Simpex Electronic AG
Binzackerstrasse 33
CH-8620 Wetzikon
Telefon +41 44 931 10 30

www.simpex.ch
contact@simpex.ch
CHE-108.018.777 MWST

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 & CE certified, EN55032 Class B

RECOM
AC/DC Converter

RAC04-GB

4 Watt Single Output EMC Class B

3 YEAR warranty

Description

The RAC04-GB 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-GB have a built-in Class B / FCC Part 15 EMC filter, are certified to IEC/EN/UL60950-1 and are certified 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]
RAC04-3.3SGB	85-305	3.3	1210	70	2000
RAC04-05SGB	85-305	5	800	72	1500
RAC04-09SGB	85-305	9	440	77	1000
RAC04-12SGB	85-305	12	330	78	500
RAC04-15SGB	85-305	15	270	78	200
RAC04-24SGB	85-305	24	170	80	150

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

E196683

UL60950-1 certified
IEC/EN60950-1 certified
UL62368-1 pending
IEC/EN62368-1 certified
EN61558-1 certified
EN61558-2-16 certified
CB report

Model Numbering

RAC04- SGB

- RAC04-: nom. Output Power, nom. Output Voltage
- SGB: EMC Class B, Single

Ordering Examples:

RAC04-12SGB 12Vout Single Output EMC Class B

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)	nom. Vin = 230VDC			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				10ms 40ms	
Internal Operating Frequency	100% load at nominal Vin				65kHz	
Output Ripple and Noise (5)	20MHz BW	0°C to 85 °C	3.3Vout 5Vout 9Vout 12Vout 15Vout 24Vout			100mVp-p 100mVp-p 120mVp-p 150mVp-p 200mVp-p 240mVp-p
		-30 °C to 0 °C	3.3Vout 5Vout 9Vout 12Vout 15Vout 24Vout			200mVp-p 200mVp-p 250mVp-p 250mVp-p 300mVp-p 300mVp-p

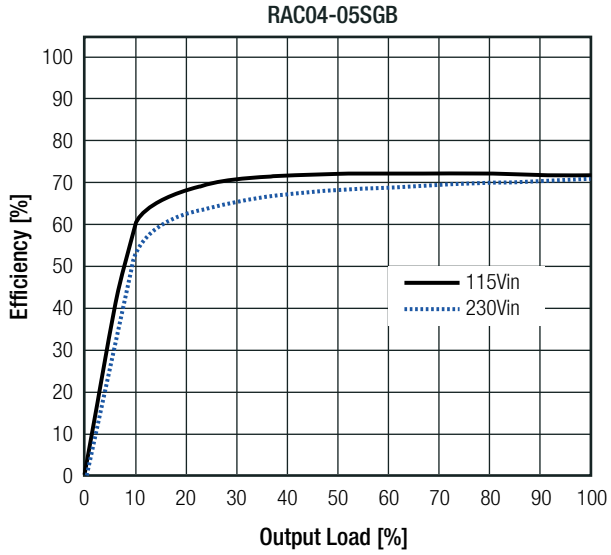
Notes:

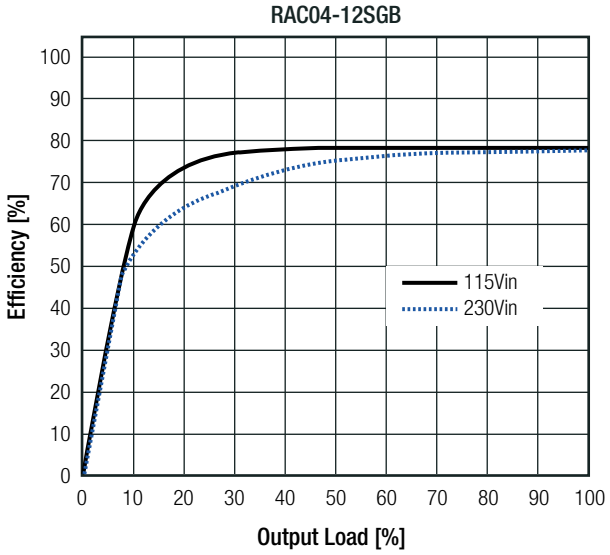
Note3: The products were submitted for safety files at AC-Input operation

