Descriptions

6W isolated，DC/DC Converter



RoHS

CE Report EN62368-1

UKCA Report BS EN 62368-1

Features

- Ultra-wide 4:1 input voltage range
- High efficiency up to 86%
- I/O isolation test voltage: 2.25k VDC
- Operating ambient temperature range: -40℃ to +85℃
- Input under-voltage protection, output short- circuit, over-current, over-voltage protection
- Low ripple & noise
- Input reverse polarity protection available with chassis(E2S) or Din-Rail mounting (D4S) version
- Industry standard pin-out

Applications

- Railway vehicle applications using 72V, 96V and 110V battery voltages

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency④ (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal② (Range)	Max.③	Voltage (VDC)	Current (mA) Max./Min.		
EN/BS EN	DRWMD6-B1D05	110 (40-160)	170	5	1200/0	78/80	1000
	DRWMD6-B1D12			12	500/0	82/84	470
	DRWMD6-B1D15			15	400/0	83/85	220
	DRWMD6-B1D24			24	250/0	84/86	100

Note:
①Use "H" suffix for heat sink mounting, "E2S" suffix for chassis mounting and "D4S" suffix for Din-Rail mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
②The minimum input voltage and starting voltage of E2S and D4S Model are 1VDC higher than those of DIP package due to input reverse polarity protection function;
③Exceeding the maximum input voltage may cause permanent damage;
④Efficiency is measure at nominal input voltage and rated output load; efficiencies for E2S and D4S Model's is decreased by 2% due to the input reverse polarity protection circuit;
⑤Product images are for reference only; the actual product shall prevail.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	Nominal input voltage		--	68/3	70/8	mA
	Reflected Ripple Current	Nominal input voltage		--	25	--	
	Surge Voltage (1sec. max.)			-0.7	--	180	VDC
	Start-up Voltage			--	--	40	
	Input Under-voltage Protection			28	33	--	
	Startup time	Nominal input voltage and constant resistance load		--	10	--	ms
	Input Filter			Pi filter			
	Hot Plug			Unavailable			
	Ctrl①	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		--	3	8	mA
Output Specifications	Voltage Accuracy②	0%-100% load		--	±1	±3	%
	Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
	Load Regulation③	0%-100% load		--	±0.5	±1	
	Transient Recovery Time	25% load step change		--	300	500	μs
	Transient Response Deviation		5V output	--	±3	±8	%
			Others	--	±3	±5	
	Temperature Coefficient	Full load		--	±0.02	±0.03	%/℃
	Ripple & Noise④	20MHz bandwidth, 5%-100% load		--	50	100	mVp-p
	Over-voltage Protection	Input voltage range		110	--	160	%Vo
	Over-current Protection			120	--	210	%Io
	Short-circuit Protection			Continuous, self-recovery			
General Specifications	Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.		2250	--	--	VDC
		Input/output-case Electric Strength Test for 1 minute with a leakage current of 1mA max.		1600	--	--	
	Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	1000	--	pF
	Operating Temperature	See Fig.1		-40	--	+85	℃
	Storage Temperature			-55	--	+125	
	Pin Soldering Resistance Temperature⑤	Soldering spot is 1.5mm away from the case, 10 seconds max.		--	--	+300	
		Wave soldering, maximum 10 seconds		255	260	265	
	Storage Humidity	Non-condensing		5	--	95	%RH
	Vibration			IEC61373 - Category 1, Grade B			
	Switching Frequency⑥	PWM Mode		--	300	--	kHz
	MTBF	MIL-HDBK-217F@25℃		1000	--	--	k hours
Mechanical	Case Material	Metal (UL94 V-0)					
	Dimensions	Horizontal package(without heat sink)			25.40 × 25.40 × 11.70 mm		

Specifications		Horizontal package(with heat sink)		25.40 × 25.40 × 16.20 mm
		E2S wiring package (without heat sink)		76.00 × 31.50 × 21.20 mm
		E2S wiring package(with heat sink)		76.00 × 31.50 × 25.20 mm
		D4S rail package(without heat sink)		76.00 × 31.50 × 25.80 mm
		D4S rail package(with heat sink)		76.00 × 31.50 × 29.80 mm
	Weight	Without heat sink	Horizontal package/E2S wiring package/D4S rail package	12.5g/36.0g/56.0g (Typ.)
		With heat sink	Horizontal package/E2S wiring package/D4S rail package	17.0g/40.0g/59.0g (Typ.)
	Cooling Methods	Free air convection		

