

# AD20-23Sxx Series

AC-DC Converter | 20W | Compact size | DIP | 4000VAC | 85~305VAC



## Features

- Universal Input: 85~305VAC / 100~430VDC
- Operating temperature range: -40°C ~ +85°C
- Isolation voltage: 4000VAC
- High efficiency up to: 87%(Typ.)
- Overvoltage category III (OVC III)
- EMI Class B without additional components
- Designed to meet IEC/EN/UL62368, EN60335, EN61558

## Product description



AD20-23Sxx series is a 20W miniature AC DC module-type power supply provided by BETTPOWER. This series features the universal input voltage range of 85-305Vac, low power consumption, high efficiency, high reliability, and reinforced isolation. The entire series is compliance with BS EN/EN55032 Class B without the need of any additional components. The EMC and safety specification design complies with IEC/EN61000-4, CISPR32/EN55032, IEC/EN/UL62368, EN60335, IEC/EN/BS EN61558. These power supply modules are widely used in industries, power generation, household appliances, instrumentation, communication, and civil applications.

## Selection Guide

Certification	Part No.	Input Voltage (VAC)	Out Power (W)	Out Voltage (VDC)	Out Current Max.(mA)	Full Load Efficiency %(230VAC, Typ.)	Capacitive Load Max.( $\mu$ F)
EN/UL pending	AD20-23S03	85~305	14.85	3.3	4500	81	8000
	AD20-23S05	85~305	20	5	4000	85	8000
	AD20-23S09	85~305	20	9	2200	84	5400
	AD20-23S12	85~305	20	12	1670	85	4000
	AD20-23S15	85~305	20	15	1330	86	3000
	AD20-23S18	85~305	20	18	1112	86	3000
	AD20-23S24	85~305	20	24	830	87	1000

Note:

1. All the above data were tested within the parameter range of typical application circuits;
2. The product images are for reference only. Please refer to the actual product for details;
3. Adding "T" to the product model suffix indicates an extension for chassis mount packaging, while adding "Din" to the suffix indicates an extension for Din-rail mount packaging.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	305	VAC
	DC input	100	--	430	VDC
Input Current	115VAC	--	--	0.5	A
	230VAC	--	--	0.3	A
Inrush Current	115VAC	--	30	--	A
	230VAC	--	60	--	A
Input Frequency		47	--	63	Hz
Recommended External Input Fuse		3.15A/300V, slow-blow, required			
Leakage Current	230VAC/50Hz	0.1mA RMS Max.			
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	10% ~ 100% load	--	±2	--	%
Line Regulation	Full load	--	±0.5	--	%
Load Regulation	0 ~ 100% load	--	±1.0	--	%
Ripple & Noise*	20MHz bandwidth (peak-to-peak value), 5% ~ 100% load	--	100	150	mV
Temperature Coefficient		--	±0.02	--	%/°C
Stand-by Power Consumption	230VAC	--	0.1	--	W
Min. Load		0	--	--	%
Over-current Protection		110	--	--	%Io
Short Circuit Protection		Continuous, Self-Recovery			
Hold-up Time	230VAC	--	50	--	ms

Note: Ripple & noise are measured at 20MHz of bandwidth with a 10uF electrolytic capacitor and a 1uF ceramic capacitor connected inparallel at the output.

## General Specifications

Item	Operating Conditions			Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, test time 1 minute, leakage current less than 5mA			4000	--	--	VAC
Insulation Resistance	Input-output, insulated voltage 500VDC			100	--	--	MΩ
Power Derating	-40°C ~ -25°C	Input voltage	85~165VAC	2.0	--	--	%°C
		Output voltage	3.3/5/9V	2.8	--	--	%°C
	+55°C ~ +85°C			12/15/18/24V	2.33	--	--

