Features

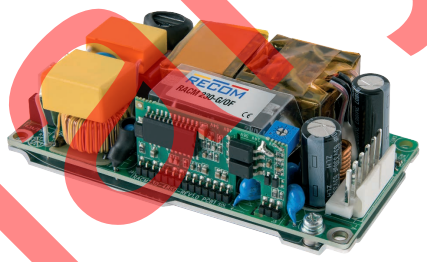
Regulated Converter

- Baseplate cooled, fanless operation
- 230 Watt maximum power
- Universal AC input range (80~264VAC)
- No load power consumption <0.5W
- Wide operating temperature range (-40°C to +80°C)
- Household, ITE and medically 2MOPP certified
- 12VDC fan output on board

RECOM
AC/DC Converter

RACM230-G

230 Watt 4" x 2" Open Frame Single Output



Description

The RACM230-G Series is designed to support continuous output power without fan cooling. The compact 2"x 4" baseplate design enables direct heat dissipation through metal housings in the application. Up to 230 watts are available to drive dynamic loads for several seconds of peak power or with forced air for even longer time frames. A smart fan output is on board as standard. A wide input range of 80 to 264VAC, up to 5000m operating altitude and international safety agency certifications make the series worldwide compliant for medical 2 MOPP, household and industrial ITE applications.

Selection Guide

Part Number	Input Voltage Range [VAC]	Nom. Output Voltage [VDC]	Max. Output Current (1) [A]	Efficiency typ. (3) [%]
RACM230-12SG	80-264	12	19.17 (2)	91
RACM230-24SG	80-264	24	9.58	92
RACM230-36SG	80-264	36	6.39	92
RACM230-48SG	80-264	48	4.80	92
RACM230-54SG	80-264	54	4.26	92

Notes:

Note1: With forced air cooling (2.5m/s) + conduction cooling + refer to "Line Derating"
Note2: Refer to "Peak Load Capability" graph
Note3: Efficiency is tested at nominal input and full load at +25°C ambient

2MOPP

IEC/EN60950-1 (pending)
IEC/EN62368-1 (pending)
IEC/EN60335-1 (pending)
IEC/EN60601-1 (pending)
ANSI/AAMI ES60601-1 (pending)
CSA/CAN 22.2 60950-1-14 (pending)
IEC/EN61558-1 (pending)
IEC/EN61558-2-16 (pending)
EN55032 compliant
EN55024 compliant

Model Numbering

RACM230-

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

Ordering Examples:

RACM230-24SG 24Vout Single open Frame

Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

BASIC CHARACTERISTICS

Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range [5]	nom. Vin= 230VAC	80VAC 120VDC	230VAC	264VAC 370VDC
Input Current	115VAC 230VAC			3A 1.1A
Inrush Current	115VAC 230VAC			40A 60A
No load Power Consumption			300mW	500mW
Input Frequency Range	AC input	47Hz	50Hz	63Hz
Output Voltage Adjustability [6]	12Vout 24Vout 36Vout 48Vout 54Vout	11.4VDC 22.8VDC 34.2VDC 45.6VDC 51.3VDC		12.6VDC 25.2VDC 37.8VDC 50.4VDC 56.0VDC
Minimum Load		0%		
Power Factor	115VAC 230VAC	0.98 0.95	0.99 0.97	
Start-up Time	115/230VAC		0.5s	
Rise Time			10ms	
Hold-up Time	115/230VAC: 230W		8ms	
	115/230VAC: 200W		10ms	
	115/230VAC: 160W		16ms	
	115/230VAC: 130W		25ms	
Output Ripple and Noise [7]	20MHz BW @ +25°C			1% of Vout nom. max.

Notes:

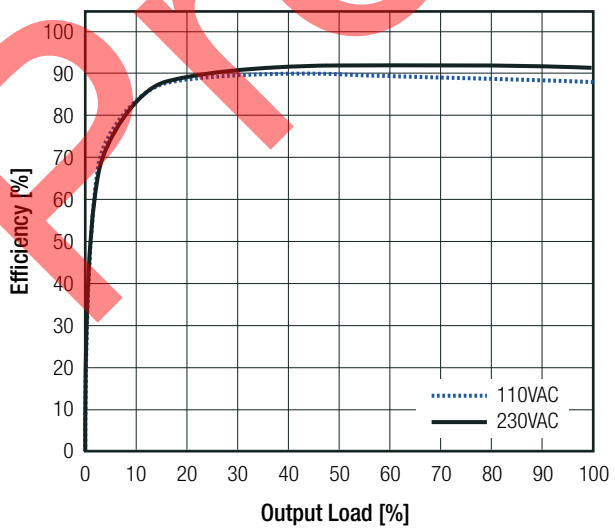
Note5: The products were submitted for safety files at AC-Input operation

