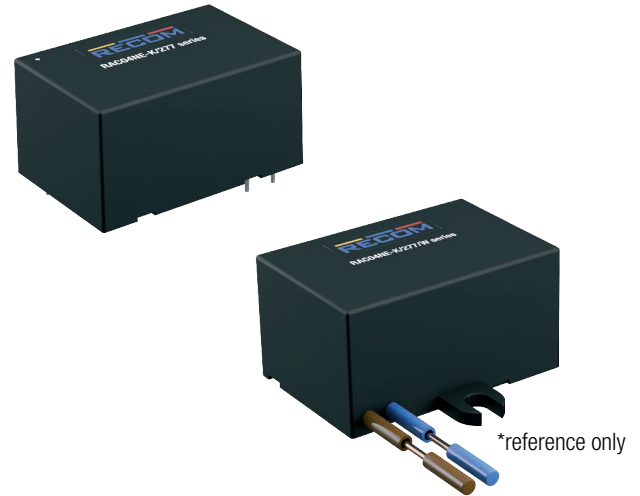


RAC04NE-K/277 Series \diamond AC/DC Power Supply

4W \diamond Input: 100V-277VAC

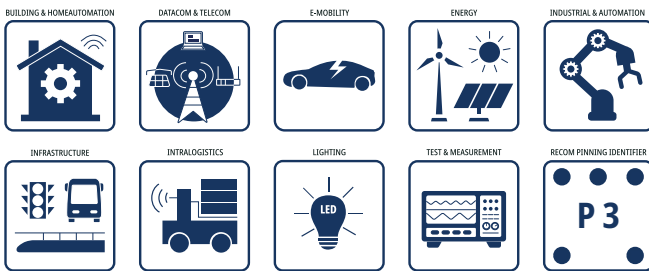
FEATURES

- 85-305VAC input with a full load up to +80°C
- Enhanced surge ratings of 2kV (L-N); 4kV (L-PE)
- OVC III overvoltage category up to 3000m altitude
- 6 watt boost power up to 20s
- Wired version with mounting tabs, IP65 rated
- EN55032 class B; floating or earth referenced
- 3 year warranty



THT-mount: 37.0 x 24.0 x 18.0mm (1.45 x 0.94 x 0.70 inch)
 Wired: 37.8 x 24.8 x 18.7mm (1.48 x 0.97 x 0.73 inch)

APPLICATIONS



SAFETY & EMC



DESCRIPTION

RAC04NE-K are exceptionally robust AC/DC modules for a maximum power range of 4 to 6 watts and have been specially designed for continuous operation under significantly expanded operating conditions. The full output power of 100% is available from -40°C to 80°C and also for all global single-phase AC networks or 100/115/200/230/277 VAC. OVC III is maintained up to 3000m operating altitude, or overvoltage category OVC II up to 5000m. The immunity to interference voltages is 2 kV (L-N); 4 kV (L-PE), which is significantly higher than usual for modules of this size. An integrated emission filter offers scope for system integration in accordance with EN55032 "B", also with load-side potential equalization of sensitive electronics or protection type PELV. In addition to the encapsulated print modules, a wired mechanical variant with mounting tabs and IP65 water resistance is available, which has also been approved according to IEC61347.

SELECTION GUIDE

| Part Number | Input Voltage Range [VAC] | Output Voltage [VDC] | Output Current nom. [mA] | Boost Current max. ⁽¹⁾ [mA] | Efficiency ⁽²⁾ typ. [%] | Output Power continuous [W] |
|------------------|---------------------------|----------------------|--------------------------|--|------------------------------------|-----------------------------|
| RAC04NE-05SK/277 | 85-305 | 5 | 800 | 1200 | 75 | 4 |
| RAC04NE-09SK/277 | 85-305 | 9 | 440 | 666 | 78 | 4 |
| RAC04NE-12SK/277 | 85-305 | 12 | 330 | 500 | 80 | 4 |
| RAC04NE-15SK/277 | 85-305 | 15 | 267 | 400 | 81 | 4 |
| RAC04NE-24SK/277 | 85-305 | 24 | 167 | 250 | 79 | 4 |

