
THERMAL RECEIPT PRINTER

Programming Manual

Thermal Receipt Printer Series

Command Description Items

Command Notation:

- 1) [Name] Command function outline.
- 2) [Format] Command format expressed in ASCII, hexadecimal, and decimal codes.
- 3) [Range] Argument value (Setting range) for the command.
- 4) [Description] Detailed command function description.
- 5) [Details] Describes the usage of the command in detail.
- 6) [Reference] Lists related commands.
- 7) [Default] Gives the default values, if any, for the command parameters.

Definitions

1. Receive buffer

The receive buffer is used to store data from the host computer. All received data is stored in this buffer and processed in the order received.

2. Print buffer

The print buffer is used to store image data for printing.

3. Ignore

This is the printer state in which the printer does nothing after receiving all codes, including parameters.

4. Disable

The state in which command codes are read in and then discarded, the parameters of codes are processed as normal data.

5. Inch

A unit of length, 1 inch = 25.4 mm

6. DPI

Dots per Inch, 1 mm = 8 dots when 200DPI

7. MSB

Most Significant Bit

1	0	0	1	0	1	0	1
---	---	---	---	---	---	---	---

8. LSB

Least Significant Bit

1	0	0	1	0	1	0	1
---	---	---	---	---	---	---	---

9. Device supported

Unless otherwise mentioned, the generic commands are used, it will be indicated the range of printer model if non-generic, the final result is subject to printer actual situation.

Numerical value

Unless otherwise specified, the ranges of values are Decimal, for example $1 \leq n \leq 2$, 1 is decimal but not ASCII. Hexadecimal number will be specified by double-byte character format such as: FF, 0XFF, <FF> H.

Control Commands List in Alphanumeric Order

Print commands:		
No.	Command	Function
1	LF	Print and line feed
2	ESC J	Print and feed paper
3	ESC d	Print and feed n lines
Print Position Commands:		
4	HT	Horizontal tab
5	ESC \$	Set absolute print position
6	ESC \	Set relative print position
7	ESC D	Set Horizontal tab positions
8	ESC a	Select justification
9	GS L	Set left margin
10	GS W	Set printing area width
11	GS P	Set horizontal and vertical motion units
Query and request commands:		
12	DLE EOT	Transmit real-time status
13	GS a	Enable/disable Automatic Status Back (ASB)
14	GS r	Transmit status
15	GS I	Transmit printer ID
16	DLE DC4	Generate pulse at real-time
17	ESC c 5	Enable/disable panel buttons
18	ESC p	Generate pulse
Line Spacing Commands:		
19	ESC 2	Select default line spacing
20	ESC 3	Set line spacing
Character set commands:		
21	ESC @	Initialize printer
22	ESC SP	Set right-side character spacing
23	ESC !	Set print mode
24	ESC %	Select/cancel user-defined character set
25	ESC &	Define user-defined character set
26	ESC -	Turn underline mode on/off
27	ESC ?	Cancel user-defined characters
28	ESC E	Turn emphasized mode on/off
29	ESC G	Turn double-strike mode on/off
30	ESC M	Select character font
31	ESC R	Specify an international character set
32	ESC V	Turn 90° clockwise rotation mode on/off
33	ESC t	Select character code table
34	ESC {	Turn upside-down print mode on/off
35	GS !	Select character size

36	GS B	Turn white/black reverse printing mode on/off
Bit-image Commands:		
37	ESC *	Specify bit image mode
38	FS P	Print NV bit image
39	FS q	Define NV bit image
40	GS v 0	Print raster bit image
41	GS *	Define downloaded bit image
42	GS /	Print downloaded bit image
Bar code Commands:		
43	GS H	Select print position of HRI characters
44	GS f	Select font for HRI characters
45	GS h	Set bar code height
46	GS k	Print bar code
47	GS w	Set bar code width
Chinese characters control commands		
48	FS !	Set print mode(s) for Kanji characters
49	FS &	Select Kanji character mode
50	FS -	Turn underline mode on/off for Kanji characters
51	FS .	Cancel Kanji character mode
52	FS 2	Define user-defined Kanji characters
53	FS S	Set Kanji left and right spacing
54	FS W	Turn quadruple-size mode on/off for Kanji characters
Black Mark related commands		
55	GS (F	Set black mark position offset
56	GS FF	Set black mark to the print starting position
Auto cutter related commands		
57	GS V	Select cut mode and execute a partial cut
Buzzer related commands		
58	ESC B	Beeps the buzzer when orders coming
59	ESC C	Beeps the buzzer and flashes alarm light when orders coming
Ethernet printer status detection commands		
60	ESC V	Ethernet printer status detection
QR code commands		
61	(K< Function 167>	QR Code: Set the size of module
62	(K< Function 169>	QR Code: Select the error correction level
63	(K< Function 180>	QR Code: Store the data in the symbol storage area
64	(K< Function 181>	QR Code: Print the symbol data in the symbol storage area

Print commands

1、LF 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.

[Details] This command sets the print position to the beginning of the line.

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

2、ESC J Print and feed paper

[Format]	ASCII	ESC	J	n
	Hex	1B	4A	n
	Decimal	27	74	n

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

[Description]

Prints the data in the print buffer and feeds the paper [n × vertical or horizontal motion unit] inches.

[Details]

- After printing is completed, this command sets the print starting position to the beginning of the line.
- The paper feed amount set by this command does not affect the values set by **ESC 2** or **ESC 3**.
- The horizontal and vertical motion unit is specified by **GS P**.
- In standard mode, the printer uses the vertical motion unit (y).
- The maximum line spacing is 956mm. When the setting value exceeds the maximum, it is converted to the maximum automatically.

[Reference] **GS P**

3、ESC d Print and feed n lines

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

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

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

[Details]

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

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

Print position commands

4、 HT Horizontal tab

[Format]	ASCII	HT
	Hex	09
	Decimal	9

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

[Details]

- This command is ignored unless the next horizontal tab position has been set.
- If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [Printing area width + 1].
- The horizontal tab position is set by **ESC D**.
- If this command is received when the printing position is at [printing area width + 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.
- The default setting of the horizontal tab position for the paper roll is font A(12*24) every 8th character(9th,17th,25th,...column).
- The below command is executed when the printer receive buffer is full: In standard mode, prints the current line and sets the print position to the beginning of the next line.

[Reference] **ESC D**

5、 ESC \$ Set absolute print position

[Format]	ASCII	ESC	\$	nL	nH
	Hex	1B	24	nL	nH
	Decimal	27	36	nL	nH

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

[Description]

Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed. The distance from the beginning of the line to the print position is $[(nL + nH \times 256) \times (\text{vertical or horizontal motion units})]$ inches.

[Details]

- Any setting values that go beyond the printable area are ignored.
- Using **GS P** to set the horizontal motion unit and the vertical motion unit.
- In standard mode, the horizontal motion unit is used for the calculation

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

6、 ESC \ Set relative print position

[Format]	ASCII	ESC	\	nL	nH
	Hex	1B	5C	nL	nH
	Decimal	27	92	nL	nH

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

[Description]

Sets the print starting position based on the current position by using the horizontal or vertical motion unit. This command sets the distance from the current position to [(nL + nH×256)× horizontal or vertical motion unit].

[Details]

- Any setting that exceeds the printable area is ignored.
- When pitch N is specified to the right: $nL + nH \times 256 = N$
- When pitch N is specified to the left (the negative direction), use the complement of 65536. When pitch N is specified to the left: $nL + nH \times 256 = 65536 - N$.
- The print starting position moves from the current position to [N×horizontal or vertical motion unit].
- The horizontal and vertical motion unit is specified by **GS P**.
- In standard mode, the horizontal motion unit is used.
- When underline mode turned on, the skipped space cannot underline.

[Reference] ESC \$, GS P

7、ESC D Set horizontal tab positions

[Format]	ASCII	ESC	D	n1...nk	NUL
	Hex	1B	44	n1...nk	00
	Decimal	27	68	n1...nk	0

[Range] $1 \leq n \leq 255$
 $0 \leq k \leq 32$

[Description] Set horizontal tab positions.

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

[Details]

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

[Default]

The default tab positions are at intervals of 8 ASCII characters (columns 9, 17, 25,...) for font A (12 × 24).

[Reference] HT

8、ESC a Select justification

[Format]	ASCII	ESC	a	n
	Hex	1B	61	n
	Decimal	27	97	n

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

[Description]

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

n	justification
0, 48	Left justification
1, 49	Center justification
2, 50	Right justification

[Details]

- The command is enabled only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command executes justification in the printing area.
- This command justifies the space area according to **HT**, **ESC \$** or **ESC **.

[Default] n = 0

[Example]



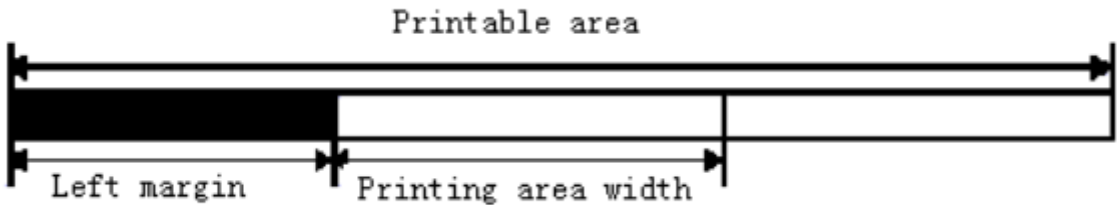
9、GS L Set left margin

[Format]	ASCII	GS	L	nL	nH
	Hex	1D	4C	nL	nH
	Decimal	29	76	nL	nH

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

$0 \leq nH \leq 255$

[Description] Set the left margin specified to $[(nL + nH \times 256) \times (\text{horizontal motion units})]$ inches.



