HM-E300
Programming Manual

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REVISION RECORDS

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CONTENTS

1. Overview

1.1 Key terms

Real-time commands:	These commands are act ed on immediately upon being received by the printer ;
Page mode:	Under this mode, the printer stores all data in a specified memory and thinks of this as a virtual page. The page is printed when the printer receives print command either FF or ESC FF;
Standard mode:	Standard mode is the default mode of printer, namely line mode. Under this mode, the printer prints data and feeds paper upon print line buffer full (data is enough for one print line) or receiving print command like LF;
HRI character:	Bar code note character. Human Readable Interface;
NV:	Non-volatile memory in which data stored does not loss when powered off. NV: Non- volatile;
RAM :	Random Access Memory;
ASB:	Auto Send Back
DPI:	Print dots per inch (one inch equals to 25.4mm). It is us ed to identify the resolution of a printer.

1.2 Command Notation

[Name]	The name of the command.
[Format]	The code sequence. [ ]k indicates the contents in brackets [ ] should be repeated k times.
[Range]	Gives the allowable ranges, if any, for the command parameters.
[Default]	Gives the default values, if any, for the arguments.
[Description]	Describes the function of the command. ” – “ in the table indicates 0 or 1.
[Notes]	Provides important information on setting and using the printer command, if necessary.
[Reference]	Gives references, if any.

2.Printing command set

2.1 Status Commands

GS I n

[Name] Real-time status transmission

[Format]

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

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

65 ≤ n ≤ 69 [Printer information B]

[Description] Transmit the specified printer ID.

Using n as follows:

n	Printer ID Type	ID
1,49	Printer Model ID	Hex：20/ Decimal32
2,50	Tyep ID	See below

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Multi-byte character codes are not supported.
	On	01	1	Multi-byte character codes are supported.
1	On	02	2	Autocutter installed.
2,3	--	--	--	Not used.
4	Off	00	0	Fixed
5	--	--	--	Reserved.
6	--	--	--	Not used.
7	Off	00	0	Fixed.

n	Printer ID	Specification
65	Firmware version	Firmware version
66	Maker name	“HPRT”
67	Printer model	HM-E300
68	Seiral No.	Serial No. of the printer
69	Font of Chinese	Simplified Chinese:CHINA GB18030
		Traditional Chinese:TAIWANBIG-5

DLE EOT n

[Name] Real-time status transmission

[Format]

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

[Range] 1 ≤ n ≤ 4

[Description]

n=1: transmit the printer status

n=2: transmit the offline status

n=3: transmit the error status

n=4: transmit paper sensor status

• The status is transmitted whenever the data sequence <10>H<04>H<n>(1 ≤ n ≤4) is received.

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

• Do not use this command within another command that consists of 2 or more bytes.

Example: If you attempt to transmit ESC 3 n to the printer, but DTR (DSR for the host computer) goes to MARK before nis transmitted and then

DLE EOT 3interrupts before nis received, the code <10>H for DLE

EOT 3is processed as the code for ESC 3 <10>H.

• The printer transmits the current status. Each status item is represented by one-byte of data.

• The printer transmits the status without confirming whether the host computer can receive data.

• The printer executes this command upon receiving it.

• This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.

• With a parallel interface model, this command cannot be executed when the printer is busy. This command is executed even when the printer is offline or in error status, when Memory Switch 1-3 is on with a parallel interface model.

• When Auto Status Back (ASB) is enabled using the GS a command, the status transmitted by the DLE EOT command and the ASB status must be differentiated. (Refer to Appendix C, TRANSMISSION STATUS IDENTIFICATION.)

n = 1 Printer status:

Bit	Off/On	HEX	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer kick-out connector pin 3 is LOW
	On	04	4	Drawer kick-out connector pin 3 is HIGH
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Not used. Fixed to On
5	Off	00	0	Not waiting for online recovery.
	On	20	32	Waiting for online recovery.
6	Off	00	0	Paper is not being fed by the paper feed button.
	On	40	64	Paper is being fed by the paper feed button.
7	Off	00	0	Not used. Fixed to Off

[Description] n = 2 Offline status:

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

n = 3 Error status:

Bit	Off/On	HEX	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On
2	Off	00	0	No recoverable error.
	On	04	4	Recoverable error occurred.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurred.
4	On	10	16	Not used. Fixed to On
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No auto-recoverable error.
	On	40	64	Auto-recoverable error occurred.
7	Off	00	0	Not used. Fixed to Off

n = 4 Paper sensor status:

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

2.2 Setting and Print Commands

ESC @

[Name] Initialize printer

[Format]

ASCII	ESC	@	
Hex	1B	40	
Decimal	27	64	

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

[Notes]
- The bit image has been downloaded and custom characters in RAM is not cleared.When the printer default is label paper, the print mode is page mode after power-on.When the printer default is continuous paper, the print mode is standard mode after power-on.
- The macro definition is not cleared.

GS P x y

[Name] Initialize printer

[Format]

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

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

[Default] x = 180, y = 360

[Description] Sets the horizontal and vertical motion units to approximately 25.4/x mm {1/x"} and approximately 25.4/y mm {1/y"}, respectively.
- When x = 0, the default value of the horizontal motion unit is used.
- When y = 0, the default value of the vertical motion unit is used.

ESC 2

[Name] Set character line spacing

[Format]

ASCII	ESC	2	
Hex	1B	32	
Decimal	27	50	

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

[Reference] **ESC 3**

ESC 3 n

[Name] Set character line spacing

[Format]

ASCII	ESC	3	n
Hex	18	33	n
Decimal	27	51	n

[Range] 0 ≤ n ≤ 255

[Description] Sets the line spacing to [n*0.125 mm].

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

[Default] n =30

[Reference] **ESC 2**

ESC S

[Name] Select standard mode

[Format]

ASCII	ESC	S
Hex	1B	53
Decimal	27	83

[Description] Switches from page mode to standard mode.

[Notes]
1) this command is effective only in page mode.
2) Data in print buffer is cleared.
3) This command sets the print position to the beginning of the line.
4) Standard mode is selected as the default
5) This command returns the values to default value in standard mode:
a. set right-side character spacing: ESC SP, FS S
b. select line spacing: ESC 2, ESC 3

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

ESC L

[Name] Select page mode

[Format]

ASCII	ESC	L
Hex	1B	4C
Decimal	27	76

[Description] Switches from standard mode to page mode.
This command is enabled only when processed at the beginning of a line in standard mode.

CAN

[Name] Cancel print data in page mode

[Format]

ASCII	CAN
Hex	18
Decimal	24

[Description] Delete all the print data for the current print job in page mode.

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

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

LF

[Name] Print the contents in the print buffer

[Format]

ASCII	LF
Hex	0A
Decimal	10

[Description] Prints the data in the print buffer and feeds one line, based on the current line spacing

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

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

FF

[Name] Print and feed the paper to the next page

[Format]

ASCII	FF
Hex	0C
Decimal	12

[Description] Paper type is continuous paper

•When this command is processed in page mode, only the print position moves, and the printer does not perform actual printing.

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

• This command is equivalent to LF in standard mode.

• This command returns the values set by ESC W to the default values.

Paper type is marked paper :

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

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

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

ESC FF

[Name] Print data in the page mode

[Format]

ASCII	ESC	FF
Hex	1B	0C
Decimal	27	12

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

[Notes] 1) This command is enable only in page mode.

2) The butter data, ESC T and ESC W set and character set are not deleted after printing.

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

ESC J n

[Name] Print and feed paper

[Format]

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

[Range] 0 ≤n ≤ 255

[Description] Prints the data in the print buffer and feeds the paper [n×0.125 mm (0.0049")].

[Notes] •After printing is completed, this command sets the print starting position to the beginning of the line.

•The paper feed amount set by this command does not affect the values set by ESC 2 or ESC 3.

•The maximum paper feed amount is 900 mm. If the paper feed amount (n ×line spacing) of more than 900 mm is specified, the printer feeds the paper only 900 mm .

