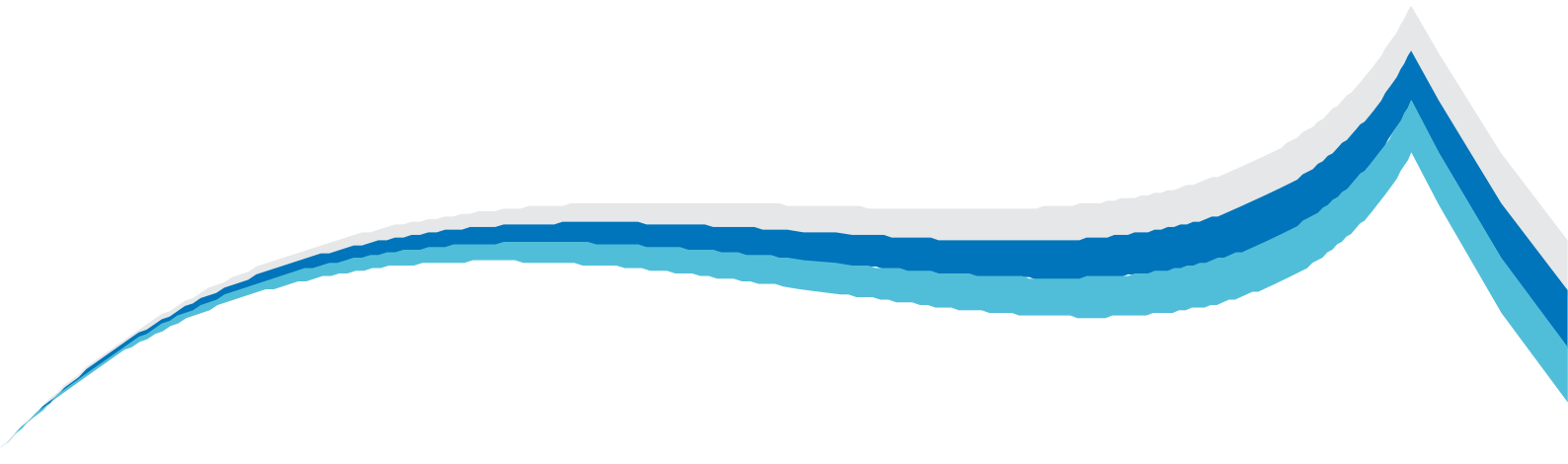
Thermal Printer

[Programmer Manual]



Format Description

This manual applies to company's 80mm Series Thermal Receipt Printer POS-80XX series.
Command description of the programming manual includes the following sections:

1) an overview of the command names and functions. This is the first part of the command description. ASCII code is given command of the form and function of the commandCan be summarized.
2) format. This section uses the ASCII coding forms, hexadecimal code form, decimal code in the form of three forms describing the lifeOrder.
Which part of the range, compared with a decimal number without special instructions, such as in the following example 1 ≤ n ≤ 4, where 1 is a decimal number 1, rather than the ASCII code table “1."
3) range. Gives a range of variables.
4) description. Gives a detailed explanation of the command.
5) annotations. Notice is given command. Since the command in the different modes, with different commands, may cause the phase Mutual influence, and this section gives the details.
6) reference. Associated with this command is given, similar to other commands.

HT

[Name] Horizontal tab
[Format] ASCII HT
Hex 09
Decimal 9
[Description] Moves the print position to the next horizontal tab position.
[Details] • 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 buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.
- The default setting of the horizontal tab position for the paper roll is font A (12 × 24) every 8th character (9th, 17th, 25th,.....column).

[Reference] **ESC D**

LF

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

DLE EOT n (*)

[Name] Real-time status transmission

[Format]

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

[Range] 1 ⩽ n ⩽ 4

[Description] Transmits the selected printer status specified by n in real-time, according to the following parameters:

n = 1: Transmit printer status
n = 2: Transmit off-line status
n = 3: Transmit error status
n = 4: Transmit paper roll sensor status

[Details] • The status is transmitted whenever the data sequence of <10>H<04>H< n> (1 ⩽ n ⩽ 4) is received.

Example:

In ESC ∗ m nL nH d1. dk, d1=<10>H, d2=<04>H, d3=<01>H

• This command should not be used within the data sequence of another command that consists of 2 or more bytes.

Example:

If you attempt to transmit ESC 3 n to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted andthen DLE EOT 3 interrupts before n is received, the code <10>H for DLE EOT 3 is processed as the code for ESC 3 <10>H.

• Even though the printer is not selected using ESC = (select peripheral device), this command is effective.
• The printer transmits the current status. Each status is represented by onebyte data.
• The printer transmits the status without confirming whether the host computer can receive data.
• The printer executes this command upon receiving it.
• This command is executed even when the printer is off-line, the receive buffer is full, or there is an error status with a serial interface model.
• With a parallel interface model, this command can not be executed when the printer is busy. This command is executed even when the printer is off-line or there is an error status when DIP switch 2-1 is on with a parallel interface model.
• When Auto Status Back (ASB) is enabled using the GS a command, the status transmitted by the DLE EOT command and the ASB status must be differentiated.

n = 1: Printer Status

Bit	Off/On	Hex	Decimal	Function
0	0	00	0	Not used. Fixed to Off.
1	1	02	2	Not used. Fixed to On.
2	0	00	0	One or two cash drawer open
	1	04	4	Both of two cash drawer closed
3	0	00	0	On-line
	1	08	8	Off-line
4	1	10	16	Not used. Fixed to On.
5,6				Undefined.
7	0	00	00	Not used. Fixed to Off.

n = 2: Off-line Status

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

n = 3: Error Status

Bit	Off/On	Hex	Decimal	Function
0	0	00	0	Not used.Fixed to Off.
1	1	02	2	Not used.Fixed to On.
2				Undefined.
3	0	00	0	No auto-cutter error.
	1	08	8	Auto-cutter error occurs.
4	1	10	16	Not used.Fixed to On.
5	0	00	0	No unrecoverable error.
	1	20	32	Unrecoverable error occurs.
6	0	00	0	No auto-recoverable error.
	1	40	64	Auto recoverable error occurs.
7	0	00	0	Not used.Fixed to Off.

n = 4: Continuous paper sensor Status

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

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

DLE DC4 n m t (*)

[Name] Generate pulse at real-time

[Format] ASCII DLE DC4 n m t

Hex 10 14 n m t

Decimal 16 20 n m t

[Range] n = 1

m = 0, 1

1 ⩽ t ⩽ 8

[Description] Outputs the pulse specified by t to connector pin m as follows:

m	Connector pin
0	Drawer kick-out connector pin 2.
1	Drawer kick-out connector pin 5.

pulse ON time is [t × 100 ms] and the OFF time is [t × 100ms].

[Details] • When the printer is in an error status when this command is processed, this command is ignored.
• When the pulse is output to the connector pin specified while **ESC** p or **DEL DC4** is executed while this command is processed, this command is ignored.
• The printer executes this command upon receiving it.
• With a serial interface model, this command is executed even when the printer is off-line, the receive buffer is full, or there is an error status.
• With a parallel interface model, this command cannot be executed when the printer is busy. This command is executed even when the printer is off-line or there is an error status when DIP switch 2-1 is on.
• If print data includes the same character strings as this command, the printer performs the same operation specified by this command. The user must consider this.
• This command should not be used within the data sequence of another command that consists of 2 or more bytes.
• This command is effective even when the printer is disabled with **ESC** = (Select peripheral device).

[Reference] **ESC p**

ESC SP n

[Name] Set right-side character spacing

[Format]

ASCII	ESC	SP	n
Hex	1B	20	n
Decimal	27	32	n

[Range] 0 ⩽ n ⩽ 255

[Description] Sets the character spacing for the right side of the character to [n horizontal or vertical motion units].

[Details] •The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is n times normal value.
• This command does not affect the setting of kanji characters.
• This command sets values independently in each mode (standard and page modes).
• The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current right-side spacing.
• The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
• In standard mode, the horizontal motion unit is used.
• In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
1 When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
2 When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.
• The maximum right-side spacing is 255/180 inches. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] n = 0

[Reference] **GS P**

ESC ! n

[Name] Select print mode(s)

[Format] ASCII ESC ! n

Hex 1B 21 n

Decimal 27 33 n

[Range] 0 ≤n ≤255

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

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (12 ×24).
	On	01	1	Character font B (9 ×17).
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

[Details] • When both double-height and double-width modes are selected, quadruple size characters are printed.

• The printer can underline all characters, but can not underline the space set by **HT** or 90° clockwise rotated characters.

• The thickness of the underline is that selected by **ESC** , regardless of the character size.

• When some characters in a line are double or more height, all the characters on the line are aligned at the baseline.

• **ESC E** can also turn on or off emphasized mode. However, the setting of the last received command is effective.

• **ESC** — can also turn on or off underline mode. However, the setting of the last received command is effective.

• **GS** ! can also select character size. However, the setting of the last received command is effective.

• Emphasized mode is effective for alphanumeric and Kanji. All print modes except emphasized mode is effective only for alphanumeric.

[Default] n = 0

[Reference] **ESC -, ESC E, GS !**

ESC $ nL nH

[Name] Set absolute print position

[Format] ASCII ESC $ nL nH

Hex 1B 24 nL nH

Decimal 27 36 nL nH

[Range] 0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

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

• The distance from the beginning of the line to the print position is [(nL + nH ×256) ×(vertical or horizontal motion unit)] inches.

[Details] • Settings outside the specified printable area are ignored.

• The horizontal and vertical motion unit are specified by **GS P**.

• The GS P command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

• In standard mode, the horizontal motion unit (x) is used.

• In page mode, horizontal or vertical motion unit differs depending on the starting position of the printable area as follows:

1 When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.

2 When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

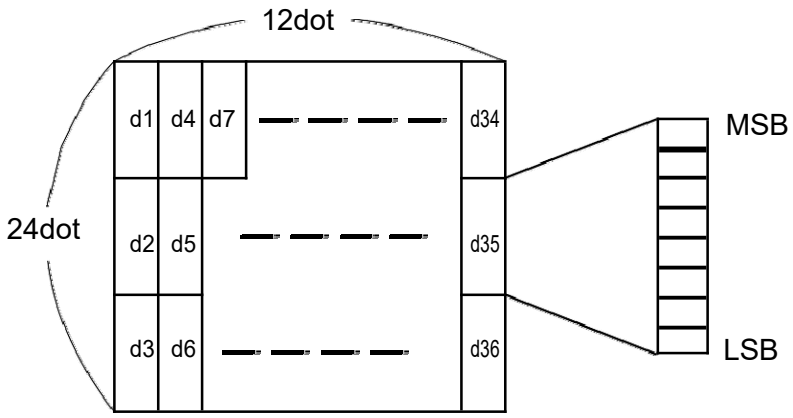
[Reference] **ESC \, GS $, GS \, GS P**

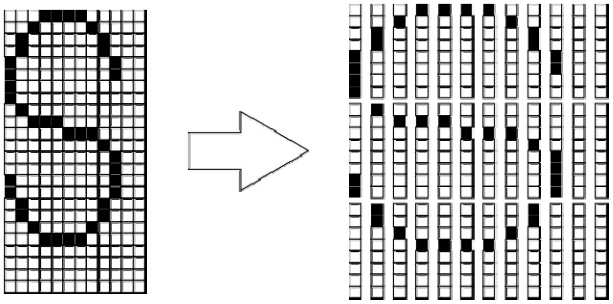
ESC % n

[Name] Select/cancel user-defined character set
[Format] ASCII ESC % n
Hex 1B 25 n
Decimal 27 37 n
[Range] 0 ⩽ nL ⩽ 255
[Description] • Selects or cancels the user-defined character set.
• When the LSB of n is 0, the user-defined character set is canceled.
• When the LSB of n is 1, the user-defined character set is selected.
[Details] • When the user-defined character set is canceled, the internal character set is automatically selected.
• n is available only for the least significant bit.
[Default] n = 0
[Reference] **ESC &, ESC ?**

ESC & y c1 c2 [x1 d1...d(y×x1)]...[xk d1...d(y ×xk)]

