

Master Specifications	
Laser Data Collector	
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Revision History

Specification No.: SS07114

Product Name: OPN-2002

Revision	Date	Section	Description of Changes
Initial Release		-	(Initial Release)

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1. Abstract

This document provides specifications on the OPN-2002 compact data collector equipped with Bluetooth.

2. Overview

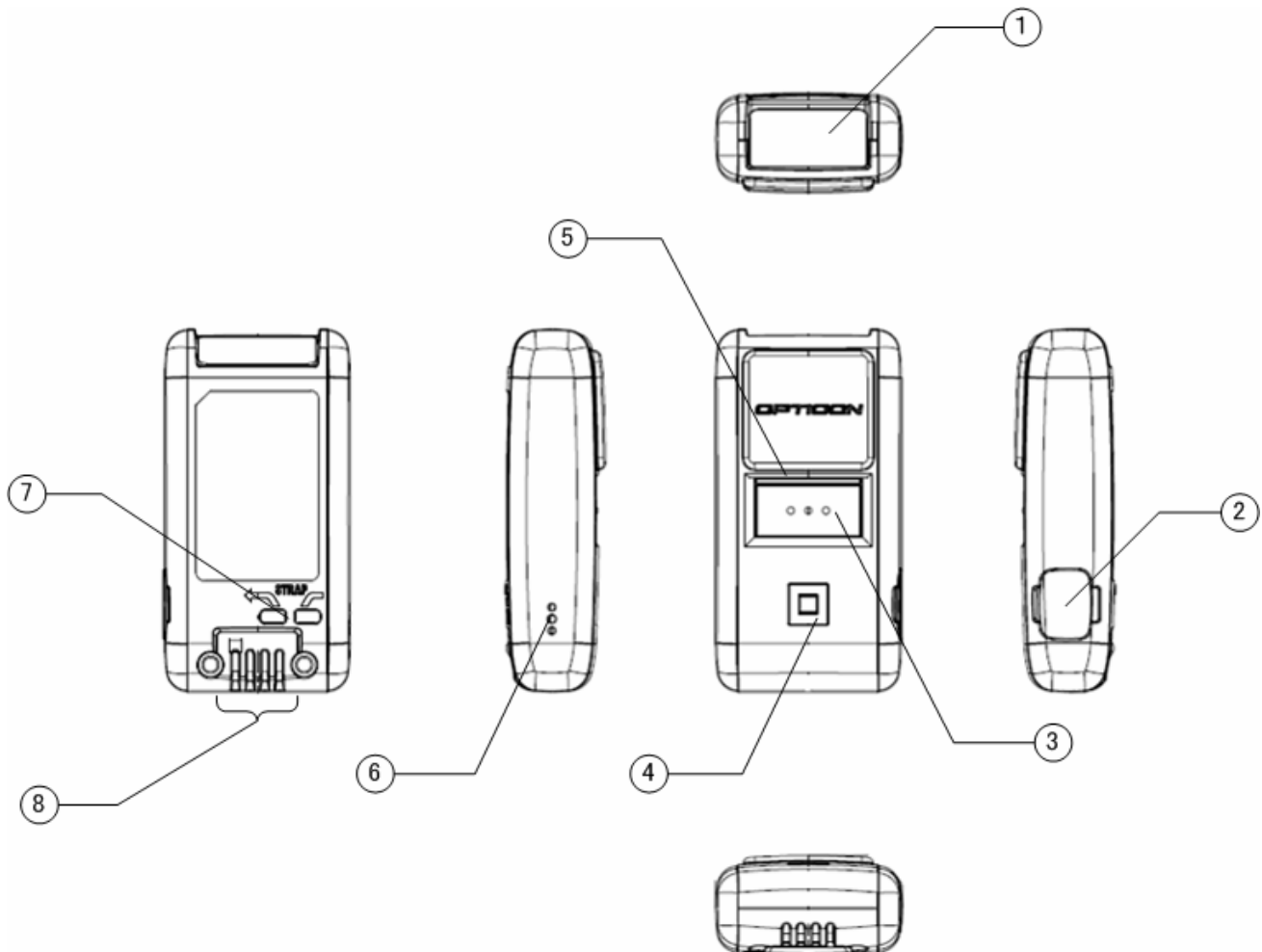
- The OPN-2002 is a simplified handheld data collector.
- The decoded text barcode images are output using USB, Bluetooth interfaces or a dedicated cradle to hosts.
- Implemented Bluetooth SPP and HID profiles
- 3.7V 240mAh lithium polymer battery is used as a power source of the OPN-2002.
- The OPN-2002 is rechargeable with a dedicated cradle.
- The OPN-2002 is a RoHS compliant product.

