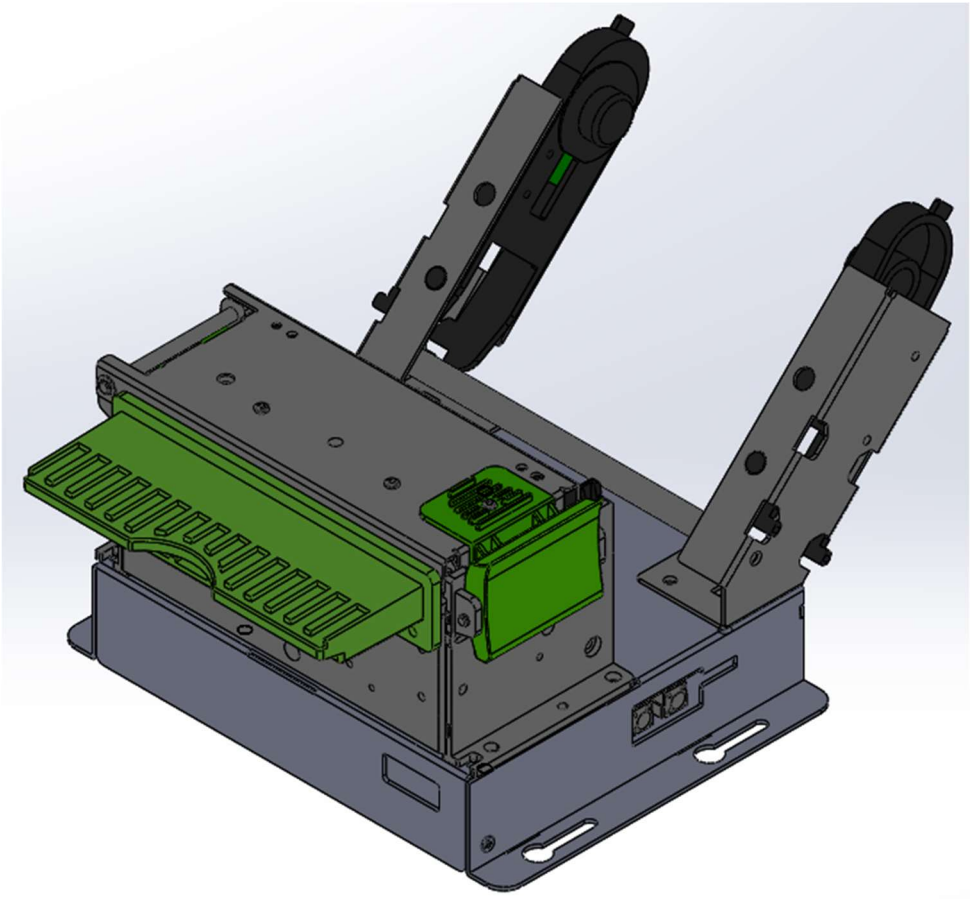
REXOD

# Thermal Line Printer

# RX835-H80

# Technical Manual (V1.2)



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# Record of Revisions

| Revision Version | Date | DESCRIPTION |
|---|---|---|
| 1.2 | 2021. 05. 13 | Preliminary 1.0 Release |

# 1 GENERAL SPECIFICATIONS

## 1.1 Printer Specifications

**1.1.1** Printing method : Thermal line printing

**1.1.2** Dot density : 203 dpi x 203 dpi

**1.1.3** Printing direction : Unidirectional with friction feed

**1.1.4** Printing width : 80mm (640 Dot)

**1.1.5** Characters per line

| When FONT A is selected | When FONT B is selected | Kanji/China(GB18030) (option) |
|---|---|---|
| 53 | 71 | 26 |

**1.1.6** Character spacing (default)

- Font A : 0.25mm (2dots)
- Font B : 0.25mm (2dots)
- Kanji/China : 0mm (0dots) (default)

Programmable by control command (in increments of 0.125mm)

**1.1.7** Printing speed : Approximately Max. 200mm/sec

**1.1.8** Paper feed speed : Approximately Max. 200mm/sec

**1.1.9** Line spacing (default) : 30 Dots

Programmable by control command (in increments of 0.125mm)

## 1.2 Character Specifications

**1.2.1** Number of characters Alphanumeric characters : 95

**1.2.2** Characters structure Font A : 12 x 24

Font B : 9 x 17

Multilingual : 24 x 24

**1.2.3** Characters size

| | Standard | Double-height | Double width | Double width / Double-height |
|---|---|---|---|---|
| | W x H | W x H | W x H | W x H |
| Font A | 1.25 x 3.0 | 1.25 x 6 | 2.5 x 3.0 | 2.5 x 6.0 |
| Font B | 0.88 x 2.13 | 0.88 x 4.25 | 1.76 x 2.13 | 1.76 x 4.25 |
| Multilingual | 3.0 x 3.0 | 3.0 x 6.0 | 6.0 x 3.0 | 6.0 x 6.0 |

## 1.3 Receive Buffer

- 10 K Byte

## 1.4 Electrical Characteristics

**1.4.1** Supply voltage : +24.0 VDC ± 1.2 V

**1.4.2** Current consumption ( at 24 V, 25 ℃)

| PRINTING MODE | STANDBY |
|---|---|
| MEAN : APPROXIMATELY 1.7A<br>PEAK : APPROXIMATELY 17.6A | APPROXIMATELY 0.5A |

***peak lead time : min 2msec**

## 1.5 Environmental conditions

**1.5.1** Operating Temperature : 5℃ ~ 55℃

**1.5.2** Operating Humidity : 10% ~ 90 %

**1.5.3** Storage Temperature : -20℃ ~ 70℃ (except for paper)

**1.5.4** Storage Humidity : 10% ~ 90 %

## 1.6 Reliability (Tentative)

**1.6.1** Print head life (Printing ratio 12.5%)

Pulse durability : 1 x $10^8$ pulses min.(with heat accumulation control)

Abrasion resistance : 200km min. with TF50KS-E2C
(NIPPON PAPER INDUSTRLES CO.)

Average resistance drift : -15%≤ ( ΔRav/Rav) ≤+15%

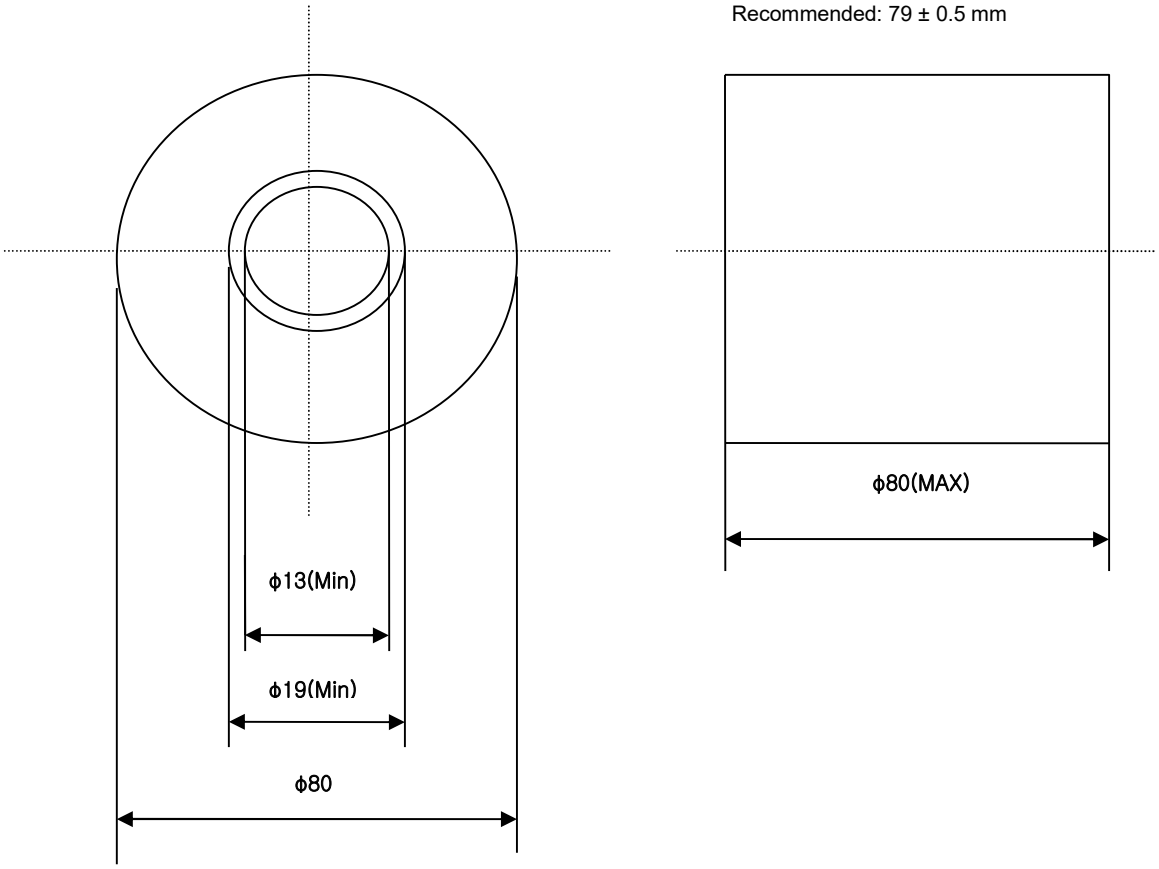
**1.6.2** Printer mechanism Life

- Approx. 10,000,000 Lines
- MCBF: Approx. 10,000,000 lines

## 1.7 Thermal paper Specifications

* Materials : Top Coated Thermal Paper 62g ± 2g

* Paper Length : 170 Meter




**1.7.1** Thickness : 60 ~ 150㎛

**1.7.2** Width : 79 ± 0.5 mm

**1.7.3** Outer Diameter : Ø 80 mm

**1.7.4** Roll Core

- Inside diameter: Ø13 mm
- Thickness : 2~3mm

**1.7.5** Strength for drawing-out of core : Greater than 4 kg

**1.7.6** Preservation condition

- Temperature : 0 ~ 40℃
- Humidity : 30 ~ 80 % RH

**1.7.7** Preservation condition

Do not fold a paper and stain it with a adhesive.

# 2 CONFIGURATION

## 2.1 Interfaces

### 2.1.1 RS-232 Serial Interface

#### 2.1.1.1 Specifications

- Data transmission : Serial
- Synchronization : Asynchronous
- Handshaking : Hard Ware (DTR) / Soft Ware (Xon/ Xoff)
- Signal levels mark = -3 to -15 V : logic “1” / off
  Space = +3 to +15 V : logic “0” / on
- Baud rate : 9600, 19200, 38400, 57600,115200 Bps
- Data word length : 8 bits
- Parity Settings : None
- Stop bits : 1
- Connector (printer side) : DSUB 9PIN Mail

#### 2.1.1.2 Switching between online and offline

The printer does not have an on-line/off-line button. The printer goes online or off-line under the following condition.

