User's Guide

Portable Printer

Document Change History

This page records changes to this document. The document was originally released as version 1.2.

Version Number	Date	Description of Change
1.0	7/2014	Released.
1.1	10/2015	Update Command Set ESC t n for Code Pages.
		Add Wi-Fi spec.
1.2	8/2016	Modify Advantages section

CONTENTS

Before you begin

Please refer to this section very carefully which presents very important information intended to ensure safe and effective use of the printer.

Cautions of printer

- Do not subject your printer to excessive force or shock such as treading on it, dropping it, or hitting it.

- Do not install your printer in locations with poor ventilation or in locations in which the air contains salt or toxic gases.

- Do not use your printer at a voltage other than the specified voltage or at frequencies other than the specified frequencies.

- Only power the printer with the supplied adapter and specified battery. Connection to an improper adapter/charger or battery may cause fire, explosion or damage to the printer.

- Do not insert or remove the power cable or interface cable by pulling on the cable.

- Do not drop or insert foreign objects like paper clips, pins, etc. into the equipment. In such case remove the object, if accessible, or contact your reseller for help.

- Do not attempt to disassemble or modify your printer. Any such unauthorized action will void the warranty and may cause a fire hazard or electric shock.

- Do not spill or spray any liquids onto the printer. In such case, immediately turn off the power, remove the power supply cable&battery, and contact your reseller for help.

- Do not plug in your printer to a receptacle and/or power-strip with too many other devices on the same circuit.

Cautions of Battery

Misuse may cause a risk of fire or explosion.

- Do not disassemble puncture incinerate crush or short terminals.

- Do not deposit the battery in fire or in water.
- Do not expose to temperature exceeding 60°C (140°F).
- Use specified charger only.
- Storage temperature is -20°C (-4°F) ~ 60°C (140°F).

Notes of Safety

- Please be sure to remove the battery if printer is not gonna be used for a long time, otherwise the battery may leak corrosive liquid. Once the battery leaks by any reasons, please do as following:

If the leaked liquid is spattered on skin or clothes, please wash it with water,

If the leaked liquid is spattered into eyes, please rinse them with water thoroughly and see the doctor in case.

- Please do not touch the printer head with body while printing or just when printing is over. Overheat may cause scald.

Notes of Using

- Be sure not to print continuously for a long time, or else it may cause damage to the printer head.

- Do not unplug the USB cable or serial COM cable in the mid of printing while USB or COM interface is being used, or else it may cause printing data lost.

- The communication distance should be within 10 meters when Bluetooth is in use.

- The paper in poor quality or stored for too much long time may reduce the print quality even damage the printer.

- Try to run out of the battery before charging it, as it can ensure the service life of the battery.

Notes of Storage

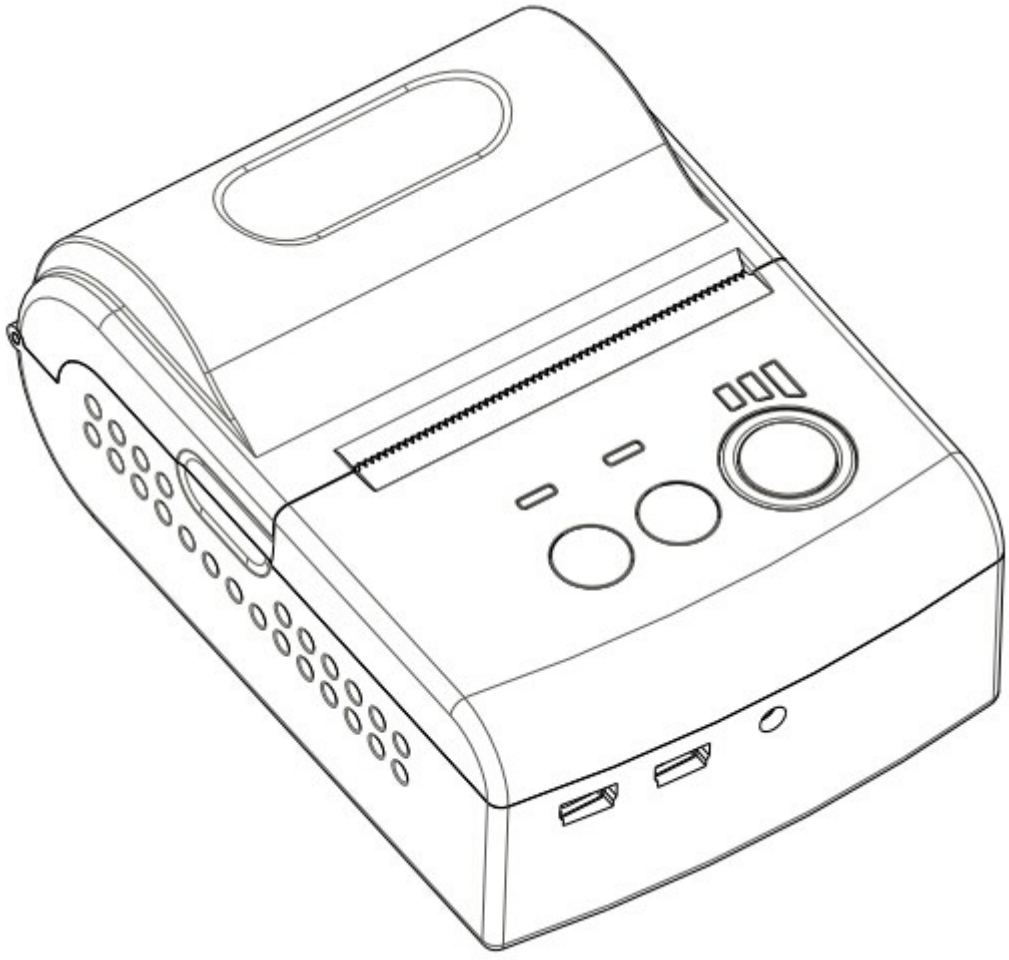
- The printer should be stored on condition that the temperature is between -40 ℃ and 70 ℃, and the relative humidity is between 10% and 95%.

● Please be sure to remove the battery if the printer would be stored for a long time, otherwise it may damage the battery even printer.

Get to know about printer

You will deeply understand the printer after reading this section.

Parts of the printer



Advantages

- **Bluetooth V2.0 compatible with Android / Windows / Wince**
- **Bluetooth V4.0 compatible with Android / iOS/ Windows / Wince**
- **Wi-Fi compatible with Android / iOS/ Windows / Wince**
- **Graphics, 1D, 2D symbologies (QR code / PDF417) supported**
- **Advanced 32-bit architecture RISC processor**
- **Fashion & Simple design**
- **High speed and print quality**
- **Li-on Battery power supply (standard)**
- **Multiple languages/ Characters sets supported**
- **Traditional Chinese(Big5 / GB18030) /Japanese/Koean are available for customization**
- **Five Interfaces Available for Selection : RS232 Serial / USB / Bluetooth V2.0 / Bluetooth V4.0 / Wi-Fi**
- **ESC/POS Emulation**
- **Logo / Trademark Downloadable and Printing**
- **LED lights to indicate charging Battery and power status**

Applications

- Mobile Receipt
- Delivery Slip
- Ticketing
- Logistics
- Restaurant/Hotel
- Retail Business
- Taxi meter
- Barcode
- Warehousing & Distribution
- Healthcare
- Remote Fault Recording
- Hospitality

Technical data

Feature	SPECIFICATIONS
color	Black(Or Customized basing MOQ)
Print Method	Line Thermal
Resolution/Total Dots	203 dpi/384 dots
Dot Density	8 dots/mm
Print Speed	Up to 90 mm (3.54 inches) per second (ips).
Print Width	48mm/line

Character (Code page)	Simplified Chinese(standard)	GB2312
	Traditional Chinese(optional*)	Big5(TaiWan),GB18030(HongKong)
	Japanese((optional*)	Shift-JIS
	Korean((optional*)	Code page 949
	Extended character sets (Standard)	OEM437(Standard Europe),Katakana, OEM850(Multilingual),OEM860(Portuguese), OEM863(Canadian-French),OEM 865(Nordic), West Europe,Greek,Hebrew,East Europe,Iran, Windows Code Page 1252,OEM866(Cyrillic#2),OEM 852(Latin2),OEM858,IranII,Latvian,Arabic,Windows Code Page 1251, OEM864
Font	Simplified Chinese(standard)	24×24dots 16 characters/line
	Traditional Chinese(optional*)	24×24dots 16 characters/line
	Japanese(optional*)	24×24dots 16 characters/line
	Korean(optional*)	24×24dots 16 characters/line
	Font A(standard)	12×24dots 32 characters/line
	Font B(standard)	9×17dots 42 characters/line
Code	1D Barcode(standard)	EAN13, EAN8, UPC-A, UPC-E, Code 93, ITF Codabar, Code 39, Code 128
	2D Code(standard)	PDF417,QRCODE
Emulation		ESC/POS+ additional unique commands
Data Buffer		10K Bytes
Printer Size	Length	106mm
	Width	75mm
	Height	45mm
Interface (Remark 2)	Bluetooth V2.0(EDR,Class 2)	Applied in Android/Windows/Wince OS
	Bluetooth V4.0 (BR/EDR/LE,Class 2)	Applied in Android/iOS/Windows/Wince OS
	Wi-Fi	Wireless Standard:Compatible with IEEE802.11b/g/n Frequency:2.4GHZ Work Mode:STA/AP Advantages: Multi-TCP Link(5 channel) supported Ultra Low Power Applied in Android/Windows/Wince/iOS OS
	RS232 serial	Applied in Windows OS or RS232 compatible device
	USB	Applied in Android/Windows/Linux OS
Power	External Adapter	100V~240V AC Input → 9V DC 1.5A~2A output
	Built-in Battery	Lithium-Ion 7.4 V. 1500 mAh
	Charging Time	About 3 hours
	Battery Duration	Standby time >40hours, can print receipts >800pcs(each receipt length= 15cm) with one full charge

	Maximum Print Lines per Charge	45,000 (continuous printing with printing rate 25% max)
Reliability (MTBF)		50km (printing rate 25% max)
Weight	Net Weight	125g
	Package Weight	<500g
Paper	Thickness	0.06 to 0.08mm
	Width	56mm~58.5mm
	Diameter	<=40mm
Operating Condition	temperature	-10°C to 50°C
	Humidity	10%~80%
Storage Condition	temperature	-40 ℃~70 ℃
	Humidity	10%~95%

Remark 1: **optional*** listed above means it's not for the standard shipment, so please leave us messages if you wanna purchase optional version. Or else we will ship the goods with standard version.

Remark 2: For standard shipment, we have 4 combinations of interfaces for your ordering, and all go with built-in battery.

1>Bluetooth V2.0 + USB + RS232 serial

2>Bluetooth V4.0 + USB + RS232 serial

3>Wi-Fi + USB + RS232 serial

4>USB + RS232 serial

If you have other requirements, please feel free to let us know,we can OEM for you. For example, some customers do not need the printer with battery, may need external power adapter or car charger only.

Accessories

Your goods comes with the following items:

Item	Part Number	Descriptions	Image
1	-	Thermal printer	
2	-	AC charger	
3	-	1 Roll of thermal paper	
4	-	CD Disk	

5	ER-B001	Battery	
6	-	USB cable	
7(optional*)	-	DB9 serial cable (**For RS232 serial interface**)	
8(optional*)	-	Pouch for Printer	

Remark： Accessories may be different from list above depending on customer's requirement.

If you need "optional*" item, please inform us before ordering.

How to operate the printer?

Before operating the printer, you should first understand all the indicators and buttons.

Indicators

【CHARGE】indicator

Blue light is on constantly: Battery is full, charging is done;

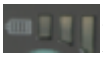
Red light is on constantly: Battery is in the mid of charging;

Blue and red lights are both on constantly: mistakes occur, please make sure if the battery is in good contact or not, or the temperature is normal or not.

【ERROR】indicator

Red light is flashing slowly: printer is out of paper

Red light is flashing quickly: mistakes occur, please power off the printer and power on it again.

【  】battery indicator

The battery indicators are composed by three bars which are explained as below:

Three bars are all lightened constantly: battery is high.

Two bars are lightened constantly: battery is medium.

One bar is lightened constantly: battery is low.

The shortest bar is flashing quickly: battery is extremely low, it must be charged immediately.

Three bars are flashing at the same time: Battery is over charged or external power supply is used without battery.

【  】power indicator

Once printer is powered on, the blue light will be on like windows starting button.

Buttons

【  】button

This button is used to power on/off the printer.

【LF】button

This button is used to feed paper manually. And it is also worked with MODE button to set printer parameters.

【MODE】button

This button is used to set printer parameters like language, font, and print density...

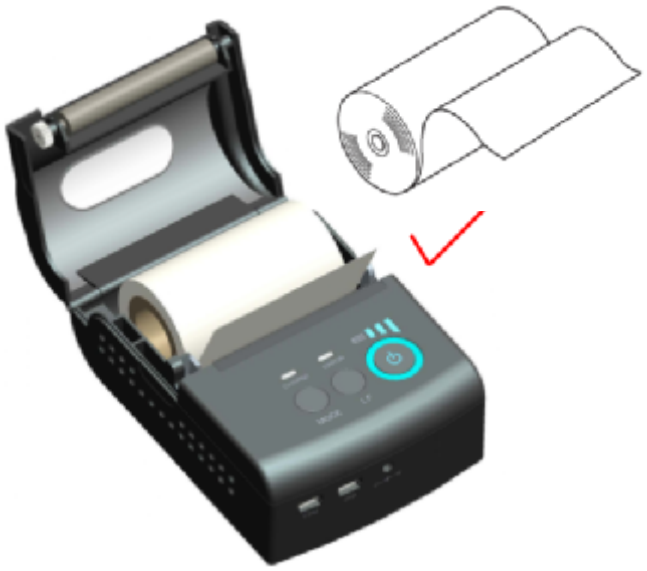
Operation

How to load paper roll correctly?

The first time when user want to use the printer, paper roll should be loaded correctly. Please follow the steps for operation.

1>. Please uncover the lid .

2>.Load paper roll manually, make sure the paper roll direction is right as picture showed.



3> cover the lid, then you could start printing.

How to power on printer?

Keep pressing【  】button for about 2 seconds, the 【  】indicator blue light(circling light) will be on, then loosen the 【  】button, the printer is already on.

How to power off printer?

Under status of power on, keep pressing the 【  】button for 2 seconds, the 【  】circling blue light goes out, then loosen the 【  】button, the printer is off.

How to print selftest page?

Power off the printer, then hold down the【**LF**】button and press【  】 button at the same time. Wait until battery indicators &【**ERROR**】indicator is on ,then loosen the 【  】button and【**LF**】button, the selftest page will be printed out.

How to feed paper manually?

Under normal printing status, the printer will feed paper once 【**LF**】 button is pressed, and stop feeding paper when【**LF**】 button is loosen .

How to set printer's parameters using MODE&LF button?

The printer has provided several different modes for setting parameters which include **[Language setting]**, **[Font setting]**, **[Density setting]**，**[International Character Set]**，and **[COM Baudrate Setting]**

First, we have to enter MODE human being interface. Please power off the printer, and then hold down the【**MODE**】button and keep pressing the【  】 button at the same time. Wait until the printer prints the presentation as following, then loosen 【**MODE**】button and the【  】 button.

[Language Setting]

---current:xxxxxx--- (xxxxxx can be either English or Chinese)

This printed information tells you that you are now under [language setting] mode, and also tells you the current valid language type.

If the current language type is not right for you , please complement one completed 【**LF**】 operation to change language type, you will see printed presentation. If the language type is still not right for you , complement one completed 【**LF**】operation again until you get the right setting.

If the current language is right for you , please ignore 【**LF**】button, just go ahead with the following.

(Remark: one completed【LF】operation includes" Press 【LF】button, then loosen it within 1 or 2 seconds". By the way , the setting value will be changed one time every one completed【LF】 operation.)

Here, [Language setting] is ok.

