

DCMB_LD-20W Series

FEATURES

- Wide 2:1 input voltage range
- Operating ambient temperature range : -40°C to +85°C
- I/O isolation test voltage 1.5k VDC
- High efficiency up to 90%
- Wide 2:1 input voltage range
- Meets CISPR32/EN55032 CLASS A, without extra components
- No-load power consumption as low as 0.15W
- Output short-circuit, over-voltage, over-current protection
- Metal shielded package
- 3 Years Warranty



DESCRIPTION

DC-DC Module Power Supply, Wide Voltage Input, Power 20W, Isolated, Regulated, Single Output, DIP Packaging.

MODEL NUMBERING

DCMBxxxxLD-20W



SELECTION GUIDE

Product Model	Input Voltage		Output Voltage (Vdc)	Output Current(mA) Max./Min.	Full Load Efficiency(%) Min./Typ.	Capacitive Load(μF) Max.
	Nominal (Range)	Max. ①				
DCMB2403LD-20W	24 (18-36)	40	3.3	5000/0	84/86	10000
DCMB2405LD-20W			5	4000/0	88/90	10000
DCMB2409LD-20W			9	2222/0	85/87	4700
DCMB2412LD-20W			12	1667/0	85/87	1600
DCMB2415LD-20W			15	1333/0	86/88	1000
DCMB2424LD-20W			24	834/0	86/88	500

DC-DC CONVERTERS

20 WATTS

Product Model	Input Voltage Nominal (Range)	Max. ①	Output Voltage (Vdc)	Output Current(mA) Max./Min.	Full Load Efficiency(%) Min./Typ.	Capacitive Load(μF) Max.
DCMB4803LD-20W	48 (36-75)	80	3.3	5000/0	84/86	10000
DCMB4805LD-20W			5	4000/0	88/90	10000
DCMB4809LD-20W			9	2222/0	87/89	4700
DCMB4812LD-20W			12	1667/0	87/89	1600
DCMB4815LD-20W			15	1333/0	88/90	1000
DCMB4824LD-20W			24	834/0	88/90	500

Note:

1. Exceeding the maximum input voltage may cause permanent damage;
2. Efficiency is measured In nominal input voltage and rated output load;
3. The specified maximum capacitive load value for positive and negative output is identical.

INPUT CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Input Current (full load)	Nominal Voltage Input 24VDC	--	799	993	mA
	Nominal Voltage Input 48VDC	--	400	497	mA
Input Current (no-load)	Nominal Voltage Input 24VDC	--	6	45	mA
	Nominal Voltage Input 48VDC	--	5	25	mA
Reflected Ripple Current	24VDC / 48VDC input	--	30	--	mA
Surge Voltage (1sec. max.)	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	VDC
Start-up Voltage	24VDC input	--	--	18	VDC
	48VDC input	--	--	36	VDC
Start-up Time	Nominal Input Voltage & Constant Resistance Load	--	10	--	ms
Input Filter		Pi filter			
Remote Control Foot (Ctrl)①	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	--	4	7	mA

Remarks: This product does not support hot plug

Note: ①The Ctrl pin voltage is referenced to input GND.

OUTPUT CHARACTERISTICS

Parameter	Operating Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy	0%-100% load		--	±1	±3	%
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	%
Transient Recovery Time			--	300	500	μs
Transient Response Deviation	25% load step change, Nominal input voltage	3.3V, 5V	--	±5	±8	%
		9V, 12V, 15V, 24V	--	±3	±5	%
Temperature Coefficient	Full load		--	--	±0.03	%/°C
Ripple & Noise	20MHz bandwidth, 5%-100% load		--	50	100	mVp-p
Trim	Input voltage range(24V/48V input series)		90	--	100	%Vo
Over-voltage Protection	Input voltage range(24V/48V input series and)		110	--	160	%Vo
Over-current Protection	Input voltage range		--	130	--	%Vo
Short-circuit Protection	Input voltage range		Hiccup, continuous, self-recovery			

Note:

1. Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;
2. Load regulation for 0%-100% load is ±5%;
3. *Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

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
Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	DCMB2424LD-20W	--	2050	--	pF
		3.3V,5V,9V,12V,15V	--	1050	--	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
Max. Case Temperature	Refer to temperature derating curve		--	--	105	°C
Vibration			10-150Hz, 5G, 90 Min. alongX, YandZ			
Switching Frequency *	PWM mode		--	270	--	kHz
MTBF	MIL-HDBK-217F@25°C		1000	--	--	khours

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	50.80 × 25.40 × 11.80 mm
Weight	26.0g(Typ.)
Cooling Method	Natural air cooling

EMC CHARACTERISTICS

Parameter	Category	Content		
EMI	CE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (see Fig.3-①for recommended circuit)		
	RE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (see Fig.3-①for recommended circuit)		
EMS	ESD	IEC/EN61000-4-2	Contact $\pm 4\text{kV}$	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2\text{kV}$ (see Fig.3-② for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{kV}$ (see Fig.3-②for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29	0%, 70%	perf. Criteria B

