

OPN 2001

Data Collector

OPTICON

Specifications Manual



All information subject to change without notice.

Document History

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1. Abstract

This manual provides specifications for the OPN 2001 compact data collector.

2. Overview

The OPN 2001 is a compact and cordless laser scanner that outputs all stored data through a USB interface. It has a 150 mAh lithium-ion battery that is charged via the USB interface.

3. Physical Features

3.1. Dimensions

W 32.0 x D 62.0 x H 16.0 mm

3.2. Weight

28 g max.

4. Environmental Specifications

4.1. Operating Temperature and Humidity

Temperature: 0 to 40 °C

Humidity: 20 to 85%

4.2. Storage Temperature and Humidity

Temperature: -20 to 60 °C

Humidity: 20 to 90%

4.3. Ambient Light Immunity

Decoding performance is guaranteed when the range of illumination on a barcode surface is between zero and the following values:

Incandescent light	to 3,000 lx
Fluorescent light	to 3,000 lx
Sunlight	to 50,000 lx

5. Electrical Specifications

5.1. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power supply voltage (V_{DD} to GND)	V_{DD}	-0.3 to 6.5	V
Input voltage	V_{IN}	-0.5 to $V_{DD} + 0.5$	V
Power ripple		0.1 V p-p (10-100 kHz)	V

5.2. Recommended Operating Conditions

Item	Symbol	Conditions	Min	Typ	Max	Unit
Power supply voltage	V_{DD}	Battery	3.1	-	4.2	V
		USB	4.5	5.0	5.5	V
Input voltage	V_{in}		0	-	V_{DD}	V

5.3. Electrical Characteristics

Parameter	During	Symbol	Min	Typ	Max	Unit
Operating current *	Scanning	I_{OP}	93	96	150	mA
	Communicating	I_{com}	41	43	45	mA
	Standby	I_{PRE}	24	25	26	mA
	Charging	I_{CHG1}	106	113	120	mA
When OFF		I_{off}	17	18	19	μ A
Battery specifications	Voltage between terminals	V_{BAT}	2.75	3.7	4.2	V
	Rated capacity		140	150	-	mAh
	Charging current	I_{CHG2}	59	66	73	mA
	Charging time	T_{chg}	-	-	2.5	hour
	Scans when fully charged **		1000	-	-	times
Startup time		T_d	-	50	-	ms

Conditions

- Connect 1 Ω resistance to a 3.7 volt power supply line in series and measure the current by the voltage between both ends of resistance.
- Power supply voltage is measured at the terminal of the secondary battery.
- The operating current specifications for power charging or communicating are described based on the power current from the USB interface.
- The number of scans when fully charged is determined based on a scanning operation where the laser beam is on for 4 seconds and the lighting LED is on for 1 second per scan.

6. Optical Specifications

Parameter	Specification	Unit
Light source	Red laser diode	-
Emission wavelength	650 \pm 10 (25° C)	nm
Light output	1.0 or less	mW
Scanning method	Bi-directional scanning	-
Scanning speed	100 \pm 20	scans/s
Scan angle	Scan angle: 54 \pm 5	°
	Read angle: 44 (Min)	°

7. Technical Specifications

The conditions for technical specifications are as follows, unless otherwise specified in each section.

Conditions

Ambient temperature and humidity	21° C/70° F, 60% RH
Ambient light	500 to 900 lx
Background	Barcode = black
	Space = white
	Margin = white
	Background of label = black
Power supply voltage	3.7 V
Decoding test	Approve the performance when decoding is successful in all ten tests. (Decoding is deemed successful when completed in 0.5 seconds or less.)

7.1. Print Contrast Signal (PCS)

0.45 or higher (over 70% of reflectivity of space and quiet zone).

7.2. Scan Area and Resolution

The depth of field is measured from the edge of the data collector. The scan area is a circular area centered on the beam, which appears at various resolutions.

