

OPTICON

Handheld 2D Auto-Focus Scanner

OPI-3201



This manual provides specifications for the OPI-3201 rugged handheld 1D/2D imager scanner with auto-focus.

Specifications Manual

All information subject to change without notice.

Document History

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1. Abstract

This manual provides specifications for the OPI-3201 rugged handheld 1D/2D imager scanner with auto-focus.

2. Overview

The OPI-3201 scanner enables smooth scanning of 1D and 2D symbologies with automatic focus function. Main features of the OPI-3201 are as follows:

- **Liquid lens**
Focus adjustment function using liquid lens enables reading of high resolution codes and long depth of field.
- **Laser aiming**
Laser aiming pointer enables easy selection of the label to be read.
- **Auto-focus**
High speed autofocusing using the laser light not only for aiming, but also for measuring the distance to a barcode to be read. Contrast method is used for the focus adjustment when the ranging with laser light is impossible due to the environmental condition.
- **High-speed scanning**
A custom high-speed / high-sensitive CMOS image sensor with a maximum frame rate of 80 fps and the fastest shutter speed in the industry enable high speed scanning without being affected by hand movement.
- **Antimicrobial coating**
Special antimicrobial treatment is applied to chassis, and alcohol can be used to wipe the scanner clean (except for the scanning window).
- **Various interfaces**
Four types of interfaces, RS232C, Keyboard Wedge, USB (HID), and USB (COM), are supported. The command communication from the host is available with the USB (COM) through the VCP function.
- **Wide range of supported symbologies**
The latest codes such as GS1 DataBar (formerly called RSS), Aztec Code, EAN, UCC Composit barcode are supported. Refer to Chapter "10. Default Settings" for details of supported symbologies.
- **RoHS compliance**
The OPI-3201 is a RoHS compliant product, which is declared by Optoelectronics Co., Ltd.

3. Basic Specifications

Item		Specification		Note	
Control Section	ASIC	OEY-0603		CPU: ARM-1026EJ-S Core: 160 MHz	
	SDRAM	128 Mbits (1 M × 4 Banks × 32 Bits)		SDCLK: 80 MHz	
	Flash ROM	16 Mbits (1 M × 16 Bits) Flash Memory			
Interface	RS-232C	9600 bps ~ 115200 bps			
	USB	<ul style="list-style-type: none"> • Full-Speed 12 Mbps (HID/COM) • Hi-power Bus-powered 			
	Wedge	DOS-V Keyboard (can choose to connect or disconnect the keyboard)			
Optical Section	Scanning method	SXGA (1.3-million-pixel) CMOS area sensor		MCLK: 48 MHz, Frame rate: 80 fps (8 bits)	
	Scanning light source	InGaAlP 1 red LED		With thermal protection feature to limit brightness	
	Effective pixels	0.46 million pixels (H: 900 x V: 512) SXGA class			
	View angle	Horizontal: about 40° Vertical: about 23°			
Supported 1D Symbologies	Symbologies	UPC-A, UPC-A Add-on, UPC-E, UPC-E Add-on, EAN-13, EAN-13 Add-on, EAN-8, EAN-8 Add-on, JAN-8, JAN-13, Code 39, Tri-Optic, Codabar (NW-7), Industrial 2 of 5, Interleaved 2 of 5, Code 93, Code 128, EAN-128, S-Code, MSI/Plessey, UK/Plessey, TELEPEN, Matrix 2 of 5, Chinese Post Matrix 2 of 5, IATA, Code 11, Korean Postal Authority code, GS1 DataBar, Postal Code		The GS1 DataBar used to be "RSS".	
	Minimum resolution	Code 39 : 0.0762 mm		PCS 0.9	
	Curvature	Radius ≥ 15 mm (8-digit JAN) Radius ≥ 20 mm (13-digit JAN)		PCS 0.9	
	Depth of field (mm)	Code 39	Resolution (0.127)	15 ~ 55	PCS 0.9
			Resolution (0.254)	15 ~ 200	
Resolution (1.0)			90 ~ 870		
JAN Code	Resolution (0.33)	35 ~ 270			
Supported 2D Symbologies	Symbologies	PDF417, MicroPDF417, QR Code, Micro QR Code, DataMatrix (ECC 0 - 140 / ECC 200), MaxiCode (Modes 2 to 5), Aztec Code, EAN.UCC Composite bar code, Codablock F		Disable Code 128 when Codablock F is active.	
	Minimum resolution (mm)	QR Code:0.127 mm DataMatrix: 0.127 mm		PCS 0.9	
	Depth of field (mm)	PDF417	Resolution (0.127)	15 ~ 70	PCS 0.9
			Resolution (0.254)	20 ~ 210	
		QR Code	Resolution (0.381)	15 ~ 170	
		DataMatrix	Resolution (0.169)	15 ~ 40	
Resolution (0.254)			15 ~ 100		
Micro QR	Resolution (0.212)	15 ~ 65			

Item		Specification		Note	
1/2 D Common	Scan angle	Pitch : $\pm 40^\circ$		Code: Code 39, PDF417 Resolution: 0.254 mm Distance: 89 mm from the edge of the scanner *Curvature R = ∞	
		Skew : $\pm 50^\circ$			
Tilt : $\pm 180^\circ$					
*There are some areas in which scanning fails due to specular reflection.					
	Minimum PCS	0.45 or more		MRD: 32% or more	
Imager	Image data format		Windows Bitmap, JPEG, TIFF		Black spot may appear on images, however, it does not affect the scanning specifications.
	Shades of gray		256, 16, 2		
	Range of output image		Select top/bottom (column) and left/right (row)		
	Resolution of output image		Full, 1/2, 1/3, 1/4		
	Interface of output image		RS-232C, USB-COM		
	Baud rate	USB-COM (full speed)		About 4 sec	Shades of gray: 256 Resolution: Full
RS-232C (baud rate: 15.2 kbps)		About 120 sec			
OCR	Supported font		OCR-A, OCR-B		
	Supported characters		A – Z, 0 – 9, <, \, - (39 kinds of characters)		
	Character length		2 ~ 127		
	Scan angle		360 °		
Power	Range of operating voltage		4.5 ~ 5.5 V: USB Specifications 5.4 ~ 6.6 V: RS232C/WEDGE (external power supply)		RS232C/WEDGE (external power supply): Dedicated AC adapter 6.0 V $\pm 5\%$
	Current consumption (RS232C)	Reading	350mA (max)		Reading means: from bar code scanning until the buzzer sounds
		Standby	75mA (max)		
Environmental Specifications	Temperature	Operating	-20 ~ 50°C		AC adapter: 0 ~ 40°C
		Storage	-20 ~ 60°C		
	Humidity	Operating	5 ~ 85% (no condensing, no frost)		
		Storage	5 ~ 85% (no condensing, no frost)		
	Ambient light immunity	Fluorescent	10,000 lx or less		PDF417 (Resolution: 0.254 mm) Optical axis angle: 75° Distance: 89 mm
		Sunlight	100,000 lx or less		
	Vibration		Increase the frequency of vibration from 10 Hz to 100 Hz at an accelerated velocity of 19.6 m/s ² (2G) for 6 minutes each in X, Y and Z-direction. Repeated this test for 10 times.		
	Drop		Drop 3 times, at each 5 faces (right, left, front, back and top), from a height of 150 cm onto a concrete surface.		* Excluding the part where the interface cable is attached
Dust and drip proof		IP42			

Item		Specification	Note	
Regulatory	This scanner is a laser Class 1 and Exempt Risk Group LED product. This information is described on the caution label.			
	LED safety	IEC 62471-1:2006 Exempt Risk Group	Peak Wavelength: 645 nm	
	Laser safety	IEC 60825-1:2007 Class 1 JIS 6802:2005 Class 1 CDRH Class 1	Peak wavelength: 650 nm	
	EMI/RFI	VCCI / EN55022 / FCC Class-B	For residential, commercial and light-industrial environments	
	Product safety	CE Marking		
	Electromagnetic compatibility (EMC)	EN55024 (EN61000-6-1) Class-B	For residential, commercial and light-industrial environments	
Immunity Test	ESD immunity	No destruction	15 kV (Apply static electricity 50 times to the surface of the scanner)	Condition: IEC:61000-4-2 compliant
		No malfunction	Contact discharge (direct / indirect): ±6 kV Air discharge (direct):±8 kV	
	Radio-frequency electromagnetic field. Amplitude modulation	Frequency	80 ~ 1000 MHz	Condition: IEC61000-4-3 compliant
		Level	3 V/m	
		AM	8% (AM)	
	Fast transient	Voltage	Alternating-current input cable: ±1 kV	Condition: IEC61000-4-4 compliant
		Pulse	5 / 50 ns (Tr / Tw)	
		Frequency	5 kHz	
	Surge	Pulse	1.2 / 50 ns (Tr / Th)	Condition: IEC61000-4-5 compliant
		Voltage	From L to P : ±2 kV (closed-loop voltage)	
			From L to L : ±1 kV (closed-loop voltage)	
	Radio-frequency common mode	Frequency	0.15 ~ 80 MHz	Condition: IEC61000-4-6 compliant
		Level	3 V	
		AM	80% (AM)	
	Power frequency magnetic field	Frequency	50 and 60 Hz	Condition: IEC61000-4-8 compliant
Level		3 A/m		
Voltage dip, momentary voltage drop, fluctuation	Dip 1	Drop 30%, 0.5 cycles	Condition: IEC61000-4-11 compliant	
	Dip 2	Drop 60%, 5 cycles		
	Momentary drop	Drop > 95%, 250 cycles		
Physical Features	Dimensions	Approx. 56 × 113 × 137 (WDH mm)		
	Weight	Approx. 80 g	Excluding the interface cable	
External Power Supply	Model name		SFP0602000P-PSE	Accessories: conversion plug
	Input	Voltage range	AC 90 ~ 265 V	
		Supply current	0.5 A (max)	
	Output	Voltage range	5.7 ~ 6.3 V	
Maximum current		2.0 A		

4. Detailed View

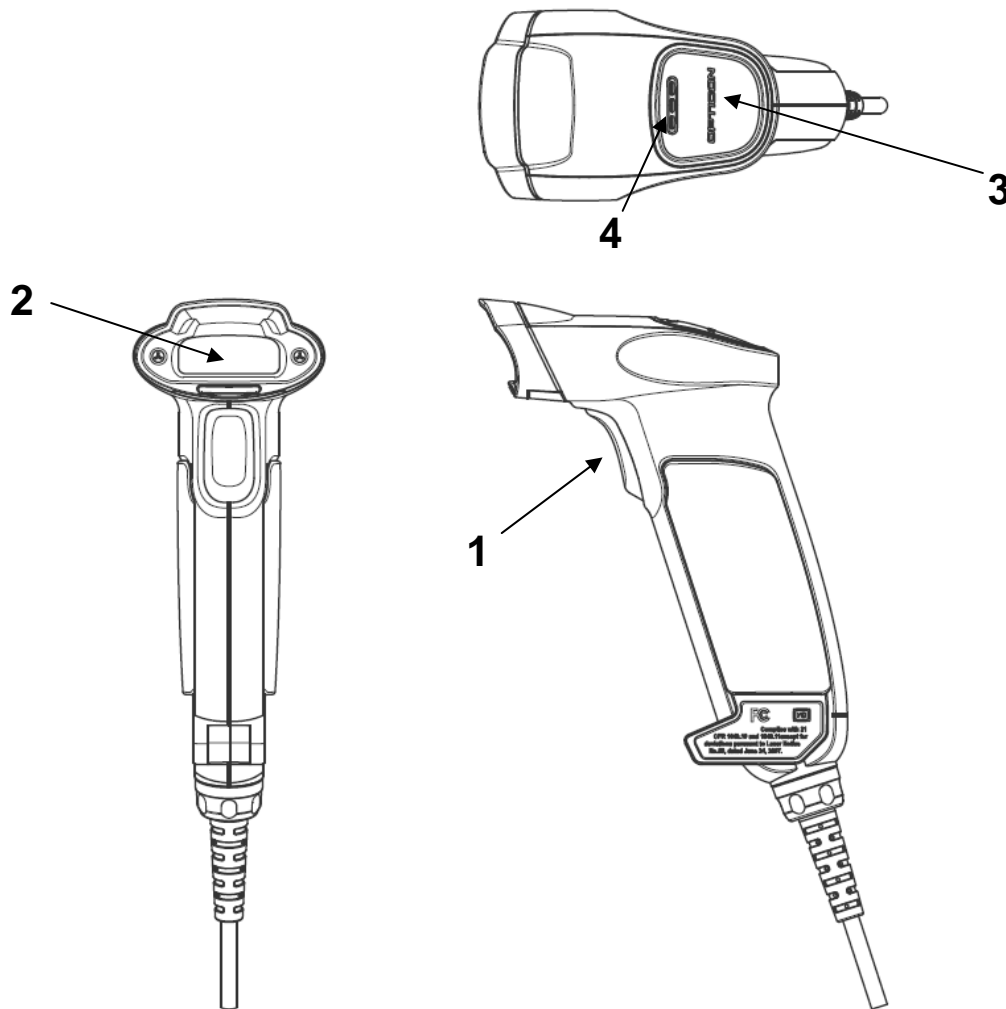


Figure 1: Detailed View of OPI-3201

No.	Name	Description
1	Trigger Key	Laser aiming light is emitted by pressing this key to read 1D/2D codes.
2	Scanning Window	The laser light is emitted through this window. Ensure that the lens is not exposed to dust and dirt before scanning.
3	Status LED	The operating status is indicated by each LED color.
4	Buzzer Hole	A sound from a built-in buzzer comes out through these holes. When they are covered, the buzzer sound may not be able to be heard. The sound varies depending on the status. Buzzer settings can be configured in various ways: enable or disable buzzer as well as change the loudness and duration.

