

!NOT RECOMMENDED FOR NEW DESIGNS!

Features

Regulated Converter

- 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

RECOM
AC/DC Converter

RACM65

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



Description

The RACM65 is a compact 3" x 2" 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 $\pm 0.2\%$ over the entire input voltage range and less than $\pm 0.5\%$ over the entire load range. The output voltage can be trimmed over a $\pm 10\%$ range. The RACM65 series is certified to medical safety standard IEC/ES/EN-60601-1 3rd Edition and with less than 75µA leakage current. It has a built-in Class B EMI filter and comes with a 5 year warranty.

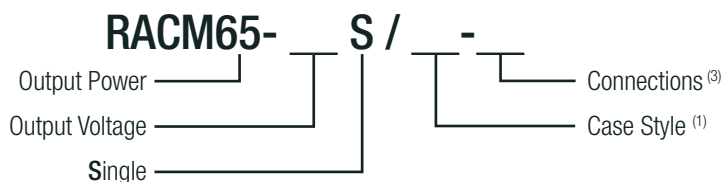
Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [A]	Efficiency typ. [%]	Max. Capacitive Load ⁽¹⁾ [µF]
RACM65-05S ^(1,2)	85-264	5	10	90	20000
RACM65-12S ^(1,2)	85-264	12	5.42	92.5	4520
RACM65-15S ^(1,2)	85-264	15	4.34	93.5	2900
RACM65-24S ^(1,2)	85-264	24	2.71	93.5	1130
RACM65-48S ^(1,2)	85-264	48	1.36	93	235

Notes:

Note1: Max Cap Load is tested at minimum input and full resistive load

Model Numbering



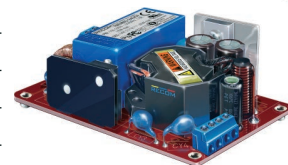
Notes:

Note2: Case Style: without suffix, standard enclosed case
add suffix "/OF" for open frame style

Note3: Connections: without suffix, standard connection with connector
with suffix "-ST" connection with screw terminals

Examples:

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



PREFERRED ALTERNATIVES

Please consider this alternatives:

RACM60-K Series

CSA/CAN-C22.2 No 60601-1:14 certified
ANSI/AAMI ES60601-1 certified
EN60601-1-2
CISPR11
FCC Part 15 & 18

Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

BASIC CHARACTERISTICS

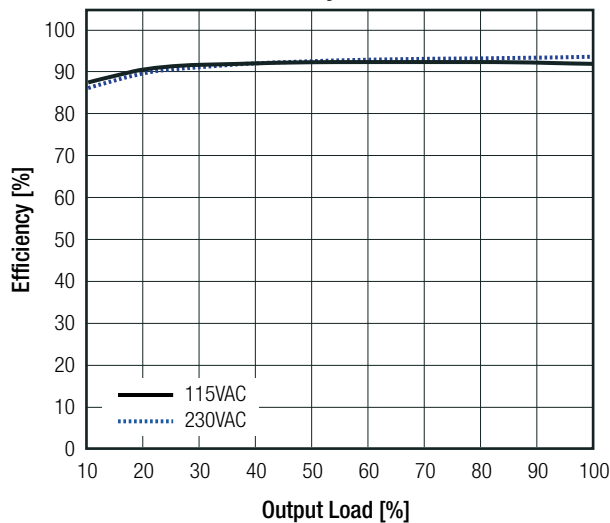
Parameter	Condition	Min.	Typ.	Max.
Input Voltage		85VAC 100VDC ⁽⁴⁾	230VAC	264VAC 370VDC
Input Current	115VAC, full load 230VAC, full load			1.6A 0.9A
Inrush Current	cold start, 230VAC			60A
No load Power Consumption				0.11W
Input Frequency Range	AC Input		50/60Hz	440Hz ⁽⁴⁾
Output Voltage Trimming	on-board trimpot		±10.0%	
Minimum Load		0%		
Start-up Time				1s
Rise Time			20ms	
Hold up Time	115VAC, full load		16ms	
Operating Frequency Range	5VDC, 230VAC others, 230VAC		60kHz 120kHz	
Output Ripple and Noise (measured @ 20MHz BW)	5VDC, 12VDC and 15VDC with 10µF/25V MLCC 24VDC, with 1µF/50V MLCC 48VDC, with 0.1µF/100V MLCC		75mVp-p 75mVp-p 150mVp-p	

Notes:

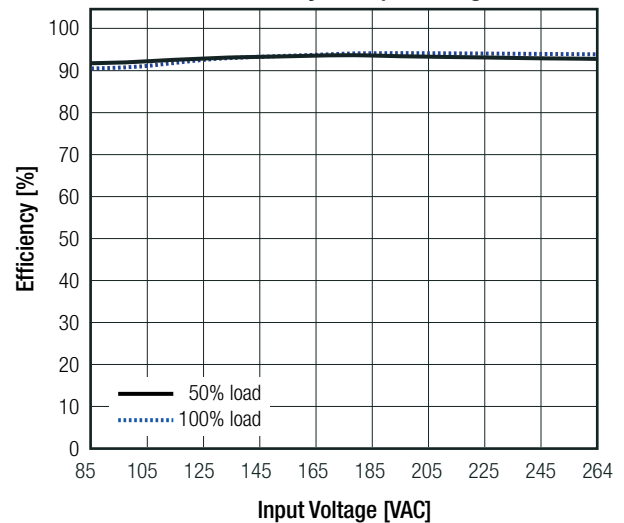
Note4: Confirmed performance, but not covered in certificates. 100V input voltage with derating

RACM65-24S

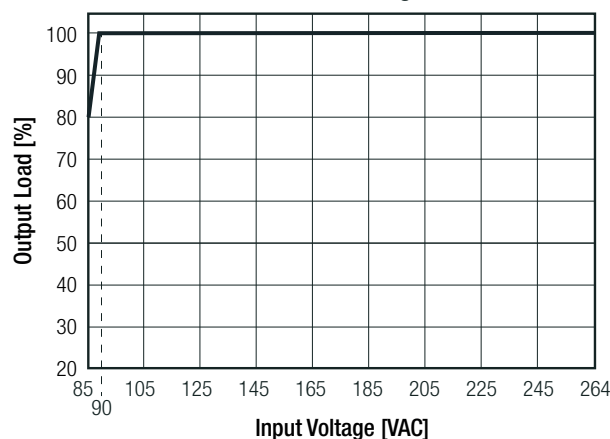
Efficiency vs. Load



Efficiency vs. Input Voltage



Line Derating

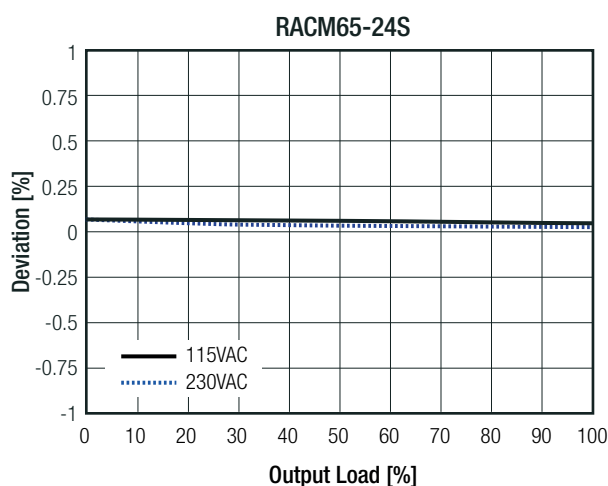


Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

REGULATIONS

Parameter	Condition		Value
Set Voltage Accuracy	230VAC, full load		±1.0%
Line Voltage Regulation	low line to high line, full load		±0.2%
Load Voltage Regulation	0% to 100% load	5VDC	0.7%
		others	0.5%
	10% to 90% load	5VDC	0.6%
		others	0.4%
Transient Peak Deviation	load step from 50% - 75% change at 2.5A/μs		3.0% Vout max.
Transient Recovery Time	load step from 50% - 75% change at 2.5A/μs		600μs typ.

Deviation vs. Load



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 Iout rated (Hiccup)		145% typ.
Over Voltage Protection (OVP)	% of Vout nominal (Latch off)		125% min / 140% max.
Isolation Voltage ⁽⁵⁾	tested for 1 minute	I/P to O/P I/P to Case, O/P to Case	4kVAC 2.5kVAC
Isolation Resistance	500VDC		100MΩ min.
Insulation Grade			reinforced
Leakage Current	264VAC		75μA max.
Means of Protection	working voltage 250VAC/continuous		2MOPP
Medical Device Classification			built-in power supply
Internal	clearance creepage		>8.0mm >8.0mm

Notes:

Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

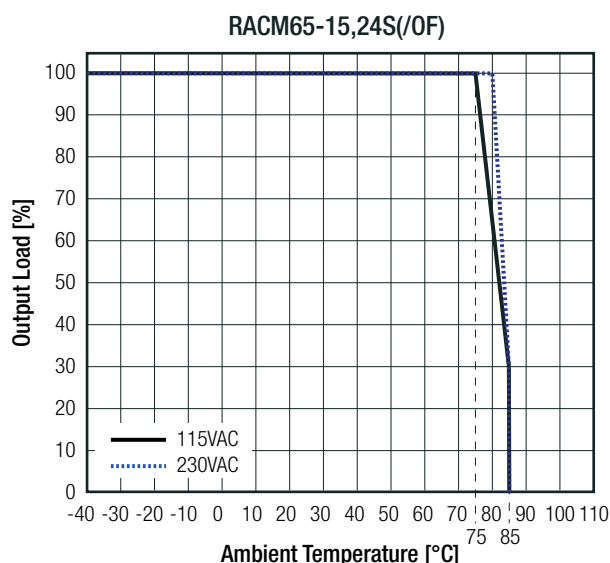
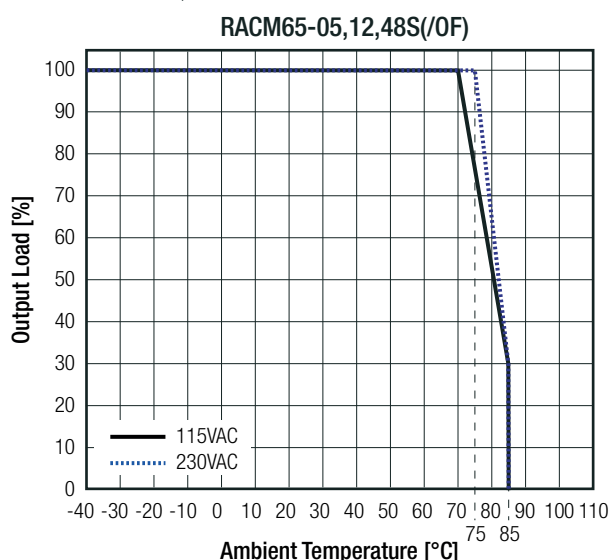
Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range	refer to derating graph	-40°C to +85°C
Temperature Coefficient		±0.02%/K
Operating Altitude		5000m max.
Operating Humidity	non-condensing	5% to 95% RH
Pollution Degree		PD2
Shock		according to IEC60068-2-27
Vibration		according to IEC60068-2-6
MTBF	according to MIL-HDBK-217F, full load, +25°C	1494 x 10 ³ hours

Derating Graph

(@ natural convection 0.1m/s)



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Medical Electric Equipment, General Requirements for Safety and Essential Performance	E314885	CAN/CSA-C22.2 No. 60601-1:14 ANSI/AAMI ES60601-1:2005 + A2:2010
Medical Electric Equipment, General Requirements for Safety and Essential Performance (CB Scheme)	151101302	IEC60601-1:2005 + C2:2007, 3rd Edition EN60601-1:2006
Information Technology Equipment - General Requirements for Safety (LVD)	TW1708008-001	EN60950-1:2006 + A2:2013
Information Technology Equipment - General Requirements for Safety		IEC60950-1:2005, 2nd Edition + A2:2013
EAC	RU-AT.49.09571	TP TC 004/2011 TP TC 004/2011
RoHS2+		RoHS-2011/65/EU + AM-2015/863

EMC Compliance (Medical)	Conditions	Standard / Criterion
Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests		EN60601-1-2:2015
Industrial, scientific and medical equipment - Radio frequency disturbance characteristics - Limits and methods of measurement		CISPR11:2009 + A1:2010, Class B

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Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

