Q-250

Wide angle 2D Imager

Serial Interface Specificaiton Manual – Rev 1.1

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

Document History

Model Number:	Q-250	Specification Number:	-
Edition:	1th	Original Spec Number:	(-)
Date:	21-April-2025		

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Limited Warranty and Disclaimers

Please read this manual carefully before installing or using the product.

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Revision History

Document Name : Q-250

Edition	Date	Section	Description of Changes	Supported Firmware
Rev 1	2024/10/11	-	Initial release	-
Rev 1.1	2025/04/21		General updates	-

Contents

1 Abstract

This document provides the serial interface specifications for the Q-250 scan engine.

1.1 Features of the Scan Engine

The Q-250 is a module, imager based, 2D barcode presentation scanner that enables high speed scanning of 1D (linear) and 2D barcodes. The main features of the Q-250 are as follows:

- **360° high speed reading:** The extremely high-performance decoder and electronics used in this product ensures stress-free scanning and fast response without being affected by hand movement and poor lighting conditions. It has full spectrum illumination suitable for on and off screen scanning.

- **Wide Angle Lens:** Provides a broad field of view, enhancing the scanner's ability to capture barcodes at small distances and at various angles and positions.

- **Fast, global shutter, highly sensitive CMOS sensor:** The camera inside the Q-250 uses a very fast 120 frames/second sensor with a global shutter with auto exposure. This results in an exceptionally high movement tolerance. The CMOS sensor has a very high sensitivity which means that the scanner can usually work without having the illumination LEDs on most of the time. This greatly improves the reading of LCD screens such as those on smart phones.

- **Editing function:** This scanner features a unique function called "Data Editing Program" 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 before it is output in one go. The output editing process, such as GS1 format, can also be configured easily.

- **Flexible interface:** The scanner comes with a dual interface that can accommodate RS232 and USB. When the USB interface is used, the scanner will be recognized as two device ports on the host computer. The first device port can be configured as keyboard (USB_HID) or as a serial port (USB-COM) over which the scanned barcode data is sent. The second port is for sending configuration commands. This allows configuring the scanner with serial commands even when it is configured as keyboard scanner. No drivers need to be installed in modern versions of Windows and Mac OS. The USB interface can be used via either a standard cable with a USB-C plug, or via a cable that is connected to the 12-pin board-to-cable header on the scanner. This header also provides the RS232 interface.

1.2 Flow to Integrate

This section describes the general flow to integrate.

1. Examine and Select the Scan Engine

Review the technical introduction:

- Before using — See Chapter 2: Before Using.
- Product specification overview — See section 10.2: Q-250 Specification Overview.

"Communication" — UART/USB

"Reading Code"

2. Download Tools

Based on the operation, download the appropriate tools from the Opticon website:

- USB-COM — "USB Driver"

3. Setting and Testing

In the actual enviroment, evaluate the optimum settings based on the operation and perform a reading test:

- Configurations — See Chapter 3.
- Interface — See Chapter 4.
- Power Management and Timing — See Chapter 5.
- Code Options — See Chapter 6.
- String Option — See Chapter 7.
- Read Options — See Chapter 8.
- Sample codes — See section 10.3.

4. Create Setting Menu

Create a command or 2D menu code suitable for operation:

- Configurations — See section 3.2.

Integrate

Refer to the "Q-250_Integration Guide".

2 Model details

The scan engine model is a combination of model name and interface.

2.1 Standard Product Specifications

The scan engine model is a combination of model name and interface.

Model name	Suffix	Standard model
Q-250_	USB-HID	Standard
	USB-COM	On request
	RS232	On request

3 Configurations

This chapter describes the scan engine configuration, default setting and saving setting, and basic commands.

3.1 Configuring with Commands

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

3.1.1 Command Packet

This section describes the command packet, from header to terminator.

<table>
<tr><th>Command Header*2</th><th colspan="2">Command ID*1</th><th>Command Terminator*</th></tr>
<tr><td rowspan="2"><ESC>
(0x1B)</td><td>None</td><td>1 - 2 digits (ASCII)</td><td rowspan="2"><CR>
(0x0D)</td></tr>
<tr><td>[(0x5B)</td><td>3 digits (ASCII)</td></tr>
</table>

*1 It is possible to send multiple command IDs between a single header and terminator, except for single digit IDs.

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>

The command can be sent via a serial monitor application.

3.1.2 Command Packet Sending Precautions

When sending packets of 32 or more characters, a transmission condition will occur under these conditions. The command may be missed.

Power Mode (UART)	UART Baud Rate [bps]							
	9600	19200	38400	57600	115200	230400	460800	921600
Standby	-	-	-	-	-	-	*	*
Low Power Standby	See section 5.4.							

Note: When sending packets of 32 or more characters, there is command packet transmission condition.

Transmission Condition: Send "Null" Characters First, and Then Send the Command After 10 ms

The maximum length of any command packet is 1000 characters. When more than 1000 characters are sent, some characters may be lost and the execution will not be performed correctly.

When a multiple command packet is sent, a subsequent command will not be received while the previous command is still being executed. To workaround this issue and get the correct timing:

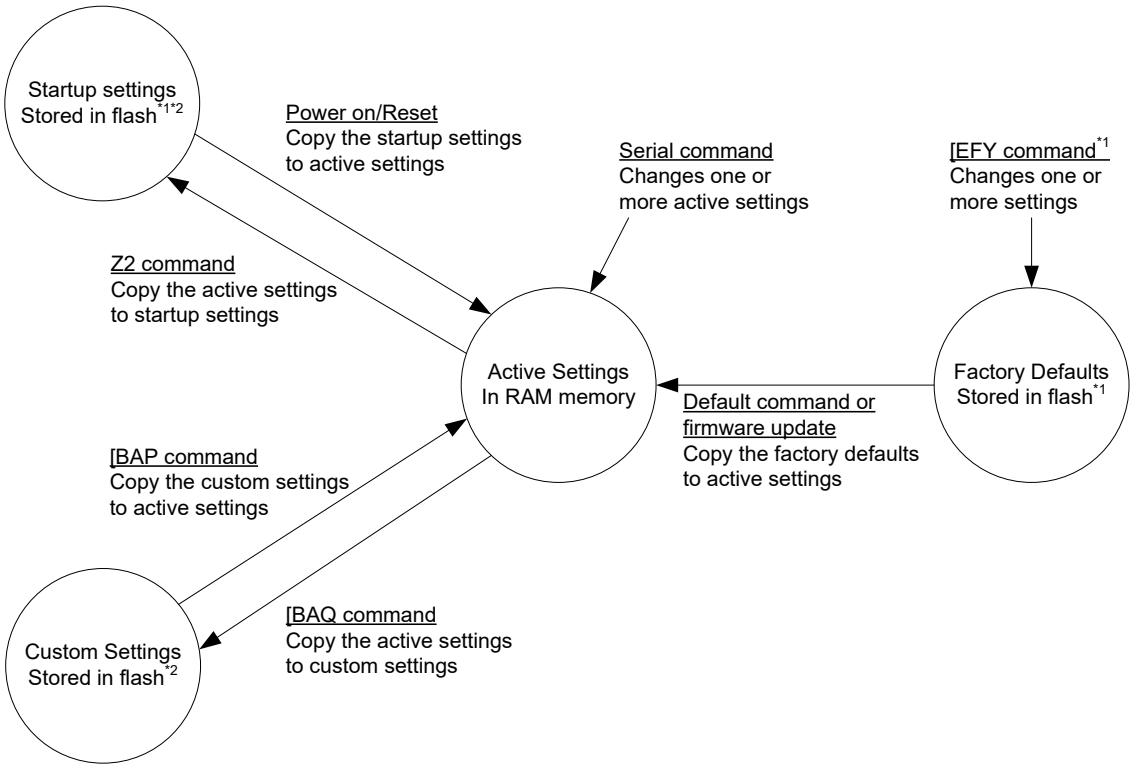
- Use a form of Handshake, BUSY/READY or MODEM, because then the RTS output will be in busy state while a command is executed making it possible to refer to this signal for the right timing. See section 4.1.6: Handshaking (Flow Control).
- Use 'ACK/NAK for serial commands'. See section 3.5.3: ACK/NAK for Serial Commands. When ACK/NAK is enabled, the scan engine will send an ACK after a command is received and processed.

Settings configured by commands are not retained in non-volatile memory. Therefore, these settings will be lost when the power is turned off and on again, and the scan engine will be in the configuration state saved in non-volatile memory. To save the settings made with commands, end the configuration by sending the Z2 command to save all the parameters in non-volatile memory.

These interface settings may disrupt communication, so they will not be reflected until they are written in non-volatile memory using Z2: Baud Rate, Data Length, Parity, and Stop Bit.

Note: Settings made by reading 1D or 2D menu codes will be saved in non-volatile memory. Any previously made settings using commands will also be saved. See section 3.6: Configuring with 2D Menu Codes and section 3.7: Configuring with 1D Menu Codes.

3.2 Command Packet Sending Precautions



*1 Only configures the factory default settings in an environment where power is stable.
*3 They can be rewritten up to 30,000 times.

3.2.1 Description of Settings

Active Settings
Active Settings are in an area in RAM, so they are lost after a power cycle. This area contains the settings that are currently active, so the scan engine operates according to these settings. These settings are loaded from one of the other areas, and contain new settings added via serial commands or menu labels.

Startup Settings
Startup Settings are in an area in non-volatile memory. When the scan engine is powered on, the data in this area is copied to the Active Settings area in RAM.

Factory Default Settings
Factory Default Settings are in an area in non-volatile memory. These are the default settings for the scan engine and are loaded to Active Settings when the default command (U2) is read or sent.

3.2.2 Interface Default Settings

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

Factory Default Setting Commands

Command	Interface	Description
U2	UART	Set back to UART Factory Default Settings
[C01	USB-COM	Set back to USB-COM Factory Default Settings
SU	USB-HID	Set back to USB-HID Factory Default Settings

3.2.3 Save Settings

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

Save Settings Command

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

Notes:

- Add “Z2” to the end of command packet to be saved.
- Saving settings more than 30,000 times may destroy memory. Avoid saving every time.
- Some settings, such as Baud Rate, will not be enabled until “Save settings” is sent.

3.3 Custom Command Line Settings (Change the Factory Default Settings)

The Factory Default Settings the scan engine was shipped with can be permanently changed via Custom Command Line commands. These settings will even survive a firmware update. The new Factory Default Settings become active after a reboot and initialization of the scan engine.

Be careful with Custom Command Line commands, because they may corrupt flash memory if the power is turned off during the setting operation. Make sure your environment has a stable power source.

Recommended settings for Custom Command Line commands:

- Fast Boot Mode. See section 3.4: Fast Boot Mode.
- Image settings. See section 3.5.7: Image Settings.
- Baud Rate, Data Length, Parity, Stop Bit, etc. See section 4.1: UART.

Command Header	Command	Separator	Command IDs (*1)	Separator	Command Terminator
<ESC>	[EFY	, (0x27)	Custom Commands	, (0x27)	<CR>

*1 Multiple commands are allowed.

To activate the new Factory Default Settings, the ”RV” command must be sent or scanned, which will reset the scan engine. To load the new Factory Default Settings, send or scan the U2 command to save the new settings so that they will be loaded after a power on.

Custom Command Line settings examples:

- Set “Fast Boot Mode” enable. “[EFXQ1”
- Set “ACK/NAK” enable. “WC”
- Set “2D Menu Code“ disable. “[D1Z”
- Set “Upside Down Image” enable. “[EFV[E8I”
- Set “Baud rate” to 115200bps. “SZ”
- Set “Low Power standby” enable. “[EB8”
- Set “Low Power standby Transition Time” to 2 seconds. “[EBAQ0Q0Q0Q2”
- Reboot the scan engine “RV”
- Initialize the scan engine “U2”

Packets sent to configure Custom Command Line settings examples:

- <ESC>[EFY'[EFXQ1WC[D1Z[EFU[E8ISZ[EB8[EBAQ0Q0Q0Q2'<CR>
- <ESC>RV<CR>
- <ESC>U2Z2<CR>

Output Configured Custom Command Line Commands
Currently configured commands in Custom Command Line settings can be output.

Item	Command	Description
Output commands	[EFZ	Output configured commands in custom command line

Example of output
[EFXQ1WC[D1Z[EFU[E8ISZ[EB8[EBAQ0Q0Q0Q2

Note: The scan engine will not send anything if no Custom Command Line commands have been configured.

3.4 Basic Commands

3.4.1 Trigger Command

The reading operation can be started and terminated by sending commands. When the read cycle timeout 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. For timeout limited reading, use the Yx commands. (See section 5.6: Read Timing.)

Trigger Command Commands

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

3.4.2 Diagnostic Commands

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

Diagnostics Commands

Command	Description
Z1	Transmit software version
ZA	Transmit ASCII printable string
YV	Transmit ASCII control string

Device Information Commands

Command		Description	Example	Possible Values
[EFK	Q0	Model Number	Q-250	N-250, L-250, P-250
	Q1	Firmware Version	ZFAV0003	ZFAVxxxx, where xxxx=revision number.
	Q2	Interface	USB-HID	UART = RS232 interface USB-HID = USB-HID (Keyboard) USB-COM = USB-Virtual COM
	Q3	Focus type	SR	SR = Standard Range HD = High Density UD = Ultra-High Density
	Q4	ID (32 digits)	0829a4530000001515f1b06b7e921f3d	Unique number for every scan engine
	Q5	Serial number	000001	Serial number of the scan engine

3.4.3 ACK/NAK for Serial Commands

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

ACK/NAK Commands

Command	Description
WC	Enable ACK/NAK for serial commands
WD (default)	Disable ACK/NAK for serial commands

3.4.4 Reboot the Scan Engine

Use this command to restart the scan engine.

Note: The “Custom Factory Default Settings” operation requires a reboot.

Software Reboot Command

Command	Description
RV	Reboot the scan engine

3.4.5 Enable/Disable 2D Menu Code

To enable or disable processing 2D menu codes, use these settings. Setting ‘Disable 2D menu codes’ is recommended when 2D menu codes are not used.

Enable/Disable 2D Menu Code

Command	Description
[D1Y (default)	Enable 2D menu code
[D1Z	Disable 2D menu code*

* Disable indicates that 2D menu codes will be read as normal 2D codes. 2D menu code data will be output when reading is successful.

3.4.6 Enable/Disable 1D Menu Code

To enable or disable decoding 1D menu codes, use these settings. Setting ‘Disable 1D menu codes’ is recommended when 1D menu codes are not used.

Enable/Disable 1D Menu Code

Command			Description	Default
[DFB	Q0	Q1	Enable 1D menu code when using TRIGn signal.	✓
	Q0	Q0	Disable 1D menu code when using TRIGn signal.*	
	Q2	Q1	Enable 1D menu code when using software trigger.	
	Q2	Q0	Disable 1D menu code when using software trigger.*	✓

* Disable indicates that 1D menu code reading is prohibited.

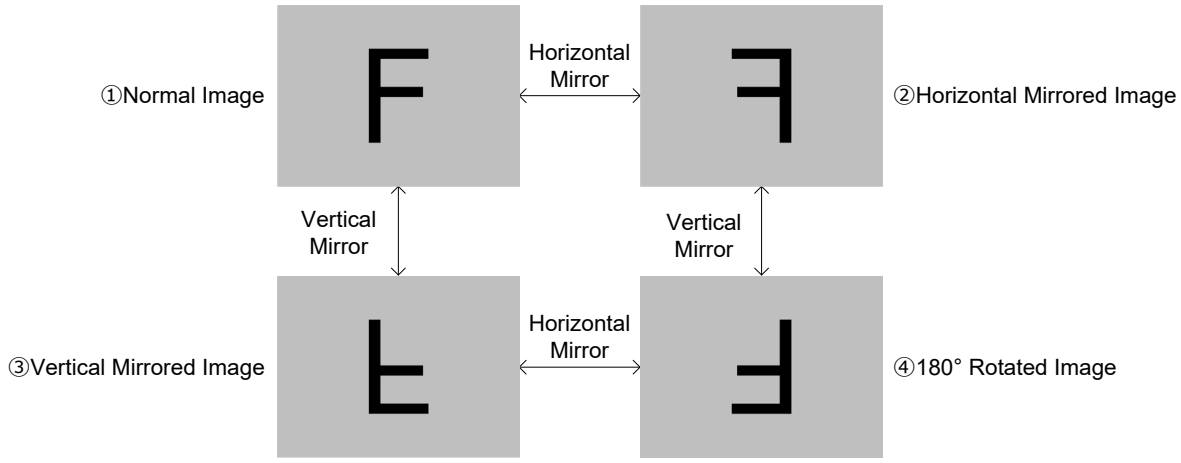
3.4.7 Image Settings

When the scan engine is mounted upside down, the sensor data is rotated 180º. This configuration is required, especially for image acquisition and OCR reading.

When an external mirror is installed in front of the scan engine, the scan engine mirrors the sensor data. Two options are available: horizontal mirror and vertical mirror.

Mirrored Image Commands

Item	Command	Description	Default
Horizontal mirrored image	[EFU	Disable horizontal mirrored image configuration	✓
	[EFV	Enable horizontal mirrored image configuration	
Vertical mirrored image	[E8J	Disable vertical mirrored image configuration	✓
	[E8I	Enable vertical mirrored image configuration	



Mirrored Image Configuration Commands

Style	Commands	Horizontal Mirror	Vertical Mirror
① Normal image	[EFU[E8J	Disable	Disable
② Horizontal mirror image	[EFV[E8J	Enable	Disable
③ Vertical mirror image	[EFU[E8I	Disable	Enable
④ 180°rotated image	[EFV[E8I	Enable	Enable

3.4.8 Disable Reading Operation

Use these settings to enable or disable reading bar codes. When reading is disabled:

- Auto trigger and TRIGn signal operation are invalid.
- Menu labels cannot be read.
- Only commands via serial communication are supported.

