APD05-xx Series

DESCRIPTIONS

5W，AC-DC Converter



RoHS

CE Report EN62368-1 EN60335-1 EN61558-1

UKCA Report BS EN62368-1

CB IEC61558-1

cULus UL62368-1

FEATURES

- Ultra-wide 85 - 305VAC and 100 - 430VDC input voltage range
- 1 × 1 inch compact size
- Operating ambient temperature range: -40℃ to +85℃
- Efficiency up to 81.5%
- No-load power consumption 0.1W
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014

APPLICATIONS

- Industrial control
- Electric power
- Home appliances
- Instrumentation
- Communication
- Civil applications

Selection Guide

Certification	Part No.	Output Power	nominal Output Voltage and Current(vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.
EN/BS EN/ IEC/UL	APD05-03	5W	3.3V/1515mA	71.5	4000
	APD05-05		5V/1000mA	77.5	3000
	APD05-09		9V/555mA	80.5	1200
	APD05-12		12V/416mA	80.5	1200
	APD05-15		15V/333mA	81.5	680
	APD05-24		24V/208mA	81.5	220

Note: 1.APD05-05E2S、APD05-12E2S、APD05-24E2S use suffix ”E2S” for chassis and APD05-05D4S、APD05-24D4S suffix ”D4S” for DIN-Rail mounting;
2.The product picture is for reference only. For details, please refer to the actual product.

Specifications

Product Specifications	Item		Operating Conditions	Min.	Typ.	Max.	Unit
Input Specifications	Input Voltage Range		AC input	85	--	305	VAC
			DC input	100	--	430	VDC
	Input Frequency			47	--	63	Hz
	Input Current		115VAC	--	--	0.13	A
			230VAC	--	--	0.07	
	Inrush Current		115VAC	--	15	--	
			230VAC	--	25	--	
	Leakage Current		277VAC/50Hz	0.25mA RMS Max.			
	Recommended External Input Fuse			1A, slow-blow, required (The actual use needs to be selected according to the application environment)			
	Hot Plug			Unavailable			
Output Specifications	Output Voltage Accuracy		3.3V output	--	±3	--	%
			others	--	±2	--	
	Line Regulation		Full load	--	±0.5	--	
	Load Regulation		0%-100% load	--	±1	--	
	Ripple & Noise*		20MHz bandwidth (peak-to-peak value)	--	50	100	mV
	Stand-by Power Consumption		230VAC	--	0.10	--	W
	Temperature Coefficient			--	±0.02	--	%/℃
	Short Circuit Protection			Hiccup, continuous, self-recover			
	Over-current Protection			≥130%Io, self-recover			
	Over-voltage Protection		3.3/5VDC output	≤7.5VDC			
			9VDC output	≤15VDC			
			12VDC output	≤16VDC			
			15VDC output	≤20VDC			
			24VDC output	≤30VDC			
	Minimum Load			0	--	--	%
	Hold-up Time		115VAC input	--	5	--	ms
			230VAC input	--	50	--	
General Specifications	Isolation	Input-Output	Electric Strength Test for 1min, leakage current <5mA	4000	--	--	VAC
	Operating Temperature			-40	--	+85	℃
	Storage Temperature			-40	--	+105	
	Storage Humidity			--	--	+95	%RH
	Soldering Temperature		Wave-soldering	260 ± 5℃; time: 5 - 10s			

