DESCRIPTIONS

15W, AC-DC Converter



RoHS

CE Report EN62368-1

UKCA Report 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℃
- High I/O isolation test voltage up to 4000VAC
- Multi application, compact size, flexible layout
- Output short circuit, over-current protection
- Plastic case meets UL94V-0 flammability
- Pollution degree 3

APPLICATIONS

- Industrial control
- Electric power
- Instrumentation
- Smart home

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	APS15-03D	9.9W	3.3V/3000mA	78	15000
	APS15-05D	15W	5V/3000mA	81	15000
	APS15-09D		9V/1670mA	84	5000
	APS15-12D		12V/1250mA	84	4000
	APS15-15D		15V/1000mA	84	1500
	APS15-24D		24V/625mA	84	680

Note: 1. *The nominal output voltage refers to the voltage applied to the load terminal after adding external circuits.
2. *The product picture is for reference only. For details, please refer to the actual produc.

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	--	--	0.4	A
		230VAC	--	--	0.25	
	Inrush Current	115VAC	--	20	--	
		230VAC	--	35	--	
	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	10% - 100% load	--	±5	--	%
	Line Regulation	Rated load 3.3V	--	±2.5	--	
		Rated load 5V/9V/12V/15V/24V	--	±1.5	--	
	Load Regulation	10% - 100% load	--	±3	--	
	Ripple & Noise*	20MHz bandwidth (peak-to-peak value), 10% - 100% load	--	80	150	mV
	Temperature Coefficient		--	±0.15	--	%/℃
	Stand-by Power Consumption	230VAC	--	0.10	0.25	W
	Short Circuit Protection		Hiccup, continuous, self-recover			
	Over-current Protection		≥110%Io, Hiccup, self-recover			
	Minimum Load		10	--	--	%
	Hold-up Time	115VAC input	--	8	--	ms
		230VAC input	--	40	--	
General Specifications	Isolation Input-output	Electric Strength Test for 1min., leakage current < 5mA	4000	--	--	VAC
	Insulation Resistance Input-output	At 500VDC	100	--	--	MΩ
	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℃ 3.3V/5V/9V/24V	1.67	--	--	%/℃
		+55℃ to +85℃ 12V	2.0	--	--	
		+50℃ to +85℃ 15V	1.72	--	--	

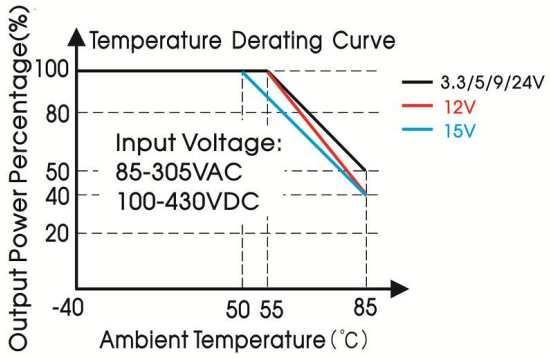
General Specifications	Power Derating	85VAC - 100VAC	1.33	--	--	%/VAC
		277VAC - 305VAC	0.72	--	--	
	Safety Class		CLASS II			
	MTBF	MIL-HDBK-217F@25℃	>1,000,000 h			
Mechanical Specifications	Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)				
	Dimension	33.34 x 21.50 x 9.72mm				
	Weight	14g (Typ.)				
	Cooling method	Free air convection				

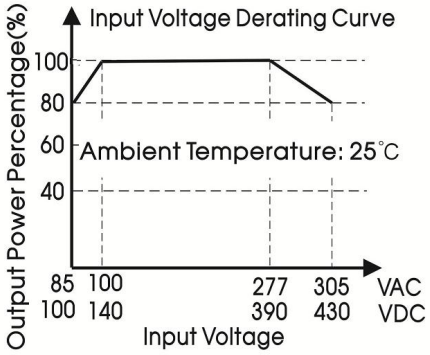
Note: 1. * The "parallel cable" method is used for ripple and noise test.
2. The product is able to work with 0% - 10% load and with stable output.

