

OPN 2001 TNS

Data Collector

OPTICON

Specifications Manual



All information subject to change without notice.

Document History

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The packing materials are recyclable. We recommend that you save all packing material to use should you need to transport your scanner or send it for service. Damage caused by improper packaging during shipment is not covered by the warranty.

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Contents

1. Abstract	5
2. Overview	5
3. Physical Features	5
3.1. Dimensions	5
3.2. Weight.....	5
4. Environmental Specifications	5
4.1. Operating Temperature and Humidity	5
4.2. Storage Temperature and Humidity.....	5
4.3. Ambient Light Immunity	5
5. Electrical Specifications	6
5.1. Absolute Maximum Ratings	6
5.2. Recommended Operating Conditions.....	6
5.3. Electrical Characteristics	6
6. Optical Specifications	7
7. Technical Specifications	7
7.1. Print Contrast Signal (PCS).....	7
7.2. Scan Area and Resolution	8
7.3. Pitch, Skew, and Tilt	9
7.3.1. Pitch Angle.....	9
7.3.2. Skew Angle and Dead Zone	9
7.3.3. Tilt Angle	10
7.4. Curvature	11
8. Interface Specifications	12
8.1. USB Interface Specifications	12
8.1.1. Settings	12
8.1.2. Cable.....	12
8.1.3. Connector.....	12
8.1.4. Interface Circuit.....	12
9. Basic Operations	13
9.1. Scanning Barcodes and Storing Scanned Data	13
9.2. Deleting Stored Barcode Data from a Single Barcode	13
9.3. Deleting All Stored Barcode Data	13
9.4. Uploading.....	13
9.5. Buzzer Control	13
9.6. Power OFF	13
9.7. Initialization (Reset).....	13

9.8. Buzzer and LED Display	13
10. Serial Number	14
11. Packaging Specifications	15
11.1. Individual Packing Specification	15
11.2. Collective Packing Specification	16
12. Durability	17
12.1. Shock Test (without packaging)	17
12.2. Shock Test (with individual packaging)	17
12.3. Vibration (without packaging)	17
12.4. Vibration (with individual packaging)	17
12.5. Static Electricity	18
13. Reliability	18
14. Regulatory compliance	18
14.1. EMC	18
14.2. Laser Safety	18
14.3. Product Safety	18
14.4. Compliance to RoHS	18
15. Safety	19
15.1.1. Shock	19
15.1.2. Temperature Conditions	19
15.1.3. Foreign Materials	19
15.1.4. Other	19
16. Mechanical Drawing	20

Table of Figures

Figure 1: The depth of a decoding field measured from the edge of the data collector.	8
Figure 2: Pitch	9
Figure 3: Skew and dead zone	9
Figure 4: Tilt angle	10
Figure 5: Curvature	11
Figure 6: USB B connector	12
Figure 7: Interface circuit	12
Figure 8: Serial number label	14
Figure 9: Packaging	15
Figure 10: Packaging	16
Figure 11: Shock (drop) test	17
Figure 12: Mechanical drawing	20

1. Abstract

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

2. Overview

The use of a short-wavelength red laser beam enhances visibility when scanning lines. The OPN 2001 outputs all stored data through a USB interface. It uses a 150-mAh lithium-ion battery as its power source. The battery can be charged through 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±10 (25° C)	nm
Light output	1.0 or less	mW
Scanning method	Bi-directional scanning	-
Scanning speed	100±20	scans/s
Scan angle	Scan angle: 54±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 second 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.

