ESC POS
Programming Manual

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Contents

1. Overview

1.1 Key Terms

Real-time commands: These commands are acted on immediately upon being received by the printer.

Page mode: Under this mode, the printer stores all data in a specified memory and thinks of this as a virtual page. The page is printed when the printer receives print command either FF or ESC FF.

Standard mode: Standard mode is the default mode of printer, namely line mode. Under this mode, the printer prints data and feeds paper upon print line buffer full (data is enough for one print line) or receiving print command like LF.

HRI character: Bar code note character. HRI： Human Readable Interface

NV: Non-volatile memory in which data stored does not loss when powered off. NV: Non-volatile

RAM: Random Access Memory.

ASB: Auto Send Back ASB： Auto Send Back

DPI: Print dots per inch (one inch equals to 25.4mm). It is used to identify the resolution of a printer.

For example, 203DPI means that 203 dots can be printed per inch. DPI： Dot Per Inch

1.2 Command Notation

[Name] The name of the command.

[Format] This part describes the command with ASCII code format, HEX. format, and Decimal format.

[Range] Gives the allowable ranges, if any, for the command parameters.

[Description] Describes the function of the command. " − " in the table indicates 0 or 1.

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

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

[Reference] Gives references, if any.

2. Printing Command Set

2.1 Basic Setting Commands

ESC @

[Name] Initialize printer

[Format]

ASCII	ESC	@
Hex	1b	40
Decimal	27	64

GS P x y

[Name] Set horizontal and vertical motion units

[Format]

ASCII	GS	P	x	y
Hex	1d	50	x	y
Decimal	29	80	x	y

[Range] $0 \leqslant x \leqslant 255$

$0 \leqslant y \leqslant 255$

[Default] x = 180, y = 360

[Description] Sets the horizontal and vertical motion units to approximately 25.4/x mm {1/x"} and approximately 25.4/y mm {1/y"}, respectively.

- When x = 0, the default value of the horizontal motion unit is used.
- When y = 0, the default value of the vertical motion unit is used.

ESC 2

[Name] Select default line spacing

[Format]

ASCII	ESC	2
Hex	1b	32
Decimal	27	50

[Description] Selects 3.75 mm (30×0.125 mm) line spacing.

[Reference] **ESC 3**

ESC 3 n

[Name] Sets the line spacing to n dot.

[Format]

ASCII	ESC	3	n
Hex	1b	33	n
Decimal	27	51	n

[Range] 0 ⩽ n ⩽ 255

[Default] Approximately 4.23 mm {1/6"}

[Description] • Sets the line spacing to n × (vertical or horizontal motion unit).

[Notes] • The maximum line spacing is 1016 mm {40 inches}.

[Reference] **ESC 2**

ESC S

[Name] Select standard mode

[Format]

ASCII	ESC	S
Hex	1b	53
Decimal	27	83

[Description] Switches from page mode to standard mode.

[Notes]
- This command is enabled only in page mode.
- Data in print buffer is cleared.
- This command sets the print position to the beginning of the line.
- Standard mode is selected as the default.
- This command returns the values to default value in standard mode:

① Set right-side character spacing: ESC SP, FS S

① Select line spacing: ESC 2, ESC 3

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

ESC L

[Name] Select page mode

[Format]

ASCII	ESC	L
Hex	1b	4c
Decimal	27	76

[Description] Switches from standard mode to page mode.

This command is enabled only when processed at the beginning of a line in standard mode. In other cases, this command is ignored.

CAN

[Name] Cancel print data in page mode

[Format] ASCII CAN
Hex 18
Decimal 24

[Description] In page mode, deletes all the print data in the current print area.

[Notes]
- This command is effective only in the page mode.
- If the regional set up previously overlaped with the current area, the overlap will be deleted.

[Reference] **ESC L, ESC W**

2.2 Basic Print Commands

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.

[Notes]
- This command sets the print position to the beginning of the line.
- When this command is processed in page mode, only the print position moves, and the printer does not perform actual printing.

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

CR

[Name] Print and carriage return

[Format] ASCII CR
Hex 0d
Decimal 13

[Description] When automatic line feed is enabled, it functions in the same way as LF.
When automatic line feed is disabled, this command is ignored.

[Notes]
- With a serial interface, the command performs as if auto line feed is disabled.
- With a parallel interface, set this command through storage switches 1-5.
- Set the print position to the beginning of the line.

[Reference] **LF**

FF

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

[Format]

ASCII	FF
Hex	0c
Decimal	12

[Description] Prints all the data in the print buffer collectively and switches from page mode to standard mode.

[Notes] Paper type is continuous paper:

• In page mode, prints all the data in the print buffer collectively and switches from page mode to standard mode.

• This command is equivalent to LF in standard mode.

• This command returns the values set by ESC W to the default values. Paper type is marked paper:

• In page mode, prints all the data in the print buffer, not to return to standard mode, not clear the data in the print buffer. The printer feeds the marked paper to the next print starting position after finished printing. Don’t change horizontal and vertical coordinates in the print buffer.

• This command is effective only in the page mode.

• This command sets the print position to the beginning of the line.

[Reference] **ESC FF, ESC L, ESC S , GS (F , GS FF**

ESC FF

[Name] Print data in the page mode

[Format]

ASCII	ESC	FF
Hex	1b	0c
Decimal	27	12

[Description] Print all buffered data in the printable area collectively in page mode.

• This command is effective only in the page mode.

[Notes] • The butter data, ESC T and ESC W set and character set are not deleted after printing.

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

ESC J n

[Name] Print and feed paper

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)].

[Notes]
- The maximum paper feed amount is 1016 mm {40"}.
- 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 maximum paper feed amount is 900 mm. If the paper feed amount (n × line spacing) of more than 900 mm is specified, the printer feeds the paper only 900 mm .

ESC K n

[Name] Print and reverse feed

[Format]			
ASCII	ESC	K	n
Hex	1b	4b	n
Decimal	27	75	n

[Description]Prints the data in the print buffer and feeds the paper n × (vertical motion unit) in the reverse direction.

[Notes]
- The maximum paper feed amount depends on the printer model.
- After printing, the print position moves to the beginning of the line. When a left margin is set, the position of the left margin is the beginning of the line.
- When standard mode is selected, the vertical motion unit is used.
- When page mode is selected, the vertical or horizontal motion unit is used for the print direction set by ESC T.
- When the starting position is set to the upper left or lower right of the print area using ESC T, the vertical motion unit is used.
- When the starting position is set to the upper right or lower left of the print area using ESC T, the horizontal motion unit is used.
- When this command is processed in page mode, only the print position moves; the printer does not perform actual printing.
- This command is used to temporarily feed a specific length without changing the line spacing set by other commands.

ESC d n

[Name] Print and feed n lines

ASCII	ESC	d	n
Hex	1b	64	n
Decimal	27	100	n

[Range] 0 ⩽n ⩽ 255

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

[Notes]
- This command sets the print starting position to the beginning of the line.
- The amount of paper fed per line is based on the value set using the line spacing command (ESC 2 or ESC 3).
- The maximum paper feed amount is 1016 mm {40 inches}. If the specified amount exceeds 1016 mm {40 inches}, the paper feed amount is automatically set to 1016 mm {40 inches}.

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

ESC e n

[Name] Print and reverse feed n lines

[Format]

ASCII	ESC	e	n
Hex	1B	65	n
Decimal	27	101	n

[Default] None

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

[Notes]
- The amount of paper fed per line is based on the value set using the line spacing command (ESC 2 or ESC 3).
- The maximum paper feed amount depends on the printer model.
- After printing, the print position moves to the beginning of the line. When a left margin is set, the position of the left margin is the beginning of the line.
- When this command is processed in page mode, only the print position moves, and the printer does not perform actual printing.
- This command is used to temporarily feed a specific line without changing the line spacing set by other commands.

2.3 Print Position Commands

HT

[Name] Horizontal tab

ASCII	HT
Hex	09
Decimal	9

[Description] Moves the print position to the next horizontal tab position.

[Notes]
- This command is ignored unless the next horizontal tab position has been set.
- 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.
- Set Horizontal tab default to 8 character width of character ASCII (12×24).
- When the print buffer is full，the printer performs the following actions：In standard mode, the printer prints the current line and sets the print position to the beginning of the line. In page mode, the printer sets the print position to the beginning of the line.

[Reference] **ESC D**

ESC D n1 ... nk NUL

[Name] Set horizontal tab positions

ASCII	ESC	D	n1...nk NUL
Hex	1b	44	n1...nk 00
Decimal	27	68	n1...nk 0

[Range] $1 \leqslant n1 \leqslant n2 \leqslant ... \leqslant nk \leqslant 255$

$0 \leqslant k \leqslant 32$

[Default] n = 8, 16, 24, 32, ... (Every eight characters for the default font set by ESC ! or ESC M)

[Description] Sets horizontal tab positions
- n specifies the number of digits from the setting position to the left edge of the print area.
- k indicates the number of horizontal tab positions to be set.

[Notes] • The horizontal tab position is stored as a value of [character width × n] measured from the beginning of the line.
• There are a total of k horizontal tab positions.
• Multiple horizontal tab commands, with the last one taking precedence.
• The horizontal tab position is calculated by the following formula:
Character width x n, the character width includes the right-side character spacing.
• This command cancels any previous horizontal tab settings.
• When n=8, the current position is in the ninth column.
• A maximum of 32 horizontal tab positions can be set. Data exceeding 32 horizontal tab positions is processed as normal data.
• Transmit [n]k in ascending order and place a NUL code at the end.
• When [n] is less than or equal to the preceding value [n]k-1, horizontal tab setting is finished, and the following data is processed as normal data.
• **ESC D NUL** cancels all horizontal tab positions.
• Even if the character width is changed after setting the horizontal tab positions, the setting of the horizontal tab positions will not be changed.
• The character width is independent in standard mode and page mode.

[Reference] **HT**

ESC $ nL nH

[Name] Set absolute print position

ASCII	ESC	$	nL	nH
Hex	1b	24	nL	nH
Decimal	27	36	nL	nH

[Range] 0 ⩽ (n L + n H × 256) ⩽ 65535 (0 ⩽ n L ⩽ 255, 0 ⩽ n H ⩽ 255)

[Description] Moves the print position to (nL + nH × 256) × (horizontal or vertical motion unit) from the left edge of the print area.

[Notes] • This command starts from the printing position at the beginning of the line.
• This command is only valid for printing the first line of data under it.
• If multiple commands are sent consecutively, the last received command shall prevail. The printer ignores any setting that exceeds the print area.
• If the horizontal absolute printing position is greater than or equal to the maximum printable width or the set printing width, the horizontal absolute printing position is invalid and printing starts from the beginning of the line.
• If the set horizontal absolute printing position is smaller than the current printing position, (1) character overlap printing will occur; (2) Move the printing position to the left.
• If the absolute printing position is greater than or equal to the printing page width, the absolute printing position setting is invalid and printing starts from the top of the page.

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

ESC \ nL nH

[Name] Set relative print position

ASCII	ESC	\	nL	nH
Hex	1b	5c	nL	nH
Decimal	27	92	nL	nH

[Range] -32768 ≤ (nL + nH × 256) ≤ 32767

[Description] Moves the print position to (nL + nH × 256) × (horizontal or vertical motion unit) from the current position.

[Notes]
- The printer ignores any setting that exceeds the print area.
- N pitch movement to the right: (nL + nH × 256) = N.
- Use the complement of N for setting N pitch movement to the left: (nL + nH × 256) = 65536 − N.
- Print starting position from the current position to [N × 0.125mm].
- This command starts counting from the current printing position.
- When set to 0, characters are printed immediately after.
- If multiple commands are sent consecutively, the movement position will be accumulated.
- Horizontal relative printing position>=maximum printable width or set printing width, relative printing position is invalid.
- When page mode is selected, the horizontal or vertical motion unit is used for the print direction set by ESC T.
- When the starting position is set to the upper left or lower right of the print area using ESC T, the horizontal motion unit is used.
- When the starting position is set to the upper right or lower left of the print area using ESC T, the vertical motion unit is used.
- When the relative printing position is greater than or equal to the printing page width, the absolute printing position setting is invalid, and printing starts from the top of the page.

