

## 5ACOS\_S series

5Watt - Single output AC-DC converter - Universal input - Non-isolated

### AC-DC Converter

5 Watt

- ⊕ Ultra-wide 85-305VAC and 70-430VDC input voltage range
- ⊕ Operating ambient temperature range: -40°C to +85°C
- ⊕ Compact size, open frame
- ⊕ Up to 77% efficiency
- ⊕ Green power
- ⊕ Industrial-grade design
- ⊕ Flexible selection of EMC additional circuits, simplify customer PCB layout
- ⊕ Output short circuit, over-current protection
- ⊕ EN62368 safety approval

The 5ACOS\_S series is one of GAPTEC's highly efficient green power AC-DC Converter series. It features wide input voltage range, accepting both DC and AC input voltage, high reliability and low power consumption. All models are widely used in industrial control instrumentation, electric power applications and smart home applications which have high requirement for dimension, the need to meet CE safety certifications and lower demand for EMC compliance levels. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.



| Common specifications     |  |
|---------------------------|--|
| Short circuit protection: | Hiccup, continuous, self-recovery  |
| Operation temperature:    | -40°C ~ +85°C  |
| Storage temperature:      | -40°C ~ +105°C   |
| Storage humidity:         | 95%RH  |
| Power Derating            | <ul style="list-style-type: none"> <li>• -40°C to -20°C                      2 %/°C</li> <li>• +65°C to +85°C                      2.5 %/°C</li> <li>• 85VAC - 100VAC                      1.33 %/VAC</li> <li>• 277VAC - 305VAC                      1.1 %/VAC</li> </ul> |
| Safety Standard:          | EN62368  |
| Safety Certification      | EN62368  |
| MTBF:                     | >1,000,000 hours (MIL-HDFK-217F@25°C)  |
| Dimensions:               | 16.13 x 15.10 x 9.50 mm  |
| Cooling:                  | Free air convection  |
| Weight:                   | 4.5g Typ.  |

| Input specifications            |                              |     |     |      |       |
|---------------------------------|------------------------------|-----|-----|------|-------|
| Item                            | Test condition               | Min | Typ | Max  | Units |
| Input Voltage Range             | AC input                     | 85  |     | 305  | mA    |
|                                 | DC input                     | 70  |     | 430  | mA    |
| Input Frequency                 |                              | 47  |     | 63   | Hz    |
| Input Current                   | 115VAC                       |     |     | 0.2  | A     |
|                                 | 230VAC                       |     |     | 0.14 | A     |
| Inrush Current                  | 115VAC                       |     | 25  |      | A     |
|                                 | 230VAC                       |     | 40  |      | A     |
| Recommended External Input Fuse | 1A/300V, slow-blow, required |     |     |      |       |
| Hot Plug                        | Unavailable                  |     |     |      |       |

**Example:**  
**5ACOS\_12S**  
 5 = 5Watt; AC = AC-DC; A = case style; 12 = 12Vout; S = single output

| Output specifications      |                                      |       |      |      |       |
|----------------------------|--------------------------------------|-------|------|------|-------|
| Item                       | Test condition                       | Min   | Typ  | Max  | Units |
| Output accuracy            | 10%-100% load                        |       | ±5   |      | %     |
| Line regulation            | Rated load                           |       | ±1.5 |      | %     |
| Load regulation            |                                      |       | ±3   |      | %     |
| Ripple & noise*            | 20MHz bandwidth (peak-to-peak value) |       | 50   | 100  | mVp-p |
| Temperature coefficient    | 100% load                            |       | ±0.1 |      | %/°C  |
| Stand-by Power Consumption | 230VAC input                         |       |      |      |       |
|                            |                                      | • 12V | 0.07 | 0.1  | W     |
|                            |                                      | • 15V | 0.12 | 0.16 | W     |
| • 18V                      | 0.16                                 | 0.2   | W    |      |       |
| Over-current Protection    | ≥110%Io, self-recovery               |       |      |      |       |
| Minimum Load               |                                      | 10    |      |      | %     |

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

#### Note:

1. External electrolytic capacitors are required to modules, more details refer to typical applications;
2. 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.
5. All index testing methods in this datasheet are based on our company corporate standards;
6. 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.

