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 & EN60335-1certified

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.

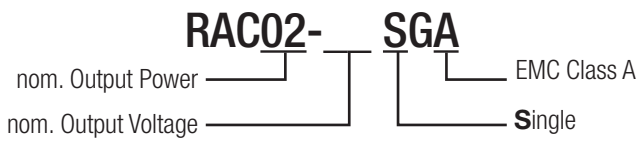
Selection Guide

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

Model Numbering



Ordering Examples:

RAC02-12SGA	12Vout	Single Output	EMC Class A

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

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:

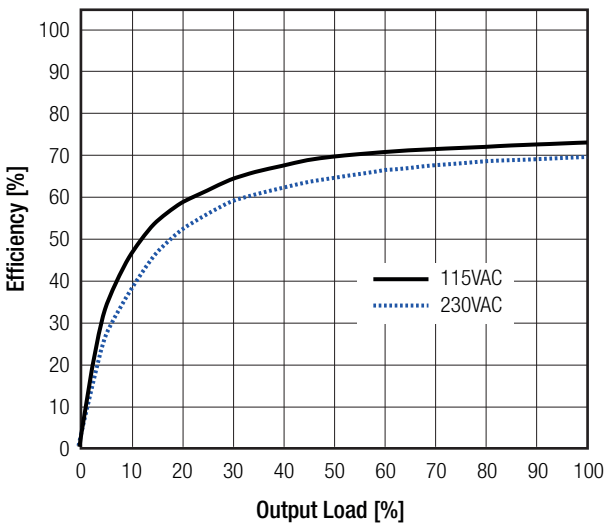
Note2: No proper operation with DC input voltage

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

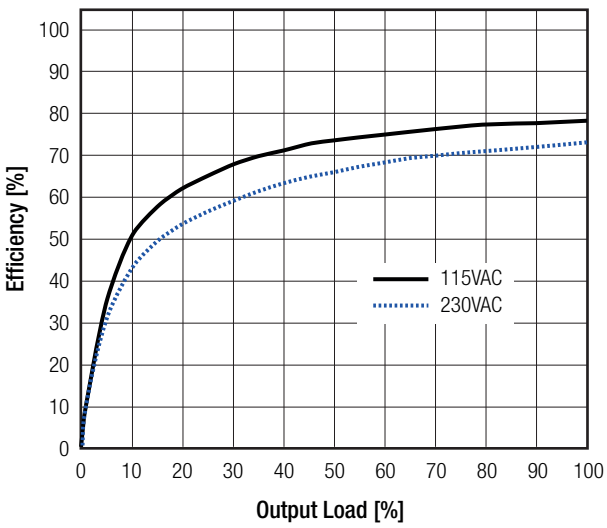
Note4: Refer to line derating graph on page 4

Efficiency vs. Load

RAC02-05SGA



RAC02-12SGA

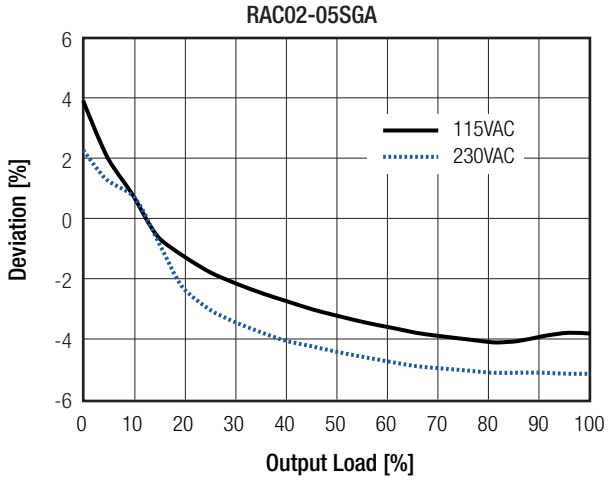


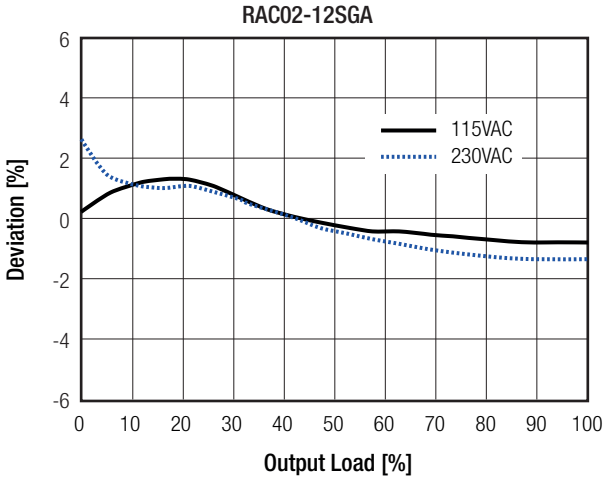
Specifications (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

REGULATIONS

Parameter	Condition	Value
Output Accuracy	-25°C to +80°C	±6.0% max.
Line Regulation	-25°C to +80°C	±2.0% max.
Load Regulation	-25°C to +80°C	6.0% max.

