

Features

Regulated Converter

- Ultra-wide input range 85-528VAC
- OVC III input rating without additional fuses
- Operating temperature range: -40°C to +80°C
- Overvoltage and overcurrent protected
- Class II installations (without FG)
- EMC compliant without external components
- No load power consumption <0.5W

RECOM

AC/DC Converter

RAC05-K/480

5 Watt Single Output



Description

The RAC05-K/480 series of 5 watt AC/DC units are specially designed for harsh industrial and outdoor mains conditions. These PCB-mount power supplies are rated to OVC III conditions from 100-480VAC nominal input lines with phase-to-phase or single phase operation without any external components needed. The modules support an operating temperature range from -40°C to +80°C and come with fully protected outputs as well as EMC class A and B compliance. All these features make them an ideal fit for integration into smart grid, renewable energy, smart metering and IoT applications.

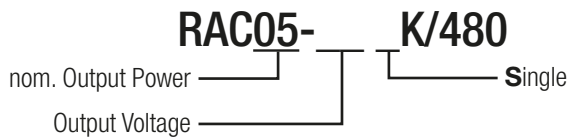
Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ ⁽¹⁾ [%]	Max. Capacitive Load ⁽²⁾ [µF]
RAC05-05SK/480	85-528	5	1000	63	10000
RAC05-12SK/480	85-528	12	420	65	1200

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



Ordering Examples:

RAC05-05SK/480	5Vout	Single Output
RAC05-12SK/480	12Vout	Single Output

- IEC/EN62368-1 certified
- IEC/EN61204 certified
- EN55032 certified
- EN55014 certified
- EN55024 certified
- EN61000 certified
- CB Report

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= 480VAC		85VAC 120VDC	480VAC	528VAC 745VDC
Input Current	400VAC 480VAC				40mA 35mA
Inrush Current	cold start at +25°C	400VAC 480VAC		18A 20A	
No load Power Consumption					500mW
Input Frequency Range	AC Input		47Hz		63Hz
Minimum Load			0%		
Power Factor	400VAC/480VAC		0.45		
Start-up Time				25ms	
Rise Time					20ms
Hold-up Time	400VAC 480VAC			150ms 200ms	
Internal Operating Frequency				130kHz	
Output Ripple and Noise ⁽⁵⁾	20MHz BW	400VAC 480VAC		50mVp-p	

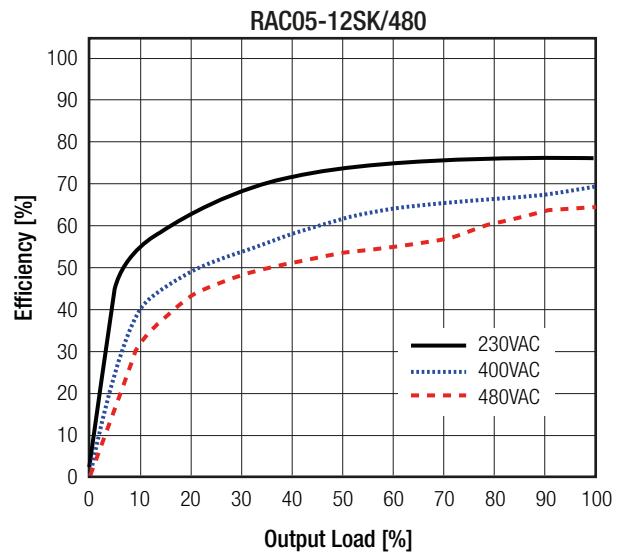
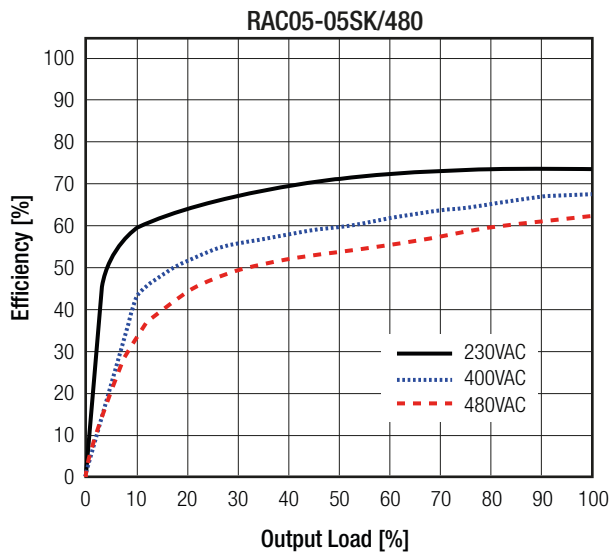
Notes:

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)

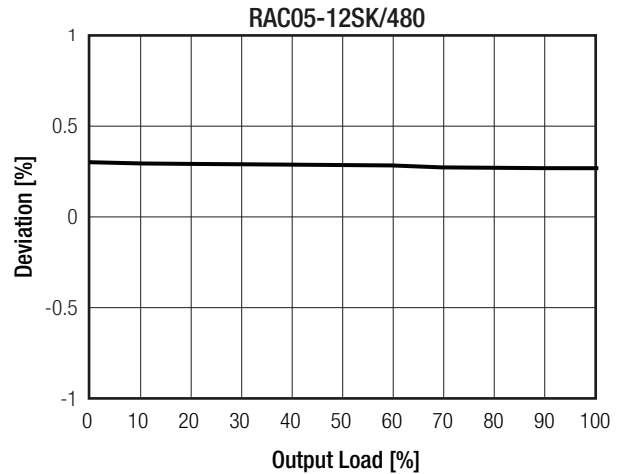
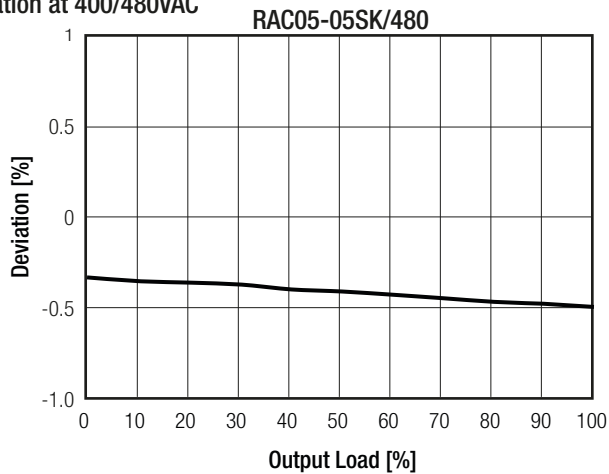
Efficiency vs. Load



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

REGULATIONS

Parameter	Condition	Value
Output Accuracy		±1.0% max.
Line Regulation		±0.5% typ.
Load Regulation	10% to 100% load	1.0% typ.
Transient Response	25% load step change recovery time	4.0% max. 500µs typ.

Deviation at 400/480VAC

PROTECTIONS

Parameter	Type	Value
Input Fuse ⁽⁶⁾	internal	fusible resistor 5Ω
Short Circuit Protection (SCP)	below 100mΩ	hiccup, automatic restart
Over Voltage Protection (OVP)		150% - 195%, hiccup mode
Over Voltage Category		OVCIII
Over Current Protection (OCP)		150% - 195%, hiccup mode
Class of Equipment		Class II
Isolation Voltage ⁽⁷⁾	I/P to O/P I/P to case and O/P to case	tested for 1 minute 4kVAC
Isolation Resistance		1GΩ min.
Isolation Capacitance		100pF max.
Insulation Grade		reinforced
Leakage Current		25µA max.

Notes:

Note6: Refer to local safety regulations if input over-current protection is also required. Recommended fuse type: slow blow

Note7: 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 +60°C
		refer to derating graph	-40°C to +80°C
Maximum Case Temperature		+100°C	
Temperature Coefficient		0.05%/K	
Thermal Impedance	0.1m/s, horizontal (vertical)	16K/W	
Operating Altitude		3000m	
Operating Humidity	non-condensing	5% - 95% RH max.	

