

# NLV 1001

## Compact Fixed Position Laser Barcode Scanner

**OPTICON**

### Specification Manual



All information subject to change without notice.

## Document History

<b>Model Number:</b>	NLV 1001	<b>Specification Number:</b>	SS06037
<b>Edition:</b>	3	<b>Original Spec Number:</b>	SS06079
<b>Date:</b>	2006-11-17		

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## 1. Abstract

This manual provides specifications of the compact fixed position scanner NLV 1001.

## 2. Overview

The NLV 1001 is a fixed-position laser barcode scanner.

The scanning width at the closest point of scanning is 44 mm, and the effective scan angle is 44°.

The use of short-wavelength red laser beams enhances the visibility of scanning lines.

The decoded text of barcode images is output through RS-232C, USB, or Wedge interfaces based on the specification.

## 3. Physical Features

### 3.1. Dimensions

W 30.0 X D 43.3 X H 20.0 mm

### 3.2. Weight

3 g max (excluding cable)

## 4. Environmental Specifications

### 4.1. Operating Temperature and Humidity

Temperature: -10 to +45 °C

Humidity: 20% to 85% RH

### 4.2. Storage Temperature and Humidity

Temperature: -20 to +60°C

Humidity: 20% 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	to 3000 lx
Fluorescent Light	to 3000 lx
Sunlight	to 50,000 lx

## 5. Electrical Specifications

### 5.1. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power supply voltage ( $V_{CC}$ to GND)	$V_{DD}$	-0.5 to 6.5	V
Input voltage	$V_{IN}$	-0.5 to $V_{CC}+0.5$	V
Power ripple		0.1 V p-p Max. (10–100 kHz)	V
Storage temperature	TSTG	-20 to 60	°C

### 5.2. Recommended Operating Conditions

Item	Symbol	Condition	Min	Typ	Max	Unit
Power supply voltage	$V_{DD}$		4.5	5.0	5.5	V
Operating temperature	$T_a$	Non-condensing Non-freezing	0	-	45	°C
Input voltage	$V_{in}$		0	-	$V_{DD}$	V
Output voltage	$V_{out}$		0	-	$V_{DD}$	V

### 5.3. Electrical Characteristics

$V_{CC} = 5V$ $T_a = 25^\circ C$					
Parameter	Symbol	Min	Typ	Max	Unit
Operating current	$I_{OP}$	-	85	150	mA
Rush current peak	$I_{PEEK}$	-	400	1500	mA
Standby current	$I_{PRE}$	-	35	70	mA
Startup time	$T_D$	-	100	-	ms

#### Conditions:

- Connect 1Ω 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. Optical Specifications

Parameter	Specification	Unit
Light emitting diode	Red laser diode	-
Wavelength	650 ± 10	nm
Output power	< 1.0	mW
Scanning method	Bi-directional	-
Scanning rate	100 ± 20	scans/s
Scanning angle	54 ± 5	°
Effective scanning angle	44 (Min)	°

## 7. Technical Specifications

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

### Conditions:

Ambient temperature and humidity	21 °C / 70 °F, 60% RH
Ambient light	500 to 900 lx
Symbol background	Barcode = black Space = white Margin = white Background of label = black
Power supply voltage	5.0 V
Decoding test	0.5 seconds or less for each decoding. Repeat this 10 times.

### 7.1. PCS

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



## 8. Interface Specifications

### 8.1. RS-232C Interface Spec

#### 8.1.1. Settings and Communication

Reading menu barcodes [ZZ] + [U2] + [ZZ] can set the RS-232C interface default.

Item	[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)	
		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

### 8.1.3. Connector Pin-outs

#### a) Standard Specification

Signal	Pin	Remarks
F.GND	Shield (Black)	Cover shielded wire with heat-shrinkable tubing
GND	Black	
VCC	Red	
TxD	Green	
RxD	White	
RTS	Grey	
CTS	Blue	
NG	Orange	
OK	Yellow	
TRIGGER	Brown	

#### b) D-sub Specification

##### (1) D-sub

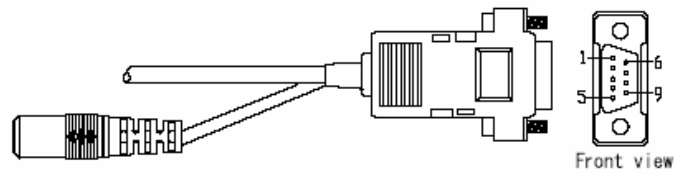


Figure 1: 9-pin D sub female connector (with power stereo jack)

Pin	Signal
1	F.GND
2	TxD
3	RxD
4	NC
5	GND
6	NC
7	CTS
8	RTS
9	NC

**(2) DC Jack**

Pin	Signal	Remarks
1	VCC	Inside
2	GND	Outside

**8.1.4. Interface Circuit**

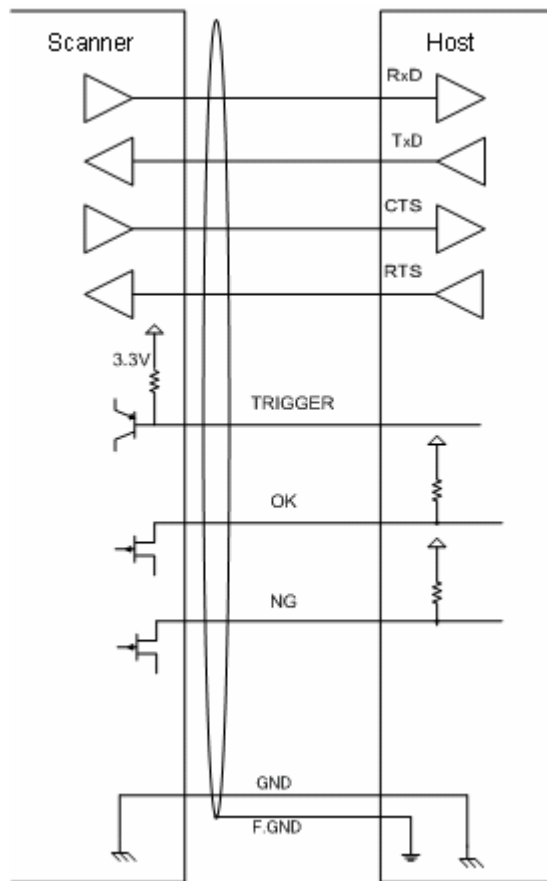


Figure 2: Interface circuit

### 8.1.5. Character Format

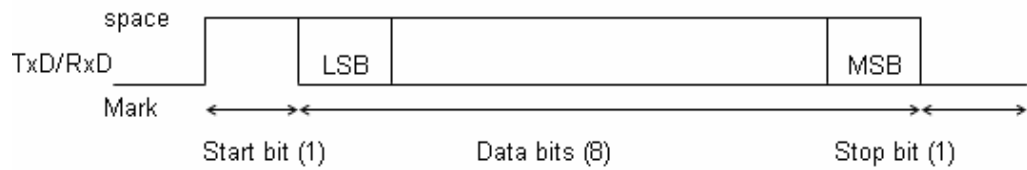


Figure 3: Character format (same for both sending and receiving)