		Manual-welding		360 ± 10℃; time: 3 - 5s			
	Switching Frequency			--	65	--	kHz
	Power Derating	-40℃ to -25℃		3.0	--	--	%/℃
		+50℃ to +70℃	3.3V	1.75	--	--	
		+55℃ to +70℃	5V/9V/12V	2.33	--	--	
		+60℃ to +70℃	15V/24V	3.5	--	--	
		+70℃ to +85℃	3.3V	1.67	--	--	
			Others	1.0	--	--	
		85VAC - 100VAC		1.0	--	--	%/VAC
		277VAC - 305VAC		0.54	--	--	
		2000m - 5000m		6.7	--	--	%/Km
	Safety Class			CLASS II			
	MTBF	MIL-HDBK-217F@25℃		≥2,602,000 h			
	Designed Life	230VAC	Ta: 25℃ 100% load	>130x10^3 h			
			Ta: 55℃ 100% load	>41x10^3 h			
Mechanical Specifications	Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)					
	Dimension	Horizontal package		25.40 x 25.40 x 17.60 mm			
		E2S chassis mounting		76.00 x 31.50 x 26.40 mm			
		D4S Din-Rail mounting		76.00 x 31.50 x 31.00 mm			
	Weight	Horizontal package		17.5g (Typ.)			
		E2S chassis mounting		38.0g (Typ.)			
		D4S Din-Rail mounting		58.0g (Typ.)			
	Cooling Method	Free air convection					

Note: *The "Tip and barrel method" is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor.

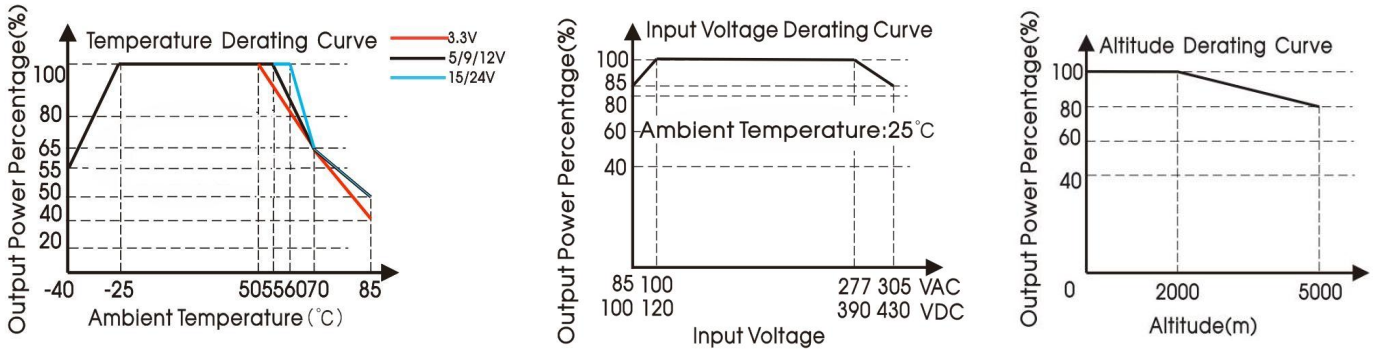
Electromagnetic Compatibility (EMC)

Electromagnetic Compatibility (EMC)	Emissions (EMI)	CE	CISPR32/EN55032 CLASS B	
			EN55014-1	
		RE	CISPR32/EN55032 CLASS B	
			EN55014-1	
	Immunity (EMS)	ESD	IEC/EN61000-4-2 Contact ±6KV/Air ±8KV	perf. Criteria B
			EN55014-2	perf. Criteria B
		RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
			EN55014-2	perf. Criteria A
		EFT	IEC/EN61000-4-4 ±2KV	perf. Criteria B
			IEC/EN61000-4-4 ±4KV (See Fig. 2 for recommended circuit)	perf. Criteria B
			IEC/EN61000-4-4 ±4KV (See Fig. 3 for recommended circuit)	perf. Criteria A
			EN55014-2	perf. Criteria B
		Surge	IEC/EN61000-4-5 line to line ±1KV	perf. Criteria B
			IEC/EN61000-4-5 line to line ±2KV (See Fig. 2 for recommended circuit)	perf. Criteria B
			IEC/EN61000-4-5 line to line ±2KV/line to PE ±4KV (See Fig. 3 for recommended circuit)	perf. Criteria A
			EN55014-2	perf. Criteria B
		CS	IEC/EN61000-4-6 10Vr.m.s	perf. Criteria A
			EN55014-2	perf. Criteria A
		Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11 0%, 70%	perf. Criteria B
			EN55014-2	perf. Criteria B

Note: ①When the output terminal of the product needs to be connected to PE through a Y capacitor, or close to the metal frame, please refer to the Fig. 3 for recommended circuit.

