

# **BL-112BT**

# **Thermal Printer**

# **Technical Guide**

Bluetooth & RS232C Model

## DECLARATION OF CONFORMITY

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**Manufacturer's Name:** Sanei-Electric Inc.  
**Manufacturer's address:** 5Floor, Taisou Ikebukuro Building, 2-61-1 Ikebukuro,  
Toshima-Ku, Tokyo 171-0014, Japan  
**Product Name:** Portable Line Thermal Printer  
**Model Number:** BL-112BT  
**Accessories:** BLS-100W / AC/DC adapter and Power cord

The product complies with the following product standards.

**VCCI** VCCI, Class B

Supplementary Information

**Declared by**

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# 1. About BL-112BT

The BL-112BT is a fast, quiet and reliable 4" compact printer and it features easy paper loading, various barcode, internal battery charger and label printing by enlarged font. This printer connects to any host computer using Bluetooth and RS232C. The printer is available for 3" paper guide model. Light weight and compact BL-112 is ideal for an application where space is a consideration.



## 2. Features

- Fast and quiet printing by 8dot/mm thermal head.
- Easy paper loading
- Print standard barcodes (UPC-A, UPC-E, JAN13, JAN8, CODE39, ITF, CODABAR, CODE128, QRCode(Model2), DataMatrix, PDF417, MicroPDF417, MaxiCode)
- Various kinds of setting such as for printing enlarged characters are performed.
  - 1-byte size character printing
  - 2-byte size character printing
  - Enlarged characters (Enlarged characters by up to 64 times)
- Graphic printing by bit image can be performed.
- Print Download characters (1-byte size), user-defined characters (2-byte size).
- The command system is compatible with ESC/POS.
- Two way-power-supply of a battery pack (Lithium Ion) and AC adapter.



### 3. General Precautions



#### 3- 1. Precautions on Safety



First of all, carefully read the Precautions of Safty. Incorrect usage and operation may result in unexpected problems such as injury, fire and shock.

 <b>Warning</b>	The symbol indicates that failure to observe these instructions or mishandle this equipment could lead to severer injury or death.
 <b>Caution</b>	The symbol indicates that failure to observe these instructions or mishandle this equipment could lead to injury or only property damage.

#### ■ Examples of Symbols












 The  symbol indicates caution (including DANGER or WARNING). The example indicates that caution or warning conditions exist.

 The  symbol indicates the action is prohibited. The example in the left column indicates disassembly is prohibited.

 The  symbol indicates a required operation that must be performed or an obligatory instruction.

The example in the left column indicates unplugging is required.

#### WARNING

	Do not use any AC adapter, power cord, battery pack or battery charger other than those specified.
	Turn off the printer and unplug the AC plug from the outlet and remove the battery pack from the printer in any of the following cases: <ul style="list-style-type: none"> <li>◆ When smells, smoke or strange noise erupts from the printer.</li> <li>◆ When the printer does not recover from error.</li> <li>◆ When the case is broken.</li> <li>◆ When a piece of metal or any liquid such as water gets inside of this unit or the slot of this unit.</li> </ul> Using the printer in any abnormal manner may cause accidents or fire.
	When the power cord or the battery charger is damaged, unplug the AC plug from the outlet to avoid fire, electric shock or defects.
	Be sure to turn off the printer before installing or removing the battery pack to and from the printer. If not, it could lead to electric shock.
	Do not drop any liquid such as water or foreign objects inside of the battery charger. It may cause in fire or electric shock.
	Do not bend the power cord forcibly, or place heavy objects on the cord. It may cause damage the power cord and cause fire or electric shock. If the cord is damaged, stop using it.
	Do not touch the output port of the battery charger and the metal part of the AC adapter or the connector, nor short-circuit the part. It could lead to fire, accidents or defects.
	Never accumulate dust or metal objects on the AC plug of the battery charger or the AC adapter. It could lead to fire or electric shock.
	Do not use the battery charger or the AC adapter without proper plugging of the AC plug. Doing so may result in fire or electric shock.
	Do not place the printer, the AC adapter, the power cord, the battery pack and the battery charger in any place it can possibly be splashed by liquid, or do not wet the printer, the AC adapter, the power cord, the battery pack and the battery charger. It could lead to fire, accidents or defects.
	Never disassemble the printer, the AC adapter, the power cord, the battery pack and the battery charger. Failure to follow this instruction may result in overheating or inflammation, which may lead to fire or accidents.



	Turn off the power switch, and keep the AC plug removed from the outlet when the printer is not used. Also remove the battery pack from the printer to avoid fire or electric shock.
	Turn off the power switch and keep AC adapter removed from the outlet when maintaining the printer, the AC adapter and the battery charger. Also remove the battery pack from the printer to avoid fire or electric shock.
	Keep the printer, the AC adapter, the battery pack and battery charger away from children to avoid injury.
	Remove the interface cable or AC adapter from the connector or the outlet by holding the connector or the AC plug. Never pull the cable itself. Doing so may damage the cable or adapter.
	Make sure to close the battery cover firmly when mounting the battery pack to the printer. If not, the battery cover may be opened and the battery pack may come out of the printer, causing injury or defects.
	The printer may not receive data due to an error of out-of-paper. Be sure to make error monitoring so as not to stop the system.
	If an unexpected state occurs at the printer, fully consider error treatment so as not to hang up the printer. Take action so as not to lead a total system failure.
	Do not place the printer, the AC adapter, the power cord, the battery pack and the battery charger in a place with direct sunlight or with high temperature. It may cause fire or defects.
	Do not place the printer, the AC adapter, the power cord, the battery pack and the battery charger in a place where they may be exposed to excessive moisture or dust. Doing so may cause fire or defects. It may result in electric leakage, overheating, explosion, inflammation or injury in case of battery pack.
	Do not touch the printer, the AC adapter, the power cord, the battery pack and the battery charger with a wet hand. Doing so may result in electrical shock.
	Do not place the printer, the AC adapter, the power cord, the battery pack and the battery charger in a place where they are exposed to excessive vibration, on an unstable place such as a shaky table or a slanted table. Doing so may cause injury or defects.
	Be careful not to touch the tear bar directly with a hand. Doing so may cause injury.
	As the thermal head may be very hot immediately after printing, do not touch it. Be sure that the thermal head is cool before removing the paper jam or cleaning the thermal head.

### 3- 2. Handling thermal paper

The surface of thermal paper has been specially treated with a chemical agent to make coloring by thermal chemical reaction.

Pay attention to the following points:

- 1) Be sure to use specified thermal paper.
- 2) Be sure to store paper at a dry, cool dark place.
- 3) Do not rub it by a hard substance strongly.
- 4) Do not put paper near an organic solvent.
- 5) Do not contact it with polyvinyl film, rubber eraser or adhesive tape for a long time.
- 6) Do not overlap diazo paper or wet type copy paper just after copying.
- 7) When pasting it with a glue, use aqueous glue. (starch glue, synthetic glue, etc.)
- 8) Adhesive tape may cause discoloring of thermal paper. Stick the rear surface with double-sided adhesive tape.
- 9) Touching paper by wet hand may cause fingerprint to be marked on the paper or record to be unclear.

### 3- 3. Installation

Avoid using the printer at the following locations. It may cause a failure.

- 1) Location with much dust or dust particles
- 2) Inclined location or a location subjected to strong vibration
- 3) Location with much water or oil
- 4) Location subjected to direct sunlight
- 5) Location with a temperature of 40°C (104°F) or higher
- 6) Location with a temperature of below 0°C (32°F)
- 7) Location with electromagnetic noise or corrosive gas
- 8) Location with a relative humidity of 80%RH or more
- 9) Location with dew condensation due to an extreme temperature change

### 3- 4. General precautions

- The information contained herein is subject to change without prior notice. For updated information, Please refer to the website [www.sanei-elec.co.jp](http://www.sanei-elec.co.jp) or contact the local reseller of Sanei Electric.
- When using this printer, please be sure to take safety measures and check operation, connectivity and compatibility prior to use the printer.
- Sanei Electric shall not be responsible for any claim of infringement or alleged infringement of patents, designs, trademarks, copyrights or other rights brought by a third party in relation to products.

## 4. Printer Setup

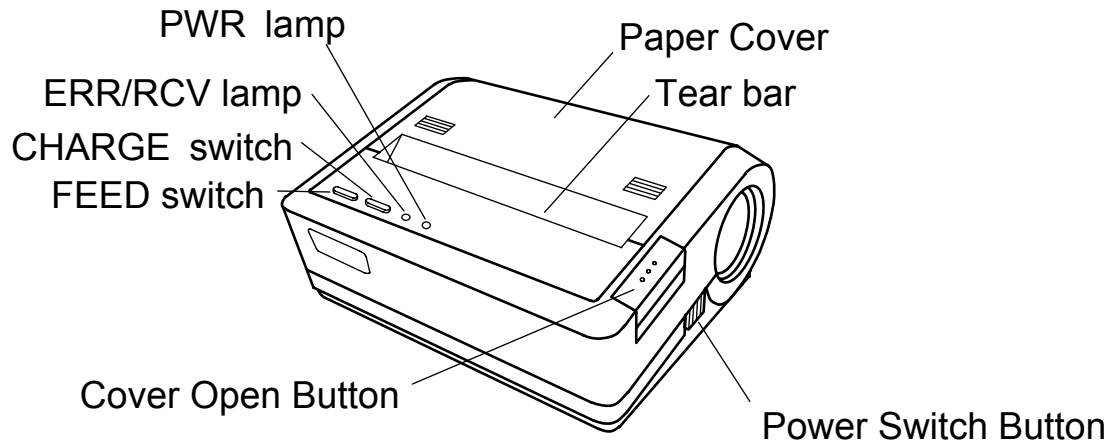
### 4- 1. Unpacking the printer

Save all packing materials for use if printer needs to be repacked. The package includes

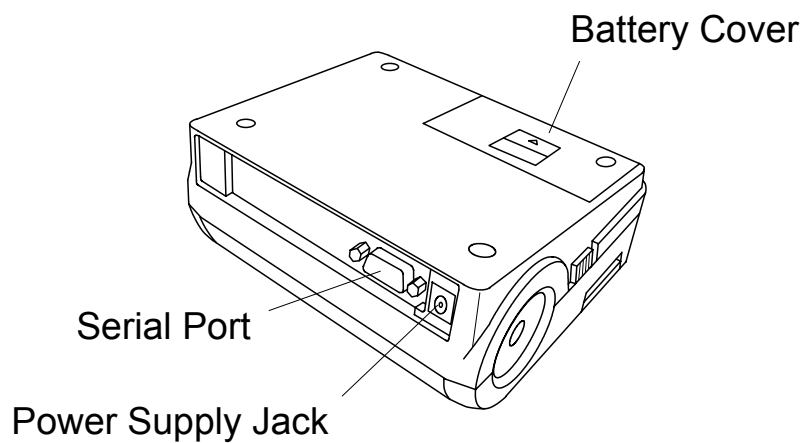
- Printer BL-112BT
- AC adapter with power cord
- Paper roll

### 4- 2. Appearance

<Front view>



<Rear view>





## 4- 3. Printer Controls

### (1) Power switch

Slide switch for turning power ON/OFF.

### (2) Feed switch

The printer continues to feed paper when this switch is pressed.

### (3) Battery Charge switch

Pressing this switch for 3 sec with connected AC adapter triggers charge to the battery pack.

### (4) Power lamp (green)

This lamp lights when the power is turned ON. It flashes when the capacity of the battery pack drops low.

### (5) Error/Receive lamp (red)

When an error occurs this lamp lights or blinks, depending on the types of error. During the bluetooth communication, it flashes to indicate it is communicating.

## 4- 4. Handling

### 1. Connecting AC adapter

- ① Turn the power switch OFF.
- ② Insert the DC plug of the AC adapter into the power supply jack of the main unit.
- ③ Connect the AC cord with the AC adapter.
- ④ Insert the AC plug of the AC adapter into the outlet.



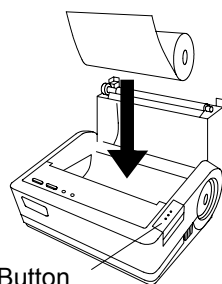
Do not touch the end of the DC plug. Before disconnecting the AC adapter, turn the power switch OFF, disconnect the AC plug first from the outlet and then take the DC plug.

### 2. Setting paper

- ① Press the paper cover open button to open the cover.
- ② Set a paper roll as shown in the drawing. (Make sure the paper roll is set properly as instructed, otherwise it does not print.)
- ③ Close the paper cover by pressing both ends of the cover, with the end of the paper emerging from the printer.



Handle the tear bar carefully not to injure the hand.



Paper cover open Button

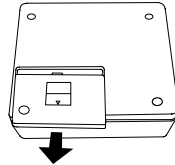
### 3. Battery pack

The battery pack and the charger are options and those are available separately.

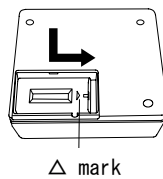
At the time of product shipment, the battery is not charged. Charge battery pack before using because of low battery level.

#### ● Inserting battery pack

- ① Turn off the power switch of the printer.
- ② Slide the battery cover in the direction of the arrow to remove it.



- ③ Place the battery pack on the left corner of the battery case, showing the  $\Delta$  mark to its right, and slide it toward the right until it clicks.



#### ● Removing battery pack

- ① Turn off the power switch of the printer.
- ② Remove the battery cover and slide the battery pack toward the left. Turn the printer upside down by holding the battery pack by hand and let it fall in your hand.

#### ● Charging the battery pack

- (1) Use built in charger

- ① Turn OFF the power switch.
- ② Mount the battery pack.
- ③ Connect the AC adapter.
- ④ Turn ON the power switch.
- ⑤ Keep CHARGE switch pressed for 3 sec.

When charging starts, PWR lamp and ERR/RCV lamp start flashing alternately.

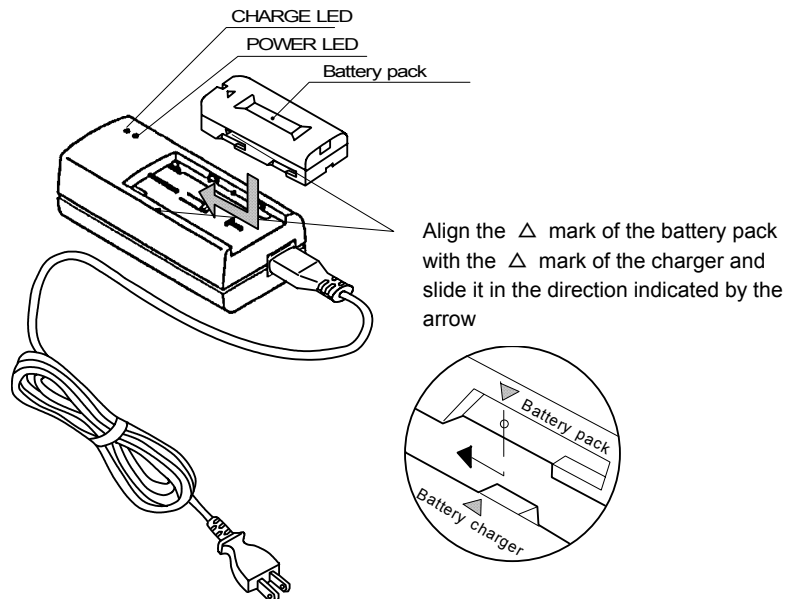
- ⑥ When charging is complete, a printing standby mode is established. (The PWR lamp goes on and the ERR/RCV lamp goes off.)

