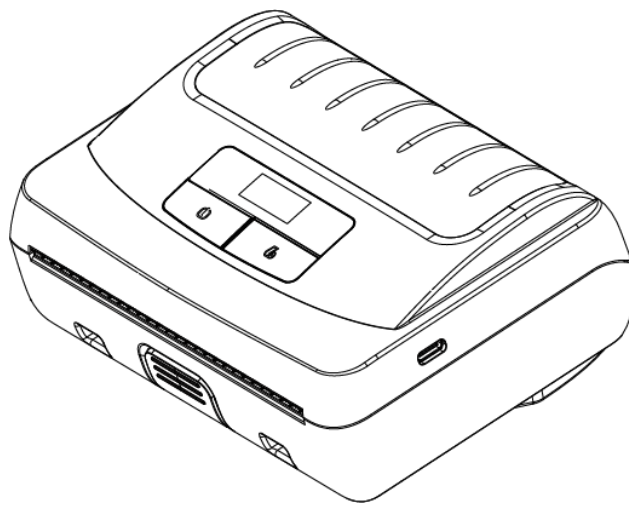


HM-A400

ESC/POS

Programming Manual



(Rev.1.0)

About This Manual

Please read this technical manual before programming.

Main description for command as below:

1) Function

This is the first part of command description. Here we propose the command of ASCII code and its function.

2) Format

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

3) Range

The range of the variable

The range value is default as decimal digit. For example, $1 \leq n \leq 4$, "1" and "4" are decimal digits.

4) Description

Detailed illustration for the command

5) Note

Different mode must be with different command. This part explains the interaction details in different mode.

6) Reference

Other commands which are interrelated or similar with this.

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1 Bit Image Commands

ESC * m nL nH d1...dk

[Function] 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
 $1 \leq (nL + nH \times 256) \leq 2047$
 $(0 \leq nL \leq 255, 0 \leq nH \leq 7)$
 $0 \leq d \leq 255$
 $k = nL + nH \times 256$ [when m = 0, 1]
 $k = (nL + nH \times 256) \times 3$ [when m = 32, 33]

[Description] • Stores the bit image data in the print buffer using the bit image mode specified by m.

m	Bit image mode	Vertical direction	Horizontal direction
0	8 dots single-density	68 dpi	101 dpi
1	8 dots dual-density	68 dpi	203 dpi
32	24-dot single-density	203 dpi	101 dpi
33	24-dot double-density	203 dpi	203 dpi

- nL, nH specifies the number of dots of the image data in the horizontal direction as (nL + nH × 256).
- d specifies the bit image data (column format).

GS * x y d1...dk

[Function] 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] $1 \leq x \leq 255$
 $1 \leq y \leq 48$ [where $1 \leq x \times y \leq 1536$]
 $0 \leq d \leq 255$
 $k = x \times y \times 8$

[Description] • Defines the downloaded bit image in the downloaded graphic area.
 • x specifies the number of bytes in the horizontal direction as x bytes.
 • y specifies the number of bytes in the vertical direction as y bytes.
 • d specifies the defined data (column format).

[Note] • A downloaded bit image and user-defined characters(ESC &) cannot be defined simultaneously. When this command is executed, all user-defined characters are deleted.

GS / m**[Function]** 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]** Prints downloaded bit image defined by GS * and using the mode specified by m.

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

GS 8 L**[Function]** Set graphics data

[Format] ASCII GS 8 L p1 p2 p3 p4 m fn [parameters]
 Hex 1D 38 4C p1 p2 p3 p4 m fn [parameters]
 Decimal 29 56 76 p1 p2 p3 p4 m fn [parameters]

[Description]

- In the description below, only GS (L is used for explanation).
- Note that GS (L and GS 8 L have the same function).
- If the [parameters] in the Format column in the table below exceed 65533 bytes, use GS 8 L.
- The only differences between GS (L and GS 8 L are as listed below. The format for GS 8 L is not provided in the following descriptions; however, [Range], [Default], [Description], and [Notes] for parameters other than those listed in the table below are the same as for GS (L. <Parameters specifying the number of parameters after pH or p4>

Command	Parameters	Structure	Maximum value
GS (L	pL, pH	2 bytes	65,535
GS 8 L	p1, p2, p3, p4	4 bytes	4,294,967,295

- Processes graphics data.
- pL, pH specify (pL + pH × 256) as the number of bytes after pH (m, fn, and [parameters]).
- fn specifies the function.
- [parameters] specify the process of each function.

GS (L pL pH m fn [parameters])

[Format]	ASCII	GS	(	L	pL	pH	m	fn	[parameters]
	Hex	1D	28	4C	pL	pH	m	fn	[parameters]
	Decimal	29	40	76	pL	pH	m	fn	[parameters]

fn	Format	Function No.	Function name
0, 48	GS (L pL pH m fn	48	Transmit the NV graphics memory capacity
2, 50	GS (L pL pH m fn	50	Print the graphics data in the print buffer
3, 51	GS (L pL pH m fn	51	Transmit the remaining capacity of the NV graphics memory
64	GS (L pL pH m fn d1 d2	64	Transmit the key code list for defined NV graphics
65	GS (L pL pH m fn d1 d2 d3	65	Delete all NV graphics data
66	GS (L pL pH m fn kc1 kc2	66	Delete the specified NV graphics data
67	GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1... [c d1...dk]b	67	Define the NV graphics data (raster format)
69	GS (L pL pH m fn kc1 kc2 x y	69	Print the specified NV graphics data
112	GS (L pL pH m fn a bx by c xL xH yL yH d1...dk	112	Store the graphics data in the print buffer (raster format)

[Note]

- Frequent write command executions by an NV memory write command may damage the NV memory.

Therefore, it is recommended to limit writing the commands into the NV memory to less than 10 times a day.

- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands, while the printer is BUSY.
- When <Function 48, 51, or 64> is transmitted, do not transmit the subsequent data until the status is received. ESC/POS Handshaking Protocol procedures are required when using <Function 64>.

Transmit the NV graphics memory capacity

[Format]	ASCII	GS	(	L	pL	pH	m	fn
	Hex	1D	28	4C	pL	pH	m	fn
	Decimal	29	40	76	pL	pH	m	fn
[Range]	$(pL + pH \times 256) = 2$ (pL = 2, pH = 0)							
	m = 48							
	fn = 0, 48							
[Description]	Transmit the entire capacity of the NV graphics area (number of bytes in the NV graphics area).							

