OPTICON



L-46X

2D Handy Scanner

User's Manual

The information in this document is subject to change without notice.

Document History

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Caution and Warning

Read following caution carefully before installing and/or using this product. Incorrect handling may cause malfunction, overheating, smoke, fire, injury and electric shock etc.

⚠Caution

Electrical handling

- In case any abnormality occurs in the scanner or stops working, unplug the cable and the AC adapter and contact the dealer. Leaving as is may cause malfunction, overheating, smoke and fire.
- Do not use this product at voltage outside the specified range. It may cause overheating, smoke and fire.
- Do not let the AC adapter get wet. It may cause overheating, smoke, fire and electric shock.
- Do not plug/unplug the connectors while power is supplied.

Excessive shock / stress

- Do not drop this product.
- Do not push or place this product under or between heavy items.
- Do not swing the product around by the cable. It may cause injury or damage to the device.

Cable handling

- Do not wrap L-46X cable around a host device (PC, tablet etc.). It may cause breakage to the strain relief and the cable jacket, and could cause malfunction, overheating, smoke and fire.
- Do not place this product and AC adapter under or between heavy items.
- Do not bend the cable at extremely low temperatures.
- Immediately unplug the cable and AC adapter, then contact your dealer if:
  - If the cable jacket tears open or separates from the connector.
  - If any core wire, become exposed.
  - If the cable generates heat, even if it looks normal.

  Continued use in any of these conditions may cause malfunction, overheating, and/or fire.

Operating environment

- Do not use this product at temperatures outside the specified range.
- Do not use this product near combustible materials (gas, gunpowder etc.). It may cause smoke and fire.
- Do not immerse this product in water or any other liquid.
- If any condensation forms on the product, abstain from the use of it until moisture has evaporated to prevent malfunctions.
- Do not store this product in dusty environments and in extremely high humidity.
- Do not store this product in extremely cold or hot places.
- Avoid exposure to direct sunlight for long periods of time.
- Avoid static electricity and do not put the product near a radio or a TV. Excessive static electricity may cause malfunction.
- Do not place in an unstable place.

Others

- Do not disassemble this product.
- Do not stare into the LED light from the scan window. It may damage your eyes.
- Do not soil or scratch the scan window. It may have a bad effect on the reading.
- Do not expose this product to edible / industrial fat and chemicals.
- This product may be affected by an instantaneous power-on condition of machinery, lighting, or motors, etc.
- Do not let children use this product.

Regulatory Compliance

(1) LED Safety
IEC 62471:2006 Exempt Risk Group

(2) EMC
EN 55024:2010 +A1:2015
EN 55032:2012 +AC:2013 Class B

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.

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1 Abstract

This document provides the user's manual for the L-46X 2D handy scanner (hereafter called "scanner")

1.1 Feature of the Scanner

1.2 Flow to Integrate

1.1 Features of the Scanner

The L-46X is a handheld, imager based, 2D barcode scanner that enables high speed scanning of 1D (linear) and 2D barcode as well as OCR fonts. The main features of the L-46X are as follows:

- 360° high speed reading
  The extremely high performance decoder and optics used in this product ensures stress-free scanning and fast response without being affected by hand movement and poor lighting conditions.

- Auto trigger
  When placed in the STD-46 stand (included or optional depending on the specification), this scanner can be set to auto trigger mode, allowing for true handsfree operation. The scanner is then triggered automatically by a moving target and barcodes will then be scanned instantaneously.

- Data edit programming (data output formatting)
  This scanner features a unique script program function called “Data Editing” which gives a user an almost unlimited flexibility to format the scanned data before it is sent out. Up to 16 barcodes can be (partially) combined and fixed parts can be added subtracted, or substituted before its final output. The output editing process, such as GS1 format, can also be configured easily.

- Anti-microbial / Anti-Yellowing (White model)
  The white model uses anti-microbial (ISO 22196 equivalent) and anti-yellowing material so that it can be used for medical applications.

- LED aiming / Lighting
  A well-defined single line of green LED light and efficient warm-white LED illumination makes it easy to aim the scanner while providing safety and long life.

- Setting tool
  “UniversalConfig” is ready to use and it makes installation easy.

- Various interfaces
  By exchanging cables and changing setting, a RS-232C model can converted to a USB model and vice versa.

- The Scanner is a RoHS compliant product, as declared by OPTOELECTRONICS CO.,LTD.

1.2 Flow to Integrate

Following are the flow of integrating general scanner.

1. Examine and Select the Scanner

Examine technical introduction in advance.

- Before using → (Refer to 2)
- Product specification overview → (Refer to 9.2)

"Communication"



"Reading code"



2. Download Tools

According to the operation, download necessary tools from our website.

- Setting, Image acquisition, confirm communication → "UniversalConfig"
- USB-COM → "USB Driver"
- COM output → HID output conversion → "WIME"

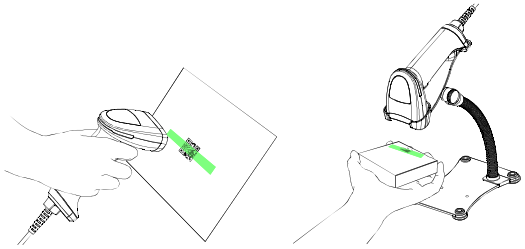
UniversalConfig

WIME

3. Setting and Testing

In the actual enviroment, evaluate the optimum setting according to the operation and perform a reading test.

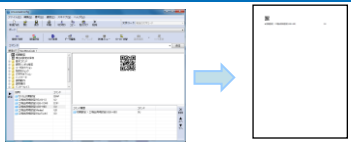
- Configurations → (Refer to 3)
- Indicator → (Refer to 4)
- Interface → (Refer to 5)
- Code Options → (Refer to 6)
- String Options → (Refer to 7)
- Read Options → (Refer to 8)



4. Create Setting Menu

Create a 2D menu code suitable for operation.

- 2D menu code → (Refer to 3.1.2)



Integrate

2 Before Using

Following explains the items required before using.

2.1 Model Details

2.2 Package Contents

2.3 Detailed View

2.4 Connect to the Host

2.5 How to Read

2.6 Reading Range

2.7 Operation Transition

2.8 Buzzer and Status LED

2.9 Cable Desorption method

2.10 Optional Accessories

2.1 Model Details

The L-46X model is constructed by a combination of following.

Model name	Focus	Vibrator	Housing	Interface	Cable length	Optional AC adapter	Optional Stand
L-46X	None or UD	-V or None	-BLK or -WHT	-USB	None (20)	None	+STD or None
					-15		
					-24		
					-28		
				-RS232C	None (20)	+PS	
					-24		
					-28		
				-RS232C(9P)	None (20)	None	

2.1.1 Standard

The following specs are the standard products.

Standard	Description
L-46X-BLK-USB+STD	Black housing USB-HID 2.0 m cable with stand
L-46X-BLK-RS232C+PS+STD	Black housing RS-232C 2.0 m cable with AC adapter and stand

Note: Other combinations only as special order, please contact sales offices for this.

2.1.2 Model Description

● Focus

Symbol	Description
None	Standard focus
UD	Ultra high resolution

● Housing

Symbol	Description
-BLK	Black housing
-WHT	White housing

● Interface

Symbol	Description
-USB	USB interface (default is USB-HID)
-RS232C	RS-232C interface with power supply (external AC adapter power supply spec)
-RS232C(9P)	RS-232C interface (power supply input connected to D-sub 9pin 9)

● Cable Length

Symbol	Description
None	Cable length 2.0 m
-24	Cable length 2.4 m
-28	Cable length 2.8 m

● Optional AC Adapter

Symbol	Description
None	AC adapter not included.
+PS	AC adapter included

● Optional Stand

Symbol	Description
None	Dedicated Auto Trigger stand (STD-46) is not included.
+STD	Dedicated Auto Trigger stand (STD-46) is included.

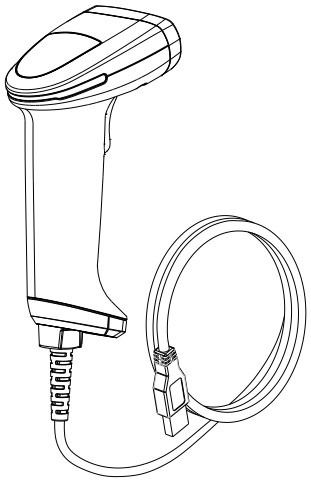
Note: Auto Trigger stand is also sold separately.

2.2 Package Contents

Following items are packed to this product. Please check before using.

USB-HID / USB-COM Interface Model

Following are included to USB interface model.



Scanner with cable

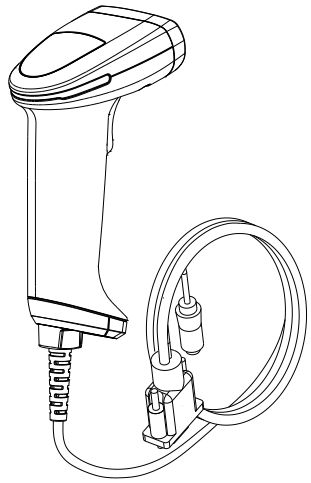




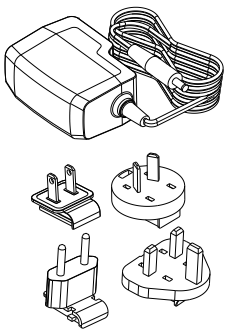
L-46X Quick Start Guide (1 copy)

RS-232C Interface Model

Following are packed to RS-232C interface model.



Scanner with Cable



AC adapter
(with AC plug)

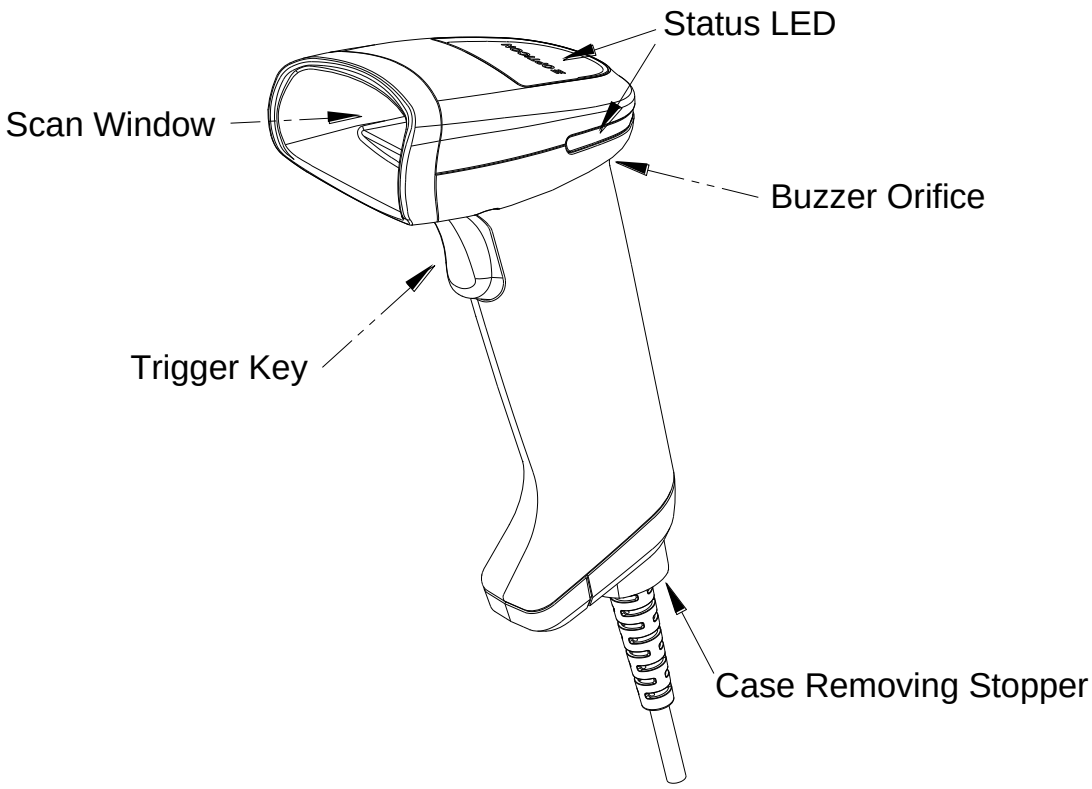




L-46X Quick Start Guide(1 copy)

2.3 **Detailed View**

Each part of the scanner's name and functions are as below.



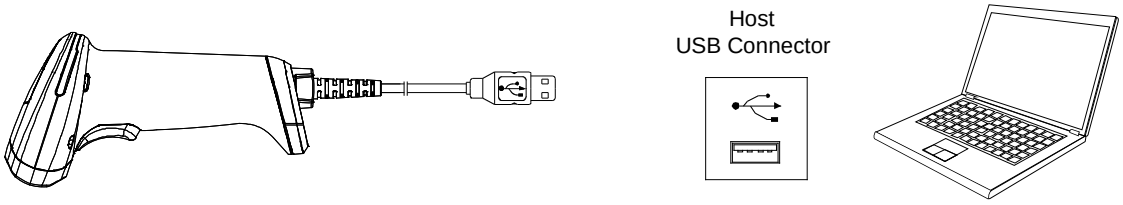
Name	Description
Trigger Key	Press this key to enable the scanner and to start reading 1D/2D codes.
Scan Window	Light paths of the imager, LED illumination and LED aiming. Ensure that the lens is not exposed to dust and dirt before scanning.
Status LED	Light blue LED light indicates good read. When Auto trigger mode is enabled by placing the scanner in the dedicated STD-46 stand, the status LED lights up in blue to indicate Auto Trigger mode.
Buzzer Orifice	Sound from a built-in buzzer comes out through these holes. When they are covered, the buzzer sound will be diminished. The sound varies depending on the settings. Buzzer settings are configurable for volume and duration.
Cable Removing Stopper	To remove cable, turn this stopper and pull out cable.

2.4 Connect to the Host

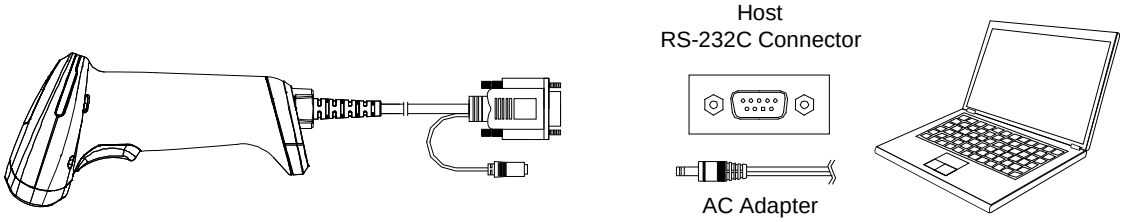
This section describes how to connect each interface to the host.
For interface setting details, refer to “5. Interface”

Connecting with the Host device
Connect interface connector to the host. When power is on, scanner makes startup sound and color indicator on top of scanner lights.
When indicator operation is completed, scanner becomes readable.

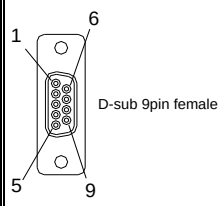
USB-HID / USB-COM Interface Connection Diagram



RS-232C Interface Connection Diagram



D-Sub 9pin (female) specification

Pin No.	Signal name	Notes	Pin No.	Signal Name	Notes	Pin Assignment
1	Shield	Open (not connected)	6	-	Connected to pin 4	
2	TxD		7	CTS		
3	RxD		8	RTS		
4	-	Connected to pin 6	9	(NC)	Open (not connected)	
5	GND		Case	FG	Shield	

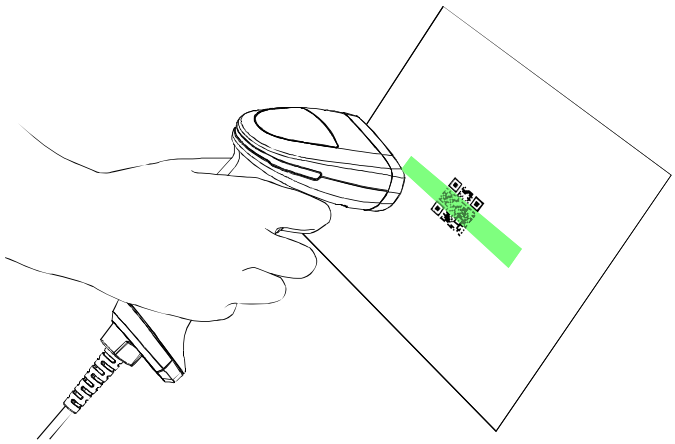
*RS-232C interface has AC adapter included.
*9 pin power supply model are also available.

2.5 How to Read

L-46X has “handheld” witch starts reading by pressing trigger switch, and “hands-free” which reads target code by placing it in front of the scanner. Details are described as follows.

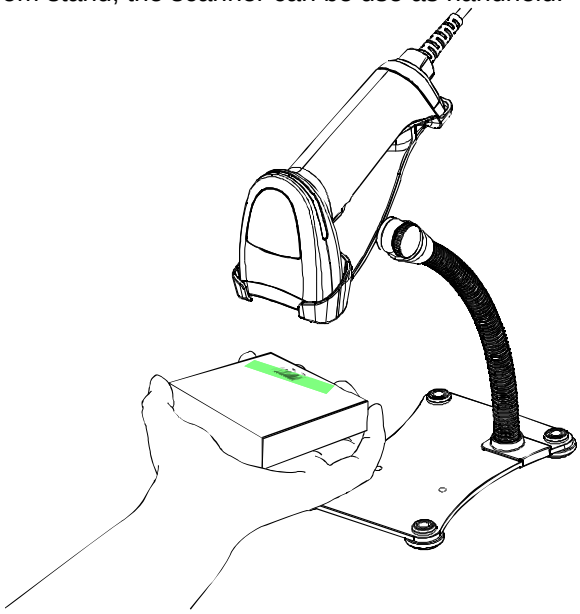
2.5.1 Handheld

The scanner read target code by acquiring the image. Reading starts by triggering, with green aiming as a guide, normally reads around 50 mm from the front edge of scanner.



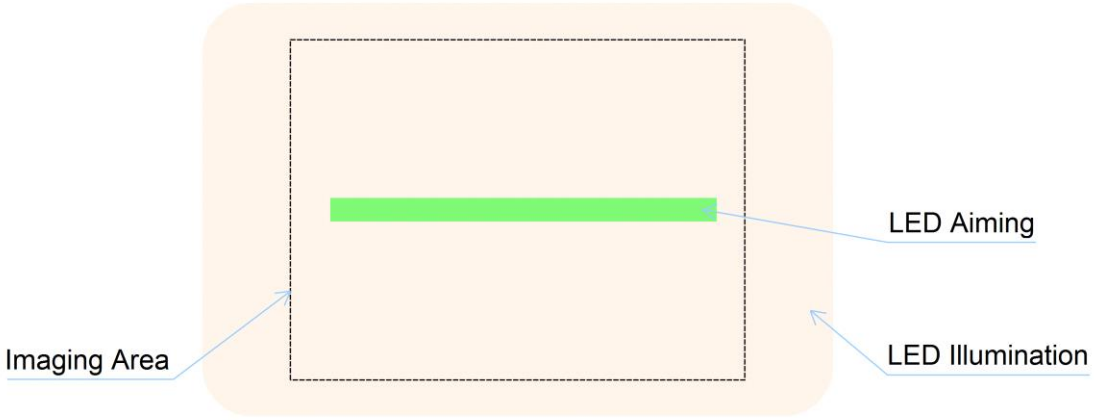
2.5.2 Hands-Free

When installing the scanner to dedicated stand STD-46, automatically shifts to auto trigger operation by magnet switch. Normally reads by holding target code to around 50 mm from front edge of the scanner. When removed from stand, the scanner can be use as handheld.



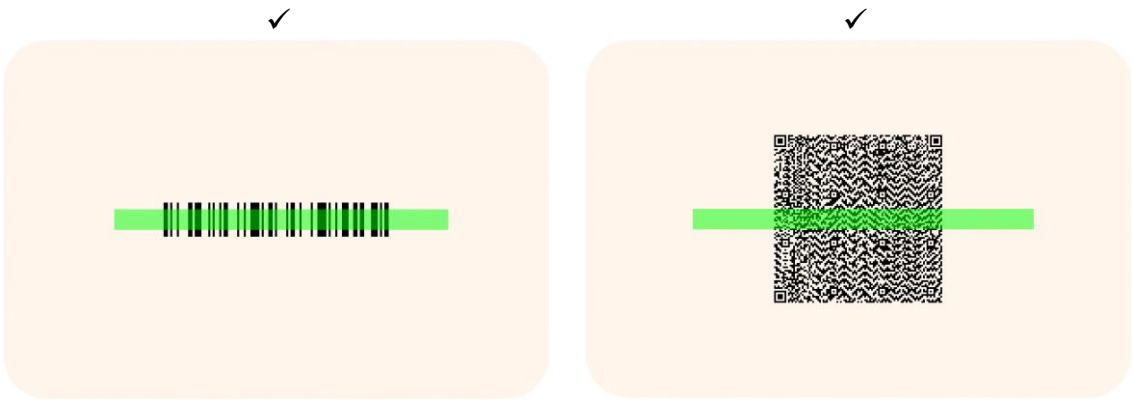
2.6 **Reading Range**

The scanner reads the code by acquiring image.
Following figure shows the read LED illumination, LED aiming and imaging range.



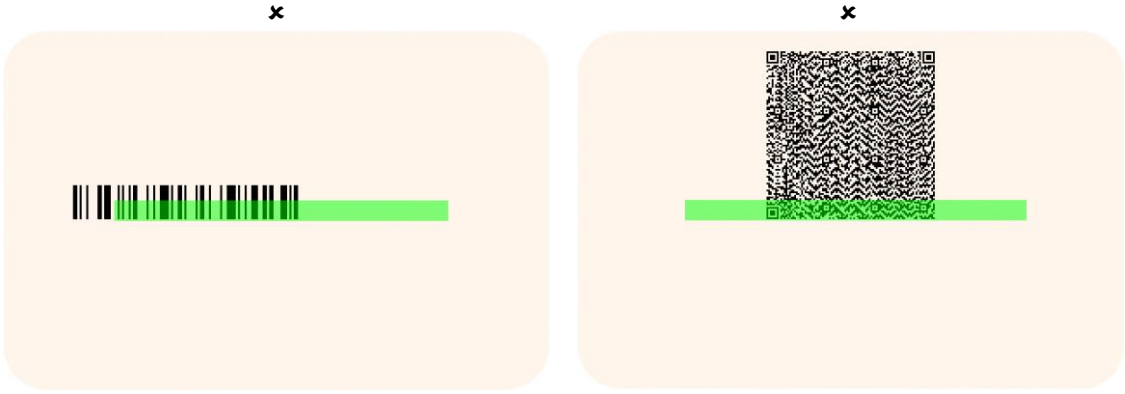
Since the dotted line in the image above is not actually visible, LED aiming will be the target when reading.
*Refer to 9.2.2 for reading depth of field.
*Refer to 8.1.3 for the setting to read only center of LED aiming.

• Appropriate LED aiming



*If the code including quiet zone is within the view angle, 360° rotation reading is possible.

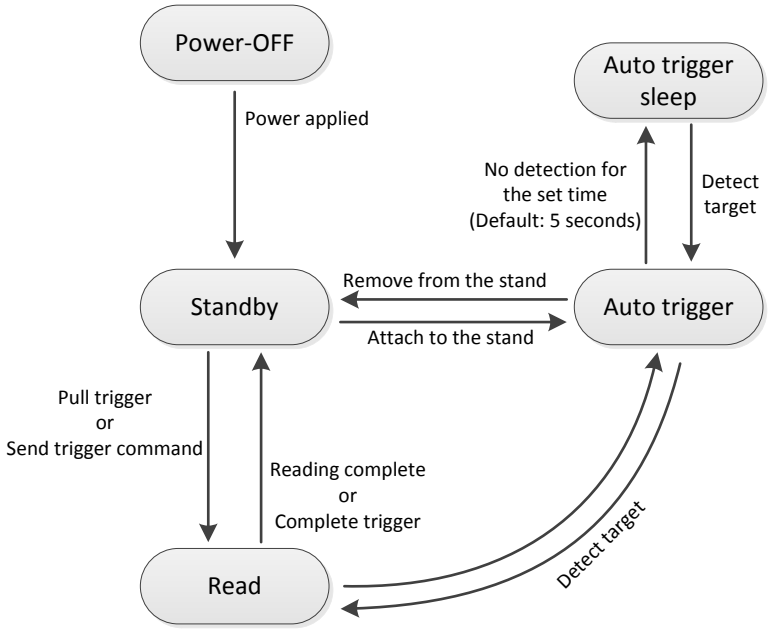
• Not appropriate LED aiming



2.7 Operation Transition

Following are the operation status transition of the scanner.

2.7.1 Operation Transition Diagram



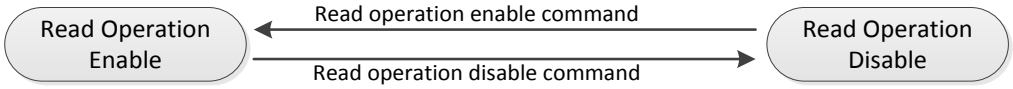
Status	Description
Read	Acquiring image and reading is in progress with the warm white LED and green aiming LED on.
Standby	Can start reading by serial command or pulling trigger.
Auto trigger	Detecting target by image. Status LED turns on in light blue and warm white LED slightly on.
Auto trigger sleep	When no detection continues for 5 seconds (default setting) while in the auto trigger mode, scanner shift to auto trigger sleep which detects with the warm white LED turned off.

Operation current transition (USB-HID)

Status	Typ.	Unit
Reading	340	mA
Auto trigger standby	160	mA
Standby	55	mA

2.7.2 **Operation Invalid Transition Diagram**

For USB-COM and RS-232C, scanner operation can be disabled by command's serial communication. When disabled, auto trigger operation becomes invalid.

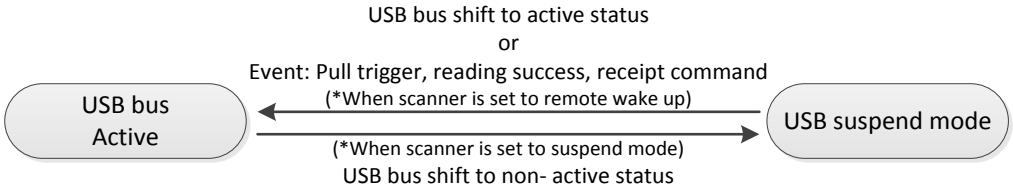


Refer to 3.3.4 for setting command.

