

#### **1ACOS\_S** series

1W - Single output AC-DC converter - Universal input - Non-isolated



### **AC-DC Converter**

1 Watt

- Wide input voltage range: 85~305VAC/70~430VDC
- Operating temperature range: -40°C to +85°C
- 🕂 Compact size, open frame
- 🕂 High reliability, green power
- 🕂 Industrial-grade design
- Over output current protection
- Short circuit protection (SCP)
- EN62368 safety approval
  Flexible selection of EMC
  - Flexible selection of EMC additional circuits, simplify customer PCB layout

The 1ACOS\_S series is a highly efficient green power AC-DC Converter series. It features wide input voltage range, accepting both DC and AC input voltage, high efficiency and low power consumption. The products are widely used in industrial control instrumentation, electric power applications and smart home type applications, they need to meet EN safety certifications and lower demand for EMC compliance levels. For extremely harsh EMC environment, we recommend using the application circuit show of this datasheet.



## **Product Selection Guide**

Approval	Model	Package	Power [W]	Output [Vo]	Output [lo]	Ripple and Noise [mV, typ/max]	Efficiency [%, typ]	Capacitive load [µF, max]
	1ACOS_05S	16.13 x 15.10 x 9.50 mm	1	5V	200mA	80/150	57	500

Input specifications		
Input voltage range	85~305VAC, 70~43	OVDC
Input frequency	47~63Hz	
Input current	115VAC • 0.12A (max)	277VAC • 0.06A (max)
Inrush current	115VAC • 25A (typ)	277VAC • 40A (typ)
Recommended eExternal input fuse (special package series include fuse)	1A/300V	
Hot plug	Unavailable	

#### Note:

- 1. External electrolytic capacitors are required to modules, more details refer to typical applications;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75%, nominal input voltage (115VAC and 230VAC) and rated output load;
- 3. In order to improve the efficiency at light load, there will be audible noise generated, but it does not affect product performance and reliability.
- 4. The module needs to be glued and fixed after assembly.
- All index testing methods in this datasheet are based on our company corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- 7. Products are related to laws and regulations: see "Features" and "EMC";
- 8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

Output specifications	
Output voltage accuracy	±1.5% (typ), -7~+3% (max)
Line regulation (rated load)	±1.5% (typ)
Load regulation	±2.5% (typ)
Ripple & Noise* (p-p)	20MHz Bandwidth: 80mV (typ), 150mV (max)
Temperature coefficient	±0.12%/°C (typ)
Stand-by power consumption	0.3W (max)
Short circuit protection	Continuous, and auto resume
Over current protection	≥110%Io, self-recovery
Min. load	10%

\* Ripple and Noise are measured by the method of parallel lines.

#### Example: 1ACOS\_05S

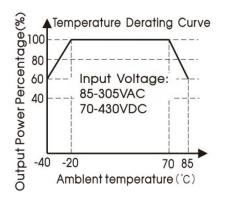
1 = 1Watt; AC = AC-DC; OS= case style; 05= 5Vout; S= single output