5. Electrical Specifications

5.1. Configuration

The OPI-3201 consists of

- Camera Module section, with CMOS sensor and lens integrated
- Decode and Communication Control section, where 1D / 2D code data from a scanned image is decoded
- Interface section that exchanges information with host computer
- Power supply section, where the main power supply is converted

The USB model is bus powered and no adapter is needed. The RS-232C and Wedge models need a dedicated adapter for DC 6.0 V power. For Wedge model, keyboard operation is possible when the interface cable is connected to the host computer even if the power is not supplied through the adapter. Do not insert and remove the power adapter when PC is on. It may cause the PC to malfunction.

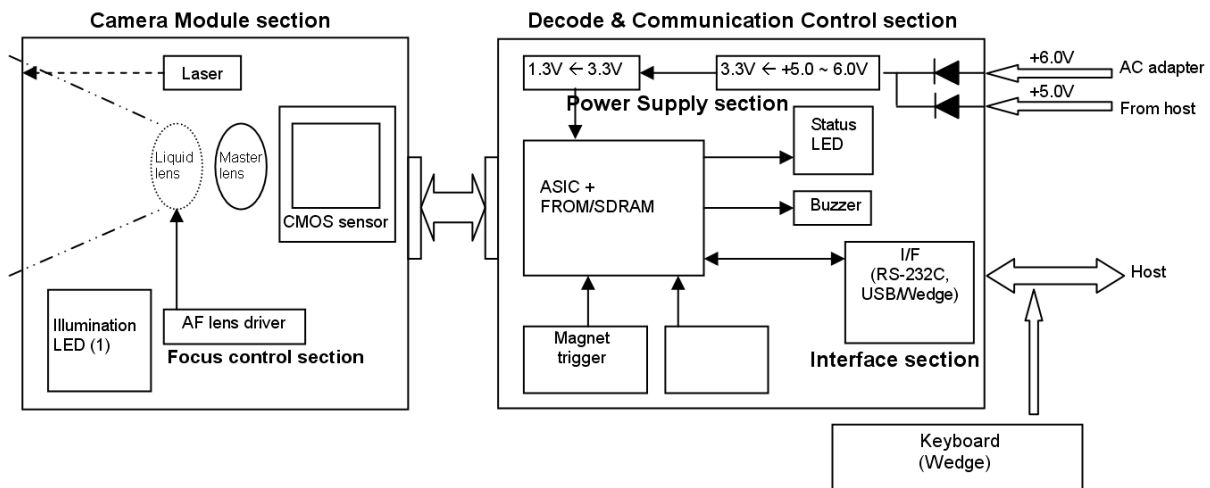


Figure 2: Configuration Diagram

5.2. AC Adapter Specifications

For RS-232C and Wedge models

5.2.1. Input Specifications

Power supply voltage	: AC 90 ~ 265 V
Power supply frequency	: 47 ~ 63 Hz
Maximum current	: 0.5 A

5.2.2. Output Specifications

Output voltage	: 6.0 V \pm 5% / Output current: 0 ~ 2.0 A (max)
Power ripple	: 100 mVp-p (max, rated load)

5.3. Wedge Power Supply (Host)

Input power supply voltage	: DC 5.0 V
Range of working voltage	: 4.5 ~ 5.5 V
Power ripple	: 0.1 Vp-p (max, 10 ~ 100 kHz, power supply voltage 5.0 V)
Current consumption	: When main power (AC adapter) is switched off: 250 mA (max) When main power (AC adapter) is switched on: 5 mA (max) in standby state

Note:

- Main power supply (AC adapter) line: consumption current when in stand-by mode: 155 mA (max)
- Main power supply (AC adapter) line: consumption current when scanning: 305 mA (max)
- Possible to operate on the keyboard even when the main power supply is turned OFF.
- These figures were measured at 25°C.

5.4. USB Power Supply

Bus-Power Class	: Hi-Power (500 mA max)
Consumption current	: In stand-by mode: 85 mA (max)
When reading	: 350 mA (max)

Note: The consumption currents are measured at 25°C.

6. Optical Specifications

Item	Characteristics	
Scan method	CMOS area sensor (white / black)	
Number of effective pixel (*1)	(Column) × (Row) 900 × 512 dots	
Image capture speed	Frame rate 80 fps	
View angle	Horizontal Approx. 40°	
	Vertical Approx. 23°	
Auxiliary light source (LED × 1)	InGaP red LED	
	Peak wavelength	645 nm
	Directivity angle: 2Φ 1/2 (*2)	60°
	Maximum radiation output (*3)	5040 mcd
Light source for aiming / ranging (Laser diode)	Red laser diode	
	Peak wavelength	650 nm
	Maximum radiation output (*4)	390 μW

Note:

- *1 : Readable pixel count: 1260 (column) × 1024 (row) dots.
- *2 : Reference value extracted from the datasheet.
Radiation pattern features: LED which has different directivity angles is used.
- *3 : Reference value based on the datasheet (25°C, IF = 50 mA).
Exempt Risk Group: Refer to Chapter 16 for further information.
- *4 : Class 1 compliant output: Refer to Chapter 16 for further information.

7. Technical Specifications

Aim the laser light at the center of a code to scan it. For long distance scanning, ambient light entering the angle of view may affect the scanning performance. The conditions for technical specifications are as follows, unless otherwise specified in each section.

<Conditions>

Ambient Temperature and Humidity	Room temperature, room humidity
Ambient Light	1000 ~ 1500 lx (on code surface)
Angles	Pitch: $\alpha = 0^\circ$, Skew: $\beta = 15^\circ$, Tilt: $\gamma = 0^\circ$
Curvature	$R = \infty$
Power Supply Voltage	6.0 V
PCS (1D and 2D)	0.9 or higher
Reading Test	Accept the performance with 70% success rate for 10 tries of scan.
Barcode Test Sample (1D and 2D)	Specified below.

Supported 1D symbology

<Code 39>

Resolution	Symbology	PCS	Size (mm)	No. of digits
0.0762 mm	Code 39	0.9	8 × 10	5
0.127 mm			11 × 10	4
0.254 mm			14 × 10	2
1.0 mm			56 × 30	

<JAN>

Resolution	Symbology	PCS	Size (mm)	No. of digits
0.260 mm	13-digit JAN	0.9/0.45	25 × 19	13
0.260 mm	8-digit JAN	0.9	17.5 × 15.5	8
0.330 mm	13-digit JAN	0.9	31.5 × 25.5	13

Supported 2D symbology

<PDF417>

Resolution	Error correction	PCS	Size (mm)	No. of character
0.254 mm	Level-4	0.9	26 × 16.5	17
0.127 mm			13 × 8	

<QR Code: Model-2>

Resolution	Error correction	PCS	Size (mm)	No. of character
0.381 mm	M	0.9	12 × 12	44
0.169 mm			5 × 5	
0.127 mm			4 × 4	

<DataMatrix>

Resolution	Model	PCS	Size (mm)	No. of character
0.254 mm	ECC200	0.9	10 × 10	40
0.169 mm			4 × 4	
0.127 mm			3 × 3	

<Micro QR >

Resolution	Error correction	PCS	Size (mm)	No. of character
0.212 mm	L	0.9	5 × 5	11

- * Code 39 (resolution 0.0762, 0.127 and 1.0 mm) and JAN codes used for the tests are OPTOELECTRONICS test samples. Others are printed by a normal printer.
- * 1D symbologies NW ratio = 1 : 1.25, The size is outline dimensions excluding the quiet zones.

7.1. Scan Area and Depth of Field

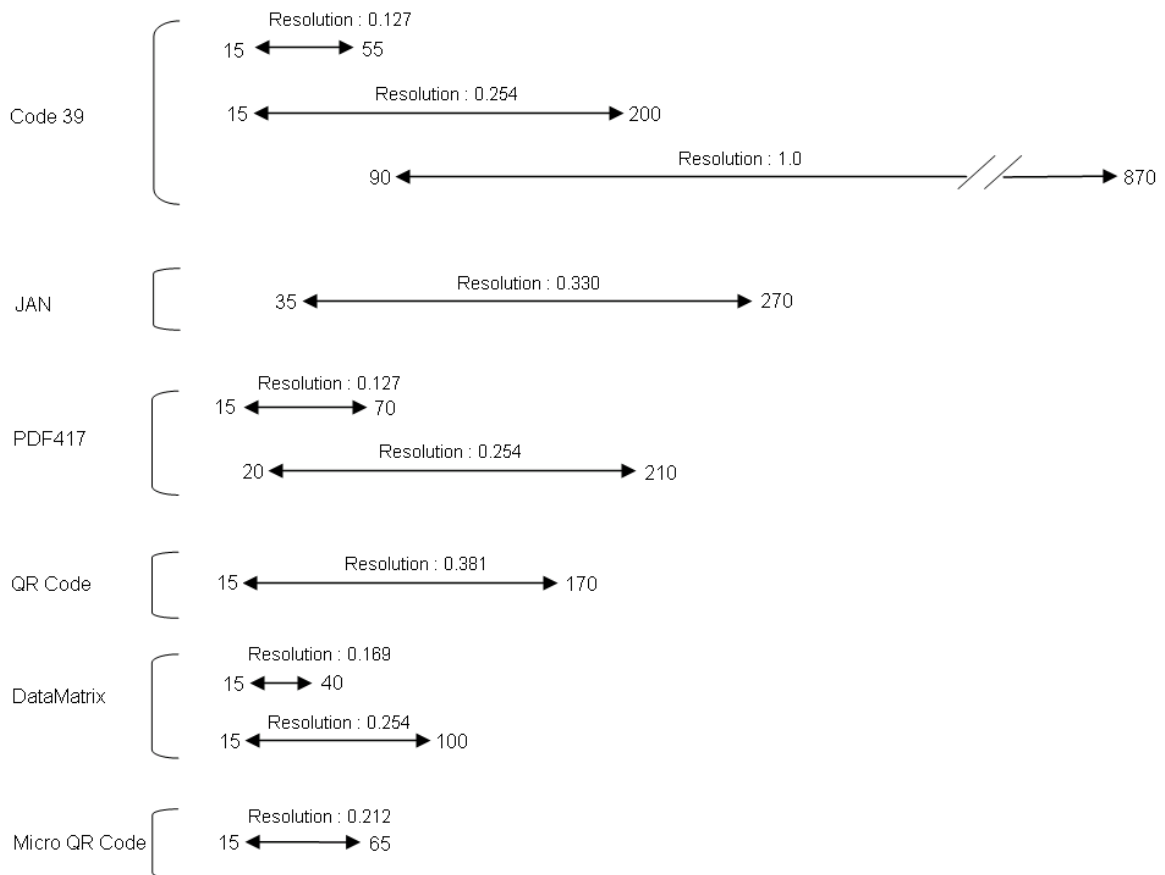
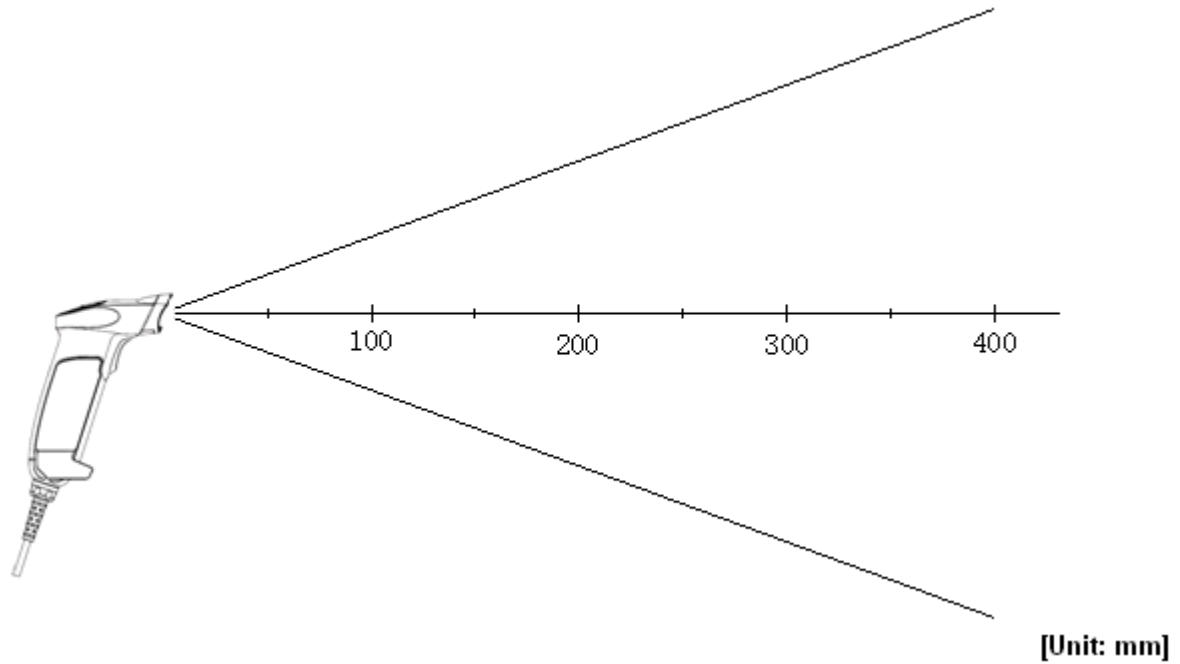


