

User's Manual

PT80KM-A

Thermal printer module with lock



The manufacturer has the right to modify the contents of the specification without prior notice

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1.GENERAL DESCRIPTION

1.1 Main Specifications

Print Method:	direct thermal
Print density:	8dot/mm
print direction:	feed direction
Print Speed:	150mm/s (Max)
Paper width:	79.5±0.5mm
Printable width:	72mm
Cut paper method:	partial cut/ full cut
Line width:	3.75mm
Width of paper loaded:	80mm
Anti-blocking:	with
Buzzer:	with

1. 2CharacterSpecifications

Characrer support:

ASCII/GB18030 Simplified Chinese/ Traditional Chinese/ Multinational character set

1. 3Cutter

Cut paper method: partial cut/ full cut (The middle part is not completely cut off)

Note: The printer should feed at least 1mm or more after the paper cutting

1. 4Print Paper

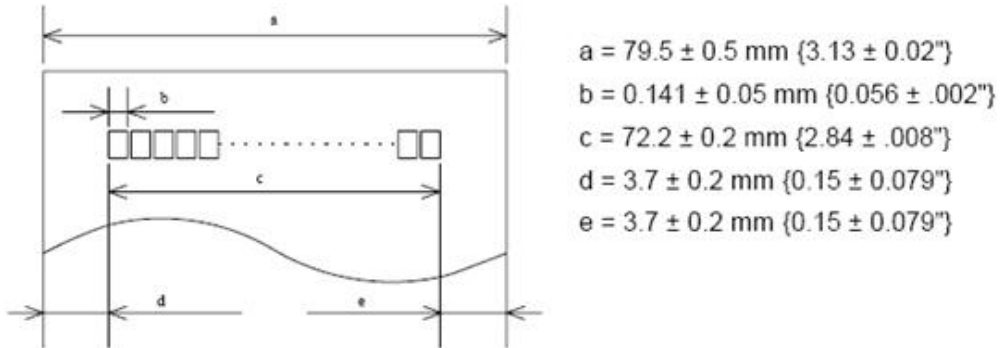
PageType: Thermal Paper

Paper width: 79.5±0.5mm

Paper roll: 80mm (Max)

1.5 Print Zone

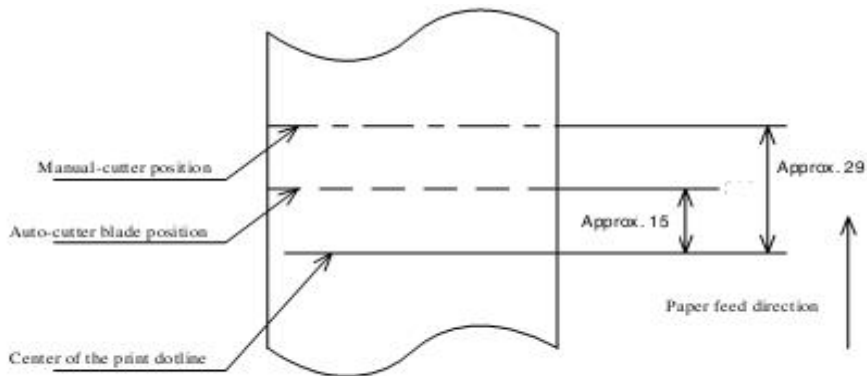
79.5±0.5mm Printable Area 72.2 ± 0.2 mm, nonprinting region 3.7 ±0.2 mm, demonstrated:



1.6 MEMOREY

- 1、RXD buffer store 4 KB。
- 2、NV buffer store: 192K

1.7 Print and Cutter position



[Units: mm (All the numeric values are typical.)]

Note: The values in the figure are a set of standard values, The value may vary due to loose paper or different paper

1.8 Operating Range

Power Supply: DC12/24V, 2A

1.9 Reliability

- 1、 Service life:
 - Thermal head life: 100KM
 - Cutter life: 1,000,000times

1.10 Environmental Specification

1、Temp: Operating Temp: 0~50°C

Storage Temp: -10~60°C (Excluding paper)

2、Humidity: Operating: 10~80%RH

Storage: 10~90%RH (Excluding paper)

Note: If the printer does not work for a long time in the presence of paper, It is possible that the thermal coating of the printing paper will fall off; The printer must run 30MM of paper before printing.

2. Exterior definition

2.1 The Printer appearance



Fig 2.1.1 PT80KM-A

2.2 2Ddimension figure

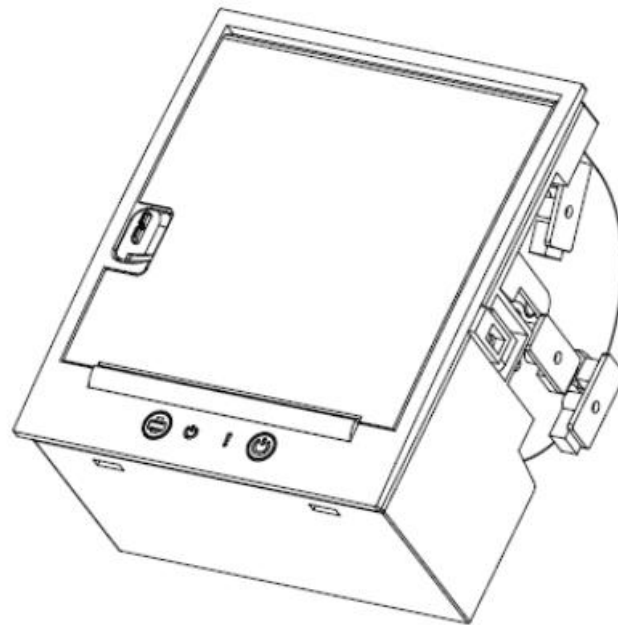


Fig . 2. 1 2D

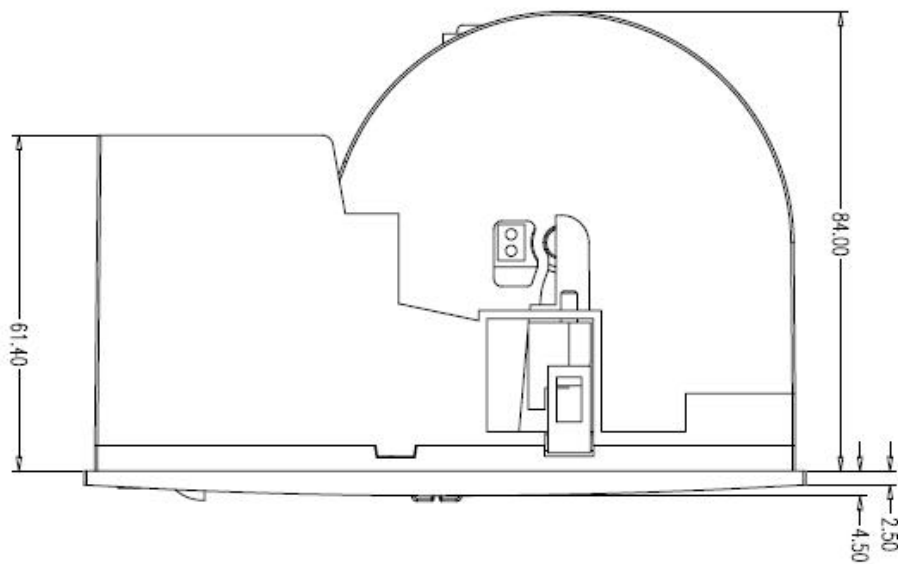


Fig. 2. 2 2D

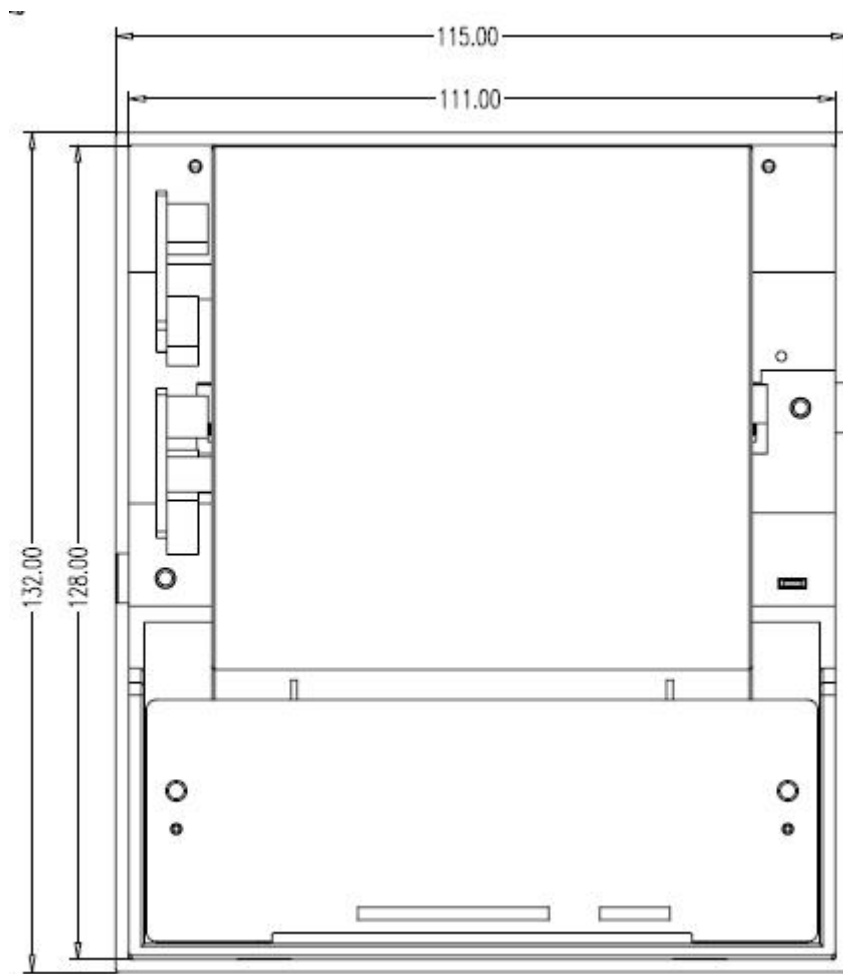


Fig. 2. 3 2D

2.3 Interface description

2.3.1 RS232(serial interface)

2.3.1.1 SPEC

Socket: CN5

Tape: 6pin PH straight blade

Gap: 2.0mm

Data transfer: serial

Synchronization design method: asynchronization

Handshaking: DTR/RTS

DRSL: MARK = -3 to-15 V; Logic“1”/ OFF

SPACE = +3 to +15 V; Logic“0”/ ON

Baud rate: 9600、19200、38400、115200 bps

Bytes: 8

verification mode:without

Stop bit: 1 or more

Note: The baud rate can be set via Memory Switch

2.3.1.2 Socket pin definition

Socket pin assignment and signal function description are shown in the following table

