LR1100 POS THERMAL PRINTER

PROGRAMMING MANUAL

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1   Overview

The LR1100 is a fast high quality POS printer using thermal technology for printing. It is compatible with most point-of-sale systems on the market. The printer can be used with computer peripheral systems, ECR and POS systems. The LR1100 was designed to facilitate simple and efficient operations.

1.1   Features

- **Fast printing up to 9.8" per second**
- High print quality
- Low noise printing
- Supports cash drawer kick out
- Low power consumption and operation cost
- Supports printing of different density bitmap
- Emulation: ESC/POS command set
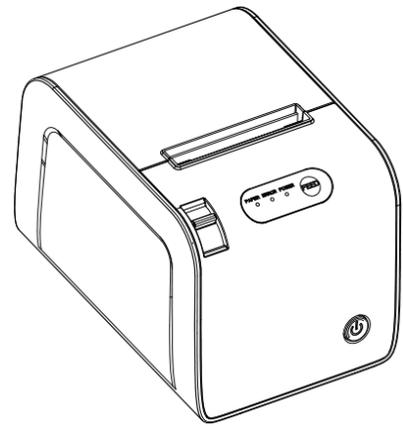
1.2   I/O connectors

At the rear panel of the LR1100 is a row of external I/O device connectors detailed as follows:

○ **DC IN** (3-pin) - for connection to power adapter (DC24V, 2.5A).

○ **CASH DAWER** (RJ11) - for connection to cash drawer to open the drawer with commands sent to the printer.

○ **ETHERNET** (RJ45) - for connection to network with LAN cable (LR1100E).

○ **USB** (type B) - for connection to host computer with USB cable (LR1100U).

2   Command List

A command set describes the behavior of the printer when sequences of bytes are received through the communication interface. The command set available with LR1100 is ESC/POS®. It is a standard defined by Seiko Epson Corporation. ESC/POS® commands can be classified as executing or setting. An executing command cause the printer to execute something and does not affect further incoming data. On the other hand, a setting command cause the printer to change its internal flags that may affect incoming data. ESC/POS® commands supported by LR1100 are summarized in the following table.

Type	Command	Name
Print Command	LF	Print and line feed
	CR	Print and carriage return
	HT	JMP to the next TAB position
	ESC D n	Set horizontal tab positions
	ESC J n	Print and Feed n dots paper
	ESC d n	Print and Feed n lines
	ESC = n	Toggle the printer online or offline
	DC2 T	Printing test page
Line spacing Command	ESC 2	Select default line spacing
	ESC 3 n	Set line spacing
	ESC a n	Select justification
	GS L nL nH	Set the left blank margin with dots
	ESC \nl nh	Set relative print position
	GS W nL nH	Set printing area width
	ESC S	Set absolute print position
Character Command	ESC ! n	Select print mode(s)
	GS ! n	Set or Cancel the double width and height
	GS B	Turn white/black reverse printing mode
	ESC V n	Turn 90°clockwise rotation mode on/off
	ESC M n	Select character font
	ESC G n	Turn on/off double-strike mode
	ESC E n	Set or Cancel bold font
	ESC SP n	Set the space between chars

Type	Command	Name
	ESC { n	Turn upside-down printing mode on/off
	ESC - n	Set the underline dots(0,1,2)
	ESC % n	Select/Cancel user-defined characters
	FS &	Select Chinese mode
	FS .	Select character mode
	FS !	Set print mode for Kanji characters
	FS - n	Turn underline mode on/off for characters
	FS 2 c1 c2	Define user-defined Kanji characters
	FS S n1 n2	Set left and right -side Kanji character spacing
	ESC &	Define user-defined characters
	ESC ? n	Cancel user-defined characters
	ESC R n	Select and international character set
	ESC t n	Select character code table
Bit Image Command	ESC *	Select bit-image mode
	GS *	Define downloaded bit image
	GS /	Print downloaded bit image
	GS v	Print the bitmap with width and height
	FS p n m	Print NV bitmap
	FS q n	Define NV bitmap
Init Command	ESC @	Initialize printer
Status Command	DLE EOT n	Real-time status transmission
	DLE ENQ n	Real-time request to printer
	DLE DC4 n m t	Generate pulse at real-time
	GS r n	Transmit status
	ESC p m	Generate pulse
	GS a n	Enable/Disable ASB
	GS I	Read Print ID
	GS (H	Set process ID response
Bar Code Command	GS H	Select printing position of human readable characters
	GS h	Set bar code height
	GS w	Set bar code width
	GS f n	Select font for HRI characters
	GS k	Print bar code

Type	Command	Name
	GS x	Set barcode printing left space
Printer Control Command	ESC c 5 n	Select/Cancel panel button。
	① GS V m ② GS V m n	Select cut mode and cut paper
	GS :	Start/end macro definition
	GS ^ r t m	Execute macro
	ESC B n t	Set beep tone
	ESC i	Cut Paper (For cut)
	ESC m	Partial Cut Paper (For cut)
	ESC 9	Select Chinese code format
Page mode command	ESC FF	Print data in page mode
	FF	Print and return to standard mode in page mode
	ESC L	Select page mode
	ESC S	Select standard mode
	ESC T	Select print direction in page mode
	ESC W	Set printing area in page mode
	ESC Z	Print 2D barcode
	FS W	Turn quadruple-size mode on/off for Kanji characters
	GS FF	Feed marked paper to print starting position
	GS S	Set absolute vertical print position in page mode
	GS (A	Execute test print
	GS C 0	Select counter print mode
	GS C 1	Select count mode (A)
	GS C 2	Set counter
	GS C;	Select count mode (B)
	GS Z	Select 2D barcode type
	GS \	Set relative vertical print position in page mode
	GS c	Print counter
	GS P	Set horizontal and vertical motion unit

3   Command Set Details

This section presents detailed information about each ESC/POS® command implemented by the LR1100 printer. Some terms used in the description of ESC/POS command set need further explanation, as described below.

- Print buffer: a buffer that stores the image data to be printed.
- Print buffer full: the state where the print buffer is full. If new print data is input while the print buffer is full, the data in the print buffer is printed out and a line feed is executed. This is the same operation as the LF operation.
- Start of line: a state that satisfies the following conditions:
  - Print buffer is empty.
  - There is no data to print (including portions of data skipped due to HT).
  - The print position has not been specified by the ESC $ or ESC \ command.
- Printable area: the maximum space available for printing. The printable area under ESC/POS for LR1100 is specified by horizontal direction (72mm or 2.84").
- Printing area: a value set by the command. It must be always less than or equal to printable area.
- Ignore: a state in which all codes, including parameters, are read in and discarded, and nothing happens.
- MSB: Most Significant Bit
- LSB: Least Significant Bit

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**

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 cu rrent line spacing.	
[Note]	This command sets the print position to the beginning of the line.	
[Reference]	**ESC 2, ESC 3**	

CR

[Name]	Print and carriage return	
[Format]	ASCII	CR
	Hex	0D
	Decimal	13
[Description]	When automatic line feed is enabled, this command functions the same as LF; when automatic line feed is disabled, this command is ignored.	
[Notes]	• This command line feed is ignored with a serial interface model.	
	• Sets the print starting position to the beginning of the line.	
[Reference]	**LF**	

DLE EOT n

[Name]	Real-time status transmission			
[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]   • The status is transmitted whenever the data sequence <10>H<04>H<n>

        $(1 \leq n \leq 4)$ 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 n is transmitted and then **DLE EOT 3** interrupts before n is received, the code <10>H for **DLE EOT 3** is 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.
- 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.

n = 1: Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer open/close signal is LOW.(connector pin3)
	On	04	4	Drawer open/close signal is HIGH.(connector pin3)
3	-	-	-	Undefined.
4	On	10	16	Not used. Fixed to On.
5.6	--	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n = 2: Offline status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Platen is closed.
	On	04	4	Platen is opened.
3	Off	00	0	Paper is not being fed by using the FEED button.
	On	08	8	Paper is being fed by the FEED button.
4	On	10	16	Not used. Fixed to On.
5	-	-	-	Undefined.
6	Off	00	0	No error.
	On	40	64	Error occurred.

| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

n = 3: Error status

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

Bit 6:   Bit 6 is On when printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is opened during printing.

n = 4: Continuous paper sensor status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2.3	-	-	-	Undefined.
4	On	10	16	Not used. Fixed to On.
5.6	Off	00	0	Paper roll sensor: Paper present.
	On	60	96	Paper roll end detected by paper roll sensor.
7	Off	00	0	Not used. Fixed to Off.

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

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 at clearing the receive and print buffers

[Notes]
- This command is effective only when an auto cutter error, a black mark 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 cannot be executed when the printer is busy.

- The status is also transmitted whenever the data sequence of <10>H<05>H<n> (1 ≤ n ≤ 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**

DLE DC4 n m t

[Name]	Generate pulse at real-time

[Format]   ASCII   DLE   DC4   n   m   t

Hex   10   14   n   m   t

Decimal   16   20   n   m   t

[Range]   n=1,m=0,1

1 ≤ t ≤ 8

[Description]   Outputs the pulse specified by t to connector pn m as follows:

m	Connector pin
0	Drawer kick-out connector pin2
1	Drawer kick-out connector pin5

The pulse ON time is [t x 100 ms] and the OFF time is [t x 100 ms].

[Details]
- When the pulse is output to the connector pin specified while **ESC p** or **DEL DC4** is executed while this command is processed, this command is ignored.
- With a serial interface model, this command is executed even when the printer is receive the command.
- With a parallel interface model, this command is not executed even when the printer is receive the command.
- If printer data includes the same character strings as this command, the printer performs the same operation specified by this command. The user must consider this.
- This command should not be used within the data sequence of another command that consists of 2 or more bytes.
- This command is effective even when the printer is disabled with **ESC =** (Select peripheral device).

[Reference]   **ESC p**

ESC SP n

[Name]   Set right-side character spacing

[Format]   ASCII   ESC   SP   n

                Hex   1B   20   n

                Decimal   27   32   n

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

[Description] Sets the character spacing for the right side of the character to [$n \times 0.125$ mm ($n \times 0.0049$")].

[Notes]
- The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is n times normal value.
- This command does not affect the setting of Kanji characters.
- This command sets values independently in standard mode.

[Default]   n = 0

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

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character Font A (12×24).
	On	01	1	Character Font B (9×17).

1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

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

[Default]   n = 0

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

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 $[(nL + nH \times 256) \times 0.125$ mm].

[Notes]
- Settings outside the specified printable area are ignored.
- In standard mode, the horizontal motion unit (x) is used.