Note6: By trimming up, decrease output current to avoid exceeding rated output power
By trimming down, do not exceed maximum continuous output current

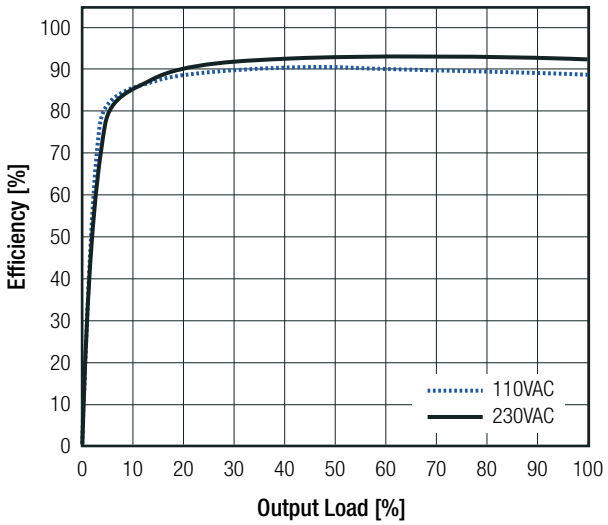
Note7: Measurements are made with a 12“ twisted pair-wire terminated with a 0.1µF and 10µF parallel capacitor

Efficiency vs. Load

RACM230-12SG



others



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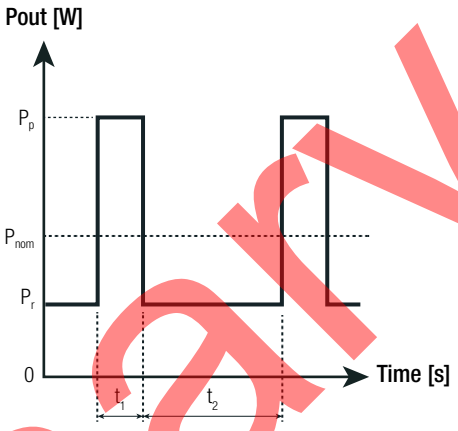
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

Peak Load Capability

Peak Load Calculation

P_{nom}	= nom. output power	[W]
P_P	= peak output power (≤230W)	[W]
P_r	= recovery output power	[W]
t_1	= peak time set (10s max.)	[s]
t_2	= recovery time (min. 4 x t_1)	[s]
k	= safety factor 1.7	[ ]

$$P_r = \frac{P_{nom} \times (t_{1set} + t_2) - (P_P \times t_{1set})}{t_2 \times k}$$



Practical Example (RACM230-12SG):

Take the RACM230-12SG at 230VAC input Voltage and full load at T_{AMB}= 25°C (160W) with conduction cooling.

$P_{nom.}$	= refer to derating graph (160W)	
P_P	= 230W	
t_1	= 1s	
t_2	= 40s	
k	= 1.7	

$$P_r = \frac{160 \times (1 + 40) - (230 \times 1)}{40 \times 1.7} = \underline{93W}$$

REGULATIONS

Parameter	Condition	Value
Output Accuracy		±1.0% typ.
Line Regulation	low line to high line, full load	±0.5% typ.
Load Regulation (8)	10% to 100% load	0.5% typ.

Notes:

Note8: Operation below 10% load will not harm the converter, but specifications may not be met

ADDITIONAL FEATURES

Parameter	Condition		Min.	Typ.	Max.
Fan Output Power	@50°C (not protected)	continuous			500mA

PROTECTIONS

Parameter	Type		Value
Internal Input Fuse (9)	line and neutral		2x T6.3A, slow blow type
Short Circuit Protection (SCP)			hiccup mode, auto recovery
Over Voltage Protection (OVP)			105% - 150%, latch off mode
Over Load Protection (OLP)			105% - 200% (150% typ.); hiccup mode auto recovery
Over Voltage Category (OVC)			OVCIII
Isolation Voltage (safety certified) (10)	I/P to O/P	1 minute	4kVAC
Isolation Resistance			10MΩ min.
Insulation Grade			reinforced
Leakage Current			0.3mA max.
Means of Protection	250VAC working voltage		2MOPP

