Descriptions

20W isolated，DC/DC Converter





RoHS

UL62368-1

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Ultra-wide 4:1 input voltage range
- High efficiency up to 90%
- No-load power consumption as low as 0.15W
- I/O isolation test voltage1.5k VDC
- Input under-voltage protection, output short-circuit, over-voltage, over-current protection
- Operating ambient temperature range: -40℃ to +85℃
- Meets CISPR32/EN55032 CLASS A, without extra components
- Six-sided metal shielding package
- Input reverse polarity protection available with chassis(E2S) or Din-Rail mounting (D4S) version
- Meets EN50155 railway standard

Applications

- Data transmission device
- Battery power supplies
- Telecommunication device
- Distributed power supply system
- Hybrid module system
- Remote control system
- Industrial robot system
- Railway fields

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency④ (%) Min./Typ.	Capacitive Load⑤ (μF)Max.
		Nominal② (Range)	Max. ③	Voltage (VDC)	Current (mA) Max./Min.		
EN/BS EN	DWLD20-A2405	24 (9-36)	40	±5	±2000/0	84/86	4800
	DWLD20-A2409			±9	±1111/0	86/88	1000
	DWLD20-A2412			±12	±834/0	86/88	800
	DWLD20-A2415			±15	±667/0	86/88	625
	DWLD20-B2403			3.3	5000/0	84/86	10000
UL/EN/BS EN	DWLD20-B2405			5	4000/0	86/88	10000
EN/BS EN	DWLD20-B2409			9	2222/0	86/88	4700
UL/EN/BS EN	DWLD20-B2412			12	1667/0	87/89	1600
EN/BS EN	DWLD20-B2415			15	1333/0	88/90	1000
UL/EN/BS EN	DWLD20-B2424			24	834/0	88/90	500
--	DWLD20-A4805	48	80	±5	±2000/0	84/86	4800

EN/BS EN	DWLD20-A4812	(18-75)		±12	±834/0	86/88	800
--	DWLD20-A4815			±15	±667/0	87/89	625
EN/BS EN	DWLD20-B4803			3.3	5000/0	84/86	10000
	DWLD20-B4805			5	4000/0	84/86	10000
	DWLD20-B4809			9	2222/0	87/89	4700
	DWLD20-B4812			12	1667/0	85/87	1600
	DWLD20-B4815			15	1333/0	88/90	1000
	DWLD20-B4824			24	834/0	86/88	500

Notes:
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 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;
⑤The specified maximum capacitive load for positive and negative output is identical;
⑥Product images are for reference only. Please refer to the actual product for details.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	24VDC input	3.3V output	--	799/40	818/45	mA
			5V output	--	969/40	993/80	
			Others	--	947/6	969/10	
		48VDC input	3.3V output	--	400/20	409/25	
			5V output	--	485/20	497/60	
			Others	--	474/5	485/9	
	Reflected Ripple Current	24VDC input		--	30	--	
		48VDC input		--	30	--	
	Surge Voltage (1sec. max.)	24VDC input		-0.7	--	50	VDC
		48VDC input		-0.7	--	100	
	Start-up Voltage	24VDC input		--	--	9	
		48VDC input		--	--	18	
	Input Under-voltage Protection	24VDC input		5.5	6.5	--	
		48VDC input		12	15.5	--	
	Start-up Time	Nominal input & constant resistance load		--	10	--	ms
	Input Filter			Pi filter			
	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		--	4	7	mA
	Hot Plug			Unavailable			
Output Specifications	Voltage Accuracy②	0%-100% load		--	±1	±3	%
	Linear Regulation	Input voltage variation from low to high at full load	Positive Output	--	±0.2	±0.5	
			Negative Output	--	±0.5	±1	
	Load Regulation③	5%-100% load	Positive Output	--	±0.5	±1	

