

DCWF1D_LD-40W



CE Report RoHS



FEATURES

- Wide input voltage range (4:1)
- Input under-voltage protection, output over-voltage, over-current, short-circuit protection, over-temperature protection
- Operating ambient temperature range -40°C to +85°C
- Industry standard pin-out
- Reinforced isolation, I/O isolation test voltage 3.0KVDC/1.5KVAC

APPLICATIONS

- Railways

MODEL NUMBERING

DCWF1DxxLD-40W



SELECTION GUIDE

Product Model	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Max. Capacitive Load (μF)
	Nominal Range	Max.②	Voltage (VDC)	Current (mA) Max./Min.		
DCWF1D03LD-40W	110 (40-160)	170	3.3	10000/0	87	10000
DCWF1D05LD-40W			5	8000/0	88	10000
DCWF1D12LD-40W			12	3330/0	91	2700
DCWF1D15LD-40W			15	2667/0	91	1680
DCWF1D24LD-40W			24	1667/0	89	680
DCWF1D48LD-40W			48	833/0	89	470

Note: Use suffix "H" for Heatsink Mounting

INPUT CHARACTERISTICS

Parameter	Operating Conditions		Min.	Typ.	Max.	Units
Input current (Full Load/no-load)	Nominal input voltage	3.3V output	--	345/5	353/15	mA
		Others	--	413/3	423/15	mA
Reflected Ripple Current	Nominal input voltage		--	25	--	mA
Input Impulse Voltage	(1 Sec. max)		-0.7	--	180	VDC
Starting Voltage	100% load		--	--	40	VDC
Under Voltage Protection			28	32	--	VDC
Start Time	Nominal input voltage & constant resistance load		--	20	--	ms
Input Filter			Pi filter			
Ctrl *	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		--	2	10	mA

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

OUTPUT CHARACTERISTICS

Parameter	Operating Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy	0%-100% load		--	±1	±3	%
Line Regulation Rate	Input voltage variation from low to high at full load		--	±0.4	±1	%
Load Regulation Rate	0% -100%load		--	±0.5	±1	%
Dynamic Response Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
Dynamic Response Step Deviation		3.3V/5V output	--	±5	±8	%
		Others	--	±3	±5	%
Temperature Drift Coefficient	Nominal input voltage, full load		--	±0.02	±0.03	%/°C
Ripple & Noise	20MHz bandwidth, nominal input voltage, full load		--	150	200	mVp-p

DC - DC CONVERTERS

40 WATTS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Trim	Input voltage range	90	--	110	%Vo
Over-voltage Protection		110	--	160	%Vo
Over-current Protection		110	140	190	%Io
Short-circuit Protection		Continuous, self-recovery			

GENERAL CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Input-output Electric Strength Test for 1 minute with a leakage current of 1mAmax.	3000	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	2200	--	pF
Working Temperature	See Fig. 1	-40	--	+85	°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
Switching Frequency *	PFM mode	--	220	--	KHz
MTBF	MIL-HDBK-217F@25°C	500	--	--	Khours
Vibration		design meet IEC61373 - Category 1, Grade B			

Note: * 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	DCWF1D_LD-40W	50.80 × 25.40 × 11.80 mm
	With heatsink	DCWF1D_LD-40WH	51.40 × 26.20 × 16.50 mm
Weight	Without heatsink	DCWF1D_LD-40W	25g(Typ.)
	With heatsink	DCWF1D_LD-40WH	41.0g(Typ.)
Cooling Method	Free air convection		

EMC CHARACTERISTICS

Parameter	Category	Content
EMI	CE	CISPR32/EN55032 CLASS B(see Fig. 4-①/4-③ for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig. 4-①/4-③ for recommended circuit)
EMS	ESD	IEC/EN61000-4-2 Contact ±6KV/Air ±8KV perf. Criteria B
	RS	IEC/EN61000-4-3 20V/m perf. Criteria A
	EFT	IEC/EN61000-4-4 100kHz ±4KV (see Fig.4-②/4-④ for recommended circuit) perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2KV (2Ω 18uF see Fig.4-②/4-④ for recommended circuit) perf. Criteria B
	CS	IEC/EN61000-4-6 10 Vr.m.s perf. Criteria A

