Features

Regulated Converter

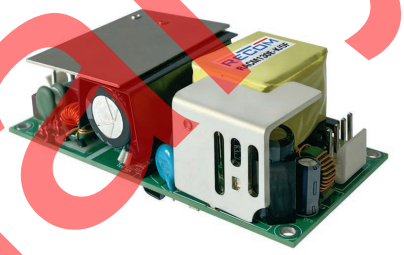
- Wide range input: 85-264VAC
- 130W peak power
- OVC III rating
- 2MOPP medical certified, B and BF ready
- 4000m operating altitude
- Class B EMC filter built-in

RECOM
AC/DC Converter

RACM130E-K

130 Watt Open Frame 2“x4“ or Enclosed

3 YEAR warranty





Description

The RACM130E-K AC/DC power supply series provides up to 130W output to drive dynamic loads and is certified to safety standards for the medical, ITE, industrial and household markets. With an industry-standard 2”x4” footprint, variants are available as an open card or with an enclosure. Input is wide-range for nominals from 100 to 240Vac, the output is tightly regulated and easy system integration is enabled by a wide compliance margin to EMC standard EN55032 class B. On-board dual fuses are included and the product includes immunity to surges for installation Class 3 and Over-Voltage Category OVCIII. Certifications are maintained to 4000m altitude and with a wide operating temperature range, the series is one of the most versatile on the market.

Selection Guide

Part Number	Input Voltage Range [VAC]	nom. Output Voltage [VDC]	Output Current (1) [A]	Output Power [W]	Efficiency typ. (2) [%]
RACM130E-12SK (2)	85-264	12	10.8	130	86
RACM130E-15SK (2)	85-264	15	8.66	130	88
RACM130E-24SK (2)	85-264	24	5.42	130	88
RACM130E-36SK (2)	85-264	36	3.61	130	88
RACM130E-48SK (2)	85-264	48	2.71	130	88

Notes:

Note1: Refer to ***“Thermal Derating for externally provided forced air”***

Note2: Efficiency is tested at nominal input and full load at +25°C ambient

Model Numbering

RACM130E- SK /

- nom. Output Power
- nom. Output Voltage
- Case style (3)
- **S**ingle

Notes:

Note3: “/OF” = standard open frame version
“/ENC”= standard enclosed version

Ordering Examples:

RACM130E-12SK/OF	12Vout	Single	open frame	2” x 4”
RACM130E-15SK/ENC	15Vout	Single	enclosed	2.4” x 4.6”

2MOPP
250VAC

ANSI/AAMI ES60601-1 Ed. 3.1 (pending)
CSA/CAN-C22.2 No. 60601-1:14 (pending)
IEC/EN60601-1 (pending)
IEC/EN62368-1 (pending)
IEC/EN60335-1 (pending)
IEC/EN61558-2-16 (pending)
IEC/EN61558-1 (pending)
EN55032 compliant
EN55035 compliant

preliminary

Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

Parameter	Condition		Min.	Typ.	Max.
Nom. Input Voltage	50/60Hz		100VAC		240VAC
Operating Range (4,5)	47-63Hz		85VAC		264VAC
	DC		120VDC		370VDC
Input Current	115VAC				2.5A
	230VAC				1.5A
Inrush Current	cold start	115VAC			30A
		230VAC			60A
No load Power Consumption	@230VAC			200mW	
ErP Standby Mode Conformity (Output Load Capability)	115/230VAC	P_{IN}= 0.5W		0.2W	
		P_{IN}= 1W		0.6W	
Input Frequency Range	AC Input		47Hz		63Hz
Minimum Load			0%		
Power Factor	115VAC			0.5	
	230VAC			0.4	
Start-up Time				200ms	
Rise Time				20ms	
Hold-up Time	115VAC			16ms	
	230VAC			70ms	
Internal Operating Frequency	100% load at nominal Vin			65kHz	
Output Ripple and Noise (6)	20MHz BW				1% of Vout

Notes:

Note4: The products were submitted for safety files at AC-Input operation

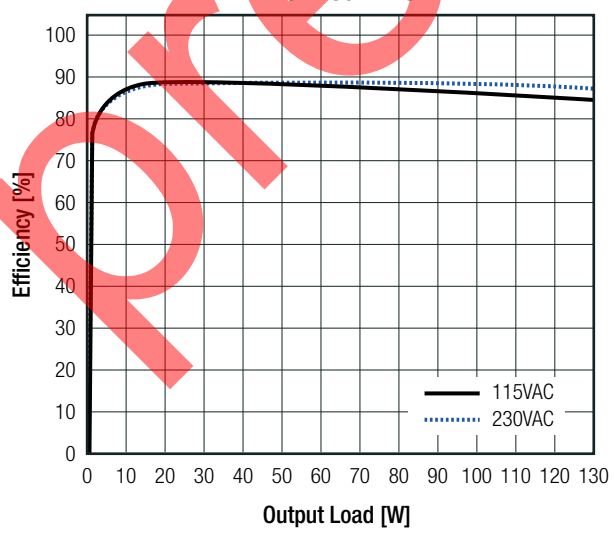
Note5: Refer to ***"Line Rating"*** & ***"PEAK LOAD CAPABILITY"***