<Conditions to go off line>

- Between when the power is turned on and when the printer is ready to receive data
- During the self-test.
- When the head module is open
- When the printer stops printing due to a paper end or error occurred

<Conditions to go on line>

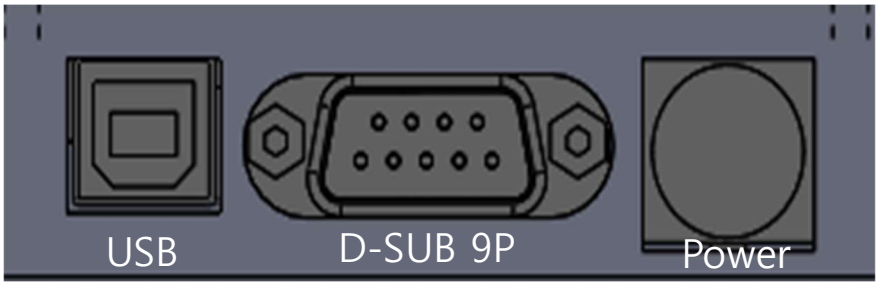
- Automatically after the time when the power is turned on (including reset using the interface) when the printer is ready to receive data.
- Automatically after the self-test.
- Interface connector terminal assignments and signal functions

### 2.1.2 USB Interface

#### 2.1.2.1 Specifications

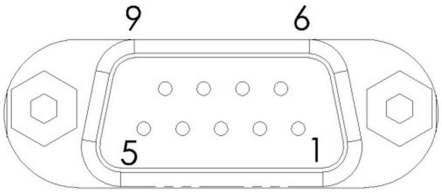
- Data transmission : USB 2.0 Compatible Bulk In / Out
- Connector : USB B Type

## 2.2 Connectors




### 2.2.1 Serial Interface Connectors

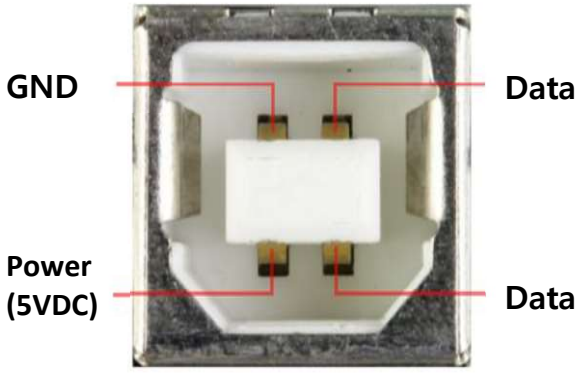
- TYPE : DSUB 9 PIN MALE




| Pin number | Signal name | Signal direction | Function |
|---|---|---|---|
| 2 | RXD | INPUT | RECEIVE DATA |
| 3 | TXD | OUTPUT | TRANSMIT DATA |
| 4 | DTR | OUTPUT | PRINTER READY |
| 5 | SG | - | SIGNAL GROUND |
| 6 | DSR | INPUT | |

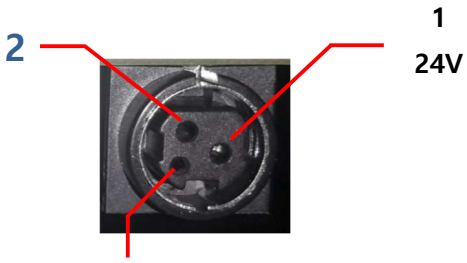
### 2.2.2 USB Interface Connector

-TYPE : USB-B




### 2.2.3 Power Supply Connector

This connector is used to connector the printer to an external power source.




### 2.2.4 Near-End Sensor (J8) Connector

| Pin No. | Wire Color | Signal Name |
|---|---|---|
| 1 | White | Paper Sensor Input |
| 2 | Black | GND |
| 3 | Red | VCC(+3.3V) |

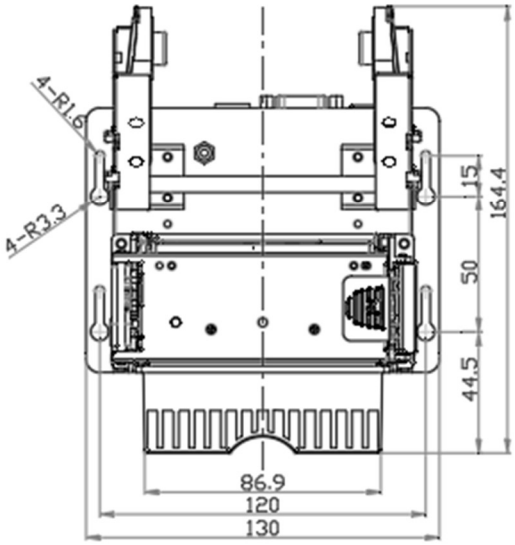
### 2.2.5 BUTTON PCB (J13) Connector(OPTION)

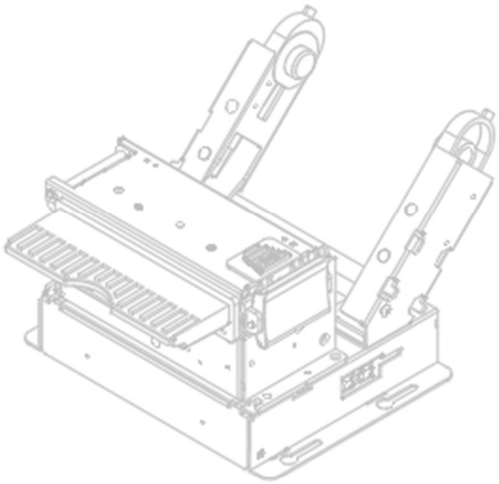
| Pin No. | Wire Color | Signal Name |
|---|---|---|
| 1 | Black | GND |
| 2 | | FEED BUTTON |
| 3 | | PE LED |
| 4 | | ERROR LED |
| 5 | | VCC(+3.3V) |

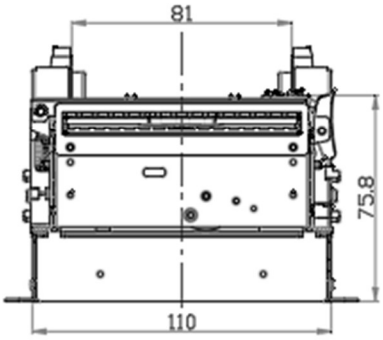
### 2.2.6 MECHANISIUM (J2) Connector

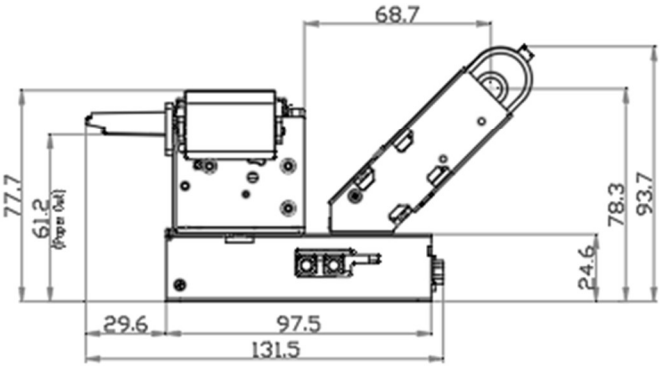
| Pin No. | Signal Name | Pin No. | Signal Name |
|---|---|---|---|
| 1 | VH | 16 | GND |
| 2 | VH | 17 | PE Signal |
| 3 | VH | 18 | VCC(+3.3V) |
| 4 | CLOCK | 19 | VCC(+3.3V) |
| 5 | LATCH | 20 | BM Signal |
| 6 | /STROBE 2 | 21 | Head Up Signal |
| 7 | /STROBE 1 | 22 | Cutter Home Signal |
| 8 | TM | 23 | Cutter Motor /B |
| 9 | DATA IN | 24 | Cutter Motor B |
| 10 | /STROBE 3 | 25 | Cutter Motor A |
| 11 | /STROBE 4 | 26 | Cutter Motor /A |
| 12 | Vdd(3.3V) | 27 | LF Motor /B |
| 13 | GND | 28 | LF Motor /A |
| 14 | GND | 29 | LF Motor B |
| 15 | GND | 30 | LF Motor A |

# 3 External Dimensions





# 4 FUNCTIONS

## 4.1 List of Commands

| | COMMAND | |
|---|---|---|
| 1 . **Control command** | | |
| 1.1 | ESC @ | Initialize printer |
| 1.2 | FF/GS FF | Print and paper to the next top (when only black mark for positioning) |
| 1.3 | LF | Print and line feed |
| 1.4 | GS ( A | Execute test Print |
| 1.5 | ESC J n | Print and paper n vertical motion units |
| 1.6 | ESC d n | Print and feed n lines |
| 1.7 | HT | Moves the print position to the next horizontal tab position |
| **2 Character Setting command** | | |
| 2.1 | ESC ! n | Set character printing mode |
| 2.2 | GS ! n | Set the size of characters |
| 2.3 | ESC M n | Set Print Fonts |
| 2.4 | ESC – n | Set / cancel underline Print |
| 2.5 | ESC E n | Set / cancel bold print |
| 2.6 | ESC G n | Set / cancel overlap (bold) printing effect with ESC E |
| 2.7 | GS B n | Turn white/black reverse printing mode on/off |
| 2.8 | ESC V n | Turn 90° clockwise rotation mode on/off |
| 2.9 | FS & | Select Kanji character mode |
| 2.10 | FS . | Cancel Kanji character mode |
| 2.11 | ESC R n | Select an international character set |
| 2.12 | ESC t n | Select character code table |
| 2.13 | ESC { n | Turn upside-down printing mode on/off |
| **3 Print layout parameter setting command** | | |
| 3.1 | ESC $ nL nH | Set absolute print position |
| 3.2 | ESC D n1 n2…nk NULL | Set horizontal tab positions |
| 3.3 | ESC 2 | Select default line spacing |
| 3.4 | ESC 3 n | Set line spacing |
| 3.5 | ESC SP n | Set right-side character spacing |
| 3.6 | ESC a n | Select justification |
| 3.7 | GS L | Set left margin |
| **4 Graphics / image print command** | | |
| 4.1 | ESC * m nL nH d1…dk | Select bit-image mode |

| | | |
|---|---|---|
| 4.2 | GS * x y d1…dk | Define downloaded bit image |
| 4.3 | GS / n | Print downloaded bit image |
| 4.4 | GS v m ...d1…dk | Print raster bit image |
| 4.5 | FS p n m | Print NV bit image |
| 4.6 | FS q n [xL xH yL yH d1..dk]1<br>... [xL xH yL yH d1..dk]n | Define NV bit image |
| **5 Bar code print command** | | |
| 5.1 | GS h n | Set bar code height |
| 5.2 | GS w n | Set bar code width |
| 5.3 | GS H n | Select printing position of HRI characters |
| 5.4 | GS f n | Select font for HRI characters |
| 5.5 | GS P n | Set horizontal and vertical motion units |
| 5.6 | GS k | Print bar code |
| **6 Printer Status Feedback** | | |
| 6.1 | DLE EOT n | Real-time status transmission |
| 6.2 | GS r | Transmit status |
| 6.3 | ESC H | Real-time Transmit status |
| 6.4 | ESC Q n | Transmit Printer ID |
| **7 Cutter Control** | | |
| 7.1 | GS V m n | Select cut mode and cut paper |
| 7.2 | ESC i | Full cut |
| 7.3 | ESC m | Partial cut |

### 4.2 Self Test

1) The printer has a self-test function that checks the following:

- Control circuit functions
- Status of the printer mechanism which is connected to the RMC8300II
- Print quality
- Interface type and its operating condition
- Control software version

2) Starting the self-test

Self Test Button Pushing

# 5 COMMANDS

## 5.1 Command Notation

[Name] The name of the command.

[Format] The code sequence.

[ ]*k* indicates the contents of [ ] should be repeated *k* times.

[Range] Gives the allowable ranges for the arguments.

[Description] Describes the function of the command.

[Details] Describes the usage of the command in detail.

[Notes] Provides important information on setting and using the printer command, if necessary.

[Default] Gives the default values, if any, for the command parameters.

[Reference] Lists related commands.

The numbers denoted by < >H are hexadecimal.

The numbers denoted by < >B are binary.

## 5.2 Control Command

**HT**

| | | |
|---|---|---|
| [Name] | Horizontal tab | |
| [Format] | ASCII | HT |
| | Hex | 09 |
| | Decimal | 9 |
| [Description] | Moves the print position to the next horizontal tab position. | |
| [Notes] | • This command is ignored unless the next horizontal tab position has been set.<br>• If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [printing area width + 1].<br>• Horizontal tab positions are set with **ESC D**.<br>• If this command is received when the printing position is at [printing area width +1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line. | |
| [Reference] | **ESC D** | |

**LF**

| | | |
|---|---|---|
| [Name] | Print and line feed | |
| [Format] | ASCII | LF |
| | Hex | 0A |
| | Decimal | 10 |
| [Description] | Prints the data in the print buffer and feeds one line, based on the current line spacing. | |
| [Note] | This command sets the print position to the beginning of the line. | |
| [Reference] | **ESC 2**, **ESC 3** | |

**FF**

[Name] Print and return to standard mode in page mode

[Format] ASCII FF

Hex 0C

Decimal 12

[Description] Prints the data in the print buffer collectively and returns to standard mode.

[Notes]
- This command is enabled only in page mode.
- The buffer data is deleted after being printed.
- This command sets the print position to the beginning of the line.

