

FEATURES

- ◆ Ultra-wide 4:1 input voltage range
- ◆ High efficiency up to 90% with full load and up to 82% with 5% load
- ◆ No-load power consumption as low as 0.14W
- ◆ I/O isolation test voltage: 1500V_{DC}
- ◆ Input under-voltage protection, output short circuit, over-voltage, over-current protection
- ◆ Operating ambient temperature range: -40℃ to +70℃
- ◆ CISPR32/EN55032 CLASS A EMI compliant without external components
- ◆ Six-sided metal shielded package
- ◆ Input reverse polarity protection available with chassis(Z2) or Din-Rail mounting (Z4) version
- ◆ Three year warranty

30W isolated DC-DC converter

Ultra-wide input and regulated dual/single output



Selection Guide

Certification	PartNo. ①	Input Voltage(V _{DC})		Output		Full Load Efficiency④(%) Min./Typ.	Max. Capacitive Load(μF) ⑤
		Nominal ② (Range)	Max. ③	Voltage(V _{DC})	Current(mA) Max./Min.		
	CFDM30-24S03	24 (9-36)	40	3.3	6000/0	83/85	10000
	CFDM30-24S05			5	6000/0	84/86	10000
	CFDM30-24S09			9	3333/0	86/88	4700
	CFDM30-24S12			12	2500/0	88/90	2700
	CFDM30-24S15			15	2000/0	88/90	1680
	CFDM30-24S24			24	1250/0	88/90	680
	CFDM30-24D05			±5	±3000/0	84/86	2000
	CFDM30-24D12			±12	±1250/0	87/89	1250
	CFDM30-24D15			±15	±1000/0	87/89	680
	CFDM30-24D24			±24	±625/0	87/89	470
	CFDM30-48S03	48 (18-75)	80	3.3	6000/0	84/86	10000
	CFDM30-48S05			5	6000/0	85/87	10000
	CFDM30-48S12			12	2500/0	86/88	2700
	CFDM30-48S15			15	2000/0	87/89	1680
	CFDM30-48S24			24	1250/0	85/87	680
	CFDM30-48D05			±5	±3000/0	84/86	2000
	CFDM30-48D12			±12	±1250/0	86/88	1250
	CFDM30-48D15			±15	±1000/0	86/88	680

Notes: ① Use "S" suffix for heat sink mounting, "Z1" suffix for chassis mounting and "Z" suffix for DIN-Rail mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;

② Minimum input voltage and start-up voltage are increased by 1V for all models with Z1 and Z suffixes because of the input reverse polarity function;

③ Exceeding the maximum input voltage may cause permanent damage;

④ Efficiency is measured at nominal input voltage and rated output load; efficiencies for Z1 and Z Model's is decreased by 2% due to the input reverse polarity protection circuit;

⑤ The specified maximum capacitive load value for positive and negative output is identical.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	24Vdc nominal input series nominal input voltage	3.3V output	--	970/60	993/100	mA
		5V output	--	1454/60	1488/100	
		Others	--	1388/6	1488/16	
	48Vdc nominal input series, nominal input voltage	3.3V output	--	474/20	485/30	
		5V output	--	710/20	726/35	
		Others	--	702/5	744/10	
Reflected Ripple Current	Nominal input series		--	40	--	
Surge Voltage(1sec.max.)	24Vdc nominal input series		-0.7	--	50	Vdc
	48Vdc nominal input series		-0.7	--	100	
Start-up Voltage	24Vdc nominal input series		--	--	9	
	48Vdc nominal input series		--	--	18	
Shut-down Voltage	24Vdc nominal input series		5.5	6.5	--	
	48Vdc nominal input series		12.0	15.5	--	
Start-up Time	Nominal input voltage & constant resistance load		--	10	--	ms
Input Filter			Pi filter			
Hot Plug			Unavailable			
CNT *	Module on		CNT pin open or pulled high(3.5-12Vdc)			
	Module off		CNT pin pulled low to -Vin(0-1.2Vdc)			
	Input current when off		--	5	8	mA

Note: *The CNT pin voltage is referenced to input -Vin .

