

OPTICON

Handy Imager Scanner

OPI 2101-HD



The OPI 2101-HD Handy Imager Scanner uses a high-speed, ultra-sensitive CMOS image sensor to attain extremely fast processing speed.

Specifications Manual

All information subject to change without notice.

Document History

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SUPPORT

USA

Phone: 800-636-0090

Email: support@opticonusa.com

Web: www.opticonusa.com

Europe

Email: support@opticon.com

Web: www.opticon.com

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1. Abstract

This manual provides specifications for the OPI 2101-HD hand-held imager scanner.

2. Overview

The OPI 2101 scanner enables smooth scanning of linear (1D) and 2D symbologies.

Its main features are:

- **High-speed, ultra-sensitive mega pixel CMOS image sensor.** A customized CMOS image sensor allows the scanner to achieve a frame rate of 30 fps with 1.3 megapixel resolution. The information capacity is four times more than that of VGA-class sensors. The image sensor makes it possible to scan images at wide angles and high resolutions.
- **Very fast image processing speed.** High-speed ASIC enables a quick response—equal to that of VGA-class sensors—by processing a vast amount of information transferred from the megapixel CMOS image sensor in a very short time.
- **Strain-reducing rubber stabilizer.** The scanner features a rubber stabilizer around the handle to reduce operator strain during long periods of use. Recessing the image scanning section not only enhances resistance to hand movement, but also improves scanning performance.
- **Enhanced floodlighting.** Ten white LEDs enhance floodlighting, supporting faster reading and decoding. The scanner is not easily influenced by hand movement. The white LEDs also make it possible for the scanner to read colored codes, including red codes.
- **Rugged design and stylish housing.** The OPI 2101 can withstand a drop from a height of two meters. Moreover, it has a stylish design suitable for use in shops and offices.
- **Various interfaces.** The OPI 2101 supports RS-232C, Keyboard Wedge, USB (HID), and USB (VCP) interfaces. USB (VCP) enables command communication from the host to the COM port through the VCP function.
- Complies with RoHS

Supported symbologies:

Linear (1D)

JAN/UPC/EAN, incl. add-on
Codabar/NW-7
Code 39
Code 93
Code 128
GS1-128 (EAN-128)
IATA
Industrial 2of5
Interleaved 2of5
Matrix 2of5
MSI/Plessey
S-Code
Telepen
Tri-Optic
UK/Plessey

Postal Code

Chinese Post
Korean Postal Authority Code

2D

Aztec Code
Aztec Runes
Codablock F
Data Matrix (ECC 0-140, ECC200)
Maxi Code (mode 2~5)
MicroPDF417
Micro QR Code
PDF417
QR Code

3. Physical Features

3.1. Dimensions

W 72.0 x D 95.0 x H 175.0 mm

3.2. Weight

185 g (max.) excluding the cable

4. Environmental Specifications

4.1. Operating Temperature and Humidity

Temperature: -20 to 50° C

Humidity: 5 to 95% RH

4.2. Charging Temperature

Temperature: 0 to 40° C

4.3. Storage Temperature and Humidity

Temperature: -25 to 70° C

Humidity: 5 to 95% RH

4.4. Ambient Light Immunity

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

Fluorescent light	10,000 lx
Sunlight	100,000 lx

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

PCS:	0.9
Resolution:	0.254 mm
Symbology:	9-digit Code 39, PDF 417
Quiet zone:	10 mm
N/W ratio:	1:2.5
Distance:	90 mm
Angle (see note below):	$\alpha = 0^\circ \beta = 15^\circ \gamma = 0^\circ$
Curvature:	$R = \infty$
Power supply voltage:	3.3 V

Direct light or specular reflection from a light source should be prevented from entering the acceptance area.

Lighting LEDs were kept ON during the test.

Note: α , β and γ respectively represent pitch, skew and tilt. Please see section 8.6 for how these values are defined.

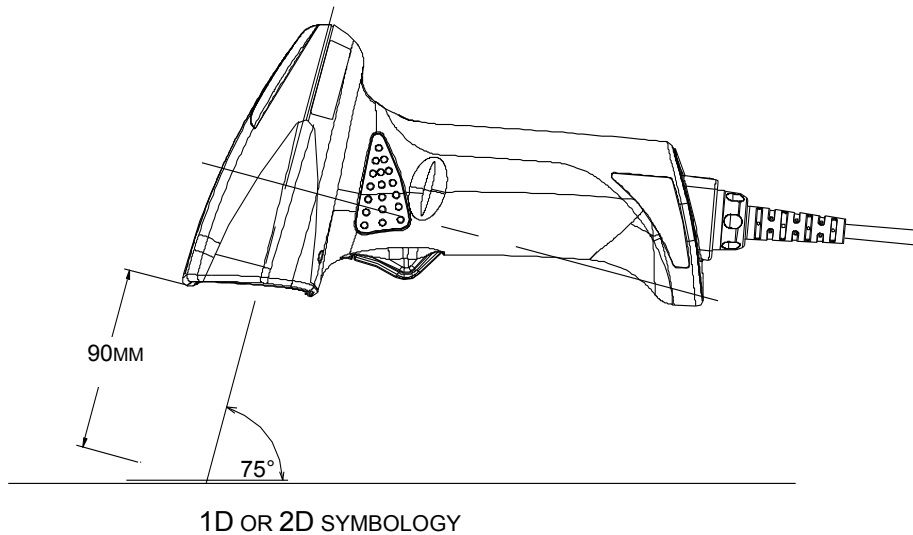


Figure 1: Ambient light immunity

5. Controls

Item	Specifications	Notes
ASIC:	OEY-0402	CPU: ARM-1026EJ-S Core: 160 MHz
SDRAM:	128 MB (1M × 4 banks × 32 bits)	SDCLK: 80 MHz
Flash ROM:	16 MB (1M × 16 bits) Flash memory	

6. Electrical Specifications

6.1. Framework and Structure

The OPI 2101 consists of a CMOS sensor, a camera section in the lens, a decode and communication section that decodes barcodes and symbologies data from the scanned image, an interface section that outputs the main power supply (3.3 v) conversion and the result of decoding, and a power supply section.

The USB models of the OPI 2101 operate on bus power and those models do not require adaptors for the power supply. However, the RS-232C and Wedge models operate on the power supply (DC 6.0 V) supplied through a dedicated adaptor.

When the interface cable of the OPI 2101 Wedge model is connected to the host, it cannot scan barcodes, but you can use the keyboard even power is not being supplied to the scanner through the dedicated AC adaptor.

Do not turn off adaptor power suddenly; it could cause the OPI 2101 to malfunction.

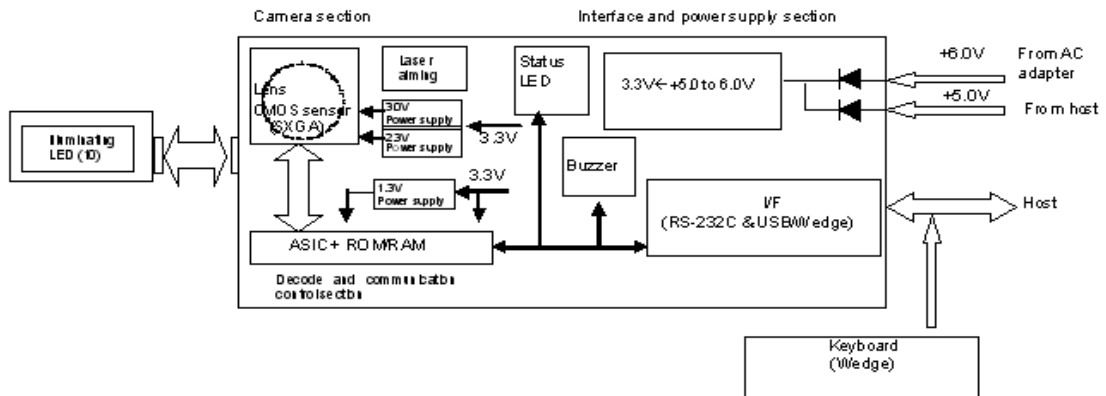


Figure 2: Configuration

6.2. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	Notes
Power supply voltage (V_{CC} to GND)	V_{CC}	4.5 to 6.6	V	Dedicated AC adapter: 6.0 V \pm 5%
Wedge power supply	V_{CC}	Power ON: 5 mA Power OFF: 250 mA (peak)		
Input voltage	V_{IN}	-0.5 to V +0.5	V	
Power ripple		0.1 Vp-p (10–100 kHz)	V	

6.3. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	
Operating current	I_{OP}	—	340	—	mA	When scanning & decoding
Rush current peak	I_{PEAK}	—	600	—	mA	When scanning & decoding
Stand-by current	I_{PRE}	—	120	70	mA	

Conditions

Connect 1 Ω resistance to a power supply line in series and measure the current by the voltage between both ends of resistance.

Power supply voltage is measured at a connector terminal area.

The current value depends on the interface type and host computer to which the device is connected.

6.4. AC Adaptor Specifications (for RS-232C and Wedge models)

6.4.1. Input Specifications

Parameter	Value
Power supply voltage	AC 90 V to 265 V
Power supply frequency	47 Hz to 63 Hz
Maximum current	0.5 A

6.4.2. Output Specifications

Parameter	Value
Output voltage	6.0 V \pm 5% / output current: 0 to 2.0 A
Power ripple	100 m Vp-p max. (rated load)

6.5. Wedge Power Supply

Parameter	Value
Input power supply voltage	DC 5.0 V
Voltage range	4.5 – 5.5 V
Power ripple	0.1 Vp-p max. (10 to 100 kHz, power supply voltage 5.0 V)
Current consumption	When main power supply is OFF: 250 mA max. When main power supply is ON: 5 mA max.

Note: You can use the keyboard even when the main power supply is turned OFF.

7. Optical Specifications

7.1. Imager Scanning

Parameter	Specification	Unit
Light-emitting element (white LEDs x 10; USB model has 8 white LEDs)	White pseudocolor Peak wave length: 468 nm / 568 nm	—
Scanning method	SXGA (1.3 million pixels) CMOS area sensor (gray scale) MCLK: 48 MHz	—
Number of effective pixels	1280 (column) x 1024 (row) Readable pixel count is 1282 dots (column) x 1026 dots (row)	dots
Frame rate	30	fps
Scan angle	Horizontal: 47.0 Vertical: 37.5	°

7.2. Imager Output

A black spot may appear on the image; however, it does not affect the scanning specifications.