<Function 50> GS (L pL pH m fn (fn = 2, 50)

[Function]	Print the graphics data in the print buffer							
[Format]	ASCII	GS	(	L	pL	pH	m	fn
	Hex	1D	28	4C	pL	pH	m	fn
	Decimal	29	40	76	pL	pH	m	fn
[Range]	$(pL + pH \times 256) = 2$ (pL = 2, pH = 0)							
	m = 48							
	fn = 2, 50							
[Description]	Prints the buffered graphics data stored by processing of GS (L <Function 112>.							

<Function 51> GS (L pL pH m fn (fn = 3, 51)

[Function]	Transmit the remaining capacity of the NV graphics memory							
[Format]	ASCII	GS	(	L	pL	pH	m	fn
	Hex	1D	28	4C	pL	pH	m	fn
	Decimal	29	40	76	pL	pH	m	fn
[Range]	$(pL + pH \times 256) = 2$ (pL = 2, pH = 0)							
	m = 48							
	fn = 3, 51							
[Description]	Transmit the number of bytes of remaining memory (unused area) in the NV graphics area.							

<Function 64> GS (L pL pH m fn d1 d2 (fn = 64)

[Function]	Transmit the key code list for defined NV graphics							
[Format]	ASCII	GS	(	L	pL	pH	m	fn d1 d2
	Hex	1D	28	4C	pL	pH	m	fn d1 d2
	Decimal	29	40	76	pL	pH	m	fn d1 d2
[Range]	$(pL + pH \times 256) = 4$ (pL = 4, pH = 0)							
	m = 48							
	fn = 64							
	d1 = 75							
	d2 = 67							
[Description]	Transmit the key code list for defined NV graphics.							

<Function 65> GS (L pL pH m fn d1 d2 d3 (fn = 65)**[Function]** Delete all NV graphics data

[Format] ASCII GS (L pL pH m fn d1 d2 d3
 Hex 1D 28 4C pL pH m fn d1 d2 d3
 Decimal 29 40 76 pL pH m fn d1 d2 d3

[Range] $(pL + pH \times 256) = 5$ ($pL = 5, pH = 0$)
 $m = 48$
 $fn = 65$
 $d1 = 67$
 $d2 = 76$
 $d3 = 82$

[Description] Delete all NV graphics data.**<Function 66> GS (L pL pH m fn kc1 kc2 (fn = 66)****[Function]** Delete the specified NV graphics data

[Format] ASCII GS (L pL pH m fn kc1 kc2
 Hex 1D 28 4C pL pH m fn kc1 kc2
 Decimal 29 40 76 pL pH m fn kc1 kc2

[Range] $(pL + pH \times 256) = 4$ ($pL = 4, pH = 0$)
 $m = 48$
 $fn = 66$
 $32 \leq kc1 \leq 126$
 $32 \leq kc2 \leq 126$

[Description] Delete the NV graphics data defined by the key codes (kc1 and kc2).

<Function 67> GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b (fn = 67)**[Function]** 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 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal 29 40 76 pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

[Range] (pL, pH) for GS (L: $12 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255$, $0 \leq pH \leq 255$)
(p1, p2, p3, p4) for GS 8 L:

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

$$(0 \leq p1 \leq 255, 0 \leq p2 \leq 255, 0 \leq p3 \leq 255, 0 \leq p4 \leq 255)$$

Common parameters for GS (L and GS 8 L:

$$m = 48$$

$$fn = 67$$

$$a = 48$$

$$32 \leq kc1 \leq 126$$

$$32 \leq kc2 \leq 126$$

b = 1 [when single-color print control is selected]

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

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

c = 49 [when single-color print control is selected]

$$0 \leq d \leq 255$$

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

The entire capacity size = 256 KB maximum.

- [Description]**
- Defines the NV graphics data (raster format) as a record specified by the key codes (kc1, kc2) in the NV graphics area.
 - b specifies the number of the color of the defined data.
 - xL, xH specify the number of dots in the horizontal direction as $(xL + xH \times 256)$.
 - yL, yH specify the number of dots in the vertical direction as $(yL + yH \times 256)$.
 - c specifies the color of the defined data.

c	Defined data color (*)
49	Color 1
50	Color 2

- [Notes]**
- d specifies the defined data (raster format).
 - In cases where there is sufficient capacity is not available for storing NV graphics data specified by $(xL + xH \times 256)$ and $(yL + yH \times 256)$, this function is ignored.
 - The [data value (k) + control information data value (24 bytes)] area of the NV graphics data domain is used when this function is executed.
 - NV graphics and NV bit image (FS q) cannot be defined simultaneously. When this function is executed, all NV bit images are deleted.

<Function 69> GS (L pL pH m fn kc1 kc2 x y (fn = 69)**[Function]** Print the specified NV graphics data

[Format] ASCII GS (L pL pH m fn kc1 kc2 x y
 Hex 1D 28 4C pL pH m fn kc1 kc2 x y
 Decimal 29 40 76 pL pH m fn kc1 kc2 x y

[Range] (pL + pH × 256) = 6 (pL = 6, pH = 0)
 m = 48
 fn = 69
 $32 \leq kc1 \leq 126$
 $32 \leq kc2 \leq 126$
 x = 1, 2
 y = 1, 2

[Description]

- Prints the NV graphics data defined by the key codes (kc1 and kc2).
- The graphics data is enlarged by x and y in the horizontal and vertical directions.

x, y	Vertical direction	Horizontal direction
1	203 dpi	203 dpi
2	101 dpi	101 dpi

<Function 112> GS (L pL pH m fn a bx by c xL xH yL yH d1...dk (fn = 112)**[Function]** 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 m fn a bx by c xL xH yL yH d1...dk
Decimal 29 40 76 pL pH m fn a bx by c xL xH yL yH d1...dk

[Range] (pL, pH) for GS (L:

$$11 \leq (pL + pH \times 256) \leq 65535 \quad (0 \leq pL \leq 255, 0 \leq pH \leq 255)$$

(p1, p2, p3, p4) for GS 8 L:

$$11 \leq (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leq 4294967295$$

$$(0 \leq p1 \leq 255, 0 \leq p2 \leq 255, 0 \leq p3 \leq 255, 0 \leq p4 \leq 255)$$

Common parameters for GS (L and GS 8 L:

$$m = 48$$

$$fn = 112$$

$$a = 48$$

$$bx = 1, 2; by = 1, 2$$

$$c = 49 \quad [\text{when single-color print control is selected}]$$

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

When single-color print control is selected

$$1 \leq (yL + yH \times 256) \leq 1662 \quad (0 \leq yL \leq 255, 0 \leq yH \leq 6) \quad [\text{when } by=1]$$

$$1 \leq (yL + yH \times 256) \leq 831 \quad (0 \leq yL \leq 255, 0 \leq yH \leq 3) \quad [\text{when } by=2]$$

When two-color print control is selected

$$1 \leq (yL + yH \times 256) \leq 831 \quad (0 \leq yL \leq 255, 0 \leq yH \leq 3) \quad [\text{when } by=1]$$

$$1 \leq (yL + yH \times 256) \leq 415 \quad (0 \leq yL \leq 255, yH = 0, 1) \quad [\text{when } by=2]$$

$$0 \leq d \leq 255$$

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

[Description]

- Stores the graphics data (raster format) in the print buffer.
- The graphics data is enlarged by bx and by in the horizontal and vertical directions.

bx, by	Vertical direction	Horizontal direction
1	203 dpi	203 dpi
2	101 dpi	101 dpi

- c specifies the color for the stored data.
- xL, xH specify the number of dots in the horizontal direction as $(xL + xH \times 256)$.
- yL, yH specify the number of dots in the vertical direction as $(yL + yH \times 256)$.
- d specifies the stored data (raster format).

