

# Features

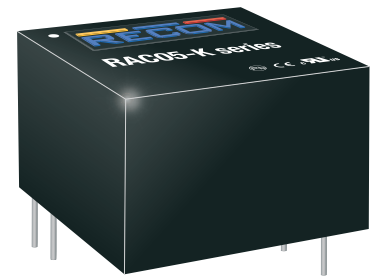
# Regulated Converter

- High efficiency over entire load range
- Class II installations (without FG)
- 5W on 1" x 1" footprint
- Internal EMC class B filter
- No external components necessary
- Electrical protection



# RAC05-K

5 Watt  
1" x 1"  
Single Output



UL62368-1 certified  
CSA C22.2 No. 62368-1-14 certified  
IEC/EN60950-1 certified  
IEC/EN62368-1 certified  
EN61204-3 compliant  
CB-Report

## Description

The RAC05-K series are ultra-compact AC/DC power supply modules in lightweight fully-encapsulated plastic casing. Beside safety approvals for industrial and IT solutions IEC60950-1 and UL62368-1, the units meet EN55032-"B" limits without any external components. Integrated fusing as well as electrical protections against short circuit and over voltage are on board. With their excellent efficiency over the entire load range including light load standby conditions, these power modules are especially suitable for IOT applications and control equipment.

## Selection Guide

| Part Number | Input Voltage Range [VAC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. <sup>(1)</sup> [%] | Max. Capacitive Load [µF] |
|-------------|---------------------------|----------------------|---------------------|------------------------------------|---------------------------|
| RAC05-3.3SK | 85-264                    | 3.3                  | 1515                | 76                                 | 6000                      |
| RAC05-05SK  | 85-264                    | 5                    | 1000                | 80                                 | 6000                      |
| RAC05-12SK  | 85-264                    | 12                   | 416                 | 81                                 | 1500                      |
| RAC05-15SK  | 85-264                    | 15                   | 333                 | 82                                 | 1000                      |
| RAC05-24SK  | 85-264                    | 24                   | 210                 | 84                                 | 330                       |

### Notes:

Note1: Efficiency is tested at 25°C with constant resistant mode at full load and 230VAC

## Model Numbering

RAC05-      SK  
Output Voltage      Single Output

## Specifications (measured @ ta= 25°C, nominal input voltage (115/230VAC), full load and after warm-up)

| BASIC CHARACTERISTICS                  |                  |                          |                 |              |                  |
|--|------------------|--------------------------|-----------------|--------------|------------------|
| Parameter                              | Condition        |                          | Min.            | Typ.         | Max.             |
| Internal Input Filter                  |                  |                          | Pi Type         |              |                  |
| Input Voltage Range <sup>(2)</sup>     |                  |                          | 85VAC<br>120VDC |              | 264VAC<br>370VDC |
| Input Current                          | 115VAC<br>230VAC |                          |                 |              | 250mA<br>100mA   |
| Inrush Current                         | cold start       | 115VAC<br>230VAC         |                 |              | 15A<br>30A       |
| No load Power Consumption              | 264VAC           |                          |                 | 75mW         |                  |
| Input Frequency Range                  |                  |                          | 47Hz            |              | 63Hz             |
| Minimum Load                           |                  |                          | 0%              |              |                  |
| Power Factor                           | 115VAC<br>230VAC |                          | 0.6<br>0.45     |              |                  |
| Start-up Time                          |                  |                          |                 | 20ms         |                  |
| Rise Time                              |                  |                          |                 |              | 8ms              |
| Hold-up time                           | 115VAC<br>230VAC |                          |                 | 12ms<br>60ms |                  |
| Internal Operating Frequency           |                  |                          |                 |              | 130kHz           |
| Output Ripple and Noise <sup>(3)</sup> | 20MHz BW         | 3.3Vout, 5Vout<br>others |                 | 60mVp-p      | 1% of Vout       |

