

OPTICON

2D Imager Scanner

OPI-3601



This manual provides specifications for the OPI-3601 handheld 2D imager scanner.

Specifications Manual

All information subject to change without notice.

Document History

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1. Abstract

This manual provides specifications for the OPI-3601 handheld 2D imager scanner.

2. Overview

The OPI-3601 is a handheld 2D imager scanner that enables high speed scanning of standard linear (1D) and 2D symbologies. Main features of the OPI-3601 are as follows:

- High-speed scanning
Extremely high speed performance ensures stress free scanning and fast response without being affected by hand movement and light conditions.
- Auto trigger, moving object scanning
With the use of a dedicated stand, the scanner is automatically triggered and a moving target can be detected automatically and scanned instantaneously.
- Editing function
A new function "Data Editing Program" captures up to 16 codes on multiple images simultaneously in one go. Output editing process, such as GS1 format, also can be set easily.
- World's most compact 2D scanner in its class
The OPI-3601 offers ultra-compact size and easy operation.
- LED aiming
A sharp single line of green LED makes it easy to aim the scanner while providing safety and long-life.
- Antimicrobial coating
Special antimicrobial treatment is applied to the chassis, and alcohol can be used to clean the scanner (except for the scanning window and the logo panel).
- Various interfaces
Four types of interfaces, RS-232C, Keyboard Wedge PS/2, USB-HID, and USB-COM, are supported.
- RoHS compliance
The OPI-3601 is a RoHS compliant product, which is declared by Optoelectronics Co., Ltd.

* Refer to "OPI-3601 User's Manual" for supported codes and commands.

3. Basic Specifications

Item			Specification		Note
Control Section	CPU		CPU: ARM-926EJ-S Core: 400 MHz		
	SDRAM		256 Mbits (2 M × 4 Banks × 32 Bits)		SDCLK: 133 MHz
	Flash ROM		16 Mbits (1 M × 16 Bits) Flash Memory		
Interface	RS-232C		300 bps ~ 115200 bps		Default: 9600bps
	USB		USB2.0 Full-Speed 12 Mbps (HID/COM)		
	Wedge		PS/2 Keyboard (selectable 'with or without keyboard connection')		
Optical Section	Scanning method		WVGA (0.36 million-pixel) CMOS area sensor		Frame rate: 60 fps
	Scanning light source		2 red LEDs		
	Aiming light source		1 green LED		
	Effective pixels		0.36 million pixels (H: 752 x V: 480)		
	View angle		Horizontal: about 40.6° Vertical: about 26.4°		
Supported 1D Symbolologies	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, S-Code, IATA, Code 93, Code 128, MSI/Plessey, UK/Plessey, TELEPEN, Matrix 2 of 5, Chinese Post Matrix 2 of 5, Code 11, Korean Postal Authority code, Postal Code		
	Minimum resolution		Code 39 : 0.127 mm		PCS 0.9
	Curvature		Radius ≥ 16 mm (12-digit 0.15mm Codabar) Radius ≥ 20 mm (13-digit UPC)		PCS 0.9
	Wide Bar Code		Possible to read: Code 39 with 100 mm width and resolution 0.2mm (DOF: 135 mm)		
	Motion tolerance		Possible to read: UPC 100% moving at 2 m/s (DOF: 100 mm)		
	Depth of field (mm)	Code 39	Resolution (0.127)	65 ~ 105	
			Resolution (0.254)	45 ~ 185	
			Resolution (0.508)	50~ 250	
		Code 128	Resolution (0.2)	65 ~ 150	
		UPC	Resolution (0.33)	45 ~ 175	
GS1/Composite	Symbologies		GS1 DataBar, GS1 DataBar Limited, GS1 DataBar Expanded, Composite GS1-DataBar, Composite GS1-128, Composite EAN, Composite UPC		GS1 DataBar: formerly called "RSS"
	Minimum resolution		GS1 DataBar : 0.169 mm Composite Code: 0.169 mm		

Item			Specification		Note
Supported 2D Symbologies	Symbologies		PDF417, MicroPDF417, Codablock F, QR Code , Micro QR Code, DataMatrix (ECC 0 - 140 / ECC 200), MaxiCode (Modes 2 to 5), Aztec Code, Chinese Sensible Code		Disable Code 128 when Codablock F is enabled.
	Minimum resolution (mm)		PDF417 : 0.169 mm QR Code : 0.212 mm DataMatrix : 0.212 mm		PCS 0.9
	Depth of field (mm)	PDF417	Resolution (0.169)	60~ 120	PCS 0.9
			Resolution (0.254)	45 ~ 185	
		QR Code	Resolution (0.212)	70 ~ 95	
			Resolution (0.381)	35 ~ 165	
		DataMatrix	Resolution (0.254)	65 ~ 120	
Common	Scan angle		Pitch : ±40°		
			Skew : ±50°		
			Tilt : ±180°		
	Minimum PCS		0.3 or more		MRD: 32% or more
Imager	Image data format		Windows Bitmap, JPEG		Black spot may appear on images, however, it does not affect the scanning performance..
	Shades of gray		1024, 256, 16, 2		
	Range of output image		Select top/bottom (column) and left/right (row)		
	Resolution of output image		Full,1/2, 1/4		
	Interface of output image		RS-232C, USB-COM		
	Baud rate	USB-COM (full speed)		About 3 sec	Resolution: Full
		RS-232C (baud rate: 15.2 kbps)		About 40 sec	
Power	Range of operating voltage		4.5 ~ 5.5 V: USB 5.4 ~ 6.6 V: RS-232C / Wedge PS/2 (external power supply)		RS-232C / Wedge (external power supply): Dedicated AC adapter 6.0 V ±5%
	Current consumption (RS-232C)	Reading	300 mA (max)		At 6.0 V, room temperature/ humidity,
		Standby	75 mA (max)		
Environmental Specifications	Temperature	Operating	-20~ 50°C		AC adapter: 0 ~ 40°C
		Storage	-20 ~ 60°C		
	Humidity	Operating	5 ~ 90% (no condensing, no frost)		
		Storage	5 ~ 90% (no condensing, no frost)		
	Ambient light immunity	Fluorescent	10,000 lx or less		UPC 100% Optical axis angle: 75° Distance: 100 mm
		Sunlight	100,000 lx or less		
	Vibration		10 Hz ~ 100 Hz, acceleration of 19.6 m/s2, 60 minutes per cycle, repeat once in each X, Y and Z-direction		
	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 an Exempt Risk Group LED product.			
	LED safety		IEC 62471-1:2006 Exempt Risk Group	Peak Wavelength: 624 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	80% (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. 56.0 × 108.1 × 148.6 (WDH mm)
Weight		Approx. 85g	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 (max)	

4. Detailed View

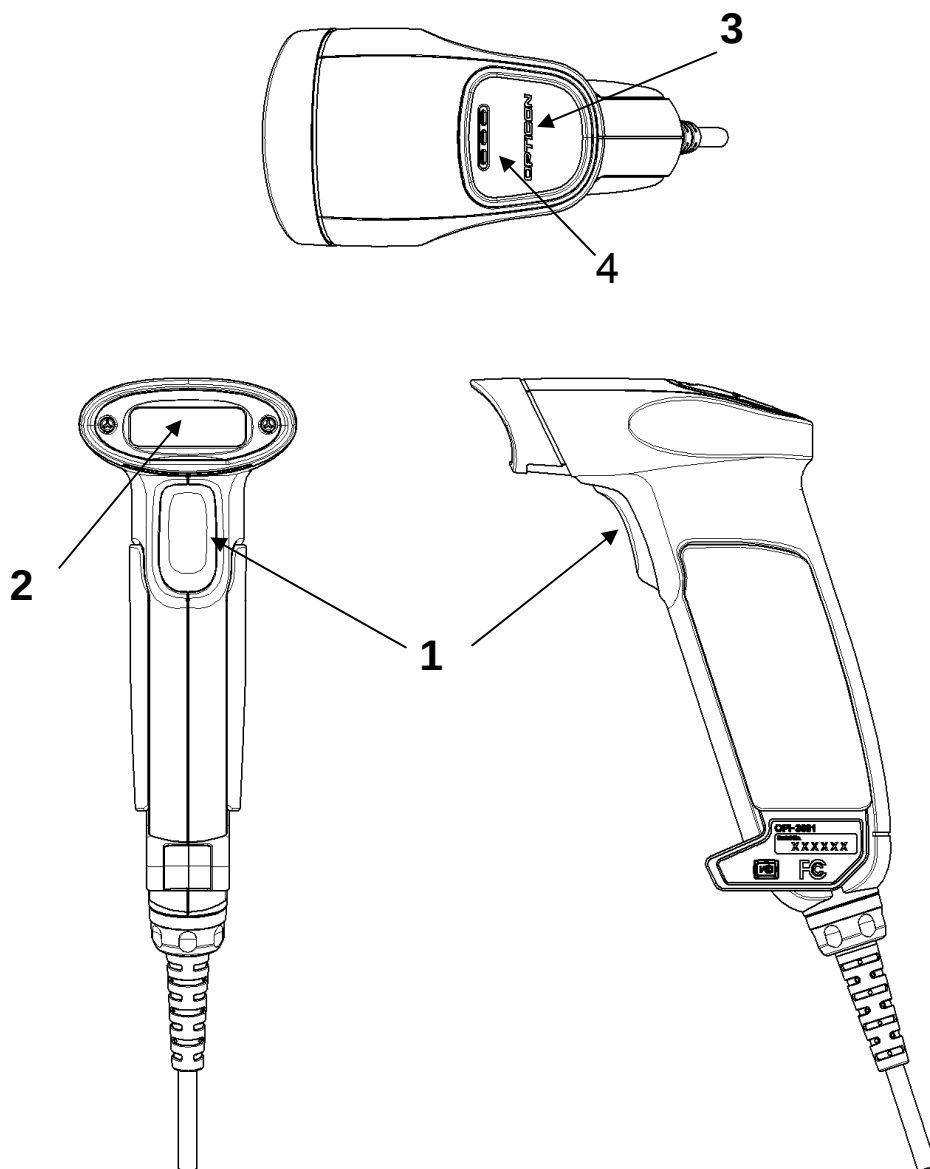


Figure 1: Detailed View of OPI-3601

No	Name	Description
1	Trigger Key	By pressing this key, the scanner starts taking an image from the scanning window and LED illumination is emitted to read 1D/2D codes.
2	Scanning Window	Light paths of the imager, LED illumination and LED aiming. Ensure that the lens is not exposed to dust and dirt before scanning.
3	Status LED	The operating statuses are indicated by different colors.
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

The OPI-3601 comprises 'Camera Module Section' with CMOS sensor, 'Decoder Section' for decoding 1D / 2D code data from a scanned image, 'Communication Control Section' to communicate with a host and 'Power Supply Section' for the main power supply conversion.

The USB model is bus powered and no adapter is needed. The RS-232C and Wedge PS/2 models need a dedicated adapter for DC 6.0 V power. Make sure not to insert and remove the power adapter when PC is on. It may cause the PC to malfunction.

