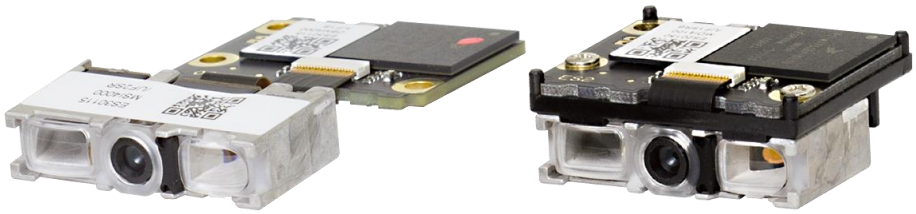
OPTICON



MDI-4000 MDI-4100

Low Profile High-performance Imager Engine

Serial Interface Specifications Manual

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

Document History

Model Number:	MDI-4x00	Specification Number:	SS15011
Edition:	Preliminary Spec	Original Spec Number:	(SS15010)
Date:	15-August-2016		

Limited Warranty and Disclaimers

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

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Revision History

Document Name: MDI-4x00 Serial Interface Specifications Manual

Edition	Date	Page	Section	Description of Changes
Pre	2016/08/18	-	-	Preliminary Spec Version

Contents

1 Abstract

This document provides the configuration specifications of the serial interface for the MDI-4x00 imager scan engine (hereafter called “scan engine”)

2 Configurations

This chapter describes in detail how to configure the scan engine and save the settings.

The chapter contains:

2.1 Configuring with Commands

You can configure the scan engine by sending commands via the serial interface. The default command format is as shown below.

2.1.1 Command format

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

Command Header *2 *3	Command ID *1		Command Terminator *2
<ESC> (0x1B)	none	1 ~ 2 digits (ASCII)	<CR> (0x0D)
	[(0x5B)	3 digits (ASCII)	
	](0x5D)	4 digits (ASCII)	

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

Input examples:

1-digit command	: <Esc>X<CR>
2-digit command	: <Esc>XX<CR>
3-digit command	: <Esc>[XXX<CR>
4-digit command	: <Esc>]XXXX<CR>
2 and 3 digits command	: <Esc>XX[YYY<CR>
Two 2 digit commands	: <Esc>XXYY<CR>

2.1.2 Command Usage Precautions

When sending multiple commands in a sequence, the subsequent command is not received while the previous command is still being executed. Since the RTS output will be in busy state while a command is executed when the Handshake is set to BUSY/READY or MODEM, it is recommended to refer to this signal for the right timing.

Any settings configured by commands are not retained in the non-volatile memory. Therefore, these will be lost when the scan engine power is turned off. When the power comes back on, the scan engine will be in the configuration state saved in the non-volatile memory. In order to save the settings with commands, send “Z2” to save all the parameters in non-volatile memory.

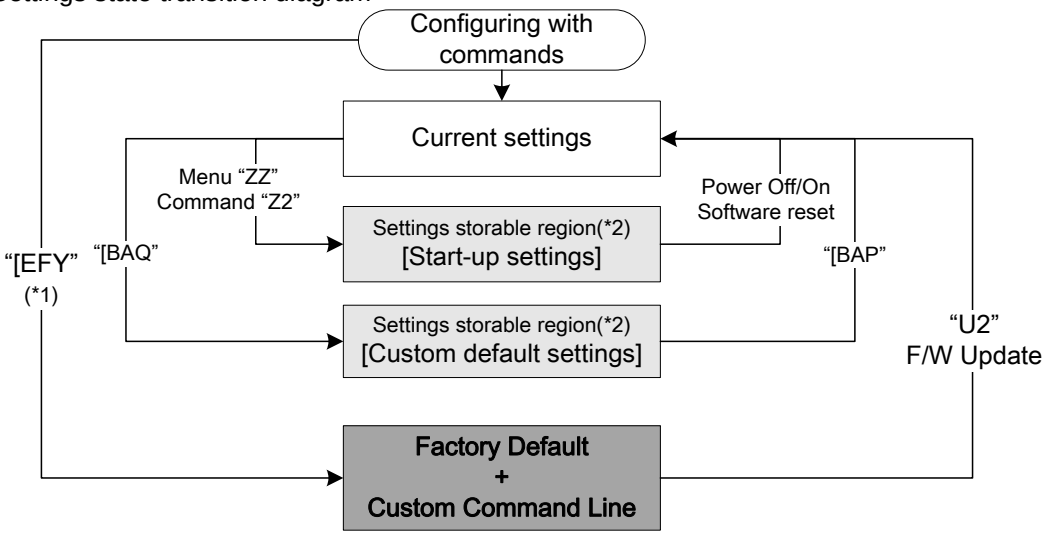
The maximum length of any command packet is 1000 characters.
If more characters than this limit are sent, some characters may be lost and the execution will not be performed correctly.

Since there is a possibility to disrupt communication when the following interface related settings are configured, they will not be reflected until they are written in non-volatile memory using Z2.
- Baud rate, Data length, Parity and Stop bit

* Settings made by reading 1D or 2D menu labels (see: 2.6 and 2.7) will be saved in non-volatile memory. Any settings made prior via commands will be saved as well.

2.2 Default Settings and Saving Settings

How to set the scan engine is described below.
<Settings state transition diagram >



*1 **Please configure this setting only in an environment where power is stable.**
Do not configure this setting while operating equipment.

*2 **The "Setting storable region" is reset when a firmware update is loaded.**
Setting storable region" can be written up to 100,000 times.

- Current Settings:
  Settings that are currently enabled (including new settings added after the scan engine has been powered on).
- Start-up Settings:
  Settings that are loaded when the scan engine is powered on.
- Custom Default Settings:
  Default settings that are customizable by users.
  * Note that the Current Settings will be overwritten with the Custom Default Settings when reading or sending the command "BAQ".
- Factory Default Settings:
  The default settings are the same as that described in the MDI-4x00 Serial Interface Specifications Manual.
- Custom command line Settings:
  Factory Default Settings are modifiable. There are requirements to set. (See: 3.2)

2.2.1 Default and Saving Settings

The current settings can be returned to the custom or factory default settings.

Item	Command	Description	Remark
Back to defaults	U2	Set back to Factory Default Settings	
	[BAP	Set back to Custom Default Settings	

The current settings can be written into the start-up settings and the custom default settings regions.

Item	Command	Description	Remark
Save settings	Z2	Save the Current Settings as Start-up Settings	
	[BAQ	Save the Current Settings as Custom Default Settings	

* There are options that will not be enabled until "Saving settings" is sent, such as baud rate setting.

2.3 Custom Command Line Settings

After saving Custom Command Line Settings, the Factory Default Settings the module was shipped with can be permanently changed.
Custom Commands Line Settings will be kept after a firmware update is loaded.
Custom Commands Line Settings will be enabled by a reboot and initialization of the module.

This setting will corrupt module memory if the power is turned off during the setting operation.
*** Please configure this setting only in an environment where power is stable.**
Do not configure this setting while operating equipment.

✧ Setting that are suggested for custom command line:
- Fast boot mode. (See: 2.4)
- Image settings (See: 2.5.5)
- Baud rate, Data length, Parity, Stop bit etc. (See: 3.2)

Factory Command Line Setting Format

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

(1) Multiple commands allowed.
To activate the newly set Custom Command Line Settings, the ”RV” command must be sent or scanned.

Example of Custom Command Line Settings
Set following commands to reboot and initialize.

- Set “Fast Boot Mode” enable. “[EFXQ1”
- Set “ACK/NAK” enable. “WC”
- Set “2D Menu Code Format” disable. “[D1Z”
- Set “Upside Down Image” enable. “[EFU[E8I”
- Set “Baud rate” to 115200bps. “SZ”
- Set “Low Power Mode” enable. “[EB8”
- Set “Low Power Mode Transition Time” to 2 seconds. “[EBAQ0Q0Q0Q2”

- Reboot the module “RV”

- Initialize the module “U2Z2”

Example of commands input
<ESC> [EFY’[EFXQ1WC[D1Z[EFU[E8ISZ[EB8[EBAQ0Q0Q0Q2’<CR>
↓
<ESC>RV<CR>
↓
<ESC>U2Z2<CR>

2.4 Fast Boot Mode

Fast Boot Mode reduces the time from power-on to ready.
However, when this mode is used, all settings that were saved with “Z2” and “BAQ” commands will be ignored and the module starts with the default settings. (See: 2.2.1)

[Configuration commands]

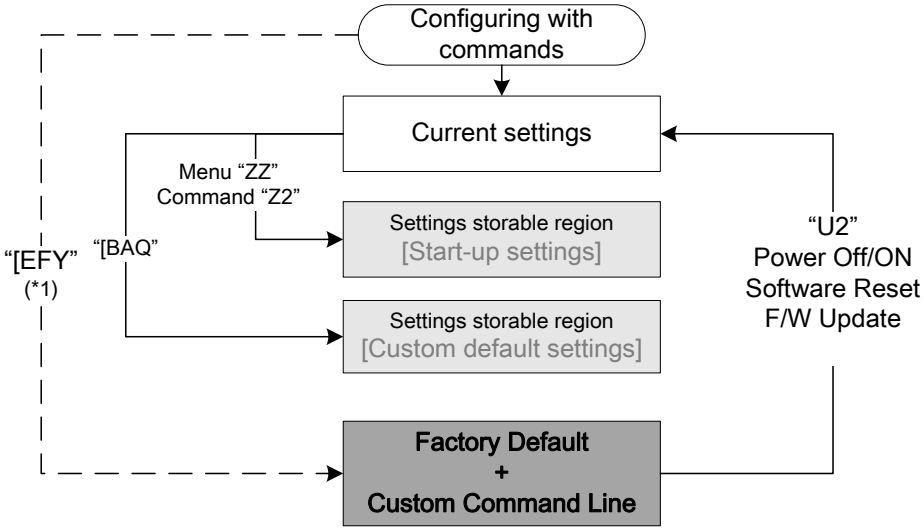
Item	Command		Description	Default
Fast Boot Mode Enable/Disable	[EFX		Get the current mode (*)	
		Q0	Disable Fast Boot Mode	✓
		Q1	Enable Fast Boot Mode	

*Return value is below
Disable Fast Boot Mode<CR>
Enable Fast Boot Mode<CR>

[Boot time]

Mode	Description	Min	Typ	Max	Unit
Normal Boot	Time taken to be ready after supplying the power	-	480	520	ms
Fast Boot Mode		-	395	420	ms

<Settings state transition diagram in fast boot mode>



*1 **Please configure this setting only in an environment where power is stable.**
Do not configure this setting while operating equipment.

2.5 Basic commands

2.5.1 Command Trigger

The reading operation can be started and terminated by sending commands. When the read time is set to 0 seconds, the read time with the Z command will be 'Indefinitely' and reading will continue until a Y command is received.

Item	Command	Description	Default	Remark
Command Trigger	Z	Start reading		Command only
	Y	Stop reading		

* When the "Z" command is sent, the read time ends in 10 seconds.

2.5.2 Diagnostic

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

Item	Command	Description	Default	Remark
Diagnostics	Z1	Transmit software version		
	ZA	Transmit ASCII printable string		
	YV	Transmit ASCII control string		

* The Z3 output result is subject to change when the firmware version is changed.