Figure 3: Scan Area and Depth of Field

7.2. Printed Contrast Signal (PCS)

0.45 or higher

<Conditions>

MRD : 32% and higher (70% or higher reflectivity of space and quiet zone)

Distance : 89 mm from the front edge of the scanner

Barcode Sample : PDF417 specified in Chapter 7 (Resolution 0.254 mm, PCS 0.45) (1D and 2D)

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

* Be sure to keep the optical window clean without dirt or scratches, or it may have a bad effect on the reading characteristics..

7.3. Minimum Resolution

0.0762 mm : Code 39 (specified in Chapter 7)

0.127 mm : PDF417, (specified in Chapter 7)

0.127 mm : QR code, DataMatrix (specified in Chapter 7)

7.4. Pitch, Skew and Tilt

Pitch angle $\alpha = \pm 40^\circ$

Skew angle $\beta = \pm 50^\circ$

Tilt angle $\gamma = \pm 180^\circ$

<Conditions>

Barcode Sample : Code 39, PDF417 specified in Chapter 7. (Resolution 0.254 mm, PCS 0.9)

Distance : 89 mm from the front edge of the scanner

Angle : Pitch angle measurement - set the skew angle $\beta = 15^\circ$ fixed.

Tilt angle measurement - set the skew angle $\beta = 15^\circ$ when pitch angle is 0° and rotate 1D/2D codes.

Curvature : $R = \infty$

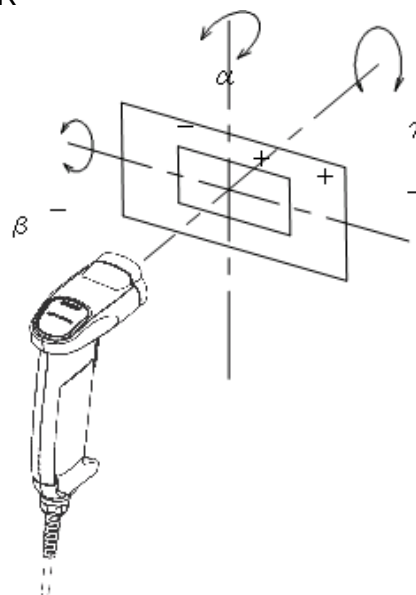


Figure 4: Pitch, Skew and Tilt

7.5. Curvature

8-digit JAN : $R \geq 15$ mm
13-digit JAN : $R \geq 20$ mm

<Conditions>

Barcode Test Sample : PCS 0.9, Resolution 0.26 mm, Quiet Zone 10 mm
(1D and 2D) as specified in Chapter 7
Distance : 89 mm from the front edge of the scanner
Angles : Skew: $\beta = 15^\circ$

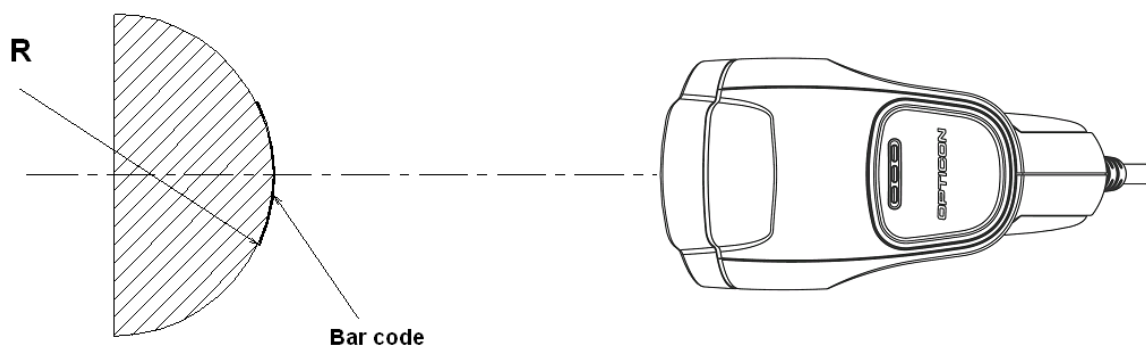


Figure 5: Curvature

Note: Scanning may fail due to the specular reflection of illumination LEDs when the reflectivity is high. In that case, scan the code tilting the scanner in the skew direction or set the illumination LED off so that the performance can improve. Make sure of the sufficient environmental illuminance (500 lx or more) when the illumination LED is off to keep the scanning performance. The ambient lights also may cause the reflection and the degraded scanning performance.

8. Interface

The OPI-3201 supports RS-232C, USB (HID), USB (COM) and Wedge interfaces.

8.1. RS-232C Interface

(1) Settings

Read menu barcodes [ZZ] + [U2] + [ZZ] to set to the RS-232C interface default.
Kanji codes and image data can be transmitted via RS-232C interface.

(2) Signal level and pin assignment

Signal names are based on the signals transmitted from the scanner to the host.

Signal Name	IN/OUT	Voltage(V)	
		Mark	Space
TxD	OUT	-5 ~ -15	+5 ~ +15
RxD	IN	-3 ~ -15	+3 ~ +15
RTS	OUT	-5 ~ -15	+5 ~ +15
CTS	IN	-3 ~ -15	+3 ~ +15

Signal Name	Pin No.	Note
Shield	1	
TxD	2	
RxD	3	
(NC)	4	Open (not connected)
GND	5	
(NC)	6	Open (not connected)
CTS	7	
RTS	8	
(NC)	9	Open (not connected)

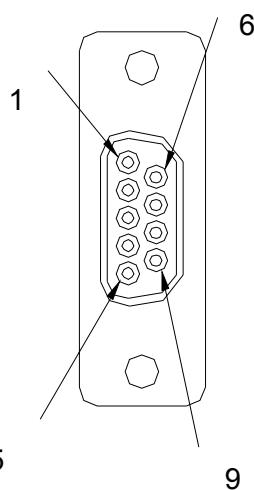


Figure 6: RS-232C Connector

(3) Interface Circuit

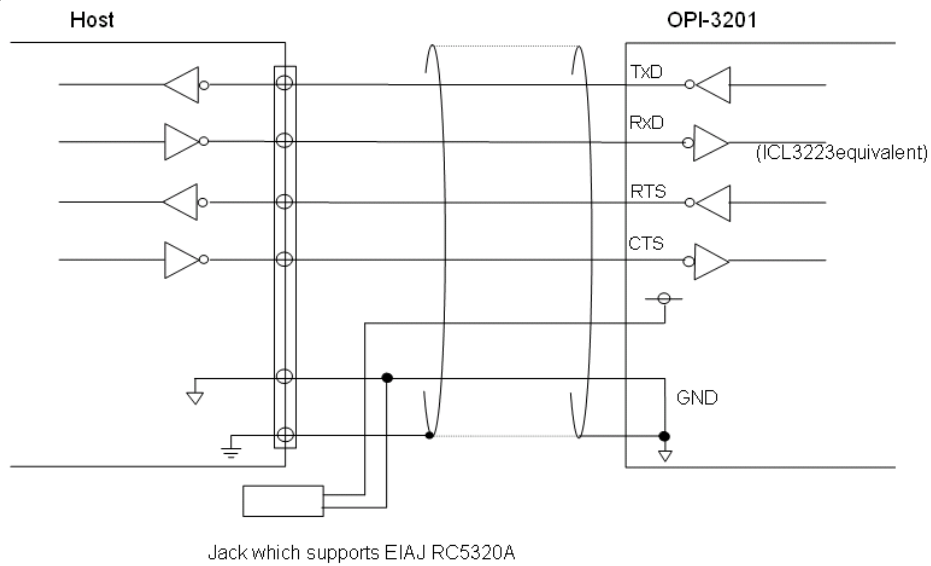


Figure 7: Interface Circuit

Connector : D-Sub9pin, female
Power supply : EIAJ RC5320A (voltage class 2) jack

(4) Character Format (for send / receive data)

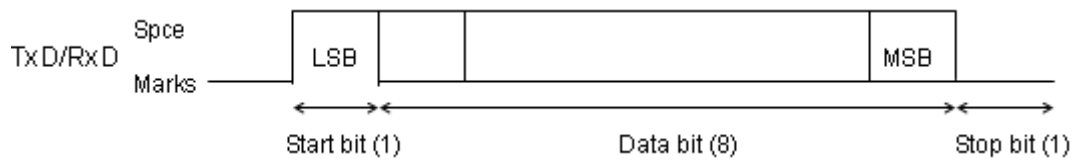


Figure 8: Character Format

(5) Communication Format

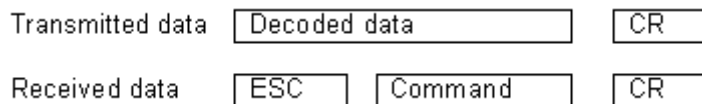


Figure 9: Communication Format

(6) Handshaking

Select handshaking options using the menu or command listed below.

Handshaking	Menu / Command
No handshake	P0
Busy/Ready	P1
Modem	P2
ACK/NAK	P3
ACK/NAK No response	P4

a) No Handshake

The scanner makes communication regardless of the state of the host system.

* In this setting, the commands from the host system may not be received correctly.

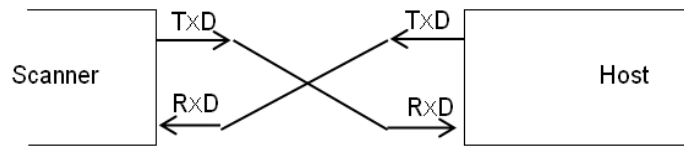


Figure 10: No Handshake

b) Busy/Ready

The scanner and the host system notify each other if they are able to receive data (BUSY/READY) via their RTS line. When they are connected as shown in the figure below, the CTS line can be used to check if the other side is busy (off) or ready to receive data (on).

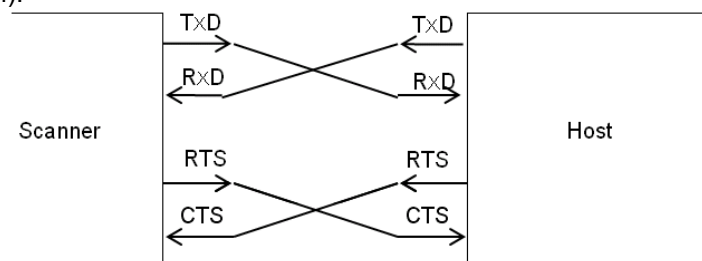


Figure 11: Busy / Ready

The scanner's RTS is normally on (so ready to receive data) except during the processing of received data, while transmitting data, and while it is busy processing menu labels. When the scanner wants to send data, it first has to check if its CTS line is on (to be sure that the host is ready to receive data) When the CTS line is off, the scanner does not send the data but waits for a specific timeout period until the CTS line is turned on. When the CTS line is not turned on within the time specified, the data transmission will be aborted. The default is Indefinitely (I0).