	85VAC ~ 100VAC	2.0	--	--	%/VAC
	277VAC ~ 305VAC	0.7	--	--	%/VAC
Operating Temperature		-40	--	85	°C
Storage Temperature		-40	--	85	°C
Storage Humidity	Non-condensing	--	--	95	%RH
Soldering Profile	Wave-soldering	260 ± 5°C; time: 5 - 10s			
	Munual soldering	360 ± 10°C; time: 3 - 5s			
Safety Standard	Product design conforms to IEC/EN/BS EN62368-1, IEC/EN/BS EN61558-1/-2-16, EN60335-1, UL62368-1				
Safety Class	CLASS II				
MTBF	MIL-HDBK-217F@25°C	>1,500,000h			

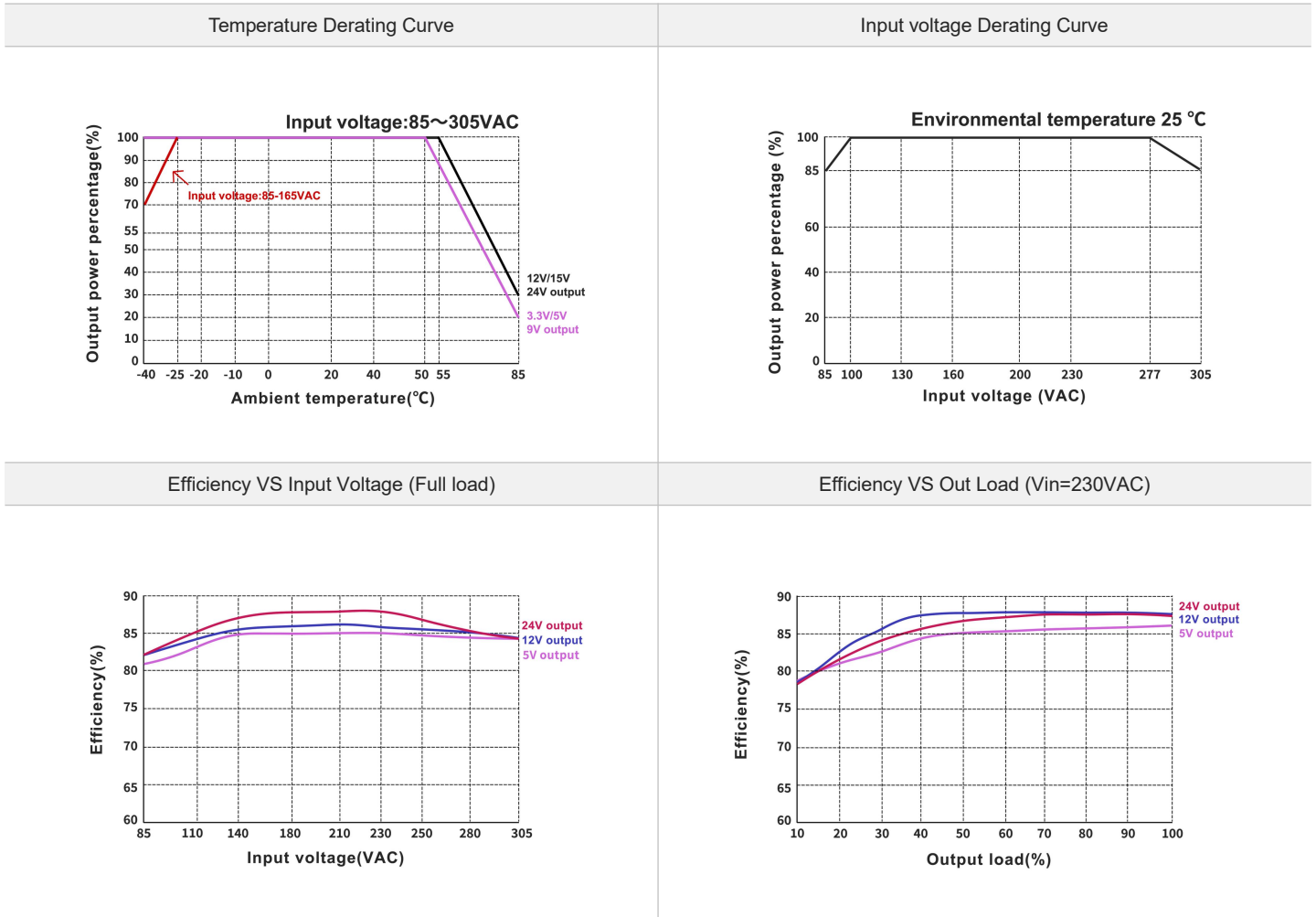
## Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)
Package Dimensions	52.40 * 27.20 * 24.00mm
Weight	50.5g(Typ.)
Cooling Method	Free air convection

