

15W isolated DC-DC converter DIP package
Ultra-wide input and regulated single output



Patent Protection

CE Report
EN62368-1

UK Report
BS EN62368-1

CB RoHS
IEC62368-1

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
- CISPR32/EN55032 CLASS A EMI compliant without external components
- Input reverse polarity protection available with chassis(A2S) or 35mm DIN-rail mounting(A4S) version
- Industry standard pin-out
- Meets EN50155 railway standard

URB_YMD-15WR3 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 short-circuit, over-current, over-voltage protection, CISPR32/EN55032 CLASS A EMI compliant without external components, which makes them widely used in industrial control, electric power, instruments communication and railway applications. Optional packages are offered for chassis or DIN-rail mounting (A2S, A4S), adding additional input reverse polarity protection.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency ③ (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal ② (Range)	Max. ③	Voltage (VDC)	Current(mA) Max./Min.		
EN/BS EN/IEC	URB2403YMD-15WR3	24 (9-36)	40	3.3	4000/0	86/88	4700
	URB2405YMD-15WR3			5	3000/0	88/90	4700
	URB2412YMD-15WR3			12	1250/0	88/90	1000
	URB2415YMD-15WR3			15	1000/0	89/91	820
	URB2424YMD-15WR3			24	625/0	89/91	270
	URB4803YMD-15WR3	48 (18-75)	80	3.3	4000/0	86/88	4700
	URB4805YMD-15WR3			5	3000/0	88/90	4700
	URB4812YMD-15WR3			12	1250/0	89/91	1000
	URB4815YMD-15WR3			15	1000/0	89/91	820
	URB4824YMD-15WR3			24	625/0	89/91	270

Notes:

- ① Use "H" suffix for heat sink mounting, "A2S" suffix for chassis mounting and "A4S" suffix for DIN-Rail mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
- 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 is decreased by 2% due to the input reverse polarity protection circuit.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
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Input Current (full load / no-load)	24VDC nominal input series, nominal input voltage	3.3V output	--	625/30	640/50	mA
		5V output	--	694/30	710/50	
		12V output	--	694/6	710/15	
		15V output	--	687/6	703/15	
		24V output	--	687/10	703/20	
	48VDC nominal input series, nominal input voltage	3.3V output	--	313/15	320/30	
		5V output	--	348/15	356/30	
		12V output	--	344/3	352/11	
		15V output	--	344/3	352/11	
		24V output	--	344/4	352/11	
Reflected Ripple Current	Nominal input voltage		--	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	
	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					
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	0%-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		3.3, 5V output	--	±3	±7	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/°C
Ripple & Noise*	20MHz bandwidth, 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			Continuous, self-recovery			

Note: *Under 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	3.3, 5V 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 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	Horizontal package(without heat sink)		25.40 x 25.40 x 11.70 mm
	Horizontal package(with heat sink)		25.40 x 25.40 x 16.20 mm
	A2S chassis package (without heat sink)		76.00 x 31.50 x 21.20 mm
	A2S chassis package(with heat sink)		76.00 x 31.50 x 25.20 mm
	A4S Din-rail package(without heat sink)		76.00 x 31.50 x 25.80 mm
	A4S Din-rail package(with heat sink)		76.00 x 31.50 x 29.80 mm
Weight	Without heat sink	Horizontal package/A2S chassis package/A4S rail package	15.0g/38.0g/58.0g (Typ.)
	With heat sink	Horizontal package/A2S chassis package/A4S rail package	19.0g/42.0g/62.0g (Typ.)
Cooling method			Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (without external components)/ CLASS B (see Fig.3-② for recommended circuit)		
	RE	CISPR32/EN55032	CLASS A (without external components)/ 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 V _{r.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 (42 Ω, 0.5 μF) (see Fig.3-① for recommended circuit)		perf. Criteria A
	CS	EN50121-3-2	0.15MHz-80MHz	10V r.m.s	perf. Criteria A

