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 & EN60335-1 certified, EN55032 Class A

RECOM

AC/DC Converter

RAC04-GA

4 Watt Single Output EMC Class A

3 YEAR warranty

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
On Request					
RAC04-3.3SGA	85-305	3.3	1210	70	2000
RAC04-09SGA	85-305	9	440	77	1000
RAC04-15SGA	85-305	15	270	78	200

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

UL60950-1 certified
IEC/EN60950-1 certified
UL62368-1 certified
IEC/EN62368-1 certified
EN61558-1 certified
EN61558-2-16 certified
EN60335-1 certified
CB Report

Model Numbering

RAC04-__ SGA

- RAC04-__: nom. Output Power / nom. Output Voltage
- SGA: EMC Class A, Single

Ordering Examples:

RAC04-12SGA	12Vout	Single Output	EMC Class A

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)				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	
Output Ripple and Noise (5)	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

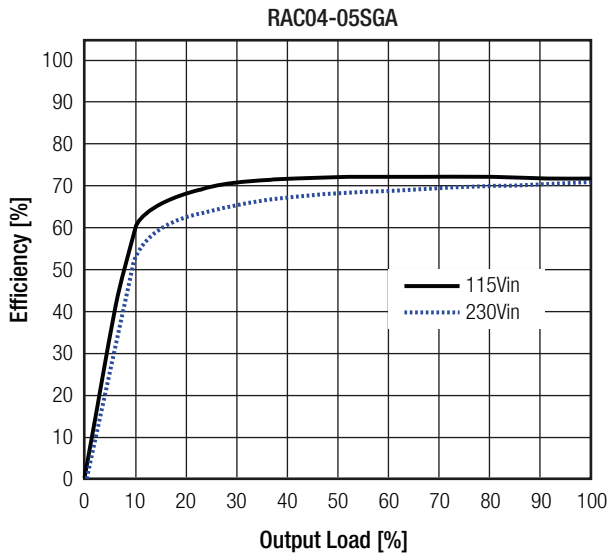
Notes:

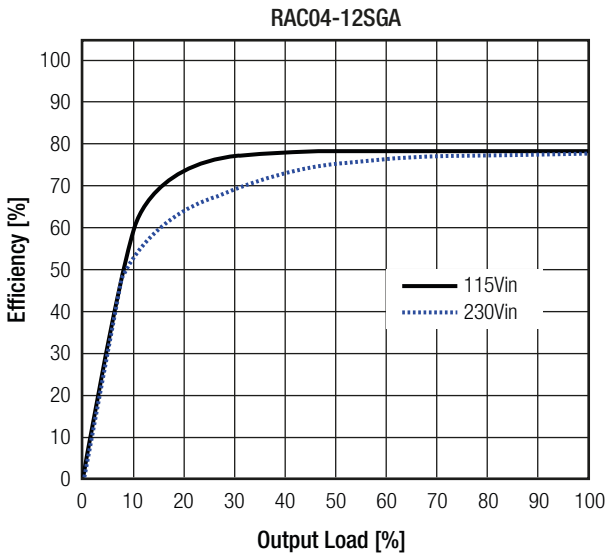
Note3: The products were submitted for safety files at AC-Input operation

Note4: Refer to line derating graph on page 4

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





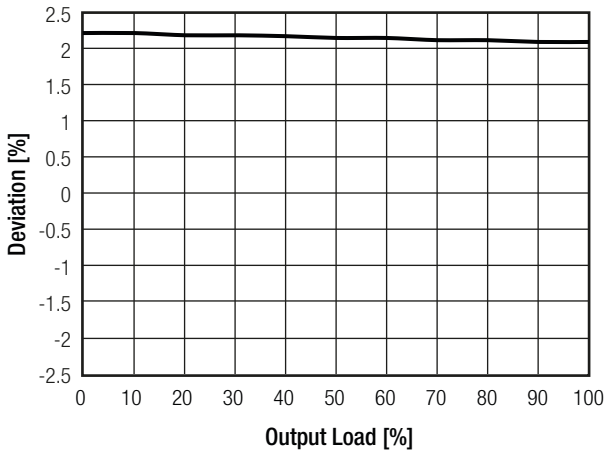
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REGULATIONS

