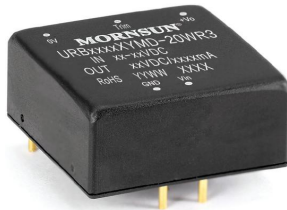


20W isolated DC-DC converter DIP package  
Ultra-wide input and regulated single output



Patent Protection RoHS

## FEATURES

- Ultra-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°C to +105°C
- Industry standard pin-out

URB\_XYMD-20WR3 series of isolated DC-DC converter products feature an ultra-wide 4:1 input voltage with efficiencies of up to 91%, 1500VDC input to output isolation, an operating ambient temperature range of -40°C to +105°C, input under-voltage protection, output over-voltage, over-current, short-circuit protection, which makes them widely used in industrial control, electric power, instruments, communication and railway applications.

## Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency <sup>②</sup> (%) Min./Typ.	Capacitive Load(μF) Max.
		Nominal (Range)	Max. <sup>①</sup>	Voltage (VDC)	Current(mA) Max./Min.		
-	URB2403XYMD-20WR3	24 (9-36)	40	3.3	5000/0	86/88	10000
	URB2405XYMD-20WR3			5	4000/0	88/90	10000
	URB2406XYMD-20WR3			6	3333/0	87/89	10000
	URB2412XYMD-20WR3			12	1667/0	88/90	1600
	URB2415XYMD-20WR3			15	1333/0	89/91	1000
	URB2424XYMD-20WR3			24	833/0	89/91	500
	URB4803XYMD-20WR3	48 (18-75)	80	3.3	5000/0	86/88	10000
	URB4805XYMD-20WR3			5	4000/0	88/90	10000
	URB4812XYMD-20WR3			12	1667/0	89/91	1600
	URB4815XYMD-20WR3			15	1333/0	89/91	1000
	URB4824XYMD-20WR3			24	833/0	89/91	500

Notes:

- ① Exceeding the maximum input voltage may cause permanent damage;
- ② Efficiency is measured at 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 series, nominal input voltage	3.3V output	--	782/30	800/50	mA
		5V output	--	926/35	947/55	
		6V output	--	936/50	958/70	
		12V output	--	926/6	947/15	
		15V output	--	916/6	937/15	
		24V output	--	916/10	937/20	
	48VDC nominal input series, nominal input voltage	3.3V output	--	391/15	400/30	
		5V output	--	463/20	474/30	
		12V output	--	458/3	469/15	
		15V output	--	458/3	469/15	
Reflected Ripple Current	Nominal input series,	--	30	--	VDC	
	24VDC nominal input series	-0.7	--	50		
Surge Voltage (1sec. max.)	48VDC nominal input series	-0.7	--	100		

Start-up Voltage	24VDC nominal input series	--	--	9	VDC
	48VDC nominal input series	--	--	18	
Input Under-voltage Protection	24VDC nominal input series	5.5	6.5	--	
	48VDC nominal input series	12	15.5	--	
Start-up Time	Nominal input voltage & constant resistance load	--	10	--	ms
Input Filter		Pi filter			
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy	0%-100% load	--	±1	±3	%	
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5		
Load Regulation <sup>①</sup>	5%-100% load	--	±0.5	±1		
Transient Recovery Time	25% load step change, nominal input voltage	--	300	500	μs	
Transient Response Deviation		3.3V/ 5V/ 6V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load	--	--	±0.03	%/°C	
Ripple & Noise <sup>②</sup>	20MHz bandwidth, 5%-100% load	--	50	100	mV p-p	
Trim	Input voltage range	90	--	110	%Vo	
Over-voltage Protection		110	--	160		
Over-current Protection		110	150	190	%Io	
Short-circuit Protection		Hiccup, continuous, self-recovery				

Note: ①Load regulation for 0%-100% load is ±5%;  
②Ripple & Noise at ≤5% load is 5%Vo max. The "parallel cable" 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-case 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	3.3V/ 5V /6V output	-40	--	+95	°C
		Others	-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	°C	
Vibration		IEC/EN61373 - Category 1, Grade B				
Switching Frequency*	PWM mode	3.3V/ 5V/ 6V output	--	300	--	kHz
		Others	--	270	--	
MTBF	MIL-HDBK-217F@25°C	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
Dimensions	25.40 x 25.40 x 11.70 mm
Weight	15.0g(Typ.)
Cooling Methods	Free air convection