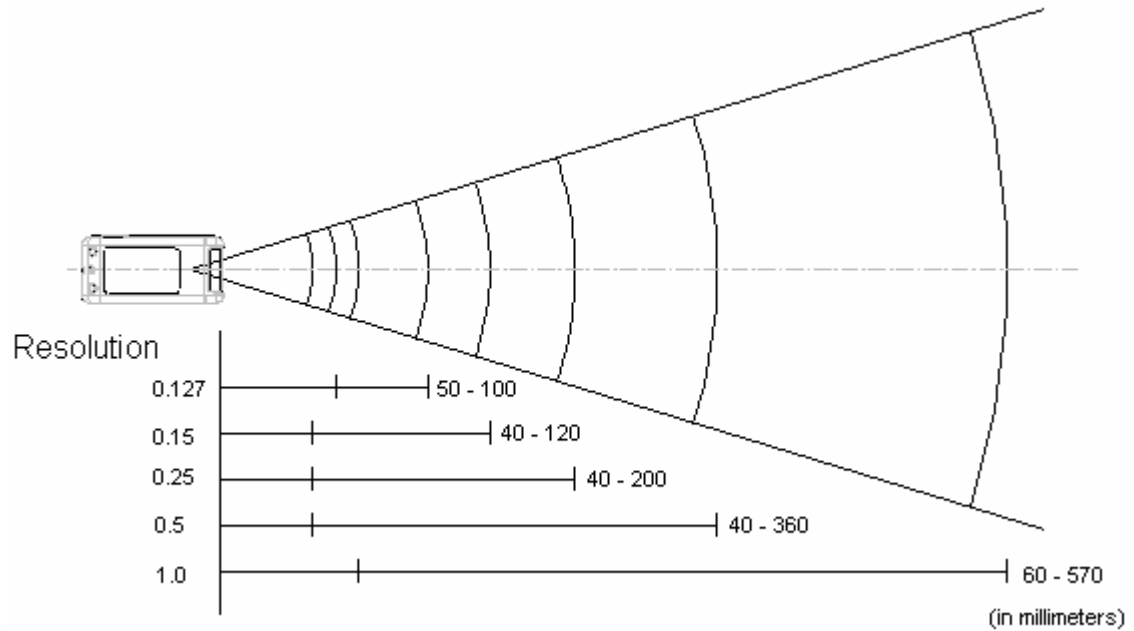


Figure 1: The depth of a decoding field measured from the edge of the data collector.

Resolution	Depth of Field (mm)	Symbology	PCS	Quiet Zone	Digit
1.0 mm	60 to 570	Code 39	0.9	25 mm	1
0.5 mm	40 to 360	Code 39	0.9	18 mm	3
0.25 mm	40 to 220	Code 39	0.9	10 mm	8
0.15 mm	40 to 120	Code 39	0.9	7 mm	10
0.127 mm	50 to 110	Code 39	0.9	5 mm	4

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

N/W Ratio: 1:2.5
 Angle: $\alpha = 0^\circ$, $\beta = 15^\circ$, $\gamma = 0^\circ$
 Curvature: $R = \infty$

7.3. Pitch, Skew, and Tilt

7.3.1. Pitch Angle

$$\alpha = \pm 30^\circ$$

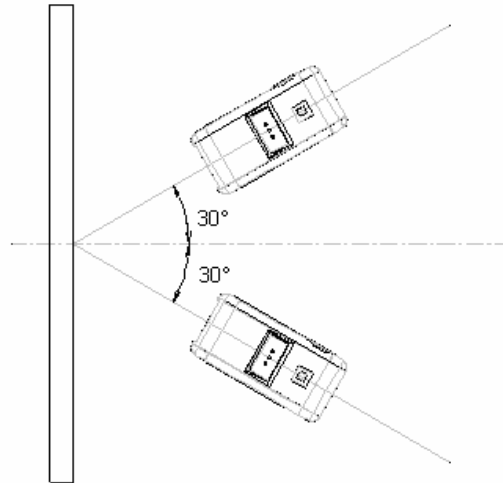


Figure 2: Pitch

7.3.2. Skew Angle and Dead Zone

Skew angle: $\beta = \pm 50^\circ$ (Excluding dead zone)

Dead zone: $\beta = \pm 8^\circ$ (There are some areas in which decoding fails due to specular reflection)