| EMC specifications |   |  |                  |
|--------------------|---|--|------------------|
| Emissions          | CE  | CISPR32/EN55032 CLASS A (See Fig. 1 for recommended circuit)<br>CISPR32/EN55032 CLASS B (See Fig. 2 for recommended circuit)           |                  |
| Emissions          | RE  | CISPR32/EN55032 CLASS A (See Fig. 1 for recommended circuit)<br>CISPR32/EN55032 CLASS B (See Fig. 1 or Fig. 2 for recommended circuit) |                  |
| Immunity           | ESD   | IEC/EN61000-4-2 Contact ± 6KV (See Fig. 1 or Fig. 2 for recommended circuit)   | perf. Criteria B |
| Immunity           | RS  | IEC/EN61000-4-3 10V/m (See Fig. 2 for recommended circuit)   | perf. Criteria A |
| Immunity           | EFT   | IEC/EN61000-4-4 ±2KV (See Fig. 1 for recommended circuit)  | perf. Criteria B |
|                    |   | IEC/EN61000-4-4 ±4KV (See Fig. 2 for recommended circuit)  | perf. Criteria B |
| Immunity           | Surge   | IEC/EN61000-4-5 line to line ±1KV (See Fig. 1 or Fig. 2 for recommended circuit)   | perf. Criteria B |
| Immunity           | CS  | IEC/EN61000-4-6 10Vr.m.s (See Fig. 2 for recommended circuit)  | perf. Criteria A |
| Immunity           | Voltage dips, short interruptions and voltage variations immunity | IEC/EN61000-4-11 0%, 70% (See Fig. 2 for recommended circuit)  | perf. Criteria B |

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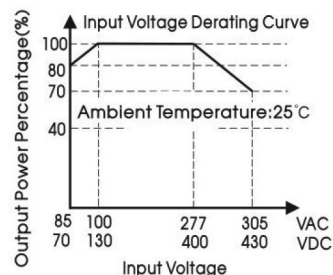
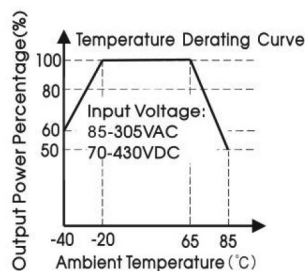
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### Product Selection Guide

| Approval | Model     | Power [W] | Output Voltage [Vo, VDC] | Rated Current [Io, mA] | Efficiency at 230VAC [%, min] | Max. Capacitive Load [uF, max] |
|----------|-----------|-----------|--------------------------|------------------------|-------------------------------|--------------------------------|
| ---      | 5ACOS_12S | 4         | 12                       | 330                    | 75                            | 160                            |
| ---      | 5ACOS_15S | 5         | 15                       | 330                    | 76                            | 160                            |
| ---      | 5ACOS_18S | 5         | 18                       | 280                    | 77                            | 160                            |

Note: Non-isolated power supply, there is no insulation protection between output and input dangerous voltage, beware of electric shock!

### Typical characteristics

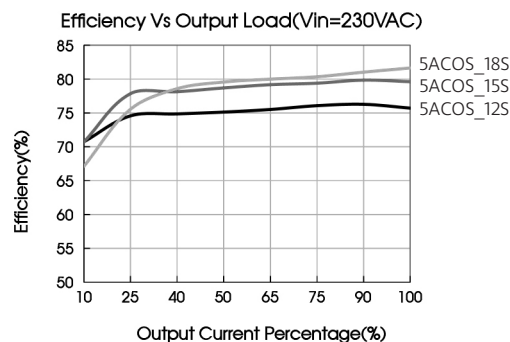
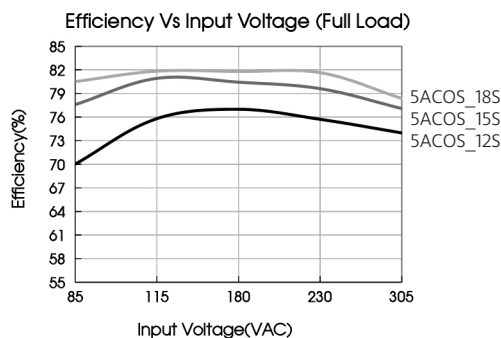


Note:

① With an AC input between 85 - 100VAC/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 one of our FAE.

