Descriptions 60W 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 93.3%
- 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
- Meet EN62368 standards

Applications

- Industrial Control
- Electrical Power
- Instrumentation
- Communication

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency② (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.①	Voltage (VDC)	Current(mA) Max./Min.		
EN/BS EN	DWLD60-B2405(H)	24 (9-36)	40	5	12000/600	90/92	20000
--	DWLD60-B2405E2S/D4S						
	DWLD60-B2405HE2S/D4S						
EN/BS EN	DWLD60-B2412(H)			12	5000/250	91/93	6000
	DWLD60-B2412E2S						
--	DWLD60-B2412D4S						
	DWLD60-B2412HE2S/D4S						
EN/BS EN	DWLD60-B2415(H)			15	4000/200	91/93.3	4000
--	DWLD60-B2415E2S/D4S						
	DWLD60-B2415HE2S/D4S						
EN/BS EN	DWLD60-B2424(H)			24	2500/125	91/93	2000
	DWLD60-B2424E2S						
--	DWLD60-B2424D4S						
	DWLD60-B2424HE2S						
EN/BS EN	DWLD60-B2424HD4S						

Note:
①Exceeding the maximum input voltage may cause permanent damage;
②Efficiency is measured at nominal input voltage and rated output load;
③Product 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		--	2718/25	2748/30	mA
	Surge Voltage (1sec. max.)			-0.7	--	50	VDC
	Start-up Voltage			--	--	9	
	Input Filter			PI filter			
	Hot Plug			Unavailable			
	Ctrl①	Module on		Ctrl pin open or pulled high TTL (3-12VDC)			
		Module off		Ctrl pin pulled low to GND (0-1.2VDC)			
Output Specifications	Voltage Accuracy	5%-100% load		--	±1	±2	%
		0%-5% load		--	±2	±5	
	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 Response Deviation	25% load step change, input voltage range	5V output	--	±3	±10	
			Other output	--	±3	±5	
	Transient Recovery Time	25% load step change, nominal input voltage		--	250	500	μs
	Ripple & Noise②	20MHz bandwidth, nominal input voltage, 5%-100% load	5V/12V/ 15V output	--	100	--	mVp-p
			24V output	--	130	--	
		20MHz bandwidth, nominal input, voltage, 0%-5% load		--	--	3	%Vo
	Over-voltage Protection	Input voltage range		110	140	160	
	Over-current Protection			110	140	200	%Io
	Short-circuit Protection			Continuous, self-recovery			
	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 Temperature③	Soldering spot is 1.5mm away from the case, 10 seconds max.		--	--	+300	℃
		Wave soldering, maximum 10 seconds		255	260	265	
	Vibration			10-150Hz, 5G, 0.75mm. along X, Y and Z			

	Switching Frequency④	PWM mode			--	370	--	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				
		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	41.0 g				
			E2S chassis mounting	64.0 g				
			D4S Din-rail mounting	84.0 g				
		Heat sink	Horizontal package	50.8 g				
			E2S chassis mounting	73.8 g				
			D4S Din-rail mounting	93.8 g				
	Cooling Method	Free air convection						

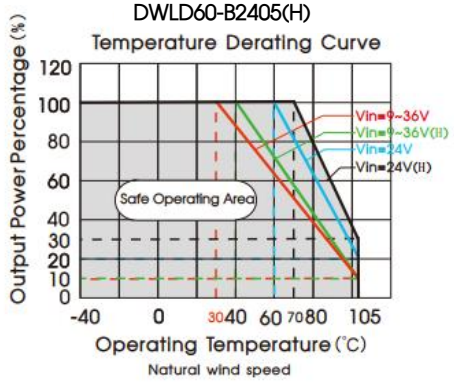
Note:
①The Ctrl pin voltage is referenced to input GND;
②By measuring method is used for Ripple and Noise test, please refer to Fig. 2. for recommended circuit.;
③The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder 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;
④Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Electromagnetic Compatibility (EMC)

