Descriptions

50W isolated, DC/DC Converter



RoHS

Features

- Ultra-wide 4:1 input voltage range
- High efficiency up to 91%
- I/O isolation test voltage 1.5K VDC
- Input under-voltage protection, output short- circuit, over-current, over-voltage protection
- Operating ambient temperature range: -40℃ to +105℃
- Six-sided metal shielding package
- Industry standard pin-out
- Input reverse polarity protection available with chassis(E2S) or Din-Rail mounting (D4S) version

Applications

- Industrial controls
- Electric power
- Instrumentation
- Communications

Selection Guide

Certification	Part No. ①	Input Voltage④ (VDC)		Output		Full Load Efficiency③(%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.②	Voltage (VDC)	Current (mA) Max./Min.		
--	DWLD50-B2412(H)(E2S/D4S)	24 (9-36)	40	12	4167/208	89/91	3700
	DWLD50-B2424(H)(E2S/D4S)			24	2083/104	89/91	1000

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;

②Exceeding the maximum input voltage may cause permanent damage;

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;

④The 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;

⑤Product 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)	Nominal input voltage		--	2289/60	2341/100	mA
	Surge Voltage (1sec. max.)			-0.7	--	50	VDC
	Start-up Voltage			--	--	9	
	Input Under-voltage Protection			5.5	6.5	--	
	Start-up Time	Nominal input voltage & constant resistance load		--	10	120	ms
	Input Filter			PI filter			
	Hot Plug			Unavailable			
	Ctrl①	Module on		Ctrl pin open or pulled high TTL (3.0-12VDC)			
		Module off		Ctrl pin pulled low to GND (0-1.2VDC)			
		Input current when off		--	6	12	mA
Output Specifications	Voltage Accuracy	5%-100% load		--	±1	±3	%
	Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
	Load Regulation	5%-100% load		--	±0.5	±1	
	Transient Recovery Time	25% load step change, nominal input voltage		--	250	500	μs
	Transient Response Deviation	25% load step change, input voltage range		--	±3	±5	%
	Temperature Coefficient	Full load		--	--	±0.03	%/℃
	Ripple & Noise②	20MHz bandwidth, nominal input voltage, 5%-100% load	12V output	--	180	250	mV p-p
			24V output	--	240	300	
	Trim	Input voltage range		90	--	110	%Vo
	Over-voltage Protection			110	140	160	
	Over-current Protection			110	140	200	%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.		1500	--	--	VDC
		Input/output-Case Electric Strength Test for 1 minute with a leakage current of 1mA max.		1000	--	--	
	Insulation Resistance	Input-output resistance at 500VDC		100	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100KHz/0.1V		--	2200	--	pF
	Operating Temperature	See Fig. 1		-40	--	+105	℃
	Storage Temperature			-55	--	+125	

	Storage Humidity	Non-condensing		5	--	95	%RH
	Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	+300	℃
	Vibration			10-150Hz, 5G, 0.75mm. along X, Y and Z			
	Switching Frequency③	PWM mode		--	300	--	kHz
	MTBF	MIL-HDBK-217F@25℃		1000	--	--	k hours
Mechanical Specifications	Case Material	Aluminum alloy					
	Dimensions	Without heat sink	Horizontal package	50.80 × 25.40 × 11.80 mm			
			E2S chassis mounting	76.00 × 31.50 × 21.20 mm			
			D4S Din-rail mounting	76.00 × 31.50 × 25.80 mm			
		With heat sink	Horizontal package	51.40 × 26.20 × 16.50 mm			
			E2S chassis mounting	76.00 × 31.50 × 25.30 mm			
			D4S Din-rail mounting	76.00 × 31.50 × 29.90 mm			
	Weight	Without heat sink	Horizontal package/E2S chassis mounting /D4S Din-rail mounting	39g(Typ.)/62g(Typ.)/82g(Typ.)			
		With heat sink	Horizontal package/ E2S chassis mounting/ D4S Din-rail mounting	48g(Typ.)/71g(Typ.)/91g(Typ.)			
	Cooling Method	Free air convection					

Note:

①The Ctrl pin voltage is referenced to input GND;

②Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The " parallel cable" method is used for Ripple and Noise test;

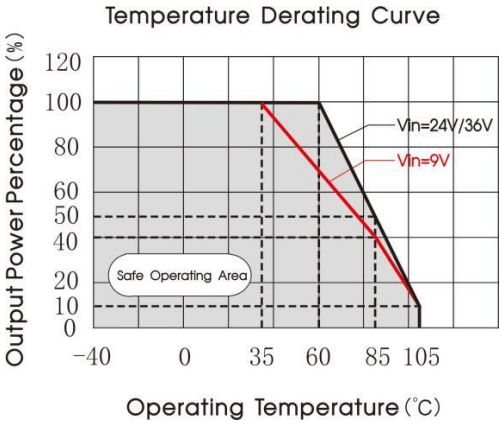
③Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Electromagnetic Compatibility (EMC)

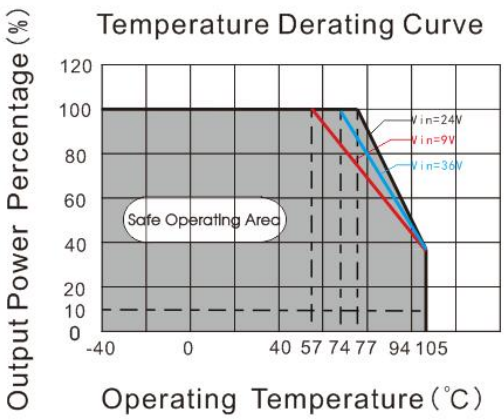
Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 3-② for recommended circuit)	
	RE	CISPR32/EN55032 CLASS B (see Fig. 3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±4KV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 100KHz ±2KV (see Fig. 3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2KV (see Fig. 3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s	perf. Criteria A

Characteristic Curve

DWLD50-B24xx



DWLD50-B2412H



DWLD50-B2424H

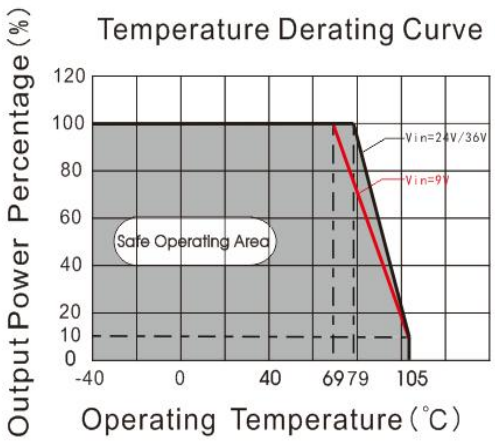
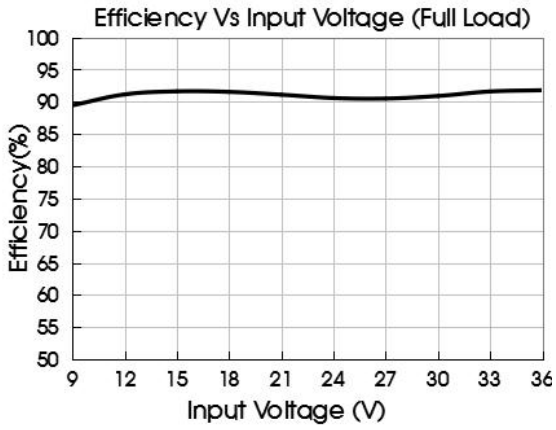
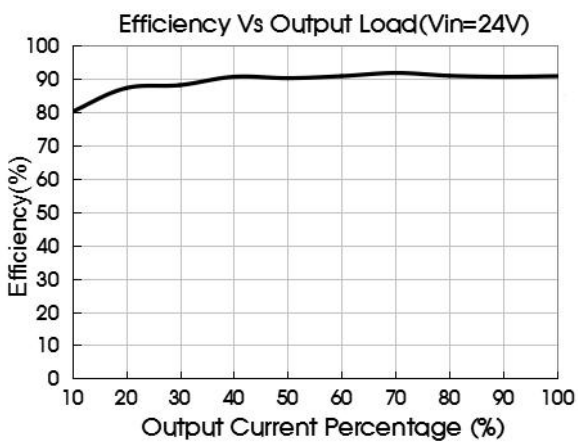


