Features

Regulated Converter

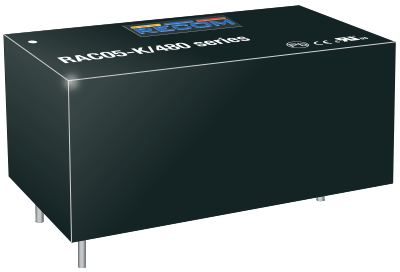
- OVC III and PD3 rating
- Continious max withstanding voltage 528VAC
- UL certified input 90-318VAC
- Operating temperature range: -40°C to +85°C
- Class II installations (without FG)
- EN55032 class "B" with floating outputs
- No load power consumption <0.5W

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 and/or PD3 conditions from 100-480VAC nominal input lines with phase-to-phase or single phase operation in class II installations by just adding a single fuse externally. 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 in floating output connections. 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

RAC05-__ __K/480

- nom. Output Power
- Output Voltage
- Single

Ordering Examples:

RAC05-05SK/480	5Vout	Single Output
RAC05-12SK/480	12Vout	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= 480VAC		85VAC 120VDC		528VAC 745VDC
Input Current	100VAC 400VAC 480VAC				110mA 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%		

Notes:

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

Note4: Refer to ***„Line Derating"***

continued on next page

RECOGNIZED COMPONENT

Intertek 5003727

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)

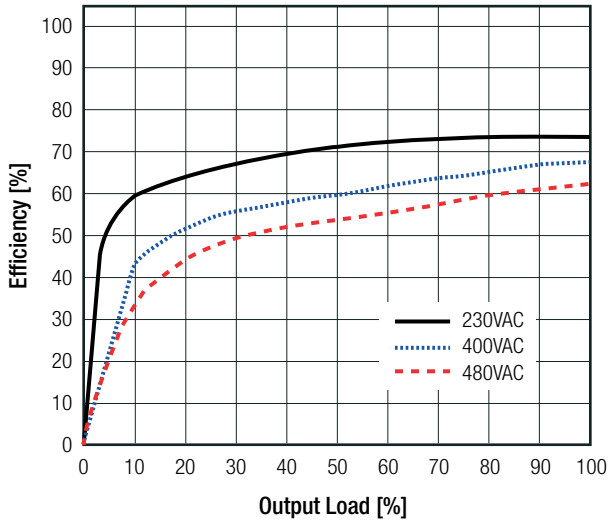
Parameter	Condition		Min.	Typ.	Max.
Power Factor	400VAC/480VAC		0.45		
Start-up Time				25ms	
Rise Time					20ms
Hold-up Time	100VAC 400VAC 480VAC			14ms 150ms 200ms	
Internal Operating Frequency				130kHz	
Output Ripple and Noise [5]	20MHz BW	400VAC 480VAC		50mVp-p	

Notes:

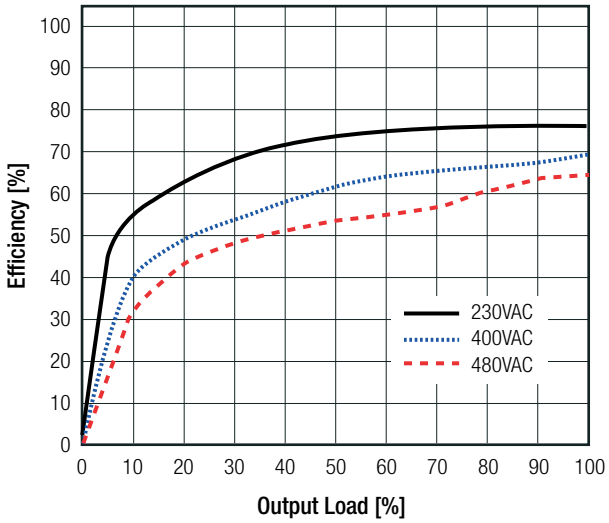
Note5: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