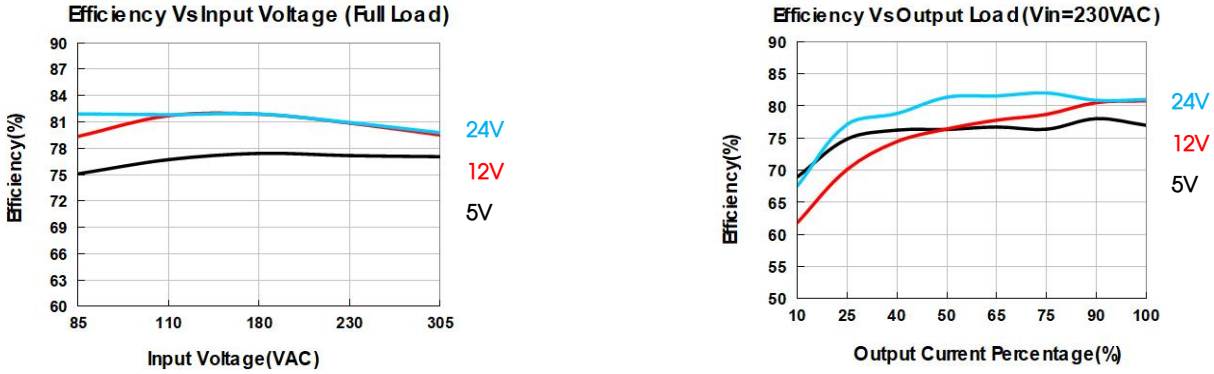
②Unless otherwise specified, EMC performance indicators are tested according to typical application circuits (Fig. 1).

Characteristic Curve



Note: ① With an AC input between 85-100V/277-305VAC and a DC input between 100-120V/390-430VDC, the output power must be derated as per temperature derating curves;

② This product is suitable for applications using natural air cooling.



Design Reference

1. Typical application

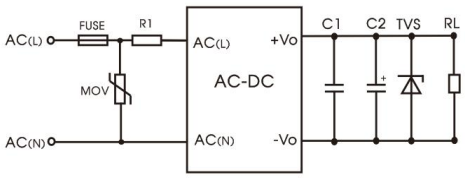


Fig. 1: Typical circuit diagram

Part No.	C1(uF)	C2(uF)	FUSE	R1	TVS	MOV
APD05-03	1	150	1A/300V, slow-blow, required	12Ω/3W (wire-wound resistor, required)	SMBJ7.0A	S10K350
APD05-05		150			SMBJ7.0A	
APD05-09		120			SMBJ12A	
APD05-12		120			SMBJ20A	
APD05-15		120			SMBJ20A	
APD05-24		68			SMBJ30A	

Output Filter Components:

We recommend using an electrolytic capacitor with high frequency, and low ESR rating for C2 (refer to manufacture's datasheet). Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1 is a ceramic capacitor used for filtering high-frequency noise and TVS is a recommended suppressor diode to protect the application in case of a converter failure.

2. EMC compliance recommended circuit

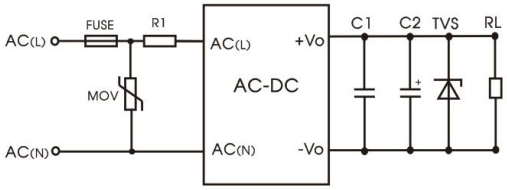


Fig. 2: EMC application circuit with higher requirements

Component	Recommended value
MOV	S14K350
R1	33Ω/3W (wire-wound resistor, required)
FUSE	2A/300V, slow-blow, required
CX	334K/305VAC

Note:

1. The function of CX is to filter out harmonic currents. It must be connected when applied in the power industry.
2. Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 is the bleeder resistance of CX, and the recommended resistance value is 1.5MΩ /150VDC.
3. The external circuit component parameters are the same as those of the above typical circuit diagram.