Turn OFF the power switch and disconnect the AC adapter. (The charging time is about 2 hours.)

With a fully-charged battery pack which is brand-new or almost brand-new, the printer can print about 64m of thermal paper. (at 100% of printing density and 30% of printing rate).

- (2) Use optional charger (NC-LSC05)

- ① Insert the AC cord in the charger.
  - ② Insert the AC cord into the outlet.
  - ③ Attach the battery pack.
  - ④ The CHARGE LED goes on and charging begins.
  - ⑤ When charging is complete, the CHARGE LED goes off. (The charging time is about 2 hours.)
- With a fully-charged battery pack which is brand-new or almost brand-new, the printer can print about 64m of thermal paper. (at 100% of printing density and 30% of printing rate).



	Charging	Charging complete
CHARGE LED	Light ON	Light OFF

#### • Replacing the battery pack

Full charge capacity may become lower when repeatedly recharging, replace the battery pack at proper time.

	Do not use a charger not approved by Sanei Electric. Use of not approved charger could damage the printer and battery pack.
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## 4- 5. Maintenance

### Cleaning the printer

When the printer surface is contaminated, wipe it with soft dry cloth or with cloth containing mild detergent.

	<ul style="list-style-type: none"> <li>• Do not use a volatile chemical such as thinner or benzene.</li> <li>• Absolutely avoid wetting the inside of the printer with water.</li> </ul>
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## 5- 3. Setting the operation function

Set the printer functions with the operation switch.

While pressing both of the FEED switch and the CHARGE switch, turn on the power switch, the function setting mode is established. After the message is printed, press the FEED switch to choose YES, or press the CHARGE switch to choose NO. After the setting, the contents are retained even if turning off the power.


- ① When the function setting mode is established, the current printer setting mode is printed and stopped.

FUNCTION SETTING MODE		
INTERFACE	= BLUETOOTH	: Interface Bluetooth
SECURITY	= ON	: Security ON
CHARACTER SET	= JAPAN	: International character Japan
FONT SIZE	= 24DOT	: Font size 24-dot
PAPER TYPE	= NORMAL PAPER	: PE buffer clear OFF
BIT LENGTH	= 8BIT	: Paper type Normal paper
PARITY	= NON	: Data bit length 8 bit
FLOW CONTROL	= RTS/CTS	: Parity Non
BAUD RATE	= 115200bps	: Control method RTS/CTS
ENTER MODE SETTING		: Baud Rate 115200bps
[YES (FEED) /NO (CHARGE)]		

- ② At this time, choose whether you enter the function change mode or not.


Pressing the CHARGE switch terminates the function setting mode.

Pressing the FEED switch enters into the function change mode as follows:


 This mark indicates the setting at the time of shipment from the factory.

Operation method: Pressing the CHARGE switch changes the function/ Pressing the FEED switch goes to the next item.


### ◇ Setting the interface

INTERFACE =  BLUETOOTH  
INTERFACE = SERIAL

### ◇ Setting the security of bluetooth


SECURITY =  ON  
SECURITY = OFF

### ◇ Setting the international character

CHARACTER SET =  JAPAN  
CHARACTER SET = U.S.A  
CHARACTER SET = GERMANY  
CHARACTER SET = ENGLAND  
CHARACTER SET = FRANCE  
CHARACTER SET = SPAIN  
CHARACTER SET = ITALY  
CHARACTER SET = SWEDEN

※When the character code other than JAPAN is set, ANK is the international character set (PC437 system).

### ◇ Setting the font size

FONT SIZE =  24DOT : 24-dot  
FONT SIZE = 16DOT : 16-dot

## ◇ Setting the paper

PAPER TYPE	=	NORMAL PAPER	: Normal paper
PAPER TYPE	=	LABEL PAPER	: Label paper

The following messages are printed when serial is enabled.

ENTER SERIAL SETTING  
[YES(FEED)/NO(CHARGE)]

If pressing the CHARGE switch, function setting mode is finished. If pressing the FEED switch, the following function mode for serial communication is enabled.

## ◇Setting Data Bit Length

BIT LENGTH	=	8BIT	: 8bit
BIT LENGTH	=	7BIT	: 7bit

## ◇Setting PARITY

PARITY	=	NON	: No Parity
PARITY	=	ODD	: Odd Parity
PARITY	=	EVEN	: Even Parity

## ◇Setting FLOW CONTROL

FLOW CONTROL	=	RTS/CTS	: Hardware control
FLOW CONTROL	=	XON/XOFF	: Xon/Xoff control

## ◇Setting BAUD RATE

BAUD RATE	=	115200bps	: 115200bps
BAUD RATE	=	1200bps	: 1200bps
BAUD RATE	=	2400bps	: 2400bps
BAUD RATE	=	4800bps	: 4800bps
BAUD RATE	=	9600bps	: 9600bps
BAUD RATE	=	19200bps	: 19200bps
BAUD RATE	=	38400bps	: 38400bps
BAUD RATE	=	57600bps	: 57600bps

When the following message is printed, the setting mode is retained.

SETTING COMPLETED

## 5- 4. Paper empty detection

The printer detects paper existence using a photo interrupter.  
The distance from the sensor to the printing head is  $12.8\pm 1\text{mm}$ .  
For the printing paper, use the specified roll.

## 5- 5 Black Mark sensing / Label print

The position of lable is sensed by photo interrupter. The top of the label is calculated with reference to the distance from printing head to the sensor  $13.8\pm 1\text{mm}$ .

<Label print> Refer to the.label print command

- ① Set the PARITY to the LABEL mode.
- ② Choose the length of media by DC2 L command  
(The data is maintained even the power off.)
- ③ Press the feed switch makes the label positioned the top of the label.  
(Pressing feed switch makes the label position automaticall the top of the label.)
- ④ Send the printing data
- ⑤ Send DS I command with the last printing data.  
(It leads the label to the top of form)
- ⑥ In case of printing next label,the label print is started from above #4.  
If the label is slided by manual, it is started from above #3.

\*Print by all dots on

Control heating dots when the label is printed all dark. It may occur the sticking between paper and print head..

## 5- 6. Adjusting the printing density

The printing density is automatically adjusted according to the head resistance value, number of dots, head temperature and head voltage.

The printing density can be adjusted by the command.

Adjustment range against the rated energy is between 50% to 200%.

## 5- 7. Resetting while printing

Printing data of many dots causes voltage drop. Accordingly, the printer resets data at that time, and resumes the printing. However, some of data during resetting is discarded.

In resetting the printer: both of a PWR and ERR/RCV flash, and then ERR/RCV turns the light off.

After resetting, the printer prints data by initialized function setting. It is apt to occur when the voltage is dropped when the battery pack is used. In this case, charge the battery pack.

The following are the command whose number of printing dots becomes large and consumes energy.

Underline

White/black reversion

Ruled line (when there are too many dots.)

Bit image

When "H"characters are fully printed without intermission in a line and a horizontal section is printed.

Further, when setting the printing density to more than 100% by the printing density command, the strobe length becomes longer. The printer is tend to reset data regardless of number of dots.

## 5- 8. Error indication

When an error occurs, the PWR lamp lights or the ERR/RCV lamp blinks, depending on the types of error.  
Types of error are as follows:

□ is approx 0.1 sec. ON and ■ is approx 0.1 sec. OFF.

Power switch	Status	Lamp indication
ON	Normal (Printing enabled)	PWR □□□□□□□□□□ ERR/RCV ■■■■■■■■■■■■
	Abnormal voltage, battery low	PWR □■□■□■□■□■ ERR/RCV ■ or □(No paper, etc.)
	Temperature error	PWR □□□□□□□□□□ ERR/RCV □■□■□■□■□■
	No paper, Cover open	PWR □□□□□□□□□□ ERR/RCV □□□□□□□□□□
	Charging (return to normal after charging completes.)	PWR □□■■□□■■□□■■ ERR/RCV ■■□□■■□□■■□□
	Setting up mode	PWR □■□■□■□■□■ ERR/RCV ■■■■■■■■■■■■
	HEX dump print	PWR □□□□□□□□□□ ERR/RCV ■■■■■■■■■■■■
	Test print , Function set mode	PWR □■□■□■□■□■ ERR/RCV ■■■■■■■■■■■■
OFF	Power off	PWR ■■■■■■■■■■■■ ERR/RCV ■■■■■■■■■■■■

## 5- 9. Barcode printing

The following barcode is able to print by this printer.

1. UPC-A
2. UPC-E
3. JAN13(EAN)
4. JAN8(EAN)
5. CODE39
6. ITF
7. NW7(CODABAR)
8. CODE128(EAN128)
9. QR Code(Mode12)
10. DataMatrix
11. Micro PDF417
12. MaxiCode
13. PDF417



## 5- 10. Memory

### 1. Input buffer memory

The printer has an internal 1,024 bytes input buffer memory (RAM).

### 2. User memory

This printer is available with a user memory of 8,192 bytes (RAM).

The data registered in the memory is cleared by the power off.

It is used when a download character, user-defined character, and downloaded bit image is used.

When using a download character or user-defined character, use a predetermined character size. For the downloaded bit image, use the remaining memory capacity. When reserving the capacity in downloaded-bit image, release the memory area used for the download character or user-defined character.

Memory area just after initialization

Application	Capacity (bytes)
Download character	4,560
User-defined character	1,080
Downloaded bit image	2,552
Total	8,192

For the download character or user-defined character, an area has been beforehand reserved at initialization.

The area can be released by the command to permit an area for the downloaded bit image to be reserved.

When registering a downloaded bit image, the remaining capacity of the memory area must be beforehand calculated.

Note that when data is registered more than remaining memory, the printer ignores data registering.

### 3. Page memory

This printer is available with a page memory (RAM).

The data registered at this time is cleared when the power is turned off.

The page memory is used for using the page mode.

Page memory size

Direction	Horizontal	Vertical
Bit	832	480
Length at printing (mm)	104	60

\* 1 bit is equivalent to 1-dot printing.

### 4. Nonvolatile memory

This printer is available with nonvolatile memory.

The data registered at this area remains even if the power is turned off.

It is used for using printing image registration/printing onto the nonvolatile memory.

Nonvolatile memory size

Size for each sheet

Direction	Horizontal	Vertical
Bit	832	1889
Length at printing (mm)	104	236.125

\* 1 bit is equivalent to 1-dot printing.

This size is available at three sides.

## 6. General Specifications

### 6- 1. Printer specifications

- Print method  
Direct line thermal
- Number of dots  
832 dots
- Resolution  
8 dots/ mm
- Printing width / Paper width  
104 mm / 112 mm
- Maximum printing speed  
640 dot lines/ sec (80mm/ sec : Using AC adapter)  
600 dot lines/ sec (75mm/ sec : Using a battery pack)
- Characters
  - (1) Types of characters      ANK : 348 types, JIS Kanji Level 1 & Level 2
  - (2) Structure of characters    1-byte character : 24×12, 16×8 dots (H×W)  
   2-byte character : 24×24, 16×16 dots (H×W)
  - (3) Dimensions of characters   1-byte character : 3.0×1.5 mm, 2.0×1.0 mm (H×W)  
   2-byte character : 3.0×3.0 mm, 2.0×2.0 mm (H×W)
  - (4) Number of characters per line    69 characters  
   (when 24-dot 1-byte character space between characters= 0 dot)
- Dot pitch  
0.125 mm
- Paper feeding pitch  
0.125 mm
- Service life (in the case of 25 °C rated energy)
  - Pulse resistance      100 millions pulse or more (printing ratio: 12.5 %)
  - Abrasion resistance    50 Km or more
- Interface  
Bluetooth (ver 1.1), RS-232C
- Current consumption
  - When the dedicated AC adapter BLS-100W is used
    - At standby    Not more than 100 mA
    - At printing   Average 3.0 A
  - When dedicated battery pack UR-121 is used
    - At 7.4 VDC
      - At standby Not more than 100 mA
      - At printing   Average 2.1 A
    - At 8.7 VDC
      - At standby Not more than 100 mA
      - At printing   Average 2.2 A

\* When the number of simultaneously conducted dots is 64 for each printing.
- Outer dimensions (W x D x H; excluding projections)  
154mm×129mm×66.3mm
- Weight  
Approx. 500 g (No accessories)

## 6- 2. Operating conditions

### □ Operating environment

Temperature 0 °C to +40 °C

32 °F to 104 °F

Humidity 30 %RH to 80 %RH (non-condensation)

### □ Storage environment

Temperature -20 °C to +60 °C

-4 °F to 140 °F

Humidity 20 %RH to 85 %RH (non-condensation)

## 6- 3. Thermal paper specifications

- Model No. : TF50KS-E2D
- Paper width : 112 mm
- Length of roll paper : Approx. 30 m
- Outer diameter of paper roll : 50 mm
- Paper core : Existence
- Outer diameter of paper core : 13 mm

\* Use a specified thermal paper. When you use thermal paper other than specified, the printing quality and the service life of the thermal head cannot be guaranteed.

## 6- 4. AC adapter specifications

- Model No. :BLS-100W
- Input voltage : 100-240 VAC, 50/ 60 Hz
- Rated output : 8.7 VDC 3.3 A
- In-rush current : Not more than 100 A  
(At an ambient temperature of 25 °C, full-load, 100-240 VAC input, and cold start)

## 6- 5. AC power cord specifications

- Model No. : ACS-100J (for Japan)  
ACS-100U (for U.S.A.)  
ACS-100G (for Europe)  
ACS-100E (for England)

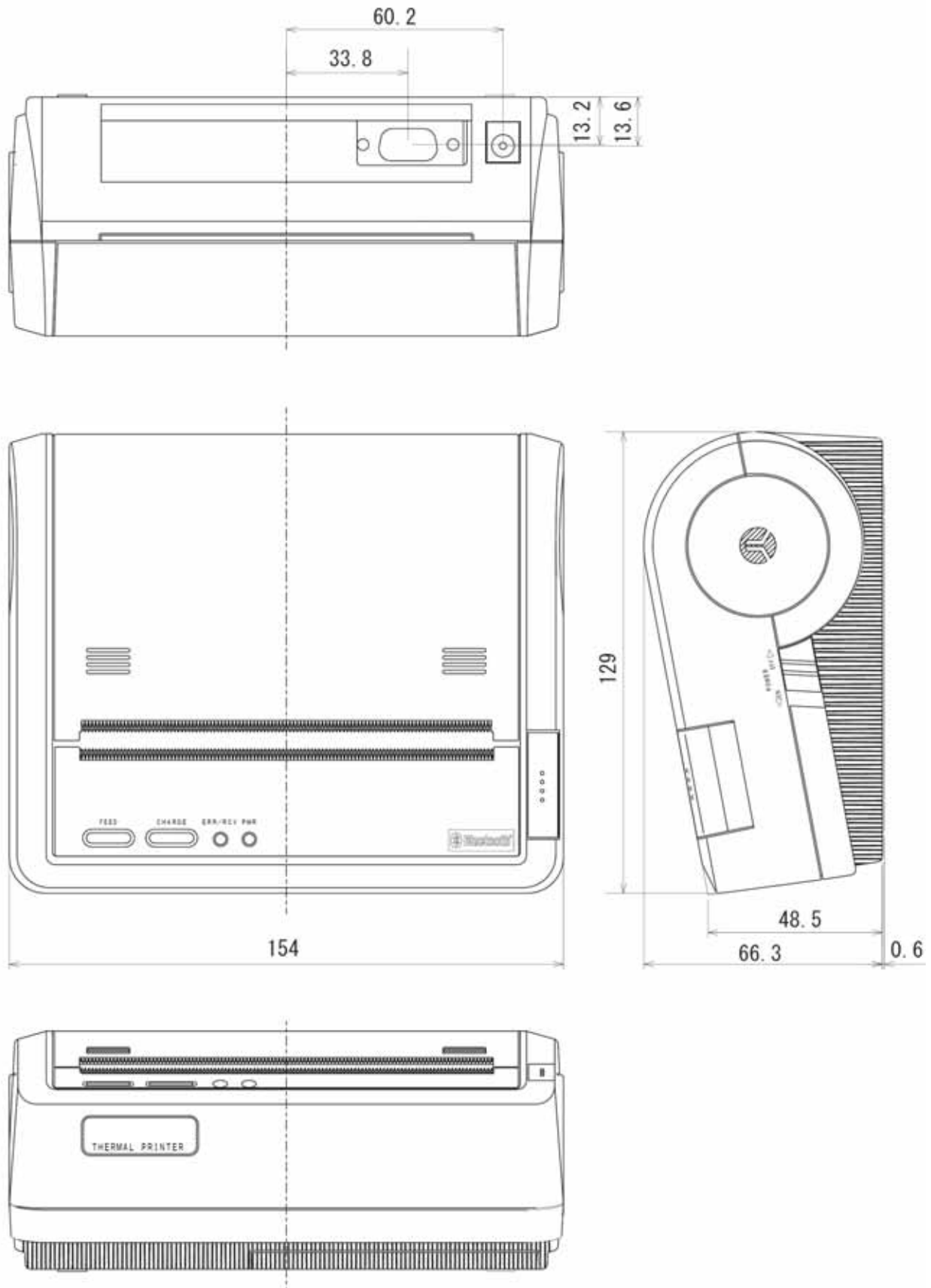
## 6- 6. Battery pack specifications (option)

