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# 1 Performance Indicators

## 1.1 Introduction

- This section introduces a thermal printer module, highlighting its high-quality, high-speed, low-noise, and reliable printing capabilities.
- The printer is suitable for a wide range of applications, including commercial cash registers, bank POS systems, and various receipt printing tasks.
- It accommodates paper rolls with a width of 58mm, a printing area of 48mm, and a maximum outer diameter of 40mm.

## 1.2 Key Benefits

- The printer is user-friendly and easy to maintain.
- It offers high-speed printing with minimal noise.
- The print head is designed for long-term reliability.
- It supports the GB18030-2000 Chinese character set and multiple ISO8859 character sets.
- The printer features a real-time detection mode for efficient operation.

## 1.3 Key Technical Indicators

### 1.3.1 Specification

- 1) Printing Method: Line-by-line thermal printing.
- 2) Print Dots: 384 dots per line (default setting).
- 3) Resolution: 203 DPI x 203 DPI.
- 4) Paper Feeding: One-way friction feed.
- 5) Print Width: 48mm, with a density of 8 dots/mm.
- 6) Character Sizes per Line:

Foreign(12x24)	Foreign (9x17)	Chinese(24x24)	Chinese(16x16)
32chars/line	42chars/line	16chars/line	24chars/line

- 7) Line Spacing: Default 24 dots (3mm), adjustable in 0.125mm increments.

If the data is out of print area, auto line wrap, and the line space is 0. The maximum line size is 2, if data is larger than 2 lines, the larger part will be discarded.

- 8) Print Speed: Up to 80mm/s, linked to data transfer speed.
- 9) Paper Feed Speed: Up to 80mm/s.
- 10) Minimum Feed Unit: 0.125mm.
- 11) Print Format: Supports various character sizes and column configurations.
  - maximum 32 columns(12x24 character).
  - maximum 42columns(9x17 characters).
  - maximum 16 columns(24x24 Chinese).

- maximum 24 columns(16x16 Chinese).

12) Internal Buffer: 4K bytes.

13) Interface: Serial TTL level, supporting RTS/CTS handshake protocol and asynchronous communication at 115200 bps (fixed).

14) Print Paper Specifications:

- Type: High-quality thermal paper.
- Thickness: 65-100 $\mu$ m.
- Recommended Specifications: 40mm maximum outer diameter, 57.5  $\pm$  0.5mm width.

15) Printer Commands:

- Compatibility with EPSON ESC/POS command list.



### 1.3.2 Thermal Paper Roll Technical Specification

- High-quality sensitive thermal paper.
- Print width: 57.5  $\pm$  0.5mm.
- Thickness: 65 $\mu$ m to 100 $\mu$ m.
- Max roll outer diameter: 50mm.
- Paper curl direction: Outside the print surface.
- Print surface: Lateral side of the paper roll.

**Note:** Non-compliant paper may cause jams.

### 1.3.3 Printing Mechanism Reliability

1) Print Movement: Life of 100 kilometers or 1 billion pulses.

2) Mechanism:

- Operating Temperature: -5 $^{\circ}$ C to 45 $^{\circ}$ C (no condensation).
- Operating Humidity: 20% to 85% (no condensation).
- Storage Temperature: -20 $^{\circ}$ C to 60 $^{\circ}$ C (no condensation).
- Storage Humidity: 5% to 95% at 40 $^{\circ}$ C (no condensation).
- Lifespan: 50km of paper feed.
- Note: Lifespan guarantee void if non-compliant paper is used.

### 1.3.4 Character CharSet

1) Character CharSet:

- Chinese: GB18030-2000 (backward compatible with GB2312-1980).
- Foreign: ISO8859 (1,2,3,4,5,7,9,13,15).

2) Character size(Listed in width x height (mm) for various styles.)

	normal	Double height	Double width	Double height +Double width
	W*H(mm)			
Foreign(12x24)	1.5x3.0	1.5x6.0	3.0x3.0	3.0x6.0
Foreign(9x17)	1.125x2.125	1.125x4.25	2.25x2.125	2.25x4.25
Chinese(24x24)	3.0x3.0	3.0x6.0	6.0x3.0	6.0x6.0
Chinese(16x16)	2.0x2.0	2.0x3.0	3.0x2.0	3.0x3.0

#### 1.4 Other

##### 1.4.1 Power supply

- Voltage: DC 6.8-8.4V.
- Average Current Consumption: About 2A.

##### 1.4.2 Support Terminal Table List

Terminal type	Outer diameter
Q1	30mm
POS1v2	40mm
Q2	40mm
Q1v2	30mm

## 2 POS Commands

### 2.1 Command List

Command	Statement
HT	Horizontal tab
LF	Print and line feed
CR	Carriage return
ESC SP	Set right-side character space
ESC !	Set the font types
ESC \$	Set the absolute print position
ESC *	Select bit-image mode
ESC -	Turn underline mode on/off
ESC 2	Set the line space to a default value
ESC 3	Set the line space to n dots
ESC SO	Set character double width
ESC DC4	Set the width normal
ESC @	Initialize the printer
ESC B	Set the left margin
ESC D	Set horizontal tab positions
ESC E	Turn bold mode on/off
ESC G	Turn double-strike mode on/off
ESC J	Print and feed paper for n dots
ESC M	Set the font grayscale
ESC R	Select an international character set
ESC V	Turn 90°clockwise rotation mode on/off
ESC \	Set the relative print position
ESC a	Set the print alignment
ESC d	Print and feed paper for n lines
ESC t	Select character code page
ESC {	Turn upside-down printing mode on/off
GS !	Select character size
GS B	Turn white/black reverse printing mode on/off
GS v 0	Print raster bit image
DC2 * r	Print bitmap
DC2 V	Print MSB bitmap
DC2 v	Print LSB bitmap

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DC2 T	Print test page
FS !	Set Chinese character printing mode
FS -	Turn Chinese character underline mode on/off
FS S	Set Chinese character space
FS W	Turn Chinese character printing on/off
ESC C	Check character code table
ESC F	Download character code table
ESC H	MD5 self-inspection
ESC A	Check the printer version
ESC >	Check information of character code table head
GS E	Set print density
GS k	Print barcode
GS h	Set height of one-dimension barcode
GS w	Set width of one-dimension barcode
GS x	Set left margin of one-dimension barcode
GS H	Set print position of HRI
GS f	Set barcode HRI font type

## 2.2 Command Explanations

### Horizontal Tab(HT)

---

[Name]	Horizontal Tab
[Format]	ASCII HT Hex 09 Decimal 9
[Description]	The Horizontal Tab command moves the printing position to the next predefined tab stop. <ul style="list-style-type: none"> <li>• Default Behavior: If no tab stops are set (which is the default), this command has no effect.</li> <li>• Setting Tab Stops: Use the ESC D command to set tab positions.</li> <li>• Note: If a tab stop is beyond the printable area, the printer will automatically start a new line, as if the line is full.</li> </ul>
[Reference]	<b>ESC D</b>

