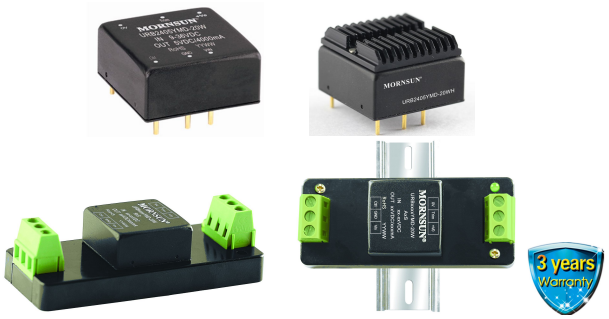
20 W, Ultra wide input voltage, isolated & regulated single output DC/DC converter



Patent Protection RoHS

FEATURES

- Wide range of input voltage (4:1)
- Efficiency up to 90%
- Isolation voltage: 1.5K VDC
- Input under-voltage protection, output over-voltage, over-current, short-circuit protection, over- temperature protection,
- Operating temperature range: -40℃ to +85℃
- Meet CISPR22/EN55022 CLASS A
- Reverse voltage protection available with A2S (Chassis mounting) or A4S(DIN-rail mounting)
- Low temperature rise, Industrial level specifications

URB_YMD-20W series are isolated 20W DC-DC products with 4:1 input voltage. They feature efficiency up to 90%, 1500VDC isolation, operating temperature of -40℃~+85℃, Input under-voltage protection, output over-voltage protection, over-current protection, over-temperature protection, short-circuit protection and EMI meets CISPR22/EN55022 CLASS A, which make them widely applied in battery power supplies, industrial control, electricity, instruments, communication fields. And extension package A2S and A4S also enable them with reverse voltage protection.

Selection Guide

Part No. ①	Input Voltage (VDC)		Output		Efficiency ③(%,Min./Typ.) @ Full Load	Max. Capacitive Load(μF)
	Nominal (Range)	Max.②	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
URB2403YMD-20W	24 (9-36)	40	3.3	5000/250	85/87	10300
URB2405YMD-20W			5	4000/200	88/90	5400
URB2412YMD-20W			12	1667/84	88/90	1200
URB2415YMD-20W			15	1333/67	88/90	750
URB4803YMD-20W	48 (18-75)	80	3.3	5000/250	86/88	10300
URB4805YMD-20W			5	4000/200	88/90	5400
URB4812YMD-20W			12	1667/84	88/90	1200
URB4815YMD-20W			15	1333/67	88/90	750

Note:
①Part No. with suffix "H" are heat sink mounting, series with suffix "A2S" are chassis mounting, with suffix "A4S" are DIN-Rail mounting, for example URB2405YMD-20WHA2S is chassis mounting with heat sink, URB2405YMD-20WA4S is DIN-Rail mounting without heat sink. If the application has a higher requirement for heat dissipation, you can choose modules with heat sink.
②Exceeding the maximum input voltage may cause permanent damage;
③The efficiency of "A2S" and "A4S" is approx. 2% lower for the protection of inverse polarity.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC input	--	925/60	947/146	mA
	48VDC input	--	463/30	474/73	
Reflected Ripple Current		--	30	--	
Input impulse Voltage (1sec. max.)	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	
Starting Voltage	24VDC input	--	--	9	
	48VDC input	--	--	18	
Under-Voltage Shutdown	24VDC input	6	--	--	
	48VDC input	15	--	--	
Ctrl*	Module turn-on	Ctrl pin floating or connected to TTL high level(2.5-12VDC)			
	Module turn-off	Ctrl pin connected to GND or low level(0-1.2VDC)			
	Input current when switched off	--	5	--	mA
Input Filter		Pi filter			

Hot Plug		Unavailable
Note: * The voltage of Ctrl pin is relative to input pin GND.		

