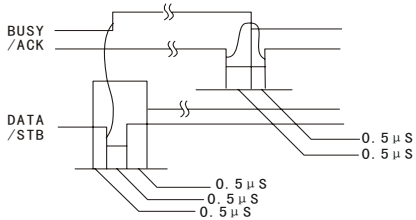
CONTENTS

SECTION 1 Account of Type and Parameter of Capability

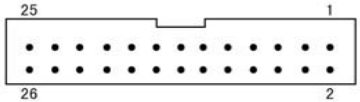
Printing method:	Thermal line dot printing
Paper width:	57.5±0.5mm
Printing density:	8dot/mm, 384dot/line
Printing speed:	30mm/s (when the utilization rate is 25%.)
life-span of print head :	6×10^6 character lines
Printing width:	48mm
Temperature for operating:	5～50℃
Humidity for operating:	10～80%
Temperature for storage:	-20～60℃
Humidity for storage:	10～90%
Power:	DC 3.5V~9V，15W/5V，3A （ refer to the type of printer）

SECTION 2 Assembly and application of Serial Interface

1 The sequence chart of parallel port printer:



2 The pin order of parallel port is shown as follow:



The pin definition of parallel interface is shown as follow:

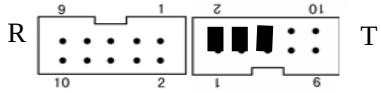
faceplate style	signal	direction	description
1	-STB	in	Data selecting burst purse . reading occurs at the rising edge.
3	DATA1	in	These signals represent the 1~8 bit of the parallel data. Each signal is high level when logic 1 and low when logic 0.
5	DATA2	in	
7	DATA3	in	
9	DATA4	in	
11	DATA5	in	
13	DATA6	in	
15	DATA7	in	
17	DATA8	in	
19	-ACK	out	Answering pulse ,low signal indicates that data have already been received and is ready for next data.
21	BUSY	out	High level indicates that the printer is busy now and can not receive more data.
25	SEL	out	Pulling up to high level signal by resister inside, it indicates that the printer is online
4	-ERR	out	Pulling up to high level signal by resister inside, it indicates that the printer is online
2,6,8,26		--	NC
10-24	GND	---	grounding signal

Attention: (1)"in" indicates input to the printer,"out" means output from the printer

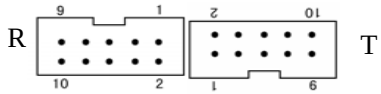
(2)signal leval is TTL standard

3 The pin order of serial port is shown as follow

There are also two kinds of logical signal level for the printer: TTL and RS232.



232



TTL

Notice :

When RS232,use the "R" interface, the "T" interface should be placed three short circuit block as photo above .

When TTL,use the "T" interface, the "R" interface is not used .

The pin assignment of serial interface mode is shown as following.

platform style	signal	direction	description
5	RXD	in	receiving data from the CPU
2	BUSY	out	High level indicates the printer is busy and can't receive data . Low level is the opposite.
3	TXD	out	transmit status messages out of printer
9	GND	—	grounding signal
6	as BUSY	out	the same as BUSY (when TTL the pin is not used.)

Attention: (1)"in" indicates input to the printer,"out" means output from the printer (2)signal leval is EIA standard

3. The method of changing the baud rate ,chroma and printer direction

4 Operation notice

● The ways to change the printer's baud rate:

1 Press SEL Key and make printer power on at the same time,The printer will print out the state of serial interface and the printer direction..

2 And press SEL once, The printer will print out the state of serial interface

3 After that we can chang the serial baud rate through the LF key. Baud rate in serial mode is optional in the range of 1200\2400\4800\9600\19200bps.The original setting is 9600bps

Printers can work at mode 1 or mode 3. its original setting is mode 1 .the mode can be changed by the SEL key.

The printer has to be repowered after setting.

Asynchronous frame format is shown as following:

1 bit	8 bit	1 bit	1 bit
start bit	data bit	parity	stop bit

mode1: one frame is 10 bits, 1 start bit, 8 data bits 1 stop bit

mode3: one frame is 11bits, 1 start bit, 8 data bits 1 parity bit ,1 stop bit

●The ways to change the printer's chroma:

Press LF Key and make printer power on at the same time . The printer will print out the state of setup chroma. After that we can chang the chroma through the keys. Press the LF Key to decrease chroma and the SEL Key to augment chroma.

The printer has to be repowered after setting.

