

FEATURES

1. Ultra-wide 4:1 input voltage range
2. High efficiency up to 88%
3. No-load power consumption as low as 0.12W
4. I/O isolation test voltage 1.5k VDC
5. Input under-voltage protection, output short-circuit, over-current, over-voltage protection
6. Operating ambient temperature range: -40°C to +85°C
7. Meets CISPR32/EN55032 CLASS A, without extra components
8. Input reverse polarity protection available with Chassis (A2S) or 35mm DIN-Rail mounting (A4S) version
9. Meets EN50155 railway standard
10. Industry standard pin-out



**3 years
Warranty**

Selection Guide

Part No. ^①	Input Voltage (VDC)		Output		Full Load Efficiency ^④ (%)Min./Typ.	Capacitive Load ^⑤ (μF)Max.		
	Nominal ^② (Range)	Max. ^③	Voltage(VDC)	Current (mA) Max./Min.				
*ZYA2405YMD-10WR3	24 (9-36)	40	±5	±1000/0	81/83	1000		
ZYA2409YMD-10WR3			±9	±555/0	84/86	680		
*ZYA2412YMD-10WR3			±12	±416/0	85/87	470		
ZYA2415YMD-10WR3			±15	±333/0	85/87	330		
*ZYA2424YMD-10WR3			±24	±208/0	85/87	100		
ZYB2403YMD-10WR3			3.3	2400/0	75/77	2200		
ZYB2405YMD-10WR3			5	2000/0	80/82	2200		
ZYB2409YMD-10WR3			9	1111/0	83/85	680		
ZYB2412YMD-10WR3			12	833/0	84/86	470		
ZYB2415YMD-10WR3			15	667/0	84/86	330		
ZYB2424YMD-10WR3			24	416/0	86/88	100		
*ZYA4805YMD-10WR3			48 (18-75)	80	±5	±1000/0	81/83	1000
*ZYA4812YMD-10WR3					±12	±416/0	85/87	470
*ZYA4815YMD-10WR3	±15	±333/0			85/87	330		
*ZYA4824YMD-10WR3	±24	±208/0			85/87	100		
*ZYB4803YMD-10WR3	3.3	2400/0			77/79	2200		
*ZYB4805YMD-10WR3	5	2000/0			81/83	2200		
*ZYB4812YMD-10WR3	12	833/0			85/87	470		
*ZYB4815YMD-10WR3	15	667/0			85/87	330		
*ZYB4824YMD-10WR3	24	416/0			86/88	100		

Notes:
 1 Use "H" suffix for heat sink mounting, "A2S" suffix for chassis mounting and "A4S" suffix for DIN-Rail mounting;
 2 The A2S and A4S Model's start-up and minimum input voltages are increased by 1VDC due to the input reverse polarity protection circuit;

- 3 Exceeding the maximum input voltage may cause permanent damage;
- 4 Efficiency is measured at nominal input voltage and rated output load; efficiencies for A2S and A4S 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;
- 6 Products marked with "*" need an input capacitor in order to meet conducted specifications of CISPR32/EN55032 CLASS A.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Current (full load / no-load)	24VDC nominal input series, nominal input voltage	3.3VDC output	-	429/5	440/12	mA
		Others	-	502/5	521/12	
	48VDC nominal input series, nominal input voltage	3.3VDC output	-	190/4	215/8	
		Others	-	251/4	258/8	
Reflected Ripple Current	24VDC nominal input series, nominal input voltage	-	40	-	VDC	
	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 Voltage	24VDC nominal input series	-	-	9	VDC	
	48VDC nominal input series	-	-	18		
Input Under-voltage Protection	24VDC nominal input series	5.5	6.5	-	VDC	
	48VDC nominal input series	12	15.5	-		
Start-up Time	Nominal input voltage & constant resistance load	-	10	-	ms	
Input Filter		Pi filter				
Hot Plug		Unavailable				
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	-	6	10	mA	