2 Print Position Commands

HT

[Function] Horizontal Tabs

[Format]

ASCII	HT
Hex	09
Decimal	9

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

ESC \$ nL nH

[Function] Set absolute print position

[Format]

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

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

[Description] Moves the print position to $[(nL + nH \times 256) \times (\text{horizontal or vertical motion unit})]$ from the left edge of the print area.

ESC T n

[Function] Select print direction in page mode

[Format]

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

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

[Default] $n = 0$

[Description] In page mode, selects the print direction and starting position.

n	Print direction	Starting position
0, 48	Left to right	Upper left
1, 49	Bottom to top	Lower left
2, 50	Right to left L	Lower right
3, 51	Top to bottom	Upper right

GS \$ nL nH

[Function] Set absolute vertical print position in page mode

[Format]

ASCII	GS	\$	nL	nH
Hex	1D	24	nL	nH
Decimal	29	36	nL	nH

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

[Description] In page mode, moves the vertical print position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ from the starting position set with **ESC T**.

ESC \ nL nH**[Function]** Set relative print position

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

[Range] $-32768 \leq (nL + nH \times 256) \leq 32767$

[Description]

- Moves the print position to $[(nL + nH \times 256) \times (\text{horizontal or vertical motion unit})]$ from the current position.
- A positive number specifies movement to the right, and a negative number specifies movement to the left.

ESC W xL xH yL yH dxL dxH dyL dyH**[Function]** Set print area in page mode

[Format]	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] $0 \leq (xL + xH \times 256) \leq 65535$; $(0 \leq xL \leq 255, 0 \leq xH \leq 255)$ $0 \leq (yL + yH \times 256) \leq 65535$; $(0 \leq yL \leq 255, 0 \leq yH \leq 255)$ $1 \leq (dxL + dxH \times 256) \leq 65535$; $(0 \leq dxL \leq 255, 0 \leq dxH \leq 255)$ $1 \leq (dyL + dyH \times 256) \leq 65535$; $(0 \leq dyL \leq 255, 0 \leq dyH \leq 255)$ **[Default]** $(xL + xH \times 256) = 0$ ($xL = 0, xH = 0$) $(yL + yH \times 256) = 0$ ($yL = 0, yH = 0$) $(dxL + dxH \times 256) = 576$ ($dxL = 0, dxH = 2$)

[80 mm paper width model]

 $(dxL + dxH \times 256) = 384$ ($dxL = 104, dxH = 4$)

[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.
- xL, xH specify the horizontal logical origin as $[(xL + xH \times 256) \times (\text{horizontal motion unit})]$ from absolute origin.
- yL, yH specify the vertical logical origin as $[(yL + yH \times 256) \times (\text{vertical motion unit})]$ from absolute origin.
- dxL, dxH specify the horizontal dimension of print area as $[(dxL + dxH \times 256) \times (\text{horizontal motion unit})]$.
- dyL, dyH specify the vertical dimension of print area as $[(dyL + dyH \times 256) \times (\text{vertical motion unit})]$.

[Note] When single-color print control is selected, the vertical dimension of the print area can be set to 207.95 mm {3324/360"} maximum.

ESC a n**[Function]** Select justification

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

[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$ **[Default]** $n = 0$ **[Description]** In standard mode, aligns all the data in one line to the selected layout.

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

GS T**[Function]** 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

[Note]

- In page mode, this command is ignored.
- This command is ignored if the print position is already the beginning of the line.
- If the print position is not set to the beginning of the line, when $n=1,49$, this command functions the same as LF.
- Setting values of each command, definitions, and receive buffer content are not changed.
- By processing this command, the print position moves to the left of the print area. The printer will be in the beginning of the line and data will not be in the print buffer.
- When using commands that are enabled only at the beginning of the line, these commands are sure to be executed if GS T is used immediately before using those commands.

ESC D n1...nk NUL

[Function]	Setting horizontal tab position				
[Format]	ASCII	ESC	D	n1 ...nk	NUL
	Hex	1B	44	n1 ...nk	00
	Decimal	27	68	n1 ...nk	0
[Range]	$1 \leq n1 \leq n2 \leq \dots \leq nk \leq 255$				
	$0 \leq k \leq 32$				
[Default]	n = 8, 16, 24, 32, 40, ..., 232, 240, 248 [for Font A (12 × 24) in a standard character size width]				
[Description]	• Sets horizontal tab positions. • n specifies the number of digits from the setting position to the left edge of the print area. • k is used to indicate the number of bytes set for the horizontal tab position.				

GS L nL nH

[Function]	Set left margin				
[Format]	ASCII	GS	L	nL nH	
	Hex	1D	4C	nL nH	
	Decimal	29	76	nL nH	
[Range]	$0 \leq (nL + nH \times 256) \leq 65535$ ($0 \leq nL \leq 255, 0 \leq nH \leq 255$)				
[Default]	$(nL + nH \times 256) = 0$ ($nL = 0, nH = 0$)				
[Description]	In standard mode, sets the left margin to $[(nL + nH \times 256) \times (\text{horizontal motion unit})]$.				

GS W nL nH

[Function]	Set print area width				
[Format]	ASCII	GS	W	nL nH	
	Hex	1D	57	nL nH	
	Decimal	29	87	nL nH	
[Range]	$0 \leq (nL + nH \times 256) \leq 65535$ ($0 \leq nL \leq 255, 0 \leq nH \leq 255$)				
[Default]	$(nL + nH \times 256) = 576$ ($nL = 40, nH = 2$) [80 mm paper width model]				
	$(nL + nH \times 256) = 406$ ($nL = 80, nH = 1$) [58 mm paper width model]				
[Description]	In standard mode, sets the print area width to $[(nL + nH \times 256) \times (\text{horizontal motion unit})]$.				