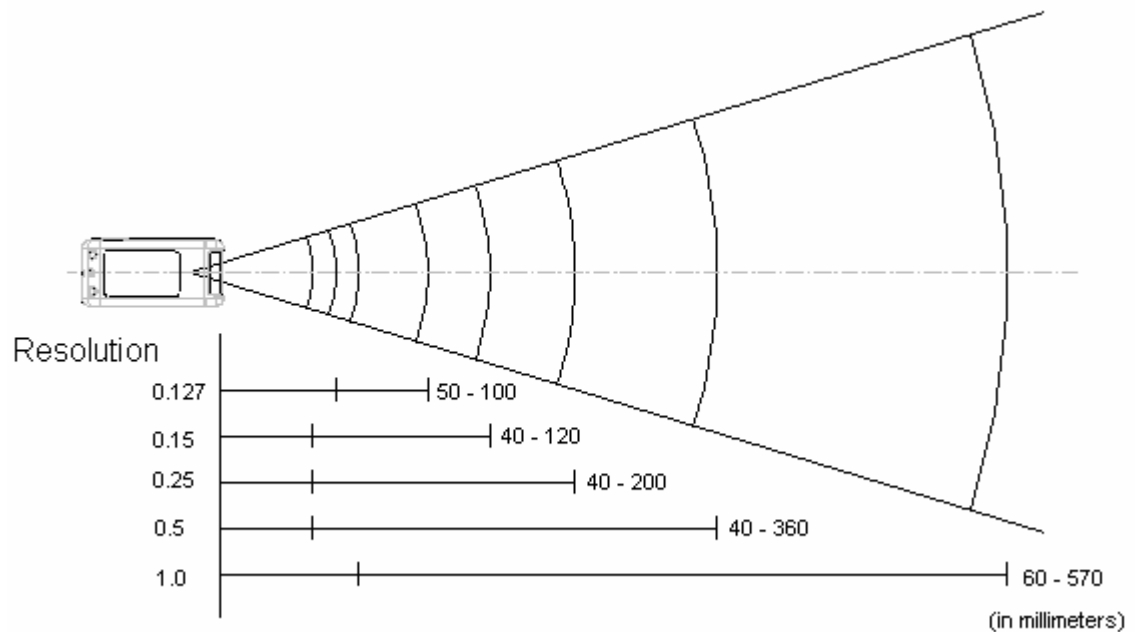


Figure 1: The depth of a decoding field measured from the edge of the data collector.

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

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

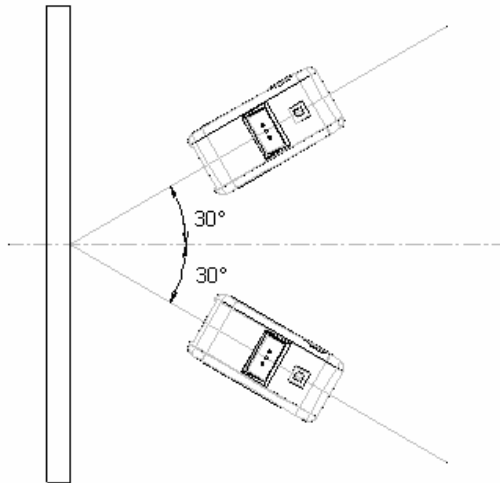


Figure 2: Pitch

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)

