

DCWB24_LD-60W Series



FEATURES

- Wide input voltage range (4:1)
- High efficiency up to 93%
- Isolation voltage :1.5K VDC
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Operating temperature range: -40°C To +105°C
- 3 Years warranty

APPLICATION

- Industrial Control
- Instrumentation
- Electrical Power
- Communication

DESCRIPTION

DC-DC Module Power Supply, Wide Voltage Input, Power 60W, Isolated, Regulated, Single Output, DIP Packaging.

MODEL NUMBERING

DCWB24xxLD-60W



SELECTION GUIDE

Product Model	Input Voltage Standard Value(range)	Output Voltage (Vdc)	Output Current(mA) Max./Min.	Efficiency % (Min./Typ.)	Maximum capacitive load (μF)
DCWB2405LD-60W	24VDC (9-36)	5	12000/600	90/92	20000
DCWB2412LD-60W		12	5000/250	91/93	6000
DCWB2415LD-60W		15	4000/200	91/93.3	4000
DCWB2424LD-60W		24	2500/125	91/93	2000

Note: Use suffix "ST" for screw terminal, suffix "DR" for DIN-Rail

INPUT CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Input Current (full load / no-load)	Nominal input voltage	--	2718/25	2748/30	mA
Input Impulse Voltage	(1 Sec. Max.)	-0.7	--	50	VDC
Starting Voltage		--	--	9	VDC
Input Filter		PI Type			
Ctrl*	Module on	Ctrl pin open or pulled high TTL (3-12VDC)			
	Module off	Ctrl pin pulled low to GND(0-1.2VDC)			

Remarks: This product does not support hot plug Note: *The Ctrl pin voltage is referenced to input GND

OUTPUT CHARACTERISTICS

Parameter	Operating Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy	5%-100% load		--	±1	±2	%
	0%-5% load		-0.7	±2	±5	%
Linear Regulation Rate	Input voltage variation from low to high at full load		--	±0.2	±0.5	%
Load Regulation Rate	5%-100% load		--	±0.5	±1	%
Dynamic Response Step Deviation	25% load step change, input	5V output	--	±3	±10	%
	Voltage range	Other output	--	±3	±5	%
Temperature Drift Coefficient	100% load		--	250	500	μs
Ripple & Noise	20MHz bandwidth, nominal input voltage, 5%-100% load	5V/12V/15V output	--	100	--	mVp-p
		24V output	--	130	--	mVp-p
	20MHz bandwidth, nominal input, voltage, 0%-5% load		--	--	3	%Vo

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Output Overvoltage Protection	Full voltage range input	110	140	160	%Vo
Output Overcurrent Protection	Full voltage range input	110	140	200	%Io
Short-Circuit Protection		Sustainable, Self-healing			

Note: ① By measuring method is used for Ripple and Noise test, please refer to Fig. 2. for recommended circuit.

GENERAL CHARACTERISTIC

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	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	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	100	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	2200	--	pF
Working Temperature	See Fig. 1	-40	--	+105	°C
Storage Temperature		-55	--	+125	°C
Storage Humidity	Non-condensing	5	--	95	%RH
Soldering Temperature Resistance Of Pins	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	°C
	Wave soldering, 10 seconds	255	260	265	°C
Vibration		10-55Hz, 2G, 30 Min. along X, Y and Z			
Switching Frequency *	PWM mode	--	370	--	KHz
MTBF	MIL-HDBK-217F @ 25°C	1000	--	--	Khours

