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

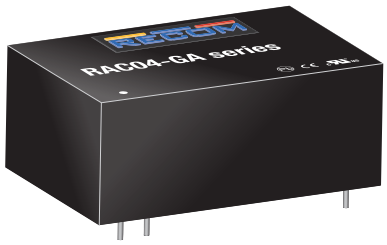
RECOM

AC/DC Converter

RAC04-GA

4 Watt Single Output EMC Class A

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 nominal input and full load at +25°C ambient

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

Model Numbering

RAC04-__SGA

- Output Power
- Output Voltage
- EMC Class A
- Single

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(3)	refer to line derating graph on page PA-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	

continued on next page

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)

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

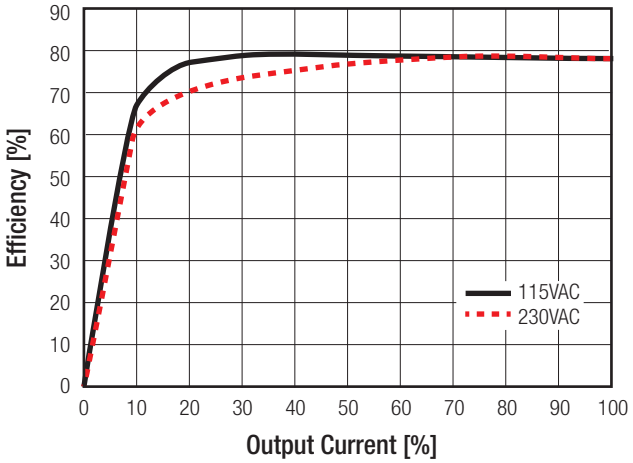
Notes:

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

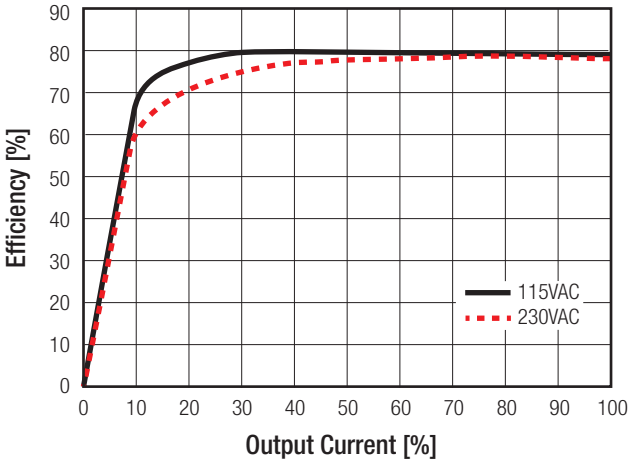
Note4: Measurements are made with a 12" twisted pair-wire with a 0.1µF and 10µF parallel capacitor across output (low ESR)

Efficiency vs. Load

RAC04-05SGA



RAC04-12SGA



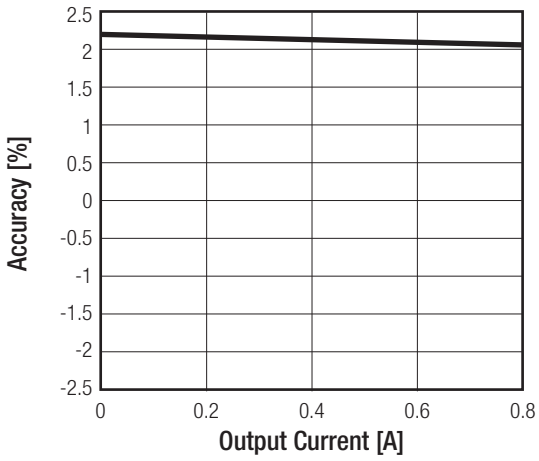
REGULATIONS

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.

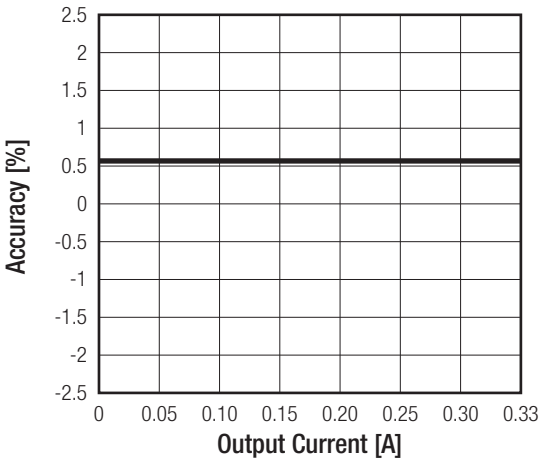
Accuracy vs. Load

(@nom. Vin: 115/230VAC)

