

# Features

## Regulated Converters

- Medical certified 2MOPP module, BF ready
- Class II installations (without FG)
- IP68 waterproof encapsulation
- Operation altitude certified up to 5000m
- No external components necessary
- Energy Efficiency Level VI

### Description

The RACM18-ER series comprises highly reliable power conversion modules in a potted IP68 waterproof encapsulation to withstand harsh operating conditions. With a certified operation up to 5000m altitude and a temperature range from -20°C up to +80°C these modules are built to power medical healthcare, household, sanitary, smart building and automation process appliances. For easy integration the product line is certified to medical, household, as well as to ITE safety standards and designed to pass class B limits by more than 6dB margin without the need for any external components.

### Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage <sup>(1)</sup> [VDC]	Output Current [A]	Efficiency typ. <sup>(2)</sup> [%]
RACM18-05SER <sup>(3)</sup>	90-264	5	2.5	81
RACM18-12SER <sup>(3)</sup>	90-264	12	1.5	82
RACM18-24SER <sup>(3)</sup>	90-264	24	0.75	83.5

#### Notes:

Note1: Other output voltages on request

Note2: Efficiency is tested at nominal input (115/230VAC) and full load at +25°C ambient

**RECOM**  
AC/DC Converter

## RACM18-ER

**18 Watt  
Round  
Shape Single  
Output**



2MOPP  
280VAC

IEC/EN60950-1 certified

UL60950-1 certified

ANSI/AAMI ES60601-1 certified

IEC/EN60601-1 certified

UL60601-1 certified

IEC/EN60335-1 certified

IEC/EN61558-1 certified

IEC/EN61558-2-16 certified

IEC/EN60601-1-2 certified

EN55024/32 certified

EN55014-1 (-2) certified

CISPR32 certified

**RACM18- SER <sup>(3)</sup>**

Output Power      |      Output Voltage

#### Notes:

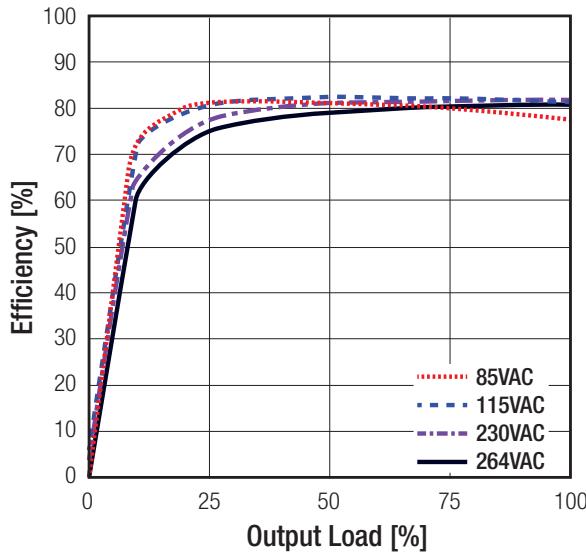
Note3: Other connection types on request

**Specifications** (measured @  $ta = 25^\circ\text{C}$ , nom.  $V_{in}$  (115/230VAC), full load after warm-up unless otherwise stated)

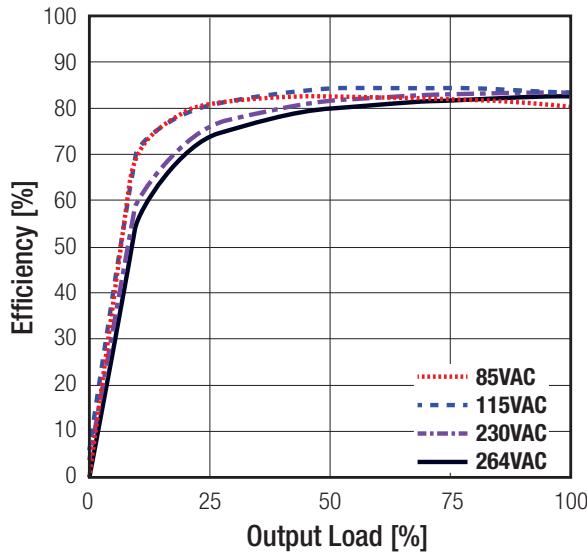
BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Internal Input Filter				Pi type
Input Voltage Range		90VAC	230VAC	264VAC
Input Current	115VAC 230VAC			500mA 150mA
Inrush Current	115VAC 230VAC		24A 46A	
No load Power Consumption			40mW	75mW
Input Frequency Range		47Hz		63Hz
Minimum Load		0%		
Power Factor			0.46	
Start-up Time	115VAC 230VAC		180ms 200ms	
Rise Time	115VAC/230VAC		15ms	
Hold-up Time	115VAC 230VAC		15ms 65ms	
Internal Operating Frequency	100% load at nominal $V_{in}$		100kHz	
Output Ripple and Noise	20MHz BW			140mVp-p