●The ways to change the printer's direction

1 Press SEL Key and make printer power on at the same time,The printer will print out the state of serial interface and the printer direction..

2 And press LF once, The printer will print out the printer direction..

3 .After that we can chang the printer direction through the both keys.

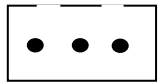
The printer has to be repowered after setting.

●The way to self-check:

Make the printer power on .Press the LF Key and the SEL Key at the same time , and then the printer print out the self-check scrip.

5 power supply connection

The power supply is DC 3.5V~9V，15W/5V，3A and it is shown as follows:



1 2 3

1: positive pole 2: NC 3: negative pole

SECTION 3 Command specification

WH series printer provide many kinds of commands, which master the printer head to realize its function. The command is compatible with other printers' that is popular in the market

1 selecting character set

1.1 select character font 1

ASCII: ESC 6

Dec: 27 54

Hex: 1B 36

All character following this command is printer out according the address in set 1.It contains 224 character. Address rang from 20H to FF H and include ASCII character and many graphic symbols.

1.2 select character font 2

ASCII: ESC 7

Dec: 27 55

Hex: 1B 37

All character following this command is printer out according the address in set 2.It contains 224 character .Address rang from 20H to FF H and include German, French, Russian, Japanese, Katakana and so on.

● WH series printer provide two kinds of lattice

printer16 lattice and 24 lattice

●when in character font 1and character font 2,print character in 6*8 lattice

●when the printer is 24 lattice ,the original setting is Chinese character in 24*24lattice and character in 20~7F in 12*24.

●when the printer is 16 lattice ,the original setting is Chinese character in 16*16 lattice and character in 20~7F in 8*16.

2 feed or recede the paper

2.1 new line

ASCII: LF

Dec: 10

Hex: 0A

Content in the buffer will be carried out after this command. The paper feeds in for a new line. The length is the high of one character and the distance rows between.

2.2 paper feeds in n dots

ASCII: ESC J n

Dec: 27 74 n

Hex: 1B 4A n

Paper feeds in n dots (enlarging command don't effect this function). $1 \leqslant n \leqslant 255$ This command don't have the "enter "function and don't have an effect on the commands back.

3 format setting

3.1 set the space between lines

ASCII: ESC 1 n

Dec: 27 49 n

Hex: 1B 31 n

The space between lines are n dots after this command(The dot number is unconditional and can't be affected by enlarging command.) 1≤n≤255. The original setting: n=3.

3.2 set the space between characters

ASCII: ESC P n

Dec: 27 112 n

ex: 1B 70 n

This command sets the space between characters n dots (The dot number is unconditional and can't be affected by enlarging command.) 1≤n≤255. The original setting: n=0.

3.3 set the vertical tab position

ASCII: ESC B n_1 n_2 …NUL

Dec: 27 66 n_1 n_2 … 0

Hex: 1B 42 n_1 n_2 …00

User can input the space between each tap position. The total number of position is 8. For example, when n1=3, paper will feed in to the 3rd unit line after "VT" command. The height of unit line is the sum of 8 dots and characters between, and is unconditional. NUL

indicates end.

The function can be erase by the ESC B NUL command.

3.4 execute vertical tap command

ASCII: VT

Dec: 11

Hex: 0B

Feed the paper to the next tap position according to the tap value .If the tap value has been deleted or finished ,VT command is to feed one unit line only.

3.5 set the horizontal tab position

ASCII: ESC D n_1 n_2 ...NUL

Dec: 27 68 n_1 n_2 ... 0

Hex: 1B 44 n_1 n_2 ... 00

User can input the space between each tap position. The total number of position is 8, and what is more, the value should inside the max of the printer head could execute. For example, when n_1=3, paper will feed in to the 3rd unit line after "HT" command. The width of each step is the sum of width of character matrix and dots characters between horizontal, and is elative to the enlarging command. NUL indicates end.

The function can be erase by the ESC D NUL command.

3.6 execute horizontal tap command

ASCII: HT

Dec: 9

Hex: 09

Feed the paper to the next tap position according to the tap value .If the tap value has been deleted or finished ,no operation will be execute.

3.7 print blank lines or characters

ASCII: ESC F m n

Dec: 27 102 m n

Hex: 1B 66 m n

When m=0, n blank characters will be printed out after this command. The width of the blank space is the sum of the width of character dot matrix and the horizontal space between . N value have to be include the max dot which printer can execute.

When m=1, n blank lines will be feed in. $1 \leqslant n \leqslant 255$.