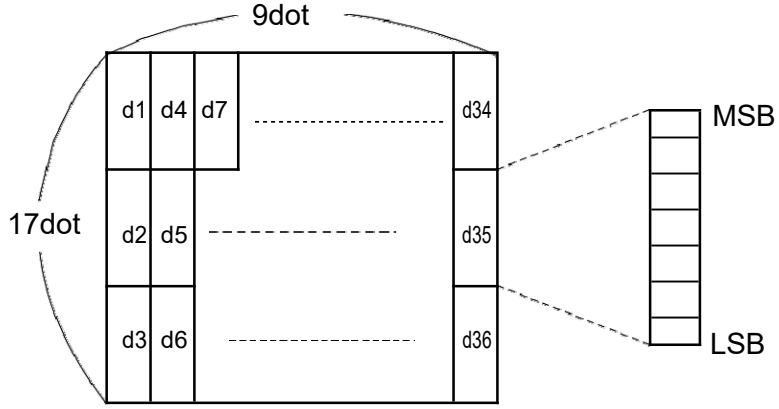
[Name] Define user-defined characters
[Format] ASCII ESC & y c1 c2 [x1 d1 ... d (y×x1)] ... [xk d1 ... d (y×xk)]
Hex 1B 26 y c1 c2 [x1 d1 ... d (y×x1)] ... [xk d1 ... d (y ×xk)]
Decimal 27 38 y c1 c2 [x1 d1 ... d (y×x1)] ... [xk d1 ... d (y ×xk)]
[Range] y = 3
32 ⩽ c1 ⩽ c2 ⩽ 127
0 ⩽ x ⩽ 12 standard ASCII font (12×24)
0 ⩽ x ⩽ 9 compressed ASCII font (9×17)
0 ⩽ d1 ... d (y × xk) ⩽ 255
[Description] • Defines user-defined characters.
• y specifies the number of bytes in the vertical direction.
• c1 specifies the beginning character code for the definition, and c2 specifies the final code.
• x specifies the number of dots in the horizontal direction.
[Details] • The allowable character code range is from ASCII code <20>H to <7E>H (96 characters).
• It is possible to define multiple characters for consecutive character codes. If only one character is desired, use c1 = c2.
• d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.
• The data to define a user-defined character is (y×x) bytes.
• Set a corresponding bit to 1 to print a dot or 0 to not print a dot.
• This command can define different user-defined character patterns by each fonts. To select a font, use ESC !
• A user-defined character and a downloaded bit image cannot be defined simultaneously. When this command is executed, the downloaded bit image is cleared.
• The user-defined character definition is cleared when:
① ESC @ is executed.
② ESC ? is executed.
③ FS q is executed.
④ GS *is executed.
⑤ The printer is reset or the power is turned off.
• When the user-defined characters are defined in font B (9×17), only the most significant bit of the 3rd byte of data in vertical direction is effective.
[Default] The internal character set
[Reference] **ESC %, ESC ?**
[Example]
• When font A (12×24) is selected.

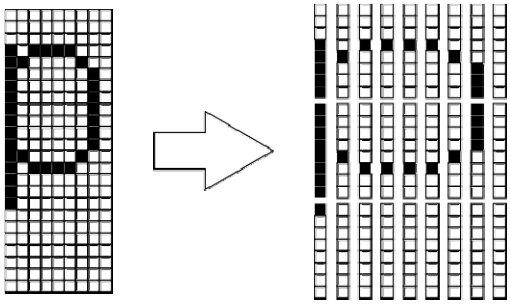




d1= <OF> H d4= <30> H d4= <40> H ...
d2= <03> H d5= <80> H d5= <40> H ...
d3= <00> H d6= <00> H d6= <20> H ...

- When font B (9×17) is selected.





d1= <1F> H d4= <08> H d4= <10> H ...
d2= <FF> H d5= <08> H d5= <04> H ...
d3= <80> H d6= <00> H d6= <00> H ...

ESC * m nL nH d1... dk

[Name] Select bit-image mode

[Format] ASCII ESC * m nL nH d1...dk

Hex 1B 2A m nL nH d1...dk

Decimal 27 42 m nL nH d1...dk

[Range] m = 0, 1, 32, 33

0 ⩽ nL ⩽ 255

0 ⩽ nH ⩽ 3

0 ⩽ d ⩽ 255

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

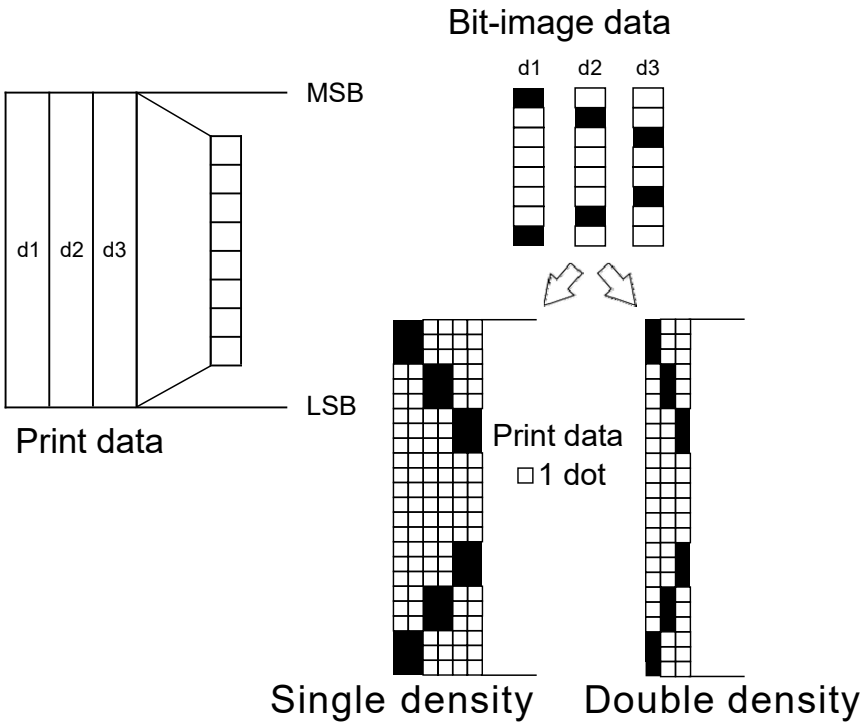
m	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot Density	Number of Data (K)
0	8-dot single-density	8	67 DPI	100 DPI	nL + nH×256
1	8-dot double-density	8	67 DPI	200 DPI	nL + nH ×256
32	24-dot single-density	24	200DPI	100DPI	(nL + nH×256)×3
33	24-dot double-density	24	200 DPI	200 DPI	(nL + nH×256)×3

[Details] • If the values of m is out of the specified range, nL and data following are processed as normal data.

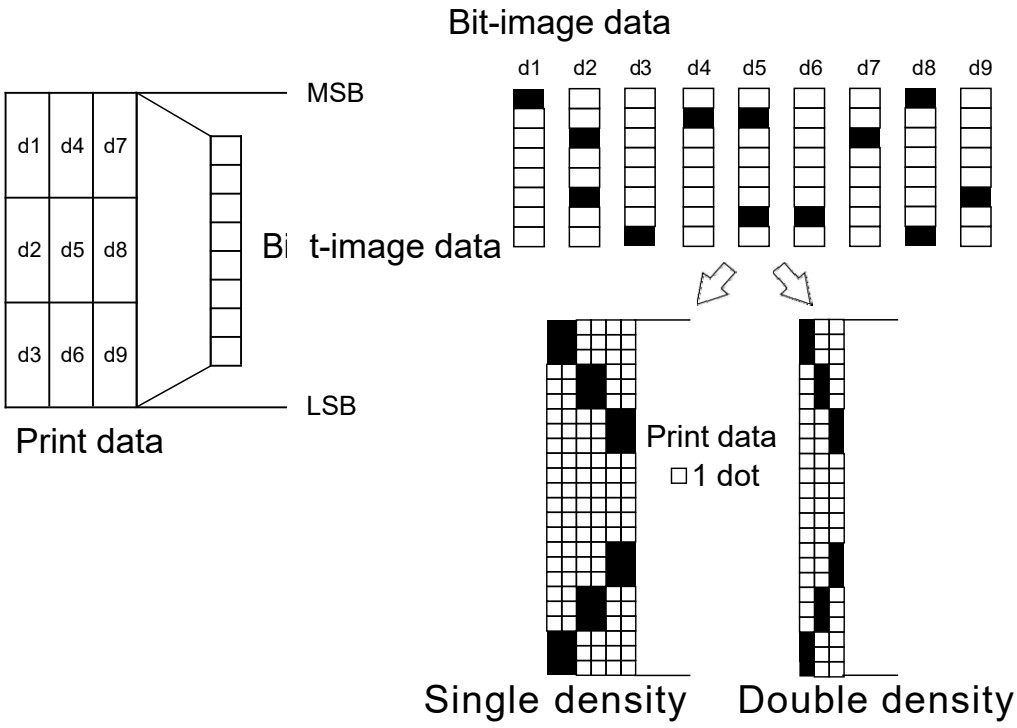
- The nL and nH indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by nL + nH ×256.
- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- d indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.
- If the width of the printing area set by GS L and GS W less than the width required by the data sent with the ESC * command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):

  ① The width of the printing area is extended to the right to accommodate the amount of data.

  ② If step ① does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
- The relationship between the image data and the dots to be printed is as follows:
- When 8-dot bit image is selected:



- When 24-dot bit image is selected:



ESC – n

[Name] Turn underline mode on/off

[Format] ASCII ESC - n

Hex 1B 2D n

Decimal 27 45 n

[Range] 0 ⩽ n ⩽ 2, 48 ⩽ n ⩽ 50

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

n	Function
0,48	Turns off underline mode
1,49	Turns on underline mode (1-dot thick)
2,50	Turns on underline mode (2-dots thick)

[Details] • The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT.**

• The printer cannot underline 90 clockwise rotated characters and white/black inverted characters.

• When underline mode id turned off by setting the value of n to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.

• Changing the character size does not affect the current underline thickness.

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

•This command does not affect the setting of Kanji characters.

[Default] n = 0

[Reference] **ESC !**

ESC 2

[Name] Select default line spacing

[Format] ASCII ESC 2

Hex 1B 32

Decimal 27 50

[Description] Selects 1/ 6-inch line (approximately 4.23mm) spacing.

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

[Reference] **ESC 3**

ESC 3 n

[Name] Set line spacing
[Format] ASCII ESC 3 n
Hex 1B 33 n
Decimal 27 51 n
[Range] 0 ≤ n ≤ 255
[Description] Sets the line spacing to [n ×vertical or horizontal motion unit] inches.
[Details] • The line spacing can be set independently in standard mode and in page mode.
• The horizontal and vertical motion unit are specified by GS P. Changing the horizontal or vertical motion unit does not affect the current line spacing.
• The GS P command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
• In standard mode, the vertical motion unit (y) is used.
• In page mode, this command functions as follows, depending on the starting position of the printable area:
① When the starting position is set to the upper left or lower right of the printable area using ESC T, the vertical moti-on unit (y) is used.
② When the starting position is set to the upper right or lower left of the print able area using ESC T, the horizontal motion unit (x) is used.
• The maximum paper feed amount is 1016 mm (40 inches). Even if a paper feed amount of more than 1016 mm (40 inches) is set, the printer feeds the paper only 1016 mm (40 inches).
[Default] Line spacing equivalent to approximately 4.23mm (1/6 inches).
[Reference] **ESC 2, GS P**

ESC = n (*)

[Name] Set peripheral device
[Format] ASCII ESC = n
Hex 1B 3D n
Decimal 27 61 n
[Range] 1 ≤ n ≤ 255
[Description] Selects device to which host computer sends data, using n as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Printer disabled
	On	01	1	Printer enabled
1-7				Undefined

[Details] When the printer is disabled, it ignores all data except for error-recovery commands **(DLE EOT, DLE ENQ, DLE DC4)** until it is enabled by this command.
[Default] n = 1

ESC @

[Name] Initialize printer
[Format] ASCII ESC @
Hex 1B 40
Decimal 27 64
[Description] Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.
[Details] • The DIP switch settings are not checked again.
• The data in the receive buffer is not cleared.
• The macro definition is not cleared.
• The NV bit image data is not cleared.
• The data of the user NV memory is not cleared.