RAC04-05SGA



RAC04-12SGA



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

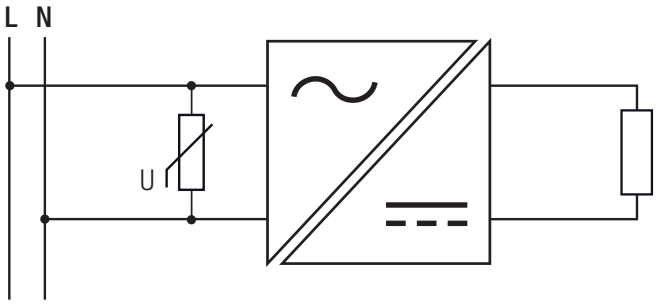
PROTECTIONS

Parameter	Type		Value
Input Fuse	internal		T1A, 300V
Short Circuit Protection (SCP)	below 100mΩ		long-term mode, auto recovery
Over Voltage Protection (OVP)	5Vout 12Vout 24Vout		5.3V - 6.8V, hiccup mode auto recovery 12.6V - 16.2V, hiccup mode auto recovery 25.2V - 32.4V, hiccup mode auto recovery
Over Current Protection (OCP)	5Vout 12Vout 24Vout		0.91A - 2.2A, hiccup mode auto recovery 0.37A - 0.95A, hiccup mode auto recovery 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			10MΩ min.
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



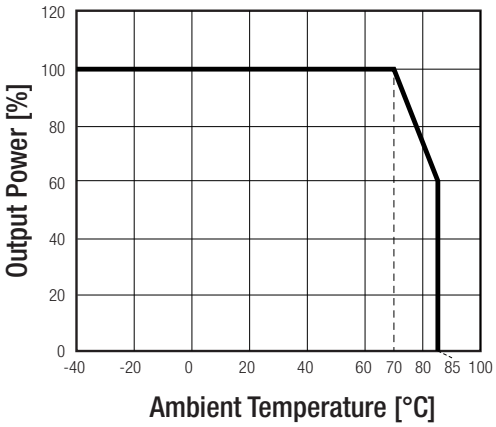
ENVIRONMENTAL

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			±0.03%/°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

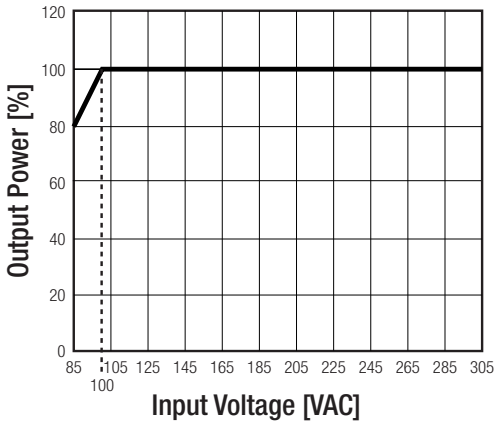
continued on next page

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

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



Line Derating Graph



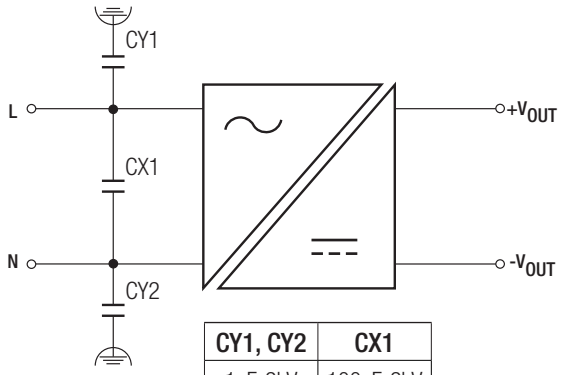
SAFETY AND CERTIFICATION		
Certificate Type (Safety)	**Report / File Number**	**Standard**
Information Technology Equipment, General Requirements for Safety (LVD)	SA17031845 001	IEC60950-1, 2nd Edition: 2005 + A1, 2009 + A2, 2013 EN60950-1: 2006 +A2, 2013
Information Technology Equipment, General Requirements 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
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 intererence allowed from digital and electronic devices	EA1703184E 01001	47 CFR FCC Part 15 Subpart B: 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

continued on next page

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

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

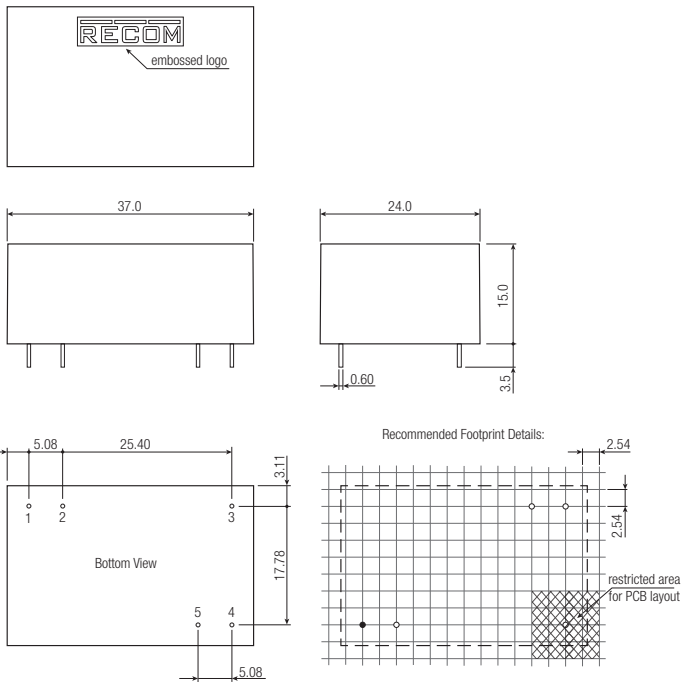


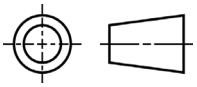
CY1, CY2	CX1
1nF, 2kV	100nF, 2kV

DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case PCB	black plastic, (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

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 Humidtiy	non-condensing	5% - 95% RH max.