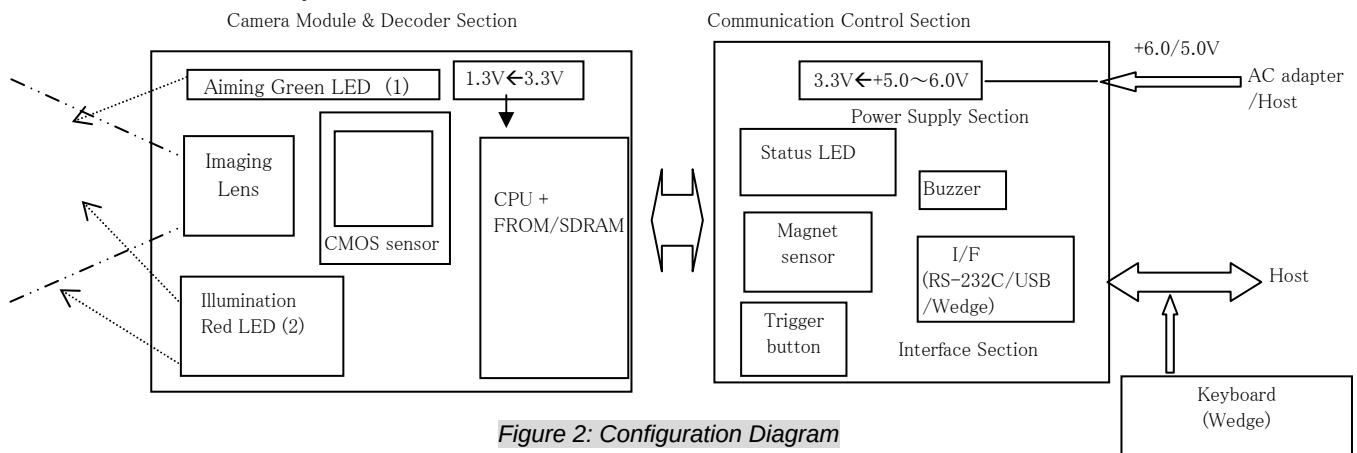


Figure 2: Configuration Diagram

5.1. AC Adapter Specifications

For RS-232C and Wedge PS/2 models

5.1.1. Input Specifications

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

5.1.2. Output Specifications

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

5.2. Wedge PS/2 Power Supply (Host)

Input power supply voltage : DC 5.0 V
Range of working voltage : 4.5 ~ 5.5 V
Power ripple : 100 mVp-p max (10 ~ 100 kHz, power supply voltage 5.0 V)
Current consumption : 100 mA (max) without main power supply (AC adapter)

- * Current consumption from the main power supply in standby state: 75 mA (max)
- * Current consumption from the main power supply during reading operation: 300 mA (max)
- * Keyboard operation is possible when the main power supply is off.
- * The current consumption was measured at 25°C.

5.3. USB Power Supply

Bus-Power Class : Hi-Power (500 mA max)
Current consumption : 75 mA (max) in stand-by mode
: 300 mA (max) during reading operation

- * The current consumption was measured at 25°C.

6. Optical Specifications

6.1. Basic Optical Specifications

Item		Characteristics
Scan method	CMOS area sensor (white / black)	-
Number of effective pixel	(Column) × (Row)	752 × 480 dots
Image capture speed (*1)	Frame rate	60 fps
Focal distance	Distance from the front edge of scanner	104 mm
View angle	Horizontal	Approx. 40.6°
	Vertical	Approx. 26.4°
Illumination light source (LED × 2)	Red LED	-
	Peak wavelength	617 nm
	Directivity angle: 2Φ 1/2 (*2)	60°
	Maximum radiation output (*3)	15000 mcd
Aiming light source	Green LED	-
	Peak wavelength	528 nm
	Maximum radiation output (*4)	18700 mcd

*1 The fastest speed of image capture

*2 Reference value extracted from the datasheet.

*3, *4 Reference value based on the datasheet (25°C, IF = 140 mA).

6.2. Aiming Pattern

The aiming is used for the following purpose:

1. Fill light to recognize the appropriate reading range.
2. Fill light when auto trigger is used.

The aiming specifications are as follows:

- An optical axis of imaging field of view and the center of horizontal aiming width coincide at a distance of $L=85\pm 20$ mm from the front edge of the scanner.
- The horizontal aiming width to the horizontal width of imaging field of view at a distance of $L=85$ is $80\%\pm 10\%$.

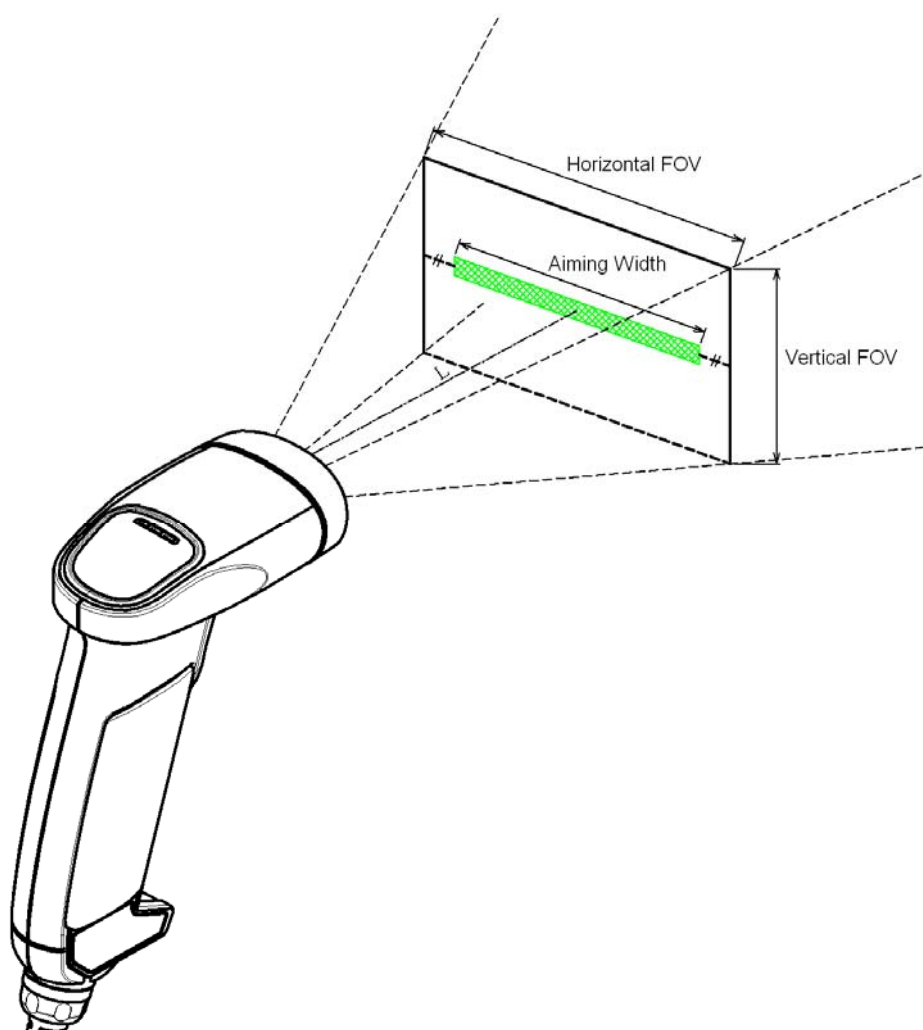


Figure 3: Aiming Pattern and Imaging Range

6.3. Imaging Range

The range is $\pm 5\%$ from the following values.

L: Distance from the front edge of scanner	[mm]	60	80	100	120	140	160
H: Horizontal imaging range	[mm]	66	82	97	111	125	136
V: Vertical imaging range	[mm]	42	52	62	72	82	93

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	100 ~200 lux (on the surface of a bar code)
Angles	Pitch: $\alpha = 0^\circ$, Skew: $\beta = 15^\circ$, Tilt: $\gamma = 0^\circ$
Curvature	$R = \infty$
Power Supply Voltage	5.0 V
PCS (1D and 2D)	0.9 or higher
Scanning Test	Accept the performance with 70% or more success rate for 10 tries of scan. One reading should be 2 seconds.
Barcode Test Sample (1D and 2D)	Specified below.

< Test chart >

For 1D codes, OPTOELECTRONICS test samples

For GS1 Databar, stacked codes and 2D codes, printed by a dedicated printer for bar code

7.1. Barcode Test Sample**1D Bar Codes****<Code 39>**

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.127 mm (5 mil)	Code 39	0.9	32 × 10	15
0.20 mm (7.9 mil)			100 × 10	31
0.254 mm (10 mil)			32.5 × 12	7
0.508 mm (20 mil)			36 × 25	4

<Code 128>

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.20 mm (7.9 mil)	Code 128	0.9	42 × 10	16

<UPC>

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.330 mm (13 mil)	12-digit UPC	0.9/0.3	31.5 × 25.0	12

<Codabar>

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.15 mm (6 mil)	Codabar	0.9	20 × 10	10

GS1 Databar/Composite**<GS1-limited>**

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.169 mm (6.7 mil)	Limited	0.9	12 × 1.5	14
0.169 mm (6.7 mil)	Limited-Composite	0.9	12 × 3.0	26

2D Codes**<PDF417>**

Resolution	Error Correction	PCS	Size (mm)	No. of Character
0.169 mm (6.7 mil)	Level-3	0.9	23 × 10	58
0.254 mm (10 mil)			35 × 15	

<QR Code: Model-2>

Resolution	Error Correction	PCS	Size (mm)	No. of Character
0.212 mm (8.4 mil)	M	0.9	6 × 6	44
0.381 mm (15 mil)			11 × 11	

<Data Matrix>

Resolution	Model	PCS	Size (mm)	No. of Character
0.212 mm (8.4 mil)	ECC200	0.9	5 × 5	40
0.254 mm (10 mil)			6 × 6	

* The size is outline dimensions excluding the quiet zones.

7.2. Scan Area and Depth of Field

The scan area is measured from the front edge of the scanner.