continued on next page

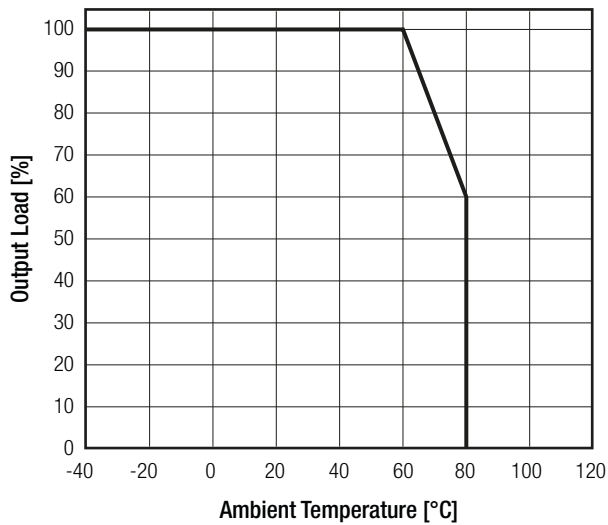
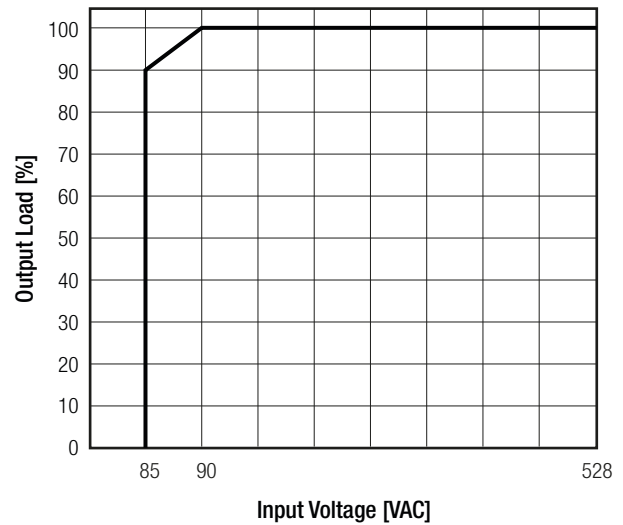
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

ENVIRONMENTAL

Parameter	Condition		Value
Pollution Degree			PD2
Vibration	according to MIL-STD-202G		10-500Hz, 2G 10min./1cycle, period 60min. each along x,y,z axes
Design Lifetime	+25°C		105 x 10 ³ hours
	+60°C		40 x 10 ³ hours
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	>450 x 10 ³ hours
		+60°C	>37.5 x 10 ³ hours

Derating Graph

(@ Chamber and natural convection 0.1 m/s)


Line Derating

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Audio/video, information and communication technology equipment. Safety requirements	A1801438	IEC62368-1:2014 2nd Edition EN62368-1:2014 + A11:2017
RoHs 2		RoHS-2011/65/EU + AM-2015/863

EMC Compliance	Condition	Standard / Criterion
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		IEC/EN61204-3:2018, Class B
Electromagnetic compatibility of multimedia equipment – Emission Requirements	LCS180508025BE	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 characteristics - 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 80-1000MHz 3V/m (1.4-2.0GHz) 1V/m (2.0-2.7GHz)	EN61000-4-3:2006+A1:2009, 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