[Details]

- This command is effective only processed at the beginning of the line in standard mode.
- If the setting exceeds the printable area, the maximum value of the printable area is used.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion unit does not affect the current left margin.

[Default] nL = 0, nH = 0

[Reference] GS P, GS W

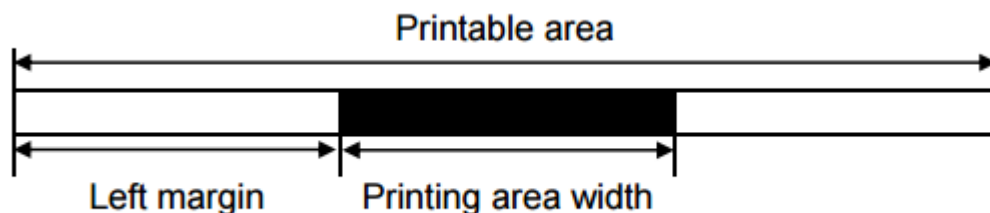
10、GS W Set printing area width

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

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

$0 \leq nH \leq 255$

[Description] Sets the printing area width to $[(nL + nH \times 256) \times (\text{horizontal motion units})]$ inches.



[Details]

- This command is effective only processed at the beginning of the line.
- The printing area width is not effective in page mode; the printer treats the data as normal data.
- This command does not affect printing in page mode.
- When (left margin + printing area width) exceeds the printable area, the printing area width is automatically set to (printing area width - left margin).
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion units does not affect the current left margin.
- The horizontal motion unit (x) is used for calculating the printing area width.

[Default] nL = 76, nH = 2

[Reference] GS L, GS P

11、GS P Set horizontal and vertical motion units

[Format]	ASCII	GS	P	x	y
	Hex	1D	50	x	y
	Decimal	29	80	x	y

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

$0 \leq y \leq 255$

[Description]

- Sets the horizontal and vertical motion units to approximately $22.5/x$ mm and approximately

22.5/y mm, respectively.

- When x and y are set to 0, the default setting of each value is used.

[Details]

- The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.
- In standard mode, the following commands use x or y:
 - ① Commands using x: **ESC SP, ESC \$, ESC \, FS S, GS L, GS W**
 - ② Commands using y: **ESC 3, ESC J, GS V**
- The command does not affect the previously specified values.
- The calculated result from combining this command with others is truncated to the minimum value of the mechanical pitch.

[Default] x =180, y =360, the horizontal motion units is 1dot and vertical motion units is 0.5 dot.
Horizontal distance is approximately 1/8mm; vertical distance is approximately 1/16mm.

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

Query and Request Commands

12、DLE EOT Transmit real-time status

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

[Range] $1 \leq n \leq 4$

[Description]

This command transmits the printer-related status specified by n as follows:

n=1: Transmit printer status

n=2: Transmit off-line status

n=3: Transmit error status

n=4: Transmit paper roll sensor status

[Details]

- To transmit the printer-related status immediately once printer receives the commands.
- This command should not be used within the data sequence of another command that consists of 2 or more bytes.
- Even though the printer is not selected using **ESC =** (select peripheral device), this command is effective.
- The printer transmits the current status; each status is represented by one byte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- The printer executes this command upon receiving it at any status.

n=1: Print status

Bit	Binary	Hex	Decimal	Status
0	0	00	0	Fixed to 0
1	1	02	2	Fixed to 1

2	0	00	0	One or two drawers open
	1	04	4	Two drawers close
3	0	00	0	On-line
	1	08	8	Off-line
4	1	10	16	Fixed to 1
5,6				Undefined
7	0	00	00	Fixed to 0

n = 2: Off-line status

Bit	Binary	Hex	Decimal	Status
0	0	00	0	Fixed to 0
1	1	02	2	Fixed to 1
2	0	00	0	Cover is closed.
	1	04	4	Cover is open.
3	0	00	0	Paper is not being fed by using the paper FEED button.
	1	08	8	Paper is being fed by the paper FEED button.
4	1	10	16	Fixed to 1
5	0	00	0	Paper adequate
	1	20	32	Paper shortage
6	0	00	0	No error.
	1	40	64	Error has occurred
7	0	00	00	Fixed to 0

n = 3: Error status

Bit	Binary	Hex	Decimal	Status
0	0	00	0	Fixed to 0
1	1	02	2	Fixed to 1
2		---	---	undefined
3	0	00	0	No auto-cutter error.
	1	08	8	Auto-cutter error occurred.
4	1	10	16	Fixed to 1
5	0	00	0	No unrecoverable error.
	1	20	32	Unrecoverable error occurs.
6	0	00	0	Print head temperature and voltage normal
	1	40	64	Print head temperature and voltage out of range
7	0	00	00	Fixed to 0

n = 4: Continuous paper sensor status

Bit	Binary	Hex	Decimal	Status
0	0	00	0	Fixed to 0
1	1	02	2	Fixed to 1

2,3	0	00	0	Paper roll near-end sensor: paper adequate.
	1	0C	12	Paper near-end is detected by the paper roll near-end sensor.
4	1	10	16	Fixed to 1
5,6	0	00	0	Paper roll sensor: Paper present.
	1	60	96	Paper roll end detected by paper roll sensor.
7	0	00	00	Fixed to 0

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

13、GS a Enable/disable Automatic Status Back (ASB)

[Format] ASCII GS a n
 Hex 1D 61 n
 Decimal 29 97 n

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

[Description] Enables or disables ASB and specifies the status items to include, using n as follows:

Bit	ABS	Bin	Hex	Decimal	Status for ASB
0	OFF	0	00	0	Drawer kick-out, connector pin 3 status disabled.
	ON	1	01	1	Drawer kick-out, connector pin 3 status enabled.
1	-	-	-	-	Undefined.
2	OFF	0	00	0	Error status disabled.
	ON	1	04	4	Error status enabled.
3	OFF	0	00	0	Paper roll sensor status disabled.
	ON	1	08	8	Paper roll sensor status enabled.
4-7	-		-	-	Undefined.

- ASB (Automatic Status Back) is the function that transmit the status of printer automatically when the printer changes in a real-time
- When ASB is active, ASB status is transmitted whenever the status changes even if the printer is disabled by **ESC =**.
- This command setting is effective until **ESC @** is executed, the printer is reset or power is turned off.
- Basic ASB status is 4-byte configuration, please refer to **ESC v**

[Default] n = 0

14、GS r Transmit status

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

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

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

n	Function
1, 49	Transmits paper sensor status

2, 50	Transmits drawer kick-out connector status
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[Details]

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

Paper sensor status (n = 1, 49) :

Bit	0/1	Hex	Decimal	Status for ASB
0, 1	0	00	0	Paper roll near-end sensor: paper adequate.
	1	03	3	Paper roll near-end sensor: paper near end.
2, 3	0	00	0	Paper roll end sensor: paper adequate.
	1	0c	12	Paper end sensor: Paper not present
4	0	00	0	Not used. Fixed to Off.
5, 6		---	---	Undefined
7	0	00	0	Not used. Fixed to Off.

drawer kick-out connector status (n = 2, 50):

Bit	0/1	Hex	Decimal	Status for ASB
0	0	00	0	Have cash drawer open
	1	01	1	No cash drawer open
1-3		---	---	Undefined.
4	0	00	0	Not used. Fixed to Off.
5, 6		---	---	Undefined.
7	0	00	0	Not used. Fixed to Off.

[Reference] **DLE EOT, GS a**

15、GS I Transmit printer ID

[Format] ASCII GS I n
 Hex 1D 49 n
 Decimal 29 73 n

[Range] n=66, 67

[Description] Transmit the printer ID specified by n as follows:

n	Hex	Status
66	42	Marker name
67	43	Printer Model

[Details]

- This return values are for reference only, subject to the actual printer model and self-test page information.

16、DLE DC4 Generate Pulse at real-time

[Format] ASCII DLE DC4 n m t
 Hex 10 14 n m t

Decimal 16 20 n m t

[Range] n = 1
 m = 0, 1
 $1 \leq t \leq 8$

[Description] Output the pulse specified by t to connector pin **m** as following:

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

Pulse ON time is [t x100 ms] and OFF time [t x100 ms].

[Details]

- When the pulse is output to the connector pin specified while **ESC p** or **DEL DC4** is executed while this command is processed, this command is ignored.
- The serial interface printer starts processing data upon receiving this command.
- With a parallel interface model, this command cannot be executed when the printer is busy.
- If print data includes the same character strings as this command, the printer performs the same operation specified by this command. The user must consider this.
- This command should not be contained within another command that consists of two or more bytes.
- Even though the printer is disabled with **ESC =** (Select peripheral device), this command is still effective.

[Reference] ESC p

17、 ESC c 5 Enable/disable panel buttons

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

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

[Description] Enable or disable the panel buttons.

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

[Details]

- Only the lowest bit of n is valid.
- When the panel buttons are disabled, none of them are usable.
- The panel buttons always are usable when executing the macro command.
- Power switch button and FUNC button are always enabled.

[Default] n = 0

18、 ESC p 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

$0 \leq t1 \leq 255, 0 \leq t2 \leq 255$

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

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

[Details]

- The pulse ON time is $[t1 \times 2 \text{ ms}]$ and the OFF time is $[t2 \times 2 \text{ ms}]$.
- If $t2 < t1$, the OFF time is $[t1 \times 2 \text{ ms}]$.

