15W & 20W, Ultra wide input isolated & regulated DC/DC converter

CE Patent Protection RoHS

FEATURES

- Ultra wide input voltage range (4:1)
- High efficiency up to 89%
- Isolation voltage :1.5K VDC
- Operating temperature range: -40℃ to +85℃
- Output short circuit(automatic recovery), over-current, over–voltage protection
- Six-sided metal shielding package
- International standard pin-out
- Reverse voltage protection available with A2S(Chassis mounting) or A4S(35mm DIN-Rail mounting)
- EN60950 approval

URB1D_LD-15W & URB1D_LD-20W series Wide input voltage range is 40-160VDC. It is suitable for 72V, 96V, 110V standard input of the bus voltage, single output and 1500VDC isolation, over current, over voltage and short-circuit protection. It offers good EMC performance, meet EN60950 standards. All models are particularly suited to railway etc.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency④ (%,Min/Typ.) @ Full Load	Max. Capacitive Load(μF)
		Nominal② (Range)	Max. ③	Output Voltage (VDC)	Output Current (mA)(Max./Min.)		
CE	URB1D03LD-15W	110 (40-160)	176	3.3	4000/200	85/87	4020
	URB1D05LD-15W			5	3000/150	87/89	4020
	URB1D12LD-15W			12	1250/63	86/88	1600
	URB1D15LD-15W			15	1000/50	86/88	1000
	URB1D24LD-15W			24	625/32	86/88	470
	URB1D05LD-20W			5	4000/200	87/89	4020
	URB1D12LD-20W			12	1667/83	86/88	1600
	URB1D15LD-20W			15	1333/67	86/88	1000
	URB1D24LD-20W			24	833/42	86/88	470

Note:
① Series with suffix "H" are heat sink mounting; series with suffix "A2S" are chassis mounting, with suffix "A4S" are DIN-Rail mounting, for example URB1D05LD-20WHA2S is chassis mounting of with heat sink, URB1D05LD-20WA4S is DIN-Rail mounting of without heat sink; If the application has a higher requirement for heat dissipation, you can choose modules with heat sink;
② The minimum input voltage and starting voltage of A2S (wiring) and A4S (rail) Model are 1VDC higher than those of DIP package due to input reverse polarity protection function;
③ Absolute maximum rating without damage on the converter, but it isn't recommended;
④ The efficiency of A2S (wiring type) and A4S (rail type) products is 2% lower than the above-mentioned value due to the reverse connection protection for input.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	URB1D_LD-15W Series	3.3VDC output	--	141/10	161/20	mA
		Others	--	155/15	159/20	
	URB1D_LD-20W Series		--	207/15	212/20	
Reflected Ripple Current			--	25	--	
Surge Voltage (1sec. max.)			-0.7	--	200	VDC
Starting Voltage	100% load		--	--	39.8	
Start-up Time	Nominal input voltage & constant resistance load		--	10	--	ms
Input Filter			Pi filter			

Hot Plug		Unavailable			
Ctrl*	Module switch on	Ctrl suspended or connected to TTL high level (2.5-12VDC)			
	Module switch off	Ctrl pin connected to GND or low level (0-1.2VDC)			
	Input current when switched off	--	1	--	mA
Note: * the voltage of Ctrl pin is relative to input pin GND.					

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy	3.3V, 5V output	--	±1	±3	%
	Others	--	±1	±2	
Line Regulation	Full load, the input voltage is from low voltage to high voltage	--	±0.2	±0.5	
Load Regulation	5%-100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change	--	500	800	μs
Transient Response Deviation		--	±3	±5	%
Temperature Coefficient	Full load	--	±0.02	--	%/℃
Ripple & Noise *	20MHz bandwidth	50	75	100	mV p-p
Trim		--	±10%Vo	--	VDC
Output Over-voltage Protection	3.3VDC output	--	4.1	--	
	5VDC output	--	6.2	--	
	12VDC output	--	15	--	
	15VDC output	--	18	--	
	24VDC output	--	28.8	--	
Output Over-current Protection	Input voltage range	110	130	190	%Io
Output Short circuit Protection		Continuous, self-recovery			
Note: * Ripple and noise tested with "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation methods.					