PRODUCT CHARACTERISTIC CURVE

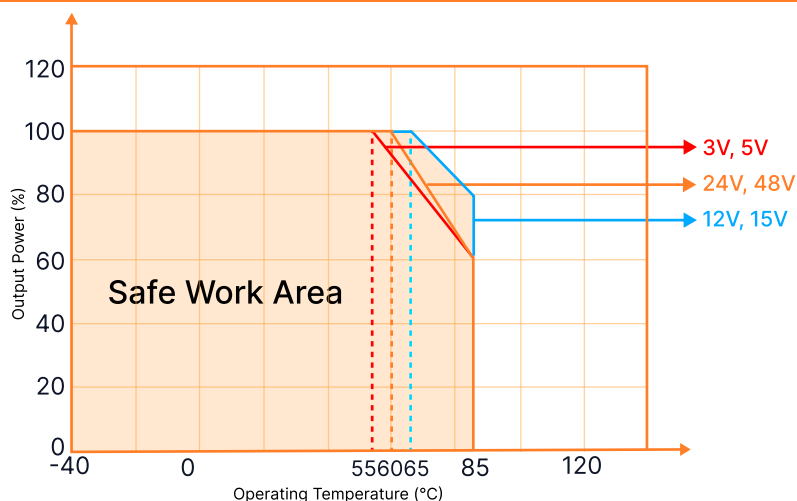


Fig.1 Temperature Derating Curve (Nominal Input)

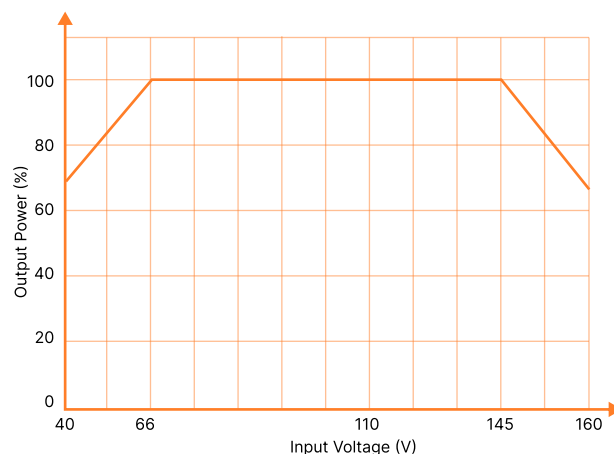
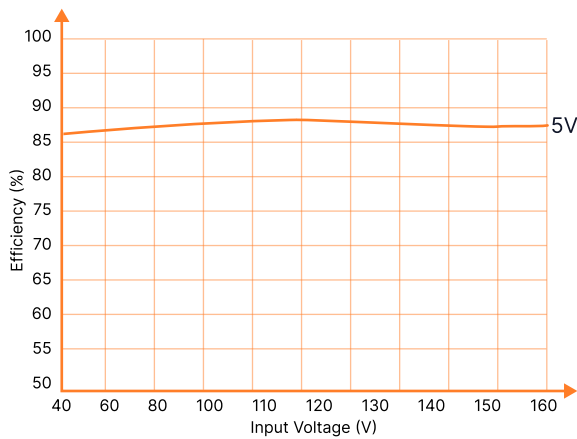
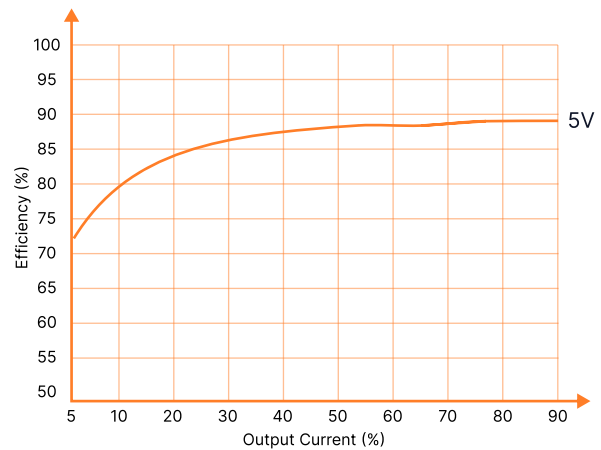