[Reference] **DLE DC4**

Line Spacing Commands

19、ESC 2 Select default line spacing

[Format]	ASCII	ESC	2
	Hex	1B	32
	Decimal	27	50

[Description] Selects default line spacing

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

[Default] 3.75 mm

[Reference] **ESC 3**

20、ESC 3 Set line spacing

[Format]	ASCII	ESC	3	n
	Hex	1B	33	n
	Decimal	27	51	n

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

[Description] Sets the line spacing as $[n \times (\text{vertical or horizontal motion units})]$ inches.

[Details]

- The line spacing is settable independently for each of standard and page modes.
- The horizontal and vertical motion unit is specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current line spacing.
- In standard mode, the vertical motion unit is used.
- In page mode, this command functions as follows, depending on the direction and starting position of the printable area:
 - 1、When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
 - 2、When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the horizontal motion unit (x) is used.
- The maximum line spacing is 956mm. When the setting value exceeds the maximum, it is converted to the maximum automatically.

[Default] Line spacing equivalent to approximately 3.75mm.

Character Set Commands

21、 ESC @ Initialize printer

[Format]	ASCII	ESC	@
	Hex	1B	40
	Decimal	27	64

[Description]

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

[Details]

- The DIP switch settings are not checked again.
- The data in the receive buffer is not cleared.
- The NV bit image data is not cleared.
- The data of the user NV memory is not cleared.

22、 ESC SP Set right-side character spacing

[Format]	ASCII	ESC	SP	n
	Hex	1B	20	n
	Decimal	27	32	n

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

[Description]

Sets the character spacing for the right side of the character to $[n \times (\text{horizontal or vertical motion units}) \text{ inch}]$.

[Details]

- When characters are enlarged, the right-side character spacing is n times normal value.
- This command sets values independently in each mode (standard and page modes).
- The horizontal and vertical motion unit is specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current right-side spacing.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- The maximum right-side spacing is 31.91mm (255/203 inches). Any setting exceeding the maximum is converted to the maximum automatically.

[Default] n = 0

[Reference] GS P

23、 ESC ! Select print mode

[Format] ASCII ESC ! n
 Hex 1B 21 n
 Decimal 27 33 n

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

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

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

[Details]

- When both double-height and double-width modes are selected, the characters will be quadrupled.
- The printer can underline all characters, but cannot underline the space set by **HT** or 90° clockwise rotated characters.
- The thickness of the underline is that selected by **ESC -**, regardless of the character size.
- When some characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- **ESC E** can also turn on or off emphasized mode. However, the setting of the last received command is effective.
- **ESC -** can also turn on or off underline mode. However, the setting of the last received command is effective.
- **GS !** can also select character size. However, the setting of the last received command is effective.
- Emphasized mode is effective for alphanumeric and Kanji. All print modes except emphasized mode is effective only for alphanumeric.

[Default] n = 0

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

24、 ESC % Select/cancel user-defined character set

[Format] ASCII ESC % n

Hex	1B	25	n
Decimal	27	37	n

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

[Description]

This command selects/deselects user-defined character set that is downloaded by user. To make it valid, the least significant bit should be defined like following.

- When the LSB of n is 0, the user-defined character set is canceled.
- When the LSB of n is 1, the user-defined character set is selected.

[Details]

- When the user-defined character set is canceled, the internal character set is automatically selected.
- n is available only for the least significant bit.

[Default] n = 0

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

25、ESC & Define user-defined character set

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

[Range] y = 3
 $32 \leq c1 \leq c2 \leq 127$
 $0 \leq x \leq 12$ ASCII Font A (12 × 24)
 $0 \leq x \leq 9$ ASCII Font B (9 × 17)
 $0 \leq d1 \dots d(y \times xk) \leq 255$

[Description]

This command defines user-defined characters for character codes in a designated range.

- y denotes the number of bytes in the vertical direction.
- c1 denotes the start character code, c2 denotes the end character code.
- x denotes the number of dots in the horizontal direction.

[Details]

- The allowable character code range is from ASCII code <20>H to <7F>H (96 characters).
- It is possible to define multiple characters for consecutive character codes. If only one character is desired, use c1 = c2.
- d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side.
- The data to define a user-defined character is (y × x) bytes.
- Set a corresponding bit to 1 to print a dot or 0 to not print a dot.
- The user-defined character definition is cleared when:
 - 1、**ESC @** is executed.
 - 2、**ESC ?** is executed.
 - 3、**FS q** is executed.
 - 4、**GS *** is executed.
 - 5、The printer is reset or the power is turned off.
- When the user-defined characters are defined in font B (9 × 17), only the most significant bit of

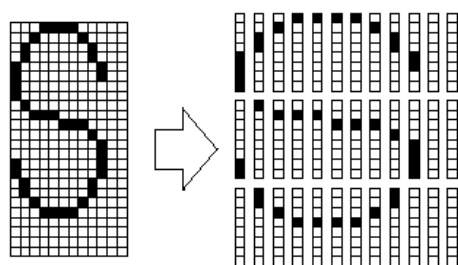
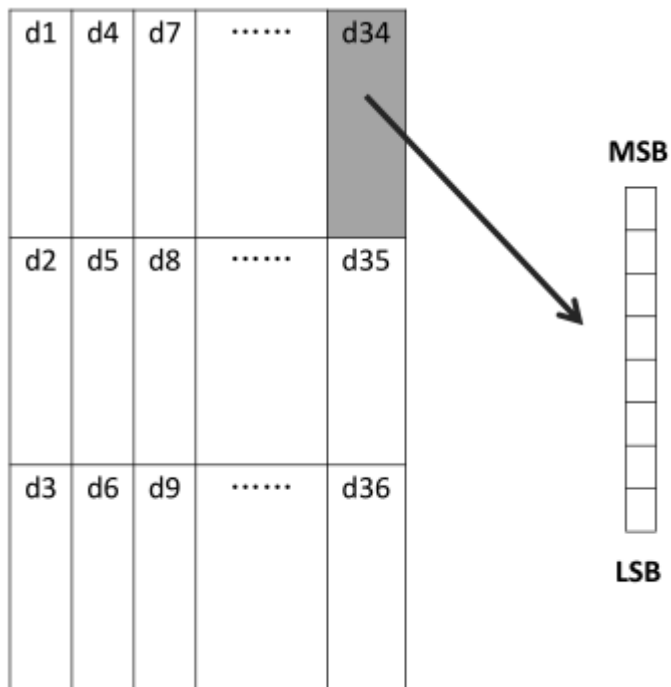
the 3rd byte of data in vertical direction is effective.

[Default] The internal character set

[Reference] **ESC %, ESC ?**

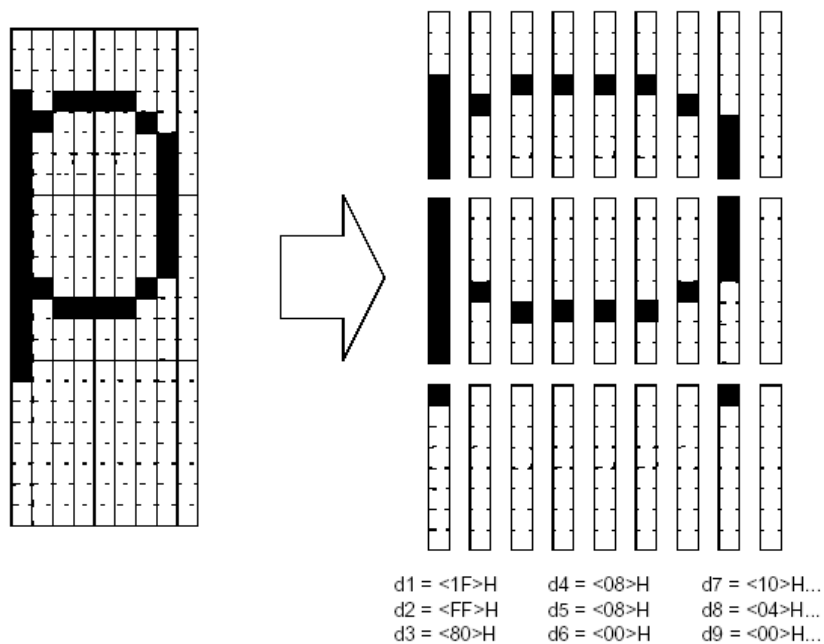
[Example]

- When font A (12 × 24) is selected



d1= <0F>H d4 = <30>H d7 = <40>H
d2 = <03>H d5 = <80>H d8 = <40>H
d3 = <00>H d6 = <00>H d9 = <20>H

- When font B (9 × 17) is selected.



26、 ESC – Turn underline mode on/off

[Format]	ASCII	ESC	-	n
	Hex	1B	2D	n
	Decimal	27	45	n

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

[Description] The underline mode varied depending on the following values of n:

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

[Details]

- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT**.
- The printer cannot underline 90° clockwise rotated characters and white/black inverted characters.
- When underline mode is turned off by setting the value of n to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.
- Changing the character size does not affect the current underline thickness.
- Using **ESC !**, the underline mode can be activated/deactivated as well. However, that the last received command is effective.
- This command does not affect the setting of Kanji characters.

[Default] n = 0

[Reference] **ESC !**

27、ESC ? Cancel user-defined characters

[Format] ASCII ESC ? n
 Hex 1B 3F n
 Decimal 27 63 n

[Range] $32 \leq n \leq 127$

[Description] Cancel user-defined characters.

