

FEATURES

1. Ultra-wide 4:1 input voltage range
2. High efficiency up to 90% with full load
3. High efficiency up to 82% with 5% load
4. No-load power consumption as low as 0.14W
5. I/O isolation test voltage 1.5k VDC
6. Input under-voltage protection, output short- circuit, over-voltage, over-current protection
7. Operating ambient temperature range: -40°C to +80°C
8. Meets CISPR32/EN55032 CLASS A without extra components
9. Six-sided metal shielded package



3 years
Warranty

Selection Guide

Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load (μF)Max.
	Nominal (Range)	Max.	Voltage (VDC)	Current (mA) Max./Min.		
ZYB2403LD-30WR3	24 (9-36)	40	3.3	6000/0	83/85	10000
ZYB2405LD-30WR3			5	6000/0	84/86	10000
ZYB2409LD-30WR3			9	3333/0	86/88	4700
ZYB2412LD-30WR3			12	2500/0	88/90	2700
ZYB2415LD-30WR3			15	2000/0	88/90	1680
ZYB2424LD-30WR3			24	1250/0	88/90	680
ZYA2405LD-30WR3			±5	±3000/0	84/86	2000
ZYA2412LD-30WR3			±12	±1250/0	87/89	1250
ZYA2415LD-30WR3			±15	±1000/0	87/89	680
ZYA2424LD-30WR3			±24	±625/0	87/89	470
ZYB4803LD-30WR3	48 (18-75)	80	3.3	6000/0	84/86	10000
ZYB4805LD-30WR3			5	6000/0	85/87	10000
ZYB4812LD-30WR3			12	2500/0	86/88	2700
ZYB4815LD-30WR3			15	2000/0	87/89	1680
ZYB4824LD-30WR3			24	1250/0	85/87	680
ZYA4805LD-30WR3			±5	±3000/0	84/86	2000
ZYA4812LD-30WR3			±12	±1250/0	86/88	1250
ZYA4815LD-30WR3			±15	±1000/0	86/88	680

Note:

①Use "H" suffix for heat sink mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;

②Exceeding the maximum input voltage may cause permanent damage;

③Efficiency is measured at nominal input voltage and rated output load;

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

Note:

① Load regulation for 0%-100% load is $\pm 5\%$;

②The “parallel cable” method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

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	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC/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	--	+80	°C
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	°C
Vibration		IEC/EN61373 - Category 1, Grade B			
Switching Frequency *	PWM mode	--	300	--	kHz
MTBF	MIL-HDBK-217F@25°C	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)		50.80 × 25.40 × 11.80 mm
	Horizontal package (with heat sink)		51.40 × 26.20 × 16.50 mm
Weight	Without heat sink	Horizontal package/A2S chassis mounting/A4S Din-rail mounting	27.8g/52.0g/72.0g(Typ.)
	With heat sink	Horizontal package/A2S chassis mounting/A4S 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.6-②for recommended circuit)	
		Dual output	CISPR32/EN55032	CLASS A (without external components)/ CLASS B (see Fig.7-②for recommended circuit)	
	RE	Single output	CISPR32/EN55032	CLASS A (without external components)/ CLASS B (see Fig.6-②for recommended circuit)	
		Dual output	CISPR32/EN55032	CLASS A (without external components)/ CLASS B (see Fig.7-②for recommended circuit)	
Immunity	ESD		IEC/EN61000-4-2	Contact ±4kV	perf. Criteria B
	RS		IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	Single output	IEC/EN61000-4-4	±2kV (see Fig.6-①for recommended circuit)	perf. Criteria B
		Dual output	IEC/EN61000-4-4	±2kV (see Fig.7-①for 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	3 Vr.m.s	perf. Criteria A
		Dual output	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A

Typical Characteristic Curves

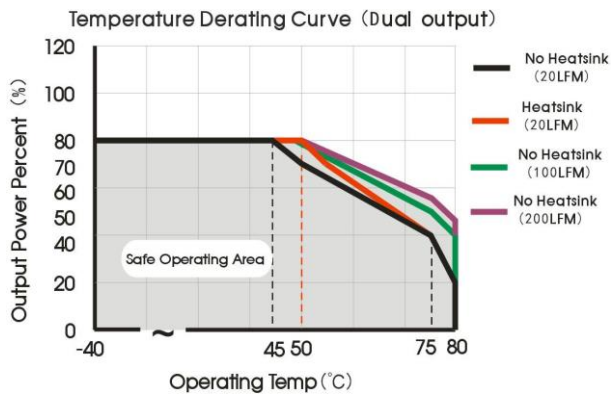


Fig. 1

Applicable models: ZYA2405LD-30W(H)R3 (9-18V input voltage), ZYA2424LD-30W(H)R3 (9-18V input voltage), ZYA4805LD-30W(H)R3 (18-36V input voltage)

