

# Features

# Regulated Converters

- Long 5 Year Warranty
- 2MOPP/250VAC
- Suitable for built in Class II Applications
- Wide Input Voltage Range (85-264VAC)
- Low Leakage Current (<75µA)
- 5000m Operation
- -40°C to +85°C Operating Temperature

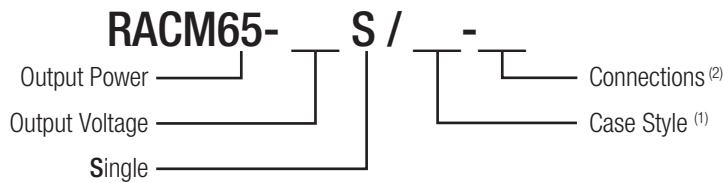
## Description

The RACM65 is a compact 3.6"x2.38" high efficiency AC/DC power supply with 2xMOPP safety approval for medical applications. These space saving enclosed power supplies have an universal input voltage range (85-264VAC), 4kVAC isolation, require no minimum load and can be used at ambient temperatures of between -40°C and +85°C. The 5V, 12V, 15V, 24V or 48V output voltages are fully protected and have tolerances of less than ±0.2% over the entire input voltage range and less than ±0.5% over the entire load range. The output voltage can be trimmed over a ±10% range. The RACM65 series is certified to medical safety standard IEC/ES/EN-60601-1 3rd Edition and feature BF rated outputs with less than 75µA leakage current. It has a built-in Class B EMI filter and comes with a 5 year warranty.

## Selection Guide

Part Number	Input Voltage Range (VAC)	Output Voltage (VDC)	Output Current (A)	Efficiency typ. (%)
RACM65-05S <sup>(1,2)</sup>	85-264	5	10	90
RACM65-12S <sup>(1,2)</sup>	85-264	12	5.42	92.5
RACM65-15S <sup>(1,2)</sup>	85-264	15	4.34	93.5
RACM65-24S <sup>(1,2)</sup>	85-264	24	2.71	93.5
RACM65-48S <sup>(1,2)</sup>	85-264	48	1.36	93

## Model Numbering



### Notes:

- Note1: Case Style: without suffix, standard enclosed case  
add suffix "/OF" for open frame style
- Note2: Connections: without suffix, standard connection with connector  
with suffix "-ST" connection with screw terminals

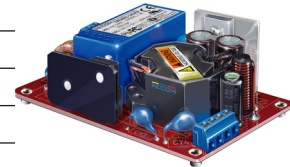
### Examples:

- RACM65-12S = 12Vout, standard enclosed case
- RACM65-48S/OF = 24Vout, open frame style
- RACD65-15S/OF-ST = 15Vout, open frame style with screw terminal connection

**RECOM**  
AC/DC Converter

## RACM65

**65 Watt**  
**Enclosed & Open Frame Case Style**  
**Single Output**



2MOPP  
250VAC



IEC/EN-60601 Certified  
ANSI/AAMI ES-60601 Certified  
EN-55011 (Pending)  
EN-55022 (Pending)

Refer to Applications Notes

**Specifications** (measured at  $T_a = 25^\circ\text{C}$ , 250VAC, full load and after warm-up)

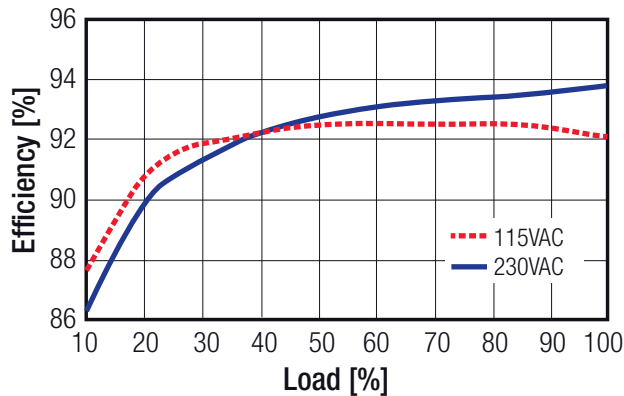
BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Input Voltage		85VAC 100VDC <sup>(3)</sup>	230VAC	264VAC 370VDC
Input Current	115VAC, full load 230VAC, full load			1.6A 0.9A
Inrush Current	cold start, 230VAC			60A
Input Power @ No Load				0.11W
Input Frequency Range	AC Input		50/60Hz	440Hz <sup>(3)</sup>
Start-up Time				1 Second
Rise Time			20ms	
Hold up Time	115VAC, full load		16ms	
Minimum Load				0%
Operating Frequency Range	5VDC, 230VAC others, 230VAC		60kHz 120kHz	
Output Ripple and Noise (measured @ 20MHz BW)	5VDC, 12VDC and 15VDC with 10 $\mu$ F/25V MLCC 24VDC, with 1 $\mu$ F/50V MLCC 48VDC, with 0.1 $\mu$ F/100V MLCC		75mVp-p 75mVp-p 150mVp-p	