Note: ① Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement

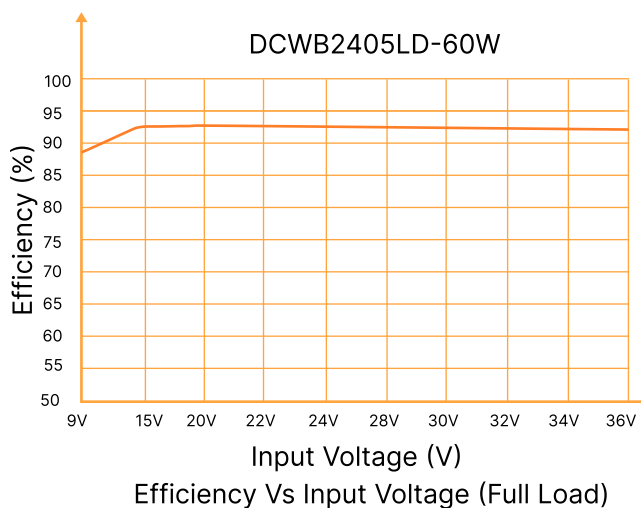
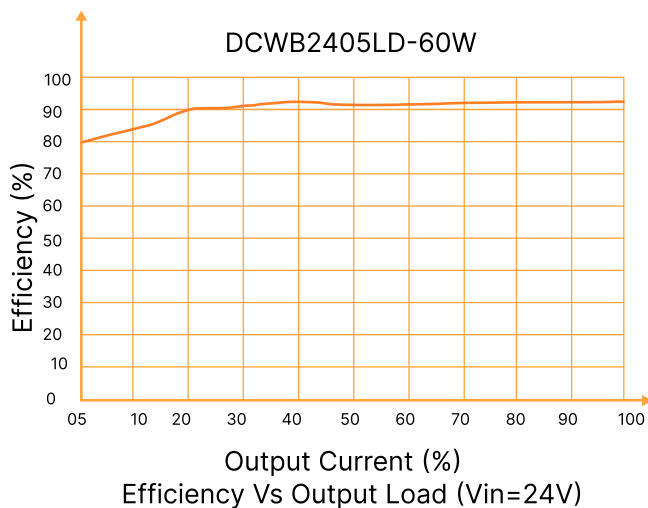
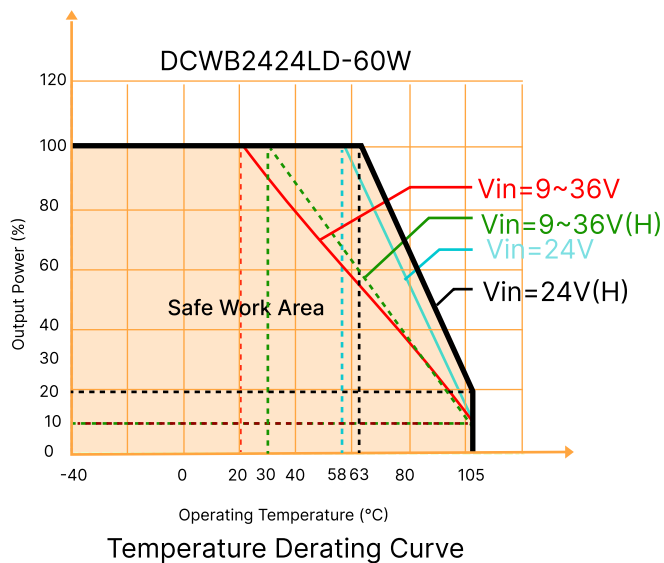
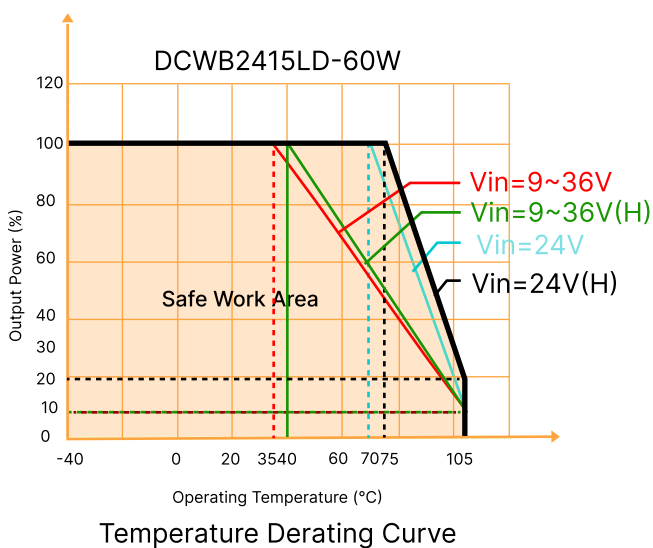
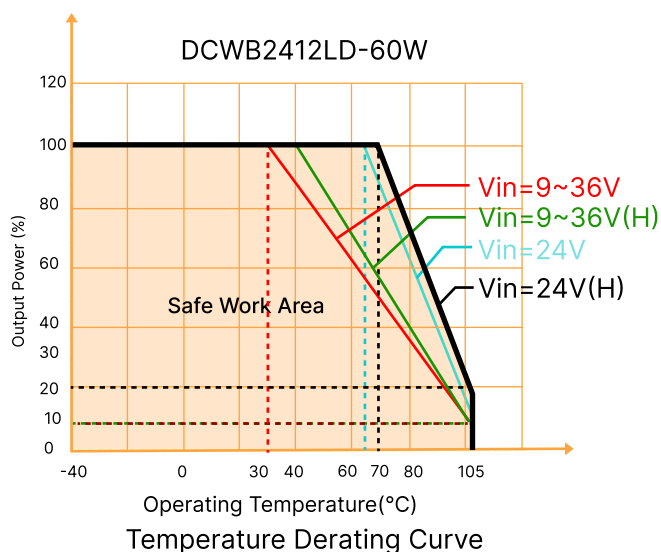
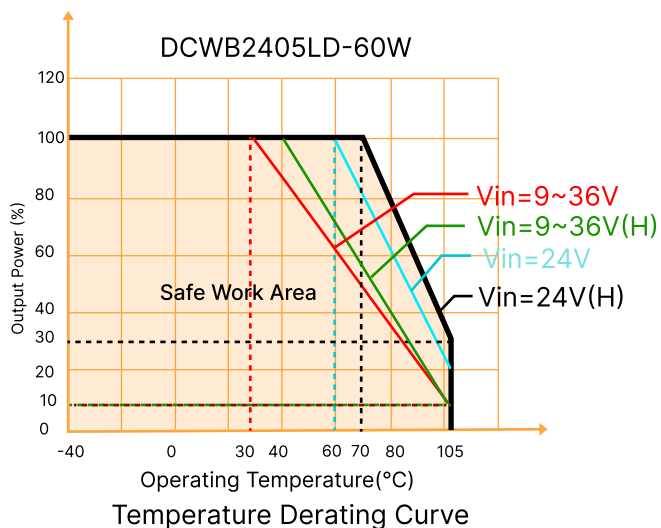
PHYSICAL CHARACTERISTICS