GS \ nL nH

[Function]	Set relative vertical print position in page mode				
[Format]	ASCII	GS	\	nL nH	
	Hex	1D	5C	nL nH	
	Decimal	29	92	nL nH	
[Range]	$-32768 \leq (nL + nH \times 256) \leq 32767$				
[Description]	• In page mode, moves the vertical print position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ from the current position. • A positive number specifies downward movement, and a negative number specifies upward movement.				

3 Print Commands

LF

[Function]	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.	

FF (In page mode)

[Function]	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.	

ESC FF

[Function]	Print data in page mode		
[Format]	ASCII	ESC	FF
	Hex	1B	0C
	Decimal	27	12
[Description]	In page mode, prints all the data in the print buffer collectively.		

ESC J n

[Function]	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 [$n \times$ (vertical or horizontal motion unit)].		
[Note]	The maximum paper feed amount is 1016 mm {40"}.		

ESC d n

[Function]	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 the paper [$n \times$ (current line spacing)].		
[Note]	The maximum paper feed amount is 1016 mm {40"}.		

4 Miscellaneous Function Commands

DLE DC4 fn a b (fn = 2)

[Function] Execute power-off sequence

[Format]

ASCII	DLE DC4	fn	a	b
Hex	10 14	fn	a	b
Decimal	16 20	fn	a	b

[Range]

fn = 2

a = 1

b = 8

[Description]

- Executes the printer power-off sequence and transmits the power-off notice.
- Stores the values of the maintenance counter.
- Sets the interface to BUSY.
- Sets the printer to standby mode.

[Note] Take the following into consideration:

- If the received data includes a data string matching this command, the printer performs the command. Users must consider this. Example: Graphic data might accidentally include a data string matching this command.
- Do not embed this command within another command. Example: Graphic data might include this command.
- This command does not shut the power off. The operator must turn the power off after receiving the power-off notice.
- If this command is executed, the printer will not continue to process anything. To recover the printer to print again, it is necessary to turn the power on again or execute a hardware reset.

DLE DC4 fn d1...d7 (fn = 8)

[Function] Clear buffer(s)

[Format]

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

- If a recoverable error occurs, recovers from the error.

[Note]

- Take the following into consideration:
- If the received data includes a data string matching this command, the printer performs the command. Users must consider this. Example: Graphic data might accidentally include a data string matching this command.
- Do not embed this command within another command. Example: Graphic data might include this command.
- Do not transmit the subsequent data until the status is received after transmitting this command.

ESC @**[Function]** Initialize printer

[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description]

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

Keeps the following data:

- Macro definition data.
- Contents stored in the NV user memory.
- Contents defined for the NV graphics (NV bit image).
- Maintenance counter value.
- Setting value specified with GS (E).

ESC = n**[Function]** Select peripheral device

[Format]

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

[Range] $0 \leq n \leq 255$ **[Default]** $n = 1$ **[Description]**

- Selects the device to which the host computer transmits data.

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

- When the printer is disabled ($n = 2$), all data except this command and the real-time commands are ignored.

ESC S**[Function]** Select standard mode

[Format]

ASCII	ESC	S
Hex	1B	53
Decimal	27	83

[Description] Switches from page mode to standard mode**ESC L****[Function]** Select page mode

[Format]

ASCII	ESC	L
Hex	1B	4C
Decimal	27	76

[Description] Switches from standard mode to page mode

ESC p m t1 t2**[Function]** Generate pulse

[Format] ASCII ESC p m t1 t2
 Hex 1B 70 m t1 t2
 Decimal 27 112 m t1 t2

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

0 ≤ t1 ≤ 255

0 ≤ t2 ≤ 255

[Description] • Outputs the pulse specified by t1 and t2 to connector pin m.

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

• t1 specifies the pulse on time as [t1 × 2 ms].

• t2 specifies the pulse off time as [t2 × 2 ms].

[Note] Specify a value (t1 < t2) so that the off time is longer than the on time.**GS I n****[Function]** Transmit printer ID

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

[Range] n = 1, 2, 49, 50 [the printer ID]
 65 ≤ n ≤ 69 [printer information B]

[Description] • Transmits the printer ID or the information of the printer specified.
 • The printer IDs that can be specified are as follows:

n	Type of printer ID	ID
1,49	Printer model ID	Hexadecimal: 20 / Decimal: 32
2,50	Type ID	See table [Type ID].

• The information B that can be specified is as follows:

n	Type of printer information	Content
65	Firmware version	Depends on firmware version.
66	Manufacturer	HPRT
67	Printer name	HM-A400
68	Product ID	Serial number.
69	Type of mounted additional fonts	Japanese model: "KANJI JAPANESE"
		Simplified Chinese model: "CHINA GB18030"
		traditional Chinese model: "TAIWAN BIG-5"

[Note] When this command is transmitted, do not transmit the subsequent data until the status is received.

GS P x y**[Function]** Set horizontal and vertical motion units

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

[Range] $0 \leq x \leq 255$ $0 \leq y \leq 255$ **[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.

GS (D pL pH m [a1 b1]...[ak bk])**[Function]** Enable/disable real-time command

[Format] ASCII GS (D pL pH m [a1 b1]...[ak bk]
 Hex 1D 28 44 pL pH m [a1 b1]...[ak bk]
 Decimal 29 40 68 pL pH m [a1 b1]...[ak bk]

[Range] $3 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255, 0 \leq pH \leq 255$)
 $m = 20$

 $a = 1, 2$ $b = 0, 1, 48, 49$ **[Default]** $b = 1$ [when $a = 1$] $b = 0$ [when $a = 2$]

[Description]

- Enables or disables the real-time command specified by a.
- pL, pH specify $(pL + pH \times 256)$ as the number of bytes after pH (m and [a1 b1]...[ak bk]).

a	b	Function
1	0,48	DLE DC4 fn m t (fn = 1): Not processed (disabled).
	1,49	DLE DC4 fn m t (fn = 1): Processed (enabled).
2	0,48	DLE DC4 fn a b (fn = 2): Not processed (disabled).
	1,49	DLE DC4 fn a b (fn = 2): Processed (enabled).

[Note] If graphics data includes a data string matching DLE DC4 (fn = 1 or 2), it is recommended to use this command in advance to disable the real-time commands.

GS (E pL pH fn [parameters])(Only support the version which is after 1.02.18)**[Function]** Set user setup commands

[Description]

- Controls the user setting modes.
- pL, pH specify $(pL + pH \times 256)$ as the number of bytes after pH (fn and [parameters]).
- fn specifies the function.
- [parameters] specify the process of each function.

fn	Format	Function No.	Function name
1	GS (E pL pH fn d1 d2	1	Change into the user setting mode.
2	GS (E pL pH fn d1 d2 d3	2	End the user setting mode session.
5	GS (E pL pH fn [a1 n1L n1H] ... [ak nkL nkH]	5	Set the customized setting values.
6	GS (E pL pH fn a	6	Transmit the customized setting values.

