

**OPTICON**

**OPN-2006**



This manual provides specifications for the OPN-2006 ultra compact data collector.

**Specifications Manual**

All information subject to change without notice.

## Document History

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## **1. Abstract**

This manual provides specifications for the OPN-2006 ultra compact data collector.

## **2. Overview**

OPN-2006 has a built in compact laser scanner and scanned barcode data output occurs via USB interface or Bluetooth. This product is compliant with RoHS.

### **2.1. Product / Model Name**

OPN-2006

### **2.2. Features**

- The OPN-2006 is handy and simple data collector.
- Its compact, lightweight design makes it easy to take anywhere.
- Data transmission is performed via Bluetooth or a USB interface.
- Power supply is 3.7V, 240 mAh and lithium-ion polymer battery is used.
- The OPN-2006 is charged from a USB interface of the host computer.

### 3. Basic Specifications

Item	Specification		Remarks
Control Section	CPU	32 bit	
	Clock	96 MHz	
	FROM	512 Kbyte + 32 Kbyte	
	SRAM	96 Kbyte	
Storage	FROM	1 Mbyte	
Input Section	Key type	2 keys: Trigger, Function	
Indication LED	2 multicolor color LEDs (red, green, orange, blue)		
Buzzer	Volume (3 levels), Adjustable tone		
USB	Mini USB ver 1.1		12 Mbps, USB-COM/USB-HID
RTC (clock)	Supported	Year, month, date, hour, minute, second (accuracy: ± 90 seconds per month)	
Power Supply	Main battery	Lithium polymer 240 mAh	
	Continuous operating time	1000 scans or more	Condition: read twice in 10 secs. at room temp.
Scanner (MSL-2001)	Light-emitting element	Red laser diode	
	Laser wavelength / output	650 ±10 nm, up to 1 mW, 25°C	
	Scanning frequency	100 ±20 scan / sec	
	Minimum resolution	0.127mm	
	Scanning distance	60 ~ 250mm	Resolution: 1.0 mm PCS 0.9
	Symbology	JAN, EAN, UPC-A, UPC-E, NW-7 (Codabar), Industrial 2 of 5, Code 11, Code 39, Code 93, Code 128, GS1 Data Bar etc.	
Dimensions	62.0 × 32.0 × 16.0 (DWH mm)		
Weight	Approx. 29 g		
Environmental Specifications	Operating temperature/humidity	0 ~ 40 °C 20 ~ 85 %RH	No frost, no condensation
	Storage temperature/humidity	-20 ~ 60°C 20 ~ 85%RH	No frost, no condensation
Drop Impact Strength (*1)	Frequency	6 faces, 3 cycles	
	Height	150 cm	
	Floor	Concrete	
Regulatory Compliance	Laser safety: IEC60825-1:2007 CE Marking, FCC		

\*1 : Conditions of drop shock resistance  
 - Scratches or whitening on plastic surface shall not be counted as a malfunction.  
 - The product shall work properly after the drop test.

## 4. Detailed View

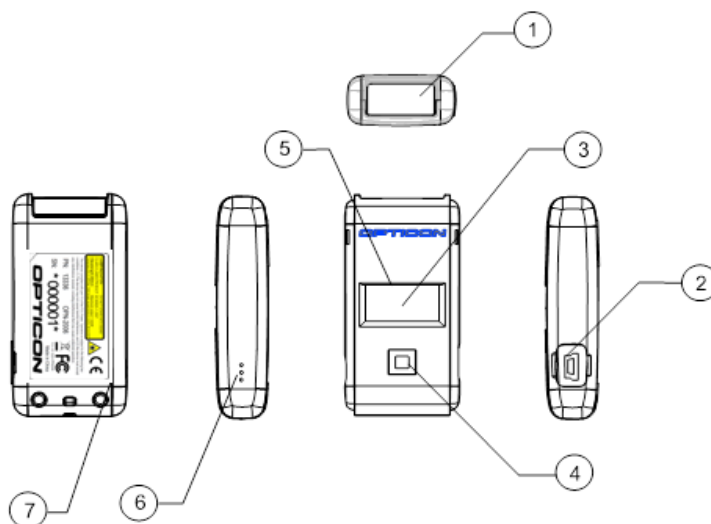


Figure 1: Detailed View

No.	Name	Description
1	Scanning Window	Laser light is emitted through this window to read bar codes.
2	Mini USB connector	Used to connect a dedicated USB cable for charging & data communication
3	Trigger Key	A trigger key used to read bar codes
4	Function Key	A function key that can be configured with application
5	LED	Indicator of operating status, such as bar code reading and warnings
6	Buzzer Hole	Sound from a built-in buzzer comes out through these holes.
7	Strap Hole	A hole to attach a hand strap



## 5. Optical Specifications

### 5.1. Laser Scanning Specifications

Item		Characteristics	Unit
Light-Emitting Element		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/sec
Scan Angle	Scan Angle	54 ±5	deg
	Read angle	44 (Min)	deg

**Notes:**

Refer to “Technical Specifications,” to read about scanning performance.

