

Features

Regulated Converters

- Wide input range 85-305Vac
- Full load temperature range: -40°C to +65°C
- Ultra-high efficiency over entire load range
- No external components necessary
- International EMC compliant
- Lowest total cost of ownership
- 140% Peak load capability

RECOM
AC/DC Converter

RAC10-K/277

10 Watt
2" x 1"
Single and Dual Output



Description

The RAC10-K/277 series are highly efficient PCB-Mount power conversion modules with ultra-low energy losses even in light load conditions. Built for worldwide usage, the AC/DC units cover an enhanced mains input range of 85Vac up to 305Vac and come with international safety certifications for both industrial and household standards. These AC/DC modules offer fully protected single or dual outputs as well as EMC class B compliance without the need of any external components. The 140% peak power capability makes the RAC10-K/277 series suitable for inductive, high start-up current or nonlinear loads. With a full load temperature range of -40°C to +65°C, they are ideal for always-on and standby mode operations in process automation, IoT and smart building applications.

Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. ⁽¹⁾ [%]	Max. Capacitive Load [μF]
RAC10-3.3SK/277	85-305	3.3	2500	79	10000
RAC10-05SK/277	85-305	5	2000	82	8000
RAC10-12SK/277	85-305	12	840	84	1500
RAC10-15SK/277	85-305	15	670	85	1000
RAC10-24SK/277	85-305	24	420	84	330
RAC10-12DK/277	85-305	±12	±420	82	±1200
RAC10-15DK/277	85-305	±15	±340	83	±1000

Notes:

Note1: Efficiency is tested at 25°C with constant resistant mode at full load and 230VAC

Model Numbering

RAC10- **K/277**
Output Voltage ——— Single or Dual Output



UL/IEC/EN62368-1 (pending)
UL60950-1 certified
IEC/EN60950-1 (pending)
IEC/EN60335-1 certified
CSA C22.2 No. 60950-1-07 certified
CSA C22.2 No. 62368-1-14 (pending)
EN62233 certified
EN61204-3 certified

Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)

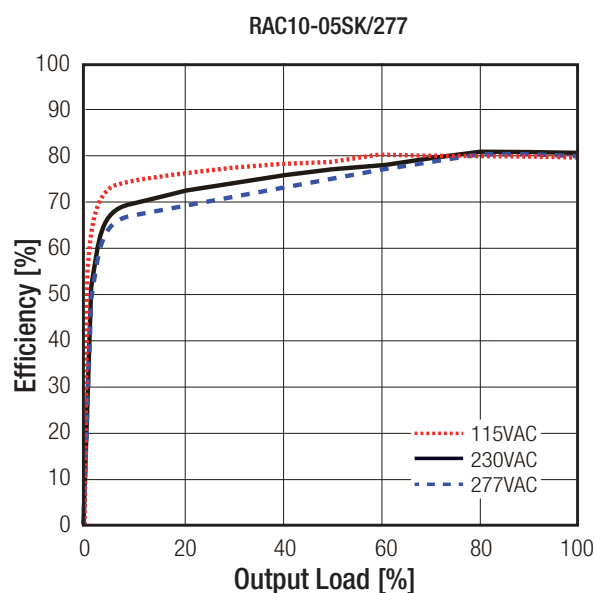
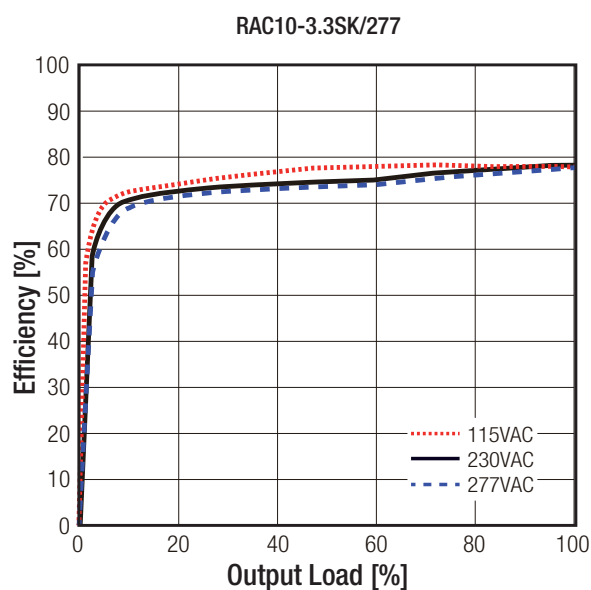
BASIC CHARACTERISTICS