[Reference] ESC $

GS L nL nH

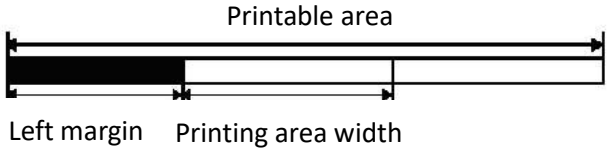
[Name] Set left margin

ASCII	GS	L	nL	nH
Hex	1d	4c	nL	nH
Decimal	29	76	nL	nH

[Range] $0 \leqslant (nL + nH \times 256) \leqslant 65535$ $(0 \leqslant nL \leqslant 255, 0 \leqslant nH \leqslant 255)$

[Default] $(nL + nH \times 256) = 0$ (nL = 0, nH = 0)

[Description]
- Set left margin.
- In standard mode, sets the left margin to (nL + nH × 256) × (horizontal motion unit) from the left edge of the printable area.



[Notes]
- The left margin set by this command is valid for printing data below it.
- If multiple commands are sent consecutively, the last received command shall prevail.
- Set the left margin at the beginning of the line, which is invalid, and output the nl and nh of this command as normal characters.
- Left margin greater than maximum printable width: The left margin decreases, and the print width expands to one character width.
- The left margin has no effect in page mode. If this command is processed in page mode, the left margin is set and it is enabled when the printer returns to standard mode.

[Reference] **GS W**

GS W nL nH

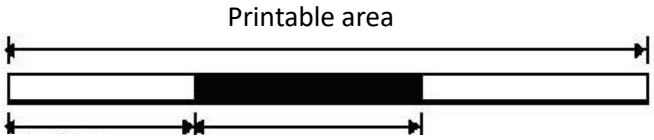
[Name] Set print area width

ASCII	GS	W	nL	nH
Hex	1d	57	nL	nH
Decimal	29	87	nL	nH

[Range] $0 \leqslant (nL + nH \times 256) \leqslant 65535$ $(0 \leqslant nL \leqslant 255, 0 \leqslant nH \leqslant 255)$

[Default] (nL+ nH × 256) = 576 (nL=40, nH = 2) [when paper width is set to 80 mm]
(nL+ nH ×256) = 384 (nL= 80, nH = 1) [when paper width is set to 58 mm]

[Description]
- Set printing area width using nL and nH.
- Set printing area width to [(nL + nH × 256)× 0.125mm)] from the beginning of a line.



[Notes]
- In standard mode, this command is enabled only when processed at the beginning of a line.
- If this command and GS L set the print area width to less than the width of one character, the print area width is extended to accommodate one character for the line. If the [left margin + print area width] exceeds the printable area, the print area width is automatically set to [printable area – left margin].
- Set the print width at the beginning of the non line, the print width setting is invalid, and the print width is the maximum printable width.
- This command is invalid in page mode: the character "A" is printed to the maximum width of the paper. After returning to standard mode, the printing width takes effect, and the printing width of character "B" is 30mm.
- If the [left margin + print area width] exceeds the printable area, the print area width is automatically set to [printable area – left margin].

ESC a n

[Name] Select justification

ASCII	ESC	a	n
Hex	1b	61	n
Decimal	27	97	n

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

[Default] n=0

[Description] In standard mode, aligns all the data in one line to the selected layout, using n as follows:

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

[Notes]
- When standard mode is selected, this command is enabled only when processed at the beginning of the line in standard mode.
- This command only changes the internal flag bit in page mode.
- This command justifies printing data (such as characters, all graphics, bar codes, and two dimensionl codes) and space area set by HT, ESC $, and ESC \.
- Setting barcode, QR code, and image alignment methods is effective.
- The justification has no effect in page mode. If this command is processed in page mode, an internal flag is activated, and this flag is enabled when the printer returns to standard mode.

[Example]

Left justification

ABC
ABCD
ABCDE

Centered

ABC
ABCD
ABCDE

Right justification

ABC
ABCD
ABCDE

GS T n

[Name] Set print position to the beginning of print line

[Format]

ASCII	GS	T	n
Hex	1d	54	n
Decimal	29	84	n

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

[Description] In standard mode, moves the print position to the beginning of the print line after performing the operation specified by n.

n	Function
0.48	Cancel data in the current print buffer
1.49	Print data in the current print buffer

ESC W xL xH yL yH dxL dxH dyL dyH

[Name] Set print area in page mode

ASCII	ESC	W	xL xH yL yH dxL dxH dyL dyH
Hex	1b	57	xL xH yL yH dxL dxH dyL dyH
Decimal	27	87	xL xH yL yH dxL dxH dyL dyH

[Range]
$0 \leqslant (xL + xH \times 256) \leqslant 65535$ $(0 \leqslant xL \leqslant 255,\ 0 \leqslant xH \leqslant 255)$
$0 \leqslant (yL + yH \times 256) \leqslant 65535$ $(0 \leqslant yL \leqslant 255,\ 0 \leqslant yH \leqslant 255)$
$1 \leqslant (dxL + dxH \times 256) \leqslant 65535$ $(0 \leqslant dxL \leqslant 255,\ 0 \leqslant dxH \leqslant 255)$
$1 \leqslant (dyL + dyH \times 256) \leqslant 65535$ $(0 \leqslant dyL \leqslant 255,\ 0 \leqslant dyH \leqslant 255)$

[Default]
$(xL + xH \times 256) = 0$ $(xL = 0, xH = 0)$
$(yL + yH \times 256) = 0$ $(yL = 0, yH = 0)$
$(dxL + dxH \times 256) = 512$ $(dxL = 0, dxH = 2)$ [80 mm paper width model]
$(dxL + dxH \times 256) = 360$ $(dxL = 104, dxH = 4)$ [58 mm paper width model]
$(dyL + dyH \times 256) = 1662$ $(dyL = 126, dyH = 6)$

[Description] In page mode, sets the size and the logical origin of the print area as follows:

- Horizontal logical origin = $(xL + xH \times 256) \times$ (horizontal motion unit) from absolute origin.
- Vertical logical origin = $(yL + yH \times 256) \times$ (vertical motion unit) from absolute origin.
- Print area width = $(dxL + dxH \times 256) \times$ (horizontal motion unit)
- Print area height = $(dyL + dyH \times 256) \times$ (vertical motion unit)

[Notes]
• If [horizontal logical origin + print area width] exceeds the printable area, the print area width is automatically set to [horizontal printable area – horizontal logical origin].
• When both the page height and width are set to 0, the page size setting is invalid, and the printing width and height are the maximum printable width and height.
• If the horizontal or vertical logical origin is set outside the printable area, this command is canceled, and the following data is processed as normal data.
• This command setting has no effect in standard mode. If this command is processed in standard mode, the logical origin and the print area are set, and they are enabled when the printer selects page mode.
• The maximum vertical motion unit that can be set is 207.95 mm {3324/406 inches}.

ESC T n

[Name] Select print direction in page mode

ASCII	ESC	T	n
Hex	1b	54	n
Decimal	27	84	n

[Range] $0 \leqslant n \leqslant 3$, $48 \leqslant n \leqslant 51$

[Default] n=0

[Description] In page mode, selects the print direction and starting position using n as follows:

n	Print direction	Starting position
0.48	Left to right	Upper left
1.49	Bottom to top	Lower left
2.50	Right to left	Lower right
3.51	Top to bottom	Upper right

[Notes] This command setting has no effect in standard mode. If this command is processed in standard mode, an internal flag is activated, and this flag is enabled when the printer selects page mode.

GS $ nL nH

[Name] Set absolute vertical print position in page mode

ASCII	GS	$	nL	nH
Hex	1d	24	nL	nH
Decimal	29	36	nL	nH

[Range] 0 ≤ (n L + n H × 256) ≤ 65535 (0 ≤ nL ≤ 255, 0 ≤ n H ≤ 255)

[Description] In page mode, moves the vertical print position to (nL + nH × 256) × (vertical or horizontal motion unit) from the starting position set by ESC T.

[Notes]
- This command is enabled only in page mode. If this command is processed in standard mode, it is ignored.
- The printer ignores any setting that exceeds the print area set by ESC W.
- The horizontal or vertical motion unit is used for the print direction set by ESC T.
- When the starting position is set to the upper left or lower right of the print area using ESC T, the vertical motion unit is used.
- When the starting position is set to the upper right or lower left of the print area using ESC T, the horizontal motion unit is used.

[Reference] **ESC $, ESC T, ESC W, ESC \, GS **

GS \ nL nH

[Name] Set relative vertical print position in page mode

ASCII	GS	\	nL	nH
Hex	1D	5C	nL	nH
Decimal	29	92	nL	nH

[Range] -32768 ≤ (n L + n H × 256) ≤ 32767

[Description] In page mode, moves the vertical print position to (nL + nH × 256) × (vertical or horizontal motion unit) from the current position.

[Notes]
- The printer ignores any setting that exceeds the print area set by ESC W.
- The horizontal or vertical motion unit is used for the print direction set by ESC T.
- When the starting position is set to the upper left or lower right of the print area using ESC T, the vertical motion unit is used.
- When the starting position is set to the upper right or lower left of the print area using ESC T, the horizontal motion unit is used.
- This command is enabled only in page mode. If this command is processed in standard mode, it is ignored.

2.4 Basic Character Commands

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

[Default] n = 0

[Description] Sets the right-side character spacing to n × (horizontal or vertical motion unit).

[Notes] • The maximum character spacing on the right side is 31.875 millimeters {203/180 "}.

• The next (character width+character right spacing) exceeds the maximum printable width and jumps to the beginning of the next line for printing.

ESC ! n

[Name] Select print mode(s)

[Format]

ASCII	ESC	!	n
Hex	1b	21	n
Decimal	27	33	n

[Range] 0 ⩽ n ⩽255

[Default] n = 0

[Description] Selects the character font and styles (emphasized, double-height, double-width, and underline) together as follows:

n: Bit	Off/On	Hex	Decimal	Function
0	OFF	00	0	Character font 1 selected.
	ON	01	1	Character font 2 selected.
1, 2	OFF	00	0	Undefined.
3	OFF	00	0	Emphasized mode is turned off.
	ON	08	8	Emphasized mode is turned on.
4	OFF	00	0	Double-height canceled.
	ON	10	16	Double-height selected.
5	OFF	00	0	Double-width canceled.
	ON	20	32	Double-width selected.
6	OFF	00	0	Undefined.
7	OFF	00	0	Underline mode is turned off.
	ON	80	128	Underline mode is turned on.

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

[Default] n = 0

[Description] Selects a character font, using n as follows:

n	Function
0.48	Font A: (12 × 24)
1.49	Font B: (9 × 17)

[Notes]
- The command ESC ! can also be used to set the font, and the final received command is valid.
- If the font to be set is not configured in the font library, the instruction is invalid.

[Description] **ESC !**

ESC E n

[Name] Turn emphasized mode on/off

[Format]

ASCII	ESC	E	n
Hex	1b	45	n
Decimal	27	69	n

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

[Default] n = 0

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

[Notes]
- Only the lowest value of n is valid.
- ESC ! command can also select/cancel bold mode, and the last received command is valid.
- Bold and double print ESC G commands can be cancelled from each other, and the last received command is valid.

[Reference] **ESC !**

ESC G n

[Name] Turn double-strike mode on/off

[Format]				
	ASCII	ESC	G	n
	Hex	1b	47	n
	Decimal	27	71	n

[Range] 0 ⩽ n ⩽ 255

[Default] n = 0

[Description] Turns double-strike mode on or off.

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

[Notes]

- Only the lowest value of n is valid.
- This command has the same effect as bold printing.
- Bold and double print ESC G commands can be cancelled from each other, and the last received command is valid.

[Reference] **ESC E**

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 using n as follows:

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

[Notes]

- The underline can be added under all characters (including right spacing, spaces), but not including spaces set by HT.
- When underline mode is turned on, 90° clockwise rotated characters and white/black reverse characters cannot be underlined.
- When underline mode is turned off, the following data cannot be underlined, but the thickness is maintained. The default width is1-dot thick.
- Changing the character size does not affect the current underline thickness.
- This command and bit 7 of ESC ! turn on and off underline mode in the same way. The last executed command is valid.

