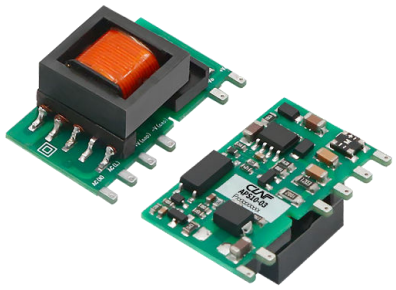
DESCRIPTIONS

10W, AC/DC Converter



RoHS

3 Years Warranty

c UL us CE Report UK CA Report

UL62368-1 EN62368-1 BS EN62368-1

FEATURES

- Ultra-wide 85 - 305VAC and 100 - 430VDC input voltage range
- Accepts AC or DC input (dual-use of same terminal)
- Operating ambient temperature range -40℃ to +85℃
- Multi application, flexible layout
- Compact size, high power density, green power
- No-load power consumption as low as 0.1W
- Output short circuit, over-current, over-voltage protection

APPLICATIONS

- Industrial control
- Electric power
- Instrumentation
- Smart home applications

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	APS10-03	6.6W	3.3V/2000mA	73	1500
UL/EN/BS EN	APS10-05	10W	5V/2000mA	77	1500
EN/BS EN	APS10-09		9V/1100mA	80	1000
UL/EN/BS EN	APS10-12		12V/830mA	82	680
EN/BS EN	APS10-15		15V/670mA	82	470
UL/EN/BS EN	APS10-24		24V/420mA	83	330

Note:
1. The nominal output voltage refers to the voltage applied to the load terminal after adding external circuits.
2. If the product is used in a severe vibration application, it needs to be glued and fixed.
3. The product picture is for reference only.For details, please refer to the actual product.

Specifications

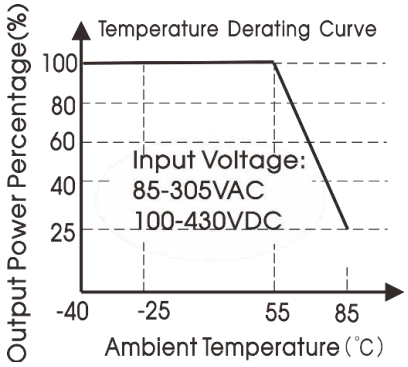
Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Voltage Range	AC input		85	--	305	VAC
		DC input		100	--	430	VDC
	Input Frequency			47	--	63	Hz
	Input Current	115VAC		--	--	0.30	A
		230VAC		--	--	0.18	
	Inrush Current	115VAC		--	15	--	
		277VAC		--	30	--	
	Recommended 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		--	±3	--	%
		5V/9V/12V/15V/24V		--	±2	--	
	Line Regulation	Rated load		--	±1	--	
	Load Regulation	0% - 100% load		--	±1.5	--	
	Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	80	150	mV
	Temperature Coefficient			--	±0.02	--	%/℃
	Stand-by Power Consumption	230VAC	3.3V/5V	--	0.05	0.10	W
			9V/12V/15V	--	0.09	0.12	
			24V	--	0.13	0.15	
	Short Circuit Protection			Hiccup, continuous, self-recovery			
	Over-current Protection			≥110% Io, self-recovery			
	Over-voltage Protection	3.3/5VDC output		≤9VDC (Output voltage clamp or hiccup)			
		9VDC output		≤15VDC (Output voltage clamp or hiccup)			
		12VDC output		≤16VDC (Output voltage clamp or hiccup)			
		15VDC output		≤21VDC (Output voltage clamp or hiccup)			
		24VDC output		≤32VDC (Output voltage clamp or hiccup)			
	Minimum Load			0	--	--	%
General Specifications	Isolation	Input-output	Electric Strength Test for 1min., leakage current < 5mA	3600	--	--	VAC
				5000	--	--	VDC
	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			
	Power Derating	+55℃ to +85℃		2.5	--	--	%/℃