3. Basic Specifications

ITEMS		SPECIFICATIONS	NOTES
Control Section	MPU	32bit ST MicroSTR710FZx	
	Clock	48MHz	
Memory	FROM	1Mbyte	
	SRAM	1Mbyte	
OS	μ ITRON		
Input Part	key input	2keys:Torrigar key/ Function key	
LED Indicate	Double color LED (RED/GREEN) :2, Single color LED (Blue) :1		
Buzzer	3 volumes (adjustable)		
Wires communication	frequency	2402MHz-2480MHz	
	Specifications	Bluetooth Ver1.2	
	Communication Range	10m	It may differ depending on the environmental conditions.
	Transmission Power	Class2	
	Profile	SPP, HID	
USB	Ver1.1		Virtual COM Port
RTS	Year, Month, Day, Hour, Minute, Second (lunar equation ± 90 seconds)		
serial port	2 ports to a cradle		
power source	main battery	lithium polymar 240mAh	
	battery hour	more than 7 hours	2 scans per 10 seconds at a ambient temperarure, Bluetooth always transmitted

ITEMS		SPECIFICATIONS		NOTES
Optical Section	Scan Method	Bi-directional		100 ±20 scan/sec
	Light Emitting Element	Red laser diode		Wavelength: 650±10nm (at 25 deg. C)
	Light Output	≤ 1.0 mW		Laser Class 2 Product
	Supported Symbologies	JAN, EAN, UPC-A, UPC-E, NW-7 (Codabar), Industrial 2 of 5, Interleaved 2 of 5, Code 11, Code 39, Code 93, Code 128, MSI/Plessey, UK/Plessey, IATA, Telepen, Matrix 2 of 5, S Code, Tri-Optic, Chinese Post Matrix 2 of 5, EAN 128, RSS-14, RSS Limited, RSS Expanded, PDF417, MicroPDF417		
Dimensions	62.0(D) × 32.0(W) × 17.0(H) (mm)			
Weight	30g			
Environmental Spec.	Temperature	Operating	0 to 50 degrees C 20%RH~85%RH	no ice or condensation
		Storage	-20 to 60 degrees C 20%RH~85%RH	no ice or condensation
	Drop	Dropped from a height of 120 cm onto a concrete surface. The drop test was done 18 times.		
	Protective Structure	IP42		
Regulations and Safety	Laser Safety	JIS C 6802 : 2005 Class 2 IEC 60825-1+A2:2001 Class 2		
	EMI	VCCI Class B, EN55022 Class 2, FCC Part 15 Subpart C		
	Product Safety	IEC/EN 60950-1		
	Other Certifications	CE Marking		
	Logo Certifications	Certifications for Construction Design of Specified Radio Equipment Bluetooth Logo Certification		
Development Environment		Development language:C		Application Development

4. Views of a device



①	Reading window	The laser beam emits from here to scan the barcode.
②	USB connector cap	A cap for a USB connector.
③	Trigger key	Press the key to scan barcodes
④	Function key	A function key configurable by the application.
⑤	LED	Indicate the status of barcode reading, Bluetooth connection or warning.
⑥	Buzzer	Buzzer
⑦	Eyelet	Fix a wrist strap here.
⑧	Connector	A connector for recharging and data transmission to a dedicated cradle.

5. Optical Specifications

Parameter		Feature	Unit
Light Emitting Element		Red laser diode	-
Wavelength		650 ±10 (at 25 deg. C)	nm
Light Output		Less than 1.0	mW
Scan Method		Bi-directional Scan	-
Scan Rate		100 ±20	Scan/sec
Scan Angle	Scan Angle	54±5	Deg.
	Effective Scan Angle	44 (Min.)	Deg

5-2. Laser Scanning Standards

5-2-1. Laser Scanning Tilt

Laser scanning tilt is the vertical difference between both ends of a laser scan line. Measure it in the middle of the laser scan line.