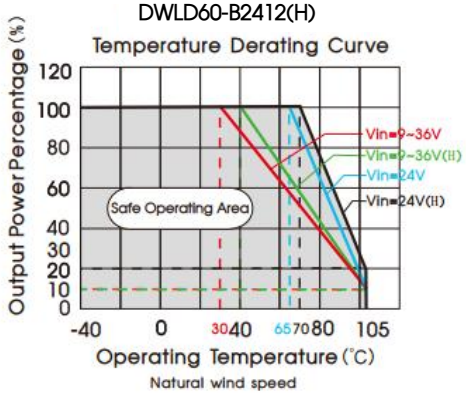
Emissions	CE	CISPR32/EN55032 CLASS A (Vout=12/15V see Fig. 3-① for recommended circuit, Vout=05/24V see Fig. 3-③ for recommended circuit) CLASS B (Vout=12/15V see Fig. 3-② for recommended circuit, Vout=05/24V see Fig. 3-④ for recommended circuit)	
	RE	CISPR32/EN55032 CLASS A (Vout=12/15V see Fig. 3-① for recommended circuit, Vout=05/24V see Fig. 3-③ for recommended circuit) CLASS B (Vout=12/15V see Fig. 3-② for recommended circuit, Vout=05/24V see Fig. 3-④ for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±6KV/Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 100KHz ±2KV (Vout=12/15V see Fig. 3-② for recommended circuit) (Vout=05/24V see Fig. 3-④ for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5 line to line ±2KV (Vout=12/15V see Fig. 3-② for recommended circuit) (Vout=05/24V see Fig. 3-④ for recommended circuit)	perf. Criteria A
	CS	IEC/EN61000-4-6 10 Vr.m.s	perf. Criteria A

Characteristic Curve

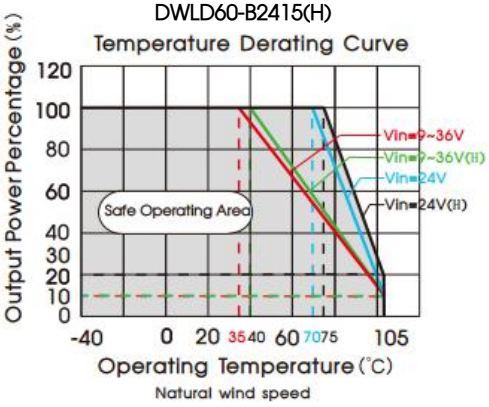
DWLD60-B2405(H)



