SPQS-0288

REVISION
LEVEL A

Fixed Type 2D Code Scanner

QM30-SS

SPECIFICATIONS

DENSO WAVE INCORPORATED

REVISION RECORDS

Revision level	Date	Description
A	Jun. 13, 2018	First Issued.
第1-1版	Jul. 9, 2018	**15.** APPEARANCE, DIMENSIONS, COLOR AND WEIGHT Corrects errors. (Weight: 15 g → 18 g)

Table of Contents

1 INTRODUCTION

1-1 Scope of Application

These specifications apply to the QM30-SS fixed type 2D Code scanner, (Refer to section 1-2.)
These specifications are applied to the product with the firmware after version Ver.1.10.

1-2 Configuration Table

Product structure

Product Name	Product No.
Scanner QM30-SS	496810-185X

(Note) “X” in the product number indicates the control number of DENSO WAVE. These product numbers may change without prior notice.

2 ENVIRONMENTAL CONDITIONS

Item	Specifications
Operating Temperature	-10 ° to 50 °C (27 ° to 122 °F)
Operating Humidity	10% to 90% RH (without condensation or freezing, wet-bulb temperature of 30 °C (86 °F) max.)
Storage Temperature	−20 ° to 60 °C (14 ° to 140 °F) (sharp temperature change, condensation or freezing not allowed, wet-bulb temperature 30 °C (86 °F) max.)
Storage Humidity	5 % to 95 % RH (sharp temperature change, condensation or freezing not allowed, wet-bulb temperature 30 °C (86 °F) max.)

3 INPUT POWER SUPPLY

Item	Specifications	
Supply Voltage	5 V DC	
Range of Supply Voltage (Note 1, 4)	4.75-5.25 V DC	
Voltage Ripple	0.1 Vp-p MAX.	
Power Supply Current (Note 2, 3)	Active state	500 mA Max. at 5.0 V
	Ready state	180 mA Max. at 5.0 V

(Note 1) These values are specified at the connector terminal.

(Note 2) This value is specified based on the Max Hold value measured with a digital multimeter.

(Note 3) The power supply current is specified with the Max Hold current value measured by a digital multi-meter.

4 SCANNING SPECIFICATIONS

4-1 Readable Codes

(1) Symbologies

2-D symbologies (Note 1)	QR Code model 1, model 2, Micro QR Code, SQRC, PDF417, MicroPDF417, MaxiCode, Data Matrix, Aztec, GS1 Composite (GS1 DataBar Composite, UPC/EAN Composite, UPC/EAN Composite with Add-on, GS1-128 Composite)
Barcode symbologies (Note 1)	EAN-13, EAN-8 (JAN-13, JAN-8) (Note 2), UPC-A, UPC-E, UPC/EAN ADD ON, Interleaved 2 of 5, Standard 2 of 5, CODABAR (NW-7), CODE39, CODE128 (GS1-128), CODE93, GS1 DataBar Omnidirectional (RSS-14), GS1 DataBar Truncated (RSS-14 Truncated), GS1 DataBar Limited (RSS Limited), GS1 DataBar Expanded (RSS Expanded), GS1 DataBar Stacked (RSS-14 Stacked), GS1 DataBar Expanded Stacked (RSS Expanded Stacked), GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional)

(Note 1) Refer to “2D CODE and BARCODE to SCAN” in Section 5 for further details.

(Note 2) JAN-13 and JAN-8 are subsets of EAN-13 and EAN-8 respectively.

(2) Codes printed on paper

Cell / Module size	In accordance with Section 5	
Reflectance (Note 1, 2)	White cell	0.3 min.
	Black cell	Within the range of PCS value
PCS value (Note 1)	$\frac{\text{(White cell Reflectance) - (Black cell Reflectance)}}{\text{White cell Reflectance}} \geq 0.3$ (Note 4)	
Bar code height (Note 2, 3)	22.5 X Narrow module (Note 3) + 7.5 (recommended) In case Narrow module is 0.125 mm, height recommended is 10 mm. In case Narrow module is 0.33 mm, height recommended is 15 mm.	

(Note 1) When the illumination is blinking, the light sources shall satisfy the PCS value and reflectance with a spectral band of 610 to 650 nm and a peak of 633 nm.

(Note 2) If the reflectance or the height of bar code is smaller, the scanner's performance will be deteriorated and the reading speed will become slower. The recommended difference of reflectance between white cell and black cell is 0.3 or more.

(Note 3) This shall be the narrowest module for non-binary codes.

(Note 4) When the illumination is blinking

(Note 1) Codes displayed on cell phone LCD

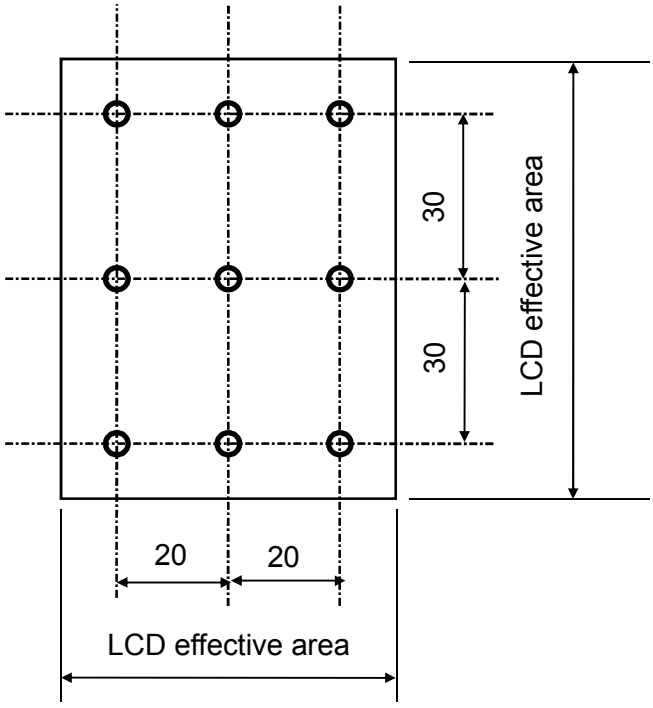
Codes may not be read if they are displayed on cell phone models with a curved LCD or a scan LCD (passive organic EL, etc.) of more than 1 msec scan cycle.
Reading may also be disabled depending on the states of LCD's contrast, backlight or surface (sealed or scratched).

Backlight On	Backlight unit (Note 1)	Luminance difference between black and white		30 cd/m² min.
		Black luminance		15 cd/m² max.
		White luminance		300 cd/m² max.
		Luminance distribution (Note 2)		50% min.
		Cell / Module Size		0.25 mm min.
Reference: Number of black/white dots		LCD resolution	200 dpi	2 dots (0.254 mm)
			300 dpi	3 dots (0.254 mm)
			350 dpi	4 dots (0.290 mm)
			400 dpi	4 dots (0.254 mm)

(Note 1) These conditions (black/white contrast ratio, luminance difference between black and white, black luminance, and luminance distribution) shall be satisfied at the acrylic surface of the LCD front.

(Note 2) Luminance distribution is defined using the following equation:
σ = (min. luminance) / (max. luminance) × 100 where min./max. luminances are chosen from the values measured at 9 points indicated in the figure below.

(Reference) Use the measuring instruments equivalent to "YOKOGAWA Multimedia Display Tester" for measuring.
(Model: Equivalent to 3298 01)



4-2 Scanning Method

When the scanner is ready to scan, if a code symbol is placed in the scanning field, the scanner automatically reads the code symbol and transfers the data to the host. When the scanner is ready to scan and a code symbol is placed within the scanning field, the scanner tries to read the code symbol repeatedly until the symbol is read correctly.
Code symbols can be placed at any position and orientation within the scanning field. Only one code symbol must be placed in the scanning field at a time. If plurality of code symbols are placed in the scanning field, the scanner may continue scanning those labels alternately.

4-3 Double-scan Prevention

Double-scan prevention is intended to the ensure that the same code is transmitted only once to the host when a code repeatedly enters the scanner field of view. The double-scan prevention time can be set in the scanner using the configuration software (See section 11-1).
As a result, to scan the same code again after successful code scanning, excluding such times as when the scanner is instructed to begin scanning by the external trigger signal and command, an operation known as “double-scan prevention release” is required that involves either aiming the scanner field of view at a blank surface for over a set length of time, or removing the scanner field of view from the code for over a set length of time. If, however, the scanner is aimed at an unreadable, poor-quality code for over a set length of time, double scanning may occur during the interval following the set length of time.

4-4 Point Scan Mode

In the point scan mode, you can aim at a target code by matching up the marker with that code. This mode can be selected by configuration software (See section 11-1).
If there is no code at the marker or the scanner cannot detect the marker due to high levels of ambient illuminance, the scanner cannot read anything. If the marker is positioned over the area spanning the two codes, the scanner may alternately read these two codes.
This mode is effective only when the lighting of the marker is enabled (See section 11-10).

Note: If scanner is used at a following condition, the point scan mode can not be performed.
Ambient illuminance is more than 10000 lx.
Reading a code displayed on cell phone LCD.
Reading a structured appended Code in batch edit mode.

(○) Suitable

(x) Unsuitable

4-5 Multi-line Barcode Scanning

A maximum of three lines of barcode within the scan field can be scanned at one time.
Number of lines, data output order and output format of Multi-line barcode can be specified by the configuration software.

4-5-1 Number of Lines

The number of lines allowed for multi-line barcode scanning is 2 or 3. Cannot be omitted.

4-5-2 Data Output Order

The output order of scanned barcode data is specified by code type (Note 1), character specification (Note 2) and the number of readable digits (Note 3).

(Note 1) The code type can be specified from enabled barcodes. This setting is required.

(Note 2) Up to two heading characters of data can be specified.
However, if a question mark "?" is selected, it will act as wild card. This setting can be omitted.

(Note 3) The selectable number of digits will vary depending on code type. This setting is required.

4-5-3 Output Format

Output format can be selected between header/terminator-delimited and comma-delimited formats.

(1) Header/terminator-delimited format

According to the specified data transmission format, data of all lines are transmitted continuously.
However, the number of digits is omitted for UPC and EAN codes.

Example: 1st line (EAN-13): 123456789012 / 2nd line (UPC-E): 343456 / 3rd line (EAN-8): 5634567

(Code mark: Type1(DENSO1) / Header: STX / Terminator: ETX / Enabled number of digits / BCC: Prohibited / Prefix, Suffix: Not specified / : C/D transmitted / Scanner ID: Prohibited)

Output data: [STX]A1234567890128[ETX][STX]C3434567[ETX][STX]B56345674[ETX]

(2) Comma-delimited format

According to the specified data transmission format, data of all lines are output delimited with comma.
Code mark set as the 1st line will be output and number of digits includes comma. Number of digits is not omitted even for UPC and EAN codes.

Example: 1st line (EAN-13): 123456789012 / 2nd line (UPC-E): 343456 / 3rd line (EAN-8): 5634567

(Code mark: Type1(DENSO1) / Header:STX / Terminator: ETX / Enabled number of digits / BCC:Prohibited / Prefix, Suffix: Not specified / : C/D transmitted / Scanner ID: Prohibited)

Output data: [STX] A00301234567890128,3434567,56345674[ETX]

(Note 1) Barcodes specified as multi-line barcodes cannot be scanned separately.

(Note 2) Multi-line barcodes with UPC/EAN add-on cannot be scanned.

(Note 3) If EAN/UPC Composite linear (EAN/UPC section) data is specified for multi-line barcode scanning, it is not possible to scan EAN/UPC Composite codes containing the linear section.

4-6 Data Editing

Data editing is a method of editing the data of scan codes by the specified format and output. Data editing setting can be set by the configuration software.

Data editing modes are described as below: 1) Data extraction mode, 2) Data conversion mode, and 3) Blocksorting mode.

4-6-1 Data Extraction Mode

This mode extracts and transmits part of the scan code data. Data extraction methods are as described below: 1) Data string extraction, 2) Data block extraction, and 3) AI Mode.

4-6-1-1 Data String Extraction

The data block of readable code, ranging from the beginning to the end of extraction area as designated, is output and transmitted in the data transmission format set by the scanner.
The start and end of extraction, and the applicable settings can be selected using the patterns listed below.

○ Start and end of extraction positions

Start Position	End Position
First character	Specified XXXXth digit
Last character	
Specified position from XXXXth digit	Last character
	Specified length of XXXXth digits
	Specified position up to XXXXth digit

The number of digits “XXXX” can be specified in the range of 1 to 9999.
The number of digits at the start of extraction block shall be smaller or equal to the end of it.

○ Setting options

Item	Options
Code type	Any Code
	QR
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	CODE128
	GS1-128
	CODABAR (NW-7)
	CODE39
	Interleaved 2 of 5 (ITF)
	Standard 2 of 5 (STF)
	CODE93
	GS1 DataBar
	GS1 Composite
Transmit data regardless of the results	Enabled/Disabled

When “Transmit data regardless of the results” is enabled, the scan data is transmitted in an unedited form if the scanner has failed extracting a data string or a code type not supported by the scanner was scanned.

Example: When QR Code is specified as a code type and the scan result is 12345

(Code mark: Type1(DENSO1) / Header: STX / Terminator: ETX / Enabled number of digits: 4 digits / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

Setting options	Start Position	End Position	Transmitted Data
Code Type: QR Transmit data regardless of the results : Disabled	First character	3rd digit	[STX]Q0003123[ETX]
	Last character	3rd digit	[STX]Q0003345[ETX]
	1st digit	Last character	[STX]Q000512345[ETX]
	1st digit	3-digit length	[STX]Q0003123[ETX]
	2nd digit	4th digit	[STX]Q0003234[ETX]
	First character	6th digit	Error
	Last character	6th digit	Error
	6th digit	Last character	Error
	6th digit	10-digit length	Error
	1st digit	6th digit	Error
Code Type: QR Transmit data regardless of the results: Enabled	First character	6th digit	[STX]Q000512345[ETX]
	Last character	6th digit	[STX]Q000512345[ETX]
	6th digit	Last character	[STX]Q000512345[ETX]
	6th digit	10-digit length	[STX]Q000512345[ETX]
	1st digit	6th digit	[STX]Q000512345[ETX]
Code type: PDF417 Transmit data regardless of the results : Disabled	All conditions	All conditions	Error
Code type: PDF417 Transmit data regardless of the results: Enabled	All conditions	All conditions	[STX]Q000512345[ETX]

4-6-1-2 Data Block Extraction

In the CSV format where the scan data is separated by commas, the scan data is divided into several blocks by commas, and then transmitted in the data transmission format set by the scanner if the code is designated as a readable code.
The extraction block can be set in the range of 1 to 99 characters and a maximum of three blocks can be extracted. The following setting options are adapted.

○ Setting options

Item	Options
Code type	Any Code
	QR
	PDF417
	Data Matrix
	Maxi Code
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	CODE128
	GS1-128
	CODABAR (NW-7)
	CODE39
	Interleaved 2 of 5 (ITF)
	Standard 2 of 5 (STF)
	CODE93
	GS1 Data Bar
	GS1 Composite
Transmit data regardless of the results	Enabled/Disabled

When “Transmit data regardless of the results” is enabled, the scan data is transmitted in an unedited form if the scanner has failed extracting a data block or a code type not supported by the scanner was scanned.

Example: When QR Code is specified as a code type and the scan result is as follows:

(Code mark: Prohibited / Header: STX / Terminator: ETX / Enabled number of digits: Prohibited / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

Setting options	Scan Data	Extraction Block	Transmitted Data
Code Type: QR Enable Output: Disabled	1,23,456,7890	1 2 3	[STX]1[ETX][STX]23[ETX][STX]456[ETX]
	1,23,456,7890	3 1 2	[STX]456[ETX][STX]1[ETX][STX]23[ETX]
	1234567890	1	[STX]1234567890[ETX]
	1,,23,456,7890	2 5	[STX][ETX][STX]7890[ETX]
	1,23,456,7890	5	Error
	1,23,456,7890	4 5	Error
	1234567890	1 2	Error
Code Type: QR Enable Output: Enabled	1,23,456,7890	5	[STX]1,23,456,7890[ETX]
	1,23,456,7890	4 5	[STX]1,23,456,7890[ETX]
	1234567890	1 2	[STX]1234567890[ETX]
Code type: PDF417 Enable Output: Disabled	1,23,456,7890	All conditions	Error
Code type: PDF417 Enable Output: Enabled	1,23,456,7890	All conditions	[STX]1,23,456,7890[ETX]

4-6-1-3 AI (Application Identifier) Mode

When the scan data is GS1-128, GS1 DataBar, or GS1 Composite (excluding liner part of UPC/EAN Composite), the data is edited and then transmitted in the data transmission format set by the scanner.
Two types of AI modes are available, one is AI Split mode and the other is AI Parenthesis mode. AI Table is used for data editing (see section 4-7-1-3(3)).

(1) AI Split Mode

Data is extracted according to the specified AIs (maximum of 3 types of AIs) and transmitted as instructed by the delimiters.
The following three types of delimiters are available.

○ Delimiters

I. Header/terminator-delimited format

Each data field is transmitted with a header and a terminator at its begging and end, respectively.
If they are supported for transmission, a prefix, suffix, the number of digits and code mark are appended to each of the separated data field. In this case, the scanner edits the data and counts the number of digits before sending it to the host unit.

Example: When the scan data is “(01)94901234567894(11)030808(13)030810”:

(Code mark: Prohibited / Header: STX / Terminator: ETX / Enabled number of digits: Prohibited / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

Specified AI	Transmitted Data
01,11,13	[STX]94901234567894[ETX][STX]030808[ETX] [STX]030810[ETX]

II. Comma-delimited format

The data field separated by commas is transmitted.
However, no comma is added to the end of the separated data filed.
A header and a terminator are appended to each of the separated data fields.
No prefix, suffix, the number of digits and code mark are transmitted irrespective of whether the transmission is enabled or disabled.

Example: When the scan data is “(01)94901234567894(11)030808(13)030810”:

(Code mark: Prohibited / Header: STX / Terminator: ETX / Enabled number of digits: Prohibited / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

Specified AI	Transmitted Data
01,11,13	[STX]94901234567894,030808,030810[ETX]

III. Tab (ASCII code 09H<HT>)

The data field separated by tabs is transmitted.
However, no tab is added to the end of the separated data field.
A header and a terminator are appended to each of the separated data fields.
No prefix, suffix, the number of digits and code mark are transmitted irrespective of whether the transmission is enabled or disabled.

Example: When the scan data is “(01)94901234567894(11)030808(13)030810”:

(Code mark: Prohibited / Header: STX / Terminator: ETX / Enabled number of digits: Prohibited / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

Specified AI	Transmitted Data
01,11,13	[STX]94901234567894[TAB]030808[TAB]030810[ETX]

○ Setting options

The following setting options are adapted.

Item	Options
Transmit data regardless of the results	Enabled/Disabled

When “Transmit data regardless of the results” is enabled, the scan data is transmitted in an unedited form if the scanner is not correctly set in the AI mode.

Example: When the scan data is
”(01)94901234567894(11)030808(13)030810(17)040208(17)040305”

(Code mark: Prohibited / Header: STX / Terminator: ETX / Enabled number of digits: Prohibited / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

Setting options	Specified AI	Delimiters	Transmitted Data
Regardless of the result, Output: Disabled	01,11,17	Comma-delimited format	[STX]94901234567894,030808,040208[ETX]
	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		Error
	01,12		Error
	01,01		Error
Regardless of the result, Output: Enabled	01,11,17		[STX]94901234567894,030808,040208[ETX]
	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		[STX]0194901234567894110308081303081017040208170405[ETX]
	01,12		
	01,01		

(Note 1) Once edited, data is transmitted in the order defined by the corresponding AI.

(Note 2) If the scan data consists of more than one data fields of the same AI, it is transmitted in the order of scanning.

(Note 3) If the data structure specified by the AI is incomplete, this is regarded as an error and the data cannot be transmitted.

(2) AI Parenthesis Mode

Parentheses are added to the AI of the scan data and the data is output. In this case, the following setting options are applied.

○ Setting options

The following setting options are adapted.

Item	Options
Transmit data regardless of the results	Enabled/Disabled

When “Transmit data regardless of the results” is enabled, the scan data is transmitted in an unedited form if the scanner is not correctly set in the AI mode.

Example:

(Code mark: Prohibited/Header: STX / Terminator: ETX / Enabled number of digits: Prohibited / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

Setting options	Scan Data	Transmitted Data
Regardless of the result, Output: Disabled	01949012345678941103080813030810170402 08	[STX](01)94901234567894(11)030808(13)030810(17)040208[ETX]
	01949012345678941103080813030810617040 2081704020817040305	Error (Note)
Regardless of the result, Output: Enabled	01949012345678941103080813030810170402 08	[STX](01)94901234567894(11)030808(13)030810(17)040208[ETX]
	01949012345678941103080813030810617040 2081704020817040305	[STX]01949012345678941103080813030810617040 2081704020817040305[ETX]

(Note) In the following example, data extraction can continue up to the AI “13” in parenthesis, but the operation stops before completion after that. This is because an AI starting with “6”, as shown in the underlined section, is not defined by the AI table.
(01)94901234567894(11)030808(13)030810<u>617040 2081704020817040305</u>

(3) AI Table

In the AI mode, data is edited according to the following AI table.

AI	No. of Digits	Description
00	n2+n18	Serial Shipping Container Code (SSCC)
01	n2+n14	Global Trade Item Number (GTIN)
02	n2+n14	GTIN of Trade Items Contained in a logistic unit (For Use with AI 37 Only)
03	n2+n14	Reserved area
04	n2+n16	Reserved area
10	n2+an..20	Batch number or lot number
11	n2+n6	Manufacture date (YYMMDD) (*)
12	n2+n6	Payment due date (YYMMDD) (*)
13	n2+n6	Packaging Date (YYMMDD) (*)
15	n2+n6	Warranty date (YYMMDD) (*)
17	n2+n6	Expiration date (YYMMDD) (*)
20	n2+n2	Renewed good and goods with modified standard
21	n2+an..20	Serial number
22	n2+an..29	Application conforming to the definition of HIBCC (Health Industry Business Communication Council).
23n	n3+n..19	Batch/lot number (for transient use) (**)
240	n3+an..30	Product Identifier added by manufacturer
241	n3+an..30	Customer Product Number
250	n3+an..30	Supplemental Serial Number
251	n3+an...30	Reference Number of the raw material
252	n3+n27	Global Serial Number
30	n2+n..8	Numerical quantity, the number of pieces, volume
310n	n4+n6	Net weight, kg
311n	n4+n6	Length or 1D size data, meter
312n	n4+n6	Width, diameter or 2D size data, meter
313n	n4+n6	Depth, thickness, height or 3D size data, meter
314n	n4+n6	Area, square meter (***)
315n	n4+n6	Capacity, liter (***)
316n	n4+n6	Volume, cubic meter (***)
320n	n4+n6	Net weight, pound (***)
321n	n4+n6	Length or 1D size data, inch (***)
322n	n4+n6	Length or 1D size data, feet (***)
323n	n4+n6	Length or 1D size data, yard (***)
324n	n4+n6	Width, diameter or 2D size data, inch (***)
325n	n4+n6	Width, diameter or 2D size data, feet (***)
326n	n4+n6	Width, diameter or 2D size data, yard (***)

AI	No. of Digits	Description
327n	n4+n6	Depth, thickness, height, or 2D size data, inch (***)
328n	n4+n6	Depth, thickness, height, or 2D size data, feet (***)
329n	n4+n6	Depth, thickness, height, or 2D size data, yard (***)
330n	n4+n6	The whole weight, kg (***)
331n	n4+n6	Length or 1D size data, meter, for distribution (***)
332n	n4+n6	Width, a diameter or 2D size data, meter, for distribution (***)
333n	n4+n6	Depth, thickness, height or 3D size data, meter, for distribution (***)
334n	n4+n6	Area, square meter, symbol logic (***)
335n	n4+n6	Whole capacity, liter (***)
336n	n4+n6	Whole capacity, cubic meter (***)
337n	n4+n6	Kg /Square meter (pressure) (***)
340n	n4+n6	The whole weight, pound (***)
341n	n4+n6	Length, 1D size data, inch, for distribution (***)
342n	n4+n6	Length, 1D size data, feet, for distribution (***)
343n	n4+n6	Length, 1D size data, yard, for distribution (***)
344n	n4+n6	Width, diameter, 2D size data, inch, for distribution (***)
345n	n4+n6	Width, diameter, 2D size data, feet, for distribution (***)
346n	n4+n6	Width, diameter, 2D size data, yard, for distribution (***)
347n	n4+n6	Depth, thickness, height, 3D size data, inch, for distribution (***)
348n	n4+n6	Depth, thickness, height, 3D size data, feet, for distribution (***)
349n	n4+n6	Depth, thickness, height, 3D size data, yard, for distribution (***)
350n	n4+n6	Area, square inch (***)
351n	n4+n6	Area, square feet (***)
352n	n4+n6	Area, square yard (***)
353n	n4+n6	Area, square inch, for distribution (***)
354n	n4+n6	Area, square feet, for distribution (***)
355n	n4+n6	Area, square yard, for distribution (***)
356n	n4+n6	Net weight, troy, ounce (***)
357n	n4+n6	Net weight (capacity) ounce (***)
360n	n4+n6	Capacity, quart (***)
361n	n4+n6	Capacity, gallon (***)
362n	n4+n6	Whole capacity, quart (***)
363n	n4+n6	Whole capacity, gallon (***)
364n	n4+n6	Capacity, cubic inch (***)
365n	n4+n6	Capacity, cubic feet (***)
366n	n4+n6	Capacity, cubic yard (***)

