APH25-xx Series

DESCRIPTIONS

25W, AC-DC Converter





RoHS

UL62368-1 EN62368-1 BS EN62368-1

FEATURES

- Universal 85-305VAC or 100-430VDC input voltage
- Operating ambient temperature range: -40℃ to +85℃
- High I/O isolation test voltage up to 4200VAC
- Up to 87% efficiency
- Output short circuit, over-current, over-voltage protection
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- Meets Emissions CLASS B and surge ±2KV/±4KV without additional circuits
- OVC III (meet IEC62477-1, 2000m altitude)

APPLICATIONS

- Industrial
- Electric power
- Civil apptication

Selection Guide

Certification	Part No.*	Output Power (W)	nominal Output Voltage and Current(vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.
EN/BS EN	APH25-03	13.53	3.3VDC/4100mA	78	48000
	APH25-05	20.5	5VDC/4100mA	82	12240
	APH25-09	22.5	9VDC/2500mA	82	5600
UL/EN/BS EN	APH25-12	25.2	12VDC/2100mA	84	5400
EN/BS EN	APH25-15	24	15VDC/1600mA	85	2400
EN/BS EN/UL	APH25-24	26.4	24VDC/1100mA	85	1440
EN/BS EN	APH25-48	24	48VDC/500mA	87	600

Note: *1. Use suffix "E2" for chassis mounting and suffix " D4" 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		--	--	0.6	A
			230VAC		--	--	0.34	
	Inrush Current		115VAC		--	20	--	
			230VAC		--	40	--	
	Leakage Current		277VAC/50Hz		0.25mA RMS Max.			
	Recommended External Input Fuse				3.15A/300V, slow-blow, required			
	Hot Plug				Unavailable			
Output Specifications	Output Voltage Accuracy		3.3V output		--	±3	--	%
			others		--	±2	--	
	Line Regulation		Rated load		--	±0.5	--	
	Load Regulation		0% - 100% load		--	±1	--	
	Ripple & Noise*		20MHz bandwidth (peak-to-peak value)		--	50	100	mV
	Temperature Coefficient				--	±0.02	--	%/℃
	Minimum Load				0	--	--	%
	Stand-by Power Consumption		230VAC	3.3V/5V/9V/12V/15V/24V	--	--	0.3	W
				48V	--	--	0.4	
	Hold-up Time		115VAC input		--	10	--	ms
			230VAC input		--	60	--	
	Short Circuit Protection				Hiccup, continuous, self-recover			
	Over-current Protection				≥150%, self-recover			
	Over-voltage Protection		3.3V/5V output		≤7.5VDC (Hiccup)			
			9V output		≤15VDC (Hiccup)			
	Over-voltage Protection		12V/15V output		≤20VDC (Hiccup)			
			24V output		≤30VDC (Hiccup)			
			48V output		≤60VDC (Hiccup)			
	Trim				±10%Vo			
General Specifications	Isolation	Input - output	Electric Strength Test for 1min., leakage current <5mA		4200	--	--	VAC
		Input - ⏚			2500	--	--	
		Output - ⏚			1250	--	--	
	Impulse Withstand Voltage	Input - output	1.2/50μs impulse waveform, three positive/ negative pulses, interval >= 5s. There is no breakdown discharge during the test.		6000	--	--	VDC
		Input - ⏚			6000	--	--	
		Output - ⏚			6000	--	--	

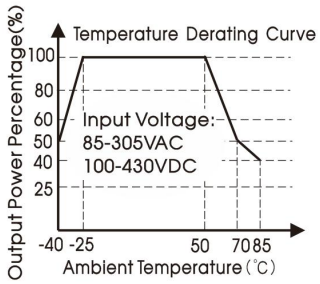
General Specifications	Insulation Resistance	Input - output	At 500VDC	100	--	--	MΩ
		Input - ⏚		100	--	--	
		Output - ⏚		100	--	--	
	Operating Temperature			-40	--	+85	℃
	Storage Temperature			-40	--	+105	
	Storage Humidity			--	--	95	%RH
	Soldering Temperature		Wave-soldering	260 ± 5℃; time: 5 - 10s			
			Manual-welding	360 ± 10℃; time: 3 - 5s			
	Switching Frequency			--	65	--	kHz
	Power Derating		-40℃ to -25℃	3.33	--	--	%/℃
			+50℃ to +70℃	2.5	--	--	
			+70℃ to +85℃	0.67	--	--	
			85VAC - 100VAC	1.00	--	--	%/VAC
			277VAC - 305VAC	0.715	--	--	
			2000m - 5000m	6.67	--	--	%/Km
	Safety Class			CLASS I			
	MTBF		MIL-HDBK-217F@25℃	≥300,000 h			
Mechanical Specifications	Case Material		Black plastic, flame-retardant and heat-resistant (UL94V-0)				
	Dimension		Horizontal package	70.00 x 48.00 x 23.50 mm			
			E2 chassis mounting	96.10 x 54.00 x 32.00mm			
			D4 Din-Rail mounting	96.10 x 54.00 x 36.60mm			
	Weight		Horizontal package/E2 chassis mounting/D4 Din-Rail mounting	120g (Typ.)/170g (Typ.)/210g (Typ.)			
	Cooling Method		Free air convection				