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±1	±3	%
Line Regulation	Full load, the input voltage is from low to high	--	±0.2	±0.5	
Load Regulation	5%-100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Coefficient	Full load	--	±0.02	--	%/℃
Ripple & Noise*	20MHz bandwidth	--	50	120	mV p-p
Trim		--	±10%Vo	--	VDC
Over-voltage Protection	3.3V output	--	3.9	--	
	5V output	--	6.2	--	
	12V output	--	15	--	
	15V output	--	18	--	
Over-current Protection	Input voltage range	--	150	--	%
Short circuit Protection		Continuous			
Note: *Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.					

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	--	--	VDC
Isolation Resistance	Input-output, isolation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	1000	--	pF
Operating Temperature	Derating when operating temperature up to ⩾71℃ (see Fig. 1)	-40	--	85	℃
Storage Temperature		-55	--	125	
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	300	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	PWM Mode	--	320	--	KHz
Over- temperature Protection	Input voltage range	--	110	--	℃
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

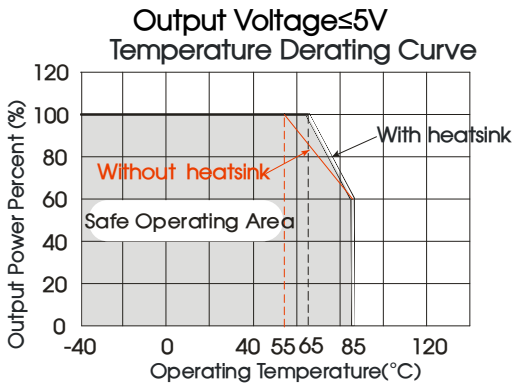
Physical Specifications

Casing Material			Aluminum alloy
Dimension	Without heatsink	DIP	25.40*25.40*11.70 mm
		A2S chassis mounting	76.00*31.50*21.20 mm
		A4S DIN-Rail mounting	76.00*31.50*25.80 mm
	With heatsink	DIP	25.40*25.40*16.40 mm
		A2S chassis mounting	76.00*31.50*25.20 mm
		A4S DIN-Rail mounting	76.00*31.50*29.80 mm
Weight	Without heatsink	DIP/A2S chassis mounting/A4S DIN-Rail mounting	15g/35g/54g(Typ.)
	With heatsink	DIP/A2S chassis mounting/A4S DIN-Rail mounting	20g/40g/59g(Typ.)
Cooling Method			Free convection

EMC Specifications

EMI	CE	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
EMS	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 ±2KV (see Fig.3-①for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29 0-70%	perf. Criteria B