Note6: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

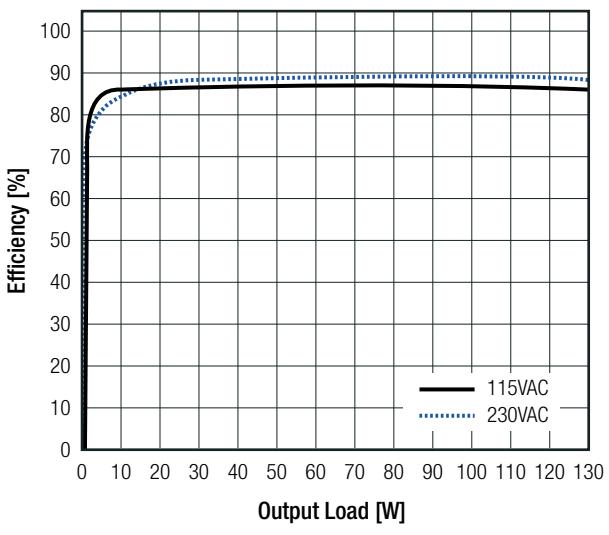
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Efficiency vs. Load

RACM130E-12SK



others



Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

REGULATIONS

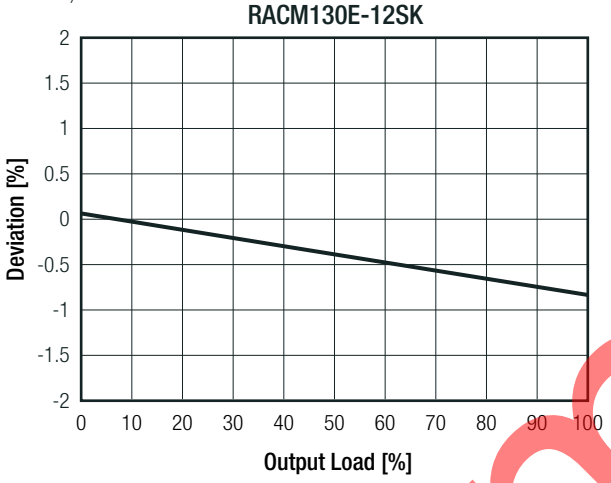
Parameter	Condition	Value
Output Accuracy		±2.0% typ.
Line Regulation	low line to high line, full load	±0.5% typ.
Load Regulation (7)	10% to 100% load	1.0% typ.
Transient Response	25% load step change	4.0% max.
	recovery time	500µs max.

Notes:

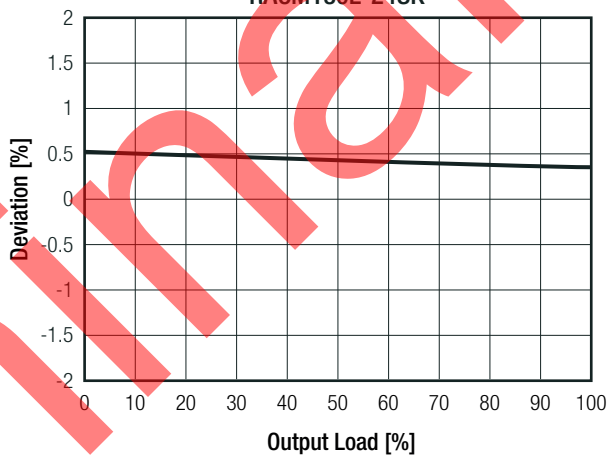
Note7: Operation below 10% load will not harm the converter, but specifications may not be met

Deviation vs. Load
(@ 115-230VAC)

RACM130E-12SK



RACM130E-24SK



PROTECTIONS

Parameter	Type		Value
Internal Input Fuse	L and N (dual fusing)		T4A, slow blow type
Short Circuit Protection (SCP)			hiccup, auto recovery
Over Voltage Protection (OVP)			120% - 180%, auto recovery
Over Voltage Category	according to 61558-2-16		OVCIII (up to 2000m)
	according to 60601-1		OVCII
Over Current Protection (OCP)			110% - 180%, auto recovery
Isolation Voltage (8)	I/P to O/P	1 minute	4kVAC
Isolation Resistance	I/P to O/P, V_{ISO}= 500VDC		1GΩ min.
Isolation Capacitance	I/P to O/P, 100kHz/0.1V		100pF max.
Touch Current	264VAC/63Hz	NC	<100µA
		SFC	<500µA
Insulation Grade			reinforced
Means of Protection	≤300Vrms working voltage		2MOPP

Notes:

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

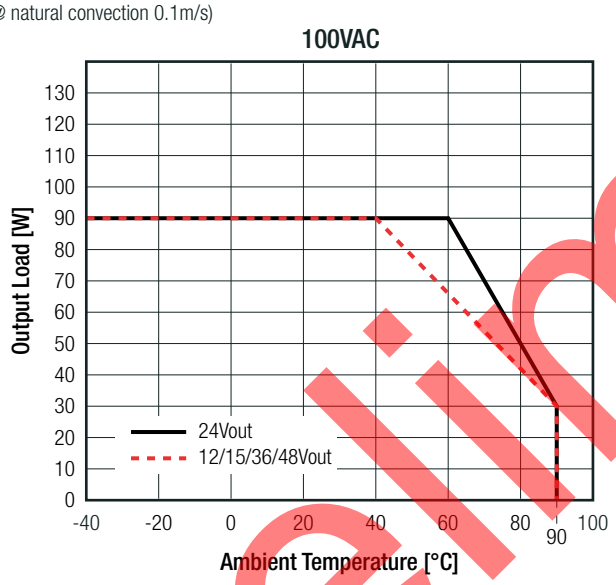
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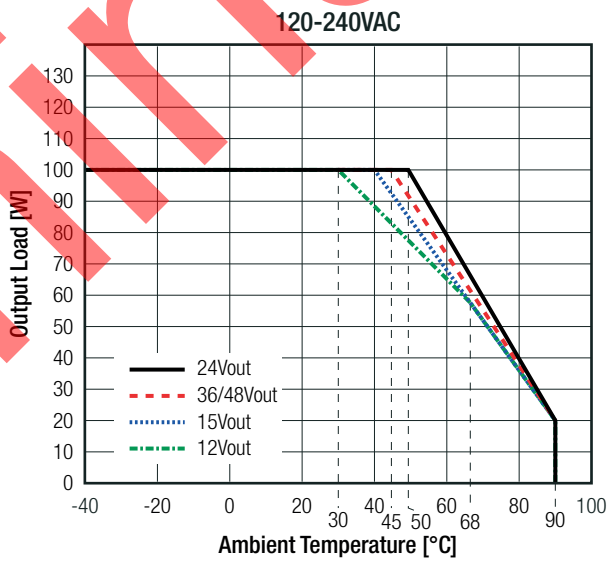
Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

ENVIRONMENTAL			
Parameter	**Condition**		**Value**
Operating Temperature Range	with derating @ natural convection 0.1m/s		-40°C to +90°C
Temperature Coefficient			±0.05%/K
Operating Altitude	according to 60601-1		4000m (OVCII)
	according to 61558-2-16		2000m (OVCIII)
Operating Humidity	non-condensing		5% - 95% RH max.
Pollution Degree			PD2
Vibration	according to MIL-STD-202G		10-500Hz, 5G 10min./1cycle, period 60min. along x,y,z axes
MTBF	according to MIL-HDBK-217F, G.B.	T_{AMB}= +25°C	>600 x 10^3 hours
		T_{AMB}= +40°C	>450 x 10^3 hours
Design Lifetime	230VAC/50Hz and full load at +25°C		>30 x 10^3 hours

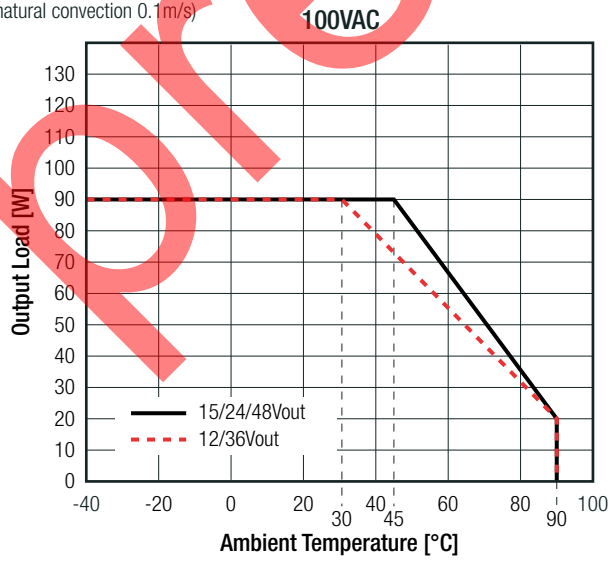
Still air convection cooled ratings

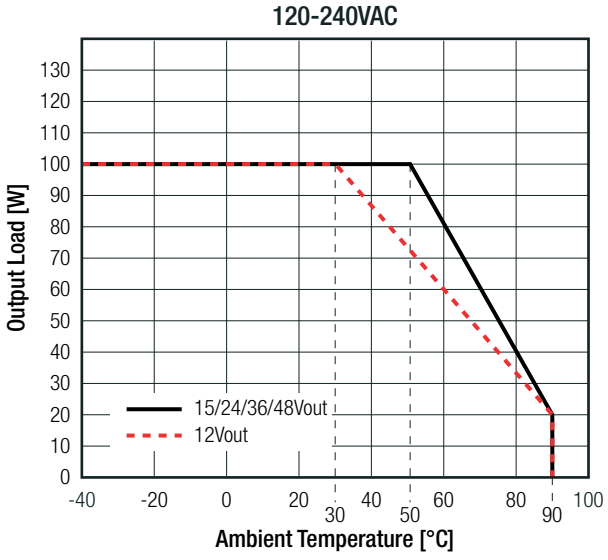
RACM130E-K/OF
(@ natural convection 0.1m/s)





