Technical Data Sheet

RAC03-K/SMT Series ◊ AC/DC Power Supply

3W ◊ Input: 100V-240VAC

RECOM AC/DC Converter

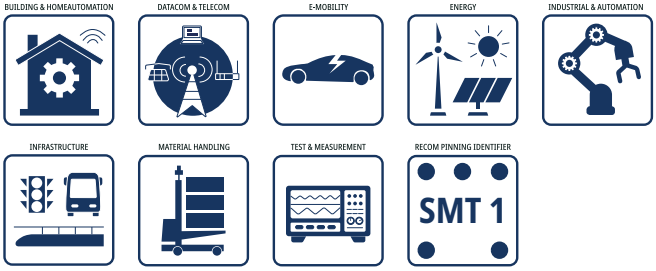
FEATURES

- JEDEC-reflow solder-able construction
- Full load line-rating from 85 to 265Vac
- -40°C to +80°C rated operating temperature
- 6000m operating altitude
- Shock and vibration stabilized
- No external components for floating loads
- 3 year warranty



Dimensions (LxWxH): 27.7 x 23.7 x 19.0mm (1.1 x 0.9 x 0.8 inch)
15.5g (0.034 lbs)

APPLICATIONS



SAFETY & EMC

CE, cULus E224736, IECEE CB SCHEME, FC, HOUSEHOLD CERTIFIED EN-60335-1, RoHS² compliant 10 from 10, Reach compliant

DESCRIPTION

The compact 3 Watt AC/DC power supplies series RAC03-K/SMT boast an optimized design tailored for JEDEC-reflow solder processes. With a mere 1in² footprint, these units facilitate automated production, ensuring a shock and vibration-resistant PCBA. The fully integrated modules eliminate the need for external components in floating load configurations, providing safety-rated performance at altitudes up to 6000m. Operating seamlessly in temperatures ranging from -40 to +80°C, and offering a continuous 3-Watt output power from -25 to +60°C, these power supplies are engineered for reliability. Compliant with international standards, including EN/IEC/UL62368, EN60335, and IEC61558, they are an ideal solution for a diverse range of applications from IoT to industrial automation, driving sensors, household and monitoring devices, as well as housekeeping auxiliary power supplies, these power units are well-suited for domestic use.

SELECTION GUIDE

Part Number	Input Voltage Range [VAC]	Output Voltage nom. [VDC]	Output Current max. [mA]	Efficiency (1) typ. [%]
RAC03-3.3SK/SMT-R	85-265	3.3	900	69
RAC03-05SK/SMT-R	85-265	5	600	74
RAC03-12SK/SMT-R	85-265	12	250	78
RAC03-15SK/SMT-R	85-265	15	200	75
RAC03-18SK/SMT-R	85-265	18	170	78
RAC03-24SK/SMT-R	85-265	24	125	77

Note1: Efficiency is tested at nominal input (230VAC) and constant resistive load at +25°C ambient

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3W ◊ Input: 100V-240VAC

RECOM AC/DC Converter

MODEL NUMBERING

RAC03- __ SK/SMT -R

- __ : nom. Output Power / nom. Output Voltage
- SK : Single
- SMT : Surface Mount Technology
- -R : Tape and Reel Packaging

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

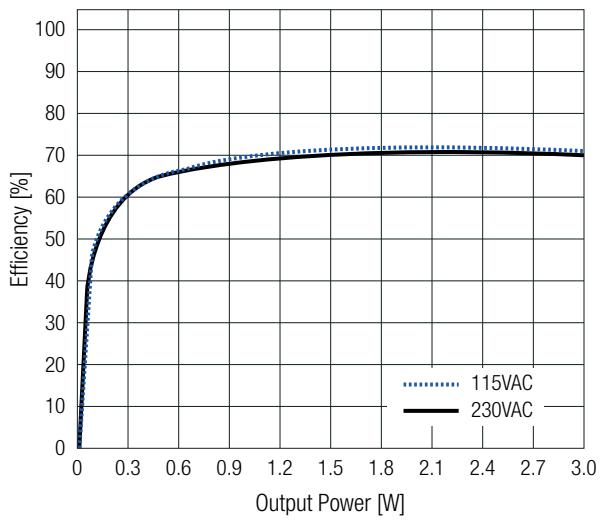
Parameter	Condition		Min.	Typ.	Max.
Nominal Input Voltage	50/60Hz		100VAC		240VAC
Operating Range [2]	47-63Hz		85VAC		265VAC
	DC		120VDC		370VDC
Input Current	115VAC				80mA
	230VAC				40mA
Inrush Current	cold start at 25°C	115VAC			10A
		230VAC			20A
No Load Power Consumption	230VAC			100mW	
Ecodesign Standby Mode Use (Available output power for stated input power)	Input Power=	0.3W			0.17W
		0.5W			0.3W
		1W			0.7W
Input Frequency Range	AC Input		47Hz		63Hz
Minimum Load			0%		
Power Factor	115VAC		0.5		
	230VAC		0.4		
Start-up time				20ms	
Rise time				15ms	
Hold-up time	115VAC			15ms	
	230VAC			80ms	
Internal Operating Frequency	100% load at nominal Vin				130kHz
Output Ripple and Noise [3]	20MHz BW	RAC03-3.3SK/SMT; RAC03-05SK/SMT			80mVp-p
		all others			1% of nom V_{OUT}