AI	No. of Digits	Description
367n	n4+n6	Whole capacity, cubic inch (***)
368n	n4+n6	Whole capacity, cubic feet (***)
369n	n4+n6	Whole capacity, cubic yard (***)
37	n2+n..8	Quantity (used together with AI "02" only.)
390n	n4+n15	Payment - single currency
391n	n4+n3+n15	Payment and ISO currency code
392n	n4+n15	Payment of trade item - single currency
393n	n4+n3+n15	Payment of trade item and ISO currency code
400	n3+an..30	Customer's purchase order number
401	n3+an..30	Commission number
402	n3+n17	Shipping ID number
403	n3+an..30	Route code
410	n3+n13	GS1 Global location number(ship-to address, location)
411	n3+n13	GS1 Global location number (billing name, billing address)
412	n3+n13	GS1 Global location number (supplier)
413	n3+n13	Supplied by GS1 Global location number
414	n3+n13	Shipping Identifier, GS1 Global location number
415	n3+n13	EAN. UCC Global location number of the request place
420	n3+an..20	Postal code defined by specific postal facilities (ship-to address, location)
421	n3+n3+an..9	Postal code with 3-digit ISO country code at the top (ship-to address, location)
422	n3+n3	Ship-to country of trade item
423	n3+n15	Initial handling country
424	n3+n3	Handling country
425	n3+n3	Disassembling country
426	n3+n3	Final processing country
43	n2+n4+n7+an..10+n1	Transport freight number
7001	n4+n13	NATO stock number (NSN)
7002	n4+an..30	UN/ECE meat handling classification
7003	n4+n10	Expiration (YYMMDDHHMM)
7030	n4+n3+an..27	Manufacturer approval number with 3-digit ISO country code: slaughtering center
7031	n4+n3+an..27	Manufacturer approval number with 3-digit ISO country code: the first processing place
703n	n4+n3+an..27	Manufacturer approval number with 3-digit ISO country code: from the second to the ninth processing place
8001	n4+n14	Roll-shaped product - width, length, core diameter, direction and joint
8002	n4+an..20	Cell phone identifier
8003	n4+n14+an..16	GS1 Global returnable asset identifier (GRAI)

AI	No. of Digits	Description
8004	n4+an..30	GS1 Global individual asset identifier (GIAI)
8005	n4+n6	Cost of the measurement goods
8006	n4+n14+n2+n2	Control number of the composite part of trade item
8007	n4+an30	International bank account number (IBAN).
8008	n4+n6+n6	Production date (YYMMDDHHMMSS)
8018	n4+n18	GS1 Global service relation number (GSRN)
8020	n4+an25	Extension gold slip reference number
8100	n4+n1+n5	Coupon expansion code UPC number system character and application number
8101	n4+n1+n5+n4	Coupon expansion code UPC number system character, application number, application completion number
8102	n4+n1+n1	Coupon expansion code ""0"" + UPC number system character
90	n2+an..30	FACT data identifier
91	n2+an..30	Internal use - company
92	n2+an..30	Internal use - company
93	n2+an..30	Internal use - company
94	n2+an..30	Internal use - company
95	n2+an..30	Internal use - carrier
96	n2+an..30	Internal use - carrier
97	n2+an..30	Internal use - company
98	n2+an..30	Internal use - company
99	n2+an..30	Internal use

(*) DD is “00” when displaying the year and month only.
(**) “n” indicates the data length.
(***) “n” indicates the location of decimal point.
a Alphabetic character
a3 Three-digit alphabetic character
a..3 Alphabetic character of up to three digits
n Numeric character
n3 Three-digit numerical character
n..3 Numeric character of up to three digits
an Alphanumeric character
an3 Three-digit alphanumeric character
an..3 Alphanumeric character of up to three digits

(Note) When the length of the specified AI is variable and the number of digits of the scan data is less than the maximum AI digit number, the scanner transmits the scan data until it is encountered by GS (1Dh).

4-6-2 Data Conversion Mode

A search for characters subject to conversion is performed within the scan data for the code specified at “Code type”, and these are replaced with the conversion characters.

○ Setting options

Item	Options
Code type	Any Code
	QR
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	CODE128
	GS1-128
	CODABAR (NW-7)
	CODE39
	Interleaved 2 of 5 (ITF)
	Standard 2 of 5 (STF)
	CODE93
	GS1 DataBar
	GS1 Composite
Characters subject to conversion/conversion characters	Up to 16 ASCII characters (00h-FFh) can be set.

Characters are converted on a one-to-one basis.

Example: When the scan code is PDF417, and the scan data is 12345678

(Code mark: Prohibited / Header: STX / Terminator: ETX / Enabled number of digits: Prohibited / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

- Applicable data conversion condition:
  Code type : PDF
  Conversion character : '2' → 'A', '3' → 'B'
  Output data : [STX]1AB45678[ETX]

(Note 1) In the multi-line barcode scanning mode, if the code marks of all lines do not match, the scanner cannot support data editing regardless of the type of scan data.
In this case, the code mark is verified in accordance with Type1(DENSO1) (see section 10-4).

(Note 2) In scanning a Edit/Non-edit mode for split code of QR, data editing is performed when scanning of all divided codes is complete when in Edit mode or Batch edit mode. When in Unedited mode, however, data editing is performed for each scan of individual divided codes.

4-6-3 Blocksorting mode

Scan data is divided (max. 5 divisions) at a specified location for the code specified at “Code type”, and data is sorted and transferred in the specified output order (block units).
The division location is specified with the number of digits from the beginning of the scan data.

○ Setting options

Item	Options
Code type	Any Code
	QR
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	CODE128
	GS1-128
	CODABAR (NW-7)
	CODE39
	Interleaved 2 of 5 (ITF)
	Standard 2 of 5 (STF)
	CODE93
	GS1 DataBar
	GS1 Composite

Example: When the scan code is CODE128, and the scan data is 1234567890

(Code mark: Prohibited / Header:STX / Terminator: ETX / Enabled number of digits: 4 digits / BCC: Prohibited / Prefix, Suffix: Not specified / Scanner ID: Prohibited)

Division Location	Output Order	After Conversion
3rd digit, 8th digit	Block 2, 1, 3	[STX]K00104567812390[ETX]
3rd digit, 8th digit	Block 1, 3	[STX]K000512390[ETX]

(Note 1) If the number of digits specified at the division location is greater than the scan data, an error will occur during the editing process.

(Note 2) In the multi-line barcode scanning mode, if the code marks of all lines do not match, the scanner cannot support data editing regardless of the type of scan data. In this case, the code mark is verified in accordance with Type1(DENSO1) (see section 10-4).

(Note 3) In scanning a Edit/Non-edit mode for split code of QR, data editing is performed when scanning of all divided codes is complete when in Edit mode or Batch edit mode. When in Unedited mode, however, data editing is performed for each scan of individual divided codes.

4-7 Edit/Non-edit mode for split QRCodes

The QR Code model 1 or model 2 have a concatenation capacity through which the data can be divided into as many as 16 separate symbol blocks. There are 3 modes for scanning structured append code: Edit mode and Batch edit mode, where structured append code data is edited in scanner side, and Unedited mode, where the scan data is transmitted to host unit each time. Edit mode, Batch edit mode and Unedited mode can be chosen using the QR Code parameter menu or the configuration software.
This function is effective only for Edit/Non-edit mode for split QR Codes of the same model.

Edit mode

The Edit mode supports the Structured Append code within 16 splits.
Every time the scanner scans a symbol block, and the data is stored in the memory of the scanner. When all the symbol blocks are scanned, the scanner then reconstructs the data content of the Structured Append code blocks and sends it to the host unit.
If the scanner scans a symbol block with a conflicting parity, or if the parity of the symbol blocks conflicts with the calculated parity based on the data content, it clears the stored data except that of the most recent symbol block, and the scanner restarts another Structured Append code scanning.
The data can be accumulated up to 8K bytes in the Edit mode. If the total amount of data in all the Structured Append codes exceeds 8K bytes, it clears all the stored data and terminates the Structured Append code scanning.

(Note) that one kanji character takes two bytes.

Batch edit mode

In the Batch edit mode, if all divided codes in the scan field can be scanned, the scanner edits all scanned Structured Append codes and transmits the result to the host unit.
A maximum of 4-divided Structured Append codes can be scanned. However, Structured Append codes divided into more than 4 can be scanned in some conditions.
If codes with a conflicting parity are mixed in the scan field, or if parity calculated based on all divided codes conflicts, scanning cannot be performed.

(Note) In the point scan mode, scanning cannot be performed.

Unedited mode

On encountering the first one of Structured Append code symbol blocks, the scanner sends the data of the symbol block to the host unit immediately. At every time each symbol block is scanned, the scanner sends the data to the host unit. When all the symbol blocks of the Structured Append code are scanned, the scanner completes the Structured Append code scanning and sends the data of the last symbol block to the host unit.
If the scanner scans a symbol block with a conflicting parity, it clears the stored data except that of the most recent symbol block, and the scanner enters another Structured Append mode and sends the data to the host unit.

(Note) In both the Edit mode and the Unedited mode, the scanner aborts the Structured Append code scanning under the following conditions.

- A QR Code without Structured Append encoding or a code symbol other than QR Code is scanned.
  The data scanned this time is sent to the host unit.
- When the scanner field of view is aimed at a blank surface for approximately three seconds or longer, or the scanner field of view is removed from the code for approximately three seconds or longer when in Continuous reading, Alternate, Momentary (reverse type), or Auto sense mode.
- When the scanner goes out of the Active state.

4-8 Reverse codes scanning

The scanner can scan symbols viewed from the front surface or from the back surface. Scanning of 2D Code viewed from the back surface can be set to enable or disable using the configuration software. If scanning of 2D Code viewed from the back surface is enabled, scanning time of 2D Code may become longer.

4-9 Black-and-white inverted codes scanning

The scanner can scan negatively printed Codes. Scanning of normal codes, black-and-white inverted codes and scanning of automatically discriminating normal codes and black-and-white inverted codes can be enabled using the QR Code parameter menu and the configuration software. The scanning time of automatic discrimination may become longer than the time for scanning of normal codes or scanning of black-and-white inverted codes.Note that a black-and-white inverted code needs more black level margin than that number of cells specified in the QR Code standard, around the code symbol. (See section “5. 2D CODE AND BARCODE TO SCAN”.)

4-10 Multi-code Scanning

The scanner automatically discriminates various code formats including 2D Codes and barcodes. Scanning of each code format is enabled/disabled using the QR Code parameter menu or the configuration software. Decoding time may increase along with the number of enabled codes.

4-11 SQRC Scanning

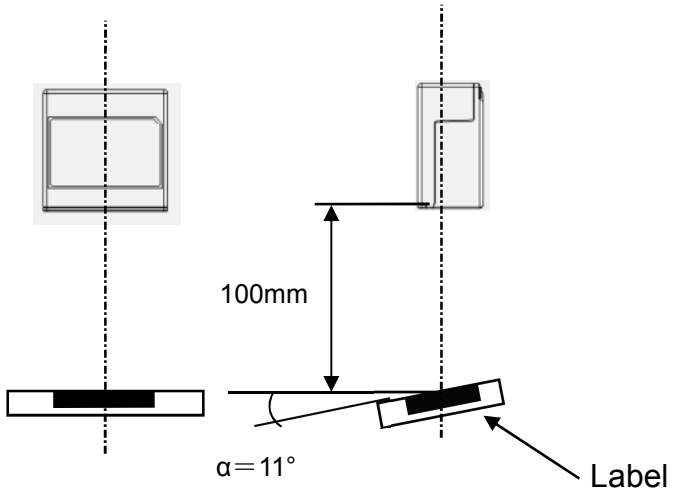
SQRC is a QR code with scanning restrictions. SQRC comes in the form of disclosed and undisclosed data. Scanning of undisclosed data is possible only if the encryption key set in the scanner matches. In order to perform SQRC scanning, it is necessary to either permit scanning of SQRC only, or to permit scanning of SQRC and QR codes (Note).
With the SQRC scanning enabled, the parameters for “Encryption key mismatch” and “Encryption key match” can be selected with the configuration software.

(Note) Encryption key setting is necessary in order to perform SQRC scanning. In order to set an encryption key(s), dedicated SQRC scan setting software (SQRC Setting (496983-0150)) is required.

4-12 Scanning Performance

The performance below is specified in the following conditions.

Ambient illuminance: 500 lx (xenon lamp)
Temperature: 25 ± 5 °C



The code is placed at the center of the scanning field of view.

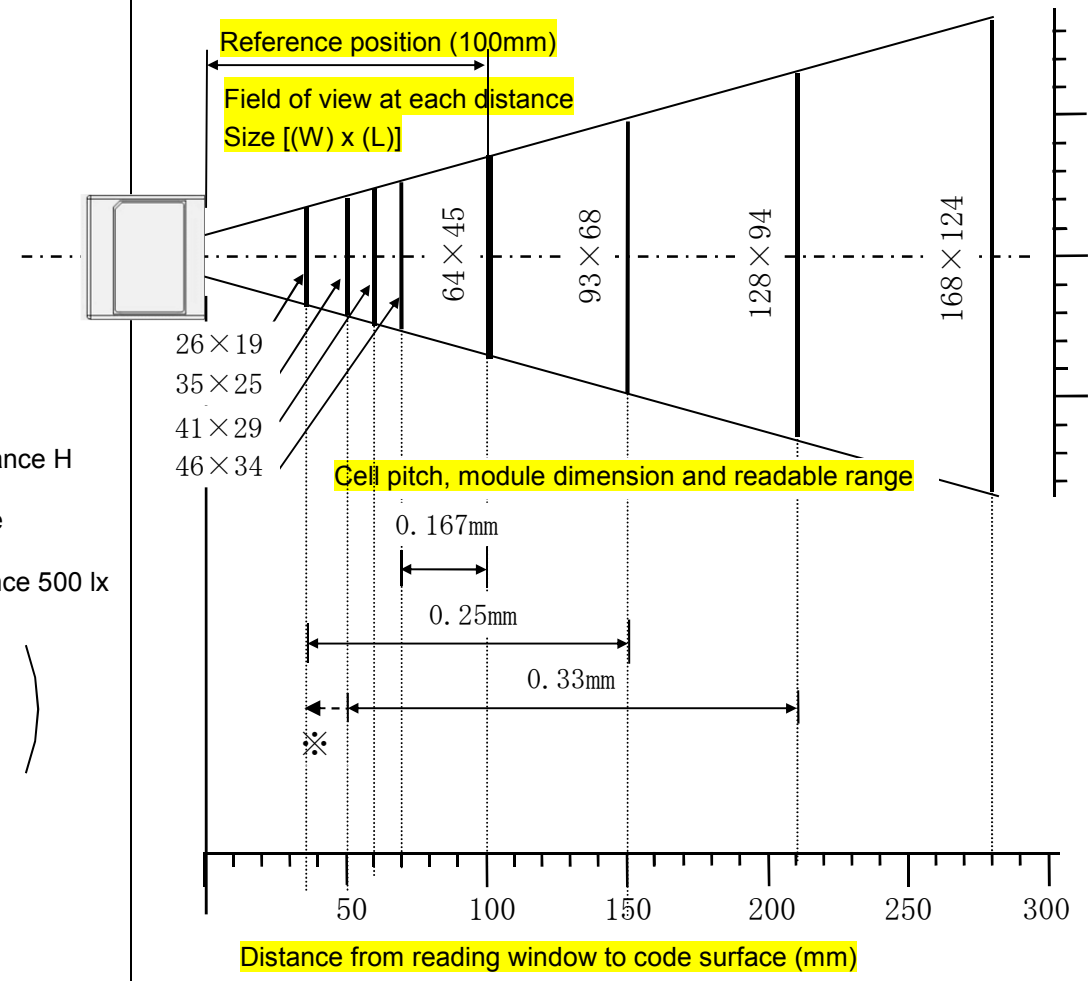
Codes printed on paper

Scanning distance H

2D Code

Ambient illuminance 500 lx

$\alpha = 11^\circ$
$\beta = 0^\circ$
$\theta = 0^\circ$



2D code cell pitch and module dimension

0.167mm	70	≦	H	≦	100	mm	(Note 1)
0.25mm	35	≦	H	≦	150	mm	(Note 2)
0.33mm	35*	≦	H	≦	210	mm	(Note 3)

A scanner may not be able to scan a code because of the specular reflection which may be caused by a postion of light source or an angle with the label surface.
A near end may be restricted by the field of view.
If the ambient illuminance is less than 500 lx because a scanner is installed in the device, the scanning distance within150 mm is recommended.

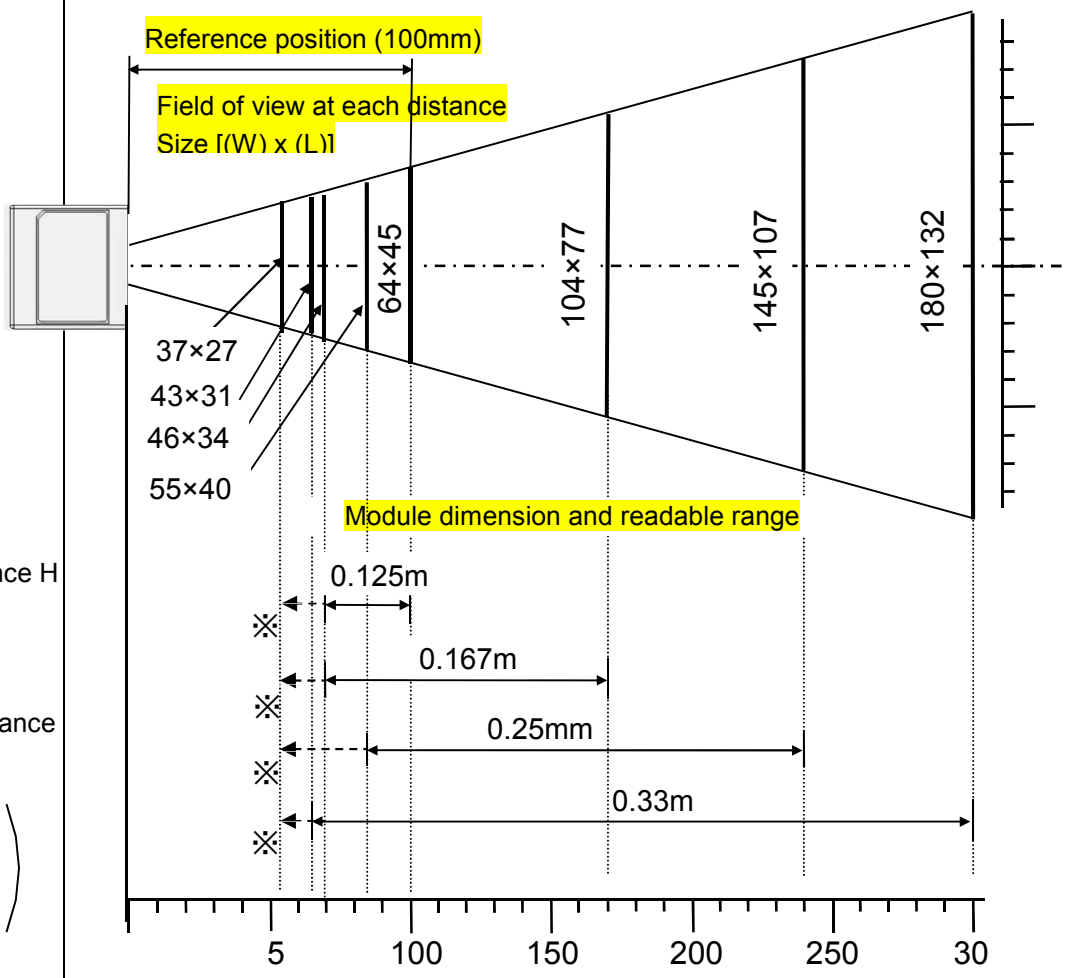
* Dashed arrow area (◄- -) of 35 mm and more may not be able to be read because the label width of code in use (Note 3) is more than the width of field of view.

Scanning distance H

Barcode

Ambient illuminance
500 lx

α=11°
β=0°
θ=0°

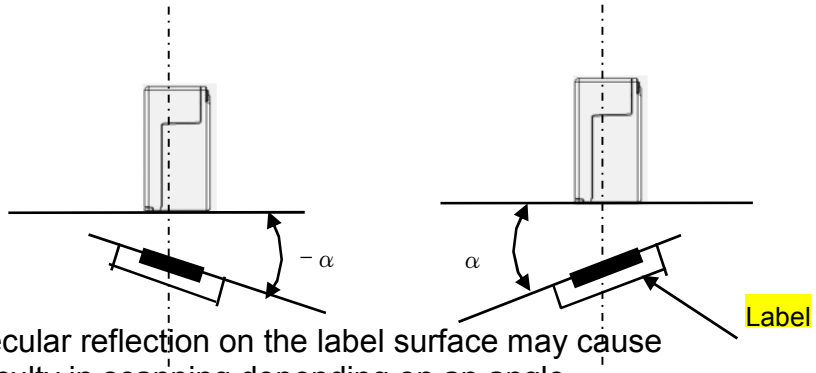
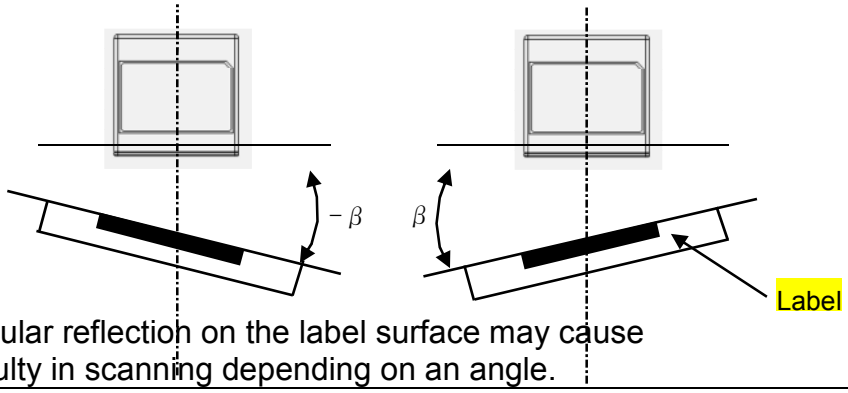
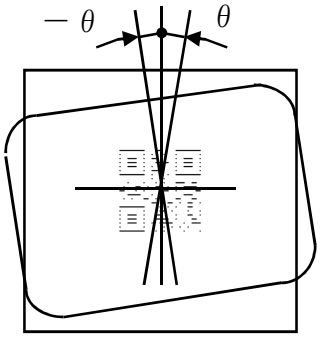


Barcode module dimension

0.125mm	55※	≦	H	≦	100	mm	(Note 4)
0.167mm	55※	≦	H	≦	170	mm	(Note 5)
0.25mm	55※	≦	H	≦	240	mm	(Note 6)
0.33mm	55※	≦	H	≦	300	mm	(Note 7)

A scanner may not be able to be scan a code because of the specular reflection which may be caused by a position of light source or an angle with the labelsurface.
A near end may be restricted by the field of view.
Barcode is placed in the direction horizontal to the field of view of a scanner..
If the ambient illuminance is less than 500 lx because a scanner is installed in the device, the scanning distance within 150 mm is recommended.

* Dashed arrow area (◄--) of 55 mm and more may not be able to be read because the label width of code in use (Note 4 to 7) is more than the wideth of field of view.

~~Elevation angle α~~ (Note 8) ~~-50°≦α≦50°~~ ~~H=100mm~~ ~~β=0°~~ ~~θ=0°~~	 Specular reflection on the label surface may cause difficulty in scanning depending on an angle.
~~Tilt angle β~~ (Note 8) ~~-50°≦β≦50°~~ ~~H=100mm~~ ~~α=0°~~ ~~θ=0°~~	 Specular reflection on the label surface may cause difficulty in scanning depending on an angle.
~~Skew angle θ~~ (Note 8) ~~All angles~~ ~~H=100mm~~ ~~α=0°~~ ~~β=0°~~	 A code symbol is placed at the center of the field of view.
~~Low PCS label~~ (Note 9) ~~H=100mm~~ ~~α=0°~~ ~~β=0°~~ ~~θ=0°~~	A code symbol is placed at the center of the field of view.

