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DC-DC CONVERTERS

60 WATTS

DCWB48_LD-60W Series



FEATURES

- Wide input voltage range (4:1)
- High efficiency up to 93%
- Isolation voltage :1.6K VDC
- Input under-voltage protection, output short-circuit, over-current, over–voltage protection
- Working 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

DCWB48xxLD-60W

- Series
- Input Voltage
- Output Voltage
- Output Power
- Packaging Form

SELECTION GUIDE

Product Model	Input Voltage Standard Value(range)	Output Voltage (Vdc)	Output Current(mA) Max./Min.	Efficiency % (Min./Typ.)	Maximum capacitive load (μF)
DCWB4805LD-60W	48VDC (18-75)	5	12000/0	90/92.5	20000
DCWB4812LD-60W		12	5000/0	91/93	5000
DCWB4815LD-60W		15	4000/0	91/93.3	3500
DCWB4824LD-60W		24	2500/0	91/93.8	2000

Note: Use suffix “H” for Heatsink, suffix “ST” for screw terminal, suffix “DR’ for DIN-Rail

INPUT CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Input Current (Rated load)	Nominal input voltage	--	1345	1389	mA
Input Current (No load)	Nominal input voltage	--	10	15	mA
Input Impulse Voltage	(1 Sec. Max.)	-0.7	--	100	VDC
Starting Voltage		--	--	18	VDC
Input Filter		PI Type			
Remote control foot Ctrl* (Some models are applicable)	Module on	Ctrl hovering or connected to TTL high level (3-12VDC)			
	Module off	Ctrl connected to GND or low level (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		--	±2	±5	%
Line Regulation Rate	Input voltage variation ±1%		--	±0.2	±0.5	%
Load Regulation Rate	5%-100% load		--	±0.5	±1	%
Dynamic Response Step Deviation	25% load step change, input voltage range	5V output	--	±3	±10	%
		Other output	--	±3	±5	%
Dynamic Response Recovery Time	25% load step change, nominal voltage range		--	250	500	μs
Ripple & Noise*	20MHz bandwidth, nominal input voltage	5%-100% load	--	100	--	mVp-p
		0%-5% load	--	--	5	%Vo
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: *By measuring method is used for Ripple and Noise test, please refer to Fig. 2. for recommended circuit.

GENERAL CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max	1600	--	--	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		10-150Hz, 5G, 0.75mm.along X, Y & 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
		DIN-Rail Mount (DR)	76.00 × 31.50 × 25.80 mm
	With heatsink	Horizontal package	51.40 × 26.20 × 16.50 mm

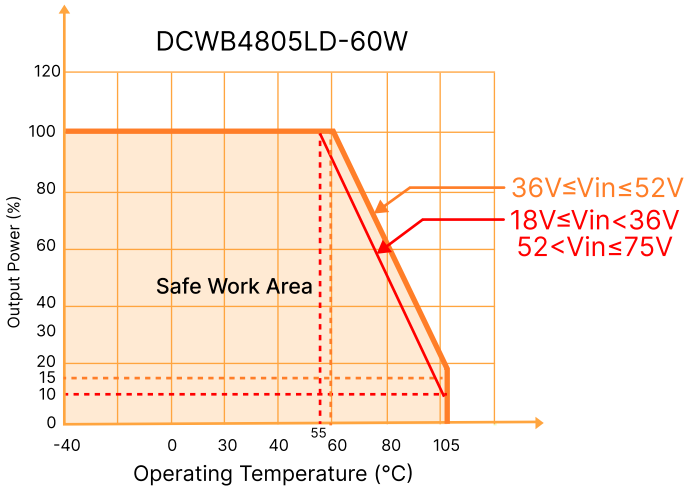
PHYSICAL CHARACTERISTICS

Parameter	Conditions		
Weight	Without heatsink	Horizontal package	40.0g
		Screw Terminal (ST)	63.0g
		DIN-Rail Mount (DR)	83.0g
	With heatsink	Horizontal package	49.8g
Cooling Method	Natural Air Cooling		

