

# **PP7MX PRINTER COMMAND MANUAL**

**Pinnacle Technology Corp.**

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# 1 COMMANDS

The command explanations include the following parts:

- 1) **Name and the general description of the command's function**---This is the first part for the command description; it presents the command's ASCII code format and general description of its function.
- 2) **Format**---This part used ASCII coding form, decimal code, and hex code to describe the command.
- 3) **(Parameter) Range**---This part gives the range of the variable. If there is special explanation, it should be the decimal value. E.g.  $1 \leq n \leq 4$ , in which the number '1' is the decimal value, but the ASCII coding form.
- 4) **Description**---This part is to explain the command in detail.
- 5) **Note**---This part gives the attention items of the command. As the commands may interfere with each other when they are used in different modes or when they co-work with different commands, yet this part gives the details for these attention items.

|    | Command       | Decimal | Hex   | Function  |
|----|---------------|---------|-------|---|
| 1  | HT            | 9       | 9     | Horizontal tab  |
| 2  | LF            | 10      | 0A    | Print and line feed                                   |
| 3  | FF            | 12      | 0C    | Print and recover to page mode                        |
| 4  | CR            | 13      | 0D    | Print and carriage return                             |
| 5  | DLE DC4 n m t | 16 20   | 10 14 | Real-time output of drawer pulse                      |
| 6  | DLE EOT       | 16 4    | 10 04 | Transmit real-time state                              |
| 7  | CAN           | 24      | 18    | Cancel print data in page mode                        |
| 8  | ESC FF        | 27 12   | 1B 0C | Print data in page mode                               |
| 9  | ESC SP        | 27 32   | 1B 20 | Set right-side character spacing                      |
| 10 | ESC !         | 27 33   | 1B 21 | Select print mode(s)                                  |
| 11 | ESC \$        | 27 36   | 1B 24 | Set absolute print position                           |
| 12 | ESC *         | 27 42   | 1B 2A | Select bit-image mode                                 |
| 13 | ESC -         | 27 45   | 1B 2D | Turn underline mode on/off                            |
| 14 | ESC 2         | 27 50   | 1B 32 | Select default line spacing                           |
| 15 | ESC 3         | 27 51   | 1B 33 | Set line spacing                                      |
| 16 | ESC =         | 27 61   | 1B 3D | Select printer or VFD                                 |
| 17 | ESC @         | 27 64   | 1B 40 | Initialize printer                                    |
| 18 | ESC D         | 27 68   | 1B 44 | Set horizontal tab positions                          |
| 19 | ESC J         | 27 74   | 1B 4A | Print bitmap lattice data, and feed n lines           |
| 20 | ESC L         | 27 76   | 1B 4C | Select page mode                                      |
| 21 | ESC M n       | 27 77   | 1B 4D | Select character font                                 |
| 22 | ESC S         | 27 83   | 1B 53 | Select standard mode                                  |
| 23 | ESC T         | 27 84   | 1B 54 | Select character print direction in page mode         |
| 24 | ESC V         | 27 86   | 1B 56 | Specify/cancel character 90 degree clockwise rotation |

|    |        |        |       |   |
|----|--------|--------|-------|---|
| 25 | ESC W  | 27 87  | 1B 57 | Set printing area in page mode  |
| 26 | ESC \  | 27 92  | 1B 5C | Specify relative position   |
| 27 | ESC a  | 27 97  | 1B 61 | Position alignment  |
| 28 | ESC d  | 27 100 | 1B 64 | Print and feed paper n lines  |
| 29 | ESC i  | 27 105 | 1B 69 | Execute partial-cut   |
| 30 | ESC m  | 27 109 | 1B 6D | Partial cut (three points left uncut)                                   |
| 31 | ESC p  | 27 112 | 1B 70 | Specify cash drawer pulse   |
| 32 | ESC t  | 27 116 | 1B 74 | Select character code table   |
| 33 | ESC {  | 27 123 | 1B 7B | Turn upside-down printing mode on/off                                   |
| 34 | FS !   | 28 33  | 1C 21 | Set Chinese characters mode   |
| 35 | FS S   | 28 83  | 1C 53 | Set Chinese character space amount                                      |
| 36 | FS p   | 28 112 | 1C 70 | Print bit image that download to flash                                  |
| 37 | FS q   | 28 113 | 1C 71 | Define NV bit image   |
| 38 | GS !   | 29 33  | 1D 21 | Select character size   |
| 39 | GS \$  | 29 36  | 1D 24 | Specify absolute position for character vertical direction in page mode |
| 40 | GS H   | 29 72  | 1D 48 | Select printing position of HRI characters                              |
| 41 | GS L   | 29 76  | 1D 4C | Set left margin   |
| 42 | GS P   | 29 80  | 1D 50 | Set basic calculated pitch  |
| 43 | GS V   | 29 86  | 1D 56 | End of printing and cut paper   |
| 44 | GS \   | 29 92  | 1D 5C | Specify relative position for character vertical direction in page mode |
| 45 | GS h   | 29 104 | 1D 68 | Set bar code height   |
| 46 | GS k   | 29 107 | 1D 6B | Print bar code  |
| 47 | GS ( k | 29 40  | 1D 28 | Set up and print the symbol   |
| 48 | GS v   | 29 118 | 1D 76 | Print raster bitmap   |
| 49 | GS w   | 29 119 | 1D 77 | Set bar code width  |
| 50 | GS k   | 29 40  | 1D 28 | Set QR code   |
| 51 | GS E   |        | 1D 28 | Set black mark detection parameter                                      |

(1)

● **HT Horizontal tab**

---

**Format:**      ASCII      HT  
                   Decimal      9  
                   Hex         09

**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.
- If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [printing area width + 1].
- Horizontal tab positions are set with ESC D.
- If this command is received when the printing position is at [printing area width + 1], the printer executes print bufferfull printing of the current line and horizontal tab processing from the beginning of the next line.

**Reference :** ESC D

(2)

- **LF**      Print and line feed

---

|                |         |    |
|----------------|---------|----|
| <b>Format:</b> | ASCII   | LF |
|                | Decimal | 10 |
|                | Hex     | 0A |

**Note:**

- LF prints the data in the print buffer and fed per line based on the current line space.
- Print characters with CR command.

(3)

- **FF**      Print and recover to page mode

---

|                |         |    |
|----------------|---------|----|
| <b>Format:</b> | ASCII   | FF |
|                | Decimal | 12 |
|                | Hex     | 0C |

**Description:** Prints all buffered data to the print region collectively, then recovers to the standard mode.

**Note:**

- All buffer data is deleted after printing.
- The print area set by ESC W (Set print region in page mode) is reset to the default setting.
- No paper cut is executed.
- Sets the print position to the beginning of the next line after execution.
- This command is enabled only in page mode.

**Reference:** ESC FF, ESC L, ESC S

(4)

- **CR**      Print and carriage return

---

|                |         |    |
|----------------|---------|----|
| <b>Format:</b> | ASCII   | CR |
|                | Decimal | 13 |
|                | Hex     | 0D |

**Note:**

- Set the print position to the beginning of the line.
- Print characters with LF command.

(5)

- **DLE DC4 n m t** Real-time output of drawer pulse

---

|                |         |     |     |   |   |   |
|----------------|---------|-----|-----|---|---|---|
| <b>Format:</b> | ASCII   | DLE | EOT | n | m | t |
|                | Decimal | 16  | 20  | n | m | t |
|                | Hex     | 10  | 14  | n | m | t |

**Range:** n = 1

m = 0, 1

1 ≤ t ≤ 8

**Description:** This outputs a signal specified by t to the connector pin specified by m.

| m | Pin #                               |
|---|-------------------------------------|
| 0 | #2 Pin of the drawer kick connector |
| 1 | #5 Pin of the drawer kick connector |

On time is set to t x 100 msec; Off time is set to t x 100 msec.

**Note:**

- This command is ignored while outputting the pulse (while executing either ESC p or DEL DC4) to the connector pin while processing this command.
- This command is executed as long as printer receives this command in serial mode.
- This command cannot be executed when the printer is busy in parallel mode.
- If printing data string is the same as this command, then the printing data string will be executed as this command. Users should pay attention to this case.
- Do not use this command to interrupt code strings of other commands that consist of 2 or more codes.
- This command is enabled even when the printer specification is disable by ESC= (select peripheral devices).

(6)

- DLE EOT n Transmit real-time state

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

**Range:** 1 ≤ n ≤ 4

**Note:**

- This command is only suitable for the printer model of serial port.
- Transmit the real-time state parameter n of the printer, in order to designate the deferent printer state, define as follows:

**n=1: transmit printer state;**

| Bit | Off/On | Hex | Decimal | Function                   |
|-----|--------|-----|---------|----------------------------|
| 0   | Off    | 00  | 0       | Fixed to Off               |
| 1   | On     | 02  | 2       | Fixed to On                |
| 2   | Off    | 00  | 0       | Cash drawer open           |
|     | On     | 04  | 4       | Cash drawer closed         |
| 3   | Off    | 00  | 0       | Online                     |
|     | On     | 08  | 8       | Offline                    |
| 4   | On     | 10  | 16      | Fixed to On                |
| 5   | Off    | 00  | 00      | Not wait for online resume |
|     | On     | 20  | 32      | Wait for online resume     |
| 6   | —      | —   | —       | Undefined                  |
| 7   | Off    | 00  | 00      | Fixed to Off               |

**n=2: transmit offline state;**

| Bit | Off/On | Hex | Decimal | Function                 |
|-----|--------|-----|---------|--------------------------|
| 0   | Off    | 00  | 0       | Fixed to Off             |
| 1   | On     | 02  | 2       | Fixed to On              |
| 2   | Off    | 00  | 0       | Upper cover closed       |
|     | On     | 04  | 4       | Upper cover open         |
| 3   | Off    | 00  | 0       | Not press paper feed key |
|     | On     | 08  | 8       | Press paper feed key     |
| 4   | On     | 10  | 16      | Fixed to On              |
| 5   | Off    | 00  | 00      | Paper adequate           |
|     | On     | 20  | 32      | Printer no paper         |
| 6   | Off    | 00  | 0       | No error                 |
|     | On     | 40  | 64      | Error                    |
| 7   | Off    | 00  | 0       | Fixed to Off             |

**n=3: transmit error state;**

| Bit | Off/On | Hex | Decimal | Function                                  |
|-----|--------|-----|---------|---|
| 0   | Off    | 00  | 0       | Fixed to Off                              |
| 1   | On     | 02  | 2       | Fixed to On                               |
| 2   |        | —   | —       | Undefined                                 |
| 3   | Off    | 00  | 0       | Cut no error                              |
|     | On     | 08  | 8       | Cut error                                 |
| 4   | On     | 10  | 16      | Fixed to On                               |
| 5   | Off    | 00  | 0       | No beyond retrieve error                  |
|     | On     | 20  | 32      | Beyond retrieve error                     |
| 6   | Off    | 00  | 0       | Printer temperature and voltage normal    |
|     | On     | 40  | 64      | Printer temperature or voltage over range |
| 7   | Off    | 00  | 0       | Fixed to Off                              |

**n=4: transmit paper roll sensor state;**

| Bit  | Off/On | Hex | Decimal | Function       |
|------|--------|-----|---------|----------------|
| 0    | Off    | 00  | 0       | Fixed to Off   |
| 1    | On     | 02  | 2       | Fixed to On    |
| 2, 3 | Off    | 00  | 0       | Paper adequate |
|      | On     | 0C  | 12      | Paper near end |
| 4    | On     | 10  | 16      | Fixed to On    |
| 5,6  | Off    | 00  | 00      | Paper adequate |
|      | On     | 60  | 96      | Paper end      |
| 7    | Off    | 00  | 0       | Fixed to Off   |

(7)

● **CAN** Cancel

---

|                |         |     |
|----------------|---------|-----|
| <b>Format:</b> | ASCII   | CAN |
|                | Decimal | 24  |
|                | Hex     | 18  |

**Description:** Deletes all print data in the currently set print region in page mode.

**Note:** .

- This command is enabled only in page mode.
- Portions included in the currently set print region are also deleted, even if previously set print region data.

