

Features

- Extra wide input range 100/115/240/277VAC
- Overvoltage category OVC III (2000m)
- Operating altitude up to 5000m (OVC II)
- Operating temperature: -40°C to +90°C
- EMC compliant without external components
- No load power consumption <100mW max.

Regulated Converter



RAC10E-K/277

10 Watt
1.8" x 1.0"
Single Output



Description

The economy itemized RAC10E-K series are extra compact 1.8"x1" encapsulated PCB-mount AC/DC modules with a wide input operating range of 85 to 305Vac and come with international safety certifications for industrial, AV and ITE as well as household standards. These Power Supply modules with certifications to overvoltage category OVC III environments operate in a temperature range of -40°C to +90°C with up to 5000m operating altitude and offer fully protected single outputs as well as EMC class B compliance without the need of any external components.

Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. (1) [%]
RAC10E-3.3SK/277	85-305	3.3	2500	76
RAC10E-05SK/277	85-305	5	2000	80
RAC10E-12SK/277	85-305	12	833	83
RAC10E-15SK/277	85-305	15	666	83
RAC10E-24SK/277	85-305	24	416	84

Notes:

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

Model Numbering



UL/IEC62368-1 3rd Ed. certified
CAN/CSA C22.2 No. 62368-1 certified
EN62368-1 2nd & 3rd Ed. certified
IEC/EN61558-1/2-16 pending
IEC/EN61204-3 compliant
FCC 47 CFR Part 18 compliant
EN61000-3-2 & 61000-3-3 compliant
CB Report

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

BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Nominal Input Voltage	50/60Hz	100VAC		277VAC
Operating Range (2,3)	47-63Hz DC	85VAC 120VDC		305VAC 430VDC
Input Current	115VAC 230VAC 277VAC			200mA 100mA 80mA
Inrush Current	cold start at 25°C 115VAC 230/277VAC			20A 40A
No load Power Consumption			75mW	100mW
ErP Standby Mode Conformity (Output Load Capability)	Input Power= 0.5W 1.0W		0.3W 0.7W	
Input Frequency Range	AC Input	47Hz		63Hz
Minimum Load		0%		

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

BASIC CHARACTERISTICS

Parameter	Condition	Min.	Typ.	Max.
Power Factor	115VAC 230VAC		0.6 0.5	
Start-up Time				50ms
Rise Time				40ms
Hold-up Time	115VAC 230VAC 277VAC	5ms 30ms 50ms		
Internal Operating Frequency	100% load at nominal Vin		80kHz	
Output Ripple and Noise ⁽⁴⁾	20MHz BW			150mVp-p

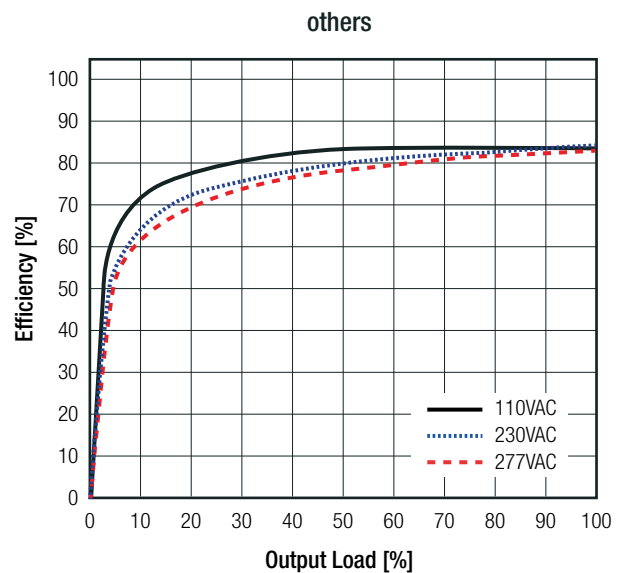
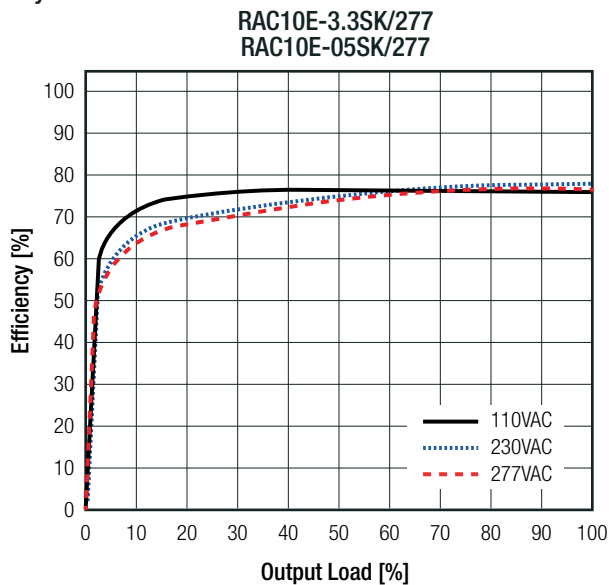
Notes:

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

Note3: Refer to **"Line Derating"**

Note4: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

Efficiency vs. Load

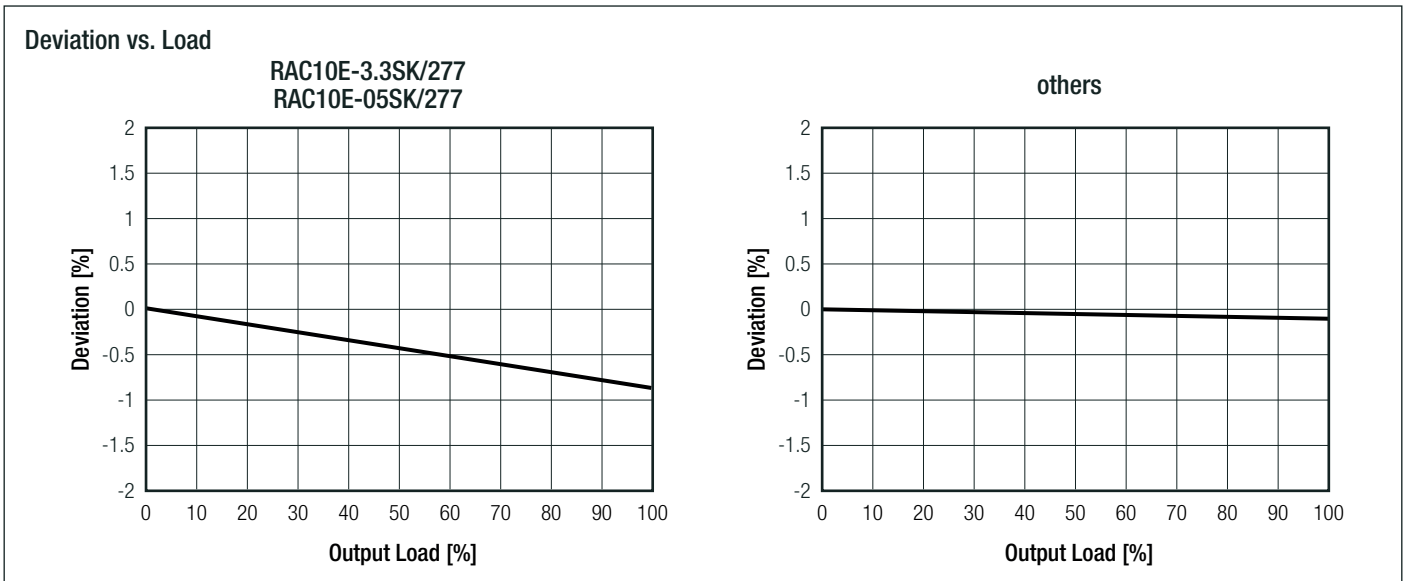


REGULATIONS

Parameter	Condition		Value
Output Accuracy			±2.0% typ.
Line Regulation	low line to high line, full load		±0.5% typ.
Load Regulation	0% to 100% load	3.3Vout	1.5% typ.
		others	0.5% typ.
Transient Response	25% load step change recovery time		3.0% max 500µs typ.

