Features

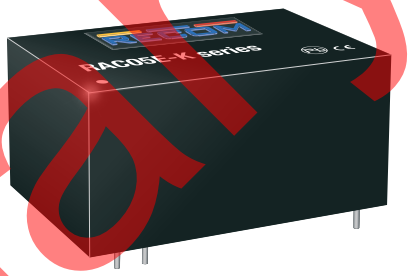
Regulated Converter

- 100-240VAC Input
- Primary side regulated
- Standard industry pinout
- Full load operation: -25 to 55°C
- No load power consumption <100mW
- Household and ITE certified

RECOM
AC/DC Converter

RAC05E-K

5 Watt
1.46“x0.95“
Single Output



Description

The economically priced RAC05E-K series of primary-side regulated AC/DC converters is designed to meet general purpose requirements for ITE and office use as well as household applications or light industrial automation processes, with less than 0.1W no-load power consumption. The footprint is based on the most common industry standard pinning for AC/DC modules from 3W onwards, with just slightly increased height. The AC/DC modules hold UL and CB certifications to the IEC 62368-1 standard and to EN 60335-1 for household applications. Certified for full load operation from -25°C to +55°C and worldwide input voltage ranges of nominal 100-240VAC, the modules feature semi-regulated outputs with permanent short circuit and over voltage protection. With only a few additional components EN55014 and EN55032 class B limits for electromagnetic compatibility are met.

Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. (1) [%]
RAC05E-05SK	90-264	5	1000	74
RAC05E-12SK	90-264	12	417	78
RAC05E-15SK	90-264	15	333	79
RAC05E-24SK	90-264	24	208	80

Notes:

Note1: Efficiency is tested at nominal input and full load at +25°C ambient

Model Numbering

RAC05E-__ SK

- max. Output Power
- nom. Output Voltage
- **S**ingle

Ordering Examples:

RAC05E-05SK	5 Watt	5Vout
RAC05E-24SK	5 Watt	24Vout

UL/IEC/EN62368-1 certified
CAN/CSA C22.2 No. 62368-1 certified
IEC/EN60335-1 certified
EN62233 certified
IEC/EN61558-1 certified
IEC/EN61558-2-16 certified
EN55032/EN55035 compliant
EN IEC 61204-3 compliant
CB Report

Specifications (measured @ Ta= 25°C, nom. Vin= 230VAC, full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

Parameter	Condition		Min.	Typ.	Max.
Internal Input Filter					Pi type
Nominal Input Voltage	50/60Hz		100VAC		240VAC
Operating Range (2, 3)	47-63Hz DC		90VAC 130VDC	230VAC	264VAC 370VDC
Input Current	115VAC 230VAC				250mA 100mA
Inrush Current	cold start at 25°C	115VAC 230VAC			20A 10A
No load Power Consumption					100mW
Input Frequency Range	AC Input		47Hz		63Hz
ErP Standby Mode Conformity (Output Load Capability)	Input power=	0.5W 1.0W			0.32 0.68
Minimum Load			0%		
Power Factor	115VAC 230VAC		0.55 0.45		
Start-up Time				20ms	
Rise Time				15ms	
Hold-up Time	115VAC 230VAC		8ms 20ms		
Internal Operating Frequency	100% load at nominal Vin				130kHz
Output Ripple and Noise (4)	20MHz BW	5Vout others			70mVp-p 1% of Vout

Notes:

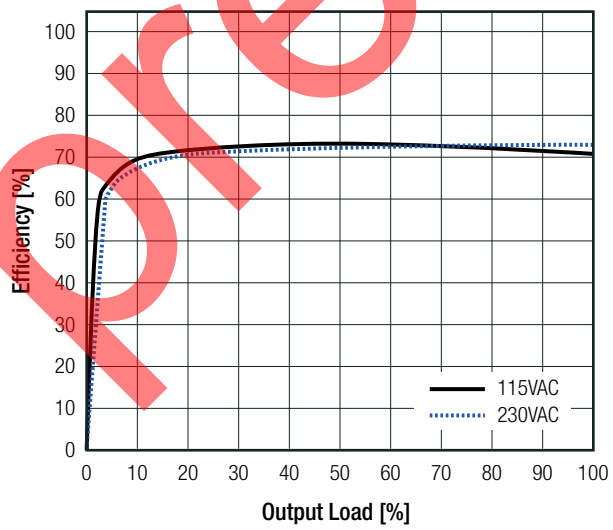
Note2: The products were submitted for safety files at AC-Input operation