### 8.1.6. Communication Format

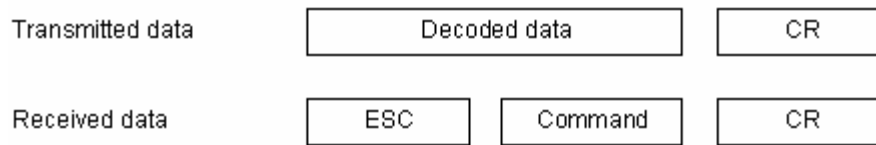


Figure 4: Communication format

### 8.1.7. Handshaking

Select handshaking options using the menu or command listed below.

Handshaking	Menu/Command
No handshake	P0
BUSY/READY	P1
MODEM	P2
ACK/NAK	P3
ACK/NAK NO RESPONSE	P4

#### a) No Handshake

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

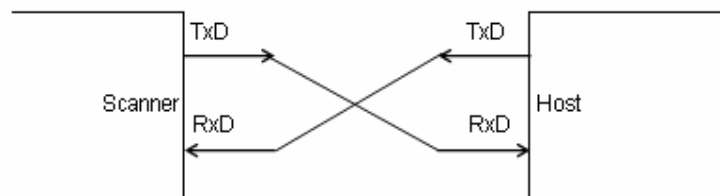


Figure 5: No handshaking

**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 RS line. They can communicate state to each other through a CTS line when connected as in the following figure.

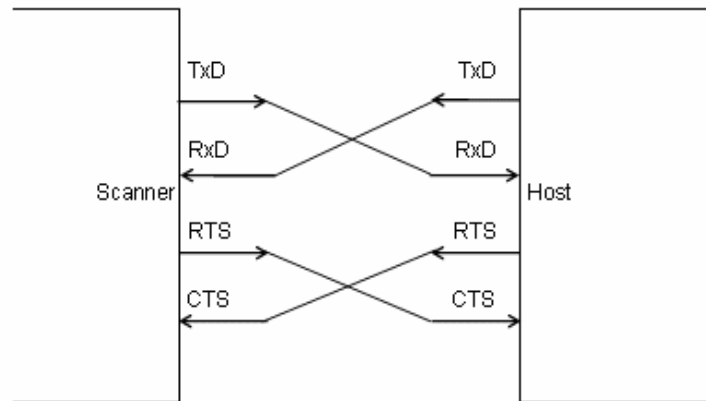


Figure 6: Busy/Ready communication

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

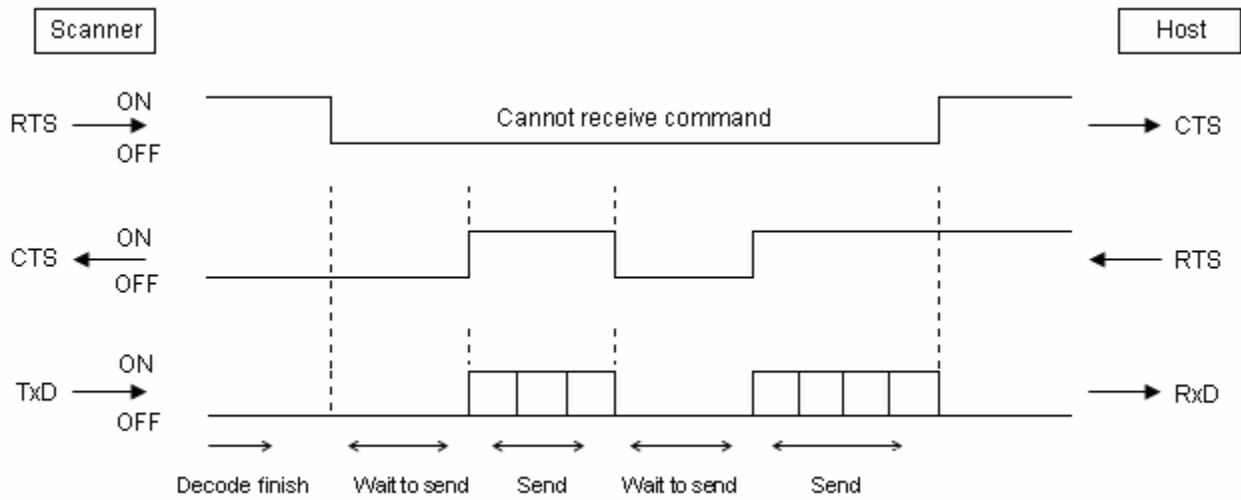


Figure 7: Cannot receive command

### CTS, Tx/D signals timing

When the CTS line is turned OFF while sending a Tx/D signal, the scanner transmits one character and waits. When the CTS signal is turned ON while transmitting a character, the character will be transmitted.

