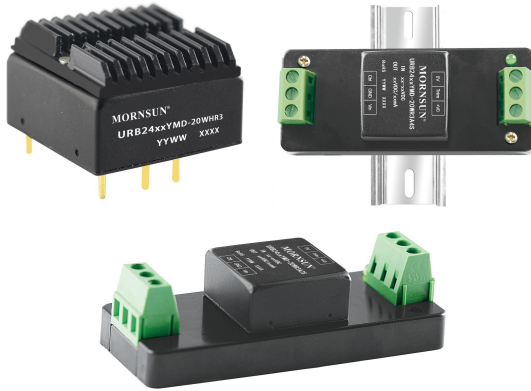


20W isolated DC-DC converter Wide input and regulated single output DIP encapsulation



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°C to +105°C
- Input reverse polarity protection available with chassis(A2S) or 35mm DIN-rail mounting(A4S) version
- Industry standard pin-out

URB2428YMD-20W(H)R3(A2S/A4S) is 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°C to +105°C, input under-voltage protection, output short-circuit, over-current and over-voltage protection. Optional packages are offered for chassis or DIN-rail mounting (A2S, A4S). This is ideally and widely used in applications such as industrial control, electric power, instruments, communications and railway.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency ③ (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal ① (Range)	Max. ③	Voltage (VDC)	Current(mA) Max./Min.		
--	URB2428YMD-20W(H)R3 (A2S/A4S)	24 (9~36)	40	28	714/0	89/91	400

Notes:  
 ① Use "H" suffix for heat sink mounting, "A2S" suffix for chassis mounting and "A4S" suffix for DIN-Rail mounting;  
 ② The A2S and A4S Model's start-up and minimum input voltages are increased by 1VDC due to the input reverse polarity protection circuit;  
 ③ Exceeding the maximum input voltage may cause permanent damage;  
 ④ Efficiency is measured at nominal input voltage and rated output load; efficiencies for A2S and A4S Model's is decreased by 2% due to the input reverse polarity protection circuit.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	24VDC Nominal input voltage	--	936/10	957/20	mA
Reflected Ripple Current	24VDC Nominal input voltage	--	30	--	
Surge Voltage (1sec. max.)		-0.7	--	50	VDC
Start-up Voltage		--	--	9	
Input under-voltage protection		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 Accuracy	5%-100% load	--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5	
Load Regulation	5%-100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change, nominal input voltage	--	300	500	µs
Transient Response Deviation		--	--	±5	%
Temperature Coefficient	Full load	--	--	±0.03	%/°C
Ripple & Noise <sup>①</sup>	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: ① Under 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	°C
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		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency *	PWM mode	--	--	370	kHz
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	Horizontal package (with heat sink)		25.40 × 25.40 × 16.20 mm		
	A2S wiring package (without heat sink)		76.00 × 31.50 × 21.20 mm		
	A4S Din-rail package (without heat sink)		76.00 × 31.50 × 25.80 mm		
Weight	without heat sink	A2S wiring package/A4S Din-rail package	38.0g/58.0g(Typ.)		
	with heat sink	Horizontal package	20.0g(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