[Default] n = 0

[Reference] **ESC !**

GS ! n

[Name] Select character size

[Format]

ASCII	GS	!	n
Hex	1d	21	n
Decimal	29	33	n

[Range] $0 \leqslant n \leqslant 255$
($1 \leqslant$ height $\leqslant 8$, $1 \leqslant$ width $\leqslant 8$)

[Description] Selects the character height (vertical number of times normal font size) using bits 0 to 3 and selects the character width (horizontal number of times normal font size) using bits 4 to 7, as follows:

Bit	Function
0-3	Character width selection, see Table 2
4-7	Character height selection, see Table 1

Table 1 Character width selection

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

Table 2 Character height selection

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

[Notes]
- This instruction is valid for all characters (ASCII characters and Chinese characters), except for HRI characters.
- If n is outside the defined range, the command is ignored.
- In standard mode, the character is enlarged in the paper feed direction when double-height mode is selected, and it is enlarged perpendicular to the paper feed direction when double-width mode is selected. However, when character orientation changes in 90° clockwise rotation mode, the relationship between double-height and double-width is reversed.
- In page mode, double-height and double-width are on the character orientation.
- When the characters are enlarged with different heights on one line, all the characters on the line are aligned at the baseline.
- ESC ! can also turn double-width and double-height modes on or off.

[Default] n = 0

[Reference] **ESC !**

ESC V n

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

[Format]

ASCII	ESC	V	n
Hex	1b	56	n
Decimal	27	86	n

[Range] 0 ⩽ n ⩽ 2, 48 ⩽ n ⩽ 50

[Default] n = 0

[Description] In standard mode, turns 90° clockwise rotation mode on or off for characters, using n as follows:

n	Function
0, 48	Turns off 90° clockwise rotation mode.
1, 49 2, 50	Turns on 90° clockwise rotation mode.

[Notes]
- This command is effective only in the standard mode.
- When underline mode is turned on, the printer does not underline 90° clockwise-rotated characters.
- When character orientation changes in 90° clockwise rotation mode, the relationship between vertical and horizontal directions is reversed.

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

ESC { n

[Name] Turn upside-down print mode on/off

[Format]

ASCII	ESC	{	n
Hex	1b	7b	n
Decimal	27	123	n

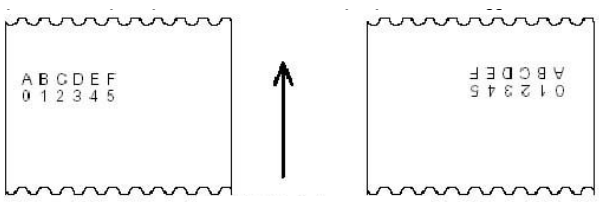
[Range] 0 ⩽ n ⩽ 255

[Default] n = 0

[Description] In standard mode, turns upside-down print mode on or off.
- When the LSB of n is 0, upside-down print mode is turned off.
- When the LSB of n is 1, upside-down print mode is turned on.

[Notes]
- Only the lowest value of n is valid.
- When standard mode is selected, this command is enabled only when processed at the beginning of the line.
- If this command is processed in page mode, an internal flag is activated, and this flag is enabled when the printer returns to standard mode.

[Example]



Feed Direction

GS B n

[Name] Turn white/black reverse print mode on/off

[Format]

ASCII	GS	B	n
Hex	1d	42	n
Decimal	29	66	n

[Range] 0 ⩽ n ⩽ 255

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

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

[Notes]

- Only the lowest value of n is valid.
- This command is valid for all characters except for HRI characters.
- When white/black reverse print mode is turned on, it also affects the right-side character spacing set by ESC SP.
- This command does not affect bitmap, custom bitmap, barcode, HRI character, or HT, ESC $, and ESC \ setting blank.
- When white/black reverse print mode is turned on, it does not affect the space between lines.
- In white/black reverse print mode, characters are printed in white on a black background. When underline mode is turned on, the printer does not underline white/black reverse characters.

[Default] n = 0

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

[Default] N=0 [Other than the following model]
n=15 [Simplified Chinese model]

[Description] Selects an international character set n as follows:

n	Country	n	Country
0	U.S.A.	8	Japan
1	France	9	Norway
2	Germany	10	Denmark II
3	U.K.	11	Spain II
4	Denmark I	12	Latin America
5	Sweden	13	Korea
6	Italy	14	Slovenia / Croatia
7	Spain I	15	China

[Note] • Only Font 0 and Font 1 fonts have international character sets. This instruction is invalid in other fonts.

ESC t n

[Name] Select character code table

[Format]

ASCII	ESC	t	n
Hex	1b	74	n
Decimal	27	116	n

[Range] 0≤n≤5; 13≤n≤21;n=26; 32≤n≤34;n=36,37; 39≤n≤40; 45≤n≤52

[Default] n = 0

[Description] Selects a page n from the character code table as follows:

n	Character code table	n	Character code table
0	[PC437 (USA: Standard Europe)]	40	[ISO8859-15 (Latin9)]
1	[Katakana]	45	[WPC1250]
2	[PC850 (Multilingual)]	46	[WPC1251(Cyrillic)]
3	[PC860 (Portuguese)]	47	[WPC1253]
4	[PC863 (Canadian-French)]	48	[WPC1254]
5	[PC865 (Nordic)]	49	[WPC1255]
13	[PC857 (Turkish)]	50	[WPC1256]
14	[PC737 (Greek)]	51	[WPC1257]
15	[ISO8859-7 (Greek)]	52	[WPC1258]
16	[WPC1252]	54	[MIK(Cyrillic /Bulgarian)]
17	[PC866 (Cyrillic #2)]	55	[CP755 (East Europe，Latvian 2)]
18	[PC852 (Latin 2)]	56	[Iran]
19	[PC858 (Euro)]	57	[Iran II]
20	[KU42]	58	[Latvian]
21	[TIS11 (Thai)]	59	[ISO-8859-1 (West Europe)]
26	[TIS18 (Thai)]	60	[ISO-8859-3(Latin 3)]
32	[PC720]	61	[ISO-8859-4(Baltic)]
33	[WPC775]	62	[ISO-8859-5(Cyrillic)]
34	[PC855 (Cyrillic)]	63	[ISO-8859-6(Arabic)]
36	[PC862 (Hebrew)]	64	[ISO-8859-8(Hebrew)]
37	[PC864 (Arabic)]	65	[ISO-8859-9(Turkish)]
39	[ISO8859-2 (Latin2)]	66	[PC856]
		67	[ABICOMP]

[Notes] Page 0/page 2/page 3/page 4/page 5/ page 14/page 17/ page 18/ page 19/ page 20/ page 21/ page 26/page 32 /page 47 Supports both 12x24 and 9x17 fonts.

2.5 Kanji Command

FS

[Name] Select Kanji character mode

[Format]

ASCII	FS	
Hex	1c	
Decimal	28	

[Description] Selects Kanji character mode.

FS .

[Name] Cancel Kanji character mode

[Format]

ASCII	FS	.
Hex	1c	2e
Decimal	28	46

[Description] Cancels Kanji character mode.

[Notes]
- If Kanji mode is canceled, the printer processes a character code as a 1-byte code of characters.
- When the power is turned on, the printer automatically enters Kanji mode.

FS ! n

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

[Format]

ASCII	FS	!	n
Hex	1c	21	n
Decimal	28	33	n

[Range] 0 ≤n ≤ 255

[Default] n = 0

[Description] Selects the character styles (double-height, double-width, and Kanji-underlined) together for multi-byte code character as follows:

n:

Bit	0/1	Hex	Decimal	Function
0, 1				Reserved
2	0	00	0	Double-width canceled
	1	04	4	Double-width selected
3	0	00	0	Double-height canceled
	1	08	8	Double-height selected
4-6				Reserved
7	0	00	0	Kanji underline mode is turned off
	1	80	128	Kanji underline mode is turned on

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

• The printer can underline all characters, including left and right spacing and spaces. Even if Kanji underline mode is specified, 90° clockwise-rotated characters, white/black reverse characters, and spaces skipped by HT are not underlined.

• When Kanji underline mode is specified, the width of the underline set by FS - is added. Even if the character size is changed, the width is not changed.

• When the heights of characters in a line are different, all characters in that line are aligned with the bottom line.

• You can use FS W or GS! command to bold the characters, and the last instruction is valid.

• You can also use the FS - command to select or cancel underline mode, and the last instruction is valid.

FS S n1 n2

[Name] Set Kanji character spacing

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

[Range] $0 \leqslant n1 \leqslant 255$

$0 \leqslant n2 \leqslant 255$

[Default] n1 = 0, n2 = 0

[Description] Sets the right-side character spacing to [(n1 + n2)× 0.125mm].

[Notes] • When a character size is set to N times as large as a normal size, both right- and left-side character spacings are also set to N times as large as a normal size.

• The maximum right spacing of Kanji characters is about 36mm. If it exceeds this value, the maximum value will be taken.

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

[Default] n = 0

[Description] Turns quadruple-size mode on or off for multi-byte code character.

• When the LSB of n is 0, quadruple-size mode is turned off and normal size is specified.

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

[Notes]

• Only the lowest value of n is valid.

• In the Kanji character double height and double width mode, the size of the printed Kanji characters is the same as when both the double width and double height modes are selected simultaneously.

• After canceling the Kanji character height and width mode, the Kanji characters printed in the future will be of normal size.

• Characters are aligned according to the bottom line.

• You can also use FS! Or GS! The instruction (select the double height and double width mode) is used to select or cancel the Kanji character double height and double width mode, and and the last received command is valid.

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

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

[Default] n=0

[Description] Turns on or off underline mode for multi-byte code character (Kanji-underline), using n as follows:

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

[Notes]
- The printer can underline all characters, including left and right spacing. Even if Kanji underline mode is specified, 90° clockwise-rotation characters, white/black reverse characters, and spaces skipped by HT are not underlined.
- When underline mode is canceled, the following characters are not underlined; however, an underline width set right before the mode is canceled remains. The width of the underlined line should be 1-dot.
- When a character size is changed, an underline width is not changed.
- Use FS! command can also select or cancel the underline mode, and the last instruction is valid.

2.6 Custom Character Commands

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
Hex	1B	26	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y
Decimal	27	38	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y

[Range]
y = 3
32 ⩽ c1 ⩽ c2 ⩽ 126
0 ⩽ x ⩽ 12 [Font A (12 × 24]
0 ⩽ x ⩽ 9 [Font B (9 × 17)]
0 ⩽ d ⩽ 255
k = c2 – c1 +1

[Description]
Defines the user-defined character pattern for the specified character codes.
- 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 from the left.
- d specifies the defined data (column format).

[Notes]
- A user-defined character, downloaded graphics, and downloaded bit image cannot be defined simultaneously on some printer models.
- When this command is executed, the downloaded bit image is cleared.

ESC % n

[Name] Select/cancel user-defined character set

[Format]

ASCII	ESC	%	n
Hex	1b	25	n
Decimal	27	37	n

[Range] 0 ⩽ n ⩽ 255

[Default] n = 0

[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.

[Notes]
- When the user-defined character set is canceled, the resident character set is automatically selected.
- Only the lowest value of n is valid.

[Reference] **ESC &, ESC ?**

ESC ? n

[Name] Cancel user-defined characters

[Format]

ASCII	ESC	?	n
Hex	1b	3F	n
Decimal	27	63	n

[Range] 32 ⩽ n ⩽ 126

[Description] Deletes the user-defined character pattern specified by character code n.

[Notes]
- After the user-defined characters are canceled, the resident character set is printed.
- If the character is not included in the custom character, the command is ignored.

[Reference] **ESC &, ESC %**

FS 2 c1 c2 d1...dk

[Name] Define user-defined Kanji 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 specifies the first byte of a character code for a user-defined Kanji character.

• c2 specifies the second byte of a character code for a user-defined Kanji character.

The ranges of c1 and c2 differ, depending on models and the character code system used.

Models	c1	c2
Japanese model (JIS code)	c1 = 77H	21H ⩽ c2 ⩽ 7EH
Japanese model (SHIFT JIS code)	c1 = ECH	40H ⩽ c2 ⩽ 7EH 80H ⩽ c2 ⩽ 9EH
Simplified Chinese model	c1 = FEH	A1H ⩽ c2 ⩽ FEH
Traditional Chinese model	c1 = FEH	A1H ⩽ c2 ⩽ FEH
Korean model	c1 = FEH	A1H ⩽ c2 ⩽ FEH

0 ⩽ d ⩽ 255

k = 72

[Description] Defines the user-defined Kanji character pattern specified by the character codes (c1 and c2) of the currently selected Kanji font.

[Notes]

• c1 specifies the first byte of a character code for a user-defined Kanji character.

• c2 specifies the second byte of a character code for a user-defined Kanji character.

• d specifies the defined data (column format). The defined data (d) sets a corresponding bit to 1 to print a dot or to 0 not to print a dot.

• Use the command ESC c1 to select the printing paper and print user-defined Kanji characters.