### Print and Feed Paper(LF)

---

[Name]	Print and Feed Paper
[Format]	ASCII LF Hex 0A Decimal 10
[Description]	<ul style="list-style-type: none"> <li>• This command is used for printing the data currently held in the printer's buffer.</li> <li>• After the printing is completed, it feeds the paper forward by one line. The amount of paper fed is determined by the current line spacing settings of the printer.</li> <li>• Post-printing, the printer's printing position is reset to the beginning of the next line.</li> </ul>
[Reference]	<b>ESC 2,ESC 3</b>

### Carriage Return (CR)

---

[Name]	Carriage Return
[Format]	ASCII CR Hex 0D Decimal 13
[Description]	<ul style="list-style-type: none"> <li>• The Carriage Return command is designed to reset the print position to the beginning of the current line.</li> <li>• In addition to moving the print position, it also performs a line feed, advancing the paper to the start of the next line.</li> </ul>
[Reference]	<b>LF</b>

### Set Right-Side Character Space(ESC SP n)

---

[Name]	Set Right-Side Character Space
[Format]	ASCII ESC SP n Hex 1B 20 n Decimal 27 32 n



[Parameter Range] 0≤n≤255

[Description]

- This command adjusts the space to the right of each character.
- The space added is calculated as  $n \times 0.125\text{mm}$ .
- Note for Double Width Mode: In double width mode, the right-side space of characters will be twice that of the normal mode.
- Limitation: This command does not affect Chinese characters.

[Default] n=0

### Set Font Type(ESC ! n)

[Name] Set Font Type

[Format]

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

[Parameter Range] 0≤n≤255

[Description]

- This command is used to select various font attributes like italic, bold, double width, double height, inverse, or underline. The parameter 'n' controls these settings through its bit values:

Bit	On/off	Hex	Decimal	Function
0	off	00	0	Character type A (12×24)
	on	01	1	Character type B (9×17)
1-3	-	-	-	Reserved
4	Off	00	0	Double-height mode off
	On	10	16	Double-height mode on
5	Off	00	0	Double-width mode off
	On	20	32	Double-width mode on
6	-	-	--	Reserved
7	Off	00	0	Underline mode off
	on	80	128	Underline mode on

- Enabling both double-width and double-height simultaneously quadruples the character size.
- Underlining does not apply to spaces created by the HT command or to characters rotated 90 degrees.
- The underline width, set by the ESC - command, is not affected by the character size.
- The ESC M command can also be used to set the character type.
- The ESC - command toggles the underline on or off.
- The GS ! command can also set the character size.

[Default] n=0

[Reference] ESC -, ESC E, GS !

### Set Absolute Print Position(ESC \$ nL nH)

[Name] Set Absolute Print Position

[Format]

ASCII	ESC	\$	nL	nH
Hex	1B	24	nL	nH

Decimal 27 36 nL nH

- [Parameter Range] • nL (Lower Byte Value): Can be any number from 0 to 255.  
 • nH (Higher Byte Value): Can be any number from 0 to 255.

[Description] This command adjusts the printer's current print position. It calculates the new position by adding (nL + nH × 256) dots to the initial printing position. This feature allows for precise control over where on the page the printing starts.

[Reference] **ESC \**

**Select Bit-Image Mode(ESC \* m nL nH d1...dk)**

[Name] Select Bit-Image Mode

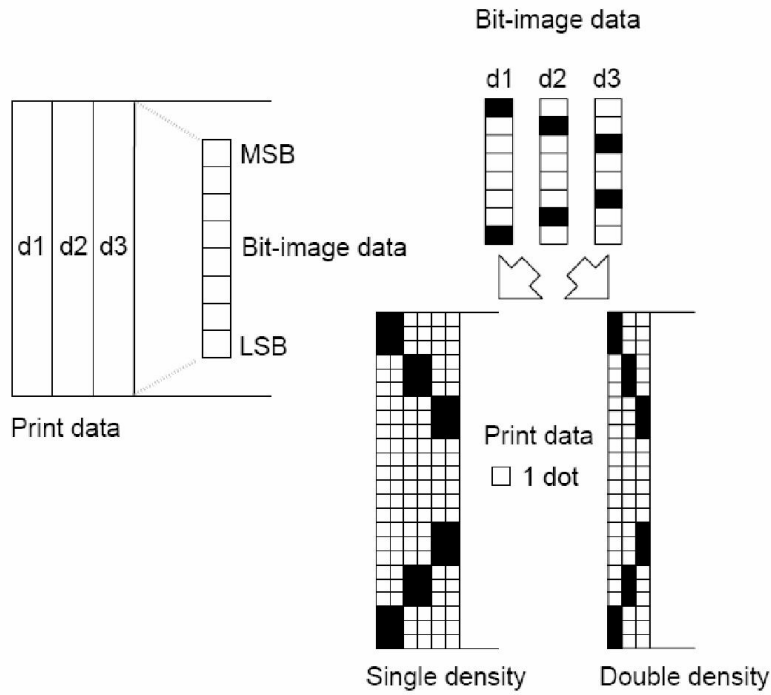
[Format] ASCII ESC \* m nL nH d1...dk  
 Hex 1B 2A m nL nH d1...dk  
 Decimal 27 42 m nL nH d1...dk

- [Parameter Range] • m (Mode): Accepts values 0, 1, 32, or 33.  
 • nL (Lower Byte): Ranges between 0 and 255.  
 • nH (Higher Byte): Ranges between 0 and 3.  
 • d (Data Bytes): Ranges between 0 and 255, representing bit image data.

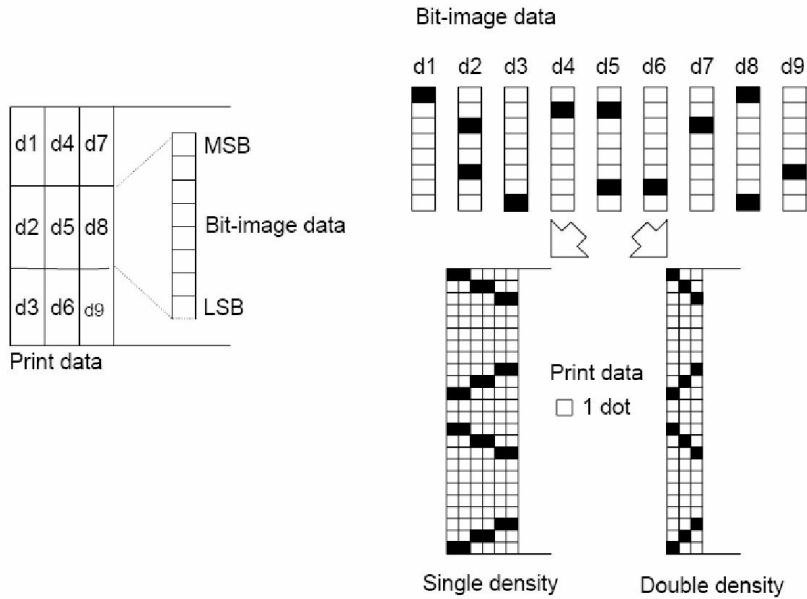
[Description] This command sets the printer to store bit image data in its print buffer. The m parameter selects the bit image mode, which determines the image processing and printing method. nL and nH define the image width in dots, calculated as (nL + 256 × nH). d1...dk represents the bit image data in column format, with k indicating the data amount, although it is not transmitted with the command.