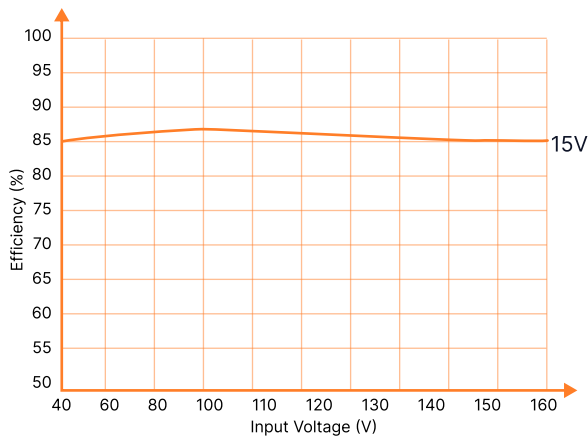
Fig.2 Input Voltage Vs. Output Power



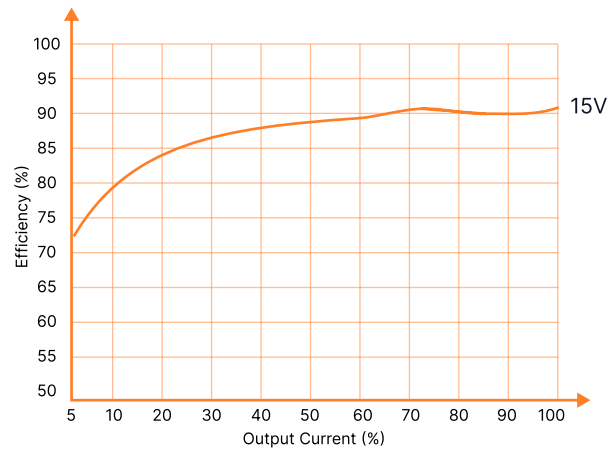
Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load (Vin=110V)



Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load (Vin=110V)

CIRCUIT DESIGN AND APPLICATION

1. Typical application

All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig.3.

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 max. capacitive load value of the product.

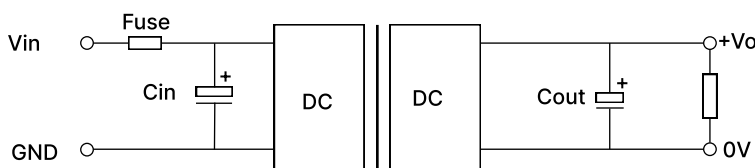


Fig.3

Vout(VDC)	Fuse	Cin	Cout
3.3,5	2A, slow blow	100μF	470μF
12,15			220μF
24,48			100μF