[Note]

- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to limit writing the commands into the NV memory to less than 10 times a day.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being

executed.

- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands, while the printer is BUSY.
- When <Function 1, 6, or 12> is transmitted, the data following must not be transmitted until the status is received.

<Function 1> GS (E pL pH fn d1 d2 (fn = 1)

[Function] Change into the user setting mode

[Format]

ASCII	GS	(	E	pL	pH	fn	d1	d2
Hex	1D	28	45	pL	pH	fn	d1	d2
Decimal	29	40	69	pL	pH	fn	d1	d2

[Range] (pL + pH × 256) = 3 (pL = 3, pH = 0)
 fn = 1
 d1 = 73
 d2 = 78

[Description] Enters the user setting mode and transmits a mode change notice.

<Function 2>GS (E pL pH fn d1 d2 d3 (fn = 2)

[Function] End the user setting mode session

[Format]

ASCII	GS	(	E	pL	pH	fn	d1	d2	d3
Hex	1D	28	45	pL	pH	fn	d1	d2	d3
Decimal	29	40	69	pL	pH	fn	d1	d2	d3

[Range] (pL + pH × 256) = 4 (pL = 4, pH = 0)
 fn = 2
 d1 = 79
 d2 = 85
 d3 = 84

[Description]

- Ends the user setting mode and performs a software reset.
- Clears the receive and print buffers.
- Resets all setting values in RAM (the print area, the character styles, and others) that were in effect at power on. (The data in the NV memory are not reset.)

<Function 5>GS (E pL pH fn [a1 n1L n1H]...[ak nkL nkH] (fn = 5)**[Function]** Set the customized setting values

[Format] ASCII GS (E pL pH fn [a1 n1L n1H] ... [ak nkL nkH]
 Hex 1D 28 45 pL pH fn [a1 n1L n1H] ... [ak nkL nkH]
 Decimal 29 40 69 pL pH fn [a1 n1L n1H] ... [ak nkL nkH]

[Range] $4 \leq (pL + pH \times 256) \leq 65533$ ($0 \leq pL \leq 255$, $0 \leq pH \leq 255$)

fn = 5; a = 5, 6, 97, 116, 118

 $0 \leq (nL + nH \times 256) \leq 6$, $(nL + nH \times 256) = 100$, $65530 \leq (nL + nH \times 256) \leq 65535$ $(0 \leq nL \leq 6, nH = 0, nL = 100, nH = 0, 250 \leq nL \leq 255, nH = 255)$ [when a = 5] $1 \leq (nL + nH \times 256) \leq 9$ ($1 \leq nL \leq 9, nH = 0$) [when a = 6] $(nL + nH \times 256) = 1, 2, 4, 128$ ($nL = 1, 2, 4, 128, nH = 0$) [when a = 97] $(nL + nH \times 256) = 1, 257$ ($nL = 1, nH = 0, 1$) [when a = 116] $(nL + nH \times 256) = 70, 85$ ($nL = 70, 85, nH = 0$) [when a = 118]**[Default (upon shipment)]** $(nL + nH \times 256) = 100$ ($nL = 100, nH = 0$) [when a = 5] $(nL + nH \times 256) = 9$ ($nL = 9, nH = 0$) [when a = 6] $(nL + nH \times 256) = 128$ ($nL = 128, nH = 0$) [when a = 97] $(nL + nH \times 256) = 1$ ($nL = 1, nH = 0$) [when a = 116] $(nL + nH \times 256) = 85$ ($nL = 85, nH = 0$) [when a = 118]**[Description]** • Sets the customized value specified by a to the values specified by $(nL + nH \times 256)$.

a	Type of customized value
3	Roll paper width
8	Default character code table
9	Default international character
100	Paper autocutting after closing the roll paper cover
101	(ARP)Enabling/disabling reduction of excessive top margin
102	(ARP)Enabling/disabling reduction of excessive bottom margin
103	(ARP)Reduction ratio of line spacing
104	(ARP)Reduction ratio of line spacing where extra line feeds are included

• Print density setting (a = 5)

$(nL + nH \times 256)$	Print density
100	Density level depending on the DIP switch settings
65530	Print density level 1. light
65531	Print density level 2.
65532	Print density level 3.
65533	Print density level 4.
65534	Print density level 5.
65535	Print density level 6.
0	Print density level 7. standard
1	Print density level 8.
2	Print density level 9.
3	Print density level 10.

4	Print density level 11	
5	Print density level 12	
6	Print density level 13	dark

• Print speed setting (a = 6)

(nL + nH × 256)	Print speed level	
1	Print speed level 1.	slow
2	Print speed level 2	
3	Print speed level 3	
4	Print speed level 4	
5	Print speed level 5	
6	Print speed level 6	
7	Print speed level 7	
8	Print speed level 8	
9	Print speed level 9	fast

• Number of division of thermal head energization setting (a = 97)

(nL + nH × 256)	Number of division of thermal head energization
1	One-part energization.
2	Two-part energization.
4	Four-part energization.
128	Automatic control of thermal head energization.

• Print control (single-color or two-color) (a = 116)

(nL + nH × 256)	Print control
1	Single-color print control.
257	Two-color print control.

(*) When "two-color print control" is selected, the use of single-color thermal paper is prohibited.

<Function 6> GS (E pL pH fn a (fn = 6)**[Function]** Transmit the customized setting values

[Format] ASCII GS (E pL pH fn a
 Hex 1D 28 45 pL pH fn a
 Decimal 29 40 69 pL pH fn a

[Range] $(pL + pH \times 256) = 2$ (pL = 2, pH = 0)
 fn = 6
 a = 5, 6, 97, 116, 118

[Description] Transmits the customized value specified by a.

a	Type of customized value
3	Roll paper width
8	Default character code table
9	Default international character
100	Paper autocutting after closing the roll paper cover
101	(ARP)Enabling/disabling reduction of excessive top margin
102	(ARP)Enabling/disabling reduction of excessive bottom margin
103	(ARP)Reduction ratio of line spacing
104	(ARP)Reduction ratio of line spacing where extra line feeds are included

<Function 11> GS (E pL pH fn a d1...dk (fn = 11)**[Function]** Set the configuration item for the serial interface

[Format] ASCII GS (E pL pH fn a d1 ... dk
 Hex 1D 28 45 pL pH fn a d1 ... dk
 Decimal 29 40 69 pL pH fn a d1 ... dk

[Range] $3 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255, 0 \leq pH \leq 255$)
 fn = 11
 a = 1
 $48 \leq d \leq 57$

[Default] d1...dk = "38400" (upon shipment)**[Description]** • Sets the configuration item for the serial interface specified by a to the values specified by d.

a	Configuration item
1	Transmission speed

- Transmission speed settings (a = 1)

d1...dk	Transmission speed
2400	2400 bps
4800	4800 bps
9600	9600 bps
19200	19200 bps
38400	38400 bps
57600	57600 bps
115200	115200 bps

- [Note]**
- The configuration item set by this function is enabled by executing GS (E <Function 2> or restarting the printer. Note that the host computer must be set to enable the printer to communicate with the host computer.

