Features

Regulated Converter

- 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.

RECOM
AC/DC 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 ro 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

RAC10E-__SK/277

- nom. Output Power
- nom. Output Voltage
- **S**ingle

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:

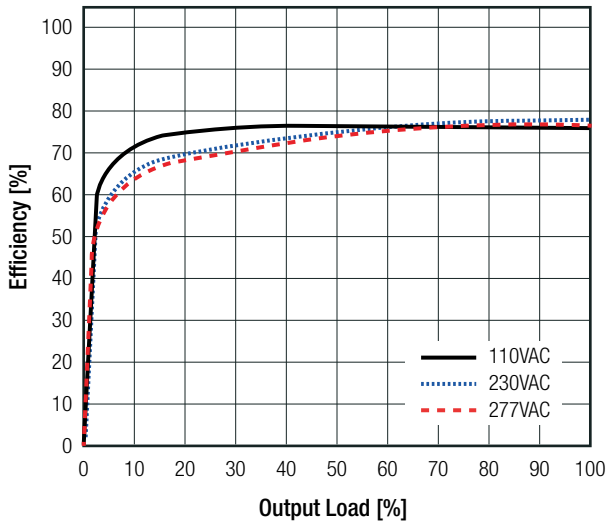
Note2: The products were submitted for safety files at AC-Input operation

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

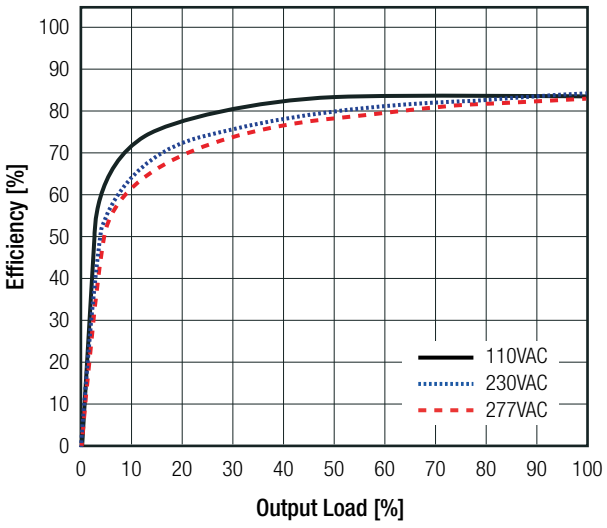
Note4: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

Efficiency vs. Load

RAC10E-3.3SK/277
RAC10E-05SK/277



others



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 others	1.5% typ. 0.5% typ.
Transient Response	25% load step change recovery time		3.0% max 500µs typ.

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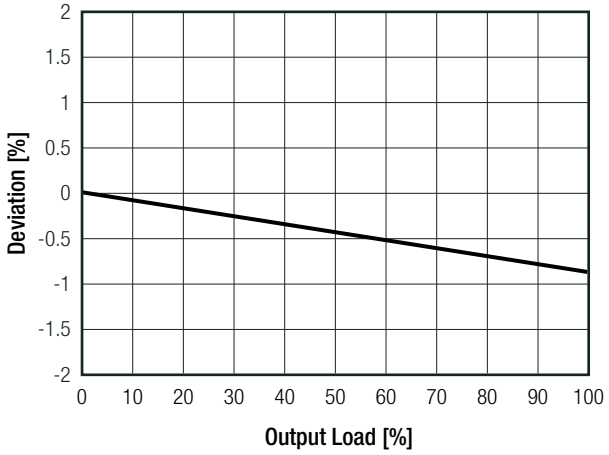
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Deviation vs. Load

