

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



Patent Protection RoHS



FEATURES

- Ultra-wide 4:1 input voltage range
- I/O isolation test voltage of 3000VDC & 1500VAC
- Operating ambient temperature range: -40°C to +85°C
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Low ripple & noise
- Meets EN50121-3-2/CISPR32/EN55032 CLASS A, without extra components
- Input reverse polarity protection available with Chassis (A2S) or 35mm DIN-Rail mounting (A4S) version
- Meets IEC60950, UL60950, EN60950 standards
- Meets requirements of railway standard EN50155
- Industry standard pin-out

URE1D_LD-20WR3 series of isolated 20W DC-DC converter products have an ultra-wide 4:1 input voltage and feature efficiencies of up to 86%. Input to output isolation is tested with 3000VDC / 1500VAC and the converters safely operate in an ambient temperature of -40°C to +85°C. Input under-voltage protection, output short-circuit, over-current, over-voltage, over-temperature protection. Offered with various mounting options, it is ideally suited electronic equipment and railway vehicle applications using 72V, 96V and 110V battery voltages.

Selection Guide

Certification	Part No. ^①	Input Voltage (VDC)		Output		Full Load Efficiency ^④ (%) Min./Typ.	Max. Capacitive Load ^⑤ (μF)
		Nominal ^② (Range)	Max. ^③	Voltage (VDC)	Current (mA) Max./Min.		
--	URE1D12LD-20WR3	110 (40-160)	170	±12	±833/0	83/85	680
	URE1D15LD-20WR3			±15	±667/0	84/86	470
	URE1D24LD-20WR3			±24	±417/0	84/86	220

Note:
 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 Minimum input voltage and startup voltage are increased by 1V 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 capacitive load of positive and negative output is identical.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	--	212/3	217/8	mA
Reflected Ripple Current	Nominal input voltage	--	25	--	
Surge Voltage (1sec. max.)		-0.7	--	180	VDC
Start-up Voltage	100% load	--	--	40	
Under-voltage Protection		28	33	--	
Start-up Time	Nominal input & 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 Accuracy	0% -100% load	Vo1	--	±1	±2	%
		Vo2	--	±1	±3	
Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.2	±0.5	
		Vo2	--	±0.5	±1	
Load Regulation ^①	5% -100% load	Vo1	--	±0.5	±1	
		Vo2	--	±0.5	±1.5	
Cross Regulation	Vo1 load at 50%, Vo2 load at range of 10%-100%	--	--	±5		
Transient Recovery Time	25% load step change, nominal input voltage	--	300	500	μs	
Transient Response Deviation		--	±3	±5	%	
Temperature Coefficient	Full load	--	±0.02	±0.03	%/°C	
Ripple & Noise ^②	20MHz bandwidth, 5% -100% load	--	50	100	mV p-p	
Over-voltage Protection	Input voltage range	110	--	160		
Over-current Protection		120	--	210	%Io	
Short-circuit Protection		Continuous, self-recovery				

Note:
 ① Load regulation for 0%-100% load is ±5%;
 ② Ripple & 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.	3000	--	--	VDC
	Input/output-case Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
	Input-output, Electric Strength Test for 1 minute with a leakage current of 5mA max.	1500	--	--	VAC
Insulation Resistance	Input-output insulation at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	2200	--	pF
Operating Temperature	See Fig. 1	-40	--	+85	°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
Switching Frequency*	PWM mode	--	300	--	KHz
Vibration		IEC61373 - Category 1, Grade B			
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	Without heat sink	Horizontal package	50.80 x 25.40 x 11.80 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		
	With heat sink	Horizontal package	51.40 x 26.20 x 16.50 mm		
		A2S chassis mounting	76.00 x 31.50 x 25.30 mm		
		A4S Din-rail mounting	76.00 x 31.50 x 29.90 mm		
Weight	Without heat sink	Horizontal package/A2S chassis mounting/A4S Din-rail mounting			26.0g/48.0g/68.0g(Typ.)
	With heat sink	Horizontal package/A2S chassis mounting/A4S Din-rail mounting			34.0g/56.0g/76.0g(Typ.)
Cooling Method	Free air convection				

Electromagnetic Compatibility (EMC) (EN60950)

Emissions	CE	CISPR32/EN55032	CLASS A (without extra components) / CLASS B (see Fig.5 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (without extra components) / CLASS B (see Fig.5 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact $\pm 6\text{KV}$ /Air $\pm 8\text{KV}$	perf. Criteria B
	RS	IEC/EN61000-4-3	20V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 4\text{KV}$ (see Fig.3 or Fig.4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ (2Ω 18 μF see Fig.3 for recommended circuit) line to ground $\pm 4\text{KV}$ (12 Ω 9 μF see Fig.3 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A

