

TP80K

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 Basic Setting 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 DIP switch and memory switch settings are not checked again.		
	The data in the receive buffer is not cleared.		
	The macro definition is not cleared.		

GS P x y

[Name]	Set horizontal and vertical motion units				
[Format]	ASCII	GS	P	x	y
	Hex	1D	50	x	y
	Decimal	29	80	x	y
[Range]	$0 \leq x \leq 255$				
	$0 \leq y \leq 255$				
[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. <ul style="list-style-type: none">• 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.				
[Default]	$x=203, y=406$				

ESC 2

[Name]	Set the default line spacing		
[Format]	ASCII	ESC	2
	Hex	1B	32
	Decimal	27	50
[Description]	Selects 3.75 mm (30×0.125 mm) line spacing.		
[Notes]	The line spacing can be set independently in standard mode and in page mode.		

ESC 3 n

[Name]	Set line spacing.			
[Format]	ASCII	ESC	3	n
	Hex	1B	33	n
	Decimal	27	51	n
[Description]	Sets the line spacing to $[n \times 0.125 \text{ mm}]$.			
[Notes]	The line spacing can be set independently in standard mode and in page mode.			
[Reference]	n =30			

ESC S

[Name]	Select standard mode		
[Format]	ASCII	ESC	S
	Hex	1B	53
	Decimal	27	83
[Default]	None		
[Description]	Switches from page mode to standard mode.		
[Notes]	■ This command is enabled only in page mode. Page mode can be selected by ESC L.		
	■ When this command is executed, data in all the print areas is cleared, the print area set by ESC W returns to the default value, but the value set by ESC T is maintained.		
	■ The following commands switch the settings for standard mode because these commands can be set independently in standard mode and in page mode:		
	• ESC SP, ESC 2, ESC 3, ESC U, and FS S.		
	■ In standard mode, CAN, ESC FF, GS \$, GS Q and GS \ are ignored.		
	■ The settings of ESC T and ESC W, GS (P do not affect printing in standard mode.		
	■ The printer selects page mode with ESC L.		
[Model-dependent variations]	■ Standard mode is selected as the default.		
	None		

ESC L

[Name]	Select page mode.		
[Format]	ASCII	ESC	L
	Hex	1B	4C
	Decimal	27	76
[Description]	Switches from standard mode to page mode.		
[Notes]	This command is enabled only when processed at the beginning of a line in standard mode.		
	This command has no effect in page mode.		
	After printing by FF is completed or by using ESC S , the printer returns to standard mode.		
	This command sets the position where data is buffered to the position specified by ESC T within the printing area defined by ESC W .		
	This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for page mode:		
	① Set right-side character spacing: ESC SP, FS S		
	② Select default line spacing: ESC 2, ESC 3		
	Only valve settings is possible for the following commands in page mode; these commands are not executed.		
	① Turn 90° clockwise rotation mode on/off: ESC V		
	② Select justification: ESC a		
	③ Turn upside-down printing mode on/off: ESC {		
	④ Set left margin: GS L		
	⑤ Set printable area width: GS W		
	The printer returns to standard mode when power is turned on, the printer is reset, or ESC @ is used.		

CAN

[Name]	Cancel print data in page mode.	
[Format]	ASCII	CAN
	Hex	18
	Decimal	24
[Description]	In page mode, deletes all the print data in the current printable area.	
[Notes]	This command is enabled only in page mode.	
	Data in the specified printing area is deleted.	
[Reference]	ESC L, ESC W	

2 Basic Print Commands

LF

[Name]	Print and line feed.
[Format]	ASCII LF Hex 0A Decimal 10
[Description]	Prints the data in the print buffer and feeds one line, based on the current line spacing.
[Notes]	This command sets the print position to the beginning of the line. When this command is processed in page mode, only the print position moves, and the printer does not perform actual printing. The printer will return data 0x06 every time a line is printed.
[Reference]	ESC 2, ESC 3

CR

[Name]	Print and carriage return
[Format]	ASCII CR Hex 0D Decimal 13
[Description]	Executes one of the following operations.

Conditions	Function
Allows auto paper feed	Same to LF
Prohibits auto paper feed and uses serial interface	This command is ignored

FF

[Name]	① Print and return to standard mode in page mode	
	② Print and feed marked paper to print starting position	
[Format]	ASCII	FF
	Hex	0C
	Decimal	12
	① When page mode is selected:	
[Description]	Prints the data in the print buffer collectively and returns to standard mode	
[Notes]	This command is enabled only in page mode. The buffer data is deleted after being printed. The printing area set by ESC W is reset to the default setting. This command sets the print position to the beginning of the line.	
[Reference]	ESC FF, ESC L, ESC S	
	② When BM sensor is effective:	
[Description]	Prints the data in the print buffer and feeds marked paper to the print starting position.	
[Notes]	This command is enabled only when the BM sensor is set to be effective using with DIP SW1-1. This command sets the print position to the beginning of the line. If this command is executed at the print starting position of the marked paper, the printer feeds the marked paper to the next print starting position.	
[Reference]	GS (F, GS FF	

ESC FF

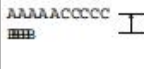
[Name]	Print data in the page mode		
[Format]	ASCII	ESC	FF
	Hex	1B	0C
	Decimal	27	12
[Description]	Print all buffered data in the printable area collectively in page mode.		
[Notes]	1) This command is enable only in page mode.		
	2) When using label paper, when this command is executed, label location is not executed.		
	3) The butter data, ESC T and ESC W set and character set are not deleted after printing.		

ESC J n

[Name]	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 [$n \times 0.125$ 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 .			

ESC K

[Name]	Print and reverse feed			
[Format]	ASCII	ESC	K	n
	Hex	1B	4B	n
	Decimal	27	75	n
[Default]	None			
[Description]	Prints the data in the print buffer and feeds the paper $n \times$ (vertical motion unit) in the reverse direction.			
[Notes]	<ul style="list-style-type: none">■ The maximum paper feed amount depends on the printer model.■ After printing, the print position moves to the beginning of the line. When a left margin is set, the position of the left margin is the beginning of the line.■ When standard mode is selected, the vertical motion unit is used.■ When page mode is selected, the vertical or horizontal motion unit is used for the print direction set by ESC T.<ul style="list-style-type: none">• When the starting position is set to the upper left or lower right of the print area using ESC T, the vertical motion unit is used.• When the starting position is set to the upper right or lower left of the print area using ESC T, the horizontal motion unit is used.■ When this command is processed in page mode, only the print position moves; the printer does not perform actual printing.■ This command is used to temporarily feed a specific length without changing the line spacing set by other commands.			

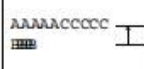
Program Example for all printers	Print Sample
<pre>PRINT #1, CHR\$(65); "P"; CHR\$(180); CHR\$(180); PRINT #1, "AAAAA"; CHR\$(65); PRINT #1, "BBBBB"; CHR\$(65); "K"; CHR\$(30); PRINT #1, "CCCCC"; CHR\$(65);</pre>	 <p>ESC K used to print one line and then reverse feed the paper by 30/180 inch</p>

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]	<p>This command sets the print starting position to the beginning of the line.</p> <p>This command does not affect the line spacing set by ESC 2 or ESC 3.</p> <p>The maximum paper feed amount is 2032 mm. If the paper feed amount (n × line spacing) of more than 2032 mm is specified, the printer feeds the paper only 2032 mm .</p>			
[Reference]	ESC 2, ESC 3			

ESC e

[Name]	Print and reverse feed n lines			
[Format]	ASCII	ESC	e	n
	Hex	1B	65	n
	Decimal	27	101	n
[Default]	None			
[Description]	Prints the data in the print buffer and feeds n lines in the reverse direction.			
[Notes]	<ul style="list-style-type: none">■ The amount of paper fed per line is based on the value set using the line spacing command (ESC 2 or ESC 3).■ The maximum paper feed amount depends on the printer model.■ After printing, the print position moves to the beginning of the line. When a left margin is set, the position of the left margin is the beginning of the line.■ When this command is processed in page mode, only the print position moves, and the printer does not perform actual printing.■ This command is used to temporarily feed a specific line without changing the line spacing set by other commands.			

Program Example for all printers	Print Sample
<pre>PRINT #1, "AAAAA"; CHR\$(65); PRINT #1, "BBBBB"; CHR\$(65); "e"; CHR\$(1); PRINT #1, "CCCCC"; CHR\$(65);</pre>	 <p>Paper reverse fed one line after printing the line of Bs</p>

3 Print Position Commands

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.	
[Reference]	ESC D	

ESC D n1 ... Nk NUL

[Name]	Set horizontal tab position				
[Format]	ASCII	ESC	D	n1	Nk...NUL
	Hex	1B	44	n1	Nk 00
	Decimal	27	68	n1	Nk 0
[Range]	$1 \leq n \leq 255$				
	$0 \leq k \leq 32$				
[Description]	Sets horizontal tab positions				
	<ul style="list-style-type: none">• n specifies the column number for setting a horizontal tab position calculated from the beginning of the line.• k indicates the total number of horizontal tab positions to be set.				
[Notes]	<ul style="list-style-type: none">• The horizontal tab position is stored as a value of [character width x n] measured from the beginning of the line. The character width includes the right-side character spacing and double-width characters are set with twice the width of normal characters.• This command cancels previous tab settings.• When setting n = 8, the print position is moved to column 9 sending \$09.• Up to 32 tab positions (k = 32) can be set. Data exceeding 32 tab positions is processed as normal data.				
	Send [n] k in ascending order and place a 0 NUL code at the end. When [n] k is less than or equal to the				
	preceding value [n] k-1, the setting is complete and the data which follows is processed as normal data. ⁵²				
	<ul style="list-style-type: none">• \$1B \$44 00 cancels all horizontal tab positions.• The previously specified horizontal tab position does not change, even if the character width is modified.				
[Default]	Default tab positions are set at intervals of 8 characters (columns12×24) for Font A when the right-side character spacing is 0.				
[Reference]	HT				