- Up to 1.2 degrees angle in vertical direction from the scan origin (mirror motor).
- Up to 3.1mm at 150mm from the scan origin. (Measured at 0 degree of Skew Angle.)

5-2-2. Scanning Curvature

The maximum difference between the laser scan line and the line between both ends of the laser scan line. Measure it in the middle of the laser scan line.

- Up to 1.27 degrees angle in vertical direction from the scan origin (mirror motor).
- Up to 3.3mm at 150mm from the scan origin.

6. Technical Specifications

Except as otherwise noted in each section, conditions for technical specifications are as follows:

<Conditions>

Ambient Temperature and Humidity: Room Temperature and Humidity

Ambient Light: 500 - 900 lx

Background: Black

Scanning Tests: Performance is approved when scanning is successful in all 10 tests. Scanning is deemed successful when completed in 0.5 second or less.

6-1. Print Contrast Signal (PCS)

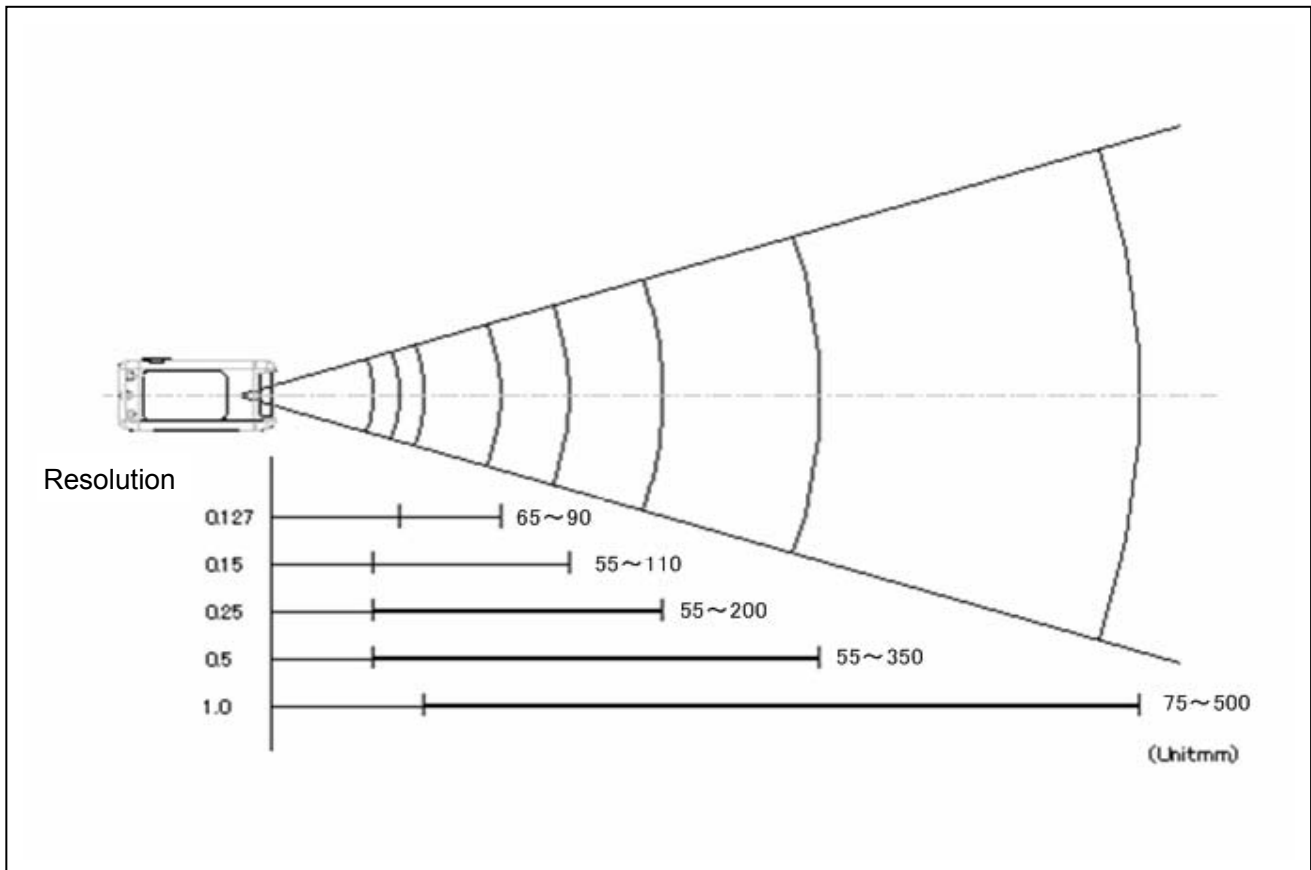
0.45 or higher (when the reflectivity of space and the quiet zone is higher than 70%)

6-2. Depth of Field and Resolution

The depth of the field is measured from the front edge of the data collector.