Notes:

Note9: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

Note10: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

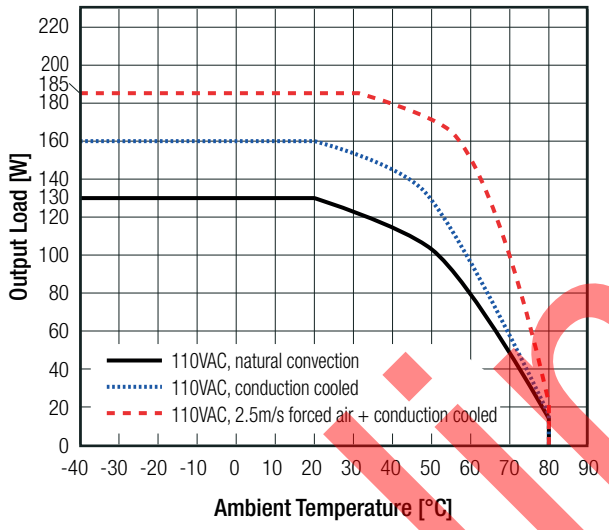
ENVIRONMENTAL			
Parameter	**Condition**		**Value**
Operating Temperature Range	refer to derating graphs		-40°C to +80°C
Temperature Coefficient			±0.05%/K
Operating Altitude (11)			5000m
Operating Humidity	non-condensing		5% - 90% RH max.
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217F, G.B.	+25°C (forced air cooling) +50°C (forced air cooling)	200 x 10^3 hours 60 x 10^3 hours

Notes:

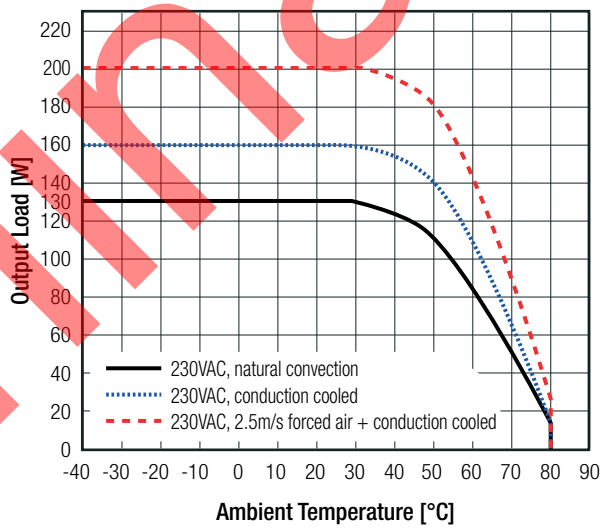
Note11: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime. Please contact RECOM tech support for advice.

