

OPTICON

Fixed Position Laser Barcode Scanner

NLB/RLB 1000



The NLB 1000 and the RLB 1000 series scanners realize a scan rate of 1000 scans/s. The NLB 1000 is a single scan model and the RLB 1000 is a raster scan model.

Specifications Manual

All information subject to change without notice.

Document History

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1. Abstract

This manual provides specifications for the NLB/RLB 1000 fixed-position laser scanner, which provides smooth, fast scanning performance.

2. Overview

The NLB 1000 and the RLB 1000 series scanners use a polygon mirror to realize a scan rate of 1000 scans/s. Those scanners output decoded data via an RS-232C or USB interface.

The NLB 1000 is a single scan model and the RLB 1000 is a raster scan model.

You can configure settings of the NLB 1000 and the RLB 1000 scanners either by sending specific commands or by scanning menu barcodes.

- The NLB 1000 and the RLB 1000 scanners emit IEC60825-1+A2:2001 Class 2 and JIS C6802:2005 Class 2 laser beams.
- The dust and drip proof performance of the NLB 1000 and the RLB 1000 scanners satisfies IP-54.
- The NLB 1000 and RLB 1000 series scanners all comply with RoHS.

Supported symbologies:

Linear (1D)

JAN/UPC/EAN, incl. add-on
Codabar/NW-7
Code 11
Code 39
Code 93
Code 128
GS1-128 (EAN-128)
IATA
Industrial 2of5
Interleaved 2of5
ISBN
Matrix 2of5
MSI/Plessey
S-Code
Telepen
Tri-Optic
UK/Plessey

Postal

Chinese Post Matrix 2of5

3. Physical Features

3.1. Dimensions

W 29.0 x D 34.5 x H 17.0 mm

3.2. Weight

30 g (max.), excluding the cable

4. Environmental Specifications

4.1. Operating Temperature and Humidity

Temperature: 0 to 45° C (32 to 113° F)

Humidity: 5 to 90% RH

4.2. Storage Temperature and Humidity

Temperature: -20 to 65° C (-4 to 149° F)

Humidity: 5 to 90% RH

4.3. Ambient Light Immunity

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

Incandescent light	4,000 lx
Fluorescent light	4,000 lx
Sunlight	80,000 lx

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

PCS:	0.9
Resolution:	0.25 mm
Symbology:	9-digit Code 39
Quiet zone:	10 mm
N/W ratio:	1:2.5
Distance:	110 mm
Angle:	$\alpha = 0^\circ \beta = 15^\circ \gamma = 0^\circ$
Curvature:	$R = \infty$
Power supply voltage:	5.0 V

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

Note: α , β and γ respectively represent pitch, skew and tilt. Please see section 6.1 for how these values are defined.

5. Electrical Specifications

5.1. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Power supply voltage	V_{DD}	4.5	5.0	5.5	V	
Operating current	I_{OP}	—	205	500	mA	LED off
Rush current peak	I_{PEAK}	—		2000	mA	
Stand-by current	I_{PRE}	—	145		mA	Laser off and polygon mirror on
Startup time	T_D	—		1.5	s	Scans at a rate of 800 scans/s to 1200 scans/s carried out within 1.5 seconds after the polygon mirror gets activated. (See note.)

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.

Note: If the current value does not stabilize within 1.5 seconds after activating the polygon mirror, this scanner detects the system error, stops the polygon mirror, and blinks green and red LEDs.

5.2. Operating Indicators

5.2.1. LEDs

There are red and green LEDs on the NLB 1000 and the RLB 1000.

1. A green LED lights up for a specific period of time after successful scanning. You can configure the settings when the green LED is blinking.
2. A red LED lights up when any unsupported menu barcode is read in the menu mode (200 ms).
3. Both green and red LEDs light up at the same time when either of the following occurs:
 - No scanning operation at the scan rate of 800–1200 scans/s is carried out within 1.5 seconds after the polygon mirror is activated.
 - No scanning operation at the scan rate of 800–1200 scans/s is carried out while the polygon mirror is operating.

5.2.2. Buzzer

The NLB 1000 and the RLB 1000 scanners have a buzzer function; the buzzer loudness is below 65 dB. The buzzer sounds:

1. After successful scanning at power activation.
2. After successful scanning.
3. After reading a valid menu barcode or when the scanner reads an unsupported barcode.
4. When there is a motor malfunction.

However, it is possible to disable the buzzer by reading specific menu barcodes.

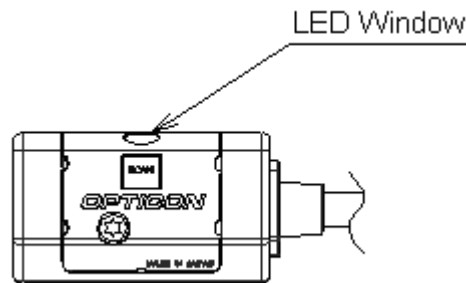


Figure 1: LED window

6. Optical Specifications

6.1. Imager Scanning

Parameter	Specification	Unit
Light-emitting element	Red laser diode	—
Emission wavelength	650 ±10 (at 25° C)	nm
Light output	1.0 or less	mW
Scanning method	Octahedron polygon mirror	—
Scanning speed	1000 ±60 (at 25° C)	scans/s
Scan angle	Scan angle: 70	°
	Effective scan angle: 40	°
Vertical scan width of NLB 1000 (single scan)	8 or less (500 mm from front edge of scanner)	mm
Vertical scan width of RLB 1000 (raster scan)	8 to 20 (500 mm from front edge of scanner)	mm

6.2. 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.

The NLB 1000 and the RLB 1000 are capable of scanning low-print-quality barcodes.

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

Refer to the Default settings chapter for more details.

7. Technical Specifications

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

Conditions

Ambient temperature and humidity	25° C or lower 85% RH or lower
Ambient light	500 to 1000 lx
Background	Barcode = black Space = white Margin = white Background of label = black
Power supply voltage	5.0 V
Decoding test	Approve the performance when decoding is successful in 70% of the tests.
Scan origin	From the front edge of the scanner

7.1. Print Contrast Signal (PCS)

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

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

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

7.2. Minimum Resolution

0.15 mm

7.3. Scan Area and Resolution

7.3.1. Scan Area

The scannable area depends on the barcode type (PCS, resolution, length, etc.) and the direction of the barcode surface. However, the barcode should be set within the following area.

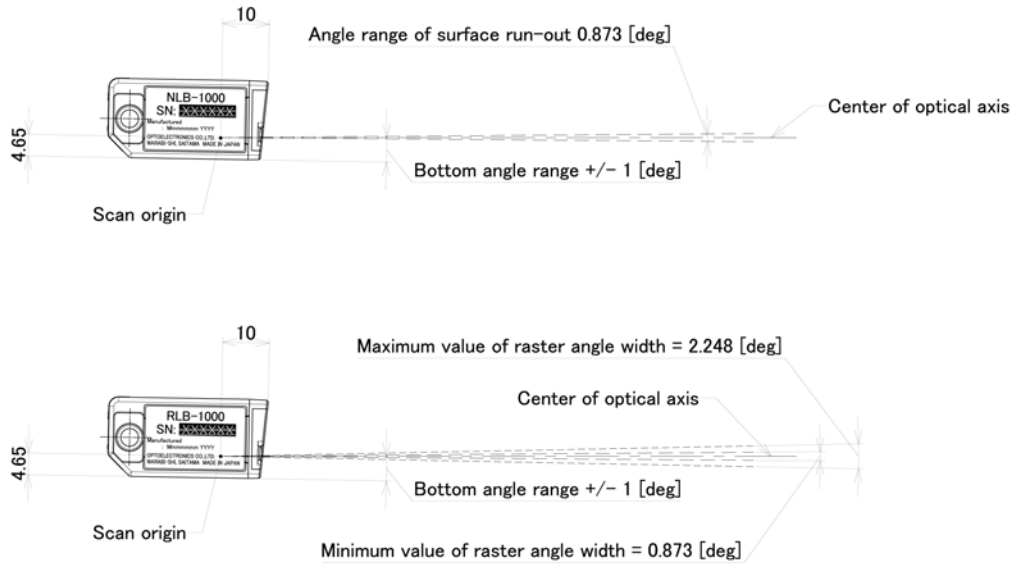


Figure 2: Scan area

7.3.2. Depth of Field

The depth of field is measured from the front edge of the scanner. The scanning area is rectilinear near the exit window and expands in an arc centered on a virtual reference point in the distance.