### 5.2. Laser Scanning Standards

#### 5.2.1. Laser Scanning Tilt

Vertical differences between both ends of a laser scanning line:

- Up to 0.92 degrees in a vertical direction from the scan origin (scanning mirror).
- Up to 2.46 mm measured at 150 mm from the scan origin and with zero skew angle.
- Measured in the middle of the scan line.

#### 5.2.2. Laser Scanning Curvature

The maximum differences between the laser scanning line and a straight line connecting the both ends of the scanning line:

- Up to 1.17 degrees from the scan origin (scanning mirror).
- Up to 3.06 mm measured at 150 mm from the scan origin with zero skew angle.
- Measured in the middle of the scan line.

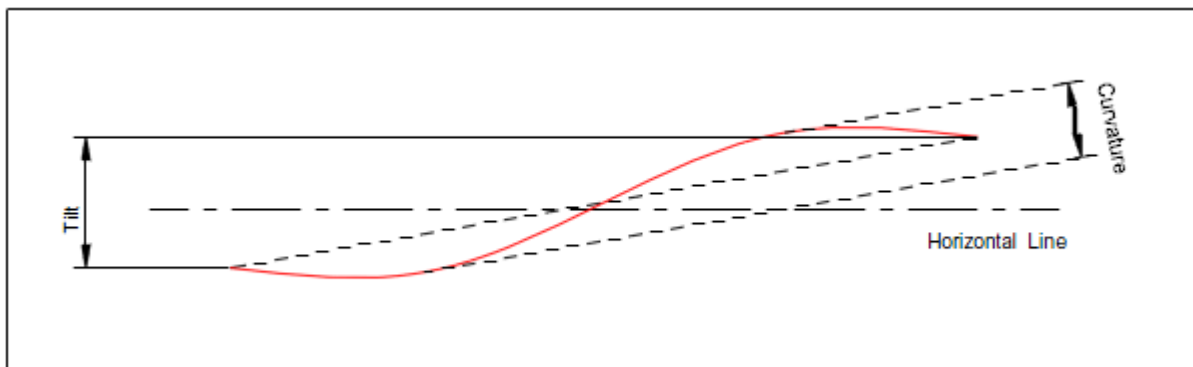


Figure 2: Laser Scanning Tilt and Curvature

## 6. Technical Specifications Barcode Scanner

The conditions are as follows, unless otherwise specified.

### Conditions

Ambient temperature and humidity:	Room temperature (20° C) Room humidity (45% to 85% RH)
Ambient light:	500 to 900 lx
Background:	Barcode = black Space = white Margin = white Background of label = black
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.)

### 6.1. Print Contrast Signal (PCS)

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

$$\text{PCS} = \frac{\text{Reflectance of white bar} - \text{Reflectance of black bar}}{\text{Reflectance of white bar}}$$

### 6.2. Minimum Resolution

0.127 mm

### 6.3. Supported symbologies:

#### Linear (1D)

JAN/UPC/EAN, incl. add-on  
Codabar/NW-7  
Code 11  
Code 39  
Code 93  
Code 128  
GS1-128 (EAN-128)  
GS1 Databar (RSS)  
IATA  
Industrial 2of5  
Interleaved 2of5  
ISBN-ISMN-ISSN  
Matrix 2of5  
MSI/Plessey