Note1: Refer to „Boost Power Duty Cycle“

Note2: Efficiency is tested at 230VAC and full load at +25°C ambient

RAC04NE-K/277 Series \diamond AC/DC Power Supply

4W \diamond Input: 100V-277VAC

MODEL NUMBERING



Note3: "/277" only= THT-solder mount, encapsulated, potted
add suffix "/W" for wired version, encapsulated, potted (except 9 & 15Vout)

ORDERING INFORMATION

| Model | Output Voltage | Package Type | |
|--------------|----------------|--|---------------------------------|
| | | 1.45" x 0.94" THT-solder mount "/277" | 1.48" x 0.97" wired "/277/W" |
| RAC04NE-05SK | 5VDC | y | y |
| RAC04NE-09SK | 9VDC | y | on request |
| RAC04NE-12SK | 12VDC | y | y |
| RAC04NE-15SK | 15VDC | y | on request |
| RAC04NE-24SK | 24VDC | y | y |

y= standard portfolio; on request= MOQ may apply on project base

BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}C$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

| Parameter | Condition | Min. | Typ. | Max. |
|---|--------------------|--------|--------|------------|
| Nominal Input Voltage | 50/60Hz | 100VAC | | 277VAC |
| Operating Range ⁽⁴⁾ | 47-63Hz | 85VAC | | 305VAC |
| | DC | 120VDC | | 430VDC |
| Input Current | 115AC | | | 90mA |
| | 230VAC | | | 50mA |
| | 277VAC | | | 45mA |
| Inrush Current | cold start at 25°C | 115VAC | | 10A |
| | | 230VAC | | 20A |
| | | 277VAC | | 25A |
| No Load Power Consumption | | | | 75mW |
| Ecodesign Standby Mode Use (Available output power for stated input power) | $P_{IN} = 0.5W$ | 0.31W | | |
| | $P_{IN} = 1.0W$ | 0.66W | | |
| Input Frequency Range | AC Input | 47Hz | | 63Hz |
| Minimum Load | | 0% | | |
| Power Factor ⁽⁴⁾ | 115VAC | | 0.6 | |
| | 230VAC | | 0.47 | |
| | 277VAC | | 0.44 | |
| Start-up time | | | 15ms | |
| Rise time | | | 10ms | |
| Hold-up time | 115VAC | | 15ms | |
| | 230VAC | | 80ms | |
| | 277VAC | | 120ms | |
| Internal Operating Frequency | | 124kHz | 132kHz | 140kHz |
| Output Ripple and Noise ⁽⁵⁾ | 20MHz BW | | | 1% of Vout |

Note4: The products were submitted for safety files at AC-Input operation (90-305VAC).

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

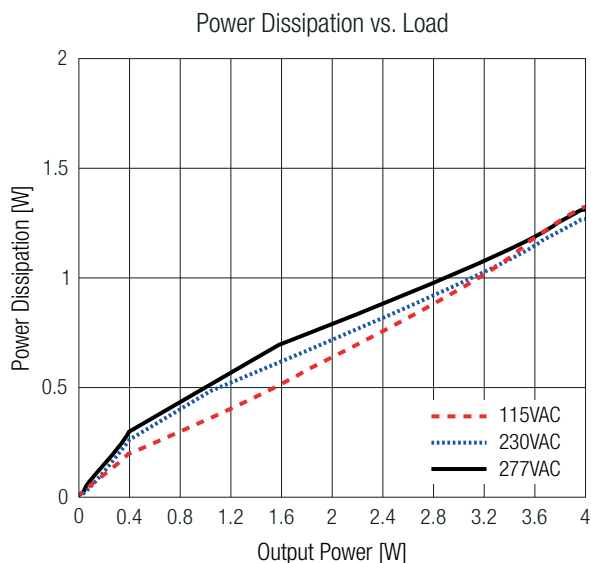
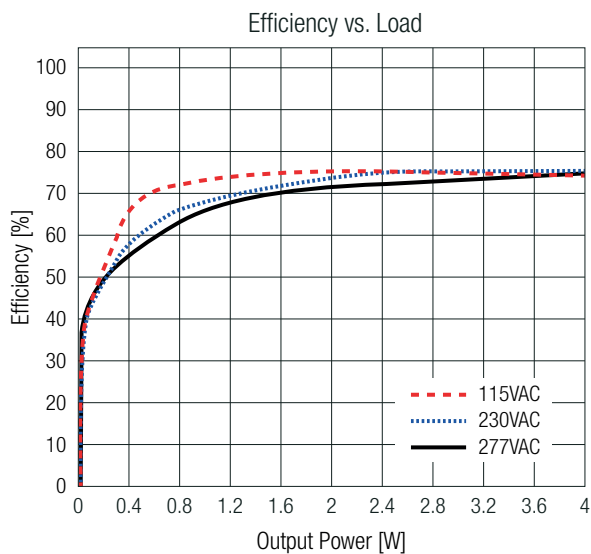
The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