Electromagnetic Compatibility (EMC)

Electromagnetic Compatibility (EMC)	Emissions	CE	CISPR32/EN55032 CLASS A (Application circuit 1, 4)	
			CISPR32/EN55032 CLASS B (Application circuit 2, 3, 5)	
		RE	CISPR32/EN55032 CLASS A (Application circuit 1, 4)	
			CISPR32/EN55032 CLASS B (Application circuit 2, 3, 5)	
	Immunity	ESD	IEC/EN61000-4-2 Contact ±6KV /Air ±8KV	perf. Criteria A
		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, 5)	perf. Criteria B
		Surge	IEC/EN61000-4-5 line to line ±1KV (Application circuit 1, 2)	perf. Criteria A
			IEC/EN61000-4-5 line to line ±2KV (Application circuit 3, 4)	perf. Criteria A
			IEC/EN61000-4-5 line to line ±2KV/line to PE ±4KV (Application circuit 5)	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

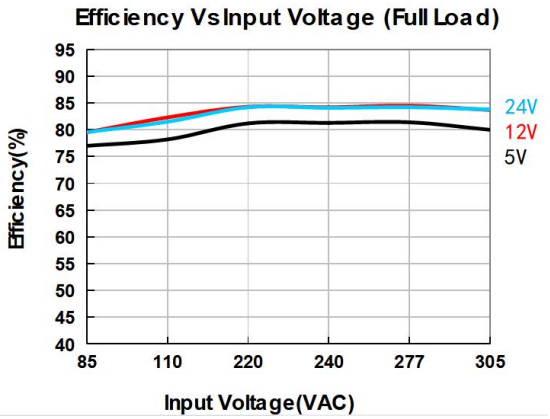
Characteristic Curve

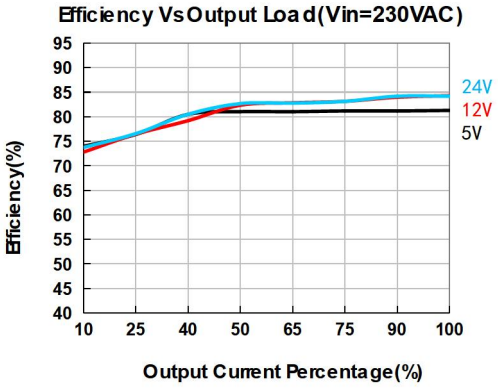




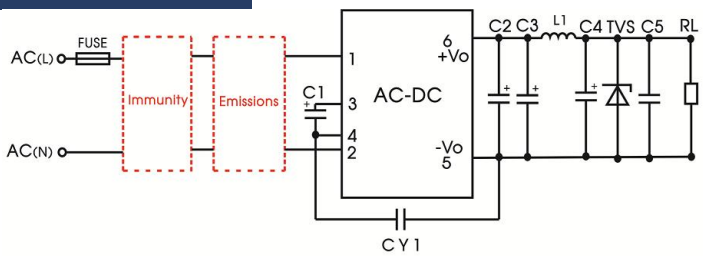
Note: ① With an AC input between 85-100VAC/277-305VAC and a DC input between 100-140VDC/390-430VDC, the output power must be derated as per temperature derating curves;

② This product is suitable for applications using natural air cooling





Additional Circuits Design Reference



APS series additional circuits design reference

APS series additional components selection guide (No EMC devices)								
Part No.	C1 (required)	C2 (required)	C3 (required)	L1 (required)	C4 (required)	C5	CY1 (required)	TVS
APS15-03D	33uF/450V (-25℃ to +85℃, 85-305VAC input; -40℃ to +85℃, 165-305VAC input)	1500uF/6.3V (solid-state capacitor)	/	2.0uH/15mΩ Max/6.5A	470uF/16V	0.1uF/ 50V	1nF/ 400VAC (2.2nF for 5V/9V in application circuit 3/5)	SMBJ7.0A
APS15-05D		1000uF/16V (solid-state capacitor)	/					
APS15-09D		470uF/16V (solid-state capacitor)	/		220uF/16V			SMBJ12A
APS15-12D					220uF/16V			SMBJ20A

