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

3 YEAR warranty

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

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%		

continued on next page

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	400VAC 480VAC			150ms 200ms	
Internal Operating Frequency				130kHz	
Output Ripple and Noise [5]	20MHz BW	400VAC 480VAC		50mVp-p	

Notes:

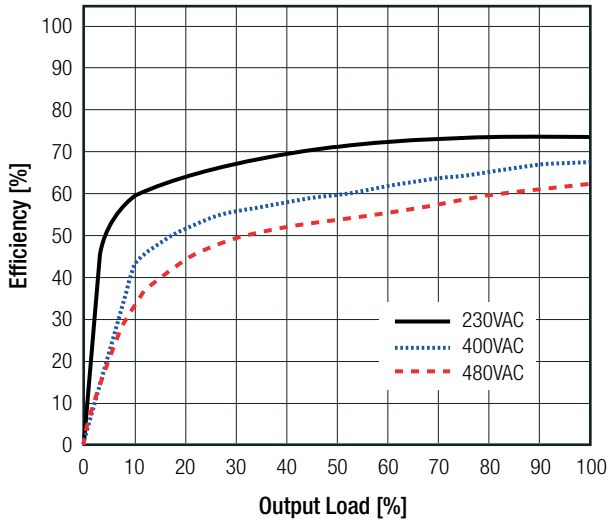
Note3: The products were submitted for safety files at AC-Input operation

Note4: Refer to ***„Line Derating“***

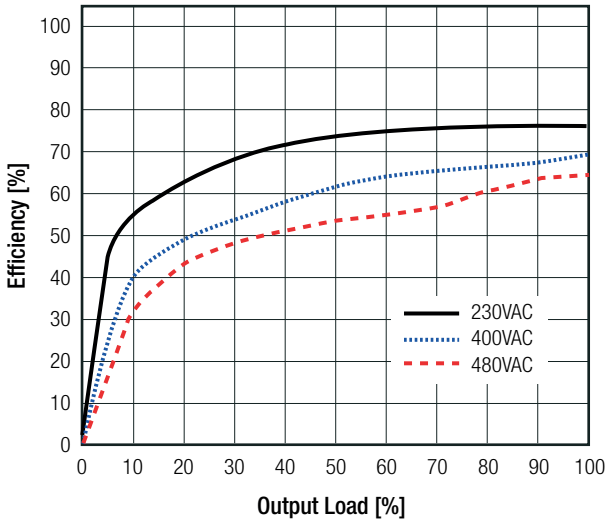
Note5: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

Efficiency vs. Load

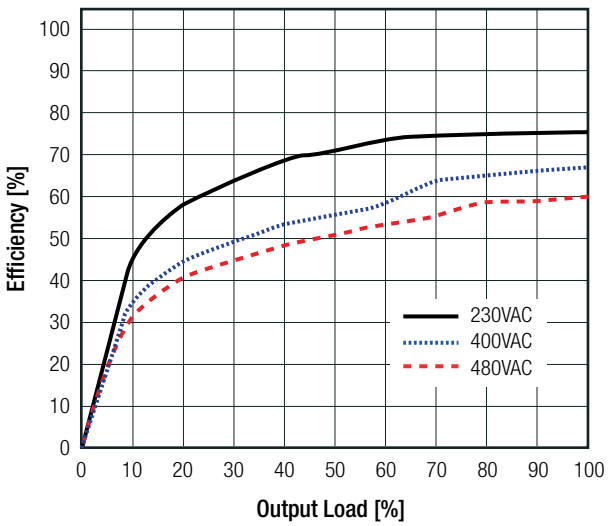
RAC05-05SK/480



RAC05-12SK/480



RAC05-15SK/480



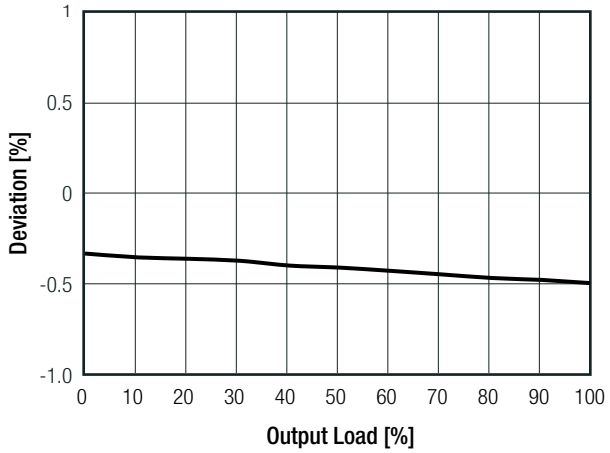
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REGULATIONS