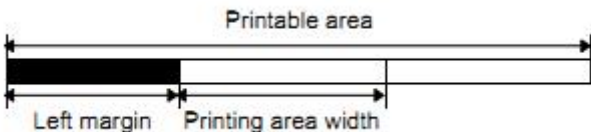
ESC \$ nL nH

[Name]	Set absolute print position				
[Format]	ASCII	ESC	\$	nL	nH
	Hex	1B	24	nL	nH
	Decimal	27	36	nL	nH
[Range]	$0 \leq nL \leq 255$				
	$0 \leq nH \leq 255$				
[Description]	Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed. The distance from the beginning of the line to the print position is $[(nL + nH \times 256) \times 0.125 \text{ mm}]$.				
[Notes]	Settings outside the specified printable area are ignored.				
	In standard mode, the horizontal motion unit (x) is used.				
	In page mode, horizontal or vertical motion units differ depending on the starting position of the printable area, as follows:				
	<ul style="list-style-type: none">① When the starting position is set to the upper left or lower right of the printable area using ESC T, the horizontal motion unit (x) is used.② When the starting position is set to the upper right or lower left of the printable area using ESC T, the vertical motion unit (y) is used.				
[Reference]	ESC \, GS \$, GS \				

ESC \ nL nH

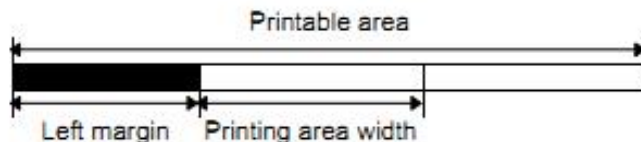
[Name]	Set relative horizontal print position.				
[Format]	ASCII	ESC	\	nL	nH
	Hex	1B	5C	nL	nH
	Decimal	27	92	nL	nH
[Range]	$0 \leq nL \leq 255$				
	$0 \leq nH \leq 255$				
[Description]	Sets the relative horizontal print starting position from the current position. This command sets the distance from the current position to $[(nL + nH \times 256) \times 0.125 \text{ mm}]$.				
[Notes]	The printer ignores any setting that exceeds the print area.				
	When pitch N is specified for the movement to the right: $nL + nH \times 256 = N$.				
	Use the complement of N for setting N pitch movement to the left: $(nL + nH \times 256) = 65536 - N$.				
	Print starting position from the current position to $[N \times 0.125 \text{ mm}]$.				
[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]	$0 \leq nL \leq 255$				
	$0 \leq nH \leq 255$				
	Sets the left margin using nL and nH. The left margin is set to $[(nL + nH \times 256) \times 0.125 \text{ mm}]$.				
[Description]					
[Notes]	This command is effective 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 does not affect printing in page mode.				
	If the setting exceeds the printable area, the maximum value of the printable area is used.				
[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]	$0 \leq nL \leq 255$				
	$0 \leq nH \leq 255$				
[Description]	Sets the printing area width to the area specified by nL and nH. The printing area width is set to $[(nL + nH \times 256) \times 0.125\text{mm} (0.0049'')]$.				



[Notes]	This command is effective only when processed at the beginning of the line.				
	If this command is input in page mode, the printer performs only internal flag operations.				
	This command does not affect printing in page mode.				
	If the setting exceeds the printable area, the maximum value of the printable area is used.				
[Default]	It's related to the actual print width. It can be set different in different printers.				
[Reference]	GS L				

ESC a n

[Name] Set relative horizontal print position.

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

[Range] $0 \leq n \leq 248 \leq n \leq 50$

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

n	Justification
0,48	Left justification
1,49	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 \.

[Default] N=0

[Example] Left justification Centering Right justification

<div>ABC ABCD ABCDE</div>	<div>ABC ABCD ABCDE</div>	<div>ABC ABCD ABCDE</div>
-----------------------------------	-----------------------------------	-----------------------------------

GS T

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

[Format]

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

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

[Default] None

[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

- [Notes]
- 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.

Program Example

```
PRINT #1, CHR$(&H1D); "T"; CHR$(1);  
PRINT #1, CHR$(&H1B); "c0"; CHR$(2);  
PRINT #1, CHR$(&H1D); "V"; CHR$(66); CHR$(66);
```

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]	<ul style="list-style-type: none">•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						

ESC T n

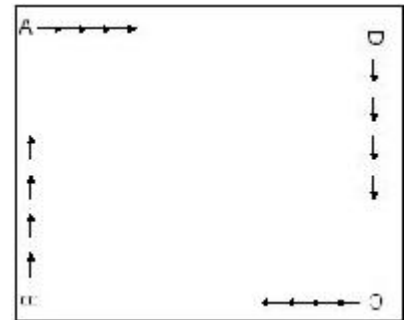
[Name] Select printing area direction in page mode.

[Format] ASCII ESC T n
 Hex 1B 54 n
 Decimal 27 84 n

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

[Description] Select direction and initial position of printing area in page mode.
n specifies the direction and initial position of printing area.

n	Print Direction	Initial Position
0,48	From left to right	A
1,49	From bottom to top	B
2,50	From right to left	C
3,51	From top to bottom	D



[Notes] • If current mode is standard mode, setting only the internal flag will not affect printing.
 • This command can set the initial position of print content in the printing area.

[Default] n=0

[Reference] ESC \$, ESC L, ESCW, ESC \, GS \$, GS \

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]	$0 \leq nL \leq 255, 0 \leq nH \leq 255$				
[Description]	Sets the absolute vertical print starting position to buffer character data in page mode.				
	This command sets the absolute print position to $[(n + n \times 256) \times 0.125 \text{ mm}]$.				
[Notes]	This command is effective only in page mode.				
	If the $[(nL + nH \times 256) \times (\text{vertical or horizontal motion units})]$ exceeds the specified printing area, this command is ignored.				
	The horizontal starting buffer position does not move.				
	The reference starting position is that specified by ESC T .				
	This command operates as follows, depending on the starting position of the printing area specified by ESC T :				
[Reference]	① When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.				
	② When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal 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]	$0 \leq nL \leq 255$ $0 \leq nH \leq 255$				
[Description]	Sets the relative vertical print starting position from the current position in page mode.				
	This command sets the distance from the current position to $[(nL + nH \times 256) \times 0.125 \text{ mm (0.0049")}]$.				
[Notes]	This command is ignored unless page mode is selected.				
	When pitch N is specified for the movement downward:				
	$nL + nH \times 256 = N$				
	When pitch N is specified for the movement upward (the negative direction), use the complement of 65536.				
	When pitch N is specified for the movement upward:				
	$nL + nH \times 256 = 65536 - N$				
	Any setting that exceeds the specified printing area is ignored.				
	This command functions as follows, depending on the print starting position set by ESC T :				
	① When the starting position is set to the upper left or lower right of the printing, the vertical motion unit (y) is used.				
	② When the starting position is set to the upper right or lower left of the printing area, the horizontal motion unit (x) is used.				

4 Basic Character Commands

ESC SP n

[Name]	Set the right spacing of character.			
[Format]	ASCII	ESC	SP	n
	Hex	1B	20	n
	Decimal	1B	20	n
[Range]	$0 \leq n \leq 255$			
[Default]	n = 0			
[Description]	Set the right spacing of character as $[n \times 0.125\text{mm}(n \times 0.0049\text{ inch})]$.			
[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).			

ESC ! n

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

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

[Notes]	When both double-height and double-width modes are selected, characters will magnify two times in horizontal and vertical. The printer can underline all characters, except the space set by HT , 90 clockwise rotated characters and HRI characters.. All characters align at bottom. ESC E can also turn on or off emphasized mode. However, the setting of the last received command is effective.
---------	--

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

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

[Default] n=0

ESC M n

[Name] Select character font

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

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

[Description] Selects the character font

n	Function
0, 48	Character Font A (12×24) selected.
1, 49	Character Font B (8×16) selected.

[Notes] **ESC !** can also select character font types. However the setting of the last received command is effective.

[Reference] **ESC !**

ESC E n

[Name] Set print density

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

[Range] $0 \leq n \leq 2$

n	Print density
0	Slightly light
1	normal
2	dark

ESC G n

[Name]	Select double-strike mode			
[Format]	ASCII	ESC	G	n
	Hex	1B	47	n
	Decimal	27	71	n
[Range]	$0 \leq n \leq 255$			
[Description]	Turns double-strike mode on or off.			
	• When the LSB of n is 0, the double-strike mode is off.			
	• When the LSB of n is 1, the double-strike mode is on.			
[Notes]	• Only the LSB of n is effective.			
	• Printer output is the same in double-strike and emphasized mode			
[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, <i>n</i> 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		
[Note]	This command is effective for all characters (including the blank space), but not the blank space set by HT .			
	When underline mode is on, 90°clock wise rotated characters and characters and white / black reverse characters cannot be underline.			
	When underline mode is off, there is no underline for following characters. Underline width stays the same, default width: one dot width.			
	Character size change has no effects on underline width.			
	Turn underline mode on / off can be set by ESC ! , the command executed at last is effective.			
[Reference]	ESC !			

GS ! n

[Name] Select character size.

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

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

($0 \leq$ vertical number of times ≤ 7 , $0 \leq$ horizontal number of times ≤ 7)

[Description] Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 6, as follows:

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

[Width magnification]

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

[Height magnification]

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

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

If n is 0 to 2 beyond the specified range, the horizontal magnification is set to 2 times.