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

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.
- 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

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

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 (12×24) is selected)

$0 \leq x \leq 9$ (when Font B (9×17) is selected)

$0 \leq d1 ... d(y \times xk) \leq 255$

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

[Notes]
- The allowable character code range is from ASCII code <20>H to <7E>H (95 characters).
- It is possible to define multiple characters for consecutive character codes. If only one character is desired, use c1 = c2.
- d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.
- The data to define user-defined characters is (y×x) bytes.
- Set a corresponding bit to 1 to print a dot or 0 not to print a dot.
- This command can define different user-defined character patterns for each font. To select a font, use **ESC !** or **ESC M**.
- User-defined characters and a downloaded bit image cannot be defined simultaneously. When this command is executed, the downloaded bit image is cleared.
- The user-defined character definition is cleared when:
  1) **ESC @** is executed.
  2) **GS ∗** is executed.
  3) **ESC ?** is executed.
  4) The power is turned off.
- When user-defined characters are defined in Font B (9 × 17), only the most significant bit of the 3rd byte of data in vertical direction is effective.

[Default]   The internal character set

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

[Example]

- When Font A (12× 24) is selected.
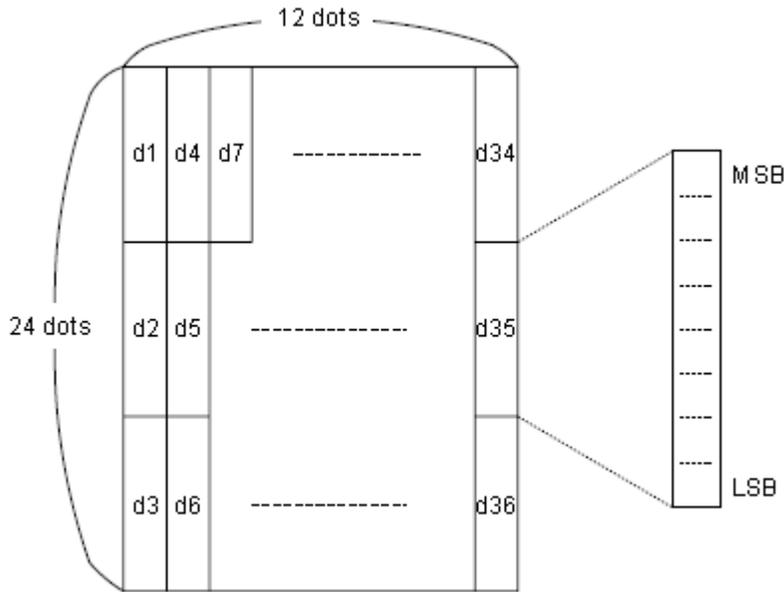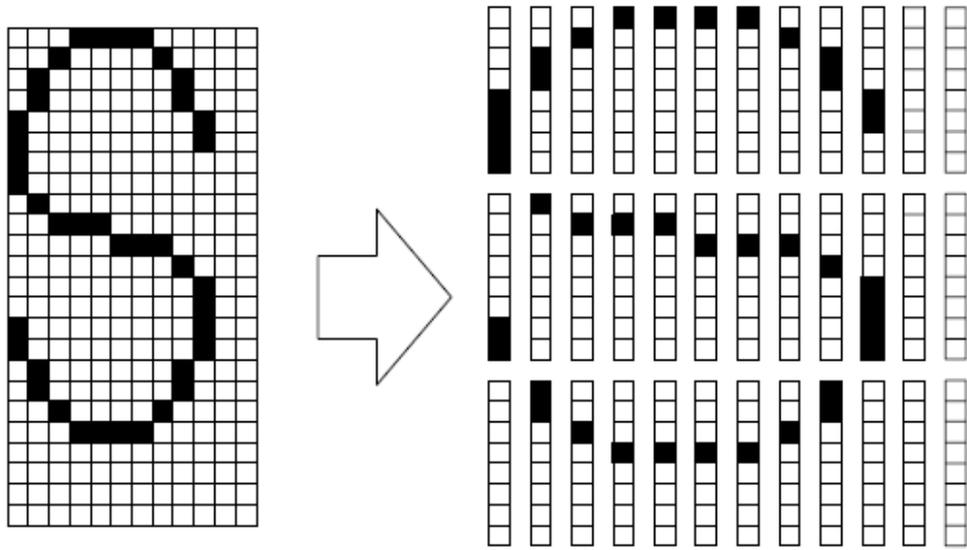
d1= <0F>H d4 = <30>H d7 = <40>H . . . .
d2 = <03>H d5 = <80>H d8 = <40>H . . . .
d3 = <00>H d6 = <00>H d9 = <20>H . . . .

- When font B (9×17) is selected.
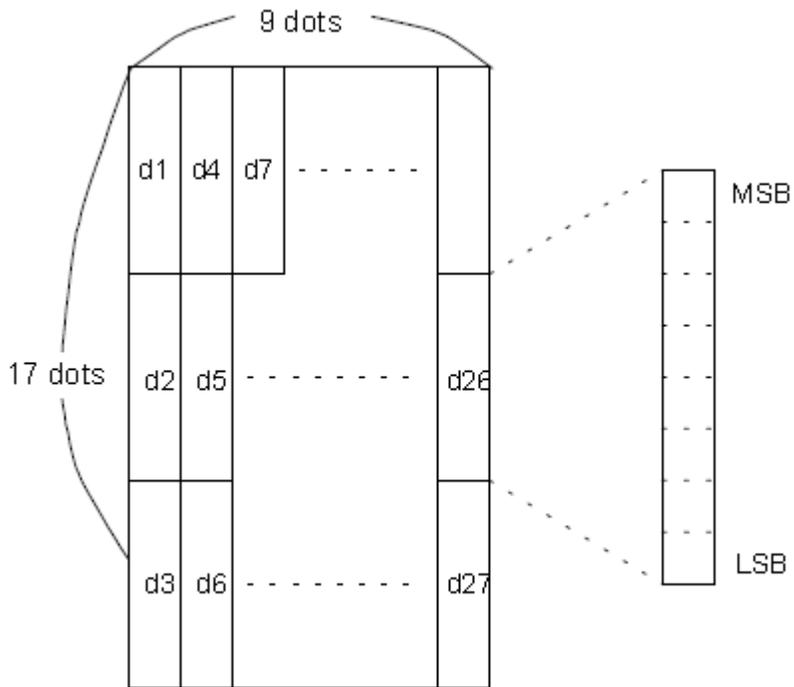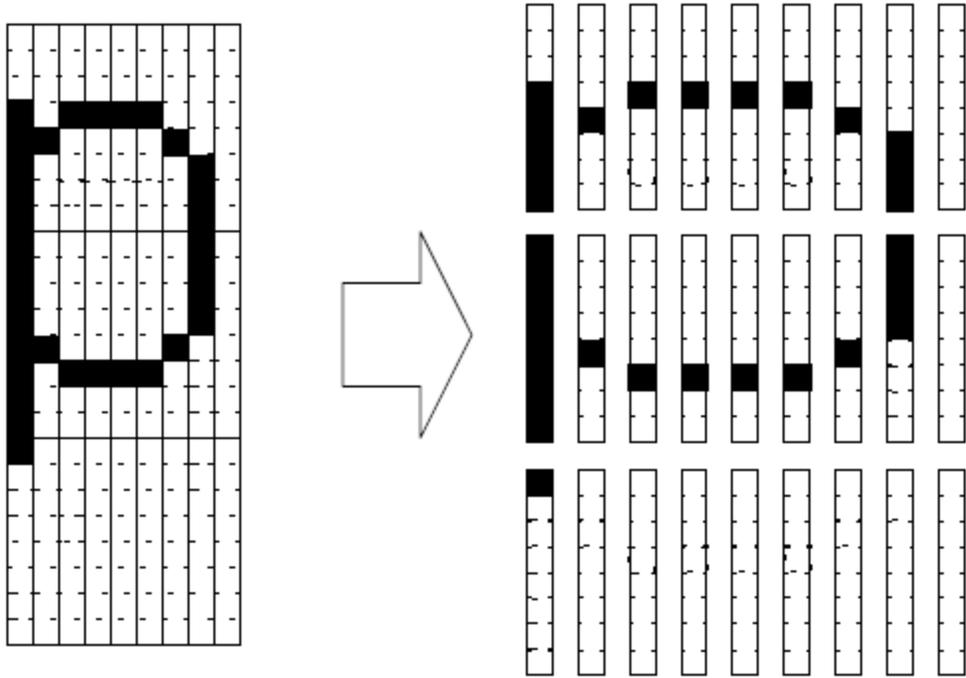
d1 = <1F>H d4 = <08>H d7 = <10>H...
d2 = <FF>H d5 = <08>H d8 = <04>H...
d3 = <80>H d6 = <00>H d9 = <00>H...

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
	$0 \leq nL \leq 255$
	$0 \leq nH \leq 3$
	$0 \leq d \leq 255$
[Description]	Selects a bit-image mode using m for the number of dots specified by nL and nH, as follows:

m	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot Density	Number of Data (k)
0	8-dot single-density	8	67.7 dpi	101.6 dpi	$nL + nH \times 256$
1	8-dot double-density	8	67.7 dpi	203.2 dpi	$nL + nH \times 256$
32	24-dot single-density	24	203.2 dpi	101.6 dpi	$(nL + nH \times 256) \times 3$
33	24-dot double-density	24	203.2 dpi	203.2 dpi	$(nL + nH \times 256) \times 3$

[Notes]
- If the value of m is out of the specified range, nL and the data following are processed as normal data.

- The nL and nH indicate the number of dots in the bit image in the horizontal direction. The number of dots is calculated by $nL + nH \times 256$.

- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.

- d indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 not to print a dot.

- If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC *** command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):

  ① The width of the printing area is extended to the right to accommodate the amount of data.

  ② If 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.

- After printing a bit image, the printer returns to normal data processing mode.

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

- The relationship between the image data and the dots to be printed is described in figure below.

- When 8-dot bit image is selected:

Single density   Double density

- When 24-dot bit image is selected:

Bit-image data

Print data

Single density   Double density
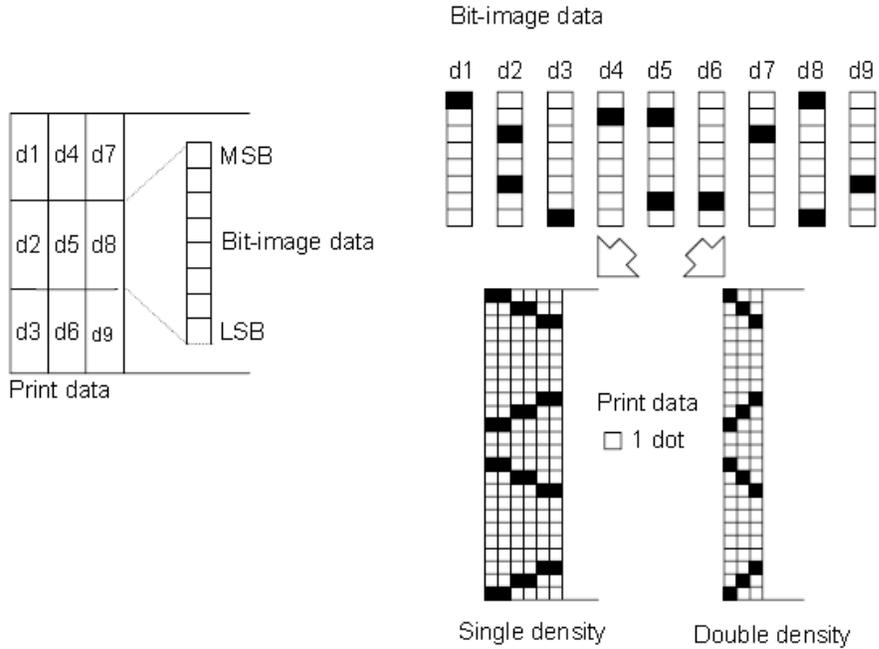
ESC - n

[Name]	Turn underline mode on/off
[Format]	ASCII ESC - n
	Hex 1B 2D n
	Decimal 27 45 n
[Range]	$0 \leq n \leq 2$, $48 \leq n \leq 50$
[Description]	Turns underline mode on or off, based on the following values

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

[Notes]
- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT.**
- The printer cannot underline 90° clockwise rotated characters and white/black inverted characters.
- When underline mode is turned off by setting the value of n to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.
- Changing the character size does not affect the current underline thickness.

