



TOSHIBA TEC Portable Printer

B-SP2D Series

External Equipment Interface Specification

First Edition: May 9, 2003
Second Edition: February 18, 2004
Third Edition: November 30, 2004

TOSHIBA TEC CORPORATION

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1. SCOPE/GENERAL DESCRIPTION

1.1 SCOPE

This specification applies to the software that is used with the B-SP2D probate printer.

1.2 GENERAL DESCRIPTION

The external equipment interface connects a printer to the host computer through the RS-232C, IrDA, Bluetooth™, or wireless LAN interface for storing forms, or issuing labels or receipts. This specification describes how to use the external equipment interface and the [FEED] switch. The specification is organized as below. Refer to each chapter according to your needs.

1.2.1 SPECIFICATION ORGANIZATION

Chapter 1: SCOPE/GENERAL DESCRIPTION
Chapter 2: OUTLINE OF SPECIFICATIONS
Chapter 3: INTERFACE
Chapter 4: TRANSMISSION SEQUENCE
Chapter 5: TPCL-LE MODE (INTERFACE COMMANDS)
Chapter 6: LABEL MODE (INTERFACE COMMANDS)
Chapter 7: RECEIPT MODE (INTERFACE COMMANDS)
Chapter 8: ERROR PROCESSING
Chapter 9: SYSTEM MODE
Chapter 10: OTHER FUNCTIONS
Chapter 11: CHARACTER CODE TABLE
Chapter 12: BAR CODE/TWO-DIMENSIONAL CODE TABLE

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2. OUTLINE OF SPECIFICATIONS

2.1 GENERAL DESCRIPTION

This chapter describes the outline of specifications – modes which the printer has. For more details, refer to the appropriate chapter.

■ [TPCL-LE (TEC Printer Command Language Light Edition) mode]

The printer draws data according to the format information and print data sent from the host, and issues labels according to the Issue Command.

■ [LABEL mode]

The label format information, graphic data, or writable character data sent from the host, is previously stored in flash ROM as an initial setting. The printer links the print data sent through its interface to the format data or writable character data in flash ROM, then prints.

■ [RECEIPT mode]

The printer draws and issues according to the data or commands sent from the host.

■ [SYSTEM mode]

In this mode, self-test printing, slant line printing, or settings/changing of internal parameters are performed.

2.2 DIMENSION

114 (W) × 91 (D) × 44 (L) mm (excluding the belt holder and cover open lever, etc.)

* 114 (W) × 101 (D) × 44 (L) mm (for the wireless LAN interface model)

2.3 WEIGHT

Approx. 380 g (including a battery, excluding paper)

* Approx. 410 g (for the wireless LAN interface model)

2.4 PRINTING METHOD

Direct thermal

2.5 HEAD SPECIFICATION

8 dots/mm (203 dpi)

Effective print width: 48 mm

2.6 PRINT SPEED

Approx. 12.5 mm/sec to Approx. 80 mm/sec

(at 25°C when using the battery designated and paper recommended by Toshiba TEC)

2.7 PRINT MODE

- LABEL mode
- RECEIPT mode
- TPCL-LE mode

2.8 FONT TYPE

2.8.1 BIT MAP FONT

- Standard character/Characters under bars..... 12 × 24 dots
- Bold character48 × 96 dots
- Price Font 1 16 × 40 dots
- Price Font 232 × 48 dots
- Times Roman (Medium) 12 point
- Times Roman (Medium) 15 point
- Times Roman (Bold) 15 point
- Times Roman (Bold) 18 point
- Times Roman (Bold) 21 point
- Times Roman (Italic) 18 point
- Helvetica (Medium)9 point
- Helvetica (Medium) 15 point
- Helvetica (Medium) 18 point
- Helvetica (Bold) 18 point
- Helvetica (Bold) 21 point
- Helvetica (Italic) 18 point
- Presentation (Bold)..... 27 point
- Letter Gothic (Medium) 14.3 point
- Prestige Elite (Medium) 10.5 point
- Prestige Elite (Bold)..... 15 point
- Courier (Medium) 15 point
- Courier (Bold) 18 point
- OCR-A 12 point
- OCR-B 12 point
- GOTHIC725 Black 6 point
- Writable character 16 × 16 dots
- Writable character 24 × 24 dots

NOTE: Some fonts cannot be printed depending on the print mode.

2.8.2 OUTLINE FONT

- TEC Font 1 (Not proportional)
- TEC Font 1 (Proportional)
- Price Font 2 (* Firmware V1.2 or greater)

NOTE: Some fonts cannot be printed depending on the print mode.

2.9 TYPE OF BAR CODE/TWO-DIMENSIONAL CODE

2.9.1 BAR CODE

- JAN8/EAN8
- JAN13/EAN13
- UPC-A
- UPC-E
- Interleaved 2 of 5 (ITF)
- NW7
- CODE39
- CODE128
- EAN128
- MSI
- Customer bar code
- RSS (* Firmware V1.2 or greater)

NOTE: Some bar codes cannot be printed depending on the print mode.

2.9.2 TWO-DIMENSIONAL CODE

- QR code
- PDF417
- Data Matrix
- Maxicode
- MicroPDF417

NOTE: Some two-dimensional codes cannot be printed depending on the print mode.

2.10 FORMAT STORAGE

LABEL mode.....	Max. 20 types can be stored. (Form storage)	Storage capacity: 128KB
TPCL-LE mode	Max. 99 types can be stored. (PC saving)	Storage capacity: 192KB

2.11 GRAPHIC STORAGE

Two graphic data can be stored. (Max. 48 × 90 Kbytes)	Storage capacity: 64KB
---	------------------------

2.12 WRITABLE CHARACTER STORAGE

LABEL mode.....	24 × 24 dots: Max. 50 writable characters can be stored	} Storage capacity: 64KB in total
TPCL-LE mode	Free size: Max. 224 writable characters can be stored	
	16 × 16 dots: Max. 188 writable characters can be stored	
	24 × 24 dots: Max. 188 writable characters can be stored.	

2.13 INTERFACE

- IrDA V1.2 (IrCOMM, TEC Protocol)
- RS-232C
- Bluetooth V1.1 (Class 2)
- Wireless LAN (802.11b)

2.14 POWER SOURCE

Type: Lithium-ion battery

Voltage: 7.4 V 1400 mAh (Nominal values)

Charging method: Charge only the battery using the battery charger.

2.15 BATTERY CAPACITY

- 300 sheets (48 (W) × 40 (H) mm label) printed/charged once
- Print ratio: 30%
- Ambient temperature: 25°C

NOTE: The printable number of labels may vary depending on the contents to be printed.

2.16 SWITCH

POWER switch

FEED switch

2.17 SENSOR

Cover open sensor

Transmissive sensor

Reflective sensor

Strip issue path detection sensor

Head temperature sensor

Ambient temperature sensor

2.18 LED

LED (Green, Orange, Red)

When the printer is turned ON First, the LED blinks in red, secondly, blinks in green, and then changes color depending on the battery level.

Battery level 3 or greater:	Power ON → Blinks in red → Blinks in green → Lights in green
Battery level 2 or greater:	Power ON → Blinks in red → Blinks in green → Lights in orange
Battery level 1:	Power ON → Blinks in red → Blinks in green → Lights in red

Error Blinks in red.

Low battery (print failure) Lights up in red.

Near-low battery Lights up in orange.

2.19 ISSUE MODE

Strip issue

Batch issue

2.20 PAPER (Toshiba TEC recommended paper should be used.)

Label width	25 to 55 mm
Gap length between labels.....	3 to 7 mm
Black mark length	3 to 7 mm
Backing paper width.....	28 to 58 mm
Receipt paper width	28 to 58 mm
Paper replacing method.....	Label loading-in method

2.21 CUT

Manual cut using the tear bar

2.22 BROKEN HEAD DOTS CHECK FUNCTION

When the printer is turned ON, or the cover is closed, the program will check for broken head dots. If broken head dots are detected, a broken head dot error will occur.

2.23 STATUS TRANSMISSION

The printer sends a status when:

- The host requests status transmission.
- The printer receives a command, while it is in an error state.
- Automatic status transmission in the Issue Command has already been designated.

2.24 AUTO LABEL POSITIONING FUNCTION

When the cover is closed after replacing the label paper, the label is automatically fed to the first print position. However, when the RECEIPT mode is selected or no sensor is designated, this function is not performed.

2.25 STATUS PRINTING

When the printer is turned ON while holding down the [FEED] switch, self-test is performed and the result of the printer's state will be printed.

2.26 CONTINUOUS PRINTING FUNCTION

When the RECEIPT mode (Mode = 2), TPCL-LE mode (Mode = A), or TPCL-LE1 mode (Mode = B) is selected, the received data is continuously printed, after an error state (label end, cover open error, or a paper jam) is cleared. After the paper is replaced, when the cover is closed, the error is cleared. The printer automatically restarts printing. If the printer is in the label end state when the cover is closed, the printer neither clears the error nor performs automatic printing. The printer is still in an error state.

3. INTERFACE

3.1 GENERAL DESCRIPTION

This chapter describes details on the interfaces between the host and the printer. The printer configurations are as follows:

- IrDA + RS-232C model
- IrDA + Bluetooth model
- IrDA + Wireless LAN model

IrDA has the following two protocols. These explanations are independently described on later pages.

- TEC Protocol
- IrCOMM (9-WIRE)

The printer interface is automatically switched between IrDA and RS-232C/Bluetooth/wireless LAN on the following conditions:

- IrDA+RS-232C model

When the RS-232C cable is connected to the printer, the printer interface will be switched to the RS-232C interface. When the RS-232C cable is disconnected, the interface will be switched to IrDA.

- IrDA+Bluetooth model or IrDA+Wireless LAN model

Usually, IrDA interface is standing by for a communication. When data is sent from Bluetooth interface or wireless LAN interface, the printer interface is automatically switched to the appropriate interface.

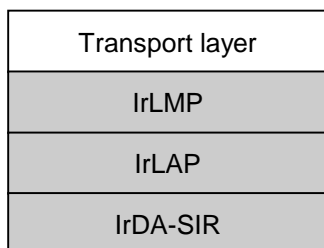
When over 5 seconds have passed since the termination of the communication by Bluetooth or wireless LAN interface, the printer interface will return to IrDA. Therefore, communication by IrDA cannot be made during or within 5 seconds after the communication by Bluetooth or wireless LAN interface.

If data is sent to the printer by Bluetooth or wireless LAN interface during the communication by IrDA, the printer interface will be automatically switched to Bluetooth or wireless LAN, and consequently the communication by IrDA cannot be made successfully.

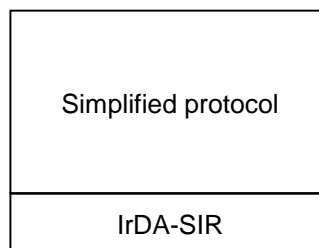
3.2 IrDA INTERFACE (TEC Protocol)

In IrDA standard, only IrDA-SIR of the physical layer should be used. For the data link layer, original simplified protocol should be provided.


3.2.1 SPECIFICATIONS FOR PHYSICAL LAYER AND TRANSMISSION CONTROL METHOD



IrDA V1.2 (Low Power) standard



B-SP2D

 parts are required.

(1) Specifications for physical layer

Item	Specifications
	Normal mode
Communication mode	Physical layer conforming to IrDA-SIR V1.2 (Low Power) standard
Transfer rate	9600, 19200, 38400, 115200 bps ^{*1}
Communication distance	within 0.1 m ^{*2}
Peak wave length of emitted light	850 to 900 nm
Communicable angle	within $\pm 15^\circ$
Ambient illuminance	1000 lx or less (fluorescent lamp and incandescent lamp)
Emissive power	Min 3.6 mW/Sr ($\theta_h, \theta_v \leq \pm 15^\circ$)
Min. photo sensibility	Min 9 $\mu\text{W}/\text{cm}^2$ ($\theta_h, \theta_v \leq \pm 15^\circ$)

*1: Values for the normal mode are dependent on the communication protocol settings.

*2: The communication distance may become shorter than 0.1 m, depending on the host's performance.

3.2.2 INPUT/OUTPUT SIGNAL

- RD (Host → Printer)

A data signal which the printer receives from the host.

Logic 1 is Low level, while logic 0 is High level.

It is in a Low state when no transmission is in progress.

- SD (Printer → Host)

A data signal which the printer sends to the host.

Logic 1 is Low level, while logic 0 is High level.

It is in a Low state when no transmission is in progress.

3.2.3 TRANSMISSION CONTROL

The host performs transmission control with a NAK (15H)/ACK (06H), which means the printer is ready, a link request PAD (FFH), and a command packet.

① Link request (Host → Printer)

The host should send a link request PAD (FFH) in order to link to the printer. The link request PAD should be intermittently sent until the printer is linked and enters a ready state.

② Printer ready (Printer → Host)

When the printer detects the link request PAD from the host, and enters a ready state for receiving the command packet, the printer sends a NAK within 40 msec. When an error such as CRC occurs, the printer sends a NAK.

NAK
15H

The printer sends an ACK, when the printer properly receives the command packet and enters a ready state for receiving the next data, or when the data is stored into flash ROM.

ACK
06H

③ End of link (Host → Printer)

When there is no packet to be sent, the host sends an EOT to end the link.

EOT
04H

④ Turnaround time

The printer should send a NAK/ACK/status packet after 5 ms from when a PAD/command packet has been received.

⑤ Time out

Host: Time out due to waiting for a NAK after a PAD is sent 50 msec.
Time out due to waiting for an ACK after a command is sent 200 msec.

Printer: Time out due to waiting for a command after a NAK is sent 1 sec.
Time out due to waiting for an EOT or a command after an ACK is sent.... 1 sec.
Time out due to waiting for an EOT after the status is sent..... 1 sec.

⑥ Status packet (Printer → Host)

If the printer enters an error state when the command is sent from the host, or when status transmission is requested, the printer sends a status.

NOTE: The data error is checked by CRC. However, noise included in sent/received data may cause misprinting. (Though CRC check is carried out in 16 bits, there is a possibility that the data including noise matches 16 bits of CRC check.)

[LABEL/RECEIPT modes]

Data to be sent

STX	Printer ID		Version No. of each form				Printer status	Battery status	CRC	
02H	xxH	xxH	V01	V02	V20	xxH	xxH	xxH	xxH

Range of CRC calculation

- Printer ID 2-byte hex data (in order from High to Low)
 - Version No. of each form (00H to 09H)
 - V01 Version of form No. 1 (1-byte hex data)
 - V02 Version of form No. 2 (1-byte hex data)
 -
 - V20 Version of form No. 20 (1-byte hex data)
 - Printer status ... Printer status is indicated in 1-byte data.
 - 00H: Normal status (Idling)
 - 01H: Cover open status
 - 02H: Command syntax error
 - 03H: Paper jam
 - 04H: Label end
 - 05H: Cover open error
 - 06H: Broken thermal head dots error
 - 07H: Thermal head excessive temperature
 - 08H: Flash ROM write error
 - 09H: Flash ROM erase error
 - 0AH: Low battery (Print failure)
 - 0BH: Operating
 - 0DH: Normal end + Label end
 - 0EH: Flash ROM storage area full state
 - 10H: Normal end
 - Battery status .. The battery charge status is indicated in 5 levels.
 - 01H: 7.2 V or less (Print failure)
 - 02H: 7.3 V to 7.4 V
(Remaining No. of printable labels: Approx. 1 to 20)
 - 03H: 7.5 V to 7.7 V
(Remaining No. of printable labels: Approx. 20 to 100)
 - 04H: 7.8 V to 7.9 V
(Remaining No. of printable labels: Approx. 100 to 200)
 - 05H: 8.0 V or more
(Remaining No. of printable labels: Approx. 200 or more)
- * The remaining number of printable labels may vary according to the contents to be printed and the ambient environment.

[TPCL-LE mode]

Data to be sent

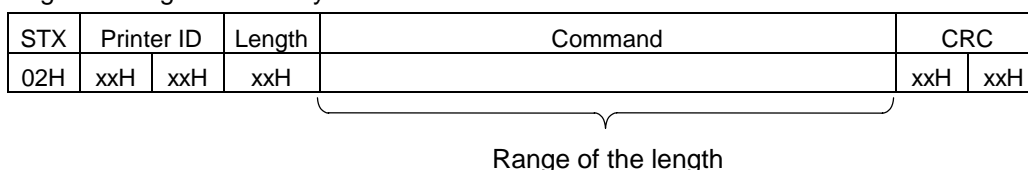
STX	Printer ID		Status			Remaining No. of labels				CRC	
02H	xxH	xxH	3xH	3xH	3xH	3xH	3xH	3xH	3xH	xxH	xxH

Range of CRC calculation

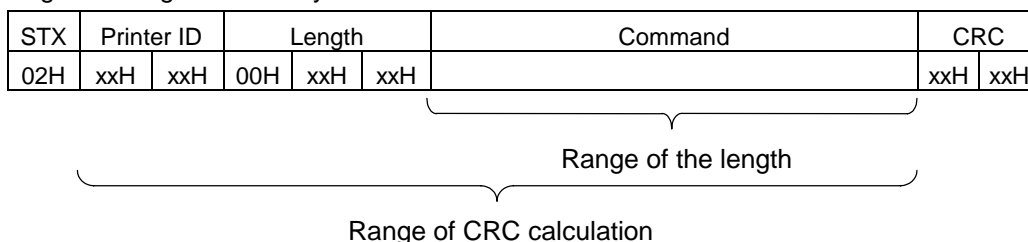
- Printer ID 2-byte hex data (in order from High to Low)
- Status Detailed status indicated in 2-byte data
 - “00”: Normal state
 - “01”: Cover open state
 - “02”: Operating
 - “06”: Command syntax error
 - “09”: Normal issue end + Label end
 - “11”: Paper jam
 - “13”: Label end
 - “15”: Cover open error
 - “17”: Broken head dots error
 - “18”: Thermal head excessive temperature
 - “36”: Low battery
 - “40”: Normal issue end
 - “41”: Normal feed end
 - “50”: Flash ROM write error
 - “51”: Flash ROM erase error
 - “54”: Flash ROM storage area full state
- Status type Indicated in 1-byte data
 - “1”: Status Request Command
 - “2”: Automatic status transmission
- Remaining No. of labels Indicated in 4-byte data
 - “0000” to “9999”

⑦ Command packet in the LABEL mode (Host → Printer)

Length is designated in 1 byte:



Length is designated in 2 bytes:



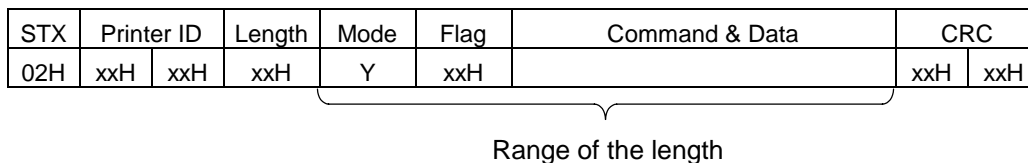
- Printer ID 2-byte hex data (in order from High to Low)
- Length Hex data indicating the number of bytes of command data
 - When the length is designated in 1 byte: 1 byte
01H to FFH
 - When the length is designated in 2 bytes: 3 bytes
The first 1 byte is fixed as 00H.
Designate the length using the remaining 2 bytes.
(in order from Low to High): 0001 H to 0FFFH
- CRC 2-byte hex data (in order from Low to High)

* Between the start and the termination of storing the form, a packet including several commands can be sent. However, the command data should not be included in two packets. For other commands, one packet should include only one command.

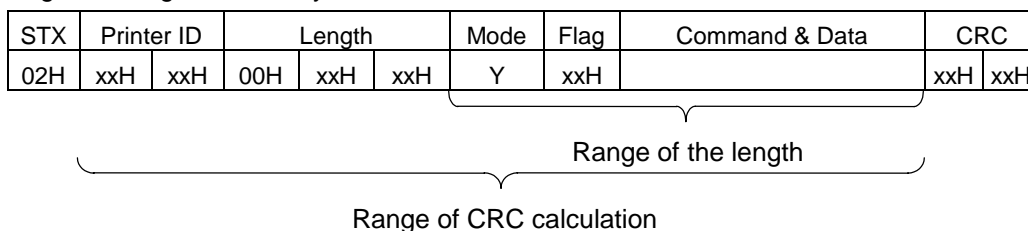
* For all commands except the Graphic Data Store Command, data included in several packets should not be sent. The Data Print Command can also send data included in several packets if it is sent using the format on the next page.