RAC04NE-K/277 Series \diamond AC/DC Power Supply

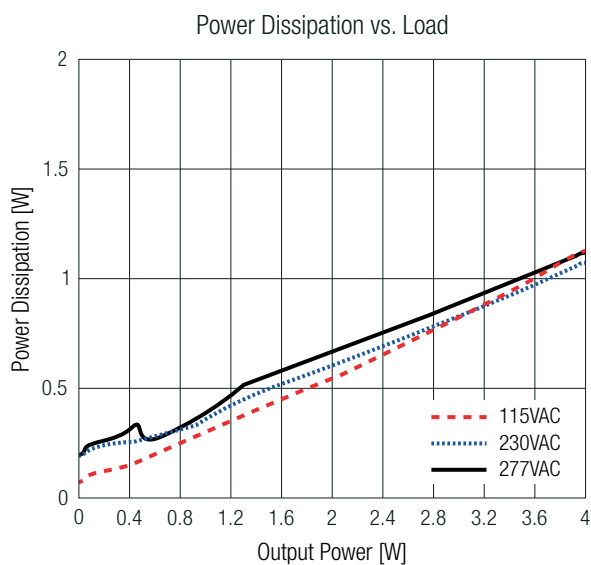
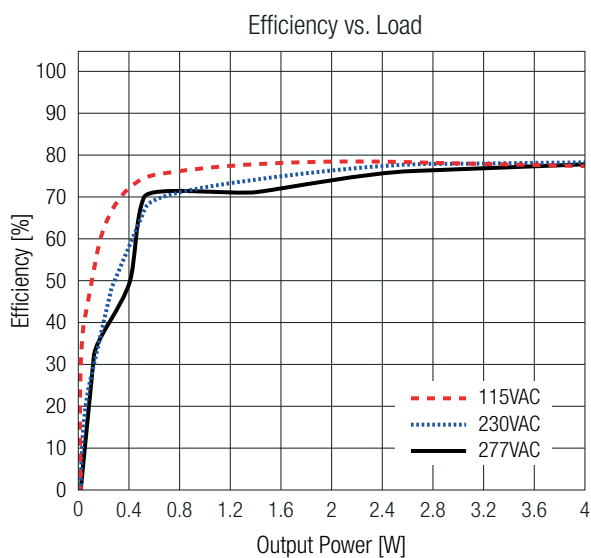
4W \diamond Input: 100V-277VAC

BASIC CHARACTERISTICS (measured @ $T_{AMB}= 25^{\circ}C$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

5Vout



others



REGULATIONS (measured @ $T_{AMB}= 25^{\circ}C$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

| Parameter | Condition | Value |
|--------------------------------|----------------------|-------------------------------------|
| Output Accuracy | | $\pm 1.0\%$ typ. / $\pm 2.0\%$ max. |
| Line Regulation | | $\pm 0.2\%$ typ. / $\pm 0.5\%$ max. |
| Load Regulation ⁽⁶⁾ | 10% to 100% load | 0.5% typ. / 1.0% max. |
| Transient Response | 25% load step change | 6.0% max. |
| | recovery time | 350 μ s typ. |