m	Mode	Vertical		Horizontal	
		Point	Density	Density	Data Count(K)
0	8 dots single density	8	67.7 dpi	101.6 dpi	nL+nH×256
1	8 dots double density	8	67.7 dpi	203.2 dpi	nL+nH×256
3 2	24 dots single density	24	203.2 dpi	101.6 dpi	(nL+nH×256)×3
3 3	24 dots double density	24	203.2 dpi	203.2 dpi	(nL+nH×256)×3

- [Note] • If m is outside its range, nL and following data are considered normal data.  
 • Any bit image data exceeding a single line of print area will be disregarded.  
 • Data dk defines printed bits (1) and unprinted bits (0).  
 • This command is unaffected by settings for bold, double-strike, underline, character size, upside-down, or black/white printing.  
 • When selecting an 8-dots bitmap mode using the Select Bit-Image Mode (ESC \* m nL nH d1...dk) command in printer programming, the print result can be understood as follows:



If select 24 dots bitmap:



### Underline Mode(ESC - n)

[Name]	Underline Mode			
[Format]	ASCII	ESC	-	n
	Hex	1B	2D	n
	Decimal	27	45	n
[Parameter Range]	n can be 0, 1, 2, 48, 49, or 50.			

[Description] Turns underline mode on or off using n as follows:

n	Function
0, 48	Turns off underline mode.
1, 49	Activates underline mode with 1-dot thickness.
2, 50	Activates underline mode with 2-dots thickness.

[Note] • Underline doesn't apply to spaces created by HT or rotated 90 degree characters or

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reverse characters.

- Default underline thickness is 1-dot.
- Underline thickness remains constant regardless of character size.
- Underline can also be toggled with ESC !.

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

---

### Default Line Spacing(ESC 2)

[Name] Default Line Spacing  
 [Format] ASCII ESC2  
 Hex 1B 32  
 Decimal 27 50  
 [Description] Sets line spacing to a default value of 3mm (24 × 0.125mm).  
 [Reference] **ESC 3**

---

### Custom Line Spacing(ESC 3 n)

[Name] Custom Line Spacing  
 [Format] ASCII ESC3 n  
 Hex 1B 33 n  
 Decimal 27 51 n  
 [Description] Sets line spacing to n dots.  
 [Default] n=24  
 [Reference] **ESC 2**

---

### Double Width Mode On(ESC SO n)

[Name] Double Width Mode On  
 [Format] ASCII ESC SO n  
 Hex 1B 0E n  
 Decimal 27 14 n  
 [Parameter Range] n ranges from 0 to 255.  
 [Description] Activates double width mode.  
 [Note] • Turn off using LF or ESC DC4.  
 [Default] n=2

---

### Double Width Mode Off(ESC DC4 n)

[Name] Double Width Mode Off  
 [Format] ASCII ESC DC4 n  
 Hex 1B 14 n  
 Decimal 27 20 n  
 [Parameter Range] n ranges from 0 to 255.  
 [Description] Deactivates double width mode.  
 [Note] • The value of n should match the one used in the turn-on command.  
 [Default] n=2

---

### Initialize Printer (ESC @)

[Name]	Initialize Printer
[Format]	ASCII      ESC   @ Hex        1B   40 Decimal    27   64
[Description]	Resets the printer and returns the print mode to its default settings.
[Note]	• This command does not clear the data in the receive buffer.

### Set Left Margin (ESC B n)

[Name]	Set Left Margin
[Format]	ASCII      ESC   B    n Hex        1B   42    n Decimal    27   66    n
[Parameter Range]	0≤n≤47
[Description]	Sets the left margin for printing.
[Note]	• This command only affects the margin for characters, not for Chinese characters.
[Default]	n=0

### Set Horizontal Tab Positions(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
[Parameter Range]	1≤n≤255 0≤k≤32
[Description]	Sets the positions for horizontal tabs. The n1...nk parameters define the tab positions (unit: 8 dots), with NULL as a stop character.
[Note]	<ul style="list-style-type: none"> <li>• Tab positions are stored as data, with the value [character width × n] from the line's beginning.</li> <li>• Previous tab settings are canceled when this command is used.</li> <li>• Tab positions can be altered using the HT command.</li> <li>• The maximum value for k is 32. Values larger than 32 are treated as normal data.</li> <li>• Transmit dk in ascending order, ending with a NULL code.</li> <li>• Horizontal tab settings conclude when dk is less than or equal to dk-1, with subsequent data processed as normal.</li> <li>• <b>ESC D NULL</b> cancels the horizontal tab positions.</li> <li>• Tab positions remain unchanged even if the character width changes.</li> </ul>
[Default]	The default tab position is for character type A (12×24), which is every eight characters (column 9, 17, 25, ...).
[Reference]	<b>HT</b>

### Bold Mode(ESC E n)

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

[Parameter Range]	0≤n≤255
[Description]	Toggles bold mode. • n = 0: Turns off bold mode. • n = 1: Turns on bold mode.
[Default]	n=0
[Reference]	<b>ESC !</b>

### Double-Strike Mode(ESC G n)

---

[Name]	Double-Strike Mode
[Format]	ASCII      ESC   G    n Hex        1B   47    n Decimal    27   71    n
[Parameter Range]	0≤n≤255
[Description]	Toggles double-strike mode. • 0: Turns off double-strike. • 1: Turns on double-strike.
[Note]	• The double-strike effect is similar to bold print.
[Default]	n=0
[Reference]	<b>ESC E</b>

### Print and Feed Paper(ESC J n)

---

[Name]	Print and Feed Paper
[Format]	ASCII      ESC J n Hex        1B   4A    n Decimal    27   74    n
[Parameter Range]	0≤n≤255
[Description]	Prints the data in the buffer and feeds paper forward by n dots (0.125mm per dot).
[Note]	• After printing, the print position resets to the beginning of the line. • This command does not alter settings made by <b>ESC 2</b> or <b>ESC 3</b> .

### Select Character Type(ESC M n)

---

[Name]	• Select Character Type						
[Format]	ASCII      ESC   M    n Hex        1B   4D    n Decimal    27   77    n						
[Parameter Range]	n = 0,1,48,49						
[Description]	Chooses the character type.						
	<table border="1"> <thead> <tr> <th>n</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0, 48</td> <td>Character type A (12×24)</td> </tr> <tr> <td>1, 49</td> <td>Character type B (9×17)</td> </tr> </tbody> </table>	n	Function	0, 48	Character type A (12×24)	1, 49	Character type B (9×17)
n	Function						
0, 48	Character type A (12×24)						
1, 49	Character type B (9×17)						
[Reference]	<b>ESC !</b>						

### Select International Character Set(ESC R n)

---

[Name]	Select International Character Set
[Format]	ASCII      ESC   R    n

Hex            1B    52    n  
 Decimal       27    82    n

[Parameter Range] 0≤n≤255

[Description] This command is used to select an international character set based on the value of n.