2.7.3 **USB Suspend Mode Transition Diagram**

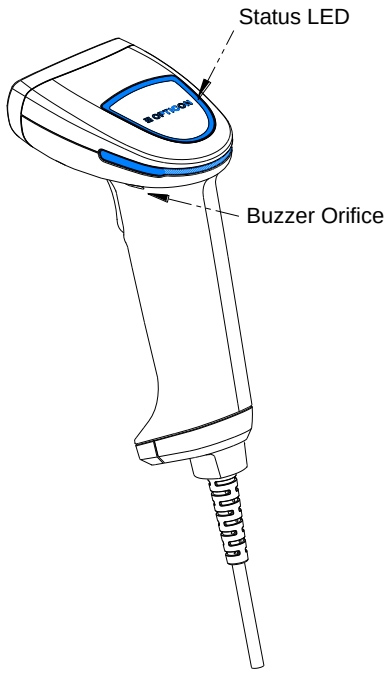
The scanner supports suspend mode and remote wakeup with USB interface.

In USB suspend mode, the scanner operates as following state transition.



2.8 Buzzer and Status LED

Buzzer sound and lighting color of LED indicates status of the scanner.
The scanner status, buzzer sound and status LED are described as below.



Item	Rumble timing	Tone interval	LED color	Enable/Disable
Start-up sound	When powered on.	Low - Low middle 2 time - Middle tone	3 color Combination	Configurable (Default: Enable)
Good read sound	When reading successes	Middle tone 1 time	Light blue	Configurable (Default: Enable)
Data transmission error	In USB, when connection is not established.	(Middle - Middle low tone) 6 times	Red	Enable (Fixed)
Batch reading Intermediate sound	When one code is read and if it does not yet meet the conditions to output data in batch reading or concatenated code reading.	Short High tone 1 time	None	Configurable (Default: Enable)
Read timeout sound	When code is not read within the effective time period.	Low tone 2 times	Red	Configurable (Default: Disable)
1D ZZ menu Reading sound	When reading start ZZ menu code.	Middle - Middle low - Middle high tone	Yellow	Enable (Fixed)
	When reading defined menu code.	Middle - Middle low - Middle-high tone	Yellow	Enable (Fixed)
	When reading not defined menu code.	Low tone 2 times	Red	Enable (Fixed)
	When reading end ZZ menu code.	Middle - Middle low - Middle-high tone	Yellow	Enable (Fixed)
	When save setting is complete	(Middle - Middle low - Middle high tone) 3 times	None	Enable (Fixed)
2D menu Reading sound	When reading 2D menu code.	Middle - Middle low - Middle high tone	Yellow	Enable (Fixed)
	When save setting is complete.	(Middle - Middle low - Middle high tone) 3 times	None	Enable (Fixed)
High temperature protection mode	If internal temperature exceeds a certain temperature, reading operation becomes disabled. While in this mode, it beeps with a 3 seconds interval.	High tone 2 times	Orange	Enable (Fixed)

* Low: around 1000 Hz, Low middle: around 1000-2000 Hz, Middle low: around 2500 Hz, Middle: around 3000 Hz, Middle high: around 3500 Hz, High: around 4000Hz.
* Refer to 4. Indicator for setting detail.
* Above is the definition of the representative status and does not indicate all of the operations.

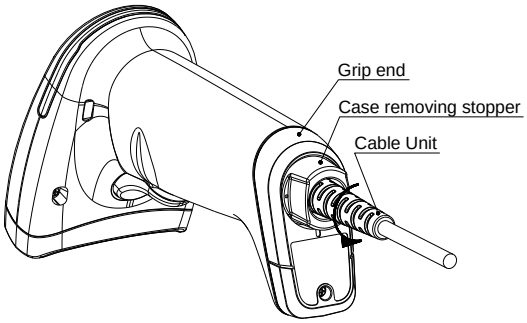
2.9 Cable Desorption Method

Following are the cable attachment / detachment method.

2.9.1 Removing Cable

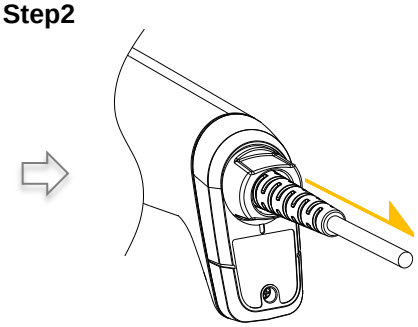
Disconnect the USB connector or AC adapter cable from the host, and follow the steps below to remove. When changing interface, interface setting change is also required. Refer to 3.2.4 for interface switching setting/menu.

Step1



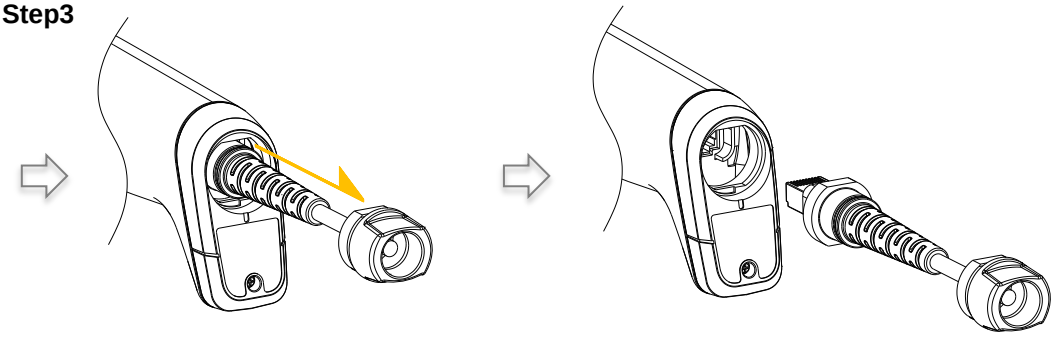
Rotate the case removing stopper for counterclockwise 90°.

Step2



Pull out the case removing stopper from grip end.

Step3

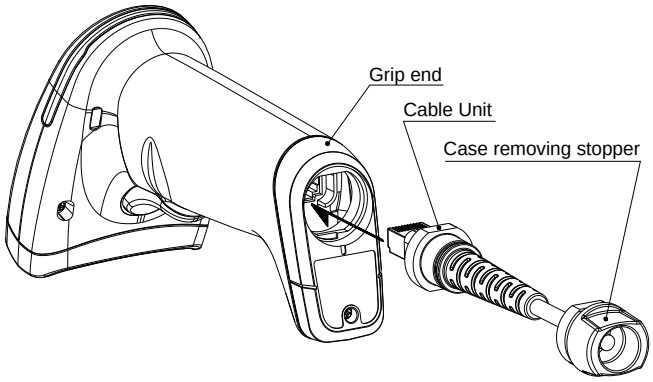


With the case removing stopper removed from the grip end, carefully pull out the cable.

2.9.2 **Attaching Cable**

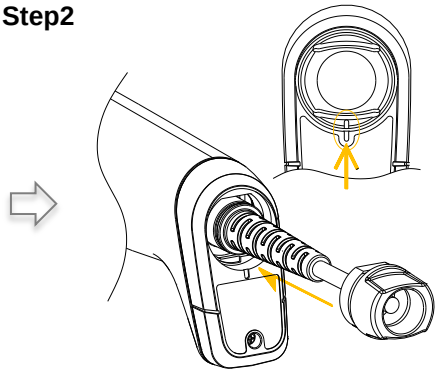
Disconnect the USB connector or AC adapter cable from the host, and follow the steps below to attach. When changing interface, interface setting change is also required. Refer 3.2.4 for interface switching setting/menu.

Step1



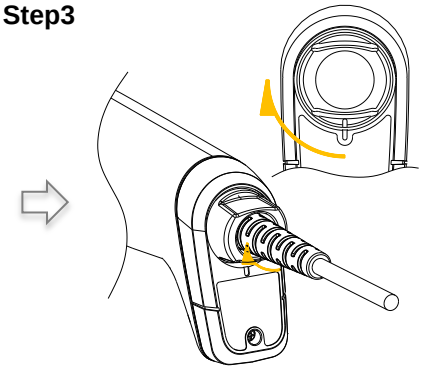
Confirm the connector insert direction of the cable unit and insert into grip end.

Step2



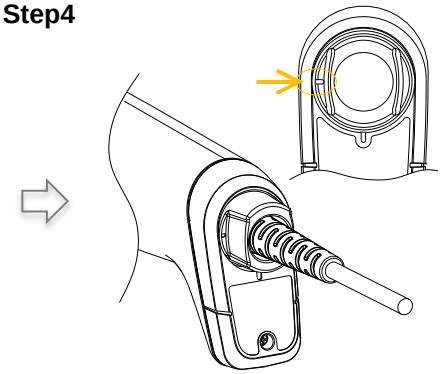
Match the direction of dent mark on the case removing stopper and grip end, and insert.

Step3



Rotate the case removing stopper for clockwise 90°.

Step4



After rotation, case removing stopper dent mark position is as above drawing.

2.10 Optional Accessories

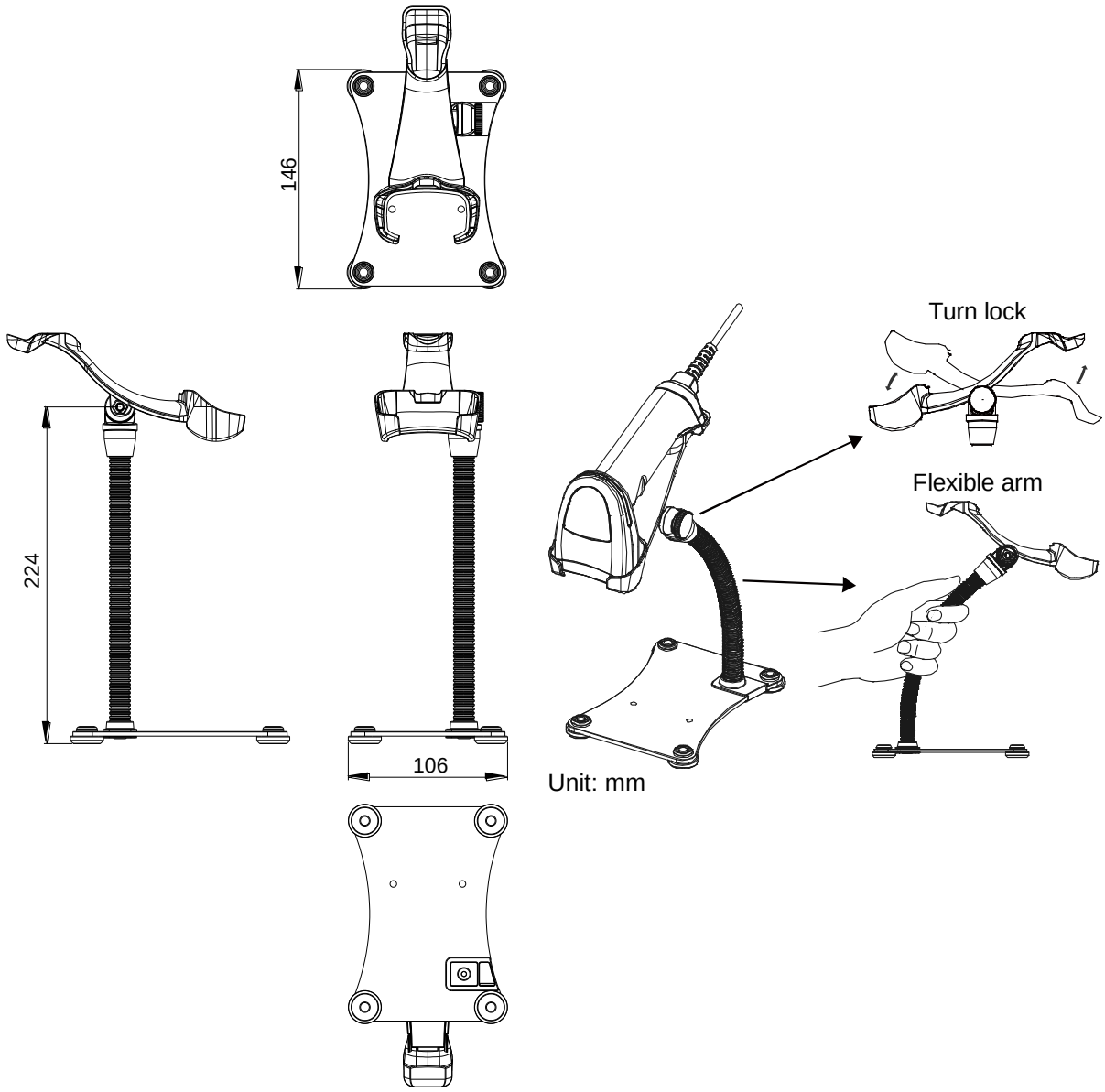
Dedicated stand that supports auto trigger stand mode. Automatically shift to auto trigger mode by magnet switch.

2.10.1 **Stand (STD-46)**

Included to scanner depend on specification.

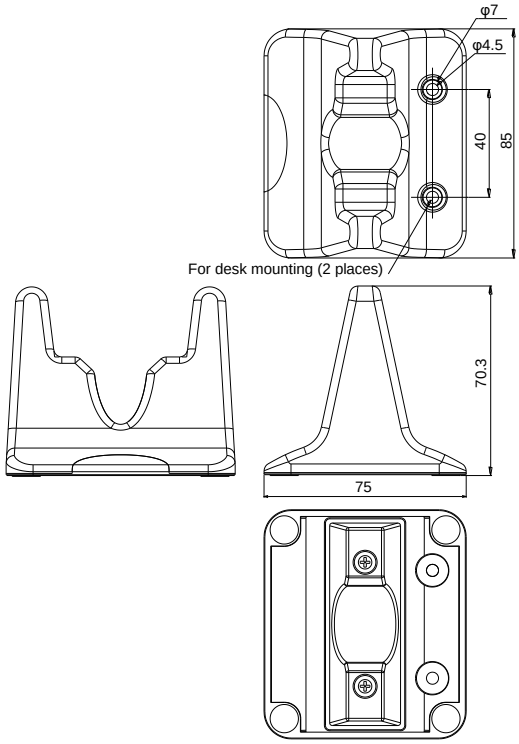
Model number	STD-46
Weight	Approx. 365 g

Mechanical drawing



2.10.2 **Holder (STD-4101)**

STD-4101 is a holder to place the scanner.
Mechanical Drawing:



2.10.3 **Various Exchange Cable**

Various exchange cable are sold separately.

3 Configurations

This chapter explains the scanner configuration, default setting and saving setting, and basic commands.

3.1 Configuring with Commands

3.2 Command Packet Sending Precautions

3.3 Basic Commands

3.1 Configuring with Commands

The scanner can be configured by sending commands via the serial interface or by reading 1D or 2D menu codes. This section describes the serial commands.

3.1.1 Command Packet

The command packet, from header to terminator, is defined as below.

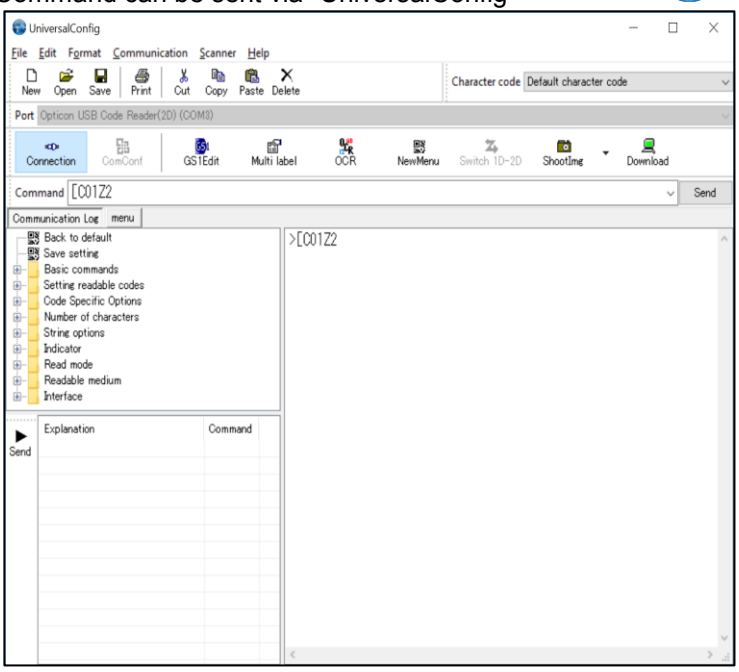
Command Header*2	Command ID*1		Command Terminator*2
<ESC> (0x1B)	None	1-2 digits (ASCII)	<CR> (0x0D)
	[(0x5B)	3 digits (ASCII)	

*1 It is possible to send multiple command IDs between a single header and terminator, except for single digit IDs.
*2 A combination of command header <STX>(0x02) and terminator <ETX>(0x03) is also possible.

Input examples:

1-digit command	<ESC>Δ<CR>
2-digit command	<ESC>ΔΔ<CR>
3-digit command	<ESC>[ΔΔΔ<CR>
Two 2 digit commands	<ESC>ΔΔΔΔ<CR>
2 and 3 digits command	<ESC>ΔΔ[ΔΔΔ<CR>

Command can be sent via “UniversalConfig”



*In UniversalConfig <ESC> is sent automatically.

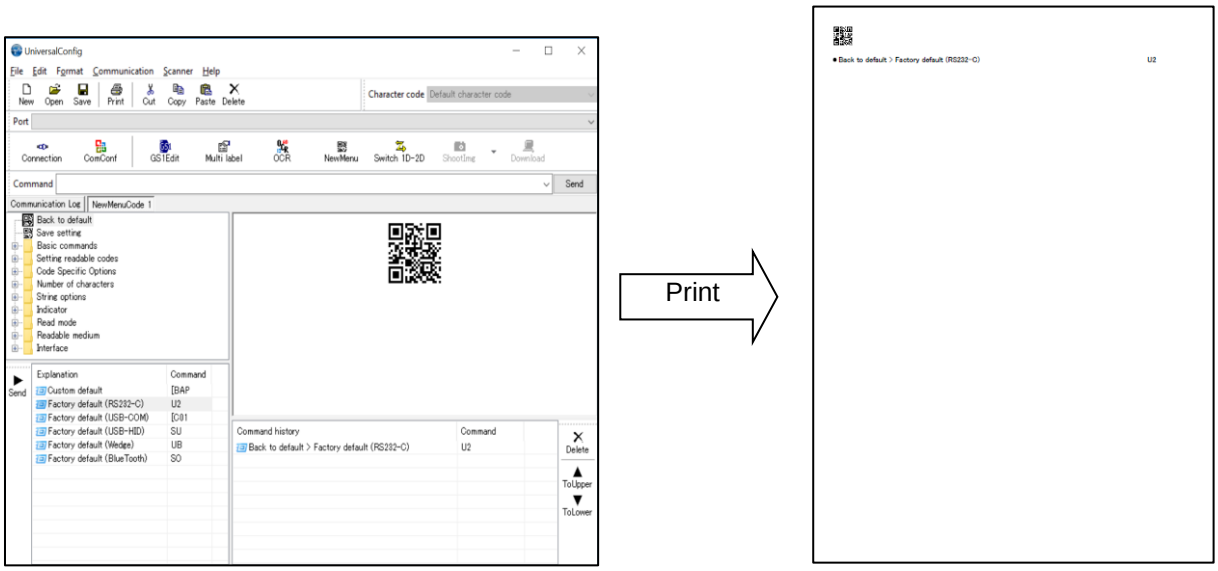
3.1.2 **Configuring with 2D Menu**

A single 2D menu code can contain multiple settings that will be processed in order, in one operation. Therefore, you can configure the scanner with multiple settings by reading only one 2D menu code. Scanning a 2D menu code will always perform a ‘save settings’ upon completion, so a Z2 command to save current settings is not needed.

Data Packet:
@MENU_OPTO@ZZ@MenuCommand 1@MenuCommand 2@ZZ@OTPO_UNEM@

“@MENU_OPTO”	(Start key)	
“@”	(Separator)	
“ZZ”	(Start menu)	
“@” “Any menu command”	(Separator) (U2 etc)	← Multiple sets allowed
“@”	(Separator)	
“ZZ”	(END menu)	
“@”	(Separator)	
“OTPO_UNEM@”	(Stop key)	

● 2D menu code can be created at “UniversalConfig”.



*Please contact sales offices for the tools.

3.1.3 **Configuring with 1D Menu Code**

By scanning a series of 1D menu codes specially designed to configure the required functions, you can set up the scanner to optimize its performance for your particular application.

The basic procedures are as follows:

Scan SET menu code (ZZ). The scanner now enters menu mode.

↓

Scan one or more desired options.

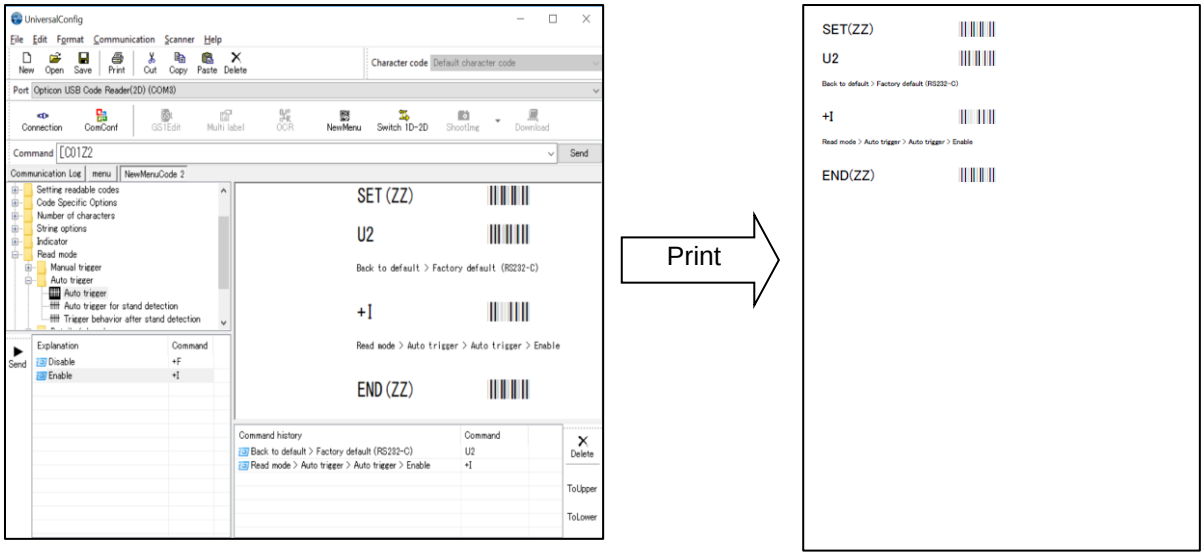
Multiple menu codes can be read when you want to configure more than one option.

↓

Read END menu code (ZZ). All the settings are saved in non-volatile memory.

* 1D Menu codes encode an ID consisting of two to five alphanumeric characters. 1D Menu codes are Code39 labels with modified start/stop characters and therefore the scanner will not acknowledge a 1D menu code as a normal barcode.

● Menu barcode can be created at “UniversalConfig”.



*Please contact sales offices for the tools.

3.1.4 **Forced Initialization**

If the Status LED remains flashing and the scanner is unable to read barcodes, use this recovery method. This typically occurs if you accidently scan USB interface change while using an RS-232C cable

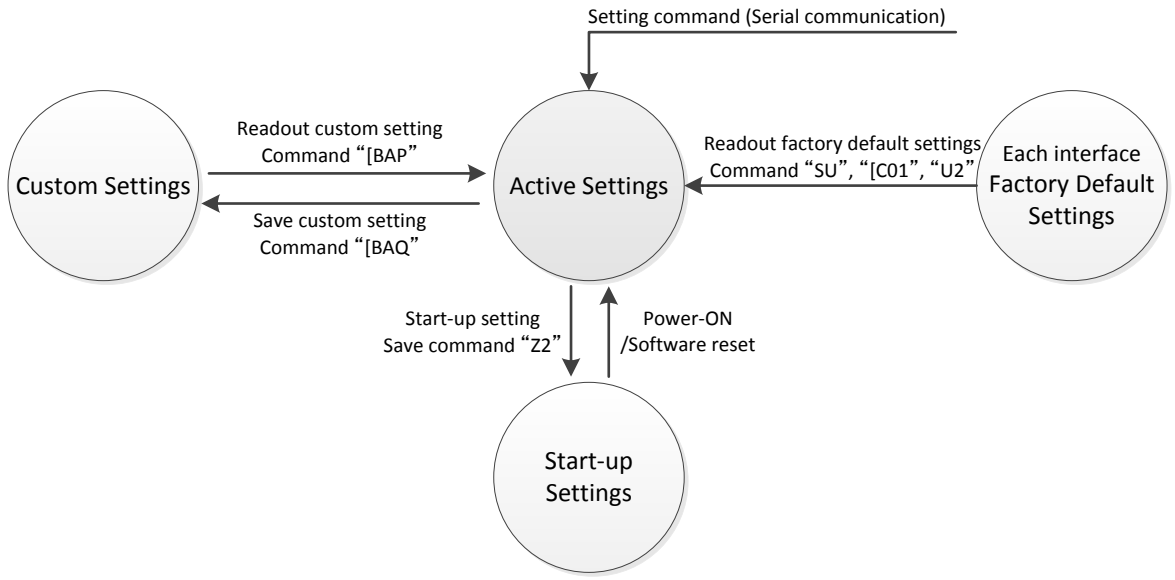
Force initialization
- Power off the scanner (remove the power).
- Press and hold the trigger key
- Power on the scanner while pressing the trigger. (Keep pressing trigger.)
- While the Status LED is flashing, hold trigger key for 10 seconds.
- The recovery signal will sound and the status LED should stop flashing.
- Trigger key should now be operational and the scanner should be able to read barcodes.

* During forced initialization, read data will not be output to the host device.

3.2 Command Packet Sending Precautions

Following are the scanner setting method.

Setting value, writing and reading diagram



* Menu barcode and 2D menu code setting are always saved in "Startup setting".
* When updating the firmware, status of interface will remained, but "Startup setting" and "Custom setting" will be initialized.

Active Settings	Settings that is currently active. (Including newly added settings from power on)
Startup Settings	The setting to be read when power is turned on.
Custom Settings	Custom setting to be saved on another memory area.
Factory Default Settings	Default setting is the same as the initial setting described in this manual. Various interfaces require switching setting.

3.2.1 Each interface Default Setting

The Active Settings can be returned to the factory default settings. Set the command that corresponds to the interface being used.

Item	Command	Interface	Description	Remark
Factory Default Settings	SU	USB-HID	Restore USB-HID to factory default settings	
	[C01	USB-COM	Restore USB-COM to factory default settings	
	U2	RS-232C	Restore RS-232C to factory default settings	

3.2.2 Save Settings

The Active Settings can be written into the “Startup Settings”.

Item	Command	Description	Remark
Save settings	Z2	Save the Active Settings as Startup Settings	Command only

* Place “Z2” at the end of command packet to be saved.
* Saving settings for more than 30,000 times may destroy memory. Avoid saving every time.
* There are options that will not be enabled until “Save settings” is sent, such as baud rate setting.