#### Efficiency vs. Load

RACM18-12SER



RACM18-24SER

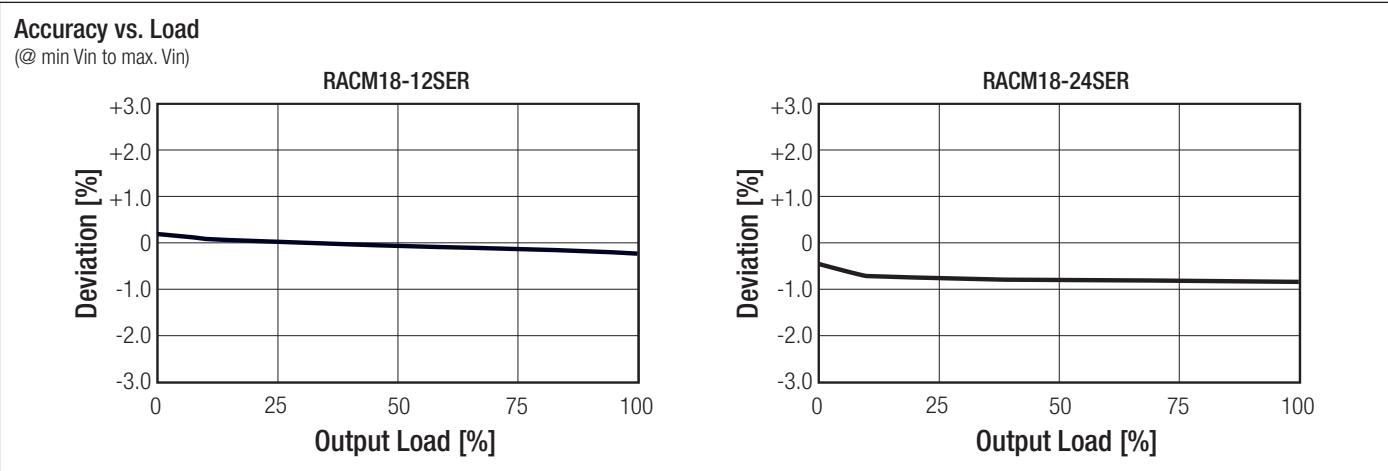


#### REGULATIONS

Parameter	Condition	Value
Output Accuracy		$\pm 3.0\%$ max.
Line Regulation	low line to high line	$\pm 1.0\%$ max.
Load Regulation	0% to 100% load	$\pm 1.0\%$ max.
Transient Response	100% load step change	$\pm 3.0\%$ max.

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**Specifications** (measured @  $ta = 25^\circ\text{C}$ , nom. Vin (115/230VAC), full load after warm-up unless otherwise stated)