- Underline mode can also be turned on or off by using **ESC !**. Note, however, that the last received command is effective.

[Default]   n = 0

[Reference]   **ESC !**

ESC 2

[Name]   Select default line spacing

[Format]   ASCII   ESC 2

                Hex   1B   32

                Decimal   27   50

[Description] Selects 3.75 mm line spacing.

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

[Reference]   **ESC 3**

ESC 3 n

[Name]   Set line spacing

[Format]   ASCII   ESC 3 n

                Hex   1B   33 n

                Decimal   27   51 n

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

[Description] Sets the line spacing to [n $\times$ vertical motion unit]. If result is less than 3.0 mm then line spacing is set to 3.0 mm.

[Notes]   - The line spacing can be set independently in standard mode and in page mode.
- The horizontal and vertical motion units are specified by GS P. changing the horizontal or vertical motion unit does not affect the current line spacing.
- In standard mode, the vertical motion unit (y) is used.

[Default]   n = 57

[Reference]   **ESC 2**

ESC = n

[Name]   Set peripheral device

[Format]   ASCII   ESC   =   n

                Hex   1b   3d n

                Decimal   27   61 n

[Description] Set peripheral device：

                bit 0：   Off (Hex 00) printer disabled

                            On (Hex 01) printer enabled

                bit 1-7：undefine

ESC ? n

[Name]	Cancel user-defined characters	
[Format]	ASCII	ESC ? n
	Hex	1B 3F n
	Decimal	27 63 n
[Range]	$32 \leq n \leq 126$	
[Description]	Cancels user-defined characters.	

[Notes]
- This command cancels the patterns defined for the character codes specified by n. After the user-defined characters are canceled, the corresponding patterns for the internal characters are printed.
- This command deletes the pattern defined for the specified code in the font selected by **ESC !**.
- If a user-defined characters have not been defined, the printer ignores this command.

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

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 settings are not checked again.
- The data in the receive buffer is not cleared.
- The macro definition is not cleared.

ESC B n t

[Name]	Set beep tone	
[Format]	ASCII	ESC B n t
	Hex	1B 42 n t
	Decimal	27 66 n t
[Range]	$1 \leq n \leq 9$, $1 \leq t \leq 9$	
[Description]	Set printer beep tone.	

- n specifies the number of the beep tone.
- t specifies the time of beep tone.

ESC D n1...nk NUL

[Name]	Set horizontal tab positions
[Format]	ASCII ESC D n1...nk NUL
	Hex 1B 44 n1...nk 00
	Decimal 27 68 n1...nk 0

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

           $0 \leq k \leq 32$

[Description]   Sets horizontal tab positions.

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

[Notes]
- The horizontal tab position is stored as a value of [character width $\times$ n] measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
- This command cancels the previous horizontal tab settings.
- When setting n = 8, the print position is moved to column 9 by sending **HT**.
- Up to 32 tab positions (k = 32) can be set. Data exceeding 32 tab positions is processed as normal data.
- Transmit [n]k in ascending order and place a NUL code 0 at the end.

  When [n]k is less than or equal to the preceding value [n]k-1, tab setting is finished and the following data is processed as normal data.
- **ESC D NUL** cancels all horizontal tab positions.
- The previously specified horizontal tab positions do not change, even if the character width changes.
- The character width is memorized for each standard mode.

[Default]   The default tab positions are at intervals of 8 characters (columns 9, 17, 25,...) for Font A (12$\times$24).

[Reference]   **HT**

ESC E n

[Name]	Turn emphasized mode on/off
[Format]	ASCII ESC E n
	Hex 1B 45 n
	Decimal 27 69 n

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

[Description]   Turns emphasized mode on or off

               When the LSB of n is 0, emphasized mode is turned off.

When the LSB of n is 1, emphasized mode is turned on.

[Notes]
- Only the least significant bit of n is enabled.
- This command and **ESC !** turn on and off emphasized mode in the same way. Be careful when this command is used with **ESC !**.

[Default]   n = 0

[Reference]   **ESC !**

ESC G n

[Name]   Turn on/off double-strike mode

[Format]

ASCII	ESC	G	n
Hex	1B	47	n
Decimal	27	71	n

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

[Description]   Turns double-strike mode on or off.
- When the LSB of n is 0, double-strike mode is turned off.
- When the LSB of n is 1, double-strike mode is turned on.

[Notes]
- Only the lowest bit of n is enabled.
- **Printer output is the same in double-strike mode and in emphasized mode.**

[Default]   n = 0

[Reference]   **ESC E**

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].

[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**.
- In standard mode, the printer uses the vertical motion unit (y).
- Even when the set value exceeds the maximum with the Black Mark sensor enabled in standard mode, this command is effective.

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 (9×17) selected.

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

[Reference]   **ESC !**

ESC R n

[Name]   Select an international character set

[Format]   ASCII   ESC R n

                Hex   1B   52 n

                Decimal   27   82 n

[Range] $0 \leq n \leq 13$

[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	Korea
14	Slovenia/Croatia
15	China

[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

[Description]   Turns 90° clockwise rotation mode on/off

n is used as follows:

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

[Notes]   • This command affects printing in standard mode. However, the setting is always effective.

• When underline mode is turned on, the printer does not underline 90° clockwise-rotated characters.

• Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double- width commands in normal mode.

[Default]   n = 0

[Reference]   **ESC !, ESC** –

ESC \ nL nH

[Name]   Set relative print position

[Format]   ASCII   ESC   \   nL   nH

Hex   1B   5C   nL   nH

Decimal   27   92   nL   nH

[Range]   0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

[Description]   Sets the print starting position based on the current position using horizontal or vertical motion units.

• This command sets the distance from the current position to [(nL + nH × 256) × 0.125 mm]

[Notes]   • Any setting that exceeds the printable area is ignored.

• When pitch N is specified to the right:

nL+ nH × 256 = N

When pitch N is specified to the left (the negative direction), use the complement of 65536.

When pitch N is specified to the left:

nL+ nH $\times$ 256 = 65536 - N

- In standard mode, the horizontal motion unit is used.

[Reference]   **ESC $**

ESC a n

[Name]   Select justification

[Format]   ASCII   ESC   a   n

Hex   1B   61   n

Decimal   27   97   n

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

[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.

- This command executes justification in the printing area.

- 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 5 n

[Name]   Enable/disable panel buttons

[Format]   ASCII   ESC   c   5   n

Hex   1B   63   35   n

Decimal   27   99   53   n

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

[Description] Enables or disables the panel buttons.

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

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

[Notes]   • Only the lowest bit of n is valid.

- When the panel buttons are disabled, none of them are usable when the printer cover is closed.

- In this printer, the only panel buttons is the FEED button.

- When in macro execution standby, the FEED button is enabled regardless of the setting of this command. However, the paper cannot be feed.

[Default]   n = 0

ESC d n

[Name]	Print and feed n lines
[Format]	ASCII ESC d n
	Hex 1B 64 n
	Decimal 27 100 n
[Range]	$0 \le n \le 255$
[Description]	Prints the data in the print buffer and feeds n lines.

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

- This command does not affect the line spacing set by **ESC 2** or **ESC 3**.

- The maximum paper feed amount is 1016 mm (40 inches). If the paper feed amount (n × line spacing) of more than 1016 mm (40 inches) is specified, the printer feeds the paper only 1016 mm (40 inches).

- Even when the set value exceeds the maximum with the Black Mark sensor enabled in standard mode, this command is effective.

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

ESC p m t1 t2

[Name]	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
	$0 \le t1 \le 255$
	$0 \le t2 \le 255$
[Description]	Outputs the pulse specified by t1 and t2 to connector pin m as follow :

On time= t1 x 2 millisecond

Off time= t2 x 2 millisecond

m =0/48 Drawer kick –out connector pin 2

m=1/49   Drawer kick –out connector pin 5

ESC t n

[Name]   Select character code table

[Format]   ASCII   ESC t n

               Hex   1B   74 n

               Decimal   27   116 n

[Range] $0 \leq n \leq 5$, $16 \leq n \leq 19$, n = 255

[Description] Selects page n from the character code table.

N	Code Page	N	Code Page
0	CP437 [U.S.A., Standard Europe]	26	Thai
1	Katakana	27	CP720[Arabic]
2	CP850 [Multilingual]	28	CP855
3	CP860 [Portuguese]	29	CP857[Turkish]
4	CP863 [Canadian-French]	30	WCP1250[Central Eurpoe]
5	CP865 [Nordic]	31	CP775
6	WCP1251 [Cyrillic]	32	WCP1254[Turkish]
7	CP866 Cyrilliec #2	33	WCP1255[Hebrew]
8	MIK[Cyrillic /Bulgarian]	34	WCP1256[Arabic]
9	CP755 [East Europe，Latvian 2]	35	WCP1258[Vietnam]
10	Iran	36	ISO-8859-2[Latin 2]
11	reserve	37	ISO-8859-3[Latin 3]
12	reserve	38	ISO-8859-4[Baltic]
13	reserve	39	ISO-8859-5[Cyrillic]
14	reserve	40	ISO-8859-6[Arabic]
15	CP862 [Hebrew]	41	ISO-8859-7[Greek]
16	WCP1252 Latin I	42	ISO-8859-8[Hebrew]
17	WCP1253 [Greek]	43	ISO-8859-9[Turkish]
18	CP852 [Latina 2]	44	ISO-8859-15 [Latin 3]
19	CP858 Multilingual Latin I +Euro)	45	Thai2
20	Iran II	46	CP856
21	Latvian	47	Cp874
22	CP864 [Arabic]		
23	ISO-8859-1 [West Europe]		
24	CP737 [Greek]		
25	WCP1257 [Baltic]		

[Default]   n = 0

ESC { n

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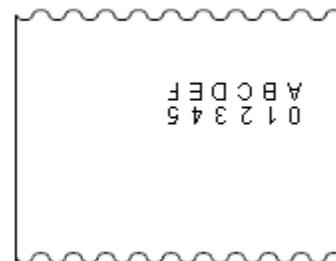
ESC i

[Name]	partial cut paper
[Format]	ASCII ESC i
	Hex 1B 69
	Decimal 27 105
[Description]	ESC m select a paper cutting mode and then partial cut the paper.