The character sets correspond to different countries or standards as follows:

n	international character
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
16	Vietnam
17	Arabia
101	ISO-8859-1
102	ISO-8859-2
103	ISO-8859-3
104	ISO-8859-4
105	ISO-8859-5
107	ISO-8859-7
109	ISO-8859-9
113	ISO-8859-13
115	ISO-8859-15
130	GB13030-2000

[Default] n=0

- It is suggested to use n=8, n=15, or n>100 for broader character set compatibility.

### 90° Clockwise Rotation Mode(ESC V n)

[Name] 90° Clockwise Rotation Mode

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

[Parameter Range] • n = 0,1,48,49

[Description] • Toggles the 90° clockwise rotation mode.

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

[Note] • Underline is not effective for rotated characters.

[Default] n=0

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

### Set Relative Print Position(ESC \ nL nH)

[Name] Set Relative Print Position

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

[Parameter Range] 0≤nL≤255  
 0≤nH≤255

[Description] Moves the print position relative to the current position by (nL + nH × 256) dots.

[Note] • If the position is outside the print area, it will be ignored.  
 • For rightward movement: N = nL + nH × 256.  
 • For leftward movement: N = 65536 - (nL + nH × 256).

[Reference] **ESC \$**

### Print Alignment Mode(ESC a n)

[Name] Print Alignment Mode

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

[Parameter Range] 0≤n≤2  
 48≤n≤50

[Description] Sets the alignment of all data in a line.

n	Mode
0, 48	Left
1, 49	Center
2, 50	Right

[Note] • The alignment command is only effective at the beginning of a line in standard mode. It means that the alignment setting is applied when processing starts at the start of a new line.  
 • This command performs alignment within the designated printing area. It ensures that the text or data is aligned according to the set parameters within the boundaries of the printable space.  
 • The alignment command works in conjunction with other commands like HT (Horizontal Tab), ESC \$ (Set Absolute Horizontal Print Position), and ESC \ (Set Relative Print Position). It aligns the blank space created by these commands, maintaining a consistent layout as per the specified alignment settings.  
 • This command is also applicable to barcode printing.

[Default] n=0



**Print and Feed Paper by Lines(ESC d n)**

[Name]	Print and Feed Paper by Lines
[Format]	ASCII    ESCd    n Hex      1B 64    n Decimal 27 100   n
[Parameter Range]	0≤n≤255
[Description]	Prints the data in the buffer and feeds paper forward by n lines.
[Note]	<ul style="list-style-type: none"> <li>• After printing, the print position resets to the start of the line.</li> <li>• Line spacing is determined by ESC 2 or ESC 3.</li> </ul>
[Reference]	<b>ESC 2, ESC 3</b>

**Select Character Code Table(ESC t n)**

[Name]	Select Character Code Table
[Format]	ASCII          ESC t    n Hex            1B 74    n Decimal       27 116   n
[Parameter Range]	0≤n≤255
[Description]	This command is used to select a character code table based on the value of n. Different values correspond to various international character sets and code pages, enabling the printer to handle a wide range of characters and symbols.

n	Character code table
0	PC437: USA, Standard Europe
1	Katakana
2	PC850: Multilingual
3	PC860: Portuguese
4	PC863: Canadian-French
5	PC865: Nordic
11	PC851: Greek
12	PC853: Turkish
13	PC857: Turkish
14	PC737: Greek
15	ISO8859-7: Greek
16	WPC1252
17	PC866: Cyrillic #2
18	PC852: Latin2
19	PC858: Euro
20	KU42: Thai
21	TIS11: Thai
26	TIS18: Thai
30	TCVN-3: Vietnamese I
31	TCVN-3: Vietnamese II
32	PC720: Arabic
33	WPC775: Baltic Rim
34	PC855: Cyrillic

35	PC861: Icelandic
36	PC862: Hebrew
37	PC864: Arabic
38	PC869: Greek
39	ISO8859-2: Latin2
40	ISO8859-15: Latin9
41	PC1098: Farsi
42	PC1118: Lithuanian
43	PC1119: Lithuanian
44	PC1125: Ukrainian
45	WPC1250: Latin 2
46	WPC1251: Cyrillic
47	WPC1253: Greek
48	WPC1254: Turkish
49	WPC1255: Hebrew
50	WPC1256: Arabic
51	WPC1257: Baltic Rim
52	WPC1258: Vietnamese
53	KZ1048: Kazakhstan

- [Note]
- The ESC t n command, which selects a character code table, offers only partial compatibility with certain printers or environments. This means that while the command may work, it might not fully support all the intended character sets or may not function as expected in all scenarios.
  - It is suggested to use the ESC R command as a replacement for selecting character sets. The ESC R command may offer a more streamlined approach or compatibility with a wider range of character sets, depending on the printer model and firmware.

[Default] n=0

### Upside-Down Printing Mode(ESC { n)

[Name] Upside-Down Printing Mode

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

[Parameter Range] 0≤n≤255

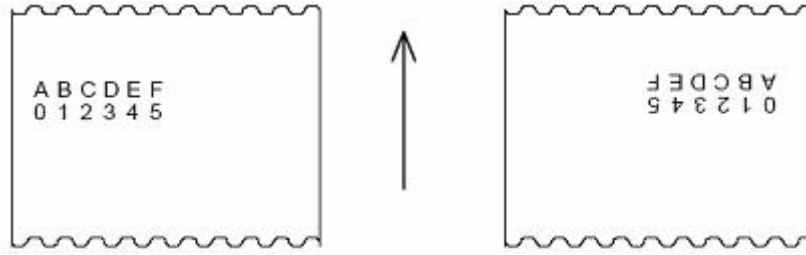
[Description] This command toggles the upside-down printing mode, which inverses the orientation of the printed text.

- 0: When the LSB of n is 0, upside-down print mode is disabled.
- 1: When the least significant bit (LSB) of n is 1, upside-down print mode is enabled.

- [Note]
- Only the least significant bit of n is considered for this command.
  - This command is effective only at the beginning of a line in standard mode.
  - In upside-down printing mode, the printer first rotates the line to be printed by 180° and then proceeds with the printing.

[Default] n=0

[Sample]



**Select Character Size(GS ! n)**

[Name] Select Character Size  
 [Format] ASCII GS ! n  
 Hex 1D 21 n  
 Decimal 29 33 n

[Parameter Range] 0≤n≤255

[Description] This command is used to set the size of characters, with the height determined by bits 0 to 3 of n, and the width determined by bits 4 to 7 of n.