Fig. 1

DWLD50-B2424



DWLD50-B2424



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

Vout (VDC)	Cin (μF)	Cout (μF)
12	100μF/50V	100μF/50V
24		47μF/50V

2.EMC compliance circuit

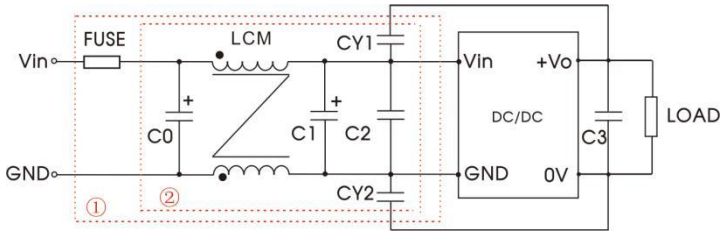
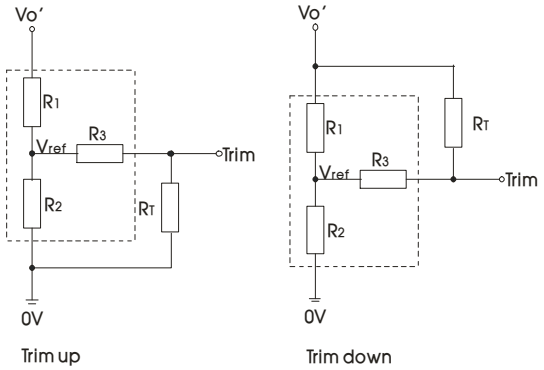


Fig. 3

Notes: Part ① in Figure 3 is used for EMC testing; Part 2 is used for EMI filtering, which can be selected according to requirements.

Model	Vin:24V
FUSE	Choose according to actual input current
C0	680μF/50V
LCM	2.2mH
C1	330μF/50V
C2	4.7uF/50V
CY1, CY2	Y1 Safety capacitor 2.2nF/250VAC
C3	Refer to the Cout in Fig. 2

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



Trim's usage circuit (dashed box inside the product):

Calculating Trim resistor values:

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

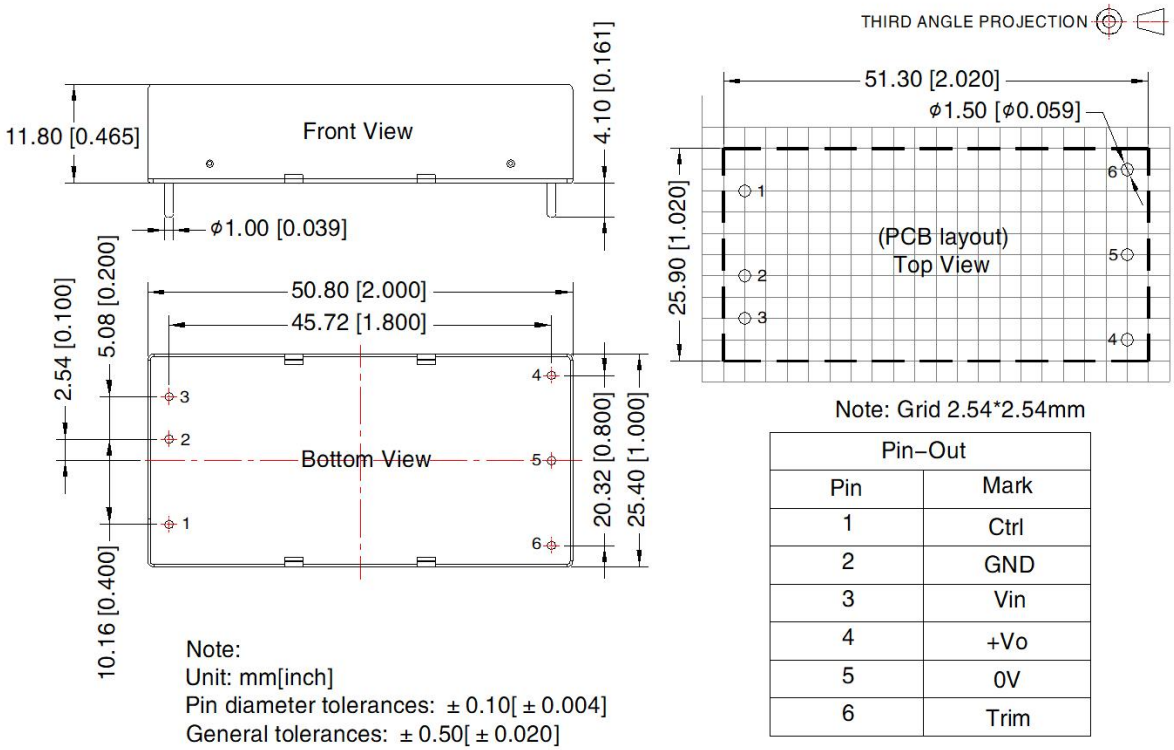
$$\text{down: } R_T = \frac{aR_1}{R_1-a} - R_3 \qquad a = \frac{V_o'-V_{ref}}{V_{ref}} \cdot R_2$$