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	--	--	VDC
Insulation Resistance	Input-output, isolation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	2000	--	pF
Operating Temperature	see Fig. 1	-40	--	+85	℃
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	+300	℃
Switching Frequency	PWM mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours
Safety approvals		EN60950			

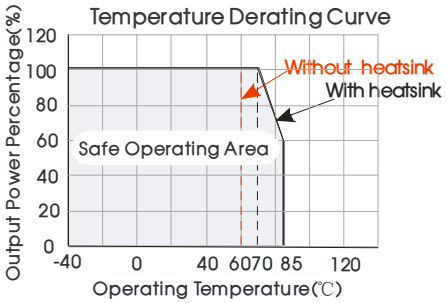
Physical Specifications

Casing Material		Aluminum alloy	
Package Dimensions	Without heat sink	Horizontal package	50.80*25.40*11.80mm
		A2S wiring package	76.00*31.50*21.20 mm
		A4S rail package	76.00*31.50*25.80 mm
	With heat sink	Horizontal package	51.40*26.20*16.50mm
		A2S wiring package	76.00*31.50*25.30 mm
		A4S rail package	76.00*31.50*29.90 mm
Weight	Without heat sink	Horizontal package/A2S wiring package/A4S rail package	28g/50g/70g(Typ.)
	With heat sink	Horizontal package/A2S wiring package/A4S rail package	36g/58g/78g(Typ.)
Cooling Method			Free air convection

EMC Specifications

EMI	CE	CISPR22/EN55022	CLASS B (see Fig.3 for recommended circuit)	
	RE	CISPR22/EN55022	CLASS B (see Fig.3 for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria B
	EFT	IEC/EN61000-4-4	±4KV (see Fig.3 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2KV(1.2μs/50μs 2Ω) line to ground ±4KV(1.2μs/50μs 12Ω) (see Fig.3 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria B
	Immunities of voltage dip, drop and short interruption	IEC/EN61000-4-29	0%，70%	perf. Criteria B

Product Characteristic Curve



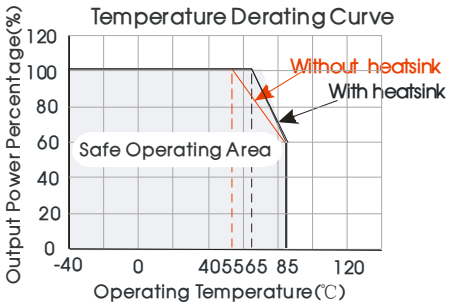
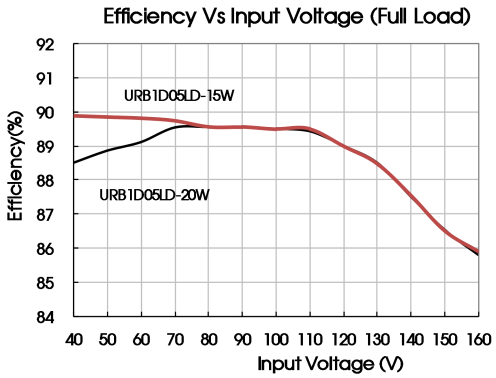
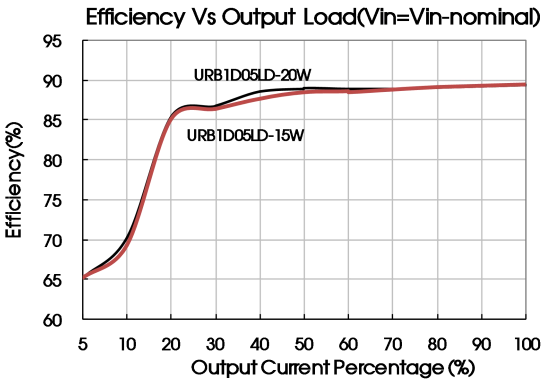
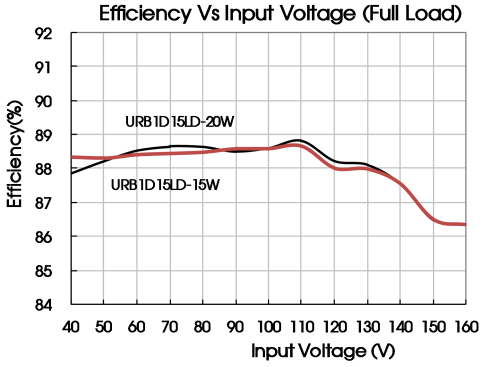
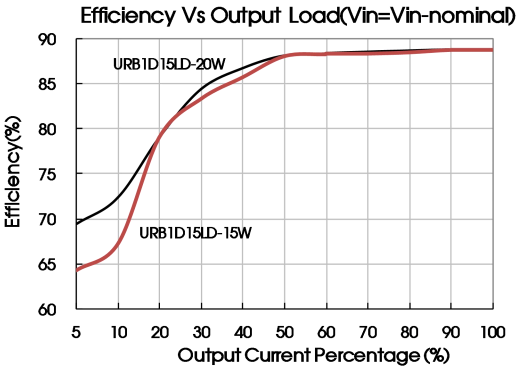