Electromagnetic Compatibility (EMC) (EN50155)

Emissions	CE	EN50121-3-2	150kHz-500kHz 99dBuV (see Fig.5 for recommended circuit)
	RE	EN55016-2-1	500kHz-30MHz 93dBuV
Immunity	ESD	EN50121-3-2	Contact $\pm 6\text{KV}$ /Air $\pm 8\text{KV}$ perf. Criteria B
	RS	EN50121-3-2	20V/m perf. Criteria A
	EFT	EN50121-3-2	$\pm 2\text{kV}$ 5/50ns 5kHz (see Fig.3 or Fig.4 for recommended circuit) perf. Criteria A
	Surge	EN50121-3-2	line to line $\pm 1\text{KV}$ (42 Ω 0.5 μF see Fig.4 for recommended circuit) perf. Criteria B
	CS	EN50121-3-2	0.15MHz-80MHz 10 Vr.m.s perf. Criteria A

Typical Characteristic Curve

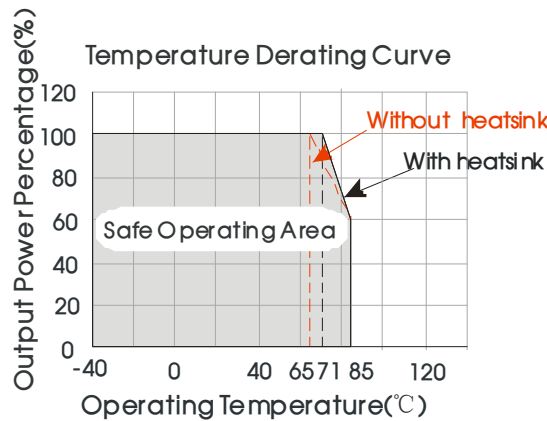
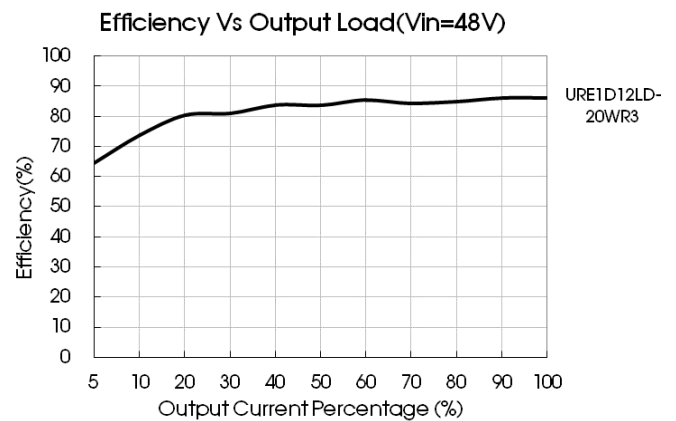
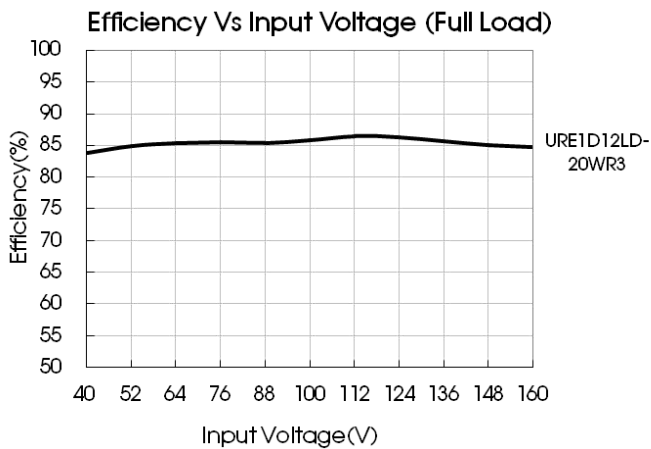
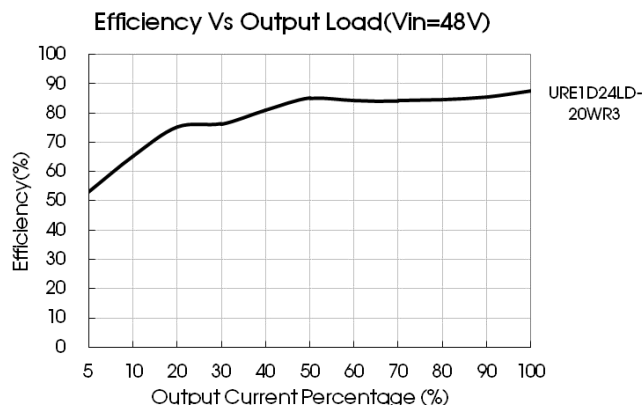
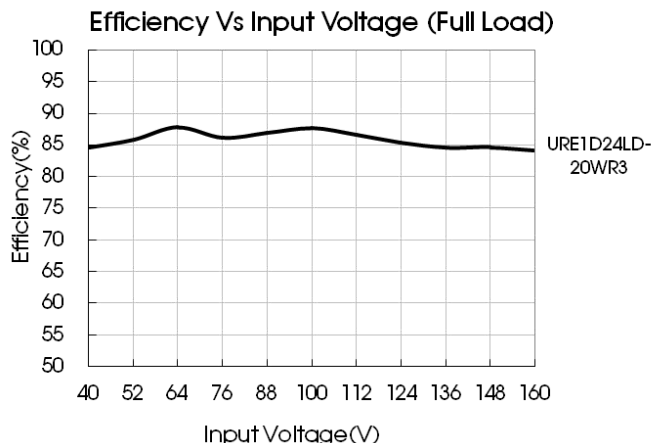


