

Features

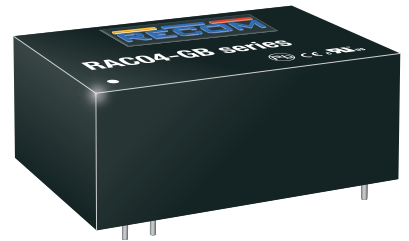
Regulated Converter

- Universal input 85-305VAC
- 4W PCB mount package
- <75mW No load power consumption
- Ultra low profile, compact size
- -40°C to +85°C Operating temperature
- Continuous SCP, OCP, OVP
- IEC/EN/UL60950 & CE certified, EN55032 Class B



RAC04-GB

**4 Watt
Single
Output
EMC Class B**



UL60950-1 certified
IEC/EN60950-1 certified
UL62368-1 pending
IEC/EN62368-1 certified
EN61558-1 certified
EN61558-2-16 certified
CB report

Description

The RAC04-GB series are low cost AC/DC power supplies, ideal for PCB mounted, compact, board level industrial applications. They feature universal AC input voltage range, regulated and short-circuit-proof isolated DC outputs, low standby power consumption and -40°C to +85°C operating temperature range. The RAC04-GB have a built-in Class B / FCC Part 15 EMC filter, are certified to IEC/EN/UL60950-1 and are certified to IEC/EN/UL62368 and EN61558 safety standards and come with a three year warranty.

Selection Guide

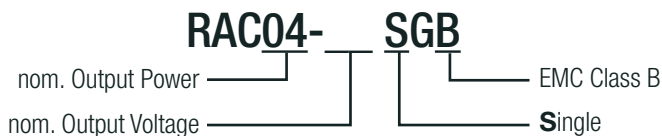
| Part Number | Input Voltage Range [VAC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ ⁽¹⁾ [%] | Max. Capacitive Load ⁽²⁾ [μF] |
|--------------|---------------------------|----------------------|---------------------|-----------------------------------|--|
| RAC04-3.3SGB | 85-305 | 3.3 | 1210 | 70 | 2000 |
| RAC04-05SGB | 85-305 | 5 | 800 | 72 | 1500 |
| RAC04-09SGB | 85-305 | 9 | 440 | 77 | 1000 |
| RAC04-12SGB | 85-305 | 12 | 330 | 78 | 500 |
| RAC04-15SGB | 85-305 | 15 | 270 | 78 | 200 |
| RAC04-24SGB | 85-305 | 24 | 170 | 80 | 150 |

Notes:

Note1: Efficiency is tested at 230VAC and full load at +25°C ambient

Note2: Max. Cap. Load is tested at nominal input and full resistive load

Model Numbering



Ordering Examples:

RAC04-12SGB 12Vout Single Output EMC Class B

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 ^(3,4) | nom. Vin = 230VDC | | 85VAC 120VDC | | 305VAC 430VDC |
| Input Current | 115VAC 230VAC | | | 85mA 55mA | |
| Inrush Current | cold start at 25°C | 115VAC 230VAC | | | 10A 20A |
| No load Power Consumption | | | | | 75mW |
| Input Frequency Range | AC Input | | 45Hz | | 65Hz |
| Minimum Load | | | 0% | | |
| Power Factor | 115VAC 230VAC | | | 0.55 0.42 | |
| Start-up Time | 115VAC, 230VAC | | | 30ms | 1s |
| Hold-up time | 115VAC 230VAC | | | 10ms 40ms | |
| Internal Operating Frequency | 100% load at nominal Vin | | | 65kHz | |
| Output Ripple and Noise ⁽⁵⁾ | 20MHz BW | 0°C to 85 °C | 3.3Vout 5Vout 9Vout 12Vout 15Vout 24Vout | | 100mVp-p 100mVp-p 120mVp-p 150mVp-p 200mVp-p 240mVp-p |
| | | -30 °C to 0 °C | 3.3Vout 5Vout 9Vout 12Vout 15Vout 24Vout | | 200mVp-p 200mVp-p 250mVp-p 250mVp-p 300mVp-p 300mVp-p |