- Model No. : UR-121
- Nominal voltage : 7.4 VDC
- Nominal capacity :1700 mAh
- Number of charge/ discharges : About 500 times
- Standard charging time : About 2 hours

## 6- 7. Battery charger specifications (option)

- Model No. : NC-LSC05
- Input voltage : 100-240 VAC, 50/60 Hz
- Input capacity : 20-32 VA
- Rated output : 8.4 VDC, 1.1 A
- Operating temperature : 0 °C to +40 °C (32 °F to 104 °F ) / 45 %RH to 85 %RH
- Storage temperature : -20 °C to +60 °C (-4 °F to 140 °F ) / 45 %RH to 85 %RH

## 6- 8. Outer dimensions



Unit:mm

## 7. Interface Specifications

### 7- 1. Bluetooth interface

#### 7-1-1. Specifications

Interface	Bluetooth 1.1 conformity
Output Frequency	2.4GHz(2402~2480MHz)
Modulation	FH-SS (Frequency hopping spectrum diffusion method)
Output level	Class2, (Expected max. distance 10m)
Coding	128bit
Security Level	Mode 3 Link level
PIN code	Max. 16 characters (Registration character is half sized alphanumeric and make arbitrary registered)
Profile	Serial Port Profile

#### ■Windows2000/XP

The printer driver is available.

#### ■PDA

The printing support library is available.

Environment (PocketPC 2003 compatible)



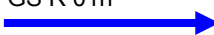

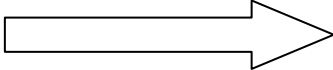


OS : Windows Mobile™ 2003

CPU : ARM architecture

Diagnos operation check : hx2410(HP), rx3715(HP)

#### 7-1-2. Direct control method from COM port

Refer to the following sequence in case of controlling from COM port.

No.	GR-LMK	Description	Printer
1	Wait 500ms after opening port (COM1~9)	Wait500ms	
2	Check bi-directional communication	GS E 04h SNEI 	Receive
3	Check receiving data	ETX DLE STX SNEI DLE 	Send
4	Acknowledge of status	GS R 01h 	receive
5	Check status	DLE STX X000 DLE ETX (X=R,B) 	Send status
6	Send printing data		Receive printing data, mapping and printing.
7	Status acknowledge command (Check the end of printing data)	GS R 01h 	
8	Wait of periodic cycle(approx.2000msec)	※Repeat every 2000ms until receiving response.	
9	Check status	DLE STX X000 DLE ETX (X=R,B) 	Send status
10	End		



#### 7-1-4. Note of Bluetooth communication

- Pairing request is transmitted only when the printer is powered on.  
Once host system is connected by Bluetooth, pairing mode is enabled until communicating with other host systems.
- Error signal like paper empty is detected with reading data.
- The frequency range of this product is 2.4MHz. It may cause interference with this printer if other device is transmitted the same frequency range.
- Interruption of communication may be caused depending on circumstance of RF and used electronic devices.
- If the interruption is kept for 5sec, it may disconnect Bluetooth communication.
- Turn off your electronic device before entering an area with potentially explosive atmosphere.  
Host electronic device could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death.



## 7- 2. RS232C Interface

### 7-2-1. Pin Layout

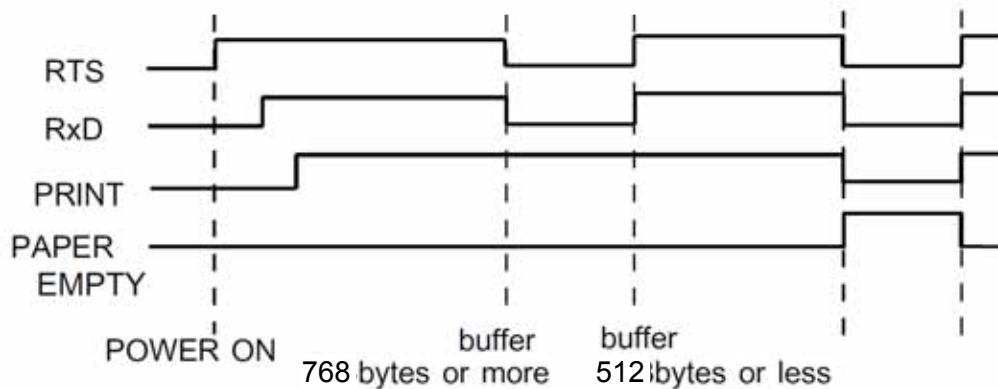
Connector : DDK 17LE-23090-27 (D4CB)

Host side : D-Sub9 (Female)

Pin No.	Signal	Direction	Function
2	RxD	Input	Serial data input
3	TxD	Output	Serial data output
5	GND	---	Ground
7	RTS	Output	Request to send
8	CTS	Input	Clear to send
1,4,6,9	N.C.	---	No connect

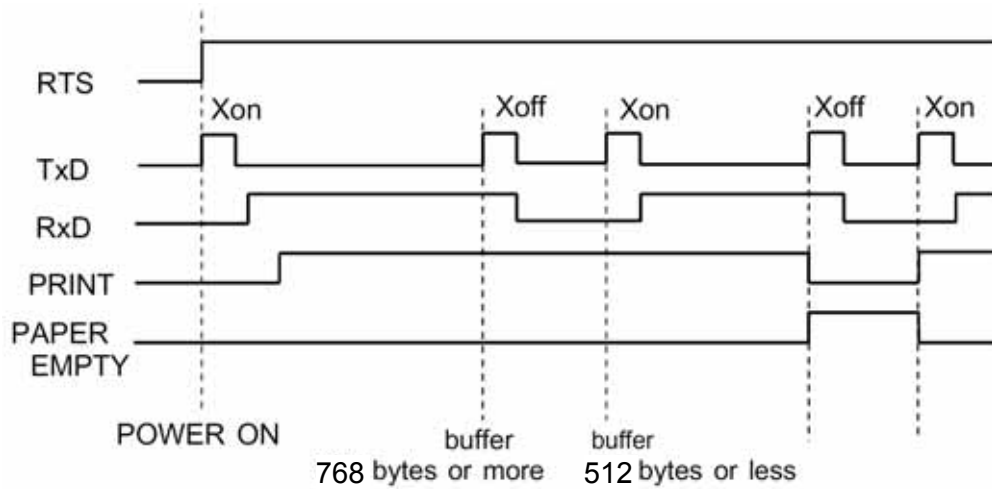
### 7-2-2. Hardware control

The receiving buffer is filled out 768bytes or more, RTS signal changes Low status. The host side should stop sending data. If the data in the input buffer is reduced 512bytes or less, RTS signal goes High status and re-start sending remained data.



## 7-2-3. Xon/Xoff control

The receiving buffer is filled out 768bytes or more, Xoff signal is sent to host systems. The host systems should stop sending data after receiving Xoff signal. If the data in the input buffer is reduced 512bytes or less, Xoff signal is sent to host systems and re-start sending remained data.



## 7-2-4. Conditions of input/output signal

Item	Condition	Rate Value			Unit
		Min.	Typ.	Max.	
High input voltage	RXD、CTS	+2.8	—	+15	V
Low input voltage	RXD、CTS	-15	—	-2.8	V
High output voltage	TXD、RTS (RL=3KΩ)	+5	+6	+15	V
Low output voltage	TXD、RTS (RL=3KΩ)	-15	-6	-5	V

## 8. Command Description

### 8- 1. Introduction

#### 1. Standard mode and page mode

This printer is available with two printing modes, standard mode and page mode.

By the default, the standard mode is available. With the page mode selection command (ESC L), the mode is shifted to the page mode.

In the page mode, the mode is shifted to the standard mode when receiving the page length printing command (FF) or standard mode selection command (ESC S).

Depending on the command, processing differs between the standard mode and page mode. For them, refer to the Commands list and each command description.

For unlisted commands, performs the same processing in both of modes.

##### (1) Standard mode

Every time a printing or paper feed command is received, the motor and head are driven to perform printing and paper feeding.

##### (2) Page mode

Even if a printing or paper feed command received, printing or paper feed is not performed immediately. Those operations are developed in the page memory available for the page mode. Printing is performed in a batch with the page length printing command (FF) or a batch printing command (ESC FF) of the page memory received.

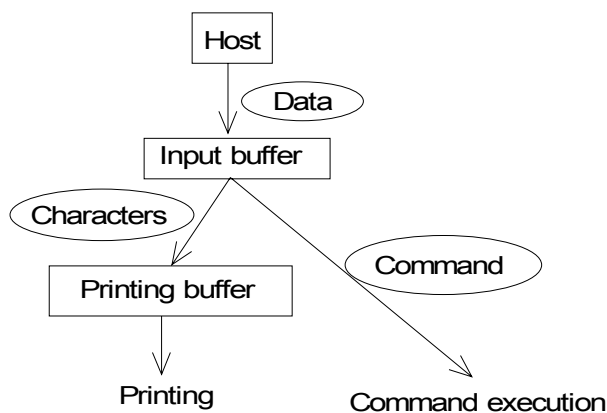
In addition, the page mode specifications are as follows:

- Use an ESC W command to specify the character development area.
- Use an ESC T command to specify the character development direction.
- The following commands can be set a value independently for each of the page mode and standard mode.
  - (1) Set the right space of a character: ESC SP
  - (2) Set the inter-character space of kanji character: FS S
  - (3) Set the initial line feed value: ESC 2
  - (4) Set the line feed value: ESC 3
- The following commands are not executed in the page mode but the value is stored as a valid setting in the standard mode. The stored value is valid when the mode shifts to the standard mode.
  - (1) Set the left margin: GS L
  - (2) Set the printing area width: GS W
  - (3) Specify the absolute position of the printing area: ESC \$
  - (4) Position alignment: ESC a
  - (5) Set the page length: ESC C
- The following command is ignored in the page mode:
  - (1) Inverse printing specification/ cancel: ESC {
- The ESC @ command executes initialization. In the page mode, the command initializes the set value and shifts the mode to the standard mode.

## 2. Flow of data processing (in the standard mode)

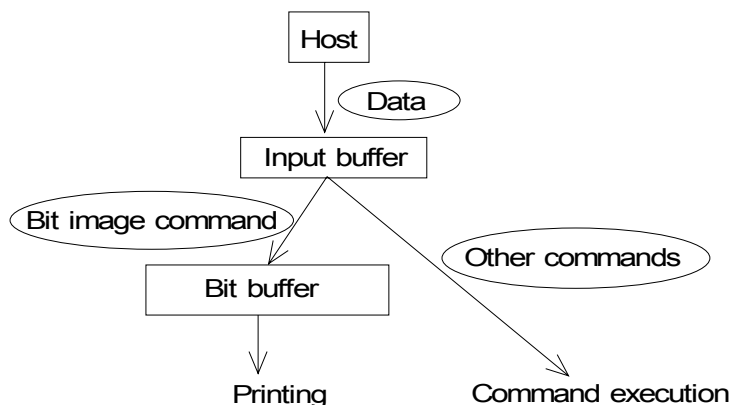
### (1) Font 1-line printing

- (1) Data sent from the host is stored in the input buffer.  
Storage into the input buffer is performed by the interrupt processing and it allows data reception even during printing.
- (2) Data is fetched from the input buffer. For the character data, (3) is executed. If the data is not a character but a command, the function is executed.
- (3) The character data is stored in the print buffer.  
When the character data size exceeds one line or the line feed command is fetched, printing begins.
- (4) The character codes stored in the printing buffer is converted into the image data equivalent to one dot line.
- (5) The image data is transferred to the print head.
- (6) The motor and the print head are driven.
- (7) Until printing equivalent to one line is completed, (4) to (6) are repeated.
- (8) Paper equivalent to the line space is fed and (2) is resumed.



### (2) Bit image printing

- (1) The data sent from the host is stored in the input buffer.  
Data storage into the input buffer is performed by the interrupt processing and even during printing, data can be received.
- (2) Data is fetched from the input buffer. When the data is a bit image command, (3) is executed. If the data is not a bit image command but a command, the function is executed.
- (3) The bit image data of the bit image command is stored in the bit buffer.  
When the size of the bit image data attains to the dot line width, printing is started.
- (4) The image data equivalent to one dot line in the bit buffer is sent to the head.
- (5) The motor and head are driven.
- (6) Until printing by the bit image command printing is completed, (3) to (5) are repeated.



## 8- 2. Command list

The commands with a mark \* provide different processing in the standard mode and page mode.  
For details, refer to each command description.