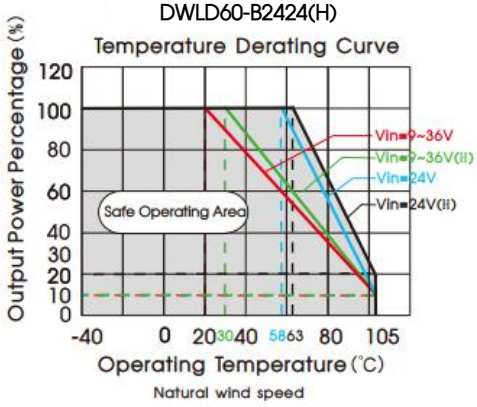
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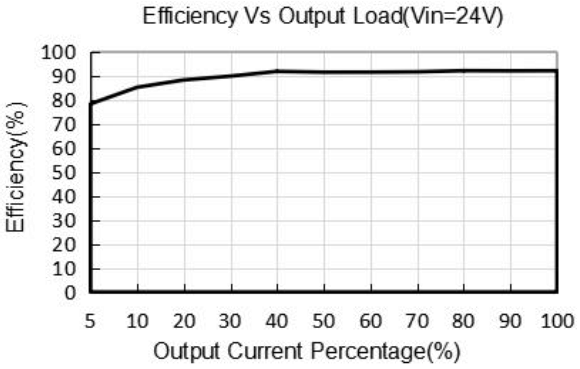
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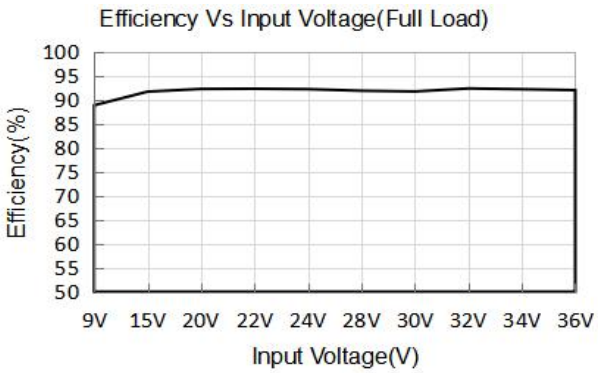
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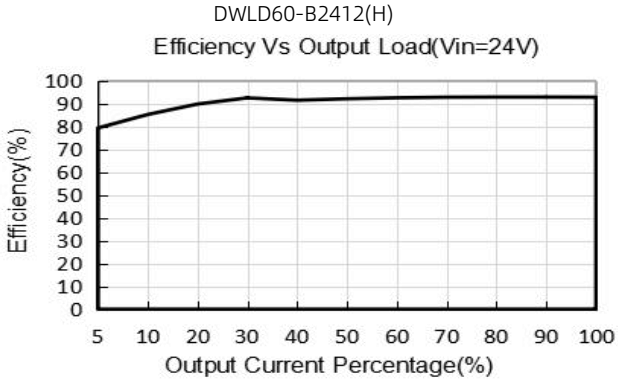
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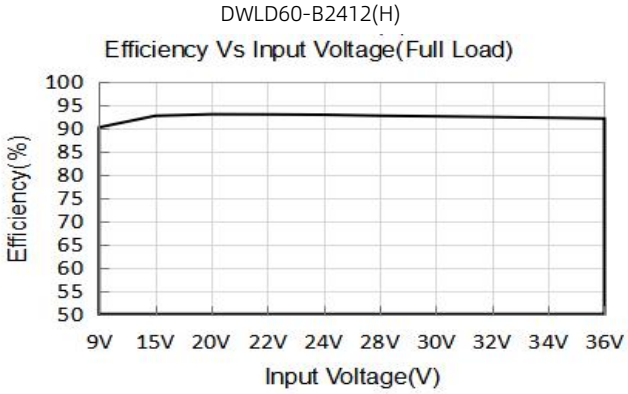
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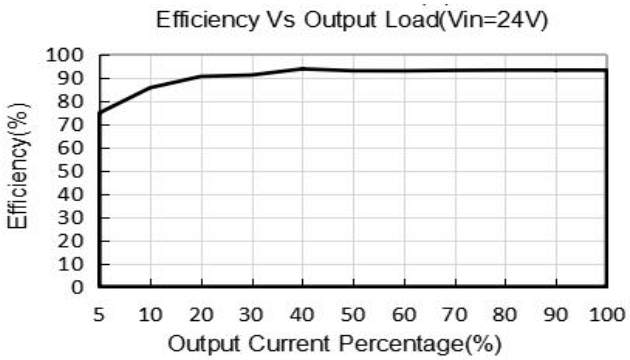
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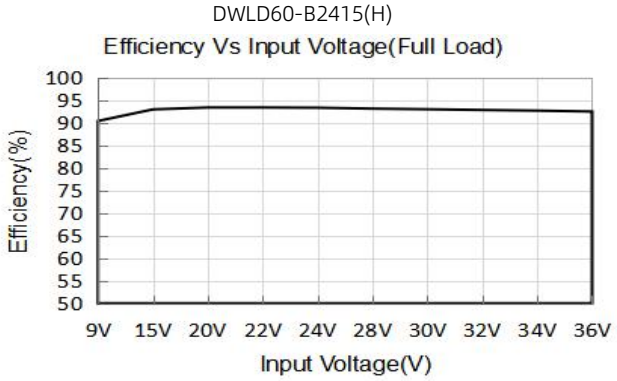
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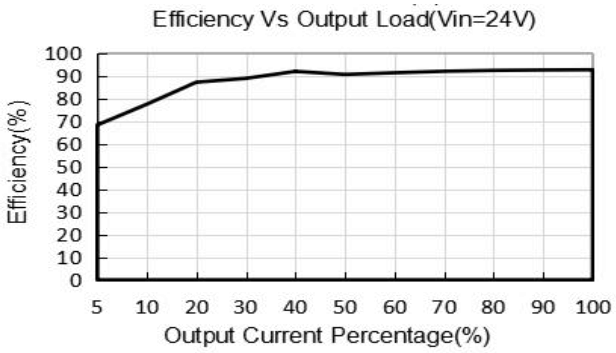
DWLD60-B2415(H)