If you want to change from [Language setting] mode to [Font setting] mode, please just press 【MODE】 one time and loosen it. The printer will print the presentation like

[Font Setting]

---current:Font xxxxxx--- (xxxxxx can be either FontA or FontB)

This printed information tells you that you are now under [Font setting] mode, and also tells you the current font type.

If the current font type is not right for you , please complement one completed 【LF】operation to change font type. If you still not get the right font type, please complement one completed 【LF】 operation again until you get the right setting.

If the current font type is right for you , please ignore【LF】button, just go ahead with the following.

Here, [Font setting] is ok.

If you want to change from [Font Setting] mode to [Density setting] mode, please just press 【MODE】 one time and loosen it. The printer will print the presentation like

[Density Setting]

---current:xxxxxx---

(xxxxxx can be either Low Level or Middle Level or High Level ,or etc.)

This printed information tells you that you are now under [Density setting] mode, and also tells you the current density level.

If the current density level is not right for you , please complement one completed 【LF】operation to change density level until you get the right setting.

If the current density level is right for you , please ignore 【LF】 button, just go ahead with the following.

If you want to change from [Density setting] mode to [International Character Set] mode, please just press【MODE】one time and loosen it. The printer will print the presentation like

[International Character Set]

---current:xxxxxx---

This printed information tells you that you are now under[International Character Set] mode, and also tells you the current International Character Set.

If the current International Character Set is not right for you , please complement one completed 【LF】operation to change it until you get the right setting.

If the current International Character Set is right for you , please ignore【LF】button, just go ahead with the following.

If you want to change from [International Character Set] mode to [COM Baudrate Setting] mode, please just press【MODE】one time and loosen it. The printer will print the presentation like

[COM Baudrate Setting]

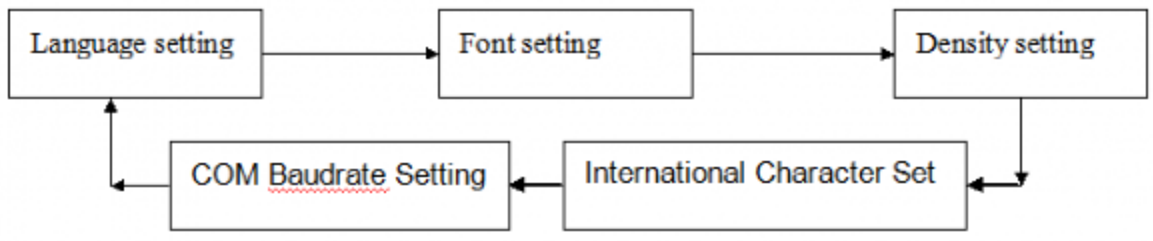
---current:xxxxxx---

This printed information tells you that you are now under[COM Baudrate Setting] mode, and also tells you the current COM Baudrate value.

If the current COM Baudrate value is not right for you , please complement one completed 【LF】operation to change it until you get the right setting.

If the current COM Baudrate value is right for you , please ignore 【LF】button, just go ahead with the following.

By now, you have got all the mode settings done. If you still need to modify the settings you did, please press MODE button and loosen it, the printer will go back to [Language setting] mode, just repeat the operation above. If you have already got all the right settings for you, you could choose to save& quit modes settings by powering off the printer and powering on the printer again.



How to enter/exit hexadecimal mode?

Hexadecimal mode is just for engineer development debugging. It's often not helpful for regular customers.

Enter hexadecimal mode: Power off the printer, hold down the【LF】button and keep pressing the 【  】 button at the same time. Wait until 【ERROR】indicator goes from on(red) to off, and to on(red) again, then loosen both buttons,the printer prints the presentation.

Exit hexadecimal mode: The way to exit hexadecimal mode is power off the printer.

How to reset wireless parameters back to factory default mode?

(**Note:This function is valid only for Wi-Fi model with firmware version which is W.10.09 and later**.)

Wireless factory default mode for Wi-Fi model is useful when unexpected situation occurs and cause wrong wireless setting and no other ways to take. We don't recommend that user do this without permission of factory alone.

Enter factory default mode: Power off the printer, hold down the【LF】button and keep pressing the 【  】 button at the same time. Wait(about 8 seconds) until the printer prints the presentation "wifi successfully reset to factory mode...",then loosen both buttons，finally restart printer.

How to set printer's other parameters using software tool ?

User can easily set other parameters for the printer by software tool "PrinterSettingTool.exe" on computer of windows OS, like downloading logo, setting language,setting print density, changing default code page, setting COM port baudrate, changing bluetooth name and pin ,and etc.

Also to make it more portable for user, user can install Android apk named by " BluetoothSettingTool.apk" to set some parameters for our printer anytime and anywhere as long as you have got cell phone or pad on hand.

Start printing with your device

The printer may contain four interfaces which are **Bluetooth Interface**, **Wi-Fi interface**,**Serial RS232 Interface**, and **USB Interface**. Please choose which interface you are going to use first, and then go to relative section to proceed with the setup.

Note: This chapter introduces manuals of all interfaces which our series printer may contain, it doesn't mean that the printer you purchased have all the interfaces, it depends on your order requirement.

Please just go to the section of interface which you purchased.

Bluetooth Interface

Information

The Bluetooth module which has advantages of small size and low consumption uses blueCore4-Ext chipset, and is fully compatible with Bluetooth 2.0; It supports 1200bps ~ 230400bps variety of baud rate combining with the printer .With SPP agreement, the maximum transfer speed is up to 3Mbit / s;

Set Bluetooth Module's parameters

We have provided "PrinterSettingTool.exe" under windows OS to let user change Bluetooth name or Pin or Baudrate. (In this way, you can use either USB interface or RS232 interface to get this done)

We also provide "BluetoothSettingTool.apk" under Android OS to let user change Bluetooth name or Pin or Baudrate , and etc.(In this way, you should only connect USB cable between your device and printer before running BluetoothSettingTool.apk)

Remark: Please note that tool mentioned above is useful only for Bluetooth 2.0 or 2.1 printer.

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How to print under Android OS with Bluetooth interface?

Please follow the steps as below:

1. Power on the printer;

2. Turn on the Bluetooth of your android device (basing on android device with Bluetooth first).

3. Scan and find the Bluetooth printer which is named by "Portable Printer".

4. Choose "Portable Printer" to pair.

5. Enter default pairing code "1234" if required.

6. If pairing is successful, "Portable Printer" would be added to paired devices list.

   If pairing fails, the Bluetooth interface might not be compatible with your android device, please contact us for technical support.

7. If paring was successful at the previous step , here, to ensure if our Bluetooth interface is working good with your device, please install our demo apk(named by "BluetoothDemo.apk") to test first. The test operation is very simple. Please go ahead with the test on your own. Contact us if need any help.

8. If demo apk test is successful, then you can start printing with your application software now.

   If demo apk test fails, the Bluetooth interface might not be compatible with your android device,

please contact us for technical support.

How to print under windows OS with Bluetooth interface?

Under windows OS, you should turn Bluetooth interface into serial port, and then start printing with Bluetooth interface like serial port does. But how to turn Bluetooth interface into serial port? Please first check if the device(laptop/PC) you are going to print with has Bluetooth function, and then install Bluetooth driver(Usually device itself with Bluetooth has already installed Bluetooth driver).You will find icon in the right bottom corner of your device desktop if Bluetooth driver is successfully installed. Then follow the steps followed to set up the Bluetooth.

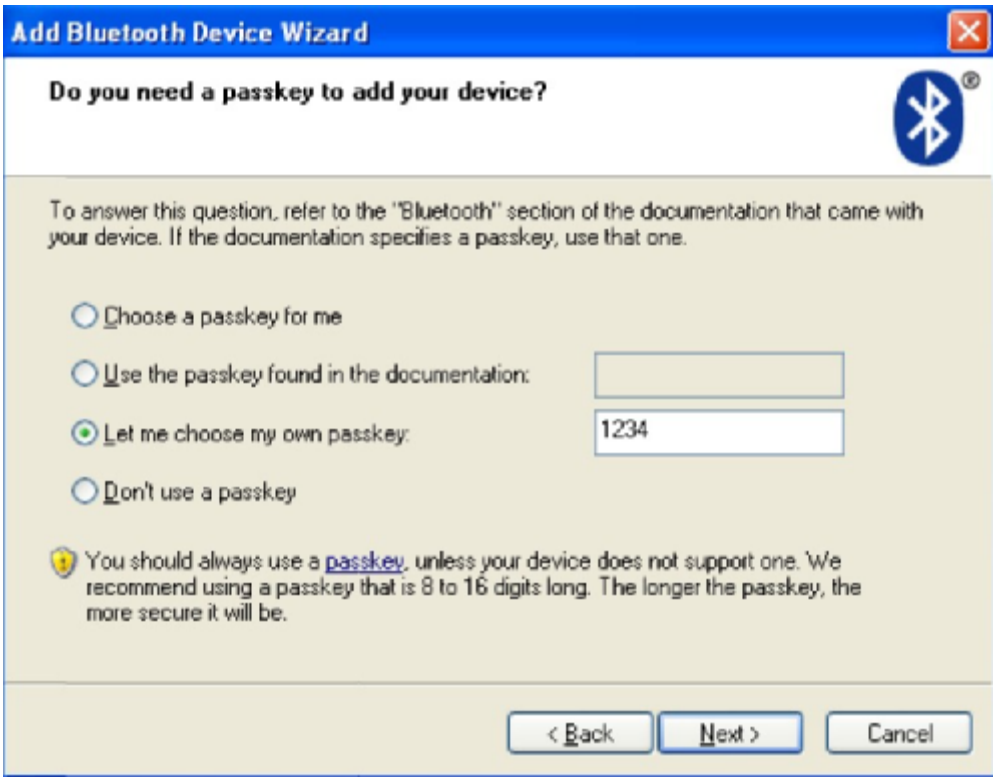
1.Power on the printer.

2.Please right-click the icon → select "Add a Bluetooth Device" ,and then proceed according to prompt ,here take windows xp for example , choose "My device is set up according and ready to be found"→ click "Next"

3.The device is now searching for the existed Bluetooth devices,please wait patiently.

4. Please select ”Portable Printer” from the device list, and click “Next”.

5. Select “Let me choose my own passkey”, then enter Bluetooth pin “1234”,and then click “Next”. (Remark: the default Bluetooth pin for our printer is “1234”， if you have changed it on your own or ordered different pin, please enter the right pin here . If you forget the pin , please contact us for help.)



6.Finally, you will see this window as below which tells you Bluetooth is set up successfully. And the Bluetooth interface is turned into serial port, click "Finish". Now start printing just like a serial port does using windows driver or a serial port tool. Just remember, for serial port printer, the Port is usually COM1, but for Bluetooth interface, the Port should be "Outgoing COM port" (for example, It's COM5 here).

Wi-Fi Interface

Information

The Wi-Fi module is compatible with IEEE802.11b/g/n wireless standard，which has advantages of small-form factor and the world's lowest power consumption embedded architecture.

Features

-Single stream Wi-Fi@2.4GHZ with support for WEP security as well as WPA/WPA2

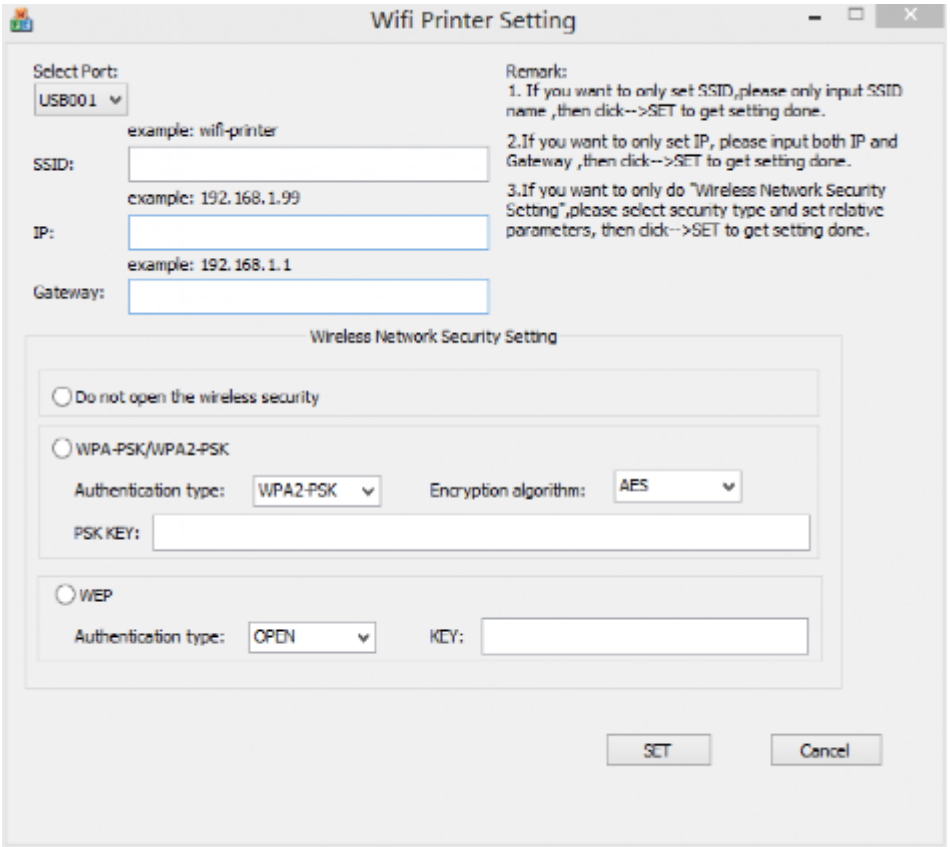
-Ultra Low Power Operation

-Support STA/AP Mode

-Support Multi-TCP Link

Set Wi-Fi Parameters

We have provided "WifiPrinterSettingTool.exe" under PC/laptop with windows OS for user to set wireless parameters before use for the first time. Please refer to CD "..\Tools\Wifi setting tool_ForWindowsOS\Wifi Printer Setting Guide.pdf" and get settings done.



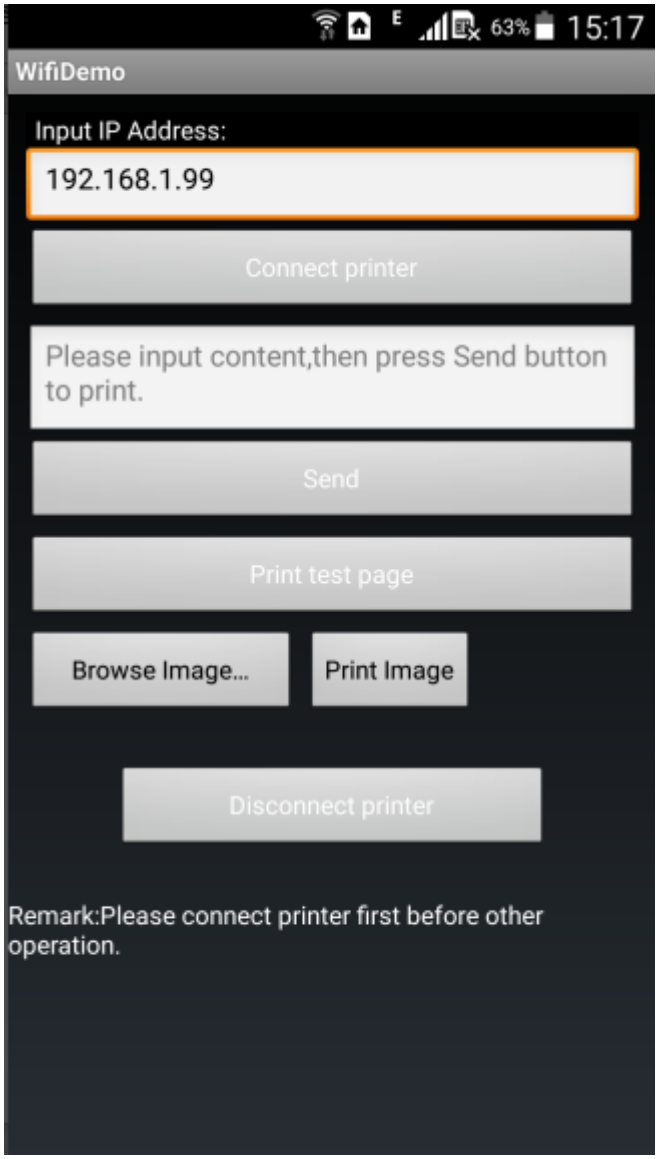
How to print under Android OS with Wi-Fi interface?