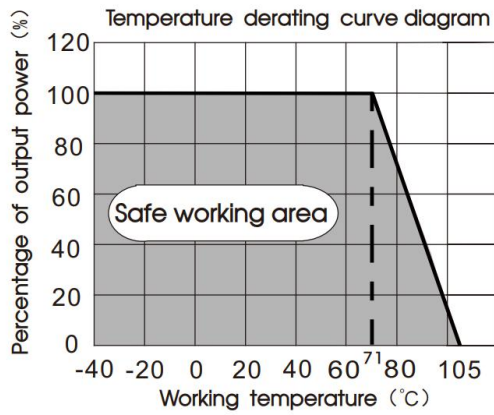


Fig. 1

Design Reference

1. Typical application

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

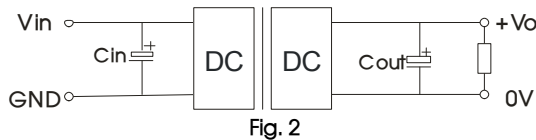


Fig. 2

Vin (VDC)	Vout (VDC)	Cin	Cout
24	28	100µF/50V	47µF/50V

2. EMC compliance circuit

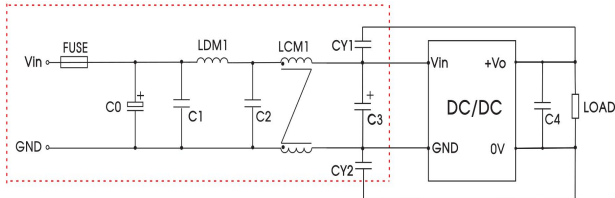


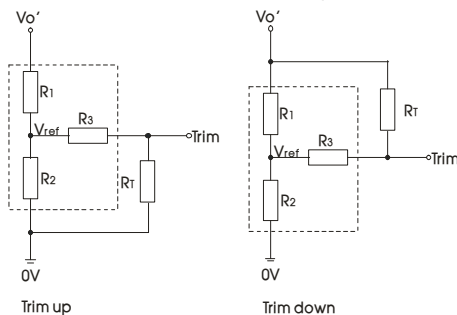
Fig. 3

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:

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

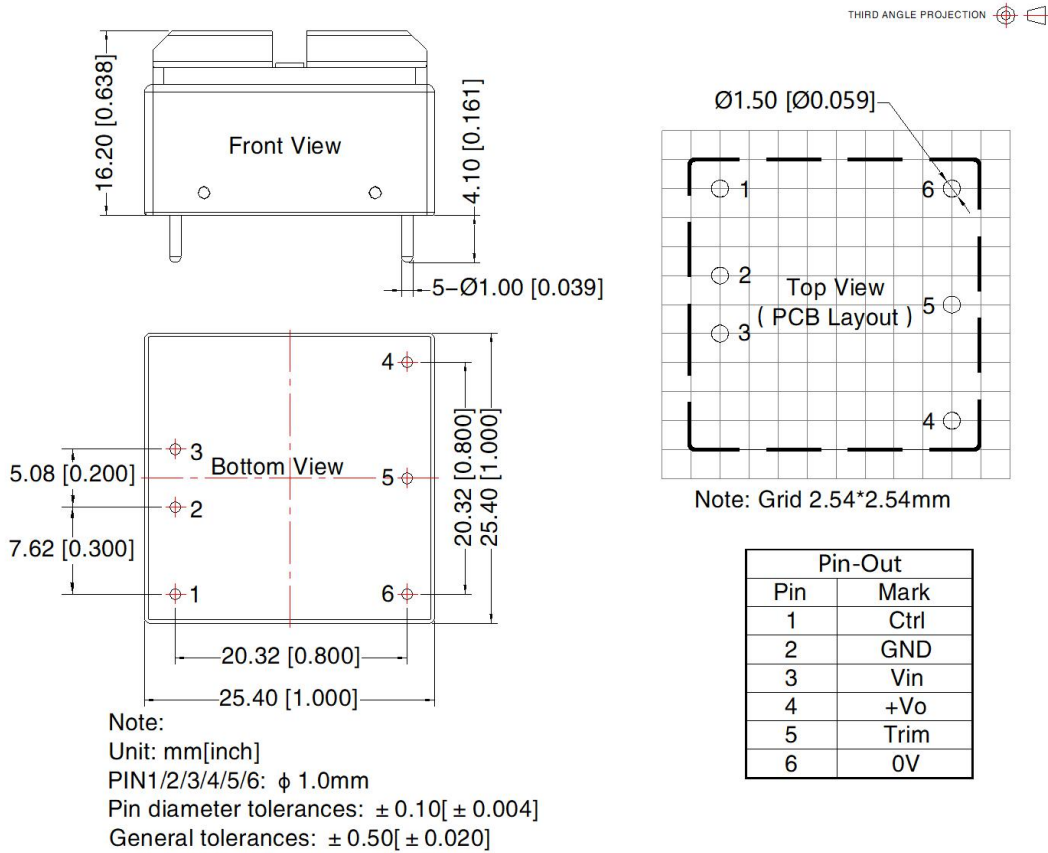
$R_T$  is Trim resistance  
 $\alpha$  is a self-defined parameter, with no real meaning.

Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
28	29.411	2.87	12	2.5

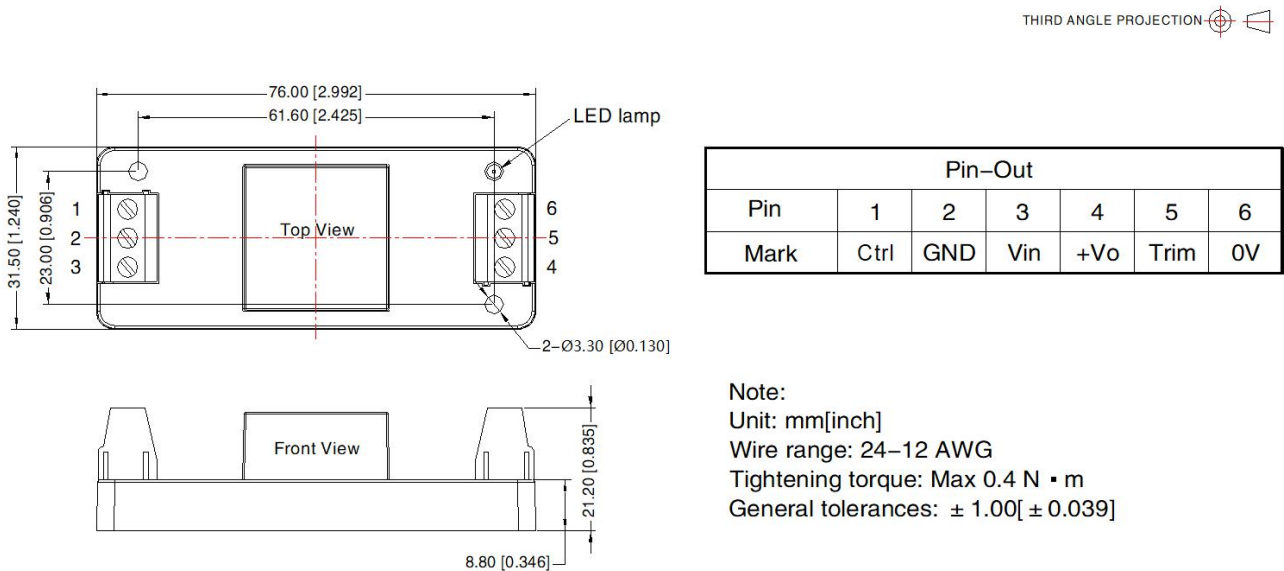
4. The products do not support parallel connection of their output

5. For additional information please refer to DC-DC converter application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Horizontal Package (with heat sink) Dimensions and Recommended Layout

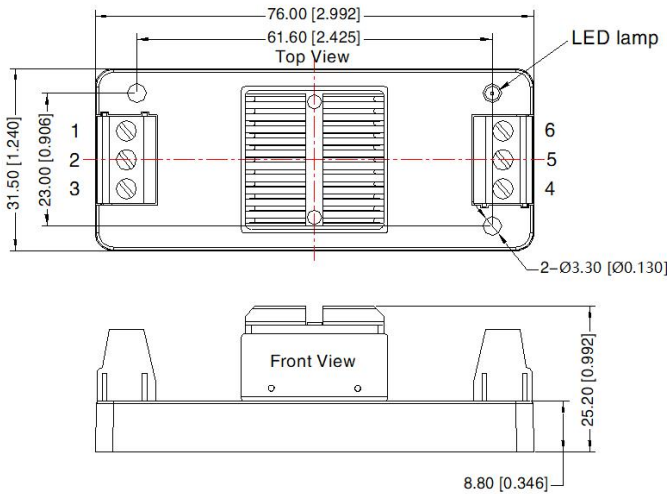


URB24\_YMD-20WR3GA2S Dimensions



URB24\_YMD-20WR3GA4S Dimensions

THIRD ANGLE PROJECTION 



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

Note:  
Unit: mm[inch]  
Wire range: 24–12 AWG  
Tightening torque: Max 0.4 N · m  
General tolerances: ± 1.00[ ± 0.039]

Note:

- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58200048 (with heat sink), 58220022 (A2S/A4S package);
- 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.
- 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;
- 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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