# Features

# Regulated Converters

- Continuous short circuit protection
- Efficiency up to 79%
- Universal input 80-264VAC
- 100mW no load power consumption
- Isolated output 3.75kVAC / 1 min
- EN, UL and CE/EAC certified

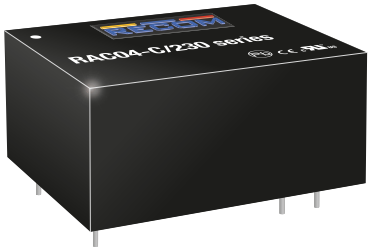
RECOM

AC/DC Converter

# RAC04-C/230

## 4 Watt Single & Dual Output

3 Year Warranty




## Description

The RAC04-C/230 series are fully certified single and dual regulated AC/DC converters in an encapsulated PCB-mount package style with 3.75kVAC isolation and very low standby power consumption. The converters have SC protected single as well as dual outputs and meet EN55032 class B without any external components. Uses include board-level power supplies, home automation, instrumentation systems and standby applications.

## Selection Guide

| Part Number | Input Voltage Range [VAC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ [%] | Max. Capacitive Load (1) [µF] |
|---|---|---|---|---|---|
| RAC04-3.3SC/230 | 80-264 | 3.3 | 1200 | 72 | 10000 |
| RAC04-05SC/230 | 80-264 | 5 | 800 | 75 | 7200 |
| RAC04-12SC/230 | 80-264 | 12 | 333 | 77 | 1000 |
| RAC04-15SC/230 | 80-264 | 15 | 267 | 78 | 820 |
| RAC04-24SC/230 | 80-264 | 24 | 167 | 79 | 220 |
| RAC04-0512DC/230 | 80-264 | 5/12 | 720/33 | 75 | 4700/100 |
| RAC04-05DC/230 | 80-264 | ±5 | ±400 | 76 | ±3300 |
| RAC04-12DC/230 | 80-264 | ±12 | ±166 | 78 | ±680 |

**Notes:**

Note1: measured at 115VAC

## Model Numbering

RAC04-__ __C/230

Output Voltage

**S**ingle or **D**ual

Ordering Examples:

e.g. RAC04-3.3SC/230, 3.3VDC single output

e.g. RAC04-05DC/230, 5VDC dual output

IEC/EN60950-1 certified
IEC/EN62368-1 certified
UL60950-1 certified
CSA/CAN 22.2 60950-1-07 certified
CB Report
EN55032 compliance
EN55024 compliance

## Specifications (measured at Ta= 25°C, nominal input voltage, full load otherwise noted)

| BASIC CHARACTERISTICS | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Condition** | | **Min.** | **Typ.** | **Max.** |
| Input Voltage Range [2] | | | 80VAC<br>113VDC | | 264VAC<br>373VDC |
| Input Current | 115VAC<br>230VAC | | | | 98mA<br>64mA |
| Inrush Current | <0.5ms<br>cold start at 25°C | 115VAC<br>230VAC | | | 15A<br>30A |
| No load Power Consumption | 115VAC/230VAC | | | | 100mW |
| Input Frequency Range | AC Input | | 47Hz | | 440Hz |
| Hold-up time | 115VAC | | | 15ms | |
| Internal Operating Frequency | 100% load at nominal Vin | | | 67kHz | |
| Minimum Load | | | 0% | | |
| Output Ripple and Noise [3] | | | | 200mVp-p | |