### Efficiency



### Recommended circuit 1

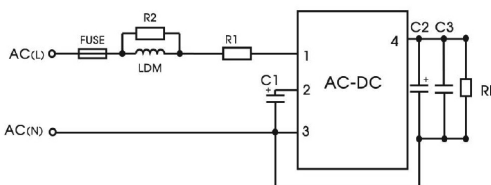


Fig. 1

| Model     | FUSE (required)     | C1 (required)                                  | C2 (required)                     | LDM (required)                                    | R1 (wire-wound resistor, required)      | C3        | R2          |
|-----------|---------------------|--|-----------------------------------|---|---|-----------|-------------|
| 5ACOS_12S | 1A/300V (slow-blow) | 10uF/400V (165-264VAC)                         | 470uF/16V (solid-state capacitor) | 4.7mH/0.2A (C1 = 10uF)<br>2.2mH/0.24A (C1 = 22uF) | 12Ω/3W (C1 = 10uF)<br>2Ω/2W (C1 = 22uF) | 0.1uF/50V | 8.2kΩ/0.25W |
| 5ACOS_15S |                     | 10uF/450V (165-305VAC)                         |                                   |   |   |           |             |
| 5ACOS_18S |                     | 22uF/400V (85-264VAC)<br>22uF/450V (85-305VAC) | 470uF/35V                         |   |   |           |             |

Note:

- C1 is used as input filter capacitor (required);
- Output filter: We recommend using an electrolytic capacitor with high frequency, high ripple current and low ESR rating for C2 refer to manufacture's datasheet). Combined with LDM, they form a pi-type filter circuit. Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%;
- Recommended R2 to use 1206 package chip resistor.

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### Recommended circuit 2

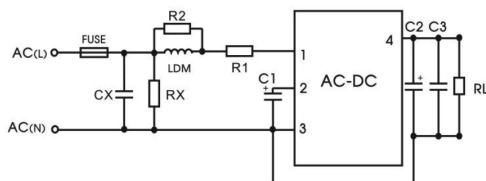


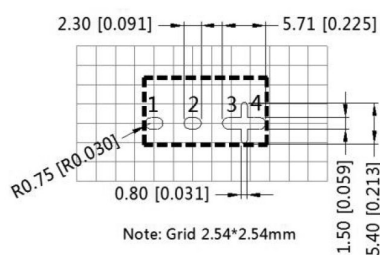
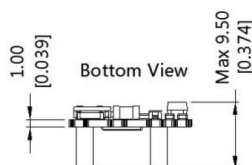
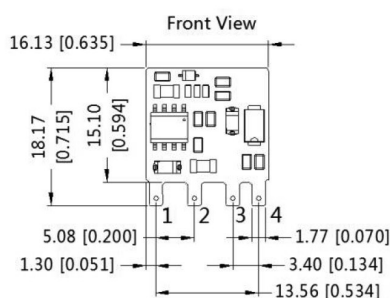
Fig 2

| Model     | FUSE<br>(required)     | C1<br>(required)       | C2<br>(required)                        | LDM<br>(required)          | R1 (wire-wound<br>resistor, required) | CX              | RX*     | C3            | R2          |
|-----------|------------------------|------------------------|---|----------------------------|---------------------------------------|-----------------|---------|---------------|-------------|
| 5ACOS_12S | 1A/300V<br>(slow-blow) | 10uF/400V (165-264VAC) | 470μF/16V<br>(solid-state<br>capacitor) | 4.7mH/0.2A<br>(C1 = 10uF)  | 12Ω/3W<br>(C1 = 10uF)                 | 104K/<br>310VAC | 5MΩ~8MΩ | 0.1uF/<br>50V | 8.2kΩ/0.25W |
| 5ACOS_15S |                        | 10uF/450V (165-305VAC) |   | 2.2mH/0.24A<br>(C1 = 22uF) |                                       |                 |         |               |             |
| 5ACOS_18S |                        | 22uF/400V (85-264VAC)  | 470μF/35V                               |                            |                                       |                 |         |               |             |

\*Note: The X capacitor needs to be connected in parallel with the bleeder resistance (RX), the recommended resistance value is between 5MΩ~8MΩ, and the actual need to be selected as series-parallel connection according to the certification standard.

### Mechanical dimensions

THIRD ANGLE PROJECTION



| Pin-Out |         |
|---------|---------|
| Pin     | Mark    |
| 1       | AC(L)   |
| 2       | +V(CAP) |
| 3       | -Vo     |
| 4       | +Vo     |

Note:  
Unit: mm[inch]  
General tolerances: ±0.50[±0.020]  
The layout of the device is for reference only,  
please refer to the actual product