Note6: Operation below 10% load will not harm the converter, but specifications may not be met

RAC04NE-K/277 Series \diamond AC/DC Power Supply

4W \diamond Input: 100V-277VAC

PROTECTIONS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

| Parameter | Type | | Value |
|----------------------------------|----------------------|----------------------|------------------------------|
| Input Fuse ⁽⁷⁾ | internal | | fusible resistor 20 Ω |
| Short Circuit Protection (SCP) | | | hiccup mode |
| Over Voltage Protection (OVP) | | | 120% - 150%, hiccup mode |
| Over Current Protection (OCP) | | | 300% - 500%, hiccup mode |
| Over Voltage Category (OVC) | according to 61558-1 | | OVC II (5000m) |
| | | | OVC III (3000m) |
| Class of Equipment | | | Class II |
| Isolation Voltage ⁽⁸⁾ | 1 minute | according to 61558 | 4.2kVAC |
| | 1 minute | according to 62368-1 | 6kVDC |
| Insulation Grade | | | reinforced |
| Isolation Resistance | | | 1G Ω min. |
| Isolation Capacitance | | | 100pF max. |

Note7: For system integration with DC operation, consider a suitable DC fuse in front of the input

Note8: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

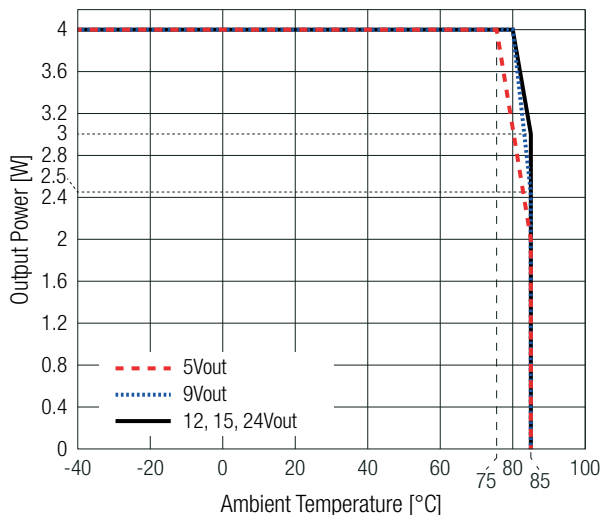
| Parameter | Condition | | Value |
|-------------------------------------|--|---------------------------------|--|
| Operating Ambient Temperature Range | @ natural convection (0.1m/s); refer to „Derating Graph“ | | -40 $^{\circ}\text{C}$ to +85 $^{\circ}\text{C}$ |
| Maximum Case Temperature | | | +110 $^{\circ}\text{C}$ |
| Temperature Coefficient | | | $\pm 0.03\%/K$ |
| Operating Altitude ⁽⁹⁾ | according to 61558-1 | | 5000m (OVC II) |
| | | | 3000m (OVC III) |
| Operating Humidity | non-condensing | | 90% RH max. |
| IP Rating | only "/277/W" versions | | IP65 |
| Pollution Degree | | | PD2 |
| MTBF | according to MIL-HDBK-217, G.B. | $T_{AMB} = +25^{\circ}\text{C}$ | 2260 x 10 ³ hours |
| | | $T_{AMB} = +40^{\circ}\text{C}$ | 2040 x 10 ³ hours |
| Design Lifetime | 230VAC and full load | $T_{AMB} = +50^{\circ}\text{C}$ | 110 x 10 ³ hours |

Note9: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime.