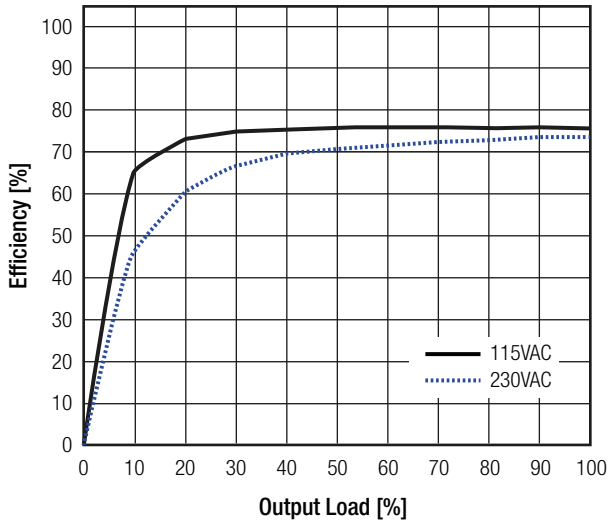
**Notes:**

Note2: Refer to line derating graph on page PA-4

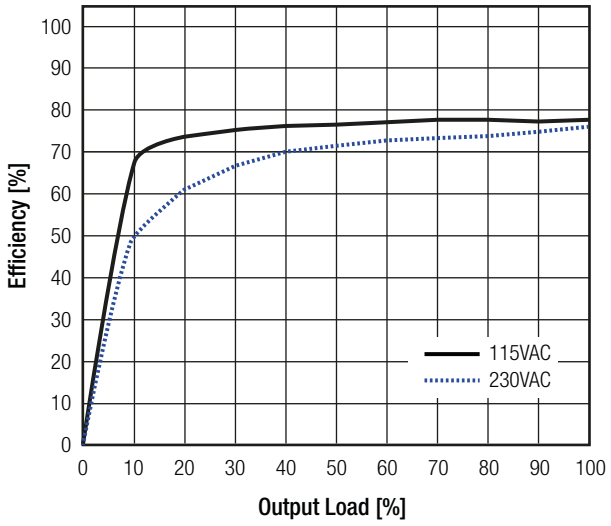
Note3: Ripple and Noise is measured at 20MHz bandwidth and with a 47µF low-ESR electrolytic capacitor in parallel with a 0.1µF ceramic capacitor across output