Parameter	Condition	Min.	Typ.	Max.
Internal Input Filter		Pi Type		
Input Voltage Range ⁽²⁾	(refer to line derating graph on PA-5)	85VAC 120VDC		305VAC 430VDC
Input Current	115VAC 230VAC			0.25A 0.21A
Inrush Current	230VAC			0.06A ² s
No load Power Consumption			150mW	250mW
ErP Standby Mode Conformity (Output Load Capability)	Input Power= 0.5W 1.0W 2.0W			0.3W 0.7W 1.4W
Input Frequency Range		47Hz		63Hz
Overload Capability	peak duty cycle: 10%; $T_{AMB} + 50^\circ\text{C}$ max.			140%/10s
Start-up Time			30ms	
Rise Time				25ms
Hold-up time	115VAC 230VAC		15ms 90ms	
Minimum Load		0%		
Internal Operating Frequency				100kHz
Output Ripple and Noise	20MHz BW 3.3V _{out} , 5V _{out} others		60mVp-p	1% of V _{out}
Power Factor	115VAC 230VAC	0.6 0.5		

Notes:

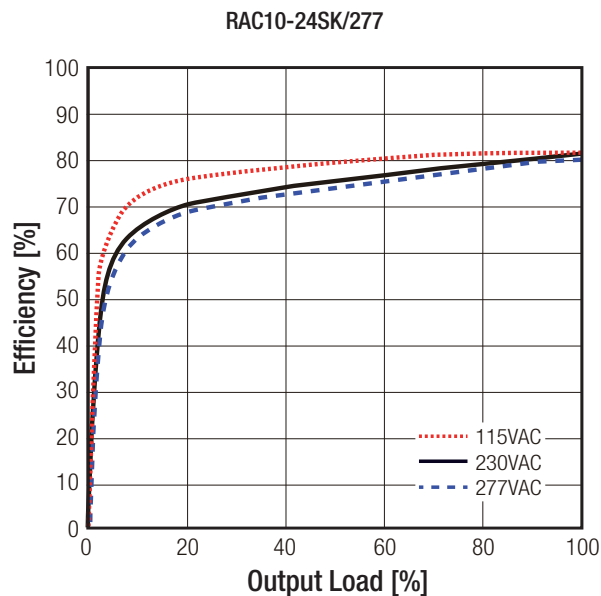
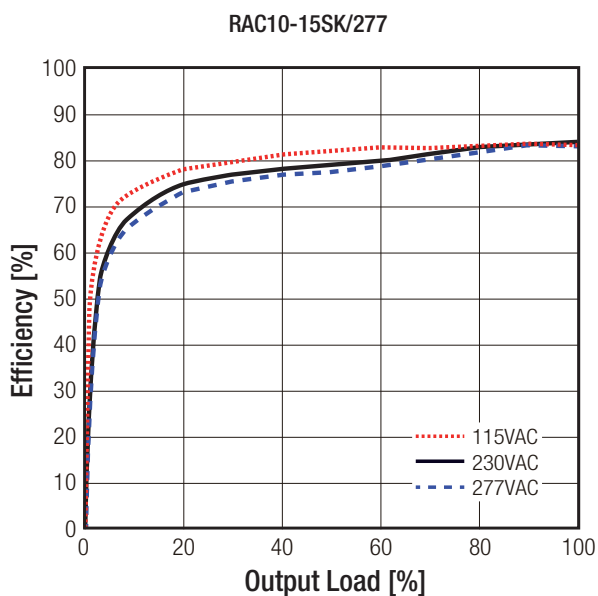
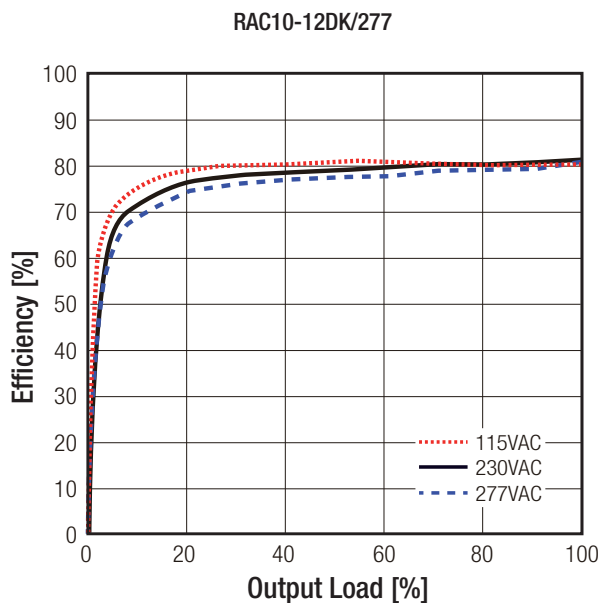
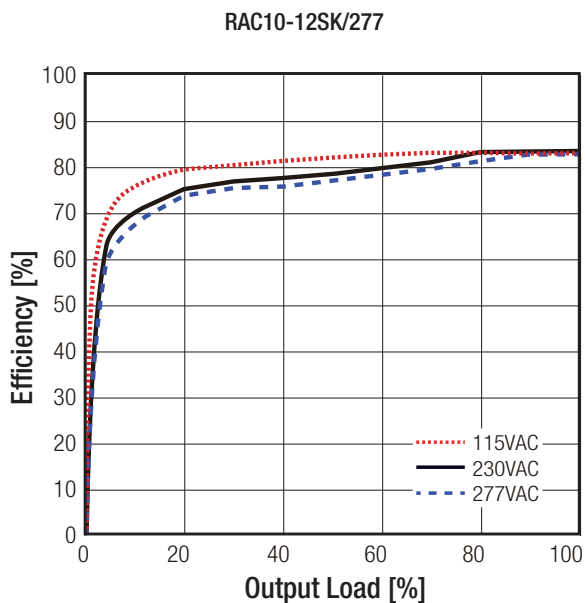
Note2: The products were submitted for safety files at AC-Input operation

Efficiency vs. Load



continued on next page

Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)