Fig. 1





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 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

Vout(VDC)	Fuse	Cin	Cout
$\pm 12/\pm 15$	2A, slow blow	10 μ F - 47 μ F	220 μ F
± 24			100 μ F

2. EMC compliance circuit

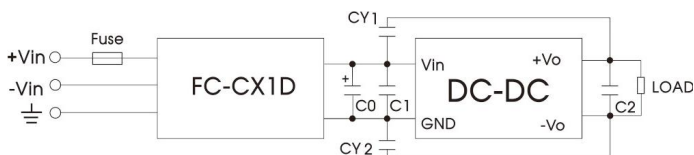


Fig. 3

Fig. 3 Parameter description

Output voltage	$\pm 12V$	$\pm 15V$	$\pm 24V$
FUSE	Choose according to actual input current		
FC-CX1D	FC-CX1D is the EMC auxiliary component of our company. Input voltage range: 40V-160V		
C0	100 μ F/200V		
C1	47 μ F/200V		
C2	220 μ F/25V	100 μ F/35V	
CY1、CY2	1000pF/400VAC		

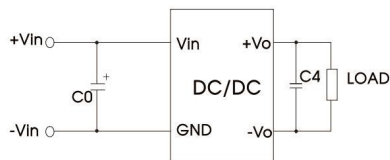


Fig. 4

Fig. 4/ Fig. 5 Parameter description

Output voltage	$\pm 12V$	$\pm 15V$	$\pm 24V$
C0	100 μ F/200V		
C1、C2	0.22 μ F/250V		
C3	47 μ F/200V		
LCM1、LCM2	30mH (common mode inductance)		
CY1、CY2、CY3、CY4	1000pF/400VAC		
C4	220 μ F/25V	100 μ F/35V	

