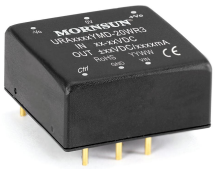
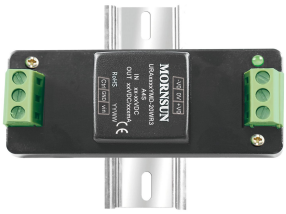
DC/DC Converter
URA_YMD-20WR3 Series

MORNSUN®

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





CE Report UKCA Report Patent Protection RoHS

EN62368-1 BS EN62368-1

FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 90%
- No-load power consumption as low as 0.24W
- 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℃
- Input reverse polarity protection available with Chassis (A2S) or 35mm DIN-Rail mounting (A4S) version
- Industry standard pin-out
- Meets EN50155 railway standard

URA_YMD-20WR3 series of isolated 20W DC-DC converter products have an ultra-wide 4:1 input voltage and feature efficiencies of up to 90%, input to output isolation is tested with 1500VDC and the converters safely operate in an ambient temperature of -40℃ to +105℃, input under-voltage protection, output short-circuit, over-current, over-voltage protection, optional packages are offered for chassis or DIN-rail mounting (A2S, A4S), adding additional input reverse polarity protection and they are widely used in applications such as industrial control, electric power, instruments, communication and railway applications.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency ④ (%)Min./Typ.	Capacitive Load ⑤ (μF)Max.
		Nominal ② (Range)	Max. ③	Voltage(VDC)	Current (mA) Max./Min.		
EN/BS EN	URA2405YMD-20WR3	24 (9-36)	40	±5	±2000	84/86	2000
	URA2412YMD-20WR3			±12	±833	88/90	800
	URA2415YMD-20WR3			±15	±667	88/90	600
	URA2424YMD-20WR3			±24	±417	86/88	300
	URA4805YMD-20WR3	48 (18-75)	80	±5	±2000	84/86	2000
	URA4812YMD-20WR3			±12	±833	87/89	800
	URA4815YMD-20WR3			±15	±667	87/89	600
	URA4824YMD-20WR3			±24	±417	88/90	300

Notes:
① Use "A2S" suffix for chassis mounting and "A4S" suffix for DIN-Rail mounting;
② Minimum input voltage and start-up voltage are increased by 1VDC for all models with A2S (wiring) and A4S (rail) suffixes because of the input reverse polarity function;
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;
⑤ The specified maximum capacitive load value for positive and negative output is identical.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC nominal input series, nominal input voltage	--	958/10	--/20	mA
	48VDC nominal input series, nominal input voltage	--	485/5	--/11	
Maximum input current	24VDC nominal input series, nominal input voltage	--	--	1100	
	48VDC nominal input series, nominal input voltage			550	

Reflected Ripple Current		--	30	--	
Surge Voltage (1sec. max.)	24VDC nominal input series	-0.7	--	50	VDC
	48VDC nominal input series	-0.7	--	100	
Start-up Voltage	24VDC nominal input series	--	--	9	VDC
	48VDC nominal input series	--	--	18	
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			
Ctrl *	Module on	Ctrl pin open or pulled high (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	Vo1	--	±0.2	±0.5	
		Vo2	--	±0.4	±1	
Load Regulation②	5%-100% load		--	±0.5	±1	
Cross Regulation	Dual output, Vo1 load at 50%, Vo2 load at range of 10%-100%		--	--	±5	
Transient Recovery Time	25% load step change, nominal input voltage	All products	--	300	500	μs
Transient Response Deviation		5VDC output	--	±3	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise③	20MHz bandwidth, 5%-100% load		--	100	200	mVp-p
Over-voltage Protection	Input voltage range		110	--	160	%Vo
Over-current Protection			110	150	200	%Io
Short-circuit Protection			Continuous, self-recovery			