Reading Operation Enable/Disable

Command	Description	Remark
[EAT (default)	Enable module reading operation	Command only
[EAU	Disable module reading operation	Command only

3.4.9 Buzzer and Indicators

These commands describe the Buzzer and Status LED. See sections 9.1: Buzzer (BUZZERn Signal) and 9.2: Good Read LED (GR_LEDn Signal).

Buzzer and Status LED Commands

Item	Command	Description	Remark
BUZZERn	B	Send the confirm buzzer signal from BUZZERn.	Command only
	E	Send the error buzzer signal from BUZZERn.	
GR_LED	L	Flash the GR_LEDn.	

3.4.10 Direct Numerical Input Command

Use these commands when a command requires additional numerical input. Use the commands in one packet with the command that requires the numerical input.

Direct Numerical Input Commands

Command	Description	Remark
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	

3.5 Configuring with 2D Menu Codes

A single 2D menu code can contain multiple settings that will be processed in order, in one operation. Therefore, you can configure the scan engine with multiple settings by reading only one 2D menu code. Scanning a 2D menu code will always '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)	

You can use "Opticonfigure" to create a 2D menu code. To use "Opticonfigure", go to https://opticonfigure.opticon.com/

3.6 Configuring with 1D Menu Codes

By scanning a series of 1D menu codes specifically designed to configure the required functions, you can set up the scan engine to optimize its performance for your situation.

Basic procedure:

Scan SET menu code (ZZ). The scan engine enters menu mode.

↓

Scan one or more options.

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

↓

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

Note: 1D menu codes encode an ID consisting of two to three alphanumeric characters. 1D menu codes are Code 39 bar code labels with modified start/stop characters, so the scan engine will not acknowledge a 1D menu code as a normal bar code.

You can use “Opticonfigure” to create a Menu bar code. To use “Opticonfigure”, go to https://opticonfigure.opticon.com/

4 Interface

The scan engine supports USB-COM, USB-HID, and UART interfaces.

4.1 UART

This chapter describes UART interface settings.

4.1.1 Switch the Interface to UART

When switching the interface to UART from USB, send this command or read the 2D menu code.
Make sure the 12-pin FFC cable is connected to UART signals when using the UART interface.

Caution: UART is standard in the scan engine's factory default setting. If the host side is a USB connection circuit, communication will fail.

Change to UART

Item	Command	Menu Code	Remark
Switching Interface to UART	[X.ZU2[X.ZZ2	@MENU_OPTO@ZZ@X.Z@U2@X.Z@ZZ@OTPO_UNEM@	*

* This setting will survive a firmware update.

4.1.2 UART Interface Signal

IRISO Electronics co.,ltd 9681-12(12PIN) (bottom contact) equivalent connector is used.

No.	Name	Function	I/O	Conditions	State	Note
1	TRIGn	Trigger	In		L: Start operation H: No action	100kΩ pull up on module
2	AIM/WAKEn	Recovery signal from Low Power state	In		L: Recover from low power state H: No action	100kΩ pull up on module
		Aiming control signal in other states than Low Power	In		L: Aiming LED on H: Aiming LED off	
3	GR_LEDn	Good read LED	Out		L: LED on H: LED off	4.7kΩ pull up on module
	EX_ILLUM	Control of an external light source.	Out	Configured*1	L: External Illumination On H: External Illumination Off	
4	BUZZERn	Buzzer	Out			100kΩ pull up on module*2
5	POWERDWN	Indicates Low Power state	Out		L: Normal state H: Low Power state	100kΩ pull up on module
6	RTS	Communication control signal to host system	Out			10kΩ pull up on module
7	CTS	Communication control signal from host system	In			100kΩ pull up on module
8	TxD	Transmitted data signal	Out			10kΩ pull up on module
9	RxD	Received data signal	In			100kΩ pull up on module
10	GND	System ground				
11	V_{CC}	Power input	In		3.3V or 5.0V	
12	Reserve		In			N.C

*1 When EX_ILLUM is set, Good Read LED cannot be used.
*2 Tone/sound pressure is adjustable by PWM signal.

4.1.3 UART Basic Information

Item	Description	Default
Transfer speed	300 to 921600 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	

4.1.4 Baud Rate (Transfer Speed)

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

Use these commands to configure the baud rate. To activate and save the new configuration, use "Z2" (save settings in non-volatile memory) after these commands.

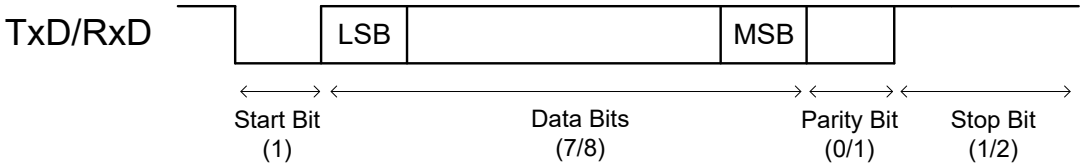
Baud Rate Commands

Command	Description	Default	Condition	Remark
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			
[D90	230400 bps			
[D91	460800 bps		Command packet Condition (See section 3.1.2: Command Packet Sending Precautions.)	
[D92	921600 bps			

*You should configure these settings at “Custom Factory Default”.

4.1.5 Character Format

The data characters are transferred in this format. A party bit is added to every character so 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.



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

Data Bit, Parity Bit, and Stop Bit Commands

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		

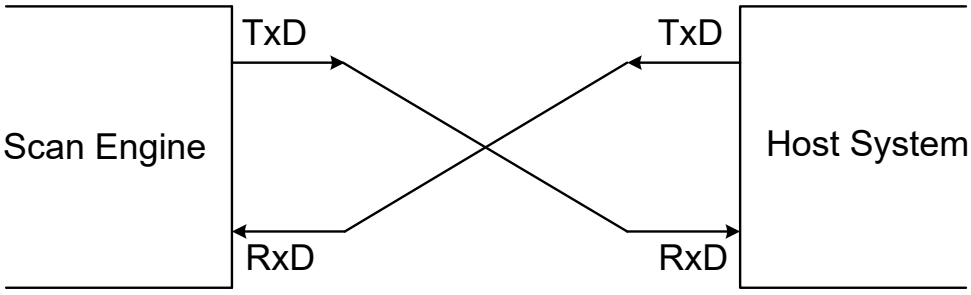
4.1.6 Handshaking (Flow Control)

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

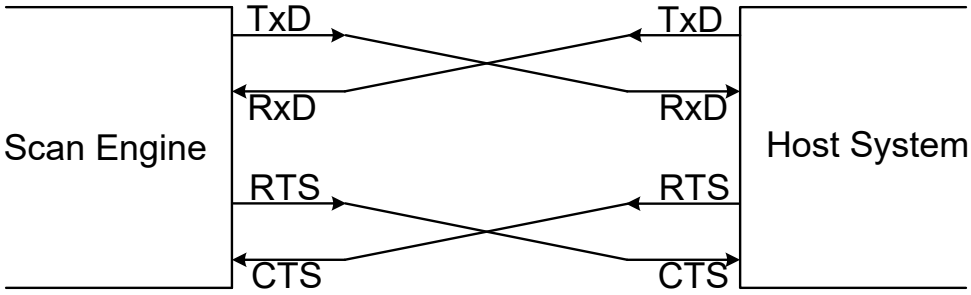
Handshaking Commands

Command	Description	Remark
P0 (default)	No handshake	Enabled after sending "Z2"
P1	Busy/ready	
P2	Modem	

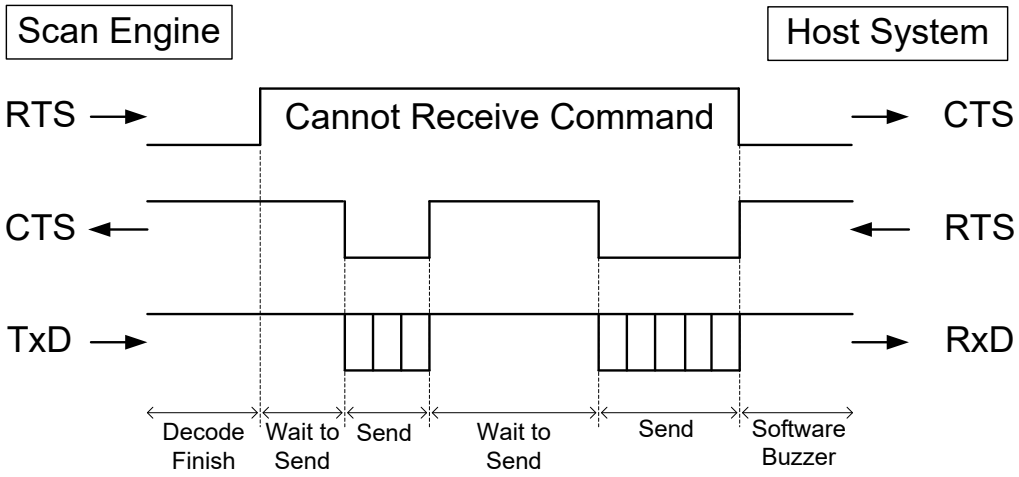
A) No Handshaking
The scan engine communicates regardless of the state of the host system.
Note: In this setting, the commands from the host system may not be received correctly.



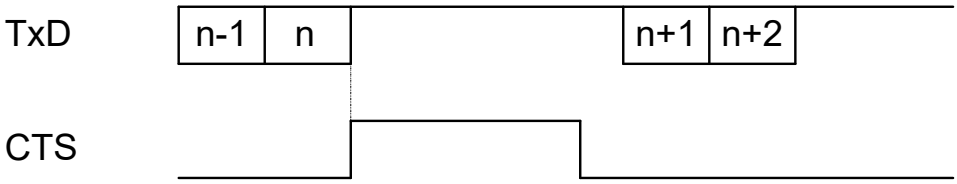
B) BUSY/READY
The scan engine and the host system notify each other when they are ready to receive data (BUSY/READY) via their RTS line. When they are connected, the CTS line can be used to check if the other side is busy (off) or ready to receive data (on).



The scan engine's RTS is typically on (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 scan engine wants to send data, it first checks if its CTS line is on (to be sure that the host is ready to receive data). If the CTS line is off, the scan engine does not send the data but waits for a specific timeout period for the CTS line to be turned 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 scan engine stops the transmission. When the CTS signal is turned on during signal transmission, characters are transmitted.



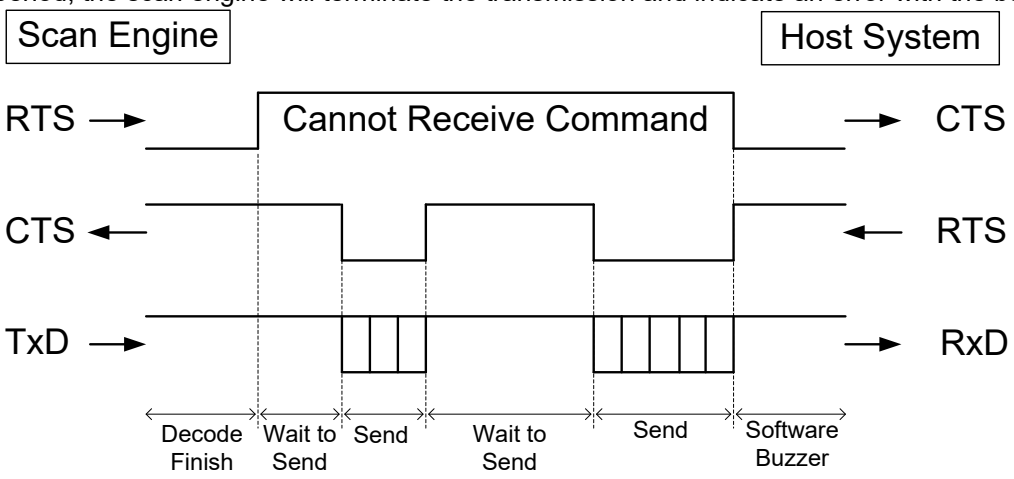
These menu codes (commands) are provided for the CTS line timeout setting. You need to use "Z2" (save settings in non-volatile memory) after these commands to activate and save the new configuration.

CTS Timeout Commands

Command	Description	Remark
I0 (default)	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 scan engine’s RTS is OFF as soon as power is supplied to the scan engine. The scan engine turns 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 scan engine is allowed to transmit data. When all data has been transmitted, the scan engine turns RTS OFF. In response, the host should turn OFF the scan engine’s CTS. If, while RTS is ON, the CTS line is not ON for a certain configurable period, the scan engine will terminate the transmission and indicate an error with the buzzer



4.1.7 Inter Character Delay (UART)

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

Inter Character Delay Commands

Command	Description	Remark
KA (default)	No delay	Activated only after “Z2”
KB	20 ms delay	
KC	50 ms delay	
KD	100 ms delay	

4.1.8 Troubleshooting UART

Use these possible solutions to troubleshoot UART problems.

Problem	Possible Solutions
Cannot communicate No response when sending command	• Verify communication settings. For example, see sections 4.1.4: Baud Rate (Transfer Speed) and 4.1.5: Character Format. • After changing communication settings, send the Z2 command. Most communication settings are not applied until the Z2 command is sent. • Verify the handshaking setting. See section 4.1.6 Handshaking (Flow Control).
Garbled characters	• Verify communication settings. For example, see sections 4.1.4: Baud Rate (Transfer Speed) and 4.1.5: Character Format. • Verify that the bar 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.

4.2 USB-COM

This chapter explains USB-COM interface related settings.

4.2.1 Switch the Interface to USB

When switching the interface to USB-COM from UART or USB-HID, send this command or read a 2D menu code. Make sure the 12-pin FFC cable is connected to USB signals when using the USB-COM interface.

Caution: UART is standard in the scan engine's factory default setting. If the host side is a UART connection circuit, communication will fail.

Change to USB-COM

Item	Command	Menu Code	Remark
Switching Interface to USB-COM	[X.Z[C01[X.ZZ2	@MENU_OPTO@ZZ@X.Z@C01@X.Z@ZZ@OTPO_UNEM@	*

* This setting will survive a firmware update.

4.2.2 USB Interface Signal

IRISO Electronics co.,ltd 9681-12(12PIN) (bottom contact) equivalent connecter is used.

No.	Name	Function	I/O	Conditions	State	Note
1	TRIGn	Trigger	In		L: Start operation H: No action	100kΩ pull up on module
2	AIM/WAKEn	Recovery signal from Low Power state	In		L: Recover from low power state H: No action	100kΩ pull up on module
		Aiming control signal in other states than Low Power	In		L: Aiming LED on H: Aiming LED off	
3	GR_LEDn	Good read LED	Out		L: LED on H: LED off	4.7kΩ pull up on module
	EX_ILLUM	Control of an external light source.	Out	Configured*1	L: External Illumination On H: External Illumination Off	
4	BUZZERn	Buzzer	Out			100kΩ pull up on module*2
5	POWERDWN	Indicates Low Power state	Out		L: Normal state H: Low Power state	100kΩ pull up on module
6	RTS	Communication control signal to host system	Out		Put it to Open.	10kΩ pull up on module
7	USB+	Communication control signal from host system	In/Out			100kΩ pull up on module
8	TxD	Transmitted data signal	Out		Put it to Open.	10kΩ pull up on module

9	USB-	Received data signal	In/Out			
10	GND	System ground				
11	V_{CC}	Power input	In		3.3V or 5.0V	
12	Reserve		In			N.C

*1 When EX_ILLUM is set, Good Read LED cannot be used.
*2 Tone/sound pressure is adjustable by PWM signal.

4.2.3 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	9039	
Suspend mode Remote wakeup	Used when the host system is using suspend.	Default: Valid
Other	CDC-ACM compliance	
Fixed COM number	Fixing COM number is possible.	Default: not fix

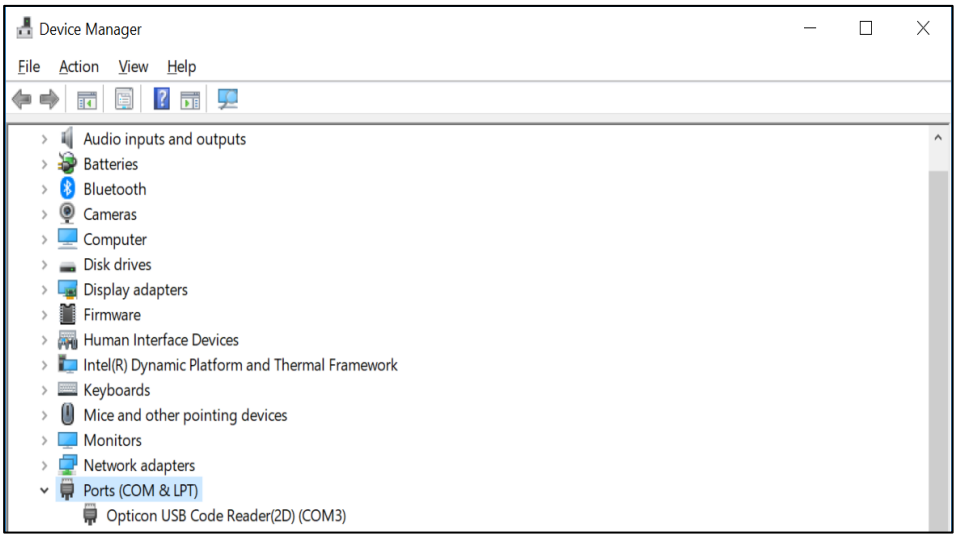
4.2.4 Integration (USB Driver)

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

4.2.5 Confirm the USB-COM Connection

For the USB-COM interface, confirm the connection:

1. Make sure your PC is running Windows 10.
2. Install the Opticon USB driver.
3. Connect the scan engine to the PC.
4. Right-click the Windows icon and click **Device Manager**.
5. Open “Ports(COM & LPT).”



