Descriptions

10W isolated，DC/DC Converter

RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Ultra-wide 4:1 input voltage range
- High efficiency up to 85%
- Reinforced 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 output ripple & noise
- EN50121-3-2 & CISPR32/EN55032 CLASS A EMI compliant without external components
- Designed to meet UL62368/IEC62368 standard
- Input Reverse Polarity Protection available with Chassis (E2S) or DIN-Rail mounting (D4S) version
- Industry standard pin-out

Applications

- Railway: 72V, 96V and 110V battery voltages

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency ③(%) Min./Typ.	Max. Capacitive Load(μF)
		Nominal (Range)	Max.②	Voltage (VDC)	Current (mA) Max./Min.		
EN/BS EN	DRWLMD10-B1D03	110 (40-160)	170	3.3	2400/0	74/76	5400
	DRWLMD10-B1D05			5	2000/0	78/80	5400
	DRWLMD10-B1D12			12	833/0	82/84	470
	DRWLMD10-B1D15			15	667/0	82/84	330
	DRWLMD10-B1E2S4			24	417/0	83/85	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;

②Absolute maximum stress rating without damage (not recommended);

③Efficiency is measured 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.

Specifications

Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	Nominal input voltage	3.3V output	--	95/3	98/8	mA
			Others	--	110/3	117/8	
	Reflected Ripple Current	Nominal input voltage		--	25	--	
	Surge Voltage (1sec. max.)			-0.7	--	180	VDC
	Start-up Voltage	100% load		--	--	40	
	Shut-down Voltage			28	33	--	
	Start-up Time	Nominal input voltage & constant resistance load		--	10	--	ms
	Input Filter			Pi filter			
	Hot Plug			Unavailable			
Output Specifications	Voltage Accuracy	0%-100% load		--	±1	±3	%
	Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
	Load Regulation	0%-100% load		--	±0.5	±1	%
	Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
	Transient Response Deviation		3.3V/5V output	--	±3	±8	%
			Others	--	±3	±5	
	Temperature Coefficient	Full load		--	±0.02	±0.03	%/℃
	Ripple & Noise①	20MHz bandwidth, 5%-100% load		--	50	100	mV p-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		--	2200	--	pF
	Operating Temperature	See Fig.1		-40	--	+85	℃
	Storage Temperature			-55	--	+125	
	Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	
	Storage Humidity	Non-condensing		5	--	95	%RH
	Vibration			IEC61373 - Category 1, Grade B			
	Switching Frequency②	PWM Mode		--	300	--	KHz
	MTBF	MIL-HDBK-217F@25℃		1000	--	--	K hours
Mechanical Specifications	Case Material	Aluminum alloy					
	Dimensions	Horizontal package (without heat sink)		50.80 × 25.40 × 11.80 mm			
		Horizontal package (with heat sink)		51.40 × 26.20 × 16.50 mm			
		E2S chassis mounting (without heat sink)		76.00 × 31.50 × 21.20 mm			

		E2S chassis mounting (with heat sink)		76.00 × 31.50 × 25.30 mm
		D4S Din-rail mounting (without heat sink)		76.00 × 31.50 × 25.80 mm
		D4S Din-rail mounting (with heat sink)		76.00 × 31.50 × 29.90 mm
	Weight	without heat sink	Horizontal package/E2S chassis mounting/D4S Din-rail mounting	26.0g/48.0g/68.0g(Typ.)
		with heat sink	Horizontal package/E2S chassis mounting/D4S Din-rail mounting	34.0g/56.0g/76.0g(Typ.)
	Cooling Methods	Free air convection		

Note:

①Ripple & 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.

② Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Electromagnetic compatibility (EMC) (EN6236)

Emissions	CE	CISPR32/EN55032 CLASS A (without external components)/ CLASS B (see Fig.3 or Fig.4 for recommended circuit)	
	RE	CISPR32/EN55032 CLASS A (without external components)/ CLASS B (see Fig.3 or Fig.4 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 150kHz-500kHz 99dBuV EN55016-2-1 500kHz-30MHz 93dBuV	
	RE	EN50121-3-2 30MHz-230MHz 40dBuV/m at 10m EN55016-2-1 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	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 10V r.m.s	perf. Criteria A

Note: All the tests are measured under the conditions of inputs capacitor 100uF/200V or EFP1DX3 filter .