3.8 set right margin

ASCII: ESC Q n

Dec: 27 81 n

Hex: 1B 51 n

N value means n-characters blank space on the right side will be left .Each character space is the sum of width of the character matrix and the horizontal space between. The command is relative to the enlarging command.

N value should be inside the area that the printer head

could reach. The initial n=0.

3.9 set left margin

ASCII:	ESC	1	n
Dec:	27	108	n
Hex:	1B	6C	n

N value means n-characters blank space on the left side will be left .Each character space is the sum of width of the character matrix and the horizontal space between. The command is relative to the enlarging command.

N value should be inside the area that the printer head could reach. The initial n=0.

3.10 set the gray degree

ASCII:	ESC	M	n
Dec:	27	109	n
Hex:	1B	6D	n

N ranges from 1 to 6 the larger of the n value, the darker the dot it is . The initial n=0. It is used to modify the final expression of different thermal paper roll.

4 character setting

4.1 enlarge in width

ASCII:	ESC	U	n
Dec:	27	85	n
Hex:	1B	55	n

The width of characters or graphics will n times of the normal one's. $1 \leqslant n \leqslant 8$ initial value is 2 to 16X16 dots matrix printer. and 1 to 24X24 dots matrix printer.

4.2 enlarge in height

ASCII: ESC V n

Dec: 27 86 n

Hex: 1B 56 n

The height of characters or graphics will n times of the normal one's. 1≤n≤8 initial value is 2 to 16X16 dots matrix printer. and 1 to 24X24 dots matrix printer.

4.3 enlarge both in width and height

ASCII: ESC W n

Dec: 27 87 n

Hex: 1B 57 n

The height and width of characters or graphics will n times of the normal one's. 1≤n≤8 initial value is 2 to 16X16 dots matrix printer. and 1 to 24X24 dots matrix printer.

4.4 select or cancel underline print

ASCII: ESC - n

Dec: 27 45 n

Hex: 1B 2D n

When n=1, select under line print .when n=0 ,cancel underline print .When repowered or initialized ,n=0. When n=1,all the characters and blank are printed out with underline.

4.5 select or cancel up-line print

ASCII: ESC + n

Dec: 27 43 n

Hex: 1B 2B n

When n=1 ,select up-line print .when n=0 ,cancel up-line print .When repowered or initialized ,n=0.

When n=1,all the characters and blank are printed out with up-line.

4.6 select or cancel white print

ASCII:	ESC	I	n
Dec:	27	105	n
Hex:	1B	69	n

When n=1,select white print. When n=0, cancel white print. When repowered or initialized, n=0.White print means the character is white and its background is black.

4.7 select or cancel reverse print

ASCII:	ESC	C	n
Dec:	27	99	n
Hex:	1B	63	n

Panel style:

When n=0, select reverse print ,printing from right to left. When n=1, cancel reverse print ,printing from left to right.

When the printer is assembled vertically, it is convenient to read the word reversely so its initial value is 1.

4.8 set charater Rotational Print

ASCⅡ:	FS	I	n
Dec:	28	73	n
Hex:	1c	49	n

This command is to rotate characters, the values of n are as following:

n	Characters rotated widdershins
0	0º
1	90º
2	180º
4	270º

4.9 Select Superscript and Subscript Print

ASCⅡ: FS r n

Dec: 28 114 n

Hex: 1c 72 n

This command is to select the position for superscript and subscript, n=0 is superscript and n= 1 is subscript. When the character is less then the highest one in the same line ,the character is align top or bottom with the highest one.

5 set the user-defined characters

5.1 define the character

ASCII: ESC & m n_1 n_2 n_i

Dec: 27 38 m n_1 n_2 n_i

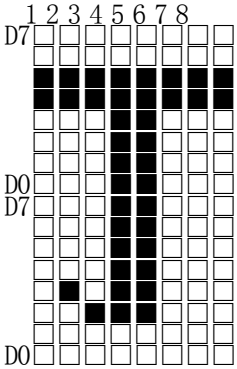
Hex: 1B 26 m n_1 n_2 n_i

User can define a character with this command. "m" the number of the user-define character.

$32 \leqslant m \leqslant 61$.Parameter n_1 n_2 n_i is the structure data of the character.