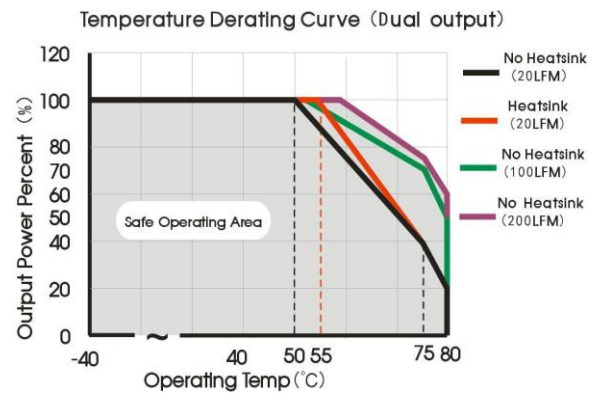


Fig. 2

Applicable models: ZYA2405LD-30W(H)R3 (18-36V input voltage), ZYA2424LD-30W(H)R3 (18-36V input voltage), ZYA4805LD-30W(H)R3 (36-75V input voltage), ZYA2412LD-30W(H)R3, ZYA2415LD-30W(H)R3, ZYA4812LD-30W(H)R3, ZYA4815LD-30W(H)R3

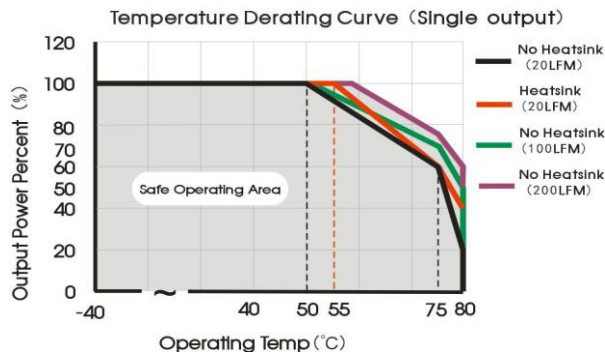


Fig. 3

Applicable models: ZYB2403LD-30W(H)R3, ZYB2405LD-30W(H)R3, ZYB4803LD-30W(H)R3, ZYB4805LD-30W(H)R3

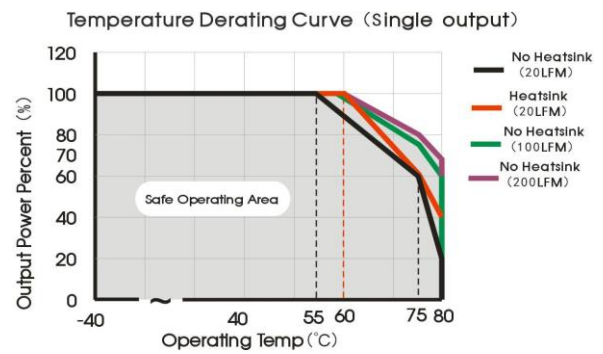
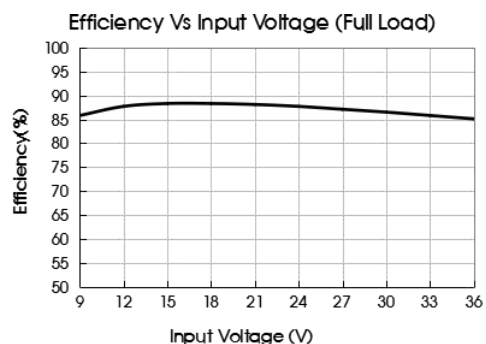
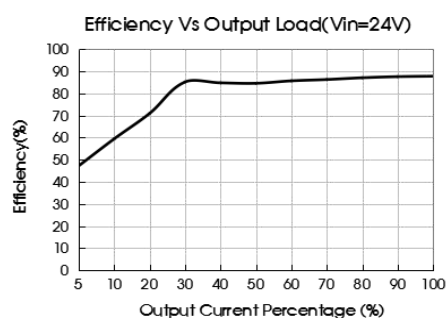