R_T = Trim Resistor value
a = self-defined parameter
Vo' = desired output voltage

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
12	10.90	2.87	15	2.5
24	24.77	2.87	5.1	2.5

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

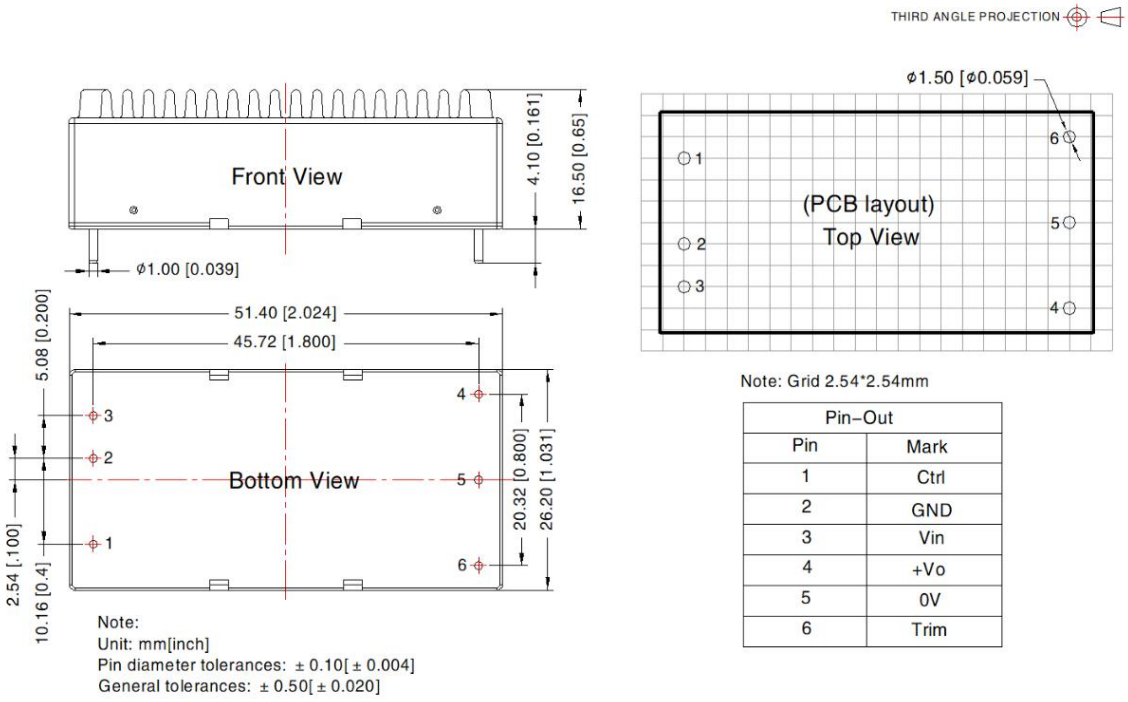
DWLD50-B24xx Dimension



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

