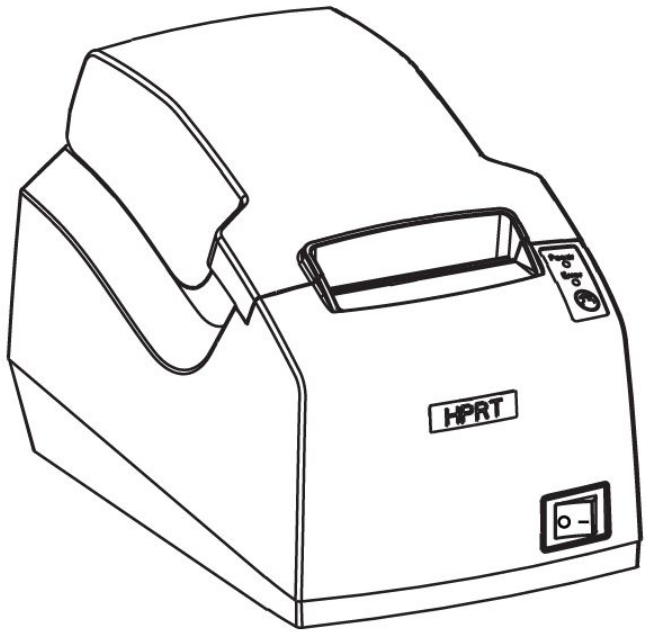
PPTII-A
Programming Manual



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1. Overview

1.1 Key terms

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

1.2 Command Notation

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

2.Printing command set

HT

[Name] Horizontal tab

[Format]
ASCII	HT
Hex	09
Decimal	9

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

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

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

In page mode, the printer sets the print position to the beginning of the line.

LF

[Name] Print the contents in the print buffer

[Format]
ASCII	LF
Hex	0A
Decimal	10

[Dscription] 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.

FF

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

[Format]
ASCII	FF
Hex	OC
Decimal	12

[Dscription] Paper type is continuous paper

[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.
- In page mode, prints all the data in the print buffer collectively and switches from page mode to standard mode.
- This command is equivalent to LF in standard mode.
- This command returns the values set by ESC W to the default values.

Paper type is marked paper :
- In page mode, prints all the data in the print buffer,not to return to standard mode ,not clear the data in the print buffer. The printer feeds the marked paper to the next print starting position after finished printing.Don’t change horizontal and vertical coordinates in the print buffer.
- This command sets the print position to the beginning of the line.

CR

[Name] Print and carriage return

[Format]

ASCII	CR
Hex	0D
Decimal	13

[Dscription] When the command is allowed, it functions in the same way as LF; when it is not, the command is ignored.

[Notes]
- Set the print position to the beginning of the line.
- Whether the command is allowed or not only up to the factory defaults.

CAN

[Name] Cancel print data in page mode

[Format]

ASCII	CAN
Hex	18
Decimal	24

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

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

DLE EOT n

[Name] Real-time status transmission

[Format]

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

[Range] 1 ≤ n ≤ 4

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

Example: In ESC ＊ m nL nH d1...dk, d1=<10>H, d2=<04>H, d3=<01>H
- Do not use this command within another command that consists of 2 or more bytes.

Example: If you attempt to transmit ESC 3 n to the printer, but DTR (DSR for the host computer) goes to MARK before nis transmitted and then
DLE EOT 3interrupts before nis received, the code <10>H for DLE
EOT 3is processed as the code for ESC 3 <10>H.
- The printer transmits the current status. Each status item is represented by one-byte of data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.

[Dscription]

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

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

n = 1 Printer status

Bit	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	Reserved
	1	08	8	Reserved
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	Reserved
	1	40	64	Reserved
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	Reserved
	1	08	8	Reserved
4	1	10	16	Not used. Fixed to On
5	0	00	0	No paper-end stop
	1	20	32	Reserved
6	0	00	0	No error
	1	40	64	Error occurred
7	0	00	0	Not used. Fixed to Off.

[Dscription] 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	Reserved
	1	04	4	Reserved
3	0	00	0	Reserved
	1	08	8	Reserved
4	1	10	16	Not used. Fixed to On
5	0	00	0	Reserved
	1	20	32	Reserved
6	0	00	0	Reserved
	1	40	64	Reserved
7	0	00	0	Not used. Fixed to Off

n = 4 Printer status

Bit	1/0	HEX	Decimal	Function
0	0	00	0	Not used. Fixed to Off.
1	1	02	2	Not used. Fixed to On
2,3	00	00	0	Reserved
	11	0C	12	Reserved
4	1	10	16	Not used. Fixed to On
5,6	00	00	0	Roll paper end sensor: paper present
	11	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 print

[Format]

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

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

[Dscription] In response to host device, n definition as follows:

n	Requests
1	Printer recovers from error status and go on printing interrupted
2	Printer recovers from error status clear commands receive and print the buffer area.

[Notes]

1) This command is only effective, when marking the mistake and no paper.
2) With a serial interface model, printer executes this command once received.
3) With a parallel interface model, this command is not executed when it is busy.
4) Don't put this command into command sequence which is with 2 Byte or more.
5) Even printer is prohibited by command ESC = (choose peripherals), this command is effective

ESC FF

[Name] Print data in the page mode

[Format]

ASCII	ESC	FF
Hex	1B	0C
Decimal	27	12

[Dscription] 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 SP n

[Name] Set character spacing

[Format]

ASCII	ESC	SP	n
Hex	1B	20	n
Decimal	27	32	n

[Range] 0 ≤ n≤255

[Dscription] Sets the right-side character spacing to [n×0.125mm(n×0.0049 inch)]

[Notes] •When characters are enlarged, the character spacing is n times normal value.
• This command sets values independently in each mode (standard and page modes).

[Default] n=0

ESC ! n

[Name] Select print mode(s)

[Format]

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

[Range] 0 ≤ n ≤ 255

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

Bit	1/0	HEX	Decimal	Function
0	0	00	0	Character font 0 selected.
	1	01	1	Character font 1 selected.
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, quadruple-size characters are printed.
• The printer can underline all characters, but cannot underline the space set by HT or 90 clockwise rotated characters.
• The thickness of the underline is that selected by ESC , regardless of the character size.
•When some characters in a line are double or more height, all the characters in the line are aligned at the baseline.
• ESC E can also turn on or off emphasized mode. However, the setting of the last received command is effective.
• ESC G print effect is the same with emphasized mode. However, the setting of the last received command is effective.
• ESC can also turn on or off underline mode. However, the setting of the last received command is effective.
• GS ! can also select character size. However, the setting of the last received command is effective.

[Default] n = 0

ESC $ nL nH

[Name] Set absolute print position
[Format] ASCII ESC $ nL nH
Hex 1B 24 nL nH
Decimal 27 36 nL nH
[Range] 0≤nL ≤ 255
0 ≤nH≤255
[Dscription] The distance from the beginning of the line to the print position is [(nL + nH ×256) ×0.125 mm].
[Notes] •Settings outside the specified printable area are ignored.
• ESC W can set horizontal starting position in page modes. However, the setting of the last received command is effective.