## **1ACOS\_S** series

1W - Single output AC-DC converter - Universal input - Non-isolated

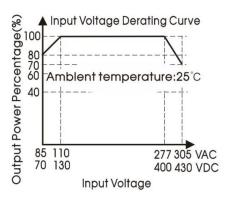
Operating temperature range40°C ~ 48°CStorage temperature range-40°C ~ 105°CPower derating temperature range-40°C to 20°C: 2%/CStorage temperature range-40°C to 20°C: 2%/CStorC to 85°C: 26%/CSSVAC 100VAC: 0.8%/VACStorage temperature range-40°C to 20°C: 2%/CStorage temperature range-40°C temperature rangeStorage temperature range-40°C temperature rangeStorage temperature range-50°C temperature range<	Common specifications			
Power derating temperature range-40°C to -20°C: 2%/°C +70°C to 85°C: 2.6%/°C 550%.c 2000 constructionCoolingFree air convectionStorage Humidity95% RH (max)EMC / EMI / CECISPR32/ENS5032, CLASS A (see typical application circuit) CISPR32/ENS5032, CLASS A (see typical application circuit)EMC / EMI / RECISPR32/ENS5032, CLASS A (see typical application circuit) CISPR32/ENS5032, CLASS A (see typical application circuit)EMC / EMI / RECISPR32/ENS5032, CLASS A (see typical application circuit) CISPR32/ENS5032, CLASS A (see typical application circuit)EMC / EMI / RECISPR32/ENS5032, CLASS A (see typical application circuit) CISPR32/ENS5032, CLASS A (see typical application circuit)EMC / EMS / ESDIEC/EN61000-4-2EMC / EMS / RSIEC/EN61000-4-3EMC / EMS / RSIEC/EN61000-4-4±2KV (see typical application circuit) ±4KV (see EMC recommended circuit)perf. Criteria B ±4KV (see EMC recommended circuit)PEMC / EMS / Surge ImmunityIEC/EN61000-4-6IEC/EN61000-4-610 Vr.m s (see EMC recommended circuit)perf. Criteria B ±4KV (see EMC recommended circuit)perf. Criteria B perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-110%-70% (see EMC recommended circuit)Safety standardIEC/EN61000-4-110%-70% (see EMC recommended circuit)Safety	Operating temperature range	-40°C ~ +85°C		
And Toric to 85°C: 267%/°C 85VAC:110×AC: 0.8%/VAC 0.88/VAC: 0.08%/VAC 277VAC: 0.58%/VAC: 11.8%/VACCoolingFree air convectionStorage Humidity95% RH (max)EMC / EMI / CECISPR32/ENS5032, CLASS A (see typical application circuit) CISPR32/ENS5032, CLASS A (see typical application circuit)EMC / EMI / RECISPR32/ENS5032, CLASS A (see typical application circuit) CISPR32/ENS5032, CLASS A (see typical application circuit)EMC / EMI / RECISPR32/ENS5032, CLASS A (see typical application circuit) CISPR32/ENS5032, CLASS A (see typical application circuit)EMC / EMS / ESDIEC/EN61000-4.2Contact ±6KV / Air ±8KV (see typical application circuit) gerf. Criteria BEMC / EMS / RSIEC/EN61000-4.4±2KV (see typical application circuit) ±4KV (see EMC recommended circuit)perf. Criteria AEMC / EMS / Surge ImmunityIEC/EN61000-4.4±2KV (see typical application circuit) ±4KV (see EMC recommended circuit)perf. Criteria B perf. Criteria B perf. Criteria B 10 Vm. s (see EMC recommended circuit)perf. Criteria B perf. Criteria B perf. Criteria B 10 Vm. s (see EMC recommended circuit)perf. Criteria B perf. Criteria B perf. Criteria B 10 Vm. s (see EMC recommended circuit)perf. Criteria B perf. Criteria B 10 Vm. s (see EMC recommended circuit)perf. Criteria B perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-110%-70% (see EMC recommended circuit)perf. Criteria ASafety standardIEC/EN61000-4-110%-70% (see EMC recommended circuit)perf. Criteria BSafety standardIEC/EN61000-4-110%-70% (see EMC recommended circuit)perf. Criteria A<	Storage temperature range	-40°C ~ +105°C		
