

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

2" x 1"

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 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
RAC05-15SK/480	85-528	15	330	60	1000

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 compliant
UL61010-1 certified
CSA C22.2 No. 61010-1 certified
IEC/EN61010-1 certified
IEC/EN61204-3 compliant
EN55032 compliant
EN55014-1 compliant
EN55014-2 compliant
EN55024 compliant
EN61000 compliant
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	

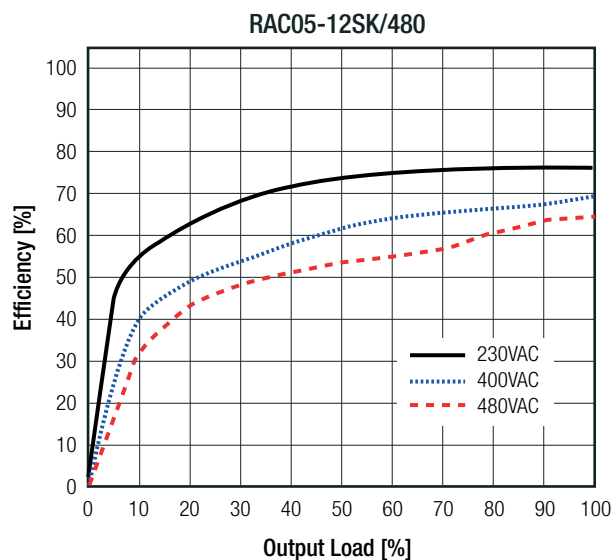
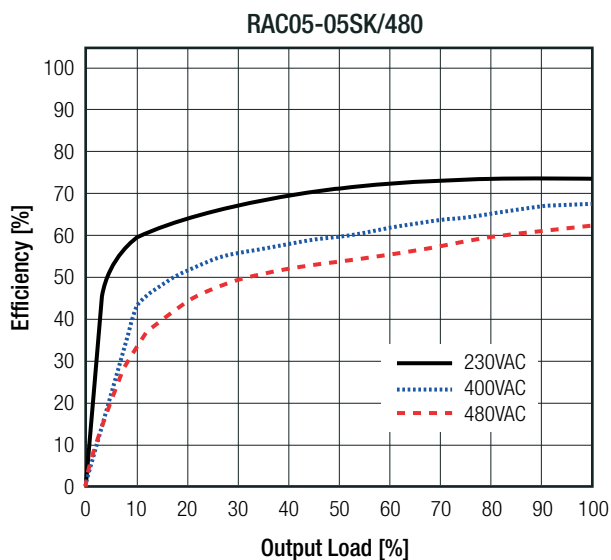
Notes:

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

Note4: Refer to „Line Derating“

Note5: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

Efficiency vs. Load



REGULATIONS

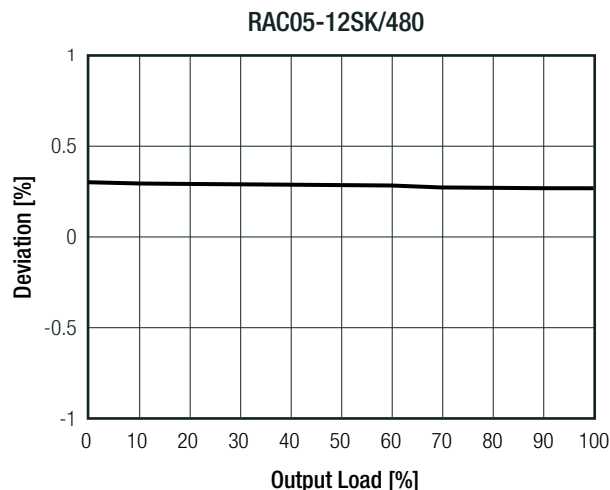
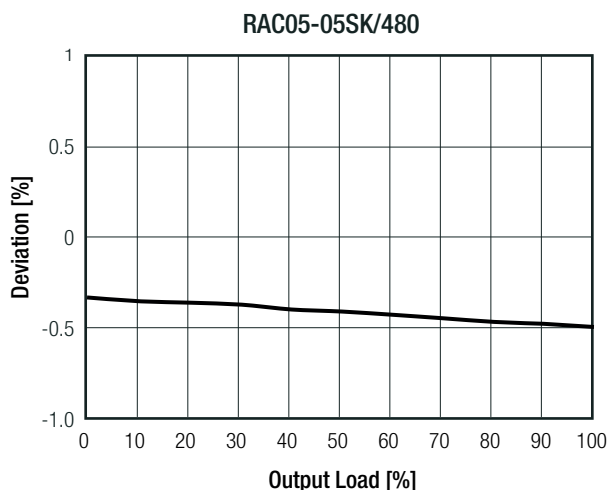
Parameter	Condition	Value
Output Accuracy		±1.0% typ.
Line Regulation		±0.5% typ.
Load Regulation	10% to 100% load	1.0% typ.