			Negative Output	--	±0.5	±1.5	
	Cross Regulation	Dual output with Positive output at 50% load and Negative output from 10%-100% load		--	--	±5	
	Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
	Transient Response Deviation		3.3V/5V/±5V output	--	±5	±8	%
			Others	--	±3	±5	
	Temperature Coefficient	Full load		--	--	±0.03	%/℃
	Ripple & Noise④	20MHz bandwidth, 5%-100% load		--	50	100	mVp-p
	Trim	Input voltage range		90	--	110	%Vo
	Over-voltage Protection			110	--	160	
	Over-current Protection			110	--	190	%Io
	Short-circuit Protection			Hiccup, continuous, self-recovery			
General Specifications	Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.		1500	--	--	VDC
	Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	DWLD20-B2424	--	2050	--	pF
			Others	--	1050	--	
	Operating Temperature	See Fig. 1		-40	--	+85	℃
	Storage Temperature			-55	--	+125	
	Storage Humidity	Non-condensing		5	--	95	%RH
	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	
	Vibration			IEC/EN61373 - Category 1, Grade B			
	Switching Frequency⑥	PWM mode		--	270	--	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	25.0g/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 Method	Free air convection					

Note:
①The Ctrl pin voltage is referenced to input GND.
②Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;
③Load regulation for 0%-100% load is ±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	CE	CISPR32/EN55032	CLASS A (without extra components)/ CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (without extra components)/ CLASS B (see Fig.3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±4kV	perf.Criteria B
	RS	IEC/EN61000-4-3	10V/m (without extra components)	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig.3-①for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s (without extra components)	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29	0%, 70%	perf. Criteria B

Electromagnetic Compatibility (EMC) (EN50155)

Emissions	CE	EN50121-3-2	150kHz-500kHz 99dBμV (see Fig.3-② for recommended circuit) 500kHz-30MHz 93dBμV (see Fig.3-② for recommended circuit)	
	RE	EN50121-3-2 EN55016-2-1	30MHz-230MHz 40dBμV/m at 10m (see Fig.3-② for recommended circuit) 230MHz-1GHz 47dBμV/m at 10m (see Fig.3-② for recommended circuit)	
Immunity	ESD	EN50121-3-2	Contact ±6kV/Air ±8kV	perf. Criteria A
	RS	EN50121-3-2	20V/m (without extra components)	perf. Criteria A
	EFT	EN50121-3-2	±2kV 5/50ns 5kHz (see Fig.3-① for recommended circuit)	perf. Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω, 0.5μF) (see Fig.3-① for recommended circuit)	perf. Criteria A
	CS	EN50121-3-2	0.15MHz-80MHz 10V r.m.s (without extra components)	perf. Criteria A