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	5%-100%load		--	±1	±3	%
	0%-5%load		--	±1	±5	
Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.2	±0.5	
		Vo2	--	±0.5	±1	
Load Regulation①	5%-100% load	Vo1	--	±0.5	±1	
		Vo2	--	±0.5	±1.5	
Cross Regulation	Dual output,Vo1 load at 50%,Vo2 load at range of 10%-100%		--	--	±5	
Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
Transient Response Deviation		3.3V/5V/±5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple/Noise②	20MHz bandwidth, nominal input voltage,100% load	Singe output	--	50	100	Mvp-p
		Dual output	--	50	150	
Trim			--	±10	--	%Vo
Over-voltage Protection	Input voltage range		110	--	160	
Over-current Protection			110	--	190	%Io
Short-circuit Protection			Hiccup,continuous,self-recovery			
Note: ① Load regulation for 0%-100% load is ±5%; ②The"parallel cable"method is used for ripple and noise test						

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② The "parallel cable" method is used for ripple and noise test

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.	1500	--	--	V _{DC}
Insulation Resistance	Input-output resistance at 500V _{DC} /60sec	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	2000	--	pF
Operating Temperature	See Fig.1, Fig.2, Fig.3 and Fig.4	-40	--	+70	℃
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	℃
Vibration		10-55Hz, 2G, 30 Min. along X, Y and Z			
Switching Frequency *	PWM mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

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

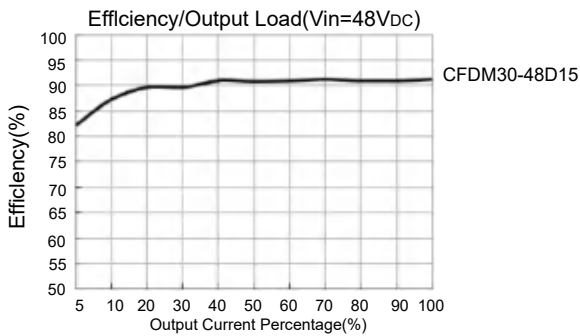
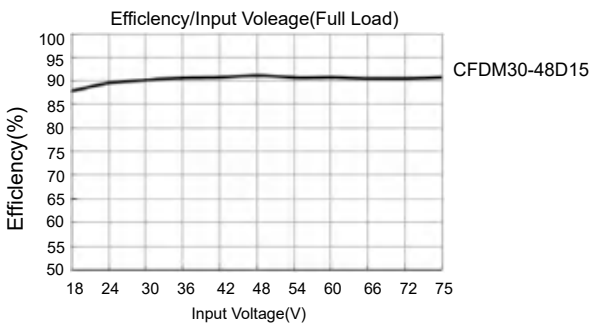
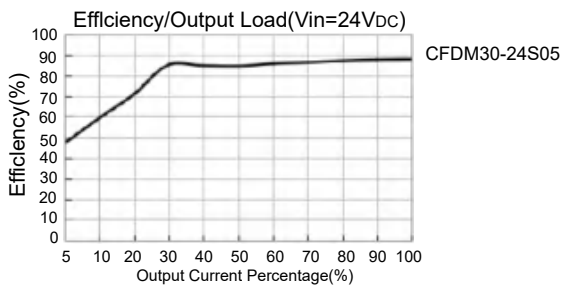
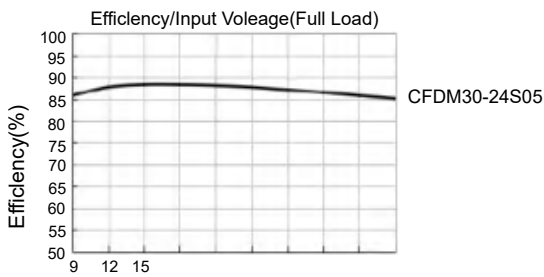
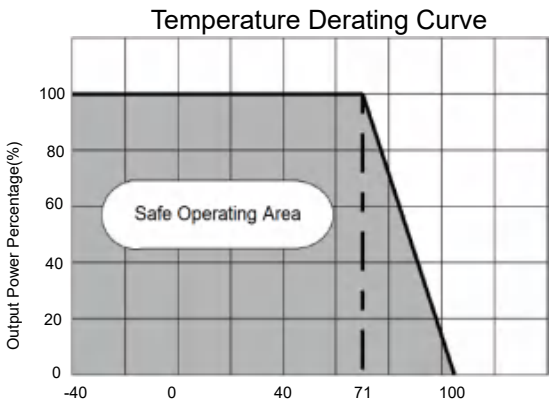
Mechanical Specifications