### Notes:

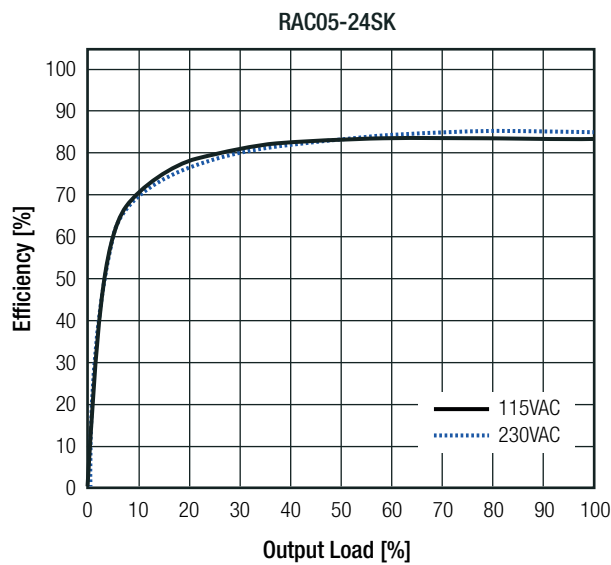
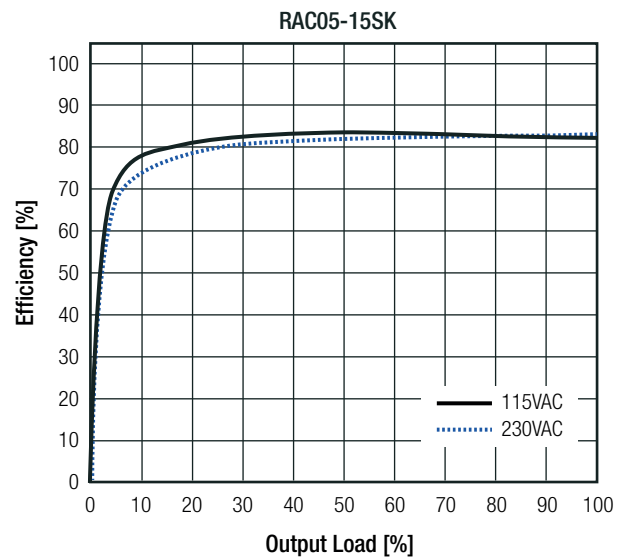
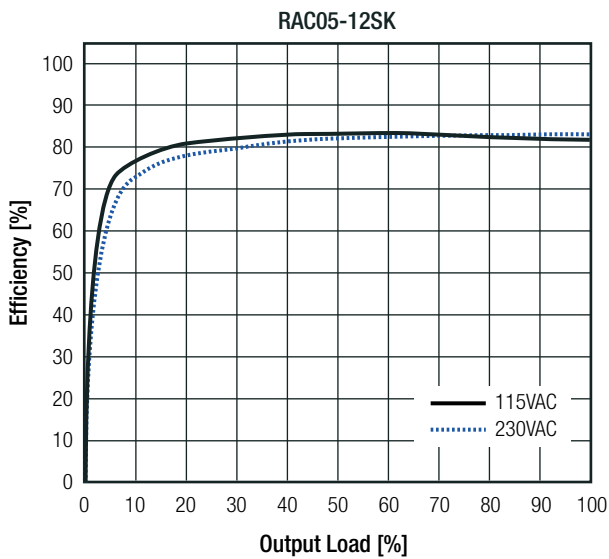
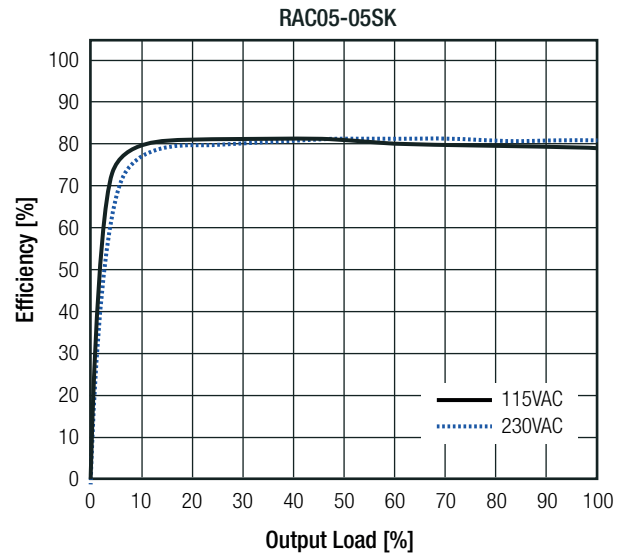
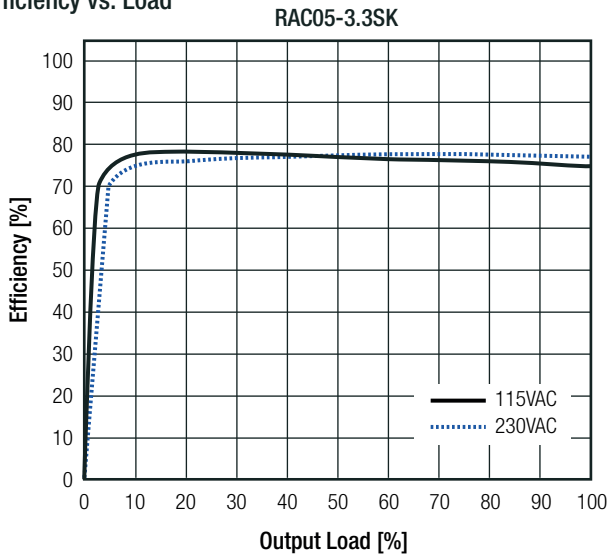
Note2: The products were submitted for safety files at AC-Input operation. Refer to „Line Derating“