ESC d n

[Name] Print and feed n lines

[Format]

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

[Range] 0 ≤n ≤ 255

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

[Notes] This command sets the print starting position to the beginning of the line.
This command affects the line spacing set by ESC 2 or ESC 3.
The maximum paper feed amount is 1016 mm {40 inch}. If the paper feed amount (n line spacing) of more than 1016 mm {40 inch} is specified, the printer feeds the paper only 1016 mm {40 inch} .

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

HT

[Name] Horizontal tab

[Format]

ASCII	HT
Hex	09
Decimal	9

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

[Notes]
- This command is ignored unless the next horizontal tab position has been set.
- If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [printing area width + 1].
- Horizontal tab positions are set with **ESC D**.
- If this command is received when the printing position is at [printing area width+ 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.
- Set Horizontal tab default to 8 character width of character ASCII (12×24).
- When the print buffer is full， the printer performs the following actions：

In standard mode， the printer prints the current line and sets the print position to the beginning of the line.
In page mode, the printer sets the print position to the beginning of the line.

[Reference] **ESC D**

ESC D n1...nk NUL

[Name] Set horizontal tab positions

[Format]

ASCII	ESC	D	n1…nk
Hex	1B	44	n1…nk
Decimal	27	68	n1…nk

[Range] 1 ≤ n ≤ 255
0 ≤ k ≤ 32

[Notes]
- 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 selected with twice the width of normal characters.
- The character width should be set before using this command. Settings of character fonts, space width,and enlargement affect the setting of character width.
- A maximum of 32 horizontal tab positions can be set. Data exceeding 32 horizontal tab positions is processed as normal data.
- This command cancels any previous horizontal tab settings.

[Notes] •Transmit [n]k in ascending order and place a NUL code at the end. ESC D NUL cancels all horizontal tab positions.
•When [n] is less than or equal to the preceding value [n]k-1, horizontal tab setting is finished, and the following data is processed as normal data.
•ESC D NUL cancel the setting of all tab positions.
•Even if the character width is changed after setting the horizontal tab positions, the setting of the horizontal tab positions will not be changed.
•Character width is independent in standard mode and page mode.

[Default] Default setting of tab: one tab position per 8 ASCII font 0(12 × 24)

[Reference] **HT**

ESC $ nL nH

[Name] Set absolute print position

[Format]

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

[Range] 0≤nL ≤ 255
0 ≤nH≤255

[Description] The distance from the beginning of the line to the print position is [(nL + nH ×256) ×0.125 mm].

[Notes] •This command is measured from the beginning of the line.
•This command is only effective for the next data printing.
•The printer ignores any setting that exceeds the print area.
•If the absolute print position ≥ the maximum printable width or the set print width, the absolute print position is ineffective, it will print from the beginning of the line.
•If the absolute print position < the current print position, it will occur:
(1) Character overlapped print; (2) Print position moves to the left.
•If the absolute print position ≥ print page width, the absolute print position is ineffective, it will print from the beginning of the line.

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

ESC \ nL nH

[Name] Set relative horizontal print position

[Format]

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

[Range] 0 ≤ nl ≤ 255 0 ≤ nH ≤ 255

[Description] Sets the relative horizontal print starting position from the current position. This command sets the distance from the current position to [(nL + nH ×256)× 0.125 mm (0.0049")].

[Notes] •The printer ignores any setting that exceeds the print area.
•When pitch N is specified for the movement to the right： nL+ nH × 256 = N.
•Use the complement of N for setting N pitch movement to the left: (nL + nH × 256) = 65536 – N.
•Print starting position from the current position to [N × 0.125mm].
•This command is measured from the beginning of the line.
•If the relative horizontal print position ≥ the maximum printable width or the set print width, the relative print position is ineffective.

[Reference] **ESC $**

GS L nL nH

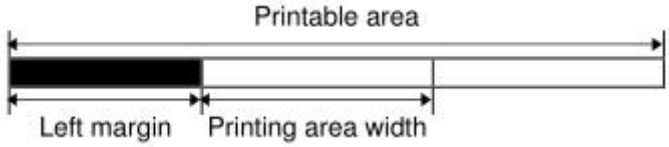
[Name] Set left margin

[Format]

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

[Range] 0 ≤ nL ≤ 255
0 ≤ nH ≤ 255

[Description] Sets the left margin using nL and nH.
The left margin is set to [(nL + nH*256)*0.125 mm].



[Notes]
- This command is effective for all the data print below.
- Sending several commands continuously, subject to the command received at last.
- When setting the left margin in non-beginning of the line, left margin is ineffective. And nL, nH is output in common characters.
- If the setting exceeds the printable area, the left margin is automatically set to the maximum value of the printable area.
- The left margin has no effect in page mode. If this command is processed in page mode, the left margin is set and it is enabled when the printer returns to standard mode.

[Default] nL = 0, nH = 0

[Reference] **GS W**

GS W nL nH

[Name] Set printing area width

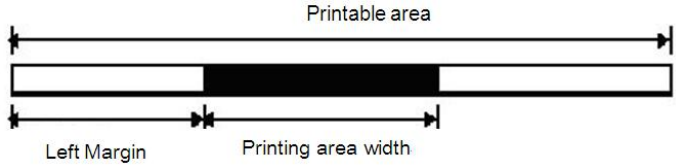
[Format]

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

[Range] 0 ≤ nL ≤ 255
0 ≤ nH ≤ 255

[Description] Set printing area width using nL and nH.

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



[Notes]

• In standard mode, this command is enabled only when processed at the beginning of a line.

• When print width is 0 or < a character width, print width is automatically extended to 1 character width on the right.

• When setting print width in non-beginning of the line, setting of print width is ineffective. Print width exceeds maximum printable width: print width is the maximum printable width.

• The print area width has no effect in page mode. If this command is processed in page mode, the print area width is set and it is enabled when the printer returns to standard mode

• If the [left margin + print area width] exceeds the printable area, the print area width is automatically set to [printable area – left margin].

ESC a n

[Name] Select justification

[Format]

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

[Range] 0 ≤ n ≤ 2, 48 ≤ n ≤ 50

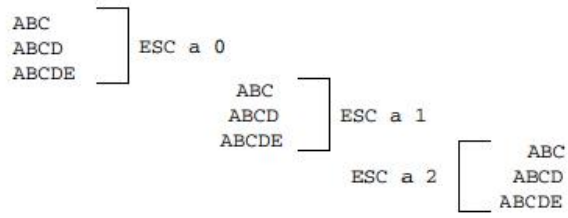
[Description] Aligns all the data in one line to the specified position.
n selects the justification as follows:

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

[Notes]
- 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 justifies the space area according to HT, ESC $ or ESC \.
- Setting the justification of bar code, QR code and image is effective.
- The justification has no effect in page mode, it is enabled when the printer returns to standard mode.

[Default] n = 0

[Sample]



GS T n

[Name] Select justification

[Format]

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

[Range] n=0, 1, 30, 31

[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, 30	Cancel data in the current print buffer
1, 31	Print data in the current print buffer

[Notes] In page mode, this command is ignored.