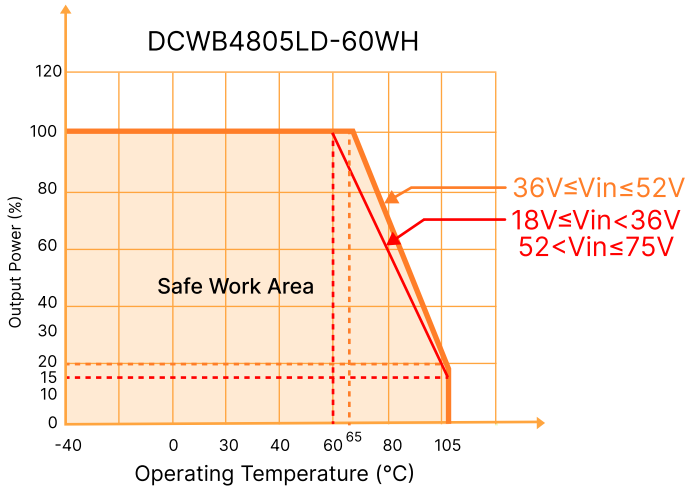
EMC CHARACTERISTICS

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

PRODUCT CHARACTERISTIC CURVE



Temperature Derating Curve

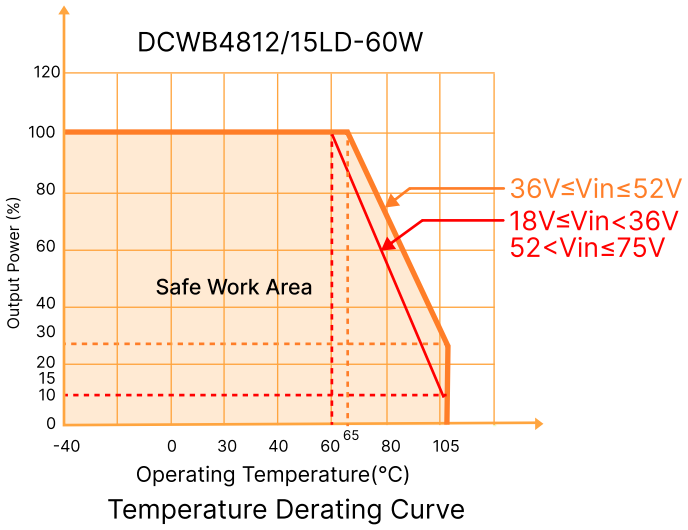


Temperature Derating Curve

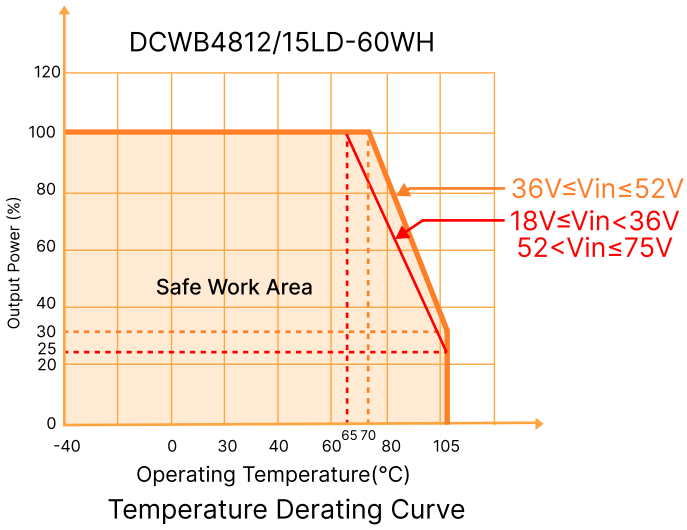
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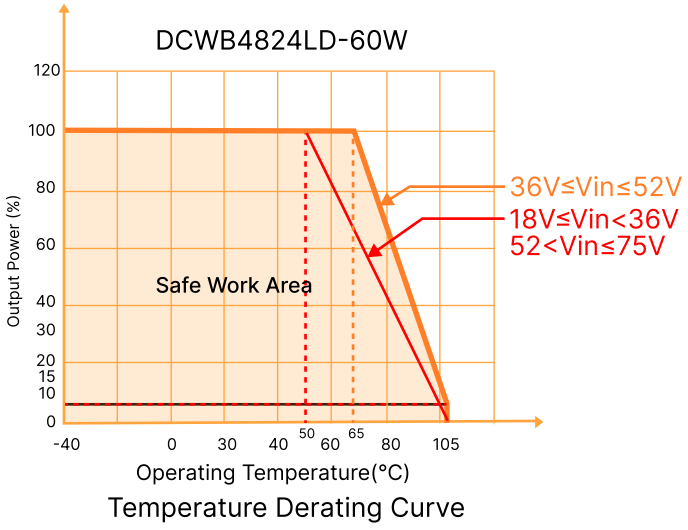
60 WATTS