Note:
①The Ctrl pin voltage is referenced to input GND;
②Vo2 output voltage accuracy of ±5VDC output converter for 0%-5% load is ±5% max;
③When tested under load conditions ranging from 0% to 100%, the load adjustment rate of the DRWMD6-B1Dxx is a maximum of ±5%;
④Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The ” parallel cable” method is used for Ripple and Noise test;
⑤The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder joints. The actual temperature set by the customer should be determined comprehensively based on factors such as PCB thickness, copper coverage, soldering iron power, and soldering iron tip selection;
⑥Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Electromagnetic Compatibility (EMC)

Emissions (EMI)	CE	CISPR32/EN55032 CLASS B (see Fig.3 or Fig.4-② for recommended circuit)	
	RE	CISPR32/EN55032 CLASS B (see Fig.3 or Fig.4-② for recommended circuit)	
Immunity (EMS)	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.4-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2kV (2Ω, 18μF see Fig.3 for recommended circuit) line to ground ±4kV (12Ω, 9μF 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 (EMI)	CE	EN50121-3-2	150kHz-500kHz 99dBμV 500kHz-30MHz 93dBμV	
	RE	EN50121-3-2	30MHz-230MHz 40dBμV/m at 10m 230MHz-1GHz 47dBμV/m at 10m	
Immunity (EMS)	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	perf. Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω, 0.5μF) line to ground ±2kV (42Ω, 0.5μF)	perf. Criteria B
	CS	EN50121-3-2	0.15MHz-80MHz 10Vr.m.s	perf. Criteria A

Note: All the tests are measured under the conditions of input capacitor 100uF/200V or FP1DX1.

Characteristic Curve

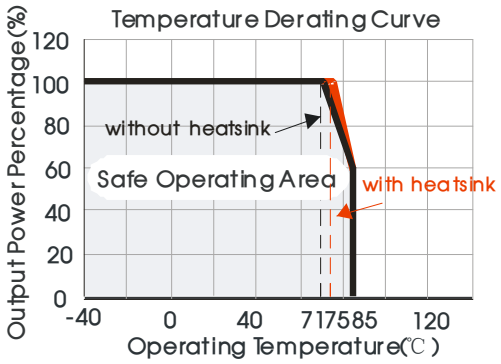
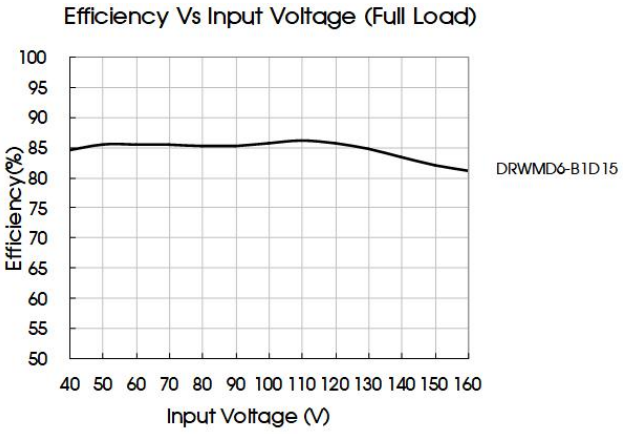
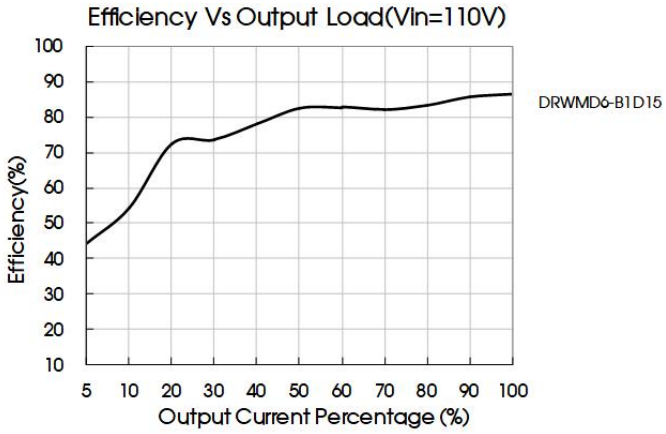


Fig. 1





Design Reference

1. Typical application

①All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.