Product Characteristic Curve



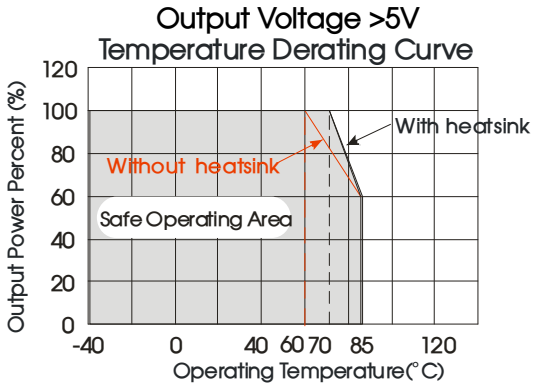
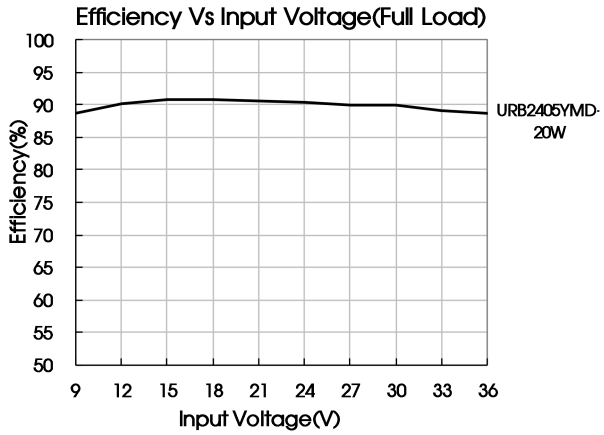
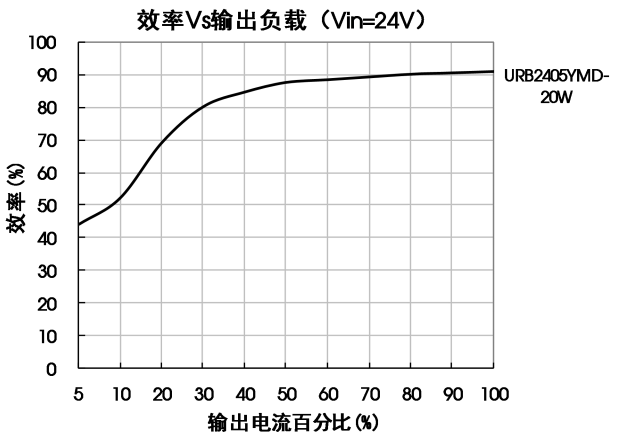
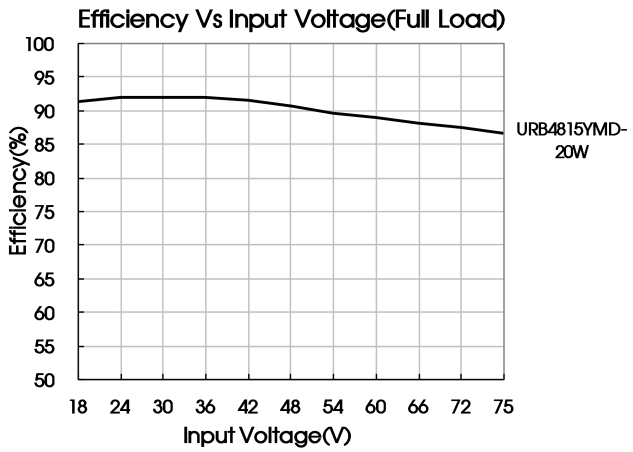
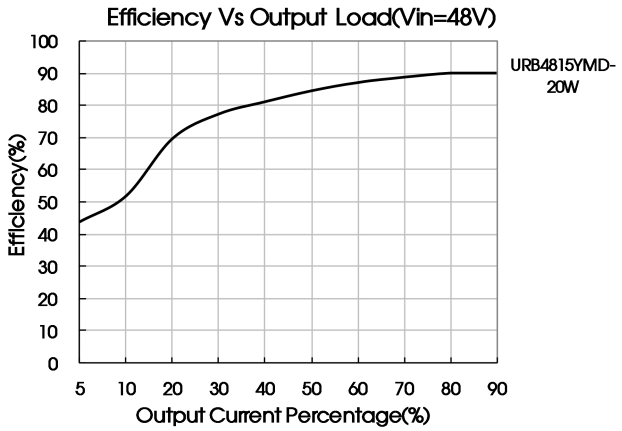


Fig. 1









Design Reference

1.Recommended circuit

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.
If a further decrease of the input and output ripple is required, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance， and ensure the capacitance should be lower than the max. capacitive load of the product.

Fig. 2

Vout (VDC)	Cin (μF)	Cout (μF)
3.3/5	100	470
12/15		220

2.EMC solution-recommended circuit

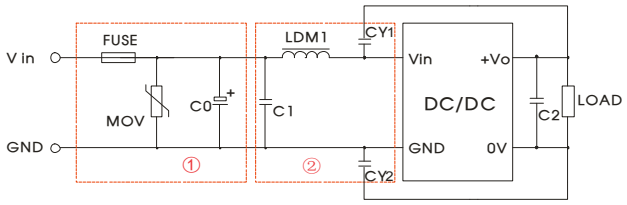


Fig. 3

Note: Part ① in the Fig. 3 is for EMS test, part ② is for EMI filtering; parts ① and ② can be added based on actual requirement.