Efficiency vs. Load

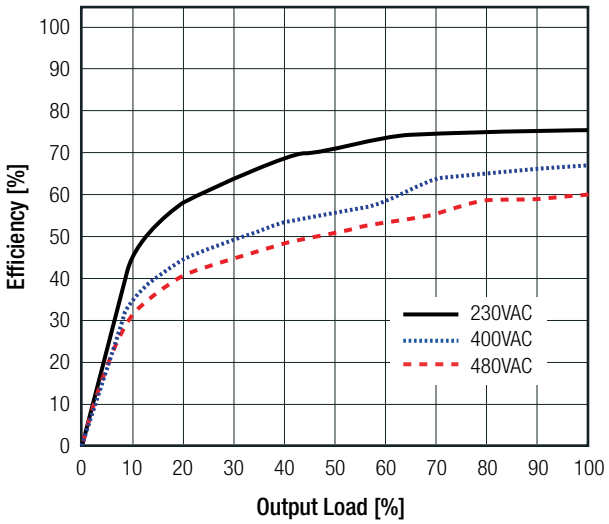
RAC05-05SK/480



RAC05-12SK/480



RAC05-15SK/480



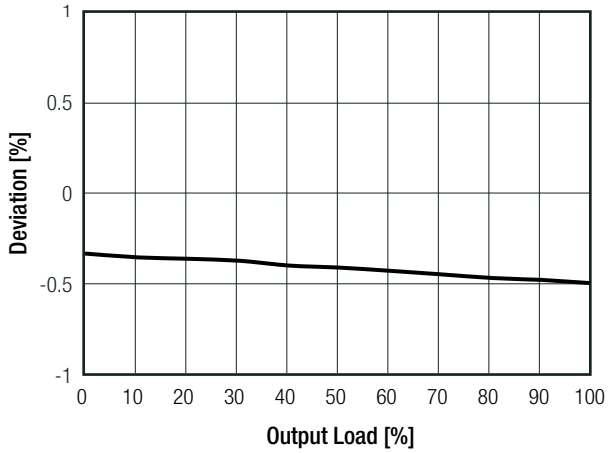
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REGULATIONS

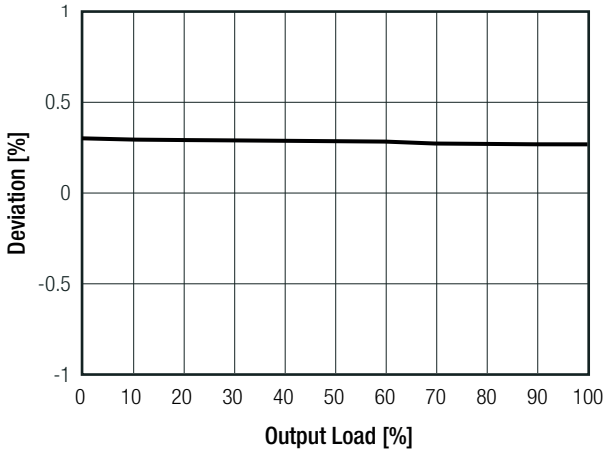
Parameter	Condition	Value
Output Accuracy		±1.0% typ.
Line Regulation		±0.5% typ.
Load Regulation	10% to 100% load	1.0% typ.
Transient Response	25% load step change recovery time	4.0% max. 500µs typ.

Deviation at 400/480VAC

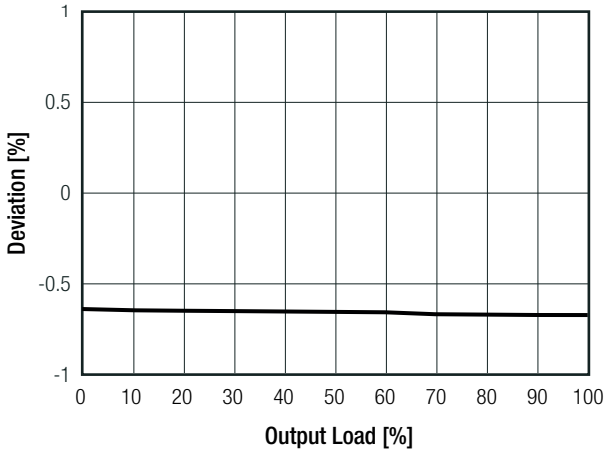
RAC05-05SK/480



RAC05-12SK/480



RAC05-15SK/480



PROTECTIONS

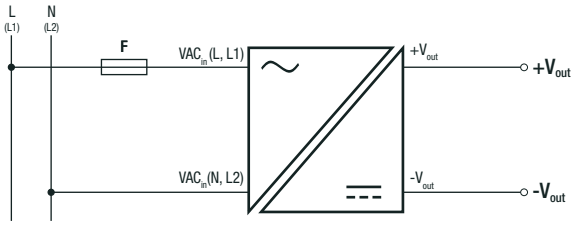
Parameter	Type	Value
Input Fuse (6)	external	slow blow 600VAC, 2A
Limited Power Source (LPS)	according to IEC62368-1 CB Report	yes
Short Circuit Protection (SCP)	below 100mΩ	hiccup, automatic restart
Over Voltage Protection (OVP)		150% - 195%, hiccup mode
Over Voltage Category		OVCIII
Over Current Protection (OCP)		150% - 195%, hiccup mode
Class of Equipment		Class II

continued on next page

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

Parameter	Type		Value
Isolation Voltage (7)	I/P to O/P	1 minute	5.4kVAC
Isolation Resistance			1GΩ min.
Isolation Capacitance			100pF max.
Insulation Grade			reinforced
Leakage Current			25µA max.