ESC W xL xH yL yH dxL dxH dyL dyH

[Name] Set printing area in page mode

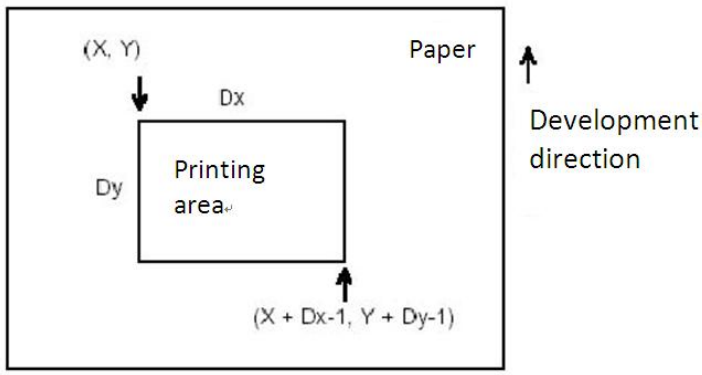
[Format]

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 ≤ xL, xH, yL, yH, dxL, dxH, dyL, dyH ≤ 255
(except for dxL= dxH=0 or dyL= dyH=0)

[Description] Set the size and position of the printing area in page mode as follows:
Horizontal starting position: x0= [(xL + xH × 256) × 0.125mm]
Vertical starting position: y0 = [(yL + yH × 256) × 0.125mm]
Printing area width: dx = [(dxL + dxH × 256) ×0.125mm]
Printing area height: dy = [(dyL + dyH × 256) ×0.125mm]

[Notes]
•This command is processed in standard mode to set an activated internal flag so that don't influence printing.
• The printer stop processing this command once horizontal starting position or vertical starting position ran out of the printing area, the subsequent data are processed as normal one.
• The printer stop processing this command once printing area width or height was set to 0, the subsequent data are processed as normal one.
• This command confirms the current printing position with command ESC T.
•The default set of printing area width is horizontal printable width - horizontal starting position if the value of horizontal starting position + printing area width was beyond printable area.
• The default set of printing area height is vertical printable height - vertical starting position if the value of vertical starting position + printing area height was beyond printable area.
• The default settings of the horizontal and vertical motion units are 0.125mm.
•Assuming horizontal starting position, vertical starting position, printing area width and printing area height X, Y, Dx, Dy, set the printing area as shown below:



[Default] xL = xH = yL = yH = 0
dxL, dxH, dyL and dyH decided by printer settings

[Example]

Left justification	Centering	Right justification
ABC ABCD ABCDE	ABC ABCD ABCDE	ABC ABCD ABCDE

ESC T n

[Name] Select character font

[Format]

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

[Range] 0 ≤ n ≤ 3, 48 ≤ n ≤ 51

[Description] Set the print direction and starting position in page mode specified by n as shown below:

n	Print Direction	Starting Position
0,48	Left to right	Upper left (A in the figure)
1,49	Bottom to top	Lower left (B in the figure)
2,50	Right to left	Lower right (C in the figure)
3,51	Top to bottom	Upper right (D in the figure)

[Notes] 1) this command is processed in standard mode, an internal flag is activated and this command is enabled when the printer returns to page mode.
2) this command set the starting position of printing data in the printing area.

[Default] n = 0

GS $ nL nH

[Name] 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 ≤ nL ≤ 255, 0 ≤ nH ≤ 255

[Description]
• Set absolute vertical print position in page mode.
•This command sets the absolute vertical print position at[(nL + nH × 256) × 0.125mm].

[Notes]
• This command is effective only in page mode.
• If [(nL + nH × 256) × 0.125mm] is outside the print area, it is ignored.
• The horizontal position is not changed after executing this command.
• Reference position depends on command ESC T
• The printer is processing depends on the differences between print area position and the starting position:
① Starting position is top left or lower right corner, this command set the absolute position at the direction parallel to the feed direction.
② Starting position is top right or lower left corner, this command set the absolute position at the direction perpendicular to the feed direction.

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

GS \ nL nH

[Name] 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 ≤ (nL + nH × 256) ≤ 32767

[Description]
- This command moves the vertical print starting position in page mode to [(nL + nH × 256) × 0.125mm] from the current position.

[Notes]
- This command is effective only in page mode, ignored in other modes.
- Print position moves downward: nL + nH × 256= N，

Use the complement of N for setting pitch movement upward:
nL + nH × 256= 65536 – N.
- Any position out of the print area is ignored.
- The printer is processing depends on the differences between print area position and the starting position:

① Starting position is top left or lower right corner, this command set the relative vertical position at the direction parallel to the feed direction.

② Starting position is top right or lower left corner, this command set the relative vertical position at the direction perpendicular to the feed direction.

2.3 Bar Code Commands

GS H n

[Name] Select printing position for HRI characters

[Format]

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

[Range] 0 ≤ n ≤ 3, 48 ≤ n ≤ 51

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

[Notes]

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.
HRI characters are printed using the font specified by GS f.

[Default] n = 0

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

GS f n

[Name] 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] • Selects a font for the HRI characters when printing a bar code.

n	Font for the HRI characters
0,48	Character font A (12 × 24)
1,49	Character font B (9 × 17)

[Notes] HRI indicates Human Readable Interpretation.
HRI characters are printed using the font specified by GS H.

[Default] n = 0

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

GS h n

[Name] Select bar code height

[Format]

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

[Range] 1 ≤ n ≤ 255

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

[Default] n = 162

GS w n

[Name] Set bar code width

[Format]

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

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

n specifies the bar code width as follows:

n	Module Width (mm) for	Binary-level Bar Code	
		Thin Element Width (mm)	Thick Element Width (mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000
4	0.500	0.500	1.250
5	0.625	0.625	1.625
6	0.750	0.750	1.875

Multi-level bar codes are as follows:

UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128

Binary-level bar codes are as follows:

CODE39, ITF, CODABAR

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

[Default] n = 3

[Reference] **GS k**

①GS k m d1 d2 … dk NUL ②GS k m n d1 d2 … dn

[Name] Print bar code

[Format]

①	ASCII	GS	k	m d1 d2 … dk NUL
	Hex	1D	6B	m d1 d2 … dk 00
	Decimal	29	107	m d1 d2 … dk 0
②	ASCII	GS	k	m n d1 d2 … dn
	Hex	1D	6B	m n d1 d2 … dn
	Decimal	29	107	m n d1 d2 … dn

[Range] ①0 ≤ m ≤ 6； ②65 ≤ m ≤ 73

[Description] m：bar code type

n：bar code length

m	Bar code system	Number of characters	Remarks
0,65	UPC-A	11,12	48-57
1,66	UPC-E	11,12	48-57
2,67	EAN13	12,13	48-57
3,68	EAN8	7,8	48-57
4,69	CODE39	>1	32,36,37,43,45-57,65-90
5,70	I25	>1 even number	48-57
6,71	CODEBAR	>1	36,43,45-58,65-68
72	CODE93	>1	0-127
73	CODE128	>1	0-127

If there are illegal characters in the data, the printer will not print the bar code

The bar code width that exceeds the print area cannot be specified.

This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by line space setting commands.

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

[Name] QR Code: Select the mode

[Format]

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

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

[Description] • Select the mode of QR CODE.

n1	Function
49	Select mode 1
50	Select mode 2

[Default] n1 = 50， n2 = 0

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

[Name] QR Code: Set the size of module

[Format]

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

[Range] (pL + pH × 256) = 3 (pL = 3, pH = 0)
cn = 49
fn = 67
1 ≤ n ≤ 16

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

[Default] n = 3

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

[Name] QR Code: Select the error correction level

[Format]

ASCII	GS	(	k	pL	pH	cn	fn	n
Hex	1D	28	6B	03	00	31	45	n
Decimal	29	40	107	3	0	49	69	n

[Range] (pL + pH × 256) = 3 (pL = 3, pH = 0)
cn = 49
fn = 69
48 ≤ n ≤ 51

[Description] • Selects the error correction level for QR Code

n	Function	Reference: Approx. figure of recovery
48	Select error correction level L	7%
49	Select error correction level M	15%
50	Select error correction level Q	25%
51	Select error correction level H	30%

[Default] n = 48

<Function 180> GS (k pL pH cn fn m d1…dk (cn = 49, fn = 80)

[Name]	QR Code: Store the data in the symbol storage area
[Format]	ASCII GS (k pL pH cn fn m d1…dk Hex 1D 28 6B pL pH 31 50 30 d1…dk Decimal 29 40 107 pL pH 49 80 48 d1…dk
[Range]	4 ≤ (pL + pH × 256) <1021 (0 ≤ pL ≤ 255, 0 ≤ pH< 4) cn = 49 fn = 80 m = 48 0 ≤ d ≤ 255 k = (pL + pH × 256) – 3
[Description]	•Stores the QR Code symbol data (d1...dk) into the symbol storage area.