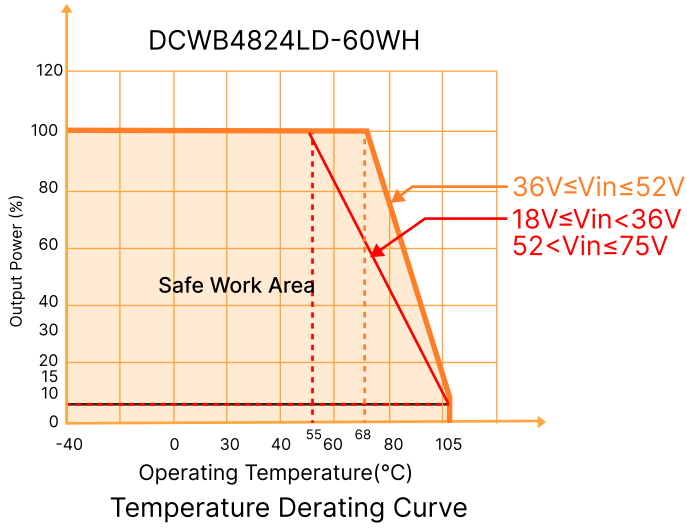
Temperature Derating Curve



Temperature Derating Curve



Temperature Derating Curve



Temperature Derating 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 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.

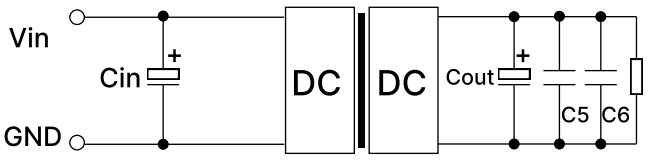


Fig. 2

Table 1: Recommended Capacitive Load Values

Vout (VDC)	Cin	Cout	C5	C6
5	100μF/100V	330μF/50V	1μF/16V	10μF/16V
12		330μF/50V	1μF/25V	10μF/25V
15		100μF/50V	1μF/25V	10μF/25V
24		100μF/50V	1μF/50V	10μF/50V