Pin No	signal name	sense	state
1	GND	-	Earth terminal
2	DTR	OUT	LPT port
3	TBD	-	Reserved
4	GND	-	Earth terminal
5	TXD	OUT	Send data
6	RXD	INPUT	Receive data

2.3.2 USB

2.3.2.1 USB SPEC

Socket: CN2

Socket typ:4pin PH

GAP: 2.0mm

MODBUS:USB 2.0

2.3.2.2 Socket pin definition

:

Pin No	signal name	state
1	GND	Earth terminal
2	D+	USB D+
3	D-	USB D-

4	+5V	supply voltage
---	-----	----------------

2.3.3 Cashbox interface

2.3.3.1 Cashbox interface SPEC

Socket: CN8

Socket typ:RJ11

GAP: 2.54mm

2.3.3.2 Socket pin definition

Pin No	signal name	state
1	GND	Earth terminal
2	Cash Boxdrives the signal	Cash Boxdrives the signal
3	ON/OFF status signal	Cash box status detection
4	+24V	supply voltage
5	-	Reserved
6	GND	Earth terminal

2.3.4 Power port

2.3.4.1 Power SPEC

Socket: CN6

Socket typ:5569

GAP: 4.2mm

2.3.4.2 Socket pin definition

Pin No	signal name	state
1	+24V	supply voltage
2	+24V	supply voltage
3	GND	Earth terminal
4	GND	Earth terminal

2.4 Demo for installing paper

PT80KM-A Easy load paper



STEP1



STEP2

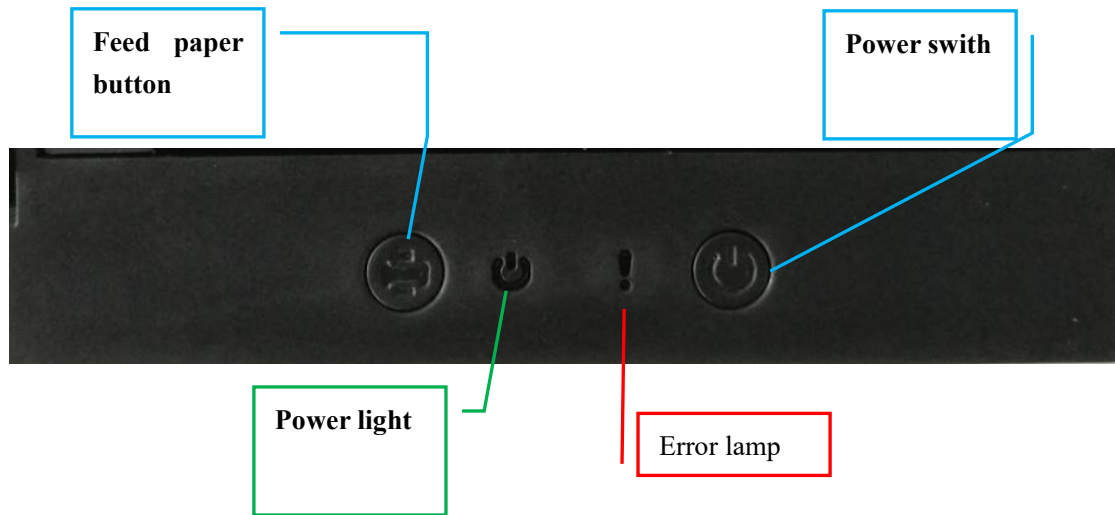


STEP3

3. Functions and operations

3.1 Button and Light

3.1.1 Button



Function:

The printer feeds on a line when the black mark sensor is disabled, The printer feed length is a unit of length of black label paper when the black label function is used In the following cases, Press the paper button to stop the feeding:

- ① Disable the button function when using command ESC C5
- ② No paper
- ③ Headstock lift

3.1.2 Indicator light

- 1)  : Green

ON: voltage stability
 OFF: Voltage instability

Status: Normally on

- 2)  : Red

ON: out of paper (Print abnormal)
 OFF: availability paper (normal print)
 flicker: paper jam, Or the blocking module is working

3.2 Special working mode

3.2.1 Self test

Self-test can detect whether the printer is working properly. If the self-test list can be printed correctly, it indicates that the printer is all right except the interface with the host, otherwise it needs to be repaired.

- 1) Check the following items according to the printer self - test function:

Control circuit function

The status of the printer mechanism attached to the control board

Printing quality

Interface types and their operating conditions

Control software version

Memory Switch set

- 2) Self-testing operation

Close the cover plate and press the feed button, then turn on the printer power. The printer state (*1) is printed out.

- (*1) Version control

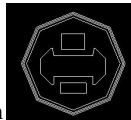
Select the interface type and communication condition

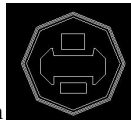
Memory Switch set

- 3) End of self-test

"*** completed ***" Indicates the end of self-test, Initialize the printer and enter standard mode

Self-check is as follows:



Turn off the power, Please press feed button  keeping about 2 sec until turn on the power, release of feed button, the printer will automatically print the self-test list.

Special Instruction: 1d 28 41 02 00 00 01 hexadecimal

3.2.2 HEX Dump

- 1) HEX Dump

This function prints out all data received from the host in hexadecimal and prints out the corresponding characters.

- 2) HEX Dump operation

There are two ways to start hexadecimal printing:

- executive command **GS (A)**.

First printing out "Hexadecimal Dump" on a roll of paper and then takes the data it receives in Hexadecimal print out the form and print out the corresponding character.

Note: 1. If the data does not have a corresponding printable character, the printer prints "."

2. Other commands other than DLE EOT, DLE ENQ, and DLE DC4 did not work during hexadecimal printing.

3. You can print out the last row of data by taking the printer offline, such as by pressing the button.

- 3) End hexadecimal printing

The following ways can end hexadecimal printing: Restart the printer or press the paper key three times
< Printing proof >

```

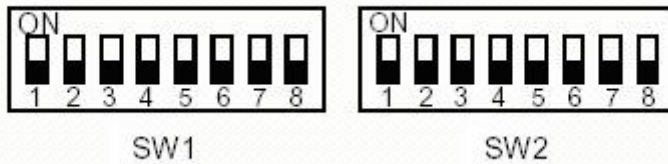
Hexadecimal Dump

1B 21 00 1B 26 02 40 40 1B 69      . ! . . & . @@ . i
1B 25 01 1B 63 34 00 1B 30 31      . % . . c 4 . . 0 1
41 42 43 44 45 46 47 48 49 4A      A B C D E F G H I J

*** completed ***
    
```

3.3 Memory Switch

PT80KM-A has two Memory Switch, which can be viewed through the self-check list, Marked SW1 and SW2, as shown in the figure



below:

Note: Changes to the Memory Switch Settings will only take effect after the printer is reenergized or reset

3.3.1 Memory Switch 1

Memory Switch 1 (SW1)

Switch No	Function	ON	OFF	Original Settings
1	Black mark sensor	Enable	Disbale	Off
2	Keep	-		Off
3	Keep	-		Off
4	PEsignal output	Disbale	Enable	Off
5	Out of paper sensor	Reverse	Normal	Off
6	Keep	-	-	Off
7	Serial baud rate selection	Refer to table 3.3.1		Off
8				Off

Baud rate selection

BPS	Switch No	
	7	8
115200	On	On
9600	Off	On
19200	On	Off
38400	Off	Off

Note: BPS – bits per second

Table 3.3.1

3.3.2 Memory Switch 2

Memory Switch 2 (SW2)

Switch No	Function	ON	OFF	Original Settings
1	Model type selection	Refer to table 3.3.2		Off
2				Off
3	Print concentration selection	Refer to table 3.3.3		Off
4				Off
5	Do not take out the paper, stop printing	Yes	No	Off
6	Cut the paper after reloading	Yes	No	Off
7	Low speed printing	Yes	No	Off
8	Cutter mode	Partial cut	Full cut	Off

Model type selection

Model type	Switch No	
	1	2
(79.5mm,576dots)	Off	Off
(79.5mm,576dots)	On	Off
(57.5mm,384dots)	Off	On
(57.5mm,384dots)	On	On

table 3.3.2

Print concentration selector



Class	Print density	Switch No	
		3	4
1	light	On	On
2	Normal	Off	Off
3	Thicker	On	Off
4	Thickest	Off	On

table 3.3.3

3.4 Error handling

1) Automatically recoverable errors



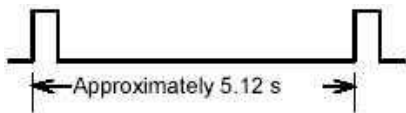
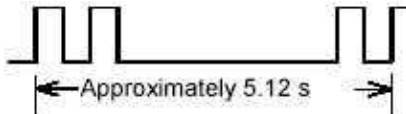
Automatically recoverable errors

Error	Describe	Flashing way	recover
Print head overheating error	The print head temperature more than 70		When the print head temperature cooled to about 60 below automatic recovery.
Preventing	Working		

paper jam	status of anti-blocking device		Paper flow after automatic reply
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2) Recoverable error

Recoverable error

Error	Describe	Flashing way 	recover
Error opening cover plate	The printer does not work as the cover plate is open		Close the top cover of the printer and restore with command DLE ENQ1 or DLE ENQ 2
Auto-paper cutting error	Automatic paper cutter can't work properly		The paper jam was ruled out, it was restored with DLE ENQ 1 or DLE ENQ 2
BMSensor detection error	No black mark can be detected even if the black mark is printed correctly		Reload the correct black label paper and restore with DLE ENQ 1 or DLE ENQ 2