4.2.6 Fixed USB-COM Port

This option enables a 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.

Note: Fixed USB-COM Port settings will become active after a reboot and initialization of the scan engine.

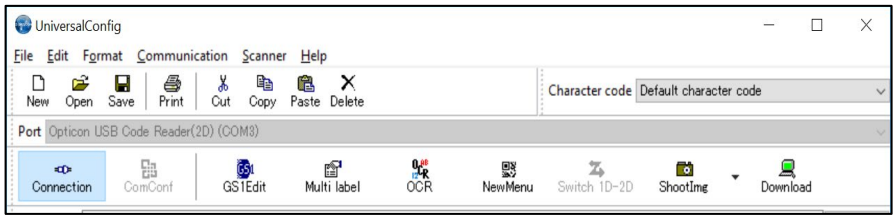
Fixed USB-COM Port Number and Driver Selection Commands

Command		Description
[EGC	Q0 (default)	Not to fix assigned COM port number
	Q1	Fix assigned COM port number

4.2.7 Connect to the Host PC

To connect to the host PC:

1. Start the tool to serial communicates (emulator or UniversalConfig).
2. Connect to the COM port confirmed at 4.2.3 Connection.



Note: For the Command packet, see section 3.1.1: Command Packet.

4.2.8 Troubleshooting USB-COM

Use these possible solutions to troubleshoot USB-COM problems.

Problem	Possible Solution
Not recognized by the PC (Scan engine does not appear in the device manager)	• Check that USB cable is properly connected. • Ensure that connected USB port is operating properly. • If you are connecting to wireless devices, like Bluetooth, disconnect once. • Verify the USB port power supply capability. When using a laptop or hub, power supply capacity may not be sufficient. • 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	• Try the possible solutions for the previous problem. • Open the COM port with the communication tool.
Cannot connect (Cannot open COM port)	• Verify the COM port number by device manager. For help, see section 4.2.5: Confirm the USB-COM Connection. • 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	Verify that the bar code to be read matches the character code of the communication tool.
Line-break is doubled	Check the line-break setting of the communication tool.

4.3 USB-HID

This chapter explains USB-HID interface related settings.

4.3.1 Switching the Interface to USB-HID

When switching the interface to USB-HID from UART or USB-COM, send this command or read the 2D menu code. Make sure the 12-pin FFC cable is connected to USB signals when using the USB-COM interface.

Caution: UART is standard in the scan engine's factory default setting. If the host side is a UART connection circuit, communication will fail.

Change to USB-HID

Item	Command	Menu Code	Remark
Switching Interface to USB-HID	[X.ZSU[X.ZZ2	@MENU_OPTO@ZZ@X.Z@SU@X.Z@ZZ@OTPO_UNEM@	Confirm host

Change to USB-HID only, no Composite interface

Item	Command	Menu Code	Remark
Switching Interface to USB-HID only	[X.Z[BBL[X.ZZ2	@MENU_OPTO@ZZ@X.Z@BBL@X.Z@Z2@ZZ@OTPO_UNEM@	No composite mode

4.3.2 USB Interface Signal

IRISO Electronics co.,ltd 9681-12(12PIN) (bottom contact) equivalent connecter is used.

No.	Name	Function	I/O	Conditions	State	Note
1	TRIGn	Trigger	In		L: Start operation H: No action	100kΩ pull up on module
2	AIM/WAKEn	Recovery signal from Low Power state	In		L: Recover from low power state H: No action	100kΩ pull up on module
		Aiming control signal in other states than Low Power	In		L: Aiming LED on H: Aiming LED off	
3	GR_LEDn	Good read LED	Out		L: LED on H: LED off	100kΩ pull up on module
	EX_ILLUM	Control of an external light source.	Out	Configured*1	L: External Illumination On H: External Illumination Off	
4	BUZZERn	Buzzer	Out			100kΩ pull up on module
5	POWERDWN	Indicates Low Power state	Out		L: Normal state H: Low Power state	100kΩ pull up on module
6	RTS	Communication control signal to host system	Out		Put it to Open.	10kΩ pull up on module
7	USB+	Communication control signal from host system	In/Out			100kΩ pull up on module

8	TxD	Transmitted data signal	Out		Put it to Open.	10kΩ pull up on module
9	USB-	Received data signal	In/Out			100kΩ pull up on module
10	GND	System ground				
11	V_{CC}	Power input	In		5.0V	
12	Reserve		In			N.C

*1 When EX_ILLUM is set, Good Read LED cannot be used.
*2 Tone/sound pressure is adjustable by PWM signal.

4.3.3 USB-HID Basic Information

Items	Description	Notes
USB	USB2.0 Full Speed	
Required power supply capacity	500 mA	Differs from actual power consumption.
Vendor ID	065A	
Product ID	9039	
Num/Caps Lock 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

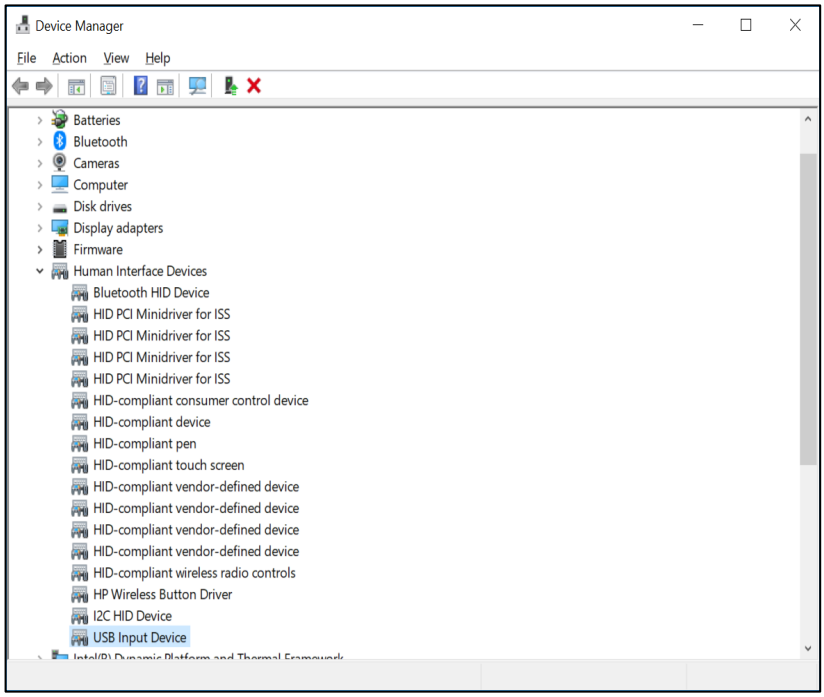
4.3.4 Confirm the USB-HID Connection

USB-HID functions just by connecting to the PC.

To confirm the USB-HID connection:

- Make sure your PC is running Windows 10.
- Connect the scan engine to the PC.
- Right-click the Windows icon and click **Device Manager**.
- Open “Human interface device”. The “USB input device” is added.

Note: If you are using other USB connected device, such as a mouse or keyboard, multiple devices will be displayed.



4.3.5 NumLock and CapsLock Control

Set NumLock and CapsLock control when sending data.

NumLock and CapsLock Control Commands

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

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

4.3.6 Data Output Speed (USB-HID)

Adjust data output speed in USB-HID. Selecting a shorter time makes the output faster. But, depending on the host system, outputting all characters may fail.

To enable this setting, you need to reboot after saving the setting.

USB-HID Data Transfer Interval Command

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

Example: Setting Data Output Speed

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

4.3.7 Inter Character Delay (USB-HID)

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

Inter Character Delay Commands

Command	Description
LA	No delay (default)
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

4.3.8 Keyboard Language

Set the keyboard language used on the host PC with the scan engine to be connect. Keyboard arrangement differs depending on the country or language. If the keyboard setting does not match, the output will be incorrect.

Keyboard Language Commands

Command	Description
KE	USA (code page)
KV	UK
KG	German
KI	French
OW	Italian
KJ	Spanish
PI	Dutch
KK	Danish
PG	Finnish
PE	Norwegian
PD	Swedish
PH	Portuguese
BAZ	Brazilian
PL	Swiss (French)
PK	Swiss (German)

4.3.9 Multi-Byte Character Output

Command	Getter / Setter	Description
C20	ALL_VALUE	Output [ALT] with 4 digits. € Euro sign = [ALT]0128
C20Q0	ALL_VALUE	Output [ALT] with 4 digits. € Euro sign = [ALT]0128
C20Q1	ONLY_ASCII	No upper ASCII
C20Q2	WITHOUT_MULTI_BYTE	Output [ALT] with 4 digits. € Euro sign = [ALT]0128
C20Q3	MULTI_BYTE_ALTL	Linux style output for upper ASCII € Euro sign = [CTRL↓][SHIFT↓]u[CTRL↑][SHIFT↑]20AC[SPACE]
C20Q4	MULTI_BYTE_ALTN	Windows Word input codepoint [ALT]digits[1] € Euro sign = [ALT]8364
C20Q5	MULTI_BYTE_ALTN_ASIS	Windows Word input codepoint [ALT]digits[1] € Euro sign = [ALT]8364
C20Q6	MULTI_BYTE_ALTN_HEX	Windows upper ASCII input[2] € Euro sign = [ALT]+20ac
C20Q7	MULTI_BYTE_ALTN_HEX_ASIS	Windows upper ASCII input[3] € Euro sign = 0020ac[ALT]X

1.	*Windows application specific.*
2.	*To use options MULTI_BYTE_ALTN_HEX A windows registry key needs to be set.* *Issue: Windows 11 does not always work* ***Registry setting enable hex numpad*** *[HKEY_CURRENT_USER\Control Panel\Input Method]* *"EnableHexNumpad"="1"* ***Registry setting disable hex numpad*** *[HKEY_CURRENT_USER\Control Panel\Input Method]* *"EnableHexNumpad"="0"* *After registry setting change a reboot or logout/login is needed for the setting to take effect.* *When enabled the Windows OS will do the translation*
3.	Some Windows application can work with 6 digit hex code [ALT]X to translate the Unicode character. This option is in Windows application specific but works in most UWP applications in Windows 11.

4.3.10 Troubleshooting (USB-HID)

Use these possible solutions to troubleshoot USB-COM problems.

Problem	Possible Solution
Output is not correct Garbled characters	• Make sure the keyboard language and output destination application are correctly configured. • If the host processing speed is not sufficient, insert an inter character delay. • If the control string is included, make sure that Ctrl +"any alphabet key" does not overlap with the shortcut key on the host side.
Line-break is doubled	Set the additional suffix setting based on the host application's line-break.
Cannot output images	Images cannot be transferred.
Scan engine does not appear in Device Manager. Restart unexpectedly Error beep sounds and data is not output when reading a bar code	• Make sure that the USB cable is properly connected. • Make sure that the connected USB port is operating properly. • Verify the USB port power supply capability. When using a laptop or hub, power supply capacity may not be sufficient. • Remove from the USB port at once, and after a while, insert again. • Insert to different port.

4.3.11 Precautions

When emulating keyboard operation, the output destination environment affects the result, especially when using control character output (Ctrl + "any alphabet key") and multi-byte output setting. Carefully review the code to use and evaluate the output destination environments.

4.4 Data Buffer Mode

The Data Buffer Mode setting is common to all interfaces. Data Buffer Mode lets you specify whether to read an object during data output. When buffer mode is enabled, the scan engine can perform other operations, such as bar code scanning, while outputting decoded data. However, the reading performance may degrade during the data output. When buffer mode is disabled, the scan engine stops other operations until the completion of decoded data output.

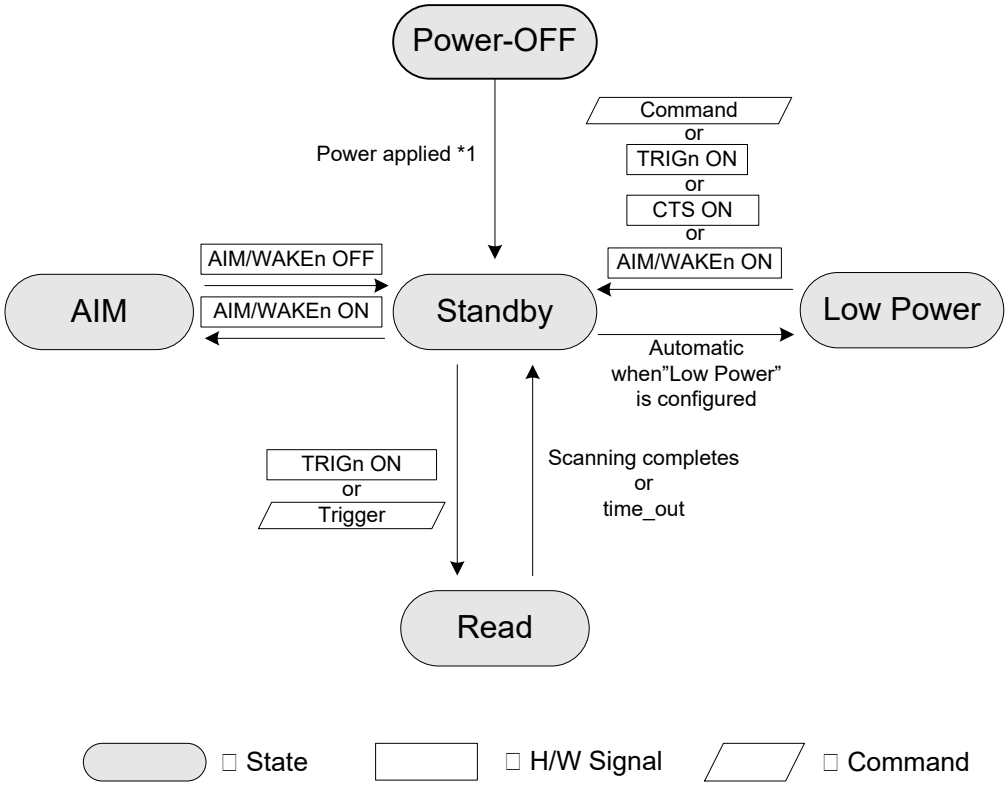
Data Buffer Mode Commands

Command	Description
[D80	Data buffer disable
[D81 (default)	Data buffer enable

5 Power Management and Timing

This chapter describes power management and various timings of the scan engine.

5.1 Power Mode Transition



*1 These options adjust the start-up time: Fast Boot and Normal Boot
*2 When Low Power is enabled, the Q-250 automatically enters Low Power mode when Standby state passes the specified time.

Power Status

Status	Description
Read	White LED illumination and green aiming light and process reading.
Standby	Ready to read. The state that can read immediately.
Low Power	Low current consumption status. The time to shift from standby is configurable.
AIM	With AIM signal is ON, green aiming lights.

5.2 Current Consumption

Each electrical specifications of the scan engine are as follows.

5.2.1 Absolute Maximum Ratings

Item	Name	Value
Power supply	VCC	0 ~ 5.5V
External trigger input	TRIG	0 ~ 12V. Idle must be high or high Z
TxD and RTS output	TXD, RTS	-6V ~ 6V
RxD and CTS input	RXS, CTS	-25V ~ 25V
USB data lines	D-, D+	0 ~ 5.5V
Buzzer, LED outputs	BUZZER, GR_LED	0 ~ 3.6V

* Operation outside the Absolute Maximum Ratings may cause permanent device damage. Note that functional operation of the device is not guaranteed at these or any other conditions beyond those listed under Recommended Operating Conditions.

5.2.2 Recommended Operating Conditions

Item	Name	Value
Power supply	VCC	5.0V±10%
External trigger input	TRIG	Open drain: Low level 0V, high level max 12V or high Z
TxD and RTS output	TXD, RTS	Driven by the Q-250, 5.4V typical.
RxD and CTS input	Low level	-12V, according to RS232 spec.
	High level	+12V, according to RS232 spec.
	High/low threshold	1V typical
USB data lines	D-, D+	0~3.3V, according to USB spec.
Buzzer, LED outputs	BUZZER, GR_LED	0~3.3V, load resistance >= 5 kΩ

5.2.3 Peak Current Consumption

Item	Name	Value
Bus-Power Class	Hi-Power	500mA max
Current consumption*:	Reading	150mA (typical)
	Max. with buzzer and LED	300mA (typical)
	Standby	100mA (typical)

* Measured at 25°C with 5V power. Current consumption may vary depending on the Host.

5.3 Low Power

Low power mode helps to further reduce power consumption when in the Standby mode. Also, the contents set in the scan engine will not be disposed when shifting to the low power mode. The low power mode can only be used with the use of an external trigger.

5.3.1 Enable/Disable Low Power

The following commands are provided for the low power standby setting.