[Details]

- This command cancels the pattern defined for the character code specified by **n**. After the user-defined characters are canceled, the corresponding pattern for the internal character is printed.
- If a user-defined character has not been defined for the specified character code, the printer ignores this command.

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

28、ESC E Turn emphasized mode on/off

[Format] ASCII ESC E n
 Hex 1B 45 n
 Decimal 27 69 n

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

[Description] Turns emphasized mode on or off.

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

[Details] Only the least significant bit of **n** is enabled.

- This command and **ESC !** turn on and off emphasized mode in the same way, the setting of the last received command is effective.

[Default] **n** = 0

[Reference] **ESC !**

29、ESC G Turn on/off double-strike mode

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

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

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

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

[Details] Only the least significant bit of **n** is enabled.

- Printer output is the same in double-strike mode and in emphasized mode.

[Default] **n** = 0

[Reference] **ESC E**

30、 ESC M Select character font

[Format] ASCII ESC M n
 Hex 1B 4D n
 Decimal 27 77 n

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

[Description] Selects character fonts.

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

31、 ESC R Specify an international character set

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

[Range] $0 \leq n \leq 15$

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

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

[Default] n = 0

32、 ESC V Turn 90° clockwise rotation mode on/off

[Format] ASCII ESC V n
 Hex 1B 56 n
 Decimal 27 86 n

[Range] $0 \leq n \leq 1, 48 \leq n \leq 49$

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

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

[Details]

- This command affects printing in standard mode.
- When underline mode is turned on, the printer does not underline 90° clockwise-rotated.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double-width commands in normal mode.

[Default] n = 0

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

33、 **ESC t** **Select character code table**

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

[Range] $0 \leq n \leq 10, 16 \leq n \leq 30, n=255$

[Description] Specifies code page according to the value of n as follows:

n	page
0	PC437 [U.S.A,Standard Europe]
1	Katakana
2	PC850 [Multilingual]
3	PC860 [Portuguese]
4	PC863 [Canadian-French]
5	PC865 [Nordic]
6	West Europe
7	Greek
8	Hebrew
9	PC755: East Europe
10	Iran
16	WPC1252
17	PC866:Cyrillic #2
18	PC852: Latin2
19	PC858
20	Iran II
21	Latvian
22	Arabic
23	PT151,1251
24	PC747
25	WPC1257
27	Vietnam
28	PC864
29	PC1001

30	Uygur
255	Thai

[Details] Code page supported by reference to printer self-test page.

[Default] n = 0

34、 ESC { Turn upside-down print mode on/off

[Format]	ASCII	ESC	{	n
	Hex	1B	7B	n
	Decimal	27	123	n

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

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

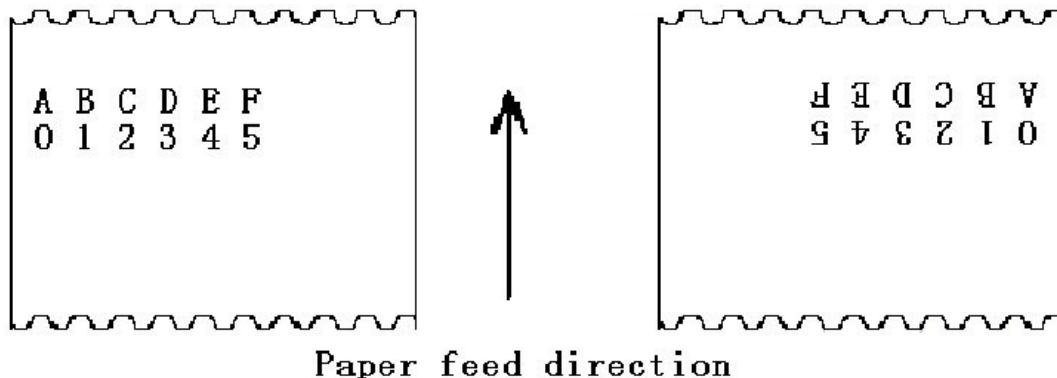
- When the LSB of n is 0, upside-down printing mode is turned off.
- When the LSB of n is 1, upside-down printing mode is turned on.

[Details]

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

[Default] n = 0

[Example]



35、 GS ! Select character size

[Format]	ASCII	GS	!	n
	Hex	1D	21	n
	Decimal	29	33	n

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

($1 \leq \text{vertical number of times} \leq 8$, $1 \leq \text{horizontal number of times} \leq 8$)

[Description]

One byte has 8 bits, selects the character height using bits 0 to 2 and selects the character width using bits 4 to 6, as follows:

Character width selection					
Bit6	Bit5	Bit4	Hex	Decimal	Enlarged in Horizontal direction
0	0	0	00	0	1 (Normal)
0	0	1	10	16	2 (Double-width)
0	1	0	20	32	3
0	1	1	30	48	4
1	0	0	40	64	5
1	0	1	50	80	6
1	1	0	60	96	7
1	1	1	70	112	8

Character height selection					
Bit2	Bit1	Bit0	Hex	Decimal	Enlarged in Horizontal direction
0	0	0	00	0	1 (Normal)
0	0	1	01	1	2 (Double-width)
0	1	0	02	2	3
0	1	1	93	3	4
1	0	0	04	4	5
1	0	1	05	5	6
1	1	0	06	6	7
1	1	1	07	7	8

[Details]

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

[Default] n = 0

[Reference] **ESC !**

36、 GS B Turn white/black reverse printing mode on/off

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

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

[Description] Turn on or off white/black reverse printing mode by setting the least significant bit of n.

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

[Details]

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

[Default] n = 0

Bit-image Commands

37、 **ESC *** **Specify 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			
	$0 \leq nL \leq 255$			
	$0 \leq nH \leq 3$			
	$0 \leq d \leq 255$			

[Description]

Specifies the bit image for the mode m as to the number of dots specified by nL and nH.

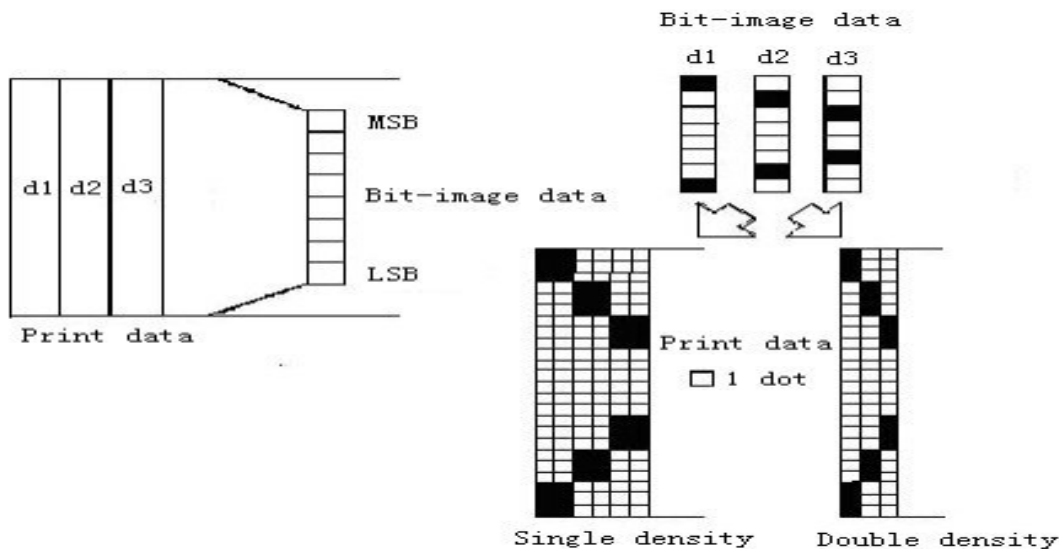
m	Mode	Vertical direction		Horizontal direction	
		Number of dots	Dot density (DPI)	Dot density (DPI)	Number of bytes (k)
0	8-dot single-density	8	67 DPI	100 DPI	$nL + nH \times 256$
1	8-dot double-density	8	67 DPI	200 DPI	$nL + nH \times 256$
32	24-dot single-density	24	200 DPI	100 DPI	$(nL + nH \times 256) \times 3$
33	24-dot double-density	24	200 DPI	200 DPI	$(nL + nH \times 256) \times 3$

[DPI: Dots Per Inch, dot/25.4mm{1"}]

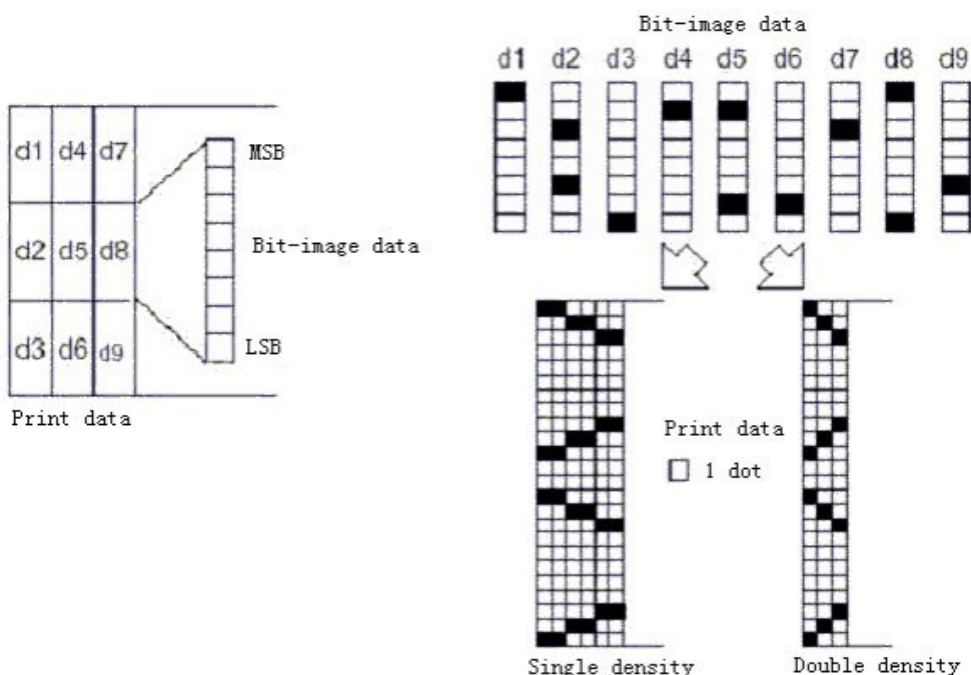
[Details]

- If the value of m is beyond the conditions, nL and the subsequent data after m will be treated as normal data.
- The nL and nH indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by $nL + nH \times 256$.
- If the bit image data being entered is beyond the number of dots to be printed, the surplus will be discarded.
- d specifies the bit image data with 1 for printed data and 0 for not printed.