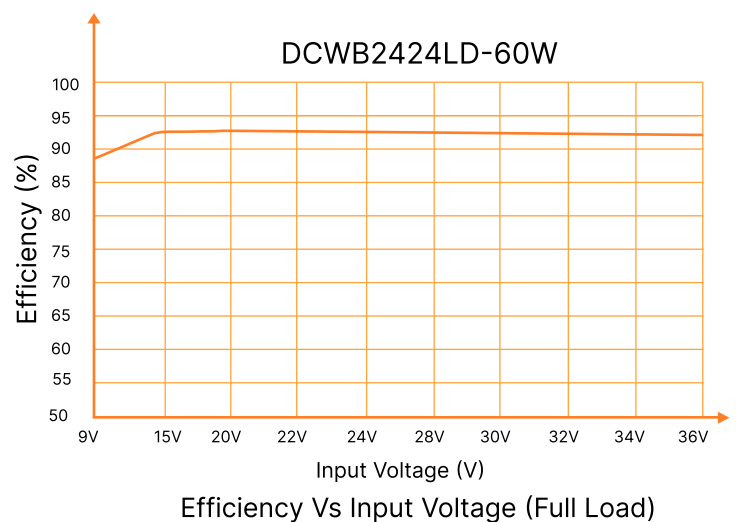
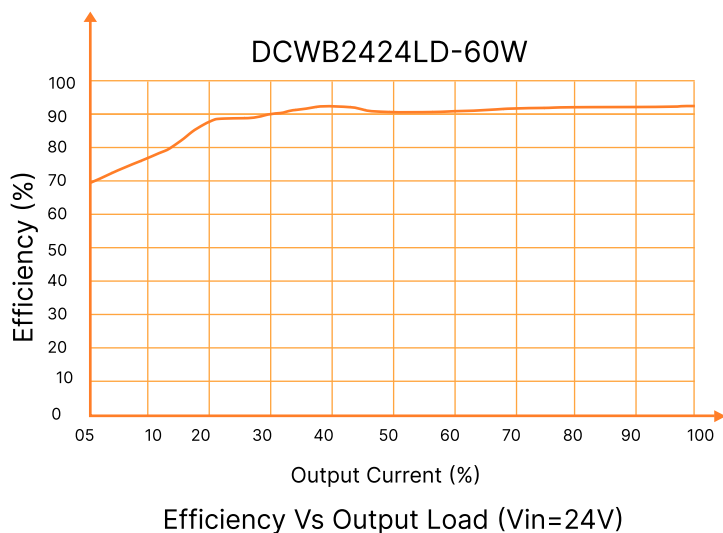
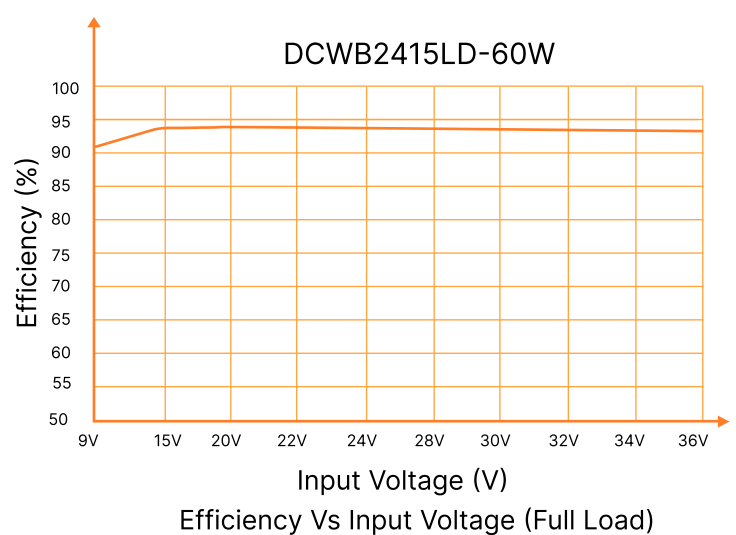
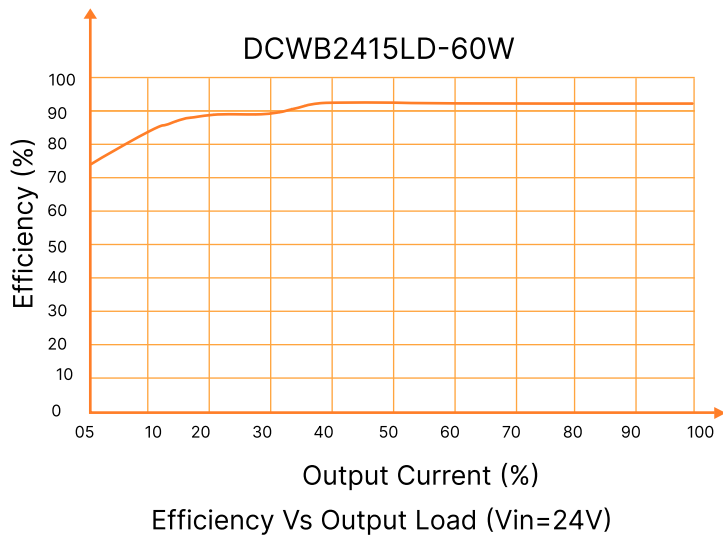
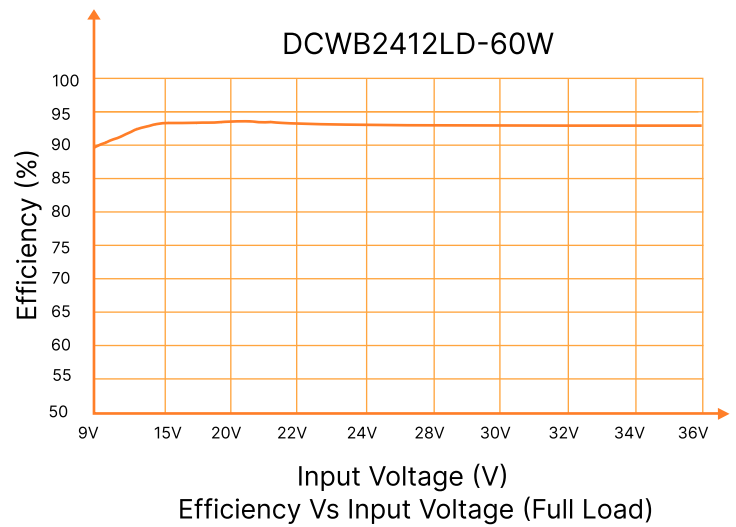
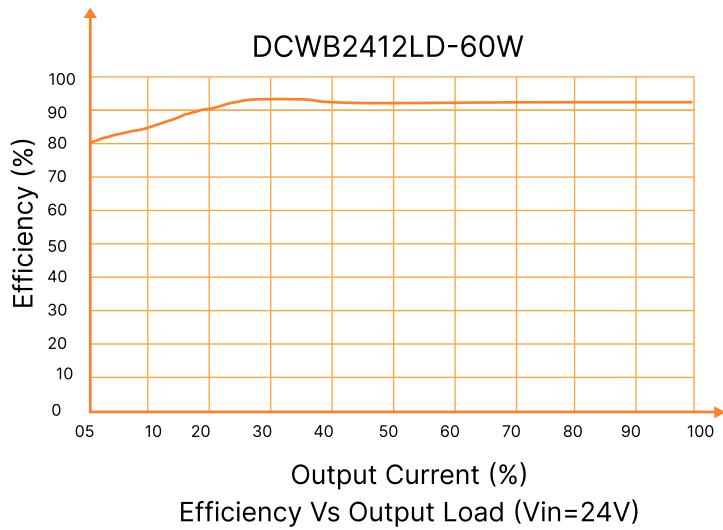
Parameter	Conditions		
Case Material	Aluminum alloy		
Dimensions	Without heatsink	Horizontal package	50.80 × 25.40 × 11.80 mm
		Screw Terminal (ST)	76.00 × 31.50 × 21.20 mm
		Screw Terminal DIN-Rail (DR)	76.00 × 31.50 × 25.80 mm
	With heatsink	Horizontal package	51.40 × 26.20 × 16.50 mm
		Screw Terminal (ST)	76.00 × 31.50 × 25.30 mm
		Screw Terminal DIN-Rail (DR)	76.00 × 31.50 × 29.90 mm
Weight	Without heatsink	Horizontal package	41.0g
		Screw Terminal (ST)	64.0g
		Screw Terminal DIN-Rail (DR)	84.0g
	With heatsink	Horizontal package	50.8g
		Screw Terminal (ST)	73.8g
		Screw Terminal DIN-Rail (DR)	93.8g
Cooling Method	Free air convection		

