

# 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



# RACM40

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



## Description

The RACM40 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 ±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 RACM40 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.

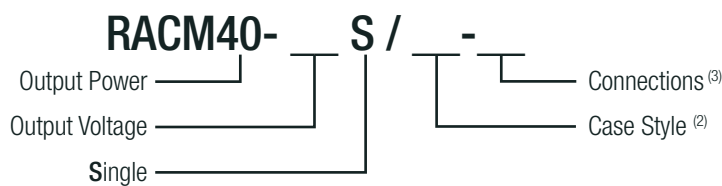
## Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [A]	Efficiency typ. [%]	Max. Capacitive Load <sup>(1)</sup> [µF]
RACM40-05S <sup>(1,2)</sup>	85-264	5	8.0	90	16000
RACM40-12S <sup>(1,2)</sup>	85-264	12	3.34	92	2785
RACM40-15S <sup>(1,2)</sup>	85-264	15	2.67	92	1780
RACM40-24S <sup>(1,2)</sup>	85-264	24	1.67	92	700
RACM40-48S <sup>(1,2)</sup>	85-264	48	0.84	93	175

### 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:

- RACM40-12S = 12Vout, standard enclosed case  
 RACM40-48S/OF = 48Vout, open frame style  
 RACM40-15S/OF-ST = 15Vout, open frame style with screw terminal connection



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**

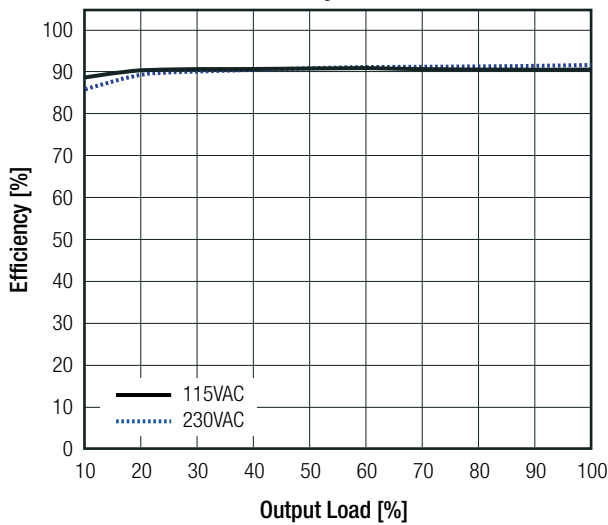
Parameter	Condition	Min.	Typ.	Max.
Input Voltage		85VAC 100VDC <sup>(4)</sup>	230VAC	264VAC 370VDC
Input Current	115VAC, full load 230VAC, full load			1.0A 0.5A
Inrush Current	230VAC			60A
No load Power Consumption				0.11W
Input Frequency Range	AC Input		50/60Hz	440Hz <sup>(4)</sup>
Output Voltage Trimming	on-board trimpot		±10.0%	
Minimum Load		0%		
Start-up Time				1s
Rise Time			20ms	
Hold up Time	115VAC, full load		25ms	
Internal Operating Frequency	5VDC, 230VAC others, 230VAC		70kHz 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:**

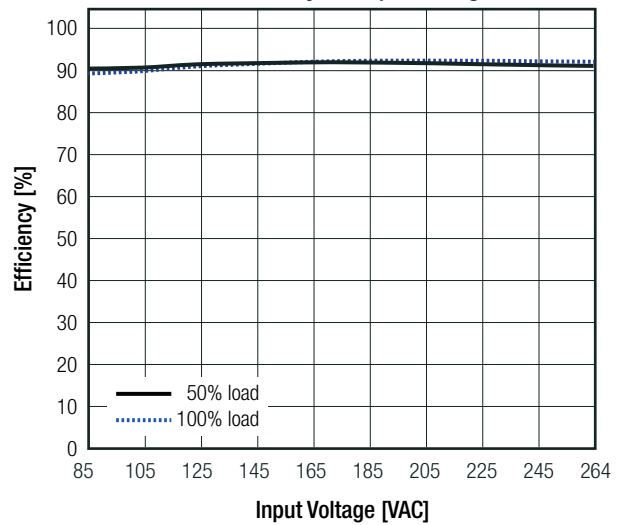
Note4: Confirmed performance, but not covered in certificates. 100V input voltage with derating