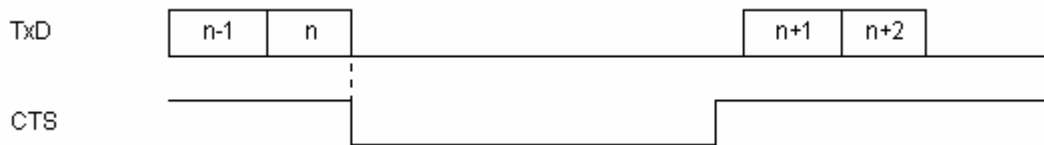


Figure 8: Signal timing

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

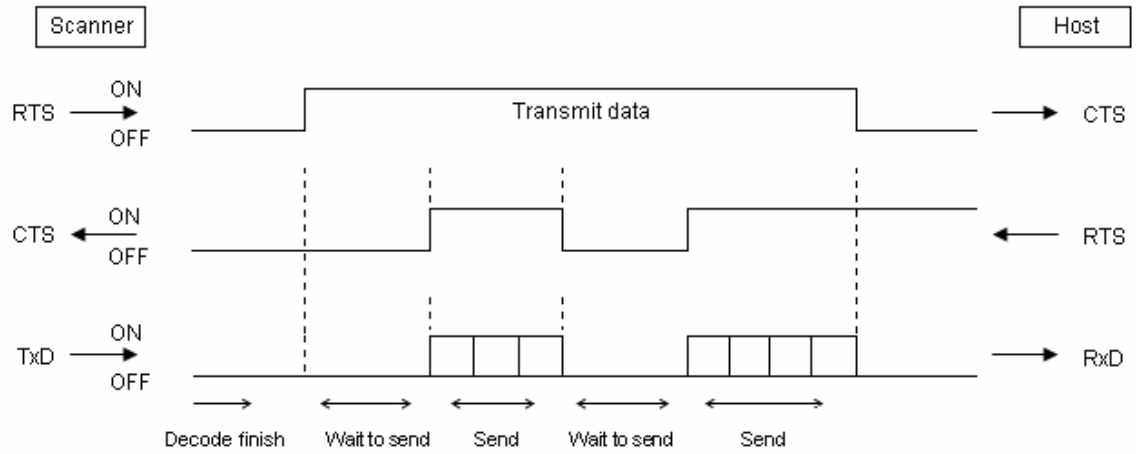


Figure 9: Handshaking—modem



#### 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.

- I4: Indefinitely (default)
- I5: 100 ms
- I6: 500 ms
- I7: 1000 ms

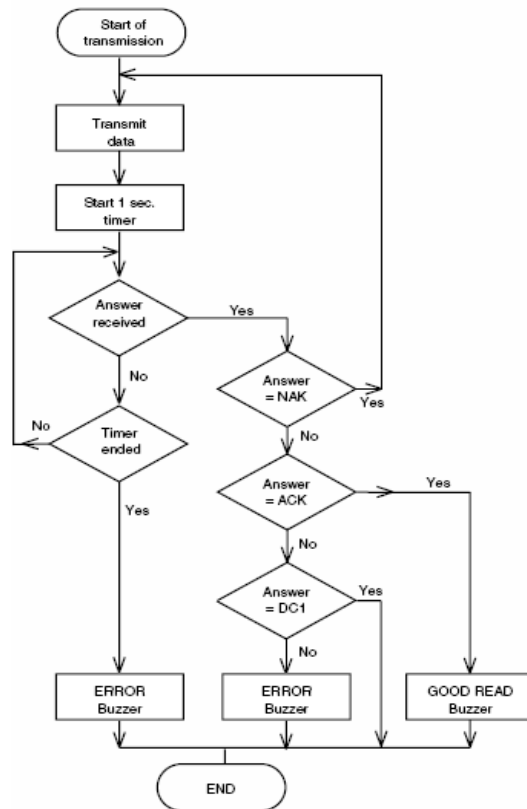


Figure 10: Handshaking—ACK/NAK

**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.

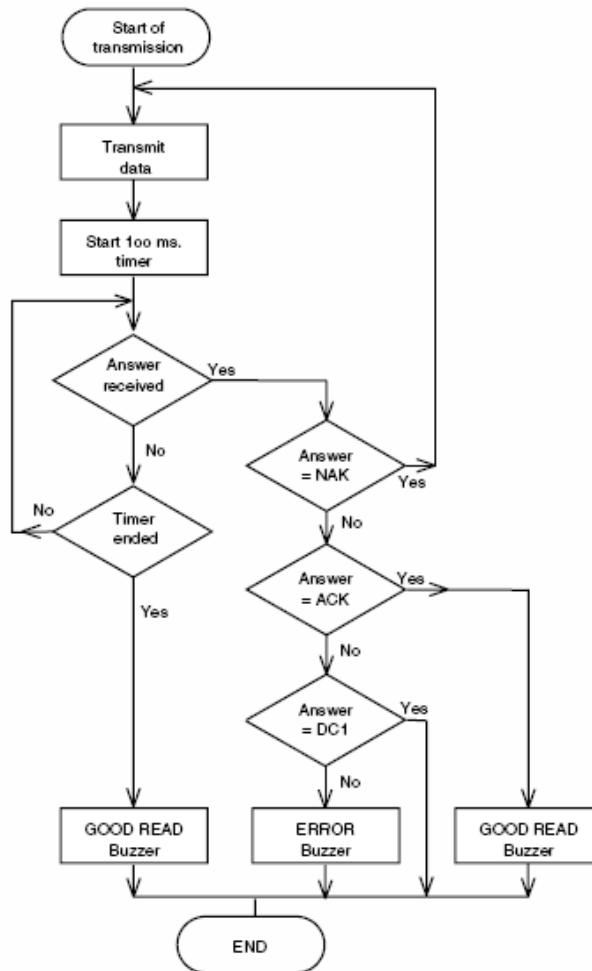


Figure 11: Handshaking—ACK/NAK, no response

### 8.1.8. OK/NG Signal (NLV 1000 RS-232C Standard Only)

The output ON/OFF or the logic can be selected by the menus or commands listed below.

Functions	Menu/Command
SYNC Synchronous H active	X*C (default)
SYNC Synchronous L active	X*D
One shot H active	X*E
One shot L active	X*F
One shot time 10 ms	X*G
One shot time 20 ms	X*H
One shot time 30 ms	X*I
One shot time 40 ms	X*J
One shot time 50 ms	X*K
One shot time 60 ms	X*L
One shot time 70 ms	X*M
One shot time 80 ms	X*N
One shot time 90 ms	X*O
One shot time 100 ms	X*P (default)
Enable sequence output	X*Q (default)
Disable sequence output	X*R

The following figures show examples of output timing when using a pull-up resistor, since the OK/NG output is the FET open drain output.

#### a) Good Read (Synchronous)

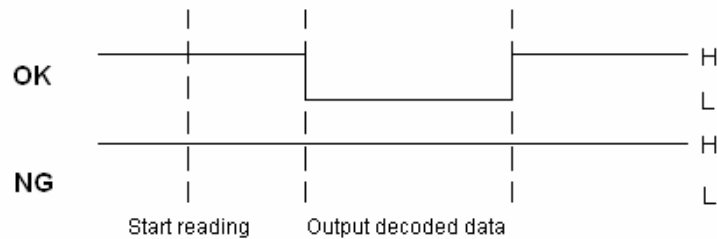


Figure 12: Good read (synchronous)

**b) Read Error within Specified Time (Synchronous)**

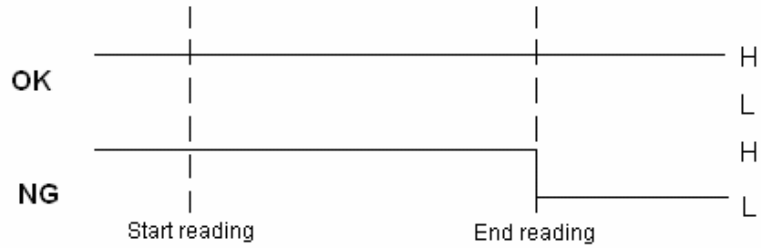


Figure 13: Read error (synchronous)