2. EMC compliance circuit

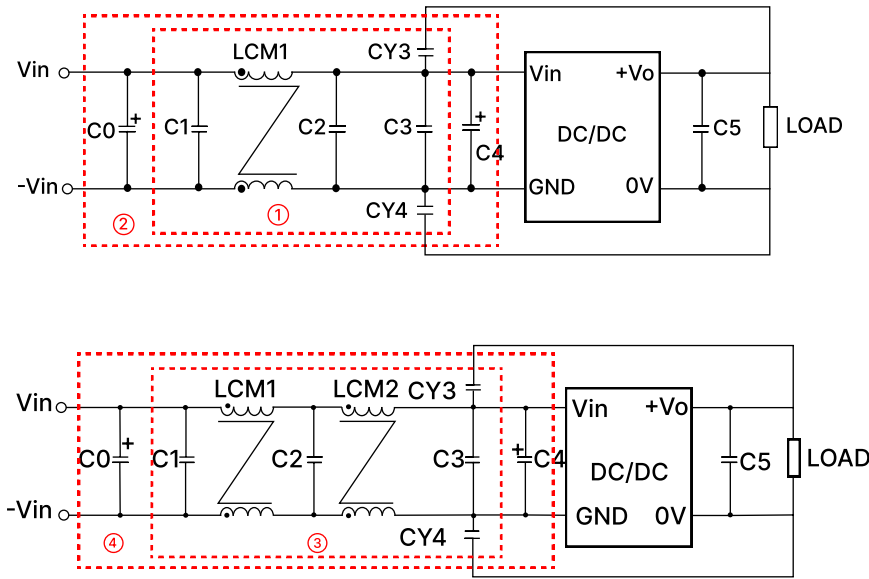


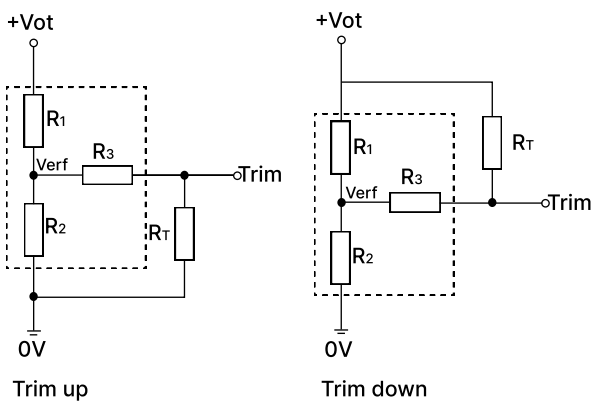
Fig.4

Component	Function
C0, C4	100μF/200V
C1, C2	2.2μF/250V
C3	Refer to the Cin in Fig.3
LCM1	10mH
LCM2	2.2mH
CY3, CY4	2200pF/400VAC
C5	Refer to the Cout in Fig.3

Notes:

- For 3.3VDC, 5VDC, 12VDC, 15VDC, 24VDC output EMC tests we use Part ② in Fig.4 for immunity and part ① for emissions test.
- For 48VDC voltage EMC tests we use Part ④ in Fig. 4 for immunity and part ③ for emissions test.

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



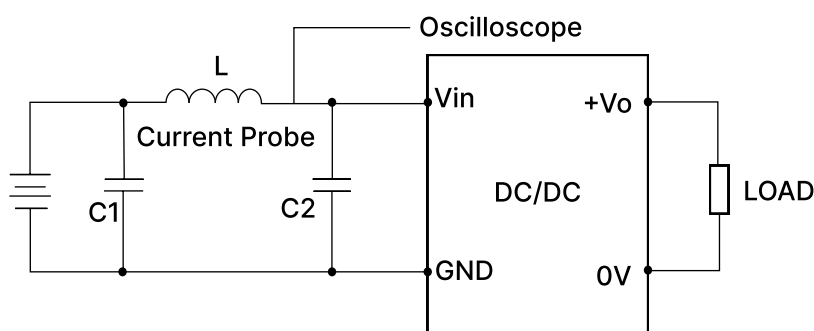
$$\begin{aligned} \text{Trim up: } R_T &= \frac{aR_2}{R_2-a} - R_3 & a &= \frac{V_{ref}}{V_o' - V_{ref}} R_1 \\ \text{Trim down: } R_T &= \frac{aR_1}{R_1-a} - R_3 & a &= \frac{V_o' - V_{ref}}{V_{ref}} R_2 \end{aligned}$$

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

TRIM resistor connection (dashed line shows internal resistor network)

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.801	2.87	10	1.24
5	2.883	2.87	10	2.5
12	11.000	2.87	15	2.5
15	14.384	2.87	15	2.5
24	24.872	2.87	17.8	2.5
48	55.28	3.0	20	2.5