2. EMC compliance circuit

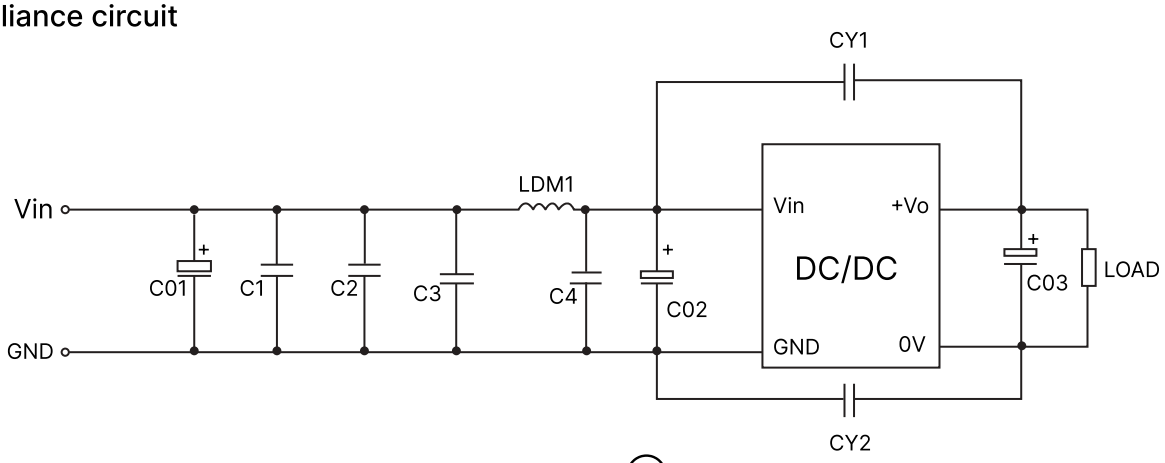


Fig. 3-①

Table 2：recommended component parameters

Model	Parameter
C1/C2	4.7uF/100V
C3/C4	22uF/100V
C01	1000uF/100V
C02	470uF/100V
C03	330uF/50V
CY1/CY2	2.2nF/3000VDC
LDM1	2.2uH

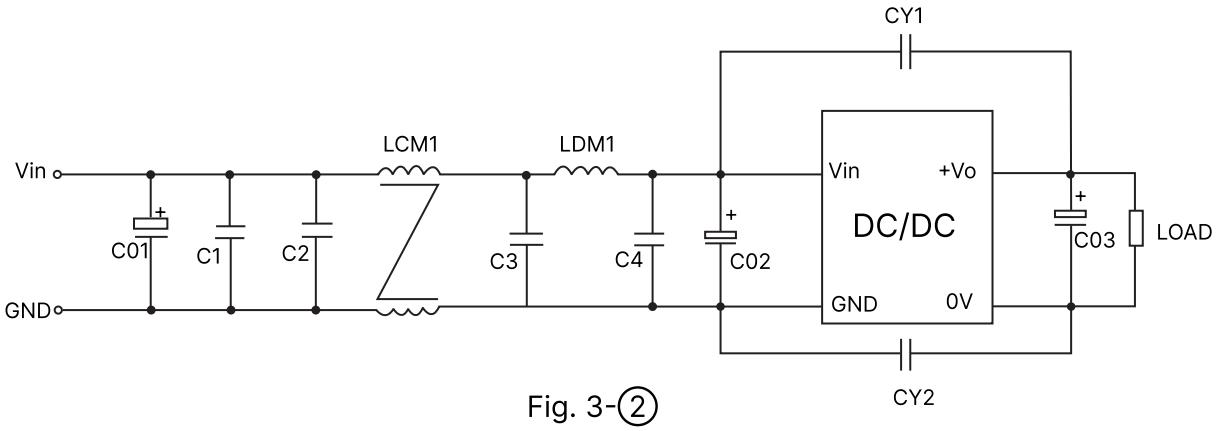
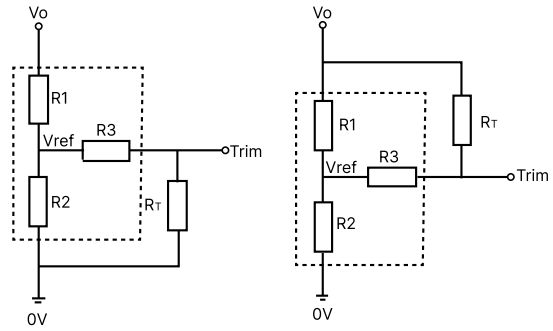


Fig. 3-②

Table 2：recommended component parameters

Model	Parameter	Model	Parameter
C1/C2	4.7uF/100V	C03	330uF/50V
C3/C4	22uF/100V	CY1/CY2	2.2nF/3000VDC
C01	1000uF/100V	LCM1	10mH
C02	470uF/100V	LDM1	2.2uH

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:

Trim up: $R_T \frac{aR_2}{R_2-a} - R_3$　　$a = \frac{Vref}{Vo'-Vref} R_1$

Trim down: $R_T \frac{aR_1}{R_1-a} - R_3$　　$a = \frac{Vo'-Vref}{Vref} R_2$

R_T = Trim resistance
a = self-defined parameter, with no real meaning.
Vo' = desired output voltage