PRODUCT CHARACTERISTIC CURVE

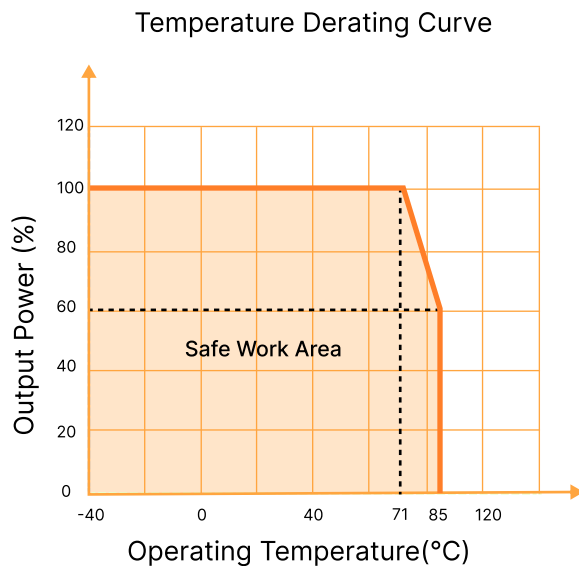
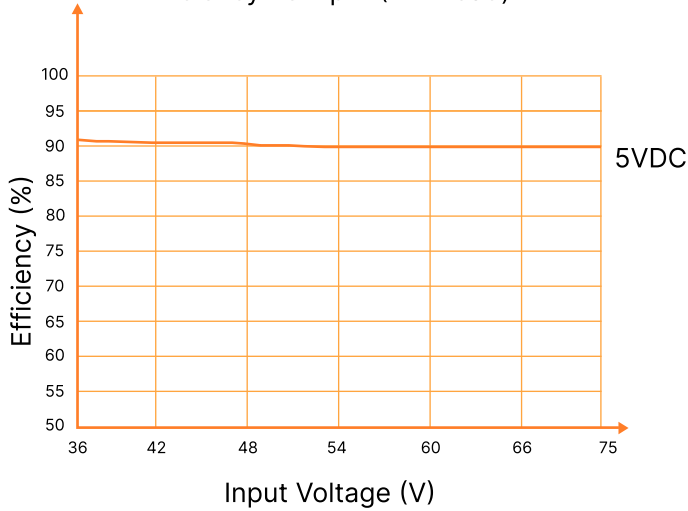
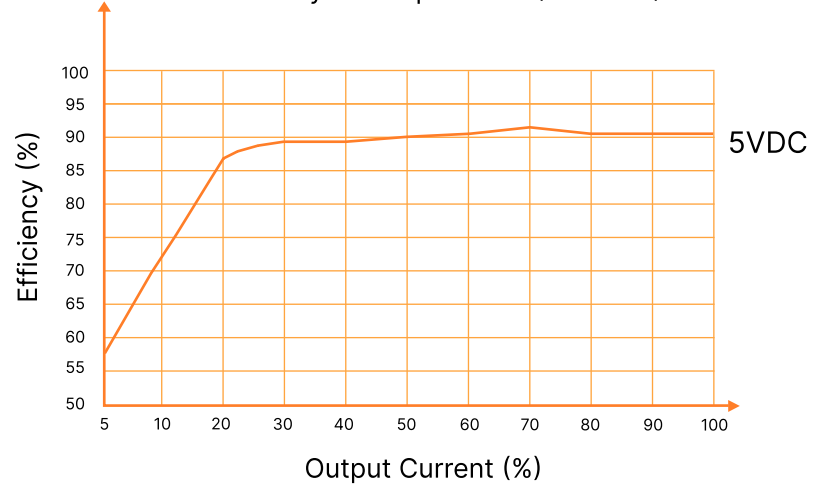


Fig.1

Efficiency Vs Input (Full Load)



Efficiency Vs Output Load (Vin=48V)



CIRCUIT DESIGN AND APPLICATION

1. Typical application

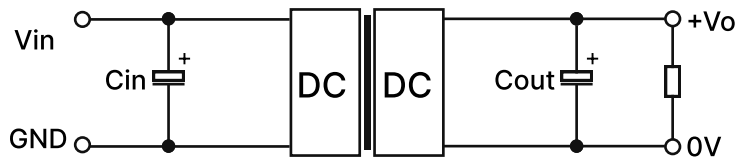


Fig.2

Vin(VDC)	Cin(μF)
24	100μF/50V
48	100μF/100V

(VDC)	Cin(μF)
3.3/5	470/16V
9/12/15	220/25V
24	100/50V

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.