(Note 1)	Reference code	2D code: QR code model 2, Ver. 5, error correction level M, cell pitch 0.167 mm, PCS 0.9 or more (white cell reflectance 85% or more), black and white label
(Note 2)	Reference code	2D code: QR code model 2, Ver. 5, error correction level M, cell pitch 0.25 mm, PCS 0.9 or more (white cell reflectance 85% or more), black and white label
(Note 3)	Reference code	2D code: QR code model 2, Ver. 5, error correction level M, cell pitch 0.33 mm, PCS 0.9 or more (white cell reflectance 85% or more), black and white label
(Note 4)	Reference code	Barcode: CODE39 10 digits, PCS 0.9 or more (white cell reflectance 85% or more), Narrow Bar, Narrow Space 0.125mm, Bar code height 10 mm or more
(Note 5)	Reference code	Barcode: CODE39 10 digits, PCS 0.9 or more (white cell reflectance 85% or more), Narrow Bar, Narrow Space 0.167mm, Bar code height 10 mm or more
(Note 6)	Reference code	Barcode: CODE39 7 digits, PCS 0.9 or more (white cell reflectance 85% or more), Narrow Bar, Narrow Space 0.25mm, Bar code height 10 mm or more
(Note 7)	Reference code	Barcode: EAN-8, x1, PCS 0.9 or more (white cell reflectance 85% or more), Bar code height 10 mm or more
(Note 8)	Reference code	2D code: QR code model 2, Ver. 5, error correction level M, cell pitch 0.33 mm, PCS 0.9 or more (white cell reflectance 85% or more), black and white label Barcode: EAN-13, x1, PCS 0.9 or more (white cell reflectance 85% or more), Bar code height 10 mm or more
(Note 9)	Reference code	2D code: QR code model 2, Ver. 1, error correction level M, cell pitch 0.33 mm, PCS 0.3 or more (white cell reflectance 85% or more), black and white label Barcode: EAN-13, x1, PCS 0.3 or more (white cell reflectance 85% or more), Bar code height 10 mm or more, black and white label

4-13 QR Code Menu Usage Restriction

The control command (see 10-4) or configuration software (see 11-9) can restirict the use of QR Code menu. During the restriction of the use of QR Code menu, the configuration change using the QR Code menu (including batch QR Code menu) is disabled. During the restriction of the use of QR Code menu, however, if the control command or the configuration software is used, the configuration change is enabled. In this case, the restriction of the use of QR Code menu is cancelled.

4-14 Ambient Luminance

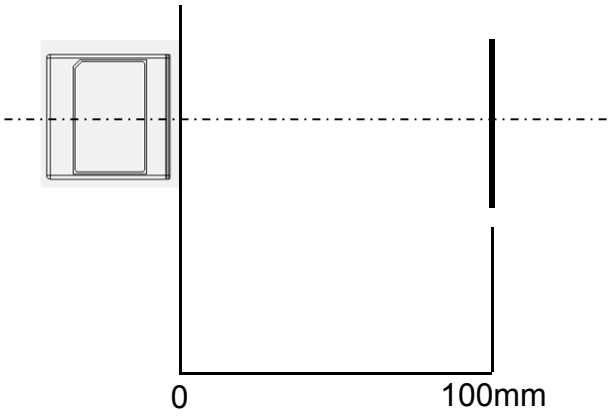
The ambient illuminance is specified at the working distance: H = 100 mm.

Item	Specifications
Ambient Luminance (Note 1, 2, 3)	0 - 10000 lx

Reference code	QR Code model 2, Ver.5, Error Correction Level: M, Cell Pitch: 0.5 mm, PCS: 0.9 min. (white cell reflectance is 85% or more), Black and white label

(Note 1) A xenon lamp shall be used as the light source.

(Note 2) Uniformity of luminance at the scanning field (including label surface) shall be maintained. (Ununiformity: ±10% max.)



Working distance H

(Note 3) The code symbol must be placed at the center of the visual field.

5 2D CODE AND BARCODE TO SCAN

The dimensions of code symbols described in this section are specified at the working distance: H = 100 mm and in the ambient illuminance range of 500 to 3000 lx. The readable number of digits is specified for the barcode placed horizontally in the field of view.

QR Code model 1, model 2

Item \ Symbologies	QR Code model 1, model 2	
Maximum cell count of readable code (including margin) (Note 1) (Note 2)	Cell pitch: 0.167 mm	Model 1: Ver1 to 14 Standard maximum (360° skew)
		Model 2: Ver1 to 20 (360° skew) Ver1 to 32 (0° skew)
	Cell pitch: 0.25 mm	Model 1: Ver1 to 14 Standard maximum (360° skew)
		Model 2: Ver1 to 19 (360° skew) Ver1 to 30 (0° skew)
Margin	4 cells min.	
Error correction	4 levels (L, M, Q, H)	
Reference standards	JIS X 0510:2004 ISO/IEC 18004:2006	

(Note 1) These values are specified for code symbols whose PCS is 0.9 and cell size is between 79 and 121% of the cell pitch.

(Note 2) Scanning of QR Code symbols with cell counts exceeding the specification above is not guaranteed, but the scanner may scan such code symbols depending on the conditions of the code label, etc.

Micro QR Code

Item \ Symbologies	Micro QR Code	
Maximum cell count of readable code (including margin) (Note)	Cell pitch: 0.20 mm	M1 to 4 Standard maximum (360° skew)
Margin	2 cells min.	
Error correction	3 levels (L, M, Q)	
Reference standards	JIS X 0510:2004 ISO/IEC 18004:2006	

(Note) These values are specified for code symbols whose PCS is 0.9 and cell size is between 79 and 121% of the cell pitch.

SQRC

Item \ Symbologies	SQRC	
Maximum cell count of readable code (Note 1) (Note 2)	Cell pitch: 0.167 mm	Ver1 to 20 (360° skew) Ver1 to 32 Standard maximum (0° skew)
	Cell pitch: 0.25 mm	Ver1 to 19 (360° skew) Ver1 to 30 (0° skew)
Margin	4 cells min.	
Error correction	4 levels (L, M, Q, H)	
Reference standards	-	

(Note 1) These values are specified for code symbols whose PCS is 0.9 and cell size is between 79 and 121% of the cell pitch.

(Note 2) Scanning of SQRC symbols with cell counts exceeding the specification above is not guaranteed, but the scanner may scan such code symbols depending on the conditions of the code label etc.

PDF417

Item \ Symbologies		PDF417
Readable number of digits and rows (number of digits and rows inside the scan field)		1 to 15 digit(s), 4 to 50 rows (Note 1) (excluding start/stop codes and indicators on both sides)
Scan dimensions	Module dimensions	0.167 mm [6.57 mils] min.
	Margin	2 modules min. (Note 2)
	Row height	4 modules min.
Reference standards		JIS X 0508:2010 ISO/IEC 15438:2006

(Note 1) 15 digits and 50 rows are guaranteed for the respective maximum number of readable digits and rows, however, depending on the label conditions (module dimensions etc.), it may be possible to scan more than 15 digits and 50 rows.

(Note 2) All four sides (right, left, top and bottom) of the code.

(Note 3) See the reference standards for the details of error correction level.

(Note 4) The global label identifier is not supported.

Micro PDF417

Item \ Symbologies		MicroPDF417
Readable number of digits and rows (number of digits and rows inside the scan field)		1 to 4 digit(s), 4 to 44 rows (Excluding RowAddressPattern at the right, center and left)
Scan dimen-sions	Module dimensions	0.167 mm [6.57 mils] min.
	Margin	2 modules min. (Note 1)
	Row height	2 modules min.
Reference standards		ISO/IEC 24728:2000

(Note 1) All four sides (right, left, top and bottom) of the code

(Note 2) The Structured Append, Global label identifier, CODE128 emulation, 05 Macro, 06 Macro and reader initialization are not supported.

MaxiCode

Item \ Symbologies	MaxiCode
Readable code size (Horizontal) × (Vertical)	30 (odd rows) / 29 (even rows) modules × 33 modules
Module pitch	0.88 mm [34.6 mils]
Margin	1 module min.
Reference standards	ISO/IEC 16023:2000

(Note 1) The Extended Channel Interpretation and Structured Append are not supported.

(Note 2) The Mode 1 and 6 are not supported.

Data Matrix

Item \ Symbologies	Data Matrix	
Maximum cell count of readable code (including margin) (Note1)	Cell pitch: 0.20 mm	52 cells × 52 cells (360° skew)
	Cell pitch: 0.25 mm	96 cells × 96 cells (360° skew) 120 cells × 120 cells (0° skew)
Margin	1 cell min.	
Error correction	ECC200	
Reference standards	ISO/IEC 16022:2000	

(Note 1) These values are specified for code symbols whose PCS is 0.9 and cell size is between 79 and 121% of the cell pitch.

(Note 2) Scanning of codes symbols with cell counts exceeding the specification above is not guaranteed, but the scanner may scan such code symbols depending on the conditions of the code label, etc.

(Note 3) Structured Append are not supported.

Aztec

Item \ Symbologies	Aztec	
Maximum cell count of readable code (Note 1) (Note 2)	Cell pitch: 0.30 mm	Layer 12 (full-range) Layer 4 (compact) (θ = 360°)
Error correction	5 - 95 level correspondence	
Reference standards	ISO/IEC 24778:2008	

(Note 1) These values are specified for code symbols whose PCS is 0.9 and cell size is between 92 and 108% of the cell pitch.

(Note 2) Scanning of codes symbols with cell counts exceeding the specification above is not guaranteed, but the scanner may scan such code symbols depending on the conditions of the code label, etc.

(Note 3) Runes is not supported.

UPC-A, UPC-E

Item \ Barcode symbologies		UPC-A	UPC-E
No. of readable digits (digits within scan field)		12 digits	7 digits
Scan dimensions	Module dimensions	0.26 - 0.50 mm	0.26 - 0.66 mm
	Magnification ratio (Note)	0.8 - 1.5	0.8 - 2.0
	Left Margin	9 modules min.	9 modules min.
	Right Margin		7 modules min.
Check digit		MOD-10	
Reference standards		JIS X 0507:2004 ISO/IEC 15420:2009	

(Note) Based on the 0.33 mm [13.0 mils] bar specified in the UPC SYMBOL SPECIFICATON MANUAL.

EAN-13, EAN-8

Item \ Barcode symbologies		EAN-13	EAN-8
No. of readable digits (digits within scan field)		13 digits	8 digits
Scan dimensions	Module dimensions	0.26 - 0.50 mm	0.26 - 0.66 mm
	Magnification ratio (Note)	0.8 - 1.5	0.8 - 2.0
	Left Margin	11 modules min.	7 modules min.
	Right Margin	7 modules min.	
Check digit		MOD-10	
Reference standards		JIS X 0507:2004 ISO/IEC 15420:2009	

(Note) Based on the 0.33 mm [13.0 mils] bar specified in the General EAN Specifications.

UPC-A / UPC-E with Add-on

Item \ Barcode symbologies		UPC-A with Add-on		UPC-E with Add-on	
		2-digit Add-on	5-digit Add-on	2-digit Add-on	5-digit Add-on
No. of readable digits (digits within scan field)		14 digits	17 digits	9 digits	12 digits
Scan dimensions	Module dimensions	0.26 - 0.40 mm	0.26 - 0.33 mm	0.26 - 0.60 mm	0.26 - 0.46 mm
	Magnification ratio (Note)	0.8 - 1.2	0.8 - 1.0	0.8 - 1.8	0.8 - 1.4
	Separation dimension	9 - 12 modules		7 - 12 modules	
	Left Margin	9 modules min.			
	Right Margin	5 modules min.			
Check digit		MOD-10			
Reference standards		JIS X 0507:2004 ISO/IEC 15420:2009			

EAN-13 / EAN-8 with Add-on

Item \ Barcode symbologies		EAN-13 with Add-on		EAN-8 with Add-on	
		2-digit Add-on	5-digit Add-on	2-digit Add-on	5-digit Add-on
No. of readable digits (digits within scan field)		15 digits	18 digits	10 digits	13 digits
Scan dimensions	Module dimensions	0.26 - 0.40 mm	0.26 - 0.33 mm	0.26 - 0.50 mm	0.26 - 0.40 mm
	Magnification ratio (Note)	0.8 - 1.2	0.8 - 1.0	0.8 - 1.5	0.8 - 1.2
	Separation dimension	7 - 12 modules			
	Left Margin	11 modules min.		7 modules min.	
	Right Margin	5 modules min.			
Check digit		MOD-10			
Reference standards		JIS X 0507:2004 ISO/IEC 15420:2009			

(Note) Based on 0.33 mm [13.0 mils] bar in UPC SYMBOL SPECIFICATION MANUAL or General EAN Specifications.

Interleaved 2 of 5 / Standard 2 of 5

Item \ Barcode symbologies		Interleaved 2 of 5	Standard 2 of 5
No. of readable digits (digits within scan field)		2 to 38 digits (Note 1)	3 to 23 digits (Note 2)
Scan dimensions	Narrow Space	0.125 mm min.	
	Narrow Bar		
	Comparison between Narrow Space (Bar) and Wide Space (Bar)	2.2 - 3.0 (Note 3)	
	Intercharacter Gap		Narrow Element – Wide Element
	Right/Left Margin	10 × Narrow Element or more	
Start/stop code			
Check digit (Note 4)		MOD-10	
Reference standards		JIS X 0505:2012 ISO/IEC 16390:2007	

(Note 1) 38 digits are guaranteed for the maximum number of readable digits, however, depending on the label conditions (narrow element dimension, narrow/wide ratio etc.), it may be possible to scan more than 38 digits.

(Note 2) 23 digits are guaranteed for the maximum number of readable digits, however, depending on the label conditions (narrow element dimension, narrow/wide ratio etc.), it may be possible to scan more than 23 digits.

(Note 3) 2.0 to 3.0 for code symbols with narrow space/bar width of 0.50 mm (19.7 mils) or more.

(Note 4) Existence of check digit is selectable.

(Note 5) If the size of the code label is larger than scanner's field of view, some digits may be lost. This is caused by characteristics of the barcode symbology.

CODABAR (NW-7)

Item \ Barcode symbologies		CODABAR (NW-7)
No. of readable digits (digits within scan field)		3 to 29 digits (Note 1) (including start/stop codes)
Scan dimensions	Narrow Space	0.125 mm min.
	Narrow Bar	
	Comparison between Narrow Space (Bar) and Wide Space (Bar)	2.2 - 3.0 (Note 2)
	Intercharacter Gap	Narrow Element - 6 × Narrow Element
	Right/Left Margin	10 × Narrow Element or more
Start/stop code		A, B, C, D
Check digit (Note 3)		MOD-16 or 7 check (Note 4)
Reference standards		JIS X 0506:2000

(Note 1) 3 to 34 digits when special characters (":", "/", ".", "+") are not included. 29 digits are guaranteed for the maximum number of readable digits, however, depending on the label conditions (narrow element dimension, narrow/wide ratio etc.), it may be possible to scan more than 29 digits.

(Note 2) 2.0 to 3.0 for code symbols with narrow space/bar width of 0.50 mm (19.7 mils) or more.

(Note 3) When adding a check digit, it is possible to select either MOD-16 or 7 check.

(Note 4) Check digit calculation method at 7 check

Check digits are calculated for data using the following method and appended directly before the stop code.

[Step 1] Characters excluding start/stop codes are converted to numerical values based on Table 1.
[Step 2] The lines of numerical values obtained at Step 1 are considered to be decimal values, and the remainder after dividing by 7 is calculated.
[Step 3] The calculation results of Step 2 are used to change converted characters to check digits based on Table 2.

Table 1 Character → Value	
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
-	5
$	4
:	2
/	7
.	6
+	3

Table 2 Value → Character	
0	0
1	1
2	2
3	3
4	4
5	5
6	6

The following check digit calculation example is given as a reference.

・Original data : A12345A
・Numerical value conversion based on Table 1 (Step 1)
: 12345
・Calculation of remainder after dividing by 7 (Step 2)
: 12345 / 7 = 1763 (remainder 4)
・Check digit character obtained based on Table 2 (Step 3)
: Check digit character is 4.
・Data appended with check digit character : A123454A

CODE39

Item \ Barcode symbologies		CODE39
No. of readable digits (digits within scan field)		1 to 20 digits (Note 1) (Excluding start/stop codes)
Scan dimensions	Narrow Space	0.125 mm [4.92 mils] min
	Narrow Bar	
	Comparison between Narrow Space (Bar) and Wide Space (Bar)	2.2 - 3.0 (Note 2)
	Intercharacter Gap	Narrow Element - 6 × Narrow Element
	Right/Left Margin	10 × Narrow Element or more
Start/stop code		*
Check digit (Note 3)		MOD-43
Reference standards		JIS X 0503:2003 ISO/IEC 16388:2007

(Note 1) 20 digits are guaranteed for the maximum number of readable digits, however, depending on the label conditions (narrow element dimension, narrow/wide ratio etc.), it may be possible to scan more than 20 digits.

(Note 2) 2.0 to 3.0 for code symbols with narrow space/bar width of 0.50 mm (19.7 mils) or more.

(Note 3) Existence of check digit is selectable.

(Note 4) CODE39 Full ASCII conversion is performed based on the Full ASCII Character Set Encoding table using AIM USS-39 barcodes. However, an error will occur and data will not be transferred if conversion is not performed based on this encoding.

CODE128 (GS1-128)

Item \ Barcode symbologies		CODE128 (GS1-128)
No. of readable digits (digits within scan field)		1 to 25 digits (Note 1) (Excluding start/stop codes and 1 check digit)
Scan dimensions	Module dimensions	0.125 mm min.
	Right/Left Margin	10 modules min.
Check digit		MOD-103
Reference standards		JIS X 0504:2003 ISO/IEC 15417:2007

(Note 1) 25 digits are guaranteed for the maximum number of readable digits, however, depending on the label conditions (narrow element dimension), it may be possible to scan more than 25 digits.

(Note 2) A barcode which consists of only special characters (function characters, CODE A, CODE B, CODE C, etc.) and does not contain any data to transfer should not be transferred.

CODE93

Item \ Barcode symbologies		CODE93
No. of readable digits (digits within scan field)		1 to 20 digits (Note) (Excluding start/stop codes and 2 check characters)
Scan dimensions	Module dimensions	0.125 mm min.
	Right/Left Margin	10 modules min.
Check digit		MOD-47
Reference standards		AIM USS-Code93(1995)

(Note) 20 digits are guaranteed for the maximum number of readable digits, however, depending on the label conditions (narrow element dimension), it may be possible to scan more than 20 digits.

GS1 DataBar Omnidirectional

Item \ Barcode symbologies		GS1 DataBar Omnidirectional
No. of readable digits (digits within scan field)		14 digits
Scan dimensions	Module dimensions	0.15 mm [5.91 mils] min.
	Right/Left Margin	0 module min.
Reference standards		JIS X 0509:2012 ISO/IEC 24724:2011

GS1 DataBar Truncated

Item \ Barcode symbologies		GS1 DataBar Truncated
No. of readable digits (digits within scan field)		14 digits
Scan dimensions	Module dimensions	0.15 mm [5.91 mils] min.
	Right/Left Margin	0 module min. (Note)
Reference standards		JIS X 0509:2012 ISO/IEC 24724:2011

GS1 DataBar Expanded

Item \ Barcode symbologies		GS1 DataBar Expanded
No. of readable digits (digits within scan field)		4 to 8 words (Note)
Scan dimensions	Module dimensions	0.15 mm [5.91 mils] min.
	Right/Left Margin	0 module min.
Reference standards		JIS X 0509:2012 ISO/IEC 24724:2011

(Note) 8 words are guaranteed for the maximum number of readable digits, however, depending on the label conditions (module dimensions etc.), it may be possible to scan more than 8 words.

GS1 DataBar Limited

Item \ Barcode symbologies		GS1 DataBar Limited
No. of readable digits (digits within scan field)		14 digits
Scan dimensions	Module dimensions	0.15 mm [5.91 mils] min.
	Right/Left Margin	0 module min.
Reference standards		JIS X 0509:2012 ISO/IEC 24724:2011

GS1 DataBar Stacked

Item \ Barcode symbologies		GS1 DataBar Stacked
No. of readable digits (digits within scan field)		14 digits
Scan dimensions	Module dimensions	0.15 mm [5.91 mils] min.
	Right/Left Margin	0 module min.
Reference standards		JIS X 0509:2012 ISO/IEC 24724:2011

GS1 DataBar Stacked Omnidirectional

Item \ Barcode symbologies		GS1 DataBar Stacked Omnidirectional
No. of readable digits (digits within scan field)		14 digits
Scan dimensions	Module dimensions	0.15 mm [5.91 mils] min.
	Right/Left Margin	0 module min.
Reference standards		JIS X 0509:2012 ISO/IEC 24724:2011

GS1 DataBar Expanded Stacked

Item \ Barcode symbologies		GS1 DataBar Expanded Stacked
No. of readable digits (digits within scan field)		2 to 8 segments, 2 to 6 rows (Note)
Scan dimensions	Module dimensions	0.15 mm [5.91 mils] min.
	Right/Left Margin	0 module min.
Reference standards		JIS X 0509:2012 ISO/IEC 24724:2011

(Note) 8 segments and 6 rows are guaranteed for the maximum number of readable digits, however, depending on the label conditions (module dimensions etc.), it may be possible to scan more than 8 segment.

GS1 Composite

Item \ Barcode symbologies		GS1 Composite
No. of readable digits (digits within scan field)		GS1 DataBar, GS1-128, UPC-A, UPC-E, EAN-13, EAN-8, PDF417, Micro PDF417 Within the tolerance of the corresponding code
Scan dimensions	Module dimensions	0.167 mm min.
	Margin	GS1 DataBar, GS1-128, UPC-A, UPC-E, EAN-13, EAN-8, PDF417, Micro PDF417 Within the tolerance of the corresponding code
Reference standards		ISO/IEC 24723:2010

6 Reading Mode

The scanner is equipped with a mode to control scanning with the external trigger signal and another mode to scan codes automatically and to control scanning with the command. These modes can be selected using the commands or configuration software.

Auto off mode

When the external trigger signal is turned ON, the scanner is brought to the Active state for approximately five seconds.
The scanner automatically returns to the Ready state when scanning is successfully completed, or after approximately five seconds elapsed with the external trigger signal ON.
The scanner goes to the Ready state if the external trigger signal is turned OFF before five seconds elapses. (Auto off mode: When normal setting)
When One Shot is set to the Auto off mode, you can set the duration of the Active state after turning ON the trigger signal.

Momentary mode

The scanner is brought to the Active state only when the external trigger signal is turned ON, and returns to the Ready state when the trigger switch is released.

Momentary mode (Reverse type)

The scanner is brought to the Ready state only when the external trigger signal is turned ON, and returns to the Active state when the trigger switch is released.

Alternate mode

The scanner alternates between the Active state and the Ready state every time the external signal trigger signal is turned ON.

Continuous reading mode 1

The scanner stays in the Active state after the power is turned on.
The scanner enters the Ready state when “Z”, “READOFF” or “LOFF” command is received, and enters the Active state when “R”, “READON” or “LON” command is received.
When the scanner enters the Ready state by receiving “Z”, “READOFF” or “LOFF” command, transmission of “ERROR” command to the host unit is optional.

Continuous reading mode 2

The scanner stays in the Active state after the power is turned on.
When scanning is complete, the scanner turns off illumination and marker and waits for “Z”, “READOFF” or “LOFF” command reception.
The scanner enters the Ready state when “Z”, “READOFF” or “LOFF” command is received, and enters the Active state when “R”, “READON” or “LON” command is received.
All external trigger signals are ignored.
When the scanner enters the Ready state by receiving “Z”, “READOFF” or “LOFF” command, transmission of “ERROR” command to the host unit is optional.

Auto sense mode

After power is turned on, the scanner turns off the illumination LED and marker and enters the Ready state.
If scanner detects an object within the scanning field of view, it turns on marker, and also turns on illumination LED if necessary, and enters the Active state, where it performs scanning. When approximately 3 seconds has elapsed after scanning is complete, or if scanning is not complete approximately 3 seconds after the scanner entered the Active state, the scanner will return to Ready state. Furthermore, all external trigger signals are ignored. Code detection level can be selected from “High”, “Medium” and “Low”. Since the scanner starts to scan when an object is detected within the scanning field of view, if the code symbol is left as is inside the scanning field of view after scanning is completed, the scanning operation may be repeated.

(Note 1) In the auto off mode, momentary mode and alternate mode, turn the external trigger signal ON before scanning.

(Note 2) During parameter setting by the QR Code parameter menu, the scanner is automatically brought to continuous reading mode regardless of reading mode selection.

(Note 3) If object cannot be detected due to low illumination, etc., the scanner will not enter the Active state. (Ambient illumination of 500 lx or more is necessary.)

(Note 4) There may be times when the unit switches between the Active state and Ready state due to fluctuations in the ambient lighting.

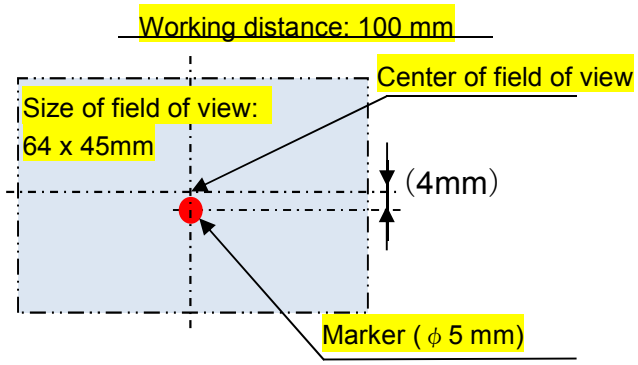
7 MARKER, ILLUMINATION LED AND INDICATOR LED

7-1 Marker

Color: Red (Wavelength: 624 nm TYP.)