EMC CHARACTERISTICS

Parameter	Category	Content		
EMI	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)		
EMS	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

PRODUCT CHARACTERISTIC CURVE





CIRCUIT DESIGN AND APPLICATION

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 C_{in} and C_{out} 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.

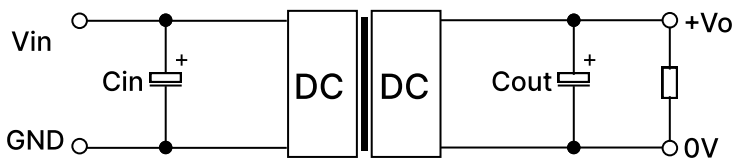


Fig. 2

Table 1: Recommended Capacitive Load Values

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

2. EMC compliance circuit

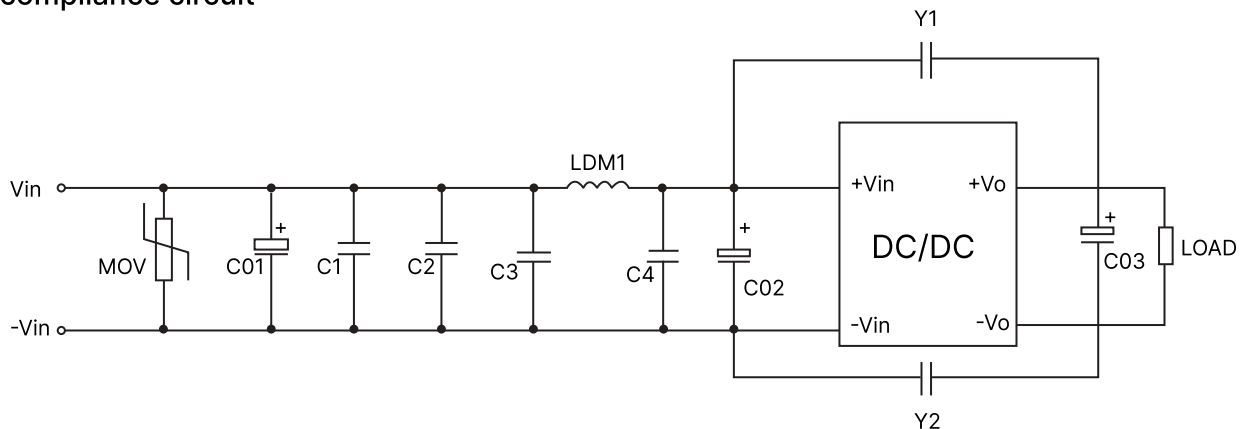


Fig. 3-①

Table 1 : recommended component parameters

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

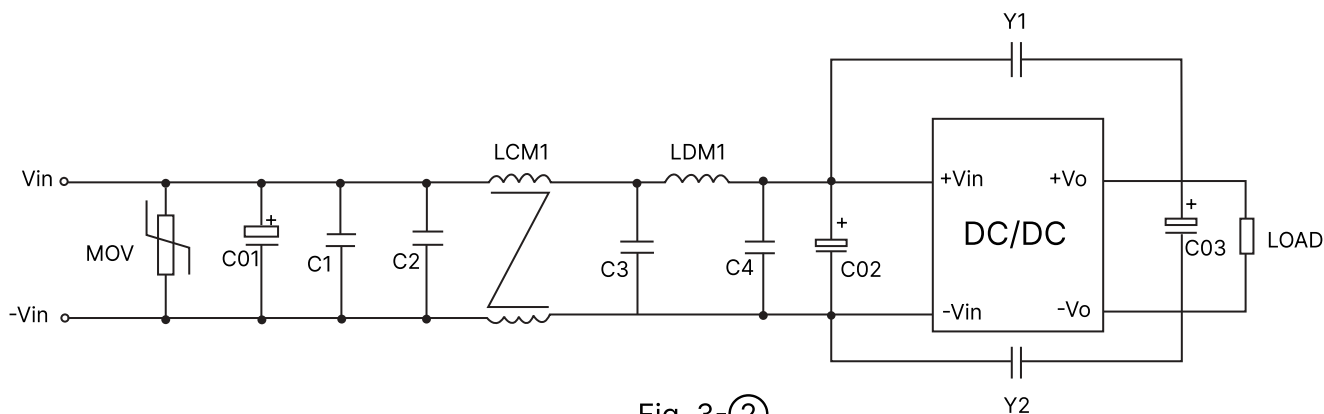


Fig. 3-②

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	/

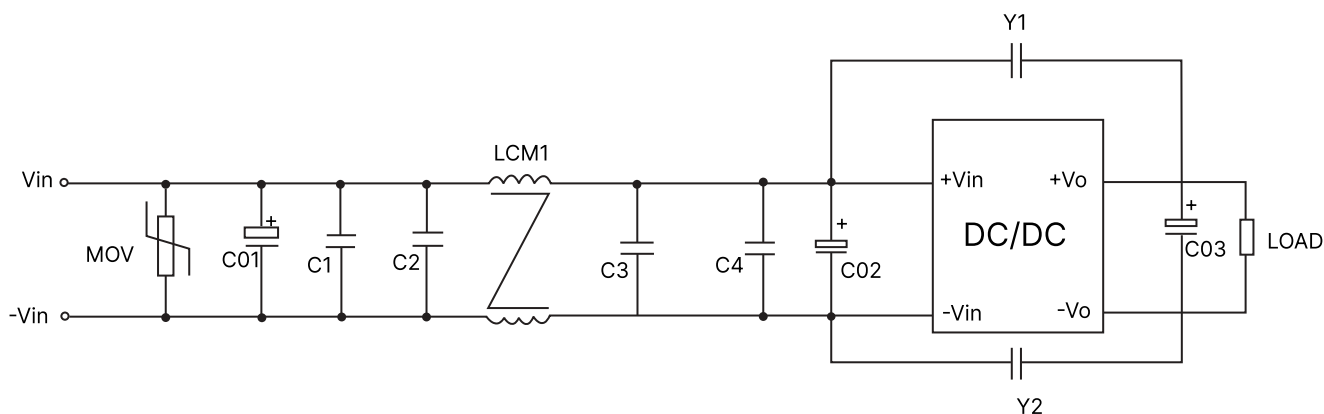


Fig. 3-③

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/180mΩMax
MOV	14D470	/

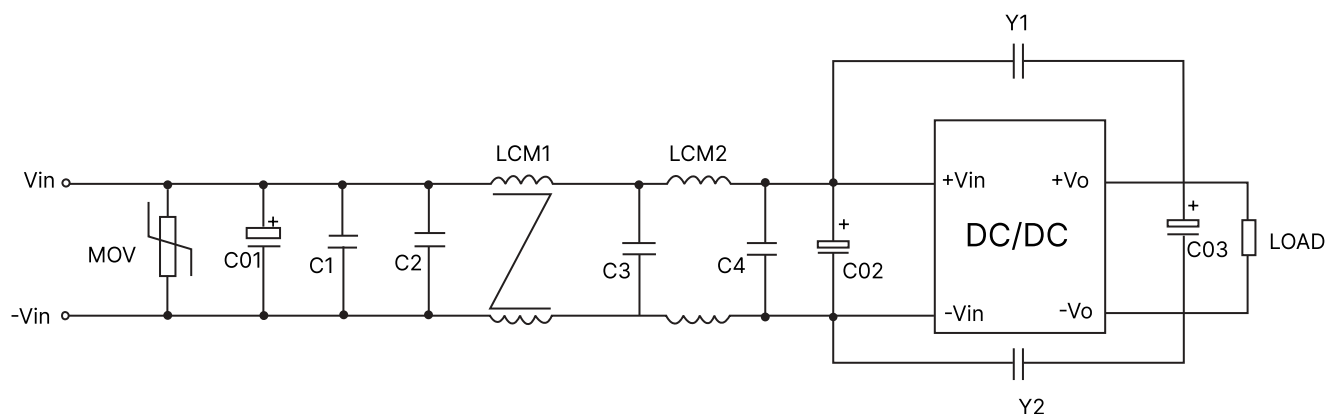
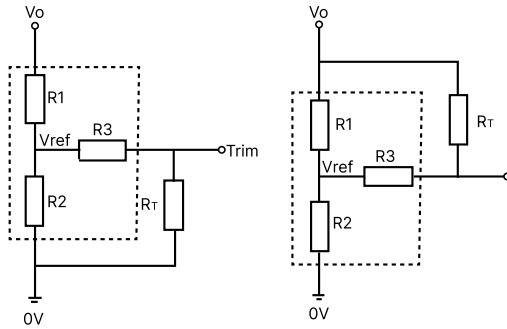


Fig. 3-④