Item	Command		Description	Example	Possible Values
Device information	[EFK	Q0	Model Number	MDI-4100	MDI-4000, MDI-4100, MDI-4300, MDI-4400,
		Q1	Firmware Version	BD01J01	BD01Jxx, where xx=revision number.
		Q2	Interface	U2	U2 = Serial Standard I/F mode U* = Serial S-Mode I/F mode SU = USB (HID/Keyboard) I/F mode C01 = USB-Virtual COM I/F mode
		Q3	Focus type	SR	SR = Standard Range (115mm fixed focus) HD = High Density (65mm fixed focus) UD= Ultra-High Density (45mm fixed focus)
		Q4	ID (32 digits)	765987D894CA53918218FB0D31A54AAF	Unique number for every module
		Q5	Serial number	1000001	Serial number of the module

2.5.3 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.

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

2.5.4 Reboot the Module

Use this command to restart the module.

Item	Command	Description	Default	Remark
Software reboot	RV	Reboot the module		

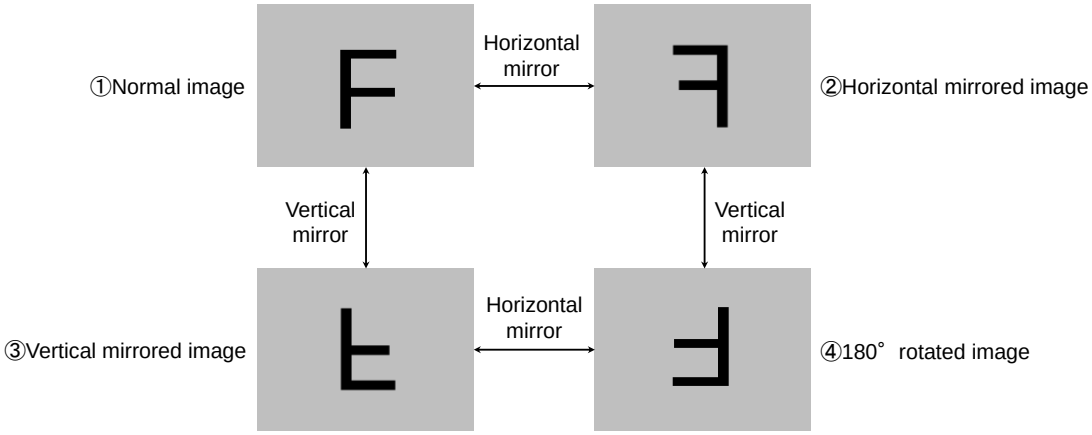
Operations which require a reboot: "Custom Factory Default Settings"

2.5.5 Image settings

When the module is mounted upside down, the module should rotate the sensor data by 180º. This configuration is required especially for image acquisition and OCR reading.
When an external mirror is installed in front of the module, the module should mirror the sensor data. Two options are available for that, horizontal mirror and vertical mirror.

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	

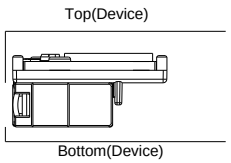
[Image]



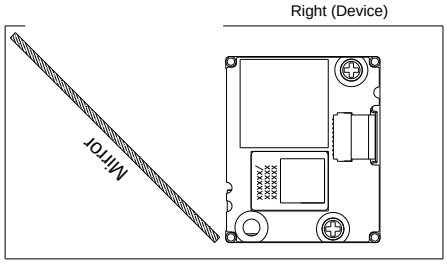
[Configuration commands]

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

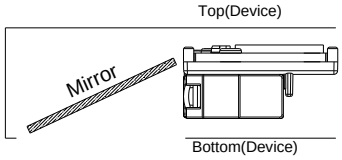
[Implementation]



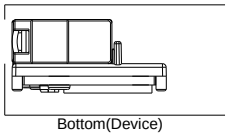
[①Normal Image]



[②Horizontal mirrored Image]



[③Vertical mirrored Image]



[④180° rotated image]

2.5.6 Disable 2D Menu Code Format

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

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

2.5.7 Buzzer and Indicator

These commands reflect "8 Indicator Options"

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

2.5.8 Direct Numerical Input Command

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

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

2.6 Configuring with 2D Menu Format

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.

[Data format:]

@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)	

Examples of a 2D menu code

Return to custom default (U2)

Command	Description	2D Menu Code
U2	Serial interface default	@MENU_OPTO@ZZ@U2@ZZ@OTPO_UNEM@

Example of 2D menu code

Return to serial interface default and enable start-up buzzer (U2) (GC)

Command	Description	2D Menu Code
U2	Serial interface default	@MENU_OPTO@ZZ@U2@GC@ZZ@OTPO_UNEM@
GC	Enable start-up buzzer	

2.7 Configuring with 1D Menu Codes

By scanning the menu barcode labels specially designed to configure the required functions, you can set up the scan engine to optimize its performance for your particular application.

The basic procedure is as follows:

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

↓

Scan one or more desired options.

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

↓

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

* Menu barcodes can be identified by an ID consisting of two to five alphanumeric characters. Menu barcodes have unique encoding specifications developed by OPTOELECTRONICS. Therefore, the scan engine will not acknowledge a menu barcode as a normal barcode.

Example of menu barcodes

To return to serial interface default and enable start-up buzzer (see: 8.1.3):

Command	Description	2D Menu Code
ZZ	Start/End menu mode	
U2	Serial interface	
GC	Enable start-up buzzer	
ZZ	Start/End Menu mode	

* A font specified by OPTOELECTRONICS needs to be installed to display 1D menu codes.

Some options among the various settings are configured using direct input numeric characters.

Example of numerical setting menu barcodes

Set good read buzzer frequency to 3500 Hz (See: 8.1.2):

Command	Description	2D Menu Code
ZZ	Start/End menu mode	
DF0	Buzzer tone (frequency)	
Q3	3	
Q5	5	
Q0	0	
Q0	0	
ZZ	Start/End menu mode	

3 Interface Specifications

This chapter describes the details of the serial interface for the scan engine.

The configurations available are:

3.1 Input / Output Signals

Input / Output signals of the scan engine are described below.

3.1.1 MDI-4x00 Input / Output Signals

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: Aiming LED on H: Aiming LED off	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 l	Out		L: LED on H: LED off	100kΩ pull up on module
	EX_ILLUM	Control of an external light source.	Out	Configured	L: External Illumination On H: External Illumination Off	
4	BUZZERn	Buzzer	Out		ACTIVE: PWM signal (frequency and duration configurable) IDLE: Steady high or low (configurable idle state)	A transistor or FET should be used to drive a buzzer.
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			100kΩ 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		3.0 ~ 5.5V	
12	DWNLDn	Forced download control signal	In		L: Forced Download mode H: Normal state	The MDI-4100 checks this signal when the power is supplied and enters firmware download mode when low. 100kΩ pull up on module

3.2 Baud Rate Setting

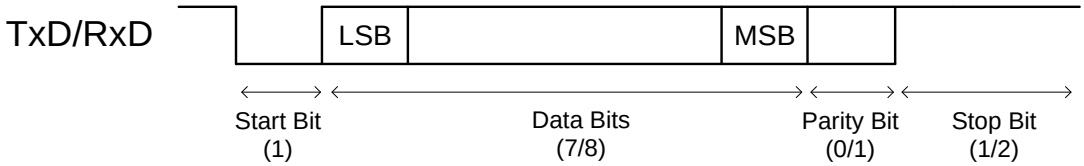
The baud rate is the rate at which bits are transmitted from the scan engine to the host and vice versa. Both the reader and the host must be set to the same baud rate.

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

Item	Command	Description	Default	Remark
Baud rate	K1	300bps		Enabled only with "Z2" or "Custom Factory Default"
	K2	600bps		
	K3	1200bps		
	K4	2400bps		
	K5	4800bps		
	K6	9600bps	✓	
	K7	19200bps		
	K8	38400bps		
	K9	57600bps		
	SZ	115200bps		
	[D90	230400bps		
	[D91	460800bps		
	[D92	921600bps		

3.3 Character Format

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



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

Item	Command	Description	Default	Remark
Data bit	L0	7 data bits		Enabled only with "Z2" or "Custom Factory Default"
	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		

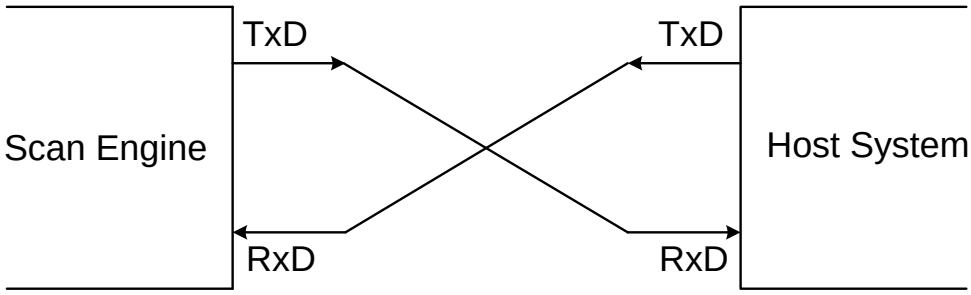
3.4 Handshaking

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

Item	Command	Description	Default	Remark
Handshaking	P0	No handshake	✓	Enabled only with “Z2” or “Custom Factory Default”
	P1	Busy/ready		
	P2	Modem		
	P3	ACK/NAK		
	P4	ACK/NAK NO RESPONSE		

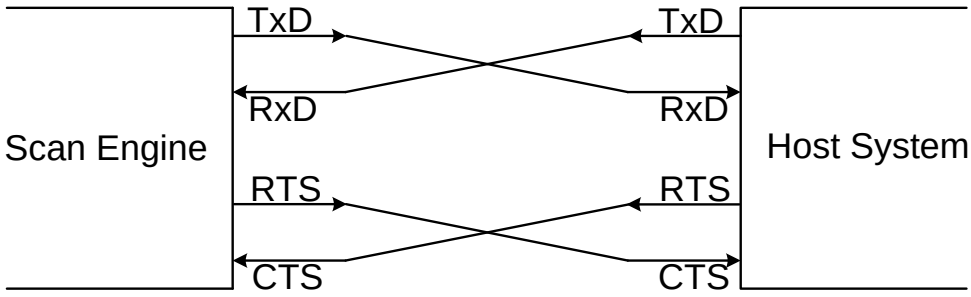
3.4.1 No Handshaking

The scan engine communicates regardless of the state of the host system.
* In this setting, the commands from the host system may not be received correctly.

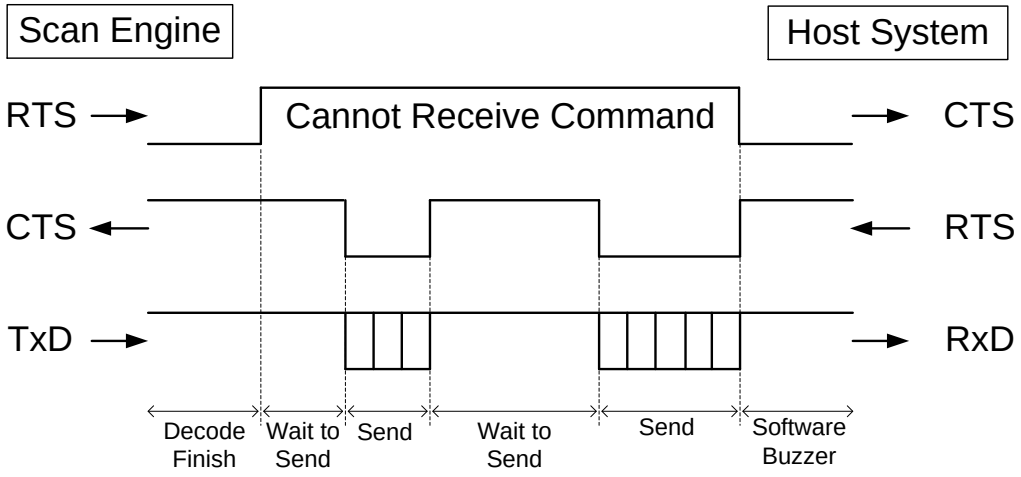


3.4.2 BUSY/READY

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 as shown in the figure below, the CTS line can be used to check if the other side is busy (off) or ready to receive data (on).