**Notes:**

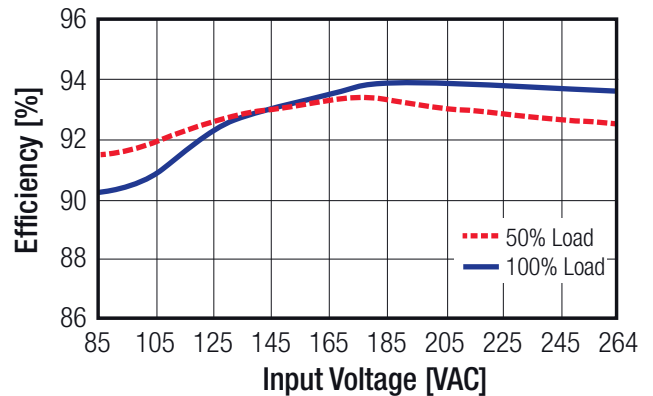
Note3: Confirmed performance, but not covered in certificates. 100V input voltage with derating.

**RACM65-24**

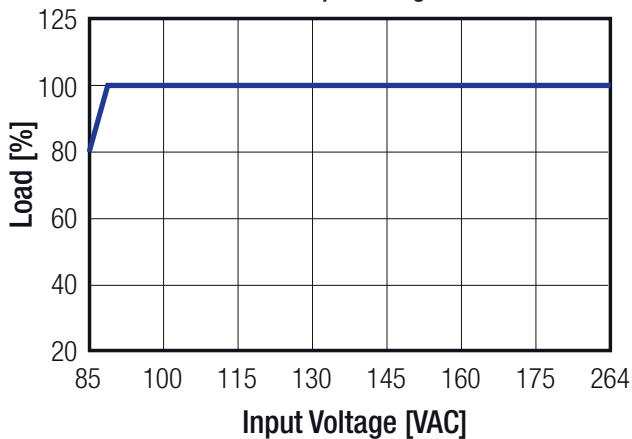
Efficiency vs. Load



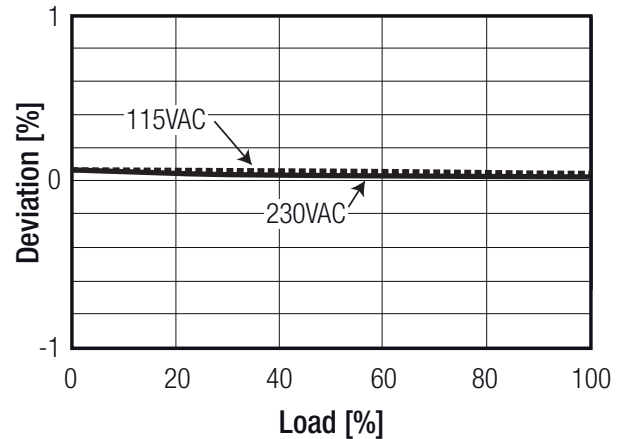
Efficiency vs. Input Voltage



Load vs. Input Voltage



Vout Deviation vs. Load



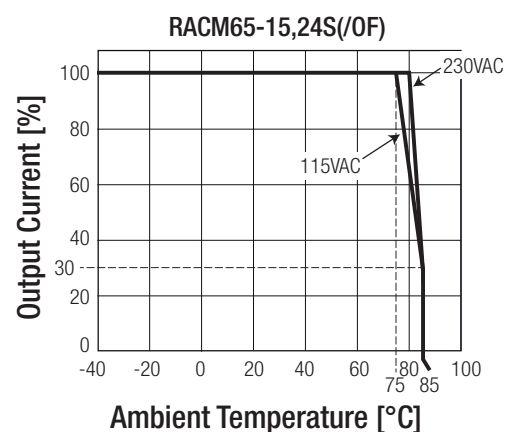
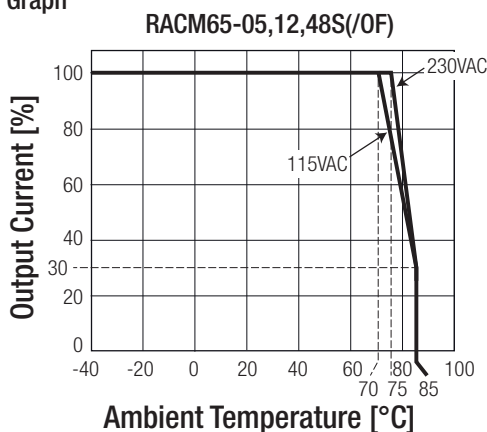
**Specifications** (measured at  $T_a=25^{\circ}\text{C}$ , 250VAC, full load and after warm-up)

REGULATIONS		
Parameter	Condition	Value
Set Voltage Accuracy	230VAC, full load	$\pm 1\%$
Line Voltage Regulation	low line to high line, full load	$\pm 0.2\%$
Load Voltage Regulation	0% to 100% load 5VDC others	$\pm 0.7\%$ $\pm 0.5\%$
	10% to 90% load 5VDC others	$\pm 0.6\%$ $\pm 0.4\%$
Output Voltage Trim	on-board trimpot.	$\pm 10\%$
Transient Peak Deviation	load step from 50% - 75% change at 2.5A/ $\mu\text{s}$	3% Vout max.
Transient Recovery Time	load step from 50% - 75% change at 2.5A/ $\mu\text{s}$	600 $\mu\text{s}$ typ.

PROTECTIONS		
Parameter	Condition	Value