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

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy ^①	0%-100% load	-	±1	±3	%	
Linear Regulation	Input voltage variation from low to high at full load	Vo1	-	±0.2		±0.5
		Vo2	-	±0.5		±1
Load Regulation ^②	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	±5	%	
Temperature Coefficient	Full load	-	-	±0.03	%/°C	
Ripple & Noise ^③	20MHz bandwidth, 5%-100% load	-	40	80	mVp-p	
Over-voltage Protection	Input voltage range	110	-	160	%Vo	
Over-current Protection		110	140	190	%Io	
Short-circuit Protection		Continuous, self-recovery				

Note:

- ① Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;
- ② Load regulation for 0%-100% load is ±5%;
- ③ 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 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	1000	–	–	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	–	1000	–	pF
Operating Temperature	See Fig. 1	-40	–	+85	°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	–	350	–	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)		25.40 × 25.40 × 11.70 mm		
	Horizontal package (with heat sink)		25.40 × 25.40 × 16.20 mm		
	A2S chassis mounting		76.00 × 31.50 × 21.20 mm		
	A4S DIN-rail mounting		76.00 × 31.50 × 25.80 mm		
Weight	without heat sink	Horizontal package/A2S chassis mounting/A4S DIN-Rail mounting		12.5g/36.0g/56.0g (Typ.)	
	with heat sink	Horizontal package		17g	
Cooling method	Free air convection				

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (Without extra components)/ CLASS B (see Fig.3-② for recommended circuit)		
	RE	CISPR32/EN55032	CLASS A (Without extra components)/ 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	3 Vr.m.s		perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29	0%, 70%		perf. Criteria B

Electromagnetic Compatibility (EMC) (EN50155)

Emissions	CE	EN50121-3-2	150kHz-500kHz	99dBuV (see Fig.3-② for recommended circuit)		
		EN55016-2-1	500kHz-30MHz	93dBuV (see Fig.3-② for recommended circuit)		
	RE	EN50121-3-2	30MHz-230MHz	40dBuV/m at 10m (see Fig.3-② for recommended circuit)		
		EN55016-2-1	230MHz-1GHz	47dBuV/m at 10m (see Fig.3-② for recommended circuit)		
Immunity	ESD	EN50121-3-2	Contact ±6kV/Air ±8kV		perf. Criteria A	
	RS	EN50121-3-2	20V/m		perf. Criteria A	
	EFT	EN50121-3-2	±2kV	5/50ns	5kHz (see Fig.3-① for recommended circuit)	perf. Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω, 0.5μF) (see Fig.3-① for recommended circuit)			perf. Criteria A
	CS	EN50121-3-2	0.15MHz-80MHz	10V r.m.s		perf. Criteria A