Note:
①Output voltage accuracy for 0%-5% load is ±4% max;
②Load regulation for 0%-100% load is ±5%;
③Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. 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	-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		IEC/EN61373 - Category 1, Grade B			
Switching Frequency *	PWM mode	--	270	--	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	
Dimensions	Horizontal package	25.40 x 25.40 x 11.70 mm
	A2S chassis mounting	76.00 x 31.50 x 21.20 mm
	A4S DIN-rail mounting	76.00 x 31.50 x 25.80 mm
Weight	Horizontal package/A2S chassis mounting/A4S DIN-rail mounting	15.0g/35.0g/58.0g (Typ.)
Cooling method	Free air convection	

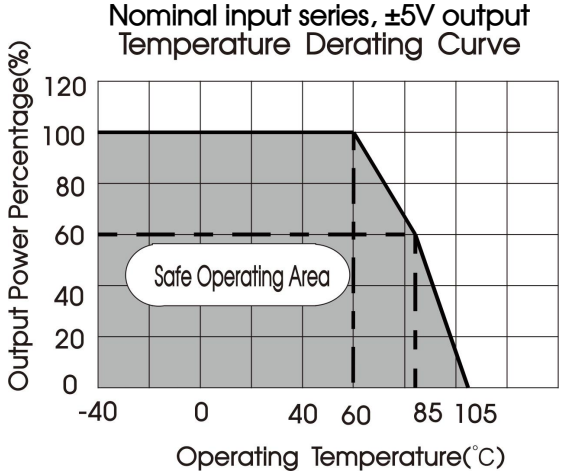
Electromagnetic Compatibility (EMC)

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 ±4kV	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 B
	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（Bare pager）	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
	CS	EN50121-3-2 0.15MHz-80MHz 10 Vr.m.s（Bare pager）	perf. Criteria A

Typical Characteristic Curves



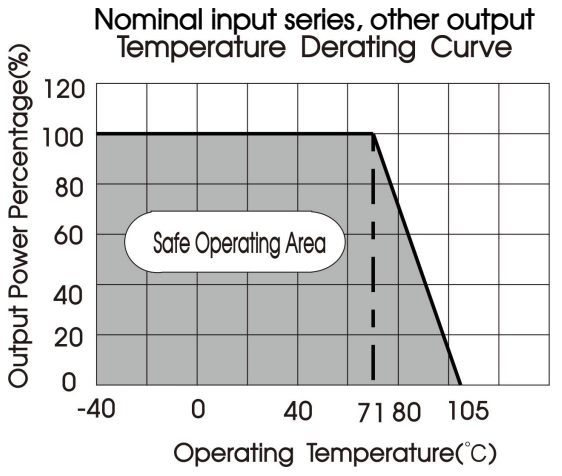
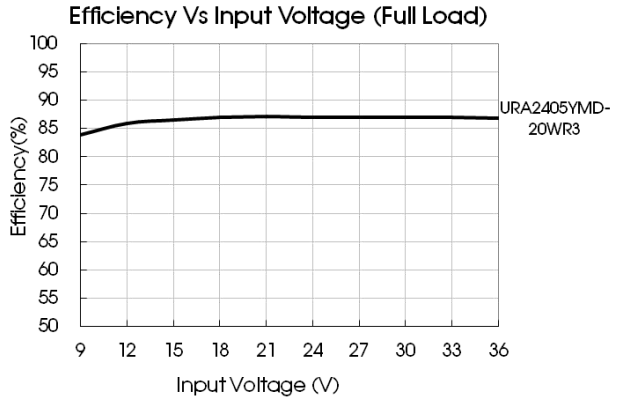
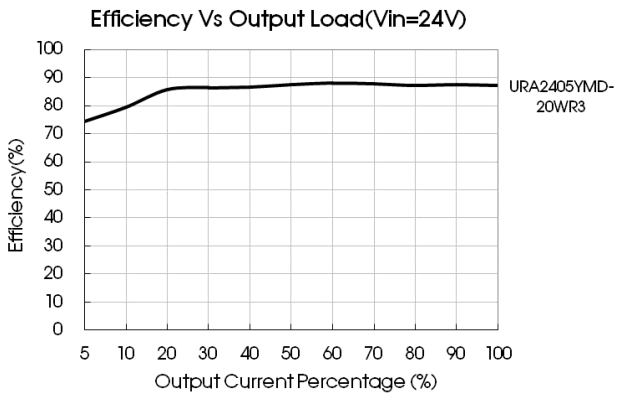
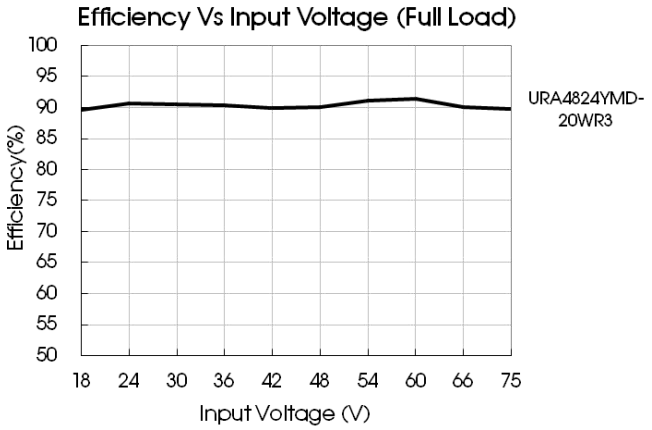
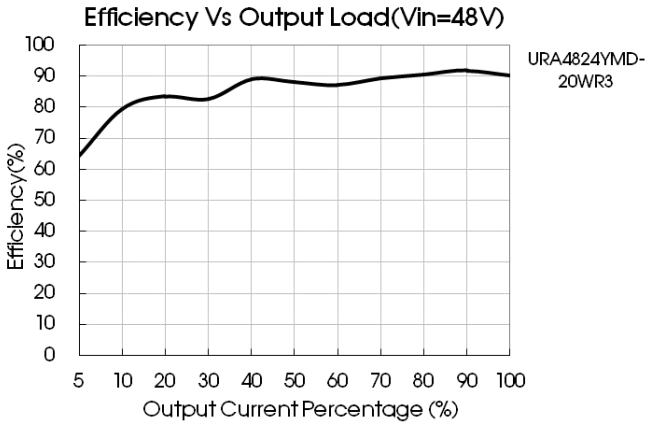