Characteristic Curve

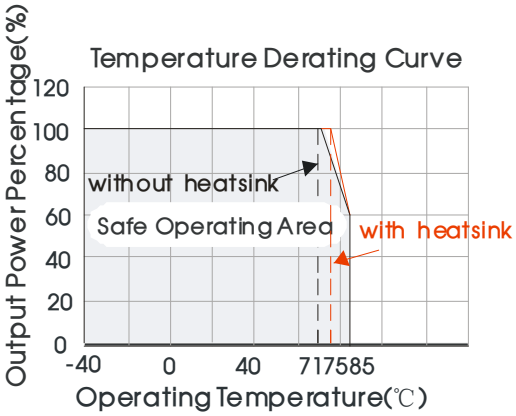
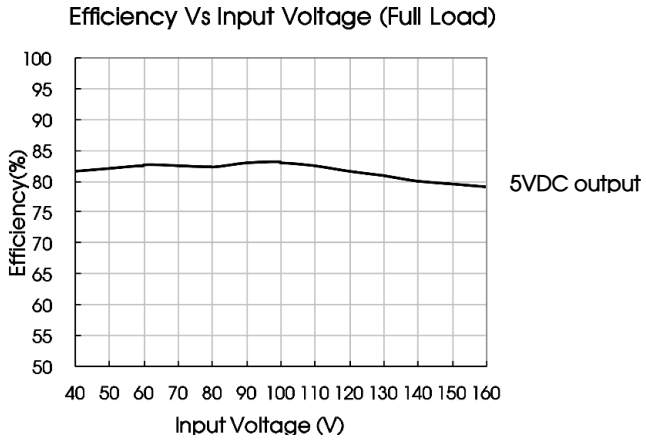
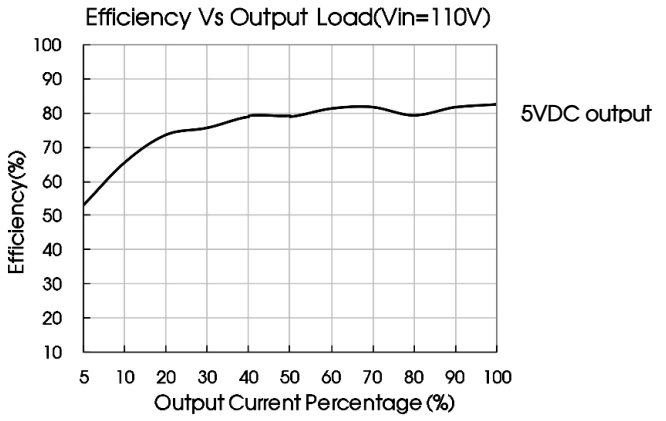
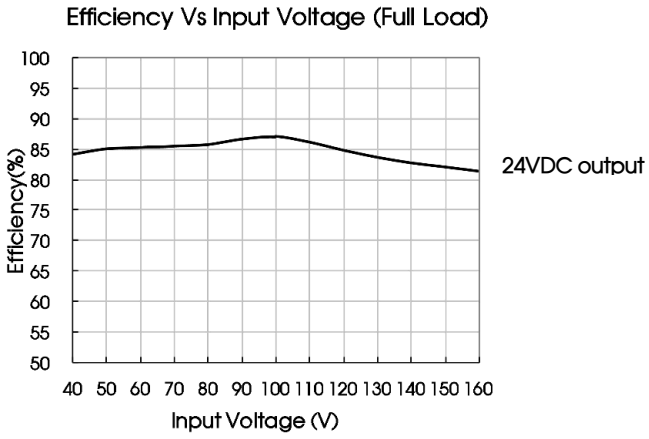
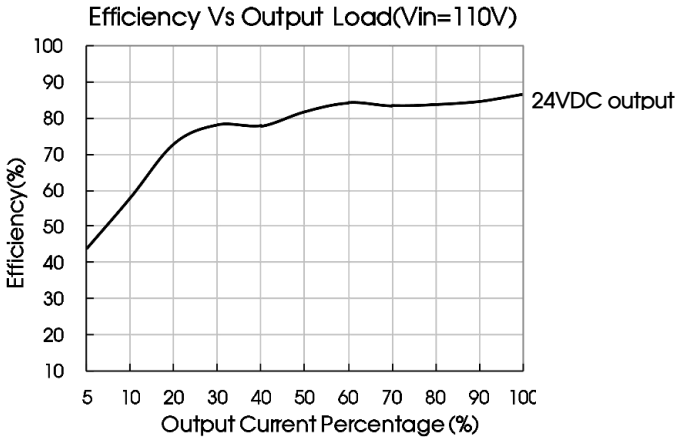


Fig. 1









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 max. capacitive load value of the product.