ESC m

[Name]	partial cut paper

[Format]   ASCII   ESC m

                  Hex   1B 6d

                  Decimal   27 109

[Description] ESC m select a paper cutting mode and then partial cut the paper.

ESC 9 n

[Name]   Select Chinese code format

[Format]   ASCII   ESC 9 n

                  Hex   1B 39 n

                  Decimal   27 57 n

[Description] Select Chinese code format, n from the character code table as follows：

0: GBK code

1: UTF-8 code

3: BIG5 code

NOTE：This version does not support English.

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] $1 \leq n \leq 255$

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

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

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203.2 dpi	203.2 dpi
1, 49	Double-width	203.2 dpi	101.6 dpi
2. 50	Double-height	101.6 dpi	203.2 dpi
3, 51	Quadruple	101.6 dpi	101.6 dpi

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

[Detail]
- 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, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
- 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.
- If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.
- 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 doubleheight 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.

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

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

[Range]

$1 \leq n \leq 255$

$0 \leq xL \leq 255$

$0 \leq xH \leq 3$ (when $1 \leq (xL + xH \times 256) \leq 1023$

$0 \leq yL \leq 255$

$0 \leq yL \leq 1$ (when $1 \leq (yL + yH \times 256) \leq 288$

$0 \leq d \leq 255$

$k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$

Total defined data area = 192K bytes

[Description]   Define the NV bit image specified by n.

- n specifies the number of the defined NV bit image.
- xL, xH specifies $(xL + xH \times 256) \times 8$ dots in the horizontal direction for the NV bit image you are defining.
- yL, yH specifies $(yL + yH \times 256) \times 8$ 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.

- The printer performs a hardware reset after the procedure to place the image into the NV memory. Therefore, user-defined characters, downloaded bit images, and macros should be defined only after completing this command. The printer clears the receive and print buffers and resets the mode to the mode that was in effect at power on. At this time, configuration settings are checked again.

- This command cancels all NV bit images that have already been defined by this command.

- From the beginning of the processing of this command till the finish of hardware reset, mechanical operations (including initializing the position of the print head when the cover is open, paper feeding using the FEED button, etc.) cannot be performed.

- 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 192K bytes. This command can define several NV bit images, but cannot define bit image data whose total capacity [bit image data + header] exceeds 192K bytes.

- 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.

[Reference]   **FS p**

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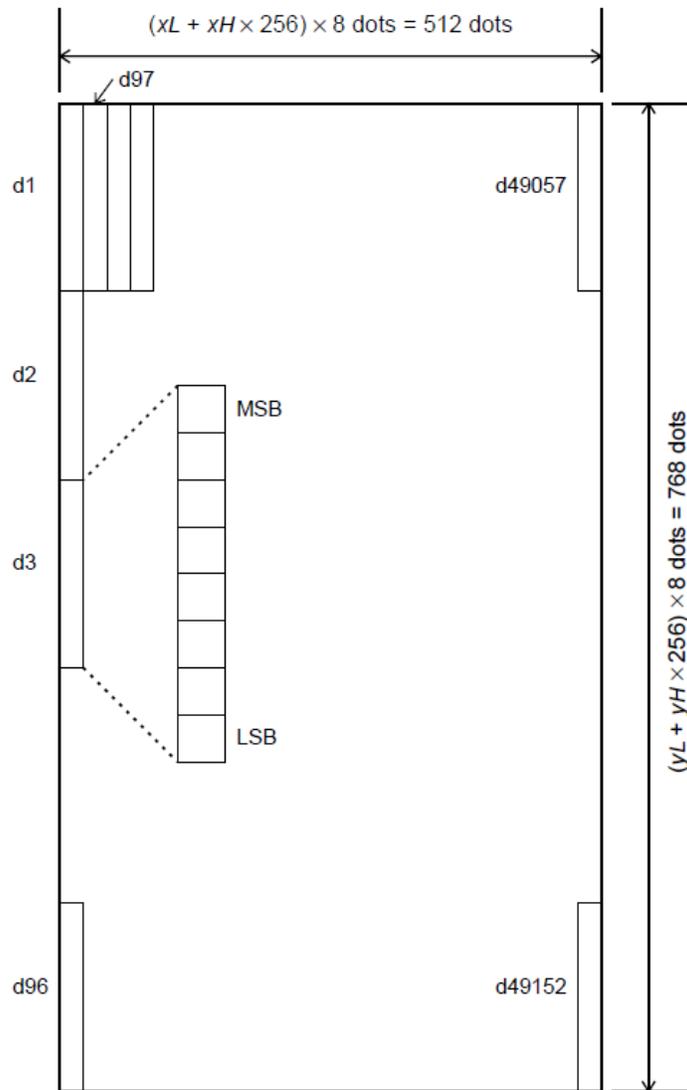
GS ! n

[Name]	Select character size	
[Format]	ASCII	GS ! n
	Hex	1D 21 n
	Decimal	29 33 n
[Range]	$0 \leq n \leq 255$	
	($1 \leq$ vertical number of times ≤ 8, $1 \leq$ horizontal number of times ≤ 8)	
[Description]	Selects the character height using bits 0 to 2 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
60	96	7
70	112	8

Table 2   Character Height Selection

Hex	Decimal	Width
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 Kanji), except for HRI characters.
- If n is outside the defined range, this command is ignored.
- In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90° clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.

- 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 !**

GS * x y d1...d(x×y×8)

[Name]   Define downloaded bit image

[Format]   ASCII   GS ∗ x y d1...d(x×y×8)

                 Hex   1D 2A x y d1...d(x×y ×8)

                 Decimal   29 42 x y d1 ...d(x× y×8)

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

                 $1 \leq y \leq 48$ (where x×y $\leq$ 1536)

                 $0 \leq d \leq 255$

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

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

[Notes]
- The number of dots in the horizontal direction is x×8; in the vertical direction it is y× 8.
- If x×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.
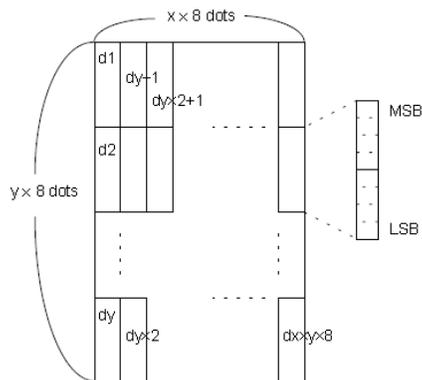
[Reference] **GS /**

GS / m

[Name] Print downloaded bit image

[Format] ASCII GS / m

Hex 1D 2F m

Decimal 29 47 m

[Range] 0 ≤ m ≤ 3, 48 ≤ m ≤ 51

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

m selects a mode from the table below:

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203.2 dpi	203.2 dpi
1, 49	Double-width	203.2 dpi	101.6 dpi
2, 50	Double-height	101.6 dpi	203.2 dpi
3, 51	Quadruple	101.6 dpi	101.6 dpi

[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 upsidedown printing mode.
- If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
- 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.

[Reference] **GS ∗**

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

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]

$65 \leq n \leq 69$ [printer information]

[Description] • Transmit 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	Hex:20 / decimal:32
2,50	Type ID	See table[Type ID] below
65	Firmware version	Depends on firmware version
66	Manufacturer	"BEMATECH"
67	Printer name	"LR1100"
68	Serial number	Depends on serial number
69	Type of additional fonts	Depends on additional fonts

[Type ID] (n=2)

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	Multi-byte code characters not supported
	On	01	1	Multi-byte code characters supported
1	On	02	2	Auto cutter Installed.(Fixed)
2,3	-	-	-	Not used
4	Off	00	0	Fixed
5	-	-	-	Not used
6	-	-	-	Not used
7	Off	00	0	Fixed

GS（H pl pH fn m d1 d2 d3 d4 (fn=48)

[Name]	Set the process ID response
[Format]	ASCII GS (H pl pH fn m d1 d2 d3 d4
	Hex 1D 28 48 pl pH fn m d1 d2 d3 d4
	Decimal 29 40 72 pl pH fn m d1 d2 d3 d4
[Range]	$(pl+pH \times 256)=6$ (pl=6,pH=0)
	Fn=48,m=48
	$32 \leq d \leq 126$
[Description]	• Saves the process ID specified by (d1,d2,d3,d4)for the data processed immediately before this function.

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

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

[Default]   n = 0
[Reference]   **GS f, GS k**

GS L nL nH

[Name]   Set left margin

[Format]   ASCII   GS L nL nH

                 Hex   1D 4C nL nH

                 Decimal   29 76 nL nH

[Range]   0 ≤ nL ≤ 255

                 0 ≤ nH ≤ 255

[Description]   Sets the left margin using nL and nH.

- The left margin is set to [(nL + nH ×256) ×0.125 mm].
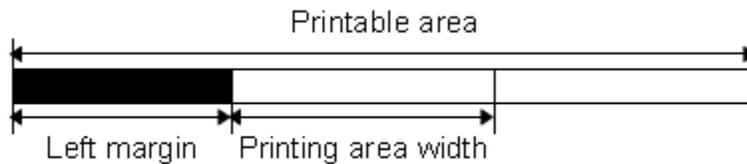
[Notes]   • This command is effective only when processed at the beginning of the line in standard mode.

- If the setting exceeds the printable area, the maximum value of the printable area is used.

[Default]   nL = 0, nH = 0

[Reference]   **GS W**

①GS V m ② GS V m n

[Name]   Select cut mode and cut paper

[Format]   ①   ASCII   GS   V   m

                      Hex   1D   56   m

                      Decimal   29   86   m

                 ②   ASCII   GS   V   m   n

                      Hex   1D   56   m   n

                      Decimal   29   86   m   n

[Range]   ①   m = 1, 49

                 ②   m = 66, 0 ≤ n ≤ 255

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

m	Print mode
1, 49	Partial cut (one point left uncut)
66	Feeds paper (cutting position + [n × 0.0.66 mm]), and cuts the paper partially (one point left uncut).

[Notes for ① and ②]

- Cutting status is different, depending on the installed auto-cutter type.
- This command is effective only when processed at the beginning of a line.

[Note for ①]
- Only the partial cut is available; there is no full cut.

[Notes for ②]
- When n = 0, the printer feeds the paper to the cutting position and cuts it.
- When n ≠ 0, the printer feeds the paper to cutting position + [n × 0.125 mm] and cuts it.
- When the Black Mark sensor is set to active, value set by **GS (F** + 0.125mm is applied.

GS W nL nH

[Name]	Set printing area width
[Format]	ASCII GS W nL nH
	Hex 1D 57 nL nH
	Decimal 29 87 nL nH
[Range]	0 ≤ nL ≤ 255
	0 ≤ nH ≤ 255
[Description]	Sets the printing area width to the area specified by nL and nH.