S-Code  
Telepen  
Tri-Optic  
UK/Plessey

#### Postal codes (1D)

Chinese Post  
Korean Postal Authority Code

#### 2D codes

GS1 Composite Codes

### 6.4. Scan Area and Depth of Field

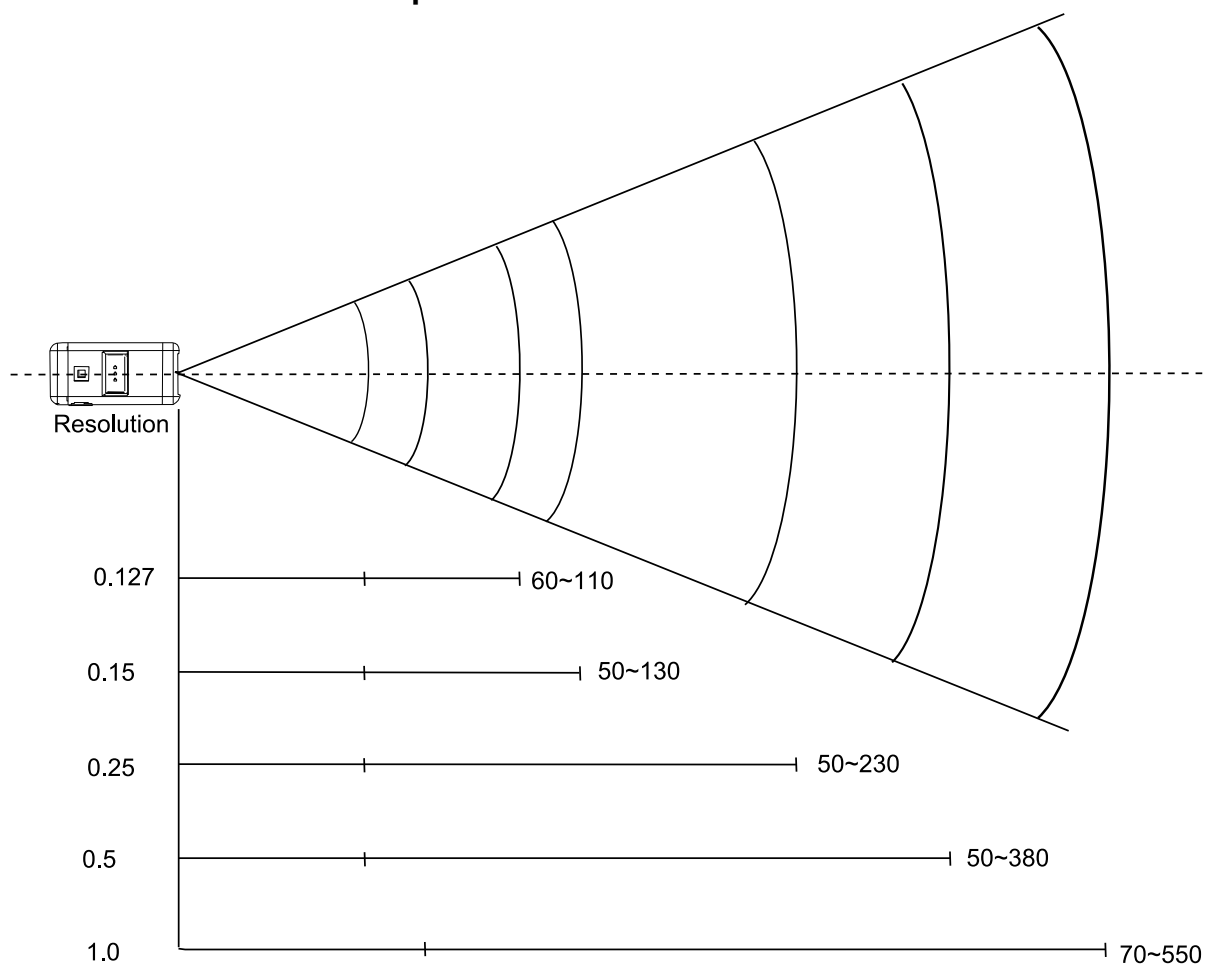


Figure 3: Scan Range and Depth of Field

Resolution	Symbology	PCS	Quiet Zone	No. of Digits
1.0 mm	Code 39	0.9	25 mm	1
0.5 mm	Code 39	0.9	18 mm	3
0.25 mm	Code 39	0.9	10 mm	8
0.15 mm	Code 39	0.9	7 mm	10
0.127 mm	Code 39	0.9	5 mm	4

<Conditions>

Bar Code Sample : Optoelectronics Test Chart, N/W ratio = 1:2.5  
 Angle :  $\alpha = 0^\circ$   $\beta = 15^\circ$   $\gamma = 0^\circ$   
 Curvature :  $R = \infty$

## 6.5. Pitch, Skew, and Tilt

Pitch	: $\alpha \cong \pm 35^\circ$
Skew	: $\beta \cong \pm 50^\circ$ (Excluding dead zone)
Dead Zone	: $\beta \cong \pm 8^\circ$ (Decoding may fail in some areas as a result of specular reflection)
Tilt	: $\gamma \cong \pm 20^\circ$

### Conditions

Bar Code Sample	Optoelectronics Test Sample
Distance	110 mm from the edge of the OPN-2006
	<Pitch, Skew and Dead Zone>
	PCS 0.9, Resolution 0.25 mm, 9-digit Code 39,
	Quiet Zone 10 mm, N/W Ratio = 1 : 2.5
	<Tilt>
	PCS 0.9, Resolution 0.5 mm, 3-digit Code 39, Quiet Zone 15 mm
Angle	Pitch and Tilt angles calculated with Skew angle $\beta = +15^\circ$
	Skew angle / Dead zone: $\alpha = 0^\circ, \gamma = 0^\circ$
Curvature	$R = \infty$