[Reference] **ESC FF**, **ESC L, ESC S**

**ESC SP *n***

[Name] Set right-side character spacing

[Format] ASCII ESC SP *n*

Hex 1B 20 *n*

Decimal 27 32 *n*

[Range] $0 \le n \le 255$

[Description] Sets the character spacing for the right side of the character to [*n* x 0.125 mm]

[Notes]
- The right-side character spacing for double-width mode is twice the normal value.
- When characters are enlarged, the right-side character spacing is *n* times normal value.
- This command sets values independently in each mode (standard and page modes).

[Default] *n* = 0

## ESC ! *n*

[Name] Select print mode(s)

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | ! | *n* |
| Hex | 1B | 21 | *n* |
| Decimal | 27 | 33 | *n* |

[Range] $0 \le n \le 255$

[Description] Selects print mode(s) using *n* as follows:

| Bit | Off / On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Character Font A ( 12x24) |
| | On | 01 | 1 | Character Font B ( 9x17) |
| 1 | - | - | - | Undefined. |
| 2 | - | - | - | Undefined. |
| 3 | Off | 00 | 0 | Emphasized mode not selected. |
| | On | 08 | 8 | Emphasized mode selected. |
| 4 | Off | 00 | 0 | Double - Height mode not selected. |
| | On | 10 | 16 | Double - Height mode selected. |
| 5 | Off | 00 | 0 | Double - Width mode not selected. |
| | On | 20 | 32 | Double - Width mode selected. |
| 6 | - | - | - | Not used. |
| 7 | Off | 00 | 0 | Underline mode not selected. |
| | On | 80 | 128 | Underline mode selected. |

[Notes]

- When both double-height and double-width modes are selected, quadruple-size characters are printed.
- The printer can underline all characters, but cannot underline the space set by **HT** or 90/180/270 clockwise rotated characters
- The thickness of the underline is that selected by ESC - , regardless of the character size.

**ESC $ nL nH**

[Name] Set absolute print position

[Format]

| | | | | |
|---|---|---|---|---|
| ASCII | ESC | $ | *nL* | *nH* |
| Hex | 1B | 24 | *nL* | *nH* |
| Decimal | 27 | 36 | *nL* | *nH* |

[Range] $0 \leq nL \leq 255$

$0 \leq nH \leq 255$

[Description] Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed.

- The distance from the beginning of the line to the print position is [(*nL* + *nH x* 256) x 0.125 mm].

[Notes]
- Settings outside the specified printable area are ignored.
- In standard mode, the horizontal motion unit (*x*) is used.
- In page mode, horizontal or vertical motion units differ depending on the starting position of the printable area, as follows:

[Reference] **ESC **

**ESC -*n***

[Name] Turn underline mode on/off

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | - | *n* |
| Hex | 1B | 2D | *n* |
| Decimal | 27 | 45 | *n* |

[Range] $0 \le n \le 255$

[Description] Turns underline mode on or off, based on the following values of *n*:

| n | Function |
|---|---|
| 0,48 | Turns off underline mode |
| 1,49 | Turns on underline mode (1 dot thick) |
| 2,50 | Turns on underline mode (2 dots thick) |
| 3,51 | Turns on underline mode (3 dots thick) |
| 4,52 | Turns on underline mode (4 dots thick) |
| 5,53 | Turns on underline mode (5 dots thick) |
| 6,54 | Turns on underline mode (6 dots thick) |
| 7,55 | Turns on underline mode (7 dots thick) |
| n > 7, n > 55 | Turns on underline mode (8 dots thick) |

[Notes]

- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT.**
- The printer cannot underline 90 clockwise rotated characters and white/black inverted characters.
- When underline mode is turned off by setting the value of *n* to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 2 dot.
- Changing the character size does not affect the current underline thickness.

Underline mode can also be turned on or off by using **ESC !**. Note, however, that the last received command is effective.

[Default] *n* = 0

[Reference] **ESC !**

**ESC * *m nL nH d1...dk***

[Name] Select bit-image mode

[Format]

| | | | | | | |
|---|---|---|---|---|---|---|
| ASCII | ESC | * | *m* | *nL* | *nH* | *d1...dk* |
| Hex | 1B | 2A | *m* | *nL* | *nH* | *d1...dk* |
| Decimal | 27 | 42 | *m* | *nL* | *nH* | *d1...dk* |

[Range] *m* = 0, 1, 32, 330 ≤ *nL* ≤ 255 0 ≤ *nH* ≤ 3 0 ≤ *d* ≤ 255

[Description] Selects a bit-image mode using *m* for the number of dots specified by *nL* and *nH*, as follows:

| m | Mode | Vertical Direction | | Horizontal Direction | |
|---|---|---|---|---|---|
| | | Number of Dots | Dot Density | Dot Density | Number of Data(K) |
| 0 | 8-dot single-density | 8 | 67.7 DPI | 101.6 DPI | nL + nH x 256 |
| 1 | 8-dot double-density | 8 | 67.7 DPI | 203.2 DPI | nL + nH x 256 |
| 32 | 24-dot single-density | 24 | 203.2 DPI | 101.6 DPI | (nL + nH x 256) x 3 |
| 33 | 24-dot double -density | 24 | 203.2 DPI | 203.2 DPI | (nL + nH x 256) x 3 |

[Notes]

- If the value of *m* is out of the specified range, *nL* and the data following are processed as normal data.
- The *nL* and *nH* indicate the number of dots in the bit image in the horizontal direction. The number of dots is calculated by *nL* + *nH* x *256.*
- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- *d* indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0

  not to print a dot.
- If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC** command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):

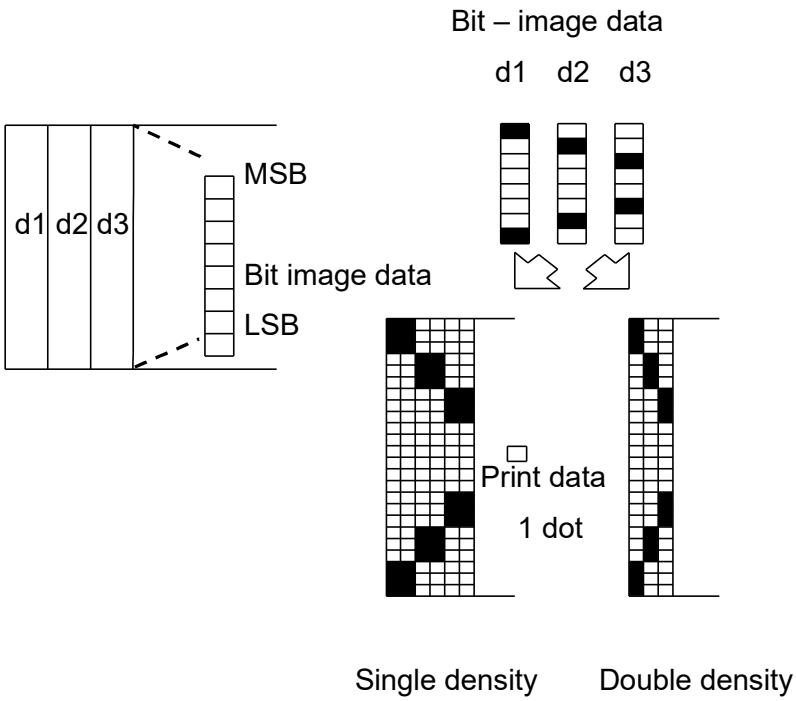
  1. The width of the printing area is extended to the right to ccommodate the amount of data.
  2. If step does not provide sufficient width for the data, the left

margin is reduced to accommodate the data.

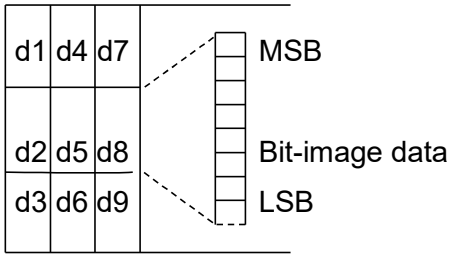
For each bit of data in single-density mode (*m* = 0, 32), the printer prints two dots: for each bit of data in double-density mode (*m* = 1, 33), the printer prints one dot. This must be considered in calculating the amount of data that can be printed in one line.

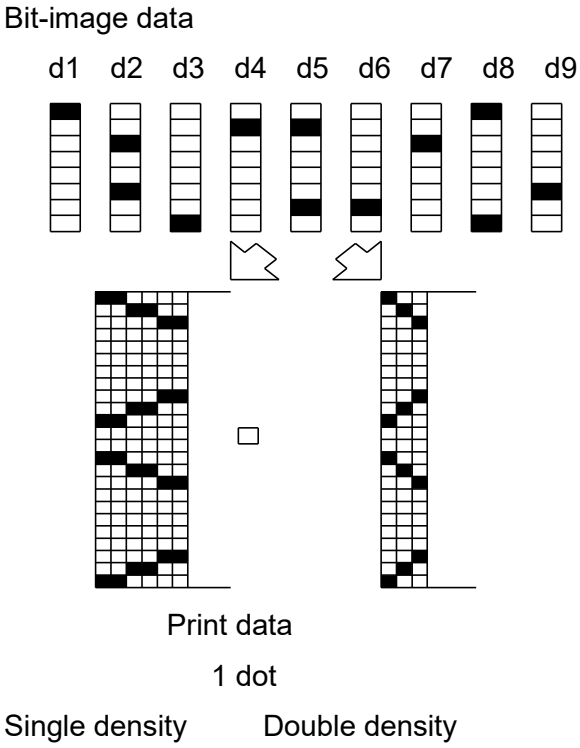
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, or white/black reverse printing)

- When 8-dot bit image is selected:



- When 24-dot bit image is selected:



**ESC 2**

[Name] Select default line spacing

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | 2 | |
| Hex | 1B | 32 | |
| Decimal | 27 | 50 | |

[Description] Selects 1mm(8 x 0.125 mm) line spacing.

[Notes] The line spacing can be set independently in standard mode and in page mode.

[Reference] **ESC 3**

**ESC 3 n**

[Name] Set line spacing

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | 3 | *n* |
| Hex | 1B | 33 | *n* |
| Decimal | 27 | 51 | *n* |

[Range] $0 \le n \le 255$

[Description] Sets the line spacing to [*n x* 0.125 mm]

[Notes]

- The line spacing can be set independently in standard mode and in page mode.
- In standard mode, the vertical motion unit (y) is used.
- In page mode, this command functions as follows, depending on the starting position of the printable area:
- When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
- When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (*x*) is used.

[Default] *n* = 8

[Reference] **ESC 2**

**ESC @**

[Name] Initialize printer

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | @ |
| Hex | 1B | 40 |
| Decimal | 27 | 64 |

[Description] Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.

[Notes]
- The data in the receive buffer is not cleared.

**ESC E *n***

[Name] Turn emphasized mode on/off

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | E | *n* |
| Hex | 1B | 45 | *n* |
| Decimal | 27 | 69 | *n* |

[Range] $0 \le n \le 255$

[Description] Turns emphasized mode on or off
- When the LSB of *n* is 0, emphasized mode is turned off.
- When the LSB of *n* is 1, emphasized mode is turned on.

[Notes]
- Only the lowest bit of *n* is enabled.
- This command and **ESC !** turn on and off emphasized mode in the same way. Be careful when this command is used with **ESC !**.

[Default] *n* = 0

[Reference] **ESC !**

**ESC D *n1...nk NUL***

[Name] Set horizontal tab positions

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | D | *n1...nk NUL* |
| Hex | 1B | 44 | *n1...nk 00* |
| Decimal | 27 | 68 | *n1...nk 0* |

[Range] 1 ≤ *n* ≤ 255, 0 ≤ *k* ≤ 32

[Description] Sets horizontal tab positions

- *n* specifies the column number for setting a horizontal tab position from the beginning of the line.
- *k* indicates the total number of horizontal tab positions to be set.

[Notes]

- The horizontal tab position is stored as a value of [character width x *n*] measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
- This command cancels the previous horizontal tab settings.
- When setting *n* = 8, the print position is moved to column 9 by sending **HT**.
- Up to 32 tab positions (*k* = 32) can be set. Data exceeding 32 tab positions is processed as normal data.
- Transmit [*n*]*k* in ascending order and place a NUL code 0 at the end.
- When [*n*]*k* is less than or equal to the preceding value [*n*]*k*-1, tab setting is finished and the following data is processed as normal data.
- **ESC D NUL** cancels all horizontal tab positions.
- The previously specified horizontal tab positions do not change, even if the character width changes.
- The character width is memorized for each standard and page mode.