3.2.3 Custom Setting

Item	Command	Description	Remark
Custom settings	[BAP	Read out Custom Settings	
	[BAQ	Save to Custom Settings	

* Place “[BAQ” at the end of command packet to be saved.
* To save both “Custom settings” and “Active Settings” at same time, send “[BAQZ2”.
* Custom settings for more than 30,000 times may destroy memory. When setting frequently, avoid saving every time.

3.2.4 Various Interface Switching

Various interface factory setting can be change. Cable changing is required for USB and RS-232C. This setting is also saved when updating firmware.

Switch to USB-HID

Item	Command	Menu	Remark
Change interface to USB-HID	[X.ZSU[X.ZZ2	@MENU_OPTO@ZZ@X.Z@SU@X.Z@ZZ@OTPO_UNEM@	Confirm cable

Switch to USB-COM

Item	Command	Menu	Remark
Change interface to USB-COM	[X.Z[C01[X.ZZ2	@MENU_OPTO@ZZ@X.Z@C01@X.Z@ZZ@OTPO_UNEM@	Confirm cable

Switch to RS-232C

Item	Command	Menu	Remark
Change interface to RS-232C	[X.ZU2[X.ZZ2	@MENU_OPTO@ZZ@X.Z@U2@X.Z@ZZ@OTPO_UNEM@	Confirm cable

3.3 Basic Commands

Following are the basic commands for the scanner.

3.3.1 Diagnostic Commands

These commands can be used to get diagnostics information from the scanner.

Item	Command	Description	Remark
Diagnostics	Z1	Transmit software version	
	Z3	Transmit settings	
	[EAR	Transmit only changes from default	
	ZA	Transmit ASCII printable string	
	YV	Transmit ASCII control string	

3.3.2 ACK/NAK for Serial Commands

When "ACK/NAK for serial commands" is enabled, the scanner will send an ACK (0x06) when a command is received and accepted, and a NAK (0x15) when a command is rejected.

Item	Command	Description	Default
ACK/NAK	WC	Enable ACK/NAK for serial commands	
	WD	Disable ACK/NAK for serial commands	✓

3.3.3 Enable/Disable 2D Menu Code

To enable/disable the processing of 2D menu codes, use the settings below.
Setting 'Disable 2D menu codes' is recommended when 2D menu codes are not used.

Item	Command	Description	Default
Enable/Disable 2D menu code	[D1Y	Enable 2D menu code	✓
	[D1Z	Disable 2D menu code*	

3.3.4 Disable Reading Operation

To enable/disable the processing of reading, use the settings below.
Auto trigger become invalid by setting this disable reading. In this setting, menu labels cannot be read, only commands via serial communication are supported.

Item	Command	Description	Default	Remark
Enable/Disable Reading operation	[EAT	Enable module reading operation	✓	Command only
	[EAU	Disable module reading operation		Command only

3.3.5 **Buzzer and Indicator**

These commands reflect “4.1 Buzzer” and “4.2 Status LED”.

Item	Command	Description	Remark
Buzzer	B	Sound the good read beep	Command only
	E	Sound the error beep	
Status LED	L	Flash the status LED	

3.3.6 **Trigger Command**

The reading operation can be started and terminated by sending commands. When the read cycle timeout (refer to 8.1.2) is set to 0 seconds (Y0 command), the read time with the Z command will be ‘Indefinitely’ and reading will continue until a Y command is received.

Item	Command	Description	Remark
Trigger Command	Z	Start the read cycle	Command only
	Y	Stop the read cycle	

3.3.7 **Direct Numerical Input Command**

When a command requires additional numerical input, the commands below can be used. Use these in one packet together with the command that requires the numerical input.

Item	Command	Description	Remark
Direct input numerical values	Q0	0	Input in a specified format
	Q1	1	
	Q2	2	
	Q3	3	
	Q4	4	
	Q5	5	
	Q6	6	
	Q7	7	
	Q8	8	
	Q9	9	

4 Indicator Options

This chapter describes the options for Buzzer and Good Read LED.

4.1 Buzzer

4.2 Status LED

4.3 Good Read Aiming

4.4 Indicator in General

4.1 Buzzer

Buzzer operation settings are described below.

4.1.1 Buzzer Loudness

The buzzer loudness can be set with these options, which is applied to all buzzers.

Item	Command	Description	Default
Buzzer loudness	T0	Buzzer loudness : Maximum	
	T1	Buzzer loudness : Loud	✓
	T2	Buzzer loudness : Normal	
	T3	Buzzer loudness : Minimum	

4.1.2 Good Read Buzzer

The good read buzzer is activated when a code is successfully read and the data is output.
3 types of tone and 5 types of duration are configurable. The good read buzzer can also be disabled.

● Buzzer Disable/Enable

Item	Command	Description	Default
Buzzer Disable/Enable	W0	Disable buzzer	
	W8	Enable buzzer	✓

● Buzzer duration

Item	Command	Description	Default
Buzzer duration	W7	Buzzer duration: 50 ms	✓
	[EFW	Buzzer duration: 75 ms	
	W4	Buzzer duration: 100 ms	
	W5	Buzzer duration: 200 ms	
	W6	Buzzer duration: 400 ms	

● Buzzer tone

Item	Command	Description	Default
Buzzer tone (*)	W1	Middle frequency buzzer (3000 Hz)	2600 Hz
	W2	2 steps buzzer (high - low buzzer)	
	W3	2 steps buzzer (low - high buzzer)	

* The good read buzzer tone (frequency) can be set with numerical parameters by inputting the command followed by a 4-digit numerical command.
Frequency range normally use is 2000 to 4000 Hz. The scanner most resonance around 2750 Hz.

Item	Command					Description	Default
Buzzer tone frequency setting	[DF0	Qa	Qb	Qc	Qd	Numerical setting of buzzer tone frequency (1000a+100b+10c+d)[Hz]	2600 Hz (1-9999)

4.1.3 **Start-up Buzzer**

This setting determines whether the scanner emits a beep when it is powered on.

Item	Command	Description	Default	Remark
Startup buzzer	GD	Disable startup buzzer		Enabled only with “Z2”
	GC	Enable startup buzzer	✓	Enabled only with “Z2”

4.1.4 **Read Timeout Buzzer**

In case a code is not read within the timeout period, an error buzzer sounds when the read operation ends.

Item	Command	Description	Default
Read timeout buzzer	[EAP	Disable read timeout buzzer	✓
	[EAQ	Enable read timeout buzzer	

4.1.5 **Intermediate Buzzer**

When one code is decoded, an intermediate buzzer sounds to indicate that the code is decoded but it does not yet meet the conditions to output data.

For instance, suppose five-codes reading is set in buffer mode, the intermediate buzzer then sounds after the decoding of the 1st, 2nd, 3rd and 4th code and a good read buzzer finally sounds when the last code is decoded after which the data is output. The data is not output when the 1st to 4th codes are decoded but reading of each code can be confirmed by the intermediate buzzer. When the good read buzzer is disabled, this setting will be forcibly disabled.

Item	Command		Description	Default
Intermediate buzzer	[EBY	Q0	Disable intermediate buzzer	
		Q1	Enable intermediate buzzer	✓

* Intermediate buzzer frequency: 5000 Hz (5 KHz), duration: 10 ms

4.2 Status LED

Each status LED operation settings are described below.

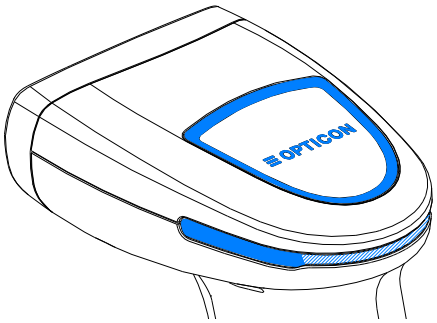
4.2.1 Status LED Lighting Color

The colors of status LED can be change depend on the each operation's lighting.

Item	Command					Function	Command Description	Initial setting
Status LED Lighting color	[EG2	Qa	Qb	Qc	Qd			
		a				Lighting situation	0: When reading success 1: When reading fail 2: When Installing to stand	*2
			b			Red optical power	Power: 0-3 level	*1
				c		Green optical power		
					d	Blue optical power		

*1 Red/Green/Blue optical power 0 = off, 1 = 20%, 2 = 80%, 3 = 100%
*2 Following are the each status color optical power's initial setting.

Light Situation	Red Optical Power	Green Optical Power	Blue Optical Power
Good read	0: OFF	1: 20%	2: 80%
Reading NG	3: 100%	0: OFF	0: OFF
Installed to stand	0: OFF	0: OFF	1: 20%



Color and command example of Good read

Color	Command Example	Color	Command Example
White	[EG2Q0Q2Q2Q2	Red	[EG2Q0Q2Q0Q0
Green	[EG2Q0Q0Q2Q0	Blue	[EG2Q0Q0Q0Q2
Orange	[EG2Q0Q3Q1Q0	Yellow	[EG2Q0Q3Q2Q0
Cyan	[EG2Q0Q0Q2Q2	Emerald	[EG2Q0Q1Q3Q1
Pink	[EG2Q0Q3Q1Q1	Off	[EG2Q0Q0Q0Q0

4.2.2 Status LED Lighting Time

The status LED lights up after a code was successfully decoded and the data was output. This can be disabled or set for several durations.

Item	Command	Description	Default
Status LED	T4	Disable indicator	
	[XT8	Indicator duration: 100 ms	
	T5	Indicator duration: 200 ms	✓
	T6	Indicator duration: 400 ms	
	T7	Indicator duration: 800 ms	

4.3 Good Read Aiming

The green aiming lights up after a code was successfully read.

Aiming indicator frequency and indicator durations after reading are configurable.

Item	Command				Function	Description	Default
Good Read Aiming	[EF3	Qa	Qb	Qc			
		a			Setting items	0:Indicator frequency 1:First indicator duration after reading	
			b		Numerical setting 10b + c	Indicator frequency 00-99 times Indicator duration 00-99 x10 ms	Indicator frequency 0 time Indicator duration 100 ms
				c			

Setting example)
- Lights 2 times (After 100ms: Default)
Command: [EF3Q0Q0Q2

- Set first indicator duration after reading to 500 ms
Continue to above indicator frequency setting
Command: [EF3Q1Q5Q0

4.4 Indicator in General

Common settings for each indicator are described below.

4.4.1 Indicator Timing

The indicators can be activated after decoding a code and before or after transmitting the data.

Item	Command	Description	Default	Remark
Indicator timing	VY	Before data transmission	✓	soon after decoding
	VZ	After data transmission		

5 Interface

The scanner support USB-HID, USB-COM and RS-232C interface.
This chapter explains each interface in detail.

5.1 USB-HID

5.2 USB-COM

5.3 RS-232C

5.4 Common Settings

5.1 **USB-HID**

This chapter explains USB-HID interface settings.

5.1.1 USB-HID Basic Information

5.1.2 Connection Confirmation (USB-HID)

5.1.3 NumLock CapsLock control

5.1.4 Data Output Speed (USB-HID)

5.1.5 Inter Character Delay (USB-HID)

5.1.6 Keyboard Language

5.1.7 Trouble Shooting (USB-HID)

5.1.1 **USB-HID Basic Information**

Basic information for USB-HID interface is as follows.

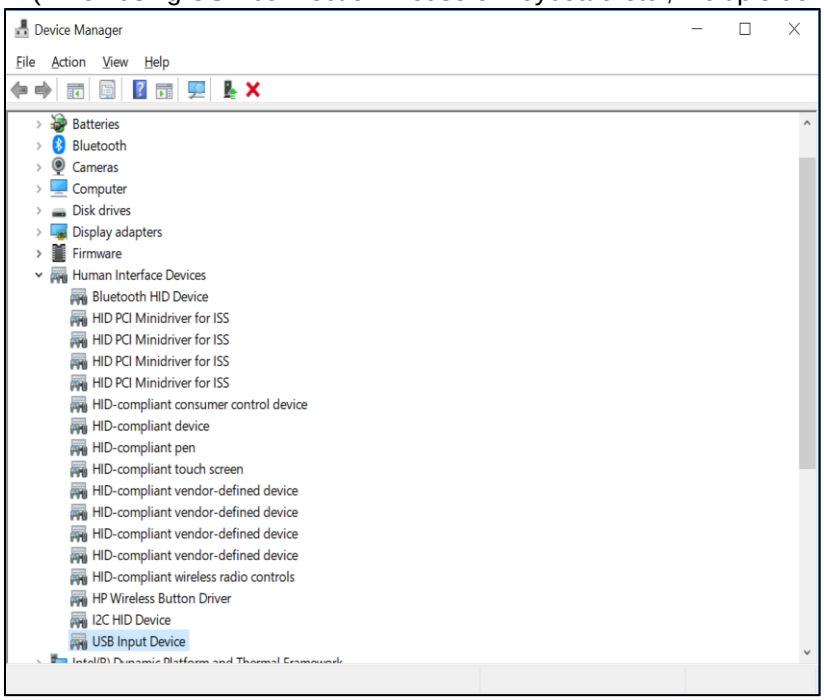
Items	Description	Notes
USB	USB2.0 Full Speed	
Required power supply capacity	500 mA	Differs from actual power consumption.
Vendor ID	065A	
Product ID	A001	
NumLock/CapsLock control	Set when using NumLock/CapsLock	Initial value: No control
Data transmit speed	Use when outputting data with high speed.	Initial setting: 4 ms (Setting range 1 ms -16 ms)
Data transmit interval (Inter-character delay)	Use when data is missing.	Initial value: no interval
Suspend mode Remote wakeup	Use when host system is using suspend.	Initial value: Valid
Keyboard language	Set according to the keyboard language.	Initial value: English (USA)
Character code	Set according to reading symbol encode data.	Initial value: not use character code
Output mode	Set when outputting Chinese-character.	Initial value: output as it is

5.1.2 Connection Confirmation (USB-HID)

USB-HID operate just by connecting to the computer.
Following are the procedure to confirm connection.

For Windows 10

1. Connect the scanner to the PC.
2. Right-click "Windows icon" and select "Device Manager".
3. Open “Human interface device”.
   “USB input device” is added.
   (When using USB connection mouse or keyboard etc., multiple devices will be displayed.)



5.1.3 NumLock CapsLock control

Set NumLock and CapsLock control method when sending data.

Item	Command	Command description	Initial setting	Notes
NumLock control	RN	Numeric value does not use numeric keypad	✓	
	RM	Numeric value use numeric keypad		
	/A	Follow NumLock status		*1
CapsLock control	5Q	No control	✓	
	8A	Invert CapsLock status		*2
	2U	CapsLock automatic control		*3

*1. Only use numeric keypad when NumLock is ON.
*2. When starting transmits, send CapsLock and invert status. Use when CapsLock is always ON. Return to CapsLock status when sending is completed.
*3. Control CapsLock status to display as the original string. Return to original CapsLock status when transmit is complete.

5.1.4 **Data Output Speed (USB-HID)**

Adjust data output speed in USB-HID. Selecting shorter time will make output faster, but depend on host system, outputting all character may fail.
To enable this setting, reboot is necessary after saving the setting.

Item	Command			Command description	Default (Effective range)
USB-HID Data transfer interval	[E9M	Qa	Qb	Set transfer interval Interval: (10a+b) ms「Unit」	4 ms 1-16 ms

Setting example)
Set the transmit interval to 1 ms (fastest).
Command: [E9MQ1
Set the transmit interval to 10 ms.
Command: [E9MQ1Q0

5.1.5 **Inter Character Delay (USB-HID)**

The inter character delay introduces a configurable delay after each transmitted character.
This may be used if the host does not support flow control and is not capable of handling the received data at full speed.

Item	Command	Description	Default
Inter character delay	LA	No delay	✓
	LB	Delay = 1	
	LC	Delay = 2	
	LD	Delay = 3	
	LE	Delay = 4	
	LF	Delay = 5	
	LG	Delay = 6	
	LH	Delay = 7	
	LI	Delay = 8	
	LJ	Delay = 9	
	LK	Delay = 10	

5.1.6 **Keyboard Language**

Set the keyboard language used on the host PC which the scanner to be connect.
Keyboard arrangement differs depend on the country or language.
If setting is incorrect, output result will be output incorrect.

Item	Command	Description	Code page	Default
Keyboard Language	KE	USA	Windows 1252	✓
	KV	UK	Windows 1252	
	KG	German	Windows 1252	
	KI	French	Windows 1252	
	OW	Italian	Windows 1252	
	KJ	Spanish	Windows 1252	
	PH	Portuguese	Windows 1252	
	PL	Swiss French	Windows 1252	
	PK	Swiss German	Windows 1252	
	PI	Dutch	Windows 1252	
	PJ	Belgian	Windows 1252	
	PD	Swedish	Windows 1252	
	PG	Finnish	Windows 1252	
	KK	Danish	Windows 1252	
	PE	Norwegian	Windows 1252	
	WF	Czech	Windows 1250	
	[BAY	Hungarian	Windows 1250	
	[BPJ	Turkish	Windows 1254	
	[EF4	Russian English	Windows 1251	
	[EF5	Russian Cyrillic	Windows 1251	
	[BAZ	Brazilian	Windows 1252	
	[E76	Chinese	Windows 1252	
	[E77	Korean	Windows 1252	
	[E78	Taiwanese	Windows 1252	
	PM	Japanese	Shift-JIS	

5.1.7 **Trouble Shooting (USB-HID)**

Following are the countermeasures for the troubles caused at USB-HID.

Behavior	Check points / Countermeasures
Output is not correct Garbled characters	• Set the keyboard language and output destination application setting correctly. • In case the host side's processing speed is not sufficient, insert inter character delay. • If control string is included, confirm that Ctrl +"any alphabet key" do not overlap with the shortcut key on the host side.
Multi byte character is not outputted	• Please consider Windows application WIME with USB-COM. Refer to 5.2.6 
Line-break is doubled	• Set the suffix additional setting according to the host side application's line-break.
Cannot output images	• Cannot transfer images.
The scanner does not appear in Device Manager. Restart unexpectedly. Error beep sounds and does not output by reading	• Check that USB cable is properly connected. • Ensure that connected USB port is operating properly. • Confirm USB port power supply capability. If using laptop or hub, supply capacity might insufficient. • Remove from USB port at once, and after a while, insert again. • Insert to different port.
Does not start reading even trigger key is turned on.	• The trigger cannot be turned on until the connection between PC and USB is established. Please refer to above "The scanner does not appear in Device Manager".

5.2 **USB-COM**

This chapter explains USB-COM interface settings.

5.2.1 USB-COM Basic Information

5.2.2 Integration (USB driver)

5.2.3 Connection Confirmation (USB-COM)

5.2.4 Fixed UBS-COM Port

5.2.5 Connection Method

5.2.6 COM to HID Output

5.2.7 Trouble Shooting (USB-COM)

5.2.1 USB-COM Basic Information

Item	Description	Note
Transfer Speed	Full Speed USB 2.0 (FS mode)	
Required power supply capability	500 mA	Actual current value is different.
Vendor ID	065A	
Product ID	A002	
Other	CDC-ACM compliance	
Fixed COM number	Fixing COM number is possible.	Default: not fix

5.2.2 Integration (USB driver)

USB driver is required to connect to the PC via USB-COM interface.
Please download the USB driver from our website, and install appropriately according to the attached documents.

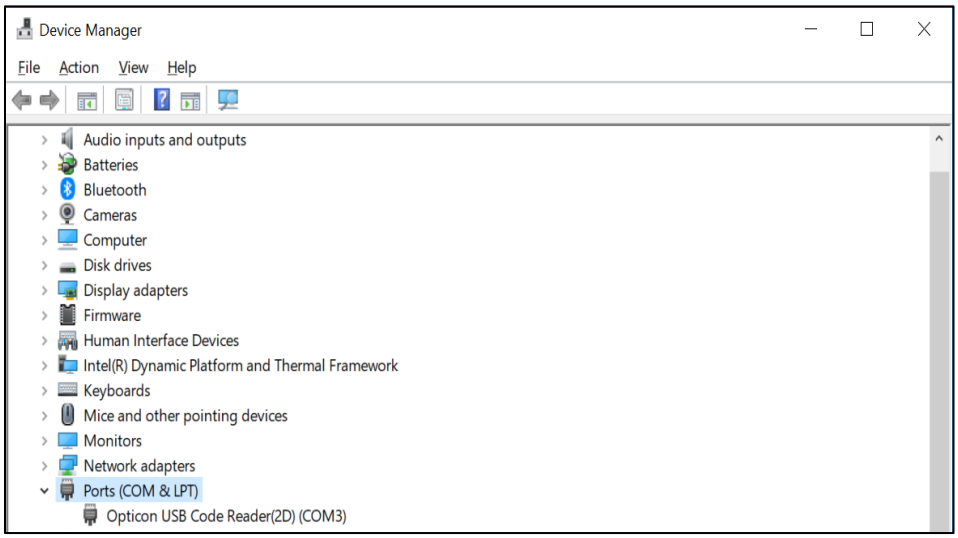
5.2.3 Connection Confirm

USB-COM interface, confirm the connection by following procedure.
For Windows 10
Install Opticon USB driver.

1. Connect the scanner to the PC.

2. Right-click "Windows icon" and select "Device Manager".

3. Open "Ports (COM & LPT)".



5.2.4 **Fixed USB-COM Port**

This option enables fixed USB-COM Port number. The COM port number to which the USB connected Windows PC is assigned will always be the same port number.

Item	Command		Description	Default
Fixed USB-COM Port number and driver selection	[EGC	Q0	Not to fix assigned COM port number	✓
		Q1	Fix assigned COM port number	

* Fixed USB-COM Port settings will become active after a reboot and initialization of the scanner.

5.2.5 **Connection Method**

Connect to the host PC by following procedure.
1. Start the tool to serial communicates (emulator or UniversalConfig).
2. Connect to the COM port confirmed at 5.2.3 Connection.

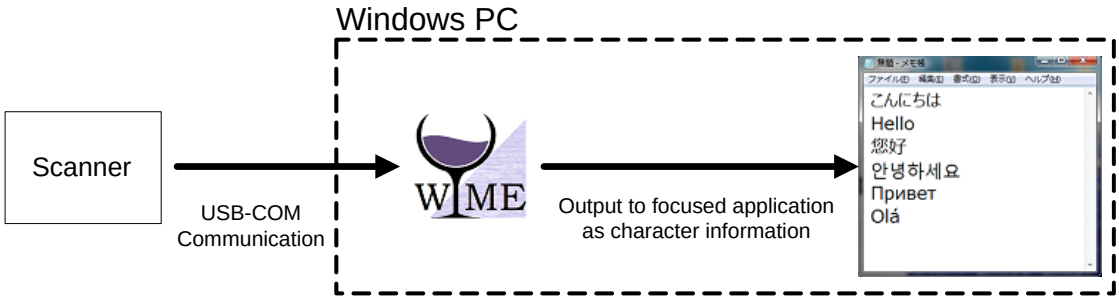


3. For Command packet, refer to 3.1.1.

5.2.6 **COM to HID Output**

WIME (Windows .NET Application) allows to convert data received by the scanner via virtual COM port (USB-COM) to HID-like and transfer to the application which has focus.

In case multi byte character is not output correctly with USB-HID, this can be solved by using WIME.



5.2.7 **Trouble Shooting (USB-COM)**

Following are the several countermeasures for the trouble caused by USB-COM.

Behavior	Check points / Countermeasures
Not recognized by the PC (Scanner does not appear in the device manager)	• Check that USB cable is properly connected. • Ensure that connected USB port is operating properly. • In case of connecting to wireless devices like Bluetooth, disconnect once. • Confirm the USB port power supply capability. When using laptop or hub, supply capacity may insufficient. • Remove from the USB port at once, and after a while, insert again. • Insert to different port.
Error beep sounds and does not output by reading	In addition to above; • Open the COM port with the communication tool.
Cannot connect (Cannot open COM port)	• Confirm the COM port number by device manager. Refer to 5.2.3 for how to check. • Close the tool and re-open it. Operation and countermeasures vary depending on the tool. Please refer to the tool help or manual. • Reboot the PC.
Garbled characters	• Confirm that code to be read matches to the character code of the communication tool.
Line-break is doubled	• Check the line-break setting of the communication tool.

5.3 **RS-232C**

This chapter explains RS-232C interface settings.

5.3.1 RS-232C Basic Information

5.3.2 Baud Rate (Transfer Speed)

5.3.3 Character Format

5.3.4 Handshaking (Flow Control)

5.3.5 Inter Character Delay (RS-232C)

5.3.6 Trouble Shooting (RS-232C)

5.3.1 **RS-232C Basic Information**

Following are the RS-232C interface basic information.

Item	Description	Default
Transfer speed	300 to 115200 bps	9600 bps
Data length	7/8 bits	8 bit
Parity bit	None/Even/Odd	None
Stop bit	1/2 bits	1 bit
Handshake	None, BUSY/READY, Modem, ACK/NAK	None
Other option	Flow control, Inter character delay	

5.3.2 **Baud Rate (Transfer Speed)**

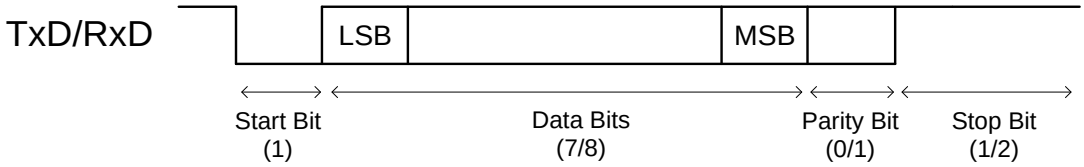
The baud rate is the rate at which bits are transmitted from the scanner to the host and vice versa. Both the scanner and the host must be set to the same baud rate.

The following commands can be used to configure the baud rate. "Z2" (safe settings in non-volatile memory) needs be used after these commands to activate and save the new configuration.

Item	Command	Description	Default	Remark
Baud rate	K1	300 bps		Enabled only with “Z2”
	K2	600 bps		
	K3	1200 bps		
	K4	2400 bps		
	K5	4800 bps		
	K6	9600 bps	✓	
	K7	19200 bps		
	K8	38400 bps		
	K9	57600 bps		
	SZ	115200 bps		

5.3.3 **Character Format**

The data characters are transferred in the format shown below. A party bit is added to every character so that the total number of 1's in the data bits, together with the parity bit, is odd for odd parity and even for even parity.



The following commands are provided to set the number of data bits, type of parity bit and the number of stop bits. The Z2 command (save settings in non-volatile memory) needs be used after these commands to activate and save the new configuration.