Please follow the steps as below:

1. Power on the printer,make sure wireless parameters are already set by “WifiPrinterSettingTool.exe”(Wifi Printer Setting Guide.pdf)

2. Turn on the Wi-Fi of your android device .

3.Ensure if our Wi-Fi interface is working good with your android device, please install our demo apk(named by “WifiDemo.apk”) to test first. The test operation is very simple. Turn on WifiDemo.apk, then input the printer IP addresss--->click on”Connect Printer”--->Input content and click on “Send” to print. Contact us if need any help.



4. If demo apk test is successful, then you can start printing with your application software now.

If demo apk test fails, then maybe wireless parameters are not set correctly, please contact us for technical support.

How to print under Windows/linux OS with Wi-Fi interface?

Please install windows/linux driver to print with Wi-Fi interface directly.

How to print under iOS with Wi-Fi interface?

Most POS APP under iOS support Wi-Fi printing, before apply the printer to iOS, make sure wireless parameters are already set by “WifiPrinterSettingTool.exe”(Wifi Printer Setting Guide.pdf).

Then set IP in your POS APP under iOS and start the print journey.

Serial RS232 Interface

Serial RS232 Interface is developed according to the EIA standard asynchronous transmission which complies with RS-232-C level.

For the first time you use the printer, you may not know the baud rate. Please get the current baud rate from the printer selftest page.(Please refer to section” How to print a selftest page?”)

Also, this RS232 interface baud rate can be changed between 1200 and 115200. Please use windows tool “PrinterSettingTool.exe” to set the right value the same as your device(usually PC or POS machine)

How to print under Windows/linux OS with RS232 interface?

Please install windows/linux driver to print with RS232 interface directly.

USB Interface

Please connect Mini USB cable (included in accessories) between printer and your device when you want to use USB interface to print. The USB type belongs to slave device type.

How to print under Android OS with USB interface?

It’s very easy to print under Android OS with USB interface as long as your device supports USB printing. We have provided demo Apk (named by “UsbDemo.apk”) to you for testing the compatibility. Please install this Apk first , and then turn it on , and after plug USB cable into your device(cell phone or pad) , then proceed with the test according to the remark.

How to print under Windows/linux OS with USB interface?

Please install windows/linux driver to print with USB interface directly.

How to clean printer ?

You should clean the printer head if the printer has the following situations.

1.After a long period of using printer, the printing might be getting unclear enough. It seems much worse than that in the beginning.

2.the printer is getting too much noisy while printing

Printer cleaning solutions:

1. Power off the printer, take off the battery.
2. If the printer just finished printing job, please wait a few minutes so that the printer head gets cool.
3. Open the media cover, remove the rest of thermal paper roll.
4. With a soft cotton dipped in ethanol (no dripping), wipe the printer head gently.
5. Wait for the complete evaporation of any ethanol, and then install battery and paper back, print a selftest page to see if it’s better.

Programmer Manual

Command Notation

[Name] The name of the command.
[Format] The code sequence.
[Range] Gives the allowable ranges for the arguments.
[Description] Describes the command's function.
[Details] Describes the usage of the command in detail.
[Notes] Provides important information on setting and using the printer command, if necessary.
[Default] Gives the default values, if any, for the command parameters.
[Reference] Lists related commands.
[Example] Gives examples of how to use the command.

Hex indicates the hexadecimal equivalents.
Decimal indicates the decimal equivalents.
[ ]*k* indicates the contents of the [ ] should be repeated *k* times.

Explanation of Terms

(1) Receive buffer
The receive buffer is a buffer that stores, as is, the data received from the host (the reception data). The reception data is stored in the receive buffer temporarily, and is then processed sequentially.
(2) Print buffer
The print buffer is a buffer that stores the image data to be printed.
(3) Print buffer full
This is the state where the print buffer is full. If new print data is input while the print buffer is full,

the data in the print buffer is printed out and a line feed is executed. This is the same operation as the LF operation.

(4) Start of line

The start of line state satisfies the following condition:

•There is no print data (including spaces and portions of data skipped due to bit image data) currently in the print buffer.

•There is no print data (including portions of data skipped due to HT)

•The print position is not specified by the ESC $ or ESC \ command.

(5) Printable area

The maximum range within which printing is possible under the printer specifications. The printable area for this printer is as follows:

①The length of the horizontal direction in standard mode:
approximately 48 mm {384/203"}

②The length of the horizontal direction in page mode:
approximately 48 mm {384/203"}

③The length of the vertical direction in page mode: approximately 117.3 mm {1662/360"}

(6) Printing area

Printing range is set by the command. It must be printing area ≤printable area.

(7) Ignore

The state in which all codes, including parameters, are read in and discarded, and nothing happens.

(8) Inch

A unit of length. One inch is 25.4 mm.

(9) MSB

Most Significant Bit

(10) LSB

Least Significant Bit

(11) Base line

Standard position when character data is stored in the print buffer.

Normal character in standard mode and page mode:

Control Commands

HT

[Name] Horizontal tab

[Format] ASCII HT
Hex 09
Decimal 9

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

[Details]
- This command is ignored unless the next horizontal tab position has been set.
- If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [Printing area width + 1].
- Horizontal tab positions are set with **ESC D**.
- If this command is received when the printing position is at [printing area width + 1], the printer executes print buffer-full printing of the current line and

horizontal tab processing from the beginning of the next line.
• The default setting of the horizontal tab position for the paper roll is font A (12 × 24) every 8th character (9th, 17th, 25th, ... column).

[Reference] **ESC D**

LF

[Name] Print and line feed

[Format] ASCII LF
Hex 0A
Decimal 10

[Description] Prints the data in the print buffer and feeds one line based on the current line spacing.

[Note] This command sets the print position to the beginning of the line.

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

FF (*)

[Name] Print and return to standard mode in page mode

[Format] ASCII FF
Hex 0C
Decimal 12

[Description] Prints the data in the print buffer collectively and returns to standard mode.

[Details]
- The buffer data is deleted after being printed.
- The printing area set by **ESC W** is reset to the default setting.
- The printer does not execute paper cutting.
- This command sets the print position to the beginning of the line.
- This command is enabled only in page mode.

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

CR

[Name] Print and carriage return

[Format] ASCII CR
Hex 0D
Decimal 13

[Description] When automatic line feed is enabled, this command functions the same as **LF**; when automatic line feed is disabled, this command is ignored.

[Details]
- Sets the print starting position to the beginning of the line.
- This command is set according to the factory tool.

[Reference] **LF**

CAN (*)

[Name] Cancel print data in page mode

[Format] ASCII CAN
Hex 18
Decimal 24

[Description] In page mode, deletes all the print data in the current printable area.

[Details]
- This command is enabled only in page mode.

- If data that existed in the previously specified printing area also exists in the currently specified printing area, it is deleted.

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

DLE EOT n (*)

[Name] Real-time status transmission

[Format]

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

[Range] $1 \leq n \leq 4$

[Description] Transmits the selected printer status specified by n in real-time, according to the following parameters:

n = 1: Transmit printer status
n = 2: Transmit off-line status
n = 3: Transmit error status
n = 4: Transmit paper roll sensor status
n = 5: Transmit battery status

[Details]

- The status is transmitted whenever the data sequence of <10>H<04>H< n> ($1 \leq n \leq 5$) is received.
  Example:
  In **ESC ＊ m nL nH d1...dk**, d1=<10>H, d2=<04>H, d3=<01>H
- This command should not be used within the data sequence of another command that consists of 2 or more bytes.
  Example:
  If you attempt to transmit **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted and then **DLE EOT 3** interrupts before n is received, the code <10>H for **DLE EOT 3** is processed as the code for **ESC 3 <**10>H.
- Even though the printer is not selected using **ESC =** (select peripheral device), this command is effective.
- The printer transmits the current status. Each status is represented by onebyte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is off-line, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command can not be executed when the printer is busy. This command is executed even when the printer is off-line or there is an error status when DIP switch 2-1 is on with a parallel interface model.
- When Auto Status Back (ASB) is enabled using the **GS a** command, the status transmitted by the **DLE EOT** command and the ASB status must be differentiated.

n = 1: Printer status

Bit	Off/On	Hex	Decimal	Function
0	0	00	0	Not used.Fixed to Off.
1	1	02	2	Not used.Fixed to On.
2	0	00	0	Drawer open/close signal is LOW(connector pin3)
	1	04	4	Drawer open/close signal is LOW(connector pin3)
3	0	00	0	On-line
	1	08	8	Off-line
4	1	10	16	Not used.Fixed to On.
5,6				Undefined.
7	0	00	00	Not used.Fixed to Off.

n = 2: Off-line status

Bit	Off/On	Hex	Decimal	Function
0	0	00	0	Not used.Fixed to Off.
1	1	02	2	Not used.Fixed to On.
2	0	00	0	Cover is closed.
	1	04	4	Cover is open.
3	0	00	0	Paper is not being fed by using the FEED button.
	1	08	8	Paper is beging fed by the FEED button.
4	1	10	16	Not used.Fixed to On.
5	0	00	0	No paper-end stop.
	1	20	32	Printing is being stopped.
6	0	00	0	No error.
	1	40	64	Error occurs.
7	0	00	0	Not used.Fixed to Off.

n = 3: Error status

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

n = 4: Continuous paper sensor status

Bit	Off/On	Hex	Decimal	Function
0	0	00	0	Not used.Fixed to Off.
1	1	02	2	Not used Fixed to On.
2,3	0	00	0	Paper roll near-end sensor:paper adequate.
	1	0C	12	Paper near-end is detected by the paper roll near-end sensor.
4	1	10	16	Not used.Fixed to On.
5,6	0	00	0	Paper roll sensor:Paper present.
	1	60	96	Paper roll end detected by paper roll senso.
7	0	00	0	Not used.Fixed to Off.

n = 5: Battery status

Return Value	Function
4~5	battery is high.
3	battery is medium
2	battery is low.
1	battery is extremely low, it must be charged at once.

[Reference] DLE ENQ, GS a, GS r

DLE ENQ n (*)

[Name] Real-time request to printer

[Format] ASCII DLE ENQ n
Hex 10 05 n
Decimal 16 5 n

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

[Description] Responds to a request from the host computer. n specifies the requests as follows:

n	Request
1	Recover from an error and restart printing from the line where the error occurred
2	Recover from an error aft clearing the receive and print buffers

[Details]
- This command is effective only when an auto-cutter error occurs.
- The printer starts processing data upon receiving this command.
- This command is executed even when the printer is off-line, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command can not be executed when the printer is busy. This command is executed even when the printer is off-line or there is an error status when DIP switch 2-1 is on with a parallel interface model.
- The status is also transmitted whenever the data sequence of <10>H<05>H<n>($1 \le n \le 2$) is received.

Example:

In **ESC ＊ m nL nH dk**, d1 = <10>H, d2 = <05>H, d3 = <01>H

- This command should not be contained within another command that consists of two or more bytes.

  Example:

  If you attempt to transmit **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted, and **DLE ENQ 2** interrupts before n is received, the code <10>H for **DLE ENQ 2** is processed as the code for **ESC 3** <10>H.

- **DLE ENQ 2** enables the printer to recover from an error after clearing the data in the receive buffer and the print buffer. The printer retains the settings (by **ESC !**, **ESC 3**, etc.) that were in effect when the error occurred. The printer can be initialized completely by using this command and **ESC @**. This command is enabled only for errors that have the possibility of recovery, except for print head temperature error.
- When the printer is disabled with **ESC =** (Select peripheral device), the error recovery functions (**DLE ENQ 1** and **DLE ENQ 2**) are enabled, and the other functions are disabled.

[Reference] **DLE EOT**

DLE DC4 n m t (*)

[Name] Generate pulse at real-time

[Format]

ASCII	DLE	DC4	n	m	t
Hex	10	14	n	m	t
Decimal	16	20	n	m	t

[Range] n = 1

m = 0, 1

$1 \leq t \leq 8$

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

m	Connector pin
0	Drawer kick-out connector pin 2.
1	Drawer kick-out connector pin 5.

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

[Details]

- When the printer is in an error status when this command is processed, this command is ignored.
- When the pulse is output to the connector pin specified while **ESC p** or **DEL DC4** is executed while this command is processed, this command is ignored.
- The printer executes this command upon receiving it.
- With a serial interface model, this command is executed even when the printer is off-line, the receive buffer is full, or there is an error status.
- With a parallel interface model, this command cannot be executed when the printer is busy. This command is executed even when the printer is off-line or there is an error status when DIP switch 2-1 is on.
- If print data includes the same character strings as this command, the printer

performs the same operation specified by this command. The user must consider this.

- This command should not be used within the data sequence of another command that consists of 2 or more bytes.
- This command is effective even when the printer is disabled with **ESC =** (Select peripheral device).

[Reference] **ESC p**

ESC FF (*)

[Name] Print data in page mode

[Format]

ASCII	ESC	FF
Hex	1B	0C
Decimal	27	12

[Description] In page mode, prints all buffered data in the printing area collectively.

[Details]
- This command is enabled only in page mode.
- After printing, the printer does not clear the buffered data, setting values for **ESC T** and **ESC W**, and the position for buffering character data.

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

ESC SP *n*

[Name] Set right-side character spacing

[Format]

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

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

[Description] Sets the character spacing for the right side of the character to [n horizontal or vertical motion units].

[Details]
- The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is n times normal value.
- This command does not affect the setting of kanji characters.
- This command sets values independently in each mode (standard and page modes).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current right-side spacing.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
  1 When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
  2 When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.
- The maximum right-side spacing is 255/180 inches. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] *n* = 0

[Reference] **GS P**

ESC ! *n*

[Name] Select print mode(s)

[Format] ASCII ESC ! *n*

Hex 1B 21 *n*

Decimal 27 33 *n*

[Range] 0 ≤ *n* ≤ 255

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

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (12 × 24).
	On	01	1	Character font B (9 × 17).
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

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

[Default] *n* = 0

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

ESC $ *nL nH*

[Name] Set absolute print position

[Format] ASCII ESC $ *nL* *nH*

Hex 1B 24 *nL* *nH*

Decimal 27 36 *nL* *nH*

[Range] 0 ≤ *nL* ≤ 255

$0 \leq nH \leq 255$

[Description] Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed.
- The distance from the beginning of the line to the print position is [(*nL* + *nH* × 256) × (vertical or horizontal motion unit)] inches.

[Details]
- Settings outside the specified printable area are ignored.
- The horizontal and vertical motion unit are specified by **GS P**.
- The GS P command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit (x) is used.
- In page mode, horizontal or vertical motion unit differs depending on the starting position of the printable area as follows:
  1 When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
  2 When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

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

ESC % n

[Name] Select/cancel user-defined character set

[Format]

ASCII	ESC	%	*n*	
Hex	1B	25	*n*	
Decimal	27	37	*n*	

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

[Description] Selects or cancels the user-defined character set.
- When the LSB of *n* is 0, the user-defined character set is canceled.
- When the LSB of *n* is 1, the user-defined character set is selected.

[Details]
- When the user-defined character set is canceled, the internal character set is automatically selected.
- *n* is available only for the least significant bit.

[Default] *n* = 0

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

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

[Name] Define user-defined characters

[Format]

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

[Range] *y* = 3

$32 \leq c1 \leq c2 \leq 126$

$0 \leq x \leq 12$ Font A (12 × 24)

$0 \leq x \leq 9$ Font B (9 × 17)

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

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

[Details]
- The allowable character code range is from ASCII code <20>H to <7E>H (95

characters).