Item	Specification
Image data format	Windows Bitmap, JPEG, TIFF
Shades of gray	256, 16, 2
Range of output image	Select in horizontal and vertical scale.
Resolution of output image	Full, 1/2, 1/3, 1/4
Interface of output image	RS-232C, USB-COM
Transmission time	USB-COM (Full speed) About 4 sec RS-232C (115.2 kbps) About 120 sec Conditions: Shades of gray: 256 Resolution: full

7.3. Scanning Barcodes on Moving Items

Scanning barcodes on moving objects requires that the speed of the barcode be adjusted to optimize the scanner’s reading performance.

Scanning barcodes on moving items may fail due to the scan rate.

8. Technical Specifications

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

Conditions

Ambient temperature and humidity:	Room temperature (5 to 35° C) Room humidity (45% to 85% RH)
Ambient light:	500 to 1500 lx
Background:	Barcode = black Space = white Margin = white Background of label = black
Power supply voltage:	6.0 V
Scanning test:	Carry out 10 scanning tests. Scanner is approved when scanning is successful in 70% of the tests.
Angles:	Pitch: $\alpha = 0^\circ$, Skew: $\beta = 15^\circ$, Tilt: $\gamma = 0^\circ$
Curvature:	$R = \infty$
PCS (scanning 2D symbologies)	0.9 or higher

8.1. Supported 1D Symbologies

8.1.1. Code 39

Resolution	Symbology	PCS	Size (mm)	Digits
0.254 mm	Code 39	0.9	14 x 10	2
0.1 mm	Code 39	0.9	10 x 9	4

8.1.2. JAN

Resolution	Symbology	PCS	Size (mm)	Digits
0.260 mm	13-digit JAN	0.9/0.45	25 x 19	13
0.260 mm	8-digit JAN	0.9	17.5 x 15.5	8

8.2. Supported 2D Symbologies

8.2.1. PDF417

Resolution	Error Correction	PCS	Size (mm)	Characters
0.339 mm	Level-4	0.9	35 x 22	17
0.254 mm	Level-4	0.9	26 x 16.5	17
0.127 mm	Level-4	0.9	13 x 8	17

8.2.2. QR Code (Model 2)

Resolution	Error Correction	PCS	Size (mm)	Characters
0.339 mm	M	0.9	10 x 10	44
0.212 mm	M	0.9	6 x 6	44
0.169 mm	M	0.9	5 x 5	44

8.2.3. Data Matrix

Resolution	Model	PCS	Size (mm)	Characters
0.339 mm	ECC200	0.9	8 x 8	40
0.212 mm	ECC200	0.9	5 x 5	40

8.2.4. Micro QR

Resolution	Error Correction	PCS	Size (mm)	Characters
0.212 mm	L	0.9	5 x 5	11

8.3. Print Contrast Signal (PCS)

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

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

Scanning performance may decline if dirt or scratches mar the optical window. Keep the optical window clean.

Conditions

Barcode test sample (1D and 2D): PDF417

MRD 32% and higher (with over 70% reflectivity of space and quiet zone.)

Distance 35 mm from the front edge of the scanner.

Resolution 0.254 mm, PCS: 0.45

8.4. Minimum Resolution

Resolution	Symbology
0.1 mm	Code 39
0.127 mm	PDF417
0.169 mm	QRCode
0.212 mm	Data Matrix, Micro QR

8.4.1. Focal Plane

The optical components of the scanner perform best when the focal plane is located 53 mm from the edge of the scanner.

For optimal performance, place barcodes about 53 mm from the scanner. This is especially helpful when scanning barcodes with high resolution or low PCS.

8.5. Scan Area and Resolution

8.5.1. Scan Range

*Unit: mm

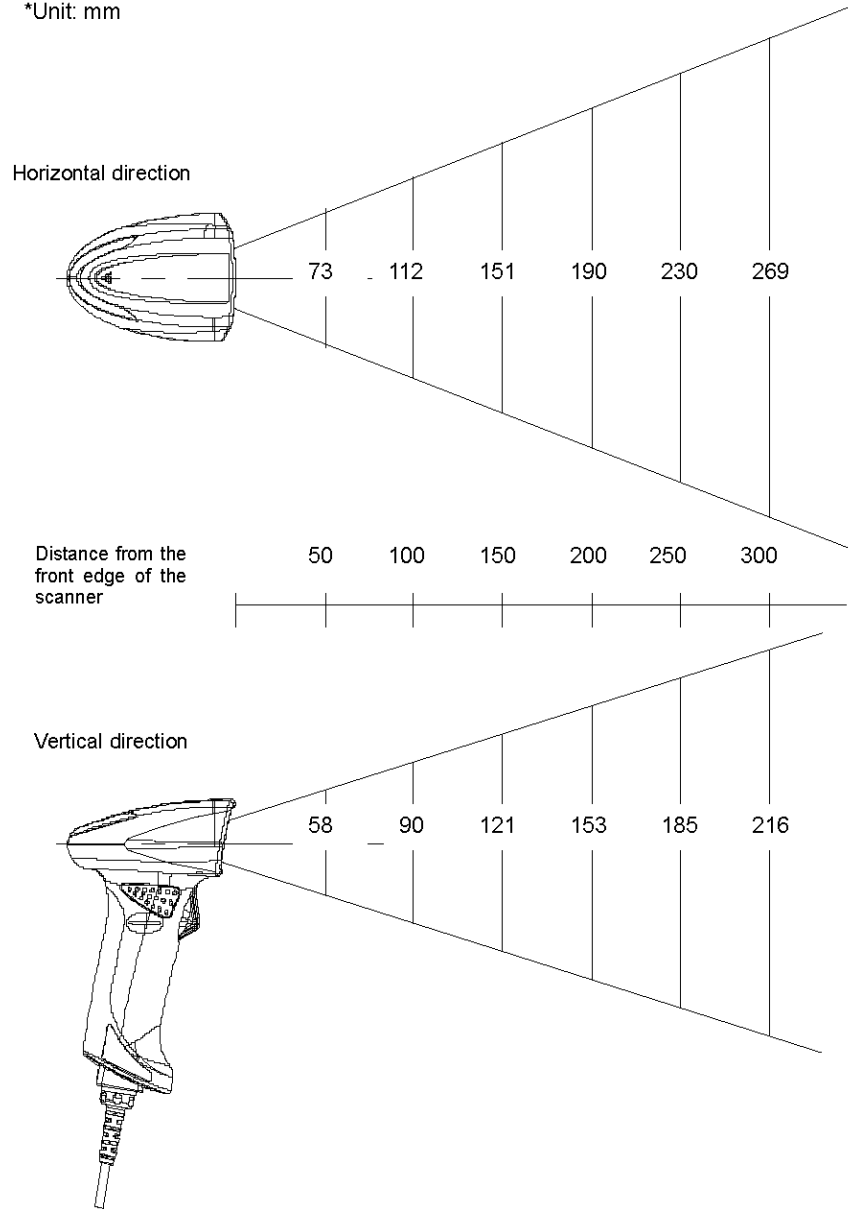


Figure 3: Scan range

Note: The figures shown above are averages and do not guarantee the possible scan range.

Distance	Scan Area
50 mm	73 x 58 mm
100 mm	112 x 90 mm
150 mm	151 x 121 mm
200 mm	190 x 153 mm
250 mm	230 x 185 mm
300 mm	269 x 216 mm

8.5.2. Depth of Field

The depth of field is measured from the front edge of the scanner. The scanning range is within the circular arc centered on the scan origin.

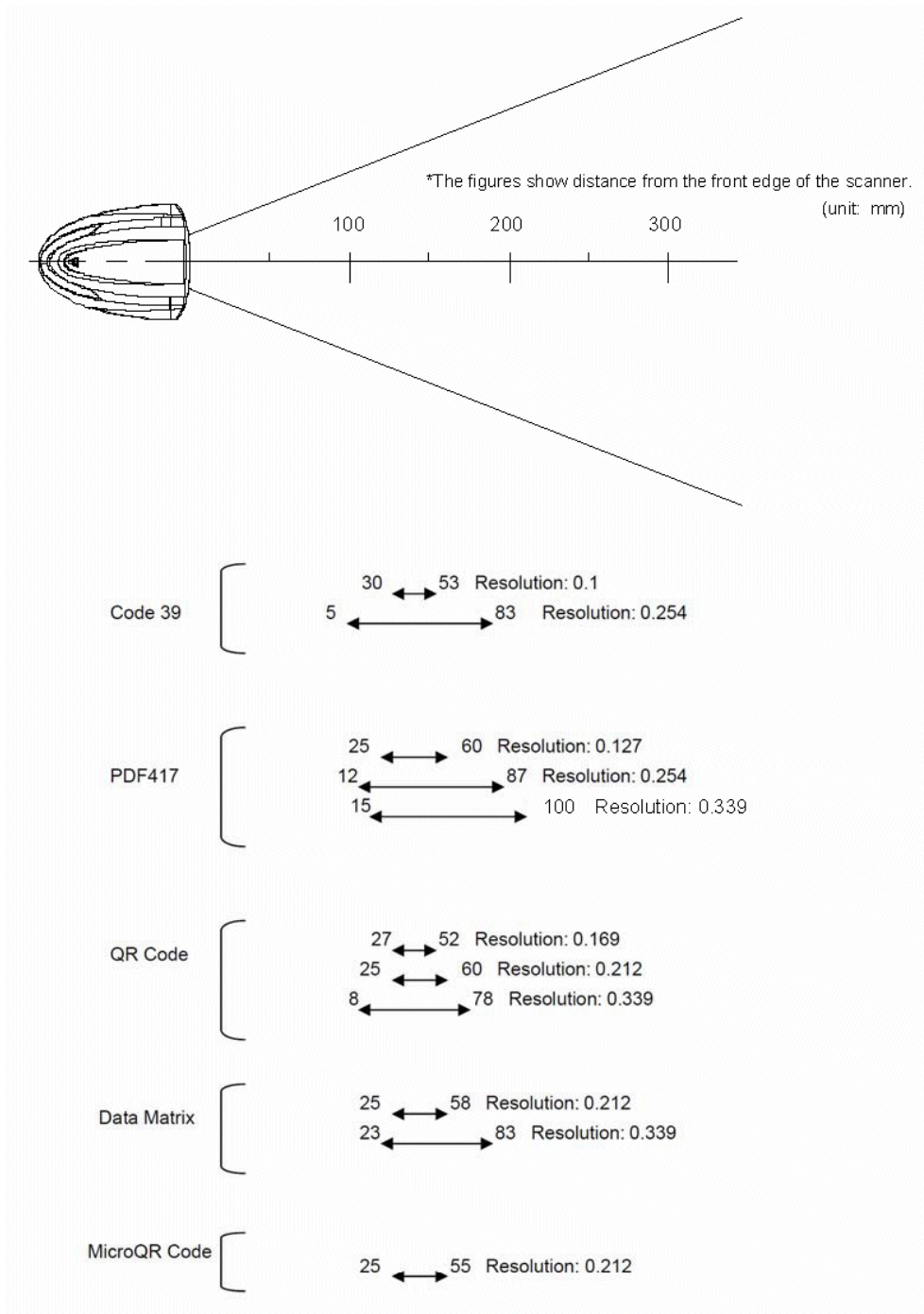


Figure 4: Depth of field

Symbology	Resolution (mm)	Decode Depth (mm)	PCS
Code 39	0.1 0.254	30–53 5–83	0.9
PDF417	0.127 0.254 0.339	25–60 12–87 15–100	0.9
QR Code	0.169 0.212 0.339	27–52 25–60 8–78	0.9
Data Matrix	0.212 0.339	25–58 23–83	0.9
Micro QR Code	0.212	25–55	0.9