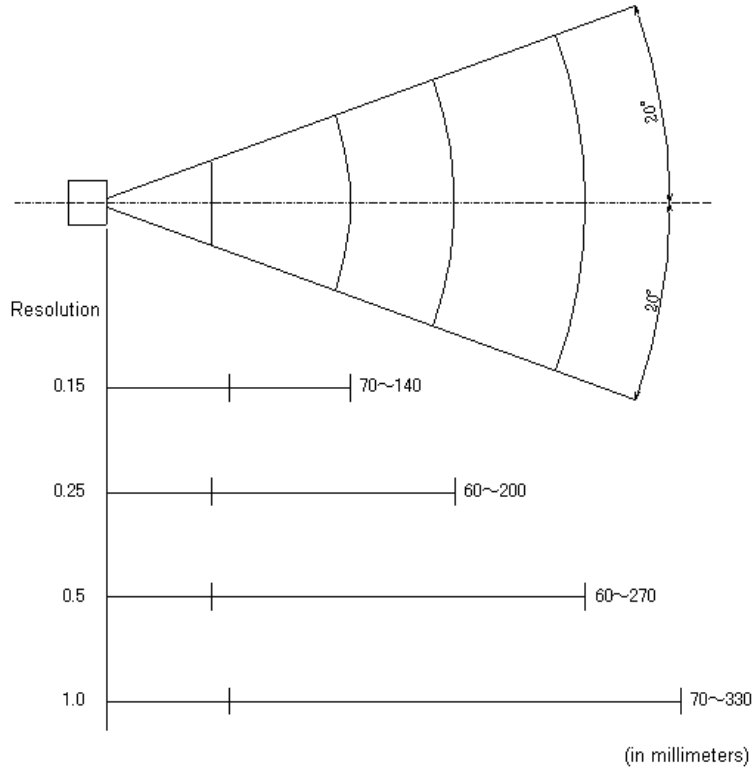


Figure 3: Scan range

PCS	Resolution (mm)	Decode Depth (mm)
0.9	1.0	70-330
	0.5	60-270
	0.25	60-200
	0.15	70-140

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

- N/W Ratio: 1:2.5
- Angle: $\alpha = 0^\circ, \beta = 15^\circ, \gamma = 0^\circ$
- Curvature: $R = \infty$

Resolution	Symbology	PCS	Quiet Zone	Digit
1.0 mm	Code 39	0.9	25 mm	1
0.5 mm	Code 39	0.9	18 mm	3
0.25 mm	Code 39	0.9	10 mm	8
0.15 mm	Code 39	0.9	7 mm	10

7.4. Pitch, Skew, and Tilt

7.4.1. Pitch Angle

$\alpha \leq \pm 30^\circ$

7.4.2. Skew Angle and Dead Zone

Skew angle: $\beta \leq \pm 60^\circ$ (Excluding dead zone)

Dead zone: $\beta \leq -7^\circ$ to $+9^\circ$ (NLB 1000)

-8° to $+10^\circ$ (RLB 1000)

(There are some areas in which decoding may fail, due to specular reflection.)

7.4.3. Tilt Angle

$\gamma \leq \pm 25^\circ$

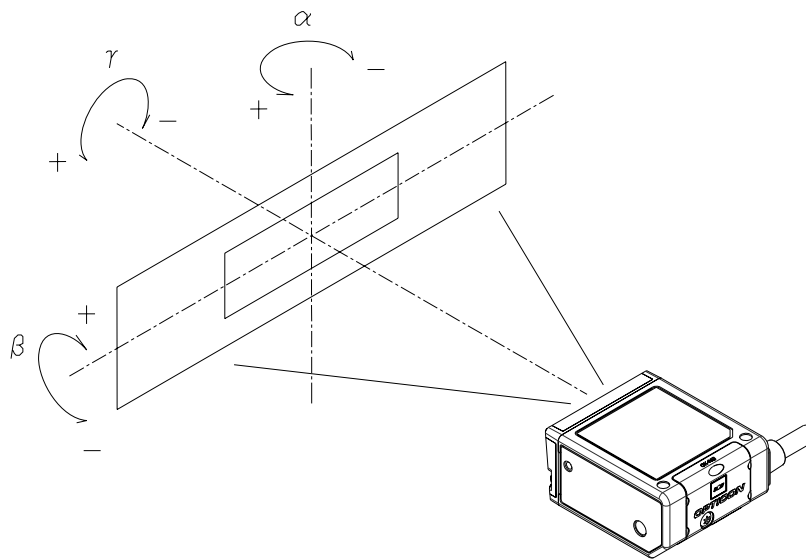


Figure 4: Pitch, skew, and tilt angles

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

Distance: 110 mm from the front edge of the scanner

Label: **Pitch, Skew Angle, Dead Zone**

PCS = 0.9, Resolution = 0.25 mm, Symbology = 9-digit Code 39,
Quiet Zone = 10 mm, N/W Ratio = 1:2.5

Tilt Angle

PCS = 0.9, Resolution = 0.26 mm, Symbology = 13-digit JAN, Quiet zone = 10 mm

Angle: Curvature: $R = \infty$, Skew Angle = $\beta + 15^\circ$ (for measuring Pitch Angle and Tilt Angle)

7.5. Curvature

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

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

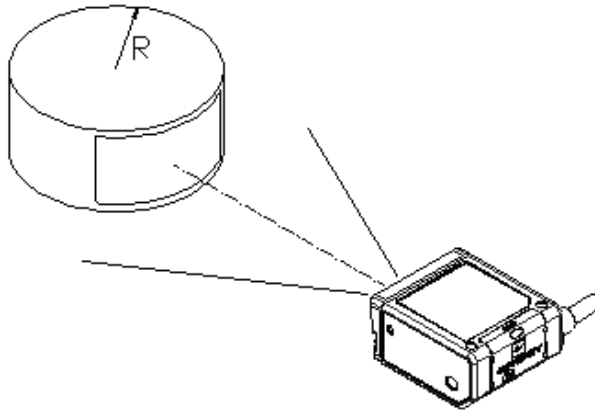


Figure 5: Curvature

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

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

Distance: 110 mm from the edge of the scanner

Angle: Skew angle $\beta = +15^\circ$

8. Interface Specifications

8.1. RS-232C Interface Spec

There are three different cable specifications for models using an RS-232C interface:

1. Cable with a D-sub 9-pin connector
2. Cable with a D-sub 25-pin connector
3. Cable without a connector

8.1.1. Settings and Communication

Reading menu barcodes [ZZ] + [U2] + [ZZ] can set the RS-232C interface default. See section 10.1 for scannable barcodes.

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

You can change the communication condition using the menu barcode.

