

# Features

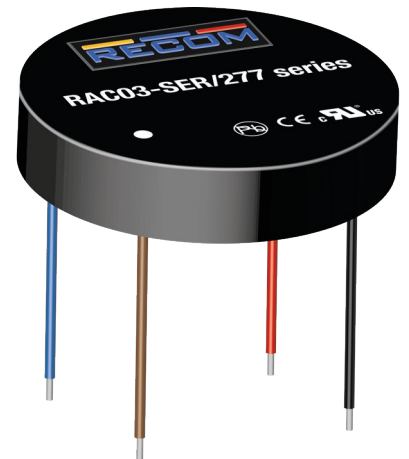
- 40mW max. no load power consumption
- High efficiency up to 76%
- Isolated output 3kVAC / 1 min
- SCP, OVP protection
- Wide operating temperature range: -40°C to +85°C
- Universal input 85-305VAC

# Regulated Converter

# RECOM AC/DC Converter

## RAC03-SER/277

### 3 Watt Single Output



UL60950-1 certified  
 CAN/CSA-22.2 No. 60950 certified  
 EN60335-1 certified  
 IEC/EN60950-1 certified  
 CB Report  
 EN55032 certified  
 EN55024 certified  
 EN55014 certified

## Description

The modules of the RAC03-SER/277 series are regulated AC/DC converters with 3kVAC isolation and a round, flat shape. This series has been designed to offer low stand-by consumption and an ultra-wide input voltage range. Uses include a variety of applications in building automation, security systems and communication systems.

## Selection Guide

| Part Number      | Input Voltage Range [VAC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ <sup>(1)</sup> [%] | Max. Capacitive Load <sup>(2)</sup> [µF] |
|------------------|---------------------------|----------------------|---------------------|-----------------------------------|--|
| RAC03-3.3SER/277 | 100-277                   | 3.3                  | 900                 | 68                                | 22000                                    |
| RAC03-05SER/277  | 100-277                   | 5                    | 600                 | 70                                | 7500                                     |
| RAC03-12SER/277  | 100-277                   | 12                   | 250                 | 74                                | 1000                                     |
| RAC03-24SER/277  | 100-277                   | 24                   | 125                 | 76                                | 200                                      |

### Notes:

Note1: Efficiency is tested at nominal input and full load at +25°C ambient

Note2: Max Cap Load is tested at nominal input and full resistive load

## Model Numbering



### Notes:

Note3: add suffix "-TRAY" for Tray packaging, without suffix standard cardboard box packaging

### Ordering Examples:

|                      |        |        |               |                |
|----------------------|--------|--------|---------------|----------------|
| RAC03-05SER/277      | 3 Watt | 5Vout  | Single Output | cardboard box  |
| RAC03-12SER/277      | 3 Watt | 12Vout | Single Output | cardboard box  |
| RAC03-05SER/277-TRAY | 3 Watt | 5Vout  | Single Output | tray packaging |

**Specifications** (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

### BASIC CHARACTERISTICS

| Parameter                              | Condition                | Min.             | Typ.                 | Max.             |
|--|--------------------------|------------------|----------------------|------------------|
| Input Voltage Range <sup>(4)</sup>     | nom. Vin= 230VAC         | 85VAC<br>120VDC  | 277VAC               | 305VAC<br>430VDC |
| Input Current                          | 115VAC<br>230VAC         |                  | 70mA<br>45mA         |                  |
| Inrush Current                         | cold start at +25°C      | 115VAC<br>230VAC |                      | 15A<br>30A       |
| No load Power Consumption              | 85-305VAC/ 47-440Hz      |                  |                      | 40mW             |
| Input Frequency Range                  | AC Input                 | 47Hz             |                      | 440Hz            |
| Minimum Load <sup>(7)</sup>            |                          |                  | 10%                  |                  |
| Hold-up Time                           | 115VAC                   | 18ms             |                      |                  |
| Internal Operating Frequency           | 100% load at nominal Vin |                  | 55kHz                |                  |
| Output Ripple and Noise <sup>(5)</sup> | 3.3Vout<br>all others    |                  | 250mVp-p<br>200mVp-p |                  |

**Notes:**

Note4: No line derating required

Note5: Ripple and Noise is the maximum peak-to-peak voltage value measured at the output with a 20MHz bandwidth, at rated line voltage at full load. And with a 47µF low-ESR electrolytic capacitor in parallel with a 0.1µF ceramic capacitor across output