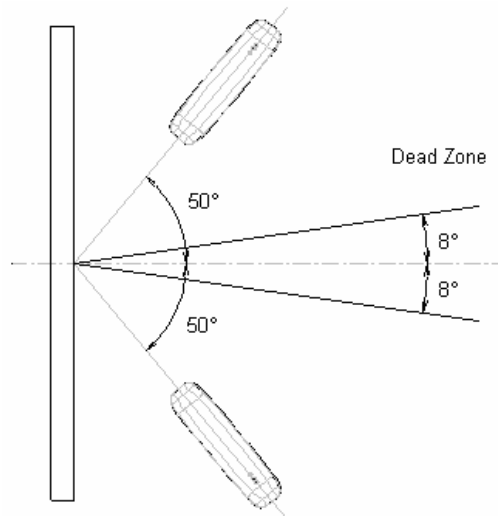


Figure 3: Skew and dead zone

7.3.3. Tilt Angle

$$\gamma = \pm 20^\circ$$

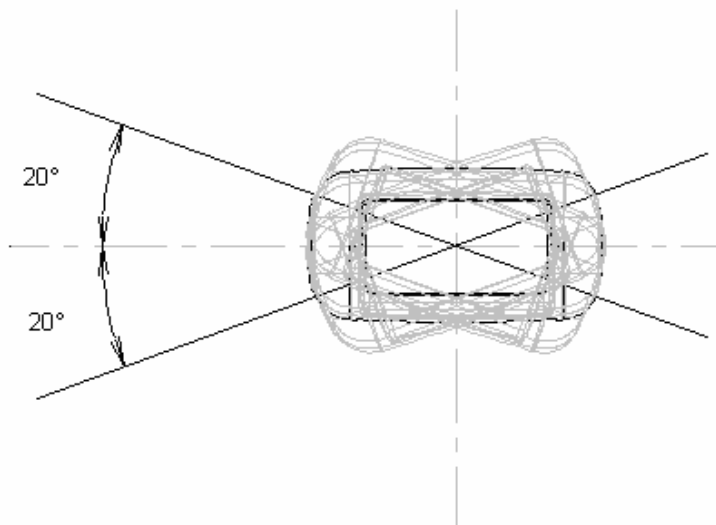


Figure 4: Tilt angle

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

Distance	100 mm from the edge of the data collector
Label	Pitch, Skew Angle, Dead Zone PCS = 0.9, Resolution = 0.25mm, 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
Pitch	Skew Angle: $\beta = +15^\circ$, Tilt Angle: $\gamma = 0^\circ$
Skew	Pitch Angle: $\alpha = 0^\circ$, Tilt Angle: $\gamma = 0^\circ$
Tilt	Pitch Angle: $\alpha = 0^\circ$, Skew Angle: $\beta = +15^\circ$
Curvature	$R = \infty$

7.4. Curvature

With 8-digit JAN/UPC/EAN barcodes, decoding performance is guaranteed when $R \geq 15$ mm.

With 13-digit JAN/UPC/EAN barcodes, decoding performance is guaranteed when $R \geq 20$ mm.

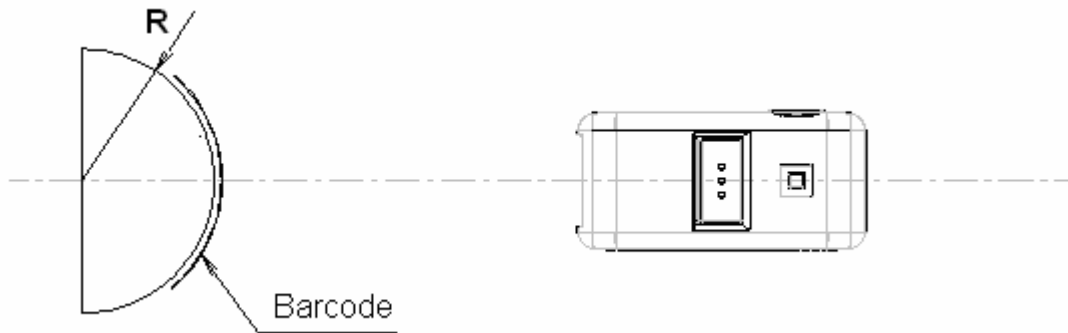


Figure 5: Curvature

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm	
Distance:	100 mm from the edge of the data collector
Angle:	Skew Angle $\beta = +15^\circ$

8. Interface Specifications

8.1. USB Interface Specifications

8.1.1. Settings

The interface is full-speed USB.