- The printing area width is set to [(nL + nH ×256) ×0.125mm (0.0049")].
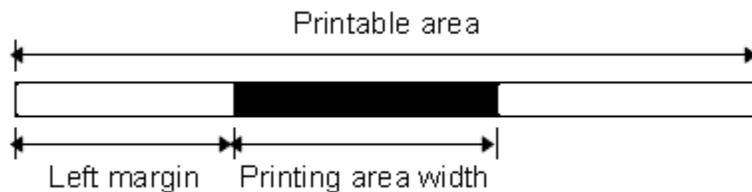
[Notes]
- This command is effective only when processed at the beginning of the line.
- If the setting exceeds the printable area, the maximum value of the printable area is used.
- The setting by **GS L** takes precedence over the setting by **GS W**. If the [left margin + printing area width] exceeds the printable area, the printer uses [Printable area width - left margin]. However, the setting by **GS W** is still reserved, even when it is not used in the current printing..
- If the width set for the printing area is less than the width of one character, when the character data is developed, the following processing is performed:

① The printing area width is extended to the right to accommodate one character.
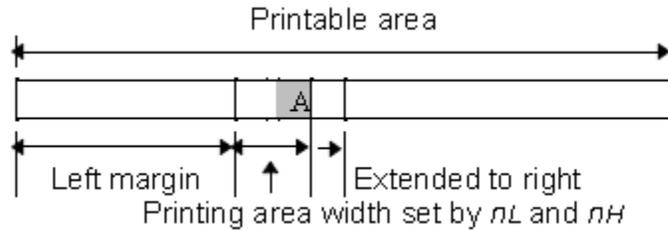
② If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one character.
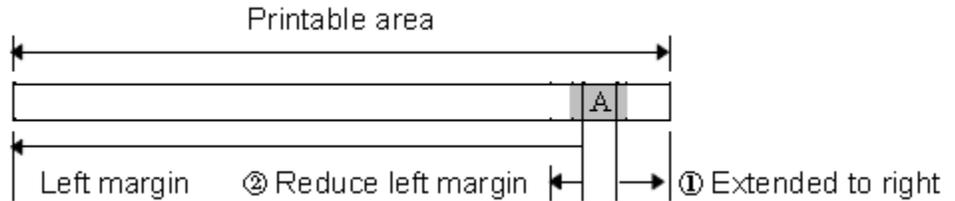
③ If the printing area width cannot be extended sufficiently, the right space is reduced.

- If the width set for the printing area is less than one vertical line, the following processing is performed only on the line in question when data other than character data (e.g., bit image, user-defined bit image) is developed:

  ① The printing area width is extended to the right to accommodate one line vertical for the bit image within the printable area.

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

[Reference]   **GS L**

GS :

[Name]   Start/end macro definition

[Format]   ASCII   GS   :

Hex   1D   3A

Decimal   29   58

[Description]   Starts or ends macro definition.

[Notes]
- Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.

- When **GS ^** is received during macro definition, the printer ends macro definition and clears the definition.

- Macro is not defined when the power is turned on.

- The defined contents of the macro are not cleared by **ESC @**. Therefore, **ESC @** can be included in the contents of the macro definition.

- If the printer receives **GS :** again immediately after previously receiving **GS :** ，the printer remains in the macro undefined state.
- The contents of the macro can be defined up to 2048 bytes. If the macro definition exceeds 2048 bytes, excess data is not stored.

[Reference]   **GS ^**

GS ^ r t m

[Name]	Execute macro
[Format]	ASCII GS ^ r t m
	Hex 1D 5E r t m
	Decimal 29 94 r t m
[Range]	$0 \leq r \leq 255$
	$0 \leq t \leq 255$
	$m = 0, 1$
[Description]	Executes a macro.

- r specifies the number of times to execute the macro.
- t specifies the waiting time for executing the macro.
- m specifies macro executing mode.
    When the LSB of m = 0:
        The macro executes r times continuously at the interval specified by t.
    When the LSB of m = 1:
        After waiting for the period specified by t, the PAPER OUT LED indicators blink and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats the operation r times.

[Notes]	• The waiting time is $t \times 100$ ms for every macro execution.

- If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.
- If the macro is not defined or if r is 0, nothing is executed.
- When the macro is executed (m = 1), paper cannot be fed by using the FEED button.

[Reference]   **GS :**

GS a n

[Name]	Enable/Disable Automatic Status Back (ASB)
[Format]	ASCII GS a n
	Hex 1D 61 n
	Decimal 29 97 n
[Range]	$0 \leq n \leq 255$

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

Bit	Off/On	Hex	Decimal	Status for ASB
0	-	-	-	Undefined .
1	-	-	-	Undefined .
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Paper roll sensor status disabled.
	On	08	8	Paper roll sensor status enabled.
4-7	-	-	-	Undefined.

[Notes]   • If any of the status items in the table above are enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever the enabled status item changes. The disabled status items may change, in this case, because each status transmission represents the current status.

• If all status items are disabled, the ASB function is also disabled.

• If the ASB is enabled as a default, the printer transmits the status when the printer data reception and transmission are possible at the first time from when the printer is turned on.

• The following four status bytes are transmitted without confirming whether the host is ready to receive data. The four status bytes must be consecutive, except for the XOFF code.

• 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.

• When using **DLE EOT**, or **GS r**, the status transmitted by these commands and ASB status must be differentiated.

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

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 A (12× 24)

1,49	Font B (9 × 17)

[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 = 162

[Reference]   **GS k**

① GS k m d1...dk NUL② GS k m n d1...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:

m		Bar Code System	Number of Characters	Remarks
①	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	$1 \leq k$ ´	$48 \leq d \leq 57$, $65 \leq d \leq 90$, 32, 36, 37, 43, 45, 46, 47
	5	ITF	$1 \leq k$ (even number)	$48 \leq d \leq 57$

	6	CODABAR	$1 \le k´$	$48 \le d \le 57$, $65 \le d \le 68$, 36, 43, 45, 46, 47, 58
②	65	UPC-A	$11 \le n \le 12$	$48 \le d \le 57$
	66	UPC-E	$11 \le n \le 12$	$48 \le d \le 57$
	67	JAN13 (EAN13)	$12 \le n \le 13$	$48 \le d \le 57$
	68	JAN 8 (EAN8)	$7 \le n \le 8$	$48 \le d \le 57$
	69	CODE39	$1 \le n \le 255$	$48 \le d \le 57$, $65 \le d \le 90$, 32, 36, 37, 43, 45, 46, 47
	70	ITF	$1 \le n \le 255$ (even number)	$48 \le d \le 57$
	71	CODABAR	$1 \le n \le 255$	$48 \le d \le 57$, $65 \le d \le 68$, 36, 43, 45, 46, 47, 58
	72	CODE93	$1 \le n \le 255$	$0 \le d \le 127$
	73	CODE128	$2 \le n \le 255$	$0 \le d \le 127$

[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.

Control character			HRI character	Control character			HRI character
ASCII	Hex	Decimal		ASCII	Hex	Decimal	
NUL	00	0	■U	DEL	10	16	■P
SOH	01	1	■A	DC1	11	17	■Q
STX	02	2	■B	DC2	12	18	■R
ETX	03	3	■C	DC3	13	19	■S
EOT	04	4	■D	DC4	14	20	■T
ENQ	05	5	■E	NAK	15	21	■U
ACK	06	6	■F	SYN	16	22	■V
BEL	07	7	■G	ETB	17	23	■W
BS	08	8	■H	CAN	18	24	■X
HT	09	9	■I	EM	19	25	■Y
LF	0A	10	■J	SUB	1A	26	■Z
VT	0B	11	■K	ESC	1B	27	■A
FF	0C	12	■L	FS	1C	28	■B
CR	0D	13	■M	GS	1D	29	■C
SO	0E	14	■N	RS	1E	30	■D
SI	0F	15	■O	US	1F	31	■E
				DEL	7F	127	■T

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

- If the top of the bar code data is not the code set selection character, the printer stops command processing and process 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 characters 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.

<Others> 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.)

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

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 specified by n as follows:

n	Function
1, 49	Transmits paper sensor status

[Notes]
- When using a serial interface

  When DTR/DSR control is selected, the printer transmits only 1 byte after confirming 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, the printer transmits only 1 byte without confirming the condition of the DSR signal.

- This command is executed when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.

- When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS r** and the ASB status must be differentiated using.
- The status types to be transmitted are shown below:

Paper sensor status (n = 1, 49):

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

Bits 2 and 3:   When the paper end sensor detects a paper end, the printer goes offline and does not execute this command. Therefore, bits 2 and 3 do not transmit the status of paper end.

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

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

$0 \leq xL \leq 255$

$0 \leq xH \leq 255$ where $1 \leq (xL + xH \times 256) \leq 128$

$0 \leq yL \leq 255$

$0 \leq yH \leq 8$ where $1 \leq (yL + yH \times 256) \leq 4095$

$0 \leq d \leq 255$

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

[Description]   Selects raster bit-image mode. The value of m selects the mode, as follows:

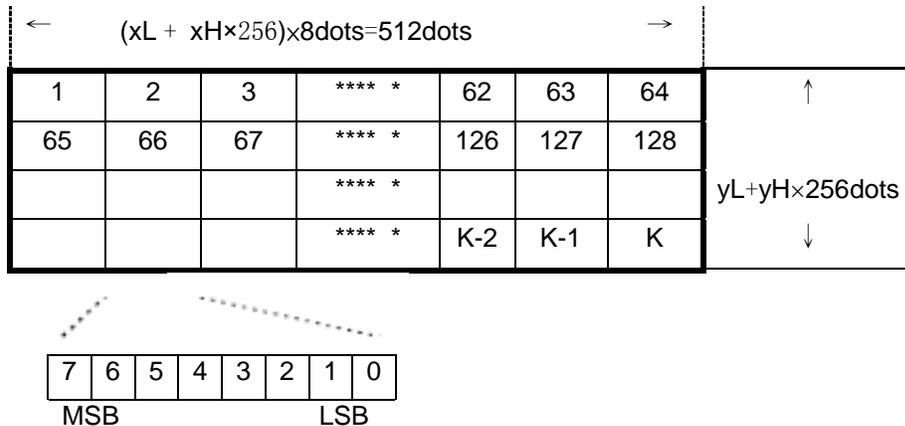| m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203.2 dpi	203.2 dpi
1, 49	Double-width	203.2 dpi	101.6 dpi
2, 50	Double-height	101.6 dpi	203.2 dpi
3, 51	Quadruple	101.6 dpi	101.6 dpi

- 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×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.

- This command is not affected by print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster bit image.

- If the printing area width set by **GS L** and **GS W** is less than the minimum width, the printing area is extended to the minimum width only on the line in question. The minimum width means 1 dot in normal (m=0, 48) and double-height (m=2, 50), 2 dots in double-width (m=1, 49) and quadruple (m=3, 51) modes.

- Data outside the printing area is read in and discarded on a dot-by-dot basis.

- The position at which subsequent characters are to be printed for raster bit image is specified by **HT** (Horizontal Tab), **ESC $** (Set absolute print position), **ESC ** (Set relative print position), and **GS L** (Set left margin). If the position at which subsequent characters are to be printed is a multiple of 8.

- The **ESC a** (Select justification) setting is also effective on raster bit images.