Table 4 : recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7uF	50V
C3	10uF	50V
C4	DCWB2405LD-60WR3	10uF
	DCWB2424LD-60WR3	47uF
C01	680uF	50V
C02	330uF	50V
C03	100uF	100V
Y1/Y2	2.2nF	Y1
LCM1/LCM2	10mH	10.0mH MIN/180mΩMax
MOV	14D470	/

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



Trim up

Trim Down

Trim resistor connections (dashed line shows internal resistor network)

Calculating Trim resistor values:

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

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

R_T is Trim resistance

a is a self-defined parameter, with no real meaning.

V_o' = desired output voltage

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
5	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°C.

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,

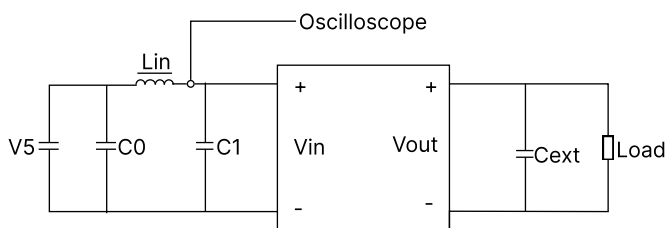
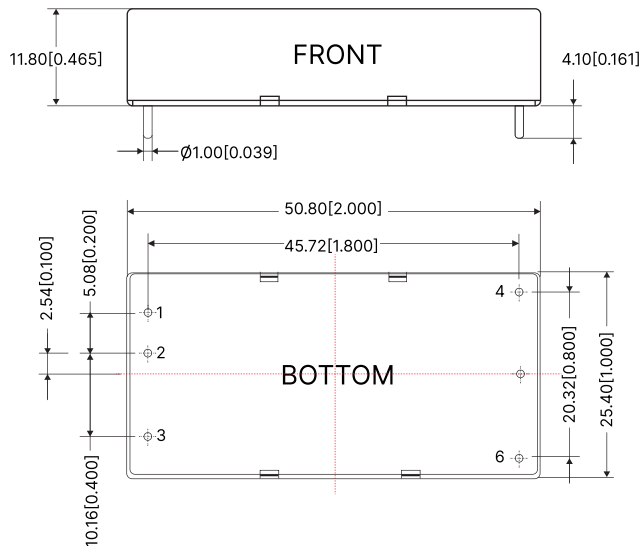


Fig. 5-④

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

OVERALL DIMENSIONS AND PIN FUNCTIONS

DCWB24_LD-60W (without heatsink)