If n is 4 to 6 beyond the specified range, the horizontal magnification is set to 2 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 !**

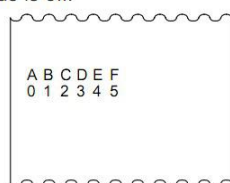
ESC V n

[Name]	Turn 90°clockwise rotation mode on/off.			
[Format]	ASCII	ESC	V	n
	Hex	1B	56	n
	Decimal	27	86	n
[Range]	n = 0, 1, 48, 49			
[Description]	n=0, 48	Doesn't rotate		
	n=1,49	Rotate 90 degrees		
[Notes]	It only support n=0, 1, 48, 49			
	This command is valid only in standard mode.			
	In underline mode,underline can't rotate 90 degrees clockwise.			
	In clockwise rotation 90 degrees mode,the direction of double-height and double-width is opposite of the normal mode.			
[Default]	n = 0			
[Reference]	ESC !, ESC			

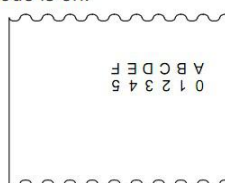
ESC { n

[Name]	Turn upside-down printing mode on/off.			
[Format]	ASCII	ESC	{	n
	Hex	1B	7B	n
	Decimal	27	123	n
[Range]	$0 \leq n \leq 255$			
[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]				

When upside-down printing mode is off.



When upside-down printing mode is on.



Paper feed direction

GS B n

[Name]	Turn white/black reverse printing mode			
[Format]	ASCII	GS	B	n
	Hex	1D	42	n
	Decimal	29	66	n
[Range]	$0 \leq n \leq 255$			
[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 available for built-in characters and user-defined 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]	$0 \leq n \leq 15$			
[Description]	Selects international character set n from the following table:			

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

[Default]	n=0
-----------	-----

ESC t n

[Name] Select character code table

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

[Range] $0 \leq n \leq 5$; $13 \leq n \leq 21$; $n = 26$; $32 \leq n \leq 34$; $n = 36, 37$; $39 \leq n \leq 40$; $45 \leq n \leq 52$; $54 \leq n \leq 66$

[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]

[Notes] Only font 0 has character code table and this command is ineffective with other fonts.

The settings won't missing even if powers off.

[Default] Default character code table 437.

5 Chinese Character Commands

FS &

[Name]	Select multi-byte character		
[Format]	ASCII	FS	&
	Hex	1C	26
	Decimal	28	38
[Description]	Selects Korean character mode.		
[Notes]	For Japanese Korean model:		
	This command is effective only when the JIS code system is selected.		
	When the Korean character mode is selected, the printer processes all Korean code as two bytes each.		
	Korean codes are processed in the order of the first byte and second byte.		
	Korean character mode is not selected when the power is turned on.		
	Using FS C , the Korean character code system is selected.		
	For Chinese/Taiwanese Korean model:		
	When The Korean character mode is selected, the printer checks whether the code is for Korean or not; then processes the first byte and the second byte if the code is for Korean.		
	Korean codes are processed in the order of the first byte and second byte.		
	Korean character mode is not selected when the power is turned on.		
[Reference]	FS ., FS C		

FS .

[Name]	Cancel multi-byte character		
[Format]	ASCII	FS	.
	Hex	1C	2E
	Decimal	28	46
[Description]	Cancels Korean character mode.		
[Notes]	For Japanese Korean model:		
	This command is effective only when the JIS code system is selected.		
	When the Korean character mode is not selected, all character codes are processed one byte at a time as ASCII code.		
	Korean character mode is not selected when the power is turned on.		
	For Chinese/Taiwanese Korean model:		
	When the Korean character mode is not selected, all character codes are processed one byte at a time as ASCII code.		
	Korean character mode is selected when the power is turned on.		
[Reference]	FS &, FS C		

FS ! n

[Name] Set multi-byte character

[Format]

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

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

[Description] Sets the print mode for Korean 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-width mode is OFF.
	On	08	8	Double-width 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.

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

It is possible to emphasize the Korean character using **FS W** or **GS !**; the setting of the last received command is effective.

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

[Default] n = 0

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

FS S n1 n2

[Name]	Set Kanji character spacing				
[Format]	ASCII	FS	S	n1	n2
	Hex	1C	53	n1	n2
	Decimal	28	83	n1	n2
[Range]	$0 \leq n1 \leq 255; 0 \leq n2 \leq 255$				
[Description]	Sets left- and right-side spacing of the multi-byte code character n1 and n2, respectively.				
	<ul style="list-style-type: none"> • Set the left-side character spacing to [n1 × horizontal or vertical motion units]. • Set the right-side character spacing to [n2 × horizontal or vertical motion units]. 				
[Notes]	<p>■ Settings of this command affect multilingual characters and user-defined characters.</p> <p>■ When a character size is set to N times as large as a normal size, both right- and left-side character spacings are also set to N times as large as a normal size.</p> <p>■ In standard mode, the horizontal motion unit (perpendicular to the paper feed direction) is used.</p> <p>■ In page mode, the horizontal or vertical motion unit differs, depending on the starting position set by ESC T.</p> <ul style="list-style-type: none"> • When the starting position is set to the upper left or lower right, the horizontal motion unit (perpendicular to the paper feed direction) is used. • When the starting position is set to the upper right or lower left, the vertical motion unit (paper feed direction) is used. <p>■ Different character spacing can be set for standard mode and page mode.</p> <ul style="list-style-type: none"> • When this command is set in standard mode, character spacing for multilingual (except Thai) characters printed in standard mode is set. • When this command is set in page mode, character spacing for multilingual (except Thai) characters printed in page mode is set. <p>■ If the horizontal or vertical motion unit is changed after setting the character spacing, the spacing between the characters is not changed.</p> <p>■ The character spacing is effective until ESC @ is executed, the printer is reset, or the power is turned off.</p> <p>■ This command is used to change spacing between characters.</p>				
[Default]	n1=0, n2=0				

<p>Program Example</p> <pre> PRINT #1, CHR\$(6H1D); "P"; CHR\$(180); CHR\$(180); PRINT #1, CHR\$(6H1C); "C"; CHR\$(0); PRINT #1, CHR\$(6H1C); "S"; PRINT #1, CHR\$(6H1C); "S"; CHR\$(0); CHR\$(0); PRINT #1, CHR\$(6H34); CHR\$(6H41); PRINT #1, CHR\$(6H3B); CHR\$(6H7A); CHR\$(6HA); PRINT #1, CHR\$(6H1C); "S"; CHR\$(8); CHR\$(8); PRINT #1, CHR\$(6H34); CHR\$(6H41); PRINT #1, CHR\$(6H3B); CHR\$(6H7A); CHR\$(6HA); PRINT #1, CHR\$(6H1C); ". "; </pre> <p>← Select JIS code system ← Specify Kanji mode ← Cancel Kanji mode</p>	<p>Print Sample</p> <p>漢字 ← Left- and right-side character spacing: 0 mm 漢字 ← Left- and right-side character spacing: approx. 1.129 mm [8/180"]</p>
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FS W n

[Name]	Turn quadruple-size mode on/off for multi-byte character			
[Format]	ASCII	FS	W	n
	Hex	1C	57	n
	Decimal	28	87	n
[Range]	$0 \leq n \leq 255$			
[Description]	Turn quadruple-size mode on/off for multi-byte character			
	When the LSB of n is 0, quadruple-size mode for Korean characters is off.			
	When the LSB of n is 1, quadruple-size mode for Korean characters is on.			
	Only the lowest bit of n is valid.			
	In quadruple-size mode, the printer prints the same size characters as when both double-width and double-height modes are both turned on.			
[Default]	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.			
[Reference]	FS ! , GS !			

FS - n

[Name]	Turn underline mode on/off for multi-byte character			
[Format]	ASCII	FS	-	n
	Hex	1C	2D	n
	Decimal	28	45	n
[Range]	0 ≤n ≤ 2, 48 ≤n ≤ 50			
[Description]	Turns underline mode for Korean characters on or off, based on the following valuesof n for both receipt and slip.			
	n	Function		
	0,48	Turns off underline mode for Korean characters		
	1,49	Turns on underline mode for Korean characters (1-dot thick)		
	2,50	Turns on underline mode for Korean characters (2-dot thick)		

[Notes]	<p>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.</p> <p>After the underline mode for Korean 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.</p> <p>The specified line thickness does not change even when the character size changes.</p> <p>It is possible to turn underline mode on or off using FS !, and the last received command is effective.</p> <p>When the slip paper is selected, the underline thickness is 1 dot even if n is 2 or 50.</p>
[Default]	n = 0
[Reference]	FS !

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.																				
	<table><thead><tr><th>Models</th><th>c1</th><th>c2</th></tr></thead><tbody><tr><td>Japanese model (JIS code)</td><td>c1 = 77H</td><td>21H ≤ c2 ≤ 7EH</td></tr><tr><td>Japanese model (SHIFT JIS code)</td><td>c1 = ECH</td><td>40H ≤ c2 ≤ 7EH, 80H ≤ c2 ≤ 9EH</td></tr><tr><td>Simplified Chinese</td><td>c1 = FEH</td><td>A1H ≤ c2 ≤ FEH</td></tr><tr><td>Traditional Chinese</td><td>c1 = FEH</td><td>A1H ≤ c2 ≤ FEH</td></tr></tbody></table>						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
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																			
	0 ≤ d ≤ 255																				
	k = 72																				
[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)	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.