16X16 dots matrix

The character matrix is 8X16. this is 8 rows and 16 dots each row. One byte data shows the structure of a row.(the dot value can be affected by enlarging command.) The high bit is on the top as figure shows



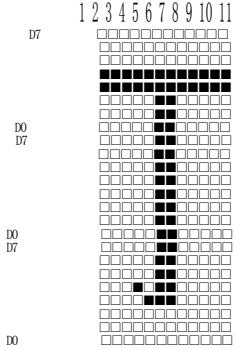
n1=30H, n2=30h, n3=30h, n4=3fh, n5=3fh, n6=30h
n7=30h,n8=30h,n9=00h,n10=08h,n11=06h,n12=0fch
n13=0fch,n14=00h,n15=00h,n16=00h

Notice: the data is from left to right. and then from the top down.

24X24 dots matrix

the character matrix is 12X24 it is 12 row and there are 24 dots each row. Three byte numbers show the structure of one row .The combination of the byte is vertical, and the high bit is on the top . Notice: the data is from left to right, and then from the top down.

Data and character structure is shown as follow:



n1=18H,n2=18H,n3=18H,n4=18H,n5=18H

n6=1fH,n7=1fH,n8=18H,n9=18H,n10=18H

n11=18H,n12=18H,n13=00H,n14=00H,n15=00H,

n16=00H,n17=00H,n18=ffH,n19=ffH,n20=00H

n21=00H,n22=00H,n23=00H,n24=00H,n25=00H

n26=00H,n27=00H,n28=80H,n29=08H,n30=f8H

n31=f8H,n32=00H,n33=00H,n34=00H,n35=00H

n36=00H

If many ESC & command use the same m value ,the last definition is effective. The total number of user-defined character is 30.

5.2 replace with user-defined character

ASCII: ESC % m_1 n_1 m_2 n_2...m_k n_k NUL

Dec: 27 37 m_1 n_1 m_2 n_2...m_k n_k 0

Hex: 1B 25 m_1 n_1 m_2 n_2...m_k n_k 00

The user-defined character m will replace character n in the current font.

m_1 m_2 … m_k are the user-defined characters.

n_1 n_2. … n_k are the characters in the current font

32≤m≤61, 32≤n≤61, 0≤k≤32 The max number is 30. Data NUL indicate the end.

5.3 recover characters in the font

ASCII: ESC :

Dec: 27 58

Hex: 1B 3A

Characters in the current font will be recovered.

6 print graphics

6.1 bit map print

ASCII: ESC K m_l m_h n_1 n_2... n_i ....

Dec: 27 75 m_l m_h n_1 n_2... n_i ....

Hex: 1B 4B m_l m_h n_1 n_2... n_i ....

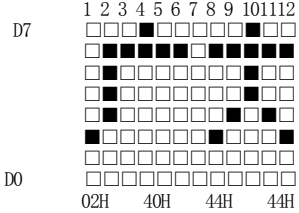
m_i m_h stand for a 16 bits binary datum . m_l is the low 8 bits and m_h is the high 8 bits. The number of graph data is $m_h \times 256+ml$. The size of graph depends on the enlarging command.

The command will print a iX8 dots graph unit for the 16X16 dots type printer. Its width is i dots and height is 8 dots. A 8-bit binary datum express row structure and the high bit is on the top.

The command will print a $(i/3) \times 24$ dots graph unit for the 24X24 dots type printer. Its width is i/3 dots and height is 24 dots. A 8-bit binary datum express a 8-dot row structure, so three 8-bit binary data is need to express the whole row, the 24-dot row. The high bit is on the top. The order of the data is first from the top to the bottom and then from left to right.

If your graph is large than one graph unit . you can divide the graph to different unit ,set and print them

separately. For example more than 8-dot height for a 16X16 dots type printer, you can divide the graph to different 8-dot unit and print them respectively.



6.2 dot line print

ASCII: FS K n1 n2 data.1~data.n2

Dec: 28 75 n1 n2 data.1~data.n2

Hex: 1C 4B n1 n2 data.1~data.n2

n1:

when n1.0=1, print graph twice in height

n1.0=0 时, print graph in original height

n1.1=1 时, print graph twice in width

n1.1=0 时, print graph in original width

n2: the large number of the byte of one line.the max is 48(one line is 384 in dot,one byte is 8 dot 8*48), when print in twice width is 24.

Data.1~data.n2: n2 graph data

The command is used to print one line graph data

6.3 print curving 1

ASCII: ESC ' ml mh l1 h1. l2 h2. li hi ...CR

Dec: 27 39 ml mh l1 h1. l2 h2. li hi ...13

Hex: 1B 27 m_l m_h l_1 h_1. l_2 h_2. l_i h_i ...0D

Note: Both the number and the position of the dots are expressed by double byte data. ml andl1 are the low

byte and m_h h_i are the high byte.