ESC D n1...nk NUL

[Name] Set horizontal tab positions

[Format] ASCII ESC D n1...nk NUL
Hex 1B 44 n1...nk 00
Decimal 27 68 n1...nk 0
[Range] 1 ≤ n ≤ 255
0 ≤ k ≤ 32
[Description] • Sets horizontal tab positions.
• n specifies the column number for setting a horizontal tab position from the beginning of the line.
• k indicates the total number of horizontal tab positions to be set.
[Details] • The horizontal tab position is stored as a value of [character width ×n] measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
• This command cancels the previous horizontal tab settings.
• When setting n = 8, the print position is moved to column 9 by sending **HT**.
• Up to 32 tab positions (k = 32) can be set. Data exceeding 32 tab positions is processed as normal data.
• Transmit [n] k in ascending order and place a NUL code 0 at the end.
• When [n] k is less than or equal to the preceding value [n] k-1, tab setting is finished and the following data is processed as normal data.
• **ESC D NUL** cancels all horizontal tab positions.
• The previously specified horizontal tab positions do not change, even if the character width changes.
• The character width is memorized for each standard and page mode.
[Default] The default tab positions are at intervals of 8 characters (columns 9, 17, 25,...) for font A (12 ×24).
[Reference] **HT**

ESC E n

[Name] Turn emphasized mode on/off
[Format] ASCII ESC E n
Hex 1B 45 n
Decimal 27 69 n
[Range] 0 n 255
[Description] • Turns emphasized mode on or off
• When the LSB of n is 0, emphasized mode is turned off.
• When the LSB of n is 1, emphasized mode is turned on.
[Details] • Only the least significant bit of n is enabled.
• This command and ESC ! turn on and off emphasized mode in the same way.
Be careful when this command is used with ESC !.
[Default] n = 0
[Reference] **ESC !**

ESC G n

[Name] Turn on/off double-strike mode
[Format] ASCII ESC G n
Hex 1B 47 n
Decimal 27 71 n
[Range] 0 ⩽ n ⩽ 255
[Description] • Turns double-strike mode on or off.
• When the LSB of n is 0, double-strike mode is turned off.
• When the LSB of n is 1, double-strike mode is turned on.
[Details] • Only the lowest bit of n is enabled.
• Printer output is the same in double-strike mode and in emphasized mode.
[Default] n = 0
[Reference] **ESC E**

ESC J n

[Name] Print and feed paper
[Format] ASCII ESC J n
Hex 1B 4A n
Decimal 27 74 n
[Range] 0 ⩽ n ⩽ 255
[Description] Prints the data in the print buffer and feeds the paper [n ×vertical or horizontal motion unit] inches.
[Details] • After printing is completed, this command sets the print starting position to the beginning of the line.
• The paper feed amount set by this command does not affect the values set by **ESC 2 or ESC 3**.
• The horizontal and vertical motion unit are specified by **GS P**.
• The GS P command can change the vertical (and horizontal) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
• In standard mode, the printer uses the vertical motion unit (y).
• In page mode, this command functions as follows, depending on the starting position of the printable area:
① When the starting position is set to the upper left or lower right of the printable area using ESC T, the vertical motion unit (y) is used.
② When the starting position is set to the upper right or lower left of the print able area using ESC T, the horizontal motion unit (x) is used.
• The maximum line spacing is 1016mm (40 inches). When the setting value exceeds the maximum, it is converted to the maximum automatically.
[Reference] **GS P**

ESC G n

[Name] Turn on/off double-strike mode
[Format] ASCII ESC G n
Hex 1B 47 n
Decimal 27 71 n
[Range] 0 ⩽ n ⩽ 255
[Description] • Turns double-strike mode on or off.
• When the LSB of n is 0, double-strike mode is turned off.
• When the LSB of n is 1, double-strike mode is turned on.
[Details] • Only the lowest bit of n is enabled.
• Printer output is the same in double-strike mode and in emphasized mode.
[Default] n = 0
[Reference] **ESC E**

ESC M n (*)

[Name] Select character font
[Format] ASCII ESC M n
Hex 1B 4D n
Decimal 27 77 n

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

[Description] Selects character fonts.

n	Function
0,48	Tcharacter font A (12×24) selected.
1,49	Character font B (9×17) selected.

ESC R n

[Name] Select an international character set

[Format] ASCII ESC R n

Hex 1B 52 n

Decimal 27 82 n

[Range] 0 ⩽ n ⩽ 15

[Description] Selects an international character set n from the following table:

n	Character
0	U.S.A
1	France
2	Germany
3	U.K
4	Denmark
5	Sweden
6	Italy

7	Spain
8	Japan
9	Norway
10	Denmark
11	Spain
12	Latin
13	Korea
14	Sloveina/Croatia
15	Chinese

The character sets for Slovenia/Croatia and China are supported only in the Simplified Chinese model.

[Default] Simplified Chinese model: n = 15

Models other than the Simplified Chinese model: n = 0

ESC V n (*)

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

[Format] ASCII ESC V n

Hex 1B 56 n

Decimal 27 86 n

[Range] 0 ⩽ n ⩽ 1, 48 ⩽ n ⩽ 49

[Description] Turns 90° clockwise rotation mode on/off n is used as follows:

n	Function
0,48	Turns off 90° clockwise rotation mode
1,49	Turns on 90° clockwise rotation mode

[Details] • This command affects printing in standard mode. However, the setting is always effective.

• When underline mode is turned on, the printer does not underline 90°clockwise-rotated.

• Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double- width commands in normal mode.

[Default] n = 0 [Reference]

ESC !, ESC -

ESC \ nL nH

[Name] Set relative print position

[Format] ASCII ESC \ nL nH

Hex 1B 5C nL nH

Decimal 27 92 nL nH

[Range] 0 ⩽ nL ⩽ 255

0 ⩽ nH ⩽ 255

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

• This command sets the distance from the current position to [(nL + nH×256)×horizontal or vertical motion unit]

[Details] • Any setting that exceeds the printable area is ignored.

• When pitch N is specified to the right:

nL+ nH×256 = N

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

When pitch N is specified to the left:

nL+ nH×256 = 65536 - N

• The print starting position moves from the current position to [N×horizontal or vertical motion unit]

• The horizontal and vertical motion unit are specified by **GS P**.

• The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

• In standard mode, the horizontal motion unit is used.

• In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area:

①When the starting position is set to the upper left or lower right of the printable area using ESC T, the horizontal motion

unit (x) is used.

②When the starting position is set to the upper right or lower left of the printable area using ESC T, the vertical motion unit (y) is used.

[Reference] **ESC $, GS P**

ESC a n

[Name] Select justification

[Format] ASCII ESC a n

Hex 1B 61 n

Decimal 27 97 n

[Range] 0 ⩽ n ⩽ 2, 48 ⩽ n ⩽ 50

[Description] Aligns all the data in one line to the specified position n selects the justification as follows:

n	Justification
0,48	Left justification
1,49	Centering
2,50	Right justification

[Details] • The command is enabled only when processed at the beginning of the line in standard mode.

• If this command is input in page mode, the printer performs only internal flag operations.

• This command has no effect in page mode.

• This command executes justification in the printing area.

• This command justifies the space area according to HT, ESC $ or ESC \.

[Default] n = 0

[Example]

Left justification

ABC
ABCD
ABCDE

Centering

ABC
ABCD
ABCDE

Right justification

ABC
ABCD
ABCDE

ESC C 5 n

[Name] Enable/disable panel buttons [Format]

ASCII	ESC	c	5	n
Hex	1B	63	35	n
Decimal	27	99	53	n

[Range] 0 ⩽ n ⩽ 255

[Description] Enables or disables the panel buttons.

- When the LSB of n is 0, the panel buttons are enabled.
- When the LSB of n is 1, the panel buttons are disabled.

[Details]
- Only the lowest bit of n is valid.
- When the panel buttons are disabled, none of them are usable when the printer cover is closed.
- In this printer, the panel buttons are the FEED button.
- In the macro ready mode, the FEED button are enabled regardless of the settings of this command; however, the paper cannot be fed by using these buttons.

[Default] n = 0

ESC d n

[Name] Print and feed n lines

[Format] ASCII	ESC	d	n	
Hex	1B	64	n	
Decimal	27	100	n	

[Range] 0 ⩽ n ⩽ 255

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

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

[Reference] ESC 2, ESC 3

ESC p m t1 t2

[Name] Generate pulse

[Format] ASCII ESC p m t1 t2

Hex 1B 70 m t1 t2

Decimal 27 112 m t1 t2

[Range] m = 0, 1, 48, 49

0 ⩽ t1 ⩽ 255, 0⩽ t2 ⩽ 255

[Description] Outputs the pulse specified by t1 and t2 to connector pin m as follows:

m	Connector pin
0,48	Drawer kick-out connector pin 2.
1,49	Drawer kick-out connector pin 5.

[Details] • The pulse ON time is [t1×2 ms] and the OFF time is [t2×2 ms].

• If t2 < t1, the OFF time is [t1x 2 ms]

[Reference] **DLE Dc4**

ESC t n

[Name] Select character code table

[Format] ASCII ESC t n

Hex 1B 74 n

Decimal 27 116 n

[Range] 0 ⩽ n ⩽10, 16 ⩽ n ⩽ 21

[Description] Selects a page n from the character code table.

n	Page
0	PC437 [U.S.A.Standard Europe]
1	Katakana
2	PC850:Multilingual
3	PC860:Portuguese
4	PC863 [Canadian French]
5	PC865:Nodic
6	West Europe
7	Greek
8	Hebrew
9	PC755:East Europe
10	Iran
16	WPC1252
17	PC866:Cyrillic#2
18	PC852:Latin2
19	PC858
20	IranII
21	Latvian

[Default] n = 0

ESC { n

[Name] Turns on/off upside-down printing mode

[Format] ASCII ESC { n

Hex 1B 7B n

Decimal 27 123 n

[Range] 0 ⩽ n ⩽ 255

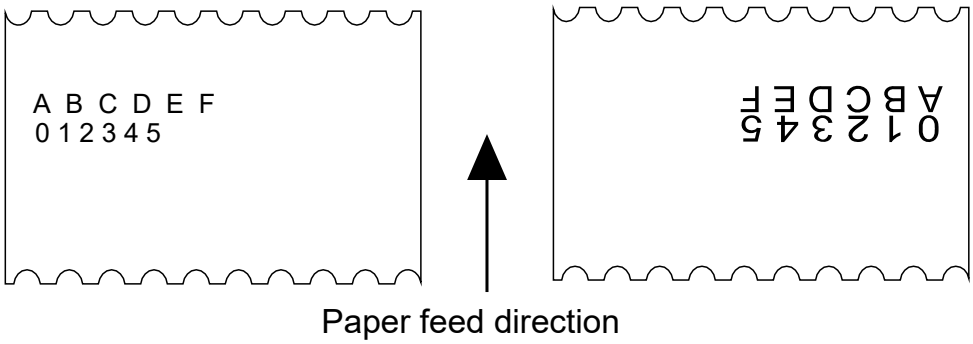
[Description] • Turns upside-down printing mode on or off.

• When the LSB of n is 0, upside-down printing mode is turned off.
• When the LSB of n is 1, upside-down printing mode is turned on.

[Details] • Only the lowest bit of n is valid.
• This command is enabled only when processed at the beginning of a line in standard mode.
• When this command is input in page mode, the printer performs only internal flag operations.
• This command does not affect printing in page mode.
• In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

[Default] n = 0

[Example]



FS p n m (*)

[Name] Print NV bit image

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

[Range] 0 ⩽ n ⩽ 255
0 ⩽ m ⩽ 3 , 48 ⩽ m ⩽ 51

[Description] Prints a NV bit image n using the mode specified by m.

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	200 dpi	200 dpi
1, 49	Double-width	200 dpi	100 dpi
2, 50	Double-height	100 dpi	200 dpi
3, 51	Quadruple	100 dpi	100 dpi

[dpi: dots per 25.4 mm {1"}]

• n is the number of the NV bit image (defined using the FS q command).
• m specifies the bit image mode.