- After printing a bit image, the printer returns to normal data processing mode.
 - This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
 - If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC *** command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):
 - 1、The width of the printing area is extended to the right to accommodate the amount of data.
 - 2、If step1 does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
 - The relationship between the image data and the dots to be printed is as follows:
- When 8-dot bit image is selected:



When 24-dot bit image is selected:



38、 FS p Print NV bit image

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

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

[Description] Prints NV bit image n using the mode specified by m as follows:

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

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

[Details]

- NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- This command is not effective when the specified NV bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command is not affected by print modes (emphasized, double-strike, double-height, double-width, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
- The printer does not print the NV bit image that is beyond one line of print area.
- This command feeds dots (for the height n of the NV bit-image) in normal and double-width modes, and feeds $n \times 2$ dots (for the height n of the NV bit-image) in double-height and quadruple modes, regardless of the line spacing specified by **ESC 2** or **ESC 3**.
- After printing the bit image, this command sets the print position to the beginning of the line and processes the data that follows as normal data.

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

39、 FS q 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] $1 \leq n \leq 255$
 $0 \leq xL \leq 255$
 $1 \leq (xL + xH \times 256) \leq 1023$
 $1 \leq (yL + yH \times 256) \leq 288$
 $0 \leq d \leq 255$
 $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
 The capacity of NV memory area is 8096bytes (max).

[Description] Defines the NV bit image in the NV memory.

- n denotes the number of the NV being defined.
- xL, xH set the number of dots in the horizontal directions to $(xL+xH \times 256) \times 8$ for the NV bit image.
- yL, yH set the number of dots in the vertical directions to $(yL+yH \times 256) \times 8$ for the NV bit image.

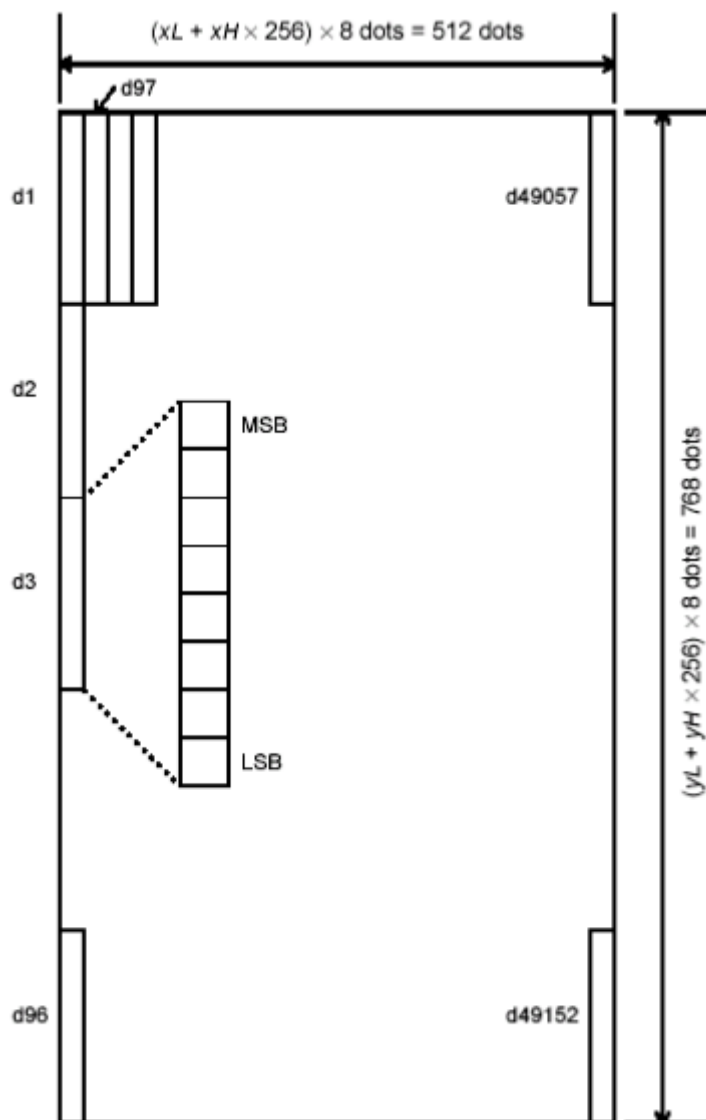
[Details]

- Excessive execution of this command may destroy the Flash memory. We recommend no more than 10 times per day for writing data to the Flash memory.
- This command cancels all NV bit images that have already been defined by this command. The printer cannot redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.
- During processing this command, the printer is in BUSY when writing the data to the NV user memory and stops receiving data. Therefore it is prohibited to transmit the data including the real-time commands during the execution of this command.
- NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- In standard mode, this command is effective only when processed at the beginning of the line.
- This command is effective when 7 bytes <FS~yH> is processed as a normal value.
- When the NV bit image bytes is exceeded the range for the left of xL, xH, yL, yH defined, the printer processes the data which xL, xH, yL, yH defined.
- In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled.
- In groups of NV bit images other than the first one, when the printer processes xL, xH, yL, yH out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that have been defined are disabled (undefined), but any NV bit images before that are enabled.
- d indicates the definition data. In data (d) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
- This command defines n as the number of a NV bit image. Numbers rise in order from NV bit image. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 1, and the last data group [xL xH yL yH d1...dk] is NV bit image n. The total agrees with the number of NV bit images specified by command **FS p**.
- A definition data of a NV bit image consists of [xL xH yL yH d1...dk]. Therefore, when only one NV bit image is defined $n=1$, the printer processes a data group [xL xH yL yH d1...dk] once. The printer uses $([data: (xL+xH \times 256) \times (yL+yH \times 256) \times 8] + [header: 4])$ bytes of NV memory.
- The definition area in this printer is a maximum of 64K bits (8K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data header] exceeds 64K bits (8K bytes). (different capacity by different printer, please refer to the print specification).
- The printer is busy immediately before writing into NV memory.
- During processing this command, the printer neither transmits the status, nor executes status queries.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
- Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
- This command performs only definition of a NV bit image and does not perform printing.

Printing of the NV bit image is performed by the **FS p** command.

[Reference] **FS p**

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



40、 GS v 0 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] $0 \leq m \leq 3$, $48 \leq m \leq 51$

$0 \leq xL \leq 255$

$0 \leq xH \leq 255$

$0 \leq yL \leq 255$

$0 \leq d \leq 255$

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

[Description] prints a raster bit image according to the mode defined by m:

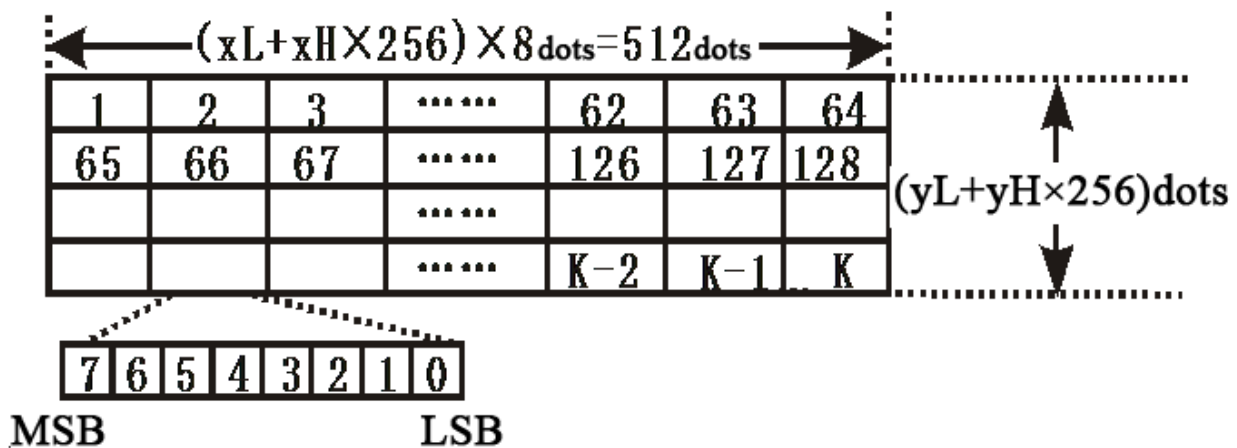
m	Mode	Vertical Dot Density (DPI)	Horizontal Dot density (DPI)
0, 48	Normal	200	200
1, 49	Double-width	200	100
2, 50	Double-height	100	200
3, 51	Quadruple	100	100

- xL、xH specifies (xL+ xH × 256) bytes in the horizontal direction for the bit image.
- yL、yH specifies (yL+ yH × 256) bytes in the vertical direction for the bit image.