**RACM40-24S**

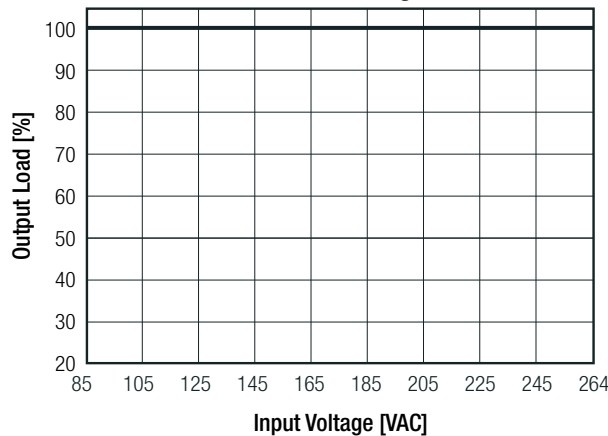
**Efficiency vs. Load**



**Efficiency vs. Input Voltage**



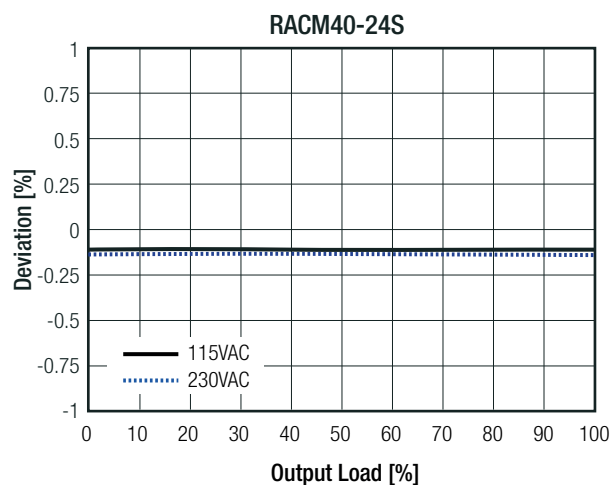
**Line Derating**



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

REGULATIONS			
Parameter	Condition	Value	
Output Accuracy	230VAC, full load	±1.0%	
Line Regulation	low line to high line, full load	±0.2%	
Load Voltage Regulation	0% to 100% load	5VDC others	0.7% 0.5%
	10% to 90% load	5VDC others	0.6% 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	500μs 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 <sup>(5)</sup>	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

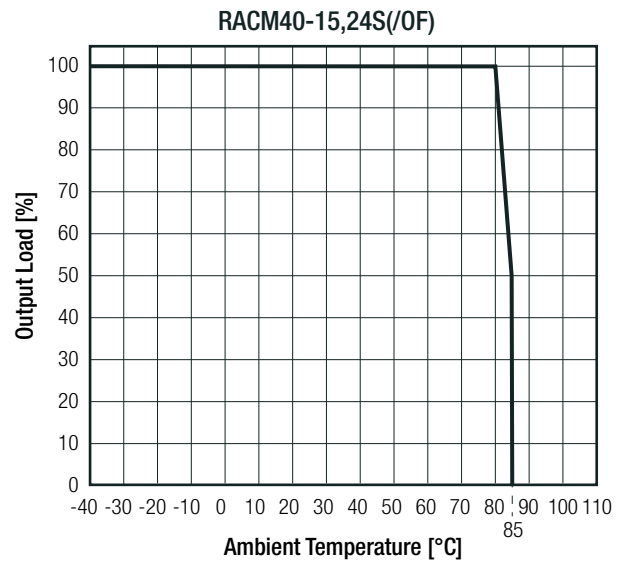
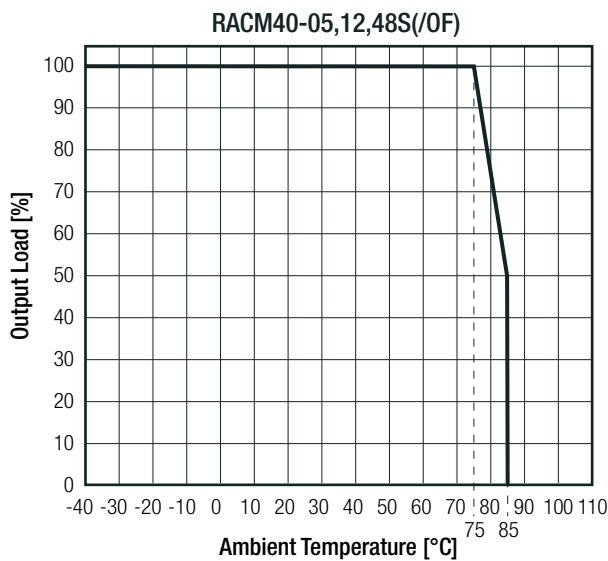
**Specifications** (measured at Ta= 25°C, 250VAC, full load and after warm-up)