[Default] The default tab positions are at intervals of 8 characters (columns 9, 17, 25, …) for Font A (12 x 24).

[Reference] **HT**

**ESC G *n***

[Name] Turn on/off double-strike mode

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | G | *n* |
| Hex | 1B | 47 | *n* |
| Decimal | 27 | 71 | *n* |

[Range] 0 ≤ *n* ≤ 255

[Description] Turns double-strike mode on or off

- When the LSB of *n* is 0, double-strike mode is turned off.
- When the LSB of *n* is 1, double-strike mode is turned on.

[Notes]
- Only the lowest bit of *n* is enabled.
- Printer output is the same in double-strike mode and in emphasized mode.

[Default] *n* = 0

[Reference] **ESC E**

**ESC J *n***

[Name] Print and feed paper

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | J | *n* |
| Hex | 1B | 4A | *n* |
| Decimal | 27 | 74 | *n* |

[Range] 0 ≤ *n* ≤ 255

[Description] Prints the data in the print buffer and feeds the paper [*n* x 0.125 mm (0.0049")].

[Notes]
- After printing is completed, this command sets the print starting position to the beginning of the line.
- The paper feed amount set by this command does not affect the values set by **ESC 2** or **ESC 3**.
- In standard mode, the printer uses the vertical motion unit (*y*).
- In page mode, this command functions as follows, depending on the starting position of the printable area:

**ESC M *n***

[Name] Select character font

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | M | *n* |
| Hex | 1B | 4D | *n* |
| Decimal | 27 | 77 | *n* |

[Range] *n* = 0, 1, 48, 49

[Description] Selects the character font

| n | Function |
|---|---|
| 0, 48 | Character Font A (12 x 24) Selected. |
| 1, 49 | Character Font B ( 9 x 17) Selected. |

[Notes] **ESC !** can also select character font types.

However the setting of the last received command is effective.

[Reference] **ESC !**

**ESC V *n***

[Name] Turn 90˚˚ clockwise rotation mode on/off

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | V | *n* |
| Hex | 1B | 56 | *n* |
| Decimal | 27 | 86 | *n* |

[Range] 0 ≤ *n* ≤ 3, 48 ≤ *n* ≤ 51

[Description] Turns 90˚/180˚/270˚ clockwise rotation mode on/off.

*n* is used as follows:

| n | Function |
|---|---|
| 0, 48 | Turns off clockwise rotation mode |
| 1, 49 | Turns on 90˚ clockwise rotation mode |

[Notes]

- This command affects printing in standard mode. However, the setting is always effective.
- When underline mode is turned on, the printer does not underline 90˚ clockwise-rotated characters.
- Double-width and double-height commands in 90˚/180˚/270˚ rotation mode enlarge characters in the opposite directions from double-height and double- width commands in normal mode.
- If this command is input in page mode, the printer performs only internal flag operations.

[Default] *n* = 0

[Reference] **ESC !, ESC –**

**ESC \ *nL nH***

[Name] Set relative print position

[Format]

| | | | | |
|---|---|---|---|---|
| ASCII | ESC | \ | *nL* | *nH* |
| Hex | 1B | 5C | *nL* | *nH* |
| Decimal | 27 | 92 | *nL* | *nH* |

[Range] $0 \le nL \le 255$

$0 \le nH \le 255$

[Description] Sets the print starting position based on the current position using horizontal or vertical motion units.

[Notes]

- This command sets the distance from the current position to [(*nL* + *nH* x 256) 0.125 mm]
- Any setting that exceeds the printable area is ignored.
- When pitch *N* is specified to the right : *nL*+ *nH* x 256 = *N*

When pitch *N* is specified to the left (the negative direction), use the complement of 65536.

- When pitch *N* is specified to the left : *nL*+ *nH* x 256 = 65536 - *N*

In standard mode, the horizontal motion unit is used.

- In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area:
- When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (*x*) is used.
- When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (*y*) is used.

[Reference] **ESC $**

**ESC a *n***

[Name] Select justification

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | a | *n* |
| Hex | 1B | 61 | *n* |
| Decimal | 27 | 97 | *n* |

[Range] $0 \le n \le 2, 48 \le n \le 50$

[Description] Aligns all the data in one line to the specified position

*n* selects the justification as follows:

| n | | **Justification** |
|---|---|---|
| Decimal | Hex | |
| 0, 48 | 0,30 | Left justification |
| 1, 49 | 1, 31 | Centering |
| 2, 50 | 2, 32 | Right justification |

[Notes]

- The command is enabled only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command has no effect in page mode.
- This command executes justification in the printing area.
- This command justifies the space area according to **HT, ESC $** or **ESC** \.

[Default] *n* = 0

[Example]

Left justification

ABC
ABCD
ABCDE

Centering

ABC
ABCD
ABCDE

Right justification

ABC
ABCD
ABCDE

**ESC d *n***

[Name] Print and feed *n* lines

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | d | *n* |
| Hex | 1B | 64 | *n* |
| Decimal | 27 | 100 | *n* |

[Range] 0 ≤ *n* ≤ 255

[Description] Prints the data in the print buffer and feeds *n* lines.

[Notes]
- This command sets the print starting position to the beginning of the line.
- This command does not affect the line spacing set by **ESC 2** or **ESC 3**.
- The maximum paper feed amount is 1016 mm {40"}.
- If the paper feed amount (*n* x line spacing) of more than 1016 mm {40"} is specified, the printer feeds the paper only 1016 mm {40"}.

[Reference] **ESC 2**, **ESC 3**

**GS ( *A***

[Name] Execute test Print

[Format]

| | | | |
|---|---|---|---|
| ASCII | GS | ( | A |
| Hex | 1D | 28 | 41 |
| Decimal | 29 | 40 | 65 |

[Description]
- Executes a test print with a specified test pattern on a specified paper
- This command is enabled only when processed at the beginning of a line in standard mode.
- This command is no effect in page mode
- The printer cuts the paper at the end of the test print.

**GS B *n***

[Name] Turn white/black reverse printing mode

[Format]

| | | | |
|---|---|---|---|
| ASCII | GS | B | *n* |
| Hex | 1D | 42 | *n* |
| Decimal | 29 | 66 | *n* |

[Range] $0 \le n \le 255$

[Description] Turns on or off white/black reverse printing mode

- When the LSB of *n* is 0, white/black reverse mode is turned off.
- When the LSB of *n* is 1, white/black reverse mode is turned on.

[Notes]

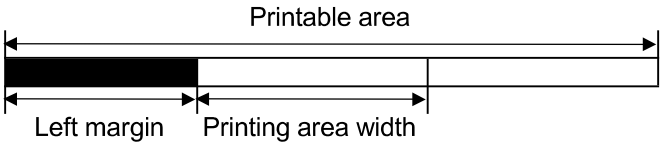
- Only the lowest bit of *n* is valid.
- This command is available for built-in characters and user-defined characters.
- When white/black reverse printing mode is on, it also applies to character spacing set by **ESC SP**.
- This command does not affect bit images, user-defined bit images, bar codes, HRI characters, and spacing skipped by **HT**, **ESC $**, and **ESC** \.
- This command does not affect the space between lines.
- White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it is disabled (but not canceled) when white/black reverse mode is selected.

[Default] *n* = 0

**GS L *nL nH***

| | | | | | |
|---|---|---|---|---|---|
| [Name] | Set left margin | | | | |
| [Format] | ASCII | GS | L | *nL* | *Nh* |
| | Hex | 1D | 4C | *nL* | *nH* |
| | Decimal | 29 | 76 | *nL* | *nH* |
| [Range] | 0 ≤ *nL* ≤ 255 | | | | |
| | 0 ≤ *nH* ≤ 255 | | | | |

[Description] Sets the left margin using *nL* and *nH*.




[Notes]
- This command is effective only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the setting exceeds the printable area, the maximum value of the printable area is used.

[Default] *nL* = 0, *nH* = 0

[Reference] **GS W**

**GS P n**

[Name] Set bar code justification

| [Format] | ASCII | GS | P | n |
|---|---|---|---|---|
| | Hex | 1D | 50 | n |
| | Decimal | 29 | 80 | n |

[Range] 0 ≤ n ≤ 2 , 48 ≤ *n* ≤ 50

[Description]

| n | | **Justification** |
|---|---|---|
| Decimal | Hex | |
| 0, 48 | 0,30 | Left justification |
| 1, 49 | 1, 31 | Centering |
| 2, 50 | 2, 32 | Right justification |

**GS W *nL nH***

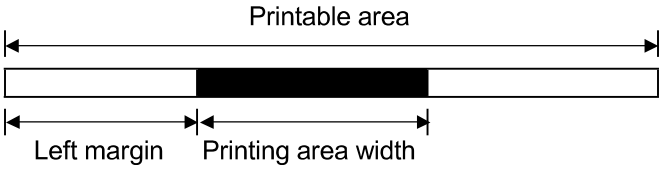
[Name] Set printing area width

| [Format] | ASCII | GS | W | *nL* | *nH* |
|---|---|---|---|---|---|
| | Hex | 1D | 57 | *nL* | *nH* |
| | Decimal | 29 | 87 | *nL* | *nH* |

[Range] $0 \le nL \le 255$

$0 \le nH \le 255$

[Description] Sets the printing area width to the area specified by *nL* and *nH*.
The printing area width is set to [(*nL* + *nH* *x* 256) x 0.125mm




[Notes]

- This command is effective only when processed at the beginning of the line.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the setting exceeds the printable area, the maximum value of the printable area is used.
- The setting by **GS L** takes precedence over the setting by **GS W**. If the [left margin + printing area width] exceeds the printable area, the printer uses
[Printable area width - left margin]. However, the setting by **GS W** is still reserved, even when it is not used in the current printing..

**GS h *n***

[Name] Select bar code height

[Format]

| | | | |
|---|---|---|---|
| ASCII | GS | h | *n* |
| Hex | 1D | 68 | *n* |
| Decimal | 29 | 104 | *n* |

[Range] 1 ≤ *n* ≤ 255

[Description] Select the height of the bar code.
*n* specifies the number of dots in the vertical direction.

[Default] *n* = 162

[Reference] **GS k**

***1)* GS k *m d1...dk NUL*** ***2)* GS k *m n d1...dn***

[Name] Print bar code

[Format]

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1) | ASCII | GS | k | *m* | *d1*...d*k* | *NUL* | |
| | Hex | 1D | 6B | *m* | *d1*...d*k* | | *00* |
| | Decimal | | 29 | 107 | *m* | *d1*...d*k* | *0* |
| *2)* | ASCII | GS | k | *m* | *n* | *d1...dn* | |
| | Hex | 1D | 6B | *m* | *n* | *d1...dn* | |
| | Decimal | | 29 | 107 | *m* | *n* | *d1...dn* |

[Range] 1) 0 ≤ *m* ≤ 6 (*k* and *d* depend on the bar code system used)
2) 65 ≤ *m* ≤ 73 (*n* and *d* depend on the bar code system used)

[Description] Selects a bar code system and prints the bar code.
*m* selects a bar code system as follows:

| *m* | | Bar Code System | Number of Characters | Remarks |
|---|---|---|---|---|
| 1) | 0 | UPC-A | 11≤*k*≤12 | 48≤*d*≤57 |
| | 1 | UPC-E | 11≤*k*≤12 | 48≤*d*≤57 |
| | 2 | JAN13 (EAN13) | 12≤*k*<13 | 48≤*d*≤57 |
| | 3 | JAN 8 (EAN8) | 7<*k*≤8 | 48≤*d*≤57 |
| | 4 | CODE39 | 1≤*k* | 48≤*d*≤57, 65≤*d*≤90,32,36,37,43,45,46,47 |
| | 5 | ITF | 1≤*k*≤255(even) | 48≤*d*≤57 |
| | 6 | CODABAR | 1≤*k* | 48≤*d*≤57, 65≤*d*≤68 ,36,43,45,46,47,58 |
| | 7 | CODE93 | 1≤*n*≤255 | 0≤*d*≤127 |

| | | | | |
|---|---|---|---|---|
| | 8 | CODE128 | 2≤*n*≤255 | 0≤*d*≤127 |
| | 7 | PDF417 | 1≤*k*≤54 | 48≤*d*≤57,<br>65≤*d*≤68,36,43,45,46,47,58 |
| 2) | 65 | UPC-A | 11≤*n*≤12 | 48≤*d*≤57 |
| | 66 | UPC-E | 11≤*k*≤12 | 48≤*d*≤57 |
| | 67 | JAN13<br>(EAN13) | 12≤*k*<13 | 48≤*d*≤57 |
| | 68 | JAN 8 (EAN8) | 7<*k*≤8 | 48≤*d*≤57 |
| | 69 | CODE39 | 1≤*n*≤255 | 48≤*d*≤57,<br>65≤*d*≤90,32,36,37,43,45,46,47<br>d1 = dk = 42(1) |
| | 70 | ITF | 1≤*n*≤255(even) | 48≤*d* ≤57 |
| | 71 | CODABAR | 1≤*n*≤255 | 48≤*d*≤57,<br>65≤*d*≤68,36,43,45,46,47,58 |
| | 72 | CODE93 | 1≤*n*≤255 | 0≤*d*≤127 |
| | 73 | CODE128 | 2≤*n*≤255 | 0≤*d*≤127 |
| | 74 | PDF417 | 1≤*k*≤54 | 48≤*d*≤57, 65≤*d*≤68,<br>36,43,45,46,47,58 |

[Notes for 1) ]

• This command ends with a NUL code.