[Default] Space

[Reference] **FS C**

FS ? c1 c2

[Name] Cancel user-defined characters

[Format]

ASCII	FS	?	c1	c2
Hex	1c	3F	c1	c2
Decimal	28	63	n	

2.7 Bit Image Commands

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 ⩽25

[Description] The bit image modes selectable by m are as follows:

m	Bit Image Mode	Vertical dot density	Horizontal dot density
0	8-dot single-density	68 dpi	101 dpi
1	8-dot double-density	68 dpi	203 dpi
32	24-dot single-density	203 dpi	101 dpi
33	24-dot double-density	203 dpi	203 dpi

dpi: dots per 25.4 mm (dots per inch)

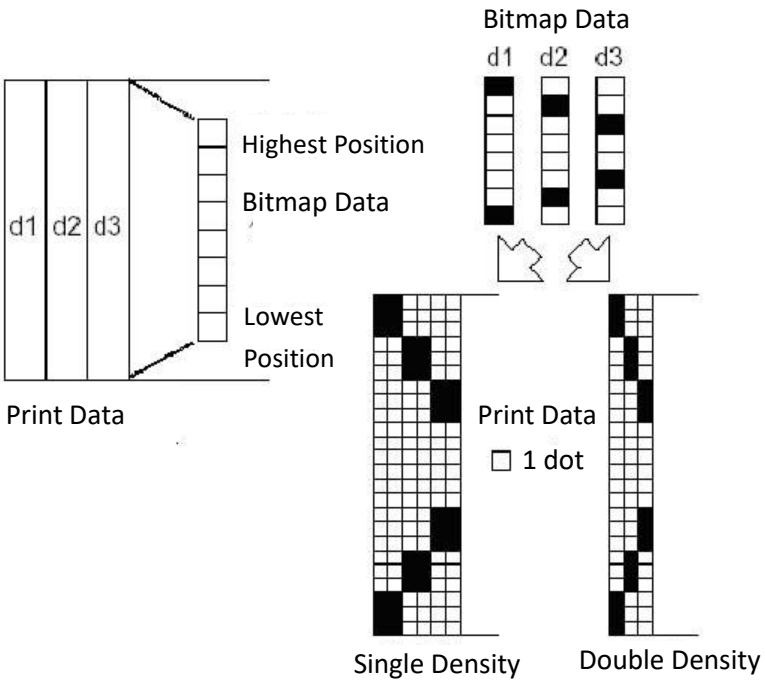
[Notes]
- If the value of m exceeds the specified range, nL and subsequent data are treated as normal data.
- nL, nH specifies a bit image in the horizontal direction as (nL + nH × 256) dots.
- If the bit image data exceeds the number of dots to be printed on a line, the excess data is ignored.
- d specifies the bit image data (column format). Data (d) specifies a bit printed to 1 and not printed to 0.
- After printing a bit image, the printer processes normal data.
- If the printing area set by GS L and GS W is smaller than the required printing width of instruction GS/, the following actions will be executed immediately (but not exceeding the maximum printing width):

① Expand the printing area to the right to accommodate the data volume of the printed bitmap

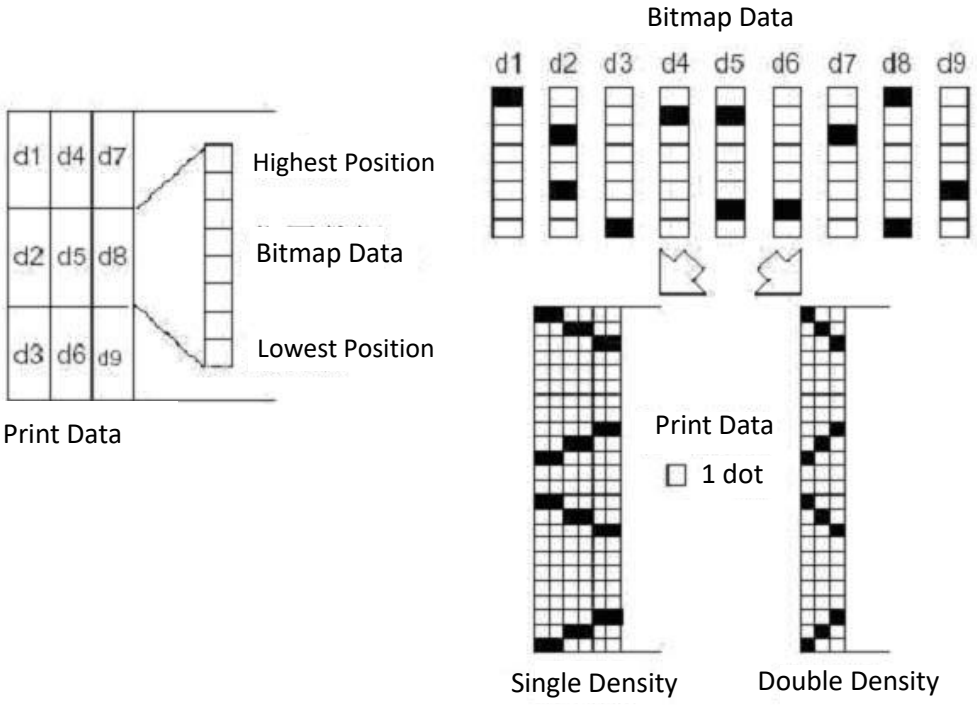
② If step ① cannot provide sufficient width for the data, the left edge is reduced to fit the data. For each bit of data in single density mode (m=0, 32), the printer prints two dots; for each bit of data in dual density mode (m=1, 33), the printer prints one dot. When calculating the amount of data that can be printed in a row, these must be taken into account.

- After printing a bitmap, the printer returns to normal data processing mode.
- Except for the inverted mode, this instruction is not affected by other printing modes (bold, double print, underline, character enlargement, and reverse).
- The relationship between data and the points to be printed is as follows:

When selecting an 8-dot density:



When selecting an 24-dot density:



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

Recommend using the GS (L (Function 69) command instead of the FS p command , as it is compatible with the FS p command upwards

[Name] Define NV bit image

[Format]

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

[Range]
$1 \leqslant n \leqslant 255$
$0 \leqslant xL \leqslant 255$
$1 \leqslant (xL + xH \times 256) \leqslant 1023$
$1 \leqslant (yL + yH \times 256) \leqslant 800$
$0 \leqslant d \leqslant 255$
$k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
The definition area is maximum 64 KB

[Description] Defines the NV bit image in the NV graphics area.
• n specifies the number of defined NV bit images.
• xL, xH specifies (xL + xH × 256) bytes in the horizontal direction for the NV bit image you defined.
• yL, yH specifies (yL + yH × 256) bytes in the vertical direction for the NV bit image you defined.

[Notes]
• The commands such as bold, overlap, underline, character size, and reverse printing are invalid for this bitmap, but the reverse printing mode setting is valid.
• In page mode, print the lower image in normal mode normally.

FS p n m

Recommend using the GS (L (Function 69) command instead of the FS p command , as it is compatible with the FS p command upwards

[Name] Print NV bit image

[Format]

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

[Range] $1 \leqslant n \leqslant 255$, $0 \leqslant m \leqslant 3$, $48 \leqslant m \leqslant 51$

[Description] Prints NV bit image n using the process of FS q and using the mode specified by m.

m	Mode	Vertical Dot density	Horizontal Dot
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	101 dpi
2, 50	Double-height	101 dpi	203 dpi
3, 51	Quadruple	101 dpi	101 dpi

GS * x y d1...dk

[Name] Define downloaded bit image

[Format]

ASCII	GS	*	x	y	d1 ...	dk
Hex	1D	2A	x	y	d1 ...	dk
Decimal	29	42	x	y	d1 ...	dk

[Range] $1 \leqslant x \leqslant 255$

$1 \leqslant y \leqslant 48$ [when $1 \leqslant x \times y \leqslant 1536$]

$0 \leqslant d \leqslant 255$

$k = x \times y \times 8$

[Description] Defines the downloaded bit image in the downloaded graphic area.

- x specifies the number of bytes in horizontal direction as x bytes.
- y specifies the number of bytes in vertical direction as y bytes.

[Notes]

- A downloaded bit image and a user-defined character cannot be defined simultaneously. When this command is executed, the user-defined character is cleared.
- Continuously define 2 down conversion bitmaps, with the last one being valid.
- This command is not affected by the printing mode (bold, overlapping, underline, character size, or reversed printing), but the reverse printing mode setting is valid.

GS / m

[Name] Print downloaded bit image

[Format]

ASCII	GS	/	m
Hex	1D	2F	m
Decimal	29	47	m

[Range] $0 \leqslant m \leqslant 3$，$48 \leqslant m \leqslant 51$

[Descripti] Prints downloaded bit image using the mode specified by m, as follows:

m	Mode	Vertical Dot density	Horizontal Dot density
0.48	Normal	203 dpi	203 dpi
1.49	Double-width	203 dpi	101 dpi
2.50	Double-height	101 dpi	203 dpi
3.51	Quadruple	101 dpi	101 dpi

[Notes]

- This command is ignored if a downloaded bit image has not been defined.
- The printer is in the beginning of a line and data is not in the print buffer.

The downloaded bit image is not affected by print mode (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside-down print mode.

If a downloaded bit image exceeds one line, the excess data is not printed.

If the printing area set by GS L and GS W is smaller than the width required for the data transmitted by GS/command, perform the following subsequent operations on the problematic line [printing does not exceed the maximum print area].

① The width of the printing area is expanded 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. For each bit of data in normal mode (m = 0,48) and double high mode (m = 2, 50), the printer prints a point; For each bit of data in double width mode (m = 1, 49) and quadruple mode (m = 3, 51), the printer prints two points.

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]
$0 \leqslant m \leqslant 3, 48 \leqslant m \leqslant 51$
$0 \leqslant xL \leqslant 255$
$0 \leqslant xH \leqslant 255$
$0 \leqslant yL \leqslant 255$
$0 \leqslant d \leqslant 255$
$k = (xL + xH \times 256) \times (yL + yH \times 256) (k \neq 0)$

[Description] Prints a raster bit image using the mode specified by m, as follows:

m	Mode	Vertical Dot density	Horizontal Dot density
0, 48	Normal	203 DPI	203 DPI
1, 49	Double-width	203 DPI	101 DPI
2, 50	Double-height	101DPI	203 DPI
3, 51	Quadruple	101DPI	101 DPI

- xL, xH specifies (xL + xH × 256) bytes in horizontal direction for the bit image.
- yL, yH specifies (yL + yH × 256) dots in vertical direction for the bit image.
- d specifies the bit image data (raster format).

[Notes]
- When standard mode is selected, this command is enabled only when there is no data in the print buffer.
- The raster bit image is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or upside-down printing).
- If a raster bit image exceeds one line, the excess data is not printed.
- ESC a (select alignment mode) is effective for raster bitmap.
- If this command is processed while a macro is being defined, the printer cancels macro definition, clears the definition, and prints a raster bit image.
- d specifies the bit image data (raster format). Data (d) specifies a bit printed to 1 and not printed to 0.

[Reference] FS p

GS (L & GS 8 L

[Name] Set graphics data

[Description]Processes graphics data.

• Function code (fn) specifies the function.

fn	Function No.	Function name
0.48	48	Transmit the NV graphics memory capacity.
1.49	49	Set the reference standard dot density for graphics.
2.50	50	Print the graphics data in the print buffer.
3.51	51	Transmit the remaining capacity of the NV graphics memory.
4.52	52	Transmit the remaining capacity of the download graphics memory.
64	64	Transmit the key code list for defined NV graphics.
65	65	Delete all NV graphics data.
66	66	Delete the specified NV graphics data.
67	67	Define the NV graphics data (raster format).
68	68	Define the NV graphics data (column format).
69	69	Print the specified NV graphics data.
80	80	Transmit the key code list for defined download graphics.
81	81	Delete all download graphics data.
82	82	Delete the specified download graphics data.
83	83	Define the downloaded graphics data (raster format).
84	84	Define the downloaded graphics data (column format).
85	85	Print the specified download graphics data.
112	112	Store the graphics data in the print buffer (raster format).
113	113	Store the graphics data in the print buffer (column format).

• pL, pH specifies (pL + pH × 256) as the number of bytes after pH (m, fn, and [parameters]).

• p1, p2, p3, and p4 specify (p1 + p2 × 256 + p3 × 65536 + p4 × 16777216) as the number of bytes after pH (m, fn, and [parameters]).

