

Features

Regulated Converter

- 35mW max. no load power consumption
- Efficiency up to 76%
- Isolated output 3kVAC / 1 min
- SCP, OVP protection
- Wide operating temperature range: -40°C to +85°C
- Universal input 85-305VAC

RECOM
AC/DC Converter

RAC02-SE/277

**2 Watt
Single
Output**



Description

The ultra-compact RAC02-SE/277 modules are available with output voltages of 3.3, 5, 12 and 24V, and the input-to-output isolation is 3kVAC/1min. With a standby consumption of 35mW maximum, the mini power supplies are particularly suitable for energy-saving sleep mode and standby applications. Because of its compact design (height <18mm), it is a versatile solution for home automation and other similar applications. Complete with an integrated input filter, the series has enhanced EMI performance and complies with EN55032, class B. The mini power supplies are also protected against short circuit with fully automatic restart after the error has been solved. The converters are EN/UL60950-1 certified and come complete with a 3 year warranty.



Selection Guide

Part Number	nom. Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ ⁽¹⁾ [%]	Max. Capacitive Load ⁽²⁾ [μF]
RAC02-3.3SE/277	100-277	3.3	600	67	12000
RAC02-05SE/277	100-277	5	400	70	5500
RAC02-12SE/277	100-277	12	167	73	500
RAC02-24SE/277	100-277	24	83	76	160

Notes:

Note1: Efficiency is tested at nominal input and full load at +25°C ambient

Note2: Max Cap Load is tested by minimum input and constant resistor load

Model Numbering



Ordering Examples:

RAC02-05SE/277 2 Watt 5Vout Single Output
RAC02-12SE/277 2 Watt 12Vout Single Output

PREFERRED ALTERNATIVES

Please consider these alternatives:

RAC02E-K/277 Series

IEC/EN60950-1 certified
CAN/CSA-22.2 No. 60950 certified
UL60950-1 certified
EN60335-1 certified
EN55032 certified
EN55024 certified
EN55014 certified

Specifications (measured @ Ta= 25°C, nom. Vin (115/230VAC), full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range ^(3,4)	nom. Vin = 230VAC		85VAC 120VDC	277VAC	305VAC 430VDC
Input Current	115VAC 230VAC			47mA 30mA	
Inrush Current	cold start at +25°C	115VAC 230VAC			15A 30A
No load Power Consumption	85-305VAC, 47-63Hz				35mW
Input Frequency Range	AC Input		47Hz		440Hz
Minimum Load ⁽⁵⁾				2%	
Hold-up Time	115VAC		18ms		
Internal Operating Frequency	100% load at nominal Vin			55kHz	
Output Ripple and Noise ⁽⁶⁾	20MHz BW	3.3V all others			300mVp-p 250mVp-p

Notes:

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

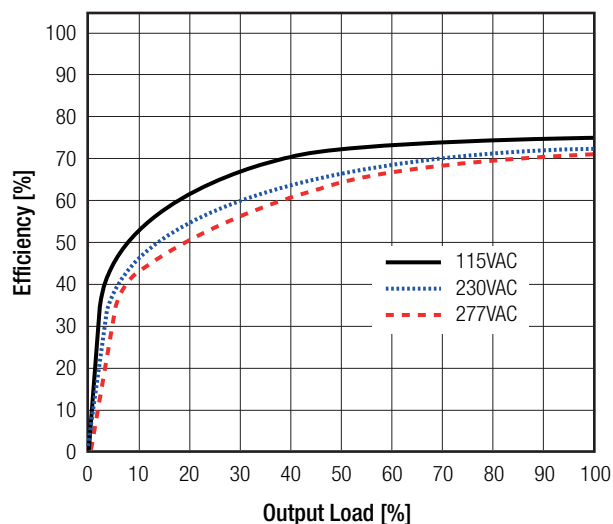
Note4: No line derating required

Note5: Operation below 2% load will not harm the converter, but specifications may not be met