• When the bar code system used is UPC-A or UPC-E, the printer prints the bar code data after receiving 12 bytes of bar code data and processes the following data as normal data.

[Notes for 2) ]

• The number of data for the ITF bar code must be even numbers.

• Odd number of bytes of data is input, the printer ignores the last received data.

• *n* indicates the number of bar code data bytes, and the printer processes *n* bytes from the next character data as bar code data.

• If *n* is outside the specified range, the printer stops command processing and processes the following data as normal data.

[Notes in standard mode]

• If *d* is outside the specified range, the printer only feeds paper and processes the following data as normal data.

• If the horizontal size exceeds printing area, the printer only feeds the paper. This command feeds as much paper as is required to print the bar

code, regardless of the line spacing specified by **ESC 2** or **ESC 3**.

• This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following *m* as normal data.

• After printing the bar code, this command sets the print position to the beginning of the line.

• This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90/180/270 rotated character, etc.)

[Notes in page mode]

• This command develops bar code data in the print buffer, but does not print it. After processing bar code data, this command moves the print position to the right side dot of the bar code.

• If *d* is out of the specified range, the printer stops command processing and processes the following data as normal data. In this case the data buffer position does not change.

• If bar code width exceeds the printing area, the printer does not print the bar code, but moves the data buffer position to the left side out of the printing area.

• If the height of the bar code will not fit on the current label, the excess is printed on the next label.

| Control character | | | HRI | Control character | | | HRI |
|---|---|---|---|---|---|---|---|
| **ASCII** | **Hex** | **Decimal** | **character** | **ASCII** | **Hex** | **Decimal** | **character** |
| NUL | 00 | 0 | U | DLE | 10 | 16 | P |
| SOH | 01 | 1 | A | DC1 | 11 | 17 | Q |
| STX | 02 | 2 | B | DC2 | 12 | 18 | R |
| ETX | 03 | 3 | C | DC3 | 13 | 19 | S |
| EOT | 04 | 4 | D | DC4 | 14 | 20 | T |
| ENQ | 05 | 5 | E | NAK | 15 | 21 | U |
| ACK | 06 | 6 | F | SYN | 16 | 22 | V |
| BEL | 07 | 7 | G | ETB | 17 | 23 | W |
| BS | 08 | 8 | H | CAN | 18 | 24 | X |
| HT | 09 | 9 | I | EM | 19 | 25 | Y |
| LF | 0A | 10 | J | SUB | 1A | 26 | Z |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| VT | 0B | 11 | K | ESC | 1B | 27 | A |
| FF | 0C | 12 | L | FS | 1C | 28 | B |
| CR | 0D | 13 | M | GS | 1D | 29 | C |
| SO | 0E | 14 | N | RS | 1E | 30 | D |
| SI | 0F | 15 | O | US | 1F | 31 | E |
| | | | | DEL | 7F | 127 | T |

[Example] Printing **GS k** 72 7 67 111 100 101 13 57 51


When CODE128 (*m* = 73) is used:

• Refer to Appendix F for the information for the CODE128 bar code and its code table.

• When using CODE128 in this printer, take the following points into account for data transmission:

1. The top of the bar code data string must be the code set selection character
   (CODE A, CODE B, or CODE C), which selects the first code set.
2. Special characters are defined by combining two characters "{" and one character. The ASCII character "{" is defined by transmitting "{" twice consecutively.

| Specific character | Transmit data | | |
|---|---|---|---|
| | ASCII | Hex | Decimal |
| SHIFT | {S | 7B, 53 | 123, 83 |
| CODE A | {A | 7B, 41 | 123, 65 |
| CODE B | {B | 7B, 42 | 123, 66 |
| CODE C | {C | 7B, 43 | 123, 67 |
| FNC1 | {1 | 7B, 31 | 123, 49 |
| FNC2 | {2 | 7B, 32 | 123, 50 |
| FNC3 | {3 | 7B, 33 | 123, 51 |

| | | | |
|---|---|---|---|
| FNC4 | {4 | 7B, 34 | 123, 52 |
| "{" | {{ | 7B, 7B | 123, 123 |

[Example] Example data for printing "No. 123456"

In this example, the printer first prints "No." using CODE B, then prints the following numbers using CODE C.

**GS k** 73 10 123 66 78 111 46 123 67 12 34 56


• If the top of the bar code data is not the code set selection character, the printer stops command processing and processes the following data as normal data.

• If the combination of "{" and the following character does not apply any special character, the printer stops command processing and processes the following data as normal data.

• If the printer receives characters that cannot be used in the special code set, the printer stops command processing and processes the following data as normal data.

• The printer does not print HRI characters that correspond to the shift characters or code set selection characters.

• HRI character for the function character is space.

• HRI characters for the control character (<00>H to <1F>H and <7F>H) are space.

<Others> • Be sure to keep spaces on both right and left sides of a bar code. (Spaces are different depending on the types of the bar code.)

**GS v 0 m *xL xH yL yH d1....dk***

[Name] Print raster bit image

[Format]

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | GS | v | 0 | *m* | *xL* | *xH* | *yL* | *yH* | *d1...dk* |
| Hex | 1D | 76 | 30 | *m* | *xL* | *xH* | *yL* | *yH* | *d1...dk* |
| Decimal | 29 | 118 | 48 | *m* | *xL* | *xH* | *yL* | *yH* | *d1...dk* |

[Range] $48 \le m \le 51$, $0 \le d \le 255$

$0 \le xL \le 255$, $0 \le xH \le 255$ where 1 $(xL + xH \times 256) \le 128$

$0 \le yL \le 255$, $0 \le yH \le 8$ where 1 $(yL + yH \times 256) \le 4095$

| M | Mode | Vertical Dot Density | Horizontal Dot Density |
|---|---|---|---|
| 48 | Normal | 203.2dpi | 203.2dpi |
| 49 | Double-width | 203.2dpi | 101.6dpi |
| 49 | Double-height | 101.6dpi | 203.2dpi |
| 51 | Quadruple | 101.6dpi | 101.6dpi |

- *xL*, *xH*, select the number of data bytes (*xL*+*xH* x 256) in the horizontal direction for the bit image.
- *yL*, *yH*, select the number of data bits (*yL*+*yH* x 256) in the vertical direction for the bit image.

[Notes]

- In standard mode, this command is effective only when there is no data in the print buffer.
- This command is not affected by print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster bit image.
- If the printing area width set by **GS L** and **GS W** is less than the minimum width, the printing area is extended to the minimum width only on the line in question. The minimum width means 1 dot in normal (*m*=0, 48) and double-height (*m*=2,50), 2 dots in double-width (*m*=1, 49) and quadruple (*m*=3, 51) modes.
- Data outside the printing area is read in and discarded on a dot-by-dot basis.
- The position at which subsequent characters are to be printed for raster bit image is specified by **HT** (Horizontal Tab), **ESC $** (Set absolute print position), **ESC ** ( Set relative print position), and **GS L** (Set left margin ). If the position at which subsequent characters are to be printed

is a multiple of 8.

• The **ESC a** (Select justification) setting is also effective on raster bit images.

• When this command is received during macro definition, the printer ends macro definition, and begins performing this command. The definition of this command should be cleared.

**GS w *n***

[Name] Set bar code width

[Format]

| | | | | |
|---|---|---|---|---|
| ASCII | GS | w | *n* | |
| Hex | 1D | 77 | *n* | |
| Decimal | | 29 | 119 | *n* |

[Range] $2 \le n \le 6$

[Description] Sets the horizontal size of the bar code.

*n* specifies the bar code width as follows:

| n | Module Width (mm) for Multi –level Bar Code | Binary-level Bar Code | |
|---|---|---|---|
| | | Thin Element Width(mm) | Thick Element Width(mm) |
| 2 | 0.250 | 0.250 | 0.625 |
| 3 | 0.375 | 0.375 | 1.000 |
| 4 | 0.560 | 0.500 | 1.250 |
| 5 | 0.625 | 0.625 | 1.625 |
| 6 | 0.750 | 0.750 | 2.000 |

• Multi-level bar codes are as follows:

UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128

• Binary-level bar codes are as follows:

CODE39, ITF, CODABAR

[Default] *n* = 3

[Reference] **GS k**

## ESC Q *n*

[Name] Transmit Printer ID

[Format]

| | | | |
|---|---|---|---|
| ASCII | ESC | Q | *n* |
| Hex | 1B | 51 | *n* |
| Decimal | 27 | 81 | *n* |

[Range] 41 ≤ *n* ≤ 45(Hex)
65 ≤ *n* ≤ 69(Decimal)

[Description] Transmits the printer ID specified.

| *n* | | | Description | Length |
|---|---|---|---|---|
| ASCII | HEX | Dec | | |
| A | 41 | 65 | Firmware Version ID | 6 byte |
| B | 42 | 66 | Manufacturing Company ID | 9 byte |
| C | 43 | 67 | Printer Model ID | 10 byte |

| | | | | | |
|---|---|---|---|---|---|
| STX | I | Return data | NULL | ETX | Firmware version ID (V2.03) |
| | | | | | Manufacturing Company ID (REXOD.co ) |
| | | | | | Printer Model ID (RX830-H120) |

## ESC H

[Name] Transmit Printer Status

[Format]

| | | |
|---|---|---|
| ASCII | ESC | H |
| Hex | 1B | 48 |
| Decimal | 27 | 72 |

[Description] Transmits the printer STATUS specified.

| First byte | 0 | 1 |
|---|---|---|
| bit 0 | 용지 잔량 있음 | 용지 잔량 없음 |
| bit 1 | Fix 0 | |
| bit 2 | PR 센서 용지 있음 | PR 센서 용지 없음 |
| bit 3 | Fix 0 | |
| bit 4 | Fix 1 | |
| bit 5 | Fix 1 | |
| bit 6 | Fix 0 | |
| bit 7 | Fix 0 | |

| Second byte | 0 | 1 |
|---|---|---|
| bit 0 | 용지 있음 | 용지 없음 |
| bit 1 | 커버 닫힘 | 커버 열림 |
| bit 2 | 커터 정상 | 커터 에러 |
| bit 3 | Fix 0 | |
| bit 4 | Fix 1 | |
| bit 5 | Fix 1 | |
| bit 6 | Fix 0 | |
| bit 7 | Fix 0 | |

**GS ! n**

[Name] Set character size

[Format] ASCII GS ! n

Hex 1D 21 n

Decimal 29 33 n

[Range] 0≤n≤255

(1≤vertical double counts≤8, 1≤horizontal double counts≤8)

[Description] Set the height of the character by bit 0 to 2, set the width of the character by bit 4 to 6. as below:

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Sets the height of character. See table 2. | | | |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | Sets the width of character. See table 1. | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |

| Hex | Decimal | Width |
|---|---|---|
| 00 | 0 | 1(normal) |
| 10 | 16 | 2(double width) |
| 20 | 32 | 3 |
| 30 | 48 | 4 |
| 40 | 64 | 5 |
| 50 | 80 | 6 |
| 60 | 96 | 7 |
| 70 | 112 | 8 |

**Table 1**

| Hex | Decimal | Width |
|---|---|---|
| 00 | 0 | 1(normal) |
| 01 | 1 | 2(double height) |
| 02 | 2 | 3 |
| 03 | 3 | 4 |
| 04 | 4 | 5 |
| 05 | 5 | 6 |
| 06 | 6 | 7 |
| 07 | 7 | 8 |

**Table 2**

[Note] .This command effects to all characters (English characters and Chinese) except for HRI character.
.If n is out of the definition range, this command will be ignored.
.At the standard mode, the vertical direction is the feed paper direction. However, when the character direction revolved clockwise 90°, the relation of vertical direction and horizontal direction will be reversed.
.When enlarges the characters in a line by the different size, all characters in a line will be paralleled along the baseline.
.Enable/disable the double width and double height mode by ESC ! command. The set of command which received at the last will be effected.

