

DCMA_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, Double Output, DIP Packaging.

MODEL NUMBERING

DCMAxxxxLD-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				
DCMA1215LD-20W	12 (9-18)	20	±15	±667/0	85/87	625
DCMA1224LD-20W			±24	±417/0	86/88	220
DCMA2405LD-20W	24 (18-36)	40	±5	±2000/0	82/84	4800
DCMA2409LD-20W			±9	±1111/0	84/86	1000

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.
DCMA2412LD-20W	24 (18-36)	40	±12	±834/0	84/86	800
DCMA2415LD-20W			±15	±667/0	84/86	625
DCMA2424LD-20W			±24	±417/0	84/86	500
DCMA4805LD-20W	48 (36-75)	80	±5	±2000/0	84/86	4800
DCMA4812LD-20W			±12	±834/0	86/88	800
DCMA4815LD-20W			±15	±667/0	87/89	625

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 12VDC	--	1894	1960	mA
	Nominal Voltage Input 24VDC	--	947	969	mA
	Nominal Voltage Input 48VDC	--	474	485	mA
Input Current (no-load)	Nominal Voltage Input 12VDC	--	12	25	mA
	Nominal Voltage Input 24VDC	--	6	10	mA
	Nominal Voltage Input 48VDC	--	5	9	mA
Reflected Ripple Current	12VDC input	--	30	--	mA
	24VDC / 48VDC input	--	30	--	mA
Surge Voltage (1sec. max.)	12VDC input	-0.7	--	25	VDC
	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	VDC
Start-up Voltage	12VDC input	--	--	9	VDC
	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)	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	5%-100% load	DCMA1215LD-20W		--	±1	±3	%
	0%-100% load	DCMA1224LD-20W	Positive output	--	±1	±3	%
			Negative output	--	±2	±4	%
Line Regulation Rate	Input voltage variation from low to high at full load	Positive output		--	±0.2	±0.5	%
		Negative output		--	±0.5	±1	%
Load Regulation Rate	5%-100% load	DCMA1215LD-20W DCMA1224LD-20W	Positive output	--	±0.5	±1	%
			Negative output	--	±1	±1.5	%
		Others	Positive output	--	±0.5	±1	%
			Negative output	--	±0.5	±1.5	%
Cross Regulation	Dual output with Positive output at 50% load and Negative output from 10%-100% load			--	--	±5	%
Dynamic response recovery time	25% load step change, Nominal input voltage			--	300	500	μs
±5VDC			--	±5	±8	%	
Others			--	±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	--	110	%Vo
Over-voltage Protection	Input voltage range(24V/48V input series and VRA1215LD-20WR3/VRA1224LD-20WR3)			110	--	160	%Vo
Over-current Protection	Input voltage range			110	--	190	%Io
Short-circuit Protection	Input voltage range			Hiccup, continuous, self-recovery			

Note:

- Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;
- Load regulation for 0%-100% load is ±5%;
- *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	--	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. along X, Y and Z			
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

