RS-3000

Sub miniature, High-Performance, 2D data collector

Specifications Manual

Spec manual RS-3000
Sub Miniature 2D data collector
Revision 1

Preliminary. The information in this document is subject to change without notice.

Limited Warranty and Disclaimers

Please read this manual carefully before installing or using the product.

Serial Number

A serial number appears on all Opticon products. This official registration number is directly related to the device purchased. Do not remove the serial number from your Opticon device. Removing the serial number voids the warranty.

Warranty

Unless otherwise agreed in a written contract, all Opticon products are warranted against defects in materials and workmanship for two years after purchase excluding batteries. Opticon will repair or, at its option, replace products that are defective in materials or workmanship with proper use during the warranty period. Opticon is not liable for damages caused by modifications made by a customer. In such cases, standard repair charges will apply. If a product is returned under warranty and no defect is found, standard repair charges will apply. Opticon assumes no liability for any direct, indirect, consequential or incidental damages arising out of use or inability to use both the hardware and software, even if Opticon has been informed about the possibility of such damages.

Packaging

The packing materials are recyclable. Damage caused by improper packaging during shipment is not covered by the warranty.

Trademarks

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Support

USA

Phone: 800-636-0090
Email: support@opticonusa.com
Web: www.opticonusa.com

Europe

Phone: +31235692728
Email: support@opticon.com
Web: www.opticon.com

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Scan, Connect, Communicate

Revision History

This document is a compilation of all individual specification manuals for the MDI-4000 Series of scan engines.

Product Name: RS-3000 Specifications Manual

Edition	Date	Page	Section	Description of Changes
First	September 16, 2019	-	-	Initial release.

Table of Content

Table of Figures

1 Abstract

This manual provides specifications for the RS-3000 sub-miniature data collector that features a 2D scan engine.

2 Overview

The RS-3000 is a very compact battery powered data collector with a built-in 2D barcode scanner. Due to its compact size and its Bluetooth capabilities, the RS-3000 is the ideal companion scanner for mobile devices like the iPhone/iPad and Android telephones and tablets. It is so small that is easily fits into your pocket. An important accessory for the RS-3000 is the ring scanner bracket that transforms the product into a wearable. Combined with the very light weight of the RS-3000 makes it an ideal product for hands-free operation.

The key features of the RS-3000 are the following:

- **Super small design, the smallest in the industry:** Even though the RS-3000 is a full featured data collector it measures just 3.2 x 4.8 x 2.0 cm, not much bigger than the average keychain.
- **Configurable and Programmable:** The RS-3000 is built onto the proven technology used in previous data collectors such as the OPN-2006 and the PX-20 that make the product programmable. All applications such as the OPN-2001 simulation app and the Bluetooth demos are supported.
- **High-speed scanning:** The extreme high-performance scan engine in the RS-3000 ensures stress-free scanning and fast response, even in the case of poor-quality barcodes. It features a high-speed CMOS image sensor that captures images at a speed of up to 100 fps, which when combined with the fastest global shutter speed in the industry, enables fast and accurate scanning.
- **Accurate battery monitoring:** With the build-in battery gas-gauge, the RS-3000 is able to accurately monitor the remaining charge level and therefore it can prevent surprise resets that may damage the filesystem.
- **Green LED aiming and Warm-White LED Illumination:** A well-defined, single line of green LED light and efficient warm-white LED illumination makes it easy to aim the scanner while providing safety and long life.
- **Designed from the start as a wearable scanner:** The RS-3000 can easily be clicked onto a ring scanner bracket to transform it into a wearable. Combined with the very light weight of the RS-3000 makes it an ideal product for hands-free operation
- **Wireless charging:** The RS-3000 can be charged wirelessly with any Qi compatible charging pad. Of course, it is also possible to charge it via the USB-C port.
- **NFC Tag for Bluetooth pairing**: The RS-3000 has a build-in tag that can be used my most modern smart phones for easy Bluetooth pairing.
- **Bluetooth**: The RS-3000 features a modern Bluetooth 4.2 compliant chip that supports both Bluetooth classic as well as Bluetooth low energy (BLE).
- **USB-C**: The RS-3000 comes with a USB-C charging/communications port. It supports USB-HID (keyboard), USB-COM (serial port) and USB-MSD (hard disk)
- **RoHS compliance:** The scan engines are RoHS compliant products, as declared by Optoelectronics Co., Ltd.