Fig. 4

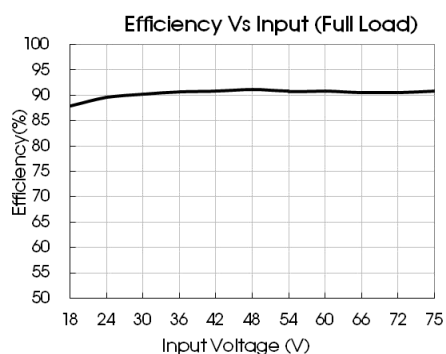
Applicable models: ZYB2409LD-30W(H)R3, ZYB2412LD-30W(H)R3, ZYB2415LD-30W(H)R3, ZYB2424LD-30W(H)R3, ZYB4812LD-30W(H)R3, ZYB4815LD-30W(H)R3, ZYB4824LD-30W(H)R3



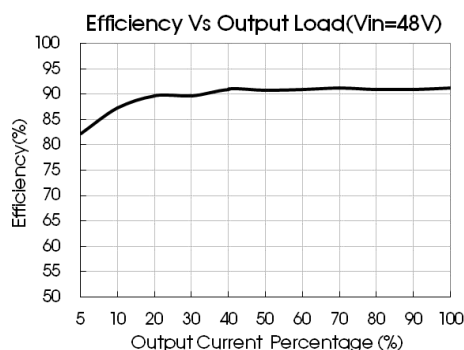
ZYB2405LD-30WR3



ZYB2405LD-30WR3



ZYB4815LD-30WR3



ZYB2405LD-30WR3

Design Reference

1. Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 5.

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.

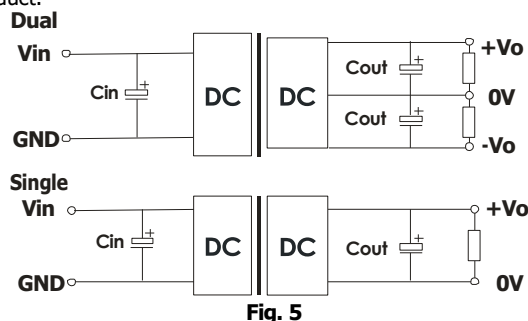


Fig. 5

Single output voltage (VDC)	Cout (μF)	Cin (μF)	Dual output voltage (VDC)	Cout (μF)	Cin (μF)
3.3/5/9	220	100	±5/±12/±15	220	100
12/15/24	100		±24	100	

2. EMC compliance circuit

Single output:

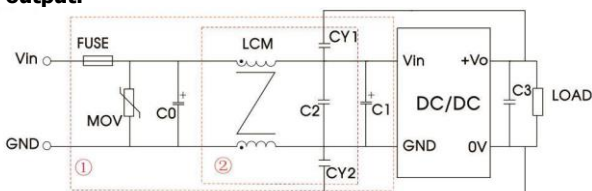


Fig. 6

Notes: We use Part ① in Fig. 6 for immunity and part ② for emissions test.
Selecting based on needs.

Parameter description:

Model	Vin:24VDC	Vin:48VDC
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, recommended to use	
CY1/CY2	1nF/2kV	

Dual output:

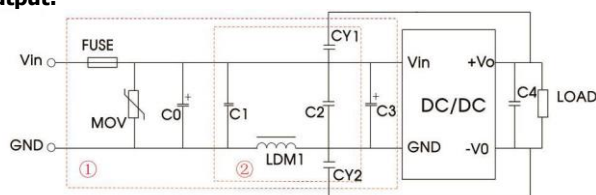
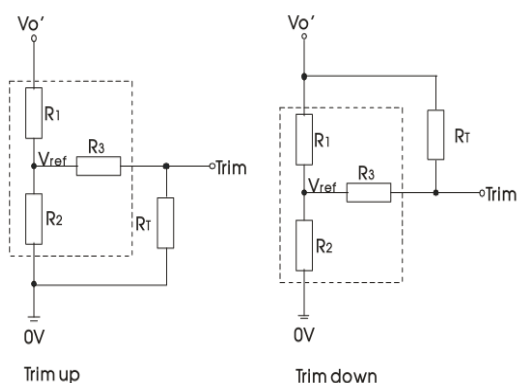


Fig.7

Notes: We use Part ① in Fig. 7 for immunity and part ② for emissions test.
Selecting based on needs.