The scan area is a circular area centered around the beam, which appears at various resolutions.

Figure : Depth of Field and Resolution



Resolution	DOF (mm)	Conditions			
		Symbology	PCS	Quiet Zone	No. of Digits
1.0 mm	75 to 500	Code 39	0.9	25 mm	1
0.5 mm	55 to 350	Code 39	0.9	18 mm	3
0.25 mm	55 to 200	Code 39	0.9	10 mm	8
0.15 mm	55 to 110	Code 39	0.9	7 mm	10
0.127 mm	65 to 90	Code 39	0.9	5 mm	4

Barcode Sample: Optoelectronics Test Sample (N/W Ratio = 1:2.5)

Angle: $\alpha = 0^\circ$, $\beta = 15^\circ$, $\gamma = 0^\circ$

Curvature: $R = \infty$

6-3. Pitch, Skew and Tilt

Pitch Angle	$\alpha = \pm 35^\circ$
Skew Angle	$\beta = \pm 50^\circ$ (Except Dead Zone)
Dead Zone (DZ)	$\beta = \pm 8^\circ$ (Scanning may fail in the dead zone as a result of specular reflection)
Tilt Angle	$\gamma = \pm 20^\circ$

<Conditions>

Barcode sample: Optoelectronics Test Sample

[Pitch angle, Skew angle and Dead zone]

PCS = 0.9, Resolution = 0.25 mm, Symbology = 9-digit Code-39, Quiet zone = 10 mm, N/W ratio = 1:2.5

[Tilt angle]

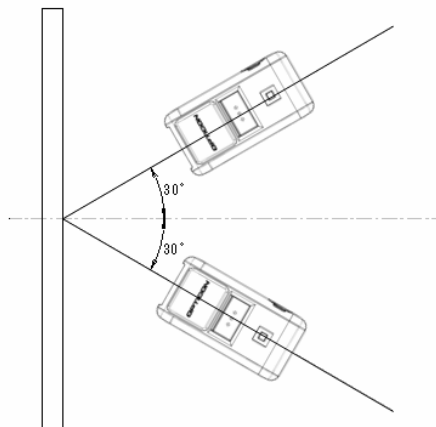
PCS = 0.9, Resolution = 0.26 mm, Symbology = 13-digit JAN, Quiet zone = 10 mm

Distance: 100 mm from the front edge of the data collector

Angles: [Pitch angle] Skew angle: $\beta = +15^\circ$, Tilt angle: $\gamma = 0^\circ$

[Tilt angle] Pitch angle: $\alpha = 0^\circ$, Skew angle: $\beta = +15^\circ$

[Skew angle, Dead zone] Pitch angle: $\alpha = 0^\circ$, Tilt angle: $\gamma = 0^\circ$



6-4. Curvature

With 8-digit JAN, scanning performance is guaranteed when $R \geq 15$ mm.

With 13-digit JAN, scanning performance is guaranteed when $R \geq 20$ mm.

<Conditions>

Barcode sample: Optoelectronics Test Sample

PCS = 0.9, Resolution = 0.26 mm, Quiet zone = 10 mm

Distance: 100 mm from the front edge of the data collector

Skew angle: $\beta = + 15^\circ$

6-5. Ambient Light Immunity

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

Incandescent	4000 lx
Fluorescent	4000 lx
Sunlight	80000 lx

<Conditions>

Barcode sample: Optoelectronics test sample

PCS = 0.9, Resolution = 0.25 mm, Symbology = 9-digit Code-39, Quiet zone = 10 mm,

N/W ratio = 1:2.5

Distance: 100 mm from the front edge of the data collector

Angle: $\alpha = 0^\circ, \beta = 15^\circ, \gamma = 0^\circ$

Curvature: $R = \infty$

Performance is guaranteed unless direct light or direct reflection from a light source falls on the area within which the OPN-2002 detects light.

