

## Features

## Regulated Converter

- 60 Watt PCB mount package
- Universal input voltage range
- 4kVAC isolation
- Low output ripple and noise
- Short circuit protected
- Output trim
- UL certified, CE marked

**RECOM**  
AC/DC Converter

## RAC60-B

**60 Watt  
Single  
Output**



**UL**  
E196683



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

## Description

Power module for PCB mounting. This switching converter has a universal input voltage range with single outputs which are trimmable to compensate for any voltage drops on the output connections. Threaded inserts ensure mechanical fixing.

## Selection Guide

| Part Number | Input Voltage Range [VAC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. <sup>(1)</sup> [%] | Max. Capacitive Load [μF] | Output Power max. [W] |
|-------------|---------------------------|----------------------|---------------------|------------------------------------|---------------------------|-----------------------|
| RAC60-05SB  | 85 - 265                  | 5                    | 10000               | 82                                 | 80000                     | 50                    |
| RAC60-09SB  | 85 - 265                  | 9                    | 6600                | 84                                 | 28000                     | 60                    |
| RAC60-12SB  | 85 - 265                  | 12                   | 5000                | 86                                 | 14000                     | 60                    |
| RAC60-15SB  | 85 - 265                  | 15                   | 4000                | 86                                 | 12000                     | 60                    |
| RAC60-24SB  | 85 - 265                  | 24                   | 2500                | 86                                 | 4000                      | 60                    |
| RAC60-48SB  | 85 - 265                  | 48                   | 1250                | 86                                 | 950                       | 60                    |

### Notes:

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

## Model Numbering



### Ordering Examples:

|            |         |        |               |
|------------|---------|--------|---------------|
| RAC60-05SB | 60 Watt | 5Vout  | Single Output |
| RAC60-24SB | 60 Watt | 24Vout | Single Output |

**PREFERRED ALTERNATIVES**  
Please consider these alternatives:

**RACM60-K/OF Series**

**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>(2)</sup>     | nom. Vin = 230VAC          | 85VAC<br>100VDC                              | 230VAC | 265VAC<br>370VDC |
| Input Current                          | 115VAC<br>230VAC           |  |        | 2A<br>1A         |
| Inrush Current                         | 2ms max., cold start       | 115VAC<br>230VAC                             |        | 30A<br>50A       |
| No load Power Consumption              | 115VAC/230VAC              |  |        | 520mW            |
| Input Frequency Range                  | AC Input                   | 47Hz   |        | 63Hz             |
| Output Voltage Trimming                | please refer to Trim table | -10%   |        | +10%             |
| Minimum Load                           |                            | 1%   |        |                  |
| Hold-up Time                           | 115VAC/230VAC              | 10ms   |        |                  |
| Internal Operating Frequency           |                            |  | 100kHz |                  |
| Output Ripple and Noise <sup>(3)</sup> | 20MHz limited              | <0.5% Vout + 50mVp-p<br><0.2% Vout + 40mVp-p |        |                  |

**Notes:**

Note2: The products were submitted for safety files at AC-Input operation

Note3: Measurements are made with a 0.1µF and 47µF MLCC in parallel across output (low ESR)

**Output Voltage Trimming**

It allows the user to increase or decrease the output voltage of the module. This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or -Vout pins. With an external resistor between the Trim and -Vout pin, the output voltage increases. With an external resistor between the Trim and +Vout pin, the output voltage decreases. The values for trim resistors shown in trim tables below, the specified percentage may slightly vary.

|                   | 5Vout |     | 9Vout |     | 12Vout |     | 15Vout |     | 24Vout |     | 48Vout |     |     |
|-------------------|-------|-----|-------|-----|--------|-----|--------|-----|--------|-----|--------|-----|-----|
| Trim up           | +10   | 100 | +10   | 100 | +10    | 100 | +10    | 100 | +10    | 100 | +10    | 100 | [%] |
| R <sub>up</sub> = | 500   | 1M  | 6k    | 1M  | 4k     | 1M  | 5k     | 1M  | 12k    | 1M  | 12k    | 1M  | [Ω] |

|                     | 5Vout |     | 9Vout |     | 12Vout |     | 15Vout |     | 24Vout |      | 48Vout |      |     |
|---------------------|-------|-----|-------|-----|--------|-----|--------|-----|--------|------|--------|------|-----|
| Trim down           | 100   | -10 | 100   | -10 | 100    | -10 | 100    | -10 | 100    | -10  | 100    | -10  | [%] |
| R <sub>down</sub> = | 1M    | 500 | 1M    | 20k | 1M     | 40k | 1M     | 60k | 1M     | 110k | 10M    | 290k | [Ω] |