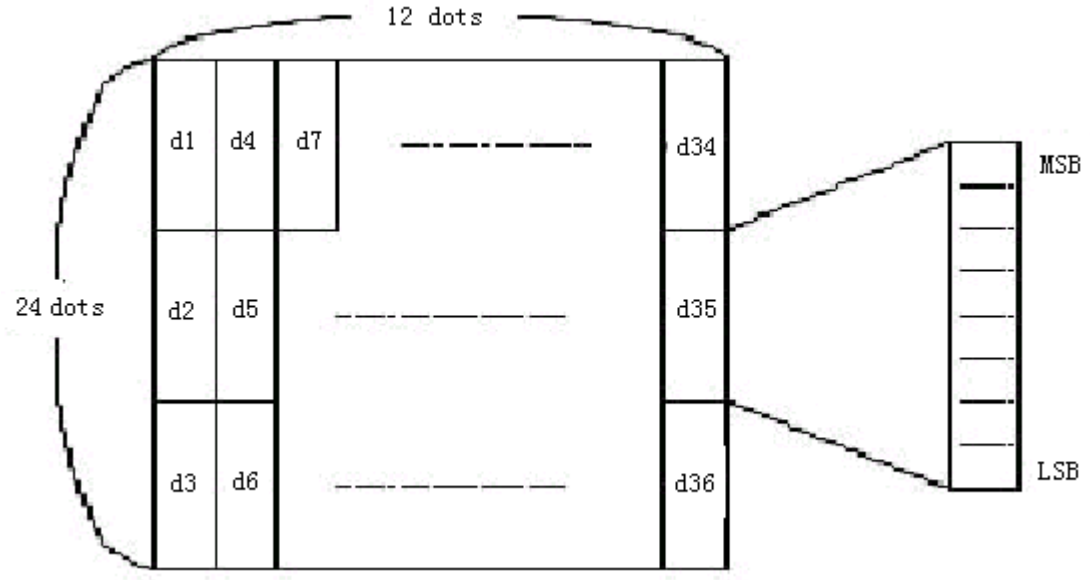
- It is possible to define multiple characters for consecutive character codes. If only one character is desired, use *c1 = c2*.
- *d* is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.
- The data to define a user-defined character is (y × x) bytes.
- Set a corresponding bit to 1 to print a dot or 0 to not print a dot.
- This command can define different user-defined character patterns by each fonts. To select a font, use **ESC !**
- A user-defined character and a downloaded bit image cannot be defined simultaneously. When this command is executed, the downloaded bit image is cleared.
- The user-defined character definition is cleared when:
  ① **ESC @** is executed.
  ② **ESC ?** is executed.
  ③ **FS q** is executed.
  ④ **GS *** is executed.
  ⑤ The printer is reset or the power is turned off.
- When the user-defined characters are defined in font B (9 × 17), only the most significant bit of the 3rd byte of data in vertical direction is effective.

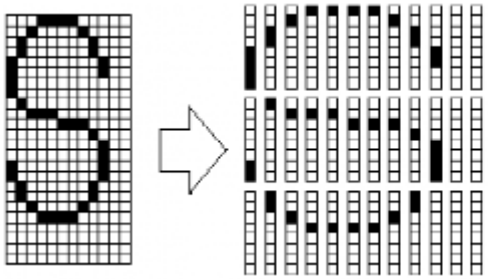
[Default] The internal character set

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

[Example]

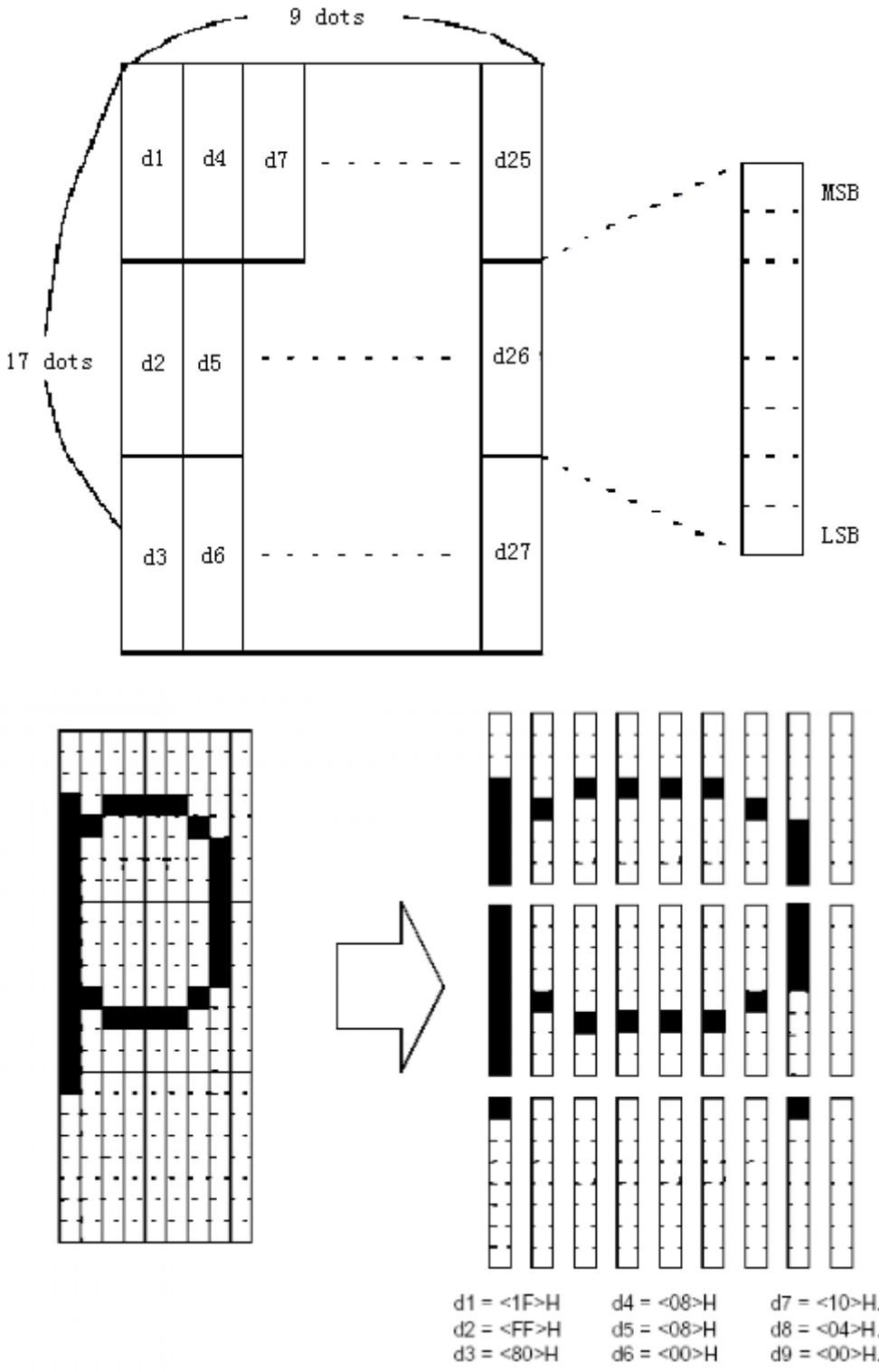
- When font A (12 × 24) is selected.





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

- When font B (9 × 17) is selected.



ESC * *m nL nH d1... dk*

[Name] Select bit-image mode

[Format]

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

[Range] *m* = 0, 1, 32, 33

$0 \leq nL \leq 255$

$0 \leq nH \leq 3$

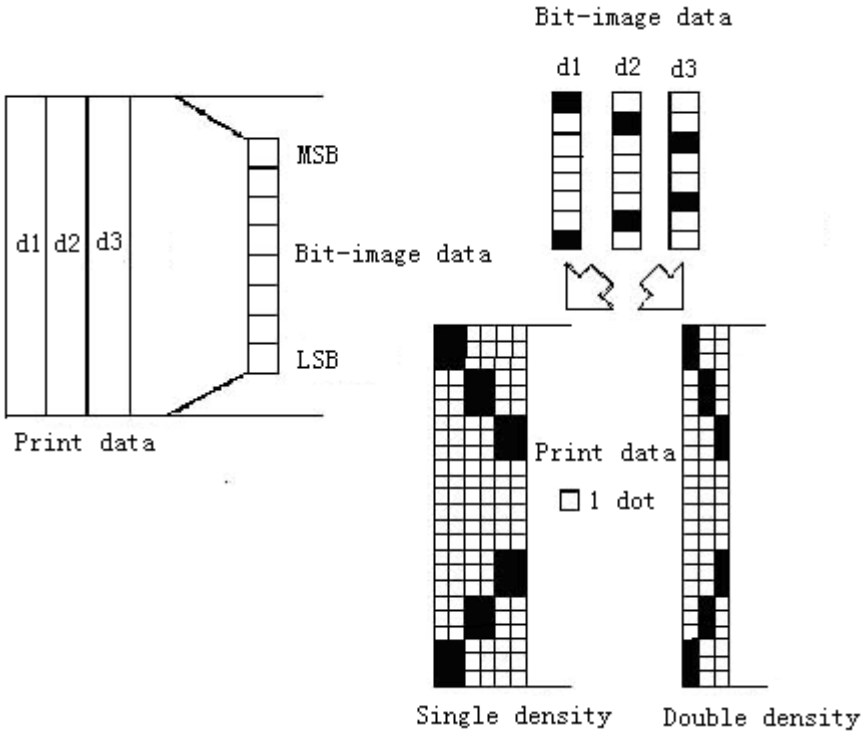
$0 \leq d \leq 255$

[Description] Selects a bit-image mode using m for the number of dots specified by *nL* and *nH*, as follows:

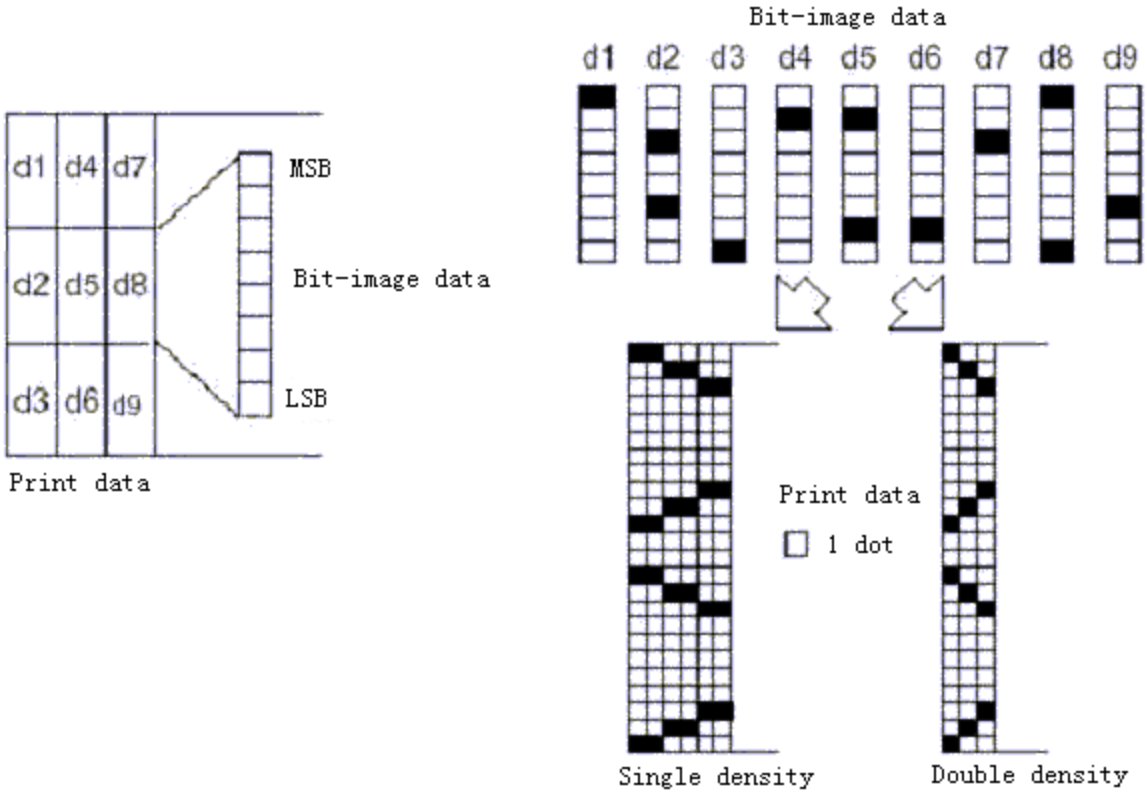
m	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot Density	Number of Data (K)
0	8-dot single-density	8	67 DPI	100 DPI	*nL + nH* × 256
1	8-dot double-density	8	67 DP	200 DPI	*nL + nH* × 256
32	24-dot single-density	24	200DPI	100 DPI	*(nL + nH* × 256*)* × 3
33	24-dot double-density	24	200 DPI	200DPI	*(nL + nH* × 256*)* × 3

[Details]

- If the values of *m* is out of the specified range, *nL* and data following are processed as normal data.
- The nL and nH indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by *nL + nH* × 256.
- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- *d* indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.
- If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC** * command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):
  ① The width of the printing area is extended to the right to accommodate the amount of data.
  ② If step ① does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
- The relationship between the image data and the dots to be printed is as follows:
- When 8-dot bit image is selected:



• When 24-dot bit image is 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] Turns underline mode on or off, based on the following values of *n*:

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

[Details]
- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT.**
- The printer cannot underline 90 clockwise rotated characters and white/black inverted characters.
- When underline mode id turned off by setting the value of n to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.
- Changing the character size does not affect the current underline thickness.
- Underline mode can also be turned on or off by using **ESC !**. Note, however, that the last received command is effective.
- This command does not affect the setting of Kanji characters.

[Default] *n* = 0

[Reference] **ESC !**

ESC 2

[Name] Select default line spacing

[Format] ASCII ESC 2

Hex 1B 32

Decimal 27 50

[Description] Selects 1/ 6-inch line (approximately 4.23mm) spacing.

[Details]
- The line spacing can be set independently in standard mode and in page mode.

[Reference] **ESC 3**

ESC 3 *n*

[Name] Set line spacing

[Format] ASCII ESC 3 *n*

Hex 1B 33 *n*

Decimal 27 51 *n*

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

[Description] Sets the line spacing to [*n* ╳ vertical or horizontal motion unit] inches.

[Details]
- The line spacing can be set independently in standard mode and in page mode.
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current line spacing.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
- In standard mode, the vertical motion unit (y) is used.
- In page mode, this command functions as follows, depending on the starting position of the printable area:
  ① When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.

② When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (x) is used.

• The maximum paper feed amount is 1016 mm (40 inches). Even if a paper feed amount of more than 1016 mm (40 inches) is set, the printer feeds the paper only 1016 mm (40 inches).

[Default] Line spacing equivalent to approximately 4.23mm (1/6 inches).

[Reference] **ESC 2**, **GS P**

ESC = *n* (*)

[Name] Set peripheral device

[Format]

ASCII	ESC	=	*n*
Hex	1B	3D	*n*
Decimal	27	61	*n*

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

[Description] Selects device to which host computer sends data, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Printer disabled
	On	01	1	Printer enabled
1-7	-	-	-	Undefined

[Details] When the printer is disabled, it ignores all data except for error-recovery commands (**DLE EOT, DLE ENQ, DLE DC4**) until it is enabled by this command.

[Default] *n* = 1

ESC ? *n*

[Name] Cancel user-defined characters

[Format]

ASCII	ESC	?	*n*
Hex	1B	3F	*n*
Decimal	27	63	*n*

[Range] $32 \leq n \leq 126$

[Description] Cancels user-defined characters.

[Details]

• This command cancels the pattern defined for the character code specified by *n*. After the user-defined characters is canceled, the corresponding pattern for the internal character is printed.

• This command deletes the pattern defined for the specified code in the font selected by **ESC !**.

• If a user-defined character has not been defined for the specified character code, the printer ignores this command.

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

ESC @

[Name] Initialize printer

[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description] Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.

[Details] • The DIP switch settings are not checked again.

• The data in the receive buffer is not cleared.
• The macro definition is not cleared.
• The NV bit image data is not cleared.
• The data of the user NV memory is not cleared.