**c) Good Read (One Shot)**

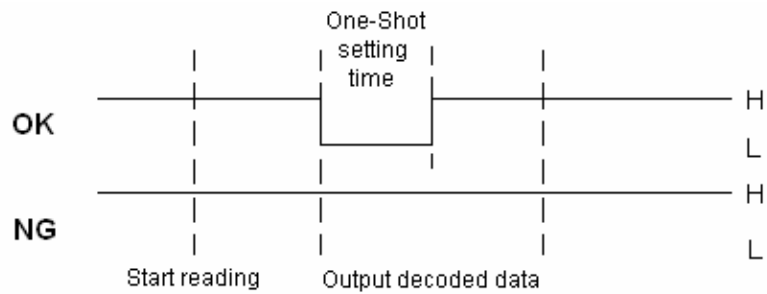


Figure 14: Good read (one shot)

**d) Read Error within Specified Time (One Shot)**



Figure 15: Read error (one shot)

## 8.2. USB Interface Specifications

### 8.2.1. Interface

The interface is full-speed USB 1.1.

### 8.2.2. Connectors

#### a) USB "A" Connector

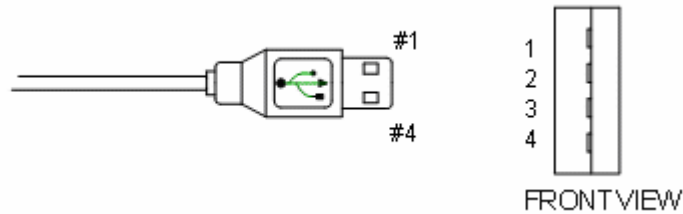


Figure 16: USB "A" connector

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

Do not use the host keyboard while data is being transmitted to the host, or the data may be transmitted incorrectly.

### 8.2.3. Interface Circuit

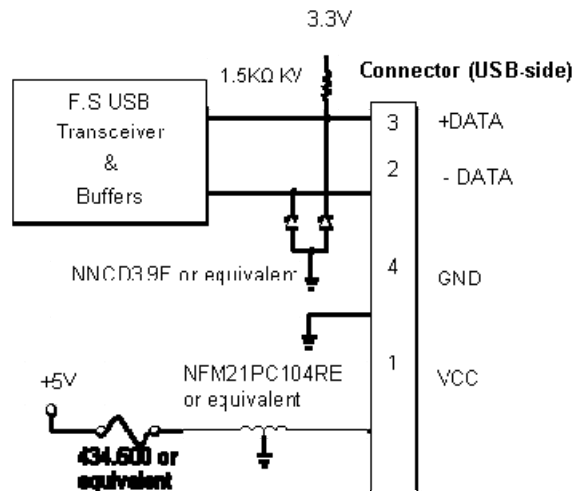


Figure 17: Interface circuit

## 8.3. DOS/V Wedge Interface Specification

### 8.3.1. Connectors

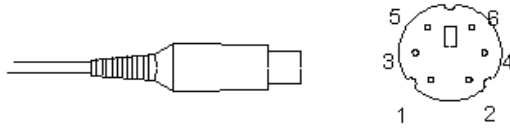


Figure 18: Connector (host side)

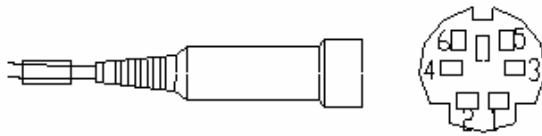


Figure 19: Connector (keyboard side)

Contact Number	Host Side	Keyboard Side
1	CPU DATA	KEY DATA
2	OPEN	OPEN
3	GND	GND
4	VCC	VCC
5	CPU CLOCK	KEY CLOCK
6	OPEN	OPEN

Set the language for the scanner and PC keyboard to the same language before use; otherwise, the output may not be correct.

Do not use the host keyboard while data is being transmitted to the host, or the data may be transmitted incorrectly.

### 8.4. Scan Area and Resolution

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

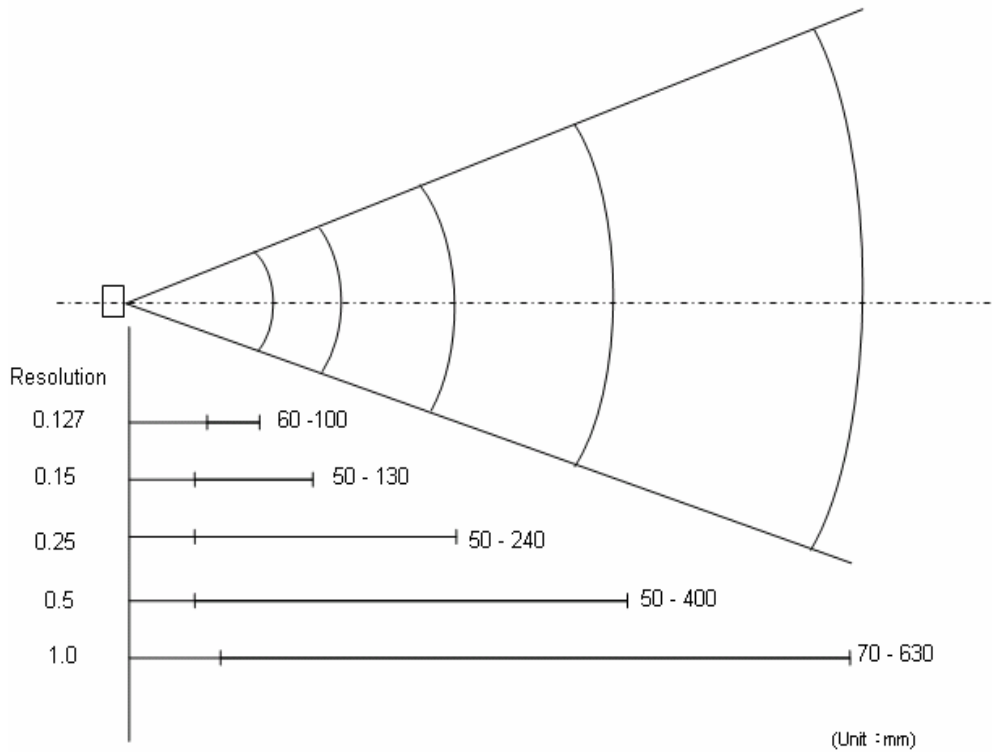


Figure 20: Scan area and resolution

PCS	Resolution (mm)	Decode Depth (mm)
0.9	1.0	70-630
	0.5	50-400
	0.25	50-240
	0.15	50-130
	0.127	60-100