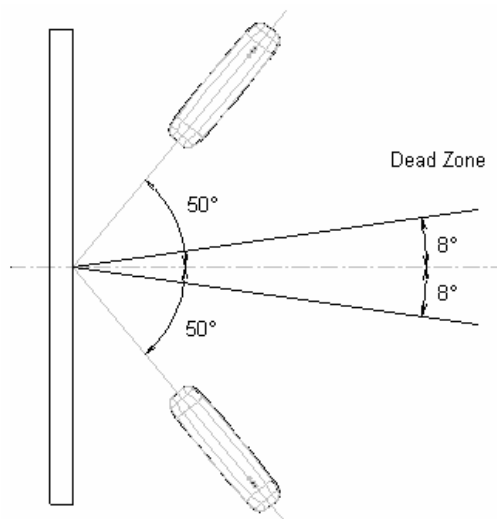


Figure 3: Skew and dead zone

7.3.3. Tilt Angle

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

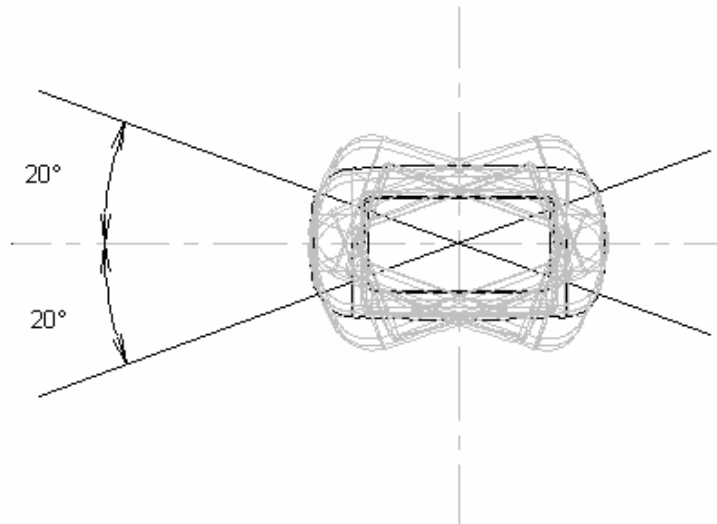


Figure 4: Tilt angle

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 = 0.26mm, 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 EAN barcodes, decoding performance is guaranteed when $R \geq 15\text{mm}$.

With 13-digit EAN barcodes, decoding performance is guaranteed when $R \geq 20\text{mm}$.