DWLD60-B2415(H)



DWLD60-B2424(H)



DWLD60-B2424(H)

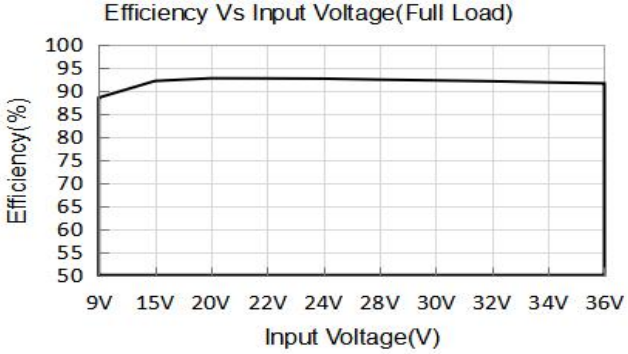


Fig. 1

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

Vout (VDC)	Cin (μF)	Cout (μF)
5	100μF/50V	220uF/16V
12/15		100μF/50V
24		47μF/50V

2. EMC compliance circuit

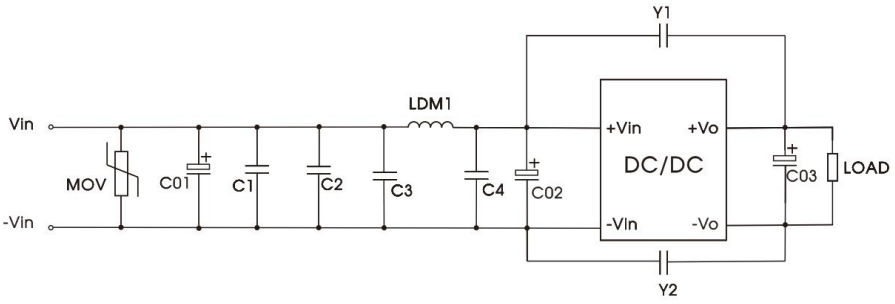


Fig. 3-①

Table 1: recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7uF	50V
C3/C4	10uF	50V
C01	680uF	50V
C02	330uF	50V
C03	100uF	100V
Y1/Y2	2.2nF	Y1
LDM1	2.2uH	/
MOV	14D470	/

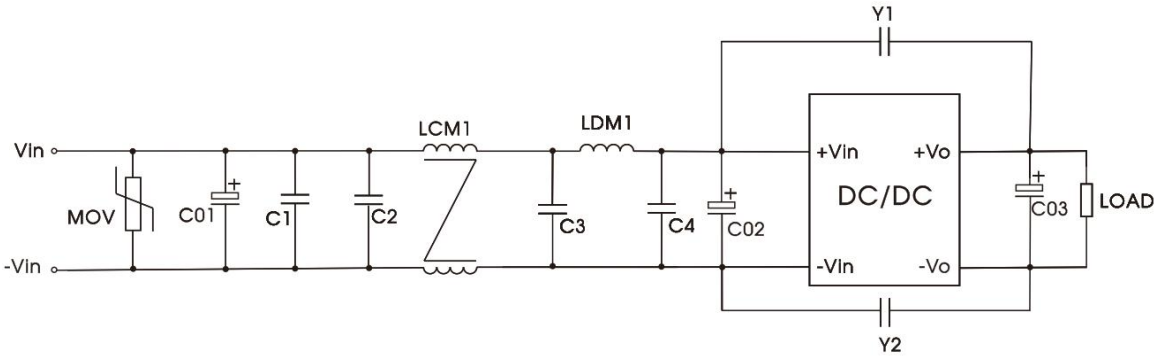


Fig. 3-②

Table 2: recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7uF	50V
C3/C4	10uF	50V
C01	680uF	50V
C02	330uF	50V
C03	100uF	100V
Y1/Y2	2.2nF	Y1
LCM1	2.2mH	/
LDM1	2.2uH	/
MOV	14D470	/