3 Physical Features

3.1 Dimensions

3.1.1 RS-3000 Dimensions

32.3 x 47.8 x 20.4 mm (WxLxH)

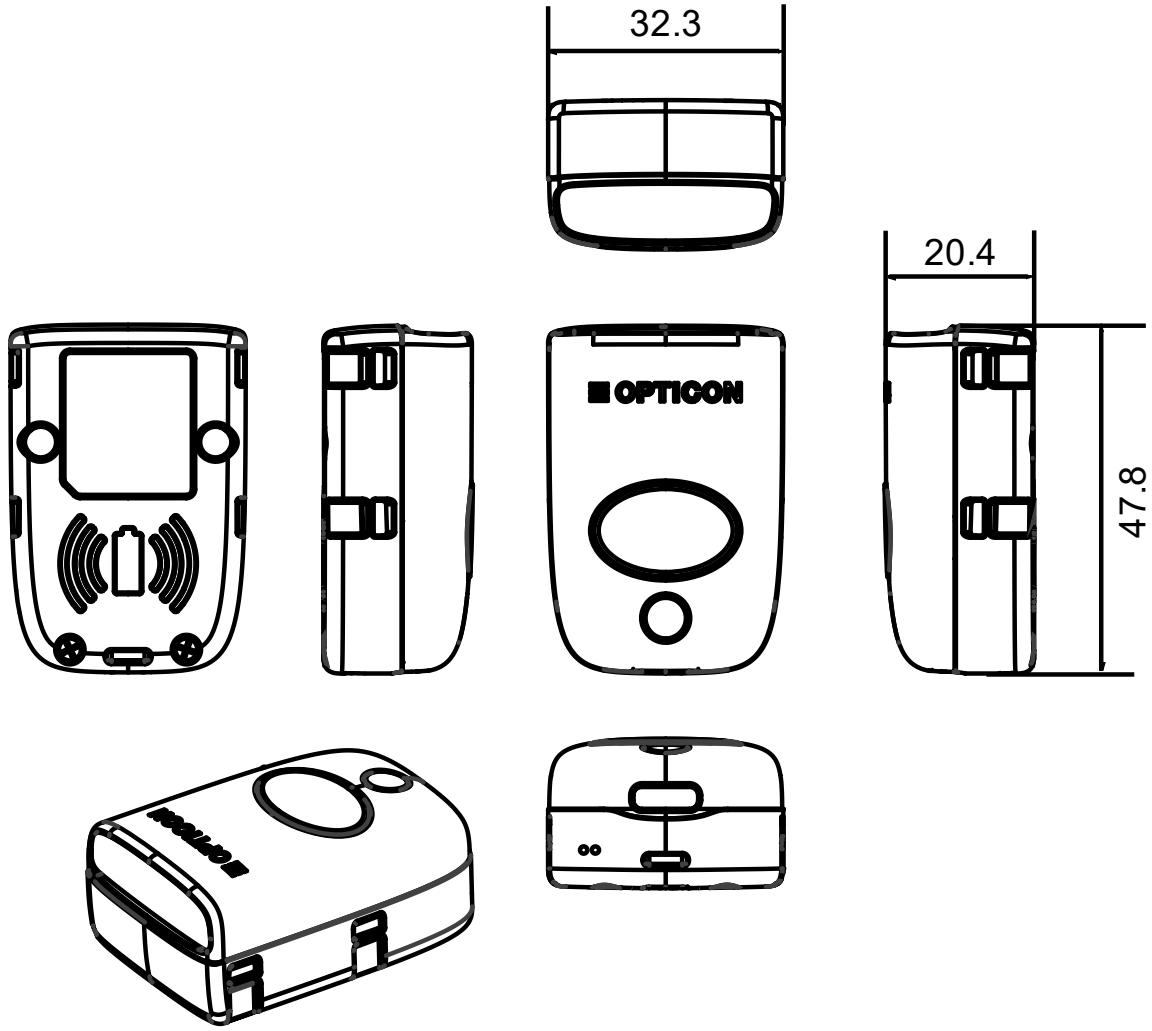

Figure ***1****: Dimensions of the RS-3000*

3.1.2 Ring scanner bracket dimensions

41.8 x 47.8 x 44.0 mm (WxLxH)