**Reference:** ESC L, ESC W

(8)

● **ESC FF** print data in page mode

---

|                |         |     |    |
|----------------|---------|-----|----|
| <b>Format:</b> | ASC II  | ESC | FF |
|                | Decimal | 27  | 12 |
|                | Hex     | 1B  | 0C |

**Description:** Prints all buffered data in the print area collectively in page mode.

**Note:**

- This command is enabled only in page mode.
- Holds the following information after printing.
  - a. Expanded data
  - b. Character print direction selection in page mode (ESCT)
  - c. Set print region (ESCW) in the page mode.
  - d. Character expansion position

**Reference:** FF, ESCL, ESCS

(9)

● **ESC SP n** Set right-side character spacing

---

|                |         |     |    |   |
|----------------|---------|-----|----|---|
| <b>Format:</b> | ASCII   | ESC | SP | n |
|                | Decimal | 27  | 32 | n |
|                | Hex     | 1B  | 20 | n |

**Range:**  $0 \leq n \leq 255$

**Initial Value:** n=0

**Function:** Set the right space amount for the character to  $[n \times \text{basic calculated pitch}]$ .

**Details:**

- If the character horizontal direction magnification ratio is more than 2, the right space amount is also enlarged accordingly.
- This command does not affect Chinese characters.
- Right space amounts can be set independently for both the standard and page modes.
- The basic calculated pitch is set by GSP (Set basic calculated pitch). Also, after setting the right space amount, it is not affected even if the basic calculated pitch is changed.
- If the calculation results in fractions, the pitch is corrected to a minimal mechanical pitch and the rest is discarded.
- In standard mode, the basic calculated pitch (x) for the horizontal direction is used.
- In page mode, the basic calculated pitch that is used according to the starting point varies.



- a. When the starting point is specified to be upper left or lower right by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (x) for the horizontal direction is used.
- b. When the starting point is specified to be upper right or lower left by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (y) for the horizontal direction is used.
- The maximum value that can be set for the right space amount is approximately 35.983 mm (or 255/180 inch). Specifications that exceed the maximum value are rounded off to that value.

(10)

• **ESC ! Select print modes**

---

|                |         |     |    |   |
|----------------|---------|-----|----|---|
| <b>Format:</b> | ASC II  | ESC | !  | n |
|                | Decimal | 27  | 33 | n |
|                | Hex     | 1B  | 21 | n |

**Range**  $0 \leq n \leq 255$

**Initial Value** n=0

**Function** Select print mode(s) using n as follows.

| Bit  | Off/On | 1/0 | Hex | Decimal | Functions                        |
|------|--------|-----|-----|---------|----------------------------------|
| 0    | Off    | 0   | 00  | 0       | Character font A(12×24) selected |
| 1, 2 | Off    |     | --- | ---     | Reserved                         |
| 3    | Off    | 0   | 00  | 0       | Emphasized mode not selected.    |
|      | On     | 1   | 08  | 8       | Emphasized mode selected.        |
| 4    | Off    | 0   | 00  | 0       | Double-height mode not selected. |
|      | On     | 1   | 10  | 16      | Double-height mode selected.     |
| 5    | Off    | 0   | 00  | 0       | Double-width mode not selected.  |
|      | On     | 1   | 20  | 32      | Double-width mode selected.      |
| 6    | Off    |     | --- | ---     | Reserved                         |
| 7    | Off    | 0   | 00  | 0       | Underline mode not selected.     |
|      | On     | 1   | 80  | 128     | Underline mode selected.         |

**Details:**

- Quadruple-size characters are printed by specifying both double-tall (bit4=1) and double-wide (bit 5=1) modes.
- An underline is applied to the entire character width, including the ESC SP (character right space amount). However, underlines are not applied to portions that have been skipped using HT (horizontal tab) or ESC V (character 90 degree rotation).
- The thickness of the underline is set by ESC - (specify/cancel underlines) regardless of the character.
- The base line for characters is the same when there are characters having different vertical direction ratios in the same line.
- The setting of the last received command is effective even when emphasized printing is executed by the ESC E (specify/cancel emphasized printing) command.
- The setting of the last received command is effective even when underlines are executed by the (ESC -) Specify/cancel underline command.
- The setting of the last received command is effective even when character size is executed by the GS! command.
- Emphasized printing (bit 3) is effective for ANK and Chinese characters. Other printing modes are effective only on ANK characters. Specifications using this command are ignored in HRI characters.

The following are the font configurations on printers.

**Reference:** ESC-, ESC E, GS!

(11)

- **ESC \$** Set absolute print position

---

|                |         |     |    |    |    |
|----------------|---------|-----|----|----|----|
| <b>Format:</b> | ASC II  | ESC | \$ | nL | nH |
|                | Decimal | 27  | 36 | nL | nH |
|                | Hex     | 1B  | 24 | nL | nH |

**Range:**  $0 \leq nL \leq 255$   
 $0 \leq nH \leq 255$

**Description:**

Specifies the next printing starting position using an absolute position based on the left margin position. The next printing starting position is the position specified by  $[(nL+nH \times 256) \times \text{basic calculated pitch}]$  from the left margin position.

**Note:**

- Specifications exceeding the print range are ignored.
- The basic calculated pitch is set by GSP (Set basic calculated pitch).
- If the calculation results in fractions, the pitch is corrected to a minimal mechanical pitch and the rest is discarded.
- In standard mode, the basic calculated pitch (x) for the horizontal direction is used.
- In page mode, the basic calculated pitch that is used according to the starting point varies.
  - When the starting point is specified to be upper left or lower right by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (x) for the horizontal direction is used.
  - When the starting point is specified to be upper right or lower left by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (y) for the horizontal direction is used.

**Reference:** ESC \ , GS \$, GS \ , GS P

(12)

- **ESC \*** Select bit-image mode

---

|                |         |     |    |   |    |    |           |
|----------------|---------|-----|----|---|----|----|-----------|
| <b>Format:</b> | ASCII   | ESC | *  | m | nL | nH | d1 ... dk |
|                | Decimal | 27  | 42 | m | nL | nH | d1 ... dk |
|                | Hex     | 1B  | 2A | m | nL | nH | d1 ... dk |

**Range:**  $m=0, 1, 32, 33$   
 $0 \leq nL \leq 255$   
 $0 \leq nH \leq 3$   
 $0 \leq d \leq 255$

ESC \* m nL nH d1 ... dk selects a bit-image mode using m for the number of dots specified by  $(nL + nH \times 256)$ . Set a bit to 1 to print a dot, or set a bit to 0 to not print a dot. d indicates the bit image data. The modes selectable by m are as follows:

| m  | Mode                  | Vertical direction               |                   | Horizontal direction |                    |
|----|-----------------------|----------------------------------|-------------------|----------------------|--------------------|
|    |                       | Number of bits for vertical data | Dot density (DPI) | Dot density (DPI)    | Amount of data (k) |
| 0  | 8-dot single-density  | 8                                | 68                | 101                  | 192                |
| 1  | 8-dot double-density  | 8                                | 68                | 203                  | 384                |
| 2  | 24-dot single-density | 24                               | 203               | 101                  | 192                |
| 33 | 24-dot double-density | 24                               | 203               | 203                  | 384                |
| 39 | 24-dot double-density | 24                               | 203DPI            | 203DPI               | 384                |

(13)

- ESC - Turn underline mode on/off

---

|                |         |     |    |   |
|----------------|---------|-----|----|---|
| <b>Format:</b> | ASC II  | ESC | -  | n |
|                | Decimal | 27  | 45 | n |
|                | Hex     | 1B  | 2D | n |

**Range:**  $0 \leq n \leq 1$   
 0: turn underline mode off  
 1: turn underline mode on

(14)

- ESC 2 Select default line spacing

---

|                |         |     |    |
|----------------|---------|-----|----|
| <b>Format:</b> | ASC II  | ESC | 2  |
|                | Decimal | 27  | 50 |
|                | Hex     | 1B  | 32 |

**Description:** Sets line feed amount per one line to approximately 4.23 mm (1/6 inch).

**Note:** Line spacing can be set independently for both the standard and page modes.

**Reference:** ESC 3

(15)

- ESC 3 Set line spacing

---

|                |         |     |    |   |
|----------------|---------|-----|----|---|
| <b>Format:</b> | ASC II  | ESC | 3  | n |
|                | Decimal | 27  | 51 | n |
|                | Hex     | 1B  | 33 | n |

**Range:**  $0 \leq n \leq 255$

**Description:** Sets the line space for one line to [n x basic calculated pitch].

**Note:**

- ESC 3 n sets the line spacing to  $n \times$  (vertical or horizontal motion unit). The default setting of the paper feed amount is 1/6 inch ( $n=60$ ). The maximum line spacing amount is 40 inches. When standard mode is selected, the vertical motion unit set by GS P is used. When page mode is selected, the vertical or horizontal motion unit set by GS P is used for the print direction set by ESC T.
- The line spacing can be set independently in standard mode and in page mode.
- The basic calculated pitch is set by GSP (Set basic calculated pitch). Also, after setting the line space, it is not affected even if the basic calculated pitch is changed.
- If the calculation results in fractions, the pitch is corrected to a minimal mechanical pitch and the rest is discarded.
- In standard mode, the basic calculated pitch (y) for the vertical direction is used.
- In page mode, the basic calculated pitch that is used according to the starting point varies.
  - When the starting point is specified to be upper left or lower right by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (x) for the horizontal direction is used.
  - When the starting point is specified to be upper right or lower left by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (y) for the horizontal direction is used.
- The maximum value that can be set for the line space is approximately 1,016mm (or 40 inches). Specifications that exceed the maximum value are rounded off to that value.

**Reference:** ESC 2, GS P

(16)

- ESC = n    Select printer or VFD

---

|                |         |     |    |   |
|----------------|---------|-----|----|---|
| <b>Format:</b> | ASCII   | ESC | =  | n |
|                | Decimal | 27  | 61 | n |
|                | Hex     | 1B  | 3D | n |

**Range:**     $1 \leq n \leq 2$

**Function:**    Selects the printer or VFD for which the data is effective from the host computer.

| Bit | 1/0 | Hex | Decimal | Function        |
|-----|-----|-----|---------|-----------------|
| 0   | 0   | 00  | 0       | Printer invalid |
| 1   | 1   | 01  | 1       | Printer valid   |
| 2   | 2   | 02  | 2       | VFD valid       |
| 3-7 |     | -   | -       | Undefined       |

The function of bit 3~7 are undefined.

**Details:**    If the printer is selected to be invalid, the printer discards all data from the next data until the printer is made valid again by this command. (This excludes DLEEOT, DLEENQ, DLEDC4.)

Even when the printer is not invalid, the printer specification of this command ( $n = 1$ ) is processed.

(17)

- ESC @    Initialize printer

---

|                |         |     |    |
|----------------|---------|-----|----|
| <b>Format:</b> | ASC II  | ESC | @  |
|                | Decimal | 27  | 64 |
|                | Hex     | 1B  | 40 |

ESC @ initializes the printer. All settings, including character font and line spacing settings, are canceled. The data in the print buffer is cleared and the printer mode is reset to the mode that was in effect when the power was turned on. The DIP switch settings are not checked again, the data in the receive buffer is not cleared, and any macro definitions are not cleared.

(18)

- ESC D    Set horizontal tab positions

---

|                |         |     |    |               |
|----------------|---------|-----|----|---------------|
| <b>Format:</b> | ASC II  | ESC | D  | n1 ... nk NUL |
|                | Decimal | 27  | 68 | n1 ... nk 00  |
|                | Hex     | 1B  | 44 | n1 ... nk 0   |

**Range:**     $1 \leq n \leq 255$   
 $0 \leq k \leq 32$

**Description:**

ESC D n1 ... nk NUL sets a horizontal tab position to n columns from the beginning of a line, with k indication the total number of horizontal tab positions to be set. When a left margin is set in standard mode, the position of the left margin is the beginning of the line. A maximum of 32 tab positions can be set. This command cancels any previous horizontal tab settings. The default tab positions are every eight characters for the font A (12x24).