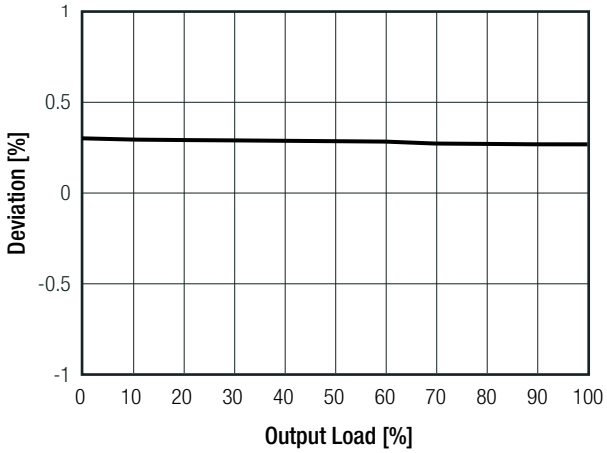
Parameter	Condition	Value
Output Accuracy		±1.0% typ.
Line Regulation		±0.5% typ.
Load Regulation	10% to 100% load	1.0% typ.
Transient Response	25% load step change recovery time	4.0% max. 500µs typ.

Deviation at 400/480VAC

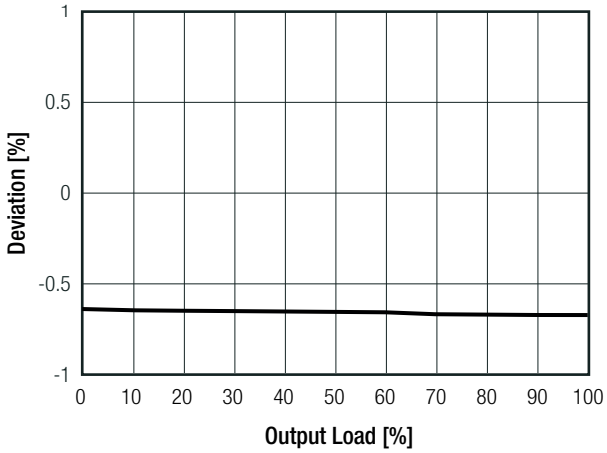
RAC05-05SK/480



RAC05-12SK/480



RAC05-15SK/480



PROTECTIONS

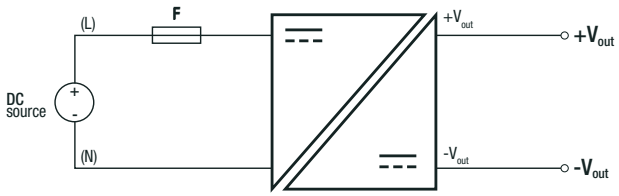
Parameter	Type	Value
Input Fuse (6)	internal	fusible resistor 5Ω
Short Circuit Protection (SCP)	below 100mΩ	hiccup, automatic restart
Over Voltage Protection (OVP)		150% - 195%, hiccup mode
Over Voltage Category		OVCIII
Over Current Protection (OCP)		150% - 195%, hiccup mode
Class of Equipment		Class II

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 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.

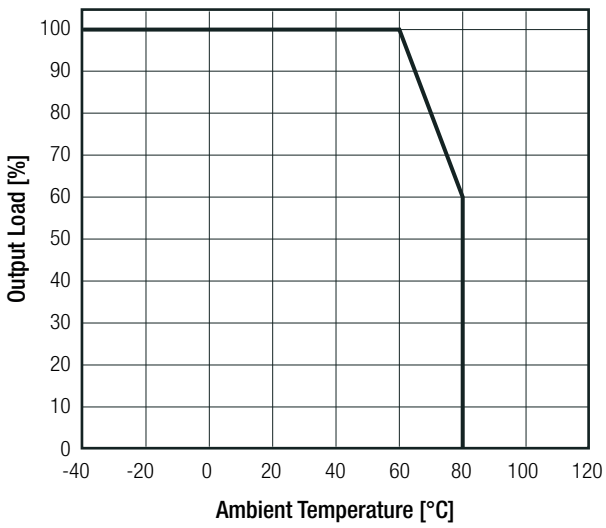
Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL

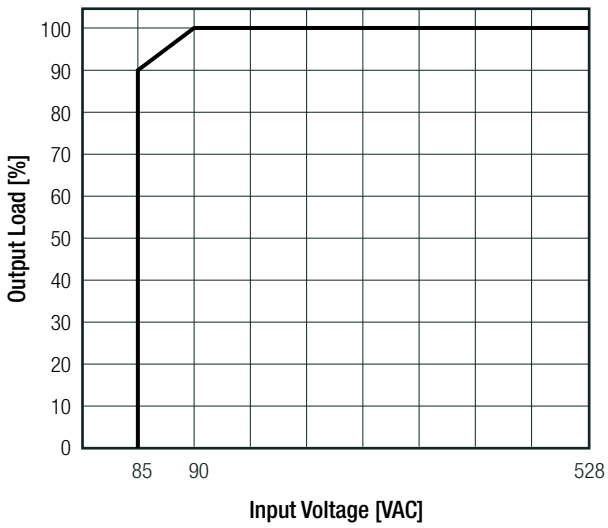
Parameter	Condition		Value
Operating Temperature Range	@ natural convection 0.1m/s	full load	-40°C to +60°C
		refer to ***„Derating Graph“***	-40°C to +80°C
Maximum Case Temperature			+100°C
Temperature Coefficient			0.05%/K
Thermal Impedance	0.1m/s, horizontal (vertical)		16K/W
Operating Altitude		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