Parameter description

Model	Vin:24V	Vin:48V
FUSE	Choose according to actual input current	
MOV	S14K35	S14K60
C0	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7μH	
CY1	1nF/2KV	
CY2	1nF/2KV	

EMC solution-recommended circuit PCB layout

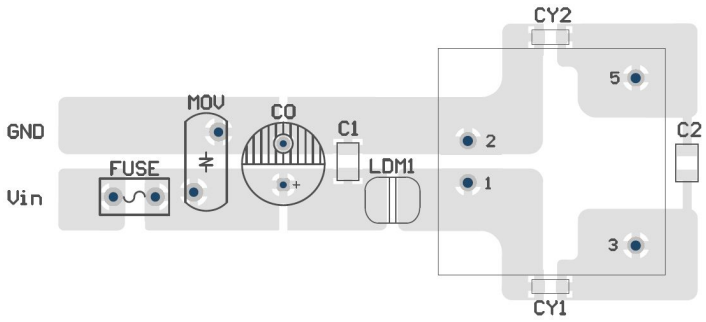
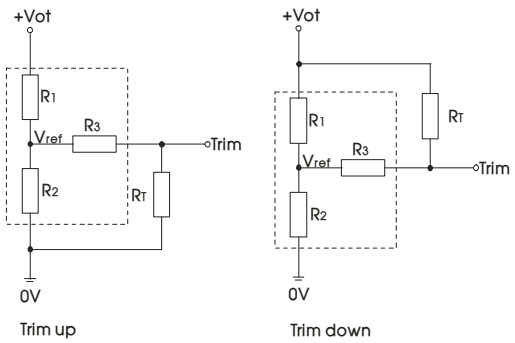


Fig. 4

Note: the min. distance of the bonding pads between input & output isolation capacitors (CY1/CY2) shall be ≥ 2mm.

3. Application of Trim and calculation of Trim resistance



Applied circuits of Trim (Part in broken line is the interior of models)

Calculation formula of Trim resistance:

up: $R_T = \frac{aR_2}{R_2-a} - R_3$ $\quad a = \frac{Vref}{Vo'-Vref} \cdot R_1$

down: $R_T = \frac{aR_1}{R_1-a} - R_3$ $\quad a = \frac{Vo'-Vref}{Vref} \cdot R_2$

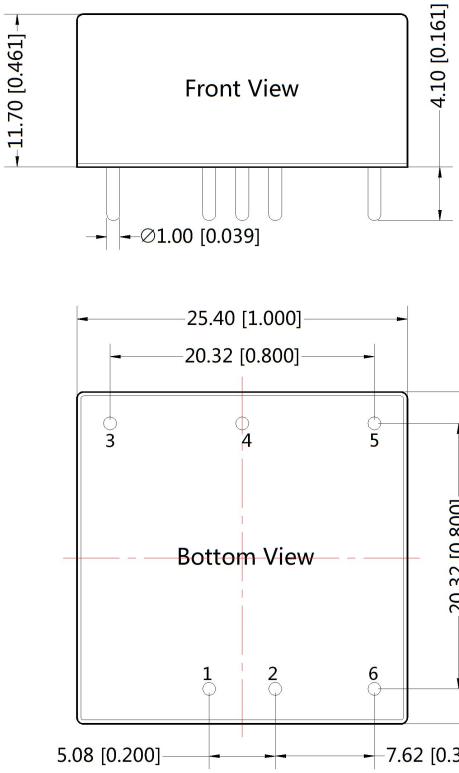
R_T is Trim resistance
a is a self-defined parameter, with no real meaning.

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.841	2.87	12.4	1.24
5	15	15	15	2.5
12	10	2.609	15	2.5
15	15	3	20	2.5

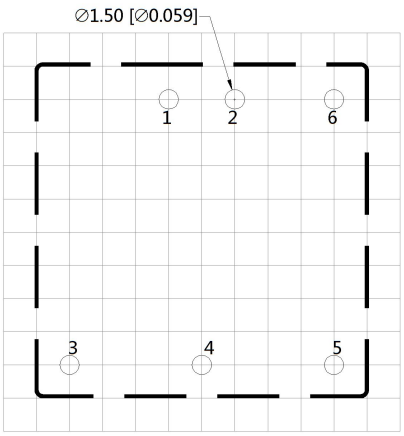
4. It is not allowed to connect modules output in parallel to enlarge the power

5. For more information about Mornsun EMC Filter products, please visit www.mornsun-power.com to download the Selection Guide of EMC Filter