<Function 181> GS (k pL pH cn fn m (cn = 49, fn = 81)

[Name]	QR Code: Print the symbol data in the symbol storage area
[Format]	ASCII GS (k pL pH cn fn m Hex 1D 28 6B 03 00 31 51 m Decimal 29 40 107 3 0 49 81 m
[Range]	(pL + pH × 256) = 3 (pL = 3, pH = 0) cn = 49 fn = 81 m = 48
[Description]	• Encodes and prints the QR Code symbol data in the symbol storage area with GS (k<Function 180>.
[Notes]	• User must secure the quiet zone (left, right, upward, and downward space areas defined by the QR Code symbol specifications) for QR Code printing.

<Function 182> GS (k pL pH cn fn m (cn = 49, fn = 82)

[Name]	QR Code: Print the symbol data in the symbol storage area
[Format]	ASCII GS (k pL pH cn fn m Hex 1D 28 6B 03 00 31 52 m Decimal 29 40 107 3 0 49 82 m
[Range]	(pL + pH × 256) = 3 (pL = 3, pH = 0) cn = 49 fn = 82 m = 48
[Description]	Transmits the size information for the encoded QR Code symbol data in the symbol storage area with GS (k <Function 180>.
[Note]	This function does not print data. The size information does not include the quiet zone (left, right, upward, and downward space areas defined by the QR Code symbol specifications).

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

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

[Format]

ASCII	GS	(	k	pL	pH	cn	fn	n
Hex	1D	28	6B	03	00	30	41	n
Decimal	29	40	107	3	0	48	65	n

[Range] (pL + pH × 256) = 3 (pL =3, pH =0)
cn = 48
fn = 65
0 ≤ n ≤ 7

[Default] n=0

[Description] Sets the number of columns in the data region for PDF417.
• When n = 0, specifies automatic processing
• When n is not 0, sets the number of columns in the data region to n codeword.

[Note] The following data is not included in the number of columns:
• Start pattern and stop pattern
• Indicator codeword of left and right

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

[Name] PDF417: Set the number of rows

[Format]

ASCII	GS	(	k	pL	pH	cn	fn	n
Hex	1D	28	6B	03	00	30	42	n
Decimal	29	40	107	3	0	48	66	n

[Range] (pL + pH × 256) = 3 (pL =3, pH =0)
cn = 48
fn = 66
n=0, 3 ⩽ n ⩽ 90

[Default] n=0

[Description] Sets the number of rows for PDF417.
• When n = 0 specifies automatic processing.
• When n is not 0, sets the number of rows to n rows.

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

[Name] PDF417: Set the number of rows

[Format]

ASCII	GS	(	k	pL	pH	cn	fn	n
Hex	1D	28	6B	03	00	30	43	n
Decimal	29	40	107	3	0	48	67	n

[Range] (pL + pH × 256) = 3 (pL =3, pH =0)
cn = 48
fn = 67
2 ⩽ n ⩽ 6

[Default] n=3

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

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

[Name] PDF417: Set the number of rows

[Format]

ASCII	GS	(	k	pL	pH	cn	fn	n
Hex	1D	28	6B	03	00	30	44	n
Decimal	29	40	107	3	0	48	68	n

[Range] (pL + pH × 256) = 3 (pL =3, pH =0)
cn = 48
fn = 68
2 ⩽ n ⩽ 8

[Default] n=3

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

<Function 069> GS (k pL pH cn fn n (cn=48, fn=68)

[Name] PDF417: Set the number of rows

[Format]

ASCII	GS	(	k	pL	pH	cn	fn	m	n
Hex	1D	28	6B	04	00	30	45	m	n
Decimal	29	40	107	4	0	48	69	m	n

[Range] (pL + pH × 256) = 4 (pL =4, pH =0)
cn = 48
fn = 69
m = 48, 49
48 ⩽ n ⩽ 56 [m = 48]
1 ⩽ n ⩽ 40 [m = 49]

[Default] m = 49, n = 1

[Description] Sets the error correction level for PDF417.

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

n	Function	Number of error correction codeword
48	Error correction level 0	2
49	Error correction level 1	4
50	Error correction level 2	8
51	Error correction level 3	16
52	Error correction level 4	32
53	Error correction level 5	64
54	Error correction level 6	128
55	Error correction level 7	256
56	Error correction level 8	512

Error correction level specified by “ratio” (m = 49) is as follows. The error correction level is defined by the calculated value [number of data codeword × n × 0.1 = (A)]. The number of the error correction codeword is changeable in proportion to the number of the codeword in the data area.

Calculated value (A)	Correction level	Number of error correction codeword
0 ~ 3	Error correction level1	4
4 ~ 10	Error correction level2	8
11 ~ 20	Error correction level3	16
21 ~ 45	Error correction level4	32
46 ~ 100	Error correction level5	64
101 ~ 200	Error correction level6	128
201 ~ 400	Error correction level7	256
401 或以上	Error correction level8	512

2.4 Bit Image Commands

ESC * m nL nH d1... dk

[Name] Select bit-image mode

[Format]

ASCII	ESC	*	m nL nH d1...dk
Hex	1B	2A	m nL nH d1...dk
Decimal	27	42	m nL nH d1...dk

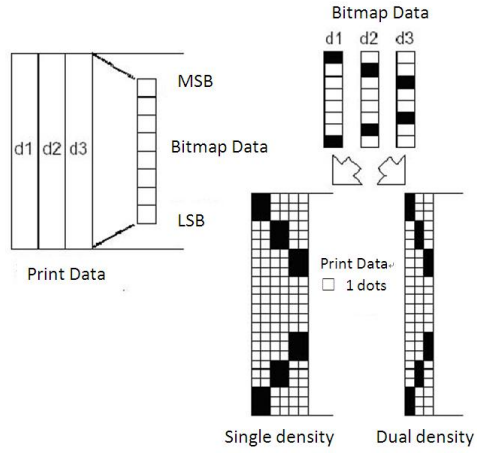
[Range] m = 0, 1, 32, 33
0 ≤ nL ≤ 255
0 ≤ nH ≤ 3
0 ≤ d ≤255

[Description] Select a bit-image mode using m, bit-image dot is decided by nL and nH.

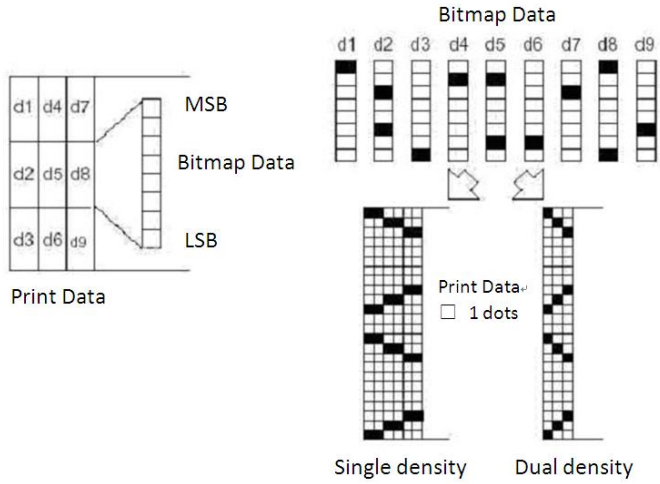
m	Mode	Vertical Direction		Horizontal Direction	
		Number of Bits for vertical data	Dot Density (DPI)	Dot Density (DPI)	Amount of Data(k)
0	8-dot single-density	8	67 DPI	101 DPI	nL + nH × 256
1	8-dot double-density	8	67 DPI	203 DPI	nL + nH × 256
32	24-dot single-density	24	203 DPI	101 DPI	(nL + nH × 256) × 3
33	24-dot double-density	24	203 DP	203 DPI	(nL + nH × 256) × 3

