

# Features

- 20 Watt PCB mount package
- Universal input voltage range
- 3000VAC / 1 minute isolation
- Low output ripple and noise
- Short circuit protected
- UL certified, CE marked

# Regulated Converter



# RAC20-A

20 Watt  
Single,  
Dual, Double,  
Triple Output



## Description

Universal input voltage switching power module for PCB or DIN-rail mounting available with single, dual or triple output voltages.

Consider RAC20-K series for new designs

## Selection Guide

| Part Number                 | Input Voltage Range [VAC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ <sup>(1)</sup> [%] | Max. Capacitive Load [µF] |
|-----------------------------|---------------------------|----------------------|---------------------|-----------------------------------|---------------------------|
| RAC20-3.3SA <sup>(2)</sup>  | 90-264                    | 3.3                  | 4500                | 75                                | 25000                     |
| RAC20-05SA <sup>(2)</sup>   | 90-264                    | 5                    | 4000                | 79                                | 13000                     |
| RAC20-09SA <sup>(2)</sup>   | 90-264                    | 9                    | 2230                | 82                                | 1100                      |
| RAC20-12SA <sup>(2)</sup>   | 90-264                    | 12                   | 1670                | 83                                | 920                       |
| RAC20-15SA <sup>(2)</sup>   | 90-264                    | 15                   | 1340                | 83                                | 820                       |
| RAC20-24SA <sup>(2)</sup>   | 90-264                    | 24                   | 840                 | 84                                | 600                       |
| RAC20-05DA <sup>(2)</sup>   | 90-264                    | ±5                   | ±2000               | 79                                | ±4300                     |
| RAC20-12DA <sup>(2)</sup>   | 90-264                    | ±12                  | ±833                | 82                                | ±560                      |
| RAC20-15DA <sup>(2)</sup>   | 90-264                    | ±15                  | ±677                | 82                                | ±220                      |
| RAC20-0512TA <sup>(2)</sup> | 90-264                    | 5/±12                | 2800/±250           | 81                                | 3500/±200                 |
| RAC20-0515TA <sup>(2)</sup> | 90-264                    | 5/±15                | 2800/±200           | 81                                | 3500/±150                 |

### Notes:

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



UL60950-1 certified  
CSA C22.2 No. 60950-1-07 certified  
EN60950-1 certified  
EN55032 compliant  
EN55024 compliant

## Model Numbering



### Notes:

Note2: no suffix for standard package (THT)  
add suffix "ST" for screw terminal module

### Ordering Examples:

|                 |         |           |               |                |
|-----------------|---------|-----------|---------------|----------------|
| RAC20-05SA      | 20 Watt | 5Vout     | Single Output | THT            |
| RAC20-05DA      | 20 Watt | ±5Vout    | Dual Output   | THT            |
| RAC20-0512TA-ST | 20 Watt | 5/±12Vout | Triple Output | Screw Terminal |
| RAC20-15SA-ST   | 20 Watt | 15Vout    | Single Output | Screw Terminal |

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

**BASIC CHARACTERISTICS**

| Parameter                              | Condition              |                  | Min.   | Typ.   | Max.             |
|--|------------------------|------------------|--|--------|------------------|
| Input Voltage Range <sup>(3)</sup>     | nom. Vin = 230VAC      |                  | 90VAC<br>100VDC  | 230VAC | 264VAC<br>375VDC |
| Input Current                          | 115VAC<br>230VAC       |                  |  |        | 400mA<br>270mA   |
| Inrush Current                         | 2ms max.               | 115VAC<br>230VAC |  |        | 30A<br>50A       |
| No load Power Consumption              | 115VAC/230VAC          |                  |  |        | 470mW            |
| Input Frequency Range                  | AC Input               |                  | 47Hz   |        | 440Hz            |
| Minimum Load                           | Single, Dual<br>Triple |                  | 0%   | 10%    |                  |
| Hold-up Time                           | 115VAC/230VAC          |                  | 13ms   |        |                  |
| Internal Operating Frequency           |                        |                  |  | 100kHz |                  |
| Output Ripple and Noise <sup>(4)</sup> | 20MHz BW               | Noise<br>Ripple  | <0.5% Vout + 50mVp-p max.<br><0.2% Vout + 40mVp-p max. |        |                  |

**Notes:**

Note3: The products were submitted for safety files at AC-Input operation

Note4: Measurements are made with a 0.1µF and 47µF MLCC across output (low ESR)

**REGULATIONS**

| Parameter                      | Condition             |                          | Value   |
|--------------------------------|-----------------------|--------------------------|---|
| Output Accuracy                |                       |                          | ±2.0% max.  |
| Line Regulation                | low line to high line | Single, Dual<br>Triple   | ±0.5% typ.<br>±1.0% typ. (+5Vout) / ±5.0 typ. (±Vout)           |
| Load Regulation <sup>(6)</sup> | 10% to 100% load      | Single<br>Dual<br>Triple | 1.0% typ.<br>3.0% typ.<br>2.0% typ. (+5Vout) / 5.0 typ. (±Vout) |

**Notes:**

Note5: Operation below 10% load will not harm the converter, but specifications may not be met