Characteristic Curve

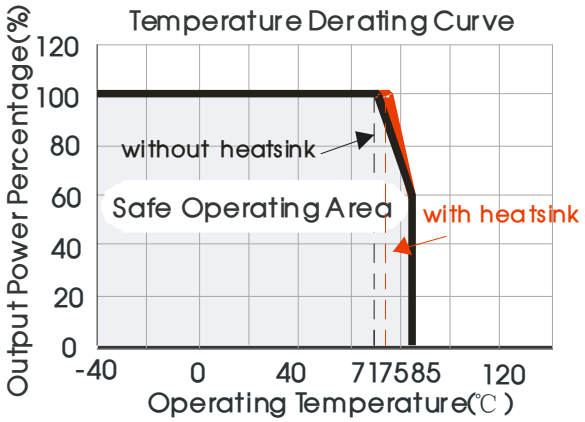
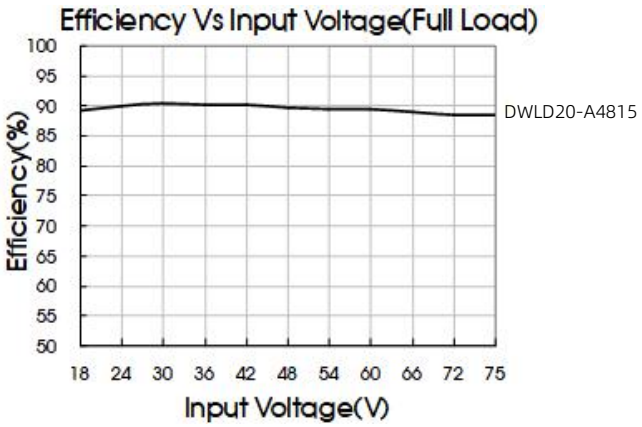
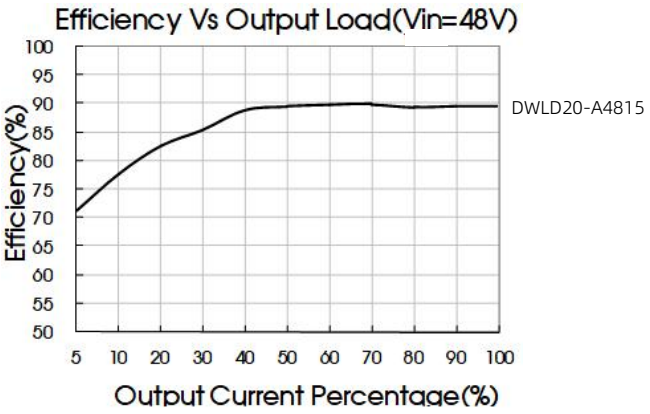
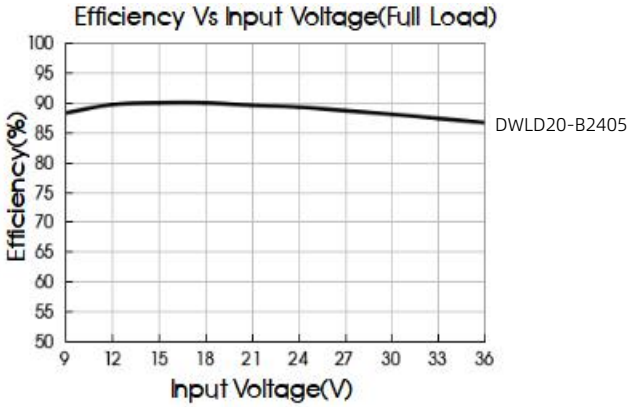
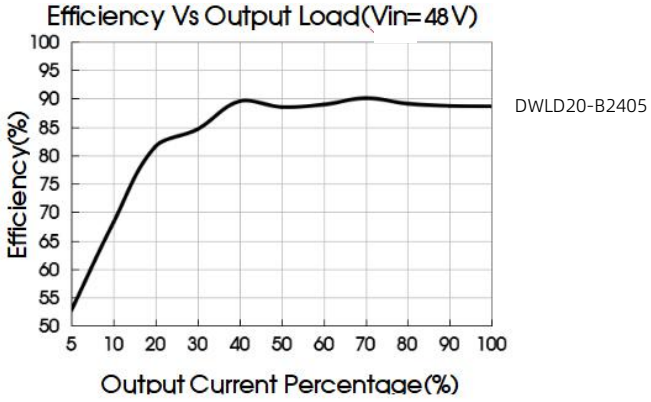


Fig. 1









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.

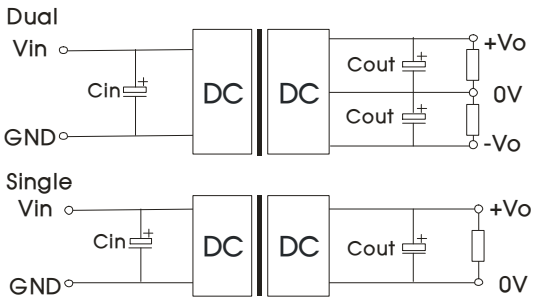
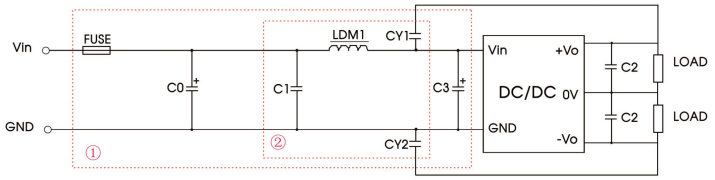