- * Multiple packet format for including the Data Print Command in several packets
(Host → Printer)

Length is designated in 1 byte:

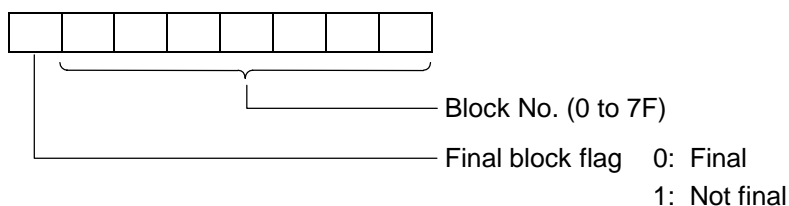


Length is designated in 2 bytes:



- Printer ID 2-byte hex data (in order from High to Low)
- Length Hex data indicating the number of bytes of command data
 - When the length is designated in 1 byte: 1 byte
01H to FFH
 - When the length is designated in 2 bytes: 3 bytes
The first 1 byte is fixed as 00H.
Designate the length using the remaining 2 bytes.
(in order from Low to High): 0001 H to 0FFFFH

NOTE: Up to 4 KB per one packet can be sent. However, total data amount from the first block to the final block must be 60 KB or less.
- Mode Fixed as “Y” (indicating the RECEIPT mode)
- Flag Flag indicating the block No. or the final block flag for the receipt issue (1 byte)



- CRC 2-byte hex data (in order from Low to High)

⑧ Command packet in the RECEIPT/TPCL-LE modes (Host → Printer)

Length is designated in 1 byte:

STX	Printer ID		Length	Mode	Flag	Command & Data	CRC	
02H	xxH	xxH	xxH	Y	xxH		xxH	xxH

Range of the length

Length is designated in 2 bytes:

STX	Printer ID		Length			Mode	Flag	Command & Data	CRC	
02H	xxH	xxH	00H	xxH	xxH	Y	xxH		xxH	xxH

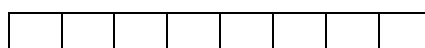
Range of the length

Range of CRC calculation

- Printer ID 2-byte hex data (in order from High to Low)
- Length Hex data indicating the number of bytes of command data
 - When the length is designated in 1 byte: 1 byte
01H to FFH
 - When the length is designated in 2 bytes: 3 bytes
The first 1 byte is fixed as 00H.
Designate the length using the remaining 2 bytes.
(in order from Low to High): 0001 H to 0FFFH

NOTE: Up to 4 KB per one packet can be sent. However, total data amount from the first block to the final block must be 60 KB or less.

- Mode Fixed as "Y" (indicating the RECEIPT mode)
- Flag Flag indicating the block No. or the final block flag for the receipt issue (1 byte)



Block No. (0 to 7F)

Final block flag 0: Final
1: Not final

- CRC 2-byte hex data (in order from Low to High)

* For the Status Request Command, the Mode Select Command, and Reset Command, one packet should include only one command.

⑨ Turnaround time

The printer should send a NAK/ACK/status packet after 10 ms from when a PAD/command packet has been received.

3.2.4 HOW TO SEND THE DATA PRINT COMMAND WHICH CANNOT BE INCLUDED IN ONE PACKET IN THE LABEL MODE

When the Data Print Command in the LABEL mode cannot be included in one packet (256 bytes or more in 1-byte length designation, 4096 bytes or more in 2-byte length designation), it can be included in several packets by using the multiple packet format for the Data Print Command, described on page 3-7.

Conditions: Data length for the Bit Map Font Field Command, the Outline Font Field Command, and the Bar Code/Two-dimensional Code Format Command, should be fixed as "00".
For the JIS 8 and Shift JIS Kanji codes only.

(Example) To include the Data Print Command below into several packets:

```
X [01H] [01H] [01]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
```

Command packet 1

```
[STX] [00H] [00H] [DEH] Y [80H] X [01H] [01H] [01H]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
[CRC] [CRC]
```

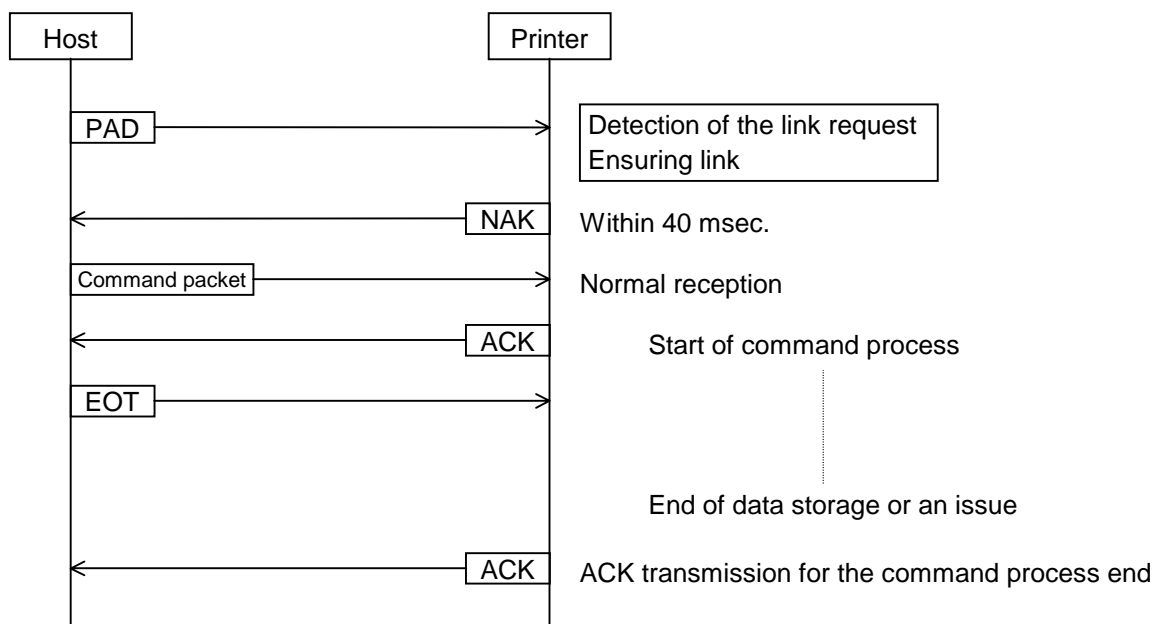
Command packet 2

```
[STX] [00H] [00H] [DAH] Y [01H]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF] ABCDEF GHIJ KLMNOP QRSTUV WXYZ [LF]
[CRC] [CRC]
```

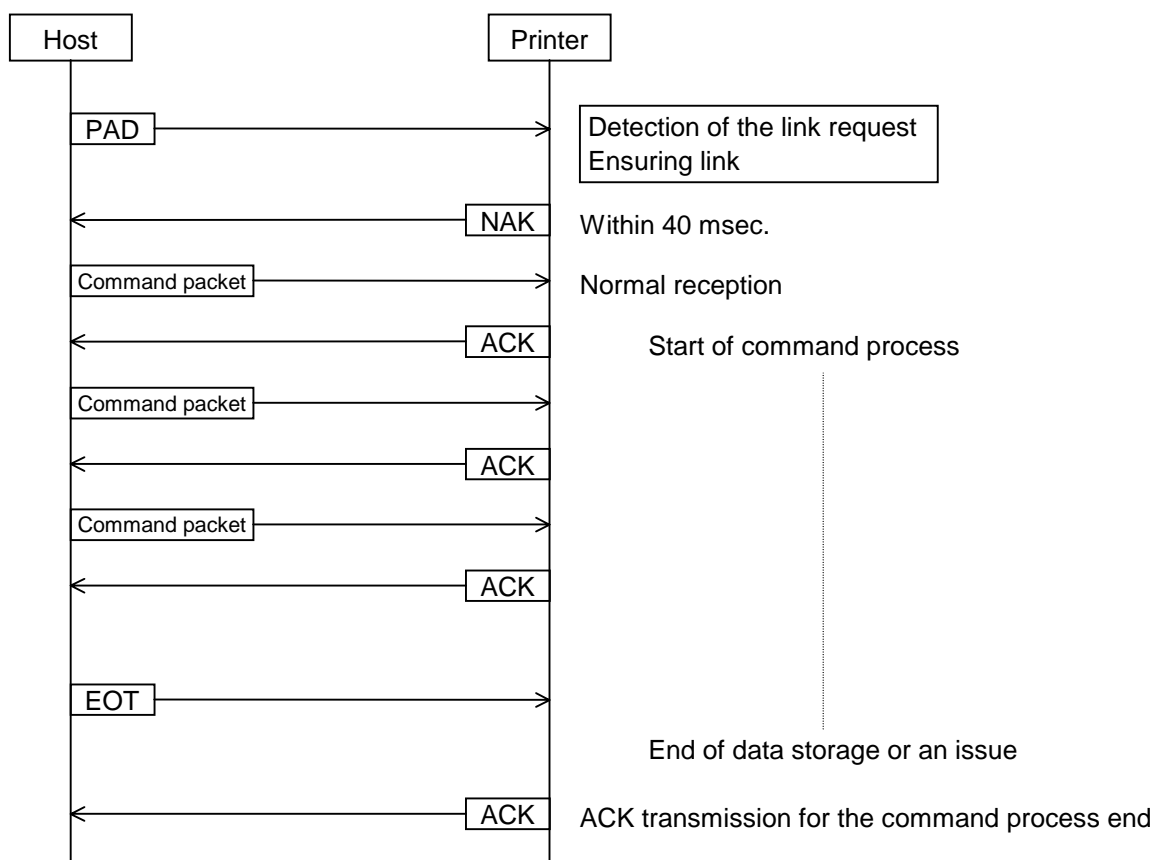
3.2.5 CONNECTION SEQUENCE EXAMPLE (FOR LABEL MODE)

< Normal transmission >

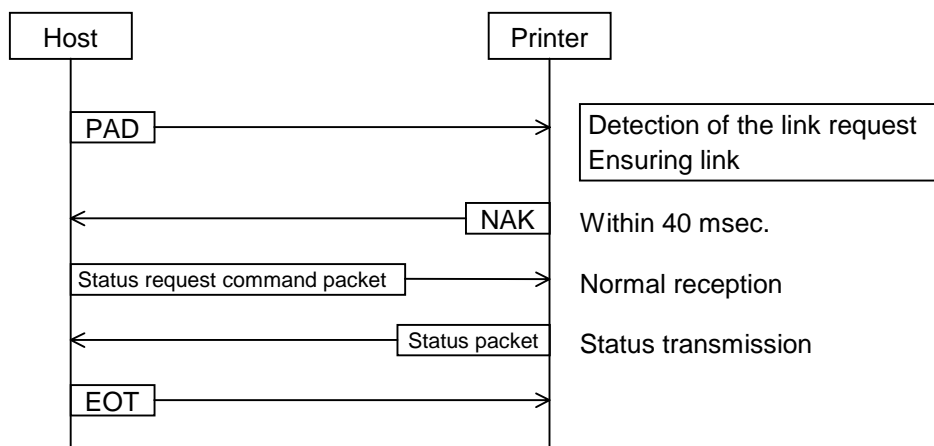
- When one packet is sent



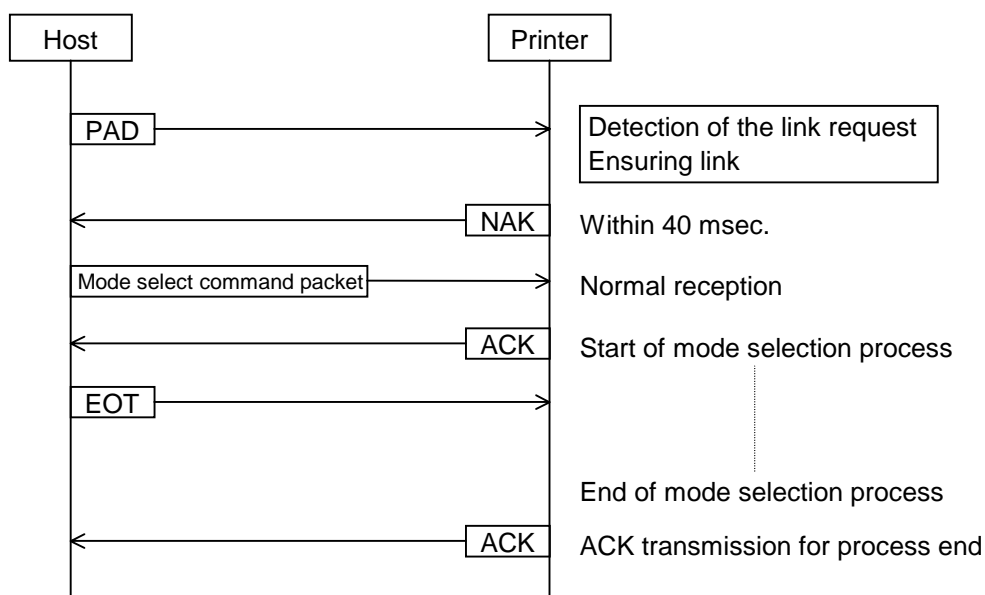
- When several packets are sent (for storing a form or graphics, or printing data)



- When the Status Request Command is sent



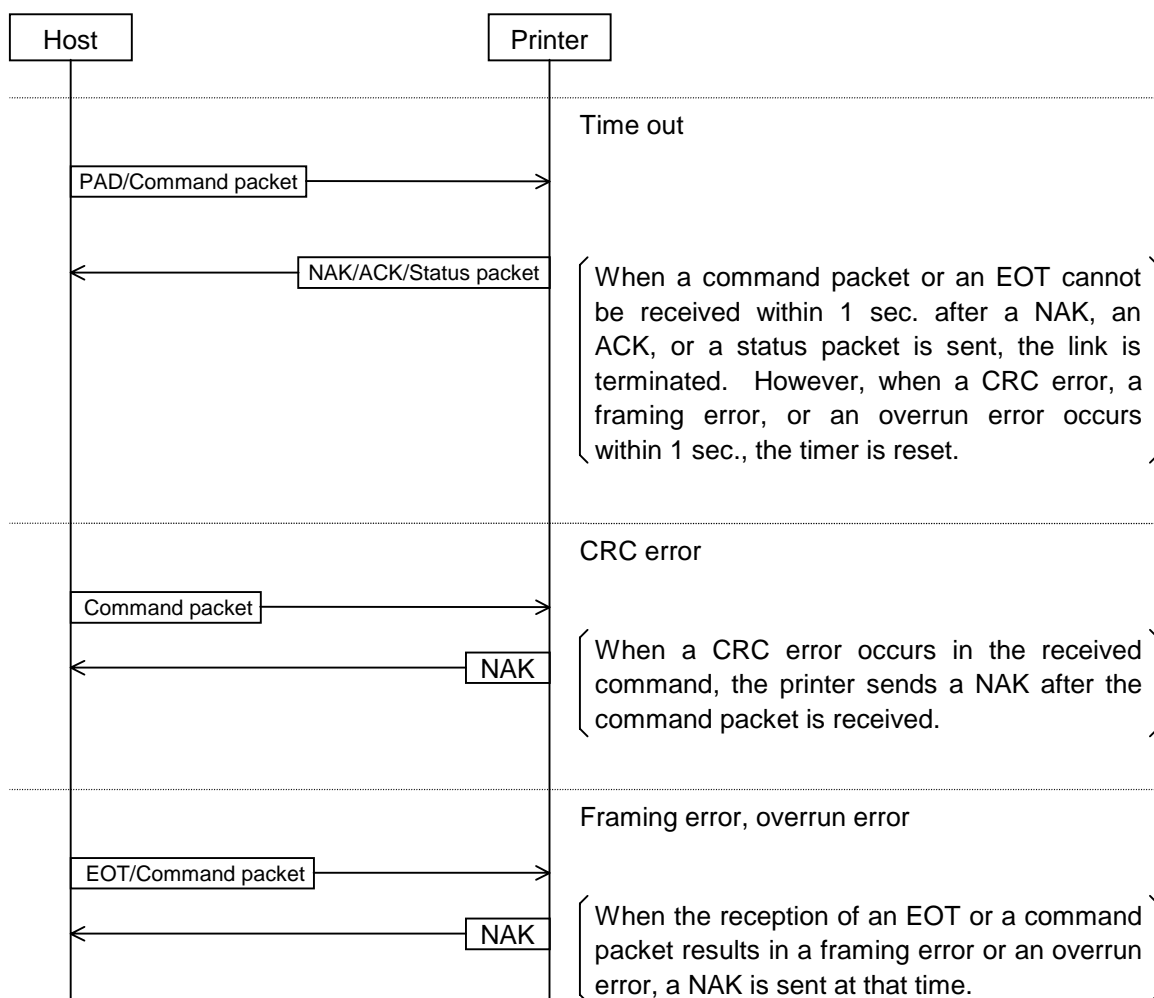
- When the host is started up, the host should send the Status Request Command to acquire the printer ID.
- When the printer ID in the command packet is set to "0", this command is acceptable for all printers.
- The IrDA interface cannot be used while the RS-232 cable is connected.
- When the Mode Select Command is sent



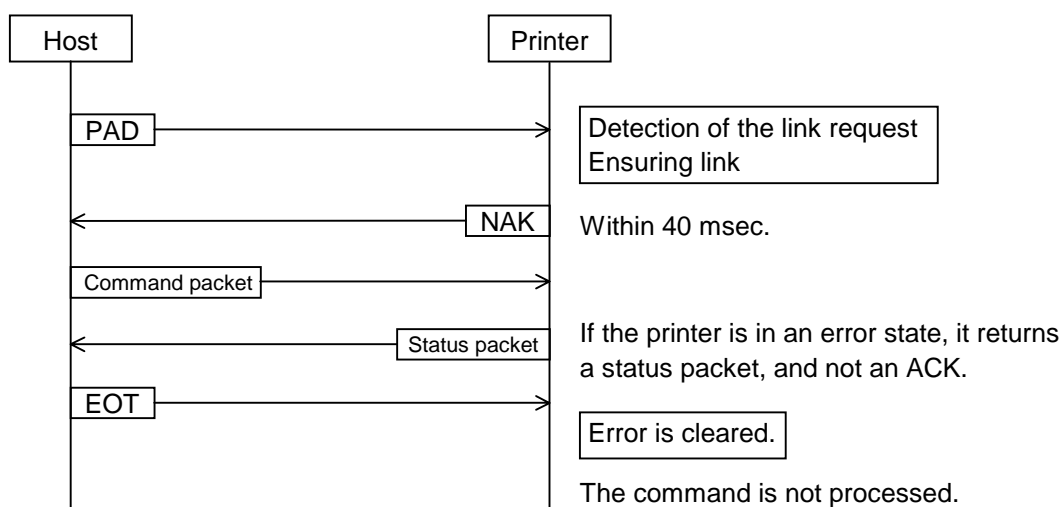
- When an EOT or other command data is not sent, after the mode select command packet is sent, the printer sends an ACK within 1 second after the mode select process is completed.

