FEATURES

1. Ultra-wide 4:1 input voltage range
2. High efficiency up to 93.8%
3. No-load power consumption as low as 0.24W
4. I/O isolation test voltage 1.6k VDC
5. Input under-voltage protection, output
6. short-circuit, over-current, over–voltage protection
7. Operating ambient temperature range: -40℃ to +105℃
8. Industry standard pin-out

RoHS CE 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.		
ZYB4805LD-60W(H)R3	48(18-75)	80	05	12000/0	90/92.5	20000
ZYB4812LD-60W(H)R3			12	5000/0	91/93	5000
ZYB4815LD-60W(H)R3			15	4000/0	91/93.3	3500
ZYB4824LD-60W(H)R3			24	2500/0	91/93.8	2000

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	--	1345/10	1389/15	mA
Surge Voltage (1sec. max.)		-0.7	--	100	VDC
Start-up Voltage		--	--	18	
Input Filter		PI filter			
Hot Plug		Unavailable			
Ctrl*	Module on	Ctrl pin open or pulled high TTL (3-12VDC)			
	Module off	Ctrl pin pulled low to GND (0-1.2VDC)			
Note: *The Ctrl pin voltage is referenced to input GND.					

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	5%-100% load		--	±1	±2	%
	0%-5% load		--	±2	±5	
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 Response Deviation	25% load step change, input voltage range	5V output	--	±3	±10	
		Other output	--	±3	±5	
Transient Recovery Time	25% load step change, nominal input voltage		--	250	500	μs
	20MHz bandwidth,	5%-100% load	--	100	--	mVp-p

Ripple & Noise①	nominal input voltage	0%-5% load	--	--	5	%Vo
Over-voltage Protection	Input voltage range		110	140	160	
Over-current Protection			110	140	200	%Io
Short-circuit Protection			Continuous, self-recovery			
Note: ①By measuring method is used for Ripple and Noise test, please refer to Fig. 2. for recommended circuit.						

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.	1600	--	--	VDC
	Input/output-Case Electric Strength Test for 1 minute with a leakage current of 1mA max.	1000	--	--	
Insulation Resistance	Input-output resistance at 500VDC	100	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	2200	--	pF
Operating Temperature	See Fig. 1	-40	--	+105	℃
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		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency ①	PWM mode	--	370	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours
Note: ①Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.					

Mechanical Specifications

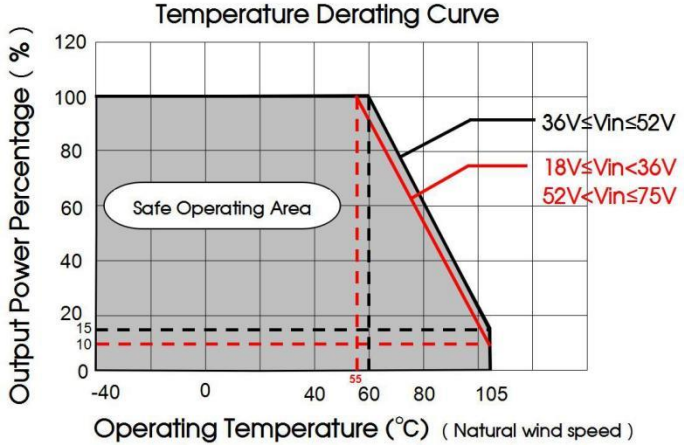
Case Material	Aluminum alloy		
Dimensions	Without heat sink	Horizontal package	50.80 × 25.40 × 11.80 mm
	Heat sink		51.40 x 26.20 x 16.50 mm
Weight	Without heat sink		40.0g
	Heat sink		49.8g
Cooling Method	Free air convection		

EMC Specifications

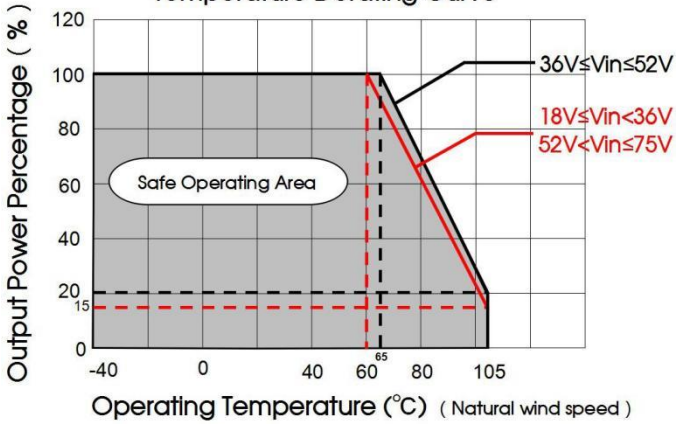
Emissions	CE	CISPR32/EN55032 CLASS A (see Fig. 3-①for recommended circuit) / CLASS B (see Fig. 3-②for recommended circuit)		
	RE	CISPR32/EN55032 CLASS A (see Fig. 3-①for recommended circuit) / CLASS B (see Fig. 3-②for recommended circuit)		
Immunity	ESD	IEC/EN61000-4-2	Contact ±6kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	100kHz ±2kV (see Fig. 3-② for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig. 3-② for recommended circuit)	perf. Criteria A
	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A