Marker form

The marker size and position differ depending on a working distance.
The relation between a marker and the size of field of view are as described below.



Lighting specifications:

Normal marker mode

Auto off mode

When the external trigger signal is turned ON, the marker illuminates continuously.
After the external trigger signal is turned ON and enters the Active state, the marker turns OFF when approximately 5 seconds have elapsed, the successful scanning is completed, or the external trigger signal is turned OFF.

Momentary mode, Alternate mode

When the scanner enters the Active state (while the external trigger signal is ON in Momentary mode, and when the Active state is entered when in Alternate mode), the marker illuminates continuously.
When the scanner enters the Ready state (while the external trigger signal is OFF in Momentary mode, and when the Ready state is entered when in Alternate mode), the marker turns OFF.

Momentary mode (Reverse type)

When the scanner is ready to scan (that is, while the external trigger signal is OFF in the momentary mode reverse type), the marker remains on.
When the scanner is on standby (that is, while the external trigger signal is ON in the momentary mode reverse type), the marker will go off.

Continuous reading mode 1, Continuous reading mode 2

When the scanner turns ON, the marker illuminates and remains ON.
If the scanner receives a “Z”, “READOFF” or “LOFF” command, it turns OFF the marker; if it receives an “R”, “READON” or “LON” command, the marker remains ON.

Auto sensing mode

When the scanner senses a code coming into the readable area and becomes ready to scan, it automatically turns on the marker. After approx. 3 seconds from completion of scanning or if scanning is not completed within approx. 3 seconds, the scanner switches to standby and turns off the marker

Marker-OFF mode

The marker will not light.

Marker-ON mode

When the scanner enters the Ready state, the marker lights continuously and turns OFF after approximately 30 seconds.
In the Active state, the marker lights continuously.

7-2 Illumination LED

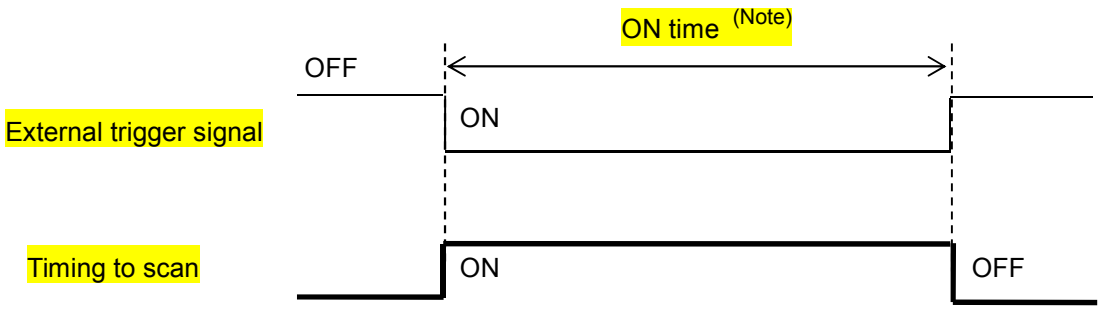
Illumination LEDs are turned on in the Active state.
Illumination LED color: Red
The illumination LED lighting status can be selected from Always OFF,or Always ON by setting at the configuration software. (See section 10-11.)

8 EXTERNAL OUTPUT/INPUT

8-1 External Trigger Terminal (External Input Terminal)

The Scanner can start and end scanning using the external trigger signal input by the external trigger terminal.

(Example of timing to scan in relation to the external trigger signal (Momentary mode))

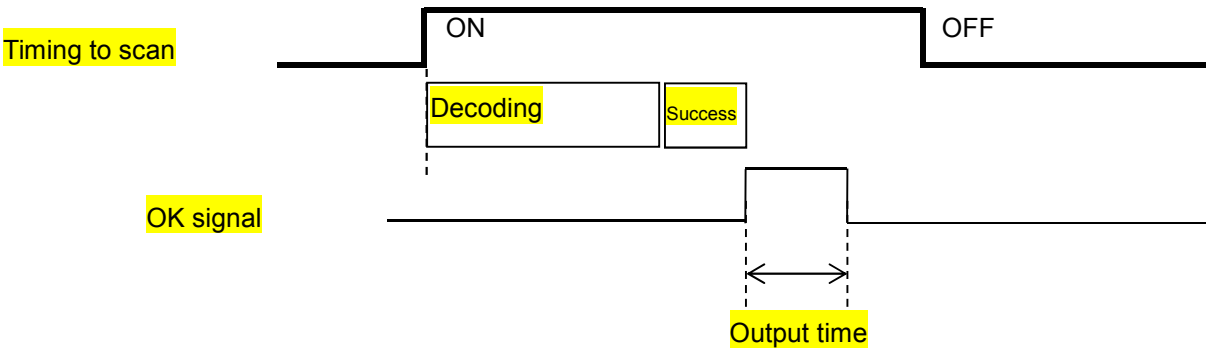


(Note) ON time of the external trigger signal is 10 ms or more. (Scanning may not be performed if ON time is short.)

8-2 Output Terminal (OK signal)

A scanner notifies the successful completion of scanning by outputting OK signal at a specific timing. The output time of the OK signal can be changed with the configuration software. (Refer to 11-9.)
For the specifications of output circuit, refer to 9-2.

(Example of timing to output OK signal)

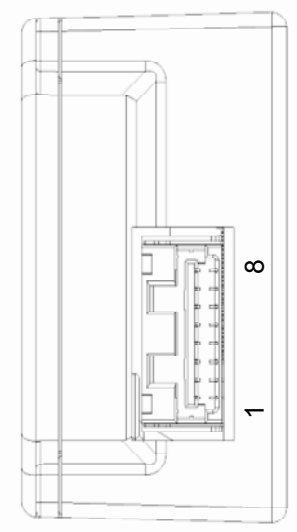


9 I/O

9-1 Connector and Signal Name

Connector (Molex 502386-0871)

・Signal line terminal assignment



Pin No.	Terminal name	Details	Input/output (Note 1)
1	VIN	Power supply	-
2	GND	Ground	-
3	RxD	Received data (Note 2)	Input
4	$\overline{\text{CTS}}$	Permit to send (Note2)	Input
5	TRG	External trigger	Input
6	TxD	Transmitted data (Note 2)	Output
7	$\overline{\text{RTS}}$	Request to send (Note2)	Output
8	OUT	Output terminal	Output

(Note 1) Input and output indicate when viewed from the scanner.

(Note 2) For details, refer to Section 10.

・Mating connector/terminal (gold-plated) Molex 502380-0800/502381-0010

9-2 External Trigger Terminal (TRG), Output Terminal (OUT)

9-2-1 External Trigger Terminal (Input)

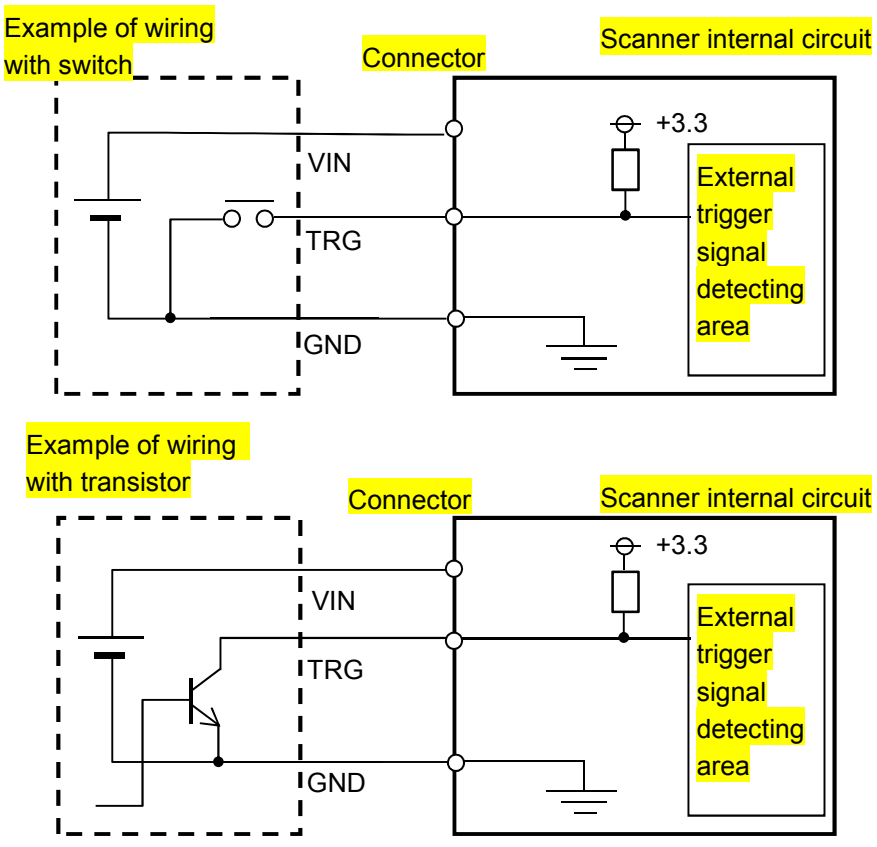
Input	External trigger signal
Low	ON
Hi-Z (High impedance)	OFF

(Note) For the functions of external trigger terminal, refer to section 8-1.

Electric specifications

Allowable voltage	5.5V max

Wiring for external trigger terminal



9-2-2 Output Terminal (Output)

Open drain output terminal

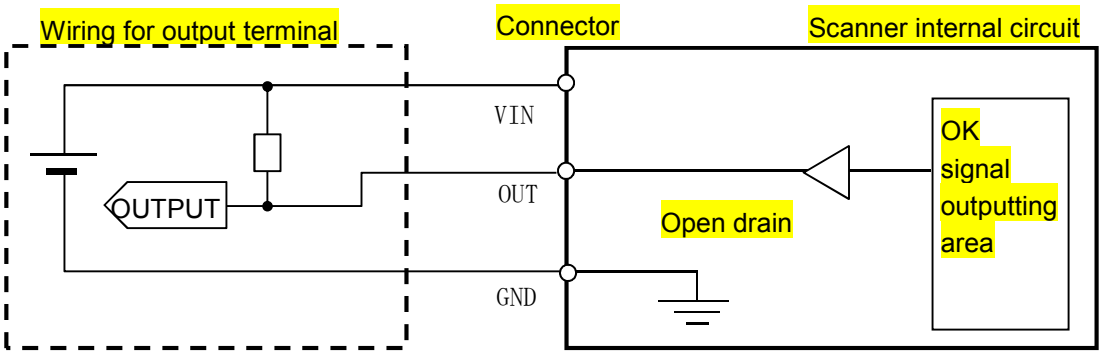
Output	OK signal
Hi-Z (High impedance)	ON
Low	OFF

(Note) For the functions of output terminal (OK signal), refer to section 8-2.

Electric specifications

Item	
Allowable voltage	5.5V max
Output Low level	0.55V max

Wiring for output terminal

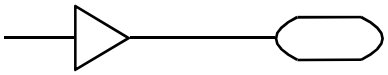
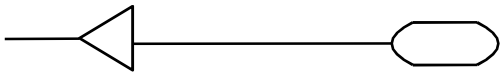


10 Serial Interfaces

10-1 Outline of Interface

The communication format is asynchronous serial interface.
The communication level is TTL level.
Furthermore, the communication conditions can be selected at the QR Code menu or configuration software.

10-1-1 Interface Circuit

Output circuit	Input circuit
TxD , $\overline{\text{RTS}}$  TTL LEVEL (Open drain)	RxD , $\overline{\text{CTS}}$  TTL LEVEL

Voltage level	Data signal	Control signal
High	0 (Space)	ON
Low	1 (Mark)	OFF

Electrical characteristics

Item (Note)		MIN.	MAX.
Ouput voltage	V_{OH}	-	5.5V
	V_{OL}	-	0.55V
Input voltage	V_{IH}	2V	5.5V
	V_{IL}	0	0.8V

(Note) The input voltage level is specified at the scanner interface connector terminal.

10-1-2 RTS Signal Control Procedure

A selection can be made between Scanner ready mode and Data ready mode.

Scanner ready mode

The RTS signal is always ON after the power is turned ON and the scanner becomes ready for communication.
When transmitting commands from the host to the scanner, a check should always be performed to first ensure that the RTS signal is ON.

Data ready mode

The RTS signal turns ON before the scanner transfers data, and then turns OFF when data transfer is complete.
When transmitting commands from the host to the scanner, the RTS signal status is irrelevant. However, there is a period of time directly after turning the scanner power ON during which commands cannot be received.

10-1-3 Transmission speed

The transmission speed can be selected from 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, or 115200 bps.

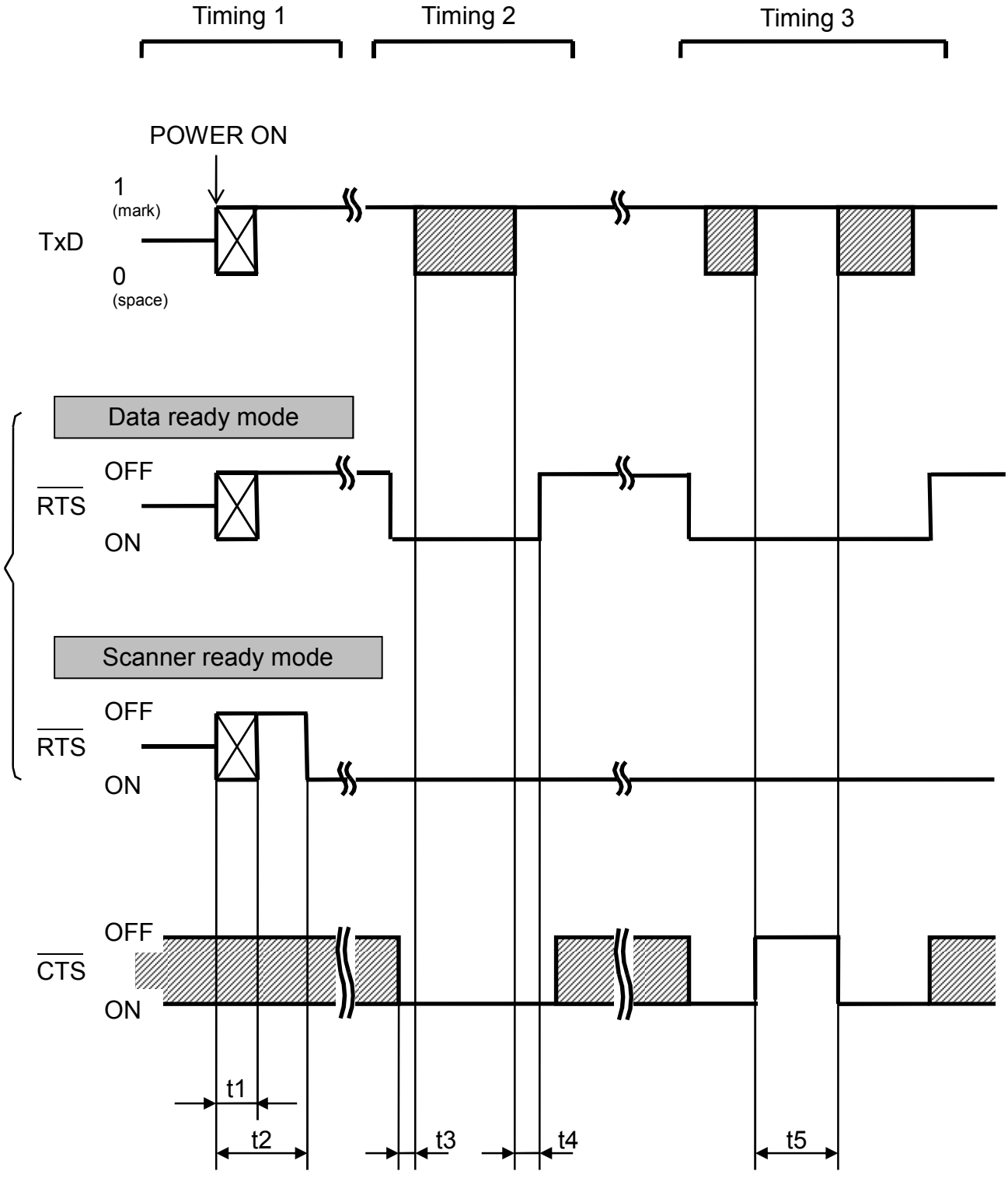
(Note) When a transmission speed of 57600 bps or 115200 bps is selected, the connection cable extension should be as short as possible. If the total cable length is too long, a communication error may occur, and communication may not be possible.

10-1-4 Transfer Characters

Transfer characters are all in ASCII code if there are no characters with binary code specification, and the format can be selected with a combination of the following items. However, if the data includes Kanji characters or binary data, by setting the word length to 7 bits, the uppermost bit will not be transferred.

Start bit : 1 bit (fixed and cannot be changed)
Word length : 7 bits, 8 bits
Parity : EVEN, ODD, NONE
Stop bi t : 1 bit, 2 bits

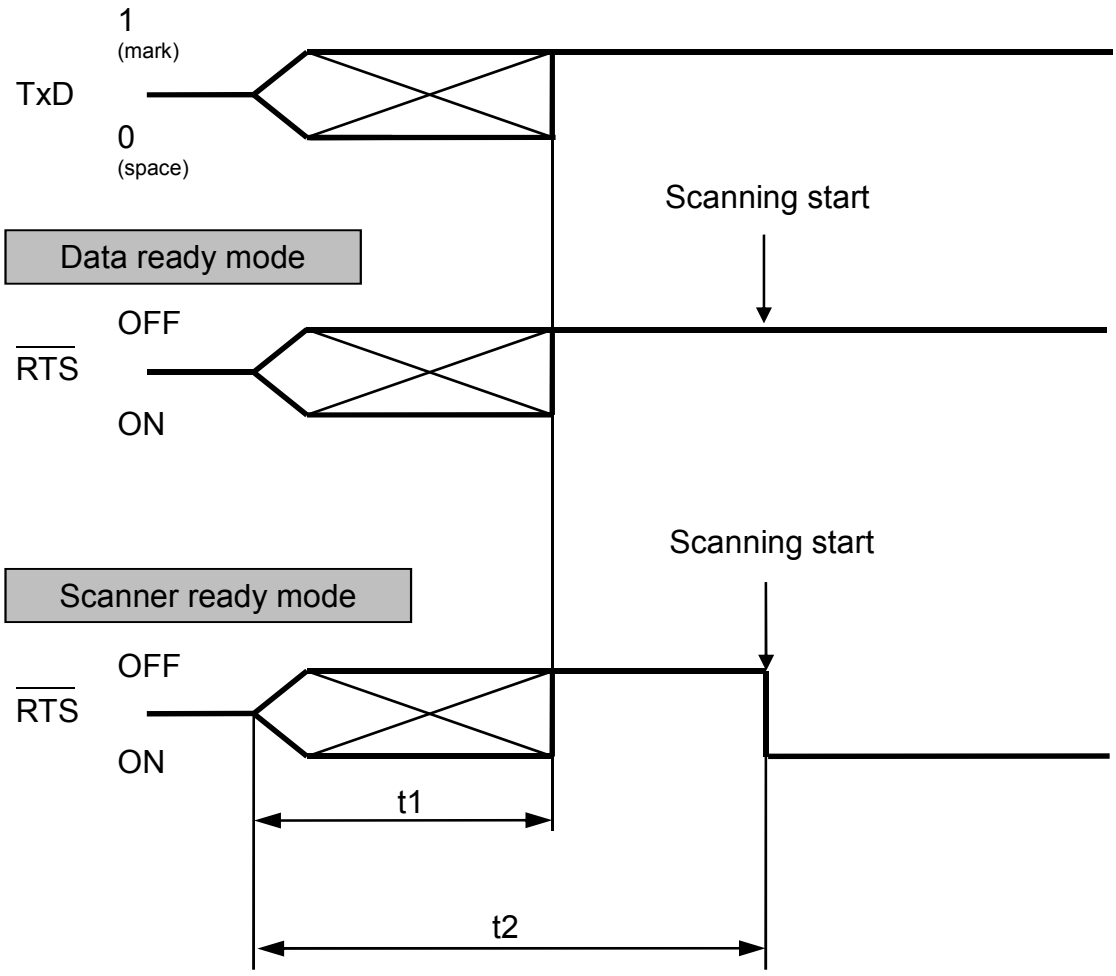
10-1-5 Serial Communication Timing



-  indicates that the signal is either ON(0) or OFF(1).

-  indicates that the signal level has not yet been fixed.

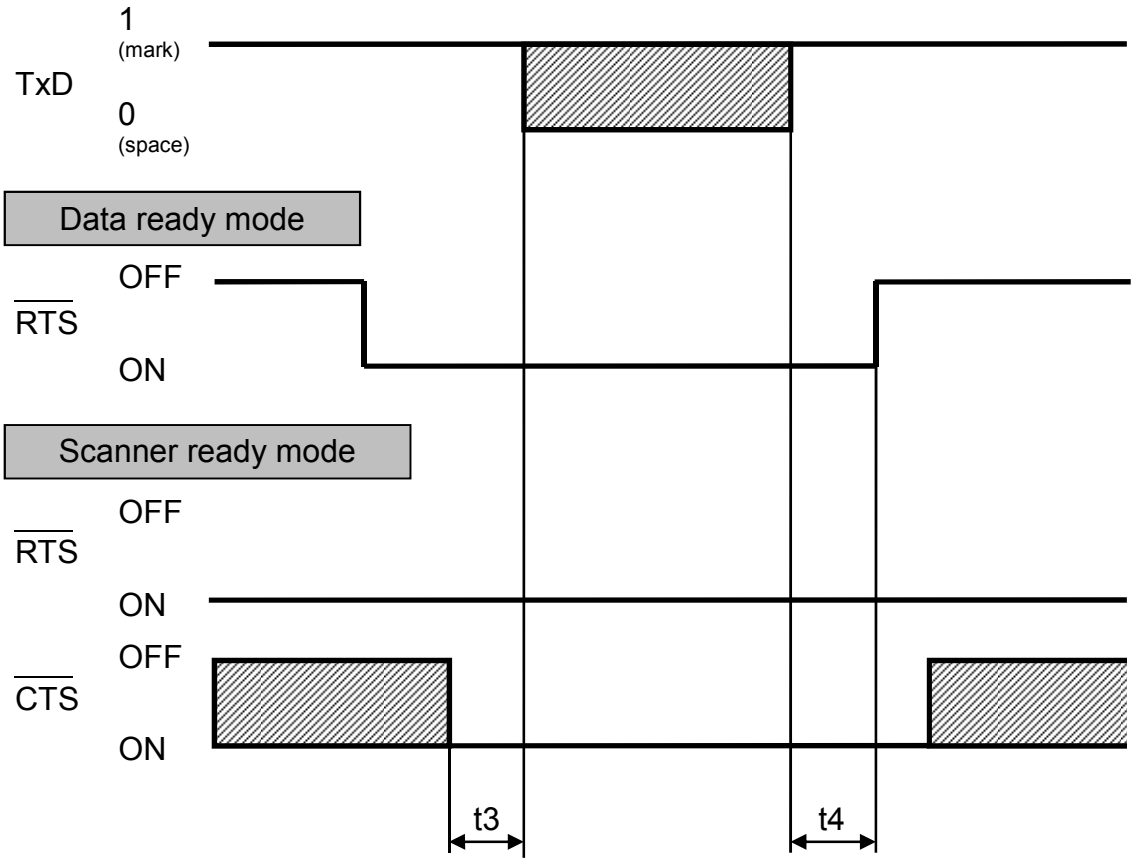
Timing 1: When power turned ON



In Scanner ready mode, after time t2 has elapsed after turning ON the power and the scanner is ready to scan, the RTS signal turns ON.