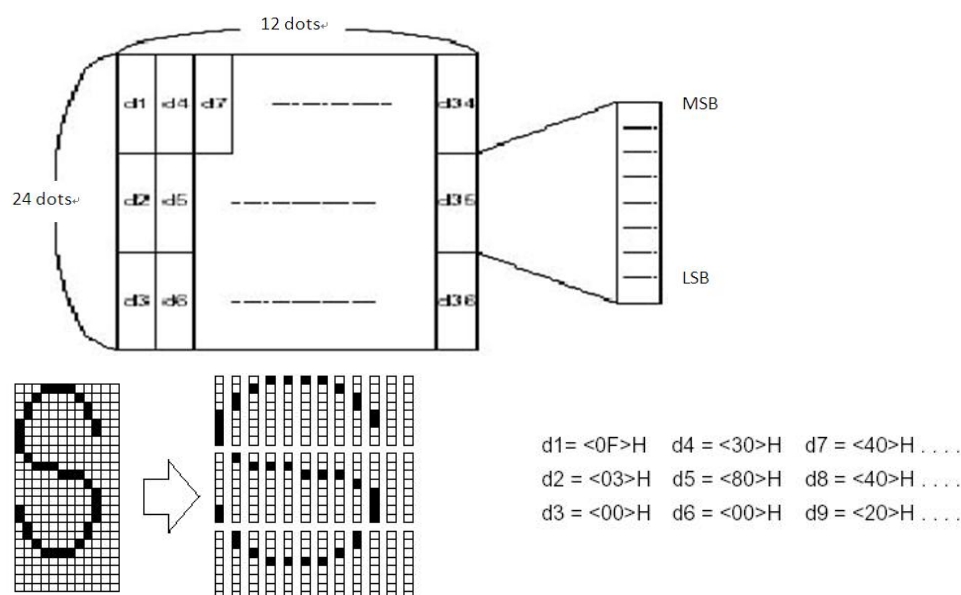
- c1 and c2 indicates the code of defined characters. c1 is the first byte, c2 is the second byte.

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

6 User-defined Character Commands

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

[Name]	Define user-defined characters.						
[Format]	ASCII	ESC	&	y	c1	c2	[x1 d1...d(y × x1)]...[xk d1...d(y × 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 is selected)						
	$0 \leq x \leq 8$ (when Font B is selected)						
[Description]	$0 \leq d1 \dots d(y \times xk) \leq 255$						
	Defines user-defined characters.						
[Notes]	<ul style="list-style-type: none"> • 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. 						
	<ul style="list-style-type: none"> • 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.						
	<ul style="list-style-type: none"> • d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. 						
	<ul style="list-style-type: none"> • The data to define user-defined characters is (y × x) bytes. 						
	<ul style="list-style-type: none"> • When x is less than 13, the user-defined character width by default into 13 points. 						
	<ul style="list-style-type: none"> • Set a corresponding bit to 1 to print a dot or 0 not to print a dot. 						
	<ul style="list-style-type: none"> • Can define up to 26 user-defined characters. 						
	<ul style="list-style-type: none"> • The user-defined character definition is cleared when: <ol style="list-style-type: none"> ① ESC ? is executed. ② The power is turned off. 						
	The internal character set.						
[Default]							
[Example]							



ESC % n

[Name]	Select/cancel user-defined character set.			
[Format]	ASCII	ESC	%	n
	Hex	1B	25	n
	Decimal	27	37	n
[Range]	$0 \leq n \leq 255$			
[Description]	Selects or cancels the user-defined character set.			
	<ul style="list-style-type: none">•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]	<ul style="list-style-type: none">•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]	$32 \leq n \leq 127$			
[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.			

7 QR Code & PDF417 Commands

GS (k pL pH cn fn [parameters])

[Name] Set up and print symbol

[Description]

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

cn	Type of Symbol
48	PDF417 (two-dimensional codes)
49	QR Code (two-dimensional codes)

cn	fn	Format	Function No.	Function name
48	65	GS (k pL pH cn fn n	065	PDF417: Set the number of columns in the data region.
	66	GS (k pL pH cn fn n	066	PDF417: Set the number of rows.
	67	GS (k pL pH cn fn n	067	PDF417: Set the width of the module.
	68	GS (k pL pH cn fn n	068	PDF417: Set the row height.
	69	GS (k pL pH cn fn m n	069	PDF417: Set the error correction level.
	70	GS (k pL pH cn fn m	070	PDF417: Select the options
	82	GS (k pL pH cn fn m	082	PDF417: Transmit the size information of the symbol data in the symbol storage area.
49	65	GS (k pL pH cn fn n1 n2	165	QR Code: Select the model
	67	GS (k pL pH cn fn n	167	QR Code: Set the size of module.
	69	GS (k pL pH cn fn n	169	QR Code: Select the error correction level.
	80	GS (k pL pH cn fn m d1...dk	180	QR Code: Store the data into the symbol storage area.
	81	GS (k pL pH cn fn m	181	QR Code: Print the symbol data in the symbol storage area.
	82	GS (k pL pH cn fn m	182	QR Code: Transmit the size information of the symbol data in the symbol storage area.

[Notes]

- "Symbol data" means the data received with <Function 080 or 180> before encoding.
- "Symbol storage area" means the area where the data received with <Function 080 or 180> before encoding is stored.
- When <Function 082 or 182> is transmitted, do not transmit the subsequent data until the status is received.
- PDF417 (cn=48) is supported in ANK model.

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

[Name]	PDF417: Set the number of columns in the data region.
[Format]	ASCII GS (k pL pH cn fn n Hex 1D 28 6B 03 00 30 41 n Decimal 29 40 107 3 0 48 65 n
[Range]	(pL + pH × 256) = 3 (pL = 3, pH = 0) cn = 48 fn = 65 0 ≤ n ≤ 30
[Default]	n=0
[Description]	Set the number of columns in the PDF417 data region. <ul style="list-style-type: none">• When n=0, specifies automatic processing.• When n is not 0, sets the number of columns in the data region to n codeword.
[Notes]	The following data is not included in the number of columns: <ul style="list-style-type: none">• 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. <ul style="list-style-type: none">• When n=0, specifies automatic processing, the number of rows is calculated by the number of print data or print area.• 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 width of the module.
[Format] ASCII GS (k pL pH cn fn n
Hex 1D 28 6B 03 00 30 43 n
Decimal 29 40 107 3 0 48 67 n
[Range] $(pL + pH \times 256) = 3$ (pL = 3, pH = 0)
cn = 48
fn = 67
 $2 \leq n \leq 8$
[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 row height
[Format] ASCII GS (k pL pH cn fn n
Hex 1D 28 6B 03 00 30 44 n
Decimal 29 40 107 3 0 48 68 n
[Range] $(pL + pH \times 256) = 3$ (pL = 3, pH = 0)
cn = 48
fn = 68
 $2 \leq n \leq 8$
[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 = 69)

[Name] PDF417: Set the error correction level

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

[Range] $(pL + pH \times 256) = 4$ ($pL = 4, pH = 0$)

cn = 48

fn = 69

m = 48, 49

$48 \leq n \leq 56$ [m = 48]

$0 \leq n \leq 40$ [m = 48]

[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 codewords
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 $\times n \times 0.1 = (A)$]. The number of the error correction codeword is changeable in proportion to the number of the codeword in the data area.

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

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

[Name]	PDF417: Select the options									
[Format]	ASCII	GS	(	k	pL	pH	cn	fn	m	
	Hex	1D	28	6B	03	00	30	46	m	
	Decimal	29	40	107	3	0	48	70	m	
[Range]	$(pL + pH \times 256) = 3$ (pL = 3, pH = 0)									
	cn = 48									
	fn = 70									
	m = 0,1									
[Default]	m = 0									
[Description]	Selects the option for PDF417.									

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

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

[Name]	PDF417: Transmit the size information of the symbol data in the symbol storage area.									
[Format]	ASCII	GS	(	k	pL	pH	cn	fn	m	
	Hex	1D	28	6B	03	00	30	52	m	
	Decimal	29	40	107	3	0	48	82	m	
[Range]	$(pL + pH \times 256) = 3$ (pL = 3, pH = 0)									
	cn = 48									
	fn = 82									
	m = 48									
[Description]	<ul style="list-style-type: none">• Transmits the size information for the encoded PDF417 symbol data in the symbol storage area using the process of <Function 080>									
[Notes]	<ul style="list-style-type: none">• This function do not process printing.									
	<ul style="list-style-type: none">• The quiet zone is not included in the size information.									

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

[Name] QR Code: Select the model

[Format] ASCII GS (k pL pH cn fn n1 n2
Hex 1D 28 6B pL pH cn fn n1 n2
Decimal 29 40 107 pL pH cn fn n1 n2

[Range] $(pL + pH \times 256) = 4$ (pL = 4, pH = 0)

cn = 49

fn = 65

n1 = 49, 50

n2 = 0

[Default] n1 = 50, n2 = 0

[Description] • Select the model for QR Code

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

<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 pL pH cn fn n
Decimal 29 40 107 pL pH cn fn n

[Range] $(pL + pH \times 256) = 3$ (pL = 3, pH = 0)

cn = 49

fn = 67

$1 \leq n \leq 16$

[Default] n = 3

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

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

[Name] QR Code: Select the error correction level

[Format] ASCII GS (k pL pH cn fn n
Hex 1D 28 6B pL pH cn fn n
Decimal 29 40 107 pL pH cn fn n

[Range] $(pL + pH \times 256) = 3$ (pL = 3, pH = 0)
cn = 49
fn = 69
 $48 \leq n \leq 51$

[Default] n = 48

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

n1	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%

<Function 180> GS (k pL pH cn 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 cn fn m d1...dk
Decimal 29 40 107 pL pH cn fn m d1...dk

[Range] $4 \leq (pL + pH \times 256) \leq 7092$ ($0 \leq pL \leq 255$, $0 \leq pH \leq 27$)
cn = 49
fn = 80
m = 48
 $0 \leq d \leq 255$
 $k = (pL + pH \times 256) - 3$

[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	pL	pH	cn	fn	m
	Decimal	29	40	107	pL	pH	cn	fn	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>.								
[Note]	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: Transmit the size information of 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).								

