

# Features

- 30mW max. no load power consumption
- High efficiency up to 80%
- Isolated output 3kVAC / 1 minute
- SCP, OVP protection
- Wide operating temperature range: -40°C to +85°C
- Universal input 85-305VAC

# Regulated Converter

# RECOM AC/DC Converter

## RAC03-SE/277

### 3 Watt Single Output



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

### Description

The ultra-compact RAC03-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 30mW 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 <sup>(1)</sup> [%]	Max. Capacitive Load <sup>(2)</sup> [µF]
RAC03-3.3SE/277	100-277	3.3	900	71	22000
RAC03-05SE/277	100-277	5	600	76	7500
RAC03-12SE/277	100-277	12	250	78	1000
RAC03-24SE/277	100-277	24	125	80	200

#### Notes:

- Note1: Efficiency is tested at 230VAC and full load at +25°C ambient  
 Note2: Max Cap Load is tested at minimum input and constant resistive load

### Model Numbering



#### Ordering Examples:

RAC03-05SE/277	3 Watt	5Vout	Single Output
RAC03-12SE/277	3 Watt	12Vout	Single Output

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

**BASIC CHARACTERISTICS**

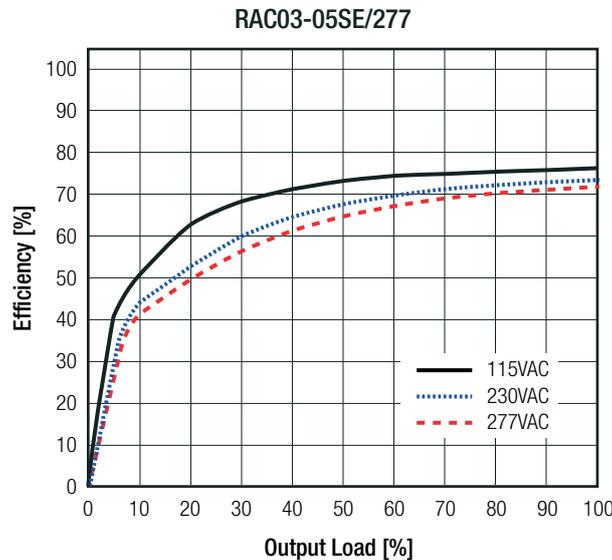
Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range <sup>(3)</sup>	nom. Vin = 230VAC	85VAC 120VDC	277VAC	305VAC 430VDC
Input Current	115VAC 230VAC		70mA 45mA	
Inrush Current	cold start at +25°C	115VAC 230VAC		15A 30A
No load Power Consumption	85-305VAC, 47-63Hz			30mW
Input Frequency Range	AC Input	47Hz		440Hz
Minimum Load			2%	
Hold-up Time	115VAC 230VAC		15ms 80ms	
Internal Operating Frequency	100% load at nominal Vin		55kHz	
Output Ripple and Noise <sup>(4)</sup>			200mVp-p	

**Notes:**

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

Note4: 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**



**REGULATIONS**

Parameter	Condition	Value
Output Voltage Tolerance <sup>(5)</sup>		±2% typ. / ±6.0% max.
Line Regulation	low line to high line, full load	±1.0% typ. / ±1.5% max.
Load Regulation	10% to 100% load	6.0% typ.

**Notes:**

Note5: Includes initial voltage accuracy, thermal drift, line regulation and load regulation at rated input voltage and load conditions

**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$  (115/230VAC), full load and after warm-up unless otherwise stated)