Input Fuse	internal line neutral	T3.15A / 250VAC, slow blow type T3.15A / 250VAC, slow blow type
Short Circuit Protection (SCP)		continuous, auto-recovery
Over Load Protection (OLP)	% of lout rated (Hiccup)	145% typ.
Over Voltage Protection (OVP)	% of Vout nominal (Latch off)	125% min / 140% max.
Isolation Voltage (2MOPP insulation)	I/P to O/P	4kVAC / 1 minunte
	I/P to Chassis, O/P to Chassis	2.5kVAC / 1 minute
	working voltage	250VAC / continuous
Means of Protection		2MOPP
Leakage Current	264VAC	75 $\mu\text{A}$ max.
Medical Device Classification		Type BF applied device
Internal Clearance	I/P to O/P	8mm min.
Creepage	I/P to O/P	8mm min.
Isolation Resistance	500VDC	100M $\Omega$ min.
Insulation Grade		Reinforced Insulation

ENVIRONMENTAL		
Parameter	Condition	Value
Operating Humidity	non-condensing	5% to 95% RH
Temperature Coefficient		$\pm 0.02\%$ / $^{\circ}\text{C}$
Operating Temperature Range	with derating	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$
Operating Altitude		5000m max.
MTBF	according to MIL-HDBK-217F, full load, $+25^{\circ}\text{C}$	1494 x 10 <sup>3</sup> hours