[Details] • NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
• This command is not effective when the specified NV bit image has not been defined.
• In standard mode, this command is effective only when there is no data in the print buffer.
• In page mode, this command is not effective.
• This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
• If the printing area width set by **GS L** and **GS W** for the NV bit image is less than one vertical line, the following rocessing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode (m=0, 48) and in double-height mode (m=2, 50), and it means 2 dots in double-width mode (m=1, 49) and in quadruple mode(m=3, 51).
①The printing area width is extended to the right in **NV** bit image mode up to one line vertically. In this case, printing does not exceed the printable area.
②If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.
• If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.
• This command feeds dots (for the height n of the **NV** bit-image) in normal and double-widthmodes, and (for the height n 2 of the NV bit-image) 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 position to the beginning of the lineand processes the data that follows as normal data.

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

FS q n [xL xH yL yH d1…dk]1…[xL xH yL yH d1…dk]n (*)

[Name] Define NV bit image

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

Hex 1C 71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

Decimal 28 113 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Range] 0 ≤ n ≤ 255

0 ≤ xL ≤ 255

0 ≤ xH ≤ 3 (when 1 ≤ (xL + xH×256) ≤ 1023)

0 ≤ yL ≤ 255

0 ≤ yL ≤ 1 (when 1 ≤ (yL + yHr256) ≤ 288)

0 ≤ d ≤ 255

k = (xL + xH×256) × (yL + yH×256)×8

Total defined data area = 0.5M bits (64K bytes) [Description] Define the NV bit image specified by n .

- n specifies the number of the defined NV bit image.
- xL, xH specifies (xL + xH×256) × 8 dots in the horizontal direction for the NV bit image you are defining.
- yL, yH specifies (yL + yH × 256) × 8 dots in the vertical direction for the NV bit image you are defining.

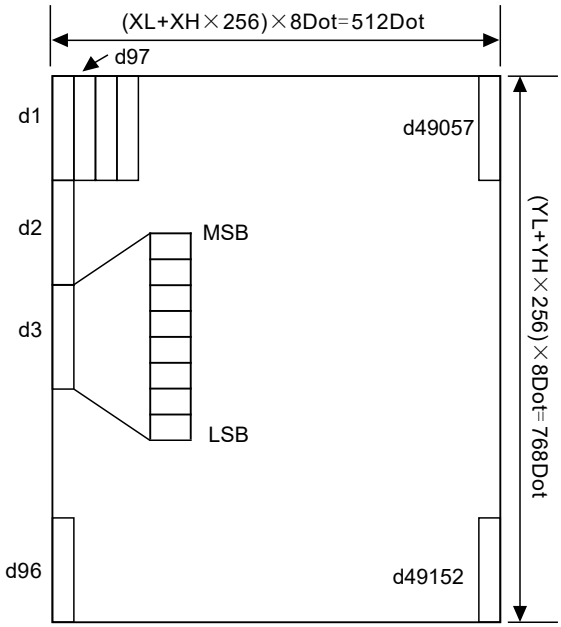
[Details]
- This command cancels all NV bit images that have already been defined by this command. The printer can not redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.
- From the beginning of the processing of this command till the finish of hardware reset, mechanical operations (including initializing the position of the printer head when the cover is open, paper feeding by using the FEED button, etc.) cannot be performed.
- During processing this command, the printer is in BUSY when writing the data to the NV user memory and stops receiving data. Therefore it is prohibitted to transmit the data including the real-time commands during the execution of this command.
- NV bit image means a bit image which is defined in a non-volatile memory by FS q and printed by FS p.
- In standard mode, this command is effective only when processed at the beginning of the line.
- In page mode, this command is not effective
- This command is effective when 7 bytes <FS<yH> is processed as a normal value.
- When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, yH out of the defined range.
- In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled.
- In groups of NV bit images other than the first one, when the printer processes xL, xH, yL, yH out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that haven¡¯t been defined are disabled (undefined), but any NV bit images before that are enabled.
- The d indicates the definition data. In data (d) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
- This command defines n as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 01H, and the last data group [xL xH yL yH d1...dk] is NV bit image n. The total agrees with the number of NV bit images specified by command **FS p.**
- A definition data of a NV bit image consists of [xL xH yL yH d1...dk]. Therefore, when only one NV bit image is defined n=1, the printer processes a data group [xL xH yL yH d1...dk] once. The printer uses ([data: (xL + xH × 256) × (yL + yH × 256) × 8] + [header :4])bytes of NV memory.
- The definition area in this printer is a maximum of 0.5M bits (64K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 0.5M bits (64K bytes).
- The printer is busy immediately before writing into NV memory.
- The printer does not transmit ASB status and perform status detection during processing of this command even when ASB is specified.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
- Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
- This command performs only definition of a NV bit image and does not perform printing.Printing of the NV bit image is performed by the **FS p** command.

[Details]
- Frequent write command execution may cause damage the NV memory.
  Therefore, it is recommended to write the NV memory 10 times or less a day.
- The printer performs a hardware reset after the procedure to place the image into the NV memory. Therefore, user-

defined characters, downloaded bit images, and macros should be defined only after completing this command. The printer clears the receive and print buffers and resets the mode to the mode that was in effect at power on. At this time, DIP switch settings are checked again.

[Reference] **FS p**

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



GS ! n (*)

[Name] Select character size

[Format] ASCII GS ! N

Hex 1D 21 n

Decimal 29 33 n

[Range] 0 ⩽ n ⩽ 255

(1 ⩽ vertical number of times ⩽ 8, 1 ⩽ horizontal number of times ⩽ 8)

[Description] Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

Bit	Off/On	Hex	Decimal	Function
0-3	Character height selection. See Table 2.			
4-7	Character width selection. See Table 1.			

Table 1 Table 2

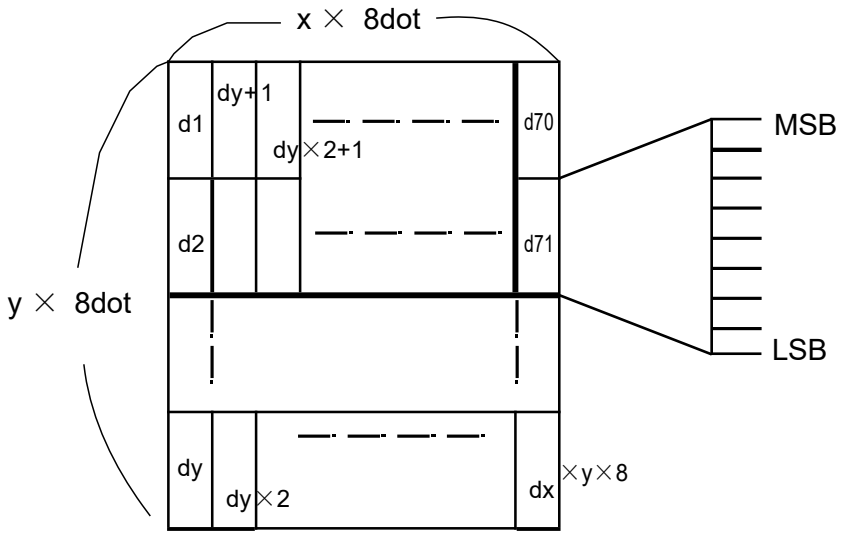
Character Width Selection

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

[Details] • This command is all characters (alphanumeric and Kanji) effective except for HRI characters.
• If n is outside of the defined range, this command is ignored.
• In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90° 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.
• When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline. The **ESC !** command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.
[Default] n = 0
[Reference] ESC !

GS * x y d1...d(x × y × 8)

[Name] Define downloaded bit image
[Format] ASCII GS * xy d1 ... d (x × y × 8)
Hex 1D 2A xy d1 ... d (x × y × 8)
Decimal 29 42 xy d1 ... d (x × y × 8)
[Range] 1 ⩽ x ⩽ 255,
1 ⩽ y ⩽ 48
x × y ⩽ 912
0 ⩽ d ⩽ 255
[Description] Defines a downloaded bit image using the number of dots specified by x and y
• x specifies the number of dots in the horizontal direction.
• y specifies the number of dots in the vertical direction.
[Details] • The number of dots in the horizontal direction is x × 8, in the vertical direction it is y × 8.
• If x × y is out of the specified range, this command is disabled.
• The d indicates bit-image data. Data (d) specifies a bit printed to 1 and not printed to 0.
The downloaded bit image definition is cleared when:
ESC @ is executed.
ESC & is executed.
FS q is executed.
Printer is reset or the power is turned off.
• The following figure shows the relationship between the downloaded bit image and the printed data.



[Reference] **GS /**

GS / m

[Name] Print downloaded bit image
[Format] ASCII GS / m
Hex 1D 2F m
Decimal 29 47 m
[Range] 0 ⩽ m ⩽ 3, 48 ⩽ m ⩽ 51
[Description] Prints a downloaded bit image using the mode specified by m.
m selects a mode from the table below:

m	Mode	Vertical Dot Density (DPI)	Horizontal Dot Density (DPI)
0, 48	Normal	200	200
1, 49	Double-width	200	100
2, 50	Double-height	100	200
3, 51	Quadruple	100	100

[Details] •This command is ignored if a downloaded bit image has not been defined.
• In standard mode, this command is effective only when there is no data in the print buffer.
• This command has no effect in the print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside down printing mode.
• If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
• Refer to Figure 3.12.3 for the downloaded bit image development position in page mode.
• If the printing area width set by **GS L** and **GS W** is less than one line in vertical, the following processing is performed only on the line in question:
The printing area width is extended to the right up to one line in vertical. In this case, printing does not exceed the printable area.
If the printing area width cannot be extended by one line in vertical, the left margin is reduced to accommodate one line in vertical.
[Reference] **GS ***

GSBn (*)

[Name] Turn white/black reverse printing mode

[Format] ASCII GS B n
Hex 1D 42 n
Decimal 29 66 n

[Range] 0 ⩽ n ⩽ 255

[Description] • Turns on or off white/black reverse printing mode.
• When the LSB of n is 0, white/black reverse mode is turned off.
• When the LSB of n is 1, white/black reverse mode is turned on.

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

[Default] n = 0

GS H n

[Name] Select printing position for HRI characters

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

[Range] 0 ⩽ n ⩽ 3, 48 ⩽ n ⩽ 51

[Description] Selects the printing position of HRI characters when printing a bar code. n selects the printing position as follows:

n	Print Position
0,48	Do not print
1,49	Top of the bar code
2,50	Below the barcode
3,51	The barcode are printed below

• HRI indicates Human Readable Interpretation.

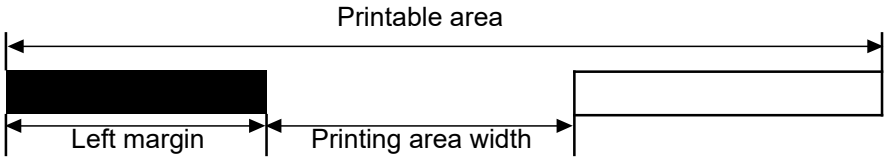
[Details] •HRI characters are printed using the font specified by GS f.

[Default] n = 0

[Reference] GS f, GS k

GS L nL nH

[Name] Set left margin
[Format] ASCII GS L nL nH
Hex 1D 4C nL nH
Decimal 29 76 nL nH
[Range] 0 ≤ nL ≤ 255 0 ≤ nH ≤ 255
[Description] • Sets the left margin using nL and nH.
• The left margin is set to [(nL + nH ×256) ×horizontal motion unit]] inches. Printable area Left margin Printing area width
[Details] • This command is effective only processed at the beginning of the line in standard mode.
• If this command is input in page mode, the printer performs only internal flag operations.
• This command does not affect printing in page mode.
• If the setting exceeds the printable area, the maximum value of the printable area is used.
• The horizontal and vertical motion units are specified by GS P. Changing the horizontal and vertical motion unit does not affect the current left margin.
• The horizontal motion unit (x) is used for calculating the left margin. The calculated result is truncated to the minimum value of the mechanical pitch.