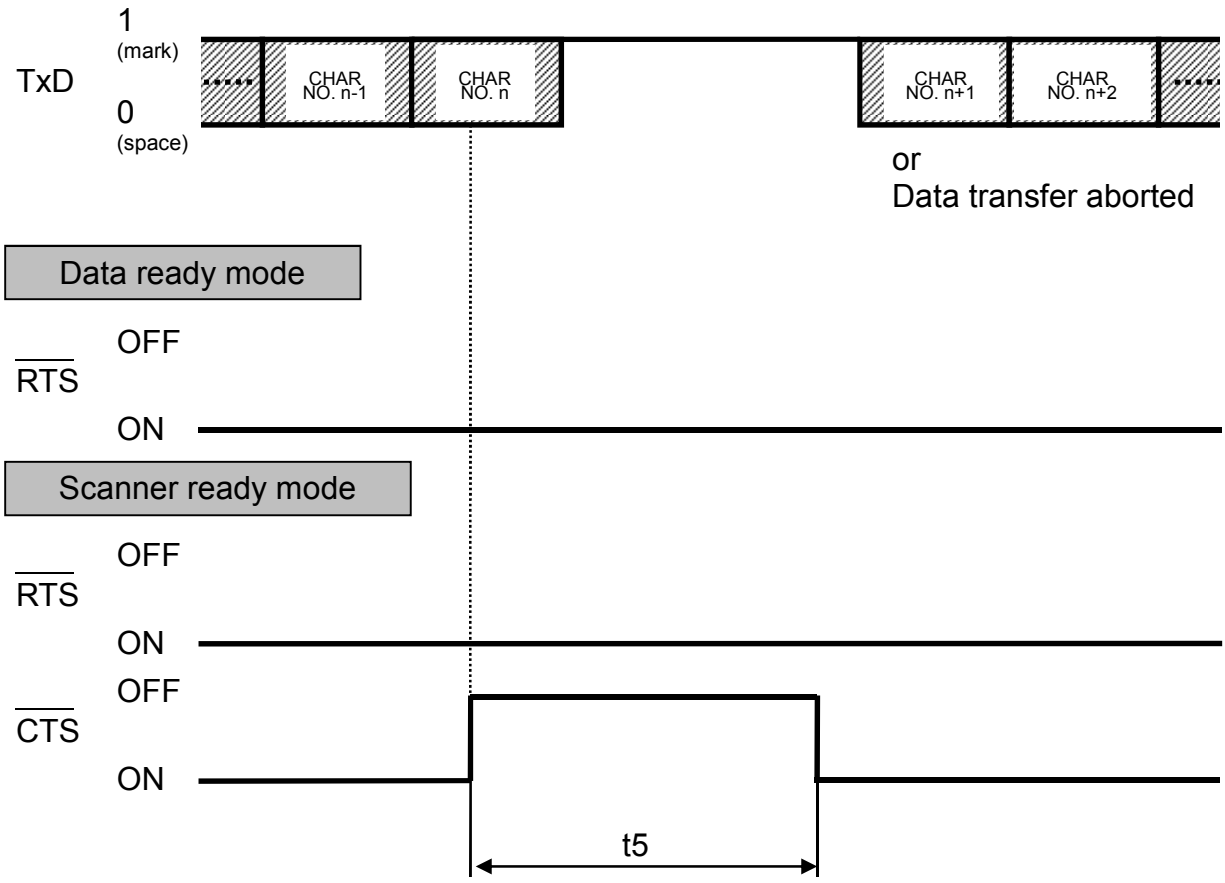
Item	Signal	MIN.	TYP.	MAX.	Unit
From power ON till signal level fixed	t1			2.5	s
From power ON till scan ready (This is the same for both Data ready mode and Scanner ready mode.)	t2			3	s

Timing 2: When transferring data



Item	Signal	Min.	Typ.	Max.	Unit
From CTS ON till data transfer is commenced when performing data transfer	t3			3	ms
From data transfer completion till RTS signal OFF (Data ready mode)	t4			3	ms

Timing 3 When CTS turns OFF during data transfer



When the CTS signal turns OFF during data transfer (when transferring the nth character), data transfer is aborted after the scanner transfers the nth character. When the CTS signal turns ON again, operation is performed as shown in the table below based on the t5 value.

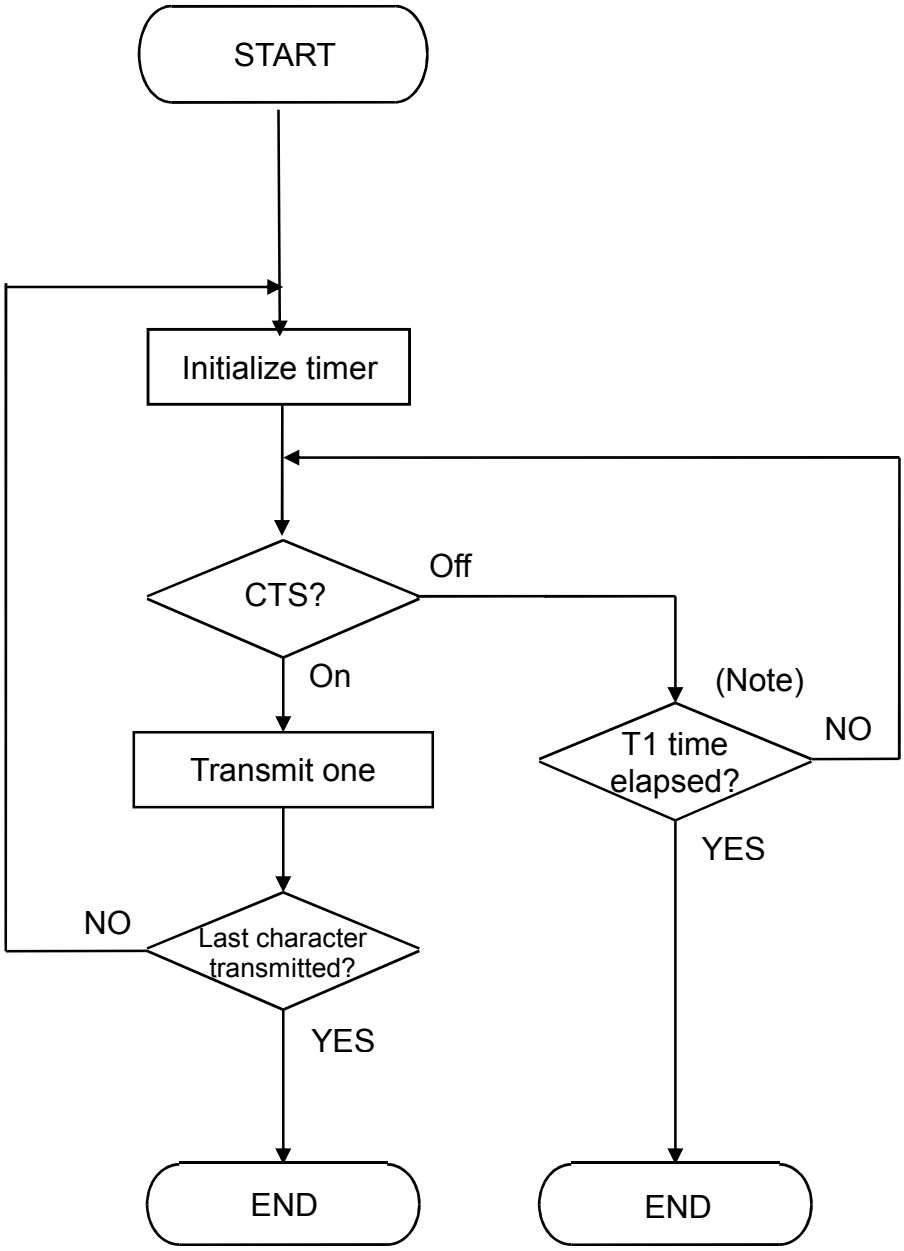
t5 ≤ CTS monitoring time	Transfer is resumed.
t5 > CTS monitoring time	Transfer is aborted. The remaining data is discarded.

The CTS monitoring time can be changed at the configuration software.

10-2 Communication Protocol

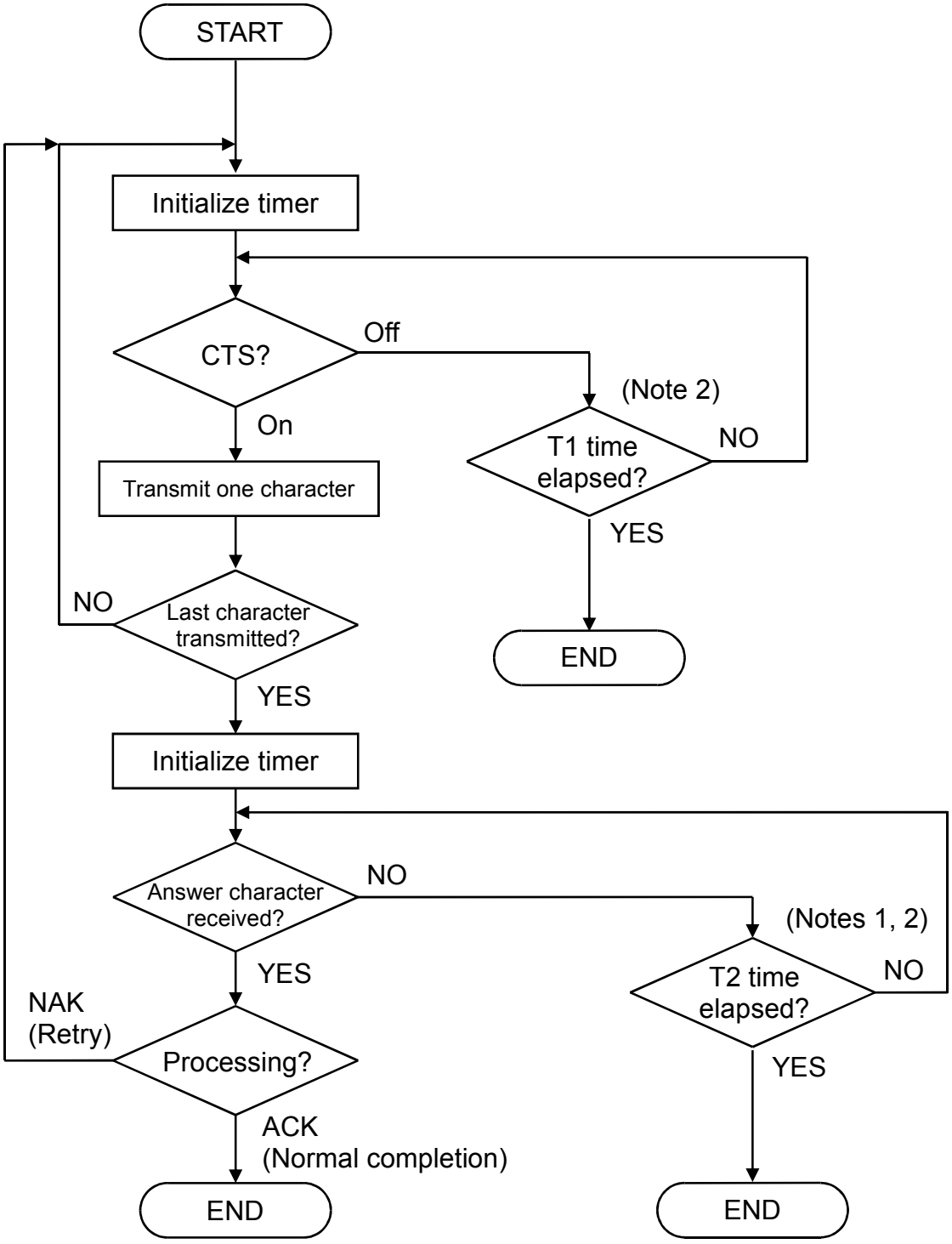
Select either Non-acknowledge mode or ACK/NAK mode.

Non-acknowledge mode



(Note) CTS signal monitoring time t1 can be selected from 100 ms to 9.9 s in intervals of 100 ms using the configuration software.

ACK/NAK mode



(Note 1) After the last character is sent, ACK/NAK is received and processed. If ACK/NAK signal cannot be received after waiting t2 time, process is completed as error.

(Note 2) CTS signal check time t1 and ACK/NAK response confirmation time t2 can be selected from 100 ms to 9.9 s in intervals of 100 ms using the configuration software.

10-3 Communication Format

Data transmission format

Format can be selected between the 2 formats shown below.

Header	Scanner ID	Code Mark	Prefix	No. of Digits				Code Data	Suffix	Terminator	BCC
				n1	n2	n3	n4				

Header	Scanner ID	Prefix	Code Mark	No. of Digits				Code Data	Suffix	Terminator	BCC
				n1	n2	n3	n4				

Control command communication format

Header	Control command	Terminator

Specific character transfer format

Header	Specific character	Terminator

Answer character transfer format

Answer character

The following are the description of each item.

(1) Header
No header and STX can be selected by the user. Furthermore, ASCII characters (00h-FFh) can be set at 4-byte configuration software as a user selection.

(2) Terminator
No terminator, ETX, CR, LF, and CR+LF can be selected by the user.

(Note) When “No terminator” is selected, the terminator for the control command communication format will be CR. Furthermore, ASCII characters (00h-FFh) can be set at 4-byte configuration software as a user selection.

(3) Prefix/Suffix
By combination of ASCII code characters (00h-FFh), a maximum setting of 8-byte length can be selected using the configuration software.

(4) BCC
Transmission of the BCC is optional. The BCC is calculated by EX-OR operation of the data, starting from the next character of the header to the terminator. It is transmitted as a single-byte binary data. When the transmission of the header is disabled, the BCC is not added.

(5) Scanner ID
A fixed, 6-digit numerical scanner ID (serial number) is transmitted to the scanner when shipped.

(6) Codemark

The code mark is used to identify code systems.
Transmission of the code mark is optional.
In transmitting the code mark, four options are available from a combination of code ID mark types (Type 1(DENSO1), Type 2(DENSO2), Type 3 and Type 4) and output modes (Coupling and Separate) as tabled below.
Furthermore, based on the ASCII character (00h-FEh) combination, a code mark of up to 2 bytes in length can be set at the configuration software as a user selection.

Code Type				Codemark			
				Type1		Type2	
				Coupling	Separate	Coupling	Separate
2D Code	QR Code			Q		Q	
	QR Code (Structured Append mode)	Edit mode		Q		Q	
		Batch edit mode		Q		Q	
		Unedited mode		S		S	
	Micro QR Code			Q		Q	
	SQRC			Q		Q	
	MaxiCode			X		X	
	PDF417			Y		Y	
	MicroPDF417			Y		Y	
	Data Matrix	Square		Z		Z	
		Rectangle		Z		Z	
	Aztec			J		J	
Barcode symbologies	UPC-A	No Add-on		A		A	
		With two-digit Add-on	Linear	A		A	
			Add-on	None		None	
		With five-digit Add-on	Linear	A		A	
			Add-on	None		None	
	UPC-E	No Add-on		C		E	
		With two-digit Add-on	Linear	C		E	
			Add-on	None		None	
		With five-digit Add-on	Linear	C		E	
			Add-on	None		None	

Code Type				Codemark			
				Type1		Type2	
				Coupling	Separate	Coupling	Separate
Barcode symbologies	EAN-13	No Add-on		A		F	
		With two-digit Add-on	Linear	A		F	
			Add-on	None		None	
		With five-digit Add-on	Linear	A		F	
			Add-on	None		None	
	EAN-8	No Add-on		B		FF	
		With two-digit Add-on	Linear	B		FF	
			Add-on	None		None	
		With five-digit Add-on	Linear	B		FF	
			Add-on	None		None	
	Interleaved 2 of 5			I		I	
	Standard 2 of 5 (short)			H		H	
	Standard 2 of 5 (normal)			H		H	
	CODE39			M		M	
	CODE39 Full ASCII			M		M	
	CODABAR (NW-7)			N		N	
	CODE128			K		K	
	GS1-128			W		W	
	CODE93			L		L	
	GS1 DataBar (Note 4)			R		R	

Code Type					Codemark			
					Type1		Type2	
					Coupling	Separate	Coupling	Separate
GS1 Composite	GS1 DataBar (Note 4) CC-A GS1 DataBar (Note 4) CC-B		GS1 DataBar		V	R	V	R
			CC-A, CC-B		None	Y (Note 1)	None	Y (Note 1)
	UPC-A CC-A, UPC-A CC-B	UPC-A	No Add-on		V	A	V	A
			With two-digit Add-on	Linear	V	A	V	A
				Add-on	None	None	None	None
			With five-digit Add-on	Linear	V	A	V	A
				Add-on	None	None	None	None
		CC-A, CC-B			None	Y (Note 1)	None	Y (Note 1)
	EAN-13 CC-A, EAN-13 CC-B	EAN-13	No Add-on		V	A	V	F
			With two-digit Add-on	Linear	V	A	V	F
				Add-on	None	None	None	None
			With five-digit Add-on	Linear	V	A	V	F
				Add-on	None	None	None	None
		CC-A, CC-B			None	Y (Note 1)	None	Y (Note 1)
	UPC-E CC-A, UPC-E CC-B	UPC-E	No Add-on		V	C	V	E
			With two-digit Add-on	Linear	V	C	V	E
				Add-on	None	None	None	None
			With five-digit Add-on	Linear	V	C	V	E
				Add-on	None	None	None	None
		CC-A, CC-B			None	Y (Note 1)	None	Y (Note 1)
	EAN-8 CC-A, EAN-8 CC-B	EAN-8	No Add-on		V	B	V	FF
			With two-digit Add-on	Linear	V	B	V	FF
				Add-on	None	None	None	None
			With five-digit Add-on	Linear	V	B	V	FF
				Add-on	None	None	None	None
		CC-A, CC-B			None	Y (Note 1)	None	Y (Note 1)
	GS1-128, CC-A, GS1-128, CC-B, GS1-128, CC-C		GS1-128		V	W	V	W
			CC-A, CC-B, CC-C		None	Y (Note 1)	None	Y (Note 1)

Code Type				Codemark			
				Type3		Type 4 (Note 2)	
				Coupling	Separate	Coupling	Separate
2D Code	QR Code			P01		]Qm	
	QR Code (Structured Append mode)	Edit mode		P01		]Qm	
		Batch edit mode		P01		]Qm	
		Unedited mode		P01		S (Note 3)	
	Micro QR Code			P01		Q (Note 3)	
	SQRC			Q		Q (Note 3)	
	MaxiCode			P02		]Um	
	PDF417			X		]L0	
	MicroPDF417			X		]L0	
	Data Matrix	Square		P00		]dm	
		Rectangle		P00		]dm	
	Aztec			z		]zm	
Barcode symbologies	UPC-A	No Add-on		A		]X0	
		With two-digit Add-on	Linear	A		]X3	]X0
			Add-on	None		None	]X1 (Note 1)
		With five-digit Add-on	Linear	A		]X3	]X0
			Add-on	None		None	]X2 (Note 1)
	UPC-E	No Add-on		A		]X0	
		With two-digit Add-on	Linear	A		]X3	]X0
			Add-on	None		None	]X1 (Note 1)
		With five-digit Add-on	Linear	A		]X3	]X0
			Add-on	None		None	]X2 (Note 1)

Code Type				Codemark			
				Type3		Type 4 (Note 2)	
				Coupling	Separate	Coupling	Separate
Barcode symbologies	EAN-13	No Add-on		A		]E0	
		With two-digit Add-on	Linear	A		]E3	]E0
			Add-on	None		None	]E1 (Note 1)
		With five-digit Add-on	Linear	A		]E3	]E0
			Add-on	None		None	]E2 (Note 1)
	EAN-8	No Add-on		A		]E4	
		With two-digit Add-on	Linear	A		]E5	]E4
			Add-on	None		None	]E1 (Note 1)
		With five-digit Add-on	Linear	A		]E6	]E4
			Add-on	None		None	]E2 (Note 1)
	Interleaved 2 of 5			F		]Im	
	Standard 2 of 5 (short)			G		]R0	
	Standard 2 of 5 (normal)			G		]S0	
	CODE39			B		]Am	
	CODE39 Full ASCII			B		]Am	
	CODABAR (NW-7)			C		]Fm	
	CODE128			D		]Cm	
	GS1-128			K		]C1	
	CODE93			E		]G0	
	GS1 DataBar (Note 4)			R		]e0	

Code Type					Codemark			
					Type3		Type 4 (Note 2)	
					Coupling	Separate	Coupling	Separate
GS1 Composite	GS1 DataBar (Note 4) CC-A GS1 DataBar (Note 4) CC-B		GS1 DataBar		T	R	]e0	
			CC-A, CC-B		None	X (Note 1)	None	
	UPC-A CC-A, UPC-A CC-B	UPC-A	No Add-on		T	A	]X0	
			With two-digit Add-on	Linear	T	A	]X3	]X0
				Add-on	None	None	None	]X1 (Note 1)
			With five-digit Add-on	Linear	T	A	]X3	]X0
				Add-on	None	None	None	]X2 (Note 1)
		CC-A, CC-B			None	X (Note 1)	]e0 (Note 1)	
	EAN-13 CC-A, EAN-13 CC-B	EAN-13	No Add-on		T	A	]E0	
			With two-digit Add-on	Linear	T	A	]E3	]E0
				Add-on	None	None	None	]E1 (Note 1)
			With five-digit Add-on	Linear	T	A	]E3	]E0
				Add-on	None	None	None	]E2 (Note 1)
		CC-A, CC-B			None	X (Note 1)	]e0 (Note 1)	
	UPC-E CC-A, UPC-E CC-B	UPC-E	No Add-on		T	A	]X0	
			With two-digit Add-on	Linear	T	A	]X3	]X0
				Add-on	None	None	None	]X1 (Note 1)
			With five-digit Add-on	Linear	T	A	]X3	]X0
				Add-on	None	None	None	]X2 (Note 1)
		CC-A, CC-B			None	X (Note 1)	]e0 (Note 1)	
	EAN-8 CC-A, EAN-8 CC-B	EAN-8	No Add-on		T	A	]E4	
			With two-digit Add-on	Linear	T	A	]E5	]E4
				Add-on	None	None	None	]E1 (Note 1)
			With five-digit Add-on	Linear	T	A	]E6	]E4
				Add-on	None	None	None	]E2 (Note 1)
		CC-A, CC-B			None	X (Note 1)	]e0 (Note 1)	
	GS1-128, CC-A, GS1-128, CC-B, GS1-128, CC-C	GS-128			T	K	]e0	
		CC-A, CC-B, CC-C			None	X (Note 1)	None	

Code Type		Modifer Character	Option
2D Code	QR Code (Note 5)	0	model 1
		1	model 2
		2	Model 2, ECI protocol implemented
		3	model 2 (FNC1 in the 1st character positions from start code)
		4	Model 2, ECI protocol implemented (FNC1 in the 1st character positions from start code)
		5	Model 2 (FNC1 in the 2nd character positions from start code)
		6	Model 2, ECI protocol implemented (FNC1 in the 2nd character positions from start code)
	MaxiCode	0	mode4, mode5
		1	mode2, mode3
	Data Matrix (Note 5)	1	ECC-200
		2	ECC-200 (1st or 5th character from start code is FNC1.)
		3	ECC-200 (2nd or 6th character from start code is FNC1.)
		4	ECC-200, ECI protocol implemented
		5	ECC-200, ECI protocol implemented (1st or 5th character from start code is FNC1.)
		6	ECC-200, ECI protocol implemented (2nd or 6th character from start code is FNC1.)
	Aztec	0	No options
		1	FNC1 preceding the 1st message character
		2	FNC1 subsequent to the 1st character or digit pair
Barcode symbologies	Interleaved 2 of 5	0	Enabled without C/D
		1	Enabled with C/D, with C/D transmitted
		3	Enabled with C/D, with C/D not transmitted
	CODE39 CODE39 Full ASCII	0	Enabled without C/D
		1	Enabled with C/D, with C/D transmitted
		3	Enabled with C/D, with C/D not transmitted
	CODABAR	0	Enabled without C/D
		1	Enabled with C/D, with C/D transmitted
		3	Enabled with C/D, with C/D not transmitted
	CODE128	0	1st and 2nd characters from start code do not contain FNC1.
		2	2nd character from start code is FNC1.

CD : Check digit

(Note 1) Code marks with this note are contained in the code data.

(Note 2) Code mark Type 4 is a code mark system complying with “Guidelines on Symbology Identifiers” of AIM USA. Ending character “m” differs depending on transmission data format of barcode system.

Example:]I3
]: Flag Character (ASCII 93h)
I: Code Character (Interleaved 2 of 5)
3: Modifier Character (See the table above.)

For example, in Interleaved 2 of 5, when “Enabled with CD” and “with CD not transmitted” are set, code mark is “]I3”.

(Note 3) For code marks not complying, the same characters as those of Type 1(DENSO1) are applied.

(Note 4) GS1 DataBar represents: GS1 DataBar Omnidirectional, GS1 DataBar Truncated, GS1 DataBar Limited, GS1 DataBar Expanded, GS1 DataBar Stacked, GS1 DataBar Expanded Stacked, GS1 DataBar Stacked Omnidirectional.

(Note 5) An ECI protocol supported code will be converted into “\ + 6-digit numbers” and transmitted as an ECI data only under the following conditions.

-The Type 4 code mark is enabled.

If the data is character “\”, it will be converted into “\\”.
In the edit or batch edit mode, if any of the split codes contains an ECI mode indicator, all code data will be converted into ECI data.
In the non-edit mode, only codes containing an ECI mode indicator will be converted into ECI data.

(7) No. of Digits
The number of digits of the code data is indicated with 4 digits (4 bytes) or 2 digits (2 bytes).
Note that UPC and EAN codes (except GS1-128) skip this field.
It is possible to select whether transfer of the number of digits is required.

- When 4 digits (4 bytes) transferred:
  n1: Units of 1000 (0 - 9)
  n2: Units of 100 (0 - 9)
  n3: Units of 10 (0 - 9)
  n4: Units of 1 (0 - 9)
- When 2 digits (2 bytes) transferred:
  n1: Units of 10 (0 - 9)
  n2: Units of 1 (0 - 9)
  However, 99 is transferred if the data byte count exceeds 99 bytes.