Case Material	Aluminum alloy		
Dimensions	Horizontal package(without heat sink)		50.8×25.4×11.8mm
	Horizontal package(with heat sink)		51.4×26.2×23.0mm
	Z1 chassis mounting(without heat sink)		76.0×31.5×21.2mm
	Z Din-rail mounting(with heat sink)		76.0×31.5×25.8mm
Weight	without heat sink	Horizontal package/Z1 chassis mounting/Z Din-rail mounting	27.8g/52.0g/72.0g(Typ.)
	with heat sink	Horizontal package/Z1 chassis mounting/Z Din-rail mounting	37.0g/60.0g/80.0g(Typ.)
Cooling Method	Free air convection		

Electromagnetic Compatibility(EMC)

Emissions	CE	Single output	CISPR32/EN55032	CLASS A(without external components)/ CLASS B(see Fig.6-② for recommended circuit)	
		Dual output	CISPR32/EN55032	CLASS A(without external components)/ CLASS B(see Fig.7-② for recommended circuit)	
	RE	Single output	CISPR32/EN55032	CLASS A(without external components)/ CCLASS B(see Fig.6-② for recommended circuit)	
		Dual output	CISPR32/EN55032	CLASS A(without external components)/ CLASS B(see Fig.7-② for recommended circuit)	
Immunity	ESD		IEC/EN61000-4-2 Contact ±4KV		perf. Criteria A
	RS		IEC/EN61000-4-3 10V/m		perf. Criteria A
	EFT	Single output	IEC/EN61000-4-4 ±2KV(see Fig.6-① for recommended circuit)		perf. Criteria B
		Dual output	IEC/EN61000-4-4 ±2KV(see Fig.7-① for recommended circuit)		perf. Criteria B
	Surge	Single output	IEC/EN61000-4-5 line to line ±2KV(see Fig.6-①for recommended circuit)		perf. Criteria B
		Dual output	IEC/EN61000-4-5 line to line ±2KV(see Fig.7-①for recommended circuit)		perf. Criteria B
	CS	Single output	IEC/EN61000-4-6 3Vr.m.s		perf. Criteria A
		Dual output	IEC/EN61000-4-6 10Vr.m.s		perf. Criteria A

Typical Characteristic Curves



Design Reference

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.

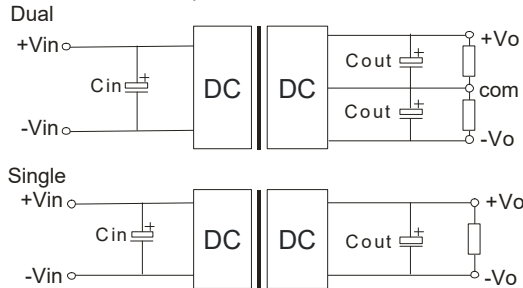


Fig. 5

Single output voltage (V _{DC})	C _{out} (μF)	C _{in} (μF)	Dual output voltage (V _{DC})	C _{out} (μF)	C _{in} (μF)
3.3/5/9	220	100	±5/±12/±15	220	100
12/15/24	100		±24	100	