Please contact RECOM tech support for advice

Derating Graph

(@ Chamber and natural convection 0.1m/s)



BOOST POWER DUTY CYCLE

P_{rated} = refer to „Derating Graph“ [W]

P_{Boost} = Boost power ($\leq 6W$) [W]

P_r = recovery output power [W]

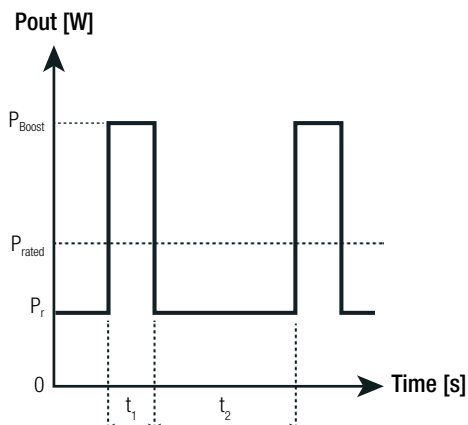
t_1 = boost time set (20s max.) [s]

t_2 = recovery time (min. $2 \times t_1$) [s]

k = for nom. 115V-277VAC [1]

k = for nom. 100V-110VAC [1.1]

$$P_r = \frac{P_{rated} \times (t_1 + t_2) - (P_{Boost} \times t_1)}{t_2 \times k}$$



Practical Example (RAC04NE-12SK/277):

Take the RAC04NE-12SK/277 at 230VAC input voltage and full load at $T_{AMB} = 80^\circ C$, with natural convection.

$P_{rated} = 4W$

$P_{Boost} = 6W$

$t_1 = 20s$

$t_2 = 40s$

$$P_r = \frac{4W \times (20s + 40s) - (6W \times 20s)}{40s \times 1} = \underline{\underline{3W}}$$

SAFETY & CERTIFICATIONS

| Certificate Type (Safety) | Report Number | Standard |
|--|--------------------|--|
| Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition | E491408-A6028-UL | UL62368-1:2019, 3rd Edition CAN/CSA-C22.2 No. 62368-1-19, 3rd Edition |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition | 240529004 | IEC62368-1:2018, 3rd Edition EN IEC 62368-1:2020 + A11:2020 |
| Household and similar electrical appliances – Safety – Part 1: General requirements | 64.110.24.00834.01 | IEC60335-1:2010 + C1:2016, 5th Edition EN60335-1:2012 + A15:2021 |
| Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure | | EN62233:2008 + AC:2008 |
| Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V 3rd Edition | 085-240083201-000 | IEC61558-1:2017, 3rd Edition EN IEC 61558-1:2019 |
| Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements | 085-240083201-000 | IEC61558-2-16:2009 + A1:2013, 1st Edition EN61558-2-16:2009 + A1:2013 |
| Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V 3rd Edition | pending | IEC61558-1:2017, 3rd Edition |
| Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements | pending | IEC61558-2-16:2021, 2nd Edition |
| Lamp controlgear Part 1: General and safety requirements | 085-240083301-000 | IEC61347-1:2015 + A1:2017, 3rd Edition EN61347-1:2015 + A1:2021 |

