

Features

Regulated Converters

- Universal input 85-305VAC
- 3W 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

RECOM
AC/DC Converter

RAC03-GB

**3 Watt
Single
Output
EMC Class B**



Description

The RAC03-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 RAC03-GB have a built-in Class B / FCC Part 15 EMC filter, are certified to IEC/EN/UL60950-1 and are pending 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]
RAC03-05SGB	85-305	5	600	72	1500
RAC03-12SGB	85-305	12	250	78	500
RAC03-24SGB	85-305	24	130	80	150

On Request

RAC03-3.3SGB	85-305	3.3	910	70	2000
RAC03-09SGB	85-305	9	330	77	1000
RAC03-15SGB	85-305	15	200	78	200

Notes:

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

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



Model Numbering



Ordering Example

RAC03-12SGB = 3W Output Power, 12V Output Voltage, Single Output, EMC Class B



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

Specifications (measured @ ta=25°C, nom. Vin, full load unless otherwise noted)

BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Internal Input Filter				Pi-Type
Input Voltage Range ⁽³⁾	refer to line derating graph on page PA-4	85VAC 120VDC		305VAC 430VDC
Input Current	115VAC 230VAC		70mA 45mA	
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		0.53 0.41	
Start-up Time	115VAC, 230VAC		30ms	1s
Hold-up Time	115VAC 230VAC		5ms 40ms	
Internal Operating Frequency	100% load at nominal Vin		65kHz	

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Specifications (measured @ $t_a=25^{\circ}\text{C}$, nom. V_{in} , full load unless otherwise noted)

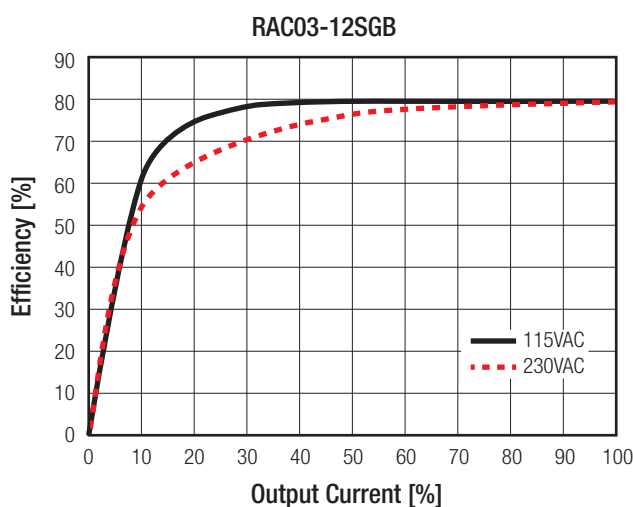
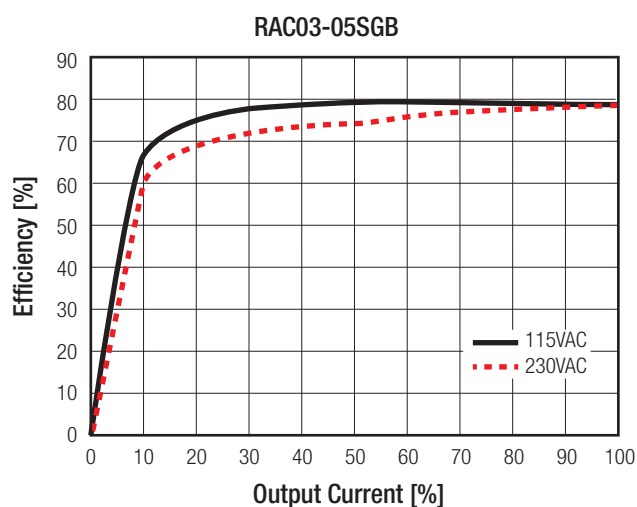
Output Ripple and Noise ⁽⁴⁾	20MHz BW	0°C to 85°C	5 Vout 12Vout 24Vout			100mVp-p 150mVp-p 240mVp-p
		-30°C to 0°C	5Vout 12Vout 24Vout			200mVp-p 250mVp-p 300mVp-p

Notes:

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

Note4: Measurements are made with a 12" twisted pair-wire with a 0.1 μF and 10 μF parallel capacitor across output (low ESR)