4. Reflected Ripple Current testing circuit

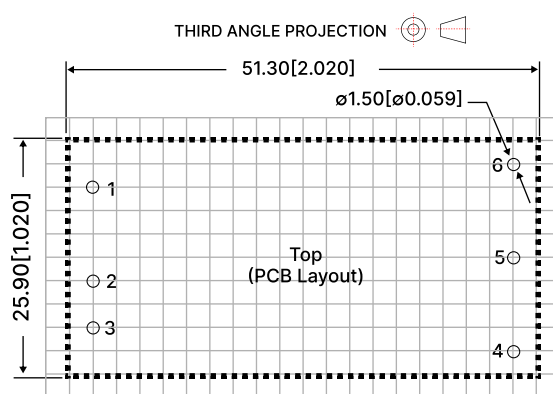
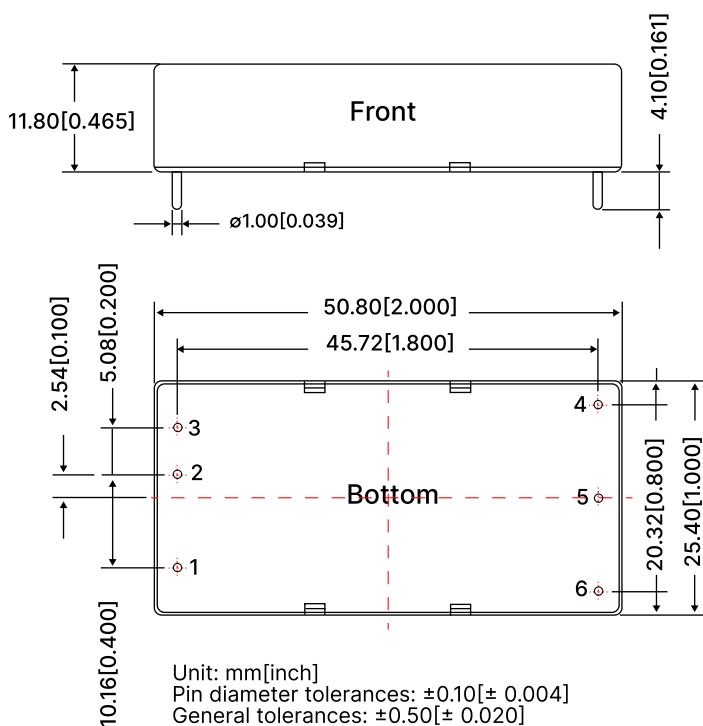


Pin	Function
C1	220uF, ESR<1.0Ω at 100KHz
L	4.7uH
C2	4.7uF/250V

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

DIMENSIONS AND INSTALLATION

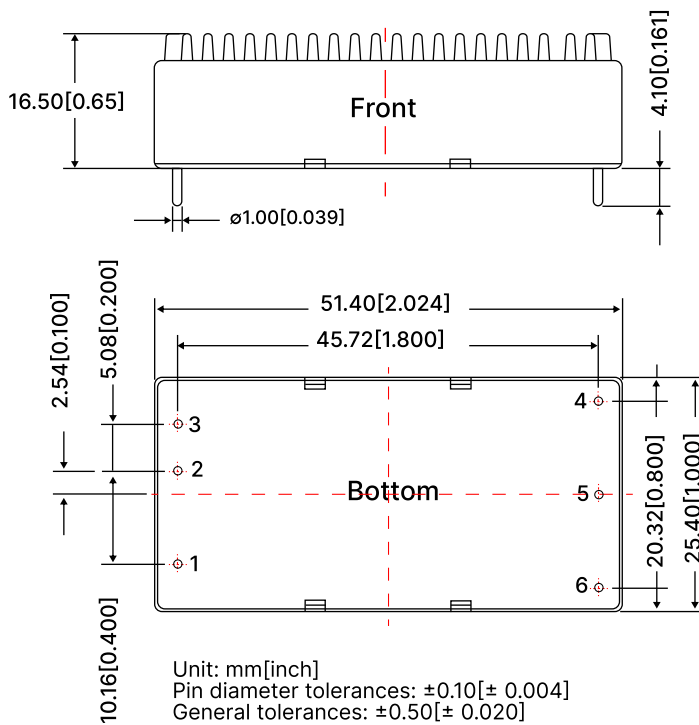
DCWF1D_LD-40W



Note: Grid 2.54 * 2.54mm

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

DCWF1D_LD-40WH



THIRD ANGLE PROJECTION

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

Note:
Unit: mm [inch]
General tolerances : $\pm 0.50 [\pm 0.020]$

NOTE

1. If the product works under the minimum required load, it cannot guarantee that the performance of the product complies with all the performance indicators in this manual;
2. The maximum capacitive load is tested under the input voltage range and full load condition;
3. Unless otherwise stated, all indexes in this manual are measured at $T_a=25^{\circ}\text{C}$, humidity $<75\%\text{RH}$, nominal input voltage and rated output load;
4. All index testing methods in this manual are based on the enterprise standards of the company;
5. Our company can provide product customization, specific needs can directly contact our technical staff;