**Note:** The character width is stored for standard and page modes.

**Reference:** HT

(19)

- ESC J    Print and feed paper

---

|                |        |     |   |   |
|----------------|--------|-----|---|---|
| <b>Format:</b> | ASC II | ESC | J | n |
|----------------|--------|-----|---|---|

|         |    |    |   |
|---------|----|----|---|
| Decimal | 27 | 74 | n |
| Hex     | 1B | 4A | n |

**Range:**  $0 \leq n \leq 255$

**Description:**

ESC J n prints the data in the print buffer and feeds the paper  $n \times$  (vertical or horizontal motion unit). This command is used to temporarily feed a specific length without changing the line spacing set by other commands. The maximum paper feed amount is 40 inches. When standard mode is selected, the vertical motion unit set by GS P is used. When page mode is selected, the vertical or horizontal motion unit set by GS P is used from the print direction set by ESC T.

**Note:**

- In standard mode, the basic calculated pitch (y) for the vertical direction is used.
- In page mode, the basic calculated pitch that is used according to the starting point varies.
  - a. When the starting point is specified to be upper left or lower right by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (x) for the horizontal direction is used.
  - b. When the starting point is specified to be upper right or lower left by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (y) for the horizontal direction is used.
- Paper is fed approximately 1016 mm if the [n x basic calculated pitch] exceeds approximately 1016mm (40 inches).

**Reference:** GS P

(20)

- ESC L Select page mode

---

|                |         |     |    |
|----------------|---------|-----|----|
| <b>Format:</b> | ASC II  | ESC | L  |
|                | Decimal | 27  | 76 |
|                | Hex     | 1B  | 4C |

**Description:** Switches from standard mode to page mode.

**Note:**

- Enabled only when input with the top of line.
- Invalid when input by page mode.
- Returns to standard mode after the following commands are issued.
  - a. FF (Print and recover to page mode)
  - b. ESC S (Select standard mode)
- Character expansion position has the starting point specified by ESC T (Character print direction selection in page mode) in the printing region designated by the ESC W (Set print region in the page mode) command.
- This command switches the settings for the following commands the values of which can be set independently in standard mode and page mode to those for page mode.
  - a. Set space amount: ESC SP, FS S
  - b. Set line feed amount: ESC 2, ESC 3
- The following commands are enabled only when in page mode.
  - a. ESC V :Specify/cancel character 90 degree clockwise rotation
  - b. ESC a :Position alignment
  - c. ESC { :Specify/cancel upside-down printing
  - d. GS L :Set left margin
  - e. GS W :Set print region width
- The following command is ignored in page mode.

- a. GS (A :Test print
- The following commands are invalid in page mode.
  - a. FSp :Print NV bit image
  - b. FSq :Define NV bit image
  - c. FSg1 :Write data to user NV memory
  - d. GSv0 :Print raster bit images
- Recover to standard mode using ESC@ (initialize printer).

**Reference:** FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS \$, GS \

(21)

- ESC M n Select character font

---

|                |         |     |    |   |
|----------------|---------|-----|----|---|
| <b>Format:</b> | ASC II  | ESC | M  | n |
|                | Decimal | 27  | 77 | n |
|                | Hex     | 1B  | 4D | n |

**Description:** Select character font.

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

**Note:**

- Currently only support Font A (12 x 24).

(22)

- ESC S Select standard mode

---

|                |         |     |    |
|----------------|---------|-----|----|
| <b>Format:</b> | ASC II  | ESC | FF |
|                | Decimal | 27  | 83 |
|                | Hex     | 1B  | 53 |

**Description:** Switches from page mode to standard mode.

**Note:**

- Valid only when input by page mode.
- All buffer data in page mode is deleted.
- Sets the print position to the beginning of the next line after execution.
- The print area set by ESCW (Set print region in page mode) is reset to the default setting.
- This command switches the settings for the following commands the values of which can be set independently in standard mode and page mode to those for standard mode
  - a. ESC SP :Set character right space amount
  - b. FS S :Set Chinese character space amount
  - c. ESC 2 :Set default line spacing
  - d. ESC 3 :Set line feed amount
- The following commands are effective only when in standard mode.
  - a. ESC W :Set print region in page mode
  - b. ESC T :Select character print direction in page mode
- The following commands are ignored in standard mode.
  - a. GS S :Specify absolute position for character vertical direction in page mode
  - b. GS \: :Specify relative position for character vertical direction in page mode
- Standard mode is selected when the power is turned on, the printer is reset or initialized (ESC @).

**Reference:** FF, ESC FF, ESC L

(23)

- ESC T Select character print direction in page mode

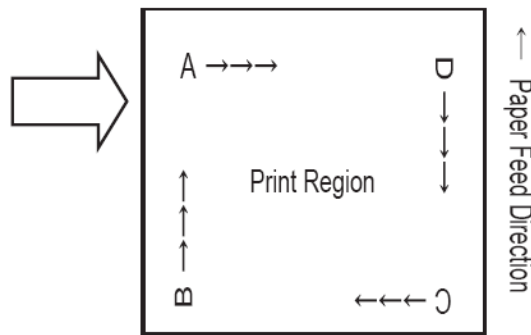
**Format:** ASC II      ESC      FF  
 Decimal      27      84  
 Hex      1B      54

**Range:**  $0 \leq n \leq 3, 48 \leq n \leq 51$

**Initial Value:**  $n = 0$

**Description:** Selects the character printing direction and starting point in page mode.

| n     | Print Direction | Starting Point                      |
|-------|-----------------|-------------------------------------|
| 0, 48 | Left to Right   | Upper Left (A in the figure below)  |
| 1, 49 | Bottom to Top   | Lower Left (B in the figure below)  |
| 2, 50 | Right to Left   | Lower Right (C in the figure below) |
| 3, 51 | Top to Bottom   | Upper Right (D in the figure below) |



**Note:**

- Executes only a printer internal flag operation when this command is input in standard mode. The command does not affect printing in standard mode.
- The character expansion starting point is in the print region specified by ESC W (Set print region in page mode).
- The basic calculated pitch (x or y) used with the following commands differs according to the starting point.
  - If the starting point is upper left or lower right (feeds paper and expands characters in the vertical direction)
    - Commands using x : ESC SP, ESC \$, ESC \, FS S
    - Commands using y : ESC 3, ESC J, GS \$, GS \
  - If the starting point is upper right or lower left
    - Commands using x : ESC 3, ESC J, GS \$, GS \
    - Commands using y : ESC SP, ESC \$, ESC \, FS S

**Reference:** ESC \$, ESC L, ESC W, ESC \, GS \$, GS P, GS \

(24)

ESC V Specify/cancel character 90 degree clockwise rotation

**Format:** ASC II      ESC      V      n  
 Decimal      27      86      n  
 Hex      1B      56      n

**Range:**  $0 \leq n \leq 1, 48 \leq n \leq 49$

**Initial Value:**  $n = 0$

**Description:** Specifies or cancels character 90 degree clockwise rotation

| n    | Function                                |
|------|---|
| 0,48 | Cancels 90 degree clockwise rotation.   |
| 1,49 | Specifies 90 degree clockwise rotation. |

**Note:**

- Underlines are not applied to characters rotated 90 degrees clockwise even when ESC !, ESC . or FS . commands are given.
- If 90 degree clockwise rotation is specified, double-wide and double-tall commands in the 90 rotation mode enlarges characters in the opposite directions to double-wide and double-tall commands.
- This command only affects printing in standard mode.
- In page mode, this command is only effective for the setting.
- This command is effective for ANK and Chinese characters.

**Reference:** ESC !, ESC -

(25)

- ESC W Set printing area in page mode

---

|                |         |     |    |                             |
|----------------|---------|-----|----|-----------------------------|
| <b>Format:</b> | ASC II  | ESC | W  | xL xH yL yH dxL dxH dyL dyH |
|                | Decimal | 27  | 87 | xL xH yL yH dxL dxH dyL dyH |
|                | Hex     | 1B  | 57 | xL xH yL yH dxL dxH dyL dyH |

**Range:**  $0 \leq xL, xH, yL, yH, dxL, dxH, dyL, dyH \leq 255$  (except for  $dxL = dxH = 0$  or  $dyL = dyH = 0$ )

**Description:**

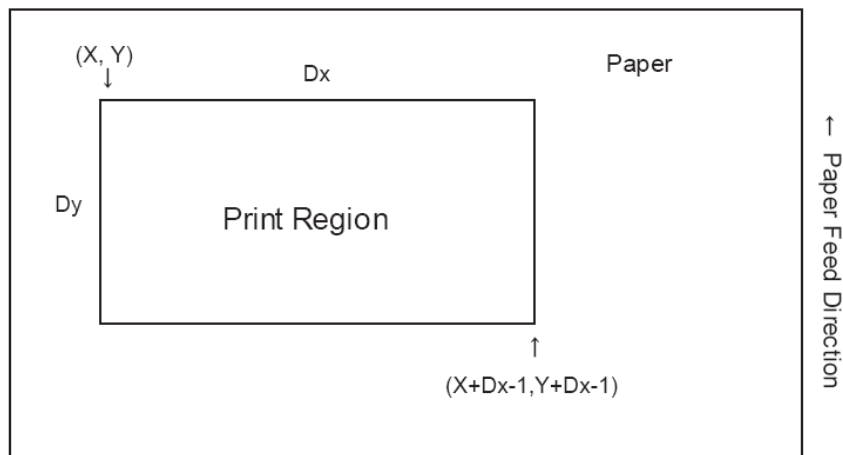
- ◇ ESC W xL xH yL yH dxL dxH dyL dyH sets the size and position of the printing area in page mode as follows:
  - \* Horizontal starting position =  $(xL + xH \times 256)$  (horizontal motion unit)
  - \* Vertical starting position =  $(yL + yH \times 256)$  (vertical motion unit)
  - \* Printing area width =  $(dxL + dxH \times 256)$  (horizontal motion unit)
  - \* Printing area height =  $(dyL + dyH \times 256)$  (vertical motion unit)
- ◇ The default settings are as follows:
  - \*  $xL = 0, xH = 0, yL = 0, yH = 0$
  - \*  $dxL = 0, dxH = 2, dyL = 126, dyH = 6$
- ◇ This command is enabled only in page mode. If this command is processed in standard mode, an internal flag is activated and this command is enabled when the printer selects page mode.
- ◇ The horizontal and vertical motion units use the horizontal and vertical values set by the GS P command. The default settings of the horizontal and vertical motion units are 1/180 and 1/360 inches, respectively.

**Note:**

- In standard mode, the printer executes only internal flag operations with this command is input.
- If the horizontal direction starting point or vertical direction starting point is outside of the printable region, the command is stopped and normal printing commences from subsequent data.
- If the horizontal direction length or vertical direction length is 0, the command is stopped and normal printing commences from subsequent data.
- The character expansion starting point is the point specified by selecting the character printing direction (ESC T) in page mode in the print region.
- If (horizontal direction starting position + horizontal direction length) exceeds the printable region in the horizontal direction, the horizontal direction length is set to (horizontal direction printable region - horizontal direction starting point).



- If (vertical direction starting position + vertical direction length) exceeds the printable region in the vertical direction, the vertical direction length is set to (vertical direction printable region – vertical direction starting point).
- The basic calculated pitch is set by GSP (Set basic calculated pitch). Also, the set printing region is not changed even if the basic calculated pitch is changed after setting the print region.
- If the calculation results in fractions, the pitch is corrected to a minimal mechanical pitch and the rest is discarded.
- The basic calculated pitch (x) is used in the calculated pitch for the horizontal direction starting point and the length in the horizontal direction; and the basic calculated pitch (y) is used in the calculated pitch for the vertical direction starting point and the length in the vertical direction.
- The print region shown in the figure below when the horizontal direction starting is X; the vertical direction starting point is Y; the horizontal direction length is Dx; and the vertical direction length is Dy.



**Reference:** CAN, ESC L, ESC T, GSP

(26)

- ESC \ nL nH Specify relative position

| Format: | ASC II  | ESC | FF |
|---------|---------|-----|----|
|         | Decimal | 27  | 92 |
|         | Hex     | 1B  | 5C |

**Range:**  $0 \leq nL \leq 255, 0 \leq nH \leq 255$

**Description:**

Specifies the next print starting position with a relative position based on the current position. This sets the position from the current position to  $[(nL + nH \times 256) \times \text{basic calculated pitch}]$  for the next print starting position.