Default] nL = 0, nH = 0
[Reference] **GS P, GS W**

GSPxy (*)

[Name] Set horizontal and vertical motion units
[Format] ASCII GS P x y
Hex 1D 50 x y
Decimal 29 80 x y
[Range] 0 ≤ x ≤ 255
0 ≤ y ≤ 255
[Description] Sets the horizontal and vertical motion units to approximately 25.4/ x mm { 1/ x inches} and approximately 25.4/ y mm {1/ y inches}, respectively. When x and y are set to 0, the default setting of each value is used.
[Details] • The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.
• In standard mode, the following commands use x or y, regardless of character rotation (upside-down or 90° clockwise rotation): ①Commands using x: **ESC SP, ESC $, ESC \, FS S, GS L, GS W** ②Commands using y: **ESC 3, ESC J, GS V**
• In page mode, the following command use x or y, depending on character orientation:
① When the print starting position is set to the upper left or lower right of the printing area using **ESC T** (data is buffered in the direction perpendicular to the paper feed direction): Commands using x: **ESC SP, ESC $, ESC W, ESC \, FS S** Commands using y: **ESC 3, ESC J, ESC W, GS $, GS \, GS V**
② When the print starting position is set to the upper right or lower left of the printing area using ESC T (data is buffered in the paper feed direction): Commands using x: **ESC 3, ESC J, ESC W, GS $, GS ** Commands using y: **ESC SP, ESC $, ESC W, ESC \,FS S, GS V**
• The command does not affect the previously specified values.
• The calculated result from combining this command with others is truncated to the minimum value of the mechanical pitch.
[Default] x = 180, y = 360
[Reference] **ESC SP, ESC $, ESC 3, ESC J, ESC W, ESC \, GS $, GS L, GS V, GS W, GS **

① GS V m ② GS V m n

[Name] Select cut mode and cut paper

[Format] ① ASCII GS V m

Hex 1D 56 m

Decimal 29 86 m

② ASCII GS V m n

Hex 1D 56 m n

Decimal 29 86 m n

[Range] ① m=0,48 , m =1,49

② m = 66, 0 ≤ n ≤ 255

[Description] Selects a mode for cutting paper and executes paper cutting. The value of m selects the mode as follows:

m	Print mode
0,48	one point left uncut
1,49	Partial cut
66	Feeds paper (cutting position + [n × (vertical motion unit)]), and cuts the paper partially (one point left uncut).

[Details for ① and ②]

• This command is effective only processed at the beginning of a line.

[Details for ①] • Only the partial cut is available; there is no full cut.

[Details for ②] • When n = 0, the printer feeds the paper to the cutting position and cuts it.

When n = 0, the printer feeds the paper to (cutting position + [n × vertical motion unit]) and cuts it.

• The horizontal and vertical motion unit are specified by **GS P**.

• The paper feed amount is calculated using the vertical motion unit (y). However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

GS W nL nH

[Name] Set printing area width

[Format] ASCII GS W nL nH

Hex 1D 57 nL nH

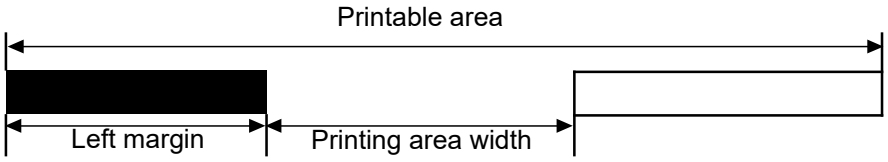
Decimal 29 87 nL nH

[Range] 0 ⩽ nL ⩽ 255

0 ⩽ nH ⩽ 255

[Description] Sets the printing area width to the area specified by nL and nH.

• The printing area width is set to [(nL + nH × 256) × horizontal motion unit]] inches.



[Details] • This command is effective only processed at the beginning of the line.

• In page mode, the printer performs only internal flag operations.

• This command does not affect printing in page mode.

• If the [left margin + printing area width] exceeds the printable area, [printable area width - left margin) is used.

• The horizontal and vertical motion units are specified by GS P. Changing the horizontal and vertical motion units does not affect the current left margin.

• The horizontal motion unit (x) is used for calculating the printing area width.

The calculated result is truncated to the minimum value of the mechanical pitch.

• If the width set for the printing area is less than the width of one character, when the character data is developed, the following processing is performed:

The printing area width is extended to the right to accommodate one character.

If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one character.

If the printing area width cannot be extended sufficiently, the right space is reduced.

• If the width set for the printing area is less than one line in vertical, the following processing is performed only on the

line in question when data other than character data (e.g., bit image, user-defined bit image) is developed:
The printing area width is extended to the right to accommodate one line in vertical for the bit image within the printable area.
If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one line in vertical.

- The commands which set the printing area width for bit image printing and its minimum widths are as follows:
- Bit image (**ESC ***):
  Single density mode = 2 dots
  Double density mode = 1 dot
- Downloaded bit image (**GS /**):
  Double width mode or Quadruple mode = 2 dots
  Normal mode or Double-height mode = 1 dot
- NV bit image (**FS p**):
  Double width mode or Quadruple mode = 2 dots
  Normal mode or Double-height mode = 1 dot
- Raster bit image (**GS r 0**):
  Double width mode or Quadruple mode = 2 dots
  Normal mode or Double-height mode = 1 dot

[Default] nL = 0, nH = 2
For 58mm paper width model; nL = 104, nH = 1
[Reference] **GS L, GS P**

Gsan (*)

[Name] Enable/Disable Automatic Status Back (ASB)
[Format] ASCII GS a n
Hex 1D 61 n
Decimal 29 97 n
[Range] 0 ≤n ≤255
[Description] Enables or disables ASB and specifies the status items to include, using n as follows:

Printer Status:
After ASB function is turned on by hex command 1D 61 FF, function "Automatic Status Back" of printer will be turned on. Four bytes data will be returned by printer each time printer status change. For the meaning of each byte, please refer to the sheet below.

- First byte

Bit	Binary	Hex	Decimal	Status for ASB
0	0	0	0	Not used. Fixed to Off
1	0	0	0	Not used. Fixed to Off
2	0	0	0	Drawer kick-out connector pin 3 is LOW
	1	4	4	Drawer kick-out connector pin 3 is HIGH
3	0	0	0	Online
	1	8	8	Offline
4	1	10	16	Not used. Fixed to On
5	0	0	0	Cover is closed.
	1	20	32	Cover is open.
6	0	0	0	Paper is not being fed by feed button
	1	40	64	Paper is being fed by feed button.
7	0	0	0	Not used. Fixed to Off

- Second byte

Bit	Binary	Hex	Decimal	Status for ASB
0	0	0	0	Not waiting for online recovery
	1	1	1	Waiting for online recovery
1	0	0	0	Paper feed button is not pushed(off)
	1	2	2	Paper feed button is pushed(on)
2	0	0	0	No recoverable error (except for auto cutter error.)
	1	4	4	Recoverable error occurred (except for auto cutter error.)
3	0	0	0	No auto cutter error
	1	8	8	Auto cutter error occurred
4	0	0	0	Not used. Fixed to Off
5	0	0	0	No unrecoverable error occurred
	1	20	32	Unrecoverable error occurred
6	0	0	0	No automatically recoverable error
	1	40	64	Automatically recoverable error occurred
7	0	0	0	Not used. Fixed to Off

- Third byte

Bit	Binary	Hex	Decimal	Status for ASB
0,1	00	00	0	Not used. Fixed to Off
2,3	00	00	0	Roll paper end sensor: paper present
	11	0C	12	Roll paper end sensor: paper not present

4	0	00	0	Not used. Fixed to Off
5,6	--	--	--	Undefined
7	0	00	0	Not used. Fixed to Off

- Fourth byte

Bit	Binary	Hex	Decimal	Status for ASB
0-3	--	--	--	Undefined
4	0	00	0	Not used. Fixed to Off
5,6	--	--	--	Undefined
7	0	00	0	Not used. Fixed to Off

GS f n (*)

[Name] Select font for Human Readable Interpretation (HRI) characters
[Format] ASCII GS f n
Hex 1D 66 n
Decimal 29 102 n
[Range] n = 0, 1, 48, 49
[Description] Selects a font for the HRI characters used when printing a bar code.
n selects a font from the following table:

n	Typeface
0,48	Standard ASCII characters (12 × 24)
1,49	Compressed ASCII characters (9 × 17)

[Details] • HRI indicates Human Readable Interpretation.
• HRI characters are printed at the position specified by **GS H**.
[Default] n = 0
[Reference] **GS H, GS k**

GS h n

[Name] Select bar code height
[Format] ASCII GS h n
Hex 1D 68 n
Decimal 29 104 n
[Range] 1 ⩽ n ⩽ 255
[Description] Selects the height of the bar code.
n specifies the number of dots in the vertical direction.
[Default] n = 162
[Reference] GS k

①GS k m d1…dk NUL ②GS k m n d1..dn

[Name] 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 ≤ m ≤ 6 (k and d depends on the bar code system used)
② 65 ≤ m ≤73 (n and d depends on the bar code system used)
[Description] Selects a bar code system and prints the bar code.
m selects a bar code system as follows:

m		Bar Code System	Numder of characters	Character	Remarks
㊀	0	UPC-A	11 ⩽ k ⩽ 12	0~9	48 ⩽ d ⩽ 57
	1	UPC-E	11 ⩽ k ⩽ 12	0~9	48 ⩽ d ⩽ 57
	2	JAN13 (EAN13)	12 ⩽ k ⩽ 13	0~9	48 ⩽ d ⩽ 57
	3	JAN8 (EAN8)	7 ⩽ k ⩽ 8	0~9	48 ⩽ d ⩽ 57
	4	CODE39	1 ⩽ k ⩽ 255	0~9,	45 ⩽ d ⩽ 57,
				A~Z	65 ⩽ d ⩽ 90,
				SP, $, %, +,	d = 32, 36, 37,
				-, ., /	43, 45, 46, 47
				*(Start / end character)	d = 42(Start / end character)
	5	ITF	1 ⩽ k ⩽255（Even number）	0~9	48 ≤ d ≤ 57
	6	CODABAR	1 ⩽ k ⩽ 255	0~9,	48 ≤ d ≤ 57,
				A~D	65 ≤ d ≤ 68,
				$, +, -, .,	d = 36, 43, 45, 46,
				/,:	47, 58

m		Bar Code System	Numder of characters	Character	Remarks
②	65	UPC-A	11 ≤ n ≤ 12	0~9	48 ≤ d ≤ 57
	66	UPC-E	11 ≤ n ≤ 12	0~9	48 ≤ d ≤ 57
	67	JAN13 (EAN13)	12 ≤ n ≤ 13	0~9	48 ≤ d ≤ 57
	68	JAN8 (EAN8)	7 ≤ n ≤ 8	0~9	48 ≤ d ≤ 57
	69	CODE39	1 ≤ k ≤ 255	0~9,	45 ≤ d ≤ 57,
				A~Z	65 ≤ d ≤ 90,
				SP, $, %, +,	d = 32, 36, 37,
				-, ., /	43, 45, 46, 47
				*(Start / end character)	d = 42(Start / end character)
	70	ITF	1 ≤ n ≤255（Even number）	0~9	48 ≤ d ≤ 57
	71	CODABAR	1 ≤ n ≤ 255	0~9,	48 ≤ d ≤ 57,
				A~D	65 ≤ d ≤ 68,
				$, +, -, .,	d = 36, 43, 45, 46,
				/,:	47, 58
	72	CODE93	1 ≤ n ≤ 255	NUL~SP(7FH)	0 ≤ d ≤ 127
	73	CODE128	2 ≤ n ≤ 255	NUL~SP(7FH)	0 ≤ d ≤ 127

[Details 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.

[Details 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. [Details 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.

[Details 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 CODE128 (m = 73) is used:

Special 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

- 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 (F + an alphabetic character) as a control character (<00>H to <1F>H and <7F>H):

[Examples] example print "No. 123456"

In this example, the printer first prints "No." With CODE B, followed by the rest of the digital print CODE C:

- If the character is not in the forefront of barcode data set selection, the printer will stop processing this command, and the rest of the data as normal data.
- If "{" and followed by its combination of character is not specified above that, the printer stops processing this command, and the rest of the data as normal data.
- If the printer is not receiving character code character set data, the printer stops processing this command, and the rest of the data as normal data.
- When the printer to print HRI characters do not print shift characters and character set selection data. HRI characters • function character is not printed.
- Control characters (<00> H to <1F> H and <7F> H) of HRI characters are not printed; <Other> must ensure clearance around barcode. Gap varies by type of bar code.