[Default] n = 0

[Reference] **ESC !**

## FS &

[Name] Set Chinese character mode

Format
ASCII FS &
Hex 1C 26
Decimal 28 38

[Description] Select Chinese character mode.

[Specification]
·This command only effects when select GB18030 code system.
·GB18030 only effects double byte 1,2,3,4,5 area.
·When select Chinese character mode, the printer processes all the Chinese code, two bytes each time.
·The sequence arranged the Chinese code according to the first and the second byte.
·When turn the power on, the printer enters into Chinese mode automatically.
·When select Chinese character mode, at first the printer checks the code whether the Chinese: If it is the Chinese, then processes the first and the second bytes of Chinese code.

[Reference] FS FS C

## FS .

[Name] Cancel Chinese character

[Format]
ASCII FS .
Hex 1C 2E
Decimal 28 46

[Description] Cancel the Chinese character mode

[Specification]
· This command only effects when select GB18030 code system.
· When not select the Chinese character mode, all character code are ASCII code, per character processes each time.
· When turns the power on, the printer enters into Chinese mode automatically.

[Reference] FS &, FS C

**ESC R n**

[Name] Select an international character set

[Format] ASCII ESC R n
Hex 1B 52 n
Decimal 27 82 n

[Rang] 0≤n≤13

[Description] Select the data of n according to the below table, set international character set.

| n | Character Set |
|---|---|
| 0 | U.S.A. |
| 1 | France |
| 2 | Germany |
| 3 | England |
| 4 | Denmark I |
| 5 | Sweden |
| 6 | Italy |
| 7 | Spain I |
| 8 | Japan |
| 9 | Norway |
| 10 | Denmark II |
| 11 | Spain II |
| 12 | Latin America |
| 13 | Korea |

[Default] n = 0

[Reference] International character set

**ESC t n**

[Name] Select character code table

[Format] ASCII ESC t n
Hex 1B 74 n
Decimal 27 116 n

[Description] Select page n from the character code table:

| n | Page | n | Page |
|---|---|---|---|
| 0 | CP437 | 108 | CP862 |
| 1 | Katakana | 109 | CP863 |
| 2 | CP850 | 110 | CP864 |
| 3 | CP860 | 111 | CP865 |
| 4 | CP863 | 112 | CP866 |
| 5 | CP865 | 113 | CP1250 |
| 100 | CP437 | 114 | CP1251 |
| 101 | CP737 | 115 | CP1252 |
| 102 | CP850 | 116 | CP1253 |
| 103 | CP852 | 117 | CP1258 |
| 104 | CP855 | 200 | KS5601 |
| 105 | CP857 | 201 | GBK |
| 106 | CP858 | 202 | Shift-JIS |
| 107 | CP860 | | |

[Default] n = 0

**GS * x y d1..d( x y 8 )**

[Name] Define download bit image

[Format] ASCII GS * x y d1...d(x× y× 8)
Hex 1D 2A x y d1...d(x× y× 8)
Decimal 29 42 x y d1...d(x× y× 8)

[Range] 1≤x≤255
1≤y≤48(x× y×1536)
0≤d≤255

[Description] Specifies dot counts by taking x and y and defines the download bit image.
.x specifies the horizontal dot counts.
.y specifies the vertical dot counts.

[Notes] .The dot counts of horizontal direction is x×8; the dot counts of vertical direction is y×8.
.If x×y over the specified scale, then this command will be disabled.
.d indicates the bit image data. The data (d) specifies the print bit is 1 , the not print bit is 0.
.At the below status, clean the download bit image definition:

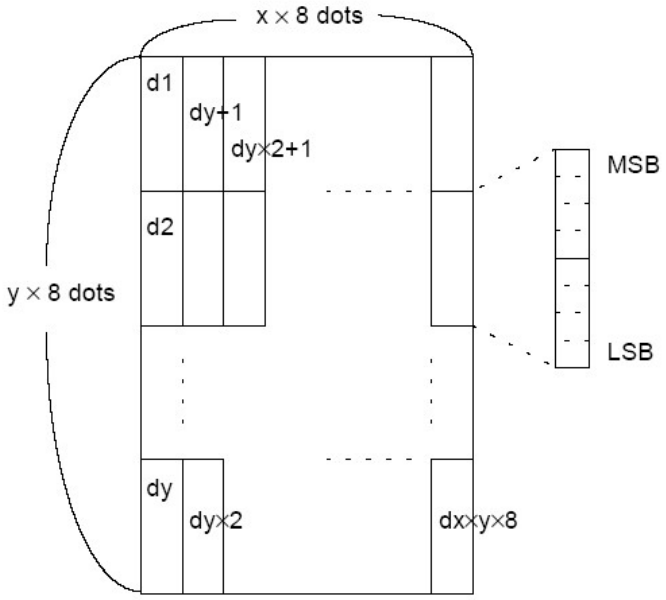
① Execute ESC @.

② Execute ESC &.

③ The printer reset or turn the power off.

.The connection between download bit image and print data as below:

[Reference]



**GS / n**

[Name] Print download bit image

[Format] ASCII GS / n
Hex 1D 2F n
Decimal 29 47 n

[Range] 0≤m≤3, 48≤m≤51

[Description] Printed the download bit image by the mode which specified by m.
m set the mode from the below table:

| m | Mode | Vertical dot density | Horizontal dot density |
|---|---|---|---|
| 0,48 | Normal | 203.2 dpi | 203.2 dpi |
| 1,49 | Double width | 203.2 dpi | 101.6 dpi |
| 2,50 | Double height | 101.6 dpi | 203.2 dpi |
| 3,51 | Four times size | 101.6 dpi | 101.6 dpi |

**Dpi: per 25.4㎜{one inch} print dot count**

[Notes] .If the bit image data undefined, then this command will be ignored.
.At the standard mode, this command effects only when there are no data in the print buffer area.
.This command is not effective at the print mode [bold, overlap, underline, character size or reverses blank printing], except for up-down print mode.
.If the near-printing download bit image over the printable area, then the over data will not print
.The download bit image at the page mode refer to picture.
.If the printable width which set by GS L and GS W is less than the width needed by GS command to send the data, then executes the below continued operation for the problem lines [the print not over the max printable area].

① The width of the printable area which extends to the right and holds the data capacity.

② If the step ① haven't provided enough width for data, then narrows the left blank to hold the data.
Each data at the normal mode (m=0, 48) and double height mode (m=2,50), the printer prints one dot; Each data at the double width mode (m=1, 48) and four double mode (m=3, 51), the printer prints two dots.

[Reference] **GS ***

**GS H n**

[Name] Select the print position of HRI character

[Format] ASCII GS H n
Hex 1D 48 n
Decimal 29 72 n

[Range] 0≤n≤3, 48≤n≤51

[Description] When print bar code, select the print position of HRI character.
n selects the print position, the table as the below table:

| n | Print position |
|---|---|
| 0,48 | Not print |
| 1,49 | Up the bar code |
| 2,50 | Below the bar code |
| 3,51 | Up and below the bar code |

**Note:** The position of the printer prints HRI characters is not set according to the standard position.

.HRI (Human Readable Interpretation) indicates the readable bar code relevant characters .

[Note] .Takes the characters which specified by GS f to print HRI characters.

[Default] n = 0

[Reference] **GS f**, **GS k**

**DLE EOT n**

[Name] Transmit real-time status

[Format]

| | | | |
|---|---|---|---|
| ASCII | DLE | EOT | n |
| Hex | 10 | 04 | n |
| Decimal | 16 | 4 | n |

[Range] 1≤n≤5

[Description] Transmit real-time status. Parameter n used to appoint printer status. the definition as below:

n=1: Transmit printer status.
n=2: Transmit offline status.
n=3: Transmit error status.
n=4: Transmit roll paper sensor status.
n=5: Transmit roll paper out sensor status.

[Specification]
·Transmit the current status, every status one byte.
·Printer can't sure whether the PC can receive data when transmitting status.
·Printer starts to execute when received this command.
·Under the serial interface mode, Even the printer is offline, the received buffer is full, or the error occurred, also execute this command.
. Under the parallel interface mode, when the printer is busy, can't execute this command.
. When enable ASB by GS a command, must distinguish the status which be sent by DLE EOT or ASB status. (Refer to appendix C)
·Even the printer doesn't choose the external equipment command, the command which be selected by ESC= also effects.

[Notes] henever received <10>H<04>H<n>(1≤n≤4) data sequence, the printer will still transmit status.

**For example:**

ESC * m nL nH d1...dK, d1=<10>H, d3=<01>H

·Do not use this command within two or more than two bytes command.

**For example:**

If want to transmit ESC 3 n to printer, before transmitting n, DTR(for the PC is DSR) will change to MARK, So, before receving n, occurs that DLE EOT 3 interrupted, the code<10>H of DLE EOT 3 will be dealt with as the code<10> of ESC 3.

*n* = 1: Printer status

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to Off. |
| 1 | On | 02 | 2 | Not used. Fixed to On. |
| 2 | On | 04 | 4 | Not used. Fixed to On. |
| 3 | Off | 00 | 0 | Online. |
| | On | 08 | 8 | Offline. |
| 4 | On | 10 | 16 | Not used. Fixed to On. |
| 5 | Off | 00 | 0 | Does not wait for online error recovery. |
| | On | 20 | 32 | Waits for online error recovery. |
| 6 | Off | 00 | 0 | FEED button is Off. |
| | On | 40 | 64 | FEED button is On. |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

*n* = 2: Offline status

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to Off. |
| 1 | On | 02 | 2 | Not used. Fixed to On. |
| 2 | Off | 00 | 0 | Platen is closed. |
| | On | 04 | 4 | Platen is open. |
| 3 | Off | 00 | 0 | Paper is not being fed by using the FEED button. |
| | On | 08 | 8 | Paper is being fed by the FEED button. |
| 4 | On | 10 | 16 | Not used. Fixed to On. |
| 5 | Off | 00 | 0 | No paper-end stop. |
| | On | 20 | 32 | Printing is being stopped. |
| 6 | Off | 00 | 0 | No error. |
| | On | 40 | 64 | Error occurred. |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

Bit 3: Becomes same as bit 6 of Printer status (*n*=1), except during a macro execution with the FEED button.

Bit 5: Becomes on when the paper end sensor detects paper end and printing stops.

*n* = 3: Error status

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to Off. |
| 1 | On | 02 | 2 | Not used. Fixed to On. |
| 2 | Off | 00 | 0 | No mechanical error. |
| | On | 04 | 4 | Mechanical error has occurred. |
| 3 | Off | 00 | 0 | No autocutter error. |
| | On | 08 | 8 | Autocutter error occurred. |
| 4 | On | 10 | 16 | Not used. Fixed to On. |
| 5 | Off | 00 | 0 | No unrecoverable error. |
| | On | 20 | 32 | Unrecoverable error occurred. |
| 6 | Off | 00 | 0 | No auto-recoverable error. |
| | On | 40 | 64 | Auto recoverable error occurred. |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

Bit 6: Bit 6 is On when printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is opened during printing.