SAFETY & CERTIFICATIONS

| Certificate Type (Safety) | Report Number | Standard |
|--|---|--|
| Lamp controlgear Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules | 085-240083301-000 | IEC61347-2-13:2014 + A1:2016, 2nd Edition EN61347-2-13:2014 + A1:2017 |
| Automatic electrical controls - Part 1: General requirements | 68.100.24.0073.01 | IEC60730-1:2022, 6th Edition |
| RoHS2 | | RoHS 2011/65/EU + AM2015/863 |
| EMC Compliance (EN61204-3) | Condition | Standard / Criterion |
| Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC) | | EN IEC 61204-3:2018 Class B |
| ESD Electrostatic discharge immunity test | Air: $\pm 2, 4, 8, 15$ kV Contact: ± 8 kV | IEC61000-4-2:2008, Criteria A EN61000-4-2:2009, Criteria A |
| Radiated, radio-frequency, electromagnetic field immunity test | 10V/m (80-1000MHz), 3V/m (1400-2000MHz), 1V/m (2000-2700MHz) | IEC/EN61000-4-3:2066 + A2:2010, Criteria A |
| Fast Transient and Burst Immunity | AC Port: L, N, L-N: 4kV | IEC/EN61000-4-4:2012, Criteria A |
| Surge Immunity | AC Port: L-N 2kV (5, 9 & 15Vout) | IEC/EN61000-4-5:2014 + A1:2017, Criteria B |
| | AC Port: L-N 0.5, 1kV (5, 9 & 15Vout) AC Port: L-N 0.5, 1, 2kV (12, 13 & 24Vout) AC Port: L-PE, N-PE: 1, 2, 4kV | IEC/EN61000-4-5:2014 + A1:2017, Criteria A |
| Immunity to conducted disturbances, induced by radio-frequency fields | 10Vrms (0.15-80MHz) | IEC61000-4-6:2013, Criteria A EN61000-4-6:2014, Criteria A |
| Power Magnetic Field Immunity | 30A/m | IEC61000-4-8:2009, Criteria A EN61000-4-8:2010, Criteria A |
| Voltage Dips | 100% (0.5P; 1.0P), 60%, 30%, 20% | IEC/EN61000-4-11:2004 + A1:2017, Criteria A |
| Voltage Interruptions | 100% | IEC/EN61000-4-11:2004 + A1:2017, Criteria B |
| Limits of Harmonic Current Emissions | | EN IEC 61000-3-2:2019 |
| Limits of Voltage Fluctuations & Flicker | | EN61000-3-3:2013 + A1:2019 |
| EMC Compliance (EN55032) | | |
| Electromagnetic compatibility of multimedia equipment – Emission Requirements | O/P connected to GND: and floating output; without external filter | EN55032:2015 + A11:2020 |

DIMENSION & PHYSICAL CHARACTERISTICS

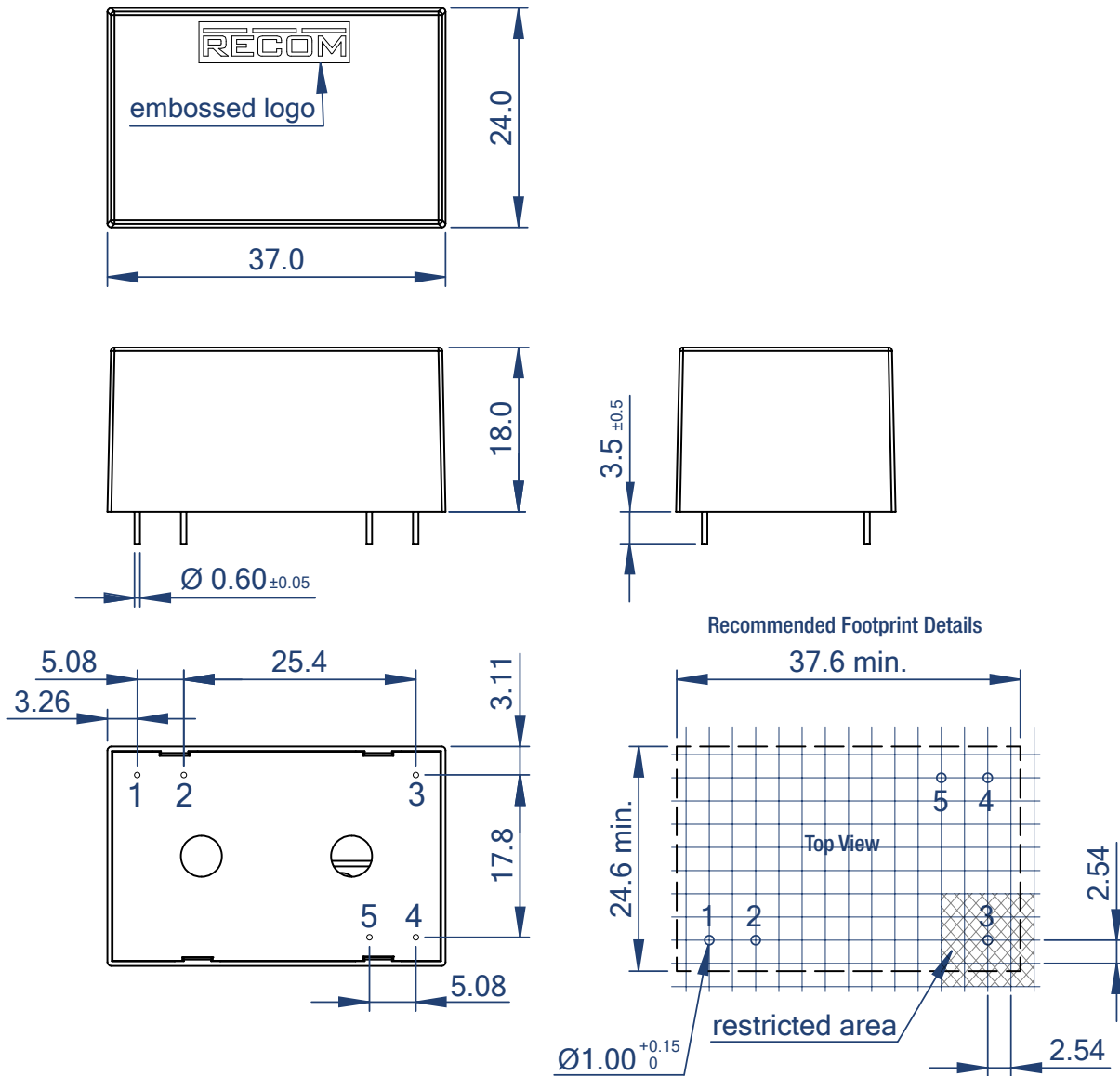
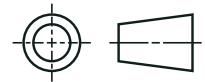
| Parameter | Type | Value |
|-------------------|----------------|---|
| Materials | case/baseplate | plastic, (UL94-V0) |
| | potting | silicone, (UL94-V0) |
| | PCB | FR4, (UL94-V0) |
| Dimension (LxWxH) | “/277” | 37.0 x 24.0 x 18.0mm 1.45 x 0.94 x 0.70 inch |
| | “/277W” | 37.8 x 24.8 x 18.7mm 1.48 x 0.97 x 0.73 inch |
| Weight | “/277” | 27.8g typ. 0.06 lbs |
| | “/277W” | 35g typ. 0.07 lbs |