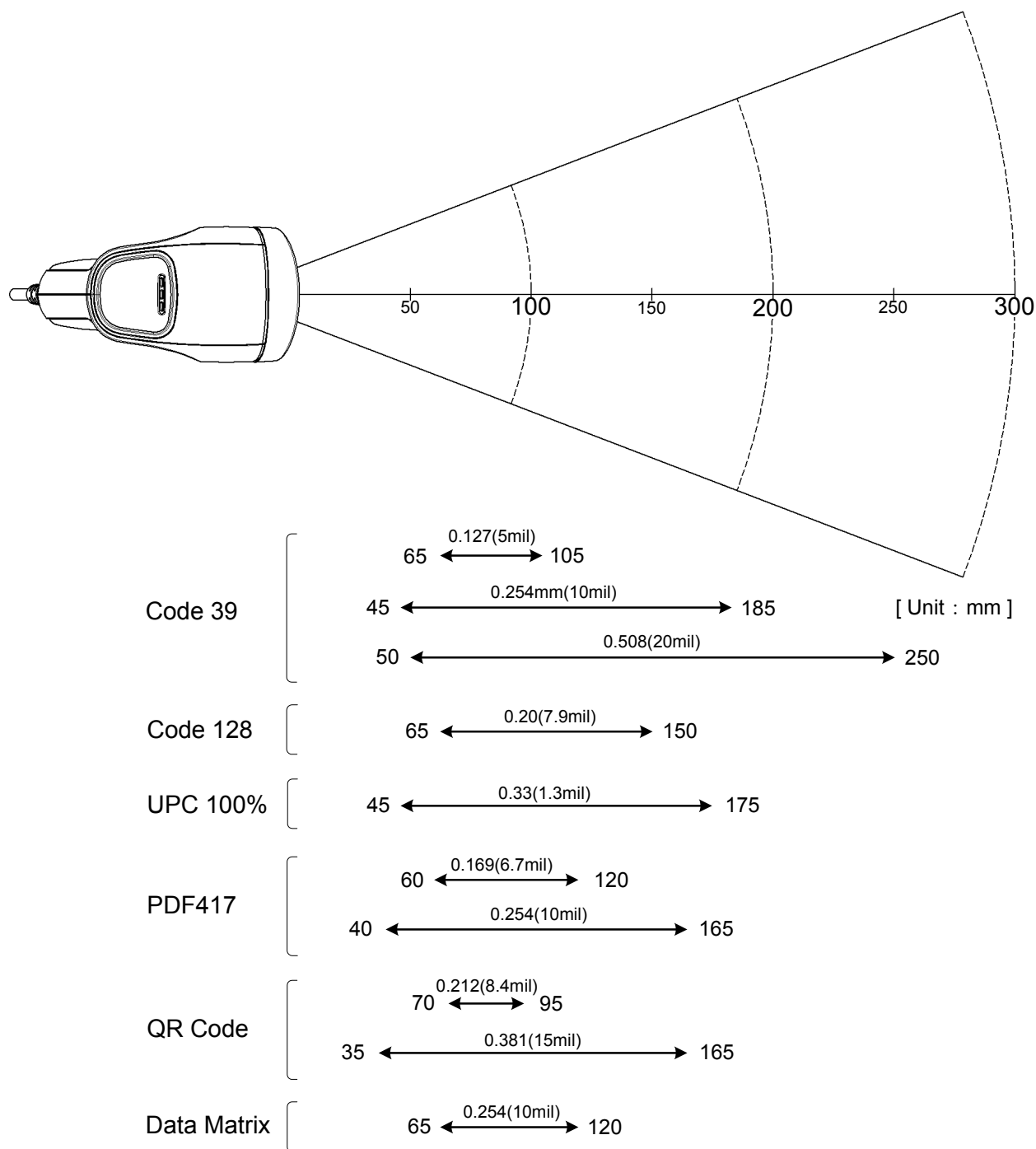


Figure 4: Scan Area and Depth of Field

7.3. Printed Contrast Signal (PCS)

0.3 or higher

<Conditions>

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

Distance : 105mm from the front edge of the scanner

Bar Code Sample : UPC specified in Chapter 8. (Resolution: 0.33 mm, PCS: 0.3)

MRD = Minimum reflectance of white bar - Maximum reflectance of black bar

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

7.4. Minimum Resolution

1D Code : 0.127 mm (5 mil) Code 39 specified in Chapter 7.1

GS1-Databar : 0.169 mm (6.7 mil) GS1 Databar Limited specified in Chapter 7.1

Stacked Code : 0.169 mm (6.7 mil) PDF417, GS1 Databar Limited Composite specified in Chapter 7.1

2D Code : 0.212 mm (8.4 mil) QR Code and Data Matrix specified in Chapter 7.1

<Conditions>

Bar Code Sample : The above codes specified in Chapter 7.1

Distance : 75 mm from the front edge of the scanner

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

Curvature : $R = \infty$

7.5. Wide Bar Code

Code 39 with width of 100 mm and resolution of 0.2 mm can be read

<Conditions>

Bar Code Sample : 0.20 mm Code 39 / PCS 0.9 specified in Chapter 7.1

Distance : 135 mm from the front edge of the scanner

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

Curvature : $R = \infty$

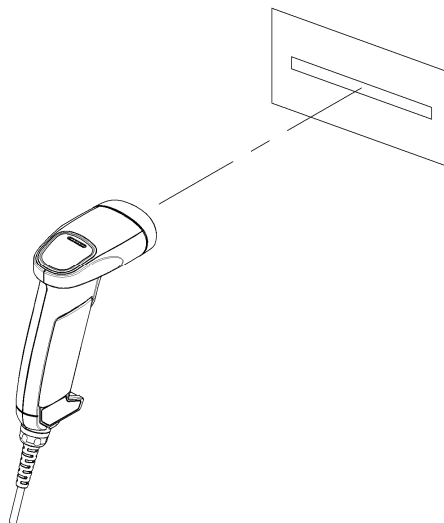


Figure 5: Wide Bar Code

7.6. Pitch, Skew and Tilt

Pitch : $\alpha = \pm 50^\circ$
 Skew : $\beta = \pm 50^\circ$
 Tilt : $\gamma = \pm 180^\circ$

<Conditions>

Bar Code Sample : 0.33 mm UPC specified in Chapter 7.1
 Distance : 105 mm from the front edge of the scanner
 Curvature : $R = \infty$

* For the pitch angle and tilt angle measurement, set the skew angle $\beta = +15^\circ$

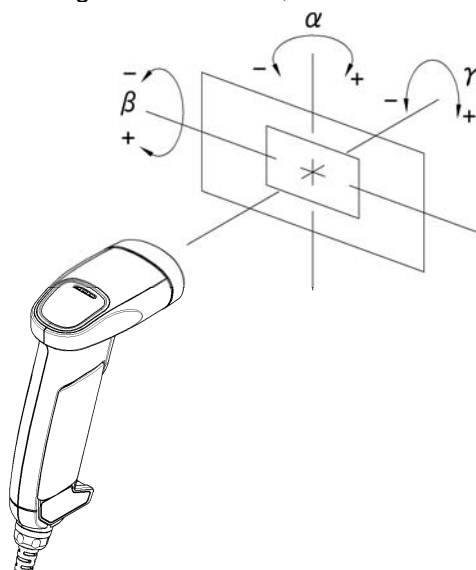


Figure 6: Pitch, Skew and Tilt

7.7. Curvature

0.33 mm 12-digit UPC : $R \geq 20 \text{ mm}$
 0.15 mm 10-digit Codabar : $R \geq 16 \text{ mm}$

<Conditions>

Bar Code Sample : 0.33 mm UPC, 0.15 mm Codabar specified in Chapter 7.1
 Distance : 85 mm from the front edge of the scanner
 Angle : $\alpha = 0^\circ$, $\beta = +15^\circ$, $\gamma = 0^\circ$

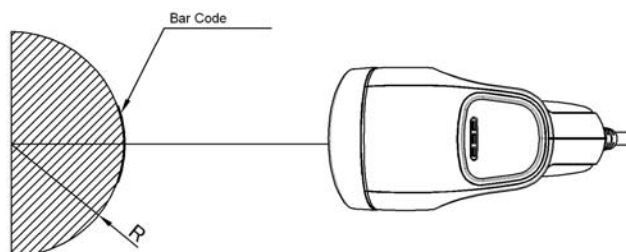


Figure 7: Curvature

Note: Scanning may fail due to the specular reflection of LED illumination when the reflectivity is high.

7.8. Auto Trigger

A dedicated stand contains a magnet and when the OPI-3601 is placed into this stand, it can detect this magnet and enters auto trigger mode. 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.

7.8.1. Stand Detection

“Stand detection - Auto trigger Flow”

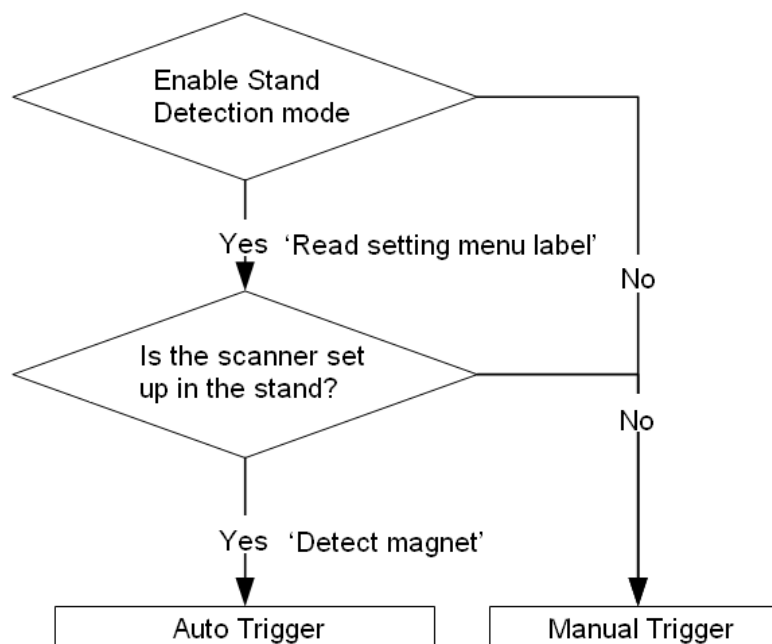


Figure 8: Stand Detection Flow

- * The dedicated stand needs to be purchased separately if auto trigger is used.
- * Auto trigger is disabled by default and needs to be enabled if it is used.

7.8.2. Auto Trigger Detection

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	: 500 ~ 1000 lux
Moving Speed of Detected Paper	: 2 m/second or slower
Ambient Temperature and Humidity	: Room temperature and room humidity

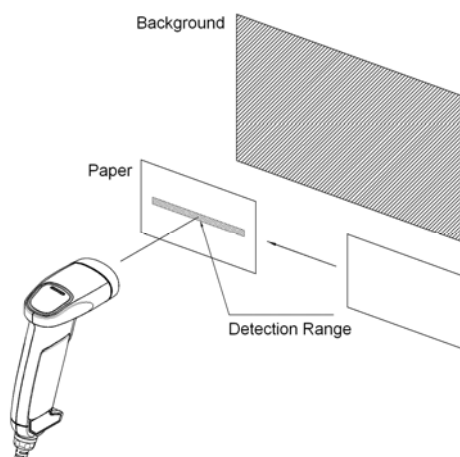


Figure 9: Auto Trigger

7.8.3. Motion Tolerance

UPC 100% can be read when it is moving at 2m/s.

<Conditions>

Ambient Temperature and Humidity	: Room temperature and Room humidity
Ambient Light	: 500 ~ 1000 lux
Distance	: 105mm from the front edge of the scanner
PCS (1D and 2D)	: 0.9 or higher
Bar Code Sample	: Refer to Chapter 7.1.

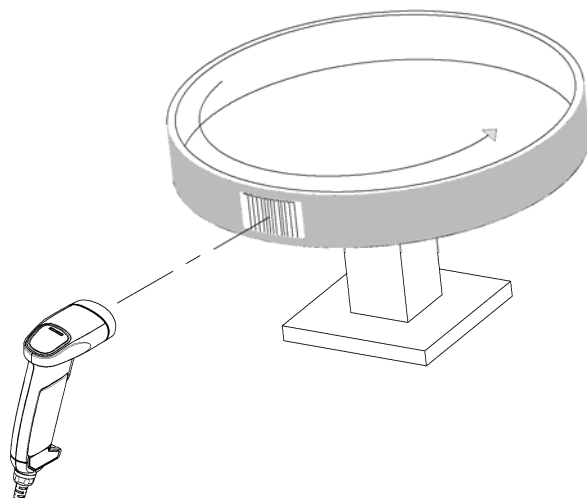


Figure 10: Motion Tolerance

Note: Scanning may fail due to the specular reflection of LED illumination when the reflectivity is high.

8. Interface Specifications

The OPI-3601 supports four types of interfaces; RS-232C, USB-HID, USB-COM and Wedge/PS2.

8.1. RS-232C

8.1.1. Communication Setting

Baud rate : 300 ~ 115200 bps
 Data length : 7 / 8 bits
 Parity bits : No / Even / Odd parity
 Stop bits : 1 / 2 bit

* Multi byte character data or images can be transmitted via RS-232C interface.