ESC D *n1...nk* NUL

[Name] Set horizontal tab positions

[Format]

ASCII	ESC	D	*n1...nk*	*NUL*
Hex	1B	44	*n1...nk*	*00*
Decimal	27	68	*n1...nk*	*0*

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

$0 \leq k \leq 32$

[Description] Sets horizontal tab positions.

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

[Details]
- The horizontal tab position is stored as a value of [character width × *n*] measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
- This command cancels the previous horizontal tab settings.
- When setting *n* = 8, the print position is moved to column 9 by sending **HT**.
- Up to 32 tab positions (*k* = 32) can be set. Data exceeding 32 tab positions is processed as normal data.
- Transmit *[n]k* in ascending order and place a NUL code 0 at the end.
- When *[n]k* is less than or equal to the preceding value [*n]k*-1, tab setting is finished and the following data is processed as normal data.
- **ESC D NUL** cancels all horizontal tab positions.
- The previously specified horizontal tab positions do not change, even if the character width changes.
- The character width is memorized for each standard and page mode.

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

[Reference] **HT**

ESC E n

[Name] Turn emphasized mode on/off

[Format]

ASCII	ESC	E	n
Hex	1B	45	n
Decimal	27	69	n

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

[Description] Turns emphasized mode on or off

- When the LSB of n is 0, emphasized mode is turned off.
- When the LSB of n is 1, emphasized mode is turned on.

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

[Default] n = 0

[Reference] **ESC !**

ESC G *n*

[Name] Turn on/off double-strike mode

[Format]

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

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

[Description] Turns double-strike mode on or off.

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

[Default] *n* = 0

[Reference] **ESC E**

ESC J *n*

[Name] Print and feed paper

[Format]

ASCII	ESC	J	*n*
Hex	1B	4A	*n*
Decimal	27	74	*n*

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

[Description] Prints the data in the print buffer and feeds the paper [*n* × vertical or horizontal motion unit] inches.

[Details]
- After printing is completed, this command sets the print starting position to the beginning of the line.
- The paper feed amount set by this command does not affect the values set by **ESC 2** or **ESC 3**.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the vertical (and horizontal) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
- In standard mode, the printer uses the vertical motion unit (y).
- In page mode, this command functions as follows, depending on the starting position of the printable area:
  ① When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
  ② When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (x) is used.
- The maximum line spacing is 1016mm (40 inches). When the setting value exceeds the maximum, it is converted to the maximum automatically.

[Reference] **GS P**

ESC L (*)

[Name] Select page mode

[Format]

ASCII	ESC	L
Hex	1B	4C
Decimal	27	76

[Description] Switches from standard mode to page mode.

[Details]
- This command is enabled only when processed at the beginning of a line in standard mode.
- This command has no effect in page mode.
- After printing by **FF** is completed or by using **ESC S**, the printer returns to standard mode.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area defined by **ESC W**.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for page mode:
  ①Set right-side character spacing: **ESC SP, FS S**
  ②Select default line spacing: **ESC 2, ESC 3**
- Only valve settings is possible for the following commands in page mode; these commands are not executed.
  ①Turn 90° clockwise rotation mode on/off: **ESC V**
  ②Select justification: **ESC a**
  ③Turn upside-down printing mode on/off: **ESC {**
  ④Set left margin: **GS L**
  ⑤Set printable area width: **GS W**
- The following command is ignored in page mode:
  ①Execute test print: **GS (A**
- The following command is not available in page mode:
  ①Print NV bit image: **FS p**
  ②Define NV bit image: **FS q**
  ③Write to user NV memory: **FS g 1**
  ④Print raster bit image: **GS v 0**
- The printer returns to standard mode when power is turned on, the printer is reset, or **ESC @** is used.

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

ESC 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 fonts.

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

ESC R n

[Name] Select an international character set

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

[Range] $0 \leq n \leq 15$

[Description] Selects an international character set *n* from the following table:

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

[Default] Simplified Chinese model: *n* = 15
Models other than the Simplified Chinese model: *n* = 0

ESC S (*)

[Name] Select standard mode

[Format] ASCII ESC S
Hex 1B 53
Decimal 27 83

[Description] Switches from page mode to standard mode.

[Details]
- This command is effective only in page mode.
- Data buffered in page mode are cleared.
- This command sets the print position to the beginning of the line.
- The printing area set by **ESC W** are initialized.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for standard mode:

①Set right-side character spacing: **ESC SP, FS S**
②Select default line spacing: **ESC 2, ESC 3**

- The following commands are enabled only to set in standard mode.

①Set printing area in page mode: **ESC W**

②Select print direction in page mode: **ESC T**

- The following commands are ignored in standard mode.

①Set absolute vertical print position in page mode: **GS $**

②Set relative vertical print position in page mode: **GS **

- Standard mode is selected automatically when power is turned on, the printer is reset, or command **ESC @** is used.

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

ESC T n (*)

[Name] Select print direction in page mode

[Format]

ASCII	ESC	T	n
Hex	1B	54	n
Decimal	27	84	n

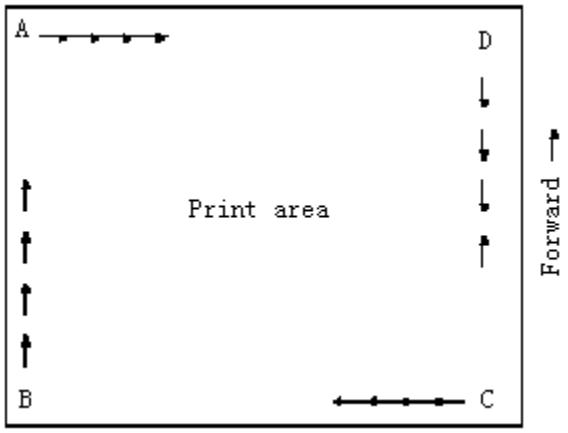
[Range] $0 \le n \le 3$

$48 \le n \le 51$

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

n specifies the print direction and starting position as follows:

n	Print Direction	Starting Position
0, 48	Left to right	Upper left
1, 49	Bottom to top	Lower left
2, 50	Right to left	Lower right
3, 51	Top to bottom	Upper right



[Details]

- When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- This command sets the position where data is buffered within the printing area set by **ESC W**.
- Parameters for horizontal or vertical motion units (x or y) differ as follows, depending on the starting position of the printing area:

① If the starting position is the upper left or lower right of the printing area, data is buffered in the direction perpendicular to the paper feed direction:

Commands using horizontal motion units: **ESC SP**, **ESC $**, **ESC **
Commands using vertical motion units: **ESC 3**, **ESC J**, **GS $**, **GS **

② If the starting position is the upper right or lower left of the printing area, data is buffered in the paper feed direction:
Commands using horizontal motion units: **ESC 3**, **ESC J**, **GS $**, **GS **
Commands using vertical motion units: **ESC SP**, **ESC $**, **ESC **

[Default] n = 0

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

ESC V n (*)

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

[Format]

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

[Range] 0 ≤ n ≤ 1, 48 ≤ n ≤ 49

[Description] Turns 90° clockwise rotation mode on/off
n is used as follows:

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

[Details]
- This command affects printing in standard mode. However, the setting is always effective.
- When underline mode is turned on, the printer does not underline 90° clockwise-rotated.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double- width commands in normal mode.

[Default] n = 0

[Reference] **ESC !, ESC** –

ESC W xL xH yL yH dxL dxH dyL dyH (*)

[Name] Set printing area in page mode

[Format]

ASC II	ESC	W	xL	xH	yL	yH	dxL	dxH	dyL	dyH
Hex	1B	57	xL	xH	yL	yH	dxL	dxH	dyL	dyH
Decimal	27	87	xL	xH	yL	yH	dxL	dxH	dyL	dyH

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

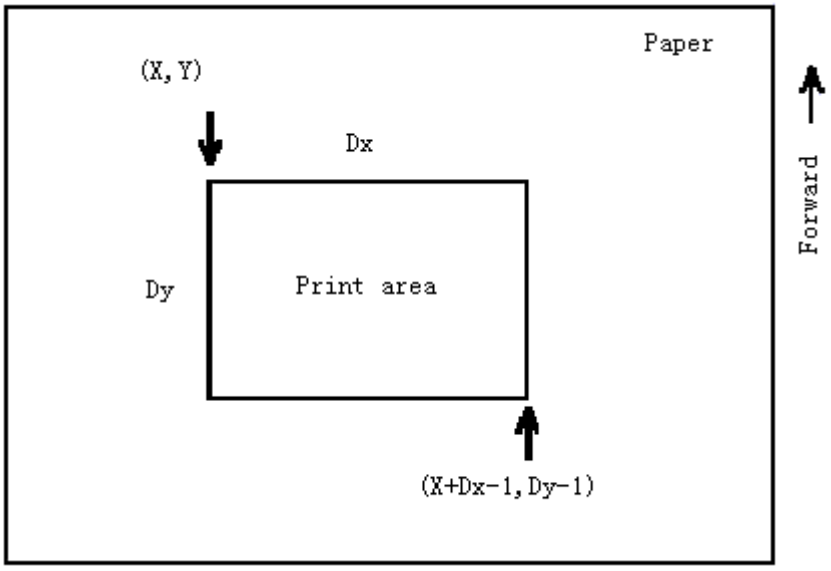
[Description]
- The horizontal starting position, vertical starting position, printing area width, and printing area height are defined as x0, y0, dx (inch), dy (inch), respectively. Each setting for the printing area is calculated as follows:

x0 = [(xL + xH × 256) × (horizontal motion unit)]
y0 = [(yL + yH × 256) × (vertical motion unit)]
dx = [dxL + dxH × 256] × (horizontal motion unit)]
dy = [dyL + dyH × 256] × (vertical motion unit)]

The printing area is set as shown in the figure below.

[Details]

- If this command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- If the horizontal or vertical starting position is set outside the printable area, the printer stops command processing and processes the following data as normal data.
- If the printing area width or height is set to 0, the printer stops command processing and processes the following data as normal data.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area.
- If (horizontal starting position + printing area width) exceeds the printable area, the printing area width is automatically set to (horizontal printable area - horizontal starting position).
- If (vertical starting position + printing area height) exceeds the printable area, the printing area height is automatically set to (vertical printable area - vertical starting position).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current printing area.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of minimum horizontal movement amount.
- Use the horizontal motion unit (x) for setting the horizontal starting position and printing area width, and use the vertical motion unit (y) for setting the vertical starting position and printing area height.
- When the horizontal starting position , vertical starting position, printing area width, and printing area height are defined as X, Y, Dx, and Dy respectively, the printing area is set as shown in the figure below.



- This printable area for this printer is approximately 72 mm in the horizontal direction and approximately 117.3 mm (1662/360 inches) in the vertical direction.

[Default] xL = xH = yL = yH = 0

dxL = 0, dxH = 2, dyL = 126, dyH = 6

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

ESC \ *nL nH*

[Name] Set relative print position

[Format]

ASCII	ESC	\	*nL*	*nH*
Hex	1B	5C	*nL*	*nH*
Decimal	27	92	*nL*	*nH*

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

$0 \le nH \le 255$

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

- This command sets the distance from the current position to [(*nL* + *nH* × 256) × horizontal or vertical motion unit]

[Details]

- Any setting that exceeds the printable area is ignored.
- When pitch N is specified to the right:
  nL + *nH* × 256 = *N*
  When pitch N is specified to the left (the negative direction), use the complement of 65536.
  When pitch N is specified to the left:
  nL + *nH* × 256 = 65536 - *N*
- The print starting position moves from the current position to [N × horizontal or vertical motion unit]
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area:
  ①When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
  ②When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

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

ESC a n

[Name] Select justification

[Format]

ASCII	ESC	a	n
Hex	1B	61	n
Decimal	27	97	n

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

[Description] Aligns all the data in one line to the specified position

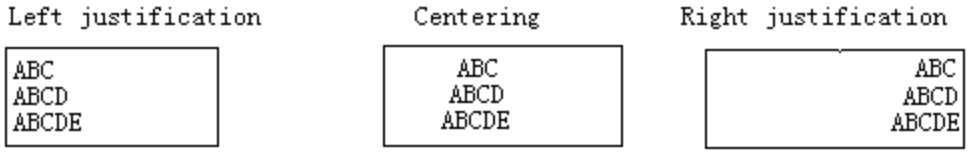
n selects the justification as follows:

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

[Details] • The command is enabled only when processed at the beginning of the line in standard mode.
• If this command is input in page mode, the printer performs only internal flag operations.
• This command has no effect in page mode.
• This command executes justification in the printing area.
• This command justifies the space area according to **HT, ESC $** or **ESC **.

[Default] n = 0

[Example]



ESC c 3 n (*)

[Name] Select paper sensor(s) to output paper end signals

[Format]

ASCII	ESC	c	3	*n*
Hex	1B	63	33	*n*
Decimal	27	99	51	*n*

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

[Description] Selects the paper sensor(s) to output paper end signals

• Each bit of *n* is used as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled
	On	01	1	Paper roll near-end sensor enabled
1	Off	00	0	Paper roll end sensor disabled
	On	02	2	Paper roll near-end sensor enabled
2	Off	00	0	Paper roll end sensor disabled
	On	04	4	Paper roll near-end sensor enabled
3	Off	00	0	Paper roll end sensor disabled
	On	08	8	Paper roll near-end sensor enabled
4-7	-	-	-	Undefined

[Details] • It is possible to select multiple sensors to output signals. Then, if any of the sensors detects a paper end, the paper end signal is output.
• The command is available only with a parallel interface and is ignored with a serial interface.
• Sensor is switched when executing this command. The paper end signal switching be delayed depending on the receive buffer state.
• If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals
• If either bit 2 or bit 3 is on, the paper roll end sensor is selected as the paper sensor outputting paper-end signals.
• When all the sensors are disabled, the paper end signal always outputs a paper present status.

ESC c 4 n (*)

[Name] Select paper sensor(s) to stop printing

[Format] ASCII ESC c 4 *n*

Hex 1B 63 34 *n*

Decimal 27 99 52 *n*

[Range] 0 ≤ *n* ≤255

[Description] Selects the paper sensor(s) used to stop printing when a paper-end is detected, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled
	On	01	1	Paper roll near-end sensor enabled
1	Off	00	0	Paper roll end sensor disabled
	On	02	2	Paper roll near-end sensor enabled
2-7	-	-	-	Undefined

[Details]
- When a paper sensor is enabled with this command, printing is stopped only when the corresponding paper is selected for printing.
- When a paper-end is detected by the paper roll sensor, the printer goes offline after printing stops.
- When either bit 0 or 1 is on, the printer selects the paper roll near-end sensor for the paper sensor to stop printing.

[Default] *n* = 0

ESC C 5 *n*

[Name] Enable/disable panel buttons

[Format] ASCII ESC c 5 *n*

Hex 1B 63 35 *n*

Decimal 27 99 53 *n*

[Range] 0 ≤ *n* ≤255

[Description] Enables or disables the panel buttons.
- When the LSB of *n* is 0, the panel buttons are enabled.
- When the LSB of *n* is 1, the panel buttons are disabled.

[Details]
- Only the lowest bit of n is valid.
- When the panel buttons are disabled, none of them are usable when the printer cover is closed.
- In this printer, the panel buttons are the FEED button.
- In the macro ready mode, the FEED button are enabled regardless of the settings of this command; however, the paper cannot be fed by using these buttons.

[Default] *n* = 0

ESC d *n*

[Name] Print and feed *n* lines

[Format] ASCII ESC d *n*

Hex	1B	64	*n*
Decimal	27	100	*n*

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

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

[Details]
- This command sets the print starting position to the beginning of the line.
- This command does not affect the line spacing set by **ESC 2** or **ESC 3**.
- The maximum paper feed amount is 1016 mm (40 inches). If the paper feed amount (*nx* line spacing) of more than 1016 mm (40 inches) is specified, the printer feeds the paper only 1016 mm (40 inches).