continued on next page

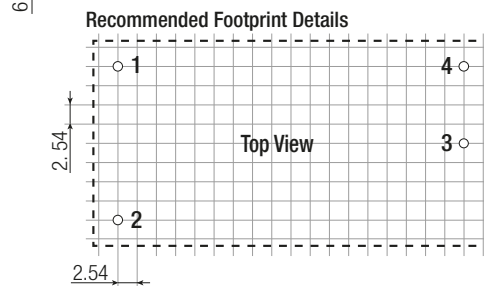
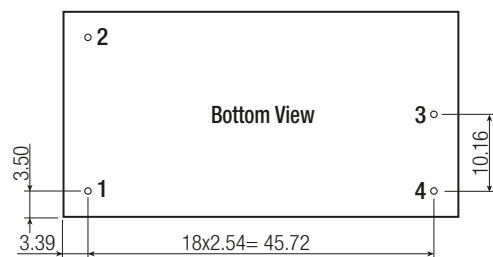
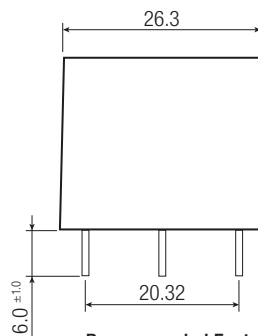
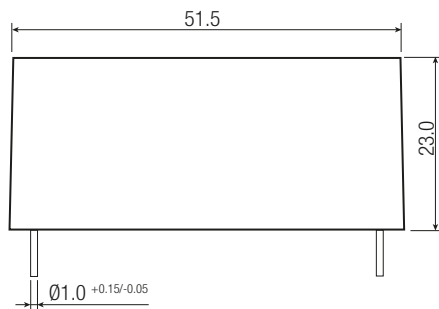
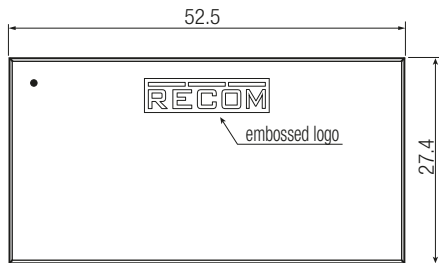
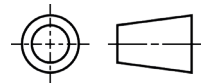
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

EMC Compliance	Condition	Standard / Criterion
Power Magnetic Field Immunity	50Hz, 30A/m	EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions	Voltage Dips 100% Voltage Dips 60% Voltage Dips 30% Voltage Dips 20% Voltage Interruptions > 95%	EN61000-4-11:2004+A1:2017, Criteria B 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 C
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013

DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case potting PCB baseplate	black plastic, (UL94V-0) silicone, (UL94V-0) FR4, (UL94V-0) plastic, (UL94V-0)
Dimension (LxWxH)		52.5 x 27.4 x 23.0mm
Weight		58g typ.

Dimension Drawing (mm)



Pin Connections

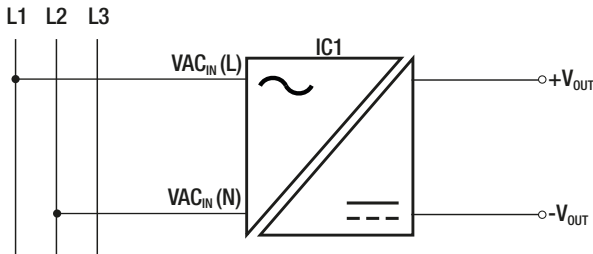
Pin #	Single
1	VAC in (N) (L2)
2	VAC in (L) (L1)
3	-Vout
4	+Vout

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

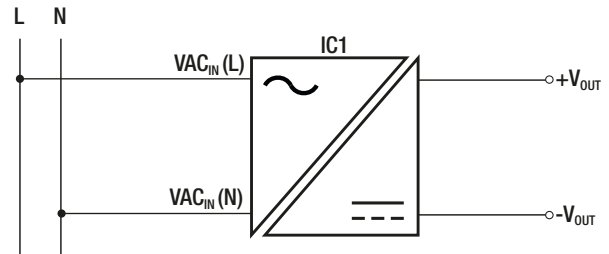
Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

INSTALLATION AND APPLICATION

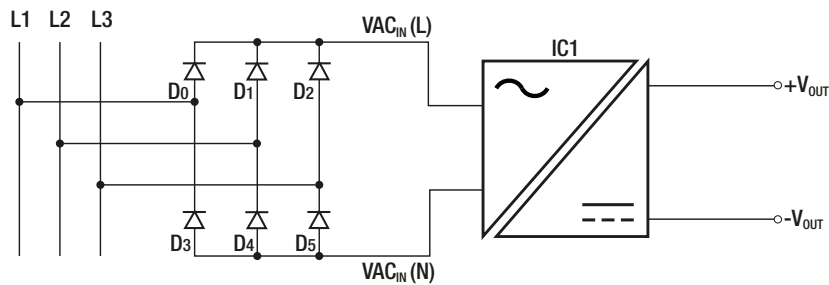
Phase to Phase Application



Standard L to N Application



Phase Redundancy B6U Application



PACKAGING INFORMATION

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

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.