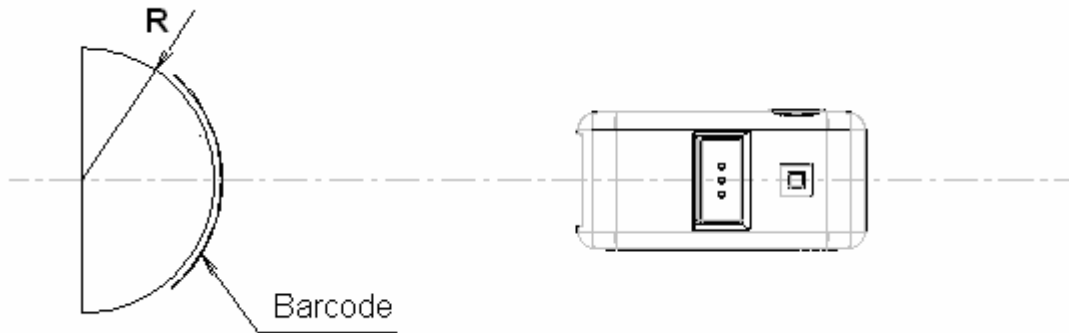


Figure 5: Curvature

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

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

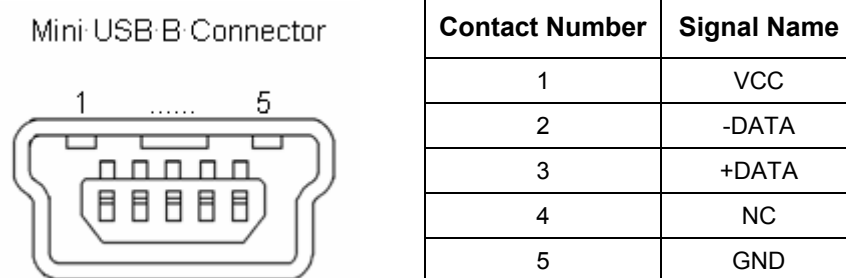


Figure 6: USB B connector

8.1.4. Interface Circuit

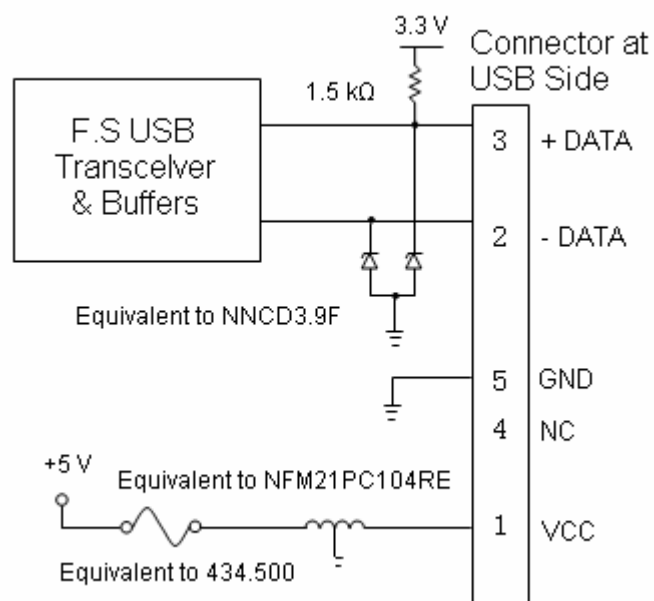


Figure 7: Interface circuit

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 is 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 Packing 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