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

ESC p *m t1 t2*

[Name] Generate pulse

[Format]	ASCII	ESC	p	*m*	*t1* *t2*
	Hex	1B	70	*m*	*t1* *t2*
	Decimal	27	112	*m*	*t1* *t2*

[Range] *m* = 0, 1, 48, 49

$0 \le t1 \le 255$, $0 \le t2 \le 255$

[Description] Outputs the pulse specified by t1 and t2 to connector pin m as follows:

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

[Details]
- The pulse ON time is [*t1* × *2* ms] and the OFF time is [*t2* × *2* ms].
- If *t2* < *t1*, the OFF time is [*t1x 2* ms]

[Reference] **DLE DC4**

ESC t n

[Name] Select character code table

[Format]	ASCII	ESC	t	*n*
	Hex	1B	74	*n*
	Decimal	27	116	*n*

[Range] $0 \le n \le 10$, $16 \le n \le 21$

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

[Default] *n* = 0

n	Codepage	n	Codepage
0	OEM437(Std.Europe)	50	OEM437(Std.Europe)
1	(Katakana)	51	(Katakana)
2	OEM850(Multilingual)	52	OEM437(Std.Europe)
3	OEM860(Portuguese)	53	OEM858(Multilingual)
4	OEM863(Canadian)	54	OEM852(Latin-2)
5	OEM865(Nordic)	55	OEM860(Portuguese)
6	(West Europe)	56	OEM861(Icelandic)
7	(Greek)	57	OEM863(Canadian)
8	(Hebrew)	58	OEM865(Nordic)
9	(East Europe)	59	OEM866(Russian)

10	(Iran)	60	OEM855(Bulgarian)
16	Windows Codepage 1252	61	OEM857(Turkey)
17	OEM866(Cyrillic#2)	62	OEM862(Hebrew)
18	OEM852(LatinII)	63	OEM864(Arabic)
19	OEM858	64	OEM737(Greek)
20	(IranII)	65	OEM851(Greek)
21	(Latvian)	66	OEM869(Greek)
22	(Arabic)	67	OEM928(Greek)
23	(PT151,1251)	68	OEM772(Lithuanian)
24	OEM747	69	OEM774(Lithuanian)
25	Windows Codepage 1257	70	OEM874(Thai)
26	Reserved	71	Windows Codepage 1252(Latin-1)
27	(Vietnam)	72	Windows Codepage 1250(Latin-2)
28	OEM864	73	Windows Codepage 1251(Cyrillic)
29	Codepage 1001	74	Codepage 3840(IBM-Russian)
30	(Uigur)	75	Codepage 3841(Gost)
31	(Hebrew)	76	Codepage 3843(Polish)
32	Windows Codepage 1255(Israel)	77	Codepage 3844(CS2)
33	Windows Codepage 1256(Arabic)	78	Codepage 3845(Hungarian)
34	Windows Codepage 1258(Vietnam)	79	Codepage 3846(Turkish)
35	OEM720(Arabic)	80	Codepage 3847(Brazil-ABNT)
36	OEM775(Latvian)	81	Codepage 3848(Brazil-ABICOMP)
37	Windows Codepage 1253(Greek)	82	Codepage 1001(Arabic)
38	Windows Codepage 1254(Turkish)	83	Codepage 2001(Lithuanian-KBL)
39	(Thai2)	84	Codepage 3001(Estonian-1)
40	ISO-8859-1(West Europe)	85	Codepage 3002(Estonian-2)
41	ISO-8859-15(Latin-3)	86	Codepage 3011(Latvian-1)
255	(Thai)	87	Codepage 3012(Latvian-2)
		88	Codepage 3021(Bulgarian)
		89	Codepage 3041(Maltese)

ESC { n

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

[Format] ASCII ESC { n

Hex 1B 7B n

Decimal 27 123 n

[Range] 0 ≤ n ≤ 255

[Description] Turns upside-down printing mode on or off.

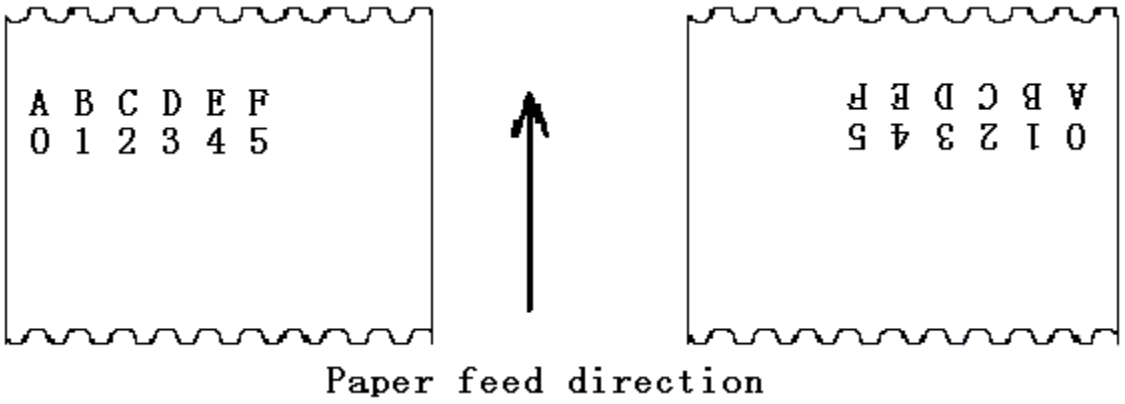
- When the LSB of n is 0, upside-down printing mode is turned off.

- When the LSB of n is 1, upside-down printing mode is turned on.

[Details]
- Only the lowest bit of n is valid.
- This command is enabled only when processed at the beginning of a line in standard mode.
- When this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

[Default] n = 0

[Example]



FS p n m (*)

[Name] Print NV bit image

[Format]

ASCII	FS	p	*n*	*m*
Hex	1C	70	*n*	*m*
Decimal	28	112	*n*	*m*

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

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

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

m	**Mode**	**Vertical Dot Density**	**Horizontal Dot Density**
0, 48	Normal	200 dpi	200 dpi
1, 49	Double-width	200 dpi	100 dpi
2, 50	Double-height	100 dpi	200 dpi
3, 51	Quadruple	100 dpi	100 dpi

[dpi: dots per 25.4 mm {1"}]

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

[Details]
- NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- This command is not effective when the specified NV bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print

buffer.

- In page mode, this command is not effective.
- This command is not affected by print modes (emphasized, double-strike, underline,character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
- If the printing area width set by **GS L** and **GS W** for the NV bit image is less than one vertical line, the following processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode (*m*=0, 48) and in double-height mode (*m*=2, 50), and it means 2 dots in double-width mode (*m*=1, 49) and in quadruple mode(*m*=3, 51).
  ①The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.
  ②If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.
- If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.
- This command feeds dots (for the height *n* of the NV bit-image) in normal and double-widthmodes, and (for the height *n* · 2 of the NV bit-image) in double-height and quadruple modes,regardless of the line spacing specified by **ESC 2** or **ESC 3**.
- After printing the bit image, this command sets the print position to the beginning of the lineand processes the data that follows as normal data.

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

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

[Name] Define NV bit image

[Format]

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

[Range]

$0 \le n \le 255$

$0 \le xL \le 255$

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

$0 \le yL \le 255$

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

$0 \le d \le 255$

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

Total defined data area = 0.5M bits (64K bytes)

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

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

[Details]

- This command cancels all NV bit images that have already been defined by this command.The printer can not redefine only one of several data definitions previously

defined. In this case, all data needs to be sent again.

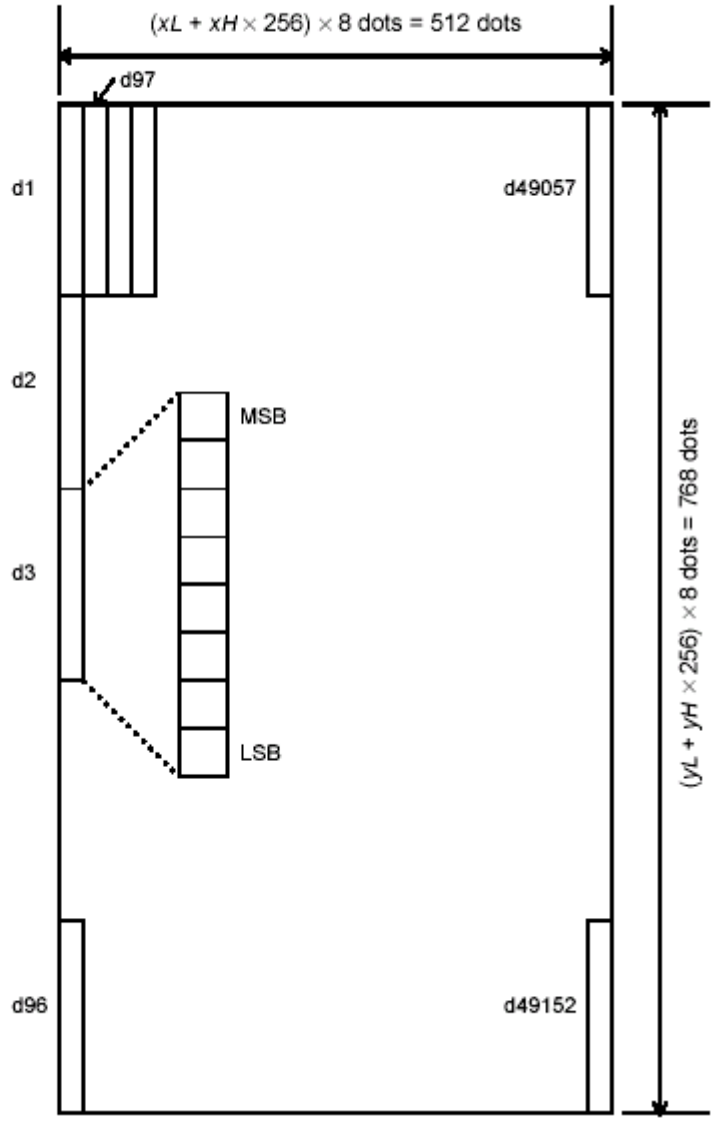
- From the beginning of the processing of this command till the finish of hardware reset,mechanical operations (including initializing the position of the printer head when the cover is open, paper feeding by using the FEED button, etc.) cannot be performed.
- During processing this command, the printer is in BUSY when writing the data to the NV user memory and stops receiving data. Therefore it is prohibitted to transmit the data including the real-time commands during the execution of this command.
- NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- In standard mode, this command is effective only when processed at the beginning of the line.

- In page mode, this command is not effective.
  - This command is effective when 7 bytes <FS yH> is processed as a normal value.
  - When the amount of data exceeds the capacity left in the range defined by *xL, xH, yL, yH*, the printer processes *xL, xH, yL, yH* out of the defined range.
  - In the first group of NV bit images, when any of the parameters *xL, xH, yL, yH* is out of the definition range, this command is disabled.
  - In groups of NV bit images other than the first one, when the printer processes *xL, xH, yL, yH* out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that haven¡¯t been defined are disabled (undefined), but any NV bit images before that are enabled.
  - The *d* indicates the definition data. In data (*d*) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
  - This command defines *n* as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group *[xL xH yL yH d1...dk]* is NV bit image 01H, and the last data group *[xL xH yL yH d1...dk]* is NV bit image *n.* The total agrees with the number of NV bit images specified by command **FS p**.
  - A definition data of a NV bit image consists of *[xL xH yL yH d1...dk].* Therefore, when only one NV bit image is defined *n*=1, the printer processes a data group *[xL xH yL yH d1...dk]* once. The printer uses ([data: (*xL* + *xH*×256) ×(*yL* + *yH*×256) ×8] + [header :4])bytes of NV memory.
  - The definition area in this printer is a maximum of 0.5M bits (64K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 0.5M bits (64K bytes).
- The printer is busy immediately before writing into NV memory.
  - The printer does not transmit ASB status and perform status detection during processing of this command even when ASB is specified.
  - When this command is received during macro definition, the printer ends macro definition,and begins performing this command.
  - Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
  - This command performs only definition of a NV bit image and does not perform printing.Printing of the NV bit image is performed by the **FS p** command.

[Details]
- Frequent write command execution may cause damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- The printer performs a hardware reset after the procedure to place the image into the NV memory. Therefore, user-defined characters, downloaded bit images, and macros should be defined only after completing this command. The printer clears the receive and print buffers and resets the mode to the mode that was in effect at power on. At this time, DIP switch settings are checked again.

[Reference] **FS p**

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



GS ! n (*)

[Name] Select character size

[Format]

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

[Range] 0 ≤ n ≤ 255

(1 ≤ vertical number of times ≤ 8, 1 ≤ horizontal number of times ≤ 8)

[Description] Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

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

Table 1 Table 2

Character Width Selection

Hex	Decimal	Width
00	0	1(normal)
10	16	2(double-width)
20	32	3
30	48	4
40	64	5
50	80	6
60	96	7
70	112	8

Table 1 Table 2

Character Height Selection

Hex	Decimal	Width
00	0	1(normal)
10	16	2(double-height)
20	32	3
30	48	4
40	64	5
50	80	6
60	96	7
70	112	8

[Details]
- This command is all characters (alphanumeric and Kanji) effective except for HRI characters.
- If n is outside of the defined range, this command is ignored.
- In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90° clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.
- In page mode, vertical and horizontal directions are based on the character orientation.

- When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.
- The **ESC !** command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

[Default] n = 0

[Reference] **ESC !**

GS $ nL nH (*)

[Name] Set absolute vertical print position in page mode

[Format]

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

[Range] $0 \le nL \le 255, 0 \le nH \le 255$

[Description]
- Sets the absolute vertical print starting position for buffer character data in page mode.
- This command sets the absolute print position to [(nL + nH $\times$ 256) $\times$ (vertical or horizontal motion unit)] inches.

[Details]
- This command is effective only in page mode.
- If the [(nL + nH $\times$ 256) $\times$ (vertical or horizontal motion unit)] exceeds the specified printing area, this command is ignored.
- The horizontal starting buffer position does not move.
- The reference starting position is that specified by **ESC T**.
- This command operates as follows, depending on the starting position of the printing area specified by **ESC T**:

  ①When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.

  ②When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal direction.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

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

*GS * x y d1...d(x×y×8)*

[Name] Define downloaded bit image

[Format]

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

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

$1 \le y \le 48$

$x \le y \le 1536$

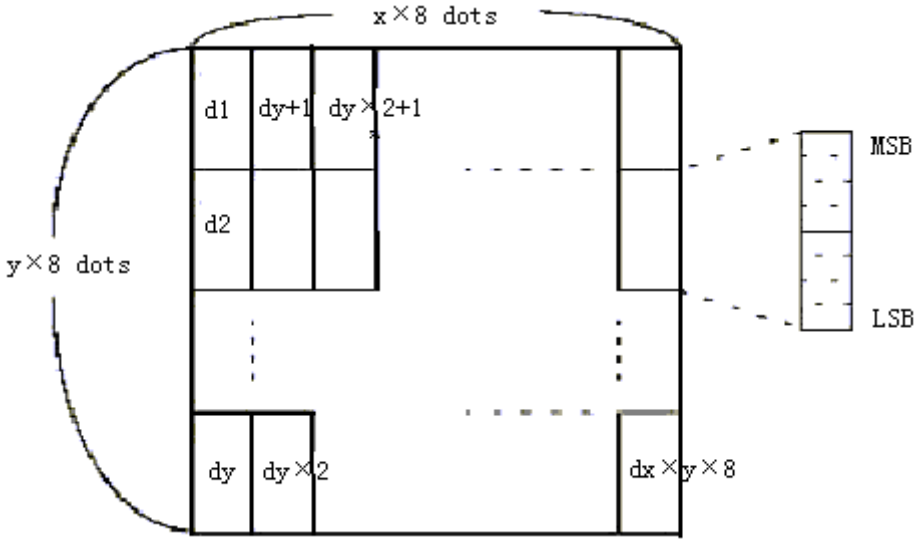
$0 \le d \le 255$

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

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

[Details]

- The number of dots in the horizontal direction is $x \times 8$, in the vertical direction it is $y \times 8$.
- If $x \times y$ is out of the specified range, this command is disabled.
- The *d* indicates bit-image data. Data (*d*) specifies a bit printed to 1 and not printed to 0.
- The downloaded bit image definition is cleared when:
  ① **ESC @** is executed.
  ② **ESC &** is executed.
  ③ **FS q** is executed.
  ④ Printer is reset or the power is turned off.
- The following figure shows the relationship between the downloaded bit image and the printed data.