4.PT80KM Command

4.1 Command list

Command	Name	Type	
		Execute	Set
HT	Horizontal tab	<input type="radio"/>	
LF	Print and line feed	<input type="radio"/>	
DLE EOT	Real-time status transmission	<input type="radio"/>	
DLE ENQ	Real-time printer requests	<input type="radio"/>	
ESC SP	Set right-side character spacing		<input type="radio"/>
ESC !	Select print mode		<input type="radio"/>
ESC \$	Set absolute print position	<input type="radio"/>	
ESC @	Initialize printer	<input type="radio"/>	<input type="radio"/>
ESC *	Select bit-image mode	<input type="radio"/>	
ESC -	Turn underline mode on/of		<input type="radio"/>
ESC 2	Select default line spacing		<input type="radio"/>
ESC 3	Set line spacing		<input type="radio"/>
ESC a	Select justification		<input type="radio"/>
ESC c 4	Select print paper sensor to stop printing		<input type="radio"/>
ESC c 5	enable/disable panel keys		<input type="radio"/>
ESC d	Print and feed n lines	<input type="radio"/>	
ESC i	Full cut	<input type="radio"/>	
ESC m	Partial cut	<input type="radio"/>	
ESC t	Select character code table		<input type="radio"/>
ESC D	Set horizontal tab position		<input type="radio"/>
ESC E	Turn emphasized mode on/off		<input type="radio"/>
ESC G	Turn double-strike mode on/off		<input type="radio"/>
ESC J	Print and feed paper	<input type="radio"/>	
ESC M	Select character font		<input type="radio"/>
ESC R	Select international character set		<input type="radio"/>
FS p	Print NV bit image	<input type="radio"/>	
FS q	Define NV bit image		<input type="radio"/>
GS FF	Feed black mark to start position	<input type="radio"/>	
GS !	Set character size		<input type="radio"/>
GS *	Define download big image		<input type="radio"/>
GS /	Print download big image	<input type="radio"/>	
GS h	Set bar code height		<input type="radio"/>
GS k	Print bar code	<input type="radio"/>	
GS r	Transmit status	<input type="radio"/>	
GS v 0	Print grating bit image	<input type="radio"/>	
GS w	Set bar code width		<input type="radio"/>
GS H	Select HRI character print position		<input type="radio"/>
GS L	Set left side blank measure		<input type="radio"/>
GS V	Select cut mode and cut paper	<input type="radio"/>	

GS W	Set printable width		○
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Command	Name	Command type	
		Execute	Set
FS !	Set Chinese character print mode(s)		○
FS &	Set Chinese mode		○
FS .	Cancel Chinese character mode		○
FS S	Set fullshaped Chinese character spacing		○
FS W	Turn quadruple size of Chinese character on/off		○
GS (B PL PH m n	Memory Switch settings		○

Command type:

Execute command: The printer executes and changes the command that will not effect the following data.

Set command: The printer set by the relative symbol, these set will effect the following data.

4. 2 Command overview

4.2.1Command notation

- [Name] The name of the command
- [Format] The code sequence.
[]k indicates the content in the []should be repeated k times.
- [Range] Give the allowable range.
- [Description] Illustrate the function of the command.
- [Description details] Particular illustrate the command use .
- [Notes] If necessary,provide important information when set and use the printer command.
- [Default value] If command with the parameter, give the parameter default value.
- [Reference] List the relationship command.
The data signed by <>H, is hexadecimal.
The data signed by<>B, is binary system.

4.2.2 Terms explanation

(1) Receive buffer

The receive buffer is a buffer which store data from the PC. All received data are stored in this buffer, then processed in sequence.

(2) Print buffer

The print buffer used to store image data of printing.

(3) Full print buffer

When the print buffer is full, If the new print dat coming, the data in the print buffer area will be printed, and executed the operation of changing a new line. The same operation as the LF command.

(4) Line starting point

Satisfied the below conditions:

- There are no print data in the print buffer area.
- Appoint print position and not by ESC \$ or ESC \ command.

(5) Printable area

The printable area of this printer as below:

The standard mode, the length of the horizontal direction:

79.5 mm Paper width type: {576dots}

(6) Printable area

The printable range set by command , print area printable area.

(7) Ignored

All commands on this condition, contains parameter, will be read, then discarded, but no operation.

(8) Inch

One inch is 25.4 mm

(9) MSB

The highest validity

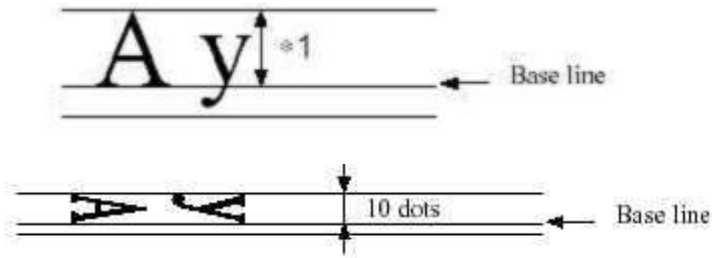
(10)LSB

The lowest validity

(11) Baseline

The standard position of the character data which be stored in the printing buffer . The normal character position of the standard mode and page mode as the below graphics:

*1When the character font is A, the width is 21 dots. When the character font is B, the width is 16 dots



4.3.Command explanation details

HT

[Name]	Horizontal tab
[Format]	ASCII HT Hex 09 Decimal 9
[Description]	Move print position to the next horizontal position.
[Specification]	. If do not set the next horizontal position, this command will be ignored, .If the next horizontal position out of the printable area, move the print position to “print width +1”. . Set the horizontal position by ESC D. .This command received when the print position located on “printable area width +1”, the printer executes the full print buffer area and prints the current line, and deals with the horizontal position at the beginning of the next line.
[Reference]	ESC D

LF

[Name]	Print and line feed
[Format]	ASCII LF Hex 0A Decimal 10
[Description]	Print the data in the buffer and feed one line which based on the current line spacing.
[Notes]	The print position set at the beginning position of the line by this command.
[Reference]	ESC2, ESC3

DLE EOT n

[Name]	Transmit real-time status
[Format]	ASCII DLE EOT n Hex 10 04 n Decimal 16 4 n
[Range]	1≤n≤4
[Description]	Transmit real-time status. Parameter n used to appoint printer status. the definition as below: n=1: Transmit printer status. n=2: Transmit offline status. n=3: Transmit error status. n=4: Transmit roll paper sensor status.
[Specification]	·Transmit the current status, every status one byte. ·Printer can't sure whether the PC can receive data when transmitting status.

- Printer starts to execute when received this command.
- Under the serial interface mode, Even the printer is offline, the received buffer is full, or the error occurred, also execute this command.
 - . Under the parallel interface mode, when the printer is busy, can't execute this command.
 - . When enable ASB by GS a command, must distinguish the status which be sent byDLE EOT or ASB status. (Refer to appendix C)
- Even the printer doesn't choose the external equipment command, the command which be selected by ESC= also effects.

[Notes] whenever received <10>H<04>H<n>(1≤n≤4) data sequence, the printer will still transmit status.

For example:

ESC * m nL nH d1...dK, d1=<10>H, d3=<01>H

- Do not use this command within two or more than two bytes command.

For example:

If want to transmit ESC 3 n to printer, before transmitting n, DTR(for the PC is DSR) will change to MARK, So, before receiving n, occurs that DLE EOT 3 interrupted, the code<10>H of DLE EOT 3 will be dealt with as the code<10> of ESC 3.

n = 1 Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Unused. Off
1	On	02	2	Unused. On
2	On	04	4	Unused. On
3	Off	00	0	Online
	On	08	8	Offline
4	On	10	16	Unused. On
5	Off	00	0	Unused. Off
6	Off	00	0	Unused. Off
7	Off	00	0	Unused. Off

Note: bit 5: the online error is the process of the printer which executes macro command period and self-test period which waited push key.

n = 2 : Offline status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Unused. Off
1	On	02	2	Unused. On
2	Off	00	0	The print head bar closed
	On	04	4	The print head bar pened
3	Off	00	0	Unused. Off
4	On	10	16	Unused. Off
5	Off	00	0	Unused. Off
6	Off	00	0	Unused. Off
7	Off	00	0	Unused. Off

Bit 5: When the without paper detector test that without paper and stop printing, it will cange to On.

n = 3: Error status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Unused. Off
1	On	02	2	Unused. On
2	Off	00	0	Unused. Off
3	Off	00	0	Unused. Off
4	On	10	16	Unused. On
5	Off	00	0	Unused. Off
6	Off	00	0	Unused. Off
7	Off	00	0	Unused. Off

Bit 2: The printer takes as error when print head bar rased, can not find black mark.

Bit 6: During printing, if over temperature of the print head, Set bit 6 to On, until the temperature declined effectively or raised the bar during printing.

n = 4: Continuous paper sensor status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Unused. Off
1	On	02	2	Unused. On
2,3	Off	00	0	Roll paper near-end sensor: paper near to end
	On	0C	12	Roll paper near-end sensor: paper near end
4	On	10	16	Unused. On
5,6	Off	00	0	Roll paper near-end sensor: with paper
	On	60	96	Roll paper near-end sensor: paper near end
7	Off	00	0	Unused. Off

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

DLE ENQ n

[Name] Send real-time request to printer

[Format] ASCII DLE ENQ n
Hex 10 05 n

Decimal 16 5 n

[Range] n=2

[Description] .Responds to a request from the host computer. n designates the following requests.

n	Request
1	Restart printing from the error recovered to appear error.
2	Recovers from an error after cleaning receive and print buffer

[Specification] .Only at the status of auto-cutter error, black mark error or print head bar raised, this command effects.

.The printer processes the data once received this command.

.Even the printer offline, full print buffer or serial interface mode error, still executing this

command.

- .At the parallel interface mode, this command can't be executed when the print is busy.
- .After cleaning the data in the receive buffer and print buffer, DLE ENQ 2 enable printer to recover from error. The printer reserves the set (For example ESC 1, ESC 3 and so on) which is effective when the error occurred. This command and ESC @ can initialize the printer completely. This command only effects that the error could be recovered, and except for the over temperature of the print head.

[Note] .Whenever receive <10>H<05>H<n>(1≤n≤2) data sequence, will send status.

For example:

ESC * m nL nH dK,dl=<10>H, d2=<05>H, d3=<01>H

.The command date which contains two or more bytes, can't use this command.

For example:

If want to send the ESC 3 n to the printer, but before sending the n, DTR(DSR for the PC) will be changed to MARK, So, before receiving the n, DLE ENQ 2 will be interrupted. The code<10>H of DLE ENQ 2 will be dealt with as the code <10>H of ESC 3.