Typical Characteristic Curves

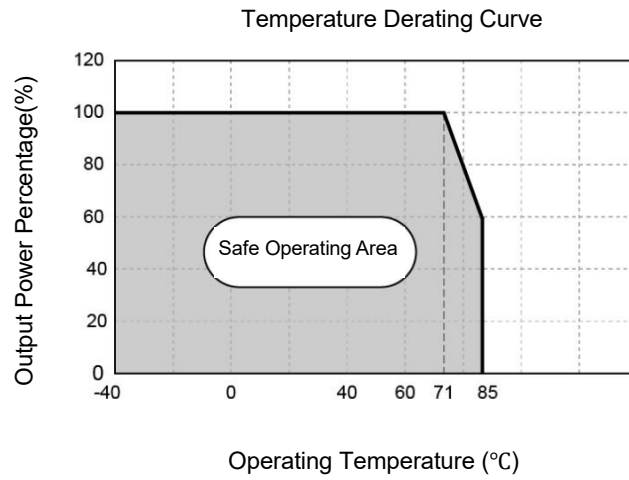
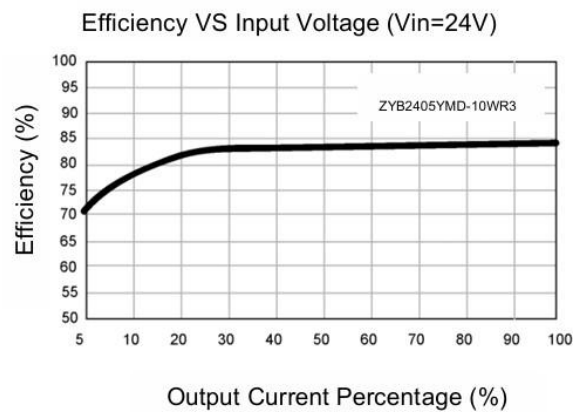
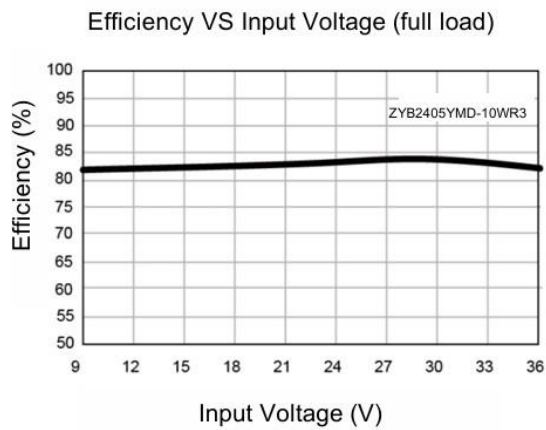
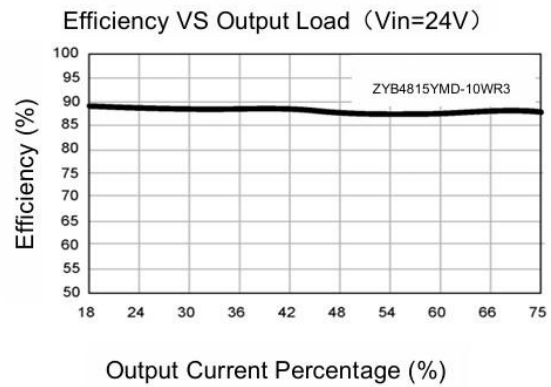
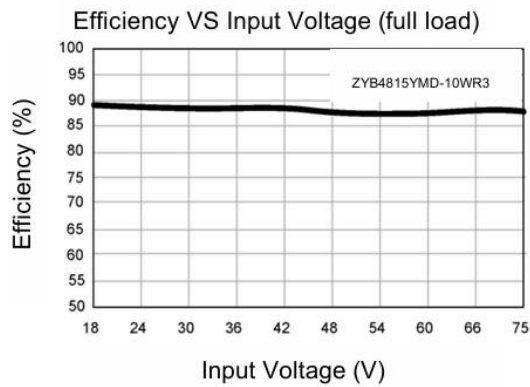


Figure 1

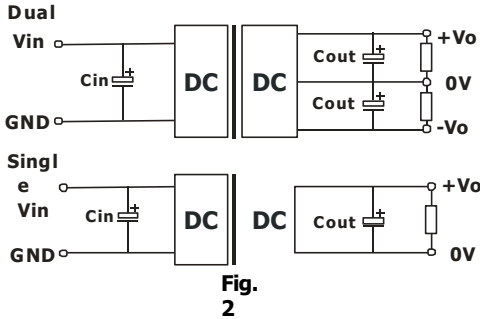


Design Reference

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 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.



