

Features

Regulated Converter

- Wide input range 85-264VAC
- Standby mode optimized PSU (ENER Lot 6)
- Ultra-high efficiency over entire load range
- Operating temperature range: -40°C to +80°C
- Overvoltage and overcurrent protected
- EMC compliant without external components
- No load power consumption < 75mW

RECOM

AC/DC Converter

RAC20-K

20 Watt Single Output



IEC62368-1 pending
 EN62368-1 certified
 UL62368-1 certified
 CAN/CSA-C22.2 No. 62368-1-14 certified
 EN/IEC60335 pending
 CB Report pending

Description

The RAC20-K series are highly efficient PCB-mount power conversion modules with ultra-low energy losses especially in light load conditions, making them a benchmark for always-on and standby mode operations, which are typically coming along with IoT and smart applications. The power supply units cover worldwide mains input range of 85VAC up to 264VAC and come with international safety certifications for industrial, AV and ITE as well as household standards. These AC/DC modules operate in a temperature range of -40°C to +80°C and offer fully protected single or dual outputs as well as EMC class B compliance without the need of any external components.

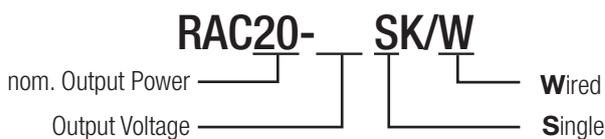
Selection Guide

| Part Number | Input Voltage Range [VAC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ ⁽¹⁾ [%] | Max. Capacitive Load ⁽²⁾ [µF] |
|---------------------------|---------------------------|----------------------|---------------------|-----------------------------------|--|
| RAC20-05SK ⁽³⁾ | 85-264 | 5 | 4000 | 84 | 10000 |

Notes:

Note1: Efficiency is tested at 230VAC input and constant resistive load at +25°C ambient
 Note2: Max Cap Load is tested at nominal input and full resistive load

Model Numbering



Notes:

Note3: Add suffix „W“ for wired version
 without suffix, standard THT version

Ordering Examples:

RAC20-05SK 5Vout Single Output standard THT version



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Zertifiziert nach ISO 9001:2015

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

BASIC CHARACTERISTICS

| Parameter | Condition | Min. | Typ. | Max. |
|--|---------------------|----------------------|--------------|----------------------|
| Internal Input Filter | | | | Pi type |
| Input Voltage Range ^(4, 5) | nom. Vin= 230VAC | 85VAC 120VDC | 230VAC | 264VAC 370VDC |
| Input Current | 115VAC 230VAC | | | 0.45A 0.40A |
| Inrush Current | cold start at +25°C | 115VAC 230VAC | | 20A 40A |
| No load Power Consumption | 230VAC | | 40mW | |
| ErP Lot 6 Standby Mode Conformity (Output Load Capability) | Input Power | 0.5W 1.0W 2.0W | | 0.3W 0.7W 1.6W |
| Input Frequency Range | AC Input | 47Hz | | 63Hz |
| Minimum Load | | 0% | | |
| Power Factor | 115VAC 230VAC | 0.6 0.5 | | |
| Start-up Time | | | 150ms | |
| Rise Time | | | 40ms | |
| Hold-up Time | 115VAC 230VAC | | 15ms 90ms | |
| Internal Operating Frequency | | | | 100kHz |
| Output Ripple and Noise ⁽⁶⁾ | 20MHz BW | | 100mVp-p | |

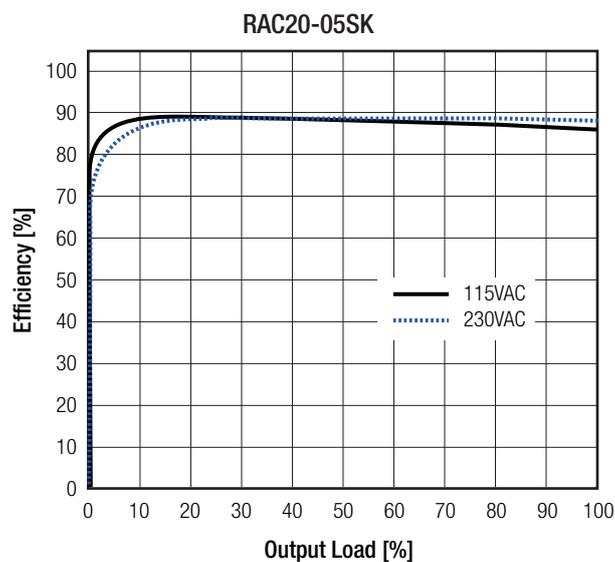
Notes:

Note4: The products were submitted for safety files at AC-Input operation

Note5: Refer to line derating graph on page 4

Note6: Measurements are made with a 1.0µF MLCC across output (low ESR)