**Derating Graph**



**Specifications** (measured at  $T_a=25^{\circ}\text{C}$ , 250VAC, full load and after warm-up)

**SAFETY AND CERTIFICATIONS**

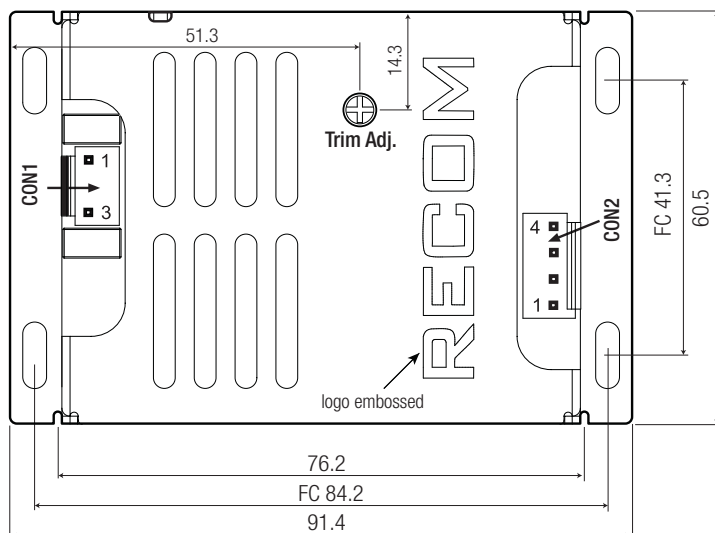
Certificate Type	Report / File Number	Standard
IEC/EN Medical Safety (CB Scheme)	151101302	IEC60601-1, 3rd Edition, 2012
ANSI/AAMI Medical Safety		EN60601-1, 3rd Edition, 2014
Risk Management	151101301_2037	ES60601-1, 2012
		ISO 14971:2007
		EN ISO 14971:2012
EMC Compliance	Condition	Standard / Criterion
EMI Standard		EN55011 + EN55022 + FCC18, Class B
ESD	Air $\pm 8\text{kV}$ ; Contact $\pm 6\text{kV}$	EN61000-4-2, Criteria A
Radiated Immunity	20V/m	EN61000-4-3, Criteria A
Fast Transient	$\pm 2\text{kV}$	EN61000-4-4, Criteria A
Surge	L-N $\pm 1\text{kV}$ and L-GND/N-GND $\pm 2\text{kV}$	EN61000-4-5, Criteria A
Conducted Immunity	20Vr.m.s	EN61000-4-6, Criteria A
Power Frequency Magnetic Field	10A/m	EN61000-4-8, Criteria A
Harmonic Current	full load	EN61000-3-2, Class A
Voltage Flicker		EN61000-3-3
Shock		IEC60068-2-27
Vibration		IEC60068-2-6
Dip and Interruptions, 230VAC 50Hz	30% 500ms 60% 100ms >95% 10ms >95% 5000ms	EN60601-1-2, Criteria A EN60601-1-2, Criteria A EN60601-1-2, Criteria A EN60601-1-2, Criteria A

**DIMENSION and PHYSICAL CHARACTERISTICS**

Parameter	Type	Value
Package Dimension (LxWxH)	Enclosed Case	91.4 x 60.5 x 33.3mm
	Open Frame	76.2 x 50.8 x 26.5mm
Package Weight	Enclosed Case	172g
	Open Frame + "-ST" Version	137g
Case Material	enclosed case	Aluminum

**Dimension Drawing Enclosed Case (mm)**

Top View



**AC Input Connector CON1**

- Pin1 Line
- Pin3 Neutral

Pin Connector: Molex KK156

**DC Output Connector CON2**

- Pin1,2 -Vout
- Pin3,4 +Vout

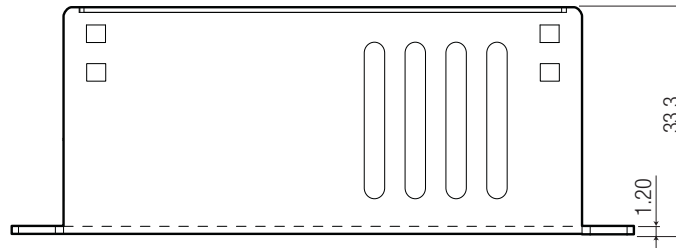
Pin Connector: Molex KK156

Tolerance:  $\pm 0.5\text{mm}$   
FC: fixing center

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**Specifications** (measured at  $T_a = 25^\circ\text{C}$ , 250VAC, full load and after warm-up)