Vin(VDC)	Vout(VDC)	Cin	Cout
24	3.3/5/±5	100µF/50V	10µF/16V
	9/12/15/±9/±12/±15		10µF/25V
	24/±24		10µF/50V
48	3.3/5/±5	10µF - 47µF/100V	10µF/16V
	9/12/15/±9/±12/±15		10µF/25V
	24/±24		10µF/50V

2. EMC compliance circuit

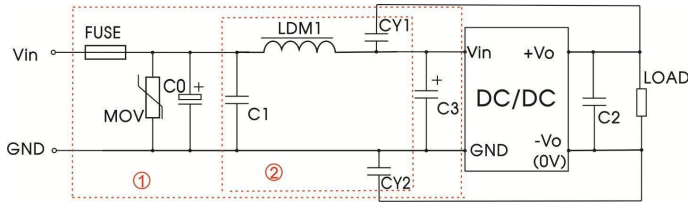


Fig. 3

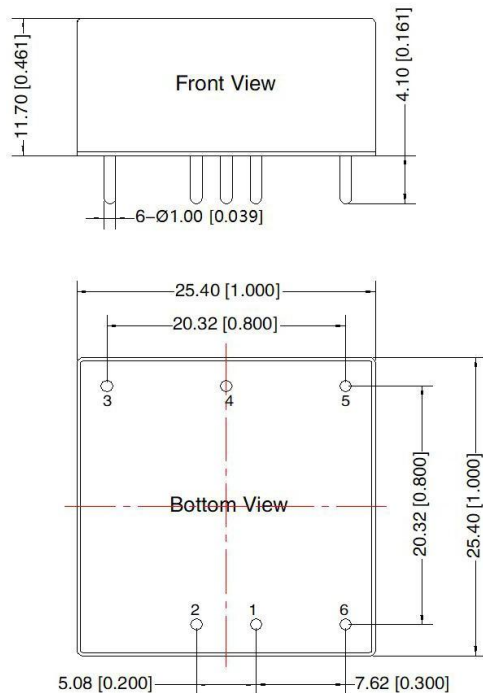
Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

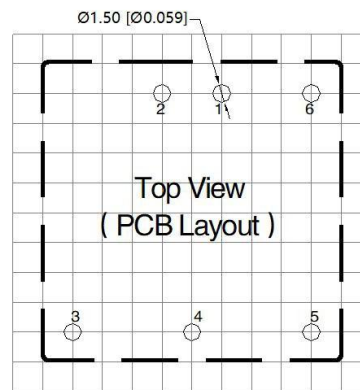
Model	Vin: 24VDC	Vin: 48VDC
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0, C3	330µF/50V	330µF/100V
C1	1µF/50V	1µF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7µH	
CY1, CY2	1nF/2kV	

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

Horizontal Package (without heat sink) Dimensions and Recommended Layout



THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

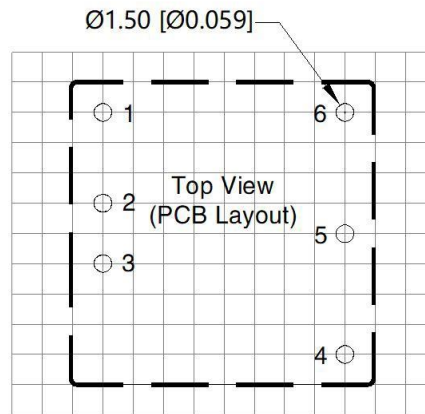
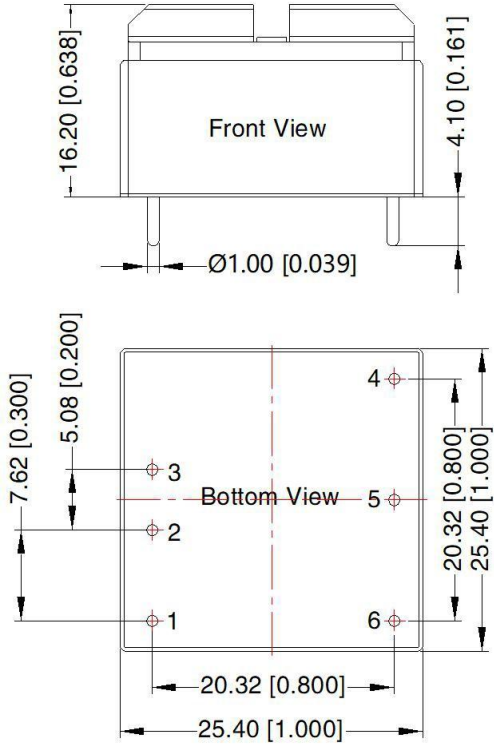
Grid 2.54*2.54mm