ESC % n

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

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

[Name] Define user-defined characters

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

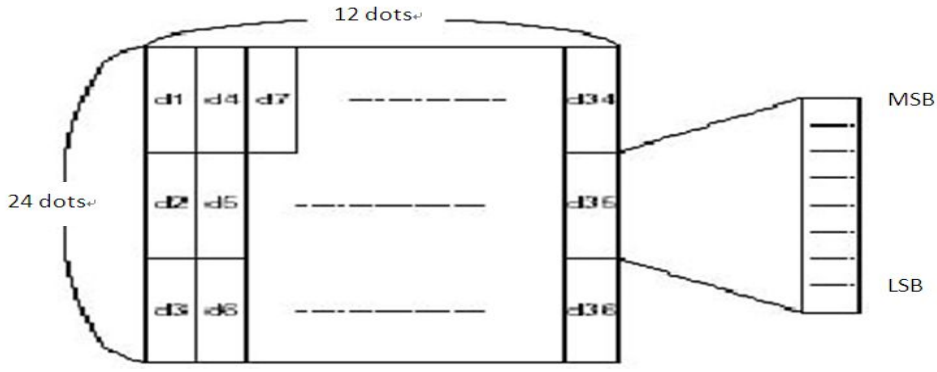
[Range] y = 3
32 ≤ c1 ≤ c2 ≤ 127
1 ≤ x ≤ 24
0 ≤ d1 ... d(y × xk) ≤ 255

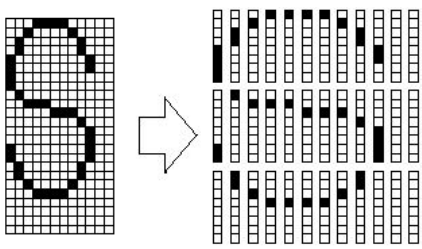
[Dscription] Defines user-defined characters.
•y specifies the number of bytes in the vertical direction.
•c1 specifies the beginning character code for the definition, and c2 specifies the final code.
•x specifies the number of dots in the horizontal direction.

[Notes] •The allowable character code range is from ASCII code <20>H to <7E>H .
•It is possible to define multiple characters for consecutive character codes.
If only one character is desired, use c1 = c2.
•d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side.
•The data to define user-defined characters is (y × x) bytes.
• When x is less than 13, the user-defined character width by default into 13 points.
•Set a corresponding bit to 1 to print a dot or 0 not to print a dot.
• Can define up to 26 user-defined characters.
• The user-defined character definition is cleared when:
①ESC ? is executed.
②The power is turned off.

[Default] The internal character set

[Example]





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

ESC * m nL nH d1... dk

[Name] Select bit-image mode

[Format]

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

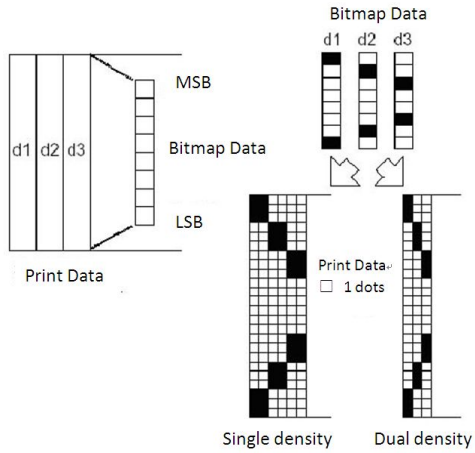
[Range] m = 0, 1, 32, 33
0 ≤ nL ≤ 255
0 ≤ nH ≤ 3
0 ≤ d ≤255

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

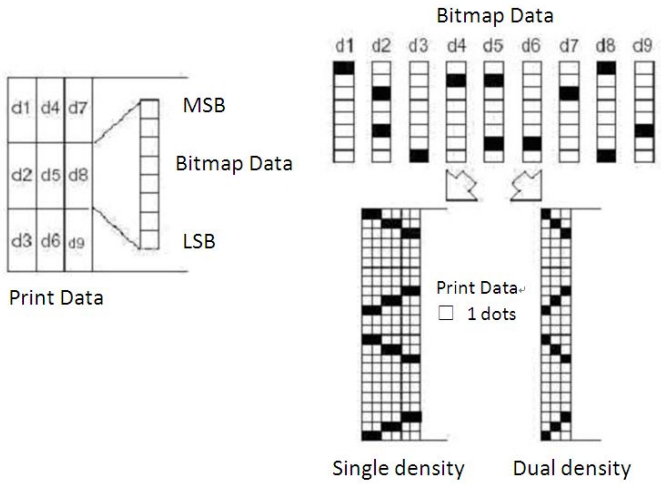
m	Mode	Vertical Direction		Horizontal Direction	
		Number of Bits for vertical data	Dot Density (DPI)	Dot Density (DPI)	Amount of Data(k)
0	8-dot single-density	8	67 DPI	101 DPI	nL + nH × 256
1	8-dot double-density	8	67 DPI	203 DPI	nL + nH × 256
32	24-dot single-density	24	203 DPI	101 DPI	(nL + nH ×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

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

Choosing 8-dot density:



Choosing 24-dot density:



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

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

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

[Notes] 1) This command is effective for all characters (including the blank space), but not the blank space set by HT.
2) When underline mode is on, 90°clock wise rotated characters and characters and white / black reverse characters cannot be underline.

[Notes] 3) When underline mode is off, there is no underline for following characters. Underline width stays the same, default width: one dot width.
4) Character size change has no effects on underline width.
5) Turn underline mode on / off can be set by ESC !, the command executed at last is effective.
[Default] n = 0

ESC 2

[Name] Set character line spacing for 30
[Format] ASCII ESC 2
Hex 1B 32
Decimal 27 50
[Dscription] Selects 3.875 mm (31* 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 character line spacing
[Format] ASCII ESC 3 n
Hex 18 33 n
Decimal 27 51 n
[Range] 0 ≤ n ≤ 255
[Dscription] Sets the line spacing to [n*0.125 mm].
[Notes] The line spacing can be set independently in standard mode and in page mode.
[Default] n =31.

ESC = n

[Name] Select peripheral device
[Format] ASCII ESC = n
Hex 1B 3D n
Decimal 27 61 n
[Range] 0≤n≤1
[Dscription] 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

ESC ? n

[Name]	Cancel user-defined characters
[Format]	ASCII ESC ? n Hex 1B 3F n Decimal 27 63 n
[Dscription]	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.

ESC @

[Name]	Initialize printer
[Format]	ASCII ESC @ Hex 1B 40 Decimal 27 64
[Dscription]	Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.
[Notes]	• The bit image has been downloaded and custom characters in RAM is not cleared.When the printer default is label paper, the print mode is page mode after power-on.When the printer default is continuous paper, the print mode is standard mode after power-on. • The macro definition is not cleared.

ESC D n1...nk NUL

[Name]	Set horizontal tab positions
[Format]	ASCII ESC D n1…nk Hex 1B 44 n1…nk Decimal 27 68 n1…nk
[Range]	k=8，n1 to nk must be according to the order from small to large
[Dscription]	In sequence from n1 to nk as horizontal anchor point value.
[Notes]	If the value of n1 to nk are not from small to large,when back value are not big than front, pls stop setting.

ESC E n

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

ESC G n

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

ESC J n

[Name] Print and feed paper
[Format] ASCII ESC J n
Hex 1B 4A n
Decimal 27 74 n
[Range] 0 ≤n ≤ 255
[Dscription] Prints the data in the print buffer and feeds the paper [n×0.125 mm (0.0049")].
[Notes] After printing is completed, this command sets the print starting position to the beginning of the line.
•The paper feed amount set by this command does not affect the values set by ESC 2 or ESC 3.
•The maximum paper feed amount is 900 mm. If the paper feed amount (n ×line spacing) of more than 900 mm is specified, the printer feeds the paper only 900 mm .

ESC L

[Name] Select page mode
[Format] ASCII ESC L
Hex 1B 4C
Decimal 27 76
[Dscription] 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

[Notes] 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.