8.1.2. 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	Connected to pin 6
GND	5	
(NC)	6	Connected to pin 4
CTS	7	
RTS	8	
(NC)	9	Open (not connected)

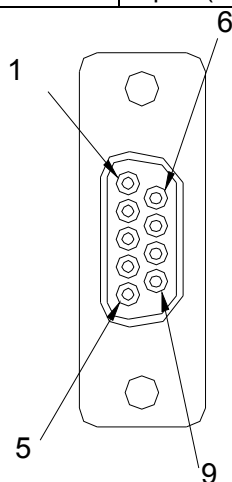


Figure 11: RS-232C Connector

8.1.3. RS-232C Interface Circuit

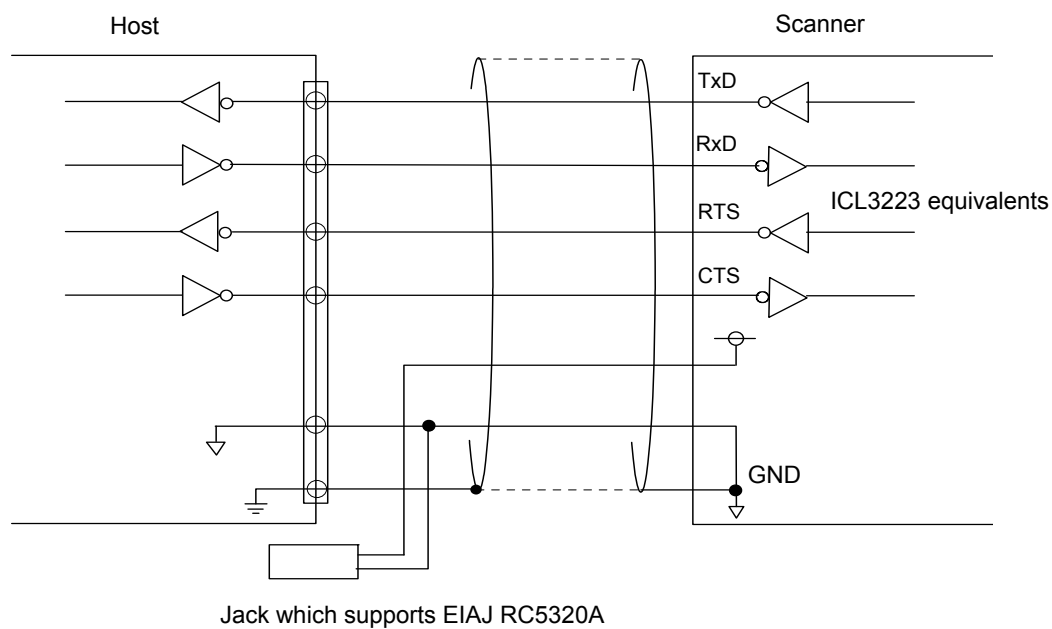


Figure 12: Interface Circuit

Connector : D-Sub 9pin, female
Power supply : EIAJ RC5320A (voltage classification 2) jack

8.2. USB

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.

* Multi byte character data or images can be transmitted via USB-COM interface.

8.2.1. USB Interface Specifications

Power supply : 500mA (High-power)
Speed : USB2.0 Full-speed (12 Mbps)
Interface : USB-HID / USB-COM (VCP)

* The USB model is bus powered and no AC adapter is required.

* Images cannot be transmitted via the USB-HID interface.

* Multi byte character data can be transmitted via USB-HID interface with settings. .

* Make sure to connect to a High-power bus (500 mA) USB terminal.

8.2.2. Connector

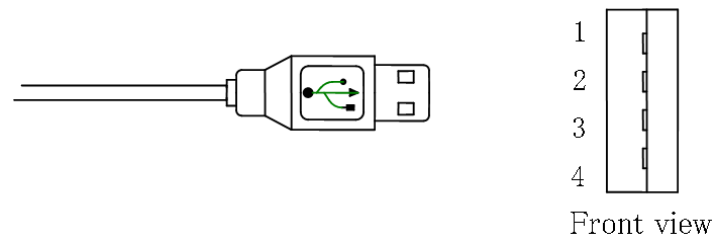


Figure 13: USB Plug (A)

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

8.2.3. USB Interface Circuit

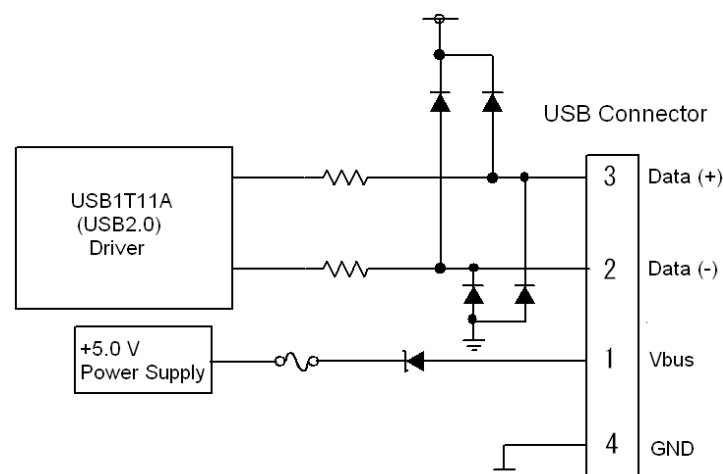


Figure 14: Interface Circuit (USB)

8.3. Wedge PS/2

8.3.1. How to Connect

- Connect the branch cable (without label on, 6-pin Mini-DIN female) to the OPI-3601 Wedge PS/2 interface cable connector (6-pin Mini-DIN male).
- Connect the branch cable connector (6-Pin Mini-DIN male) to the host keyboard connector.
- 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.

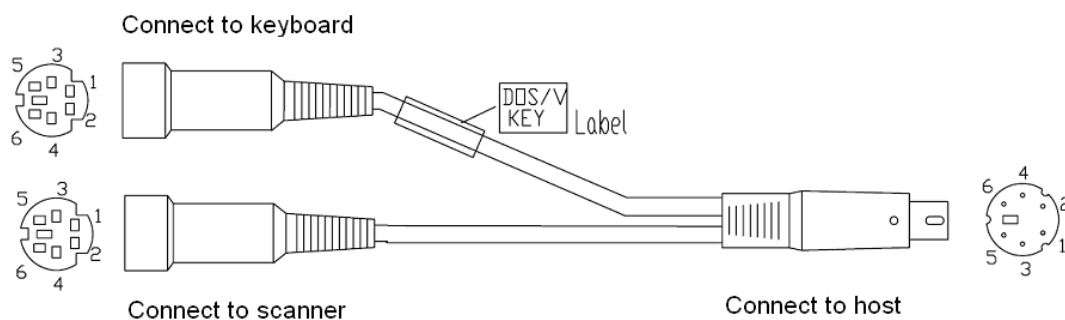
8.3.2. Caution

- 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.
- Images cannot be transmitted via this Wedge PS/2 interface.
- Multi byte character data can be transmitted via this Wedge PS/2 interface with settings.
- Do not start any scanning operation or keyboard operation before the OS of the host computer is fully activated.

8.3.3. Pin Assignment

Wedge PS/2 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 PS/2 Interface Cable for the OPI-3601

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

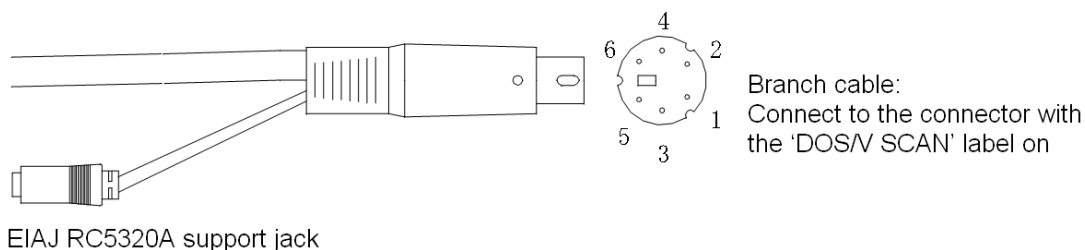


Figure 15: Pin Assignment (Wedge PS/2)

9. Cable and Connector

9.1. RS-232C

Weight: approx. 90 g

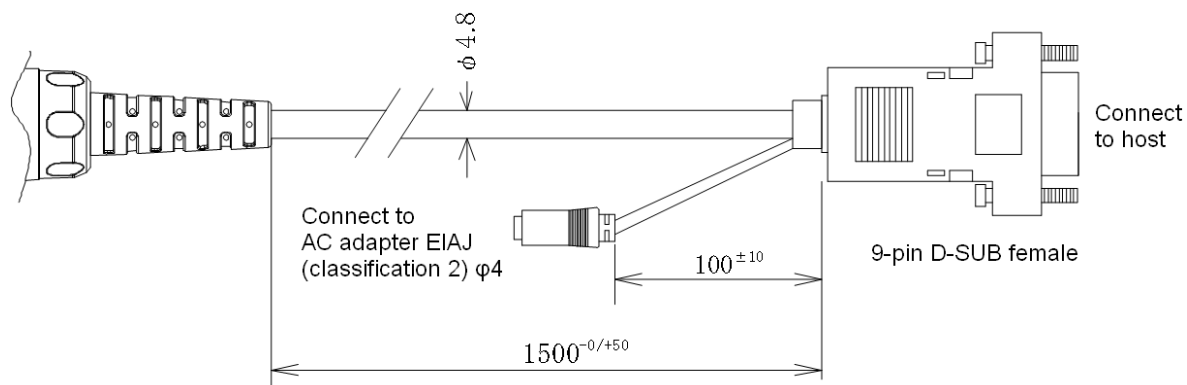


Figure 16: Cable (RS-232C)

9.2. USB

Weight: approx. 70 g

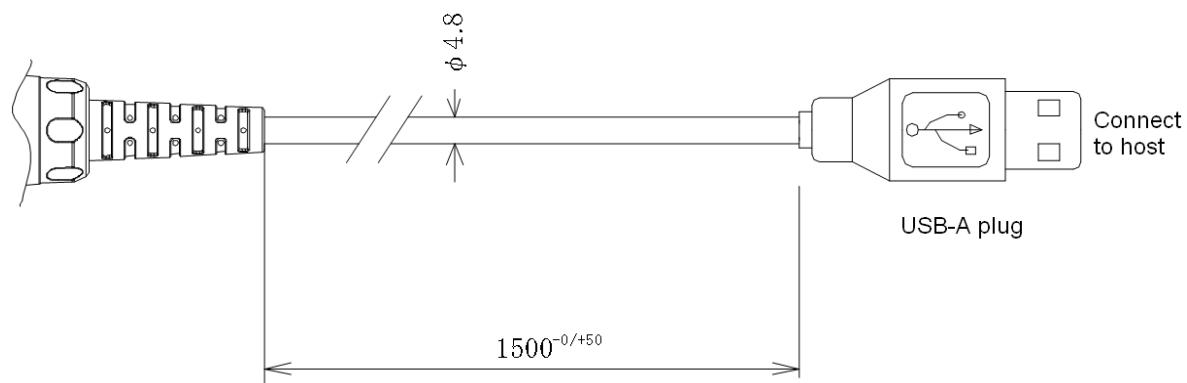


Figure 17: Cable (USB)

9.3. Wedge PS/2

9.3.1. Wedge PS/2 Straight Cable

Weight: approx. 75 g

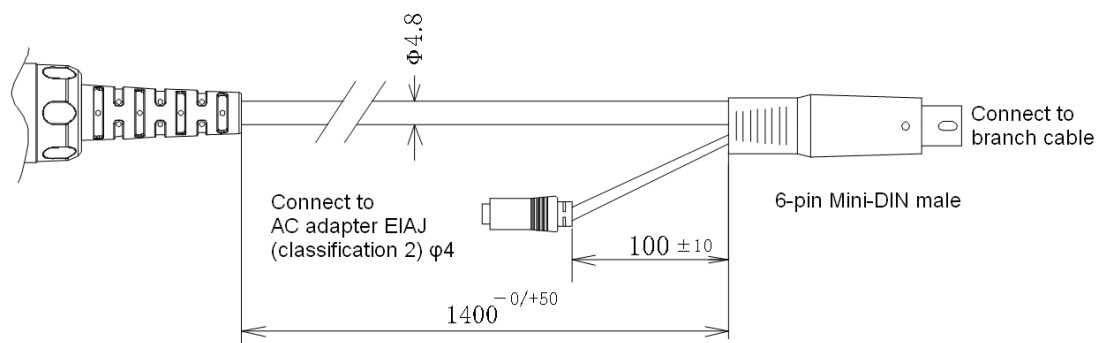


Figure 18: Cable (Wedge PS/2)

9.3.2. Wedge PS/2 Branch Cable

Weight: approx. 25 g

This cable is required when connecting both the scanner and the keyboard to the host.