### Efficiency vs. Load



### REGULATIONS

| Parameter                               | Condition                        | Value                   |
|---|----------------------------------|-------------------------|
| Output Voltage Tolerance <sup>(6)</sup> | 3.3Vout                          | ±4.0% typ. / ±8.0% max. |
|   | 5Vout                            | ±3.5% typ. / ±5.0% max. |
|   | 12, 24Vout                       | ±3.0% typ. / ±4.0% max. |
| Line Regulation                         | low line to high line, full load | ±0.7% typ. / ±1.0% max. |
| Load Regulation <sup>(7)</sup>          | 3.3Vout                          | 5.5% typ. / 9.0% max.   |
|   | 5Vout                            | 5.0% typ. / 7.5% max.   |
|   | 12, 24Vout                       | 4.0% typ. / 5.5% max.   |

**Notes:**

Note6: Includes initial voltage accuracy, thermal drift, line regulation and load regulation at rated input voltage and load conditions

Note7: Operation below 10% load will not harm the converter, but specifications may not be met

**Specifications** (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

**PROTECTIONS**

| Parameter                      | Type                |                     | Value                          |
|--------------------------------|---------------------|---------------------|--------------------------------|
| Short Circuit Protection (SCP) |                     |                     | continuous, automatic recovery |
| Over Voltage Protection (OVP)  | zener diode clamp   |                     | 105% - 150%                    |
| Over Current Limit             |                     |                     | 120% - 190%                    |
| Over Voltage Category          |                     |                     | OVCII                          |
| Isolation Voltage              | I/P to O/P          | tested for 1 minute | 3kVAC                          |
| Isolation Resistance           |                     |                     | 1GΩ min.                       |
| Leakage Current                | 85-305VAC, 47-440Hz |                     | 10μA max.                      |

**Notes:**

Note8: Refer to local wiring regulations if input over-current protection is also required. Recommended fuse: slow blow type



**ENVIRONMENTAL**

| Parameter                                  | Condition                        |       | Value                        |
|--|----------------------------------|-------|------------------------------|
| Operating Temperature Range <sup>(9)</sup> | full load                        |       | -40°C to +75°C               |
|  | refer to derating graph          |       | -40°C to +85°C               |
| Maximum Case Temperature                   |                                  |       | +105°C                       |
| Thermal Impedance                          |                                  |       | 9.5K/W typ.                  |
| Operating Humidity                         | non-condensing                   |       | 5% - 95% RH max.             |
| MTBF                                       | according to MIL-HDBK-217F, G.B. | +25°C | 3554 x 10 <sup>3</sup> hours |
|  |                                  |       | 3219 x 10 <sup>3</sup> hours |

**Notes:**

Note9: At low input voltage (85-140VAC) and temperature below -25°C the RAC03-3.3SER/277 and RAC03-05SER/277, will not start

**Derating Graph**



**Specifications** (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

### SAFETY AND CERTIFICATIONS

| Certificate Type (Safety)   | Report / File Number | Standard   |
|---|----------------------|--|
| Information Technology Equipment, General Requirements for Safety (CB Scheme) | L0339L26-CB-1-B4     | IEC60950-1:2005 2nd Edition + A2:2013<br>EN60950-1:2006 + A2:2013                    |
| Information Technology Equipment, General Requirements for Safety             | E224736-A24-UL       | UL No. 60950-1, 2nd Edition, 2014<br>CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2014 |
| Household and similar electrical appliances, General requirements             | L0339L26-B2-L        | EN60335-1:2012+A11:2014  |
| EAC Safety of Low Voltage Equipment   | RU-AT.37.02367       | TP TC 004/2011   |
| RoHS2+  |                      | RoHS-2011/65/EU + AM-2015/863  |

| EMC Compliance (Industrial)  | Condition  | Standard / Criterion  |
|--|--|---|
| Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement |  | EN55032:2015, Class B   |
| Information technology equipment - Immunity characteristics - Limits and methods of measurement          |  | EN55024:2010  |
| ESD Electrostatic discharge immunity test  | ±8kV air, ±4kV contact   | EN61000-4-2:2009, Criteria B  |
| Radiated, radio-frequency, electromagnetic field immunity test   | 3V/m   | EN61000-4-3:2006 + A2:2010, Criteria A  |
| Fast Transient and Burst Immunity  | AC Power Port: ±1kV  | EN61000-4-4:2012, Criteria A  |
| Power Magnetic Field Immunity  | 50Hz, 1A/m   | EN61000-4-8:2010, Criteria A  |
| Voltage Dips and Interruption  | Voltage Dips: >95% reduction<br>>30% reduction<br>Interruption: >95% | EN61000-4-11:2004, Criteria A<br>EN61000-4-11:2004, Criteria A<br>EN61000-4-11:2004, Criteria B |
| Limits of Voltage Fluctuations & Flicker   |  | EN61000-3-3:2013  |