Bit	On/off	Hex	Decimal	Function
0				Table2
1				
2				
3				
4				Table1
5				
6				
7				

Table1 Set Character Width

Hex	Decimal	Width
00	00	1 (Normal)
10	16	2 (Double)
20	32	3
30	48	4
40	64	5
50	80	6
60	96	7
70	112	8

Table2 Set character Height

Hex	Decima l	Height
00	00	1 (Normal)
01	1	2 (Double)
02	2	3
03	3	4
04	4	5
05	5	6
06	6	7
07	7	8

[Note]

- If n is outside the specified range, the command will be ignored.
- In the standard mode of a printer, the vertical direction is aligned with the direction in which the paper feeds through the printer. When the character orientation is adjusted to rotate 90 degrees clockwise, what was originally the vertical direction (aligned with the paper feed) becomes the new horizontal direction. Conversely, the original horizontal direction (perpendicular to the paper feed) becomes the new vertical direction.
- The ESC ! command can also be used to toggle double-width and double-height settings.

[Default] n=0

[Reference] **ESC !**

**Inverse (Black/White) Printing Mode(GS B n)**

[Name] Inverse (Black/White) Printing Mode

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

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

[Description] This command switches the inverse (black/white) printing mode on or off.  
 Enable Mode: When the least significant bit (LSB) of n is 1, the inverse printing mode is activated.  
 Disable Mode: When the LSB of n is 0, the inverse printing mode is deactivated.

[Note]
 

- LSB Consideration: The command only considers the LSB of n.
- Effect on ESC SP Spaces: Spaces set by the ESC SP command are affected by this inverse mode.
- No Impact on Certain Spaces and Bitmaps: The command does not alter spaces created by HT, ESC \$, and ESC \, nor does it affect bitmap printing.
- Line Spacing: Line spacing remains unaffected by this command.
- Disabling but Not Canceling Underline Mode: Inverse mode takes precedence over underline mode, it temporarily disables the effects of an active underline mode. This implies that while the underline mode may still be technically 'on', its underlining effect will not be applied to the printed text or content.

[Default] n=0

**Print Raster Bitmap(GS v 0 xL xH yL yH d1...dk)**

[Name] Print Raster Bitmap

[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

[Parameter Range] m (Mode):  $0 \leq m \leq 3$  or  $48 \leq m \leq 51$   
 xL, xH: Horizontal byte count ( $0 \leq xL \leq 255$ ,  $0 \leq xH \leq 255$ ) with  $1 \leq (xL + xH \times 256) \leq 128$   
 yL, yH: Vertical byte count ( $0 \leq yL \leq 255$ ,  $0 \leq yH \leq 8$ ) with  $1 \leq (yL + yH \times 256) \leq 4095$   
 d: Data bytes for bitmap ( $0 \leq d \leq 255$ )  
 k: Total bytes ( $k = (xL + xH \times 256) \times (yL + yH \times 256)$ ,  $k > 0$ )

[Description] Print raster bit image, the meanings of parameter m are 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 size	101.6 dpi	101.6 dpi

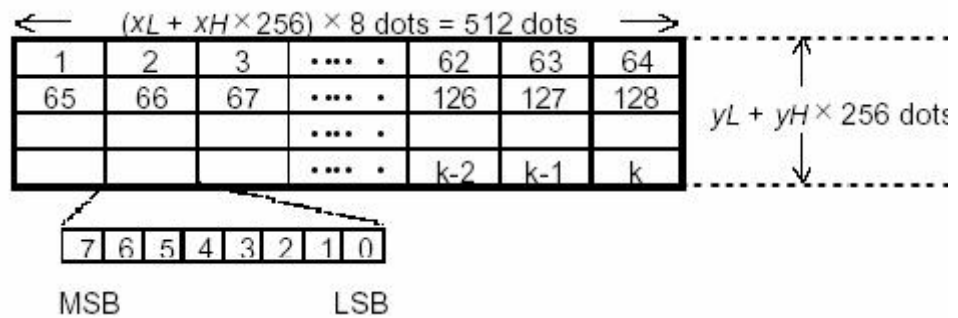
[Note]
 

- Bitmap Dimensions: xL and xH set the number of horizontal bytes ( $xL + xH \times 256$ ); yL and yH set the number of vertical bytes( $yL + yH \times 256$ ) for the bitmap.
- Command Effectiveness: In standard mode, this command is effective only when there's no data in the print buffer.

- Independence from Print Modes: Raster bitmap printing is unaffected by print modes (character size, bold, underline, inverse mode, etc.).
- Handling of Data Outside Print Area: Data outside the print area is read and discarded dot by dot.
- Setting Print Position: The print position for subsequent characters intended for raster bitmap printing can be set using HT (Horizontal Tab), ESC \$ (Set Absolute Print Position), ESC \ (Set Relative Print Position), and GS L (Set Left Margin).
- Alignment: The ESC a (Set Alignment Mode) command is also effective for raster bitmaps.
- Bitmap Data: d specifies the bitmap data. A bit set to '1' indicates a dot to be printed; a '0' indicates no dot.

[Sample]

If  $xL + xH \times 256 = 64$



### Bitmap Printing(DC2 \* r n d1...dn)

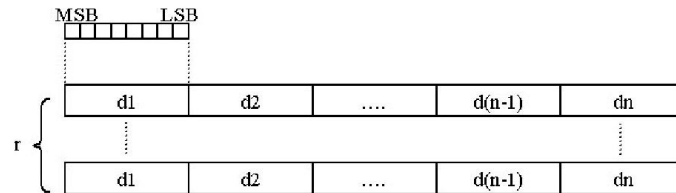
[Name] Bitmap Printing

[Format] ASCII DC2 \* r n d1...dn  
 Hex 12 2A r n d1...dn  
 Decimal 18 42 r n d1...dn

[Parameter Range] r: Height of the bitmap to be printed ( $0 < r \leq 255$ ).  
 n: Width of the bitmap to be printed ( $0 < n \leq 255$ ).

[Description] This command is used for printing a bitmap with specified height (r) and width (n).  
 Bitmap Data (d): Specifies the bitmap data. A bit set to '1' indicates a dot to be printed; a '0' indicates no dot.

Bitmap Format as follows:

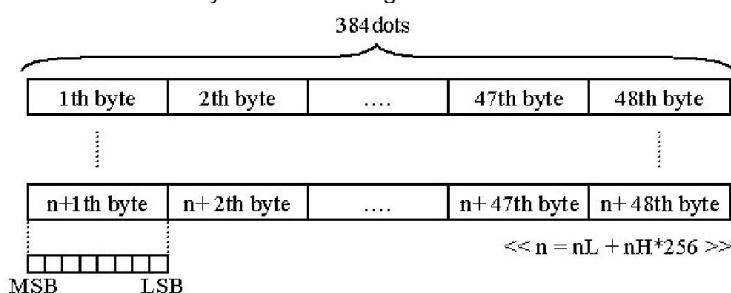


[Note]

- Command Effectiveness: Effective only when there is no data in the print buffer.
- Independence from Print Modes: Bitmap printing is unaffected by print modes (character size, bold, underline, inverse mode, etc.).
- Data Outside Print Area: Data outside the print area is read and discarded dot by dot.
- Bitmap Format: The bitmap is formatted according to the specified height and width, with the data d1...dn representing the pattern to be printed.