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

GS r n (*)

[Name] Transmit status

[Format] ASCII GS r n

Hex 1D 72 n

Decimal 29 114 n

[Range] n = 1, 2, 49, 50

[Description] Transmits the status specified by n as follows:

n	Function
0,48	Transmits paper sensor status
1,49	Transmits drawer kick-out connector status

[Details] • This command just effect the serial interface.

- This command is executed after the data in the receive buffer is processed. Therefore,there may be a time lag between receiving this command and transmitting the status,depending on the receive buffer status.
- The status types to be transmitted are shown below:

Paper sensor status (n = 1, 49):

Bit	Off/On	Hex	Decimal	Status for ABS
0-1	Off	00	0	Paper roll near-end sensor: paper adequate.
	On	03	3	Paper roll near-end sensor: paper almost used up.
2-3	Off	00	0	Paper roll end sensor: paper adequate.
	On	0C	12	Paper roll end sensor: no paper.
4	Off	00	0	Not used. Fixed to Off.
5,6		—	—	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Cash drawer status(n = 2, 50):

Bit	Off/On	Hex	Decimal	Status for ABS
0	Off	00	0	Cash drawer opening.
	On	01	1	No cash drawer opening.
1-3		—	—	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5,6		—	—	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Reference] DLE EOT, GS a

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

[Name] Print raster bit image

[Format] ASCII GS v 0 m xL xH yL yH d1 ... dk

Hex 1D 76 30 m xL xH yL yH d1 ... dk

Decimal 29 118 48 m xL xH yL yH d1 ... dk

[Range] 0 ≤ m ≤ 3, 48 ≤ m ≤ 51

0 ≤ xL ≤ 255

0 ≤ xH ≤ 255

0 ≤ yL ≤ 255

0 ≤ d ≤ 255

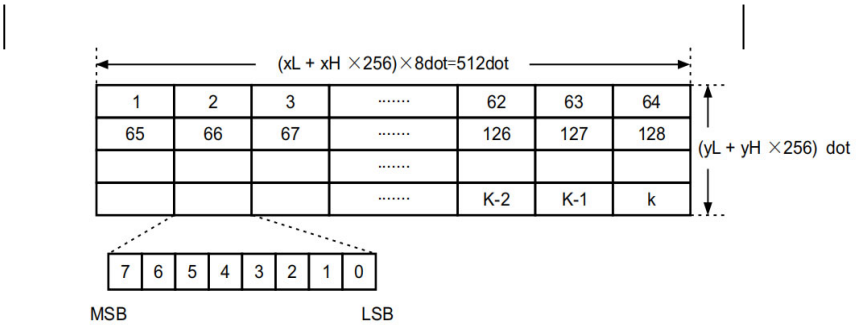
k = (xL + xH × 256) × (yL + yH × 256) (k ≠ 0)

[Description] Selects Raster bit-image mode. The value of m selects the mode, as follows:

n	Mode	Vertical Dot Density	Horizontal Dot ensity
0,48	Normal	200 DPI	200 DPI
1,49	Double-width	200 DPI	100 DPI
2,50	Double-height	100 DPI	200 DPI
3,51	Quadruple	100 DPI	100 DPI

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

[Details]
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command has no effect in all print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster bit image.
- If the printing area width set by GS L and GS W is less than the minimum width, the printing area is extended to the minimum width only on the line in question. The minimum width means 1 dot in normal (m=0, 48) and double-height (m=2, 50), 2 dots in double-width (m=1, 49) and quadruple (m=3, 51) modes.
- Data outside the printing area is read in and discarded on a dot-by-dot basis.
- The position at which subsequent characters are to be printed for raster bit image is specified by HT (Horizontal Tab), ESC $ (Set absolute print position), ESC \ (Set relative print position), and GS L (Set left margin). If the position at which subsequent characters are to be printed is not a multiple of 8, print speed may decline.
- The ESC a (Select justification) setting is also effective on raster bit images.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command. The definition of this command should be cleared.
- d indicates the bit-image data. Set time a bit to 1 prints a dot and setting it to 0 does not print a dot.



GS w n

[Name] Set bar code width

[Format] ASCII GS w n

Hex 1D 77 n

Decimal 29 119 n

[Range] 2≤ n≤ 6

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

n specifies the bar code width as follows:

n	Module Width (mm) for Multi-level Bar Code	Binary-level bar codes	
		Thin element width (mm)	Thick element width (mm)
2	0.25	0.25	0.625
3	0.375	0.375	1.0
4	0.5	0.5	1.25
5	0.625	0.625	1.625
6	0.75	0.75	1.875

- Multi-level bar codes are as follows:
  UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128
- Binary-level bar codes are as follows:
  CODE39, ITF, CODABAR

[Default] n = 3

[Reference] **GS k**

FS ! n

[Name] Set print mode(s) for Kanji characters

[Format] ASCII FS ! n

Hex 1C 21 n

Decimal 28 33 n

[Range] 0 ≤ n ≤ 255

[Description] Sets the print mode for Kanji characters, using n as follows:

Bit	Off/On	Hex	Decimal	Function
0-1	—	—	—	Undefined.
2	Off	00	0	Double-width mode is OFF.
	On	04	4	Double-width mode is ON.
3	Off	00	.	Double-height mode is OFF.
	On	08	8	Double-height mode is ON.
4-6	—	—	—	Undefined.
7	Off	00	0	Underline mode is OFF.
	On	80	128	Underline mode is ON.

[Details]
- When both double-width and double-height modes are set (including right- and left-side character spacing), quadruple-size characters are printed.
- The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.
- The thickness of the underline is that specified by **FS** , regardless of the character size.
- When some of the characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- It is possible to emphasize the Kanji character using **FS W** or **GS** !, the setting of the last received command is effective.
- It is possible to turn under line mode on or off using **FS** , and the setting of the last received command is effective.

[Default] n = 0

[Reference] **FS -, FS W, GS !**

FS &

[Name] Select Kanji character mode
[Format] ASCII FS &
Hex 1C 26
Decimal 28 38
[Description] Selects Kanji character mode.
[Reference] **FS .,**

FS – n

[Name] Turn underline mode on/off for Kanji characters
[Format] ASCII FS - n
Hex 1C 2D n
Decimal 28 45 n
[Range] 0 ⩽ n ⩽ 2, 48 ⩽ n ⩽ 50
[Description] Turns underline mode for Kanji characters on or off, based on the following values of n.

n	Function
0,48	Turns off underline mode for Kanji characters
1,49	Turns on underline mode for Kanji characters (1-dot thick)
2,50	Turns on underline mode for Kanji characters (2-dot thick)

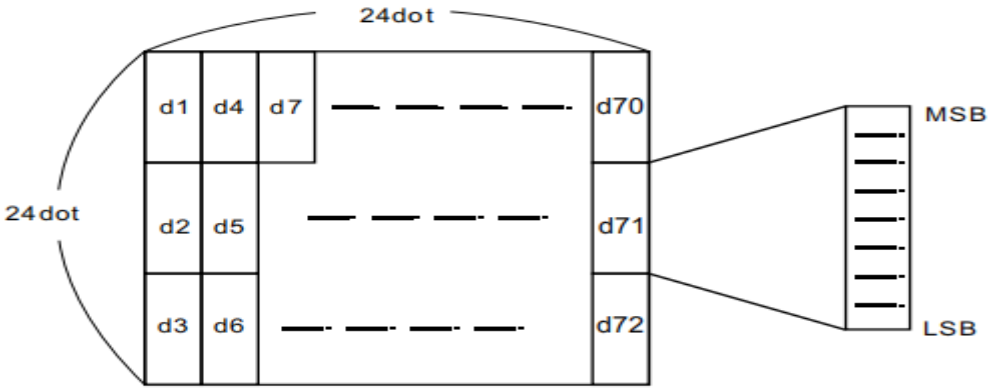
[Details] • The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.
• After the underline mode for Kanji characters is turned off by setting n to 0, underline printing is no longer performed, but the previously specified underline thickness is not changed. The default underline thickness is 1 dot.
• The specified line thickness does not change even when the character size changes.
• It is possible to turn underline mode on or off using **FS** !, and the last received command is effective.
[Default] n = 0
[Reference] **FS !**

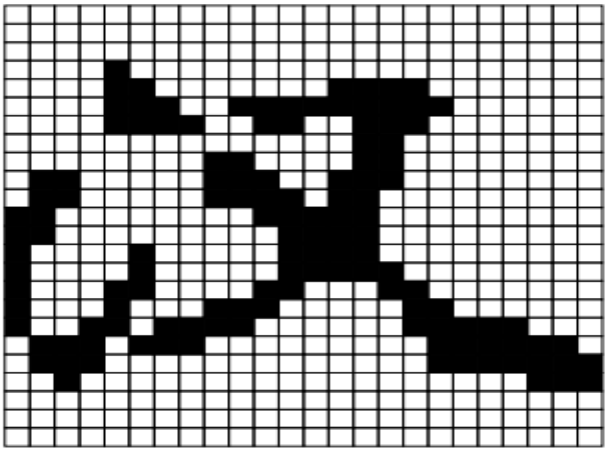
FS .

[Name] Cancel Kanji character mode
[Format] ASCII FS .
Hex 1C 2E
Decimal 28 46
[Description] Cancels Kanji character mode.
[Reference] **FS &,**

FS 2 c1 c2 d1...dk Define user-defined characters

[Format] ASCII FS 2 c1 c2 d1 ... dk
Hex 1C 32 c1 c2 d1 ... dk
Decimal 28 50 c1 c2 d1 ... dk
[Range] c1, c2 define the character of the representative character encoding
C1=FEH
A1H ⩽ c2 ⩽ FEH
0 ⩽ d ⩽ 255
k = 72
[Description]Defined by the designated c1, c2 characters
[Default] • c1, c2 on behalf of a user-defined character encoding, c1 specifies the first byte, c2 specify the second byte.
[Notes] • d represents the data. 1 to print a dot, 0 means no printing point.
No custom characters.
Between custom Kanji fonts and data relationship shown below:





D1=00H, D4=00H, D7=00H, D10=00H .....
D2=1FH, D5=78H, D8=60H, D11=00H .....
D3=C0H, D6=30H, D9=38H, D12=70H .....

FS S n1 n2

[Name] Set left- and right-side Kanji character spacing

[Format] ASCII FS S n1 n2
Hex 1C 53 n1 n2
Decimal 28 83 n1 n2

[Range] 0 ≤ n 1 ≤ 255
0 ≤ n 2 ≤ 255

[Description] Sets left- and right-side Kanji character spacing n1 and n2, respectively.

- When the printer model used supports GS P, the left-side character spacing is [n1 × horizontal or vertical motion units], and the right-side character spacing is [n2 × horizontal or vertical motion units].

[Details]
- When double-width mode is set, the left- and right-side character spacing is twice the normal value.
- The horizontal and vertical motion units are set by **GS P**. The previously specified character spacing does not change, even if the horizontal or vertical motion unit is changed using **GS P**.
- The value cannot be less than the minimum horizontal movement amount, and must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:

① When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal

motion unit (x) is used.

② When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

③ The maximum right-side spacing is 255/180 inches for the paper roll and is approximately 35.983 mm {255/150 inches}. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] n1 = 0, n2 = 0

[Reference] **GS P**

FS W n

[Name] Turn quadruple-size mode on/off for Kanji characters

[Format] ASCII FS W n

Hex 1C 57 n

Decimal 28 87 n

[Range] 0 ⩽ n ⩽ 255

[Description] • Turns quadruple-size mode on or off for Kanji characters.

• When the LSB of n is 0, quadruple-size mode for Kanji characters is turned off.

• When the LSB of n is 1, quadruple-size mode for Kanji characters is turned on.

[Details] • Only the lowest bit of n is valid.

• In quadruple-size mode, the printer prints the same size characters as when double-width and double-height modes are both turned on.

• When quadruple-size mode is turned off using this command, the following characters are printed in normal size.

• When some of the characters on a line are different in height, all the characters on the line are aligned at the baseline.

• **FS** ! or **GS** ! can also select and cancel quadruple-size mode by selecting double-height and double-width modes, and the setting of the last received command is effective.

[Default] n = 0

[Reference] **FS !, GS !**

The printer features a command prompt

ESC B n t

[Name] Printer to print single Beeper

[Format] ASCII ESC B n t

Hex 1B 42 n t

Decimal 27 66 n t

[Range] 1 <= n <= 9,1 <= t <= 9

[Description] • printer to print single Beeper.