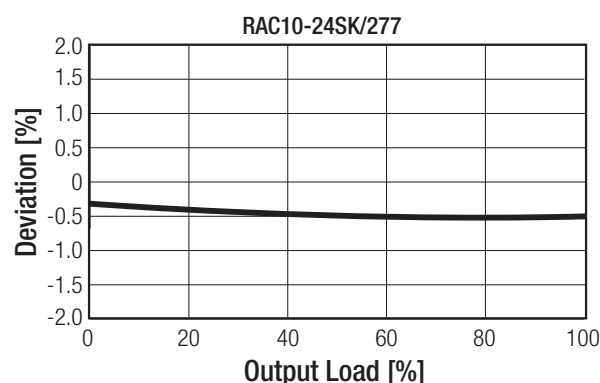
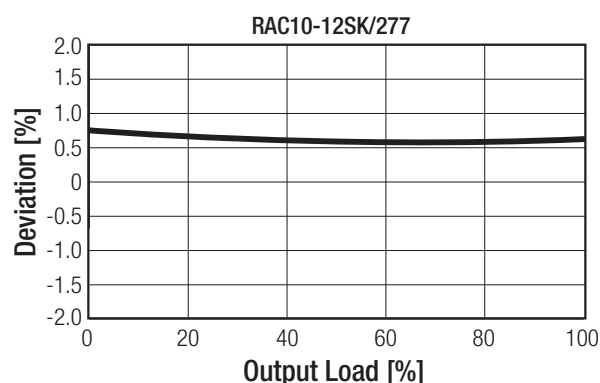
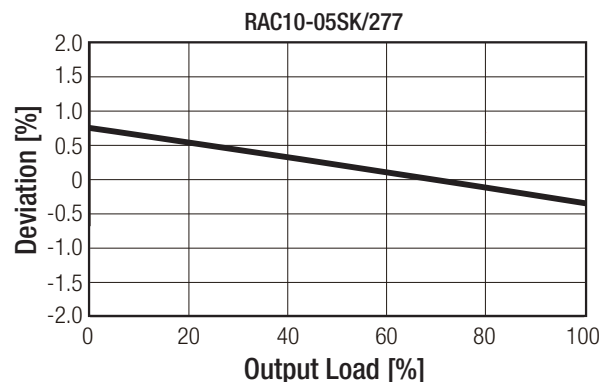
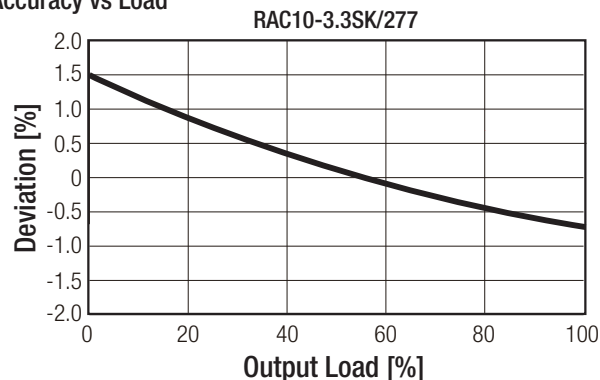
REGULATIONS

Parameter	Condition		Value
Output Accuracy			$\pm 1.0\%$ typ.
Line Regulation	low line to high line		$\pm 0.5\%$ typ.
Load Regulation	0-100% load	3.3, 5 Vout	$\pm 1.5\%$ typ.
		others	$\pm 1.0\%$ typ.
Transient Response	25% load step change recovery time		4.0% max. 500 μs

continued on next page

Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)

Accuracy vs Load



PROTECTIONS

Parameter	Type	Value
Internal Input Fuse		T2A, slow blow
Short Circuit Protection (SCP)		Hiccup, automatic restart
Over Voltage Protection (OVP)		150% - 195%, Hiccup Mode
Over Load Protection (OLP)		150% - 195%, Hiccup Mode
Over Voltage Category (OVC)		OVC II
Isolation Voltage	tested for 1 minute	4kVAC
Isolation Resistance	I/P to O/P, Isolation Voltage 500VDC	1GΩ min.
Isolation Capacitance	I/P to O/P, 100kHz/0.1V	100pF max.
Insulation Grade		reinforced
Leakage Current		0.25mA max.

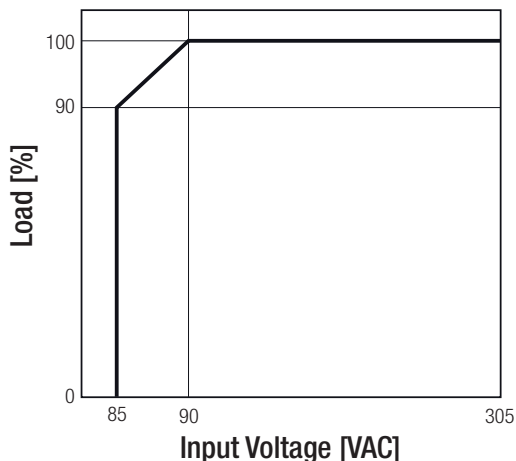
ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range	with derating (see graph)	-40°C to +80°C
Maximum Case Temperature		+100°C
Temperature Coefficient		±0.05%/°C
Operating Altitude		3000m
Operating Humidity	non-condensing	20% to 90% RH
Design Lifetime	115VAC/60Hz and full load at +25°C	>10 x 10 ³ hours
MTBF	according to MIL-HDBK-217F, G.B. +25°C +65°C	>450 x 10 ³ hours >28 x 10 ³ hours
Pollution Degree		PD2
Vibration		10-500Hz, 2G 10min./1cycle, period 60min. each along x,y,z axes