Fig. 1









Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

Fig. 2

Vout(VDC)		Cin(μF)	Cout(μF)
Single	3.3/5	100	470
	12/15		220
	24		100

2. EMC module solution-recommended circuit

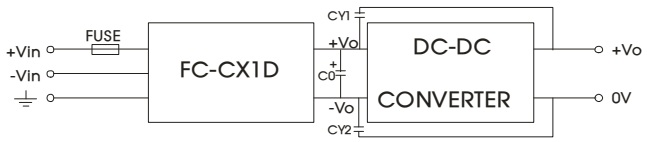
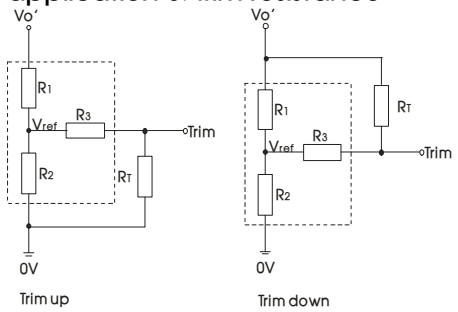


Fig. 3

Parameter description

FUSE	Choose according to actual input current
C0	100μF/200V
CY1、CY2	1nF/2KV

3. Trim application & Trim resistance



Application circuit for TRIM (Part in broken line is the interior of models)

Calculation formula of Trim resistance:

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

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

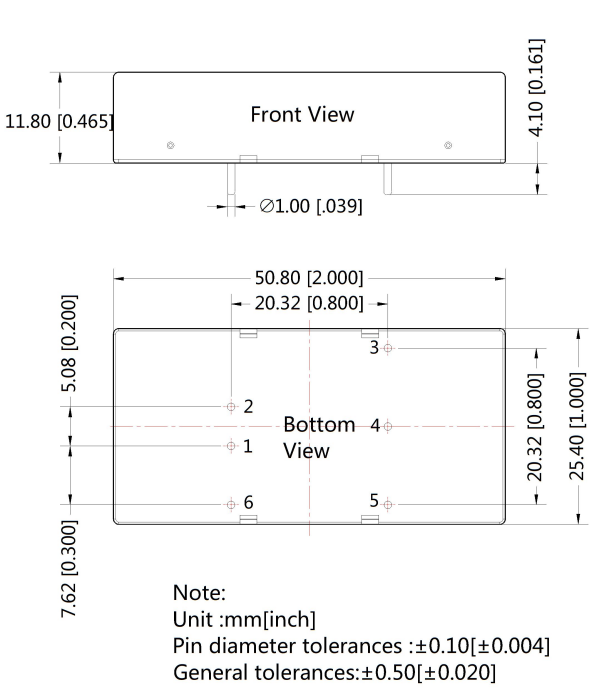
Note: Leave open if not used. R_T: Resistance of Trim. a: User-defined parameter, no actual meanings.