EMC Compliance (Medical)	Conditions	Standard / Criterion
ESD Electrostatic discharge immunity test	Air $\pm 15\text{kV}$; Contact $\pm 8\text{kV}$	IEC61000-4-2:2008
Radiated, radio-frequency, electromagnetic field immunity test	20V/m (80-2700MHz) 27V/m (385MHz) 28V/m (450MHz)	IEC61000-4-3:2006 + A2:2010
Fast Transient and Burst Immunity	AC Power Port: $\pm 2\text{kV}$	IEC61000-4-4:2012
Surge Immunity	AC Port: L-N= $\pm 1\text{kV}$ L-GND= $\pm 2\text{kV}$	IEC61000-4-5:2014
Immunity to conducted disturbances, induced by radio-frequency fields	20Vr.m.s	IEC61000-4-6:2013
Power Frequency Magnetic Field	50Hz, 30A/m	IEC61000-4-8:2009
Voltage Dips and Interruptions	Dips: >95%; 30%; Interruptions >95%	IEC61000-4-11:2004
Limits of Voltage Fluctuations and Flicker		EN61000-3-3:2013
Limitations on the amount of electromagnetic interference allowed from digital & electronic devices		47CFR FCC Part 15 Subpart B, Class B
Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		ANSI C63.4:2014
FCC methods of measurement of radio noise emissions from industrial, scientific, and medical equipment		FCC OST/MP-5
EMC Compliance (Industrial)	Conditions	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements		EN55032:2015+AC:2013, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010+A1:2015
ESD Electrostatic discharge immunity test	Air $\pm 15\text{kV}$; Contact $\pm 6\text{kV}$	IEC61000-4-2:2008, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-1000MHz) 20V/m (80-1000MHz)	IEC61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: $\pm 4\text{kV}$	IEC61000-4-4:2012, Criteria A
Surge Immunity	AC Port: L-N= $\pm 2\text{kV}$ L-PE= $\pm 4\text{kV}$	IEC61000-4-5:2014, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port 10V, 20V	IEC61000-4-6:2013, Criteria A
Power Frequency Magnetic Field	50Hz/60Hz, 100A/m, 1000A/m	IEC61000-4-8:2009, Criteria A
Voltage Dips and Interruptions	Dips: >95%; 60%; 30% Interruptions >95%	IEC61000-4-11:2004, Criteria A IEC61000-4-11:2004, Criteria B
Damped oscillatory wave immunity test	AC Port: L-N= $\pm 1\text{kV}$ L/N-G= $\pm 2.5\text{kV}$	IEC61000-4-18:2006 + A1:2010, Criteria A
Limits of Voltage Fluctuations and Flicker		EN61000-3-3:2013

DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	enclosed case PCB	aluminum FR4, (UL94V-0)
Dimension (LxWxH)	enclosed case open frame	91.4 x 60.5 x 33.3mm 76.2 x 50.8 x 26.5mm
Weight	enclosed case open frame + "-ST" version	172g 137g

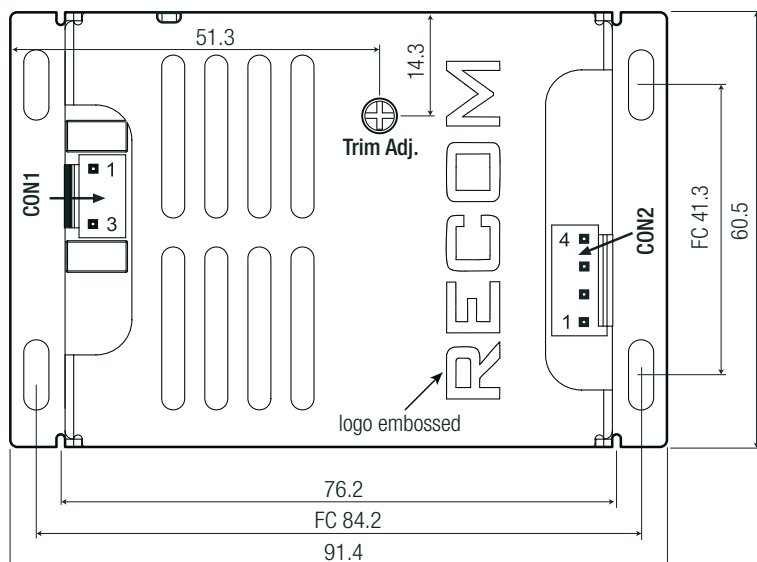
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Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

Dimension Drawing Enclosed Case (mm)



Top View



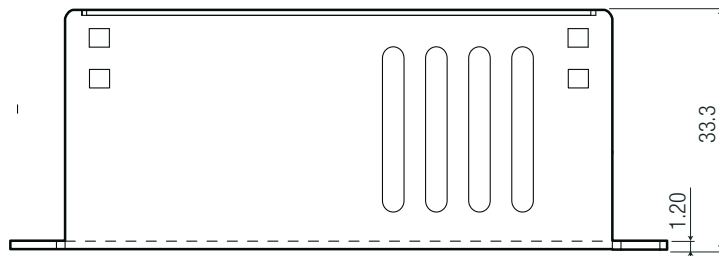
AC Input Connector (CON1)

Pin#	Terminal	Mating Housing
1 AC/L	Molex KK156	Molex KK156
3 AC/N	(SD-2478)	(09508031)

DC Output Connector (CON2)

Pin#	Terminal	Mating Housing
1,2 V-	Molex KK156	Molex KK156
3,4 V+	(SD-2478)	(09508041)