Storage Humidity95% RH (max)EMC / EMI / CECISPR32/EN5S032, CLASS A (see typical application circuit) CISPR32/EN5S032, CLASS B (see EMC recommended circuit)EMC / EMI / RECISPR32/EN5S032, CLASS A (see typical application circuit) CISPR32/EN5S032, CLASS B (see EMC recommended circuit)EMC / EMI / RECISPR32/EN5S032, CLASS B (see EMC recommended circuit)EMC / EMS / ESDIEC/EN61000-4-2Contact ±6KV / Air ±8KV (see typical application circuit) perf. Criteria BEMC / EMS / ESDIEC/EN61000-4-3IEC/EMS / RSIEC/EN61000-4-4EMC / EMS / EFT*IEC/EN61000-4-4EMC / EMS / Surge ImmunityIEC/EN61000-4-5IEC/ENS / Surge ImmunityIEC/EN61000-4-6IEC / EMS / Surge ImmunityIEC/EN61000-4-6IEC / EMS / CSIEC/EN61000-4-6IEC / EMS / CSIEC/EN61000-4-1Vortus (see EMC recommended circuit)perf. Criteria B perf. Criteria B perf. Criteria B (see EMC recommended circuit)EMC / EMS / Surge ImmunityIEC/EN61000-4-610 Vr.m.s (see EMC recommended circuit)EMC / EMS / Voltage dips, short and interruptions immunityIEC62368/UL62368/U	Power derating temperature range	+70°C to 85°C: 2.67%/°C 85VAC-110VAC: 0.8%/VAC		
EMC / EMI / CECISPR32/EN55032, CLASS A (see typical application circuit) CISPR32/EN55032, CLASS B (see EMC recommended circuit)EMC / EMI / RECISPR32/EN55032, CLASS A (see typical application circuit) CISPR32/EN55032, CLASS B (see EMC recommended circuit)EMC / EMS / ESDIEC/EN61000-4-2Contact ±6KV / Air ±8KV (see typical application circuit) perf. Criteria BEMC / EMS / RSIEC/EN61000-4-310V/m (see EMC recommended circuit)perf. Criteria BEMC / EMS / ESTIEC/EN61000-4-4±2KV (see typical application circuit) 	Cooling	Free air convection		
Initial ConstraintsCISPR32/EN55032, CLASS B (see EMC recommended circuit)EMC / EMI / RECISPR32/EN55032, CLASS B (see EMC recommended circuit)EMC / EMS / ESDIEC/EN61000-4-2EMC / EMS / RSIEC/EN61000-4-3IEC/ EMS / MSIEC/EN61000-4-3EMC / EMS / ESTIEC/EN61000-4-4EMC / EMS / ESTIEC/EN61000-4-4EMC / EMS / ESTIEC/EN61000-4-4EMC / EMS / Strape ImmunityIEC/EN61000-4-4EMC / EMS / Strape ImmunityIEC/EN61000-4-5IEC/ EN61000-4-5Into to line ±1KV (see typical application circuit) ±4KV (see EMC recommended circuit)EMC / EMS / Surge ImmunityIEC/EN61000-4-5IEC/ EN61000-4-610 Vr.m.s (see EMC recommended circuit)EMC / EMS / Surge ImmunityIEC/EN61000-4-5IEC/ EN61000-4-610 Vr.m.s (see EMC recommended circuit)EMC / EMS / Surge ImmunityIEC/EN61000-4-10IEC/ EN61000-4-610 Vr.m.s (see EMC recommended circuit)EMC / EMS / Surge ImmunityIEC/EN61000-4-11Michtoge dips, short and interruptions immunityIEC/EN61000-4-11ISC41000-4-110%-70% (see EMC recommended circuit)Safety standardIEC62368/EN62368/UL6236ESafety standardIEC62368/EN62368/UL6236ESafety standardUI-94-0InstallOEBMILHIDEK-21TF@25°C-3UC-B@25°CMILHIDEK-21TF@25°C-3UC-B@25°C	Storage Humidity	95% RH (max)		
CISPR32/EN55032, CLASS B (see EMC recommended circuit)EMC / EMS / ESDIEC/EN61000-4-2Contact ±6KV / Air ±8KV (see typical application circuit)perf. Criteria BEMC / EMS / RSIEC/EN61000-4-3I0V/m (see EMC recommended circuit)perf. Criteria AEMC / EMS / EFT*IEC/EN61000-4-3it2KV (see typical application circuit)perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5line to line ±1KV (see typical application circuit)perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5line to line ±1KV (see typical application circuit)perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5line to line ±1KV (see typical application circuit)perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5line to line ±1KV (see typical application circuit)perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5line to line ±1KV (see typical application circuit)perf. Criteria BSafety standardIEC/EN61000-4-110%-70% (see EMC recommended circuit)perf. Criteria BSafety standardIEC62368/EN62368/UEC358/UEC3	EMC / EMI / CE			
