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.

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			
	Ctrl ①	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 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 Frequency ⑤	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			
		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			

Specifications		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;
③Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The ” parallel cable” method is used for Ripple and Noise test;
④Switching 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

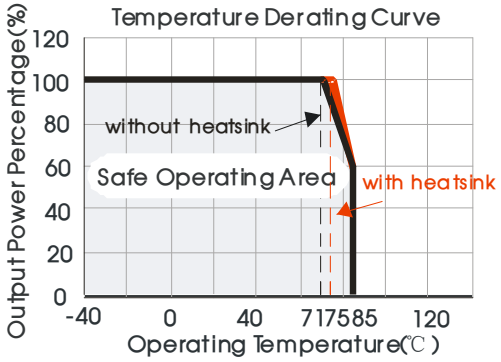
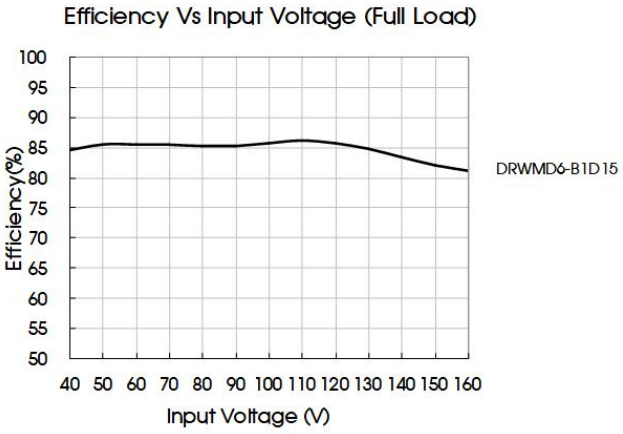
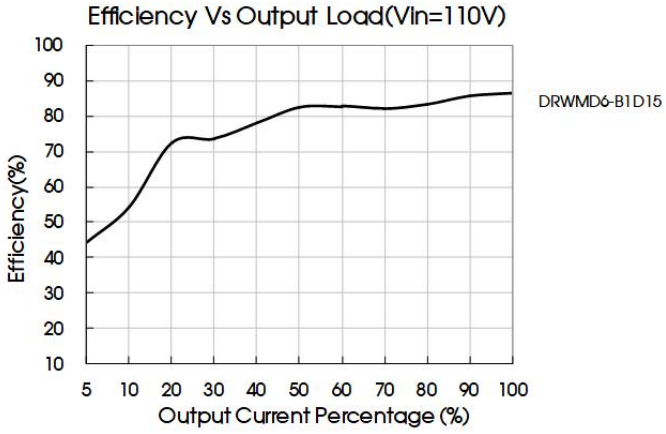