APS15-15D	47uF/450V (-40℃ to +85℃, 85-305VAC input)	470uF/25V	470uF/25V		220uF/25V			
APS15-24D		470uF/35V	/		100uF/35V			SMBJ30A

Note:

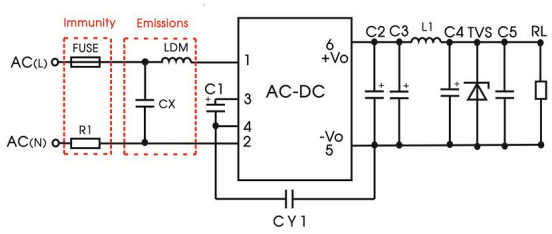
1. C1 is used as filter capacitor with AC input (must be connected externally) and as EMC filter capacitor with DC input (must be connected), and it is recommended to use the capacitor with ripple current > 400mA@100KHz.
2. We recommend using an electrolytic capacitor with high frequency and low ESR rating for C4 (refer to manufacture's datasheet), electrolytic capacitor can be used for C2, C3 when applied in normal and high temperature environments. Combined with C2, C3, L1, they form a pi-type filter circuit. Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C5 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
5	Outdoor industrial environment	Electricity/Grid		-40℃ to +85℃	Class B	Level 4

Electromagnetic Compatibility Solution--Recommended Circuit

1. Application circuit 1——Basic application



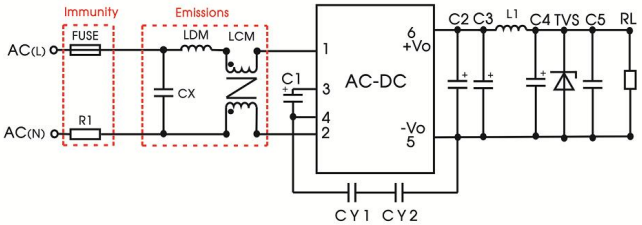
Application circuit 1

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

Component	Recommended value
FUSE	1A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)

CX	0.1uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A
Note 1: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistors or carbon film resistor. 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.	

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

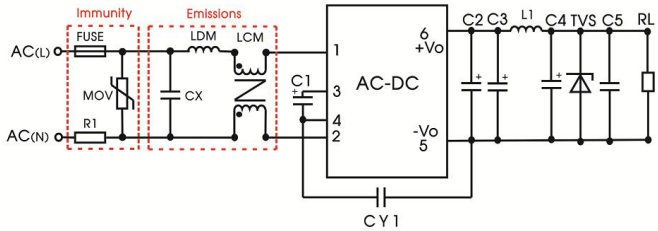


Application circuit 2

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

Component	Recommended value
FUSE	1A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
CX	0.2uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A
LCM	12.6mH/Min: 0.4A
Note 1: In the home appliance application environment, the two Y capacitors of the primary and secondary need to be externally connected (CY1/CY2, value at 2.2nF/250VAC), which can meet the EN60335 certification. 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 2.5MΩ, 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 resistors or carbon film resistor.	

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



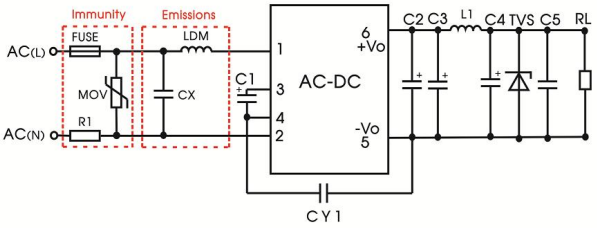
Application circuit 3

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

Component	Recommended value
FUSE	2A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)

MOV	S14K350
CX	0.2uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A
LCM	12.6mH/Min: 0.4A
Note 1: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistors or carbon film resistor. 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 2.5MΩ, and the actual need to be selected according to the certification standard.	