Note3: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

continued on next page

Specifications (measured @ Ta= 25°C, nominal input voltage (115/230VAC), full load and after warm-up)

Efficiency vs. Load



**Specifications** (measured @ Ta= 25°C, nominal input voltage (115/230VAC), full load and after warm-up)

| REGULATIONS        |                                       |                    |
|--------------------|---------------------------------------|--------------------|
| Parameter          | Condition                             | Value              |
| Output Accuracy    |                                       | ±1.0% typ.         |
| Line Regulation    |                                       | ±0.5% typ.         |
| Load Regulation    |                                       | 1.0% typ.          |
| Transient Response | 25% load step change<br>recovery time | 4.0% max.<br>500µs |

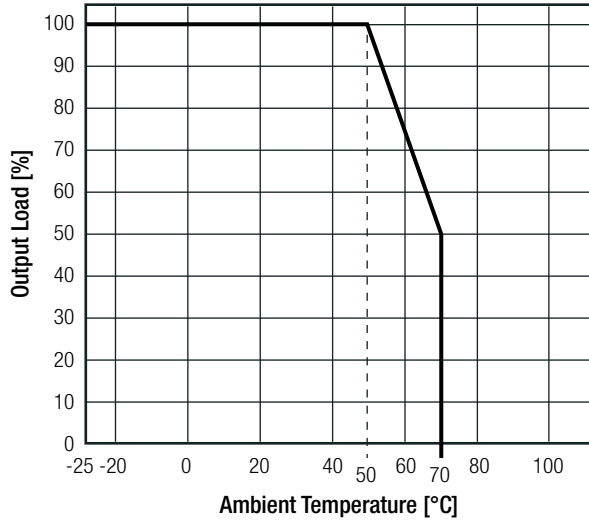
| PROTECTIONS  |   |   |                             |
|--|---|---|-----------------------------|
| Parameter  | Type                                    |   | Value                       |
| Internal Input Fuse <sup>(4)</sup>   |   |   | T1A, slow blow              |
| Short Circuit Protection (SCP)   |   |   | Hiccup, automatic restart   |
| Over Voltage Protection (OVP)  |   |   | 125% - 195%, latch off mode |
| Over Current Protection (OCP)  |   |   | 150% - 195%, hiccup mode    |
| Over Voltage Category (OVC)  |   |   | OVC II                      |
| Class of Equipment   |   |   | Class II                    |
| Isolation Voltage  | I/P to O/P, I/P to Case and O/P to Case | tested for 1 minute<br>tested for 3 seconds | 3kVAC<br>4kVAC              |
| Isolation Resistance   | I/P to O/P                              | Isolation Voltage 500VDC                    | 1GΩ min.                    |
| Isolation Capacitance  |   | 100kHz/0.1V                                 | 100pF max.                  |
| Insulation Grade   |   |   | reinforced                  |
| Leakage Current  |   |   | 0.25mA max.                 |
| <p><b>Notes:</b></p> <p>Note4: Refer to local safety regulations if input over-current protection is also required</p> |   |   |                             |

| ENVIRONMENTAL               |                                    |                           |   |
|-----------------------------|------------------------------------|---------------------------|---|
| Parameter                   | Condition                          |                           | Value   |
| Operating Temperature Range | @ natural convection 0.1m/s        | full load                 | -25°C to +50°C  |
|                             |                                    | refer to „Derating Graph“ | -25°C to +70°C  |
| Maximum Case Temperature    | 230VAC                             |                           | +90°C   |
| Temperature Coefficient     |                                    |                           | 0.05%/K   |
| Operating Altitude          |                                    |                           | 3000m   |
| Operating Humidity          | non-condensing                     |                           | 20% to 90% RH   |
| Design Lifetime             | 115VAC/60Hz and full load at +25°C |                           | 136 x 10 <sup>3</sup> hours                                     |
| MTBF                        | according to MIL-HDBK-217F, G.B.   | +25°C                     | >450 x 10 <sup>3</sup> hours                                    |
|                             |                                    | +50°C                     | >250 x 10 <sup>3</sup> hours                                    |
| Pollution Degree            |                                    |                           | PD2   |
| Vibration                   |                                    |                           | 10-500Hz, 2G 10min./1cycle, period 60min. each along x,y,z axes |
| continued on next page      |                                    |                           |   |