Fig. 1





Design Reference

1.Typical application

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

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

2.EMC compliance circuit

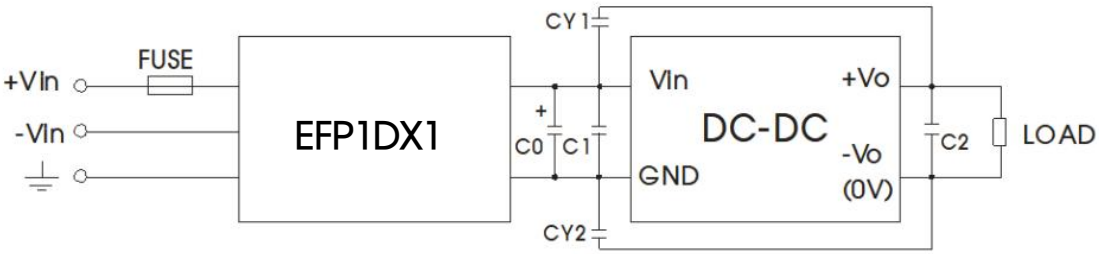


Fig. 3

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

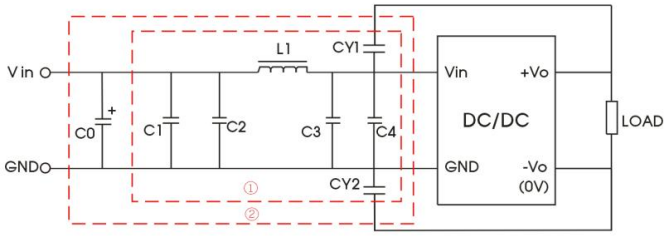


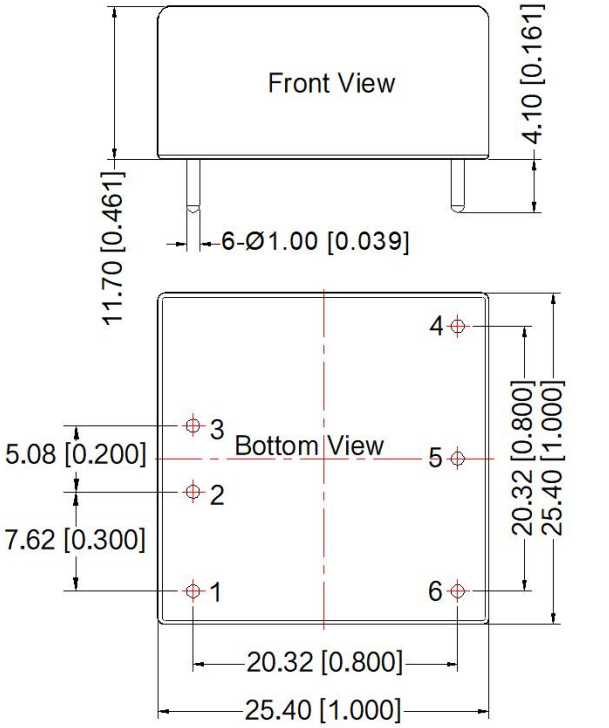
Fig. 4

Fig. 4 Parameter description:

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

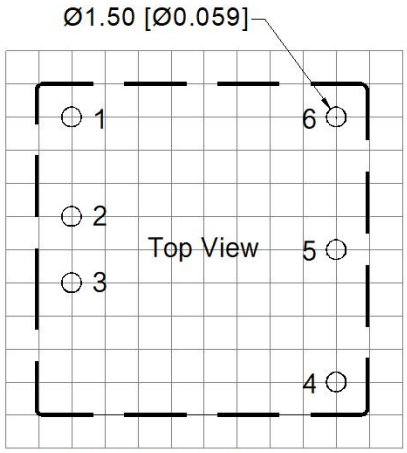
3.The products do not support parallel connection of their output

Dimensions and Recommended



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]