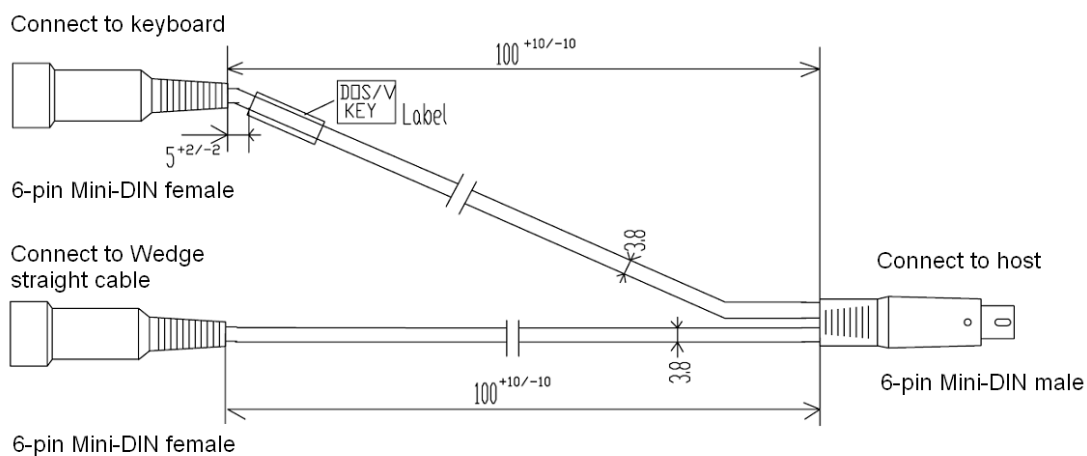


Figure 19: Branch Cable (Wedge PS/2)

10. Environmental Specifications

10.1. Temperature

Scanning performance is guaranteed when the range of ambient temperature around the scanner is the following values:

Operating Temperature : -20 ~ 50 °C
Storage Temperature : -20 ~ 60 °C

<Conditions>

Bar Code Sample : 0.33 mm UPC specified in Chapter 7.1
Distance : 105 mm from the front edge of the scanner
Angle : $\alpha = 0^\circ$, $\beta = +15^\circ$, $\gamma = 0^\circ$
Curvature : $R = \infty$
Scanning Test : Read at intervals of 300 ms

10.2. Humidity

Scanning performance is guaranteed when the range of ambient humidity around the scanner is the following values:

Operating Humidity : 5 ~ 90% RH (no condensation, no frost)
Storage Humidity : 5 ~ 90% RH (no condensation, no frost)

<Conditions>

Bar Code Sample : 0.33 mm UPC specified in Chapter 7.1
Distance : 75 mm from the front edge of the scanner
Angle : $\alpha = 0^\circ$, $\beta = +15^\circ$, $\gamma = 0^\circ$
Curvature : $R = \infty$

10.3. Ambient Light Immunity

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

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

<Conditions>

Bar Code Sample : 0.33 mm UPC specified in Chapter 7.1
Distance : 100 mm from the front edge of the camera module
Angle : $\alpha = 0^\circ$, $\beta = +15^\circ$, $\gamma = 0^\circ$
Curvature : $R = \infty$
Power Supply Voltage : 5.0 V

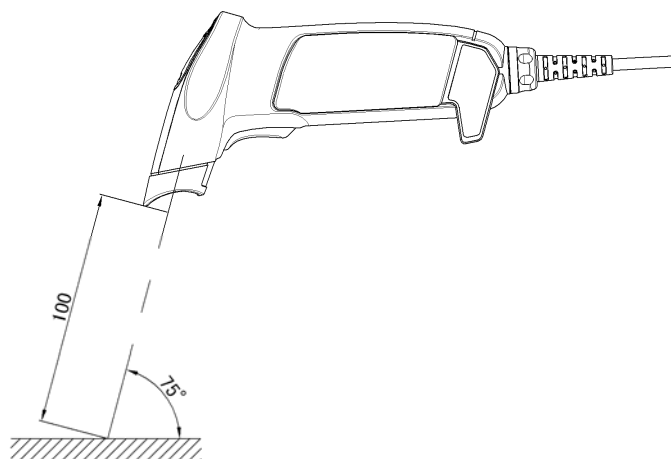


Figure 20: Ambient Light Immunity

* Be sure that the direct light or specular reflection from the light source does not enter the light receiving section of the OPI-3601.

10.4. 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°

10.5. 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.

10.6. 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.

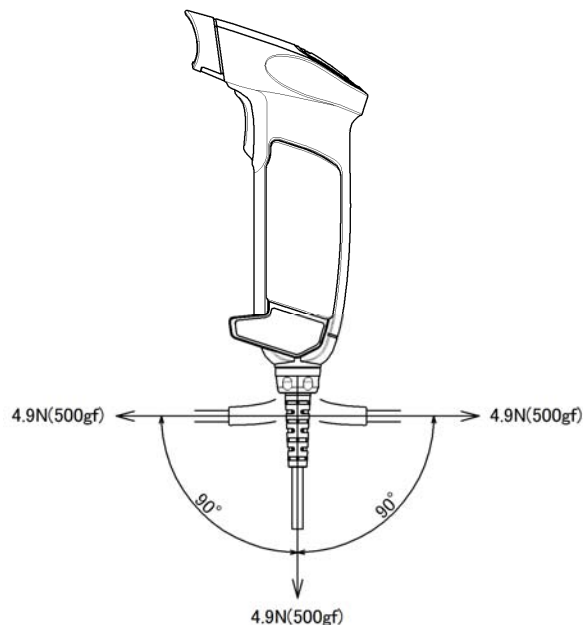


Figure 21: Cable Bending

10.7. 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/s^2 (2.0 G) for 30 minutes (60 minutes per cycle) in the non-operating state. Repeat this in each X, Y and Z direction.

10.8. 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/s^2 (2.0 G) for 30 minutes (60 minutes per cycle) in individually packaged state. Repeat this in each X, Y and Z direction.

10.9. 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.

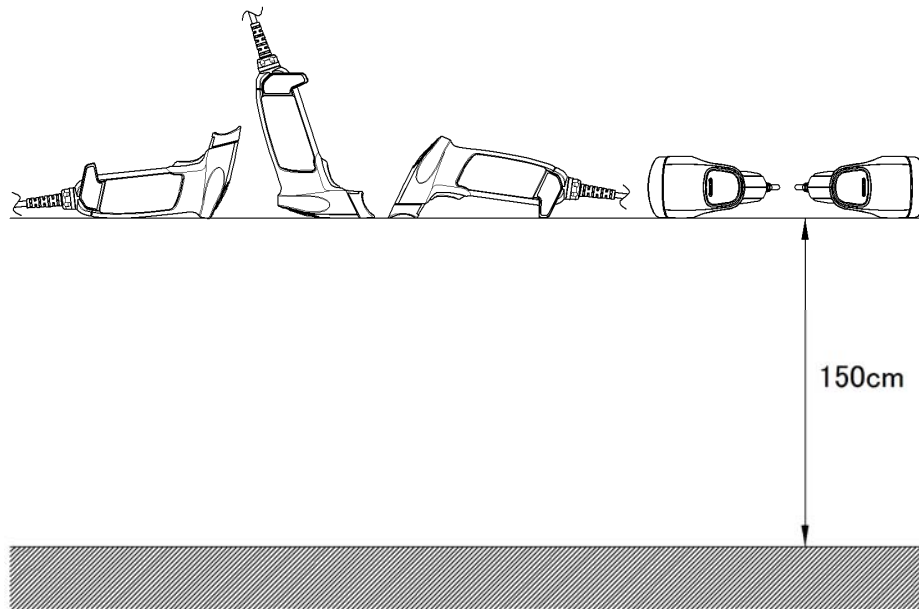


Figure 22: Drop Test

10.10. 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.

10.11. Electrical Specifications

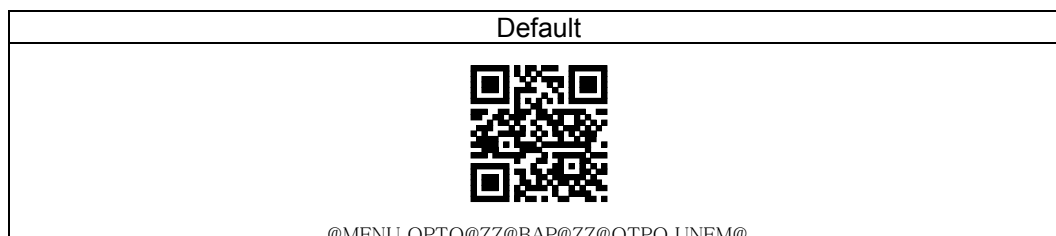
Withstand Voltage	: AC 1500 V / 60 seconds, 10 mA or less
Insulation Resistance	: DC 500 V, 2 MΩ or higher
Current Leakage	: 250 μA or less / AC 250 V 60 Hz
Power Line Noise Immunity	: ±1 kV or lower
Electrostatic Discharge Immunity	: No destruction found (±15 kV, air or direct discharge)
	: No malfunction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

*Testing method is compliant with IEC-61000-4-2. (150 pF, 330Ω)

11. Default Setting

11.1. Default Setting Menu Code

The OPI-3601 is set to default settings by reading the following menu label regardless of the interface types.