(8) Code Data
The following are the data transmission format for each code system.
Enable or disable of CD transmission of barcode (Except for CODE128, GS1-128, CODE93) can be selected using the configuration software menu or QR Code parameter menu.

QR Code/Micro QR Code

The data content is transmitted.

QR Code (Structured Append mode)

<Edit mode>
The reconstructed data content is transmitted.
The code block number, the total number of Code blocks and the parity are not transmitted.

<Batch edit mode>
The reconstructed data content is transmitted.
The code block number, the total number of Code blocks and the parity are not transmitted.

<Unedited mode>
The code block number (one byte, hexadecimal), the total number of code blocks (one byte, hexadecimal), the parity (two bytes, hexadecimal) and the data content of each code block are transmitted in order.
Hexadecimal is expressed using ASCII characters (“0” to “9” and “A” to “F”).
In this case, the code block number, the total number of code blocks and the parity shall not be counted as readable number of digits.

SQRC

The data content is transmitted. If the scanner is set to transmit only the undisclosed data in the encryption key match setting, transmission is limited to undisclosed data only and no other data is transferred.

$$X_1X_2\ldots X_{n-1}X_nY_1Y_2\ldots Y_{m-1}Y_m$$

X_n : Disclosed data
Y_m : Undisclosed data

Transmission of disclosed data + undisclosed data

$$X_1X_2\ldots X_{n-1}X_nY_1Y_2\ldots Y_{m-1}Y_m$$

Transmission of undisclosed data only

$$Y_1Y_2\ldots Y_{m-1}Y_m$$

PDF417

The data content is transmitted.

Micro PDF417

The data content is transmitted.

MaxiCode

The data content is transmitted.

Data Matrix

The data content is transmitted.

Aztec

The data content is transmitted.

UPC-A

It is possible to select whether the leading character “0” for adjustment of the transferred number of digits, number system character “S”, and check digit transfer “C/D” are required or not.
If transfer of “S” is set to be prohibited, transfer is prohibited regardless of whether “0” is set.
It is also possible to select whether conversion to GTIN format is required. (See section 10-5 when GTIN format conversion is permitted.)

Conversion to GTIN format prohibited

0S$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$C/D

0 : Leading character for adjustment of the transferred number of digits
S : Number system character

UPC-E

It is possible to select whether the leading character “0” for adjustment of the transferred number of digits, number system character “S”, conversion to UPC-A, and check digit transfer “C/D” is required or not.
If transfer of “S” is set to be prohibited, transfer is prohibited regardless of whether “0” is set.
It is also possible to select whether conversion to GTIN format is required. (See section 10-5 when GTIN format conversion is permitted.)

Conversion to UPC-A prohibited, conversion to GTIN format prohibited

0$X_1X_2X_3X_4X_5X_6$C/D

Conversion to UPC-A permitted, conversion to GTIN format prohibited

X_6=0-2 : **0S$X_1X_2X_6$0000$X_3X_4X_5$C/D**

X_6=3 : **0S$X_1X_2X_3$00000X_4X_5C/D**

X_6=4 : **0S$X_1X_2X_3X_4$ 00000X_5C/D**

X_6=5-9 : **0S$X_1X_2X_3X_4X_5$0000X_6C/D**

0 : Leading character for adjustment of the transferred number of digits
S : Number system character

EAN-13

It is possible to select whether transfer of the leading two prefix characters "P1P2", conversion to ISBN/ISSN format, and check digit transfer "C/D" is required.
If conversion to ISBN/ISSN format is permitted, conversion is made to ISBN format if the prefix characters are "978" and "979", and to ISSN format if the prefix character is "977".
It is also possible to select whether conversion to GTIN format is required. (See section 10-5 when GTIN format conversion is permitted.)

Conversion to ISBN/ISSN format prohibited, conversion to GTIN format prohibited

$P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D

P_n : Prefix character

Conversion to ISBN/ISSN format permitted, conversion to GTIN format prohibited

- ISBN format
  $X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D (Note)
- ISSN format
  $X_1X_2X_3X_4X_5X_6X_7$C/D (Note)

(Note) The ISBN/ISSN check digit is calculated with MOD11 and then transferred.

EAN-8

It is possible to select whether conversion to EAN-13 and check digit transfer "C/D" is required or not.
It is also possible to select whether conversion to GTIN format is required. (See section 10-5 when GTIN format conversion is permitted.)

Conversion to EAN-13 prohibited, conversion to GTIN format prohibited

$P_1P_2P_3X_1X_2X_3X_4$C/D

Conversion to EAN-13 permitted, conversion to GTIN format prohibited

00000$P_1P_2P_3X_1X_2X_3X_4$C/D

P_n : Prefix character

UPC/EAN with Add-on

A 2-digit or 5-digit add-on is appended to UPC-A/UPC-E/EAN-13/EAN-8 barcode data. This applies to all code formats for UPC-A/UPC-E/EAN-13/EAN-8 barcode data formats. It is also possible to select whether conversion to GTIN format is required. (See section 10-5 when GTIN format conversion is permitted.)
When the scanner uses the Type 4 code mark and Separate output mode, the code mark is appended before the add-on code data. (Refer to Section 11-3 for further details on code marks.)

Conversion to GTIN format prohibited

(Ex.) With UPC-A add-on (add-on data: 2 digits)

0S$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$C/D $X_{11}X_{12}$

(Ex.) With UPC-A add-on (add-on data: 5 digits)

0S$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$C/D $X_{11}X_{12}$ $X_{13}X_{14}X_{15}$

0 : Leading character for adjustment of the transferred number of digits
S : Number system character
$X_{11 \text{ to } 15}$: Add-on code data

CODE39

The scanned data characters including the start/stop codes are transmitted.
Whether or not the start/stop codes are transmitted to the host unit can be selected.
It is also possible to select whether check digit transfer “C/D” is required.

Interleaved 2 of 5 / Standard 2 of 5

The scanner transmits code data read, starting from the character following the start pattern to the one preceding the stop pattern. No start/stop patterns will be transmitted.
It is possible to select whether check digit transfer “C/D” is required or not.
It is also possible to select whether conversion of 14-digit Interleaved 2 of 5 scan data to GTIN format is required. (See section 10-5 when GTIN format conversion is permitted.)

CODABAR (NW-7)

The scanned data characters including the start/stop codes are transmitted.
Whether or not the start/stop codes are transmitted to the host unit can be selected.
Transmission of start/stop codes can be selected from either lower case characters “a/b/c/d” or upper case characters “A/B/C/D”.

CODE 128 (GS1-128)

The data, starting from the character after the start code, to the one before the check digit, is transmitted in order. The start/stop codes, FNC codes and check digit are not transmitted. However, the first or second FNC1 that comes after the start code is not transmitted. It is possible to select whether FNC1 in other locations is converted to <GS>(1Dh) and transmitted.

CODE93

The scanned data characters, excluding the start/stop codes and check digit, are transmitted.

GS1 DataBar

The data content is transmitted.

(Note) GS1 DataBar represents: GS1 DataBar, GS1 DataBar Truncated, GS1 DataBar Limited, GS1 DataBar Expanded, GS1 DataBar, GS1 DataBar Expanded Stacked, GS1 DataBar Stacked Omnidirectional.

GS1 DataBar composite

The data content is transmitted.
GTIN format conversion does not apply. (See section 10-5.)
When Code Mark Type is Type 1 and Output Mode is Separate in the scanner setting, the separator [GS:1Dh] and 2D code mark are added between the linear code data and 2D code data. (Refer to Section 10-4 for further details on code marks.)
When Code Mark Type is Type 4 and Linear Code Length is Variable in the scanner setting, a separator [GS:1Dh] is added between the linear barcode data and 2D code data.

(Note) GS1 DataBar represents: GS1 DataBar, GS1 DataBar Truncated, GS1 DataBar Limited, GS1 DataBar Expanded, GS1 DataBar, GS1 DataBar Expanded Stacked, GS1 DataBar Stacked Omnidirectional.

UPC/EAN Composite

The data content is transmitted.
The format settings for each code do not apply to the linear section (UPC-A/UPC-E/EAN-13/EAN-8) format.
GTIN format conversion does not apply. (See section 10-5.)
When the scanner uses the Type 1(DENSO1) code mark and Separate output mode, a separator [GS: 1Dh] and a 2D Code mark are added between the liner barcode data and the 2D Code data.
When the scanner uses the Type 4 code mark, a 2D Code mark is added between the liner barcode data and the 2D Code data. (Refer to Section 11-3 for further details on code marks.)

UPC/EAN Composite with Add-on

The data content is transmitted.
The format settings for each code do not apply to the linear section (UPC-A/UPC-E/EAN-13/EAN-8) format.
GTIN format conversion does not apply. (See section 10-5.)
When the scanner uses the Type 1(DENSO1) code mark and Separate output mode, a separator [GS: 1Dh] and a 2D Code mark are added between the liner barcode data and the 2D Code data.
When the scanner uses the Type 4 code mark and Coupling output mode, a 2D Code mark is added between the liner barcode data and the 2D Code data.
When the scanner uses the Type 4 code mark and Separate output mode, the code mark is added before the add-on and between the add-on code data and the 2D Code data.
(Refer to Section 11-3 for further details on code marks.)

GS1-128 Composite

The data content is transmitted.
The GS1-128 format does not apply to the linear section (GS1-128) format.
GTIN format conversion does not apply. (See section 10-5.)
When the scanner uses the Type 1(DENSO1) code mark and Separate output mode, a separator [GS: 1Dh] and a 2D Code mark are added between the liner barcode data and the 2D Code data. (Refer to Section 11-3 for further details on code marks.)
If the Code ID mark type is set to Type 4 and the linear code length to variable at the scanner, a separator [GS: 1Dh] is added between the liner barcode data and 2D code data.

10-4 Control Commands

The commands which are transmitted between the host unit and the scanner through the communication line are called the control commands. Items set by control commands from the host unit overlap those indicated in “Parameter setting by QR Code parameter menu and/or configuration software".
Designation by the control command prevails over that by the QR Code parameter menu. However, unless a PW command is given, the value set with the control command will not be stored in the internal FLASH memory, and therefore if the power is turned OFF, all designations made with control commands will be cleared, and only the parameters set with the QR Code menu will be valid.

There are 2 types of control commands:
(1) Commands which consist of the command section only
(2) Commands which consist of the command section + option section

10-4-1 Commands which consist of the command section only

Command	Direction Scanner ↔ Host	Response	Description
Z (Note 2, 3)	←	OK/NG (Note 7)	Scanning standby Only when the reading mode is set to continuous reading mode 1 or mode 2, the scanner will enter the scanning standby mode by receiving “Z”, “READOFF” or “LOFF” command.
READOFF	←		
LOFF	←		
R (Note 2)	←		Scanning start Only when the reading mode is set to continuous reading mode 1 or mode 2, the scanner enters the scanning ready mode by receiving “R”, “READON” or “LON” command.
READON	←		
LON	←		

Command	Direction Scanner ↔ Host	Response	Description
U1 U2 U3 U4 U5 U6 U7 U8	←	OK/NG (Note 7)	Reading mode U1 : Auto off mode U2 : Momentary switching mode U3 : Alternate switching mode U4 : Continuous reading mode 1 U5 : Continuous reading mode 2 U6 : Auto sensing mode U7 : Auto stand mode U8 : Momentary switching mode (Reverse type)
PW (Note 5)	←		Parameter storage The values set with commands U1 to U8 and commands which consist of the command section and option section (10-4-2) are stored in the internal FLASH memory. If this command is not issued, these values are not retained when the power is turned OFF, and original values are restored.
VER	←	Operates as described in Description.	Firmware version request Response from the scanner : Ver.n.nn n.nn : Version No. example : Ver.1.00
VERF	←		Setting parameter version request Check the setting parameter version required to generate a batch setting QR Code (when not connected to the scanner) with the configuration software (Scanner Setting 2D). Response from the scanner [Ver.n.nn.mm] n.nn : Firmware version No. mm : Setting parameter version No. Example : Ver.1.00.00
IDF	←		Scanner ID (Serial number) request Response from the scanner [ID. XXXXXXXXXynnnnn] XXXXXXXXXX : Scanner Part No. y : Lower 1 digit of production year nnnnn : serial number

TMON		OK/NG (Note 7)	The external trigger signal function is enabled. When it is set as the continuous reading mode, it functions in the same way as the command "R".
TMOFF	←		The external trigger signal function is disabled and the scanner enters Ready state. When it is set as the continuous reading mode, it functions in the same way as the command "Z".
ERROR	→	-	Scan fail When Continuous reading mode 1 or 2 is set, data is transmitted when scanner enters Ready state without completing scanning in Active state. Whether or not to send this command can be selected.
DEFAULT	←	OK/NG (Note 7)	The parameter setting is reset to the default setting (factory default).
MENULOCK (Note 5, 6)	←		Configuration by the QR Code menu is disabled. (Refer to 4-13.)
MENUUNLOCK (Note 5, 6)	←		Configuration by the QR Code menu is enabled. (Refer to 4-13.)

(Note 1) Operation is not guaranteed if any command other than the above is transmitted to scanner.

(Note 2) When the code remains within the reading window, if the scanner receives the “Z” and then “R” commands after the scanned data is transmitted by the receipt of the “R” command, the scanned data is transmitted again. This is because the “Z” command clears the prevention of double-scanning.
For the same reason, if the scanner enters the scanning standby mode by the receipt of the “Z” command before all the blocks of a Structured Append Code are completely scanned, the Structured Append Code data are cleared.
However, even when “READOFF” or “LOFF” command is received instead of “Z” command, or “READOFF” or “LOFF” instead of “R” command, operation will be the same.

(Note 3) When the external trigger signal is received in the scanning standby mode, the LED may momentarily light up.
However, scanning is not allowed.

(Note 4) The next command operation is not performed until the current operation is complete.

(Note 5) The number of executions of these commands are a maximum of 100,000 times due to the restrictions on the EEPROM.

(Note 6) Do not power OFF until OK/NG response is received after transmitting these commands to store the configured state in the flash memory. If the power is turned OFF, the scanner may operate erroneously.

(Note 7) When the control parameter is received correctly, "OK" is transmitted. When the format and parameters of the control command are erroneous, "NG" is transmitted.

10-4-2 Commands which consist of the command section + option section

Command	Direction Scanner ↔ Host	Response	Description
S	←	OK/NG (Note 2)	1D Code Scanning Code Setting
D	←		2D Code Scanning Code Setting

(Note 1) The setting is not changed when the above commands only are transmitted.

(Note 2) When the control command is received correctly, "OK" is transmitted. When the format and parameters of the control command are erroneous, "NG" is transmitted.

(1) S command's option section format

S , [Scanning code] , , [Check digit] , , [Min. no. of digits] , [Max. no. of digits]

Options are separated with comma ",".
Even if middle options are not specified, "," must be inserted between options.
If the later options are not specified, they can be omitted.

Example : S , , , [Check digit] , , ,

Cannot be omitted. (Note 1) Can be omitted.

(Note 1) If no options are specified like ",,,", the command scanning code cannot be read. You can insert up to 6 commas.

(Note 2) In the case of "S,", the setting remains unchanged.

(Note 3) In the following cases, ",," must be inserted :
- Between the scanning code option and check digit option.
- Between the check digit option and minimum number of digits option.

(Note 4) When the control command is received correctly, "OK" is transmitted. When the format and parameters of the control command are erroneous, "NG" is transmitted.

You can specify the scanning code, check digit, minimum number of digits, and maximum number of digits as shown in the table below.

Symbol	Type of enabled scanning code	Check digit	Min. no. of digits	Max. no. of digits
A	UPC-A, UPC-E, EAN8, EAN13	-	-	-
E	UPC-A, UPC-E, EAN8, EAN13, UPC/EAN ADD ON	-	-	-
H	Standard 2 of 5	H	H3 (Note 2)	H99
I	Interleaved 2 of 5	I	I4 (Note 3)	I99
N	CODABAR (NW-7)	N	N4 (Note 4)	N99
M	CODE39	M	M1	M99
L	CODE93	-	L1	L99
K	CODE128, GS1-128 (EAN128)	-	K1	K99
R	GS1 DataBar Omnidirectional (RSS-14), GS1 DataBar Stacked (RSS-14 Stacked), GS1 DataBar Truncated (RSS-14 Truncated), GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional)	-	R1	R99

Specify the scanning code with symbol, check digit with symbol of a relevant code, and Min. and Max. number of digits with symbol + number of digits (in single or double digits). The setting range must be from the minimum number of digits to maximum number of digits. If the minimum number of digits and maximum number of digits are not specified, their default values in the above table are set.

(Note 1) When symbol A and E are set at the same time, it results in an error.

(Note 2) In the case of multi-code scanning, the minimum number of digits becomes triple digits, and in the case of single-code scanning, it becomes single digit.

(Note 3) In the case of multi-code scanning, the minimum number of digits becomes quadruple digits, and in the case of single-code scanning, it becomes double digits.

(Note 4) You can set single digit as the minimum number of digits. However, if the minimum number of digits is not specified, the minimum number of digits given above is automatically set.

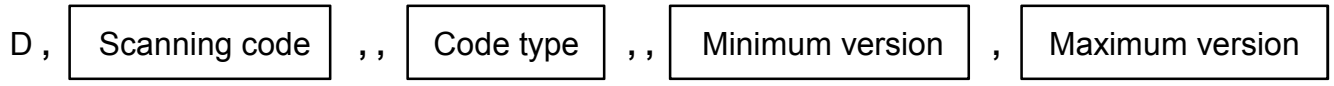
○ Setting Example

S , ANL
・Scanning code : POS, CODABAR (without check digit), CODE93
・No. of readable digits : Default value

S , INM , , NM , , I10N5 , I20N12
・Readable codes : Interleaved 2 of 5 (without check digit), CODABAR (without check digit), CODE39 (without check digit)
・Number of readable digits : Interleaved 2 of 5 (10 to 20 digits), CODABAR (5 to 12 digits), CODE39 (default)

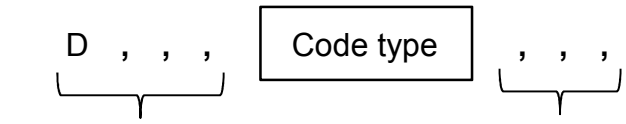
S , INM , , , , N5M8 , I20N5
・Readable codes : Interleaved 2 of 5 (without check digit), CODABAR (without check digit), CODE39 (without check digit)
・Number of readable digits: Interleaved 2 of 5 (4 to 20 digits), CODABAR (5 digits), CODE39 (8 to 99 digits)

(2) D command's option section format



Options are separated with comma ",".
Even if middle options are not specified, "," must be inserted between options.
If the later options are not specified, they can be omitted.

Example :



Cannot be omitted. (Note 1) Can be omitted.

(Note 1) If no options are specified like ",,,", the command scanning code cannot be read. You can insert up to 6 commas.

(Note 2) In the case of "D,", the setting remains unchanged.

(Note 3) In the following cases, ",," must be inserted :
・Between the scanning code option and check digit option.
・Between the check digit option and minimum number of digits option.

You can specify the scanning code, code type, minimum version, and maximum version as shown in the table below.

Symbol	Type of enabled scanning code	Code type	Type of enabled scanning code	Minimum version	Maximum version
Q	QR Code	QM	model 1	Q01	Q40
		QL	model 2		
		QS	Micro QR Code	QM1	QM4
X	MaxiCode	-		-	-
Y	PDF417	YM	PDF417	-	-
		YS	MicroPDF417		
Z	DataMatrix	ZS	Square	Z01	Z24
		ZR	Rectangle	ZR1	ZR6
J	Aztec	-		-	-
V	GS1 Composite	-		-	-

Specify the scanning code with symbol, code type with symbol + type (alphabet) of a relevant code, and Min. and Max. versions with symbol + number of digits (in single or double digits). The setting range must be from the minimum version to maximum version. If the minimum and maximum versions are not specified, their default values in the above table are set.

(Note 1) If the code types of QR code, PDF417, DataMatrix are omitted, all the code types can be read.

(Note 2) DataMatrix defines the versions as shown in the table below.

(Note 3) When setting the maximum version of QR Code model 1, the maximum version is Version 14 even if Version 15 or higher is set.

<DataMatrix Square>

Version	No. of Cells (Row × Col)	Version	No. of Cells (Row × Col)	Version	No. of Cells (Row × Col)	Version	No. of Cells (Row × Col)
1	10 × 10	7	22 × 22	13	44 × 44	19	88 × 88
2	12 × 12	8	24 × 24	14	48 × 48	20	96 × 96
3	14 × 14	9	26 × 26	15	52 × 52	21	104 × 104
4	16 × 16	10	32 × 32	16	64 × 64	22	120 × 120
5	18 × 18	11	36 × 36	17	72 × 72	23	132 × 132
6	20 × 20	12	40 × 40	18	80 × 80	24	144 × 144

<DataMatrix Rectangle>

Version	No. of Cells (Row × Col)	Version	No. of Cells (Row × Col)	Version	No. of Cells (Row × Col)
1	8 × 18	3	12 × 26	5	16 × 36
2	8 × 32	4	12 × 36	6	16 × 48

○ Setting Example

D , QYJ
・Scanning code : QR code (model 1, model 2, micro QR code), PDF417 (PDF417, micro PDF), AzTec
・Scanning version : Default value

D , QY , , QLQSQMYM
・Scanning code : QR code (model 1, model 2, micro QR code), PDF417 (PDF417)
・Scanning version : Default value

D , QZ , , QLQS , , Q14QM1Z08ZR4 , , Q20QM2Z08
・Scanning code : QR code (model 2, micro QR code), DataMatrix (Square, Rectangle)
・Scanning version : QR code_model 2 (version 14 to 20), DataMatrix_Square (version 8), DataMatrix_Rectangle (version 4 to 6)

10-5 GTIN format Conversion

This function is used to output EAN-13, UPC-A, EAN-8, UPC-E, ITF (14 digits) codes in GTIN (global trade item number) format and GTIN format GS1 DataBar and GS1-128 codes in product code (EAN-13/JAN-13) format.

(Note) GTIN format conversion is not possible under the following conditions.
When performing code scanning under conditions specified at multi-line barcodes
・When using Data edit mode (Data extraction, Data conversion mode, Blocksorting mode)

10-5-1 Conversion from GTIN to EAN/JAN

It is possible to select whether “conversion to EAN/JAN format” is required for GTIN format (16 digits for application identifier “01”) GS1 DataBar or GS1-128 scan data.
It is possible to select whether to convert EAN/JAN format to 13 digits (Do not transfer application identifier “01” and “PI” at start) or 14 digits (Do not transfer application identifier “01”).

GS1 DataBar

・Scan data

0 1 PI $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}X_{11}$ X_{12} C/D

PI : Package Indictor

・Conversion to 13 digits. (Do not transfer application identifier “01” and “PI” at start.)

$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}X_{11}$ X_{12} C/D (Note)

(Note) Check digits are recalculated and transferred.
If code mark transfer is permitted at the scanner settings, EAN-13 code marks are transferred.

・Conversion to 14 digits. (Do not transfer application identifier “01”.)

PI $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}X_{11}$ X_{12} C/D

(Note) GS1 DataBar represents: GS1 DataBar, GS1 DataBar Truncated, GS1 DataBar Limited, GS1 DataBar Expanded, GS1 DataBar, GS1 DataBar Expanded Stacked, GS1 DataBar Stacked Omnidirectional.

GS1-128

・Scan data

0 1 PI $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}X_{11}$ X_{12} X_{13}(C/D)

PI : Package Indictor

・Conversion to 13 digits. (Do not transfer application identifier “01” and “PI” at start.)

$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}X_{11}$ X_{12} X_{13}(C/D) (Note)

(Note) Check digits are recalculated and transferred.
If code mark transfer is permitted at the scanner settings, EAN-13 code marks are transferred.

・Conversion to 14 digits. (Do not transfer application identifier “01”.)

PI $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}X_{11}$ X_{12} X_{13}(C/D)

10-5-2 Conversion of EAN/UPC and ITF (14 digits) to GTIN

It is possible to select whether “conversion to GTIN format” is required for EAN-13, UPC-A, EAN-8, UPC-E, and ITF (14 digits) scan data.
It is possible to select whether to convert GTIN format to 16 digits (Add application identifier “01” and “PI” to transfer) or 14 digits (Add “PI” to transfer).
However, this is not applied to output formats specifiable with EAN-13, UPC-A, EAN-8 or UPC-E.

UPC-A

・Scan data

0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D

0 : Leading character for adjustment of the transferred number of digits
S : Number system character

・Conversion to 16 digits. (Add application identifier “01” and “PI” to transfer.)

0 1 PI 0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

・Conversion to 14 digits. (Add “PI” to transfer.)