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
5	2.97	2.87	8.1	2.5
12	10.91	2.87	15	2.5
15	14.35	2.87	12.1	2.5
24	24.77	2.87	6.1	2.5

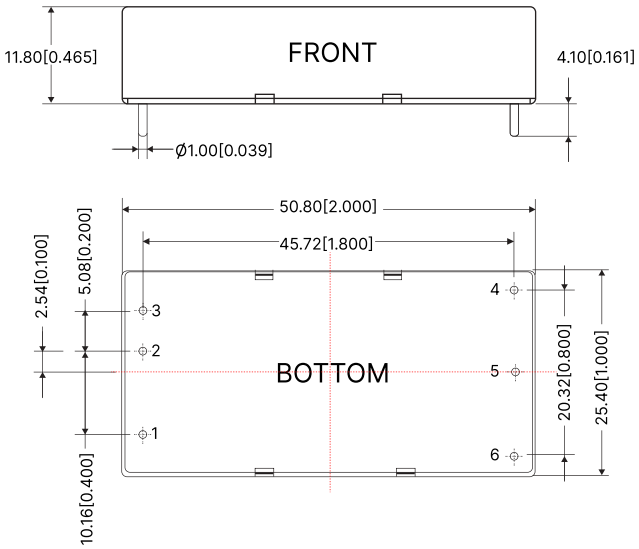
4. Recommended solution for thermal testing

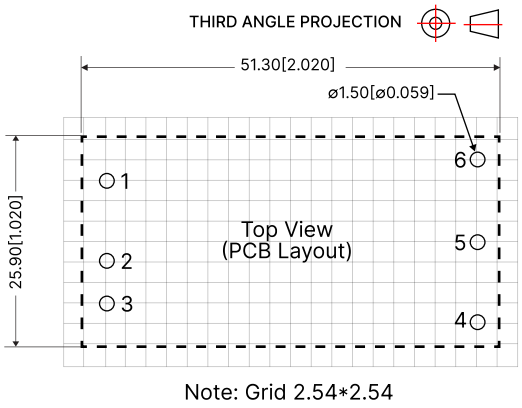
During the application process, the thermal design of the product can be evaluated in combination with the temperature derating curve of the product, or it can be determined by testing the temperature at point A, it is an safe operating area if the temperature lower than 100°C.



OVERALL DIMENSIONS AND PIN FUNCTIONS

DCWB48_LD-60W (without heatsink)





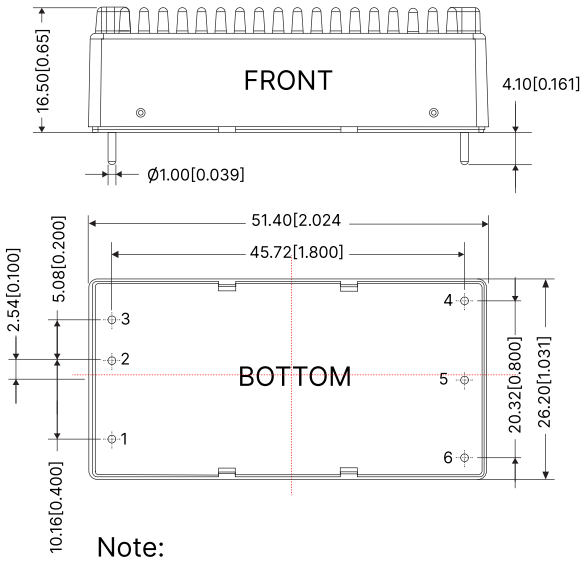
Note: Grid 2.54*2.54

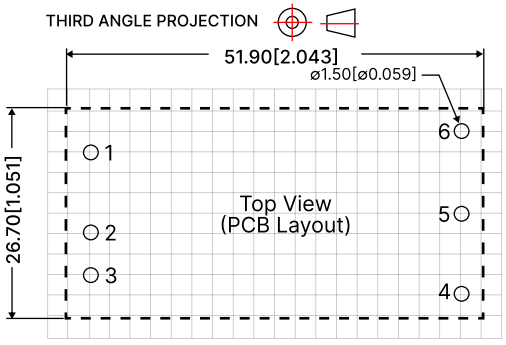
Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10 [±0.004]
General tolerances: ±0.50 [±0.020]