• Differences between GS (L and GS 8 L

• All commands possess the same functions for "Graphics data processing."

• Specifications (conventions) concerning function code (fn) are identical, while only the parameters (pL, pH, p1, p2, p3, and p4) used to specify the parameter values from m differ.

Command	Description
GS (L	Parameter value is 2 bytes less than that for GS 8 L. Used to fix the parameter value. Used when sending data divided into blocks.
GS 8 L	Possesses powerful range of expression. Used for batch transfer of large volumes of data.

• Be sure to use GS 8 L when the parameter value exceeds 65535 bytes for Functions 67, 68, 83, 84, 112, and 113.

[Recommended Functions]

• This command is recommended for use when printing image data.
• The image processing controlled using this command is referred to as the "Graphics function." The name is important as it distinguishes it from conventional bit image functions.
• The graphics functions provided here maintain upward compatibility with conventional bit image processing.

Graphics type	Corresponding bit image command (*1)
NV graphics	FS p, FS q
Download graphics	GS ✻, GS /
Graphics	GS Q 0, GS v 0

(*1) These commands are supported by some of the printer models but will not be supported by future
models.
• The various graphics functions (of this command), more user-friendly than conventional bit image functions, offer the following advantages.
• Definition of multiple items of logo mark and insignia data (with most functions).
• Management of data using key codes.
• Deletion of and redefinition of data per key code.
• Color coding of image-data.
• Definition of image-data in both raster and column formats.
• Confirmation of available capacity in domain.
• Continuous processing possible (without a software reset when a command has been processed).
• The following three types of graphics functions are included.
• NV graphics [Functions 48, 51, 64, 65, 66, 67, 68, and 69] Stores data in non-volatile memory.
Defined data is retained when power is turned off.
There is a limit on the number of times that non-volatile memory can be written to.
• Download graphics [Functions 52, 80, 81, 82, 83, 84, and 85] Stores data in volatile memory (RAM).
Defined data is lost when the ESC @ command is executed, the system is reset, or power is turned off.
• Graphics [Functions 50, 112, and 113] Stores data in the print buffer.
When standard mode is selected, prints data using Function 50 and clears the print buffer.
When page mode is selected, prints data using FF and ESC FF and clears the print buffer after FF is executed.

[Notes]• The functions of this command are determined by the (fn) setting. Actual command operation varies according to function.

• The NV graphics and download graphics data is managed using key codes.

• Expressed as kc1 and kc2, the key codes are used to identify data groups.

• The key codes have a 2-byte configuration and can be specified using the full range of character codes in Hexadecimal: 20H to 7EH / in Decimal: 32 to 126.

• The data referred to here is image data specified using d1 through dk of Functions 67, 68, 83, and 84.

• The printer automatically adds control information when it stores the data. The image data domain is used as the control information. Control information formats and data values vary according to function.

• Note that it is not possible to create definitions for both NV graphics data (this command) and NV bit image data (FS q). NV bit image data definitions are deleted when this command is used.

• Note that it is not possible to create definitions for both download graphics data (this command) and download bit image data (GS ✻). Download bit image data definitions are deleted when this command is used.

• With certain printers, it is not possible to create definitions for both download graphics data (this command) and download character data (ESC &).

• Defined download character data is deleted when this command is used.

• Executing ESC & deletes download graphics data.

• Always execute Function 50 after executing this command 112 or 113 when the standard mode is selected.

• When printing the various types of graphics data, using the ESC U command will ensure that the printed results are properly aligned vertically by printing in a single direction.

• Functions 65, 66, 67, or 68 write data to a non-volatile memory. Note the following items when using the function.

• Do not turn off the power or reset the printer from the interface when the relevant functions are being executed.

• The printer may be BUSY when storing data and will not receive any data. In this case, be sure not to transmit data from the host.

• Excessive use of this function may destroy the non-volatile memory. As a guideline, do not use any combination of the following commands more than 10 times per day for writing data to the nonvolatile memory: GS (A (part of functions), GS (C (part of functions), GS (E (part of functions), GS (L / GS 8 L (part of functions), GS (M (part of functions), GS g 0, FS q 1, FS q.

• The following restrictions apply when performing non-volatile memory operations (including data store and delete).

• The paper cannot be fed by paper feed switch.

• The real time command is not processed.

• The ASB status will not be sent, even when the ASB function is set to enable.

[Notes for transmission process]

• Data send operations are performed using Functions 48, 51, 52, 64, and 80. When you use these functions, obey the following rules.

• When the host PC transmits the function data, transmit the next data after receiving the corresponding data (Header ~ NULL) from the printer.

• When operating with a serial interface, be sure to configure operation so that the host computer uses the printer only when it is READY.

• When operating with a parallel interface, the data sent by this function (starting with Header and ending with NUL), as with other data, is first stored in the send buffer, then output in sequential order when the host computer changes to the reverse mode. Note that the send buffer capacity is 99 bytes, and any data exceeding this volume limit will be lost; therefore, when using this command, it is important to configure the operation so that the host computer’s change to the reverse mode and the subsequent status send/receive process is performed quickly.

• During the interval between the sending of the data header and NUL, ASB status and the real time commands are rendered invalid.

• When communication with the printer uses XON/XOFF control with serial interface, the XOFF code may interrupt the "Header to NUL" data string.

• The information for each function can be identified to other transmission data according to specific data of the transmission data block. When the header transmitted by the printer is [hex = 37H/decimal =55], treat NUL [hex = 00H/decimal =0] as a data group and identify it according to the combination of the header and the identifier.

[Notes for ESC/POS Handshaking Protocol]

• It will be necessary to perform the ESC/POS Handshaking Protocol procedures listed below when using Functions 64 and 80.

Procedure	**Host operation**	**Printer operation**
1	This command sends Function 64.	Function 64 is initiated.
2	Data is received from printer.	Key code list is sent.
3	Response code (*1) is sent.	Procedures (*2 and *3) are performed according to response code.

(*1) Response Code

ASCII	Hexadecimal	Decimal	**Request definition**
ACK	06	6	Send next data group.
NAK	15	21	Resend just-received data group.
CAN	18	24	Cancel send operation.

(*2) Processing According to Response Code

Response code	**Description**
ACK	Initiates operation to send next data.
NAK	Resends the just-received data.
CAN	Cancels processing initiated by this command.

(*3) Processing According to Response Code (When No More Send Data Remains (indicated by identification status of send data group))

Response code	**Description**
ACK, CAN	Cancels procedure initiated by this command.
NAK	Resends the just-received data.

• When codes other than the ACK, NAK, or CAN codes are received, the CAN procedure is executed.

GS 8 L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

[Name] Define the NV graphics data (raster format).

[Format]

ASCII	GS	(	L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex	1D	28	4C pL pH 30 43 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal	29	40	76 pL pH 48 67 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
ASCII	GS	8	L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex	1D	38	4C p1 p2 p3 p4 30 43 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal	29	56	76 p1 p2 p3 p4 48 67 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

[Range] $12 \leqslant (pL + pH \times 256) \leqslant 65535$

$(0 \leqslant pL \leqslant 255, 0 \leqslant pH \leqslant 255)$

When using GS 8 L:

$12 \leqslant (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leqslant 4294967295]$

m = 48, fn = 67, a = 48

$32 \leqslant kc1 \leqslant 126$

$32 \leqslant kc2 \leqslant 126$

b = 1, 2

$1 \leqslant (xL + xH \times 256) \leqslant 8192 (0 \leqslant xL \leqslant 255, 0 \leqslant xH \leqslant 32)$

$1 \leqslant (yL + yH \times 256) \leqslant 2304 (0 \leqslant yL \leqslant 255, 0 \leqslant yH \leqslant 9)$

c = 49, 50 (when using recommended two-color paper)

C=49 (when using recommended solid color paper)

$0 \leqslant d \leqslant 255$

$k = (int((xL + xH \times 256) + 7)/8) \times (yL + yH \times 256)$

b=1 (when monochrome printing control is selected)

b = 1, 2 (When selecting dual color printing control)

[Description] Defines the NV graphics data (raster format) as a record specified by the key codes (kc1 and kc2) in the NV graphics area.

• b specifies the number of colors for the defined data.

• xL and xH specify the number of dots in the horizontal direction as $(xL + xH \times 256)$.

• yL and yH specify the number of dots in the vertical direction as $(yL + yH \times 256)$.

c	Color specifications
49	Color 1
50	Color 2

d specifies the defined data (raster format).

k indicates the number of the definition data. k is an explanation parameter; therefore it does not need to be transmitted.

[Notes] In cases where the specified key code already exists in memory, it will be necessary to overwrite the data.

NV graphics indicate image data groups defined in the printer's internal non-volatile memory. Data definitions for NV graphics data created using this command are valid until redefined by this function or <Function 68>.

The functions used to define NV graphics data are this function and Function 68. Even with printer models that support both, it is recommended that only one of the functions be used for data definition tasks.

• The two functions differ only in that one function (this function) defines data in raster format, while the other (Function 68) defines data in column format. The domains and control information are identical.

• In cases where the key code specified by this function coincides with a key code being used by Function 68, a new data definition is created.

Use this function at the beginning of the line when the standard mode is selected.

This function is incompatible with macros, so make sure to avoid including it when defining macros.

In cases where there is insufficient capacity available for storing NV graphics data, this function cannot be used. Use Function 51 to confirm the available capacity in the NV graphics data area.

One option is to delete items of NV graphics data that were previously defined to the same key code.

The data for byte k of d1 ... dk is processed as a single item of defined NV graphics data. The defined data (d) specifies "1" for bits corresponding to dots that will be printed and "0" for bits corresponding to dots that will not be printed.

NV graphics data is defined using the dot density set by Function 49.

Specify single data groups [c d1 ... dk] when monochrome is selected (b = 1) as the color.

Specify b number of data groups [c d1 ... dk] when multiple colors are selected (b ≠ 1). It is also important to specify different colors in units of data groups when specifying color (c).

NV graphics data is printed using Function 69.

Note that it is not possible to create definitions for both NV graphics data (this command) and NV bit image data (FS q). NV bit image data definitions are deleted when this command is used.

The relationship between NV graphics data (raster format) and print results is shown in the table below.

d1	**d2**	...	**dx**
dx+1	**dx**+2	...	**dx**x2
:	:	...	:
...	**dk**-2	**dk**-1	**dk**
MSB LSB	MSB LSB	MSB LSB	MSB LSB

X = (**xL** + **xH** × 256)

GS 8 L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

[Name] Define the NV graphics data (column format).

[Format]

ASCII	GS	(	L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex	1D	28	4C pL pH 30 44 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal	29	40	76 pL pH 48 68 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
ASCII	GS	8	L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex	1D	38	4C p1 p2 p3 p4 30 44 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal	29	56	76 p1 p2 p3 p4 48 68 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

[Range] $12 \leqslant (pL + pH \times 256) \leqslant 65535$

$(0 \leqslant pL \leqslant 255, 0 \leqslant pH \leqslant 255)$

When using GS 8 L:

$12 \leqslant (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leqslant 4294967295]$

$m = 48, fn = 68, a = 48$

$32 \leqslant kc1 \leqslant 126$

$32 \leqslant kc2 \leqslant 126$

$0 \leqslant d \leqslant 255$

$k = (xL + xH \times 256) \times (int((yL + yH \times 256) + 7)/8)$

[Description] Defines the NV graphics data (column format) as a record specified by the key codes (kc1 and kc2) in the NV graphics area.

- b specifies the number of colors for the defined data.
- xL and xH specify the number of dots in the horizontal direction as $(xL + xH \times 256)$.
- yL and yH specify the number of dots in the vertical direction as $(yL + yH \times 256)$.
- c specifies the color of the defined data.

c	Color specifications
49	Color 1
50	Color 2
51	Color 3

- d specifies the defined data (column format).

k indicates the number of the definition data. k is an explanation parameter; therefore it does not need to be transmitted.

[Notes]

• In cases where the specified key code already exists in memory, it will be necessary to overwrite the data.

• NV graphics indicate image data groups defined in the printer's internal non-volatile memory. Data definitions for NV graphics data created using this command are valid until redefined by this function or <Function 67>.

• The functions used to define NV graphics data are this function and Function 67. Even with printer models that support both, it is recommended that only one of the functions be used for data definition tasks.

• The two functions differ only in that one function (this function) defines data in raster format, while the other (Function 67) defines data in column format. The domains and control information are identical.

• In cases where the key code specified by this function coincides with a key code being used by Function 67, a new data definition is created.