8 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

$0 \leq nL \leq 255$

$0 \leq nH \leq 3$

$0 \leq d \leq 255$

[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)	Amount of Data(k)	Number of Bits for vertical data
0	8-dot single-density	8	67	101	$nL + nH \times 256$
1	8-dot double-density	8	67	203	$nL + nH \times 256$
32	24-dot single-density	24	203	101	$(nL + nH \times 256) \times 3$
33	24-dot double-density	24	203	203	$(nL + nH \times 256) \times 3$

[Note] 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 $nL + nH \times 256$.

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 **GS L** and **GS W** less 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.

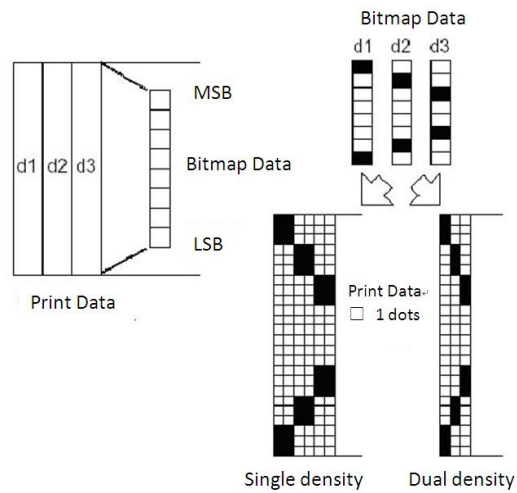
② If step ① does not provide sufficient width for the data, the left margin is reduced to accommodate the data. For each bit of data in single-density mode (m = 0, 32), the printer prints two dots: for each bit of data in double-density mode (m = 1, 33), the printer prints one dot. This must be considered 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.

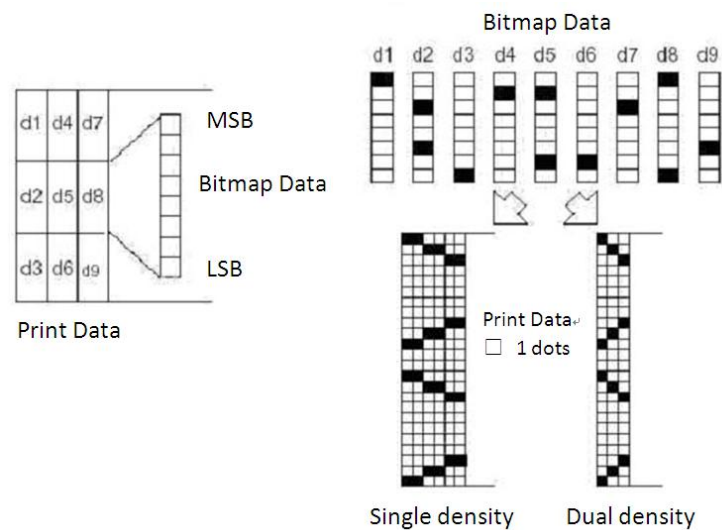
This command won't be influenced by other print modes (emphasized)

/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 ≤ n ≤ 255				
	0 ≤ xL ≤ 255				
	1 ≤ (xL + xH × 256) ≤ 1023				
	1 ≤ (yL + yH × 256) ≤ 800				
	0 ≤ d ≤ 255				
	k = (xL + xH × 256) × (yL + yH × 256) × 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.				
[Notes]	yL, yH specifies (yL + yH × 256) × 8 dots in the vertical direction for the NV bit image you are defining.				
	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

$([data: (xL + xH \times 256) \times (yL + yH \times 256) \times 8] + [header :4])$ bytes of NV memory.

The definition area in this printer is a maximum of 64K 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.

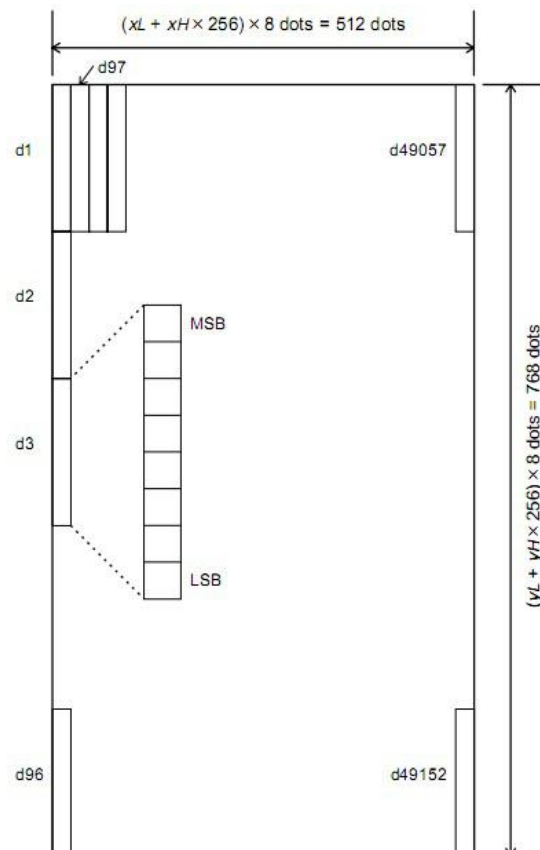
Once an NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.

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.

When bit image downloads normally, the printer will return data 0x06; While download error occurs, the printer will return data 0x15.

[Example]

When xL = 64, xH = 0, yL = 96, yH = 0



FS p n m

[Name] Print NV bit image

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

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

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

m	Mode	Scaling for horizontal	Scaling for vertical
0, 48	Normal	203dpi	203dpi
1, 49	Double-width	203dpi	101dpi
2, 50	Double-height	101dpi	203dpi
3, 51	Quadruple	101dpi	101dpi

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

m specifies the bit imagemode.

[Notes] NV bit image is a bit image defined in non-volatile memory by FS q and printed by **FS p**.

This command is not effective when the specified NV bit image has not been defined.

In standard mode, this command is effective only when there is no data in the print buffer.

This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.

If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.

If the printing area width set by **GS L** and **GS W** for the NV bit image is less than one vertical line, the following processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode (m=0, 48) and in double-height mode (m=2, 50), and it means 2 dots in double-width mode (m=1, 49) and in quadruple mode (m=3, 51).

① The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.

② If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.

This command feeds dots (for the height n of the NV bit image) in normal and double-width modes, and (for the height $n \times 2$ of the NV bit image) in double-height and quadruple modes, regardless of the line spacing specified by **ESC 2** or **ESC 3**.

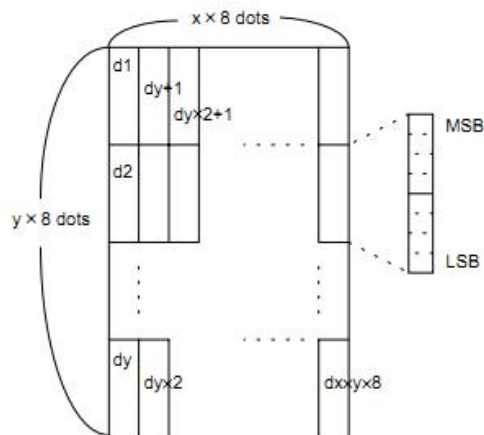
After printing the bit image, this command sets the print position to the beginning of the line and processes the data that follows as normal data.

When NV bit image prints normally, the printer will return data 0x06; While printing fails, the printer will return data 0x15.

[Reference] **GS k**

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]	$1 \leq x \leq 72$, $1 \leq y \leq 48$, $0 \leq d \leq 255$, $x \times y \leq 1536$
[Description]	Defines a downloaded bit image using the number of dots specified by x and y. x specifies the number of dots in the horizontal direction. y specifies the number of dots in the vertical direction.
[Notes]	The number of dots in the horizontal direction is $x \times 8$; in the vertical direction it is $y \times 8$.
	If $x \times y$ is out of the specified range, this command is disabled.
	The d indicates bit-image data. Data (d) specifies a bit printed as 1 and not printed as 0.
	The downloaded bit image definition is cleared when:
	① ESC @ is executed. ② ESC & is executed. ③ Printer is reset or the power is turned off.
	The following figure shows the relationship between the downloaded bit image and the printed data.



When bit image downloads normally, the printer will return data 0x06; While download error occurs, the printer will return data 0x15.

[Reference] **GS /**

GS / m

[Name] Print downloaded bit image.

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

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

[Description] Print downloaded bit image 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
3,51	Quadruple	101dpi	101dpi

[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.
This command has no effect in the print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside-down printing mode.
If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
Refer to Figure 3.11.3 for the downloaded bit image development position in page mode.
If the width of the printing area set by **GS L** and **GS W** is less than the width required by the data sent with the **GS /** command; the following will be performed on the line in question (but the printing cannot exceed the maximum printable area)
① The width of the printing area is extended to the right to accommodate the amount of data.
② If step ① does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
For each bit of data in normal mode ($m = 0,48$) and double-height mode ($m = 2, 50$), the printer prints one dot: for each bit of data in double-width mode ($m = 1, 49$) and quadruple mode ($m = 3, 15$), the printer prints two dots.
When bit image prints normally, the printer will return data 0x06; While print error occurs, the printer will return data 0x15.