The command is used to set and print the curving graph along the paper-feeding orientation. The value of m_l m_h indicates the number of dots you need in this current line. It should be not bigger than 384.

The value of l_i h_i sets the position of the dot i .It should be not bigger than 384 $i_{max} = m_l m_h$.

0D is to execute this command.

6.4 Print Curve 2（fill with point automatically）

ASCII：ESC ， ml mh l1 h1 l2 h2 l3 h3 … li hi… CR

Dec：27 44 ml mh l1 h1 l2 h2 l3 h3 … li hi… 13

Hex：1B 2C ml mh l1 h1 l2 h2 l3 h3 … li hi…… 0D

The method of application is the same as Print Curve 1.

7 Print bar code

7.1 Set the size of both the wide and narrow bar

ASCII: GS W n_1 n_2

Dec: 29 87 n_1 n_2

Hex: 1D 57 n_1 n_2

The size of the narrow bar is n_1 dot.

One dot is 1/203 inch or 0.125mm.

initial value is 3.

The size of the wide bar is n_2 dot.

7.2 Print bar code

ASCII: GS k n [d] NUL

Dec: 29 107 n [d] NUL

Hex: 1D 6B n [d] NUL

n is used to choose the bar code system.

n	bar code
2	EAN-13
3	EAN-8

Please pay attention to the limited number of the bar code system .

Both the EAN-13 and EAN-8 can get the verify number automatically

[d] is the bar code character.

NUL is the end of this command

7.3 Permit /forbid printing HRI character

ASCII: GS H n

Dec: 29 72 n

Hex: 1D 48 n

When n=0,HRI character will not be printed out and it is the initial value.

When n=1,HRI character will be printed out under the bar code.

7.4 Set the height of the bar code

ASCII: GS h n

Dec: 29 104 n

Hex: 1D 68 n

n=0～255,when n=0,the height is 256 dot.

initial value is 60.

7.5 Set the landscape orientation size of the bar code

ASCII: GS w n

Dec: 29 119 n

Hex: 1D 77 n

n=1~4, the size of the bar code be different when the n is different.

n	narrow bar	wide bar
1	1	3
2	2	5
3	3	7
4	4	9

The default of n is 3

8 Chinese character setting(16dot*16dot)

8.1 be at the Chinese character mode

ASCII: FS &
Dec: 28 38
Hex: 1C 26

The command forces the printer to be at the Chinese character mode. At this mode the printer will find the Chinese character model at the GB I II according to the code received. Print it out when find it, otherwise, printers will take no action. If the code ranges from 20H to 9FH, the relevant ASCII character will be printed out. They have the same base line grid with the Chinese characters.

9 initialize the printer

ASCII: ESC @
Dec: 27 64
Hex: 1b 40

This command is used to initialize the printer. There are two ways we can initialize the printer :

(1) use the command ESC @

(2) repower the printer

10 data-control command :enter

ASCII: CR

Dec: 13

Hex: 0D

After this command, printer will deal with the data in the buffer, print out all the content and feed in paper for a new line.

11 Allow / forbid printer process data

Format: ASCII: ESC d n

Dec: 27 100 n

Hex: 1B 64 n

When n=0, forbid the data received, and all the commands received are of no effect; When n=1, Allow the data received.

Default n=1.

12 Send the printer state to CPU

ASCII: FS v

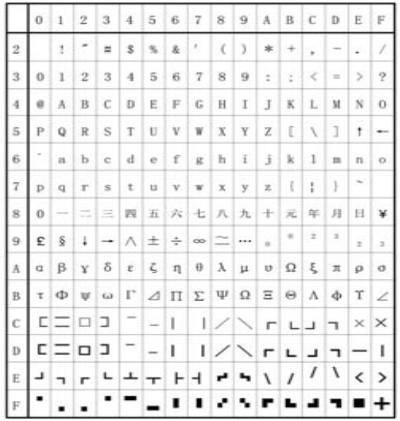
Dec: 28 118

Hex: 1c 76

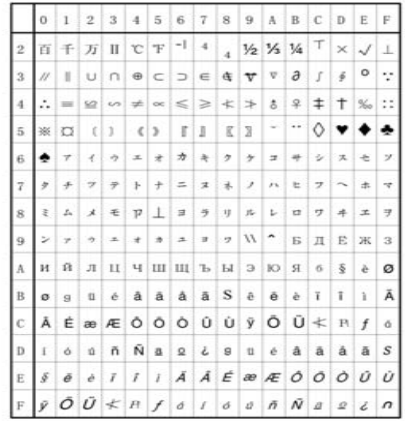
This command is only for serial printer .After this command printer will send one byte through TXD. When the byte is 0x00 ,show that the paper is enough; when the byte is 0x04 ,show that the paper is lacking