### 1. Paper feed command

Command	Name
CR	Carriage return/line feed
LF	Carriage return/line feed
FF	Page length printing *
ESC J	Printing and feed forward *
ESC j	Printing and feed backward *
ESC d	Printing and consecutive line feed
ESC C	Set the page length *

### 2. Tab command

Command	Name
HT	Horizontal tab
ESC D	Horizontal tab setting

### 3. Format command

Command	Name
ESC 2	Set the initial line feed value *
ESC 3	Set the line feed value *
ESC SP	Set the right space of a character *
GS L	Set the left margin *
GS W	Set the printing area width *
ESC \$	Specify the absolute position of the printing area *
ESC a	Position alignment *

### 4. Character modification command

Command	Name
ESC !	Modification character specification in a batch
ESC G	Bold character specification/ cancel
ESC E	
ESC {	Inverse printing specification/ cancel *
ESC -	Underline specification/ cancel
GS !	Set a character size
GS B	Specify and cancel a black and white reverse character

### 5. Character selection command

Command	Name
ESC M	Choose a character font
ESC R	Choose an international character
ESC t	Choose a character code table
ESC &	Register a download character
ESC ?	Erase a download character
ESC %	Specify and cancel a download character

## 6. Barcode command

Command	Name
GS H	Set the HRI character printing
GS w	Set the barcode width
GS h	Set the barcode height
GS k	Print a barcode *

## 7. Ruled line command

Command	Name
DC3 A	Choose ruled line buffer A
DC3 B	Choose ruled line buffer B
DC3 C	Clear the ruled line buffer
DC3 D	Write dot specification to the ruled line buffer
DC3 L	Write line specification of the ruled line buffer
DC3 +	Enable the ruled line printing mode *
DC3 -	Disable the ruled line printing mode
DC3 P	Execute printing of 1-dot ruled line

## 8. Bit image command

Command	Name
ESC *	Specify the bit image *
GS *	Register the downloaded bit image
GS /	Print the downloaded bit image *
DC2 V	Specify the high-speed bit image *

## 9. Page mode command

Command	Name
ESC L	Page mode selection *
ESC S	Standard mode selection *
ESC FF	Print the page memory in a batch *
CAN	Erase the print buffer, and clear the page memory area *
ESC T	Choose the printing direction and stating point *
ESC W	Specify the development area *

## 10. Kanji character command

Command	Name
FS &	Specify the kanji mode
FS .	Cancel the kanji mode
FS C	Choose the kanji code system
FS S	Set the inter-character space of a kanji character *
FS !	Specify a batch mode by a kanji character
FS -	Set and cancel a underline of a kanji character
FS W	Kanji Double-Height and Double-Width Specify/ Cancel
FS K	Kanji Double Height
FS 2	User-defined character registration

## 11. Function/Setting command

Command	Name
ESC @	Initialization *
DC2 D	Reserve and release a download character registration area
DC2 G	Reserve and release a user-defined character registration area
DC2 ~	Set a printing density
DC2 P	Setting the PIN code (Refer to 7-1-3)

## 12. Printing image registration/printing to the nonvolatile memory

Command	Name
FS Q	Specification of image registration onto the nonvolatile memory
FS R	Image registration canceling in the nonvolatile memory
FS O	Printing specification the image registered in the nonvolatile memory.
FS P	Canceling of printing of the image registered in the nonvolatile memory

## 13. Label print command

Command	Name
DC2 L	Set the length of label
DC2 I	Label feed

## 14. Character modification command

Command	Name
SO	Set double width with automatic reset
DC4	Cancel double width mode set by SO
ESC O	Set 16dots line space
ESC A	Set n dots line space
ESC W	Set/Cancel double width
ESC K	Specify single density bit image
ESC ^ O	Specify double height density bit image
ESC ^ 1	Specify double height and width density bit image

## 15. Two dimensional barcode command

Command	Name
GS Q	Print two dimensional barcode
GS S	Change the cell size of two dimensional barcode

## 16. Response command

Comand	Name
GS a	Enabling/Disabling Automatic Status Bac
GS r	Sending status
GS E	Check bi-directional communication (Refer to 7-1-3)
GS R	Check printer status (Refer to 7-1-3)

## 8- 3. Command Description

### 1. Paper feed command

#### **CR**

[Name]	Carriage return/line feed
[Code]	<0D>h
[Function]	Prints data in the print buffer and makes line feed based on the line feed amount.
[Detail]	<ul style="list-style-type: none"> <li>• After execution, makes the beginning of a line (left extremity) as the start position of printing.</li> <li>• LF code received immediatery following CR is ignored.</li> <li>• Disable LF after CR.</li> </ul>

#### **LF**

[Name]	Carriage return/line feed
[Code]	<0A>h
[Function]	Makes the same operation as CR.
[Detail]	<ul style="list-style-type: none"> <li>• After execution, make the beginning of a line as the printing start position.</li> <li>• LF code received immediatery following CR is ignored.</li> <li>• Disable LF after CR.</li> </ul>

#### **FF**

[Name]	Page length printing
[Code]	<0C>h
[Function]	<p>&lt;Standard mode&gt;</p> <p>Performs form feed based on the page length setting (ESC C).</p> <p>&lt;Page mode&gt;</p> <p>Returns to the standard mode after page memory batch printing.</p>
[Detail]	<ul style="list-style-type: none"> <li>• After execution, makes the beginning of a line as the next printing start position.</li> </ul>

#### **ESC J n**

[Name]	Printing and feed forward
[Code]	<1B>h <4A>h n
[Definition area]	$0 \leq n \leq 255$
[Function]	<p>&lt;Standard mode&gt;</p> <p>Prints data in the print buffer and feeds paper based on [n x paper feed pitch].</p> <p>&lt;Page mode&gt;</p> <p>Moves y-axis in the forward direction.</p>
[Detail]	<ul style="list-style-type: none"> <li>• After execution, makes the beginning of a line as the printing start position.</li> <li>• Receives no influence from the setting of the line feed amount .</li> </ul>



**ESC j n**

[Name] Printing and feed backward

[Code] <1B>h <6A>h n

[Definition area]  $0 \leq n \leq 255$

[Function] <Standard mode>

Prints data in the print buffer and feeds paper in the reverse direction based on [n x paper feed pitch].

<Page mode>

Moves y-axis in the backward direction.

- [Detail]
- After execution, makes the beginning of a line as the printing start position.
  - Receives no influence from the setting of the line feed amount.

**ESC d n**

[Name] Printing and consecutive line feed.

[Code] <1B>h <64>h n

[Definition area]  $0 \leq n \leq 255$

[Function] Prints data in the print buffer and makes paper feed forward by n lines.

- [Detail]
- After execution, makes the beginning of a line as the printing start position.

**ESC C n**

[Name] Set the page length

[Code] <1B>h <43>h n

[Definition area]  $1 \leq n \leq 255$

[Function] <Standard mode>

Sets the number of lines in a page used for the page length printing command (FF).

<Page mode>

Performs the setting for the standard mode.

[Detail] <Standard mode>

- With the value set with the command, the page length printing command (FF) makes form feed.
- <Page mode>
- This command is not executed in the page mode but the value is stored as a valid setting in the standard mode.
  - The stored value is valid when the mode shifts to the standard mode.

## 2. Tab command

### HT

- [Name] Horizontal tab
- [Code] <09>h
- [Function] Moves the printing position to the next horizontal tab position.
- [Detail]
- When the horizontal tab position is not specified, this command is ignored.
  - When the horizontal tab position exceeds the printing area, set the tab position to the starting position of the next line.
  - To set the horizontal tab position, use Horizontal tab setting (ESC D).
  - The initial value of the horizontal tab is at an interval of every eight characters.

### ESC D n1...nk NUL

- [Name] Horizontal tab setting
- [Code] <1B>h <44>h n1...nk <00>h
- [Definition area]  $1 \leq n \leq 255$   
 $1 \leq k \leq 32$
- [Function] Sets the horizontal tab position  
 The initial value of the horizontal tab is at an interval of every eight characters.  
 n indicates the number of digits from the starting position of a line to the setting position.  
 k indicates the number of tabs that can be set in a line.
- [Detail]
- The horizontal tab position to be set as [character width x n].  
 →The character width includes the right space and the horizontal size at character enlargement.
  - All of values set before are reset.
  - Up to 32 tab positions can be set in a line. When the number of tab positions exceeds the limit, the data that follows the limit is not processed with the horizontal tab setting command but processed as ordinary data.
  - The tab positions are set in the ascending order and end with a NUL code. When the setting position is not in the ascending order (when a smaller value is set than the previous one), it is recognized as a NULL code.
  - Even by changing the character width after setting, the set tab positions are retained.

### 3. Format command

#### **ESC 2**

- [Name] Set the initial line feed value
- [Code] <1B>h <32>h
- [Function] Returns the line feed amount per line to the initial value.
- [Detail] <Standard mode>
- Makes setting valid for the standard mode.
- <Page mode>
- Makes setting valid for the page mode.

#### **ESC 3 n**

- [Name] Set the line feed value
- [Code] <1B>h <33>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Sets the line feed amount per line in [n x line feed pitch].
- [Detail] <Standard mode>
- Makes setting valid for the standard mode.
  - The height of smaller line feed depends on data existence in buffer. When the line feed amount is smaller than character height and existing that character in the buffer, the line feed amount becomes same as character height. If not existing that character, the printer processes the height of line feed as the line feed amount specified.
- <Page mode>
- Makes setting valid for the page mode.

#### **ESC SP n**

- [Name] Set the right space of a character
- [Code] <1B>h <20>h n
- [Definition area]  $0 \leq n \leq 127$
- [Function] Sets the right space amount per character to [n x dot pitch].
- [Detail] <Standard mode>
- When the character size is horizontally doubled, the right space amount is accordingly increased.
  - This command has no influence over kanji characters.
  - The initial value is n=0.
- <Page mode>
- Makes setting valid for the page mode.

#### **GS L nl nh**

- [Name] Set the left margin
- [Code] <1D>h <4C>h nl nh
- [Definition area]  $0 \leq nl \leq 255$   
 $0 \leq nh \leq 255$
- [Function] <Standard mode>
- Sets the left margin as [(nh×256+nl) x dot pitch].
- <Page mode>
- Makes setting for the standard mode.
- [Detail] <Standard mode>
- The maximum settable left margin is an area that permits horizontal printing.
  - When the parameter exceeds than printable area, it is rounded to the printable area.
  - The initial value is nh=nl=0.
- <Page mode>
- Only for the beginning of a line, setting is enabled.
  - This command is not executed in the page mode but the value is stored as a valid setting in the standard mode.
- The stored value is valid when the mode shifts to the standard mode.

**GS W nl nh**

[Name] Set the printing area width

[Code] <1D>h <57>h nl nh

[Definition area]  $0 \leq nl \leq 255$   
 $0 \leq nh \leq 255$

[Function] <Standard mode>

Sets the printing area width as  $[(nh \times 256 + nl) \times \text{dot pitch}]$ .

<Page mode>

Makes setting for the standard mode.

[Detail] • Sets the printable area other than the left margin within horizontal printing area. When the parameter exceeds than printable area, the area is rounded to the horizontal printable area.

• The initial value is  $nhnl=832$ .

<Standard mode>

• Only for the beginning of a line, setting is enabled.

<Page mode>

• This command is not executed in the page mode but the value is stored as a valid setting in the standard mode.

The stored value is valid when the mode shifts to the standard mode.

**ESC \$ nl nh**

[Name] Specify the absolute position of the printing area

[Code] <1B>h <24>h nl nh

[Definition area]  $0 \leq nl \leq 255$   
 $0 \leq nh \leq 127$   
 $0 \leq nh \times 256 + nl \leq 127$

[Function] <Standard mode>

Sets the printing area by the absolute position based on the left margin.

The setting width is  $[(nh \times 256 + nl) \times \text{dot pitch}]$ .

<Page mode>

Makes setting for the standard mode.

[Detail] • When the parameter exceeds than the maximum value of  $nh \times 256 + nl$ , this command is ignored.

<Standard mode>

• Only for the beginning of a line, setting is enabled.

<Page mode>

• This command is not executed in the page mode but the value is stored as a valid setting in the standard mode.

The stored value is valid when the mode shifts to the standard mode.

**ESC a n**

[Name] Position alignment

[Code] <1B>h <61>h n

[Definition area]  $0 \leq n \leq 2$

[Function] <Standard mode>

Aligns the printing data of a line to the specified position.

$n=0$  : Left alignment

$n=1$  : Center alignment

$n=2$  : Right alignment

<Page mode>

Makes setting for the standard mode.

[Detail] • The position is aligned in the set printing area.

• The initial value is  $n=0$ .

<Standard mode>

• Only for the beginning of a line, setting is enabled.

<Page mode>

• This command is not executed in the page mode but the value is stored as a valid setting in the standard mode.

The stored value is valid when the mode shifts to the standard mode.

#### 4. Character modification command

##### **ESC ! n**

[Name] Modification character specification in a batch

[Code] <1B>h <21>h n

[Definition area]  $0 \leq n \leq 255$

[Function] Specifies the printing mode in a batch.

Bit	Item description	Function
0	Character font	0 : 24-dot 1 : 16-dot
1	Undefined	—
2	Undefined	—
3	Bold character	0 : Cancel 1 : Specified
4	Double-height character	0 : Cancel 1 : Specified
5	Double-width character	0 : Cancel 1: Specified
6	Undefined	—
7	Underline	0 : Cancel 1: Specified

- [Detail]
- When specifying both of bit 4 and 5 as 1, character size becomes double-height and double-width. The underline amount is 2-dot pitch.
  - The setting except the Bold character and character font is enabled only for a 1-byte size character.
  - A setting in this command can be specified by other commands, but the last command processing is enabled.
  - The initial value is n=0.

##### **ESC G n**

##### **ESC E n**

[Name] Bold character specification/ cancel

[Code] <1B>h <47>h n

<1B>h <45>h n

[Definition area]  $0 \leq n \leq 255$

[Function] Specifies and cancel the bold printing.

n=<xxxxxxx0>B : Cancel

n=<xxxxxxx1>B : Specified

- [Detail]
- n is valid only for the least significant bit.
  - The command can be also set by ESC ! but the command processed last is valid.
  - The initial value is n=0.

**ESC { n**

- [Name] Inverse printing specification/ Cancel
- [Code] <1B>h <7B>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] <Standard mode>  
 Specifies and cancels inversed printing.  
 n=<xxxxxxx0>B : Cancel  
 n=<xxxxxxx1>B : Specified  
 <Page mode>  
 Invalidation (forbiddance)
- [Detail] • n is valid only for the least significant bit.  
 • The initial value is n=0.  
 <Standard mode>  
 • Only for the beginning of a line, setting is enabled.  
 <Page mode>  
 • Ignores this command.

**ESC - n**

- [Name] Underline specification/ cancel
- [Code] <1B>h <2D>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Cancels and specifies the underline.  
 n=<xxxxx000>B : Underline 0-dot pitch  
 |  
 n=<xxxxx111>B : Underline 7-dot pitch
- [Detail] • This command is valid only for the least significant three bits of n.  
 • The command is valid only for the 1-byte size character.  
 • The underline is added to the character width and the character space. In addition, it is not influenced by the line feed amount setting.  
 • The underline is not added to a rotated character.  
 • The command can be also set by ESC ! but the command processed last is valid.  
 • The initial value is n=0.

**GS ! n**

- [Name] Sets a character size
- [Code] <1D>h <21>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Specifies the character size  
 n=<xxxx0000>B : Vertical direction magnification ratio 1 time <minimum>  
 |  
 n=<xxxx0111>B : Vertical direction magnification ratio 8 times <maximum>  
  
 n=<0000xxxx>B : Horizontal direction magnification 1 time <minimum>  
 |  
 n=<0111xxxx>B : Horizontal direction magnification 8 times <maximum>
- [Detail] • This command is valid for all the characters except the HRI characters.  
 • The magnification ratio specification other than the specified range is ignored.  
 • The command can be also set by ESC ! but the command processed last is valid.  
 • The initial value is n=0.  
 <Page mode>  
 • For how to develop the data, refer to How to Development in Page Mode (P51).

**GS B n**

- [Name] Specify and cancel a black and white reverse character
- [Code] <1D>h <42>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Cancels and specifies a black and white reverse character.  
n=<xxxxxxx0>B : Cancel  
n=<xxxxxxx1>B : Specified
- [Detail]
  - This command is valid only for the least significant bit of n.
  - The initial value is n=0.