PI 0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

UPC-A with Add-on

・Scan data

With two-digit Add-on

0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D $X_{11}X_{12}$

With five-digit Add-on

0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D $X_{11}X_{12}$ $X_{13}X_{14}X_{15}$

0 : Leading character for adjustment of the transferred number of digits
S : Number system character
$X_{11\ to\ 15}$: Add-on code data

・Conversion to 16 digits. (Add application identifier “01” and “PI” to transfer.)

With two-digit Add-on

0 1 PI 0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D $X_{11}X_{12}$ (Note)

With five-digit Add-on

0 1 PI 0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D $X_{11}X_{12}$ $X_{13}X_{14}X_{15}$ (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

・Conversion to 14 digits. (Add “PI” to transfer.)

With two-digit Add-on

PI 0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D $X_{11}X_{12}$ (Note)

With five-digit Add-on

PI 0 S $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ C/D $X_{11}X_{12}$ $X_{13}X_{14}X_{15}$ (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

UPC-E

・Scan data

0$X_1X_2X_3X_4X_5X_6$ C/D

0 : Leading character for adjustment of the transferred number of digits

・Conversion to 16 digits. (Add application identifier “01” and “PI” to transfer.)

X_6=0-20 : **1 PI 0 S $X_1X_2X_6$0 0 0 0$X_3X_4X_5$C/D** (Note)
X_6=3 : **0 1 PI 0 S $X_1X_2X_3$0 0 0 0 0X_4X_5C/D** (Note)
X_6=4 : **0 1 PI 0 S $X_1X_2X_3X_4$0 0 0 0 0X_5C/D** (Note)
X_6=5-9 : **0 1 PI 0 S $X_1X_2X_3X_4X_5$0 0 0 0 X_6C/D** (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

・Conversion to 14 digits. (Add “PI” to transfer.)

X_6=0-2 : **PI 0 S $X_1X_2X_6$0 0 0 0$X_3X_4X_5$C/D** (Note)
X_6=3 : **PI 0 S $X_1X_2X_3$0 0 0 0 0X_4X_5C/D** (Note)
X_6=4 : **PI 0 S $X_1X_2X_3X_4$0 0 0 0 0X_5C/D** (Note)
X_6=5-9 : **PI 0 S $X_1X_2X_3X_4X_5$0 0 0 0 X_6C/D** (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

UPC-E with Add-on

・Scan data

With two-digit Add-on

0$X_1X_2X_3X_4X_5X_6$C/D X_7X_8

With five-digit Add-on

0$X_1X_2X_3X_4X_5X_6$C/D X_7X_8 $X_9X_{10}X_{11}$

0 : Leading character for adjustment of the transferred number of digits
$X_{7\ to\ 11}$: Add-on code data

・Conversion to 16 digits. (Add application identifier “01” and “PI” to transfer.)

With two-digit Add-on

X_6=0-20 : **1 PI 0 S $X_1X_2X_6$0 0 0 0$X_3X_4X_5$C/D X_7X_8** (Note)
X_6=3 : **0 1 PI 0 S $X_1X_2X_3$0 0 0 0 0X_4X_5C/D X_7X_8** (Note)
X_6=4 : **0 1 PI 0 S $X_1X_2X_3X_4$0 0 0 0 0X_5C/D X_7X_8** (Note)
X_6=5-9 : **0 1 PI 0 S $X_1X_2X_3X_4X_5$0 0 0 0 X_6C/D X_7X_8** (Note)

With five-digit Add-on

X_6=0-20 : **1 PI 0 S $X_1X_2X_6$0 0 0 0$X_3X_4X_5$C/D X_7X_8 $X_9X_{10}X_{11}$** (Note)
X_6=3 : **0 1 PI 0 S $X_1X_2X_3$0 0 0 0 0X_4X_5C/D X_7X_8 $X_9X_{10}X_{11}$** (Note)
X_6=4 : **0 1 PI 0 S $X_1X_2X_3X_4$0 0 0 0 0X_5C/D X_7X_8 $X_9X_{10}X_{11}$** (Note)
X_6=5-9 : **0 1 PI 0 S $X_1X_2X_3X_4X_5$0 0 0 0 X_6C/D X_7X_8 $X_9X_{10}X_{11}$** (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

・Conversion to 14 digits. (Add “PI” to transfer.)

With two-digit Add-on

X_6=0-2 : **PI 0 S $X_1X_2X_6$0 0 0 0$X_3X_4X_5$C/D X_7X_8** (Note)
X_6=3 : **PI 0 S $X_1X_2X_3$0 0 0 0 0X_4X_5C/D X_7X_8** (Note)
X_6=4 : **0 1 PI 0 S $X_1X_2X_3X_4$0 0 0 0 0X_5C/D X_7X_8** (Note)
X_6=5-9 : **PI 0 S $X_1X_2X_3X_4X_5$0 0 0 0 X_6C/D X_7X_8** (Note)

With five-digit Add-on

X_6=0-2 : **PI 0 S $X_1X_2X_6$0 0 0 0$X_3X_4X_5$C/D X_7X_8 $X_9X_{10}X_{11}$** (Note)
X_6=3 : **PI 0 S $X_1X_2X_3$0 0 0 0 0X_4X_5C/D X_7X_8 $X_9X_{10}X_{11}$** (Note)
X_6=4 : **0 1 PI 0 S $X_1X_2X_3X_4$0 0 0 0 0X_5C/D X_7X_8 $X_9X_{10}X_{11}$** (Note)
X_6=5-9 : **PI 0 S $X_1X_2X_3X_4X_5$0 0 0 0 X_6C/D X_7X_8 $X_9X_{10}X_{11}$** (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

EAN-13

・Scan data

$P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D

P_n : Prefix character

・Conversion to 16 digits. (Add application identifier “01” and “PI” to transfer.)

0 1 PI $P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

・Conversion to 14 digits. (Add “PI” to transfer.)

PI $P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

EAN-13 with Add-on

・Scan data

With two-digit Add-on

$P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D $X_{10}X_{11}$

With five-digit Add-on

$P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D $X_{10}X_{11}$ $X_{12}X_{13}X_{14}$

Pn : Prefix character
$X_{10 \text{ to } 14}$: Add-on code data

・Conversion to 16 digits. (Add application identifier “01” and “PI” to transfer.)

With two-digit Add-on

0 1 PI $P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D $X_{10}X_{11}$ (Note)

With five-digit Add-on

0 1 PI $P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D $X_{10}X_{11}$ $X_{12}X_{13}X_{14}$ (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

・Conversion to 14 digits. (Add “PI” to transfer.)

With two-digit Add-on

PI $P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D $X_{10}X_{11}$ (Note)

With five-digit Add-on

PI $P_1P_2P_3X_1X_2X_3X_4X_5X_6X_7X_8X_9$C/D $X_{10}X_{11}$ $X_{12}X_{13}X_{14}$ (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

EAN-8

・Scan data

$P_1P_2P_3X_1X_2X_3X_4$C/D

$P_{n:}$ Prefix character

・Conversion to 16 digits. (Add application identifier “01” and “PI” to transfer.)

0 1 PI 0 0 0 0 0 $P_1P_2P_3X_1X_2X_3X_4$C/D (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

・Conversion to 14 digits. (Add “PI” to transfer.)

PI 0 0 0 0 0 $P_1P_2P_3X_1X_2X_3X_4$ C/D (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

EAN-8 with Add-on

・Scan data

With two-digit Add-on

$P_1P_2P_3X_1X_2X_3X_4$ C/D X_5X_6

With five-digit Add-on

$P_1P_2P_3X_1X_2X_3X_4$ C/D X_5X_6 $X_7X_8X_9$

Pn : Prefix character

$X_{5\ to\ 9}$: Add-on code data

・Conversion to 16 digits. (Add application identifier “01” and “PI” to transfer.)

With two-digit Add-on

0 1 PI 0 0 0 0 0 $P_1P_2P_3X_1X_2X_3X_4$C/D X_5X_6 (Note)

With five-digit Add-on

0 1 PI 0 0 0 0 0 $P_1P_2P_3X_1X_2X_3X_4$C/D X_5X_6 $X_7X_8X_9$ (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

・Conversion to 14 digits. (Add “PI” to transfer.)

With two-digit Add-on

PI 0 0 0 0 0 $P_1P_2P_3X_1X_2X_3X_4$ C/D X_5X_6 (Note)

With five-digit Add-on

PI 0 0 0 0 0 $P_1P_2P_3X_1X_2X_3X_4$ C/D X_5X_6 $X_7X_8X_9$ (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

Interleaved 2 of 5 (14 digits)

・Scan data

$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ X_{11} X_{12} X_{13}C/D

・GTIN format conversion permit. (Add application identifier “01” to transfer.)

0 1 $X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ X_{11} X_{12} X_{13}C/D (Note)

(Note) Check digits are recalculated and transferred regardless of the setting for transfer.

11 PARAMETER SETTING BY QR CODE PARAMETER MENU AND CONFIGURATION SOFTWARE

Using the exclusive QR Code parameter menu or the configuration software (Scanner Setting 2D), parameters can be selected for each setting item. The parameter being set is held even if the power is turned off.

(Note) When using the configuration software or QR Code parameter menu :

(1) There are 2 types of parameters: One can be set by either QR Code parameter menu or the configuration software, and the other can be set only by the configuration software.

Refer to section 11-1 to 11-9.
QR menu with "○" mark added :
Can be set by either with the QR Code parameter menu or configuration software
QR menu with "●" mark added :
Can be set only with the control command.
Other : Can be set only with the configuration software

(2) To set with the configuration software, there are 2 methods: One is to set by communication using an interface cable, and the other is to set by generating a batch setting QR Code and scanning with scanner.

11-1 Scanning Mode Parameter Selection

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
	Data editing	No editing	*	*	See 4-6.
		Data Extraction Mode			
		Data Conversion Mode			
		Blocksorting mode			
	Point Scan Mode	Enabled			See 4-4.
		Disabled	*	*	
	Period of Double-Read Prevention	Double-read enabled			See 4-3.
		Period of double-read prevention (0.1 to 9.9 seconds)	1.0 s	1.0 s	

11-2 Serial Interface Parameter Selection

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○	Communication Protocol	No-protocol mode	*	*	See 10-2.
		ACK/NAK mode			
○	Transmission speed	4800 bps			See 10-1-3.
		9600 bps			
		19200 bps			
		38400 bps	*	*	
		57600 bps			
		115200 bps			
○	Word length	7 bit			See 10-1-4.
		8 bit	*	*	
○	Parity	ODD			See 10-1-4.
		EVEN			
		None	*	*	
○	Stop bit	1bit	*	*	See 10-1-4.
		2bit			
	CTS signal monitoring	Controlled			See 10-1-5.
		Not controlled	*	*	
	CTS signal monitoring time	Setting range: 0.1 - 9.9 s	2.0 s	2.0 s	See 10-2.
	ACK/NAK response confirmation time	Setting range: 0.1 - 9.9 s	1.0 s	1.0 s	
	RTS Signal Control Procedure	Scanner ready mode	*	*	See 10-1-2.
		Data ready mode			

11-3 Data Transmission Format Selection

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○	Transmission of code mark	Enabled			See 10-3.
		Disabled	*	*	
	Code mark position	Before Prefix			See 10-3.
		After Prefix	*	*	
	Code mark type	Type1	*	*	See 10-3.
		Type2			
		Type3			
		Type4			
		User-defined			
	Output mode	Coupling	*	*	See 10-3.
		Separate			
○	Transmission of the number of digits (not applicable to UPC/EAN codes)	Enabled, in 4 digits			See 10-3.
		Enabled, in 2 digits (Note)			
		Disabled	*	*	
	Prefix transmission	Enabled			See 10-3.
		Disabled	*	*	
	Suffix transmission	Enabled			See 10-3.
		Disabled	*	*	
	Scanner ID output	Enabled			See 10-3.
		Disabled	*	*	
	GTIN format conversion	Disabled	*	*	See 10-5.
		Enabled			
	GTINled6.at conversion type	Conversion to 14 digits	*	*	See 10-5.
		Conversion to 13 digits			
		Disable conversion			
	EAN/UPC → GTIN conversion type	Conversion to 16 digits	*	*	See 10-5.
		Conversion to 14 digits			
		Disable conversion			
	EAN/UPC → GTIN conversion with PI added	0 - 9	0	0	See 10-5.

(Note) Unable to specify at the QR Code menu.

11-4 Serial Interface Data Transmission Format Selection

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○	Header	None	*	*	See 10-3.
		STX			
		User-defined (Note)			
○	Terminator	None			See 10-3.
		ETX			
		CR	*	*	
		LF			
		CR+LF			
		User-defined (Note)			
○	Transmission of BCC	Enabled			See 10-3.
		Disabled	*	*	

(Note) Unable to specify at the QR Code menu.

11-5 2D Code Scanning Code Selections

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
	Reading reverse codes	Enabled			See 4-8.
		Disabled	*	*	
○	Reading black-and-white inverted codes	Black cells/bars on a white background	*	*	See 4-9.
		Black and white inverted codes			
		Auto detection of black and white inverted codes			
○	Edit/Non-edit mode for split QR Code	Edit mode	*	*	See 4-7
		Batch edit mode			
		Unedit mode			
	QR Code, min. version readable	Setting range: 1 - 40	1	1	See 5.
	QR Code, max. version readable		40	40	
	Reading QR Code	Enabled	*	*	See 4-10.
		Disabled			
○	Reading MicroQR	Enabled	*	*	See 4-10.
		Disabled			
	Micro QR Code, min. Version scanning	Setting range: 1 - 4	1	1	See 5.
	Micro QR Code, max.version readable		4	4	
	SQRC Scanning	Disabled	*	*	See4-11.
		Enable SQRC scanning only			
		Enabled			
	Encryption key mismatch	Disabled	*	*	See4-11.
		Enable transmission of disclosed data only			
	Encryption key match	Enable transmission of disclosed data + undisclosed data	*	*	See4-11.
		Transmission of undisclosed data only			
	SQRC Code minimum version readable	Setting range: 1 - 40	1	1	See 5.
	SQRC Code,maximum version readable		40	40	

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○	Reading PDF417	Enabled	*	*	See 4-10.
		Disabled			
	Reading MicroPDF417	Enabled			See 4-10.
		Disabled	*	*	
○	Reading MaxiCode	Enabled	*	*	See 4-10.
		Disabled			
○ (Note 4)	Reading Data Matrix (square)	Enabled	*	*	See 4-10.
		Disabled			
	Data Matrix (square), min.code number readable	Setting range: 1 - 24 (Note 2)	1	1	See 5.
	Data Matrix (square), max.code number readable		24	24	
○ (Note 4)	Reading DataMatrix (Rectangular)	Enabled	*	*	See 4-10.
		Disabled			
	Data Matrix (rectangular), min. code number readable	Setting range: 1 - 6 (Note 3)	1	1	See 5.
	Data Matrix (rectangular), max. code number readable		6	6	
	Reading Aztec (Full Range)	Enabled			See 4-10.
		Disabled	*	*	
	Aztec, (Full range) minimum version readable	Setting range: 1 - 32	1	1	See 5.
	Aztec, (Full range) maximum version readable		32	32	
	Reading Aztec (Compact)	Enabled			See 4-10.
		Disabled	*	*	
	Aztec, (Compact) minimum version readable	Setting range: 1 - 4	1	1	See 5.
	Aztec, (Compact) maximum version readable		4	4	

(Note 1) Refer to the reference standard for each code in Section 5 for code details.

(Note 2) The following table shows the Data Matrix (square) code number vs the number of cells.

Code No.	No. of Cells (Row × Col)	Code No.	No. of Cells (Row × Col)	Code No.	No. of Cells (Row × Col)	Code No.	No. of Cells (Row × Col)
1	10 × 10	7	22 × 22	13	44 × 44	19	88 × 88
2	12 × 12	8	24 × 24	14	48 × 48	20	96 × 96
3	14 × 14	9	26 × 26	15	52 × 52	21	104 × 104
4	16 × 16	10	32 × 32	16	64 × 64	22	120 × 120
5	18 × 18	11	36 × 36	17	72 × 72	23	132 × 132
6	20 × 20	12	40 × 40	18	80 × 80	24	144 × 144

(Note 3) The following table shows the Data Matrix (square) code number vs the number of cells.

Code No.	No. of Cells (Row × Col.)
1	8 × 18
2	8 × 32
3	12 × 26
4	12 × 36
5	16 × 36
6	16 × 48

(Note 4) It is not possible to simultaneously enable/disable square or rectangular at the QR Code parameter menu.

11-6 Barcode Scanning Code Selections

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○ (Note 2)	Reading UPC-A, EAN-13	Enabled	*	*	See 4-10.
		Disabled			
	UPC-A transmission of check digit	Enabled	*	*	See 10-3.
		Disabled			
	UPC-A Transmission of number system character	Enabled	*	*	See 10-3.
		Disabled			
	UPC-A Transmission of the leading charac-ter for adjustment of transmission digits	Enabled	*	*	See 10-3.
		Disabled			
	EAN-13 transmission of check digit	Enabled	*	*	See 10-3.
		Disabled			
	EAN-13 Transmission of country code	Enabled	*	*	See 10-3.
		Disabled			
	EAN-13 Conversion to the ISBN/ISSN format	Enabled			See 10-3.
		Disable conversion	*	*	
○ (Note 2)	Reading UPC-E	Enabled	*	*	See 4-10.
		Disabled			
	UPC-E transmission of check digit	Enabled	*	*	See 10-3.
		Disabled			
	UPC-E Transmission of the leading character for adjustment of transmission digits	Enabled			See 10-3.
		Disabled	*	*	
	UPC-E Conversion to the UPC-A format	Enabled			See 10-3.
		Disable conversion	*	*	
	UPC-E Transmission of number system character	Enabled	*	*	See 10-3.
		Disabled			
○ (Note 2)	Reading EAN-8	Enabled	*	*	See 4-10.
		Disabled			
	EAN-8 transmission of check digit	Enabled	*	*	See 10-3.
		Disabled			
	EAN-8 Conversion to the EAN-13 format	Enabled			See 10-3.
		Disable conversion	*	*	
	Reading UPC/EAN with 2-digit add-on	Enabled			See 4-10.
		Disabled	*	*	
	Reading UPC/EAN with 5-digit add-on	Enabled			
		Disabled	*	*	
	Reading UPC/EAN with add-on only	Enabled			
		Disabled	*	*	
	UPC/EAN add-on check level	Disabled	*	*	(Note 5) Reference
		Setting range Levels 1 to 4			

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○	Reading Interleaved 2 of 5	Enabled (without C/D)	*	*	See 4-10.
		Enabled with C/D C/D transfer enabled			
		Enabled with C/D C/D transfer disabled (Note 3)			
		Disabled			
	Min. number of digits to be scanned for Interleaved 2 of 5	Setting range: 2 - 99 digits	4 digits	4 digits	See 5.
	Max. number of digits to be scanned for Interleaved 2 of 5		99 digits	99 digits	
	Reading Standard 2 of 5	Enabled (without C/D)			See 4-10.
		Enabled with C/D			
		Disabled	*	*	
	Standard 2 of 5 transmission of check digit	Enabled	*	*	See 4-10.
		Disabled			
	Minimum number of readable digits for Standard 2 of 5	Setting range: 2 - 99 digits	3 digits	3 digits	See 5.
	Maxmum number of readable digits for Standard 2 of 5		99 digits	99 digits	
○	Reading CODABAR (NW-7)	Enabled (without C/D)	*	*	See 4-10.
		Enabled with C/D C/D transfer enabled			
		Enabled with C/D C/D transfer disabled			
		Disabled			
	CODABAR (NW-7) code C/D calculation method	MOD-16	*	*	See 5.
		7 check			
○	Transmission of Start/Stop codes for CODABAR (NW-7)	Enabled (a/b/c/d)	*	*	See 10-3.
		Enabled (A/B/C/D)			
		Disabled			
	Min. number of digits to be scanned for CODABAR (NW-7)	Setting range: 3 - 99 digits (including start/stop codes)	4 digits	4 digits	See 5.
	Max. number of digits to be scanned for CODABAR (NW-7)		99 digits	99 digits	

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○	Reading CODE39	Enabled (without C/D)	*	*	See 4-10.
		Enabled with C/D C/D transfer enabled			
		Enabled with C/D C/D transfer disabled			
		Disabled			
○	Transmission of Start/Stop codes for Code 39	Enabled			See 10-3.
		Disabled	*	*	
	Conversion of CODE 39 to FULL ASCII	Enabled			See 5.
		Disable conversion	*	*	
	Min. number of digits to be scanned for CODE39	Setting range: 1 - 99 digits (Start/stop code not included)	1 digit	1 digit	See 5.
	Max. number of digits to be scanned for CODE39		99 digits	99 digits	
○ (Note 4)	Reading CODE128	Enabled	*	*	See 4-10.
		Disabled			
○ (Note 4)	Reading GS1-128	Enabled	*	*	See 4-10.
		Disabled			
	Transmission of FNC1 for Code 128	Disabled			See 10-3.
		Convert to GS and transmit it.	*	*	
		User-defined			
	Transmission of FNC1 for GS1-128	Disabled			See 10-3.
		Convert to GS and transmit it.	*	*	
		User-defined			
	Min. number of readable digits for CODE128	Setting range: 1 - 99 digits (excluding start/stop codes and 1-digit check digits)	1 digit	1 digit	See 5.
	Max. number of readable digits for CODE128		99 digits	99 digits	
○	CODE93	Enabled			See 4-10.
		Disabled	*	*	

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
	Min. number of digits to be scanned for CODE93	Setting range: 1 - 99 digits (excluding start/stop codes and 2-digit check digits)	1 digit	1 digit	See 5.
	Max. number of digits to be scanned for CODE93		99 digits	99 digits	
○ (Note 6)	GS1 DataBar Omnidirectional,GS1 DataBar Truncated	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 6)	GS1 DataBar Stacked GS1 DataBar Stacked Omnidirectional	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 6)	GS1 DataBar Limited	Enabled (ISO/IEC24724:2006)			See 4-10.
		Enabled (ISO/IEC24724:2011) (Note 8)			
		Disabled	*	*	
○ (Note 6)	GS1 DataBar Expanded	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 6)	GS1 DataBar Expanded Stacked	Enabled			See 4-10.
		Disabled	*	*	
	GS1 DataBar Expanded Min. number of readable digits	Setting range: 1 - 99 digits	1 digit	1 digit	See 5.
	GS1 DataBar Expanded Max. number of readable digits		99 digits	99 digits	
	Transmission of FNC1 or GS1 DataBar Expanded	Disabled			See 4-10.
		Convert to GS and transmit it.	*	*	
		User-defined			
○ (Note 7)	GS1 Composite	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 7)	Composite GS1-DataBar CC-A	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 7)	Composite GS1-DataBar CC-B	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 7)	Composite UPC/EAN CC-A	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 7)	Composite UPC/EAN CC-B	Enabled			See 4-10.
		Disabled	*	*	

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○ (Note 7)	Composite GS1-128 CC-A	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 7)	Composite GS1-128 CC-B	Enabled			See 4-10.
		Disabled	*	*	
○ (Note 7)	Composite GS1-128 CC-C	Enabled			See 4-10.
		Disabled	*	*	

(Note 1) Refer to the reference standard for each code in Section 5 for code details.

(Note 2) With the QR Code parameter menu, UPC-A, EAN-13, UPC-E and EAN-8 will be enabled/disabled at the same time.

(Note 3) Unable to specify at the QR Code menu.

(Note 4) With the QR Code parameter menu, CODE128 and GS1-128 will be enabled/disabled at the same time.

(Note 5) The add-on check level can be set in order to prevent a digit scanning miss when performing add-on scanning. Add-on check level (Low) Disabled < Level 1 < Level 2 < Level 3 < Level 4 (High). The scan time may increase by raising the add-on check level.

(Note 6) In the QR Code menu, the GS1 DataBar codes are enabled or disabled all.

(Note 7) In the QR Code menu, the Composite codes are enabled or disabled all together.

(Note 8) It is readable only if the space of 5 module is included in the right guard bar.

GS1 Databar Limited
(ISO/IEC 24724:2006) model

GS1 Databar Limited
(ISO/IEC 24724:2011) model

11-7 Multi-line Barcode Scanning Selection

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
	Multi-line Barcode Scanning	Enabled			See 4-5.
		Disabled	*	*	
	Number of readable lines for Multi-line barcode scanning	2 lines	*	*	See 4-5-1.
		3 lines			
	Multi-line barcode output format	Header / terminator-delimited format			See 4-5-3.
		Comma-delimited format	*	*	
	1st line barcode type	Specified from enabled codes.	Not specified	Not specified	See 4-5-2.
	Leading character for 1st line barcode	Specified up to 2 characters with ASCII characters.	Not specified	Not specified	See 4-5-2.
	Min. number of digits to be scanned for 1st line barcode	Setting range: max. 99 digits	Not specified	Not specified	See 5.
	Max. number of digits to be scanned for 1st line barcode	Setting range: max. 99 digits	Not specified	Not specified	See 5.
	2nd line barcode type	Specified from enabled codes.	Not specified	Not specified	See 4-5-2.
	Leading character for 2nd line barcode	Specified up to 2 characters with ASCII characters.	Not specified	Not specified	See 4-5-2.
	Min. number of digits to be scanned for 2nd line barcode	Setting range: max. 99 digits	Not specified	Not specified	See 5.
	Max. number of digits to be scanned for 2nd line barcode	Setting range: max. 99 digits	Not specified	Not specified	See 5.
	3rd line barcode type	Specified from enabled codes.	Not specified	Not specified	See 4-5-2.
	Leading character for 3rd line barcode	Specified up to 2 characters with ASCII characters.	Not specified	Not specified	See 4-5-2.
	Min. number of digits to be scanned for 3rd line barcode	Setting range: max. 99 digits	Not specified	Not specified	See 5.
	Max. number of digits to be scanned for 3rd line barcode	Setting range: max. 99 digits	Not specified	Not specified	See 5.