**Note:**

- Specifications exceeding the print range are ignored.
- If the right direction of the current position is specified for the character direction, specify a positive number; if the left direction is specified, a negative number is used.
- Negative numbers is represented by the complement of 65536. For example, when moving in the left direction n pitches, use:  $nL + nH \times 256 = 65536 - N$
- The basic calculated pitch is set by GSP (basic calculated pitch setting).
- If there are fractions in the result, correct to the minimum mechanical pitch and discard.
- Use the basic calculated pitch (x) for the horizontal direction in standard mode.
- The following operations occur according to the starting point in page mode.

- a. If the starting point is set to upper left or lower right by the ESC T (Select character print direction in page mode) command, specify the relative position of the vertical direction in the paper feed. Use the basic calculated pitch (x) for the horizontal direction at this time.
- b. If the starting point is set to upper right or lower left by the ESC T (Select character print direction in page mode) command, move the print position in the paper feed direction. Use the basic calculated pitch (y) for the horizontal direction at this time.

**Reference:** ESC \$, GS P

(27)

● ESC a Position alignment

---

**Format:**        ASCII        ESC    a    n  
                   Hex.        1B    61   n  
                   Decimal    27    97   n

**Range:**         $0 \leq n \leq 2, 48 \leq n \leq 50$

**Default Value:** n = 0

**Description:** Aligns all print data in one line to a specified position.

| N     | Position        |
|-------|-----------------|
| 0, 48 | Left alignment  |
| 1, 49 | Center          |
| 2, 50 | Right alignment |

**Notes:**

- This command is effective only when input at the top of the line when standard mode is being used.
- This command has no affect in page mode. In page mode, this command is only effective for the setting.
- Specifies the alignment position in the printing region that has been set.
- Portions skipped using command HT, ESC \$ and ESC \ are also targeted for position alignment.

**E.g.**

**Left alignment**

|       |
|-------|
| ABC   |
| ABCD  |
| ABCDE |

**Center**

|       |
|-------|
| ABC   |
| ABCD  |
| ABCDE |

**Right alignment**

|       |
|-------|
| ABC   |
| ABCD  |
| ABCDE |

(28)

● ESC d Print and feed paper n lines

---

**Format:**        ASCII        ESC    d    n  
                   Hex.        1B    64   n  
                   Decimal    27    100 n

**Range:**         $0 \leq n \leq 255$

**Description:** Prints the data in the print buffer and performs a paper feed of n lines.

**Notes:**

- Sets the print position to the beginning of the next line after printing.
- Line feeds set by command ESC 2 and ESC 3 are not affected.
- Paper is fed approximately 1016 mm (40 inc hes) if the [n x line feed amount] exceeds approximately 1016 mm (40 inches) .

**Reference:** ESC 2, ESC 3

(29)

- ESC i Execute partial-cut (one point left uncut)

---

**Format:** ASCII    ESC    i    n  
 Decimal    27    105    n  
 Hex.        1B    69    n

**Description:** Execute a partial cut of the paper.

(30)

- ESC m Execute partial-cut (three point left uncut)

---

**Format:** ASCII    ESC    m  
 Decimal    27    109  
 Hex.        1B    6D

**Range:** None

**Default:** None

**Description:** Execute a partial cut of the paper.

**Notes:** This command is supported by some printer models but will not be supported by future printer models. GS V is recommended for cutting paper. GS V <Function A> gives the same result as this command.

- See GS V <Function A> for details.
- The cutting shape depends on the specification of the mounted autocutter.

(31)

- ESC p m t1 t2 Specify cash drawer impulse

---

**Format:** ASCII        ESC    p        m    t1    t2  
 Hex                1B    70        m    t1    t2  
 Decimal            27    112       m    t1    t2

**Range:** m = 0, 48, 1, 49  
 $0 \leq t1 \leq 255$   
 $0 \leq t2 \leq 255$

- Drawer kick on time is set to [t1\*2] millisecond; off time is set to [t2\*2] millisecond.
- When  $t2 < t1$ , the value of t2 is processed as  $t2=t1$ .
- If  $t2 < 50$ , its value is supposed to be 50.

(32)

- ESC t n Select character code table

---

**Format:** ASCII    ESC    t    n  
 Hex        1B    74    n  
 Decimal    27    116    n

**Range:**  $0 \leq n \leq 255$

**Initial Value:** n=0

**Function:** Select page n of the character code table.

| n | character            |
|---|----------------------|
| 0 | PC347(U.S.A)         |
| 2 | PC850(Multilingual)  |
| 3 | PC860(Portuguese)    |
| 4 | PC863(Canada-French) |
| 5 | PC865(Nordic)        |

|    |                     |
|----|---------------------|
| 7  | (Spanish)           |
| 8  | PC857(Turkey)       |
| 10 | (Farsi)             |
| 14 | PC864(Arabic)       |
| 18 | PC852 (Latin2)      |
| 20 | PC737(Greek)        |
| 25 | WPC1254(Turkey)     |
| 27 | (Vietnam)           |
| 32 | WPC1255(Israel)     |
| 33 | Rumania             |
| 59 | PC866 (Cyrillic #2) |
| 68 | (Armenia)           |

(33)

- ESC { Turn upside-down printing mode on/off

---

|                |         |     |     |   |
|----------------|---------|-----|-----|---|
| <b>Format:</b> | ASC II  | ESC | {   | n |
|                | Decimal | 27  | 123 | n |
|                | Hex     | 1B  | 7B  | n |

**Range:**  $0 \leq n \leq 255$

ESC { n turns upside-down printing mode on or off. When the LSB (least significant bit) of n is 1, upside-down printing mode is turned on; when it is 0, upside-down printing mode is turned off. The default setting is n=0. When upside-down mode is turned on, the printer prints 180 °-rotated characters from right to left. The line printing order is not reversed; therefore, be careful of the order of the data transmitted. In standard mode, this command is enabled only when processed at the beginning of a line. In page mode, an internal flag is activated and this command is enabled when the printer returns to standard mode.

(34)

- FS ! n Set Chinese characters printing mode compages

---

|                |         |    |    |   |
|----------------|---------|----|----|---|
| <b>Format:</b> | ASCII   | FS | !  | n |
|                | Decimal | 28 | 33 | n |
|                | Hex     | 1C | 21 | n |

**Range:**  $0 \leq n \leq 255$

Set the parameter n of Chinese characters printing mode as follows:

| Digit | 0/1 | Hex | Decimal | Function                         |
|-------|-----|-----|---------|----------------------------------|
| 0, 1  |     | —   | —       | Undefined.                       |
| 2     | 0   | 00  | 0       | Double-width mode not selected.  |
|       | 1   | 04  | 4       | Double-width mode selected.      |
| 3     | 0   | 00  | 0       | Double-height mode not selected. |
|       | 1   | 08  | 8       | Double-height mode selected.     |
| 4-6   |     | --  | --      | Undefined.                       |
| 7     | 0   | 00  | 0       | Underline not selected.          |
|       | 1   | 128 | 80      | Underline selected.              |

(35)

- FS S n1 n2 Set Chinese character space amount

---

**Format:**      ASCII    FS      S      n1   n2  
                   Decimal    28      83      n1   n2  
                   Hex        1C      53      n1   n2

**Range:**       $0 \leq n1 \leq 255, 0 \leq n2 \leq 255$

**Initial value:** n1=0, n2=0

**Description:** 1. Sets the Chinese character space amount and right space amount.  
2. Left space amount: n1 x (basic calculated pitch)  
3. Right space amount: n2 x (basic calculated pitch)

**Note:**

- The space amount set by this command is the amount when using standard sized characters. When expanding characters more than double in the horizontal direction, the space amount is [set amount x horizontal direction magnification].
- Space amount can be set independently for both the standard and page modes.
- The basic calculated pitch is set by GSP (Set basic calculated pitch). Also, after setting the Chinese character space amount, it is not affected even if the basic calculated pitch is changed.
- If there are fractions in the result, correct to the minimum mechanical pitch and discard.
- Use the basic calculated pitch (x) for the horizontal direction in standard mode.
- In page mode, the basic calculated pitch that is used according to the starting point is shown below.
  - a. When the starting point is specified to be upper left or lower right by the ESC T command (Character print direction selection in page mode), the basic calculated pitch (x) for the horizontal direction is used.
  - b. When the starting point is specified to be upper right or lower left by the ESC T command, the basic calculated pitch (y) for the vertical direction is used.
  - c. The maximum value for the left or right space for Chinese characters is approximately 35.893 mm (255/180 inches). Specifications that exceed the maximum value are rounded off to that value.

**Reference:** GSP

(36)

- FS p n m Print the bit image that download to flash

---

**Format**      ASCII    FS    p      n    m  
                   Hex        1C    70      n    m  
                   Decimal    28    112    n    m

**Range:**       $1 \leq n \leq 255, 0 \leq m \leq 3, 48 \leq m \leq 51$

**Description:** Using mode m to print bit image that download to flash.

| m     | Mode             | Density of Vertical Direction Dots | Density of Horizontal Direction Dots |
|-------|------------------|------------------------------------|--------------------------------------|
| 0, 48 | Normal Mode      | 180DPI                             | 180 DPI                              |
| 1, 49 | Double-wide Mode | 180DPI                             | 90 DPI                               |
| 2, 50 | Double-tall Mode | 90 DPI                             | 180 DPI                              |
| 3, 51 | Quadruple Mode   | 90 DPI                             | 90 DPI                               |

n specifies the bit image(defined by command FS q) number.

m specifies the bit-image mode.

**Details:**

- ◇ Flash bit image is a bit image defined in flash memory by FS q and printed by this command.
- ◇ This command is ignored when the bit image is undefined.
- ◇ This command is effective only when no data exists in the print buffer in standard mode.

- ✧ Excluding upside-down printing, print modes (emphasized printing, double printing, double wide, double tall, underlines, character sizes, black/white inverted printing and 90 degree clockwise rotation) are unaffected.
- ✧ If bit image specification is of a size that exceeds the print region, the data in the print region is targeted for printing, but the excessive data is not printed.
- ✧ This command feeds dots (for the height  $n$  of the NV bit image) in normal and double-width modes,
- ✧ and (for the height of the NV bit image  $n \times 2$ ) in double-height and quadruple modes, regardless of
- ✧ the line spacing specified by ESC 2 or ESC 3.
- ✧ After printing the bit image, this command sets the print line feed and processes the subsequent data as normal data.

**Reference:** ESC \*, FS q, GS /, GS v 0

(37)

● **FS q n [xL xH yL yH d1...dk] 1... [xL xH yL yH d1...dk] n Define NV bit image**

| Format | ASCII   | FS | q   | n | [xLxHyLyHd1...dk]1 ... [xLxHyLyHd1...dk] n |
|--------|---------|----|-----|---|--|
|        | Hex     | 1C | 71  | n | [xLxHyLyHd1...dk]1 ... [xLxHyLyHd1...dk] n |
|        | Decimal | 28 | 113 | n | [xLxHyLyHd1...dk]1 ... [xLxHyLyHd1...dk] n |

**Range:**

$$1 \leq n \leq 255$$

$$0 \leq xL \leq 255$$

$$1 \leq (xL+xH \times 256) \leq 1023$$

$$1 \leq (yL+yH \times 256) \leq 288$$

$$0 \leq d \leq 255$$

$$k = (xL+xH \times 256) \times (yL+yH \times 256) \times 8$$

The maximum capacity that downloads to NV is 8096 bytes.

**Descriptions:** Defines the specified flash bit image.

- ✧  $n$  specifies the number of NV bit images to define.
- ✧  $xL$  and  $xH$  specify the horizontal direction for one NV bit image  $(xL + xH \times 256) \times 8$  dots.
- ✧  $yL$  and  $yH$  specify the vertical direction for one NV bit image  $(yL + yH \times 256) \times 8$  dots.