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

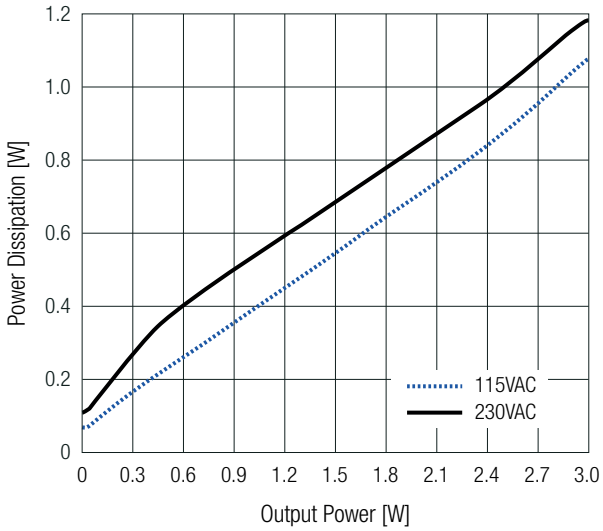
Note3: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

RAC03-3.3SK/SMT
RAC03-05SK/SMT

Efficiency vs. Load



Power Dissipation vs. Load

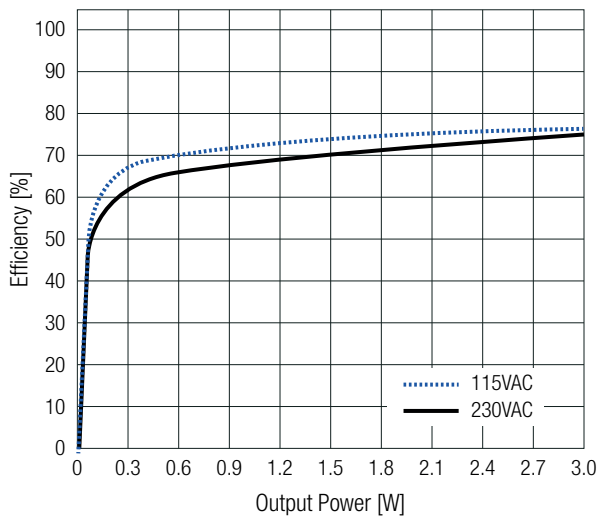


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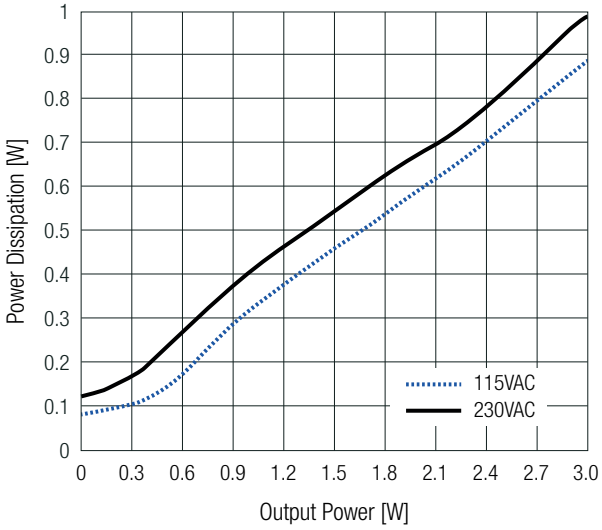
BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