Fig. 2

Cin		Single Vo (VDC)	Cout	Dual Vo (VDC)	Cout
Vin: 24VDC	Vin: 48VDC				
100μF/50V	100μF/100V	3.3/5	470μF/16V	±5	220μF/16V
		9	220μF/16V	±9	100μF/16V
		12/15	220μF/25V	±12/±15	100μF/25V
		24	100μF/50V	--	--

2. EMC compliance circuit

Dual



Single

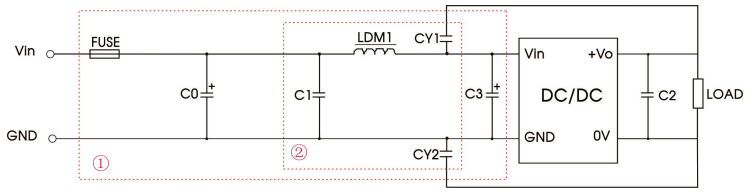


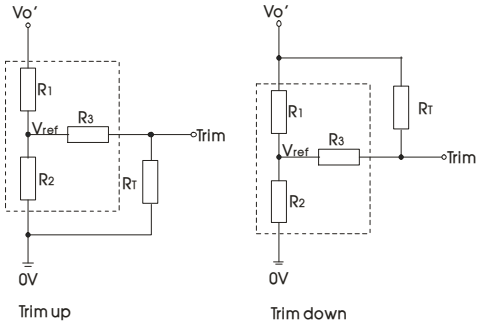
Fig. 3

Notes: We use Part ① in Fig. 3 for Immunity tests and Part ② for Emissions test. Selecting based on needs.

Parameter description:

Model	Vin: 24VDC	Vin: 48VDC
FUSE	Choose according to actual input current	
C0/C3	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7μH/3.1A	
CY1/CY2	1nF/2kV	

3. Trim Function for Output Voltage Adjustment (open if unused)



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

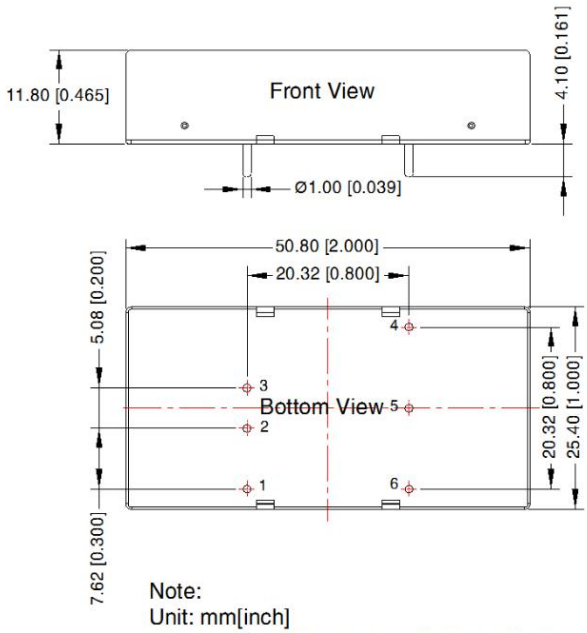
R_T= Trim Resistor value

a= self-defined parameter

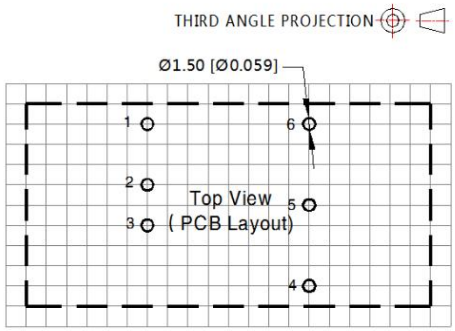
Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
3.3	4.772	2.87	12.4	1.25
5	2.883	2.87	10	2.5
9	7.500	2.87	15	2.5
12	11.000	2.87	15	2.5
15	14.494	2.87	15	2.5
24	24.872	2.87	17.8	2.5