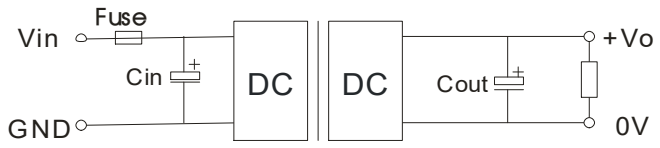


Fig. 2

Vout(VDC)	Fuse	Cin	Cout
3.3/5	2A，slow blow	10μF - 47μF	100μF
12/15			47μF
24			22μF

2. EMC compliance circuit

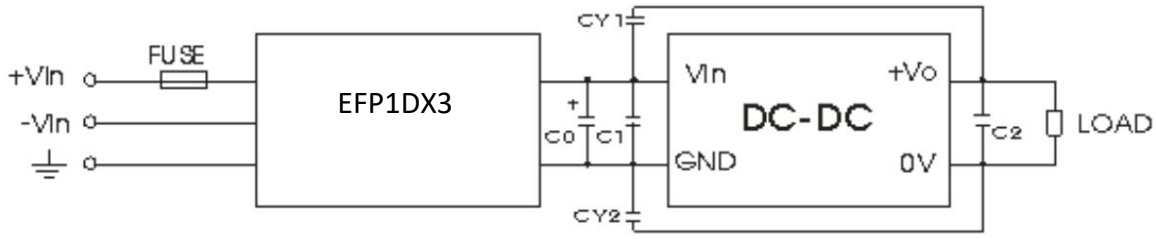


Fig. 3

Fig. 3 List of components:

FUSE	Choose according to actual input current
EFP1DX3	FP1DX3 is the EMC auxiliary component of our company. Input voltage range: 40V-160V；P：30W
C0	100μF/200V
C1	Refer to the Cin in Fig.2
C2	Refer to the Cout in Fig.2
CY1、CY2	1000pF/400VAC

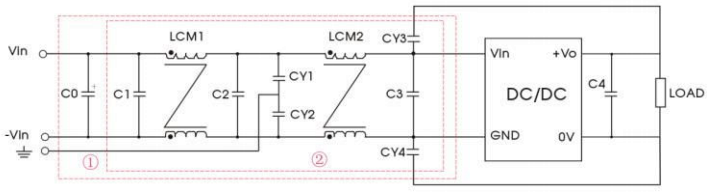


Fig. 4

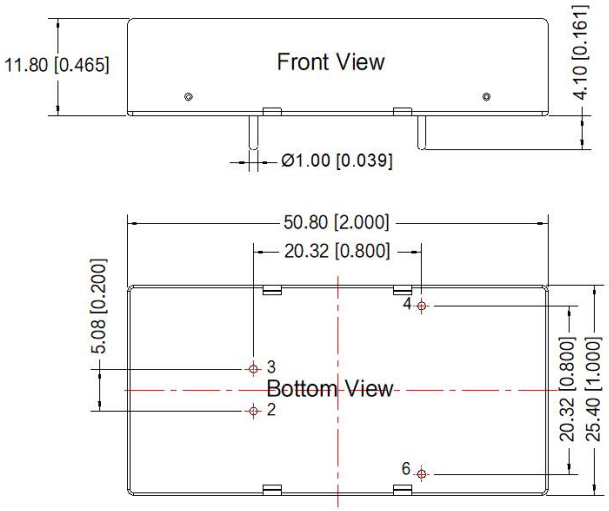
Notes: Part ① in the Fig. 4 is used for EMC test and part ② for EMI test

Fig. 4 List of components:

C0	100μF/200V
C1、C2	0.22μF/250V
C3	Refer to the Cin in Fig.2
LCM1	2.2mH
LCM2	1.1mH (material:TN150P-RH12.7*12.7*7.9)
CY1、CY2、CY3、CY4	1000pF/400VAC
C4	Refer to the Cout in Fig.2