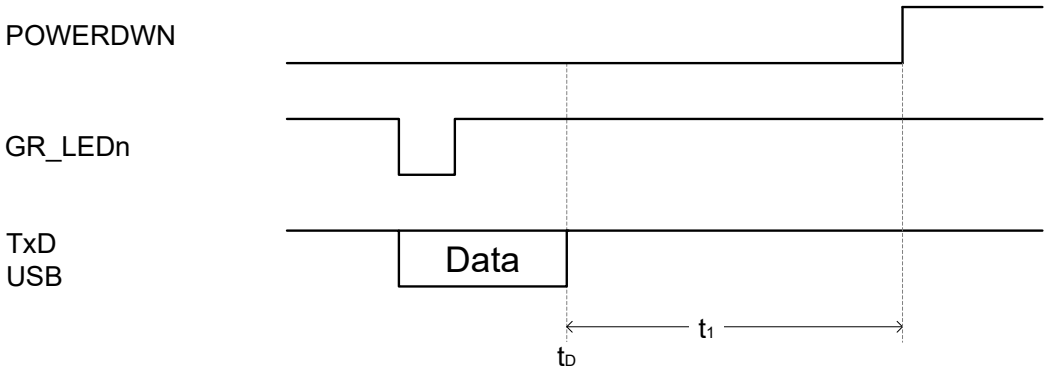
Low Power Mode Enable/Disable Commands

Command	Description
[XSC	Disable low power mode (default)
[EB8	Enable low power mode

* When you enable low power mode, the initial value of the transition time is set to 5 seconds.

5.3.2 Transition Time

You can set the transition time t_1 to low power. The transition time t_1 means that the scan engine is in "Standby mode". After the transition time t_1, low power mode becomes effective and the POWERDWN signal becomes high.



Low Power Transition Time

Command					Description	Default
[EBA	Qa	Qb	Qc	Qd	Set low power transition time with numerical values. (1000a+100b+10c+d [s])	5 s (0 - 9999)

* When 0, transition time is set to 150 ms.

Example: Command Input

Enable "low power mode" and set the transition time to low power to 3 seconds

<ESC>[EB8[EBAQ0Q0Q0Q3<CR>

Note: You should configure these setting at the factory default settings. For help, see section 3.3.

5.3.3 USB Low Power Mode Transition Condition

For USB, the scan engine transitions to low power mode when these conditions are met:

- The scan engine's low power mode is enabled.
- The scan engine passed the specified time (transition time) in standby state.
- The USB bus shifted to SUSPEND mode*1.

*1 USB bus can be placed in SUSPEND mode when effective USB communication, such as read data or command data is not performed for a certain period of time. The USB host device controls the management of this mode.

Using as USB-COM (USB Virtual COM)

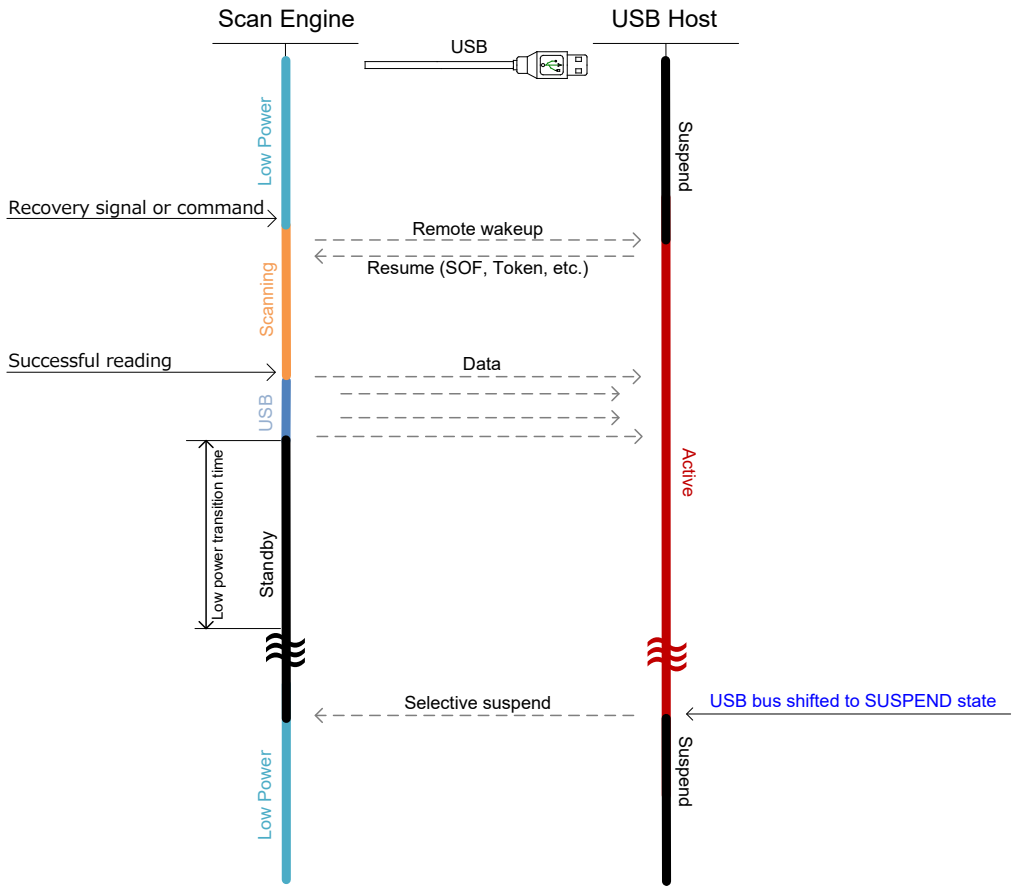
By using Opticon USB Code Reader drive Version 3.0.0.0 or after and enabling USB Selective suspend function, shifting USB bus to the SUSPEND mode when valid communication is not placed is possible. Refer to Opticon USB Code Reader drive install manual.

Using as USB-HID (Key Code Input)

When connecting a scan engine and PC that has Windows OS installed, HID connection is done by the Windows inbox driver. By controlling the registry that controls the inbox driver, you can enable the Selective suspend function. For more information, see the Microsoft HID USB peripherals page (https://msdn.microsoft.com/library/dn672268(v=vs.85).aspx).

5.3.4 USB Low Power Mode Communication Sequence

The scan engine detects USB bus shifting to SUSPEND mode and transitions to low power mode. This diagram illustrates the scan engine and USB host device communication sequence.



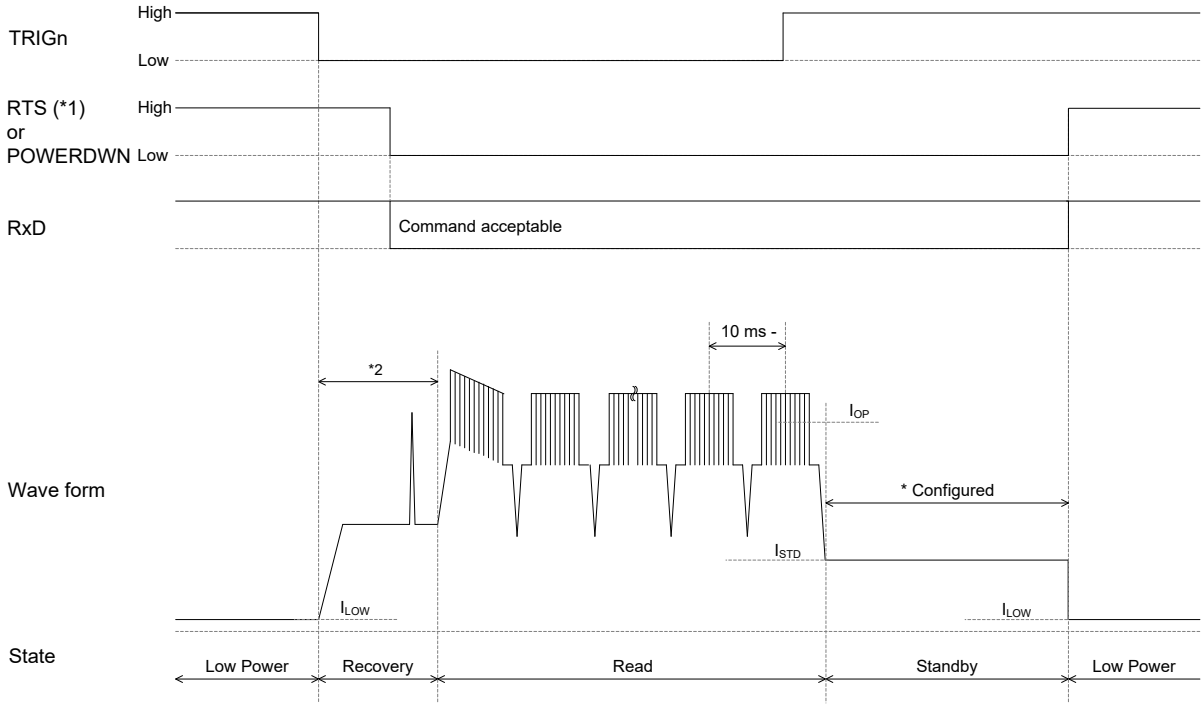
5.4 Recovery from Low Power Mode

To recover from low power mode, certain conditions, such as the signal to use and timing, must be met.

5.4.1 Recovery from Low Power Mode by Signal (UART)

To recover from low power mode, you can use a signal (TRIGn, CTS, and AIM/WAKEn). If additional commands are required, these commands will be acceptable from the time when the RTS or POWERDWN signal becomes low.

Example: Recover from Low Power Mode Using TRIGn Signal



* To configure low power mode, see section 5.3: Low Power.

*1 When communication control is set to “MODEM”, these signals cannot be used because the RTS signal becomes “High”.

5.4.2 Recovery from Low Power Mode by Command (UART)

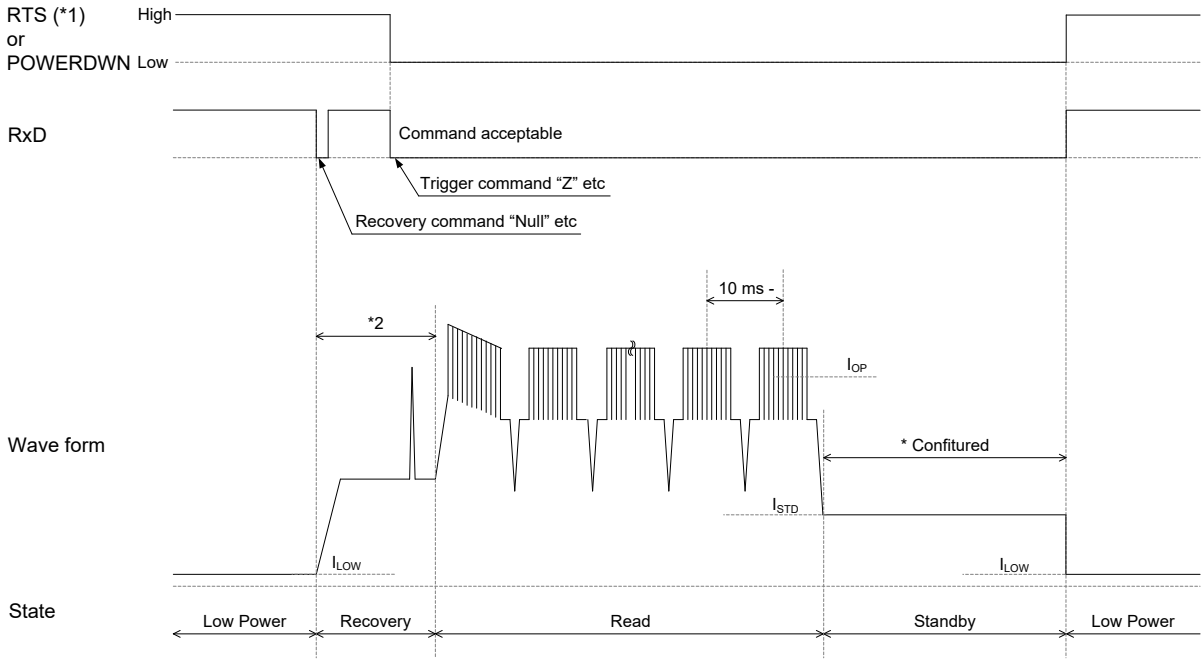
To recover from low power mode, you can use commands.

1. To start the recovery process, send Null or dummy data. The command becomes acceptable from the time the RTS or POWERDWN signal becomes low.
2. To start reading, send the trigger command “Z”.

Note: If there is no RTS or POWERDWN signal, send the command 30 ms after starting recovery.

Example: Recover from Low Power Mode Using Command

If additional commands are required, confirm the RTS or POWERDWN signal and then send the commands.

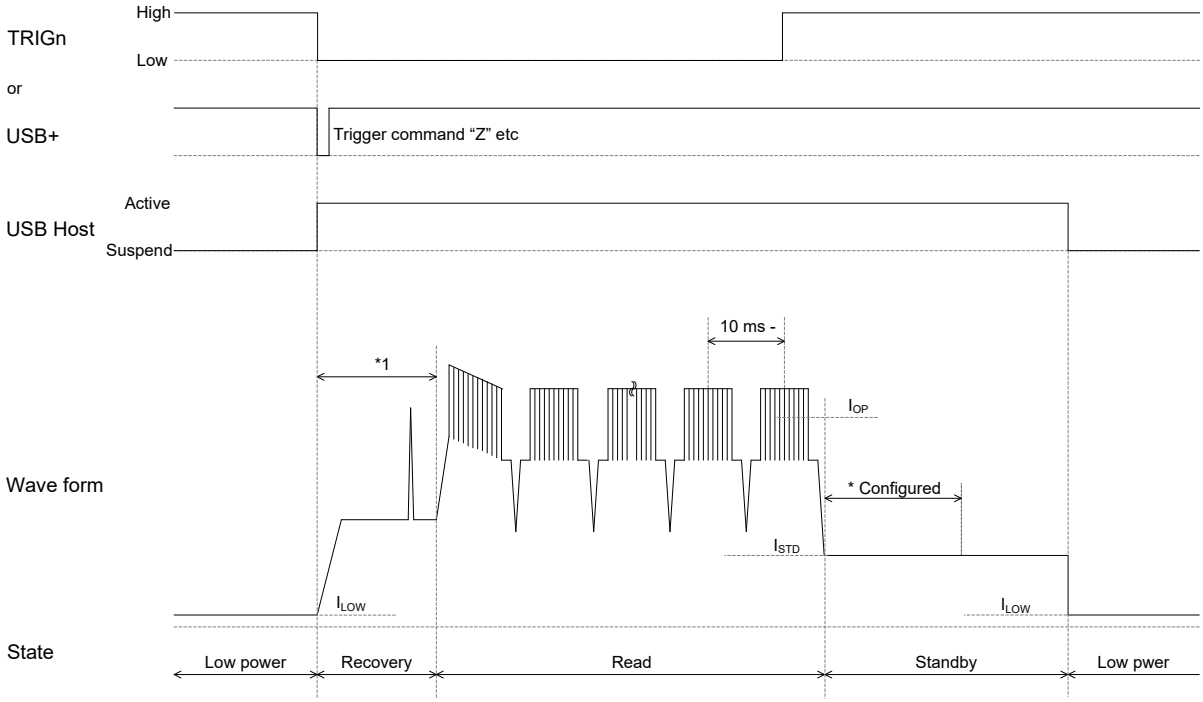


* To configure low power mode, see section 5.3: Low Power.

*1 When communication control is set to “MODEM”, these signals cannot be used because the RTS signal becomes “High”.

5.4.3 Recovery from Low Power Mode (USB)

To recover from low power mode, you can use a signal (TRIGn, CTS, and AIM/WAKEn) and a command. Recovery starts with a signal and becomes readable in about 43 ms. USB always accepts the command. USB shift to Active after sending the command.



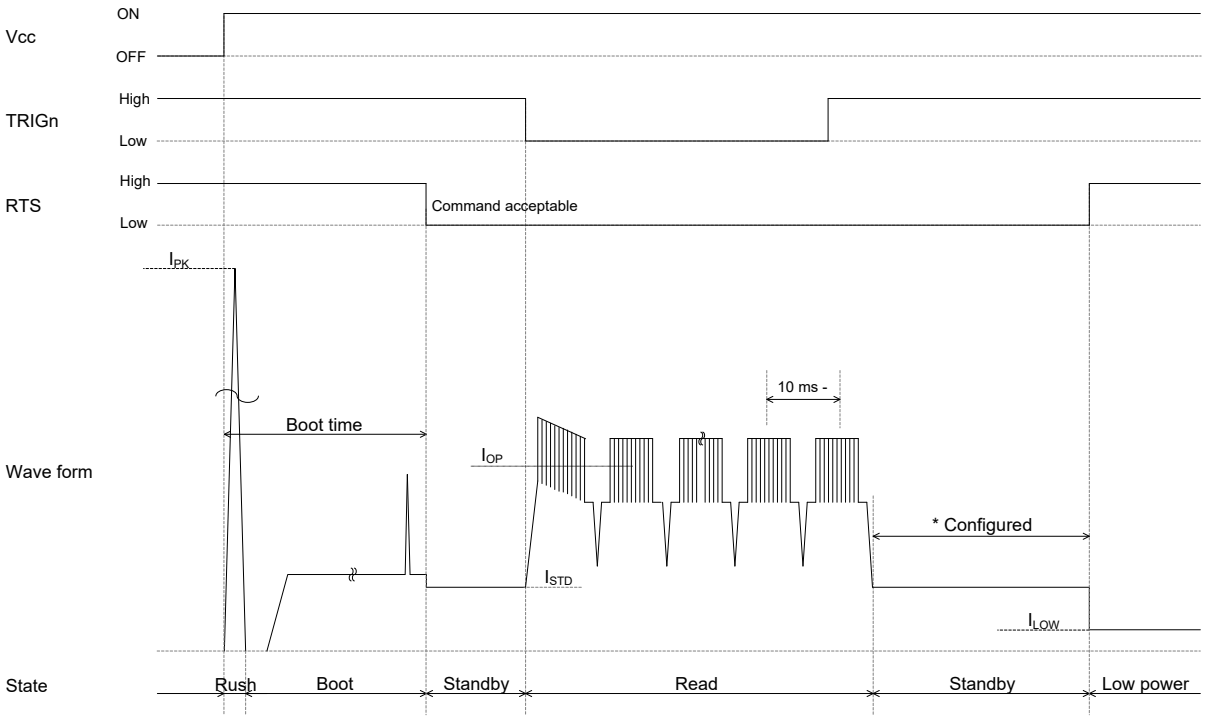
* To configure low power mode, see section 5.3: Low Power.

