

Features

Regulated Converter

- Universal input 85-264VAC
- <250mW No load power consumption
- -25°C to +80°C Operating temperature, with derating
- Class II installations (without FG)
- Continuous SCP, OCP
- IEC/EN/UL60950, IEC/EN/UL62368 & EN60335-1 certified

RECOM
AC/DC Converter

RAC02-GA

**2 Watt
Single
Output
EMC Class A**



Description

The RAC02-GA 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 -25°C to +80°C operating temperature range. The RAC02-GA have a built-in Class A / FCC Part 15 EMC filter, are certified to EN60335, EN60950 and EN62368 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 [%]	Max. Capacitive Load ⁽¹⁾ [μF]
RAC02-3.3SGA	85-264	3.3	500	63	500
RAC02-05SGA	85-264	5	400	63	500
RAC02-12SGA	85-264	12	167	68	200
RAC02-15SGA	85-264	15	140	63	200
RAC02-24SGA	85-264	24	83	63	200

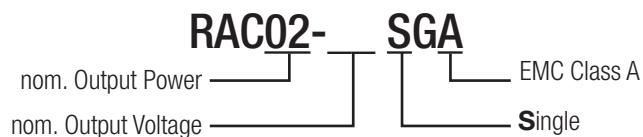
Notes:

Note1: Measured with all input voltages at +25°C with constant resistant mode at full load



UL/IEC/EN60950-1 certified
CAN/CSA-C22.2 No. 62368 certified
UL/IEC/EN62368-1 certified
EN60335-1 certified
CB Report

Model Numbering



Ordering Examples:

RAC02-12SGA 12Vout Single Output EMC Class A

Specifications (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

Parameter	Condition		Min.	Typ.	Max.
Internal Input Filter			Pi-type		
Input Voltage Range ^(2,3,4)	nom. Vin = 230VAC		85VAC	230VAC	264VAC
Input Current	115VAC 230VAC				50mA 30mA
Inrush Current	cold start at +25°C	115VAC 230VAC			30A 40A
No load Power Consumption				180mW	250mW
Input Frequency Range			47Hz		63Hz
Minimum Load			0%		
Power Factor	115VAC 230VAC			0.55 0.42	
Start-up Time	115VAC 230VAC			250ms 200ms	2s 2s
Hold-up time	115VAC 230VAC				20ms 80ms
Internal Operating Frequency	100% load at nominal Vin			65kHz	
Output Ripple and Noise	20MHz BW	0°C to 80°C	3.3Vout 5Vout 12Vout 15Vout 24Vout		100mVp-p 100mVp-p 200mVp-p 200mVp-p 240mVp-p
		-25°C to 0°C	3.3Vout 5Vout 12Vout 15Vout 24Vout		200mVp-p 200mVp-p 300mVp-p 300mVp-p 300mVp-p

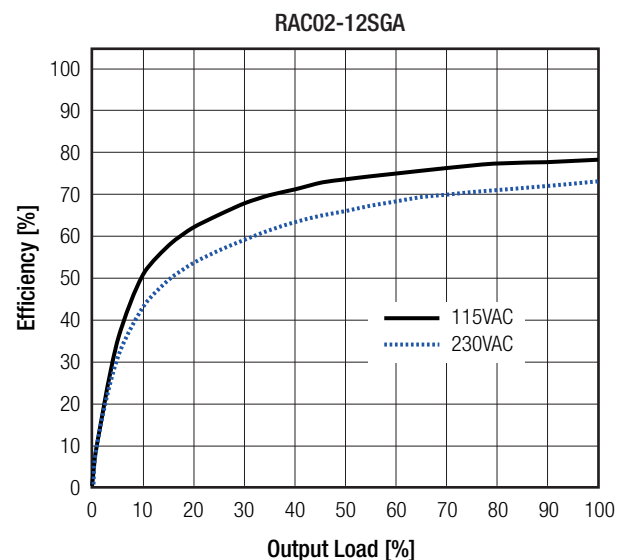
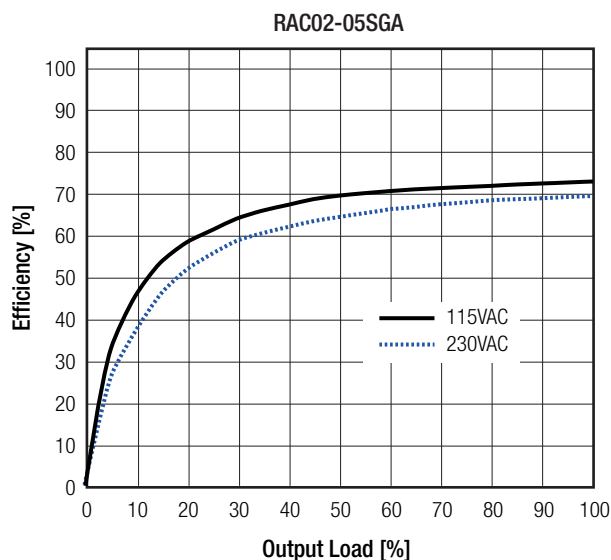
Notes:

Note2: No proper operation with DC input voltage

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

Note4: Refer to line derating graph on page 4

Efficiency vs. Load

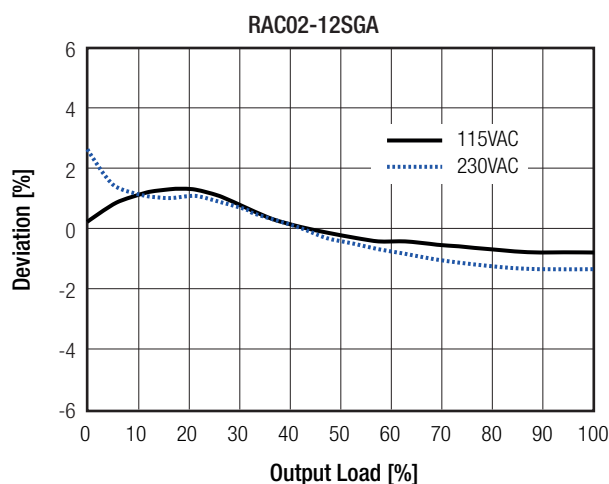
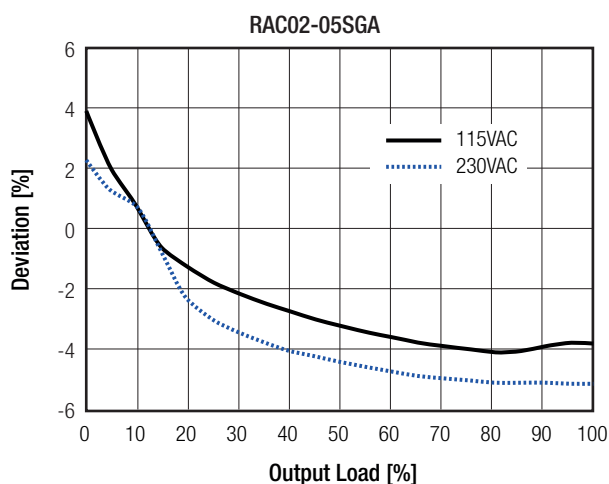


Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} (115/230VAC), full load and after warm-up unless otherwise stated)

REGULATIONS

Parameter	Condition	Value
Output Accuracy	-25°C to $+80^\circ\text{C}$	$\pm 6.0\%$ max.
Line Regulation	-25°C to $+80^\circ\text{C}$	$\pm 2.0\%$ max.
Load Regulation	-25°C to $+80^\circ\text{C}$	6.0% max.

Deviation vs. Load



PROTECTIONS

Parameter	Type	Value
Input Fuse ⁽⁵⁾	internal	fusible resistor, 1 Ω /1W
Short Circuit Protection (SCP)	below 100m Ω	continuous, auto recovery
Over Voltage Category		OVCII
Over Current Protection (OCP)	3.3V _{out} 5V _{out} 12V _{out} 15V _{out} 24V _{out}	0.67A - 1.81A 0.44A - 1.20A 0.18A - 0.50A 0.15A - 0.42A 0.09A - 0.25A hiccup mode
Class of Equipment		Class II
Isolation Voltage ⁽⁶⁾	I/P to O/P	rated for 1 minute 3kVAC
Isolation Resistance		100M Ω min.
Insulation Grade		reinforced
Leakage Current	I/P to O/P	0.25mA max.