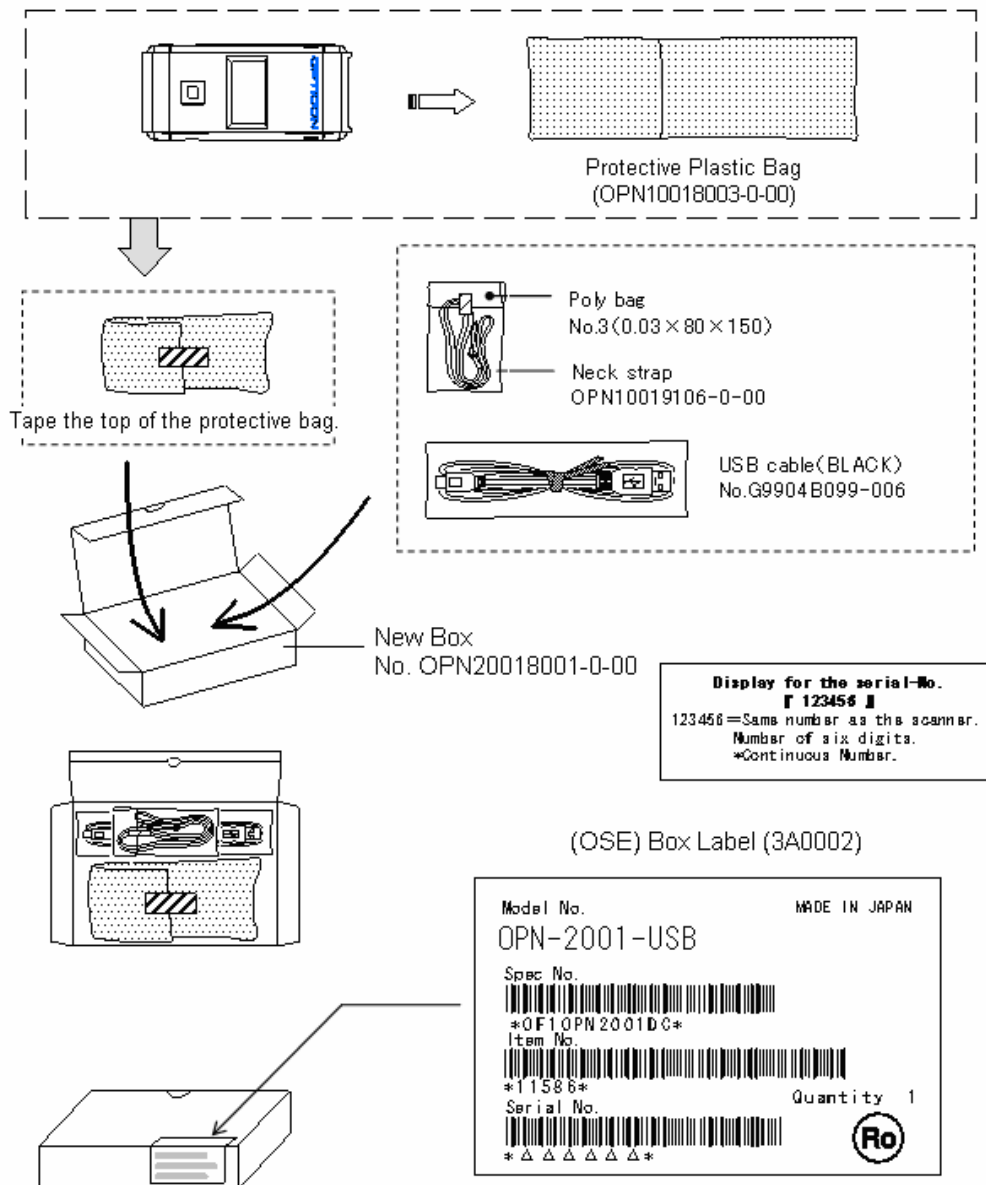


Figure 9: Packaging

11.2. Collective Packing Specification

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

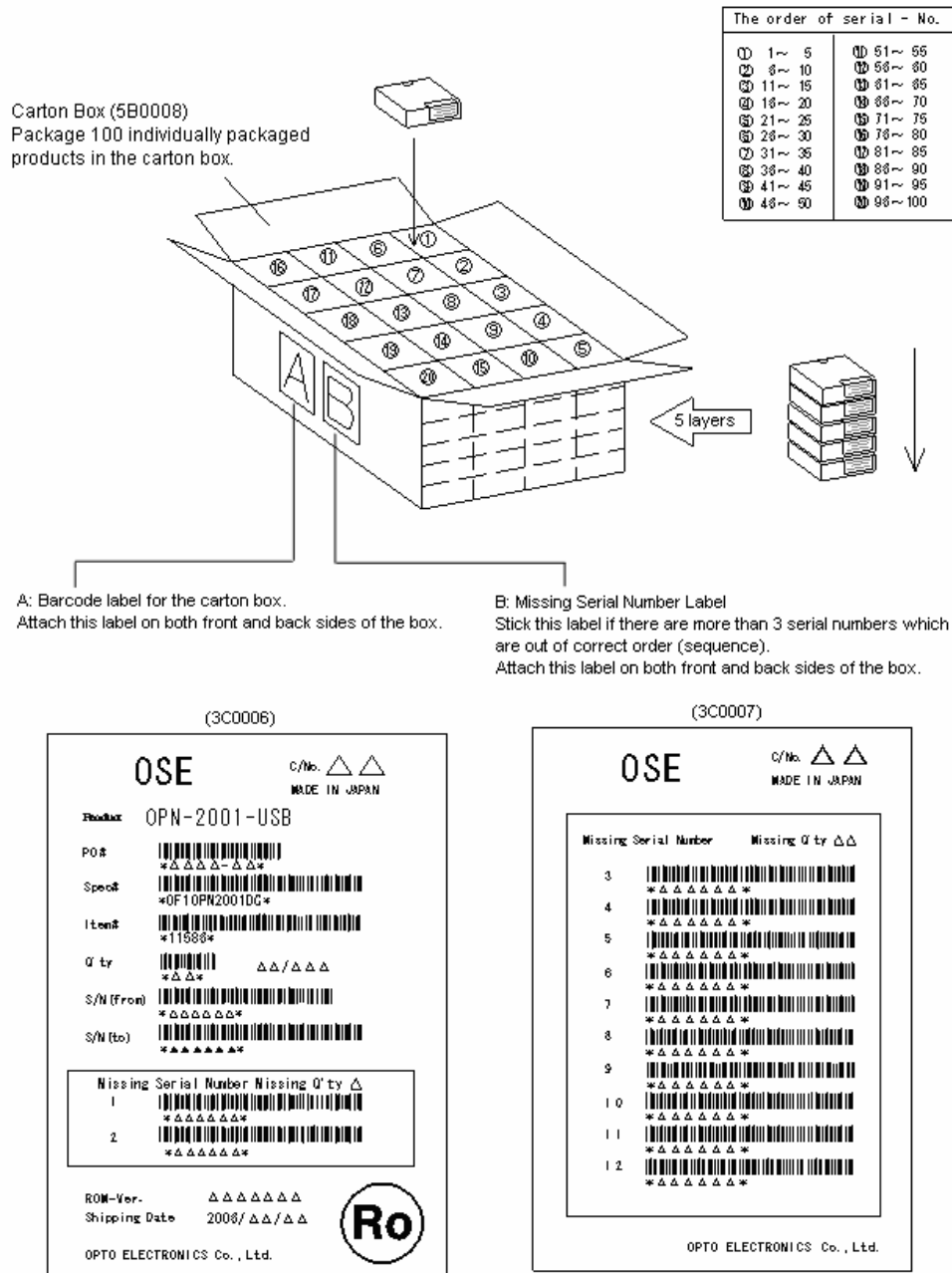


Figure 10: Packaging

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 .7 meters onto a concrete floor. The shock test was done 3 times on each of 6 sides (total of 18 times).

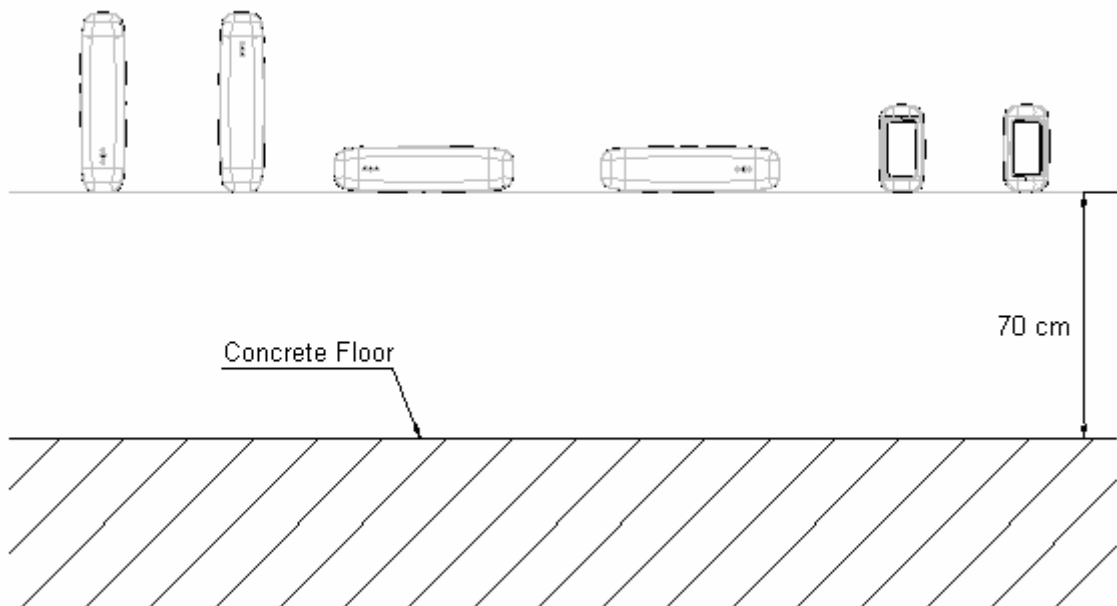


Figure 11: Shock (drop) test

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 10Hz to 100Hz with accelerated velocity 19.6m/s^2 (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 OPN 2001 in an individual packaging box. Increase the frequency of the vibration from 10Hz to 100Hz with accelerated velocity 19.6m/s^2 (2G) for 30 minutes in 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:	330Ω
Capacitor charging:	150pF

13. Reliability

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

14. Regulatory compliance

14.1. 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.

14.2. 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 1. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50 dated July 26, 2001.

Class 1 laser devices are not considered to be hazardous when used for their intended purpose. Avoid staring into the laser beam.

