

Features

Regulated Converters

- 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
- EN60335, EN60950, UL60950 & CE Pending

RECOM
AC/DC Converter

RAC04-GA

4 Watt
Single
Output
EMC Class A



UL60950-1 Certified
IEC/EN60950-1 Certified
UL62368-1 Pending
IEC/EN62368-1 Pending
EN61558-1 Pending
EN61558-2-16 Pending

Description

The RAC04-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 -40°C to +85°C operating temperature range. The RAC04-GA have a built-in Class A / FCC Part 15 EMC filter, are certified to IEC/EN/UL60950-1 and EN60335 and are pending to IEC/EN/UL62368 and EN61558 safety standards and come with a three year warranty.

Selection Guide

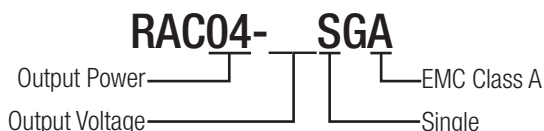
Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. ⁽¹⁾ [%]	Max. Capacitive Load ⁽²⁾ [μF]
RAC04-05SGA	85-305	5	800	72	1500
RAC04-12SGA	85-305	12	330	78	500
RAC04-24SGA	85-305	24	170	80	150

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

RAC04-12SGA = 4W Output Power, 12V Output Voltage, Single Output, EMC Class A

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			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			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)

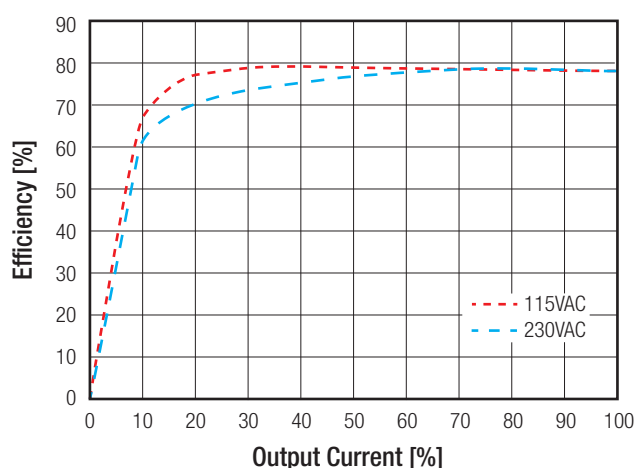
Output Ripple and Noise ^③	20MHz BW	0°C to 85°C	5Vout 12Vout 24Vout			100mVp-p 150mVp-p 240mVp-p
		-30°C to 0°C	5Vout 12Vout 24Vout			200mVp-p 250mVp-p 300mVp-p

Notes:

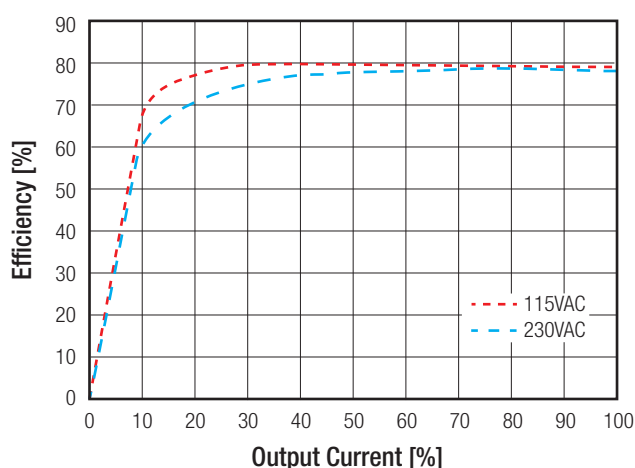
Note3: Measurements are made with a 12" twisted pair-wire with a 0.1 μF and 10 μF parallel capacitor across output (low ESR).