Typical Characteristic Curves

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

Nominal input voltage, 3.3V, 5V output

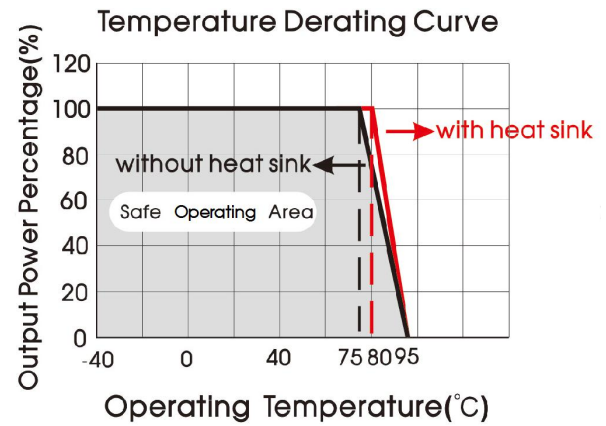
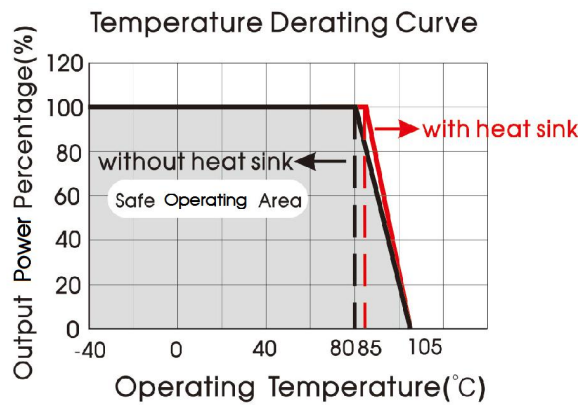
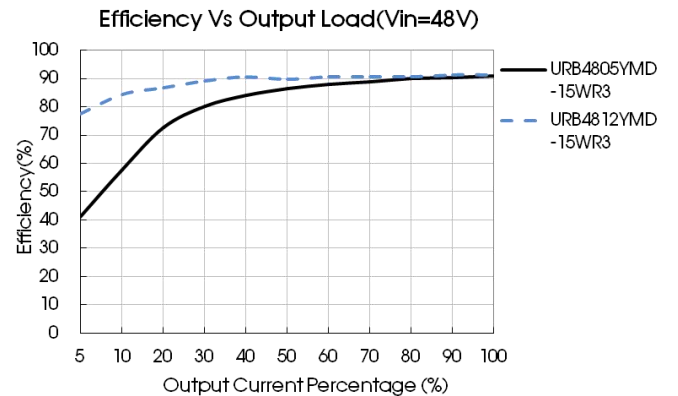
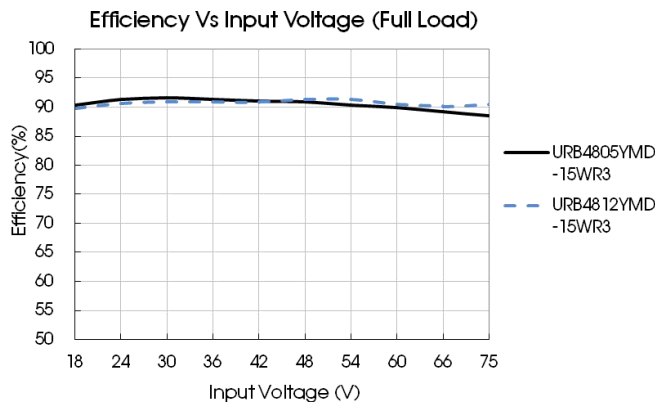
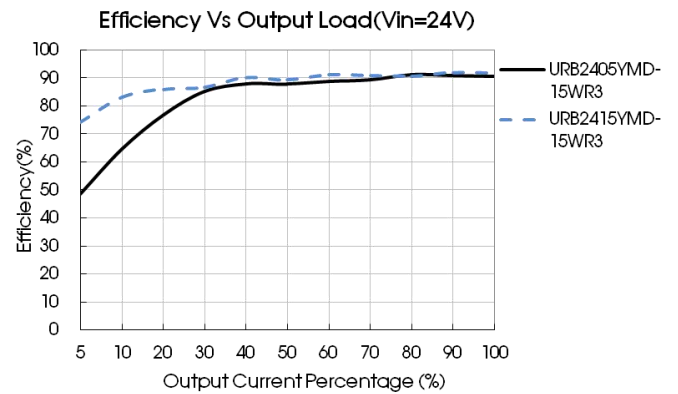
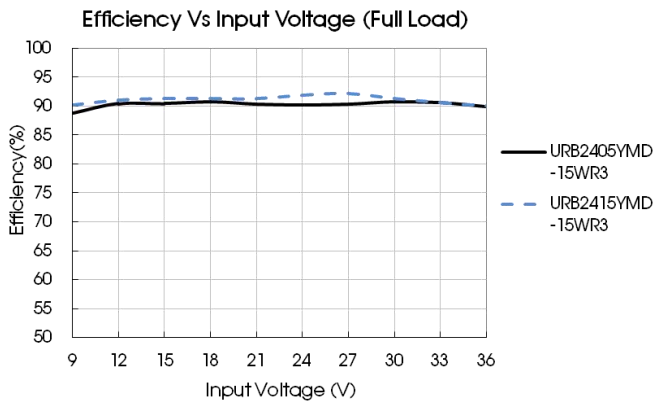