## 5. Character selection command

### ESC M n

[Name] Choose a character font

[Code] <1B>h <4D>h n

[Definition area]  $0 \leq n \leq 255$

[Function] Chooses a character font.

n=<xxxxxxx0>B : Character font (12×24, 24×24)

n=<xxxxxxx1>B : Character font (8×16, 16×16)

- [Detail]
- Only the least significant bit of n is valid.
  - This command is also valid for the kanji character.
  - The command can be also set by ESC ! but the command processed last is valid.
  - The initial value is n=0.

### ESC R n

[Name] Choose an international character

[Code] <1B>h <52>h n

[Definition area]  $0 \leq n \leq 7$

[Function] Chooses a character set of a country shown below.

n=0 : Japan

n=1 : USA

n=2 : Germany

n=3 : England

n=4 : France

n=5 : Spain

n=6 : Italy

n=7 : Sweden

- [Detail]
- The data other than in the specified range is ignored.
  - The initial value is n=0.

### ESC t n

[Name] Choose an international character

[Code] <1B>h <52>h n

[Definition area]  $0 \leq n \leq 7$

[Function] Chooses a character set of a country shown below.

n=0 : PC437

n=1 : Katakana

n=2 : PC850

n=3 : PC857

- [Detail]
- The data other than in the specified range is ignored.
  - The default value is n=0.



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

[Name] Register a download character

[Code] <1B>h <26>h y c1 c2 [x1 d1...d(y×x1)] . . . [xk d1...d(y×xk)]

[Definition area] y=3

<20>h ≤ c1 ≤ c2 ≤ <7E>h

1 ≤ x ≤ 12 (When character font (12 x 24) is chosen)

1 ≤ x ≤ 9 (When character font (8 x 16) is chosen)

0 ≤ d ≤ 255

[Function] Defines the download pattern for the specified the character code.

y= Number of bytes in the vertical direction

c1= Character definition start code

c2= Character definition end code

x= Number of bits in a horizontal direction

[Detail]

- c1=c2 is set when only one character is defined.
- d is graphic data of a character downloaded.
- The right space surplus given by x specification is handled as a blank.
- When the command is specified for the previously registered code, the character is overwritten.
- When using a registered download character, specify ESC % as 1.
- Specifies 16-dot character as width of 8 dots and height of 16 dots.

**ESC ? n**

[Name] Erase a download character

[Code] <1B>h <3F>h n

[Definition area] <20>h ≤ n ≤ <7E>h

[Function] Erases the download character of a specified code.

[Detail] • n indicates a defined character code. After erasion, an internal character is printed.

- When a specified character code is not defined, the command is ignored.

**ESC % n**

[Name] Specify and cancel a download character

[Code] <1B>h <25>h n

[Definition area] 0 ≤ n ≤ 255

[Function] Cancels and specifies a download character set.

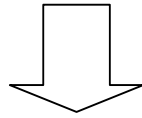
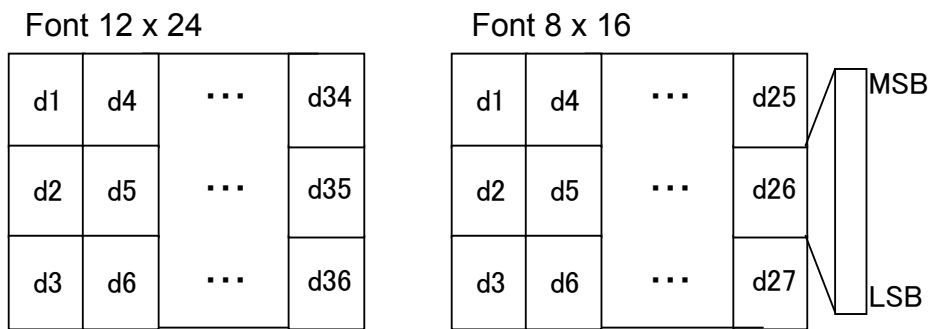
n=<xxxxxxx0>B : Cancel

n=<xxxxxxx1>B : Specified

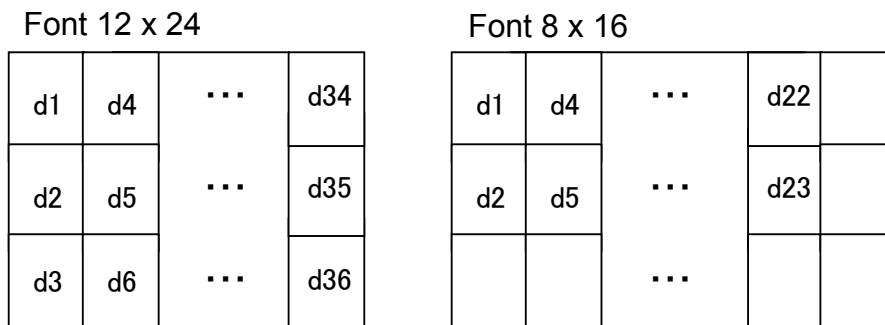
[Detail]

- Only the least significant bit of n is valid.
- When resetting a download character set, specify the internal character set.
- When a download character set is specified, a definition code is specified as the download character. Otherwise, undefined code is specified as an internal character.
- The initial value is n=0.

## Registration image



## Character output range



## 6. Barcode command

### GS H n

- [Name] Set the HRI character printing
- [Code] <1D>h <48>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Specifies the printing position of the HRI characters at barcode printing.
- n=<xxxxxx00>B : Does not print HRI characters.
  - n=<xxxxxx01>B : Printing on a barcode.
  - n=<xxxxxx10>B : Printing under a barcode.
  - n=<xxxxxx11>B : Printing on and under a barcode.
- [Detail] • The initial value is n=0.

### GS w n

- [Name] Set the barcode width
- [Code] <1D>h <77>h n
- [Definition area]  $1 \leq n \leq 4$
- [Function] Sets the width of a barcode.

N	JAN/UPC Module width	ITF, CODE39, CODABAR module width	
		Thin bar	Bold bar
1	2-dot pitch	1-dot pitch	3-dot pitch
2	3-dot pitch	2-dot pitch	5-dot pitch
3	4-dot pitch	3-dot pitch	8-dot pitch
4	5-dot pitch	4-dot pitch	10-dot pitch

- [Detail] • The initial value is n=2.
- In the case of CODE128, the initial value is 2-dot pitch.  
And, the module width setting conforms to JAN/ UPC.

### GS h n

- [Name] Set the barcode height.
- [Code] <1D>h <68>h n
- [Definition area]  $1 \leq n \leq 255$
- [Function] Sets the barcode height. Unit n is a dot pitch.
- [Detail] • The initial value is n=162.

**GS k m d1.. dk NUL**

[Name] Print a barcode

[Code] &lt;1D&gt;h &lt;6B&gt;h m d1. . dk &lt;00&gt;h

[Definition area]  $0 \leq m \leq 7$ 

d1 ... dk is barcode data and differs according to the barcode system.

[Function] Chooses the barcode system and prints a barcode.

m	Barcode system	No. of maximum digits (initial value)
0	UPC-A	Fixed
1	UPC-E	Fixed
2	JAN13	Fixed
3	JAN8	Fixed
4	CODE39	26 digits
5	ITF	50 digits
6	NW7(CODABAR)	37 digits
7	CODE128(EAN128)	34 digits (Start A) 34 digits (Start B) 58 digits (Start C)

- [Detail]
- UPC-A has 11 bytes as barcode data and the check digit is internally added.
  - UPC-E has 7 bytes as barcode data and the check digit is internally added.
  - JAN13 has 12 bytes as barcode data and the check digit is internally added.
  - JAN8 has 7 bytes as barcode data and the check digit is internally added.
  - IN CODE39, a start/stop module is internally added.
  - ITF has an even byte as barcode data and the start/stop module is internally added.
  - In CODE 128, a start module (either start A, start B, or start C) and barcode data are sent. The check digit and stop module are internally added.
  - A separator or check digit for each application identifier by EAN128 are not internally added.

Each special character is specified with 2 bytes as follows:

SHIFT	-> 7Bh, 53h	"{S "
CODE A	-> 7Bh, 41h	"{A "
CODE B	-> 7Bh, 42h	"{B "
CODE C	-> 7Bh, 43h	"{C "
FNC 1	-> 7Bh, 31h	"{1 "
FNC 2	-> 7Bh, 32h	"{2 "
FNC 3	-> 7Bh, 33h	"{3 "
FNC 4	-> 7Bh, 34h	"{4 "
'{'	-> 7Bh, 7Bh	"{{ "
Start A	-> 67h (103)	"g"
Start B	-> 68h (104)	"h"
Start C	-> 69h (105)	"i"

<Page mode>

- For how to develop the data, refer to How to Development in Page Mode (P51).

## 7. Ruled line command

### **DC3 A**

- [Name] Choose ruled line buffer A
- [Code] <13>h <41>h
- [Function] Chooses a ruled line buffer A.
- [Detail]
  - The ruled line buffer has two independent buffers inside it (buffer A, buffer B), and buffer A is chosen precedent.
  - The ruled line buffer is a 1-dot line buffer. In it, a ruled line is printed by setting the dot pattern in it and drawing it in a vertical direction.
  - Buffer A is chosen as the initial value.

### **DC3 B**

- [Name] Choose an international character
- [Code] <13>h <42>h
- [Function] Chooses ruled line buffer B.
- [Detail]
  - The ruled line buffer has two independent buffers inside it (buffer A, buffer B) and buffer B is chosen precedent.
  - The ruled line buffer is a 1-dot line buffer. In it, a ruled line is printed by setting the dot pattern in it and drawing it in a vertical direction.
  - Buffer A is chosen as the initial value.

### **DC3 C**

- [Name] Clear the ruled line buffer
- [Code] <13>h <43>h
- [Function] Clears the contents of a chosen ruled line buffer.
- [Detail]
  - The clear data is all dots "0" (white spot).

### **DC3 D nl nh**

- [Name] Write dot specification to the ruled line buffer
- [Code] <13>h <44>h nl nh
- [Definition area]  $0 \leq nl \leq 255$   
 $0 \leq nh \leq 3$
- [Function] Writes "1" (black spot) at the specified dots position of the ruled line buffer.  
The position specified is  $[(nh \times 256 + nl) \times \text{dot pitch}]$ .
- [Detail]
  - The range of the ruled line buffer is "0" to "1023" dots. Irrespective of the printable area, writes "1" (black spot) in the ruled line buffer.
  - When specifying a parameter other than at the specified range, the command is ignored.

**DC3 L nl nh ml mh**

[Name] Write line specification of the ruled line buffer

[Code] <13>h <4C>h nl nh ml mh

[Definition area]  $0 \leq nl \leq 255$   
 $0 \leq nh \leq 3$   
 $0 \leq ml \leq 255$   
 $0 \leq mh \leq 3$

[Function] Writes "1" (black spot) in a range of nhnl through mhml dots to the ruled line buffer.

$0 \leq nhnl \leq mhml \leq 1023$

$nhnl = (nh \times 256 + nl) \times \text{dot pitch}$

$mhml = (mh \times 256 + ml) \times \text{dot pitch}$

[Detail] • The range of the ruled line is "0" to "1023" dots. Irrespective of the printable area, "1" (black dot) is written in the specified dot range of a chosen ruled line buffer.  
 • When specifying a parameter other than in the specified range, the command is ignored.

**DC3 +**

[Name] Enable the ruled line printing mode

[Code] <13>h <2B>h

[Function] Permits the printing mode of the ruled line buffer.

[Detail] • After permission, when printing data (including CR/ LF) is printed, the dot pattern in a chosen ruled line buffer is overwritten and printed.  
 • This command is not influenced by the right margin setting (GS L), printing area width setting (GS W), and the printing area absolute position specification (ESC \$).  
 • In initialization, the printing mode of the ruled line is disabled.  
 <Standard mode>  
 • Data in the ruled line buffer 0 to 1023 dots can be specified, however, the printer prints the dots up to 831 but does not print following dots.  
 <Page mode>  
 • The range of the ruled line buffer data that conforms to the page horizontal size or vertical size is printed.

**DC3 -**

[Name] Disable the ruled line printing mode

[Code] <13>h <2D>h

[Function] Disables the printing mode of the ruled line buffer.

[Detail] • After disabling, the dot pattern in the ruled line buffer is not overwritten and printed.

**DC3 P**

[Name] Execute printing of 1-dot ruled line

[Code] <13>h <50>h

[Function] Prints data in the print buffer and prints a 1-dot line in a chosen ruled line buffer.

[Detail] • When data is not found in the print buffer, prints a 1-dot line of the ruled line buffer as it is.  
 • When the print mode of the ruled line buffer is disabled, printing is not performed.

## 8. Bit image command

### ESC \* m nl nh d1... dk

[Name] Specify the bit image

[Code] <1B>h <2A>h m nl nh d1. . . dk

[Definition area] m=0, 1, 32, 33

$0 \leq nl \leq 255$

$0 \leq nh \leq 3$

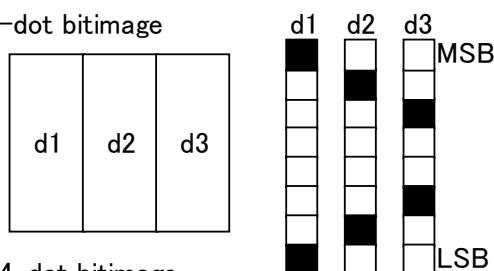
$0 \leq d \leq 255$

[Function] The bit image equivalent to the number of dots in a horizontal direction that are specified with nl, nh is printed. The printing pattern follows the mode specified with m.

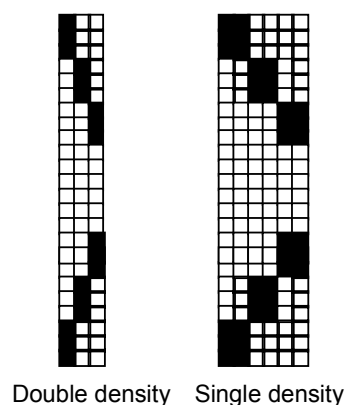
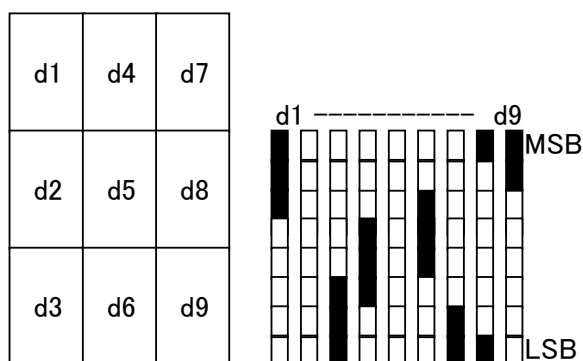
m	Mode	Number of vertical dots	Number of horizontal dots (1 line)	Number of data items (k)
0	8-dot single density	8	416	$nh \times 256 + nl$
1	8-dot double density	8	832	$nh \times 256 + nl$
32	24-dot single density	24	416	$(nh \times 256 + nl) \times 3$
33	24-dot double density	24	832	$(nh \times 256 + nl) \times 3$

- [Detail]
- When m is out of the definition area, data subsequent to nl is not processed with the command but as ordinary data.
  - nl and nh indicates the number of dots in the horizontal direction for dot image printed.
  - When dot is specified out of the printable area, data is discarded.
  - The printing start position follows the cursor position at the corresponding time.
  - In inverted image printing, data is inverted only and not influenced by the others ( bold, black and white reversion.)
- <Standard mode>
- As for data development manner, see the figure below.
- <Page mode>
- As for data development manner, refer to How to Development in Page Mode (P51).

