



## 20ACEW\_4 series

20Watt - AC-DC converter

## AC-DC Converter 20 Watt

- ⊕ Ultra-wide 85-305VAC and 100-430VDC input voltage range
- ⊕ Operating ambient temperature range: -40°C to +85°C
- ⊕ Up to 87% efficiency
- ⊕ No-load power consumption 0.1W
- ⊕ 5000m altitude application
- ⊕ Plastic case meets UL94V-0 flammability
- ⊕ EMI performance meets CISPR32/EN55032 CLASS B, EN55014
- ⊕ IEC/EN/UL62368/EN60335/EN61558 safety approved
- ⊕ Over-voltage class III (designed to meet EN61558)



UL-62368-1 (E347551)

20ACEW\_4 series AC-DC converters is one of GAPTEC's new generation compact size power converter. It features ultra-wide AC input and at the same time accepts DC input voltage, low power consumption, low ripple & noise, high efficiency, high reliability, reinforced isolation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets IEC/EN/UL62368/EN60335/ EN61558/IEC/EN60601-1/ANSI/AAMI ES60601-1 standards. The converters are widely used in industrial, power, medical treatment, home appliances, instrumentation, communication and civil applications. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

### Common specifications

| Item                         | Operating condition                | Min   | Typ | Max | Units          |
|------------------------------|------------------------------------|---|-----|-----|----------------|
| Short circuit protection:    |                                    | Hiccup, continuous, self-recovery   |     |     |                |
| Cooling:                     |                                    | Free air convection   |     |     |                |
| Operating temperature:       |                                    | -40   |     | +85 | °C             |
| Operation temperature range: | Wave-soldering<br>Manual-welding   | 260 ± 5°C; time: 5 - 10s<br>360 ± 10°C; time: 3 - 5s  |     |     |                |
| Storage humidity:            |                                    |   | 95  |     | %RH            |
| Switching Frequency          |                                    |   | 65  |     | kHz            |
| Power derating:              | -40°C to -25°C 85VAC-165VAC        | 2.0   |     |     | %/°C           |
|                              | +50°C to +70°C: 3/5/9V             | 2.5   |     |     | %/°C           |
|                              | +55°C to +70°C: 12/15/24V          | 3.33  |     |     | %/°C           |
|                              | +70°C to +85°C                     | 1.33  |     |     | %/°C           |
|                              | 85VAC - 100VAC:                    | 2   |     |     | %/°VAC         |
|                              | 277VAC - 305VAC:<br>2000m - 5000m: | 0.71<br>6.7   |     |     | %/°VAC<br>%/Km |
| Safety standard:             |                                    | IEC/UL62368-1, EN61558-1, EN60335-1 Safety Approval & EN62368-1 (Report); Design refer to IEC/EN60601-1/ANSI/AAMI ES60601-1 |     |     |                |
| Safety Certification:        |                                    | UL/EN/IEC62368/EN60335/EN61558  |     |     |                |
| Safety Class:                |                                    | Class II  |     |     |                |
| MTBF:                        |                                    | MIL-HDBK-217F@25°C > 1500,000 h   |     |     |                |
| Hot plug:                    |                                    | Unavailable   |     |     |                |
| Case material:               |                                    | Black plastic, flame-retardant and heat-resistant (UL94V-0)   |     |     |                |
| Designed Life: (230VAC)      | Ta: 25°C 100% load                 | >130x10 <sup>3</sup> h  |     |     |                |
|                              | Ta: 55°C 100% load                 | >16x10 <sup>3</sup> h   |     |     |                |
|                              | Ta: 55°C 80% load                  | >27x10 <sup>3</sup> h   |     |     |                |
| Dimension                    | DIP package                        | 52.40 x 27.20 x 24.00 mm  |     |     |                |
|                              | Chassis mounting                   | 76.00 x 31.50 x 32.30 mm  |     |     |                |
|                              | DIN-rail mounting                  | 76.00 x 31.50 x 37.40 mm  |     |     |                |
| Weight:                      | DIP                                | 55  |     |     | g              |
| Weight:                      | (Chassis mounting)                 | 75  |     |     | g              |
| Weight:                      | (DIN rail mounting)                | 95  |     |     | g              |