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



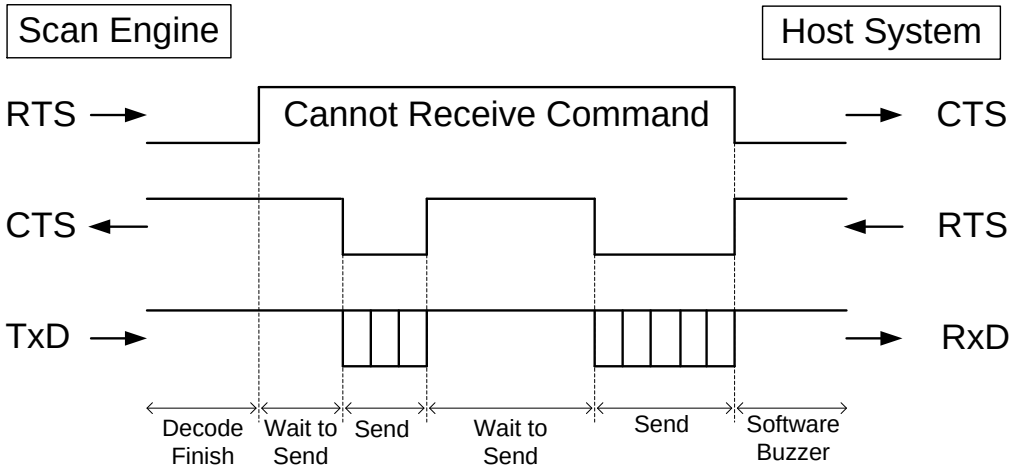
<CTS, TxD signal timing>
When the CTS line (RTS signal on the host side) is turned off during a TxD signal transmission, the scan engine stops the transmission. When the CTS signal is turned on during signal transmission, characters will be transmitted.

The following menu barcodes / commands are provided for the CTS line timeout setting.

Item	Command	Description	Default	Remark
CTS timeout	I0	Flow Control timeout Indefinitely	✓	Enabled only with "Z2" or "Custom Factory Default"
	I1	Flow Control timeout 100 ms		
	I2	Flow Control timeout 200 ms		
	I3	Flow Control timeout 400 ms		

3.4.3 MODEM

The scan engine's RTS is OFF as soon as power is supplied to the scan engine. The scan engine will turn RTS ON when it wants to transmit data to the host. The host should respond with CTS ON when it is ready to receive data. While the host CTS is ON the scan engine is allowed to transmit data. When all data has been transmitted, the scan engine will turn 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 with an error indication of the buzzer.



3.4.4 ACK/NAK

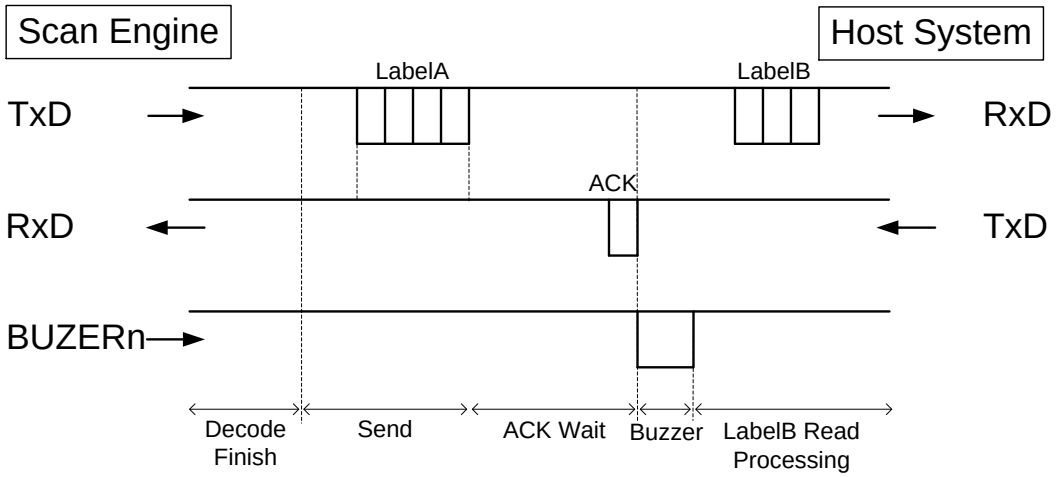
In ACK/NAK mode, the scanner will transmit data and expects to receive one of the following responses from the host:

Response: "ACK" (ASCII: Hex 06)
The scan engine terminates transmission with the good-read buzzer.

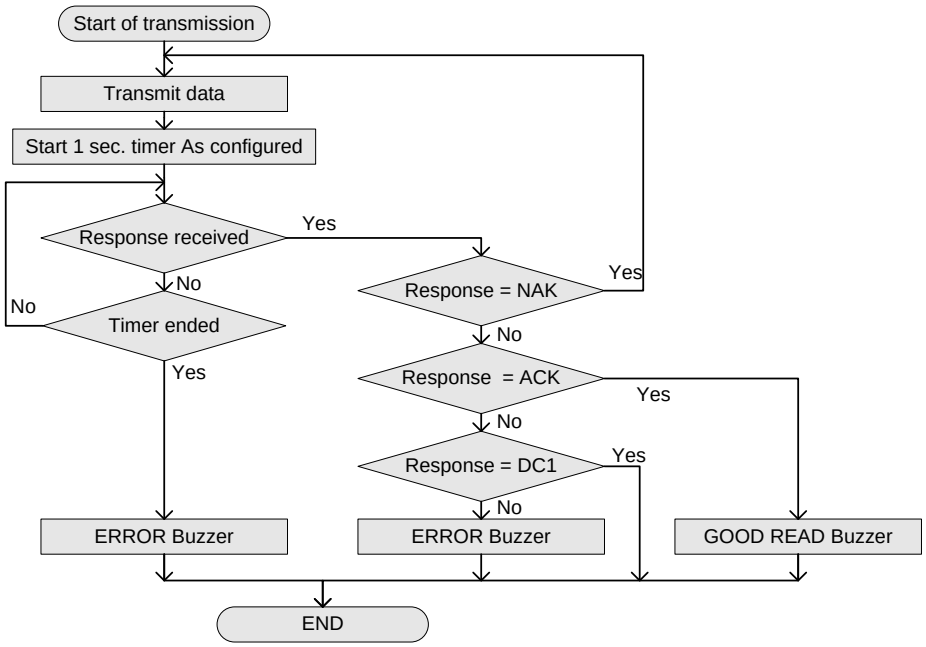
Response: "NAK" (ASCII: Hex 15)
The scan engine sends the data again and waits for the response from the host.

Response: "DC1" (ASCII: Hex 11)
The scan engine terminates transmission without the good-read or error buzzer.

Response: "None"
If there is no response within the timeout period then the scan engine terminates transmission with the error buzzer.(See: ACK/NAK flow chart)



<ACK/NAK flowchart>



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

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

3.4.5 ACK/NAK NO RESPONSE

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

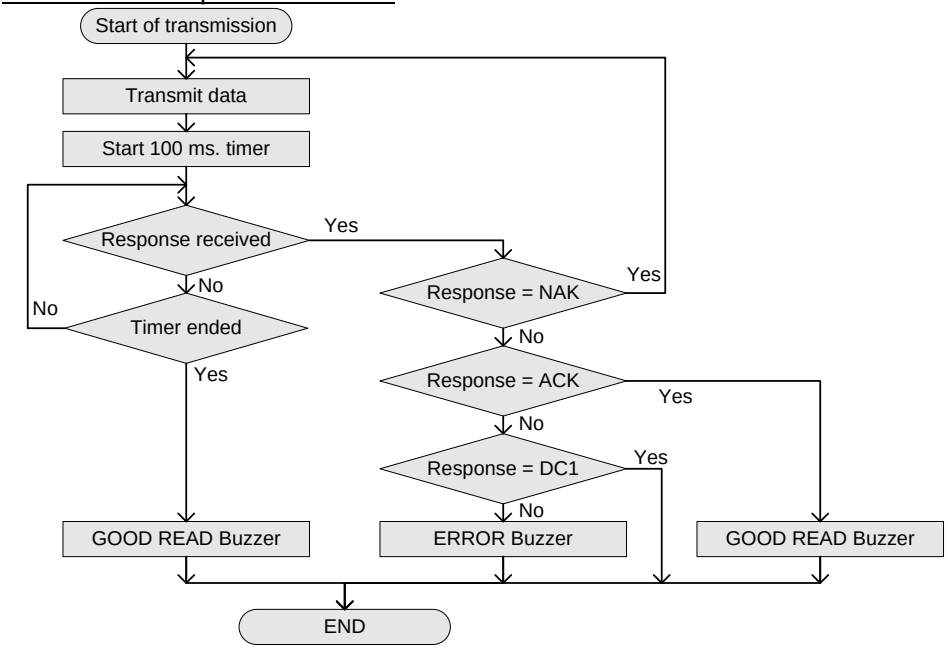
Response: "ACK" (ASCII: Hex 06)
The scan engine terminates transmission with the good-read buzzer.

Response: "NAK" (ASCII: Hex 15)
The scan engine sends the data again.

Response: "DC1" (ASCII: Hex 11)
The scan engine terminates transmission without a good-read or error buzzer.

Response: "None"
If there is no response within 100 ms then the scan engine terminates transmission with the good read buzzer. (See: *ACK/NAK no response flow chart*)

ACK/NAK no response flow chart



3.4.6 Inter Character Delay

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

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

Item	Command	Description	Default	Remark
Inter character delay	KA	No delay	✓	Enabled only with “Z2” or “Custom Factory Default”
	KB	20 ms delay		
	KC	50 ms delay		
	KD	10 ms delay		