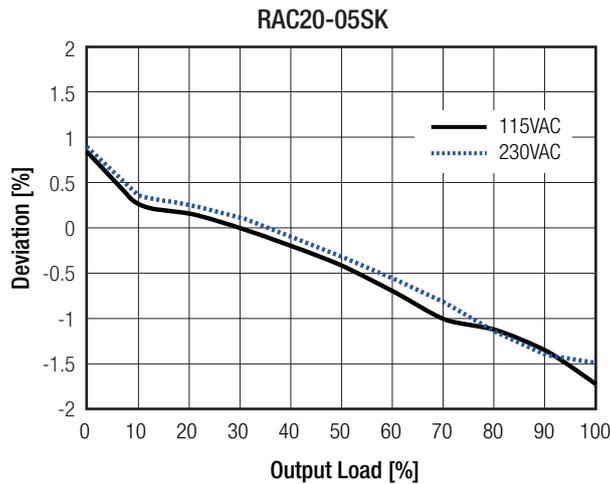
Efficiency vs. Load



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

| REGULATIONS | | |
|--------------------|---------------------------------------|-------------------------|
| Parameter | Condition | Value |
| Output Accuracy | | ±2.0% typ. |
| Line Regulation | | ±0.5% typ. |
| Load Regulation | 10% to 100% load | 2.0% typ. |
| Transient Response | 25% load step change recovery time | 4.0% max. 500µs typ. |

Deviation vs. Load



| PROTECTIONS | | |
|----------------------------------|-------------|-----------------------------|
| Parameter | Type | Value |
| Input Fuse ⁽⁷⁾ | internal | T3.15A, slow blow type |
| Short Circuit Protection (SCP) | below 100mΩ | hiccup, auto recovery |
| Over Voltage Protection (OVP) | | 150% - 195%, latch off mode |
| Over Current Protection (OCP) | | 110% - 130%, latch off mode |
| Over Voltage Category | | OVCII |
| Isolation Voltage ⁽⁸⁾ | I/P to O/P | tested for 1 minute |
| Isolation Resistance | | Isolation Voltage 500VDC |
| Isolation Capacitance | 100kHz/0.1V | 100pF max. |
| Insulation Grade | | reinforced |
| Leakage Current | | 0.25mA max. |

Notes:

Note7: Refer to local wiring regulations if input over-current protection is also required

Note8: For repeat Hi-Pot testing, reduce the time and/or the test voltage

| ENVIRONMENTAL | | |
|-----------------------------|-----------------------------|--|
| Parameter | Condition | Value |
| Operating Temperature Range | @ natural convection 0.1m/s | full load |
| | | refer to derating graph |
| Maximum Case Temperature | 230VAC | +95°C |
| Temperature Coefficient | | 0.05%/K |
| Operating Altitude | | 3000m |
| Operating Humidity | non-condensing | 20% - 90% RH max. |
| Pollution Degree | | PD2 |
| Vibration | according to MIL-STD-202G | 10-500Hz, 2G 10min./1cycle, period 60min. along x,y,z axes |

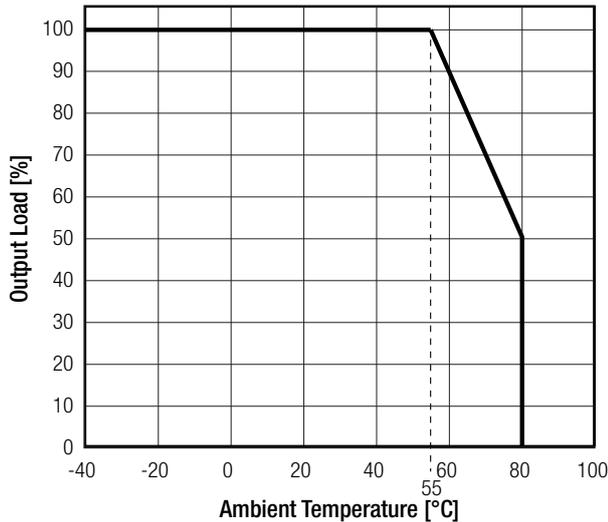
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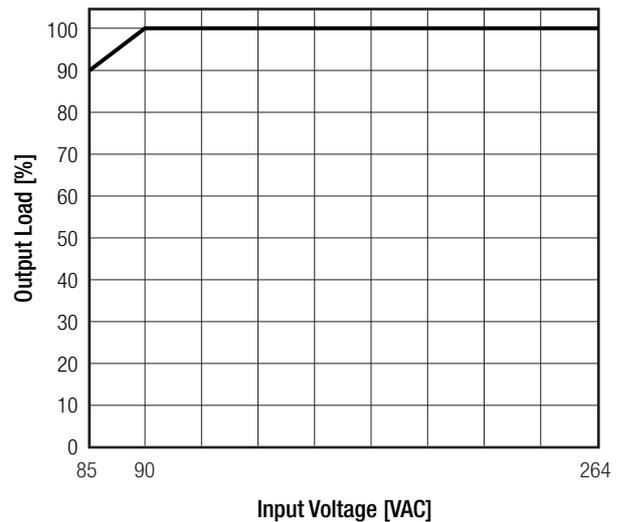
| Parameter | Condition | Value |
|-----------------|----------------------------------|------------------------------|
| Design Lifetime | +25°C | 130 x 10 ³ hours |
| | +55°C | 16 x 10 ³ hours |
| MTBF | according to MIL-HDBK-217F, G.B. | >450 x 10 ³ hours |