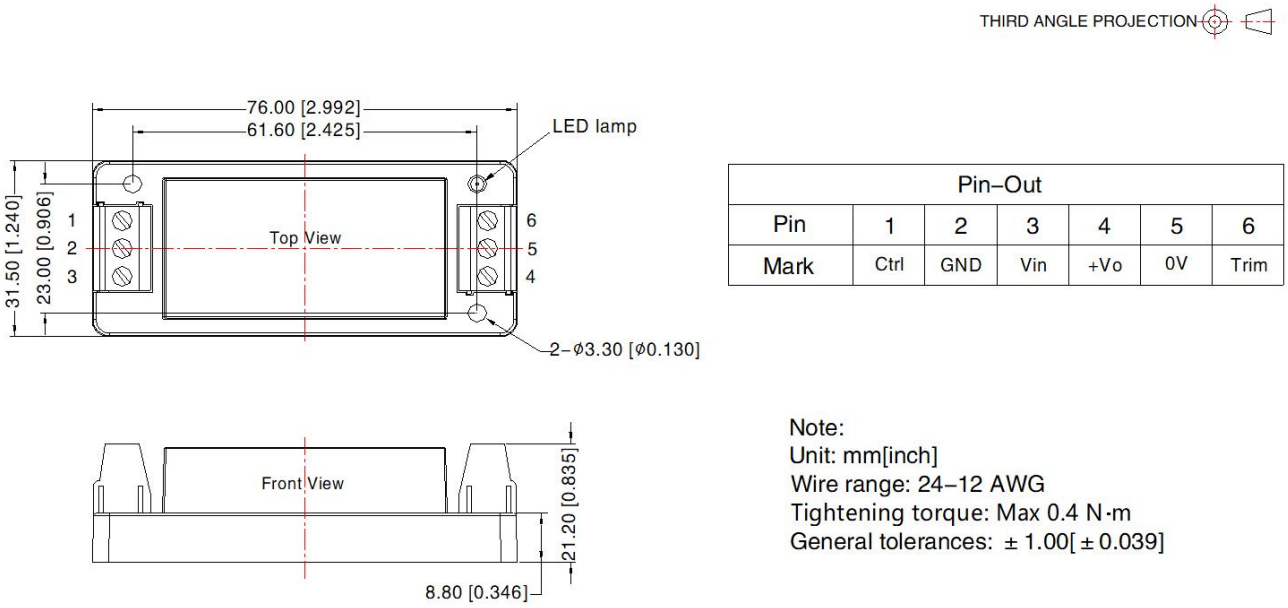
Pin–Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

DWLD50-B24xxH Dimension



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

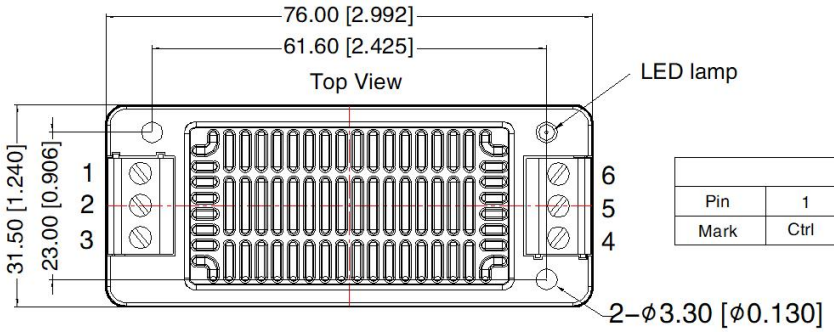
DWLD50-B24xxE2S Dimension



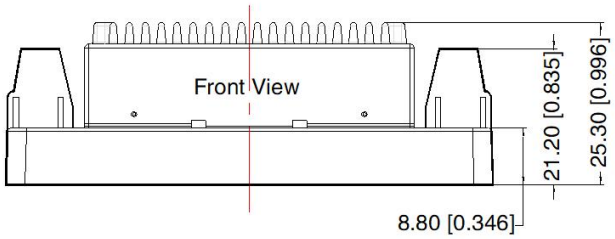
Pin–Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	0V	Trim