- When this command is received during macro definition, the printer ends macro definition, and begins performing this command. The definition of this command should be cleared.

- d indicates the bit-image data. Setting a bit to 1 prints a dot and setting it to 0 does not print a dot.

[Example]   When xL+xH×256=64

←	(xL + xH×256)×8dots=512dots					→	
1	2	3	**** *	62	63	64	↑
65	66	67	**** *	126	127	128	
			**** *				yL+yH×256dots
			**** *	K-2	K-1	K	↓

7	6	5	4	3	2	1	0
MSB							LSB

GS w n

[Name]	Set bar code width		
[Format]	ASCII	GS	w	n

Hex   1D   77   n

Decimal   29   119   n

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

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

n specifies the bar code width as follows:

n	Module Width (mm) for Multi-level Bar Code	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	0.560	0.560	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**

GS x n

[Name]   Set barcode printing left space

[Format]   ASCII   GS   x n

Hex   1D   78 n

Decimal   29   120 n

[Description]   The print bar code staring positions is: 0 to 255

GS P x y

[Name]   Set horizontal and vertical motion unit

[Format]   ASCII :   GS P   x y

Hex :   1D 50 x y

Decimal : 29 80 x y

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

$0 \le y \le 255$

[Description]   This command sets the horizontal and vertical motion unit to approximately 25.4/x mm and 25.4/y mm, respectively. The default value are x = 203 and y = 203. When x and y are set to 0, the default setting of each value is used.

KANJI CONTROL COMMANDS

FS ! n

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

[Format]   ASCII   FS   !   n

                Hex   1C   21 n

                Decimal   28   33 n

[Range]   0 ≤ n ≤ 255

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

Bit	Off/On	Hex	Decimal	Function
0	—	—	—	Undefined.
1	—	—	—	Undefined.
2	Off	00	0	Double-width mode is OFF.
	On	04	4	Double-width mode is ON.
3	Off	00	0	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.
- When some of the characters in a line are double or more height, all thecharacters on the line are aligned at the baseline.
- It is possible to emphasize the Kanji character using **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 −**, **GS !**

FS &

[Name]	Select Kanji character mode
[Format]	ASCII FS &
	Hex 1C 26
	Decimal 28 38
[Description]	Selects Kanji character mode.
[Notes]	For Kanji model:

- 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.

[Reference]	**FS .**

FS - n

[Name]	Turn underline mode on/off for Kanji characters
[Format]	ASCII FS - n
	Hex 1C 2D n
	Decimal 28 45 n
[Range]	$0 \leq n \leq 2$, $48 \leq n \leq 50$
[Description]	Turns underline mode for Kanji characters on or off, based on the following values of n.

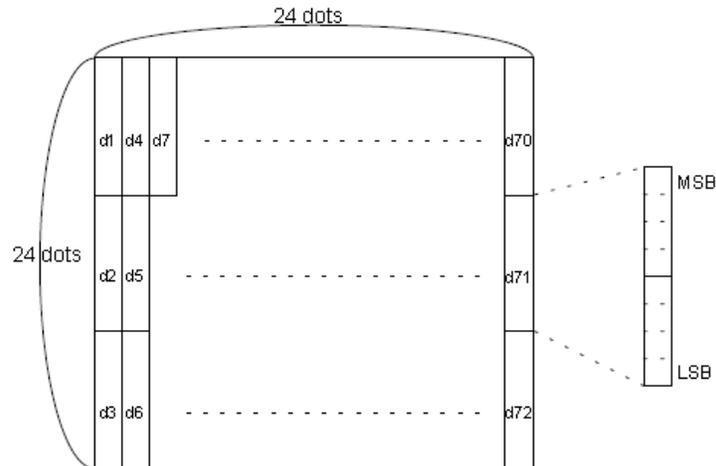| n	Function
0, 48	Turns off underline mode for Kanji characters
1, 49	Turns on underline mode for Kanji characters (1-dot thick)
2, 50	Turns on underline mode for Kanji characters (2-dot thick)

[Notes]

- 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.
- 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.

[Default]	n = 0
[Reference]	**FS !**

FS .

[Name]	Cancel Kanji character mode
[Format]	ASCII FS .
	Hex 1C 2E
	Decimal 28 46
[Description]	Cancels Kanji character mode.
[Notes]	For 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 not selected when the power is turned on.

[Reference]	**FS &**

FS 2 c1 c2 d1...dk

[Name]	Define user-defined Kanji characters
[Format]	ASCII FS 2 c1 c2 d1...dk
	Hex 1C 32 c1 c2 d1...dk
	Decimal 28 50 c1 c2 d1...dk
[Range]	c1 and c2 indicate character codes for the defined characters.

Model type	c1	c2
Chinese kanji supporting model	c1 = FEH	A1H $\leq$ c2 $\leq$ FEH

$0 \leq d \leq 255$

k = 32 (slip), k = 72 (paper roll)

[Description]	Defines user-defined Kanji characters for the character codes specified by c1 and c2.
[Notes]	• c1 and c2 indicate character codes for the defined characters. c1 specifies for the first byte, and c2 for the second byte.

- d indicates the dot data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.
- The user-defined Kanji characters is printed on the selected paper set by the **ESC c1** command.

[Default]	All spaces.
[Reference]	**ESC c 1**

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]	$0 \leq n1 \leq 255$	
	$0 \leq n2 \leq 255$	
[Description]	Sets left- and right-side Kanji character spacing to n1 and n2, respectively.	

- The left-side character spacing is [n1$\times$ 0.125 mm], and the right-side character spacing is [n2$\times$ 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.
- In standard mode, the horizontal motion unit is used.

[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]	$0 \leq n \leq 255$	
[Description]	Turns quadruple-size mode on or off for Kanji characters.	

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

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

[Default]   n = 0
[Reference]   FS !, GS !

PAGE MODE COMMANDS

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 processed in the specified memory, and no printing action is executed. All data in the memory is then printed when an ESC FF or FF command is received.

For example, when the printer receives the data "ABCDEF12345" and <LF> in standard mode, it prints "ABCDEF12345" and feeds the paper by one line. In page mode, data "ABCDEF12345" is written to the specified printing area in memory. The position in memory for the next print data is shifted by one line.

The ESC L command sets 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 data in page mode memory. The received data is cleared from memory instead.

FF

[Name]	Print and return to standard mode in page mode	
[Format]	ASCII	FF
	Hex	0C
	Decimal	12
[Description]	When in page mode, this prints the data in the print buffer collectively and returns to standard mode.	
	When black mark is enabled, this prints the data in the print buffer and feeds paper to the TOF position (the black mark).	
[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**	

ESC FF

[Name]	Print data in mode page		
[Format]	ASCII	ESC	FF
	Hex	1B	0C

Decimal   27   12

[Description]   When in page mode ESC FF prints all data in the print buffer in one time.The buffer data is not deleted after being printed.

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:

▪ Set right-side character spacing: **ESC SP**
▪ 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.

▪ Turn 90 degrees clockwise rotation mode on/off: ESC V
▪ Select justification: ESC a
▪ Turn upside-down printing mode on/off: ESC {
▪ Set left margin: GS L
▪ 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.

[Reference]   **FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS $, GS **

ESC S

[Name]   Select standard mode

[Format]   ASCII   ESC   S

Hex   1B   53

Decimal   27   83

[Description]   Switches from page mode to standard mode.

[Notes]   • This command is effective only in page mode.

- Data buffered in page mode is cleared.
- This command sets the print position to the beginning of the line.
- The printing area set by **ESC W** is initialized.
- 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 standard mode:
  - Set right-side character spacing: ESC SP
  - Select default line spacing: ESC 2, ESC 3

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

ESC T n

[Name] Select print direction in page mode

[Format] ASCII ESC T n

Hex 1B 54 n

Decimal 27 84 n

[Range] $0 \le n \le 3$

$48 \le n \le 51$

[Description] Selects the print direction and starting position in page mode.

n specifies the print direction and starting position as follows:

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)
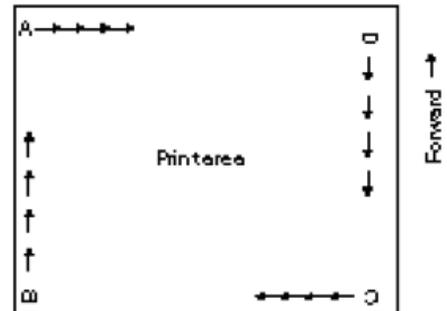
[Notes]
- When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- This command sets the position where data is buffered within the printing areaset by **ESC W**.

[Default] n = 0

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

ESC W xL xH yL yH dxL dxH dyL dyH

[Name] Set printing area in page mode

[Format]　　　ASC II　　ESC　W　xL　xH　yL　yH　dxL　dxH　dyL　dyH

　　　　　　　Hex　　　1B　　57　xL　xH　yL　yH　dxL　dxH　dyL　dyH

　　　　　　　Decimal　27　87　xL　xH　yL　yH　dxL　dxH　dyL　dyH

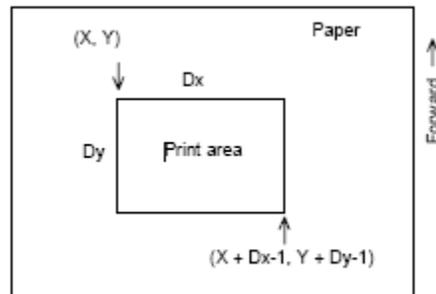[Range]　　　$0 \leq$ xL, xH, yL, yH, dxL, dxH, dyL, dyH ≤ 255 (except dxL=dxH=0 or dyL=dyH=0)

[Description]　• The horizontal starting position, vertical starting position, printing area width,and printing area height are defined as x0, y0, dx (inch), dy (inch), respectively.Each setting for the printing area is calculated as follows:

x0 = [(xL + xH×256) × 0.125 mm]

y0 = [(yL + yH × 256) × 0.125 mm]

dx = [(dxL + dxH× 256) ×0.125 mm]

dy = [(dyL + dyH × 256) ×0.125 mm]

[Notes]　　• If this command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.

　　　　　• If the horizontal or vertical starting position is set outside the printable area, the printer stops command processing and processes the following data as normal data.

　　　　　• If the printing area width or height is set to 0, the printer stops command processing and processes the following data as normal data.

　　　　　• This command sets the position where data is buffered to the position specified by **ESC T** within the printing area.

　　　　　• If (horizontal starting position + printing area width) exceeds the printable area,the printing area width is automatically set to (horizontal printable area -horizontal starting position).

　　　　　• If (vertical starting position + printing area height) exceeds the printable area,the printing area height is automatically set to (vertical printable area – vertical starting position).

　　　　　• Use 0.125 mm (0.0049") pitch for setting the horizontal starting position and printing area width, and use 0.125 mm pitch for setting the vertical starting position and printing area height.

　　　　　• When the horizontal starting position, vertical starting position, printing area width, and printing area height are defined as X, Y, Dx, and Dy respectively, the printing area is set as shown in the figure below.