5.5 Power ON/OFF Timing

This section describes the power on/off timing of the scan engine.

5.5.1 Power-On Timing

Power-on timing indicates the time from power on until the scan engine can read bar codes.



*1 When communication control is set to “MODEM”, these signals cannot be used because the RTS signal becomes “High”.

Startup Time Modes

(IF:UART/USB VCC = 3.3V/5.0V TA = 25°C)

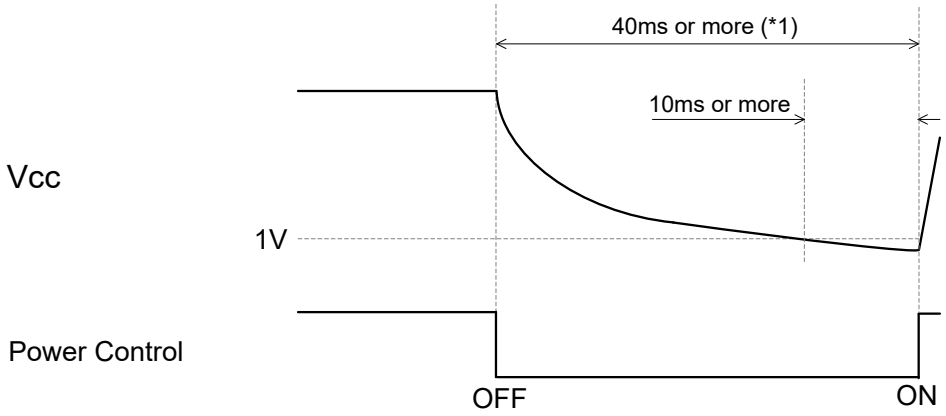
Mode	Condition	Min	Typ	Max	Unit
Normal Boot		-	510	-	ms
Fast Boot Mode	Configured*1		425	-	ms

*For more information about fast boot mode, see section 3.4: Fast Boot Mode.

5.5.2 Power-Off Timing

When the power is turned off while an input signal to the scan engine is high, leakage current will be drawn from that signal. Therefore, all input signals to the scan engine should be set to “High impedance” or “Low”.

The interval between scan engine powers off to on, the time for 10 ms or more with Vcc 1V or lower is required.



*1 For MEK-3100 circuit configuration, 40 ms or more is required.

Caution: For power off when saving configurations, the settings are stored in the scan engine:

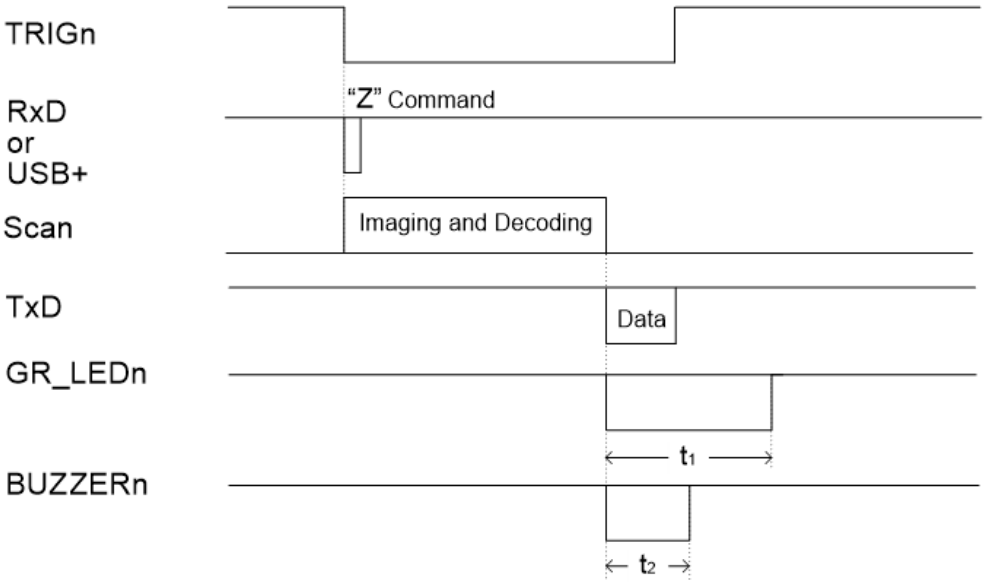
- when the Z2 command is sent to save the parameters.
- after 1D or 2D menu codes are processed.

Writing the settings to the flash ROM can take up to 10 seconds. Make sure the power is not turned off during this period or the settings may be corrupted.

Note: When the Z2 command is sent, if the option “ACK/NAK for serial command” is enabled, the scan engine will send an ACK after writing the configuration data is completed. This function lets you get the correct timing.

5.6 Read Timing

The read timing of the scan engine is as follows.



Symbol	Description	Min	Typ	Max	Unit
t_1	GR_LEDn signal period		200*1	-	ms
t_2	BUZZERn signal period	-	50*2	-	ms

*1 GR_LEDn signal period can be set. See section 9.2: Good Read LED (GR_LEDn Signal).
*2 BUZZERn signal period can be set. See section 9.1: Buzzer (BUZZERn Signal).

5.6.1 Read Effective Time

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

Read Effective Time

Command	Description
Y0	Trigger signal synchronization or “Z” “Y” command control (default)
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

Note: When auto trigger is set and the command “Y0” is set, the read effective time is automatically set by image processing.

Read effective time can also be set with a specific time in increments of 10 ms. To set read effective time with a specific time, enter the command followed by a 4-digit numeric command.

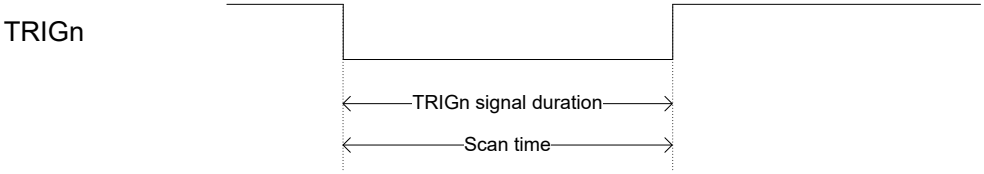
Read Effective Time Numeric Setting

Command					Description	Default (Effective range)
[EF7	Qa	Qb	Qc	Qd	Set read effective time (1000a+100b+10c+d) [x10 ms]	Trigger synchronize

Example: Setting Read Effective Time, Numeric Setting
Read effective time 500 ms
<Esc>[DF7Q0Q0Q5Q0<CR>
0050 x10 = 500 ms (This setting is in increments of 10 ms.)

5.6.2 Trigger Signal Control

By default, trigger signal synchronization is set to (Y0). The TRIGn signal determines the reading time. If TRIGn signal is active, the scan engine will read bar codes.

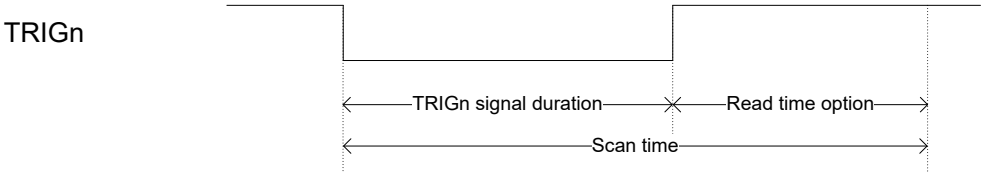


Effective Read Time

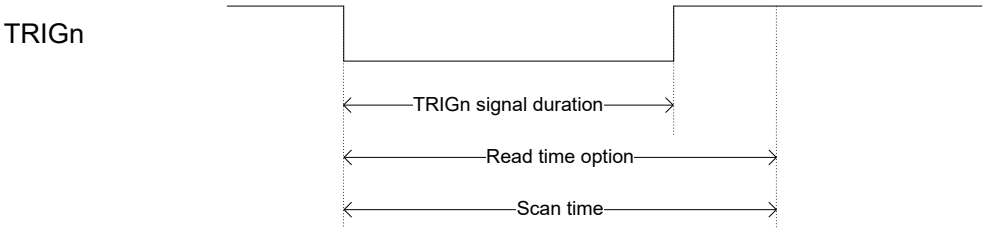
Command	Description
+O (default)	Counting starts from TRIGn signal end
+P	Counting starts from TRIGn signal start

Note: For more information, see section 5.6.1: Read Effective Time.

Counting starts from the TRIGn signal end.

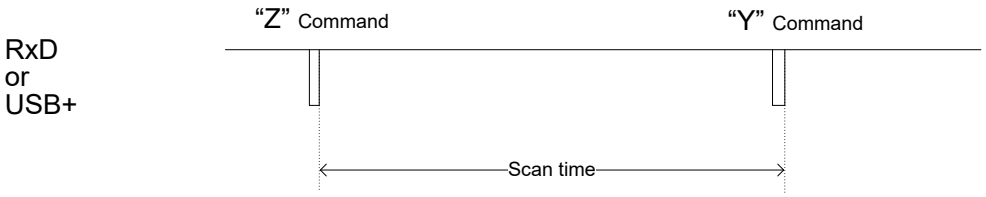


Counting starts from the TRIGn signal start.

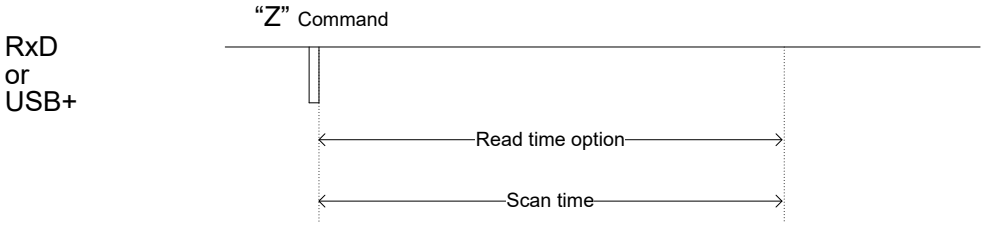


5.6.3 Command Trigger Control

When reading with a command, start reading with the trigger “Z” command and stop reading by sending the “Y” command.



When effective read time is set, reading stops when the set time elapses. Reading also stops when the “Y” command is sent.



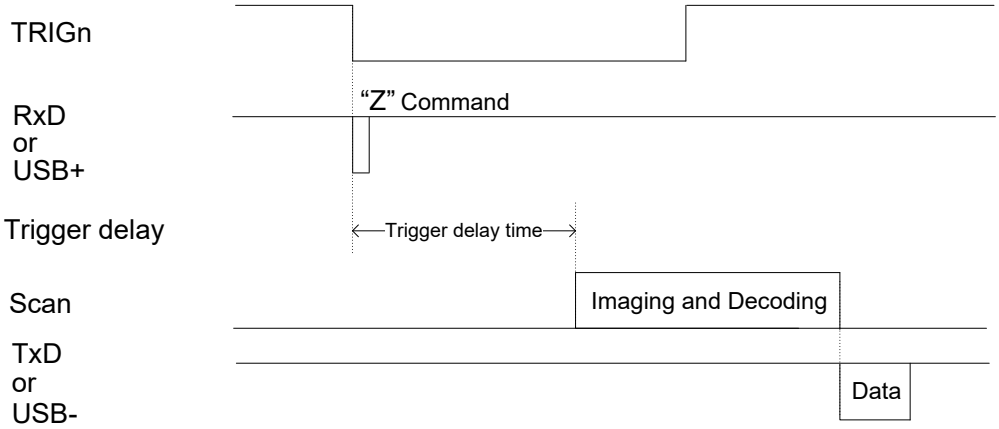
5.6.4 Trigger Delay

Trigger delay can start reading from after the trigger delay set time to the trigger.

Trigger Delay

Command					Description	Default
[DEC	Qa	Qb	Qc	Qd	Trigger delay time (1000a+100b+10c+1d)x[10ms]	0 ms

Timing diagram of the trigger delay:



5.6.5 Decode Timeout

Decode timeout limits decode processing time for one image. When reading bar codes continuously, decoding a poor quality bar code image and peripheral symbols may take time. By limiting the decode time, the scan engine will try to decode the next image and may stabilize the reading.

Decode Timeout

Command							Description	Default
[EAV	Q7	A4	Qa	Qb	Qc	Qd	Decode timeout (1000a+100b+10c+1d)x[1ms]	0 ms *

* Decode timeout = 0 means that the function is disabled and processes decoding for one image until the end. The processing time depends on the image.

6 Code Options

The code options for the scan engine let you configure the enabled bar code types, bar code specific options, and number of characters to be read.

For best reading performance, you should only enable the bar codes and options you need. These settings do not affect the reading of the 1D menu codes.

For more information, see section 10.3 Sample Codes.

6.1 Setting Readable Codes

Configuration commands are classified by one of these categories:

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

6.1.1 1D Bar Codes

Symbologies	Enable/Disable Command			Default					
	Single	Multiple	Disable	Enable	Mini Length	Positive Negative Image	ST/SP Transmission	CD check	Suffix
UPC	J1	R1	[X4B	✓	-	Positive Image Only	-	✓	USB-HID "ENTER" USB-COM UART "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		-	×	

* GS-128 will read as Code 128. To convert GS1-128 to GS1, see section 6.2.1: GS1 Convert.

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"
Korean Postal Authority	JL	WH	WI		USB-COM UART "CR"

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 UART "CR"
GS1 DataBar Limited	JJ		JY		SK		✓	
GS1 DataBar Expanded • GS1 DataBar Expanded • GS1 DataBar Expanded Stacked	JK		DR		SL		✓	

Note: To convert to GS1, see section 6.2.1: GS1 Convert.

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 UART "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				

Notes:

- To convert to GS1, see section 6.2.1: GS1 Convert.
- 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 UART "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		
Dot Code	[DOC	[DOD	[DOE		

Note: To convert to GS1 and read GS1 QR codes and GS1 Data Matrix, see section 6.2.1: GS1 Convert.

6.1.6 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 UART "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		

Note: Because the format is fixed, ICAO travel documents can be read regardless of the image direction.

To free edit and read standard OCR fonts see section 6.2.7: OCR Free Edit. For advanced settings, see the "Data Edit Programming Manual".

6.1.7 Code Type Settings

Symbologies	Initialize Command	Enable (Single)	Enable (Multiple)	Disable
All 1D Bar Codes	[DX1	[BCA*1	[BCM*1	[BCY
All 2D Codes	[DX2	[BCB	[BCN	[BCZ
All Codes (1D, 2D)	[DX0*2	A0*3		B0

*1 Add-on code will also be added. The Add-on delay timer will be activated and requires a longer time to read.
*2 OCR will also be initialized.
*3 OCR and Add-on will not be added.

6.2 Setting Code Common Options

6.2.1 GS1 Convert

Because the FNC1 character is not included in ASCII, when it is used, variable length termination will not be transmitted when reading GS1 symbols (GS1-128, GS1 DataBar, GS1 DataBar Composite, GS1 DataMatrix, GS1 QR Code, GS1 Dot Code) with the default setting. For GS1 conversion, to analyse the GS1 data at the host, convert variable length data termination FNC1 to ”Ctrl+]” and key outputs for USB-HID. For USB-COM and RS-232C, you need to convert to GS(0x1D) and outputs. However, if the last of variable length data is AI data, FNC1 does not exist and GS is not output.

<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 UART

AIM-ID (output)	AI	Data (fixed length)	AI Data (variable length)	**GS(0x1D)** (output)	・・・	AI	AI Data (variable length)

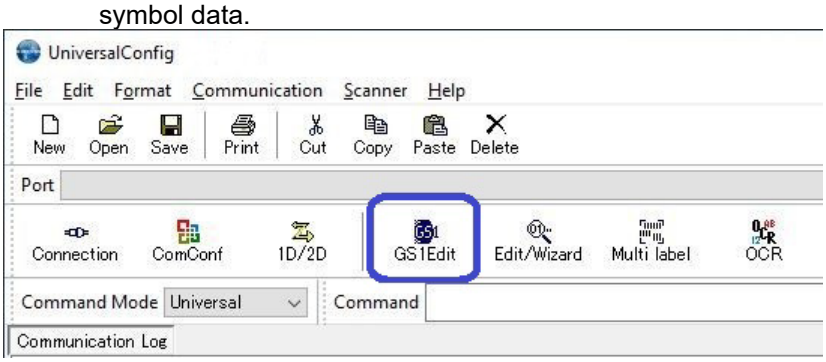
* For AIM-ID, see section 9.1.2: Good Read Buzzer.