EMC / EMS / RSIEC/EN61000-4-3IOV/m (see EMC recommended circuit)perf. Criteria AEMC / EMS / EFT*IEC/EN61000-4-4 $\pm 2kV$ (see typical application circuit) $\pm 4kV$ (see EMC recommended circuit)perf. Criteria B perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5line to line $\pm 1kV$ (see typical application circuit)perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5line to line $\pm 1kV$ (see typical application circuit)perf. Criteria BEMC / EMS / CSIEC/EN61000-4-610 Vr.m.s (see EMC recommended circuit)perf. Criteria AEMC / EMS / Voltage dips, short and interruptions immunityIEC/EN61000-4-110%-70% (see EMC recommended circuit)perf. Criteria BSafety standardIEC62368/EN62368/UL623680%-70% (see EMC recommended circuit)perf. Criteria BSafety certificationEN62368IEC62368/UL62368/UL62368IEC62368/EN62368/UL62368Case materialU194V-0IEC4000-4-11IEC4000-4-11InstallPCBIEC4000-4-11IEC4000-4-11MTBFUL-HDBK-217F@25°C>UC+300-00-025°CIEC4000-4-11	EMC / EMI / RE			
EMC / EMS / EFT*IEC/EN61000-4-4±2KV (see typical application circuit) ±4KV (see EMC recommended circuit)perf. Criteria B perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5line to line ±1KV (see typical application circuit)perf. Criteria BEMC / EMS / CSIEC/EN61000-4-610 Vr.m.s (see EMC recommended circuit)perf. Criteria AEMC / EMS / Voltage dips, short and interruptions immunityIEC/EN61000-4-110%-70% (see EMC recommended circuit)perf. Criteria BSafety standardIEC62368/EN62368/UL62368/UL623680%-70% (see EMC recommended circuit)perf. Criteria BSafety certificationIEC62368/EN62368/UL62368/UL62368VEC8VEC8Case materialUL94V-0VEC8VEC8InstallPCBVEC8VEC8MILHDBK-217F@25°C>300 BVEC8VEC8VEC8	EMC / EMS / ESD	IEC/EN61000-4-2	Contact $\pm 6 \text{KV}$ / Air $\pm 8 \text{KV}$ (see typical application circuit)	perf. Criteria B
#4KV (see EMC recommended circuit)perf. Criteria BEMC / EMS / Surge ImmunityIEC/EN61000-4-5Ine to line ±1KV (see typical application circuit)perf. Criteria BEMC / EMS / CSIEC/EN61000-4-610 Vr.ns (see EMC recommended circuit)perf. Criteria AEMC / EMS / Voltage dips, short and interruptions immunityIEC/EN61000-4-110%-70% (see EMC recommended circuit)perf. Criteria BSafety standardIEC62368/DU623IEC688/DU62368/DU62	EMC / EMS / RS	IEC/EN61000-4-3	10V/m (see EMC recommended circuit)	perf. Criteria A
EMC / EMS / CSIEC/EN61000-4-610 Vr.m.s (see EMC recommended circuit)perf. Criteria AEMC / EMS / Voltage dips, short and interruptions immunityIEC/EN61000-4-110%-70% (see EMC recommended circuit)perf. Criteria BSafety standardIEC62368/EN62368/UL62368IEC62368/UL62368/UL62368IEC62368/UL6	EMC / EMS / EFT*	IEC/EN61000-4-4	±2KV (see typical application circuit) ±4KV (see EMC recommended circuit)	
EMC / EMS / Voltage dips, short and interruptions immunity    IEC/EN61000-4-11    0%-70% (see EMC recommended circuit)    perf. Criteria B      Safety standard    IEC62368/EN62368/UL62368    IEC62368/EN62368/UL62368    IEC62368/EN62368/UL62368      Safety certification    EN62368    IEC62368/UL62368    IEC62368/EN62368/UL62368      Case material    UL94V-0    IEC62368/UL62368    IEC62368/UL62368/UL62368      Install    PCB    IEC62368/UL62368/UL62368    IEC62368/UL62368/UL62368	EMC / EMS / Surge Immunity	IEC/EN61000-4-5	line to line ±1KV (see typical application circuit)	perf. Criteria B
interruptions immunity      Safety standard    IEC62368/UL62368      Safety certification    EN62368/UL62368      Case material    UL94V-0      Install    PCB      MTBF    MLHDBK-217F@25°C>300,000h @25°C	EMC / EMS / CS	IEC/EN61000-4-6	10 Vr.m.s (see EMC recommended circuit)	perf. Criteria A
Safety certificationEN62368Case materialUL94V-0InstallPCBMTBFMIL+HDBK-217F@25°C > 300,000h @25°C		IEC/EN61000-4-11	0%-70% (see EMC recommended circuit)	perf. Criteria B
Case material  UL94V-0    Install  PCB    MTBF  MIL-HDBK-217F@25°C >300,000h @25°C	Safety standard	IEC62368/EN62368/UL623	368	
Install      PCB        MTBF      MIL-HDBK-217F@25°C >300,000h @25°C	Safety certification	EN62368		
MTBF MIL-HDBK-217F@25°C >300,000h @25°C	Case material	UL94V-0		
	Install	PCB		
Weight 4.2g	MTBF	MIL-HDBK-217F@25°C >30	0,000h @25°C	
	Weight	4.2g		