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

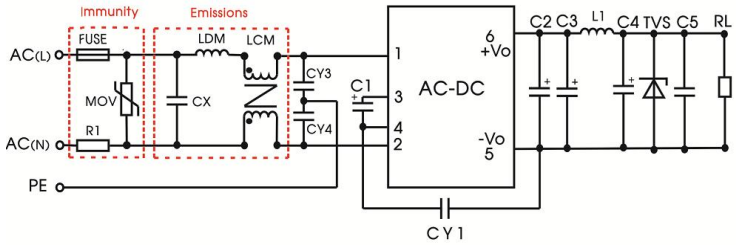


Application circuit 4

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

Component	Recommended value
FUSE	2A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
MOV	S14K350
CX	0.1uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A
Note 1: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistors or carbon film resistor. 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.	

5. Application circuit 5——Universal system recommended circuits for outdoor industrial environment



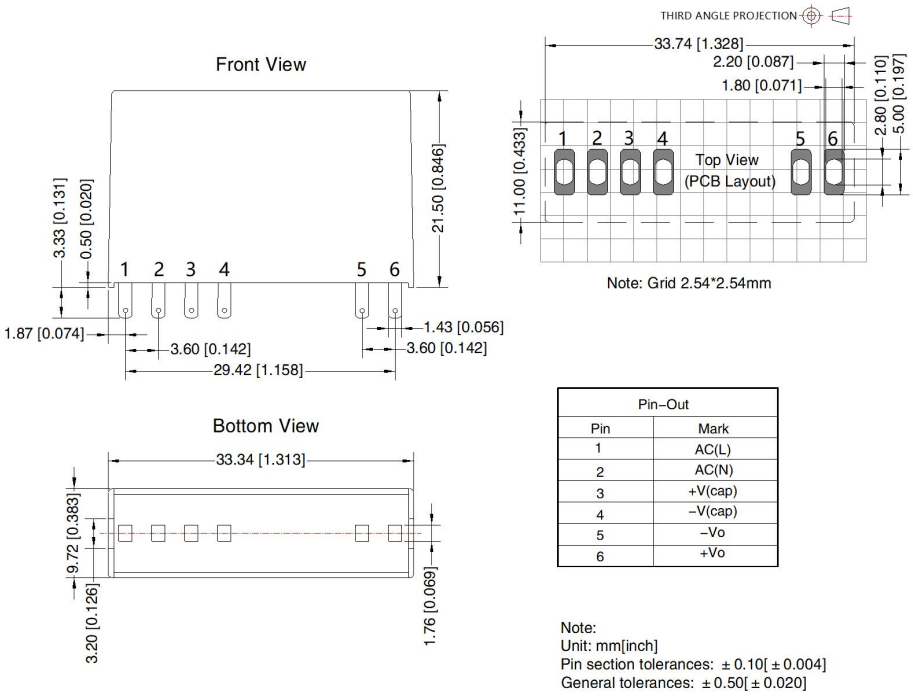
Application circuit 5

Application environmental	Ambient temperature range	Immunity level	Emissions class
Outdoor industrial environment	-40℃ to +85℃	Level 4	Class B

Component	Recommended value
FUSE	2A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
MOV	S14K350

CX	0.2uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A
LCM	12.6mH/Min: 0.4A
CY3/CY4	1nF/400VAC
Note 1: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistors or carbon film resistor. 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 2.5MΩ, and the actual need to be selected according to the certification standard.	

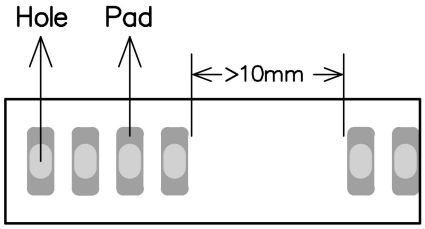
Dimensions and Recommended Layout



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

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

Recommended pad



Note: Please refer to the recommended dimensions or pad.

Note:

1. External electrolytic capacitors are required to modules, more details refer to typical applications;
2. This series is a potting product, at least 6.4mm creepage distance between the primary and secondary external components of the module is needed to meet the safety requirement, refer to the recommended welding hole design in the external dimension drawing;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%, 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.
8. 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.