11.2. Supported Symbolologies

11.2.1. 1D bar codes

Code type	Default	Minimum length	Remarks
UPC	○	-	
UPC Add-on 2 UPC Add-on 5			
EAN(JAN)	○	-	
EAN Add-on 2 EAN Add-on 5			
EAN-13	○		
EAN-13 Add-on 2 EAN-13 Add-on 5			
EAN-8	○		
EAN-8 Add-on 2 EAN-8 Add-on 5			
Code 39	○	1	Not transmit ST/SP
Tri-Optic	○	-	Not transmit ST/SP
Codabar (NW7)	○	1	Not transmit ST/SP
Industrial 2of 5	○	5	
Interleaved 2of 5	○	6	
S-Code		5	
Code 128	○	1	GS1 conversion (setting required)
Code 93	○	1	
IATA	○	5	
MSI/Plessey		3	
UK/Plessey		2	
Telepen		1	
Code 11		1	
Matrix 2 of 5		5	
Chinese Post Matrix 2 of 5		-	
Korean Postal Authority		-	
Intelligent Mail Barcode		-	
POSTNET		-	
JPN (Customer Bar Code)		-	

11.2.2. GS1 Databar, Composite Code

Code type	Default	Remarks
GS1 DataBar •GS1 DataBar Omnidirectional •GS1 DataBar Truncated •GS1 DataBar Stacked •GS1 DataBar Stacked Omnidirectional	○	GS1 conversion (setting required)
GS1 DataBar Limited	○	
GS1 DataBar Expanded •GS1 DataBar Expanded •GS1 DataBar Expanded Stacked	○	
Composite GS1 DataBar •CC-A •CC-B •Limited CC-A •Limited CC-B •Expanded CC-A •Expanded CC-B		GS1 conversion (setting required)
Composite GS1-128 •CC-A •CC-B •CC-C		GS1 conversion (setting required)
Composite EAN •EAN-13 CC-A •EAN-13 CC-B •EAN-8 CC-A •EAN-8 CC-B		GS1 conversion (setting required)
Composite UPC •UPC-A CC-A •UPC-A CC-B •UPC-E CC-A •UPC-E CC-B		GS1 conversion (setting required)

11.2.3. 2D Codes

Code type	Default	Remarks
PDF417	○	
Micro PDF417		
Codablock F		
QR Code	○	GS1 conversion (setting required)
Micro QR	○	
Data Matrix (ECC 200)	○	GS1 conversion (setting required)
Data Matrix (ECC 000-140)		
Aztec Code	○	
Aztec Runes		
Chinese-sensible code		
Maxi Code		

11.3. Other Default

Item	Default Setting
Read mode	Single read
Extended read time	Disable
Buzzer duration	75 ms
Buzzer tone	3 kHz
Startup buzzer	Enable
Buzzer loudness	Loud (70%)
Buzzer timing	Before data transmission
Good read LED indicator duration	200 ms
Stand detection	Disable
Data buffering	Buffered mode

[Data buffering]

Not all output data can be received depending on the host system. Therefore, it is recommended to use buffered mode for USB-HID and Wedge PS/2 interfaces and Unbuffered mode for RS-232C and USB-COM interfaces.

Unbuffered mode	Buffered mode (default)
 @MENU_OPTO@ZZ@D80@ZZ@OTPO_UNEM@	 @MENU_OPTO@ZZ@D81@ZZ@OTPO_UNEM@

[Stand detection]

Enable stand detection	Disable stand detection (default)
 @MENU_OPTO@ZZ@*4@ZZ@OTPO_UNEM@	 @MENU_OPTO@ZZ@*5@ZZ@OTPO_UNEM@

* Refer to "OPI-3601 User's Manual" for supported commands.

11.4. RS-232C Default

Item	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
CTS time out	Indefinitely
ACK/NAK time out	1 second
Command header	ESC or STX
Command terminator	CR or ETX
Response to the commands	Disable

11.5. USB-COM

OPTOELECTRONICS USB-COM driver needs to be downloaded.

Item	Description
Baud rate	USB2.0 Full Speed
Power supply	500 mA
Vender ID	065A
Product ID	A002
Supported OS	Microsoft Windows 2000 / XP/ Vista / 7 (32/64 bit)
Standards	CDC-ACM

11.6. USB-HID, Wedge PS/2 Defaults

Item	Default Setting
Keyboard language	USA
Output mode	Output all values
Character encoding	None
LF output	Disable

12. Regulatory Compliance

12.1. LED Safety

IIEC 62471-1:2006 Exempt Risk Group

12.2. 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.

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.

13. RoHS

The OPI-3601 is compliant with RoHS.

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

14. Reliability

MTBF (Mean Time Between Failures) 47,480 hours

Note: The reliability of the OPI-3601 is guaranteed as far as it is operated under normal operating conditions in the range of advised operating temperature and without excessive electrical or mechanical shock.

15. Precautions

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

(1) Shock

- Do not drop from the non-standard height.
- Do not swing around the cable.
- Do not place any heavy items on the scanner.
- Do not squeeze it between any heavy items.

(2) Temperature Conditions

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

(3) Foreign Materials

- Do not put the scanner into water.
- Do not put the scanner into chemicals.

(4) Others

- Do not plug/unplug the connectors when the laser beam is emitted.
- Do not disassemble this product.
- Do not use the scanner near a radio or a TV receiver. It may cause reception problems.
- The scanner may be damaged by voltage drops caused by lightning.
- The scanner may not perform properly in environments when placed near a magnetic material.

16. Product Labels

The product labels are affixed to the scanner as shown below.

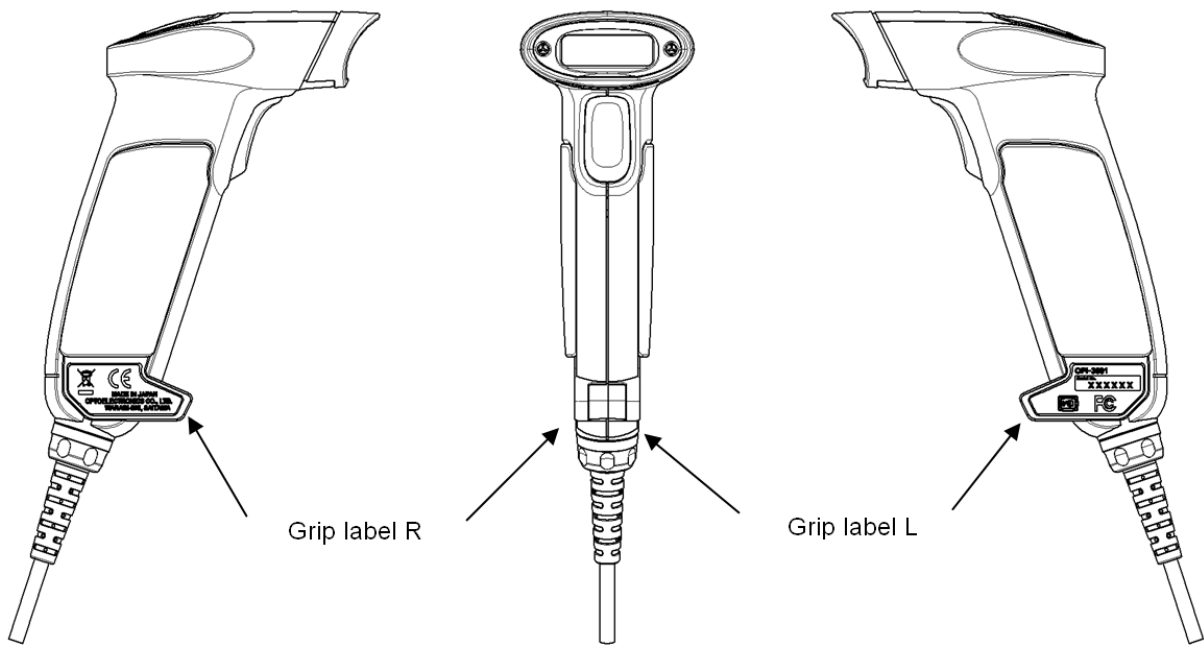


Figure 23: Product Labels

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

<Product Label 1>

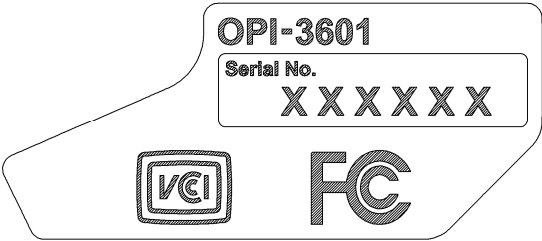


Figure 24: Grip Label L

<Product Label 2>

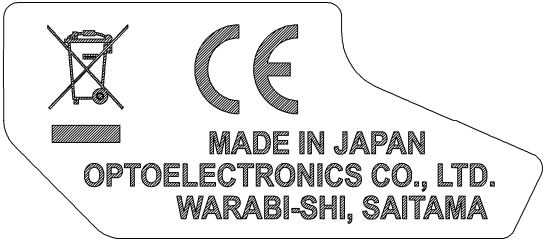


Figure 25: Grip Label R

17. Packaging Specifications

17.1. Individual Packaging (RS-232C/Wedge PS/2)

Put the scanner in a protection poly bag and place it in a box.

Assembled package size: 260 × 115 × 103 (WDH mm)

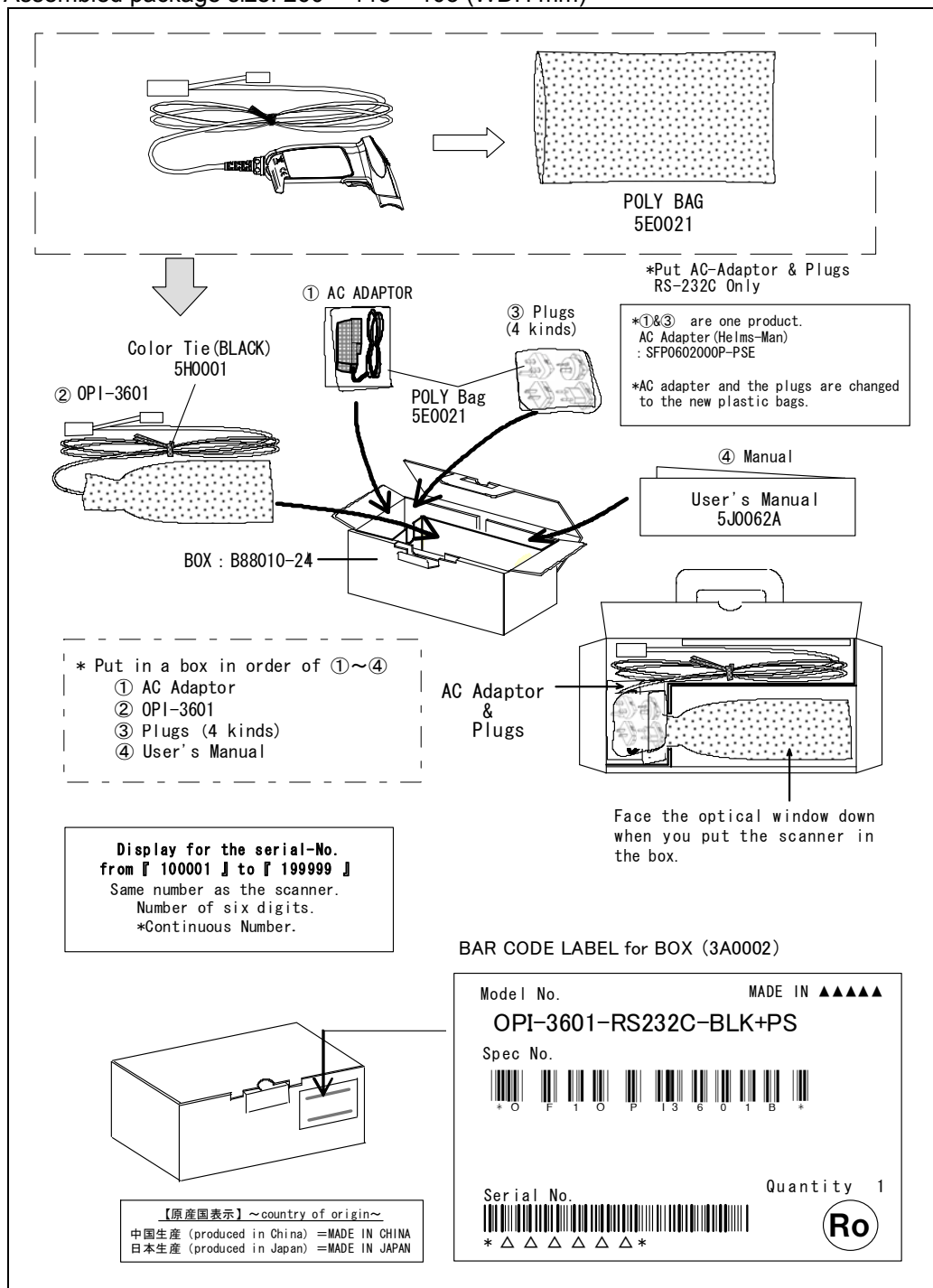


Figure 26: Individual Packaging (OF1OPR3601B)