[Reference] **DLE EOT**

ESC SP n

[Name] Set right-side character spacing

[Format] ASCII ESC SP n
 Hex 1B 20 n
 Decimal 27 32 n

[Range] 0≤n≤255

[Description] Set right-side character spacing is (n×0.125 mm) .

[Specification] . At the double width mode, the right-side character spacing is two times than the the normal mode. When the characters be broadened n times, the right-side character spacing is n times than the normal mode.
 .This command not effects the Chinese character setting.

[Default] n = 0

ESC ! n

[Name] Select print mode(s)

[Format] ASCII ESC ! n
 Hex 1B 21 n
 Decimal 27 33 n

[Range] 0≤n≤255

[Description] Select the print mode through designating the value of n. the definition of parameter n as below:

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

2	---	---	---	Undefined
3	Off		0	Emphasized mode not selected.
	On		8	Emphasized mode selected.
4	Off		0	Double-height mode not selected.
	On		16	Double-height mode selected.
5	Off		0	Double=width mode not selected.
	On		32	Double-width mode selected.
6	---	---	---	Undefined
7	Off		0	Underline mode not selected.
	On		128	Underline mode selected.

[Specification] .When select double-height and double-width mode at the same time , then printingforetimes size characters.

.The printer can add the underline to all characters, But can't add the underline to theblank which causes by HT command or the character of revolving 90°according to wise clock direction.

.The thickness of the underline set by ESC -, it is no relationship with the characters.

. When some of double-height or more height characters in a line, all the characters in a line will be stayed at the same level on baseline.

. ESC M cane set the font type of characters. the last be set of the received command will effect.

. ESC E can be set or cancel the emphasize mode, the last be set of the received command will effect.

.ESC – Enable/cancel underline mode, the last be set of the received command will effect.

. GS ! can set the size of character. the last be set of the received command will effect.

. The emphasize mode is effective for the English characters and Chinese. The entire printmode except for emphasize mode only effects for the English character.

[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≤nL≤255
0≤nH≤255

[Description] Set the space from the beginning of the line to the position of the print character which will be printed.

. The space from the beginning of eth line to the print position is $((nL+nH \times 256) \times 0.125 \text{ mm})$.

[Specification] .Designated the set which out of the printable area that will neglected.

.At the normal mode , uses the horizontal unit(x).

.At the page mode, with the different printable area start position that the horizontal orvertical moving unit is different, the specification as follows:

① When set the start position to the printable area's up-left or down-right by ESC T , uses the horizontal moving unit(x).

② When set the start position to the printable area's up-right or down-left , uses the vertical moving unit(y).

[Reference] **ESC \,GS **

ESC @

[Name] Initialize printer

[Format] ASCII ESC @
 Hex 1B 40
 Decimal 27 64

[Description] Clean the data in the print buffer and reset the printer mode to the mods that effects when turning the power on.

[Notes] ·Not check the DIP switch setting again.
 ·Not cleans the data in the receive buffer area.
 ·Not clean the macro definition.

ESC * m nL nH d1... dk

[Name] Select bit-image mode

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

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

[Description] Select bit-image mode to use m, the dot of bit-image specified by nL and nH, as the below table:

m	Mode	Vertical Direction		Horizontal Direction	
		Dot	Dot Density	Dot Density	Data Number(K)
0	8-dot single density	8	67.7dpi	101.6 dpi	nL+nH×256
1	8-dot double density	8	67.7 dpi	203.2 dpi	nL+nH×256
32	24-dot single density	24	203.2 dpi	101.6 dpi	(nL+nH×256) ×3
33	24-dot double density	24	203.2 dpi	203.2 dpi	(nL+nH×256) ×3

Dpi: 1 inch print dot count per 25.4mm

[Notes] ·If the data of m over the specified range, then nL and the later data dealt with as the general

data.

·nL and nH specifies the dots of the horizontal direction up bit image. Through nL+nH×256 and counts the dots.

·If the bit image data input overs one line which the dots be printed, then the over data will be neglected.

·d indicates bit image data. 1 sets by the relevance bit and prints one of dots, or sets 0 and not prints one of dots.

·If the printing scale width which sets by GS L and GS W is less than the requisite width which the data sends by ESC * command, so executes the below operation for the error line(but the printing can't over the largest printing range):

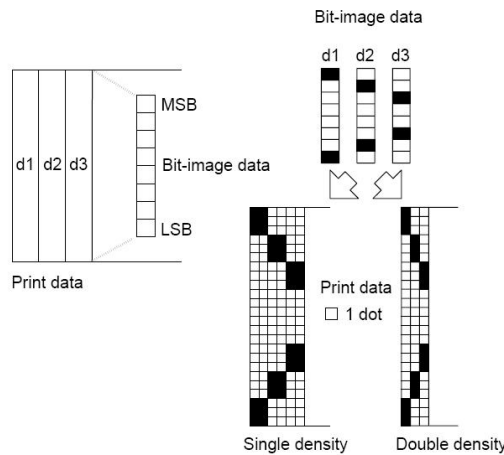
- ① The width of the printable area enlarges to the right and adapts to the data amount.
- ② If the step ① can't provide enough width for data, then the left will be decreased and adapt to data. For each bit data at the single density mode (m=1, 32), The printer prints two dots: for each bit data at the single density mode (m=1,33), the printer prints one bit. When calculating the data account in the line, all these should be considered.

·After printing one bit-image, the printer returns to the normal data deal mode.

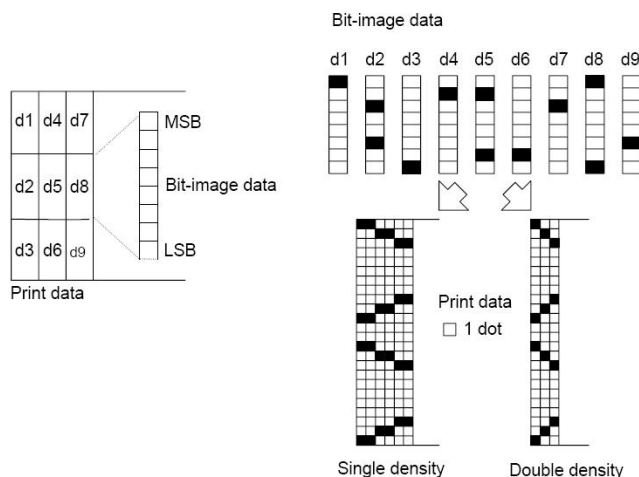
·This command not be affected by the printing mode (bold, repetition, underline, character size, or reverse blank printing), unless the reversed printing mode.

·The below graphic described the relations between bit image data and the dot which be printed.

When 8-dot bit image be selected:



When 24-dot bit image be selected:



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] On the basis of the below value, turns the underline mode on/off:

n	Function
0, 48	Turn underline off
1, 49	Turn underline on(one dot thickness)

[Notes] .The printer can print the underline for all characters (contains right character space),but except for the blank which be set by HT.

.The printer can't print the underline for the characters which revolved 90°according to clockwise and reversing blank characters.

.Turns underline off through setting that the data of n is 0 or 48, the next data can't be printed the underline, and before turning the underline mode on, the degree of boldfaced not be changed, the boldfaced default underline is 1 dot.

.Change the character size not effects the current underline boldfaced degree.

.Use ESC ! also can turn underline on/off. But the final received command iseffective.

[Default] n= 0

[Reference] **ESC !**

ESC 2

[Name] Select the line space

[Format] ASCII ESC 2

Hex 1B 32

Decimal 27 50

[Description] Select the line space3.75 mm(30×0.125 mm).

[Note] .Line spacing could be set under the normal mode and the page mode.

[Reference] ESC 3

ESC 3 n

[Name] Set the line space

[Format] ASCII ESC 3 n

Hex 1B 33 n

Decimal 27 51 n

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

[Description] Set the line space to (n×0.125 mm) .

[Default] n= 30

[Reference] **ESC 2**

ESC a n

[Name] Select justification
 [Format] ASCII ESC a n
 Hex 1B 61 n
 Decimal 27 97 n
 [Range] $0 \leq n \leq 2, 48 \leq n \leq 50$
 [Description] Justify a line data according to the point position

Select justification by n as follows:

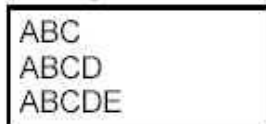
n	Justification
0, 48	Left justification
1, 49	Centering
2, 50	Right justification

[Notes] In stable mode, this command is valid only the original line.
 If input this command in page mode, printer only executes inner sign operation.
 This command invalids in page mode.
 This command executes justification in print area.
 This command justifies the blank area according to HT , **ESC \$** or **ESC **.

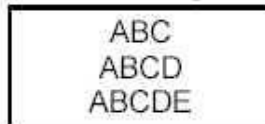
[Default] n= 0

[Examples]

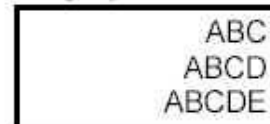
Left justification



Centering



Right justification



ESC c 5 n

[Name] Enable/disable panel buttons
 [Format] ASCII ESC c 5
 Hex 1B 63 35
 Decimal 27 99 53

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

[Description] Enable or disable the panel keys.
 ·When the LSB of n is 0, enabled the panel keys.
 ·When the LSB of n is 1, disabled the panel keys.

[Notes] ·Only use the LSB of n.
 ·If disable the panel keys, then all keys can't use when closing the print head bar.
 ·For this printer, the only one panel key is feed paper key.

[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] $0 \leq n \leq 255$

[Description] Print the data in the output print buffer area, and feed paper n lines.

[Notes] .This command set the line start point to the printing start position.
 .This command not effect the line space which set by ESC 2 or ESC 3 command.
 .The max quantity of feed paper is 1016 mm{40 inch}. If the specified quantity of feed paper{n×line space} is 1016 mm{40 inch}, the printer only feed paper 1016mm{40inch}.

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

ESC i

[Name] Full cut

[Format] ASCII ESC i
 Hex 1B 69
 Decimal 27 105

[Description] After receiving this command, the printer executes full cut.

[Note] As it won't feed paper when executing this command, please assures that feed paper 5mm or more before executing this command next time, to avoid that the cutter be damaged.

[Default] The default is partial cut mode.

ESC m

[Name] Partial cut

[Format] ASCII ESC m
 Hex 1B 6d
 Decimal 27 109

[Description] The printer received this command, then executing partial cut at present position.