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

Horizontal Package (without heat sink) Dimension and Recommended Layout



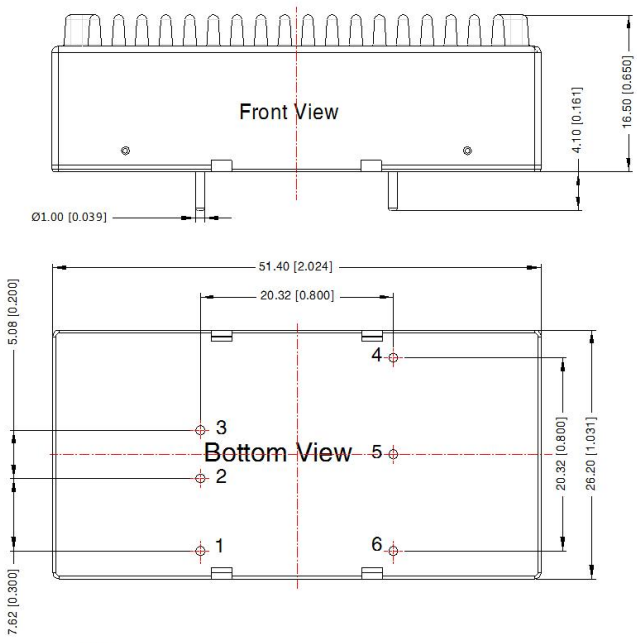
Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]