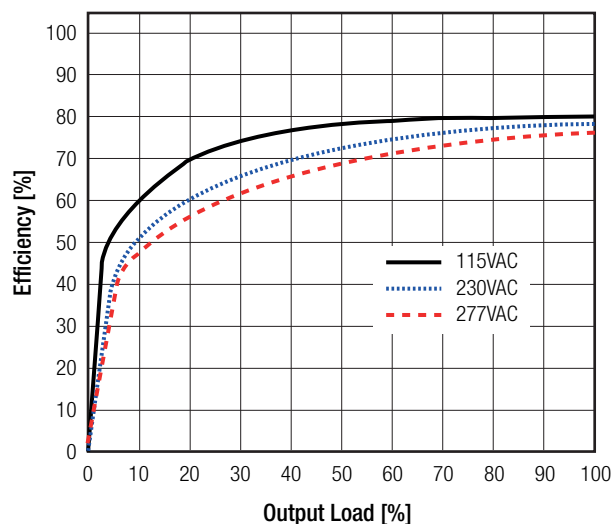
Note6: Ripple and Noise is the maximum peak-to-peak voltage value measured at the output with a 20MHz bandwidth, at rated line voltage at full load. And with a 47µF low-ESR electrolytic capacitor in parallel with a 0.1µF ceramic capacitor across output

Efficiency vs. Load

RAC02-05SE/277



RAC02-12SE/277


REGULATIONS

Parameter	Condition	Value
Output Accuracy ⁽⁷⁾		±6.0% max.
Line Regulation	low line to high line, full load	±1.5% max.
Load Regulation	2% to 100% load	6.0% typ.

Notes:

Note7: Includes initial voltage accuracy, thermal drift, line regulation and load regulation at rated input voltage and load conditions

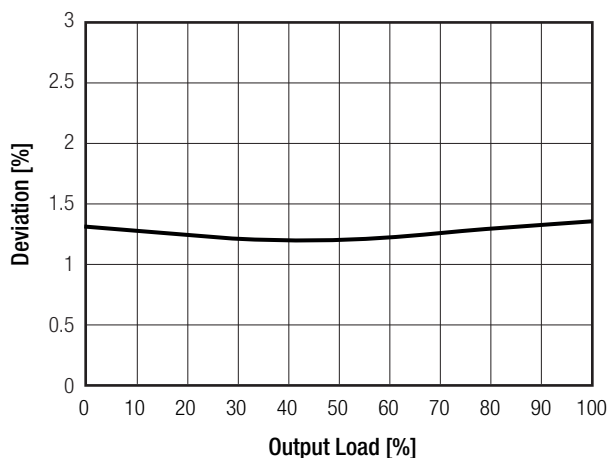
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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

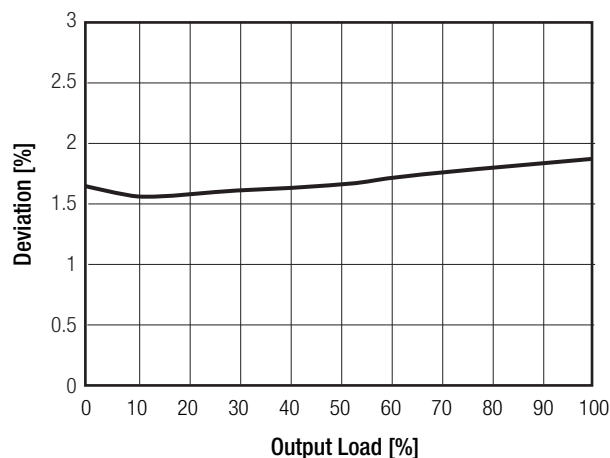
Deviation vs. Load

(at 115VAC, 230VAC, 277VAC)