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
0.127 mm	CODE-39	0.9	5 mm	4

**Conditions:**

Barcode Sample: OPTOELECTRONICS Test Sample

N/W Ratio: 1:2.5

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

Curvature:  $R = \infty$

**8.5. Pitch, Skew, and Tilt (PCS)**

**8.5.1. Pitch Angle**

$\alpha = \pm 35^\circ$

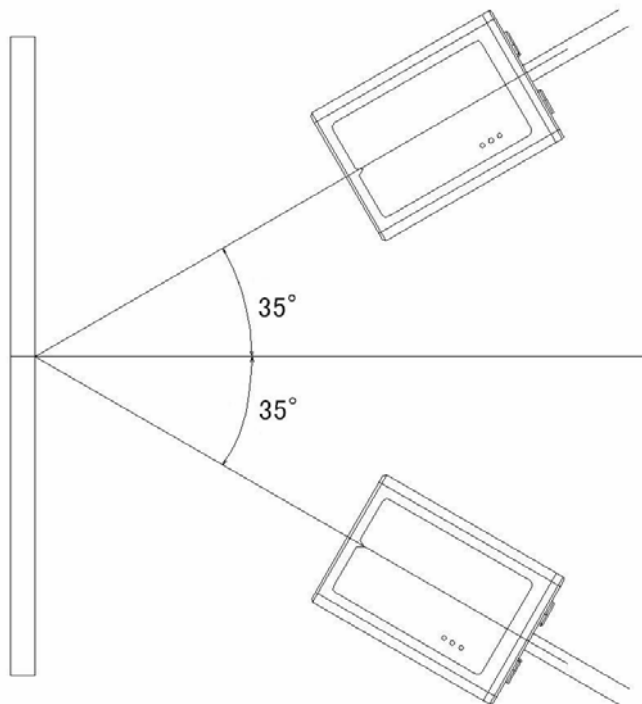


Figure 21: Pitch

### 8.5.2. Skew Angle and Dead Zone

Skew angle:  $\beta = \pm 50^\circ$  (Excluding dead zone)

Dead zone:  $\beta = \pm 8^\circ$  (Areas in which decoding fails due to specular reflection)

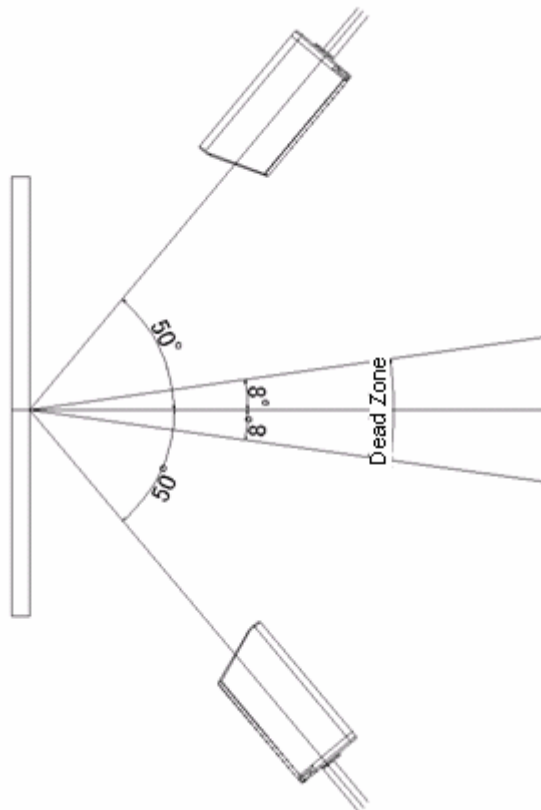


Figure 22: Skew angle and dead zone

### 8.5.3. Tilt Angle

$$\gamma = \pm 20^\circ$$

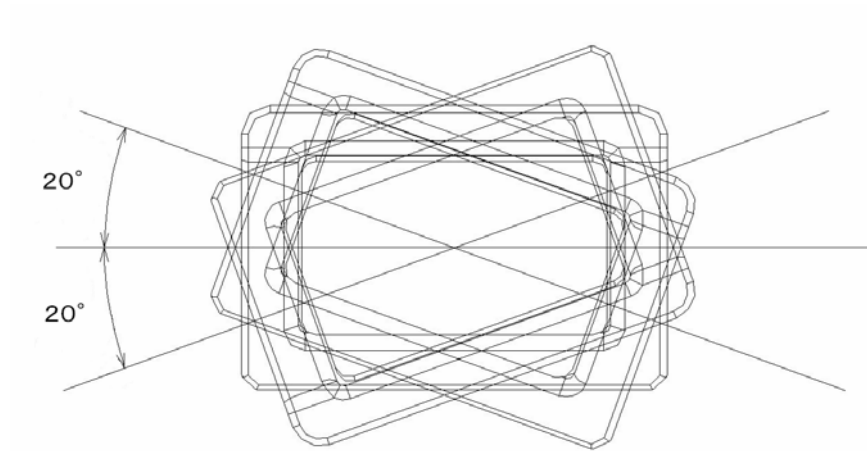


Figure 23: Tilt angle

#### Conditions:

Barcode Sample: OPTOELECTRONICS Test Sample

Distance: 100 mm from the edge of the scanner

Label: **Pitch Angle, 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)

## 8.6. Curvature

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

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



Figure 24: Curvature

### Conditions:

Barcode Sample: OPTOELECTRONICS Test Sample

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

Distance: 100 mm from the edge of the scanner

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

## 9. Cable and Connector

### 9.1. RS-232C Cable

#### 9.1.1. Standard Specification

Type:	Straight
Diameter:	$\phi 3.8 \pm 0.5$ mm
Length:	$1500 \pm 50$ mm
Cores:	8 insulated wires, 1 conductive wire
Weight:	Approximately 45 g

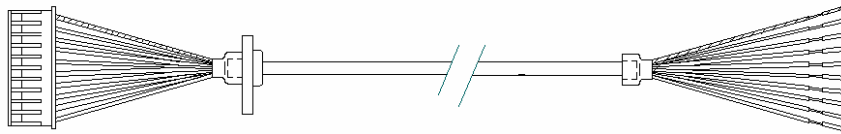


Figure 25: RS-232C cable (standard)

