Features

Regulated Converter

- Wide input range 85-264VAC
- Standby mode optimized PSU (ENER Lot 6)
- Ultra-high efficiency over entire load range
- Operating temperature range: -40°C to +85°C
- Class II installations (without FG)
- EMC compliant without external components
- No load power consumption 40mW typ.

RECOM

AC/DC Converter

RAC15-K

15 Watt Single Output

IEC/EN62368-1 certified
UL62368-1 certified
CAN/CSA-C22.2 No. 62368-1-14 certified
IEC/ENC60335 pending
IEC/EN61204-3 compliant
EN55032/14 compliant
EN55024 compliant
CB Report

Description

The RAC15-K series are highly efficient PCB-mount power conversion modules with ultra-low energy losses especially in light load conditions, making them a benchmark for always-on and standby mode operations, which are typically coming along with IoT and smart applications. The power supply units cover worldwide mains input range of 85VAC up to 264VAC and come with international safety certifications for industrial, AV and ITE as well as household standards. These AC/DC modules operate in a temperature range of -40°C to +85°C and offer fully protected single or dual outputs as well as EMC class B compliance without the need of any external components.

Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ (1) [%]	Max. Capacitive Load (2) [µF]
RAC15-05SK	85-264	5	3000	84	10000
RAC15-12SK	85-264	12	1670	86	8000
RAC15-15SK	85-264	15	1000	86	1500
RAC15-24SK	85-264	24	630	85	1000

Notes:

Note1: Efficiency is tested at 230VAC input and constant resistive load at +25°C ambient

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

Model Numbering

RAC15-__ SK

nom. Output Power

Output Voltage

Single

Ordering Examples:

RAC15-05SK	5Watt	5Vout	Single Output

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 = 230VAC		85VAC 120VDC	230VAC	264VAC 370VDC
Input Current	115VAC 230VAC				400mA 350mA
Inrush Current	cold start at +25°C	115VAC 230VAC			20A 40A

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

BASIC CHARACTERISTICS

Parameter	Condition	Min.	Typ.	Max.
No Load Power Consumption	230VAC		40mW	
ErP Lot 6 Standby Mode Conformity (Output Load Capability)	0.5W Input Power = 1.0W 2.0W			0.3W 0.7W 1.6W
Input Frequency Range	AC Input	47Hz		63Hz
Minimum Load		0%		
Power Factor	115VAC 230VAC	0.6 0.5		
Start-up Time			150ms	
Rise Time			40ms	
Hold-up Time	115VAC 230VAC		15ms 90ms	
Internal Operating Frequency				100kHz
Output Ripple and Noise [5]	20MHz BW		100mVp-p	

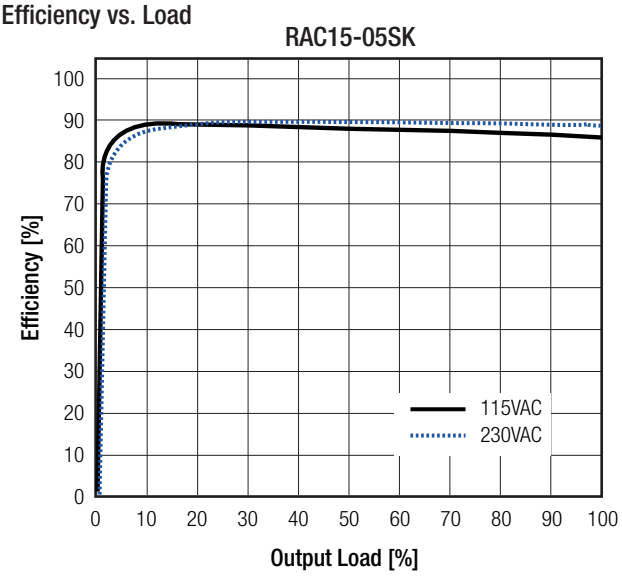
Notes:

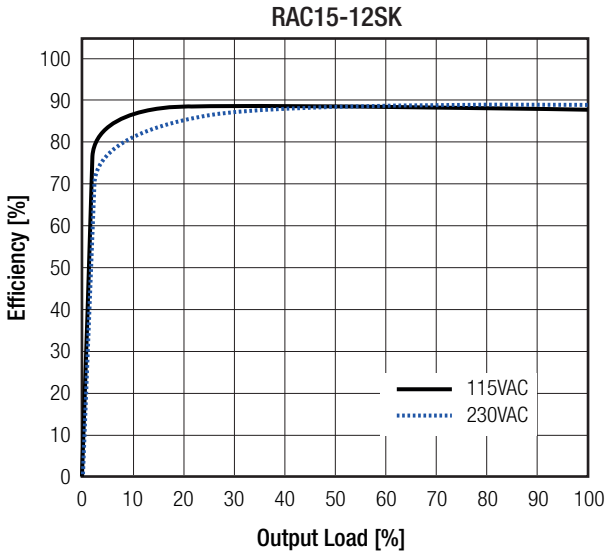
Note3: The products were submitted for safety files at AC-Input operation

Note4: Refer to line derating graph on page 4

Note5: Measurements are made with a 1.0µF MLCC across output (low ESR)

Efficiency vs. Load





REGULATIONS

Parameter	Condition	Value
Output Accuracy		±2.0% typ.
Line Regulation	low line to high line	±1.0% typ.
Load Regulation [6]	10% to 100% load	1.0% typ.
Transient Response	25% load step change recovery time	4.0% max. 500µs typ.

Notes:

Note6: Operation below 10% load will not harm the converter, but specifications may not be met

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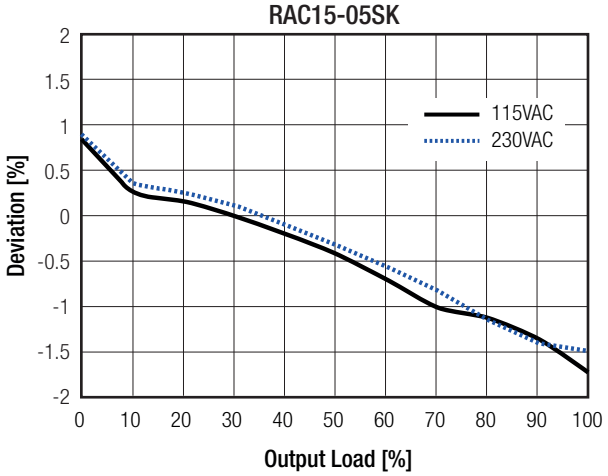
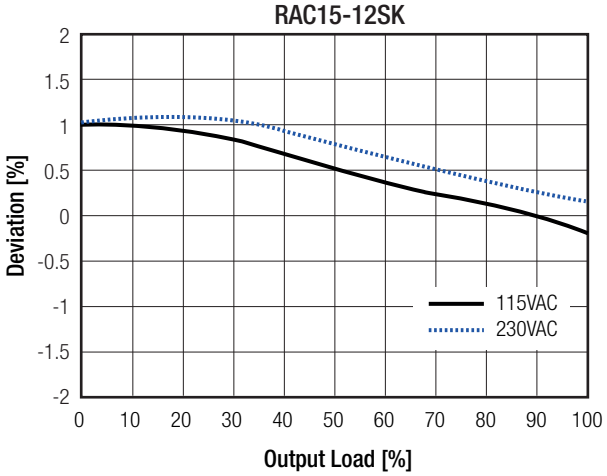
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Deviation vs. Load

RAC15-05SK



RAC15-12SK



PROTECTIONS

Parameter	Type		Value
Input Fuse (7)	internal		T3.15A, slow blow type
Short Circuit Protection (SCP)	below 100mΩ		hiccup, auto recovery
Over Voltage Protection (OVP)			150% - 195%, latch off mode
Over Current Protection (OCP)			150% - 195%, hiccup mode
Over Voltage Category			OVCII
Class of Equipment			Class II
Isolation Voltage (8)	I/P to O/P	tested for 1 minute	3kVAC
Isolation Resistance		V_{iso} = 500VDC	1GΩ min.
Isolation Capacitance			100pF max.
Insulation Grade			reinforced
Leakage Current			0.25mA max.