8-dot bitimage



24-dot bitimage



**GS \* x y d1... d(x×y×8)**

[Name] Register the downloaded bit image

[Code] <1D>h <2A>h x y d1. . . d(x×y×8)

[Definition area]  $1 \leq x \leq 255$

$1 \leq y \leq 48$  where,  $(x \times y \times 8) \leq$  user memory empty area

$0 \leq d \leq 255$

[Function] Registers bit image data with a size specified by x and y in the user memory.

X indicates that the horizontal size is (x x 8) dots.

Y indicates that the vertical size is (y x 8) dots.

[Detail] • When the parameter is out of the specified range, this command is ignored.

• For the empty area of the user memory, refer to the user memory (P14).

• As for data development manner, see the figure below.

**GS / m**

[Name] Print the downloaded bit image

[Code] <1D>h <2F>h m

[Definition area]  $0 \leq m \leq 3$

[Function] The registered download bit image is printed in a mode specified with m.

m	Printing mode	Contents
0	Normal mode	Printing by the ordinary magnification.
1	Horizontal double-sized mode	Printing by double-width.
2	Vertical double-sized mode	Printing by double-height.
3	Double-width and double-height mode	Printing by double-width and double-height.

[Detail] • When download bit image is not defined, this command is ignored.

• The printing mode other than inverse printing command has no influence with this command.

• Even if the area out of printable range, the fraction section that protrudes in units of bytes in the right direction is printed.

<Standard mode>

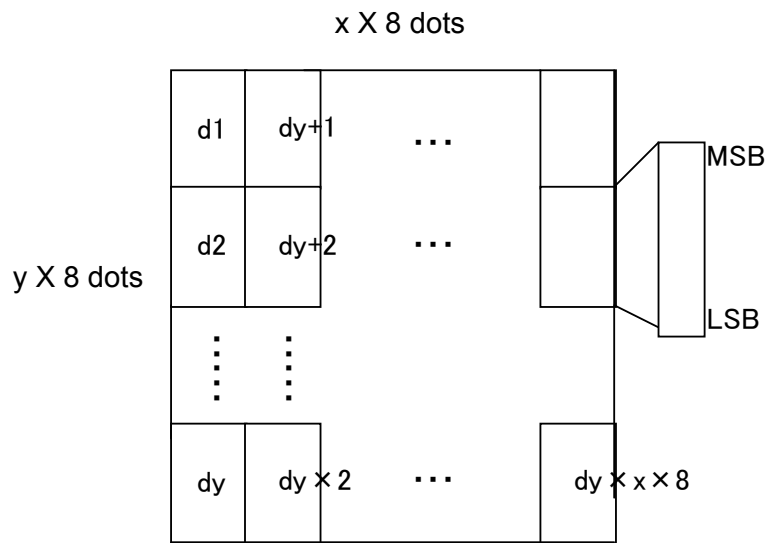
• When data remains in the print buffer, the printer prints that data and then prints download bit image.

<Page mode>

• As for data development manner, refer to How to Development in Page Mode (P51).



## Download bit image configuration



**DC2 V nl nh d1... dk**

[Name] Specify the high-speed bit image (image layout: Horizon)

[Code] <12>h <56>h nl nh d1. . . dk

[Definition area]  $0 \leq nl \leq 255$

$0 \leq nh \leq 255$

$0 \leq d \leq 255$

[Functions] <Standard mode>

Prints bit image of the number of lines specified by nl and nh.

Number of data in a line	Number. of entire data (k)
104	$(nh \times 256 + nl) \times 104$

\* When Paper Size=112mm is set

<Page mode>

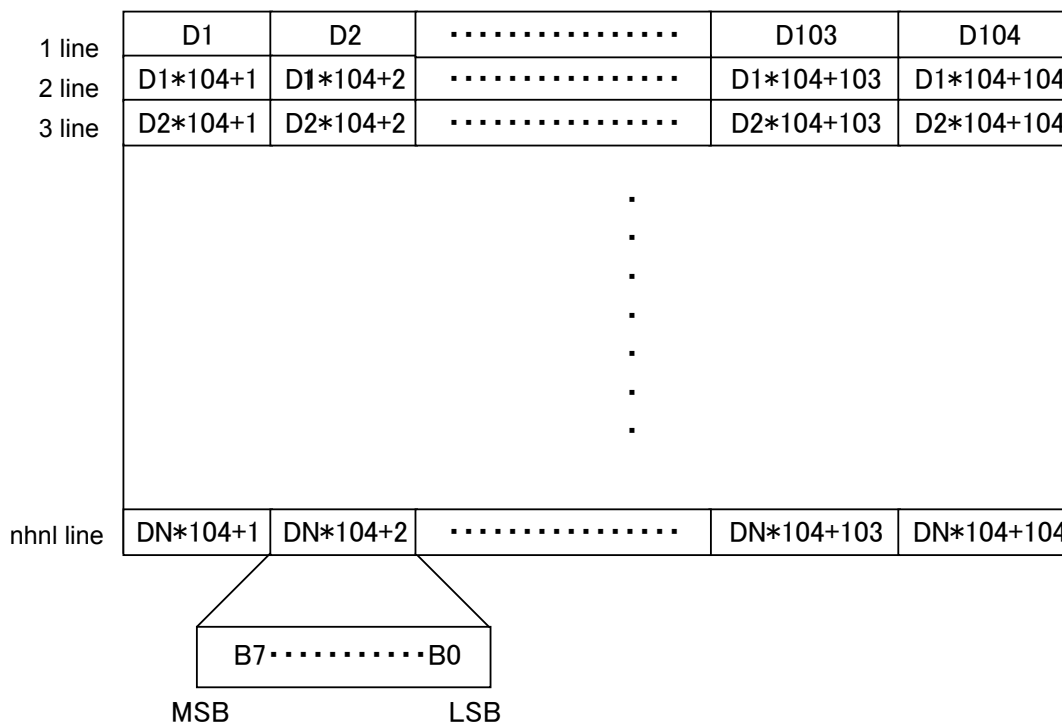
Invalidation (forbiddance)

[Detail] <Standard mode>

- nl and nh indicate the number of vertical lines. (nh×256+nl line)
- The number of data in horizontal direction is fixed to 104 bytes.
- As for image development manner, see the figure below.

<Page mode>

- Ignores this command.



## 9. Page Command

### **ESC L**

[Name]	Page mode selection
[Code]	<1B>h <4C>h
[Function]	<Standard mode> Changes the standard mode to the page mode. <Page mode> Invalidation (forbiddance)
[Detail]	<Standard mode> <ul style="list-style-type: none"> <li>Only for the beginning of a line, setting is enabled.</li> </ul> <Page mode> <ul style="list-style-type: none"> <li>Ignores this command.</li> </ul>

### **ESC S**

[Name]	Standard mode selection
[Code]	<1B>h <53>h
[Function]	<Standard mode> Invalidation (forbiddance) <Page mode> Changes the page mode to the standard mode.
[Detail]	<Standard mode> <ul style="list-style-type: none"> <li>Ignores this command.</li> </ul> <Page mode> <ul style="list-style-type: none"> <li>Even when data is found in the page memory, the page mode is terminated without further printing.</li> <li>After execution, makes the beginning of a line as the printing start position.</li> </ul>

### **ESC FF**

[Name]	Prints the page memory in a batch
[Code]	<1B>h <0C>h
[Function]	<Standard mode> Invalidation (forbiddance) <Page mode> Performs batch printing of the printing area.
[Detail]	<Standard mode> <ul style="list-style-type: none"> <li>Ignores this command.</li> </ul> <Page mode> <ul style="list-style-type: none"> <li>After execution, setting of ESC W, ESC T is retained.</li> <li>After execution, the data in the page memory is retained.</li> </ul>

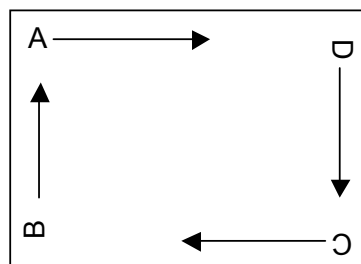
**CAN**

- [Name] Erases the print buffer, and clears the page memory area
- [Code] <18>h
- [Function] <Standard mode>  
Clears the print buffer.
- <Page mode>  
Clears all data in specified area of the page mode by ESC W.
- [Detail ] <Standard mode>
- The beginning of a line is treated as the printing start position after execution.
- <Page mode>
- The command returns the development position to the start position of the ESC T command after execution.

**ESC T n**

- [Name] Chooses the printing direction and starting point
- [Code] <1B>h <54>h n
- [Definition area]  $0 \leq n \leq 3$
- [Function] <Standard mode>  
Invalidation (forbiddance)
- <Page mode>  
Chooses the character printing direction and start point.

n	Starting point and development direction
0	A
1	B
2	C
3	D



- [Detail] <Standard mode>
- Ignores this command.
- <Page mode>
- The printing development position is specified area by ESC W command.
  - The X axis and Y axis are reversed in the development direction.
- Development direction (A, C)  
Y axis : ESC J, ESC j, ESC 2, ESC 3  
X axis: ESC SP, FS S
  - Development direction B, D)  
Y axis : ESC SP, FS S  
X axis : ESC J, ESC j, ESC 2, ESC 3
- The initial value is n=0.

**ESC W xl xh yl yh dxl dxh dyl dyh**

[Name] Specify the development area

[Code] &lt;1B&gt;h &lt;57&gt;h xl xh yl yh dxl dxh dyl dyh

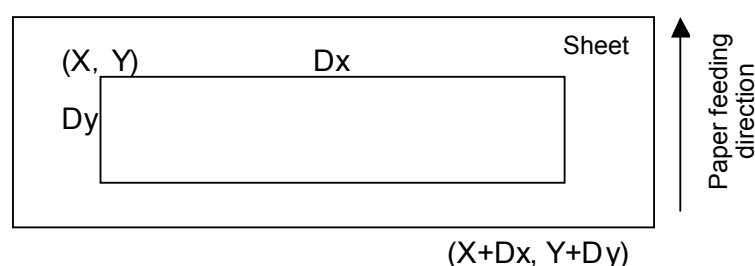
[Definition area]  $0 \leq (xh \times 256 + xl) \leq 830$  $0 \leq (yh \times 256 + yl) \leq 478$  $1 \leq (dxh \times 256 + dxl)$  $1 \leq (dyh \times 256 + dyl)$ 

[Function] &lt;Standard mode&gt;

Invalidation (forbiddance)

&lt;Page mode&gt;

Sets the printing area.

① X-axis origin =  $(xh \times 256 + xl) \times \text{dot pitch}$ ② Y-axis origin =  $(yh \times 256 + yl) \times \text{dot pitch}$ ③ X-axis length =  $(dxh \times 256 + dxl) \times \text{dot pitch}$ ④ Y-axis length =  $(dyh \times 256 + dyl) \times \text{dot pitch}$ 

[Detail] &lt;Standard mode&gt;

- Ignores this command.

&lt;Page mode&gt;

- During operation, when a parameter outside the definition area is set, a code up to dyh is acquired and invalidates the command.
- Use the ESC T command to specify the development direction and starting point of the character position.
- The Y-direction maximum value = 831. When data exceeds 831, Dx is rounded and (X + Dx) is handled as 831.
- The Y-direction maximum value = 479. When data exceeds 479, Dy is rounded and (y + Dy) is handled as 479.
- When performing printing, the maximum set value in the Y axis is the printing length.

Example: First printing; Y=100, Dy=50 (y+Dy=150)

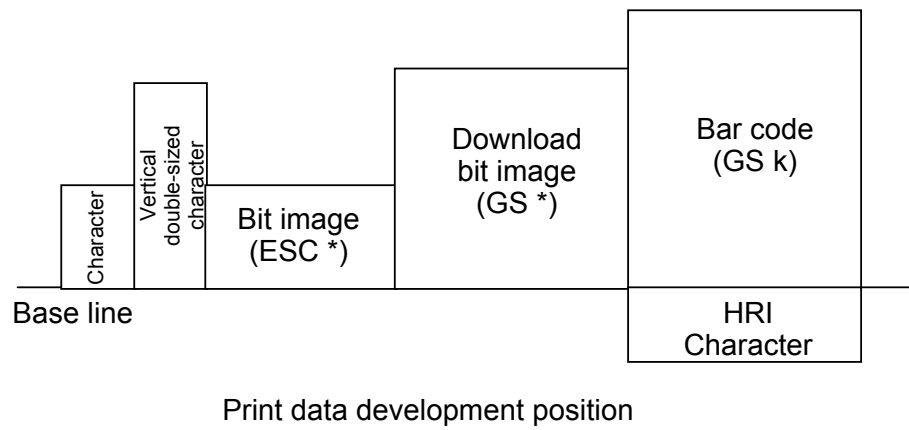
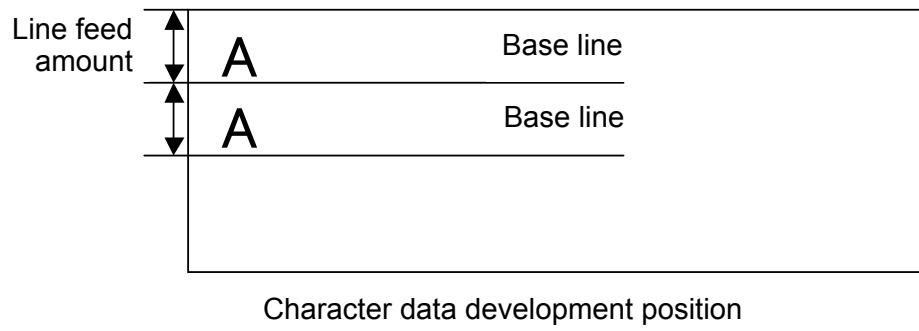
Second printing; Y=0, Dy=479 (y+Dy=479)

Third printing; Y=300, Dy=100 (y+Dy=400)

At printing, page printing is performed based on the length set the second time (because the size is the maximum.)

- When not setting the command, the printing length is determined by the initial value.
- The initial values are X=0, Y=0, DX=831, and DY=479.
- The line feed from the base line follows Set the initial line feed value (ESC 2) and Set the line feed value (ESC 3).

## How to development in Page Mode



## 10. Kanji character command

### **FS &**

- [Name] Specify the kanji mode
- [Code] <1C>h <26>h
- [Function] Specifies the kanji mode.
- [Detail]
  - This command is valid when the JIS code is chosen for the kanji character coding system. (The initial state of the kanji character coding system is JIS code.)
  - The FS C command is used to choose the kanji system.
  - When the kanji mode is chosen, all the data is processed as a 2-byte kanji code.
  - In the initial state, the kanji mode is cancel.

### **FS .**

- [Name] Cancel the kanji mode
- [Code] <1C>h <2E>h
- [Function] Cancels the kanji mode.
- [Detail]
  - The kanji mode specification with the command is valid only when the JIS code is chosen.
  - When canceling the kanji mode, all the character codes are processed as an ASCII code.
  - In the initial state, the kanji mode is cleared.

### **FS C**

- [Name] Choose the kanji code system
- [Code] <1C>h <43>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Chooses the kanji code system.
- n=<xxxxxxx0>B : JIS code
- n=<xxxxxxx1>B : Shift JIS code
- [Detail]
  - At the initial state, n=0.