8.1.2. Cable

Cable with PC connector.

8.1.3. Connector

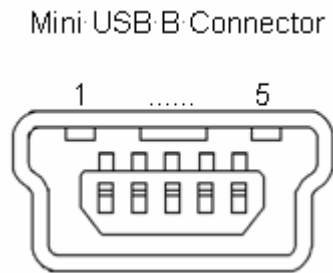


Figure 6: USB B connector

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

8.1.4. Interface Circuit

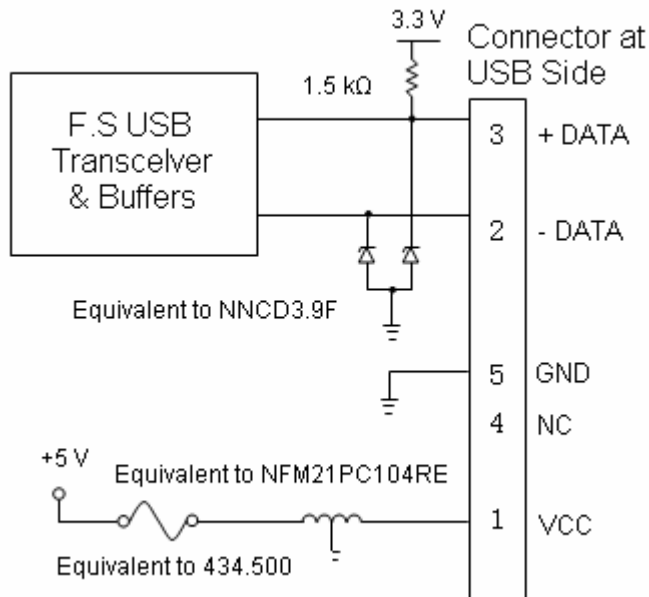


Figure 7: Interface circuit

9. Basic Operations

9.1. Scanning Barcodes and Storing Scanned Data

Press the scan button and the scanning operation starts.

If the scanned data is stored successfully, the green LED will light and the buzzer will sound.

If the data collector fails to store data due to a shortage of memory capacity, the red LED will light and the buzzer will sound.

9.2. Deleting Stored Barcode Data from a Single Barcode

To delete stored barcode data from one barcode, press the clear button and scan the same barcode again.

If the scanned data is deleted successfully, the orange LED will light and the buzzer will sound.

If all stored barcode data is deleted by mistake, or if there is no stored data, the red LED will light and the buzzer will sound.

To delete all stored barcode data, you can also use the computer application.

9.3. Deleting All Stored Barcode Data

Press and hold down the clear button for 6 seconds and all stored barcode data will be deleted.

9.4. Uploading

Connect the OPN 2001 to the PC via the USB interface and use a designated application on the PC to upload.

9.5. Buzzer Control

Press and hold down the scan button for 10 seconds to disable the buzzer.

Press and hold down the scan button for 10 seconds again to enable the buzzer.

9.6. Power Off

Power gets turned off automatically after the scanning operation.

Power is always turned on while OPN 2001 is connected via USB.

9.7. Initialization (Reset)

Simultaneously press and hold down both the scan button and the clear button for 10 seconds. All settings will be reset to factory defaults.

All stored data will be initialized but the internal clock will operate continuously.

9.8. Buzzer and LED Display

The data collector signals operation status using LED displays and the buzzer.

Status		Color	Display	Status	Buzzer
Scan Barcode		Green	Light	Successful scanning or data saving	Yes
		Red	Light	Unsuccessful data saving	Yes
Delete Stored Data		Orange	Light	Successful deleting of stored data	Yes
		Red	Light	No stored data to delete	Yes
Connect USB	Comm.	—	—	Successful reception of command	Yes
		—	—	Disconnected communication	Yes
	Power charge	Red	Light	Charging the battery	No
		Green	Light	Battery fully charged	No

10. Serial Number

The serial number shown below is affixed to the data collector.