7. Application Development Environment

This is an environment for developing a business oriented application. (Option)

Application development language is C.

【Development Environment】

- A guide for application development
- Application Development Environment
- Library specification
- Compiler(※)

※IAR Embedded Workbench for ARM (EWARM) Ver.5.11

8. USB Interface Specifications

The OPN-2002 USB model uses Full Speed USB interface.

8-1. USB Connector

Contact Number	Signal Name
1	VCC
2	-DATA
3	+DATA
4	NC
5	GND

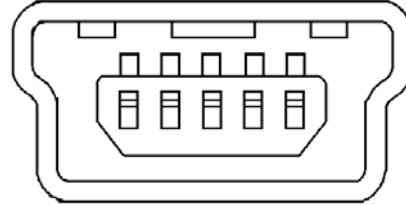


Figure : MINI USB B Connector

9. Wireless Connection

The wireless interface used by the OPN-2002 complies with Bluetooth Ver. 1.2. SPP (Serial Port Profile) and HID (Human Interface Device) is supported to enable OPN-2002 to communicate with other Bluetooth devices equipped with the same profile.

- Supported Profile

- SPP (Serial Port Profile)
 - HID (Human Interface Device)

- Communication Configuration

- Support N(1 to 7) Piconet (s).
 - After connecting to the piconet, it shifts from master to slave.

- Operation Mode in Connection

- Master: OPN-2002
 - Slave: other Bluetooth devices

- Low Power Mode

- Sniff mode

- Security and Encryption

- Security and encryption settings are available.

10. Serial Number

The serial number is stated on a serial label shown below.

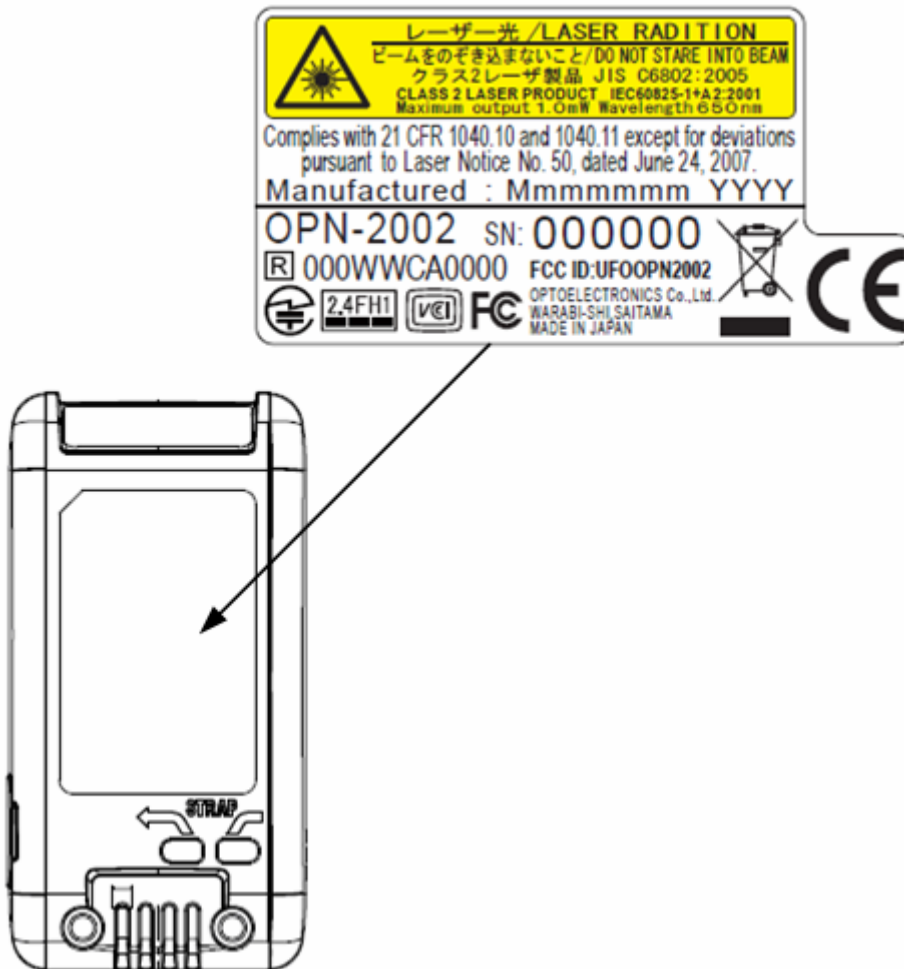


Figure: Serial Number

11. Packaging Specifications

11-1. Single Packaging Specifications

Put the OPN-2002 data collector in protective foamed bag and put it in the individual packaging box.