Derating Graph

(@ Chamber and natural convection 0.1m/s)



Line Derating



SAFETY AND CERTIFICATIONS

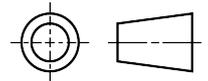
| Certificate Type (Safety) | Report / File Number | Standard |
|---|----------------------|--|
| Audio/Video, information and communication technology equipment - Safety requirements | E224736 | UL62368-1, 2nd Edition, 2014 CAN/CSA C22.2 Nr. 62368-1-14, 2nd Ed. 2014 |
| Audio/Video, information and communication technology equipment - Safety requirements (CB) | pending | IEC/EN62368-1, 2nd Edition, 2014 |
| Audio/Video, information and communication technology equipment - Safety requirements (LVD) | E491408-A6002-CB-1 | EN62368-1, 2nd Edition, 2014 + A11:2017 |
| Household and similar electrical appliances – Safety – Part 1: General requirements | pending | EN/IEC60335-1:2012+A11:2014 |
| RoHS 2 | | RoHS-2011/65/EU |

| EMC Compliance | Condition | Standard / Criterion |
|---|---|---|
| Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC) | | EN61204-3:2000, Class B |
| Electromagnetic compatibility of multimedia equipment - Emission requirements | | EN55032:2015, Class B |
| Electromagnetic compatibility of household appliances, electric tools and similar apparatus - Emission Requirements | | EN55014-2:2015 + 1:2017 |
| Information technology equipment - Immunity characters - Limits and methods of measurement | | EN55024:2010 + A1:2015 |
| ESD Electrostatic discharge immunity test | Contact: ±4.0kV | EN61000-4-2:2009, Criteria B |
| Radiated, radio-frequency, electromagnetic field immunity test | | EN61000-4-3:2006 + A2:2010, Criteria B |
| Fast Transient and Burst Immunity | AC In Port: ±1.0kV | EN61000-4-4, Criteria B |
| Surge Immunity | AC In Port: L-N ±1.0kV | EN61000-4-5:2014, Criteria B |
| Immunity to conducted disturbances, induced by radio-frequency fields | AC Power Port: 3V | EN61000-4-6:2014, Criteria A |
| Power Magnetic Field Immunity | | EN61000-4-8:2010, Criteria A |
| Voltage Dips and Interruptions | Voltage Dips 30% Voltage Dips 60% Voltage Interruptions > 95% | EN61000-4-11:2004, Criteria C EN61000-4-11:2004, Criteria C EN61000-4-11:2004, Criteria C |
| Limits of Voltage Fluctuations & Flicker | | EN61000-3-3:2013 |

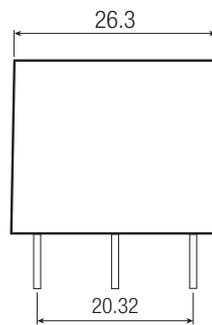
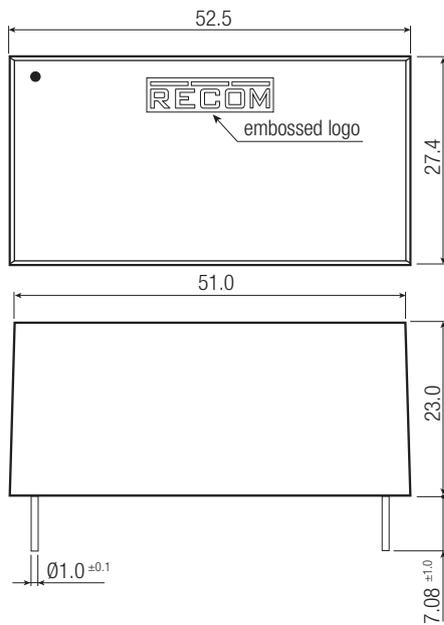
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