8.6. Pitch, Skew, and Tilt

8.6.1. Pitch Angle

$$\alpha = \pm 60^\circ$$

8.6.2. Skew Angle

$$\text{Skew angle: } \beta = \pm 65^\circ$$

8.6.3. Tilt Angle

$$\gamma = 360^\circ$$

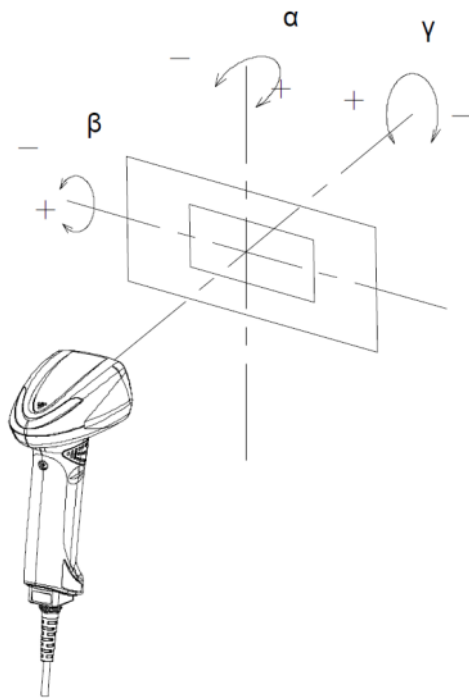


Figure 5: Pitch, skew, and tilt

Conditions

Barcode Sample (1D and 2D): Code 39 and PDF 417 (resolution 0.254 mm; PCS 0.9)

Distance: 35 mm from the front edge of the scanner
Angle: Curvature: $R = \infty$
Skew Angle: $\beta = 15^\circ$ (for measuring Pitch Angle)
Tilt Angle: $\beta = 15^\circ$ when the pitch angle is 0°

8.7. Curvature

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

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

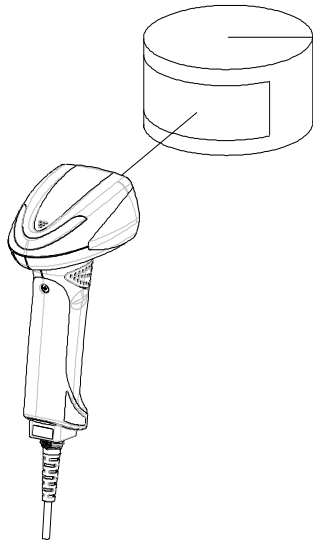


Figure 6: Curvature

Note: Scanning performance may fail due to the specular reflection of illumination LED when the reflectivity is high. If that occurs, one of the following will help solve the problem:

- Tilt the scanner 15 degrees in the skew direction when scanning.
- Set illumination LED OFF.

When turning the illumination LED OFF, make sure the ambient light immunity is over 1,000 lx; otherwise, the quality of scanning performance may be lower.

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

Distance:	35 mm from the front edge of the scanner
Label:	PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm
Angle:	Skew Angle $\beta = +15^\circ$

9. Interface Specifications

The OPI 2101 model supports the RS-232C, USB, or Wedge interface.

9.1. RS-232C Interface Spec

9600 bps to 115.2 kbps

9.1.1. Settings and Communication

Reading the menu barcodes in section 11.1 can set the RS-232C interface default.

Kanji codes and image data can be transmitted via the RS-232C interface.

Parameter	[U2] setting
Baud rate	9600 bps
Start/stop bits	1 bit
Data bits	8 bits
Parity bits	No parity
Handshaking	No handshake
Flow control time out	Indefinitely

Communication settings can be configured by scanning corresponding menu barcodes.

9.1.2. Signal Level

Signal Name	I/O	RS-232C Level (V)	
		Mark/OFF	Space/ON
TxD	OUT	-5 to -15	+5 to +15
RxD	IN	-3 to -15	+3 to +15
RTS	OUT	-5 to -15	+5 to +15
CTS	IN	-3 to -15	+3 to +15

9.1.3. Interface Circuit

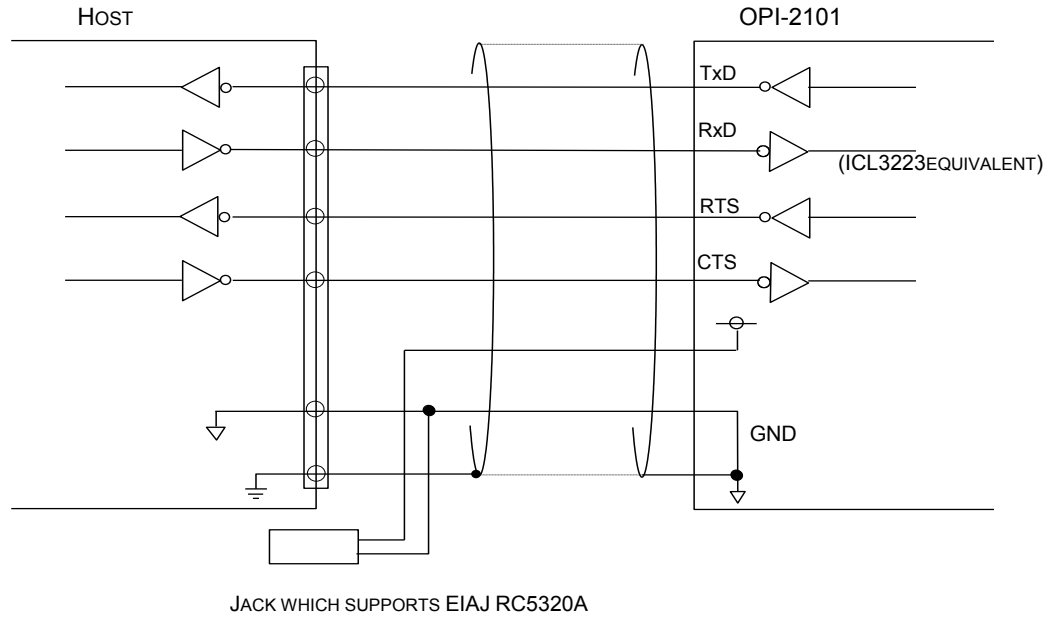


Figure 7: Interface circuit

9.1.4. Character Format

Uses the same format for both sending and receiving.

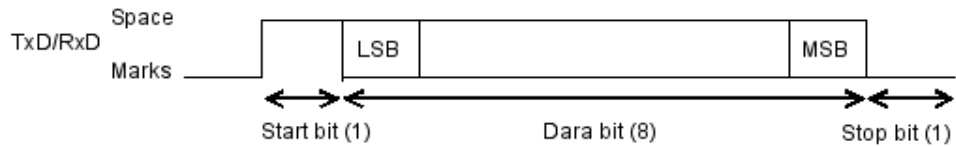


Figure 8: Character format

9.1.5. Communication Format

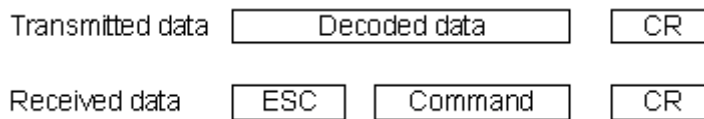


Figure 9: Communication format

9.1.6. 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 Handshaking

The scanner attempts the communication regardless of the state of the host computer.

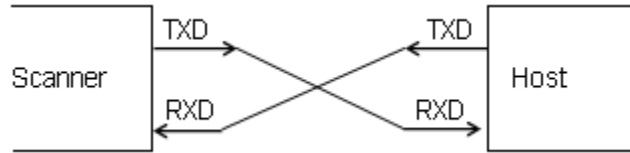


Figure 10: No handshaking

b) BUSY/READY

The scanner and the host computer notify each other of their state and whether they can receive data with BUSY/READY through an RTS line. They can communicate state to each other through a CTS line when connected as in the following figure.

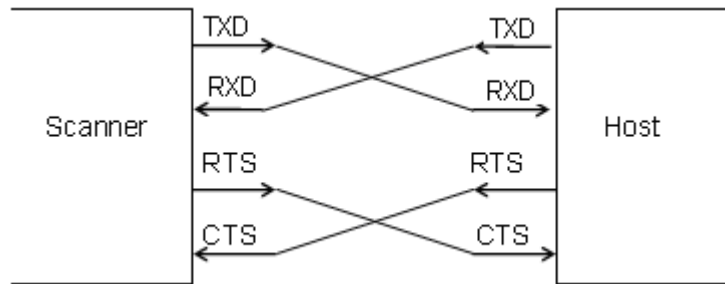


Figure 11: Busy/Ready (connection)

The scanner stays ON (is able to receive data) except during certain parts of the process, such as receiving data (buzzer command execution), transmitting data, and menu processing. The scanner checks the CTS line before transmitting data. When it is ON, the scanner transmits data. When it is OFF, the scanner waits for it to turn ON within a set time. The scanner will abort transmission with an error indication (buzzer) when the CTS line is not ON within a specified period. The Flow Control time-outs are as follows, and the default setting is “indefinitely” (I0).

Flow Control Time Out	Menu/Command
Indefinitely	I0
100 ms	I1
200 ms	I2
400 ms	I3

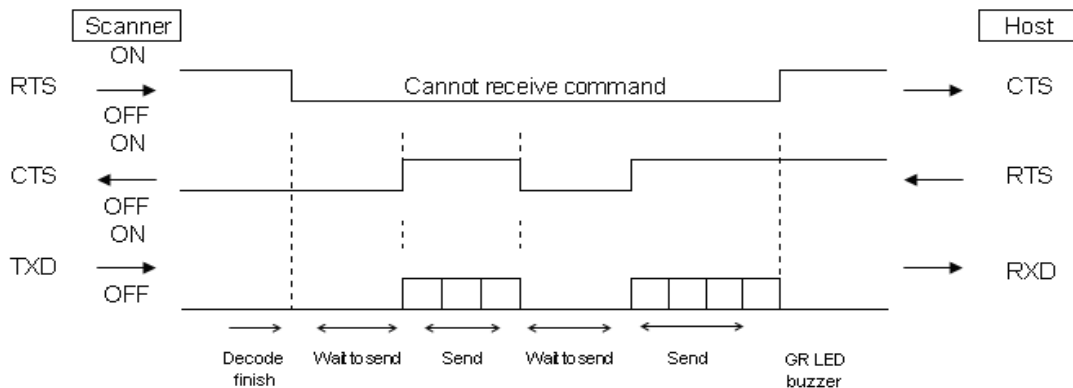


Figure 12: Busy/ready (control)

CTS, TXD signal timing

When the CTS line (RTS signal of the host) is turned OFF while sending a TxD signal, the scanner transmits one or two characters and waits. When the CTS signal is turned ON while transmitting those characters, those characters will be transmitted.