CTS duration	Menu / Command
Indefinitely	I0
100 msec	I1
200 msec	I2
400 msec	I3

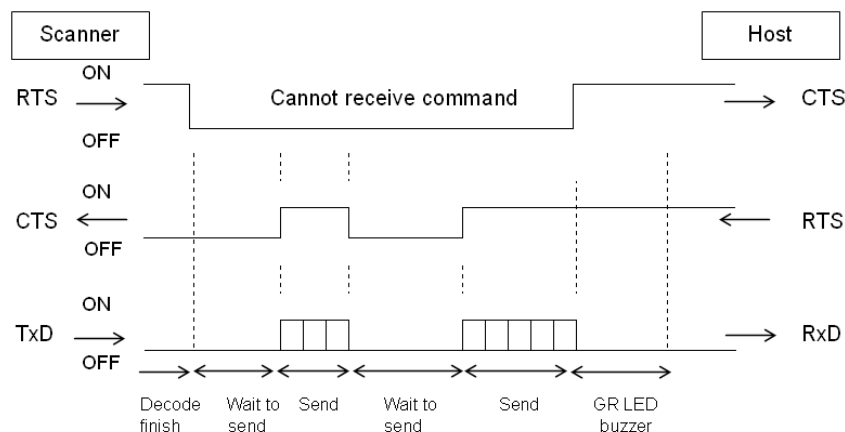


Figure 12: Busy/Ready (Control)

CTS,TxD Signal Timing

When the CTS line (RTS signal on the host side) is turned off during a TXD signal transmission, the scanner transmits one or two characters and waits. When the CTS signal is turned on during a character transmission, the character will be transmitted

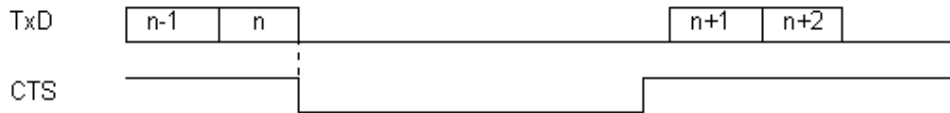


Figure 13: Busy/Ready (CTS,TxD Control)

Note: When loopback (wire connection) is used for RTS, CTS line of the scanner in this setting, *No handshake* is not enabled.

c) Modem Control

The scanner's RTS is OFF as soon as power is supplied to the scanner. The scanner will turn RTS ON when it wants to transmit data to the host. The host should respond by putting CTS ON when it is ready to receive data. While CTS is ON the scanner is allowed to transmit data. When all data has been transmitted, the scanner will turn RTS OFF. In response, the host should turn OFF the scanner's CTS. If, while RTS is ON, the CTS line is not ON for a certain configurable period, the scanner will terminate the transmission with an error indication of the buzzer.

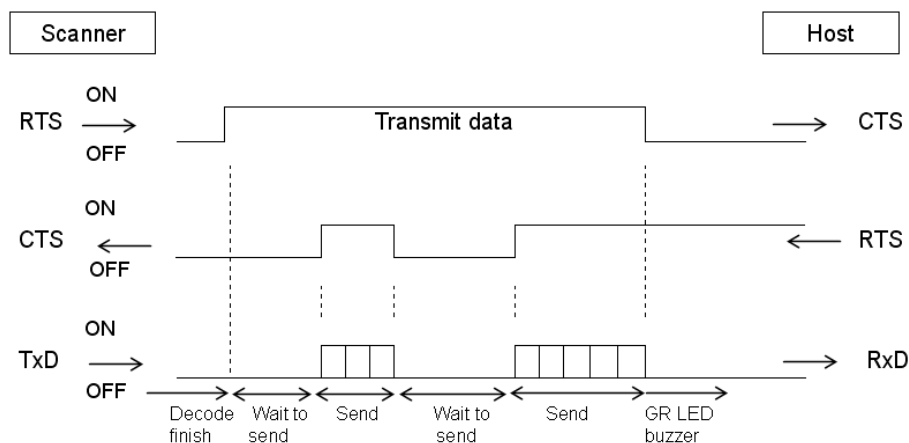


Figure 14: Modem Control

d) ACK/NAK

After data has been transmitted, the scanner expects to receive one of the following responses from the host:

- ACK response The scanner completes transmission successfully with the good-read buzzer and returns to the initial state.
- NAK response The scanner sends the data again and waits for the response from the host.
- DC1 response The scanner returns to 'waiting for the trigger' when it has a trigger (the initial state).
- None response The scanner sounds the error buzzer and returns to the initial state.

*ACK/NAK timeout period is 1 second.

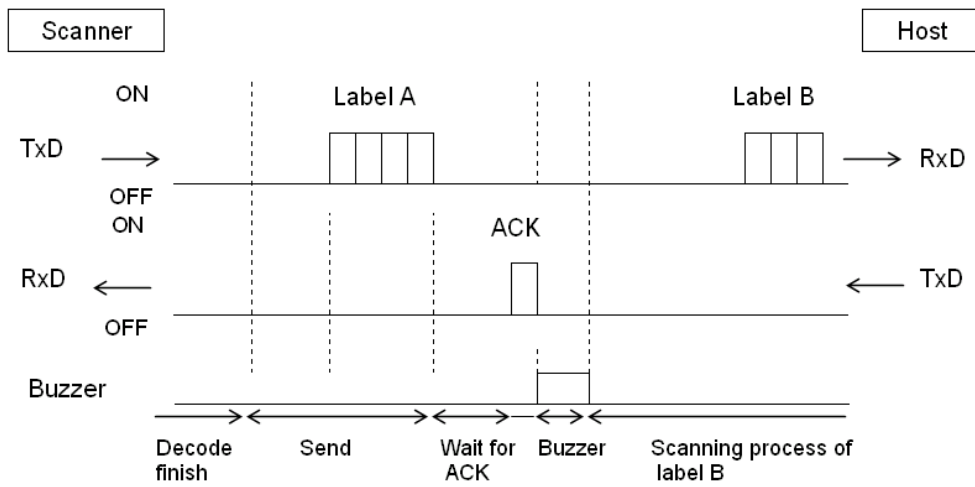


Figure 15: ACK/NAK Control

e) ACK/NAK No Response

When no response from the host is received within a specified time, the scanner assumes that the host properly received the data. The other actions are the same as ACK/NAK.

*ACK/NAK timeout period is 100 ms.

8.2. Wedge Interface

8.2.1. Settings

1. With Desktop PC (when using external keyboard)
Read menu barcodes [ZZ] + [UB] + [KM] + [ZZ] to set Wedge interface default.
2. With Notebook PC (when not using external keyboard)
Read menu barcodes [ZZ] + [UB] + [KL] + [ZZ] to set Wedge interface default

8.2.2. How to Connect

- Connect the branch cable (with “DOS/V SCAN” label on, 6-pin Mini-DIN female) to the connector of the OPI-3201 wedge interface cable (6-pin Mini-DIN male).
- Connect the branch cable connector (with DOS/V HOST label on, 6-Pin Mini-DIN male) to the host keyboard connector, and connect the other branch cable connector (with DOS/V KEY label on, 6-pin Mini DIN, female) to the keyboard.
- Insert the AC adapter plug to the DC jack of the interface cable and start the host computer.

** Refer to Chapter “9.3. Wedge Interface” for details of the cable.

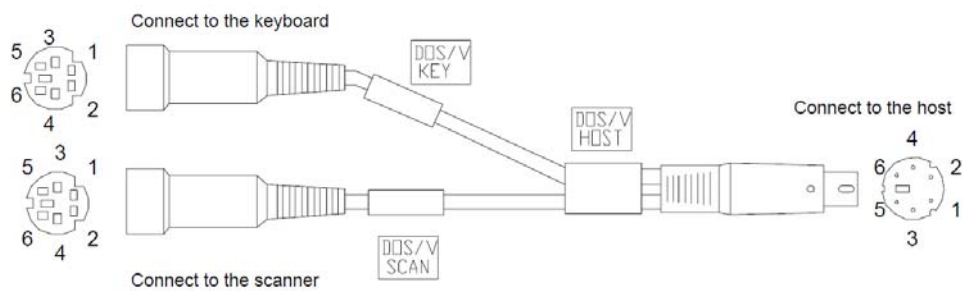
8.2.3. Caution

- Do not operate on the keyboard during the data transmission to the host or the data transmission may fail.
- The keyboard can operate without connecting to the AC adapter when this device is not used. However, do not turn ON or OFF the adapter while operating on the keyboard. It may cause malfunctions.
- Japanese kanji data or images cannot be transmitted via this wedge interface.
- Do not start any scanning operation or keyboard operation before the OS of the host computer is fully activated.

8.2.4. Pin Assignment

Wedge Branch Cable

Pin No.	Signal Name
1	KEY DATA
2	N.C
3	GND
4	VCC
5	KEY CLK
6	N.C



Pin No.	Signal Name
1	CPU DATA
2	N.C
3	GND
4	VCC
5	CPU CLK
6	N.C

Wedge Interface Cable for OPI-3201

Pin No.	Signal Name
1	CPU DATA
2	KEY DATA
3	GND
4	VCC
5	CPU CLK
6	KEY CKL

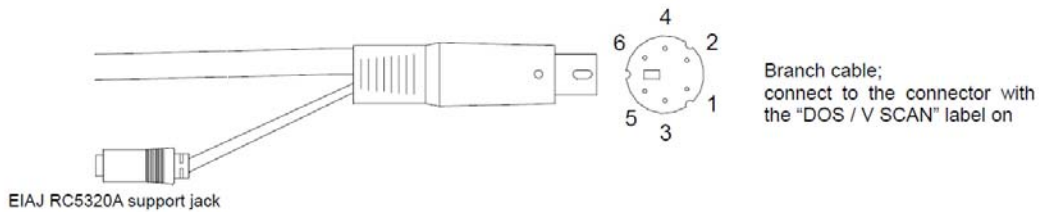


Figure 16: Pin Assignment (Wedge)

8.3. USB Interface

The USB interface models have two specifications:
HID (Human Interface Device Class) and COM (Communication Device Class).

With USB-COM model, VCP (Virtual Communication Port) allows virtual serial communication and the commands can be transmitted from the host computer.

(1) Settings

Read menu barcodes [ZZ] + [SU] + [ZZ] to set USB-HID interface default.
Read menu barcodes [ZZ] + [C01] + [ZZ] to set USB-COM interface default.

(2) USB Interface Specifications

Device Class : High-power bus-powered function. An AC adapter is not required.
Speed : Full-speed (12 Mbps)
Interface : USB-HID / USB-COM (VCP)

Note:

- Japanese kanji data or images cannot be transmitted via this USB-HID interface.
- Make sure to connect to a Hi-power bus (500 mA max) USB terminal.

(3) Connector

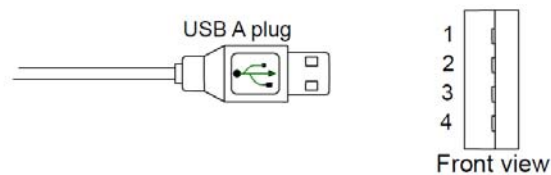


Figure 17: USB Plug (A)

Pin No.	Signal name	Note
1	V bus	
2	Data (-)	
3	Data (+)	
4	GND	

(4) Interface Circuit

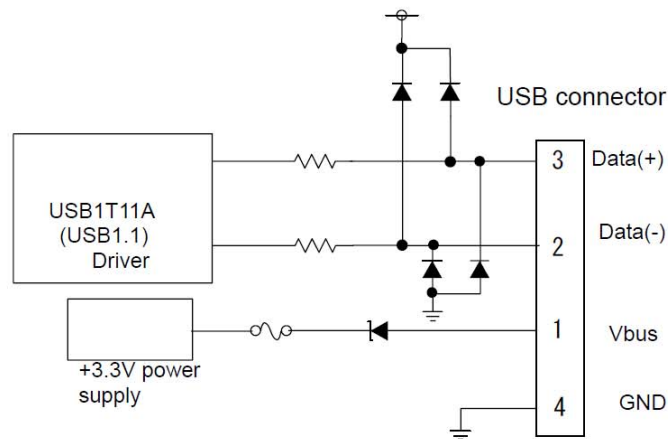


Figure 18: Interface Circuit (USB)