### MSB Bitmap Printing(DC2 V nL nH d1...d48)

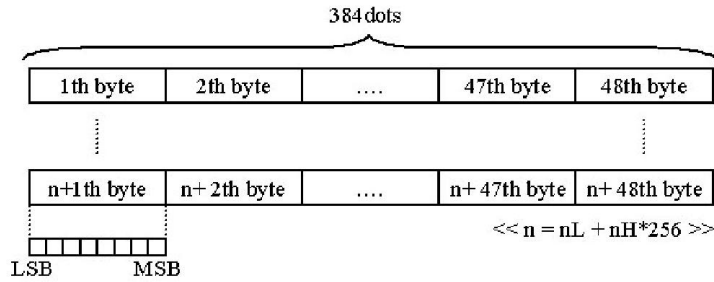
[Name]	MSB Bitmap Printing
[Format]	ASCII DC2 V nL nH d1...d48 Hex 12 56 nL nH d1...d48 Decimal 18 86 nL nH d1...d48
[Parameter Range]	nL, nH: Determine the height of the bitmap ( $0 < nL + nH \times 256$ ).
[Description]	This command is used for printing a bitmap in MSB (Most Significant Bit) format. Bitmap Width: The bitmap has a fixed width of 384 bits. Bitmap Height: The height is defined by the combined value of nL and nH ( $nL + nH \times 256$ ). Bitmap Format: The bitmap is formatted in MSB order, with the data d1...d48 representing the pattern to be printed. The MSB format requires a specific arrangement of data bits to correctly render the image:



- [Note]
- Command Effectiveness: Effective only when the print buffer is empty.
  - Independence from Print Modes: MSB bitmap printing is unaffected by print modes (character size, bold, underline, inverse mode, etc.).
  - Handling of Data Outside Print Area: Data outside the designated print area is read and discarded dot by dot.
  - Bitmap Data (d): Specifies the bitmap data. Bits set to '1' indicate dots to be printed; bits set to '0' indicate no print.

### LSB Bitmap Printing(DC2 v nL nH d1...d48)

[Name]	LSB Bitmap Printing
[Format]	ASCII DC2 v nL nH d1...d48 Hex 12 76 nL nH d1...d48 Decimal 18 118 nL nH d1...d48
[Parameter Range]	nL, nH: Determine the height of the bitmap ( $0 < nL + nH \times 256$ ).
[Description]	This command is used for printing a bitmap in LSB (Least Significant Bit) format. Bitmap Width: The bitmap has a fixed width of 384 bits. Bitmap Height: The height is defined by the combined value of nL and nH ( $nL + nH \times 256$ ). The bitmap is formatted in LSB order, with the data d1...d48 representing the pattern to be printed. The LSB format requires a specific arrangement of data bits to correctly render the image:



- [Note]
- Command Effectiveness: Effective only when the print buffer is empty.
  - Independence from Print Modes: LSB bitmap printing is unaffected by print modes (character size, bold, underline, inverse mode, etc.).
  - Handling of Data Outside Print Area: Data outside the designated print area is read and discarded dot by dot.
  - Bitmap Data (d): Specifies the bitmap data. Bits set to '1' indicate dots to be printed; bits set to '0' indicate no print.

### Print Test Page(DC2 T)

[Name]	Print Test Page		
[Format]	ASCII	DC2	T
	Hex	12	54
	Decimal	18	84
[Description]	This command is used to print a test page. The test page is typically used to diagnose printing issues, check print quality, and verify printer functionality.		

### Check Print Module Version(ESC A)

[Name]	Check Print Module Version		
[Format]	ASCII	ESC	A
	Hex	1B	41
	Decimal	27	65
[Description]	This command is used to check the version of the print module. The return value is a 32-byte string (char[32]). This command is essential for diagnostics, maintaining printer software, and verifying that the printer is using the correct version of its printing module.		

### Check Font Library Header Information(ESC >)

[Name]	Check Font Library Header Information		
[Format]	ASCII	ESC	>
	Hex	1B	3E
	Decimal	27	62
[Description]	<p>This command is used to check the font library header information.</p> <p>Command Execution: Upon sending the <b>ESC &gt;</b> command, the printer responds with font library header information.</p> <p>Return Value: The printer sends back a 128-byte information string.</p> <p>Structure of the Return Information:</p> <p>Magic Number (char magic[8]): Identifies the file or data format.</p> <p>Version (int version): Version number of the font library.</p> <p>Size (int size): Size of the font library.</p>		

Offset (int offset): Offset value within the font library.

MD5 Hash (char md5[16]): MD5 hash for integrity check.

Timestamp (char time[24]): Time information related to the font library.

Reserved Space (char reserve[2]): Reserved bytes for future use.

Description (char describe[64]): Detailed description of the font library.

Unused Space (char unuse): Unused byte.

Checksum (char checksum): Checksum for validation.

### Set Print Density(GS E n)

[Name] Set Print Density

[Format] ASCII GS E n  
 Hex 1D 45 n  
 Decimal 29 69 n

[Parameter Range]  $0 \leq n \leq 3$

[Description] This command adjusts the print density. The settings correspond to different density levels:

n	Description
0	lighter
1	light
2	dark
3	darker

[Note] • Persistent Setting: The density setting remains effective until the printer is powered off or the command is reset.  
 • Impact: This setting influences the overall darkness or lightness of the printed output, affecting the visibility and contrast of the print.

[Default] The default setting is  $n=1$ , which corresponds to a light print density.

### Print Barcodes(①GS k m d1...dk NUL ②GS k m n d1...dn)

[Name] Print Barcodes

[Format] ①ASCII GS k m d1...dk NUL  
 Hex 1D 6B m d1...dk00  
 Decimal 29 107 m d1...dk0  
 ②ASCII GS k m n d1...dn  
 Hex 1D 6B m n d1...dn  
 Decimal 29 107 m n d1...dn

[Parameter Range] Format 1 ① ( $0 \leq m \leq 8$ ) and Format 2 ② ( $65 \leq m \leq 75$ ): The value of m determines the barcode system used. The number and type of d characters depend on the selected barcode system.

Selects a barcode system and prints the barcode. The parameter m defines the barcode system and the valid range of characters for each system.

Barcode Systems include UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE39, ITF, CODABAR, standard EAN13, standard EAN8, CODE93, CODE128, etc., with specific character count and range requirements.

Data Length: For Format 1 ①(GS k m d1...dk NUL), k and d depend on the barcode



system. For Format 2② (GS k m n d1...dn), n specifies the number of barcode data bytes, and the printer processes the next n bytes as barcode data.