### **FS S nl nr**

- [Name] Set the inter-character space of a kanji character
- [Code] <1C>h <53>h nl nr
- [Definition area]  $0 \leq nl \leq 127$   
 $0 \leq nr \leq 127$
- [Function] Sets the kanji left space amount (nl) and right space amount (nr).
- [Detail]
  - An parameter is the space amount of the standard character size. When printing the enlarged character, the space amount is accordingly enlarged in proportion to the character magnification ratio. However, when the parameter exceeds the maximum value of the definition area, it is substituted with the maximum value.
  - This command is valid only for the kanji character.
  - The initial value is nl=nr=0.

<Standard mode>

  - Make setting valid for the standard mode.

<Page mode>

  - Make setting valid for the page mode.

**FS ! n**

[Name] Specify a batch mode by a kanji character

[Code] <1C>h <21>h n

[Definition area]  $0 \leq n \leq 255$

[Function] Specifies the kanji printing mode in a batch.

Bit	Item description	Function
0	Undefined	—
1	Undefined	—
2	Double-width character	0 : Cancel 1 : Specify
3	Double-height character	0 : Cancel 1 : Specify
4	Undefined	—
5	Undefined	—
6	Undefined	—
7	Underline	0 : Cancel 1 : Specify

- [Detail]
- When specifying both double-width and double-height as 1, the character size becomes double height and width size.
  - The dots of kanji underline are 2-dot lines.
  - A setting in this command can be specified by other commands, but the last command processing is enabled.
  - The initial value is n=0.

**FS - n**

[Name] Set and cancel a underline of a kanji character

[Code] <1C>h <2D>h n

[Definition area]  $0 \leq n \leq 255$

[Function] Sets the kanji character underline

n=<xxxxx000>B : Underline 0-dot pitch

|

n=<xxxxx111>B : Underline 7-dot pitch

- [Detail]
- Only the low 3 bits are valid for n.
  - This command is valid only for the kanji characters.
  - The underline is added to the character and the character space.
  - The underline is not added to a rotated character.
  - When canceling the command, specify 0 dot pitch.
  - The command can be also set by FS ! but the command processed last is valid.
  - The initial value is n=0.

**FS W n**

[Name] Kanji Double-Height and Double-Width Specify/ Cancel

[Code] <1C>h <57>h n

[Definition area]  $0 \leq n \leq 255$

[Function] Specifies and cancels double-width and double-height kanji characters.

n=<xxxxxxx0>B : Cancel

n=<xxxxxxx1>B : Specify

- [Detail]
- The least significant 1 bit is valid for n.
  - This command is valid only for the kanji characters.
  - The command can be also set by FS ! but the command processed last is valid.
  - The default value is n=0.



**FS K n**

[Name] Character modification Kanji Horizontal and Vertical Select

[Code] <1C>h <48>h n

[Definition area]  $0 \leq n \leq 255$

[Function] Selects horizontal and vertical kanji characters.

n=<xxxxxxx0>B : Horizontal writing

n=<xxxxxxx1>B : Vertical writing

[Detail] • The least significant 1 bit is valid for n.

• This command is valid only for the kanji characters.

• The part of vertical writing characters like ‘、’, ‘。’, ‘「’, and ‘」’ is valid.

• The default value is n=0.

**FS 2 c1 c2 d1... dk**

[Name] User-defined registration

[Code] &lt;1C&gt;h &lt;32&gt;h c1 c2 d1...dk

[Definition area]  $0 \leq d \leq 255$   
k=72

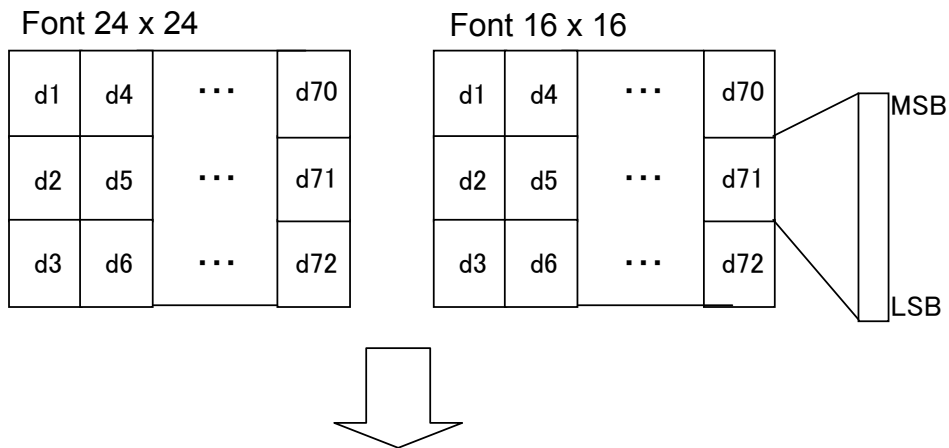
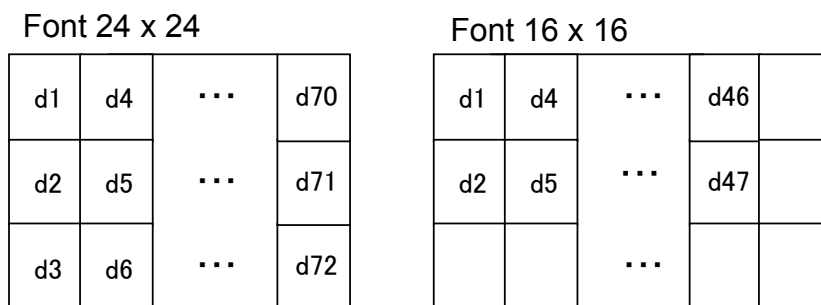
c1 and c2 differs according to the kanji character code system.

Kanji code system	C1	C2
JIS code	c1=77h	$21h \leq c2 \leq 2Fh$
Shift JIS code	c1=ECh	$40h \leq c2 \leq 4Eh$

[Function] Registers a user-defined character in the kanji code specified with c1 and c2.

[Detail]

- c1 = first byte and c2 = second byte.
- D is image data. A bit to be colored is handled as 1 and a bit not to be colored, 0.
- When a font is selected with 16-dot font characters, the printer outputs user defined characters as 16 x 16 dots.

**Registration image****Character output range**

## 11. Function/setting command

### ESC @

- [Name] Initialization
- [Code] <1B>h <40>h
- [Function] Initializes the printer.
- [Detail]
- Initializes the user memory assignment.
  - Data in the reception buffer is retained.
  - Data in the print buffer is cleared.
  - All the command settings are initialized.
  - Rereads the operation function setting.
  - The data in the nonvolatile memory is retained.
- <Page mode>
- Returns to the standard mode.

### DC2 D n

- [Name] Reserve and release a download character registration area
- [Code] <12>h <44>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Reserves and releases the download character area.
- <xxxxxxx0>B : Download character area release
- <xxxxxxx1>B : Download character area reservation
- [Detail]
- When download character area is released, memory capacity of user memory increases by released download character area.
  - After releasing, download character registration is not performed.
  - When download character area is reserved, the printer allocates memory capacity for download character 4560 bytes.
  - After reservation, download character registration is performed.
  - The initial value is n=1 (reserved).

### DC2 G n

- [Name] Reserve and release a user-defined character registration area
- [Code] <12>h <47>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Reserves and releases the user-defined area.
- <xxxxxxx0>B : User-defined character area release
- <xxxxxxx1>B : User-defined character area reservation
- [Detail]
- When releasing the command, the area is added to the empty area of the user memory.
  - The user-defined character after releasing is not registered.
  - When user-defined character area is reserved, the printer allocates memory capacity for user-defined character 1080 bytes.
  - After reservation, an user-defined character is registered.
  - The initial value is n=1 (reserved).

**DC2 ~ n**

[Name] Set a printing density

[Code] <12>h <7E>h n

[Definition area]  $50 \leq n \leq 200$

[Function] Sets the printing density.

[Detail] • The unit of n is %.

• The printing density can be adjusted to double for low thermal paper, set n as 200.

• This command is not effective in one character, setting is available for one line.

• The initial value is n=100.

If the PAPER TYPE ="LABEL PAPER" is enabled, the default is n=130.

## 12. Printing image registration/printing to the nonvolatile memory

### **FS Q n**

- [Name] Specification of image registration onto the nonvolatile memory
- [Code] <1C>h <51>h n
- [Definition area]  $0 \leq n \leq 2$
- [Function] Registers data that follows the command as image data in the nonvolatile memory with a number specified with n.
- [Detail]
- Subsequently, continues registration until the FS R command (registration resetting) is executed.
  - The number of lines that can be registered is 1889 lines (about 236 mm) . The data of the printing image exceeding the maximum value is discarded.
  - The paper feeding command such as ESC J, ESC j is not registered as printing image.
  - During execution of the command, inverse/erect specification cannot be changed.
  - The command registered in the nonvolatile memory is disabled.
- [Caution]
- Frequency registration onto the nonvolatile memory may cause the memory to be destroyed. Do not use the nonvolatile memory in such a manner as rewriting it frequently at any time.
  - Do not turn off the power during execution of the command. The printer may be damaged.

### **FS R n**

- [Name] Image registration canceling in the nonvolatile memory
- [Code] <1C>h <52>h n
- [Definition area]  $0 \leq n \leq 2$
- [Function] Terminates the image data registration onto the nonvolatile memory. (n must be the same value.)
- [Detail]
- The subsequent data is processed as an ordinary command.

### **FS O n**

- [Name] Printing specification the image registered in the nonvolatile memory.
- [Code] <1C>h <4F>h n
- [Definition area]  $0 \leq n \leq 2$
- [Function] The printing image n registered by FS Q is overlapped printing with the output data after this command. (the printer links the data with printing image registered by FS Q.)
- [Detail]
- When the setting of the printing image registered in the nonvolatile memory is not the same as that of the inverse/erect printing of data that is overlaid and printed with the printing image registered in the nonvolatile memory, the command does not make linkage with the printing image.
  - The paper feed command such as ESC J or ESC j does not make linkage with the printing form but executes paper feeding.
  - During execution of the command, inverse/erect image specification cannot be performed.
  - This command is not valid during FS Q execution.

### **FS P n**

- [Name] Canceling of printing of the image registered in the nonvolatile memory
- [Code] <1C>h <50>h n
- [Definition area]  $0 \leq n \leq 2$
- [Function] Cancels printing specification of the nonvolatile memory registration image. (n must be the same value.)
- [Detail]
- The command is used to terminate overlapped by the image registered in the nonvolatile memory. The following data is printed normally after executing this command.

### 13. Label Command

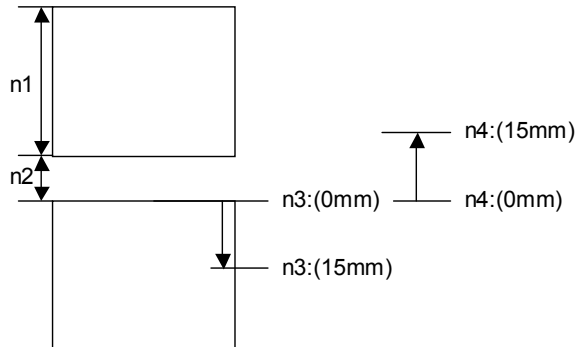
#### **DC2 L n1 n2 n3 n4**

[Name] Set the length of label

[Code] <12>h <4C>h n1 n2 n3 n4

[Definition area]  $1 \leq n1 \leq 255$   
 $0 \leq n2 \leq 20$   
 $0 \leq n3 \leq 15$   
 $0 \leq n4 \leq 15$

[Function] Set the length of label specified by n1, n2, n3, n4.



- [Detail]
- n1 = Length of the printing area
  - n2 = Length of gap between labels
  - n3 = Feed amount for the beginning of a line after “DC2 I”
  - n4 = Feed back amount before the beginning of printing
  - Only for PAPER TYPE = “LABEL PAPER”, this command is enabled.
  - Established parameter is registered nonvolatile memory.
  - The default value is n1 = 180, n2 = 4, n3 = 9, n4 = 9.

- [Note]
- Do not register parameters into nonvolatile memory multiple times every operation. It may cause the damage of nonvolatile memory.
  - Do not turn the power off while executing this command.

#### **DC2 I**

[Name] Label feed

[Code] <12>h <6C>h

[Function] Feed the position of next label based on the setting label page.

## 14. Character modification command

### SO

- [Name] Set double width with automatic reset
- [Code] <0E>h
- [Details]
- Print double width character until line feeding.
  - No influence occurred for 24x24, 16x16 characters.
  - No influence occurred even large font is previously enabled.
  - To be canceled by input of DC4,CR,LF or by full buffer data printing
  - This command is ignored in page mode.

### DC4

- [Name] Cancel double width mode set by SO
- [Code] <14>h
- [Details]
- Cancel double width mode
  - No influence occurred for 24x24, 16x16 characters.
  - This command is ignored in page mode.

### ESC O

- [Name] Set 16dots line space
- [Code] <1B>h <30>h
- [Function] Set line spacing to 16dots line.
- [Details]
- Possible to set the independent line space for standard mode and page mode

### ESC A n

- [Name] Set n dots line space
- [Code] <1B>h <41>h n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Set line space( $n \times$  dot pitch).
- [Details]
- Possible to set the independent line space for standard mode and page mode
  - Default value is  $n=28$ .

**ESC W n**

[Name] Set/Cancel double width

[Code] &lt;1B&gt;h &lt;57&gt;h n

[Definition area]  $0 \leq n \leq 255$ 

[Function] Set/Cancel double width at standard mode

n=&lt;xxxxxxx0&gt;B : Cancel

n=&lt;xxxxxxx1&gt;B : Set

[Details] • This command is enabled at standard mode.

• For page mode, refer to the command of ESC W on page XXX.

**ESC K nl nh [d1... dk]**

[Name] Specify single density bit image

[Code] &lt;1B&gt;h &lt;4B&gt;h nl nh [d1... dk]

**ESC ^ 0 nl nh [d1... dk]**

[Name] Specify double height density bit image

[Code] &lt;1B&gt;h &lt;5E&gt;h &lt;30&gt;h nl nh [d1... dk]

**ESC ^ 1 nl nh [d1... dk]**

[Name] Specify double height and width density bit image

[Code] &lt;1B&gt;h &lt;5E&gt;h &lt;31&gt;h nl nh [d1... dk]

[Definition area]  $0 \leq nl \leq 255$  $0 \leq nh \leq 3$  $0 \leq d \leq 255$ 

[Function] Specify the bit image by mode m with selecting dots nl,nh

Bit image	Vertical direction No. of dot	Horizontal direction No. of dots	No. of data(k)
Single density	8	416	$nh \times 256 + nl$
Double width density	8	832	$nh \times 256 + nl$
Double height density	16	416	$(nh \times 256 + nl) \times 3$
Double height & width density	16	832	$(nh \times 256 + nl) \times 3$

[Details] • nl,nh shows horizontal direction of bit image

• If the width of barcode exceeds printing area, such barcode is not printed.

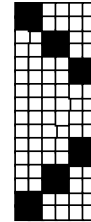
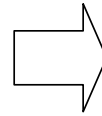
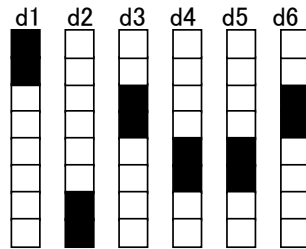
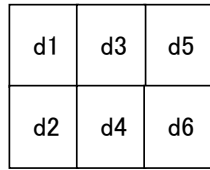
• Printing data is comply with starting position of barcode printing.