GS1 Convert

GS1 Conversion Supported Symbologies	Command	Command Description
GS1-128 GS1 DataBar GS1 DataBar Composite GS1 Data Matrix GS1 QR Code GS1 Dot Code	[X/0 (initial setting)	Disable GS1 conversion
	[X/4	Enable GS1 conversion

To process and output GS1 conversion data in the scan engine:

- Use the Opticon application tool “UniversalConfig” to enable processing and outputting GS1 symbol data.

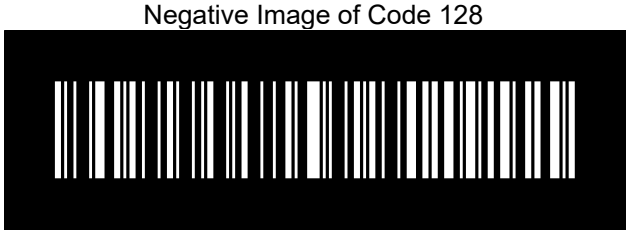


6.2.2 Positive and Negative Image of Bar Codes (1D Code Common)

Typically, bar codes are printed in black on a white background (normal/positive bar code). But there may be instances where they are printed in white on a black background (negative bar code).

Positive Image of Code 128

Negative Image of Code 128



Positive and Negative Bar Code Image

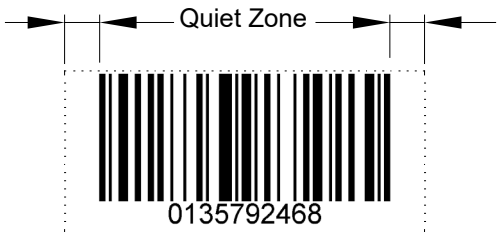
Code	Command		Description
1D	[DLA	Q0	Decode positive bar codes only. (default)
		Q1	Decode negative bar codes only.
		Q2	Decode positive bar codes and negative bar codes.

Note: For best reading performance, only enable the required codes and options.

.

6.2.3 Smart Quiet Zone (1D Code)

The required margin on the left and right of the bar code is called the quiet zone. If the quiet zone is narrow or the flame line is too close, enabling the smart quiet zone will adjust to the maximum performance for reading various 1D bar codes. This setting does not comply with bar code standards, so the possibility of misreading may increase. If misreading occurs, disable this setting.



Smart Quiet Zone Enable/Disable Commands

Item	Command			Description
Enable smart quiet zone	[DLY	Qa	Qb	Enable the code specified by QaQb
Disable smart quiet zone	[DLZ			Disable the code specified by QaQb

1D Bar Code Settings for Smart Quiet Zone

Symbologies	ab	Default
EAN/UPC	01	✓
Code 39	02	✓
Codabar	03	
Industrial 2 of 5	04	
Interleaved 2 of 5	05	
S-Code	06	
Code 128	07	✓
Code 93	08	✓
IATA	09	
MSI/Plessey	10	
UK/Plessey	11	
Telepen	12	✓
Code 11	13	✓
Matrix 2 of 5	14	
Chinese Post Matrix 2 of 5	15	✓

6.2.4 Redundancy (1D Code Common)

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

Note: This setting only affects reading 1D Bar Codes.

Redundancy Commands

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

6.2.5 Add-On Waiting Time

The scan engine searches for valid UPC/EAN add-on codes within the selected amount of time. If an effective add-on code is found, the scan engine immediately sends the data. If there is nothing to read after the code, the scan engine sends the data without an add-on. If there is something to read after the code but it is not a valid add-on code, the scan engine ignores the code.

Supported codes:

- UPC 2 digits/5 digits add-on and GS1 composition symbol
- EAN/JAN 2 digits/5 digits add-on and GS1 composition symbol

Add-On Waiting Time Commands

Command	Description
XA	Add-on standby mode invalid
XB	Add-on standby mode 0.25 seconds
XC	Add-on standby mode 0.5 seconds (initial setting)
XD	Add-on standby mode 0.75 seconds

6.2.6 ECI Protocol Output

ECI Protocol Output determines whether to output data related to ECI (Extended Channel Interpretation) protocol in 2D codes (QR Code, Data Matrix, Aztec Code, Maxi Code, and Dot Code).

If ECI protocol exists for data, the ECI number is indicated by a 6-digit number following the backslash and two backslashes indicating a backslash.

To not output ECI protocol, change the data career identifier to ID not use ECI protocol, delete the 6-digit number following the backslash, and replace the two backslashes with one backslash.

Supported codes: QR Code, Data Matrix, Aztec Code, Maxi Code, and Dot Code.

Example Output

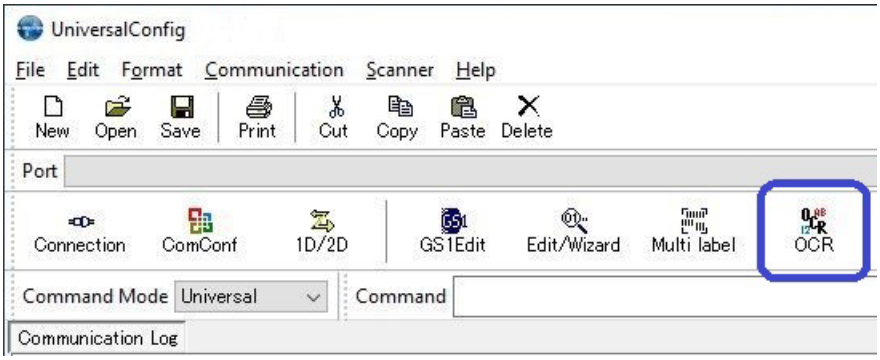
```
 Output:         ]Q2\000001test\\test
 Not output:     ]Q1test\test
*Backslash: ’\’
```

ECI Protocol Output Commands

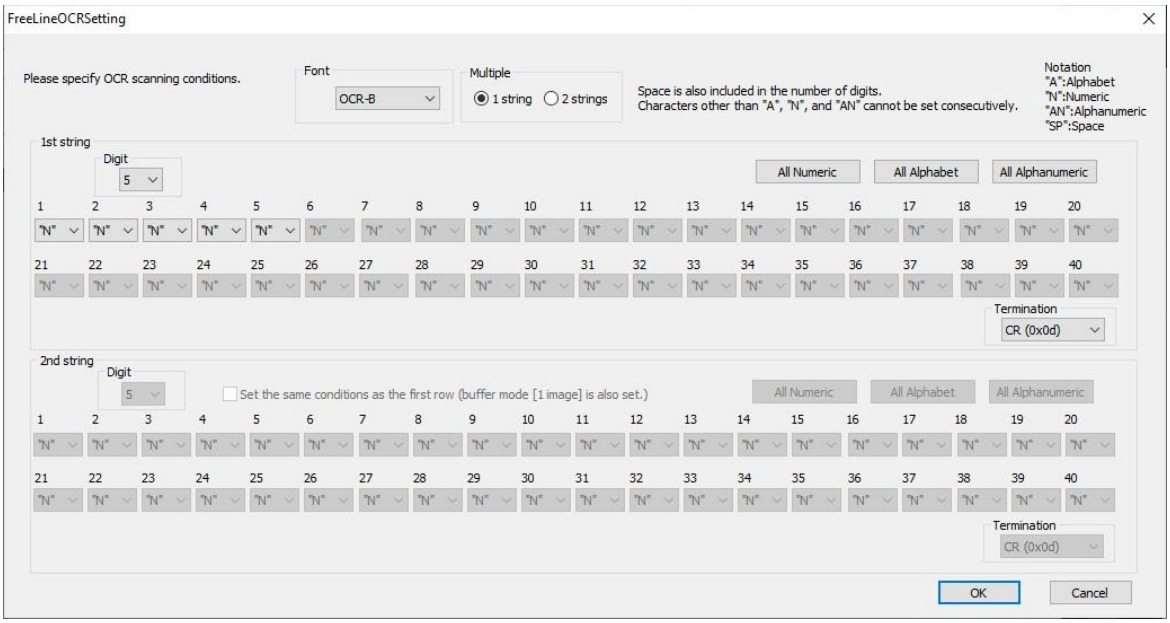
Command	Description
[DLE	Do not output ECI protocol (default)
[DLF	Output ECI protocol

6.2.7 OCR Free Edit

To read OCR standard format, use the UniversalConfig tool to configure OCR free edit to generate a setup QR code.



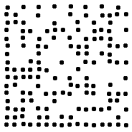
You can set up to 40 digits (2 rows) of numbers, alphabets, and symbols. For advanced settings, see the “Data Edit Programming Manual”. For items that cannot be set, please contact your local sales office.



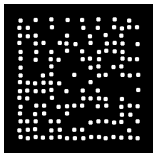
6.2.8 DPM (Dot Peen Making) Code Reading

DPM reading is used to read codes that are imprinted directly on metal or other materials in the form of dots.

DataMatrix in dot print



DataMatrix in negative dot print



Normal DataMatrix

The scan engine may not be able to read theses codes due to specular reflection or contrast reduction due to materials or curved surfaces.

DPM Reading Commands

Command		Description
[DPF	Q0 (default)	Do not read DMP patterns.
	Q1	Execute processing of multiple DPM patterns.
	Q2	Execute processing of multiple DPM patterns and fixate to the process where reading was successful. *

* Fixating the DPM pattern process stabilizes the reading. To initialize the fixated process, resend [DPFQ2.

6.3 Setting Code Specific Options

6.3.1 UPC

UPC code is a bar code established by the United States Uniform Code Council Inc. and used by the distribution industry.

6.3.1.1 UPC-A

UPC-A Configuration

Item	Overview
Character set	Numeric (0 - 9)
Number of digits	12 digits (11 digits +CD1 digit) fixed length
CD (check digit) check method	Modulus 10/Wait 3

UPC-A Transfer Data Format

Leading "0"	Data 11 digits	CD 1 digit

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

UPC-A Add-On 2 Digits/5 Digits

UPC-A Add-On 2 Digits/5 Digits is a UPC-A bar code of plus a 2-digit or 5-digit supplemental code. When add-on is enabled. The add-on code must be within the reading range of the scan engine. If it is not within range, after the add-on waiting time the scan engine reads the code as UPC or EAN. When add-on is allowed and the scan engine is only reading UPC or 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

Use this command to determine whether to transmit a CD (check digit) and a leading “0”. If you set the 13 digits transfer data format that transfers a leading “0” and CD, the format becomes compatible with JAN/EAN-13.

6.3.1.2 UPC-E

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 UPC-E bar code plus a 2-digit or 5-digit supplemental 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
Use this command to determine whether to transmit a CD (check digit) and a leading “0”. If you set the 8-digit transfer data format that transfers a leading “0” and CD, the format becomes compatible with JAN/EAN-8.

Convert UPC-E to UPC-A Format
You can convert UPC-E to UPC-A format.

UPC-A and UPC-E Settings

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, do not transmit CD	
		E5	UPC-A, No leading zero, do 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, do not transmit CD, transfer digits 7 digits	
		E9	UPC-E , No leading zero, do 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, common product symbols in the distribution industry. The 13-digit version is the standard version and the 8-digit version is the shortened version.

6.3.2.1 EAN/JAN-13

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

EAN/JAN-13 Add-On 2 Digits/5 Digits

EAN/JAN-13 Add-On 2 Digits/5 Digits is an EAN/JAN -13 bar code plus a 2-digit or 5-digit supplemental code. When add-on is enabled. The add-on code must be within the reading range of the scan engine. If it is not within range, after the add-on waiting time the scan engine reads the code as UPC or EAN. When add-on is allowed and the scan engine is only reading UPC or 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

Use this command to determine whether to transfer EAN/JAN-13 CD (check digit).

EAN-13 Forced Add-On

You can force EAN-13 with leading 3 digits (378/379/529/414/419/434/439/977/978) to be handled as “with add-on”. When enabled, the bar code without the add-on (which is the condition of leading 3 digits) cannot be read.

ISBN Conversion

When ISBN conversion is enabled, it converts data with an EAN-13 leading “978” or “979”. ISBN conversion re-calculates the CD by omitting the leading 3 digits and outputs 10 digits. If CD is 10, X is output.

Examples:

- ISBN conversion of EAN-13 “9791230671184”; converts to “1230671188” and outputs this data.
- ISBN conversion of EAN-13 “9780123782830”; converts to “012378283X” and outputs this data.

ISSN Conversion
When ISSN conversion is enabled, it converts data with an EAN-13 leading “977”. ISSN conversion re-calculates the CD by omitting leading 3 digits and outputs 8 digits.

ISMN Conversion
When ISMN conversion is enabled, it converts data with an EAN-13 leading “9790”. ISMN conversion converts the leading 4 digits to “M” and outputs 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 to “M230671187” and outputs this data.

6.3.2.2 EAN/JAN-8

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

EAN/JAN -8 Add-on 2 Digits/5 Digits
EAN/JAN-8 Add-On 2 Digits/5 Digits is an EAN/JAN-8 bar code plus a 2-digit or 5-digit supplemental code. When add-on is enabled. The add-on code must be within the reading range of the scan engine. If it is not within range, after the add-on waiting time the scan engine reads the code as UPC or EAN. When add-on is allowed and the scan engine is only reading UPC or EAN, **reading response will decrease**.

Transfer Data Format (EAN/JAN-8 Add-On 2 Digits)

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
Use this command to determine whether to transfer EAN/JAN-8 CD (check digit).

EAN/JAN-13 Optional Settings

Symbologies	Item	Command	Description	Default
EAN/JAN-13	CD Transmission	6K	Transmit EAN/JAN -13 CD	✓
		6J	Do 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 starts at 378/379/529; enable EAN forced add-on	
		-H	When EAN-13 starts at 378/379/529; disable EAN forced add-on	✓
		-C	When EAN-13 starts at 434/439/414/419/977/978; enable EAN forced add-on	
		-D	When EAN-13 starts 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	

EAN/JAN-8 Optional Settings

Symbologies	Item	Command	Description	Default
EAN/JAN-8	CD Transmission	6I	Transmit EAN/JAN-8 CD	✓
		6H	Do 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 39 is a bar code developed by Intermec and has been standardized as ISO/IEC 16388. It is mainly used in the industrial fields.

Code 39 Configurations

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

Transfer Data Format

Start code "*"	Data Variable length	CD	Stop code "*"

Calculate Code 39 CD

This command determines whether to check the CD (check digit) 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 Conversion Settings

Setting	Description
Standard Code 39	Sends the data character as is.
Full ASCII Code 39	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 Code 39	Converts the specified combination of the data character to Full ASCII and transmits it. If a combination is incorrect, it will be transmitted without converting, as is.
Italian Pharmaceutical	Converts Code 39 data to Italian Pharmaceutical format. Italian Pharmaceutical format is fixed length containing 1 digit of mandatory check digit after 8 digits of numeric data. When not converting to Italian Pharmaceutical, the bar code will not be sent.
When Possible Italian Pharmaceutical	Convert Code 39 data to Italian Pharmaceutical format. When not converting to Italian Pharmaceutical, the bar code will be sent as standard Code 39.

Code 39/It. Pharm Optional Settings

Item	Command	Description	Default
CD check	C1	Do not check CD	✓
	C0	Check CD	
CD transmission	D9	Transmit Code 39 CD	✓
	D8	Do not transmit Code 39 CD	
ST/SP transmission	D1	Do 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	Do 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 a relatively early-stage bar code developed by Monarch Marking Company in 1972, following 2 of 5.

Codabar Configurations

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 generally not often used.

Transfer Data Format

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

Codabar (NW-7) Read Mode

Mode	Description
Standard mode	Consists of 1 bar code.
ABC mode	Acronym for the American Blood Commission. This mode consists of 2 side-by-side bar codes. (Margin is necessary.) When the bar code's first stop character and the second start character is D, it will be concatenated and sent. Two D characters will not be sent.
CX mode	Consists of 2 side-by-side bar codes. (Margin is necessary.) When the bar code's first stop character is C and the second start character is B, it will be concatenated and sent. B and C characters will not be sent.

Codabar CD Check

In Codabar, Modulus 16 is generally used.

Codabar CD Transfer

Determines if transferring the CD (check digit) is configurable.

Start / Stop Code Transfer

Determines if transferring the start/stop code is configurable. It can also convert the code and transfer when transferring the start/stop code.

Codabar Optional Settings

Item	Command	Description	Default
CD check	H7	Do not check CD	✓
	H6	Check CD	
CD transmission	H8	Transmit Codabar CD	✓
	H9	Do not transmit Codabar CD	
ST/SP transmission	F0	Do 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 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

Interleaved 2 of 5 CD Check

Determines if checking the CD (check digit) is configurable. This setting also configures whether to check Interleaved 2 of 5, Industrial 2 of 5, S-Code, and Matrix 2 of 5 CD.

Interleaved 2 of 5 CD Transmit

Determines if transferring the CD (check digit) is configurable. This setting also configures whether to transfer Interleaved 2 of 5, Industrial 2 of 5, S-Code, and Matrix 2 of 5 CD.

Industrial 2 of 5 Space Check

Determines whether to enable/disable the space (inter-character gap) check of Industrial 2 of 5.

Interleaved 2 of 5 and Industrial 2 of 5 Optional Settings

Code	Item	Command	Description	Default
Interleaved 2 of 5 S-Code	CD check	G0	Do not check CD	✓
		G1	Check CD	
	CD transmission	E0	Transmit CD	✓
		E1	Do 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	Do not transmit S-Code as Interleaved 2 of 5	✓
		GG	Transmit S-Code as Interleaved 2 of 5	

6.3.6 Code 128

Code 128 was developed by Computer Identix Inc. in the USA in 1981. Code 128 is a symbol standardized as USS-CODE128. Because it can encode ASCII128 characters, it is called Code 128.