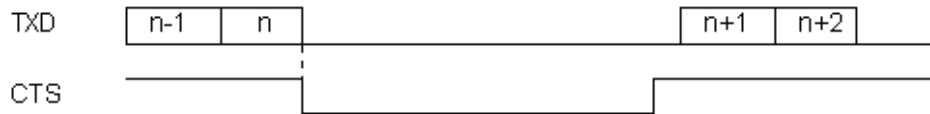


Figure 13: Signal timing

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

c) MODEM

The scanner turns RTS line ON before transmitting data. Other processes are the same as BUSY/READY.

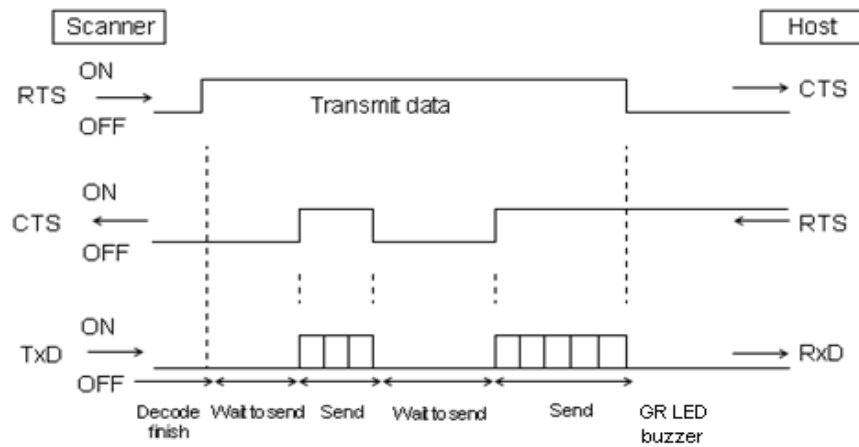


Figure 14: Modem transmit data

d) XON/XOFF CONTROL

During data transmission

While this configuration is enabled, the scanner keeps on sending data until it receives a control code XOFF (ASCII DC3, Hex13). It stops the data transmission once it receives the control code XOFF (ASCII DC3, Hex13). It re-starts sending the data when it receives a control code XON (ASCII DC1, Hex11).

During data reception

While this configuration is enabled, the scanner sends a control code XOFF (ASCII DC3, Hex13) to the host if the remaining buffer capacity for data reception gets low. When the buffer empties after the completion of buffer processing, the OPR 3201 sends a control code XON (ASCII DC1, Hex11) to the host and re-starts processing the received data.

e) ACK/NAK

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

ACK response—Action: The scanner completes transmission with the good-read buzzer and returns to the initial state.

NAK response—Action: The scanner sends the data again and waits for the response from the host.

DC1 response—Action: The scanner returns to waiting for the trigger, if it has a trigger (the initial state).

None response—Action: The scanner sounds the error buzzer and returns to the initial state.

ACK/NAK timeout is 1 second.

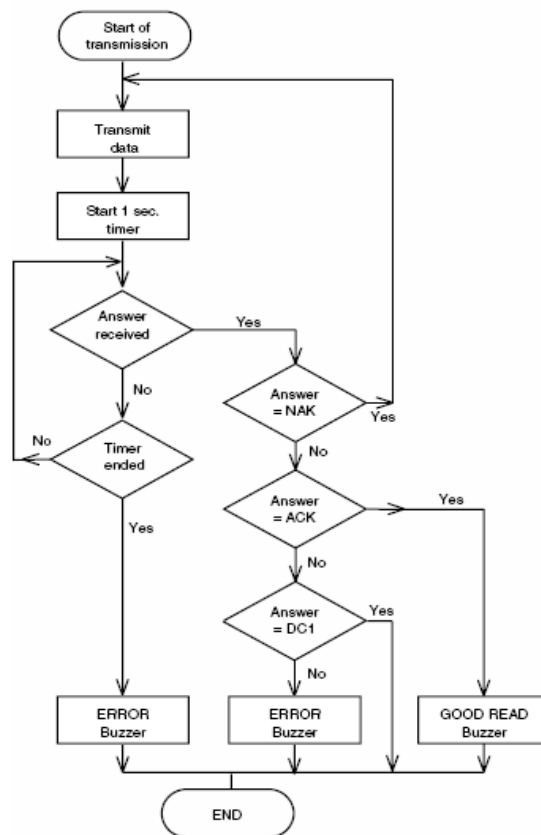


Figure 15: ACK/NAK

f) ACK/NAK NO RESPONSE

When no response from the host is received within the setting time, the scanner assumes an ACK response, and returns to the initial state without the error buzzer. The other actions are the same as ACK/NAK.

ACK/NAK timeout is 100 ms.

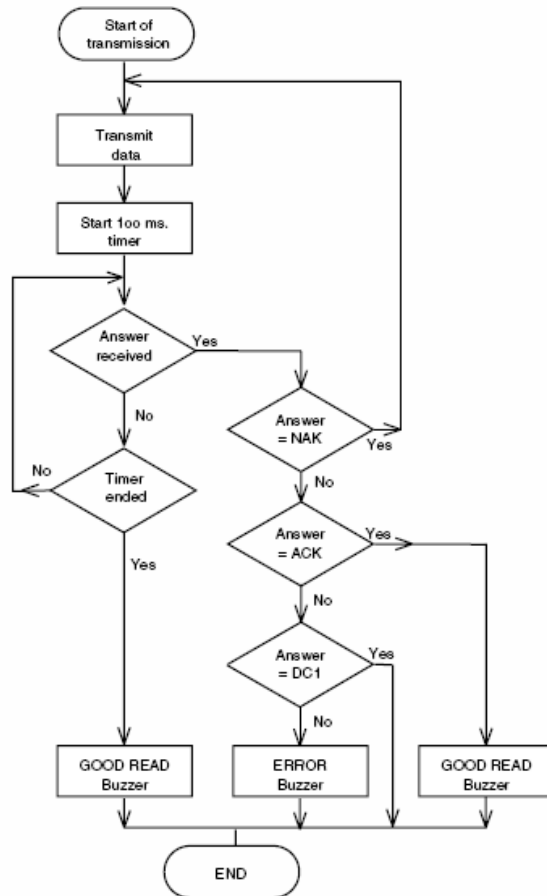


Figure 16: ACK/NAK—No response

9.2. USB-HID and USB-VCP Interface Specifications

There are two models that use a USB interface: HID (Human Interface Device Class) and COM (Communication Device Class). The USB-COM model is referred to as USB-VCP because a VCP (Virtual Communication Port) allows virtual serial communication and the commands can be transmitted from the host computer.

9.2.1. Settings and Communication

Reading the menu barcodes in section 11.1 can set the USB interface default.

The interface is full-speed USB (12 Mbps).

Device Class: High power bus-powered function. This interface does not require an AC adaptor. It connects to a high-power bus (500 mA max.) USB terminal.

Japanese Kanji data or images cannot be transmitted via the USB-HID interface.

9.2.2. Interface Circuit

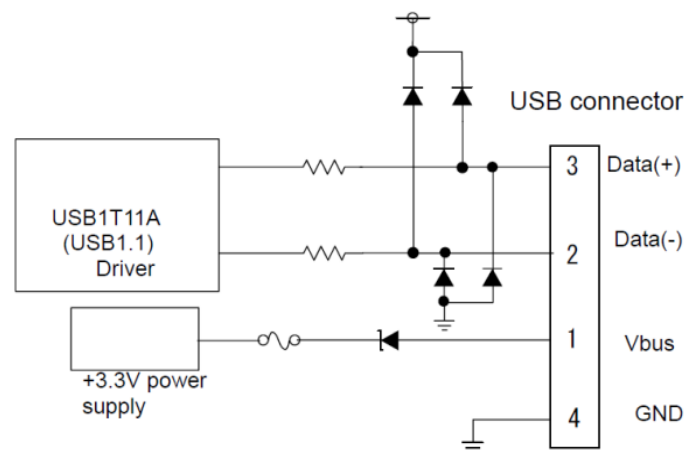


Figure 17: USB interface circuit

9.3. DOS/V Wedge Interface Specification

Reading the menu barcodes in section 11.1 can set the DOS/V wedge interface default.

For either interface (USB or Wedge)—Set the language for the scanner and PC keyboard to the same language before use; otherwise, the output may not be correct.

Japanese Kanji data or images cannot be transmitted via the USB-HID interface.