Efficiency vs. Load

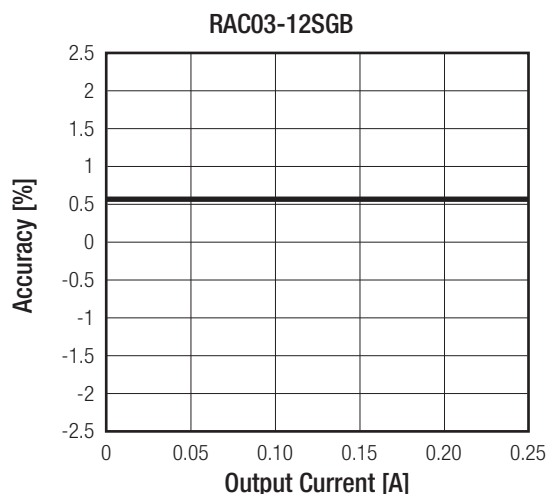
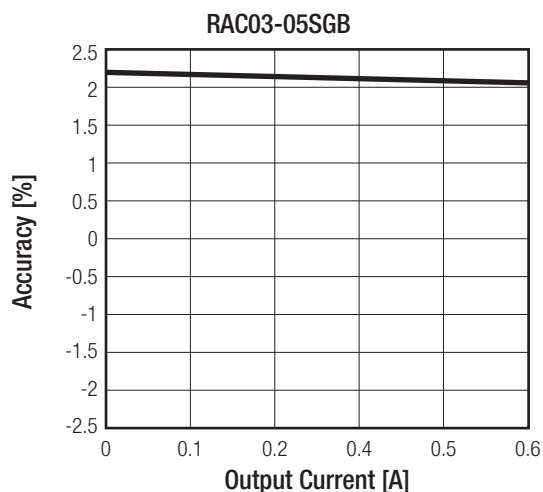


REGULATIONS

Parameter	Condition	Value
Output Accuracy		$\pm 2.5\%$ max.
Line Regulation	low line to high line	$\pm 0.5\%$ max.
Load Regulation	10% to 100% load	$\pm 0.5\%$ max.

Accuracy vs. Load

(@nom. V_{in} : 115/230VAC)



Specifications (measured @ $t_a=25^{\circ}\text{C}$, nom. V_{in} , full load unless otherwise noted)

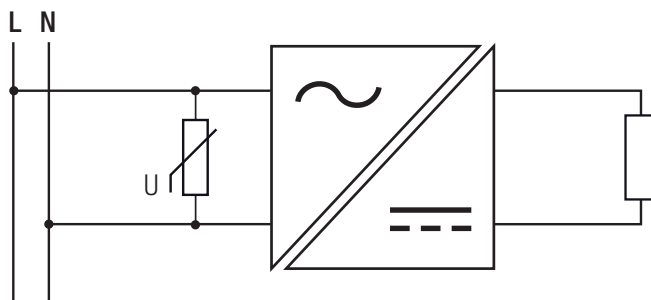
PROTECTIONS

Parameter	Type		Value
Input Fuse	internal		T1A, 300V
Short Circuit Protection (SCP)	below 100m Ω		long-term mode, auto recovery
Over Voltage Protection (OVP)	5V _{out}		5.3V - 6.8V, hiccup mode auto recovery
	12V _{out}		12.6V - 16.2V, hiccup mode auto recovery
	24V _{out}		25.2V - 32.4V, hiccup mode auto recovery
Over Current Protection (OCP)	5V _{out}		0.91A - 2.2A, hiccup mode auto recovery
	12V _{out}		0.37A - 0.95A, hiccup mode auto recovery
	24V _{out}		0.19A - 0.45A, hiccup mode auto recovery
Class of Equipment			Class II
Over Voltage Category (OVC)			OVC II
Isolation Voltage ⁽⁵⁾	I/P to O/P	rated for 1 minute	3kVAC/10mA
Isolation Resistance			10M Ω min.
Isolation Capacitance			800pF min., 1200pF max.
Insulation Grade			Reinforced
Leakage Current	277VAC, 50Hz		0.1mA max.

Notes:

Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note6: For operation at 230VAC, an external MOV is recommended. The Varistor should comply with IEC61051-2. eg. EPCOS S14 series



ENVIRONMENTAL

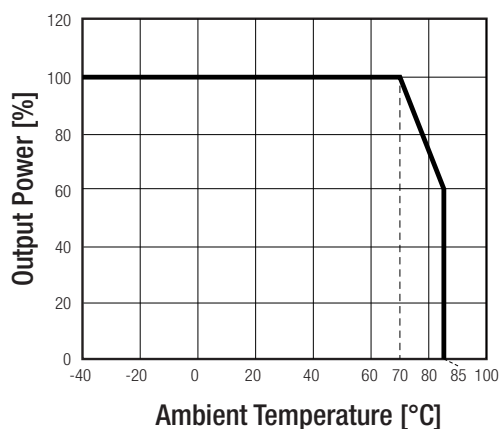
Parameter	Condition		Value
Operating Temperature Range	@ natural convection 1m/s see graph	without derating	-40°C to +70°C
Maximum Case Temperature			+100°C
Temperature Coefficient			$\pm 0.03\%/^{\circ}\text{C}$
Operating Altitude			3000m
Operating Humidity	non-condensing		5% - 95% RH
Pollution Degree			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
MTBF	according to MIL-HDBK-217F, G.B.	+25°C +70°C	100 x 10 ³ hours 17 x 10 ³ hours