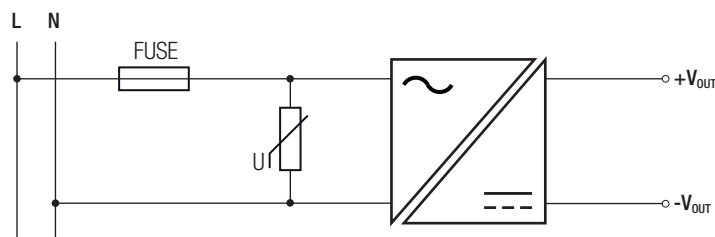
Notes:

Note5: Refer to local safety regulations if input over-current protection is also required

Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note7: For operation at 230VAC, an external MOV is recommended. The Varistor should comply with IEC-61051-2. e.g. EPCOS S14 series

Protection Circuit



Specifications (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	@ natural convection 0.1m/s	full load	-25°C to +70°C
		refer to derating graph	-25°C to +80°C
Maximum Case Temperature			+120°C
Temperature Coefficient			0.03%/K
Operating Altitude ⁽⁸⁾			4000m
Operating Humidity	non-condensing		5% - 95% RH max.
Pollution Degree			PD2
Shock			10-150Hz, 2G 10min./1cycle, period 60min. each along x,y,z axes
Vibration	according to MIL-STD-202G		20G/11ms pulse, 3 times at each x, y, z axes
MTBF ⁽⁹⁾	according to MIL-HDBK-217F, method 2	+25°C	1691 x 10 ³ hours
		+70°C	424 x 10 ³ hours

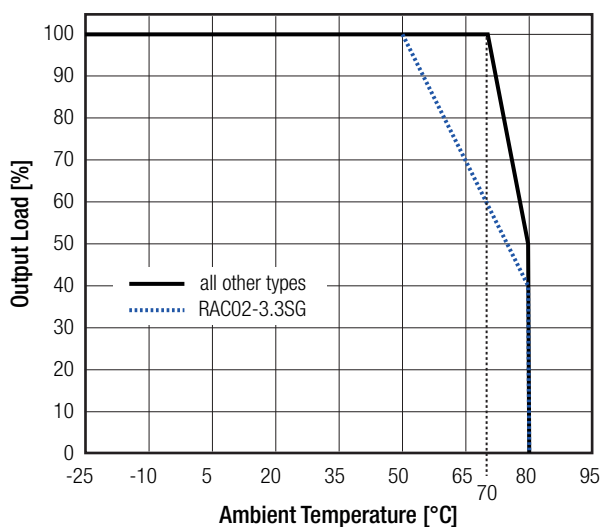
Notes:

Note8: Recognized by UL for safe operation up to 4000m. High altitude operation may impact the performance and lifetime. Please contact RECOM tech support for advice

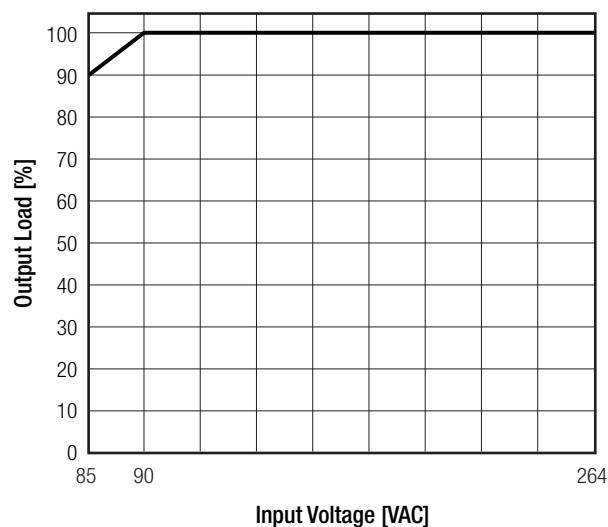
Note9: Based on calculation for 5Vout

Derating Graph

(@ Chamber and natural convection 0.1m/s)



Line Derating



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Household and similar electrical appliances – Safety – Part 1: General requirements	SES180313004001E	EN60335-1:2012+A11:2014
Information Technology Equipment, General Requirements for Safety	E196683-A5	UL60950-1, 2nd Edition 2014 CAN/CSA-C22.2 No. 60950-1, 2nd Edition 2015
Information Technology Equipment, General Requirements for Safety	16BAS10048 11 SA1804152L01001	IEC60950-1:2005 2nd Edition + Am2:2013 EN60950-1:2006 + A2:2013
Information Technology Equipment, General Requirements for Safety (CB Scheme)	16BAS10048 11	IEC60950-1:2005 2nd Edition + Am2:2013