10. Cable and Connector

10.1. RS-232C Cable

(Standard specification)

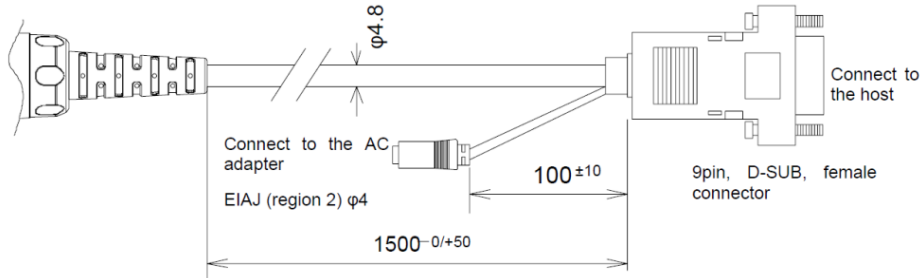


Figure 18: RS-232C cable

Type:	Straight
Diameter:	Φ4.8 mm
Length:	1500 ±50 mm
Cores:	8 insulated wires, 1 conductive wire
Weight:	Approximately 90 g

10.1.1. DB9 Connector

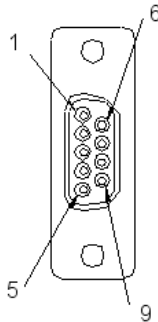


Figure 19: DB 9 connector

10.1.2. DB9 Pin Assignment

Pin	Signal	Remarks
1	SHIELD	
2	TxD	
3	RxD	
4	(NC)	Open (not connected)
5	GND	

Pin	Signal	Remarks
6	(NC)	Open (not connected)
7	CTS	
8	RTS	
9	(NC)	Open (not connected)

10.2. USB Cable

(Standard specification)

Type:	Straight
Diameter:	Φ4.8 mm
Length:	1500 ±50 mm
Cores:	4 insulated wires, 1 conductive wire
Weight:	Approximately 70 g

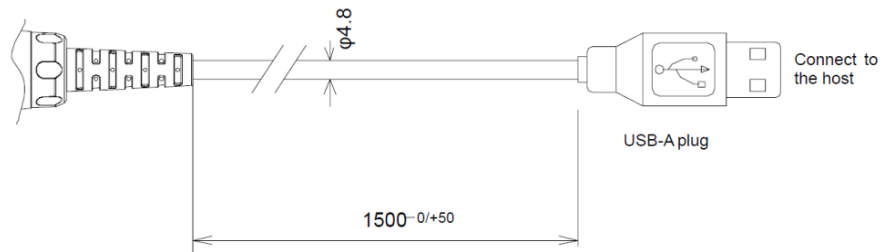


Figure 20: USB cable

10.2.1. USB “A” Connector

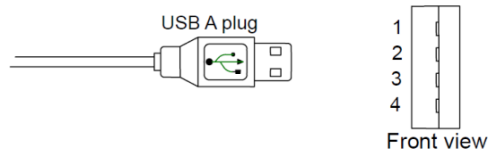


Figure 21: USB “A” connector

10.2.2. Pin Assignment

Pin	Signal
1	VCC
2	-DATA
3	+DATA
4	GND

10.3. Wedge Cable

(Standard specification)

Type:	Straight
Diameter:	Φ4.8 mm
Length:	1400 ±50 mm
Cores:	6 insulated wires, 1 conductive wire
Weight:	Approximately 75 g

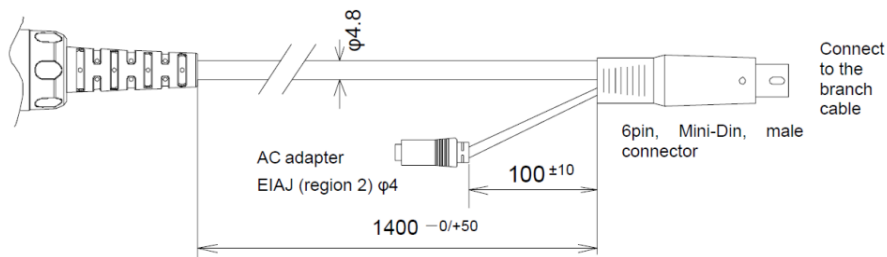


Figure 22: Wedge cable

(Wedge Y adapter specification)

Type:	Straight
Diameter:	Φ4.8 mm
Length:	100 ±10 mm
Cores:	6 insulated wires, 1 conductive wire
Weight:	Approximately 25 g

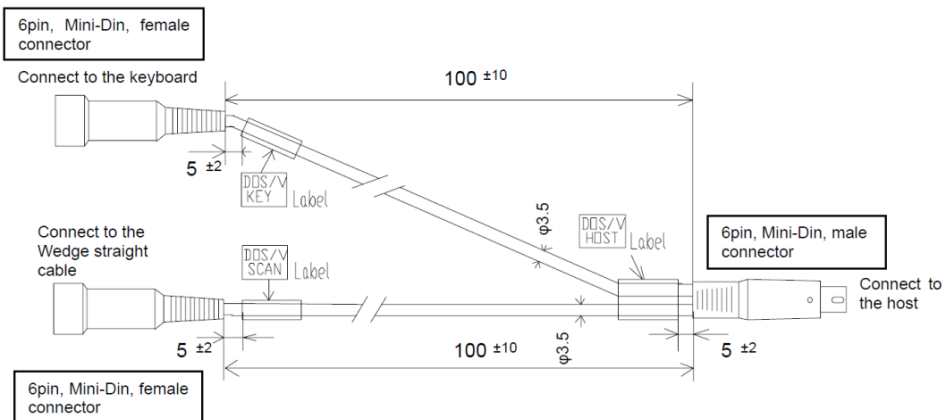


Figure 23: Wedge Y adapter cable

10.3.1. Pin Assignment

Wedge Y cable—Keyboard connector

Pin	Signal
1	KEY DATA
2	Not connected
3	GND
4	VCC
5	KEY CLOCK
6	Not connected

a) Wedge Y Cable

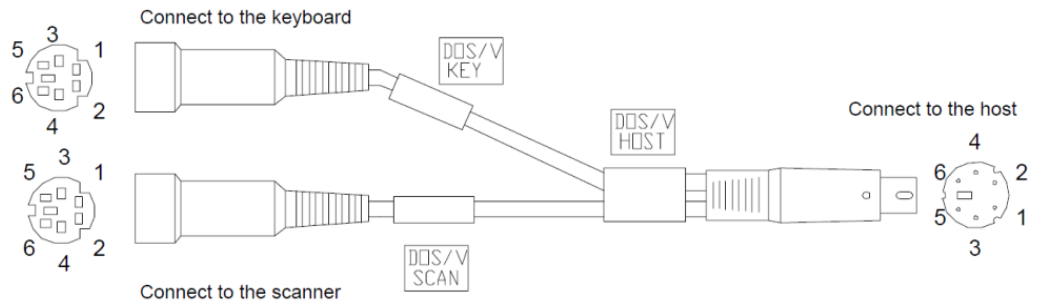


Figure 24: DOS/V Wedge interface cable pin assignments

Wedge Y cable—Scanner connector

Contact Number	Signal Name
1	CPU DATA
2	Not connected
3	GND
4	VCC
5	CPU CLOCK
6	Not connected

b) DOS/V Host Side

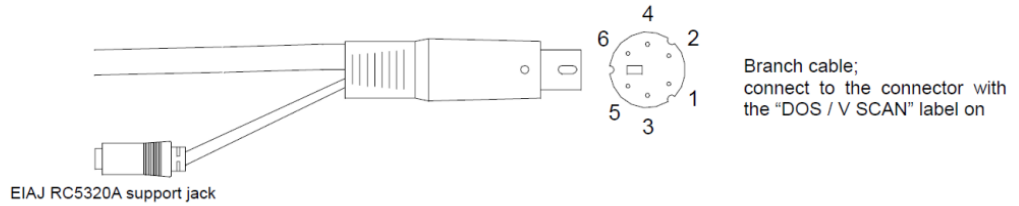


Figure 25: Wedge Y cable pin assignment

Wedge Y cable—Host connector

Contact Number	Signal Name
1	CPU DATA
2	KEY DATA
3	GND
4	VCC
5	CPU CLOCK
6	KEY CLOCK

Do not use the keyboard of the host during data transmission from the scanner to host. It may cause problems with the data transmission.

11. Default Settings




11.1. Set Default Interface

Scan the following menu barcodes to return to the default settings.




RS-232C

Functions	Menu labels	Menu codes
SET		ZZ
RS-232C		U2
END		ZZ





USB-HID

Functions	Menu labels	Menu codes
SET	 z z	ZZ
USB-HID	 s u	SU
END	 z z	ZZ





USB-VCP

Functions	Menu labels	Menu codes
SET	 z z	ZZ
USB-VCP	 c 0 1	C01
END	 z z	ZZ

Wedge (with external keyboard)

Functions	Menu labels	Menu codes
SET	 z z	ZZ
AT-Wedge	 u b	UB
Keyboard layout: with keyboard	 k m	KM
END	 z z	ZZ

Wedge (without external keyboard)

Functions	Menu labels	Menu codes
SET	 z z	ZZ
AT-Wedge	 u b	UB
Keyboard layout: without keyboard	 k l	KL
END	 z z	ZZ

11.2. Default Settings 1: Readable Codes

Symbology	Read	Transmit Code Length	Transmit CD	Calculate CD	Set Prefix	Set Suffix	Other
UPC-A	■	X	■	■	—	CR	
UPC-A Add-on	X	X	■	■	—	CR	
UPC-E	■	X	■	■	—	CR	
UPC-E Add-on	X	X	■	■	—	CR	
EAN-13	■	X	■	■	—	CR	
EAN-13 Add-on	X	X	■	■	—	CR	
EAN-8	■	X	■	■	—	CR	
EAN-8 Add-on	X	X	■	■	—	CR	
Aztec Code	■	X	—	■	—	CR	
Aztec Runes	X	X	—	■	—	CR	
Chinese Post	X	X	■	X	—	CR	
Codabar / NW-7	■	X	■	X	—	CR	Not transmit ST/SP
Codablock F	X	X	—	■	—	CR	
Code 39	■	X	■	X	—	CR	Not transmit ST/SP
Code 93	■	X	—	■	—	CR	
Code 128	■	X	—	■	—	CR	
Composite EAN EAN13 CCA EAN13 CCB EAN8 CCA EAN8 CCB	X	X*	■ (1D code)	■	—	—	
Composite UPC UPCA-CCA UPCA-CCB UPCE-CCA UPCE-CCB	X	X	■ (1D code)	■	—	—	
GS1 Databar (RSS) RSS-14 CCA RSS-14 CCB RSS Limited CCA RSS Limited CCB RSS Expanded CCA RSS Expanded CCB	X	X	■ (1D code)	■	—	—	
Composite GS1-128 UCC/EAN128 CCA UCC/EAN128 CCB UCC/EAN128 CCC	X	X	—	■	—	—	
Data Matrix (ECC0-140)	■	X	—	■	—	CR	
Data Matrix (ECC200)	■	X	—	■	—	CR	

Symbology	Read	Transmit Code Length	Transmit CD	Calculate CD	Set Prefix	Set Suffix	Other
EAN-128	X	X	—	■	—	CR	
IATA	■	X	■	X	—	CR	
Industrial2of5	■	X	■	X	—	CR	
Interleaved2of5	■	X	■	X	—	CR	
Korean Postal Code	X	X	X	■	—	CR	
Matrix2of5	X	X	■	X	—	CR	
Maxi Code	■	X	—	■	—	CR	
MicroPDF417	■	X	—	■	—	CR	
PDF417	■	X	—	■	—	CR	
MSI/Plessey	■	X	■	■	—	CR	Not transmit CD2
UK/Plessey	■	X	■	■	—	CR	
GS1 Databar Standard Truncated Stacked Stacked omni- directional	X	X	■	■	—	CR	
S-Code	■	X	■	X	—	CR	
Telepen	■	X	—	■	—	CR	
Trioptic	■	X	—	—	—	CR	Not transmit ST/SP

Notes:

In the “Reading” column, “■” means “Enable reading” and “X” means “Disable reading.”

In the “Transmit code length” column, “■” means “Transmit code length” and “X” means “Do not transmit code length.”