<b>PROTECTIONS</b>							
<b>Parameter</b>	<b>Type</b>		<b>Value</b>				
Input Fuse	internal (line & neutral)			T2A, slow blow			
Short Circuit Protection (SCP)				continuous, auto recovery			
Over Voltage Protection (OVP)	5Vout, 12Vout 24Vout			16VDC, Latch OFF 24VDC, Latch OFF			
Over Voltage Category (OVC)				OVCII			
Over Current Protection (OCP)	< 1 minute	90VAC 160VAC 264VAC	145% of nominal Output Current, auto recovery 180% of nominal Output Current, auto recovery 165% of nominal Output current, auto recovery	Hiccup Mode			
Over Temperature Protection (OTP)	95°C ambient			thermal shutdown, auto recovery			
Class of Equipment				Class II			
Isolation Voltage <sup>(3)</sup>	I/P to O/P	tested for 1 minute	4.6kVAC				
Insulation Grade				reinforced			
Leakage Current				100µA max.			
Means of Protection	280VAC working voltage			2MOPP			
Medical Device Classification				Type BF			
<b>Notes:</b>							
Note3: For repeat Hi-Pot testing, reduce the time and/or the test voltage							

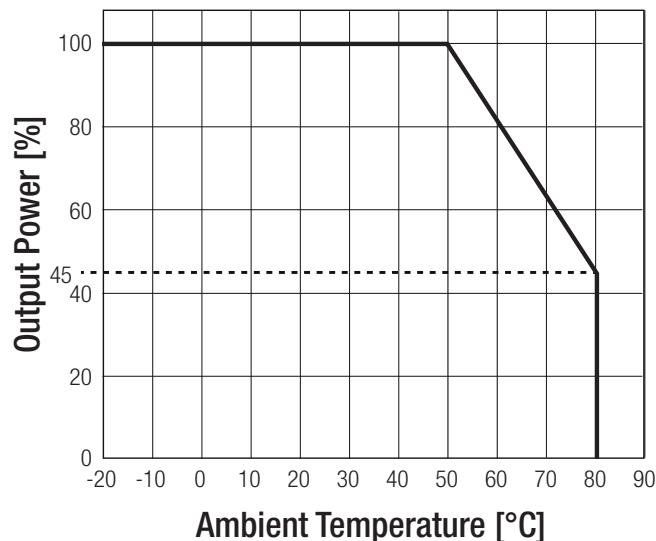
<b>ENVIRONMENTAL</b>				
<b>Parameter</b>	<b>Condition</b>		<b>Value</b>	
Operating Temperature Range	natural convection 0.1m/s	without derating with derating	-20°C to +50°C -20°C to +80°C	
Maximum Case Temperature				+85°C
Operating Altitude				5000m
Operating Humidity	non-condensing			95% RH max.
Pollution Degree				PD2
MTBF	according to MIL-HDBK-217F, G.B.	+25°C +50°C	563 x 10 <sup>3</sup> hours 112 x 10 <sup>3</sup> hours	
Design Lifetime				130 x 10 <sup>3</sup> hours

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**Specifications** (measured @  $ta = 25^\circ\text{C}$ , nom.  $V_{in}$  (115/230VAC), full load after warm-up unless otherwise stated)

**Derating Graph**

(@ Chamber and natural convection 0.1m/s)



**SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety (CB Scheme)	T223-0257/17	IEC60950-1:2005, 2nd Edition + Am2:2013 EN60950-1:2006 + A2:2013
Information Technology Equipment, General Requirements for Safety	T223-0257/17	UL60950-1, 2nd Edition:2014 CAN/CSA C22.2 No. 60950-1, 2nd Edition:2014
Medical Electric Equipment, General Requirements for Safety and Essential Performance (CB Scheme)	T223-0256/17	IEC60601-1:2005, AM1:2012 EN60601-1:2006 + A12:2014
Medical Electric Equipment, General Requirements for Safety and Essential Performance	T223-0256/17	CAN/CSA-C22.2 No. 60601-1:14, 3rd Edition 2014 ANSI/AAMI ES60601-1:2005
Household and similar electrical appliances - Safety Part 1: General requirements (CB Scheme)	T211-0761/17	IEC60335-1:2010, 5th Edition + A1:2013 EN60335-1:2012 + A11:2014
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100V	T211-0762/17	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		IEC61558-2-16:2009, 1st Edition + A1:2013 EN61558-2-16:2009 + A1:2013
RoHs 2 (2+)		RoHs 10/10, AM2015