Protection Circuit (3,6)



Notes:

Note6: An external fuse is mandatory in order to protect the device in addition on the AC input side. RECOM recommend: slow blow type, 600Vac, 2A.

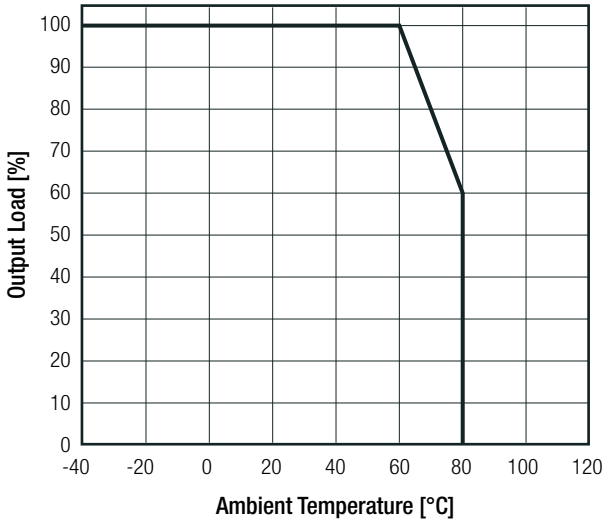
Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL

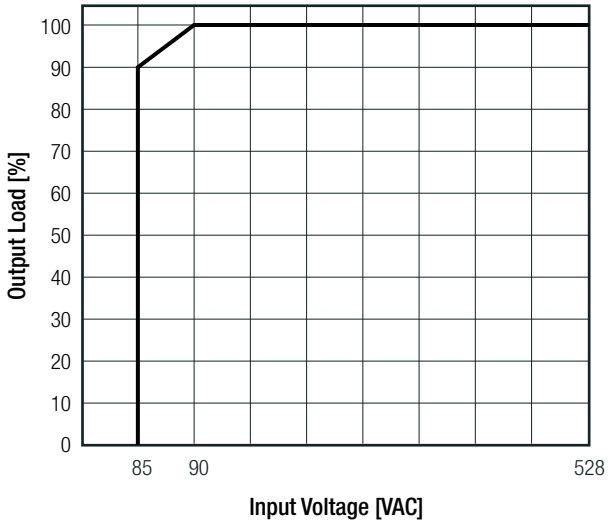
Parameter	Condition		Value
Operating Temperature Range (8)	@ natural convection 0.1m/s	full load	-40°C to +60°C
		refer to *„Derating Graph (8)“*	-40°C to +80°C
Maximum Case Temperature			+100°C
Temperature Coefficient			0.05%/K
Thermal Impedance	0.1m/s airflow		16K/W
Operating Altitude	according to 61010-1		5000m
Pollution Degree	according to 61010-1		PD3
Operating Humidity	non-condensing		5% - 95% RH max.
Vibration	according to MIL-STD-202G		10-500Hz, 2G 10min./1cycle, 60min. each along x,y,z axes
Design Lifetime	+25°C +60°C		105 x 10^3 hours 40 x 10^3 hours
MTBF	according to MIL-HDBK-217F, G.B.	+25°C +40°C	>1726 x 10^3 hours >1585 x 10^3 hours

Derating Graph (8)

(@ Chamber and natural convection 0.1m/s)



Line Derating



Notes:

Note8: The 12Vout and 15Vout were submitted for safety file (190415125GZU-001) for full load operation up to T_{AMB}= +50°C only

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
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

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 (9)		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, 8, 15kV, Contact: ±2, 4, 6, 8kV	EN61000-4-2: 2009, Criteria A
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 (5-100kHz) DC Out Port: ±2.0kHz	EN61000-4-4:2012, Criteria A EN61000-4-4:2012, Criteria B
Surge Immunity	AC IN Port: L-N ±0.5, 1, 2, 4kV DC Out Port: ±0.5kV	EN61000-4-5:2019, Criteria A 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:

Note9: 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, (UL94 V-0) polyurethane, (UL94 V-0) FR4, (UL94 V-0) plastic, (UL94 V-0)
Dimension (LxWxH)		52.5 x 27.4 x 23.0mm
Weight		58g typ.