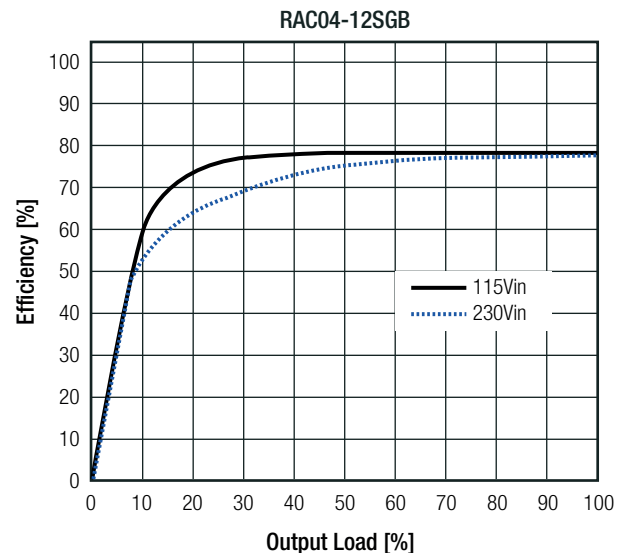
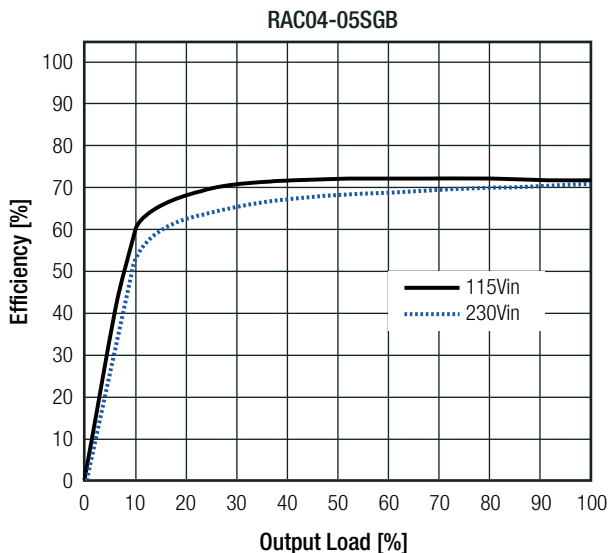
Notes:

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

Note4: Refer to **"Line Derating"**

Note5: Measurements are made with a 12" twisted pair-wire with a 0.1µF and 10µF parallel capacitor across output (low ESR)

Efficiency vs. Load



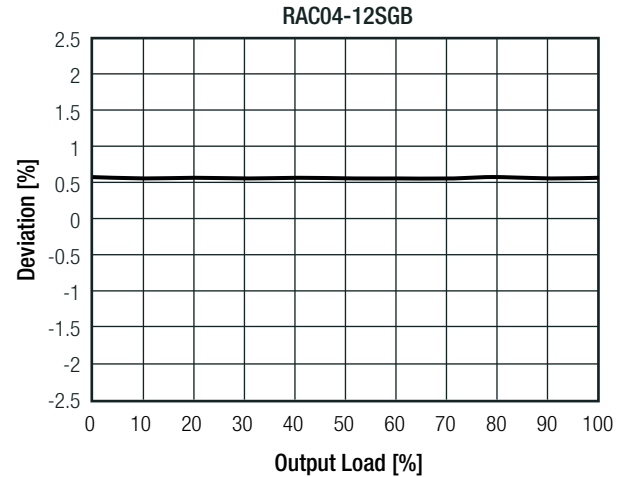
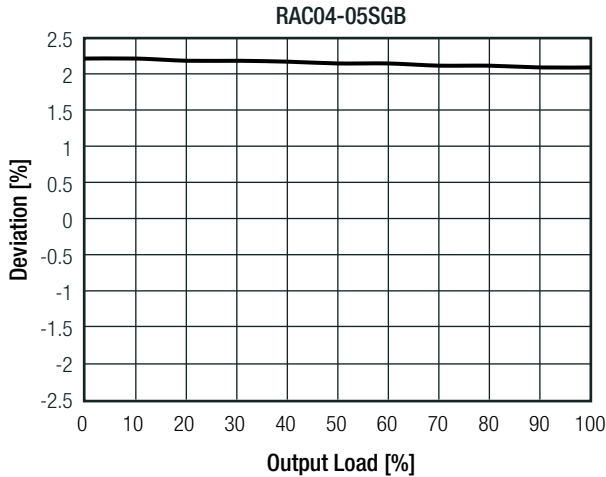
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REGULATIONS