Table 1: Pin Function Table

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

DCWB48_LD-60WH (with heatsink)





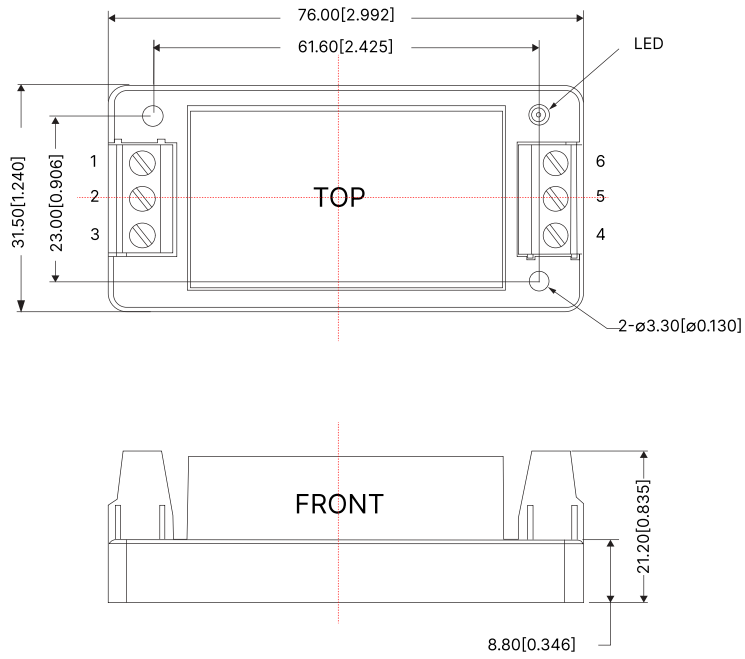
Note: Grid 2.54*2.54

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

Table 2: Pin Function Table

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

DCWB48_LD-60WST (without heatsink)



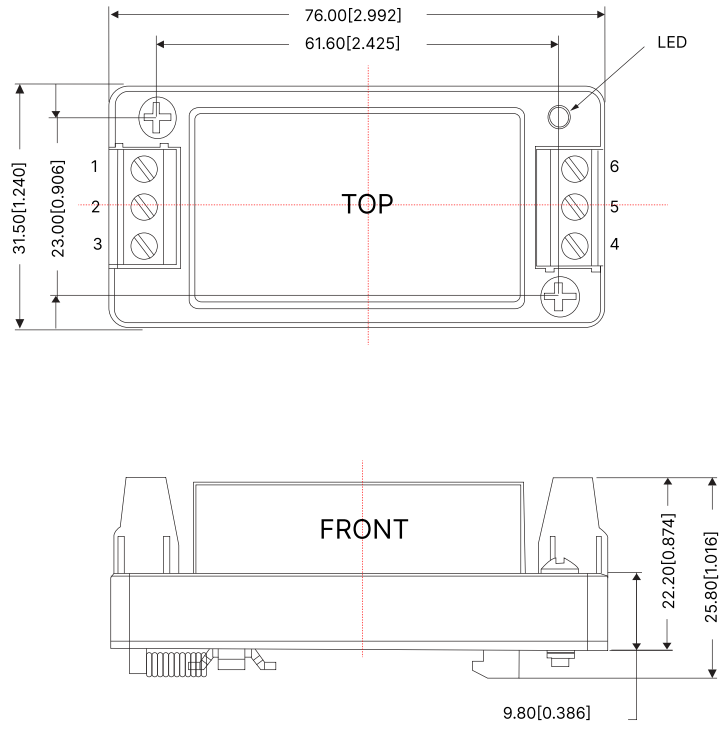
THIRD ANGLE PROJECTION

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]

DCWB48_LD-60WDR (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. 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. 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;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. The products do not support parallel connection of their output