[Details]

- In standard mode, this command is effective only when the printer buffer is empty.
- None of the print modes such as character size, emphasized, double-strike, upside-down printing, underline, white/black reverse printing, etc, affects the printing of the bit image.
- If the bit image to be printed exceeds the printable area, the excess data is not printed.
- The **ESC a** (Select justification) setting is also effective on raster bit images.
- When this command is received during macro definition, the printer ends macro definition and begins performing this command. This command is not for the part of macro definition.
- d specifies the definition data of the bit image data with 1 for printed a dot and 0 for not printed.

[Example] When xL+ xH × 256 = 64



41、 GS * Define downloaded bit image

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

[Range] $1 \leq x \leq 255, 1 \leq y \leq 48$

$x \times y \leq 912$

$0 \leq d \leq 255$

[Description]

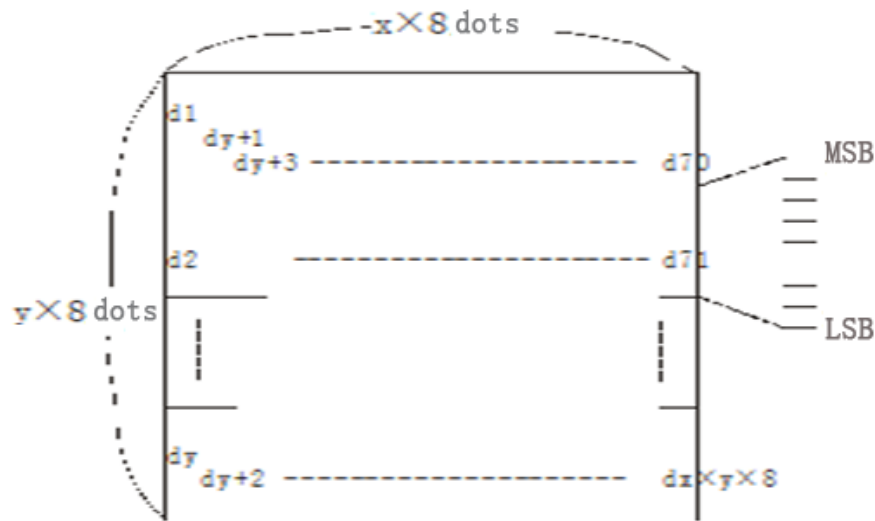
Defines a downloaded bit image using the number of dots specified by x and y.

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

[Details]

- The number of dots in the horizontal direction is $x \times 8$, in the vertical direction it is $y \times 8$.

- If $x \times y$ is out of the specified range, this command is disabled.
- The d indicates bit-image data. Data (d) specifies a bit printed to 1 and not printed to 0.
- The downloaded bit image definition is cleared when:
 1. **ESC @** is executed.
 2. **ESC &** is executed.
 3. **FS q** is executed.
 4. Printer is reset or the power is turned off.
- The following figure shows the relationship between the downloaded bit image and the printed data:



[Reference] **GS /**

42、 **GS /** Print downloaded bit image

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

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

[Description] Print a downloaded bit image using the mode specified by m.

m selects a mode from the table below:

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

[Details]

- This command is ignored when if a downloaded bit image is not defined.
- In standard mode, this command works only when the print buffer is empty.
- Except for upside-down printing mode, none of print mode such as emphasized, double-strike, underline, character size, or white/black reverse printing, affects the printing of the downloaded

bit image.

- If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
- The bit image to be printed using this commands is downloaded to RMA not FLASH, corresponding image number is set by the **GS ***

[Reference] **GS ***

Barcode commands

43、 GS H Select print position for HRI characters

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

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

[Description] Select the printing position of HRI characters when printing a bar code.

The printing position is set according to the value of as follows:

n	Printing position
0, 48	Not printed
1, 49	Above the bar code
2, 50	Below the bar code
3, 51	Both above and below the bar code

- HRI indicates Human Readable Interpretation.

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

[Default] n = 0

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

44、 GS f Select font for HRI characters

[Format]	ASCII	GS	f	n
	Hex	1D	66	n
	Decimal	29	102	n

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

[Description] Select a font for the HRI characters used when printing a bar code.

n selects a font from the following table:

n	Font
0,48	Font A (12 × 24)
1,49	Font B (9 × 17)

[Details]

- HRI indicates Human Readable Interpretation.
- HRI characters are printed at the position specified by **GS H**.

[Default] n = 0

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

45、GS h Set bar code height

[Format] ASCII GS h n
 Hex 1D 68 n
 Decimal 29 104 n

[Range] 1 ≤ n ≤ 255

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

[Default] n = 162

[Reference] **GS k**

46、47、①GS k Print bar code

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

[Range] ①0 ≤ m ≤ 6 (k and d depends on the bar code system used)

 ②65 ≤ m ≤ 73 (n and d depends on the bar code system used)

[Description] Selects a bar code system and prints the bar code.

m selects a bar code system as follows:

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

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

[Details for ①]

- This command ends with a NUL code.
- When the bar code system used is UPC-A or UPC-E, the printer prints the bar code data after receiving 12 bytes bar code data and processes the following data as normal data.
- When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes bar code data and processes the following data as normal data.
- When the bar code system used is JAN8 (EAN8), the printer prints the bar code after receiving 8 bytes bar code data and processes the following data as normal data.
- The number of data for ITF bar code must be even numbers. When an odd number of data is input, the printer ignores the last received data.

[details for ②]

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

[Details in standard mode]

- This command is not effective when if d is outside of the specified range.
- This command is not effective when if the horizontal size exceeds printing area.
- This command feeds paper length to be same as bar code height, regardless of the line height specified by **ESC 2** or **ESC 3**.
- This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, this command is ignored.
- After printing bar code, this command sets the print position to the beginning of the line.
- Except for upside-down printing mode, none of print mode such as emphasized, double-strike, underline, character size, white/black reverse printing, or 90° clockwise-rotation character, affects the printing of the bar code.

When CODE128 (m = 73) is used:

- Refer to Appendix A for Code 128.
- when using CODE 128, coding as follows:
 - ① Starting character must select character set from (any of CODE A, CODE B, or CODE C) firstly.
 - ② Selecting the character set is by sending “{” combined with the other character to execute, ASCII character “{” is set by sending “{” two times.

special character	Sending data		
	ASCII	Hex	Decimal
SHIFT	{S	7B, 53	123, 83
CODE A	{A	7B, 41	123, 65
CODE B	{B	7B, 42	123, 66
CODE C	{C	7B, 43	123, 67
FNC1	{1	7B, 31	123, 49
FNC2	{2	7B, 32	123, 50
FNC3	{3	7B, 33	123, 51
FNC4	{4	7B, 34	123, 52
"{"	{{	7B, 7B	123, 123

[Example] Print “No.123456” using CODE128

Firstly select CODE B to print “No.”, and then select CODE C to print the rest numbers: **GS k 73 10 123 66 78 111 46 123 67 12 34 56**



- If the front of bar code data is not character set selection, the printer will stop executing this command, the rest of data will be treated as normal data.
- If “{” and the subsequent character is not the appointed combination as shown above, the printer will stop executing this command, the rest of data will be treated as normal data.
- If receiving character is not bar code character set data, the printer will stop executing this command, the rest of data will be treated as normal data.
- When printing HRI characters, shift character and character set selection data is not printed.
- HRI characters of the function characters are not printed.
- HRI characters of the control characters (in Hexadecimal: <00>H to <1F>H and <7F>H) are not printed.
- Make sure to keep the left-side and right-side spacing, as different spacing per different bar code type.

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

47、 **GS w** Set bar code width

[Format]	ASCII	GS	w	n
	Hex	1D	77	n
	Decimal	29	119	n

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

[Description] Sets the horizontal size of the bar code, using n as follows:

n	Multi-level bar code module width (mm)	Binary-level bar code	
		Thin element width (mm)	Thick element width (mm)
2	0.25	0.25	0.625
3	0.375	0.375	1.0
4	0.5	0.5	1.25
5	0.625	0.625	1.625
6	0.75	0.75	1.875

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

[Default] $n = 3$

[Reference] **GS k**

Chinese characters control commands

48、FS ! Set print mode(s) for Kanji characters

[Format]	ASCII	FS	!	n
	Hex	1C	21	n
	Decimal	28	33	n

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

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

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

[Details]

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

received command is effective.

- It is possible to turn underline mode on or off using **FS -**, and the setting of the last received command is effective.

[Default] n = 0

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

49、FS & Select Kanji character mode

[Format] ASCII FS &
 Hex 1C 26
 Decimal 28 38

[Description] Select Kanji character mode.

[Details]

- When Kanji mode is selected, the printer checks if the character is Kanji code or not, if yes, the printer processes the first byte of Kanji code, and then checks if the second byte is Kanji code or not.
- Kanji mode is selected at default once printer is power on.

[Reference] **FS .**

50、FS - Turn underline mode on/off for Kanji characters

[Format] ASCII FS - n
 Hex 1C 2D n
 Decimal 28 45 n

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

[Description] Turns underline mode for Kanji characters on or off, based on the following values of n.