< Error transmission >

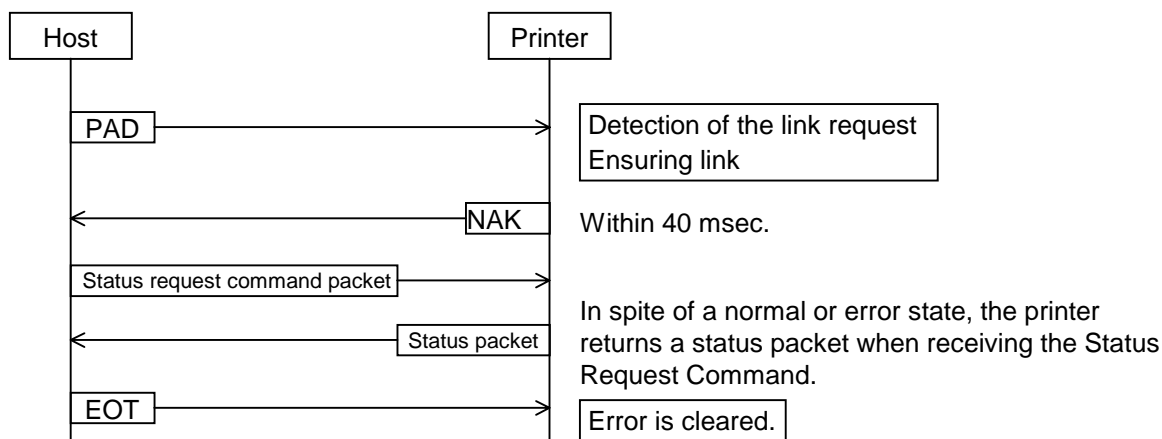
- When an error occurs during communication



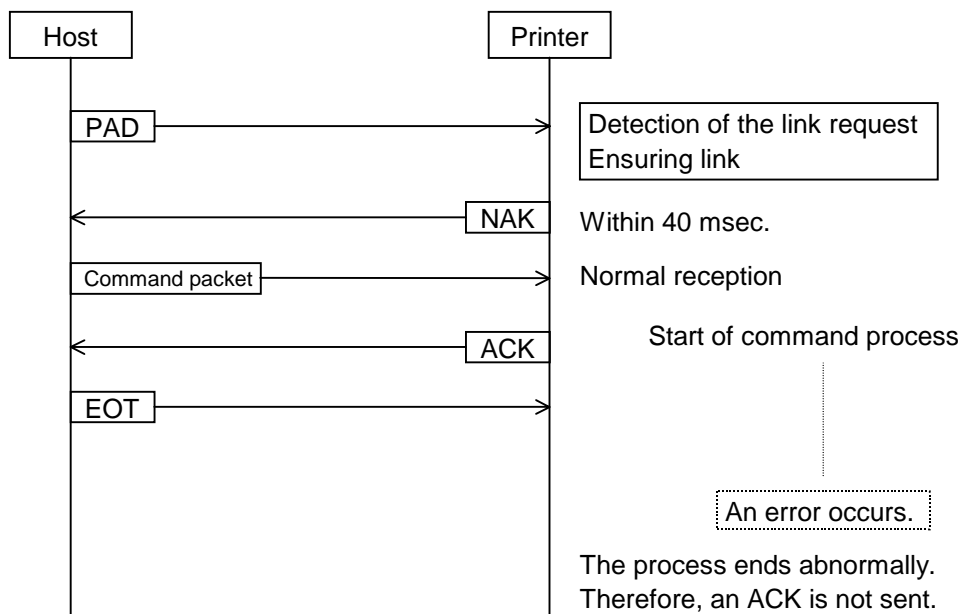
- When the communication is made during an error state



- When the Status Request Command is sent during an error state



- When an error occurs while the command is being processed.



Time out

Host: Time out due to waiting for a NAK after a PAD is sent.....50 msec.

(After time out, a PAD should be sent repeatedly.)

Time out due to waiting for an ACK after a command is sent200 msec.

NOTE: The process time for issuing a label or storing data into flash ROM varies according to the contents to be processed. Therefore, time out waiting for an ACK is not set.

Printer: Time out due to waiting for a command after a NAK is sent..... 1 sec.

Time out due to waiting for an EOT or a command after an ACK is sent 1 sec.

Time out due to waiting for an EOT after the status is sent 1 sec.

3.2.7 PRINTER STATE TRANSITION (FOR LABEL MODE)

Printer state transition

Event State	Ensuring link	Issue Command reception Store Command reception	End of issue End of storage	Status Request Command reception	EOT reception	Time out	CRC error	Syntax error, Storage error, Error during issuing
Wait state for the link S1	NAK transmission → S2	—	—	—	—	—	—	—
Wait state for a command after the NAK transmission S2	—	<u>Normal</u> ACK transmission Command analysis → S3	—	<u>Normal</u> Status transmission → S3	—	End of link	NAK transmission	—
		<u>Error</u> Status transmission → S4	—	<u>Error</u> Status transmission → S4				
Wait state for a command/EOT after the ACK transmission S3	—	ACK transmission Command analysis → S3	<u>EOT has been received</u> ACK transmission (NOTE 1) → S1	Status transmission → S3	<u>Store Command</u> Start of storage process → S3	End of link (NOTE 2)	NAK transmission → S2	—
			<u>EOT has not been received</u> → S3		<u>Issue Command</u> ACK transmission if the issue is completed. (NOTE 1) → S1 If the issue is not completed → S3			
			—		<u>Status Request Command</u> → S1			
Wait state for an EOT after the status transmission S4	—	Status transmission → S4	—	Status transmission → S4	Clear of error → S1	End of link → S1	—	→ S1

- NOTES:**
1. Only when the ACK transmission for the process end is specified by the Data Print Command, an ACK is sent after an issue is completed.
 2. An ACK for the command process end is also sent, when the time out occurs during the wait state for an EOT.

Host state transition

Event State	NAK reception	ACK reception	Status reception	Time out (NOTE 1)	CRC error Framing error Overrun error	Activation of transmission to the printer
Wait state for a NAK for the link request S1	Command transmission → S2	→ S1	→ S1	→ S1	→ S1	—
Wait state for an ACK/status after the command transmission S2	Command retransmission → S2	<u>Middle block</u> Command transmission → S2	<u>Final block</u> EOT transmission → S3 or → S4	EOT transmission → S4	→ S4	—
Wait state for an ACK after the EOT transmission S3	—	→ S4	→ S4	→ S4	→ S4	—
Key entry mode S4	→ S4	→ S4	→ S4	—	—	→ S1

NOTE: The retry count is optionally determined by the host.

3.2.8 PRINTER STATE TRANSITION (FOR RECEIPT/TPCL-LE MODES)

Printer state transition

Event State	Ensuring link	Reception of the middle block packet	Reception of the final block packet	End of issue	Status Request Command reception	EOT reception	Time out	CRC error	Framing error Overrun error	Syntax error Error during issuing
Wait state for the link S1	NAK transmission → S2	—	—	—	—	—	—	—	—	—
Wait state for a packet after the NAK transmission S2	—	<u>Normal</u> ACK transmission → S3	<u>Normal</u> ACK transmission Command analysis → S3	—	<u>Normal</u> Status transmission → S3	—	End of link → S1	NAK transmission → S2	NAK transmission → S2	— → S1
		<u>Error</u> Status transmission → S4	<u>Error</u> Status transmission → S4	—	<u>Error</u> Status transmission → S4					
Wait state for a packet/EOT after the ACK transmission S3	—	ACK transmission → S3	ACK transmission Command analysis → S3	<u>EOT has been received.</u> ACK transmission → S1 <u>EOT has not been received</u> → S3	Status transmission → S3	<u>Normal command</u> ACK transmission if the issue is completed. → S1 If the issue is not completed → S3 <u>Status request</u> → S1	End of link (NOTE 1) → S1	NAK transmission → S2	NAK transmission → S2	— → S1
Wait state for an EOT after the status transmission S4	—	Status transmission → S4	Status transmission → S4	—	Status transmission → S4	Clear of error → S1	End of link → S1	—	Timer reset → S4	— → S1

NOTE: An ACK for the command process end is also sent, when the time out occurs during the wait state for an EOT.

Host state transition

Event State	NAK reception	ACK reception		Status reception	Time out (NOTE 1)	CRC error Framing error Overrun error	Activation of transmission to the printer
Wait state for a NAK of the link request S1	Command transmission → S2	→ S1		→ S1	→ S1	→ S1	—
Wait state for an ACK/status after the command transmission S2	Packet retransmission → S2	<u>Middle block</u> Packet transmission → S2	<u>Final block</u> EOT transmission → S3 or → S4	EOT transmission → S4	→ S4	→ S4	—
Wait state for an ACK after the EOT transmission S3	—	→ S3		→ S4	→ S4	→ S4	—
Key entry mode S4	→ S4	→ S4		→ S4	—	—	→ S1


NOTE: The retry count is optionally determined by the host.

3.3 IrDA (IrCOMM) INTERFACE

The protocol for IrComm specifications is provided.

Application layer
IrComm
Tiny TP
IrLMP
IrLAP
IrDA-SIR

IrDA V1.2 (Low Power) standard

 parts are required.

Item	Specifications
Communication mode	Physical layer conforming to IrDA-SIR V1.2 (Low Power) standard
Transfer speed	9600, 19200, 38400, 115200 bps ^{*1}
Communication distance	within 0.1 m ^{*2}
Peak wave length of emitted light	850 to 900 nm
Communication angle	within $\pm 15^\circ$
Ambient illuminance	1000 lx or less (fluorescent lamp and incandescent lamp)
Emissive power	Min 3.6 mW/Sr ($\theta_h, \theta_v \leq \pm 15^\circ$)
Min. photo sensibility	Min 9 $\mu\text{W}/\text{cm}^2$ ($\theta_h, \theta_v \leq \pm 15^\circ$)

**1: Values are dependent on the communication protocol settings.*

**2: The communication distance may become shorter than 0.1 m, depending on the host's performance.*

Device nickname: B-SP2D
 Service name (Class name): IrDA: IrCOMM
 Min. turnaround time: 1 msec
 Link termination threshold time: 12 sec

3.4 RS-232C INTERFACE

Item	Specifications
	Normal mode
Communication mode	Start-stop synchronization mode
Communication direction	Transmission/reception (Full duplex)
Transmission rate	9600, 19200, 38400, 115200 bps ^{*1}
Start bit	1 bit
Stop bit	1 bit
Data length	8 bits
Parity	None/Even (depending on the setting)
Error detection ^{*2}	Overrun error
	Framing error
	Parity error
Received buffer	64 KB

*1: Values are dependent on the communication protocol settings.

*2: Error detection is available only for the RECEIPT mode.

3.4.1 TRANSMISSION CONTROL (XON/XOFF PROTOCOL)

- The printer sends an XOFF code (13H) to the host, when the blank positions in the receive buffer become 800 bytes or less.
- The printer sends an XON code (11H) to the host, when the blank positions in the receive buffer become 2K bytes or more.
- When there are no blank positions in the receive buffer, the printer discards the received data which exceeds the receive buffer capacity without storing it in the buffer, and the buffer full error occurs. (After detecting the XOFF code, the host must stop transmission before the printer receive buffer becomes full.)

3.4.2 NOTES WHEN SENDING A COMMAND

- In the LABEL mode, when any of the commands below are sent, the host should send the next command after receiving the process end status. If the host sends the next command before receiving the process end status, the printer may discard it without receiving.
 - Print Density Fine Adjust Command (If it is not stored in the form)
 - Print Position Fine Adjust Command (If it is not stored in the form)
 - Form Store Terminate Command
 - Graphic Data Store Command
 - Printer ID Set Command
 - Flash Memory Storage Area Format Command
 - Writable Character Data Store Command
 - Status Request Command
 - Mode Select Command
 - Strip Sensor Adjust Command
 - Data Print Command
- * When automatic status transmission is not specified by the Data Print Command, the issue end status is not sent. Therefore, check the printer status by transmitting the Status Request Command. When the printer status is idling, the next command should be sent.
- In the TPCL-LE mode, when the automatic status response is selected, the host sends a response when receiving an error, print end, and feed end status.
- In the RECEIPT mode, the host sends a status when receiving an error status, though there is no automatic status response selection. To the print end and feed end statuses, the host does not return any status.

- Contents of the status

[LABEL/RECEIPT modes]

Data to be sent (Fixed as 5 bytes)

STX	Printer ID		Printer status	Battery status
02H	xxH	xxH	xxH	xxH

- Printer ID 2-byte hex data (in order from High to Low)

- Printer status ... Printer status is indicated in 1-byte data.

00H: Normal status (Idling)
 01H: Cover open status
 02H: Command syntax error
 03H: Paper jam
 04H: Label end
 05H: Cover open error
 06H: Broken thermal head dots error
 07H: Thermal head excessive temperature
 08H: Flash ROM write error
 09H: Flash ROM erase error
 0AH: Low battery (Print failure)
 0BH: Operating
 0CH: Communication error (Parity, overrun, framing errors)
 (only for RECEIPT mode)
 0DH: Normal end + Label end (*See **NOTE.***)
 0EH: Flash ROM storage area full state
 10H: Normal end

NOTE: In the LABEL mode, this is a state when the printer runs out of labels, after the effective print length is printed. In the RECEIPT mode, this status is returned to the host, when the printer runs out of labels, after a receipt is issued.

- Battery status .. The battery charge status is indicated in 5 levels.

01H: 7.2 V or less (Print failure)
 02H: 7.3 V to 7.4 V
 (Remaining No. of printable labels: Approx. 1 to 20)
 03H: 7.5 V to 7.7 V
 (Remaining No. of printable labels: Approx. 20 to 100)
 04H: 7.8 V to 7.9 V
 (Remaining No. of printable labels: Approx. 100 to 200)
 05H: 8.0 V or more
 (Remaining No. of printable labels: Approx. 200 or more)

* The remaining number of printable labels may vary according to the contents to be printed and the ambient environment.

[TPCL-LE mode]

Data to be sent

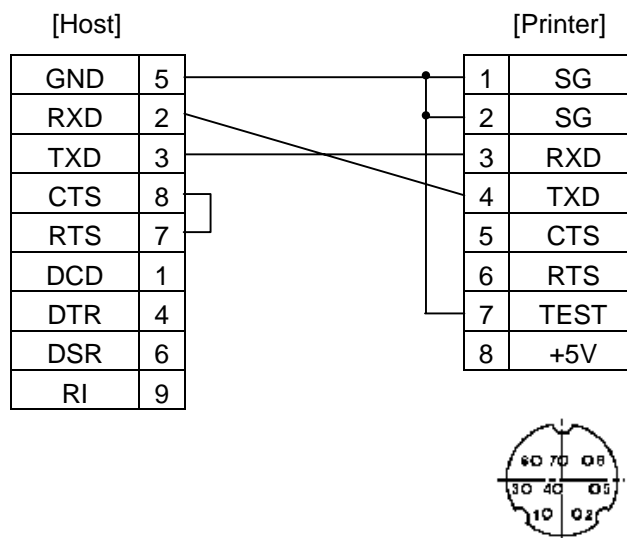
SOH	STX	Status			Remaining No. of labels				ETX	EOT	CR	LF
01H	02H	3xH	3xH	3xH	3xH	3xH	3xH	3xH	03H	04H	0DH	0AH

- Status Detailed status indicated in 2-byte data
 - “00”: Normal state
 - “01”: Cover open state
 - “02”: Operating
 - “06”: Command syntax error
 - “09”: Normal issue end + Label end
 - “11”: Paper jam
 - “13”: Label end
 - “15”: Cover open error
 - “17”: Broken head dots error
 - “18”: Thermal head excessive temperature
 - “36”: Low battery
 - “40”: Normal issue end
 - “41”: Normal feed end
 - “50”: Flash ROM write error
 - “51”: Flash ROM erase error
 - “54”: Flash ROM storage area full state
- Status type Indicated in 1-byte data
 - “1”: Status Request Command
 - “2”: Automatic status transmission
- Remaining No. of labels Indicated in 4-byte data
 - “0000” to “9999”

(1) Connector pin diagram and signal description

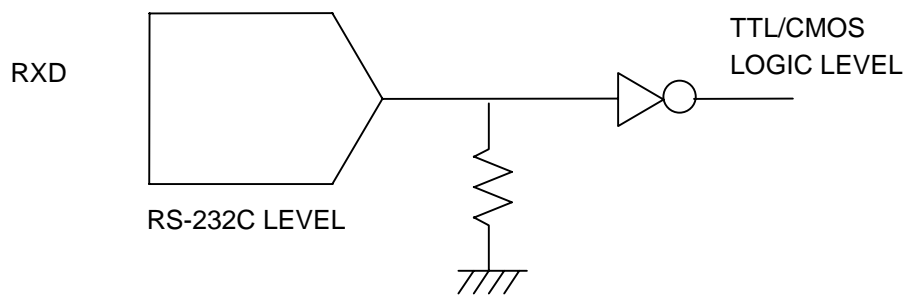
Pin No.	Signal name	Function	Signal direction
1 2	SG	Ground line for all data and control signals. (without the noise filter)	—
3	RXD	Line for data which the host sends to the printer. Logic “1” is a “Low” level, while logic “0” is a “High” level. It is in a “Low (Mark)” state when no transmission is in progress. In power save mode, it should be in a “Low (Mark)” state. If it is in a “High” state, the printer cannot be returned to the normal state from the power save mode by opening/closing the cover, or pressing the [POWER] switch or the [FEED] switch.	← Host
4	TXD	Line for data which the printer sends to the host. Logic “1” is a “Low” level, while logic “0” is a “High” level. It is in a “Low (Mark)” state when no transmission is in progress. It is in a high impedance state in power save mode.	Printer →
5	CTS	N/A	—
6	RTS	N/A	—
7	TEST	The signal is connected with SG.	—
8	N.C		—

(2) Wire connection diagram

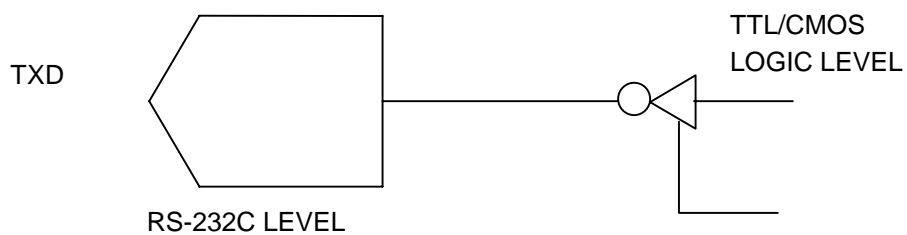


(3) Interface circuit

• Input circuit



• Output circuit



Signal levels

Input voltage H +2.4 V to +25 V
 L -25 V to -0.6 V

Output voltage H Min. +5.0 V Typ +5.4 V
 L Min. -5.0 V Typ -5.4 V

(4) Connector used for the communication cable

• For the printer

Manufacturer: HOSHIDEN

Model name: TCP8580 or equivalent

• For the host

Manufacturer: DDK

Model name: 17JE-13090-02-D8C or equivalent

3.5 Bluetooth INTERFACE

3.5.1 OUTLINED SPECIFICATIONS

Item	Specification
Communication method	Bluetooth V1.1 (with logo certification)
Supported profile	Serial port profile
Communication class	Class 2
Communication distance	3 m/360°
Service name	ZV-AT
Device nickname	TOSHIBA TEC BT
Flow control	Credit based flow control
Operation mode	Slave mode
PIN code	Not used
Receive buffer	2 Kbytes
Link break time out	20 sec.
Inquiry control	No response to an inquiry can be made 1 minute after the power is turned ON.
SR mode at page/inquiry scanning	R1 scan interval 1.28 sec. Scan window 22.5 msec. ^(*)

(*) Applicable from the production of January 2004. For the production of December 2003 or before, it is 11.25 msec.

3.5.2 Bluetooth DEVICE ADDRESS (BD address)

As long as the Bluetooth interface has been installed on the printer, when the printer is turned ON, the printer prints the Bluetooth device address.

[Character]

The BD address is printed on the self-test result in the system mode.

[Bar code]

The bar code indicating BD address is printed by holding down the [POWER] switch for approximately 5 seconds, when the printer is turned ON.

3.6 WIRELESS LAN INTERFACE

3.6.1 OUTLINED SPECIFICATIONS

Item	Specification
Communication method	IEEE802.11b
Supported profile	Socket communication/LPR
Transmission rate	11/5.5/2/1M bps
Communication distance	100 m/360° (depending on operating environment)
Client protocol	DHCP, WINS
Security protocol	WEP (40 bits, 104 bits), MD5/EAP
Flow control	TCP/IP flow control
Antenna	Built-in
Parameter setting	Via HTTP or via UART

3.6.2 MAC ADDRESS

When the wireless LAN module has been installed on the printer, the printer prints the MAC address and wireless LAN module's parameter settings.

[MAC address]

The MAC address is printed on the self-test result in the system mode.

[Parameter settings]

The parameter settings are printed by holding down the [POWER] switch for approximately 5 seconds, when the printer is turned ON.