8.1.2. Signal Level

Signal Name	I/O	RS-232C Level (V)	
		Bars/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

8.1.3. Pin Assignment and Interface Circuit

a) DB9 Pin Assignment

Pin	Wire Color	Signal Name	Remarks
1	Brown	TRIGGER	Shield
2	Green	TxD	
3	White	RxD	
4		—	Connected to pin 6 with jumper cable
5	Purple	S.GND	
6		—	Connected to pin 4 with jumper cable
7	Blue	CTS	
8	Gray	RTS	
9			Open (not connected)
S	Red	VCC	PTF
Shield		F.GND	

Connector: D-sub 9-pin female (with inch-long screw)

Power supply: Stereo jack

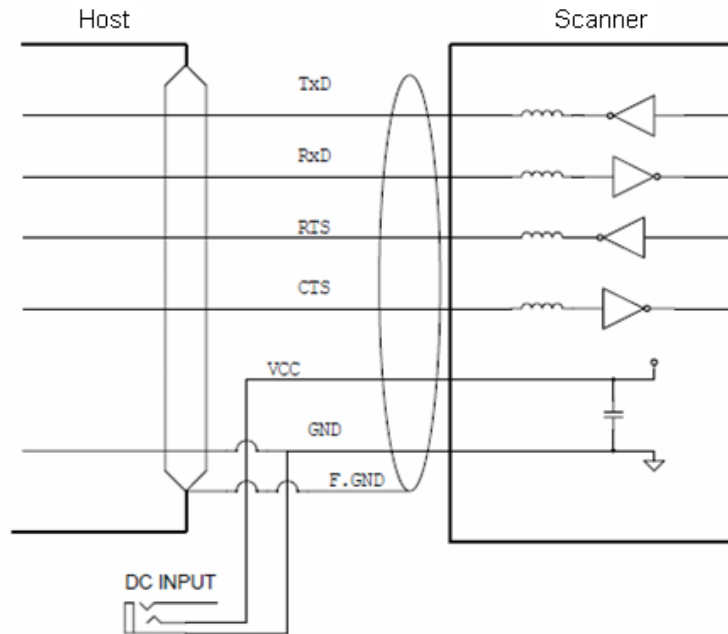


Figure 6: D-sub 9-pin connector - interface circuit

b) DB25 Pin Assignment

Pin	Wire Color	Signal	Remarks
Shield / 1		F.GND	
2	White	RxD	
3	Green	TxD	
4	Blue	CTS	
5	Gray	RTS	
7	Black	S.GND	
11	Brown	TRIGGER	H-level: Open; L-level: Trigger
12	Yellow	OK	NPN open connector (DC 24 V, 30 mA)
13	Orange	NG	NPN open connector (DC 24 V, 30 mA)
S	Red	VCC	PTF

Connector: D-sub 25-pin female (with inch-long screw)

Power supply: Stereo jack

Note: You can change the sequencer (OK or NG) settings using the menu barcode. However, for a certain period of time, it will remain at OK when H-level signals are sent and NG when L-level signals are sent.

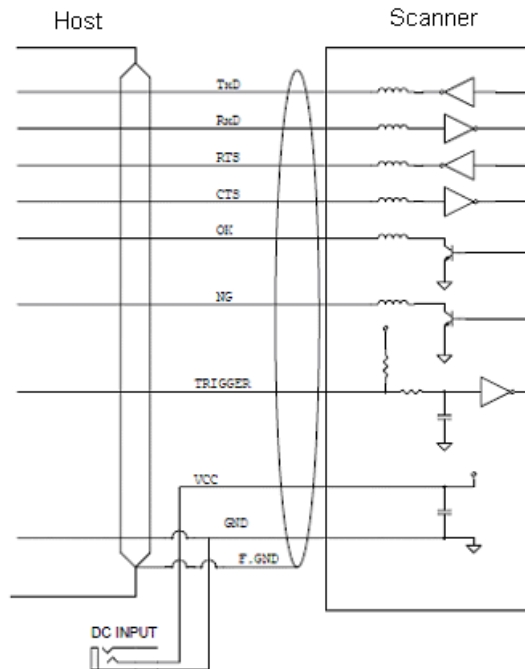


Figure 7: D-sub 25-pin connector - interface circuit

c) No connector

Wire Color	Signal	Remarks
Green	TxD	
White	RxD	
Gray	RTS	
Blue	CTS	
Red	VCC	5 V input
Black	S.GND	GND
Brown	Trigger	H-level: Open; L-level: Trigger
Yellow	OK	NPN open connector (DC 24 V, 30 mA)
Orange	NG	NPN open connector (DC 24 V, 30 mA)
Shield	F.GND	shrinkable tube

Note: You can change the sequencer (OK or NG) settings using the menu barcode. However, for a certain period of time, it will remain at OK when H-level signals are sent and NG when L-level signals are sent.

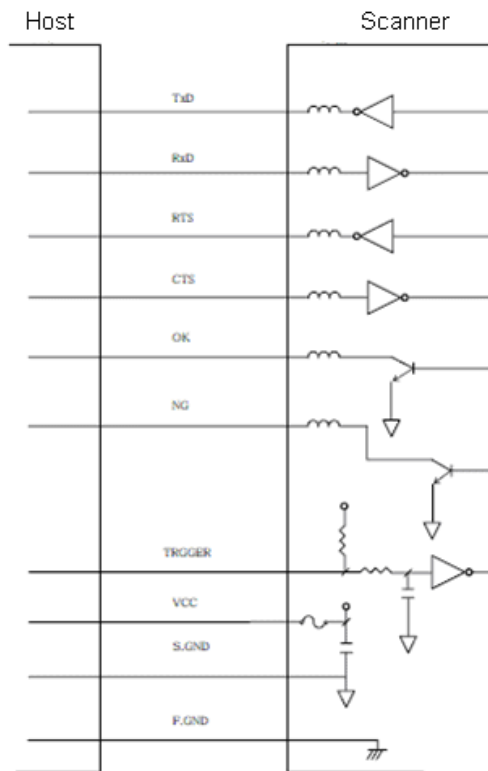


Figure 8: No connector - interface circuit

8.1.4. Character Format

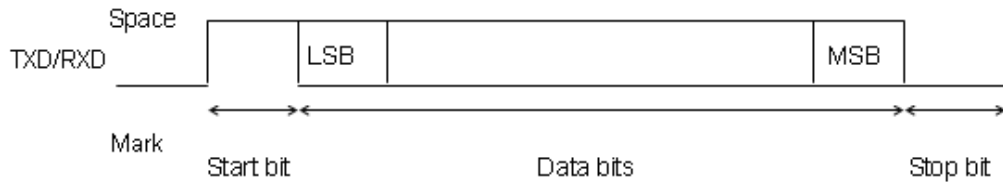


Figure 9: Character format

8.1.5. Communication Format

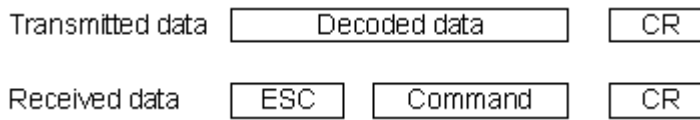


Figure 10: Communication format

8.1.6. 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 11: 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.

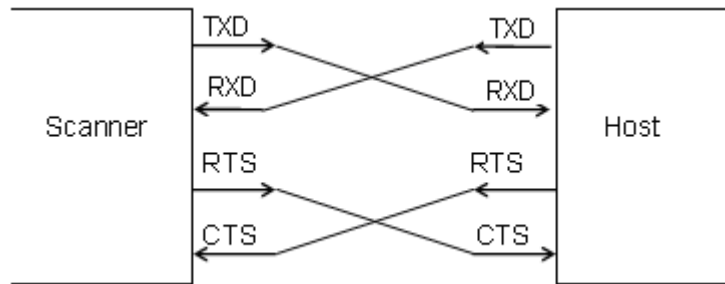


Figure 12: Busy/Ready communication

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

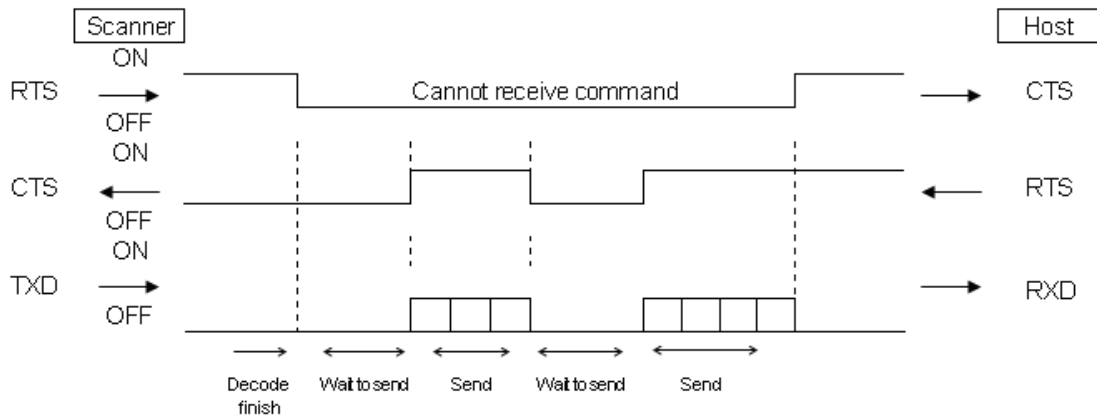


Figure 13: Cannot receive command

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 character and waits. When the CTS signal is turned ON while transmitting a character, the character will be transmitted.