11-8 Data Editing Mode Selection

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
	Applicable codes for data editing	Specified from the codes	Any Code (Note 1)	Any Code (Note 1)	See 4-6.
	When a data edit error occurs	Transmit data regardless of the results			See 4-6.
		Transmit data when edit is complete successfully.	*	*	
	Data extraction mode in data editing	Data String Extraction	*	*	See 4-6-1.
		Data block extraction			
		AI mode			
	Extraction start position for data string extraction	First character			See 4-6-1.
		Last character			
		Specified position	*	*	
	Extraction end position for data string extraction	Last character	*	*	See 4-6-1.
		Specified no. of digits			
		Specified position			
	Extraction start position for data string extraction	Specify 0001 to 9999 digits in ASCII characters.	1 digit	1 digit	See 4-6-1.
	Extraction end position for data string extraction	Specify 0001 to 9999 digits in ASCII characters.	9999 digits	9999 digits	See 4-6-1.
	Number of data blocks for data block extraction (Max. 3 blocks)	Specify 01 to 99 digits in ASCII characters.	Not specified	Not specified	See 4-6-1.
	Search string and substitution string in data substitution mode	Specify max. 16 characters in ASCII. characters	Not specified	Not specified	See 4-6-1.
	Number of splits in data blocksorting mode	2 to 5 splits	2 splits	2 splits	See 4-6-1.
	Split position in data blocksorting mode	Specify 0001 to 9999 characters in ASCII characters.	1 character	1 character	See 4-6-1.
	Blocksorting mode output order	BLOCK1-BLOCK5	BLOCK1 / BLOCK2	BLOCK1 / BLOCK2	See 4-6-1.
	AI mode	AI Split Mode	*	*	See 4-6-1.
		AI Parenthesis Mode			
	AI Split Mode AI1 designation enable / disenable	Enabled	*	*	See 4-6-1.
		Disabled			
	AI Split Mode AI2 designation enable / disenable	Enabled			See 4-6-1.
		Disabled	*	*	

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
	AI Split Mode AI3 designation enable/disenable	Enabled			See 4-6-1.
		Disabled	*	*	
	AI split mode AI1	Specified from AI candidates (Note 2)	00	00	See 4-6-1.
	AI split mode AI2	Specified from AI candidates (Note 2)	00	00	See 4-6-1.
	AI split mode AI3	Specified from AI candidates (Note 2)	00	00	See 4-6-1.
	AI Split Mode Delimiters	Header/Terminator	*	*	See 4-6-1.
		Comma-delimited format			
		Tab			

(Note 1) When Any code is selected, all code data is edited.

(Note 2) Refer to Section 4-6-1 for more information about AI.

11-9 Other Selections

QR Menu	Setting	Parameters	Default Setting	Shipping Setting	Remarks
○	Reading mode	Auto off mode			See 6.
		Momentary mode			
		Momentary mode (Reverse type)			
		Alternate mode			
		Continuous reading mode 1	*	*	
		Continuous reading mode 2			
		Auto sense mode			
	Auto-off mode reading time (One shot mode)	1 s			See 6.
		2 s			
		3 s			
		4 s			
		5 s	*	*	
	Error issue when reading fails	Disabled	*	*	See 6.
		“ERROR” transmission enabled			
	Scanner sensitivity level in Auto sensing mode	High			See 6.
		Medium	*	*	
		Low			
	Marker	Marker-OFF mode	*	*	See 7-1.
		Normal marker mode			
		Marker-ON mode			
	Illumination LED	Off			See 7-2.
		On	*	*	
	External output	Unused	*	*	See 8-2.
		OK signal			
	External output (OK signal) time	Setting range: 10 to 2250 ms	500 ms	500 ms	See 8-2.
○	Restriction for using QR Code menu	Restricted			See 4-13.
		Not restricted	*	*	

12 IMAGE CAPTURE FUNCTION

12-1 Outline of the Function

The scanner is equipped with an image capture function to take in a scanned image. The BMP (bit map file) format and JPEG format can be selected as the output format.
The JPEG format offers three quality choices--standard, high, and low.
The size of image can be selected from SVGA, 1/4 SVGA, and 1/16 SVGA. When 1/4 SVGA or 1/16 SVGA is selected, the center part of the full-screen (1/1 SVGA) is extracted (center-screen display) or pixel-skipped image is enlarged to fill the screen (full-screen display). When you choose the center-screen display, the field of view becomes smaller but image quality is maintained. When you choose the full-screen display, on the contrary, the field of view becomes larger but image quality deterioration is inevitable.
Thumbnail transmission is also provided to preview the captured image. The thumbnail is transmitted in the BMP format for a 1/64 SVGA image or the JPEG format for a 1/4 SVGA image, both in a full-screen display size.
The image size, output type, display type, and thumbnail transmission status can be changed through parameter setting of the setting command.

12-2 Specifications

(1) Output format

JPEG, BMP

(2) Image size

Image size	(No. of Pixels)	BMP	JPEG	Display Type
SVGA	800 × 600 pixels	○	○	Full-screen
1/4 SVGA	400 × 296 pixels	○	○	Full-screen/ center-screen
1/16 SVGA	200 × 144 pixels	○	○	Full-screen/ center-screen
Thumbnail (1/64 SVGA)	96 × 72 pixels	○	-	Full-screen
Thumbnail (1/4 SVGA)	400 × 296 pixels	-	○	Full-screen

(3) Communication protocol for image transmission

Xmodem1k

(4) Setting command for image output

IMAGEOUT#l#m#n.....When thumbnail transmission is enabled
or
IMAGEOUT#l#m#n#0.....When thumbnail transmission is disabled

Description of the four parameters :

l : Output type (file type)

B	BMP format
J or J0	JPEG format (standard)
J1	JPEG format (high quality)
J2	JPEG format (low quality)

m : Image size

0	SVGA
2	1/4 SVGA
4	1/16 SVGA

n : Display type

F	Full-screen
C	Center screen

0 : Thumbnail

0	Disable thumbnail transmission
None or 1	Enable BMP thumbnail transmission
2	Enable 1/4 SVGA JPEG thumbnail transmission

12-3 Operation

1. When the scanner receives the image output setting command (see 12-2 (4)), the scanner captures the image. The scanner then enters an image transmission mode (Xmodem1k protocol).

2. [1] When thumbnail transmission is enabled :
   Thumbnails (BMP file for 1/64 SVGA or the JPEG file for 1/4 SVGA) are repeatedly transmitted.
   When the external trigger signal is turned ON at the external trigger terminal of the scanner, the image is loaded and the image transmission (Xmodem1k protocol) starts. For details of the external trigger signal, refer to 8-1 and 9-2-1.
   [2] When thumbnail transmission is disabled :
   The scanner immediately transmits an image in the format specified by IMAGEOUT parameter (Xmodem 1K protocol). (It is not required to turn ON the external trigger signal at the external trigger terminal (TRG) of the scanner.)

3. When image transmission is finished, the scanner automatically ends the image transmission mode and returns to the normal operation mode.

(Note 1) Image transmission can be enabled only by commands; it cannot be started by the QR-coded parameter menu.

(Note 2) When the scanner is in the image transmission mode, it cannot scan QR codes, etc. The protocol is fixed to the Xmodem 1K.

(Note 3) When setting the parameters of the command, use uppercase or numeric ASCII characters.

(Note 4) The communication conditions such as the command header, terminator, and transmission speed are set as normal commands.

(Note 5) The transmission speed when the protocol is Xmodem1K is the same as the one of the normal mode (no protocol or ACK/NAK).

(Note 6) After completing image transmission, the transfer protocol returns to the normal mode (no protocol or ACK/NAK).

(Note 7) When JPEG is selected as the output type, the image quality may deteriorate because the image is compressed during conversion.

12-4 Image Transmission Time (Reference Value)

Image Type	Output type		Transmission Time
SVGA	BMP	470 KB	55 s
1/4 SVGA	BMP	117 KB	15 s
1/16 SVGA	BMP	30 KB	5 s
Thumbnail (1/64 SVGA)	BMP	8 KB	2 s
Thumbnail (1/4 SVGA)	JPEG	(Note 2)	-
SVGA	JPEG	(Note 2)	-

(Note 1) The application condition is as described below.
The serial interface transmission speed: 115200 bps
The transmission time varies according to the configuration at the host side and performance of the host computer.

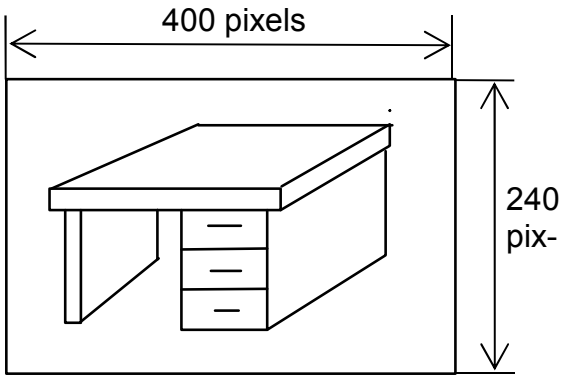
(Note 2) In the JPEG file format, images will be compression-converted, so the file size may vary. No compression ratio can be specified.

12-5 Full-screen/Center-screen Display

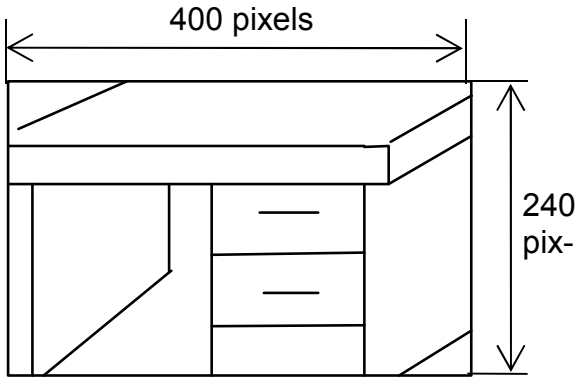
For an image (SVGA),

1. When full-screen display is selected for a 1/4 SVGA image, every one pixel out of two is vertically and horizontally skipped. Therefore, resolution (image quality) is impaired.

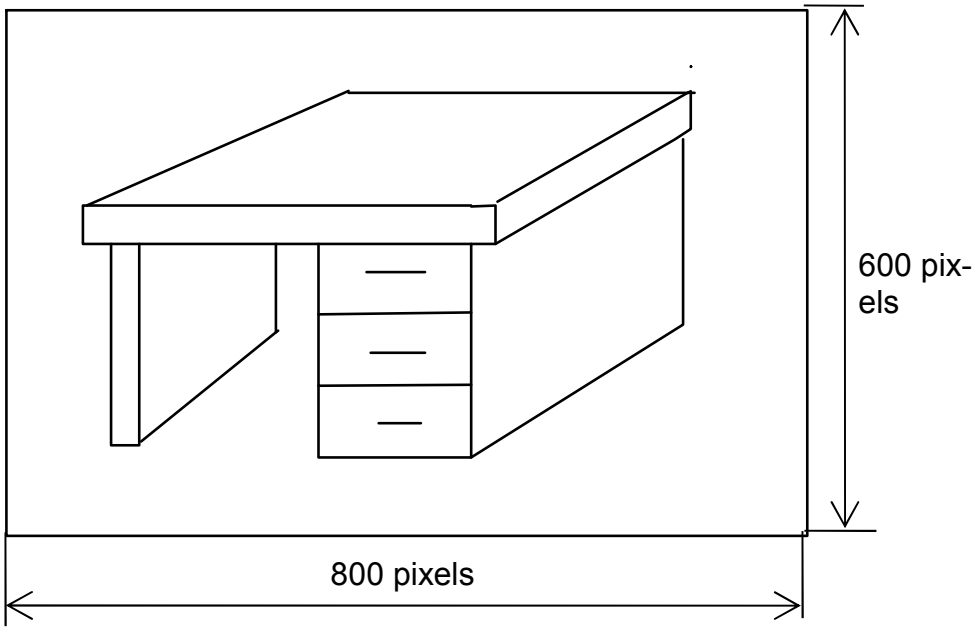
2. When center-screen display is selected for a 1/4 SVGA image, only the center part of the SVGA (full-screen) is extracted .
   Therefore, image quality is maintained.



<1/4 SVGA Full-screen>



<1/4 SVGA Center-screen>



<SVGA Image>

13 QUALITY ASSURANCE STANDARDS

13-1 Applicable Standards

	Country or Region	Standards	Condition (Note)	Remarks
EMC standards	Japan	VCCI	◎	Class A

(Note) ◎ Satisfied and application is made.
○ Satisfied.
× Not satisfied.
- Not applied.

The scanner is guaranteed to comply with the standards mentioned above only when it is operated as a single unit and not when it is connected to the host unit.

13-2 Quality Verification Test

Tests for which no specific test conditions are indicated shall be tested under the normal temperature and normal humidity conditions specified in JIS Z 8703-1983, which are the standard temperature (20 ±15 °C) (68 ±27 °F) and standard humidity (65 ±20 %).

Item	Test Conditions	Criterion
High temperature operation test	Supply current for 48 hours at the maximum operating voltage under ambient temperature of 50 ±3 °C (140 ±5.4 °F). Leave the test sample for 4 hours or more under the conditions of normal temperature and normal humidity. Conduct the test after that.	The specifications must be satisfied. (No condensation and freezing allowed when testing and measuring.)
Low temperature operation test	Supply current at the maximum operating voltage for 48 hours under ambient temperature of -10 ±3 °C (14 ±5.4 °F). Leave the test sample for 4 hours or more under the conditions of normal temperature and normal humidity. Conduct the test after that.	The specifications must be satisfied. (No condensation and freezing allowed when testing and measuring.)
High humidity operation test	Supply current at the maximum operating voltage for 48 hours under the environmental conditions of 50 ±3 °C (122 ± 5.4 °F) and 90 to 95 % RH. Leave the test sample for 4 hours or more under the conditions of normal temperature and normal humidity. Conduct the test after that.	The specifications must be satisfied. (No condensation and freezing allowed when testing and measuring.)
Low temperature storage test	Leave the test sample under ambient temperature of -20±3 °C (5±5.4 °F) for 96 hours. Leave the test sample for 4 hours or more under the conditions of normal temperature and normal humidity. Conduct the test after that.	The specifications must be satisfied. (No condensation and freezing allowed when testing and measuring.)

Item	Test Conditions	Criterion
High temperature high humidity storage test	Leave the test sample under the environmental conditions of 60 ±3 °C (140 ±5.4 °F) and 90 to 95 % RH for 96 hours. Leave the test sample for 4 hours or more under the conditions of normal temperature and normal humidity. Conduct the test after that.	The specifications must be satisfied. (No condensation and freezing allowed when testing and measuring.)
Vibration durability test for transportation	After applying vibration under the following conditions to the test sample in a package, conduct the test. 1. Acceleration Vertical : 9.8 m/s^2 Horizontal : 4.9 m/s^2 2. Vibration frequency : 8 to 70 Hz, sweep 3. Sweep time : 5 minutes/cycle 4. Acceleration application time : 48 hours	Must be free of abnormality in appearance, construction and performance of the product.
Electrostatic durability test (Direct electric discharge)	Apply static electricity as specified below directly to the test sample, not connected to the host control unit (no power supplied) conforming to the IEC 61000-4-2. 1. Capacity of static electricity charge capacitor : 150 pF 2. Discharge resistor : 330 Ω 3. Application frequency : 10 times 4. Application speed : Once/sec 5. Voltage : ±4 kV	Must be free of damage.
Electrostatic durability test (Indirect electric discharge)	Apply static electricity as specified below indirectly to the test sample, connected to the host control unit (power supplied) at the rated voltage conforming to the IEC 61000-4-2. 1. Capacity of static electricity charge capacitor : 150 pF 2. Discharge resistor : 330 Ω 3. Application frequency : 10 times 4. Application speed : Once/sec 5. Voltage : ±6 kV	Must be able to function normally.
Temperature rise test	Apply the maximum operating voltage and conduct scanning operation every 5 seconds until temperature rise is saturated. Measure temperature rise of the exterior of the case.	Temperature rise must be 20 °C (59 °F) or less.

14 OPERATING PRECAUTIONS

(1) The scanner may erroneously decode an image as a barcode symbol when the reading window of the scanner is faced or oriented to surfaces with patterns such as text, ruled lines or grain of wood. To avoid this problem, we recommend adding a check digit to bar-code symbols when encoding, and enabling the check digit verification of the scanner.

(2) Avoid dropping the scanner on the floor, hitting the scanner against the desk top, or giving any physical shock to the scanner.

(3) Avoid touching or scratching the reading window. Stains and scratches on the reading window will affect the scanning performance.

(4) Do not expose the scanner to electrostatic hazards.

(5) Avoid pulling the cable during operation. When disconnecting the interface connector, hold and pull the connector.

(6) Avoid getting the scanner wet.

(7) Normal reading is not guaranteed depending on the model type of the used cell phone.

(8) Normal reading is not guaranteed depending on the setting of the cell phone (contrast, backlight) and LCD surface condition (existence of some stickers, scratches, etc.).

(9) Do not use the scanner in excessive temperatures or near heat source.

(10) Keep the reading window clean, since dust and dirt may adversely affect the reading performance. When cleaning, use an airbrush to blow dust off and wipe the reading window lightly with a dry and soft cloth.

(11) There are some defective picture elements within a permissible level on the area sensor, but this does not affect scanning performance. When an image is captured, unevenness due to defective picture elements or fine spots may occur, but this is not a malfunction.

(12) Place a scanner so as not to apply strong impact or vibration to it.

(13) When setting a plate on the reading surface, it is recommended to use a plate with the antireflection coating applied.

(14) To avoid the specular reflection, it is recommended to place a scanner by tilting at 11°.

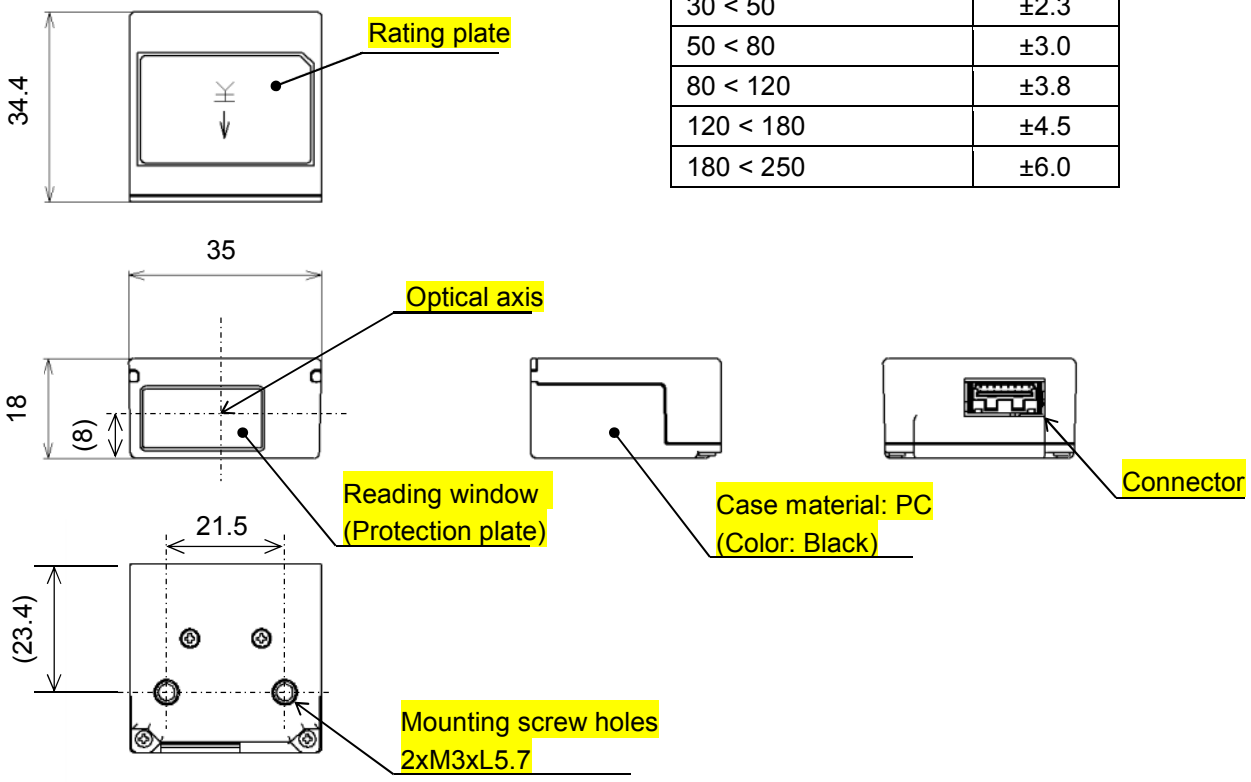
15 APPEARANCE, DIMENSIONS, COLOR AND WEIGHT

15-1 Scanner

Weight : Approx. 18 g

(mm)

Standard Tolerance	
Nominal Dimension (L)	Tolerance
18 or less	±1.2
18 < 30	±1.5
30 < 50	±2.3
50 < 80	±3.0
80 < 120	±3.8
120 < 180	±4.5
180 < 250	±6.0



(Note 1) Tolerances of dimensions for which tolerances are not indicated conform to the standard tolerance in the table above.

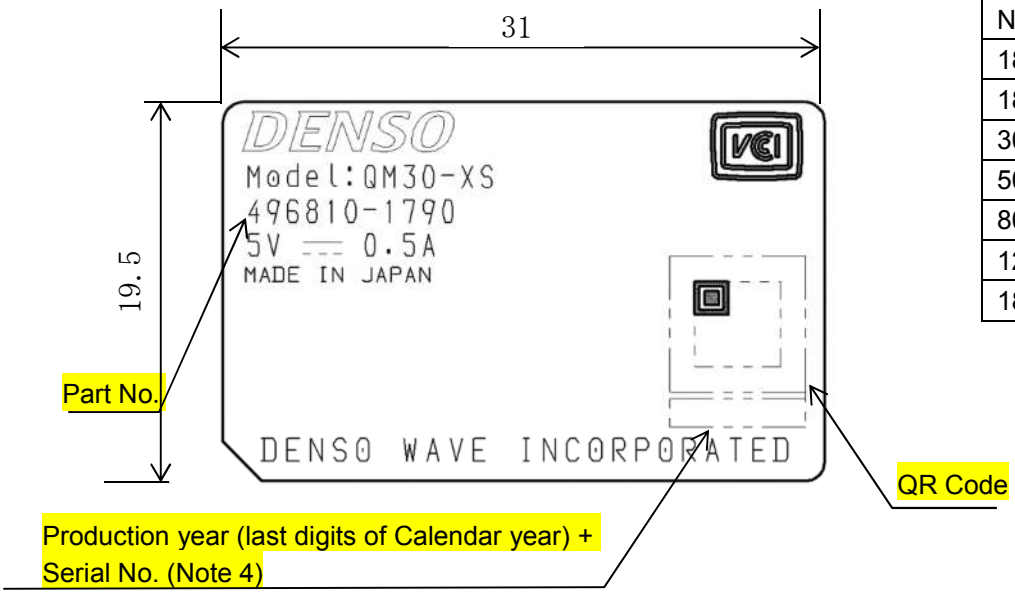
(Note 2) Recommended tightening torque for mounting screw is 0.315 N・m and the upper limit is 0.75 N・m.

15-2 Name Plates

Rating Plates

(mm)

Standard Tolerance	
Nominal Dimension (L)	Tolerance
18 or less	±1.2
18 < 30	±1.5
30 < 50	±2.3
50 < 80	±3.0
80 < 120	±3.8
120 < 180	±4.5
180 < 250	±6.0



QR Code representation

Digits	Description
1 - 10	Part No.
11	Production year (last digits of Calendar year)
12 - 16	Serial No. (missing numbers allowed)
17 - 22	Product model (" QM30SS")

(Note 1) Tolerances of dimensions for which tolerances are not indicated conform to the standard tolerance in the table (right above).

(Note 2) A material color is white and printing color is black.

(Note 3) For the production year, the last digits of the calendar year are applied.

(Note 4) Serial number starts from "00001" every year. Missing numbers are allowed but duplicate numbers are disapproved.

(Note 5) The suffix of part number "X" is the control number and subject to change without prior notice.

16 NOTES

・This products is the RoHS Directive compliant. (RoHS Directive 2011/65/EU)

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Specifications No. : SPQS-0288
Model : QM30-SS

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