4. TRANSMISSION SEQUENCE

4.1 GENERAL DESCRIPTION

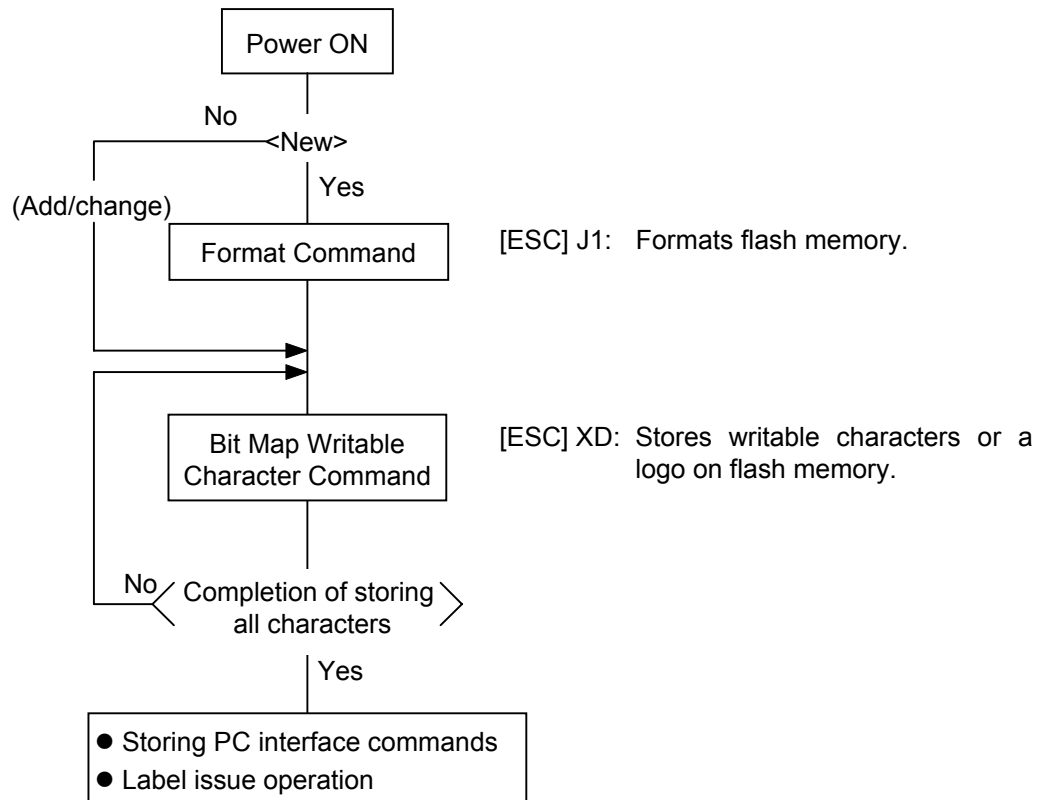
This section describes details of the transmission sequence between the host and the printer.

4.2 TPCL-LE MODE

4.2.1 INITIAL SETTING

Writable characters, logo, and PC interface commands must be stored, before the label issue operation.

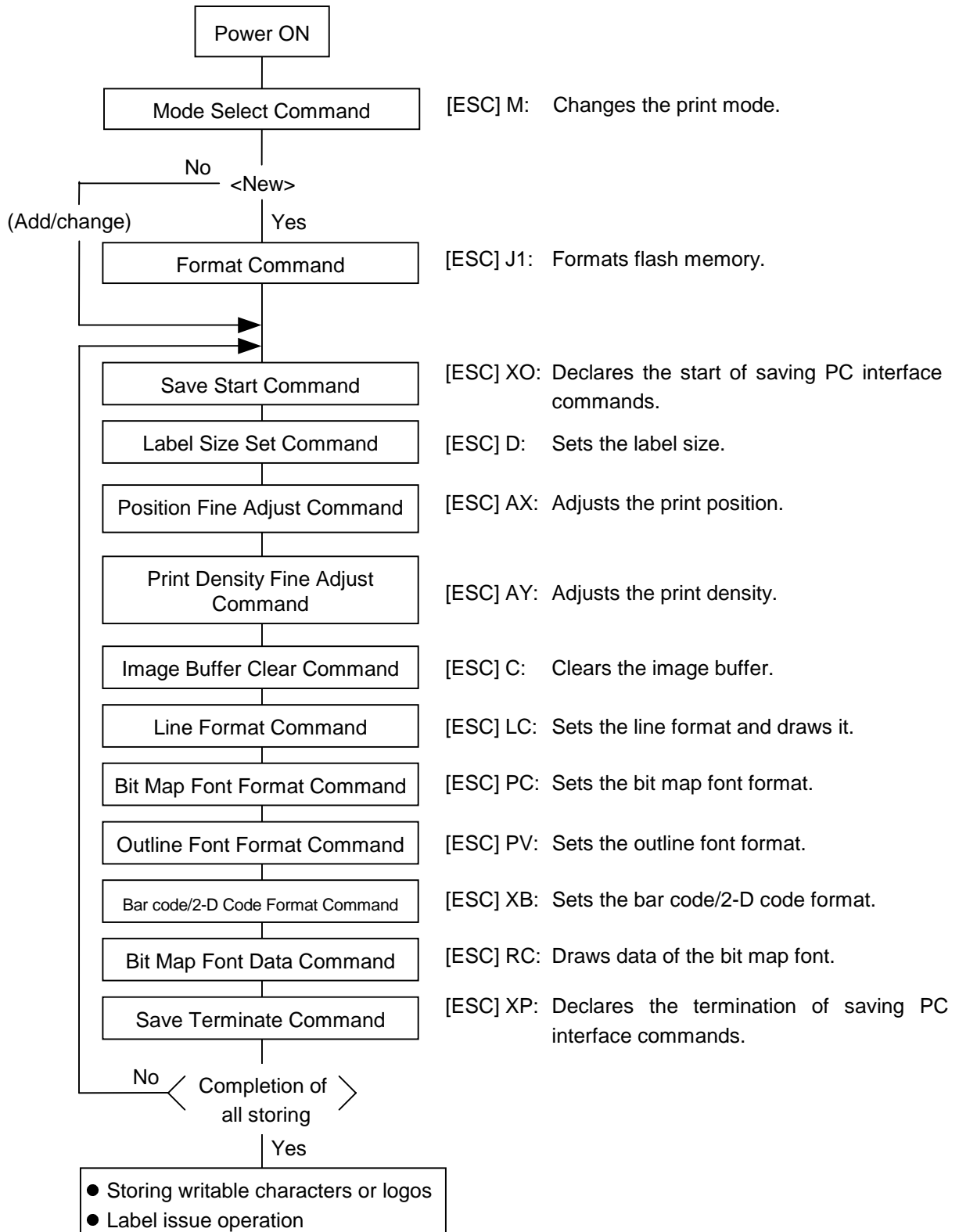
(1) Storing writable characters and logos



NOTES: (1) The storage of writable characters or logos is only performed if it is required.

(2) When the Format Command is not sent before storing a writable character or a logo with the same number as the already stored writable character or logo, memory will be used with each storing.

(2) Storing PC interface commands

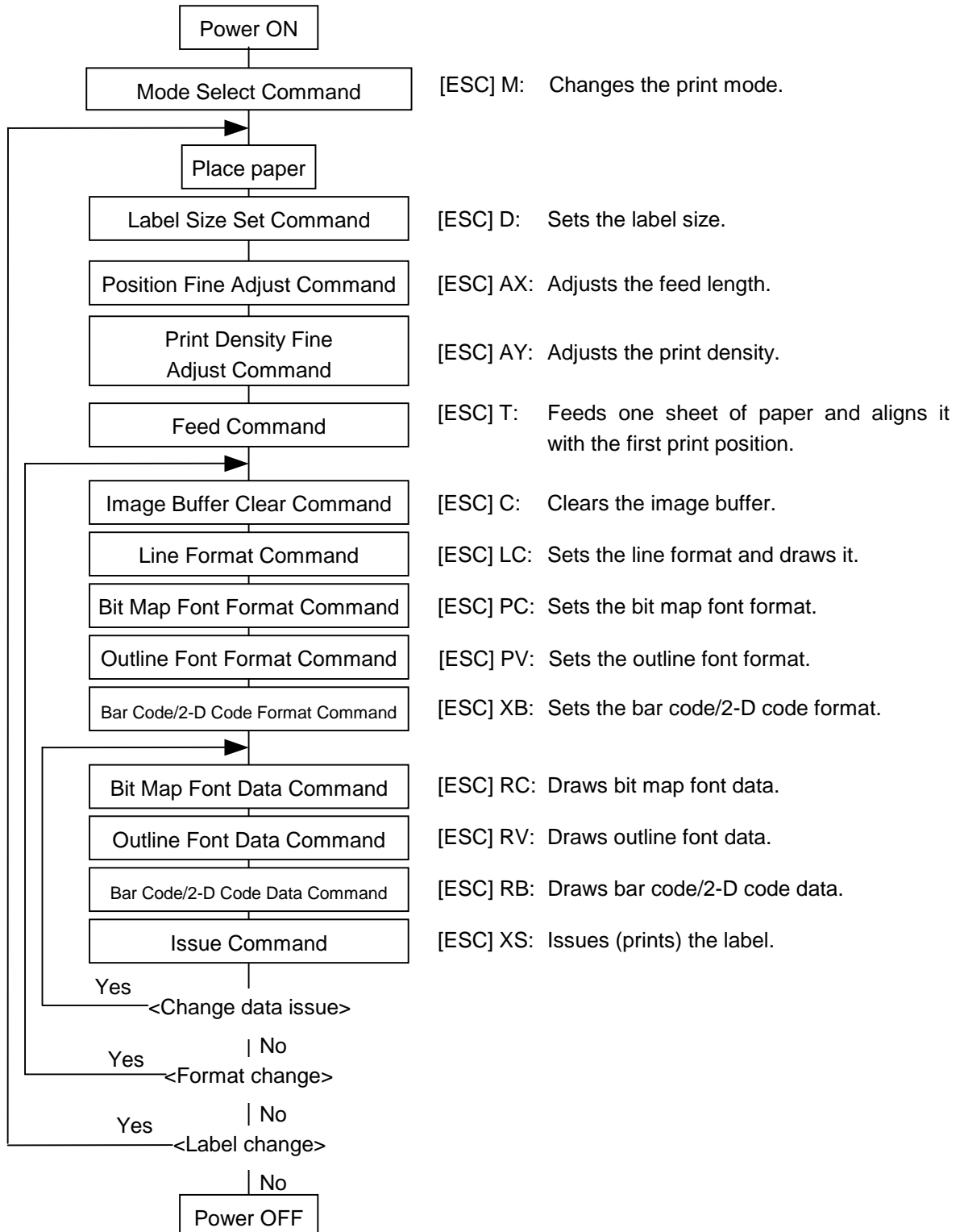


- NOTES:**
- (1) The storage of PC commands is only performed if it is required.
 - (2) When the Format Command is not sent before storing the PC interface command with the same number as the already stored PC command, memory will be used with each storing.
 - (3) Select commands to be stored as the occasion arises.

4.2.2 LABEL ISSUE OPERATION

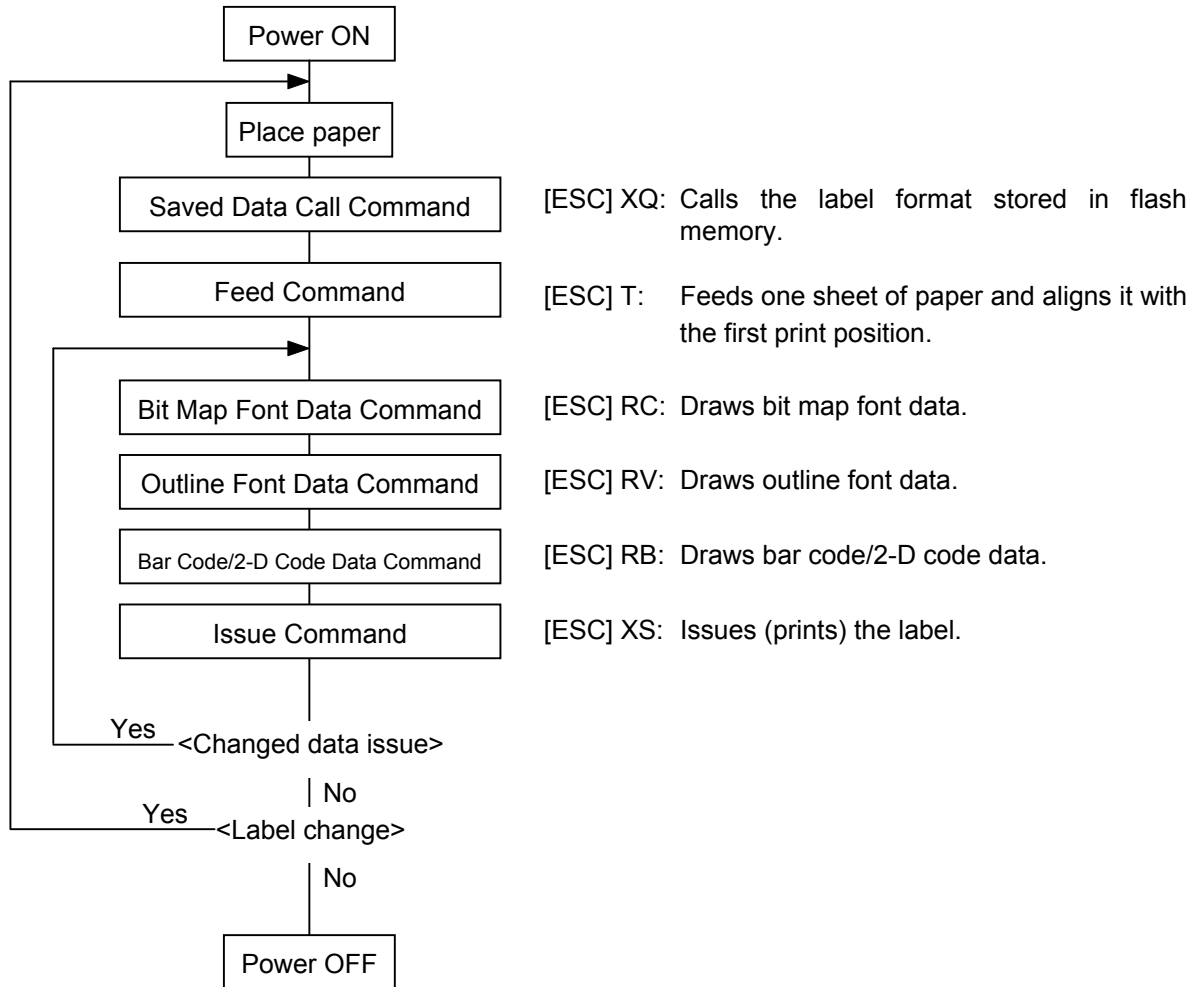
An example of the label issue operation is described below.

(1) Where the Saved Data Call Command is not used:



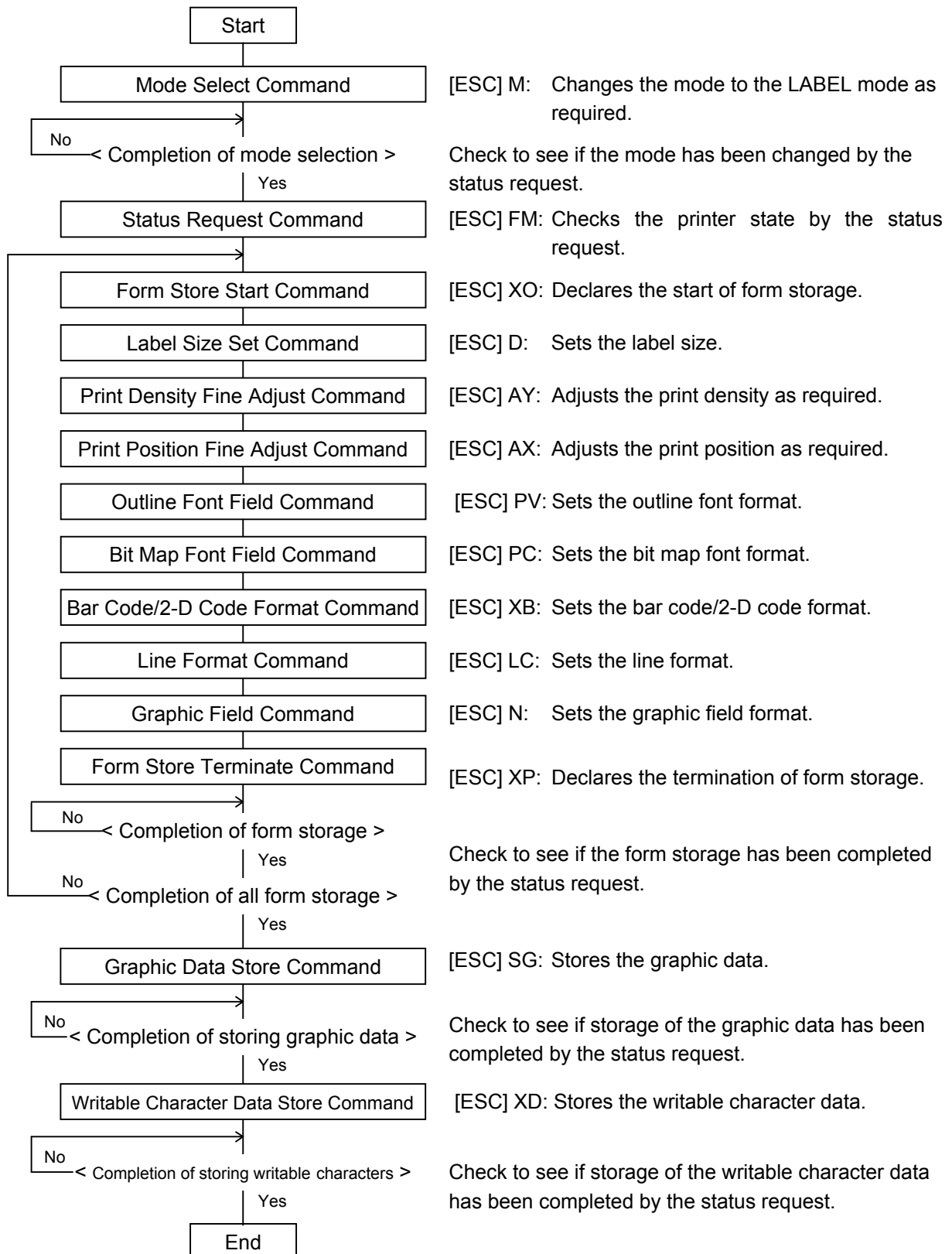
- NOTES:**
- (1) The Label Size Set Command must be sent.
 - (2) After the power is turned off then on, the Bit Map Font Format Command, the Outline Font Format Command, and the Bar Code/Two-dimensional Code Format Command should be sent as the occasion arises, because they are not protected in memory.