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



PROTECTIONS

Parameter	Type	Value
Input Fuse ⁽⁵⁾	internal	T2A, slow blow type
Short Circuit Protection (SCP)	below 100mΩ	hiccup mode, auto recovery
Over Voltage Protection (OVP)		105% - 120%, clamping, auto restart
Over Current Protection (OCP)		128% - 155%, hiccup mode
Over Voltage Category (OVC)	according to 62368-1; -2-16 according to 61558-1; 2-16 (3rd Edition)	OVCII (5000m) OVCIII (2000m)
Isolation Voltage ⁽⁶⁾	I/P to O/P	1 minute
Isolation Resistance	I/P to O/P, Isolation Voltage 500VDC	1GΩ min.
Isolation Capacitance	I/P to O/P, 100kHz/0.1V	100pF max.
Leakage Current	@277VAC	0.05mA max.
Insulation Grade		reinforced

Notes:

- Note5: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type
 Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL

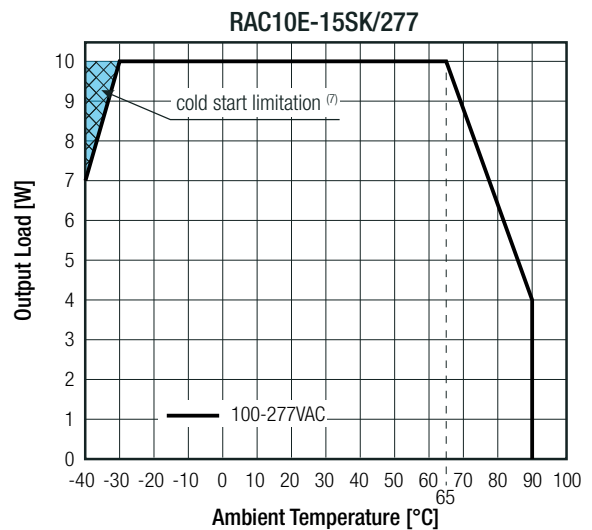
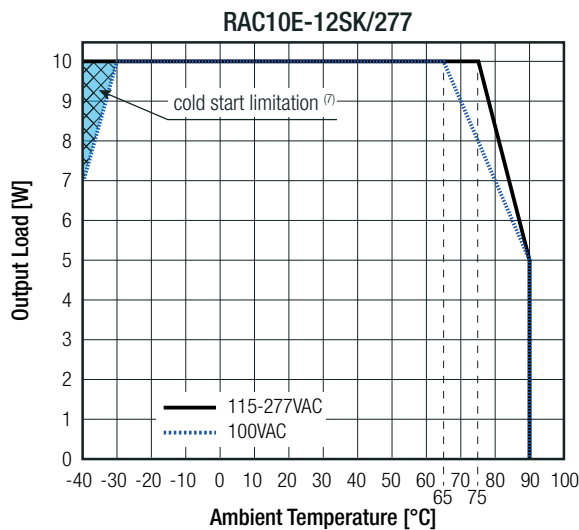
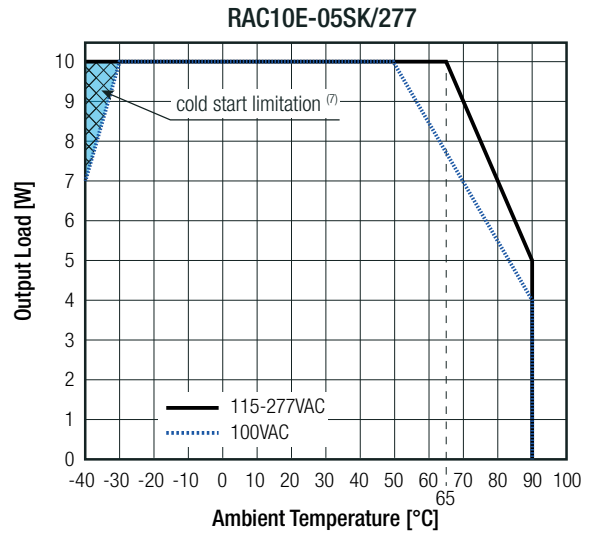
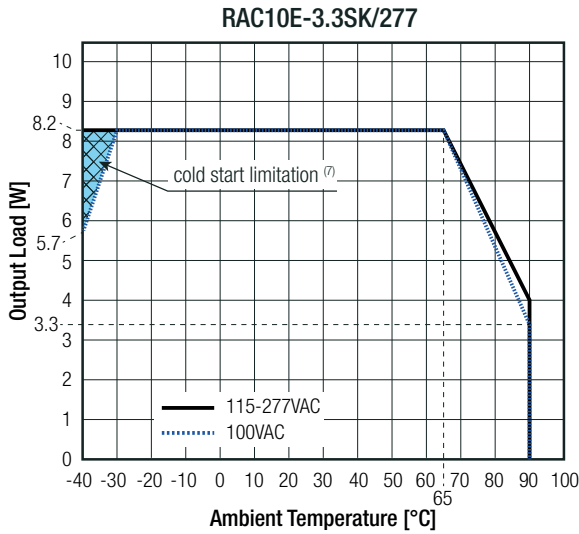
Parameter	Condition	Value
Operating Temperature Range	@ natural convection 0.1m/s full load refer to "Derating Graph"	-40°C to +65°C
Maximum Case Temperature		+110°C
Temperature Coefficient		±0.02%/K
Operating Humidity	non-condensing	95% RH max.
Operating Altitude		5000m (OVCII) 2000m (OVCIII)
Pollution Degree		PD2
Vibration		10-500Hz, 2G10min./1cycle, period 60min. each along x,y,z axes
MTBF	according to MIL-HDBK-217F, G.B.	+25°C +40°C 1710 x 10 ³ hours 1460 x 10 ³ hours
Design Lifetime	230VAC/60Hz and full load +55°C	>35 x 10 ³ hours