ESC M n

[Name] Select character font
[Format] ASCII ESC M n
Hex 1B 4D n
Decimal 27 77 n
[Range] 0 ≤ n ≤ 2, 48 ≤ n ≤ 50
[Dscription] select character font

n	Function
0, 48	Choose character font A (12 * 24)
1, 49	Choose character font B (9 * 17)
2,50	Choose character font C (8 * 16)

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

ESC R n

[Name] Select an international character set
[Format] ASCII ESC R n
Hex 1B 52 n
Decimal 27 82 n
[Range] 0≤n≤15

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

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

ESC S

[Name] Select standard mode
[Format] ASCII ESC S
Hex 1B 53
Decimal 27 83
[Dscription] Switches from page mode to standard mode.
[Notes] 1) this command is effective only in page mode.
2) Data in print buffer is cleared.
3) This command sets the print position to the beginning of the line.
4) Standard mode is selected as the default
5) This command returns the values to default value in standard mode:
a. set right-side character spacing: ESC SP, FS S
b. select line spacing: ESC 2, ESC 3

ESC T n

[Name] Select character font
[Format] ASCII ESC T n
Hex 1B 54 n
Decimal 27 84 n
[Range] 0 ≤ n ≤ 3, 48 ≤ n ≤ 51
[Dscription] Set the print direction and starting position in page mode specified by n as shown below:

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

[Notes] 1) this command is processed in standard mode, an internal flag is activated and this command is enabled when the printer returns to page mode.
2) this command set the starting position of printing data in the printing area.
[Default] n = 0

ESC V n

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

[Format]

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

[Range] 0 ≤ n ≤ 1, 48 ≤ n ≤ 49

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

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

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

[Default] n=0

ESC W xL xH yL yH dxL dxH dyL dyH

[Name] Set printing area in page mode

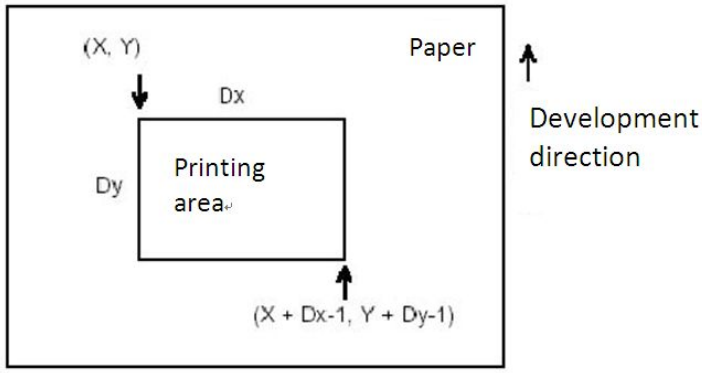
[Format]

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)

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

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



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

ESC \ nL nH

[Name] Set relative horizontal print position
[Format] ASCII ESC \ nL nH
Hex 1B 5C nL nH
Decimal 27 92 nL nH
[Range] 0 ≤ nl ≤ 255 0 ≤ nH ≤ 255
[Dscription] Sets the relative horizontal print starting position from the current position.
This command sets the distance from the current position to [(nL + nH ×256)× 0.125 mm (0.0049")].
[Notes] •The printer ignores any setting that exceeds the print area.
•When pitch N is specified for the movement to the right： nL+ nH × 256 = N。
•Use the complement of N for setting N pitch movement to the left: (nL + nH × 256) = 65536 – N.
•Print starting position from the current position to [N × 0.125mm].

ESC a n

[Name] Select justification
[Format] ASCII ESC a n
Hex 1B 61 n
Decimal 27 97 n
[Range] 0 ≤ n ≤ 2, 48 ≤ n ≤ 50
[Dscription] 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
ABC ABCD ABCDE	ABC ABCD ABCDE	ABC ABCD ABCDE

ESC c 0 n

[Name] Select paper type

[Format]

ASCII	ESC	c	0	n
Hex	1B	63	30	n
Decimal	27	99	48	n

[Range] 0≤n≤2

[Dscription] Select paper type, the type of paper using n:

n	paper type
0	receipt paper
1	label paper
2	label paper

[Notes]
- This command using to select paper type.
- The printer turns into standard mode automatically when selecting receipt paper.
- The printer turns into page mode automatically when selecting label paper.
- Paper type recovers to the default after printer resetting, re-up electricity and executing ESC @.

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

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

[Notes] This command sets the print starting position to the beginning of the line.
This command does not affect the line spacing set by ESC 2 or ESC 3.
The maximum paper feed amount is 900 mm. If the paper feed amount (n line spacing) of more than 900 mm is specified, the printer feeds the paper only 900 mm .

ESC l n X0l X0h Y0l Y0h X1l X1h Y1l Y1h

[Name] crossed instruction

[Format]

ASCII	ESC	l	n	X0l X0h Y0l Y0h X1l X1h Y1l Y1h
Hex	1B	6C	n	X0l X0h Y0l Y0h X1l X1h Y1l Y1h
Decimal	27	108	n	X0l X0h Y0l Y0h X1l X1h Y1l Y1h

[Range] 0 ≤n ≤ 255

[Dscription] Set the starting point and terminal point coordinate, and generate into straight line on the printing buffer area.
N is for setting line width.
X0l X0h Y0l Y0h are for setting the start point coordinate（X0，Y0）, X1l X1h Y1l Y1h are for setting line terminal point（X1，Y1）.
X0 = X0l + X0h×255，Y0 = Y0l + Y0h×255，X1 = X1l + X1h×255，Y1 = Y 1l + Y1h×255.

[Notes]
- This command affect only in page mode.
- The command can generate into horizontal line or vertical line, not oblique line. So if X0≠X1， Y0 should be equal to Y1.
The same situation, if YO≠Y1， XO should be equal to X1.
- This command does not affect when the starting point and ending point beyond printing area.

ESC p

[Name] Generate pulse
[Format] ASCII ESC p m t1 t2
Hex 1B 70 m t1 t2
Decimal 27 112m t1 t2
[Range] m= 0, 1, 48, 49
0 ≤ t1 ≤255
0 ≤ t2 ≤ 255
[Default] None
[Dscription] Outputs the pulse specified by t1and t2to the specified connector pin mas follows:

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

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

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

ESC t n

[Name] Select character code table
[Format] ASCII ESC t n
Hex 1B 74 n
Decimal 27 116 n
[Range] 0≤n≤47
[Dscription] Select character code table

n	Character Code table	n	Character Code table
0	[PC437 (USA: Standard Europe)]	45	[WPC1250]
1	[Katakana]	46	[WPC1251(Cyrillic)]
2	[PC850 (Multilingual)]	47	[WPC1253]
3	[PC860 (Portuguese)]	48	[WPC1254]
4	[PC863 (Canadian-French)]	49	[WPC1255]
5	[PC865 (Nordic)]	50	[WPC1256]
13	[PC857 (Turkish)]	51	[WPC1257]
14	[PC737 (Greek)]	52	[WPC1258]
15	[ISO8859-7 (Greek)]	54	[MIK(Cyrillic /Bulgarian)]
16	[WPC1252]	55	[CP755 (East Europe，Latvian 2)]
17	[PC866 (Cyrillic #2)]	56	[Iran]
18	[PC852 (Latin 2)]	57	[Iran II]
19	[PC858 (Euro)]	58	[Latvian]
20	[KU42]	59	[ISO-8859-1 (West Europe)]
21	[TIS11 (Thai)]	60	[ISO-8859-3(Latin 3)]
26	[TIS18 (Thai)]	61	[ISO-8859-4(Baltic)]

]

n	Character Code table	n	Character Code table
32	[PC720]	62	[ISO-8859-5(Cyrillic)]
33	[WPC775]	63	[ISO-8859-6(Arabic)]
34	[PC855 (Cyrillic)]	64	[ISO-8859-8(Hebrew)]
36	[PC862 (Hebrew)]	65	[ISO-8859-9(Turkish)]
37	[PC864 (Arabic)]	66	[PC856]
39	[ISO8859-2 (Latin2)]		
40	[ISO8859-15 (Latin9)]		

[Notes] Page0/Page2/Page3/Page4/Page5/Page14/Page17/Page18/Page19/Page20/Page21/Page26/Page32/Page37/Page47/Page50 supports both 12 x 24 fonts and 9 x 17 fonts.