RAC02-05SE/277



RAC02-12SE/277



PROTECTIONS

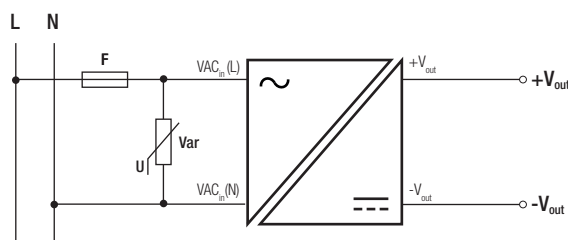
Parameter	Type		Value
Short Circuit Protection (SCP)	below 100mΩ		continuous, automatic recovery
Over Voltage Protection (OVP)	zener diode clamp		110% - 140%
Over Voltage Category			OVCII
Over Current Limit			110% - 190%
Isolation Voltage	tested for 1 minute	I/P to O/P	3kVAC
Isolation Resistance			1GΩ min.
Leakage Current	85-305VAC, 47-63Hz		10μA max.

Notes:

Note8: Refer to local wiring regulations if input over-current protection is also required. Recommended fuse: T1A slow blow type

Note9: An external MOV is recommended. The Varistor should comply with IEC-61051-2. e.g. EPCOS S 14 Series

Protection Circuit



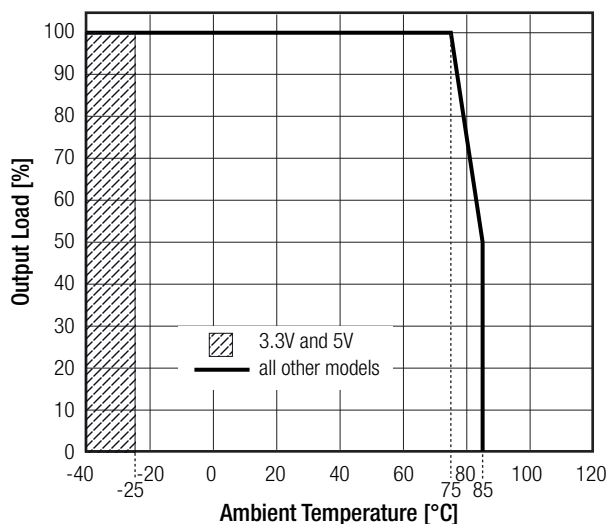
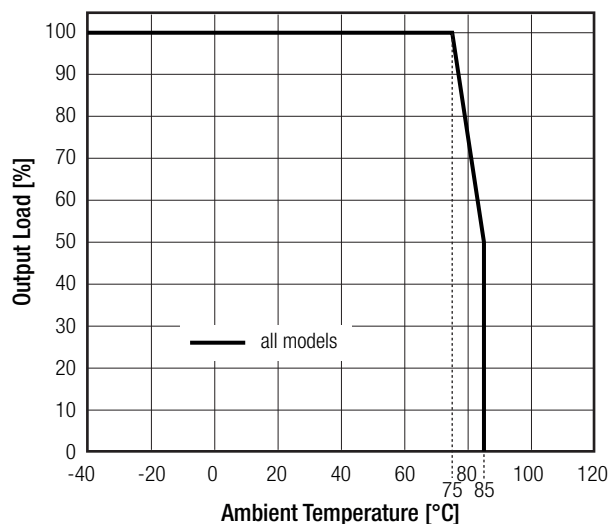
ENVIRONMENTAL

Parameter	Condition			Value
Operating Temperature Range	@ natural convection 0.1m/s, 140-305VAC	full load		-40°C to +75°C
		refer to derating graph		-40°C to +85°C
Maximum Case Temperature				+105°C
Thermal Impedance				8.5°C/W typ.
Operating Humidity	non-condensing			5% - 95% RH max.
Vibration				according to MIL-STD-202G standard
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	115VAC	2238 x 10³ hours
			230VAC	1670 x 10³ hours

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RECOM**AC/DC Converter****RAC02-SE/277****Series****Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)**Derating Graph**

(@ Chamber and natural convection 0.1 m/s)