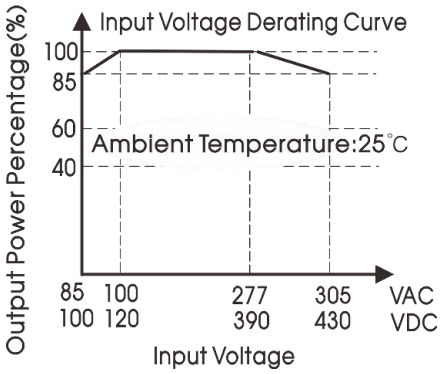
		85VAC - 100VAC	1	--	--	%/VAC
		277AVC - 305VAC	0.54	--	--	
	Safety Class		CLASS II			
	MTBF	MIL-HDBK-217F@25℃	> 1000,000 h			
Mechanical Specifications	Dimension	32.00 x 17.20 x 15.05 mm				
	Weight	8.2g (Typ.)				
	Cooling method	Free air convection				
Note: 1. * The "parallel cable" method is used for ripple and noise test.						

Electromagnetic Compatibility (EMC)

Electromagnetic Compatibility (EMC)	Emissions	CE	CISPR32/EN55032 CLASS A (Application circuit 1, 4)	
			CISPR32/EN55032 CLASS B (Application circuit 2, 3)	
		RE	CISPR32/EN55032 CLASS A (Application circuit 1, 4)	
			CISPR32/EN55032 CLASS B (Application circuit 2, 3)	
	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 ±2KV (Application circuit 1, 2)	perf. Criteria B
			IEC/EN61000-4-4 ±4KV (Application circuit 3, 4)	perf. Criteria B
		Surge	IEC/EN61000-4-5 line to line ±1KV (Application circuit 1, 2)	perf. Criteria B
			IEC/EN61000-4-5 line to line ±2KV (Application circuit 3, 4)	perf. Criteria B
		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

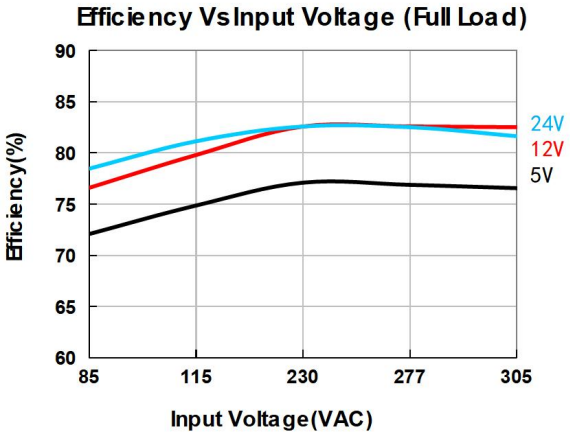


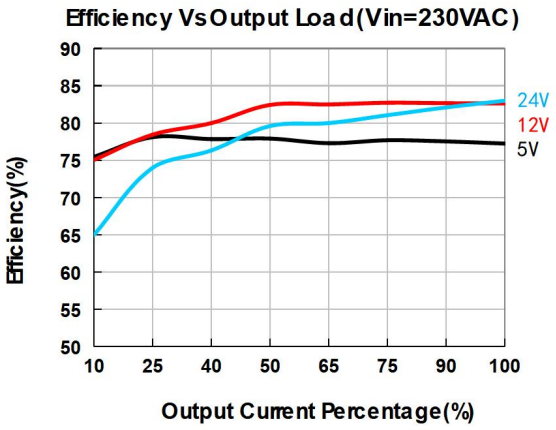


Note:

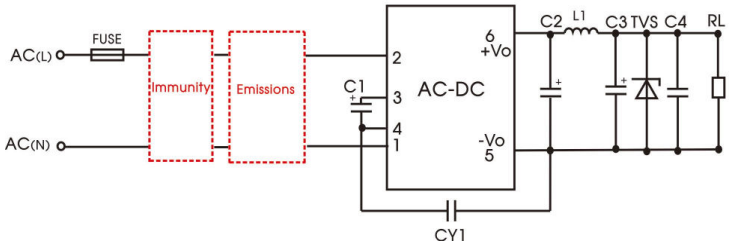
① With an AC input between 85 -100VAC/277- 305VAC and a DC input between 100 - 120VDC/390 - 430VDC, the output power must be derated as per temperature derating curves;