②Input 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

Cin	Vo(VDC)	Cout
10μF/250V -47μF/250V	5	10μF/16V
	12/15	10μF/25V
	24	10μF/50V

2. EMC compliance circuit

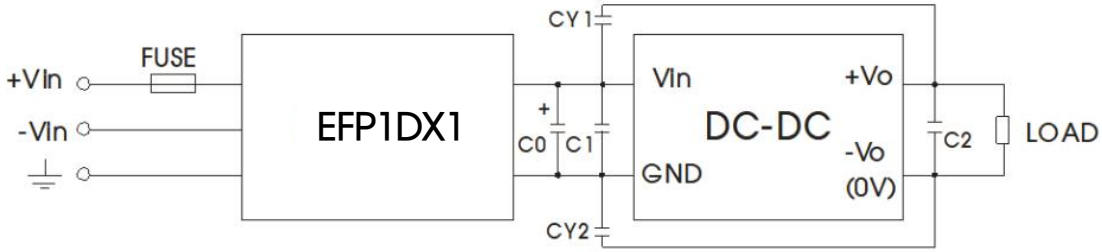
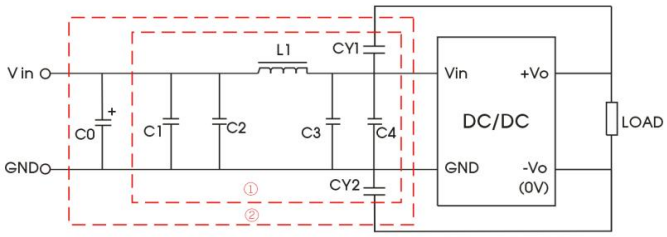


Fig. 3

Parameter description:

FUSE	Choose according to actual input current
EFP1DX1	EFP1DX1 is the EMC auxiliary component of our company. Input voltage range: 40V-160V
C0	100μF/200V
C1	Refer to the Cin in Fig.2
C2	Refer to the Cout in Fig.2
CY1/CY2	1nF/3kV



Parameter description:

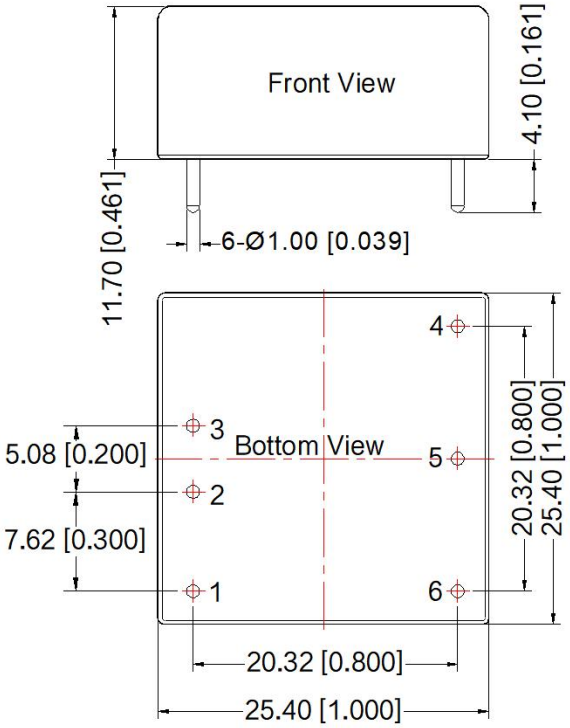
C0	100μF/200V
C1/C2/C3/C4	0.22μF/250V
L1	68μH
CY1/CY2	1nF/3kV

Fig. 4

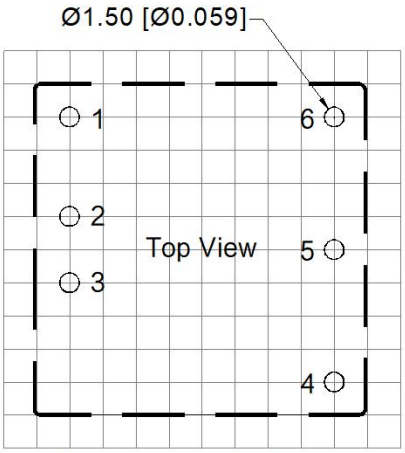
3.The products do not support parallel connection of their output