[Reference] **GS /**

GS / *m*

[Name] Print downloaded bit image

[Format]

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

[Range] $0 \le m \le 3, 48 \le m \le 51$

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

m selects a mode from the table below:

m	**Mode**	**Vertical Dot Density (DPI)**	**Horizontal Dot Density (DPI)**
0, 48	Normal	203	203
1, 49	Double-width	203	101.5
2, 50	Double-height	101.5	203
3, 51	Quadruple	101.5	101.5

[Details]
- This command is ignored if a downloaded bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command has no effect in the print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except forupsidedownprinting mode.
- If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
- Refer to Figure 3.12.3 for the downloaded bit image development position in page mode.
- If the printing area width set by **GS L** and **GS W** is less than one line in vertical, the following processing is performed only on the line in question:
  ① The printing area width is extended to the right up to one line in vertical. In this case, printing does not exceed the printable area.
  ② If the printing area width cannot be extended by one line in vertical, the left margin is reduced to accommodate one line in vertical.

[Reference] **GS ***

GS : (*)

[Name] Start/end macro definition

[Format]

ASCII	GS	:	
Hex	1D	3A	
Decimal	29	58	

[Description] Starts or ends macro definition.

[Details]
- Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.
- When **GS ^** is received during macro definition, the printer ends macro definition and clears the definition.
- Macro is not defined when the power is turned on.
- The defined contents of the macro are not cleared by **ESC @**. Therefore, **ESC @** can be included in the contents of the macro definition.
- If the printer receives **GS :** again immediately after previously receiving **GS :** the printer remains in the macro undefined state.
- The contents of the macro can be defined up to 2048 bytes. If the macro definition exceed 2048 bytes, excess data is not stored.

[Reference] **GS ^**

GS B n (*)

[Name] Turn white/black reverse printing mode

[Format]

ASCII	GS	B	n
Hex	1D	42	n
Decimal	29	66	n

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

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

[Details]
- Only the lowest bit of n is valid.
- This command is available for built-in characters and user-defined characters.

- When white/black reverse printing mode is on, it also applied to character spacing set by **ESC SP**.
- This command does not affect bit image, user-defined bit image, bar code, HRI characters, and spacing skipped by **HT**, **ESC $**, and **ESC **.
- This command does not affect the space between lines.
- White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it is disabled (but not canceled) when white/black reverse mode is selected.

[Default] n = 0

GS H n

[Name] Select printing position for HRI characters

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

[Range] $0 \le n \le 3, 48 \le n \le 51$

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

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

- HRI indicates Human Readable Interpretation.

[Details] • HRI characters are printed using the font specified by **GS f**.

[Default] n = 0

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

GS L *nL nH*

[Name] Set left margin

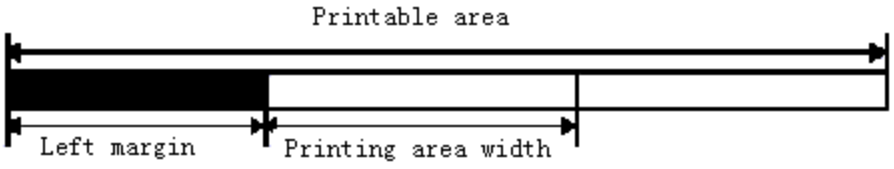
[Format] ASCII GS L *nL* *nH*
Hex 1D 4C *nL* *nH*
Decimal 29 76 *nL* *nH*

[Range] $0 \le nL \le 255$
$0 \le nH \le 255$

[Description] Sets the left margin using nL and nH.
• The left margin is set to [($nL + nH \times 256$) ×horizontal motion unit]] inches.
Printable area
Left margin Printing area width

[Details]
• This command is effective only processed at the beginning of the line in standard mode.
• If this command is input in page mode, the printer performs only internal flag operations.
• This command does not affect printing in page mode.
• If the setting exceeds the printable area, the maximum value of the printable area is used.
• The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion unit does not affect the current left margin.

• The horizontal motion unit (x) is used for calculating the left margin. The calculated result is truncated to the minimum value of the mechanical pitch.



[Default] *nL* = 0, *nH* = 0

[Reference] **GS P**, **GS W**

GS P x y (*)

[Name] Set horizontal and vertical motion units

[Format] ASCII GS P x y

Hex 1D 50 x y

Decimal 29 80 x y

[Range] 0 ≤ x ≤ 255

0 ≤ y ≤ 255

[Description] Sets the horizontal and vertical motion units to approximately 25.4/ x mm { 1/ x inches} and approximately 25.4/ y mm {1/ y inches}, respectively.

When x and y are set to 0, the default setting of each value is used.

[Details]
- The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.
- In standard mode, the following commands use x or y, regardless of character rotation (upside-down or 90° clockwise rotation):

  ①Commands using x: **ESC SP**, **ESC $**, **ESC **, **FS S, GS L**, **GS W**

  ②Commands using y: **ESC 3**, **ESC J**, **GS V**
- In page mode, the following command use x or y, depending on character orientation:

  ①When the print starting position is set to the upper left or lower right of the printing area using **ESC T** (data is buffered in the direction perpendicular to the paper feed direction):

  Commands using x: **ESC SP**, **ESC $**, **ESC W**, **ESC \, FS S**

  Commands using y: **ESC 3**, **ESC J**, **ESC W**, **GS $**, **GS **, **GS V**

  ②When the print starting position is set to the upper right or lower left of the printing area using **ESC T** (data is buffered in the paper feed direction):

  Commands using x: **ESC 3**, **ESC J**, **ESC W**, **GS $**, **GS **

  Commands using y: **ESC SP**, **ESC $**, **ESC W**, **ESC **,**FS S**, **GS V**
- The command does not affect the previously specified values.
- The calculated result from combining this command with others is truncated to the minimum value of the mechanical pitch.

[Default] x = 180, y = 360

[Reference] **ESC SP**, **ESC $**, **ESC 3**, **ESC J**, **ESC W**, **ESC **, **GS $**, **GS L**, **GS V**, **GS W**, **GS **

① GS V *m* ② GS V *m n*

[Name] Select cut 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 ≤ *n* ≤ 255

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

m	**Print mode**
0, 1, 49	Partial cut (one point left uncut)
66	Feeds paper (cutting position + [*n* × (vertical motion unit)]), and cuts the paper partially (one point left uncut).

[Details for ① and ②]

• This command is effective only processed at the beginning of a line.

[Details for ①] • Only the partial cut is available; there is no full cut.

[Details for ②] • When *n* = 0, the printer feeds the paper to the cutting position and cuts it.

• When *n* = 0, the printer feeds the paper to (cutting position + [*n* × vertical motion unit]) and cuts it.

• The horizontal and vertical motion unit are specified by **GS P**.

• The paper feed amount is calculated using the vertical motion unit (y). However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

GS W *nL nH*

[Name] Set printing area width

[Format] ASCII GS W *nL* *nH*

Hex 1D 57 *nL* *nH*

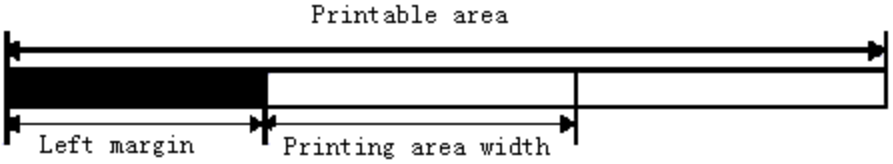
Decimal 29 87 *nL* *nH*

[Range] 0 ≤ *nL* ≤ 255

0 ≤ *nH* ≤ 255

[Description] Sets the printing area width to the area specified by nL and nH.

• The printing area width is set to [(*nL* + *nH* × 256) × horizontal motion unit]] inches.



[Details] • This command is effective only processed at the beginning of the line.

• In page mode, the printer performs only internal flag operations.

• This command does not affect printing in page mode.

• If the [left margin + printing area width] exceeds the printable area, [printable area width - left margin) is used.

- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion units does not affect the current left margin.
- The horizontal motion unit (x) is used for calculating the printing area width. The calculated result is truncated to the minimum value of the mechanical pitch.
- If the width set for the printing area is less than the width of one character, when the character data is developed, the following processing is performed:
  ① The printing area width is extended to the right to accommodate one character.
  ② If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one character.
  ③ If the printing area width cannot be extended sufficiently, the right space is reduced.
- If the width set for the printing area is less than one line in vertical, the following processing is performed only on the line in question when data other than character data (e.g., bit image, user-defined bit image) is developed:
  ① The printing area width is extended to the right to accommodate one line in vertical for the bit image within the printable area.
  ② If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one line in vertical.
- The commands which set the printing area width for bit image printing and its minimum widths are as follows:
  - Bit image (**ESC ***):
    Single density mode = 2 dots
    Double density mode = 1 dot
  - Downloaded bit image (**GS *l***):
    Double width mode or Quadruple mode = 2 dots
    Normal mode or Double-height mode = 1 dot
  - NV bit image (**FS p**):
    Double width mode or Quadruple mode = 2 dots
    Normal mode or Double-height mode = 1 dot
  - Raster bit image (**GS r 0**):
    Double width mode or Quadruple mode = 2 dots
    Normal mode or Double-height mode = 1 dot

[Default] *nL* = 0, *nH* = 2
For 58mm paper width model; *nL* = 104, *nH* = 1

[Reference] **GS L**, **GS P**

GS \ *nL nH*

[Name] Set relative vertical print position in page mode

[Format]

ASCII	GS	\	*nL*	*nH*
Hex	1D	5C	*nL*	*nH*
Decimal	29	92	*nL*	*nH*

[Range] 0 ≤ *nL* ≤ 255
0 ≤ *nH* ≤ 255

[Description] Sets the relative vertical print starting position from the current position in page mode.
- This command sets the distance from the current position to [(*nL* + *nH* × 256) × vertical or horizontal motion unit].

[Details]
- This command is ignored unless page mode is selected.
- When pitch *N* is specified to the movement downward:
  nL + *nH* × 256 = *N*
  When pitch *N* is specified to the movement upward (the negative direction), use the

complement of 65536.

When pitch *N* is specified to the movement upward:

nL + *nH* × 256 = 65536 - *N*

• Any setting that exceeds the specified printing area is ignored.

• This command function as follows, depending on the print starting position set by **ESC T**:

When the starting position is set to the upper left or lower right of the printing, the vertical

motion unit (*y*) is used.

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

• The horizontal and vertical motion unit are specified by **GS P**.

• The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

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

GS ^ r t m (*)

[Name] Execute macro

[Format]

ASCII	GS	^	r	t	m	
Hex	1D	5E	r	t	m	
Decimal	29	94	r	t	m	

[Range] 0 ≤ r ≤ 255

0 ≤ t ≤ 255

m = 0, 1

[Description] Executes a macro.

- r specifies the number of times to execute the macro.
- t specifies the waiting time for executing the macro.
- m specifies macro executing mode.

When the LSB of m = 0:

The macro executes r times continuously at the interval specified by t.

When the LSB of m = 1:

After waiting for the period specified by t, the PAPER OUT LED indicators blink and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats the operation r times.

[Details]

- The waiting time is t × 100 ms for every macro execution.
- If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.
- If the macro is not defined or if r is 0, nothing is executed.
- When the macro is executed (m = 1), paper always cannot be fed by using the FEED button.

[Reference] **GS :**

GS a n (*)

[Name] Enable/Disable Automatic Status Back (ASB)

[Format] ASCII GS a *n*

Hex 1D 61 *n*

Decimal 29 97 *n*

[Range] 0 ≤*n* ≤255

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

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Drawer kick-out connector pin 3 status disabled.
	On	01	1	Drawer kick-out connector pin 3 status enabled.
1	-	-	-	Undefined.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Paper roll sensor status disabled.
	On	08	8	Paper roll sensor status enabled.
4-7	-	-	-	Undefined.

[Details]
- If any of the status items in the table above are enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever the enabled status item changes. The disabled status items may change, in this case, because each status transmission represents the current status.
- If all status items are disabled, the ASB function is also disabled.
- If the ASB is enabled as a default, the printer transmits the status when the printer data reception and transmission is possible at the first time from when the printer is turned on.
- The following four status bytes are transmitted without confirming whether the host is ready to receive data. The four status bytes must be consecutive, except for the XOFF code.
- Since this command is executed after the data is processed in the receive buffer, there may be a time lag between data reception and status transmission.
- When the printer is disabled by **ESC =** (Select peripheral device), the four status bytes are transmitted whenever the status changes.
- When using **DLE EOT**, **GS** I, or **GS r**, the status transmitted by these commands and ASB status must be differentiated, according to the procedure in Appendix G, *Transmission Status Identification*.

GS f n (*)

[Name] Select font for Human Readable Interpretation (HRI) characters

[Format] ASCII GS f *n*

Hex 1D 66 *n*

Decimal 29 102 *n*

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

[Description] Selects a font for the HRI characters used when printing a bar code.

n selects a font from the following table:

n	**Font**
0, 48	Font A (12 · 24)
1, 49	Font B (9 · 17)

[Details] . HRI indicates Human Readable Interpretation.

. HRI characters are printed at the position specified by **GS H**.

[Default] *n* = 0

[Reference] **GS H**, **GS k**

GS h n

[Name] Select bar code height

[Format] ASCII GS h n

Hex 1D 68 n

Decimal 29 104 n

[Range] 1 ≤ n ≤ 255

[Description] Selects the height of the bar code.

n specifies the number of dots in the vertical direction.

[Default] n = 162

[Reference] **GS k**

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] ①0 ≤ *m* ≤ 6 (*k* and *d* depend on the bar code system)

②65 ≤ *m* ≤73 (*n* and *d* depends on the bar code system)

[Description] This command selects a bar code system and prints the bar code.

- k indicates the number of bytes of bar code data.
- n specifies the number of bytes of bar code data.
- d specifies the character code data of the bar code data to be printed.

m selects a bar code system as follows:

m		**Bar Code System**	**Number of Character code**	**Range of d**
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 ≤ 255	45 ≤ d ≤ 57， 65 ≤ d ≤ 90， d = 32, 36, 37, 43, 45, 46, 47 d = 42
	5	ITF	1 ≤ k ≤255（even number）	48 ≤ d ≤ 57
	6	CODABAR	1 ≤ k ≤ 255	48 ≤ d ≤ 57, 65 ≤ d ≤ 68, d = 36, 43, 45, 46, 47, 58
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	45 ≤ d ≤ 57， 65 ≤ d ≤ 90， d = 32, 36, 37, 43, 45, 46, 47 d = 42
	70	ITF	1 ≤ n ≤ 255（even number）	48 ≤ d ≤ 57
	71	CODABAR	1 ≤ n ≤ 255	48 ≤ d ≤ 57, 65 ≤ d ≤ 68, d = 36, 43, 45, 46, 47, 58
	72	CODE93	1 ≤ n ≤ 255	0 ≤ d ≤ 127
	73	CODE128	2 ≤ n ≤ 255	0 ≤ d ≤ 127

[Details for ①]

. This command ends with a NUL code.

. When the bar code system UPC-A or UPC-E, the printer prints the bar code data after receiving 12 bytes bar code data and processes the following data as normal data.

. When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes bar code data and processes the following data as normal data.

. When the bar code system used is JAN8 (EAN8), the printer prints the bar code after receiving 8 bytes bar code data and processes the following data as normal data.

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

[Details for ②]

. If *n* is outside of the specified range, the printer stops command processing and processes the following data as normal data.

[When in standard mode]

. If *d* is outside of the specified range, the printer only feeds paper and processes the following data as normal data.

. If the bar code width exceeds printing area, the printer only feeds the paper.

. This command feeds as much paper as is required to print the bar code, regardless of

the line spacing specified by ESC 2 or ESC 3.

. This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following *m* as normal data.

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

. This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.

[When in page mode]

. This command creats bar code data in the print buffer, but does not print it. After processing bar code data, this command moves the print position to the right side dot of the bar code.

. If *d* is out of the specified range, the printer stops command processing and processes the following data as normal data. In this case the data buffer position does not change.