[Notes]
• If the value of m out of the specified range, nL and the subsequent data will be processed as normal one.
• The number of horizontal direction is up to nL and nH, the total number is nL + nH × 256.
• The part which bit-image is beyond the current area will be amputated.
• d indicates the bit image data. Set a bit to 1 to print a dot, or set a bit to 0 to not print a dot.
• After the bit-image is sent successfully, the printer will be back to the normal data processing mode.
• If the width printing area set by GSL and GSW lee than the printing width of GS / required by the data sent with the ESC* command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):
① The width of the printing area is extended to the right to accommodate the amount of data.
② If step ¬ does not provide sufficient width for the data, the left margin is reduced to accommodate the data. For each bit of data in single-density mode (m = 0, 32), the printer prints two dots: for each bit of data in double-density mode (m = 1, 33), the printer prints one dot. This must be considered in calculating the amount of data that can be printed in one line.
• It back to the normal data processing mode after printing a bit-image.
• This command won't be influenced by other print modes (emphasized /double-strike /underline /characters amplification /white / black reverse), except upside-down printing mode.
• the relationship between data and the point to be print as follows:

Choosing 8-dot density:



Choosing 24-dot density:



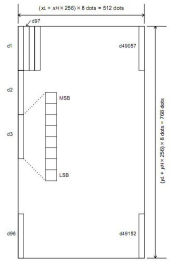
FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Name]	Define NV bit image			
[Format]	ASCII	FS	q	n [xL xH yL yH d1...dk]...[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]	$1 \le n \le 255$			
	$0 \le xL \le 255$			
	$1 \le (xL + xH \times 256) \le 1023$			
	$1 \le (yL + yH \times 256) \le 800$			
	$0 \le d \le 255$			
	$k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$			
	Total defined data area =64K bytes			
[Description]	Define the NV bit image specified by n.			
	n specifies the number of the defined NV bit image.			
	xL, xH specifies (xL+ xH*256)*8 dots in the horizontal direction for the NV bit image you are defining.			
	yL, yH specifies (yL+yH*256)* 8 dots in the vertical direction for the NV bit image you are defining.			

[Notes] Frequent write command executions may damage the NV memory.
Therefore, it is recommended to write the NV memory 10 times or less a day.
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 of this command, the printer is BUSY when writing data to the user NV memory and stops receiving data. Therefore it is prohibited to transmit the data, including real-time commands, during the execution of this command.
NV bit image is a bit image defined in 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> of the command are processed normally.
When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, yH out of the defined range.
In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled.
In groups of NV bit images other than the first one, when the printer encounters xL, xH, yL, yH out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that haven't been defined are disabled (undefined), but any NV bit images before that are enabled.
The d indicates the definition data. In data (d) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
This command defines n as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 01H, and the last data group [xL xH yL yH d1...dk] is NV bit image n.The total agrees with the number of NV bit images specified by the command FS p.
The definition data for an NV bit image consists of [xL xH yL yH d1...dk].
Therefore, when only one NV bit image is defined n=1, the printer processes a data group [xL xH yL yH d1...dk] once. The printer uses ([data: (xL+xH*256) (yL+yH*256)*8] [header :4]) bytes of NV memory.
The definition area in this printer is a maximum of 64K bytes. This command can define several NV bit images, but cannot define bit image data whose total
The printer is busy immediately before writing into NV memory
The printer does not transmit ASB status or perform status detection during processing of this command even when ASB is specified.
When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
Once an NV bit image is defined, it is not erased by performing ESC @, reset, and power off.
This command performs only definition of an NV bit image and does not perform printing. Printing of the NV bit image is performed by the FS p command.
NV bit image of each piece of space in NV memory is equal to the size of the NV bit image data plus 4 bytes.

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



GS * x y d1...d(x × y × 8)

[Name] Define download 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)

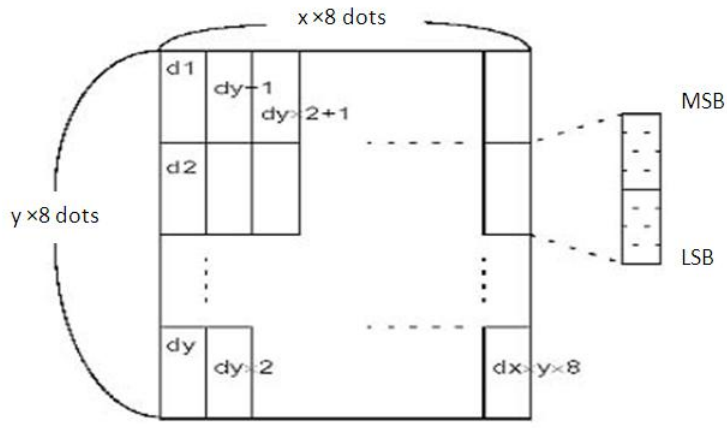
[Range] 1 ≤ x ≤ 48， y = 1， 0 ≤ d ≤ 255， x × y ≤ 384

[Description] It defines a downloaded bit image using x and y.

- x dots in the horizontal direction of bit imge
- y dots in the vertical direction of bit image

[Notes]

- x × 8 dots in the horizontal direction and y × 8 dots in the vertical direction.
- Once the value of x × y beside the defined range, the command is ineffective.
- d indicates the bit image data. Set a bit to 1 to print a dot, or set a bit to 0 to not print a dot.
- The downloaded bit image will be cleared if the power is turned off.
- If the area of storing downloaded bit image in RAM has no room to store the current downloaded bit image, the printer will clear the previously one to store the latest downloaded bit image.
- The relationship between printing data and downloading bit image as follows:



GS / m

[Name] print downloaded bit image

[Format]

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

[Range] 0 ≤ m ≤ 3, 48 ≤ m ≤ 51

[Description] print a downloaded bit image using the mode specified by m, as follows.

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

[Notes]

- This command is ignored if a downloaded bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- Other print modes is ineffective (emphasized/ double-strike/ underline/ characters amplification/ white/ black reverse), except upside-down printing mode.

[Notes] • The part exceeded the print area of the downloaded bit image is not to be printed. The printer is processing depends on the differences between print area position and the starting position:
① Starting position is top left or lower right corner, this command set the absolute position at the direction parallel to the feed direction.
② Starting position is top right or lower left corner, this command set the absolute position at the direction perpendicular to the feed direction.

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

[Name] Print raster bit image

[Format]

ASCII	GS	v	0	m xL xH yL yH d1...dk
Hex	1D	76	30	m xL xH yL yH d1...dk
Decimal	29	118	48	m xL xH yL yH d1...dk

[Range]
0 ≤ m ≤ 3,
48 ≤ m ≤ 51
0 ≤ xL ≤ 255
0 ≤ xH ≤ 255
0 ≤ yL ≤ 255
0 ≤ d ≤ 255

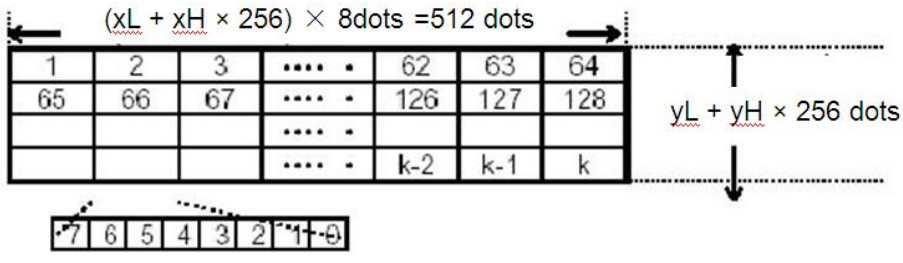
[Description] k = (xL + xH × 256) × (yL + yH × 256) (k ≠ 0)
print raster bit image, using m to select raster bit image mode:

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

•xL、xH indicates the number of bit image bytes in horizontal direction（xL+ xH ×256）
•yL、yH indicates the number of bit image bytes in vertical direction（yL+ yH × 256）.