Figure 14: 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.

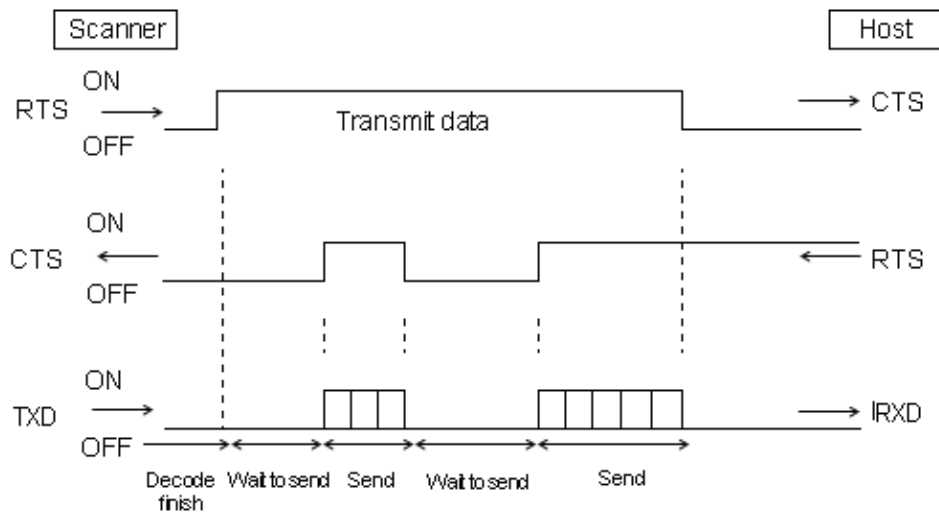


Figure 15: Modem transmit data

d) 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 can be set as follows using the menu or commands.

ACK/NAK Timeout	Menu/Command
Indefinitely (default)	XI4
100 ms	XI5
500 ms	XI6
1000 ms	XI7

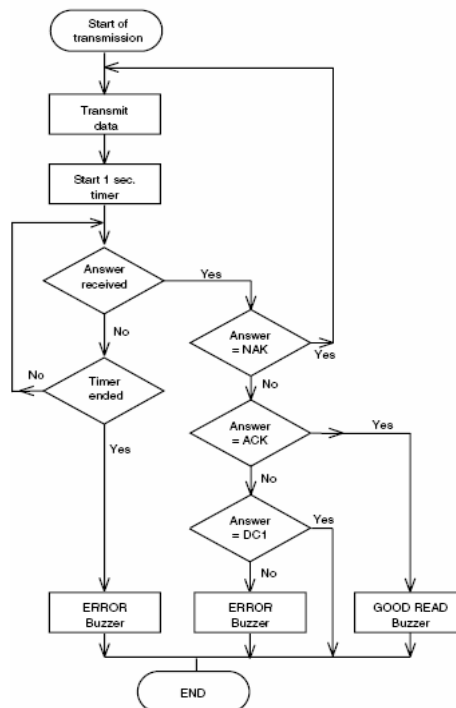


Figure 16: ACK/NAK

e) 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.

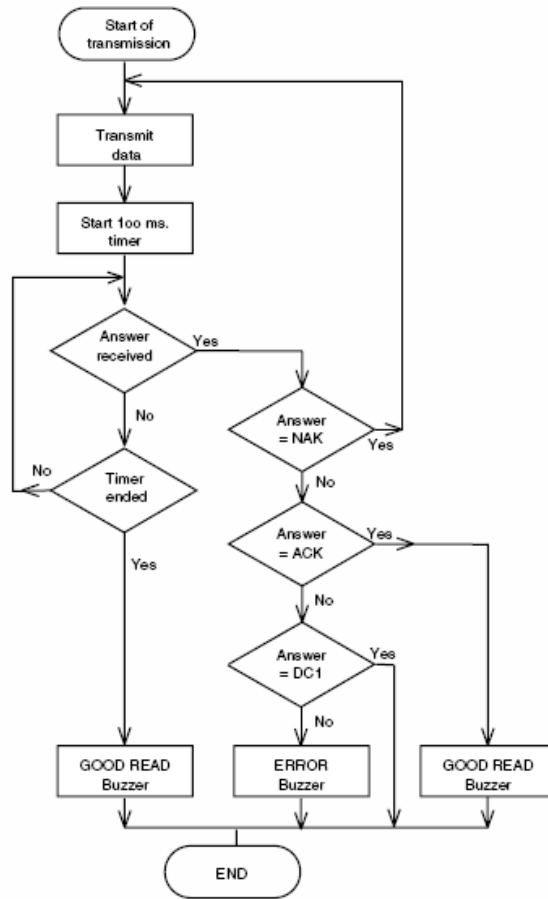


Figure 17: ACK/NAK—No response

8.2. USB Interface Specifications

8.2.1. Settings and Communication

Reading menu barcodes [ZZ] + [C01] + [ZZ] can set the USB-VCP interface default. See section 10.1 for scannable barcodes.

8.2.2. Connector and Interface Circuit

a) USB "A" connector

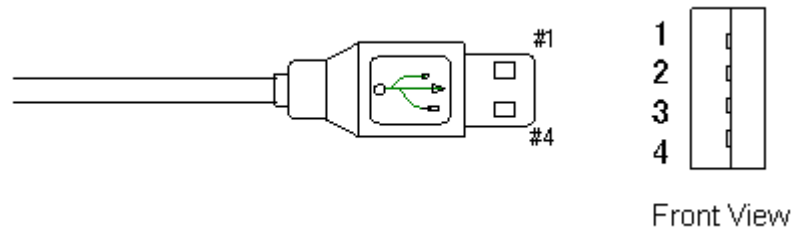


Figure 18: USB "A" connector

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

b) Interface Circuit

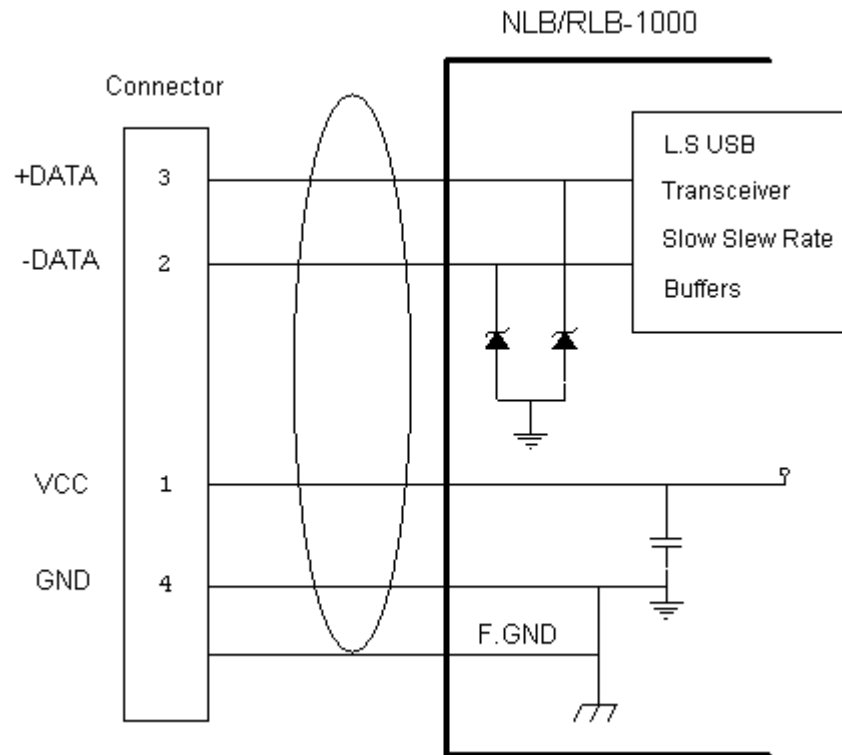


Figure 19: Interface circuit

9. Cable and Connector

The shape of the connector may change without prior notice.