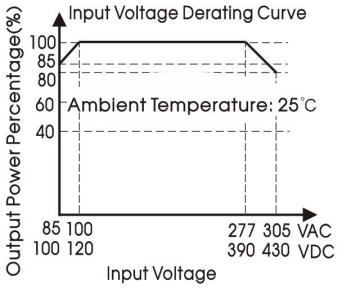
Note: *The "parallel cable" method is used for ripple and noise test.

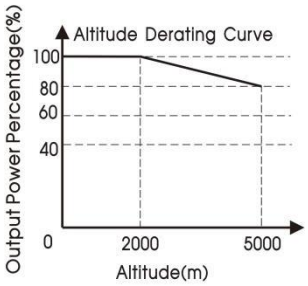
Electromagnetic Compatibility (EMC)

Electromagnetic Compatibility (EMC)	Emissions (EMI)	CE	CISPR32/EN55032 CLASS B	
		RE	CISPR32/EN55032 CLASS B	
	Immunity (EMS)	ESD	IEC/EN61000-4-2 Contact ±8KV/Air ±15KV	perf. Criteria A
		RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
		EFT	IEC/EN61000-4-4 ±4KV	perf. Criteria A
		Surge	IEC/EN61000-4-5 line to line ±2KV/line to PE ±4KV	perf. Criteria A
			IEC/EN61000-4-5 line to line ±4KV/line to PE ±6KV (See Fig. 2 for recommended circuit)	perf. Criteria A
		CS	IEC/EN61000-4-6 10Vr.m.s	perf. Criteria A
		Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11 0%, 70%	perf. Criteria B

Characteristic Curve

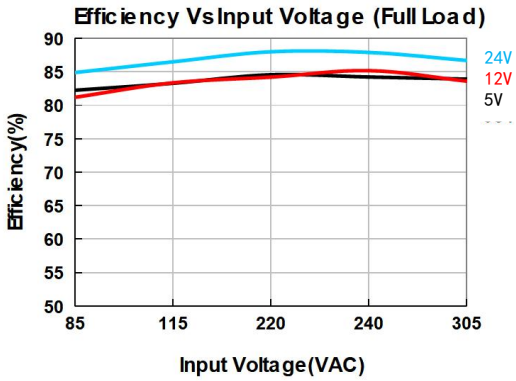


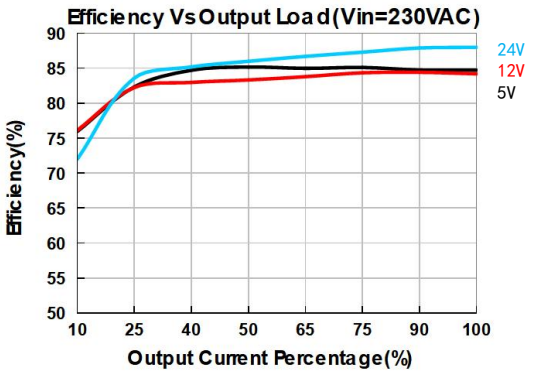




Note: ① With an AC input between 85 - 100VAC/277 - 305VAC and a DC input between 100 - 120VDC/390 - 430VDC, the output power must be derated as per temperature derating curves;

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





Design Reference

1. Typical application

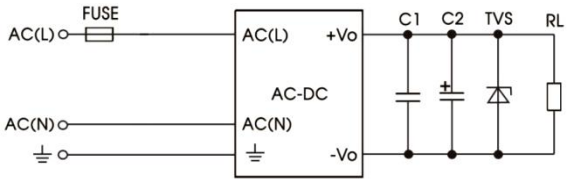


Fig. 1: Typical circuit diagram

Part No.	C1	C2	FUSE	TVS
APH25-03	1uF/50V	330uF/16V	3.15A/300V, slow-blow, required	SMBJ7.0A
APH25-05		330uF/16V		SMBJ7.0A
APH25-09		330uF/16V		SMBJ12A
APH25-12		330uF/25V		SMBJ20A
APH25-15		330uF/25V		SMBJ20A
APH25-24		120uF/35V		SMBJ30A
APH25-48		68uF/63V		SMBJ64A