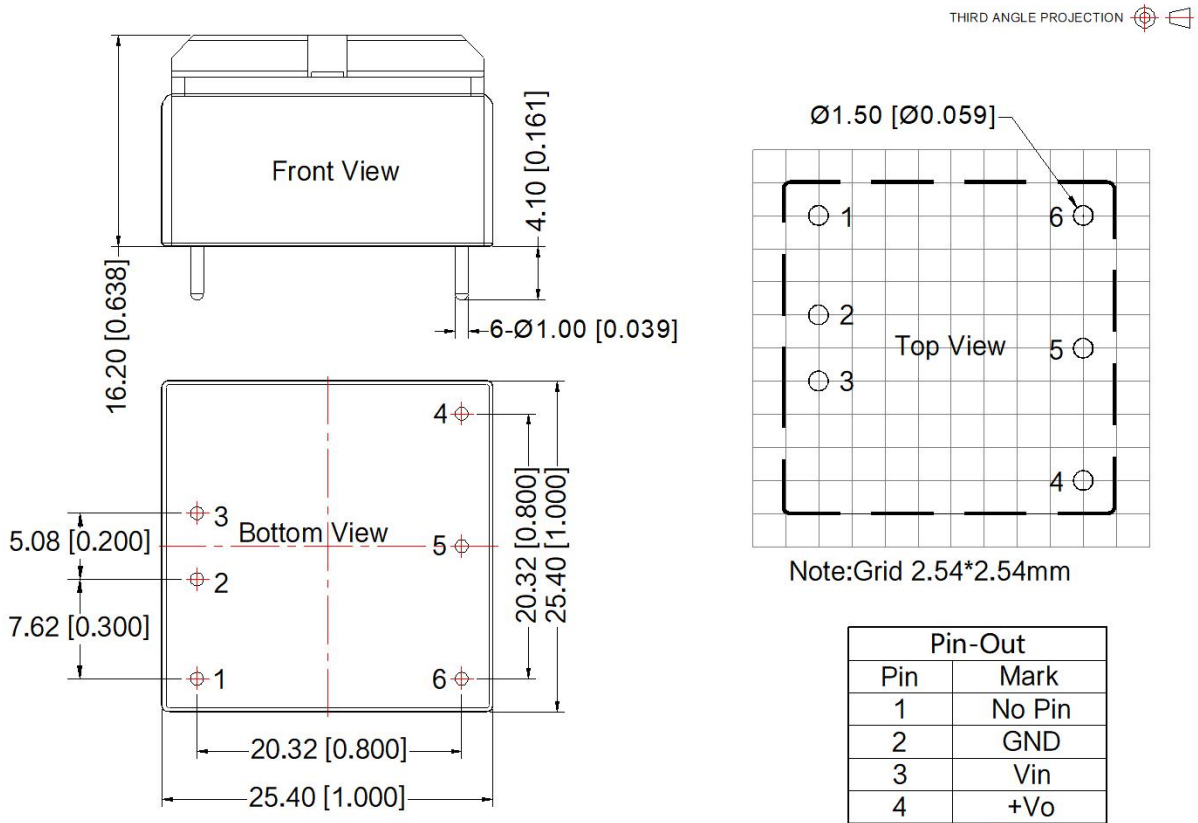
THIRD ANGLE PROJECTION



Note:Grid 2.54*2.54mm

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

Horizontal Package (with heat sink) Dimension

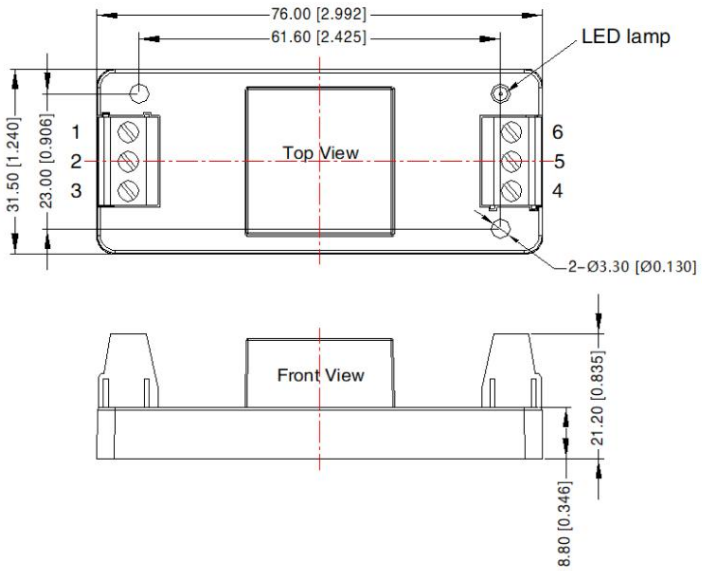


Pin-Out	
Pin	Mark
1	No Pin
2	GND
3	Vin
4	+Vo
5	No Pin
6	0V

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]