[Reference] **GS ***

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

$0 \leq xL \leq 255$

$0 \leq xH \leq 255$

$0 \leq yL \leq 255$

$0 \leq d \leq 255$

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

[Description] Selects raster bit-image mode.

The value of m selects the mode, as follows:

M	Mdoe	Vertical Dot Density	Horizontal Dot Density
0,48	Normal	203 dpi	203 dpi
1,49	Double-width	203 dpi	101 dpi
2,50	Double-height	101 dpi	203 dpi
3,51	Quadruple	101 dpi	101 dpi

xL, xH, select the number of data bytes ($xL+xH \times 256$) in the horizontal direction for the bit image.

yL, yH, select the number of data bits ($yL+yH \times 256$) in the vertical direction for the bit image.

[Notes] In standard mode, this command is effective only when there is no data in the print buffer.

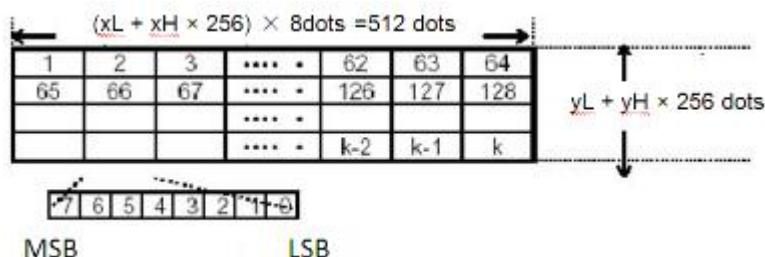
The part exceeds printing area is not to be printed.

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 $xL + xH \times 256 = 64$,



GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b

<Function 67 >

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

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

[Format]

ASCII	GS	(	L	pL	pH	m	fn	a	kc1	kc2	b	xL	xH	yL	yH	[c	d1...dk]1...[c d1...dk]b
Hex	1D	28	4C	pL	pH	30	43	30	kc1	kc2	b	xL	xH	yL	yH	[c	d1...dk]1...[c d1...dk]b
Decimal	29	40	76	pL	pH	48	67	48	kc1	kc2	b	xL	xH	yL	yH	[c	d1...dk]1...[c d1...dk]b
ASCII	GS	8	L	p1	p2	p3	p4	m	fn	a	kc1	kc2	b	xL	xH	yL	yH [cd1...dk]1...[cd1...dk]b
Hex	1D	38	4C	p1	p2	p3	p4	30	43	30	kc1	kc2	b	xL	xH	yL	yH [c d1...dk]1...[cd1...dk]b
Decimal	29	56	76	p1	p2	p3	p4	48	67	48	kc1	kc2	b	xL	xH	yL	yH [c d1...dk]1...[cd1...dk]b

[Range]

$12 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255, 0 \leq pH \leq 255$)

[When using GS 8 L:

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

$m = 48, fn = 67, a = 48, a = 52$ (TM-T88V only)

$32 \leq kc1 \leq 126$

$32 \leq kc2 \leq 126$

$0 \leq d \leq 255$

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

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

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

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

- d specifies the defined data (raster format).
 - k indicates the number of the definition data. k is an explanation parameter; therefore it does not need to be transmitted.
- In cases where the specified key code already exists in memory, it will be necessary to overwrite the data. [Notes]
- NV graphics indicate image data groups defined in the printer's internal non-volatile memory. Data definitions for NV graphics data created using this command are valid until redefined by this function or <Function 68>.
- The functions used to define NV graphics data are this function and Function 68. Even with printer models that support both, it is recommended that only one of the functions be used for data definition tasks.
- The two functions differ only in that one function (this function) defines data in raster format, while the other (Function 68) defines data in column format. The domains and control information are identical.
 - In cases where the key code specified by this function coincides with a key code being used by Function 68, a new data definition is created.
- Use this function at the beginning of the line when the standard mode is selected.
- This function is incompatible with macros, so make sure to avoid including it when defining macros.
- In cases where there is insufficient capacity available for storing NV graphics data, this function cannot be used. Use Function 51 to confirm the available capacity in the NV graphics data area.
- One option is to delete items of NV graphics data that were previously defined to the same key code.
- The data for byte k of d1 ... dk is processed as a single item of defined NV graphics data. The defined data (d) specifies "1" for bits corresponding to dots that will be printed and "0" for bits corresponding to dots that will not be printed.
- NV graphics data is defined using the dot density set by Function 49.
- Specify single data groups [c d1 ... dk] when monochrome is selected (b = 1) as the color.
- Specify b number of data groups [c d1 ... dk] when multiple colors are selected (b ≠ 1). It is also important to specify different colors in units of data groups when specifying color (c).
- NV graphics data is printed using Function 69.
- Note that it is not possible to create definitions for both NV graphics data (this command) and NV bit image data (FS q). NV bit image data definitions are deleted when this command is used.
- The relationship between NV graphics data (raster format) and print results is shown in the table below.

d1	d2	...	dx
dx+1	dx+2	...	dx+2
⋮	⋮	...	⋮
...	dk-2	dk-1	dk
MSB LSB	MSB LSB	MSB LSB	MSB LSB

X = (**xL** + **xH** × 256)

**GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
<Function 68>**

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

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

[Format]

ASCII	GS	(	L	pL	pH	m	fn	a	kc1	kc2	b	xL	xH	yL	yH	[c	d1...dk]1...[c d1...dk]b
Hex	1D	28	4C	pL	pH	30	44	30	kc1	kc2	b	xL	xH	yL	yH	[c	d1...dk]1...[c d1...dk]b
Decimal	29	40	76	pL	pH	48	68	48	kc1	kc2	b	xL	xH	yL	yH	[c	d1...dk]1...[c d1...dk]b
ASCII	GS	8	L	p1	p2	p3	p4	m	fn	a	kc1	kc2	b	xL	xH	yL	yH[c d1...dk]1...[cd1...dk]b
Hex	1D	38	4C	p1	p2	p3	p4	30	44	30	kc1	kc2	b	xL	xH	yL	yH[c d1...dk]1...[cd1...dk]b
Decimal	29	56	76	p1	p2	p3	p4	48	68	48	kc1	kc2	b	xL	xH	yL	yH[c d1...dk]1...[cd1...dk]b

$12 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255, 0 \leq pH \leq 255$)

[When using GS 8 L:

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

[Range] $m = 48, fn = 68, a = 48$

$32 \leq kc1 \leq 126$

$32 \leq kc2 \leq 126$

$0 \leq d \leq 255$

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

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

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

[Description]

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

■ NV graphics data is printed using Function 69.

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

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

d1	dv+1	...	1	MSB LSB
d2	dv+2	...	dk-2	MSB LSB
:	:	...	dk-1	MSB LSB
dv	dvx2	...	dk	MSB LSB

$$Y = (y_L + y_H \times 256)$$

[Notes]

GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
<Function 83 >
GS 8 L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c
d1...dk]b

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

[Format] ASCII GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex 1D 28 4C pL pH 30 53 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal 29 40 76 pL pH 48 83 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
ASCII GS 8 L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
Hex 1D 38 4C p1 p2 p3 p4 30 53 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
Decimal 29 56 76 p1 p2 p3 p4 48 83 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
 $12 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255$, $0 \leq pH \leq 255$)
[When using GS 8 L: $12 \leq (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leq 4294967295$]
 $m = 48$, $fn = 83$, $a = 48$, $a = 52$ (TM-T88V only)
 $32 \leq kc1 \leq 126$
 $32 \leq kc2 \leq 126$
Defines the downloaded graphics data (raster format) as a record specified by the key codes (kc1 and kc2) in the downloaded graphics area.

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

[Range]

c	Color specifications
49	Color 1
50	Color 2
51	Color 3
52	Color 4

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

■ Downloaded graphics indicate image data groups defined in the printer's internal volatile memory (RAM).

Once the download graphics data have been defined, they are available until GS (L <Function 83>,

<Function 84> or ESC @ is executed. The download graphics data are lost when the power is turned off or the printer is reset.

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

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

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

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

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

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

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

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

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

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

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

■ Downloaded graphics data is printed using Function 85.

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

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

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

- Downloaded graphics data are deleted by ESC &.

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

d1	d2	...	dx
dx+1	dx+2	...	dx+2
⋮	⋮	...	⋮
...	dk-2	dk-1	dk

$$X = (xL + xH \times 256)$$

[Note]

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

GS 8 L p1 p2 p3 p4 m fn a bx by c xL xH yL yH d1...dk

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

[Format] ASCII GS (L pL pH m fn a bx by c xL xH yL yH d1...dk

Hex 1D 28 4C pL pH 30 70 30 Bx by c xL xH yL yH d1...dk

Decimal 29 40 76 pL pH 48 112 48 bx by c xL xH yL yH d1...dk

ASCII GS 8 L p1 p2 p3 p4 m fn a bx by c xL xH yL yH d1...dk

Hex 1D 38 4C p1 p2 p3 p4 30 70 30 bx by c xL xH yL yH d1...dk

Decimal 29 56 76 p1 p2 p3 p4 48 112 48 bx by c xL xH yL yH d1...dk

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

[When using GS 8 L:

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

$m = 48, fn = 112, a = 48, a = 52$ (TM-T88V only)

$0 \leq d \leq 255$

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

Stores the graphics data (raster format) in the print buffer.

- Users have the option of specifying horizontal (times bx) × vertical (times by) size settings for the selected data.
- c specifies the color of the stored data.

[Description]

c	Color specifications
49	Color 1
50	Color 2
51	Color 3
52	Color 4

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

■ The functions used to store graphics data directly to the print buffer are this function and Function 113.