DCMA1215LD-20W
Temperature Derating Curve

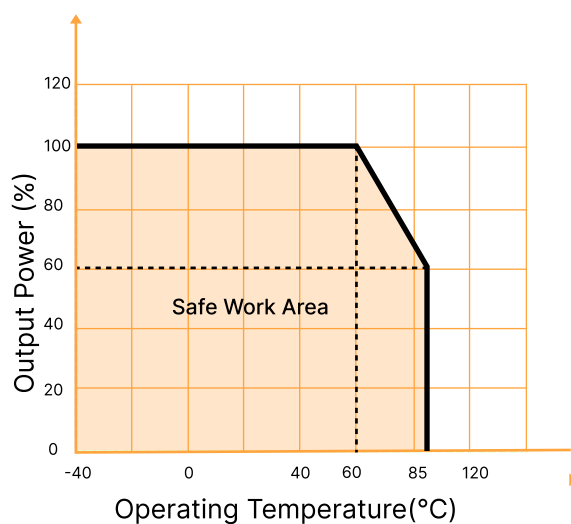
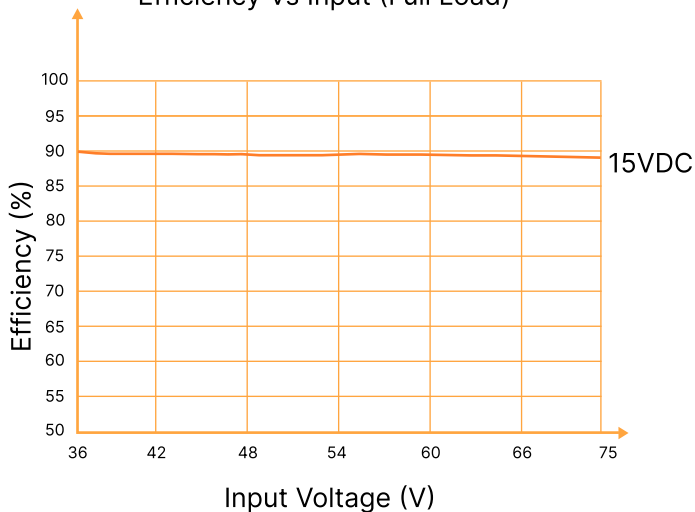
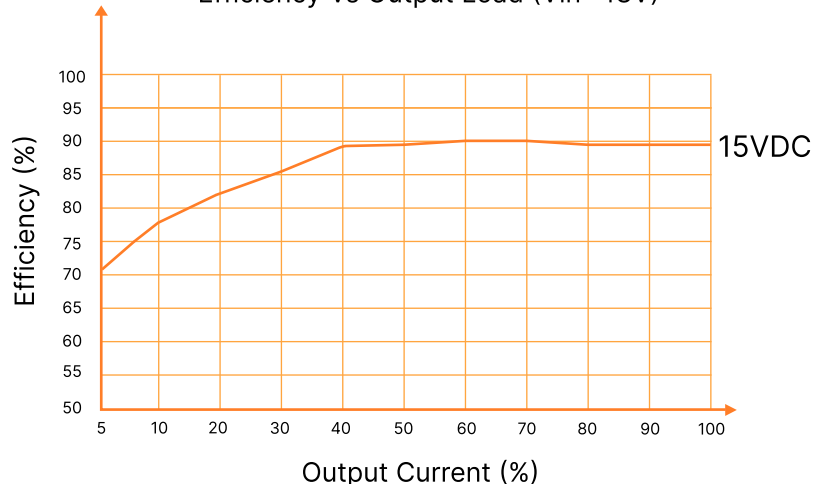


Fig: 1

Efficiency Vs Input (Full Load)



Efficiency Vs Output Load (Vin=48V)



CIRCUIT DESIGN AND APPLICATION

1. Typical application

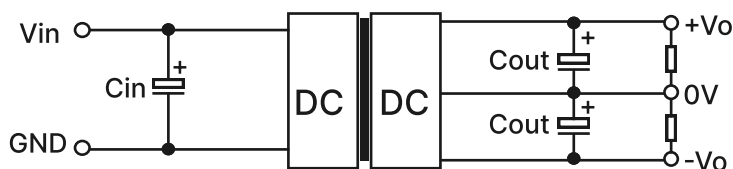


Fig: 2

Vin(VDC)	Cin(μ F)	Dual Vout (VDC)	Cout (μ F)
12	100 μ F/25V	± 5	220/16V
24	100 μ F/50V	$\pm 9/\pm 12/\pm 15$	100/25V
48	100 μ F/100V	± 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 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.