Model	Vin:24VDC	Vin:48VDC
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)



Calculating Trim resistor values:

$$\begin{aligned} \text{up: } R_T &= \frac{\alpha R_2}{R_2 - \alpha} - R_3 & \alpha &= \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{\alpha R_1}{R_1 - \alpha} - R_3 & \alpha &= \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

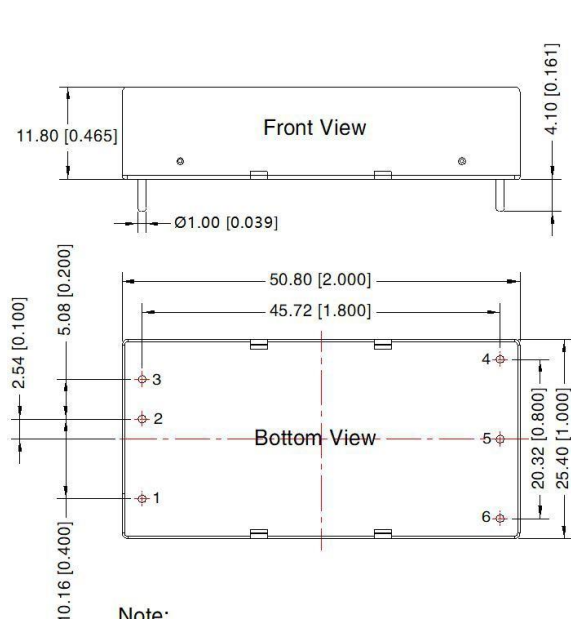
R_T = Trim Resistor value
 α = self-defined parameter
 V_o' = desired output voltage

TRIM resistor connection (dashed line shows internal resistor network)

Vout(VDC)	R1(kΩ)	R2(kΩ)	R3(kΩ)	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

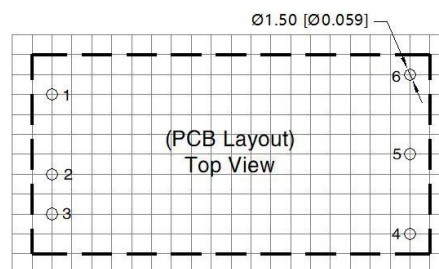
4. The products do not support parallel connection of their output

Horizontal Package (without heat sink) Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin diameter tolerances: $\pm 0.10 [\pm 0.004]$
General tolerances: $\pm 0.50 [\pm 0.020]$

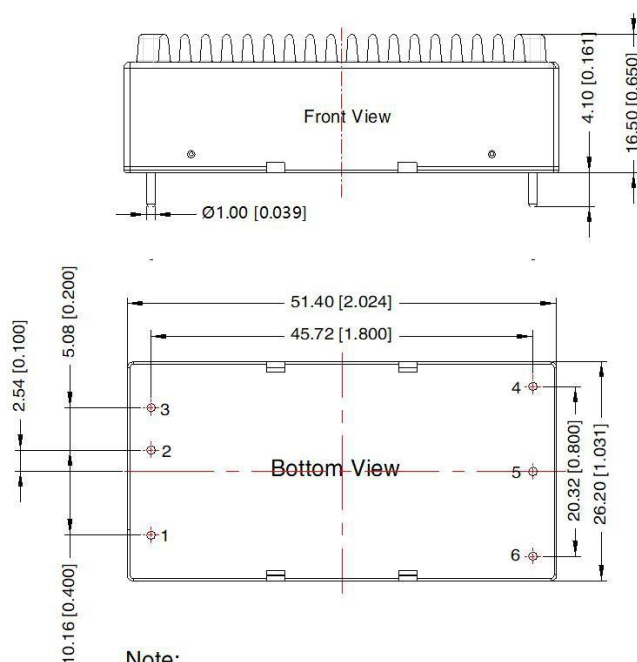
THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

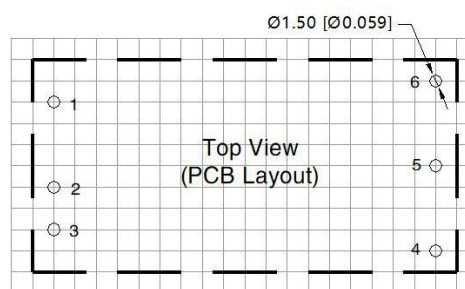
Pin-Out		
Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	+Vo	+Vo
5	0V	0V
6	Trim	-Vo

Horizontal Package (with heat sink) Dimensions



Note:
Unit: mm[inch]
Pin diameter tolerances: $\pm 0.10 [\pm 0.004]$
General tolerances: $\pm 0.50 [\pm 0.020]$

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	+Vo	+Vo
5	0V	0V
6	Trim	-Vo

Notes & Instructions

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 Ta=25°C, humidity <75%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;