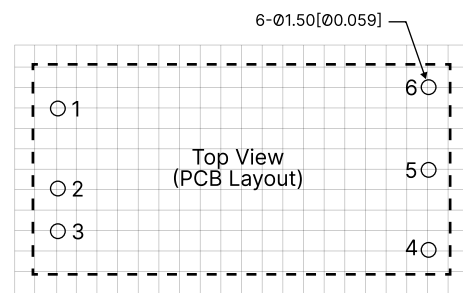
Note:

Unit: mm[inch]

Pin diameter tolerances: $\pm 0.10 [\pm 0.004]$

General tolerances: $\pm 0.50 [\pm 0.020]$

THIRD ANGLE PROJECTION

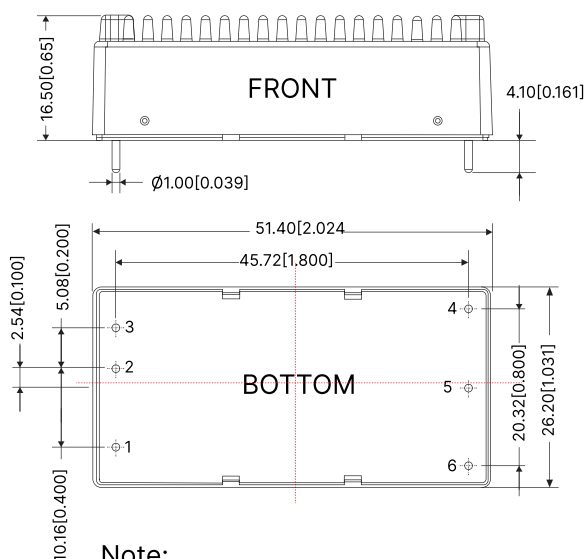


Note: Grid 2.54*2.54

Table 1: Pin Function Table

Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

DCWB24_LD-60WH (with heatsink)



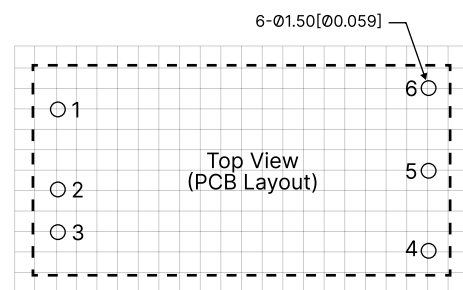
Note:

Unit: mm[inch]

Pin diameter tolerances: $\pm 0.10 [\pm 0.004]$

General tolerances: $\pm 0.50 [\pm 0.020]$

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54

Table 2: Pin Function Table

Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

DCWB24_LD-60WST (without heatsink)

THIRD ANGLE PROJECTION

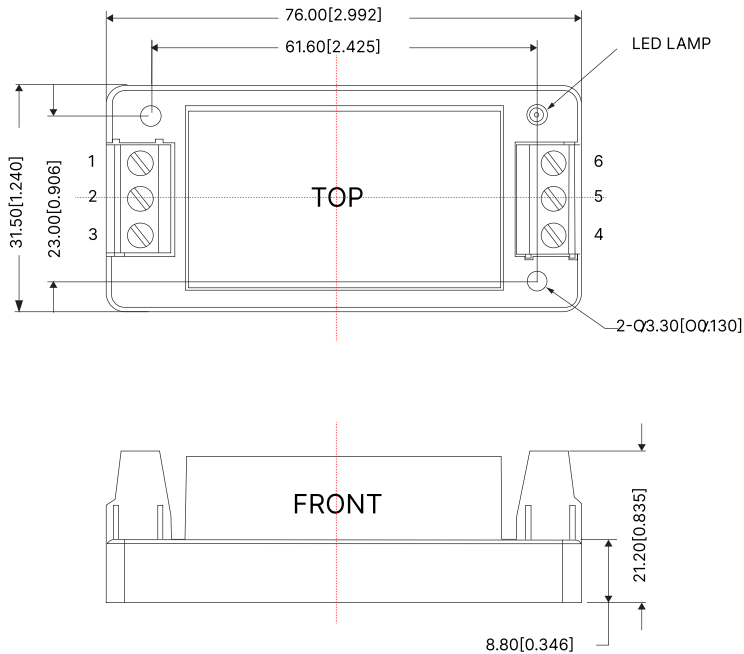


Table 3: Pin Function Table

Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

Note:

Unit: mm[inch]

Wide range: 24-12 AWG

Tightening torque: Max 0.4 N-m

General tolerances: ± 1.00 [± 0.039]

DCWB24_LD-60WHST (with heatsink)