### PROTECTIONS

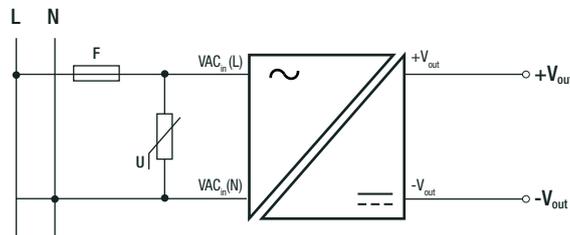
Parameter	Type		Value
Short Circuit Protection (SCP)	below $100\text{m}\Omega$		continuous, automatic recovery
Over Voltage Protection (OVP)	zener diode clamp		112% - 140%
Over Current Limit			120% - 190%
Over Voltage Category			OVCII
Isolation Voltage	I/P to O/P	tested for 1 minute	3kVAC
Isolation Resistance			$1\text{G}\Omega$ min.
Leakage Current	85-305VAC, 47-63Hz		$10\mu\text{A}$ max.

#### Notes:

Note6: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

Note7: An external MOV is recommended. The Varistor should comply with IEC-61051-2. e.g. EPCOS S 14 series

#### Protection Circuit



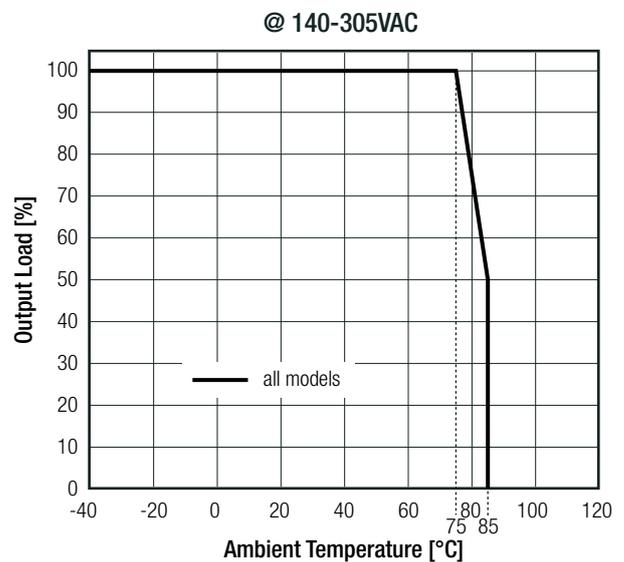
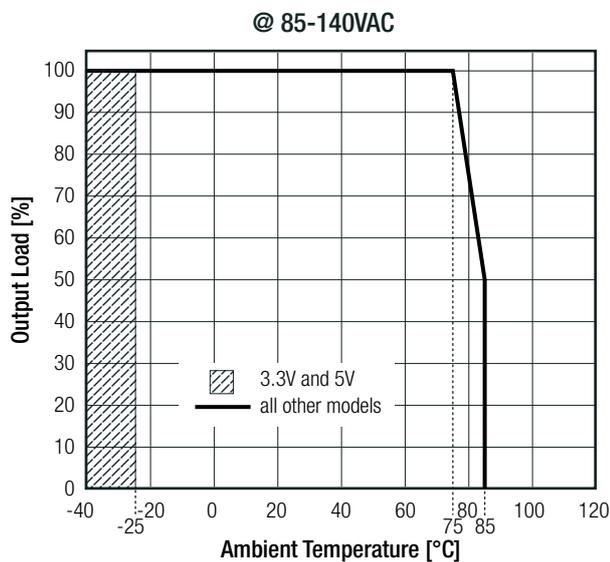
### ENVIRONMENTAL

Parameter	Condition			Value
Operating Temperature Range <sup>(8)</sup>	full load, 230VAC			$-40^\circ\text{C}$ to $+75^\circ\text{C}$
	refer to derating graph			$-40^\circ\text{C}$ to $+85^\circ\text{C}$
Maximum Case Temperature				$+105^\circ\text{C}$
Thermal Impedance				$10\text{K/W}$ typ.
Operating Humidity	non-condensing			5% - 95% RH max.
Vibration				MIL-STD-202G
MTBF	according to MIL-HDBK-217F, G.B.	$+25^\circ\text{C}$	115VAC	$3503 \times 10^3$ hours
			230VAC	$1816 \times 10^3$ hours