Fig. 1



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.

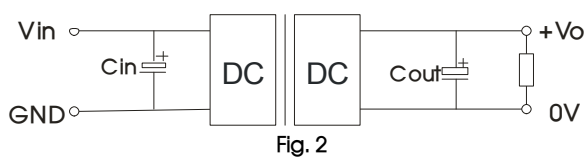


Fig. 2

Vin (VDC)	Vout (VDC)	Cin	Cout
24	3.3/5	100μF/50V	100μF/16V
	12/15		100μF/25V
	24		47μF/50V
48	3.3/5	100μF/100V	100μF/16V
	12/15		100μF/25V
	24		47μF/50V

2. EMC compliance circuit

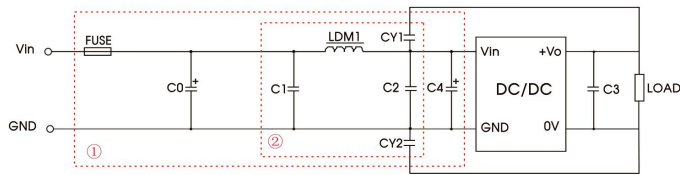


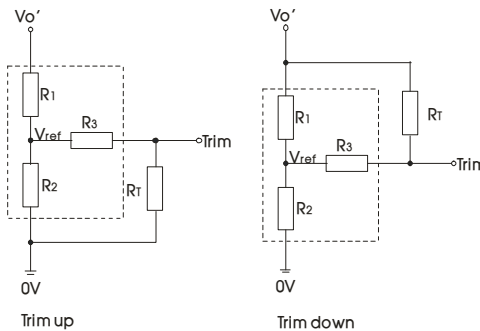
Fig. 3

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

Parameter description:

Model	Vin: 24VDC	Vin: 48VDC
FUSE	Select fuse value 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)



TRIM resistor connection (dashed line shows internal resistor network)

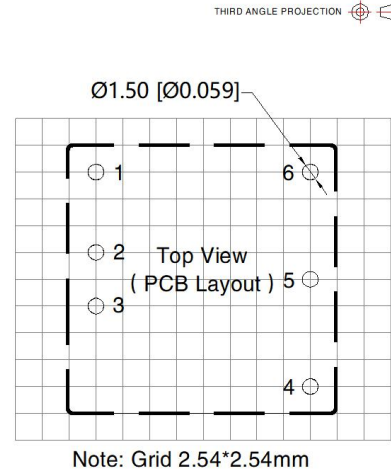
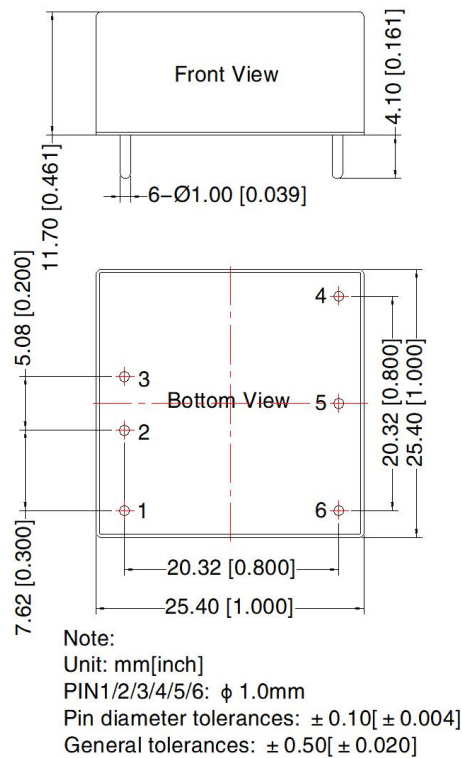
Calculating Trim resistor values:

$$\begin{aligned} \text{up: } R_T &= \frac{aR_2}{R_2-a} - R_3 & a &= \frac{V_{ref}}{V_{O'} - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{aR_1}{R_1-a} - R_3 & a &= \frac{V_{O'} - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

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

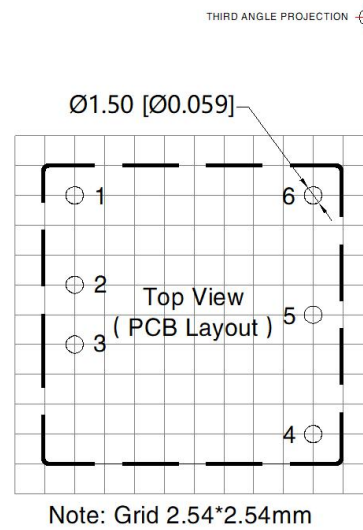
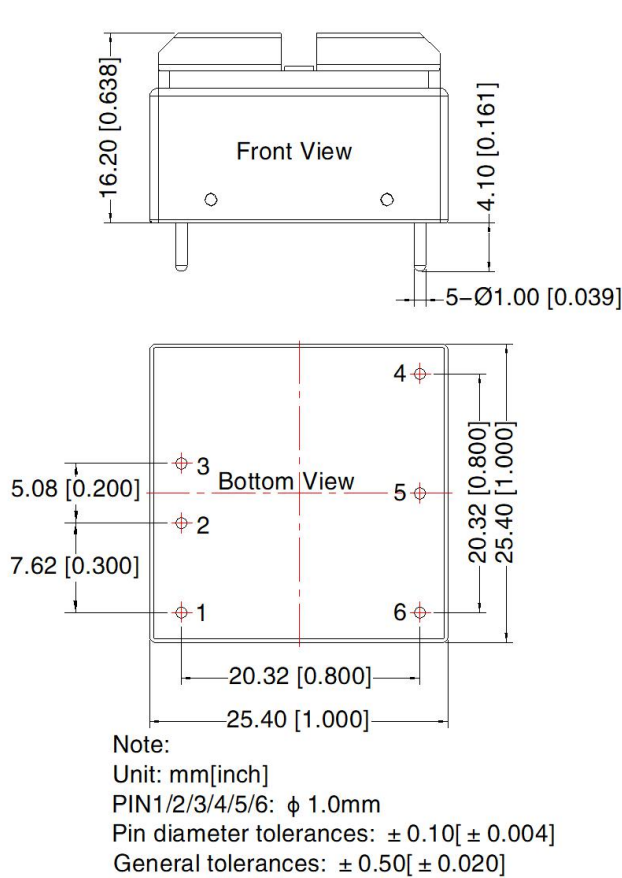
Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
3.3	4.772	2.87	15	1.25
5	2.894	2.87	10	2.5
12	11.000	2.87	17.4	2.5
15	14.494	2.87	17.4	2.5
24	24.872	2.87	20	2.5