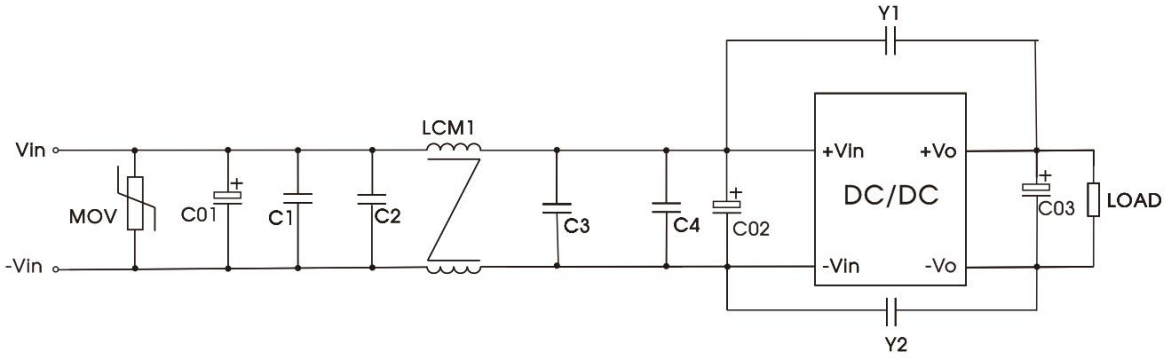


Fig. 3-③

Table 3: recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7uF	50V
C3/C4	10uF	50V
C01	680uF	50V
C02	330uF	50V
C03	100uF	100V
Y1/Y2	2.2nF	Y1
LCM1	10mH	10.0mH MIN
MOV	14D470	/

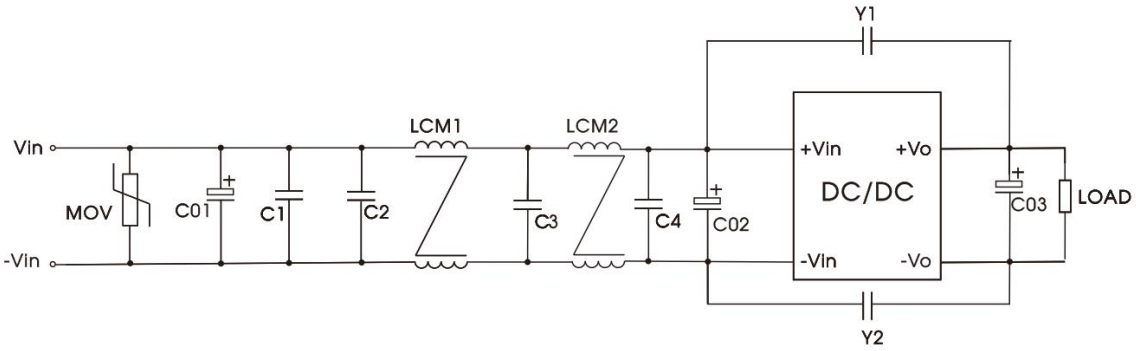
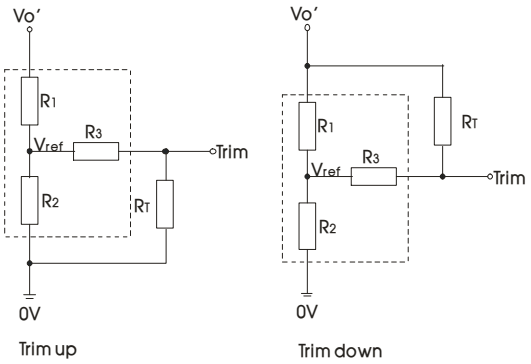