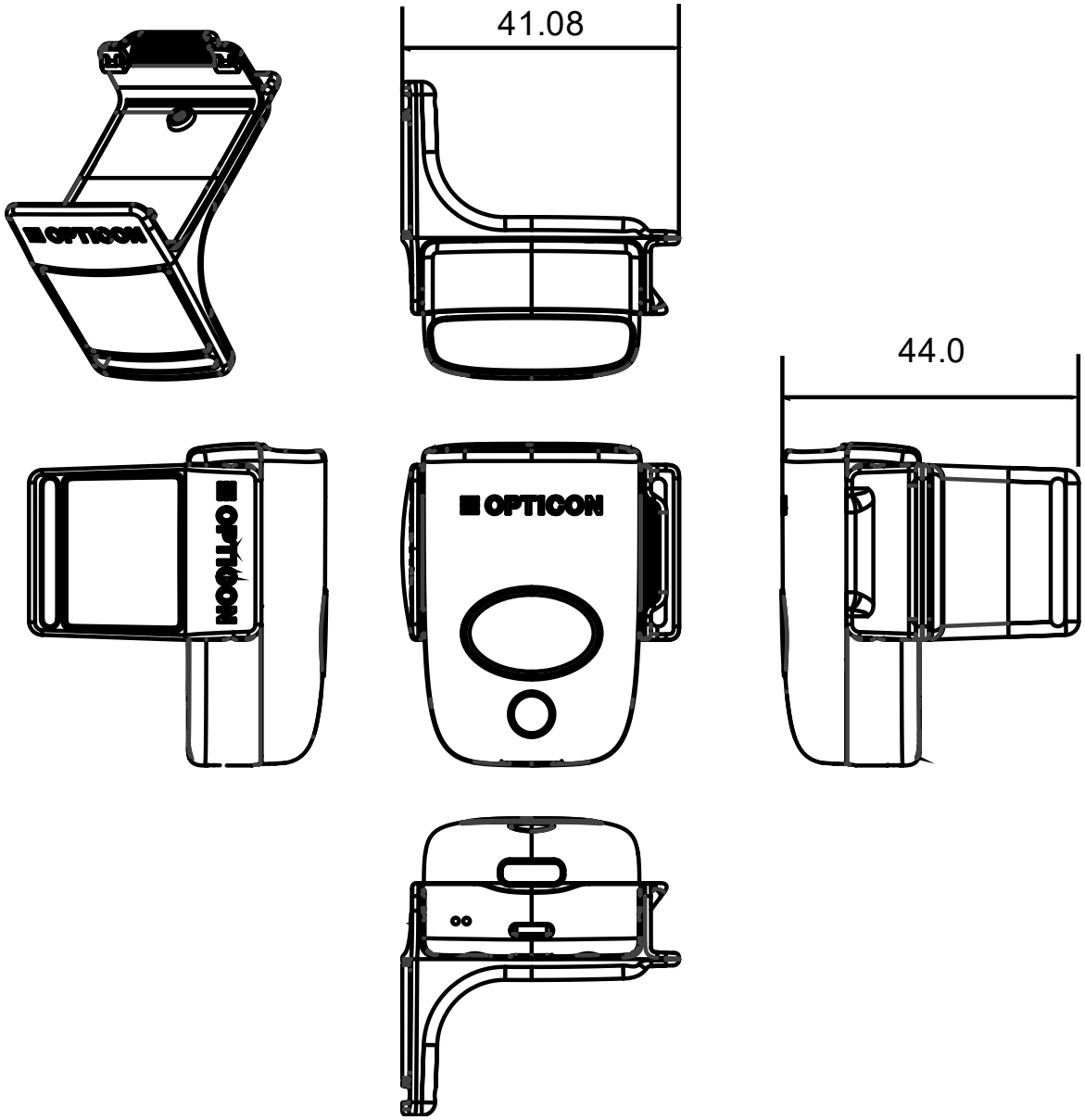

*Figure **2**: Dimensions of ring scanner bracket*

3.2 Weight

The weight of the RS-3000 (excluding bracket) is: 50g

4 Environmental Specifications

Unless otherwise noted, these conditions apply to all environmental specifications where applicable.