| Parameter | Condition | Value |
|-----------------|-----------------------|------------|
| Output Accuracy | | ±2.5% max. |
| Line Regulation | low line to high line | ±0.5% max. |
| Load Regulation | 10% to 100% load | 0.5% max. |

Deviation vs. Load

(@ 115VAC, 230VAC)



PROTECTIONS

| Parameter | Type | Value |
|----------------------------------|---|---|
| Input Fuse ⁽⁶⁾ | internal | T1A slow blow type, 300V |
| Short Circuit Protection (SCP) | below 100mΩ | long-term mode, auto recovery |
| Over Voltage Protection (OVP) | 3.3Vout 5Vout 9Vout 12Vout 15Vout 24Vout | 3.8V - 4.9V 5.3V - 6.8V 10.3V - 12.2V 12.6V - 16.2V 15.75V - 20.3V 25.2V - 32.4V hiccup mode, auto recovery |
| Over Voltage Category | | OVCII |
| Over Current Protection (OCP) | 3.3Vout 5Vout 9Vout 12Vout 15Vout 24Vout | 1.41A - 3A 0.91A - 2.2A 0.49A - 1.25A 0.37A - 0.95A 0.29A - 0.72A 0.19A - 0.45A hiccup mode, auto recovery |
| Class of Equipment | | Class II |
| Isolation Voltage ⁽⁷⁾ | I/P to O/P | rated for 1 minute 3kVAC/10mA |
| Isolation Resistance | | 10MΩ min. |
| Isolation Capacitance | | 800pF min. / 1200pF max. |
| Insulation Grade | | reinforced |
| Leakage Current | 277VAC, 50Hz | 0.1mA max. |

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

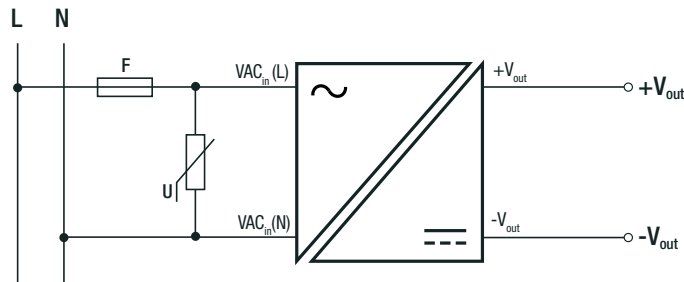
Notes:

Note6: Refer to local wiring regulations if input over-current protection is also required

Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note8: For operation $\geq 230\text{VAC}$, an external MOV is recommended. The Varistor should comply with IEC61051-2. eg. EPCOS S14 series