#### 9.1.2. D-sub Specification)

Type:	Straight
Diameter:	$\phi 3.8 \pm 0.5$ mm
Length:	$1500 \pm 50$ mm or $500 \pm 50$ mm
Cores:	8 insulated wires, 1 conductive wire
Weight:	Approximately 65 g

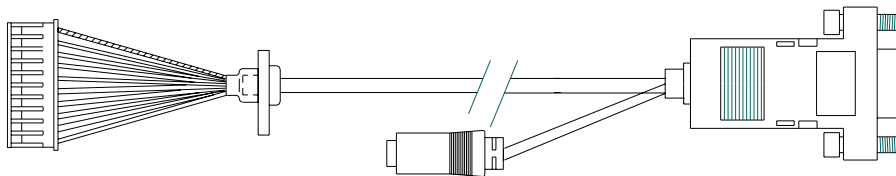


Figure 26: RS-232C cable (D-sub)

## 9.2. USB Cable

(Standard specification)

Type:	Straight
Diameter:	$\phi 3.8 \pm 0.5$ mm
Length:	1500 $\pm$ 50 mm
Cores:	4 insulated wires, 1 conductive wire
Weight:	Approximately 50 g

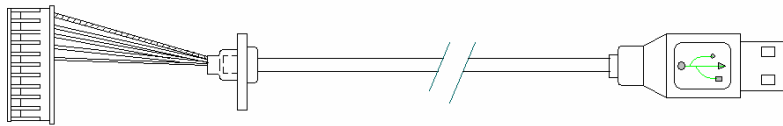


Figure 27: USB cable

## 9.3. Wedge Cable

(Standard specification)

Type:	Y cable
Diameter:	$\phi 3.8 \pm 0.5$ mm
Length:	1500 $\pm$ 50 mm
Cores:	6 insulated wires, 1 conductive wire
Weight:	Approximately 60 g

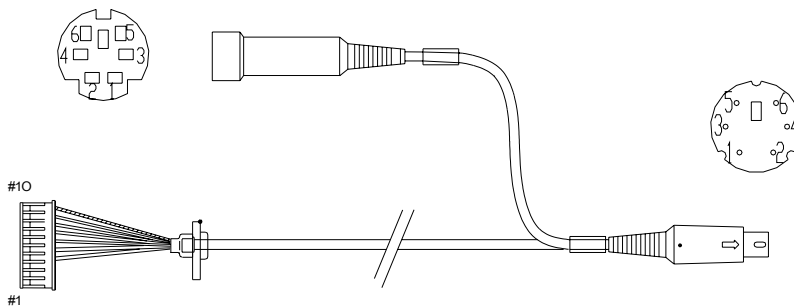


Figure 28: Wedge cable

## 9.4. Connector Specification (Scanner Side)

CN1 (10-pin)

Pin #	Specifications		
	RS-232C	USB	WEDGE
1	TRIGGER	NC	NC
2	OK	NC	NC
3	NG	NC	NC
4	CTS	NC	KEY DATA
5	RTS	NC	KEY CLOCK
6	RxD	USB-	CPU DATA
7	TxD	USB+	CPU CLOCK
8	VCC	VCC	VCC
9	GND	GND	GND
10	SHIELD	SHIELD	SHIELD

## 10. Default Settings

### 10.1. Barcodes

Default menu barcodes set the scanner to factory defaults.

#### RS-232C

Functions	Menu labels	Menu codes
SET	 z z	<b>ZZ</b>
RS-232C	 u z	<b>U2</b>
END	 z z	<b>ZZ</b>

#### USB-HID

Functions	Menu labels	Menu codes
SET	 z z	<b>ZZ</b>
USB-HID	 s u	<b>SU</b>
END	 z z	<b>ZZ</b>



## USB-VCP


A driver is required and can be downloaded from Opticon's support Web site:  
<http://opticonfigure.opticon.com/>.

Functions	Menu labels	Menu codes
SET		<b>ZZ</b>
USB-VCP		<b>C01</b>
END		<b>ZZ</b>

## Wedge (with keyboard)

Functions	Menu labels	Menu codes
SET		<b>ZZ</b>
AT-Wedge		<b>UB</b>
With keyboard		<b>KM</b>
END		<b>ZZ</b>

## Wedge (without keyboard)

Functions	Menu labels	Menu codes
SET		<b>ZZ</b>
AT-Wedge		<b>UB</b>
Without keyboard		<b>KL</b>
END		<b>ZZ</b>

## 10.2. Default Settings 1: Readable Codes

Code type	Reading	Transmit Code Length	Transmit CD	Calculate CD	Prefix	Suffix	Transmit Other	Remarks
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		
Code-39	■	X	■	X	-	CR	Not transmit ST/SP	Intercharacter gap check ≤ *1
Code-39 Trioptic	■	X	■	X	-	CR	Not transmit ST/SP	
NW-7 (CODABAR)	■	X	■	X	-	CR	Not transmit ST/SP	
Industrial2of5	■	X	■	X	-	CR		
Interleaved2of5	■	X	■	X	-	CR		
Code-93	■	X	X	■	-	CR		
Code-128	■	X	X	■	-	CR		
EAN-128	X	X	X	■	-	CR		
S-Code	■	X	■	X	-	CR		
MSI/Plessey	■	X	■CD1	■CD1	-	CR		
UK/Plessey	■	X	■	■	-	CR		
Telepen	■	X	■	■	-	CR		
Matrix2of5	X	X	■	X	-	CR		
Chinese Post Matrix 2of5	X	X	■	X	-	CR		
IATA	■	X	■	X	-	CR		
RSS-14	X	X	■	■	-	CR		
RSS-Limited	X	X	■	■	-	CR		
RSS-Expanded	X	X	■	■	-	CR		
PDF417	X	X	-	-	-	CR		
MicroPDF417	X	X	-	-	-	CR		
CODE-11	X	X	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.”

**10.3. Default Settings 2: Read Options, Trigger, Buzzer**

Item		Default Setting
Setting the number of characters		Fixed length OFF all codes
Read mode		Multiple read
Multiple read reset time		500 ms
Add-on wait mode		500 ms
Multiple label read		Disable
Multiple column read		Disable
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"> <li>• Code39 with length &lt;= 5</li> <li>• MSI/Plessey with length &lt;= 4</li> <li>• IATA, Industrial 2of5, Interleaved 2of5 with length &lt;= 8</li> <li>• Matrix 2of5 (&amp; Chin.Post), Scode with length &lt;= 8</li> <li>• Codabar (NW7) with all lengths</li> <li>• Code-11 with length &lt;= 5</li> </ul>
Trigger switch		Enable
Trigger repeat		Disable
Auto trigger		Disable
Read time		2 seconds
Margin check		Normal
Buzzer duration		50 ms
Buzzer tone		Single tone (3 kHz)
Buzzer loudness		Maximum
Buzzer transmission		Before transmission
Startup buzzer		Enable
Good read LED		Indicator duration 200 ms

## 11. Product Labeling

### 11.1. Serial Number

The serial number shown below is affixed to the scanner.