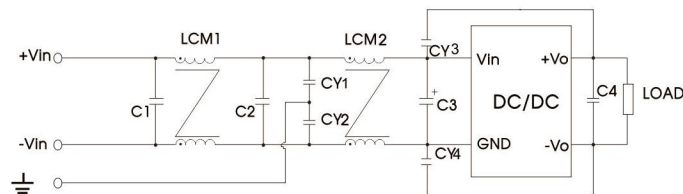


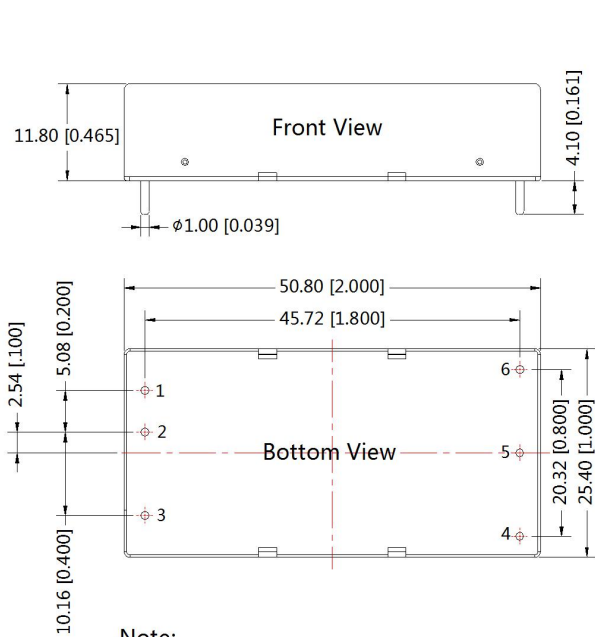
Fig. 5

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

4. For additional information please refer to DC-DC converter application notes on

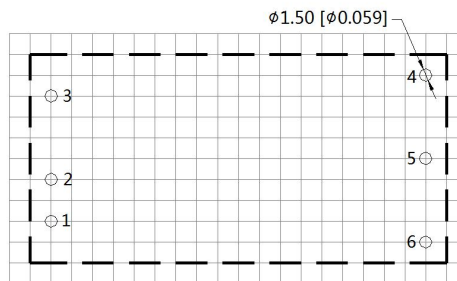
www.mornsun-power.com

Horizontal Package (without heat sink) Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin diameter tolerances: $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$

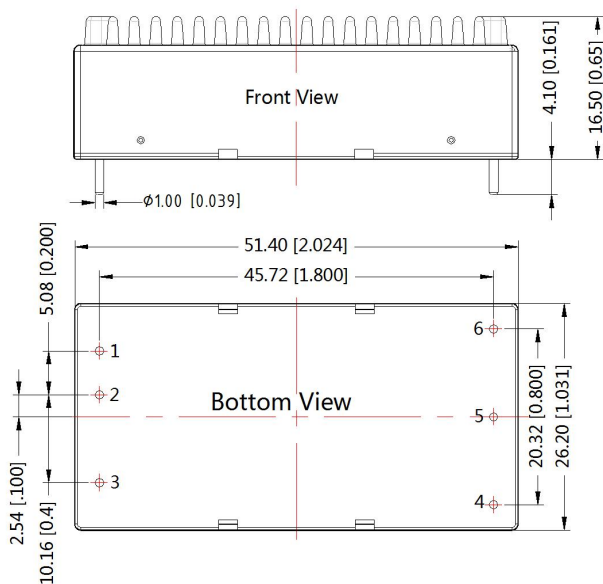
THIRD ANGLE PROJECTION



Note : Grid 2.54*2.54mm

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

Horizontal Package (with heat sink) Dimensions



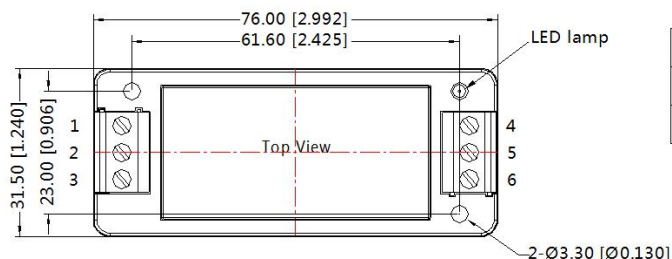
Note:
Unit: mm[inch]
General tolerances: $\pm 0.50[\pm 0.020]$

THIRD ANGLE PROJECTION

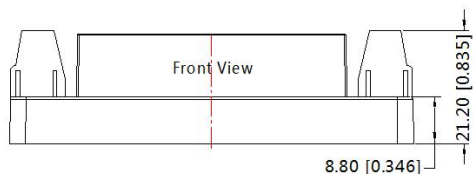
Pin-Out	
Pin	Dual
1	Vin
2	GND
3	Ctrl
4	-Vo
5	0V
6	+Vo

URE1D_LD-20WR3A2S (without heatsink) Dimensions

THIRD ANGLE PROJECTION 




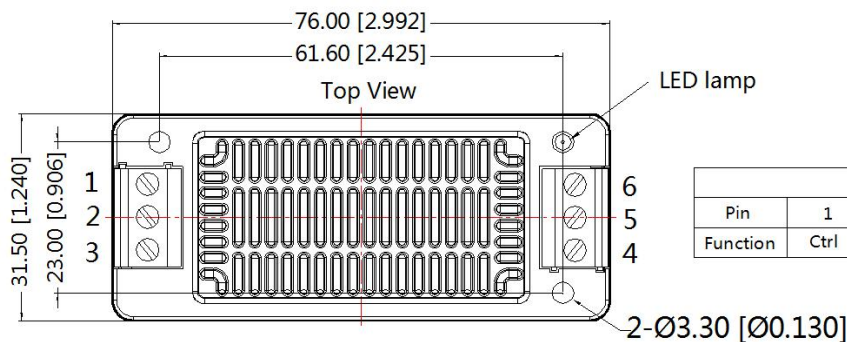
Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	-Vo	0V	+Vo