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

Parameter	Condition	Value
Transient Response	25% load step change recovery time	4.0% max. 500µs typ.

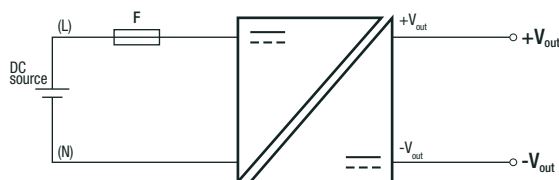
Deviation at 400/480VAC



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.

Protection Circuit ^(3,6)



Notes:

- Note6: Refer to local safety regulations if input over-current protection is also required. Recommended fuse type: slow blow
This product can also be used with a DC supply if an appropriately rated external fuse is used. Recom recommends a 600mA, 1kVDC fuse with a 10kA interrupting rating.
- Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage

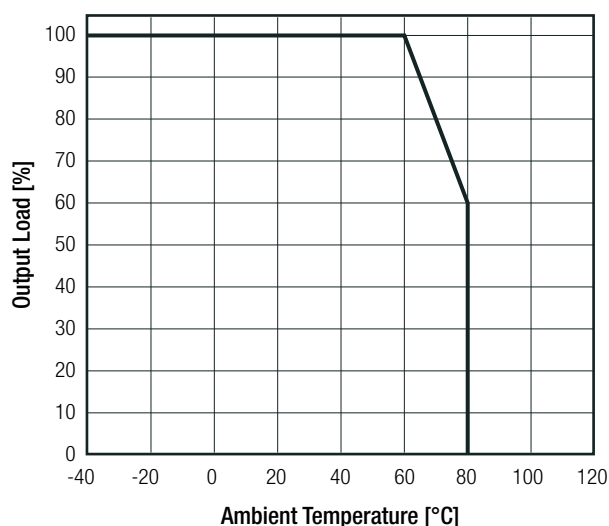
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

ENVIRONMENTAL

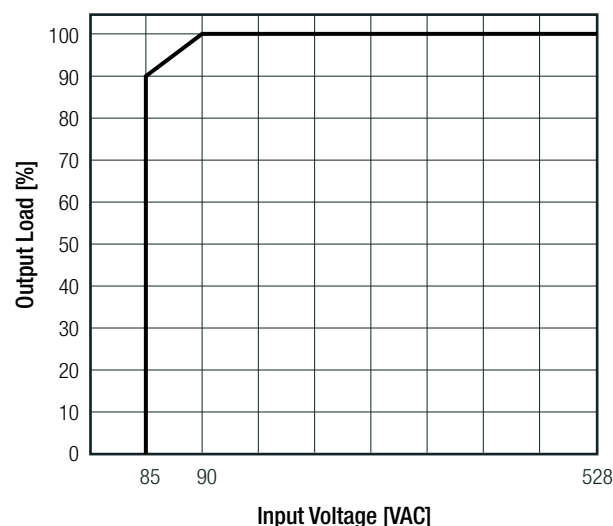
Parameter	Condition		Value
Operating Temperature Range	@ natural convection 0.1m/s	full load	-40°C to +60°C
		refer to „Derating Graph“	-40°C to +80°C
Maximum Case Temperature			+100°C
Temperature Coefficient			0.05%/K
Thermal Impedance	0.1m/s, horizontal (vertical)		16K/W
Operating Altitude			3000m
Operating Humidity	non-condensing		5% - 95% RH max.
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 0.1m/s)



Line Derating



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Audio/video, information and communication technology equipment. Safety requirements (LVD)		IEC62368-1:2014 2nd Edition EN62368-1:2014 + A11:2017
Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements	190415122GZU-001	UL61010-1, 3rd Edition 2012 CSA C22.2 No. 61010-1, 3rd Edition:2012
Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements	190415125GZU-001	EN61010-1:2010
Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements (CB Scheme)		IEC61010-1:2010 + A1:2016 3rd Edition
EAC	RU-AT.03.67361	TP TC 004/020, 2011
RoHS2		RoHS-2011/65/EU + AM-2015/863

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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
Low-voltage power supplies DC output - Part 3: Electromagnetic compatibility	LCS180508025BE	IEC/EN61204-3:2018, Class B
Electromagnetic compatibility of multimedia equipment – Emission Requirements ⁽⁸⁾		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	±8, 4, 2kV Air; ±4, 2kV Contact	EN61000-4-2: 2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	10V/m, 80MHz-1GHz 3V/m, 1.5GHz-2GHz 1V/m, 2GHz-2.7GHz	EN61000-4-3: 2006 + A1:2009, Criteria A
Fast Transient and Burst Immunity	AC In Port: ±2.0kV DC Out Port: ±2.0kV	EN61000-4-4:2012, Criteria B
Surge Immunity	AC IN Port: L-N ±1.0kV DC Out Port: ±0.5kV	EN61000-4-5:2014+A1:2017, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	10Vrms	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 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
Notes: Note8: If output is connected to GND, please contact RECOM tech support for advice		