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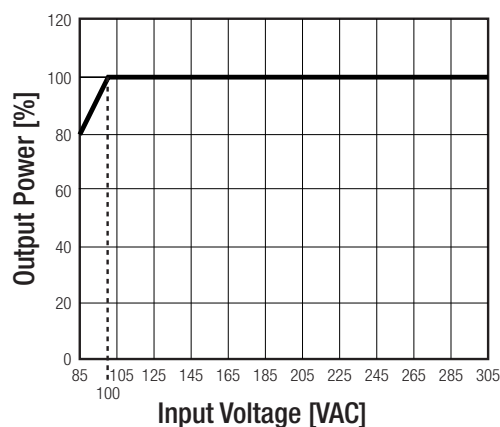
Specifications (measured @ $t_a=25^{\circ}\text{C}$, nom. V_{in} , full load unless otherwise noted)

Derating Graph

(@ Chamber and natural convection 0.1 m/s)



Line Derating Graph



SAFETY AND CERTIFICATION

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety (LVD)	SA17031845 001	IEC60950-1, 2nd Edition: 2005 +9 + A2, 2013 EN60950-1: 2006 +A2, 2013
Information Technology Equipment, General Requirements for Safety	E196683-A3-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	pending	UL62368-1, 2nd Edition CAN/CSA C22.2 No 62368-1
Audio/video, information and communication technology equipment. Safety requirements	pending	IEC62368-1, 2nd Edition: 2014 EN62368-1: 2014
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements	pending	EN61558-1: 2005 + A1, 2009 EN61558-2-16: 2009 + A1, 2013
RoHs 2+		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	EA1703184E 01001	EN55032: 2015, Class B
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices	EA1703184E 01001	47 CFR FCC Part 15 Subpart B: 2016
ESD Electrostatic discharge immunity test	Air $\pm 8\text{kV}$, Contact $\pm 4\text{kV}$	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 Power Port $\pm 1\text{kV}$	EN61000-4-4: 2012, Criteria A
Surge Immunity	AC Power Port L-N $\pm 1\text{kV}$	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% Voltage Dips 30% Voltage Interruptions >95%	EN61000-4-11: 2004, Criteria A EN61000-4-11: 2004, Criteria A EN61000-4-11: 2004, Criteria C

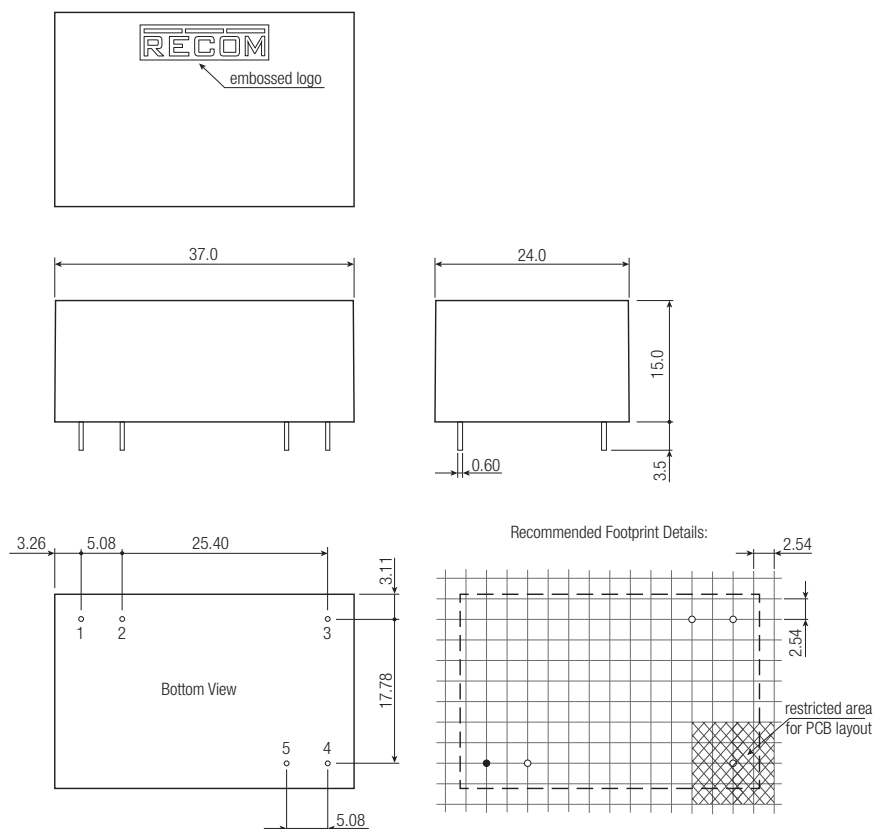
DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case PCB	black plastic, (UL94 V-0) FR4, (UL94 V-0)
Package Dimension (LxWxH)		37.0 x 24.0 x 15.0mm
Package Weight		20g typ.

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Specifications (measured @ $t_a=25^{\circ}\text{C}$, nom. Vin, full load unless otherwise noted)

Dimension Drawing (mm)



Pin Connections

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

NC: not connected

Tolerance: XX.X $\pm 0.5\text{mm}$

Pin Width: XX.X $\pm 0.05\text{mm}$

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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