9. Cable and Connector

9.1. RS-232C Interface

Weight: approx. 90 g

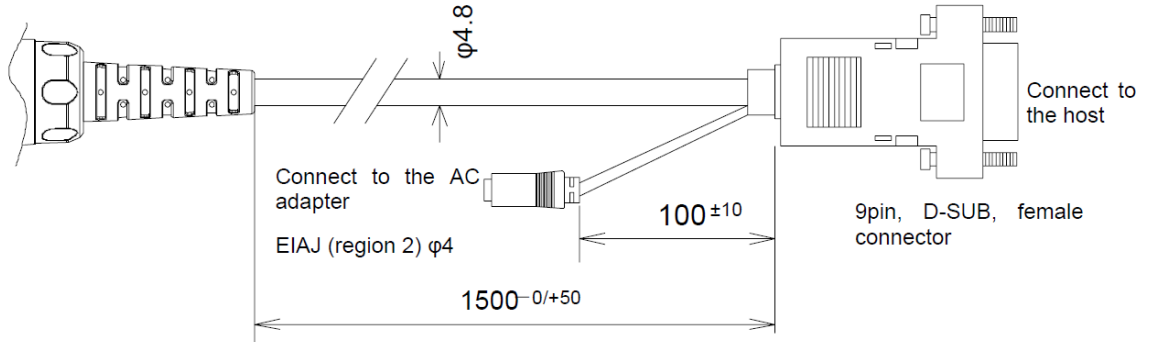


Figure 19: Cable (RS-232C)

9.2. USB Interface

Weight: approx. 70 g

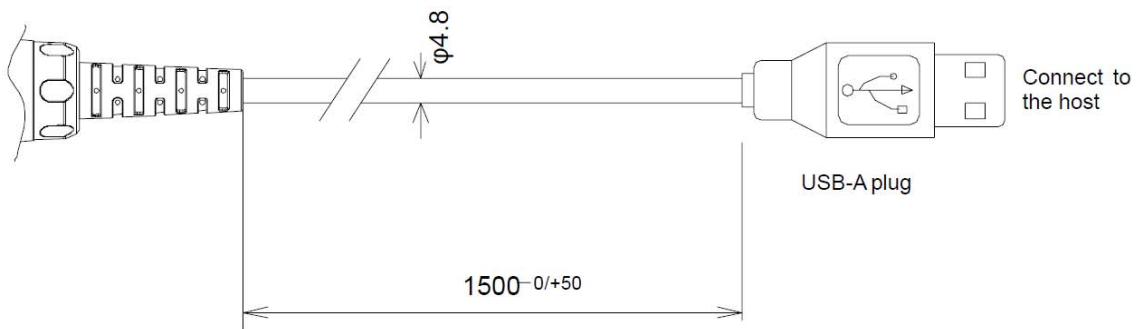


Figure 20: Cable (USB)

9.3. Wedge Interface

9.3.1. Wedge Straight Cable

Weight: approx. 75 g

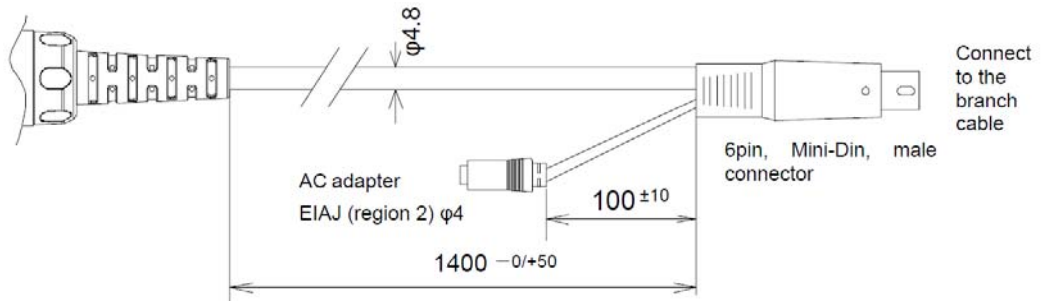


Figure 21: Cable (Wedge)

9.3.2. Wedge Branch Cable

Weight: approx. 25 g

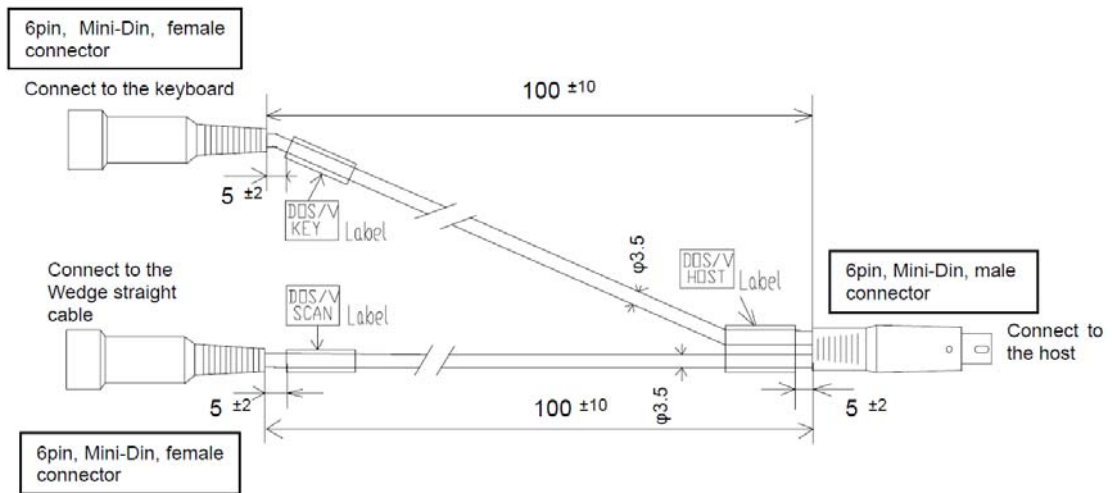


Figure 22: Branch Cable (Wedge)

10. Default Settings

The OPI-3201 is set to default settings before being shipped out from the factory.

Default Settings 1: Readable Codes

Code type	Read	Transmit Code Length	Transmit CD	Calculate CD	Transmit Other	Set Prefix	Set Suffix
UPC-A	○	×	○	○		-	CR
UPC-A Add-on	×	×	○	○		-	CR
UPC-E	○	×	○	○		-	CR
UPC-E1	×	×	○	○		-	CR
UPC-E Add-on	×	×	○	○		-	CR
EAN-13	○	×	○	○		-	CR
EAN-13 Add-on	×	×	○	○		-	CR
EAN-8	○	×	○	○		-	CR
EAN-8 Add-on	×	×	○	○		-	CR
Code 39	○	×	○	×	Not transmit ST/SP	-	CR
Tri-Optic	○	×	-	-	Not transmit ST/SP	-	CR
Codabar (NW-7)	○	×	○	×	Not transmit ST/SP	-	CR
Industrial 2 of 5	○	×	○	×		-	CR
Interleaved 2 of 5	○	×	○	×		-	CR
Code 93	○	×	-	○		-	CR
Code 128	○	×	-	○		-	CR
EAN-128	×	×	-	○		-	CR
S-Code	○	×	○	×		-	CR
MSI/Plessey	○	×	○	○	Not transmit CD2	-	CR
UK/Plessey	○	×	○	○		-	CR
TELEPEN	○	×	×	○		-	CR
Matrix 2 of 5	×	×	○	×		-	CR
Chinese Post Matrix 2 of 5	×	×	○	×		-	CR
IATA	○	×	○	×		-	CR
Code 11	×	×	×	○		-	CR
Postal Code (JPN)	×	×	-	○		-	CR
Postal Code (USPS)	×	×	-	○		-	CR
Postal Code (POSTNET)	×	×	-	○		-	CR
Korean Postal Authority code	×	×	×	○		-	CR
PDF417	○	×	-	○		-	CR
QR Code	○	×	-	○		-	CR
Micro QR Code	○	×	-	○		-	CR
DataMatrix (ECC200)	○	×	-	○		-	CR
DataMatrix (ECC0-140)	×	×	-	○		-	CR
MaxiCode	○	×	-	○		-	CR
MicroPDF417	○	×	-	○		-	CR
Aztec Code	○	×	-	○		-	CR
Aztec Runes	×	×	-	○		-	CR
Codablock F	×	×	-	○		-	CR

Note: Disable Code 128 when enabling Codablock F. The scanner may incorrectly recognize a broken Codablock F as Code 128.

Default Settings 2: Read Options, Trigger, Buzzer

Item	Default setting
Setting the number of characters	Fixed length OFF all codes
Read mode	Single read
Codabar (NW-7) intercharacter gap check	The number of character x 1
Multiple read (1D bar code only)	Disable
Trigger switch	Enable
Read time	2 seconds
Buzzer duration	50 ms
Buzzer tone	3 kHz
Buzzer loudness	Volume 1 (max)
Indicator (blue LED) duration	200 ms

Default Settings 3-1: Communication Settings (RS-232C)

Item	"U2" Default Setting
Baud rate	9600 bps
Parity bits	No parity
Data length	8 bits
Stop bits	1 bit
Handshaking	No handshake
ACK/NAK	ACK/NAK NO RESPONSE
CS time out	Indefinitely
ACK/NAK time out	1 second
Command header	ESC or STX
Command terminator	CR or ETX
Response to the commands	Disable

Default Settings 3-2: Communication Settings (Wedge)

Item	"UB" Default Setting
Transmit Enter key output as a suffix	Enable
Transmit Tab key output as a suffix	Disable
Transmit Arrow right key output as a suffix	Disable
Delay after transmission	6 ms
Scan code	Scan code set 2 (keyboard)
Select keyboard	US keyboard emulation

Default Settings 3-2: Communication Settings (USB-HID, USB-VCP)

Item	"SU"/"C01" Default Setting
Scanner power: Max Power Descriptor	500 mA
Keyboard (*1)	US Keyboard
Vender ID	0x65a (OPTOELECTRONICS)
Transmit Enter key output as a suffix (*1)	Enable
Transmit Tab key output as a suffix (*1)	Disable
Transmit Arrow right key output as a suffix (*1)	Disable

(*1): Settings are valid when using USB (HID) interface.

11. Product Labels

The labels shown below are attached to the scanner.

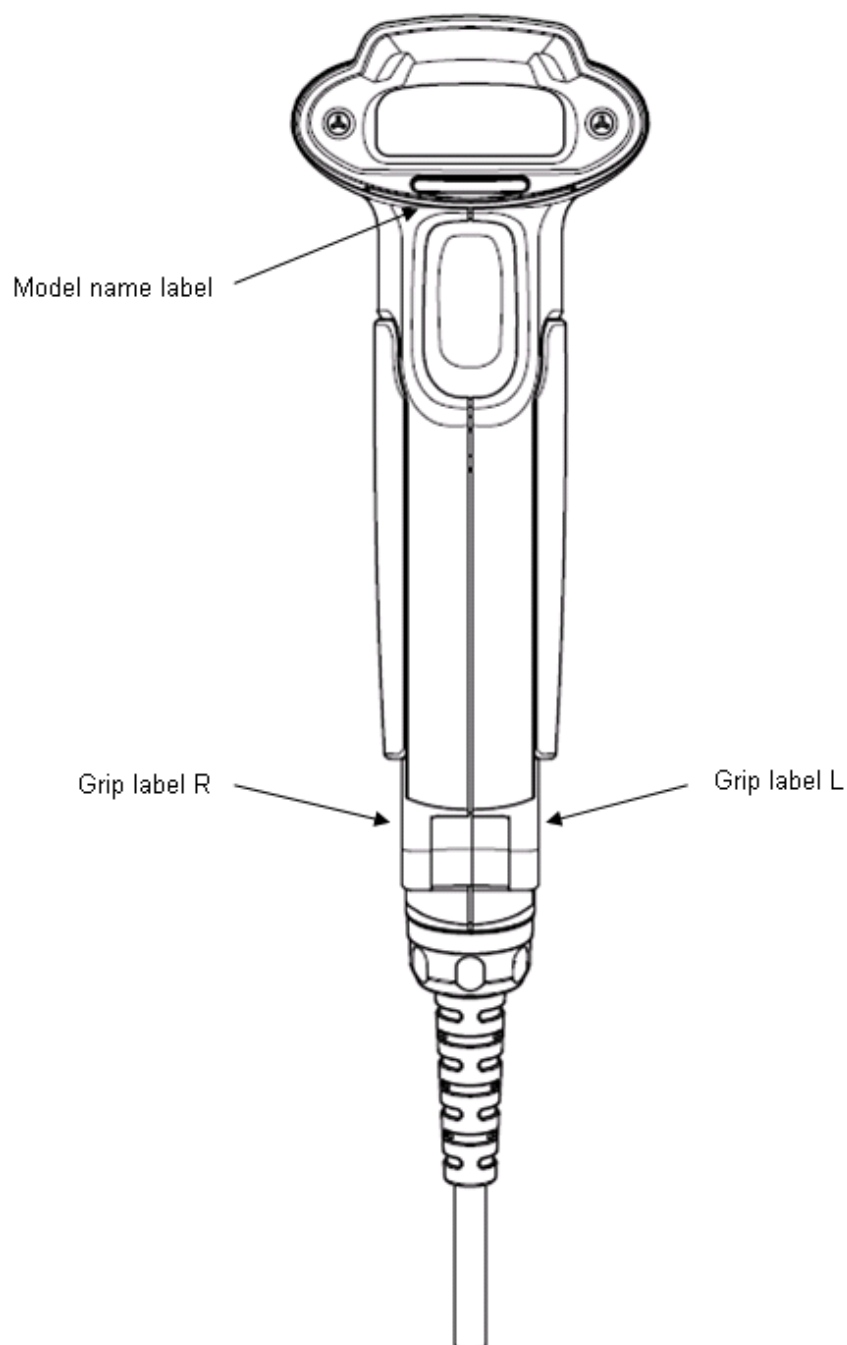


Figure 23: Product Labels

Model name label	Shows the product name, serial number, month and year of manufacture, laser and laser Class 1
Grip label R/L	Shows the standards-compliant languages and logos.