[Description]

	n	m	length	Legal character
①	0	UPC-A	11≤k≤12	48≤d≤57
	1	UPC-E	6≤k≤8, 11≤k≤12	48≤d≤57
	2	JAN13(EAN13)	12≤k≤13	48≤d≤57
	3	JAN8(EAN8)	7≤k≤8	48≤d≤57
	4	CODE39	1≤k	48≤d≤57, 65≤d≤90, 32, 36, 37, 43, 45, 46, 47
	5	ITF	1≤k(k is even number)	48≤d≤57
	6	CODABAR	1≤k	48≤d≤57, 65≤d≤68, 36, 43, 45, 46, 47, 58
	7	EAN13	12≤k≤13	48≤d≤57
	8	EAN8	7≤k≤8	48≤d≤57
②	65	UPC-A	11≤n≤12	48≤d≤57
	66	UPC-E	6≤n≤8, 11≤n≤12	48≤d≤57
	67	JAN13(EAN13)	12≤n≤13	48≤d≤57
	68	JAN8(EAN8)	7≤n≤8	48≤d≤57
	69	CODE39	1≤n≤255	48≤d≤57, 65≤d≤90, 32, 36, 37, 43, 45, 46, 47
	70	ITF	1≤n≤255(n is even number)	48≤d≤57
	71	CODABAR	1≤n≤255	48≤d≤57, 65≤d≤68, 36, 43, 45, 46, 47, 58
	72	CODE93	1≤n≤255	0≤d≤127
	73	CODE128	1≤n≤255	0≤d≤127
	74	EAN13	12≤n≤13	48≤d≤57
	75	EAN8	7≤n≤8	48≤d≤57

[Comment①]

- This command is terminated by a NUL (null) code.

[Comment②]

- The parameter n specifies the number of bytes in the barcode data. The printer processes the next n bytes as barcode data.
- If n exceeds the specified range, the printer stops processing the command.

[Note]

- ITF Barcode Data: For ITF barcodes, the number of data elements must be even. If an

odd number of data elements is input, the printer ignores the last received data.

- Data Range Compliance: If d exceeds its specified range, the printer does not process it.
- Print Area Limitation: If the horizontal size of the barcode exceeds the print area, the printer will only feed the paper.
- Feeding According to Barcode Requirements: This command feeds paper as required for barcode printing, regardless of the line spacing set by ESC 2 or ESC 3.
- Print Position Post-Barcode: After printing a barcode, the command sets the print position at the beginning of the next line.
- Unaffected by Print Modes: The command is not affected by print modes such as bold, overlap, underline, character size, inverse print, upside-down print, or 90-degree rotation.
- UPC-E Conversion: UPC-E barcodes can be converted from UPC-A, with specific conversion rules detailed in Appendix B.

[Sample]

When printing CODE93 barcodes:

Print a HRI char(□) at the beginning of the HRI string.

Print a HRI char(□) at the end of the HRI string.

Print a HRI char(□+ char) as control char, from 00(H) to 1F(H), 7F(H).

Control char			HRI char	Control char			HRIchar
AS CII	Hex	Decimal		ASCII	Hex	Decimal	
NU L	00	0	□U	DLE	10	16	□P
SO H	01	1	□A	DC1	11	17	□Q
ST X	02	2	□B	DC2	12	18	□R
ET X	03	3	□C	DC3	13	19	□S
EO T	04	4	□D	DC4	14	20	□T
EN Q	05	5	□E	NAK	15	21	□U
AC K	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	EN	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 printing CODE128 barcodes:

For information on the CODE128 encoding table, refer to Appendix A.

Consider the following factors for data transmission in CODE128 on this printer:

The start of the barcode data string must include a set selection character (CODE A, CODE B, or CODE C) to choose the initial encoding set.

Use the character “{” followed by another character to define special characters. To represent the ASCII character “{” in the barcode, transmit “{” twice consecutively.

Special char	Data		
	ASCII	Hex	Decimal
CODE A	{A	7B,41	123,65
CODE B	{B	7B,42	123,66
CODE C	{C	7B,43	123,67
“{”	{{	7B,7B	123,123

Print sample data “No.123456”.

Firstly, using CODE B to print “No.”, then using CODE C to print the numbers.

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



[Reference] **GS H, GS f, GS h, GS w, GS x, ESC a, Appendix**

**Set Barcode Height(GS h n)**

[Name] Set Barcode Height

[Format] ASCII GS h n  
 Hex 1D 68 n  
 Decimal 29 104 n

[Parameter Range] 1≤n≤255

[Description] This command sets the height of a one-dimensional barcode.  
 Height Specification: The value of n determines the height of the barcode in points in the vertical direction.

[Default] The default height is set to n = 96 points.

[Reference] **GS k**

**Set Barcode Width (GS w n)**

[Name] Set Barcode Width

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

[Parameter Range] 2≤n≤6

[Description] This command sets the horizontal dimensions of a barcode.  
 Width Specification: The value of n determines the barcode width as follows:

n	Multiple Barcode Unit Width (mm)	Binary barcode	
		Narrow Strip Width (mm)	Wide Strip Width (mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000

4	0.560	0.500	1.250
5	0.625	0.625	1.625
6	0.750	0.750	2.000

Barcode Types:

- Multiple barcode types include UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128.
- Binary barcode types include CODE39, ITF, CODABAR.

[Default] n = 3

[Reference] **GS k**

### Set Left Margin of Barcode(GS x n)

[Name] Set Left Margin of Barcode

[Format] ASCII GS x n  
Hex 1D 78 n  
Decimal 29 120 n

[Parameter Range] 0≤n≤255

[Description] This command sets the left margin of a barcode.

[Default] n = 0

[Reference] **GS k**

### Set Barcode HRI Characters Position(GS H n)

[Name] Set Barcode HRI Characters Position

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

[Parameter Range] 0≤n≤3,48≤n≤51

[Description] This command sets the printing position of HRI (Human Readable Interpretation) characters when printing a barcode.

The value of n determines the position of the HRI characters in relation to the barcode:

n	Print Position
0,48	Do not print HRI characters.
1,49	Print HRI characters above the barcode.
2,50	Print HRI characters below the barcode.
3,51	Print HRI characters above and below the barcode.

HRI Characters: HRI refers to the human-readable text that typically accompanies a barcode, representing the data encoded in the barcode in a format that can be read by people.

[Default] n = 2

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

### Set Font of Barcode HRI Characters(GS f n)

[Name] Set Font of Barcode HRI Characters

[Format] ASCII GS f n  
Hex 1D 66 n

Decimal 29 102 n

[Parameter Range]

n=0,1,48,49

[Description]

This command sets the font of HRI (Human Readable Interpretation) characters when printing a barcode.

n	Font Type
0,48	Font Type A(12×24)
1,49	Font Type B(9×17)

HRI Characters: HRI refers to the human-readable text that typically accompanies a barcode, representing the data encoded in the barcode in a format that can be read by people.