17.2. Collective Packaging (RS-232C/Wedge)

Assembled package size: 560 × 650 × 350 (WDH mm)

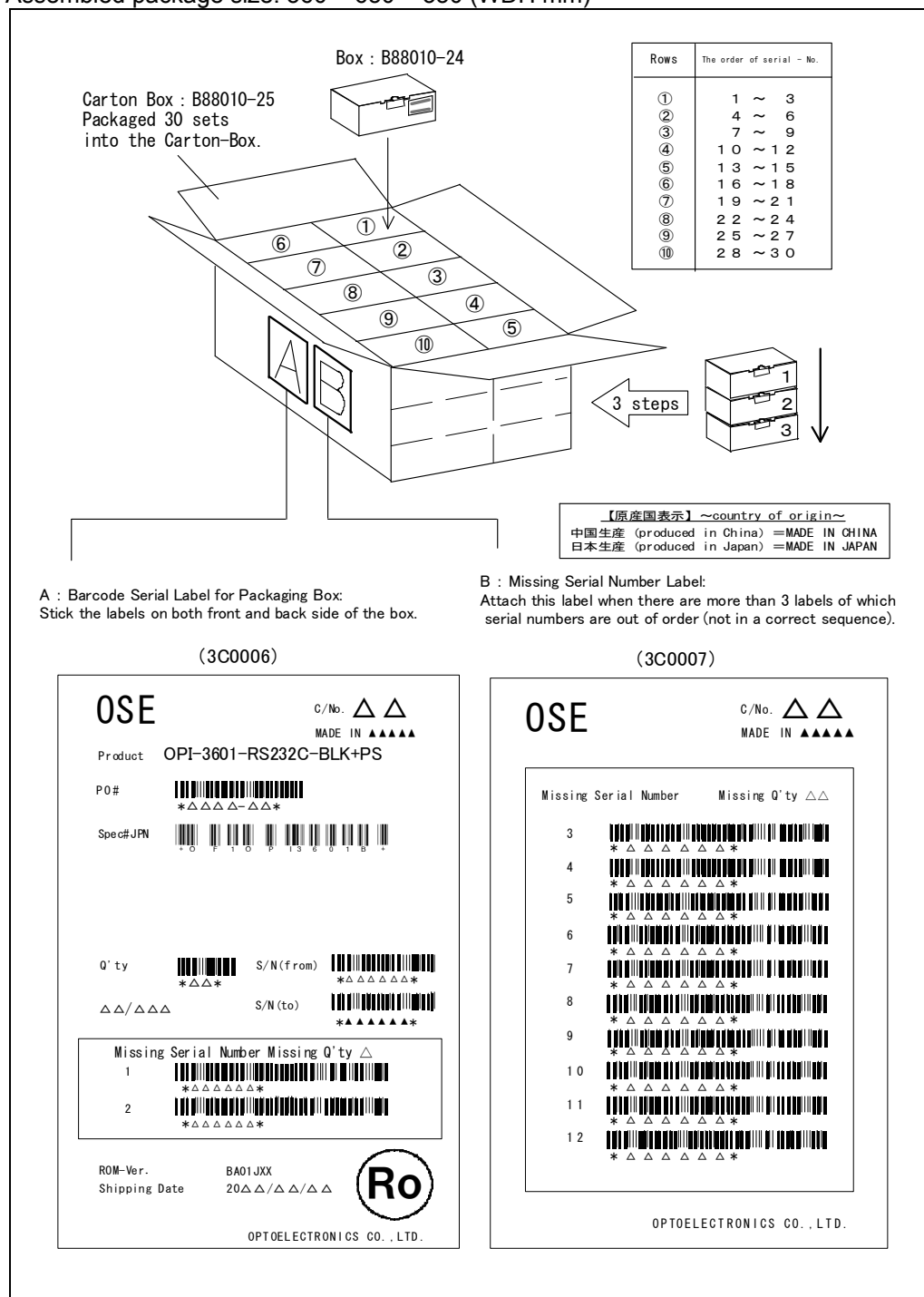


Figure 27: Collective Packaging (OF1OPR3601B)

Product name, number of products contained within and name of the manufacturer shall be displayed on the shipping box.

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.

17.3. Individual Packaging (USB)

Put the scanner in a protection poly bag and place it in a box.
Assembled package size: 245 × 112 × 85 (WDH mm)

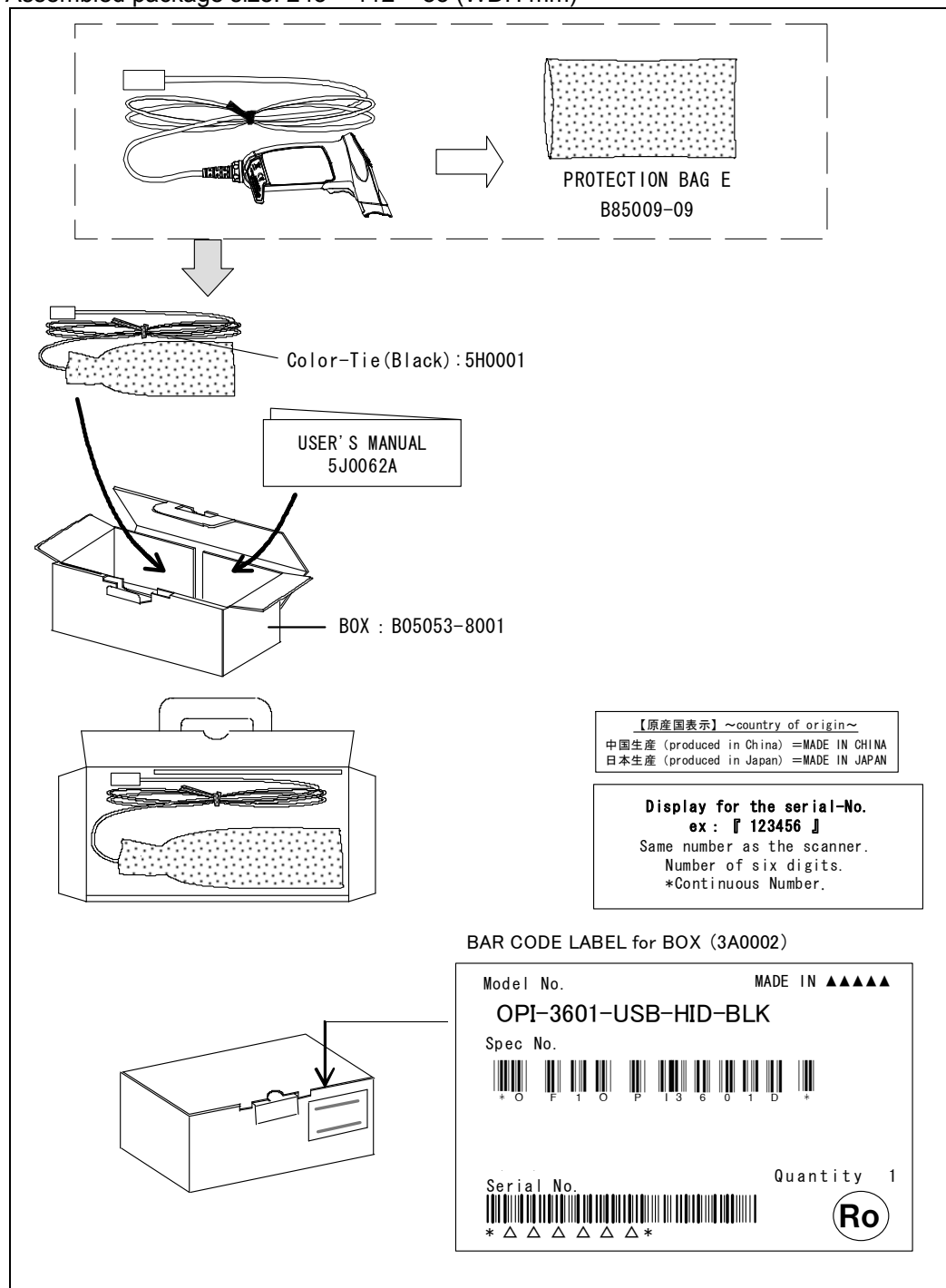


Figure 28: Individual Packaging (OF1OPR3601D)

17.4. Collective Packaging (USB)

Assembled package size: 540 × 600 × 470 (WDH mm)

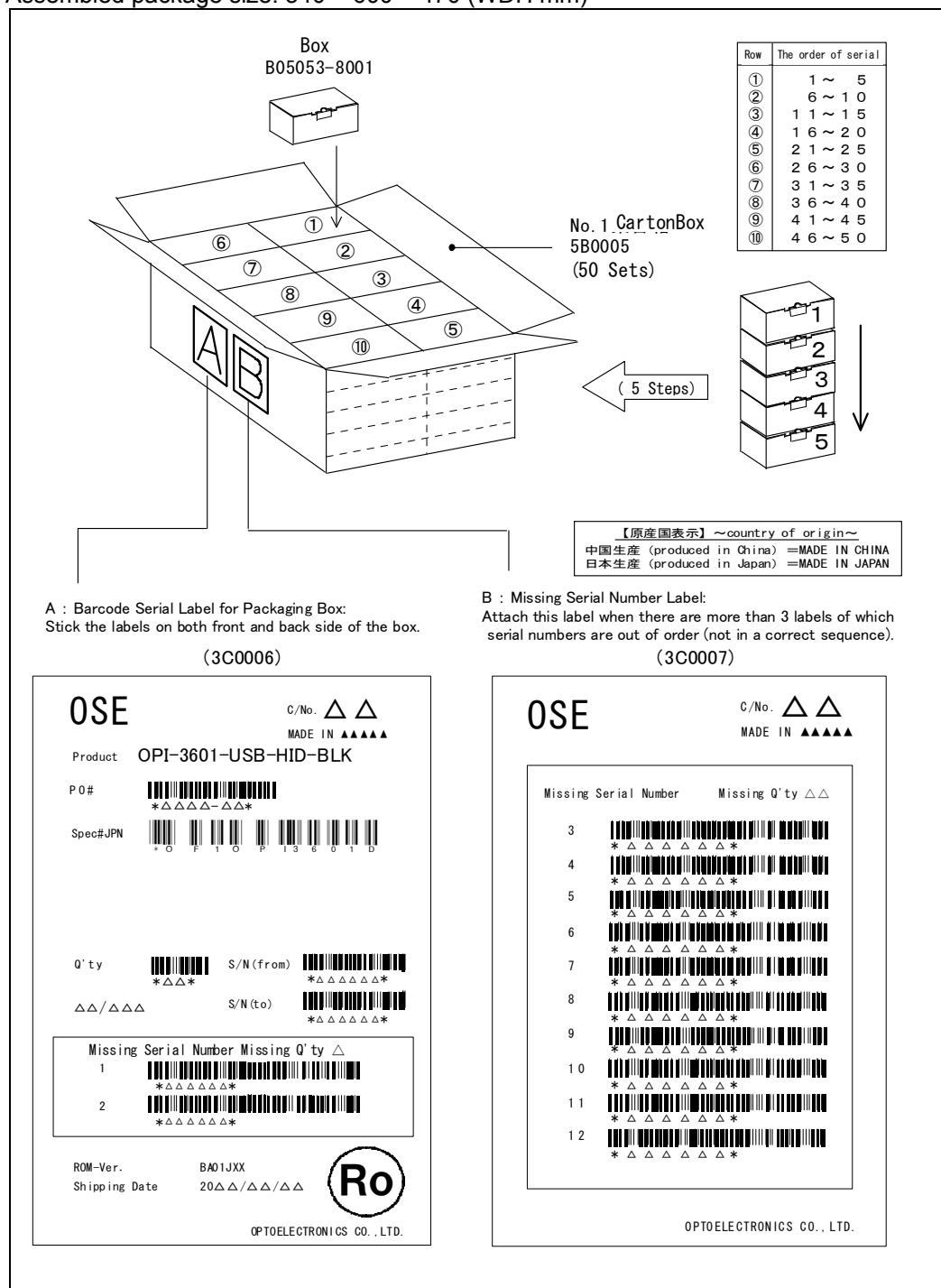


Figure 29: Collective Packaging (OF1OPR3601D)

Product name, number of products contained within and name of the manufacturer shall be displayed on the shipping box.