2. EMC compliance circuit

Single output

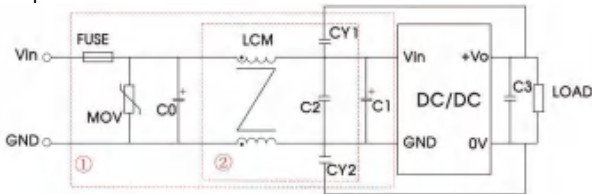


Fig. 6

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

Parameter description

Model	Vin:24V	Vin:48V
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680μF/50V	330μF/100V
C1	330μF/50V	330μF/100V
C2	4.7μF/50V	2.2μF/100V
C3	Refer to the Cout in Fig.5	
LCM	1mH	
CY1,CY2	1nF/2KV	

Dual output

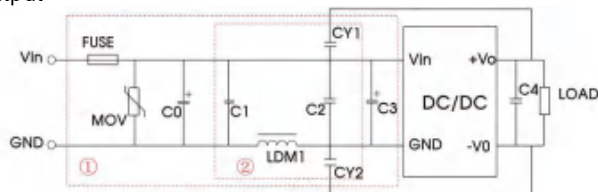
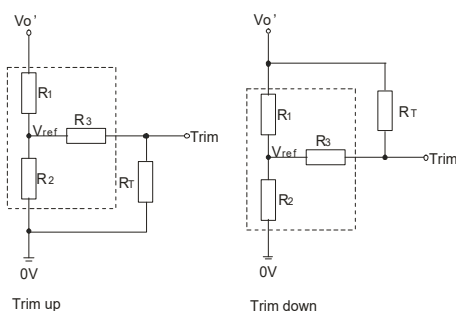


Fig. 7

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

Model	Vin:24V	Vin:48V
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680μF/50V	330μF/100V
C1,C2	2.2μF/50V	2.2μF/100V
C3	330μF/50V	330μF/100V
C4	Refer to the Cout in Fig.5	
LDM1	3.3μH	
CY1,CY2	2.2nF/400VAC Safety Y Capacitor	

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



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

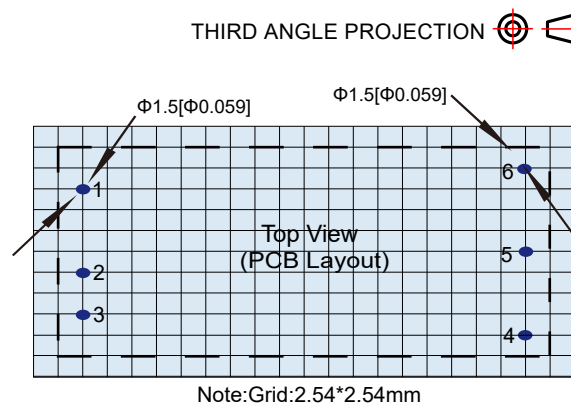
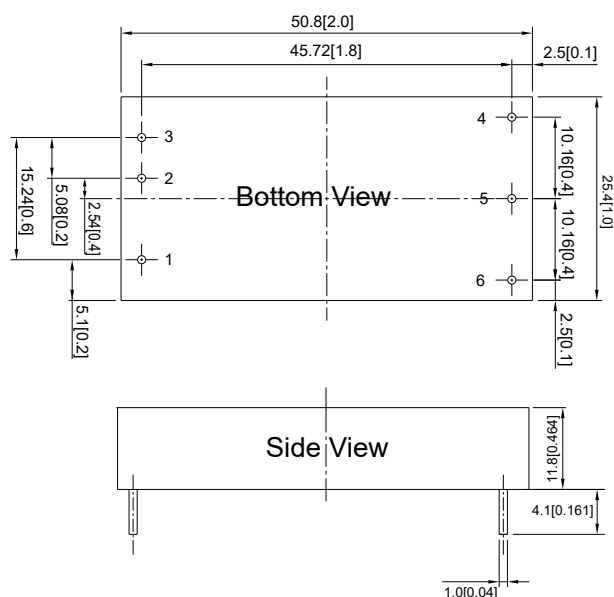
$$\begin{aligned} \text{up: } R_T &= \frac{aR_2}{R_2 - a} - R_3 & a &= \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{aR_1}{R_1 - a} - R_3 & a &= \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