[Note] As the printer do not feed paper when executing this command, so before executing this command in the next time, assure that feed paper at least 5mm or more, prevent cutter broken.

[Default] Partial cut mode is default.

ESC t n

[Name] Select character code table

[Format] ASCII ESC t n

Hex 1B 74 n
 Decimal 27 116 n

[Range] 0≤n ≤5, 16≤n ≤19, n=255

[Description] Select page n from the character code table:

n	Page
0	PC437[America, Europe standard]
1	Katakana
2	PC850[Multi-language]
3	PC860[Portuguese]
4	PC863[Canada-France]
5	PC865[North Europe]
16	WPC1252
17	PC866[Yugoslavia2]
18	PC852[Latin2]
19	PC858[Europe]
255	Space page

[Default] n = 0

[Reference] Character table

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≤n≤255
 0≤k≤32

[Description] .Sets the horizontal tab position.
 .n specifies the number of digits from the set position to the left edge of the print area.
 .k indicates the number of bytes that set for the horizontal tab position.

[Notes] .The horizontal position stored as a value, the value is (the character width×n) which be measured from the beginning of the line. The width of the character contains the character right-side space, and the double width character to be dealt with as the double width of the normal character.

.This command delete the advanced set horizontal position.
 .When n=8, the print position be moved to ninth through sending HT.
 .Can set to 32 position (k=32). The data over 32 position which be dealt with as thenormal data.
 .Transmits (n) k according to raise sequence and set a NUL code 0 on the end.

.ESC D NUL cancel all of the horizontal position.
 .Even the character width changed, the advanced specified horizontal position won't bechanged.
 .At the normal and page mode, the character width be memorized.

[Default] Default position is the 8 character space (for example 9,17,25...) of the type A(12×24).
 [Reference] HT

ESC E n

[Name] Turn emphasized mode on/off
 [Format] ASCII ESC E n
 Hex1B 5 n
 Decimal27 69 n
 [Range] $0 \leq n \leq 255$
 [Description] Turn emphasized mode on/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] Permits to only the LSB of n.
 This command turns emphasized mode on/off by the same command as ESC ! Be care, when this command used the same time as ESC !.
 [Default] n= 0
 [Reference] **ESC !**

ESC G n

[Name] Turn double-strike mode on/off
 [Format] ASCII ESC G n
 Hex 1B 47 n
 Decimal 27 71 n
 [Range] $0 \leq n \leq 255$
 [Description] Turn double-strike mode on/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] Permits to use only the LSB of n.
 The same output in double-strike mode and 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] Print the data in the print buffer and feed the paper (n×0.125 mm) .
 [Notes] After printing, this command set the starting position of printer to the beginning of the line.

·Feed paper quantity set by this command that will not effect the data which set by ESC 2 or ESC 3 command.

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 character font.

n	Function
0,48	Character font A(12×24)
1,49	Character font B(9×17)

[Specification] .ESC ! can select the character type. But, the set is effective which only set by the final received command.

[Reference] **ESC !**

ESC R n

[Name] Select an international character set

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

[Rang] 0≤n≤13

[Description] Select the data of n according to the below table, set international character set.

n	Character Set
0	U.S.A.
1	France
2	Germany
3	England
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

[Default] n= 0

[Reference] International character set

FS p n m

[Name] Print NV bit image

[Format] ASCII FS p n m

Hex 1C 70 n m

Decimal 28 112 n m

[Range] 1≤n≤255

0≤m≤3, 48≤m≤51

[Description] Print NV bit image by m which be specified.

m	Mode	Vertical Density	Horizontal Density
0,48	Normal	203.2dpi	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	Four times size	101.6 dpi	101.6 dpi

Dpi: {1 inch} print dot per 25.4mm

.n is the quantity of NV bit image (defined by FS q).

.m specified bit image mode.

[Specification] .NV bit image is a bit image which defined at the not easy losing memory. Defined by FS q , printed by FS q.

.This command will not effect when the specified NV bit image not existed.

.This command not be effected by the print mode (bold, repetition, underline, character size, or reverse blank printing), except the reversed print mode.

- ① At the NV bit image mode, the width of printable area right extends to a vertical line. In such circumstances, Print can't over the printable area.
- ② If the width of printable area can't extend a vertical line, then the left blank will be narrowed and to held a vertical line.

.If the printable download bit image over a line, then the over data not to be printed.

.At the normal and double width mode, this command feed paper n dots, n is the height of NV bit image, Under the double height and four times size mode, this command feeds paper 2n dots, n is the height of NV bit image, it's not relevant to the line spacing which set by ESC 2 or ESC 3.

.After printing bit image, this command sets the print position at the beginning of a line, and deal with the continued data as the normal data.

[Reference] 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 $1 \leq (xL + xH \times 256) \leq 1023$)

$0 \leq yL \leq 255$

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

$0 \leq d \leq 255$

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

The total of defined data area = 192k bytes

[Description] Define NV bit image which uses the specific value n.

.n specifies the quantity of NV bit image.

.xL, xH specifies the dot count of the horizontal direction in defined NV bit image, the dot count is $(xL + xH \times 256) \times 8$.

.yL, yH specifies the dot count of the vertical direction in defined NV bit image, the dot count is $(yL + yH \times 256) \times 8$.

[Specification] .This command cancels the NV bit image which defined by this command. At the serial defined data, the printer can't define any one of data renewable. If renew to define certain data, then all data needs to send again.

.From the beginning to deal with this command to finish hardware reset, can't execute mechanical operation (contains initialized print head position when opening the print head bar, feed paper used the paper feeding button and so on.)

.During deal with this command, when writing data to user NV memory, the printer is busy and stops receiving data. So, Disabled sending data during executing this command, contains real-time command.

.NV bit image is a bit image which defined at the not easy losing memory. Defines and prints FS p by FS q.

.This command effects after the seven bytes <FS~yH> be dealt with normally.

.When the data quantity over the left capacity of the scale which defined by xL, xH, yL, yH, the printer deals with xL, xH, yL, yH out of the defined scale.

.At any one of group bit image except for the first group, when the printer meets that xL, xH, yL, yH over the defined scale, then stop dealing with this command, and begin to write to NV image. At this moment disabled the undefined NV bit image (undefined), but any NV bit image defined before still effective.

.d indicates the defined data. At the data (d), one bit specified one print dot and one 0 bit specified one which can't print dot.

.n be defined the quantity of NV bit image by this command. The quantity goes up according to the sequence which begins from bit image 01H. Therefore the first data group [xL xH yL yH d1...dK] is the NV bit image 01H. The last data group [xL xH yL yH d1...dK] is the NV bit image n. The total count is consistent with the NV bit image which set by FS p command.

.The definition data of one NV bit image formed by [xL xH yL yH d1...dK]. So, when only have one NV bit image n=1, the printer only deals with the data group [xL xH yL yH d1...dK] one time. The printer uses $([data:(xL + xH \times 256) \times (yL + yH \times 256) \times 8] + [header:4])$ bytes of the NV memory.

- .The definition area of this printer is 192K bytes (max). This command could define several bit images, but can't define the bit image which the total capacity [bit image data + head] over 192K bytes.
- .Though defining ASB, the printer not send the ASB status or execute status test during dealing with this command.
- .When received this command during macro definition, the printer stops macro definition and executes this command.
- .Once define one NV bit image, it can't be executed ESC @ command, and deleted when reset and turn power off.
- .This command only executes the definition of NV bit image, not executes printing. The printing of NV bit image executed by FS p command.

[Notes] Frequently executes the written command which could be broken the NV memory. So, suggest that execute the written operation not over ten times for NV memory in a day.

- .After the process of putting one bit image into NV memory, the printer executes one hardware reset operation. So, defines the user-defined character, downloads bit image and macro after finishing this command. The printer clears receiving and printing buffer area, and resets to the effective mode when connecting the power supply.

[Reference] FS p

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

GS FF

[Name] Feed black mark to start position

[Format] ASCII GS FF
 Hex 1D 0C
 Decimal 29 12

[Description] Feed black mark paper to start position.

[Notes] When just set black mark sensor by DIP SW-1-1, this command is effective.
 This command set the print position to the beginning of the line.
 Even execute this command at the beginning of the black mark start position, the printer will not print to the next print start position.

[Reference] **GS (F,**

GS ! n

[Name] Set character size

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

[Range] 0≤n≤255

(1≤vertical double counts≤8, 1≤horizontal double counts≤8)

[Description] Set the height of the character by bit 0 to 2, set the width of the character by bit 4 to 6. as below:

Bit	Off/On	Hex	Decimal	Function
0				Sets the height of character. See table 2.
1				
2				
3				
4				Sets the width of character. See table 1.
5				
6				
7				

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

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
----	---	---

Table 1**Table 2**

[Note] .This command effects to all characters (English characters and Chinese) except for HRI character.

.If n is out of the definition range, this command will be ignored.

.At the standard mode, the vertical direction is the feed paper direction. However, when the character direction revolved clockwise 90°, the relation of vertical direction and horizontal direction will be reversed.

.When enlarges the characters in a line by the different size, all characters in a line will be paralleled along the baseline.

.Enable/disable the double width and double height mode by ESC ! command. The set of command which received at the last will be effected.

[Default] n= 0

[Reference] **ESC !**

GS * x y d1..d(x y 8)

[Name] Define download bit image

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

Hex 1D 2A x y d1...d(x× y× 8)

Decimal 29 42 x y d1...d(x× y× 8)

[Range] 1≤x≤255

1≤y≤48(x× y×1536)

0≤d≤255

[Description] Specifies dot counts by taking x and y and defines the download bit image.

.x specifies the horizontal dot counts.

.y specifies the vertical dot counts.

[Notes] .The dot counts of horizontal direction is x×8; the dot counts of vertical direction is y×8.