. If bar code width exceeds the printing area, the printer does not print the bar code but moves the data buffer position to the left side out of the printing area.

<When using CODE 128 bar code (m = 73)>

With CODE 128 bar codes, it is possible to express one character of full ASCII128 character groups or two digits numbers with one bar code character by combining 103 bar code types and three types of code sets.

- Code Set A Expresses ASCII characters of 00H to 5FH
- Code Set B Expresses ASCII characters of 20H to 7FH
- Code Set C Expresses two-digit numbers with one character (100 types of 00 to 99)

Also in CODE 128, the following special characters are available.

- Shift characters (SHIFT)

In code set A, 1 character immediately after a shift is handled as a character from code set B.
In code set B, 1 character immediately after is handled as a character from code set A.
Note that this is not used with code set C.

- Code set selection characters (Code A, Code B, Code C)

Switches the following code set to A, B or C.

- Function characters (FNC1, FNC2, FNC3, FNC4)

The use of function keys depends on the application. Note that only FNC1 is used with code set C.

- See following for details on CODE 128 bar codes and code tables.
- To print CODE 128 bar codes on this printer, be careful of the following points to send the bar code data.

a. At the top of the bar code string, always set the code set selection characters (either of the CODE A, CODE B, or CODE C) to select the initial code set.

b. Specify special characters using the two characters of ‘{’ and one subsequent character. Also, the ‘{’ of the ASCII characters are specified by sending ‘{’ for two characters consecutively.

Special Characters	Transmission Data		
	ASCII	Hexadecimal	Decimal
SHIFT	{S	7B, 53	123, 83
CODE A	{A	7B, 41	123, 65
CODE B	{B	7B, 42	123, 66
CODE C	{C	7B, 43	123, 67
FNC1	{1	7B, 31	123, 49
FNC2	{2	7B, 32	123, 50
FNC3	{3	7B, 33	123, 51
FNC4	{4	7B, 34	123, 52
'{'	{{	7B, 7B	123, 123

- If the top of the bar code data string is not a code set selection character, the command is stopped and processing is handled normally from subsequent data.
- If the combination of '{' and 1 character immediately after does not conform to either of the special characters, the command is stopped and processing is handled normally from subsequent data.
- If a character that cannot be used with the selected code set is received, the command is stopped and processing is handled normally from subsequent data.
- HRI characters that correspond to shift characters and code set selection characters are not printed.
- HRI characters of function characters are printed with a space.
- HRI characters of the control characters (00H to 1FH and 7FH) are printed with a space.

Code Tables

1>Code Set A

Character	Transmission Data		Character	Transmission Data		Character	Transmission 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
HT	09	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B,31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51
DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,35	123,53
NAK	15	21	=	3D	61	CODE B	7B,42	123,66
SYN	16	22	>	3E	62	CODE C	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			

2>Code Set B

Character	Transmission Data		Character	Transmission Data		Character	Transmission 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
,	2C	44	T	54	84	|	7C	124
-	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	to	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,35	123,53
5	35	53	]	5D	93	CODE A	7B,41	123,65
6	36	54	^	5E	94	CODE B	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			

3>Code Set C

Character	Transmission Data		Character	Transmission Data		Character	Transmission 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	CODE A	7B,41	123,65
22	16	22	62	3E	62	CODE B	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			

GS r n (*)

[Name] Transmit status

[Format] ASCII GS r *n*

Hex 1D 72 *n*

Decimal 29 114 *n*

[Range] *n* = 1, 2, 49, 50

[Description] Transmits the status specified by *n* as follows:

n	Function
1, 49	Transmits paper sensor status
2, 50	Transmits drawer kick-out connector status

[Details] . When a serial interface(bluetooth or COM) is used,
when DTR/DSR control is selected, the printer transmits only 1 byte after confirming the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready.

When XON/XOFF control is selected, the printer transmits only 1 byte.

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

. When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS r** and the ASB status must be differentiated.

. The status to be transmitted is as following:

• Paper sensor status (*n* = 1, 49):

Bit	Off/On	Hex	Decimal	Status for ASB
0,1	Off	00	0	Paper near-end sensor: Paper adequate.
	On	03	3	Paper near-end sensor: Paper near end.
2,3	Off	00	0	Paper end sensor: Paper present.
	On	0C	12	Paper end sensor: Paper not present.
4	Off	00	0	Not used. Fixed to Off.
5,6	Off	00	0	Not used. Fixed to Off.
7	Off	00	0	Not used. Fixed to Off.

Bits 2 and 3: This command may not be excuted when paper is not present , and is excuted until paper is present. Therefore, the status of bits 2 and 3 is not transmitted instantly.

• Drawer kick-out connector status (*n* = 2, 50): **(Note:This function is not valid for standard portable printer)**

Bit	Hex	Decimal	Status for ASB
0	00	0	Drawer kick-out connector pin 3 is LOW.
	01	1	Drawer kick-out connector pin 3 is HIGH.
1-3	-	-	Undefined.
4	00	0	Not used. Fixed to Off.
5,6	-	-	Undefined.
7	00	0	Not used. Fixed to Off.

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

[Name] Print raster bit image

[Format] ASCII GS v 0 m xL xH yL yH d1...dk

Hex 1D 76 30 m xL xH yL yH d1...dk

Decimal 29 118 48 m xL xH yL yH d1...dk

[Range] $0 \le m \le 3, 48 \le m \le 51$

$0 \le xL \le 255$

$0 \le xH \le 255$

$0 \le yL \le 255$

$0 \le d \le 255$

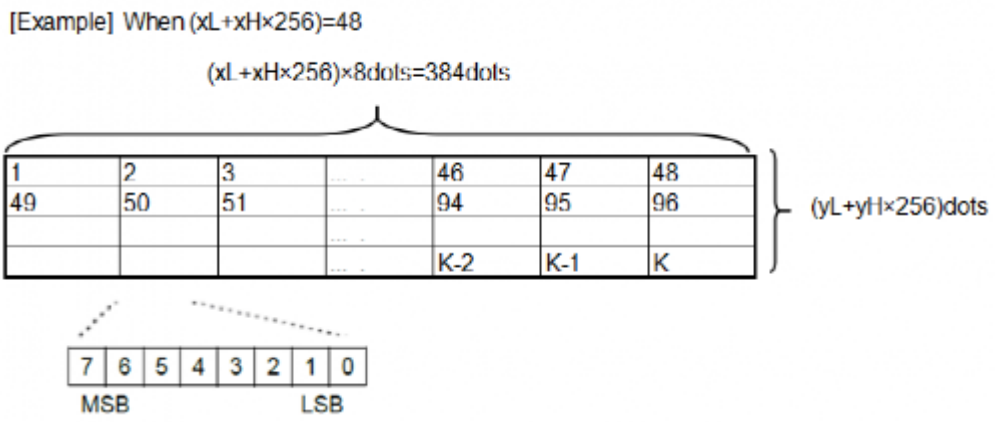
$k = (xL + xH \times 256) \times (yL + yH \times 256) (k \neq 0)$

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

m	Mode	Vertical Dot Density	Horizontal Dot ensity
0, 48	Normal	203 DPI	203 DPI
1, 49	Double-width	203 DPI	101.5 DPI
2, 50	Double-height	101.5 DPI	203 DPI
3, 51	Quadruple	101.5 DPI	101.5 DPI

- xL, xH specify (xL+ xH×256) byte(s) in the horizontal direction for the bit image.
- yL, yH specify (yL+ yH×256) dot(s) in the vertical direction for the bit image.
- d specifies the definition data of the bit image.

[Details]
- In standard mode, this command is effective only when there is no data in the print buffer and the printer is in the beginning of the line. If the print buffter is not empty,after processing 1D 76(hex), the printer treats the following data as normal Data.
- None of the print modes such as character size, emphasized,double-strike, upside-down, underline, white/black reverse printing, etc.) afftects the printing of raster bit image.
- If the printing area width set by **GS L** and **GS W** is less than the minimum width, the printing area is extended to the minimum width only on the line in question. The minimum width means 1 dot in normal (m=0, 48) and double-height (m=2, 50), 2 dots in double-width (m=1, 49) and quadruple (m=3, 51) modes.
- Data outside the printing area is read in and discarded on a dot-by-dot basis.
- The position at which subsequent characters are to be printed for raster bit image is specified by **HT** (Horizontal Tab), **ESC $** (Set absolute print position), **ESC** \ (Set relative print position), and **GS L** (Set left margin). If the position at which subsequent characters are to be printed is not a multiple of 8, print speed may decline.
- The **ESC a** (Select justification) setting is also effective on raster bit images.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command. The definition of this command should be cleared.
- d indicates the bit-image data. Setting a bit to 1 prints a dot and setting it to 0 does not print a dot.



GS w *n*

[Name] Set bar code width

[Format] ASCII GS w *n*

Hex 1D 77 *n*

Decimal 29 119 *n*

[Range] 2≤ *n*≤ 6

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

n specifies the bar code width as follows:

n	Module Width (mm) for Multi-level Bar Code	Binary-level bar codes	
		Thin element width (mm)	Thick element width (mm)
2	0.25	0.25	0.625
3	0.375	0.375	1.0
4	0.5	0.5	1.25
5	0.625	0.625	1.625
6	0.75	0.75	1.875

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

[Default] *n* = 3

[Reference] **GS k**

FS ! *n*

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

[Format]

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

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

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

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

[Details]
- When both double-width and double-height modes are set (including right- and left-side character spacing), quadruple-size characters are printed.
- The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.
- The thickness of the underline is that specified by **FS** , regardless of the character size.
- When some of the characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- It is possible to emphasize the Kanji character using **FS W** or **GS !**, the setting

of the last received command is effective.
- It is possible to turn under line mode on or off using **FS** , and the setting of the last received command is effective.

[Default] *n* = 0

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

FS &

[Name] Select Kanji character mode

[Format]

ASCII	FS	&
Hex	1C	26
Decimal	28	38

[Description] Selects Kanji character mode.

[Reference] **FS .**, **FS C**

FS – *n*

[Name] Turn underline mode on/off for Kanji characters

[Format]

ASCII	FS	-	*n*
Hex	1C	2D	*n*
Decimal	28	45	*n*

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

[Description] Turns underline mode for Kanji characters on or off, based on the following values of *n*.

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

[Details]
- The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.
- After the underline mode for Kanji characters is turned off by setting *n* to 0, underline printing is no longer performed, but the previously specified underline thickness is not changed. The default underline thickness is 1 dot.
- The specified line thickness does not change even when the character size changes.
- It is possible to turn underline mode on or off using **FS !**, and the last received command is effective.

[Default] *n* = 0

[Reference] **FS !**

FS .

[Name] Cancel Kanji character mode

[Format]

ASCII	FS	.
Hex	1C	2E
Decimal	28	46

[Description] Cancels Kanji character mode.

[Reference] **FS &**, **FS C**

FS 2 *c1 c2 d1...dk*

[Name] Define user-defined Kanji characters

[Format]

ASCII	FS	2	*c1*	*c2*	*d1...dk*
Hex	1C	32	*c1*	*c2*	*d1...dk*
Decimal	28	50	*c1*	*c2*	*d1...dk*

[Range] *c1* and *c2* indicate character codes for the defined characters. The range of values for *c1* and *c2* differ depending on the character code system used.

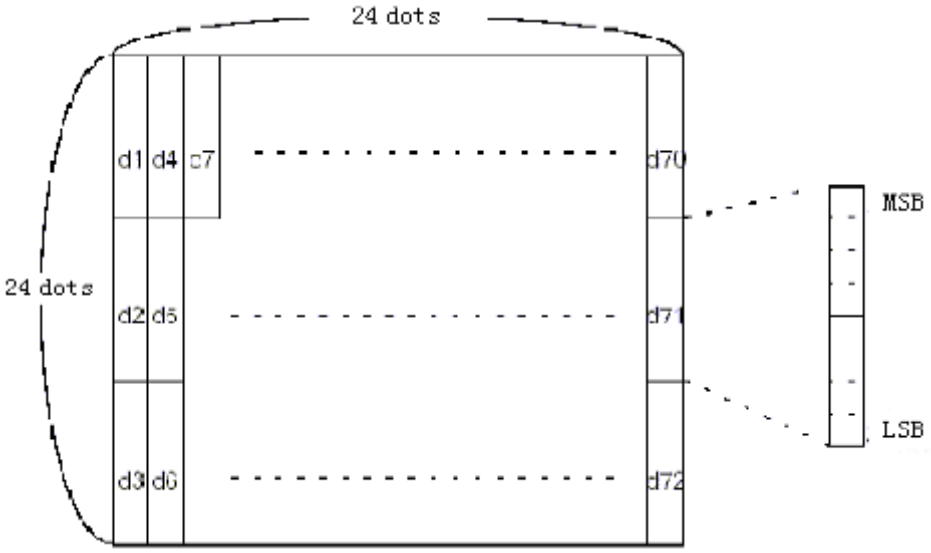
Kanji type	*c1*	*c2*
Chinese Kanji	*c1* = FEH	A1H ≤c2 ≤FEH

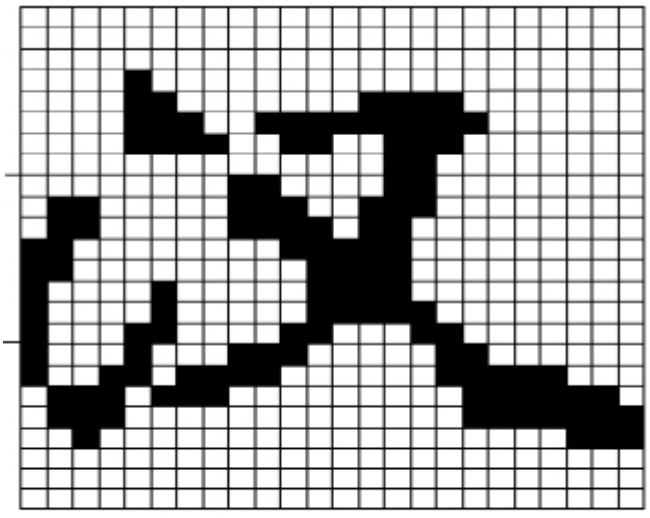
[Description] Defines user-defined Kanji characters for the character codes specified by *c1* and *c2*.

[Details]
- *c1* and *c2* indicate character codes for the defined characters. *c1* specifies for the first byte, and *c2* for the second byte.
- *d* indicates the dot data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.

[Default] All spaces.

[Reference] **FS C**





D1=00H, D4=00H, D7=00H, D10=00H.....
D2=1FH, D5=78H, D8=60H, D11=00H.....
D3=C0H, D6=30H, D9=38H, D12=70H.....

FS S *n1 n2*

[Name] Set left- and right-side Kanji character spacing

[Format]

ASCII	FS	S	*n 1*	*n2*
Hex	1C	53	*n 1*	*n2*
Decimal	28	83	*n 1*	*n2*

[Range] $0 \leq n\,1 \leq 255$

$0 \leq n\,2 \leq 255$

[Description] Sets left-side and right-side Kanji character spacing *n1* and *n2*, respectively.

- When the printer language is set to Chinese , the left-side character spacing is [*n1* ╳ horizontal or vertical motion units], and the right-side character spacing is [*n2* ╳ horizontal or vertical motion units].

[Details]

- When double-width mode is set, the left- and right-side character spacing is twice the normal value.
- The horizontal and vertical motion units are set by **GS P**. The previously specified character spacing does not change, even if the horizontal or vertical motion unit is changed using **GS P**.
- The value cannot be less than the minimum horizontal movement amount, and must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
  ① When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
  ② When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.
  ③ The maximum right-side spacing is 255/180 inches for the paper roll and is approximately 35.983 mm {255/150 inches}. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] *n1* = 0, *n2* = 0

[Reference] **GS P**

FS W *n*

[Name] Turn quadruple-size mode on/off for Kanji characters

[Format]

ASCII	FS	W	*n*
Hex	1C	57	*n*
Decimal	28	87	*n*

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

[Description] Turns quadruple-size mode on or off for Kanji characters.

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

[Details]

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

[Default] *n* = 0

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