

# Features

# Regulated Converters

- 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



## 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 EN55022, 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. [%]	Max. Capacitive Load <sup>(1)</sup> [µF]
RAC02-3.3SE/277	100-277	3.3	600	67	12000
RAC02-05SE/277	100-277	5.0	400	70	5500
RAC02-12SE/277	100-277	12	167	73	500
RAC02-24SE/277	100-277	24	83	76	160

**Notes:**

Note1: Test by minimum input and constant resistor load.



### Specifications (measured @ ta= 25°C, nominal input voltage (115/230VAC), full load and after warm-up)

BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range		85VAC 120VDC		305VAC 430VDC
Input Current	115VAC 230VAC		47mA 30mA	
Inrush Current	cold start at 25°C, 115VAC cold start at 25°C, 230VAC			15A 30A
No load Power Consumption	85-305VAC, 47-440Hz			35mW
Input Frequency Range	AC Input	47Hz		440Hz
Hold-up time	115VAC	18ms		
Internal Operating Frequency	100% load at nominal Vin		55kHz	
Minimum Load			2%	
Output Ripple and Noise <sup>(2)</sup>	3.3V 5V, 12V, 24V			300mVp-p 250mVp-p

**Notes:**

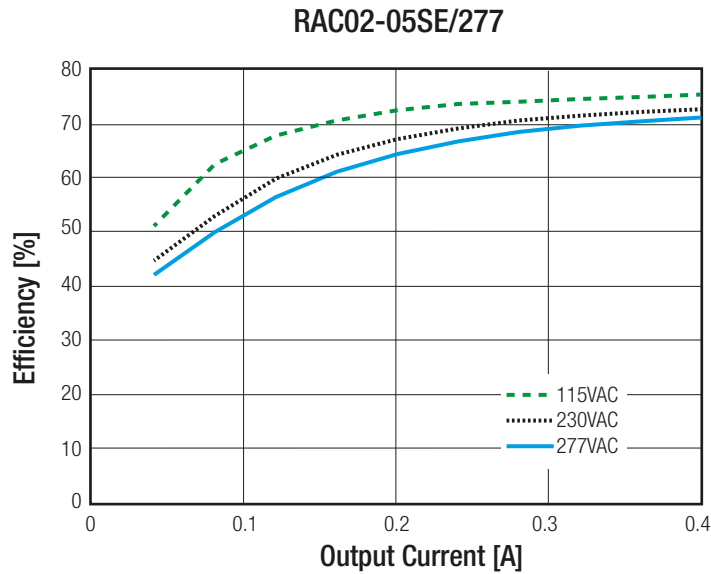
Note2: Ripple and Noise is the maximum peak-to-peak voltage value measured at the output with a 20MHz bandwidth, at rated line voltage at full load. And with a 47µF low-ESR electrolytic capacitor in parallel with a 0.1µF ceramic capacitor across output.

continued on next page

EN55024 Certified  
EN60950-1 Certified  
UL60950-1 Certified  
EN60335-1 Certified

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

Efficiency vs. Load



### REGULATIONS

Parameter	Condition	Value
Output Voltage Tolerance <sup>(3)</sup>		±6% max.
Line Voltage Regulation	low line to high line, full load	±1.5% max.
Load Voltage Regulation	2% to 100% load	±6% typ.

**Notes:**

Note3: Includes initial voltage accuracy, thermal drift, line regulation and load regulation at rated input voltage and load conditions.

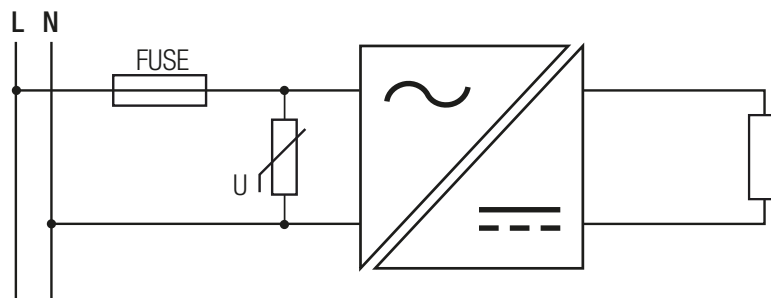
### PROTECTIONS

Parameter	Type	Value
Short Circuit Protection (SCP)		continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode clamp	110% - 140%
Over Current Limit		110% - 190%
Over Voltage Category		OVC II
Isolation Voltage		3kVAC / 1 Minute
Isolation Resistance		1GΩ min.
Leakage Current	85-305VAC, 47-440Hz	10μA max.

**Notes:**

Note4: An input fuse is required if the mains supply is not over-current protected. Recommended fuse: T1A slow blow type

Note5: An external MOV is recommended. The Varistor should comply with IEC-61051-2. e.g. EPCOS S14 Series



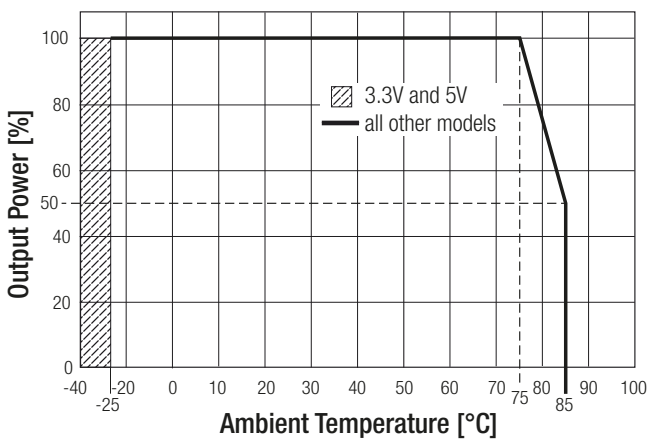
**Specifications** (measured @  $t_a = 25^\circ\text{C}$ , nominal input voltage (115/230VAC), full load and after warm-up)