Electromagnetic Compatibility (EMC)

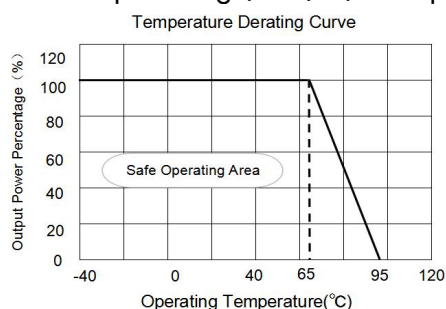
Emissions	CE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6kV, Air ±8kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV (see Fig.3-① for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

Electromagnetic Compatibility (EMC) (EN50155)

Emissions	CE	EN50121-3-2	150kHz-500kHz	99dBuV (see Fig.3-② for recommended circuit)
		EN55016-2-1	500kHz-30MHz	93dBuV (see Fig.3-② for recommended circuit)
RE	EN50121-3-2	30MHz-230MHz	40dBuV/m at 10m (see Fig.3-② for recommended circuit)	
	EN55016-2-1	230MHz-1GHz	47dBuV/m at 10m (see Fig.3-② for recommended circuit)	
Immunity	ESD	EN50121-3-2	Contact ±6kV/Air ±8kV	perf. Criteria A
	RS	EN50121-3-2	20V/m	perf. Criteria A
	EFT	EN50121-3-2	±2kV 5/50ns 5kHz (see Fig.3-① for recommended circuit)	perf. Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω, 0.5μF) (see Fig.3-① for recommended circuit)	perf. Criteria A
Immunity	CS	EN50121-3-2	0.15MHz-80MHz 10V r.m.s	perf. Criteria A

Typical Characteristic Curves

Nominal input voltage, 3.3V, 5V, 6V output



Nominal input voltage, 12V, 15V, 24V output

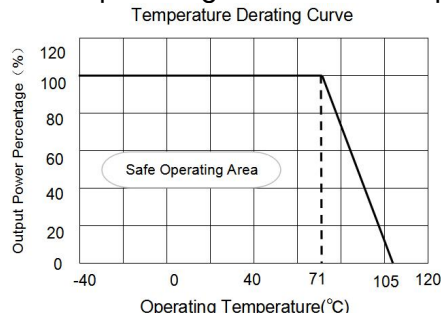


Fig. 1

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  $C_{in}$  and  $C_{out}$  and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.



Fig. 2

$C_{in}$	Vout (VDC)	$C_{out}$
100μF/100V	3.3/5	100μF/16V
	12/15	100μF/25V
	24	47μF/50V

2. EMC compliance circuit

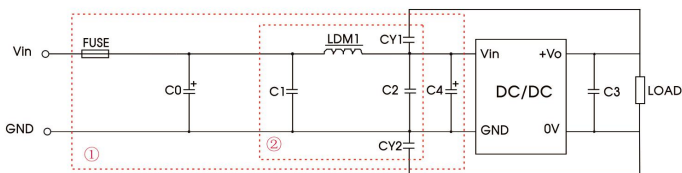
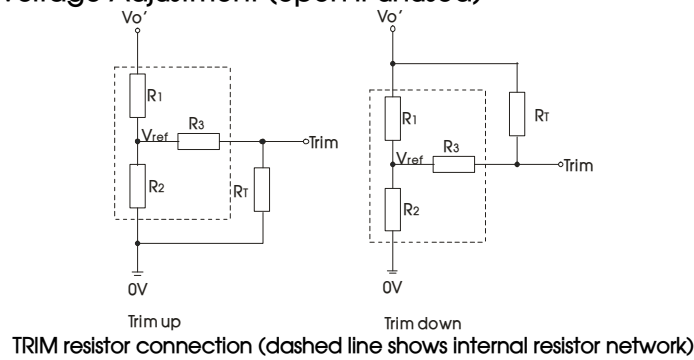


Fig. 3

Notes: We use Part ① in Fig. 3 for Immunity tests and Part ② for Emissions test. Selecting based on needs.