Use this function at the beginning of the line when the standard mode is selected.

This function is incompatible with macros, so make sure to avoid including it when defining macros.

• In cases where there is insufficient capacity available for storing NV graphics data, this function cannot be used. Use Function 51 to confirm the available capacity in the NV graphics data area.

• One option is to delete items of NV graphics data that were previously defined to the same key code.

• The data for byte k of d1 ... dk is processed as a single item of defined NV graphics data. The defined data (d) specifies "1" for bits corresponding to dots that will be printed and "0" for bits corresponding to dots that will not be printed.

• NV graphics data is defined using the dot density set by Function 49.

• Specify single data groups [c d1 ... dk] when monochrome is selected (b = 1) as the color.

• Specify b number of data groups [c d1 ... dk] when multiple colors are selected (b ≠ 1). It is also important to specify different colors in units of data groups when specifying color (c).

• NV graphics data is printed using Function 69.

• Note that it is not possible to create definitions for both NV graphics data (this command) and NV bit image data (FS q). NV bit image data definitions are deleted when this command is used.

• The relationship between NV graphics data (column format) and print results is shown in the table below.

d1	**dv**+1	...	:	MSB LSB
d2	**dv**+2	...	**dk**-2	MSB LSB
:	:	...	**dk**-1	MSB LSB
dv	**dv**x2	...	**dk**	MSB LSB

Y = (**yL** + **yH** × 256)

GS 8 L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

[Name] Define the downloaded graphics data (raster format).

[Format]

ASCII	GS	(	L	pL	pH	m	fn	a	kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex	1D	28	4C	pL	pH	30	53	30	kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal	29	40	76	pL	pH	48	83	48	kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
ASCII	GS	8	L	p1	p2	p3	p4	m	fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
Hex	1D	38	4C	p1	p2	p3	p4	30	53 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
Decimal	29	56	76	p1	p2	p3	p4	48	83 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b

[Range] $12 \le (pL + pH \times 256) \le 65535$ ($0 \le pL \le 255$, $0 \le pH \le 255$)

[When using GS 8 L: $12 \le (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \le 4294967295$]

m = 48, fn = 83, a = 48, a = 52

$32 \le kc1 \le 126$

$32 \le kc2 \le 126$

Defines the downloaded graphics data (raster format) as a record specified by the key codes (kc1 and kc2) in the downloaded graphics area.

- b specifies the number of colors for the defined data.
- xL and xH specify the number of dots in the horizontal direction as (xL + xH × 256).
- yL and yH specify the number of dots in the vertical direction as (yL + yH × 256).
- c specifies the color of the defined data.

C	Color
49	Color 1
50	Color 2
51	Color 3
52	Color 4

- d specifies the defined data (raster format).
- k indicates the number of the definition data. k is an explanation parameter; therefore it does not need to be transmitted.
- In cases where the specified key code already exists in memory, it will be necessary to overwrite the data.

d1	**d2**	...	**dx**
dx+1	**dx**+2	...	**dx**x2
:	:	...	:
...	**dk**-2	**dk**-1	**dk**

X = (**xL** + **xH** × 256)

[Notes] • Downloaded graphics indicate image data groups defined in the printer’s internal volatile memory (RAM).

Once the download graphics data have been defined, they are available until GS (L <Function 83>, <Function 84> or ESC @ is executed. The download graphics data are lost when the power is turned off or the printer is reset.

• The functions used to define downloaded graphics data are this function and Function 84. Even with printer models that support both, it is recommended that only one of the functions be used for data definition tasks.

• The two functions differ only in that one function (this function) defines data in raster format, while the other (Function 84) defines data in column format. The domains and control information are identical.

• In cases where the key code specified by this function coincides with a key code being used by Function 84, a new data definition is created.

• Use this function at the beginning of the line when the standard mode is selected.

• This function is incompatible with macros, so make sure to avoid including it when defining macros.

• In cases where there is insufficient capacity available for storing downloaded graphics data, this function cannot be used. Use Function 52 to confirm the available capacity in the downloaded graphics data area.

• One option is to delete items of downloaded graphics data that were previously defined to the same key code.

• The data for byte k of d1 ... dk is processed as a single item of defined downloaded graphics data. The defined data (d) specifies "1" for bits corresponding to dots that will be printed and "0" for bits corresponding to dots that will not be printed.

• Downloaded graphics data is defined using the dot density set by Function 49.

• Specify single data groups [c d1 ... dk] when monochrome is selected (b = 1) as the color.

• Specify b number of data groups [c d1 ... dk] when multiple colors are selected (b ≠ 1). It is also important to specify different colors in units of data groups when specifying color (c).

• Downloaded graphics data is printed using Function 85.

• Note that it is not possible to create definitions for both downloaded graphics data (this command) and downloaded bit image data (GS ✻). Downloaded bit image data definitions are deleted when this command is used.

• For some models, downloaded graphics (this command) and user-defined characters (ESC &) cannot be defined simultaneously.

• User-defined characters defined are deleted by using this command.

• Downloaded graphics data are deleted by ESC &.

• The relationship between downloaded graphics data (raster format) and print results is shown in the table below.

GS 8 L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

[Name] Define the downloaded graphics data (column format).

[Format]

ASCII	GS	(	L	pL	pH	m	fn	a	kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex	1D	28	4C	pL	pH	30	54	30	kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal	29	40	76	pL	pH	48	84	48	kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
ASCII	GS	8	L	p1	p2	p3	p4	m	fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
Hex	1D	38	4C	p1	p2	p3	p4	30	54 30kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
Decimal	29	56	76	p1	p2	p3	p4	48	84 48kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b

[Range] $12 \leqslant (pL + pH \times 256) \leqslant 65535$ ($0 \leqslant pL \leqslant 255$, $0 \leqslant pH \leqslant 255$)

[When using GS 8 L: $12 \leqslant (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leqslant 4294967295$]

m = 48, fn = 84, a = 48

$32 \leqslant kc1 \leqslant 126$

$32 \leqslant kc2 \leqslant 126$

$0 \leqslant d \leqslant 255$

$k = (xL + xH \times 256) \times (int((yL + yH \times 256) + 7)/8)$

[Description] Defines the downloaded graphics data (column format) as a record specified by the key codes (kc1 and kc2) in the downloaded graphics area.

- b specifies the number of colors for the defined data.
- xL and xH specify the number of dots in the horizontal direction as ($xL + xH \times 256$).
- yL and yH specify the number of dots in the vertical direction as ($yL + yH \times 256$).
- c specifies the color of the defined data.

C	Color
49	Color 1
50	Color 2
51	Color 3

- d specifies the defined data (raster format).
- k indicates the number of the definition data. k is an explanation parameter; therefore it does not need to be transmitted.
- In cases where the specified key code already exists in memory, it will be necessary to overwrite the data.

[Notes] • Downloaded graphics indicate image data groups defined in the printer's internal volatile memory (RAM). Once the download graphics data have been defined, they are available until GS (L <Function 83>, <Function 84> or ESC @ is

executed. The download graphics data are lost when the power is turned off or the printer is reset.

• The functions used to define download graphics data are this function and Function 83. Even with printer models that support both, it is recommended that only one of the functions be used for data definition tasks.

• The two functions differ only in that one function (this function) defines data in raster format, while the other (Function 83) defines data in column format. The domains and control information are identical.

• In cases where the key code specified by this function coincides with a key code being used by Function 83, a new data definition is created.

• Use this function at the beginning of the line when the standard mode is selected.

• This function is incompatible with macros, so make sure to avoid including it when defining macros.

• In cases where there is insufficient capacity available for storing download graphics data, this function cannot be used. Use Function 52 to confirm the available capacity in the download graphics data area.

• One option is to delete items of download graphics data that were previously defined to the same key code.

• The data for byte k of d1 ... dk is processed as a single item of defined downloaded graphics data. The defined data (d) specifies "1" for bits corresponding to dots that will be printed and "0" for bits corresponding to dots that will not be printed.

• Downloaded graphics data is defined using the dot density set by Function 49.

• Specify single data groups [c d1 ... dk] when monochrome is selected (b = 1) as the color.

• Specify b number of data groups [c d1 ... dk] when multiple colors are selected (b ≠ 1). It is also important to specify different colors in units of data groups when specifying color (c).

• Downloaded graphics data is printed using Function 85.

• Note that it is not possible to create definitions for both download graphics data (this command) and download bit image data (GS ✻). download bit image data definitions are deleted when this command is used.

• For some models, downloaded graphics (this command) and user-defined characters (ESC &) cannot be defined simultaneously.

• User-defined characters defined are deleted by using this command.

• Downloaded graphics data are deleted by ESC &.

• The relationship between download graphics data (column format) and print results is shown in the table below.

d1	**dv**+1	...	:
d2	**dv**+2	...	**dk**-2
:	:	...	**dk**-1
dv	**dv**x2	...	**dk**

Y = (**yL** + **yH** × 256)

<Function 112> GS (L pL pH m fn a bx by c xL xH yL yH d1…dk (fn=112)

[Name] Store the graphics data in the print buffer (raster format).

[Format]

ASCII	GS	(	L	pL pH m fn a bx by c xL xH yL yH d1...dk
Hex	1D	28	4C	pL pH 30 70 30 bx by c xL xH yL yH d1...dk
Decimal	29	40	76	pL pH 48 112 48 bx by c xL xH yL yH d1...dk
ASCII	GS	8	L	p1 p2 p3 p4 m fn a bx by c xL xH yL yH d1...dk
Hex	1D	38	4C	p1 p2 p3 p4 30 70 30 bx by c xL xH yL yH d1...dk
Decimal	29	56	76	p1 p2 p3 p4 48 112 48 bx by c xL xH yL yH d1...dk

[Range] $11 \leqslant (pL + pH \times 256) \leqslant 65535$ ($0 \leqslant pL \leqslant 255$, $0 \leqslant pH \leqslant 255$)

When using GS 8 L: $11 \leqslant (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leqslant 4294967295$]

m = 48, fn = 112, a = 48, a = 52

$0 \leqslant d \leqslant 255$

$k = (int((xL + xH \times 256) + 7)/8) \times (yL + yH \times 256)$

bx = 1, 2

by = 1, 2

c = 49 (when the recommended monochrome paper is used)

c = 49, 50 (when the recommended two-color paper is used)

$1 \leqslant (xL + xH \times 256) \leqslant 2047$ ($0 \leqslant xL \leqslant 255$, $0 \leqslant xH \leqslant 7$)

With recommended monochrome paper

(by = 1): $1 \leqslant (yL + yH \times 256) \leqslant 1662$ ($0 \leqslant yL \leqslant 255$, $0 \leqslant yH \leqslant 6$)

(by = 2): $1 \leqslant (yL + yH \times 256) \leqslant 831$ ($0 \leqslant yL \leqslant 255$, $0 \leqslant yH \leqslant 3$)

With recommended two-color paper

(by = 1): $1 \leqslant (yL + yH \times 256) \leqslant 831$ ($0 \leqslant yL \leqslant 255$, $0 \leqslant yH \leqslant 3$)

(by = 2): $1 \leqslant (yL + yH \times 256) \leqslant 415$ ($0 \leqslant yL \leqslant 255$, yH = 0, 1)

<Function 48> GS (L pL pH m fn (fn=0, 48)

[Name] Transmit the NV graphics memory capacity.

[Format]

ASCII	GS	(	L	pL	pH	m	fn
Hex	1D	28	4C	02	00	30	fn
Decimal	29	40	76	2	0	48	fn

[Range] $(pL + pH \times 256) = 2$ (pL = 2, pH = 0)

m = 48

fn = 0, 48+

[Description] Transmits the entire capacity of the NV graphics area (number of bytes in the NV graphics area).

2.8 Bar Code Commands

GS H n

[Name] Select print position of HRI characters

ASCII	GS	H	n
Hex	1d	48	n
Decimal	29	72	n

[Range] 0 ⩽ n ⩽ 3, 48 ⩽ n ⩽ 51

[Default] n = 0

[Description] Selects the print position of Human Readable Interpretation (HRI) characters when printing a bar code, using n as follows:

n	**Print position**
0, 48	Not printed
1, 49	Above the bar code
2, 50	Below the bar code

[Notes]
- HRI characters are printed using the font specified by GS f.
- The font of HRI characters is specified by the GS f command.
- ESC ! command is invalid for HRI character settings such as font selection, height/width doubling, bold, underline, etc.
- **GS !** (character double-height and double-width), ESC SP (right-side character spacing setting), and ESC V (rotation 90 degrees) are invalid for HRI characters.