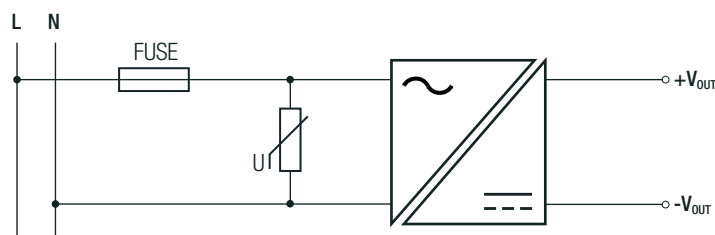
**PROTECTIONS**

| Parameter                      | Type       |                     | Value                      |
|--------------------------------|------------|---------------------|----------------------------|
| Short Circuit Protection (SCP) |            |                     | Hiccup mode, auto recovery |
| Over Voltage Protection (OVP)  |            |                     | zener diode clamp          |
| Over Current Protection (OCP)  |            |                     | 105% typ.                  |
| Isolation Voltage              | I/P to O/P | tested for 1 minute | 3kVAC                      |
| Leakage Current                |            |                     | 0.25mA max.                |

**Notes:**

Note6: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

Note7: An external MOV is recommended. The varistor should comply with IEC-61051-2. e.g. 14S471K series



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

| ENVIRONMENTAL               |                                  |                                      |                                  |
|-----------------------------|----------------------------------|--------------------------------------|----------------------------------|
| Parameter                   | Condition                        |                                      | Value                            |
| Operating Temperature Range | @ natural convection 0.1 m/s     | full load<br>refer to derating graph | -25°C to +50°C<br>-25°C to +70°C |
| Temperature Coefficient     |                                  |                                      | ±0.02%/K typ.                    |
| Operating Humidity          | non-condensing                   |                                      | 95% RH max.                      |
| MTBF                        | according to MIL-HDBK-217F, G.B. | +25°C                                | >400 x 10 <sup>3</sup> hours     |

**Derating Graph**

(@ Chamber and natural convection 0.1 m/s)



**SAFETY AND CERTIFICATIONS**

| Certificate Type (Safety)   | Report / File Number | Standard  |
|---|----------------------|---|
| Information Technology Equipment, General Requirements for Safety | E196683              | UL60950-1, 2nd Edition, 2007<br>CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2007 |
| Information Technology Equipment, General Requirements for Safety |                      | EN60950-1:2006 + A2:2013  |
| EAC Safety of Low Voltage Equipment                               | RU-AT.49.09571       | TP TC 004/2011  |
| RoHS2+  |                      | RoHS-2011/65/EU + AM-2015/863   |

| EMC Compliance  | Condition | Standard / Criterion   |
|---|-----------|------------------------|
| Electromagnetic Compatibility of Multimedia Equipment – Emission Requirements                   |           | EN55032:2015, Class B  |
| Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement |           | EN55024:2010 + A1:2015 |
| Limits for Harmonic Current Emissions   |           | EN61000-3-2: 2014      |
| Limitation of Voltage Fluctuations/Flicker in Low-Voltage Systems                               |           | EN61000-3-3: 2013      |

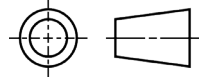
**DIMENSION AND PHYSICAL CHARACTERISTICS**

| Parameter         | Type              | Value                           |
|-------------------|-------------------|---------------------------------|
| Material          | case              | epoxy with fibreglass (UL94V-0) |
| Dimension (LxWxH) | standard          | 70.0 x 48.0 x 22.0mm            |
|                   | with suffix "-ST" | 111.9 x 64.6 x 27.5mm           |
| Weight            | standard          | 122g typ.                       |
|                   | with suffix "-ST" | 197g typ.                       |

continued on next page

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

### Dimension Drawing (mm)



### Pin Connections

| Pin # | Single     | Dual       | Triple     |
|-------|------------|------------|------------|
| 1     | FG         | FG         | FG         |
| 2     | VAC in (N) | VAC in (N) | VAC in (N) |
| 3     | VAC in (L) | VAC in (L) | VAC in (L) |
| 4     | no Pin     | no Pin     | -Vout      |
| 5     | -Vout      | -Vout      | Com        |
| 6     | no Pin     | Com        | +Vout      |
| 7     | +Vout      | +Vout      | +5V Rtn    |
| 8     | no Pin     | no Pin     | +5Vout     |

Tolerance: xx.x=  $\pm 0.5$ mm  
xx.xx=  $\pm 0.25$ mm

### Screw Terminal Module "ST" version



### Screw terminal information

| # | Single     | Dual       | Triple     |
|---|------------|------------|------------|
| 1 | FG         | FG         | FG         |
| 2 | VAC in (N) | VAC in (N) | VAC in (N) |
| 3 | VAC in (L) | VAC in (L) | VAC in (L) |
| 4 | NC         | NC         | -Vout      |
| 5 | -Vout      | -Vout      | Com        |
| 6 | NC         | Com        | +Vout      |
| 7 | +Vout      | +Vout      | +5V Rtn    |
| 8 | NC         | NC         | +5Vout     |

7.5mm Pitch  
suitable wire: 24-12AWG (0.5-2.5mm<sup>2</sup>)  
wire stripping length: 7mm typ.  
recommended tightening torque: 0.5Nm  
NC = No Connection  
FC = Fixing Centers  
Tolerance: xx.x=  $\pm 0.5$ mm  
xx.xx=  $\pm 0.25$ mm

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

| PACKAGING INFORMATION       |                   |                   |                       |
|-----------------------------|-------------------|-------------------|-----------------------|
| Parameter                   | Type              |                   | Value                 |
| Packaging Dimension (LxWxH) | cardboard box     | standard          | 260.0 x 70.0 x 42.0mm |
|                             |                   | with suffix "-ST" | 119.0 x 64.0 x 54.0mm |
| Packaging Quantity          | standard          |                   | 3pcs                  |
|                             | with suffix "-ST" |                   | 1pcs                  |
| Storage Temperature Range   |                   |                   | -40°C to +85°C        |
| Storage Humidity            | non-condensing    |                   | 95% RH                |

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