### Efficiency vs. Load

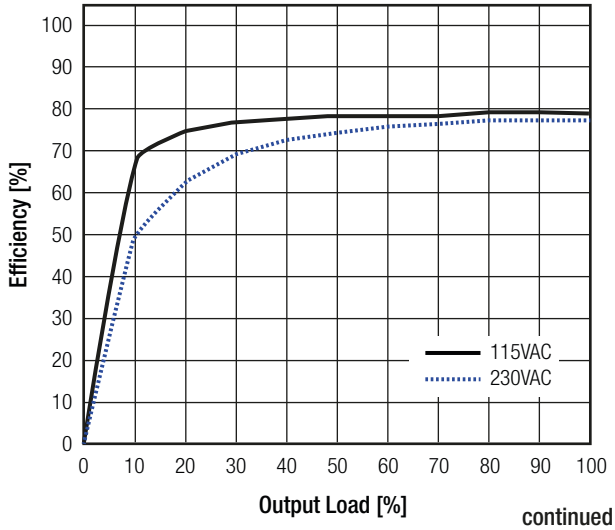
RAC04-3.3SC/230



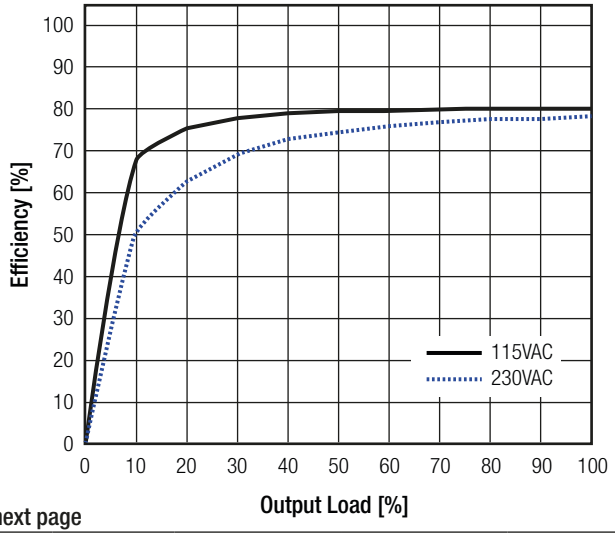

RAC04-05SC/230




RAC04-12SC/230




RAC04-15SC/230

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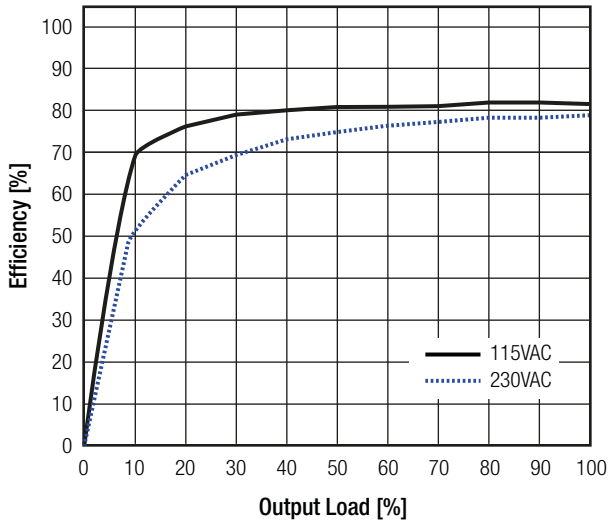
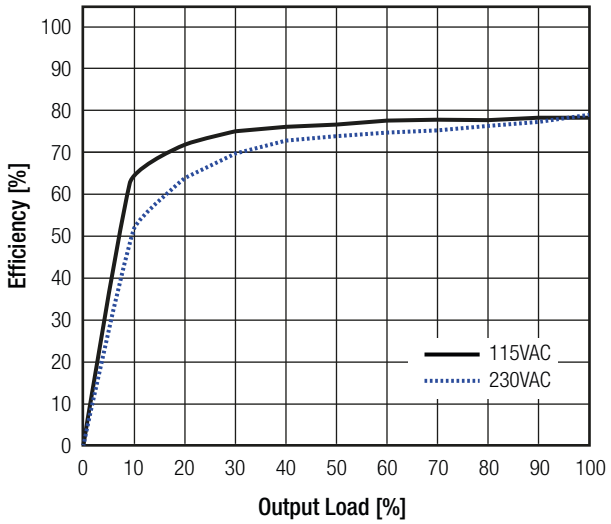
## Specifications (measured at Ta= 25°C, nominal input voltage, full load otherwise noted)

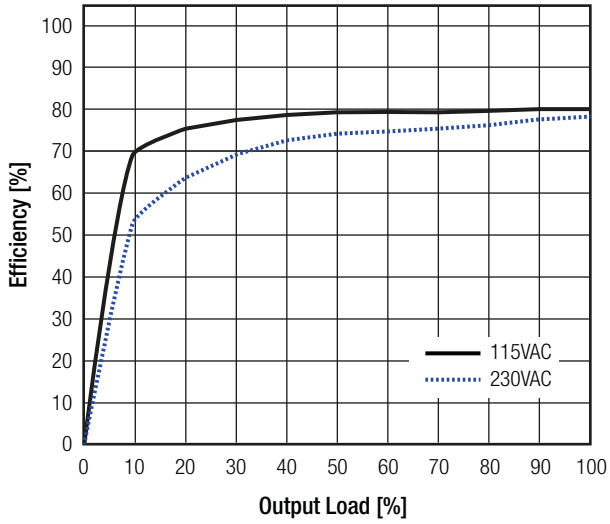
RAC04-24SC/230



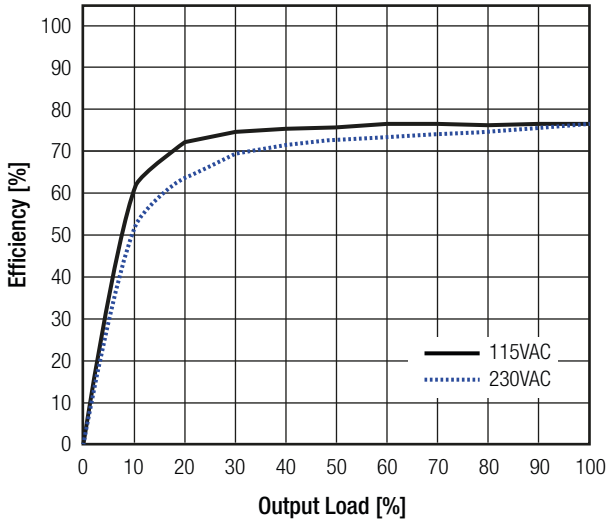

RAC04-05DC/230




RAC04-12DC/230




RAC04-0512DC/230




### REGULATIONS

| Parameter | Condition | | Value |
|---|---|---|---|
| Output Accuracy | single and dual<br>5V/12V dual assymetrical | | ±2.0% typ.<br>±2.0% / ±10.0% typ. |
| Line Regulation | 90-264VAC | single and dual<br>5V/12V dual assymetrical | ±0.2% typ.<br>±0.2% / ±1.0% typ. |
| Load Regulation | 10% to 100% load | 3.3V, 5V output<br>all others<br>5V/12V dual assymetrical | 1.0% typ.<br>0.5% typ.<br>1.0% / 5.0% typ. |

### PROTECTIONS

| Parameter | Type | | Value |
|---|---|---|---|
| Short Circuit Protection (SCP) | | | automatic recovery |
| Over Voltage Category | | | OVC II |
| Isolation Voltage | I/P to O/P | tested for 1 minute | 3.75kVAC |
| Isolation Resistance | | | 100MΩ min. |
| Insulation Grade | | | reinforced |
| Leakage Current | 230VAC / 50Hz | | 0.25mA max. |

