FEATURES

- Wide 4:1 input voltage range
- High effic ienc y up to 93%
- I/O isolation test voltage 1500V_{DC}
- Input over-voltage,under-voltage protec tion,
- output short-c ircuit,over-current and over-voltage protec tion
- Operating ambient temperature range:-40℃~+70℃ Six-sided metal shielding pac kage
- Input reverse polarity protec tion available with chassis (Z2) or DIN-Rail mounting (Z4) version
- Industry standard pin-out EN60950 approved
- Warranty period of three years

50W isolated DC-DC converter in DIP pac kaging
Wide input and regulated single output

Selec tion Guide

Certification	Part No.①	Input Voltage (V_{DC}) Nominal② (Range)	Output Voltage(V_{DC})	Output Current(mA) Max./Min.	Full Load Efficiency③(%) Min./Typ.	Max.Capac itive Load(μF)
	CFDMR50-24S03	24 (9-36)	3.3	10000/500	89/91	27000
	CFDMR50-24S05		5	10000/500	89/91	18900
	CFDMR50-24S12		12	4167/208	91/93	3700
	CFDMR50-24S15		15	3333/167	91/93	2000
	CFDMR50-24S24		24	2083/104	89/91	1000
	CFDMR50-48S03	48 (18-75)	3.3	10000/ 500	89/ 91	27000
	CFDMR50-48S05		5	10000/ 500	89/ 91	18900
	CFDMR50-48S12		12	4167/ 208	91/ 93	3700
	CFDMR50-48S15		15	3333/ 167	91/ 93	2000
	CFDMR50-48S24		24	2083/ 104	90/ 92	1000

Notes:
①Use“S”suffix for heat sink mounting,“Z2” suffix for chassismounting and“Z4”suffix for DIN-Rail mounting.We recommend to choose moduleswith a heat sink for enhanced heat dissipation and applicationswith extreme temperature requirements;
②The minimum input voltage and starting voltage of Z2 and Z4 Model are 1V_{DC} higher than those of DIP package due to input reverse polarity protec tion func tion;
③Efficiency ismeasured at nominal input voltage and rated output load;effic ienc ies for Z2 and Z4 Model's is decreased by 2%due to the input reverse polarity protection circuit;

Input Spec ifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	24V_{DC} nominal input series, nominal input voltage	3.3V_{DC} output	--	1511/42	1545/55	mA
		5V_{DC} output	--	2289/59	2341/105	
		12V_{DC} output	--	2240/ 85	2290/105	
		15V_{DC} output	--	2240/90	2290/105	
		24V_{DC} output	--	2289/45	2341/65	
	48V_{DC} nominal input series, nominal input voltage	3.3V_{DC} output	--	756/30	773/35	
		5V_{DC} output	--	1144/50	1171/55	
		12V_{DC} output	--	1120/34	1145/55	
		15V_{DC} output	--	1120/50	1145/70	
		24V_{DC} output	--	1132/30	1158/50	

Reflected Ripple Current	24VDC nominal input series,nominal input voltage		--	40	--	mA
	48VDC nominal input series,nominal input voltage		--	30	--	
Surge Voltage(1sec.max.)	24VDC nominal input series		-0.7	--	50	VDC
	48VDC nominal input series		-0.7	--	100	
Start-up Time	Nominal input voltage & constant resistance load		--	10	--	ms
Under-voltage Protection	24VDC nominal input series	Start-up Voltage	--	--	18	VDC
		Shutdown Voltage	15	--	--	
	48VDC nominal input series	Start-up Voltage	--	--	36	
		Shutdown Voltage	31	--	--	
Over-voltage Protection	24VDC nominal input series	Start-up Voltage	36	--	--	
		Shutdown Voltage	--	--	41	
	48VDC nominal input series	Start-up Voltage	75	--	--	
		Shutdown Voltage	--	--	83	
Input Filter			Pi filter			
Hot Plug			Unavailable			
CNT*	Module on		CNT pin open or pulled high(3-12VDC)			
	Module off		CNT pin pulled low to -Vin(0-1.2VDC)			
	Input current when off		--	6	--	mA

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

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy			--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
Load Regulation	5%-100% load		--	±0.5	±1	
Transient Recovery Time	Nominal input voltage,25% load step change	24VDC output	--	500	1000	μs
		Others	--	200	500	
Transient Response Deviation	Nominal input voltage,25% load step change		--	±3	±5	%
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple/Noise①	20MHz bandwidth	CFDMR50-24S03 CFDMR50-48S03 CFDMR50-24S05 CFDMR50-48S05	--	100	250	mVp-p
		CFDMR50-48S24	--	200	350	
		Others	--	200	300	
Trim			--	±10%Vo	--	VDC
Over-voltage Protection②	Input voltage range	3.3VDC output	--	3.9	--	
		5VDC output	--	6.2	--	
		12VDC output	--	15	--	
		15VDC output	--	18	--	
		24VDC output	--	30	--	
Over-current Protection	Input voltage range		120	--	160	%Io
Short-circuit Protection			Hiccup,continuous,self-recovery			