R_T =Trim Resistor value;
 a =self-defined parameter;
 $V_{o'}$ =desired output voltage.

Vout(V _{dc})	R1(K Ω)	R2(K Ω)	R3(K Ω)	Vref(V)
3.3	4.801	2.87	12.4	1.24
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

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

Horizontal Package(without heat sink)Dimensions and Recommended Layout



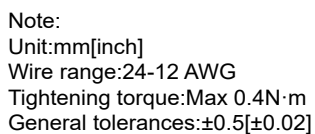
Note:
Unit:mm[inch]
General tolerances:±1.0[±0.039]

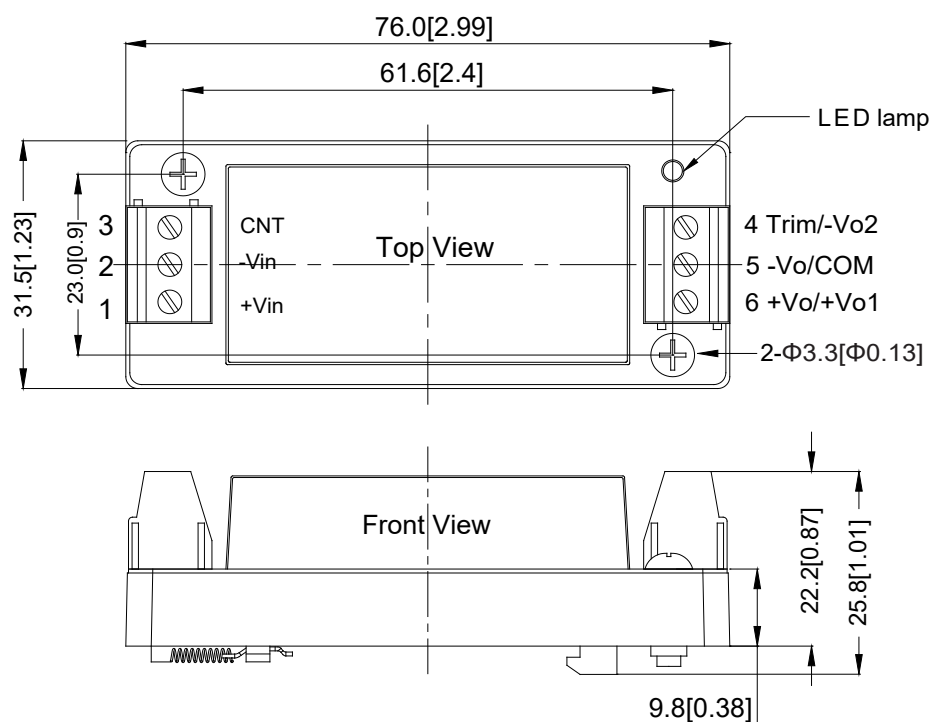
Pin	1	2	3	4	5	6
Single	CNT	-Vin	+Vin	+Vo	-Vo	TRIM
Dual	CNT	-Vin	+Vin	+Vo1	COM	-Vo2

THIRD ANGLE PROJECTION



THIRD ANGLE PROJECTION





Note:

Unit:mm[inch]

Wire range:24-12 AWG

Tightening torque:Max 0.4 N·m

General tolerances: ± 0.5 [± 0.02]

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