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.

18. Physical Features

18.1. Dimensions

Approx. 56.0 × 108.1 × 148.6 (WDH mm)

18.2. Weight

Approx. 85 g (excluding the cable)

18.3. Mechanical Drawing

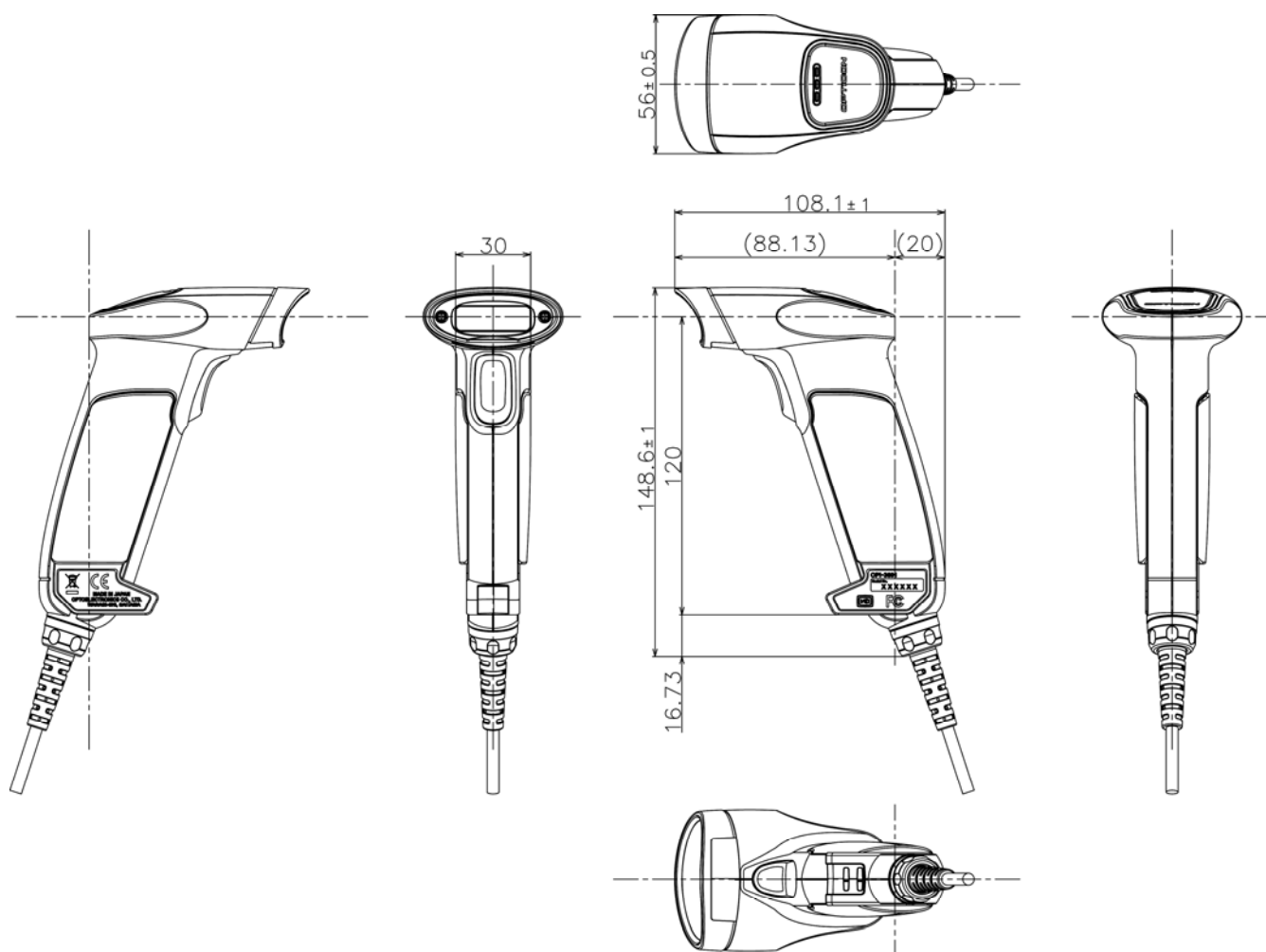


Figure 30: Mechanical Drawing

19. Accessories

19.1. AC Adapter Specifications

The OPI-3601 with RS-232C serial interface is shipped with a dedicated AC adapter “Universal AC Adapter Kit.” Plug connectors can be changed for each region. Refer to 19.2 for the detailed view.

Item		Specifications
Model Name		SFP0602000P-PSE
Dimensions		47.5 × 28.0 × 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

19.2. AC Adapter Mechanical Drawing

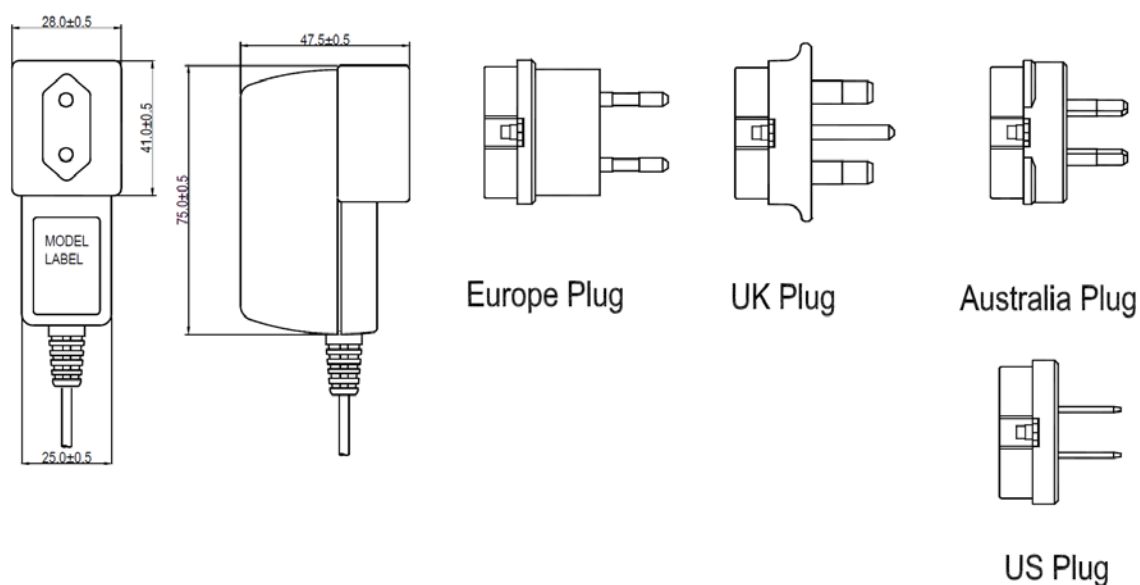


Figure 31: AC Adapter (input side)

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

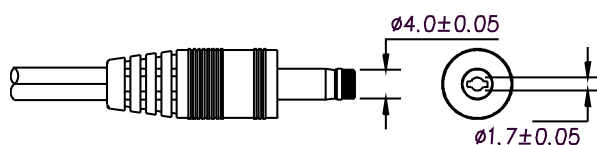


Figure 32: AC Adapter (output side: DC jack)

20. STD-3601 Stand (Sold Separately)

20.1. Stand Mechanical Drawing

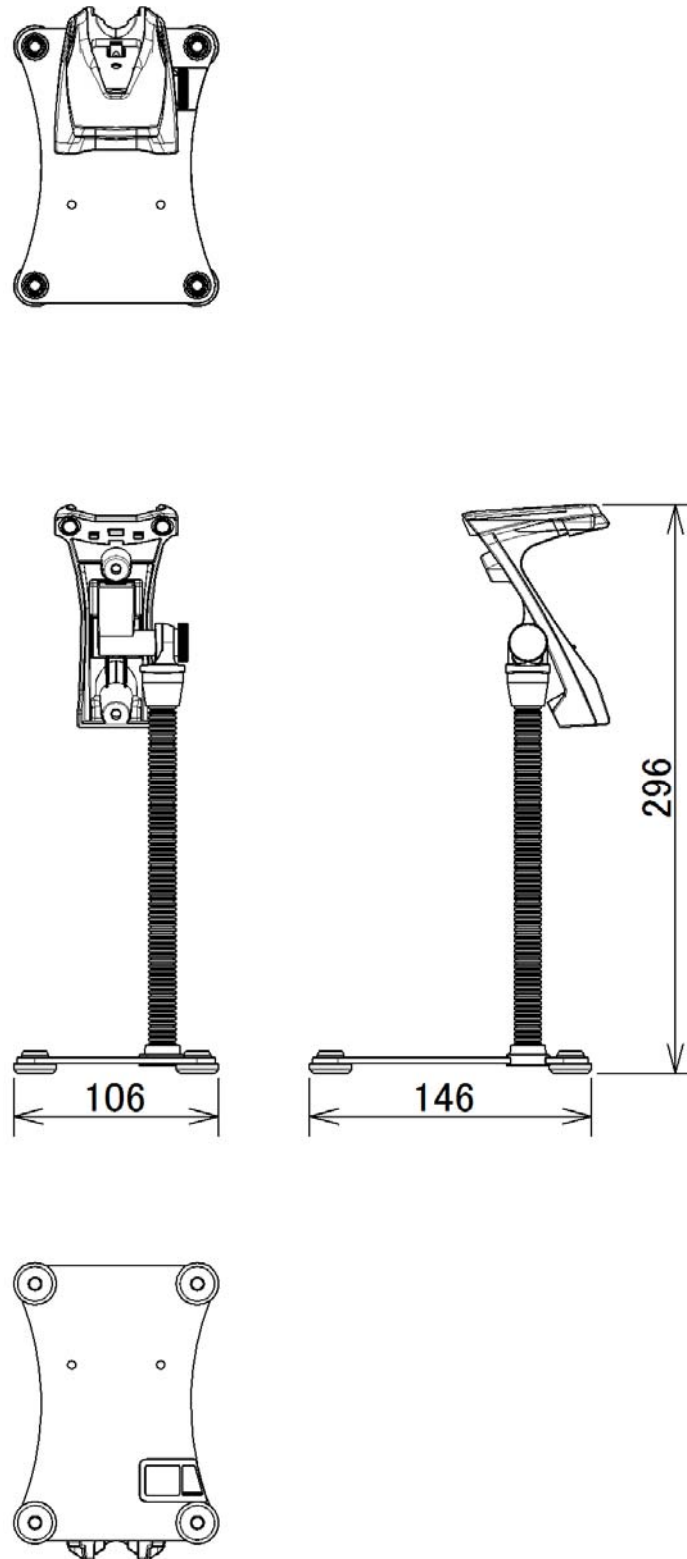


Figure 33: Stand