[Notes] • In standard mode, this command is effective only when there is no data in the print buffer.
• Printing modes, such as characters amplification/ emphasized/ double-strike/ underline/ white/ black reverse/ upside-down printing, etc., are effective to this command.
• The part exceeds printing area is not to be printed.
• ESC a (select justification) is effective to raster bit image.
• If this command is received while a macro is being defined, the printer ends macro definition mode and execute it. This command is not part of macro definition.
•d indicates the bit image data. Set a bit to 1 to print a dot, or set a bit to 0 to not print a dot.

[Example] When xL+ xH × 256 = 64



GS (L & GS 8 L

[Name] Set graphics data

[Format]
ASCII GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex 1D 28 4C pL pH 30 43 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal 29 40 76 pL pH 48 67 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
ASCII GS 8 L p1 p2 p3 p4 m fn akc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex 1D 38 4C p1 p2 p3 p4 30 43 30kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal 29 56 76 p1 p2 p3 p4 48 67 48kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

[Range]
$12 \leqslant (pL + pH \times 256) \leqslant 65535$
$(0 \leqslant pL \leqslant 255, 0 \leqslant pH \leqslant 255)$
When using GS 8 L:
$12 \leqslant (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leqslant 4294967295]$
m = 48, fn = 67, a = 48
$32 \leqslant kc1 \leqslant 126$
$32 \leqslant kc2 \leqslant 126$
b = 1, 2
$1 \leqslant (xL + xH \times 256) \leqslant 8192$ $(0 \leqslant xL \leqslant 255, 0 \leqslant xH \leqslant 32)$
$1 \leqslant (yL + yH \times 256) \leqslant 2304$ $(0 \leqslant yL \leqslant 255, 0 \leqslant yH \leqslant 9)$
c = 49, 50 (When using recommended bi-color paper)
c = 49 (When using recommended pure-color paper)
$0 \leqslant d \leqslant 255$
$k = (int((xL + xH \times 256) + 7)/8) \times (yL + yH \times 256)$
b = 1 (When selecting single-color print control)
b = 1, 2 (When selecting bi-color print control)

[Description] Defines the NV graphics data (raster format) as a record specified by the key codes (kc1 and kc2) in the NV graphics area.
• b specifies the number of colors for the defined data.
• xL and xH specify the number of dots in the horizontal direction as (xL + xH × 256).
• yL and yH specify the number of dots in the vertical direction as (yL + yH × 256).

c	Color specifications
49	Color 1
50	Color 2

d specifies the defined data (raster format).
k indicates the number of the definition data. k is an explanation parameter; therefore it does not need to be transmitted.

[Notes] In cases where the specified key code already exists in memory, it will be necessary to overwrite the data.
NV graphics indicate image data groups defined in the printer's internal non-volatile memory. Data definitions for NV graphics data created using this command are valid until redefined by this function or <Function 68>.
The functions used to define NV graphics data are this function and Function 68. Even with printer models that support both, it is recommended that only one of the functions be used for data definition tasks.
• The two functions differ only in that one function (this function) defines data in raster format, while the other (Function 68) defines data in column format. The domains and control information are identical.
• In cases where the key code specified by this function coincides with a key code being used by Function 68, a new data definition is created.

Use this function at the beginning of the line when the standard mode is selected.
This function is incompatible with macros, so make sure to avoid including it when defining macros.
In cases where there is insufficient capacity available for storing NV graphics data, this function cannot be used. Use Function 51 to confirm the available capacity in the NV graphics data area.
One option is to delete items of NV graphics data that were previously defined to the same key code.
The data for byte k of d1 ... dk is processed as a single item of defined NV graphics data.
The defined data (d) specifies “1” for bits corresponding to dots that will be printed and “0” for bits corresponding to dots that will not be printed.
NV graphics data is defined using the dot density set by Function 49.
Specify single data groups [c d1 ... dk] when monochrome is selected (b = 1) as the color.
Specify b number of data groups [c d1 ... dk] when multiple colors are selected (b ≠ 1). It is also important to specify different colors in units of data groups when specifying color (c).
NV graphics data is printed using Function 69.
Note that it is not possible to create definitions for both NV graphics data (this command) and NV bit image data (FS q). NV bit image data definitions are deleted when thiscommand is used.
The relationship between NV graphics data (raster format) and print results is shown in the table below.

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

X = (**xL** + **xH** × 256)

2.5 Character Commands

ESC SP n

[Name] Set character spacing
[Format] ASCII ESC SP n
Hex 1B 20 n
Decimal 27 32 n
[Range] 0 ≤ n≤255
[Description] Sets the right-side character spacing to [n×0.125mm(n×0.0049 inch)]
[Notes] •When characters are enlarged, the character spacing is n times normal value.
• This command sets values independently in each mode (standard and page modes).
[Default] n=0

ESC ! n

[Name] Select print mode(s)
[Format] ASCII ESC ! n
Hex 1B 21 n
Decimal 27 33 n
[Range] 0 ≤ n ≤ 255
[Description] Selects print mode(s) using n as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font 0 selected.
	On	01	1	Character font 1 selected.
1,2	Off	00	0	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	Off	00	0	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

[Notes] • When both double-height and double-width modes are selected, quadruple-size characters are printed.
• 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 in 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 G print effect is the same with 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.
[Default] n = 0

ESC M n

[Name] Select character font
[Format] ASCII ESC M n
Hex 1B 4D n
Decimal 27 77 n
[Range] 0 ≤ n ≤ 1, 48 ≤ n ≤ 49
[Description] select character font

n	Function
0, 48	Choose character font A (12 * 24)
1, 49	Choose character font B (9 * 17)

[Notes] 1) ESC ! can set character font too, the command received at last is effective.
2) If there is such font required in dot-matrix, this command is ineffective.
[Reference] **ESC !**

ESC E n

[Name] Turn emphasized mode on/off
[Format] ASCII ESC E n
Hex 1B 45 n
Decimal 27 69 n
[Range] 0 ≤ n ≤ 255
[Description] Turns emphasized mode on or off
When the LSB of n is 0, emphasized mode is turned off.
When the LSB of n is 1, emphasized mode is turned on.
[Notes] • Only the least significant bit of n is enabled.
• This command and ESC ! turn on and off emphasized mode in the same way. however, that the last received command is effective.
• Emphasized mode and double-strike mode ESC G can cancel each other.However, that the last received command is effective.
[Default] n = 0
[Reference] **ESC !**

ESC G n

[Name] Turn on/off double-strike mode
[Format] ASCII ESC G n
Hex 1B 47 n
Decimal 27 71 n
[Range] 0 ≤ n ≤ 255
[Description] Turns double-strike mode on or off.
•When the LSB of n is 0, double-strike mode is turned off.
•When the LSB of n is 1, double-strike mode is turned on.
[Notes] •Only the lowest bit of n is enabled.
•Printer output is the same in double-strike mode and in emphasized mode.
•Emphasized mode and double-strike mode ESC G can cancel each other.However, that the last received command is effective.
[Default] n = 0
[Reference] **ESC E**

ESC - n

[Name] Turn underline mode on /off

[Format]

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

[Range] 0≤ n ≤ 2
48 ≤ n ≤ 50

[Description] turn underline mode on/off, n value as follows:

n	Function
0, 48	underline mode is turn off
1, 49	underline mode (one dot width) is turn on
2, 50	underline mode (two dot width) is turn on

[Notes] 1) This command is effective for all characters (including the blank space), but not the blank space set by HT.
2) When underline mode is on, 90°clock wise rotated characters and characters and white / black reverse characters cannot be underline.
3) When underline mode is off, there is no underline for following characters. Underline width stays the same, default width: one dot width.
4) Character size change has no effects on underline width.
5) Turn underline mode on / off can be set by ESC !, the command executed at last is effective.