<Function 12> GS (E pL pH fn a (fn = 12)

[Function] Transmit the configuration item for the serial interface

[Format] ASCII GS (E pL pH fn a
Hex 1D 28 45 pL pH fn a
Decimal 29 40 69 pL pH fn a

[Range] (pL + pH × 256) = 2 (pL = 2, pH = 0)
fn = 12
a = 1

[Description] Transmits the configuration item for the serial interface specified by a.

a	Configuration item
1	Transmission speed

5 Character Control Commands

ESC ! n

[Function]	Select print mode(s)		
[Format]	ASCII	ESC !	n
	Hex	1B 21	n
	Decimal	27 33	n
[Range]	$0 \leq n \leq 255$		
[Default]	n = 0		
[Description]	Select the character font and styles (emphasized, double-height, double-width, and underlined) together.		

(n)Bit	Off/On	HEX	Decimal	Function
0	Off	00	0	Character font A (12 × 24) selected.
	On	01	1	Character font B (9 × 17) selected.
1,2	Off	00	0	Reserved.
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	Reserved.
7	Off	00	0	Underline mode is turned off.
	On	80	128	Underline mode is turned on.

ESC % n

[Function]	Select/cancel user-defined character set		
[Format]	ASCII	ESC %	n
	Hex	1B 25	n
	Decimal	27 37	n
[Range]	$0 \leq n \leq 255$		
[Default]	n = 0		
[Description]	• Select or cancel 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.		

ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]**[Function]** Define user-defined characters

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

[Range] y =3
 $32 \leq c1 \leq c2 \leq 126$
 $0 \leq x \leq 12$ [when Font A (12 × 24) is selected]
 $0 \leq x \leq 9$ [when Font B (9 × 17) is selected]
 $0 \leq d \leq 255$
 $k = c2 - c1 + 1$

[Description]

- Define the user-defined character pattern for the specified character code
- 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 edge.
- d specifies the defined data(column format).

[Note]

- User-defined characters and a downloaded bit image cannot be defined simultaneously.when this command is executed,the download bit image is deleted.

ESC ? n**[Function]** Cancel user-defined characters

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

[Range] $32 \leq n \leq 126$ **[Description]** • Deletes the user-defined character pattern specified by character code n.**ESC SP n****[Function]** Set right-side character spacing

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

[Range] $0 \leq n \leq 255$ **[Default]** n = 0**[Description]** Set the right-side character spacing to [n × (horizontal or vertical motion unit)].**[Note]** The maximum right-side spacing is 31.875 mm {255/203"}.**CAN****[Function]** 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.

ESC – n**[Function]** Turn underline mode on/off

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

[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$ **[Default]** $n = 0$ **[Description]** Turns underline mode on or off.

n	Function
0, 48	Turns off underline mode
1, 49	Turns on underline mode, set at 1-dot width.
2, 50	Turns on underline mode, set at 2-dot width

ESC E n**[Function]** Turn emphasized mode on/off

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

[Range] $0 \leq n \leq 255$ **[Default]** $n = 0$

[Description]

- Turns emphasized mode on or off.
- When the LSB of n is 0, turns off emphasized mode.
- When the LSB of n is 1, turns on emphasized mode.

ESC M n**[Function]** 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.

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

ESC V n**[Function]** Turn 90° clockwise rotation mode on/off

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

[Range] $0 \leq n \leq 2$, $48 \leq n \leq 50$ **[Default]** $n = 0$ **[Description]**

- In standard mode, turns 90° clockwise rotation mode on or off for characters.

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

ESC { n**[Function]** Selecting upside-down printing mode

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

[Range] $0 \leq n \leq 255$ **[Default]** $n = 0$ **[Description]**

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

ESC G n**[Function]** Turn double-strike mode on/off

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

[Range] $0 \leq n \leq 255$ **[Default]** $n = 0$ **[Description]**

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

GS B n**[Function]** Turn white/black reverse print mode on/off

[Format]

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

[Range] $0 \leq n \leq 255$ **[Default]** $n = 0$

[Description]

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

GS ! n**[Function]** Select character size

[Format]

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

[Range] $0 \leq n \leq 7$, $16 \leq n \leq 23$, $32 \leq n \leq 39$, $48 \leq n \leq 55$, $64 \leq n \leq 71$,
 $80 \leq n \leq 87$, $96 \leq n \leq 103$, $112 \leq n \leq 119$
 (1≤Enlargement in vertical direction≤8, 1≤Enlargement in horizontal direction≤8)

[Default] $n = 0$ **[Description]** Selects character size (height magnification and width magnification).

(n) Bit	Off/On	Hex	Decimal	Function
0 - 2	See table [Height magnification]			Selects the height magnification.
3	Off	00	0	Reserved.
4 - 6	See table [Width magnification].			Selects the width magnification.
7	Off	00	0	Reserved.

[Height magnification]

Hex	Decimal	Enlargement
00	0	1 time (standard)
01	1	2 times
02	2	3 times
03	3	4 times
04	4	5 times
05	5	6 times
06	6	7 times
07	7	8 times

[Width magnification]

Hex	Decimal	Enlargement
00	0	1 time (standard)
10	16	2 times
20	32	3 times
30	48	4 times
40	64	5 times
50	80	6 times
60	96	7 times
70	112	8 times

ESC t n**[Function]** Select character code table

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

[Range] $0 \leq n \leq 5$, $16 \leq n \leq 19$, $n = 255$ **[Default]** $n = 0$ **[Description]** Selects page n from the character code table.

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]

[Note] 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 They are support both 12×24 font and 9×17 font.

FS 2**[Function]** 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] The ranges of c1 and c2 differ, depending on models and the character code system used. The ranges of c1 and c2 for each model are as follows.

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

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

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

[Notes] • This command is effective only for Japanese, Simplified Chinese, Traditional Chinese, and Korean models.