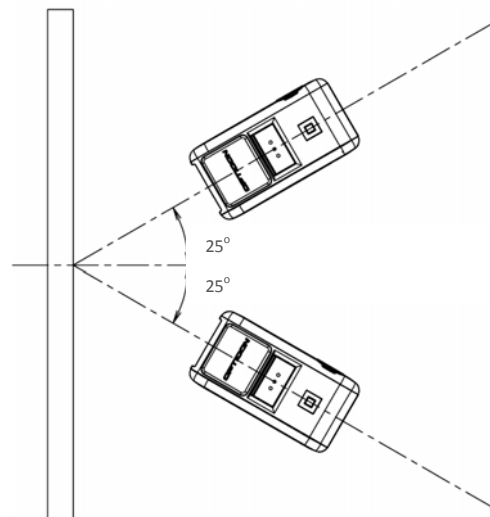


Figure 4: Pitch

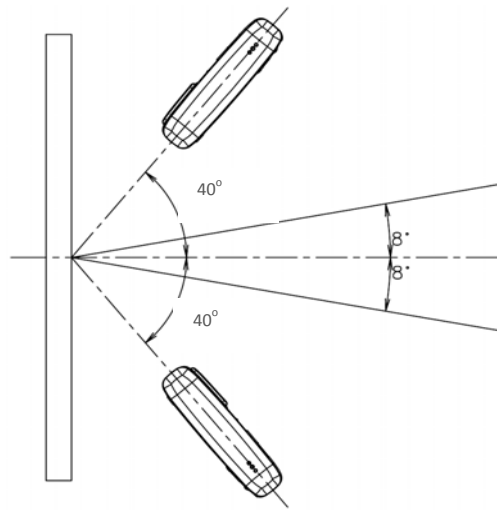


Figure 5: Skew

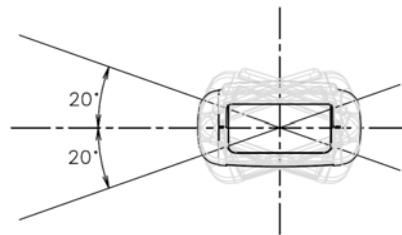


Figure 6: Tilt

### 6.6. 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

**Conditions**

Bar Code Sample	Optoelectronics Test Sample
	PCS 0.9, Resolution 0.26 mm, Quiet Zone 10 mm
Distance	110 mm from the edge of the scanner
Angle	Skew angle $\beta = +15$

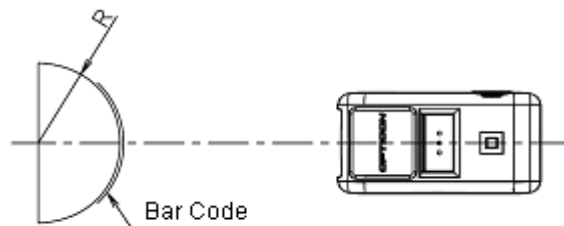


Figure 7: Curvature

## 7. Interface Specifications

### 7.1. USB

#### 7.1.1. Settings

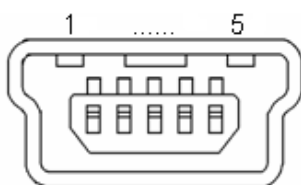
The interface is full-speed USB.

#### 7.1.2. Cable

Dedicated cable with PC connector is provided.

#### 7.1.3. Connector

Mini-USB B Connector



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

Figure 8: USB B connector

#### 7.1.4. Interface Circuit

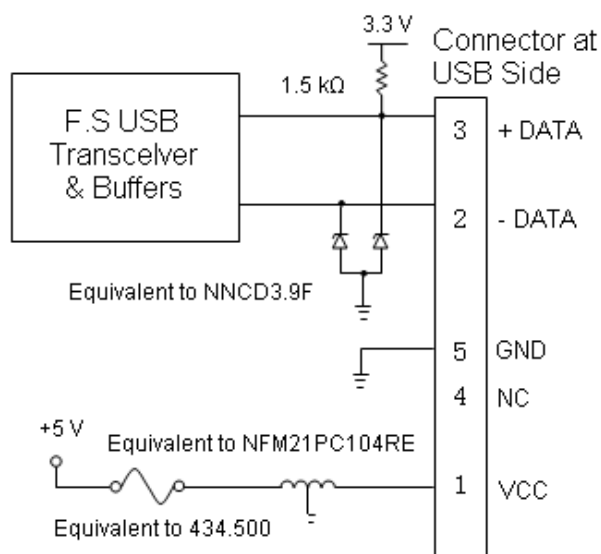


Figure 9: Interface circuit

## 7.2. Bluetooth

### 7.2.1 Module

The OPN-2006 is equipped with a low power fully certified Bluetooth module.