Fig. 1









Design Reference

1. Typical application

All the 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 Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the max. capacitive load value of the product.

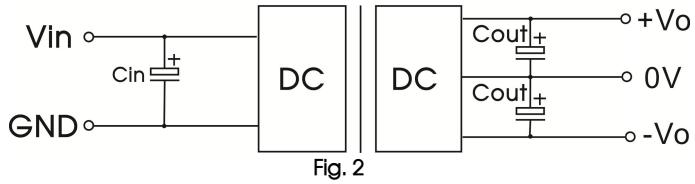


Fig. 2

Vin (VDC)	Vout (VDC)	Cin	Cout
24	±5	100μF/50V	10μF/16V
	±12/±15		10μF/25V
	±24		10μF/50V
48	±5	10μF - 47μF/100V	10μF/16V
	±12/±15		10μF/25V
	±24		10μF/50V

2. EMC compliance circuit

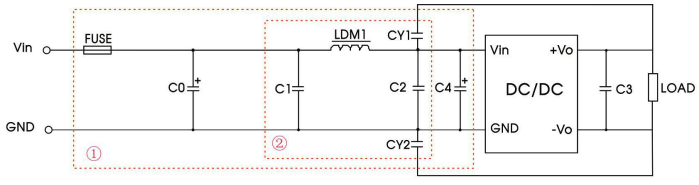


Fig. 3

Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

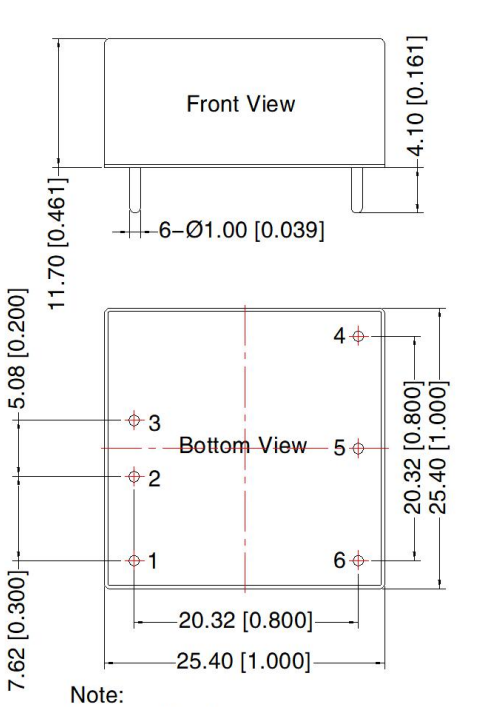
List of components:

Model	Vin: 24VDC	Vin: 48VDC
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	4.7μH	
CY1, CY2	1nF/2kV	

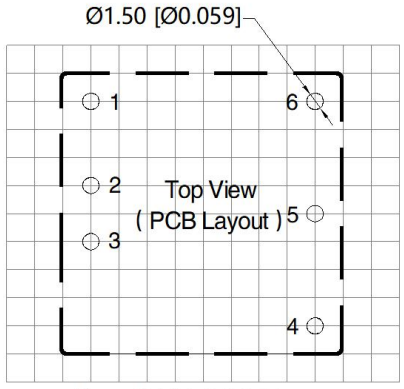
3. The products do not support parallel connection of their output

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

Dimensions and Recommended Layout



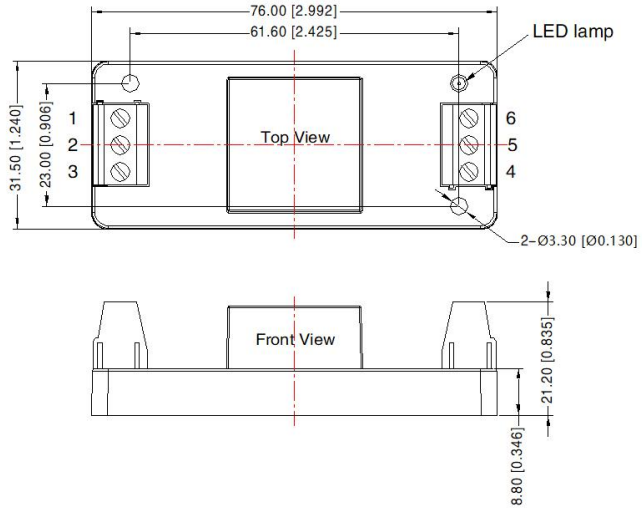
Note:
Unit: mm[inch]
PIN1/2/3/4/5/6: ϕ 1.0mm
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]



Note: Grid 2.54*2.54mm

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

URA_YMD-20WR3A2S Dimensions

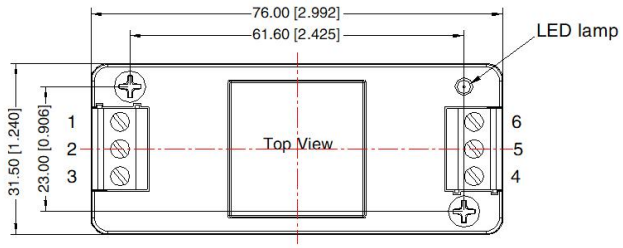


Pin–Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	0V	–0V

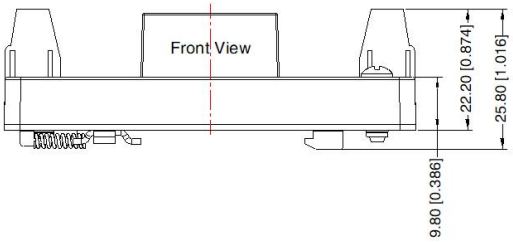
Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N ▪ m
General tolerances: ± 1.00[± 0.039]

URA_YMD-20WR3A4S Dimensions

THIRD ANGLE PROJECTION



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



Note:
Unit: mm[inch]
Mounting rail: TS35
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N ▪ m
General tolerances: ± 1.00[± 0.039]

Note:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210003 (DIP), 58220022(A2S/A4S package);
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. 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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