*n* = 4: Continuous paper sensor status

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to Off. |
| 1 | On | 02 | 2 | Not used. Fixed to On. |
| 2, 3 | Off | 00 | 0 | Paper roll near-end sensor: paper adequate. |
| | On | 0C | 12 | Paper near-end is detected by the paper roll near-end sensor. |
| 4 | On | 10 | 16 | Not used. Fixed to On. |
| 5, 6 | Off | 00 | 0 | Paper roll sensor: Paper present. |
| | On | 60 | 96 | Paper roll end detected by paper roll sensor. |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

[Reference] DLE ENQ, GS a, GS r, Appendix C

**n = 5: Continuous paper out sensor status**

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Unused. Off |
| 1 | Off | 00 | 0 | Unused. off |
| 2, | Off | 04 | 4 | Paper out sensor |
| | On | 00 | 0 | Paper out sensor detate |
| 3 | off | 00 | 0 | Unused. off |
| 4 | Off | 00 | 0 | Unused. off |
| 5 | Off | 00 | 0 | Unused. off |
| 6,7 | Off | 00 | 0 | Unused. Off |

[Reference] **DLE ENQ** , **GS a** , **GS r**

**GS r n**

[Name] Transmit status

[Format] ASCII GS r n
Hex 1D 72 n
Decimal 29 114 n

[Range] n=1, 49

[Description] Transmits the status n which specified by n as below:

| n | Function |
|---|---|
| 1,49 | Transmit the print paper sensor status |

[Notes] .When taking serial interface, If set DTR/DSR control, the printer only transmits one byte after be sure that the PC have received the date (DSR signal is SPACE). If the PC haven't got ready to receive data (DSR signal is MARK), the printer waited until the PC have got ready to.
If set SON/XOFF control, the printer only transmits one byte, and be not sure the DSR signal status.
.Execute this commands when the data affects in the printing buffer area. So, between receiving this command and transmitting status, may be have a time spacing, it decided by the status of receiving buffer area.
.When takes ASB by GS a, distinguished the transmitting status of GS r and ASB status which refers to the table in the appendix C.
.The transmitting status types as below:

**The print paper sensor status (n=1,49)**

| Bit | Off/On | Hex | Decimal | ASB status |
|---|---|---|---|---|
| 0,1 | Off | 00 | 0 | Paper near-end sensor printing paper enough. |
| | On | 03 | 3 | Paper near-end sensor printing paper enough. |
| 2,3 | Off | 00 | 0 | Paper-end sensor: printing paper enough. |
| | On | (0C) | (12) | Paper-end sensor: without paper. |
| 4 | Off | 00 | 0 | Unused. Off is fixed. |
| 4,6 | - | - | - | Undefined. |
| 7 | On | 00 | 0 | Unused. Off is fixed. |

Bit 2 and 3: When the paper-end sensor tests the printing paper-end, the printer enters into offline. So, bit 2 and 3 not transmits without paper status.

[Reference] DLE EOT, GS

**①GS V m ②GS V m n**

[Name] Select cut paper mode and cut paper

| [Format] | | | | | |
|---|---|---|---|---|---|
| | ①ASCII | GS | V | m | |
| | Hex | 1D | 56 | m | |
| | Decimal | 29 | 86 | m | |
| | ②ASCII | GS | V | m | n |
| | Hex | 1D | 56 | m | n |
| | Decimal | 29 | 86 | m | n |

[Range] ① m = 1, 49

② m = 66, 0 ≤ n ≤ 255

[Description] Select one cut paper mode, and execute cut paper operation. Select model by taking the value of m, as below:

[The description for ① and ② ]

.According to the different auto-cut paper machine type, the cut paper status is different.

.This command effects only when processing this command at the beginning of a line.

[The specification for ①]

.Only partial cut paper; not full cut paper.

[The specification for ②]

.When n =0, the printer feeds paper to cut paper position and cuts paper.

.When n≠0, the printer feeds paper to (cut paper position+[n×0.125㎜ {0.0049inch}] and cut paper.

**ESC m**

[Name] Partial cut

| [Format] | | | |
|---|---|---|---|
| | ASCII | ESC | m |
| | Hex | 1B | 6d |
| | Decimal | 27 | 109 |

[Description] The printer received this command, then executing partial cut at present position.

[Note] As the printer do not feed paper when executing this command, so before executing this command in the next time, assure that feed paper at least 5mm or more, prevent cutter broken.

[Default] Partial cut mode is default.

## ESC i

[Name] Full cut

[Format]

| | | |
|---|---|---|
| ASCII | ESC | i |
| Hex | 1B | 69 |
| Decimal | 27 | 105 |

[Description] After receiving this command, the printer executes full cut.

[Note] As it won't feed paper when executing this command, please assures that feed paper5mm or more before executing this command next time, to avoid that the cutter be damaged.

[Default] The default is partial cut mode.

**FS p n m**

[Name] Print NV bit image

[Format] ASCII FS p n m

Hex 1C 70 n m

Decimal 28 112 n m

[Range] 1≤n≤255

0≤m≤3, 48≤m≤51

[Description] Print NV bit image by m which be specified.

| m | Mode | Vertical Density | Horizontal Density |
|---|---|---|---|
| 0,48 | Normal | 203.2dpi | 203.2 dpi |
| 1,49 | Double width | 203.2 dpi | 101.6 dpi |
| 2,50 | Double height | 101.6 dpi | 203.2 dpi |
| 3,51 | Four times size | 101.6 dpi | 101.6 dpi |

**Dpi: {1 inch} print dot per 25.4mm**

.n is the quantity of NV bit image (defined by FS q).

.m specified bit image mode.

[Specification] .NV bit image is a bit image which defined at the not easy losing memory. Defined by FS q , printed by FS q.

.This command will not effect when the specified NV bit image not existed.

.This command not be effected by the print mode (bold, repetition, underline, character size, or reverse blank printing), except the reversed print mode.

① At the NV bit image mode, the width of printable area right extends to a vertical line. In such circumstances, Print can't over the printable area.

② If the width of printable area can't extend a vertical line, then the left blank will be narrowed and to held a vertical line.

.If the printable download bit image over a line, then the over data not to be printed.

.At the normal and double width mode, this command feed paper n dots, n is the height of NV bit image, Under the double height and four times size mode, this command feeds paper 2n dots, n is the height of NV bit image, it's not relevant to the line spacing which set by ESC 2 or ESC 3.

.After printing bit image, this command sets the print position at the beginning of a line, and deal with the continued data as the normal data.

[Reference] ESC *, FS q , GS / , GS v 0

**FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n**

[Name] Define NV bit image

[Format]

| | | | | |
|---|---|---|---|---|
| ASCII | FS | q | n | [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n |
| Hex | 1C | 71 | n | [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n |
| Decimal | 28 | 113 | n | [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n |

[Range] 1≤n≤255

0≤xL≤255

0≤xH≤3(when 1≤(xl+xh×256) ≤1023

0≤yl≤255

0≤yh≤1(when 1≤(yl+yh×256) ≤288

0≤d≤255

K=(xl+xh×256) ×(yl+yh×256) ×8

The total of defined data area=192k bytes

[Description] Define NV bit image which uses the specific value n.

.n specifies the quantity of NV bit image.

.xL, xH specifies the dot count of the horizontal direction in defined NV bit image,the dot count is (xL+xH×256) ×8.

.yL, yH specifies the dot count of the vertical direction in defined NV bit image, the dot count is (yL+yH×256) ×8.

[Specification] .This command cancels the NV bit image which defined by this command. At the serial defined data, the printer can't define any one of data renewable. If renew to define certain data, then all data needs to send again.

.From the beginning to deal with this command to finish hardware reset, can't execute mechanical operation(contains initialized print head position when opening the print head bar, feed paper used the paper feeding button and so on.)

.During deal with this command, when writing data to user NV memory, the printer is busy and stops receiving data. So, Disabled sending data during executing this command, contains real-time command.

.NV bit image is a bit image which defined at the not easy losing memory. Defines and prints FS p by FS q.

.This command effects after the seven bytes<FS ~ yH> be dealt with normally.

.When the data quantity over the left capacity of the scale which defined by xL, xH, yL, yH, the printer deals with xL, xH, yL, yH out of the defined scale.

.At any one of group bit image except for the first group, when the printer meets that xL,xH, yL, yH over the defined scale, then stop dealing with this

command, and begin to write to NV image. At this moment disabled the undefined NV bit image (undefined), but any NV bit image defined before still effective.

.d indicates the defined data. At the data (d), one bit specified one print dot and one 0 bit specified one which can't print dot.

.n be defined the quantity of NV bit image by this command. The quantity goes up according to the sequence which begins from bit image 01H. Therefore the first data group [xL xH yL yH dl...dK] is the NV bit image 01H. The last data group [xL xH yL yH dl...dK] is the NV bit image n. The total count is consistent with the NV bit image which set by FS p command.

.The definition data of one NV bit image formed by [xL xH yLl xH dl...dK]. So, when only have one NV bit image n=1, the printer only deals with the data group [xL xH yL yH dl...dK] one time. The printer uses ([data:(xL+xH×256) × (yL+yH×256) × 8]+[header:4]) bytes of the NV memory.

.The definition area of this printer is 192K bytes (max). This command could define several bit images, but can't define the bit image which the total capacity [bit image data + head] over 192K bytes.

.Though defining ASB, the printer not send the ASB status or execute status test during dealing with this command.

.When received this command during macro definition, the printer stops macro definition and executes this command.

.Once define one NV bit image, it can't be executed ESC @ command, and deleted when reset and turn power off.

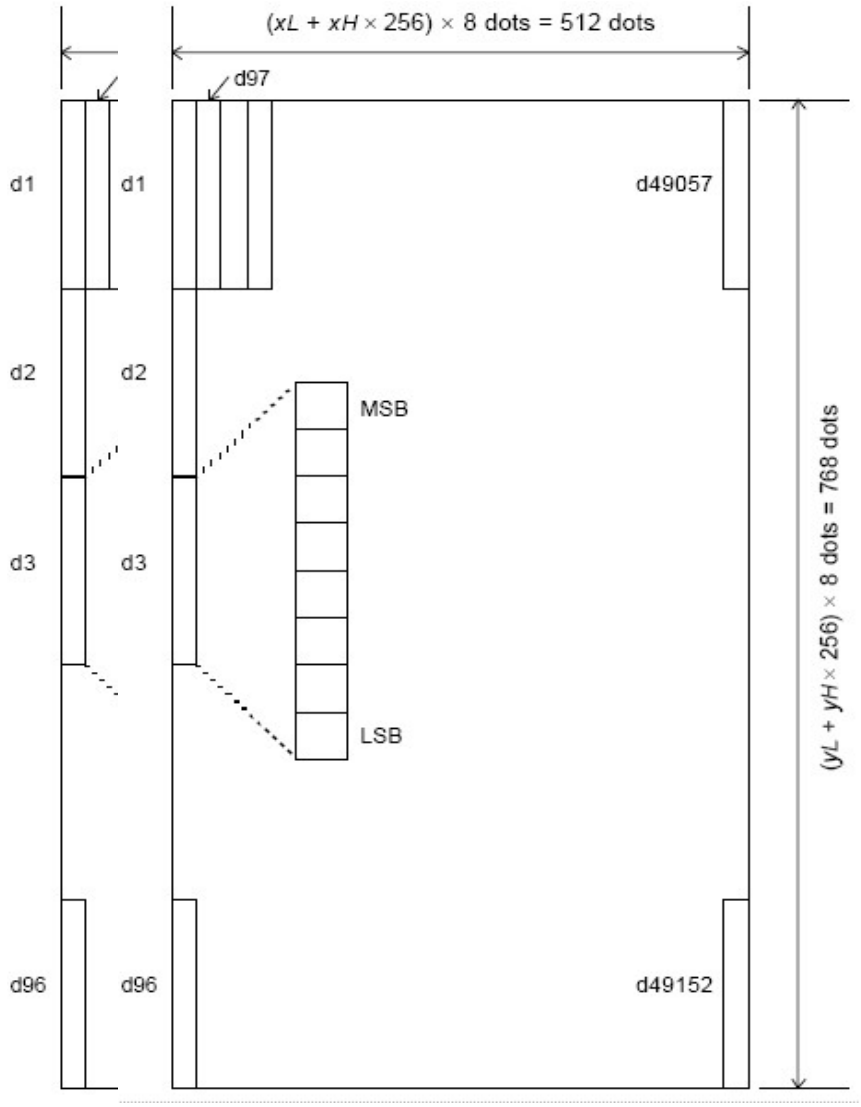
.This command only executes the definition of NV bit image, not executes printing. The printing of NV bit image executed by FS p command.