### ENVIRONMENTAL

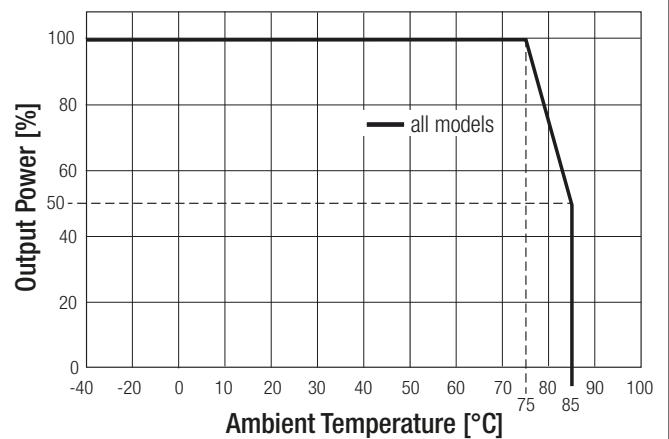
Parameter	Condition	Value
Operating Temperature Range <sup>(6)</sup>	230VAC, with derating (see graph)	-40°C to +85°C
Maximum Case Temperature		+105°C
Thermal Impedance		8.5°C/W typ.
Humidity	non-condensing	5% - 95%, RH max.
Vibration		MIL-STD-202G
MTBF <sup>(7)</sup>	MIL-HDBK-217F, 115VAC, +25°C MIL-HDBK-217F, 230VAC, +25°C	2238 x 10 <sup>3</sup> hours 1670 x 10 <sup>3</sup> hours

### Derating Graph

**@ 85-140VAC**



**@ 140-305VAC**



#### Notes:

Note6: At low input voltage (85-140VAC) and temperature below -25°C the RAC02-3.3SE/277 and RAC02-05SE/277, will not start.

Note7: MTBF is referring RAC02-05SE/277

### SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety (LVD)	LVD1208051	IEC60950-1, 2nd Edition, 2009 EN60950-1, 2nd Edition, 2011
Information Technology Equipment, General Requirements for Safety	E224736-X1-A24	UL60950-1, 2nd Edition, 2014 CAN/CSA C22.2 No. 60950-1-07, 2nd Edition 2014
Household and similar electrical appliances, General requirements	L0339L26-B2	EN60335-1, 2014

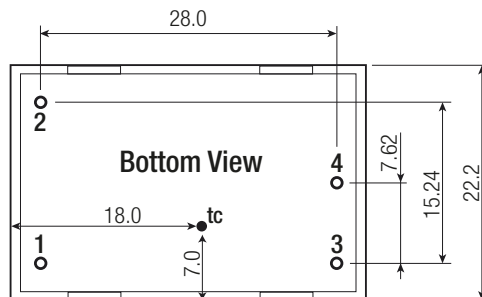
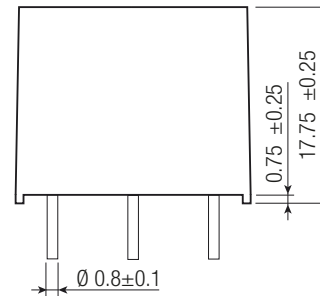
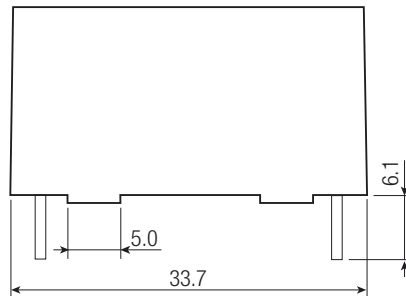
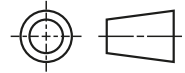
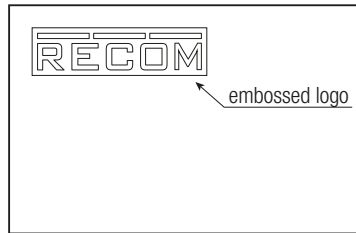
EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	Report: 1502CE17	EN55022, Class B EN55024
ESD Electrostatic discharge immunity test	±8kV Air Discharge; ±6kV Contact	EN61000-4-2, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	3V/m	EN61000-4-3, Criteria A
Fast Transient and Burst Immunity	AC Power Port: ±1kV	EN61000-4-4, Criteria B
Surge Immunity	AC Power Port: line to line: ±1kV	EN61000-4-5, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port: 3V/m	EN61000-4-6, Criteria A
Power Magnetic Field Immunity	1 A/m	EN61000-4-8, Criteria A
Voltage Dips and Interruption	Voltage Dips: >95% reduction >30% reduction Interruption: >95%	EN61000-4-11, Criteria B EN61000-4-11, Criteria C EN61000-4-11, Criteria C
Voltage Fluctuations and Flicker in Public Low-Voltage Systems		EN61000-3-3

**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 Potting	black plastic (UL94 V-0) silicone (UL94 V-0)
Package Dimension (LxWxH)		33.7 x 22.2 x 17.75mm
Package 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= ±0.5mm

xx.xx= ±0.35mm

Pin width: ±0.05mm

### PACKAGING INFORMATION

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