Notes:
① The"parallel cable"method is used for Ripple and Noise test,
② The module needs to be re-start after output over-voltage protection.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation	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	--	2000	--	pF
Operating Temperature	See Fig.1	-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,10G,30Min.along X,Y and Z			
Switching Frequency	PWM mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

Mechanical Specifications

Case Material	Aluminum alloy		
Dimensions	Without heat sink	Horizontal package	50.8×25.4×11.8mm
		Z1 wiring package	76.0×31.5×21.2mm
		Z rail package	76.0×31.5×25.8mm
	With heat sink	Horizontal package	51.4×26.2×23.0mm
Weight	Without heat sink	Horizontal package/Z1 wiring package/Z rail package	35.0g/77.0g(Typ.)
	With heat sink	Horizontal package	43.0g(Typ.)
Cooling Method	Free air convection		

Electromagnetic Compatibility (EMC)

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

Typical Characteristic Curves

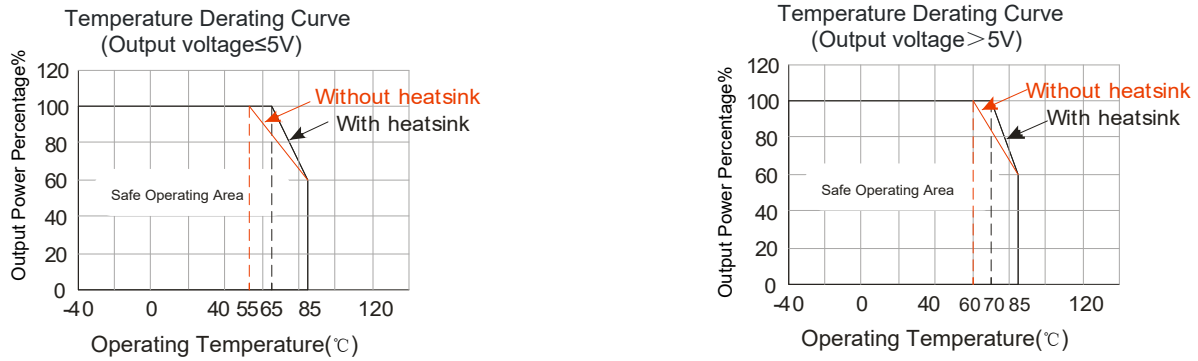


Fig. 1

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 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.

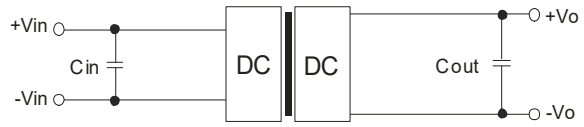


Fig. 2

Vout(VDC)	Cin(μF)	Cout(μF)
3.3/5	100	470
12/15		100
24		47

2. EMC compliance circuit

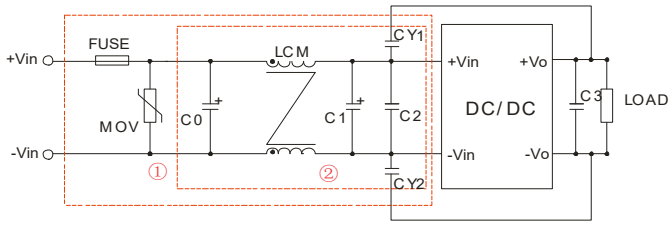


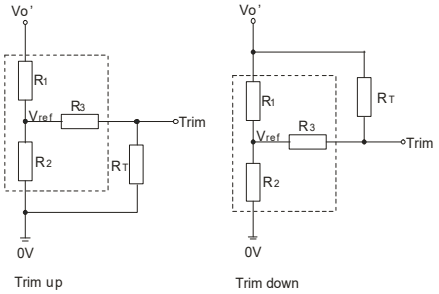
Fig.3

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
LCM	2.2mH	
C1	330μF/50V	330μF/100V
C2	4.7uF/50V	2.2uF/100V
CY1, CY2	Y1 Safety capacitor 3.3nF/250VAC	
C3	Refer to the Cout in Fig.2	

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



TRIM resistor connection (dashed line shows internal resistor network)

Trim resistor calculation:

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

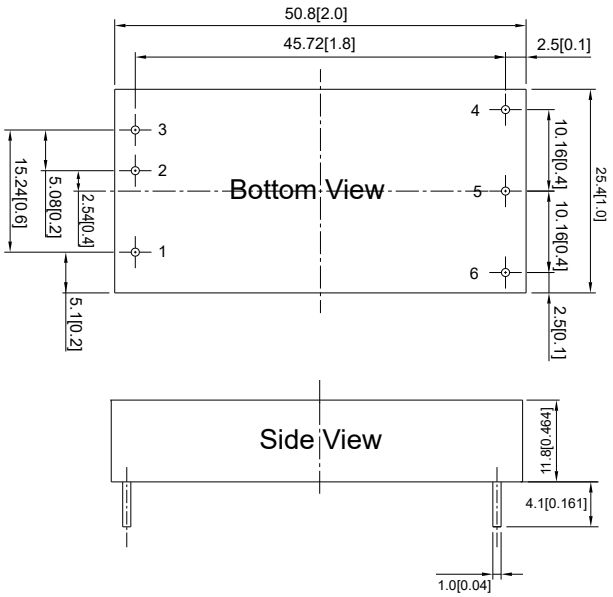
$$down{:}R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{Vo'-Vref}{Vref}\cdot R_2$$

RT=Trim Resistor value;
a=self-defined parameter
Vo'=actual needs of the up or down regulated voltage

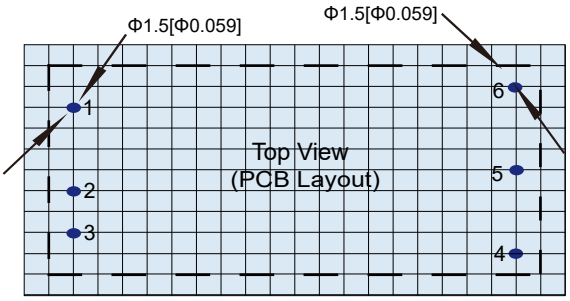
Nominal input voltage	Vout	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
24/48	3.3	4.788	2.87	12.4	1.24
24/48	5	2.87	2.87	10	2.5
24/48	12	11	2.87	15	2.5
24/48	15	15	3	17.4	2.5
48	24	26	3	15	2.5
24	24	20	2.308	15	2.5

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

Horizontal Package Dimensions (without heat sink)



THIRD ANGLE PROJECTION



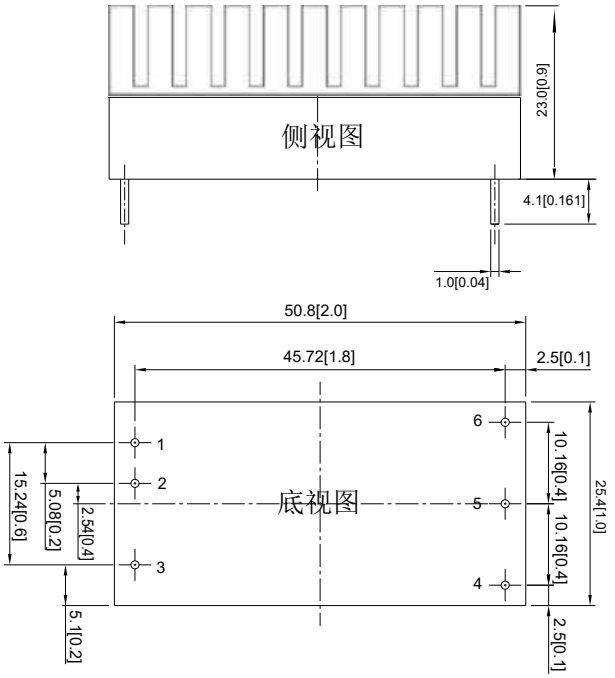
Note:Grid:2.54*2.54mm

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

Pin	1	2	3	4	5	6
Single	CNT	-Vin	+Vin	+Vo	-Vo	TRIM

Horizontal Package Dimensions (with heat sink)