RACM230-12SG

110VAC

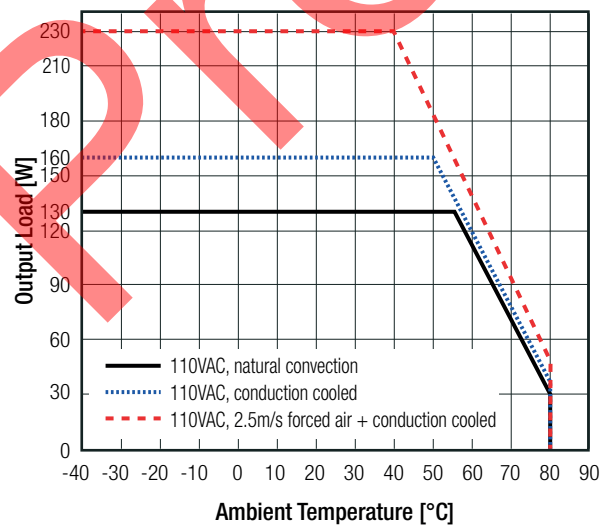


230VAC

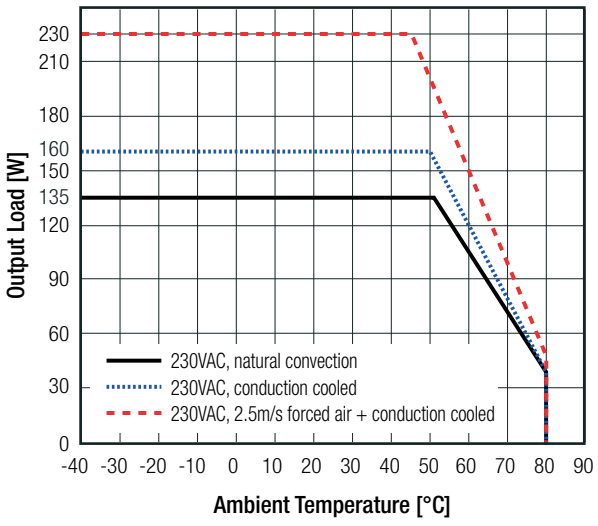


Other Models

110VAC



230VAC



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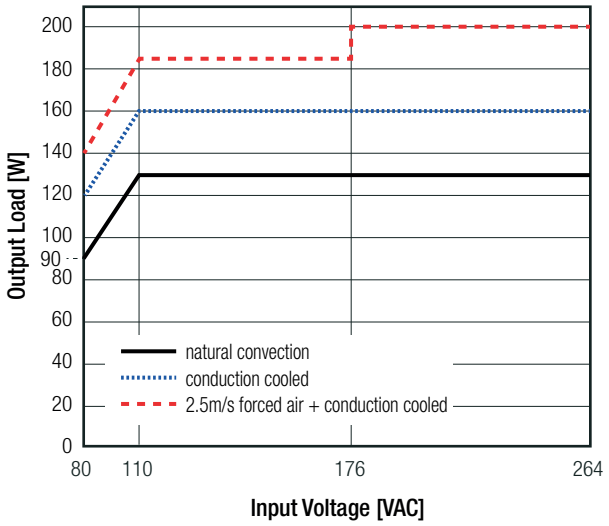
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

Line Derating

(at +25°C ambient)

12Vout



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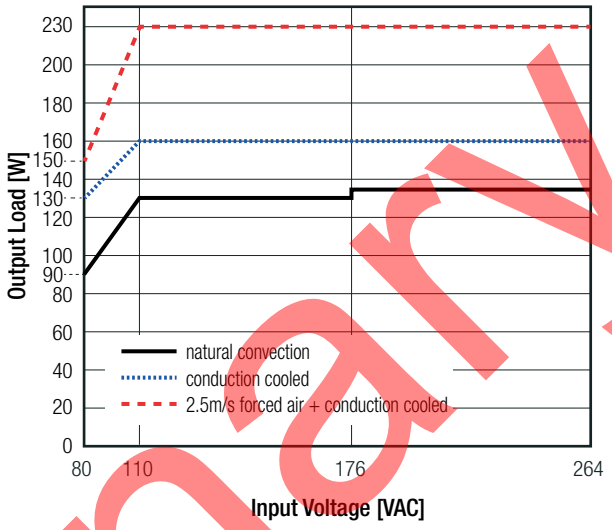

<0.1m/s = still air
0.1 - 0.2m/s = natural convection

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Report / File Number**	**Standard**
Audio/video, information and communication technology equipment - Safety requirements (CB)	pending	IEC62368-1:2014 2nd Edition
Audio/video, information and communication technology equipment - Safety requirements	pending	EN62368-1:2014 + A11:2017
Household and similar electrical appliances - Safety - Part 1: General requirements	pending	EN60335-1:2012 + A11:2014
Medical Electric Equipment, General Requirements for Safety and Essential Performance	pending	ANSI/AAMI ES60601-1:2005 CAN/CSA-C22.2 No. 6060-1:14
Medical Electric Equipment, General Requirements for Safety and Essential Performance (LVD)	pending	IEC60601-1:2005, 3rd Edition + AM1:2014
Medical Electric Equipment, General Requirements for Safety and Essential Performance (CB)		EN60601-1:2006 + A12:2014
Information Technology Equipment, General Requirements for Safety	pending	IEC60950-1:2005, 2nd Edition + A2:2013 EN60950-1:2006 + A2:2013
Safety of transformers, reactors, power supply units and combinations thereof Part 1: General requirements and tests	pending	IEC61558-1:2005, 2nd Edition + A1:2009 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)	pending	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 (LVD)	pending	EN61558-2-16:2009 + A1:2013
RoHS2		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	without external filter	EN55032, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010 + A1:2015