• Refer to below bit image.

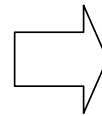
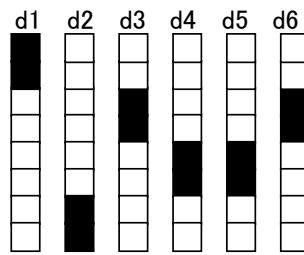
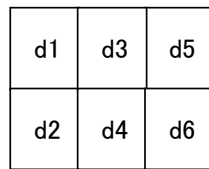
• This command is ignored at page mode



## Double height mode



Double width and double height mode



**15. Two dimensional barcode****GS 'Q' n ...**

[Name]    Print two dimensional barcode  
[Code]    <1D>h <51>h n . . .  
[Function]    Print barcode type specified by n  
                  n= 0:Setting is prohibited  
                  1: Setting is prohibited  
                  2:PDF417  
                  3:MicroPDF417  
                  4:DataMatrix  
                  5:MaxiCode  
                  6:QRCode

\*Refer to the next page for parameter after n

**PDF417**

GS + Q + 2 +

Type +EncMode +ECC\_LV +Size +nl +nh +Data(1)...Data(n)

Type symbol

0: Standard

1: Truncate

EncMode Encode mode

0: Auto proper encode

1: Binary Encode

ECC\_LV ECC(Error correction control) Level

Specify 0~7

Size

Choose one combination under below table.

Combination table of column and step (X=Column ,Y=step)

0	X 2: Y 4	8	X 12: Y 4
1	X 2: Y 9	9	X 12: Y 9
2	X 2: Y 15	10	X 12: Y 15
3	X 2: Y 20	11	X 12: Y 20
4	X 7: Y 4	12	X 20: Y 4
5	X 7: Y 9	13	X 20: Y 9
6	X 7: Y 15	14	X 20: Y 15
7	X 7: Y 20	15	X 20: Y 20

nl, nh

Specify data size lower byte/ higher byte.

 $1 \leq nhnl \leq 384$ 

\*Max. size of data is changed depending on the selected parameter.

Data(1)...Data(n)

Barcode data (Input number of data specified by n &lt;n=nhnl&gt;)

**MicroPDF417**

GS +Q +3 +

Type +EncMode +Size +n + Data(1)...Data(n)

Type symbol

0:Standard

1:Code128 Emulation mode (No specific regulation)

2:Code128 Emulation mode (Specific industrial regulation FNC1 1st)

3:Code128 Emulation mode (Specific industrial regulation FNC1 2nd)

EncMode Encode mode

0:Auto proper encode

1:Binary encode

Size

Choose one combination under below table.

Combination table of column and step (X=Column ,Y=step)

0	X 1: Y 11	8	X 3: Y 26
1	X 1: Y 17	9	X 3: Y 44
2	X 1: Y 28	10	X 4: Y 4
3	X 2: Y 8	11	X 4: Y 10
4	X 2: Y 17	12	X 4: Y 12
5	X 2: Y 26	13	X 4: Y 26
6	X 3: Y 6	14	X 4: Y 44
7	X 3: Y 12		

n

Specify the size of data

 $1 \leq n \leq 150$ 

\*Max. size of data is changed depending on the selected parameter.

Data(1)...Data(n)

Barcode data (Input number of data specified by n)

**DataMatrix**

GS +Q +4 +

Type +(Cells or SizeXY) + nl + nh + Data(1)...Data(n)

Type symbol

0:square

1:rectangular

Cells (In case the symbol is square)

Either 10, 18, 22, 26, 32, 40 or 48

SizeXY (In case the symbol is rectangular)

0:X=18, Y= 8

1:X=32, Y= 8

2:X=26, Y=12

3:X=36, Y=12

4:X=36, Y=16

5:X=48, Y=16

nl, nh

Specify data size lower byte/ higher byte.

$1 \leq nhnl \leq 172$

\*Max. size of data is changed depending on the selected parameter.

Data(1)...Data(n)

Input the number of data specified by n<nhnl>

**MaxiCode**

GS + Q+ 5+

Type +(OPT + SC + CC + PC) + n+ Data(1)...Data(n)

Type symbol

0:Standard

1:Full ECC

2:Construction of string (layout) data

OPT (In case of Type is 2)

BIT0: Specify 1 service class

BIT1: Specify 1 country code

BIT2: Specify 1 post code

\* Must specify one of above BIT.

SC (In case of Type is 2 and BIT0 is 1 specified in above OPT)

ASIC alphanumeric up to specified 3bytes of service class, finishing by NULL

CC (In case of Type is 2 and BIT1 is 1 specified in above OPT Type)

ASIC alphanumeric up to specified 3bytes of country code, finishing by NULL

PC (In case of Type is 2 and BIT2 is 1 specified in above OPT)

ASIC alphanumeric up to specified 6bytes or 9bytes of post code, finishing by NULL

n

Specify the data size.

$1 \leq n \leq 92$

\*Max. size of data is changed depending on the selected parameter.

Data(1)..Data(n)

Barcode data (Input the number of data specified n)

**QRCode**

GS + Q+ 6 +  
+ Size +ECC\_LV +nl +nh +Data(1)...Data(n)

Size Symbol Size  
1, 4, 6, 8, 10, 12, 14

ECC\_LV ECC(Error collection control)Level  
1: L (7%)  
2: M (15%)  
3: Q (25%)  
4: H (30%)

nl, nh  
Specify data size lower byte/ higher byte.  
 $1 \leq nhnl \leq 448$   
\*Max. size of data is changed depending on the selected parameter.

Data(1)..Data(n)  
Barcode data (Input the number of data specified  $n < nhnl >$ )

**GS 'S' n**

[Name] Change the cell size of two dimensional barcode  
[Code] <1D>h <53>h n  
[Definition area]  $0 \leq n \leq 1$   
[Function] Change the cell size of two dimensional barcode  
n=0 : Set initial value of cell size (Default)  
n=1 : Enlarge cell size

	Default	After changed
PDF417	2	3
MicroPDF417	2	3
DataMatrix	3	4
QRCode	3	4

\*After changing the cell size, size 0 to 11 is printable for PDF417.

## 16.Response Command

### GS a n

- [Name] Enabling/Disabling Automatic Status Back
- [Code] <1D> <61> n
- [Definition area]  $0 \leq n \leq 3$
- [Function] This command selects the status of Automatic Status Back  
 n=0: Disabling Automatic Status Back  
 n=1: Enabling Automatic Status Back
- [Details]
- The status is sent each time an enable status changes automatically.
  - Refer to the following status table 1.
  - There may be a delay between command receiving and status sending depending on the condition of the receive buffer.
  - The printer send the status without checking whether the host is ready to receive or busy.
  - For bluetooth, obtain the printer status through GS R 01h command.

### GS r n

- [Name] Sending status
- [Code] <1D> <72> n
- [Definition area]  $0 \leq n \leq 255$
- [Function] Sending the current printer status to the host  
 n=<xxxxxxx1>B: corresponding status
- [Details]
- This command is executed when data is mapped in the receive buffer, there may be a delay between receiving the command and sending the status depending on the condition of the receive buffer.
  - The printer sends the status without checking whether the host is ready to receive or busy.  
 Send the current status regardless of Automatic Status Back is enabled or disabled..
  - n is enabled at lowest bit
  - Refer to the following status table 1.
  - For bluetooth, obtain the printer status through GS R 01h command.

Status table 1

Bit	Function
0	0 : Paper found by paper emtty sensor 1 : No paper found by paper empty sensor
1	0 : Cover closed 1 : Cover open
2	0 : Right Voltage 1 : Error of Voltage
3	0 : Right Temperature 1 : Error of Temperature
4	Not used (0)
5	Set 1 (Fixed)
6	Set 1 (Fixed)
7	Not used (0)



## 8- 4. Data Code Table

JAPAN Character set

High-order bit Low-order bit											
		0	1	2	3	4	5	6	7	8	9
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001
0	0000		DLE	SP	0	@	P	'	p	—	⊥
1	0001			!	1	A	Q	a	q	—	⊥
2	0010		DC2	"	2	B	R	b	r	—	⊥
3	0011		DC3	#	3	C	S	c	s	—	⊥
4	0100	EOT		\$	4	D	T	d	t	—	—
5	0101	ENQ		%	5	E	U	e	u	—	—
6	0110			&	6	F	V	f	v	—	
7	0111			'	7	G	W	g	w	—	
8	1000		CAN	(	8	H	X	h	x		⌈
9	1001	HT		)	9	I	Y	i	y		⌋
A	1010	LF		*	:	J	Z	j	z		⌌
B	1011		ESC	+	;	K	[	k	{		⌍
C	1100	FF	FS	,	<	L	¥	l		—	⌎
D	1101	CR	GS	-	=	M	]	m	}	—	⌏
E	1110			.	>	N	^	n	~	—	⌐
F	1111			/	?	O	_	o		+	⌑

High-order bit Low-order bit							
		A	B	C	D	E	F
		1010	1011	1100	1101	1110	1111
0	0000	SP	一	タ	ミ	二	×
1	0001	。	ア	チ	ム	ト	円
2	0010	「	イ	ツ	メ	キ	年
3	0011	」	ウ	テ	モ	コ	月
4	0100	、	エ	ト	ヤ	ノ	日
5	0101	・	オ	ナ	ユ	シ	時
6	0110	ヲ	カ	ニ	ヨ	フ	分
7	0111	ヲ	キ	ヌ	ラ	セ	秒
8	1000	イ	ク	ネ	リ	ハ	千
9	1001	ウ	ケ	ノ	ル	コ	市
A	1010	エ	コ	ハ	レ	シ	区
B	1011	オ	サ	ヒ	ロ	コ	町
C	1100	ヤ	シ	フ	ワ	コ	村
D	1101	ユ	ス	ヘ	ン	コ	人
E	1110	ヨ	セ	ホ	ノ	コ	■
F	1111	ツ	ソ	マ	°	ノ	

- SP indicates space.
- The code in the blank section is ignored.
- The content in a bold frame is a function code.

\*A character in a row marked with \* is not printed in the SHIFT JIS CODE.

## International character

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
JAPAN	#	\$	@	[	¥	]	^	`	{		}	~
U. S. A.	#	\$	@	[	\	]	^	`	{		}	~
GERMANY	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
ENGLAND	£	\$	@	[	\	]	^	`	{		}	~
FRANCE	#	\$	à	°	ç	§	^	`	é	ù	è	''
SPAIN	£	\$	@	í	Ñ	¿	^	`	''	ñ	}	~
ITALY	#	\$	@	°	\	é	^	ù	à	ò	è	ì
SWEDEN	#	Ö	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü

PC437 system

High-order bit \ Low-order bit		0	1	2	3	4	5	6	7	8	9
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001
0	0000		DLE	SP	0	@	P	'	p	Ç	É
1	0001			!	1	A	Q	a	q	ü	æ
2	0010		DC2	"	2	B	R	b	r	é	Æ
3	0011		DC3	#	3	C	S	c	s	â	ô
4	0100	EOT		\$	4	D	T	d	t	ä	ö
5	0101	ENQ		%	5	E	U	e	u	à	ò
6	0110			&	6	F	V	f	v	á	ú
7	0111			'	7	G	W	g	w	ç	ù
8	1000		CAN	(	8	H	X	h	x	ê	ÿ
9	1001	HT		)	9	I	Y	i	y	ë	Ö
A	1010	LF		*	:	J	Z	j	z	è	Ü
B	1011		ESC	+	;	K	[	k	{	ï	Ç
C	1100	FF	FS	,	<	L	\	l		î	Ð
D	1101	CR	GS	-	=	M	]	m	}	ì	¥
E	1110			.	>	N	^	n	~	Ä	Ŕ
F	1111			/	?	O	_	o	SP	Å	f

High-order bit \ Low-order bit		A	B	C	D	E	F
		1010	1011	1100	1101	1110	1111
0	0000	á	⌘	⌞	⌞	α	≡
1	0001	í	⌘	⌞	⌞	β	±
2	0010	ó	⌘	⌞	⌞	Γ	≥
3	0011	ú	⌞	⌞	⌞	π	≤
4	0100	ñ	⌞	⌞	⌞	Σ	∫
5	0101	Ñ	⌞	⌞	⌞	σ	∫
6	0110	ä	⌞	⌞	⌞	μ	÷
7	0111	ø	⌞	⌞	⌞	τ	≈
8	1000	¿	⌞	⌞	⌞	φ	°
9	1001	⌞	⌞	⌞	⌞	θ	·
A	1010	⌞	⌞	⌞	⌞	Ω	-
B	1011	½	⌞	⌞	■	δ	√
C	1100	¼	⌞	⌞	■	∞	∞
D	1101	¡	⌞	⌞	■	∅	²
E	1110	«	⌞	⌞	■	∈	■
F	1111	»	⌞	⌞	■	∩	SP

- SP indicates space.
- A code in the blank section is ignored.
- The content in a bold frame is a function code.

Note: The character code table indicates bits arranged in the shape of a character and does not represent an actual printing pattern.

## PC850 system

High-order bit \ Low-order bit		0	1	2	3	4	5	6	7	8	9
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001
0	0000		DLE	SP	0	@	P	'	p	Ç	É
1	0001			!	1	A	Q	a	q	ü	æ
2	0010		DC2	"	2	B	R	b	r	é	Æ
3	0011		DC3	#	3	C	S	c	s	â	ô
4	0100	EOT		\$	4	D	T	d	t	ä	ö
5	0101	ENQ		%	5	E	U	e	u	à	ò
6	0110			&	6	F	V	f	v	å	û
7	0111			'	7	G	W	g	w	ç	ù
8	1000		CAN	(	8	H	X	h	x	ê	ÿ
9	1001	HT		)	9	I	Y	i	y	ë	ÿ
A	1010	LF		*	:	J	Z	j	z	è	Ü
B	1011		ESC	+	;	K	[	k	{	ï	ø
C	1100	FF	FS	,	<	L	\	l		î	£
D	1101	CR	GS	-	=	M	]	m	}	ì	Ø
E	1110			.	>	N	^	n	~	Ä	×
F	1111			/	?	O	_	o		Å	f

High-order bit \ Low-order bit		A	B	C	D	E	F
		1010	1011	1100	1101	1110	1111
0	0000	á	⌘	⌘	⌘	ó	-
1	0001	í	⌘	⌘	⌘	β	±
2	0010	ó	⌘	⌘	⌘	ô	≥
3	0011	ú		⌘	⌘	ò	$\frac{3}{4}$
4	0100	ñ	⌘	⌘	⌘	õ	¶
5	0101	Ñ	Á	⌘	⌘	Õ	§
6	0110	ä	Â	ä	í	μ	÷
7	0111	ø	À	Ã	î	þ	,
8	1000	¿	©	⌘	ÿ	þ	<sup>0</sup>
9	1001	®	⌘	⌘	⌘	ú	..
A	1010	⌘		⌘	⌘	û	.
B	1011	$\frac{1}{2}$	⌘	⌘	■	ü	<sup>1</sup>
C	1100	$\frac{1}{4}$	⌘	⌘	■	ý	<sup>3</sup>
D	1101	ì	⌘	⌘	⌘	ÿ	<sup>2</sup>
E	1110	«	⌘	⌘	⌘	—	■
F	1111	»	⌘	□	■	´	

- SP indicates space.
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Note: The character code table indicates bits arranged in the shape of a character and does not represent an actual printing pattern.

# MEMO