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

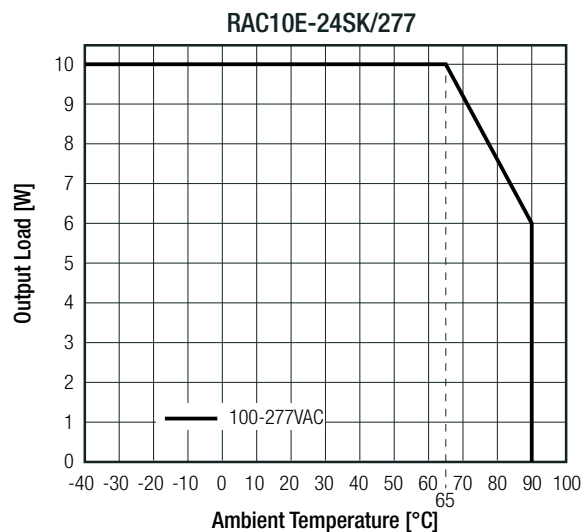
Derating Graph

(@ Chamber and natural convection 0.1 m/s)



Notes:

Note7: Cold start is limited to reduced output Power for 15V in general and for 3.3 to 12V versions at use in low line conditions



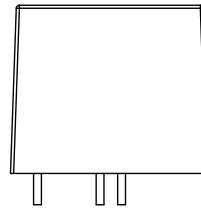
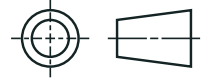
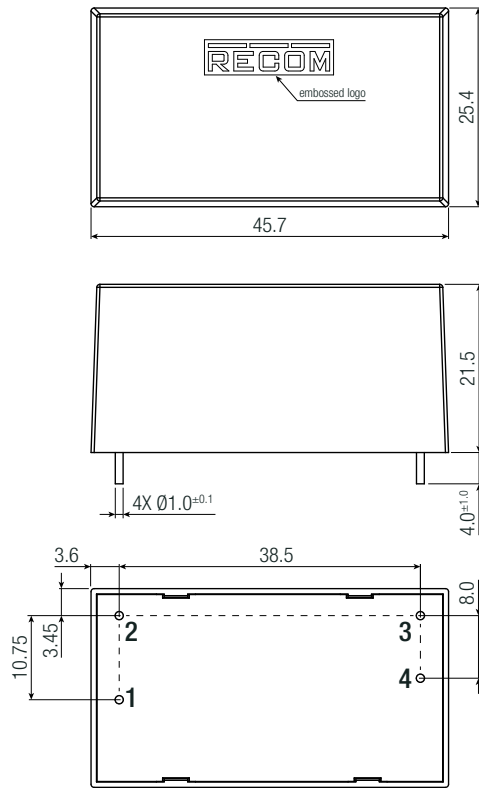
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part 1: Safety requirements	E491408-A6019-UL	UL62368-1:2019 3rd Ed. CAN/CSA-C22.2 No. 62368-1:2019 3rd Ed.
Audio/video, information and communication technology equipment. Safety requirements (CB Scheme)	210824013	IEC62368-1:2018 3rd Ed.
Audio/video, information and communication technology equipment. Safety requirements (LVD)	210824013	EN IEC 62368-1:2020 + A11:2020
Audio/video, information and communication technology equipment. Safety requirements (CB Scheme)	210824014	IEC62368-1:2014 2nd Ed.
Audio/video, information and communication technology equipment. Safety requirements (LVD)		EN62368-1:2014 + A11:2017
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB Scheme)	pending	IEC61558-2-16:2009 AMD1:2013
Safety of power transformers, power supplies, reactors and similar products - Part 1: General requirements and tests (CB Scheme)	pending	IEC61558-1:2017
RoHS2		RoHS 2011/65/EU + AM2015/863
EMC Compliance		
Condition		Standard / Criterion
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		EN IEC 61204-3:2018
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices, industrial, scientific, and medical equipment		FCC 47 CFR Part 18
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8kV Contact: ±4kV	IEC61000-4-2:2008, Criteria A EN61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10 V/m (80-1000 MHz) 3 V/m (1400-2000MHz) 1 V/m (2000-2700MHz)	IEC/EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: L, N: ±2kV L-N: +/-2kV	IEC/EN61000-4-4:2012, Criteria A IEC/EN61000-4-4:2012, Criteria B
Surge Immunity	AC Power Port: L-N 1.0kV	IEC/EN61000-4-5:2014, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port: 10 Vrms (0.15-80MHz)	IEC61000-4-6:2013, Criteria A EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	30 A/m	IEC61000-4-8:2009, Criteria A EN61000-4-8:2010, Criteria A
Voltage Dips	Voltage Dip 100% (0.5P) Voltage Dip 100% (1.0P) Voltage Dip 20, 30, 60%	IEC/EN61000-4-11:2004, Criteria A
Voltage Interruptions	Voltage Interruption 100%	IEC/EN61000-4-11:2004, Criteria B
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/baseplate potting PCB	black plastic (UL94V-0) silicone (UL94V-0) FR4 (UL94V-0)
Dimension (LxWxH)		45.7 x 25.4 x 21.5mm
Weight		52g typ.
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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)



Recommended Footprint Details

Pinning Information

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

Tolerance:

xx.x= ±0.5mm
xx.xx= ±0.25mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	490.0 x 50.0 x 36.0mm
Packaging Quantity		17pcs
Storage Temperature Range		-40°C to +85°C
Storage Humidity		20% to 90% RH max.

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