Notes:

Note7: Refer to local safety regulations if input over-current protection is also required

Note8: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	natural convection 0.1m/s	full load	-40°C to +55°C
		refer to derating graph	-40°C to +85°C
Maximum Case Temperature			+95°C
Temperature Coefficient			0.05%/K
Operating Altitude			3000m
Operating Humidity	non-condensing		20% - 90% RH max.
IP Rating			IP20
Pollution Degree			PD2
Vibration	according to MIL-STD-202G		10-500Hz, 2G 10min./1cycle, period 60min. along x,y,z axes
Design Lifetime	+25°C		300 x 10^3 hours
	+55°C		40 x 10^3 hours
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	>450 x 10^3 hours
		+55°C	>56 x 10^3 hours

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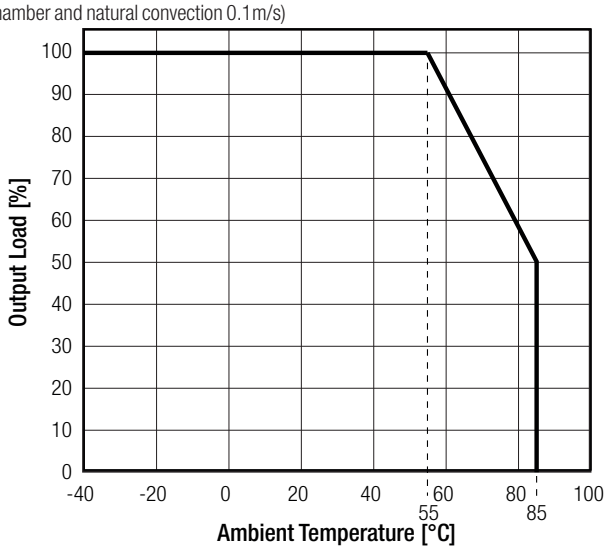
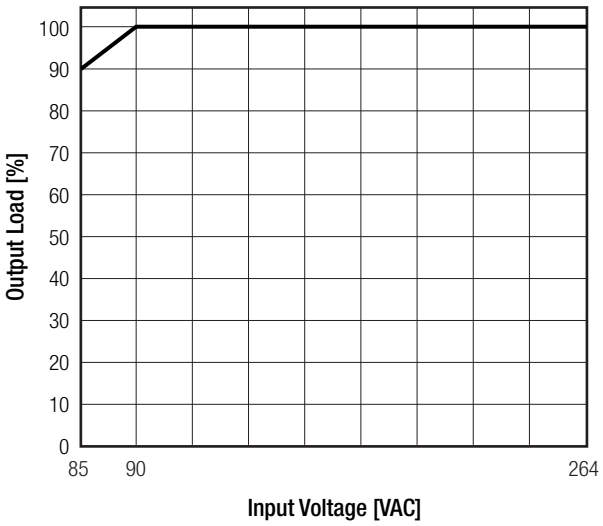
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Derating Graph

(@ Chamber and natural convection 0.1m/s)



Line Derating



SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Report / File Number**	**Standard**
Audio/Video, information and communication technology equipment - Safety requirements	E224736	UL62368-1, 2nd Edition, 2014 CAN/CSA C22.2 Nr. 62368-1-14, 2nd Ed. 2014
Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme)	E491408-A6002-CB-1	IEC62368-1:2014 2nd Edition EN62368-1:2014 + A11:2017
Household and similar electrical appliances – Safety – Part 1: General requirements	pending	IEC60335-1:2010 + AMD2:2016 + COR1:2016 EN60335-1:2012 + A11:2014 + A13:2017
RoHS 2		RoHS-2011/65/EU

EMC Compliance	**Condition**	**Standard / Criterion**
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		IEC/EN61204-3:2000, Class B
Electromagnetic compatibility of multimedia equipment - Emission requirements	without external filter	EN55032:2015, Class B
Electromagnetic compatibility of household appliances, electric tools and similar apparatus - Emission Requirements		EN55014-1:2006+A2:2011
Information technology equipment - Immunity characters - Limits and methods of measurement		EN55024:2010 + A1:2015
Electromagnetic compatibility of household appliances, electric tools and similar apparatus - Immunity Requirements		EN55014-2:2015
ESD Electrostatic discharge immunity test	air ±2, 4, 8kV, contact ±2, 4kV	EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	10V/m, 3V/m, 1V/m	EN61000-4-3:2006 + A1:2008, Criteria A
Fast Transient and Burst Immunity	AC Power Port: ±2.0kV DC Output Port: ±2.0kV	EN61000-4-4:2012, Criteria B
Surge Immunity	AC Power Port: L-N ±1.0kV DC Output Port: ±0.5kV	EN61000-4-5:2014+A1:2017, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port: 10V DC Output Port: 10V	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	50Hz, 30A/m	EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions	Voltage Dips 20% Voltage Dips 30% Voltage Dips 60% Voltage Dips 100% Voltage Interruptions > 95%	EN61000-4-11:2004+A1:2017, Criteria C EN61000-4-11:2004+A1:2017, Criteria C EN61000-4-11:2004+A1:2017, Criteria C EN61000-4-11:2004+A1:2017, Criteria B EN61000-4-11:2004+A1:2017, Criteria C