### Input specifications

| Item                | Operating condition | Min | Typ                   | Max  | Units |
|---------------------|---------------------|-----|-----------------------|------|-------|
| Input voltage range | • AC Input          | 85  |                       | 305  | VAC   |
|                     | • DC Input          | 100 |                       | 430  | VDC   |
| Input frequency     |                     | 47  |                       | 440  | Hz    |
| Input current       | • 115VAC            |     |                       | 0.50 | A     |
|                     | • 230VAC            |     |                       | 0.30 | A     |
| Inrush current      | • 115VAC            |     | 20                    |      | A     |
|                     | • 230VAC            |     | 45                    |      | A     |
| Leakage Current     | 277VAC/50Hz         |     | 0.1mA RMS Max.        |      |       |
| Built In Fuse       |                     |     | 3.15A/300V, slow-blow |      |       |

### Isolation specifications

| Item                     | Operating Conditions                                  | Min  | Typ | Max | Units |
|--------------------------|---|------|-----|-----|-------|
| Isolation (Input-Output) | Electric Strength Test for 1min, leakage current <5mA | 4000 |     |     | VAC   |

### Example:

#### 20ACEW\_03S4

20 = 20Watt; AC = AC-DC; E = case style ; W = wide input  
 03 = 3.3Vout; S = single output; 4 = 4 kVAC isolation

### Note:

- 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;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75% with nominal input voltage and rated output load;
- 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;
- Products are related to laws and regulations: see "Features" and "EMC";
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

## 20ACEW\_4 series

20Watt - AC-DC converter

| Output specifications      |                                      |     |  |     |       |  |
|----------------------------|--------------------------------------|-----|--|-----|-------|--|
| Item                       | Operating condition                  | Min | Typ                                      | Max | Units |  |
| Output voltage accuracy    |                                      |     | ±1.5                                     |     | %     |  |
| Line regulation            | Full load                            |     | ±0.5                                     |     | %     |  |
| Load regulation            | 0% - 100% load                       |     | ±1                                       |     | %     |  |
| Ripple & Noise*            | 20MHz bandwidth (peak-to-peak value) |     | 100                                      | 150 | mV    |  |
| Stand-by Power Consumption | 230VAC: 3.3/5/9/12/15V               |     | 0.1                                      |     | W     |  |
|                            | 230VAC: 24V                          |     | 0.12                                     |     | W     |  |
| Temperature Coefficient    |                                      |     | ±0.02                                    |     | %/°C  |  |
| Over-current Protection    |                                      |     | ≥110%Io, self-recovery                   |     |       |  |
| Over-voltage Protection    | 3.3/5VDC output                      |     | ≤7.5VDC (Output voltage clamp or hiccup) |     |       |  |
|                            | 9VDC output                          |     | ≤15VDC (Output voltage clamp or hiccup)  |     |       |  |
|                            | 12/15VDC output                      |     | ≤20VDC (Output voltage clamp or hiccup)  |     |       |  |
|                            | 24VDC output                         |     | ≤30VDC (Output voltage clamp or hiccup)  |     |       |  |
| Min. load                  |                                      | 0   |  |     | %     |  |
| Hold-up Time               | 115VAC input                         |     | 8  |     | ms    |  |
|                            | 230VAC input                         |     | 50                                       |     | ms    |  |

Note: \*The "Tip and barrel method" is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor, please refer to AC-DC Converter Application Notes for specific information.

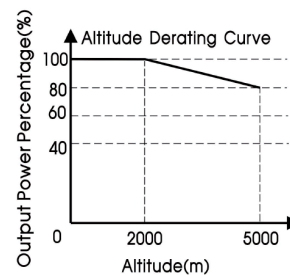
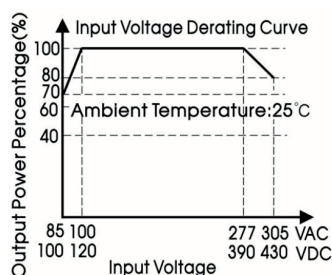
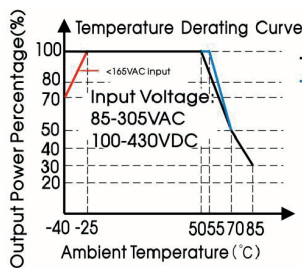
## Product Selection Guide

| Approval | Model       | Power [W] | Output [Vo] | Output [Io] | Efficiency [%, typ] | Capacitive load [μF, max] |
|----------|-------------|-----------|-------------|-------------|---------------------|---------------------------|
| UL       | 20ACEW_03S4 | 14.85     | 3.3V        | 4500mA      | 81                  | 8000                      |
| UL       | 20ACEW_05S4 | 20        | 5V          | 4000mA      | 85                  | 8000                      |
| UL       | 20ACEW_09S4 | 20        | 9V          | 2200mA      | 85                  | 5400                      |
| UL       | 20ACEW_12S4 | 20        | 12V         | 1670mA      | 86                  | 4000                      |
| UL       | 20ACEW_15S4 | 20        | 15V         | 1330mA      | 87                  | 3000                      |
| UL       | 20ACEW_24S4 | 20        | 24V         | 830mA       | 87                  | 1000                      |