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

[Details]

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

[Default] n = 0

[Reference] **FS !**

51、FS . Cancel Kanji character mode

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

[Description] Cancel Kanji character mode.

[Details]

- When Kanji mode is canceled, the printer processes all characters as ASCII character, and processes a 1-byte code of character per each time.
- Kanji mode is selected at default once printer is power on.

[Reference] FS &

52、FS 2 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 and c2 indicate character codes for the defined characters.

c1 = <FE>H

<A1>H ≤ c2 ≤ <FE>H

0 ≤ d ≤ 255

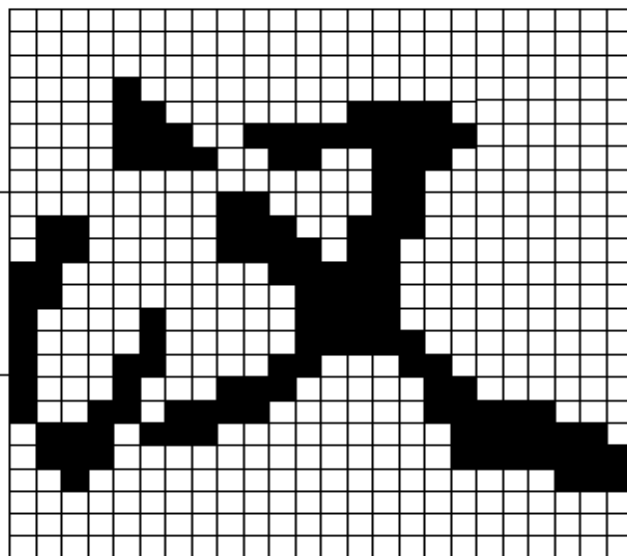
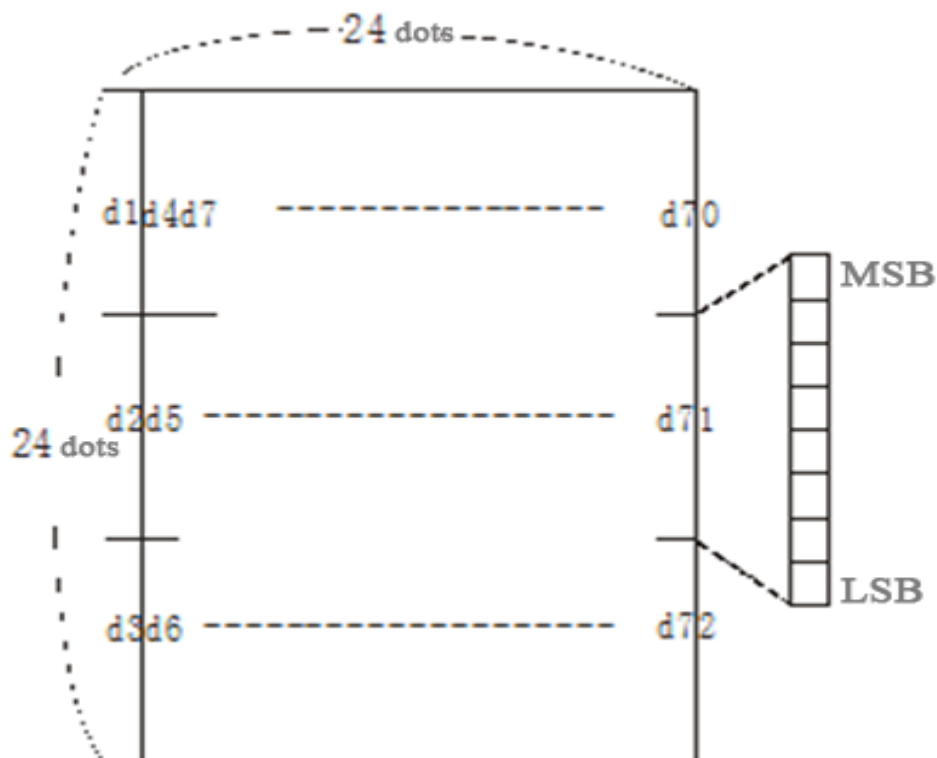
k = 72

[Description] Defines user-defined Kanji characters for the character codes specified by c1 and c2.

[Details]

- c1 and c2 indicate character codes for the defined characters. c1 specifies for the first byte, and c2 for the second byte.
- d indicates the dot data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.

[Default] None



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

53、FS S Set Kanji left and right spacing

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

[Range] $0 \leq n1 \leq 255$
 $0 \leq n2 \leq 255$

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

- When the printer model used supports **GS P**, the left-side character spacing is $[n1 \times \text{horizontal}]$

or vertical motion units] inches, and the right-side character spacing is [n2 × horizontal or vertical motion units] inches.

[Details]

- When double-width mode is set, the left- and right-side character spacing is twice the normal value.
- The horizontal and vertical motion units are set by **GS P**. The previously specified character spacing does not change, even if the horizontal or vertical motion unit is changed using **GS P**.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
 - ① When the starting position is set to the upper left or lower right of the printable area, the horizontal motion unit is used.
 - ② When the starting position is set to the upper right or lower left of the printable area, the vertical motion unit is used.
 - ③ The maximum right-side spacing is 36mm, any setting exceeding the maximum is converted to the maximum automatically.

[Default] n1 = 0, n2 = 0

[Reference] GS P

54、FS W Turn quadruple-size mode on/off for Kanji characters

[Format]	ASCII	FS	W	n
	Hex	1C	57	n
	Decimal	28	87	n

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

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

- When the LSB of n is 0, quadruple-size mode for Kanji characters is turned off.
- When the LSB of n is 1, quadruple-size mode for Kanji characters is turned on.

[Details]

- Only the lowest bit of n is valid.
- In quadruple-size mode, the printer prints the same size characters as when double-width and double-height modes are both turned on.
- When quadruple-size mode is turned off using this command, the following characters are printed in normal size.
- When some of the characters on a line are different in height, all the characters on the line are aligned at the baseline.
- **FS !** or **GS !** can also select and cancel quadruple-size mode by selecting double-height and double-width modes, and the setting of the last received command is effective.

[Default] n = 0

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

Black mark related commands.

55、GS (F Set black mark position offset

[Format]	ASCII	GS (F	pL	pH	a	m	nL	nH
	Hex	1D 28	46	pL	pH	a	m	nL nH
	Decimal	29 40	70	pL	pH	a	m	nL nH

[Description]

- All function data specified by this commands will not be lost when the printer is power down.
- Using this command to select black mark position control allowable, and set cutting/tearing position or print starting position relative to black mark detection offset.

$pL + (pH \times 256) \equiv 4$ means $pL=4$, $pH=0$

$a=1, 2; m=0, 48$

$0 \leq (nL + nH \times 256) < 1700$

Select to set cutting/tearing position or print starting position offset using a as follows:

a	Function
1	Set print starting position relative to black mark detection offset.
2	Set cutting/tearing position relative to black mark detection offset.

- $m=0$ or 48 , offset direction is same as feed paper direction.
- The offset specified by nL , nH corresponds to the actual distance for $(nL + nH \times 256) \times 0.125\text{mm}$.
- Black mark position set using **GS FF** and **GS V** is effective only when executing this command.
- To set print starting position offset ($a=1$) is effective when executing **GS FF**.
- To set cutting/tearing position offset ($a=2$) is effective when executing **GS V m**.
- Default $nL=nH=0$, it means, when the black mark detected, print-head position corresponds to the current paper is set to the print starting position, cutting/tearing position corresponds to the current paper is set to cutting/tearing position.

[Details]

- If both of cutting/tearing position offset and print starting position offset are 0, in this case, using **GS V m** to execute position print for each receipt.
- If cutting/tearing position offset is not 0, in this case, using **GS (F** to set cutting/tearing position offset for ($a=2$), and print starting position for ($a=1$).
- Feed paper to print start position using **GS FF** only when set the starting print position, otherwise inaccurate positioning occurs or feed blank paper occurs.
- If updated the last offset data using **GS (F**, the first printed paper might occur inaccurate positioning or feed blank paper, but it will be in normal for the subsequent printed paper.

56、GS FF Set black mark position to the print starting position

[Format]	ASCII	GS	FF
	Hex	1D	0C
	Decimal	29	12

[Description]

- This command is effective only when black mark position control allowable.
- The printer detects black mark in the paper and feed paper to the print starting position which

set by **GS (F** (a=1) .

- If the paper is in standby at the print starting position, the printer does not feed.
- If the printer with auto cutter and set partial cut mode, the printer does not back-feed.

Auto cutter related commands

57、GS V Select cut mode and execute a partial cut

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

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

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

M	Cutting mode
1, 49	Partial cut
65,66	Feeds paper ([n × (vertical motion unit) inches]) and cuts the paper partially.

- This command is effective only processed at the beginning of a line.
- When m = 0,48,1,49, the printer cuts the paper directly.
- When m = 65,66, the printer feeds the paper (the distance from printing position to cutter+ [n × vertical motion unit]) and then cuts it.
- The paper feed amount is calculated using the vertical motion unit (y).

Buzzer related commands

58、ESC B Beeps the buzzer when orders coming

[Format]	ASCII	ESC	B	n	t
	Hex	1B	42	n	t
	Decimal	27	66	n	t

[Range] $1 \leq n \leq 9$, $1 \leq t \leq 9$

[Description] Beep the buzzer.