ESC v

[Name] Transmit printer status

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

[Dscription]
- This command is only effective with a serial interface printer to transmit printer status to host machine.
- When the printer receive command, transfer a byte to the hardware.

Defined as follows:

bit	0/1	HEX	Decimal	function
0	0	00	0[Name]	normal
	1	01	1	Paper near end
1,6	0	00	0	Print head pressure
	1	42	66	Print head uplift
2	0	00	0	Paper exist
	1	04	4	Paper end
3	0	00	0	normal
	1	08	8	Cutter error
4	0	00	0	Fixed to Off
5	0	00	0	normal
	1	20	32	Thermal head over heat
7	---	---	---	Undefined

[Notes]
- This command is only effective with a serial interface mode

ESC { n

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

[Format]

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

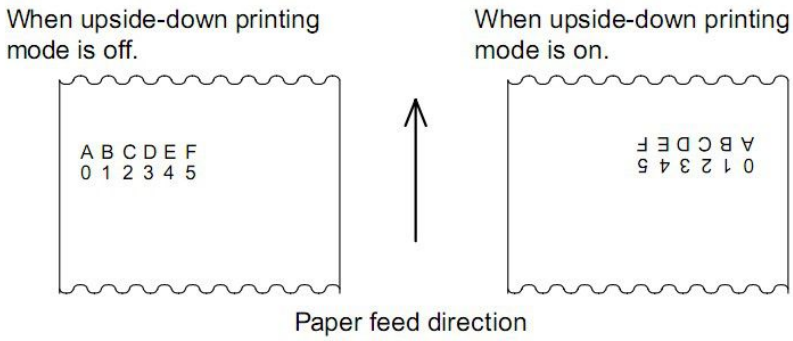
[Range] 0 ≤ n ≤ 255

[Dscription] 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]



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 ≤ n ≤ 255 0 ≤ m ≤ 3 , 48 ≤ m ≤51

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

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

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

[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 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.

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

[Name] Define NV bit image

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

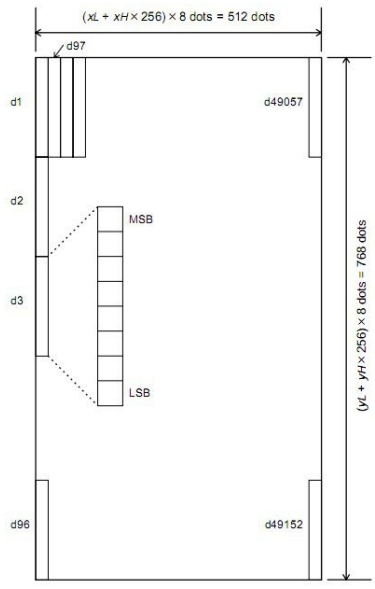
[Range] $1 \le n \le 255$
$0 \le xL \le 255$
$1 \le (xL + xH \times 256) \le 1023$
$1 \le (yL + yH \times 256) \le 800$
$0 \le d \le 255$
$k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
Total defined data area =64K bytes

[Dscription] Define the NV bit image specified by n.
n specifies the number of the defined NV bit image.
xL, xH specifies (xL+ xH*256)*8 dots in the horizontal direction for the NV bit image you are defining.
yL, yH specifies (yL+yH*256)* 8 dots in the vertical direction for the NV bit image you are defining.

[Notes] Frequent write command executions may damage the NV memory.
Therefore, it is recommended to write the NV memory 10 times or less a day.
This command cancels all NV bit images that have already been defined by this command. The printer cannot redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.
During processing of this command, the printer is BUSY when writing data to the user NV memory and stops receiving data. Therefore it is prohibited to transmit the data, including real-time commands, during the execution of this command.
NV bit image is a bit image defined in non-volatile memory by FS q and printed by FS p.

[Notes] In standard mode, this command is effective only when processed at the beginning of the line.
This command is effective when 7 bytes <FS yH> of the command are processed normally.
When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, yH out of the defined range.
In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled.
In groups of NV bit images other than the first one, when the printer encounters xL, xH, yL, yH out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that haven't been defined are disabled (undefined), but any NV bit images before that are enabled.
The d indicates the definition data. In data (d) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
This command defines n as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 01H, and the last data group [xL xH yL yH d1...dk] is NV bit image n.The total agrees with the number of NV bit images specified by the command FS p.
The definition data for an NV bit image consists of [xL xH yL yH d1...dk].
Therefore, when only one NV bit image is defined n=1, the printer processes a data group [xL xH yL yH d1...dk] once. The printer uses ([data: (xL+xH*256) (yL+yH*256)*8] [header :4]) bytes of NV memory.
The definition area in this printer is a maximum of 64K bytes. This command can define several NV bit images, but cannot define bit image data whose total
The printer is busy immediately before writing into NV memory
The printer does not transmit ASB status or perform status detection during processing of this command even when ASB is specified.
When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
Once an NV bit image is defined, it is not erased by performing ESC @, reset, and power off.
This command performs only definition of an NV bit image and does not perform printing. Printing of the NV bit image is performed by the FS p command.
NV bit image of each piece of space in NV memory is equal to the size of the NV bit image data plus 4 bytes.

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



GS FF

[Name] Marking paper locating

[Format]

ASCII	GS	FF
Hex	1D	0C
Decimal	29	12

[Dscription] Marking paper locating to the print starting position.

[Notes]
- This command is effective only when paper type is marking paper.
- This command is ignored when using receipt paper.

GS ! n

[Name] Select character size

[Format]

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

[Range] 0 ≤ n ≤ 255

（1 ≤ vertical number of times ≤ 6， 1 ≤ horizontal number of times ≤ 6）

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

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

Table 1 Character Width Selection

Hex	Decimal	Width
00	0	1 (normal)
10	16	2 (double-width)
20	32	3
30	48	4
40	64	5
50	80	6

Table 2 Character Height Selection

Hex	Decimal	Width
00	0	1 (normal)
01	1	2 (double-width)
02	2	3
03	3	4
04	4	5
05	5	6

[Notes] This command is effective for all characters (alphanumeric and Kanji), except for HRI characters .
• If n is 0 to 3 beyond the specified range, the horizontal magnification is set to 6 times.
If n is 4 to 7 beyond the specified range, the horizontal magnification is set to 6 times.
In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However,when character orientation
changes in 90 clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.
In page mode, vertical and horizontal directions are based on the character orientation.
When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.
The ESC ! command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

[Default] n = 0

GS $ nL nH

[Name] Set absolute vertical print position in page mode

[Format]

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

[Range] 0 ≤ nL ≤ 255, 0 ≤ nH ≤ 255

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

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

GS (A pL pH n m

[Name] Execute test printing

[Format]