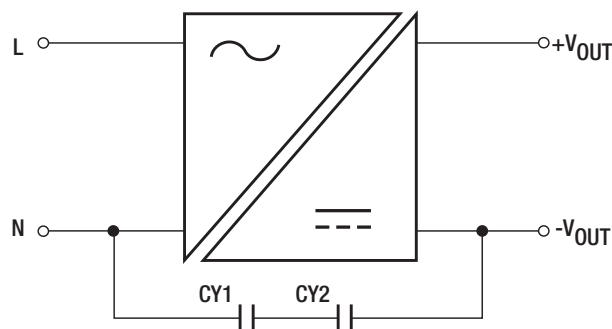
continued on next page

Specifications (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

Certificate Type (Safety)	Report / File Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements	E196683-A5 E196683-A6001	UL62368-1, 2nd Edition CAN/CSA-C22.2 No. 62368-1-14
Audio/Video, information and communication technology equipment - Part1: Safety requirements	16BCS1004811	IEC62368-1:2014 2nd Edition EN62368-1:2014+A11:2017
Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB Scheme)	SA1804152S 001	IEC62368-1:2014 2nd Edition
RoHS2		RoHS 2011/65/EU

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	EA1804152E 01001	EN55032:2015, Class A
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010+A1:2015
ESD Electrostatic discharge immunity test	Air $\pm 2, 4, 8\text{kV}$ Contact $\pm 2, 4\text{kV}$	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
Immunity to conducted disturbances, induced by radio-frequency fields	50Hz, 1A/m	IEC61000-4-8:2009; Criteria A
Voltage Dips and Interruption	Voltage Dips >95%	EN61000-4-11:2004, Criteria A
	Voltage Dips 30%	EN61000-4-11:2004, Criteria B
	Voltage Interruptions >95%	EN61000-4-11:2004, Criteria B
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013

EMI Filtering according to EN60335-1 / EN55032 Class B Compliance



CY1,CY2

Vishay 564R30TSD22, SLCC
X7R radial, 2.2nF, 3kVDC $\pm 10\%$

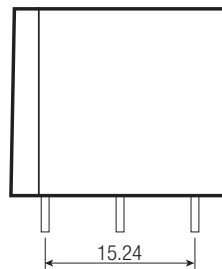
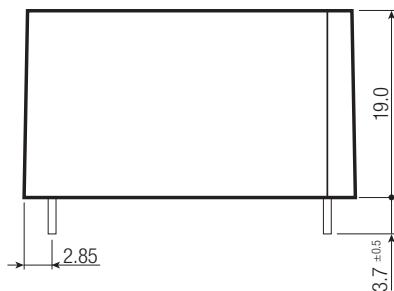
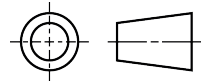
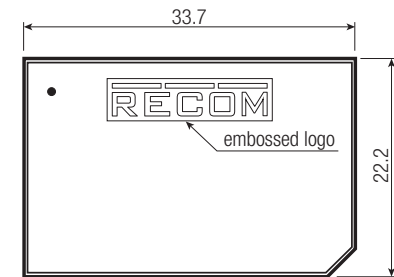
DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case PCB	black plastic (UL94V-2) FR4 (UL94V-0)
Dimension (LxWxH)		33.7 x 22.2 x 19.0mm
Weight		12g typ.

continued on next page

Specifications (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)



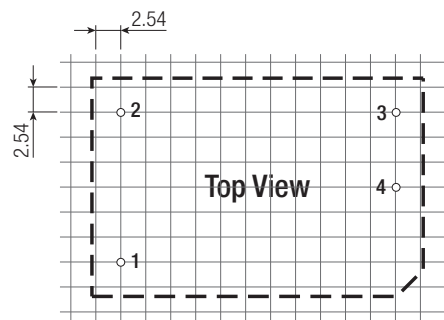
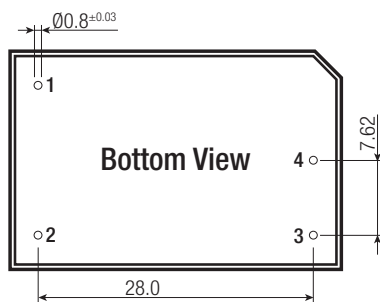
Pin Connections

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

Tolerance: xx.x= ±0.5mm

Pin width: ±0.05mm

Recommended Footprint Details



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	470.0 x 36.4 x 26.4mm
Packaging Quantity		20pcs
Storage Temperature Range		-25°C to +85°C
Storage Humidity	non-condensing	5% - 95% RH max.

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.