**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	3010 x 10 <sup>3</sup> 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 ±15kV; Contact ±8kV	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: ±2kV	IEC61000-4-4:2012
Surge Immunity	AC Port: L-N= ±1kV L-GND= ±2kV	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 ±15kV; Contact ±6kV	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: ±4kV	IEC61000-4-4:2012, Criteria A
Surge Immunity	AC Port: L-N= ±2kV L-PE= ±4kV	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= ±1kV L/N-G= ±2.5kV	IEC61000-4-18:2006 + A1:2010, Criteria A
Limits of Voltage Fluctuations and Flicker		EN61000-3-3:2013

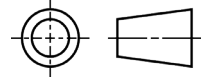
### DIMENSION and PHYSICAL CHARACTERISTICS

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

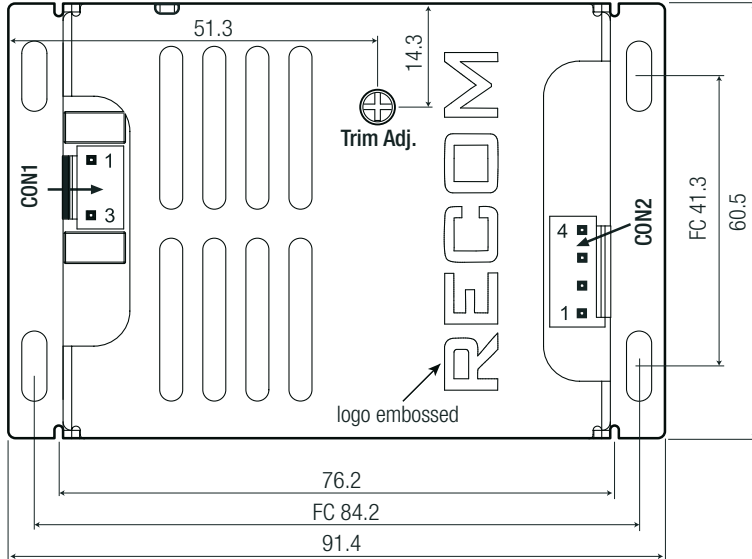
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**Specifications** (measured at Ta= 25°C, 250VAC, full load and after warm-up)

Dimension Drawing Enclosed Case (mm)