9.1. RS-232C Cable (D-sub, 9-pin female)

(Standard specification)

Type:	Straight
Diameter:	$\phi 3.8$ mm (main cable) $\phi 3$ mm (AC adapter cable)
Length:	1500 \pm 50 mm (main cable, excluding connector) 100 \pm 10 mm (AC adapter cable, excluding jack)

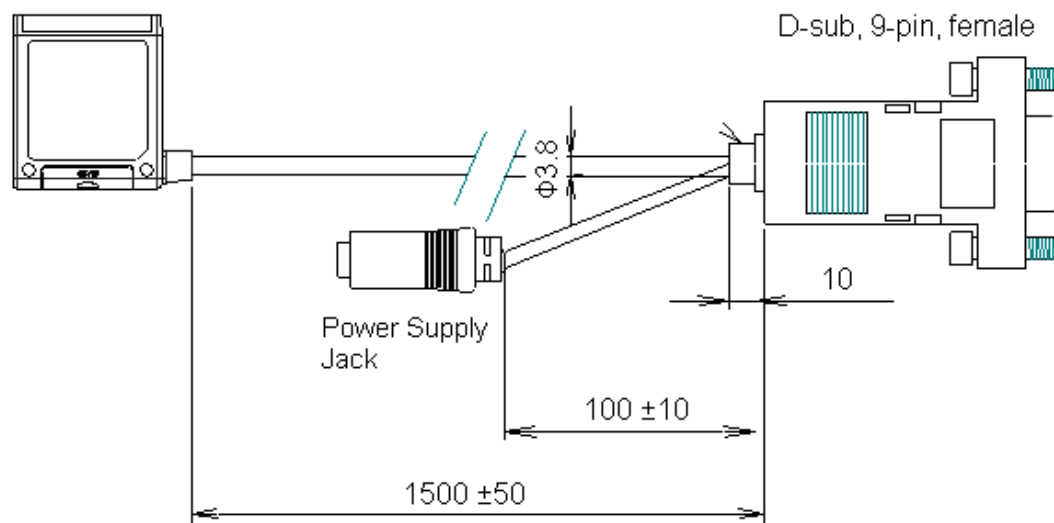


Figure 20: RS-232C cable: D-sub, 9-pin female

9.2. RS-232C Cable (D-sub, 25-pin female)

(Standard specification)

Type:	Straight
Diameter:	φ3.8 mm (main cable) φ3 mm (AC adapter cable)
Length:	1500 ±50 mm (main cable, excluding connector) 100 ±10 mm (AC adapter cable, excluding jack)

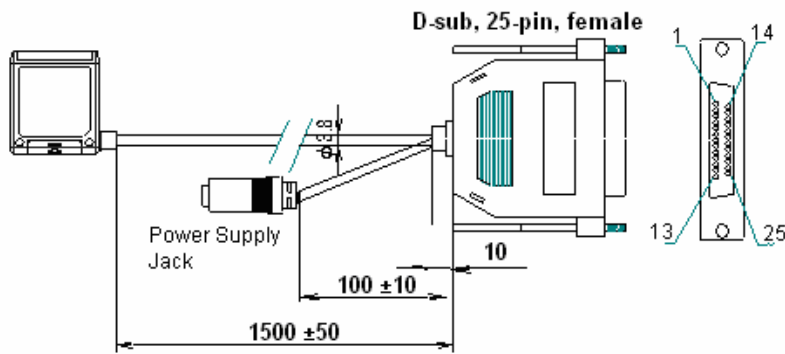


Figure 21: RS-232C cable: D-sub, 25-pin female

9.3. RS-232C Cable (no connector)

(Standard specification)

Type:	Straight
Diameter:	φ3.8 mm (main cable) φ3 mm (AC adapter cable)
Length:	1500 ±50 mm (main cable)

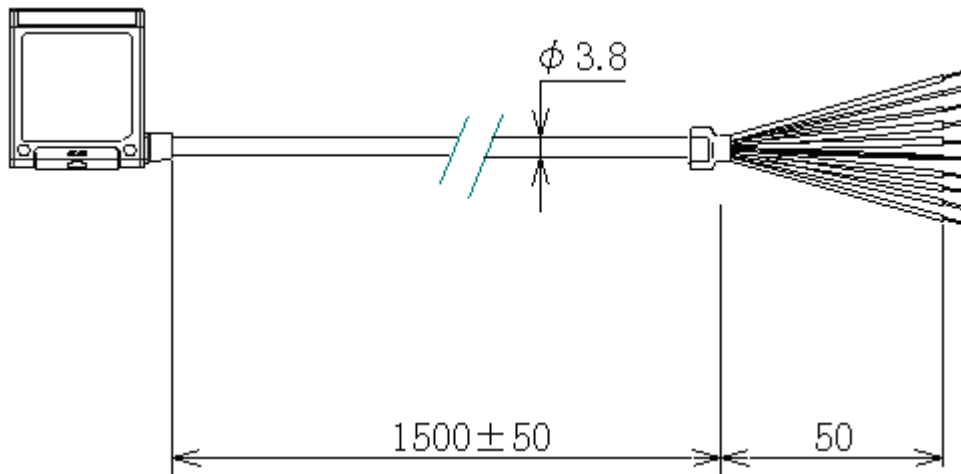


Figure 22: RS-232C cable: no connector

9.3.1. Pin Assignment

a) DB9 Pin Assignment

Pin	Wire Color	Signal	Remarks
1	Brown	TRIGGER	
2	Green	TxD	
3	White	RxD	
4			Jumper
5	Purple	S.GND	
6			Jumper
7	Blue	CTS	
8	Gray	RTS	
9			N.C.
S	Red	VCC	PTF
Shield		F.GND	

b) DB25 Pin Assignment

Pin	Wire Color	Signal	Remarks
Shield / 1		F.GND	
2	White	RxD	
3	Green	TxD	
4	Blue	CTS	
5	Gray	RTS	
11	Brown	TRIGGER	
12	Yellow	OK	
7	Black	S.GND	
13	Orange	NG	
S	Red	VCC	PTF

c) No Connector Pin Assignment

Wire Color	Signal	Remarks
Green	TxD	
White	RxD	
Gray	RTS	
Blue	CTS	
Red	VCC	
Yellow	OK	
Orange	NG	
Black	S.GND	
Brown	TRIGGER	
Unshielded	F.GND	

9.4. USB Cable

(Standard specification)

Type:	Straight with clamp filter
Diameter:	φ3.8 mm (main cable)
Length:	1450 ±50 mm (main cable, excluding connector)