Environmental Specification Conditions

Condition	Description
Barcode Sample	0.33 mm UPC specified in Chapter 8
Distance	130 mm from the front edge of the scan engine
Angle	α = 0°, β =+15°, γ = 0°
Curvature	R = ∞
Scanning Test	Read at intervals of 300 ms
Power Supply Voltage	3.3 and 5.0 V

4.1 Temperature

Operating Temperature: -20 to 60 °C
Storage Temperature: -40 to 70 °C

Note: Temperature during charging should be between 0 and 45 °C. To protect the battery the RS-3000 will automatically stop the charging process when the temperature is outside these values.

4.2 Humidity

Operating Humidity 5 to 90% RH (no condensation, no frost)
Storage Humidity 5 to 90% RH (no condensation, no frost)

4.3 Ambient Light Immunity

Scanning performance is guaranteed when the illuminance on the surface of a barcode is between zero and the following values:

Incandescent Light 10,000 lux
Fluorescent Light 10,000 lux
Sunlight 100,000 lux

Note: Scanning performance is guaranteed if direct ambient light does not enter the light receiving section of the scan engine.

4.4 LED light immunity

The scan performance of the RS-3000 is unaffected by indoor LED lighting applications.

4.5 Electrical Noise

There shall be no abnormalities when sinusoidal electrical noise (50 Hz to 100 kHz, smaller than 0.1 Vp-p) is added to the power supply line via the USB port.

4.6 Vibration Strength

The RS-3000 is guaranteed to withstand the conditions of the following vibration test.

Vibration Test: Increase the frequency of the vibration from 12Hz to 200Hz at accelerated velocity 32.3m/s2(3.3G) for ten minutes. Continue this routine for 2 hours to X-direction, 2 hours to Y-direction and 4 hours to Z-direction.

4.7 Drop Impact Strength

The RS-3000 is guaranteed to withstand the conditions of the following drop test.

Drop test: Drop the RS-3000 10 times in total, at top, bottom, front, back, left, right, top-left, top-right, bottom-left and bottom-right faces, from a height of 1.5 meters onto a concrete floor.

5 Optical Specifications

5.1 Basic Optical Specifications

Specification		Characteristics
Scan method	CMOS array area sensor	(black and white)
Number of effective pixels	(H) × (V)	640 × 480
Image capture speed	Frame rate*1	100 fps
Sensor shutter speed	Minimum shutter speed	30µs
Focal distance	From the front edge of scan engine	115 mm
View angle	Horizontal	Approx. 38.0°
	Vertical	Approx. 28.9°
	Diagonal	Approx. 46.4°
Auxiliary light source	Warm white LED	-
	Color temperature	2600 to 3700K
	Maximum Optical Efficiency*2	114 lm/W
Light source for aiming	Single Line Green LED	-
	Peak Wavelength	535nm
	Maximum Optical Efficiency*2	87.4 lm/W
Minimum contrast	PCS	0.2
Minimum resolution	1D barcodes	0.1mm (4mil)
	2D codes	0.169 (6.7 mil)
Barcode width		100mm
Pitch, Skew, and Tilt	Resp. α, β and γ	α = ±65° β = ±65° γ = 360°
Curvature	Radius	R ≧ 20 mm
Motion tolerance	Speed	2.54m/s
Decode rate	1D barcodes	40
	2D codes	25

*1 The fastest speed of image capture.

*2 The reference value extracted from the LED datasheet.

Note: The same basic conditions apply as for the Environmental Specifications (See chapter 4)

Note: For more details on the optical specifications, refer to the MDI-4150 specifications manual.

6 Component specification

Item	Specification	Notes
2D engine	MDI-4150	Low power high speed 2D engine
Application processor	Renesas RX62N	96MHz clock speed
Flash memory	1Mbyte serial flash	Barcode storage >50,000 + time stamp. Also used as file storage media
	512Kbyte program flash	128Kbyte available for user applications
	32Kbyte config flash	For configuration storage such as Bluetooth link addresses.
RAM	96Kbyte	16Kbyte available for user applications
LED indicator	2 pcs	Red/Green/Blue
Bluetooth	CSR8811	Bluetooth 4 classic and Bluetooth Low Energy