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

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

[Dscription]
• Execute test printing， the way of printing depends on n,m.
n determine the test paper type

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

m determine printing content

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

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

GS * x y d1...d(x × y × 8)

[Name] Define download bit image

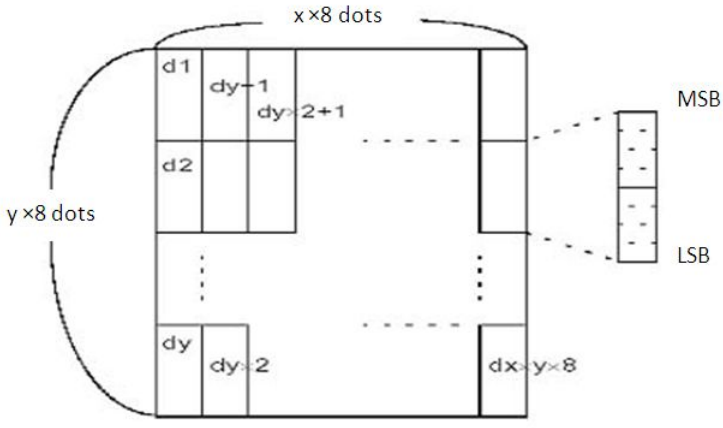
[Format]

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

[Range] 1 ≤ x ≤ 255，1 ≤ y ≤ 48，0 ≤ d ≤ 255，x × y ≤ 1023

[Dscription] It defines a downloaded bit image using x and y.
- x dots in the horizontal direction of bit imge
- y dots in the vertical direction of bit image

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



GS / m

[Name] print downloaded bit image

[Format]

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

[Range] 0 ≤ m ≤ 3, 48 ≤ m ≤ 51

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

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

[Notes]
- This command is ignored if a downloaded bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- Other print modes is ineffective (emphasized/ double-strike/ underline/ characters amplification/ white/ black reverse), except upside-down printing mode.
- The part exceeded the print area of the downloaded bit image is not to be printed. The printer is processing depends on the differences between print area position and the starting position:

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

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

GS

[Name] Start/ end macro definition

[Format]

ASCII	GS	:
Hex	1D	3A
Decimal	29	58

[Dscription] Start/ end macro definition

[Notes]
- Macro definition starts when this command is received during normal operation and ends when it is received during macro definition.
- If this command GS ^ is received while a macro is being defined, the printer ends macro definition mode and clears the definition.
- There is no macro definition when the printer is on.
- Since ESC @ can't delete macro definition, it can be included by macro definition.
- The macro definition can contain up to 1023 bytes. If the macro definition exceeds this value,

the excess data is processed as normal one.

GS B n

[Name] Turn white/black reverse printing mode

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

[Range] 0 ≤ n ≤ 255

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

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

[Default] n = 0

GS H n

[Name] Select printing position for HRI characters

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

[Range] 0 ≤ n ≤ 3, 48 ≤ n ≤ 51

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

[Notes]

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

HRI indicates Human Readable Interpretation.
HRI characters are printed using the font specified by GS f.

[Default] n = 0

GS L nL nH

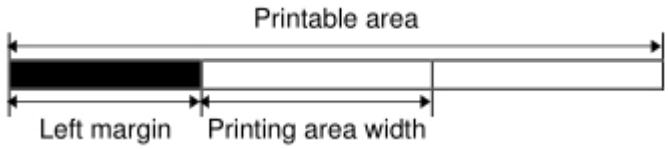
[Name] Set left margin

[Format]

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

[Range] 0 ≤ nL ≤ 255
0 ≤ nH ≤ 255

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



[Notes] This command is effective 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

GS W nL nH

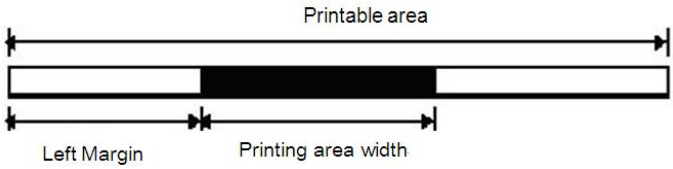
[Name] Set printing area width

[Format]

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

[Range] 0 ≤ nL ≤ 255
0 ≤ nH ≤ 255

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



[Notes] • In standard mode, this command is enabled only when processed at the beginning of a line.
• This command is ineffective in page mode, all the command data is managed as normal characters.
• This command does not affect printing in page mode.
• If the command sets the value of left margin + printing area width more than the printable area, the printing area width is the printable area width-left margin.

[Default] related to the actual printable width, different printer types set different.

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 ≤ nL ≤ 255
0 ≤ nH ≤ 255

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

[Notes] • This command is effective only in page mode, ignored in other modes.
• Print position moves downward: nL + nH × 256= N，
Use the complement of N for setting pitch movement upward:
nL + nH × 256= 65536 – N.
• Any position out of the print area is ignored.

GS f n

[Name] Select font for HRI characters

[Format]

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

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

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

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

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

[Default] n = 0

GS h n

[Name] Select bar code height

[Format]

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

[Range] 1 ≤ n ≤ 255

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

[Default] n = 162

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

[Name] Print bar code

[Format]

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

[Range] ①0 ≤ m ≤ 10； ②65 ≤ m ≤ 75

[Dscription] m：bar code type
n：bar code length

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

If there are illegal characters in the data, the printer will not print the bar code
The bar code width that exceeds the print area cannot be specified.
This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by line space setting commands.

GS r n

[Name] Transmit status
[Format] ASCII GS r n
Hex 1D 72 n
Decimal 29 114 n
[Range] n = 1, 49
[Dscription] • This command is only available on serial port 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 tansmission.
• 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	Paper roll end sensor: paper present
	1	0c	12	Paper roll end sensor: paper bot present
4	0	00	0	Not used. Fixed to Off.
5，6				Undefined.
7	0f	00	0	Not used. Fixed to Off.

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

[Name] Print raster bit image

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

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

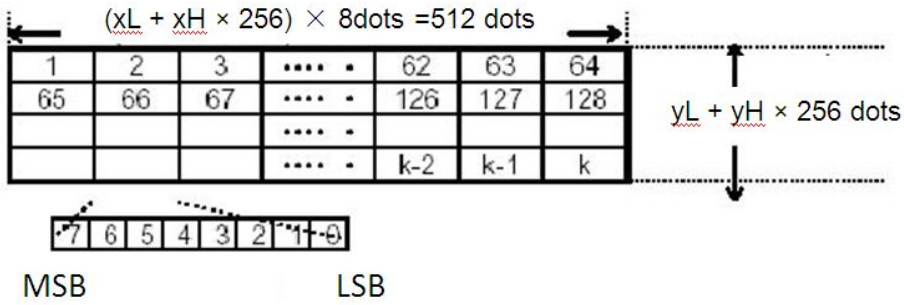
[Dscription] k = (xL + xH × 256) × (yL + yH × 256) (k ≠ 0)
print raster bit image, using m to select raster bit image mode:

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

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

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

[Example] When xL+ xH × 256 = 64



GS w n

[Name] Set bar code width

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

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

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

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

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

[Default] n = 2

3.Multi-byte code characters commands list

FS ! n

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

[Format]

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

[Range] 0 ≤ n ≤ 255

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

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

[Notes] When both double-width and double-height modes are set (including right-and left-side character spacing), quadruple-size characters are printed.
The printer can underline all characters (including right-and left-side character spacing), but cannot underline the space set by HT and 90° clockwise- rotated characters.
The thickness of the underline is that specified by FS ,regardless of the character size.
It is possible to emphasize the Kanji character using FS W or GS !; the setting of the last received command is effective.
It is possible to turn underline mode on or off using FS

[Default] n = 0

[Reference] FS_,FS W, GS

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

FS &

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

FS -n

[Name] Turn underline mode on/off for Kanji characters
[Format] ASCII FS - n
Hex 1C 2D n
Decimal 28 45 n
[Range] 0 ≤n ≤ 2, 48 ≤n ≤ 50
[Dscription] Turns underline mode for Kanji characters on or off, based on the following values of n for both receipt and slip.
The printer can underline all characters (including right- and left-side character spacing), butcannot underline the space set by HT and 90° clockwise-rotated characters.
After the underline mode for Kanji characters is turned off by setting n to 0, underline printing is no longer executed, but the previously specified underline thickness is not changed. The default underline thickness is 1 dot.
The specified line thickness does not change even when the character size changes.
It is possible to turn underline mode on or off using FS !, and the last received command is effective.
When the slip paper is selected, the underline thickness is 1 dot even if n is 2 or 50.