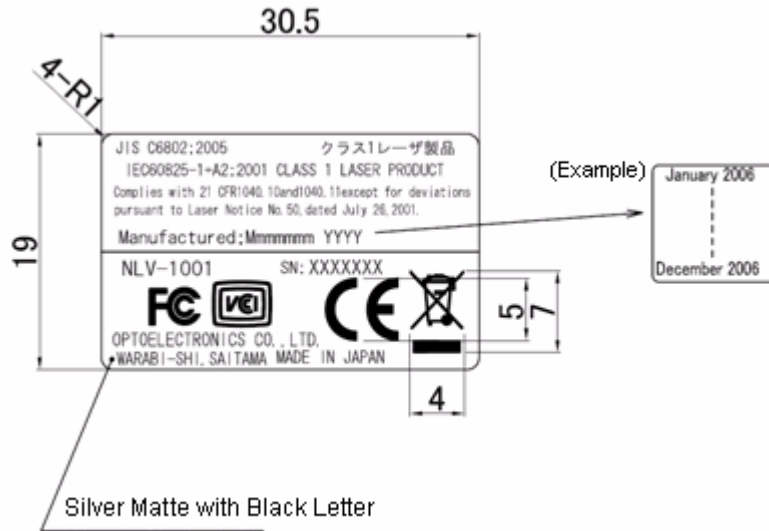


Figure 29: Serial number diagram

### 11.2. FCC Label

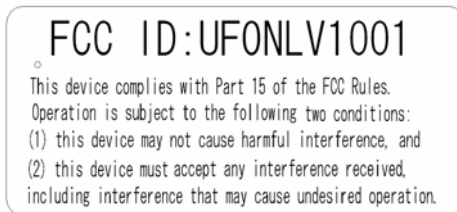


Figure 30: FCC label

## 12. Packaging Specifications

### 12.1. Individual Packaging Specification

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

Size of the package (after assembly): 245 (W) X 110 (D) X 38 (H) mm

### 12.2. Collective Packaging Specification

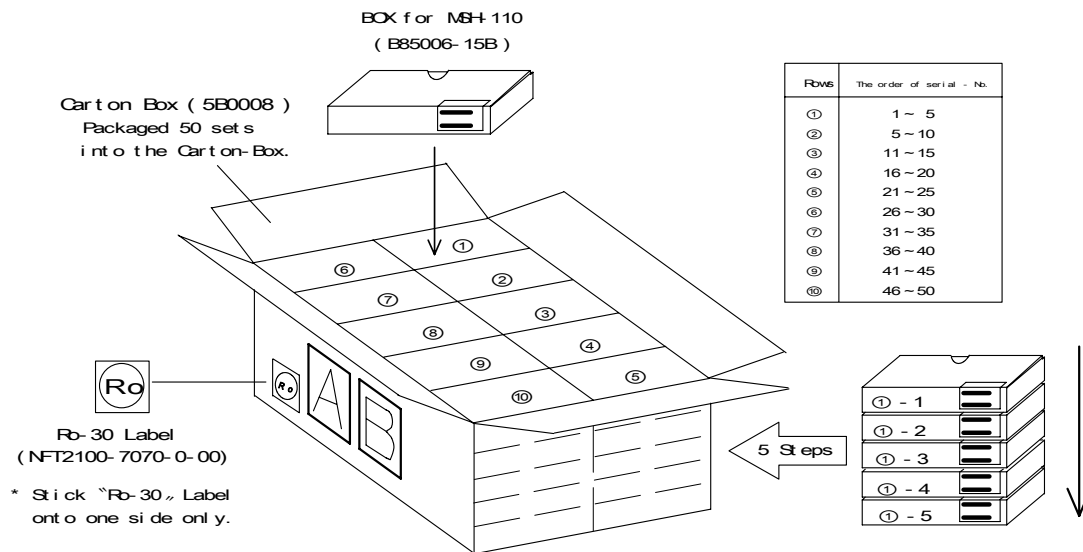


Figure 31: Packaging the NLV 1001

Note: The "Ro" mark on inner and outer packaging is to notify that this product does not use any material, components, or parts that are restricted under RoHS. 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 the 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. Shock

No malfunction occurred after the following drop test.

Drop Test: Dropped the scanner from the 75 centimeter above the concrete floor (once in each of 5 directions).

### 13.3. Vibration

No malfunction occurred after the following vibration test.

Vibration Test: Increase the frequency of the vibration from 12Hz to 100Hz with accelerated velocity 19.6m/s<sup>2</sup> (2G) for 60 minutes in non-operating state. Repeat this routine in each X, Y, Z direction once for 60 minutes each.

### 13.4. Static Electricity

Aerial discharge	8kV Max. (No malfunction) 10kV Max. (No destruction)
Measurement environment	Use electrostatic testing device compliant with IEC 61000-4-2
Discharge resistance:	330Ω
Capacitor charging:	150pF

### 13.5. Other

Dust and drip proof IEC IP43

Cable bending resistance is not warrantable.

## 14. Reliability

MTBF (mean time between failures) of this product except for the laser diode and the mirror motor scan unit is 30,000 hours.

Life cycle of the laser diode is 10,000 hours and that of the mirror motor scan unit is also 10,000 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. Auto Trigger (Option)

The NLV 1001 has an optional auto trigger setting, which starts barcode reading automatically by using sensor detection. The scanner starts barcode reading after detecting reflection from the surface when the auto trigger is used.

Auto trigger distance: 50 ±10 mm from the edge of the scanner.