Horizontal Package Dimensions and Recommended Layout (Without heatsink)



THIRD ANGLE PROJECTION



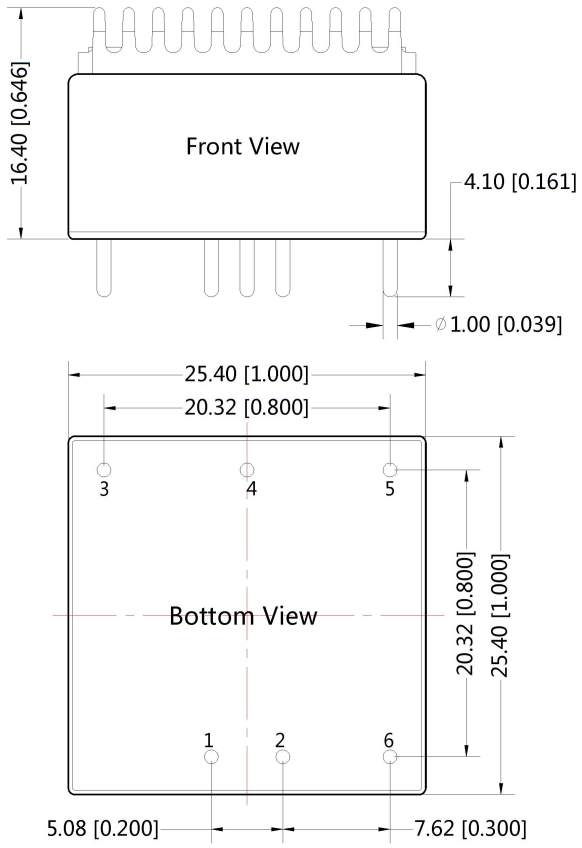
Note:Grid 2.54*2.54mm

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

Note:
Unit :mm[inch]
Pin diameter tolerances :±0.10[±0.004]
General tolerances:±0.50[±0.020]

Horizontal Package Dimensions (With heatsink)

THIRD ANGLE PROJECTION

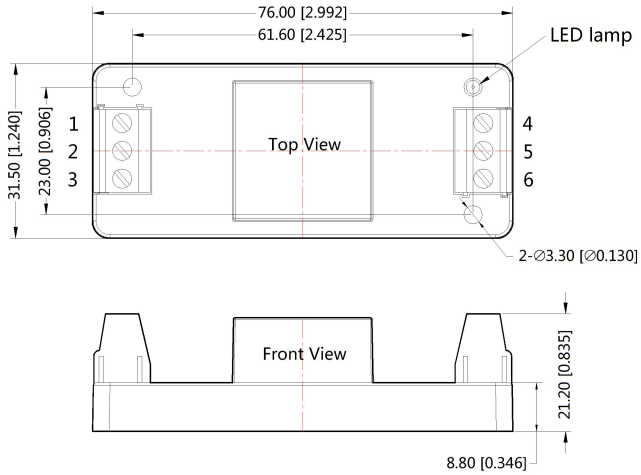


Pin-Out	
Pin	Function
1	Vin
2	GND
3	+Vo
4	Trim
5	0V
6	Ctrl

Note:
Unit :mm[inch]
General tolerances:±0.50[±0.020]
If use heat sinks, make sure there is enough space for a specific size in the above graph.

URB_YMD-20WA2S Chassis Mounting (Without heatsink)