<Product Label 1>

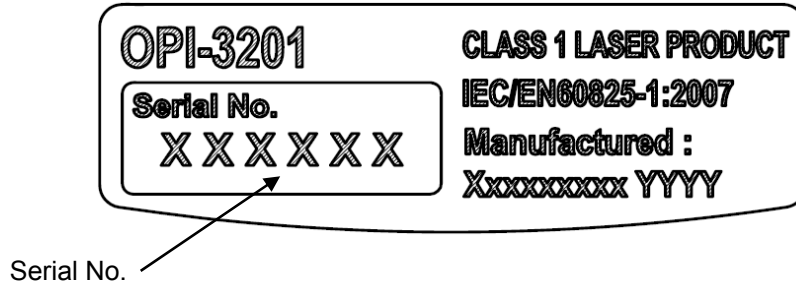


Figure 23-1: Model Name Label

<Product Label 2>

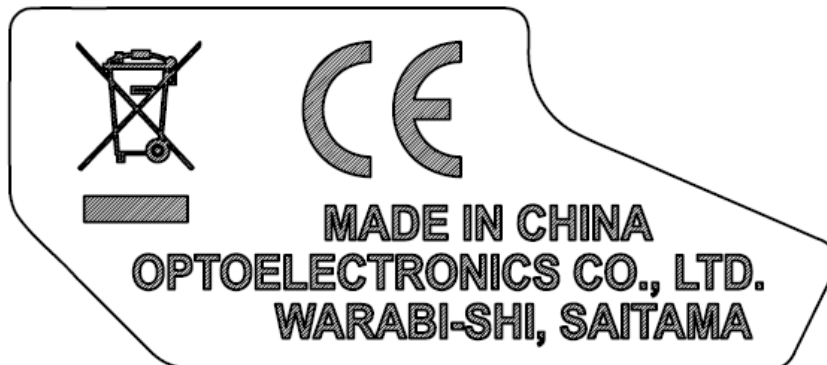


Figure 25: Grip Label R

<Product Label 3>

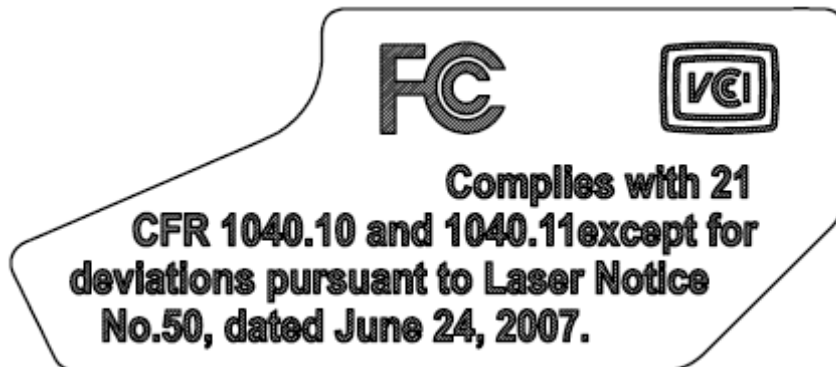


Figure 26: Grip Label L

12. Packaging Specifications

12.1. Individual Packaging Specification

Put the scanner in a protection poly bag and place it in a box.
Assembled package size: 260 x 120 x 105 (WDH mm)

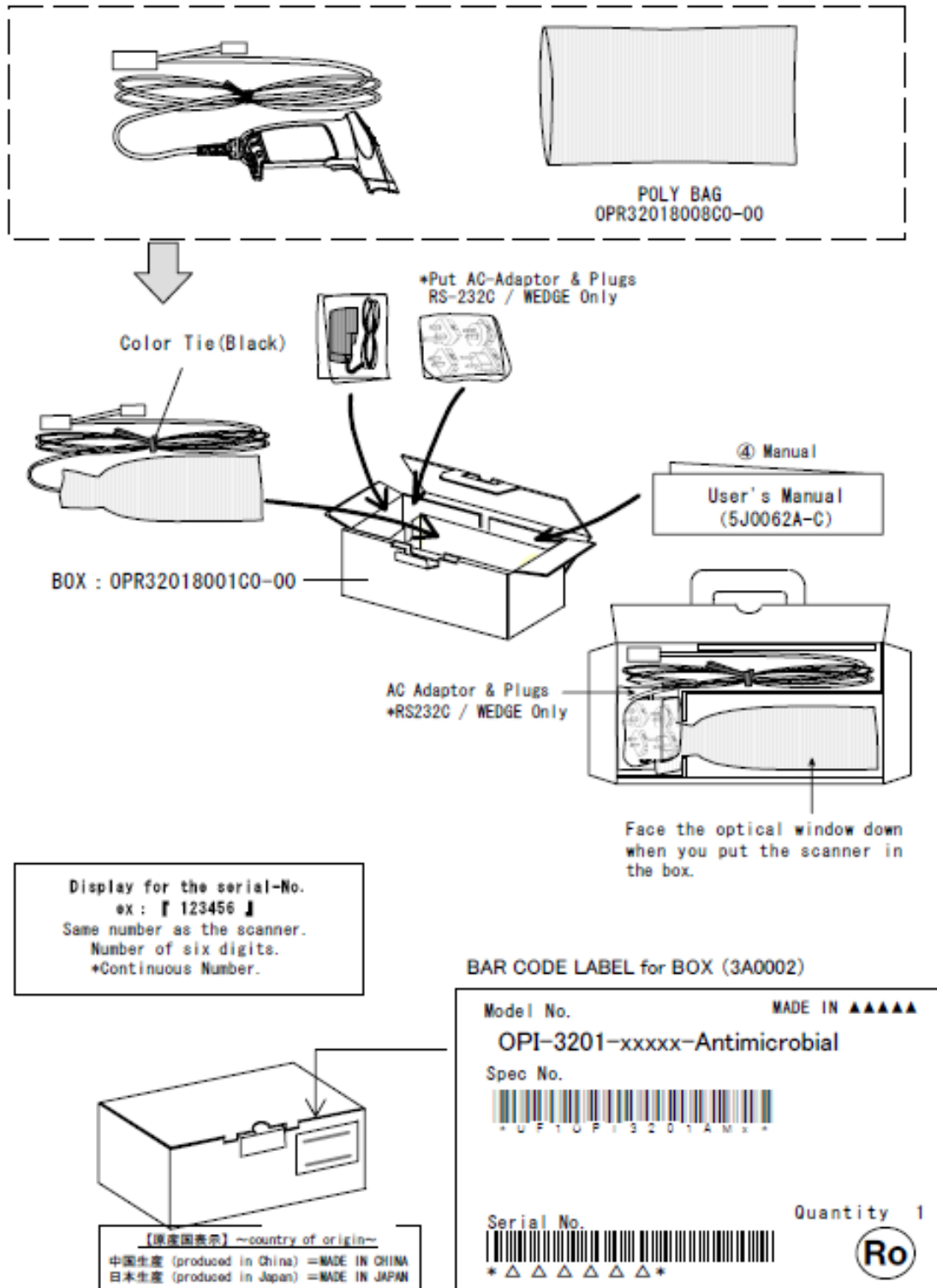


Figure 27: Individual Packaging

12.2. Collective Packaging Specification

Assembled package size: 550 x 630 x 350 (WDH mm)

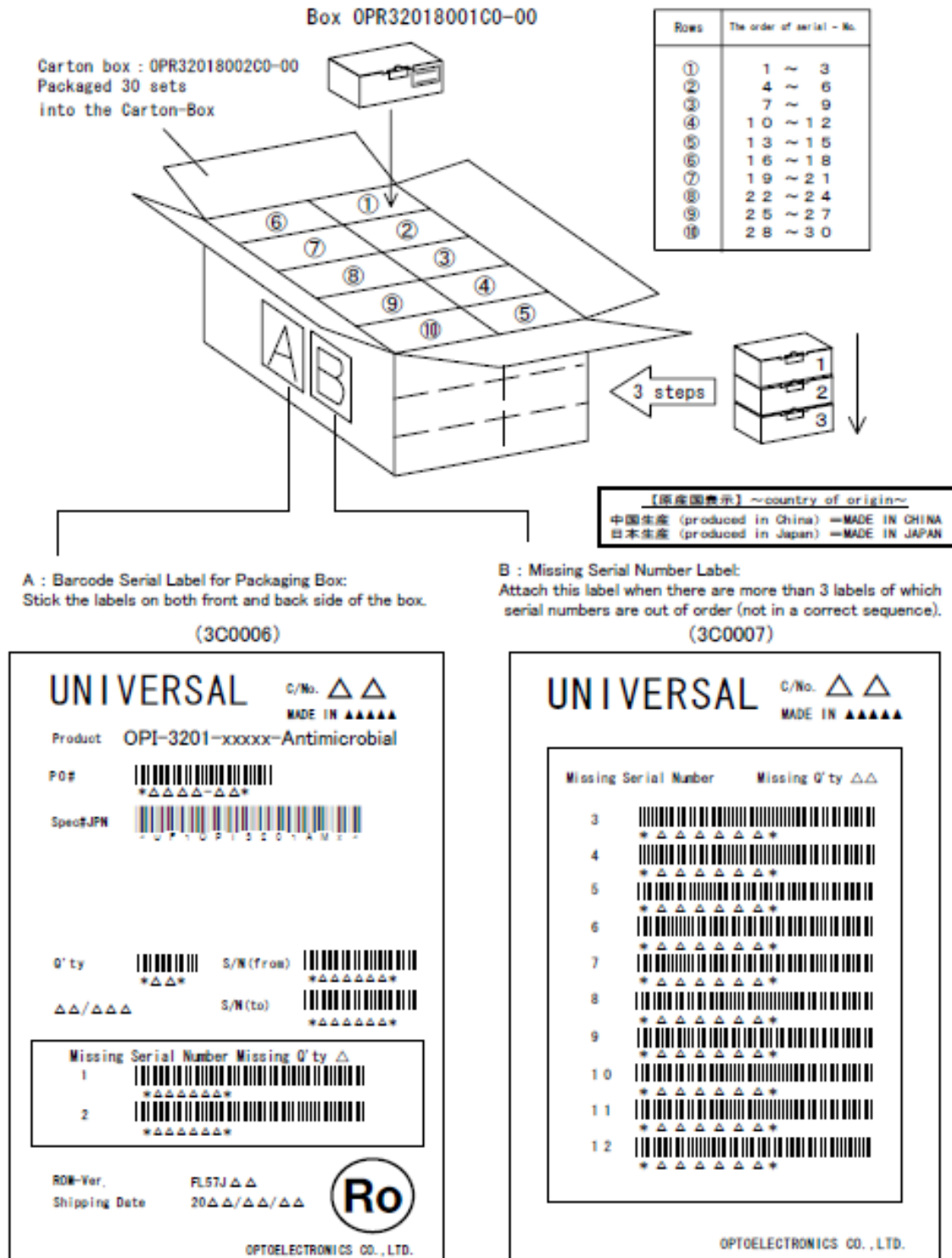


Figure 28: Collective Packaging

Note: 'Ro mark' on the trays and the boxes for the product indicates that the product is RoHS compliant, which is declared by Optoelectronics Co., Ltd.

13. Environmental Specifications

The power-supply voltages are as follows, unless otherwise stated separately:
RS-232C: 6.0 V, Wedge/USB: 5.0 V

13.1. Operating Temperature and Humidity

Temperature : -5 ~ 50°C (excluding AC adapter)
Humidity : 5 ~ 85%RH (no condensation, no frost)

13.2. Storage Temperature and Humidity

Temperature : -20 ~ 60°C (excluding AC adapter)
Humidity : 5 ~ 85%RH (no condensation, no frost)

13.3. Ambient Light Immunity

Scanning performance is guaranteed when the range of illumination on a barcode surface is the following values.