Efficiency vs. Load

RAC04-05SGA



RAC04-12SGA

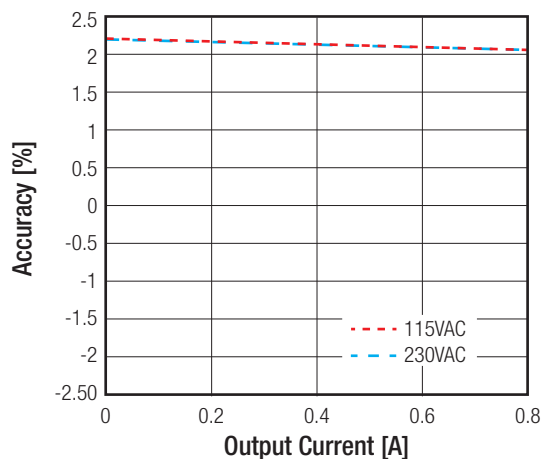


REGULATIONS

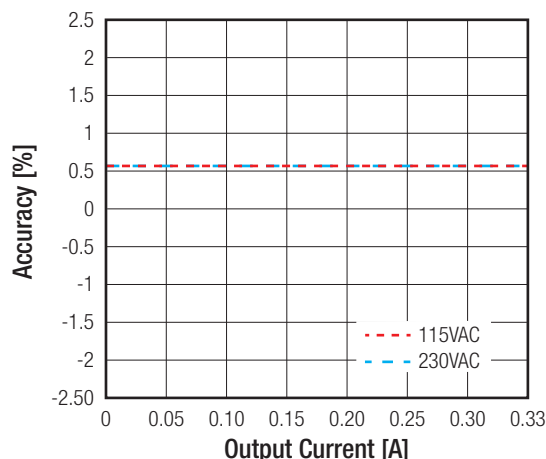
Parameter	Condition	Value
Output Accuracy		$\pm 2.5\%$ max.
Line Regulation	low line to high line	$\pm 0.5\%$ max.
Load Regulation	10% to 100% load	$\pm 0.5\%$ max.

Accuracy vs. Load

RAC04-05SGA



RAC04-12SGA



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

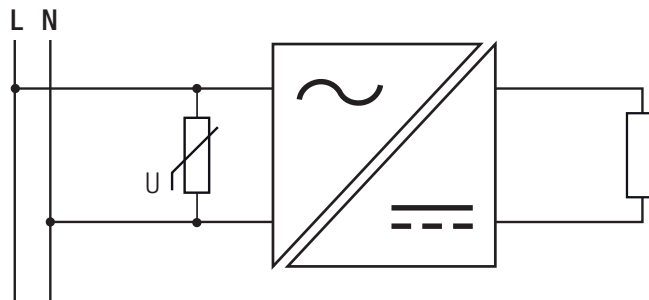
PROTECTIONS

Parameter	Type		Value
Input Fuse	internal		T1A, 300V
Short Circuit Protection (SCP)	below $100\text{m}\Omega$		long-term mode, auto recovery
Over Voltage Protection (OVP)	5Vout		5.3V - 6.8V, hiccup mode auto recovery
	12Vout		12.6V - 16.2V, hiccup mode auto recovery
	24Vout		25.2V - 32.4V, hiccup mode auto recovery
Over Current Protection (OCP)	5Vout		0.91A - 2.2A, hiccup mode auto recovery
	12Vout		0.37A - 0.95A, hiccup mode auto recovery
	24Vout		0.19A - 0.45A, hiccup mode auto recovery
Class of Equipment			Class II
Over Voltage Category (OVC)			OVC II
Isolation Voltage ⁽⁴⁾	I/P to O/P	rated for 1 minute	3kVAC/10mA
Isolation Resistance			$10\text{M}\Omega$ min.
Insulation Grade			Reinforced
Leakage Current	277VAC, 50Hz		0.1mA max.

Notes:

Note4: For repeat Hi-Pot testing, reduce the time and/or the test voltage.

Note5: For operation at 230VAC, an external MOV is recommended. The Varistor should comply with IEC61051-2. eg. EPCOS S14 series.