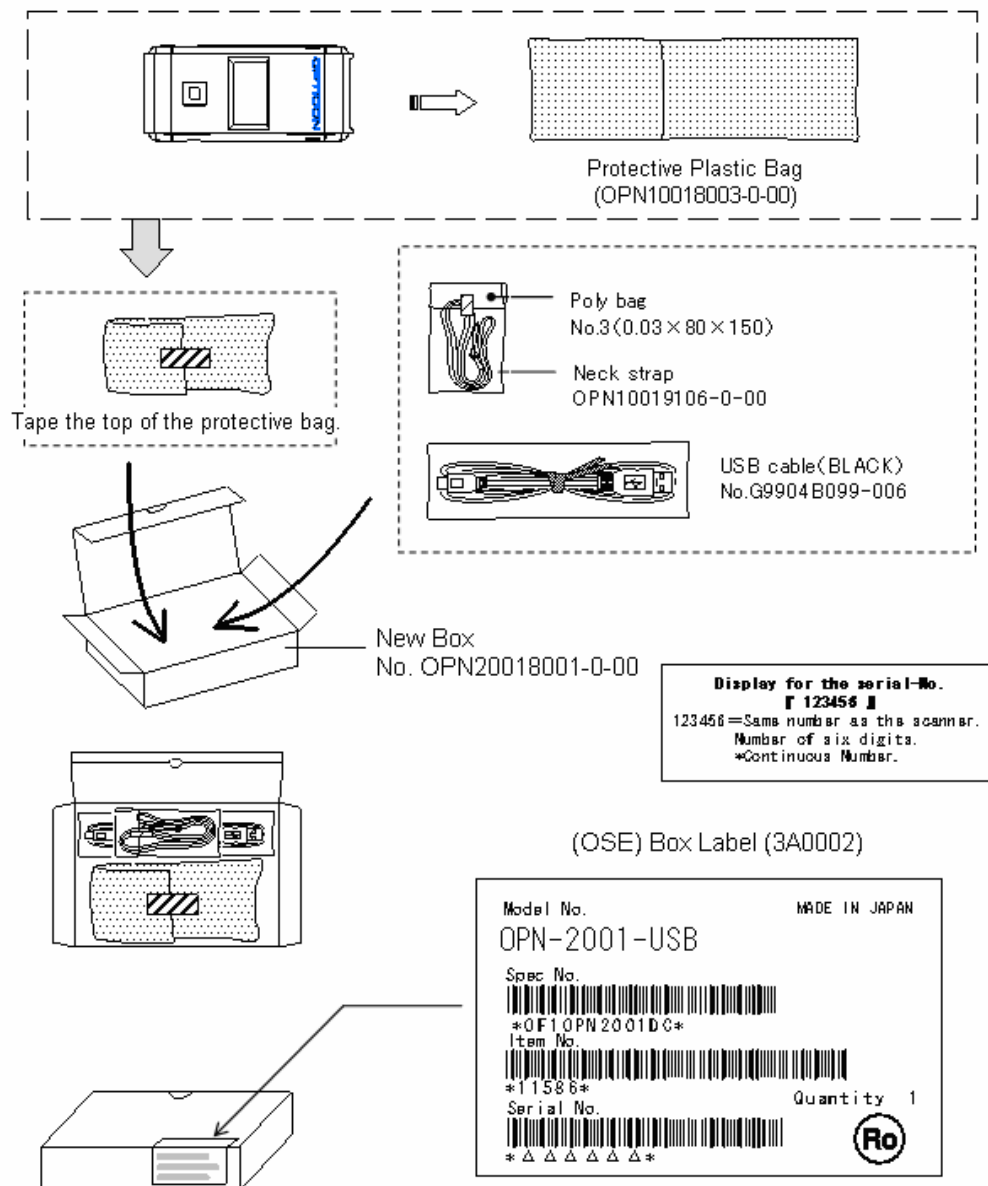
Figure 8: Serial number label

11. Packaging Specifications

11.1. Individual Packaging Specification

Put the OPN 2001 in a protective foam bag and place it in an individual packing box.

Size of the package after assembly: 125 (W) x 112 (D) x 40 (H) mm



Do not fold on the barcode when attaching the label on the corner of box.