**REGULATIONS**

| Parameter                      | Condition                        | Value      |
|--------------------------------|----------------------------------|------------|
| Output Accuracy                |                                  | ±2.0% max. |
| Line Regulation                | low line to high line, full load | ±1.0% typ. |
| Load Regulation <sup>(4)</sup> | 5% to 100% load                  | 1.0% typ.  |

**Notes:**

Note4: Operation below 5% load will not harm the converter, but specifications may not be met

**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$ , full load and after warm-up unless otherwise stated)

**PROTECTIONS**

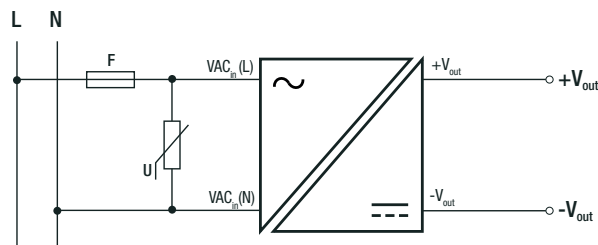
| Parameter                      | Type       |                     | Value                             |
|--------------------------------|------------|---------------------|-----------------------------------|
| Short Circuit Protection (SCP) |            |                     | continuous, hiccup, auto recovery |
| Over Voltage Protection (OVP)  |            |                     | zener diode clamp                 |
| Over Current Protection (OCP)  |            |                     | auto recovery                     |
| Over Voltage Category          |            |                     | OVCII                             |
| Isolation Voltage              | I/P to O/P | tested for 1 minute | 4kVAC                             |
| Isolation Resistance           |            |                     | 100M $\Omega$ max.                |
| Leakage Current                |            |                     | 0.5mA max.                        |

**Notes:**

Note5: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

Note6: An external MOV is recommended. The varistor should comply with IEC-61051-2. e.g. 14S471K series

**Protection Circuit**

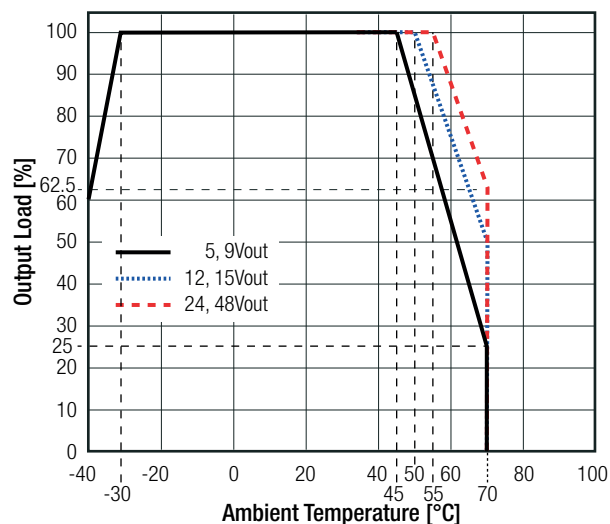


**ENVIRONMENTAL**

| Parameter                   | Condition                        |                         |            | Value                        |
|-----------------------------|----------------------------------|-------------------------|------------|------------------------------|
| Operating Temperature Range | @ natural convection<br>0.1m/s   | full load               | 5, 9Vout   | -30°C to +45°C               |
|                             |                                  |                         | 12, 15Vout | -30°C to +50°C               |
|                             |                                  |                         | 24, 48Vout | -30°C to +55°C               |
|                             |                                  | refer to derating graph |            | -40°C to +70°C               |
| Temperature Coefficient     |                                  |                         |            | 0.02%/K typ.                 |
| Operating Altitude          |                                  |                         |            | 2000m                        |
| Pollution Degree            |                                  |                         |            | PD2                          |
| MTBF                        | according to MIL-HDBK-217F, G.B. |                         | +25°C      | >300 x 10 <sup>3</sup> hours |