RAC04NE-K/277 Series \diamond AC/DC Power Supply

4W \diamond Input: 100V-277VAC

DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing "/277" version (mm)



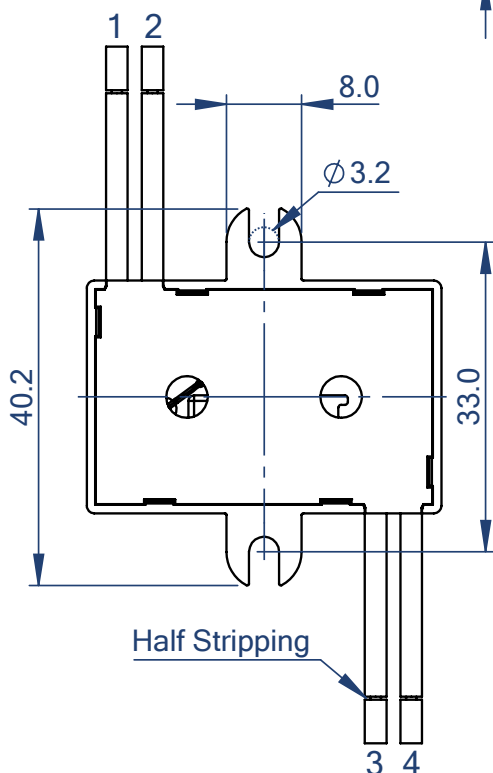
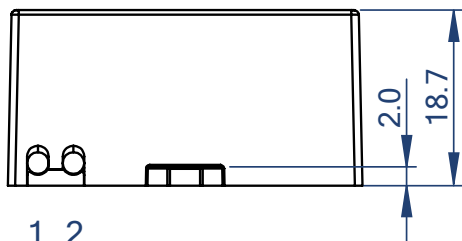
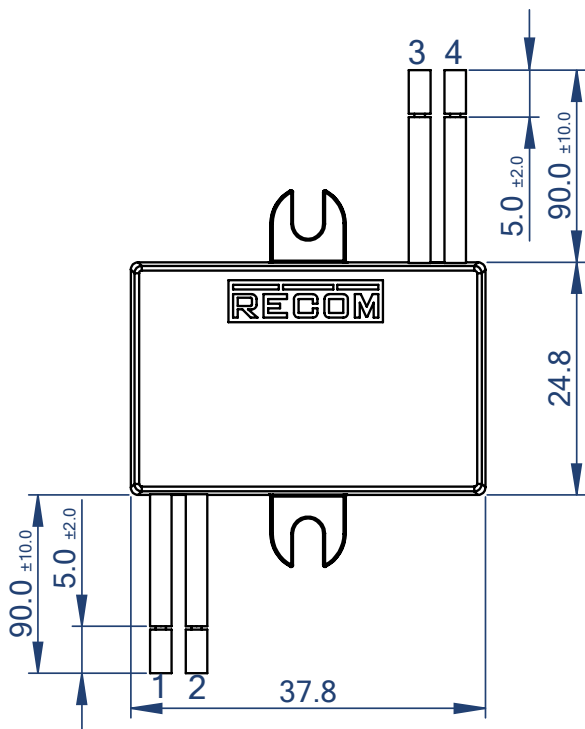
Pinning information [P3]