Incandescent light : 0 ~ 10,000 lx
Fluorescent light : 0 ~ 10,000 lx
Sunlight : 0 ~ 100,000 lx

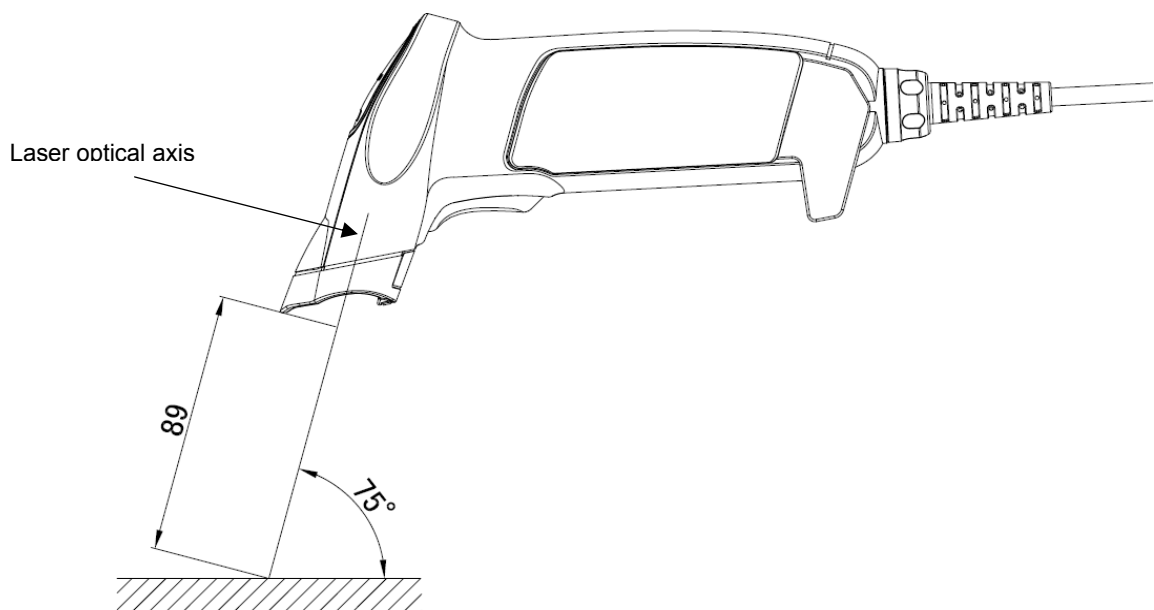


Figure 29: Ambient Light Immunity

<Conditions>

Barcode Test Sample	PDF417 specified in Chapter 7. (Resolution 0.254 mm, PCS 0.9)
Distance	89 mm from the front edge of the scanner
Angles	Pitch: $\alpha = 0^\circ$, Skew: $\beta = 15^\circ$, Tilt: $\gamma = 0^\circ$
Curvature	$R = \infty$

* Be sure that the direct light or specular reflection from the light source does not enter the light receiving section of the OPI-3201.

13.4. Dust and Drip Proof

IEC IP42 equivalent

Protection against solid objects: Level 4

Protected against solid objects greater than 1.0 mm

Protection against liquids: Level 2 (JIS IPX2)

Protected against dripping water from the vertical when tilted up to 15°

13.5. Cable Strength

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

Cable Strength Test: Affix the scanner to an immovable object and pull it using a force of 24.5 N (2.5 kgf static loading) for 1 second. Repeat this 20 times continuously.

13.6. Cable Bending Strength

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

Cable Bending Test: Add a load of 4.9 N (500 gf) to a cable and bend it at an angle of 90° to both right and left. Repeat this 1 million times continuously.

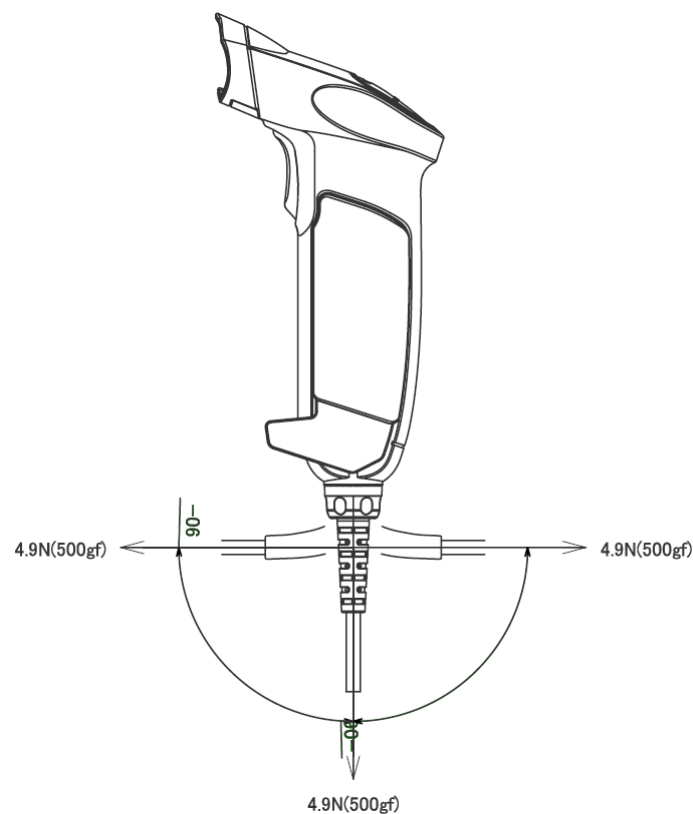


Figure 30: Cable Bending

13.7. 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 10Hz to 100Hz at an accelerated velocity of 19.6m/s² (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.

13.8. 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 10Hz to 100Hz at an accelerated velocity of 19.6 m/s² (2.0 G) for 30 minutes (60 minutes for a cycle) in individually packaged state. Repeat this in each X, Y and Z direction.

13.9. Drop Impact Strength (without packaging)

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

Drop test: Drop the scanner three times (15 times in total), at each 5 face, from a height of 150cm onto a concrete floor as shown below.

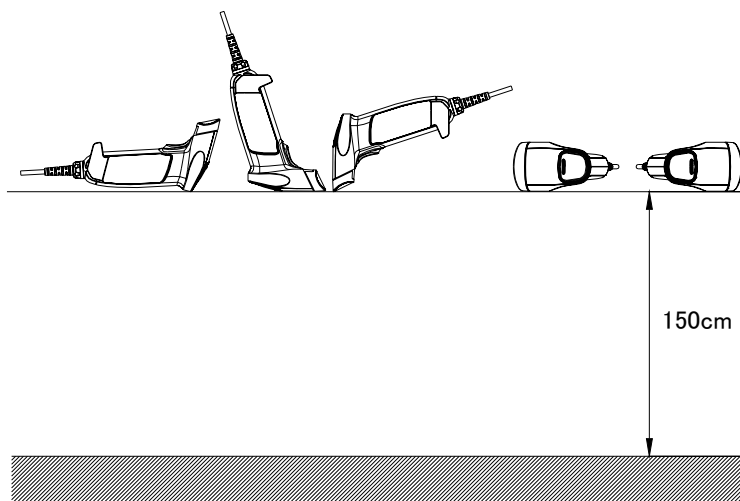


Figure 31: Drop Test

13.10. Drop Impact Strength (in individual packaging)

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

Drop test: Drop an individually packaged scanner 10 times in total, at any of 1 corner, 3 edges, and 6 faces, from a height of 150 cm onto a concrete floor.

13.11. Electrical Specifications

Withstand Voltage	: AC 1500 V/ per 60 seconds, 10 mA or less
Insulation Resistance	: DC 500 V, 2 MΩ or higher
Current Leakage	: 250 μA or less / AC 250 V 60 Hz
Power Line Noise Immunity	: ±1 kV or lower
Electrostatic Discharge Immunity	: No destruction found ±15 kV (air or direct discharge) No malfunction found ±10 kV (air or direct discharge), ±6 kV (contact, direct or indirect discharge)

*Note: Testing method is compliant with IEC-61000-4-2. (150 pf, 330 ohm)

14. Reliability

MTBF (Mean Time Between Failures)	50,000 hours
For Camera module	10,000 hours

15. Regulatory Compliance

15.1. LED Safety

IIEC 62471-1:2006 Exempt Risk Group
JIS C 6802:2005 Class 1
IEC 60825-1+A2:2001 Class 1
CDRH Class 1

15.2. Laser Safety

JIS C 6802:2005 Class 1
IEC 60825-1+A2:2001 Class 1
CDRH Class 1

15.3. 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.

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.

16. RoHS

The OPI-3201 is compliant with RoHS.

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

17. Precautions

17.1. 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.

17.2. Handling

Handle this product carefully. Do not 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 swing the cable around.
- Do not place this product under or between any heavy items.

(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.
- Do not bend the cable at extremely low temperature.

(3) Foreign Materials:

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

(4) Others

- Do not insert and remove a cable while the power is being supplied.
- 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 environments when placed near a flickering light, such as a CRT (computer monitor, television, etc.).

18. Auto Trigger

The OPI-3201 can be set to auto trigger mode. This means that the scanner starts scanning automatically when it detects a change in brightness that occurs when a bar code label is presented in front of it.

18.1. Outline of Operation

In auto trigger mode, the scanner captures a barcode image using the ambient light and detects the brightness of multiple bright / dark parts in the detection area of the image (a shaded area in the figure below). The scanner constantly monitors the areas to see if the brightness is changed. When the brightness variations at regular time intervals in either area is larger than the threshold value, the scanning operation (single read) starts. The scanning continues until the elapse of the specified read time. When reading succeeded, the scanner goes back to the auto trigger state.

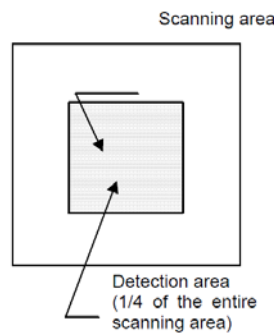


Figure 32: Detection Area

18.2. Specifications

Trigger is enabled when inserting a gray-colored paper on a black backing paper.
Trigger is also enabled when inserting a black-colored paper on a gray backing paper.

<Conditions>

- Paper used : Black paper from Glory called as Black 010010016
Gray paper from Glory called as Silver-gray 010010016
- Ambient Light : 300 lx or higher
- Size of Backing Paper : Larger than the scanning area
- Size of Detected Paper : Larger than the detecting area
- Moving Speed of Detected Paper : 105 mm/second or slower
- Ambient Temperature and Humidity : Room temperature and room humidity

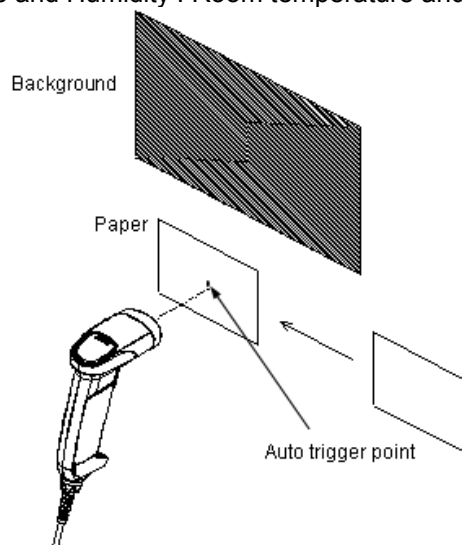


Figure 33: Auto Trigger

18.3. Settings

(1) Enable / Disable setting of auto trigger

Enable Auto Trigger



@MENU_OPTO@ZZ@+I@ZZ@OTPO_UNEM@

Disable Auto Trigger (default)



@MENU_OPTO@ZZ@+F@ZZ@OTPO_UNEM@

(2) Read time options

Set the read time after enabling the auto trigger. The read time is the length of period that the reader is ON after auto triggered. To configure the read time, read the menu labels “Set (ZZ)”, “Read time” and “End (ZZ)” listed in the table below. The default is 2 seconds. Selecting a read time of 0 seconds means that the reader will stays ON by pressing the trigger switch.











* Transition to a “waiting to scan” state

After a lapse of 30 seconds in scan state after auto triggered, the laser aiming will turns off and only the illumination LEDs will blink. However, the scan state continues all this time.

Functions	Menu bar code	Functions	Menu bar code
SET	Z Z	6 seconds	Y 6
0 seconds	Y 0	7 seconds	Y 7
1 second	Y 1	8 seconds	Y 8
2 seconds	Y 2	9 seconds	Y 9
3 seconds	Y 3	Indefinitely	Y M
4 seconds	Y 4	Read time * 10	Y L
5 seconds	Y 5	END	Z Z

(3) Multiple read reset time options

This option allows you to configure the number of frames that the scanner should be pointed away from the label before it can decode the same label again.
To configure the multiple read reset time, read the menu labels “Set (ZZ)”, “Number of frames” and “End (ZZ)” listed in the table below. The default is 6 frames.