Fig. 3-④

Table 4: recommended component parameters

Model	Parameter		Parameter description
C1/C2	4.7uF		50V
C3	10uF		50V
C4	DWLD60-B2405	10uF	50V
	DWLD60-B2424	47uF	
C01	680uF		50V
C02	330uF		50V
C03	100uF		100V
Y1/Y2	2.2nF		Y1
LCM1/LCM2	10mH		10.0mH MIN/180mΩ Max
MOV	14D470		/

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



Trim resistor connections (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

Vo' = desired output voltage

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
05	2.97	2.87	6.1	2.5
12	10.91	2.87	6.1	2.5
15	14.35	2.87	6.1	2.5
24	24.77	2.87	6.1	2.5

4. Recommended solution for thermal testing

During the application process, the thermal design of the product can be evaluated in combination with the temperature derating curve of the product, or it can be determined by testing the temperature at point A, it is an safe operating area if the temperature lower than 100℃.



Fig. 4

5. Reflected ripple current test circuit

All DC-DC converters of this series are tested using the recommended circuit shown in Fig. 5. Test point,

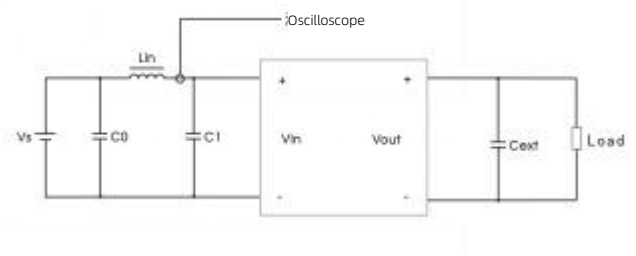
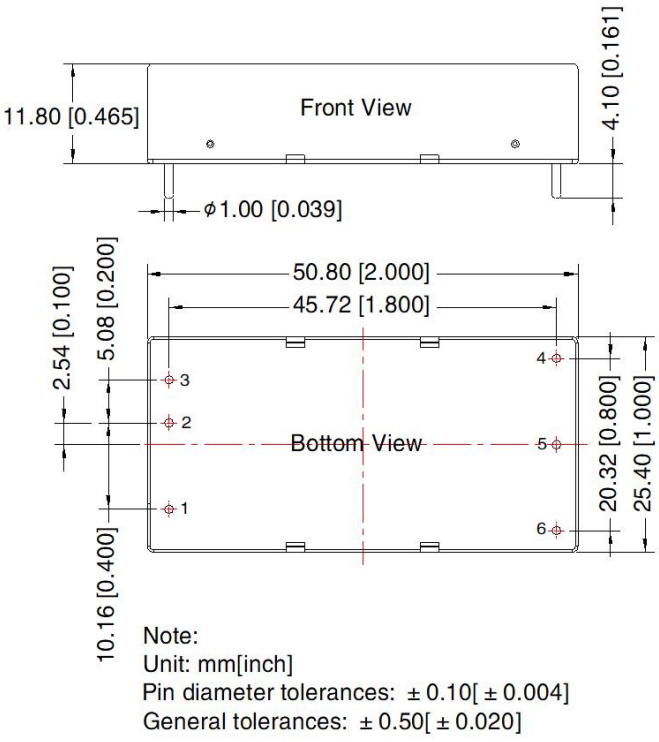


Fig. 5

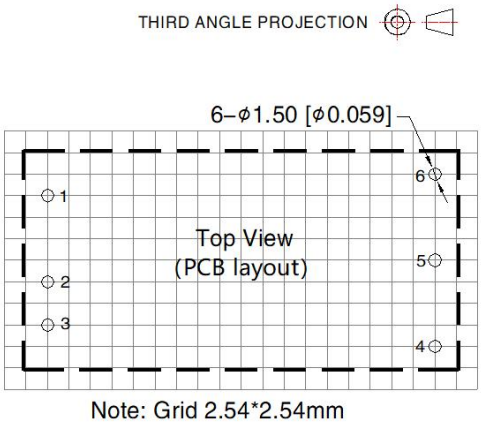
Components	Recommended Component Value
C0	220μF/100V
Lin	10uH/15A
C1	470μF/100V
Cext	470μF/63V