Typical Characteristic Curves

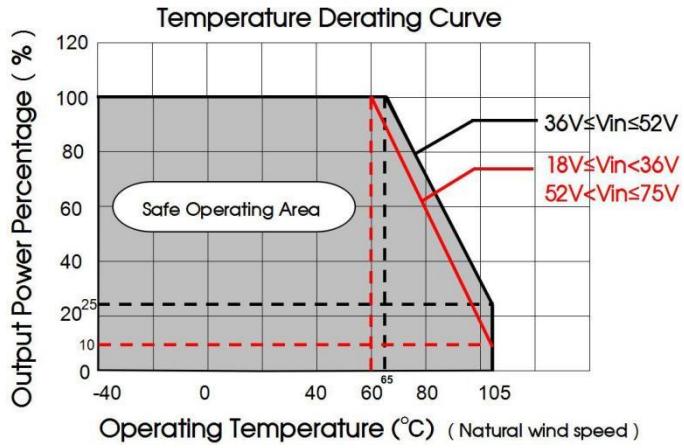
ZYB4805LD-60WHR3



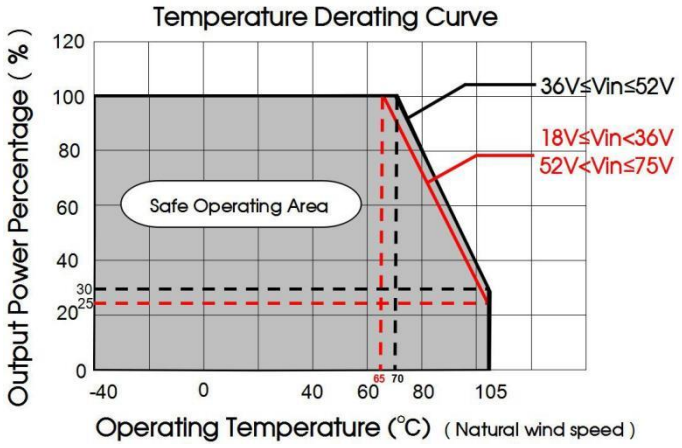
ZYB4805LD-60WHR3



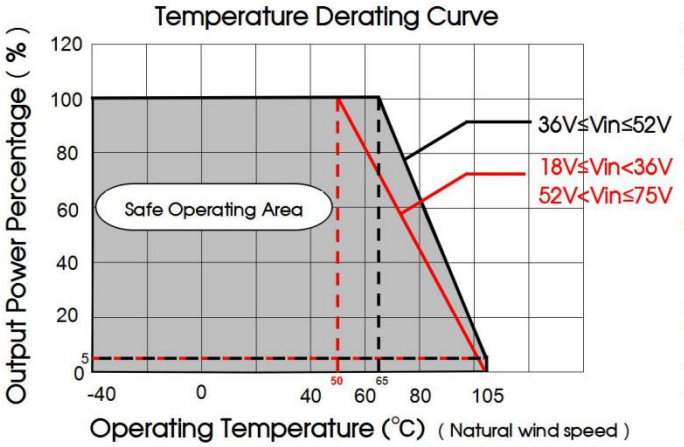
ZYB4812/15LD-60WHR3



ZYB4812/15LD-60WHR3



ZYB4824LD-60WHR3



ZYB4824LD-60WHR3

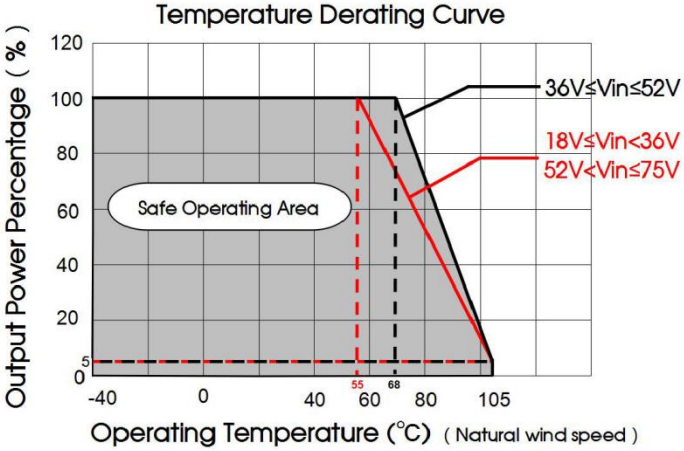


Fig. 1

Typical Circuit Design And Application

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.