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 113) defines data in column format.

■ Use this function when the printer enters the “beginning of the line” or “except for graphic data, no data in print buffer” state during the standard mode.

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

■ NV graphics data that exceeds the print area for one line will not be printed.

■ The scales for width and height of graphics are specified by (x, y). Therefore, in page mode with 90° or

270° clockwise-rotated graphics, the printer applies print area and dot density from [x: direction of paper feed, y: perpendicular to direction of paper feed].

■ Settings for text effect (bold, underline, orientation) and font size do not affect the printing of the NV graphics data.

■ Print position does not change before and after this function is used.

Overprinting of data of multiple colors can be performed by simply changing the selected color (c) and running this function again, but it is not possible to specify the same color to overprint.

■ Use Function 50 to print graphics after graphics data has been stored in the print buffer when the standard mode is selected.

■ 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.

■ During processing of this function, real time commands are not available.

■ 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+2
:	:	...	:
...	dk-2	dk-1	dk

$$X = (x_L + x_H \times 256)$$

[Notes]

**GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
<Function 84>**

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

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

[Format] ASCII GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Hex 1D 28 4C pL pH 30 54 30 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
Decimal 29 40 76 pL pH 48 84 48 kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b
ASCII GS 8 L p1 p2 p3 p4 m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
Hex 1D 38 4C p1 p2 p3 p4 30 54 30kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
Decimal 29 56 76 p1 p2 p3 p4 48 84 48kc1 kc2 b xL xH yL yH [c d1...dk]1...[cd1...dk]b
 $12 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255$, $0 \leq pH \leq 255$)
[When using GS 8 L: $12 \leq (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leq 4294967295$]

[Range] $m = 48$, $fn = 84$, $a = 48$
 $32 \leq kc1 \leq 126$
 $32 \leq kc2 \leq 126$
 $0 \leq d \leq 255$
 $k = (xL + xH \times 256) \times (\text{int}((yL + yH \times 256) + 7)/8)$
Defines the downloaded graphics data (column format) as a record specified by the key codes (kc1 and kc2) in the downloaded graphics area.

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

[Description]

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

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

■ Downloaded graphics indicate image data groups defined in the printer's internal volatile memory (RAM).

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

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

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

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

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

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

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

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

■ The data for byte k of d1 ... dk is processed as a single item of defined download 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.

■ Download 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).

■ Download graphics data is printed using Function 85.

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

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

- User-defined characters defined are deleted by using this command.
- Downloaded graphics data are deleted by ESC &.

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

d1	dv+1	...	:
d2	dv+2	...	dk-2
:	:	...	dk-1
dv	dvx2	...	dk

Y = (yL + yH × 256)

[Notes]

9 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] $0 \leq n \leq 3, 48 \leq n \leq 51$

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

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

HRI indicates Human Readable Interpretation.

[Notes] 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 Human Readable Interpretation (HRI) characters			
[Format]	ASCII	GS	f	n
	Hex	1D	66	n
	Decimal	29	102	n
[Range]	n = 0, 1, 48, 49			
[Description]	Selects a font for the HRI characters used when printing a bar code.			
	n selects a font from the following table:			
	n	Font		
	0,48	Font ASCII 0(12 × 24)		
	1,49	Font ASCII 1(8 × 16)		
[Notes]	HRI indicates Human Readable Interpretation.			
	HRI characters are printed at the position specified by GS H .			
[Default]	n = 0			
[Reference]	GS H , GS k			

GS h n

[Name]	Select bar code height.			
[Format]	ASCII	GS	h	n
	Hex	1D	68	n
	Decimal	29	104	n
[Range]	$1 \leq n \leq 255$			
[Description]	Selects the height of the bar code.			
	n specifies the number of dots in the vertical direction.			
[Default]	n = 60			
[Reference]	GS k			

GS w n

[Name] Set bar code width.

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

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

[Description] Sets the horizontal size of the bar code.
n specifies the bar code width as follows:

n	Module Width (mm)	Binary-level Bar Code					
	fo Multi-level Bar Code	Thin (mm)	Element	Width	Thick (mm)	Element	Width
2	0.250		0.250			0.625	
3	0.375		0.375			1.000	
4	0.560		0.500			1.250	
5	0.625		0.625			1.625	
6	0.750		0.750			2.000	

Multi-level bar codes are as follows:

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

Binary-level bar codes are as follows:

CODE39, ITF, CODABAR

[Default] n = 3

[Reference] **GS k**

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

[Name] Print bar code

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

[Range] ① $0 \leq m \leq 6$ (k and d depend on the bar code system used)
 ② $65 \leq m \leq 73$ (n and d depend on the bar code system used)

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

m selects a bar code system as follows:

①

m	Bar Code System	Number of Characters	Remarks
0	UPC-A	$11 \leq k \leq 12$	$48 \leq d \leq 57$
1	UPC-E	$11 \leq k \leq 12$	$48 \leq d \leq 57$
2	JAN13 (EAN13)	$12 \leq k \leq 13$	$48 \leq d \leq 57$
3	JAN 8 (EAN8)	$7 \leq k \leq 8$	$48 \leq d \leq 57$
4	CODE39	$1 \leq k \leq 255$	$48 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 4$
5	ITF	$1 \leq k \leq 255$	$48 \leq d \leq 57$
6	CODABAR	$1 \leq k \leq 255$	$48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$
②			
m	Bar Code System	Number of Characters	Remarks
65	UPC-A	$11 \leq k \leq 12$	$48 \leq d \leq 57$
66	UPC-E	$11 \leq k \leq 12$	$48 \leq d \leq 57$
67	JAN13 (EAN13)	$12 \leq k \leq 13$	$48 \leq d \leq 57$
68	JAN 8 (EAN8)	$7 \leq k \leq 8$	$48 \leq d \leq 57$
69	CODE39	$1 \leq k \leq 255$	$48 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43 \quad d1 = dk = 42$
70	ITF	$1 \leq k \leq 255$	$48 \leq d \leq 57$
71	CODABAR	$1 \leq k \leq 255$	$48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$
72	CODE93	$1 \leq k \leq 255$	$0 \leq d \leq 127$
73	CODE128	$2 \leq k \leq 255$	$0 \leq d \leq 127$

[Notes for ①]

This command ends with a NUL code.

When the bar code system used is UPC-A or UPC-E, the printer prints the bar code data after receiving 12 bytes of bar code data and processes the following data as normal data.

When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes of bar code data and processes the following data as normal data.

When the bar code system used is JAN8 (EAN8), the printer prints the bar code after receiving 8 bytes of bar code data and processes the following data as normal data.

The number of data for the ITF bar code must be even numbers. When an odd number of bytes of data is input, the printer ignores the last received data.

[Notes for ②]

n indicates the number of bar code data bytes, and the printer processes n bytes from the next character data as bar code data.

If n is outside the specified range, the printer stops command processing and processes the following data as normal data.

[Notes in
standard
mode]

If d is outside the specified range, the printer only feeds paper and processes the following data as normal data.

If the horizontal size exceeds printing area, the printer only feeds the paper.

This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by **ESC 2** or **ESC 3**.

This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following m as normal data.

After printing the bar code, this command sets the print position to the beginning of the line.

This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.

[Notes in page
mode]

This command develops bar code data in the print buffer, but does not print it.

After processing bar code data, this command moves the print position to the right side dot of the bar code.

If d is out of the specified range, the printer stops command processing and processes the following data as normal data. In this case the data buffer position does not change.

If bar code width exceeds the printing area, the printer does not print the bar code, but moves the data buffer position to the left side out of the printing area..

When CODE128 (m = 73) is used:

When using CODE128 in this printer, take the following points into account for data transmission:

- ① The top of the bar code data string must be the code set selection character(CODE A, CODE B, or CODE C), which selects the first code set.
- ② Special characters are defined by combining two characters "{" and one character. The ASCII character "{" is defined by transmitting "{" twice consecutively.

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

[Example]

Example data for printing "No. 123456"

In this example, the printer first prints "No." using CODE B, then prints the following numbers using CODE C.

GS k 73 10 123 66 78 111 46 123 67 12 34 56



If the top of the bar code data is not the code set selection character, the printer stops command processing and processes the following data as normal data.

If the combination of "{" and the following character does not apply any special character, the printer stops command processing and processes the following data as normal data.

If the printer receives characters that cannot be used in the special code set, the printer stops command processing and processes the following data as normal data.

The printer does not print HRI characters that correspond to the shift character or code set selection characters.

HRI character for the function character is space.

HRI characters for the control character (<00>H to <1F>H and <7F>H) are Space.

[Reference]

Be sure to keep spaces on both right and left sides of a bar code. (Spaces are different depending on the types of the bar code.)

GS H, GS f, GS h, GS w

10 State Query Commands

ESC v

[Name] Transmit printer status.

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

[Description] When the printer receive command, transfer a byte to the hardware.
Defined as follows:

Bit	0/1	HEX	Decimal	Function
0, 1	0	00	0	Roll paper near-end sensor: paper adequate.
	1	03	3	Roll paper near-end sensor: paper near end.
2,3	0	00	0	Roll paper end sensor: paper present.
	1	0C	12	Roll paper end sensor: paper not present
4	0	00	0	Not used. Fixed to Off.
5, 6	-	-	-	Undefined.
7	0	00	0	Not used. Fixed to Off.