Note: \* Use suffix "/CM" for chassis and suffix "/DR" for DIN-Rail mounting.

| EMC specifications |         |   |                       |  |  |  |
|--------------------|---------|---|-----------------------|--|--|--|
| Emissions          | CE      | CISPR32/EN55032 CLASS B<br>CISPR11/EN55011 CLASS B<br>EN55014-1   |                       |  |  |  |
| Emissions          | RE      | CISPR32/EN55032 CLASS B<br>CISPR11/EN55011 CLASS B<br>EN55014-1   |                       |  |  |  |
| Emissions          | Flicker | IEC/EN6100-3-3<br>EN55014-1   |                       |  |  |  |
| Immunity           | ESD     | IEC/EN 61000-4-2<br>IEC/EN55014-2   | Contact ±6KV/Air ±8KV |  | perf. Criteria B<br>perf. Criteria B                     |  |
| Immunity           | RS      | IEC/EN 61000-4-3<br>IEC/EN55014-2   | 10V/m                 |  | perf. Criteria A<br>perf. Criteria A                     |  |
| Immunity           | EFT     | IEC/EN61000-4-4 ±2KV<br>IEC/EN61000-4-4 ±4KV (See Fig.2 for recommended circuit)<br>EN55014-2                           |                       |  | perf. Criteria B<br>perf. Criteria B<br>perf. Criteria B |  |
| Immunity           | Surge   | IEC/EN61000-4-5 line to line ±1KV<br>IEC/EN61000-4-5 line to line ±2KV (See Fig.2 for recommended circuit)<br>EN55014-2 |                       |  | perf. Criteria B<br>perf. Criteria B<br>perf. Criteria B |  |
| Immunity           | PFMF    | IEC/EN6100-4-8<br>IEC/EN55014-2   | 10A/m                 |  | perf. Criteria A<br>perf. Criteria A                     |  |
| Immunity           | CS      | IEC/EN 61000-4-6<br>EN55014-2   | 10 Vr.m.s             |  | perf. Criteria A<br>perf. Criteria A                     |  |

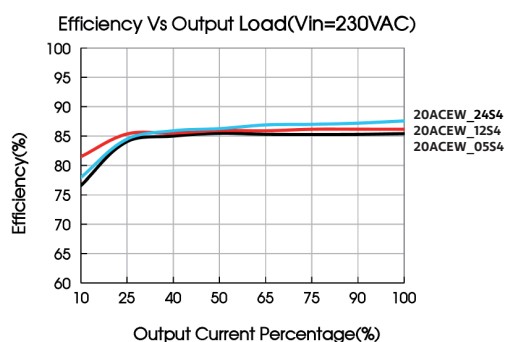
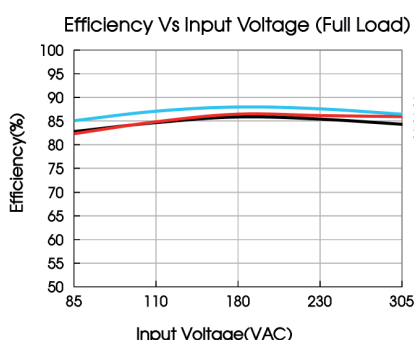
## Product Characteristic Curve



Note:

- ① With an AC input between 85-100V/277-305VAC and a DC input between 100-120V/390-430VDC, 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 our FAE's.

## Efficiency



## Typical application

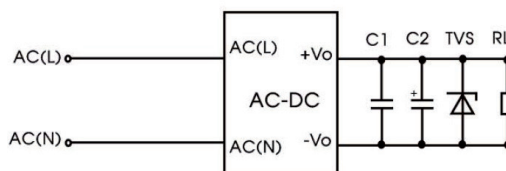


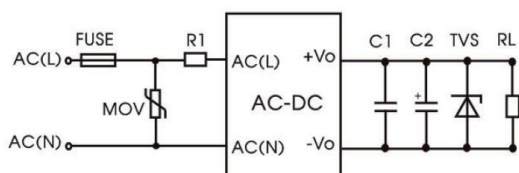
Fig. 1: Typical circuit diagram

| Part No.    | C1 (μF) | C2 (μF)  | TVS      |
|-------------|---------|----------|----------|
| 20ACEW_03S4 | 1μF/50V | 10μF/16V | SMBJ7.0A |
| 20ACEW_05S4 |         | 10μF/16V | SMBJ7.0A |
| 20ACEW_09S4 |         | 10μF/25V | SMBJ12A  |
| 20ACEW_12S4 |         | 10μF/25V | SMBJ20A  |
| 20ACEW_15S4 |         | 10μF/25V | SMBJ20A  |
| 20ACEW_24S4 |         | 10μF/35V | SMBJ30A  |

Output Filter Components:

- ① C1 is a ceramic capacitor used for filtering high-frequency noise and TVS is a recommended suppressor diode to protect the application in case of a converter failure;
- ② This circuit is recommended for indoor use.