all others

Efficiency vs. Load



Power Dissipation vs. Load



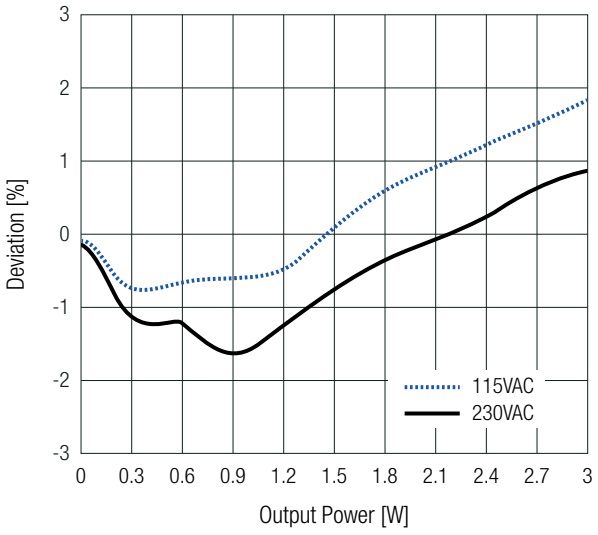
REGULATIONS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Condition	Value
Output Accuracy		±3.0% typ.
Line Regulation	low line to high line, full load	±2.5% typ.
Load Regulation (4)	10% to 100% load	2.5% typ.
Transient Response	25% load step change	4.0% max.
	recovery time	500µs max.

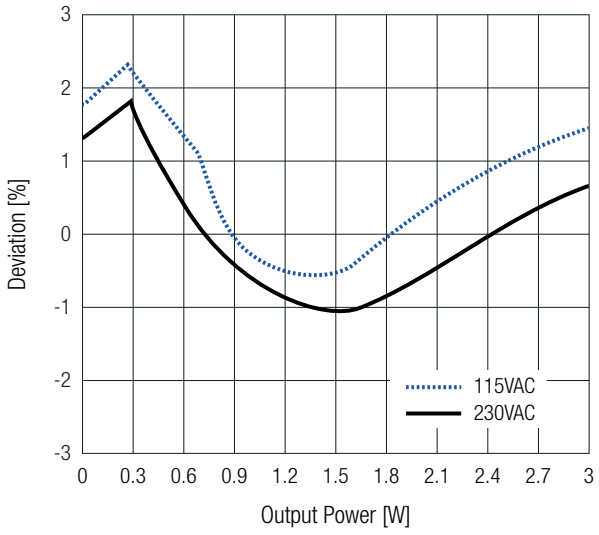
Note4: Operation below 10% load will not harm the converter, but specifications may not be met

Deviation vs. Load

RAC03-3.3SK/SMT; RAC03-05SK/SMT



all others



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RAC03-K/SMT Series ◊ AC/DC Power Supply

3W ◊ Input: 100V-240VAC

RECOM AC/DC Converter

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

Parameter	Type			Value
Input Fuse (5)	internal			fusible resistor
Limited Powr Source (LPS)				yes
Short Circuit Protection (SCP)	below 100mΩ			hiccup mode, auto recovery
Over Current Protection (OCP)				hiccup mode, auto recovery
Over Voltage Category (OVC)				OVC II
Class of Equipment				Class II
Isolation Voltage (6)	I/P to O/P	1 minute	according to 60335-1	3kVAC
			according to 62368-1	4kVAC
			according to 61558	4.2kVAC
Isolation Resistance	V_{ISO}= 500VDC			1GΩ min.
Isolation Capacitance	I/P to O/P, 100kHz/0.1V			100pF max.
Insulation Grade				reinforced

Note5: For system integration with DC operation, consider a suitable DC fuse in front of the input

Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

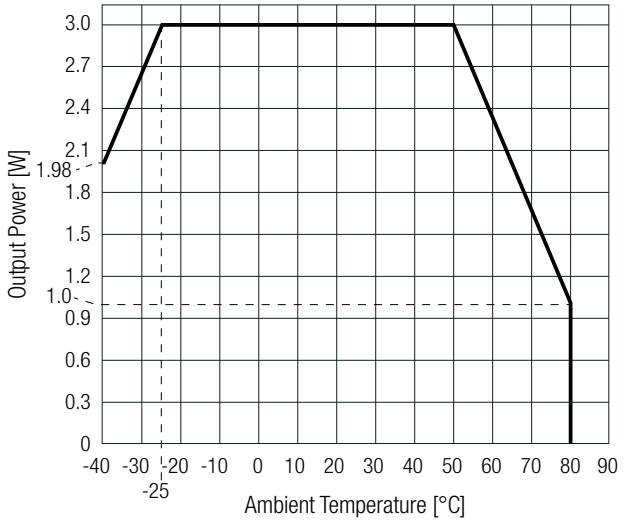
ENVIRONMENTAL (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Condition		Value
Operating Ambient Temperature Range	@ natural convection (0.1m/s)	with derating, refer to **„Derating Graph“**	-40°C to +80°C
Maximum Case Temperature			+95°C
Temperature Coefficient			±0.05%/K
Operating Altitude	according to 62368-1		5000m
	according to 60335-1		6000m
Operating Humidity	non-condensing		20-90% RH max.
Pollution Degree			PD2
Vibration	according to MIL-STD-202G		10-500Hz, 2G, 10min.: 1cycle, period / 60min. each along x,y,z axes
MTBF	according to MIL-HDBK-217, G.B.	T_{AMB}= +25°C	>1977 x 10^3 hours
		T_{AMB}= +30°C	>1895 x 10^3 hours
		T_{AMB}= +40°C	>1794 x 10^3 hours
Design Lifetime	230VAC/60Hz and full load	T_{AMB}= +25°C	>40 x 10^3 hours

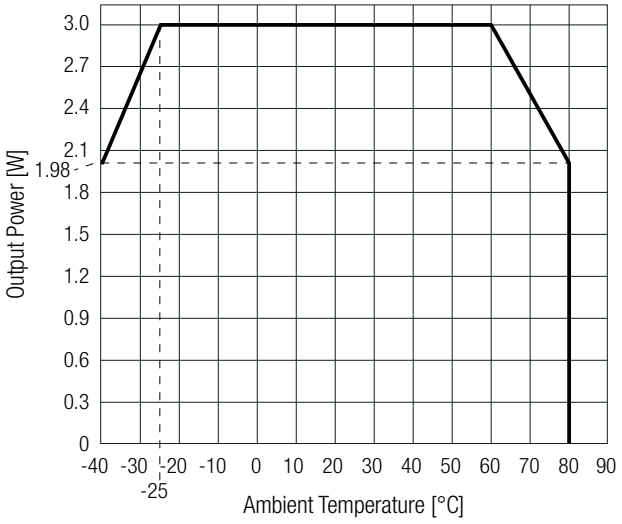
Derating Graph

(@ Chamber and natural convection 0.1m/s)

RAC03-3.3SK/SMT, RAC03-05SK/SMT



all others



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SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements	E491408-A6012-UL	UL62368-1:2014, 2nd Edition
		CAN/CSA C22.2 No. 62368-1-14, 2nd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB Scheme)	231023001	IEC62368-1:2014, 2nd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements (LVD)		EN62368-1:2014 + A11:2017
Household and similar electrical appliances – Safety – Part 1: General requirements (CB Scheme)	LCS190408025CS	IEC60335-1:2010 + C1:2016, 5th Edition
Household and similar electrical appliances – Safety – Part 1: General requirements (LVD)		EN60335-1:2012 + A13:2017
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure		EN62233:2008
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB Scheme)	50237373-001	IEC61558-1:2005 2nd Edition + A1:2009
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V	50237374-001	EN61558-1:2005 + A1:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units (CB Scheme)	50237373-001	IEC61558-2-16:2009 1st Edition + A1:2013
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units	50237374-001	EN61558-2-16:2009 + A1:2013
RoHS2		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Low voltage power supplies, d.c. output - Part 3: Electromagnetic compatibility	LCS190408054BE	IEC/EN61204-3:2008, Class B
Electromagnetic compatibility of multimedia equipment - Emission requirements (7)		EN55032:2015, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010 + A1:2015
Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission (7)		EN55014-1:2006 + A2:2011, Class B
Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity		EN55014-2:2015
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8kV Contact: ±2, 4kV	IEC61000-4-2:2008 , Criteria B EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity	10V/m (80-1000MHz) 3V/M (1.4-2GHz) 1V/m (2-2.7GHz)	IEC61000-4-3:2006 + A1:2007 , Criteria A EN61000-4-3:2006 + A1:2009, Criteria A
Fast Transient and Burst Immunity	AC & DC Port: ±2kV	IEC/EN61000-4-4:2012, Criteria B
Surge Immunity	AC Port: ±1kV DC Port: ±0.5kV	IEC/EN61000-4-5:2014 + A1:2017, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC & DC Port: 10V	IEC61000-4-6:2013, Criteria A EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	50Hz, 30A/m	IEC61000-4-8:2009, Criteria A EN61000-4-8:2010, Criteria A
Voltage Dips	100%	IEC/EN61000-4-11:2004 + A1:2017, Criteria B
	60%, 30% and 20%	IEC/EN61000-4-11:2004 + A1:2017, Criteria C
Voltage Interruptions	>95%	IEC/EN61000-4-11:2004 + A1:2017, Criteria C
Limits of Harmonic Current Emissions		EN61000-3-2:2014
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices		FCC 47 Part 15 Subpart B