[Default] n = 0

[Reference] **ESC !**

GS ! n

[Name] Select character size

[Format]

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

[Range] 0 ≤ n ≤ 255
（1 ≤ vertical number of times ≤ 6， 1 ≤ horizontal number of times ≤ 6）

[Description] Selects the character height using bits 0 to 3 and selects the character width using bits 4 to 7, as follows:

Bit	Off/On	Hex	Decimal	Function
0	Character height selection. See Table 2.			
1				
2				
3				
4	Character width selection. See Table 1.			
5				
6				
7				

Table 1 Character Width Selection

Hex	Decimal	Width
00	0	1 (normal)
10	16	2 (double-width)
20	32	3
30	48	4

Table 2 Character Height Selection

Hex	Decimal	Width
00	0	1 (normal)
01	1	2 (double-width)
02	2	3
03	3	4

[Notes] This command is effective for all characters (alphanumeric and Kanji), except for HRI characters .

• If n is 0 to 3 beyond the specified range, the horizontal magnification is set to 6 times.

If n is 4 to 7 beyond the specified range, the horizontal magnification is set to 6 times.

In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However,when character orientation changes in 90 clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.

In page mode, vertical and horizontal directions are based on the character orientation.

When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.

The ESC ! command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

[Default] n = 0

[Reference] **ESC !**

ESC V n

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

[Format]

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

[Range] 0 ≤ n ≤ 3

[Description] Set the print direction and starting position in page mode specified by n as shown bellow.

n	Function
0	No rotation
1	Turn 90° clockwise rotation
2	Turn 180° clockwise rotation
3	Turn 270° clockwise rotation

[Notes] 1) This command is effective only in standard mode.
2) When choosing underline mode, underline cannot clockwise 90 degrees.
3) When 90°clockwise rotation mode is on, the direction of double height and double width reverse to that in normal mode (90°clockwise rotation mode is off).

[Default] n=0

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

ESC { n

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

[Format]

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

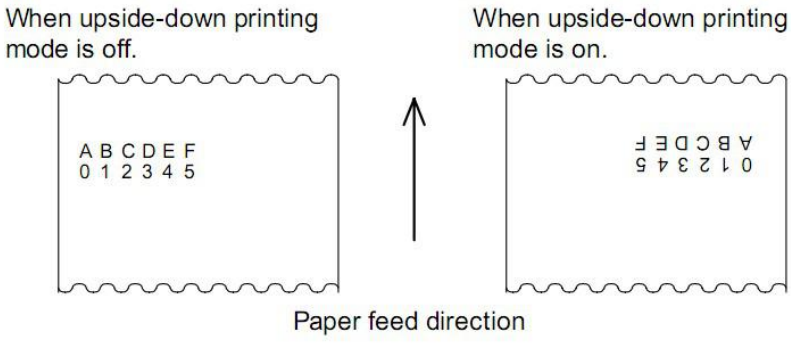
[Range] 0 ≤ n ≤ 255

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

[Notes]
• 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]



GS B n

[Name] Turn white/black reverse printing mode

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

[Range] 0 ≤ n ≤ 255

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

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

[Default] n = 0

ESC R n

[Name] Select an international character set

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

[Range] 0≤n≤15

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

[Notes] • Only character Font 0 and Font 1 has international character set. The command is ineffective with other fonts.

[Default] n=0

FS &

[Name] Select Chinese character mode

[Format]

ASCII	FS	&
Hex	1C	26
Decimal	28	38

[Description] Selects Chinese character mode.

[Notes] When the Chinese character mode is selected, the printer checks whether the code is for Chinese or not; then processes the first byte and the second byte if the code is for Chinese.
Chinese codes are processed in the order of the first byte and second byte.
Chinese character mode is selected when the power is turned on.

[Reference] **FS .**

FS ! n

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

[Format]

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

[Range] 0 ≤ n ≤ 255

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

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

[Notes] When both double-width and double-height modes are set (including right-and left-side character spacing), quadruple-size characters are printed.
The printer can underline all characters (including right-and left-side character spacing), but cannot underline the space set by HT and 90° clockwise- rotated characters.
The thickness of the underline is that specified by FS ,regardless of the character size.
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

[Default] n = 0

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

FS .

[Name] Cancel Chinese character mode
[Format] ASCII FS .
Hex 1C 2E
Decimal 28 46
[Description] Cancels Chinese character mode.
[Notes] Chinese character mode is not selected when the power is turned on.
For Simple Chinese/Traditional Chinese model:
When the Chinese character mode is not selected, all character codes are processed one byte at a time as ASCII code.
Chinese character mode is selected when the power is turned on.
[Reference] **FS &**

ESC % n

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

ESC ? n

[Name] Cancel user-defined characters
[Format] ASCII ESC ? n
Hex 1B 3F n
Decimal 27 63 n
[Range] 32 ≤ n ≤ 127
[Description] Cancels user-defined characters.
[Notes] This command cancels the patterns defined for the character codes specified by n.
After the user-defined characters are canceled, the corresponding patterns for the internal characters are printed.
If a user-defined characters have not been defined, the printer ignores this command.

FS S n1 n2

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

[Format]

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

[Range]
0 ≤ n1 ≤ 255
0 ≤ n2 ≤ 255

[Description]
Sets left- and right-side Chinese character spacing to n1 and n2, respectively.
The left-side character spacing is [n1 × 0.125 mm], and the right-side character spacing is [n2 × 0.125 mm].

[Notes]
This command sets the left- and right-side character spacing for normal-sized characters. When double-width mode is set, the left- and right-side character spacing is twice the normal value.
The spacing which is set with this command can be set independently in standard mode and in page mode.
n standard mode, the horizontal motion unit is used.
In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area, as follows:
1、When the starting position is set to the upper left or lower right of the printable area using ESC T, the horizontal motion unit (x) is used.
2、When the starting position is set to the upper right or lower left of the printable area using ESC T, the vertical motion unit (y) is used.
3、The maximum right-side spacing is approximately 32 mm {255 × 0.125 mm} for slip paper. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] n1 = 0 n2 = 0

FS W n

[Name]	Turn quadruple-size mode on/off for Kanji characters
[Format]	ASCII FS W n Hex 1C 57 n Decimal 28 87 n
[Range]	0 ≤ n ≤ 255
[Description]	Turn quadruple-size mode on/off for Kanji characters When the LSB of n is 0, quadruple-size mode for Kanji characters is off. When the LSB of n is 1, quadruple-size mode for Kanji characters is on. nly the lowest bit of n is valid. n quadruple-size mode, the printer prints the same size characters as when b double-width and double-height modes are both turn on. When quadruple-size mode is turned off using this command, the following characters are printed in normal size. FS! Or GS! can also select and cancel quadruple-size mode by selecting double-height and double-height modes, and the setting of the last received command is effective.
[Default]	n = 0
[Reference]	**FS ! ,GS!**

FS -n

[Name]	Turn underline mode on/off for Kanji characters
[Format]	ASCII FS - n Hex 1C 2D n Decimal 28 45 n
[Range]	0 ≤n ≤ 2, 48 ≤n ≤ 50
[Description]	Turns underline mode for Kanji characters on or off, based on the following values of n for both receipt and slip. The printer can underline all characters (including right- and left-side character spacing), butcannot 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 executed, 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. When the slip paper is selected, the underline thickness is 1 dot even if n is 2 or 50.
[Default]	n = 0
[Reference]	**FS !**

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

[Name] Define user-defined characters

[Format]

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

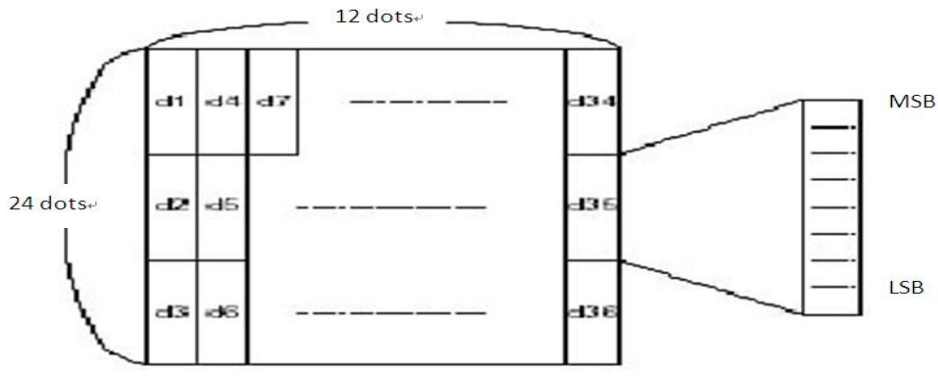
[Range]
y = 3
32 ≤ c1 ≤ c2 ≤ 127
1 ≤ x ≤ 24
0 ≤ d1 ... d(y × xk) ≤ 255