DWLD50-B24xxHE2S Dimension

THIRD ANGLE PROJECTION



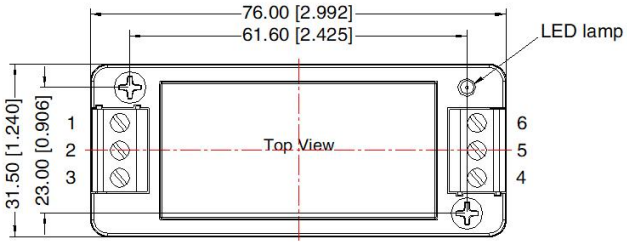
Pin–Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	0V	Trim



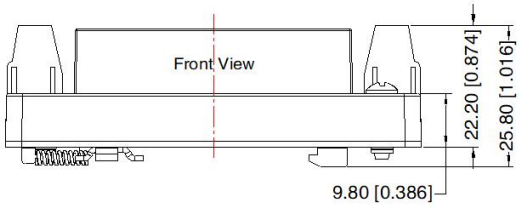
Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N・m
General tolerances: ± 1.00[± 0.039]

DWLD50-B24xxD4S Dimension

THIRD ANGLE PROJECTION

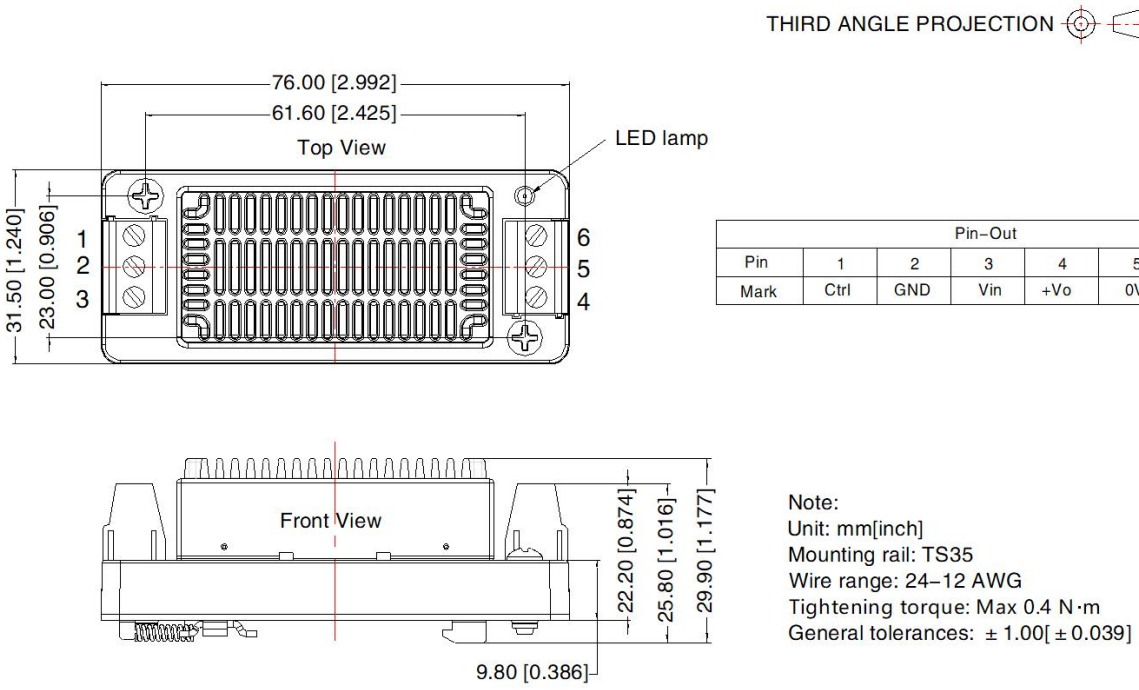


Pin–Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	0V	Trim



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]

DWLD50-B24xxHD4S Dimension



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

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. Recommended used in more than 10% load, if the load is lower than 10%, then the ripple index of the product may exceed the specification, but does not affect the reliability of the product;
2. The maximum capacitive load is tested within the input voltage range and under full load conditions
3. 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;
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.