Top View



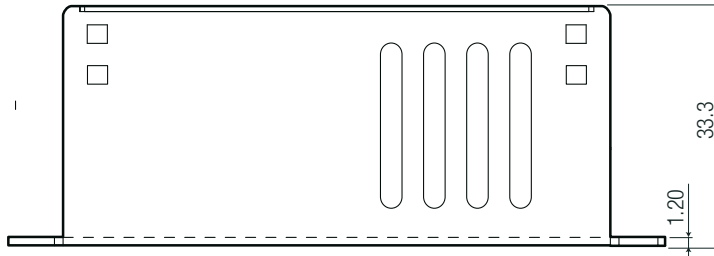
**AC Input Connector (CON1)**

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



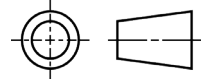
Bottom View



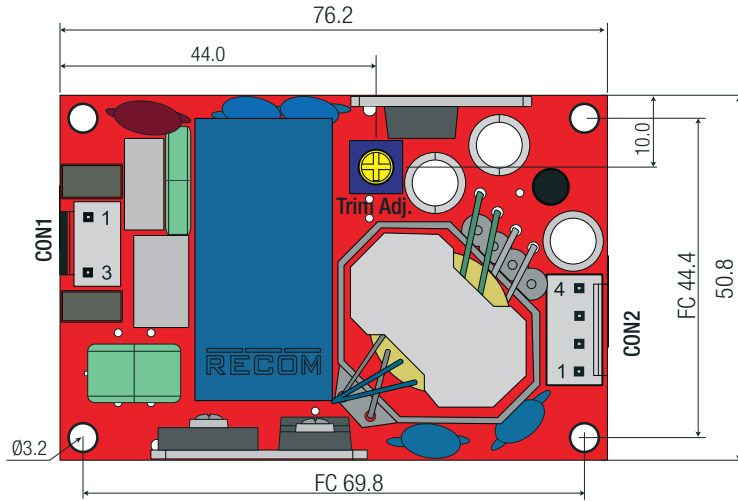
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**Specifications** (measured at Ta= 25°C, 250VAC, full load and after warm-up)

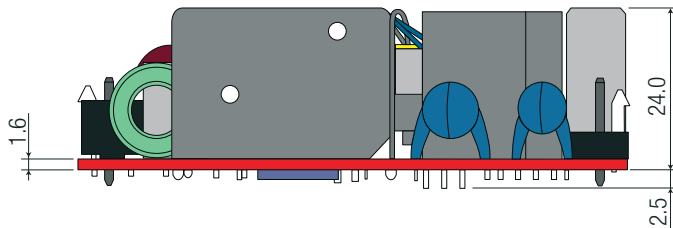
**Dimension Drawing Open Frame (/OF) (mm)**



**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)

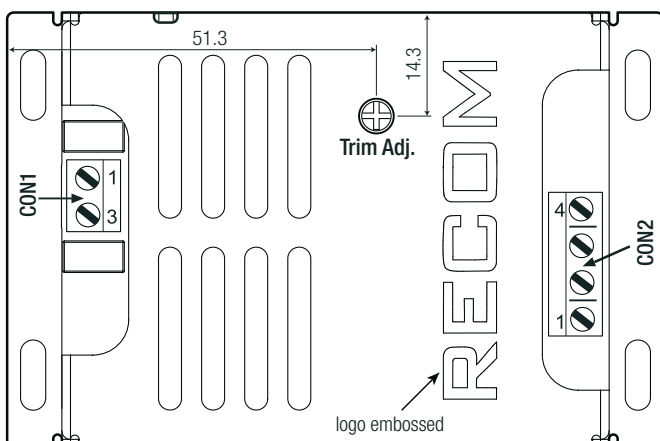
**DC Output Connector (CON2)**

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

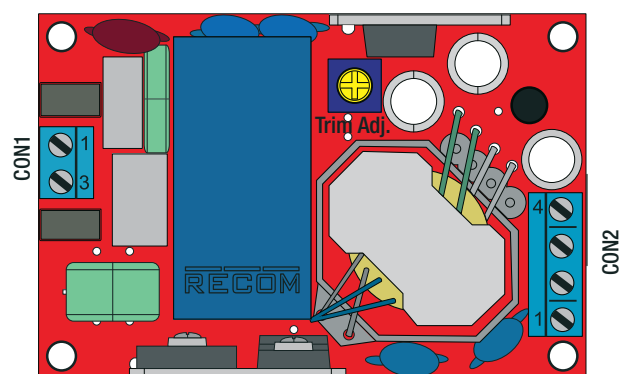
**Screw Terminal Connection "-ST"**

**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			1 pcs
Storage Temperature Range			-40°C to +85°C
Storage Humidity	non-condensing		5% to 95% RH

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