RACM130E-K/ENC
(@ natural convection 0.1m/s)





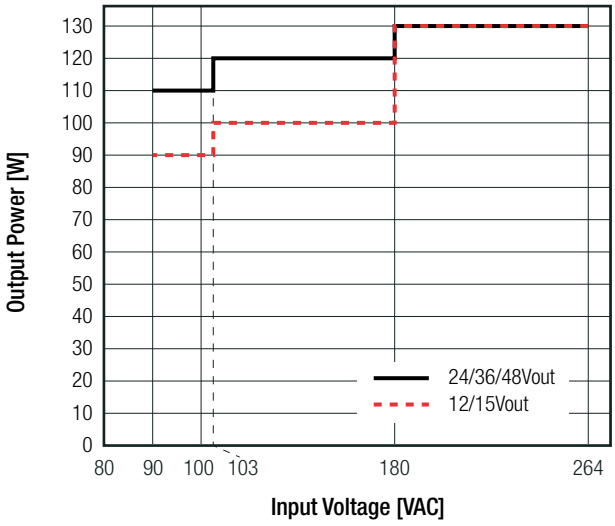
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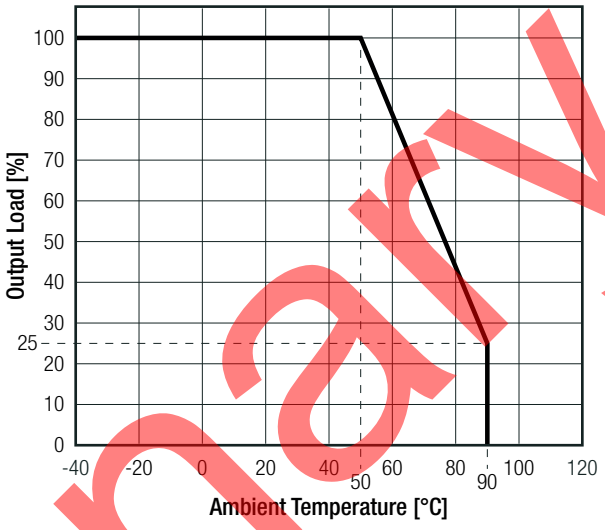
Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

Thermal Derating for externally provided forced air

Line Rating
(@ 1m/s airflow; valid for "/OF" and "/ENC" versions)



Thermal Derating
(valid for "/OF" and "/ENC" versions)



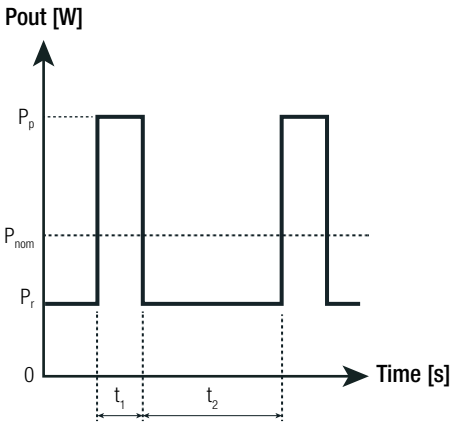
PEAK LOAD CAPABILITY (@ 0.1 m/s natural convection; valid for "/OF" and "/ENC" versions)



Calculation for recovery power:

P_P	= peak output power (≤130W)	[W]
P_r	= recovery output power	[W]
t_1	= peak time set (10s max.)	[s]
t_2	= recovery time (min. 3 x t_1)	[s]
k	= safety factor 1.2	[ ]

$$P_r = \frac{100 \times (t_1 + t_2) - (P_P \times t_1)}{t_2 \times k}$$



Practical Example (RACM130E-24SK/OF):

Take the RACM130E-24SK/OF at 230VAC input Voltage and full load at T_{AMB}= 25°C ,with natural convection.