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





Additional Circuits Design Reference



AS series additional circuits design reference

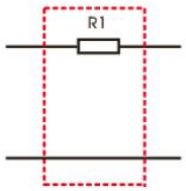
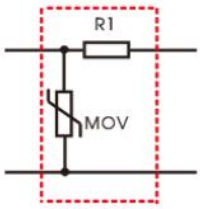
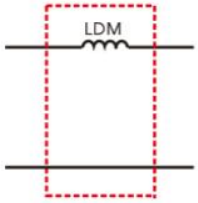
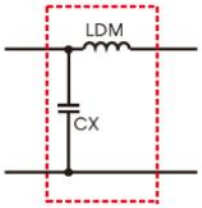
APS10 series additional components selection guide (No EMC devices)							
Part No.	C1(required)	C2 (required)	L1 (required)	C3 (required)	C4	CY1(required)	TVS
APS10-03	22uF/450V	820uF/16V (solid-state capacitor)	2.2uH/15mΩ Max/6.5A	150uF/35V	0.1uF/50V	1nF/400VAC	SMBJ7.0A
APS10-05							
APS10-09		270uF/16V (solid-state capacitor)					SMBJ12A
APS10-12							SMBJ20A
APS10-15		470uF/35V		100uF/35V			
APS10-24							SMBJ30A

Note:

1. C1 is used as filter capacitor with AC input (must be connected externally) and as EMC filter capacitor with DC input (must be connected), and it is recommended to use the capacitor with ripple current > 300mA@100KHz.
2. We recommend using an electrolytic capacitor with high frequency and low ESR rating for C3 (refer to manufacture's datasheet), electrolytic capacitor can be used for C2 when applied in normal and high temperature environments. Combined with C2, L1, they form a pi-type filter circuit. Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%, C4 is a ceramic capacitor, used for filtering high frequency noise.
3. A suppressor diode (TVS) is recommended to protect the application in case of converter failure and specification should be 1.2 times of the output voltage

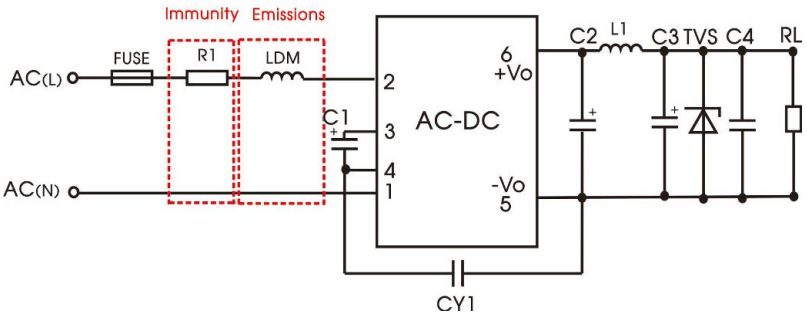
Environmental Application EMC Solution

APS series environmental application EMC solution selection table						
Recommended circuit	Application environmental	Typical industry	Input voltage range	Environment temperature	Emissions	Immunity
1	Basic application	None	85 - 305VAC	-40℃ to +85℃	Class A	Level 3
2	Indoor civil environment	Smart home/Home appliances (2Y)		-25℃ to +55℃	Class B	Level 3
	Indoor general environment	Intelligent building/Intelligent agriculture				
3	Indoor industrial environment	Manufacturing workshop		-25℃ to +55℃	Class B	Level 4
4	Outdoor general environment	ITS/Video monitoring/Charging point/Communication/Security and protection		-40℃ to +85℃	Class A	Level 4

Immunity design circuits for reference		Emissions design circuits for reference	
Level 3	Level 4	Class A	Class B
			