3.4.7 Data Buffer Mode

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

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

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

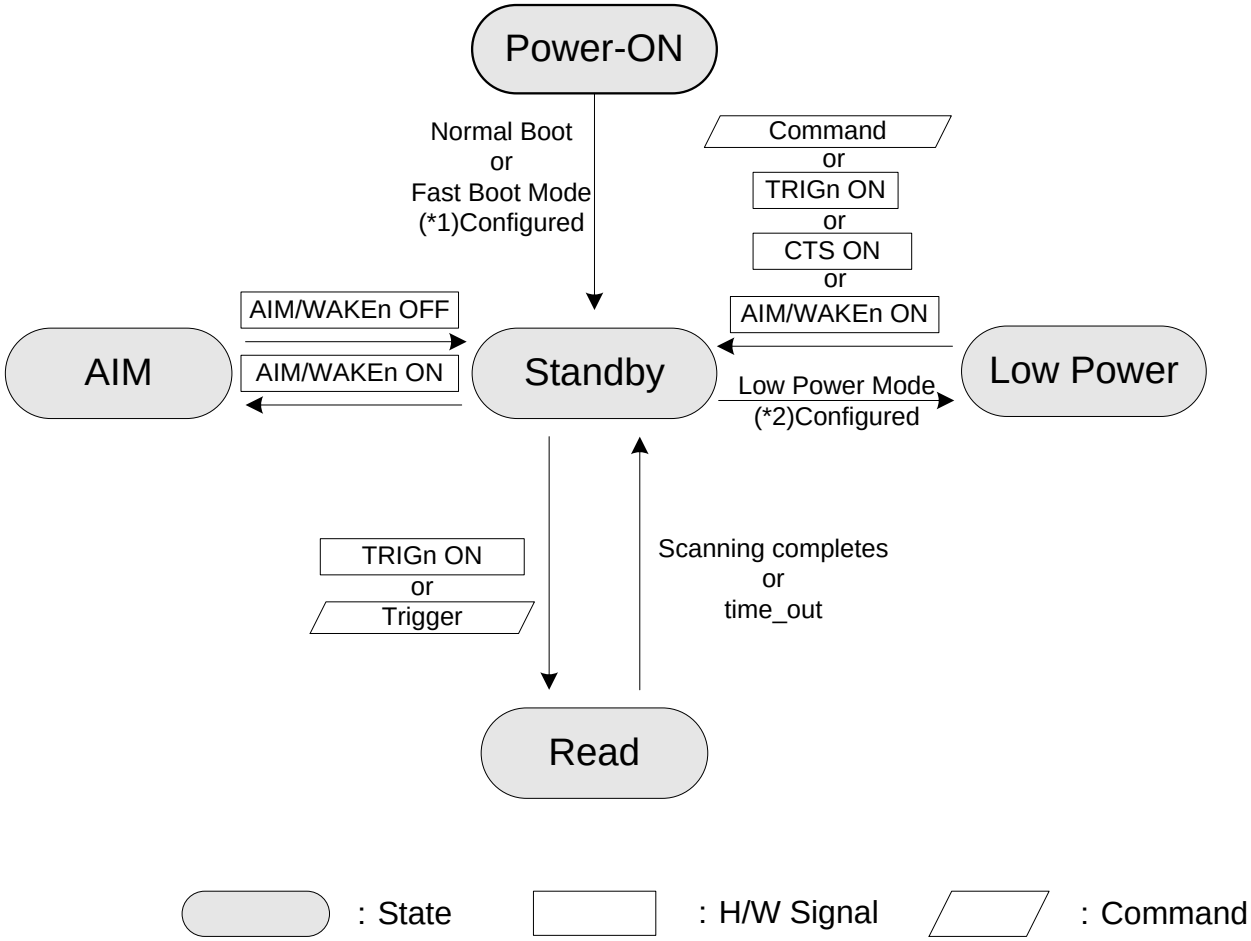
∗ When handshaking is configured, this setting is ignored and is Data Buffer Mode is disabled.

4 Power Management and Timing

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

The configurations available are:

4.1 Power Mode



*1 When Fast Boot Mode is set, there are conditions for configuration.(See: 4.4)
*2 When Low Power Mode is enabled, the MDI-4100 automatically enters its Low Power state after Power On. (See: 4.3)

4.2 Current Consumption

4.2.1 Absolute Maximum Ratings*

Item	Symbol	Rated Value	Unit
Supply Voltage (V_{CC} to GND)	V_{CC}	-0.3 ~ 7.0	V
Input Voltage	V_I	-0.3 ~ V_{CC} +0.3	V

* Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

4.2.2 Recommended Operating Conditions*

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage (V_{CC} to GND)*		V_{CC}		3.0	3.3~5.0	5.5	V
Input Voltage	Low	V_{IL}		0	-	0.15	V
	High	V_{IH}		V_{CC} -0.4	-	V_{CC}	V
Output Voltage	Low	V_{OL}	I_{OL} = 600μA		-	0.55	V
	High	V_{OH}	I_{OH} = -20μA	0.67*V_{CC}	-	V_{CC}	V
Output current	Low	I_{OL}	V_{cc} = 3.0V			-4	mA
	High	I_{OH}	V_{cc} = 3.0V			4	mA

* Measured at the MDI-4000 connector

4.2.3 Current Consumption

(V_{CC} = 3.3V, 5.0V T_A = 25℃)

Item	State	Symbol	Conditions	Min.	Typ.	Max.	Unit
Peak Rush Current *	Boot	I_{PK}	-	-	800	1000	mA

* Measured at the MDI-4000 connector

(V_{CC} = 3.3V, T_A = 25℃)

Item	State	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Current	Read	I_{OP}	-	-			mA
Standby current	Standby	I_{STB}	-	-			mA
Low Power Mode current	Low Power	I_{Low}	Configured	-			mA

(V_{CC} = 5.0V, T_A = 25℃)

Item	State	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Current	Read	I_{OP}	-	-			mA
Standby current	Standby	I_{STB}	-	-			mA
Low Power Mode current	Low Power	I_{Low}	Configured	-			mA

4.3 Low Power Mode

Low power mode helps to further reduce power consumption when in the Standby State.

4.3.1 Enable / Disable Low Power Mode

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

[Low power mode Enable/Disable]

Item	Command	Description	Default
Low power mode Enable/Disable	[XSC	Disable low power mode	✓
	[EB8	Enable low power mode	

4.3.2 Transition Time

The following commands are provided for setting the transition time t_1 to low power mode.

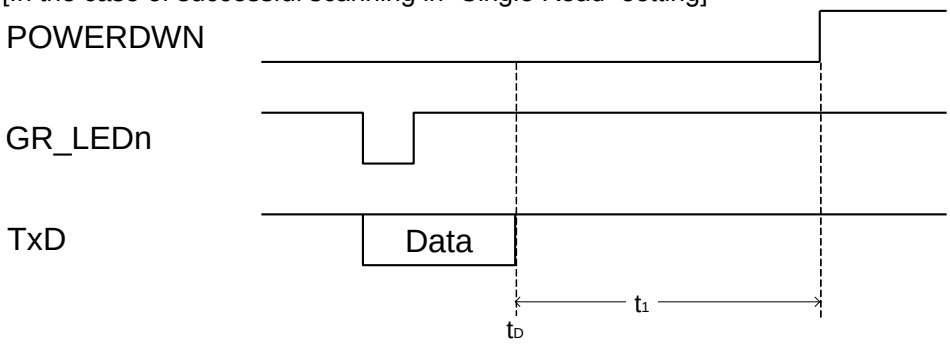
[Low power mode transition time]

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

Example of command input
Enable “low power mode” and set the transition time to low power mode to 0 seconds

<Esc>[EB8[EBAQ0Q0Q0Q0Z2<CR>

[In the case of successful scanning in “Single Read” setting]



4.4 Power ON /OFF Timing

The power on/off timing of the scan engine is described below.

4.4.1 Power-On Timing

Mode	Description	Min	Typ	Max	Unit
Normal Boot	t_1:Time taken to be ready after supplying the power	-	480	520	ms
Fast Boot Mode			395	420	ms

*1 The RTS signal level will be “High: not ready to receive” when the communication control is set to “MODEM”.
*2 The signal level will be “High” when the software buzzer is set to available.
Enabling / Disabling software start-up buzzer is configurable (See: 8.1.3)

4.4.2 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”.

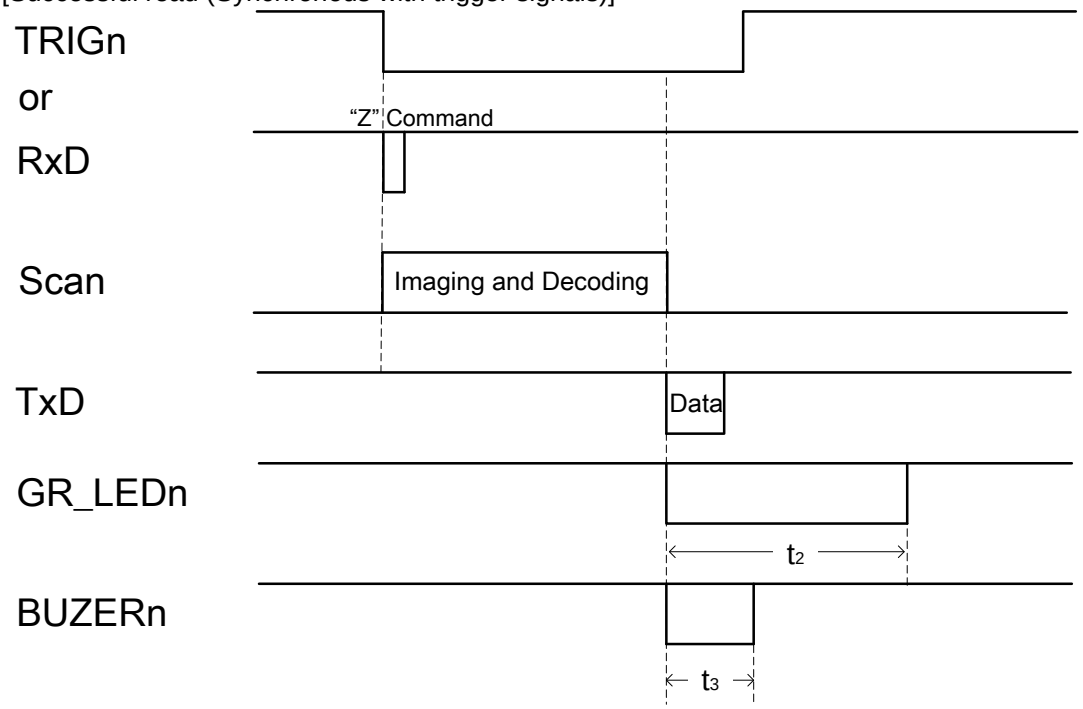
Power off when saving configurations:
The settings are stored in the scan engine when
1) Z2 command is sent to save the parameters.
2) After 1D or 2D menu codes are processed.
Writing the settings into the flash ROM can take up to10 seconds. Make sure the power is not turned off during this period, otherwise the settings may be corrupted.

* For 1), if the option “ACK/NAK for serial command” is enabled (see: 2.5.3) in advance, the scan engine will send an ACK after the writing configuration data is completed. This allows you to get the timing right.

4.5 Code Read Timing

The code read timing of the scan engine is described below.

[Successful read (Synchronous with trigger signals)]



	Description	Min	Typ	Max	Unit
t_1	GR_LEDn signal duration		200 (*1)	-	ms
t_2	BUZERn signal duration	-	50 (*2)	-	ms

*1 GR_LEDnsignal duration is configurable (See: 8.2)
*2 BUZERn signal duration is configurable (See: 8.1)

4.5.1 Read time

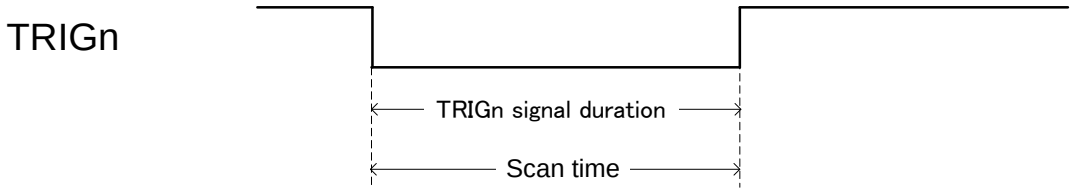
Read time in single read, after Trigger singnal is ON or the read command is sent, can be configurable. Reading operation stops when no data is output within the specified time.

Item	Command	Description	Default	Remark
Synchronous with trigger signals	Y0	Synchronous with trigger signals	✓	
Read time option	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		
	YL	Read time x10 times		
	YM	Indefinitely		

* In the case of "Synchronous with trigger signals" in auto trigger, the read time is automatic.