In the “Transmit CD” column, “■” means “Transmit check digit” and “X” means “Do not transmit check digit.”

In the “Calculate CD” column, “■” means “Calculate check digit” and “X” means “Do not calculate check digit.” — means “not supported.”

In the “Prefix” column, “—” means “there is no prefix setting.”

In the “Suffix” column, suffix is set to “Enter [0x84].” In addition the command for “Direct input keyboard keys” is set to “71.” These are only for USB and Wedge models.

11.3. Default Settings 2: Read Options, Trigger, Buzzer

Item	Default Setting
Setting the number of characters	Fixed length OFF all codes
Read mode	Single read
Multiple read reset time	500 ms
Add-on wait mode	500 ms
Multiple label read (1D barcode only)	Disable
NW-7 intercharacter gap check	up to 1 character
Trigger switch	Enable
Read time	2 seconds
Buzzer duration	50 ms
Buzzer tone	Single tone (3 kHz)
Buzzer loudness	Maximum
Good read LED (blue)	Indicator duration 200 ms

11.4. Default Settings 3A: Serial Communication Settings—RS-232C

Parameter	“U2” Default Setting
Baud rate	9600 bps
Parity bits	No parity
Data length	8 bits
Stop bits	1 bit
Handshaking	No handshaking
ACK/NAK	ACK/NAK no response
CS time out	Indefinitely
ACK/NAK timeout	1 s
Command header	ESC/STX
Command terminator	CR/ETX
ACK/NAK for RS-232C comm.	Disable

11.5. Default Settings 3B: Communication Settings—USB-HID, USB-VCP

Parameter	“SU” and “C01” Default Setting
Scanner power: max. power descriptor	500 mA
Keyboard *	US keyboard
Vendor ID	0x65a (OPTOELECTRONICS)
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

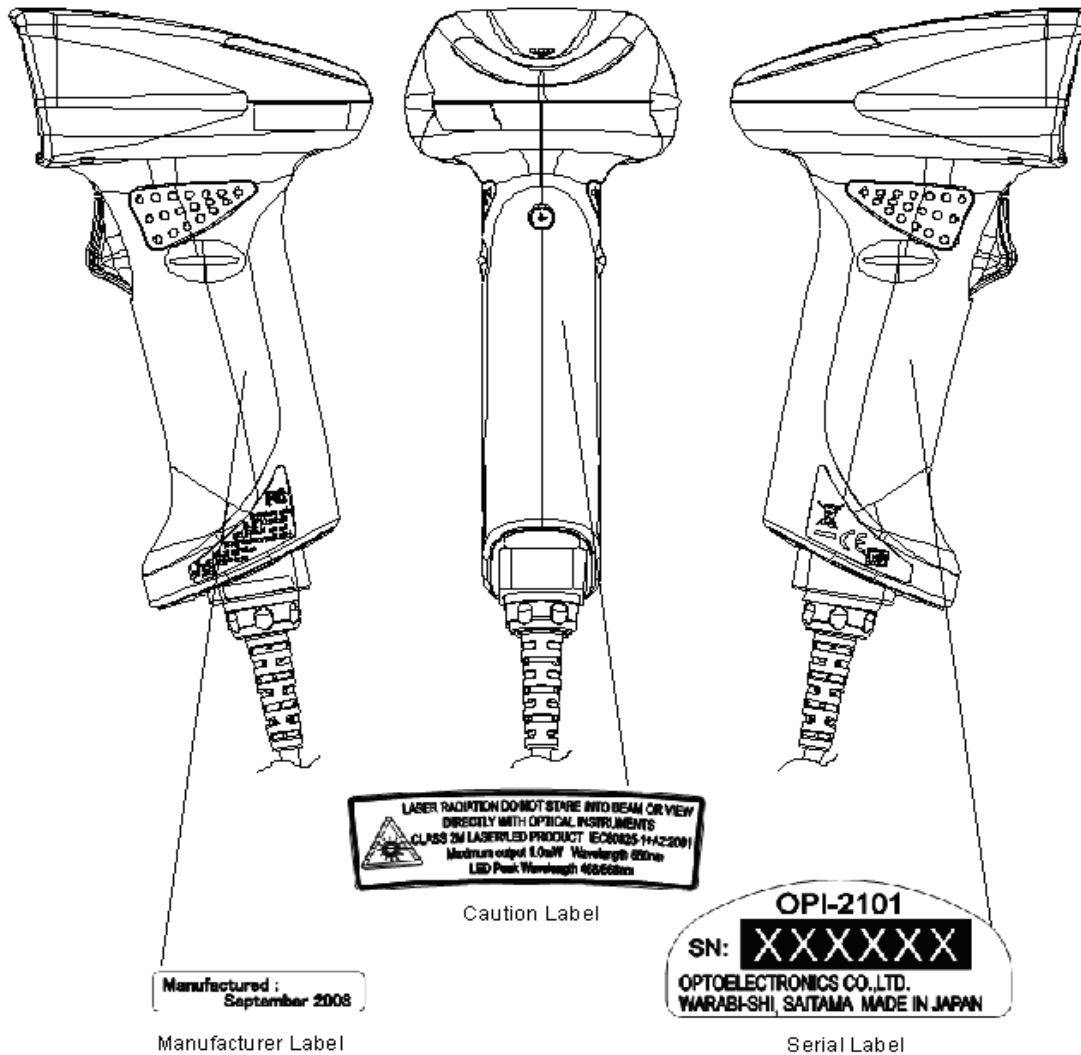
* Settings are valid when using the USB-HID interface.

11.6. Default Settings 3C: Keyboard Communication Settings—Wedge

Parameter	“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	AT wedge
Select keyboard	US keyboard emulation

12. Serial Number and Labeling

The serial number shown below is affixed to the scanner. The standards of Japan, Europe, and the U.S.A. are printed on the labels that are also affixed to the both sides of the scanner.



(The figure shown is an example of a product manufactured in September 2008)

Figure 26: Serial number diagram

13. Packaging Specifications

13.1. Individual Packaging Specification

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

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

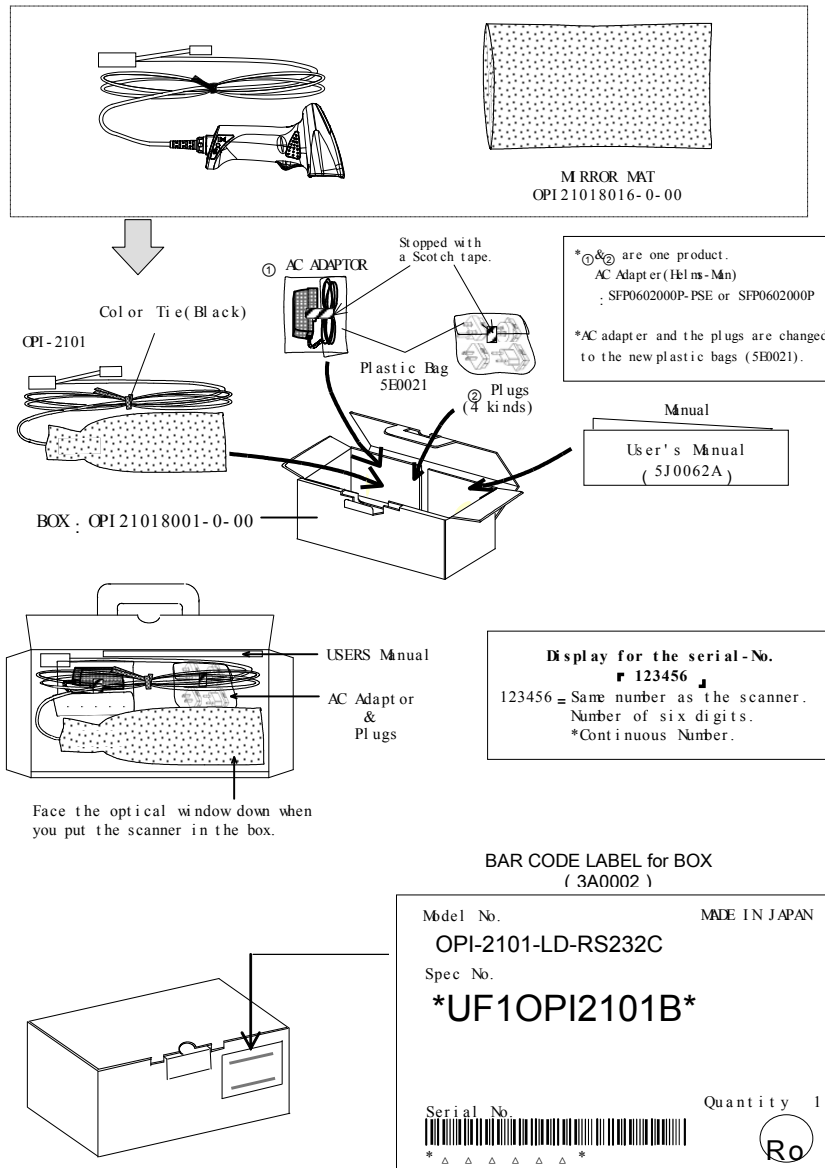


Figure 27: Individual packaging

13.2. Accessory Specifications

The following table shows a list of accessories for each model.

Model	AC Adaptor	Wedge Branch Cable
OPI 2101-HD RS-232C	Yes	N/A
OPI 2101-HD USB	N/A	N/A
OPI 2101-HD Wedge	Yes	Yes

Adapter part number: SFP0602000P-PSE

Note: Four types of conversion plugs are included for the AC adapter.

13.3. Collective Packaging Specification

The following figure shows an example of the collective packaging for the OPI 2101 RS-232C model.