[Default]

n = 0

[Reference]

**GS H,GS k**

## Appendix A: CODE128 barcode

The CODE128 barcode system utilizes a character set that can represent 128 ASCII characters and two-digit numbers. This system is defined by 103 barcode characters and three code sets:

Code Set A: Represents ASCII characters from 00H to 5FH.

Code Set B: Represents ASCII characters from 20H to 7FH.

Code Set C: Represents two-digit numbers from 00 to 99 using a single character.

In CODE128, there are special characters such as SHIFT, which allows switching between code sets A and B. There are also code set selection characters (CODE A, CODE B, CODE C) for switching to the respective code sets, and function characters (FNC1, FNC2, FNC3, FNC4) whose usage depends on the application software. In Code Set C, only FNC1 is available.

### Code Set A:

Char	data		Char	data		Char	data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NUL	0	0	(	28	40	P	50	80
SOH	1	1	)	29	41	Q	51	81
STX	2	2	*	2A	42	R	52	82
ETX	3	3	+	2B	43	S	53	83
EOT	4	4	,	2C	44	T	54	84
ENQ	5	5	-	2D	45	U	55	85
ACK	6	6	.	2E	46	V	56	86
BEL	7	7	/	2F	47	W	57	87
BS	8	8	0	30	48	X	58	88
T	9	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B, 31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51
DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,53	123,83
NAK	15	21	=	3D	61	CODEB	7B,42	123,66
SYN	16	22	>	3E	62	CODEC	7B,43	123,67
ETB	17	23	?	3F	63			
CAN	18	24	@	40	64			
EM	19	25	A	41	65			
SUB	1A	26	B	42	66			
ESC	1B	27	C	43	67			
FS	1C	28	D	44	68			
GS	1D	29	E	45	69			
RS	1E	30	F	46	70			

US	1F	31	G	47	71			
SP	20	32	H	48	72			
!	21	33	I	49	73			
"	22	34	J	4A	74			
#	23	35	K	4B	75			
\$	24	36	L	4C	76			
%	25	37	M	4D	77			
&	26	38	N	4E	78			
'	27	39	O	4F	79			

Code Set B:

Char	data		Char	data		Char	data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
SP	20	32	H	48	72	p	70	112
!	21	33	I	49	73	q	71	113
"	22	34	J	4A	74	r	72	114
#	23	35	K	4B	75	s	73	115
\$	24	36	L	4C	76	t	74	116
%	25	37	M	4D	77	u	75	117
&	26	38	N	4E	78	v	76	118
'	27	39	O	4F	79	w	77	119
(	28	40	P	50	80	x	78	120
)	29	41	Q	51	81	y	79	121
*	2A	42	R	52	82	z	7A	122
+	2B	43	S	53	83	{	7B,7B	123,123
,	2C	44	T	54	84		7C	124
_	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	—	7E	126
/	2F	47	W	57	87	DEL	7F	127
0	30	48	X	58	88	FNC1	7B,31	123,49
1	31	49	Y	59	89	FNC2	7B,32	123,50
2	32	50	Z	5A	90	FNC3	7B,33	123,51
3	33	51	[	5B	91	FNC4	7B,34	123,52
4	34	52	\	5C	92	SHIFT	7B,53	123,83
5	35	53	]	5D	93	CODEA	7B,41	123,66
6	36	54	^	5E	94	CODEC	7B,43	123,67
7	37	55	—	5F	95			
8	38	56	`	60	96			
9	39	57	a	61	97			
:	3A	58	b	62	98			
;	3B	59	c	63	99			
<	3C	60	d	64	100			
=	3D	61	e	65	101			
>	3E	62	f	66	102			
?	3F	63	g	67	103			
@	40	64	h	68	104			
A	41	65	i	69	105			
B	42	66	j	6A	106			
C	43	67	k	6B	107			
D	44	68	l	6C	108			
E	45	69	m	6D	109			
F	46	70	n	6E	110			
G	47	71	o	6F	111			

Code Set C:

Char	data		Char	data		Char	data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
0	0	0	40	28	40	80	50	80
1	1	1	41	29	41	81	51	81
2	2	2	42	2A	42	82	52	82

3	3	3	43	2B	43	83	53	83
4	4	4	44	2C	44	84	54	84
5	5	5	45	2D	45	85	55	85
6	6	6	46	2E	46	86	56	86
7	7	7	47	2F	47	87	57	87
8	8	8	48	30	48	88	58	88
9	9	9	49	31	49	89	59	89
10	0A	10	50	32	50	90	5A	90
11	0B	11	51	33	51	91	5B	91
12	0C	12	52	34	52	92	5C	92
13	0D	13	53	35	53	93	5D	93
14	0E	14	54	36	54	94	5E	94
15	0F	15	55	37	55	95	5F	95
16	10	16	56	38	56	96	60	96
17	11	17	57	39	57	97	61	97
18	12	18	58	3A	58	98	62	98
19	13	19	59	3B	59	99	63	99
20	14	20	60	3C	60	FNC1	7B,31	123,49
21	15	21	61	3D	61	CODEA	7B,41	123,65
22	16	22	62	3E	62	CODEB	7B,42	123,66
23	17	23	63	3F	63			
24	18	24	64	40	64			
25	19	25	65	41	65			
26	1A	26	66	42	66			
27	1B	27	67	43	67			
28	1C	28	68	44	68			
29	1D	29	69	45	69			
30	1E	30	70	46	70			
31	1F	31	71	47	71			
32	20	32	72	48	72			
33	21	33	73	49	73			
34	22	34	74	4A	74			
35	23	35	75	4B	75			
36	24	36	76	4C	76			
37	25	37	77	4D	77			
38	26	38	78	4E	78			
39	27	39	79	4F	79			



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## Appendix B:UPC-A to UPC-E barcode Transformation Rule

Format		Format	
UPC-A	Transform to UPC-E	UPC-A	Transform to UPC-E
AB000-00HIJ	ABHIJ0	12000-00789	127890
AB100-00HIJ	ABHIJ1	12100-00789	127891
AB200-00HIJ	ABHIJ2	12200-00789	127892
AB300-000IJ	AB3IJ3	12300-00089	123893
AB400-000IJ	AB4IJ3	12400-00089	124893
AB500-000IJ	AB5IJ3	12500-00089	125893
AB600-000IJ	AB6IJ3	12600-00089	126893
AB700-000IJ	AB7IJ3	12700-00089	127893
AB800-000IJ	AB8IJ3	12800-00089	128893
AB900-000IJ	AB9IJ3	12900-00089	129893
ABCD0-0000J	ABCDJ4	12910-00009	129194
ABCDE-00005	ABCDE5	12911-00005	129115
ABCDE-00006	ABCDE6	12911-00006	129116
ABCDE-00007	ABCDE7	12911-00007	129117
ABCDE-00008	ABCDE8	12911-00008	129118
ABCDE-00009	ABCDE9	12911-00009	129119

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