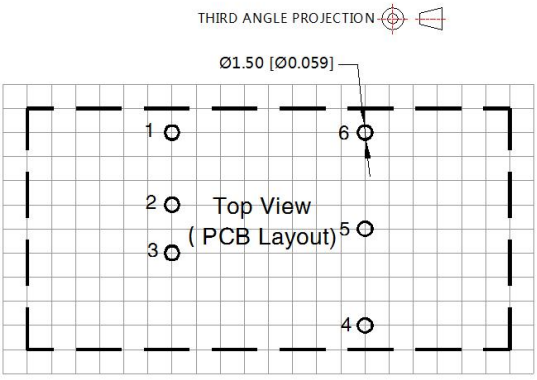
Note: Grid 2.54*2.54mm

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

Horizontal Package (with heat sink) Dimension and Recommended Layout



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

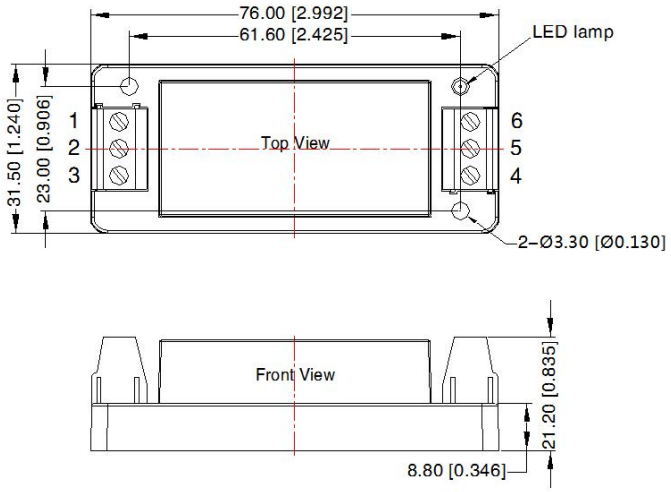


Note: Grid 2.54*2.54mm

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

E2S (without heat sink) Dimension

THIRD ANGLE PROJECTION

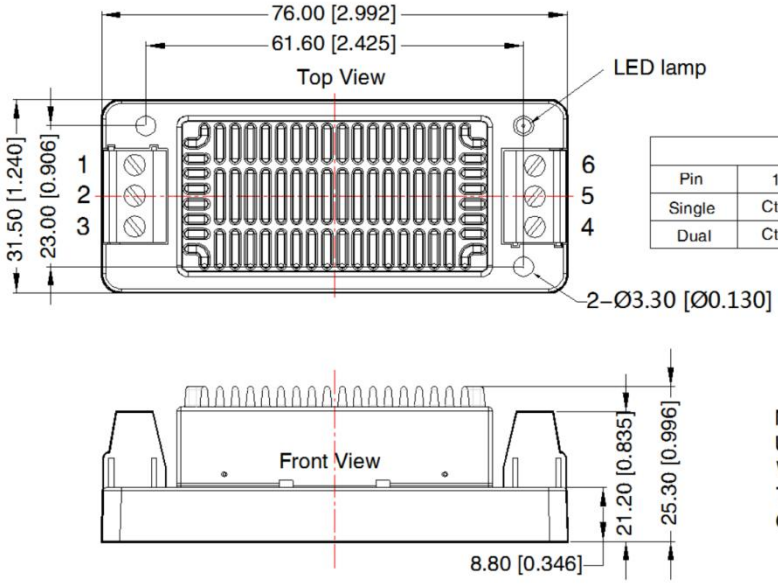


Pin–Out						
Pin	1	2	3	4	5	6
Dual	Ctrl	GND	Vin	+Vo	0V	–Vo
Single	Ctrl	GND	Vin	+Vo	Trim	0V

Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N ▪ m
General tolerances: ± 1.0[± 0.039]

E2S (with heat sink) Dimension

THIRD ANGLE PROJECTION

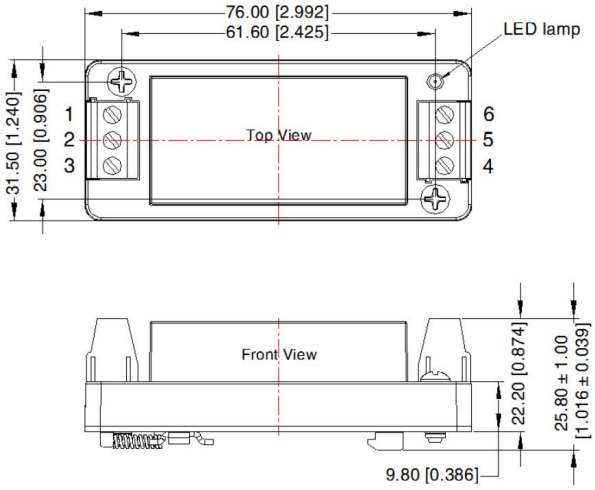


Pin–Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	Trim	0V
Dual	Ctrl	GND	Vin	+Vo	0V	–Vo

Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ± 1.0[± 0.039]

D4S (without heat sink) Dimension

THIRD ANGLE PROJECTION

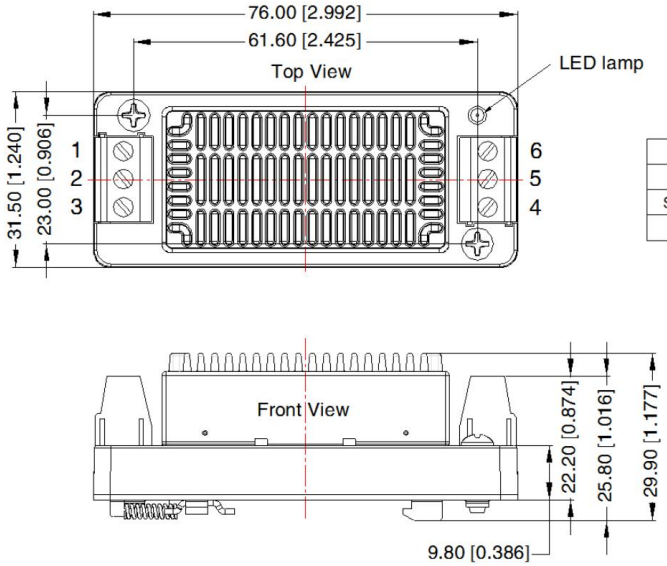


Pin–Out						
Pin	1	2	3	4	5	6
Dual	Ctrl	GND	Vin	+Vo	0V	–Vo
Single	Ctrl	GND	Vin	+Vo	Trim	0V

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	Ctrl	GND	Vin	+Vo	Trim	0V
Dual	Ctrl	GND	Vin	+Vo	0V	–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. 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 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;
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.