Deviation vs. Load





PROTECTIONS

Parameter	Type		Value	
Input Fuse (5)	internal		fusible resistor, 1Ω/1W	
Short Circuit Protection (SCP)	below 100mΩ		continuous, auto recovery	
Over Voltage Category			OVCII	
Over Current Protection (OCP)	3.3Vout 5Vout 12Vout 15Vout 24Vout		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			100MΩ min.	
Insulation Grade			reinforced	
Leakage Current	I/P to O/P		0.25mA max.	

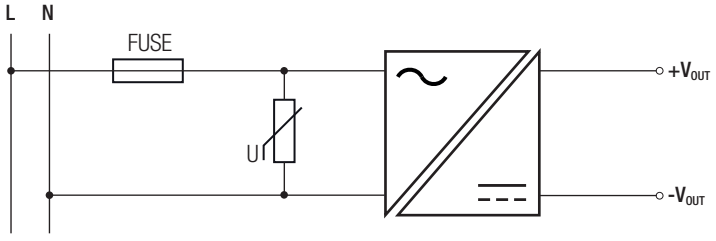
Notes:

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

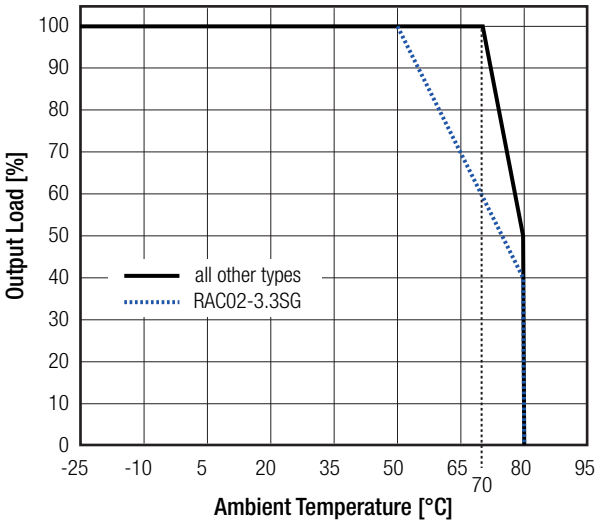
Parameter	Condition		Value
Operating Temperature Range	@ natural convection 0.1m/s	full load	-25°C to +70°C
		refer to derating graph	-25°C to +80°C
Maximum Case Temperature			+120°C
Temperature Coefficient			0.03%/K
Operating Altitude [8]			4000m
Operating Humidity	non-condensing		5% - 95% RH max.
Pollution 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 +70°C	1691 x 10^3 hours 424 x 10^3 hours

Notes:

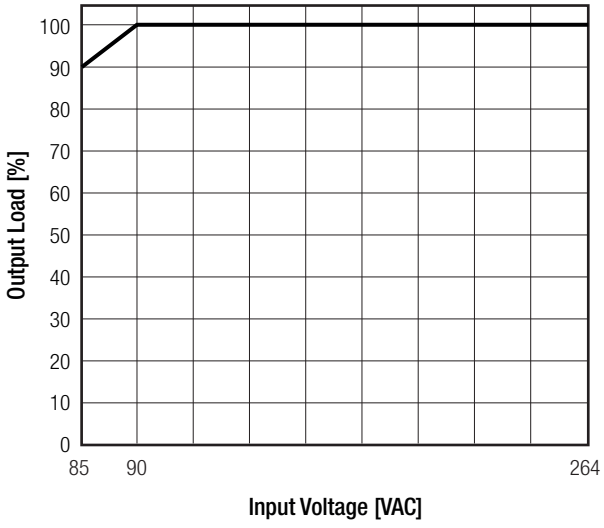
Note8: Recognized by UL for safe operation up to 4000m. High altitude operation may impact the performance and lifetime. Please contact RECOM tech support for advice