THIRD ANGLE PROJECTION

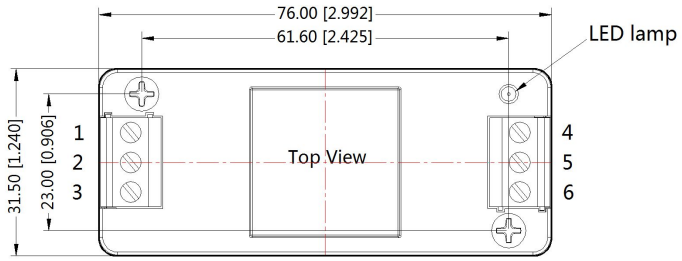


Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	Trim	+Vo

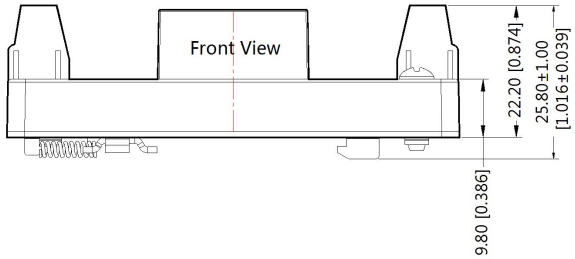
Note:
Unit:mm[inch]
Wire range:24~12 AWG
General tolerances:±0.50[±0.020]

URB_YMD-20WA4S Din-Rail Mounting (Without heatsink)

THIRD ANGLE PROJECTION



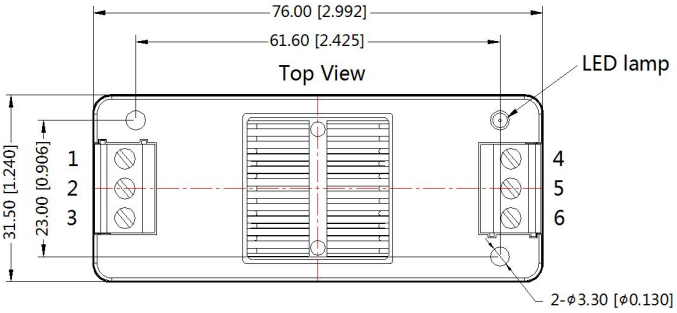
Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	Trim	+Vo



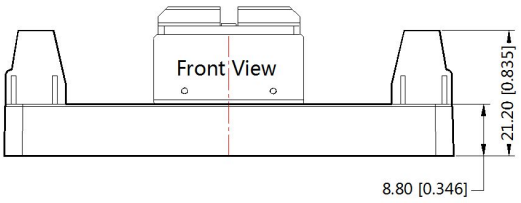
Note:
Unit:mm[inch]
Wire range:24~12 AWG
General tolerances:±0.50[±0.020]

URB_YMD-20WHA2S Chassis Mounting (With heatsink)

THIRD ANGLE PROJECTION



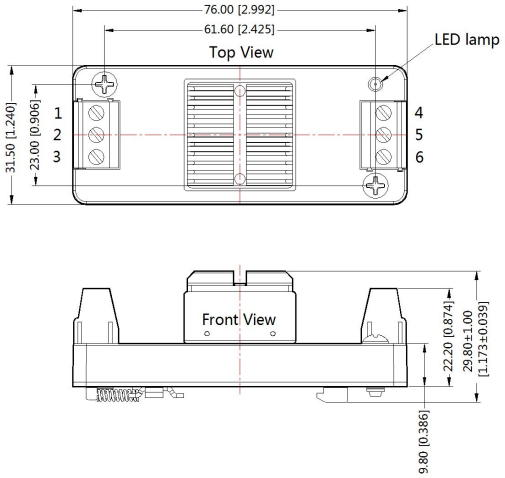
Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	Trim	+Vo



Note:
Unit:mm[inch]
Wire range:24~12 AWG
General tolerances:±0.50[±0.020]

URB_YMD-20WHA4S Din-Rail Mounting (With heatsink)

THIRD ANGLE PROJECTION



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

Note:
Unit:mm[inch]
Wire range:24~12 AWG
General tolerances:±0.50[±0.020]

Notes:

1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com. Horizontal Packing bag number (without heatsink): 58210003, Horizontal Packing bag number (with heatsink)：58200048, 2S/A4S Packing Bag Number: 58220022;
2. Recommend to use module with more than 5% load, if not, the ripple of the product may exceeds the specification, but does not affect the reliability of the product;
3. The recommended unbalance degree of the dual output module load is ⩽±5%; if the degree exceeds ±5%, than the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
4. The maximum capacitive load offered were tested at nominal input voltage and full load;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with nominal input voltage and rated output load;
6. All index testing methods in this datasheet are based on our Company's corporate standards;
7. The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
8. We can provide product customization service;
9. Specifications are subject to change without prior notice.

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