[Notes] Frequently executes the written command which could be broken the NV memory. So, suggest that execute the written operation not over ten times for NV memory in a day.

.After the process of putting one bit image into NV memory, the printer executes one hardware reset operation. So, defines the user-defined character, downloads bit image and macro after finishing this command. The printer clears receiving and printing buffer area, and resets to the effective mode when connecting the power supply.

[Reference] FS p

[For example] When xL = 64, xH = 0, yL = 96, yH = 0



**GS I** xL xH R EM SL SH d1...Dk

[Name] QR CODE PRINT (2D BAR CODE)

| [Format] | ASCII | GS | I | xL | xH | R | EM | SL | SH d1...Dk |
|---|---|---|---|---|---|---|---|---|---|
| | Hex | 1D | 6C | xL | xH | R | EM | SL | SH d1...Dk |
| | Decimal | 29 | 108 | xL | xH | R | EM | SL | SH d1...Dk |

[Range]

xL,xH :

XL+XH*256=Xoffset,It decide the width of paper on the left of QR Code.

R:

0<= R<=3,It means Rotation ,0 to 270 degrees.

EM:

1<=EM<=18,Enlarge Multiple,Multiple of Width and Hight.

SL, SH:

SL+SH*256=Size of data,It means how many data is to be coded.
(It seems that Size can not be more than 230)

d1.....dk:

data to be coded,handle by fuotion in lib file

[TEST CODE]

1d 6c c8 00 01 0a 09 00 62 61 69 64 75 2e 63 6f 6d 0a 0a 0a 0a

It will lead you to baidu.com

# APPENDIX A : CODE128 BAR CODE

## A.1 Description of the CODE128 Bar Code

In CODE128 bar code system, it is possible to represent 128 ASCII characters and 2-digit numerals using one bar code character that is defined by combining one of the 103 bar code characters and 3 code sets. Each code set is used for representing the following characters:

· Code set A: ASCII characters 00H to 5FH
· Code set B: ASCII characters 20H to 7FH
· Code set C: 2-digit numeral characters using one character (100 numerals from 00 to 99)

The following special characters are also available in CODE128:

· Code set selection character (CODE A, CODE B, CODE C).
This character switches the following code set to code set A, B, or C.

## A.2 Code Tables

Printable characters in code set A

| Char-acte | Transmit Data | | Char-acte | Transmit Data | | Char-acte | Transmit Data | | Char-acte | Transmit Data | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hex | Dec | | Hex | Dec | | Hex | Dec | | Hex | Dec |
| NULL | 00 | 0 | FS | 1C | 28 | 8 | 38 | 56 | T | 54 | 84 |
| SOH | 01 | 1 | GS | 1D | 29 | 9 | 39 | 57 | U | 55 | 85 |
| STX | 02 | 2 | RS | 1E | 30 | : | 3A | 58 | V | 56 | 86 |
| ETX | 03 | 3 | US | 1F | 31 | ; | 3B | 59 | W | 57 | 87 |
| EOT | 04 | 4 | SP | 20 | 32 | < | 3C | 60 | X | 58 | 88 |
| ENQ | 05 | 5 | ! | 21 | 33 | = | 3D | 61 | Y | 59 | 89 |
| ACK | 06 | 6 | " | 22 | 34 | > | 3E | 62 | Z | 5A | 90 |
| BEL | 07 | 7 | # $ | 23 | 35 | ? | 3F | 63 | [ | 5B | 91 |
| BS | 08 | 8 | % | 24 | 36 | @ | 40 | 64 | ₩ | 5C | 92 |
| HT | 09 | 9 | & | 25 | 37 | A | 41 | 65 | ] | 5D | 93 |
| LF | 0A | 10 | ' | 26 | 38 | B | 42 | 66 | ^ | 5E | 94 |
| VT | 0B | 11 | ( | 27 | 39 | C | 43 | 67 | _ | 5F | 95 |
| FF | 0C | 12 | ) | 28 | 40 | D | 44 | 68 | FNC1 | 7B,31 | 123,49 |
| CR | 0D | 13 | * | 29 | 41 | E | 45 | 69 | FNC2 | 7B,32 | 123,50 |
| SO | 0E | 14 | + | 2A | 42 | F | 46 | 70 | FNC3 | 7B,33 | 123,51 |
| SI | 0F | 15 | , | 2B | 43 | G | 47 | 71 | FNC4 | 7B,34 | 123,52 |
| DLE | 10 | 16 | - | 2C | 44 | H | 48 | 72 | SHIFT | 7B,53 | 123,83 |
| DC1 | 11 | 17 | . | 2D | 45 | I | 49 | 73 | CODEB | 7B,42 | 123,66 |
| DC2 | 12 | 18 | / | 2E | 46 | J | 4A | 74 | CODEC | 7B,43 | 123,67 |
| DC3 | 13 | 19 | 0 | 2F | 47 | K | 4B | 75 | | | |
| DC4 | 14 | 20 | 1 | 30 | 48 | L | 4C | 76 | | | |
| NAK | 15 | 21 | 2 | 31 | 49 | M | 4D | 77 | | | |
| SYN | 16 | 22 | 3 | 32 | 50 | N | 4E | 78 | | | |
| ETB | 17 | 23 | 4 | 33 | 51 | O | 4F | 79 | | | |
| CAN | 18 | 24 | 5 | 34 | 52 | P | 50 | 80 | | | |
| EM | 19 | 25 | 6 | 35 | 53 | Q | 51 | 81 | | | |
| SUB | 1A | 26 | 7 | 36 | 54 | R | 52 | 82 | | | |
| ESC | 1B | 27 | | 37 | 55 | S | 53 | 83 | | | |

Printable characters in code set B

| Char-acte | Transmit Data | | Char-acte | Transmit Data | | Char-acte | Transmit Data | | Char-acte | Transmit Data | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hex | Dec | | Hex | Dec | | Hex | Dec | | Hex | Dec |
| SP | 20 | 32 | ; | 3B | 59 | V | 56 | 86 | q | 71 | 113 |
| ! | 21 | 33 | < | 3C | 60 | W | 57 | 87 | r | 72 | 114 |
| " | 22 | 34 | = | 3D | 61 | X | 58 | 88 | s | 73 | 115 |
| # | 23 | 35 | > | 3E | 62 | Y | 59 | 89 | t | 74 | 116 |
| $ | 24 | 36 | ? | 3F | 63 | Z | 5A | 90 | u | 75 | 117 |
| % | 25 | 37 | @ | 40 | 64 | [ | 5B | 91 | v | 76 | 118 |
| & | 26 | 38 | A | 41 | 65 | ₩ | 5C | 92 | w | 77 | 119 |
| ' | 27 | 39 | B | 42 | 66 | ] | 5D | 93 | x | 78 | 120 |
| ( | 28 | 40 | C | 43 | 67 | ^ | 5E | 94 | y | 79 | 121 |
| ) | 29 | 41 | D | 44 | 68 | _ | 5F | 95 | z | 7A | 122 |
| * | 2A | 42 | E | 45 | 69 | ` | 60 | 96 | { | 7B,7B | 123,123 |
| + | 2B | 43 | F | 46 | 70 | a | 61 | 97 | \| | 7C | 124 |
| , | 2C | 44 | G | 47 | 71 | b | 62 | 98 | } | 7D | 125 |
| - | 2D | 45 | H | 48 | 72 | c | 63 | 99 | ~ | 7E | 126 |
| . | 2E | 46 | I | 49 | 73 | d | 64 | 100 | DEL | 7F | 127 |
| / | 2F | 47 | J | 4A | 74 | e | 65 | 101 | FNC1 | 7B,31 | 123,49 |
| 0 | 30 | 48 | K | 4B | 75 | f | 66 | 102 | FNC2 | 7B,32 | 123,50 |
| 1 | 31 | 49 | L | 4C | 76 | g | 67 | 103 | FNC3 | 7B,33 | 123,51 |
| 2 | 32 | 50 | M | 4D | 77 | h | 68 | 104 | FNC4 | 7B,34 | 123,52 |
| 3 | 33 | 51 | N | 4E | 78 | i | 69 | 105 | SHIFT | 7B,53 | 123,83 |
| 4 | 34 | 52 | O | 4F | 79 | j | 6A | 106 | CODEA | 7B,41 | 123,65 |
| 5 | 35 | 53 | P | 50 | 80 | k | 6B | 107 | CODEC | 7B,43 | 123,67 |
| 6 | 36 | 54 | Q | 51 | 81 | l | 6C | 108 | | | |
| 7 | 37 | 55 | R | 52 | 82 | m | 6D | 109 | | | |
| 8 | 38 | 56 | S | 53 | 83 | n | 6E | 110 | | | |
| 9 | 39 | 57 | T | 54 | 84 | o | 6F | 111 | | | |
| : | 3A | 58 | U | 55 | 85 | p | 70 | 112 | | | |

Printable characters in code set C

| Char-acte | Transmit Data | | Char-acte | Transmit Data | | Char-acte | Transmit Data | | Char-acte | Transmit Data | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hex | Dec | | Hex | Dec | | Hex | Dec | | Hex | Dec |
| 0 | 00 | 0 | 28 | 1C | 28 | 56 | 38 | 56 | 84 | 54 | 84 |
| 1 | 01 | 1 | 29 | 1D | 29 | 57 | 39 | 57 | 85 | 55 | 85 |
| 2 | 02 | 2 | 30 | 1E | 30 | 58 | 3A | 58 | 86 | 56 | 86 |
| 3 | 03 | 3 | 31 | 1F | 31 | 59 | 3B | 59 | 87 | 57 | 87 |
| 4 | 04 | 4 | 32 | 20 | 32 | 60 | 3C | 60 | 88 | 58 | 88 |
| 5 | 05 | 5 | 33 | 21 | 33 | 61 | 3D | 61 | 89 | 59 | 89 |
| 6 | 06 | 6 | 34 | 22 | 34 | 62 | 3E | 62 | 90 | 5A | 90 |
| 7 | 07 | 7 | 35 | 23 | 35 | 63 | 3F | 63 | 91 | 5B | 91 |
| 8 | 08 | 8 | 36 | 24 | 36 | 64 | 40 | 64 | 92 | 5C | 92 |
| 9 | 09 | 9 | 37 | 25 | 37 | 65 | 41 | 65 | 93 | 5D | 93 |
| 10 | 0A | 10 | 38 | 26 | 38 | 66 | 42 | 66 | 94 | 5E | 94 |
| 11 | 0B | 11 | 39 | 27 | 39 | 67 | 43 | 67 | 95 | 5F | 95 |
| 12 | 0C | 12 | 40 | 28 | 40 | 68 | 44 | 68 | 96 | 60 | 96 |
| 13 | 0D | 13 | 41 | 29 | 41 | 69 | 45 | 69 | 97 | 61 | 97 |
| 14 | 0E | 14 | 42 | 2A | 42 | 70 | 46 | 70 | 98 | 62 | 98 |
| 15 | 0F | 15 | 43 | 2B | 43 | 71 | 47 | 71 | 99 | 63 | 99 |
| 16 | 10 | 16 | 44 | 2C | 44 | 72 | 48 | 72 | FNC1 | 7B,31 | 123,49 |
| 17 | 11 | 17 | 45 | 2D | 45 | 73 | 49 | 73 | CODEA | 7B,41 | 123,65 |
| 18 | 12 | 18 | 46 | 2E | 46 | 74 | 4A | 74 | CODEB | 7B,42 | 123,66 |
| 19 | 13 | 19 | 47 | 2F | 47 | 75 | 4B | 75 | | | |
| 20 | 14 | 20 | 48 | 30 | 48 | 76 | 4C | 76 | | | |
| 21 | 15 | 21 | 49 | 31 | 49 | 77 | 4D | 77 | | | |
| 22 | 16 | 22 | 50 | 32 | 50 | 78 | 4E | 78 | | | |
| 23 | 17 | 23 | 51 | 33 | 51 | 79 | 4F | 79 | | | |
| 24 | 18 | 24 | 52 | 34 | 52 | 80 | 50 | 80 | | | |
| 25 | 19 | 25 | 53 | 35 | 53 | 81 | 51 | 81 | | | |
| 26 | 1A | 26 | 54 | 36 | 54 | 82 | 52 | 82 | | | |
| 27 | 1B | 27 | 55 | 37 | 55 | 83 | 53 | 83 | | | |