Figure 9: Individual packaging

11.2. Collective Packaging Specification

Size of the package after assembly: 595 (W) x 520 (D) x 245 (H) mm

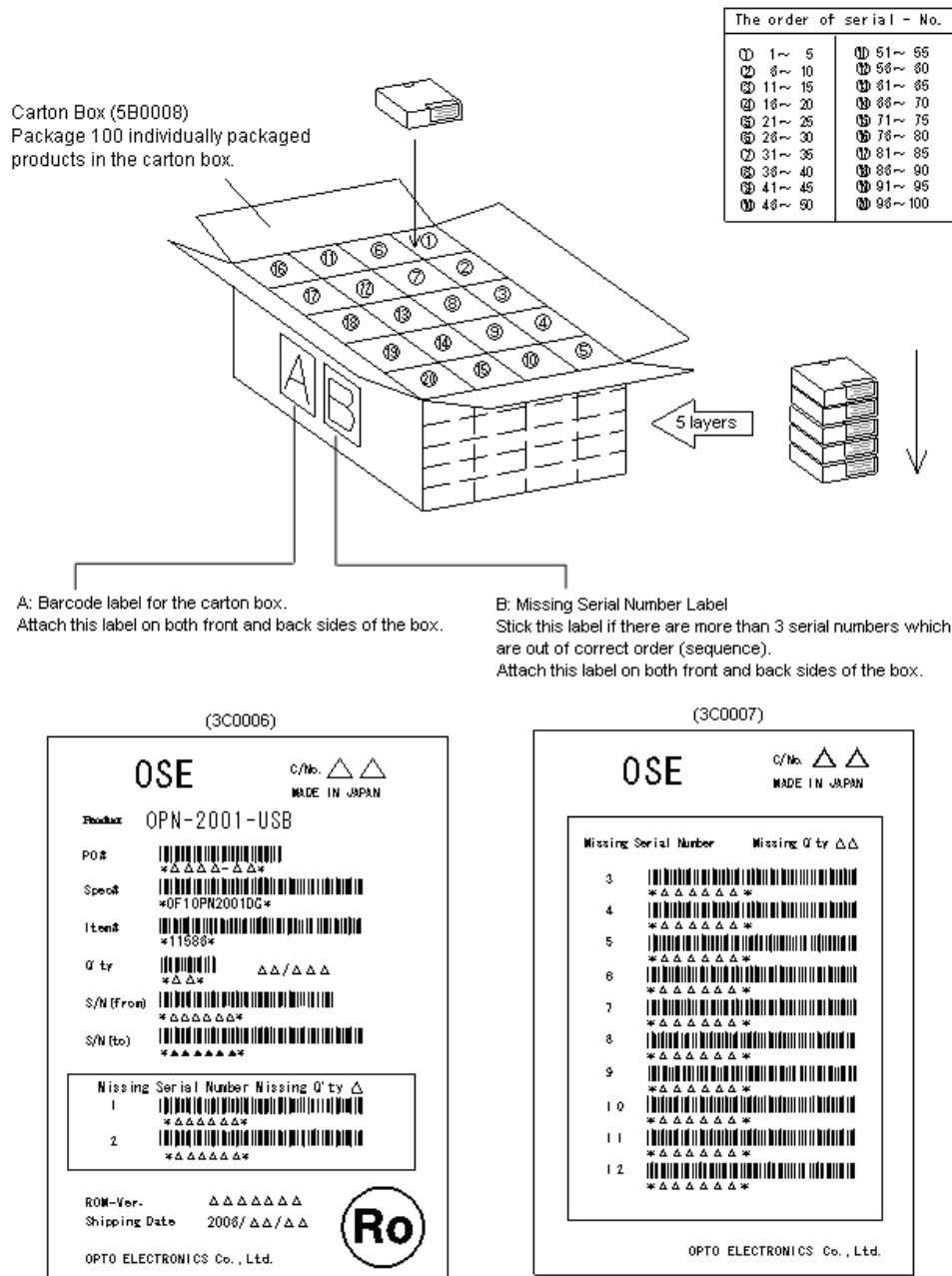


Figure 10: Collective packaging

Note: The “RO” mark labeled on the package tray or package box guarantees that the applicable product has passed our test of RoHS restrictions compliance (the restriction of the use of certain hazardous substances in electrical and electronic equipment, 2002/95 EC). However, this document does **not** have any legal weight in the European Union.

12. Durability

12.1. Shock Test (without packaging)

No malfunction should occur after the following drop test.

