DC/DC Converter

URE1D_LD-20W(H)R3G Series

MORNSUN®

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 3000VAC
- Operating ambient temperature range: -40℃ to +85℃
- 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
- Meets IEC62368, UL62368, EN62368 standards
- Meets requirements of railway standard EN50155
- Industry standard pin-out

URE1D_LD-20W(H)R3G 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 3000VAC and the converters safely operate in an ambient temperature of -40℃to +85℃. Input under-voltage protection, output short-circuit, over-current, over–voltage, over-temperature protection. Offered with various mounting options, it is ideally suiting 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 Efficiency③ (%) Min./Typ.	Capacitive Load④ (μF)Max.
		Nominal (Range)	Max.②	Voltage (VDC)	Current (mA) Max./Min.		
--	URE1D12LD-20W(H)R3G	110 (40-160)	170	±12	±833/0	83/85	680
	URE1D15LD-20W(H)R3G			±15	±667/0	84/86	470
	URE1D24LD-20W(H)R3G			±24	±417/0	84/86	220

Note:
①Use"H" suffix for heat sink mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
②Exceeding the maximum input voltage may cause permanent damage;
③Efficiency is measured at nominal input voltage and rated output load;
④The 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	
Input Under-voltage Protection		24	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 (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	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 Regulation①	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	%/℃
Ripple & Noise②	20MHz bandwidth, 5% -100% load		--	50	100	mV p-p
Over-voltage Protection	Input voltage range		110	--	160	%Vo
Over-current Protection			120	--	260	%Io
Short-circuit Protection			Continuous, self-recovery			

Note:
①Load regulation for 0%-100% load is ±5%;
②Ripple & 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 5mA max.	3000	--	--	VAC
	Input/output-case Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
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	℃
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	℃
Switching Frequency*	PWM mode	--	300	--	kHz
Vibration		IEC61373 - Category 1, Grade B			
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	Without heat sink	50.80 x 25.40 x 11.80 mm
	With heat sink	51.40 x 26.20 x 16.50 mm
Weight	Without heat sink	26.0g(Typ.)
	With heat sink	34.0g(Typ.)
Cooling Method	Free air convection	

Electromagnetic Compatibility (EMC) (EN62368)

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 ±6kV/Air ±8kV	perf. Criteria B
	RS	IEC/EN61000-4-3	20V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±4kV (see Fig.3 or Fig.4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV (2Ω 18uF see Fig.3 for recommended circuit) line to ground ±4kV (12Ω 9uF 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 EN55016-2-1	150kHz-500kHz 99dBuV (see Fig.5 for recommended circuit) 500kHz-30MHz 93dBuV	
	RE	EN50121-3-2 EN55016-2-1	30MHz-230MHz 40dBuV/m at 10m (see Fig.5 for recommended circuit) 230MHz-1GHz 47dBuV/m at 10m	
Immunity	ESD	EN50121-3-2	Contact ±6kV/Air ±8kV	perf. Criteria B
	RS	EN50121-3-2	20V/m	perf. Criteria A
	EFT	EN50121-3-2	±2kV 5/50ns 5kHz (see Fig.3 or Fig.4 for recommended circuit)	perf. Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω 0.5uF 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