• n is the number of times the buzzer.

• t is the number of tweets buzzer each time (t × 50) ms

ESC C m t n

[Name] Printer to print single Beeper and alarm light flashes

[Format] ASCII ESC C m t n

Hex 1B 43 m t n

Decimal 27 67 m t n

Range] 1 <= m <= 20,1 <= t <= 20,0 <= n <= 3,

[Description] •printer to print single Beeper and alarm lights blinking.

• m: 1 <= m <= 20, refers to the warning light flashes the number of times or buzzer.

• t: 1 <= t <= 20, refers to the warning lights flashing at intervals of t * 50 ms or buzzer interval of (t × 50) ms.

• When n = 0, the buzzer does not beep while warning light does not blink;

• When n = 1, the buzzer sounds; when n = 2, warning lights flashing;

• When n = 3, the buzzer sounds, while warning lights flashing;

Appendix X: 128 Code

X.1 128 Yard Review

128 yards through the alternate character sets A, B character set and character set C, capable of 128 and 100 ASCII characters from 00 to 99 digits , and some special characters are encoded . Each character set encoding of characters is as follows :

- Character Set A: ASCII character codes 00H to 5FH
- Character Set B: ASCII character codes 20H to 7FH
- Character Set C: 00 ~ 99 of 100 digital

128 yards on the following special characters can be encoded :

- SHIFT character "SHIFT" to make the character behind the bar code symbol SHIFT first character from the character set A character set conversion to B, or from character set to character set B A, began to recover from the second character to the previously used SHIFT character set. "SHIFT" character set only character set conversion between A and B used in the character , it does not make the current coded character set C character enters or exits the state .
- Character set selection character (CODE A, CODE B, CODE C) These characters can convert it back to a character set encoding of characters A, B or C.
- function character (FNC1, FNC2, FNC3, FNC4) the usefulness of these features characters depends on the application software. In the character set C , only FNC1 available.

X.2 character set characters

A set of characters

Characters	Send data		Characters	Send data		Characters	Send data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NUL	00	0	(	28	40	P	50	80
L	01	1	)	29	41	Q	51	81
SOH	02	2	*	2A	42	R	52	82
STX	03	3	+	2B	43	S	53	83
ETX	04	4	,	2C	44	T	54	84
EOT	05	5	-	2D	45	U	55	85
ENQ	06	6	.	2E	46	V	56	86
ACK	07	7	/	2F	47	W	57	87
BEL	08	8	0	30	48	X	58	88
BS	09	9	1	31	49	Y	59	89
HT	0A	10	2	32	50	Z	5A	90
LF	0B	11	3	33	51	[	5B	91
VT	0C	12	4	34	52	\	5C	92
FF	0D	13	5	35	53	]	5D	93
CR	0E	14	6	36	54	^	5E	94
SO	0F	15	7	37	55	_	5F	95
SI	10	16	8	38	56	FNC	7B,31	123,49
DLE	11	17	9	39	57	1	7B,32	123,50
DC1	12	18	:	3A	58	FNC	7B,33	123,51
DC2	13	19	;	3B	59	2	7B,34	123,52
DC3	14	20	<	3C	60	FNC	7B,53	123,83
DC4	15	21	=	3D	61	3	7B,42	123,66
NAK	16	22	>	3E	62	FNC	7B,43	123,67
SYN	17	23	?	3F	63	4		
ETB	18	24	@	40	64	SHIF		
CAN	19	25	A	41	65	T		
EM	1A	26	B	42	66	COD		
SUB	1B	27	C	43	67	EB		
ESC	1C	28	D	44	68	COD		
FS	1D	29	E	45	69	EC		
GS	1E	30	F	46	70			
RS	1F	31	G	47	71			
US	20	32	H	48	72			
SP	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			

B set of characters

Characters	Send data		Characters	Send data		Characters	Send 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	FNC	7B,31	123,49
1	31	49	Y	59	89	1	7B,32	123,50
2	32	50	Z	5A	90	FNC	7B,33	123,51
3	33	51	[	5B	91	2	7B,34	123,52
4	34	52	\	5C	92	FNC	7B,53	123,83
5	35	53	]	5D	93	3	7B,41	123,65
6	36	54	^	5E	94	FNC	7B,43	123,67
7	37	55	_	5F	95	4		
8	38	56	`	60	96	SHIF		
9	39	57	a	61	97	T		
:	3A	58	b	62	98	COD		
;	3B	59	c	63	99	EA		
<	3C	60	d	64	100	COD		
=	3D	61	e	65	101	EC		
>	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			

Characters in the character set C

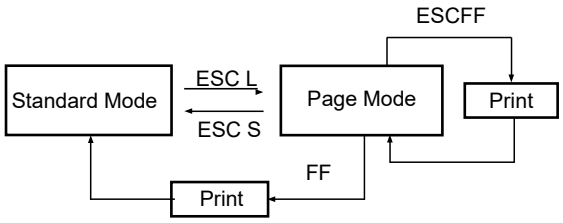
Characters	Send data		Characters	Send data		Characters	Send data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
0	00	0	40	28	40	80	50	80
1	01	1	41	29	41	81	51	81
2	02	2	42	2A	42	82	52	82
3	03	3	43	2B	43	83	53	83
4	04	4	44	2C	44	84	54	84
5	05	5	45	2D	45	85	55	85
6	06	6	46	2E	46	86	56	86
7	07	7	47	2F	47	87	57	87
8	08	8	48	30	48	88	58	88
9	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	FNC	7B,31	123,49
21	15	21	61	3D	61	1	7B,41	123,65
22	16	22	62	3E	62	COD	7B,42	123,66
23	17	23	63	3F	63	EA		
24	18	24	64	40	64	COD		
25	19	25	65	41	65	EB		
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			

Appendix Y: print mode and its conversion

Y.1 Summary printer has two operating modes: standard mode and page mode. In standard mode , as long as the line printer buffer is full , or received

Print or feed command, the printer will print the paper in hand . In page mode , all of the print data and feed commands are in the specified memory space, the printer does not perform any operation is stored . Until it receives an ESC FF or FF command, the printer will print all the content areas are printed.

For example : When the printer is in standard mode received "ABCDEF" <LF>, it immediately "ABCDEF" to print out a line of paper in hand . In page mode , the printer will "ABCDEF" is written in memory of the print area, the next print data on the next line of the print area . ESC L command to switch the printer to the page mode , all data are processed after this in page mode . All data can thus execute ESC FF command received print out all the data , but can only execute FF command received print out, and the printer will switch to standard mode. ESC S command execution can also switch the printer to standard mode , but it does not print in page mode the received data, and these data will be cleared .



Map

Switching Y.1 standard mode and page mode between

Y. 2 set various values in standard mode and page mode

1) Some commands (eg : ESC SP, ESC 2, ESC 3, and FS S) can be used both in standard mode and can be used in page mode , and their arguments are the same. However, provided in two modes are independent , they are stored , respectively .

Y. 3 Set Print Area

1) print area is set by ESC W command. If the ESC W command before receiving all of the print and paper feed operations have been completed , the printer to the left (as you face the printer) as the print area of the origin of coordinates (x0, y0). Width (dx dot) extension of the rectangular printing area to the right in the x- direction (perpendicular to the paper feed direction) from the origin of coordinates (x0, y0); Height (dy point) in the y direction (paper feed direction) . If you do not use ESC W set the print area , the print area using default values.

2) After the printer in the print area and the print area direction (by the ESC T command set) is set , the received print data will be arranged according to the position within the print area as shown in Figure B.2 , Apoint for the starting position of the print area this is a default value. (When a character is printed , A point as the baseline) print data downloaded bitmap or barcode data to its current position as the lower left corner (Figure B.3 in point B), aligned with the baseline.

3) Upon receiving a command containing feed (eg : Before LF or ESC J), if the print data (including character spacing) has exceeded the print area , the printer automatically feeds the line (how much feed , determined by the ESC line-height 2 and ESC 3 settings) , while the printing position to the next column header .

4) The default line height is 1/6 inch , equivalent to 31 points on the vertical . If the line containing the next print data in the longitudinal upscaling 2 times the characters, or bitmap occupies two lines or more lines , as well as higher than normal character code , the printer can not meet the needs of the feed volume , resulting in a character on a line of characters printed and the printed overlay. To avoid this, the line can be increased higher .

For example

When printing a height of 6 bytes downloaded bitmap using the formula below :

{ Vertical dots (8 × 6) - printing area starting position feed point (24)} × vertical motion unit (200 /200) =24 , that is, to print the bitmap is complete , will require the print position based on the starting position of the area down 24 points. With the following command :