Note7: If output is connected to GND, please contact RECOM tech support for further information

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RAC03-K/SMT Series ◊ AC/DC Power Supply

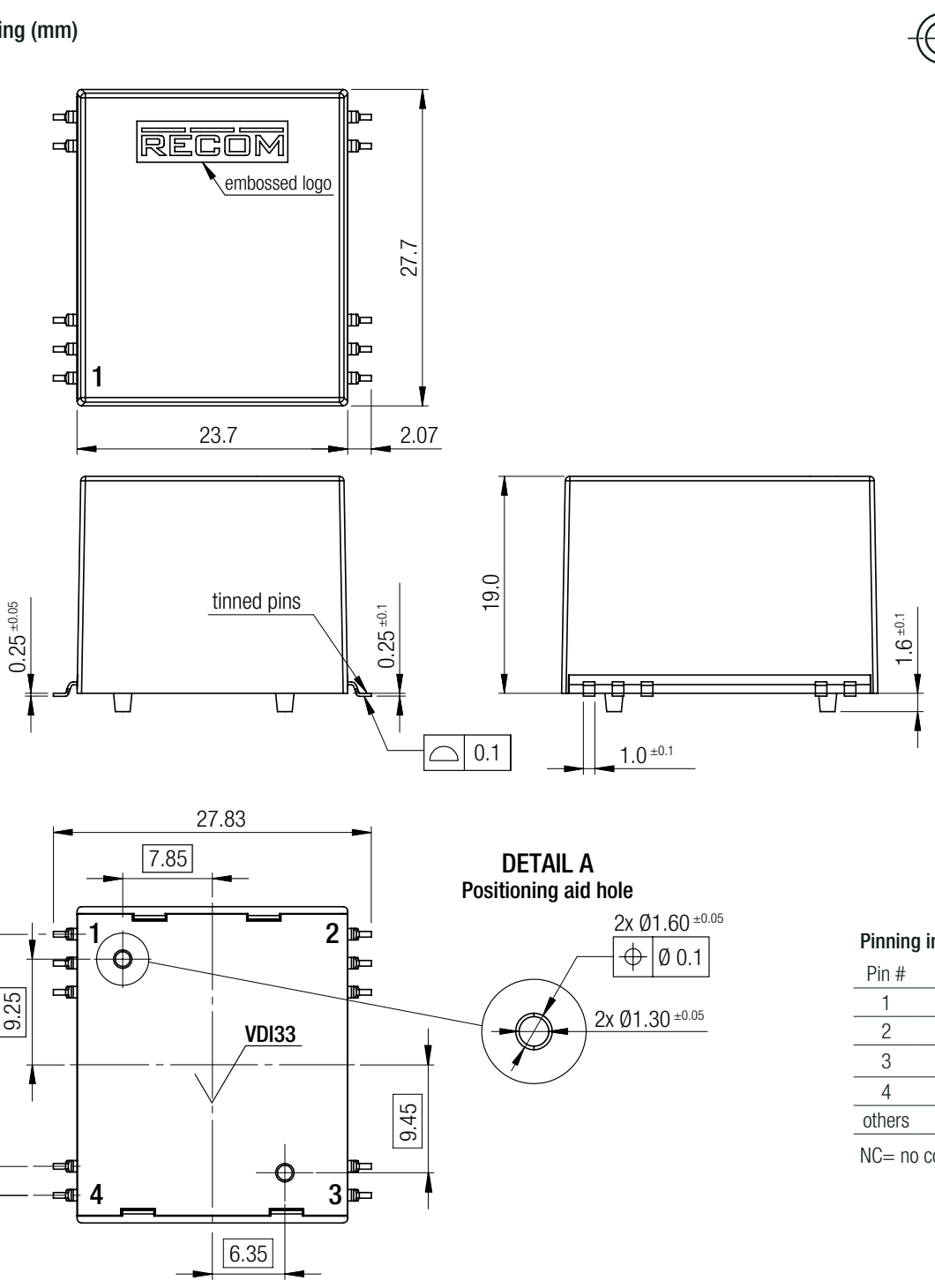
3W ◊ Input: 100V-240VAC

RECOM AC/DC Converter

DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Materials	case/baseplate	black plastic, (UL94 V-0)
	potting	silicone, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		27.7 x 23.7 x 19.0mm 1.1 x 0.9 x 0.8 inch
Weight		15.5g typ. 0.034 lbs