• The printer processes k byte data of d1...dk and defined data. The defined data (d) sets a corresponding bit to 1 to print a dot or to 0 not to print a dot.

• The number of characters to be defined differ, depending on the printer models.

• Different user-defined characters can be defined for each Kanji character.

• Defined data is effective until it is redefined, ESC @ is executed, the printer is reset, or the power is turned off.

• User-defined characters are not defined and space is printed at the default

• The relationship between the defined data and a print result is as follows.

Example: data of the definition of the user defined character (2 bytes in vertical×16 dots in horizontal) is necessary. (k=32)

d1	d3	d5	...	d27	d29	d31	MSB
							LSB
d2	d4	d6	...	d28	d30	d32	MSB
							LSB

6 Macro Function Commands

GS :

[Function]	Start/end macro definition		
[Format]	ASCII	GS	:
	Hex	1D	3A
	Decimal	29	58
[Description]	Starts or ends macro definition.		
[Note]	The contents of the macro can be defined up to 2048 bytes.		

GS ^ r t m

[Function]	Execute macro			
[Format]	ASCII	GS	^	r t m
	Hex	1D	5E	r t m
	Decimal	29	94	r t m
[Range]	$1 \leq r \leq 255$ $0 \leq t \leq 255$ $m = 0, 1$			
[Description]	Executes the macro that was defined with GS :.			

m	Operation
0	Executes the macro r times continuously at an interval of $[t \times 100 \text{ ms}]$.
1	After waiting for $[t \times 100 \text{ ms}]$, flashes the LED indicator and waits for the FEED button to be pressed. After the button is pressed, executes the macro once. Then repeats the operation r times.

7 Status Commands

GS a n

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

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

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

[Default] $n = 0$ [when DIP switch [SW 2-1] is off.]

[Description] • Enables or disables basic ASB (Automatic Status Back).

(n)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	Paper sensor status disabled.
	On	08	8	Paper sensor status enabled.
4-7	Off	00	0	Reserved.

- While basic ASB is active, the selected enabled basic ASB status is transmitted whenever the status changes.
- The basic ASB status to be transmitted is the four bytes that follow:
- First byte (printer information)

Bit	Off / On	Hex	Decimal	Status
0,1	Off	00	0	Fixed
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
5	Off	00	00	Cover is closed.
	On	20	32	Cover is open.
6	Off	00	0	Paper is not being fed with the paper FEED button.
	On	40	64	Paper is being fed with the paper FEED button
7	Off	00	0	Fixed

• Second byte (printer information)

Bit	Off / On	Hex	Decimal	Status
0-2	_____	_____	_____	Reserved.
3	Off	00	0	No auto cutter error.
	On	08	8	Auto cutter error occurred.
4	Off	00	0	Fixed
5	Off	00	0	No unrecoverable error
	On	20	32	Unrecoverable error occurred.
6	Off	00	00	No automatically recoverable error
	On	40	64	Automatically recoverable error occurred.
7	Off	00	00	Fixed

• Third byte (paper sensor information)

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 sensor): paper present.
	On	0C	12	Roll paper end sensor (Paper sensor): paper not present.
4	Off	00	00	Fixed
5,6	_____	_____	_____	Reserved.
7	Off	00	00	Fixed

• Fourth byte (paper sensor information)

Bit	Off / On	Hex	Decimal	Status
0-3	_____	_____	_____	Reserved.
4	Off	00	00	Fixed
5,6	_____	_____	_____	Reserved.
7	Off	00	00	Fixed

GS r n**[Function]** 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

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

•This printer transmits the following status.

•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 sensor):paper present.
	On	0c	12	Roll paper end sensor(Paper sensor):paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

•Drawer kick-out connector status (n = 2, 50)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Drawer kick-out connector pin3 is LOW.
	On	01	1	Drawer kick-out connector pin3 is HIGH.
1-3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

[Note] •When this command is transmitted, do not transmit the subsequent data until this status is received.

ESC v**[Function]** Transmit paper sensor status

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

[Description] • Transmits the status of paper sensor(s) as 1 byte of data, 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 sensor): paper present.
	On	0c	12	Roll paper end sensor(Paper sensor): paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

[Note] • This command is only valid for serial model.**DLE EOT n****[Function]** Transmit real-time status

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

[Range] $1 \leq n \leq 4$ **[Description]** Transmit the real-time status.

n	Function
1	Transmits printer status.
2	Transmits offline cause status.
3	Transmits error cause status.
4	Transmits roll paper sensor status.

• This printer transmits the following status in real time.

• Printer status (n = 1)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fix as 0.
1	On	02	2	Fix as 1.
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	Fix as 1.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fix as 0.

• Offline cause status (n = 2)

Bit	Off/On	HEX	Decimal	Status
0	Off	00	0	Fix as 0
1	On	02	2	Fix as 1
2	Off	00	0	Cover is closed.
	On	04	4	Cover is open.
3	Off	00	0	Paper is not being fed with the paper FEED button.
	On	08	8	Paper is being fed with the paper FEED button.
4	On	10	16	Fixed.
5	Off	00	0	No paper end stop.
	On	20	32	Printing stopped due to paper end.
6	Off	00	0	No error.
	On	40	64	Error occurred.
7	Off	00	0	Fixed.

• Error cause status (n = 3)

Bit	Off/On	HEX	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2	--	--	--	Reserved.
3	Off	00	0	No auto cutter error.
	On	08	8	Auto cutter error occurred.
4	On	10	16	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
7	Off	00	0	Fixed.

- Roll paper sensor status (n = 4)

Bit	Off/On	HEX	Decimal	Status
0	Off	00	0	Fixed
1	On	02	2	Fixed
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
5,6	Off	00	0	Roll paper end sensor (paper sensor): paper present.
	On	60	96	Roll paper end sensor (paper sensor): paper not present.
7	Off	00	0	Fixed

[Note]

- Take the following into consideration:
 - If the received data includes a data string matching this command, the printer performs this command. Users must consider this.
Example: Graphic data might accidentally include a data string matching this command.
 - Do not embed this command within another command.
Example: Graphic data might include this command.
 - Transmit this command using the following method:
 - When this command is transmitted, the subsequent data must not be transmitted until the status is received.
 - However, if this command must be transmitted continuously, it is possible to transmit up to 4 commands at once.
In this case, the subsequent data must not be transmitted until the all status is received.
If this command is transmitted without using the above method, the status may not be received.

8 Barcode Commands

GS h n

[Function]	Set bar code height			
[Format]	ASCII	GS	h	n
	Hex	1D	68	n
	Decimal	29	104	n
[Range]	$1 \leq n \leq 255$			
[Default]	n = 162			
[Description]	• Sets the height of the bar code to n dots.			