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

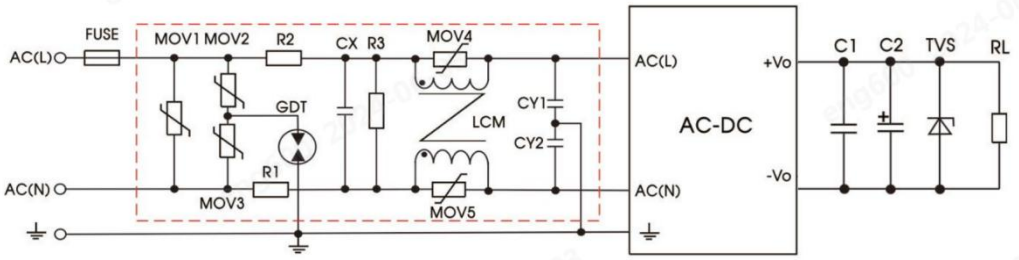
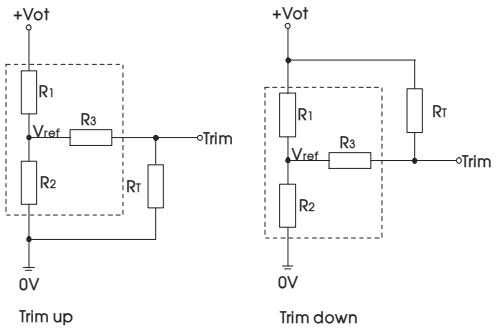


Fig. 2: EMC application circuit with higher requirements

Component	Recommended value	Component	Recommended value
FUSE	6.3A/300V, slow-blow, required	GDT	B 5G3600
MOV1	S20K350	CX	0.15uF/300VAC
MOV2/MOV3	S14K350	CY1/CY2	2200pF/400VAC
MOV4/MOV5	S07K350	R1/R2	2Ω/3W (wire-wound resistor, required)
LCM	10mH	R3	1MΩ/2W (wire-wound resistor, required)
Note: R3 (required) can also be replaced by 4 pieces of 1.5MΩ/1206 patch resistors in series and parallel.			

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



Trim resistor connection (dashed line shows internal resister network)

Calculation formula of Trim resistance:

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

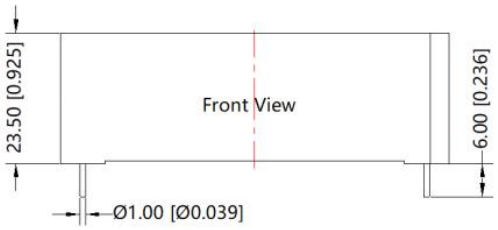
$$down:\ R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{Vot-Vref}{Vref}\cdot R_2$$

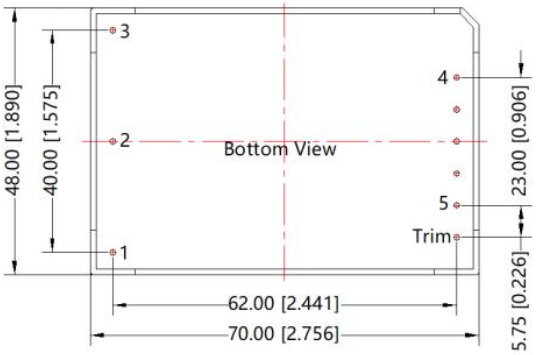
RT = Trim Resistor value;

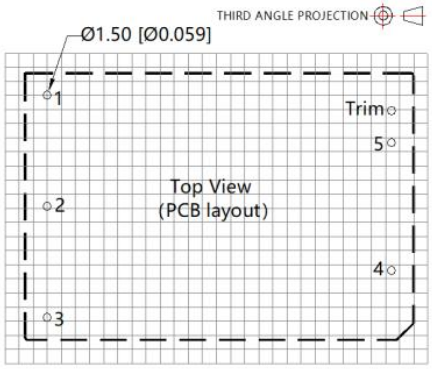
a = Self-defined parameter;

Vout	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)	Vot(V)
3.3V	7.5	4.45	1	1.24	Output voltage after regulation, variation ≤ ±10%
5V	7.5	7.33	1	2.5	
9V	12.4	4.75	1	2.5	
12V	24	6.28	1	2.5	
15V	20	3.96	1	2.5	
24V	24	2.76	1	2.5	
48V	27	1.47	1	2.5	

