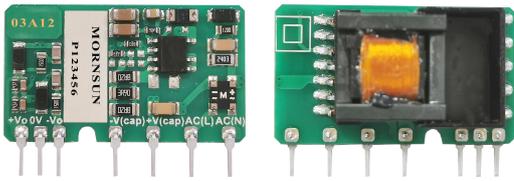


2.4W, AC-DC converter



Part no. marking with number, such as "03A12" means "CLS03-15A12SR2S"

FEATURES

- Universal 85-264VAC or 100-370VDC input voltage
- Operating ambient temperature range: -40°C to +85°C
- High efficiency, high power density
- Output short circuit, over-current protection
- Low power consumption, green power
- Industrial-grade design
- Open frame, Compact size
- Flexible design of peripheral circuit reduces layout problems
- Design to meet IEC62368/EN62368/UL62368 standards
- Production process in accordance with IATF16949 system control, applied to automobile industry

CLS03-15A12SR2S is one of Mornsun's highly efficient green power AC-DC Converter series. It features ultra-wide wide input range accepting either AC or DC voltage, high reliability, low power consumption and reinforced isolation. Production process in accordance with IATF16949 system control, all models are particularly suitable for industrial control, electric power, instrumentation, smart home and automobile applications which have high requirement for dimension and don't have high requirement on EMC. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

Selection Guide

Part No.	Output Power	Nominal Output Voltage and Current		Efficiency at 230VAC (%) Typ.	Capacitive Load (μF) Max.
		(Vo1/Io1)	(Vo2/Io2)		
CLS03-15A12SR2S	2.4W	+12V/150mA	-12V/50mA	74	100

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	264	VAC
	DC input	100	--	370	VDC
Input Frequency		47	--	63	Hz
Input Current	115VAC	--	--	0.12	A
	230VAC	--	--	0.06	
Inrush Current	115VAC	--	13	--	
	230VAC	--	23	--	
Recommended External Input Fuse		1A/250V, slow-blow, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	10%-100% load(balanced load)	Vo1	±5	--	%
		Vo2	±10	--	
Line Regulation	Full load	--	±2.5	--	%
Load Regulation	10%-100% load	--	±2.5	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	70	150	mV
Stand-by Power Consumption	230VAC	--	--	0.5	W
Temperature Coefficient		--	±0.15	--	%/°C
Short Circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		≥110%Io, self-recovery			
Minimum Load		10	--	--	%

Note: * The "parallel cable" method is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Isolation	Input-Output	Electric Strength Test for 1min., leakage current <5mA	3000	--	--	VAC
Operating Temperature		-40	--	+85	°C	
Storage Temperature		-40	--	+105		
Storage Humidity		--	--	95	%RH	
Soldering Temperature	Wave-soldering	260 ± 5°C; time: 5 - 10s				
	Manual-welding	360 ± 10°C; time: 3 - 5s				
Power Derating	-40°C to -20°C	2.0	--	--	% / °C	
	+55°C to +85°C	1.33	--	--		
	85VAC - 110VAC	0.8	--	--	% / VAC	
	240VAC - 264VAC	0.833	--	--		
Safety Standard		IEC62368/EN62368/UL62368				
Safety Class		CLASS II				
MTBF		MIL-HDBK-217F@25°C > 300,000 h				

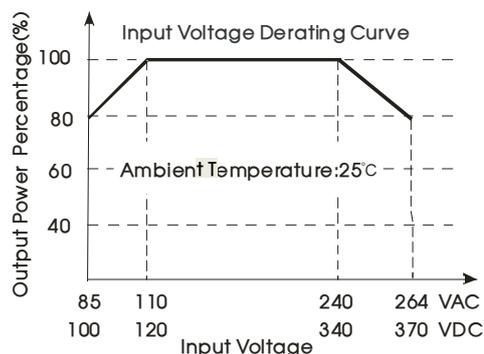
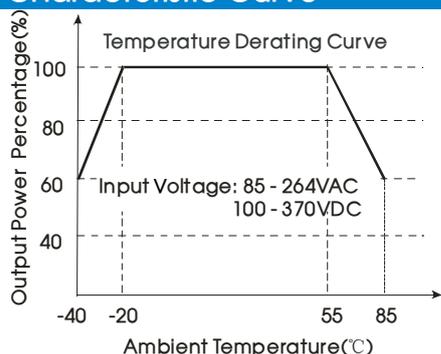
Mechanical Specifications

Dimension	35.00 x 21.00 x 13.00 mm
Weight	6.5g (Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