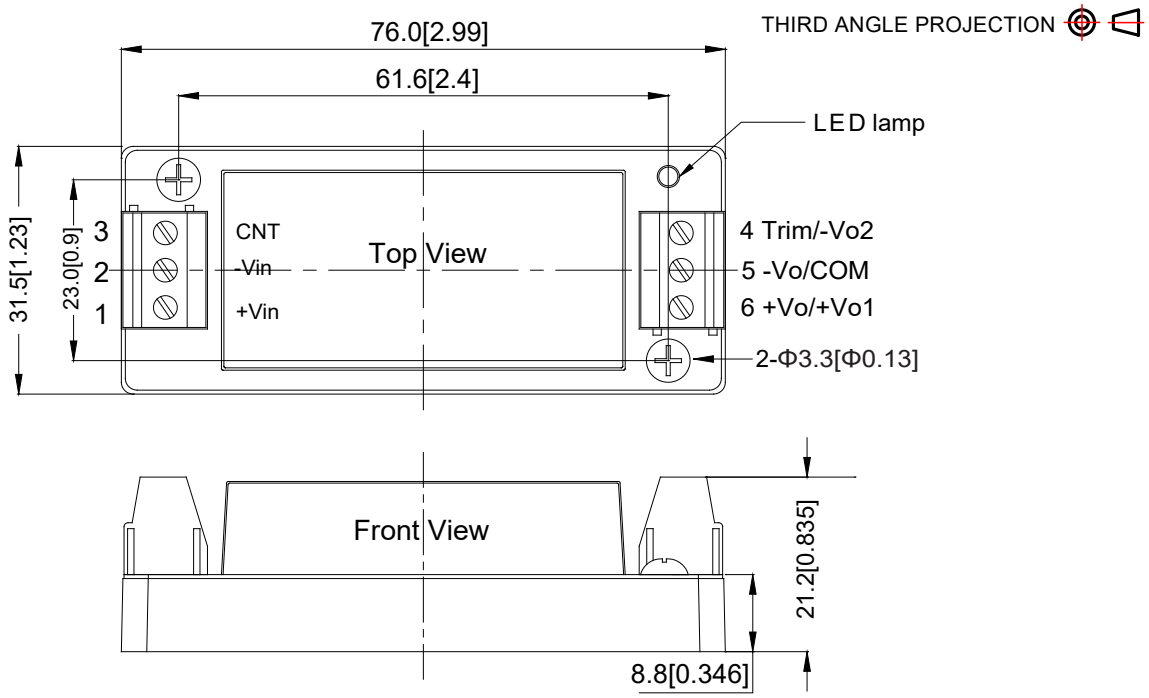
THIRD ANGLE PROJECTION



管脚 Pin	1	2	3	4	5	6
单路 Single	+Vin	-Vin	CNT	TRIM	-Vo	+Vo

Z1 Package Dimensions (without heat sink)

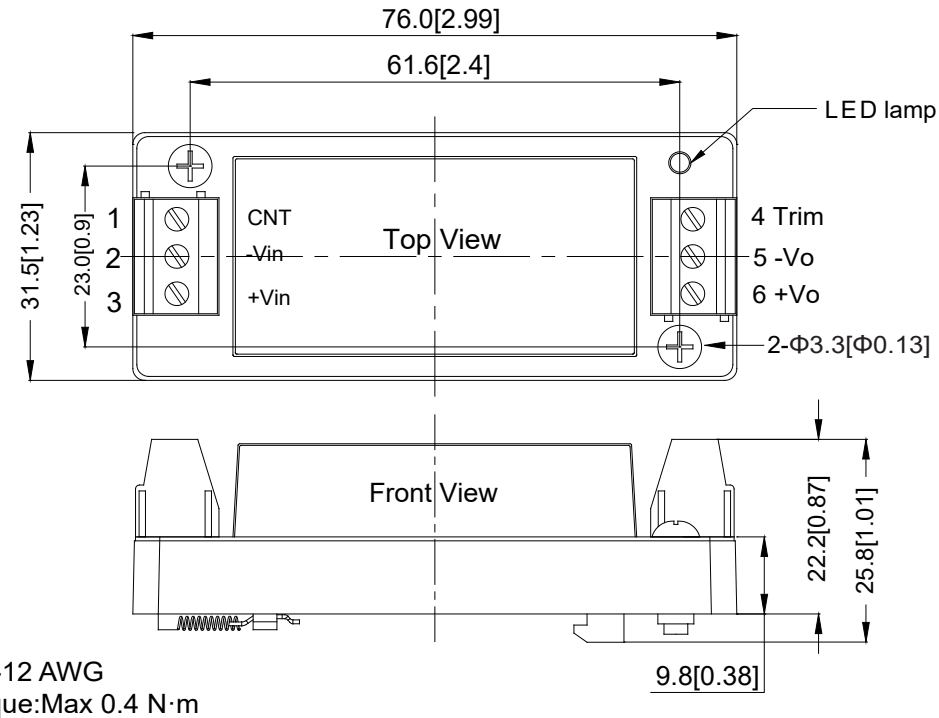
THIRD ANGLE PROJECTION



Note:
Unit:mm[inch]
Wire range:24-12 AWG
Tightening torque:Max 0.4N·m
General tolerances:±0.5[±0.02]

Z Package Dimensions (without heat sink)

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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