[Default] n = 0
[Reference] FS !

FS .

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

FS S n1 n2

[Name] Set left- and right-side Kanji character spacing
[Format] ASCII FS S n1 n2
Hex 1C 53 n1 n2
Decimal 28 83 n1 n2
[Range] 0 ≤ n1 ≤ 255
0 ≤ n2 ≤ 255
[Dscription] Sets left- and right-side Kanji character spacing to n1 and n2, respectively.
The left-side character spacing is [n1 × 0.125 mm], and the right-side character spacing is [n2 × 0.125 mm].
[Notes] This command sets the left- and right-side character spacing for normal-sized characters. When double-width mode is set, the left- and right-side character spacing is twice the normal value.
The spacing which is set with this command can be set independently in standard mode and in page mode.
n standard mode, the horizontal motion unit is used.
In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area, as follows:
1、When the starting position is set to the upper left or lower right of the printable area using ESC T, the horizontal motion unit (x) is used.
2、When the starting position is set to the upper right or lower left of the printable area using ESC T, the vertical motion unit (y) is used.
3、The maximum right-side spacing is approximately 32 mm {255 × 0.125 mm} for slip paper. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] n1 = 0 n2 = 0

FS W n

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

ESC m x x' y y' w w' h h'

[Name]	Rectangle									
[Format]	ASCII	ESC	m	x	x'	y	y'	w	w'	h	h'
	Hex	1b	6d	xL	xH	yL	yH	wL	wH	hL	hH
	Decimal	27	109	xL	xH	yL	yH	wL	wH	hL	hH
[Range]	0≤xH≤1 0≤yH≤1 0≤wH≤1 0≤hH<3									
[Dscription]	xL、xH Denote the low and high bytes on X coordinate of Left upper corner of the rectangle. yL、yH Denote the low and high bytes on Y coordinate of Left upper corner of the rectangle wL、wH Denote the low and high bytes on the rectangle width hL、hH Denote the low and high bytes on the rectangle height									
[Default]	The function just come true by page mode When rectangle, please pay attention about the size of the canvas page mode. Rectangle can't be drew if the size pass over canvas.									

ESC o x x' y y' r r'

[Name] Circle

[Format]

ASCII	ESC	m	x	x'	y	y'	r	r'
Hex	1b	6f	xL	xH	yL	yH	rL	rH
Decimal	27	111	xL	xH	yL	yH	rL	rH

[Range] 0≤xH≤1
0≤yH≤1
0≤rH≤1

[Dscription] xL、xH Denote the low and high bytes on X coordinate of Origin point .
yh、yH Denote the low and high bytes on Y coordinate of Origin point .
rL、rH Denote the low and high bytes of Radius

[Default] The function just come true by page mode
When circle, please pay attention about the size of the canvas page mode.Circle can't be drew if the size pass over canvas.

GS x n

[Name] Set serial port 2 baud rate

[Format]

ASCII	GS	x	n
Hex	1D	78	n
Decimal	29	120	n

[Dscription]

n	Baud rate
0	9600
1	19200
2	38400
3	57600
4	115200

[Default] The modified value will be saved .The baud rate is still that you revised at next time open the printer.

GS i n

[Name] Adjusting AD

[Format]

ASCII		GS	i	n
Hex		1d	69	n
Decimal	29	105	n	

[Range] n=0、1

[Dscription] n=0 Adjusting the value of AD line
n=1 Recover the default value of AD line

[Default] The modified value will be saved .The baud rate is still that you revised at next time open the printer

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 × 256) = 3 (pL = 3, pH = 0)
cn = 49
fn = 67
1 ≤ n ≤ 8
[Dscription] • Sets the size of the module for QR Code to n dots.
[Default] [Default]

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 × 256) = 3 (pL = 3, pH = 0)
cn = 49
fn = 69
48 ≤ n ≤ 51
[Dscription] • Selects the error correction level for QR Code

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

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

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

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
[Dscription]	• Encodes and prints the QR Code symbol data in the symbol storage area with GS (k<Function 180>.
[Notes]	• User must secure the quiet zone (left, right, upward, and downward space areas defined by the QR Code symbol specifications) for QR Code printing.

4.Programming Process Guide

Because the different printing stat us and error can be transmitted by Auto Status Back (ASB) command, it is recommended that you can use ASB command to inquiry status. ASB command is effective when the printer is powered on and can be directly sent to inquiry the status.

The recommended programming process is shown as below:

1) Inquire the printer status

Make sure that the printer status is normal before sending data to print.

2) Intitialize the printer

Make sure that the previous setting does not affect the current printing.

3) Set the print content

Set the print content such as character property, bitmap property and barcode property etc for the needed printing effect.

4) Send the data for printing (including the setup command befor printing)

If the printing data is bitmap data, please do not send the status inquiry command before sending printing data.

5) Inquire the printer status after printing

If ASB is enabled, the printer will return the printer status automatically.

Appendix

Appendix A: Code128 Bar Code

A.1 Description of th e CODE128 Bar Code

In CODE128 bar code system, it is possible to represent 128 ASCII characters, the one hundred numbers from 00 to 99 and some special characters with three code sets: A, B and C. Each code set is used for representing the following characters:

· Code set A: ASCII characters 00H to 5FH
· Code set B: ASCII characters 20H to 7FH
· Code set C: 100 numerals from 00 to 99

The following special characters are also available in CODE128:

· SHIFT characters

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

· Code set selection character (CODE A, CODE B, CODE C).