### 7.2.2 Specifications

Bluetooth standard: 3

High speed UART interface

Supported profiles: SPP (serial port profile) and HID (keyboard emulation)

## 8. Product Label

The label shown below is attached to the back of the OPN-2006.

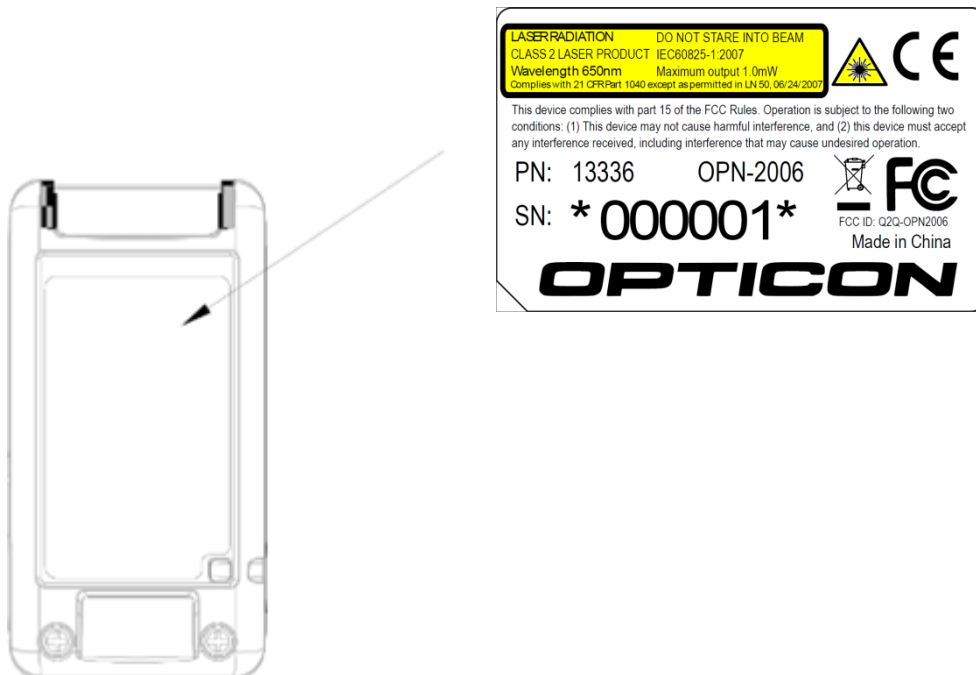
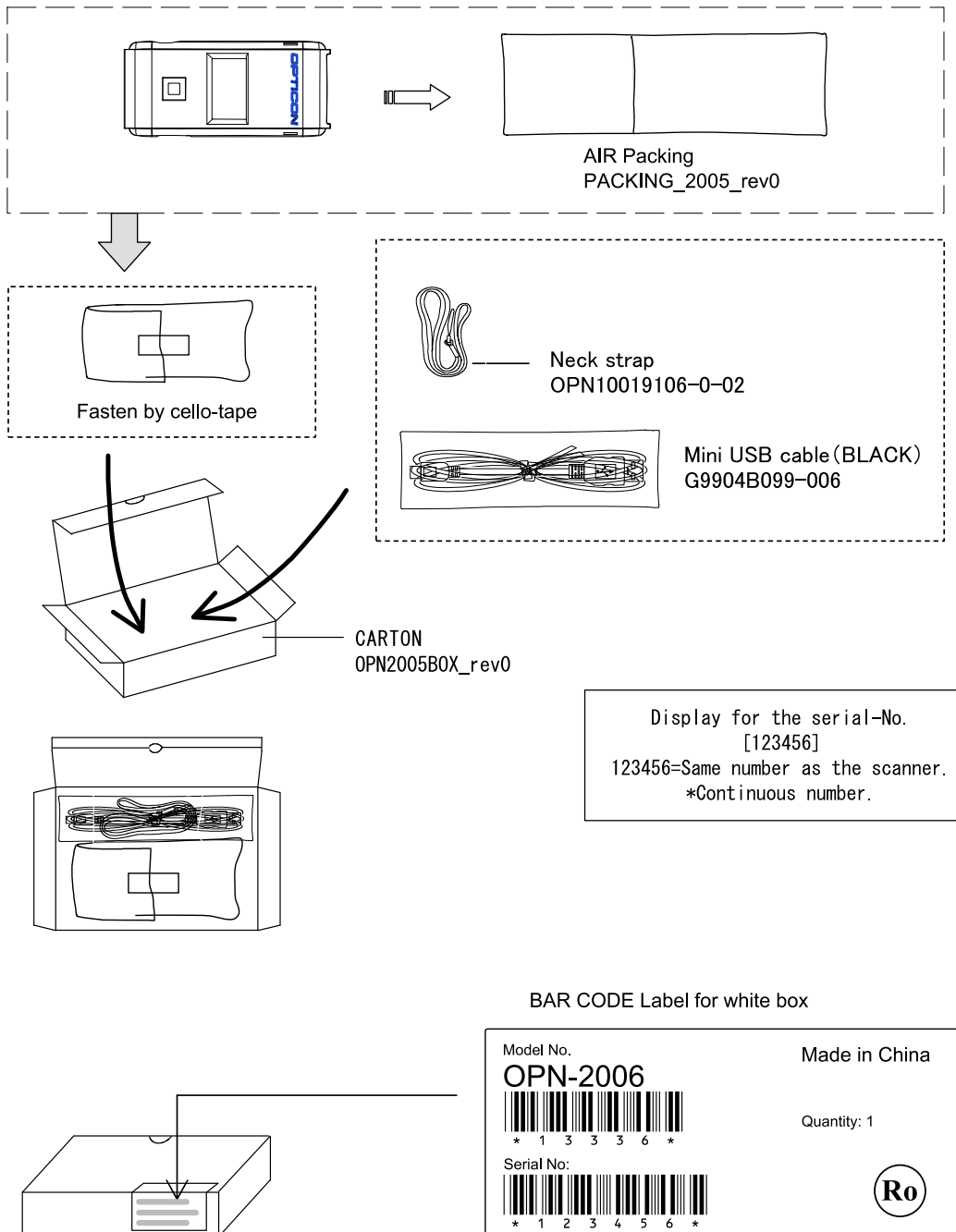