GS r n

[Name] Transmit status

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

[Range] n=1,49

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

[Note] This command is only valid for serial printer.
Since this command is executed after the data is processed in the receive buffer, there may be a time lag between data reception and status transmission.

transmit 1 byte of status data specified by *n* as follows:

Paper sensor status(n = 1, 49):

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

The status to be transmitted is as follows:

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

Bit	0/1	Hex	Decimal	Status
0	0	00	0	Drawer kick-out connector pin 3 is LOW.
	1	01	1	Drawer kick-out connector pin 3 is HIGH.
1-3	-	-	-	Undefined.
4	0	00	0	Not used. Fixed to Off.
5, 6	-	-	-	Undefined.
7	0	00	0	Not used. Fixed to Off.

[Reference] DLE EOT, GS a

DLE EOT n

[Name] Transmit real-time status

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

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

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

n = 1: Transmit printer status

n = 2: Transmit offline status

n = 3: Transmit error status

n = 4: Transmit paper roll sensor status

- [Notes]
- 1) Printer back to required status when received the command.
 - 2) Don't put this command into command sequence which is with 2 Byte or more.
 - 3) Even printer is prohibited by command **ESC** = (choose peripherals), this command is effective.
 - 4) Printer transmitting current status, 1 byte stands for each status
 - 5) Printer transmission value can make sure whether host computer receive or not.
 - 6) This command is executed once received by printer.
 - 7) When received it, printer execute it under any situation.

n=1:Printer status

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

n=2:Printer status

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

n=3:Printer status

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

n=4:Printer status

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

DLE ENQ n

[Name] Real-time request to printer

[Format]

ASCII	DLE	ENQ	n
Hex	10	05	n
Decimal	16	5	n

[Range] $1 \leq n \leq 2$

[Description] Responds to a request from the host computer.
n specifies the requests as follows:

n	Request
1	Recover from an error and restart printing from the line where the error occurred
2	Recover from an error aft clearing the receive and print buffers

[Note] This command is effective only when an autocutter error, a BM detecting error or a platen-open error occurs.

The printer starts processing data upon receiving this command.

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 can not be executed when the printer is busy. This command is executed even when the printer is offline or there is an error status when Memory Switch 1-3 is on with a parallel interface model.

The status is also transmitted whenever the data sequence of <10>H<05>H<n> ($1 \leq n \leq 2$) is received.

Example:

In **ESC m nL nH dk**, d1 = <10>H, d2 = <05>H, d3 = <01>H

This command should not be contained within another command that consists of two or more bytes.

Example:

If you attempt to transmit **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted, and **DLE ENQ 2** interrupts before n is received, the code <10>H for **DLE ENQ 2** is processed as the code for ESC 3 <10>H.

DLE ENQ 2 enables the printer to recover from an error after clearing the data in the receive buffer and the print buffer. The printer retains the settings (by **ESC !**, **ESC 3**, etc.) that were in effect when the error occurred. The printer can be initialized completely by using this command and **ESC @**. This command is enabled only for errors that have the possibility of recovery, except for print head temperature error.

[Reference] **DLE EOT**

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	-	-	-	Reserved.
1	0	00	0	Paper feed button is not pushed.
				Paper feed button is not pushed.
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 I n

[Name] Transmit printer ID

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

[Range] n = 1, 2, 49, 50 [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	0x27
2, 50	Type ID	See table[type ID]

[Type ID]

Bit	Off/On	Hex	Decimal	Function
0	0	00	0	Multi-byte code character not supported
	1	01	1	Multi-byte code character supported
1	1	02	2	Auto cutter installed (fixed)
2	0	00	0	BM sensor disable
	1	04	4	BM sensor enable
3	-	-	-	Not used
4	0	00	0	Fixed
5	-	-	-	Reserved
7	-	-	-	Not used
8	0	00	0	Fixed

The information B that can be specified is as follows:

n	Type of printer information	Contents
65	Firmware version	Depends on firmware version
66	Manufacturer	"HPRT"
67	Printer name	CAPD347
68	Product ID	Serial number

[Note] When DTR/DSR control is selected in the serial interface model, the printer transmits only 1 byte after confirming that the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready.

When XON/XOFF control is selected in the serial interface model, the printer transmits only 1 byte without confirming the condition of the DSR signal.

The printer ID is transmitted when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.

When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS I** and the ASB status must be differentiated.

11 Cutter Commands

ESC i

[Name]	Partial cut (one point left uncut)		
[Format]	ASCII	ESC	i
	Hex	1B	69
	Decimal	27	105
[Description]	Printer executes cutting after receiving this command.		

ESC m

[Name]	Partial cut (three points left uncut)		
[Format]	ASCII	ESC	m
	Hex	1B	6D
	Decimal	27	109
[Description]	Printer executes cutting after receiving this command.		

<A>GS V m GS V m n

[Name]	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	Full cut (completely cut paper)
	1,49	Partial cut (one point left uncut)
	65	Feeds paper to (cutting position + [n×(vertical motion unit)]) and completely cuts paper.
	66	Feeds paper to (cutting position + [n×(vertical motion unit)]) and cuts paper with one point left uncut.

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

12 Cash Drawer Command

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											
	$0 \leq t1 \leq 255$											
	$0 \leq t2 \leq 255$											
[Description]	<ul style="list-style-type: none">• Outputs the pulse specified by t1 and t2 to connector pin m. <table border="1"><tr><td>m</td><td>Connector pin</td></tr><tr><td>0, 48</td><td>Drawer kick-out connector pin 2.</td></tr><tr><td>1, 49</td><td>Drawer kick-out connector pin 5.</td></tr></table> <ul style="list-style-type: none">• t1 specifies the pulse on time as [t1 × 2 ms].• t2 specifies the pulse off time as [t2 × 2 ms].						m	Connector pin	0, 48	Drawer kick-out connector pin 2.	1, 49	Drawer kick-out connector pin 5.
m	Connector pin											
0, 48	Drawer kick-out connector pin 2.											
1, 49	Drawer kick-out connector pin 5.											
[Note]	Specify a value (t1 < t2) so that the off time is longer than the on time.											

13 Buzzer Commands

ESC (A pL pH fn n c t1 t2 <Fuction97>

[Name]	Beeper alarm setting										
[Format]	ASCII	ESC	(	A	pL	pH	fn	n	c	t1	t2
	Hex	1B	28	41	05	00	61	n	c	t1	t2
	Decimal	27	40	65	5	0	97	n	c	t1	t2
[Range]	$(pL + pH \times 256) = 5$ ($pL = 5, pH = 0$)										
	fn = 97										
	n = 100										
	$0 \leq c \leq 63$										
	$0 \leq t1 \leq 255$										
[Description]	$0 \leq t2 \leq 255$										
	The beeper alarm setting is as below:										
	<ul style="list-style-type: none">c specifies times of beeping										
	<ul style="list-style-type: none">t1 specifies beeping time($t1 \times 100 \text{ ms}$)t2 specifies time for stop beeping ($t2 \times 100 \text{ ms}$)										

[Notes]

- This function repeats integrated beeper control of $[(t_1 \times 100 \text{ ms}) \text{ beep} / (t_2 \times 100 \text{ ms}) \text{ stop}]$ c times.
- If this command is newly processed during beeping of the buzzer, the current process for beeping the buzzer is stopped and the new process for beeping the buzzer is started
- The beeper beeping by this function stops due to any of the following factors.
 - Finish specification of (c) .
 - Reset or power off.

14 Other Commands

GS (A pL pH n m

[Name] Execute the test printing

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

[Range] (pL+(pH × 256))=2 (pL=2, pH=0)

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

$1 \leq m \leq 5, 49 \leq m \leq 53$

[Description] • Execute the test printing, printing method is determined by n, m
n determines the test paper type

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

m determines the printing content

m	Printing Content
1, 49	Hex (dump) printing
2, 50	Printer configuration information printing
3, 51	Reserved
4, 52	Start paper verification process
5, 53	Reserved

[Notes] • It is only valid for the beginning of line in the standard mode.
• If receiving this command during macro definition, stop the macro definition and execute this command.
• After executing this command, printer will execute the soft reset function. The printer will remove printing buffer area, and all the settings (including user-defined character mode, downloading the format of bit image, macro and character mode).
• If starting paper verification, return to 6 byte data after completing paper verification, the first byte is the identification character. If verification succeeds, the first byte of returned information is character 'N', the second byte is the high byte of label height, the third byte is the low byte of label height. The unit is label height is dot, 8 dots/mm. If verification fails, the first byte of returned information is character 'E', the second byte is the error state code, the third byte is 0*00. Despite the verification succeeds or fails, the definition of three returned bytes subsequently are:
4 byte: label level 5 byte: backing paper level
6 byte: justify domain value

ESC c 4 n

[Type]	Paper sensor
[Function]	Selecting paper sensor to stop printing
[Format]	ASCII ESC c 4 n Hex 1B 63 34 n Decimal 27 99 52 n
[Range]	$0 \leq n \leq 255$
[Default]	$n = 0$
[Description]	Select the paper sensor(s) whether to use to stop printing or not when a paper end is detected.

(n)Bit	Off/On	Hex	Decimal	Function
0	-	-	-	Undefined.
1	Off	00	0	Roll paper near-end sensor disabled
	On	02	2	Roll paper near-end sensor enabled.
2-7	Off	00	0	Reserved.

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]	$0 \leq n \leq 255$
[Default]	$n = 0$
[Description]	<ul style="list-style-type: none">• 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]	<ul style="list-style-type: none">• This command affects the FEED button.• The FEED button is disabled regardless of the settings with this command, when the cover is open.

ESC = n

[Name] Select peripheral device

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

[Range] $0 \leq n \leq 1$

[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 m t (fn=1)

[Name] Generate pulse in real-time

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

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

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

m	Descriptions
0	Kick out drawer 1
1	Kick out drawer 2

t indicates pulse ON/OFF time is (t×100ms).

-
-
- [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.

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
- [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.

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.

- 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.
• 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.