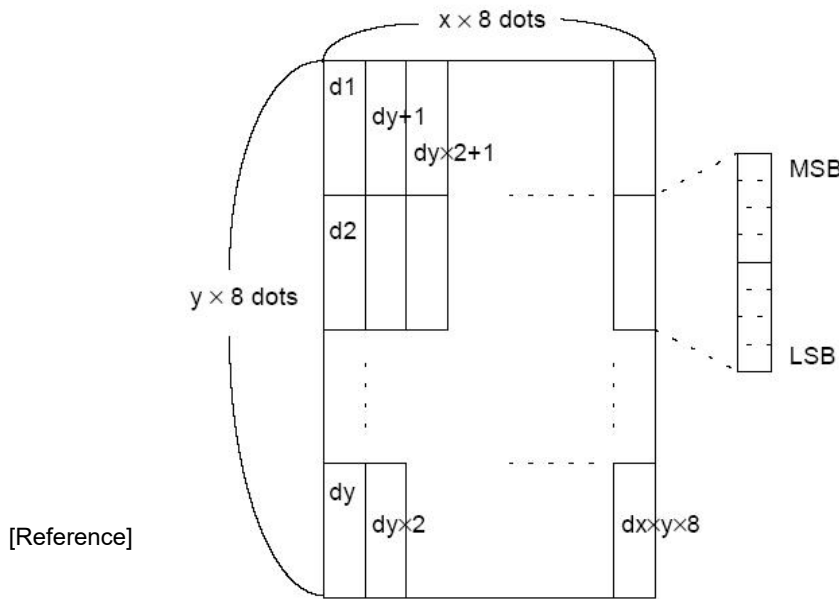
.If x×y over the specified scale, then this command will be disabled.

.d indicates the bit image data. The data (d) specifies the print bit is 1 , the not print bit is 0.

.At the below status, clean the download bit image definition:

- ① Execute ESC @.
- ② Execute ESC &.
- ③ The printer reset or turn the power off.

.The connection between download bit image and print data as below:



GS / m

[Name] Print download bit image

[Format] ASCII GS / m

Hex 1D 2F m

Decimal 29 47 m

[Range] 0≤m≤3, 48≤m≤51

[Description] Printed the download bit image by the mode which specified by m.

m set the mode from the below table:

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	Four times size	101.6 dpi	101.6 dpi

Dpi: per 25.4 mm{one inch} print dot count

[Notes] .If the bit image data undefined, then this command will be ignored.

.At the standard mode, this command effects only when there are no data in the print buffer area.

.This command is not effective at the print mode [bold, overlap, underline, character size or reverses blank printing], except for up-down print mode.

.If the near-printing download bit image over the printable area, then the over data will not print

.The download bit image at the page mode refer to picture.

.If the printable width which set by GS L and GS W is less than the width needed by GS command to send the data, then executes the below continued operation for the problem lines [the print not over the max printable area].

- ① The width of the printable area which extends to the right and holds the data capacity.
- ② If the step ① haven't provided enough width for data, then narrows the left blank to hold the data.

Each data at the normal mode (m=0, 48) and double height mode (m=2,50), the printer prints one dot; Each data at the double width mode (m=1, 48) and four double mode (m=3, 51), the printer prints two dots.

[Reference] **GS ***

GS h n

[Name] Set the bar code height

[Format] ASCII GS h n

Hex 1D 68 n

Decimal 29 104 n

[Range] 1 ≤ n ≤ 255

[Description] Set the bar code height
n sets the dot counts at the vertical direction.

[Default] n=162

[Reference] GS k

①GS k m d1 . dk NUL ②GS k m n d1 . dn

[Name] Print bar code

[Format] ①ASCII GS k m d1 ... dk NUL

Hex 1D 6B m d1 ... dk 00

Decimal 29 107 m d1 ... dk 0

②ASCII GS k m n d1 ... dn

Hex 1D 6B m n d1 ... dn

Decimal 29 107 m n d1 ... dn

[Range] ① 0 ≤ m ≤ 6 (k and d decided by the used bar code system)

② 65 ≤ m ≤ 73 (n and d decided by the used bar code system)

[Description] Select bar code system and print bar code.
m select bar code system as the below table

m	Bar code system	Character number	Note
①	0	UPC-A	11 k 12 48 d 57
	1	UPC-E	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 odd) 48 ≤ d ≤ 57
	6	CODABAR	1 k 48 d 57, 65 d 68, 36, 43, 45, 46, 47, 58

	7	Standard EAN13	12 k 13	48 d 57
	8	Standard EAN8	7 k 8	48 d 57
②	65	UPC-A	11 n 12	48 d 57
	66	UPC-E	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)	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	Standard EAN13	12 n 13	48 d 57
	75	Standard EAN8	7 n 8	48 d 57

[Explanation ①]

.This command ended by NUL.

.When the used bar code system is UPC-A or UPC-E, print the bar code and process the continued data as the normal data after the printer received 12 bytes bar code data.

.When the used bar code system is JAN13 (EAN13) , print the bar code and process the continued data as the normal data after the printer received 13 bytes bar code data.

.When the used bar code system is JAN8 (EAN8) , print the bar code and process the continued data as the normal data after the printer received 8 bytes bar code data.

.The unit of the ITF bar code data must be the even. When the input data is odd, the printer ignores the last received data.

[Explanation ②]

.n specified the data bytes, and the printer processes the n byte data as the bar code data from the next character.

.If n over the specified scale, then the printer stops to process this command, and processes the continued data as the normal data.

The notes at the standard mode

.If d over the specified scale, the printer only feeds paper and processes the continued data as the normal data.

.If the size at the horizontal direction over the printable area, the printer only feeds paper.

.This command feeds paper as the printing bar code, In spite of the line spacing which set by EΣX2 or EΣX3.

.This command effects only when there are no data in the printing buffer area. When there are data in the printing buffer area, the printer processes the continued data of m as the normal data.

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

.This command no effects by the print mode(over-striking, overlap, underline, character size,

opposites blank printing, or character 90°revolved and so on.), except for the reversed print mode.

The notes at the page mode

.This command makes the bar code data in the print buffer area, but not printing. After processing the bar code data, this command moves the print position to the right side of the bar code.

.If d over the specified scale, the printer stops to process this command and processes the continued data as the normal data. In such circumstance, the position of data buffer area not changed.

.If the bar code width over the printable area, the printer doesn't print the bar code, but moves the position of data buffer area to left and out of the printable area.

.Refer to the section 3.9 the page mode.

When using thermal lable:

.If the bar code width is not fit for the present lable, the over part to be printed on the next mark.

When using CODE93 (m=72):

.The printer prints a HRI character at the beginning of the HRI character font(□), as the starting character of the HRI character font.

. The printer prints a HRI character at the end of the HRI character font(□), as the ended character of the HRI character font.

. The printer prints HRI character(■+one character) as the control character from (<00>H to <1F>H and <7F>H):

Control character			HRI character	Control character			HRI character
ASCII	Hex	Decimal		ASCII	Hex	Decimal	
NUL	00	0	■U	DLE	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	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

[For example] Print GS k 72 7 67 111 100 101 13 57 51



When using CODE128 (m= 73) :
 Prints GS k 72 7 67 111 100 101 13 57 51



When takes CODE128 (m=73):

.About CODE128 bar code and code table information , refer to the appendix E.
 .When the printer uses CODE128, please considers the below which about the data transmitting data:

- ① The head of bar code data font needs to be the code font selected character(CODE A, CODE B, or CODE C), takes to be selected the first using code fond.
- ② Defines the special character by character “{” and a character group. Defines ASCII character “{” through continuing transmitting “{” twice.

Special character	Transmitting 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

[For example] Print the actual example data of “No. 123456”

At this actual example, first the printer takes CODE B to print “No.”, then takes CODE C to print the below figures.

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



- .If the data font head of bar code is not the code fond selected character, the printer stops to command disposal, and processes the continued data as the normal data.
- .If the combined of “{” and continued characters is not fit for the any special characters, the printer stops to command disposal, and processes the continued data as the normal data.
- .If the printer received characters which can’t be used to special code font, the printer stops to command disposal, and processes the continued data as the normal data.

.The printer doesn't print the HRI characters which relatives to shift characters or code font selected characters.

.The HRI characters of function character is blank.

.The HRI characters is the blank which about control characters (<00>H to <7F>H).

[Others] Be sure to reserve spacing at the left and right of 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 n which specified by n as below:

n	Function
1,49	Transmit the print paper sensor status

[Notes] .When taking serial interface, If set DTR/DSR control, the printer only transmits one byte after be sure that the PC have received the date (DSR signal is SPACE). If the PC haven't got ready to receive data (DSR signal is MARK), the printer waited until the PC have got ready to.

If set SON/XOFF control, the printer only transmits one byte, and be not sure the DSR signal status.

.Execute this commands when the data affects in the printing buffer area. So, between receiving this command and transmitting status, may be have a time spacing, it decided by the status of receiving buffer area.

.When takes ASB by GS a, distinguished the transmitting status of GS r and ASB status which refers to the table in the appendix C.

.The transmitting status types as below:

The print paper sensor status (n=1,49)

Bit	Off/On	Hex	Decimal	ASB status
0,1	Off	00	0	Paper near-end sensor: printing paper enough.
	On	03	3	Paper near-end sensor: printing paper enough.
2,3	Off	00	0	Paper-end sensor: printing paper enough.
	On	(0C)	(12)	Paper-end sensor: without paper.
4	Off	00	0	Unused. Off is fixed.
4,6	-	-	-	Undefined.
7	On	00	0	Unused. Off is fixed.

Bit 2 and 3: When the paper-end sensor tests the printing paper-end, the printer enters into offline. So, bit 2 and 3 not transmits without paper status.

[Reference] DLE EOT, GS

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

[Name] Print grating 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] $0 \leq m \leq 3, 48 \leq m \leq 51$

$0 \leq xL \leq 255$

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

$0 \leq yL \leq 255$

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

$01 \leq d \leq 255$

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

[Description] Sets grating bit image m as 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	Four times size	101.6 dpi	101.6 dpi

(dpi: per 25.4 mm{one inch} printing dots)

·xL, xH, sets bit image horizontal direction data bytes($xL + xH \times 256$)

·yL, yH, sets bit image vertical direction data bytes($yL + yH \times 256$)

[Notes] ·At the standard mode, this command only effects when there are no data in the printing buffer area.

·For the grating bit image printing, this command no effects by the printing mode(character size, over striking, overlap, up-down printing, underline, reverses blank printing mode and so on).

·If the printable area width which set by GS L and GS W is narrower than the min width, the printer only extends the problem line to the nine width. The min width for normal mode ($m=0,48$) and double height mode($m=2, 50$) is a dot, for the double width mode($m=1,49$) and four times size mode($m=3,51$) is two dots.

·The data out of the printing area be read, and discarded one by one.