(2) Where the Saved Data Call Command is used:



4.3 LABEL MODE

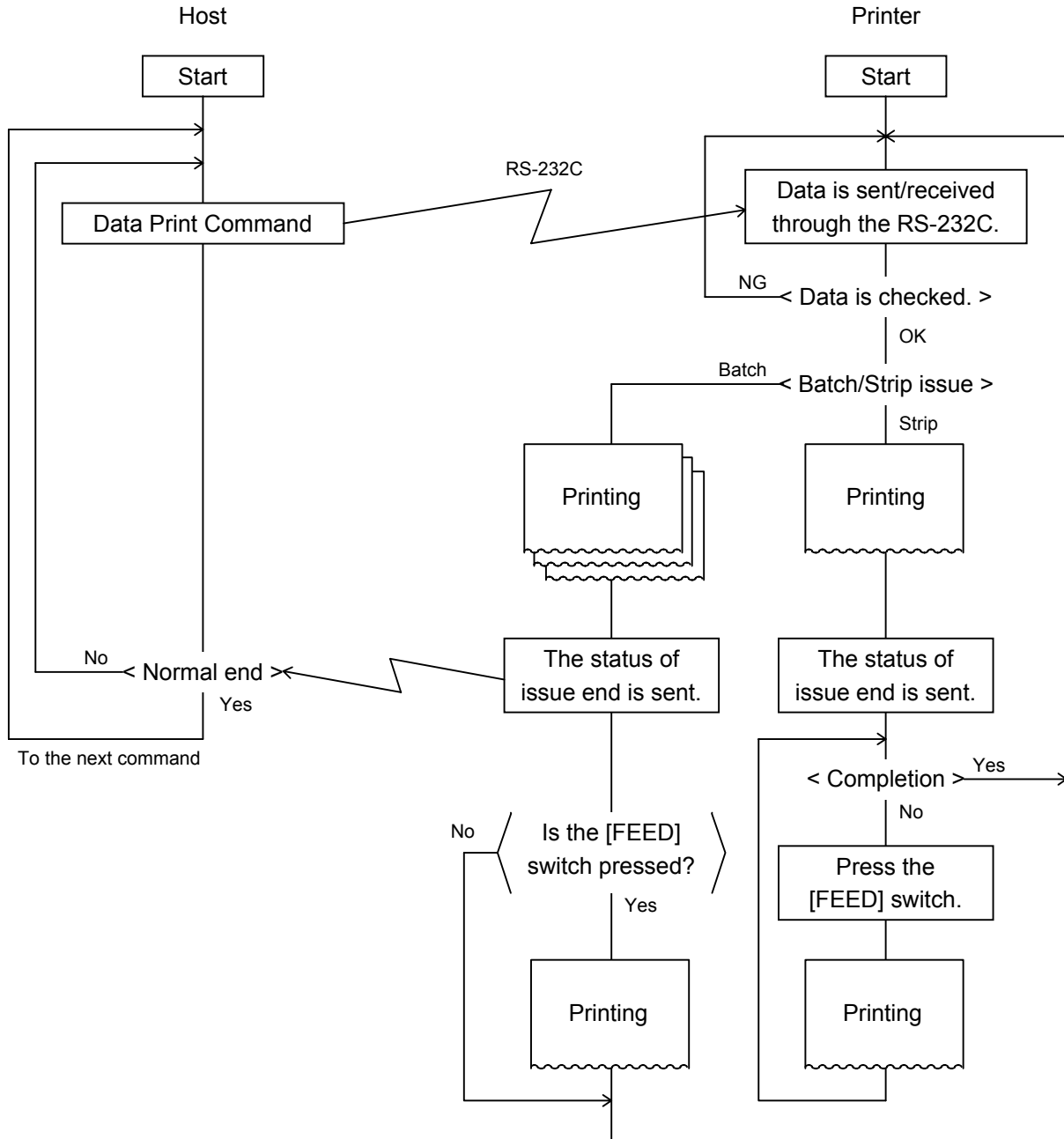
4.3.1 INITIAL SETTING



NOTES: (1) Previously assign the form to be stored to each form No., and store it. Store writable character data and graphic data as required.

(2) When a command such as the above is sent, be sure to confirm that the process is completed, before the next command is sent.

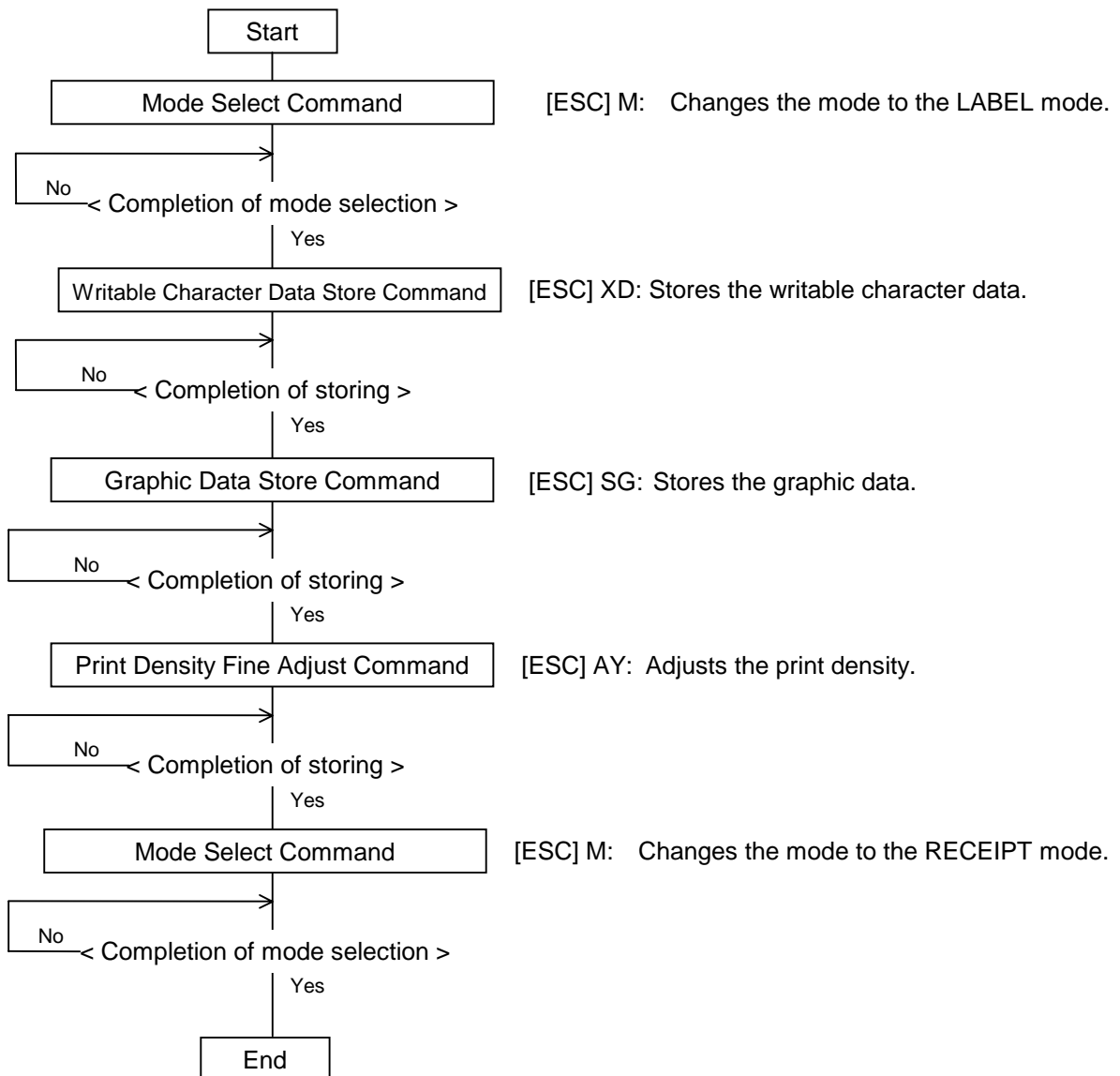
4.3.2 LABEL ISSUE OPERATION



- NOTES:** (1) In the batch issue mode, the printer issues the designated number of labels. If the labels are short because one failed to attach, issue labels again by pressing the [FEED] switch.
- (2) In the strip issue mode, the printer issues only one label in spite of the designation. Issue the required number of labels by pressing the [FEED] switch.

4.4 RECEIPT MODE

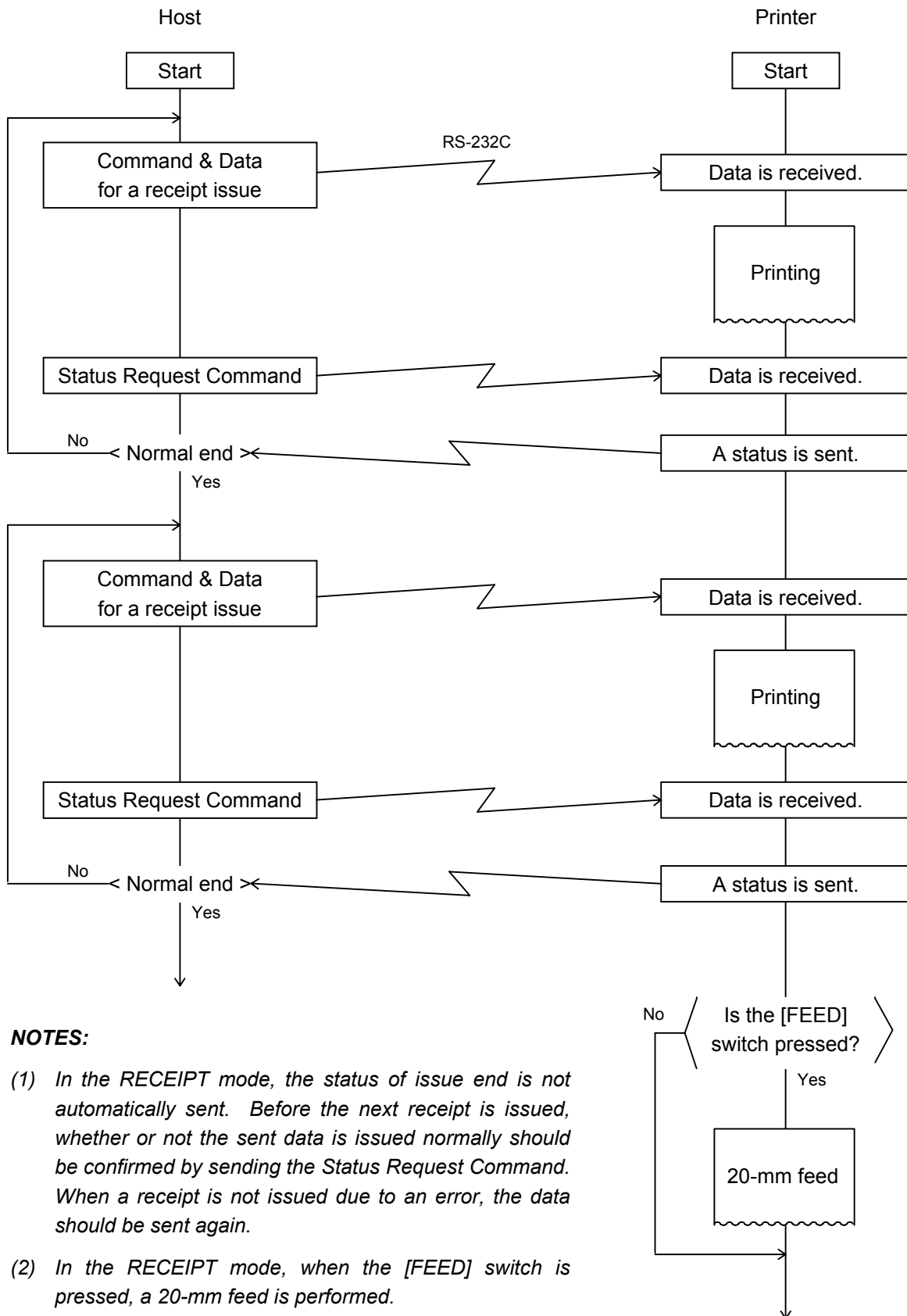
4.4.1 INITIAL SETTING



NOTES: (1) To store the writable character data and the print tone fine adjustment value, the mode should be changed to the LABEL mode. After storing is finished, the mode should be returned to the RECEIPT mode.

(2) When a command such as the above is sent, be sure to confirm that the process is completed, before the next command is sent.

4.4.2 RECEIPT ISSUE OPERATION

**NOTES:**

- (1) In the RECEIPT mode, the status of issue end is not automatically sent. Before the next receipt is issued, whether or not the sent data is issued normally should be confirmed by sending the Status Request Command. When a receipt is not issued due to an error, the data should be sent again.
- (2) In the RECEIPT mode, when the [FEED] switch is pressed, a 20-mm feed is performed.
- (3) In the RECEIPT mode, the issue count cannot be set. If the batch/strip issue mode is set, it does not become effective.

5. TPCL-LE MODE (INTERFACE COMMANDS)

5.1 GENERAL DESCRIPTION

This chapter describes details regarding the interface commands for the TPCL-LE mode (including TPCL-LE1 mode) of the print mode. There are two issue types, “Batch issue” and “Strip issue”. In batch issues, a backfeed is performed before printing, regardless of the selected sensor type. In strip issues, a backfeed is not performed.

NOTE:

With the firmware V1.3 or greater, a back feed is not performed even in batch issue mode if there is no print data to be printed within 2.1 mm from the top of the print area.

[Command List]

Format	Command	Automatic ACK/Status Response (conditionally)
[ESC]D	Label Size Set Command	No
[ESC]ID	Printer ID Set Command	Yes
[ESC]M	Mode Select Command	No, when the mode is changed to TPCL-LE.
[ESC]AX	Position Fine Adjust Command	Yes
[ESC]AY	Print Density Fine Adjust Command	Yes
[ESC]AH	Strip Sensor Threshold Value Set Command	Yes
[ESC]C	Image Buffer Clear Command	No
[ESC]XR	Clear Area Command	No
[ESC]LC	Line Format Command	No
[ESC]PC	Bit Map Font Format Command	No
[ESC]PV	Outline Font Format Command	No
[ESC]XB	Bar Code Format Command	No
[ESC]RC	Bit Map Font Data Command	No
[ESC]RV	Outline Font Data Command	No
[ESC]RB	Bar Code/Two-Dimensional Code Data Command	No
[ESC]XS	Issue Command	Yes
[ESC]T	Feed Command	Yes
[ESC]J1	Flash Memory Format Command	Yes
[ESC]XD	Bit Map Writable Character Command	Yes
[ESC]SG	Graphic Command	No
[ESC]XO	Save Start Command	No
[ESC]XP	Save Terminate Command	Depends on the setting of [ESC]X0.
[ESC]XQ	Saved Data Call Command	No
[ESC]HD	Head Broken Dots Check Command	Yes
[ESC]WR	Reset Command	Yes, only when the interface is IrDA (TEC Protocol) or RS-232C.
[ESC]WS [ESC]FM [ESC]v	Status Request Command	---
[ESC]WX	Mode Information Acquire Command	---
[ESC]WV	Version Information Acquire Command	---
[ESC]IT	Device Address Acquire Command	---

5.2 OUTLINE OF COMMANDS

5.2.1 FORMAT OF INTERFACE COMMAND

ESC	Command & Data	LF	NUL
-----	----------------	----	-----

- The length from [ESC] to [LF] [NUL] must be as specified by each command.
- There are the following three kinds of control codes:
 - ① ESC (1BH), LF (0AH), NUL (00H)
 - ② { (7BH), | (7CH), } (7DH)

5.2.2 HOW TO USE REFERENCE

Function	Describes the outline of the function of the command.
----------	---

Format	Shows the format of the command.
--------	----------------------------------

The format designation method should conform to the following rules:

- Each set of small letters (such as aa, bbbb) indicates a parameter item.
- An item enclosed in parentheses may be omitted.
- “---” indicates the repetition of an item.
- Brackets and parentheses are used only in coding, and must not be transmitted in practice.
- Other symbols must always be inserted at designated positions before being transmitted.

Term	Explains the term(s) used in the format. * “0 to 999” described in the entry range indicates that up to 3-digit variable-length entry is allowed. (Entry of “001” or “009” is also possible.) “000 to 999” indicates that the entry must be fixed as 3 digits.
------	---

Explanation	Explains the command in detail.
-------------	---------------------------------

Note	Supplementary explanation of the command.
------	---

Refer to	Related commands
----------	------------------

Examples	Explains the command examples.
----------	--------------------------------

[ESC] T20C30 [LF] [NUL]

The above corresponds to the transfer of the following:

<u>1B</u>	<u>54</u>	<u>32</u>	<u>30</u>	<u>43</u>	<u>33</u>	<u>30</u>	<u>0A</u>	<u>00</u>
[ESC]	T	2	0	C	3	0	[LF]	[NUL]

5.2.3 PRECAUTIONS

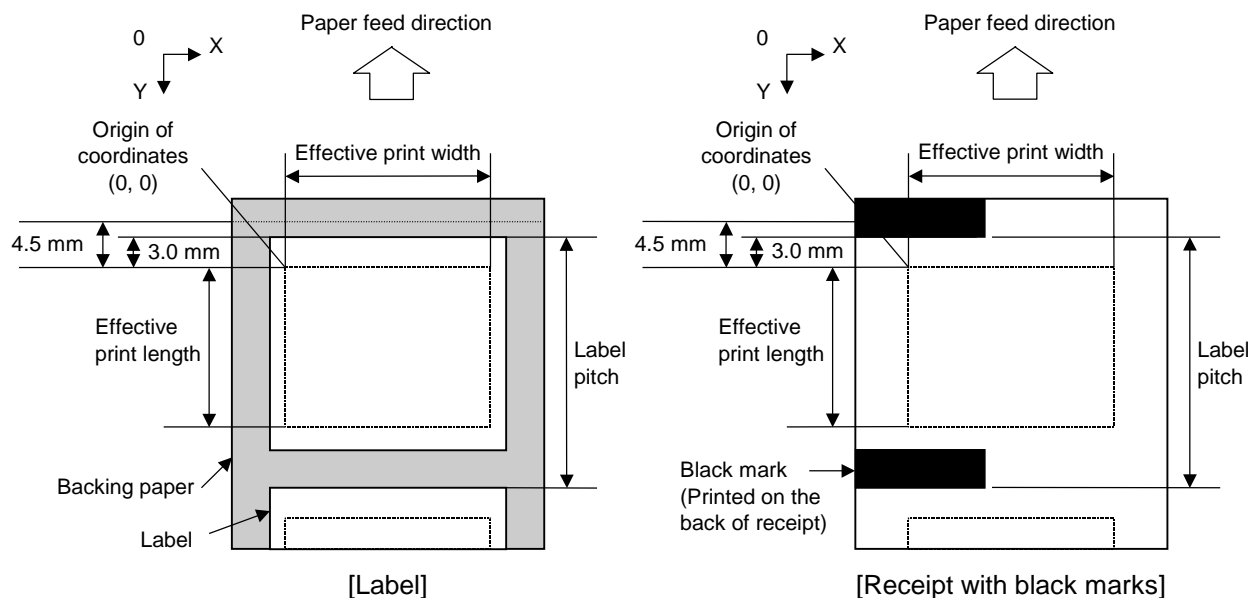
The commands and parameters described in this specification must always be used. If any command or parameter other than those covered in this specification are used, the printer's operation will not be guaranteed.

5.3 COMMANDS RELATED TO SETTING

5.3.1 LABEL SIZE SET COMMAND

[ESC] D

Function	Sets the size of a label or tag.
Format	[ESC] Daaaa, bbbb, cccc (, dddd) [LF] [NUL]
Term	<p>aaaa: Pitch length of the label or tag 4 and 5 digits (in 0.1 mm units) 4 digits: 0100 (10.0 mm) to 5070 (507.0 mm) 5 digits: 00100 (10.0 mm) to 05070 (507.0 mm)</p> <p>bbbb: Effective print width Fixed as 4 digits (in 0.1 mm units) 0480 (48.0 mm)</p> <p>cccc: Effective print length 4 and 5 digits (in 0.1 mm units) 4 digits: 0070 (7.0 mm) to 5000 (500.0 mm) 5 digits: 00070 (7.0 mm) to 05000 (500.0 mm)</p> <p>dddd: Reserved area (Omissible) Fixed as 4 digits (in 0.1 mm units)</p>
Explanation	<p>(1) Pitch length of labels or tags If any value out of the above range is specified, it should be corrected. When a smaller value than 10.0 mm is specified, it should be changed to 10.0 mm. When a larger value than 507.0 mm is specified, it should be changed to 507.0 mm.</p> <p>(2) Effective print width It should be fixed as 48.0 mm. If any value other than 48.0 mm is specified, it is changed to 48.0 mm.</p> <p>(3) Effective print length If any value out of the above range is specified, it should be corrected. When a smaller value than 7.0 mm is specified, it should be changed to 7.0 mm. When a larger value than 500.0 mm is specified, it should be changed to 500.0 mm.</p> <p>(4) Reserved area (Omissible) The reserved parameter is not checked.</p>

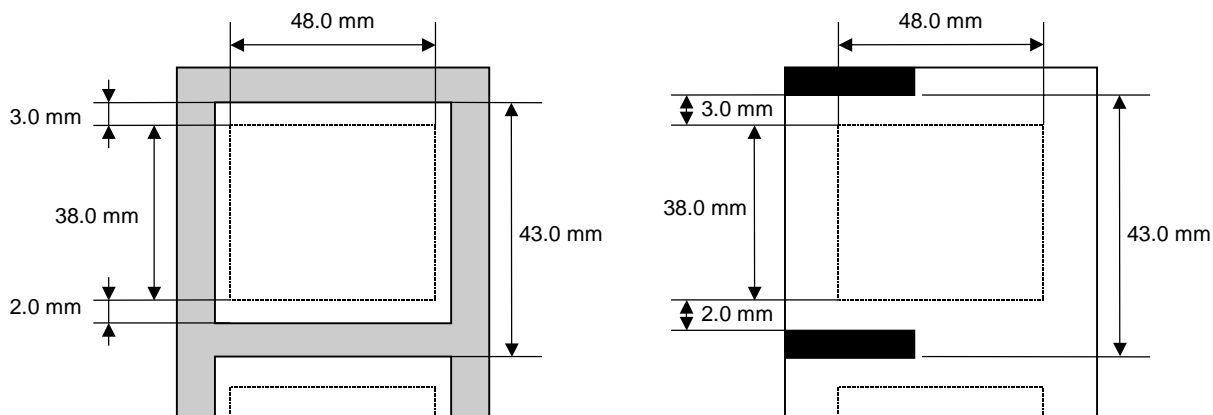


Notes

- (1) When the label size or type of sensor is changed, the Label Size Set Command must first be transmitted.
- (2) The label pitch length is protected in memory (even if the power is turned off).
- (3) After sending the Label Size Set Command, one sheet of paper must be fed by the [FEED] switch or the Feed Command ([ESC] T), to align the paper with the first print position prior to printing.
- (4) The origin of drawing coordinates and the print stop position (head position at stop) are determined according to the parameters of the Label Size Set Command.
- (5) The origin of drawing coordinates and the print stop position (head position at stop) are adjustable by the Fine Adjust Commands.
- (6) Even if a gap or a black mark is detected within less than 90% of the effective print length specified by the Label Size Set Command, it is ignored.
- (7) When a gap or a black mark cannot be detected within less than 150% of the label pitch length, it is assumed to be a paper jam error.