EMC Compliance (Medical)	Condition	Standard / Criterion
Medical electrical equipment Part 1-2: Electromagnetic disturbances – Requirements and tests		EN60601-1-2:2015
ESD Electrostatic discharge immunity test	Air $\pm 2, 4, 8, 15\text{kV}$ ; Contact $\pm 8\text{kV}$	IEC61000-4-2:2008, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80 - 2700MHz)	IEC61000-4-3:2006 + A2:2010 , Criteria A
Radiated, radio-frequency, electromagnetic field immunity test (table 9)	27V/m (385MHz), 28V/m (450MHz), 9V/m (710, 745, 780MHz), 28V/m (810, 870, 930, 1720, 1845, 1970, 2450MHz), 9V/m (5240, 5500, 5785MHz)	IEC61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port $\pm 2.0\text{kV}$ DC Output Port $\pm 1\text{kV}$	IEC61000-4-4:2012, Criteria A
Surge Immunity	AC Power Port: L-N $\pm 0.5, 1.0\text{kV}$	IEC61000-4-5:2005, Criteria A

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### Specifications (measured @ $ta = 25^\circ\text{C}$ , nom. $V_{in}$ (115/230VAC), full load after warm-up unless otherwise stated)

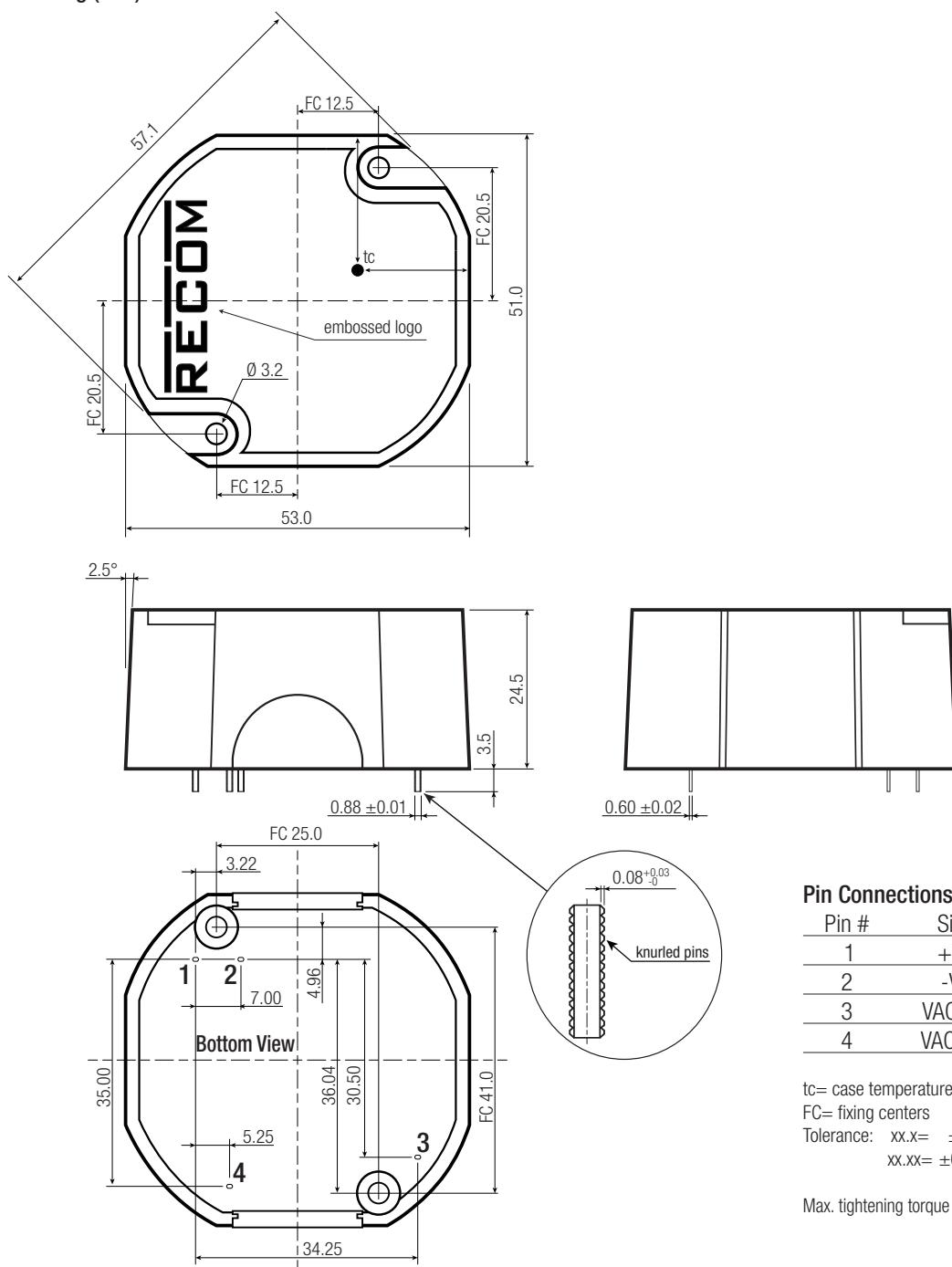
EMC Compliance (Medical)	Condition	Standard / Criterion
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port 6V DC Output Port 6V	IEC61000-4-6:2013, Criteria A
Power Magnetic Field Immunity	50Hz, 60Hz, 30A/m	IEC61000-4-8:2009, Criteria A
Voltage Dips and Interruptions		IEC61000-4-11:2004, Criteria A
EMC Compliance (Household)	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements		EN55014-1:2006 + A2:2011
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55014-2:1997 + A2:2008
ESD Electrostatic discharge immunity test	Air $\pm 8\text{kV}$ ; Contact $\pm 4\text{kV}$	EN61000-4-2:1995 + A2:2001, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	3V/m (80 - 1000MHz)	EN61000-4-3:2006 + A1:2008, Criteria A
Fast Transient and Burst Immunity	AC Power Port: $\pm 1.0\text{kV}$ DC Power Port $\pm 0.5\text{kV}$	EN61000-4-4:2004, Criteria A