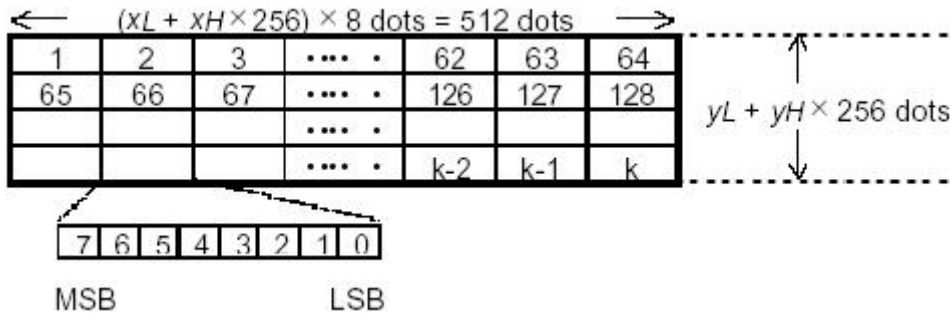
· If the printing position of continued character is the multiple of 8. The continued will be the character printing position of grating bit image, sets by HT(horizontal table), ESC \$(set absolute printing position), ESC \ (set relative printing position) and GS L(set left side spacing).

·The set by ESC a (set justification) for the grating bit image is effective.

·Receive this command during macro definition, the printer finishes the macro definition, and begins to execute this command. Should clear the definition of this command.

·d designates bit image data. Set the printing dot 1, no printing dot 0.

[For example] When $xL + xH \times 256 = 64$



GS w n

[Name] Set bar code width
 [Format] ASCII GS w n
 Hex 1D 77 n
 Decimal 29 119 n
 [Range] $2 \leq n \leq 6$
 [Description] Set bar code horizontal size.

n set the bar code width as below:

n	Multi-bar code unit Width(mm)	Two-bar code	
		Narrow width(mm)	Wide 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

·The below is the multi-bar code:
 UPC-A, UPC-E, JAN13 (EAN13), JAN8(EAN8), CODE93, CODE128
 ·The below is the two-bar code:
 CODE39, ITF, CODABAR

[Short data] n=3
 [Reference] GS k

GS H n

[Name] Select the print position of HRI character
 [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] When print bar code, select the print position of HRI character.

n selects the print position, the table as the below table:

n	Print position
---	----------------

0,48	Not print
1,49	Up the bar code
2,50	Below the bar code
3,51	Up and below the bar code

Note: The position of the printer prints HRI characters is not set according to the standard position.

.HRI (Human Readable Interpretation) indicates the readable bar code relevant characters .

[Note] .Takes the characters which specified by GS f to print HRI characters.

[Default] n= 0

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

GS L nL nH

[Name] Set left-side blank quantity

[Format] ASCII GS L nL nH

Hex 1D 4C nL nH

Decimal 29 76 nL nH

[Range] 0≤nL≤255

0≤nH≤255

[Description] Set the left side blank quantity by nL and nH

.The left side blank quantity set to [(nL+nH×256) ×0.125 mm]



The left side blank The width of printable width

[Notes] .At the standard mode, this command only effects when processing at the beginning of a line.

.If set over the printable area , then using the max value of the printing unit.

.When executing the light bit image command (GS v o), set the left side blank quantity through this command, and only can take the unit of the 8 bits. If the left side blank quantity which wanted be set can't divide by 8, then omit the remainder counts.

[Default] nL = 0, nH = 0

[Reference] **GS W**

①GS V m ②GS V m n

[Name] Select cut paper mode and cut paper

[Format] ①ASCII GS V m

Hex 1D 56 m

Decimal 29 86 m

②ASCII GS V m n

Hex 1D 56 m n

Decimal 29 86 m n

[Range] ① m = 1, 49

② $m = 66, 0 \leq n \leq 255$

[Description] Select one cut paper mode, and execute cut paper operation. Select model by taking the value of m, as below:

[The description for ① and ②]

.According to the different auto-cut paper machine type, the cut paper status is different.
 .This command effects only when processing this command at the beginning of a line.

[The specification for ①]

.Only partial cut paper; not full cut paper.

[The specification for ②]

.When $n=0$, the printer feeds paper to cut paper position and cuts paper.
 .When $n \neq 0$, the printer feeds paper to (cut paper position+[$n \times 0.125 \text{ mm}$ { 0.0049 inch }] and cut paper.

GS W nL nH

[Name] Set print area width

[Format] ASCII GS W nL nH

Hex 1D 57 nL nH

Decimal 29 87 nL nH

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

$0 \leq nH \leq 255$

[Description] nL and nH set the print area width.
 .The printable width set to $[(nL+nH \times 256) \times 0.125 \text{ mm}]$.

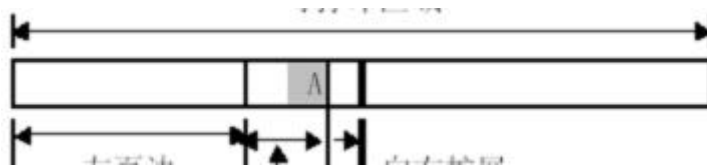


The left side blank The width of printable width

[Notes] .This command only effects when processing at the beginning of the line.
 .If the set value over the printable area, takes the max printable area.
 .The set PRI of GS L is surpass than the set PRI of GS W. If [the left side blank + printable area width] over the printable area, the printer takes [printable area width-the left side blank]. However, not takes the set which sets through GS W even if at the current print, reserves the set which sets through GS W.
 .If the width which set in the printable area is smaller than the width of one character, when printing character data, executes the below disposals:

- ① The printable area width extend to the right and adapt one character.

Printable area



The left side Extends to the right
The printable area width set by nL and nH

- ② If extends the printable area width not enough, then narrows the right spacing.

.If the width which sets by the printable area is narrower than a vertical line, when printing non-character data (for example, bit image, the bit image of user-defined), only for the problem lines to the below disposals:

- ① Extend the printable area width to the right and adapts a vertical line of bit image in the printable area.
- ② If extends the printable area width not enough, then narrows the left spacing to adapt a vertical line.

[Reference] **GS L**

FS ! n

[Name] Set character print mode(s)

[Format] ASCII FS ! n
 Hex 1C 21 n
 Decimal 28 33 n

[Range] 0≤n≤255

[Description] Set the character print mode, set n as below:

Bit	Off/On	Hex	Decimal	Function
0	--	--	--	Undefined
1	--	--	--	Undefined
2	Off	00	0	Prohibit double width mode
	On	04	4	Permit double width mode
3	Off	00	--	Prohibit double height mode
	On	08	8	Permit double height mode
4	--	--	--	Undefined
5	--	--	--	Undefined
6	--	--	--	Undefined
7	Off	--	--	Undefined
	On	--	--	Undefined

[Specification] · On the status of setting the double wide and height mode(contains the right and left character spacing), will print the four times size character.

. The printer can add underline for all characters(contains right-side and left-side character spacing), but can't add underline for the blank which set by HT command, and clockwise 90°revolved characters.

- The width of underline designated by FS. It is not relevant to the size of character.
 - When some of characters in a line is double height characters or more, all character in this line will stand at the same level along datum line.
 - Enlarge Chinese character could use FS W or GS ! command, the set is effective when received finally.
 - The command which received finally is effective, the set is effective when received finally.

[Default] n = 0

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

FS &

[Name] Set Chinese character mode

Format ASCII FS &
 Hex 1C 26
 Decimal 28 38

[Description] Select Chinese character mode.

[Specification] · This command only effects when select GB18030 code system.

· GB18030 only effects double byte 1,2,3,4,5 area.

· When select Chinese character mode, the printer processes all the Chinese code, two bytes each time.

· The sequence arranged the Chinese code according to the first and the second byte.

· When turn the power on, the printer enters into Chinese mode automatically.

· When select Chinese character mode, at first the printer checks the code whether the Chinese: If it is the Chinese, then processes the first and the second bytes of Chinese code.

[Reference] FS FS C

FS .

[Name] Cancel Chinese character

[Format] ASCII FS .
 Hex 1C 2E

Decimal 28 46

[Description] Cancel the Chinese character mode

[Specification] · This command only effects when select GB18030 code system.

· When not select the Chinese character mode, all character code are ASCII code, per character processes each time.

· When turns the power on, the printer enters into Chinese mode automatically.

[Reference] FS &, FS C

FS S n 1 n 2

[Name] Set Chinese right and left character spacing

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

[Range] 0≤n1≤255

0≤n2≤255

[Description] Respectively set left side and right side Chinese character spacing is n1 and n2.

- .The left side character spacing is $[n1 \times 0.125 \text{ mm}]$, the right character spacing is $[n2 \times 0.125 \text{ mm}]$.
- [Specification] .This command sets the left side and right side character spacing of normal size character.
 When setting double width mode, the left side and right side character spacing is twice than the normal mode.
 .Could set the spacing by this command respectively under the standard mode and page mode.
 .Under the standard mode, takes the horizontal moving unit.
 .Under the page mode, takes the horizontal moving unit or vertical moving unit changed by page mode, depends on the difference of printable area starting position. The specification as below:
- ①When set the starting position to the printable area up-left or down-right by ESC T, uses the horizontal moving unit(y).
 - ②When set the starting position to the printable area up-right or down-left, uses the vertical moving unit(x).
 - ③For appendix, the widest right side spacing about $32 \text{ mm} (255 \times 0.125 \text{ mm})$. Any set which over the max will change to the max value automatically.
- [Default] $n1 = 0, n2 = 0$

FS W n

- [Name] Turn quadruple-size mode on/off for Chinese character
- [Format] ASCII FS W n
 Hex 1C 57 n
 Decimal 28 87 n
- [Rang] $0 \leq n \leq 255$
- [Description] Turn quadruple-size mode on/off for Chinese characters.
 .When the LSB of n is 0, quadruple-size mode is turned off.
 .When the LSB of n is 1, quadruple-size mode is turned on.
- [Specification] .Only the LSB of n is effective.
 .Under the quadruple-size mode, the printing character size is the same as the printing character size when sets double width and double height.
 .When taking this command to turn the quadruple-size mode off, prints the following characters according to the size of normal characters.
 .When the different of some characters height in a line, all characters in this line will flush on the basis of baseline.
 .When the characters enlarged along the horizontal direction, the character enlarged to right, and the baseline according to the left side of characters.
 .Turn the quadruple-side mode on/off by FS ! or GS ! which could through selecting double width and double height mode. The command set which receives at last is also effective.
- [Default] $n=0$
- [Reference] FS !, GS !