2. EMC compliance circuit

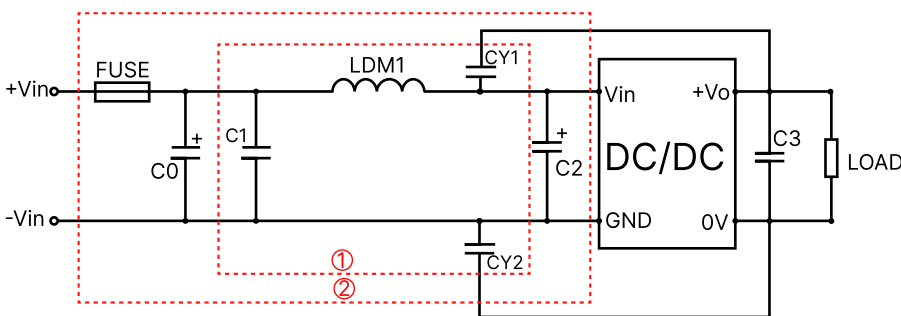
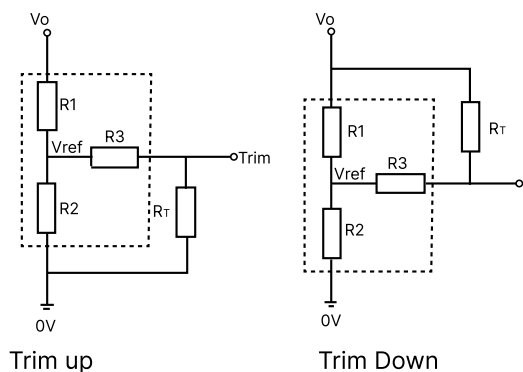


Fig. 3

Notes: For EMC tests we use Part ① in Fig. 3 for emissions and part ② for immunity test. Selecting based on needs.

Mode	Vin:24VDC	Vin: 48VDC
FUSE	Choose according to actual input current	
C0	680μF/100V	680μF/100V
C1	1μF/50V	1μF/100V
C2	330μF/50V	330μF/100V
C3 / C4	Refer to the Cout in Fig.2	
LDM1	4.7μH	
CY1/ CY2	1nF/2kV	

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



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

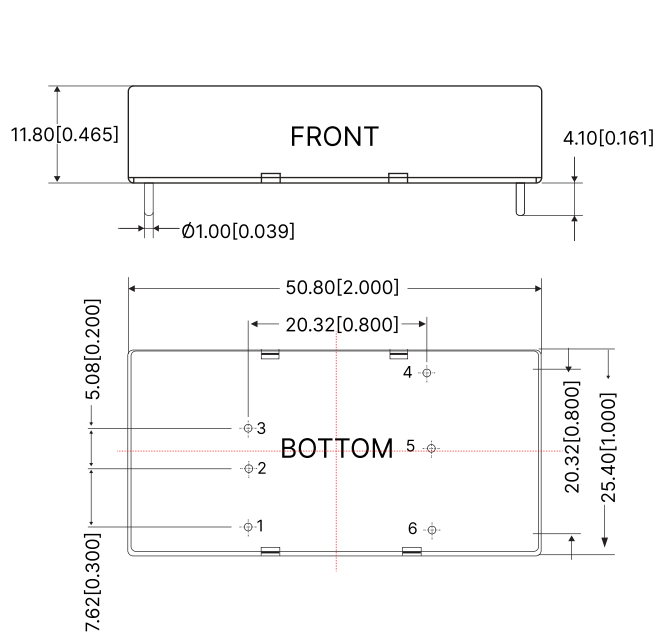
$$\text{Trim up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_o' - V_{ref}} R_1$$

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

R_T = Trim resistance;
a = self-defined parameter.

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.775	2.87	12.4	1.25
5	2.883	2.87	10	2.5
9	7.500	2.87	15	2.5
12	11.000	2.87	15	2.5
15	14.494	2.87	15	2.5
24	24.872	2.87	17.8	2.5

OVERALL DIMENSIONS AND PIN FUNCTIONS



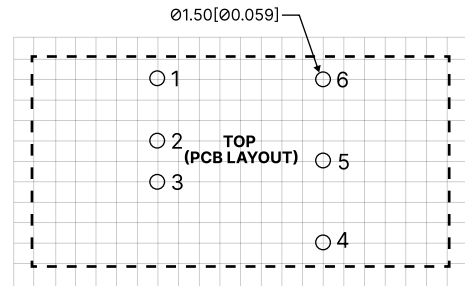
Note:

Unit: mm[inch]

Pin diameter tolerances: ± 0.10 [± 0.004]

General tolerances: ± 0.50 [± 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	Trim
6	0V

NOTES

1. We suggest to use module at load of over 5%, if not, the ripple of the product may exceeds the specification, but does not affect the reliability of the product;
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 $T_a=25^{\circ}\text{C}$, 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. We can provide product customization service, please contact our technicians directly for specific information;
6. The products do not support parallel connection of their output