Dimensions of protective foamed bag: (W) 60mm x (D) 135mm

11-2. Collective Packaging Specifications

Put 100 individually packaged OPN-2002 in a collective packaging box.

(1 tray can hold 10pcs of the OPN-2002)

Dimensions (Assembled State): (W) 470 mm x (D) 350 mm x (H) 335 mm (inside dimensions)

Note: The 'Ro' mark on the inner and outer packaging indicates that this product does not use any materials, components or parts that are restricted under RoHS standards (the restriction of the use of certain hazardous substances in electrical and electronic equipment, 2002/95/EC). This is an internal determination by Optoelectronics and carries no legal weight in the EU.

12. Durability

12-1. Ambient Light Immunity

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

Incandescent: 3,000 lx

Fluorescent: 3,000 lx

Sunlight: 50,000 lx

<Conditions>

Barcode sample: Optoelectronics test sample

PCS = 0.9, Resolution = 0.25 mm, Symbology = 9-digit Code-39, Quiet zone = 10 mm,

N/W ratio = 1:2.5

Distance: 100 mm from the front edge of the data collector

Angle: $\alpha = 0^\circ$, $\beta = 15^\circ$, $\gamma = 0^\circ$

Curvature: $R = \infty$

Power supply voltage: 3.7V

Performance is guaranteed unless direct light or direct reflection from a light source falls on the area within which the OPN-2002 detects light.

12-2. Dust and Water Proof

IP42

12-3. Vibration Test (Without Packaging)

There was no sign of malfunction with the data collector's exterior appearance or its operation after the following vibration test: In the non-operating state, increased the frequency of the vibration from 10 Hz to 100 Hz with accelerated velocity 2.0 G (19.6 m/s²) for over 30 minutes (60 minutes for one cycle). Repeat this routine for X, Y and Z direction, respectively.

12-4. Vibration Test (With Collective Packaging)

There was no sign of malfunction with the data collector's exterior appearance or its operation after the following vibration test: With the collective packaging, increased the frequency of the vibration from 10 Hz to 100 Hz with accelerated velocity 2.0 G (19.6 m/s²) for over 30 minutes (60 minutes for one cycle). Repeat this routine for X, Y and Z direction, respectively.

12-5. Product Drop Test (Without Packaging)

No malfunction should occur after the following drop test.

As shown below, drop the data collector from 120cm above the concrete floor. (three times from each of its 6 sides)

12-6. Collective Package Drop Test

No malfunction should occur after the following drop test.

Drop the collective package box from 70cm above the concrete floor once its one corner, three edges and six sides.

12-7. Static Electricity

Air discharge: 8kV max (No malfunction)

15kV max (No destruction)

Contact discharge: 4kV max (No malfunction) (Discharge point: Screws which fix cases)

10kV max (No destruction)

Measurement environment: Use electrostatic testing device compliant with IEC61000-4-2

Discharge resistance: 330Ω

Capacitor charging: 150pF

12-8. Reliability

MTBF: 10,000 hours

13. Warranty

13-1. Warranty period

OPTOELECTRONICS Co., Ltd. warrants that this product is free of defects or malfunctions for a period of twelve (12) months from its shipment. In case of having defects or malfunctions caused by normal usage in accordance with this specification during the foregoing warranty period, OPTOELECTRONICS shall repair or adjust the product free of charge.

Any repair or replacement of the product after the foregoing warranty period shall be charged at regular repair rates.

If defects or malfunctions were caused by customer mishandling, product repairs or replacement will be charged at regular repair rates, even during the foregoing warranty period.

13-2. Delivery

Products for maintenance or repair shall be sent back to OPTOELECTRONICS. The sender is responsible for all shipping costs.

13-3. Repair Timeframe

Repaired products shall be shipped back to the customer within 20 days after acceptance by OPTOELECTRONICS.