Code 128 Configurations

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 1type
Digits	Variable length
CD (check digit) check method	Modulus 103

Transfer Data Format

Data (variable length)

GS1 Conversion

You can disable or enable GS1-128 GS1 conversion. For more information, see section 6.2.1: GS1 Convert.

Concatenation of Code 128

When Code 128 data has a leading FNC2 character, you cannot concatenate the data. To concatenate the data, you need to omit the leading FNC2.

When the scan engine reads a bar code that does not contain the leading FNC2 character, it concatenates the data to the end of the data that is buffering to the scan engine and sends the entire buffer.

The reading time is updated each time a label is read. If the reading is not completed within the reading time, the buffered data will be discarded.

A maximum of 400 characters can be concatenated.

Code 128 Optional Settings

Item	Command	Description	Default
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

The standards for bar codes and magnetic stripes on boarding passes are published by the International Air Transport Association (IATA).

IATA Settings

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

6.3.8 MSI/Plessey

MSI/Plessey is a numeric-only, variable-length symbology that is a variant of Plessey Code, which was originally developed by the Plessey Company of England in 1971. This bar code is used on shelves in supermarkets, as well as warehouses and other storage facilities for inventory purposes.

MSI/Plessey Settings

Item	Command	Description	Default
CD check	4A	Do 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	Do not transmit CD	
	4E	Transmit CD 1	✓
	4F	Transmit CD 1 and CD 2	

6.3.9 UK/Plessey

UK/Plessey Code, originally developed by the Plessey Company of England in 1971 is a continuous, variable-length symbology that is used to encode hexadecimal data.

UK/Plessey Settings

Item	Command	Description	Default
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

Telepen is designed to express all 128 ASCII characters without using shift characters for code switching, and using only two different widths for bars and spaces.

Telepen Settings

Item	Command	Description
Conversion output mode	D2 (default)	Numeric mode
	D3	ASCII mode

6.3.11 Code 11

Code 11 was developed by Intermec in 1977 and is primarily used in telecommunications.

Code 11 Settings

Item	Command	Description	Default
CD check	BLF	Do not check CD	
	BLG	Check 1CD	
	BLH	Check 2CD	
	BLI	Check auto 1 or 2 CD	✓
CD transmission	BLJ	Do not transmit CD	✓
	BLK	CD transmit	

6.3.12 Korean Postal Authority

The Korean Postal Authority bar code encodes a 6-digit Zip code plus a mod 10 check digit.

Korean Postal Authority Settings

Item	Command	Description	Default
CD transmission	*+	CD transmit	
	*-	Do not transmit CD	✓
Transmit dash	*.	Transmit dash	✓
	*/	Do 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 relatively new bar code, developed close to GS1 and standardized by ISO/IEC 24724:2011. It has 3 types and 7 kinds. GS1 DataBar can hold information in a smaller space and is often used to label fresh foods.

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 and GS1 DataBar Limited)

AI “01”	Data (13 digits)	CD (1 digit)

Transfer Data Format (GS1 DataBar Expanded)

Data (1 - 74 digits)

GS1 Conversion

You can disable or enable GS1 DataBar’s GS1 conversion. For more information, see section 6.2.1: GS1 Convert.

6.3.14 Composite GS1 DataBar

Composite GS1 DataBar is a bar code developed by GS1 for medical use and standardized by ISO/IEC 24723. The 2D bar code symbol is included above a GS1 DataBar, GS1-128 or UPC/EAN to encode additional data.

Composite GS1 DataBar 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 characters CC-B: 338 characters CC-C: 2361 characters
Symbol size	1D part: refer to GS1 DataBar and UPC/EAN Composite part: CC-A and CC-B are the same as MicroPDF417. CC-C is the same as PDF417.
Error correction	1D part: error detection only Composite part: 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)

GS1 Conversion

You can disable or enable Composite GS1 DataBar conversion. For more information, see section 6.2.1: GS1 Convert.

6.3.15 PDF417

PDF417 is a stacked linear barcode developed by Symbol Technologies, and is standardized by ISO/IEC 15438:2006. PDF417 is used for international logistics, ID cards (overseas), and parts labelling.

PDF417 sample

Micro PDF417 sample

PDF417 Configurations

Item	Overview
Character set	ASCII value 0 – 127 (ISO 646) ASCII value 128 – 255 (ISO 8859-1, Alphabet No.1, Extended ASCII) For Macro PDF417: many other character sets
Maximum digits (PDF417)	Text compression: 1850 characters Byte compression: 1108 characters Numeric compression: 2710 characters
Maximum digits (MicroPDF417)	Text compression: 250 characters Byte compression: 150 characters Numeric compression: 366 characters
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)

MicroPDF417

For MicroPDF417, the default is not valid. To enable the setting, see section 6.1.5: 2D Codes.

6.3.16 QR Code

QR code is a matrix type 2D code developed by DENSO WAVE INC. and is standardized to ISO/IEC 18004:2000. QR code supports high-speed reading and is used in a wide range of fields.

QR Code Configurations

Item	Overview
Character set	Numeric data (Numbers 0-9) Alphanumeric data (Numbers 0-9, Capital letters A-Z, 9 special characters: space, $, %, *, +, -, ., /, :) 8-bit byte data (Latin characters based on JIS X 0201, character set of 8-bit code for Katakana characters.) Chinese characters (Character specified by the shift-coded expression of JIS X 0208)
Maximum digits	Alphanumeric data: 4296 characters 8 bit data: 2953 characters Numeric data: 7089 characters Chinese character data: 1817 characters
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 is readable.
Concatenated code	Outputs after reading all concatenated codes.

Transfer Data Format

Data (variable length)

GS1 Conversion

You can disable or enable GS1 QR code conversion. For more information, see section 6.2.1: GS1 Convert.

ECI Protocol Output

You can enable or disable output of QR code ECI protocol data. For more information, see section 6.2.6: ECI Protocol Output.

Micro QR Code

Micro QR code is a variant of QR code. Micro QR codes have a restricted size and capacity to limit the data.

Micro QR

Micro QR Code Configurations

Item	Overview
Character set	Numeric data (numbers 0-9) Alphanumeric data (numbers 0-9, capital characters A-Z, 9 special characters: space, $, %, *, +, -, ., /, :) 8-bit byte data (Latin character based on JIS X 0201, character set of 8-bit code for Katakana character.) Chinese characters (Character specified by the shift-coded expression of JIS X 0208)
Maximum digits	Alphanumeric data: 21 characters 8-bit data: 15 characters Numeric data: 35 characters Chinese character data: 9 characters
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 codes are readable.

Transfer Data Format

Data (variable length)

6.3.17 Data Matrix

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


Data Matrix


RectangleMatrixCode

Data Matrix Configurations

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 bar code, mirror printing	Negative and mirror printed Data Matrix are readable.

Transfer Data Format

Data (variable length)

ECC 000-140
You can enable or disable (default) ECC 000-140.

GS1 Conversion
You can disable or enable GS1 Data Matrix conversion. For more information, see section 6.2.1: GS1 Convert.

ECI Protocol Output
You can enable or disable output of Data Matrix ECI protocol. For more information, see section 6.2.6: ECI Protocol Output.

6.3.18 Aztec Code

Aztec Code is a matrix type 2D code developed by Welch Allyn Company. Aztec Code has a fender in the center of the code and does not require a quiet zone. Aztec Code is mainly used for tickets and in the medical industry.

Aztec code

Aztec Code Configurations

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 characters
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)

ECI Protocol Output

You can enable or disable output of Aztec Code ECI protocol. For more information, see section 6.2.6: ECI Protocol Output.

6.4 Setting Number of Characters

To read fixed-length bar codes, you should configure the scan engine for the fixed number of characters. The scan engine will verify that codes read are of the correct length and reject 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, which is 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 (do 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 type and will only affect the specified code types.

Fixed-Length Configuration Commands

Command					Description	Default (valid range)
Specify Code	Input length of digits					
See section 6.4.2: Command List: Fixed Length ON/Minimum/Maximum Length.	Qa	Qb	Qc	Qd	Fixed length for selected codes Length: (1000a+100b+10c+d)	(0 - 8000)

Fixed-Length Configuration Examples

Example	Command
Fix Code 39 length to 6 digits	<ESC>[DC1Q6<CR>
Fix Code 39 length to 6 digits and 12 digits	<ESC>[DC1Q0Q0Q0Q6Q0Q0Q1Q2<CR>
Fix Code 39 length to 6 digits and Interleaved 2 of 5 to 12 digits	<ESC>[DC1Q6[DC4Q1Q2<CR>
Clear fixed length for Code 39	<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 Code 39 to 12 digits	<ESC>[DA1Q1Q2<CR>
Clear max length for Code 39	<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

To set the length of each bar code, enter the appropriate command followed by the value of the length of each code. When you reset the settings, the length currently set becomes the default.

Fixed Length Commands

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
Dot Code	[DCU	[DBU	[DAU
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 changes that can be made to the transmitted data string.

7.1 Case Conversion

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 Examples

Description	AbCd
No case conversion (default)	AbCd
Convert to upper case	ABCD
Convert to lower case	abcd
Exchange case	aBcD

Upper Case/Lower Case Conversion Commands

Command	Description
YZ (default)	No case conversion
YW	Convert to upper case
YX	Convert to lower case
YY	Exchange case

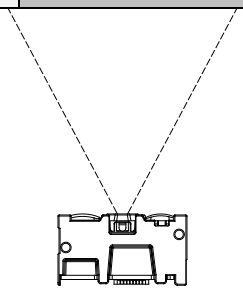
7.2 Prefix/Suffix (Appending Character Function)

Additional functions 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. By default, the prefix is empty and the suffix of all codes is a “CR” character. Prefix/suffix cannot be set when using OCR Free Edit or Data Edit Reading. For more information, see sections 6.2.7: OCR Free Edit and 8.5.2: Data Edit Reading.
- 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, the prefix and suffix 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



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

Program Values

Value	Description
ASCII (See section 7.2.3: ASCII Prefix/Suffix Values)	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 section 6.3: Setting Code Specific Options.
Code coordinate	The code coordinate is transmitted as the pixel coordinate of the image sensor.
Code tilt angle	The tilt angle of the read code can be added to the prefix and suffix.
Scan time	The scan time is the time from the trigger pull until the data output starts.
Bank Number	The current operating bank number can be added to the prefix and suffix.

7.2.1 Set Prefix/Suffix

To add a Prefix/Suffix, use the Prefix/Suffix commands. You can also set a Prefix/Suffix with a menu bar code or 2D menu code.

Notes:

- The prefix and suffix setting commands clear the current values and configure new ones. The default suffix CR is also cleared.
- To clear the default suffix CR, scan 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.

Prefix/Suffix Commands

Command			Description	Default
Set Commands	Value Commands	See Section		
See section 7.2.2: Prefix/Suffix Settings.	ASCII	7.2.3	Set character to Prefix/Suffix	All codes Suffix USB-HID: “Enter” USB-COM:“CR” UART:“CR”
	Code ID	7.2.4		
	Code Length	7.2.5		
	Code Coordinates	7.2.6		
	Code Tilt Angle	7.2.7		
	Scan Time	7.2.8		
	Bank Number	7.2.9		

Example: To set “C39:” as the prefix and “CR” and “LF” as the suffix for Code 39, set this command:
<ESC>M40CQ3Q96AO41M1J<CR>

7.2.2 Prefix/Suffix Settings

All Codes Prefix/Suffix

Prefix Command	Suffix Command
RY	RZ

Note: By default, “CR” (“Enter” for USB-HID) is added to the suffix of all bar codes. To clear “CR” or “Enter”, send the “RZ” command only.

Individual Bar Code Prefix/Suffix Commands

Bar 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	*$	*%

Individual Bar Code Prefix/Suffix Commands (continued)

Bar 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	[D6J	[D6G
GS1 DataBar Limited	[D6K	[D6H
GS1 DataBar Expanded	[D6L	[D6I
GS1 Composite code	RR	RS
Codablock F	[D4S	[D4T
Data Matrix	MD	PO
Dot Code	[DOF	[DOG
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

Preamble/Postamble Commands

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

To add Code ID, send the Code ID command after the prefix/suffix setting command.

Code ID Command

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

Use one of these methods to add Code ID:

- Use OPTICON Code ID. For more information, see section 10.1.1: Opticon Code ID Prefix/Suffix Values.
- AIM/ISO Code ID. For more information, see section 10.1.2: Code Option AIM/ISO15424 Code ID Prefix/Suffix Values. The code identifier is transmitted in ISO 15424 format:

  ]cm

  where:
  ] is ASCII value decimal 93
  c is the code character
  m is modifier character

  Example: Add “<OPTICON Code ID>” to the all codes prefix.
  Configure with this command:
  <ESC>RY$2<CR>

7.2.5 Code Length

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

You can add code length by sending a Code Length command after the prefix/suffix setting command.

Code Length Commands

Command	Description
$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)>:
Configure with this command:
<ESC>RY$3<CR>

8 Read Options

This chapter describes the read options for the scan engine.

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”, “multiple read 1” and “multiple read 2”.

Read Mode Commands

Item	Command	Description
Single Read	S0 (default)	Single read in a single trigger
Multiple Read	S1	Multiple read in a single trigger, the scan engine reads the same data.

8.1.1.1 Single Read

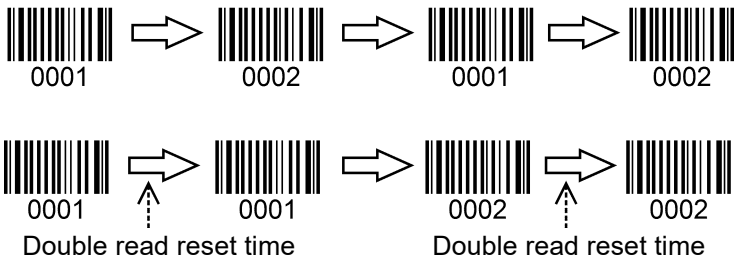
The scan engine starts reading after a trigger pull and continues reading until a bar code is successfully decoded or until the read time expires. For more information, see section 5.6.1: Read Effective Time.

8.1.1.2 Multiple Read

The scan engine starts reading after a trigger pull and keeps reading (even after a bar code is successfully decoded) until the read time expires. The same bar code cannot be read twice unless another bar code is read in between or when “Double read reset time” has past.

If the same bar code remains in the same position in the image, the bar code will not be read even if the double read reset time is canceled.

Example: Read multiple codes sequentially with a single trigger pull.



8.2 Auto Trigger

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

8.2.1 Normal Auto Trigger

There are two modes for auto trigger

- Presentation auto trigger mode: for applications where the scan engine is fixed and bar codes are presented.
- Handheld auto trigger mode: for applications where the scan engine is not fixed.

Auto Trigger Commands

Item	Command	Description	Default
Auto trigger	+F	Disable presentation auto trigger	
	+I	Enable presentation auto trigger	✓

8.2.2 Auto Trigger Sensitivity

The detection sensitivity varies with the ambient environment and made need to be adjusted.

Auto Trigger Sensitivity

Command	Description
[XMF	Sensitive
[XMH (default)	Normal
[XMJ	Insensitive

8.2.3 Double Read Reset Time

In auto trigger mode, set the time before the same bar code can be decoded again. When a code with different data is read, this command is reset.

Double Read Reset Time

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

Note: When 0 seconds is set, the same bar code will not be decoded.

8.3 Illumination and Aiming

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

8.3.1 Reading LED Illumination

Warm White LED illumination can be enabled or disabled You can also set the illumination method and brightness for reading bar codes.

LED Illumination Mode

Command	Description
[D39	LED illumination → Enable
[D3A	LED illumination → Disable When illumination is disable, reading performance may decrease. Reading performance may improve when reading only the code displayed on the LCD screen.
[D3B	LED illumination → Automatic switching In this mode, floodlight ON and OFF are alternated. The scan engine remembers the illumination in which a bar code was read and is is prioritized for subsequent reading. This function is recommended when reading a target where specular reflection easily occurs.
[D3Q (default)	LED illumination → Prevent specular reflection Disable illumination only when specular reflection from the LED illumination occurs and read the bar code.

9 Indicator Options

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

9.1 Buzzer (BUZZERn Signal)

BUZZERn controls the buzzer tone and sound pressure with the PWN signal.

9.1.1 Buzzer Loudness

Buzzer loudness is applied to all buzzers.

Buzzer Loudness Commands

Command	Description
T0 (default)	Buzzer loudness : Maximum
T1	Buzzer loudness : Loud
T2	Buzzer loudness : Normal
T3	Buzzer loudness : Minimum

9.1.2 Good Read Buzzer

The good read buzzer is activated when a bar code is successfully read. The good read buzzer can be disabled or enabled with three types of tones and five durations.

Buzzer Disable/Enable Commands

Command	Description
W0	Disable buzzer
W8 (default)	Enable buzzer

Buzzer Duration Commands

Command	Description
W7 (default)	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 Commands

Command	Description
W1 (default)	Middle frequency buzzer (3000 Hz)
W2	2 steps buzzer (high - low buzzer)
W3	2 steps buzzer (low - high buzzer)

Note: The good read buzzer tone (frequency) can be set with numerical parameters by entering the command followed by a 4-digit numerical command.

Buzzer Tone Frequency Commands

Command					Description	Default
[DF0	Qa	Qb	Qc	Qd	Numerical setting of buzzer tone frequency (1000a+100b+10c+d)[Hz]	3000 Hz (1 - 9999)

9.1.3 Start-Up Buzzer

The start-up buzzer determines whether the scan engine emits a beep when it is powered on.