GS H n

[Function]	Select print position of HRI characters			
[Format]	ASCII	GS	H	n
	Hex	1D	48	n
	Decimal	29	72	n
[Range]	$0 \leq n \leq 3, 48 \leq n \leq 51$			
[Range]	n = 0			
[Description]	Select the print position of HRI characters when printing a bar code.			

n	Print 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.

GS k

[Function]	Print barcode			
[Format]	<A> ASCII	GS	k	m d1...dk NUL
	Hex	1D	6B	m d1...dk 00
	Decimal	29	107	m d1...dk 0
	 ASCII	GS	k	m n d1...dn
	Hex	1D	6B	m n d1...dn
	Decimal	29	107	m n d1...dn
[Range]	<A> $0 \leq m \leq 6$ (For the range of k and d, see [Description].)			
	 $65 \leq m \leq 73$ (For the range of n and d, see [Description].)			
[Description]	Print the bar code using the bar code system specified by m. For <Function A>			

m	Bar code system	Range of k	Range of d
0	UPC-A	k = 11, 12	$48 \leq d \leq 57$
1	UPC-E	k = 11, 12	$48 \leq d \leq 57$ [where d1 = 48]
2	JAN13 / EAN13	k = 12, 13	$48 \leq d \leq 57$
3	JAN8 / EAN8	k = 7, 8	$48 \leq d \leq 57$
4	CODE39	$1 \leq k$	$48 \leq d \leq 57$, $65 \leq d \leq 90$, d = 32, 36, 37, 42, 43, 45, 46, 47
5	ITF	$2 \leq k$ (even number)	$48 \leq d \leq 57$
6	CODABAR (NW-7)	$2 \leq k$	$48 \leq d \leq 57$, $65 \leq d \leq 68$, $97 \leq d \leq 100$, d = 36, 43, 45, 46, 47, 58 [where $65 \leq d1 \leq 68$, $65 \leq dk \leq 68$, $97 \leq d1 \leq 100$, $97 \leq dk \leq 100$]

- k of <Function A> indicates the number of bytes of bar code data.
- d specifies the bar code data.

For <Function B>

m	Bar code system	Range of n	Range of d
65	UPC-A	n = 11, 12	$48 \leq d \leq 57$
66	UPC-E	n = 11, 12	$48 \leq d \leq 57$ [where d1 = 48]
67	JAN13 / EAN13	n = 12, 13	$48 \leq d \leq 57$
68	JAN8 / EAN8	n = 7, 8	$48 \leq d \leq 57$
69	CODE39	$1 \leq n \leq 255$	$48 \leq d \leq 57$, $65 \leq d \leq 90$, d = 32, 36, 37, 42, 43, 45, 46, 47
70	ITF	$2 \leq n \leq 254$ (even number)	$48 \leq d \leq 57$
71	CODABAR (NW-7)	$2 \leq n \leq 255$	$48 \leq d \leq 57$, $65 \leq d \leq 68$, $97 \leq d \leq 100$, d = 36, 43, 45, 46, 47, 58 [where $65 \leq d1 \leq 68$, $65 \leq dn \leq 68$, $97 \leq d1 \leq 100$, $97 \leq dn \leq 100$]
72	CODE93	$1 \leq n \leq 255$	$0 \leq d \leq 127$
73	CODE128	$2 \leq n \leq 255$	$0 \leq d \leq 127$ [where d1 = 123, $65 \leq d2 \leq 67$]

[Note]

- n of <Function B> specifies the number of bytes of bar code data.
- d specifies the bar code data.
- Users must secure the quiet zone (left or right side space area defined by the bar code standard) for bar code printing.

GS w n**[Function]** Set bar code width

[Format]

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

[Range] $2 \leq n \leq 6$ **[Range]** $n = 3$ **[Description]** • Sets the horizontal size of the bar code.

n	Multi-level bar code	Binary-level bar code	
	Module width (mm)	Thin element width (mm)	Thick element width (mm)
2	0.25	0.25	0.625
3	0.375	0.375	2.303
4	0.5	0.5	1.250
5	0.625	0.625	1.625
6	0.750	0.750	2

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

9 Mechanical Control Commands

GS V

[Function] Select cut mode and cut paper

[Format]

<A> ASCII	GS	V	m
Hex	1D	56	m
Decimal	29	86	m
 ASCII	GS	V	m n
Hex	1D	56	m n
Decimal	29	86	m n

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

 m = 65, 66, 0 < n ≤ 255

[Description] Executes paper cutting specified by m.

m		Function
<A>	0, 48	Cuts paper.
	1, 49	
	65, 66	Feeds paper to (cutting position + [n × (vertical motion unit)]) and cuts the paper.

[Note] This printer executes a partial cut (one point left uncut).

10 Other Commands

GS (A pL pH n m

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

$0 \leq n \leq 2, 48 \leq n \leq 50$

$1 \leq m \leq 3, 49 \leq m \leq 51$

[Description]

- Executes a specified test print.
- pL, pH specify $(pL + pH \times 256)$ as the number of bytes after pH (n and m).
- n specifies the paper used for the test print.

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

- m specifies a test pattern.

M	Test pattern
1,49	Hexadecimal dump print
2,50	Printer status print
3,51	Rolling pattern print

[Note]

- The printer executes software reset after processing this command.
- Clear the receive and print buffers.
- Resets all setting values in RAM (the print area, the character styles, and others) that were in effect at power on. (The data in the NV memory is not reset.)

ESC 2

[Type] Line spacing

[Function] Select default line spacing

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description] Sets the line spacing to approximately 4.23 mm {30×0.125mm}

ESC 3 n

[Type]	Line spacing			
[Function]	Set line spacing			
[Format]	ASCII	ESC	3	n
	Hex	1B	33	n
	Decimal	27	51	n
[Range]	$0 \leq n \leq 255$			
[Default]	Equivalent to approximately 4.23 mm $n=30$ {30×0.125mm}			
[Description]	Sets the line spacing to $[n \times (\text{vertical or horizontal motion unit})]$			
[Note]	The maximum is 1016 mm {40"}.			

ESC c 5 n

[Type]	Panel button			
[Function]	Enable/disable panel buttons			
[Format]	ASCII	ESC	c	5 n
	Hex	1B	63	35 n
	Decimal	27	99	53 n
[Range]	$0 \leq n \leq 255$			
[Default]	$n = 0$			
[Description]	• Enables or disables the panel buttons. • When the LSB of n is 0, the panel buttons are enabled. • When the LSB of n is 1, the panel buttons are disabled.			
[Note]	• This command affects the FEED button. • The FEED button is disabled regardless of the settings with this command, when the cover is open.			