Electromagnetic Compatibility Solution--Recommended Circuit

1. Application circuit 1——Basic application

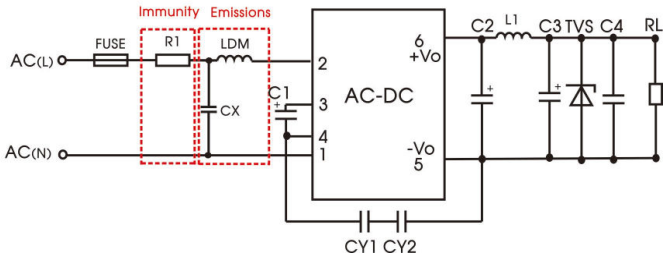


Recommended circuit 1

Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Basic application	-40℃ to +85℃	Level 3	Class A

Component	Recommended value
FUSE (required)	1A/300V, slow-blow
R1 (wire-wound resistor, required)	6.8Ω/3W
LDM	2.2mH/Max: 4Ω/Min: 0.24A
Note: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.	

2. Application circuit 2——Indoor civil /Universal system recommended circuits for general environment

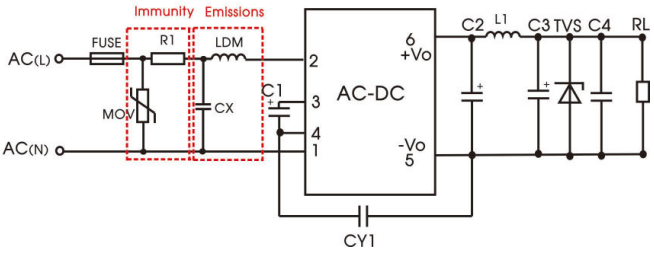


Recommended circuit 2

Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Indoor civil /general	-25℃ to +55℃	Level 3	Class B

Component	Recommended value
FUSE (required)	1A/300V, slow-blow
R1 (wire-wound resistor, required)	6.8Ω/3W
CY1(CY2)	1nF/400VAC
LDM	2.2mH/Max: 4Ω/Min: 0.24A
CX	0.1uF/310VAC
Note 1: To meet the IEC/EN60335 certification, the two Y capacitors of the primary and secondary need to be externally connected (CY1/CY2, value at 2.2nF/250VAC); Note 2: According to the certification requirements, the X capacitor needs to be connected in parallel with the bleeder resistance, the recommended resistance value is less than 3.8MΩ, and the actual need to be selected according to the certification standard. Note 3: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.	

3. Application circuit 3——Universal system recommended circuits for indoor industrial environment

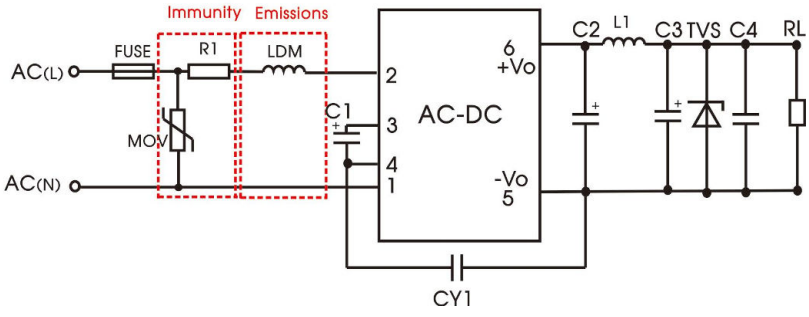


Recommended circuit 3

Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Indoor industrial	-25℃ to +55℃	Level 4	Class B

Component	Recommended value
FUSE (required)	2A/300V, slow-blow
MOV	S14K350
CY1	1nF/400VAC
CX	0.1uF/310VAC
LDM	2.2mH/Max: 4Ω/Min: 0.24A
R1 (wire-wound resistor, required)	6.8Ω/3W
Note 1: According to the certification requirements, the X capacitor needs to be connected in parallel with the bleeder resistance, the recommended resistance value is less than 3.8MΩ, and the actual need to be selected according to the certification standard. 2: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.	