Example

[ESC] D0430, 0480, 0380 [LF] [NUL]



Available media size

[mm]

Item	Paper	Label		Receipt	
	Issue	Batch	Strip	with black marks	without black marks
Label pitch	Min.	10.0	13.0	10.0	—
	Max.	167.0	67.0	507.0	—
Label length	Min.	7.0	10.0	7.0	—
	Max.	160.0	60.0	500.0	—
Backing paper width	Min.	28.0, 31.0, 34.0, 37.0, 40.0, 43.0, 46.0, 49.0, 52.0, 55.0, 58.0 ± 0.5		—	
	Max.				
Label width	Min.	25.0		—	
	Max.	55.0			
Paper width	Min.	—		28.0, 31.0, 34.0, 37.0, 40.0, 43.0, 46.0, 49.0, 52.0, 55.0, 58.0 ± 0.5	
	Max.	—			
Gap length	Min.	3.0			—
	Max.	7.0			—
Black mark length	Min.	—		3.0	—
	Max.	—		7.0	—
Margins of backing paper	Min.	1.5		—	
	Max.	7.0		—	
Effective print width	Min.	48.0			
	Max.	—			
Effective print length	Min.	7.0			—
	Max.	160.0	60.0	500.0	—
Slow up interval		2.25			
Non-printable area	Min.	1.0 ^(*) (when the gap or black mark length is 5.0 mm)			—
	Max.	3.0 (when the gap or black mark length is 3.0 mm)			—

(*1) Print position fine adjustment is necessary.

5.3.2 PRINTER ID SET COMMAND**[ESC] ID**

Function	Sets the ID for the printer.
Format	[ESC] ID ; aa(,b) [LF] [NUL]
Term	aa: Printer ID (2-byte hex data) 0000H to FFFFH b: Reserved area (Omissible) (* Firmware V1.3 or greater) Fixed to 0.
Explanation	(1) The printer ID is necessary information to identify each printer in RF communications
Notes	(1) The set printer ID is backed up in memory (even if the power is turned off). (2) The last 5 digits of the printer's serial number have been set as the printer ID, at the time of shipment from the factory. (3) In IrDA: TEC Protocol, the printer checks the set ID against the ID in the received command packet. If they do not match, the printer discards the command packet. However, when the ID in the command packet is "0", the printer accepts the command packet without checking the set IDs.
Example	To set "03H 51H" as the ID of the printer: [ESC] ID ; [03H] [51H] [LF] [NUL] In this case, the printer ID in status printing is "00849".

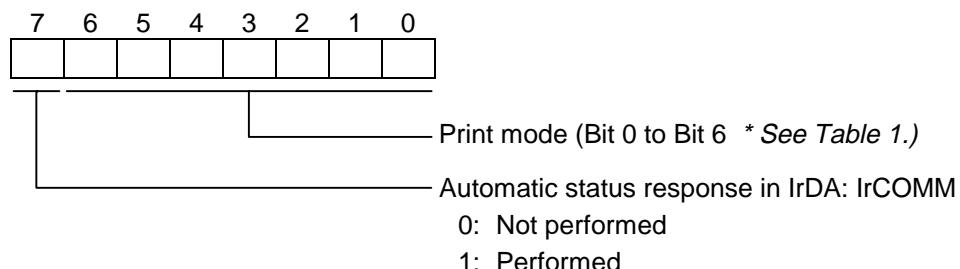
5.3.3 MODE SELECT COMMAND

[ESC] M

Function	Changes the print mode.
----------	-------------------------

Format	[ESC] M; a(b) [LF] [NUL]
--------	--------------------------

Term	a: Print mode designation
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* Table 1 Print mode

HEX	Mode	How to deal with the received data after an error is cleared
30H	LABEL	Discards
31H	RECEIPT	Discards
32H	RECEIPT1	Continues printing
33H	RECEIPT	Discards
41H	TPCL-LE	Continues printing
42H	TPCL-LE1	Continues printing (* Firmware V1.5 or greater)

b: Print position detection feed (Omissible. If omitted, the print position detection feed is not performed.) (* Firmware V1.1 or greater)

- 0: When the mode change from RECEIPT or RECEIPT1 to LABEL is requested, a print position detection feed is not performed after the mode is changed.
- 1: When the mode change from RECEIPT or RECEIPT1 to LABEL is requested, a print position detection feed is performed after the mode is changed.

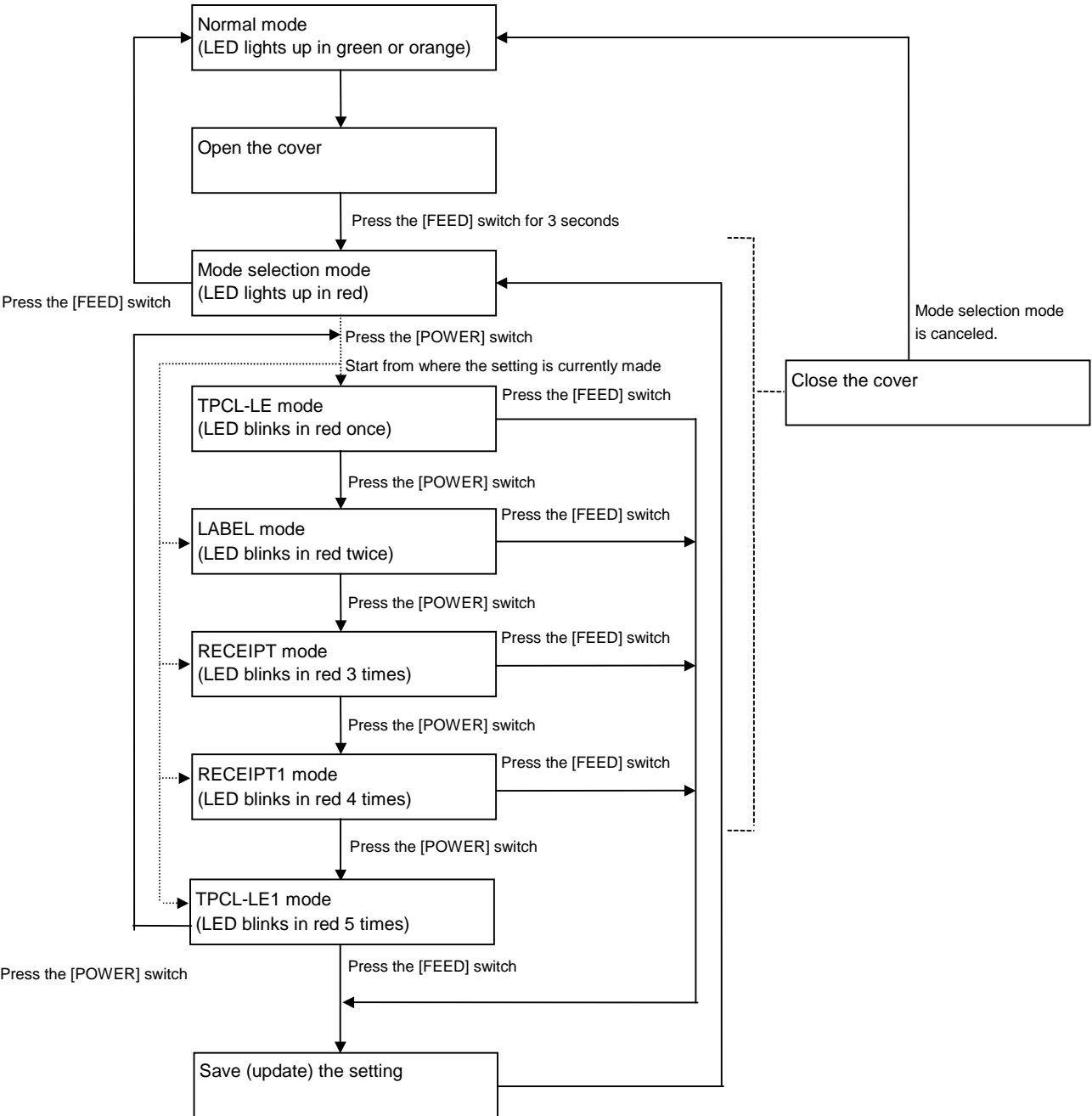
Explanation

- (1) There are 3 types of the print mode: "LABEL", "RECEIPT", and "TPCL-LE".
- (2) Both 31H and 33H are used for the "RECEIPT" mode. 33H is provided to maintain the compatibility with RECEIPT2 used for the conventional models. On the B-SP2D, the RECEIPT mode operation of 33H is the same as the 31H. Therefore, both 31H and 33H are defined as "RECEIPT".
- (3) "Automatic status response in IrDA: IrCOMM" is the function for the specifications which do not allow the printer to spontaneously send the status thorough IrDA; IrCOMM. This function enables the printer to forcefully send the status to the host, if the link between the printer and the host is established. However, if the link between the printer and the host is not established upon the status transmission, the printer cannot send the status. Therefore, the status is discarded. (In the next connection to the host, the printer does not send the status to the host.)
- (4) "Print position detection feed" is a function that automatically feeds the label to the print start position after the print mode is changed from RECEIPT or RECEIPT1 to LABEL. The sensor is not used when issuing in RECEIPT or RECEIPT 1 mode, therefore, after mode is changed to LABEL, the print start position cannot be detected. This is useful when using sensor detectable paper in both RECEIPT and LABEL modes.
- (5) In the TPCL-LE1 mode, it is possible to re-print the last print data by pressing the FEED button.

Notes

- (1) The print mode designation (the specified print mode and the automatic status response in IrDA: IrCOMM) is backed up in memory (even if the power is turned off).
- (2) The factory default is "30H: LABEL mode" and "Automatic status response in IrDA: IrCOMM is not performed". (The IrDA protocol is "TEC Protocol".)
- (3) When the print mode is changed, the type of sensor is automatically changed.

LABEL mode (0):	The previously backed up sensor is designated.
TPCL-LE mode (A):	The previously backed up sensor is designated.
TPCL-LE1 mode (B):	The previously backed up sensor is designated.
RECEIPT mode (1 or 3):	No sensor is designated.
RECEIPT1 mode (2):	No sensor is designated.
- (4) If the RECEIPT mode is selected or no sensor is designated in the LABEL or TPCL-LE mode, an initial feed is not performed when the cover is closed.
- (5) When the mode change is finished, the printer sends the normal end status or an ACK to the host. However, when the mode is changed to the TPCL-LE mode, the printer does not send the status. In IrDA: IrCOMM, only when bit 7 of the print mode designation is set to "1", the printer sends the status.
- (6) The print mode can be changed by the printer itself. However, since the setting for the automatic status response in IrDA: IrCOMM cannot be changed, the setting remains as the same.
- (7) As the print position detection feed parameter is effective only when changing the print mode to LABEL, this parameter status will be ignored when changing the mode to TPCL-LE.
- (8) The print position detection feed is performed according to the conditions, such as, label pitch, fine adjustment, and sensor selection, which were set in the LABEL or TPCL-LE mode before the printer is operated in RECEIPT or RECEIPT1 mode. If no sensor is selected, the print position detection feed will not be performed.
- (9) After performing a print position detection feed, the printer does not send a process end status. If an error occurs during the print position detection feed, the printer does not feed after the error is cleared. However, when the error is cleared by opening/closing the cover, the print position detection feed is performed.
- (10) When changing the print mode by the printer itself, the print position detection feed parameter cannot be set.
- (11) When the mode select command is designated with the print position detection feed at the end of a print data issued in RECEIPT1 mode, and if an error occurs while printing, the printing will restart after the error is cleared and then, the print mode will be changed to the LABEL mode and a print position detection feed is performed.
- (12) When the LABEL mode is selected in the mode select command and the print position detection feed parameter is set 0 (not performed), and if an error occurs while the printer issues in RECEIPT1 mode, the print mode is changed to the LABEL mode after the error is cleared. (The mode select command is executed.)



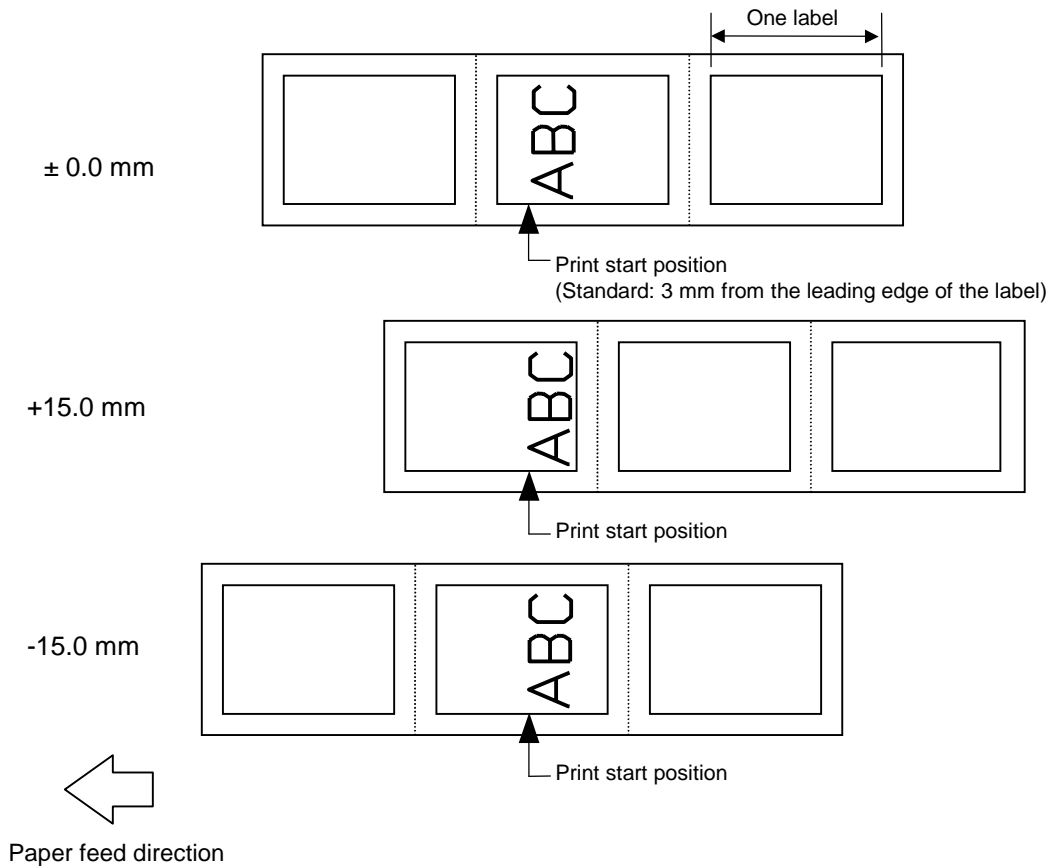
5.4 COMMANDS RELATED TO FINE ADJUSTMENT

5.4.1 POSITION FINE ADJUST COMMAND

[ESC] AX

Function	Adjusts the feed value so that the label will be shifted forward or backward from the standard print start position.
Format	[ESC] AX; abbb, cddd, eff [LF] [NUL]
Term	<p>a: Indicates the direction, forward or backward, in which a fine adjustment is to be made. +: Backward -: Forward</p> <p>bbb: Feed value to be finely adjusted. 000 to 150 (in 0.1 mm units)</p> <p>c: Reserved area</p> <p>ddd: Reserved area</p> <p>e: Reserved area</p> <p>ff: Reserved area</p>
Explanation	<p>(1) When parameter "a" is set to any value other than "+" or "-", a command error occurs.</p> <p>(2) If any value out of the above range is specified for the feed value, it should be corrected. If a larger value than 15.0 mm is specified, it should be changed to 15.0 mm.</p> <p>(3) The reserved parameters are not checked.</p> <p>(4) When the print position is changed or the gap between the labels is not 3 mm, the Print Position Fine Adjust Command should be used as required. (When the gap between the labels is 3 mm, the standard print start position is 3 mm from the leading edge of the label.)</p>

[Print position fine adjustment] (To finely adjust the feed for shifting backward or forward)



Notes

- (1) The set print position fine adjustment value is protected in memory (even if the power is turned off).
- (2) The factory default value is 0.0 mm.
- (3) The fine adjustment values changed by the Position Fine Adjust Command in the LABEL mode, are also effective for the TPCL-LE mode.

5.4.2 PRINT DENSITY FINE ADJUST COMMAND**[ESC] AY**

Function	Adjusts the automatically set print density.
Format	[ESC] AY ; abb, c (, d) [LF] [NUL]
Term	<p>a: Indicates whether to increase or decrease the density +: Increase (Darker) -: Decrease (Lighter)</p> <p>bb: Print density fine adjustment value 00 to 10 (in units of 1 step)</p> <p>c: Print mode 0: Reserved 1: Direct thermal</p> <p>d: Head output division designation (Omissible) 0: Auto (Divided by 2 or 3) 1: Divided by 2 (Default) 2: Divided by 3 3: Auto1 (Not divided/Divided by 2 or 3)</p>
Explanation	<p>(1) If the print mode is set to any value other than "1", it should be changed to "1"</p> <p>(2) The default value for the head output division designation is "1".</p> <p>(3) The standard density is finely adjusted to increase or decrease.</p> <p>(4) When any print density fine adjustment value out of the above range is set, a command error will occur.</p> <p>(5) The print density may become lower if the print ratio per line is high. When "Divided by 3" is designated in the head output division designation, the print density may be improved. However, the issue speed when "Divided by 3" is set, may be slower than when "Divided by 2" is set.</p> <p>(6) When "0: Auto" is designated, "Divided by 3" or "Divided by 2" is automatically selected for every line according to the print ratio. The width of half a dot may not be printed on the line when switching between "Divided by 2" and "Divided by 3". Therefore, do not designate "0: Auto" when a serial bar code is printed.</p> <p>(7) When "3: Auto1" is designated, "Not divided", "Divided by 3", or "Divided by 2" is automatically selected for every line according to the print ratio. The width of half a dot may not be printed on the line when switching between "Not divided", "Divided by 2" and "Divided by 3". Therefore, do not designate "3: Auto1" when a serial bar code is printed.</p> <p>(8) When "3: Auto1" is designated, it will be automatically changed to "Divided by 3" if the battery level becomes 2, in order to stable the print quality. As a result, the print speed will be reduced.</p>

Notes

- (1) The set print density fine adjustment value and the head output division designation, are protected in memory (even if the power is turned off).
- (2) The fine adjustment values changed by the Print Density Fine Adjust Command in the LABEL mode, are also effective for the TPCL-LE mode.
- (3) When the head output division designation is omitted, the backed up value in memory is used.