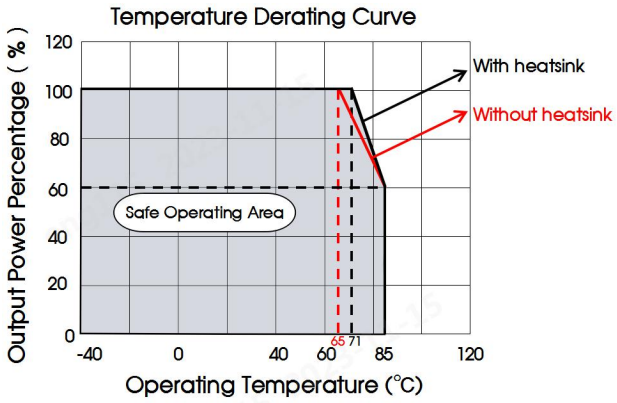
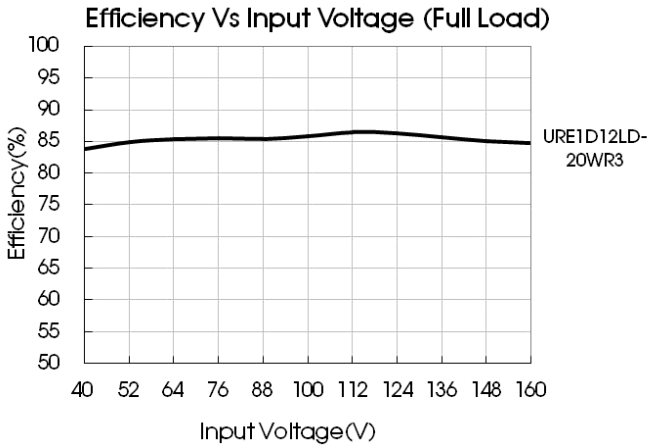
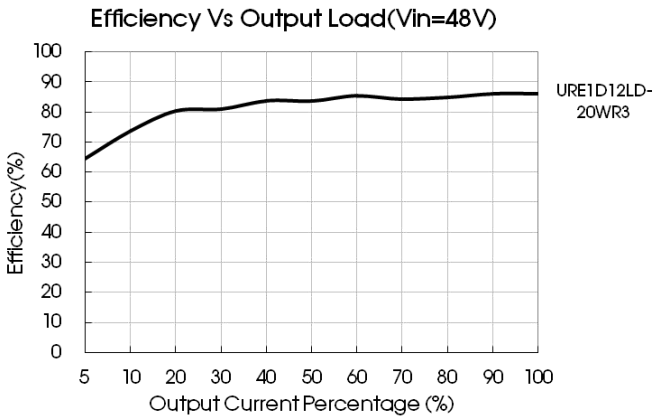
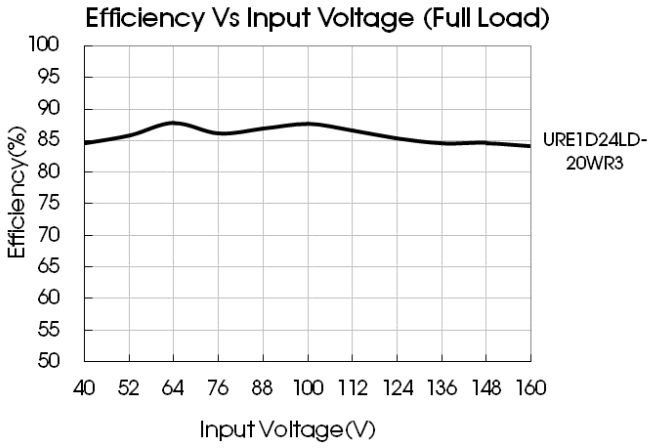
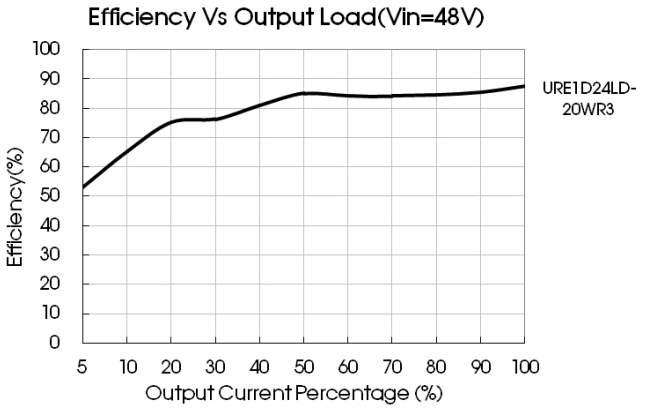


Fig. 1









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 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 specified max. capacitive load value of the product.

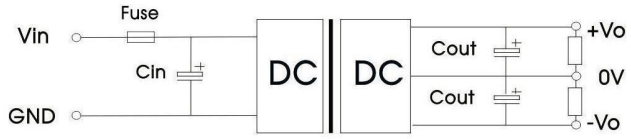


Fig. 2

Vout(VDC)	Fuse	Cin	Cout
±12/±15	2A, slow blow	100μF/200V	220μF/25V
±24			100μF/50V

2. EMC compliance circuit

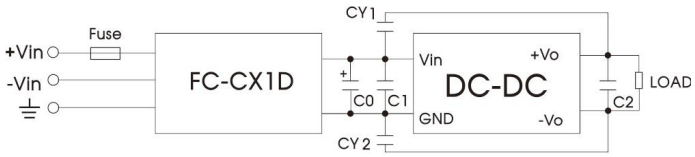


Fig. 3

Fig. 3 Parameter description

Output voltage	±12V	±15V	±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	100μF/200V		
C1	47μF/200V		
C2	220μF/25V		100μF/35V
CY1、CY2	1000pF/400VAC		