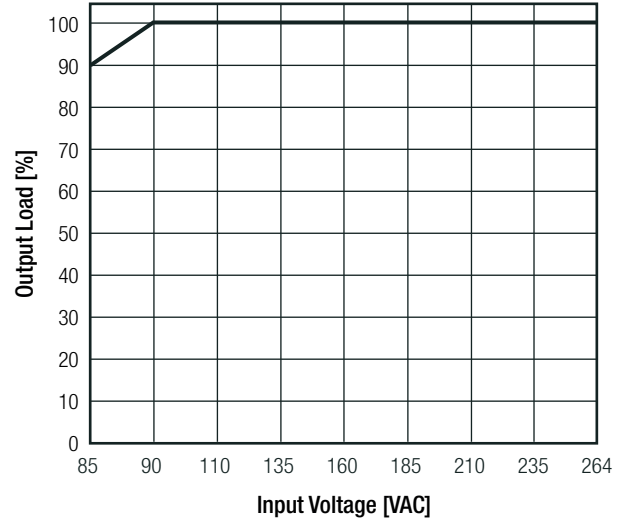
**Specifications** (measured @ Ta= 25°C, nominal input voltage (115/230VAC), full load and after warm-up)

**Derating Graph**

(@ Chamber and natural convection 0.1 m/s)



**Line Derating <sup>(5)</sup>**



**Notes:**

Note5: No derating required for the specified DC-input range

**SAFETY AND CERTIFICATIONS**

| Certificate Type (Safety)   | Report / File Number | Standard  |
|---|----------------------|---|
| Audio/Video, information and communication technology equipment - Safety requirements             | E224736              | UL62368-1, 2nd Edition: 2014<br>CSA C22.2 Nr. 62368-1-14, 2nd Edition: 2014 |
| Information Technology Equipment, General Requirements for Safety (CB Scheme)                     | E491408-A2-CB-1      | IEC60950-1:2005, 2nd Edition: + A2:2013                                     |
| Information Technology Equipment, General Requirements for Safety                                 |                      | EN60950-1:2006 + A2:2013  |
| Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme) | OFF-4787889086-1     | IEC62368-1:2014, 2nd Edition  |
| Audio/Video, information and communication technology equipment - Safety requirements             |                      | EN62368-1: 2014 + A11:2017  |
| EAC   | RU-AT.03.67361       | TP TC 004/020, 2011   |
| RoHS2+  |                      | RoHS 2011/65/EU + AM2015/863  |

| EMC Compliance  | Conditions  | Standard / Criterion   |
|---|---|--|
| Low-voltage power supplies DC output - Part 3: Electromagnetic compatibility  |   | EN61204-3: 2000, Class B   |
| ESD Electrostatic discharge immunity test                                     | ±8kV Air; ±4kV Contact  | EN61000-4-2: 2009, Criteria B  |
| Radiated, radio-frequency, electromagnetic field immunity test                | 10V/m, 80MHz-1GHz<br>3V/m, 1.5GHz-2GHz<br>1V/m, 2GHz-2.7GHz     | EN61000-4-3: 2006 + A2, 2010, Criteria A   |
| Fast Transient and Burst Immunity   | AC In Port: ±2.0kV  | EN61000-4-4: 2012, Criteria B  |
| Surge Immunity  | AC In Port (L-N): ±1.0kV<br>DC Output Port: ±0.5kV              | EN61000-4-5: 2014, Criteria B  |
| Immunity to conducted disturbances, induced by radio-frequency fields         | AC and DC Power Port: 10V                                       | EN61000-4-6: 2014, Criteria A  |
| Power Magnetic Field Immunity   | 50Hz, 1A/m  | EN61000-4-8: 2010, Criteria A  |
| Voltage Dips and Interruptions  | Voltages Dips: >95%<br>Voltage Dips: 30%<br>Interruptions: >95% | EN61000-4-11: 2004, Criteria B<br>EN61000-4-11: 2004, Criteria C<br>EN61000-4-11: 2004, Criteria C |
| Voltage Fluctuations and Flicker in Public Low-Voltage Systems ≤16A per phase |   | EN61000-3-3: 2013  |