14.3. Product Safety

IEC60950

EN60950

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

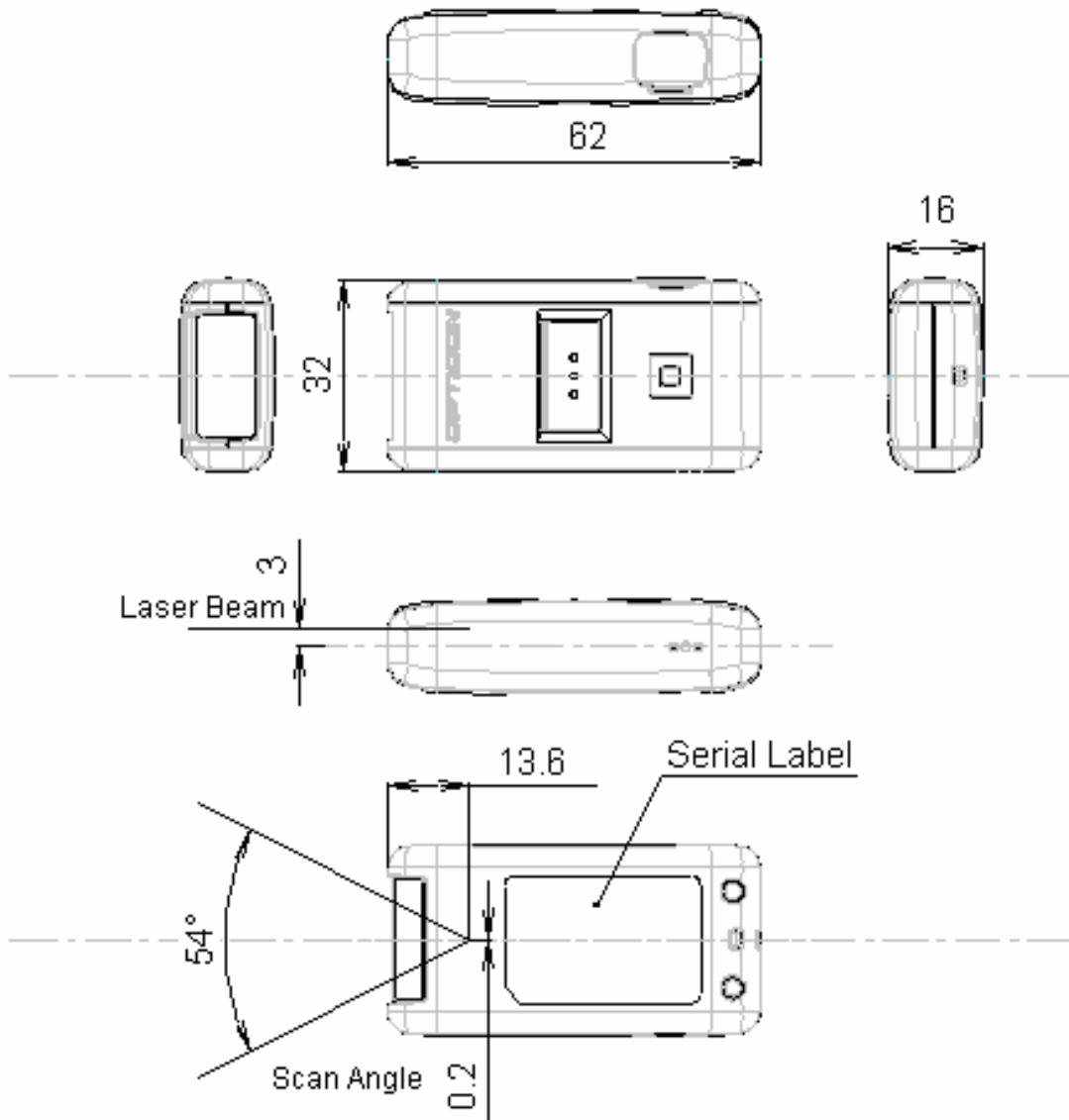


Figure 12: Mechanical drawing