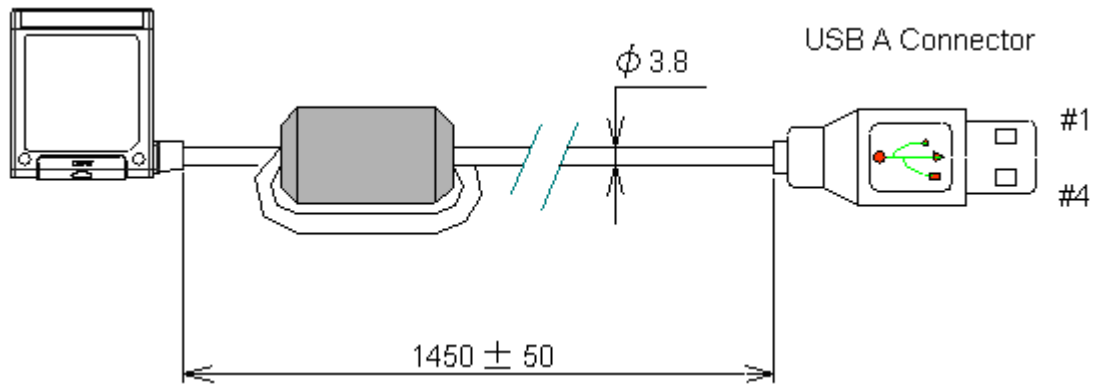


Figure 23: USB cable

9.4.1. Pin Assignment

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

10. Default Settings

10.1. Barcodes

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

RS-232C Default

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

USB-VCP Default

Functions	Menu labels	Menu codes
SET		ZZ
USB-VCP		C01
END		ZZ

10.2. 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	
Chinese Post	X	X	■	X	—	CR	
Codabar / NW-7	■	X	■	X	—	CR	Not transmit ST/SP
Code 11	X	X	X	■	—	CR	
Code 39	■	X	■	X	—	CR	Not transmit ST/SP
Code 93	■	X	X	■	—	CR	
GS1-128	■	X	X	■	—	CR	
EAN-128		X	X	■	—	CR	
IATA	■	X	■	X	—	CR	
Industrial2of5	■	X	■	X	—	CR	
Interleaved2of5	■	X	■	X	—	CR	

Symbology	Read	Transmit Code Length	Transmit CD	Calculate CD	Set Prefix	Set Suffix	Other
Matrix2of5	X	X	■	X	—	CR	
MSI/Plessey	■	X	■CD1	■CD1	—	CR	
S-Code	■	X	■	X	—	CR	
Telepen	■	X	X	■	—	CR	
Trioptic	■	X	■	X	—	CR	Not transmit ST/SP
UK/Plessey	■	X	■	■	—	CR	

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.”
- EAN-128 barcodes are processed as Code-128 and “FNC1” data will be ignored.

10.3. 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
Redundancy	Default option ([X0] setting)	Read 1 times, redundancy = 0
	Other options ([X1 .. X3] setting) ([BS .. BW] setting)	Read n times, redundancy = n+1 for following symbologies and lengths: <ul style="list-style-type: none"> • Code 39 with length <= 5 • MSI/Plessey with length <= 4 • IATA, Industrial 2of5, Interleaved 2of5 with length <= 8 • Matrix 2of5 (& Chinese Post), S-code with length <= 8 • Codabar (NW7) with all lengths • Code 11 with length <= 5
Inter-character gap check		Character 1 >
Multiple column read		Disable
Limitation of decode time (see note)		Disable
Read time		2 seconds
Buzzer duration		50 ms
Buzzer tone		2.6 kHz
Buzzer loudness		Loud (maximum)
Indicator duration (Green LED)		200 ms
Code 39 minimum digit		1 digit
NW-7 minimum digit		5 digits
Industrial 2of5 minimum digit		5 digits
Interleaved 2of5 minimum digit		6 digits
MSI/Plessey minimum digit (only when enabled)		3 digits

Note: Refer to 6.2 Scanning Barcodes on Moving Items




10.4. Default Settings 3: Communication Settings

Item	Default 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

The communication condition can be changed by using the menu barcode.




10.5. Default Settings 4: Scanning Barcodes on Moving Items

Scanning performance when scanning barcodes on moving items may be improved by configuring the settings below.

Functions	Menu labels	Menu codes
SET		ZZ
Limitation of Decode Time: Enable		E7K
END		ZZ

The degree of improvement of scanning performance using this configuration differs depending on the scan rate and the redundancy configurations.

Return the scanner to its default settings by configuring the settings below.

Functions	Menu labels	Menu codes
SET		ZZ
Limitation of Decode Time: Disable		E 7 J
END		ZZ

11. Serial Number and Labeling

11.1. Serial Label

The serial number shown below is affixed to the scanner. Letters are printed on a matte-black background and serial numbers in black on a white background.

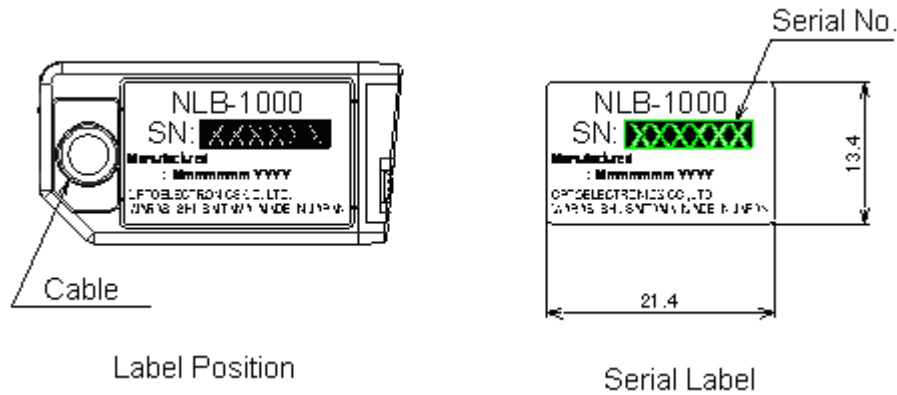


Figure 24: Serial number label

11.2. Laser Caution Label

The laser caution label is affixed on the upper side of the scanner. Letters are printed in black on a yellow background.

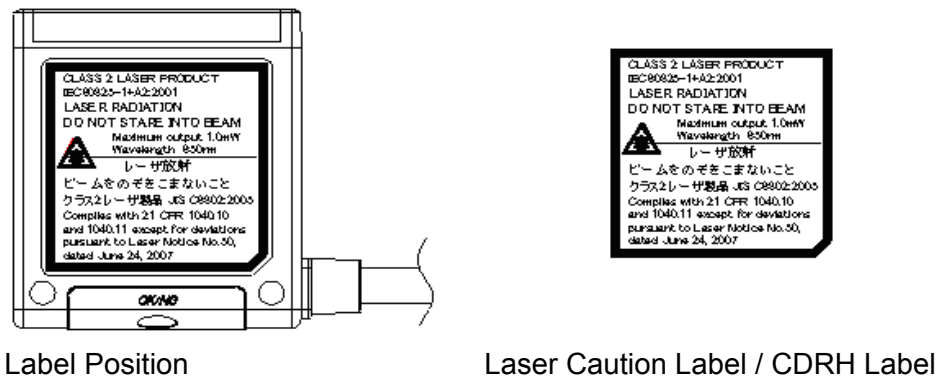


Figure 25: Laser caution label

11.3. Certification Logo Label

The certification logo label is attached on one side of the cable.

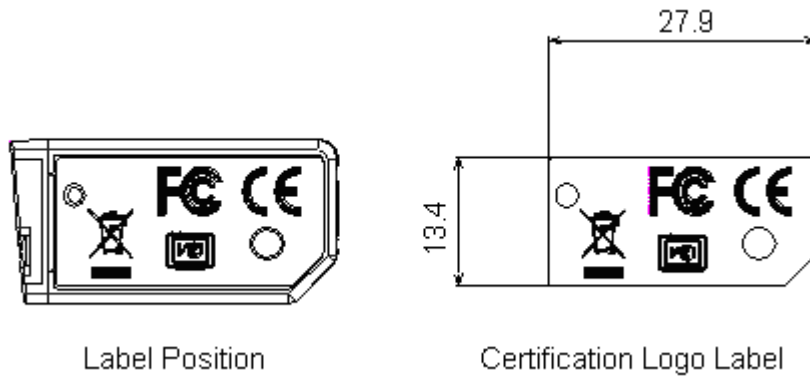


Figure 26: Certification logo label

11.4. Back Side Label

The back side label is attached on the other side of the cable.