## Electromagnetic Compatibility (EMC)

EMI	CE	CISPR32/EN55032 CLASS B CISPR11/EN55011 CLASS B EN55014-1	
	RE	CISPR32/EN55032 CLASS B CISPR11/EN55011 CLASS B EN55014-1	
EMS	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
		EN55014-2	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (EMC Solutions - Recommended Circuit(2-1))	perf. Criteria B
		IEC/EN61000-4-4 ±4KV (EMC Solutions - Recommended Circuit(2-2))	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(EMC Solutions - Recommended Circuit(2-2))	perf. Criteria B
		IEC/EN61000-4-5 line to line ±2KV/line to PE ±4KV(EMC Solutions - Recommended Circuit(2-2))	perf. Criteria A
EN55014-2		perf. Criteria B	
CS	IEC/EN61000-4-6 10Vr.m.s	perf. Criteria A	
	EN55014-2	perf. Criteria A	
ESD	IEC/EN61000-4-2 Contact ±6KV / Air ±8KV	perf. Criteria B	

## Product Characteristic Curve

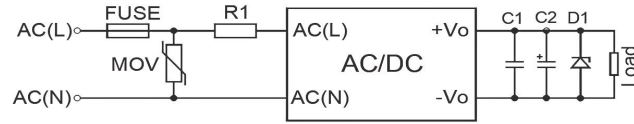


Note:

1. For input voltages of 85-100VAC/277-305VAC, voltage derating should be carried out on the basis of temperature derating.
2. This product is suitable for use in a natural wind-cooled environment.

## Design Reference - Application circuit

Application circuit(Figure 1)



Reference Table for Selection of Peripheral Devices

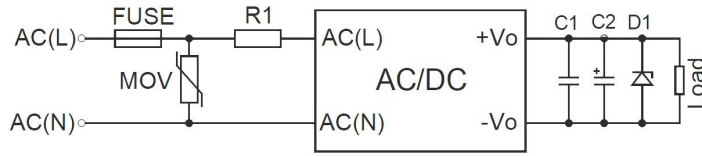
Part No.	FUSE	MOV	R1	C1	C2	D1
AD20-23S03	3.15A/300VAC Slow-blow Required	14D561K	3Ω/3W Wire-wound resistor Required	1uF/16V	330uF/16V	See Note 2
AD20-23S05				1uF/16V	330uF/16V	
AD20-23S09				1uF/25V	220uF/25V	
AD20-23S12				1uF/25V	220uF/25V	
AD20-23S15				1uF/25V	220uF/25V	
AD20-23S18				1uF/50V	100uF/35V	
AD20-23S24				1uF/50V	100uF/35V	

Note:

1. FUSE and MOV can be selected based on actual needs.
2. D1 is a TVS transistor that can protect the downstream circuit in case of module abnormalities. It is recommended to choose a model that is 1.2 times the output voltage.

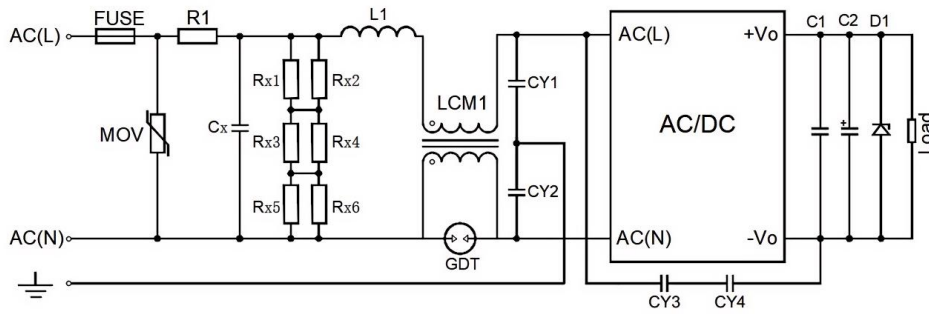
Design Reference - EMC Solutions - Recommended Circuits