THIRD ANGLE PROJECTION

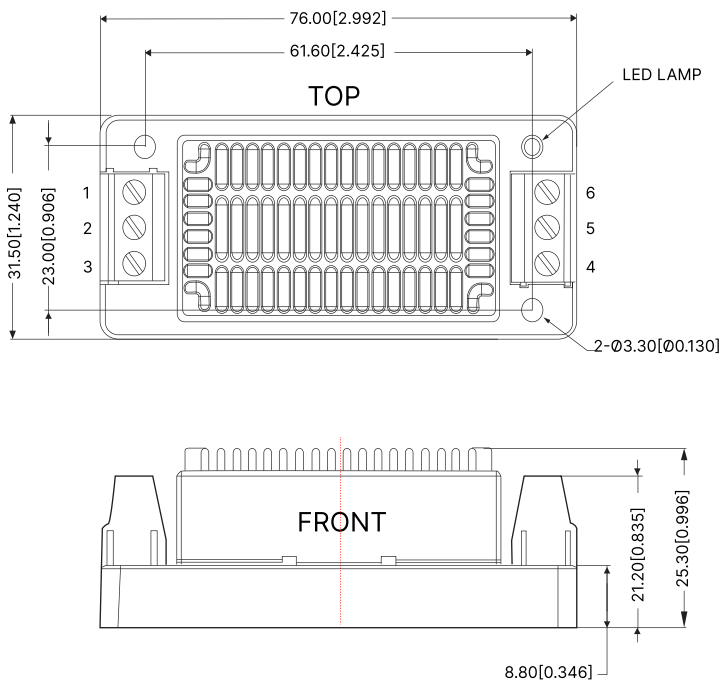


Table 4: Pin Function Table

Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

Note:

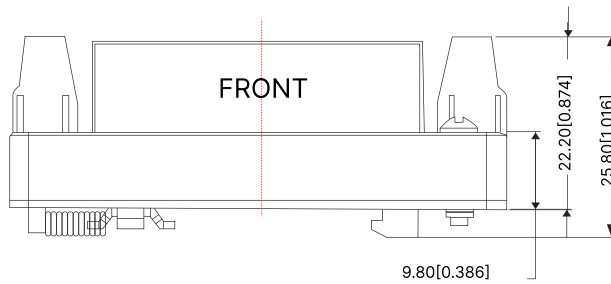
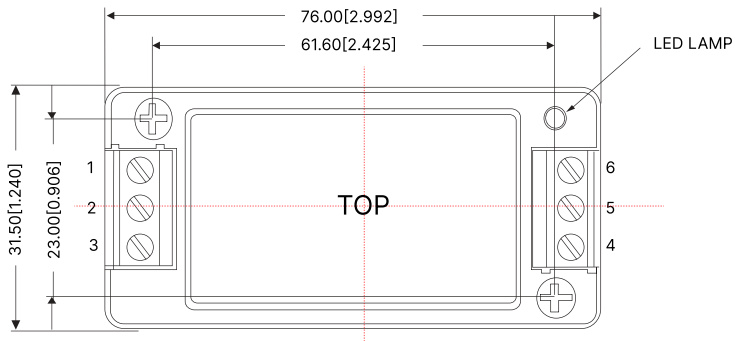
Unit: mm[inch]

Wide range: 24-12 AWG

Tightening torque: Max 0.4 N-m

General tolerances: ± 1.00 [± 0.039]

DCWB24_LD-60WDR (without heatsink)



THIRD ANGLE PROJECTION

Table 5: Pin Function Table

Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

Note:

Unit: mm[inch]

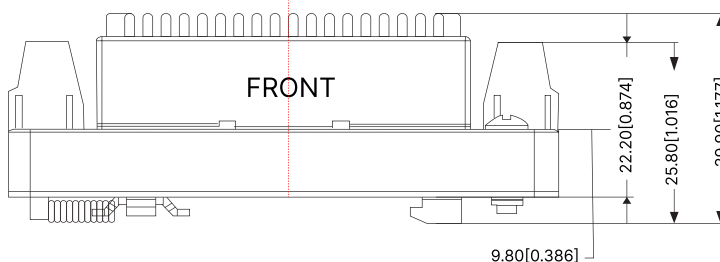
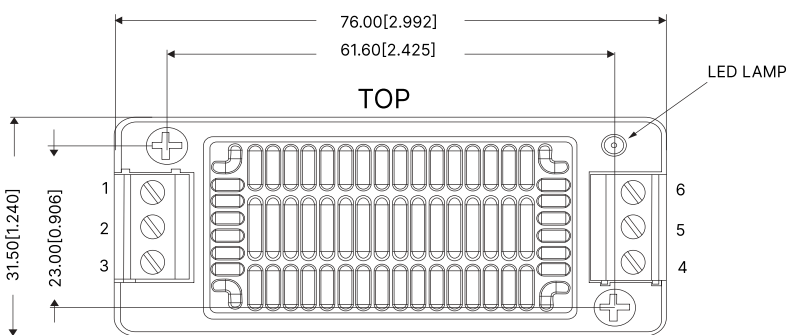
Mounting Rail: TS35

Wide range: 24-12 AWG

Tightening torque: Max 0.4 N-m

General tolerances: ± 1.00 [± 0.039]

DCWB24_LD-60WHDR (with heatsink)



THIRD ANGLE PROJECTION

Table 6: Pin Function Table

Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

Note:

Unit: mm[inch]

Mounting Rail: TS35

Wide range: 24-12 AWG

Tightening torque: Max 0.4 N-m

General tolerances: ± 1.00 [± 0.039]

NOTES

1. For additional information on Product Packaging please refer to www.henxy.com
2. 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;
3. 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;
4. The maximum capacitive load offered were tested at input voltage range and full load;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
6. All index testing methods in this datasheet are based on company corporate standards;
7. We can provide product customization service, please contact our technicians directly for specific information;
8. Products are related to laws and regulations: see "Features" and "EMC"; 9. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.