4. Application circuit 4——Universal system recommended circuits for outdoor general/harsh environment



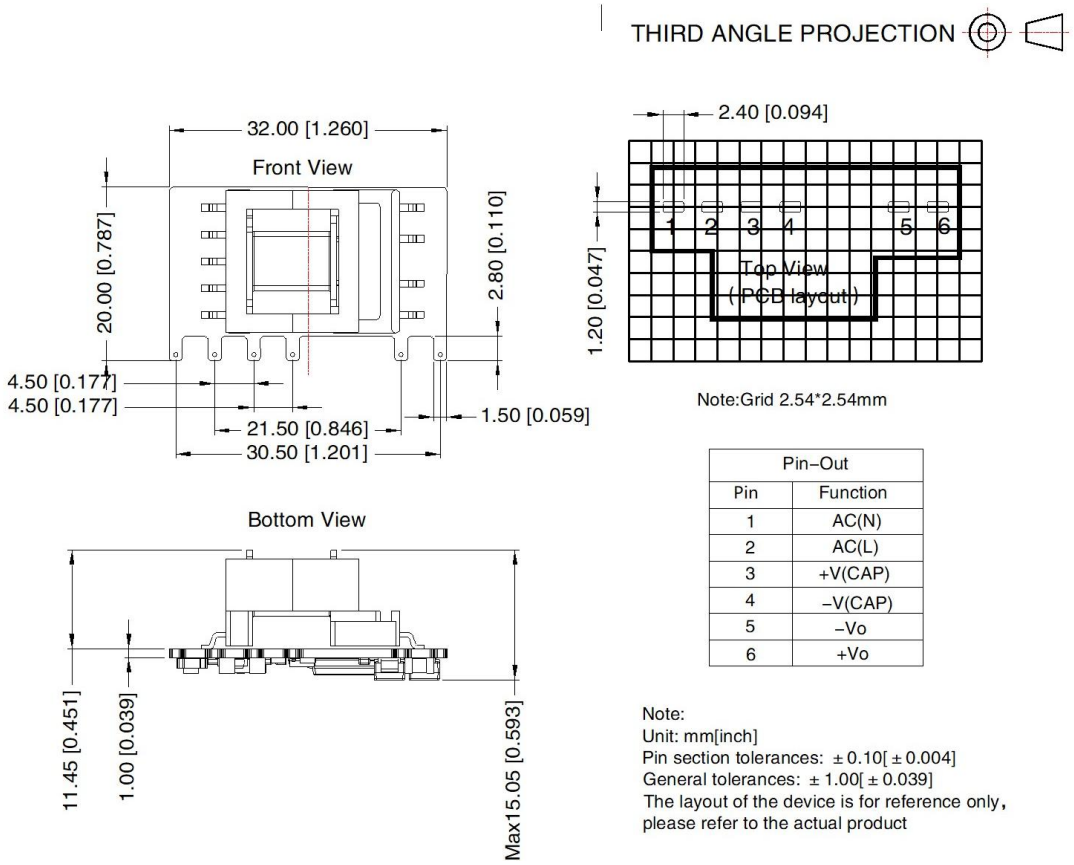
Recommended circuit 4

Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Outdoor general environment	-40℃ to +85℃	Level 4	Class A

Component	Recommended value
FUSE (required)	2A/300V, slow-blow
MOV	S14K350

LDM	2.2mH/Max: 4Ω/Min: 0.24A
R1 (wire-wound resistor, required)	6.8Ω/3W
Note: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.	

Dimensions and Recommended Layout



Pin–Out	
Pin	Function
1	AC(N)
2	AC(L)
3	+V(CAP)
4	–V(CAP)
5	–Vo
6	+Vo

Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±1.00[±0.039]
The layout of the device is for reference only, please refer to the actual product

Note:

1. External electrolytic capacitors are required to modules, more details refer to typical applications;
2. This part is open frame, at least 6.4mm creepage distance between the primary and secondary external components of the module is needed to meet the safety requirement;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%, recommended circuit, nominal input voltage (115V and 230V) and rated output load;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.