

# 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 RACM30-ER series comprises reliable and highly efficient power conversion modules in a potted IP68 waterproof encapsulation to withstand harsh operating conditions. With a certified operation up to 5000m altitude and less than 2"x2" of required board space, these modules are built to power compact applications in medical healthcare, household, sanitary, smart building, and automation appliances. For easy integration the series are covered by certifications for medical, household, and ITE safety standards and designed to pass class B limits by more than 6dB margin without the need for any external components.

### Selection Guide

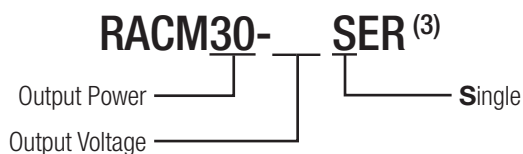
Part Number	Input Voltage Range [VAC]	Output Voltage <sup>(1)</sup> [VDC]	Output Current [A]	Efficiency typ. <sup>(2)</sup> [%]
RACM30-12SER <sup>(3)</sup>	90-264	12	2.5	88
RACM30-24SER <sup>(3)</sup>	90-264	24	1.25	89.5

#### Notes:

Note1: Other output voltages on request

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

### Model Numbering



#### Notes:

Note3: Other connection types on request

**RECOM**  
AC/DC Converter

## RACM30-ER

30 Watt  
Round  
Shape Single  
Output



2MOPP  
250VAC

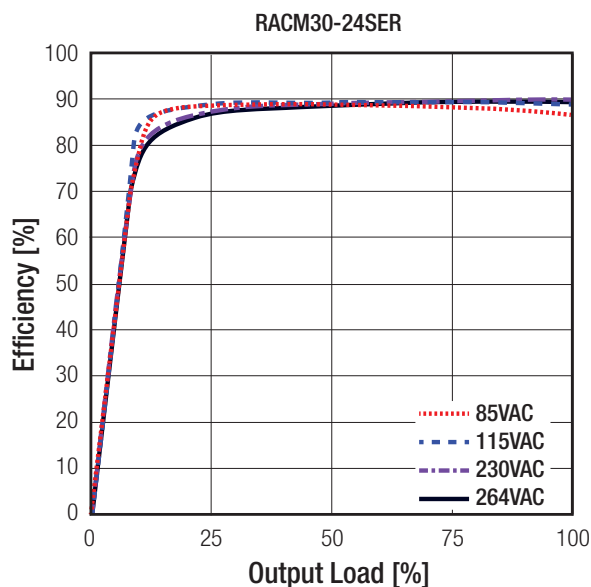
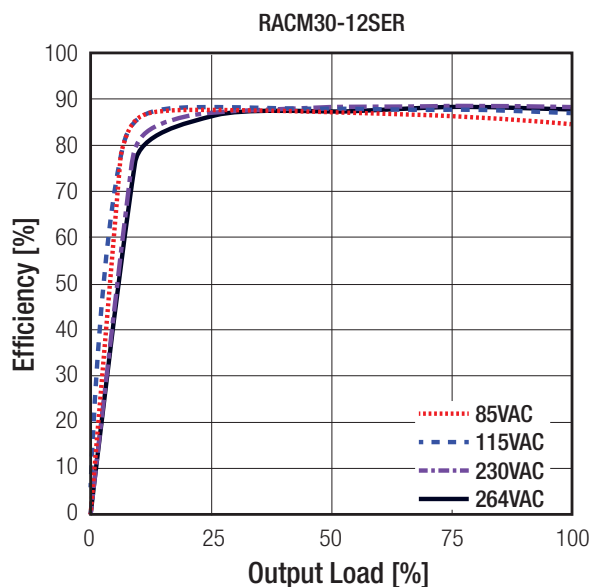
IEC/EN60950-1 certified  
UL60950-1 certified  
ANSI/AAMI ES60601-1 certified  
IEC/EN60601-1 certified  
UL60601-1 certified  
IEC/EN60335-1 certified  
IEC/EN61558-1 certified  
IEC/EN61558-2-16 certified  
IEC/EN60601-1-2 certified  
EN55024/32 certified  
EN55014-1 (-2) certified

**Specifications** (measured @  $t_a = 25^\circ\text{C}$ , nom. Vin (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			1000mA 290mA
Inrush Current	115VAC 230VAC		60A 95A	
No load Power Consumption				75mW
Input Frequency Range		47Hz		63Hz
Minimum Load		0%		
Power Factor			0.55	
Start-up Time	115VAC 230VAC		75ms 150ms	
Rise Time	115VAC / 230VAC		10ms	
Hold-up Time	115VAC 230VAC		15ms 55ms	
Internal Operating Frequency	100% load at nominal Vin		100kHz	
Output Ripple and Noise				75mVp-p