RAC10E-3.3SK/277
RAC10E-05SK/277



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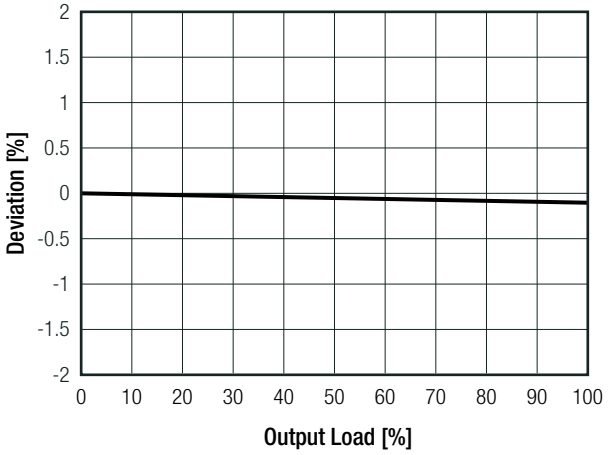

PROTECTIONS

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	4kVAC
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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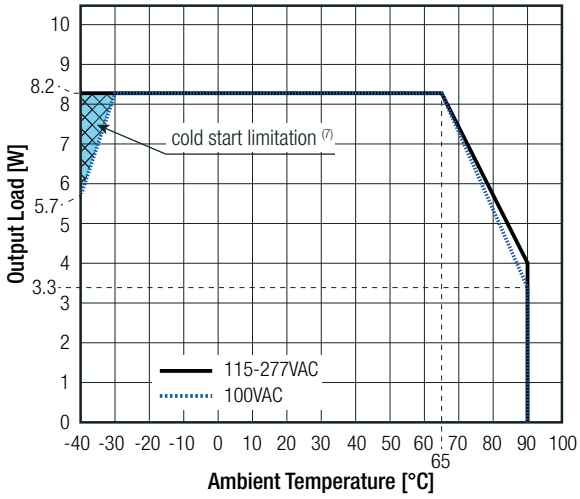
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

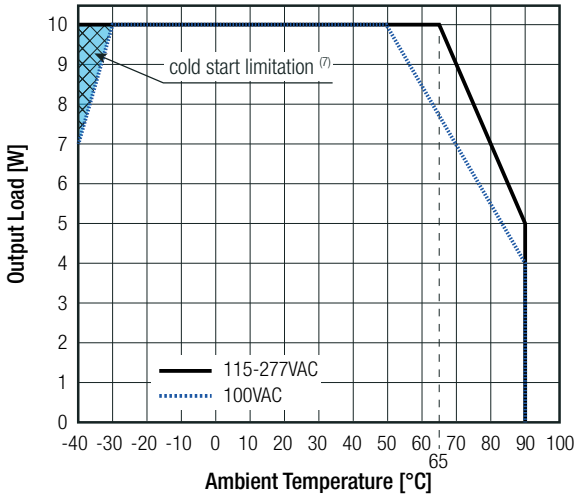
Derating Graph

(@ Chamber and natural convection 0.1m/s)