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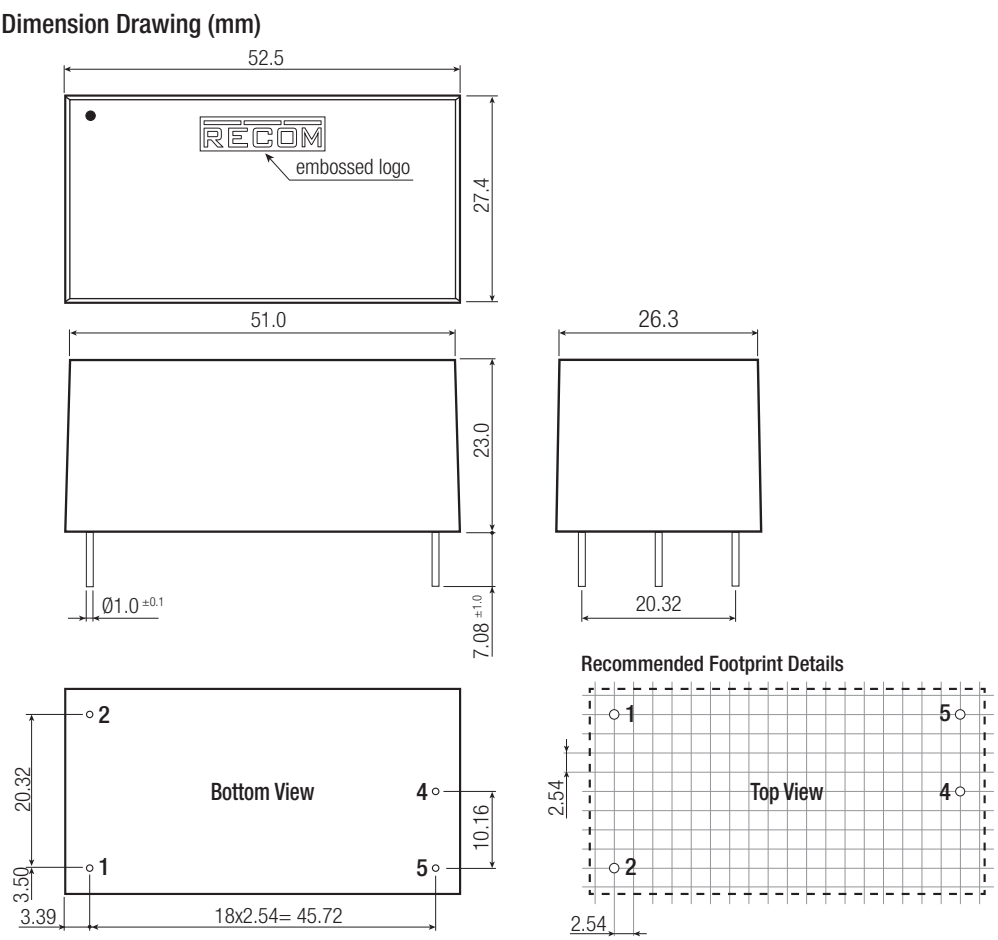
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

EMC Compliance	Condition	Standard / Criterion
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013
Limitations on the amount of electromagnetic intererence allowed from digital and electronic devices		FCC 47 CFR Part 15 Subpart B, Class B
American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		ANSI C63.4-2014, Class B

DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case potting PCB baseplate	black plastic, (UL94V-0) silicone, (UL94V-0) FR4, (UL94V-0) black plastic, (UL94V-0)
Dimension (LxWxH)		52.5 x 27.4 x 23.0mm
Weight		60g typ.

Dimension Drawing (mm)



Pinning information

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

Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	490.0 x 56.0 x 40.0mm
Packaging Quantity	tube	15pcs
Storage Temperature Range		-40°C to +85°C
Storage Humidity	non-condensing	20% to 90% RH max.