Surge Immunity	AC Power Port: L-N $\pm 0.5, 1.0\text{kV}$	EN61000-4-5:2006, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port 3V DC Power Port 3V	EN61000-4-6:2007, Criteria A
Voltage Dips and Interruptions		EN61000-4-11:2004
EMC Compliance (Multimedia)	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements		EN55032:2010, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010
Electromagnetic compatibility of multimedia equipment - Emission requirements		CISPR 32:2012, Class B
ESD Electrostatic discharge immunity test	Air $\pm 2, 4, 8\text{kV}$ ; Contact $\pm 4\text{kV}$	EN61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	3V/m (80 - 1000MHz)	EN61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: $\pm 1.0\text{kV}$ DC Power Port $\pm 0.5\text{kV}$	EN61000-4-4:2004, Criteria A
Surge Immunity	AC Power Port: L-N $\pm 0.5, 1.0\text{kV}$	EN61000-4-5:2006, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port 3V DC Power Port 3V	EN61000-4-6:2009, Criteria A
Power Magnetic Field Immunity	50Hz, 60Hz, 1A/m	EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions		EN61000-4-11:2004
Limits of Voltage Fluctuations & Flicker		IEC/EN61000-3-3:2013

DIMENSION AND PHYSICAL CHARACTERISTICS		
Parameter	Type	Value
Material	Case Potting PCB	non-conductive black plastic, (UL94V-0) polyurethane, (UL94V-0) FR4, (UL94V-0)
Package Dimension (LxWxH)		53.0 x 51.0 x 24.5mm
Package Weight		88g max.

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Specifications (measured @  $ta = 25^\circ\text{C}$ , nom.  $V_{in}$  (115/230VAC), full load after warm-up unless otherwise stated)

Dimension Drawing (mm)



**PACKAGING INFORMATION**

Parameter	Type	Value
Packaging Dimension (LxWxH)	carton	310.0 x 220.0 x 100.0mm
Packaging Quantity		10pcs
Storage Temperature Range		-30°C to +80°C
Storage Humidty	non-condensing	95% RH max.

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