Item	Command	Description	Default	Remark
Data bit	L0	7 data bits		Enabled after sending "Z2"
	L1	8 data bits	✓	
Parity bit	L2	No parity	✓	
	L3	Even parity		
	L4	Odd parity		
Stop bit	L5	1 stop bit	✓	
	L6	2 stop bits		

5.3.4 **Handshaking (Flow Control)**

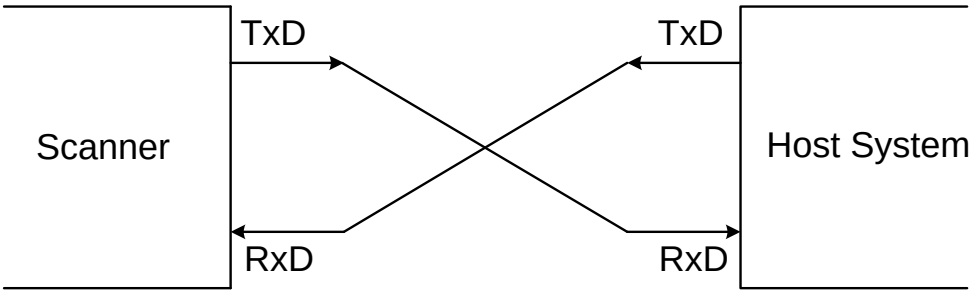
The communication control method can be set using these commands.
"Z2" (save command in non-volatile memory) needs be used after these commands to activate and save the new configuration.

Item	Command	Description	Default	Remark
Handshaking	P0	No handshake	✓	Enabled after sending "Z2"
	P1	Busy/ready		
	P2	Modem		
	P3	ACK/NAK		
	P4	ACK/NAK NO RESPONSE		

A) No Handshaking

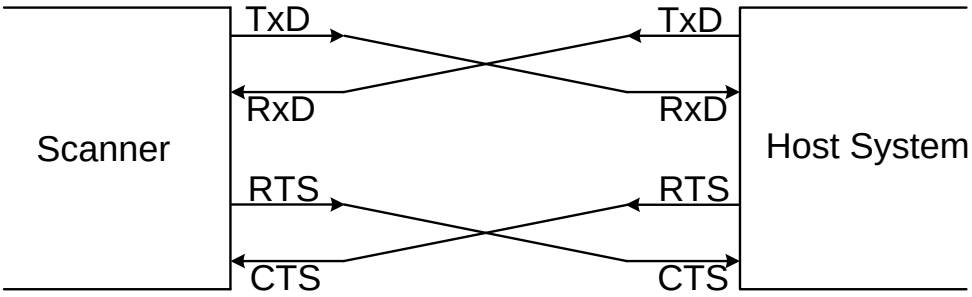
The scanner communicates regardless of the state of the host system.

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

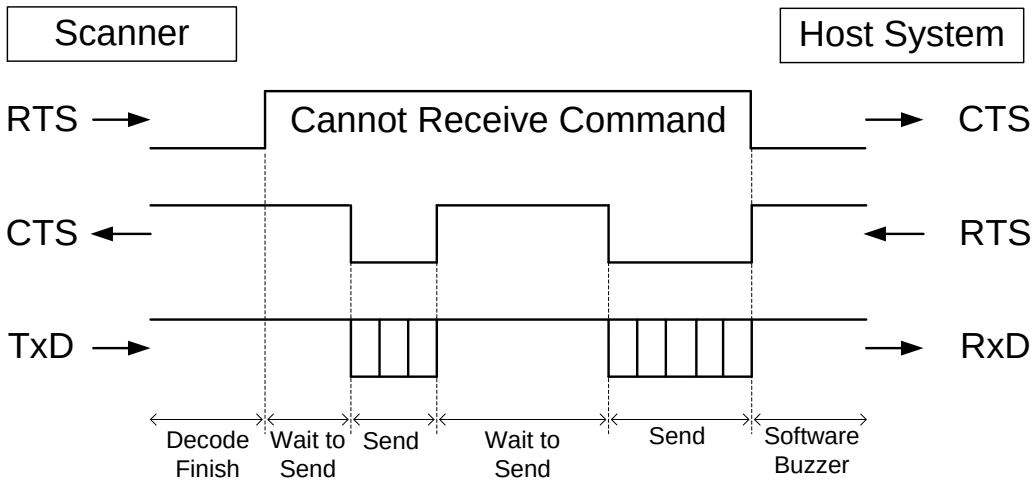


B) BUSY/READY

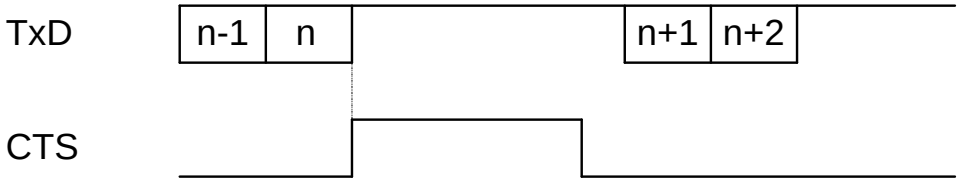
The scanner and the host system notify each other when they are ready to receive data (BUSY/READY) via their RTS line. When they are connected as shown in the figure below, the CTS line can be used to check if the other side is busy (off) or ready to receive data (on).



The scanner's RTS is normally on (so ready to receive data) except during the processing of received data, while transmitting data, and while it is busy processing 1D/2D menu codes. When the scanner wants to send data, it first will check if its CTS line is on (to be sure that the host is ready to receive data). If the CTS line is off, the scanner does not send the data but waits for a specific timeout period for the CTS line to be tuned on. If the CTS line is not turned on within the time specified, the data transmission will be aborted.



<CTS, TxD signal timing>
When the CTS line (RTS signal on the host side) is turned off during a TxD signal transmission, the scanner stops the transmission. When the CTS signal is turned on during signal transmission, characters will be transmitted.



The following menu codes / commands are provided for the CTS line timeout setting.
"Z2" (save settings in non-volatile memory) needs be used after these commands to activate and save the new configuration.

Item	Command	Description	Default	Remark
CTS timeout	I0	Flow Control timeout Indefinitely	✓	Enabled only with “Z2”
	I1	Flow Control timeout 100 ms		
	I2	Flow Control timeout 200 ms		
	I3	Flow Control timeout 400 ms		

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

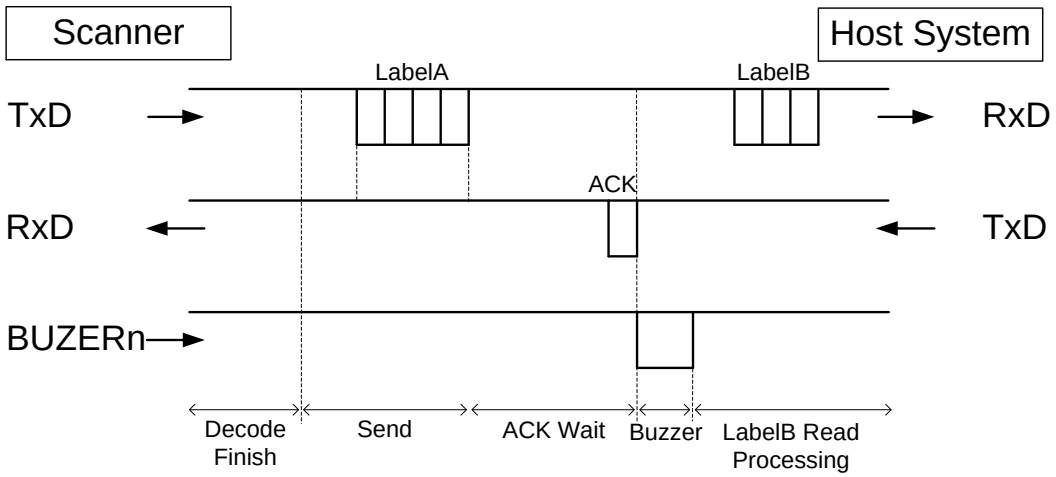
D) ACK/NAK Control
In ACK/NAK mode, the scanner will transmit data and expects to receive one of the following responses from the host:

Response: "ACK" (ASCII:0x06)
The scanner terminates transmission with the good-read buzzer.

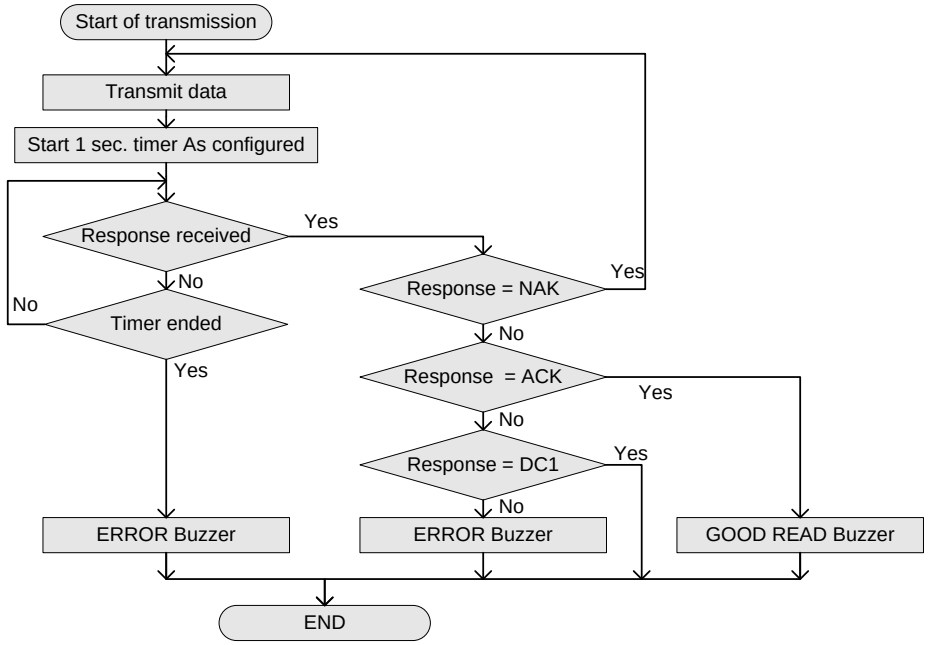
Response: "NAK" (ASCII:0x15)
The scanner sends the data again.

Response: "DC1" (ASCII:0x11)
The scanner terminates transmission without the good-read or error buzzer.

Timeout
If there is no response within 1 second, the scanner terminates transmission with the error buzzer.



<ACK/NAK Flow chart>



The following commands are provided for the setting ACK/NAK timeout.

Item	Command	Description	Default
ACK/NAK timeout	[XI4	ACK/NAK timeout Indefinitely	
	[XI5	ACK/NAK timeout 100 ms	
	[XI6	ACK/NAK timeout 500 ms	
	[XI7	ACK/NAK timeout 1 s	✓

E) ACK/NAK No Response

The difference from the ACK/NAK mode is that when no response from the host is received within 100ms, the scanner assumes that the data has been received correctly by the host.

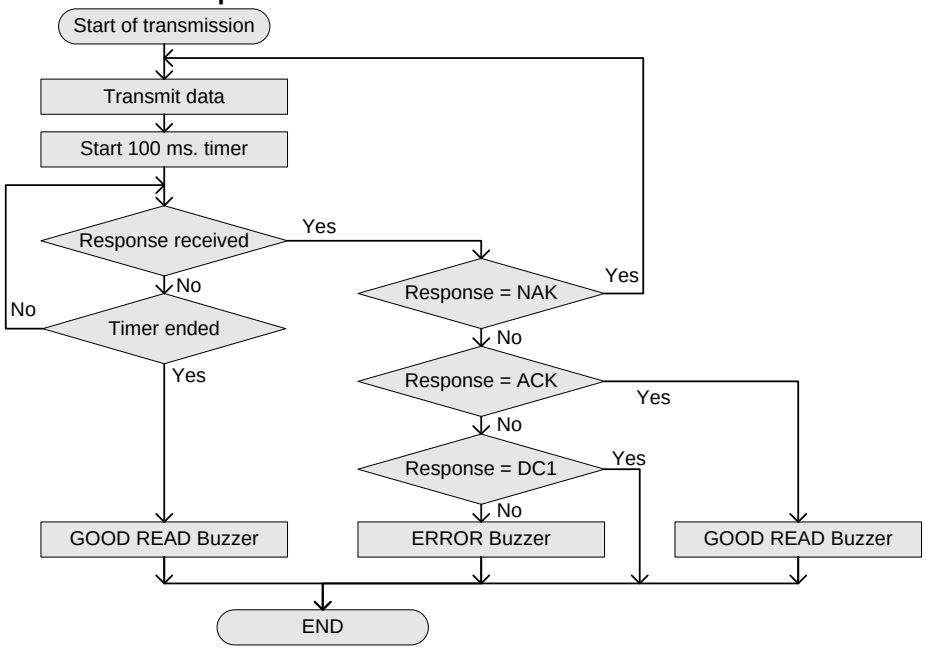
Response: "ACK" (ASCII:0x06)
The scanner terminates transmission with the good-read buzzer.

Response: "NAK" (ASCII:0x15)
The scanner sends the data again.

Response: "DC1" (ASCII:0x11)
The scanner terminates transmission without a good-read or error buzzer.

Timeout
If there is no response within 100 ms then the scanner terminates transmission with the good read buzzer.

<ACK/NAK No Response Flow Chart>



5.3.5 **Inter Character Delay (RS-232C)**

The inter character delay introduces a configurable delay after each transmitted character. This may be used if the host does not support flow control and is not capable of handling the received data.

The following menu codes / commands are provided for the inter character delay setting.

Item	Command	Description	Default	Remark
Inter character delay	KA	No delay	✓	Activated only after “Z2”
	KB	20 ms delay		
	KC	50 ms delay		
	KD	100 ms delay		

5.3.6 **Trouble Shooting (RS-232C)**

Following are the several countermeasures for the trouble caused by RS-232C

Behavior	Check points / Countermeasures
Cannot communicate No response when sending command	•Confirm communication settings (5.3.2 transfer speed, 5.3.3 character format etc.) •After changing communication setting, send Z2 command. Most of communication settings are not reflected until Z2 command is sent. •Confirm 5.3.4 handshake setting.
Garbled characters	•Confirm communication settings (5.3.2 transfer speed, 5.3.3 character format etc.) •Set the 5.3.5 inter-character delay according to the host PC’s processing speed. •Confirm that code to be read matches to the character code of the communication tool.
Line-break is doubled	•Check the line-break setting of the communication tool.

5.4 Common Settings

This section describes the settings common to all interfaces.

5.4.1 Data Buffer Mode

This option allows you to specify whether to read an object during data output.
When buffer mode is enabled, the scanner can perform other operations such as barcode scanning while outputting decoded data. However, the reading performance may degrade during the data output. When buffer mode is disabled, the scanner stops other operations until the completion of decoded data output.

The following menu codes / commands are provided for the data buffer mode setting.

Item	Command	Description	Default
Data buffer mode	[D80	Data buffer disable	
	[D81	Data buffer enable *	✓

* When handshaking is configured, this setting is ignored and Data Buffer Mode is disabled.

6 Code Options

This chapter describes the code options for the scanner.

These options allow you to configure the enabled code types, code specific options, and number of characters to be read.
It is strongly recommended to enable only the required codes and options for best reading performance. These settings do not affect the reading of the 1D menu codes.
*Refer 9.3 Sample codes for the codes.

6.1 Setting of Readable Codes

6.2 Setting of Code Common Options

6.3 Setting of Code Specific Option

6.4 Setting of Number of Characters

6.1 Setting of Readable Codes

The following tables show the supported symbologies and their configuration commands.

- **Single**
  Only the specified symbology will be enabled and all other symbologies will be disabled.
- **Multiple**
  The specified symbology will be enabled in addition to the already enabled symbologies.
- **Disable**
  The specified symbology will be disabled. All other enabled symbologies stay enabled.

6.1.1 1D Codes

Symbologies	Enable/Disable command			Default					
	Single	Multiple	Disable	Enable	Mini length	Positive Negative Image	ST/SP trans mission	CD check	Suffix
UPC	J1	R1	[X4B	✓	-	Positive Image Only	-	✓	USB-HID "ENTER" USB-COM RS-232C "CR"
UPC-A	[J1A	[R1A	[V1A	✓	-		-	✓	
UPC-E	[J1B	[R1B	[V1B	✓	-		-	✓	
EAN/JAN	J4	R4	[X4E	✓	-		-	✓	
EAN/JAN-13	JG	JU	[DDM	✓	-		-	✓	
EAN/JAN-8	JA	JO	[DDN	✓	-		-	✓	
Code 39	A2	B2	VB	✓	1		×	×	
Tri-Optic	JD	JZ	[DDJ	✓	-				
Codabar	A3	B3	VC	✓	2		×	×	
Industrial 2 of 5	J7	R7	[X4K	✓	5		-	×	
Interleaved 2 of 5	J8	R8	[X4L	✓	6		-	×	
S-Code	RA	R9	[DDK		5				
Code 128	A6	B6	VE	✓	1		-	✓	
Code 93	A5	B5	VD	✓	1		-	✓	
IATA	A4	B4	VH	✓	5		-	×	
MSI/Plessey	A7	B7	VF		3		-	✓	
UK/Plessey	A1	B1	VA		2		-	✓	
Telepen	A9	B9	VG		1		-	✓	
Code 11	[BLB	[BLC	[BLA		1		-	✓	
Matrix 2 of 5	AB	BB	[DDL		5		-	×	

* Refer to 6.2.1 for convert and Code 128 to GS1 128 and read.

6.1.2 **Postal Code**

Symbologies	Enable/Disable command			Default	
	Single	Multiple	Disable	Enable	Suffix
Chinese Post Matrix 2 of 5	JE	JS	JT		USB-HID “ENTER” USB-COM RS-232C “CR”
Korean Postal Authority	JL	WH	WI		
Intelligent Mail Barcode	[D5H	[D5F	[D5G		
POSTNET	[D6C	[D6A	[D6B		
PLANET	[DG2	[DG3	[DG4		
Japan Postal	[D5R	[D5P	[D5Q		
Netherland KIX Code	[D5M	[D5K	[D5L		
Australian Postal	[D6O	[D6M	[D6N		
UK Postal (Royal mail)	[DG7	[DG8	[DG9		
4-State Mailmark Barcode	[DGS	[DGT	[DGU		

6.1.3 **GS1 DataBar**

Symbologies	Enable/Disable command						Default	
	Single		Multiple		Disable		Enable	Suffix
GS1 DataBar • GS1 DataBar Omnidirectional • GS1 DataBar Truncated • GS1 DataBar Stacked • GS1 DataBar Stacked Omnidirectional	J9	[BC6	JX	[BCI	SJ	[BCU	✓	USB-HID “ENTER” USB-COM RS-232C “CR”
GS1 DataBar Limited	JJ		JY		SK		✓	
GS1 DataBar Expanded • GS1 DataBar Expanded • GS1 DataBar Expanded Stacked	JK		DR		SL		✓	

* Refer to 6.2.1 for convert GS1 and read.

6.1.4 **GS1 Composite Code**

Symbologies	Enable/Disable command		Default	
	Multiple	Disable	Enable	Suffix
Composite GS1 DataBar • CC-A • CC-B • Limited CC-A • Limited CC-B • Expanded CC-A • Expanded CC-B	[BHE	[BHF	✓	USB-HID “ENTER” USB-COM RS-232C “CR”
Composite GS1-128 • CC-A • CC-B • CC-C			✓	
Composite EAN • EAN-13 CC-A • EAN-13 CC-B • EAN-8 CC-A • EAN-8 CC-B	[D1V	[D1W		
Composite UPC • UPC-A CC-A • UPC-A CC-B • UPC-E CC-A • UPC-E CC-B				

*Refer to 6.2.1 for convert GS1 and read.
*When composite EAN or composite UPC is enabled, EAN or UPC only cannot be read.

6.1.5 **2D Codes**

Symbologies	Enable/Disable command			Default	
	Single	Multiple	Disable	Enable	Suffix
PDF417	[BC3	[BCF	[BCR	✓	USB-HID "ENTER" / USB-COM RS-232C "CR"
MicroPDF417	[BC4	[BCG	[BCS		
Codablock F	[D4R	[D4P	[D4Q		
QR Code	[BC1	[BCD	[BCP	✓	
Micro QR	[D38	[D2U	[D2V	✓	
Data Matrix (ECC 200)	[BC0	[BCC	[BCO	✓	
Aztec Code	[BC5	[BCH	[BCT	✓	
Aztec Runes	[BF4	[BF2	[BF3		
Chinese-sensible code	[D4K	[D4L	[D4M		
Maxi Code	[BC2	[BCE	[BCQ		

*Refer to 6.2.1 for convert and read GS1 QR code and GS1 Data Matrix.

6.1.6 **Other Options for Codes**

Symbologies	Single	Multiple	Disable	Remark
All codes (1D, 2D)	A0		B0	Excluding add-on
All 1D codes	[BCA	[BCM	[BCY	Excluding add-on
All 2D codes	[BCB	[BCN	[BCZ	*1, *2

*1 PDF417, Codablock F, QR Code, Data Matrix(ECC 200), Maxi Code, MicroPDF417, Aztec Code, Composite code, Aztec Runes, Micro QR and Chinese-sensible code
*2 When 'ALL 2D codes' is enabled, a link flag will be enabled, and UPC/EAN cannot be read.

6.1.7 **OCR**

ICAO Machine Readable Travel Documents Charts

Documents	Enable/Disable command			Default	
	Single	Enable	Disable	Enable	Suffix
Machine readable Passports	[DJ1	[DJ2	[DJ3		USB-HID "ENTER" / USB-COM RS-232C "CR"
Machine readable Visa-A	[DJ4	[DJ5	[DJ6		
Machine readable Visa-B	[DJ7	[DJ8	[DJ9		
Official Travel Documents 1	[DJA	[DJB	[DJC		
Official Travel Documents 2	[DJD	[DJE	[DJF		

* ICAO travel document can be read regardless of the image direction because the format is fixed.

OCR free edit
To free edit standard OCR font and read, refer to 6.2.7 OCR free edit.
For advanced setting, please check the separate sheet "Data Edit Programing Manual".

6.2 Setting of Code Common Options

6.2.1 GS1 Convert

FNC1 that indicate variable length termination will not be transmitted when reading GS1 symbol (GS1-128, GS1 DataBar, GS1 DataBar Composite, GS1 DataMatrix, GS1 QR Code) label with default setting. This is because FNC1 is not included in ASCII. For GS1 conversion, in order to analyses the GS1 data at the host side, convert valuable length data termination FNC1 to ”Ctrl+]” and key outputs for USB-HID, and for USB-COM and RS-232C, convert to GS(0x1D) and outputs. However, if the last of valuable length data is AI data, FNC1 does not exist and GS is not outputted.

<Initial setting status>

FNC1 (Non-output)	AI	Data (Fixed length)	AI Data (Variable length)	**FNC1 (Non-output)**	・・・	AI	AI Data (Variable length)

↓

＜GS1 after conversion＞

・For USB-HID

AIM-ID (output)	AI	Data (Fixed length)	AI Data (Variable length)	**Ctrl+]** (Key output)	・・・	AI	AI Data (Variable length)

・For USB-COM and RS-232C

AIM-ID (output)	AI	Data (Fixed length)	AI Data (Variable length)	**GS(0x1D)** (Output)	・・・	AI	AI Data (Variable length)

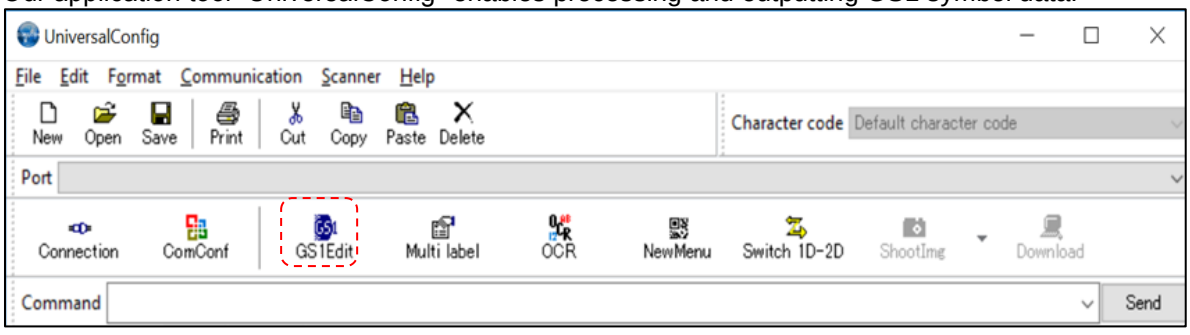
* For AIM-ID, refer to 9.1.2.

GS1 conversion setting can be set by following menu / command.

GS1 conversion supported symbologies	Item	Command	Command description	Initial setting
GS1-128 GS1 DataBar GS1 DataBar Composite GS1 Data Matrix GS1 QR Code	GS1 Convert	[X/0	Disable GS1 conversion	✓
		[X/4	Enable GS1 conversion	

■ To process and output GS1 conversion data within the scanner.

Our application tool “UniversalConfig” enables processing and outputting GS1 symbol data.



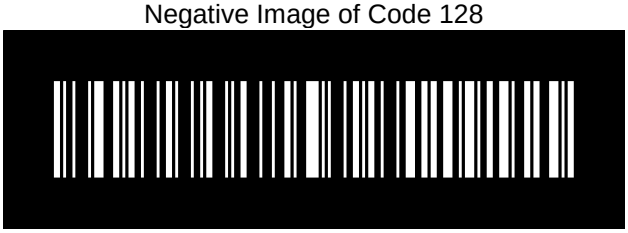
6.2.2 **Positive and Negative Image of Barcodes (1D code common)**

Normally, the barcode is printed in black on white background, but there a case with white on black background. Black on white background is called normal (positive) barcode and white on black background is called negative barcode.

Positive Image of Code 128



Negative Image of Code 128



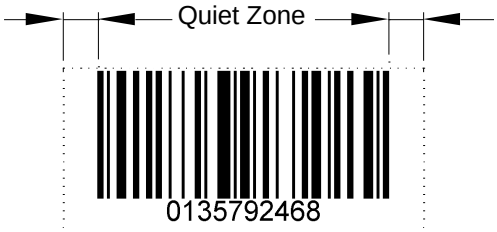
Following are the positive and negative barcode reading setting.

Code	Item	Command		Description	Default
1D	Positive and Negative Image of Barcodes	[DLA	Q0	Decode positive bar codes only.	✓
			Q1	Decode negative bar codes only.	
			Q2	Decode positive bar codes and negative bar codes.	

* It is strongly recommended to enable only the required codes and options for best reading performance.

6.2.3 **Quiet Zone (1D code common)**

This option allows the scanner to decode barcodes that have smaller start and/or end margins than standard for the symbologies. Note that this option may increase the possibility of partial and ghost reads, so do not use smaller margin checks unless necessary.