4.5.2 Trigger Signal Control

When using the TRIGn signal, the operation is shown below.
[Synchronous with trigger signals]

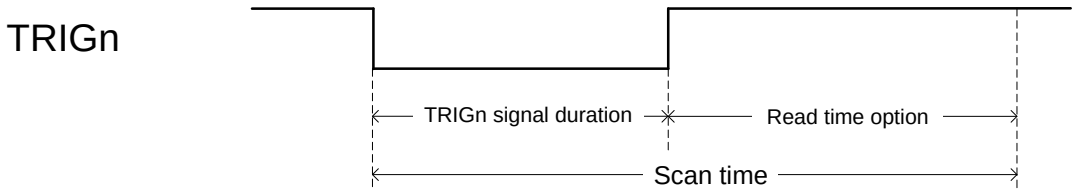


* Read time must be at least 200 ms from the beginning of TRIGn signal.

When using the TRIGn signal, the start timing of the “Read Time option” is configurable.

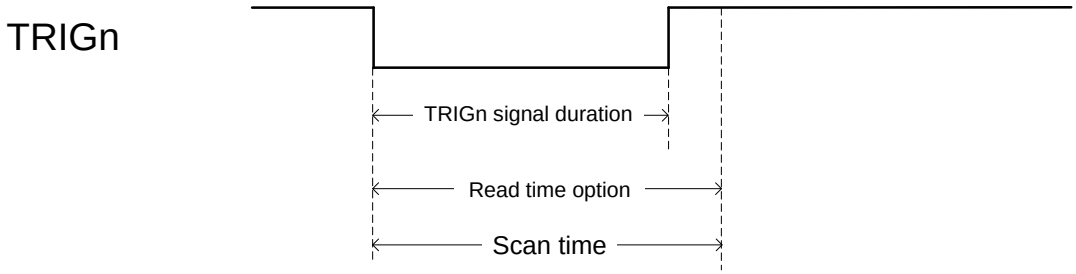
Item	Command	Description	Default
Read time option timing	+O	The time from the end of trigger signal	✓
	+P	The time from the start of trigger signal	

[Read time from the end of trigger signal]



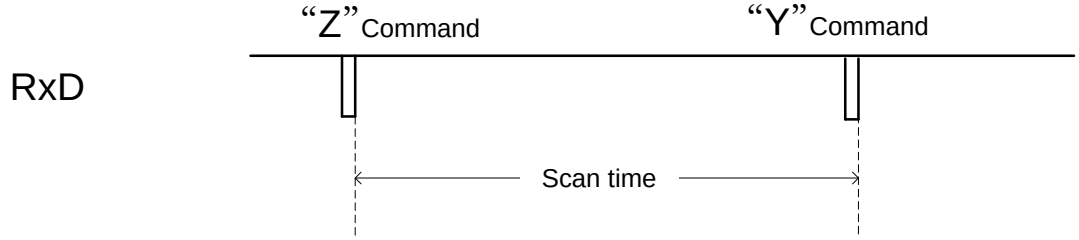
*Default setting of “Read time option” is disable.

[Read time from the start of trigger signal]



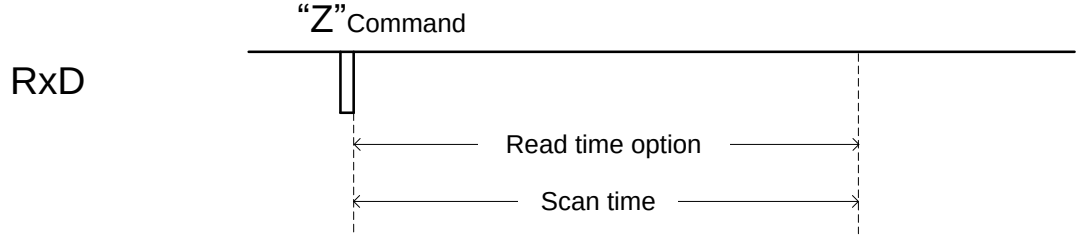
4.5.3 Command Trigger Control

When using command trigger “Z”, the operation is shown below.
[Synchronous with trigger signals]



* The read time option is “Synchronous with trigger signals”, and reading stops with “Y” command.

[Read time option setting]

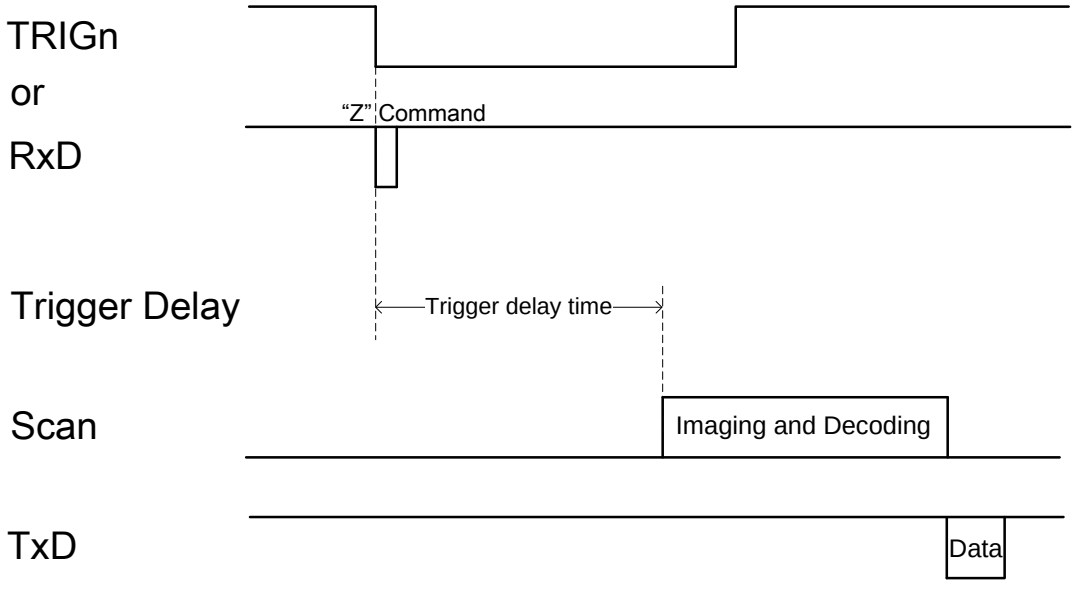


* When the read time option is set, reading stops when the specified period of time has elapsed or with “Y” command.

4.5.4 Trigger Delay

Trigger delay, it is possible to start scanning after the trigger delay setting time.

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



5 Code Options

This chapter describes the code options for the scan engine.

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

The configurations available are:

5.1 Setting of Readable Codes

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

[Single] :
Only the specified symbology will be enabled and all other symbologies will be disabled.

[Multiple] :
The specified symbology will be enabled in addition to the already enabled symbologies.

[Disable] :
The specified symbology will be disabled. All other enabled symbologies stay enabled.

5.1.1 1D Codes

Symbologies	Single command	Multiple command	Disable command	Default	Mini length	CD trans mission	CD check	Remark
UPC	J1	R1	[X4B	✓	-	✓	✓	
UPC Add-on 2 UPC Add-on 5	J2 J3	R2 R3	[X4C [X4D		-	✓		
EAN	J4	R4	[X4E	✓	-	✓	✓	
EAN Add-on 2 EAN Add-on 5	J5 J6	R5 R6	[X4F [X4G		-	✓		
EAN-13	JG	JU	[DDM		-	✓		
EAN-13 Add-on 2 EAN-13 Add-on 5	JH JI	JV JW	[X4N [X4P		-	✓		
EAN-8	JA	JO	[DDN		-	✓		
EAN-8 Add-on 2 EAN-8 Add-on 5	JB JC	JP JQ	[X4M [X4O		-	✓		
Code 39	A2	B2	VB	✓	1	✓	×	
Tri-Optic	JD	JZ	[DDJ	✓	-	-		
Codabar	A3	B3	VC	✓	2	✓	×	
Industrial 2of 5	J7	R7	[X4K	✓	5	✓	×	
Interleaved 2of 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	✓	×	

5.1.2 Postal Code

Symbologies	Single	Multiple	Disable	Default	Remark
Chinese Post Matrix 2 of 5	JE	JS	JT		
Korean Postal Authority	JL	WH	WI		
Intelligent Mail Barcode	[D5H	[D5F	[D5G		
POSTNET	[D6C	[D6A	[D6B		
PLANET	[DG2	[DG3	[DG4		
Japan Postal	[D5R	[D5P	[D5Q		
Netherland KIX Code	[D5M	[D5K	[D5L		
Australian Postal	[D6O	[D6M	[D6N		
UK Postal (Royal mail)	[DG7	[DG8	[DG9		
4-State Mailmark Barcode	[DGS	[DGS	[DGU		

5.1.3 GS1 DataBar

Symbologies	Single		Multiple		Disable		Default	Remark
GS1 DataBar ・GS1 DataBar Omnidirectional ・GS1 DataBar Truncated ・GS1 DataBar Stacked ・GS1 DataBar Stacked Omnidirectional	J9	[BC6	JX	[BCI	SJ	[BCU	✓	
GS1 DataBar Limited	JJ		JY		SK		✓	
GS1 DataBar Expanded ・GS1 DataBar Expanded ・GS1 DataBar Expanded Stacked	JK		DR		SL		✓	

5.1.4 Composite Code

Symbologies	Multiple	Disable	Default	Remark
Composite GS1 DataBar ・CC-A ・CC-B ・Limited CC-A ・Limited CC-B ・Expanded CC-A ・Expanded CC-B	[BHE	[BHF	✓	
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				

*1 When composite EAN or composite UPC is enabled, a link flag will be enabled and EAN or UPC only cannot be read.

5.1.5 2D Codes

Symbologies	Single	Multiple	Disable	Default	Remark
PDF417	[BC3	[BCF	[BCR	✓	
Micro PDF417	[BC4	[BCG	[BCS		
Codablock F	[D4R	[D4P	[D4Q		Code128 must be disable
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	✓	

5.1.6 Other Option for Codes

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

*1 PDF417, QR Code, Data Matrix(ECC 200, ECC 000-140), Maxi Code, Micro PDF417, Aztec Code, GS1-128 Composite barcode, Aztec Runes, Micro QR and Chinese-sensible code
*2 When ‘ALL 2D codes’ is enabled, a link flag will be enabled, and UPC/EAN only cannot be read.