Note3: Refer to ***"Line Derating"***

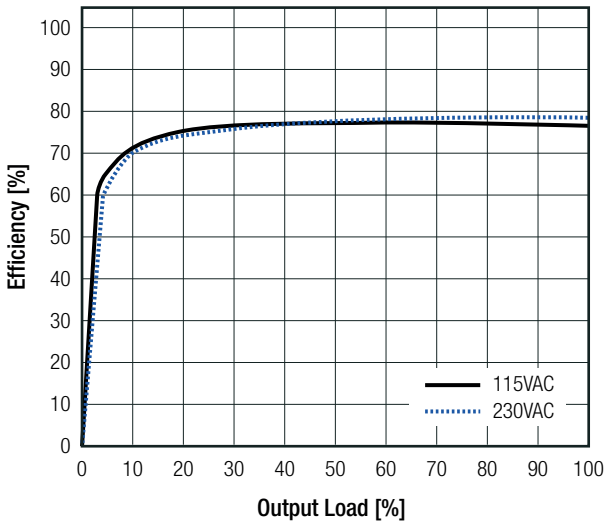
Note4: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

Efficiency vs. Load

RAC05E-05SK



RAC05E-12SK + RAC05E-15SK



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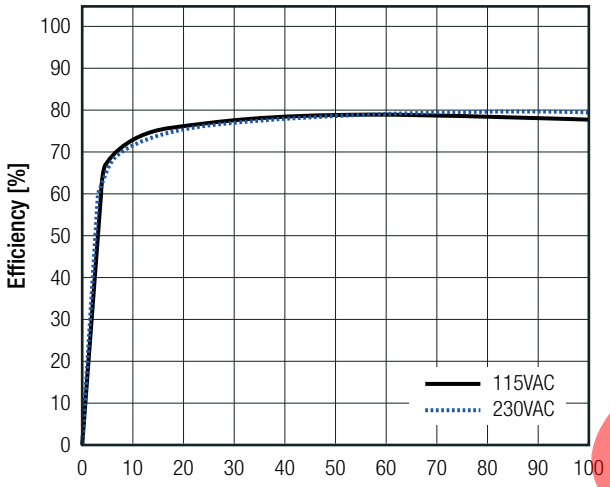
Specifications (measured @ Ta= 25°C, nom. Vin= 230VAC, full load and after warm-up unless otherwise stated)

Efficiency vs. Load

RAC05E-24SK



REGULATIONS

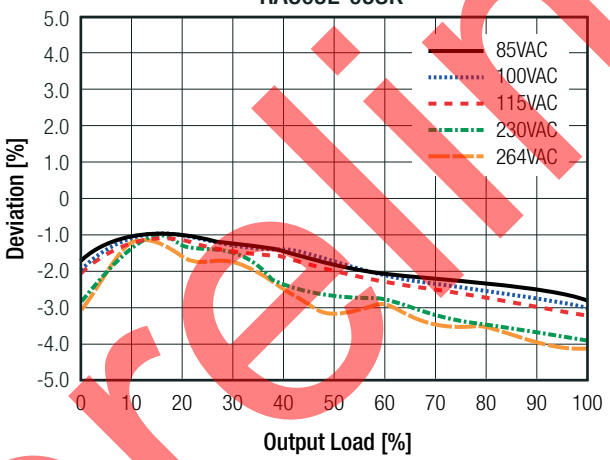
Parameter	Condition	Value
Output Accuracy		±5.0% typ.
Line Regulation		±5.0% typ.
Load Regulation (5)		5.0% typ.

Notes:

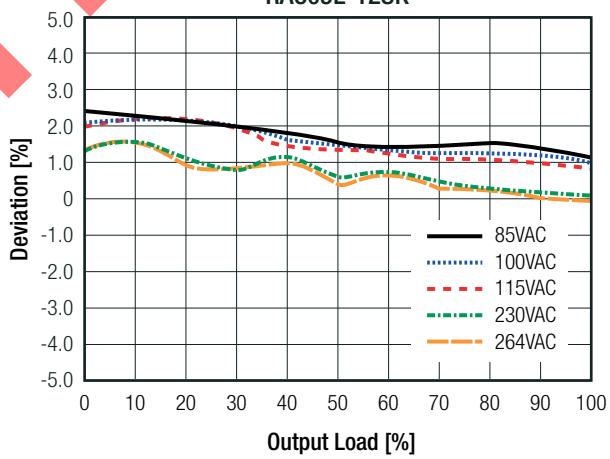
Note5: Operation below 10% load will not harm the converter, but specifications may not be met