Item	Command	Description	Default
Margin check	YN	No margin check	
	YO	Margin check 1/7 nominal	
	YP	Margin check 2/7 nominal	
	YQ	Margin check 3/7 nominal	
	YR	Margin check 4/7 nominal	
	YS	Margin check 5/7 nominal	
	YT	Margin check 6/7 nominal	
	YU	Margin check nominal	✓

6.2.4 **Redundancy (1D code common)**

When redundancy is enabled, a 1D code has to be scanned and decoded multiple times and the results must be the same before it considered correctly decoded. The redundancy count is the number of times that the code has to be scanned in addition to the first scan. Selecting a higher redundancy count reduces the probability of reading errors, but it makes the output response slower. With high quality printed codes, the default setting is enough to ensure the reliability.

Item	Command	Description	Default
Redundancy (*)	X0	Read 1 time, redundancy = 0	
	X1	Read 2 time, redundancy = 1	
	X2	Read 3 time, redundancy = 2	
	X3	Read 4 time, redundancy = 3	✓
	BS	Read 5 time, redundancy = 4	
	BT	Read 6 time, redundancy = 5	
	BU	Read 7 time, redundancy = 6	
	BV	Read 8 time, redundancy = 7	
	BW	Read 9 time, redundancy = 8	

* This setting only affects the reading of 1D barcodes. 2D codes are not affected by this redundancy setting.

6.2.5 **Add-on waiting time**

The scanner search valid UPC/EAN add-on code within the selected time. If effective add-on code is found, scanner sends data immediately. If there is nothing after the code, scanner sends data without add-on. If there is something after the code, but not valid add-on code, reader ignores the code.
“Supported code”
• UPC 2 digits / 5 digits add-on and GS1 composition symbol
• EAN/JAN 2digits / 5 digits add-on and GS1 composition symbol.

Item	Command	Command description	Initial Setting
Add-on waiting time	XA	Add-on standby mode invalid	
	XB	Add-on standby mode 0.25 seconds	
	XC	Add-on standby mode 0.5 seconds	
	XD	Add-on standby mode 0.75 seconds	✓

6.2.6 **ECI Protocol Output**

This allows setting whether to output data relates to ECI (Extended Channel Interpretation) protocol which is within 2D code (QR code, Data Matrix, Aztec Code, Maxi Code) data.
For the data that ECI protocol exists, ECI number is indicated with a 6-digits number following the back-slack and 2 back-lash indicates back-slash.
To not to output ECI protocol, change the data career identifier to ID not using ECI protocol, delete the 6-digits number following the back-slash and replace the 2 back-slashes to 1 back-slash.

“Supported Code”
QR Code, Data Matrix, Aztec Code, Maxi Code

Output example)



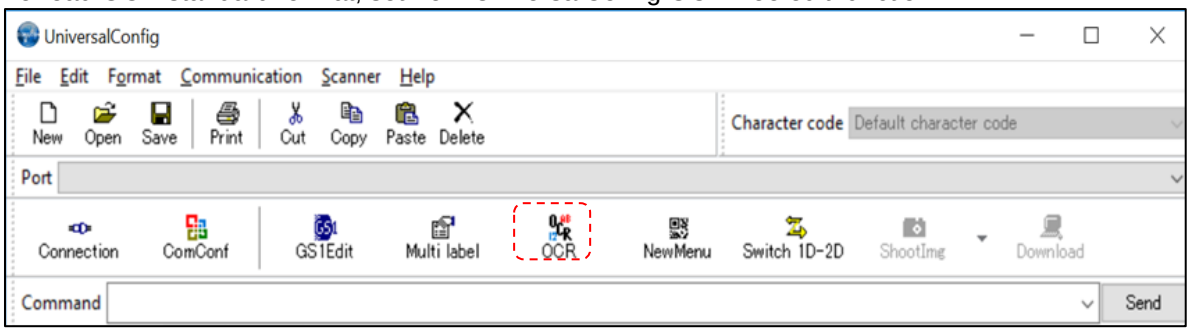
```
Output:         ]Q2\000001test\\test
Not output:     ]Q1test\test
*Back-slash: ’\’
```

Setting command are as follows;

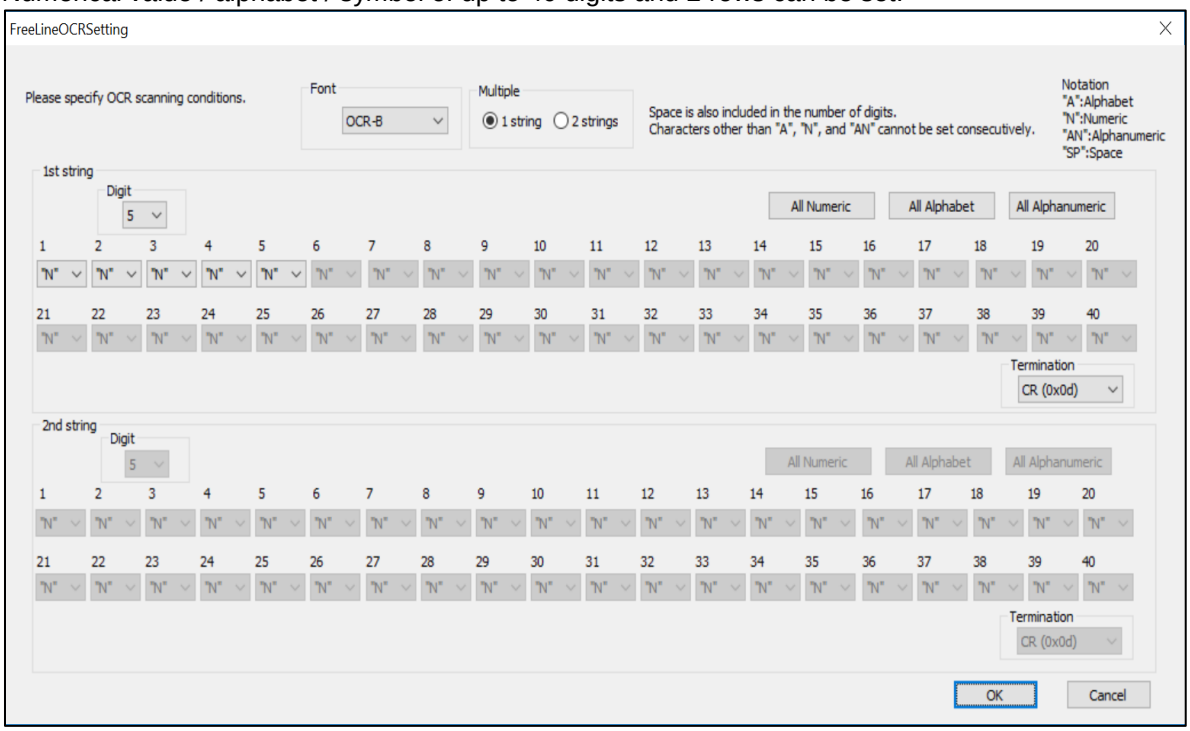
Item	Command	Description	Default
ECI protocol output setting	[DLE	Not output ECI protocol	✓
	[DLF	Output ECI protocol	

6.2.7 **OCR Free Edit**

To read OCR standard format, set from UniversalConfig OCR free edit function.



Numerical value / alphabet / symbol of up to 40 digits and 2 rows can be set.



* For advanced setting, please check the separate sheet “Data Edit Programing Manual”.
* Please contact to the sales offices for the items cannot set.

6.3 Setting of Code Specific Options

6.3.1 UPC

UPC code is a barcode for distribution industry established by the United States Uniform Code Council Inc.



UPC-A Overview

Following are the UPC-A configuration.

Item	Overview
Character set	Numeric (0-9)
Number of digits	12 digits (11 digits + CD 1 digit) fixed length
CD (check digit) check method	Modulus 10 / Wait 3

Transfer data format

Leading "0"	Data 11 digits	CD 1 digit

*Setting to 13 digits transfer data format that transfer a leading “0” and CD, the format becomes compatible with JAN / EAN-13.

● **Setting items**

UPC-A Add-on 2 digits / 5 digits

UPC-A add-on 2 digits / 5 digits is a barcode of UPC-A plus 2 digits or 5 digits supplement code.

* When Add-on is enabled, 2D scanner needs Add-on code to be within the read range or fails to read.
  If it is not within the range, after Add-on waiting time, it reads as UPC or EAN.
  When Add-on is enabled and reading only UPC/EAN, **reading response will decrease**.

Transfer data format (UPC-A Add-on 2 digits)

Leading "0"	Data 11 digits	CD 1 digit	Add-on 2 digits

Transfer data format (UPC-A Add-on 5 digits)

Leading "0"	Data 11 digits	CD1 digit	Add-on 5 digits

UPC-A CD transfer / front “0” transfer

This allows you to set whether or not to transmit CD (check digit) and a leading “0”.
The 13 digits transfer data format that transfer a leading “0” and CD, the format becomes compatible with JAN / EAN-13.

UPC-E Overview



Following are the UPC-E configuration.

Item	Overview
Character set	Numeric (0-9)
Number of digits	7 digits (6 digits + CD 1 digit) fixed length
CD (check digit) check method	Modulus 10 / Wait 3

Transfer data format

Leading "0"	Data 6 digits	CD 1 digits

UPC-E Add-on 2 digits / 5 digits
UPC-E Add-on 2 digits / 5 digits is a barcode of UPC-E plus 2 digits or 5 digits supplement code.

Transfer data format (UPC-E Add-on 2 digits)

Leading "0"	Data 6 digits	CD 1 digit	Add-on 2 digits

Transfer data format (UPC-E Add-on 5 digits)

Leading "0"	Data 6 digits	CD 1 digit	Add-on 5 digits

UPC-E CD transfer / front “0” transfer
This allows you to set whether or not to transmit CD (check digit) and a leading “0”.
The 8 digits transfer data format that transfer a leading “0” and CD, the format becomes compatible with JAN / EAN-8.

Convert UPC-E to UPC-A format and transfer
Transfer setting to UPC-A format is possible.

Code	Item	Command	Description	Default
UPC-A	UPC-A Leading zero CD transmission	E2	UPC-A, Leading zero, transmit CD	
		E3	UPC-A, No leading zero, transmit CD	✓
		E4	UPC-A, Leading zero, not transmit CD	
		E5	UPC-A, No leading zero, not transmit CD	
	Add-on 2 digits	J2	Enable single UPC Add-on 2	
		R2	Enable UPC Add-on 2	
		[X4C	Disable UPC Add-on 2	✓
	Add-on 5 digits	J3	Enable single UPC Add-on 5	
		R3	Enable UPC Add-on 5	
		[X4D	Disable UPC Add-on 5	✓
UPC-E	UPC-E Leading zero CD transmission	E6	UPC-E , Leading zero, transmit CD, transfer digits 8 digits	
		E7	UPC-E , No leading zero, transmit CD, transfer digits 7 digits	✓
		E8	UPC-E , Leading zero, not transmit CD, transfer digits 7 digits	
		E9	UPC-E , No leading zero, not transmit CD, transfer digits 6 digits	
	UPC-A, E conversion	6Q	Transmit UPC-E	✓
		6P	Transmit as UPC-A	

6.3.2 **EAN/JAN**

EAN/JAN-13 and EAN/JAN-8 are standardized as common product symbol in the distribution industry. There are 13 digits standard version and 8 digits shorten version.

EAN/JAN-13 Overview



Following are the EAN/JAN-13 configuration.

Item	Overview
Character set	Numeric (0-9)
Number of digits	13 digits (12 digits + CD1 digit) fixed length
CD (check digit) check method	Modulus 10 / Wait 3

Transfer data format

Data 12 digits	CD 1 digit

● **Setting items**

EAN/JAN-13 Add-on 2 digits / 5 digits
EAN/JAN-13 Add-on 2 digits / 5 digits is the barcode of EAN/JAN -13 plus 2 digits or 5 digits supplement code.
* When Add-on is enabled, 2D scanner needs Add-on code to be within the read range or fails to read. If it is not within the range, after Add-on waiting time, it reads as UPC or EAN. When Add-on is enabled and reading only UPC/EAN, **reading response will decrease**.

Transfer data format (EAN/JAN -13 Add-on 2 digits)

Data 12 digits	CD 1 digit	Add-on 2 digits

Transfer data format (EAN/JAN -13 Add-on 5 digits)

Data 12 digits	CD 1 digit	Add-on 5 digits

EAN/JAN -13 CD transfer
Whether to transfer EAN/JAN-13 CD (check digit) or not is configurable.

EAN-13 forced add-on setting
EAN-13 with a leading 3 digits 378/379/529/414/419/434/439/977/978 can be forcibly handles as “with add-on”. When enabled, the barcode without the add-on which is the condition of a leading 3 digits cannot be read.

ISBN conversion
When ISBN conversion is enabled, it converts the data with a leading “978” or “979” of EAN-13.
ISBN conversion re-calculates the CD by omitting a leading 3 digits and outputs it in 10 digits. If CD is 10, it outputs X.
Example) ISBN conversion of EAN-13 “9791230671184”; converts it to “1230671188” and outputs it.
ISBN conversion of EAN-13 “9780123782830”; converts it to “012378283X” and outputs it.

ISSN conversion
When ISSN conversion is enabled, it converts data with a leading “977” of EAN-13.
ISSN conversion will re-calculate CD by omitting leading 3 digits and outputs it in 8 digits.

ISMN conversion
When ISMN conversion is enabled, it converts data with a leading “9790” of EAN-13.
ISMN conversion will convert a leading 4 digits to “M” and outputs it in 10 digits.
When ISMN conversion is disabled and ISBN conversion is enabled, EAN-13 with a leading “9790” will be converted to ISBN format.
Example) ISMN conversion of EAN-13 “9790230671187”; converts it to “M230671187” and outputs it.

EAN/JAN-8 Overview



Following are the EAN/JAN-8 configuration.

Item	Overview
Character set	Numeric (0-9)
Number of digits	8 digits (7 digits + CD1 digit) fixed length
CD (check digit) check method	Modulus 10 / Wait 3

Transfer data format

Data 7 digits	CD 1 digit

● **Setting items**

EAN/JAN -8 Add-on 2 digits / 5 digits

EAN/JAN-8 Add-on 2 digits / 5 digits is the barcode of EAN/JAN-8 plus 2 digits or 5 digits supplement code.

*When Add-on is enabled, 2D scanner needs Add-on code to be within the read range or fails to read. If it is not within the range, after Add-on waiting time, it reads as UPC or EAN.

When Add-on is permitted and reading only UPC/EAN, **reading response will decrease**.

Transfer data format (EAN/JAN-8 Add-on 2digits)

Data 7 digits	CD 1 digit	Add-on 2 digits

Transfer data format (EAN/JAN-8 Add-on 5 digits)

Data 7 digits	CD 1 digit	Add-on 5 digits

EAN/JAN -8 CD transfer

Whether to transfer EAN/JAN-8 CD (check digit) or not is configurable.

Following are EAN/JAN-13 optional settings.

Symbologies	Item	Command	Description	Default
EAN/JAN-13	CD Transmission	6K	Transmit EAN/JAN -13 CD	✓
		6J	Not transmit EAN/JAN-13 CD	
	Add-on 2 digits	JH	Singly enable EAN/JAN -13 Add-on 2 digits	
		JV	Add enable EAN/JAN -13 Add-on 2 digits	
		[X4N	Disable EAN/JAN -13 Add-on 2 digits	
	Add-on 5 digits	JI	Singly enable EAN/JAN -13 Add-on 5 digits	
		JW	Add enable EAN/JAN -13 Add-on 5 digits	
		[X4P	Disable EAN/JAN -13 Add-on 5 digits	
EAN -13	EAN-13 Forced add-on	-G	When EAN-13 start at 378/ 379 / 529; Enable EAN forced add-on	
		-H	When EAN-13 start at 378/ 379 / 529; Disable EAN forced add-on	✓
		-C	When EAN-13 start at 434 / 439 / 414 / 419 / 977 / 978; Enable EAN forced add-on	
		-D	When EAN-13 start at 434 / 439 / 414 / 419 / 977 / 978; Disable EAN forced add-on	✓
	ISBN Conversion	IB	Disable ISBN conversion	✓
		IA	Enable ISBN conversion	
		IK	When possible, enable ISBN conversion	
	ISSN Conversion	HN	Disable ISSN conversion	✓
		HO	Enable ISSN conversion	
		4V	When possible, enable ISSN conversion	
	ISMN Conversion	IO	Disable ISMN conversion	✓
		IP	Enable ISMN conversion	
		IQ	When possible, enable ISMN conversion	

Following are EAN/JAN-8 option al settings.

Symbologies	Item	Command	Description	Default
EAN/JAN-8	CD Transmission	6I	Transmit EAN/JAN-8 CD	✓
		6H	Not transmit EAN/JAN-8 CD	
	Add-on 2 digits	JB	Singly enable EAN/JAN-8 Add-on 2 digits	
		JP	Add enable EAN/JAN-8 Add-on 2 digits	
		[X4M	Disable EAN/JAN-8 Add-on 2 digits	
	Add-on 5 digits	JC	Singly enable EAN/JAN-8 Add-on 5 digits	
		JQ	Add enable EAN/JAN-8 Add-on 5 digits	
		[X4O	Disable EAN/JAN-8 Add-on 5 digits	

6.3.3 Code 39 and It. Pharm (Code 32)

Code 39 is a barcode developed by Intermec and has been standardized as ISO/IEC 16388. It is mainly used in the industrial fields.

Code39 Overview



Following are the Code 39 configuration.

item	Overview
Character set	Numeric (0-9) Symbol (- , Space $ / + %) Alphabet (A-Z)
Start / Stop code	*
Digits	Variable length

Transfer data format

Start code “*”	Data Variable length	CD	Stop code “*”

● **Setting items**

Calculate Code 39 CD

Whether to check CD (check digit) or not is configurable.

Transfer Code 39 CD

Whether to transfer CD (check digit) or not is configurable.

Transfer Code 39 Start / Stop Code

Whether to transfer Start / Stop code or not is configurable.

Code 39 Various Conversion Settings

Standard Code39:

Send data character as it is.

Full ASCII Code39:

This setting converts the correct combination of the data character to Full ASCII and transmits it.
If an incorrect combination is found in the character, it will not be transmitted.

When possible Full ASCII Code39:

This setting converts the specified combination of the data character to Full ASCII and transmits it.
Incorrect combination will be transmitted without converting, as it is.

Italian Pharmaceutical:

This setting converts Code39 data to Italian Pharmaceutical format.
Italian Pharmaceutical format is a fixed length containing 1 digit of mandatory check digit after 8 digits numeric data.
When not adapting to Italian Pharmaceutical, it will not be sent.

When possible Italian Pharmaceutical:

This setting convert converts Code39 data to Italian Pharmaceutical format.
When not adapting to Italian Pharmaceutical, it will be send with standard Code39 etc.

Code 39 Optional setting are as follows.

Code	Item	Command	Description	Default
Code 39 It. Pharm (Code 32)	CD check	C1	Not check CD	✓
		C0	Check CD	
	CD transmission	D9	Transmit Code39 CD	✓
		D8	Not transmit Code39 CD	
	ST/SP transmission	D1	Not transmit ST/SP	✓
		D0	Transmit ST/SP	
	Full ASCII conversion	D5	Normal Code 39	✓
		D4	Full ASCII Code 39	
		+K	Full ASCII Code 39 if possible	
	It. Pharm	D6	It. Pharmaceutical only	
		D7	It. Pharmaceutical if possible	
		DA	Not transmit leading A for It. Pharm	✓
		DB	Transmit leading A for It. Pharm	
	Concatenation	+M	Disable concatenation	✓
		+L	Enable concatenation	

6.3.4 **Codabar**

Codabar is relatively early stage barcode developed by Monarch Marking Company in 1972 following 2 of 5.

Codabar Overview



Following are the Codabar configuration.

Item	Overview
Character set	Numeric (0-9) Symbol (- $: / , +)
Start / Stop code	A, B, C, or D
Digits	Variable length
CD (check digit) check method	Check digits are not much used in general.

Transfer data format

Start code 1 digit	Data Variable length	CD	Stop code 1 digit

● **Setting items**

Codabar (NW-7) read mode

Standard mode:
It consists of 1 barcode.

ABC mode:
ABC is an acronym of American Blood Commission.
It consists of 2 side by side barcodes. (Margin is necessary.)
When the barcode's first stop character and the second start character is D, it will be concatenated and sent. Two D character will not be sent.

CX mode:
It consists of 2 side by side barcodes. (Margin is necessary.)
When the barcode's first stop character is C and the second start character is B, it will be concatenated and sent. B and C character will not be sent.

Codabar CD check
In Codabar, Modulus 16 is generally used.

Codabar CD transfer
Whether to transfer CD (check digit) or not is configurable.

Start / Stop code transfer
Whether to transfer start / stop code or not is configurable. Also, it can convert the code and transfers when transferring start / stop code.

Codabar option settings are as follows.

Code	Item	Command	Description	Default
Codabar	CD check	H7	Not check CD	✓
		H6	Check CD	
	CD transmission	H8	Transmit Codabar CD	✓
		H9	Not transmit Codabar CD	
	ST/SP transmission	F0	Not transmit Start / Stop code	✓
		F1	Start / Stop code: ABCD/TN*E	
		F2	Start / Stop code: abcd/tn*e	
		F3	Start / Stop code: ABCD/ABCD	
		F4	Start / Stop code: abcd/abcd	
		HJ	Start / Stop code: <DC1><DC2><DC3><DC4> /<DC1><DC2><DC3><DC4>	
	Space insertion	HE	Disable space insertion	✓
		HD	Enable space insertion	
	ABC, CX conversion	HA	Enable only Codabar normal mode	✓
		H4	Enable only ABC code	
		H5	Enable only CX code	
		H3	Enable Codabar / ABC and CX	

6.3.5 Interleaved 2 of 5 and S-Code

Interleaved 2 of 5 is a symbol standardized by ISO/IEC 16390 as the standard distribution symbol ITF.

Interleaved 2 of 5 Overview



Following are the Interleaved 2 of 5 configurations.

Item	Overview
Character set	Numeric (0-9)
Start / Stop code	Hidden character
Digits	Variable length (even number)
CD (check digit) check method	Modulus 10 / Wait 3

Transfer data format

Data variable length	CD

● Setting items

Interleaved 2 of 5 CD check

Whether to check CD (check digit) or not is configurable. This setting also configures Interleaved 2 of 5, Industrial 2 of 5, S-Code and Matrix 2 of 5 CD check or not.

Interleaved 2 of 5 CD transmit

Whether to transfer CD (check digit) or not is configurable. This setting also configures Interleaved 2 of 5, Industrial 2 of 5, S-Code and Matrix 2 of 5 CD transfer or not.

Industrial 2 of 5 space check

Whether to enable / disable the space (inter-character gap) check of Industrial 2 of 5 which has large or irregular spaces can be set.

Following are the Interleaved 2 of 5 and Industrial 2 of 5 optional setting.

Code	Item	Command	Description	Default
Interleaved 2 of 5 S-Code	CD check	G0	Not check CD	✓
		G1	Check CD	
	CD transmission	E0	Transmit CD	✓
		E1	Not transmit CD	
	Space check	GK	Disable space check for Industrial 2 of 5	
		GJ	Enable space check for Industrial 2 of 5	✓
	S-Code conversion	GH	Not transmit S-Code as Interleaved 2 of 5	✓
		GG	Transmit S-Code as Interleaved 2 of 5	

6.3.6 **Code128**

Code128 is developed by Computer Identix Inc. in the USA in 1981.
Code128 is a symbol standardized as USS-CODE128. Because it can encode ASCII128 characters, it is called Code128.

Code128 Overview



Following are the Code128 configuration.

Item	Overview
Character set	ASCII128 character Function character (FNC1-4) Code set selection character (A, B, C and Shift)
Start / Stop code	Hidden character Start pattern 3 types (A,B and C), Stop pattern 1 type
Digits	Variable length
CD (check digit) check method	Modulus 103

Transfer data format

Data (variable length)

● **Setting items**
GS1 conversion
Disable / Enable GS1-128 GS1 conversion is configurable.
Refer to 6.2.1 for setting detail.

Concatenation of Code 128
When Code128 data's leading is FNC2 character, concatenate or not can be set.
Reading the barcode that contains FNC2 character in leading of Code128 data, concatenate the data by omitting the leading FNC2.
When reading the barcode that does not contains FNC2 character in leading of Code128, it concatenates the data to the end of data that is buffering to the scanner, and send entire buffer.
The reading time is updated every time 1 label is read, but if the reading is not completed within the reading time, the buffered data will be discarded.
The maximum number of character that can be concatenated at a time is 400 characters.

Following are the Code 128 optional setting.

Code	Item	Command	Description	Default
Code 128	GS1 conversion	OF	Disable GS1-128	✓
		JF	Enable GS1-128 only	
		OG	Enable GS1-128 if possible	
	Concatenation	MP	Disable concatenation	✓
		MO	Enable concatenation	

6.3.7 **IATA**

Code	Item	Command	Description	Default
IATA	CD check	4H	Not check CD	✓
		4I	Check FC / SN only	
		4J	Check FC / CPN / SN	
		4K	Check FC / CPN / AC / SN	
	CD transmission	4M	Not transmit CD	
		4L	Transmit CD	✓

6.3.8 **MSI/Plessey**

Code	Item	Command	Description	Default
MSI/ Plessey	CD check	4A	Not check CD	
		4B	Check 1 CD = MOD 10	✓
		4C	Check 2 CD = MOD 10/MOD 10	
		4D	Check 2 CD = MOD 10/MOD 11	
		4R	Check 2 CD = MOD 11/MOD 10	
		4S	Check 2 CD = MOD 11/MOD 11	
	CD transmission	4G	Not transmit CD	
		4E	Transmit CD 1	✓
		4F	Transmit CD 1 and CD 2	

6.3.9 **UK/Plessey**

Code	Item	Command	Description	Default
UK/ Plessey	CD transmission	4O	Not transmit CD	
		4N	Transmit CD	✓
	Space insertion	DO	Disable space insertion	✓
		DN	Enable space insertion	
	X conversion	DP	Conversion A -> X disable	✓
		DQ	Conversion A -> X enable	

6.3.10 **Telepen**

Code	Item	Command	Description	Default
Telepen	Conversion output mode	D2	Numeric mode	✓
		D3	ASCII mode	

6.3.11 **Code 11**

Code	Item	Command	Description	Default
Code 11	CD check	[BLF	Not check CD	
		[BLG	Check 1CD	
		[BLH	Check 2CD	
		[BLI	Check auto 1 or 2 CD	✓
	CD transmission	[BLJ	Not transmit CD	✓
		[BLK	CD transmit	

6.3.12 **Korean Postal Authority**

Code	Item	Command	Description	Default
Korean Postal Authority code	CD transmission	*+	CD transmit	
		*-	Not transmit CD	✓
	Transmit dash	*.	Transmit dash	✓
		*/	Not transmit dash	
	Upside down reading	*9	Upside down reading enabled	
		*8	Upside down reading disabled	✓

6.3.13 **GS1 DataBar**

GS1 DataBar (formerly RSS) is a symbol developed close to GS1, and has 3 types 7 kinds and is a relatively new symbol. GS1 DataBar has characteristics of being able to express it in a smaller space. It is a symbol standardized by ISO/IEC 24724:2011.