SECTION 4 Character font

font 1



font 2



Section 5 Command table for quick consultant

Commands			description	page
ASCII	Dec	Hex		
ESC 6	27 54	1B 36	Select character set I	9
ESC 7	27 55	1B 37	Select character set II	9
LF	10	0A	Feed line	10
ESC J n	27 74 n	1B 4A n	N dot line feed	10
ESC 1 n	27 49 n	1B 31 n	Set n dot line spacing	11
ESC p n	27 112 n	1B 70 n	set the space between characters	11
ESC B n1 n2 n3..NUL	27 66 n1 n2 n3..0	1B 42 n1 n2 n3…0	Set Vertical Tab Value	11
VT	11	0B	Carry out Vertical Tab Value	12
ESC D n1 n2 n3.NUL	27 68 n1 n2 n3..0	1B 44 n1 n2 n3…0	Set Horizontal Tab Value	12
HT	9	09	Carry out Horizontal Tab Value	13
ESC f m n	27 102 m n	1B 66 m n	Print Blank Character or Lines	13
ESC Q n	27 81 n	1B 51 n	Set right margin	13
ESC 1 n	27 108 n	1B 6C n	Set left margin	14
ESC m n	27 109 n	1B 6D n	set the gray degree	14
ESC U n	27 85 n	1B 55 n	enlarge in width	14
ESC V n	27 86 n	1B 56 n	Enlarge in height	15
ESC W n	27 87 n	1B 57 n	enlarge both in width and height	15
ESC — n	27 45 n	1B 2D n	Select/cancel Underline Print	15
ESC + n	27 43 n	1B 2B n	Select/cancel Up-line Print	15

ESC I n	27 105 n	1B 69 n	Select/cancel Reverse White Print	16
ESC c n	27 99 n	1B 63 n	select or cancel reverse print	16
FS I n	28 73 n	1C 49 N	Set Chinese Character Rotational Print	16
FS r n	28 114 n	1C 72 n	Select Superscript and Subscript Print	17
ESC & m n1 n2…n6	27 38 m n1 n2…n6	1B 26 m n1 n2..n6	User-defined Characters	17
ESC%m1n1m2n2.mknk nul	27 37 m1n1m2 n2 ..mk nk.. 0	1B 25 m1n1m2n2mknk 0	Replace with User-defined Characters	19
ESC :	27 58	1B 3A	Restore Characters that in Character Set	20
ESC K n1 n2…data…	27 75 n1 n2…data..	1B 4B n1 n2…data..	Print bit-map graphics	20
FS K n1 n2 data.1～data.n2	28 75 n1 n2 data.1～data.n2	1C 4Bn1n2data.～data.n2	dot line print	21
ESC 'ml mh l1 h1 l2 h2 l3 h3…li hi …CR	27 39 ml mh l1 h1 l2 h2 l3 h3…li hi …13	1B 27 ml mh l1 h1 l2 h2 l3 h3…li hi …0D	print curving 1	21
ESC , ml mh l1 h1 l2 h2 l3 h3…li hi …CR	27 44 ml mh l1 h1 l2 h2 l3 h3…li hi …13	1B 2C ml mh l1 h1 l2 h2 l3 h3…li hi …0D	Print Curve 2(fill with point automatically)	22
GS W n1 n2	29 87 n1 n2	1D 57 n1 n2	Set the size of both the wide and narrow bar	22
GS k n [d] NUL	29 107 n [d] 00	1D 6B n [d] 00	Print bar code	22
GS H n	29 72 n	1b 48 n	Permit /forbid printing HRI character	23
GS h n	29 104 n	1D 68 n	Set the height of the bar code	23
GS w n	29 119 n	1D 77 n	Set landscape orientation size of bar code	23
FS &	28 38	1C 26	Chinese character	24
ESC @	27 64	1B 40	Initialize Printer	24
CR	13	0D	Carriage return	25
ESC d n	27 100 n	1B 64 n	Allow/forbid printer process data	25
FS v n	28 118 n	1c 76 n	Send the printer state to CPU	25