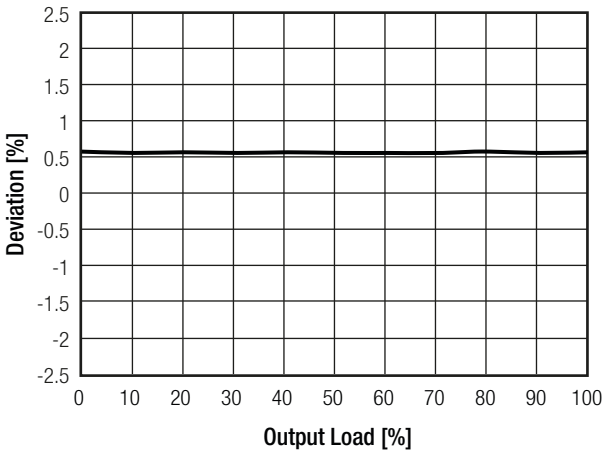
Parameter	Condition	Value
Output Accuracy		±2.5% max.
Line Regulation	low line to high line	±0.5% max.
Load Regulation	10% to 100% load	0.5% max.

Deviation vs. Load
(at 115VAC, 230VAC)

RAC04-05SGB



RAC04-12SGB



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)	5Vout 12Vout 24Vout		5.3V - 6.8V 12.6V - 16.2V 25.2V - 32.4V	hiccup mode, auto recovery
Over Voltage Category			OVCII	
Over Current Protection (OCP)	5Vout 12Vout 24Vout		0.91A - 2.2A 0.37A - 0.95A 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.	

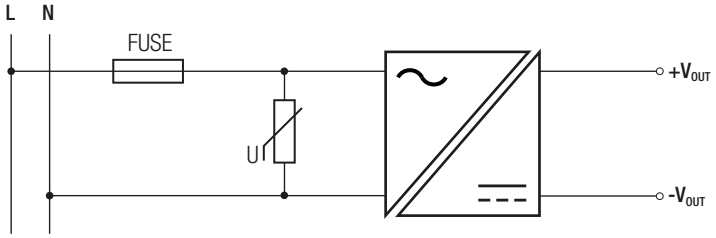
Notes:

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 ≥230VAC, an external MOV is recommended. The Varistor should comply with IEC61051-2. eg. EPCOS S14 series

Protection Circuit

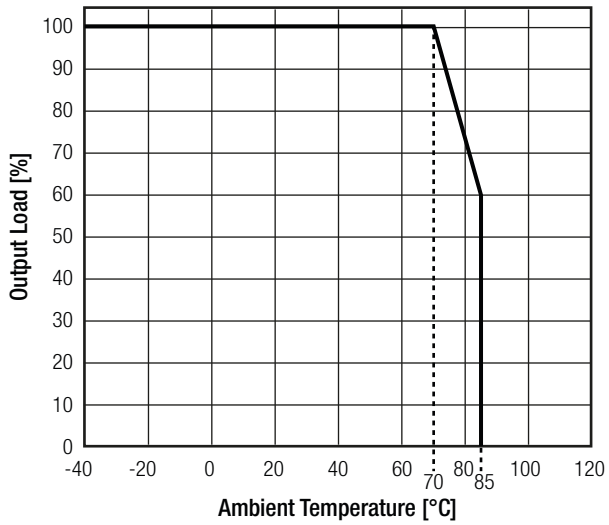


Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

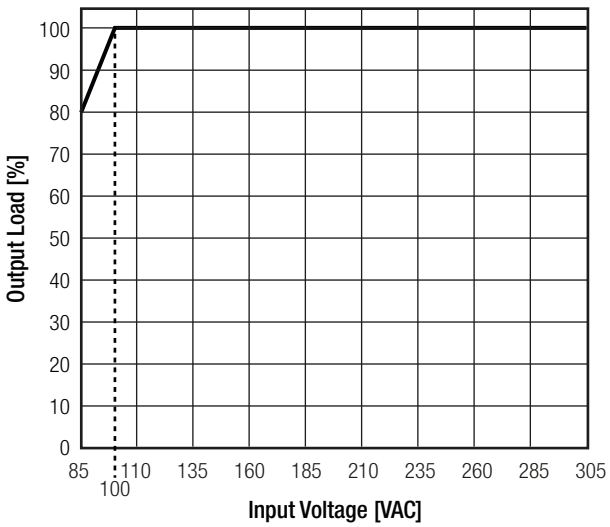
ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	@ natural convection 0.1m/s	full load	-40°C to +70°C
		refer to derating graph	-40°C to +85°C
Maximum Case Temperature			+100°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
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	100 x 10^3 hours
		+70°C	17 x 10^3 hours