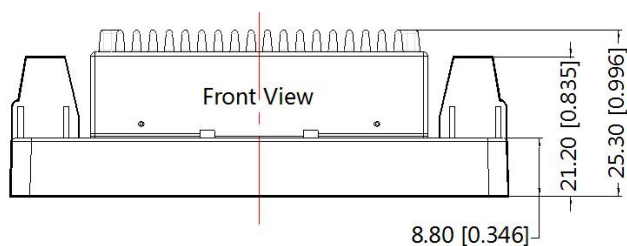
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.039]

URE1D_LD-20WHR3A2S (with heatsink) Dimensions

THIRD ANGLE PROJECTION 



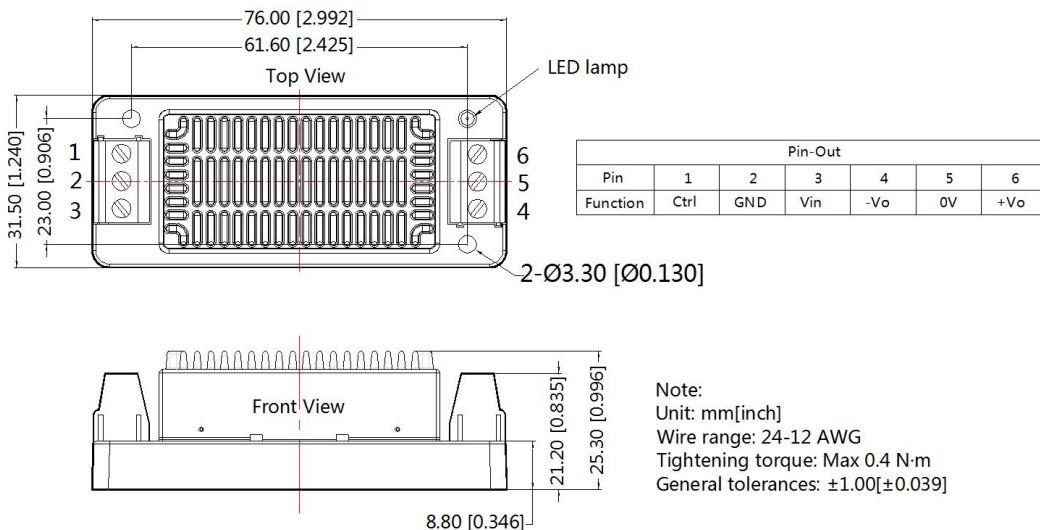
Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	-Vo	0V	+Vo



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

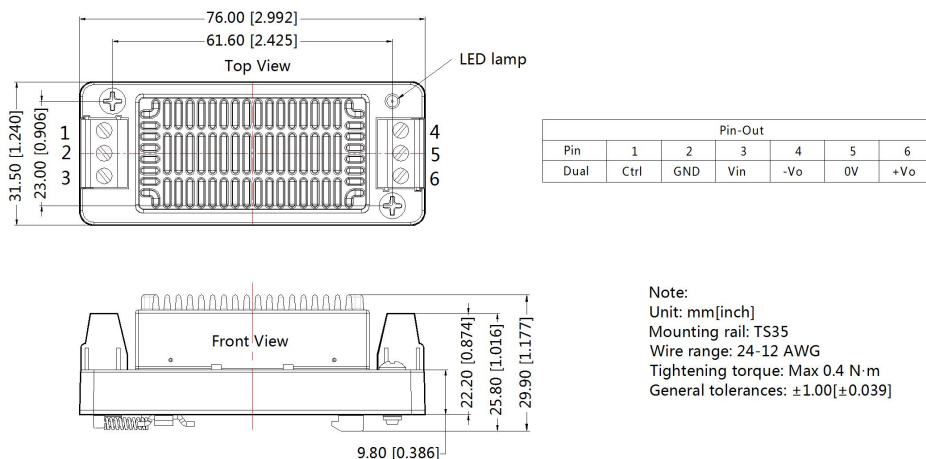
URE1D_LD-20WR3A4S (without heatsink) Dimensions

THIRD ANGLE PROJECTION 



URE1D_LD-20WHR3A4S (with heatsink) Dimensions

THIRD ANGLE PROJECTION 



Note:

- For additional information on Product Packaging please refer to www.mornsun-power.com. The Packaging bag number of Horizontal packaging: 58200035(without heat sink), 58200051(with heat sink), A2S/A4S packaging number: 58220022;
- 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 Ta=25°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 ISO 14001 and related environmental laws and regulations, and shall be handled by qualified units.

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