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

DWLD60-B24xx Dimensions and Recommended Layout



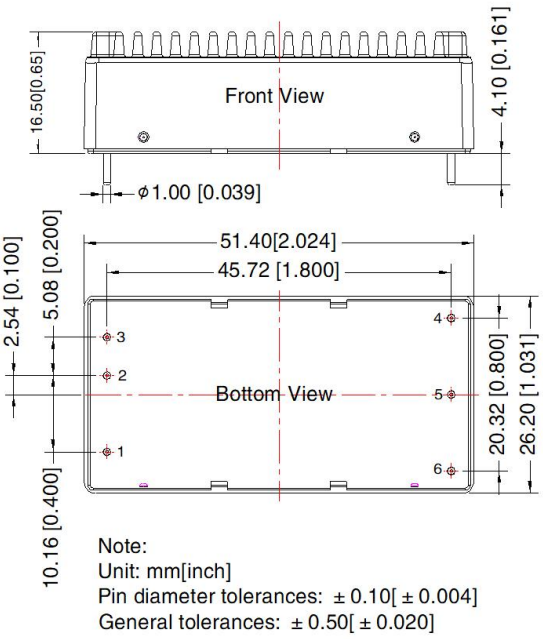
Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]



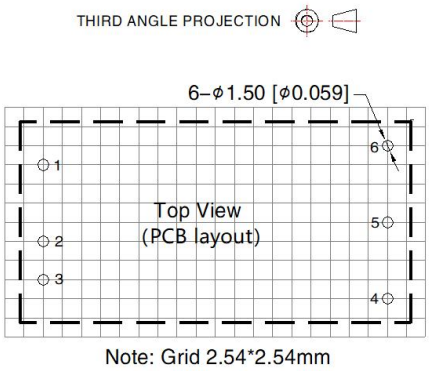
Note: Grid 2.54*2.54mm

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

DWLD60-B24xxH Dimensions and Recommended Layout



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

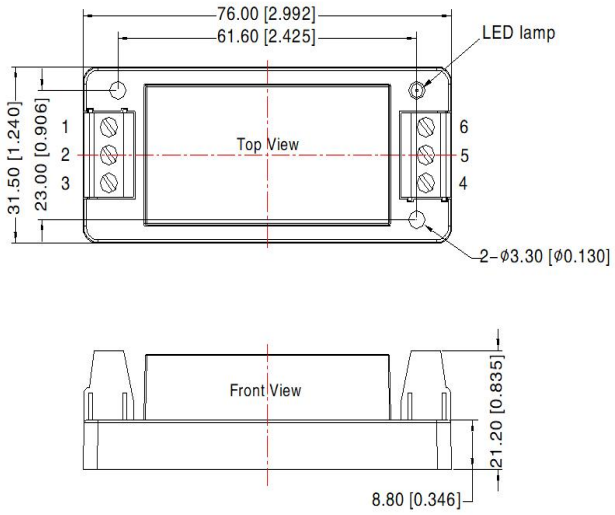


Note: Grid 2.54*2.54mm

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

DWLD60-B24xxE2S Dimensions and Recommended Layout



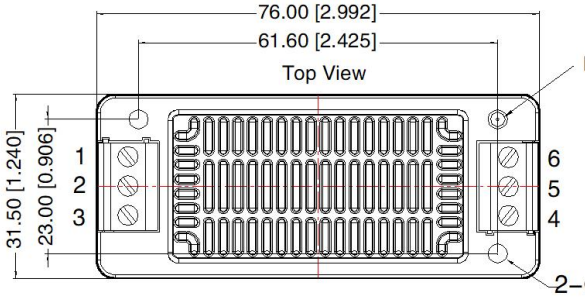


Pin–Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	0V	Trim

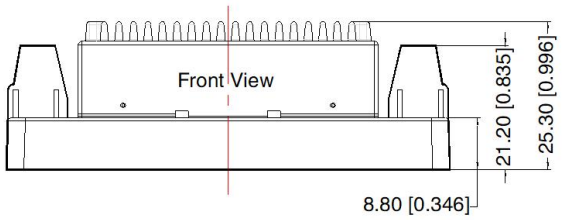
Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ± 1.00[± 0.039]