Dimension Drawing (mm)



Pinning information

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

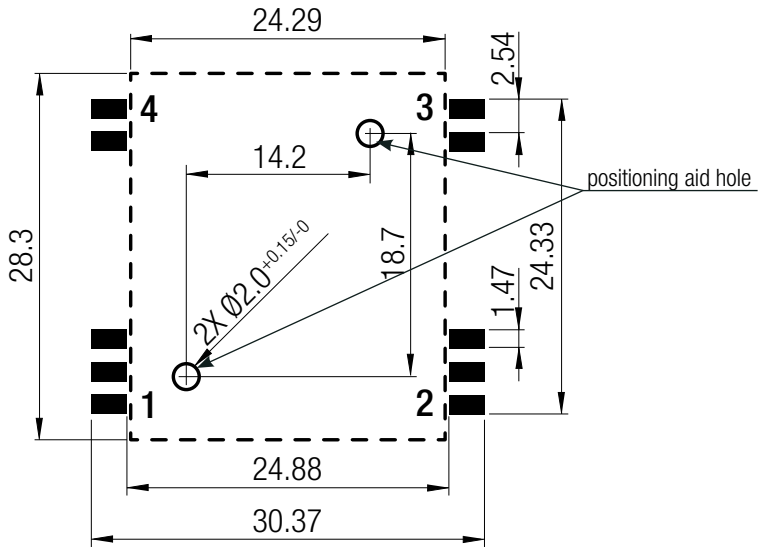
NC= no connection

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

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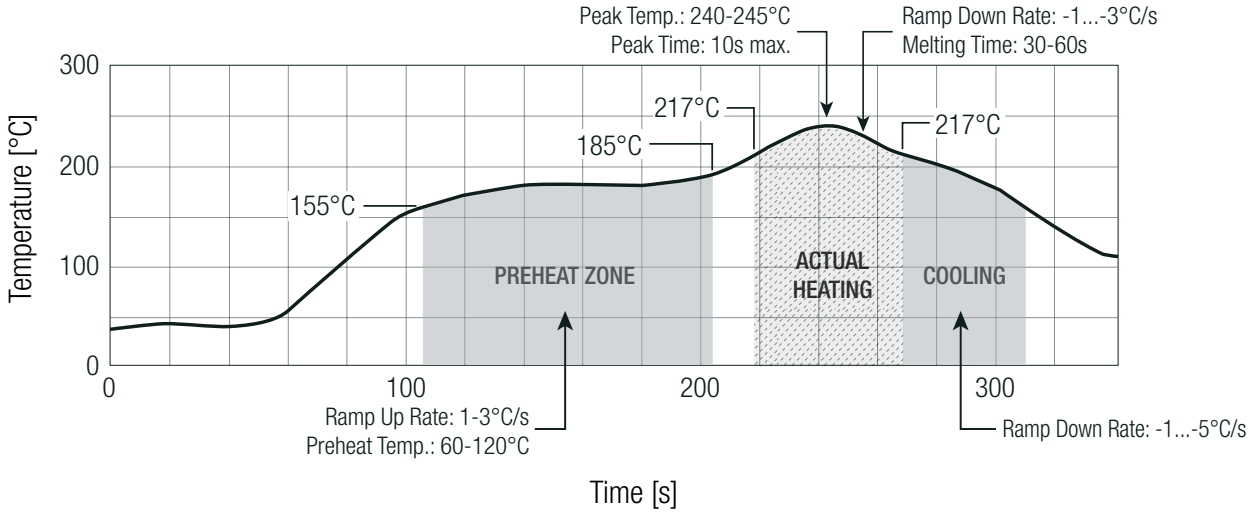
DIMENSION & PHYSICAL CHARACTERISTICS

Recommended Footprint Details
(Top view)



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

SOLDER PROFILE



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimensions (LxWxH)	reel (diameter + width)	Ø380.0 + 60.0mm
	tape and reel (carton)	435.0 x 435.0 x 73.0mm
Tape Width		56mm
Packaging Quantity	reel	50pcs
Storage Temperature Range		-40°C to +85°C
Storage Humidity	non-condensing	20-95% RH max.
Moisture Sensitive Level		2

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