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

GS f n

[Name] Select font for HRI characters

ASCII	GS	f	n
Hex	1d	66	n
Decimal	29	102	n

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

[Default] n = 0

[Description] Selects a font for the Human Readable Interpretation (HRI) characters when printing a bar code, using n as follows:

N	**Font of HRI characters**
0,48	Font A: 12 × 24
1,49	Font B: 9 × 17

[Notes]
- HRI character is Human Readable Interpretation character indicated with bar code.
- HRI characters are printed at the position specified by GS H.

[Reference] **GS** H, **GS k**

GS h n

[Name] Set bar code height

ASCII	GS	h	n
Hex	1d	68	n
Decimal	29	104	n

[Range] $1 \leqslant n \leqslant 255$

[Default] n = 162

[Description] Sets the height of a bar code to n dots.

[Notes] When the barcode height exceeds the set page height in page mode, the excess part will not be printed.

[Reference] **GS k**

GS w n

[Name] Set bar code width

ASCII	GS	w	n
Hex	1d	77	n
Decimal	29	119	n

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

[Default] n = 3

[Description] Sets the horizontal size of a bar code.
n specifies the bar code module width.

n	Module width (mm) for multilevel bar code	Binary level bar code	
	Width (mm)	Thin element width (mm)	Thick element width (mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000
4	0.500	0.500	1.250
5	0.625	0.625	1.625
6	0.750	0.750	2.000

- Bar code types are Multi level bar code UPC-A, UPC-E, JAN13 / EAN13, JAN8 / EAN8, CODE93, CODE128, GS1-128
- Binary level bar code [CODE39, ITF, CODABAR(NW-7)].

[Notes]
- When the barcode printing width exceeds the set width, it will not be printed.
- In page mode, if the barcode width exceeds the set page width, the excess part will not be printed.

[Reference]**GS k**

GS k

①GS k m d1...dk NUL②GS k m n d1...dn

[Name] Print bar code

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

[Range] ①0 ⩽ m ⩽ 6 (The domain of d and k differs according to the bar code)
②65 ⩽ m ⩽ 73 (The domain of d and k differs according to the bar code)

[Description]Select a barcode type and print the barcode.
Prints the bar code using the bar code system specified by m.

	m	Bar code system	Bar code data	d
①	0	UPC-A	11 ⩽ k ⩽ 12	48 ⩽ d ⩽ 57
	1	UPC-E	11 ⩽ k ⩽ 12	48 ⩽ d ⩽ 57
	2	JAN13 (EAN13)	12 ⩽ k ⩽ 13	48 ⩽ d ⩽ 57
	3	JAN 8 (EAN8)	7 ⩽ k ⩽ 8	48 ⩽ d ⩽ 57
	4	CODE39	1 ⩽ k ⩽ 255	45 ⩽ d ⩽ 57, 65 ⩽ d ⩽ 90, 32, 36, 37,43
	5	ITF	1 ⩽ k ⩽ 255	48 ⩽ d ⩽ 57
	6	CODABAR	1 ⩽ k ⩽ 255	48 ⩽ d ⩽ 57, 65 ⩽ d ⩽ 68 , 36, 43,45,46,47,58
②	65	UPC-A	11 ⩽ n ⩽ 12	48 ⩽ d ⩽ 57
	66	UPC-E	11 ⩽ n ⩽ 12	48 ⩽ d ⩽ 57
	67	JAN13 (EAN13)	12 ⩽n ⩽ 13	48 ⩽ d ⩽ 57

[Notes ①]
- This command ends with NULL in this format.
- When selecting UPC-A or UPC-E code, the printer receives 12 byte barcode data and processes the remaining characters as regular characters.
- When selecting JAN13 (EAN13) type, after the printer receives 13 byte barcode data, the remaining characters are treated as normal characters.
- When selecting JAN8 (EAN8) type, after the printer receives 8-byte barcode data, the remaining characters are treated as normal characters.
- The number of ITF code data must be even. If an odd number of barcode data are entered, the last data is ignored.

2.9 Two Dimension Code Commands

GS (k

[Name] Set up and print the symbol

[Description] Performs data processing related to 2-dimensional codes (PDF417, QR Code, MaxiCode, 2-dimensional GS1 DataBar, Composite Symbology).

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

cn	fn	Function No.	Function name
48	65	Function 065	PDF417: Set the number of columns in the data region
	66	Function 066	PDF417: Set the number of rows
	67	Function 067	PDF417: Set the width of the module
	68	Function 068	PDF417: Set the row height
	69	Function 069	PDF417: Set the error correction level
	70	Function 070	PDF417: Select the options
	80	Function 080	PDF417: Store the data in the symbol storage area
	81	Function 081	PDF417: Print the symbol data in the symbol storage area
	82	Function 082	PDF417: Transmit the size information of the symbol data in the symbol storage area

49	65	Function 165	QR Code: Select the model
	67	Function 167	QR Code: Set the size of module
	69	Function 169	QR Code: Select the error correction level
	80	Function 180	QR Code: Store the data in the symbol storage area
	81	Function 181	QR Code: Print the symbol data in the symbol storage area
	82	Function 182	QR Code: Transmit the size information of the symbol data in the symbol storage area

<Function 065> GS (k pL pH cn fn n (cn=48, fn=65)

[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 (pL = 3, pH = 0)

cn = 48

fn = 65

0 ⩽ n ⩽ 30

[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.

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

[Notes]

- Start pattern and stop pattern
- Indicator codeword of left and right

[Default] n=0

<Function 066> GS (k pL pH cn fn n (cn=48, fn=66)

[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 (pL = 3, pH = 0)

cn = 48

fn = 66

n=0, 3 ⩽ n ⩽ 90

[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.

[Default] n=0

<Function 067> GS (k pL pH cn fn n (cn=48, fn=67)

[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 (pL = 3, pH = 0)

cn = 48

fn = 67

2 ⩽ n ⩽ 8

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

[Default] n=3

<Function 068> GS (k pL pH cn fn n (cn=48, fn=68)

[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 (pL = 3, pH = 0)

cn = 48

fn = 68

2 ⩽ n ⩽ 8

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

[Default] n=3

<Function 069> GS (k pL pH cn fn m n (cn=48, fn=69)

[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 (pL = 4, pH = 0)

cn = 48

fn = 69

m = 48, 49

48 ⩽ n ⩽ 56 [when m =48]

0 ⩽ n ⩽ 40 [when m =48]

[Description] Sets the error correction level for PDF417.

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

[Description] 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)	Function	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

[Default] m=49, n=1

<Function 070> GS (k pL pH cn fn m (cn=48, fn=70)

[Name] PDF417: Select the options

[Format]

ASCII	GS	(	k	pL	pH	cn	fn	m
Hex	1D	28	6B	03	00	30	46	m
Decimal	29	40	107	3	0	48	70	m

[Range] (pL + pH × 256) = 4 (pL = 4, pH = 0)

cn = 48

fn = 70

m = 0, 1

[Description] Selects the option for PDF417.

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

<Function 082> GS (k pL pH cn fn m (cn=48, fn=82)

[Name] PDF417: Transmit the size information of the symbol data in the symbol storage

[Format]

ASCII	GS	(	k	pL	pH	cn	fn	m
Hex	1D	28	6B	03	00	30	52	m
Decimal	29	40	107	3	0	48	82	m

[Range] (pL + pH × 256) =3 (pL = 3 ,pH = 0)

cn = 48

fn = 82

m = 48

[Description] Transmits the size information for the encoded PDF417 symbol data in the symbol storage area using the process of <Function 080>.

[Notes]

- This function does not print.
- Size information does not include safe blank areas (defined by the PDF417 symbol specification as upper, lower, left, and right margins).

<Function 165 > GS (k pL pH cn fn n1 n2 (cn=49,fn=65)

[Name] QR Code: Select the model

[Format]

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

[Range] (pL + pH × 256) = 4 (pL = 4, pH = 0)

cn = 49

fn = 65

n1 = 49, 50

n2 = 0

[Default] n1 = 50， n2 = 0

[Description] Selects the model for QR Code

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

<Function 167> GS (k pL pH cn fn n (cn=49,fn=67)

[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 n dots.

<Function 169> GS (k pL pH cn fn n (cn=49,fn=69)

[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%

2.10 Status Commands

ESC v

[Name] Transmit paper sensor status

[Format]

ASCII	ESC	v
Hex	1b	76
Decimal	27	118

[Description] Transmitting printer status to the printer is only valid for serial port printers.
Transmits the status of paper sensor(s) as 1 byte of data.
The paper sensor status to be transmitted is as follows:

Bit	Off/On	HEX	Decimal	Status
0.1	OFF	00	0	Roll paper near-end sensor: paper adequate.
	ON	03	3	Roll paper near-end sensor: paper near end.
2.3	OFF	00	0	Roll paper end sensor: paper present.
	ON	0C	12	Roll paper end sensor: paper not present.
4	OFF	00	0	Fixed
5.6	---	--	--	Undefined.
7	OFF	00	0	Fixed

[Notes] This instruction is only valid for serial port models.

GS r n

[Name] Transmit status

[Format]

ASCII	GS	r	n
Hex	1d	72	n
Decimal	29	114	n

[Range] n = 1, 49 2, 50

[Description] Transmits the status using n as follows:

N	Function
1,49	Transmits paper sensor status
2,50	Transmits drawer kick-out connector status

[Notes]
- This command is only valid for serial printers.
- After the data before this command in the receiving buffer is processed, the instruction is executed, so there is a certain time lag between sending the command and receiving the return status.
- The status to be transmitted is as follows:

Paper sensor status (n = 1, 49)

Bit	Off/On	HEX	Decimal	Status
0.1	OFF	00	0	Roll paper near-end sensor: paper adequate.
	ON	03	3	Roll paper near-end sensor: paper near end.
2.3	OFF	00	0	Roll paper end sensor: paper present.
	ON	0C	12	Roll paper end sensor: paper not present.
4	OFF	00	0	Fixed to Off.
5.6	---	--	--	Undefined.
7	OFF	00	0	Fixed to Off.

Paper sensor status (n = 2, 50)

Bit	Off/On	HEX	Decimal	Status
0	OFF	00	0	Drawer kick-out connector pin 3 is LOW.
	ON	01	1	Drawer kick-out connector pin 3 is HIGH.
1-3	---	--	--	Undefined.
4	OFF	00	0	Fixed to Off.
5.6	---	--	--	Undefined.
7	OFF	00	0	Fixed to Off.

[Notes] Do not transmit more data from the PC until the response data or status data are received from the printer.

[Reference] **DLE EOT**，**GS a**

DLE EOT n [a]

[Name] Transmit real-time status

[Format]

ASCII	DLE	EOT	n	[a]
Hex	10	04	n	[a]
Decimal	16	4	n	[a]

[Range] 1≤n≤4

[Description] Transmits the real-time status, using n as follows:

n = 1：Transmit printer status

n = 2：Transmit offline status

n = 3：Transmit error status

n = 4：Transmit roll paper sensor status

n=1： Printer status is as follows:

Bit	Off/On	HEX	Decimal	Function
0	OFF	00	0	Fixed to Off.
1	ON	02	2	Fixed to On.
2	OFF	00	0	Drawer kick-out connector pin 3 is LOW.
	ON	04	4	Drawer kick-out connector pin 3 is HIGH.
3	OFF	00	0	Online.
	ON	08	8	Offline.
4	ON	10	16	Fixed to On.
5.6	---	--	--	Undefined.
7	OFF	00	0	Fixed to Off.

Offline status A (n = 2) is as follows:

Bit	Off/On	HEX	Decimal	Function
0	OFF	00	0	Fixed to Off.
1	ON	02	2	Fixed to On.
2	OFF	00	0	Cover is closed.
	ON	04	4	Cover is open.
3	OFF	00	0	Paper is not being fed by the paper feed button.
	ON	08	8	Paper is being fed by the paper feed button.
4	ON	10	16	Fixed to On.
5	OFF	00	0	No paper-end stop.
	ON	20	32	Printing stops due to a paper-end.
6	OFF	00	0	No error.
	ON	40	64	Error occurred.
7	OFF	00	0	Fixed to Off.

Error status (n = 3) is as follows:

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

Bit 5：Unrecoverable error occurred：Refers to abnormal input voltage;

Bit 6：Auto-recoverable error occurred：Refers to the overheating error of the print head; When a print head overheating error occurs, wait for a period of time until the print head temperature decreases, and the error will automatically restored.