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.801	2.864	15	1.24
5	2.883	2.864	10	2.5
12	10.971	2.864	17.8	2.5
15	14.497	2.864	17.8	2.5
24	24.872	2.863	17.8	2.5

4. The product does not support output in parallel with power per liter use

5. For more information please find the application notes on www.mornsun-power.com

Dimensions and Recommended Layout(without heatsink)

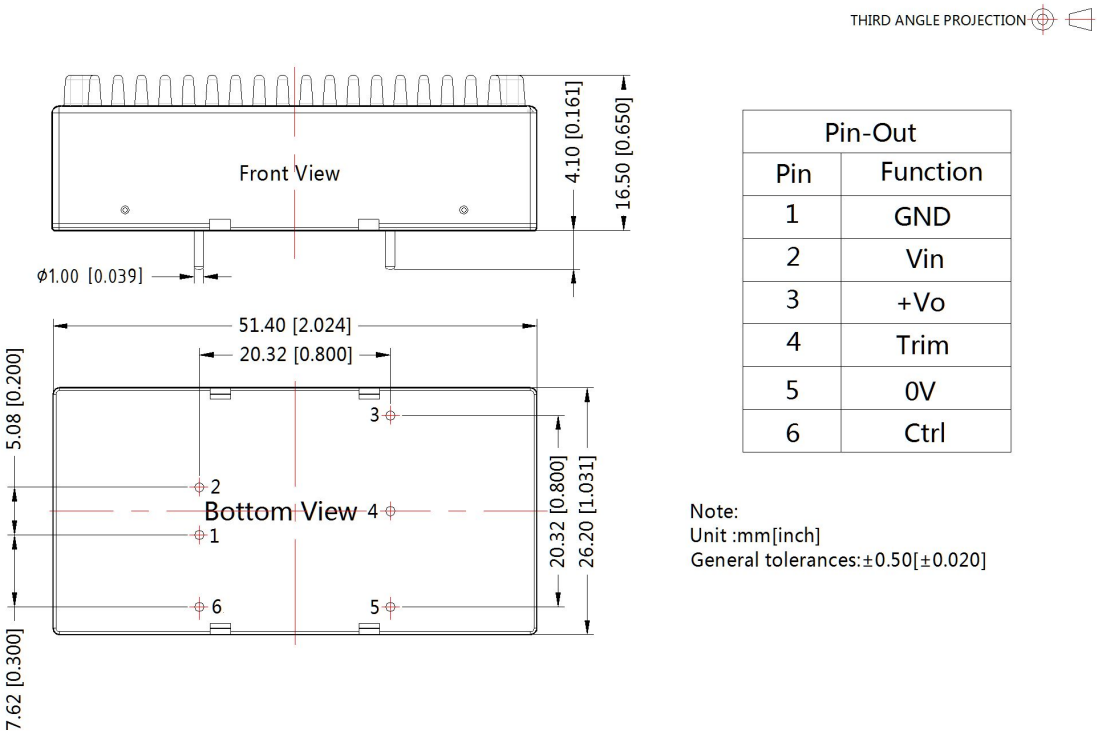


Note : Grid 2.54*2.54mm

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

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

Dimensions (with heatsink)

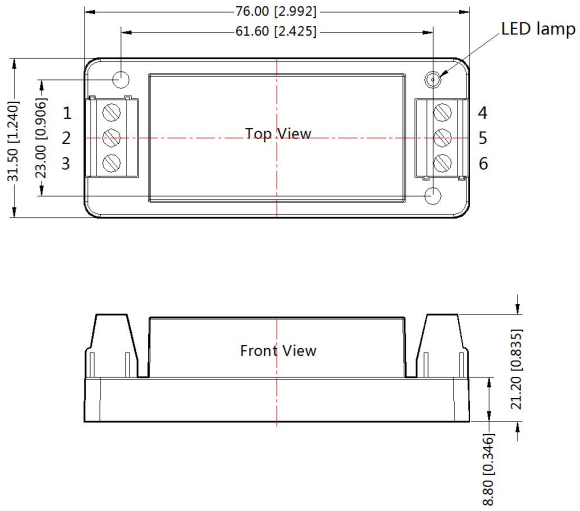


Pin-Out	
Pin	Function
1	GND
2	Vin
3	+Vo
4	Trim
5	0V
6	Ctrl

Note:
Unit :mm[inch]
General tolerances:±0.50[±0.020]

A2S Wiring Package Dimensions(without heatsink)