continued on next page

Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)

Line Derating ⁽³⁾

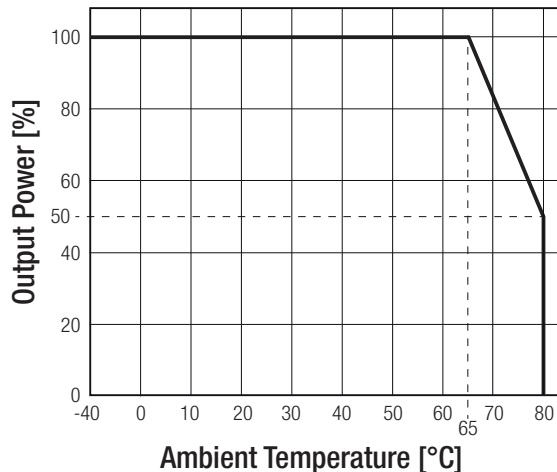


Notes:

Note3: No derating required for the specified DC-input range

Derating Graph

(@ Chamber and natural convection 0.1m/s)



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E491408-A3	UL60950-1, 2nd Edition, 2014 CAN/CSA C22.2 No. 60950-1-07, 2nd Ed. 2014
Audio/Video, information and communication technology equipment - Safety requirements	pending	UL62368-1, 2nd Edition, 2014 CAN/CSA C22.2 Nr. 62368-1-14, 2nd Ed. 2014
Information Technology Equipment, General Requirements for Safety (CB)	E491408-A4-CB-1	IEC60950-1:2005, 2nd Edition + A2:2013
Household and similar electrical appliances - Safety - Part 1: General requirements	LCS170821028CS	IEC60335-1:2010 + A2:2016 + C1:2016, 5th Edition EN60335-1:2012 + A11:2014
Information Technology Equipment, General Requirements for Safety (LVD)	pending	EN60950-1:2006 + A2:2013
Audio/Video, information and communication technology equipment - Safety requirements (CB)	16BECS10045 11	IEC62368-1:2014, 2nd Edition EN62368-1:2014 + A11:2017
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	LCS170821028CS	EN62233:2008
RoHS2	pending	RoHS 2011/65/EU + AM2015/863