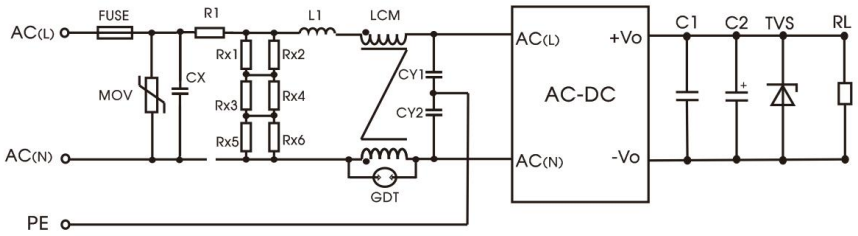


Fig. 3: Recommended circuit for class I equipment

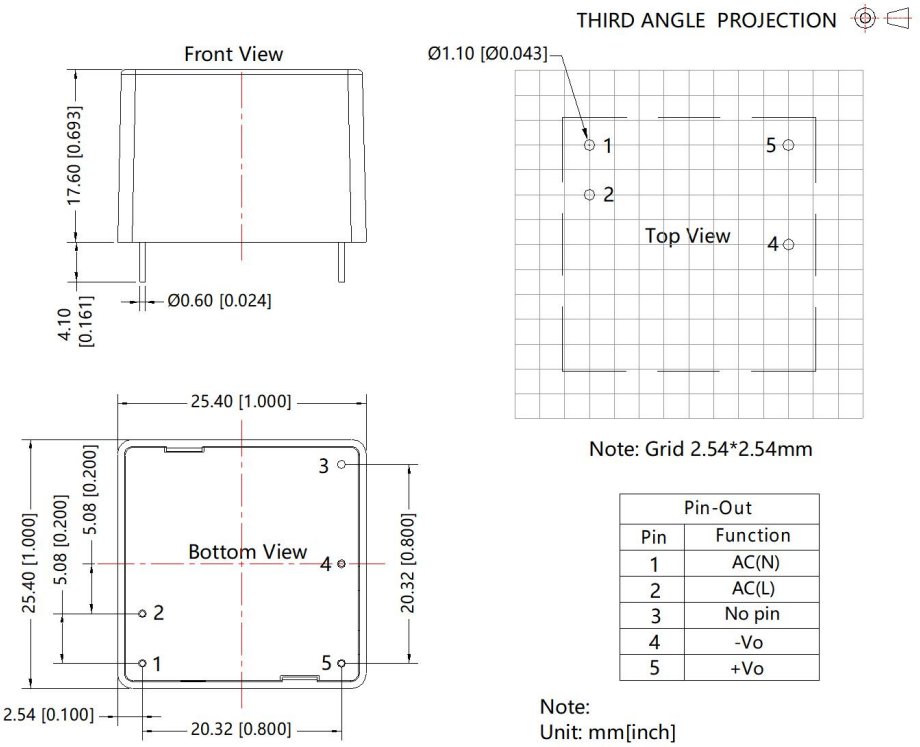
(Recommended when the output terminal of the product needs to be connected to PE or connected to PE through a Y capacitor)

Component	Recommended value
FUSE	2A/300V, slow-blow, required
MOV	S14K350
CX	334K/305VAC
R1	33Ω/3W (wire-wound resistor, required)
L1	1.2mH/0.3A
CY1/CY2	1nF/400VAC
GDT	300V/1KA
LCM	20 mH

Note:

1. Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 is the bleeder resistance of CX, and the recommended resistance value is 1.5MΩ/150VDC.
2. The external circuit component parameters are the same as those of the above typical circuit diagram.