(@ Chamber and natural convection 0.1m/s)



Line Derating



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 (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

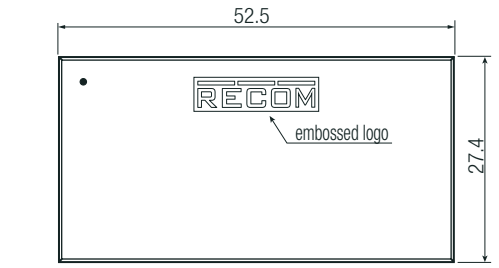
DIMENSION AND PHYSICAL CHARACTERISTICS

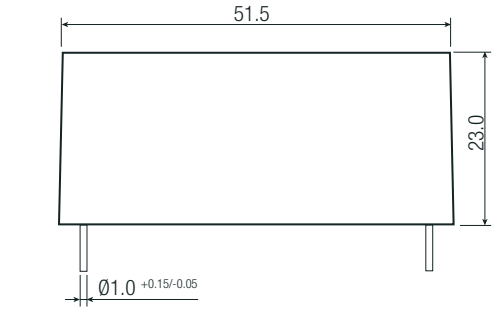
Parameter	Type	Value
Material	case potting PCB baseplate	black plastic, (UL94V-0) silicone, (UL94V-0) FR4, (UL94V-0) plastic, (UL94V-0)
Dimension (LxWxH)		52.5 x 27.4 x 23.0mm
Weight		58g typ.

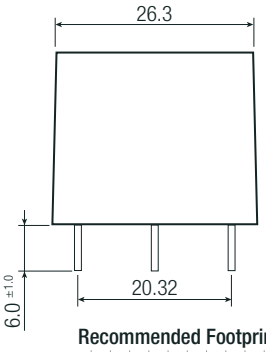
continued on next page

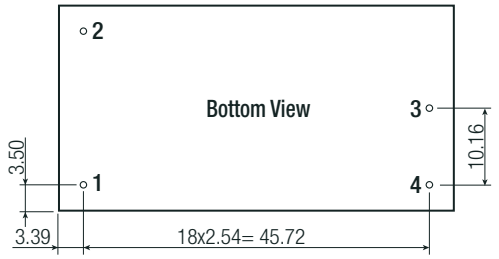
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)

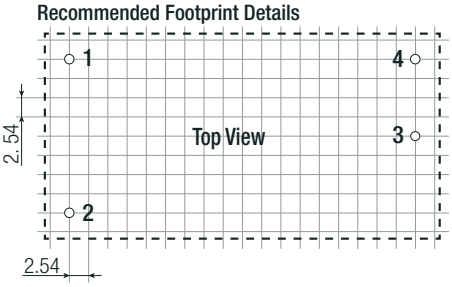








Recommended Footprint Details



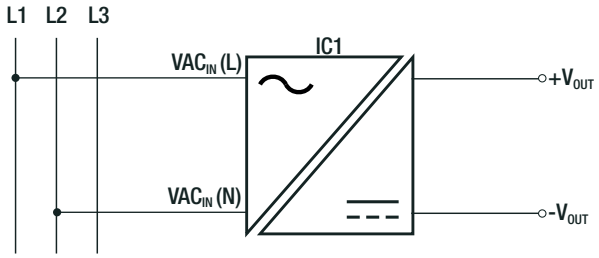
Pin Connections

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

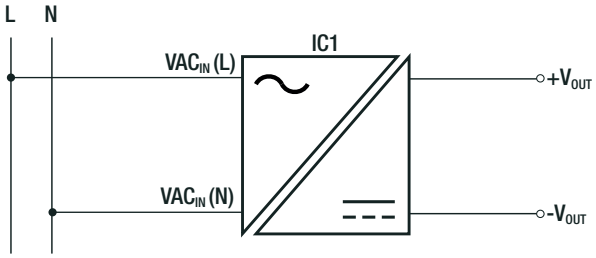
Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm

INSTALLATION AND APPLICATION

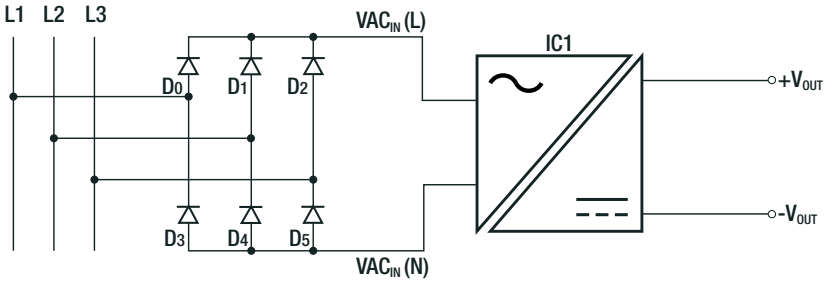
Phase to Phase Application



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.