Pin	Pin-Out	
	Single	Dual
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	No Pin	0V
5	0V	-Vo
6	Ctrl	Ctrl

Note:
 Unit: mm[inch]
 PIN1/2/3/4/5/6: ϕ 1.0mm
 Pin diameter tolerances: ± 0.10 [± 0.004]
 General tolerances: ± 0.50 [± 0.020]

Horizontal Package (with heat sink) Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



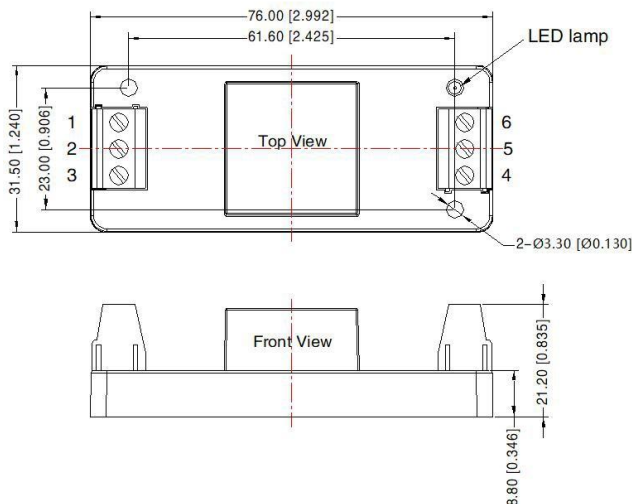
Note: Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Double
1	Ctrl	Ctrl
2	GND	GND
3	Vin	Vin
4	+Vo	+Vo
5	No Pin	0V
6	0V	-Vo

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

ZYA_YMD-10WR3A2S & ZYB_YMD-10WR3A2S Dimensions

THIRD ANGLE PROJECTION

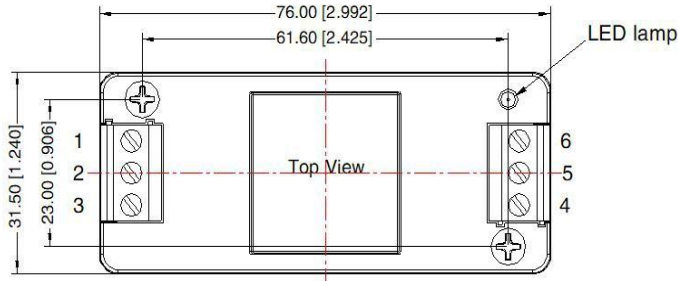


Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	+Vo	NC	0V
Dual	Ctrl	GND	Vin	+Vo	0V	-Vo

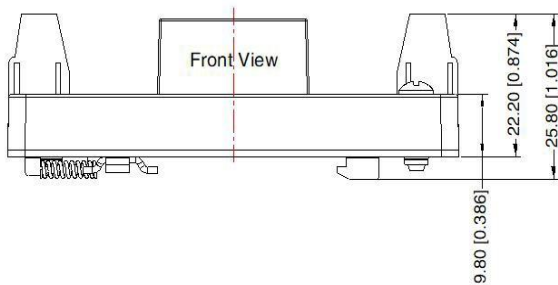
Note:
 Unit: mm[inch]
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N · m
 General tolerances: ± 1.00 [± 0.039]

ZYA_YMD-10WR3A4S & ZYB_YMD-10WR3A4S Dimensions

THIRD ANGLE PROJECTION 



Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	V _{in}	+V _o	NC	0V
Dual	Ctrl	GND	V _{in}	+V _o	0V	-V _o



Note:
 Unit: mm[inch]
 Mounting rail: TS35
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N · m
 General tolerances: ± 1.00 [± 0.039]

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;

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Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at www.norpas-power.com

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