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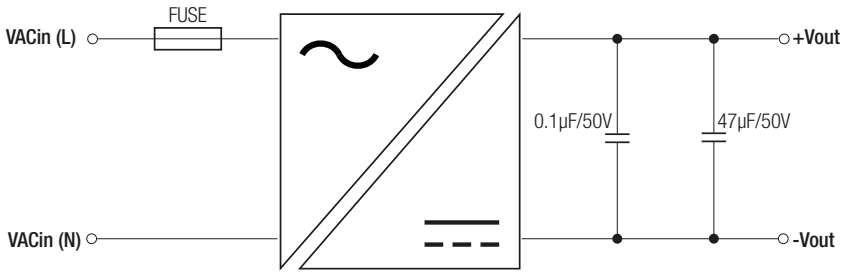
## Specifications (measured at Ta= 25°C, nominal input voltage, full load otherwise noted)

**Notes:**

Note4: Refer to local safety regulations if input over-current protection is also required

### Protection Circuit

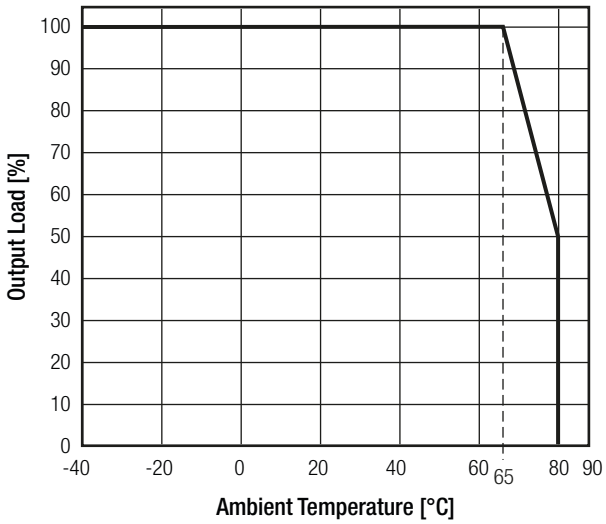



### ENVIRONMENTAL

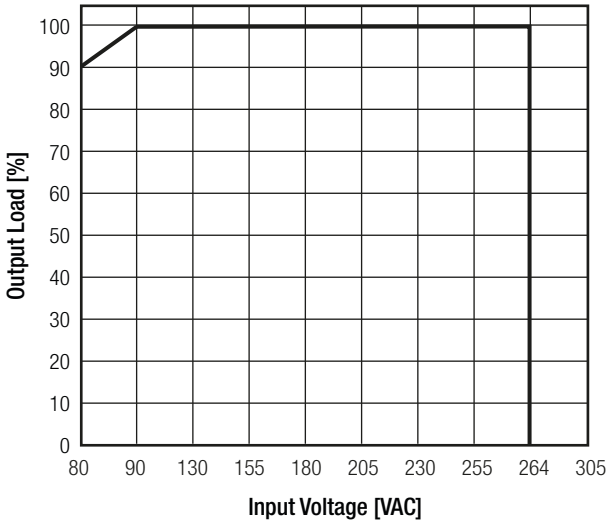
| Parameter | Condition | | Value |
|---|---|---|---|
| Operating Temperature Range | @ natural convection 0.1m/s | full load | -40°C to +65°C |
| | | refer to derating graph | -40°C to +80°C |
| Operating Altitude | | | 2000m |
| Operating Humidity | non-condensing | | 95% RH max. |
| Pollution Degree | | | PD2 |
| Vibration | | | according to MIL-STD-810F standard |
| MTBF | according to MIL-HDBK-217F, G.B. | +25°C | 500 x $10^3$ hours |

### Derating Graph

(@ Chamber and natural convection 0.1m/s)




### Line Derating




### SAFETY AND CERTIFICATIONS

| Certificate Type | Report / File Number | Standard |
|---|---|---|
| Information Technology Equipment, General Requirements for Safety (CB Scheme) | 1310055-1-CB-M1 | IEC60950-1:2005, 2nd Edition + A1:2009 |
| Information Technology Equipment, General Requirements for Safety | E224736-A21 | UL60950-1, 2nd Edition 2011<br>CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2011 |
| Audio/video, information and communication technology equipment - Safety requirements | AL106051 | EN62368-1:2014<br>IEC62368-1:2014 2nd Edition |
| EAC | RU-AT.03.67361 | TP TC 004/020, 2011 |
| RoHS2+ | | RoHS-2011/65/EU + AM-2015/863 |