@ 85-140VAC**@ 140-305VAC****SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment - General Requirements for Safety (CB Scheme)	L0339L26-CB-1-B4	IEC60950-1:2005, 2nd Edition + A2:2013 EN60950-1:2006 + A2:2013
Information Technology Equipment, General Requirements for Safety	E224736-A24-UL	UL60950-1, 2nd Edition, 2014 CAN/CSA-C22.2 60950-1, 2nd Edition, 2014
Household and similar electrical appliances - Safety - Part 1: General requirements	L0339L26-B2-L	EN60335-1:2012 + A11:2014
EAC Safety of Low Voltage Equipment	RU-AT.49.09571	TP TC 004/2011
RoHS2+		RoHS-2011/65/EU + AM-2015/863

EMC Compliance (Industrial)

Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	EN55032:2015, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement	EN55024:2010
ESD Electrostatic discharge immunity test	±8kV air, ±4kV contact EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	3V/m EN61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: ±1.0kV EN61000-4-4:2012, Criteria A
Power Magnetic Field Immunity	50Hz, 1A/m EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions	Voltage Dips >95% Voltage Dips 30% Voltage Interruptions >95% EN61000-4-11:2004, Criteria A EN61000-4-11:2004, Criteria A EN61000-4-11:2004, Criteria B
Limits of Voltage Fluctuations & Flicker	EN61000-3-3:2013

EMC Compliance (Household)

Condition	Standard / Criterion
Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission	EN55014-1:2006+A2:2011
Information technology equipment - Immunity characteristics - Limits and methods of measurement	EN55014-2:2015
ESD Electrostatic discharge immunity test	±8kV air, ±4kV contact IEC61000-4-2:2008, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	3V/m IEC61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: ±1kV DC Output: ±0.5kV IEC61000-4-4:2012, Criteria A

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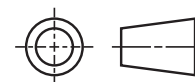
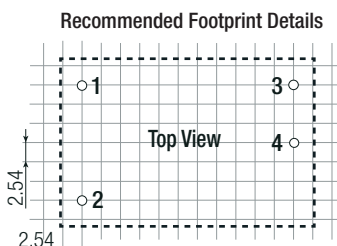
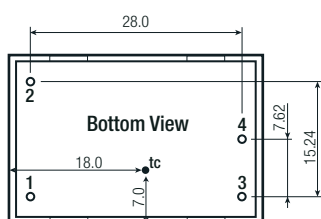
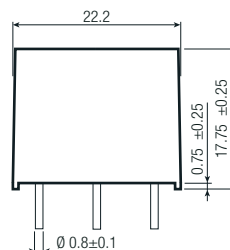
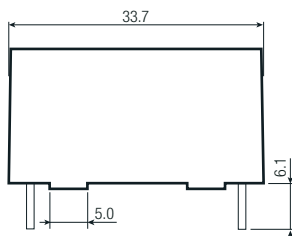
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

SAFETY AND CERTIFICATIONS

EMC Compliance (Household)	Condition	Standard / Criterion
Surge Immunity	AC Power Port: L to N ± 2 kV DC Output: L to N ± 1 kV	IEC61000-4-5:2014, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	3 Vr.m.s.	IEC61000-4-6:2013, Criteria A
Voltage Dips and Interruptions	Voltage Dips >95% Voltage Dips 30% Voltage Interruptions >95%	IEC61000-4-11:2004, Criteria B IEC61000-4-11:2004, Criteria C IEC61000-4-11:2004, Criteria C
Limits of Harmonic Current Emissions		EN61000-3-2:2014
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013

DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case potting	black plastic, (UL94V-0) silicone, (UL94V-0)
Dimension (LxWxH)		33.70 x 22.20 x 17.75mm
Weight		24.5g typ.

Dimension Drawing (mm)

Pin Connections

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

Tolerance: xx.x= ± 0.5 mm
 xx.xx= ± 0.35 mm
 Pin width: ± 0.05 mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 37.0 x 28.0mm
Packaging Quantity		22pcs
Storage Temperature Range		-40°C to +85°C

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.