5.1.7 OCR

ICAO Machine Readable Travel Documents Charts

Documents	Single	Multiple	Disable	Default	Remark
Machine readable Passports	[DJ1	[DJ2	[DJ3		
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		

Documents	Single	Multiple	Disable	Default	Remark
ISBN (OCR font-B)	[DJG	[DJH	[DJI		

5.2 Setting of Code Specific Options

5.2.1 UPC-A, UPC-E

Code	Item	Command	Description	Default
UPC-A	UPC-A Leading zero CD transmission	E3	UPC-A, No leading zero, transmit CD	✓
		E5	UPC-A, No leading zero, not transmit CD	
		E2	UPC-A, Leading zero, transmit CD	
		E4	UPC-A, Leading zero, not transmit CD	
UPC-E	UPC-E Leading zero CD transmission	E7	UPC-E , No leading zero, transmit CD	✓
		E9	UPC-E , No leading zero, not transmit CD	
		E6	UPC-E , Leading zero, transmit CD	
		E8	UPC-E , Leading zero, not transmit CD	
	UPC-A, E conversion	6Q	Transmit UPC-E	✓
		6P	Transmit as UPC-A	
	UPC-E1 conversion	KP	Disable UPC-E1	✓
		KQ	Enable UPC-E1	

5.2.2 EAN-13, EAN-8

Code	Item	Command	Description	Default
EAN-13 and EAN-8	CD transmission	6J	Not transmit EAN-13 CD	
		6K	Transmit EAN-13 CD	✓
	CD transmission	6H	Not transmit EAN-8 CD	
		6I	Transmit EAN-8 CD	✓
	ISBN conversion	IB	Disable ISBN conversion	✓
		IA	Enable ISBN conversion	
		IK	Enable ISBN if possible	
	ISSN conversion	HN	Disable ISSN conversion	✓
		HO	Enable ISSN conversion	
		4V	Enable ISSN if possible	
	ISMN conversion	IO	Disable ISMN conversion	✓
		IP	Enable ISMN conversion	
		IQ	Enable ISMN if possible	
	EAN13 forced add-on 1	-G	Enable EAN forced add-on when EAN13 starts with 378/ 379 / 529	
		-H	Disable EAN forced add-on when EAN13 starts with 378/ 379 / 529	✓
	EAN13 forced add-on 2	-C	Enable EAN forced add-on when EAN13 starts with 434 / 439 / 414 / 419 / 977 /978	
		-D	Disable EAN forced add-on when EAN13 starts with 434 / 439 / 414 / 419 / 977/ 978	✓

5.2.3 Code 39 and It. Pharm

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

5.2.4 Codabar

Code	Item	Command	Description	Default
Codabar	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	
	CD check	H7	Not check CD	✓
		H6	Check CD	
	CD transmission	H9	Not transmit CD	
		H8	Transmit CD	✓
	Space insertion	HE	Disable space insertion	✓
		HD	Enable space insertion	
	ST/SP transmission	F0	Not transmit ST/SP	✓
		F3	ST/SP: ABCD/ABCD	
		F4	ST/SP: abcd/abcd	
		F1	ST/SP: ABCD/TN*E	
		F2	ST/SP: abcd/tn*e	
		HJ	ST/SP: <DC1><DC2><DC3><DC4> /<DC1><DC2><DC3><DC4>	

5.2.5 Code 128 and GS1-128

Code	Item	Command	Description	Default
Code 128	EAN128 conversion	OF	Disable GS1-128	✓
		JF	Enable GS1-128 only	
		OG	Enable EAN-128 if possible	
	Concatenation	MP	Disable concatenation (FNC2 message append)	✓
		MO	Enable concatenation (FNC2 message append)	

5.2.6 IATA

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

5.2.7 MSI/Plessey

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

5.2.8 UK/Plessey

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

5.2.9 Telepen

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

5.2.10 Code 11

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

5.2.11 Korean Postal Authority Code

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

5.3 Setting of Number of Characters

If you are going to read barcodes of fixed length, it is recommended to configutre the scan engine for that fixed number of characters. The scan engine will verify that labels read are of the correct length and rejects labels that do not have the specified length. The advantage of setting a fixed length is that it provides protection against spurious short scans of labels, possible with e.g. Interleaved 2of5 that does not provide sufficient security against partial scans. The length checking is done on the label data and is not affected by options such as (not) transmit start/stop character or check digit. Setting the number of characters does not affect fixed length codes, such as EAN-13.

The following options are available:

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

This option enables fixed length and minimum / maximum length checking for different barcode types and will only affect the specified barcode types.
[Configuration with commands]

Item	Command					Description	Default (valid range)
Fixed length	See 5.3.2	Qa	Qb	Qc	Qd	Fixed length for selected codes	-

Fixed commands : Input command ID for each code
abcd : Up to 8000 decimal

Examples:

Fix Code39 length to 6 digits	: <Esc>[DC1Q6<CR>
Fix Code39 length to 6 digits and 12 digits	: <Esc>[DC1Q6[DC1Q1Q2<CR>
Fix Code39 length to 6 digits and Interleaved 2of5 to 12 digits	: <Esc>[DC1Q6[DC4Q1Q2<CR>
Clear fixed length for Code39	: <Esc>[DC1<CR>
Set minimum length for Interleaved 2of5 to 4 digits	: <Esc>[DB4Q4<CR>
Clear minimum length for Interleaved 2of5	: <Esc>[DB4<CR>
Set maximum length for Code39 to 12 digits	: <Esc>[DA1Q1Q2<CR>
Set max length for PDF417 to 20 digits and QR code 125 digits	: <Esc>[DALQ2Q0[DAJQ1Q2Q5<CR>

[Configuring with menu barcodes]
Scan ZZ menu label
Scan HK, HL, or HM menu label
(See 5.3.3. for the fixed length or minimum/maximum length for selected codes.)
Scan a barcode with the required length
Scan a 2nd barcode with the required length (fixed length only)
Scan the ZZ menu label.

Note:

- With ‘HK’ menu label (Fixed length on for selected codes), fixed lengths for up to two types of codes at a time are configurable.
- If you want to configure the fixed length for more than two types of codes with the HK menu label, repeat the same procedure with the required codes one or two at a time.
- With “HL / HM” menu labels (Minimum / Maximum length for selected codes), only one length is configurable.
- There is the following order of priorities: Fixed length ON for selected codes, Fixed length ON all codes, Minimum / Maximum length for selected codes. When trying to set a lower priority setting after a higher priority setting was made, the prior setting should be cleared to enable the lower priority setting.
- If a label is checked for fixed length, it will not be checked for minimum or maximum length.
- The maximum number of characters is 8000.
- If any digit is omitted from 4 numerical values of QaQbQcQd, the change will be invalid and the default value will be set.

5.3.2 Command List: Fixed Length ON/Minimum/Maximum Length

Code type	Fixed length	Mini length	Max length
Reset settings	[DC0	[XQG	[XNG
Code-39	[DC1	[DB1	[DA1
Codabar	[DC2	[DB2	[DA2
Industrial 2of5	[DC3	[DB3	[DA3
Interleaved 2of5	[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
DataMatrix	[DCH	[DBH	[DAH
Maxi code	[DCK	[DBK	[DAK
Aztec code	[DCI	[DBI	[DAI
microPDF417	[DCM	[DBM	[DAM
RSS-Expanded(GS1 Databar)	[DCF	[DBF	[DAF
Composite	[DCG	[DBG	[DAG
EAN-128(GS1-128)	[DCC	[DBC	[DAC
S-code	[DC5	[DB5	[DA5
UK/Plessey	[DCA	[DBA	[DAA
Matrix 2of5/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

5.3.3 Command List: Setting of Number of Characters

Item	Command	Description	Default	Remark
Setting the number of characters	HK	Fixed length ON for selected codes		Menu only
	HL	Minimum length for selected codes		Menu only
	HM	Maximum length for selected codes		Menu only

6 String Options

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

The configurations available are:

6.1 Case Conversion

The barcode 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.

Example of case conversion:

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

The following menu barcodes / commands are provided for the case conversion setting.

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

6.2 Prefix / Suffix

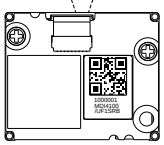
The following additional characters can be included in the output for code data.

[Output Format:]

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

(2) 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 is a “CR” character.

Preamble	**Prefix for each code**	Data	**Suffix for each code**	**Postamble**
Max 8 digits	Max 4 digits		Max 4 digits	Max 8 digits



[Program Value:]

- ASCII
  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 “5.2. Setting of Code Specific Options”.

- Code coordinate
  The code coordinate is transmitted as the pixel coordinate of the image sensor.

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

6.3 Set Prefix / Suffix

How to add the prefix / suffix is described below.

[Configuring with Command:]

Item	Command		Description	Default
Prefix/Suffix	Set commands	Value commands	Set Prefix/Suffix	All codes Suffix “CR”
	6.3.1	ASCII: 6.3.2		
		Code ID: 6.3.3		
		Code Length: 6.3.6		
		Code Coordinates: 6.3.7		
		Scan time: 6.3.8		

Example: to set “C39:” as the prefix and “CR” and “LF” as the suffix for Code 39.

<Esc>M40CQ3Q96AO41M1J<CR>

[Configuring with menu barcodes:]
(1) Scan the SET menu label.
(2) Scan the "6.3.1 Command List: Prefix / Suffix "menu label for the symbology for which you want to set the prefix or suffix.
(3) Scan one or more menu labels for "6.3.2 Prefix / Suffix Values"
(4) Scan the END menu label.

Example: to set “C39:” as the prefix and “CR” and “LF” as the suffix for Code 39.

1. Scan “ZZ” to start.
2. Scan “M4” to set Code 39 prefix.
3. Scan “0C” to set C.
4. Scan “Q3” to set 3.
5. Scan “Q9” to set 9.
6. Scan “6A” to set :.
7. Scan “O4” to set Code 39 suffix.
8. Scan “1M” to set CR.
9. Scan “1J” to set LF.
10. Scan “ZZ” to end.

Note:

- The prefix and suffix setting commands clear the current values and configure new ones. The default suffix of CR is also cleared.
- If you want to clear the default suffix CR, it is possible by scanning RZ menu label (Set suffix for all codes) only or PR menu label only(Clear suffix).
- When the number of configured prefix / suffix characters exceeds the maximum limit (4 digits), the configuration will be ignored.

6.3.1 Command List: Prefix / Suffix

Code	Prefix Command	Suffix Command
Clear all codes Prefix / Suffix	MG	PR
All codes Prefix / Suffix	RY	RZ
Preamble / Postamble	MZ	PS

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 Chinese Post Matrix 2 of 5	GL	GM
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	*$	*%
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
Australian Postal	[D6P	[D6Q
4-state Mailmark barcode	[DGV	[DGW
GS1 DataBar	OE	PQ
GS1 DataBar	[D6G	[D6J
GS1 DataBar Limited	[D6H	[D6K
GS1 DataBar Expanded	[D6I	[D6L
Composite code	RR	RS

Code	Prefix Command	Suffix Command
Codablock-F	[D4S	[D4T
Data Matrix	MD	PO
Aztec	[BF0	[BF1
Chinese Sensible Code	[D4N	[D4O
QR Code	MK	PW
Maxicode	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

6.3.2 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				

6.3.3 Code ID

Code identification OPTICON (See: 6.3.4)
The direct input 'code identifier' provides a quick method of sending barcode type ID instead of programming a separate prefix or suffix for each barcode type.