[Reference]　　**CAN**, **ESC L**, **ESC T**

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 pagemode.
- This command sets the absolute print position to [(nL + nH 256) $\times$ 0.125 mm].

[Notes]
- This command is effective only in page mode.
- If the [(nL + nH $\times$ 256) $\times$ (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**:

  When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.

  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 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×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:**

When the starting position is set to the upper left or lower right of the printing, the vertical motion unit (y) is used.

When the starting position is set to the upper right or lower left of the printing area, the horizontal motion unit (x) is used.

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

SPECIAL PRINTING COMMANDS

ESC Z m n k dL dH d1...dn

[Name]   Print 2D barcode

[Format]   ASC II   ESC Z   m n k dL dH d1…dn

Hex   1B   5A m n k dL dH d1…dn

Decimal   27   90 m n k dL dH d1…dn

[Application]   PDF417 barcode and QR-CODE only

[Description]   ① PDF417 barcode printing

m specifies column number of 2D barcode.($1 \le m \le 30$)

n specifies security level to restore when barcode image is damaged.($0 \le n \le 8$)

k is used for define horizontal and vertical ratio.($2 \le k \le 5$)

d is the length of data and it is consist of 2 bytes:

dL: 1st byte is lower number.

dH: 2nd byte is upper number.

d1…dn is barcode data.

The size of PDF417 is influenced by barcode width command (GS w n).

② QR-CODE printing

m specifies version of the symbol (1 to 40, 0: auto size)

n specifies error correction level (L:7%, M:15%, Q:25%, H:30%)

k specifies module size (1 to 8)

d is the length of data and it is consist of 2 bytes:

dL: 1st byte is lower number.

dH: 2nd byte is upper number.

d1…dn is barcode data.

GS Z n

[Name]   Select 2D barcode type

[Format]   ASCII   GS Z   n

                Hex   1D 5A   n

                Decimal   27 90 n

 [Range]   n=0: PDF417(default)

                n=1: QR-CODE

GS (k pL pH cn fn n (cn=48, fn=65)

[Function]   Set PDF417 code number of columns in the data region

[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 = 3, pH = 0

                cn = 48, fn = 65

                $0 \leq n \leq 30$

[Default]   n = 0

[Description]   Sets the number of columns in the data region for PDF417.

                • When n = 0, automatic processing is selected.

                • When n ≠ 0, the number of columns in the data region is set to n code words.

[Notes]   • Setting of this function affect the processing of functions 81 and 82.

                • When auto processing (n = 0) is selected, the maximum number of columns in the data area is 30 columns.

                • The following data is not included in the number of columns:

                   - Start pattern and stop pattern.

                   - Indicator codeword of left and right.

                • When automatic processing (n = 0) is selected, the number of columns is calculated by the print area when processing functions 81, 82, module width (function 67), and option setting (function 70).

                • Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k pL pH cn fn n (cn=48, fn=66)

[Function]   Set PDF417 number of rows

[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 = 3, pH = 0

                cn = 48, fn = 66

n = 0 (automatic processing)

[Description]   Set number of rows for PDF417.

GS (k pL pH cn fn n (cn=48, fn=67)

[Function]   Set the PDF417 module width

[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 = 3, pH = 0

                cn = 48, fn = 67

                2 ≤ n ≤ 8

[Default]   n = 3

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

[Notes]   • Settings of this function affect the processing of functions 81 and 82.

                • Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k pL pH cn fn n (cn=48, fn=68)

[Function]   Set PDF417 row height

[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 = 3, pH = 0

                cn = 48, fn = 68

                2 ≤ n ≤ 8

[Default]   n = 3

[Description]   Set row height to [n × (module width)] for PDF417.

[Notes]   • Settings of this function affect the processing of functions 81 and 82.

                • Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k pL pH cn fn m n (cn=48, fn=69)

[Function]   Set PDF417 error correction level.

[Format]   ASCII   GS (k pL pH cn fn m n

                Hex   1D 28 6B pL pH cn fn m n

                Decimal   29 40 107 pL pH cn fn m n

[Range]   pL = 4, pH = 0

                cn = 48, fn = 69

m = 48, 49

48 ≤ n ≤ 56 [m = 48]

1 ≤ n ≤ 40 [m = 49]

[Default] m = 49, n = 1

[Description] Set error correction level for PDF417.

m	Function
48	The error correction level is set by "level".
49	The error correction level is set by "ratio". The ratio is [n x 10%]

[Notes]
- Settings of this function affect the processing of functions 81 and 82.
- Error correction level is specified by either "level" or "ratio."
- Error correction level specified by "level" (m = 48) is as defined in following table The number of the error correction codeword is fixed regardless of the number of codeword in the data area.

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

- Error correction level specified by "ratio" (m = 49) is defined in following table. The error correction level is defined by [number of data codeword × n × 0.1 = (A)]. The number of the error correction codeword changes depending on the number of codeword in the data area.

(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

- The error correction codeword is calculated by modulus 929.
- Settings of this function are effective until ESC @ is executed, the printer is reset, or the power is turned off.

GS (k pL pH cn fn n (cn=48, fn=70)

[Function]	Select PDF417 option
[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 = 3, pH = 0
	cn = 48, fn = 70
	n = 0 (standard PDF417)
[Description]	Select option for PDF417.

GS (k pL pH cn fn m d1 ... dk (cn=48, fn=80)

[Function]	Store PDF417 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]	$4 \leq (pL + pH \times 256) \leq 65{,}535$ (pL ≤ 255; pH ≤ 255)
	cn = 48, fn = 80
	m = 48
	$0 \leq d \leq 255$
	$k = (pL + pH \times 256) - 3$
[Description]	Store PDF417 symbol data (d1 ... dk) in the symbol storage area.
[Notes]	• Data stored in the symbol storage area is processed by functions 81 and 82. This data is not destroyed after execution of function 81 or 82.
	• k bytes of d1...dk are processed as symbol data.
	• Specify only the data codeword of the symbol with this function. The information listed below is added automatically by the printer:
	o Start pattern and stop pattern.
	o Indicator codeword of left and right.
	o The descriptor of symbol length (the first codeword in the data area).
	o The error correction codeword calculated by modulus 929.
	• Settings of this function are effective until the following processing is performed:
	o Function 80 is executed.
	o ESC @ is executed.

o The printer is reset or the power is turned off.

GS (k pL pH cn fn m (cn=48, fn=81)

[Function]	Print PDF417 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 = 3, pH = 0	
	cn = 48, fn = 81	
	m = 48	
[Description]	Encodes and prints the PDF417 symbol data stored in the symbol storage area by function 80.	

[Notes]
- A symbol that size exceeds the print area cannot be printed.
- If there is any an inconsistence in the data of symbol storage area, it cannot be printed.

    o There is no data (function 80 was not executed).

    o If [(number of columns × number of rows) < number of codeword] when auto processing is specified for number of columns and number of rows.

    o Number of codeword exceeds 928 in the data area.
- The following data are added automatically by the encode process:

    o Start pattern and stop pattern.

    o Indicator codeword of left and right.

    o The descriptor of symbol length (the first codeword in the data area).

    o The error correction codeword calculated by modulus 929.

    o Pad codeword.
- When auto processing (function 65) is specified, the number of columns is calculated by the current print area, module width (function 67), option setting (function 70), and the codeword in the data area. Maximum number of columns is 30.
- Printing of symbol is not affected by print mode (emphasized, double-strike, underline, white/black reverse printing, or 90° clockwise-rotated), except for character size and upside-down print mode.
- This command executes paper feeding for the amount needed for printing the symbol regardless of the paper feed amount set by the paper feed setting command. The print position returns to the left side of the printable area after printing the symbol.
- The quiet zone is not included in the printing data. Be sure to include the quiet zone when using this function.

GS (k pL pH cn fn m (cn=48, fn=82)

[Function]	Request to transmit size information of PDF417 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 = 3, pH = 0

              cn = 48, fn = 82

              m = 48

[Description]   Request transmission of the size information for the encoded PDF417 symbol data stored in symbol storage area.

[Notes]   • The quiet zone is not included in the size information.

              • The following size information will be returned by the printer.

Information	Hex	Decimal	Data length (bytes)
Header	37	55	1
Identifier	2F	47	1
Width	30 - 39	48 - 57	1 to 5
Delimiter	1F	31	1
Height	30 - 39	48 - 57	1 to 5
Delimiter	1F	31	1
Fixed Value	31	49	1
Delimiter	1F	31	1
Other information	30 or 31	48 or 49	1
NUL	00	0	1

• The height and width data of the pattern are in dot units. The decimal values of the height and width data are converted to ASCII character format and sent in order from the MSB.

    Example.: When the horizontal size is 120 dots, "120" is converted to 3 bytes of data (Hex:31H, 32H, 30H, Decimal:49, 50, 48).

• Other information data transmission:

    Hex=30H / Decimal=48 indicates that the data is printable

    Hex=31H / Decimal=49 indicates that the data is not printable

GS (k pL pH cn fn n1 n2 (cn=49, fn=65)

[Name]   Set QR Code model

[Format]   ASC II   GS (k pL pH cn fn n n2

              Hex   1D 28 6b pL pH cn fn n1 n2

              Decimal   29 40 107 pL pH cn fn n1 n2

[Range]   pL = 4, pH = 0

              cn = 49, fn = 65

n1 = 49, 50

n2 = 0

[Default]   n1=50, n2=0

[Description] Set the QR Code model by n1.

n1	Function
49	Set model 1 QR code conversion
50	Set model 2 QR code conversion

GS (k pL pH cn fn n (cn=49, fn=67)

[Name]   Set QR Code module size

[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 = 3, pH = 0

                cn = 49

                fn = 67

                $1 \le n \le 16$

[Default]   n = 3

[Description] Set QR Code module size to [n dots * n dots]

GS (k pL pH cn fn n (cn=49, fn=69)

[Name]   Set QR Code 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 = 3, pH = 0

                cn = 49

                fn = 69

                $48 \le n \le 51$

[Default]   n=48

[Description] Set the QR code error correction level

	Function	Approx. damage % recovery capability
48	Error correction level L	7%
49	Error correction level M	15%
50	Error correction level Q	25%
51	Error correction level H	30%

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

[Name]	Store QR code 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 QR Code data (d1... dk) into the QR Code symbol storage area.	
	(pL + pH x 256) - 3) bytes are processed as QR Code data after m (d1...dk).	

GS (k pL pH cn fn m (cn=49, fn=81)

[Name]	Print QR Code in 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 = 3, pH = 0	
	cn = 49	
	fn = 81	
	m = 48	
[Description]	Print QR Code from data stored in QR code symbol storage area	
	User must consider QR code quiet zone (spacing of above, below, left and right of printed QR code as specified in the QR Code specification.)	

GS (k pL pH cn fn m (cn=49, fn=82)

[Name]	Request size information of QR Code in 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 = 3, pH = 0	
	cn = 49	
	fn = 82	
	m = 48	
[Description]	Request transmission of size information data of QR Code in symbol storage area.	

Following information will be returned by the printer.