**Notes:**

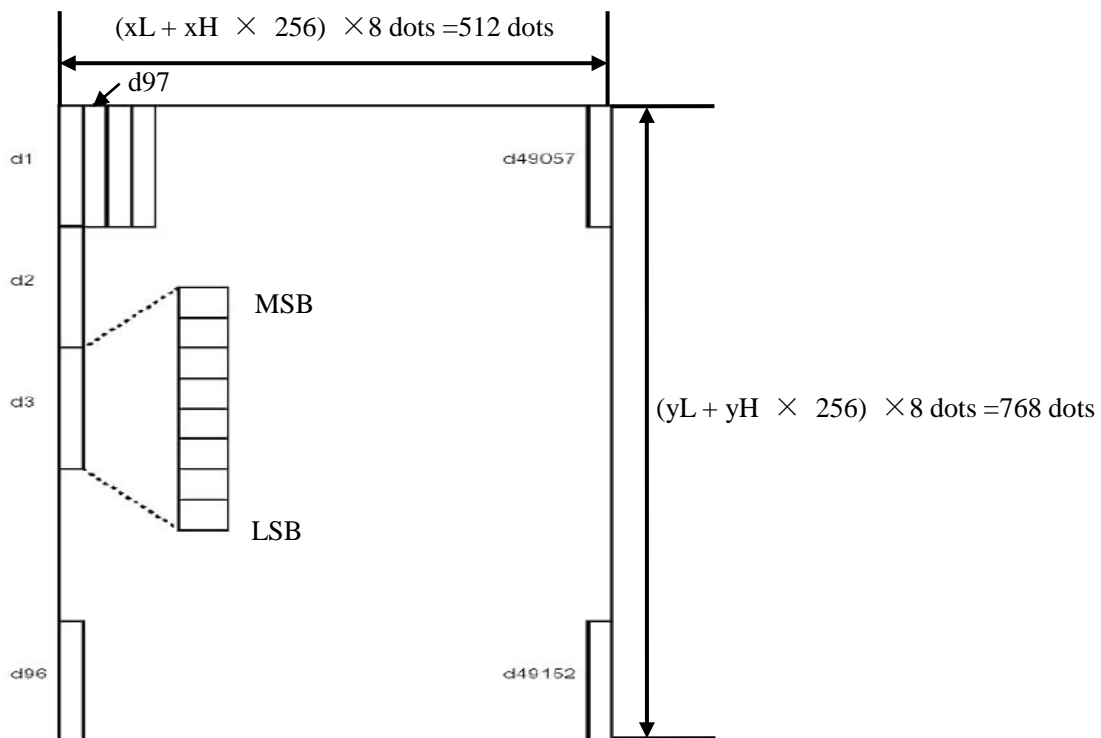
- There is the potential of damaging the non-volatile memory by overusing the command, so only use this command once a day to write to the non-volatile memory.
- This command erases all previously defined NV bit images. The printer cannot redefine only one of several data definitions that had been defined before. Therefore, all data must be resent.
- The printer may enter a BUSY state while writing data to the non-volatile memory when using this command. While the printer is BUSY, the printer will stop receptions so data will not be received from the host (including real-time commands).
- NV bit image is a bit image defined by this command in non-volatile memory and is printed by the FS p (Print NV bit image) command.
- This command is effective only when processed at the top of the line when standard mode is being used.
- This command is effective when 7 bytes of FS to yH of the command are processed normally.
- When the amount of data exceeds the capacity left in the range defined by  $xL$ ,  $xH$ ,  $yL$ ,  $yH$ , the printer only processes the data in the defined range.
- This command is invalid when processing an argument that is out of the defined range with the initial NV bit image data.
- The printer terminates processing of this command and starts writing data to the non-volatile memory if an

argument out of the defined range is processed on the second and subsequent NV bit image data. This invalidates the NV bit image being defined (making it undefined), but the NV bit images prior to that are valid.

- d specifies defined data. Bits that correspond to the dots to print are 1, and the bits that correspond to the dots that are not printed are 0.
- An n number of NV bit images are defined in ascending order from 01H. Therefore, The first data of [xLxHyLyHd1.dk] is an NV bit image of the number 01H. The final data of [xLxHyLyHd1.dk] is the NV bit image of the number n. This matches with the NV bit image number that is specified for NV bit image printing (by FS p).
- One NV bit image definition data is configured by [xL xH yL yH d1.dk]. Therefore, if defining only one NV bit image data, n = 1. The data of [xL xH yL yH d1.dk] is processed only once. This uses  $([data: (xL + xH \times 256) \times (yL + yH \times 256) \times 8] + [Data: 4])$  of non-volatile memory.
- The printer is in a BUSY state just prior to writing to the non-volatile memory.
- The sending of ASB status and detection of status are not possible while processing this command even when the ASB function is specified.
- When processing this command while defining a macro, the macro definition is terminated and the command commences with processing.
- NV bit images that have been defined are not initialized by the ESC @ (Initialize printer), a reset or by turning off the printer's power.
- This command only defines the NV bit image, but it does not print it. To print an NV bit image, use FS p (Print NV bit image).

**Reference:** FS p

**Ex.:** For xL=64, xH=0, yL=96, yH=0



(38)

● **GS ! n** Select character size

---

**Format:** ASCII GS ! n  
Hex 1D 21 n  
Decimal 29 33 n

**Range:**  $0 \leq n \leq 255$

GS ! n selects the character height using bits 0 to 3, and selects the character width using bits 4 to 7.

Character width selection is as follows:

| Hex | Decimal | Width            |
|-----|---------|------------------|
| 00  | 0       | 1 (normal)       |
| 10  | 16      | 2 (double-width) |

Character height selection is as follows:

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

**Note:**

- This command is effective for all characters (ANK and Chinese characters), excluding HRI characters.
- If the vertical and horizontal magnification ratios are outside the defined range, this command is ignored.
- In standard mode, the vertical direction is the paper feed direction; the horizontal direction traverses the paper feed direction. Therefore, when character orientation changes in 90 degree clockwise rotation mode, the relationship between vertical and horizontal directions is reversed.
- In page mode, vertical and horizontal directions are based on the character orientation.
- The base line for characters is the same when there are characters having different vertical direction ratios in the same line.
- The ESC ! (Batch specify print mode) command can also turn double-width and double-height modes on or off, but the setting of the last received command is effective.

**Reference:** ESC !

(39)

● **GS \$ nL nH** Specify absolute position for character vertical direction in page mode

---

**Format:** ASCII GS ! nL nH  
Hex 1D 24 nL nH  
Decimal 29 36 nL nH

**Range:**  $0 \leq nL \leq 255, 0 \leq nH \leq 255$

**Description:**

Specifies the character vertical direction position for the data expansion starting position using the absolute position based on the starting point in page mode. The position of the character vertical direction for the next data expansion starting position is the position specified by  $[(nL + nH \times 256) \times \text{basic calculated pitch}]$  from



the starting point.

**Note:**

- When not in page mode, this command is ignored.
- Specifications for absolute positions that exceed the specified print range are ignored.
- The position of the character horizontal direction of the data expansion starting position does not move.
- The starting point that is used as a reference is specified by ESC T.
- The following operations occur depending on the starting point of (Selecting the character printing direction in page mode) ESC T.
  - a. If the starting point is upper left or lower right, specify the absolute position for the paper feed direction (character vertical direction). Use the basic calculated pitch (y) for the horizontal direction at this time.
  - b. If the starting point is upper right or lower left, specify the absolute position for the paper feed in the vertical direction (character vertical direction). Use the basic calculated pitch (x) for the horizontal direction at this time.
- The basic calculated pitch is set by GSP (Set basic calculated pitch).
- If the calculation results in fractions, the pitch is corrected to a minimal mechanical pitch and the rest is discarded.

**Reference:** ESC \$, ESC T, ESC W, ESC \, GS P, GS \

**(40)**

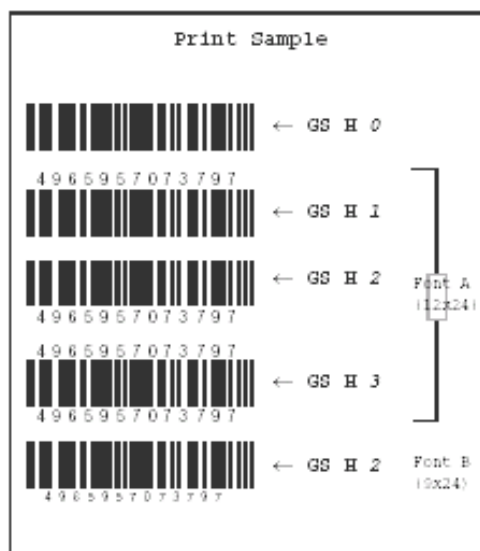
- GS H n Select printing position of HRI characters

---

|                |             |    |    |   |
|----------------|-------------|----|----|---|
| <b>Format:</b> | ASCII       | GS | H  | n |
|                | Hex         | 1D | 48 | n |
|                | Decimal     | 29 | 72 | n |
| <b>Range:</b>  | 0 ≤ n ≤ 3   |    |    |   |
|                | 48 ≤ n ≤ 51 |    |    |   |

GS H n selects the printing position for HRI characters when printing a bar code. n selects the printing position as follows:

The default setting is n=0. HRI characters are printed at the position specified by GS H.



(41)

● **GS L nL nH** Set left margin

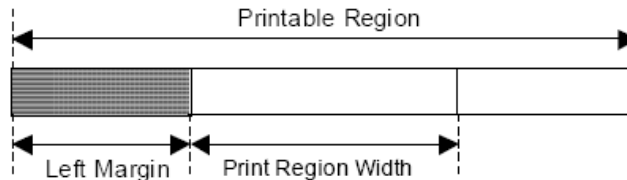
---

**Format:** ASCII GS L nL nH  
Hex 1D 4C nL nH  
Decimal 29 76 nL nH

**Range:**  $0 \leq nL \leq 255, 0 \leq nH \leq 255$

**Description:**

1. nL and nH set the specified left margin.
2. The left margin is  $[(nL + nH \times 256) \times \text{basic calculated pitch}]$



**Note:**

- This command is effective only when input at the top of the line when standard mode is being used.
- This command has no affect in page mode. This command is only effective for the setting.
- The maximum setting for the left margin is the same size as the printable region for the horizontal direction. Specifications that exceed the maximum value are rounded off to that value.
- The basic calculated pitch is set by GSP (Set basic calculated pitch). Also, after setting the left margin, it is not affected even if the basic calculated pitch is changed.
- Use the basic calculated pitch (x) for the horizontal direction of GS P (Set basic calculated pitch) to calculate the left margin. If the calculation results in fractions, the pitch is corrected to a minimal mechanical pitch and the rest is discarded.

**Reference:** GS P, GS W

(42)

● **GS P x y** Set basic calculated pitch

---

**Format:** ASCII GS P x y  
Hex 1D 50 x y  
Decimal 29 80 x y

**Range:**  $0 \leq x \leq 255, 0 \leq y \leq 255$

**Initial value:** x = 180, y = 360: EPSON targeted model print head 180 DPI  
x = 203, y = 203: EPSON targeted model print head 203 DPI

**Description:**

Sets the horizontal basic calculated pitch to approximately  $25.4/x$ mm  $[(1/x)$  inch], and the vertical basic calculated pitch to approximately  $25.4/y$ mm  $[(1/y)$  inch].

x = 0: Returns the horizontal basic calculated pitch to its default value.

y = 0: Returns the vertical basic calculated pitch to its default value.

**Note:**

- Horizontal direction refers to the vertical direction in reference to paper feed; Vertical direction refers to the direction of paper feed.
- With standard mode, use the parameters shown below regardless of the direction of the characters (upside down, or rotated 90 degrees).
  - a. Commands using x: ESC SP, ESC \$, ESC \, FSS, GSL, GSW
  - b. Commands using y: ESC 3, ESC J, GSV
- With page mode, use the parameters shown below according to the direction of the characters.
  - a. If the starting point is upper left or lower right using ESC T (Character print direction selection in page

mode) (feeds paper and expands characters in the vertical direction):

Commands using x: ESC SP, ESC \$, ESCW, ESC \, FSS

Commands using y: ESC3, ESCJ, ESCW, GS\$, GS\, GSV

b. If the starting point is upper right or lower left using ESC T (Character print direction selection in page mode) (expands characters in the paper feed direction):

Commands using x: ESC 3, ESC J, ESCW, GS \$, GS \

Commands using y: ESC SP, ESC \$, ESCW, ESC \, FSS, GSV

- This command has no affect on any previously set setting values.
- If the calculation combining other commands results in fractions, the pitch is corrected to a minimal mechanical pitch and the rest is discarded.