#### Notes:

Note8: At low input voltage (85-140VAC) and temperature below  $-25^\circ\text{C}$  the RAC03-3.3SER/277 and RAC03-05SER/277, will not start

#### Derating Graph



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

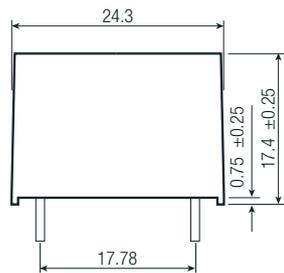
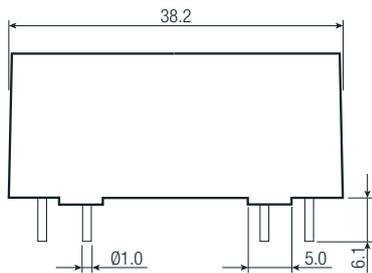
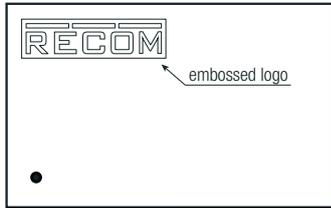
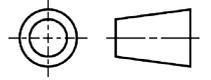
<b>SAFETY AND CERTIFICATIONS</b>		
<b>Certificate Type (Safety)</b>	<b>Report / File Number</b>	<b>Standard</b>
Information Technology Equipment - General Requirments for Safety (CB Scheme)	L0339L26-CB-1-B4	IEC60950-1:2005, 2nd Edition + A2:2013 EN60950-1:2006 + A2:2013
Information Technology Equipment, 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
<b>EMC Compliance (Industrial)</b>		
	<b>Condition</b>	<b>Standard / Criterion</b>
Electromagnetic compatibility of multimedia equipment – Emission Requirements	1502CE17	EN55032:2015, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010
ESD Electrostatic discharge immunity test	±8.0kV air, ±4.0kV 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
<b>EMC Compliance (Household)</b>		
	<b>Condition</b>	<b>Standard / Criterion</b>
Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission	E16113001	EN55014-1:2006+A2:2011
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55014-2:2015
ESD Electrostatic discharge immunity test	±8.0kV air, ±4.0kV 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: ±1.0kV DC Output: ±0.5kV	IEC61000-4-4:2012, Criteria A
Surge Immunity	AC Power Port:L to N ±2.0kV DC Output: L to N ±1.0kV	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

<b>DIMENSION AND PHYSICAL CHARACTERISTICS</b>		
<b>Parameter</b>	<b>Type</b>	<b>Value</b>
Material	case potting	black plastic, (UL94V-0) silicone, (UL94V-0)
Dimension (LxWxH)		38.25 x 24.35 x 17.4mm
Weight		28g typ.

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

Dimension Drawing (mm)



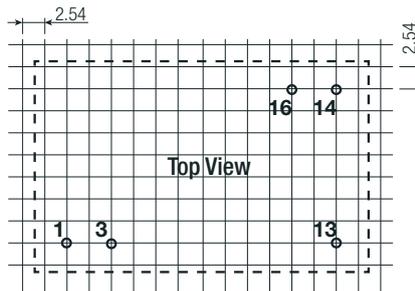
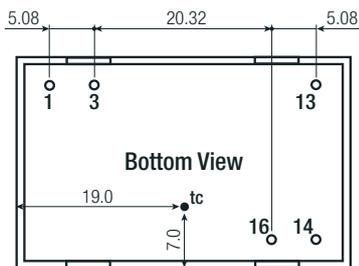
Pin Connections

Pin #	Single
1	VAC in (L)
3	VAC in (N)
13	NC
14	-Vout
16	+Vout

NCno connection  
tc= case temperature measuring point

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

Recommended Footprint Details



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 32.0 x 27.0mm
Packaging Quantity		12pcs
Storage Temperature Range		-40°C to +85°C

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