ESC W xL, xH, yL, yH, dxL, dxH, dyL, dyH ESC T n

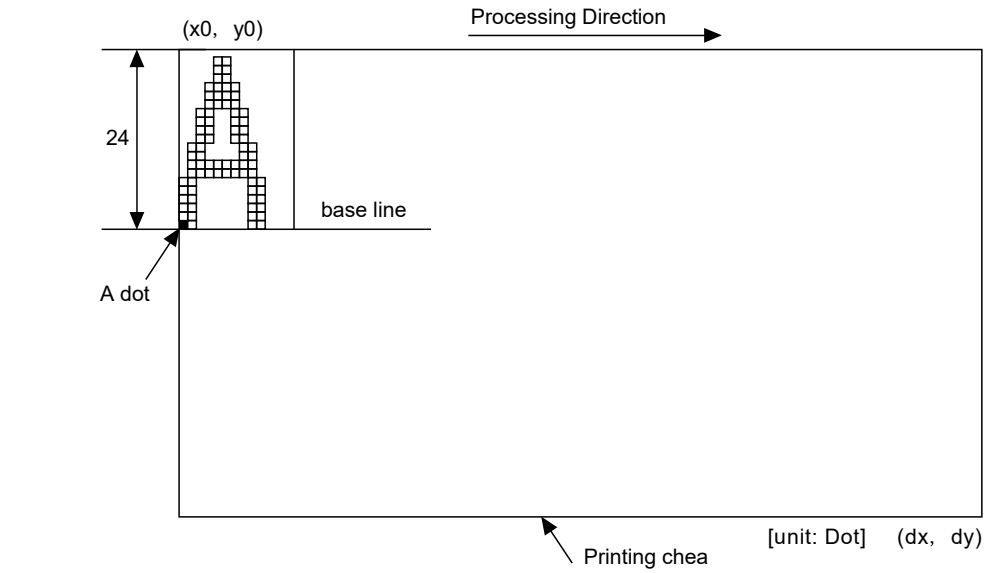
ESC 3 24 Å to set a new line of high-

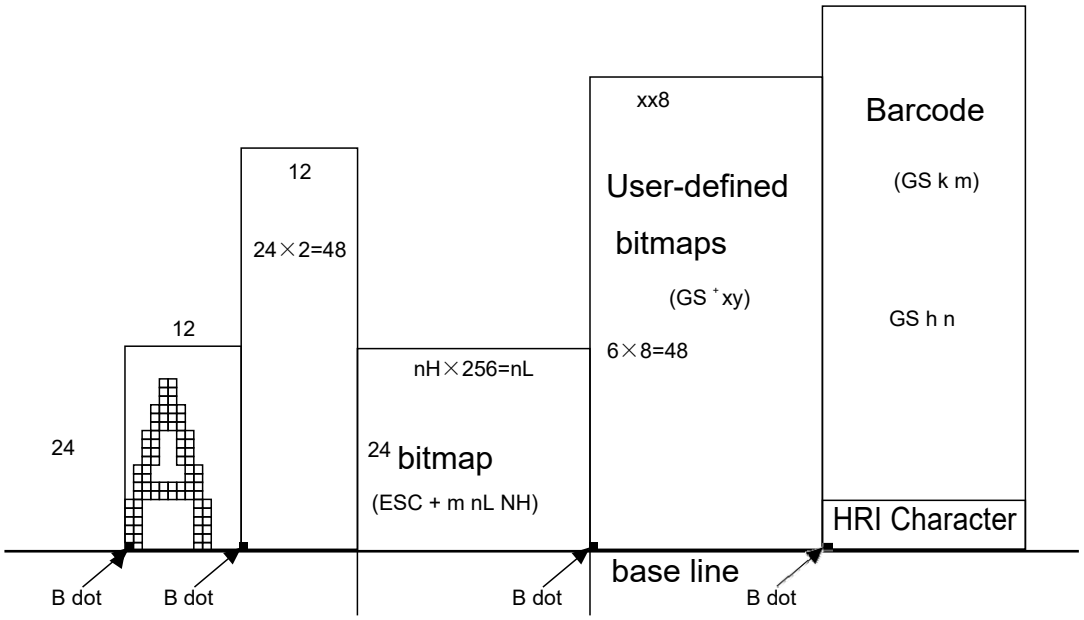
LF

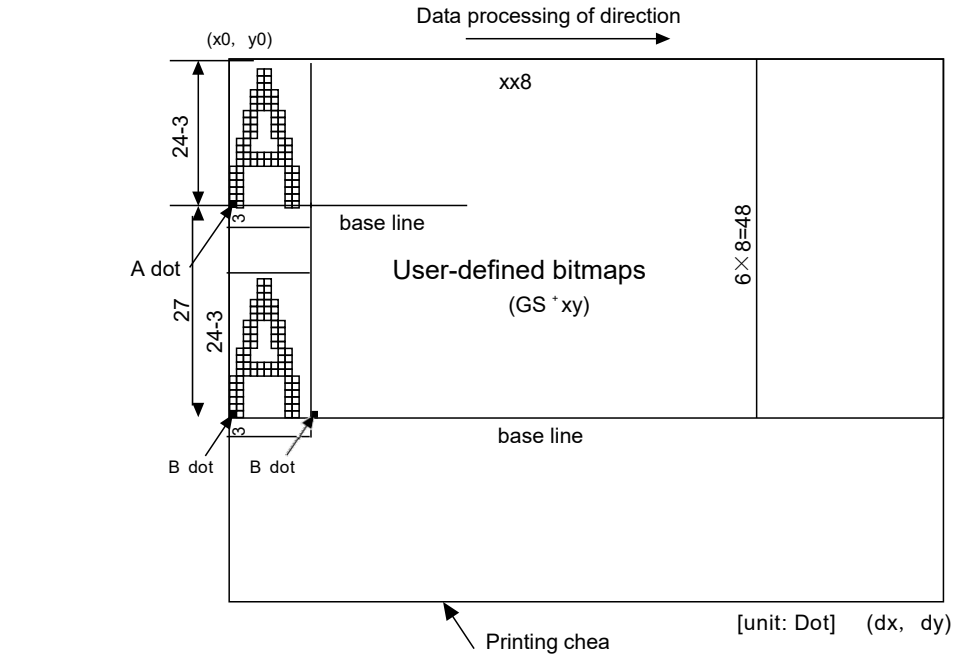
GS / 1

ESC 2 Å The row height back to the 1/6 inches

Storage location map Y.2 character data







Storage location map Y.3 print data

Storage location map Y.3 download bitmap

GS (k <Function 065>

[Name] PDF417: Set the number of columns in the data region

[Format] ASCII GS (k pL pH cn fn n

[Hex] 1D 28 6B 03 00 30 41 n

[Decimal] 29 40 107 3 0 48 65 n

[Range] (pL + pH × 256) = 3

cn = 48

fn = 65

n = 0 – 30

[Default] n = 0

[Description] Sets the number of columns in the data region for PDF417.

• When n = 0, specifies automatic processing

• When n is not 0, sets the number of columns in the data region to n codeword.

[Notes] Settings of this function affect the processing of Functions 081 and 082.

• When auto processing (n = 0) is specified, the maximum number of columns in the data area is 30 columns.

• The following data is not included in the number of columns:

• Start pattern and stop pattern

• Indicator codeword of left and right

• When automatic processing (n = 0) is specified, the number of columns is calculated by the print area when processing Functions 081, 082 module width (Function 067), and option setting (Function 070).

• Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k <Function 066>

[Name] PDF417: Set the number of rows

[Format] ASCII GS (k pL pH cn fn n

[Hex] 1D 28 6B 03 00 30 42 n

[Decimal] 29 40 107 3 0 48 66 n

[Range] (pL + pH × 256) = 3

cn = 48

fn = 66

n = 0, 3 – 90

[Default] n = 0

[Description] Sets the number of rows for PDF417.

• When n = 0 specifies automatic processing.

• When n is not 0, sets the number of rows to n rows.

[Notes] Settings of this function affect the processing of Functions 081 and 082.

• When automatic processing (n = 0) is specified, the maximum number of rows is 90.

• When automatic processing (n = 0) is specified, the number of rows is calculated by the print area when processing Functions 081, 082 and module height (Function 068).

• Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k <Function 067>

[Name] PDF417: Set the width of the module

[Format] ASCII GS (k pL pH cn fn n

[Hex] 1D 28 6B 03 00 30 43 n

[Decimal] 29 40 107 3 0 48 67 n

[Range] (pL + pH × 256) = 3

cn = 48

fn = 67

n=2-8

n: different depending on the printers

[Default] n: different depending on the printers

[Description] Sets the width of the module for PDF417 to n dots.

[Notes] Settings of this function affect the processing of Functions 081 and 082.

• Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k <Function 068>

[Name] PDF417: Set the row height

[Format] ASCII GS (k pL pH cn fn n

[Hex] 1D 28 6B 03 00 30 44 n

[Decimal] 29 40 107 3 0 48 68 n

[Range] (pL + pH × 256) = 3

cn = 48

fn = 68

n=2-8

n: different depending on the printers

[Default] n: different depending on the printers

[Description] Sets the row height for PDF417 to [n × (the width of the module)].

[Notes] Settings of this function affect the processing of Functions 081 and 082.

• Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

• The module height influences the recognition rate of the symbol.

• The module height is recommended to be set to 3 – 5 times the module width.

• The recognition rate might decrease when the vertical size of the symbol is 5 mm {0.2"} or less. The vertical size of the symbol can be confirmed by the transmission data of Function 082.

GS (k <Function 069>

[Name] PDF417: Set the error correction level

[Format] ASCII GS (k pL pH cn fn m n

[Hex] 1D 28 6B 04 00 30 45 m n

[Decimal] 29 40 107 4 0 48 69 m n

[Range] (pL + pH × 256) = 4

cn = 48

fn = 69

m = 48 ,n = 48 – 56

m = 49 ,n = 1 – 40

[Default] m = 49, n = 1 [ratio: 10%]

[Description] Sets the error correction level for PDF417.

m	Function
48	The error correction level is set by "level."
49	The error correction level is set by "ratio." The ratio is[n × 10%].

[Notes] Settings of this function affect the processing of Functions 081 and 082.

• Error correction level is specified by either "level" or "ratio."

• Error correction level specified by "level" (m = 48) is as follows. The number of the error correction codeword is fixed regardless of the number of codewords in the data area.

n	Function	Number of error correction codeword
48	Error correction level 0	2
49	Error correction level 1	4

50	Error correction level 2	8
51	Error correction level 3	16
52	Error correction level 4	32
53	Error correction level 5	64
54	Error correction level 6	128
55	Error correction level 7	256
56	Error correction level 8	512

• Error correction level specified by "ratio" (m = 49) is as follows. The error correction level is defined by the calculated value [number of data codeword × n × 0.1 = (A)].

• The number of the error correction codeword is changeable in proportion to the number of the codeword in the data area.

Calculated value (A)	Correction level	Number of error correction codeword
0 – 3	Error correction level 1	4
4 – 10	Error correction level 2	8
11 – 20	Error correction level 3	16
21 – 45	Error correction level 4	32
46 – 100	Error correction level 5	64
101 – 200	Error correction level 6	128
201 – 400	Error correction level 7	256
401 or more	Error correction level 8	512

• The error correction codeword calculated by modulus 929.

• Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k <Function 070>

[Name] PDF417: Select the options

[Format] ASCII GS (k pL pH cn fn n

[Hex] 1D 28 6B 03 00 30 46 n

[Decimal] 29 40 107 3 0 48 70 n

[Range] (pL + pH × 256) = 3

cn = 48

fn = 70

m = 0, 1

[Default] m = 0

[Description] Selects the option for PDF417.

m	Function
0	Selects the standard PDF417.
1	Selects the truncated PDF417.

[Notes] Settings of this function affect the processing of Functions 081 and 082.

Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k <Function 080>

[Name] PDF417: 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 30 50 30 d1...dk

[Decimal] 29 40 107 pL pH 48 80 48 d1...dk

[Range] (pL + pH × 256) = 4 – 65535

cn = 48

fn = 80

m = 48

d = 0 – 255

k = (pL + pH × 256) − 3

[Description] Stores the PDF417 symbol data (d1...dk) in the symbol storage area.

[Notes] The symbol data saved in the symbol storage 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 data in the symbol storage area is kept.

k bytes of d1...dk are processed as symbol data.

Specify only the data codeword of the symbol with this function. Be sure not to include the following data in the data d1...dk because they are added automatically by the printer.

• Start pattern and stop pattern

• Indicator codeword of left and right

• The descriptor of symbol length (the first codeword in the data area)

• The error correction codeword calculated by modulus 929

• Pad codeword

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 081>

[Name] PDF417: Print the symbol data in the symbol storage area

[Format] ASCII GS (k pL pH cn fn m

[Hex] 1D 28 6B 03 00 30 51 m

[Decimal] 29 40 107 3 0 48 81 m

[Range] (pL + pH × 256) = 3

cn = 48

fn = 81

m = 48

[Description] Encodes and prints the PDF417 symbol data in the symbol storage area using the process of <Function 080>.

[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."

• A symbol that size 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 080 is not processed).

• If [(number of columns × number of rows) < number of codeword] when auto processing is specified for number of columns and number of rows.

• Number of codeword exceeds 928 in the data area.

• The following data are added automatically by the encode processing.

• Start pattern and stop pattern

• Indicator codeword of left and right

• The descriptor of symbol length (the first codeword in the data area)

• The error correction codeword calculated by modulus 929

• Pad codeword

• The data area includes the following codeword.

• Data specified by Function 080.

• The descriptor of symbol length (the first codeword in the data area).

• The error correction codeword calculated by modulus 929.

• Pad codeword

• When auto processing (Function 065) is specified, the number of columns is calculated by the current print area, module width (Function 067), option setting (Function 070), and the codeword in the data area. The maximum number of the columns is 30.

• When auto processing (Function 066) is specified in Standard mode, the number of rows is calculated by module height (Function 068) and the codeword in the data area. The maximum number of rows is 90.

• When auto processing (Function 066) is specified in Page mode, the number of rows is calculated by the current print area, module height (Function 068), and the codeword in the data area. The maximum number of rows is 90.

• 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. After the symbol printing, the print postion is moved to left side of the printable area. Also, the printer is in the status "beginning of the line".

• 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.

• The symbol is printed with appropriate printing speed regardless of the printer's maximum printing speed or the setting of GS (K . <Function 48>.

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 = 50
n2 = 0

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
1 ≤ n ≤ 16

[Default] n = 3

[Description] Sets the size of the module for QR Code to ndots.

[Notes] ■ 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	**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 ≤ n ≤ 51

[Default] n = 48

[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

GS (k <Function 180>

[Name] QR Code: 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] cn = 49 fn = 80

m = 48

0 ≤ d ≤ 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.**

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

GS (k <Function 181>

[Name] QR Code: 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 180>.

HEX Sample A：

1D 28 6B 04 00 31 41 32 00
1D 28 6B 03 00 31 43 03
1D 28 6B 03 00 31 45 30

1D 28 6B 13 00 31 50 30 57 65 6C 63 6F 6D 65 20 70 6F 73 20 74 65 73 74

There are totally 19, Hex command in red color, characters inputted. Therefore HEX 13 inputted ahead represents the quantity of red characters.

1D 28 6B 03 00 31 51 30

HEX Sample B：

1D 28 6B 04 00 31 41 32 00

1D 28 6B 03 00 31 43 03
1D 28 6B 03 00 31 45 30

1D 28 6B 23 00 31 50 30 57 65 6C 63 6F 6D 65 20 70 6F 73 20 74 65 73 74
57 65 6C 63 6F 6D 65 20 70 6F 73 20 74 65 73 74
There are totally 35, Hex command in red color, characters inputted. Therefore HEX 23 inputted ahead represents the quantity of red characters.

1D 28 6B 03 00 31 51 30