Deviation vs. Load

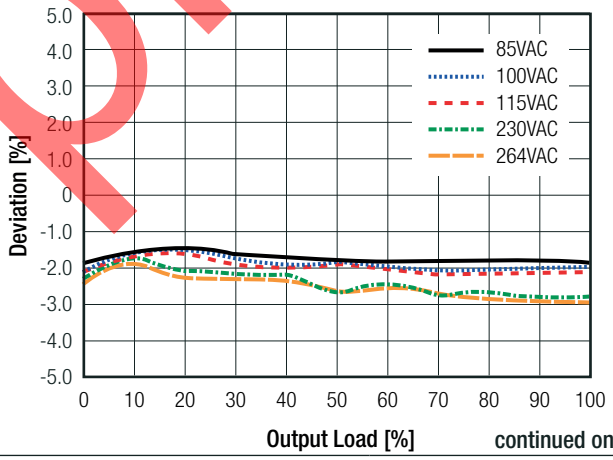
RAC05E-05SK



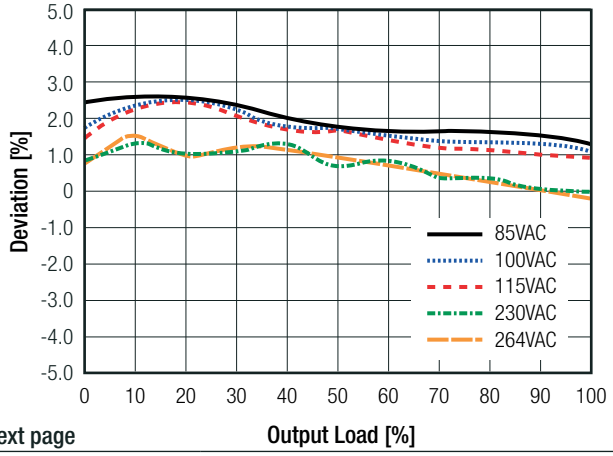
RAC05E-12SK



RAC05E-15SK



RAC05E-24SK



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Specifications (measured @ Ta= 25°C, nom. Vin= 230VAC, full load and after warm-up unless otherwise stated)

PROTECTIONS

Parameter	Type			Value
Input Fuse [6]	external			fusible resistor 5.1Ω
Short Circuit Protection (SCP)	below 100mΩ			Hiccup mode, auto recovery
Over Voltage Category (OVC)				OVCII
Over Current Protection (OCP)				120% - 180%, hiccup mode
Isolation Voltage (safety certified)	I/P to O/P	1 minute	according to 60335-1 according to 62368-1 according to 61558	3kVAC 4kVDC 4.2kVAC
Insulation Grade				reinforced

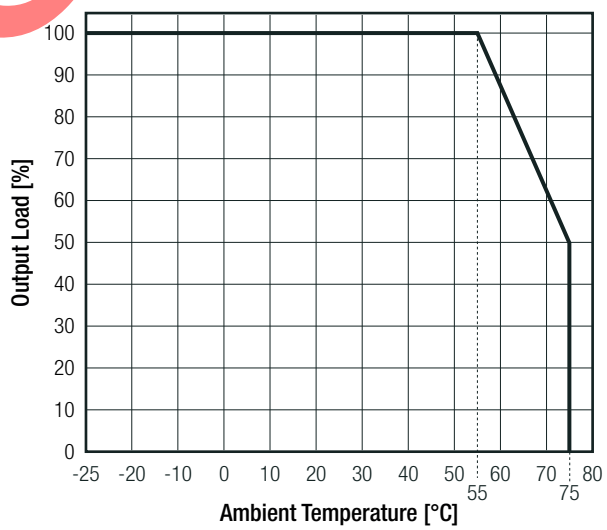
Notes:

Note6: An external fuse is mandatory in order to protect the device in addition on the AC input side.

ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	full load refer to *"Derating Graph"*		-25°C to +75°C
Maximum Case Temperature			+90°C
Temperature Coefficient			±0.05%/K
Operating Altitude	according to 60335-1		5000m
Operating Humidity	non-condensing		20% - 95% RH max.
Pollution Degree			PD2
Vibration			10-500Hz, 2G10min./1cycle, period 60min. each along x,y,z axes
MTBF	according to MIL-HDBK-217F, G.B.	+25°C +40°C	1680 x 10^3 hours 1290 x 10^3 hours
Design Lifetime	+50°C		>40 x 10^3 hours

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



Specifications (measured @ Ta= 25°C, nom. Vin= 230VAC, full load and after warm-up unless otherwise stated)

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Report Number**	**Standard**
Audio/Video, information and communication technology equipment - Part 1: Safety requirements	E491408-A6016-UL	UL62368-1:2014 CAN/CSA-C22.2 No. 62368-1:2014
Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme)	E491408-A6017-CB-1	IEC62368-1:2014 2nd Edition
Audio/Video, information and communication technology equipment - Safety requirements (LVD)	E491408-A6015-IT-1	EN62368-1:2014 + A11:2017
Household and similar electrical appliances – Safety – Part 1: General requirements (CB Scheme)	LCS200820072AS	IEC60335-1:2010 5th Edition + C1:2016
Household and similar electrical appliances – Safety – Part 1: General requirements (LVD)		EN60335-1:2012 + A11:2014+A13:2017+A1 :2019+A2:2019+A14:2019
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure		EN62233:2008
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB Scheme)	NN20TGSJ-001	IEC61558-1:2005 2nd Edition + A1:2009
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100 V Part 2: Particular requirements (CB Scheme)		IEC61558-2-16:2009 1st Edition + A1:2013
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V	NN20UK56-001	EN61558-1:2005 + A1:2009
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100 V Part 2: Particular requirements		EN61558-2-16:2009 + A1:2013
RoHS2		RoHS 2011/65/EU + AM2015/863

EMC Compliance (Industrial)	Condition		Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements			EN55032:2015, Class A/B
Electromagnetic compatibility of multimedia equipment – Immunity requirements			EN55035:2017
ESD Electrostatic Discharge Immunity Test	Air: ± 2, 4, 8kV Contact: ±2, 4kV		IEC61000-4-2:2008, Criteria B EN61000-4-2:2009, Criteria B
Radiated, Radio-Frequency, Electromagnetic Field Immunity Test	3V/m: 80-1000MHz 1800MHz, 2600MHz 3500MHz, 5000MHz		IEC/EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Port: ±1kV		IEC/EN61000-4-4:2012, Criteria B
Surge Immunity	AC Power Port: ±1kV		IEC61000-4-5:2014, Criteria B EN61000-4-5:2014+A1:2017, Criteria B
Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields	3Vrms: 0.15-10MHz 3-1Vrms: 10-30MHz 1Vrms: 30-80MHz		IEC61000-4-6:2013, Criteria A EN61000-4-6:2014+AC:2015, Criteria A
Power Magnetic Field Immunity	1A/m		IEC61000-4-8:2009, Criteria A EN61000-4-8:2010, Criteria A
Voltage Dips and Interruption	Voltage Dips:	100%	IEC61000-4-11:2004, Criteria B EN61000-4-11:2004+A1:2017, Criteria B
		30%	IEC61000-4-11:2004, Criteria C EN61000-4-11:2004+A1:2017, Criteria C
	Interruptions:	100%	IEC61000-4-11:2004, Criteria C EN61000-4-11:2004+A1:2017, Criteria C

EMC Compliance (Low Voltage PSU)	Condition	Standard / Criterion
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		EN IEC 61204-3:2018, Class A/B
ESD Electrostatic Discharge Immunity Test	Air: ± 2, 4, 8kV Contact: ±2, 4kV	IEC61000-4-2:2008, Criteria B EN61000-4-2:2009, Criteria B

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Specifications (measured @ Ta= 25°C, nom. Vin= 230VAC, full load and after warm-up unless otherwise stated)