7 Electrical specification

7.1 Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power supply voltage (VDD to GND)	Vdd	-0.3 to 6.5	V
Input voltage (IO Pins)	D+ and D-	As per USB spec.	V
Power ripple		0.1 V p-p (10-100 kHz)	V
Max input current (via USB port, empty battery while scanning, no inrush current)	Imax	1	A

7.2 Recommended Operating Conditions

Parameter	Symbol	Value	Unit
Power supply voltage (VDD to GND)	Vdd	5	V
Input voltage	D+ and D-	As per USB spec	V
Power ripple		0.1 V p-p (10-100 kHz)	V

7.3 Battery

Parameter	Value	Unit
Battery capacity	400	mAh
Battery voltage	3.7 (typ)	V
Max charging current	300	mA
Max charging time	4	h

8 Serial Label

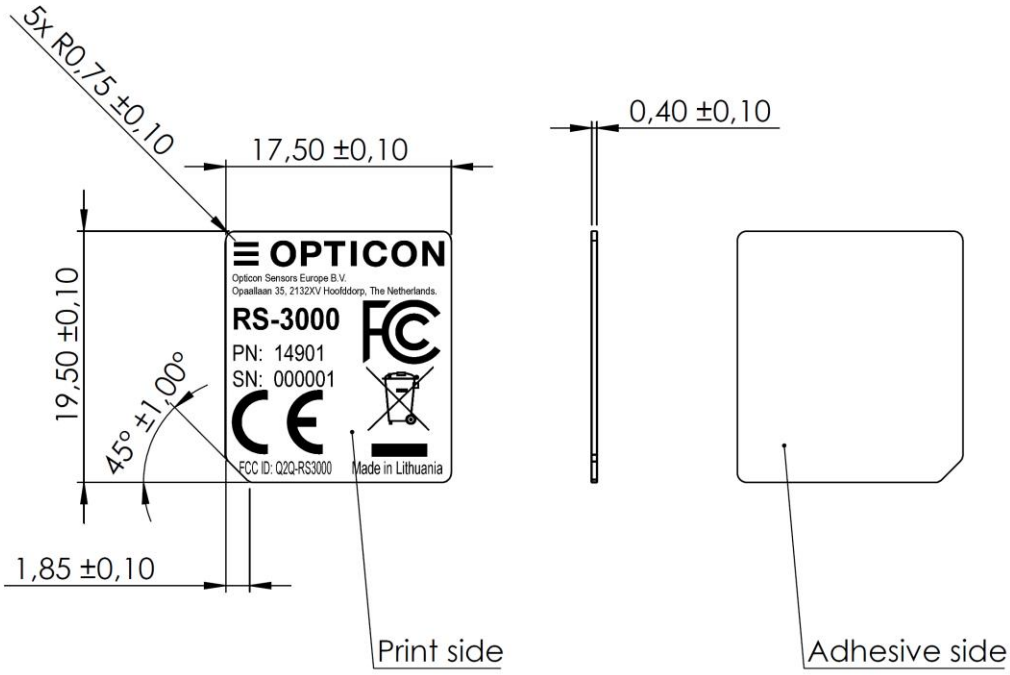

Figure **3***: Serial label*

Label dimension:

17.5mm x 19.5mm
Tolerance ± 0.1mm

Label material:
Consist of base + laminate protection against wear.
Base: 80µ yupo label, backing with glue
Laminate: 25µ clear lamination
RoHS complaint

Bar code area:

Standard Code 39 + human readable text (printed below the bar code).
Bar code height = 3mm (excluding the human readable text).

Serial number: 6 numerical digits starts with 000001. Increment with 1 for each label. No double serial number may exist.

9 Regulatory Compliance

9.1 LED Safety

IEC 62471:2006 Exempt Risk Group

9.2 Product Safety

EN 62368-1:2014 +A11:2017
IEC 62368-1:2014

9.3 EMC and RED

EN 300 328 V2.1.1
EN 301 489-1 V2.1.1
EN 301 489-17 V3.1.1
EN 62479:2010
EN 55024:2010 +A1:2015
EN 55032: 2012 +AC: 2013 Class A

9.4 FCC

FCC Part 15.19

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:

1) This device may not cause harmful interference and 2) This device must accept any interference received, including interference that may cause undesired operation of the device.

FCC Part 15.105(b)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

FCC Part 15.21

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2. For body worn operation, this device has been tested and meets FCC RF exposure guidelines. When used with an accessory that contains metal may not ensure compliance with FCC RF exposure guidelines.