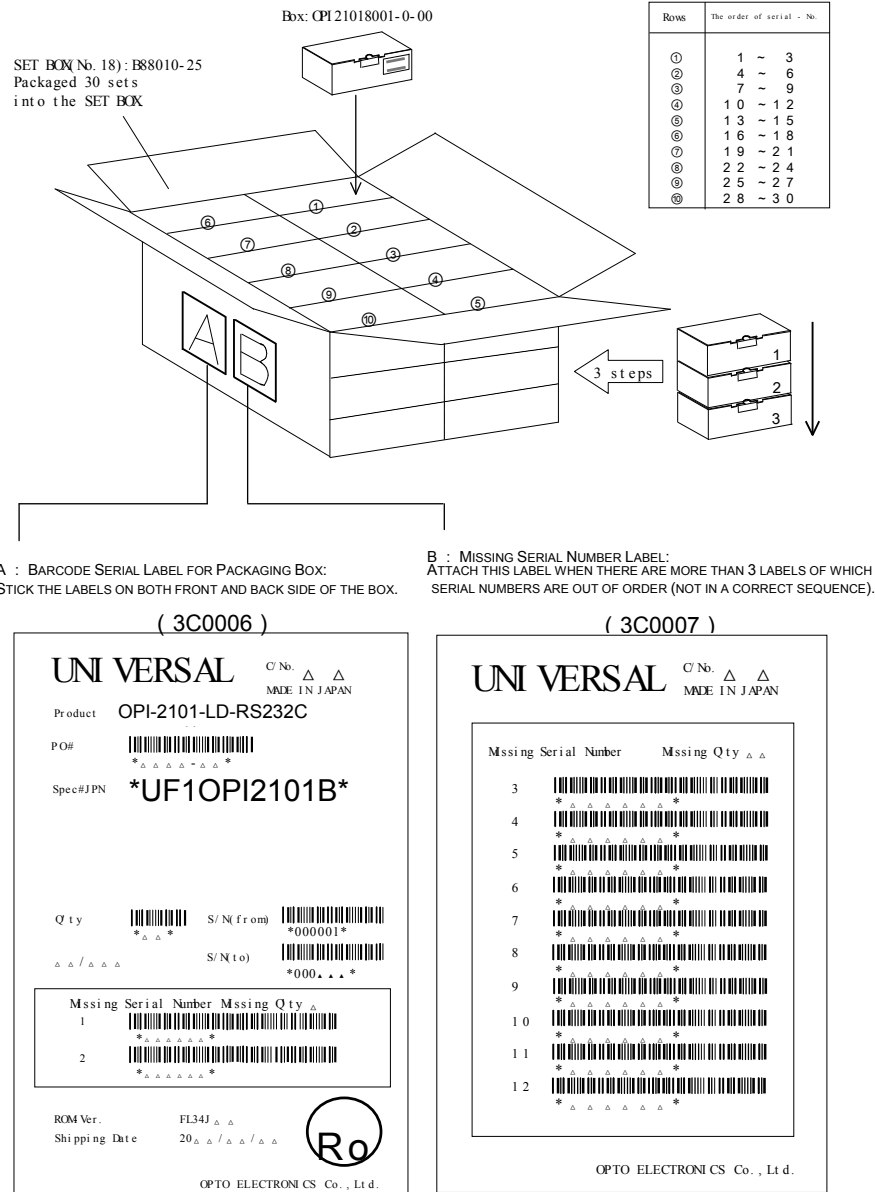


Figure 28: Collective packaging

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

14. Durability

14.1. Electrical Noise

No malfunction occurred when sinusoidal electrical noise (50 Hz–100 kHz, < 0.1 Vp-p) was added to the power supply line.

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

PCS	0.9
Resolution	0.26 mm
Symbology	9-digit Code 39
Quiet Zone	10 mm
N/W Ratio	1:2.5
Distance	35 mm
Angle	$\alpha = 0^\circ \beta = 15^\circ \gamma = 0^\circ$
Curvature	$R = \infty$
Power Supply Voltage	6.0 V

14.2. Static Electricity

Air discharge:	± 8 kV max. (No malfunction) ± 15 kV max. (No destruction)
Contact discharge:	± 6 kV max. (No malfunction) ± 15 kV max. (No destruction)
Measurement environment:	Use electrostatic testing device compliant with IEC 61000-4-2. Built up and discharged 15 kV of static electricity on the scanner surface 50 times.
Discharge resistance:	330 Ω
Capacitor charging:	150 pF

14.3. Shock

14.3.1. Drop Test (without packaging)

No malfunction occurred after the following drop test.

Drop Test: Drop the scanner five cycles from a height of 150 cm onto a concrete floor and one cycle from a height of 200 cm. Each cycle equals 5 sides: left, right, front, back, and top.

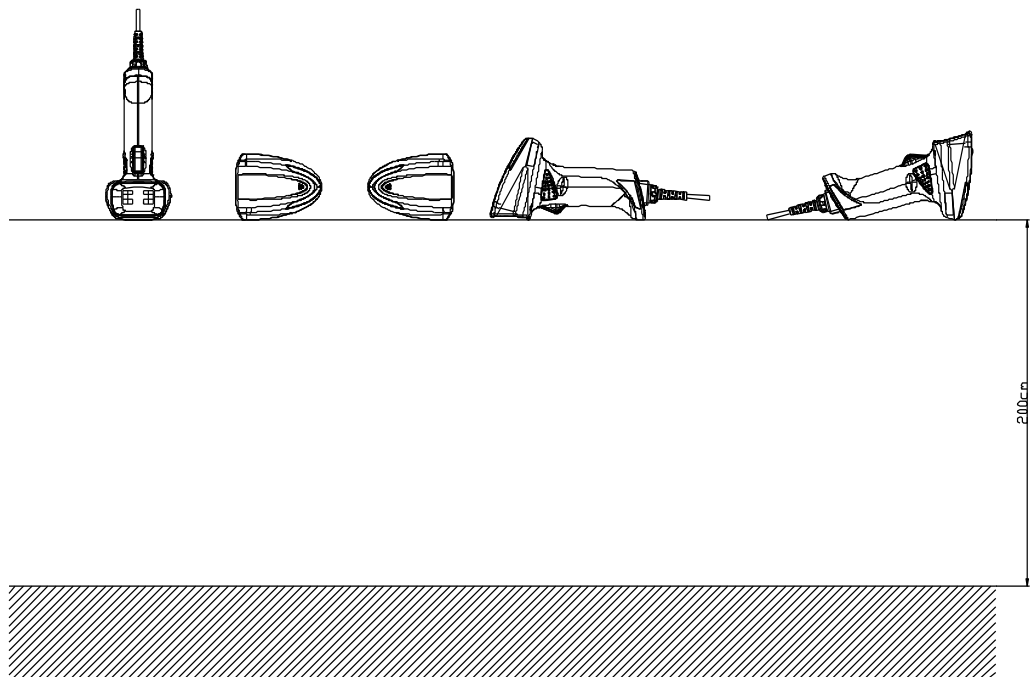


Figure 29: Drop test

14.3.2. Drop Test (with individual packaging)

No malfunction occurred after the following drop test.

Drop Test: Drop an individually packaged scanner from a height of 150 cm onto a concrete floor once on its 1 corner, 3 edges, and 6 sides (10 total drop tests).

14.4. Vibration Strength

No malfunction occurred after the following vibration test.

Vibration test: Increase the frequency of the vibration from 10 Hz to 100 Hz with accelerated velocity 19.6 m/s^2 (2 G) for 60 minutes in individually packaged state. Repeat this routine in each X, Y, Z direction once for 60 minutes each. (Ten cycles for each direction and 180 minutes total.)

14.5. Dust and Drip Proof

IEC IP42 equivalent

14.5.1. Dust Prevention

Level 4: Protected against solid objects greater than 1.0 mm.

14.5.2. Water prevention

Level 2: Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle of up to 15° from its normal position.

14.6. Cable Strength

No malfunction occurred after the following cable strength test.

Affix the scanner to an immovable object, then pull it using a force of 2.5 kgf (static loading) for 1 second. Repeat this test 20 times.

14.7. Cable Bending Test

No malfunction occurred after the following cable bending test.

Add a load of 4.9 N (500 g) to a cable then bend it at an angle of 90° to both right and left. Repeat this bending test for 1 million times on the tail of the cable

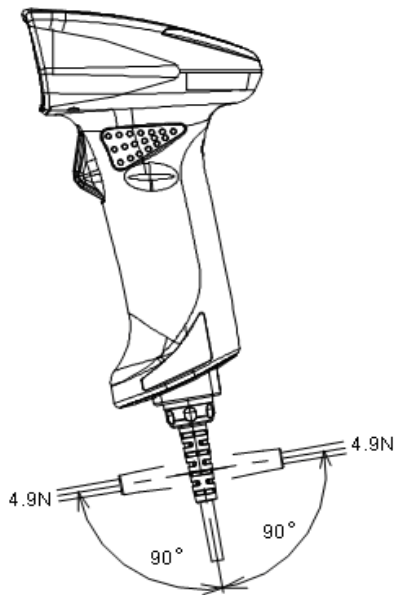


Figure 30: Cable bending test

15. Reliability

MTBF (Mean Time Between Failures) of this product is 40,000 hours.

The estimate of MTBF is based on standard operation of the product within the recommended temperature range and without extreme electronic or mechanical shock.

16. Trigger and Read Options

The OPI 2101 has read and trigger settings as follows:

16.1. Trigger Modes

Disabled: When this option is selected, the reader will stay on all the time.

Enabled: After receiving a trigger signal, the barcode reader will turn on and the read cycle starts. The reader will stay on for a time as set in 'Read time options'. The trigger signal can be initiated in the following ways:

Manual mode: When the trigger key is pressed, the read cycle starts.

Auto trigger mode: The read cycle automatically starts when a trigger signal is received via sensor detection.

Serial mode: The read cycle starts at the time set in 'Read time options' after a serial command (<ESC>Z<CR>) is received.

16.2. Read Modes

Single read mode: When a symbol has been decoded, the reader will be turned off. The reader must be triggered again to read another symbol. This option and 'Disable trigger' cannot be programmed at the same time.

Multiple read mode: When a symbol has been decoded, the reader will stay on for a time (set by 'Read time options') or indefinitely, if the trigger switch has been disabled. The same symbol can only be decoded again after the symbol has not been detected for a set number of scans (multiple read reset time).

Continuous read mode: The reader will produce as much data as it can decode even if it is reading the same symbol. This mode is mainly used for demonstration and diagnosis.

16.3. Auto Trigger Options

16.3.1. Auto Trigger Sensor

When auto trigger is used, the scanner starts barcode reading after detecting a change in reflection in the detection area (the hatched area in the figure below). The scanner will be triggered if the sensors detect changes in brightness in the detection area (multiple reading).

The trigger is enabled when you insert a gray-colored paper on a black backing paper, or a black-colored paper on a gray backing paper.

Conditions

Paper used for the test:	Black paper from Glory (Black 010010016) Gray paper from Glory (Silver-gray 010010016)
Moving speed:	105 mm/s or slower
Angle:	Vertical to the edge of the scanner
Environmental temperature and humidity:	Room temperature and humidity
Environmental illuminance:	300 lx or higher
Conditions for the auto trigger:	<ol style="list-style-type: none"> 1. Barcode sheet: OPTOELECTRONICS Test Sheet (gray) Background: OPTOELECTRONICS Test Sheet (black) 2. Barcode sheet: OPTOELECTRONICS Test Sheet (black) Background: OPTOELECTRONICS Test Sheet (gray)

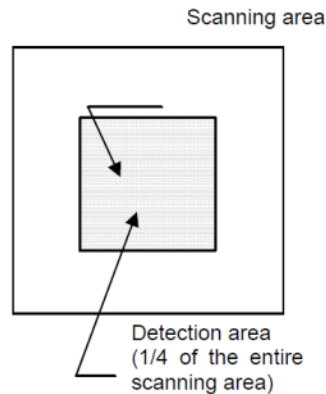


Figure 30: Detection area

Figure 31: Auto trigger detection area











17. Trigger and Read Settings

17.1. Read Time Settings

17.1.1. Read Time

This option allow you to configure the time period that the reader is ON after the trigger switch is pressed or after auto trigger mode is enabled.