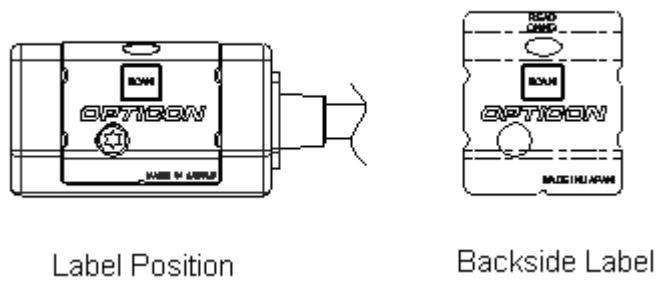


Figure 27: Backside label

12. Packaging Specifications

12.1. 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): 245 (W) x 110 (D) x 40 (H) mm

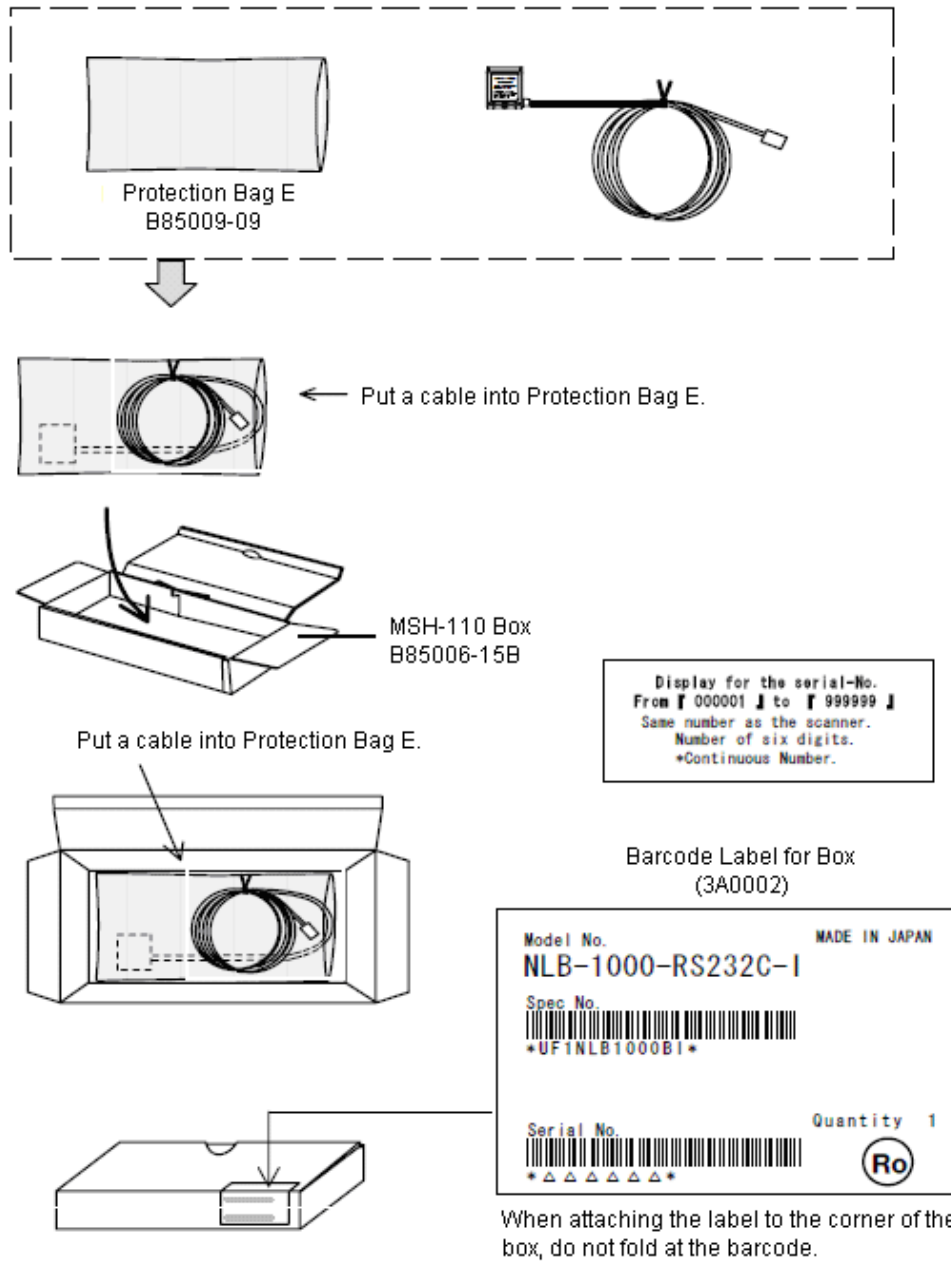


Figure 28: Packaging

12.2. Collective Packaging Specification

Put 50 individually packaged scanners in a collective packing box.

Size of the package (after assembly): 600 (W) x 520 (D) x 250 (H) mm

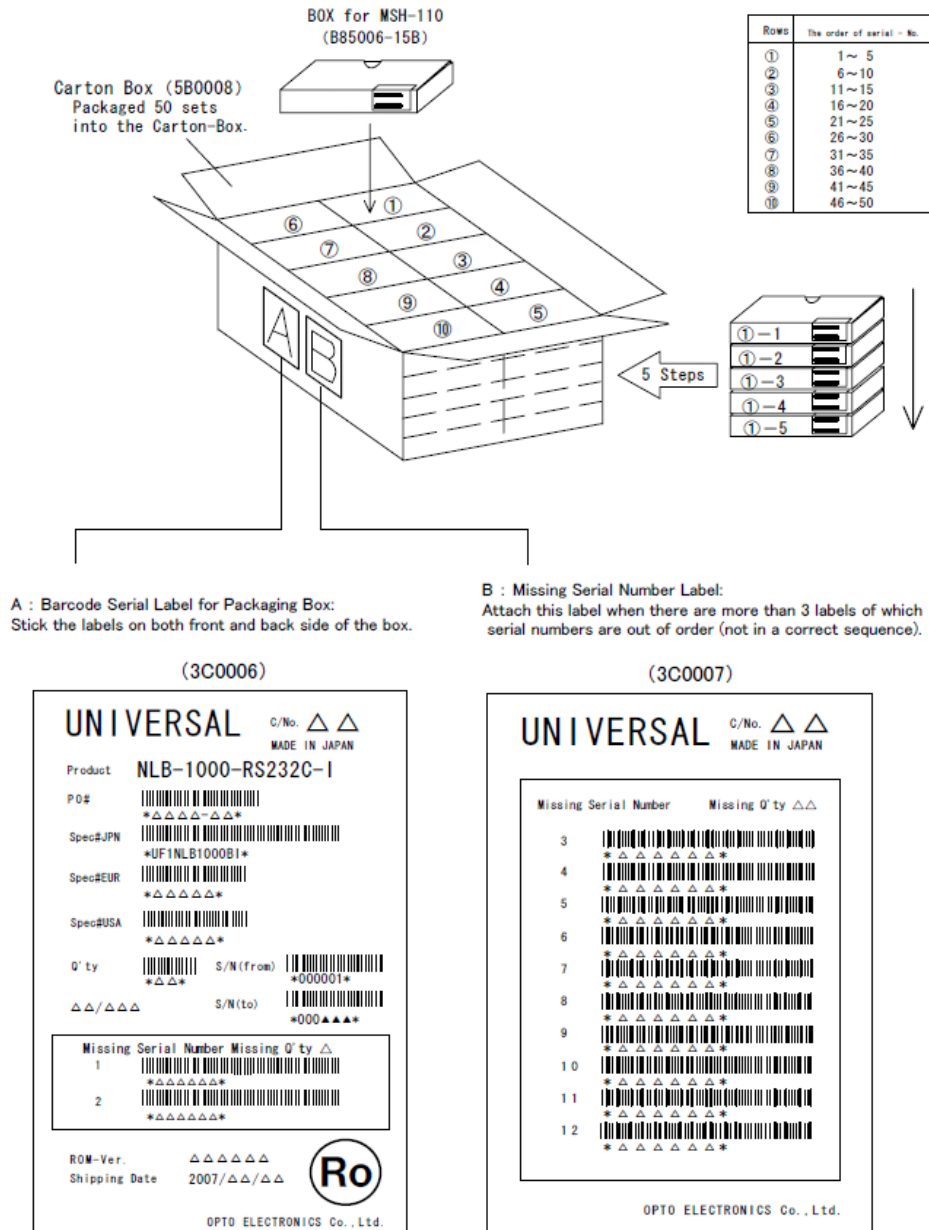


Figure 29: Collective packaging

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.