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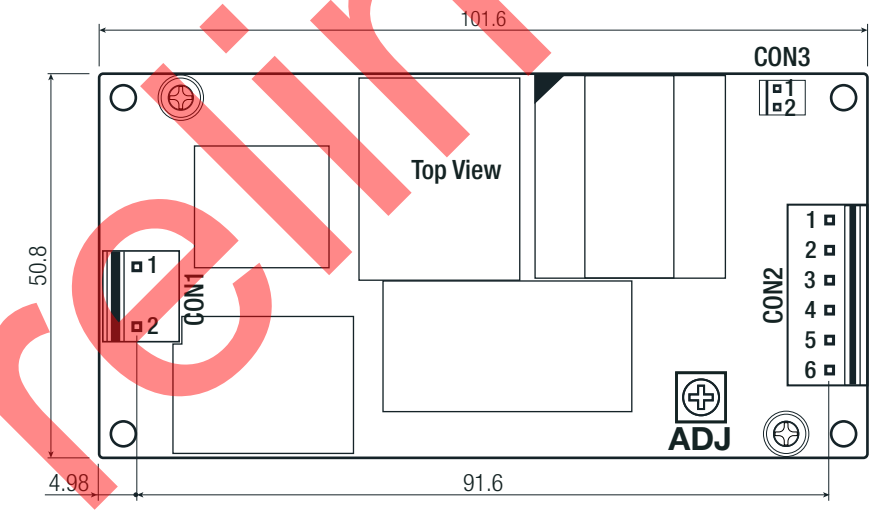
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

EMC Compliance	Condition	Standard / Criterion
ESD Electrostatic Discharge Immunity Test		IEC/EN61000-4-2
Radiated, Radio-Frequency, Electromagnetic Field Immunity Test		IEC/EN61000-4-3
Fast Transient and Burst Immunity		IEC/EN61000-4-4
Surge Immunity		IEC/EN61000-4-5
Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields		IEC/EN61000-4-6
Power Magnetic Field Immunity		IEC/EN61000-4-8
Voltage Dips and Interruptions		IEC/EN61000-4-11

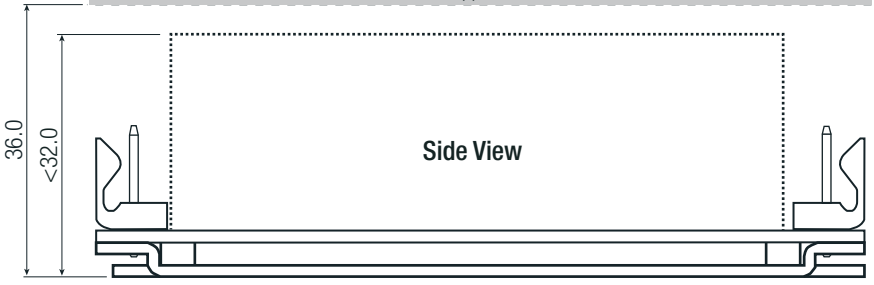
DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	PCB baseplate	FR4, (UL94 V-0) aluminium
Dimension (LxWxH)		101.6 x 50.8 x 32.0mm
Weight		220g typ.

Dimension Drawing (mm)