**Reference:** ESC SP, ESC \$, ESC 3, ESC J, ESC W, ESC \, GS \$, GS L, GS V, GS W, GS \

(43)

- **①GS V m (Function A) ②GS V m n (Function B)** End of printing and cut paper

| Format: | ①ASCII  | GS | V  | m   | (Function A) |
|---------|---------|----|----|-----|--------------|
|         | Hex     | 1D | 56 | m   |              |
|         | Decimal | 29 | 86 | m   |              |
|         | ②ASCII  | GS | V  | m n | (Function B) |
|         | Hex     | 1D | 56 | m n |              |
|         | Decimal | 29 | 86 | m n |              |

**Range:**  $0 \leq n \leq 255$

(Function A)  $m = 0, 1, 48, 49$

(Function B)  $m = 65, 66$

**Description:** Cuts paper in the specified mode.

|            | m     | Function   |
|------------|-------|--|
| Function A | 0, 48 | Executes a full cut (cuts the paper completely).   |
|            | 1,49  | Executes a partial cut (one point left uncut).   |
| Function B | 65    | Feeds paper to paper tearing position/cutting position + $n \times$ vertical motion unit and executes a paper tearing/ a full cut (cuts the paper completely). |
|            | 66    | Feeds paper to paper tearing position/cutting position + $n \times$ vertical motion unit) and executes a paper tearing/a partial cut (one point left uncut).   |

•The paper is completely or partially (with one point left uncut) cut depending on the printer model.

(44)

- **GS \ nL nH** Specify relative position for character vertical direction in page mode

| Format: | ASCII   | GS | \  | nL | nH |
|---------|---------|----|----|----|----|
|         | Hex     | 1D | 5C | nL | nH |
|         | Decimal | 29 | 92 | nL | nH |

**Range:**  $0 \leq nL \leq 255, 0 \leq nH \leq 255$

**Description:**

Specifies the character vertical direction position for the data expansion starting position using the relative position based on the current point in page mode. This sets the position moved from the current position to  $[(nL + nH \times 256) \times \text{basic calculated pitch}]$  for the next data expanding starting position.

**Note:**

- When not in page mode, this command is ignored.
- If the direction below the current position is specified for the characters, specify a positive number; if the direction above is specified, a negative number is used.
- Negative numbers are represented by the complement of 65536. For example, when moving in the upward direction N pitches, use:  $nL + nH \times 256 = 65536 - N$
- Specifications for relative positions that exceed the specified print region are ignored.
- The following operations occur depending on ESC T (Selecting the character printing direction in page mode).
  - a. If the starting point is upper left or lower right, specify the relative position for the paper feed direction. Use the basic calculated pitch (y) for the horizontal direction at this time.
  - b. If the starting point is upper right or lower left, specify the relative position for the paper feed in the vertical direction. Use the basic calculated pitch (x) for the horizontal direction at this time.
- The basic calculated pitch is set by GSP (Set basic calculated pitch).
- If the calculation results in fractions, the pitch is corrected to a minimal mechanical pitch and the rest is discarded.

**Reference:** ESC \$, ESC T, ESC W, ESC \, GS \$, GS P

(45)

- GS h n Set bar code height

---

|                |         |    |     |   |
|----------------|---------|----|-----|---|
| <b>Format:</b> | ASCII   | GS | h   | n |
|                | Hex     | 1D | 68  | n |
|                | Decimal | 29 | 104 | n |

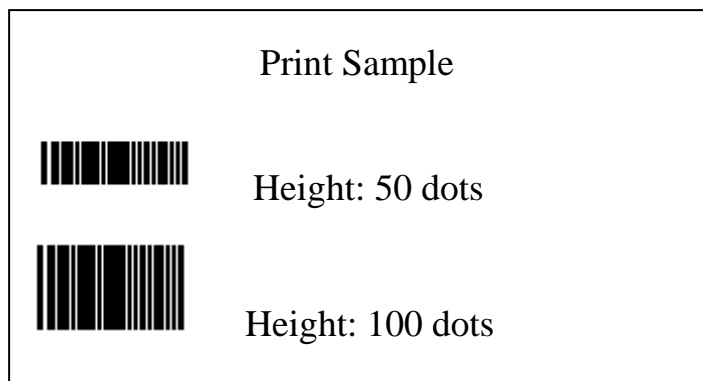
**Range:**  $1 \leq n \leq 255$

GS h n selects the height of a bar code. n specifies the number of dots in the vertical direction. One dot corresponds to 1/180 inch. The default setting is n=162.

```

Program Example
PRINT #1,CHR$(&H1D);"h";CHR$(50);Set height to 50
PRINT #1,CHR$(&H1D);"k";CHR$(2);Print bar code
PRINT #1,"496595707379";CHR$(0);
PRINT #1,CHR$(&HA);
PRINT #1,CHR$(&H1D);"h";CHR$(100);Set height to 100
PRINT #1,CHR$(&H1D);"k";CHR$(2);Print bar code
PRINT #1,"496595707379";CHR$(0);
PRINT #1,CHR$(&HA);

```



(46)

- **GS k m d1 ... dk NUL GS k m n d1 ... dn** Print bar code

| Format: | ① ASCII | GS | k   | m d1 ... dk NUL |
|---------|---------|----|-----|-----------------|
|         | Hex     | 1D | 6B  | m d1 ... dk 00  |
|         | Decimal | 29 | 107 | m d1 ... dk 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  $0 \leq m \leq 6$  (k and d depend on the bar code system used)

②  $65 \leq m \leq 73$  (n and d depend on the bar code system used)

①GS k m d1 ... dk NUL and ②GS k m n d1 ... dn select a bar code system and print the bar code.

m specifies a bar code system as follows:

| m | Bar Code System | Number of Characters | Remarks                           |  |
|---|-----------------|----------------------|-----------------------------------|--|
| ① | 0               | UPC-A                | $11 \leq k \leq 12$               | $48 \leq d \leq 57$  |
|   | 1               | UPC-E                | $11 \leq k \leq 12$               | $48 \leq d \leq 57$  |
|   | 2               | JAN13 (EAN13)        | $12 \leq k \leq 13$               | $48 \leq d \leq 57$  |
|   | 3               | JAN 8 (EAN8)         | $7 \leq k \leq 8$                 | $48 \leq d \leq 57$  |
|   | 4               | CODE39               | $1 \leq k$                        | $48 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43, 45, 46, 47$ |
|   | 5               | ITF                  | $1 \leq k$ (even number)          | $48 \leq d \leq 57$  |
|   | 6               | CODABAR              | $1 \leq k$                        | $48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$     |
| ② | 65              | UPC-A                | $11 \leq n \leq 12$               | $48 \leq d \leq 57$  |
|   | 66              | UPC-E                | $11 \leq n \leq 12$               | $48 \leq d \leq 57$  |
|   | 67              | JAN13 (EAN13)        | $12 \leq n \leq 13$               | $48 \leq d \leq 57$  |
|   | 68              | JAN 8 (EAN8)         | $7 \leq n \leq 8$                 | $48 \leq d \leq 57$  |
|   | 69              | CODE39               | $1 \leq n \leq 255$               | $48 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43, 45, 46, 47$ |
|   | 70              | ITF                  | $1 \leq n \leq 255$ (even number) | $48 \leq d \leq 57$  |
|   | 71              | CODABAR              | $1 \leq n \leq 255$               | $48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$     |
|   | 72              | CODE93               | $1 \leq n \leq 255$               | $0 \leq d \leq 127$  |
|   | 73              | CODE128              | $2 \leq n \leq 255$               | $0 \leq d \leq 127$  |

**Note:**

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 bar code data and processes the following data as normal data.
- When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes bar code data and processes the following data as normal data.

- When the bar code system used is JAN8 (EAN8), the printer prints the bar code after receiving 8 bytes bar code data and processes the following data as normal data.
- The number of data for ITF bar code must be even numbers. When an odd number of data is input, the printer ignores the last received data.

For ②:

- n indicates the number of bar code data, and the printer processes n bytes from the next character data as bar code data.
- If n is outside of the specified range, the printer stops command processing and processes the following data as normal data.

**When in standard mode:**

- If d is outside of 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 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° rotated character, etc.), except for upside-down printing mode.

**When 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.

**When CODE93 (*m = 72*) is used:**

- The printer prints an HRI character ( □ ) as start character at the beginning of the HRI character string.
- The printer prints an HRI character ( □ ) as a stop character at the end of the HRI character string.
- The printer prints HRI characters ( ■ + an alphabetic character) as a control character (<00>H to <1F>H and <7F>H):

| Control character |     |         | HRI character | Control character |     |         | HRI character |
|-------------------|-----|---------|---------------|-------------------|-----|---------|---------------|
| ASCII             | Hex | Decimal |               | ASCII             | Hex | Decimal |               |
| 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 J for the information of the CODE 128 bar code and its code table.
- When using the CODE 128 in this printer, take the following points into account for data transmission:  
 The top of the bar code data string must be code set selection character (any of CODE A, CODE B or CODE C) which selects the first code set.  
 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 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.)

[Reference] GS H, GS f, GS h, GS w, Appendix

(47) GS ( k Set up and print the symbol

- Symbol type is specified by **cn**
- Function code **fn** specifies the function

| cn | fn | Function NO. | Function name  |
|----|----|--------------|--|
| 49 | 65 | Function 1   | QR Code: Select the model  |
|    | 67 | Function 2   | QR Code: Set the size of module  |
|    | 69 | Function 3   | QR Code: Select the error correction level   |
|    | 80 | Function 4   | QR Code: Store the data in the symbol storage area                                   |
|    | 81 | Function 5   | QR Code: Print the symbol data in the symbol storage data                            |
|    | 82 | Function 6   | QR Code: Transmit the size information of the symbol data in the symbol storage area |



**1) GS ( k <Function 1>****Select the model**

- 
- [Format]** ASCII GS ( k pL pH cn fn n1 n2  
Hex 1D 28 6B 04 00 31 41 n1 n2  
Decimal 29 40 107 4 0 49 65 n1 n2
- [Range]**  $(pL + pH *256) = 4$  (pL = 4, pH = 0)  
cn = 49  
fn = 65  
n1 = 49, 50  
n2 = 0
- [Default]** n1 = 50, n2 = 0
- [Description]** Selects the model for QR Code.

| n1 | Function         |
|----|------------------|
| 49 | Selects model 1. |
| 50 | Selects model 2. |

- [Notes]** ■ Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

**2) GS ( k <Function 2>****Set the size of module**

- 
- [Format]** ASCII GS ( k pL pH cn fn n  
Hex 1D 28 6B 03 00 31 43 n  
Decimal 29 40 107 3 0 49 67 n
- [Range]**  $(pL + pH *256) = 3$  (pL = 3, pH = 0)  
cn = 49  
fn = 67  
 $1 \leq n \leq 16$
- [Default]** n = 3

**[Description]** Sets the size of the module for QR Code to n dots.

- [Notes]** ■ Settings of this function affect the processing of Functions 5 and 6.  
■ Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.  
■ n = width of a module = height of a module. (Because the QR code modules are square.)

**3) GS ( k <Function 3>****Select the error correction level**

- 
- [Format]** ASCII GS ( k pL pH cn fn n  
Hex 1D 28 6B 03 00 31 45 n  
Decimal 29 40 107 3 0 49 69 n
- [Range]**  $(pL + pH *256) = 3$  (pL = 3, pH = 0)  
cn = 49  
fn = 69  
 $48 \leq n \leq 51$
- [Default]** n = 48
- [Description]** Selects the error correction level for QR Code.

| <b>n</b> | <b>Function</b>                  | <b>Recovery Capacity % (approx.)</b> |
|----------|----------------------------------|--------------------------------------|
| 48       | Selects Error correction level L | 7                                    |
| 49       | Selects Error correction level M | 15                                   |
| 50       | Selects Error correction level Q | 25                                   |
| 51       | Selects Error correction level H | 30                                   |

- [Notes]
- Settings of this function affect the processing of Functions 5 and 6.
  - QR Code employs Reed-Solomon error correction to generate a series of error correction codewords.
  - Settings of this function are effective until **ESC @** is executed, the printer is reset, or the power is turned off.