13. Durability

13.1. Electrical Noise

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

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

PCS:	0.9
Resolution:	0.25 mm
Symbology:	9-digit Code 39
Quiet zone:	10 mm
N/W ratio:	1:2.5
Distance:	150 mm
Angle:	$\alpha = 0^\circ \beta = 15^\circ \gamma = 0^\circ$
Curvature:	$R = \infty$
Power supply voltage:	5.0 V

13.2. Static Electricity

Air discharge:	± 8 kV MAX (No malfunction) ± 15 kV MAX (No destruction)
Contact discharge:	± 4 kV MAX (No malfunction) ± 8 kV MAX (No destruction)
Measurement environment:	Use electrostatic testing device compliant with IEC 61000-4-2
Discharge resistance:	330 Ω
Capacitor charging:	150 pF

13.3. Shock

13.3.1. Drop Test (without packaging)

No malfunction occurred after the following drop test.

Drop test: Drop the scanner from a height of 30 cm onto a plastic tile resting on a table (once on each of 6 sides).

13.3.2. Drop Test (with individual packaging)

No malfunction occurred after the following drop test.

Drop test: Drop an individually packaged scanner from a height of 60 cm onto a plastic tile resting on a table (once on each of 6 sides).

13.4. Vibration Strength

13.4.1. Vibration Test (without packaging)

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 19.6m/s^2 (2G) for 30 minutes in non-operating state. Repeat this routine in each X, Y, Z direction once for 60 minutes each.

13.4.2. Vibration Test (with individual packaging)

No malfunction occurred after the following vibration test.

Vibration test: Put the scanner in an individual packing box. Increase the frequency of the vibration from 10 Hz to 100 Hz with accelerated velocity 19.6m/s^2 (2G) for 30 minutes in non-operating state. Repeat this routine in each X, Y, Z direction once for 60 minutes each.

13.5. Water Resistant and Dust and Drip Proof

IEC IP54

IEC60529

JIS C0920

13.6. Cable Strength

13.6.1. Cable Stretch Test

No cable malfunction occurred after the following stretch tests.

Stretch Test: Fix the scanner and pull the cable with the force of 2.5 kg (24.5N) for 1 second. Repeat 20 times.

13.6.2. Cable Tail Bending Test

No cable malfunction occurred after the following bending tests.

Bending Test: Fix the scanner and attach a weight of 500 grams (4.9N) and swing the cable back and forth at an angle of 60 degrees. Repeat 1,000 times.

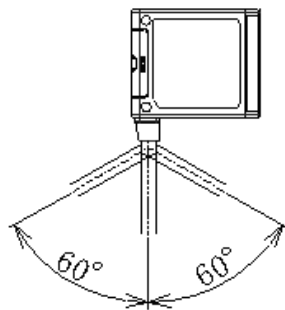


Figure 30: Cable tail bending test

14. Reliability

MTBF (Mean Time Between Failures) of the NLB 1000 and the RLB 1000 is 30,000 hours, excluding the laser diode and the scan unit.

Life cycle of the laser diode is 10,000 hours and that of the mirror motor scan unit is 20,000 hours.

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

15. Trigger and Read Options

15.1. Trigger Switch

The trigger switch for the NLB 1000 and the RLB 1000 is on the back side of the scanner. The switch is labeled SCAN, as shown in the figure below. Unless the scanner read options are configured otherwise, you can start the scanning operation by pressing this switch. (By default, manual scanning is enabled.)

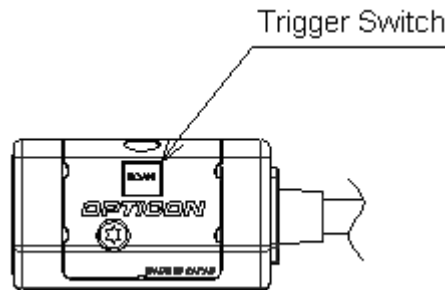


Figure 31: Trigger switch

15.2. 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.

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

Hardware mode: After an electrical pulse (low), the read cycle starts at the time set in 'Read time options' and behaves as if the trigger is continuously released.

15.3. 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. Regulatory Compliance

16.1. Laser Safety

The scanner emits laser beams.

- JIS C6802:2005 Class 2
- IEC60825-1+A2:2001 Class 2
- FDA CDRH Laser Class II. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50 dated June 24, 2007.

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

16.2. 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.

16.3. RoHS

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

17. Safety

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

17.1. Shock

Do not throw or drop the scanner.

Do not place heavy objects on the cables.

17.2. 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.

17.3. Foreign Materials

Do not immerse the scanner in liquids.

Do not subject the scanner to chemicals.

17.4. 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.

18. Mechanical Drawing

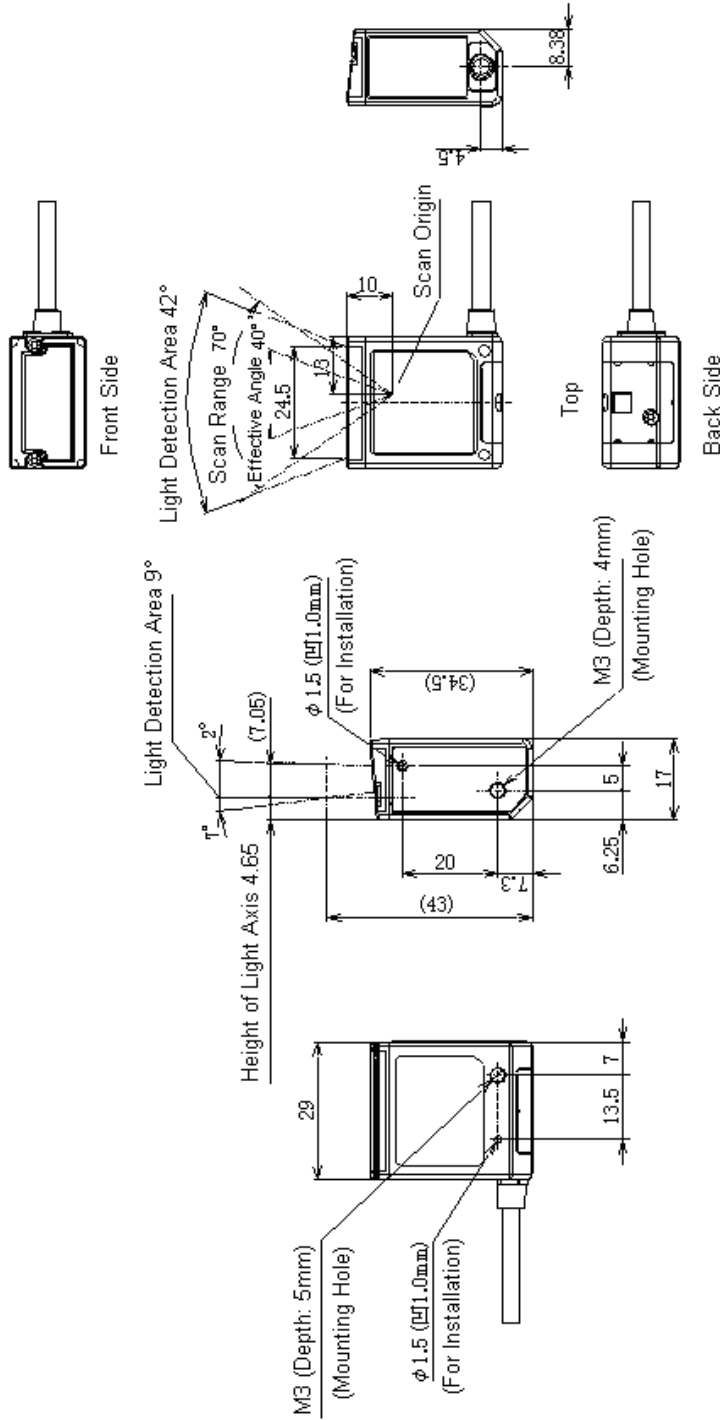


Figure 32: Mechanical drawing