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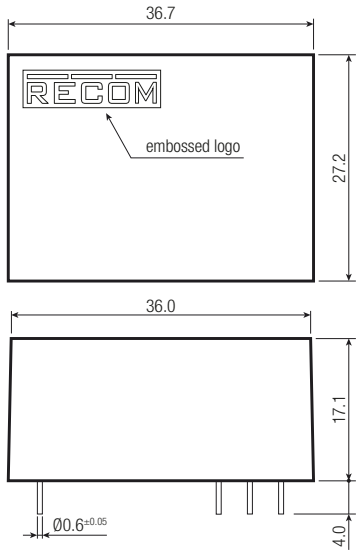
## Specifications (measured at Ta= 25°C, nominal input voltage, full load otherwise noted)

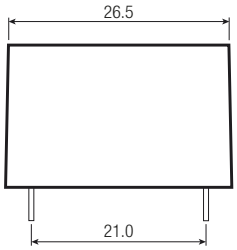
| EMC Compliance | Report / File Number | Standard / Criterion |
|---|---|---|
| Electromagnetic compatibility of multimedia equipment - Emission requirements | T160225D10-E | EN55032, Class B |
| Information technology equipment - Immunity characteristics - Limits and methods of measurement | | EN55024:2010 |
| ESD Electrostatic discharge immunity test | Air: ±2, 4, 8kV<br>Contact: ±4kV | IEC61000-4-2:2008, Criteria A |
| Radiated, radio-frequency, electromagnetic field immunity test | 3V/m | IEC61000-4-3:2010, Criteria A |
| Fast Transient and Burst Immunity | AC Power Port: ±1kV | IEC61000-4-4:2004 + A1:2010, Criteria A |
| Surge Immunity | AC Power Port: L-N ±1kV | IEC61000-4-5:2005, Criteria A |
| Immunity to conducted disturbances, induced by radio-frequency fields | AC Power Port: 3V | IEC61000-4-6:2008, Criteria A |
| Power Magnetic Field Immunity | 50Hz, 1A/m | IEC61000-4-8:2009, Criteria A |
| Voltage Dips and Interruptions | Voltage Dips: >95%<br>Voltage Dips: 30%<br>Interruptions: >95% | IEC61000-4-11:2004, Criteria A<br>IEC61000-4-11:2004, Criteria A<br>IEC61000-4-11:2004, Criteria B |

## DIMENSION AND PHYSICAL CHARACTERISTICS

| Parameter | Type | Value |
|---|---|---|
| Material | case<br>potting<br>PCB | black plastic (UL94 V-0)<br>silicone (UL94 V-0)<br>FR4 (UL94 V-0) |
| Dimension (LxWxH) | | 36.7 x 27.2 x 17.1mm |
| Weight | | 31.5g typ. |

### Dimension Drawing (mm)



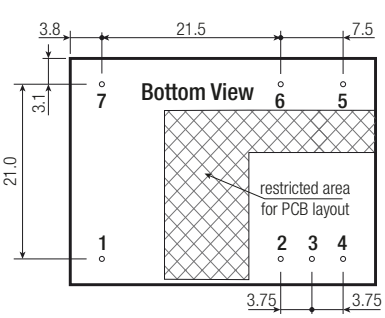

### Pinning information

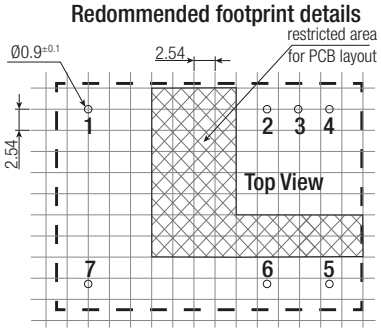
| Pin # | Single | Dual | Dual (assymetric) |
|---|---|---|---|
| 1 | No Pin | No Pin | No Pin |
| 2 | +Vout | +Vout | +5Vout |
| 3 | -Vout | Com | Com |
| 4 | NC | -Vout | +12Vout |
| 5 | VAC in (L) | VAC in (L) | VAC in (L) |
| 6 | VAC in (N) | VAC in (N) | VAC in (N) |
| 7 | NC* | NC* | NC* |

*Pin 7 is NC but need 4mm minimum clearence to ground for safety

NC= no connection
Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm

### Redommended footprint details



## Specifications (measured at Ta= 25°C, nominal input voltage, full load otherwise noted)

| PACKAGING INFORMATION | | |
|---|---|---|
| **Parameter** | **Type** | **Value** |
| Packaging Dimension (LxWxH) | tube | 520.0 x 32.0 x 27.0mm |
| Packaging Quantity | | 12pcs |
| Storage Temperature Range | | -40°C to +100°C |