**Derating Graph**

(@ Chamber and natural convection 0.1m/s)



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

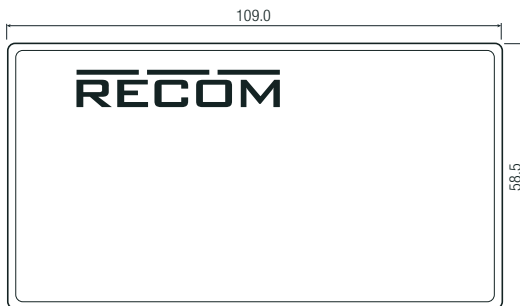
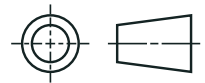
**SAFETY AND CERTIFICATIONS**

| Certificate Type (Safety)   | Report / File Number | Standard  |
|---|----------------------|---|
| Information Technology Equipment, General Requirements for Safety                               | 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  |
| Information technology equipment - Immunity characteristics - Limits and methods of measurement |                      | EN55024:2010 + A1:2015  |
| Limitation of voltage fluctuations/flicker in low-voltage systems                               |                      | EN61000-3-3: 2013   |

**DIMENSION AND PHYSICAL CHARACTERISTICS**

| Parameter         | Type | Value                           |
|-------------------|------|---------------------------------|
| Material          | case | epoxy with fibreglas, (UL94V-0) |
| Dimension (LxWxH) |      | 109.0 x 58.5 x 30.0mm           |
| Weight            |      | 310g typ.                       |

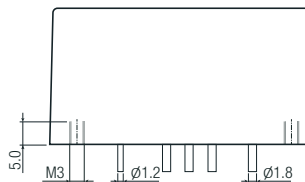
**Dimension Drawing (mm)**



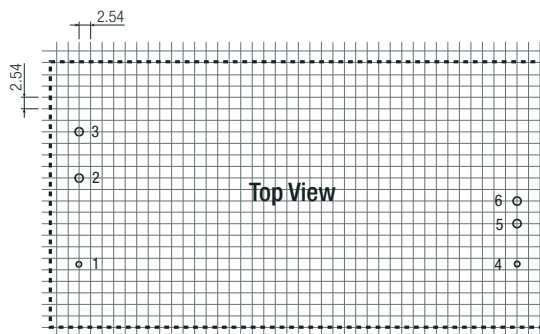
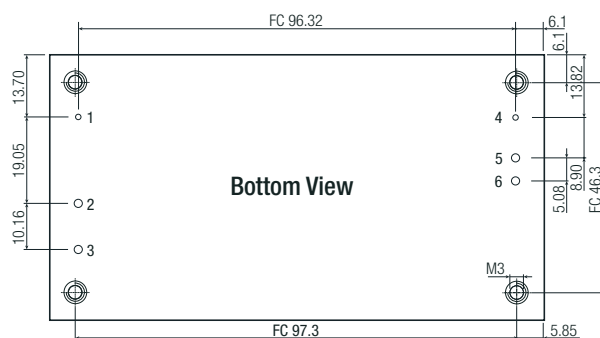
**Pinning information**

| Pin # | Single     | Dia. (mm) |
|-------|------------|-----------|
| 1     | FG         | 1.2       |
| 2     | VAC in (L) | 1.8       |
| 3     | VAC in (N) | 1.8       |
| 4     | Trim       | 1.2       |
| 5     | -VDC out   | 1.8       |
| 6     | +VDC out   | 1.8       |

FC = Fixing Centers  
Tolerance: xx.x ± 0.5mm  
xx.xx ± 0.25mm



**Recommended Footprint Details**



**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  | 120.0 x 65.0 x 55.0mm |
| Packaging Quantity          |                | 1pcs                  |
| Storage Temperature Range   |                | -50°C to +85°C        |
| Storage Humidity            | non-condensing | 95% RH max.           |

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