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

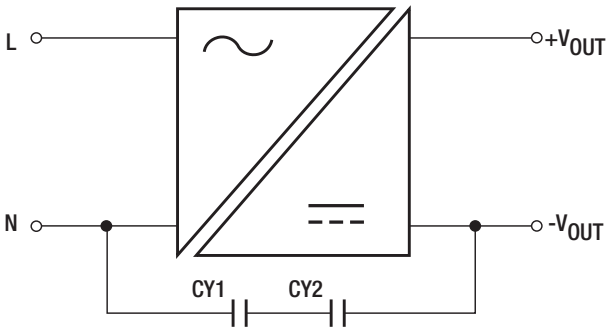
continued on next page

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 ±2, 4, 8kV Contact ±2, 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 Power Port: ±1kV	EN61000-4-4:2012, Criteria A
Surge Immunity	AC Power 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
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 ±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.

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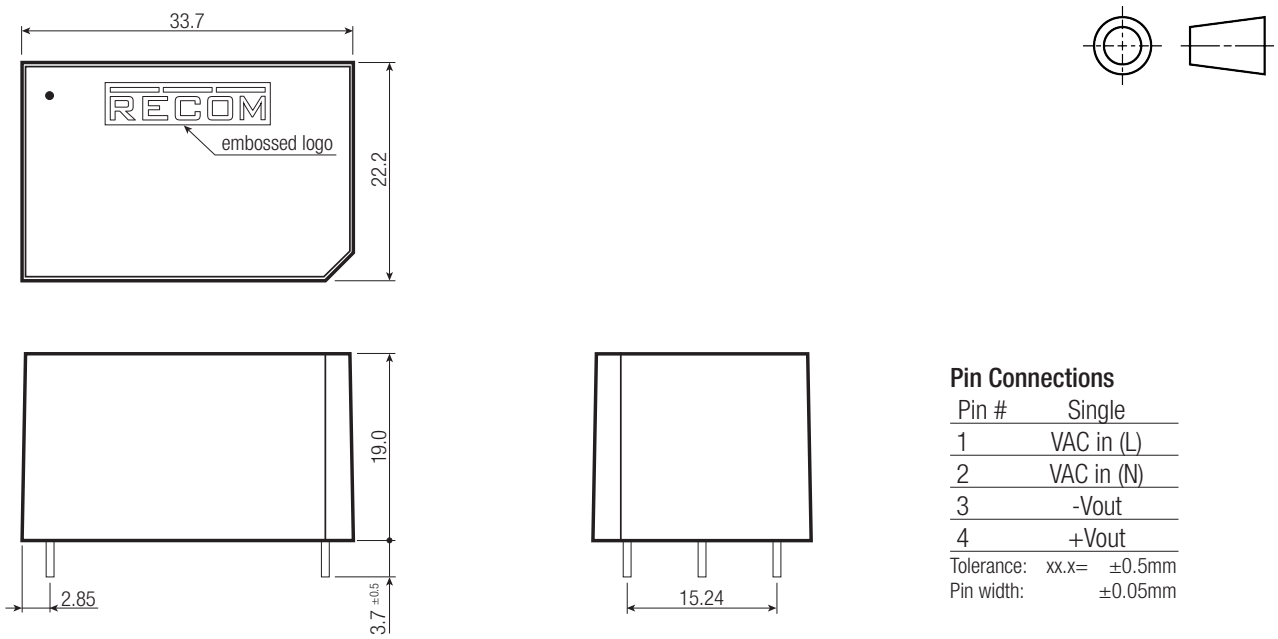
Specifications (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)

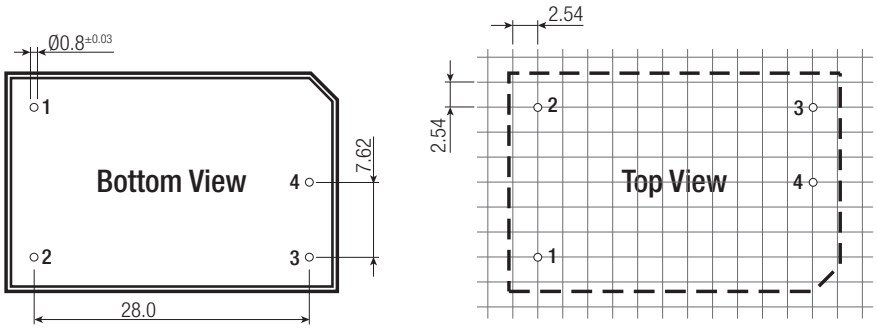


Pin Connections

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.