**Notes:**

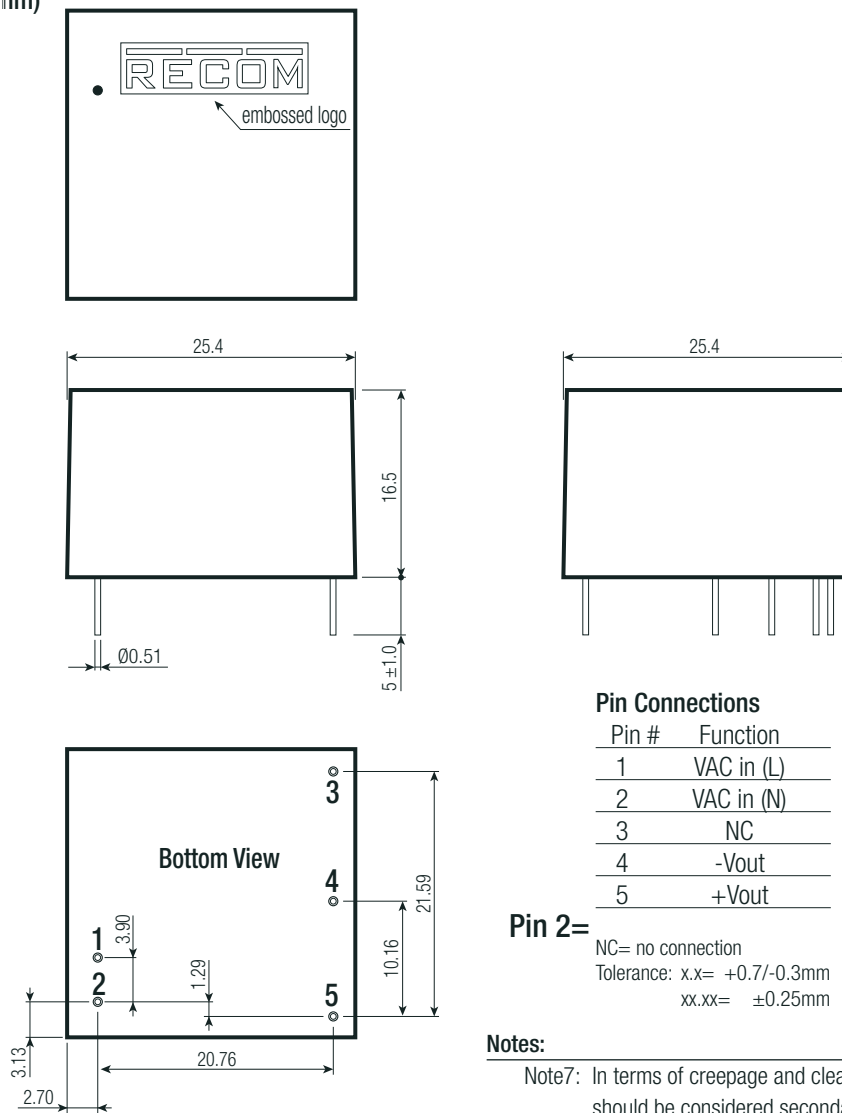
Note6: If output is connected to GND, please contact RECOM tech support for advice

**Specifications** (measured @ Ta= 25°C, nominal input voltage (115/230VAC), full load and after warm-up)

**DIMENSION and PHYSICAL CHARACTERISTICS**

| Parameter         | Type      | Value                   |
|-------------------|-----------|-------------------------|
| Material          | case      | black plastic (UL94-V0) |
|                   | potting   | silicone (UL94-V0)      |
|                   | PCB       | FR4 (UL94-V0)           |
|                   | baseplate | plastic (UL94-V0)       |
| Dimension (LxWxH) |           | 25.4 x 25.4 x 16.5mm    |
| Weight            |           | 20g typ.                |

**Dimension Drawing (mm)**



**Notes:**

Note7: In terms of creepage and clearance unconnected pin #3 should be considered secondary side

**PACKAGING INFORMATION**

| Parameter                   | Type           | Value                 |
|-----------------------------|----------------|-----------------------|
| Packaging Dimension (LxWxH) | tube           | 530.0 x 27.5 x 25.6mm |
| Packaging Quantity          |                | 18pcs                 |
| Storage Temperature Range   |                | -40°C to +85°C        |
| Storage Humidity            | non-condensing | 20% to 90% RH         |

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