GS1 DataBar Overview



Following are the GS1 DataBar configuration.

Item	Overview
Character set	GS1 DataBar Omnidirectional and GS1 DataBar Limited: Numeric (0-9) GS1 DataBar Expanded: capital / small character alphabet, numbers, 20 types symbol, function character (FNC1)
Digits	GS1 DataBar Omnidirectional and GS1 DataBar Limited: Application identifier ”01” and 14 digits GS1 DataBar Expanded: number 74 digits and alphabet 41 digits
Check sum	Check sum is always checked, but not sent. GS1 DataBar Omnidirectional: Modulus 79 GS1 DataBar Limited: Modulus 89 GS1 DataBar Expanded: Modulus 211
CD check	GS1 DataBar Omnidirectional and GS1 DataBar Limited: Modulus 10/ Wait 3

Transfer data format (GS1 DataBar Omnidirectional, GS1 DataBar Limited)

AI “01”	Data (13 digits)	CD (1 digit)

Transfer data format (GS1 DataBar Expanded)

Data (1-74 digits)

● **Setting items**
GS1 conversion
Disable / Enable GS1 DataBar’s GS1 conversion is configurable.
Refer to 6.2.1 for setting detail.

6.3.14 **Composite GS1 DataBar**

Composite GS1 symbol is a code developed by GS1 for medical use and standardized by ISO/IEC 24723. Indicate symbol composite to GS1 DataBar, GS1-128 and UPC/EAN. In the market, other than Composite GS1 DataBar is not much used.

Composite GS1 DataBar Overview



Following are the Composite GS1 configuration.

Item	Overview
Character set	ASCII value 0-127 (ISO 646) ASCII value 128-255 (ISO 8859, Alphabet No.1, Extend ASCII) Using ECI: many other character sets
Composite	CC-A is a revised version of MicroPDF417. CC-B is normal MicroPDF417. CC-C is normal PDF417.
Maximum digits	CC-A: 56 character CC-B: 338 character CC-C: 2361 character
Symbol size	1D part: refer to GS1 DataBar and UPC/EAN Composite part: CC-A and CC-B are same as MicroPDF417. CC-C is same as PDF417
Error correction	1D part: error detection only Composite par: Reed Solomon error correction
Link flags	GS1 DataBar and GS1 128 composite have link flags. UPC/EAN composite does not have link flags.

Transfer data format (CC-A)

1D data (1-74 digits)	Composite data (1-56 digits)

Transfer data format (CC-B)

1D data (1-74 digits)	Composite data (1-338 digits)

Transfer data format (CC-C)

1D data (1-74 digits)	Composite data (1-2361 digits)

● **Setting item**
GS1 conversion
Disable/enable GS1 conversion of Composite GS1 DataBar by setting.
Refer to 6.2.1 for details.

6.3.15 **PDF 417**

PDF417 is a stack type code developed by Symbol Technology Inc., and is used for international logistics, ID card (overseas) and parts label etc. PDF417 is a symbol standardized also in ISO/IEC 15438:2006.

PDF417 Overview



Following are the PDF417 configuration.

Item	Overview
Character set	ASCII value 0-127 (ISO 646) ASCII value 128-255 (ISO 8859-1, Alphabet No.1, Extended ASCII) For MicroPDF 417: many other character sets
Maximum digits (PDF417)	Text compression: 1850 character Byte compression: 1108 character Numeric compression: 2710 character
Maximum digits (MicroPDF417)	Text compression: 250 character Byte compression: 150 character Numeric compression: 366 character
Symbol size (PDF417)	Number of lines: 3-90 Number of rows: 1-30
Symbol size (MicroPDF417)	Number of lines: 4-44 Number of rows: 1-4
Error correction (PDF417)	Error correction level 8. The option for error detection only.
Error correction (MicroPDF417)	Number of code words for error correction is fixed by the symbol and cannot be changed.

Transfer data format

Data (variable length)

● **Setting item**
MicroPDF417, default is invalid.
To enable the setting, refer to 6.1.5.

6.3.16 QR Code

QR code is a matrix type 2D barcode developed by DENSO WAVE INC., and has characteristics of high speed reading and is used in a wide range of fields. QR code is a symbol standardized to SO/IEC 18004:2000.

QR Code Overview



Following are the QR code configuration.

Item	Overview
Character set	1) Numeric data (Numbers 0-9) 2) Alphanumeric data (Numbers 0-9, Capital letter A-Z, 9 special characters: space, $, %, *, +, -, ., /, :) 3) 8 bit byte data (Latin character based on JIS X 0201, character set of 8 bit code for Katakana character.) 4) Chinese character (Character specified by the shift-coded expression of JIS X 0208)
Maximum digits	Alphanumeric data: 4296 character 8 bit data: 2953 character Numeric data: 7089 character Chinese character data: 1817 character
Symbol size	Minimum: 21 x 21 module Maximum: 177 x 177 module
Error correction	Reed Solomon error correction level 4 L:7% M:15% Q:25% H:30%
Negative barcode, mirror printing	Negative and mirror printed QR code are readable.
Concatenated code	Outputs after reading all concatenated codes.

Transfer data format

Data (variable length)

● **Setting item**

GS1 conversion

Disable/enable GS1 QR code conversion by setting.
Refer to 6.2.1 for setting detail.

ECI protocol output

Enable/disable output of QR code ECI protocol data by setting.
Refer to 6.2.6 for setting detail.

Micro QR code overview



Following are the Micro QR code configuration.

Item	Overview
Character set	1) Numeric data (numbers 0-9) 2) Alphanumeric data (numbers 0-9, capital characters A-Z, 9 special characters: space, $, %, *, +, -, ., /, :) 3) 8 bit byte data (Latin character based on JIS X 0201, character set of 8 bit code for Katakana character.) 4) Chinese character (Character specified by the shift-coded expression of JIS X 0208)
Maximum digits	Alphanumeric data: 21 character 8 bit data: 15 character Numeric data: 35 character Chinese character data: 9 character
Symbol size error correction	Version M1: 11 x 11 module – Error detection only Version M2: 13 x 13 module – Reed Solomon error correction 2 steps(L, M) Version M3: 15 x 15 module – Reed Solomon error correction 2 steps(L, M) Version M4: 17 x 17 module – Reed Solomon error correction 3 steps (L, M, Q)
Negative barcode, mirror printing	Negative and mirror printed QR code are readable

Transfer data format

Data (variable length)

● **Setting item**
None in particular

6.3.17 **Data Matrix**

Data Matrix is a matrix type 2D barcode developed by Idymatrix Corporation, which has characteristics of L-shaped finder and a symbol capable of miniaturizing. It is mainly used for industrial, and is used in a wide range of fields at overseas. Data Matrix is a symbol standardized also in ISO/IEC 16022.

Data Matrix Code Overview



Following are the Data Matrix configuration.

Item	Overview
Character set	ASCII value 0-127 (ISO 646) ASCII value 128-255 (ISO 8859-1, Alphabet No.1, Expand ASCII) Using ECI: many other character sets
Maximum digits (ECC200 square)	Alphanumeric data: 2335 characters 8 bit data: 1556 characters Numeric data: 3116 characters
Maximum digits (ECC200 rectangle)	Alphanumeric data: 98 characters 8 bit data: 47 characters Numeric data: 72 characters
Symbol size (ECC200)	Even rows and even columns, square or rectangle, Square: minimum 10 x 10, maximum 144 x 144 module Rectangle: minimum 8 x 18, maximum 16 x 48 module (6 patterns)
Error correction (ECC200)	Set automatically
Negative barcode, mirror printing	Negative and mirror printed Data Matrix are readable

Transfer data format

Data (variable length)

● **Setting item**

GS1 conversion

Disable/enable GS1 Data Matrix conversion by setting.
Refer to 6.2.1 for setting detail.

ECI protocol output

Enable/disable output of Data Matrix ECI protocol data by setting.
Refer to 6.2.6 for setting detail.

6.3.18 **Aztec Code**

Azetc Code is a matric type 2D barcode developed by Welch Allyn Company, and has characteristic of quiet zone unnecessary by fender in the center. Mainly used in tickets and medicals.

Aztec Code Summary



Following are the Aztec configuration.

Item	Overview
Character set	ASCII value 0-127 (ISO 646) ASCII value 128-255 (ISO 8859-1, Alphabet No.1, Expand ASCII) Using ECI: many other character sets
Maximum number of digits	Alphanumeric data: 3067 characters Number: 3832 characters Byte: 1914 character
Symbol size	Minimum: 15 x 15 module Maximum: 151 x 151 module
Error correction	The selectable error correction level is 5% to 95% of the data area.

Transfer data format

Data (variable length)

● **Setting item**
ECI protocol output
Enable/disable output of Aztec Code ECI protocol data by setting.
Refer to 6.2.6 for setting detail.

6.4 Setting of Number of Characters

If you are going to read codes of fixed length, it is recommended to configure the scanner for that fixed number of characters. The scanner will verify that codes read are of the correct length and rejects codes that do not have the specified length. The advantage of setting a fixed length is that it provides protection against spurious short scans of codes, possible with code types that do not provide sufficient security against partial scans (e.g. Interleaved 2 of 5). The length checking is done on the code data and is not affected by options such as (not) transmit start/stop character or check digit. Setting the number of characters does not affect fixed length codes, such as EAN-13.

6.4.1 Fixed Length ON, Minimum / Maximum Length for Selected Codes

This option enables fixed length and minimum / maximum length checking for each code types and will only affect the specified code types.

Configuration with commands

Item	Command					Description	Default (valid range)
Fixed length	Specify Code	Input length of digits				Fixed length for selected codes Length: (1000a+100b+10c+d)	(0-8000)
	6.4.2	Qa	Qb	Qc	Qd		

Configuration example	Command
Fix Code39 length to 6 digits	<Esc>[DC1Q6<CR>
Fix Code39 length to 6 digits and 12 digits	<Esc>[DC1Q6[DC1Q1Q2<CR>
Fix Code39 length to 6 digits and Interleaved 2 of 5 to 12 digits	<Esc>[DC1Q6[DC4Q1Q2<CR>
Clear fixed length for Code39	<Esc>[DC1<CR>
Set minimum length for Interleaved 2 of 5 to 4 digits	<Esc>[DB4Q4<CR>
Clear minimum length for Interleaved 2 of 5	<Esc>[DB4<CR>
Set maximum length for Code39 to 12 digits	<Esc>[DA1Q1Q2<CR>
Clear max length for Code39	<Esc>[DA1<CR>
Set max length for PDF417 to 20 digits and QR code 125 digits	<Esc>[DALQ2Q0[DAJQ1Q2Q5<CR>

6.4.2 **Command List: Fixed Length ON/Minimum/Maximum Length**

Enter the following command followed by a value to set length of each code.
When reset settings, the length currently set becomes the default.

Code type	Fixed length	Min length	Max length
Reset settings	[DC0	[XQG	[XNG
Code 39	[DC1	[DB1	[DA1
Codabar	[DC2	[DB2	[DA2
Industrial 2 of 5	[DC3	[DB3	[DA3
Interleaved 2 of 5	[DC4	[DB4	[DA4
Code 93	[DCD	[DBD	[DAD
Code 128	[DCB	[DBB	[DAB
MSI/Plessey	[DC8	[DB8	[DA8
IATA	[DC7	[DB7	[DA7
PDF417	[DCL	[DBL	[DAL
QR code	[DCJ	[DBJ	[DAJ
Data Matrix	[DCH	[DBH	[DAH
Maxi code	[DCK	[DBK	[DAK
Aztec code	[DCI	[DBI	[DAI
MicroPDF417	[DCM	[DBM	[DAM
RSS-Expanded (GS1 Databar)	[DCF	[DBF	[DAF
Composite	[DCG	[DBG	[DAG
GS1-128	[DCC	[DBC	[DAC
S-Code	[DC5	[DB5	[DA5
UK/Plessey	[DCA	[DBA	[DAA
Matrix 2 of 5 / Chinese Post	[DC6	[DB6	[DA6
Telepen	[DC9	[DB9	[DA9
Codablock F	[DCO	[DBO	[DAO
Code 11	[DCE	[DBE	[DAE
Chinese Sensible Code	[DCN	[DBN	[DAN

7 String Options

This chapter describes the alterations which can be made to the transmitted data string.

The configurations available are:

7.1 Case Conversion

7.2 Prefix / Suffix

7.1 Case Conversion

The decoded data may be converted to either all lower case or all upper case or the case may be exchanged. These options may be used if the host requires upper or lower case characters only.

● Upper case / Lower case conversion example

Description	AbCd	Default
No case conversion	AbCd	✓
Convert to upper case	ABCD	
Convert to lower case	abcd	
Exchange case	aBcD	

Upper case and Lower case can be set from following commands.

Items	Command	Description	Default
Case Conversion	YZ	No case conversion	✓
	YW	Convert to upper case	
	YX	Convert to lower case	
	YY	Exchange case	

7.2 **Prefix / Suffix (appending character function)**

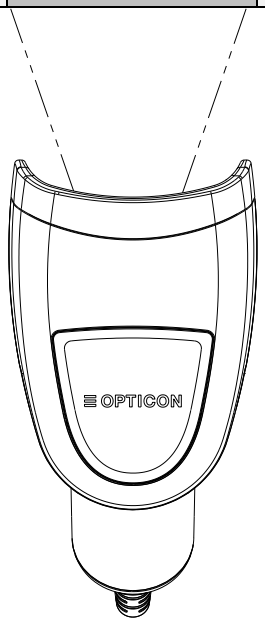
The following section explains the additional functions that can place informational characters just before the decoded data (pre-data) or be transmitted immediately after the data (post-data).

Output Format:

- Prefix / suffix (up to 4 digits)
  Specified characters can be added in front of or at the end of the data for each specific symbology.
  *1 By default, the prefix is empty and the suffix of all codes is a “CR” character.
  *When using 6.2.7 OCR Free Edit or 8.4.4 Data Edit Reading, this cannot be set.

- Preamble / Postamble (up to 8 digits)
  Specified characters can be added in front of or at the end of the data for all codes.
  *By default, they are empty.

Preamble	**Prefix for each code**	Decoded Data	**Suffix (*1) for each code**	**Postamble**
Max 8 digits	Max 4 digits		Max 4 digits	Max 8 digits



*By default, <CR> is added to suffix with all codes “RZ” command.

Program Value:

- ASCII (Refer to 7.2.3)
  All 128 characters

- Code identification
  The code identification is transmitted in OPTICON ID, ISO15424 standard or AIM-ID.

- Code length
  The code length is the number of characters after the output format that is configured with options in "6.3 Setting of Code Specific Options".

- Scan time
  The scan time is the time from the trigger until the data output start.

7.2.1 **Set Prefix / Suffix**

How to add the prefix / suffix is described below.

Configuring with Command

<table>
<tr><th>Item</th><th colspan="2">Command</th><th>Description</th><th>Default</th></tr>
<tr><td rowspan="5">Prefix/Suffix</td><td>Set commands</td><td>Value commands</td><td rowspan="5">Set character to Prefix/Suffix</td><td rowspan="5">All codes Suffix
USB-HID: “Enter”
USB-COM:“CR”
RS-232C:“CR”</td></tr>
<tr><td rowspan="4">7.2.2</td><td>ASCII: 7.2.3</td></tr>
<tr><td>Code ID: 7.2.4</td></tr>
<tr><td>Code Length: 7.2.5</td></tr>
<tr><td>Scan time: 7.2.6</td></tr>
</table>

Example: to set “C39:” as the prefix and “CR” and “LF” as the suffix for Code 39.
Command: <Esc>M40CQ3Q96AO41M1J<CR>

*Prefix / Suffix can also be set with 1D menu code or 2D menu code.

Note:
- The prefix and suffix setting commands clear the current values and configure new ones. The default suffix of CR is also cleared.
- Clearing the default suffix CR is possible by scanning the RZ menu code (Set suffix for all codes) without codes for the suffix or the PR menu code (Clear suffix).
- When the number of configured prefix / suffix characters exceeds the maximum limit (4 digits), the configuration will be ignored.

7.2.2 **Command List: Settings of the Prefix / Suffix**

Code	Prefix Command	Suffix Command
All codes Prefix / Suffix	RY	RZ

By default, “CR” is added to the suffixes all code.
*To clear “CR”, send “RZ” command only.

Following are the each code prefix / suffix setting command.

Code	Prefix Command	Suffix Command
UPC-A	N1	N6
UPC-A add-on	M0	O0
UPC-E	N2	N7
UPC-E add-on	M1	O1
EAN-13	N3	N8
EAN-13 add-on	M2	O2
EAN-8	N4	N9
EAN-8 add-on	M3	O3
Code 39	M4	O4
Tri-optic	MC	PN
Codabar	M5	O5
Industrial 2 of 5	M6	O6
Interleaved 2 of 5	M7	O7
S-Code	MB	OB
Matrix 2 of 5	GL	GM
Chinese Post Matrix 2 of 5		
IATA	I8	I9
MSI/Plessey	N0	N5
Telepen	L8	L9
UK/Plessey	MA	OA
Code 128	M9	O9
GS1-128	[XMX	[XOX
Code 11	[BLD	[BLE
Korean Postal Authority	*$	*%

Code	Prefix Command	Suffix Command
Intelligent Mail Barcode	[D5I	[D5J
POSTNET	[D6D	[D6E
PLANET	[DG5	[DG6
Japan Postal	[D5S	[D5T
Netherlands Kix Code	[D5N	[D5O
UK Postal (Royal Mail)	[DGA	[DGB
4-state Mailmark barcode	[DGV	[DGW
Australian Postal	[D6P	[D6Q
GS1 DataBar	OE	PQ
GS1 DataBar	[D6G	[D6J
GS1 DataBar Limited	[D6H	[D6K
GS1 DataBar Expanded	[D6I	[D6L
GS1 Composite code	RR	RS
Codablock F	[D4S	[D4T
Data Matrix	MD	PO
Aztec	[BF0	[BF1
Chinese Sensible Code	[D4N	[D4O
QR Code	MK	PW
Maxi Code	ML	PX
PDF417	OC	PY
MicroPDF417	OD	PZ
Machine Readable Passports	[DJJ	[DJP
Machine Readable Visas-A	[DJK	[DJQ
Machine Readable Visas-B	[DJL	[DJR
Official Travel Documents 1	[DJM	[DJS
Official Travel Documents 2	[DJN	[DJT
ISBN	[DJO	[DJU

To add to preamble / postamble, use the following command.

Code	Preamble Command	Postamble Command
Preamble / Postamble	MZ	PS

7.2.3 **ASCII (Prefix / Suffix Values)**

ASCII	Command	ASCII	Command	ASCII	Command	ASCII	Command
<SPACE>	5A	A	0A	a	$A	^@ (NULL)	9G
!	5B	B	0B	b	$B	^A (SOH)	1A
"	5C	C	0C	c	$C	^B (STX)	1B
#	5D	D	0D	d	$D	^C (ETX)	1C
$	5E	E	0E	e	$E	^D (EOT)	1D
%	5F	F	0F	f	$F	^E (ENQ)	1E
&	5G	G	0G	g	$G	^F (ACK)	1F
'	5H	H	0H	h	$H	^G (BEL)	1G
(	5I	I	0I	i	$I	^H (BS)	1H
)	5J	J	0J	j	$J	^I (HT)	1I
*	5K	K	0K	k	$K	^J (LF)	1J
+	5L	L	0L	l	$L	^K (VT)	1K
,	5M	M	0M	m	$M	^L (FF)	1L
-	5N	N	0N	n	$N	^M (CR)	1M
.	5O	O	0O	o	$O	^N (SO)	1N
/	5P	P	0P	p	$P	^O (SI)	1O
:	6A	Q	0Q	q	$Q	^P (DLE)	1P
;	6B	R	0R	r	$R	^Q (DC1)	1Q
<	6C	S	0S	s	$S	^R (DC2)	1R
=	6D	T	0T	t	$T	^S (DC3)	1S
>	6E	U	0U	u	$U	^T (DC4)	1T
?	6F	V	0V	v	$V	^U (NAK)	1U
@	6G	W	0W	w	$W	^V (SYN)	1V
[	7A	X	0X	x	$X	^W (ETB)	1W
\	7B	Y	0Y	y	$Y	^X (CAN)	1X
]	7C	Z	0Z	z	$Z	^Y (EM)	1Y
^	7D	0	Q0			^Z (SUB)	1Z
_	7E	1	Q1			^[(ESC)	9A
`	7F	2	Q2			^\ (FS)	9B
{	9T	3	Q3			^] (GS)	9C
|	9U	4	Q4			^^ (RS)	9D
}	9V	5	Q5			^_ (US)	9E
~	9W	6	Q6			DEL (ASCII127)	9F
		7	Q7				
		8	Q8				
		9	Q9				

7.2.4 **Code ID**

Code ID can be added by sending following command continue to the prefix / suffix setting command.

Item	Command	Description	Default
Code identification	$2	Code identification using OPTICON ID	
	$1	Code identification using AIM ID/ ISO 15424	

There are two ways of adding Code ID as follows.
● OPTICON Code ID: (Refer appendix 9.1.1)

● AIM/ISO Code ID: (Refer appendix 9.1.2)
The code identifier is transmitted in ISO 15424 format.]cm
•] is ASCII value, decimal 93
• c is code character
• m is modifier character

Example) Add “<OPTICON Code ID>” to the all codes prefix.
Configuring with Command:
<Esc>RY$2<CR>

7.2.5 **Code Length**

For 1D codes the code length is transmitted as 2 digits, excluding prefix and suffix characters. For 2D codes the code length is transmitted as 6 digits. It is also possible to send the length as 6 digits for both 1D and 2D codes. These direct input characters count as 1 entry of the 4 permissible entries for a prefix and suffix.

Code length can be added by sending following command continue to the prefix / suffix setting command.

Item	Command	Description	Default
Code length value	$3	Code length (1D/2D: 2/6 digit)	
	$6	Code length (1D/2D: 6/6 digit)	

Example: Set the prefix for all codes to <Code length (1D/2D: 2/6 digit)>:

Configuring with Command:
<ESC>RY$3<CR>

7.2.6 **Scan Time**

The scan time is the time from trigger until data output start.

Item	Command	Description	Default
Scan time value	[EDG	Scan time	

8 Read Options

This chapter describes the read options for the scanner.

8.1 Read Modes

8.2 Manual Trigger

8.3 Auto Trigger

8.4 Illumination and Aiming

8.1 Read Modes

Code reading starts when the trigger signal (TRIGn) is pulled low, when the trigger command (“Z”) is received or when an object is detected while in auto trigger mode.

8.1.1 Read Modes

Read modes includes “single read” and “multiple read” modes.

Item	Command	Description	Default
Single Read	S0	Single read in a single trigger	✓
Multiple Read 1	[D3P	Multiple read in a single trigger, the scanner saves the read data in memory to not read the same data.	
Multiple Read 2	S1	Multiple read in a single trigger, the scanner read the same data.	

- Single Read
  The scanner starts reading after a trigger until a barcode is successfully decoded or until the read time expires. (See 8.1.2)

- Multiple Read 1 (Do not read the same data)
  The scanner starts reading after a trigger and stays reading even after a barcode is successfully decoded, until the read time expires. To prevent that a barcode is read twice, the scanner saves the read barcodes in memory and checks if it has been read before. The list in memory is 20 barcodes long so after 20 different barcodes, the same barcode can be read again.

  If there is more than one code within the read area, as in the following figure, this read mode is helpful to prevent reading the same code twice.

  Example: Read multiple codes continuously with a single trigger.



- Multiple Read 2 (Permit same data reading)
  The scanner starts reading after a trigger and stays reading even after a barcode is successfully decoded until the read time expires. The same barcode cannot be read twice unless another barcode is read in between or when at least “Double read reset time” has past.

  Example: Read multiple codes sequentially with single trigger.



8.1.2 **Read Time**

Read time setting sets the reading time of 1 reading operation. After trigger signal is on, or when the readout command “Z” is sent, readout operation starts. If no data outputted within the specified time, the readout operation stops.

Item	Command	Description	Default	Remark
Read time setting	Y0	Using trigger key : Synchronized with trigger key Auto trigger : Auto	✓	*
	Y1	1 second		
	Y2	2 seconds		
	Y3	3 seconds		
	Y4	4 seconds		
	Y5	5 seconds		
	Y6	6 seconds		
	Y7	7 seconds		
	Y8	8 seconds		
	Y9	9 seconds		
	YM	Read time infinite		
	YL	Read time 10 times		

* When auto trigger with “Y0”, read time is automatically set by the image processing.
* When auto trigger read time is auto, read time can be adjusted in 8.3.4.

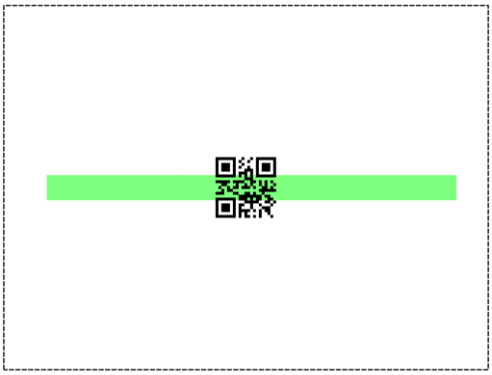
8.1.3 **Central Reading**

This function can be used to read a specific target code when multiple codes are closely positioned. Only the code in the central portion of an image will be read, as shown below.

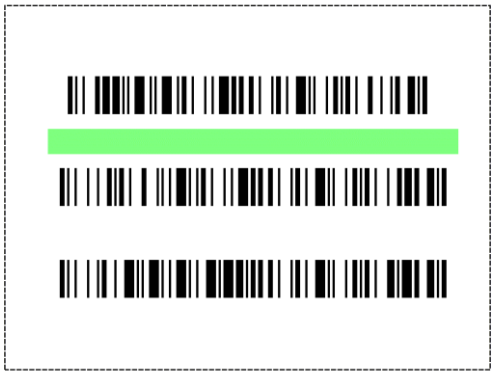
Item	Command	Description	Default
Central reading	[D00	Enable central reading; read only a code at the center of aiming LED	
	[D0Z	Disable central reading; read within entire image	✓

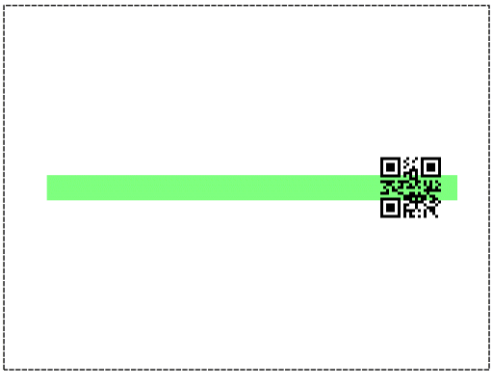
Examples of readable positions in central reading setting





Examples of unreadable positions in central reading setting





* When several codes are tightly packed, it is recommended to use the Trigger Repeat (See: 8.2.1) function to Improve reading performance.