### Conditions:

Moving speed:	100 ±10 mm/s
Angle:	Vertical to the edge of the scanner
Environmental temperature and humidity:	Room temperature and humidity
Environmental illuminance:	500 to 900 lx
Conditions for the auto trigger:	<ol style="list-style-type: none"> <li>1. Barcode sheet: OPTOELECTRONICS Test Sheet (white) Background: OPTOELECTRONICS Test Sheet (black)</li> <li>2. Barcode sheet: OPTOELECTRONICS Test Sheet (black) Background: OPTOELECTRONICS Test Sheet (white)</li> </ol>



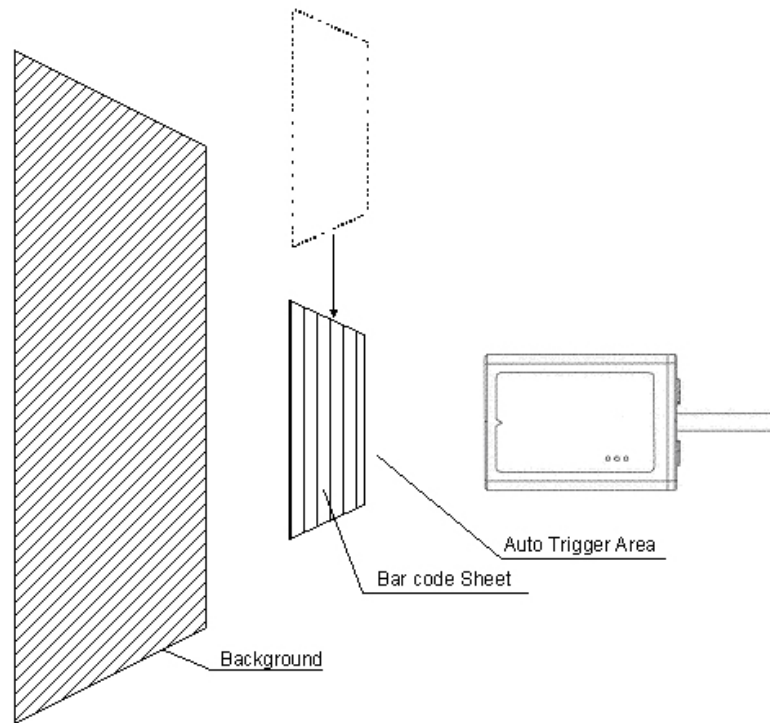


Figure 32: Auto trigger

### 15.1. Auto Trigger Settings

Functions	Menu labels	Menu codes
SET		<b>ZZ</b>
Disable auto trigger		<b>+F</b>
Enable auto trigger		<b>+I</b>
END		<b>ZZ</b>

## 16. Regulatory Compliance

### 16.1. Laser Safety

The scanner emits laser beams. Class 1 laser devices are not considered to be hazardous when used for their intended purpose. Avoid staring into the laser beam.

IEC60825-1+A2: 2001 Class 1

JIS-C-6802: 2005 Class 1

FDA CDRH Laser Class 1. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50 dated July 26, 2001.

### 16.2. Product Safety

EN60950-1: 2001

IEC60950-1: 2001

### 16.3. 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.

### 16.4. 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 use the scanner near a radio or a TV receiver. It 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.

## 18. Mechanical Drawing

Dimensions: 30 X 20 X 43.3 mm (cable not shown)

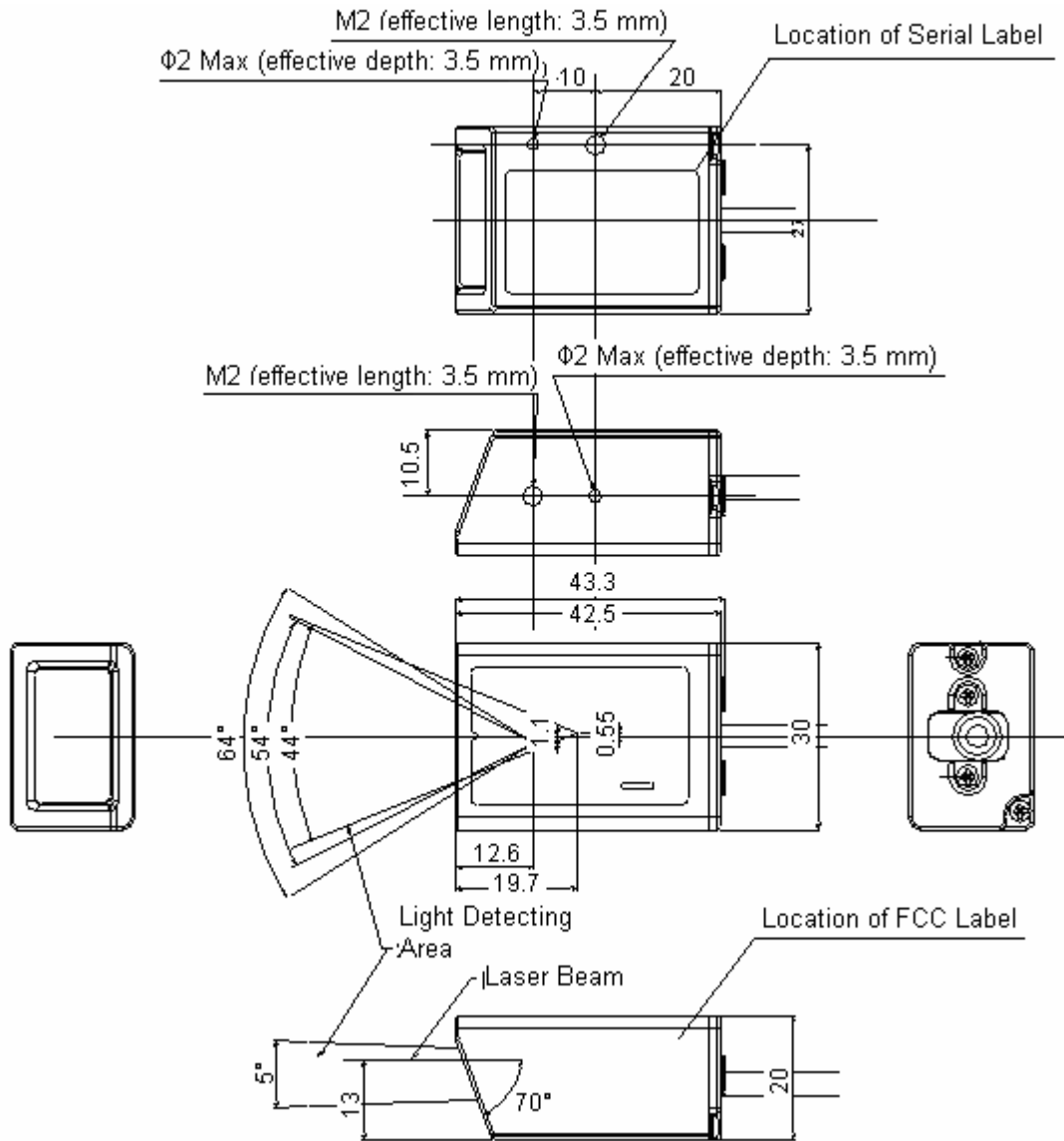


Figure 33: Mechanical drawing