Side View



Bottom View

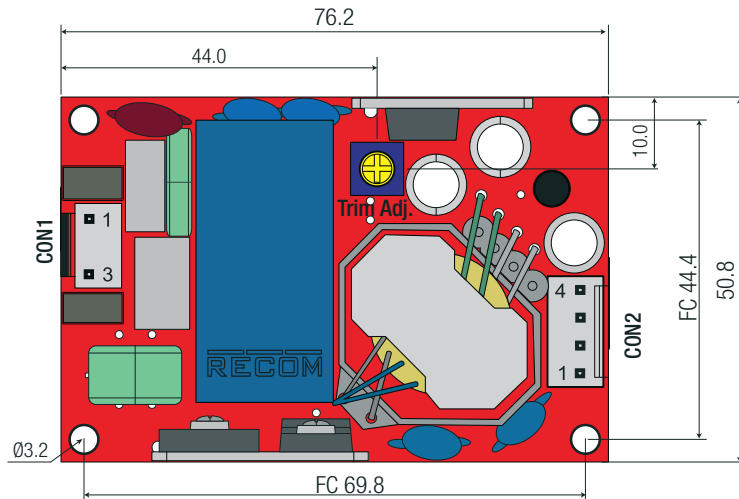


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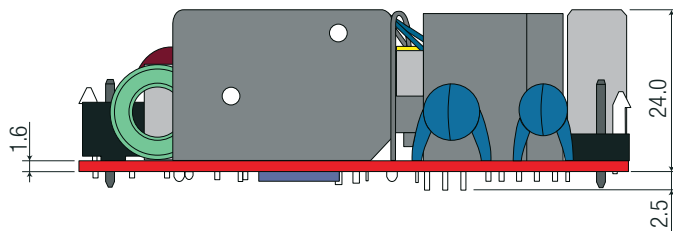
Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

Dimension Drawing Open Frame (/OF) (mm)

Top View



Side View



AC Input Connector (CON1)

Pin#	Terminal	Mating Housing
1 AC/L	Molex KK156	Molex KK156
3 AC/N	(SD-2478)	(09508031)

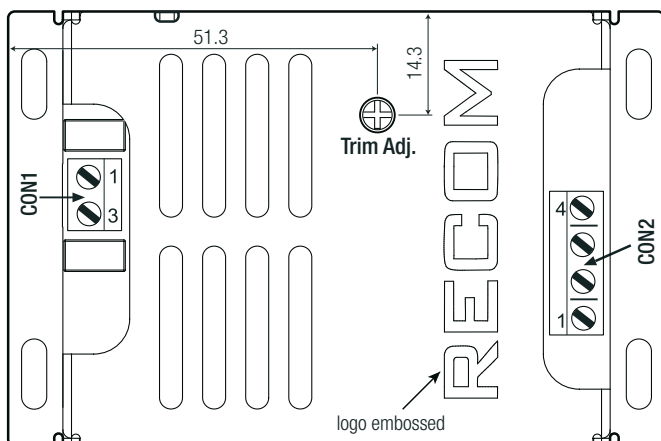
DC Output Connector (CON2)

Pin#	Terminal	Mating Housing
1,2 V-	Molex KK156	Molex KK156
3,4 V+	(SD-2478)	(09508041)

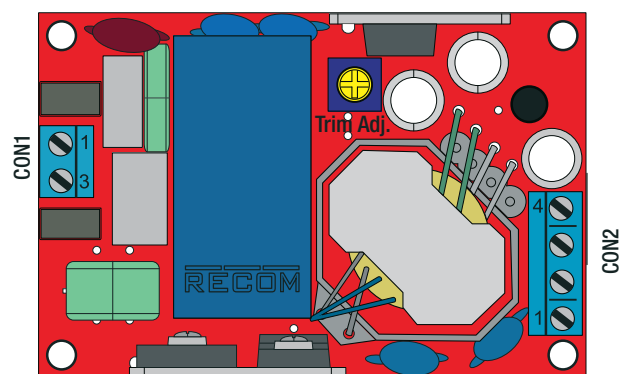
Screw Terminal Connection “-ST”

Top View

Enclosed Version



Open Frame Version



Screw terminal information

#	Function	AWG	Model
1	VAC in (L)	26-16	ETB30
3	VAC in (N)	26-16	(EK381V)
1,2	-Vout	26-16	ETB30
3,4	+Vout	26-16	(EK381V)

recommended tightening torque: 0.2Nm

Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)**PACKAGING INFORMATION**

Parameter	Type		Value
Packaging Dimension (LxWxH)	cardboard box	enclosed case	120.0 x 80.0 x 85.0mm
		open frame	111.0 x 94.0 x 51.0mm
Packaging Quantity			1pcs
Storage Temperature Range			-40°C to +85°C
Storage Humidity	non-condensing		5% to 95% RH

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.