DRWMD6-B1Dxx Dimensions and Recommended

THIRD ANGLE PROJECTION



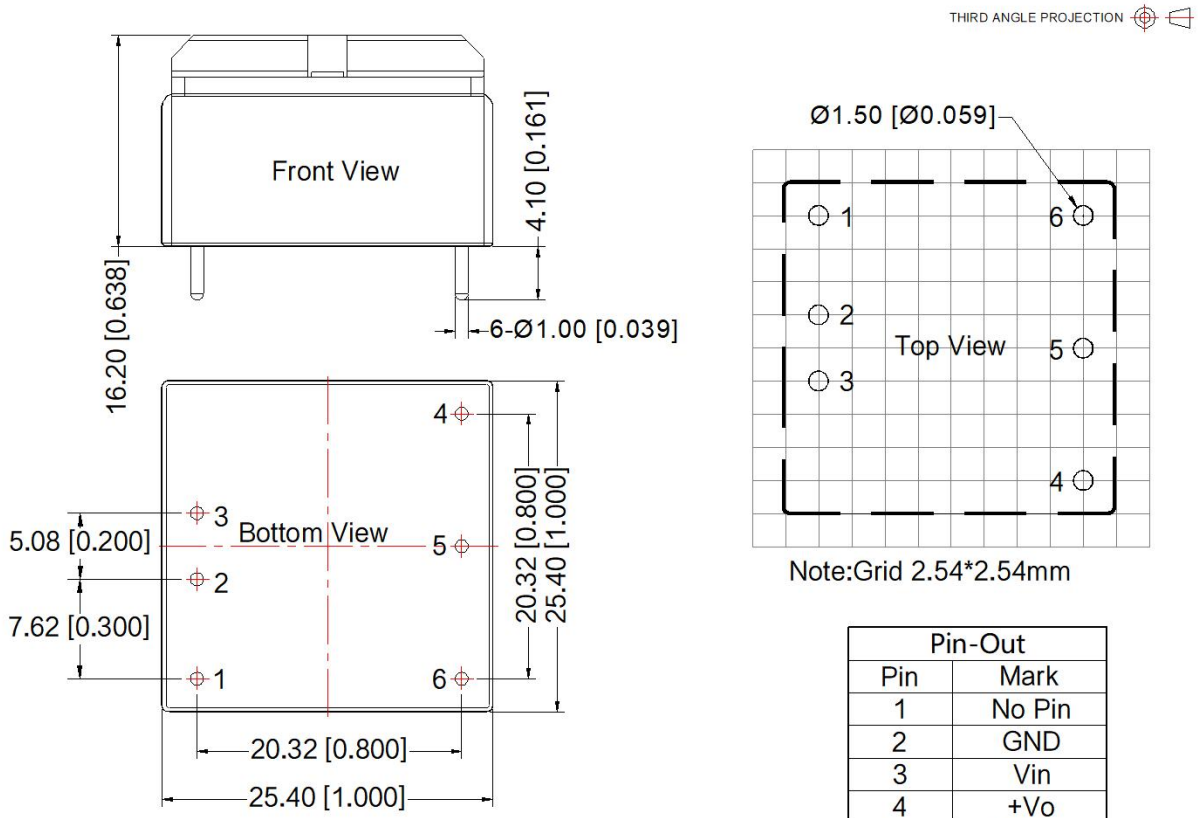
Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
Pin diameter1/2/3/4/5/6: Ø1.0mm
General tolerances: ± 0.50[± 0.020]



Note:Grid 2.54*2.54mm

Pin-Out	
Pin	Mark
1	No Pin
2	GND
3	Vin
4	+Vo
5	No Pin
6	0V

DRWMD6-B1DxxH Horizontal Package (with heat sink) Dimension

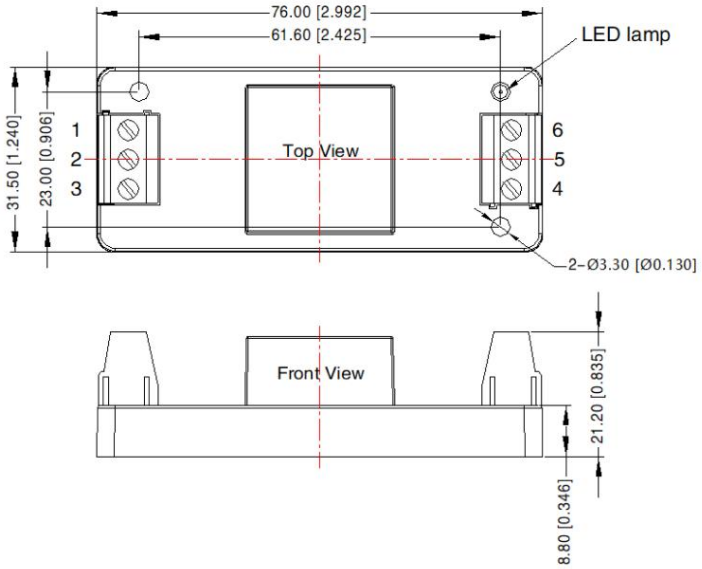


Pin-Out	
Pin	Mark
1	No Pin
2	GND
3	Vin
4	+Vo
5	No Pin
6	0V

Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
Pin diameter1/2/3/4/5/6: Ø 1.0mm
General tolerances: ± 0.50[± 0.020]