Protection Circuit

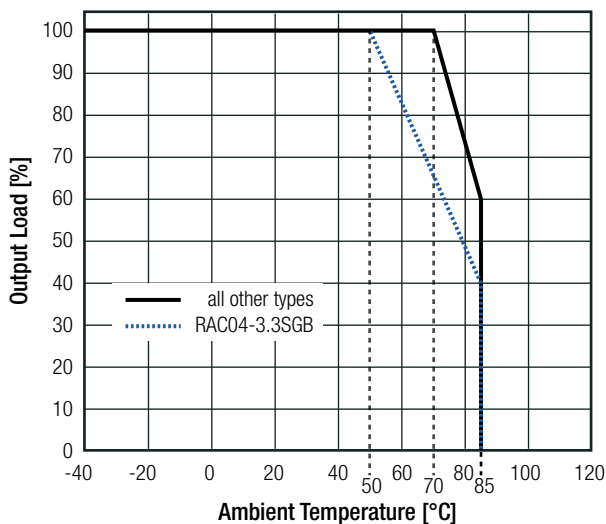


ENVIRONMENTAL

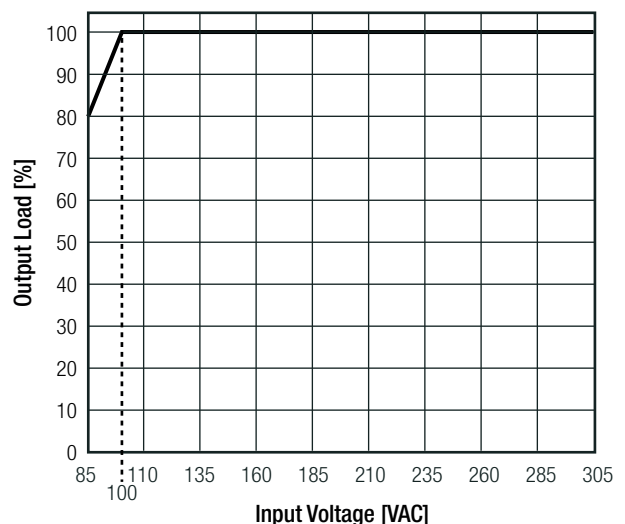
| Parameter | Condition | | Value |
|-----------------------------|----------------------------------|---------------------------|---|
| Operating Temperature Range | @ natural convection 0.1m/s | full load | -40°C to $+70^\circ\text{C}$ |
| | | refer to "Derating Graph" | -40°C to $+85^\circ\text{C}$ |
| Maximum Case Temperature | | | $+100^\circ\text{C}$ |
| Temperature Coefficient | | | 0.03%/K |
| Operating Altitude | | | 3000m |
| Operating Humidity | non-condensing | | 5% - 95% RH |
| Pollution Degree | | | PD2 |
| Shock | | | 20G/11ms pulse, 3 times at each x, y, z axes |
| Vibration | | | 10-150Hz, 2G 10min./1cycle, period 60min. along x,y,z axes for 6 cycles |
| Design Lifetime | $+25^\circ\text{C}$ | | 90×10^3 hours |
| | $+50^\circ\text{C}$ | | 62×10^3 hours |
| MTBF | according to MIL-HDBK-217F, G.B. | $+25^\circ\text{C}$ | $>900 \times 10^3$ hours |
| | | $+50^\circ\text{C}$ | $>198 \times 10^3$ hours |

Derating Graph

(@ Chamber and natural convection 0.1m/s)



Line Derating



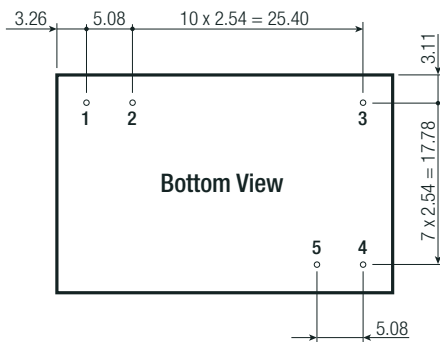
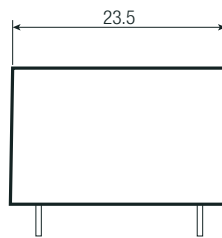
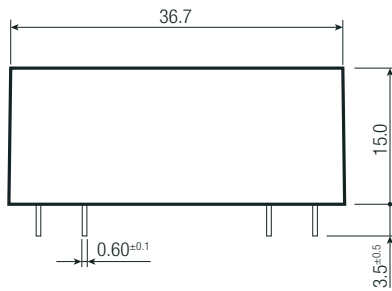
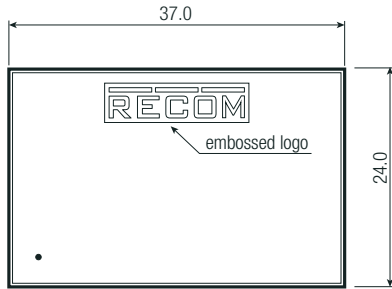
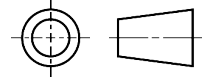
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