ENVIRONMENTAL

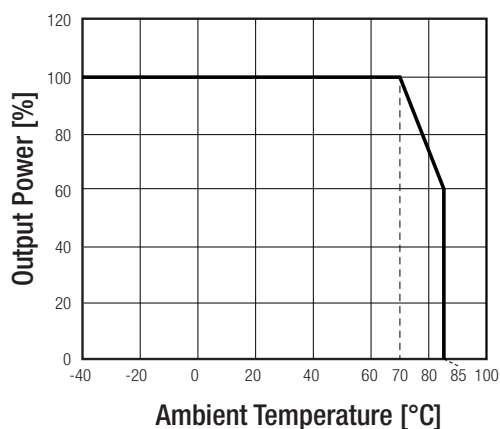
Parameter	Condition		Value
Operating Temperature Range	without derating (@ natural convection 0.1m/s, see graph)		-40°C to $+70^{\circ}\text{C}$
Maximum Case Temperature			$+100^{\circ}\text{C}$
Temperature Coefficient			$\pm 0.03\%/^{\circ}\text{C}$
Operating Altitude			3000m
Operating Humidity	non-condensing		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.	$+25^{\circ}\text{C}$ $+70^{\circ}\text{C}$	100×10^3 hours 100×10^3 hours

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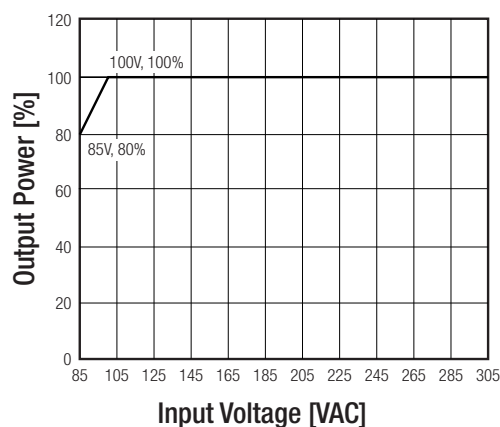
Specifications (measured @ $t_a=25^{\circ}\text{C}$, nom. V_{in} , full load unless otherwise noted)

Derating Graph

(@ Chamber and natural convection 0.1 m/s)



Input Voltage 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 + A1, 2009 + A2, 2013 EN60950-1, 2006 + A11, 2009 + A1, 2010 + A12, 2011 + 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 CAN/CSA C22.2 No 62368-1
Audio/video, information and communication technology equipment. Safety requirements	pending	IEC62368-1 EN62368-1
Household and similar electrical appliances - Safety. General requirements	SA1703184L 01001	EN60335, 2012 + A11, 2014
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	SA1703184L 01001	EN62233, 2008
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 with external components	EN55032, 2015, Class A
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 + A1, 2008 + 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

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

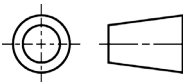
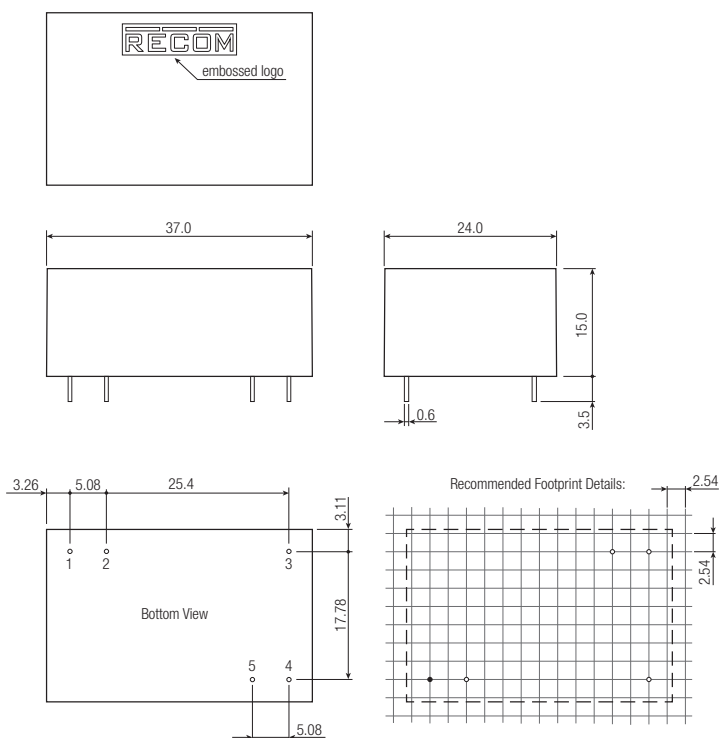
EMI Filtering according to EN60335-1 / EN55032 Class B Compliance

TBD

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.

Dimension Drawing (mm)



Pin Connections

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

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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