- n specifies the times of beeping.
- t specifies the beeping cycle time (t × 50)ms

59、ESC C Beeps the buzzer and flashes alarm light when orders coming

[Format]	ASCII	ESC	C	m	t	n
	Hex	1B	43	m	t	n
	Decimal	27	67	m	t	n

[Range] $1 \leq m \leq 20, 1 \leq t \leq 20, 0 \leq n \leq 3$

[Description] Beep the buzzer and alarm light flashes when orders coming.

- m: specifies the times of beeping or alarm light flashes.
- t: specifies the beeping cycle time ($t \times 50$)ms or alarm light flashing cycle time ($t \times 50$)ms.

When $n=0$, no beeps, and no flashes.

When $n=1$, beeps

When $n=2$, flashes.

When $n=3$, beeps and flashes.

Ethernet printer status detection commands

NOTE: When transmitting Hex 1B 76 command to the printer, please set 4000 for TCP protocol purpose port (9100 for transmitting print data port).

60、ESC v Ethernet printer status detection

[Format] ASCII ESC v
 Hex 1B 76
 Decimal 27 118

[Description] Printer returns four bytes of status back to host. Status data as follows:

The first byte (Printer status)

Bit	OFF/ON	Hex	Decimal	ASB Status
0,1	OFF	00	0	Not used. 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	Printer online
	ON	08	8	Printer offline
4	ON	10	16	Not used. 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 using the paper FEED button
	ON	40	64	Paper is being fed by using the paper FEED button
7	OFF	00	0	Not used. Fixed to Off.

The second byte (Printer status)

Bit	OFF/ON	Hex	Decimal	ASB Status
0-2	-	-	-	Undefined.
3	OFF	00	0	No auto-cutter error.
	ON	08	8	Auto-cutter error occurs.
4	OFF	00	0	Not used. Fixed to Off.
5	OFF	00	0	No unrecoverable error.
	ON	20	32	Unrecoverable error has occurred.
6	OFF	00	0	No recoverable error.
	ON	40	64	Recoverable error has occurred.
7	OFF	00	0	Not used. Fixed to Off.

The third byte (Paper sensor status)

Bit	OFF/ON	Hex	Decimal	ASB Status
0, 1	OFF	00	0	Paper near end no detection
	ON	03	3	Paper near end.
2,3	OFF	00	0	Paper adequate.
	ON	0C	12	Paper end.
4	OFF	00	0	Not used. Fixed to Off.
5, 6	-	-	-	Undefined.
7	OFF	00	0	Not used. Fixed to Off.

The fourth byte (Paper sensor status)

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

QR code commands

61、(K< Function 167> 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≤9								
[Default]	n=3								
[Description]	Set the size of the module for QR Code to n dots.								
[Details]									

- Settings of this function are effective until **ESC @** is executed, the printer is reset, or the power

is turned off.

- n = width of a module = height of a module. (Because the QR code modules are square.)

62、(K< Function 169> 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]	Select 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				

[Details] Settings of this function are effective until **ESC @** is executed, or the power is turned off, the printer will be reset.

63、(K< Function 180> QR Code: Store the data in the symbol storage area

[Format]	ASCII	GS	(	K	pL	pH	cn	fn	m	d1...dk
	Hex	1D	28	6B	pL	pH	31	50	30	d1...dk
	Decimal	29	40	107	pL	pH	49	80	48	d1...dk
[Range]	4≤(pL+pH×256)≤7092 (0≤pL≤255,0≤pH≤27)									
	cn=49									
	fn=80									
	m=48									
[Description]	k=(pL+pH×256)-3									
	Store the QR Code symbol data (d1...dk) in the symbol storage area.									

[Details]

- Store the QR code symbol data into the printer.
- Settings of this function are effective until **ESC @** is executed, or the power is turned off, the printer will be reset.

64、(K< Function 181> QR Code: Print the symbol data in the symbol storage area

[Format]	ASCII	GS	(	K	pL	pH	cn	fn	m
	Hex	1D	28	6B	03	00	31	51	30

	Decimal	29	40	107	3	0	49	81	48
[Range]	(pL+pH×256)=3 (pL=3,pH=0)								
	cn=49								
	fn=81								
	m=48								
[Description]	Encodes and prints the QR Code symbol data in the symbol storage area using the process of (K< Function 180).								

[Example]

Prints QRcode for “Gprinter”.

1. Set the size of module to 5 (default 3) according to (K< Function 167) .

Transmit: **0x1d 0x28 0x6b 0x03 0x00 0x31 0x43 0x05**,

2. Stores “Gprinter” QR Code symbol data in the symbol storage area according to (K< Function 180)

Transmit: **0x1d 0x28 0x6b 0x0b 0x00 0x31 0x50 0x30 0x47 0x70 0x72 0x69 0x6e 0x74 0x65 0x72** (ASCII Hex data corresponds to “Gprinter” which has 8 characters, so k=8)

3. Print QRCode

Transmit: **0x1d 0x28 0x6b 0x03 0x00 0x31 0x51 0x30**

APPENDIX A: CODE128 BAR CODE

A.1 Description of the CODE128 Bar Code

In CODE128 bar code system, it is possible to represent 128 ASCII characters and 100 numbers from 00 to 99 and some special characters to code using 3 code sets. Each code set is used for representing the following characters:

- Code set A: ASCII characters 00H to <5F>H
- Code set B: ASCII characters 20H to <7F>H
- Code set C: 2-digit numeral characters (100 numerals from 00 to 99)

The following special characters are also available in CODE128:

- SHIFT characters

In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as the character for code set A. SHIFT characters cannot be used in code set C.

- Code set selection character (CODE A, CODE B, CODE C)

This character switches the following code set to code set A, B, or C.

- Function character (FNC1, FNC2, FNC3, FNC4)

The usage of function characters depends on the application software. In code set C, only FNC1 is available.

A.2 Code Set

Numerical value		Special Character		
Decimal	Hex	CODE A	CODE B	CODE C
123,49	7B,31	FNC1	FNC1	FNC1
123,50	7B,32	FNC2	FNC2	
123,51	7B,33	FNC3	FNC3	
123,52	7B,34	FNC4	FNC4	
123,65	7B,41		CODE A	CODE A
123,66	7B,42	CODE B		CODE B
123,67	7B,43	CODE C	CODE C	
123,83	7B,53	SHIFT	SHIFT	

Numerical value		Character			Numerical value		Character		
Decimal	Hex	CODE A	CODE B	CODE C	Decimal	Hex	CODE A	CODE B	CODE C
0	00	NUL		00	66	42	B	B	66
1	01	SOH		01	67	43	C	C	67
2	02	STX		02	68	44	D	D	68
3	03	ETX		03	69	45	E	E	69
4	04	EOT		04	70	46	F	F	70
5	05	ENQ		05	71	47	G	G	71
6	06	ACK		06	72	48	H	H	72
7	07	BEL		07	73	49	I	I	73
8	08	BS		08	74	4A	J	J	74
9	09	HT		09	75	4B	K	K	75
10	0A	LF		10	76	4C	L	L	76
11	0B	VT		11	77	4D	M	M	77
12	0C	FF		12	78	4E	N	N	78
13	0D	CR		13	79	4F	O	O	79
14	0E	SO		14	80	50	P	P	80
15	0F	SI		15	81	51	Q	Q	81
16	10	DLE		16	82	52	R	R	82
17	11	DC1		17	83	53	S	S	83
18	12	DC2		18	84	54	T	T	84
19	13	DC3		19	85	55	U	U	85
20	14	DC4		20	86	56	V	V	86
21	15	NAK		21	87	57	W	W	87
22	16	SYN		22	88	58	X	X	88
23	17	ETB		23	89	59	Y	Y	89
24	18	CAN		24	90	5A	Z	Z	90
25	19	EM		25	91	5B	[	[	91
26	1A	SUB		26	92	5C	\	\	92
27	1B	ESC		27	93	5D	]	]	93
28	1C	FS		28	94	5E	^	^	94

29	1D	GS		29	95	5F	—	—	95
30	1E	RS		30	96	60		,	96
31	1F	US		31	97	61		a	97
32	20	SP	SP	32	98	62		b	98
33	21	!	!	33	99	63		c	99
34	22	"	"	34	100	64		d	
35	23	#	#	35	101	65		e	
36	24	\$	\$	36	102	66		f	
37	25	%	%	37	103	67		g	
38	26	&	&	38	104	68		h	
39	27	'	'	39	105	69		i	
40	28	(	(	40	106	6A		j	
41	29	)	)	41	107	6B		k	
42	2A	*	*	42	108	6C		l	
43	2B	+	+	43	109	6D		m	
44	2C	,	,	44	110	6E		n	
45	2D	-	-	45	111	6F		o	
46	2E	.	.	46	112	70		p	
47	2F	/	/	47	113	71		q	
48	30	0	0	48	114	72		r	
49	31	1	1	49	115	73		s	
50	32	2	2	50	116	74		t	
51	33	3	3	51	117	75		u	
52	34	4	4	52	118	76		v	
53	35	5	5	53	119	77		w	
54	36	6	6	54	120	78		x	
55	37	7	7	55	121	79		y	
56	38	8	8	56	122	7A		z	
57	39	9	9	57	123	7B		{	
58	3A	:	:	58	124	7C			
59	3B	;	;	59	125	7D		}	
60	3C	<	<	60	126	7E		~	
61	3D	=	=	61	127	7F		DEL	
62	3E	>	>	62					
63	3F	?	?	63					
64	40	@	@	64					
65	41	A	A	65					