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

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

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

Printable characters in code set A

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NULL	00	0	(	28	40	P	50	80
SOH	01	1	)	29	41	Q	51	81
STX	02	2	*	2A	42	R	52	82
ETX	03	3	+	2B	43	S	53	83
EOT	04	4	,	2C	44	T	54	84
ENQ	05	5	-	2D	45	U	55	85
ACK	06	6	.	2E	46	V	56	86
BEL	07	7	/	2F	47	W	57	87
BS	08	8	0	30	48	X	58	88
HT	09	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B,31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51

DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,53	123,83
NAK	15	21	=	3D	61	CODEB	7B,42	123,66
SYN	16	22	>	3E	62	CODEC	7B,43	123,67
ETB	17	23	?	3F	63			
CAN	18	24	@	40	64			
EM	19	25	A	41	65			
SUB	1A	26	B	42	66			
ESC	1B	27	C	43	67			
FS	1C	28	D	44	68			
GS	1D	29	E	45	69			
RS	1E	30	F	46	70			
US	1F	31	G	47	71			
SP	20	32	H	48	72			
!	21	33	I	49	73			
"	22	34	J	4A	74			
#	23	35	K	4B	75			
$	24	36	L	4C	76			
%	25	37	M	4D	77			
&	26	38	N	4E	78			
'	27	39	O	4F	79			

Printable characters in code set B

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
SP	20	32	H	48	72	p	70	112
!	21	33	I	49	73	q	71	113
"	22	34	J	4A	74	r	72	114
#	23	35	K	4B	75	s	73	115
$	24	36	L	4C	76	t	74	116
%	25	37	M	4D	77	u	75	117
&	26	38	N	4E	78	v	76	118
'	27	39	O	4F	79	w	77	119
(	28	40	P	50	80	x	78	120
)	29	41	Q	51	81	y	79	121
*	2A	42	R	52	82	z	7A	122
+	2B	43	S	53	83	{	7B,7B	123,123
,	2C	44	T	54	84	|	7C	124
-	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	—	7E	126
/	2F	47	W	57	87	DEL	7F	127
0	30	48	X	58	88	FNC1	7B,31	123,49
1	31	49	Y	59	89	FNC2	7B,32	123,50
2	32	50	Z	5A	90	FNC3	7B,33	123,51

3	33	51	[	5B	91	FNC4	7B,34	123,52
4	34	52	\	5C	92	SHIFT	7B,53	123,83
5	35	53	]	5D	93	CODEA	7B,41	123,65
6	36	54	^	5E	94	CODEC	7B,43	123,67
7	37	55	_	5F	95			
8	38	56	`	60	96			
9	39	57	a	61	97			
:	3A	58	b	62	98			
;	3B	59	c	63	99			
<	3C	60	d	64	100			
=	3D	61	e	65	101			
>	3E	62	f	66	102			
?	3F	63	g	67	103			
@	40	64	h	68	104			
A	41	65	i	69	105			
B	42	66	j	6A	106			
C	43	67	k	6B	107			
D	44	68	l	6C	108			
E	45	69	m	6D	109			
F	46	70	n	6E	110			
G	47	71	o	6F	111			

Printable characters in code set C

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
0	00	0	40	28	40	80	50	80
1	01	1	41	29	41	81	51	81
2	02	2	42	2A	42	82	52	82
3	03	3	43	2B	43	83	53	83
4	04	4	44	2C	44	84	54	84
5	05	5	45	2D	45	85	55	85
6	06	6	46	2E	46	86	56	86
7	07	7	47	2F	47	87	57	87
8	08	8	48	30	48	88	58	88
9	09	9	49	31	49	89	59	89
10	0A	10	50	32	50	90	5A	90
11	0B	11	51	33	51	91	5B	91
12	0C	12	52	34	52	92	5C	92
13	0D	13	53	35	53	93	5D	93
14	0E	14	54	36	54	94	5E	94
15	0F	15	55	37	55	95	5F	95
16	10	16	56	38	56	96	60	96
17	11	17	57	39	57	97	61	97
18	12	18	58	3A	58	98	62	98

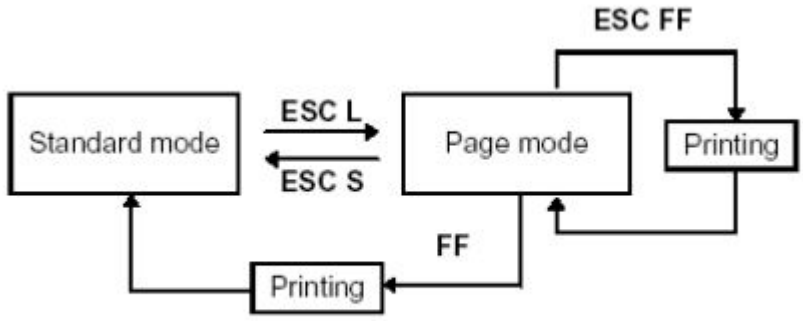
19	13	19	59	3B	59	99	63	99
20	14	20	60	3C	60	FNC1	7B,31	123,49
21	15	21	61	3D	61	CODEA	7B,41	123,65
22	16	22	62	3E	62	CODEB	7B,42	123,66
23	17	23	63	3F	63			
24	18	24	64	40	64			
25	19	25	65	41	65			
26	1A	26	66	42	66			
27	1B	27	67	43	67			
28	1C	28	68	44	68			
29	1D	29	69	45	69			
30	1E	30	70	46	70			
31	1F	31	71	47	71			
32	20	32	72	48	72			
33	21	33	73	49	73			
34	22	34	74	4A	74			
35	23	35	75	4B	75			
36	24	36	76	4C	76			
37	25	37	77	4D	77			
38	26	38	78	4E	78			
39	27	39	79	4F	79			

B.1 General Description

The printer operates in two print modes: standard mode and page mode. In standard mode, the printer prints and feeds paper each time it receives print data or paper feed commands. In page mode, all the received print data and paper feed commands are proce ssed in the specified memory, and the printer executes no operation. All the data in the memory is then printed when an ESC FF or FF command is received.

For example, when the printer receives the data "ABCDEF" <LF> in standard mode, it prints "ABCDEF" and feeds the paper by one line. In page mode, "ABCDEF" is written to the specified printing area in memory, and the position in memory for the next print data is shifted by one line.

The ESC L command puts the printer into page mode, and all commands received thereafter are processed in page mode. Executing an ESC FF command prints the received data collectively, and executing an FF command restores the printer to standard mode after the received data is printed collectively. Executing an ESC S command restores the printer to standard mode without printing the received data in page mode; the received data is cleared from memory instead.



Shifting Between Standard Mode and Page Mode

B.2 Setting Values in Standard and Page Modes

1) The available commands and parameters are t he same for both standard and page modes. However, these values can be set indepe ndently in each mode for the ESC SP , ESC 2 , ESC 3 , and FS S commands. For these commands, different settings can be stored for each mode.

B.3 Formatting of Print Data in the Printable Area

1) The printable area is set by ESC W. If all printing and feeding operations are complete before the printer receives the ESC W command, the left side (as you face the printer) is taken as the origin (x0, y0) of the printable area. The printable rectangular area is defined by the length (dx dots) extending from and including the origin (x0, y0) in the x di rection (perpendicular to the paper feed direction), and by the length (dy dots) in the y direction (paper feed direction). (If the ESC W command is not used, the printable area remains the default value.)

2) When the printer receives print data after ESC W sets the printable area and ESC T sets the printing direction, the print data is formatt ed within the printable area so that point A in Figure B.2 is at the beginning of the printable area as a default value. (When a character is pr inted, point A is the baseline.) Print data containing downloaded bit images or bar codes is formatted so that the bottom point of the left side of the image data (point B in Figur e B.3) is aligned with the baseline.