P_P = 130W
t_1 = 10s
t_2 = 30s
k = 1.2

$$P_r = \frac{100 \times (10 + 30) - (130 \times 10)}{30 \times 1.2} = \underline{75W}$$

preliminary

Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Report Number**	**Standard**
Medical electrical equipment Part 1: General requirements for basic safety and essential performance	pending	CAN/CSA-C22.2 No. 60601-1:14 ANSI/AAMI ES60601-1:2005
Medical electrical equipment Part 1: General requirements for basic safety and essential performance	pending	IEC60601-1:2005 EN60601-1:2006
Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme)	pending	IEC62368-1:2014
Audio/Video, information and communication technology equipment - Safety requirements (LVD)	pending	EN62368-1:2014
Household and similar electrical appliances – Safety – Part 1: General requirements (LVD)	pending	IEC60335-1:2010 EN60335-1:2012
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100 V Part 2: Particular requirements (CB Scheme)	pending	IEC61558-2-16:2009
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100 V Part 2: Particular requirements	pending	EN61558-2-16:2009
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB Scheme)	pending	IEC61558-1:2017
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB Scheme)		EN IEC 61558-1:2019
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	JYTAB-R01-2100249	EN/IEC61204-3:2018
ESD Electrostatic discharge immunity test	Contact: ±4kV	EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-1000MHz) 3V/m (1400-2000MHz) 1V/m (2000-2700MHz)	EN61000-4-3:2006, Criteria A
Fast Transient and Burst Immunity	AC Port: L-N 2kV	EN61000-4-4:2012, Criteria A
Surge Immunity	AC Port: L-N 0,5, 1kV	EN61000-4-5:2014, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Port: 10Vrms (0.15-80MHz)	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	30A/M	EN61000-4-8:2010; Criteria A
Voltage Dips and Interruptions	Dips: 100% (0.5, 1.0P), 30%, 20% 60% Interruptions: 100%	EN61000-4-11:2004, Criteria A EN61000-4-11:2004, Criteria B EN61000-4-11:2004, Criteria B
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013

EMC Compliance (EN55032)	**Condition**	**Standard / Criterion**
Electromagnetic compatibility of multimedia equipment - Emission requirements	JYTAB-R01-2100250	EN55032:2015
Electromagnetic compatibility of multimedia equipment - Immunity requirements		EN55035:2017
ESD Electrostatic discharge immunity test	Contact: ±2, 4kV	EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	3 V/m (80-5000MHz)	EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Port: L-N 1kV	EN61000-4-4:2012, Criteria A
Surge Immunity	AC Port: L-N 0,5, 1kV	EN61000-4-5:2014, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Port: 3Vrms (0.15-10MHz) 3-1Vrms (10-30MHz) 1Vrms (30-80MHz)	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	1A/m	EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions	Dips: 100%, 30% Interruptions:100%	EN61000-4-11:2004 , Criteria A EN61000-4-11:2004, Criteria B
Limits of Harmonic Current Emissions		EN61000-3-2:2014
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013