EMC Solutions - Recommended Circuits(Figure 2-1)



EMC Solutions - Recommended Circuits(Figure 2-2)

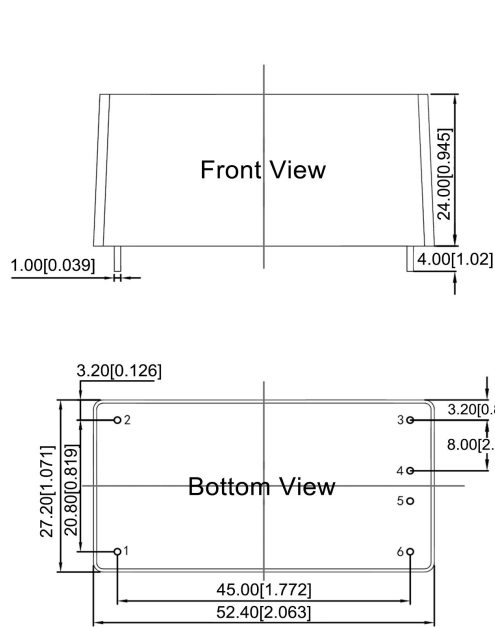
(When the output of the product needs to be connected to PE or connected to PE through Y capacitor,Recommended)



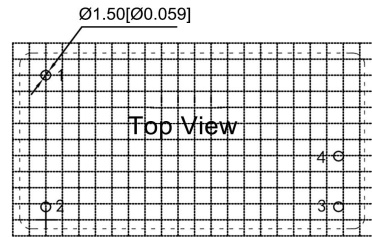
Recommended parameter values for EMC solution circuits	Model	Recommended value
	FUSE	3.15A/300VAC, Slow-blow, Required
	MOV	14D561K
	R1	6.8Ω/5W(Wire-wound resistor, Required)
	Cx	0.33uF/305VAC
	L1	1.2mH/0.5A
	CY1,CY2	2.2nF/400VAC
	CY3,CY4	2.2nF/400VAC
	GDT	300V/1KA
	LCM1	20mH, Common mode inductance
	Rx1,Rx2,Rx3,Rx4	1.5MΩ/1206
	C1,C2,D1	Refer to typical circuit design and application

## Dimensions and Recommended Layout

AD20-23Sxx Dimensions and Recommended Layout



Third Angle Projection



The grid distance size is 2.54mm\*2.54mm

Pin	Function
1	AC(L)
2	AC(N)
3	-Vo
4	+Vo
5,6	No Pin

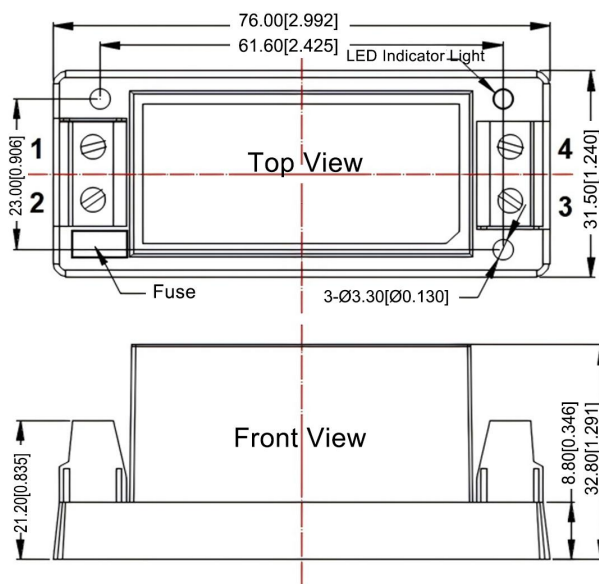
Note:

Size unit: mm [inch]

Terminal diameter tolerance size:  $\pm 0.10 [\pm 0.004]$

Unmarked dimensional tolerance:  $\pm 0.50 [\pm 0.020]$

AD20-23Sxx-T wired packaging Dimensions



Third Angle Projection

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

Note:

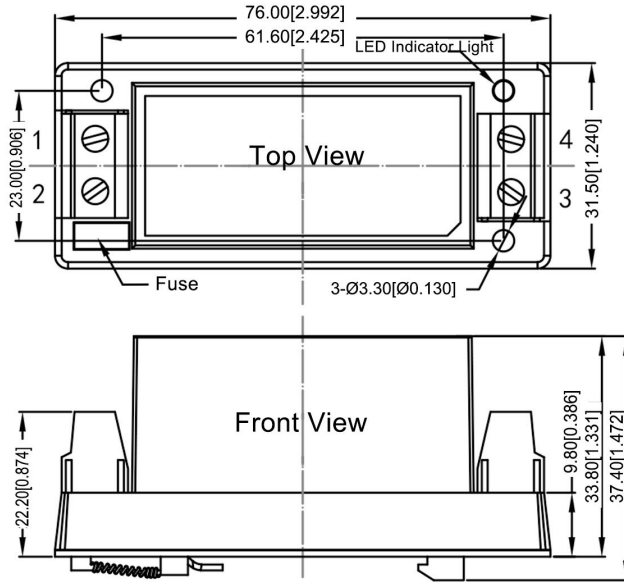
Size unit: mm [inch]

Wire diameter: 24-12AWG

Tightening force distance: Max0.4N · m

Unmarked tolerance:  $\pm 1.00 [\pm 0.039]$

## AD20-23Sxx-DIN rail-mounted packaging Dimensions



Third Angle Projection

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

Note:

Size unit: mm [inch]

Wire diameter: 24-12AWG

Tightening force distance: Max0.4N · m

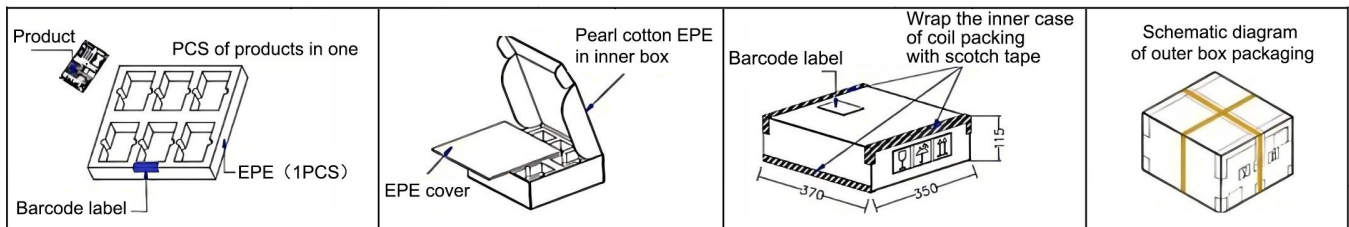
Rail type: TS35, rail needs to be grounded

Unmarked tolerance:  $\pm 1.00$  [ $\pm 0.039$ ]

## Packaging Information

Model series	Product quantity(pcs/tray)	Inner carton quantity(pcs/carton)	Outer carton quantity(pcs/carton)
AD20-23Sxx	35	105	210
AD20-23Sxx-T	28	56	112
AD20-23Sxx-DIN	28	56	112

The schematic diagram of pearl cotton packaging is shown below:



## Product precautions

1. The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
  2. It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
  3. The maximum capacitive load is tested within the input voltage range and under full load conditions;
  4. Unless otherwise specified, all indicators in this manual are measured at  $T_a=25\text{ }^\circ\text{C}$ , humidity<75% RH, nominal input voltage, and output rated load;
  5. All indicator testing methods in this manual are based on our company's corporate standards;
  6. Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel;
- Product specifications are subject to change without prior notice.

## Manufacturer contact information

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