Code identification AIM/ISO (See: 6.3.5)
The code identifier is transmitted to ISO 15424 format.]cm

-] is ASCII value, decimal 93
- c is code character
- M is modifier character

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

6.3.4 Opticon Code ID (Prefix / Suffix Values)

Code	Code ID	Code	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	Aztec	o
Industrial 2of5	O	Aztec Runes	
Interleaved 2of5	N	Chinese Sensible Code	e
S-Code	g	QR Code	u
Matrix 2of5	Q	Micro QR Code	j
Chinese Post	w	Maxi Code	v
IATA	P	PDF417	r
MSI/Plessey	Z	Micro PDF417	s
Telepen	d	ICAO Travel Documents (OCR)	9
UK/Plessey	a	Other OCR Font B	z

6.3.5 AIM / ISO 15424 Code ID (Prefix / Suffix Values)

AIM/ISO15424 Code ID			
Code	Code	Code	Code
UPC-A	]E0	Telepen	]B*
UPC-A +2	]E3	UK/Plessey	]P0
UPC-A +5	]E3	Code 128	]C0
UPC-E	]E0	GS1-128	]C1
UPC-E +2	]E3	Code 93	]G0
UPC-E +5	]E3	Code 11	]H*
EAN-13	]E0		]X0
EAN-13 +2	]E3	Korean Postal Authority	]X0
EAN-13 +5	]E3	Intelligent Mail Barcode	]X0
EAN-8	]E4	POSTNET	]X0
EAN-8 +2	]E7	GS1 Databar	]e0
EAN-8 +5	]E7	CC-A	]e1
Code 39	]A*	CC-B	]e1
Code 39 Full ASCII	]A*	CC-C	]e1
Tri-Optic	]X0	GS1 Databar with CC-A	]e0
Code 39 lt. Pharmaceutical	]X0	GS1 Databar with CC-B	]e0
Codabar	]F*	GS1 Databar with CC-C	]e0
Codabar ABC	]F*	Codablock F	]0*
Codabar CX	]X0	DataMatrix	]d*
Industrial 2 of 5	]S0	Aztec	]z*
Interleaved 2 of 5	]I*		]X0
S-Code	]X0	QR Code	]Q*
Matrix 2 of 5	]X0	Micro QR Code	]Q*
Chinese Post	]X0	Maxi Code	]U*
IATA	]R*	PDF417	]L0
MSI/Plessey	]M*	Micro PDF417	]L0
	]X0		

Code option	]AIM-ID	Code option	]AIM-ID
IATA option AIM/ISO15424 Code ID : R*			
Not check CD (4H) Transmit CD (4L)	]R0	Not check CD (4H) Not transmit CD (4M)	]R2
Check FC and SN only (4I) or Check CPN,FC and SN (4J) or Check CPN,AC,FC and SN (4K) Transmit CD (4L)	]R1	Check FC and SN only (4I) or Check CPN,FC and SN (4J) or Check CPN, AC, FC and SN (4K) Not transmit CD (4M)	]R3
MSI/Plessey option AIM/ISO15424 Code ID : M*/X0			
Check 1CD = MOD 10 (4B): (4B) + Transmit CD1 (4E) or (4B) + Not transmit CD (4G) or (4B) + Transmit CD1 and CD2 (4F)	]M0]M1]X0	Check 2CD's = MOD 10/MOD 11 (4D): (4D) + Transmit CD1 (4E) or (4D) + Not transmit CD (4G) or (4D) + Transmit CD1 and CD2 (4F)	]X0
Check 2CD's = MOD 10/MOD 10 (4C): (4C) + Transmit CD1 (4E) or (4C) + Not transmit CD (4G) or (4C) + Transmit CD1 and CD2 (4F)	]X0	Check 2CD's = MOD 11/MOD 10 (4R): (4D) + Transmit CD1 (4E) or (4D) + Not transmit CD (4G) or (4D) + Transmit CD1 and CD2 (4F)	]X0
Telepen option AIM/ISO15424 Code ID : B*			
Telepen (numeric or ASCII only): ASCII mode (D3) Numeric mode (D2)	]B0]B1	Telepen (numeric followed by ASCII): ASCII mode (D3) Numeric mode (D2)	]B0]B2
Telepen (ASCII followed by numeric) (not supported): ASCII mode (D3) Numeric mode (D2)	]B0]B2		
Code 11 option AIM/ISO15424 Code ID : H*/X0			
Check 1CDs (BLG) or Check auto 1 or 2CDs (BLI) (length > 12) Transmit $CD_{(S)}$ (BLK)	]H0	Check 1CDs (BLG) or Check 2CDs (BLH) or Check auto 1 or 2CDs (BLI) (length > 12) Transmit $CD_{(S)}$ (BLK)	]X3
Check 2CDs (BLH) or Check auto 1 or 2CDs (BLI) (length > 12) Transmit $CD_{(S)}$ (BLK)	]H1	Not check CD (BLF) Not transmit CD (BLJ)	]X0
Codablock F option AIM/ISO15424 Code ID : O*			
FNC1 not used	]O4	FNC1 in 1st position	]O5

Code option	]AIM-ID	Code option	]AIM-ID
DataMatrix option 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 option 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

6.3.6 Code Length

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

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

Example: to set the all code prefix <code identifier>:<code length>:.

Configuring with Command:
<Esc>RY$26A$36A<CR>

Configuring with menu barcode:
1. Scan “ZZ” to start
2. Scan “RY” to set prefix all codes
3. Scan “$2” to set Code identification using OPTICON ID
4. Scan “6A” to set
5. Scan “$3” to set code length (1D/2D : 2/6 digits)
6. Scan “6A” to set
7. Scan “ZZ” to end.

6.3.7 Code Coordinates

The code coordinate is transmitted as the pixel coordinate of the image sensor
It is able to output the vertex and the center of the read code.

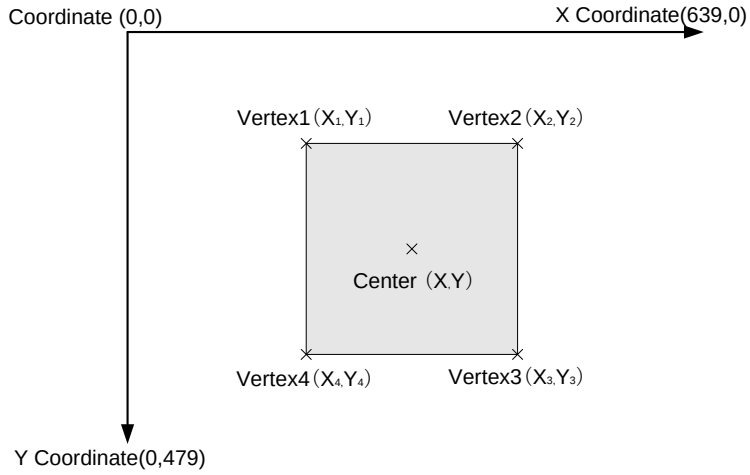
Item	Command	Description	Default
Code coordinate value	[DDX	Code vertex coordinate	
	[DDY	Code center coordinate	

•Code vertex coordinate optput format:
$X_1/Y_1:X_2/Y_2:X_3/Y_3:X_3/Y_3:X_4/Y_4$

•Code center coordinate output format
X/Y

•X Y format
X : 1 to 3 digits
Y : 1 to 3 digits

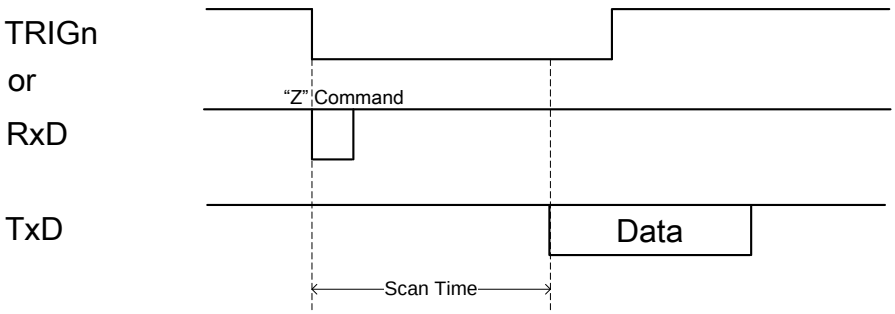
The range of coordinate is described below.
X : 0 to 639 Y : 0 to 479



6.3.8 Scan time

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

Item	Command	Description	Default
Scan time value	[EDG	Scan time	



7 Read Options

This chapter describes the read options for the scan engine.

The configurations available are:

7.1 Read Modes

Code reading starts by pressing trigger, sending the trigger command or detecting object in auto trigger.

7.1.1 Read Modes

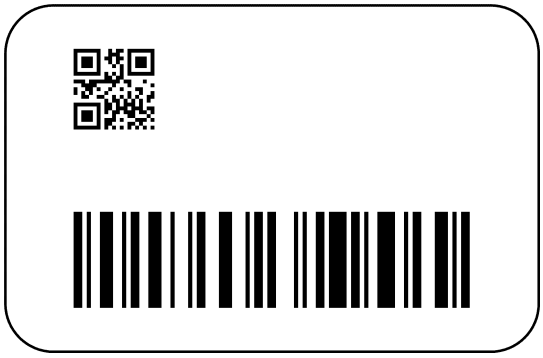
Read modes includes “single read” and “multiple read” modes.
Single read and Multiple read settings are described below.

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

☐ Single Read
Read the target code by each valid trigger.
Reading stops after success of reading single code and outputting result, or exceeding read extended time（See: 10.1.1.）.

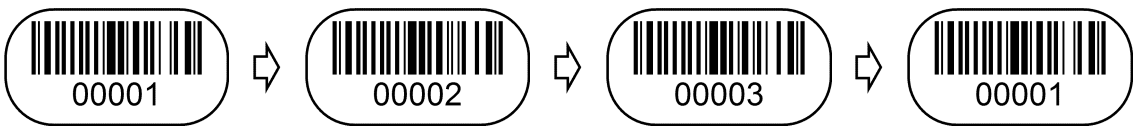
☐ Multiple Read 1 (No same data reading)
If there is more than one code within read area as following figure, to prevent reading twice, the module saves the read data in memory to not read the same data while triggering.
However, memory is sequentially reset by reading more than 20 codes.

Example) Read multiple codes continuously with single trigger.



☐ Multiple Read 2 (Permit same data reading)
While triggering, continuously read multiple target codes.
However, same data will not be read while 7.3.2 “Double read reset time”.

Example) Read multiple codes sequentially with single trigger.

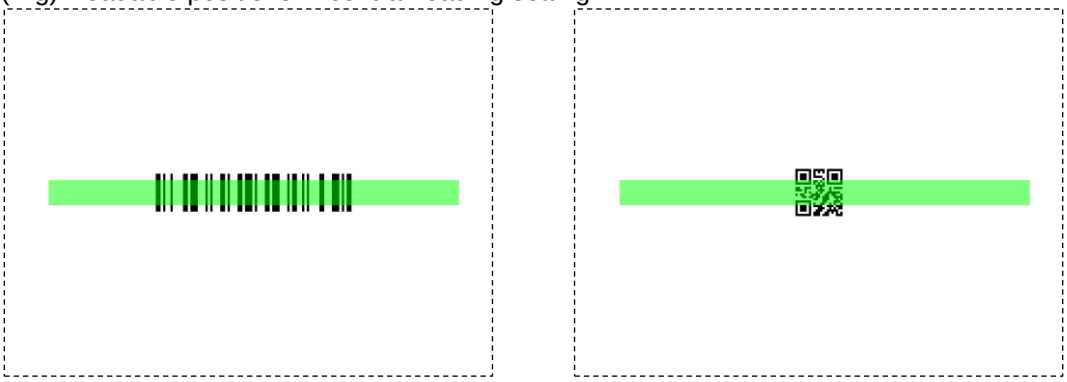


7.1.2 Central Reading

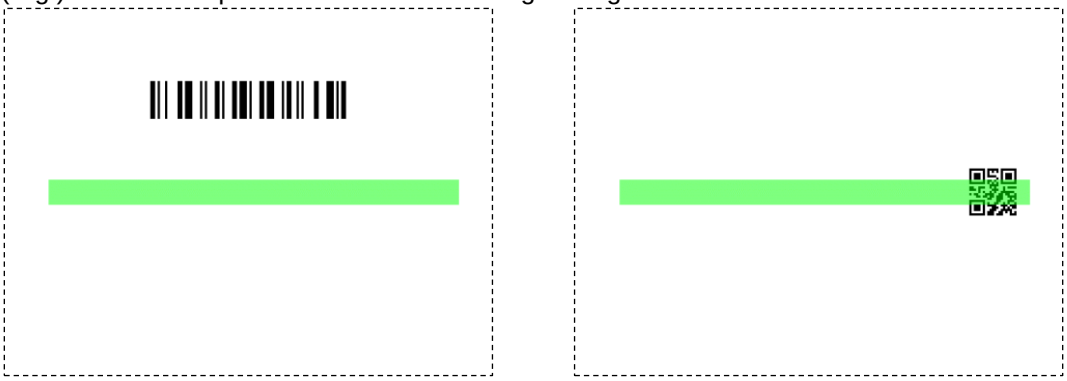
This function is used to read a target code when multiple codes are closely positioned. Reading can be activated only when the code is in the central portion of an image as shown below.