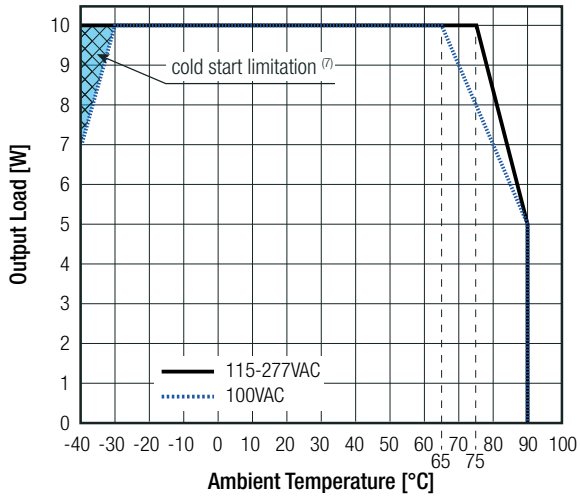
RAC10E-3.3SK/277



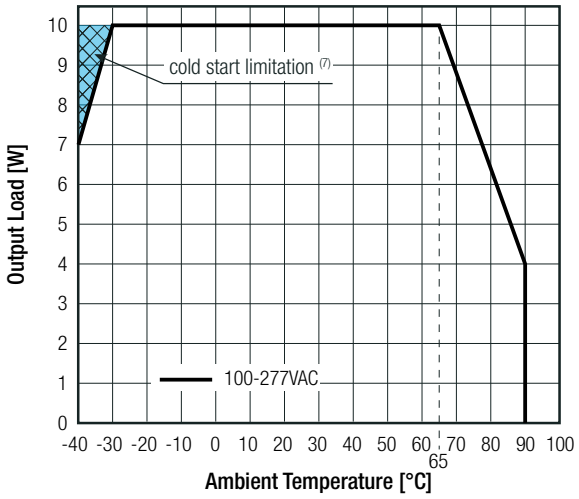
RAC10E-05SK/277



RAC10E-12SK/277



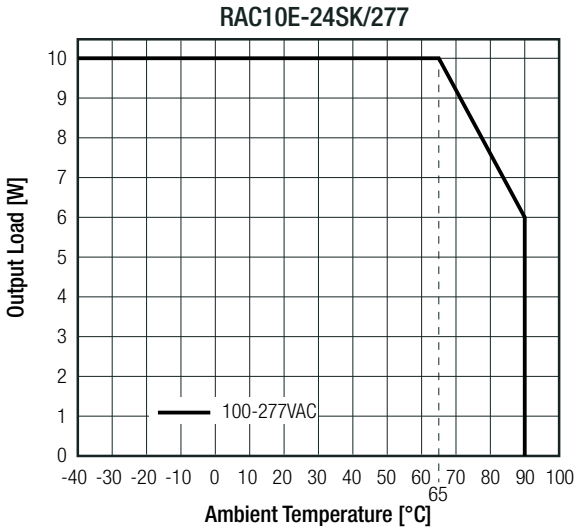
RAC10E-15SK/277



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

RAC10E-24SK/277



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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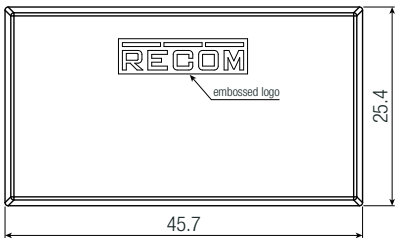
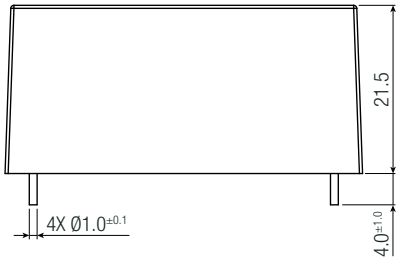
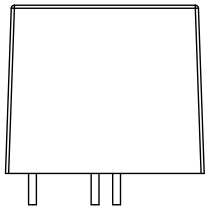
RAC10E-K/277 Series

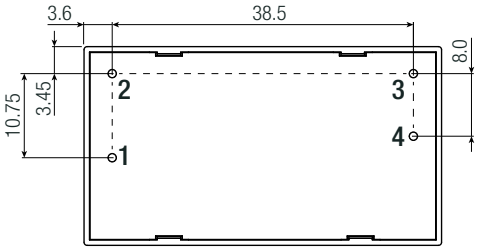
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)

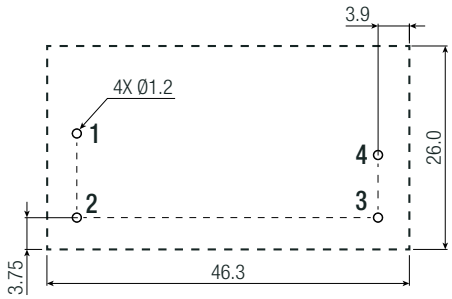








Recommended Footprint Details



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.