EMC Compliance (Low Voltage PSU)	Condition		Standard / Criterion
Radiated, Radio-Frequency, Electromagnetic Field Immunity Test	10V/m: 80-1000MHz 3V/m: 1400-2000MHz 1V/m: 2000-2700MHz		IEC/EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Port: ±2kV		IEC/EN61000-4-4:2012, Criteria B
Surge Immunity	AC Power Port: ±1kV		IEC61000-4-5:2014, Criteria B EN61000-4-5:2014+A1:2017, Criteria B
Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields	10Vrms: 0.15-80MHz		IEC61000-4-6:2013, Criteria A EN61000-4-6:2014+AC:2015, Criteria A
Power Magnetic Field Immunity	30A/m		IEC61000-4-8:2009, Criteria A EN61000-4-8:2010, Criteria A
Voltage Dips and Interruption	Voltage Dips:	100% (0.5P; 1.0P)	IEC61000-4-11:2004, Criteria B EN61000-4-11:2004+A1:2017, Criteria B
		20%, 30%, 60%	IEC61000-4-11:2004, Criteria C EN61000-4-11:2004+A1:2017, Criteria C
	Interruptions:	100%	IEC61000-4-11:2004, Criteria C EN61000-4-11:2004+A1:2017, Criteria C
Limits of Voltage Fluctuations & Flicker			EN61000-3-3:2013+A1:2019
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices			FCC 47 CFR Part 15 Subpart B, Class B
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices, industrial, scientific, and medical equipment			FCC 47 CFR Part 18

DIMENSION AND PHYSICAL CHARACTERISTICS		
Parameter	**Type**	**Value**
Material	case/baseplate potting PCB	black plastic, (UL94 V-0) PU, (UL94 V-0) FR4, (UL94 V-0)
Dimension (LxWxH)		37.0 x 24.0 x 18.0mm
Weight		26.4g typ.

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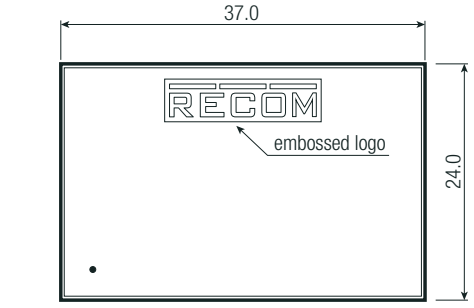
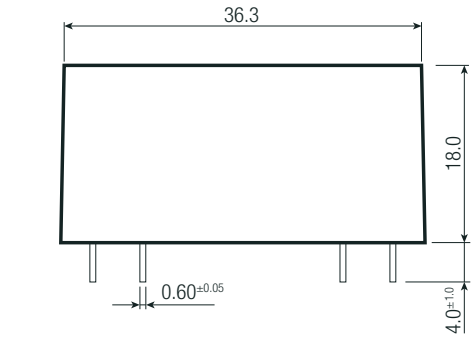
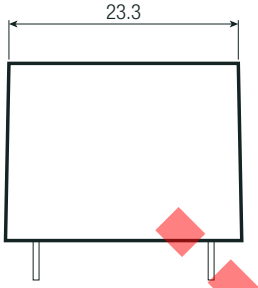
Specifications (measured @ Ta= 25°C, nom. Vin= 230VAC, full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)





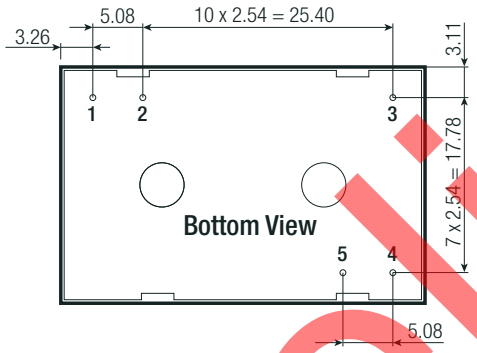


General tolerances according to ISO 2768-m (table for reference only)	
Dimension range	Tolerances
0.5 - 6 mm	±0.1 mm
6 - 30 mm	±0.2 mm
30 - 120 mm	±0.3 mm
120 - 400 mm	±0.5 mm

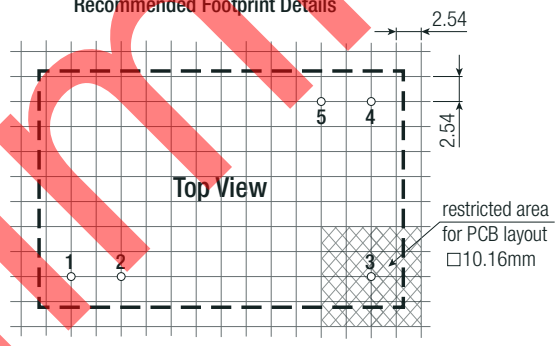
Pinning Information

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

NC= no connection



Recommended Footprint Details



PACKAGING INFORMATION		
Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	490.0 x 26.6 x 25.3mm
Packaging Quantity		12pcs