Drop Test: Drop the data collector from 0.7 meters onto a concrete floor. The shock test was done 3 times on each of 6 sides (total of 18 times).

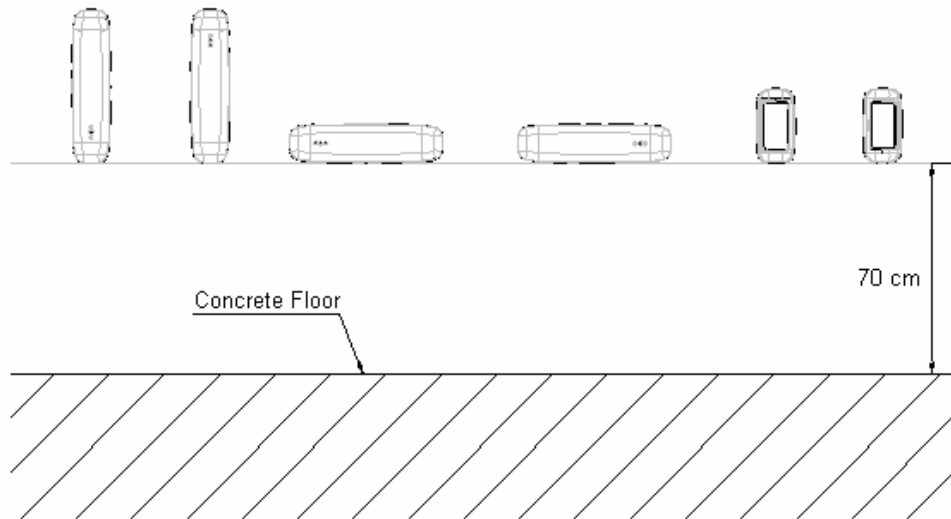


Figure 11: Shock (drop) test

12.2. Shock Test (with individual packaging)

There was no sign of malfunction after the following shock test.

Drop the OPN 2001 on all sides: face, top, bottom, left, right, top-left, top-right, bottom-left and bottom-right from a height of 0.7 meters onto a concrete surface. The shock test was done 10 times in all directions.

12.3. Vibration (without packaging)

No malfunction should occur after the following vibration test.

Vibration Test: Increase the frequency of the vibration from 10 Hz to 100 Hz with accelerated velocity 19.6 m/s² (2G) for 30 minutes in non-operating state. Repeat this routine in each X, Y, Z direction once for 30 minutes each.

12.4. Vibration (with individual packaging)

No malfunction should occur after the following vibration test.

Vibration Test: Put the OPN 2001 in an individual packing box. Increase the frequency of the vibration from 10 Hz to 100 Hz with accelerated velocity 19.6 m/s² (2G) for 30 minutes in a non-operating state. Repeat this routine in each X, Y, Z direction once for 30 minutes each.

12.5. Static Electricity

Air discharge:	8 kV Max. (No malfunction) 15 kV Max. (No destruction)
Contact discharge:	4 kV Max. (No malfunction) [Discharged from the frame of the USB connector.] 10 kV Max. (No destruction)
Measurement environment:	Use electrostatic testing device compliant with IEC 61000-4-2
Discharge resistance:	330 Ω
Capacitor charging:	150 pF

13. Reliability

MTBF (Mean Time Between Failures) of this product is 10,000 hours.

14. Regulatory compliance

14.1. Laser Safety

The data collector emits laser beams.

- JIS C6802: 2005: Laser Class 1
- IEC 825-1/EN 60825-1: Laser Class 1
- FDA CDRH Laser Class I. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50 dated June 24, 2007.

14.2. Product Safety

EN60950-1: 2001

IEC60950-1: 2001

14.3. EMC

EN55022

EN55024

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. Please install and use the equipment according to the instruction manual.

FCC Part 15 Subpart B Class B: 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.

14.4. Compliance to RoHS

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

15. Safety

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

15.1.1. Shock

- Do not throw or drop the data collector.
- Do not place heavy objects on the cables.

15.1.2. Temperature Conditions

- Do not use the data collector at temperatures outside the specified range.
- Do not pour boiling water on the data collector.
- Do not throw the data collector into the fire.
- Do not forcibly bend the cables at low temperatures.

15.1.3. Foreign Materials

- Do not immerse the data collector in liquids.
- Do not subject the data collector to chemicals.