Dimensions and Recommended Layout

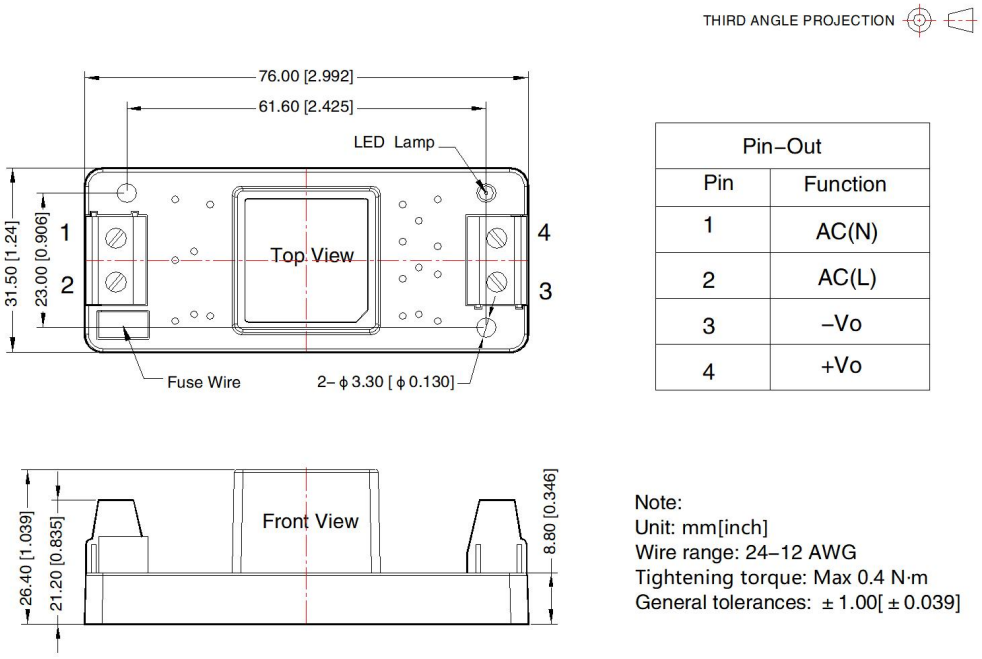


Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	No pin
4	-Vo
5	+Vo

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

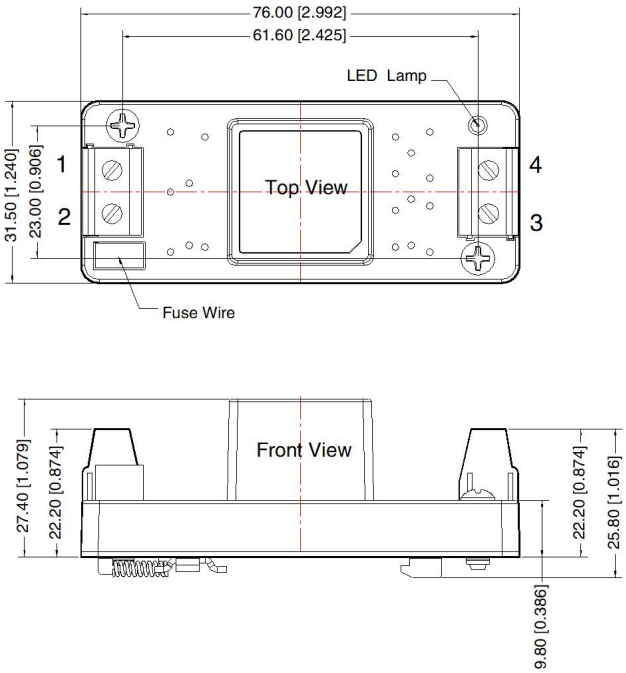
E2S Dimension



Pin–Out	
Pin	Function
1	AC(N)
2	AC(L)
3	–Vo
4	+Vo

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

D4S Dimension



THIRD ANGLE PROJECTION

Pin–Out	
Pin	Function
1	AC(N)
2	AC(L)
3	–Vo
4	+Vo

Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N·m
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ± 1.00[± 0.039]

Note:

1.If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;

2.Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with nominal input voltage and rated output load;

3.All index testing methods in this datasheet are based on our company corporate standards;

4.We can provide product customization service, please contact our technicians directly for specific information;

5.Products are related to laws and regulations: see "Features" and "EMC";

6.Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

7.The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.