Functions	Menu bar code	Functions	Menu bar code
SET		5 frames	
1 frame		6 frames	
2 frames		7 frames	
3 frames		Indefinitely	
4 frames		END	

(4) Auto trigger sensitivity options

This option allows you to configure the threshold level of the scanner to detect the dark pixels and light pixels.

**High Sensitivity
(default)**



@MENU_OPTO@ZZ@XMF
@ZZ@OTPO_UNEM@

Normal Sensitivity



@MENU_OPTO@ZZ@XMH
@ZZ@OTPO_UNEM@

Low Sensitivity



@MENU_OPTO@ZZ@XMJ
@ZZ@OTPO_UNEM@

* When using the auto trigger function, it is recommended to fully confirm the performance under real operating conditions with bar codes, 2D codes, background and operating environments (ambient light etc.) that are actually used.

***Note**

When scanning a barcode with low resolution from a distance, the scanner may be considerably affected by ambient lights other than the brightness of the barcode (brightness of detecting field) and start scanning.

18.4. Auto Trigger Activation Conditions

Auto trigger can be enabled in 2 different ways:

- Stand detection mode:
Auto trigger is activated automatically when the scanner is inserted into the stand.
- Normal auto trigger mode:
Auto trigger is activated all the time.

Both can be set in the following procedures.

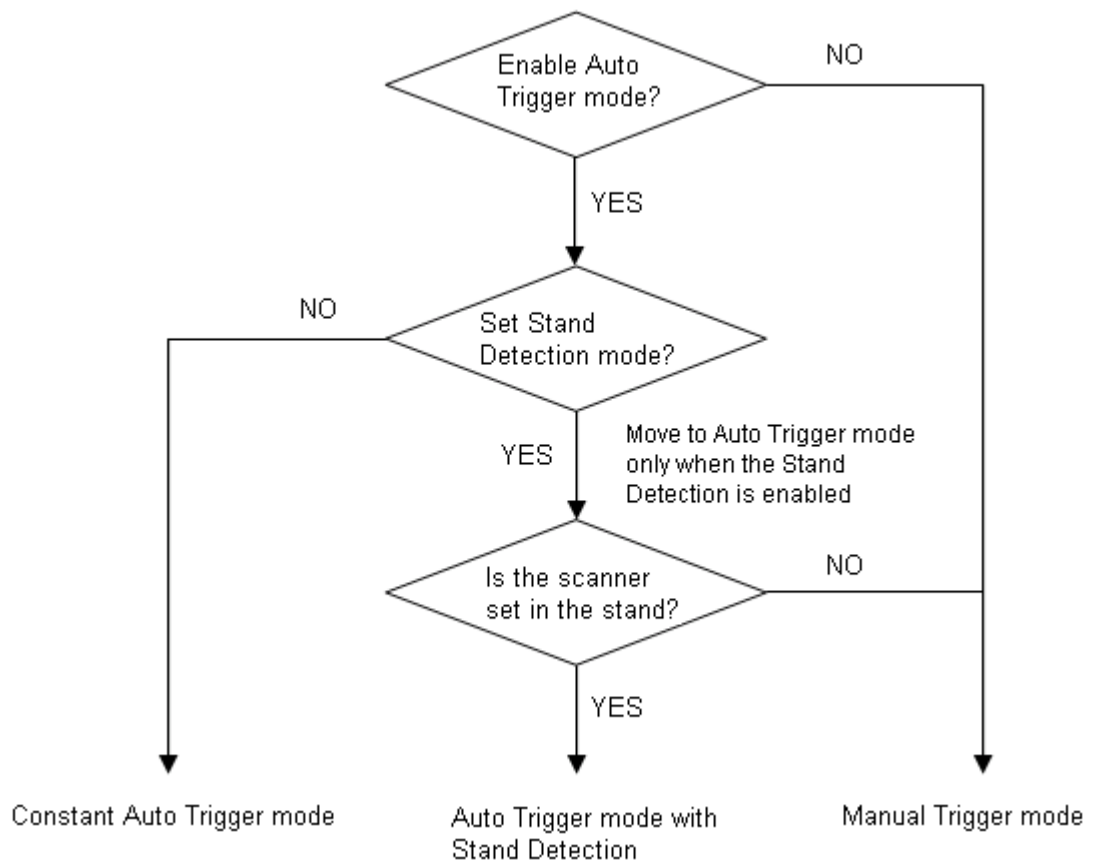


Figure 34: Auto Trigger Operation Flow

1. Auto Trigger with Stand Detection

When the scanner detects the stand when it is placed into it, the auto trigger is automatically enabled in this mode.

When the scanner is used without the stand, the auto trigger is disabled and only the manual trigger is enabled.



@MENU_OPTO@ZZ@+I@*4
@ZZ@OTPO_UNEM@

2. Use auto trigger constantly



@MENU_OPTO@ZZ@+I@*5
@ZZ@OTPO_UNEM@

2. Use manual trigger only (default)



@MENU_OPTO@ZZ@+F@*5
@ZZ@OTPO_UNEM@

* A hole device and a magnet are used for stand detection operation. Therefore, auto trigger may get activated when there is a magnetic substance near by.

19. Accessories

AC adapter

The OPI- 3201 with RS-232C serial interface is shipped with a dedicated AC adapter “Universal AC Adapter Kit.” Plug connectors can be changed for each region. See Appendix 2 for the detailed view.

Item		Specifications
Model Name		SFP0602000P-PSE
Dimensions		47.5 x 28.0 x 75.0 (WDH mm)
DC Output Cable Length		1.8 m
Input Spec	Voltage Range	AC 90 ~ 265 V
	Supply Current	0.5 A max
Output Spec	Voltage Range	5.7 ~ 6.3 V
	Maximum Current	2 A max
Operating Temperature		0 ~ 40°C

Appendix 1: Mechanical Drawings

Dimensions: 56.0 × 112.3 x 136.9 (WDH mm, except protruding portion)

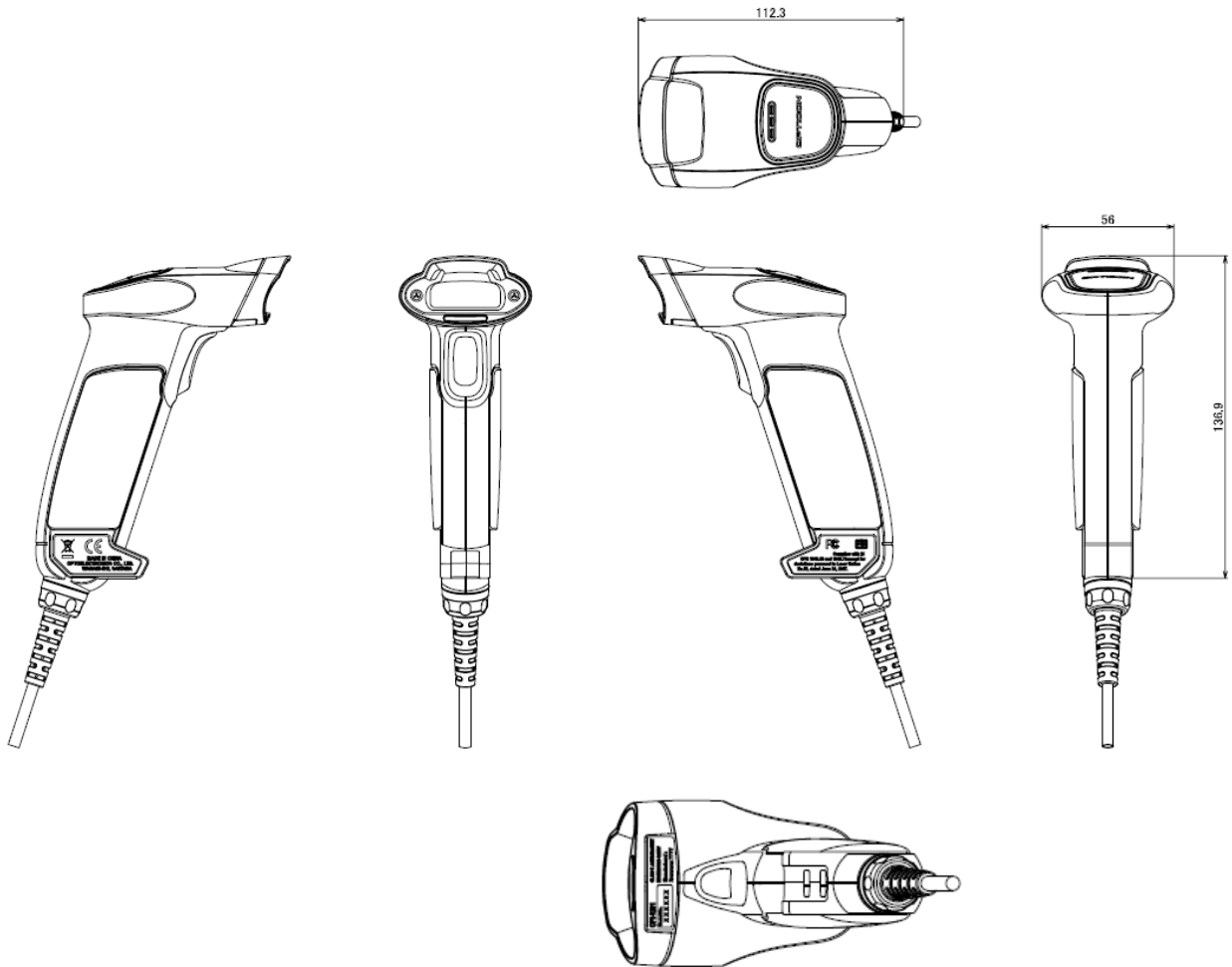


Figure 35: Mechanical Drawing

Appendix 2: Detailed View of AC Adapter

SFP0602000P-PSE

[Unit: mm]

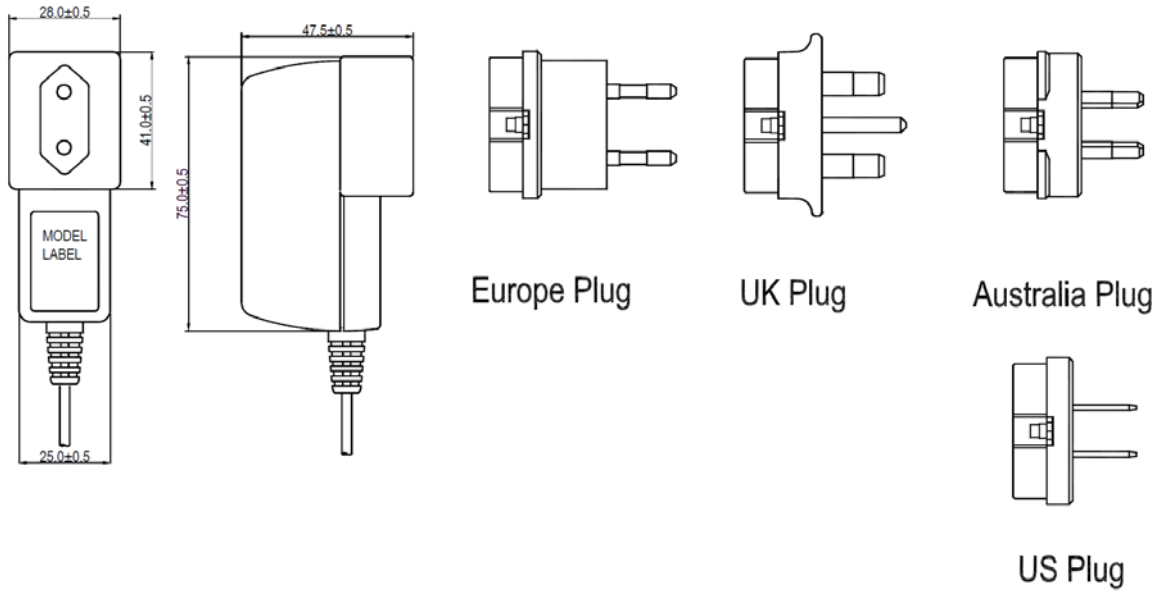


Figure 35: AC Adapter (input side)

Note: The polarity of the center of DC jack is plus (+).

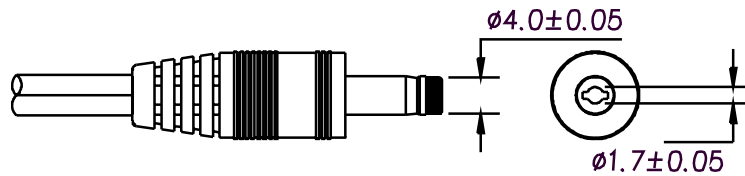


Figure 36: AC Adapter (output side: DC jack)