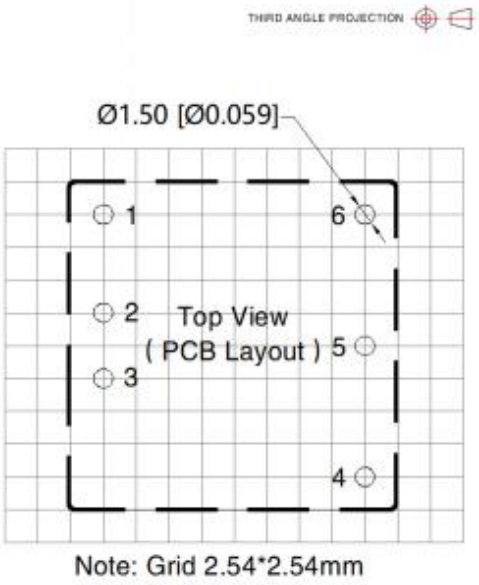
4. The products do not support parallel connection of their output

5. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
PIN1/2/3/4/5/6: ϕ 1.0mm
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]



Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	Trim
6	0V

Note:
1. For additional information on Product Packaging please refer to www.mornsun-power.com.Packaging bag number: 58210003;
2. it is recommended to use at more than 10% load,if less than 10 percent load,the product ripple index may exceed the specification,but does not affect the reliability of the product.
3. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
4. The maximum capacitive load offered were tested at input voltage range and full load;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
6. All index testing methods in this datasheet are based on company corporate standards;
7. We can provide product customization service, please contact our technicians directly for specific information;
8. Products are related to laws and regulations: see "Features" and "EMC";
9. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

Mornsun Guangzhou Science & Technology Co., Ltd.
Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com