- 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



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

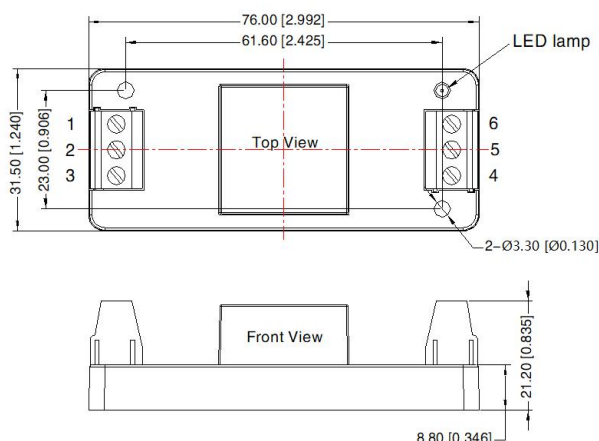
Horizontal Package (with heat sink) Dimensions



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

URB_YMD-15WR3A2S Dimensions

THIRD ANGLE PROJECTION

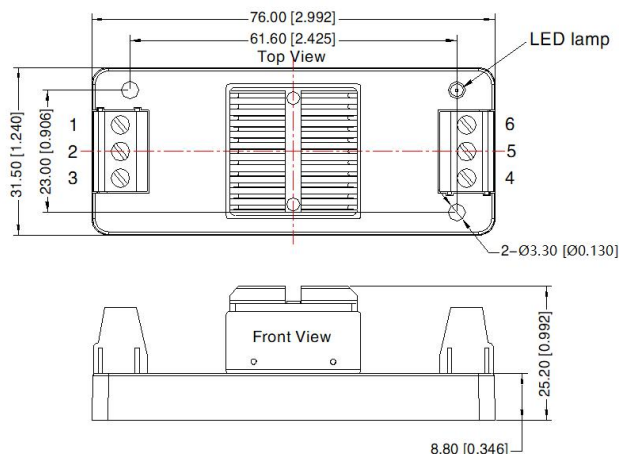


Pin-Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	Trim	0V

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

URB_YMD-15WHR3A2S (with heat sink) Dimensions

THIRD ANGLE PROJECTION

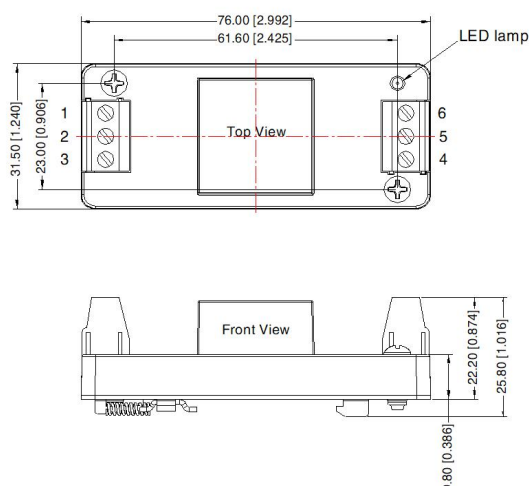


Pin-Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	Trim	0V

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

URB_YMD-15WR3A4S Dimensions

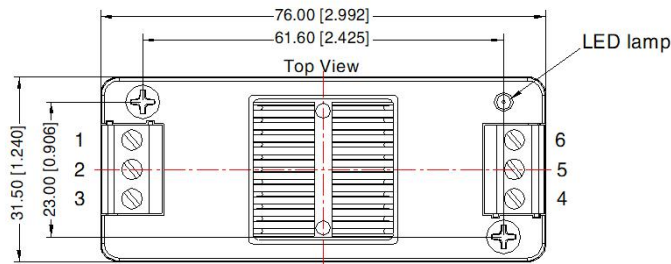
THIRD ANGLE PROJECTION



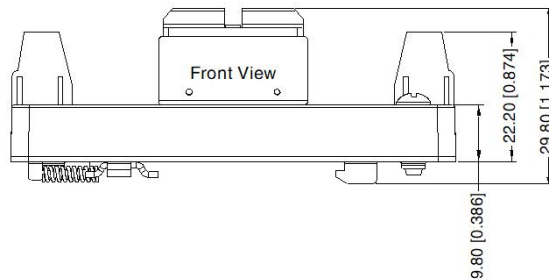
Pin-Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	Trim	0V

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

URB_YMD-15WHR3A4S(with heat sink) Dimensions



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

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210003 (DIP), 58200048 (with heat sink), 58220022(A2S/A4S package);
- 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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