THIRD ANGLE PROJECTION

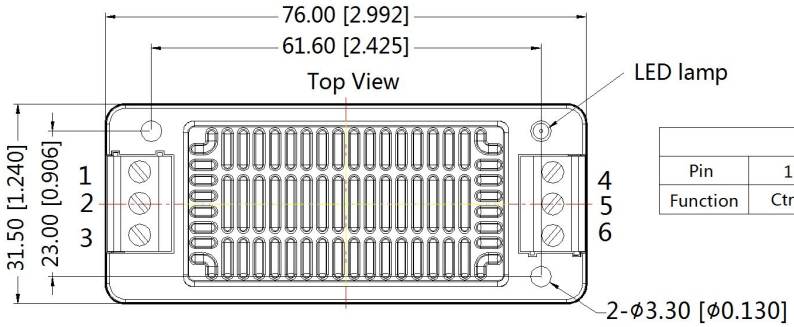


Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	Trim	+Vo

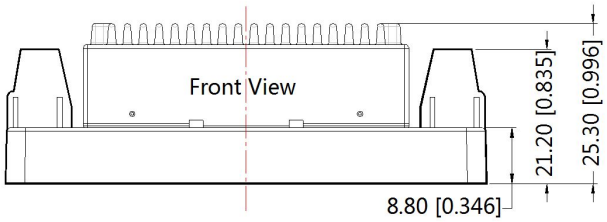
Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±0.50[±0.020]

A2S Wiring Package Dimensions(with heatsink)

THIRD ANGLE PROJECTION



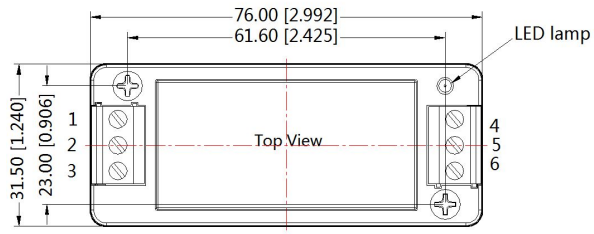
Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	Trim	+Vo



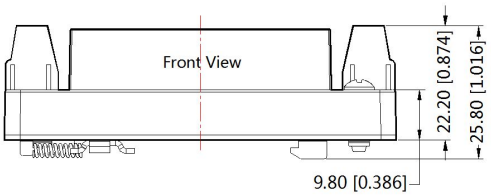
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±0.50[±0.020]

A4S Rail Package Dimensions(without heatsink)

THIRD ANGLE PROJECTION



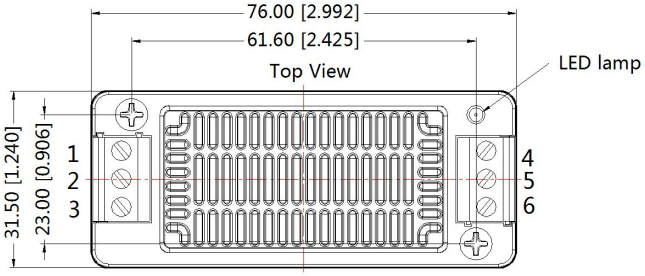
Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	Trim	+Vo



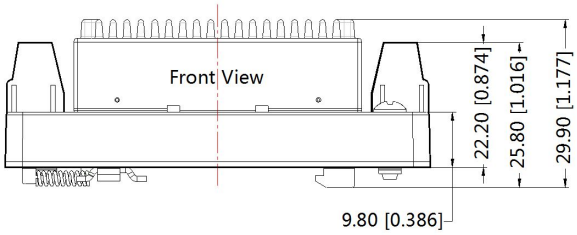
Note:
Unit: mm[inch]
Mounting rail: TS35
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.039]

A4S Rail Package Dimensions(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]
Mounting rail: TS35
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.039]

Notes:

1. Packing Information please refer to 'Product Packing Information'. The Packing bag number of Horizontal package: 58200024(without heatsink),58200051(with heatsink), the Packing bag number of A2S/ A4S package: 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 maximum capacitive load offered were tested at input voltage range and full load;
4. 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;
5. All index testing methods in this datasheet are based on Company's corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Specifications are subject to change without prior notice.

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