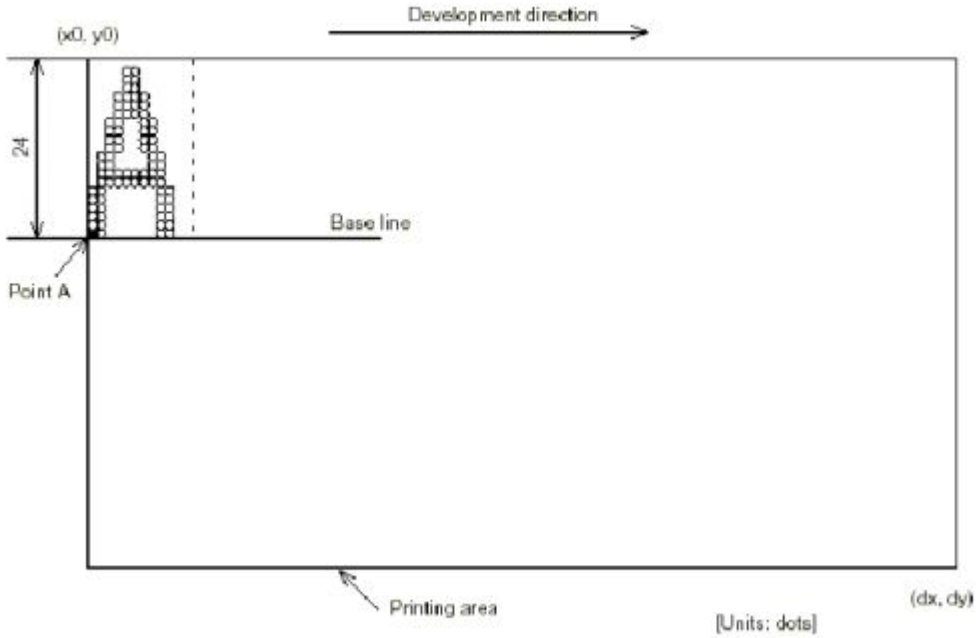
3) If the print data (including charac ter spacing) exceeds t he printable area before the printer receives a command (e.g., LF or ESC J) that includes line feeding, a line feed is executed aut omatically within the printable area. The print position, therefore, moves to the beginning of the next line. The line feed amount depends on the values set by commands (such as ESC 2 and ESC 3).

4) The default value of the line spacing is set to 1/6 inch and corresponds to 31 dots in the vertical direction. If print data for the next line contains extended characters that are higher than double-height characters, bit images taking up two or more lines, or bar codes higher than normal characters, the amount of line feeding may be insufficient, resulting in overlapping of the characters' higher-order dots with the previous line. To avoid this, increase the amount of line spacing.

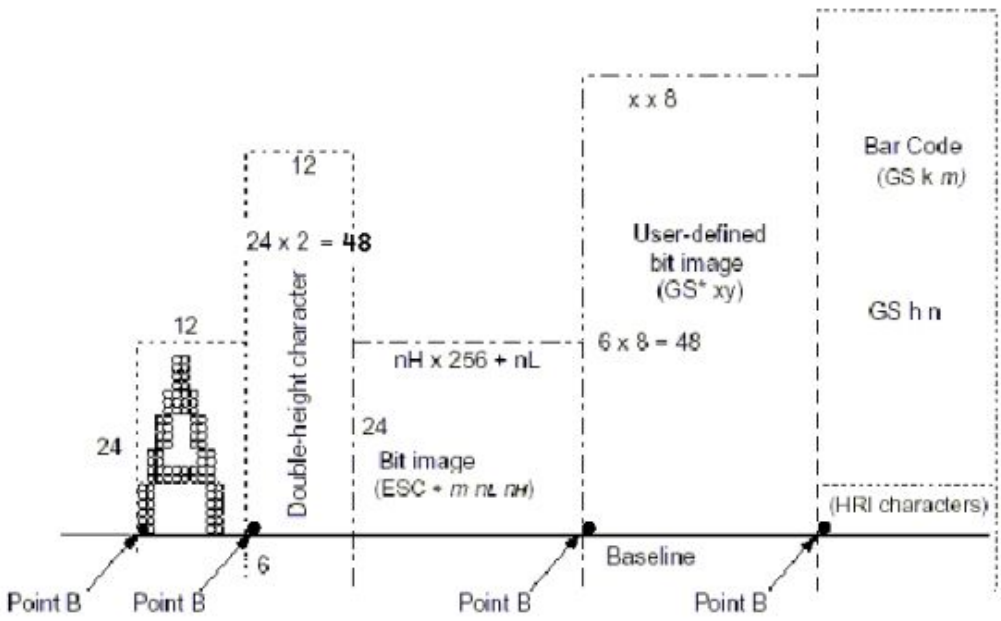
Example

When printing a downloaded bit image of six bytes in the vertical direction, use the following formula:
{number of vertical dots (8 ×6) - number of dots for feeding at the beginning of the printable area (24)} × vertical motion unit (203/203) = 24
Therefore, 24 dots are required for feeding.
Use the following commands:

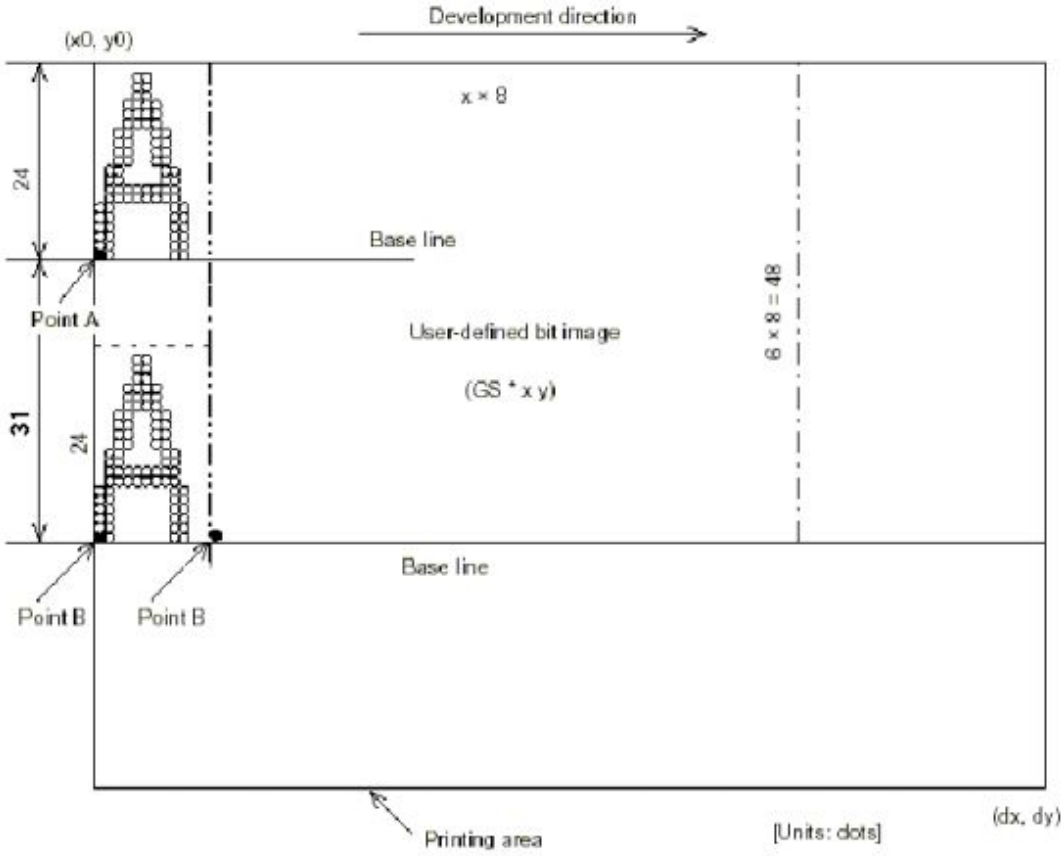
ESC W xL , xH, yL, yH, dxL , dxH , dyL , dyH
ESC T n
ESC 3 24 ¬ Set line spacing to be added.
LF
GS / 1
ESC 2 ¬ Reset the line spacing to 1/6 inch.



Character Data Developing Position



Print Data Developing Position



Downloaded Bit Image Developing Position