Customer Application



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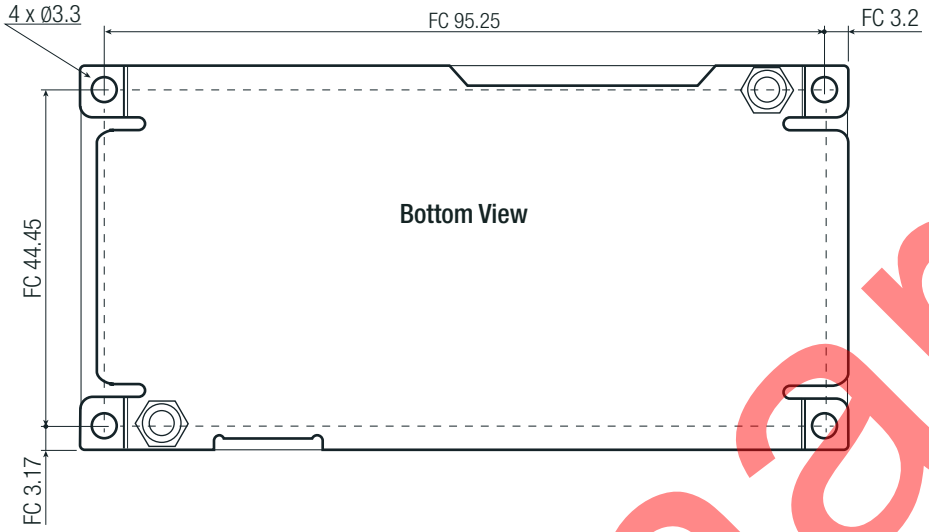
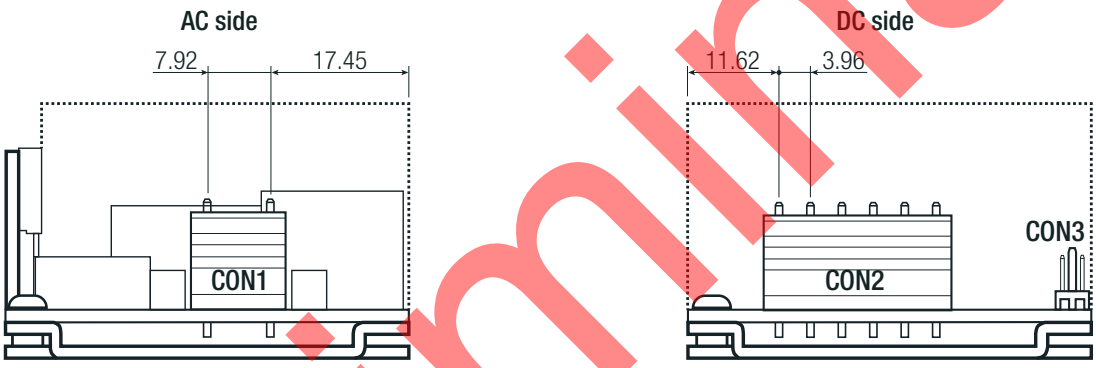
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

Dimension Drawing (mm)





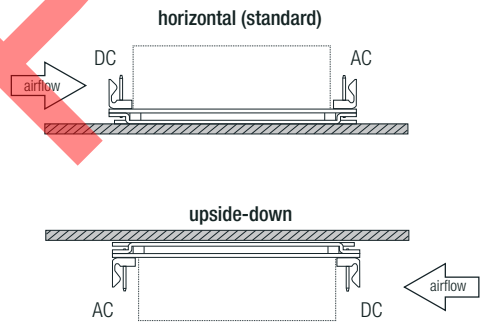
Compatible Connector

AC Input (CON1)			DC Output Connector (CON2)			FAN Connector (CON3)		
#	Function	Connector	#	Function	Connector	#	Function	Connector
1	AC/L	Molex 09-50-103	1,2,3	+Vout	Molex 09-50-1061	1	-FAN	Molex 22-01-1022
3	AC/N	or similar	4,5,6	-Vout	or similar	2	+FAN	or similiar

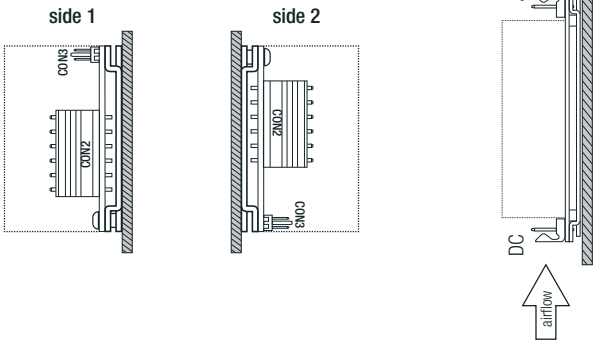
FC= fixing centers
Tolerance: xx.x= ±1.0mm
xx.xx= ±0.5mm

INSTALLATION AND APPLICATION

Mounting



If module is side mounted, vertically or upside-down with natural convection cooling, the power must be derated down to 85% for the RACM230-12SG or 90% for the others.
Device should be fan cooled from DC side.



Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

PACKAGING INFORMATION		
Parameter	**Type**	**Value**
Packaging Dimension (LxWxH)	cardboard box	112.0 x 80.0 x 50.0mm
Packaging Quantity		1pcs
Storage Temperature Range		-55°C to +100°C
Storage Humidity	non-condensing	5% - 90% RH max.