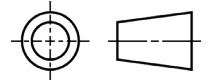
| EMC Compliance (Household)  | Condition  | Standard / Criterion   |
|---|--|--|
| Electromagnetic compatibility of multimedia equipment – Emission Requirements                   |  | EN55014-1:2006+A2:2011   |
| Information technology equipment - Immunity characteristics - Limits and methods of measurement |  | EN55014-2:2015   |
| ESD Electrostatic discharge immunity test   | ±8kV Air, ±4kV Contact   | IEC61000-4-2:2008, Criteria A  |
| Radiated, radio-frequency, electromagnetic field immunity test                                  | 3V/m   | IEC61000-4-3:2006 + A2:2010, Criteria A  |
| Fast Transient and Burst Immunity   | AC Power Port +/-1.0kV<br>DC Output +/-0.5kV                         | IEC61000-4-4:2012, Criteria A  |
| Surge Immunity  | AC Power Port L-N +/-2kV<br>DC Output L-N +/-1kV                     | IEC61000-4-5:2014, Criteria B  |
| Immunity to conducted disturbances, induced by radio-frequency fields                           | AC Power Port 3V, DC Output 3V                                       | IEC61000-4-6:2013, Criteria A  |
| Voltage Dips and Interruption   | Voltage Dips: >95% reduction<br>>30% reduction<br>Interruption: >95% | IEC61000-4-11:2004, Criteria B<br>IEC61000-4-11:2004, Criteria C<br>IEC61000-4-11:2004, Criteria C |
| Limits of Harmonic Current Emissions  |  | EN61000-3-2:2014   |
| Limits of Voltage Fluctuations & Flicker  |  | EN61000-3-3:2013   |

### DIMENSION AND PHYSICAL CHARACTERISTICS

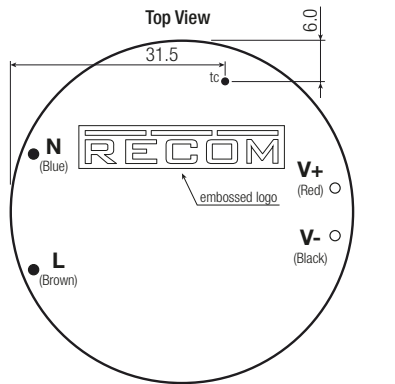
| Parameter         | Type            | Value  |
|-------------------|-----------------|--|
| Material          | case<br>potting | black plastic, (UL94V-0)<br>epoxy, (UL94V-0) |
| Dimension (LxWxH) |                 | 50.3 x 50.3 x 11.0mm                         |
| Weight            |                 | 41g typ.                                     |

continued on next page

**Specifications** (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)



Dimension Drawing (mm)



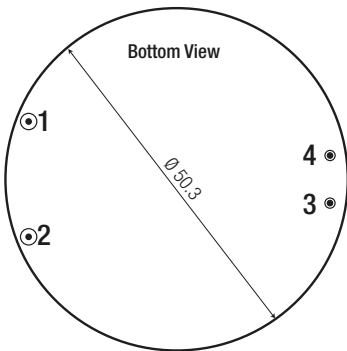
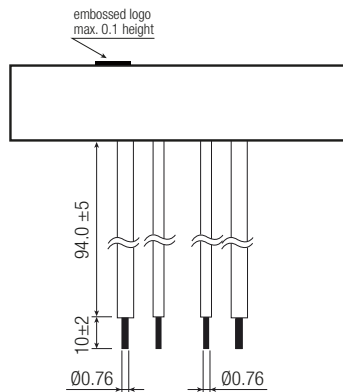
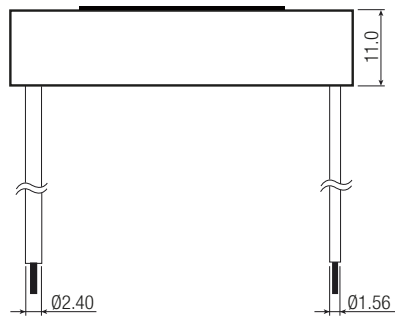
**Wired information**

| # | Function   | Wire color | Type    | AWG |
|---|------------|------------|---------|-----|
| 1 | VAC in (L) | brown      | UL-1015 | 22  |
| 2 | VAC in (N) | blue       | UL-1015 | 22  |
| 3 | +Vout      | red        | UL-1430 | 22  |
| 4 | -Vout      | black      | UL-1430 | 22  |

tc= case temperature measuring point

Tolerance: xx.x= ±0.5mm

xx.xx= ±0.35mm



**PACKAGING INFORMATION**

| Parameter                   | Type          | Value                   |
|-----------------------------|---------------|-------------------------|
| Packaging Dimension (LxWxH) | cardboard box | 195.0 x 170.0 x 140.0mm |
|                             | tray          | 462.0 x 292.0 x 49.0mm  |
| Packaging Quantity          | cardboard box | 12pcs                   |
|                             | tray          | 72pcs                   |
| Storage Temperature Range   |               | -40°C to +85°C          |

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