DIMENSION AND PHYSICAL CHARACTERISTICS

| Parameter | Type | Value |
|-------------------|--------------|--------------------------|
| Material | case | black plastic, (UL94V-0) |
| | potting | silicone, (UL94V-0) |
| | PCB | FR4, (UL94V-0) |
| | baseplate | plastic, (UL94V-0) |
| Dimension (LxWxH) | THT/wired | 52.5 x 27.4 x 23.0mm |
| Weight | THT wired | 60g typ. 65g typ. |



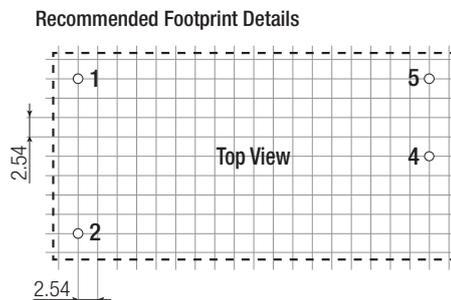
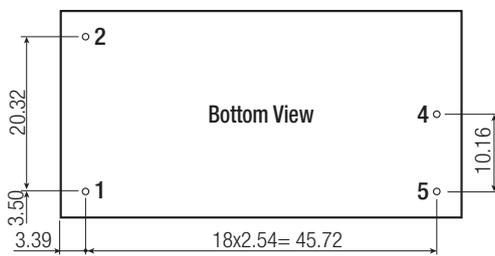
Dimension Drawing (mm)



Pinning information

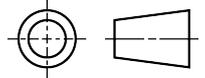
| Pin # | Single |
|-------|------------|
| 1 | VAC in (N) |
| 2 | VAC in (L) |
| 4 | -Vout |
| 5 | +Vout |

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

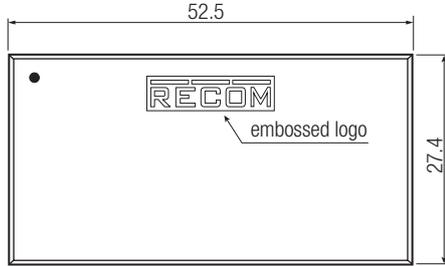


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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)



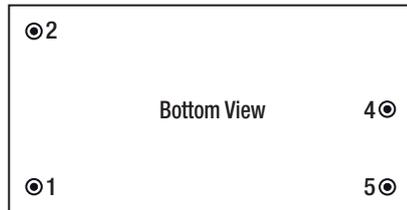
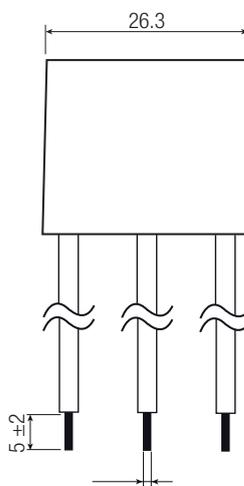
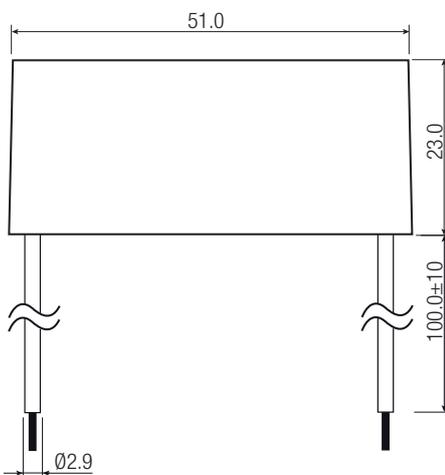
Dimension Drawing Single Wired (mm)



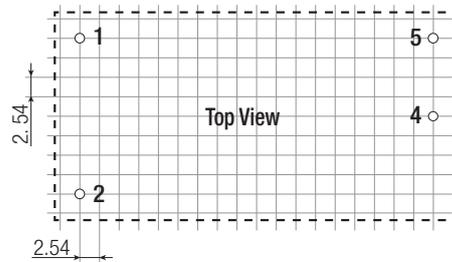
Wired information

| # | Function | Wire color | Type | AWG |
|---|------------|------------|---------|-----|
| 1 | VAC in (N) | blue | UL-1015 | 18 |
| 2 | VAC in (L) | brown | UL-1015 | 18 |
| 4 | -Vout | red | UL-1015 | 18 |
| 5 | +Vout | black | UL-1015 | 18 |

Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm



Recommended Footprint Details



PACKAGING INFORMATION

| Parameter | Type | | Value |
|-----------------------------|----------------|-----------|---|
| | THT wired | tube tray | |
| Packaging Dimension (LxWxH) | | | 490.0 x 56.0 x 40.0mm 488.0 x 202.0 x 47.0mm |
| Packaging Quantity | THT wired | | 15pcs 20pcs |
| Storage Temperature Range | | | -40°C to +85°C |
| Storage Humidity | non-condensing | | 20% to 90% RH max. |

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