Model	Vin:24V	Vin:48V
FUSE	Choose according to actual input current	
C0, C4	330μF/50V	330μF/100V
C1, C2	4.7μF/50V	4.7μF/100V
C3	Refer to the Cout in Fig.2	
LDM1	2.2μH/4A	2.2μH/2A
CY1, CY2	1nF/2kV	

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



Calculating Trim resistor values:

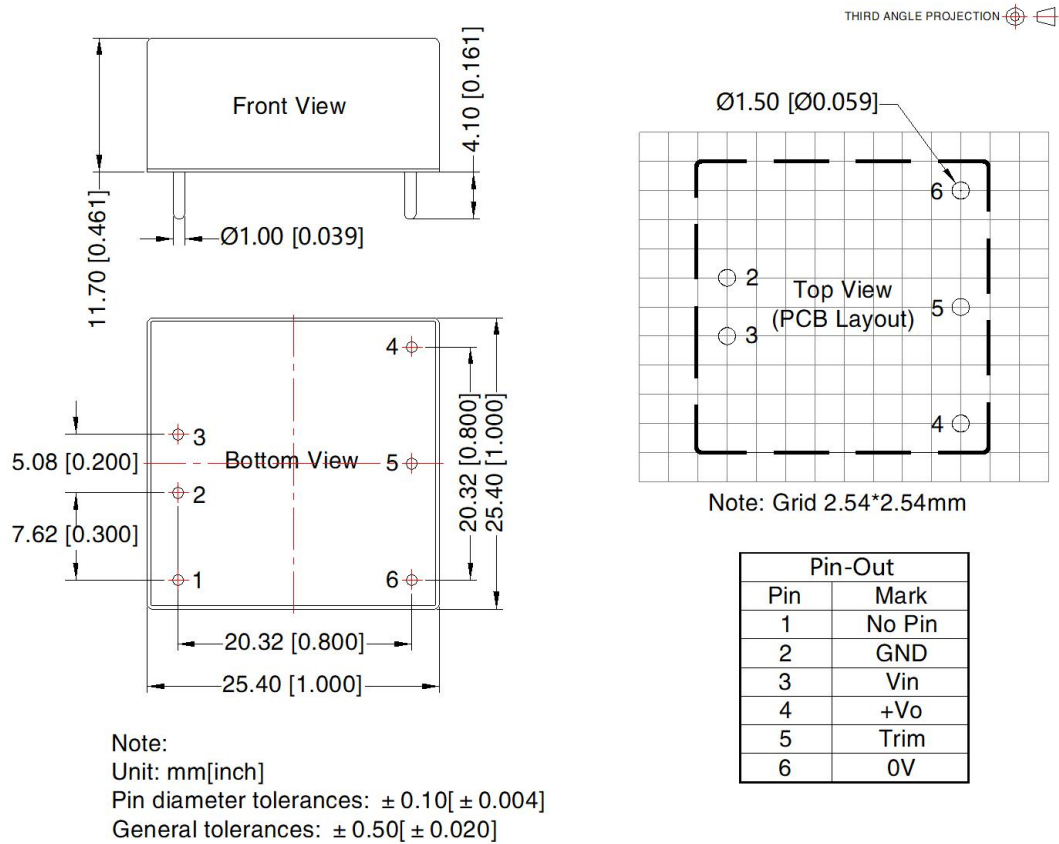
$$\begin{aligned} \text{up: } R_T &= \frac{\alpha R_2}{R_2 - \alpha} - R_3 & \alpha &= \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{\alpha R_1}{R_1 - \alpha} - R_3 & \alpha &= \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

$R_T$  = Trim Resistor value;  
 $\alpha$  = self-defined parameter;  
 $V_{o'}$  = desired output voltage

Vout(V)	R1(k $\Omega$ )	R2(k $\Omega$ )	R3(k $\Omega$ )	Vref(V)
3.3	4.829	2.87	15	1.24
5	2.894	2.87	10	2.5
6	4.064	2.87	10	2.5
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

- The products do not support parallel connection of their output
- For additional information please refer to DC-DC converter application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Note:

- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58210003;
- The maximum capacitive load offered were tested at input voltage range and full load;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^\circ\text{C}$ , humidity<75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on company corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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