Derating Graph
(@ Chamber and natural convection 0.1m/s)



Line Derating Graph



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E196683-A4	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, 2nd Edition: 2005 + AM2, 2013
Audio/video, information and communication technology equipment. Safety requirements	4787985921-20171025	EN62368-1: 2014
Audio/video, information and communication technology equipment. Safety requirements (CB)		IEC62368-1, 2nd Edition: 2014
Household and similar electrical appliances – Safety – Part 1: General requirements	211-600771-000	EN60335-1:2012 + A12:2017
Household and similar electrical appliances – Safety – Part 1: General requirements (CB)		IEC60335-1:2010 5th Edition + A1:2013

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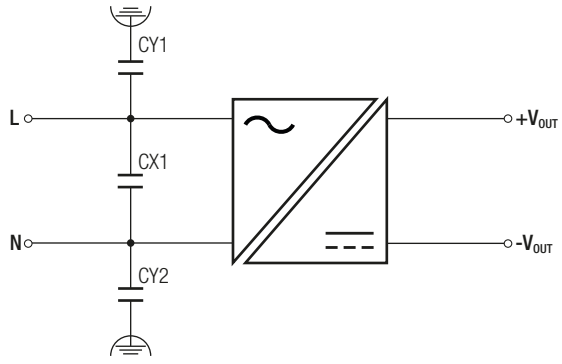
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Certificate Type (Safety)	Report / File Number	Standard
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V	SA 1709184L 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
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB)	211-600770-000	IEC61558-1:2005 2nd Edition + A1:2009
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements (CB)		IEC61558-2-16:2009 1st Edition + A1:2013
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	SA1703184L 01001	EN62233:2008
EAC	RU-AT.03.67361	TP TC 004/020, 2011
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 A
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010 + A1:2015
Limitations on the amount of electromagnetic intererence allowed from digital and electronic devices	EA1703184F 01001	47 CFR FCC Part 15 Subpart A: 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 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
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

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



CY1, CY2	CX1
1nF, 2kV	100nF, 2kV

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.

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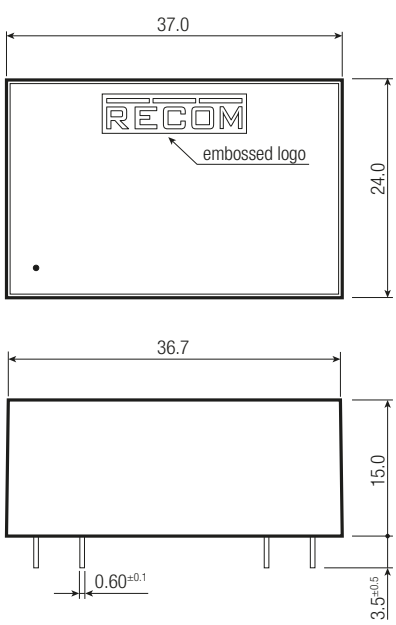
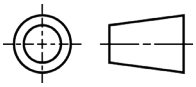
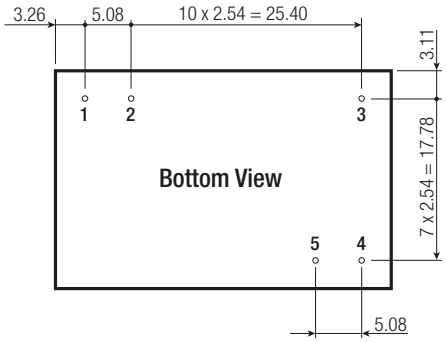
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

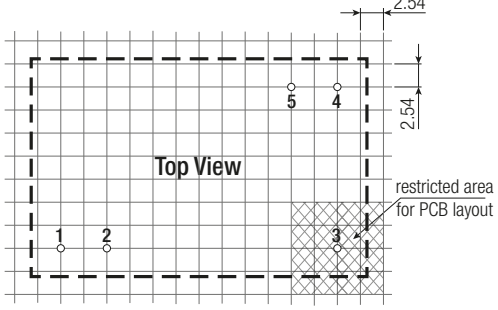
Dimension Drawing (mm)







Recommended Footprint Deltais



Pin Connections

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

NC: not connected
Tolerance: XX.X ±0.5mm
Pin Width: XX.X ±0.05mm

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.