### Efficiency vs. Load



### REGULATIONS

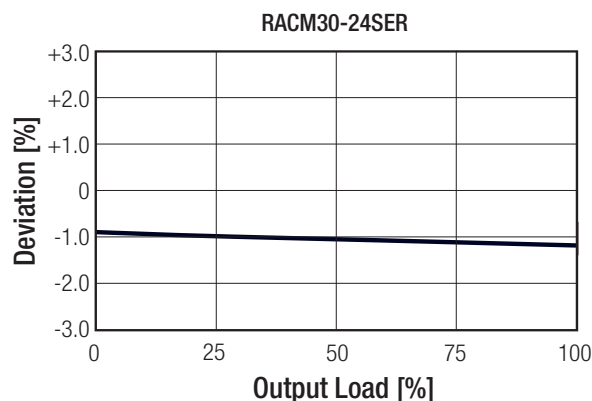
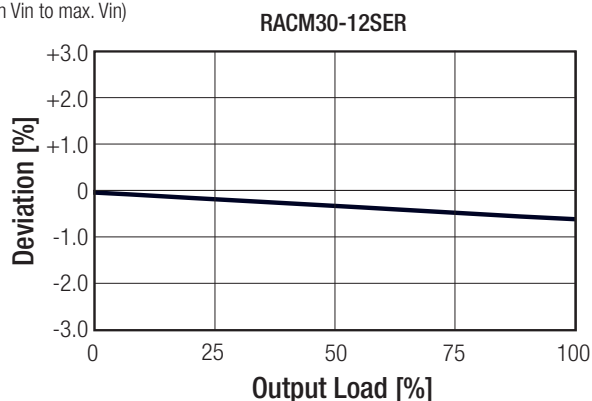
Parameter	Condition	Value
Output Accuracy		$\pm 3.0\%$ max.
Line Regulation	low line to high line	$\pm 1.0\%$ max.
Load Regulation	0% to 100% load	$\pm 1.0\%$ max.
Transient Response	100% load step change	$\pm 3.0\%$ max.

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

### Accuracy vs. Load

(@ min Vin to max. Vin)



### PROTECTIONS

Parameter	Type		Value	
Input Fuse	internal (line & neutral)		T2A, slow blow	
Short Circuit Protection (SCP)			continuous, auto recovery	
Over Voltage Protection (OVP)	12Vout 24Vout		17VDC, Latch OFF 35VDC, Latch OFF	
Over Voltage Category (OVC)			OVCII	
Over Current Protection (OCP)	< 1 minute	90VAC 264VAC	140% of nominal output current, auto recovery 170% 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	4.4kVAC	
Insulation Grade			reinforced	
Leakage Current			100µA max.	
Means of Protection	260VAC working voltage		2MOPP	
Medical Device Classification			Type BF	

#### Notes:

Note3: For repeat Hi-Pot testing, reduce the time and/or the test voltage

### ENVIRONMENTAL

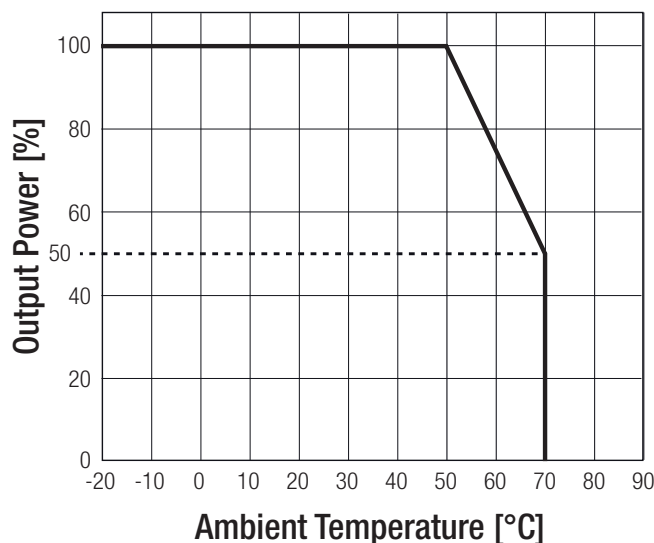
Parameter	Condition		Value
Operating Temperature Range	natural convection 0.1m/s	without derating	-20°C to +50°C
		with derating	-20°C to +70°C
Maximum Case Temperature			+85°C
Operating Altitude			5000m
Operating Humidity	non-condensing		95% RH max.
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	538 x 10 <sup>3</sup> hours
		+50°C	107 x 10 <sup>3</sup> hours
Design Lifetime	E-Cap limitation		130 x 10 <sup>3</sup> hours

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

### Derating Graph

(@ Chamber and natural convection 0.1 m/s)



### SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety (CB Scheme)	T223-0255/17	IEC60950-1:2005, 2nd Edition + Am2:2013 EN60950-1:2006 + A2:2013
Information Technology Equipment, General Requirements for Safety	T223-0255/17	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)	T223-0254/17	IEC60601-1:2005, AM1:2012 EN60601-1:2006 + A12:2014
Medical Electric Equipment, General Requirements for Safety and Essential Performance	T223-0254/17	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)	T211-0759/17	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	T211-0760/17	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 1720, 1845, 1970, 2450MHz), 9V/m (5240, 5500, 5785MHz)	IEC61000-4-3:2006 + A2:2010, Criteria A
	28V/m (800-960MHz)	IEC61000-4-3:2006 + A2:2010, Criteria B <sup>(4)</sup>
Fast Transient and Burst Immunity	AC Power Port: $\pm 2.0\text{kV}$	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

#### Notes:

Note4: Output voltage doesn't meet specified output accuracy

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**Specifications** (measured @  $t_a = 25^\circ\text{C}$ , nom. Vin (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, 30A/m	IEC61000-4-8:2009, Criteria A
Voltage Dips and Interruptions		IEC61000-4-11:2004
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 $\pm 4\text{kV}$	EN61000-4-2:2009, 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 $\pm 0.5\text{kV}$	EN61000-4-4:2012, Criteria A
Surge Immunity	AC Power Port: L-N $\pm 1\text{kV}$	EN61000-4-5:2014, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port 3V DC Power Port 1V	EN61000-4-6:2014, Criteria A
Voltage Dips and Interruptions		EN61000-4-11:2004
EMC Compliance (Multimedia)	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements		EN55032:2012, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010
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: $\pm 1.0\text{kV}$	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		EN61000-3-3:2013
EMC Compliance (Generic Standards)	Condition	Standard / Criterion
Generic standards – Immunity standard for residential, commercial and light-industrial environments		EN61000-6-1:2007
Generic standards – Immunity standard for industrial environments		EN61000-6-2:2005
Generic standards – Emission standard for residential, commercial and light-industrial environments		EN61000-6-3:2007 + A1:2011

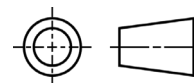
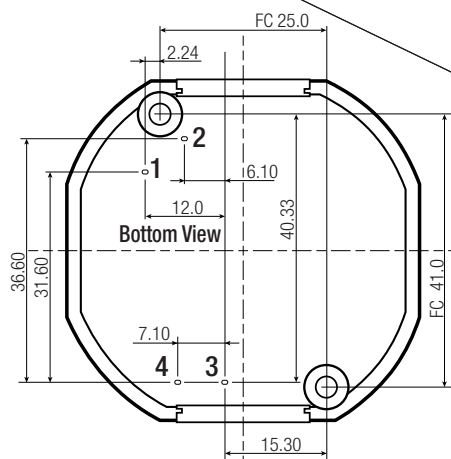
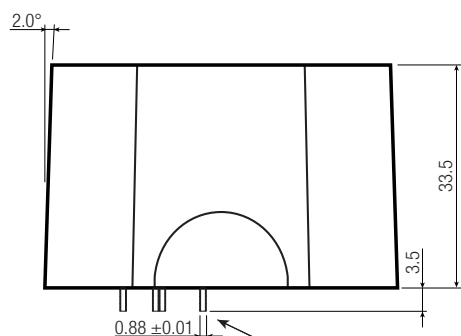
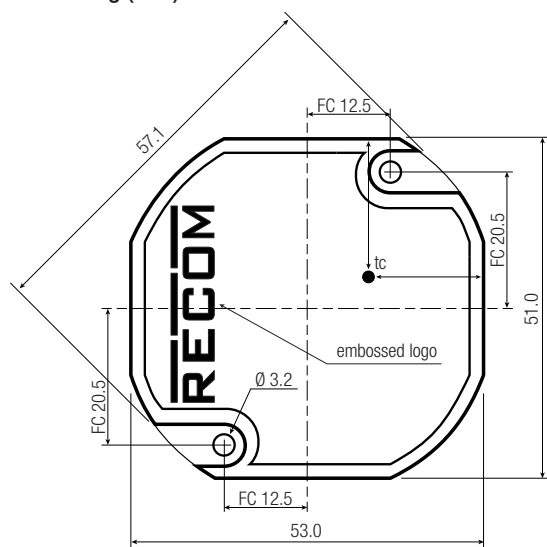
**DIMENSION AND PHYSICAL CHARACTERISTICS**

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 33.5mm
Package Weight		128g max.

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

Dimension Drawing (mm)



### Pin Connections

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

tc= case temperature measuring point

FC= fixing centers

Tolerance: xx.x= ±0.5mm

xx.xx= ±0.25mm

Max. tightening torque fixing screws: 0.3Nm

### 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 Humidity	non-condensing	95% RH max.

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