**4) GS ( k <Function 4> Store the data in the symbol storage area**

---

- [Format] ASCII GS ( k pL pH cn fn m d1...dk  
Hex 1D 28 6B pL pH 31 50 30 d1...dk  
Decimal 29 40 107 pL pH 49 80 48 d1...dk
- [Range]  $4 \leq (pL + pH * 256) \leq 1023$  ( $0 \leq pL \leq 255, 0 \leq pH \leq 3$ )  
cn = 49  
fn = 80  
m = 48  
 $0 \leq d \leq 255$   
 $k = (pL + pH * 256) - 3$

[Description] Stores the QR Code symbol data (d1...dk) in the symbol storage area.

- [Notes]
- k bytes of d1...dk are processed as symbol data.
  - It is possible to encode to a QR Code as follows. Be sure not to include anything except the following data in the data d1...dk.

| <b>Category of data</b> | <b>Characters it is possible to specify</b>       |
|-------------------------|---|
| Numerical Mode data     | "0" ~ "9"   |
| Alphanumeric Mode data  | "0" ~ "9", "A" ~ "Z", SP, \$, %, *, +, -, ., /, : |
| Kanji Mode data         | Shift JIS value (Shift value from JISX0208)       |
| 8-Bit Byte Mode data    | 00H ~ FFH   |

- Settings of this function are effective until the following processing is performed:
  - **ESC @** is executed
  - The printer is reset or the power is turned off

**5) GS ( k <Function 5> Print the symbol data in the symbol storage area**

---

- [Format] ASCII GS ( k pL pH cn fn m  
Hex 1D 28 6B 03 00 31 51 m  
Decimal 29 40 107 3 0 49 81 m
- [Range]  $(pL + pH * 256) = 3$  ( $pL = 3, pH = 0$ )  
cn = 49  
fn = 81  
m = 48

[Description] Encodes and prints the QR Code symbol data in the symbol storage area using the process of <Function 4>.

- [Notes]
- In standard mode, use this function when printer is “at the beginning of a line,” or “there is no data in the print buffer.”
  - The symbol size that exceeds the print area cannot be printed.
  - If there is any error described below in the data of the symbol storage area, it cannot be printed.
    - There is no data (Function 4 is not processed).
    - If the data of the symbol storage area is more than the data allowed by specified model and data compaction mode. (This case is an abnormal number of data.)
    - The four data compaction modes are listed below (in order of compaction rate). Automatically selects best compaction mode by the data of the symbol storage area.
      - Numerical mode
      - Alphanumeric mode
      - Kanji mode
      - 8-Bit Byte Mode
  - The following data are added automatically by the encode processing.
    - Position Detection Patterns
    - Separators for Position Detection Patterns
    - Timing Patterns
    - Format Information
    - Version Information
    - Error Correction codewords (employs the Reed-Solomon Error Detection and Correction algorithm)
    - Pad codeword
    - Number of bits in Character Count Indicator
    - Mode Indicator
    - Terminator
    - Alignment Patterns (when model 2 is selected)
    - Extension Patterns (when model 1 is selected)
  - Printing of symbol is not affected by print mode (emphasized, double-strike, underline, white/black reverse printing, or 90 ° clockwise-rotated), except for character size and upside-down print mode.
  - In standard mode, this command executes paper feeding for the amount needed for printing the symbol, regardless of the paper feed amount set by the paper feed setting command. The print position returns to the left side of the printable area after printing the symbol, and printer is in the status “beginning of the line,” or “there is no data in the print buffer.”
  - In page mode, the printer stores the symbol data in the print buffer without executing actual printing. The printer moves print position to the next dot of the last data of the symbol.
  - The quiet zone is not included in the printing data. Be sure to include the quiet zone when using this function.

**6) GS ( k <Function 6> Transmit the size information of the symbol data in the symbol storage area**

- [Format]      ASCII GS ( k **pL pH cn fn m**  
                   Hex 1D 28 6B **03 00 31 52 m**  
                   Decimal 29 40 107 **3 0 49 82 m**
- [Range]        (**pL + pH \*256**) = 3 (**pL = 3, pH =0**)  
                   **cn = 49**

**fn** = 82

**m** = 48

[Description] Transmits the size information for the encoded QR Code symbol data in the symbol storage area using the process of <Function 4>.

[Notes] ■ In standard mode, use this function when the printer is “at the beginning of a line,” or “there is no data in the print buffer.”

■ The size information for each data is as follows;

| Send data             | Hex        | Decimal  | Data      |
|-----------------------|------------|----------|-----------|
| Header                | 37H        | 55       | 1 byte    |
| Identifier            | 36H        | 54       | 1 byte    |
| Horizontal size(*1)   | 30H –39H   | 48 –57   | 1 –5 byte |
| Separator             | 1FH        | 31       | 1 byte    |
| Vertical size(*1)     | 30H –39H   | 48 –57   | 1 –5 byte |
| Separator             | 1FH        | 31       | 1 byte    |
| Fixed value           | 31H        | 49       | 1 byte    |
| Separator             | 1FH        | 31       | 1 byte    |
| Other information(*2) | 30H or 31H | 48 or 49 | 1 byte    |
| NUL                   | 00H        | 0        | 1 byte    |

(\*1)“Horizontal size” and “vertical size” indicate the number of dots of the symbol. The decimal value of the vertical size and horizontal size is converted to text data and sent starting from the high order end.

(ex: When horizontal size is 120 dots, horizontal size is “120” (in hexadecimal: 31H, 32H, and 30H / in decimal: 49, 50, and 48 ), which is 3 bytes of data.)

(\*2)“Other information” indicates whether printing of the data in the symbol storage area is possible or impossible. The “Other information“ is the following.

**Other information**

| Hex | Decimal | Condition              |
|-----|---------|------------------------|
| 30H | 48      | Printing is possible   |
| 31H | 49      | Printing is impossible |

- Size information indicates size of symbol that is printed by Function 5.
- The quiet zone is not included in the size information.
- If “other information” is “Printing is impossible“(in decimal: 49), use one of the solutions shown below.

| Cause   | Solution  |
|---|---|
| There are data in the print buffer in the standard mode | Put the printer in the "there is no data in the print buffer" status by executing <b>GS T</b> or print commands ( <b>LF, CR, ESC J</b> ).             |
| Symbol is bigger than the current print area.           | Expand the print area by <b>GS W, ESC W, ESC \$</b> .<br>Reduce the module size by Function 167.<br>Lower the error correction level by Function 169. |
| The data in the symbol storage area is too large.       | Send correct data by Function 180.<br>Select other model by Function 165<br>Lower the error correction level by Function 169.                         |
| There is no data in the symbol storage area.            | Send data to the symbol storage area by Function 180.   |

- See previous [Notes for transmission process] for process sending data group.

For instance:

Send "1d 28 6b 03 00 31 43 03 1d 28 6b 1a 00 31 50 30 31 32 33 61 62 63 34 35 36 37 38 39 41 42 43 39 38 37 36 35 6f 6b 21 1D 28 6b 03 00 31 51 30" to the printer. Then QR code will be printed that shows 123abc456789ABC98765ok!.

1d 28 6b 03 00 31 43 03: set the size of QR code. Modify last one 03 to change size.

1d 28 6b 1a 00 31 50 30: set the content of QR code.

31 32 33 61 62 63 34 35 36 37 38 39 41 42 43 39 38 37 36 35 6f 6b 21: 123abc456789ABC98765ok!

1D 28 6b 03 00 31 51 30: print QR code.

(48)

- **GS v 0 m xL xH yL yH d1...dk** Print raster graphic

**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

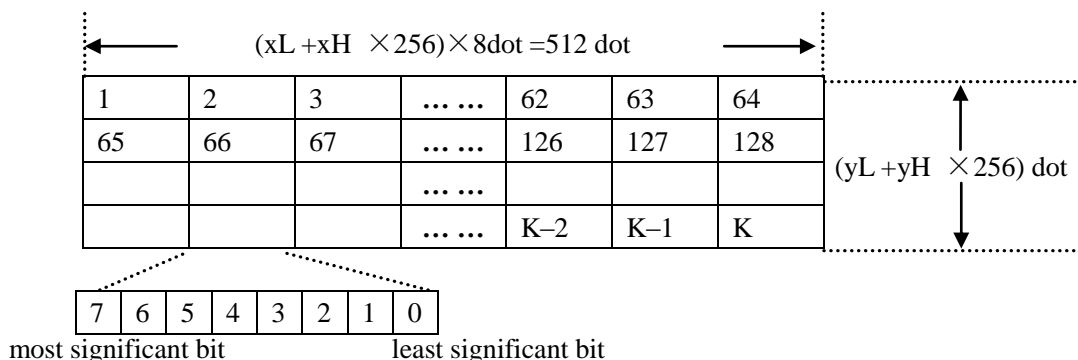
**Range:** m=0  
 $0 \leq xL \leq 27$   
xH=0  
yL=24  
yH=0  
 $0 \leq d \leq 5$

$$k = (xL + xH \times 256) \times (yL + yH \times 256) \quad (k \neq 0)$$

◇ xL and xH specify the horizontal direction data count for one bit image (xL + xH x 256) in bytes.

◇ yL and yH specify the vertical direction data count for one bit image (yL + yH x 256) in bytes.

**E.g.** when  $xL + xH \times 256 = 64$



(49)

- GS w n Set bar code width

|                |         |    |     |   |
|----------------|---------|----|-----|---|
| <b>Format:</b> | ASCII   | GS | w   | n |
|                | Hex     | 1D | 77  | n |
|                | Decimal | 29 | 119 | n |

**Range:**  $2 \leq n \leq 6$

GS w n selects the horizontal size of a bar code. n specifies the bar code width as shown below. The multilevel bar codes are UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, and CODE128. The binary level bar codes are CODE39, ITF, and CODABAR. The default setting is n=3.

| n | Module Width (mm) for Multilevel Bar Code | Binary Level Bar Code   |                          |
|---|---|-------------------------|--------------------------|
|   |   | Thin Element Width (mm) | Thick Element Width (mm) |
| 2 | 0.282                                     | 0.282                   | 0.706                    |
| 3 | 0.423                                     | 0.423                   | 1.129                    |
| 4 | 0.564                                     | 0.564                   | 1.411                    |
| 5 | 0.706                                     | 0.706                   | 1.834                    |
| 6 | 0.847                                     | 0.847                   | 2.258                    |

Program Example

```

PRINT #1,CHR$(&H1D);"w";CHR$(3);Set width size to 3
PRINT #1,CHR$(&H1D);"k";CHR$(2);Print bar code
PRINT #1,"496595707379";CHR$(0);
PRINT #1,CHR$(&HA);
PRINT #1,CHR$(&H1D);"w";CHR$(4);Set width size to 4
PRINT #1,CHR$(&H1D);"k";CHR$(2);Print bar code
PRINT #1,"496595707379";CHR$(0);
PRINT #1,CHR$(&HA);
PRINT #1,CHR$(&H1D);"w";CHR$(5);Set width size to 5
PRINT #1,CHR$(&H1D);"k";CHR$(2);Print bar code
PRINT #1,"496595707379";CHR$(0);
PRINT #1,CHR$(&HA);

```

Print Sample



Width size 3



Width size 4



Width size 5

## GS ( k <Function 165>

---

[Name] QR Code: Select the model

[Format] ASCII GS ( k **pL pH cn fn n1 n2**  
Hex 1D 28 6B **04 00 31 41 n1 n2**  
Decimal 29 40 107 **4 0 49 65 n1 n2**

[Range] **(pL + pH × 256) = 4 (pL = 4, pH = 0)**  
**cn = 49**  
**fn = 65**  
**n1 = 49, 50**  
**n2 = 0**

[Default] **n1 = 50, n2 = 0**

[Description] Selects the model for QR Code.

| n1 | Function         |
|----|------------------|
| 49 | Selects model 1. |
| 50 | Selects model 2. |

[Notes] ■ Settings of this function affect the processing of Functions 181 and 182.  
■ Settings of this function are effective until **ESC @** is executed, the printer is reset, or the power is turned off.

## GS ( k <Function 167>

---

[Name] QR Code: Set the size of module

[Format] ASCII GS ( k **pL pH cn fn n**  
Hex 1D 28 6B **03 00 31 43 n**  
Decimal 29 40 107 **3 0 49 67 n**

[Range] **(pL + pH × 256) = 3 (pL = 3, pH = 0)**  
**cn = 49**  
**fn = 67**

[Description] Sets the size of the module for QR Code to **n** dots.