Preliminary

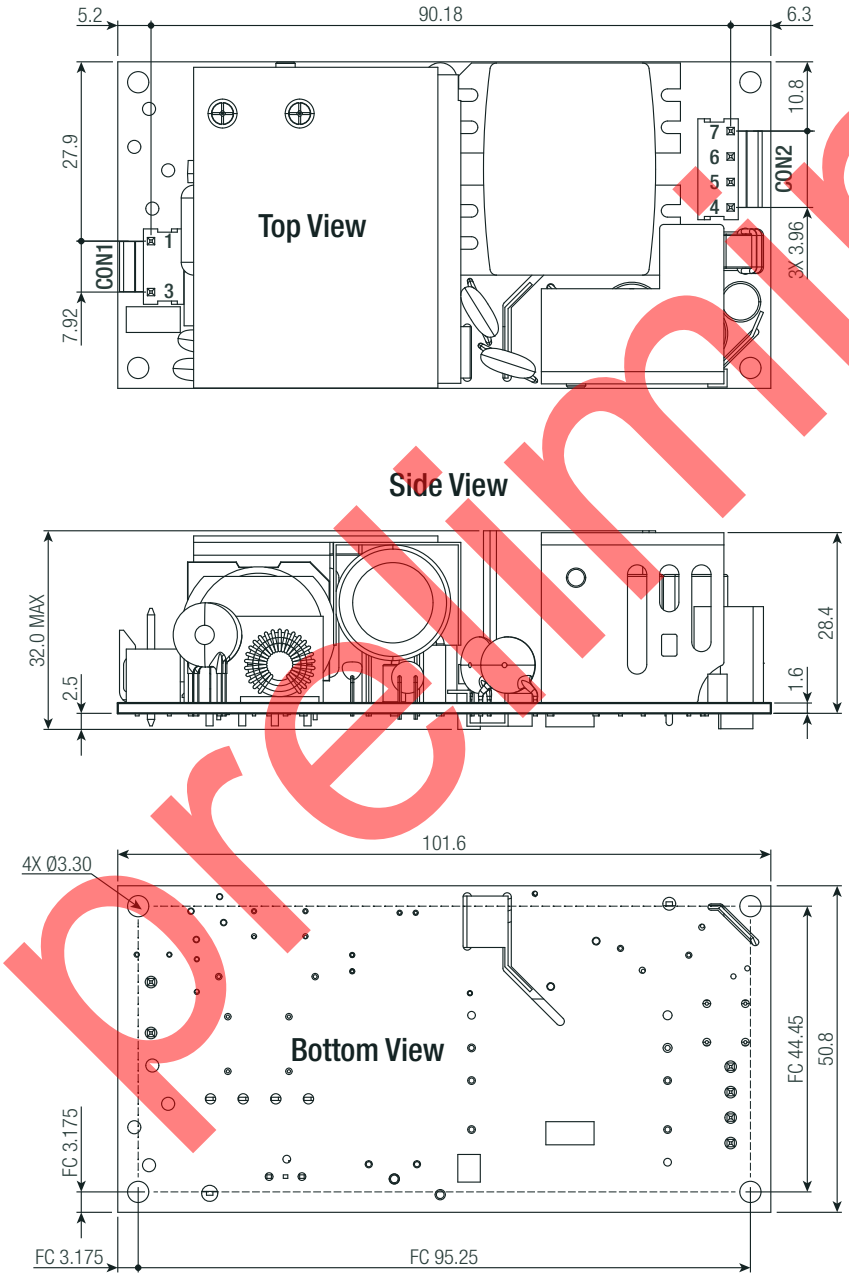
RACM130E-K Series

Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

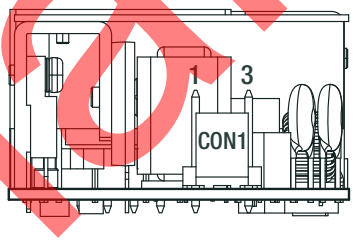
DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	PCB	FR4, (UL94-V0)
	baseplate / case ("/ENC)	aluminum
Dimension (LxWxH)	"/OF" Version	101.6 x 50.8 x 32.0mm
	"/ENC" Version	118.3 x 62.7 x 38.7mm
Weight	"/OF" Version	200g typ.
	"/ENC" Version	260g typ.

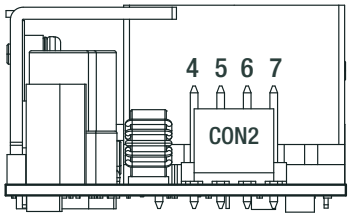
Dimension Drawing "/OF"(mm)



AC Input Side View



DC Output Side View



Connector Information

#	Function	Terminal
	AC Input (CON1)	
1	VAC in (N)	3 Pins (Pin2 removed)
3	VAC in (L)	with 3.96mm pitch
	DC Output (CON2)	
4,5	+VDC out	4 Pins
6,7	-VDC out	with 3.96mm pitch

FC= fixing centers

Compatible Connector

Housing
Molex 41695 Series or equivalent
Crimp Terminal
Molex 2478 Series or equivalent