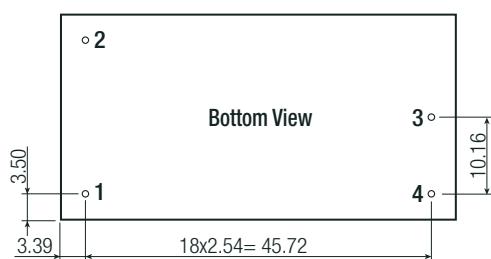
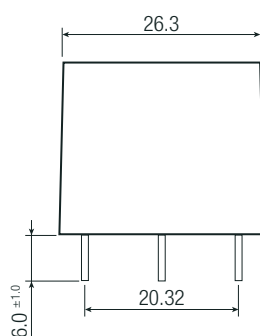
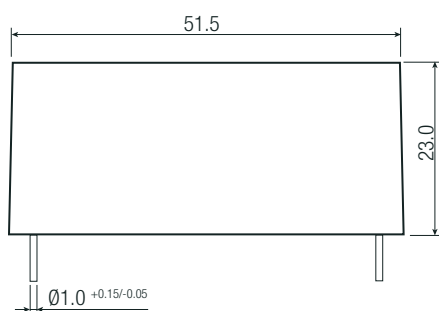
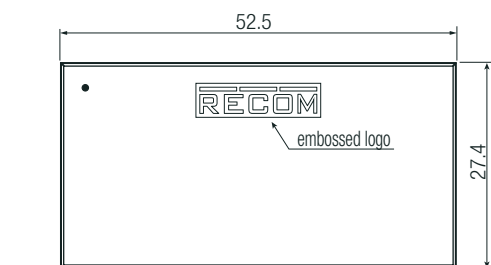
DIMENSION AND PHYSICAL CHARACTERISTICS

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.

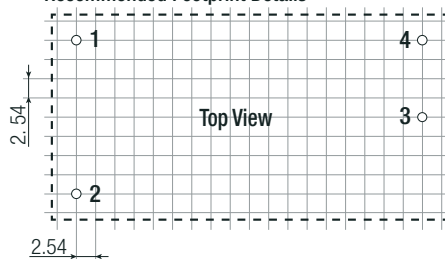
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Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)



Recommended Footprint Details

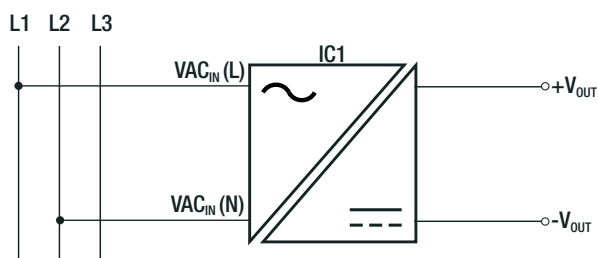


Pin Connections

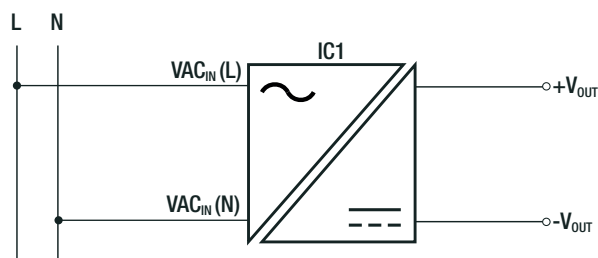
Pin #	Single
1	VAC in (N) (L2)
2	VAC in (L) (L1)
3	-Vout
4	+Vout
Tolerance: xx.x= ±0.5mm	
xx.xx= ±0.25mm	

INSTALLATION AND APPLICATION

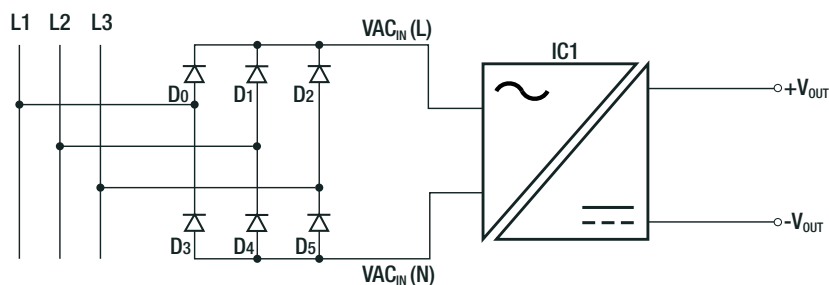
Phase to Phase Application



Standard L to N Application



Phase Redundancy B6U Application



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

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.