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

(E.g) Readable positions in central reading setting



(E.g.) Unreadable positions in central reading setting



* When several codes are tightly packed, it is recommended to use Trigger Repeat (See: 7.1.2) function that Improved reading performance.

7.2 Manual Trigger

7.2.1 Trigger Repeat

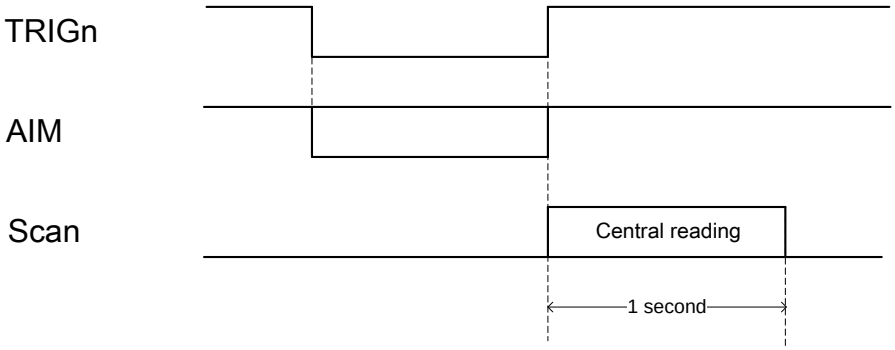
Trigger repeat helps the user to properly aim the module before it starts scanning. This can be very handy in situations where several barcodes are printed close to each other.

The actual behavior depends on the configuration of Read Time. (See : 4.5.1)

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

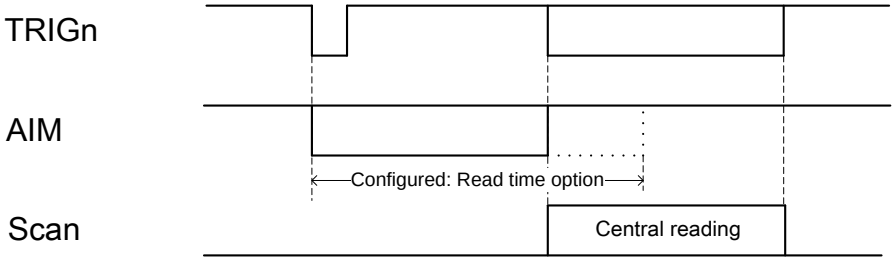
- Read time: Default setting, ”Y0”, Synchronous with trigger signals

As long as the trigger is pressed the green aiming light is emitted, allowing the user to aim at the target code. When the trigger is released, then the code in the center of the image is read. The read time after releasing the trigger is 1 second.



- Read time: ”Y1” and other read times

When the trigger is pressed the green aiming light is emitted but the module does not start scanning, allowing the user to aim at the target code. When the trigger is pressed for the 2nd time, then the code in the center of the image is read. The read time after the second trigger press is the configured read time.



7.3 Auto Trigger

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

The options below are used to activate auto trigger mode. To have auto trigger enabled at start-up, make sure to save the setting. When auto trigger is disabled, manual trigger is used.

There are two modes for auto trigger.
•Presentation auto trigger mode
This mode is meant for applications where the scanner is fixed and codes are presented.

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

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

7.3.1 Auto Trigger Sensitivity

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

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

7.3.2 Double Read Reset Time

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

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

*When fixed the read time, please see: 7.1.2 “Read Time”

7.3.3 Auto Trigger Sleep Mode

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

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

7.3.4 Detection mode

There are three methods for detecting a target code.

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

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

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

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

7.4 Illumination and Aiming

7.4.1 LED illumination

Warm white LED illumination used for scanning can be enabled or disabled.

- Disable illumination
  When the illumination is disabled, the reading performance may be degraded.

- Automatic illumination switching
  Floodlight ON and OFF are alternated. The illumination in which a code was read is memorized and will be prioritized for subsequent scanning.

Item	Command	Description	Default
LED illumination mode	[D39	Enable LED illumination	✓
	[D3A	Disable LED illumination	
	[D3B	LED illumination alternating	
	[D3Q	Prevent specular reflection	
LED illumination brightness	[DDB	Brightness "Standard"	✓
	[DDC	Brightness "Low"	

7.4.2 LED Aiming

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

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

7.5 Decoder Details

7.5.1 Quiet Zone

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

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

7.5.2 Redundancy

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

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

* This setting is valid only 1D code.

8 Indicator Options

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

The configurations available are:

8.1 Buzzer

Buzzer settings are described below.

8.1.1 Buzzer Loudness

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

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

8.1.2 Good Read Buzzer

The good read buzzer is activated after a barcode was successfully decoded and the data was output. 3 types of tone and 5 types of duration are configurable. Buzzer also can be disabled.

- Buzzer Disable/Enable

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

- Buzzer tone

Item	Command	Description	Default
Buzzer tone (*)	W1	Single tone buzzer (3000Hz)	✓
	W2	High - low buzzer	
	W3	Low - high buzzer	

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

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

- Buzzer duration

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

8.1.3 Start-up Buzzer

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

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

8.1.4 Read Timeout Buzzer

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

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

8.1.5 Intermediate Buzzer

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

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

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

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

8.2 Status LED

Status LED settings for successful reading are described below.

8.2.1 Good Read LED

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

Item	Command	Description	Default	Remark
Good read LED	T4	Disable indicator		
	[XTH	Indicator duration: 60 ms		
	[XT8	Indicator duration: 100 ms		
	T5	Indicator duration: 200 ms	✓	
	T6	Indicator duration: 400 ms		
	T7	Indicator duration: 800 ms		

8.2.2 Inversion of Good Read LED

In good read LED inverted mode, the good read LED stays on when stand detection is enabled and the scanner is placed in a stand. It turns off for a set period of time described above 8.2.1 when a barcode is successfully decoded.

Item	Command	Description	Default	Remark
Inversion of Good Read LED	[E6Y	Good Read LED normal mode	✓	
	[E6Z	Good Read LED inverted mode		

8.3 Indicators Timing

Common settings for both buzzer and good read LED are described below.

8.3.1 Indicator Timing

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

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

9 Appendix

9.1 Sample Codes

9.1.1 1D Code

UPC

UPC-A

UPC-A +2

UPC-A +5

EAN

EAN-13

EAN-13 +2

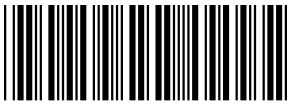
EAN-13 +5

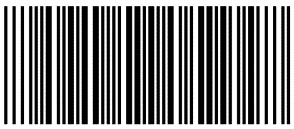
EAN-8

EAN-8 +2

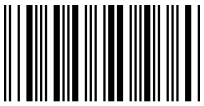
EAN-8 +5

Code 39

Code 39	Code39 Italian Pharmaceutical
 CODE39	 A908557705

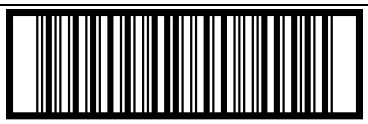
Code 39 Full ASCII	Tri-Optic
 Code 39	 R01260

Codabar

Codabar	Codabar ABC
 01235	 01234 56789

Codabar CX
 12344 56784

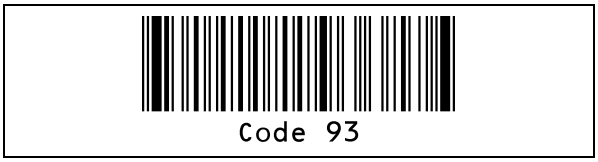
Industrial 2 of 5 / Interleaved 2 of 5

Industrial 2 of 5	Interleaved 2 of 5
 1234567895	 14901234567891

S-Code
 987654326

Code 128

Code 93



IATA

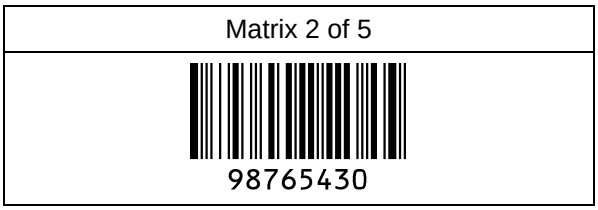
MSI/Plessey

UK/Plessey

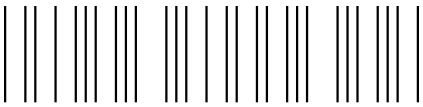
Telepen

Code11

Matrix 2 of 5



9.1.2 **Postal Codes**

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

Intelligent Mail Barcode
 94765432101234567890

POSTNET
 012340

PLANET
 012345678905

Japan Postal
 33500024-12-17

Netherland KIX Code
 3992RK28

Australian Postal
 56439111ABA9

UK Postal(Royal mail)
 12345678

4-State Mailmark Barcode
 410384224165637 62EF61AH8T

9.1.3 **GS1 DataBar**

GS1 DataBar Omnidirectional	GS1 DataBar Truncated
 0165473728281919	 0100012345678905

GS1 DataBar Stacked	GS1 DataBar Stacked Omnidirectional
 0198321456098768	 0165473728287645

GS1 DataBar Limited	GS1 DataBar Expanded
 0117834783468340	 012345ABCDE

GS1 DataBar Expanded Stacked
 0123456789ABCDEFGHIJ

9.1.4 Composite GS1 DataBar

CC-A	CC-B
(17) 120903 (10) CCA  (01) 0 4912345 67890 4	(17) 120903 (10) CCB (240) 123456789omnidilectionalccb  (01) 0 4912345 67890 4

Limited CC-A	Limited CC-B
(17) 201607 (10) ABCCA  (01) 1 4512345 67890 3	(17) 201607 (10) ABCCB (240) 12345678limitedccb  (01) 1 4512345 67890 3

Expanded CC-A	Expanded CC-B
(17) 890805 (10) CCA  (04) 91234598763	(17) 890805 (10) CCB (240) 1U16C19A876B54T3210expandedccb  (04) 91234598763

Composite GS1-128

CC-A	CC-B
(17) 198909 (10) CCA  (04) 91234598763	(17) 198908 (10) CCB (240) 123456789compositgs1128ccb  (04) 91234598763

CC-C
(17) 198910 (10) CCC  (04) 91234500000

Composite EAN

EAN-13 CC-A	EAN-13 CC-B
0123456789548 (17) 211209 (10) EANCCA	0123456789548 (17) 211209 (10) EANCCB (240) 21U16C19A876B54T3210ean13cc-b

EAN-8 CC-A	EAN-8 CC-B
0123456789548 (17) 211209 (10) EANCCA	0123456789548 (17) 211209 (10) EANCCB (240) 21U16C19A876B54T3210ean13cc-b

Composite UPC

UPC-A CC-A	UPC-A CC-B
314159265358 (17) 197808 (10) UPCACCA	314159265358 (17) 197808 (10) UPCACCB (240) 21U16C19A876B54T3210UPCACCB

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

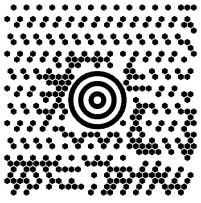
9.1.5 **2D Codes**

PDF417	Micro PDF417
	

Codablock F	QR Code
	

Micro QR	Data Matrix(ECC 200)
	

Aztec Code	Aztec Runes
	

Chinese-sensible code	Maxi Code
	

9.1.6 OCR

ICAO Machine Readable 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

10 Firmware Revision

Firmware Revision

Edition	Date	Firmware No	Description of Changes and added function
First	2016/08/10	BD01J01	First edition firmware

OPTICON