Examples

To set the density to -2.

```
[ESC] AY; -02, 1 [LF] [NUL]
```

To set the density to +3.

```
[ESC] AY; +03, 1 [LF] [NUL]
```

5.4.3 STRIP SENSOR THRESHOLD VALUE SET COMMAND [ESC] AH

Function	Sets the sensor threshold value to switch the mode between strip and batch.
Format	[ESC] AH; a [LF] [NUL]
Term	a: Setting 0: Default value (3.2 V) 1: Threshold value 2: Fixed as the batch mode 3: Fixed as the strip mode 4: Reserved
Explanation	(1) If the issue mode is not properly switched when using thin backing paper, “1: Threshold value” should be set, as required. (2) When “1: Threshold value” is set, this command is sent after the backing paper of the label to be used, is positioned on the strip issue path and the cover is closed. The printer reads the sensor adjustment value for the backing paper, and then sets the threshold value to switch the mode between strip and batch. (When this command is sent, the backing paper must be loaded on the strip issue path. If the backing paper is loaded on the batch issue path, or the label is loaded, and the command is sent, the mode will not be switched properly.)
Notes	(1) The set threshold value is backed up and kept until a new value is set using this command. When the power is turned on, the backed up value is retrieved and set (2) “0: Default value” has been set as the default at the time of shipment from the factory. (3) This command is used for sensor adjustment. Therefore, it must not be included in issue operations. (4) When either “2: Fixed as the batch mode” or “3: Fixed as the strip mode” for parameter “a”, is selected, the printer operates in the specified mode, without automatically switching between the batch and strip modes. Particularly when the printer is used without the strip roller module, the strip sensor value becomes unstable. Additionally, the stop position for the label becomes misaligned, and the issue count is corrected to “1”. Therefore, “2: Fixed as the batch mode” or “3: Fixed as the strip mode” for parameter “a” must be specified in this command.

5.5 COMMANDS RELATED TO CLEAR

5.5.1 IMAGE BUFFER CLEAR COMMAND

[ESC] C

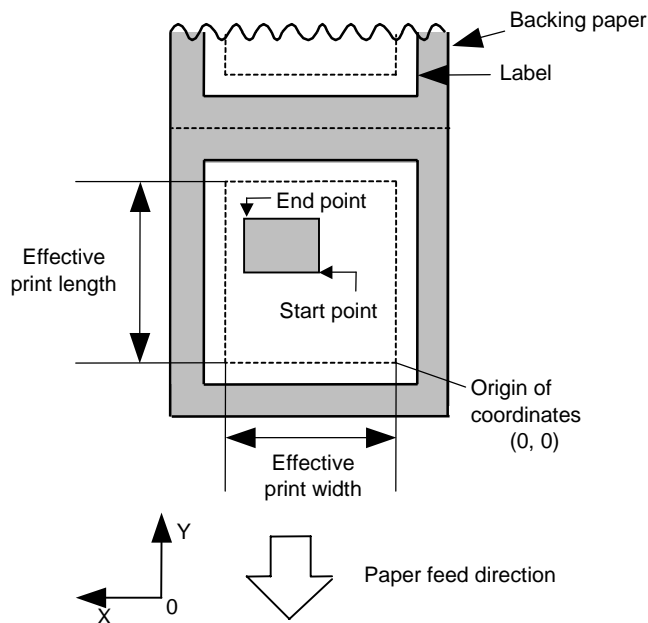
Function	Clears the image buffer for drawing characters, lines, bar codes, and graphics.
Format	[ESC] C [LF] [NUL]
Explanation	<p>(1) After changing the label size, the image buffer must be cleared.</p> <p>(2) The increment/decrement designation is valid until the Image Buffer Clear Command is transmitted.</p>
Examples	<pre>[ESC]D0508,0480,0468[LF][NUL] [ESC]T20C51[LF][NUL] [ESC]C[LF][NUL] [ESC]PC000;0080,0065,1,1,A,+00,00,B,J0000,M0,+0000000000,Z00,P1[LF][NUL] [ESC]PC001;0250,0150,1,1,G,+00,00,B,J0000,M0,+0000000000,Z00,P1[LF][NUL] [ESC]RC000;ABC[LF][NUL] [ESC]RC001;DEF[LF][NUL] [ESC]XS;I,0001,0002C3000[LF][NUL]</pre>

5.5.2 CLEAR AREA COMMAND

[ESC] XR

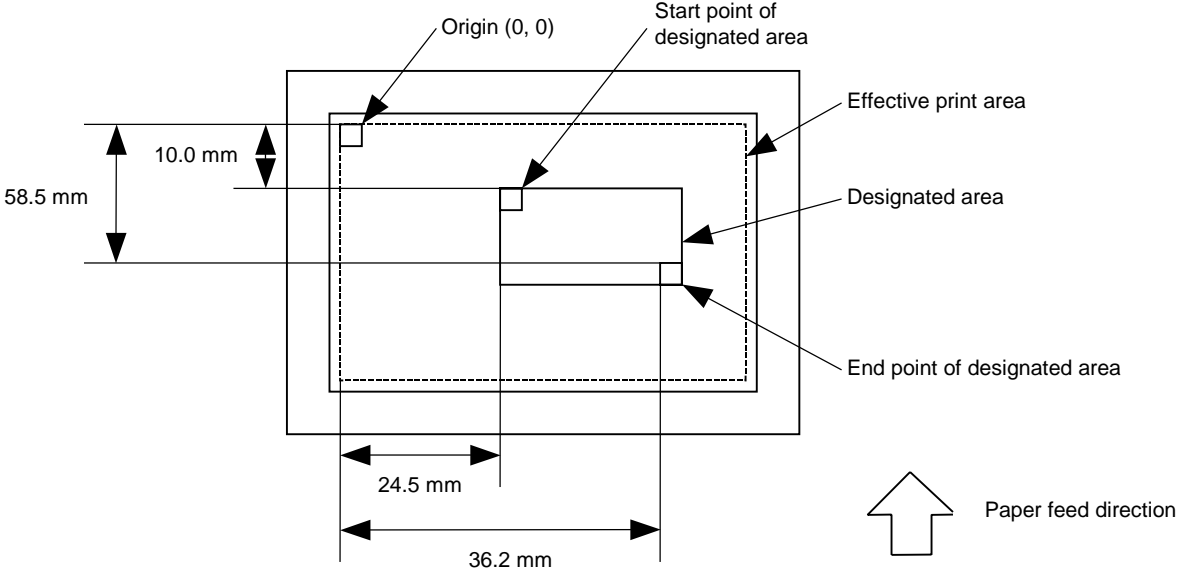
Function	Clears the designated area or reverses the white/black dot pattern in the designated area in the drawing area.
Format	[ESC] XR; aaaa, bbbb, cccc, dddd, e [LF] [NUL]
Term	<p>aaaa: Designated area start point X-coordinate Fixed as 4 digits (in 0.1 mm units)</p> <p>bbbb: Designated area start point Y-coordinate 4 or 5 digits (in 0.1 mm units)</p> <p>cccc: Designated area end point X-coordinate Fixed as 4 digits (in 0.1 mm units)</p> <p>dddd: Designated area end point Y-coordinate 4 or 5 digits (in 0.1 mm units)</p> <p>e: How to clear A: Clears the contents in the designated area to zeros. B: Reverses the white/black dot pattern in the designated area.</p>

Explanation



Notes	<p>(1) The result is the same even if the start and end point coordinates are reversed.</p> <p>(2) The result is the same even if the start and end point coordinates are set to an upper right and a lower left points, respectively.</p> <p>(3) The start and end point coordinates of the designated area must be set within the effective print area set by the Label Size Set Command ([ESC] D).</p> <p>(4) If the print ratio of one line (the print head width) is higher than defined, printing may become poor, or the printer may reset. When "B: Reverses the white/black dot pattern in the designated area" is selected for how to clear and the black dot pattern is increased, note the print ratio.</p>
-------	---

Examples



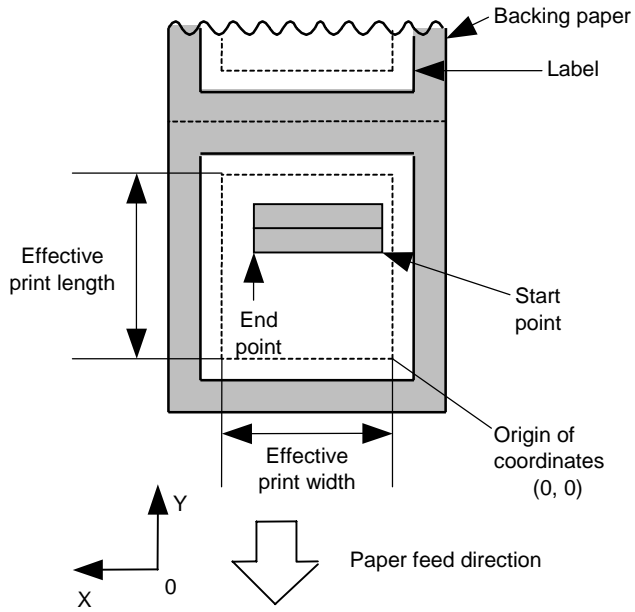
```
[ESC]XR;0245,0100,0362,0585,A[LF][NUL]
[ESC]XS;l,0001,0002C3000[LF][NUL]
```

5.6 COMMANDS RELATED TO DRAWING FORMAT

5.6.1 LINE FORMAT COMMAND

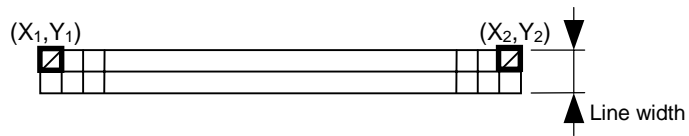
[ESC] LC

Function	Sets the line format and draws the line.
Format	[ESC] LC; aaaa, bbbb, cccc, dddd, e, f (, ggg) [LF] [NUL]
Term	<p>aaaa: Start point X-coordinate Fixed as 4 digits (in 0.1 mm units)</p> <p>bbbb: Start point Y-coordinate 4 or 5 digits (in 0.1 mm units)</p> <p>cccc: End point X-coordinate Fixed as 4 digits (in 0.1 mm units)</p> <p>dddd: End point Y-coordinate 4 or 5 digits (in 0.1 mm units)</p> <p>e: Type of line 0: Line (horizontal, vertical) 1: Rectangle 2: Reserved (If specified, it is processed as "0".) 3: Reserved (If specified, it is processed as "1".) 4: Reserved (If specified, it is processed as "1".) 5: Reserved (If specified, it is processed as "0".) 6: Reserved (If specified, it is processed as "1".)</p> <p>f: No. of line width dots 1 to 9 (in 0.1 mm units)</p> <p>ggg: Reserved area (Omissible) Fixed as 3 digits (in 0.1 mm units)</p>
Explanation	<p>(1) When the set values for the start point X- and Y- coordinates and the end point X- and Y- coordinates are not within the image (frame) buffer, the line is not drawn.</p> <p>(2) When the type of line is set to any value other than the range from 0 to 6, a command error occurs.</p> <p>(3) When the number of line width dots is set to "0", a command error occurs.</p> <p>(4) The reserved parameter is not performed.</p> <p>(5) If the print ratio of one line (the print head width) is higher than defined, printing may become poor, or the printer may be reset. When a horizontal line is printed, note the print ratio.</p>

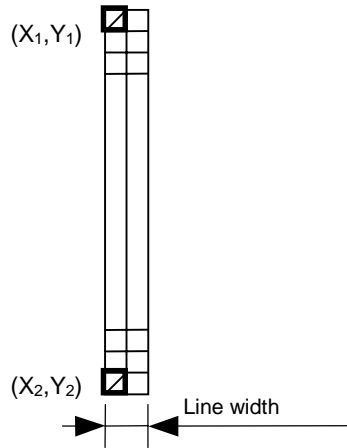


[Line]

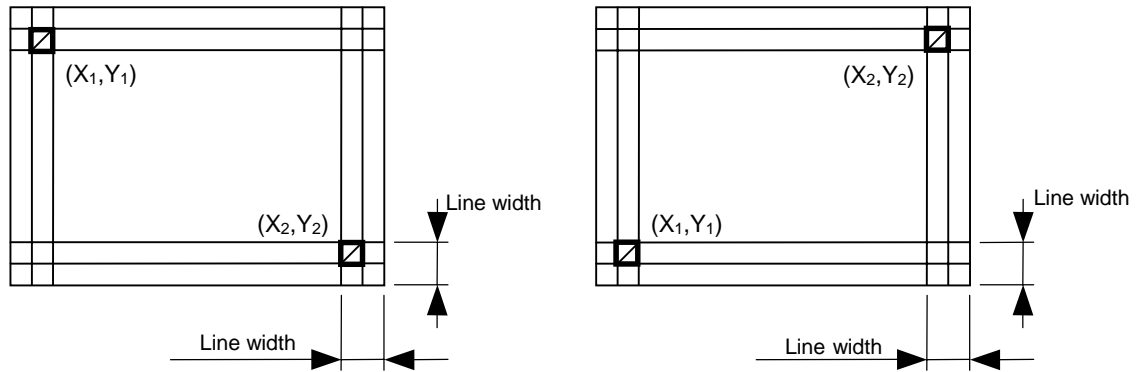
(1) Horizontal line (In the case of $|Y_2 - Y_1| = 0$)



(2) Vertical line (In the case of $|X_2 - X_1| = 0$)



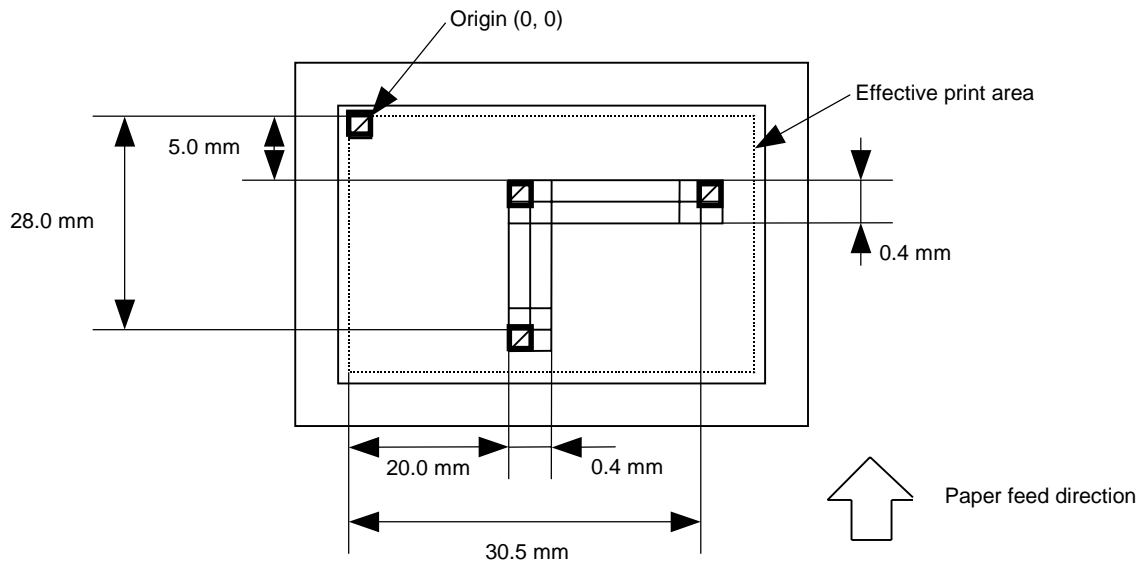
[Rectangle]



Notes

- (1) In line designation, a horizontal line or a vertical line is drawn, according to the start and end point coordinates. When the coordinates which make a slanted line are specified, a rectangle is drawn.
- (2) The result is the same even if the start and end point coordinates are reversed.
- (3) The start and end point coordinates must be set so that the result of line drawing will be within the effective print area set by the Label Size Set Command ([ESC] D).

Examples



```
[ESC]C[LF][NUL]
[ESC]LC;0200,0050,0305,0050,0,4[LF][NUL]
[ESC]LC;0200,0050,0200,0280,0,4[LF][NUL]
[ESC]XS;1,0001,0002C3000[LF][NUL]
```


5.6.2 BIT MAP FONT FORMAT COMMAND**[ESC] PC**

Function	Sets the format indicating the position on the label at which the bit map font is to be printed and how it is to be printed.																																																																																		
Format	[ESC] PCaaa; bbbb, cccc, d, e, ff (, gh), ii, j (, Jkll) (, Mm) (, noooooooooo) (, Zpp) (, Pq) (= rrr ----- rrr) [LF] [NUL]																																																																																		
Term	<p>aaa: Character string number 000 to 199 (Two digits, 00 to 99, also acceptable.)</p> <p>bbbb: Print origin of X-coordinate of character string Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of character string 4 or 5 digits (in 0.1 mm units)</p> <p>d: Character horizontal magnification 0.5 to 4.0 (in 0.5 magnification units) * Two digit designation enables magnifications in 0.5 units. (05 ~ 40: 0.5 to 4.0 magnifications)</p> <div style="margin-left: 40px;"> d d └───┬─── Designation in 0.5 magnification units : 0 or 5 └───┴─── Designation in magnifications : 0 to 4 </div> <p>e: Character vertical magnification 0.5 to 4.0 (in 0.5 magnification units) * Two digit designation enables magnifications in 0.5 units. (05 ~ 40: 0.5 to 4.0 magnifications)</p> <div style="margin-left: 40px;"> e e └───┬─── Designation in 0.5 magnification units : 0 or 5 └───┴─── Designation in magnifications : 0 to 4 </div> <p>ff: Type of font</p> <table border="0" style="margin-left: 40px;"> <tr><td>A:</td><td>Times Roman</td><td>(Medium)</td><td>12 point</td></tr> <tr><td>B:</td><td>Times Roman</td><td>(Medium)</td><td>15 point</td></tr> <tr><td>C:</td><td>Times Roman</td><td>(Bold)</td><td>15 point</td></tr> <tr><td>D:</td><td>Times Roman</td><td>(Bold)</td><td>18 point</td></tr> <tr><td>E:</td><td>Times Roman</td><td>(Bold)</td><td>21 point</td></tr> <tr><td>F:</td><td>Times Roman</td><td>(Italic)</td><td>18 point</td></tr> <tr><td>G:</td><td>Helvetica</td><td>(Medium)</td><td>9 point</td></tr> <tr><td>H:</td><td>Helvetica</td><td>(Medium)</td><td>15 point</td></tr> <tr><td>I:</td><td>Helvetica</td><td>(Medium)</td><td>18 point</td></tr> <tr><td>J:</td><td>Helvetica</td><td>(Bold)</td><td>18 point</td></tr> <tr><td>K:</td><td>Helvetica</td><td>(Bold)</td><td>21 point</td></tr> <tr><td>L:</td><td>Helvetica</td><td>(Italic)</td><td>18 point</td></tr> <tr><td>M:</td><td>Presentation</td><td>(Bold)</td><td>27 point</td></tr> <tr><td>N:</td><td>Letter Gothic</td><td>(Medium)</td><td>14.3 point</td></tr> <tr><td>O:</td><td>Prestige Elite</td><td>(Medium)</td><td>10.5 point</td></tr> <tr><td>P:</td><td>Prestige Elite</td><td>(Bold)</td><td>15 point</td></tr> <tr><td>Q:</td><td>Courier</td><td>(Medium)</td><td>15 point</td></tr> <tr><td>R:</td><td>Courier</td><td>(Bold)</td><td>18 point</td></tr> <tr><td>S:</td><td>OCR-A</td><td></td><td>12 point</td></tr> <tr><td>T:</td><td>OCR-B</td><td></td><td>12 point</td></tr> </table>			A:	Times Roman	(Medium)	12 point	B:	Times Roman	(Medium)	15 point	C:	Times Roman	(Bold)	15 point	D:	Times Roman	(Bold)	18 point	E:	Times Roman	(Bold)	21 point	F:	Times Roman	(Italic)	18 point	G:	Helvetica	(Medium)	9 point	H:	Helvetica	(Medium)	15 point	I:	Helvetica	(Medium)	18 point	J:	Helvetica	(Bold)	18 point	K:	Helvetica	(Bold)	21 point	L:	Helvetica	(Italic)	18 point	M:	Presentation	(Bold)	27 point	N:	Letter Gothic	(Medium)	14.3 point	O:	Prestige Elite	(Medium)	10.5 point	P:	Prestige Elite	(Bold)	15 point	Q:	Courier	(Medium)	15 point	R:	Courier	(Bold)	18 point	S:	OCR-A		12 point	T:	OCR-B		12 point
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- U: Writable character 41 (16 × 16 dots)
W: Writable character 42 (24 × 24 dots)
a: Standard character (12 × 24 dots)
b: Bold character (48 × 96 dots)
d: Price Font 1 (16 × 40 dots)
e: Price Font 2` (32 × 48 dots)
o: Gothic725 Black 6 point
q: Gothic725 Black 6 point
01 (a): Writable character 1 (1×1 dot to 384×720 dots)
a: Reserved area (Omissible)
0 to 2
- * The following fonts are proportional.
A, B, C, D, E, F, G, H, I, J, K, L, o, q
- ghh: Fine adjustment of character-to-character space
(Omissible. If omitted, space is adjusted according to the designated font.)
g: Designates whether to increase or decrease the character-to-character space.
+: Increase
-: Decrease
hh: No. of space dots between characters
00 to 99 (in dots)
- ii: Rotational angles of a character and character string
00: 0° (char.) 0° (char.-string)
11: 90° (char.) 90° (char.-string)
22: 180° (char.) 180° (char.-string)
33: 270° (char.) 270° (char.-string)
- j: Character attribution
B: Black character
W (aabb): Reverse character
aa: No. of dots from the character string to the end of the black background in the horizontal direction
aa: 01 to 99 (in units of dots)
bb: No. of dots from the character string to the end of the black background in the vertical direction
bb: 01 to 99 (in units of dots)
F (aabb): Reserved (If specified, it is processed as "B".)
aa: 01 to 99
bb: 01 to 99
C (aa): Reserved (If specified, it is processed as "B".)
aa: 01 to 99
- * Parenthesized descriptions are omissible. If "F" or "C" is specified, it is ignored.
- If the parenthesized values for "W: Reverse character" are omitted, the characters are reversed. Thus, increasing the larger of the two black character magnifications (horizontal or vertical) × 6 dots.