DWLD60-B24xxHE2S Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



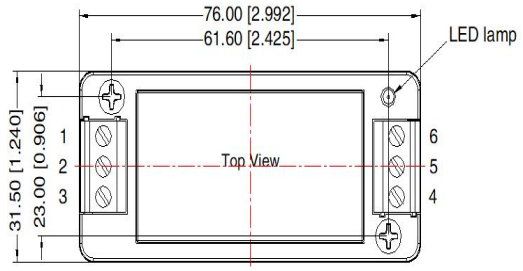
Pin–Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	0V	Trim



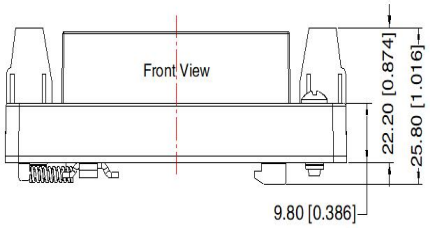
Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N・m
General tolerances: ± 1.00[± 0.039]

DWLD60-B24xxD4S Dimensions and Recommended Layout

THIRD ANGLE PROJECTION

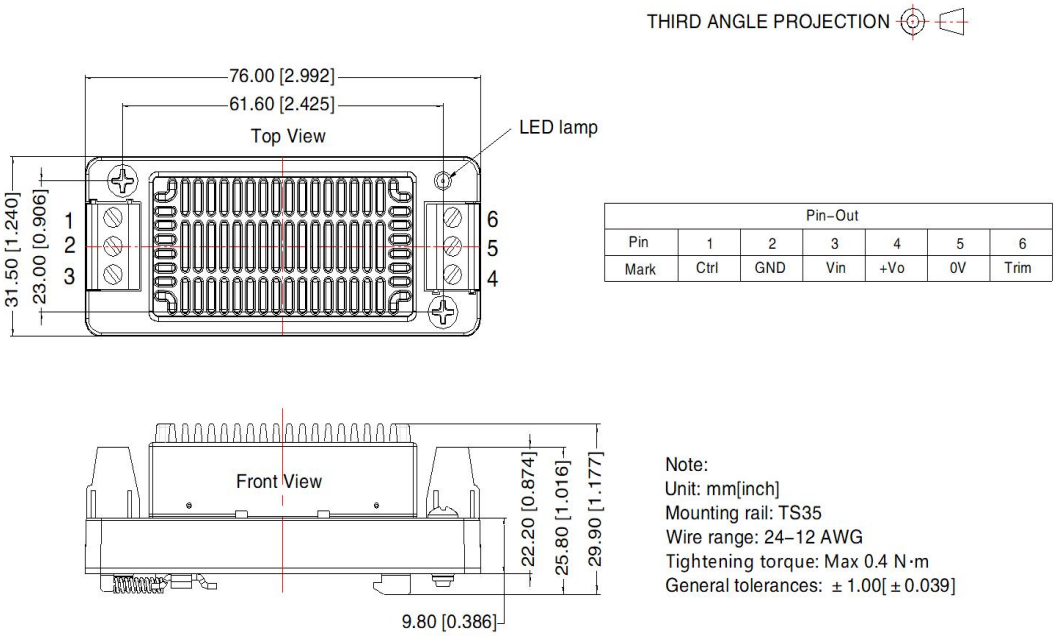


Pin–Out						
Pin	1	2	3	4	5	6
Mark	Ctrl	GND	Vin	+Vo	0V	Trim



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]

DWLD60-B24xxHD4S Dimensions and Recommended Layout



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]

Note:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
2. The maximum capacitive load offered were tested at input voltage range and full load;
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. All index testing methods in this datasheet are based on company corporate standards;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified 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.