Dimensions and Recommended





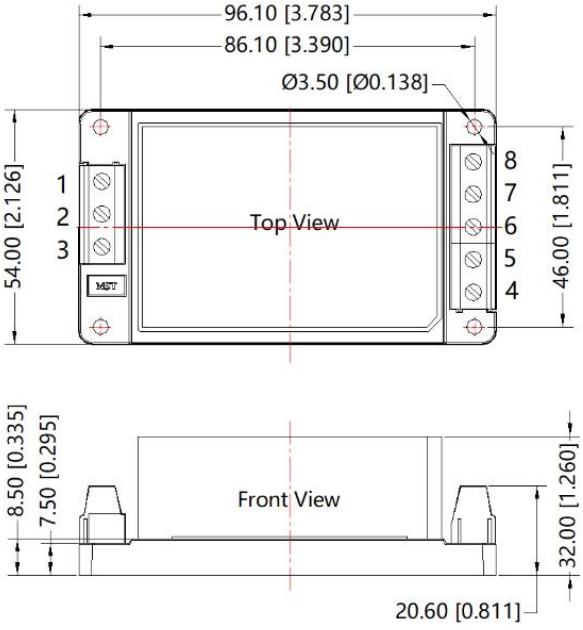


Note: Grid 2.54*2.54mm

Pin	Mark
1	⏚
2	AC(N)
3	AC(L)
4	+Vo
5	-Vo
Trim	Trim

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

E2 Dimension

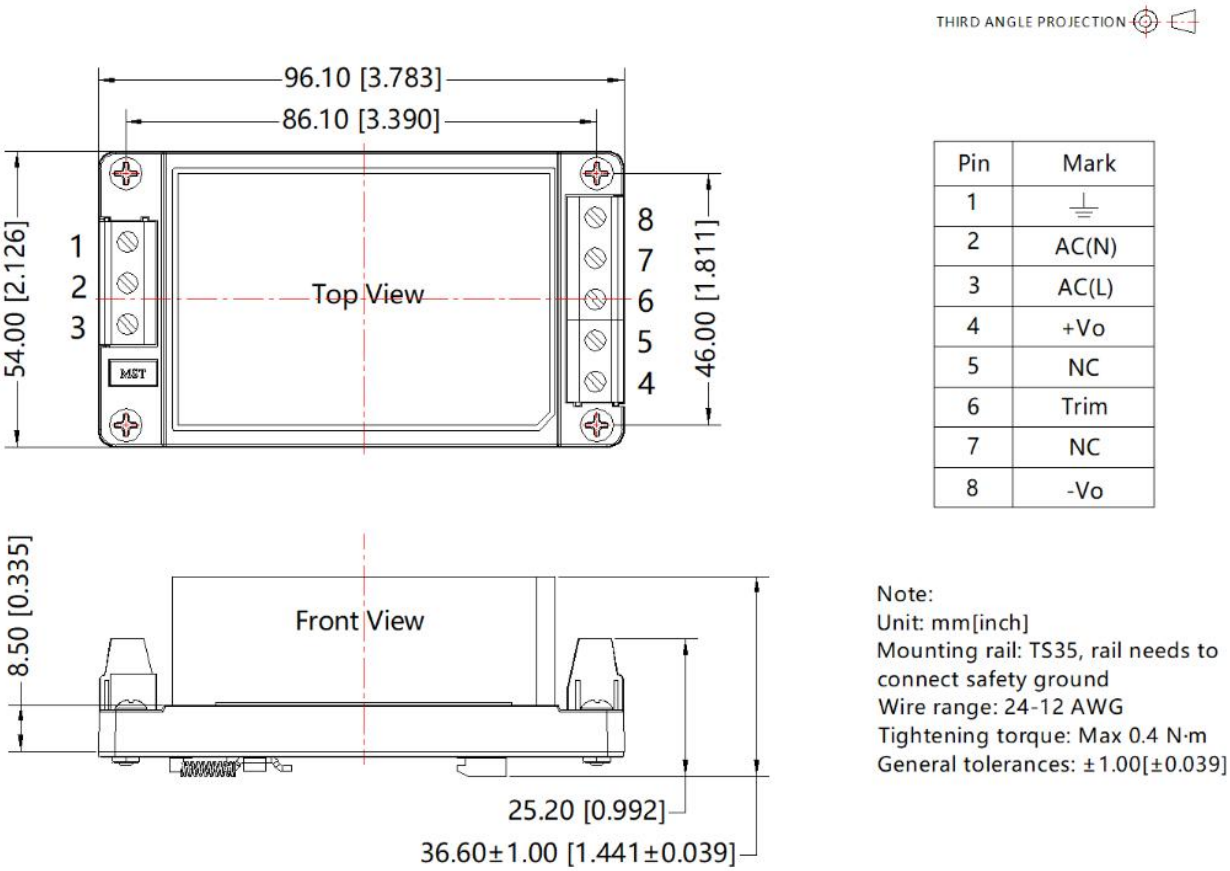




Pin	Mark
1	⏚
2	AC(N)
3	AC(L)
4	+Vo
5	NC
6	Trim
7	NC
8	-Vo

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

D4 Dimension



Pin	Mark
1	⏚
2	AC(N)
3	AC(L)
4	+Vo
5	NC
6	Trim
7	NC
8	-Vo

Note:
Unit: mm[inch]
Mounting rail: TS35, rail needs to connect safety ground
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
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.