Note4: Refer to ***"Line Derating"***

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



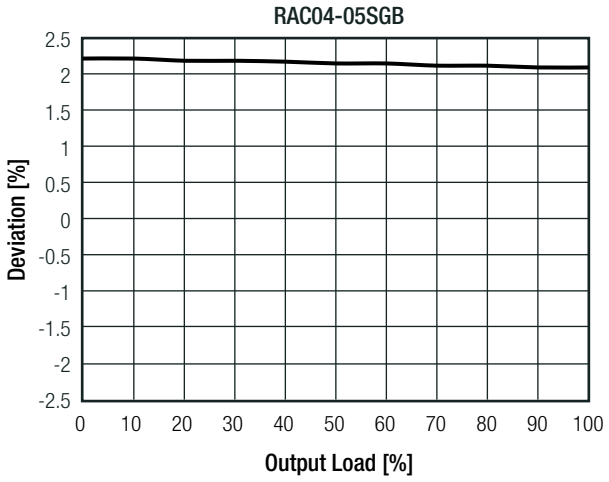


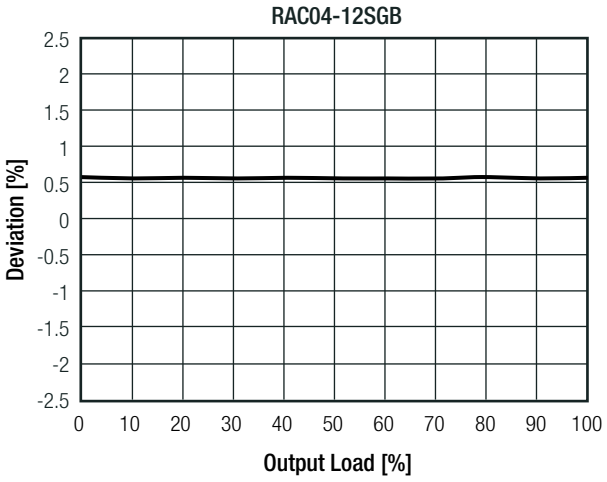
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

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
(@ 115VAC, 230VAC)





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)	3.3Vout 5Vout 9Vout 12Vout 15Vout 24Vout		3.8V - 4.9V 5.3V - 6.8V 10.3V - 12.2V 12.6V - 16.2V 15.75V - 20.3V 25.2V - 32.4V	hiccup mode, auto recovery
Over Voltage Category				OVCII
Over Current Protection (OCP)	3.3Vout 5Vout 9Vout 12Vout 15Vout 24Vout		1.41A - 3A 0.91A - 2.2A 0.49A - 1.25A 0.37A - 0.95A 0.29A - 0.72A 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.

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

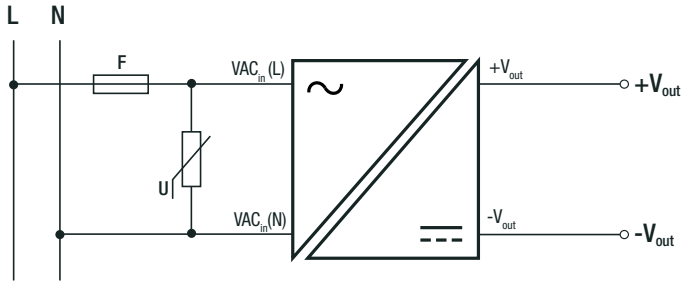
Notes:

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

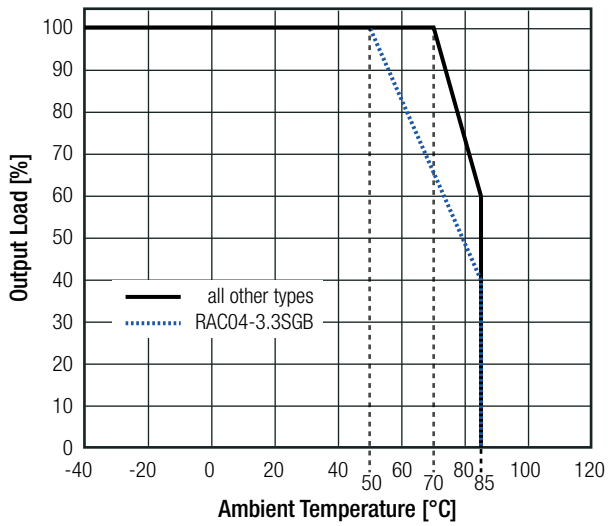


ENVIRONMENTAL

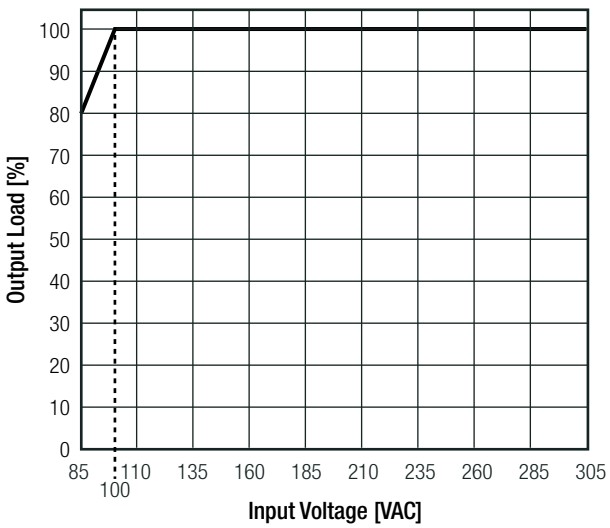
Parameter	Condition		Value
Operating Temperature Range	@ natural convection 0.1m/s	full load	-40°C to + 70°C
		refer to ***"Derating Graph"***	-40°C to + 85°C
Maximum Case Temperature			+100°C
Temperature Coefficient			0.03%/K
Operating Altitude			3000m
Operating Humidity	non-condensing		5% - 95% RH
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
Design Lifetime	+25°C +50°C		90 x 10³ hours 62 x 10³ hours
MTBF	according to MIL-HDBK-217F, G.B.	+25°C +50°C	>900 x 10³ hours >198 x 10³ hours

Derating Graph

(@ Chamber and natural convection 0.1m/s)



Line Derating



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

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Report / File Number**	**Standard**
Information Technology Equipment, General Requirements for Safety	E196683-A4-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		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)		IEC60950-1:2005, 2nd Edition + A2:2013
Audio/video, information and communication technology equipment. Safety requirements	4787985921-20171025-CB	EN62368-1: 2014
Audio/video, information and communication technology equipment. Safety requirements (CB)		IEC62368-1:2014, 2nd Edition
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V	SA 1703184L 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
EAC	RU-AT.03.67361	TP TC 004/020, 2011
RoHS 2+		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements (9)	EA1703184E 01001	EN55032: 2015, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010 + A1:2015
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices	EA1703184F 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 Port ±1kV	EN61000-4-4: 2012, Criteria A
Surge Immunity	AC 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% Interruptions >95%	EN61000-4-11: 2004, Criteria A EN61000-4-11: 2004, Criteria A EN61000-4-11: 2004, Criteria C

Notes:

Note9: If output is connected to GND, please contact RECOM tech support for advice

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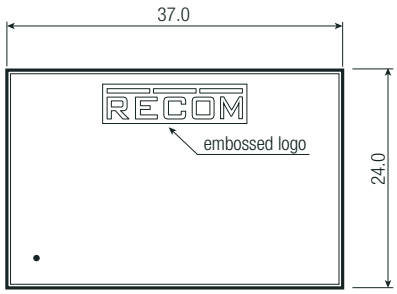
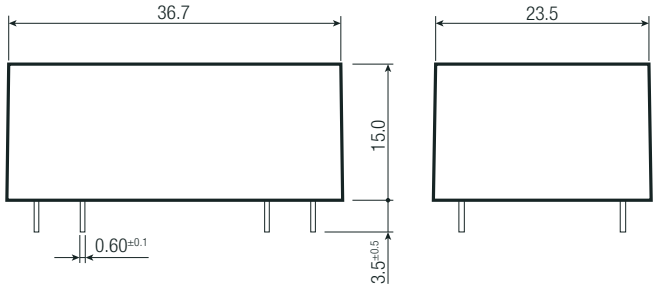
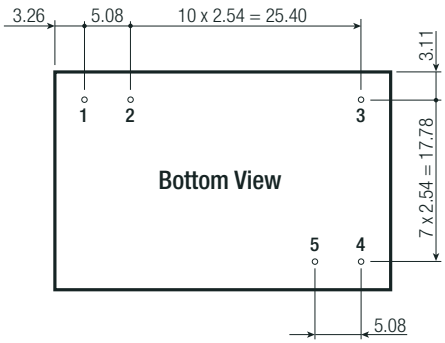
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

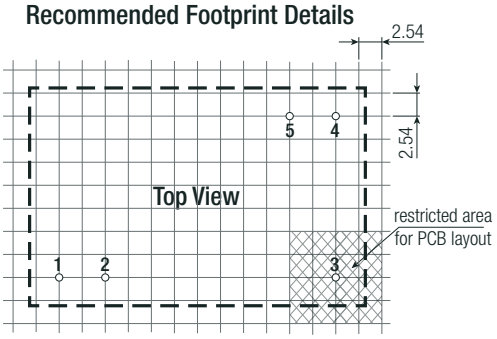
Dimension Drawing (mm)







Recommended Footprint Details



Pin Connections

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

NC: Not Connected
Tolerances:
xx.x= ±0.5mm
x.xx= ±0.25mm

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.