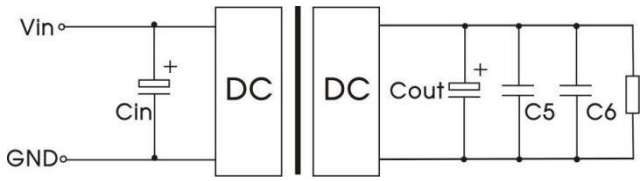


Fig. 2

Vout (VDC)	Cin	Cout	C5	C6
5	100μF/ 100V	330μF/50V	1μF/16V	10μF/16V
12			1μF/25V	10μF/25V
15		100μF/50V	1μF/25V	10μF/25V
24			1μF/50V	10μF/50V

2. EMC compliance circuit

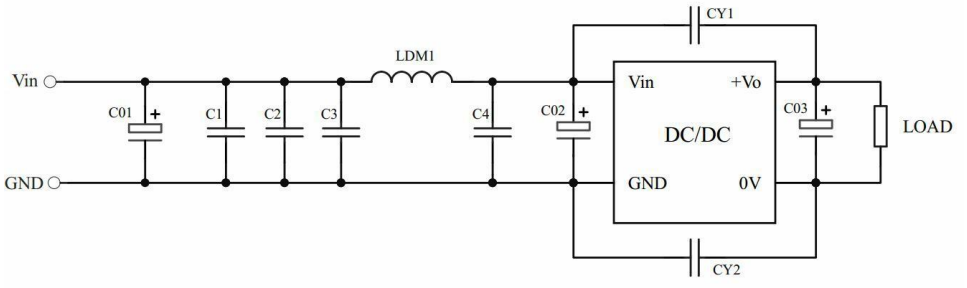


Fig. 3-①

Table 1：recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7μF	100V
C3/C4	20μF	100V
C01	1000μF	100V
C02	470μF	100V
C03	330μF	50V
CY1/CY2	2.2nF	1808/3000VDC
LDM1	2.2uH	/

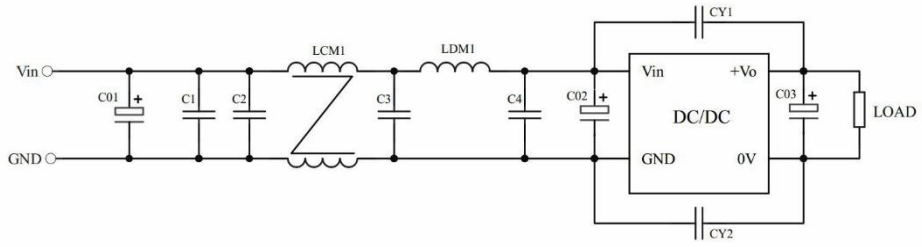
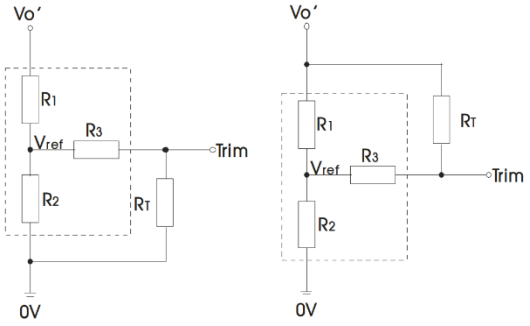


Fig. 3-②

Table 2：recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7μF	100V
C3/C4	20μF	100V
C01	1000μF	100V
C02	470μF	100V
C03	330μF	50V
CY1/CY2	2.2nF	1808/3000VDC
LCM1	10mH	10.0mH Min/180mΩ Max
LDM1	2.2uH	/

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



Trim resistor connections (dashed line shows internal resistor network)

Calculating Trim resistor values:

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

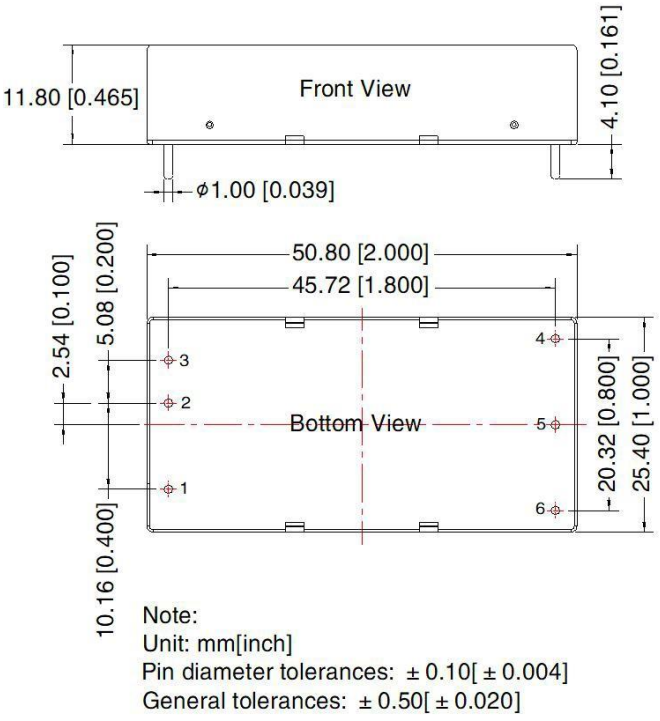
$$\text{down: } R_T = \frac{aR_1}{R_1-a} - R_3 \qquad a = \frac{V_o'-V_{ref}}{V_{ref}} \cdot R_2$$

RT = Trim Resistor value
a = self-defined parameter
Vo' = desired output voltage

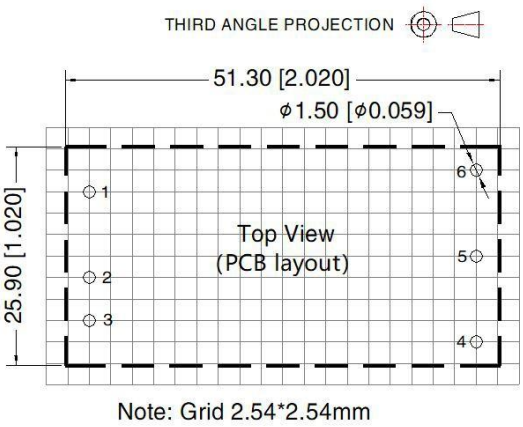
Vout(VDC)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
05	2.97	2.87	8.1	2.5
12	10.91	2.87	15	2.5
15	14.35	2.87	12.1	2.5
24	24.77	2.87	6.1	2.5

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

ZYB48_LD-60WR3 Dimensions and Recommended Layout



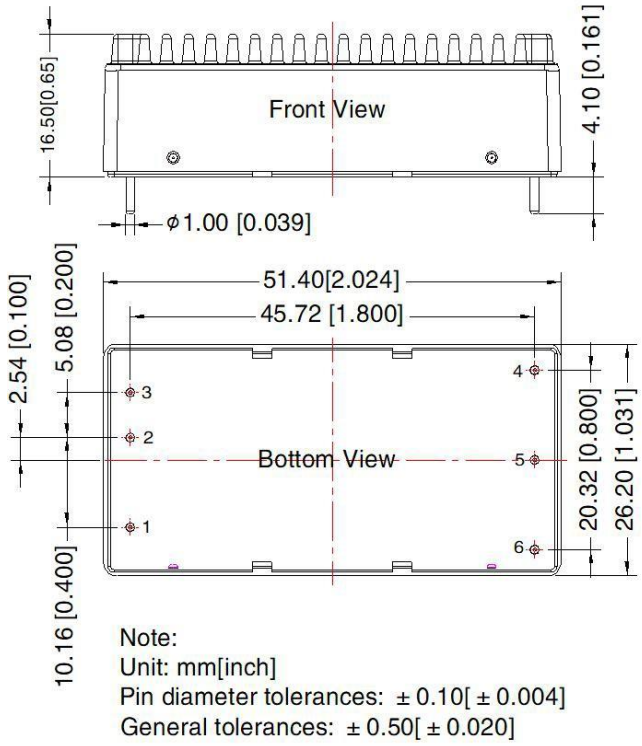
Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]



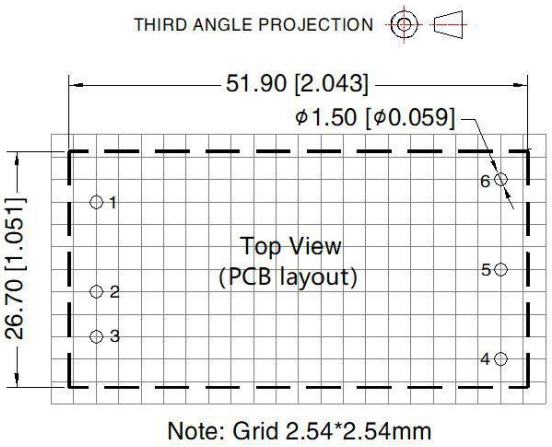
Note: Grid 2.54*2.54mm

Pin–Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

ZYB48_LD-60WHR3 Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]



Note: Grid 2.54*2.54mm

Pin–Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

Note:
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℃, 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;