Figure 10: Product & Laser Caution Label

## 9. Packaging Specifications

### 9.1. Individual Packaging Specification

Assembled package size: 125 x 112 x 40 (WDH mm)



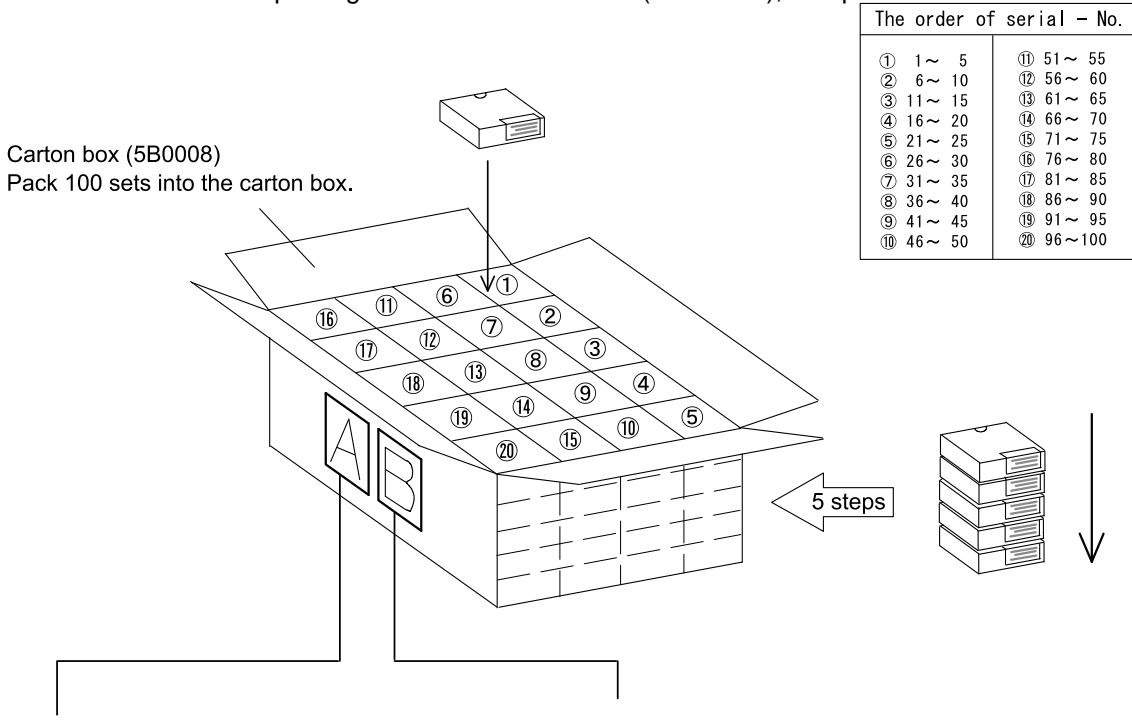
Do not fold at the barcode position when the label is affixed onto the corner of the box.

Figure 11: Individual Packaging



**9.2. Collective Packaging Specification**

Assembled package size: 595 x 520 x 245 (WDH mm), 100 pieces/box



**A:** Barcode serial label for shipment box  
Stick this label on a side of the box that is visible when the box is placed on a pallet.