Information	Hex	Decimal	Data length (bytes)
Header	37	55	1
Identifier	36	54	1
Width	30 - 39	48 - 57	1 to 5
Delimiter	1F	31	1
Height	30 - 39	48 - 57	1 to 5
Delimiter	1F	31	1
Fixed Value	31	49	1
Delimiter	1F	31	1
Other information	30 or 31	48 or 49	1
NUL	00	0	1

The height and width data of the pattern are in dot units. The decimal values of the height and width data are converted to ASCII character format and sent in order from the MSB.

Example.: When the horizontal size is 120 dots, "120" is converted to 3 bytes of data (Hex:31H, 32H, 30H, Decimal:49, 50, 48).

Other information data transmission:

Hex=30H / Decimal=48 indicates that the data is printable

Hex=31H / Decimal=49 indicates that the data is not printable

[Note]   This command does not print the QR code graphics.

The quiet zone is not included in the size information.

GS (A pL pH n m

[Name]	Execute test print
[Format]	ASCII GS (A pL pH n m
	Hex 1D 28 41 pL pH n m
	Decimal 29 40 65 pL pH n m
[Range]	$(pL+(pH \times 256))=2$ (where pL=2, pH=0)
	$0 \leq n \leq 2$, $48 \leq n \leq 50$
	$1 \leq m \leq 3$, $49 \leq m \leq 51$
[Description]	• Executes a test print with a specified test pattern on a specified paper.
	• pL and pH set the number of parameters so that $(pL + (pH \times 256))$ bytes.
	n specifies the paper to be tested.

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

m specifies a test pattern.

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

[Notes]
- This command has enabled only when processed at the beginning of a line in standard mode.
- This command is no effect in page mode.
- When this command is received during macro definition, the printer ends macro definition and begins performing this command.
- After the test print is finished, the printer resets itself automatically. Therefore, data already defined before this command is executed, such as user-defined characters, downloaded bit image, and macro, becomes undefined;
- The printer cuts the paper at the end of the test print.
- The printer goes BUSY while this command is executed.

GS (F pL pH a m nL nH

[Name]   Set black mark adjustment value

[Format]   ASCII   GS (F pL pH a m nL nH

               Hex   1D 28 46 pL pH 61 m nL nH

               Decimal   29 40 70 pL pH 97 m nL nH

[Range]   (pL+pHx256) = 4 (where pL = 4, pH = 0)

               $1 \le a \le 2$

               m = 0,1

               $0 \le nL \le 255, 0 \le nH \le 255$

[Description] Sets the adjustment value of the black mark detection position.

               a specifies the type of adjustment value.

a	Function
1	Sets the adjustment value of the black mark detection position.
2	Sets the adjustment value of the paper cutting position after black mark detection.

m specifies the direction of adjustment

m	Function
0	Forward Direction (Paper Feed Direction)
1	Reverse Direction

nL, nH specify the amount of adjustment. Adjustment = (nH×256 + nL) × 0.125 mm.

[Notes]
- When processing this command while defining a macro, the macro definition is immediately terminated and the command commences with processing.
- The black mark detection position (a = 1) is affected by the following command operations.

    FF

    GS FF

- The paper cutting position after black mark detection (a = 2) is affected by the following command operation.

    GS V m n

- Because this command is executed when processing a normal command after it is stored once in the reception buffer, there may be a delay between the reception of the command from the reception buffer to the actual operation.

[Reference] **FF, GS FF, GS V**

GS FF

[Name]	Feed black-marked paper to print starting position (top of form)
[Format]	ASCII GS FF
	Hex 1D 0C
	Decimal 29 12
[Description]	Feeds the marked paper to the print starting position (TOF).
[Notes:]	• This command is enabled only when the BM sensor is set to be effective.
	• This command sets the next print position to the beginning of the line.
	• If this command is executed at the print starting position of the marked paper, the printer does not feed the marked paper to the next print starting position.
[Reference]	**GS (F, FF**

GS C 0 n m

[Name]	Select counter print mode
[Format]	ASCII GS C 0 n m
	Hex 1D 43 30 n m
	Decimal 29 67 48 n m
[Range]	$0 \leq n \leq 5$
	$0 \leq m \leq 2, 48 \leq m \leq 50$

[Description]   Selects a print mode for the serial number counter.

- n specifies the number of digits to be printed as follows:

    When n = 0, the printer prints the actual digits indicated by the number value.

    When n = 1 to 5, this command sets the number of digits to be printed.

- m specifies the printing position within the entire range of printed digits, as follows:

m	Printing Position	Processing of digits less than those specified
0,48	Align right	Adds spaces to the left
1,49	Align right	Adds 0 to the left
2,50	Align left	Adds spaces to the right

[Notes]   - If n or m is out of the defined range, the previously set print mode is not changed.

- If n = 0, m does not have any meaning.

[Default]   n = 0, m = 0

[Reference]   **GS C 1, GS C 2, GS C ;, GS c**

[Examples]

n=3,m=0   n=3,m=1   n=3,m=2

▲▲1   001   1▲▲
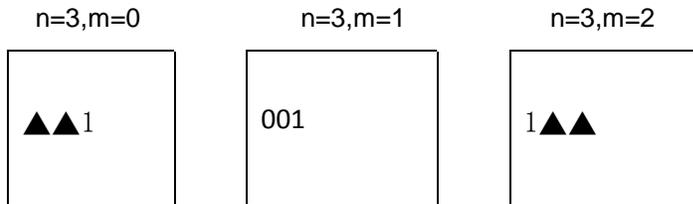
▲Indicates a space

GS C 1 aL aH bL bH n r

[Name]   Select count mode (A)

[Format]   ASCII   GS C 1 aL aH aL bH n r

Hex   1D 43 31 aL aH aL bH n r

Decimal   29   67 49 aL aH aL bH n r

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

$0 \leq aH \leq 255$

$0 \leq bL \leq 255$

$0 \leq bH \leq 255$

$0 \leq n \leq 255$

$0 \leq r \leq 255$

[Description]   Selects a count mode for the serial number counter.

- aL, aH or bL, bH specify the counter range.

- n indicates the stepping amount when counting up or down.

- r indicates the repetition number when the counter value is fixed.

[Notes]
- Count-up mode is specified when:

  [aL + aH$\times$ 256] < [bL + bH $\times$ 256] and n $\neq$ 0 and r $\neq$ 0

- Count-down mode is specified when:

  [aL + aH $\times$ 256] > [bL + bH $\times$ 256] and n $\neq$ 0 and r $\neq$ 0

- Counting stops when:

  [aL + aH $\times$ 256] = [bL + bH $\times$ 256] and n = 0 or r = 0

- In setting count-up mode, the minimum value of the counter is [aL + aH $\times$ 256] and the maximum value is [bL + bH $\times$ 256]. If counting up reaches a value exceeding the maximum, it is resumed with the minimum value.

- In setting count-down mode, the maximum value of the counter is [aL + aH $\times$ 256] and the minimum value is [bL + bH$\times$ 256]. If counting down reaches a value less than the minimum, it is resumed with the maximum value.

- When this command is executed, the internal counter that indicates the repetition number specified by r is cleared.

[Defaults]   aL = 1, aH = 0, bL = 255, bH = 255, n =1, r = 1

[Reference] **GS C 0, GS C 2, GS C ;, GS c**

GS C 2 nL nH

[Name]   Set counter

[Format]   ASCII   GS C 2 nL mH

                Hex   1D 43 32 nL mH

                Decimal   29 67 50 nL mH

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

            $0 \leq nH \leq 255$

[Description]   Sets the serial number counter value.

- nL and nH determine the value of the serial number counter set by [nL + nH $\times$256].

[Notes]
- In count-up mode, if the counter value specified by this command goes out of the counter operation range specified by **GS C1** or **GS C ;**, it is forced to convert to the minimum value by **GS c**.

- In count-down mode, if the counter value specified by this command goes out of the counter operation range specified by **GS C1** or **GS C ;**, it is forced to convert to the maximum value by **GS c**.

[Default]   nL = 1, nH = 0

[Reference] **GS C 0, GS C 1, GS C ; GS c**

GS C ; sa ; sb ; sn; sr; sc;

[Name]   Select count mode (B)

[Format]   ASCII   GS C ; sa ; sb ; sn ; sr ; sc ;

                Hex   1D 43 3B sa 3B sb 3B sn 3B sr 3B sc 3B

| | Decimal | 29 67 59 sa 59 sb 59 sn 59 sr 59 sc 59 |

[Range]   "0" ≤ sa ≤ "65535"

"0" ≤ sb ≤ "65535"

"0" ≤ sn ≤ "255"

"0" ≤ sr ≤ "255"

"0" ≤ sc ≤ "255"

These values are all character strings.

[Description] Selects a count mode for the serial number counter and specifies the value of the counter.

- sa, sb, sn, sr and sc are all displayed in ASCII characters, using the codes for "0" to "9."

- sa and sb specify the counter range.

- sn indicates the stepping amount for counting up or down.

- sr indicates the repetition number with the counter value fixed.

- sc indicates the counter value.

[Notes]   • Count-up mode is specified when:

$sa < sb$ and $sn \ne 0$ and $sr \ne 0$

- Count-down mode is specified when:

$sa > sb$ and $sn \ne 0$ and $sr \ne 0$

- Counting stops when:

$sa = sb$ or $sn = 0$ or $sr = 0$

- When count-up mode is specified, sa is the minimum counter value and sb is the maximum counter value. If counting up reaches a value exceeding the maximum, it is resumed with the minimum value. If the counter value set by sc is outside the counter operation range, the counter value is forced to convert to the minimum value by executing **GS c**.

- When count-down mode is specified, sa is the maximum counter value and sb is the minimum counter value. If counting down reaches a value less than the minimum, it is resumed with the maximum value. If the counter value set by sc is outside the counter operation range, the counter value is forced to convert to the maximum value by executing **GS c**.

- Parameters sa to sc can be omitted. If omitted, these argument values are unchanged.

- Parameters sa to sc must not contain characters, except 0 to 9.

- If an incorrect syntax is used, the corresponding parameter setting has no effect, and the data after that is processed as normal data.

[Default]   sa = 1, sb = 65535, sn = 1, sr = 1, sc = 1

[Reference]   **GS C 0, GS C 1, GS C 2, GS c**

GS c

[Name]	Print counter
[Format]	ASCII GS c
	Hex 1D 63
	Decimal 29 99

[Description]   Sets the serial counter value in the print buffer and increments or decrements the counter value.

[Notes]
- After setting the current counter value in the print buffer as print data (a character string), the printer counts up or down based on the count mode set.The counter value in the print buffer is printed when the printer receives a print command or is in the buffer-full state.
- The counter print mode is set by **GS C 0**.
- The counter mode is set by **GS C1** or **GS C**.
- In count-up mode, if the counter value set by this command goes out of the counter operation range set by **GS C1** or **GS C ;**, it is forced to convert to the minimum value.
- In count-down mode, if the counter value set by this command goes out of the counter operation range set by **GS C1** or **GS C ;**, it is forced to convert to the maximum value.

[Reference]   **GS C 0, GS C 1, GS C 2, GS C ;**