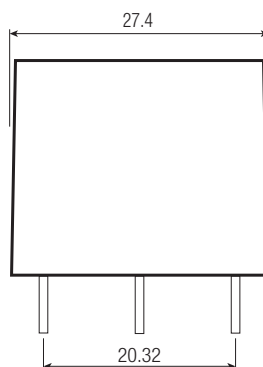
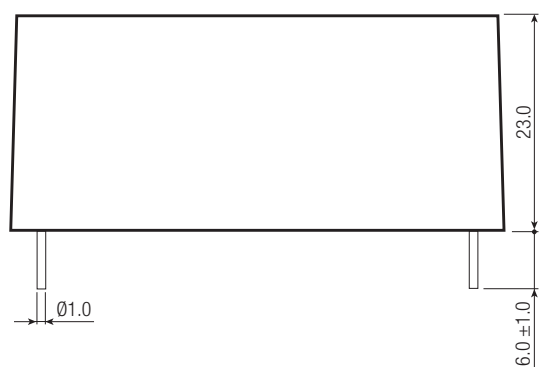
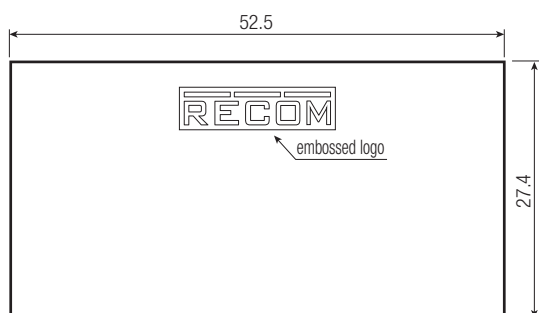
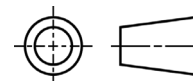
EMC Compliance	Conditions	Standard / Criterion
Low-voltage power supplies DC output - Part 3: Electromagnetic compatibility		EN61204-3:2000, Class B
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	pending	AS/NZS CSMR 22:2009 + A1:2010, Class B
ESD Electrostatic discharge immunity test	$\pm 8\text{kV}$ Air; $\pm 4\text{kV}$ Contact	EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	10V/m 80-1000MHz	EN61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC In Port: $\pm 2.0\text{kV}$ DC Out Port: $\pm 2.0\text{kV}$	EN61000-4-4:2012, Criteria B
Surge Immunity	AC In Port: $\pm 1.0\text{kV}$ L-PE, N-PE $\pm 2.0\text{kV}$ DC Out Port: $\pm 0.5\text{kV}$	EN61000-4-5:2014, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	10Vrms	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	50Hz, 1A/m	EN61000-4-8:2010, Criteria A
Voltage Dips	Voltage Dips 30% Voltage Dips 60%	EN61000-4-11:2004, Criteria B EN61000-4-11:2004, Criteria C
Voltage Interruptions	>95%	EN61000-4-11:2004, Criteria C
Voltage Fluctuations and Flicker in Public Low-Voltage Systems $\leq 16\text{A}$ per phase		EN61000-3-3:2013

Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)

DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case	black plastic (UL94V-0)
	Potting	silicone (UL94V-0)
	PCB	FR4 (UL94V-0)
	Baseplate	plastic (UL94V-0)
Package Dimension (LxWxH)		52.5 x 27.4 x 23.0mm
Package Weight		65g typ.

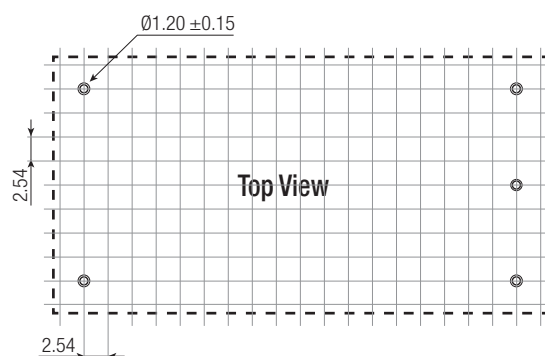
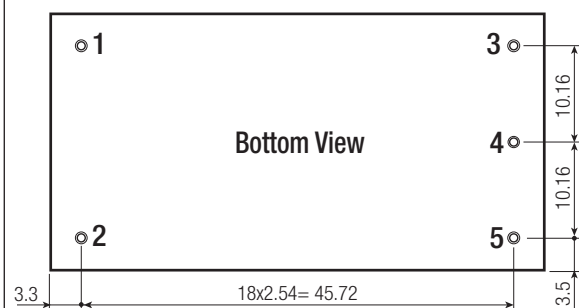
Dimension Drawing (mm)



Pin Connections

Pin #	Single	Dual
1	VAC in (N)	VAC in (N)
2	VAC in (L)	VAC in (L)
3	No Pin	-Vout
4	-Vout	COM
5	+Vout	+Vout

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



PACKAGING INFORMATION

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

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.