**B:** Missing serial number label  
Attach this label when there are more than 3 labels of which serial numbers are out of order (not in a correct sequence).

**OPTICON** C/No ▲▲

Product: **OPN-2006**

PO:

QTY:

SN/From:

SN/TO:

Missing Serial number Q'ty ▲▲

1

2

Shipping date ▲▲▲▲▲▲

**Ro**

Opticon Sensors Europe B.V.

**OPTICON** C/No ▲▲

Missing Serial number Q'ty ▲▲

3

4

5

6

7

8

9

10

**Ro**

Opticon Sensors Europe B.V.

Figure 12: Collective Packaging

## 10. Durability

### 10.1. Ambient Light Immunity

Scanning performance is guaranteed when the barcode surface is illuminated as follows.

Incandescent light : 0 ~ 4,000 lx  
 Fluorescent light : 0 ~ 4,000 lx (excluding high-frequency lighting)  
 Sunlight : 0 ~ 80,000 lx

<Conditions>

Barcode Test Sample	OPTOELECTRONICS test chart PCS = 0.9, Resolution 0.25 mm, 9-digit Code 39, Quiet Zone 10 mm, N/W Ratio = 1:2.5
Distance scanner. Angles	100 mm from the front edge of the Pitch: $\alpha = 0^\circ$ , Skew: $\beta = 15^\circ$ , Tilt: $\gamma = 0^\circ$
Curvature	$R = \infty$
Power Voltage	3.7 V

\* Be sure that direct light or specular reflection does not enter the light receiving section of the OPN-2006.

### 10.2. Vibration Strength (without packing)

There shall be no sign of malfunction after the following vibration test.

**Vibration test:** Increase the frequency of the vibration from 10 Hz to 100 Hz at an accelerated velocity of 19.6 m/s<sup>2</sup> (2.0 G) for 30 minutes (60 minutes for a cycle) in the non-operating state. Repeat this in each X, Y and Z direction.

### 10.3. Vibration Strength (in individual packing)

There shall be no sign of malfunction after the following vibration test.

**Vibration test:** Increase the frequency of the vibration from 10 Hz to 100 Hz at an accelerated velocity of 19.6 m/s<sup>2</sup> (2.0 G) for 30 minutes (60 minutes for a cycle) in the individual packaged state. Repeat this in each X, Y and Z direction.

#### 10.4. Drop Impact Strength (without packaging)

There shall be no sign of malfunction after the following drop test.

**Drop test:** Drop the scanner 3 times (18 times in total), at each 6 face, from a height of 150 cm onto a concrete floor as shown below.

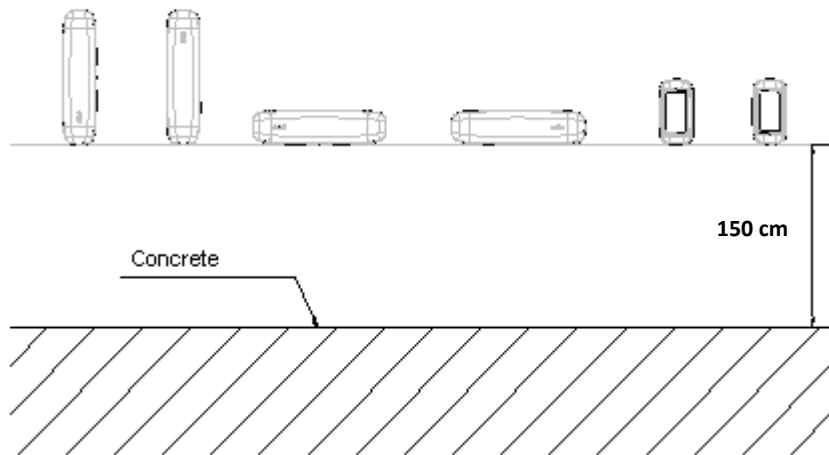


Figure 13: Drop Test

#### 10.5. Electrostatic Discharge Immunity

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 $\Omega$
Capacitor charging:	150 pF

#### 10.6. MTBF

MTBF (Mean Time Between Failures)	30,000 hours (excluding the following parts)
Laser diode :	10,000 hours
Mirror scan unit :	10,000 hours

## 11. Regulatory Compliance

### 11.1. Laser Safety

IEC 60825-1 Ed.2: 2007 Class 2  
CDRH Class II

### 11.2. EMC

EN55022  
EN55024  
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.

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.

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.

## 12. RoHS

The OPN-2006 is compliant with RoHS.

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

## 13. Precautions

### 13.1. Precaution against Laser Light

\*Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Caution - Do not stare into the laser light from a scanning window. It may harm your eyes.  
Do not point the laser directly at others' eyes. It may harm your eyes.  
Do not stare into the beam with optical instruments. It may harm your eyes.