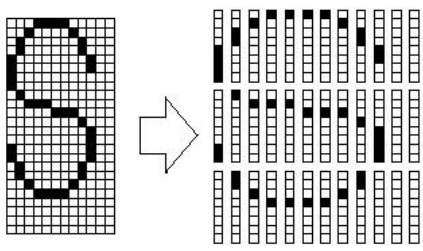
[Description]
Defines user-defined characters.
•y specifies the number of bytes in the vertical direction.
•c1 specifies the beginning character code for the definition, and c2 specifies the final code.
•x specifies the number of dots in the horizontal direction.

[Notes]
•The allowable character code range is from ASCII code <20>H to <7E>H .
•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 user-defined characters is (y × x) bytes.
• When x is less than 13, the user-defined character width by default into 13 points.
•Set a corresponding bit to 1 to print a dot or 0 not to print a dot.
• Can define up to 26 user-defined characters.
• The user-defined character definition is cleared when:
①ESC ? is executed.
②The power is turned off.

[Default] The internal character set

[Example]





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 . . .

ESC % n

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

ESC ? n

[Name]	Cancel user-defined characters
[Format]	ASCII ESC ? n Hex 1B 3F n Decimal 27 63 n
[Range]	32 ≤ n ≤ 126
[Description]	Cancels user-defined characters.
[Notes]	This command cancels the patterns defined for the character codes specified by n. After the user-defined characters are canceled, the corresponding patterns for the internal characters are printed. If a user-defined characters have not been defined, the printer ignores this command.
[Reference]	**ESC &, ESC %**

FS 2 c1 c2 d1 ... dk

[Name] Define user-defined Chinese 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	c1 = FEH	A1H ≤c2 ≤ FEH
Traditional Chinese	c1 = FEH	A1H ≤c2 ≤ FEH

[Description] Cancel the user-defined Chinese characters, character codes are specified by c1 and c2.
c1 specifies the first byte of a character code for a user-defined Chinese character.
c2 specifies the second byte of a character code for a user-defined Chinese character.

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

[Reference] **FS C**

FS ? c1 c2

[Name] Cancel user-defined characters

[Format] ASCII FS ? c1 c2
Hex 1C 3F c1 c2
Decimal 28 63 c1 c2

[Range] c1 and c2 indicates the code of defined characters. The range of c1 and c2 differs depending on the character code system used.

Type of character	c1	c2
Japanese (JIS code system)	c1 = 77H	21H ⩽ c2 ⩽ 7EH
Japanese (SHIFT-JIS code system)	c1 = ECH	40H ⩽ c2 ⩽ 7EH
Simple Chinese	c1 = FEH	A1H ⩽ c2 ⩽ FEH
Traditional Chinese	c1 = FEH	A1H ⩽ c2 ⩽ FEH
Korean (KS C5601)	c1 = FEH	A1H ⩽ c2 ⩽ FEH

[Description] Cancel user-defined Chinese characters, character code is specified by c1 and c2.
•c1 and c2 indicates the code of defined characters. c1 is the first byte, c2 is the second byte.

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

2.6 Other Commands

GS :

[Name] Start/end macro definition

[Format] ASCII GS :

Hex 1D 3A

Decimal 29 58

[Descriptions] Starts or ends macro definition

[Notes] • The maximum capacity of macro function content can be up to 2048 bytes.

GS ^ r t m

[Name] Execute macro

[Format] ASCII GS ^ r t m

Hex 1D 5E r t m

Decimal 9 94 r t m

[Range] 1 ≤ r ≤ 255

0 ≤ t ≤ 255

m = 0, 1

[Descriptions] Executes a macro r times while waiting t × 100 msec for each macro execution, using the mode specified by m as follows:

m	Operation Mode
0	The macro executes r times continuously at the interval specified by **t**.
1	The printer waits for period specified by [t × 100 ms], PAPER OUT LED flashes, and waits for the FEED button to be pressed. After this button is pressed, the printer executes the macro once. The printer repeats this operation r times.

GS (A pL pH n m

[Name] Execute test printing

[Format]

ASCII	GS	(	A	pL pH n
Hex	1D	28	4	pL pH n
Decimal	29	40	6	pL pH n

[Range] (pL+(pH × 256))=2 (pL=2, pH=0)
0 ≤ n ≤ 2， 48 ≤ n ≤ 50
1 ≤ m≤ 5， 49 ≤ m ≤ 53

[Description] • Execute test printing， the way of printing depends on n,m.

n determine the test paper type

n	Paper type
0, 48	Base type(paper roll)
1, 49	Paper roll
2, 50	

m determine printing content

m	printing content
1, 49	Hexadecimal (dump) printing
2, 50	printer configuration infos printing
3, 51	reserve
4,52	start paper check out
5,53	reserve

[Notes] • This command is effective at the beginning of the line in standard mode.
• Receiving this command when defining macro, stop defining macro and execute this command.
•After the test print is finished, the printer resets itself automatically. Therefore, the already-defined data before this command is executed, such as an user-defined characters, downloaded bit image, and macro, becomes undefined,and the receive buffer and print buffer are cleared, and each setting returns to the default value.

ESC c 5 n

[Name]	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 ≤ n ≤ 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. • Only use the effective lowest bit of n. • The FEED button is disabled regardless of the settings with this command, when the cover is open. • When executing the command in macro status, FEED button is activated but paper cannot be fed, i.e. FEED button is effective but cannot feed paper.

ESC = n

[Name]	Select peripheral device
[Format]	ASCII ESC = n Hex 1B 3D n Decimal 27 61 n
[Range]	0≤n≤1
[Description]	selects the device to which the host computer sends data, based on the value of n as follows:

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

[Notes]	• When the printer is disabled, it ignores all received data with the exception of DLE EOT 、 DLE ENQ and ESC ＝.
[Default]	n=1

DLE DC4 fn a b (fn=2)

[Name] Execute power-off sequence

[Format]

ASCII	DLE	DC4	fn	a	b
Hex	10	14	02	a	b
Decimal	16	20	2	a	b

[Range] fn = 2
a = 1
b = 8

[Description] Executes the printer power-off sequence and transmits the power-off notice.
• Saving the maintenance counter values
• Busy controlling for interface
• Changing to waiting state of mechanism
Executes power off processing (this processing depends on printer model).

[Notes] This is a real-time command that the printer executes upon receiving it. Note the following when using this command.
• If this command is embedded within the code string of another command, it is processed as a parameter of the other command, and the print result is not correct.
• If another command (such as graphics data or defined data) has a code string in a parameter that is the same as this command, the printer starts processing this command.
• This command do not turn off the power, the power will be turned off by the operator after receiving power-off notice.
• After executing this command, printer will not process anything. To make the printer to print again, power should be turned off or hardware should be reset.

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

[Name] Clear buffer(s)

[Format]

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

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

[Description] • Clears all data stored in the receive buffer and the print buffer and transmits Clear response.
• If a recoverable error occurred, it will recover from the error.

[Notes] • Do not use this command in a system in which the printer is used with the OPOS driver and Java POS driver that are provided by Seiko Epson Corporation.
• If a code string of this command is embedded within parameters of other commands (graphics data,defined data), the printer performs a buffer clear. If the printer has this command, be sure to check if the code string of this command is embedded within the parameters of another command before transmitting the bit-image data and defined data.