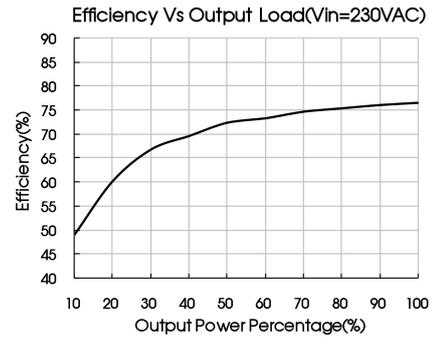
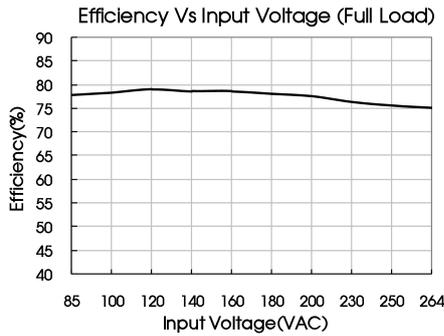
Emissions	CE	CISPR22/EN55022	CLASS A (See Fig. 1 for typical application circuit)	
	RE	CISPR22/EN55022	CLASS A (See Fig. 1 for typical application circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±4KV (See Fig. 1 for typical application circuit)	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m (See Fig. 2 for recommended circuit)	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV (See Fig. 1 for typical application circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±1KV (See Fig. 1 for typical application circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s (See Fig. 2 for recommended circuit)	perf. Criteria A

Product Characteristic Curve



Note: ① With an AC input between 85-110V/240-264VAC and a DC input between 100-120V/340-370VDC, the output power must be derated as per temperature derating curves;

② This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.



Design Reference

1. Typical application

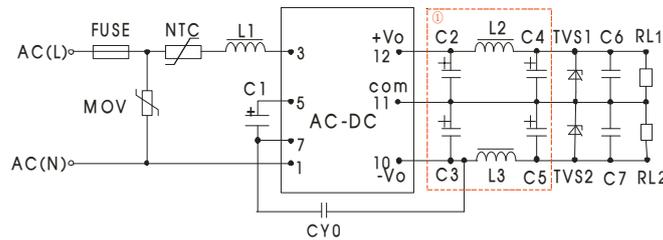


Fig. 1: Typical circuit diagram

Part No.	FUSE (required)	NTC	MOV	C1 (required)	L1	L2/L3	C2/C3	C4/C5	C6/C7	CY0	TVS1/TVS2
CLS03-15A12SR2S	1A/250V	13D-5	S14K320	10uF/450V	4.7mH	2.2uH	150uF/35V	68uF/35V	0.1uF/50V	1nF/400VAC	SMBJ20A

Note:
We recommend using an electrolytic capacitor with high frequency and low ESR rating for C2, C3, C4, C5 (refer to manufacture’s datasheet). Combined with L2, L3, they form a pi-type filter circuit. Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C6, C7 is a ceramic capacitor, used for filtering high frequency noise. A suppressor diode (TVS) is a recommended to protect the application in case of a converter failure.

2. EMC compliance recommended circuit

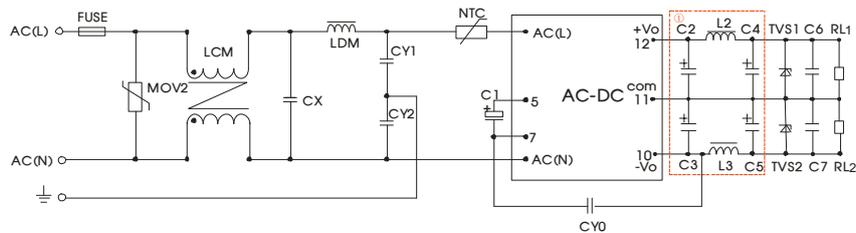


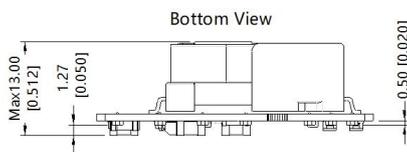
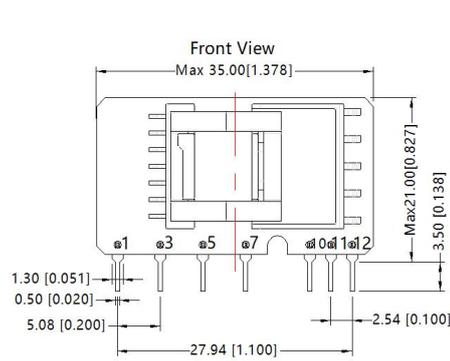
Fig 2: EMC application circuit with higher requirements

Element model	Recommended value
MOV2	S14K320
CY1/CY2	1nF/400VAC
CX	0.1uF/275VAC
LCM	3.5mH
LDM	0.33mH
NTC	13D-5
FUSE	1A/250V, slow-blow, required

Note: The recommended value of other components refers to typical application circuit.

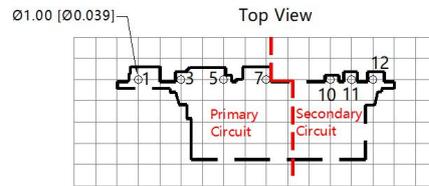
3. For additional information please refer to application notes on www.mornsun-power.com.

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin section tolerances: $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$
The layout of the device is for reference only ,
please refer to the actual product

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	AC (N)
3	AC (L)
5	+V(cap)
7	-V(cap)
10	-Vo
11	COM
12	+Vo

- 1.It is necessary to add C1 between pin5 and pin7.
- 2.It is necessary to add circuit to the output,such as the typical application of Figure 1.
- 3.It is needed to have distance $\geq 6.4\text{mm}$ for safety between external componets in primary circuit and secondary circuit.

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220084;
2. 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;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^\circ\text{C}$, humidity<75% with nominal input voltage 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.

Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com