2. EMC compliance circuit

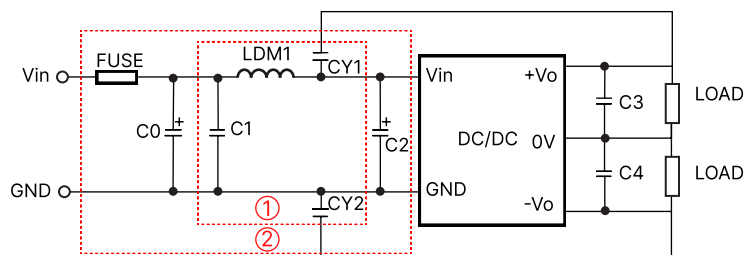
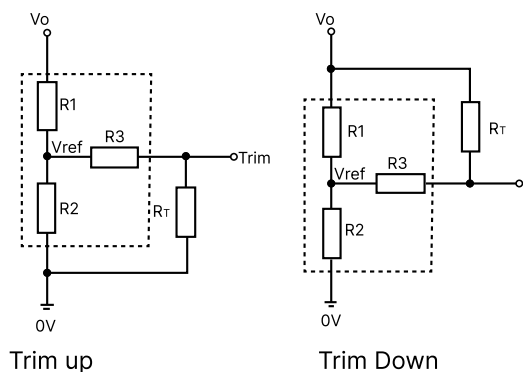


Fig: 3

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:12VDC, 24VDC	Vin: 48VDC
FUSE	Choose according to actual input current	
C0	680 μ F/100V	680 μ F/100V
C1	1 μ F/50V	1 μ F/100V
C2	330 μ F/50V	330 μ F/100V
C3 / C4	Refer to the Cout in Fig.2	
LDM1	4.7 μ H	
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:

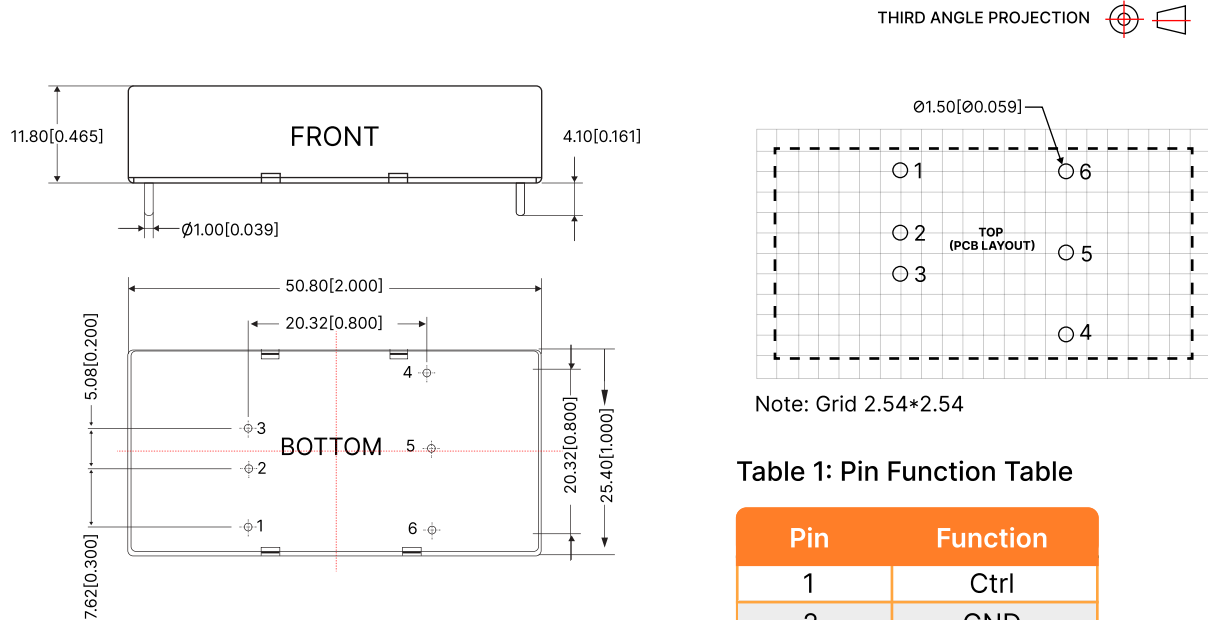
$$\text{Trim up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_o' - V_{ref}} R_1$$

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

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]

Table 1: Pin Function Table

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

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 $<75\%\text{RH}$ 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