To configure the read time, scan “ZZ”, “Yn”, and “ZZ”.

Functions	Menu labels	Menu codes
SET		ZZ
Indefinitely		Y0
1 second		Y1
2 seconds (default)		Y2
3 seconds		Y3
4 seconds		Y4
6 seconds		Y5
8 seconds		Y6
10 seconds		Y7
END		ZZ

17.1.2. Multiple Read Reset Time

This option allows you to configure the number of frames during which the scanner must be pointed away from the label before it can decode the same label again.

To configure the multiple read reset time, scan “ZZ”, “Ax”, and “ZZ”.

Functions	Delay	Menu labels	Menu codes
SET			ZZ
Multiple read reset time	1 frame		AH
	2 frames		AI
	3 frames		AJ
	4 frames		AK
	5 frames		AL
	6 frames (default setting)		AM
	7 frames		AN
END			ZZ



17.2. Auto Trigger Settings

17.2.1. Enable/Disable Settings

Use the following settings to enable or disable the auto trigger. (Auto trigger is disabled by default).

To enable auto trigger, scan “ZZ”, “+I” and “ZZ” in that order.

To disable auto trigger, scan “ZZ”, “+F” and “ZZ” in that order.

Functions	Menu labels	Menu codes
Enable auto trigger		+I
Disable auto trigger		+F

Note: Please configure the following **after** enabling the auto trigger.

17.2.2. Auto Trigger Sensitivity Settings

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

Note: Please confirm the background and the operating environments (ambient light, etc) of the barcode when carrying out the following configuration.

To configure auto trigger sensitivity options, scan “ZZ”, “Mx”, and “ZZ”.

Functions	Menu labels	Menu codes
SET		ZZ
High		MF
Normal (default setting)		MH
Low		MJ
END		ZZ

17.2.3. Auto Trigger Settings

This option enables auto trigger all the time.

Functions	Menu labels	Menu codes
SET		ZZ
Enable auto trigger		*1
END		ZZ

18. Regulatory Compliance

18.1. LED Safety

All LED-based products are LED class 1 and are safe under reasonably foreseeable operating conditions. Do not stare into the beam.

- JIS C6802: 2005: Class 1M
- IEC 60825-1+A2: 2001 Class 1M

18.2. Product Safety

EN60950-1: 2001

IEC60950-1: 2001

18.3. EMC

EN55022

EN55024

VCCI Class B: This is a Class B product, to be used in a domestic environment based on the Technical Requirement of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Please install and use the equipment according to the instruction manual.

FCC Part 15 Subpart B Class B: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

18.4. RoHS

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

19. Safety

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

19.1. Shock

Do not throw or drop the scanner.

Do not place heavy objects on the cables.

19.2. 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 forcibly bend the cables at low temperatures.

19.3. Foreign Materials

Do not immerse the scanner in liquids.

Do not subject the scanner to chemicals.

19.4. Other

Do not plug/unplug the connectors before disconnecting the power.

Do not disassemble this product.

Do not place the product near a radio or a TV receiver, as the scanner may cause reception problems.

The scanner may be damaged by voltage drops.

The scanner may not perform properly in environments when placed near a flickering light, such as a computer monitor, television, etc.

Opticon shall not be held responsible for any damages caused by using an AC adapter not provided by Opticon.

20. Mechanical Drawing

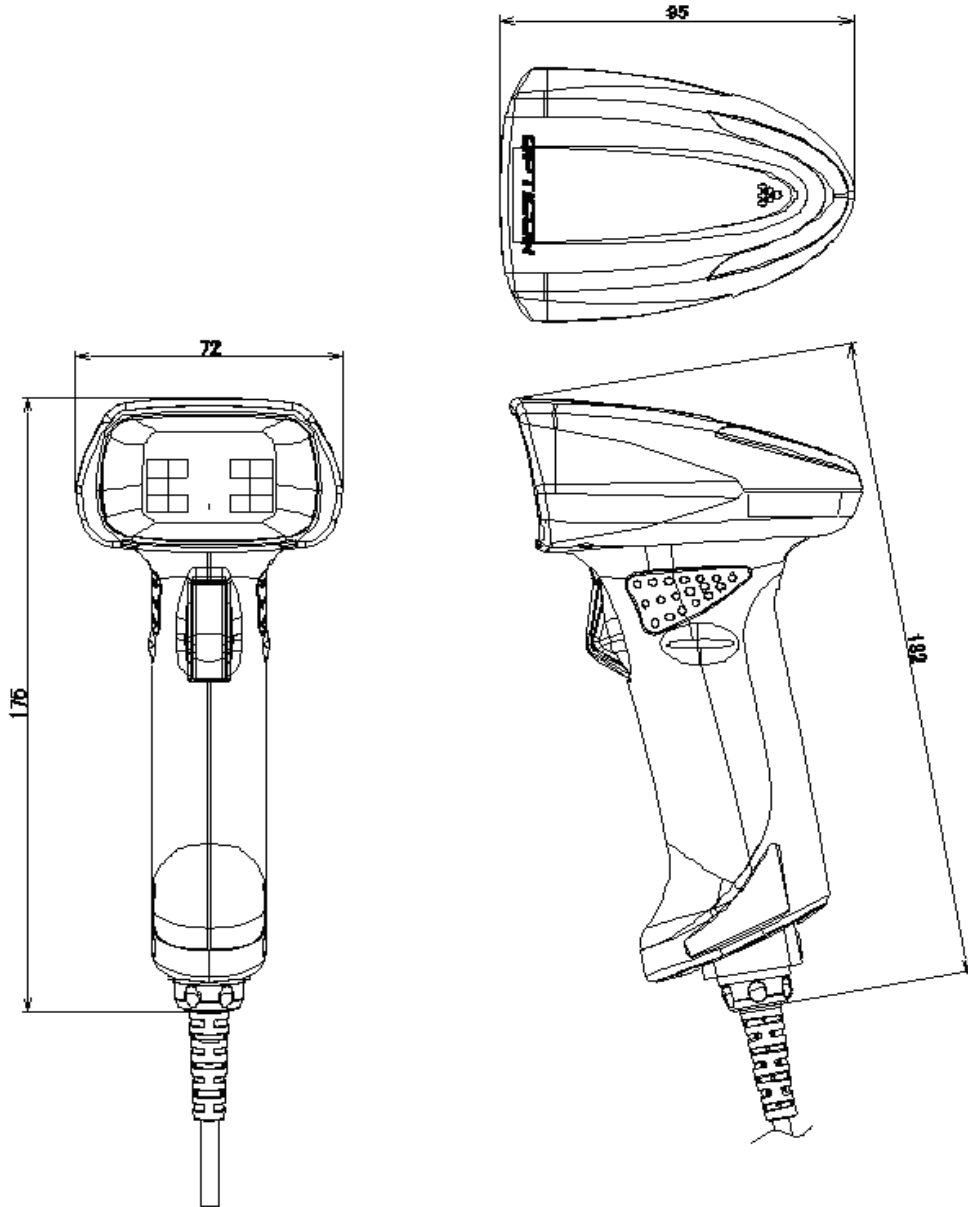


Figure 32: Mechanical drawing

AC adapter is part number SFP0602000P-PSE

All measurements are in millimeters.

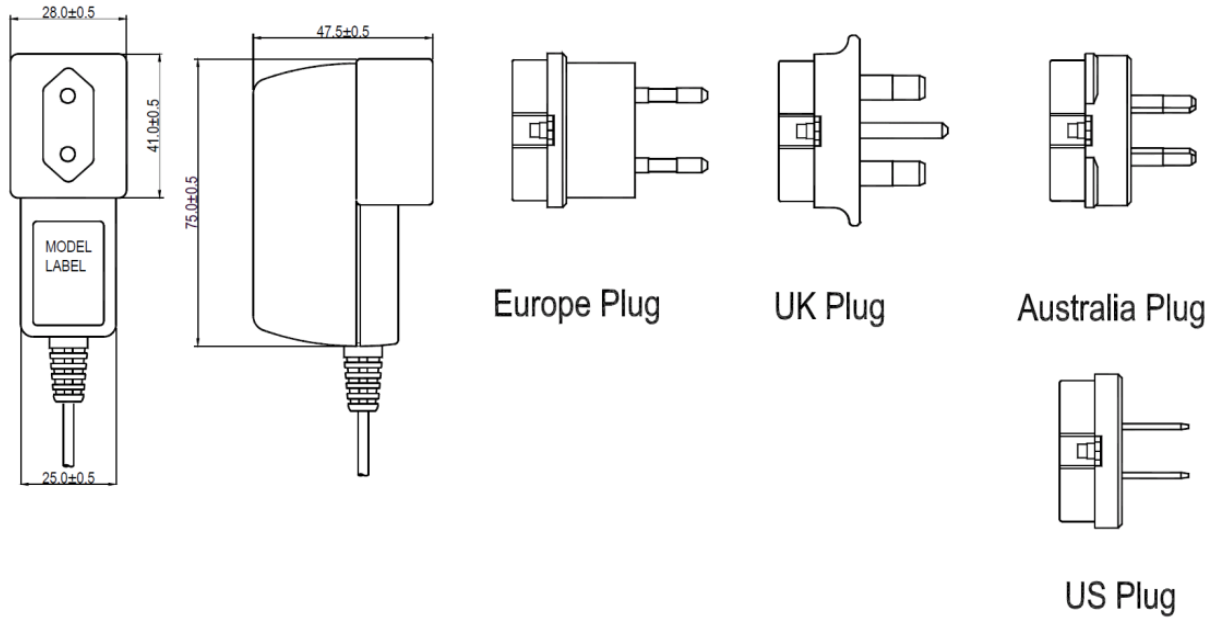


Figure 33: AC adapter (for input side)

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

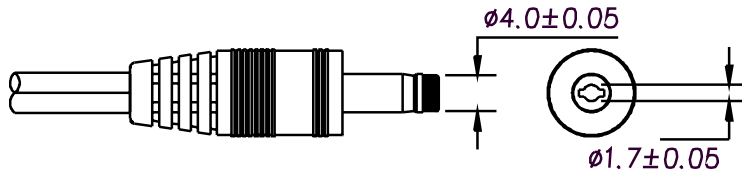


Figure 34: AC adapter (for output side: DC jack)