15.1.4. Other

- Do not plug/unplug the connectors before disconnecting the power.
- 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.
- The data collector may not perform properly in environments when placed near a flickering light, such as a computer monitor, television, etc.

16. Mechanical Drawing

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

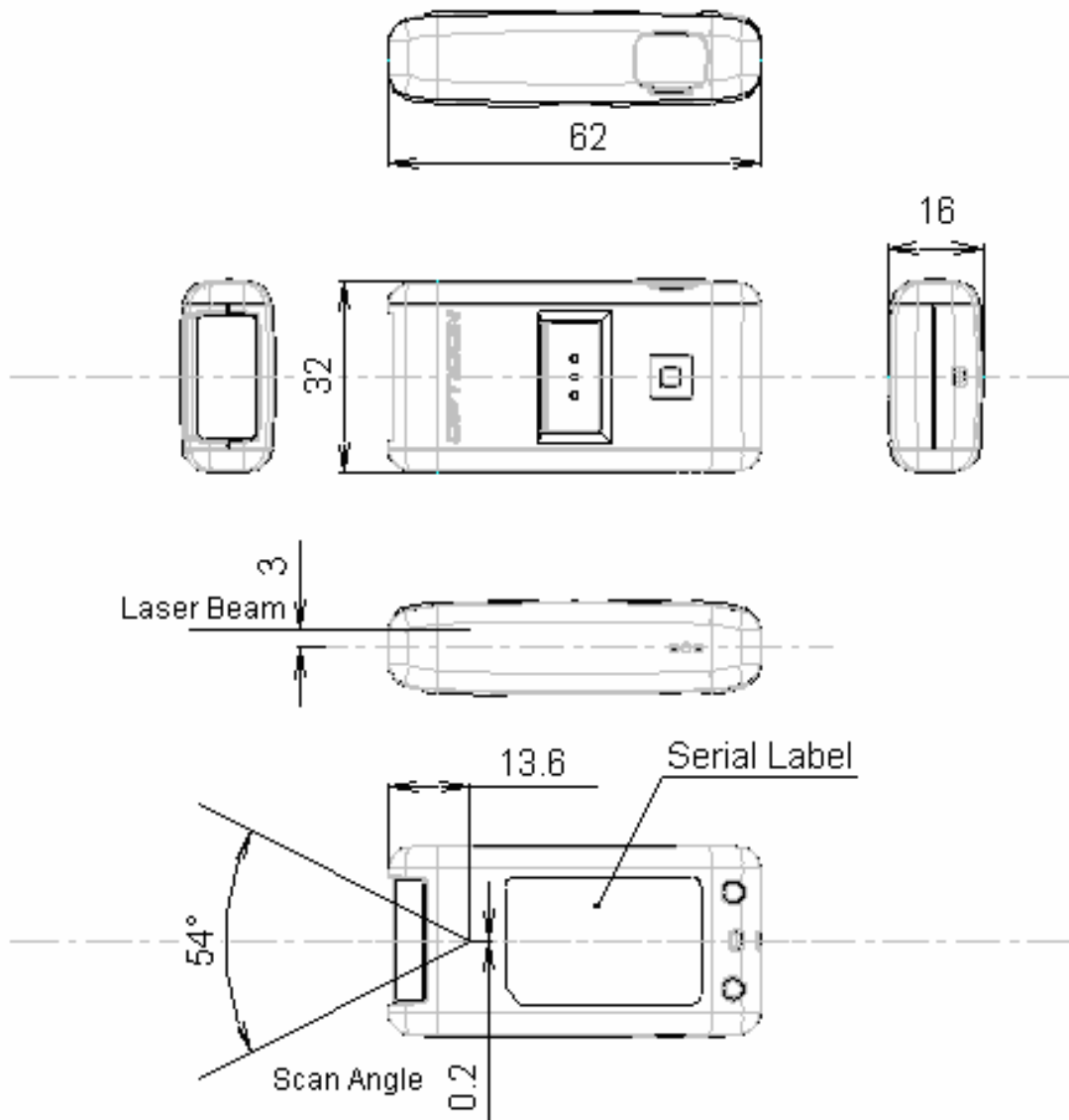


Figure 12: Mechanical drawing