# Typical characteristics



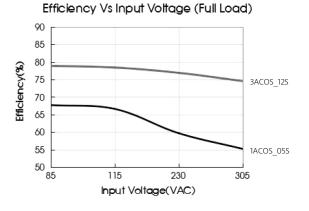
③ With an AC input between 85 - 110VAC/277- 305VAC and a DC input between 70 - 130VDC/400 - 430VDC, the output power must be derated as per temperature derating curves;

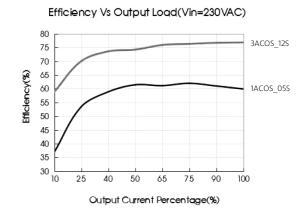
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.



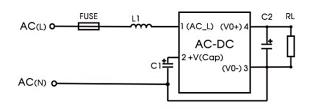
1W - Single output AC-DC converter - Universal input - Non-isolated

## Efficiency





# Typical application circuit



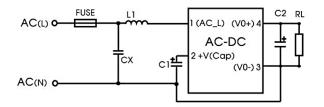
Model	FUSE (required)	C1 (required)	C2 (required)	L1 (required)
1ACOS_05S	1A/300V	10uF/400V:165-264VAC 10uF/450V:165-305VAC 22uF/400V: 85-264VAC 22uF/450V: 85-305VAC	220µF/16V	1.2mH

#### Note:

C1 is used as filter capacitor(required), if the surge immunity index is to be met, the C1 capacitor needs to be connected to  $22 u {\rm F}.$ 

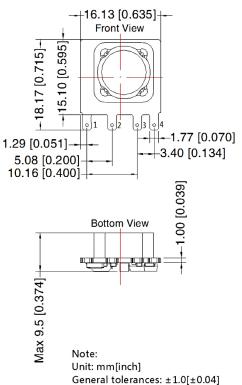
Output filter: We recommend using an electrolytic capacitor with high frequency, high ripple current and low ESR rating for C2. Combined with L1, they form a pi-type filter circuit. Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%.

## EMC compliance recommended circuit



Components	Recommended parameter
СХ	0.1µF/310VAC
L1	1.2mH
FUSE (required)	1A/300V, slow blow
C1 (required)	10uF/400V:165-264VAC 10uF/450V:165-305VAC 22uF/400V: 85-264VAC 22uF/450V: 85-305VAC
C2 (required)	2.2nF/400V

## Mechanical dimensions



<i>[</i>	¢2.2	7 [Ø(	0.089
¢	Q	- O	Ģ

THIRD ANGLE PROJECTION  $\bigoplus$ 

Note: Grid: 2.54\*2.54mm

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

Note: Unit: mm[inch] General tolerances: ±1.0[±0.04] The layout of the device is for reference only, please refer to the actual product