GS (B PL PH m n

[Name] Setting up the Memory Switch

[Format] ASCII GS (B PL PH m n

Hex1d28 42 PL PH m n

Decimal28 4066PL PH m n

[Description] PL = 2, PH = 0;

m=0 or 1. When m=0, the code SW1 is represented; when m=1, the code SW2 is represented.

n represents the current 8 dialing settings, each bit representing a set value.

When m=0, the eight dialing states represented by n are as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	01	1	Black mark function (not yet turned on)
	On	00	0	
1	Off	02	2	Reserve
	On	00	0	Reserve
2	Off	04	4	Reserve
	On	00	0	Reserve
3	Off	08	8	PE output signal (not yet turned on)
	On	00	0	
4	Off	10	16	PNE signal output as normal (default)
	On	00	0	PNE signal output in reverse
5	Off	20	32	Buzzer on
	On	00	0	Buzzer off
6	Off	40	64	Set the baud rate: bit6 off, bit7 off: 38400
	On	00	0	
7	Off	80	128	bit6 off, bit7 on: 9600
	On	00	0	bit6 on, bit7 off: 19200 bit6 on, bit7 on: 115200

When m=1, the eight dialing states represented by n are as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Set the effective print width: bit0 off, bit1 off: 640 dots(invalid)
	On	01	1	
1	Off	00	0	bit0 on, bit1 off: 576 dots bit0 off, bit1 on: 448 dots bit0 on, bit1 on: 432 dots
	On	02	1	
2	Off	00	0	Set the print density: bit2 off, bit3 off: Normal
	On	04	1	
3	Off	00	0	bit2 on, bit3 off: Slightly dark bit2 off, bit3 on: Dark bit2 on, bit3 on: Slightly Light
	On	08	1	
4	Off	00	0	Paper is not removed, not printed (not

	On	10	16	yet enabled)
5	Off	00	0	Enable Cut paper after reload
	On	20	32	Disable Cut paper after reload is enable
6	Off	00	0	Turn off low speed printing
	On	40	64	Turn on low speed printing
7	Off	00	0	Set the default cut mode to full cut
	On	80	128	Set the default cut mode to half cut

[Examples] 1) If set the baud rate 115200, turn on the buzzer, other by default, then $m = 0$,
 $n = 0x3f$; $m = 1$, $n = 0xff$;

2) If set the baud rate 38400, turn off the buzzer, low speed printing, other according to the default value, then $m=0$, $n=0xdf$; $m=1$, $n=0xbf$;

[Default] When $m=0$, $n=0xff$; when $m=1$, $n=0xff$.

APPENDIX A: MISCELLANEOUS NOTES

1. External Power Connection Notes

Connect the external power to the printer. and turn the power on when need. Be sure the correct connection, if it is wrong, may be damage the external power or the printer.

Over high voltage or low voltage occurred, turn the power off as soon as possible.

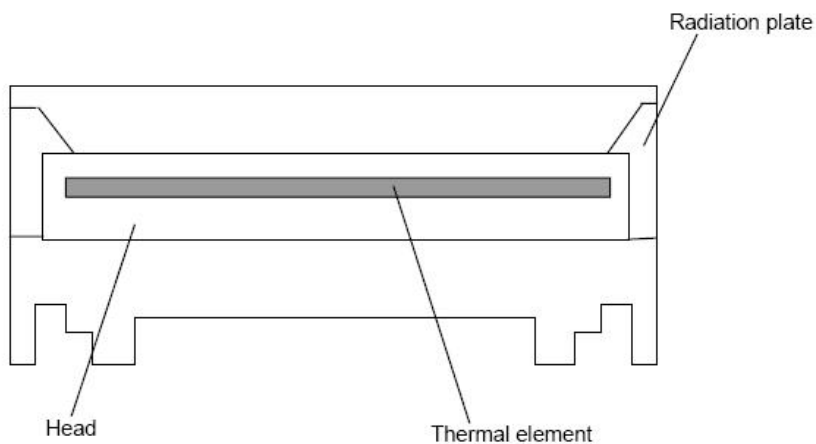
2. Another Notes

- The printer operation
- When roll paper cover is closed, do not pull the roll paper.
- Thermal print head slice and driver IC are easy to damage, do not touch by metal.
- In printing process or after using one period time, thermal print head slice temperature turns to high, do not touch the print head slice.
- Do not use the roll paper cover usually when it is with roll paper.
- Do not touch the print head slice, dusty and other dirt materials with print head cover that will damage the print head.
- Thermal roll paper contains Na^+ , K^+ , Cl^- that will damage the thermal element with thermal print head, so, please use the specified roll paper.
- Label paper can't be used.

APPENDIX B: CLEAN THE PRINT HEAD

Roll paper slice fallen to the print head, it will cause print quality, clean the print head as the following steps:

- 1 . Turn the power off, and pull the power cable and communication out.
- 2 . Open the roll paper cover.
- 3 . Clean cotton with a little alcohol, paint to surface dirt slightly, do not use sandpaper, blade or force materials to clean print head slice! Or, the thermal print head slice will be damaged, and can't be recovered.
- 4 . Clean the print head slice, after complete dry, do self test, watch the print result.



Note: Never clean the print head slice when the thermal print head slice is heat, Or, it will cause head slice to break.

APPENDIX C: CODE128 BAR CODE

C.1 CODE128 bar code description

In CODE128 bar code system, use one bar code character set, indicate 128 unit ASCII characters and 2 bit data. These bar code characters specify 103 unit bar code characters and 3 unit code. Each code indicates the following characters:

Code set A: ASCII character from 00H to 5FH

Code set B: ASCII character from 20H to 7FH

Code set C: 2 bit natural digit character indicate by one character(100 unit natural digit from 00 to 99)

The following special characters in CODE128:

SHIFT characters

Code set A, the code follow with SHIFT will be processed as code B. Code B, the code follow with SHIFT will be processed as code A. SHIFT characters can not be used in code C.

Code set select character (CODE A, CODE B, CODE C)

The code set follow with this character turn to code AB or C.

Function characters (FNC1, FNC2, FNC3, FNC4)

Function character depends on application software. FNC1 is valid in code C.

C.2 Code table

Printable character in code set A

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NUL	00	0	(	28	40	P	50	80
SOH	01	1	)	29	41	Q	51	81
STX	02	2	*	2A	42	R	52	82
ETX	03	3	+	2B	43	S	53	83
EOT	04	4	,	2C	44	T	54	84
ENQ	05	5	-	2D	45	U	55	85
ACK	06	6	.	2E	46	V	56	86
BEL	07	7	/	2F	47	W	57	87
BS	08	8	0	30	48	X	58	88
T	09	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B, 31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51
DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,53	123,83
NAK	15	21	=	3D	61	CODEB	7B,42	123,66
SYN	16	22	>	3E	62	CODEC	7B,43	123,67
ETB	17	23	?	3F	63			
CAN	18	24	@	40	64			
EM	19	25	A	41	65			
SUB	1A	26	B	42	66			
ESC	1B	27	C	43	67			
FS	1C	28	D	44	68			
GS	1D	29	E	45	69			
RS	1E	30	F	46	70			
US	1F	31	G	47	71			
SP	20	32	H	48	72			
!	21	33	I	49	73			
"	22	34	J	4A	74			
#	23	35	K	4B	75			
\$	24	36	L	4C	76			
%	25	37	M	4D	77			
&	26	38	N	4E	78			
'	27	39	O	4F	79			

Printable character in code set B

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
SP	20	32	H	48	72	p	70	112
!	21	33	I	49	73	q	71	113
"	22	34	J	4A	74	r	72	114
#	23	35	K	4B	75	s	73	115
\$	24	36	L	4C	76	t	74	116
%	25	37	M	4D	77	u	75	117
&	26	38	N	4E	78	v	76	118
'	27	39	O	4F	79	w	77	119
(	28	40	P	50	80	x	78	120
)	29	41	Q	51	81	y	79	121
*	2A	42	R	52	82	z	7A	122
+	2B	43	S	53	83	{	7B,7B	123,123
,	2C	44	T	54	84	|	7C	124
_	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	—	7E	126
/	2F	47	W	57	87	DEL	7F	127
0	30	48	X	58	88	FNC1	7B,31	123,49
1	31	49	Y	59	89	FNC2	7B,32	123,50
2	32	50	Z	5A	90	FNC3	7B,33	123,51
3	33	51	[	5B	91	FNC4	7B,34	123,52
4	34	52	\	5C	92	SHIFT	7B,53	123,83
5	35	53	]	5D	93	CODEA	7B,41	123,66
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			

Printable character in code set C

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
00	00	0	40	28	40	80	50	80
01	01	1	41	29	41	81	51	81
02	02	2	42	2A	42	82	52	82
03	03	3	43	2B	43	83	53	83
04	04	4	44	2C	44	84	54	84
05	05	5	45	2D	45	85	55	85
06	06	6	46	2E	46	86	56	86
07	07	7	47	2F	47	87	57	87
08	08	8	48	30	48	88	58	88
09	09	9	49	31	49	89	59	89
10	0A	10	50	32	50	90	5A	90
11	0B	11	51	33	51	91	5B	91
12	0C	12	52	34	52	92	5C	92
13	0D	13	53	35	53	93	5D	93
14	0E	14	54	36	54	94	5E	94
15	0F	15	55	37	55	95	5F	95
16	10	16	56	38	56	96	60	96
17	11	17	57	39	57	97	61	97
18	12	18	58	3A	58	98	62	98
19	13	19	59	3B	59	99	63	99
20	14	20	60	3C	60	FNC1	7B,31	123,49
21	15	21	61	3D	61	CODEA	7B,41	123,65
22	16	22	62	3E	62	CODEB	7B,42	123,66
23	17	23	63	3F	63			
24	18	24	64	40	64			
25	19	25	65	41	65			
26	1A	26	66	42	66			
27	1B	27	67	43	67			
28	1C	28	68	44	68			
29	1D	29	69	45	69			
30	1E	30	70	46	70			
31	1F	31	71	47	71			
32	20	32	72	48	72			
33	21	33	73	49	73			
34	22	34	74	4A	74			
35	23	35	75	4B	75			
36	24	36	76	4C	76			
37	25	37	77	4D	77			
38	26	38	78	4E	78			
39	27	39	79	4F	79			