DRWMD6-B1DxxE2S (without heat sink) Dimension

THIRD ANGLE PROJECTION

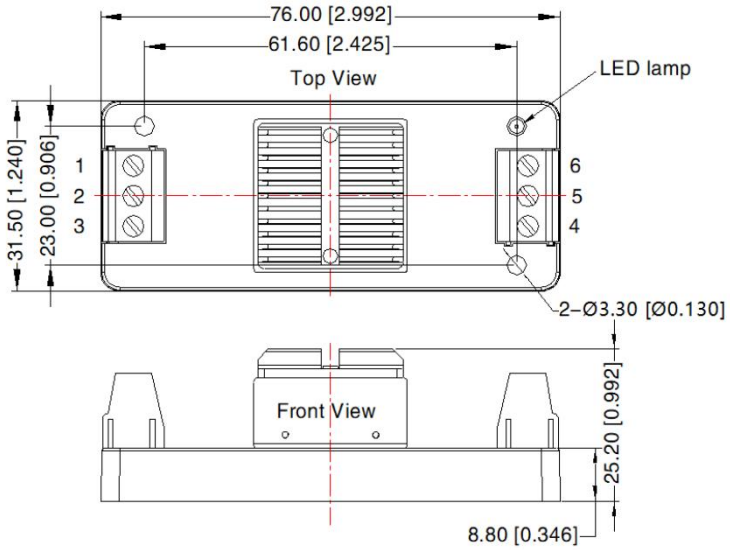


Pin-Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V

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

DRWMD6-B1DxxHE2S (with heat sink) Dimension

THIRD ANGLE PROJECTION

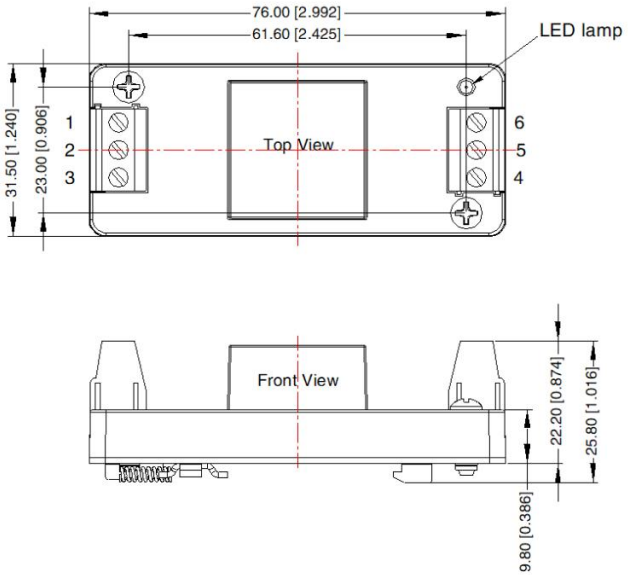


Pin-Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V

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

DRWMD6-B1DxxD4S (without heat sink) Dimension

THIRD ANGLE PROJECTION

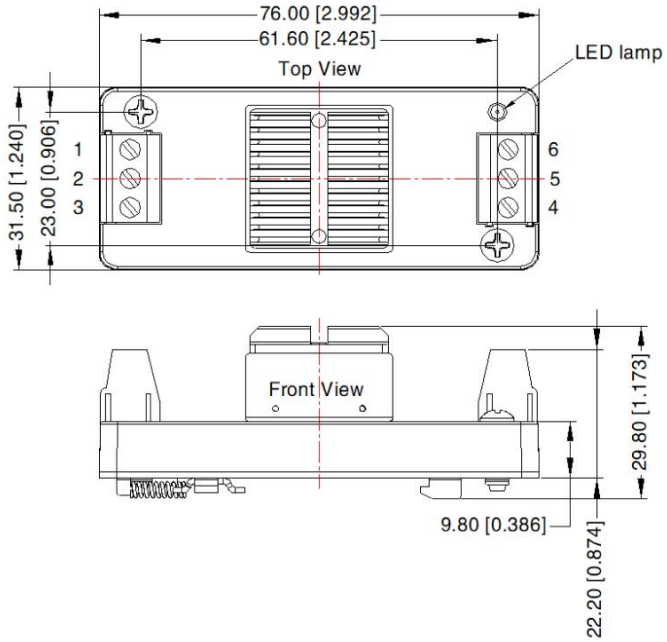


Pin–Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V

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]

DRWMD6-B1DxxHD4S (with heat sink) Dimension

THIRD ANGLE PROJECTION



Pin–Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	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:

1. The maximum capacitive load offered were tested at nominal input voltage range and full load;
2. 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;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
7. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.