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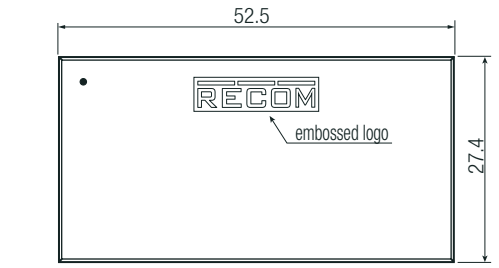
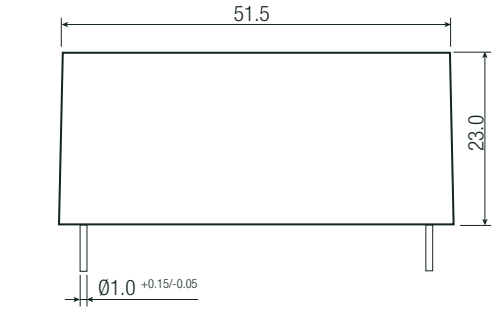
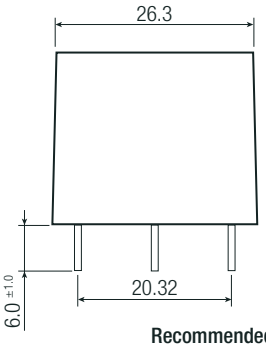
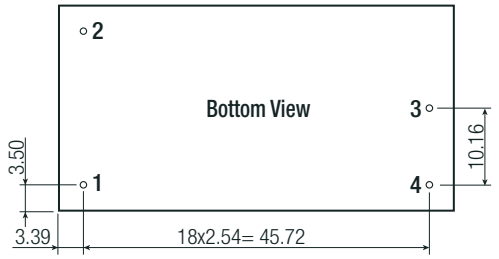
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)

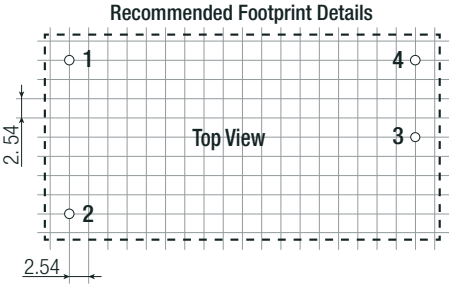








Recommended Footprint Details



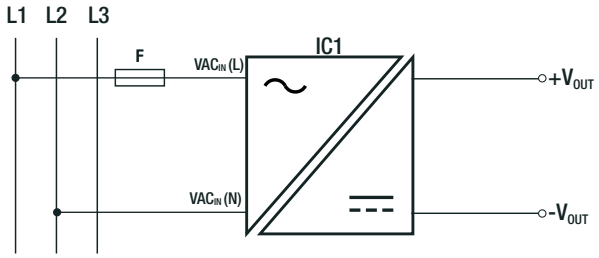
Pin Connections

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

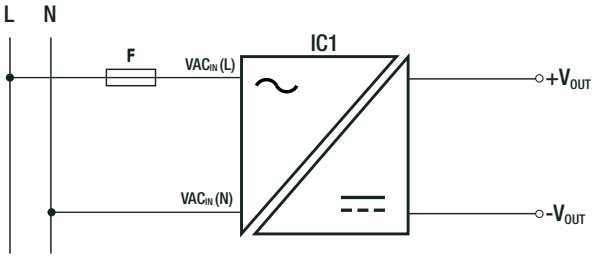
Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm

INSTALLATION AND APPLICATION

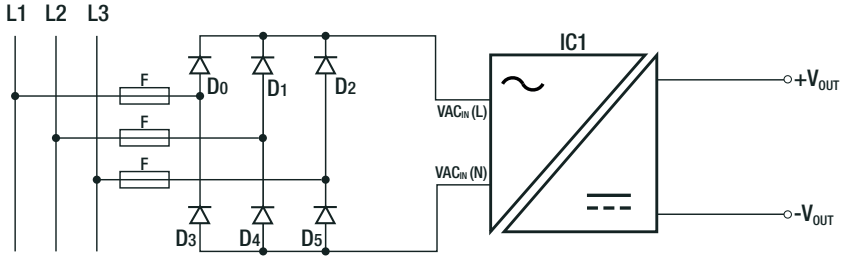
Phase to Phase Application



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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

RECOM:

RAC05-12SK/480 RAC05-05SK/480 RAC05-15SK/480