9.5 RoHS/Reach

Regulation (EC1907/2006) compliance

The RS-6000 is RoHS compliant.

Note: RoHS: The restriction of the use of certain hazardous substances in electrical and electronic equipment, 2011/65/EU.

10 Handling Precautions

10.1 Charging

- Dust or dirt on the charging terminal may prevent charging. Opticon recommends cleaning the charging terminal once or twice a month with a blower, dry soft cloth, or cotton swab.
- In general, the battery needs to be charged about once a day. When fully charged, the battery life is approximately 2 days when scanning 5000 scans per day.
- To keep battery performance from decreasing during storage, the RS-3000 is not shipped fully charged. Before you start using the product, fully charge the battery.
- The battery used in the RS-3000 may slightly expand as performance degrades. Even if the product is not in use, battery performance may deteriorate after two years from the battery manufacture date. Battery performance decreases more rapidly in extremely hot and cold environments.
- Over discharge may cause battery failure. Avoid long-term storage in a low battery state.
- If the operating time is decreasing, contact your dealer to replace the battery.
- Opticon recommends using the product at room temperature and charging at 10 - 30°C. In an environment where the internal product temperature is below 5°C or over 40°C, charging may stop to prevent battery failure.
- Risk of explosion if battery is replaced by an incorrect type.
- Dispose of used batteries according to local regulations.

10.2 Excessive Shock or Stress

- Do not drop this product.
- Do not push or place this product under or between heavy objects.
- Do not apply shock or excessive force to connectors.
- Do not place the cable or AC adapter under or between heavy items.
- Do not bend the cable at extremely low temperatures.
- While a cable is attached to the device, do not swing the device around with the cable, as that might cause injury or damage to the device.
- If the cable sheath breaks or becomes damaged, the core wires may be exposed or break. The wires may also become exposed if there is damage at the base of the cable. If any of these conditions occur or if the cable generates heat, unplug the cable and contact the dealer. Using the product with exposed or broken wires may cause the product to malfunction, overheat, create smoke, or catch fire.
- If the charging AC adapter is faulty, unplug it and contact the dealer.
- Do not use this product at a voltage outside the specified range. The product may overheat, create smoke, or catch fire. Do not get the AC adapter wet. The AC adapter may cause a short circuit.

10.3 Bluetooth

- This product supports Bluetooth wireless communication with other Bluetooth devices that have the same profile.
- This product complies with Bluetooth standards; however, its communication performance with untested devices is not guaranteed.
- Bluetooth devices use the 2.4 GHz frequency band that is shared among other devices. It may affect the communication speed and distance between this product and the host device.
- The communication speed and distance may vary depending on the interference and radio wave condition between this product and the host device.

10.4 Frequency Band.

- This product uses the 2.4 GHz frequency band. Make sure you understand the following information before using this product.

Note: Scientific, medical, industrial devices, and microwaves use the 2.4 GHz frequency band. Electronic devices with some form of wireless communication, as well as amateur radio stations may also use the 2.4 GHz frequency band and may interfere with this product. For best performance, follow these guidelines:

1. Before using this product, make sure that other devices are not using the 2.4 GHz frequency band.
2. If radio interference occurs, change the location of this device, or stop the other devices that are using the 2.4 GHz frequency band.
3. If you have any questions or issues, please contact our sales office.

10.5 Operating Environment

- Do not use this product at temperatures outside the specified range.
- Do not use this product near combustible materials (including gas, powder, etc.). It may cause smoke and fire.
- Do not immerse this product in water or any other liquid.
- If condensation forms on the product, do not use the product. The product may malfunction. Wait until the moisture has evaporated.
- Do not store this product in either dusty environments or in extremely high humidity.
- Do not store this product in either extremely cold or hot places. Also avoid exposure to direct sunlight for long periods of time.
- Avoid static electricity and do not put the product near a radio or a TV. Excessive static electricity may cause malfunctions.
- Do not place in an unstable place.

10.6 General Cautions

- Do not disassemble this product.
- Do not stare into the LED light from the scan window. The LED may damage your eyes.
- Do not expose this product to oil and chemicals.
- This product may be affected by momentary voltage fluctuations caused by lightning.
- Do not let children use this product.

11 Packaging Specifications

To be determined