E2S (without heat sink) Dimension

THIRD ANGLE PROJECTION

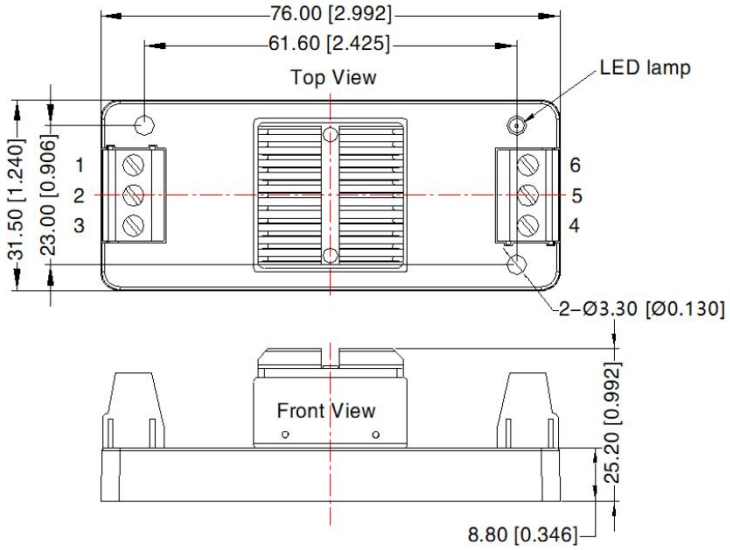


Pin-Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V

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

E2S (with heat sink) Dimension

THIRD ANGLE PROJECTION

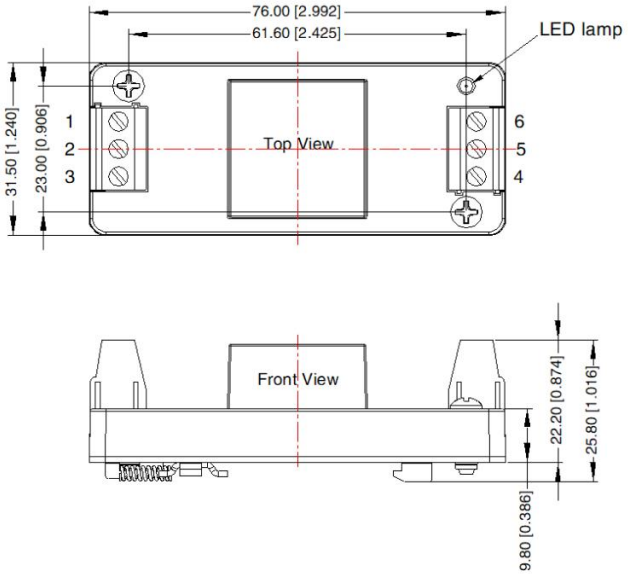


Pin-Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V

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

D4S (without heat sink) Dimension

THIRD ANGLE PROJECTION

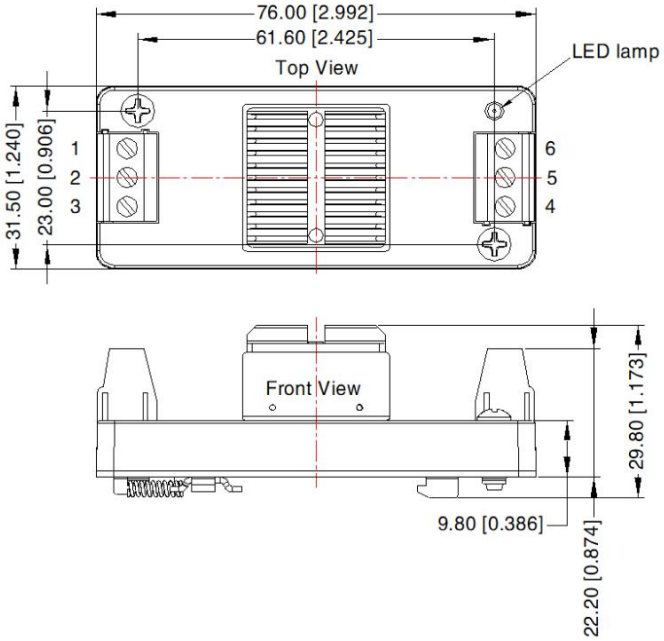


Pin–Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V

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]

D4S (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.