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

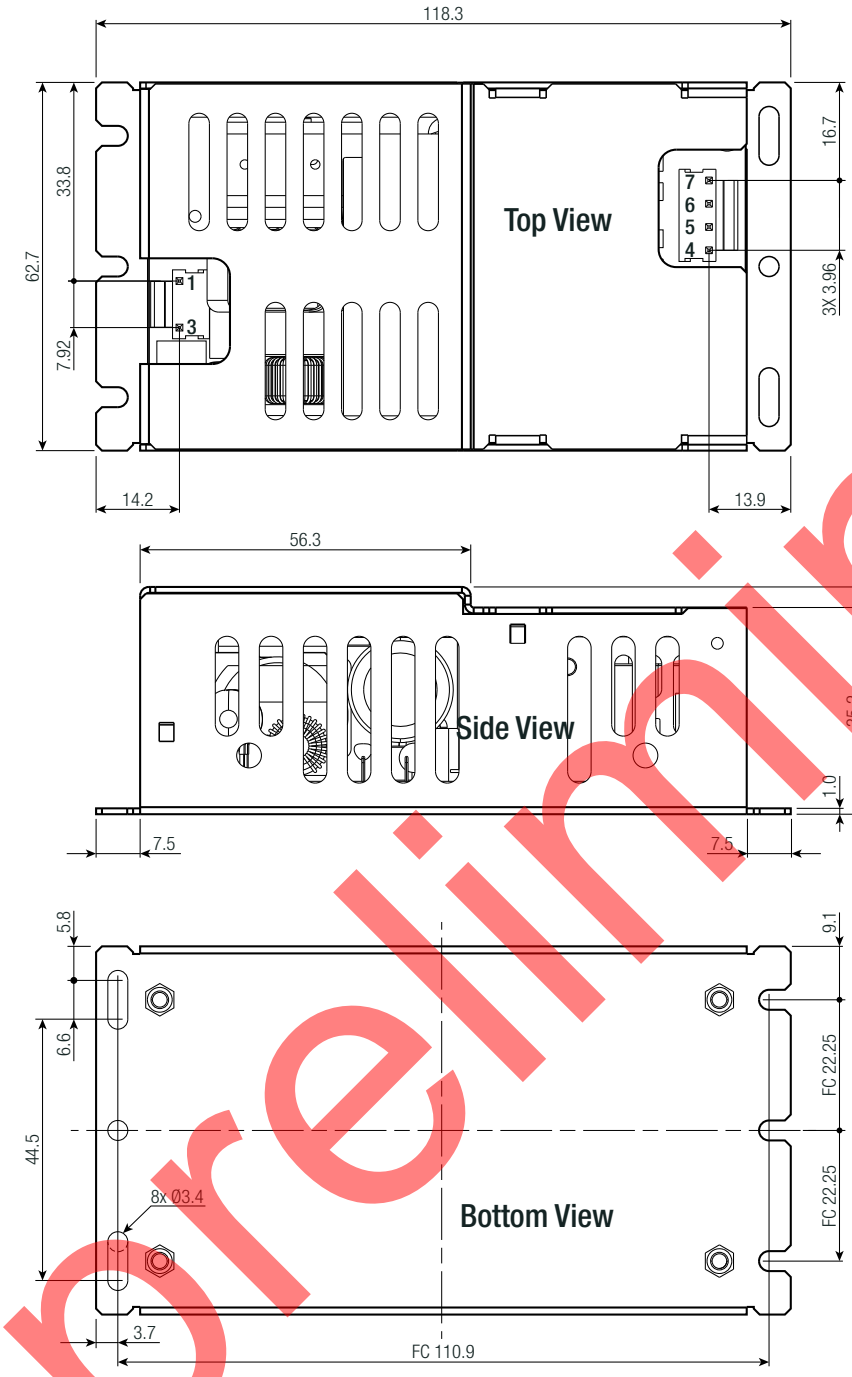
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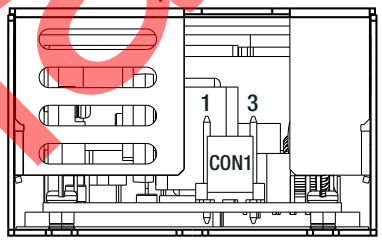
RACM130E-K Series

Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

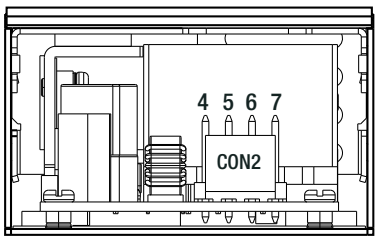
Dimension Drawing "/ENC"(mm)



AC Input Side View



DC Output Side View



Connector Information

#	Function	Terminal
	AC Input (CON1)	
1	VAC in (N)	3 Pins (Pin2 removed)
3	VAC in (L)	with 3.96mm pitch
	DC Output (CON2)	
4,5	+VDC out	4 Pins
6,7	-VDC out	with 3.96mm pitch

FC= fixing centers

Compatible Connector

Housing
Molex 41695 Series or equivalent
Crimp Terminal
Molex 2478 Series or equivalent

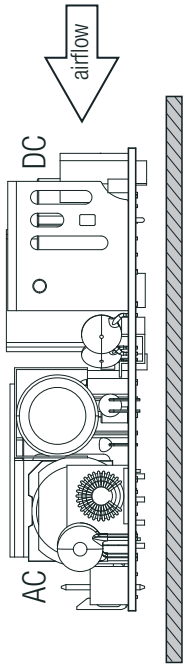
Tolerances: xx.x= ±0.5mm
xx.xx= ±0.25mm

preliminary

Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

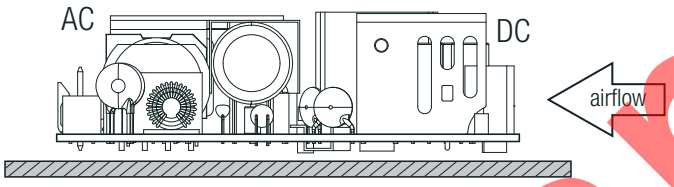
APPLICATION AND INSTALLATION

Mounting



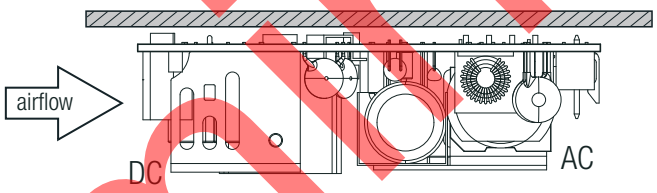
vertical

horizontal (standard)