8.2 Manual Trigger

8.2.1 Trigger Repeat

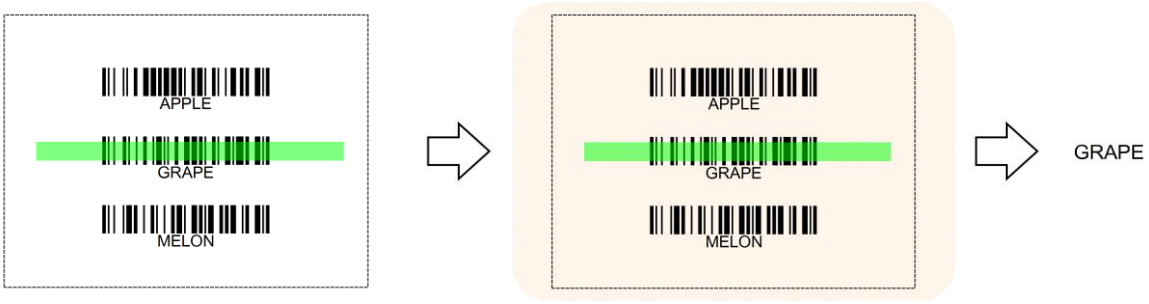
Trigger repeat helps the user to properly aim the scanner before it starts scanning. This can be very handy in situations where several codes are printed close to each other.

The actual behavior depends on the configuration of Read Time. (See 8.1.3)

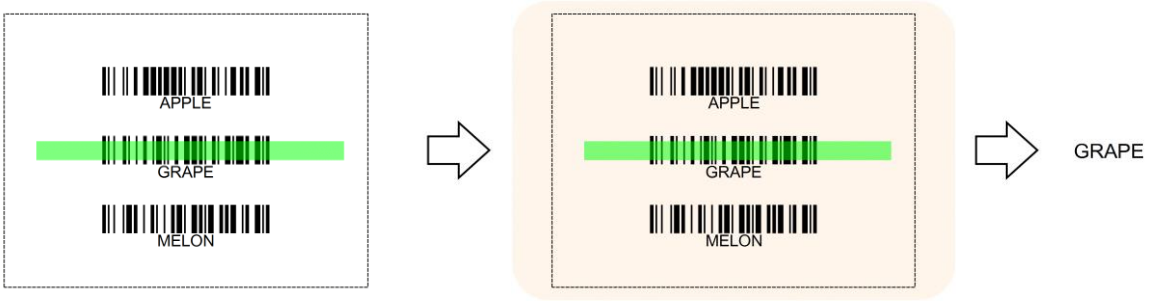
Item	Command	Description	Default
Trigger repeat	/K	Disable trigger repeat	✓
	/M	Enable trigger repeat	

The operation varies depend on the Read Cycle Timeout (refer 8.1.2).

● Read time option: When trigger key is synchronized (Default).
Example)
"While trigger is pressed" "Release trigger" "Output data"



● Read time option: When read time option is 1 second or more.
Example)
"While trigger is pressed" "Start reading by pulling trigger again" "Output data"



8.3 Auto Trigger

When auto trigger is enabled, the scanner automatically detects an object in front and starts reading it.

8.3.1 Normal Auto Trigger

There are two modes for auto trigger.

- Presentation auto trigger mode
  This mode is meant for applications where the scanner is fixed and codes are presented.

- Handheld auto trigger mode
  This mode is meant for applications where the module is not fixed.

Item	Command	Description	Default
Auto trigger	+F	Disable presentation auto trigger	✓
	+I	Enable presentation auto trigger	
Auto trigger Mode	[DL5	Presentation auto trigger mode	✓
	[DL6	Hand held auto trigger mode	

8.3.2 Auto Trigger Sensitivity

The detection sensitivity can be adjusted. The sensitivity varies with the ambient environment and adjustment may be necessary.

Item	Command	Description	Default
Auto trigger sensitivity	[XMF	Sensitive	
	[XMH	Normal	✓
	[XMJ	Insensitive	

8.3.3 Double read reset time

This allows setting of time interval before the same code can be decoded again in auto trigger mode. When a code with different data is read, this will be reset.

Item	Command					Description	Default (valid range)
Double read reset time	[D3R	Qa	Qb	Qc	Qd	Double read reset time (1000a+100b+10c+d) [ms]	700 ms (0-9999)

*When 0 second is set, the same code will not be decoded.

8.3.4 **Read Time Adjustment**

The time to end the auto trigger scanning can be adjusted.

Item	Command	Description	Default
Auto trigger read time adjustment	[EFH	Long time	
	[EFI	Normal	✓
	[EFJ	Short time	

*When the read time is fixed, please see: "Read Time"

8.3.5 **Auto Trigger Sleep Mode**

When nothing is detected after a specific configurable period while in auto trigger mode, the scanner goes into sleep mode. The scanner performs presence detection at specified time intervals in sleep mode and when a target is detected or any event such as trigger occurs, the unit exits from sleep mode. Setting a time of 0 seconds means that sleep mode is disabled.

Item	Command					Description	Default (valid range)
Auto trigger sleep mode	[EBW	Qa	Qb	Qc	Qd	Transition time to sleep mode (1000a+100b+10c+d) [s]	60 s (0-9999)

8.3.6 **Detection Mode**

There are three methods for detecting a target code.

- Warm white illumination detection
  When a target code falls within the range of the field of view of the warm white light, the target is detected. This mode is preferred in a dark environment.

- Green aiming detection
  When a target code falls within the green aiming light, the target is detected. This mode is recommended for indoor use only because target detection is reduced in environments with higher illumination levels than typically found indoors.

- No illumination detection
  A target code is detected without illumination light. The power consumption will be reduced, but the effectiveness of detection will also be reduced. Ambient light is used for detection in this mode, so this mode should not be used in a dark environment. Best used in a well-lit area.

Item	Command	Description	Default
Auto trigger	[DDH	Warm white illumination detection	✓
	[DDG	Green aiming detection	
	[DDI	No illumination detection	

8.4 Illumination and Aiming

Warm white illumination for reading and Green LED aiming can be enabled or disabled.

8.4.1 Reading LED Illumination

Red LED illuminations enable / disable, illuminance method and brightness that are used for reading can be set.
Following method is available for reading target that specular reflection is likely to occur.

- LED Illumination → Enable / Disable
  When the illumination is disabled, the reading performance may be degraded.
  However, when reading only the code displayed on the LCD screen, the reading performance may improve.

- LED Illumination → Automatic switching
  Floodlight ON and OFF are alternated. The illumination in which a code was read is memorized and will be prioritized for subsequent reading.
  This function is recommended when reading the target that specular reflection easily occurs.

- LED Illumination → Prevent specular reflection
  Disable illumination only when specular reflection by LED illumination occur and reads.

Item	Command	Description	Default
LED illumination mode	[D39	LED illumination → Enable	
	[D3A	LED illumination → Disable	
	[D3B	LED illumination → Automatic switching	
	[D3Q	LED illumination → Prevent specular reflection	✓
LED illumination brightness	[DDB	LED brightness → Standard	✓
	[DDC	LED brightness → Low	

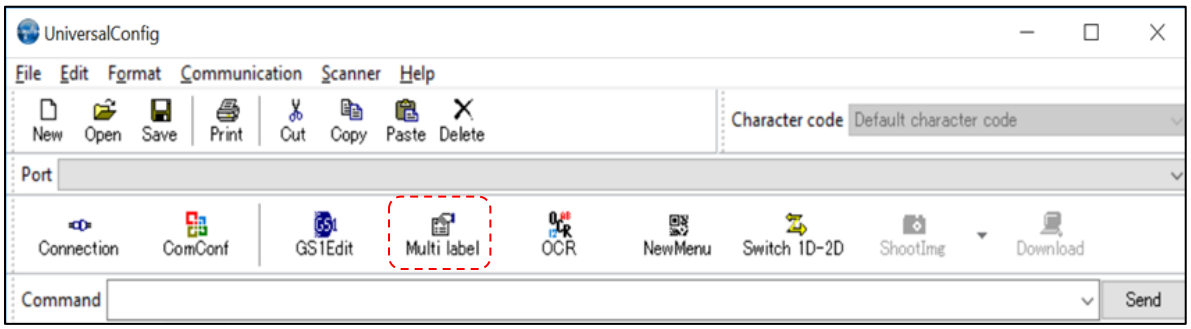
8.4.2 LED Aiming

Green LED floodlight used for aiming can be set to enable / disable. The brightness is also configurable.

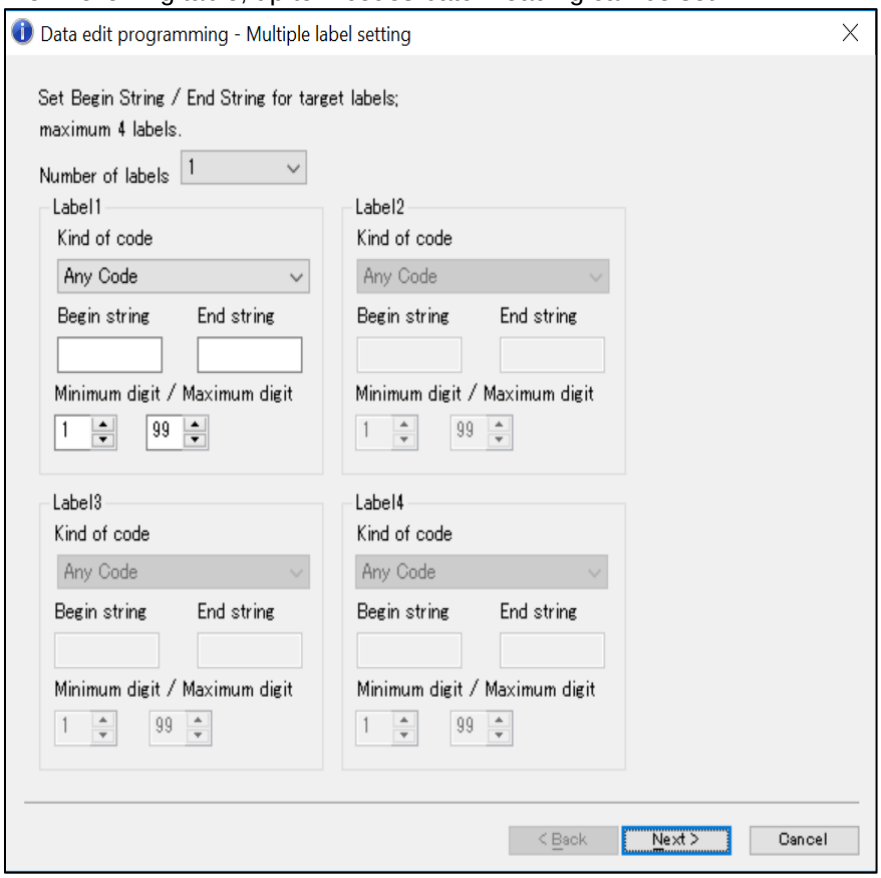
Item	Command	Description	Default
LED aiming ON/OFF	[D3D	Enable LED aiming	✓
	[D3E	Disable LED aiming	
LED aiming brightness	[DDD	Brightness "High"	✓
	[DDE	Brightness "Standard"	
	[DDF	Brightness "Low"	

8.4.3 Batch Reading / Data Edit Function

When reading fixed format code in a batch, setting is available from the UniversalConfig batch reading function.



From following table, up to 4 codes batch reading can be set.



*Please contact to sales offices if there are items cannot be set with above.

8.4.4 Data Edit Function

Data edit script programming is a form of data output formatting so the user may change the scanned data to a format that is more desirable to be output This data edit script programming is integrated into the software of the scanner. The Universal Config utility has some support for Data Editing, but it is an advance language and may need extra support. Please contact technical support or your sales office for more information on this.

9 Appendix

This chapter lists the reference data.

9.1 Code ID Table

9.2 L-46X Specification Overview

9.3 Sample Codes

9.1 Code ID Table

Following are the Code ID to be added to the prefix / suffix.

9.1.1 Opticon Code ID prefix / suffix value

Code	Code ID	Code	Code ID
UPC-A	C	Code 11	b
UPC-A +2	F	Code 128	T
UPC-A +5	G	GS1-128	
UPC-E	D	GS1 DataBar	y
UPC-E +2	H	CC-A	m
UPC-E +5	I	CC-B	n
EAN-13	B	CC-C	l
EAN-13 +2	L	Korean Postal Authority	c
EAN-13 +5	M	Intelligent mail	0
EAN-8	A	Postal-TNT, KIX	1
EAN-8 +2	J	Japan postal	2
EAN-8 +5	K	Postnet	3
Code 39	V	Australia postal code	4
Code 39 Full ASCII	W	US Planet	6
Italian Pharmaceutical	Y	UK Postal (Royal mail)	7
Codabar	R	4-state Mailmark barcode	8
Codabar ABC	S	Codablock F	E
Codabar CX	f	Data Matrix	t
Industrial 2 of 5	O	Aztec	o
Interleaved 2 of 5	N	Aztec Runes	
S-Code	g	Chinese Sensible Code	e
Matrix 2 of 5	Q	QR Code	u
Chinese Post	w	Micro QR Code	j
Code 93	U	Maxi Code	v
IATA	P	PDF417	r
MSI/Plessey	Z	MicroPDF417	s
Telepen	d	ICAO Travel Documents (OCR)	9
UK/Plessey	a	ISBN and Other OCR Font B	z

9.1.2 **Code Option AIM / ISO15424 Code ID prefix / Suffix value**

AIM/ISO15424 Code ID			
Symbology	Code ID	Symbology	Code ID
UPC-A	]E0	Telepen	]B*
UPC-A +2	]E3	UK/Plessey	]P0
UPC-A +5	]E3	Code 128	]C0
UPC-E	]E0	GS1-128	]C1
UPC-E +2	]E3	Code 93	]G0
UPC-E +5	]E3	Code 11	]H*
EAN-13	]E0		]X0
EAN-13 +2	]E3	Korean Postal Authority	]X0
EAN-13 +5	]E3	Intelligent Mail Barcode	]X0
EAN-8	]E4	POSTNET	]X0
EAN-8 +2	]E7	GS1 DataBar	]e0
EAN-8 +5	]E7	CC-A	]e1
Code 39	]A*	CC-B	]e1
Code 39 Full ASCII	]A*	CC-C	]e1
Tri-Optic	]X0	GS1 DataBar with CC-A	]e0
Code 39 lt. Pharmaceutical	]X0	GS1 DataBar with CC-B	]e0
Codabar	]F*	GS1 DataBar with CC-C	]e0
Codabar ABC	]F*	Codablock F	]O*
Codabar CX	]X0	DataMatrix	]d*
Industrial 2 of 5	]S0	Aztec	]z*
Interleaved 2 of 5	]I*		]X0
S-Code	]X0	QR Code	]Q*
Matrix 2 of 5	]X0	Micro QR Code	]Q*
Chinese Post	]X0	Maxi Code	]U*
IATA	]R*	PDF417	]L0
MSI/Plessey	]M*	MicroPDF417	]L0
	]X0	OCR	]X0

“*” are described differently depend on code type, please refer below.

Code option	]AIM-ID	Code option	]AIM-ID
Code 39 option AIM/ISO15424 Code ID : A*			
Normal Code 39 (D5) Not check CD (C1) Transmit CD (D9)	]A0	Full ASCII Code 39 (D4) or Full ASCII Code 39 if pos. (+K) Not check CD (C1) Transmit CD (D9)	]A4
Normal Code 39 (D5) Check CD (C0) Transmit CD (D9)	]A1	Full ASCII Code 39(D4) or Full ASCII Code 39 if pos. (+K) Check CD (C0) Transmit CD (D9)	]A5
Normal Code 39 (D5) Not check CD (C1) Not transmit CD (D8)	]A2	Full ASCII Code 39(D4) or Full ASCII Code 39 if pos. (+K) Not check CD (C1) Not transmit CD (D8)	]A6
Normal Code 39 (D5) Check CD (C0) Not transmit CD (D8)	]A3	Full ASCII Code 39(D4) or Full ASCII Code 39 if pos. (+K) Check CD (C0) Not transmit CD (D8)	]A7
Codabar option AIM/ISO15424 Code ID : F*			
Codabar normal mode (HA) Not check CD (H7) Transmit CD (H8)	]F0	Codabar normal mode(HA) Not check CD (H7) Not transmit CD (H9)	]F4
Codabar ABC (H4) or (H3) Not check CD (H7) Transmit CD (H8)	]F1	Codabar ABC (H4) or (H3) Not check CD (H7) Not transmit CD (H9)	]F5
Codabar normal mode (HA) Check CD (H6) Transmit CD (H8)	]F2	Codabar normal mode (HA) Check CD (H6) Not transmit CD (H9)	]F6
Codabar ABC (H4) or (H3) Check CD (H6) Transmit CD (H8)	]F3	Codabar ABC (H4) or (H3) Check CD (H6) Not transmit CD (H9)	]F7
Interleaved 2 of 5 option AIM/ISO15424 Code ID : I*			
Not check CD (G0) Transmit CD (E0)	]I0	Not check CD (G0) Not Transmit CD (E1)	]I2
Check CD (G1) Transmit CD (E0)	]I1	Check CD (G1) Not Transmit CD (E1)	]I3

Code option	]AIM-ID	Code option	]AIM-ID
IATA option AIM/ISO15424 Code ID : R*			
Not check CD (4H) Transmit CD (4L)	]R0	Not check CD (4H) Not transmit CD (4M)	]R2
Check FC and SN only (4I) or Check CPN,FC and SN (4J) or Check CPN,AC,FC and SN (4K) Transmit CD (4L)	]R1	Check FC and SN only (4I) or Check CPN,FC and SN (4J) or Check CPN, AC, FC and SN (4K) Not transmit CD (4M)	]R3
MSI/Plessey option AIM/ISO15424 Code ID : M*/X0			
Check 1CD = MOD 10 (4B): (4B) + Transmit CD1 (4E) or (4B) + Not transmit CD (4G) or (4B) + Transmit CD1 and CD2 (4F)	]M0]M1]X0	Check 2CD's = MOD 10/MOD 11 (4D): (4D) + Transmit CD1 (4E) or (4D) + Not transmit CD (4G) or (4D) + Transmit CD1 and CD2 (4F)	]X0
Check 2CD's = MOD 10/MOD 10 (4C): (4C) + Transmit CD1 (4E) or (4C) + Not transmit CD (4G) or (4C) + Transmit CD1 and CD2 (4F)	]X0	Check 2CD's = MOD 11/MOD 10 (4R): (4D) + Transmit CD1 (4E) or (4D) + Not transmit CD (4G) or (4D) + Transmit CD1 and CD2 (4F)	]X0
Telepen option AIM/ISO15424 Code ID : B*			
Telepen (numeric or ASCII only): ASCII mode (D3) Numeric mode (D2)	]B0]B1	Telepen (numeric followed by ASCII): ASCII mode (D3) Numeric mode (D2)	]B0]B2
Telepen (ASCII followed by numeric) (not supported): ASCII mode (D3) Numeric mode (D2)	]B0]B2		
Code 11 option AIM/ISO15424 Code ID : H*/X0			
Check 1CDs (BLG) or Check auto 1 or 2CDs (BLI) (length > 12) Transmit $CD_{(S)}$ (BLK)	]H0	Check 1CDs (BLG) or Check 2CDs (BLH) or Check auto 1 or 2CDs (BLI) (length > 12) Not Transmit $CD_{(S)}$ (BLJ)	]H3
Check 2CDs (BLH) or Check auto 1 or 2CDs (BLI) (length > 12) Transmit $CD_{(S)}$ (BLK)	]H1	Not check CD (BLF) Not transmit CD (BLJ)	]X0
Codablock F option AIM/ISO15424 Code ID : O*			
FNC1 not used	]O4	FNC1 in 1st position	]O5

Code option	]AIM-ID	Code option	]AIM-ID
DataMatrix options AIM/ISO15424 Code ID: d*			
ECC200	]d1	ECC200, supporting ECI protocol	]d4
ECC200, FNC1 IN 1st or 5th position	]d2	ECC200,FNC1 in 1st or 5th position and supporting ECI protocol	]d5
ECC200, FNC1 IN 2nd or 6th position	]d3	ECC200,FNC1 in 2nd or 6th position and supporting ECI protocol	]d6
Aztec options AIM/ISO15424 Code ID: z*			
No structure/other	]z0	Structured append header included, FNC1 following an initial letter or pair of digits	]z8
FNC1 preceding 1st message character	]z1		
FNC1 following an initial letter or pair of digits	]z2	Structured append header included and ECI protocol implemented	]z9
ECI protocol implemented	]z3		
FNC1 preceding 1st message character and ECI protocol implemented	]z4	Structured append header included, FNC1 preceding 1st message character, ECI protocol implemented	]zA
FNC1 following an initial letter or pair of digits, ECI protocol implemented	]z5	Structured append header included, FNC1 following an initial letter or pair of digits, ECI protocol implemented	]zB
Structured append header included	]z6		
Structured append header included and FNC1 preceding 1st message character	]z7	Aztec runes	]zC
QR Code option AIM/ISO15424 Code ID: Q*			
Model 1	]Q0	Model 2, ECI protocol implemented FNC1 in first position	]Q4
Model 2, ECI protocol not implemented	]Q1		
Model 2, ECI protocol implemented	]Q2	Model 2, ECI protocol not implemented FNC1 in second position	]Q5
Model 2, ECI protocol not implemented FNC1 in first position	]Q3	Model 2, ECI protocol implemented FNC1 in second position	]Q6
Maxi Code option AIM/ISO15424 Code ID: U*			
Symbol in mode 4 of 5	]U0	Symbol in mode 4 of 5, ECI protocol implemented	]U2
Symbol in mode 2 of 3	]U1	Symbol in mode 2 of 3, ECI protocol implemented	]U3

9.2 L-46X Specification Overview

L-46X specifications overview is as follows.

9.2.1 Common Specification Overview

Item			Specification		Note
Control Section	CPU		CPU：ARM Cortex-A7		Core: 800 MHz
	LPDDR2 RAM		1G bits		DDRCLK: 400 MHz
	Flash ROM		1G bits Flash Memory		
Interface	RS-232C		300 bps to 115200 bps		Default: 9600 bps
	USB		Full Speed 12 Mbps (HID/COM)		
Indicator	LED		Upper panel and side bars 3 color LED		
	Buzzer		Loudness / tone adjustable		
	Vibrator		Vibration motor (default off)		Option
Optical Section	Scanning method		Monochrome CMOS area sensor		Frame rate: 100 fps
	Scanning light source		1 warm white LED		
	Aiming light source		1 green LED		Single line
	Effective pixels		0.30 million pixels		
	View angle		Horizontal : about 38.0° Vertical : about 28.9° Diagonal : about 46.4°		
Supported 1D Symbologies	Symbologies	1D	UPC-A, UPC-E, UPC-E1, UPC-A Add-on, UPC-E Add-on, EAN-13, EAN-8, EAN-13 Add-on/EAN-8 Add-on, JAN-8, JAN-13, Code 39, Codabar, Industrial 2 of 5, Interleaved 2 of 5, Code 93, Code 128, GS1-128, MSI/Plessey, Code 11, UK/Plessey, Telepen, S-Code, Matrix 2 of 5		
		Postal	Korean Postal Authority code, Chinese Post Matrix 2 of 5, Japan Postal, Intelligent Mail Barcode, POSTNET, PLANET, Netherlands KIX Code, Australian Postal, UK Postal, 4-State Mailmark Barcode		
	Curvature		Radius ≥ 20 mm (12-digit UPC)		PCS 0.9
	Barcode width		Possible to read: Code 39 with 100 mm width and resolution 0.2 mm (DOF: 127 mm)		
	Motion tolerance		Possible to read: UPC 0.33 mm moving at 2.54 m/s (DOF: 107 mm)		
	Depth of field (Typ.)	Code 39	Resolution (0.127)	12 – 85 mm	
			Resolution (0.254)	11 – 196 mm	
			Resolution (0.508)	28 – 392 mm	
		Code 128	Resolution (0.20)	9 – 150 mm	
		UPC	Resolution (0.33)	9 – 250mm	

Item			Specification		Note
GS1/Composite	Symbologies		GS1 DataBar , GS1 DataBar Limited , GS1 DataBar Expanded Composite GS1 DataBar , Composite GS1-128 , Composite EAN , Composite UPC		GS1 DataBar: formerly called “RSS”
	Minimum resolution		GS1 DataBar : 0.169 mm Composite Code : 0.169 mm		PCS 0.9
Supported 2D Symbologies	Symbologies		PDF417, MicroPDF417, Codablock F, QR Code , Micro QR Code, DataMatrix (ECC 200), MaxiCode, Aztec Code, Chinese Sensible Code		Disable Code 128 when Codablock F is enabled.
	Minimum resolution (mm)		PDF417 : 0.169 mm QR Code : 0.169 mm Data Matrix : 0.169 mm		PCS 0.9
	Depth of field (Typ)	PDF417	Resolution (0.169)	8 – 105 mm	
			Resolution (0.254)	1 – 170 mm	
		QR Code	Resolution (0.169)	19 – 70 mm	
			Resolution (0.381)	0 – 209 mm	
		Data Matrix	Resolution (0.169)	21 – 75 mm	
			Resolution (0.254)	2 – 132 mm	
Common	Scan angle		Pitch ±65°		
			Skew ±65°		
			Tilt 360°		
	Minimum PCS		0.2 or more		MRD: 13% or more
OCR	OCR font		Machine Readable Travel Documents, OCR-A/B		
Imager	Image data format		Windows Bitmap, JPEG		
	Shades of gray		1024, 256, 16, 2		
	Range of output image		Select top/bottom (column) and left/right (row)		
	Resolution of output image		Full,1/2, 1/4		
	Interface of output image		RS-232C, USB-COM		
	Baud rate		USB-COM (full speed)	About 3 sec	Resolution: Full
			RS-232C (baud rate: 115.2 kbps)	About 40 sec	