### 13.2. Handling

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

(1) Shock:

- Do not drop this product from a height greater than specified in this manual.
- Do not place this product under or between any heavy items.
- Do not swing this product around holding the hand strap.

(2) Temperature Conditions:

- Do not use this product at temperatures outside the specified range.
- Do not pour boiling water on this product.
- Do not throw this product into a fire.

(3) Foreign Materials:

- Do not immerse this product in water or other liquid.
- Do not expose this product to chemicals.

(4) Battery:

**CAUTION**  
**RISK OF EXPLOSION IF BATTERY IS REPLACED**  
**BY AN INCORRECT TYPE.**  
**DISPOSE OF USED BATTERIES ACCORDING**  
**TO THE INSTRUCTIONS**

(5) Others

- Do not disassemble this product.
- Do not use this product near a radio or a TV. It may cause reception problems.
- This product may be affected by a momentary voltage drop caused by lightning.
- This product may not perform properly in a place where it will be subjected to a flickering light, such as a CRT (computer monitor, television, etc.).

\* This specification manual is subject to change without prior notice.

Appendix 1: Mechanical Drawing

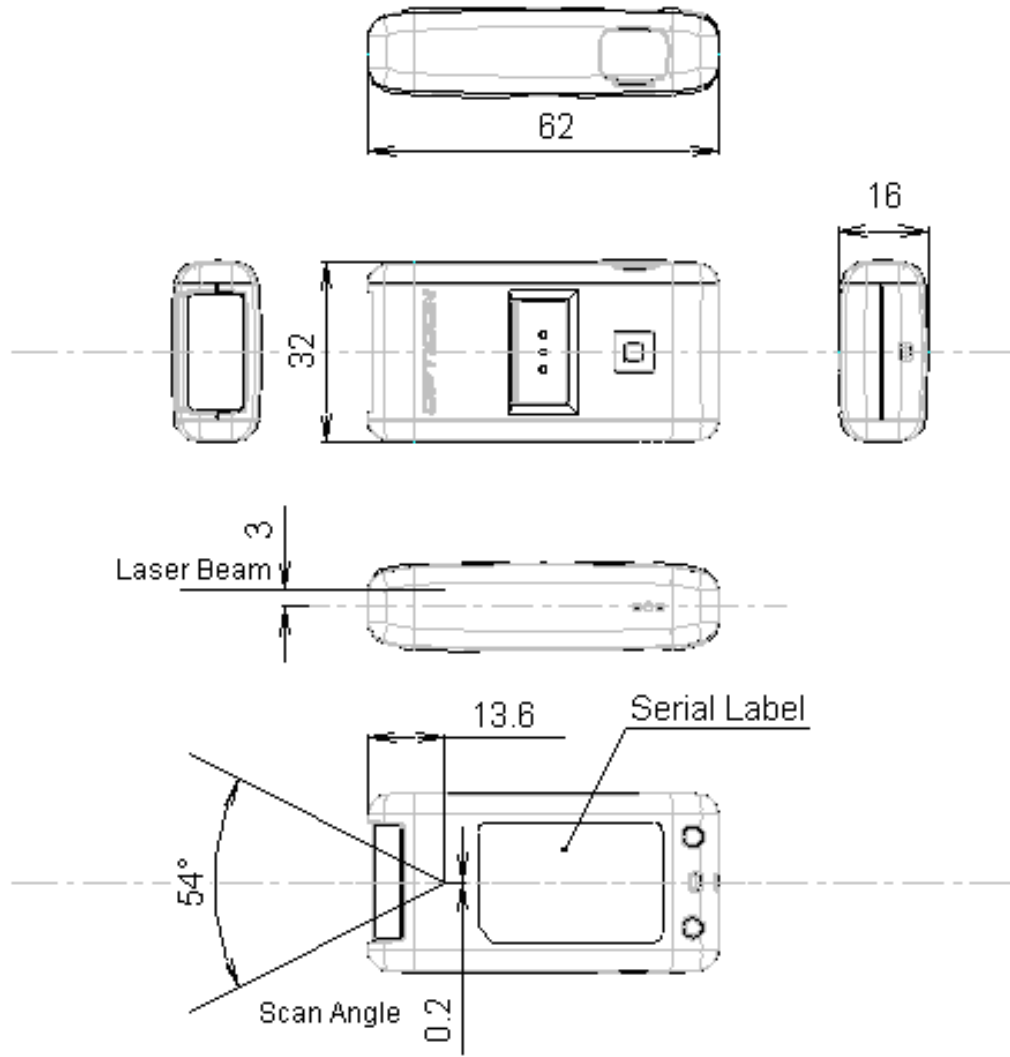


Figure 14: Mechanical Drawing