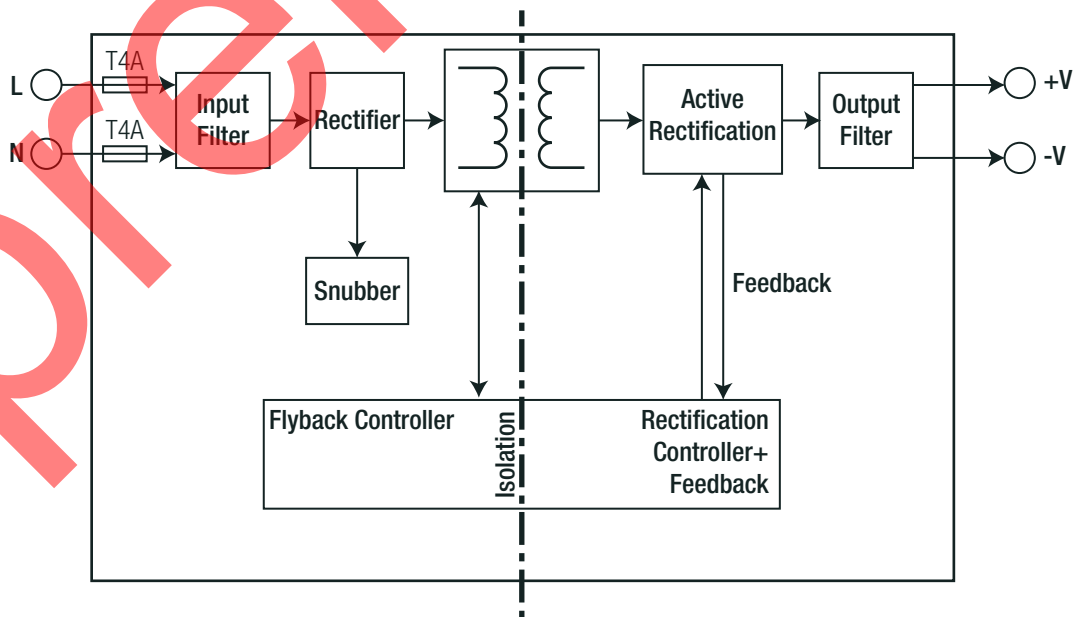


If module is mounted vertical or upside-down with natural convection cooling, the power must be derated ≥ 10%.

upside-down



Blockdiagram ("/OF")



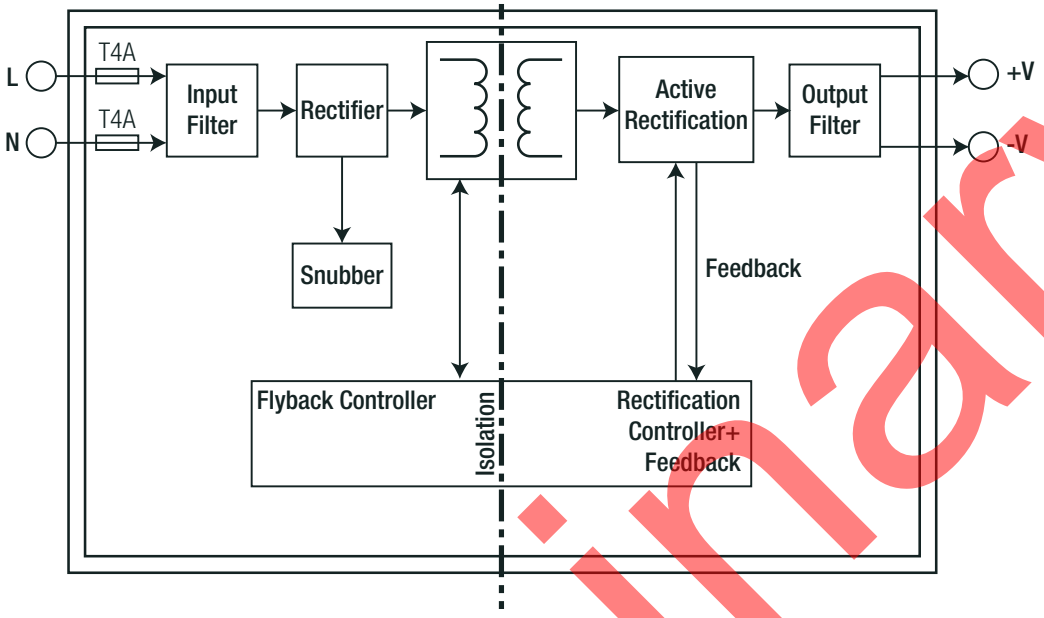
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preliminary

Specifications (measured @ Ta= 25°C, nom. Vin, 130W @1m/s airflow and after warm-up unless otherwise stated)

APPLICATION AND INSTALLATION

Blockdiagram ("/ENC")



PACKAGING INFORMATION

Parameter	Type		Value
Packaging Dimension (LxWxH)	"/OF" type	tray	360.0 x 205.0 x 50.0mm
	"/ENC" type		405.0 x 360.0 x 85.0mm
Packaging Quantity	"/OF" type		9pcs
	"/ENC" type		18pcs
Storage Temperature Range			-40°C to +90°C
Storage Humidity	non-condensing		95% max.

preliminary

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.