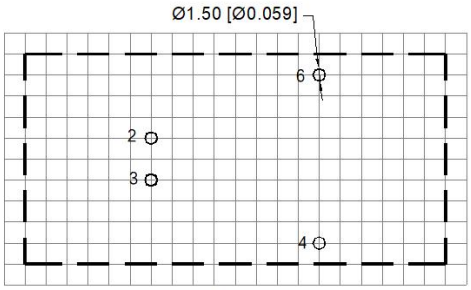
3. The products do not support parallel connection of their output

Horizontal Package (without heat sink) Dimensions and Recommended Layout



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

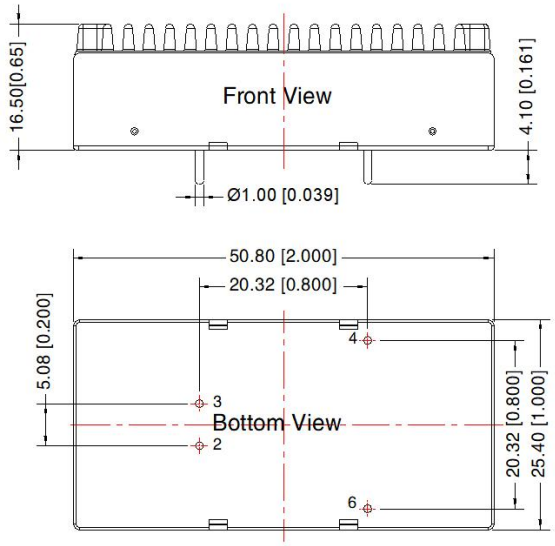
THIRD ANGLE PROJECTION



Note：Grid 2.54*2.54mm

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

Horizontal Package (with heat sink) Dimensions



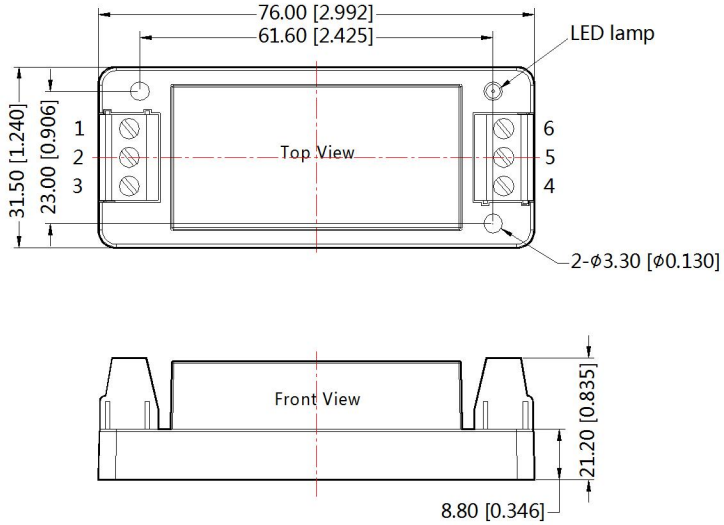
THIRD ANGLE PROJECTION

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

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

E2S (without heat sink) Dimensions

THIRD ANGLE PROJECTION

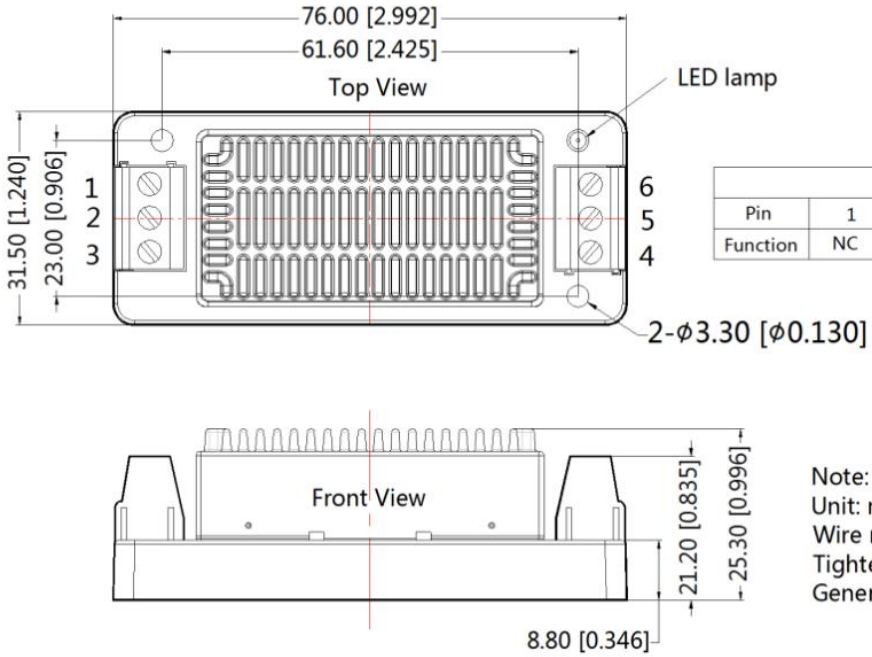


Pin-Out						
Pin	1	2	3	4	5	6
Function	NC	GND	Vin	+Vo	NC	0V