Expedited repairs may be available, subject to terms agreed to by OPTOELECTRONICS and the customer.

13-4. Maintenance Period

The maintenance period of this product is 5 years after its shipment.

OPTOELECTRONICS may discontinue maintenance for this product during the 5-year maintenance period if a satisfactory replacement product or maintenance solution is agreed to.

13-5. Other

Any additional warranty issues must be discussed with OPTOELECTRONICS on a case-by-case basis.

14. Regulatory Compliance

14-1. Laser Safety

JIS C 6802:2005 Class 2

IEC60825-1+A2:2001 Class 2

CDRH Class II

14-2. Product Safety

IEC60950

EN60950

14-3. EMC

EN55022

EN55024

FCC Part15 Subpart B, and Subpart C

Federal Communications Commission Notices

This product 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.

Harmful Interference Notice

This product has been tested and complies with the specifications 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 according to 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 is found 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 or devices
- Connect the equipment to an outlet other than the receiver's
- Consult a dealer or an experienced radio/TV technician for assistance

Changes or modifications to this equipment that have not been approved by Ruckus Wireless may void the user's authority to operate this equipment.

VCCI Class B

This is a Class B product, to be used in a domestic environment, based on the Technical Requirement of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference.

14-3. Others

Radio Law 38-24-1

Bluetooth Logo certified

15. Reduction of Environmental Loads

The OPN-2002 is a RoHS compliant product.

RoHS: The restriction of the use of certain hazardous substances in electrical and electronic equipment, 2002/95/EC.

16. Precautions

16-1. Laser-related Caution



Please do not look directly at the laser.

Please do not point the laser at others' eyes.

Please do not look directly at the beam of optical instruments.

These things have the potential to damage your eyes.

16-2. Handling

Handle this product carefully. Do not subject it to any of the following:

(1) Shock

Do not drop this device from a height greater than specified in this manual.

Do not swing around the cable.

Do not put heavy items on the cable.

(2) Temperature Conditions

Do not use the device at temperatures outside the specified range.

Do not pour boiling water on the device.

Do not expose the device to open flame.

Do not bend the cable at temperatures lower than the specified range.

(3) Foreign Materials

Do not put the device in water.

Do not expose the device to chemicals.

(4) Other

Do not plug/unplug the connectors before the power is disconnected.

Insert the USB connector correctly.

Do not disassemble this product.

Do not use the data collector near a radio or a TV receiver. It may cause reception problems.

The data collector may be damaged by voltage drops caused by lightning.

The data collector may not perform properly in environments when placed near a flickering light, such as a CRT (computer monitor, television, etc.).

16-3. Bluetooth

- Bluetooth is trademark owned by Bluetooth SIG, Inc., U.S.A. and licensed to OPTOELECTRONICS.
- OPN-2002 supports Bluetooth wireless communication with other Bluetooth device which has the same profile.
- OPN-2002 complies with Bluetooth Ver. 1.2. However, its communication performance with equipments other than cradles or devices stated in this manual is not guaranteed.
- The frequency band (2.4 GHz) which is used by Bluetooth devices is also used by miscellaneous other equipments. The baud rate or the communication range of OPN-2002 may be degraded by the negative impacts of those other equipment.
- The baud rate or the communication range of OPN-2002 may be degraded by obstacles, radio wave conditions or the state of the device which OPN-2002 is communicating with.
- Communication performance of OPN-2002 may be degraded when there is a metal item extremely close to the back of the scanner.

16-4. Frequency Band

The frequency band of 2.4 GHz is utilized by this scanner. Read carefully the followings before using this product.

In the frequency band of this scanner, scientific, medical and industrial devices including microwaves are used. Also other radio stations including local private radio station for mobile object identification requiring license for such as manufacturing lines at factories, specific power-saving radio station requiring no license and amateur radio station are managed.

- Please make sure that “other radio stations” are not operated in the frequency band of 2.4 GHz before using this scanner.
- In case that radio interference occurs between this scanner and “other radio stations,” change the service space immediately, or stop transmitting radiowave to avoid the interference.
- If you have any questions or troubles, please contact our marketing group.

Appendix 1: Mechanical Drawing

Dimensions: 62.0(D) × 32.0(W) × 16.0(H) (mm)