Start-Up Buzzer Commands

Command	Description	Remark
GD (default)	Disable startup buzzer	Enabled only with “Z2”
GC	Enable startup buzzer	Enabled only with “Z2”

9.1.4 Intermediate Buzzer

When one bar code is decoded, an intermediate buzzer sounds to indicate that the bar code had been decoded but has not yet meet the conditions to output data.

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

Intermediate Buzzer Commands

Command		Description
[EBY	Q0	Disable intermediate buzzer
	Q1 (default)	Enable intermediate buzzer

Note: Intermediate buzzer frequency is 5000 Hz (5 KHz), duration 10 ms.

9.2 Good Read LED (GR_LEDn Signal)

You can configure Status LED settings to successfully read bar code. This section assumes that a LED is connected to the GR_LEDn pin. Note that a transistor is required in most cases due to the limited output current that the scan engine can supply through this pin.

9.2.1 Good Read LED

The good read LED lights up after a code was successfully decoded. This can be disabled or set for several durations.

Good Read LED Commands

Command	Description
T4	Disable indicator
[XTH	Indicator duration: 60 ms
[XT8	Indicator duration: 100 ms
T5 (default)	Indicator duration: 200 ms
T6	Indicator duration: 400 ms
T7	Indicator duration: 800 ms

9.3 Indicator in General

You can configure common settings for both buzzer and good read LED.

9.3.1 Indicator Timing

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

Indicator Timing Commands

Command	Description	Remark
VY (default)	Before data transmission	soon after decoding
VZ	After data transmission	

10 Appendix

This appendix contains useful reference data.

10.1 Code ID Table

These Code ID values can be added to the prefix/suffix.

10.1.1 Opticon Code ID Prefix/Suffix Values

Code	Code ID	Symbology	Code ID
UPC-A	C	Code 128	T
UPC-A +2	F	GS1-128	
UPC-A +5	G	GS1 DataBar	y
UPC-E	D	CC-A	m
UPC-E +2	H	CC-B	n
UPC-E +5	I	CC-C	l
EAN-13	B	Korean Postal Authority	c
EAN-13 +2	L	Intelligent mail	0
EAN-13 +5	M	Postal-TNT, KIX	1
EAN-8	A	Japanese postal code	2
EAN-8 +2	J	Postnet	3
EAN-8 +5	K	Australia postal code	4
Code 39	V	US Planet	6
Code 39 Full ASCII	W	UK Postal (Royal mail)	7
Italian Pharmaceutical	Y	4-state Mailmark barcode	8
Codabar	R	Codablock F	E
Codabar ABC	S	Data Matrix	t
Codabar CX	f	Dot Code	k
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
Code 11	b		

10.1.2 Code Option AIM/ISO15424 Code ID Prefix/Suffix Values

AIM/ISO15424 Code ID			
Symbology	Code ID	Symbology	Code ID
UPC-A	]E0	UK/Plessey	]P0
UPC-A +2	]E3	Code 128	]C0
UPC-A +5	]E3	GS1-128	]C1
UPC-E	]E0	Code 93	]G0
UPC-E +2	]E3	Code 11	]H*
UPC-E +5	]E3		]X0
EAN-13	]E0	Korean Postal Authority	]X0
EAN-13 +2	]E3	Intelligent Mail Barcode	]X0
EAN-13 +5	]E3	POSTNET	]X0
EAN-8	]E4	GS1 DataBar	]e0
EAN-8 +2	]E7	CC-A	]e1
EAN-8 +5	]E7	CC-B	]e1
Code 39	]A*	CC-C	]e1
Code 39 Full ASCII	]A*	GS1 DataBar with CC-A	]e0
Tri-Optic	]X0	GS1 DataBar with CC-B	]e0
Code 39 It. Pharmaceutical	]X0	GS1 DataBar with CC-C	]e0
Codabar	]F*	Codablock F	]O*
Codabar ABC	]F*	DataMatrix	]d*
Codabar CX	]X0	Dot Code	]J**
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
Telepen	]B*		

Notes:
* These Code IDs are described differently depend on code type. For more information, see the next table.
** These Code IDs are described differently depend on code type.

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

Code Option	]AIM-ID	Code Option	]AIM-ID
IATA Option AIM/ISO15424 Code ID: R*			
Do not check CD (4H) Transmit CD (4L)	]R0	Do not check CD (4H) Do 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) Do 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) + Do 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) + Do 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) + Do 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) Do not Transmit $CD_{(S)}$ (BLJ)	]H3
Check 2CDs (BLH) or Check auto 1 or 2CDs (BLI) (length > 12) Transmit $CD_{(S)}$ (BLK)	]H1	Do not check CD (BLF) Do 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*			
ECC000-ECC140	]d0	ECC200, supporting ECI protocol	]d4
ECC200	]d1	ECC200, FNC1 in 1st or 5th position and supporting ECI protocol	]d5
ECC200, FNC1 in 1st or 5th position	]d2	ECC200, FNC1 in 2nd or 6th position and supporting ECI protocol	]d6
ECC200, FNC1 in 2nd or 6th position	]d3		
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

10.2 Q-250 Specification Overview

Q-250 specifications overview is as follows.

10.2.1 Common Specification Overview

Item			Specification		Note
Control Section	CPU		CPU： MIPS Based, Dual core		Core clock：1.2GHz
	DDR3 RAM		1Gbit (128Mbyte)		DDRCLK：1333 MHz
	Flash ROM		128Mbit (16Mbyte)		
Interface	USB		Full Speed 12Mbps (HID/COM) data port plus 12Mbps (COM) command port		Bus powered, 500mA mode
Indicator	LED		2 red LEDs and 2 green LEDs		Underneath the semi translucent dome
	Buzzer		Loudness / tone adjustable		
Optical Section	Scanning method		Monochrome CMOS area sensor		Frame rate: 120 fps
	Scanning light source		8 white LEDs		Underneath the translucent dome for diffuse illumination.
	Effective pixels		0.30 million pixels (H: 640 x V: 480)		
	View angles		Horizontal: 84.0° Vertical: 68.0° Diagonal: 96.0°		Lens EFI 1.02mm
	Focal point		Approx 2.5cm above the housing		
Supported 1D Symbologies	Symbologies	1D	All UPC/ENA/JAN including Addon, Code 39, Codabar, Industrial 2 of 5, Interleaved 2 of 5, Code 93, Code 128, GS1-128, MSI/Plessey, Code 11, UK Plessey, Telepen, Matrix 2 of 5		
		Postal	Korean Postal Authority code, Chinese Post Matrix 2 of 5, Japanese Postal, Intelligent Mail Barcode, Postnet, Planet, Netherlands KIX Code, Australian Postal, UK Postal, 4-State Mailmark Barcode		
	Minimum resolution		Code 39 : 0.1 mm		PCS 0.9
	Curvature		Radius ≧ 20 mm (12-digit UPC)		
	Barcode width		Possible to read: Code 39 with 100 mm width and resolution 0.2mm (DOF: 127 mm)		
	Motion tolerance		Possible to read: UPC 100% moving at 3 m/s (DOF: 87 mm)		
	Depth of field (mm)	Code 39	Resolution (0.127) Resolution (0.254) Resolution (0.508)	TBD	
		Code 128	Resolution (0.20)	TBD	
		UPC	Resolution (0.33)	TBD	
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 Composite Code	TBD	PCS 0.9

Item			Specification		Note
Supported 2D Symbologies	Symbologies		(micro)PDF417, Codablock F, (micro)QR Code, DataMatrix (ECC 200), MaxiCode, Aztec Code, Chinese Sensible Code		Disable Code 128 when Codablock F is enabled.
	Minimum resolution (mm)		PDF417 QR Code Data Matrix	TBD	PCS 0.9
	Depth of field (mm)	PDF417	Resolution (0.169) Resolution (0.254)		
		QR Code	Resolution (0.169) Resolution (0.381)		
		Data Matrix	Resolution (0.169) Resolution (0.254)		
Common	Scan angle		Pitch ±65° Skew ±65° Tilt 360°		
	Minimum PCS		0.2 or more		MRD: 13% or more
Image capture	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		USB-COM or RS232		
	Transfer time		USB-COM: Around 80 frames/sec RS232: About 1 frame/sec		Resolution: Full
Power	Operating voltage		5V ± 10%		
	Current consumption	Reading	370mA (typ)		Ambient temperature: 25°C
		Auto trigger	260mA (typ)		
		Standby	90mA (typ)		
Environmental Specifications	Temperature	Operating	-5 to 70 °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 100% Optical axis angle: 75° Distance: 90 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		-		-
	Dust and drip proof		-		

Item			Specification	Note
Regulatory	This scanner is an Exempt Risk Group LED product.			
	LED safety		IEC 62471:2006 Exempt Group	
	EMI/RFI		EN55032 / FCC Class-B	For residential, commercial, and light-industrial environments
	Product safety		CE Marking	
	Electromagnetic compatibility (EMC)		EN55024 (EN61000-6-1) Class-B	For residential, commercial, and light-industrial environments
Immunity Test	ESD immunity	No damage	Air discharge (direct): ±15 kV	Condition: IEC:61000-4-2 compliant
		No malfunction	Contact discharge (direct / indirect): ±6kV Air discharge (direct): ±8 kV	
	Radio-frequency electromagnetic field. Amplitude modulation	Frequency	80 to 1000 MHz	Condition: IEC61000-4-3 compliant
		Level	3 V/m	
		AM	80% (AM)	
	Fast transient	Voltage	Alternating-current input cable: ±1 kV	Condition: IEC61000-4-4 compliant
		Pulse	5 / 50 ns (Tr / Tw)	
		Frequency	5 kHz	
	Surge	Pulse	1.2 / 50 ns (Tr / Th)	Condition: IEC61000-4-5 compliant
		Voltage	From L to P : ±2 kV (closed-loop voltage)	
			From L to L : ±1 kV (closed-loop voltage)	
	Radio-frequency common mode	Frequency	0.15 to 80 MHz	Condition: IEC61000-4-6 compliant
		Level	3 V	
		AM	80% (AM)	
	Power frequency magnetic field	Frequency	50 and 60 Hz	Condition: IEC61000-4-8 compliant
		Level	3 A/m	
	Voltage dip, momentary voltage drop, fluctuation	Dip 1	Drop 30%, 0.5 cycles (both half cycles tested)	Condition: IEC61000-4-11 compliant
		Dip 2	Drop 60%, 5 cycles	
		Momentary drop	Drop > 95%, 250 cycles	
Physical Features	Dimensions		Approx. 68.0 × 77.0 × 39.1 (WDH mm)	Excluding cable
	Weight		Approx. 100g	Excluding cable
	Housing color		Black	

10.2.2 Technical Specifications

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

Conditions

Ambient Temperature and Humidity	Room temperature, room humidity
Ambient Light	100 to 500 lux
Angles	Pitch: α = 0°, Skew: β = +15°, Tilt: γ = 0°
Curvature	R = ∞
USB Power Supply Voltage	5.0 V
PCS (1D and 2D)	0.9 or higher
Scanning Test	Accept the performance with 90% or more success rate for 10 tries of scan. One reading should be 2 seconds.
Barcode Test Sample (1D and 2D)	Specified at section 8.1

All measurements are done without specular (mirror-like) reflection of the illumination LEDs.

Reading Depth of Field

Resolution	Code	No. of Digits	Depth of field (mm) (Certified value)		Depth of field (mm) (Typ)	
			Near	Far	Near	Far
0.127mm	Code 39	4 digits	10	75		
0.254mm	Code 39	7 digits	10	115		
0.508mm	Code 39	4 digits				
0.20mm	Code 128	16 digits				
0.33mm	UPC/EAN	12 digits				
0.169mm	PDF417	58 digits				
0.254mm	PDF417	58 digits				
0.169mm	QR Code	44 digits	15	40		
0.381mm	QR Code	44 digits	5	115		
0.169mm	Data Matrix	40 digits				
0.254mm	Data Matrix	40 digits				

10.2.3 Q-250 Detailed View

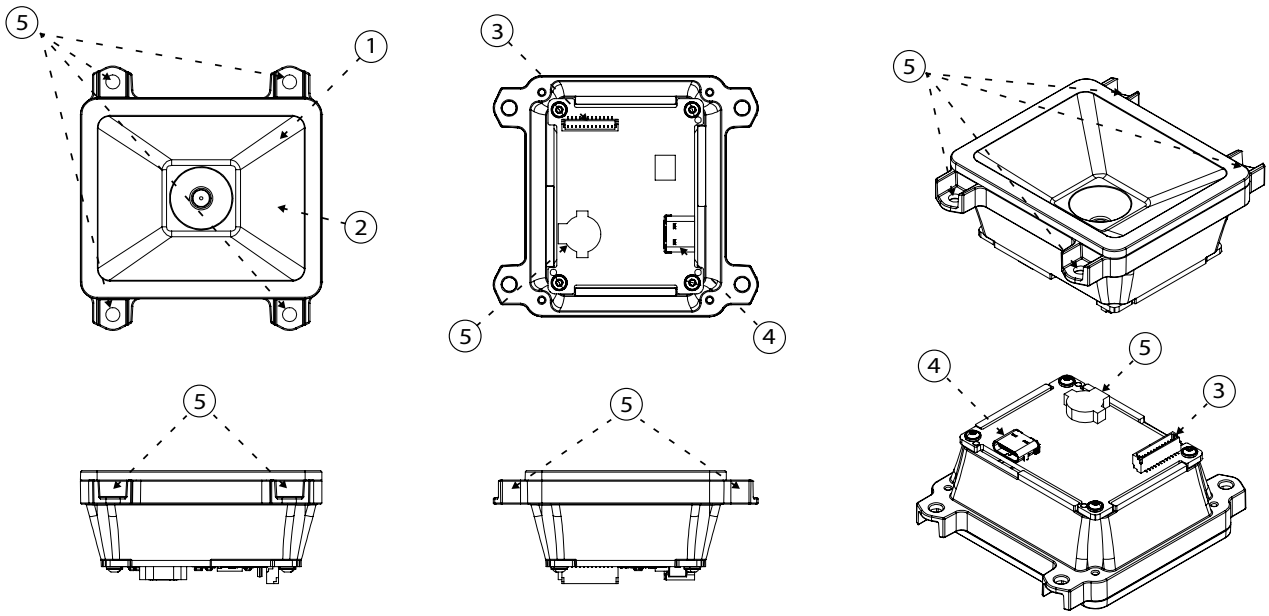


Figure 1: Detailed View of Q-250

No.	Name	Description
1	Illumination dome	Underneath the semi-translucent dome there are 4 illumination LED's
2	Status LED	Underneath the semi-translucent dome. Red indicates scanning. Green is good read.
3	USB/RS232 Interface header	Header for providing power to the scanner and connecting an USB or RS232 interface
4	USB-C Interface	USB-C socket for providing power to the scanner and USB interface
5	Mounting holes	Ø ±3.5mm

10.3 Sample Codes

10.3.1 1D Code

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

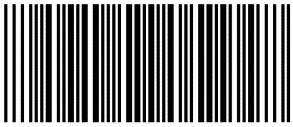
Code 39

Code 39

Code39 Italian Pharmaceutical

Code 39 Full ASCII

Tri-Optic

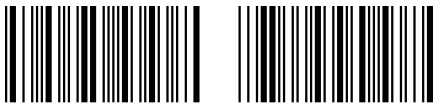


Codabar

Codabar

Codabar ABC

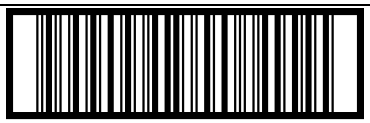
Codabar CX



Industrial 2 of 5 / Interleaved 2 of 5

Industrial 2 of 5

Interleaved 2 of 5



S-Code

Code 128

Code 128

GS1 128

Code 93

Code 93

IATA

IATA

MSI/Plessey

MSI/Plessey

UK/Plessey

UK/Plessey

Telepen

Telepen

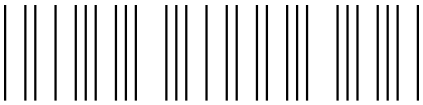
Code11

Code11

Matrix 2 of 5

Matrix 2 of 5

10.3.2 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

10.3.3 GS1 DataBar

GS1 DataBar Omnidirectional

GS1 DataBar Truncated

GS1 DataBar Stacked

GS1 DataBar Stacked Omnidirectional

GS1 DataBar Limited

GS1 DataBar Expanded

GS1 DataBar Expanded Stacked

10.3.4 GS1 Composite Code

CC-A	CC-B
	
Limited CC-A	**Limited CC-B**
	
Expanded CC-A	**Expanded CC-B**
	

Composite GS1-128

CC-A	CC-B
	
CC-C	
	

Composite EAN

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

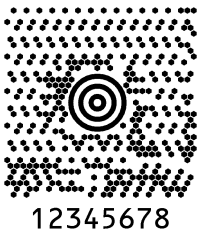
EAN-8 CC-A	EAN-8 CC-B
12345670 (17) 160401 (10) EAN08CCA 	12345670 (17) 170408 (10) EAN08CCB (240) 12345678ean8ccb 

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 

10.3.5 2D Code

PDF417	MicroPDF417
	
Codablock F	**QR Code**
	
Micro QR	**Data Matrix(ECC 200)**
	
Data Matrix(ECC 140)	**DMRE (Datamatrix Rectangular Extension)**
	
Aztec Code	**Aztec Runes**
	
Chinese-sensible code (Han Xin Code)	**Maxi Code**
	

Dot Code
 3UP2FYHLE3FB

10.3.6 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