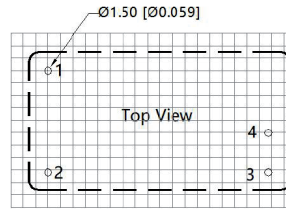
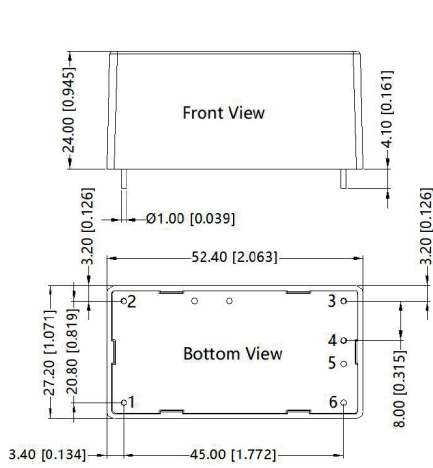
## EMC compliance recommended circuit



| Component | Recommended value               |
|-----------|---------------------------------|
| MOV       | S14K350                         |
| R1        | 3Ω/5W (wire wound resistor)     |
| FUSE      | 3.15A/300V, slow-blow, required |

## Dimensions and Recommended Layout - DIP Package

THIRD ANGLE PROJECTION



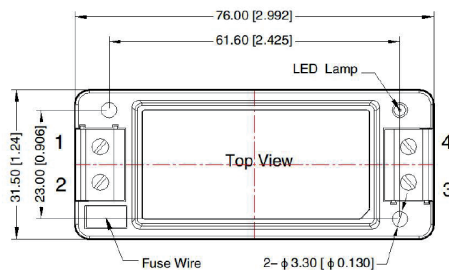
Note: Grid 2.54\*2.54mm

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

Note:  
 Unit: mm[inch]  
 Pin diameter tolerances:  $\pm 0.10$  [ $\pm 0.004$ ]  
 General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]

## Chassis mounting

THIRD ANGLE PROJECTION



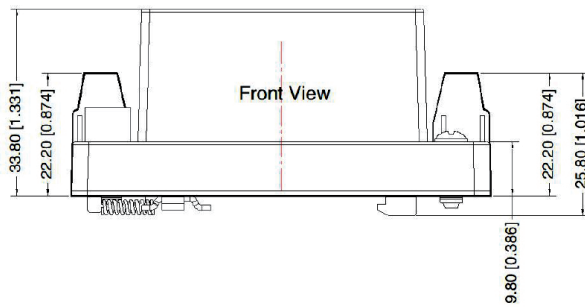
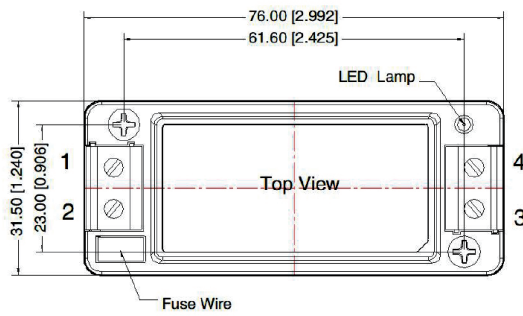
| Pin-Out |          |
|---------|----------|
| Pin     | Function |
| 1       | AC(N)    |
| 2       | AC(L)    |
| 3       | -Vo      |
| 4       | +Vo      |


Note:  
 Unit: mm[inch]  
 Wire range: 24-12 AWG  
 Tightening torque: Max 0.4 N·m  
 General tolerances:  $\pm 1.00$  [ $\pm 0.039$ ]

## 20ACEW\_4 series

20Watt - AC-DC converter

### DIN rail mounting



THIRD ANGLE PROJECTION 

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

Note:  
Unit: mm[inch]  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N-m  
Mounting rail: TS35, rail needs to connect safety ground  
General tolerances:  $\pm 1.00[\pm 0.039]$