[Notes] ■ Settings of this function affect the processing of Functions 181 and 182.  
■ Settings of this function are effective until **ESC @** is executed, the printer is reset, or the power is turned off.  
■ **n** = width of a module = height of a module. (Because the QR code modules are square. )

## GS ( k <Function 169>

|               |   |
|---------------|---|
| [Name]        | QR Code: Select the error correction level  |
| [Format]      | ASCII GS ( k <b>pl pH cn fn n</b><br>Hex 1D 28 6B <b>03 00 31 45 n</b><br>Decimal 29 40 107 <b>3 0 49 69 n</b>  |
| [Range]       | $(pl + pH \times 256) = 3$ ( <b>pl = 3, pH = 0</b> )<br><b>cn = 49</b><br><b>fn = 69</b><br>$48 \leq n \leq 51$ |
| [Default]     | <b>n = 48</b>   |
| [Description] | Selects the error correction level for QR Code.   |

| n  | Function                         | Recovery Capacity % (approx.) |
|----|----------------------------------|-------------------------------|
| 48 | Selects Error correction level L | 7                             |
| 49 | Selects Error correction level M | 15                            |
| 50 | Selects Error correction level Q | 25                            |
| 51 | Selects Error correction level H | 30                            |

- [Notes]
- Settings of this function affect the processing of Functions 181 and 182.
  - QR Code employs Reed-Solomon error correction to generate a series of error correction codewords.
  - Settings of this function are effective until **ESC @** is executed, the printer is reset, or the power is turned off.

## GS ( k <Function 180>

|          |   |
|----------|---|
| [Name]   | QR Code: Store the data in the symbol storage area  |
| [Format] | ASCII GS ( k <b>pl pH cn fn m d1...dk</b><br>Hex 1D 28 6B <b>pl pH 31 50 30 d1...dk</b><br>Decimal 29 40 107 <b>pl pH 49 80 48 d1...dk</b>  |
| [Range]  | $4 \leq (pl + pH \times 256) \leq 7092$ ( $0 \leq pl \leq 255, 0 \leq pH \leq 27$ )<br><b>cn = 49</b><br><b>fn = 80</b><br><b>m = 48</b><br>$0 \leq d \leq 255$<br><b>k = (pl + pH × 256) – 3</b> |

[Description] Stores the QR Code symbol data (**d1...dk**) in the symbol storage area.

- [Notes]
- The symbol data saved in the symbol archive area by this function is encoded by <Function 081> and <Function 082> of this command. After <Function 081> and <Function 082> are executed, the symbol archive area symbol data is kept.
  - **k** bytes of **d1...dk** are processed as symbol data.
  - It is possible to encode to a QR Code as follows. Be sure not to include anything except the following data in the data **d1...dk**.

| Category of data       | Characters it is possible to specify              |
|------------------------|---|
| Numerical Mode data    | "0" ~ "9"   |
| Alphanumeric Mode data | "0" ~ "9", "A" ~ "Z", SP, \$, %, *, +, -, ., /, : |
| Kanji Mode data        | Shift JIS value (Shift value from JISX0208)       |
| 8-Bit Byte Mode data   | 00H ~ FFH   |

- Settings of this function are effective until the following processing is performed:
  - Function 080 or 180 or 280 or 380 or 480 is executed
  - **ESC @** is executed
- The printer is reset or the power is turned off



## GS ( k <Function 181>

---

|               |  |
|---------------|--|
| [Name]        | QR Code: Print the symbol data in the symbol storage area  |
| [Format]      | ASCII GS ( k <b>pl pH cn fn m</b><br>Hex 1D 28 6B <b>03 00 31 51 m</b><br>Decimal 29 40 107 <b>3 0 49 81 m</b>   |
| [Range]       | $(pl + pH \times 256) = 3$ ( <b>pl = 3, pH = 0</b> )<br><b>cn = 49</b><br><b>fn = 81</b><br><b>m = 48</b>  |
| [Description] | Encodes and prints the QR Code symbol data in the symbol storage area using the process of <Function 180>.   |
| [Notes]       | <ul style="list-style-type: none"><li>■ In standard mode, use this function when printer is "at the beginning of a line," or "there is no data in the print buffer."</li><li>■ The symbol size that exceeds the print area cannot be printed.</li><li>■ If there is any error described below in the data of the symbol storage area, it cannot be printed.<ul style="list-style-type: none"><li>• There is no data (Function 180 is not processed).</li><li>• If the data of the symbol storage area is more than the data allowed by specified model and data compaction mode. (This case is an abnormal number of data.)</li><li>• The four data compaction modes are listed below (in order of compaction rate). Automatically selects best compaction mode by the data of the symbol storage area.<ul style="list-style-type: none"><li>– Numerical mode</li><li>– Alphanumeric mode</li><li>– Kanji mode</li><li>– 8-Bit Byte Mode</li></ul></li></ul></li><li>■ The following data are added automatically by the encode processing.<ul style="list-style-type: none"><li>• Position Detection Patterns</li><li>• Separators for Position Detection Patterns</li><li>• Timing Patterns</li><li>• Format Information</li><li>• Version Information</li><li>• Error Correction codewords (employs the Reed-Solomon Error Detection and Correction algorithm)</li><li>• Pad codeword</li><li>• Number of bits in Character Count Indicator</li><li>• Mode Indicator</li><li>• Terminator</li><li>• Alignment Patterns (when model 2 is selected)</li><li>• Extension Patterns (when model 1 is selected)</li></ul></li><li>■ Printing of symbol is not affected by print mode (emphasized, double-strike, underline, white/ black reverse printing, or 90° clockwise-rotated), except for character size and upside-down print mode.</li><li>■ In standard mode, this command executes paper feeding for the amount needed for printing the symbol, regardless of the paper feed amount set by the paper feed setting command. The print position returns to the left side of the printable area after printing the symbol, and printer is in the status "beginning of the line," or "there is no data in the print buffer."</li><li>■ In page mode, the printer stores the symbol data in the print buffer without executing actual printing. The printer moves print position to the next dot of the last data of the symbol.</li><li>■ The quiet zone is not included in the printing data. Be sure to include the quiet zone when using this function.</li></ul> |

## GS ( k <Function 182>

- [Name] QR Code: Transmit the size information of the symbol data in the symbol storage area
- [Format] ASCII GS ( k **pL pH cn fn m**  
 Hex 1D 28 6B **03 00 31 52 m**  
 Decimal 29 40 107 **3 0 49 82 m**
- [Range]  $(pL + pH \times 256) = 3$  (**pL = 3, pH = 0**)  
**cn = 49**  
**fn = 82**  
**m = 48**
- [Description] Transmits the size information for the encoded QR Code symbol data in the symbol storage area using the process of <Function 180>.
- [Notes] ■ In standard mode, use this function when the printer is "at the beginning of a line," or "there is no data in the print buffer."  
 ■ The size information for each data is as follows;

| Send data             | Hex        | Decimal  | Data      |
|-----------------------|------------|----------|-----------|
| Header                | 37H        | 55       | 1 byte    |
| Identifier            | 36H        | 54       | 1 byte    |
| Horizontal size(*1)   | 30H –39H   | 48 –57   | 1 –5 byte |
| Separator             | 1FH        | 31       | 1 byte    |
| Vertical size(*1)     | 30H –39H   | 48 –57   | 1 –5 byte |
| Separator             | 1FH        | 31       | 1 byte    |
| Fixed value           | 31H        | 49       | 1 byte    |
| Separator             | 1FH        | 31       | 1 byte    |
| Other information(*2) | 30H or 31H | 48 or 49 | 1 byte    |
| NUL                   | 00H        | 0        | 1 byte    |

(\*1)"Horizontal size" and "vertical size" indicate the number of dots of the symbol.

The decimal value of the vertical size and horizontal size is converted to text data and sent starting from the high order end.

(ex: When horizontal size is 120 dots, horizontal size is "120" (in hexadecimal: 31H, 32H, and 30H / in decimal: 49, 50, and 48 ), which is 3 bytes of data.)

(\*2)"Other information" indicates whether printing of the data in the symbol storage area is possible or impossible. The "Other information" is the following.

### Other information

| Hex | Decimal | Condition              |
|-----|---------|------------------------|
| 30H | 48      | Printing is possible   |
| 31H | 49      | Printing is impossible |

- Size information indicates size of symbol that is printed by Function 181.
- The quiet zone is not included in the size information.
- If "other information" is "Printing is impossible"(in decimal: 49), use one of the solutions shown below.

| Cause   | Solution  |
|---|---|
| There are data in the print buffer in the standard mode | Put the printer in the "there is no data in the print buffer" status by executing <b>GS T</b> or print commands ( <b>LF, CR, ESC J</b> ).             |
| Symbol is bigger than the current print area.           | Expand the print area by <b>GS W, ESC W, ESC \$</b> .<br>Reduce the module size by Function 167.<br>Lower the error correction level by Function 169. |
| The data in the symbol storage area is too large.       | Send correct data by Function 180.<br>Select other model by Function 165<br>Lower the error correction level by Function 169.                         |
| There is no data in the symbol storage area.            | Send data to the symbol storage area by Function 180.   |

- See previous [Notes for transmission process] for process sending data group.

## (51) Black mark detection parameter setting

### 1) Black mark detection parameter setting

---

**[Format]**     ASII     GS   (   E pL PH fn d11...d1k d21...d2k d31...d3k d41...d4k d51...d5k d61...d6k  
                  d71...d7k d81...d8k

              Hex 1D 28 45 pL PH fn d11...d1k d21...d2k d31...d3k d41...d4k d51...d5k d61...d6k d71...d7k  
                  d81...d8k

**[Range]**     fn = 49

              1 <= K <= 6

              0x30 <= d <= 0x39 or d=0x3B

**[Default]**   D = d1 ... dk

**[Description]**   d1 ... dk = 0x31 0x32 0x33 0x34 0x35 0x36 then D = 123456;

                  d1 ... dk = 0x31 0x32 0x33 0x3B then D = 123

**[Notes]**

D1 = d11...d1k   D1=0x31 allow black mark detection, otherwise black mark detection is prohibited

D2 = d21...d2k   the height between the two black marks (the top is aligned)

D3 = d21...d2k   the height of black mark

D4 = d31...d3k   top of the black mark to print starting position

D5 = d41...d4k   top of the black mark to cutter position

D6 = d51...d5k   print starting position to print finishing position

D7 = d61...d6k   horizontal left unprinted margin

D8 = d71...d7k   horizontal printable range

### 2) Upload black mark detection parameter

---

**[Format]**     ASII     GS   (   E pL PH fn n

              Hex 1D 28 45 pL PH fn n

**[Range]**     fn = 50

## 2 COMMAND SAMPLE (hex command)

```
1d 68 64 1d 6b 02 34 39 36 35 39 35 37 30 37 33 37 39 00 0a
//print a barcode width 1, height 100
1d 77 02 1d 6b 02 34 39 36 35 39 35 37 30 37 33 37 39 00 0a
// print a barcode width 2, height 100
1d 77 02 1d 6b 02 32 32 30 30 30 30 32 30 30 30 35 30 35 00 0a
// print EAN-13 barcode
1d 6b 00 30 30 30 30 30 30 30 30 30 30 00 0a
//print UPC-A barcode
1d 6b 03 30 30 30 30 30 30 30 30 00 0a
//print EAN-8 barcode
1d 6b 04 30 30 30 30 30 30 30 30 30 30 30 00 0a
// CODE39
1d 68 64 1d 48 03 1d 6b 04 30 30 30 30 30 30 30 30 30 30 00 0a
//set the position of digits on the barcode
```

## 3 APPENDIX: CODE128 BAR CODE

### 3.1 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:

- SHIFT characters  
In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as the character for code set A. SHIFT characters cannot be used in code set C.
- Code set selection character (CODE A, CODE B, CODE C)
- This character switches the following code set to code set A, B, or C.
- Function character (FNC1, FNC2, FNC3, FNC4)
- The usage of function characters depends on the application software. In code set C, only FNC1 is available.

## 3.2 Code Tables

Printable characters in code set A.

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

Printable characters in code set B.

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

Printable characters in code set C.

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