Roll paper sensor status (n = 4) is as follows:

Bit	Off/On	Hex	Decimal	Function
0	OFF	00	0	Fixed to Off.
1	ON	02	2	Fixed to On.
2.3	OFF	00	0	Roll paper near-end sensor: paper adequate.
	ON	0C	12	Roll paper near-end sensor: paper near end.
4	ON	10	16	Fixed to On.
5.6	OFF	00	0	Roll paper end sensor: paper present.
	ON	60	96	Roll paper end sensor: paper not present.
7	OFF	00	0	Fixed to Off.

[Notes] When you use this command, follow these rules.

• If another command (such as graphics data or defined data) has a code string in a parameter that is the same as this command, the printer starts processing this command. Users need to consider this situation;

Example: The graphic data may contain data that matches the command. Do not embed the command into another command.

Example: The graphic data may contain this command.

Transfer the instruction through the following methods:

If this command is sent while another command is processing, processing of the other command is canceled.

However, if the command must be transmitted continuously, 4 commands can be transmitted at a time.

In this case, subsequent data cannot be transmitted until all states are received.

If the command is not transmitted using the above method, its status may not be received.

GS a n

[Name] Enable/disable Automatic Status Back (ASB)

[Format]

ASCII	GS	a	n
Hex	1d	61	n
Decimal	29	97	n

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

[Default] n = 0

[Description] Enables or disables basic ASB (Automatic Status Back) and specifies the status items to include, using n as follows:

Bit	Off/On	Hex	Decimal	Function
0	OFF	00	0	Drawer kick-out connector status disabled.
	ON	01	1	Drawer kick-out connector status enabled.
1	OFF	00	0	Online/offline status disabled.
	ON	02	2	Online/offline status enabled.
2	OFF	00	0	Error status disabled.
	ON	04	4	Error status enabled.
3	OFF	00	0	Roll paper sensor status disabled.
	ON	08	8	Roll paper sensor status enabled.
4~7	OFF	00	0	Undefined.

When ASB is active, ASB status is transmitted whenever the status changes
Basic ASB status is 4-byte configuration [first byte - fourth byte].
First byte (printer information)

Bit	Off/On	Hex	Decimal	Printer status is as follows:
0,1	OFF	00	0	Fixed to Off.
2	OFF	00	0	Drawer kick-out connector pin 3 is LOW.
	ON	04	4	Drawer kick-out connector pin 3 is HIGH.
3	OFF	00	0	Online.
	ON	08	8	Offline.
4	ON	10	16	Fixed to On.
5	OFF	00	0	Cover is closed.
	ON	20	32	Cover is open.
6	OFF	00	0	Paper is not being fed by the paper feed button.
	ON	40	64	Paper is being fed by the paper feed button.
7	OFF	00	0	Fixed to Off.

Second byte (printer information)

Bit	Off/On	Hex	Decimal	Printer status is as follows:
0-2	--	--	--	Undefined.
3	OFF	00	0	Undefined.
	ON	08	8	No cutter error.
4	OFF	00	0	Fixed
5	OFF	00	0	No unrecoverable error.
	ON	20	32	Unrecoverable error occurred.
6	OFF	00	0	No automatically recoverable error.
	ON	40	64	Automatically recoverable error occurred.

Unrecoverable error: refers to abnormal input voltage;
Automatic recovery error: Refers to the overheating error of the print head, waiting for a period of time for the print head to overheat and automatically recover from errors

Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Printer status is as follows:
0, 1	OFF	00	0	Roll paper near-end sensor: paper adequate.
	ON	03	3	Roll paper near-end sensor: paper near end.
2, 3	OFF	00	0	Roll paper end sensor: paper present.
	ON	0C	12	Roll paper end sensor: paper not present.
4	OFF	00	0	Fixed
5, 6	--	--	-	Undefined.
7	OFF	00	0	Fixed

Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Printer information
0~3	--	--	--	Undefined.
4	OFF	00	0	Fixed
5, 6	--	--	--	Undefined.
7	0	00	0	Fixed

GS I n

[Name] Transmit printer ID

[Format]

ASCII	GS	I	n
Hex	1d	49	n
Decimal	29	73	n

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

65 ⩽ n ⩽ 69 [printer information B]

[Description] Transmits the printer ID.

• Transmits 1 byte of printer ID, using n as follows:

n	Printer ID	ID
1,49	Printer model ID	Hex code: 20 / Decimal code: 32
2,50	Type ID	See the table below

Bit	Off/On	Hex	Decimal	Content
0	OFF	00	0	Multi-byte character codes are not supported.
	ON	01	1	Multi-byte character codes are supported.
1	ON	02	2	Autocutter installed.
2.3	--	--	--	Not used.
4	OFF	00	0	Not used. Fixed to Off.
5	--	--	--	Reserved.
6	--	--	--	Not used.
7	OFF	00	0	Not used. Fixed to Off.

smits specified printer information B, using n as follows:

n	Printer ID	Specification
65	Firmware version	Firmware version
66	Maker name	"HPRT"/ Tally DASCOM
67	Printer model	"TP801"or"TP805"or"TP806" / DT-230
68	Serial No	Serial No of the printer
69	Font of Language for each country	Japanese model: "KANJI JAPANESE"
		Simplified Chinese model: "CHINA GB18030"
		Traditional Chinese model: "TAIWAN BIG-5"

[Notes] When this command is transmitted, the guidance receives the status, otherwise subsequent data will not be transmitted.

2.11 Mechanism Control Commands

ESC i

[Name] Partial cut (one point left uncut)

[Format]

ASCII	ESC	i
Hex	1b	69
Decimal	27	105

[Description] Executes a partial cut of the roll paper.

ESC m

[Name] Partial cut (three points left uncut)

[Format]

ASCII	ESC	m
Hex	1b	6d
Decimal	27	109

[Description] Executes a partial cut of the roll paper.

GS V

①GS V m ②GS V m n

[Name] Select cut mode and cut paper

Function A

ASCII	GS	V	m
Hex	1d	56	m
Decimal	29	86	m

Function B

ASCII	GS	V	m	n
Hex	1d	56	m	n
Decimal	29	86	m	n

[Range] <A> m = 0, 1, 48, 49

[Range] <B> m = 65, 66, $0 \leqslant n \leqslant 255$

[Description] Executes paper cutting specified by m, as follows:

m		Function
<A>	0.48	Executes a full cut (cuts the paper completely).
	1.49	Executes a partial cut (one point left uncut).
<B>	65	Feeds paper to (cutting position + n × vertical motion unit) and executes a full cut (cuts the paper completely).
	66	Feeds paper to (cutting position + n × vertical motion unit) and executes a partial cut (one point left uncut).

[Notes] The printer performs a partial cut (one point left uncut).

2.12 Control Commands

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 the specified connector pin m as follows:

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

The pulse for ON time is (t1 × 2 msec) and for OFF time is (t2 × 2 msec).

[Notes] If t2 < t1, the OFF time is equal to the ON time.

2.13 Beeper Commands

ESC (A pL pH fn n c t1 t2 <Function 97 >

[Name] Beep integrated beeper

[Format]

ASCII	ESC	(	A	pL	pH	fn	n	c	t1	t2
Hex	1B	28	41	05	00	61	n	c	t1	t2
Decimal	27	40	65	5	0	97	c	t1	n	t2

[Range] (pL + pH × 256) = 5 (pL = 5, pH = 0)

fn = 97

n = 100

0 ⩽ c ⩽ 63

0 ⩽ t1 ⩽ 255

0 ⩽ t2 ⩽ 255

[Description] Beeps the integrated beeper.

- c specifies times of beeping.
- t1 specifies beeping time (t1 × 100 ms).
- t2 specifies time for stop beeping (t2 × 100 ms).

[Notes] •This function repeats integrated beeper control of [(t1 × 100 ms) beep/ (t2 × 100 ms) stop] c times.
If this command is newly processed during beeping of the buzzer, the current process for beeping the buzzer is stopped and the new process for beeping the buzzer is started.
Integrated beeper beeping by this function stops due to any of the following factors.
• Finish specification of (c).
• Reset or power off.

2.14 Miscellaneous Commands（including Macro Function Commands）

GS (A pL pH n m

[Name] Execute test print

[Format]

ASCII	GS	(	A	pL pH n m
Hex	1D	28	41	pL pH n m
Decimal	29	40	65	pL pH n m

[Range] (pL + pH × 256)=2 (pL=2, pH=0)
0 ⩽ n ⩽ 2，48 ⩽ n ⩽ 50
1 ⩽ m⩽ 3，49 ⩽ m ⩽ 51

[Description] Executes a specified test print.
• pL, pH specifies (pL + pH × 256) as the number of bytes after pH (n and m).
• n specifies the paper used for the test print as follows:

n	Paper Type
0, 48	Basic sheet (roll paper)
1, 49	Roll paper
2, 50	

• m specifies a test pattern as follows:

1, 49	Hexadecimal dump
2, 50	Printer status printing
3, 51	Rolling pattern

[Notes] • After processing this command, the printer performs a software reset.
• Clear the receive buffer and print buffer.
• Reset all settings in RAM after power on, and data stored in NV will not be reset.

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

[Default] n = 0

[Description] Enables or disables the panel buttons.

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

[Notes]
- If panel buttons are disabled, the function of the panel button, such as feeding, will be executed when the panel button is turned on.
- When the printer cover is open, there are buttons that are always enabled or disabled regardless of this command. The buttons are different, depending on the printer model.

ESC = n

[Name] Select peripheral device

[Format]

ASCII	ESC	=	n
Hex	1B	3D	n
Decimal	27	61	n

[Range] 0 ⩽ n ⩽ 255

[Default] n = 1

[Description] Selects the device to which the host computer transmits data, using n as follows:

n	Function
1, 3	Enables printer.
2	Disables printer.

[Notes]
- When the printer is disabled, it ignores all received data and commands with the exception of ESC = and real-time commands (**DLE EOT, DLE ENQ**).
- If ASB is enabled when the printer is disabled by this command, the printer transmits the ASB status message whenever the status changes.

DLE DC4 (fn = 1) m t

[Name] Generate pulse in real-time

[Format]

ASCII	DLE	DC4	fn	m	t
Hex	10	14	fn	m	t
Decimal	16	20	fn	m	t

[Range] fn = 1

m = 0, 1

1≤ t ≤ 8

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

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

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

[Notes] • Note the following when using this command:

• If another command (such as graphics data or defined data) has a code string in a parameter that is the same as this command, the printer starts processing this command. Users need to consider this situation;

Example: Graphic data may contain a code string in a parameter that is the same as this command

• Do not embed this command within the code string of another command

Example: The graphic data may contain this command

DLE DC4（fn=8）d1...d7

[Name] Clear buffer (s)

[Format]

ASCII	DLE	DC4	fn	d1	...	d7
Hex	10	14	08	d1	...	d7
Decimal	16	20	8	d1	...	d7

[Range] fn = 8
d1 = 1, d2 = 3, d3 = 20, d4 = 1, d5 = 6, d6 = 2, d7 = 8

[Description] • Clears all data stored in the receive buffer and the print buffer and transmits Clear response.

[Notes] • Do not use this command in a system in which the printer is used with the OPOS driver and Java POS driver that are provided by Seiko Epson Corporation.

• Note the following when using this command

• If another command (such as graphics data or defined data) has a code string in a parameter that is the same as this command, the printer starts processing this command. Users need to consider this situation;

Example: Graphic data may contain a code string in a parameter that is the same as this command

• Do not embed this command within the code string of another command

Example: The graphic data may contain this command

• If this command is sent while another command is processing, processing of the other command is canceled.

GS :

[Name] Start/end macro definition

[Format]

ASCII	GS	:
Hex	1d	3a
Decimal	29	58

[Description] Start/end macro definition

[Notes] • The maximum number of data to be defined is 2048 bytes.

GS ^ r t m

[Name] Execute macro

[Format]

ASCII	GS	^	r t m
Hex	1D	5E	r t m
Decimal	9	94	r t m

[Range] $1 \leqslant r \leqslant 255$

$0 \leqslant t \leqslant 255$

m = 0, 1

[Description]Using the mode specified by m as follows:

m	Operation
0	The macro executes r times continuously at the interval specified by t.
1	The printer waits for the period specified by t, flashes the LED, and then waits for the paper feed button to be pressed. After this button is pressed, the printer executes the macro once. The printer repeats this operation r times.