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

E2S (with heat sink) Dimensions

THIRD ANGLE PROJECTION

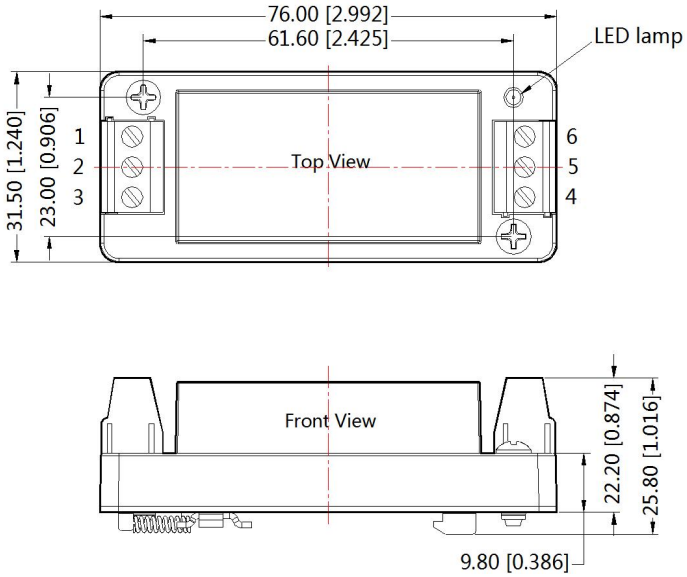


Pin-Out						
Pin	1	2	3	4	5	6
Function	NC	GND	Vin	+Vo	NC	0V

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

D4S (without heat sink) Dimensions

THIRD ANGLE PROJECTION

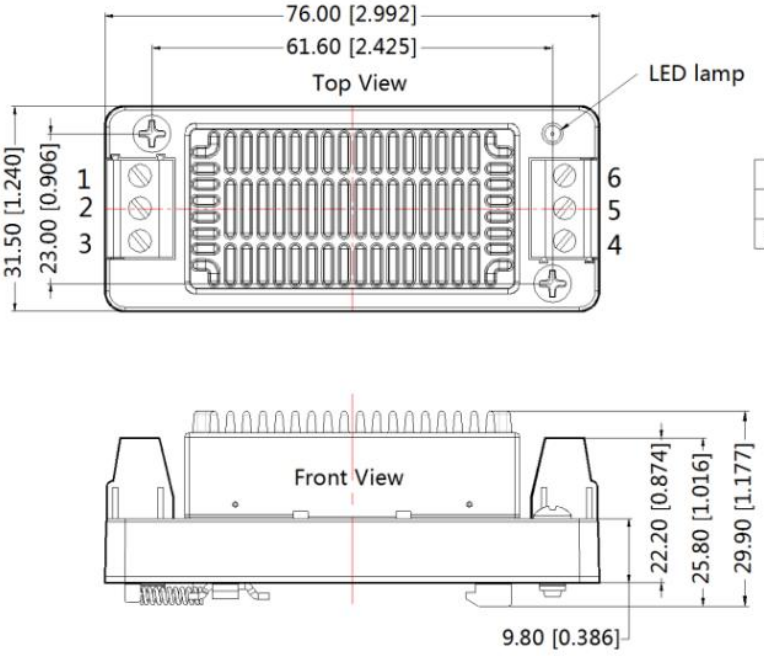


Pin-Out						
Pin	1	2	3	4	5	6
Function	NC	GND	Vin	+Vo	NC	0V

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]

D4S (with heat sink) Dimensions

THIRD ANGLE PROJECTION



Pin-Out						
Pin	1	2	3	4	5	6
Function	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 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 Company's corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
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.