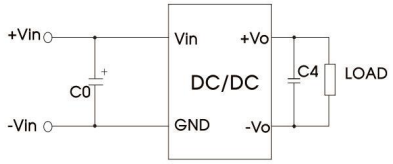


Fig. 4

Fig. 4/Fig. 5 Parameter description

Output voltage	±12V	±15V	±24V
C0	100μF/200V		
C1、C2	0.22μF/250V		
C3	47μF/200V		
LCM1、LCM2	30mH (common mode inductance)		
CY1、CY2、	1000pF/400VAC		
CY3、CY4	2200pF/400VAC		
C4	220μF/25V	100μF/35V	

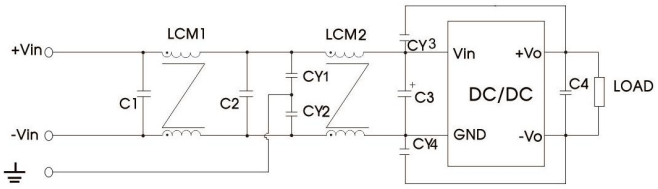


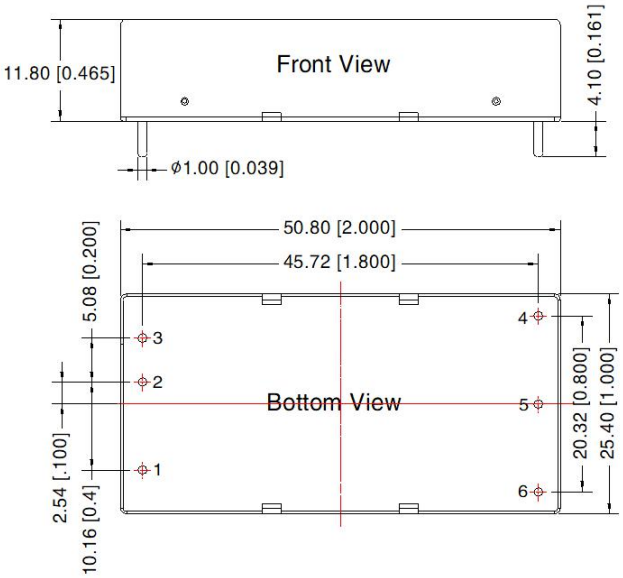
Fig. 5

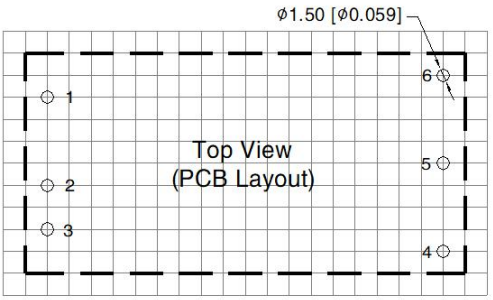
3. The products do not support parallel connection of their output

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

URE1D_LD-20WR3G Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





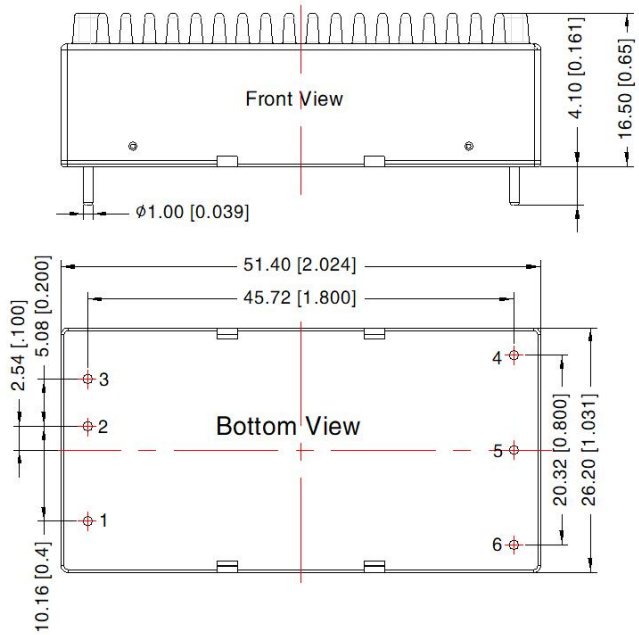
Note: Grid 2.54*2.54mm

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

Note:
Unit: mm[inch]
Pin1/2/3/4/5/6: ϕ1mm
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]

URE1D_LD-20WHR3G Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



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

Note:
Unit: mm[inch]
Pin1/2/3/4/5/6: ϕ1mm
General tolerances: ± 0.50[± 0.020]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. The Packaging bag number: 58200035(without heat sink), 58200051(with heat sink);
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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