| SAFETY AND CERTIFICATIONS | | |
|--|-----------------------------|---|
| Certificate Type (Safety) | Report / File Number | Standard |
| Information Technology Equipment, General Requirements for Safety | E196683-A4-UL | UL60950-1, 2nd Edition, 2014 CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014 |
| Audio/video, information and communication technology equipment. Safety requirements | | UL62368-1, 2nd Edition CAN/CSA C22.2 No 62368-1-14 |
| Information Technology Equipment, General Requirements for Safety | SA1703184S 001 | EN60950-1: 2006 + A2:2013 |
| Information Technology Equipment, General Requirements for Safety (CB) | | IEC60950-1:2005, 2nd Edition + A2:2013 |
| Audio/video, information and communication technology equipment. Safety requirements | 4787985921- | EN62368-1: 2014 |
| Audio/video, information and communication technology equipment. Safety requirements (CB) | 20171025-CB | IEC62368-1:2014, 2nd Edition |
| Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V | SA 1703184L 02001 | EN61558-1: 2005 + A1:2009 |
| Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements | | EN61558-2-16: 2009 + A1:2013 |
| EAC | RU-AT.03.67361 | TP TC 004/020, 2011 |
| RoHS 2+ | | RoHS 2011/65/EU + AM2015/863 |
| EMC Compliance | | |
| | Condition | Standard / Criterion |
| Electromagnetic compatibility of multimedia equipment – Emission Requirements ⁽⁹⁾ | EA1703184E 01001 | EN55032: 2015, Class B |
| Information technology equipment - Immunity characteristics - Limits and methods of measurement | | EN55024:2010 + A1:2015 |
| Limitations on the amount of electromagnetic interference allowed from digital and electronic devices | EA1703184F 01001 | 47 CFR FCC Part 15 Subpart B: 2016 |
| ESD Electrostatic discharge immunity test | Air ±8kV, Contact ±4kV | EN61000-4-2: 2009, Criteria A |
| Radiated, radio-frequency, electromagnetic field immunity test | 3V/m | EN61000-4-3: 2006 + A2, 2010, Criteria A |
| Fast Transient and Burst Immunity | AC Port ±1kV | EN61000-4-4: 2012, Criteria A |
| Surge Immunity | AC Port L-N ±1kV | 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 |
| Voltage Dips and Interruption | Voltage Dips >95% | EN61000-4-11: 2004, Criteria A |
| | Voltage Dips 30% | EN61000-4-11: 2004, Criteria A |
| | Interruptions >95% | EN61000-4-11: 2004, Criteria C |
| <p>Notes:</p> <p>Note9: If output is connected to GND, please contact RECOM tech support for advice</p> | | |

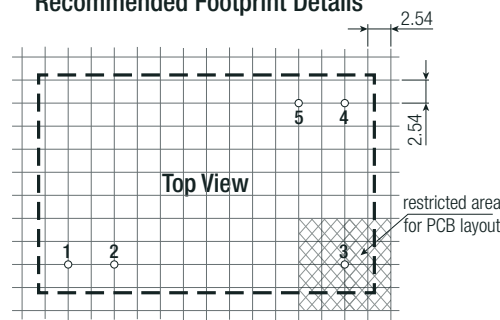
| DIMENSION AND PHYSICAL CHARACTERISTICS | | |
|---|-------------|--|
| Parameter | Type | Value |
| Material | case PCB | black plastic, (UL94V-0) FR4, (UL94V-0) |
| Dimension (LxWxH) | | 37.0 x 24.0 x 15.0mm |
| Weight | | 20g typ. |
| continued on next page | | |

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

Dimension Drawing (mm)



Recommended Footprint Details



Pin Connections

| Pin # | Single |
|-------|------------|
| 1 | VAC in (L) |
| 2 | VAC in (N) |
| 3 | NC |
| 4 | -Vout |
| 5 | +Vout |

NC: Not Connected

Tolerances:

xx.x= ±0.5mm

x.xx= ±0.25mm

PACKAGING INFORMATION

| Parameter | Type | Value |
|-----------------------------|----------------|-----------------------|
| Packaging Dimension (LxWxH) | tube | 505.0 x 39.7 x 23.2mm |
| Packaging Quantity | | 20pcs |
| Storage Temperature Range | | -40°C to +100°C |
| Storage Humidity | non-condensing | 5% -95% RH max. |

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