| Pin # | Single |
|-------|------------|
| 1 | VAC in (N) |
| 2 | VAC in (L) |
| 3 | NC |
| 4 | -Vout |
| 5 | +Vout |

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

DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing “/277/W” version (mm)



Wire information

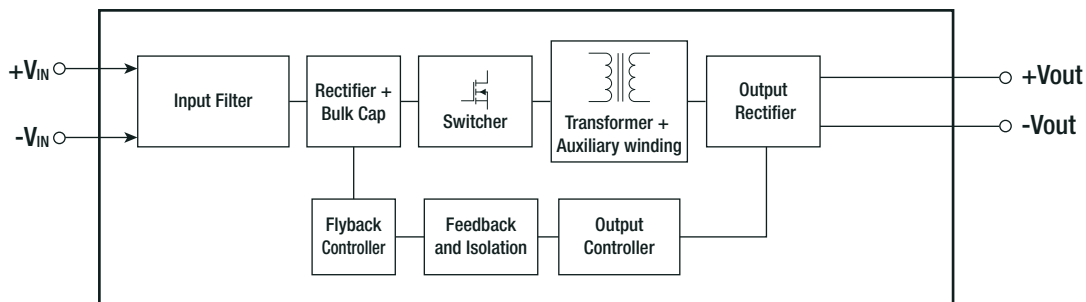
| # | Function | Wire color | Type | Wire Cross Section |
|---|------------|------------|---------|-------------------------------|
| 1 | VAC in (L) | brown | UL-1015 | 22AWG (0.318mm ²) |
| 2 | VAC in (N) | blue | UL-1015 | 22AWG (0.318mm ²) |
| 3 | +Vout | red | UL-1015 | 22AWG (0.318mm ²) |
| 4 | -Vout | black | UL-1015 | 22AWG (0.318mm ²) |

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

RAC04NE-K/277 Series \diamond AC/DC Power Supply

4W \diamond Input: 100V-277VAC

BLOCK DIAGRAMM



PACKAGING INFORMATION

| Parameter | Type | | Value |
|-----------------------------|----------------|----------|------------------------|
| Packaging Dimension (LxWxH) | tube | "/277" | 490.0 x 26.5 x 27.5mm |
| | tray | "/277/W" | 365.0 x 365.0 x 55.0mm |
| Packaging Quantity | "/277" | | 12pcs |
| | "/277/W" | | 35pcs |
| Storage Temperature Range | | | -40°C to +90°C |
| Storage Humidity | non-condensing | | 90% RH max. |

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.