Side View

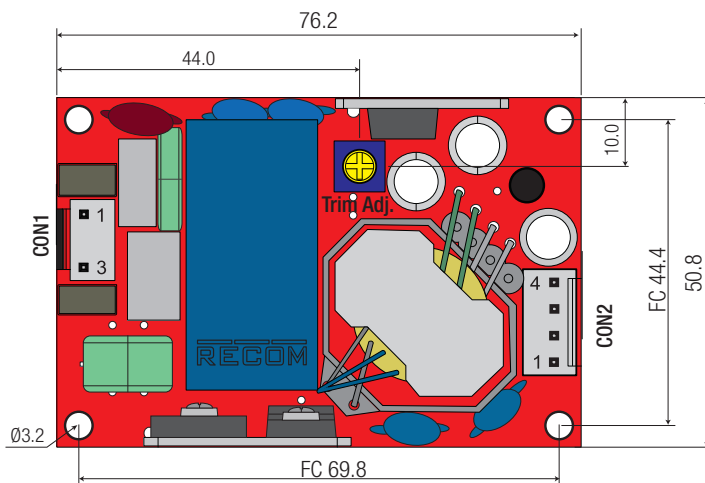


Bottom View



**Dimension Drawing Open Frame (/OF) (mm)**

Top View



**AC Input Connector CON1**

- Pin1 Line
- Pin3 Neutral

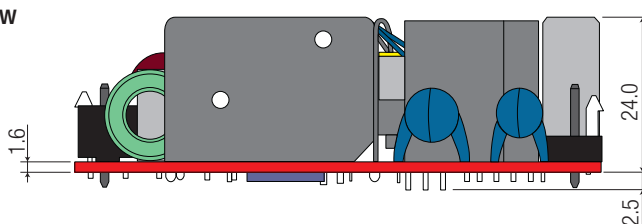
Pin Connector: Molex KK156

**DC Output Connector CON2**

- Pin1,2 -Vout
- Pin3,4 +Vout

Pin Connector: Molex KK156

Side View



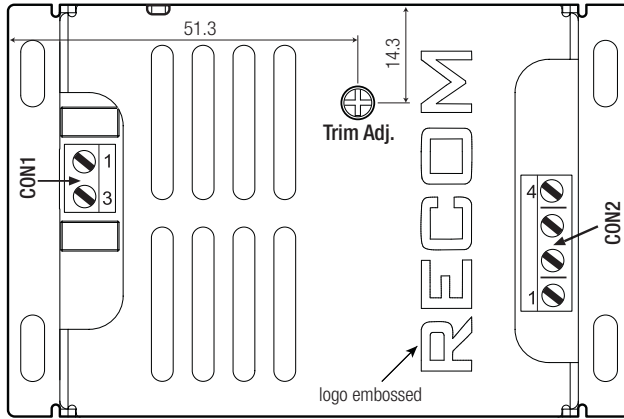
Tolerance:  $\pm 0.5\text{mm}$   
FC: fixing center

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**Specifications** (measured at  $T_a = 25^\circ\text{C}$ , 250VAC, full load and after warm-up)

### Screw Terminal Connection “-ST”

#### Enclosed Version



#### AC Input Connector CON1

Pin1 Line

Pin3 Neutral

Screw Terminal: ETB30

#### DC Output Connector CON2

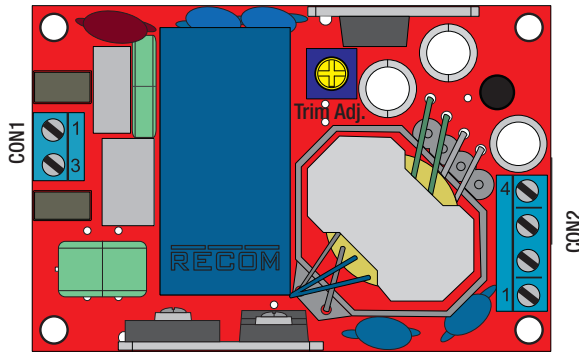
Pin1,2 -Vout

Pin3,4 +Vout

Screw Terminal: ETB30

Tolerance:  $\pm 0.5\text{mm}$   
FC: fixing center

#### Open Frame Version



### PACKAGING INFORMATION

Parameter	Type		Value
Packaging Dimension (LxWxH)	cardboard box	enclosed case	111.0 x 94.0 x 51.0mm
		open frame	120.0 x 80.0 x 85.0mm
Packaging Quantity			1pcs
Storage Temperature Range			-40°C to +85°C

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