Item			Specification	Note
Power	Range of operating voltage		5V ± 10%	Both RS232 and USB
	Current consumption	Reading	RS-232C: 330 mA / USB : 340 mA (typ)	Ambient temperature: 25°C
		Auto trigger Standby	RS-232C: 145 mA / USB: 160 mA (typ)	
		Standby	RS-232C: 40 mA / USB: 55 mA (typ)	
Environmental Specifications	Temperature	Operating	-5 to 50°C	AC adapter 0 to 40°C
		Storage	-30 to 60°C	
	Humidity	Operating	5 to 90% (no condensing, no frost)	
		Storage	5 to 90% (no condensing, no frost)	
	Ambient light immunity	Fluorescent	10,000 lx or less	UPC 0.33 mm
		Sunlight	100,000 lx or less	
	Vibration		10 Hz to 100 Hz, acceleration of 19.6 m/s^2, 60 minutes per cycle, repeat once in each X, Y and Z-direction	
	Drop		Drop 3 times, at each 5 faces (right, left, front, back and top), from a height of 180 cm onto a concrete surface.	* Excluding the part where the interface cable is attached
	Dust and drip proof		IP42 equivalent	
Physical Features	Dimensions		Approx. 105.4 × 60 × 153.4 (DWH mm)	Except protruding portion
	Weight		Approx. 112 g	Excluding the cable
	Housing color		Black / White	
	Anti-microbial		ISO 22196 equivalent	White model only

9.2.2 Technical Specifications

Standard model reading characteristics

Item		Specification	Notes
Standard model	Minimum Resolution	Code 39 : 0.1 mm GS1 DataBar : 0.169 mm Composite Code : 0.169 mm PDF417 : 0.169 mm QR Code : 0.169 mm Data Matrix : 0.169 mm	OPTOELECTRONICS test chart
	Barcode width	Possible to read: Width 100 mm Code 39 Resolution 0.2 mm (DOF: 127 mm)	
	Motion tolerance	Possible to read: UPC 100% moving at 2.54 m/s (DOC: 107 mm)	

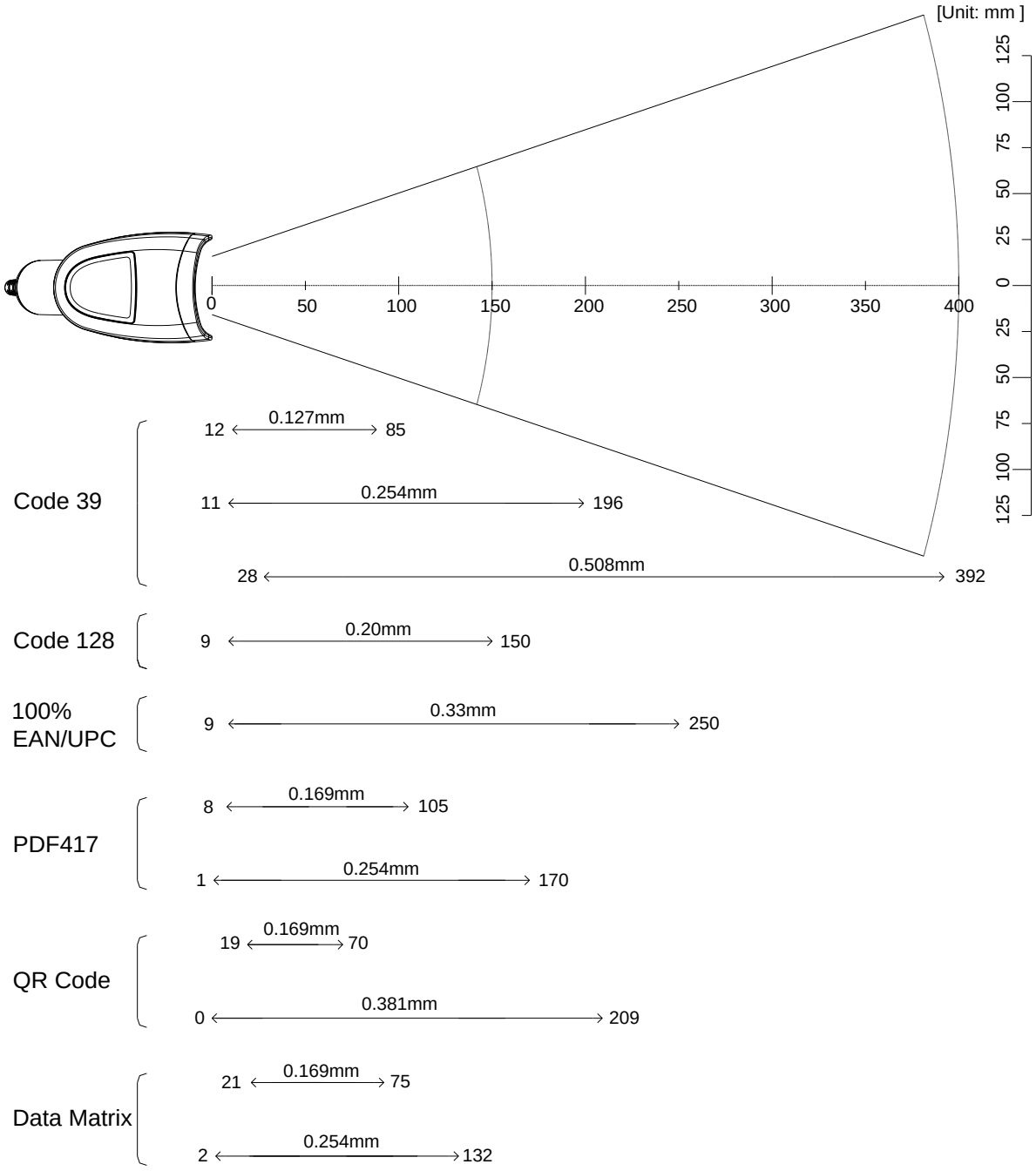
Standard model reading depth of field

Typical values of reading depth are as follows.

Resolution	Code	No. of Digits or Character	Scanning Depth of field (mm) (Typ)	
			Near	Far
0.127mm	Code 39	4 digits	12	85
0.254mm	Code 39	7 digits	11	196
0.508mm	Code 39	4 digits	28	392
0.20mm	Code 128	16 digits	9	150
0.33mm	UPC/EAN	12 digits	9	250
0.169mm	PDF417	58 character	8	105
0.254mm	PDF417	58 character	1	170
0.169mm	QR Code	44 character	19	70
0.381mm	QR Code	44 character	0	209
0.169mm	Data Matrix	40 character	21	75
0.254mm	Data Matrix	40 character	2	132

Note: The depth of field is a determined while using the OPTOELECTRONICS test chart PCS 0.9, without specular reflection and at room temperature and room humidity.

Standard model reading depth of field



Note: The depth of field is the typical value measured by tilting the test chart 15° from the optical axis.

High Resolution (UD) model reading characteristics

Item		Specification	Notes
High resolution model	Minimum resolution	Code 39 : 0.051 mm QR Code : 0.084 mm Data Matrix : 0.084 mm	OPTOELECTRONICS test chart
	Barcode width	Possible to read: Width 40 mm Code 39 Resolution 0.2 mm (DOF: 32 mm)	

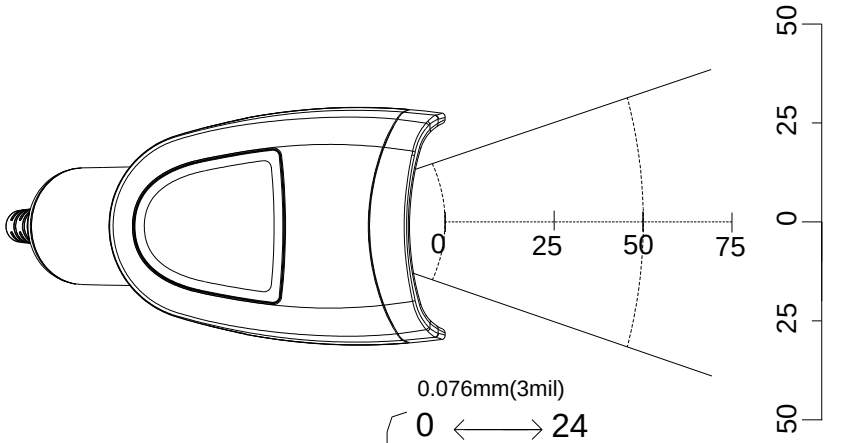
High resolution (UD) model reading depth of field

Typical values of reading depth are as follows.

Resolution	Code	No. of Digits or Character	Reading Depth of field (mm) (Typ)	
			Near	Far
0.076mm	Code 39	5 digits	0	24
0.127mm	Code 39	4 digits	0	41
0.254mm	Code 39	7 digits	12	62
0.33mm	UPC/EAN	12 digits /13 digits	9	73
0.084mm	QR Code	44 character	0	14
0.381mm	QR Code	44 character	0	68
0.084mm	Data Matrix	40 character	0	14
0.254mm	Data Matrix	40 character	0	42

Note: The depth of field is a determined while using the OPTOELECTRONICS test chart PCS 0.9, without specular reflection and at room temperature and room humidity.

High Resolution (UD) model reading depth of field



Code 39
- 0.076mm(3mil): 0 ⟷ 24
- 0.127mm(5mil): 0 ⟷ 41
- 0.254mm(10mil): 12 ⟷ 62

UPC/EAN
- 0.33mm(13mil): 9 ⟷ 73

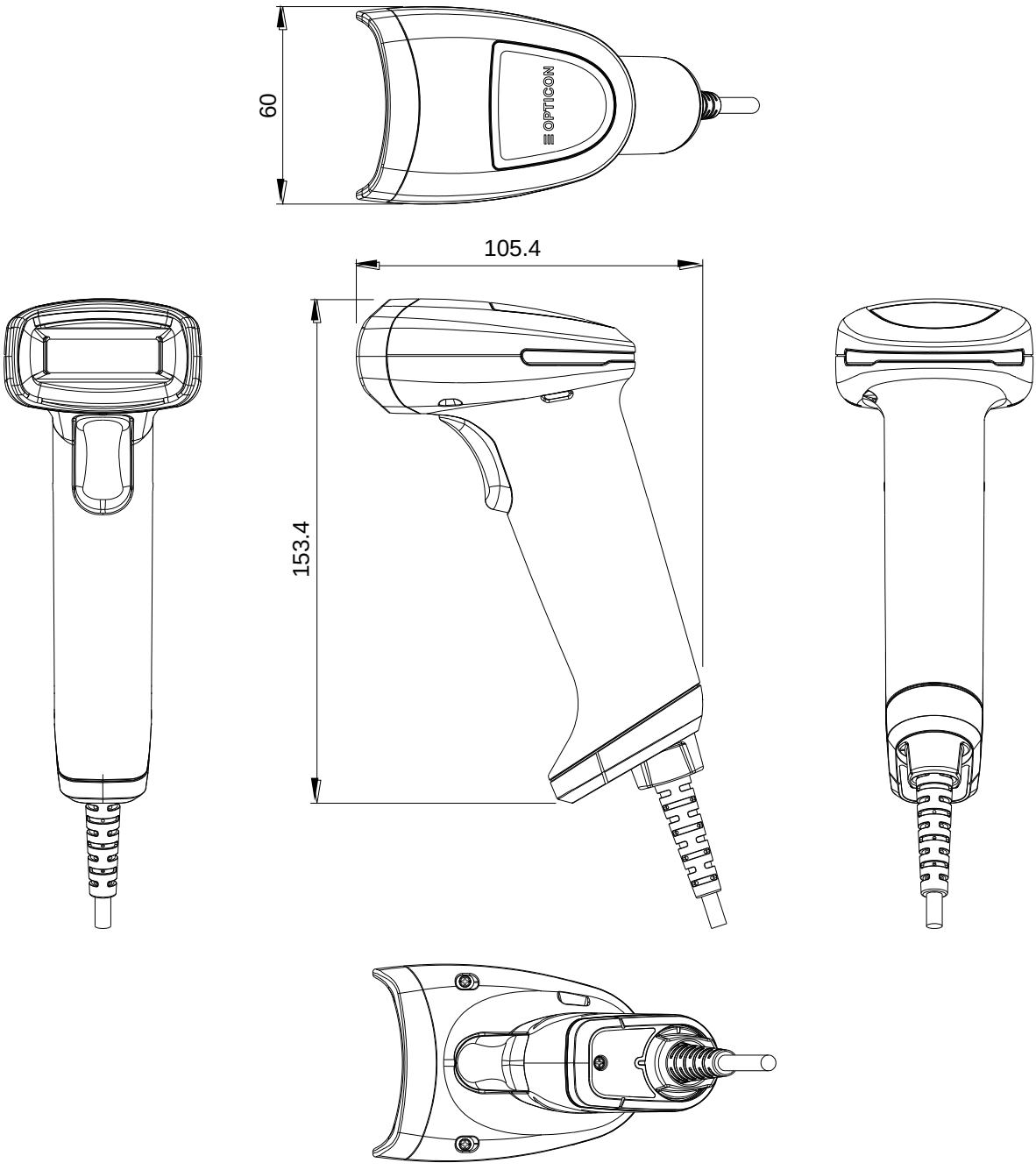
QR Code
- 0.084mm(3.3mil): 0 ⟷ 14
- 0.381mm(15mil): 0 ⟷ 68

Data Matrix
- 0.084mm(3.3mil): 0 ⟷ 14
- 0.254mm(10mil): 0 ⟷ 42

[Unit: mm]

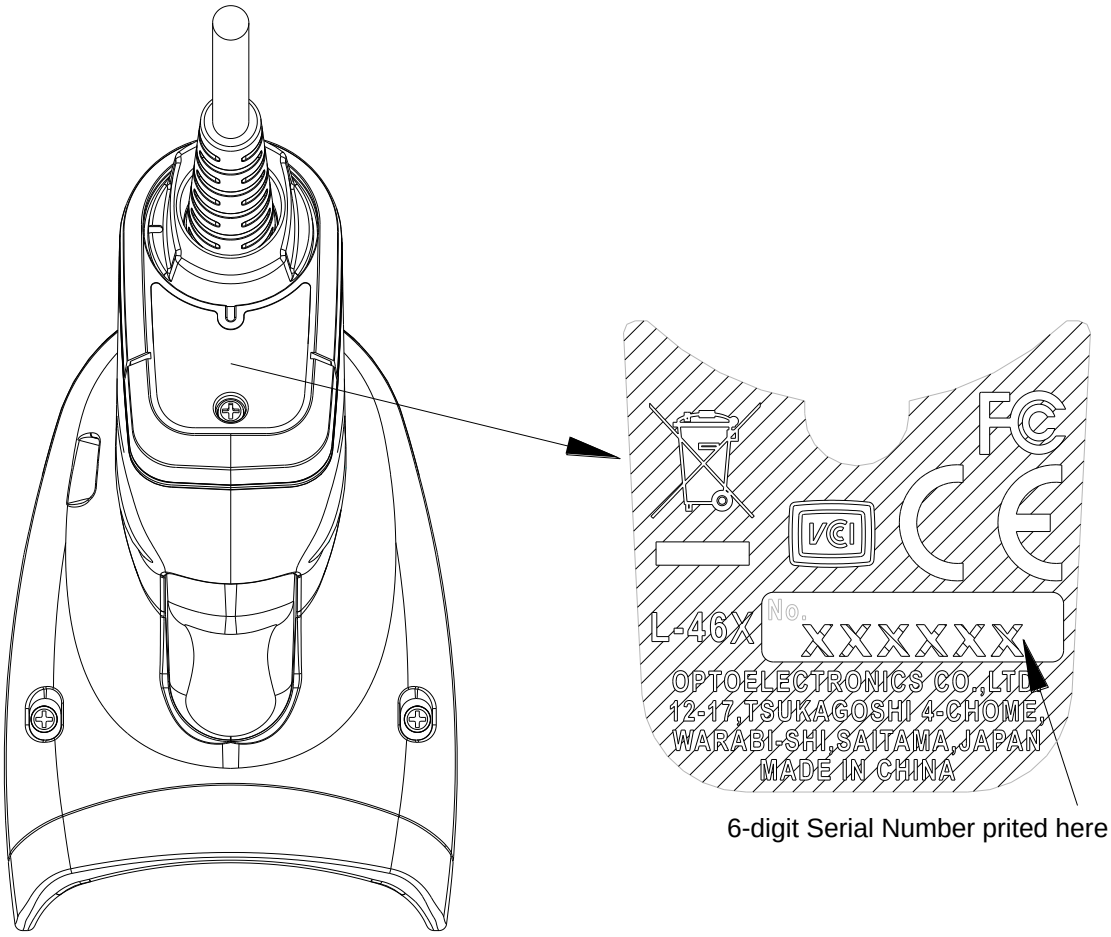
9.2.3 **Detailed View**

Dimensions	Approx.105.4 mm (D) × 60 mm (W) × 153.4 mm (H) (except protruding portion)
Weight	Approx.112 g (excluding cable)
Mechanical Drawing	



9.2.4 **Product Label**

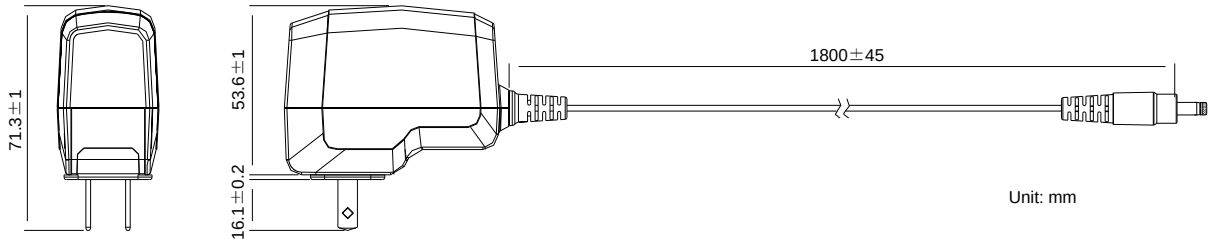
Example of label attached to the scanner is shown below:

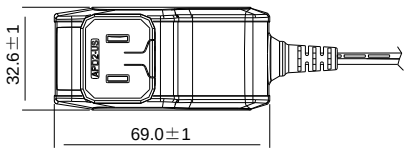


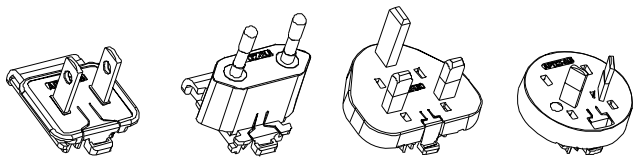
9.2.5 **Accessories**

RS-232C model product is shipped with a dedicated AC adapter.
AC Plugs connectors can be changed for to match local requirements.

Weight	Approx. 90 g (Excluding AC plug for exchanging.)
Mechanical Drawing	as following drawing



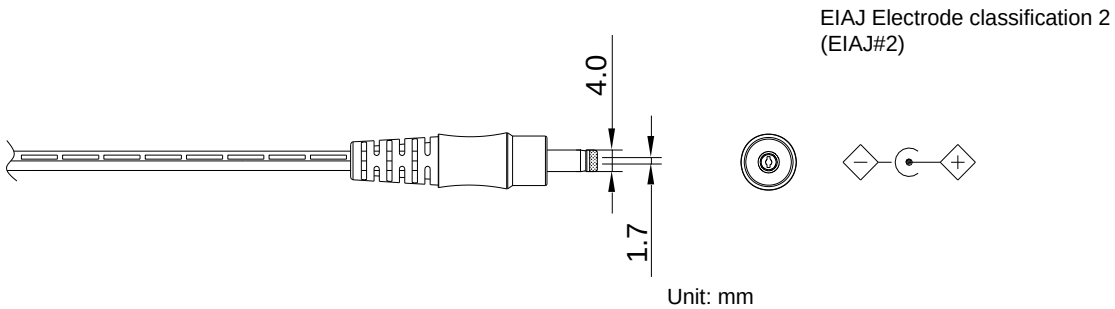




<AC plug for exchanging>

<DC output side>

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



9.3 Sample Codes

9.3.1 1D Barcode

UPC

UPC-A



UPC-A +2



UPC-A +5



UPC-E



UPC-E +2



UPC-E +5



EAN/JAN

EAN/JAN-13



EAN/JAN-13 +2



EAN/JAN-13 +5



EAN/JAN-8



EAN/JAN-8 +2



EAN-8 +5



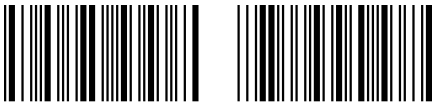
Code 39

Code 39	Code39 Italian Pharmaceutical
 CODE39	 A908557705

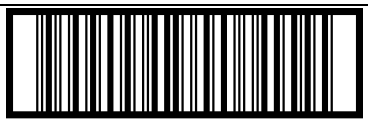
Code 39 Full ASCII	Tri-Optic
 Code 39	 R01260

Codabar

Codabar	Codabar ABC
 01235	 01234 56789

Codabar CX
 12344 56784

Industrial 2 of 5 / Interleaved 2 of 5

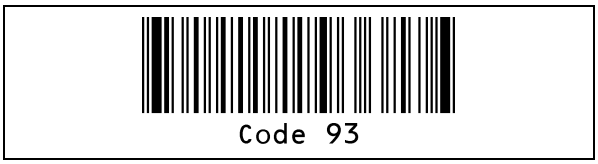
Industrial 2 of 5	Interleaved 2 of 5
 1234567895	 14901234567891

S-Code
 987654326

Code 128



Code 93



IATA



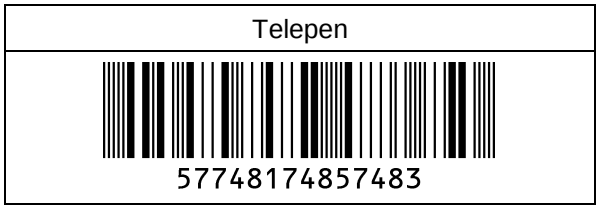
MSI/Plessey



UK/Plessey



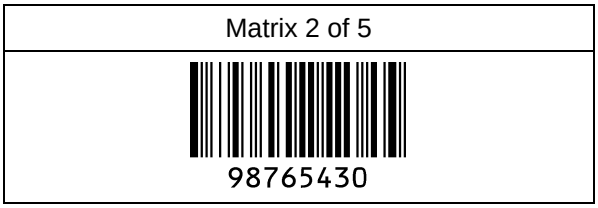
Telepen



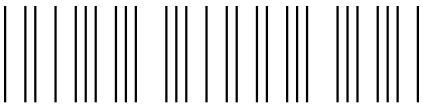
Code11



Matrix 2 of 5



9.3.2 **Postal Code**

Chinese Post Matrix 2 of 5	Korean Postal authority
 01647100611	 345-678

Intelligent Mail Barcode
 94765432101234567890

POSTNET
 012340

PLANET
 012345678905

Japan Postal
 33500024-12-17

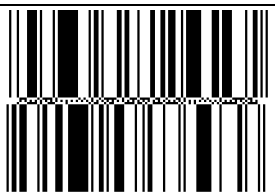
Netherland KIX Code
 3992RK28

Australian Postal
 56439111ABA9

UK Postal(Royal mail)
 12345678

4-State Mailmark Barcode
 410384224165637 62EF61AH8T

9.3.3 **GS1 DataBar**

GS1 DataBar Omnidirectional	GS1 DataBar Truncated
 0165473728281919	 0100012345678905
GS1 DataBar Stacked	**GS1 DataBar Stacked Omnidirectional**
 0198321456098768	 016547372828764 5
GS1 DataBar Limited	**GS1 DataBar Expanded**
 0117834783468340	 012345ABCDE
GS1 DataBar Expanded Stacked	
 0123456789ABCDEFGHIJ	

9.3.4 **GS1 Composite Code**

CC-A	CC-B
(17) 120903 (10) CCA (01) 0 4912345 67890 4	(17) 120903 (10) CCB (240) 123456789omnidilectionalccb (01) 0 4912345 67890 4
Limited CC-A	**Limited CC-B**
(17) 170330 (10) ABCCA (01) 1 4512345 67890 3	(17) 170330 (10) ABCCB (240) 12345678limitedccb (01) 1 4512345 67890 3
Expanded CC-A	**Expanded CC-B**
(17) 890805 (10) CCA (04) 91234598763	(17) 890805 (10) CCB (240) 1U16C19A876B54T3210expandedccb (04) 91234598763

Composite GS1-128

CC-A	CC-B
(17) 170330 (10) CCA (04) 91234598763	(17) 170330 (10) CCB (240) 123456789compositgs1128ccb (04) 91234598763
CC-C	
(17) 891010 (10) CCC (04) 91234500000	

Composite EAN

EAN-13 CC-A	EAN-13 CC-B
0123456789548 (17) 120304 (10) EANCCA 	0123456789548 (17) 120304 (10) EANCCB (240) 21U16C19A876B54T3210ean13cc-b 

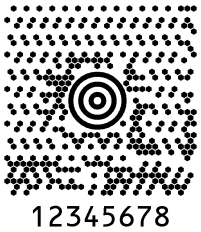
EAN-8 CC-A	EAN-8 CC-B
12345670 (17) 160401 (10) EAN08CCA 	12345670 (17) 170408 (10) EAN08CCB (240) 12345678ean8ccb 

Composite UPC

UPC-A CC-A	UPC-A CC-B
314159265358 (17) 170809 (10) UPCACCA 	314159265358 (17) 170809 (10) UPCACCB (240) 21U16C19A876B54T3210UPCACCB 

UPC-E CC-A	UPC-E CC-B
01234565 (17) 040104 (10) UPCECCA 	01234565 (17) 040104 (10) UPCECCB (240) 12345678upceccb 

9.3.5 **2D Code**

PDF417	MicroPDF417
	
Codablock F	**QR Code**
	
Micro QR	**Data Matrix(ECC 200)**
	
Aztec Code	**Aztec Runes**
	
Chinese-sensible code	**Maxi Code**
	

9.3.6 **OCR Font (Machine Readable Travel Document)**

ICAO Travel Documents

Machine readable Passports
P<JPNABCDEFG<<HIJKLMN<OPQRSTU<VWXYZ<<<<<<<<< L898902C<3JPN4209247M1609271123456789O<<<<78

Machine readable Visa-A
V<UTOERIKSSON<<ANNA<MARIA<<<<<<<<<<<<<<<<<< L8988901C4XXX4009078F96121096ZE184226B<<<<<<

Machine readable Visa-B
V<UTOERIKSSON<<ANNA<MARIA<<<<<<<<< L8988901C4XXX4009078F9612109<<<<<<<<

Official Travel Documents 1
I<UTOD231458907<<<<<<<<<<<<<< 7408122F1204159UTO<<<<<<<<<<6 ERIKSSON<<ANNA<MARIA<<<<<<<<<<

Official Travel Documents 2
I<UTOERIKSSON<<ANNA<MARIA<<<<<<<<< D231458907UTO7408122F1204159<<<<<<<6

9.3.7 **OCR Font (Free OCR Edit)**

OCR-A		OCR-B	
OCR-A Free Edit Enable		OCR-B Free Edit Enable	
4567890 0123456789012 DEFGHIJ 23456CDEFGH		345678 89012345678 FGHIJKLMN 56789012ABCD	
Free Edit Disable			

OPTICON
We scan, connect and communicate