Jkkl: Reserved area (Omissible)
kk: 00 to 16
ll: 00 to 16

Mm: Reserved area (Omissible)
m: 0 to 2

nooooooooo: Increment and decrement (Omissible)
n: Designates whether to increment or decrement.
+: Increment
-: Decrement

oooooooooooo: Skip value
0000000000 to 9999999999
* If omitted, incrementing/decrementing is not performed.

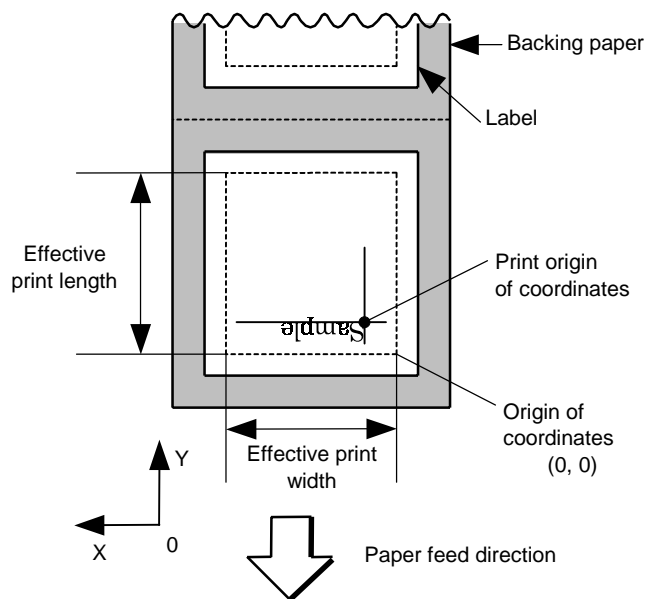
Zpp: Reserved area (Omissible)
pp: 00 to 20

Pq: Alignment (Omissible. If omitted, the alignment is set to the left.)
q: Designates the character position
1: Left
2: Center
3: Right
4aaaa: Reserved (If specified, it is processed as "1")
aaaa: 0050 to 1040
5aaaabbbcc: Reserved (If specified, it is processed as "1")
aaaa: 0050 to 1040
bbb: 010 to 500
cc: 01 to 99

rrr-----rrr: Data string to be printed (Omissible)
Max. 100 digits

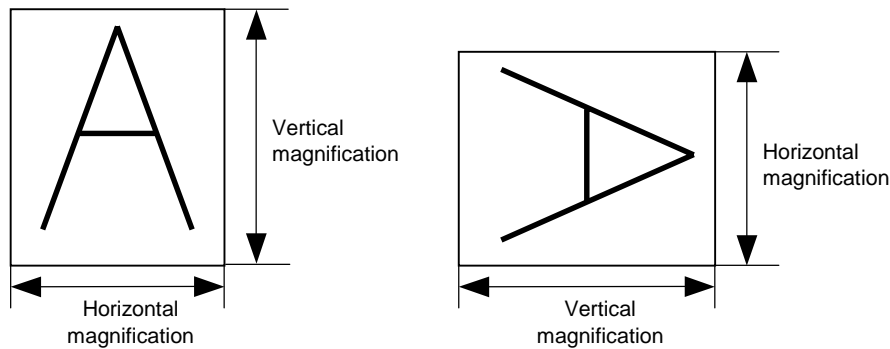
Explanation

- (1) Character string number
When drawing by the Data Command ([ESC] RC), the format designated by the character string number is selected.
- (2) Print origin of coordinates

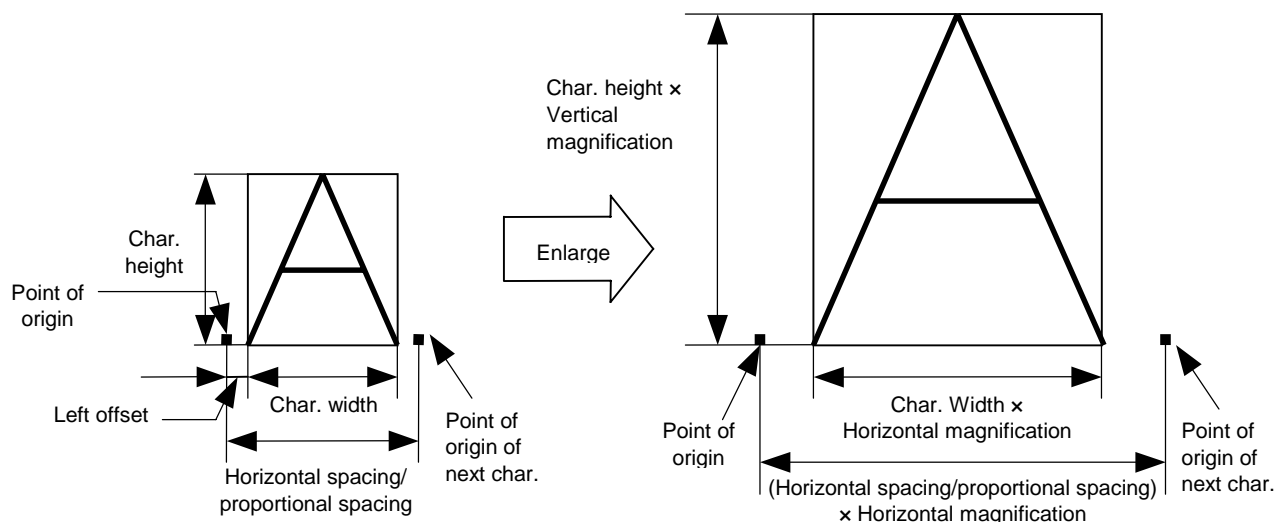


The print origin of coordinates must be set, so that the character drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

- (3) Horizontal magnification and vertical magnification



[Relationship between drawing coordinates and magnification]



(4) Type of font

A: Times Roman : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMabcdefghijklmÂÏØÆàìÆ

B: Times Roman : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIGabcdefghijklgÂÏØÆàìÆ

C: Times Roman : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIGabcdefghijklgÂÏØÆàìÆ

D: Times Roman : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIGabcdefghijklgÂÏØÆàìÆ

E: Times Roman : !"#\$%&'()*+,-./0123456789@ABCDEFGHIGabcdefghijklgÂÏØÆàìÆ

F: Times Roman : !"#\$%&'()*+,-./0123456789@ABCDEFGHIGabcdefghijklgÂÏØÆàìÆ

G: Helvetica : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNopqrstuvwxyzwÂÏØÆàìÆ

H: Helvetica : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIHabcdefghijklhÂÏØÆàìÆ

I: Helvetica : !"#\$%&'()*+,-./0123456789@ABCDEFGHIHabcdefghijklhÂÏØÆàìÆ

J: Helvetica : !"#\$%&'()*+,-./0123456789@ABCDEFGHIHabcdeÂÏØÆàìÆ

K: Helvetica : !"#\$%&'()*+,-./0123456789@ABCDEFGHIHabcdeÂÏØÆàìÆ

L: Helvetica : !"#\$%&'()*+,-./0123456789@ABCDEFGHIHabcdeÂÏØÆàìÆ

M: Presentation : **!"#\$%&'0123456789@ABCDEFGHIABCDEF**

N: Letter Gothic : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNopabcdefghijklmnoÂÏØÆàìÆ

O: Prestige Elite : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNopabcdefghijklmnoÂÏØÆàìÆ

P: Prestige Elite : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIHabcdefghijklhÂÏØÆàìÆ

Q: Courier : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIHabcdefghijklhÂÏØÆàìÆ

R: Courier : !"#\$%&'()*+,-./0123456789@ABCDEFGHIHabcdeÂÏØÆàìÆ

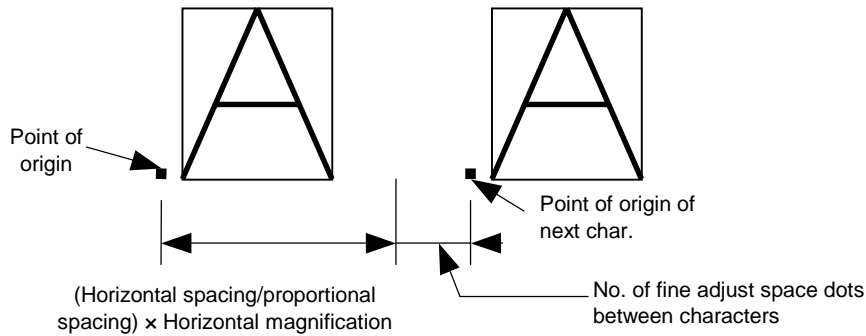
S: OCR-A : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIabcdefghijkl

T: OCR-B : !"#\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIabcdefghijkl

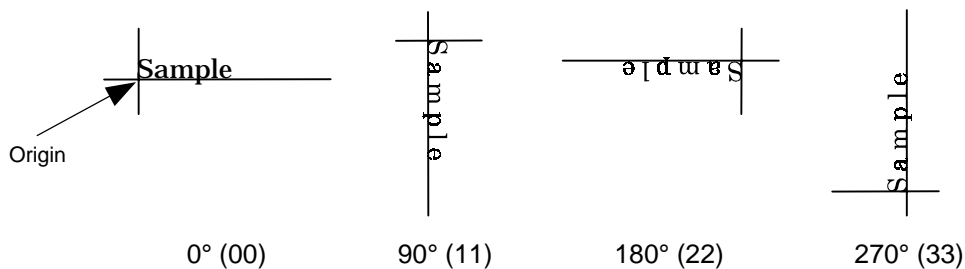
[illegible]

(5) Fine adjustment of character-to-character space

If no character-to-character space is specified or the number of space dots between characters is 0, drawing will take place according to the horizontal spacing/proportional spacing determined for each character. If character-to-character space is specified, drawing will take place according to the value obtained by adding the character spacing/proportional spacing to the specified value.



(6) Rotational angles of a character and character string



(7) Selection of character attribution



If the print ratio of one line (the print head width) is higher than defined, printing may become poor, or the printer may be reset. When “B: Reverses the white/black dot pattern in the designated area” is selected for how to clear and the black dot pattern is increased, note the print ratio.

(8) Increment/decrement

Printing is performed while the data is incremented or decremented every time a label is issued. Where the data row exceeds the maximum number of digits (40), the data row will not be drawn.

When the font type is U, V, a, e, or j, the increment or decrement cannot be specified. (Even if the increment or decrement is specified, it will be ignored.) Font type “e” is applicable only when Chinese () is specified, therefore, it is possible to specify the increment/decrement in case of Price Font 2.

Initial value	0000	0000	0000	0000	999999
INC/DEC	+10	+10	+10	+10	+1
1st label	0000	0000	└000	0000	999999
2nd label	0010	0010	└010	0010	└└└000
3rd label	0020	0020	└020	0020	└└└001
4th label	0030	0030	└030	0030	└└└002
5th label	0040	0040	└040	0040	└└└003

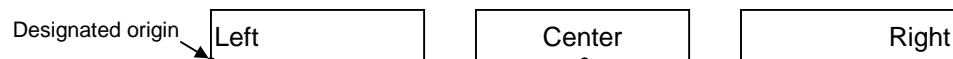
Letters and numerals for increment/decrement

For the data string, up to 40 digits (including letters, numerals, and symbols) are possible. Only the numerals are selected and calculated for incrementing/decrementing, and then are returned to the previous position to draw the data.

Example of increment/decrement calculation

Initial value	00000	A0A0A	7A8/9	A2A0A
INC/DEC	+1	+1	+3	-3
1st label	00000	A0A0A	7A8/9	A2A0A
2nd label	00001	A0A1A	7A9/2	A1A7A
3rd label	00002	A0A2A	7A9/5	A1A4A
4th label	00003	A0A3A	7A9/8	A1A1A
5th label	00004	A0A4A	8A0/1	A0A8A

(9) Alignment



(10) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol “=.” Up to 100 digits can be printed. If the number of digits exceeds the maximum value, the excess data will be discarded.

For the character code table, refer to chapter 11 “CHARACTER CODE TABLE”.

(11) Reserved area (Omissible)

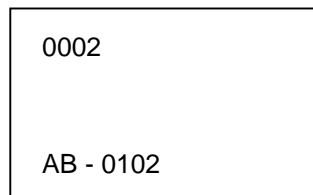
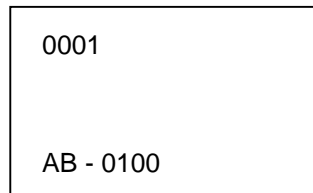
The value range of the reserved parameter is described in this specification. However, if values for the reserved parameters are specified, they are not checked.

Notes

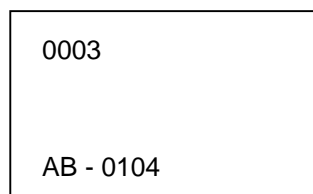
- (1) Up to 32 fields for which incrementing/decrementing has been designated can be drawn. If the total bit map font, outline font, and bar code/two-dimensional code increment/decrement fields exceeds 32, drawing will take place without incrementing/decrementing any excess field. The field to be incremented or decremented is incremented or decremented until the Image Buffer Clear Command ([ESC] C) is transmitted.

[Example]

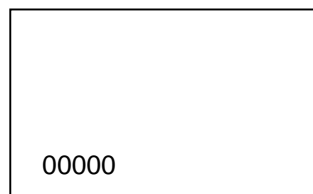
- 1) Format Command (Increment character string No. 001 (+1))
- 2) Format Command (No incrementing for character string No. 002)
- 3) Format Command (Increment character string No. 003 (+2))
- 4) Image Buffer Clear Command
- 5) Data Command (Character string No. 001 "0001")
- 6) Data Command (Character string No. 002 "AB-")
- 7) Data Command (Character string No. 003 "0100")
- 8) Issue Command (2 labels)



- 9) Issue Command (1 label)



- 10) Image Buffer Clear Command
- 11) Data Command (Character string No. 002 "00000")
- 12) Issue Command (1 label)



- (2) The Bit Map Font Format Command may be connected to the Outline Font Format Command when transmitted.

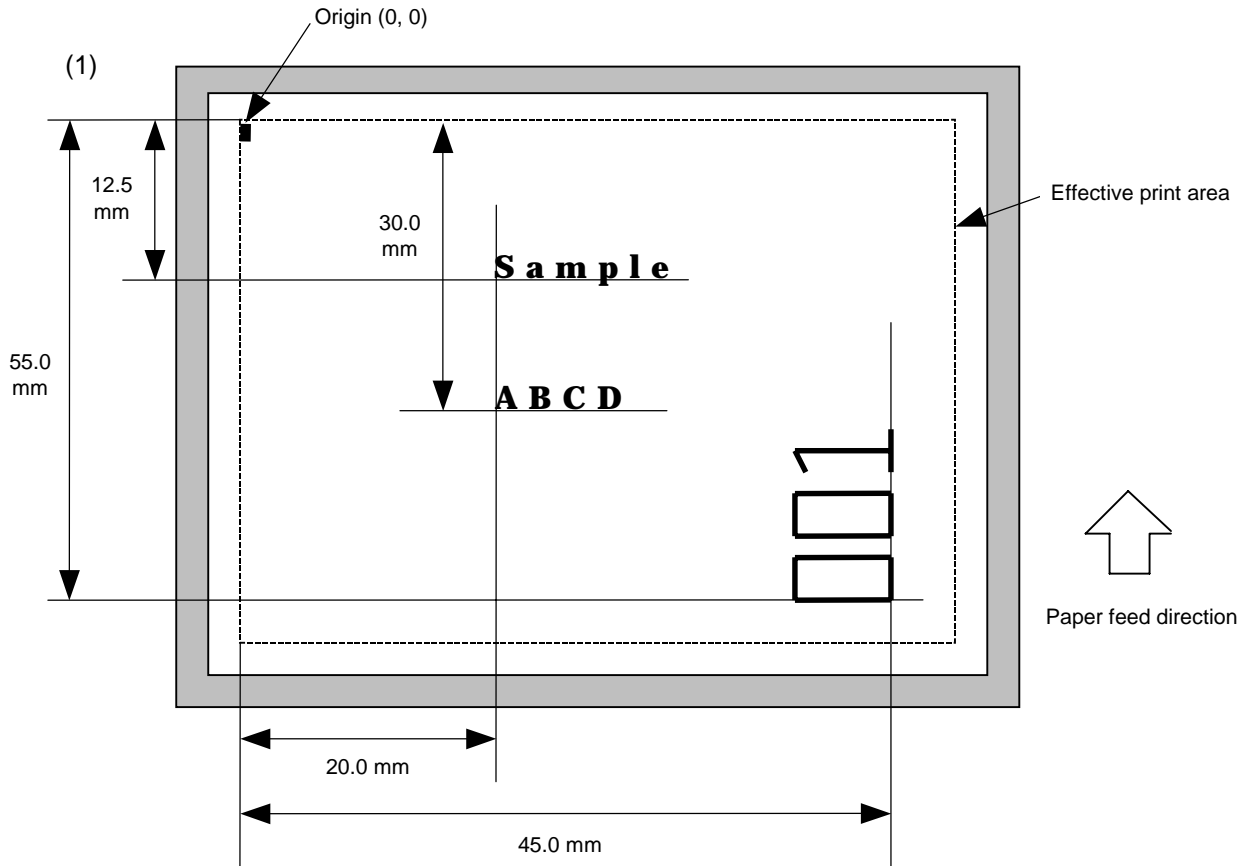
```
[ESC] P C001; 0100, 0150, 1, 1, A, 00, B [LF]
      C002; 0350, 0180, 1, 1, A, 00, B [LF]
      C005; 0200, 0300, 25, 2, C, +05, 00, B, +0000000001 [LF]
      V01; 0500, 0400, 0100, 0100, A, 00, B [LF] [NUL]
```

- (3) When the drawing data is changed per label issue during printing, the drawing data field for the previous label is automatically cleared using the character string number. Then the next drawing data is printed. Therefore, the character string number which differs according to the drawing fields should be designated. Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same character string number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same character string number are automatically cleared until the Clear Command is sent.)

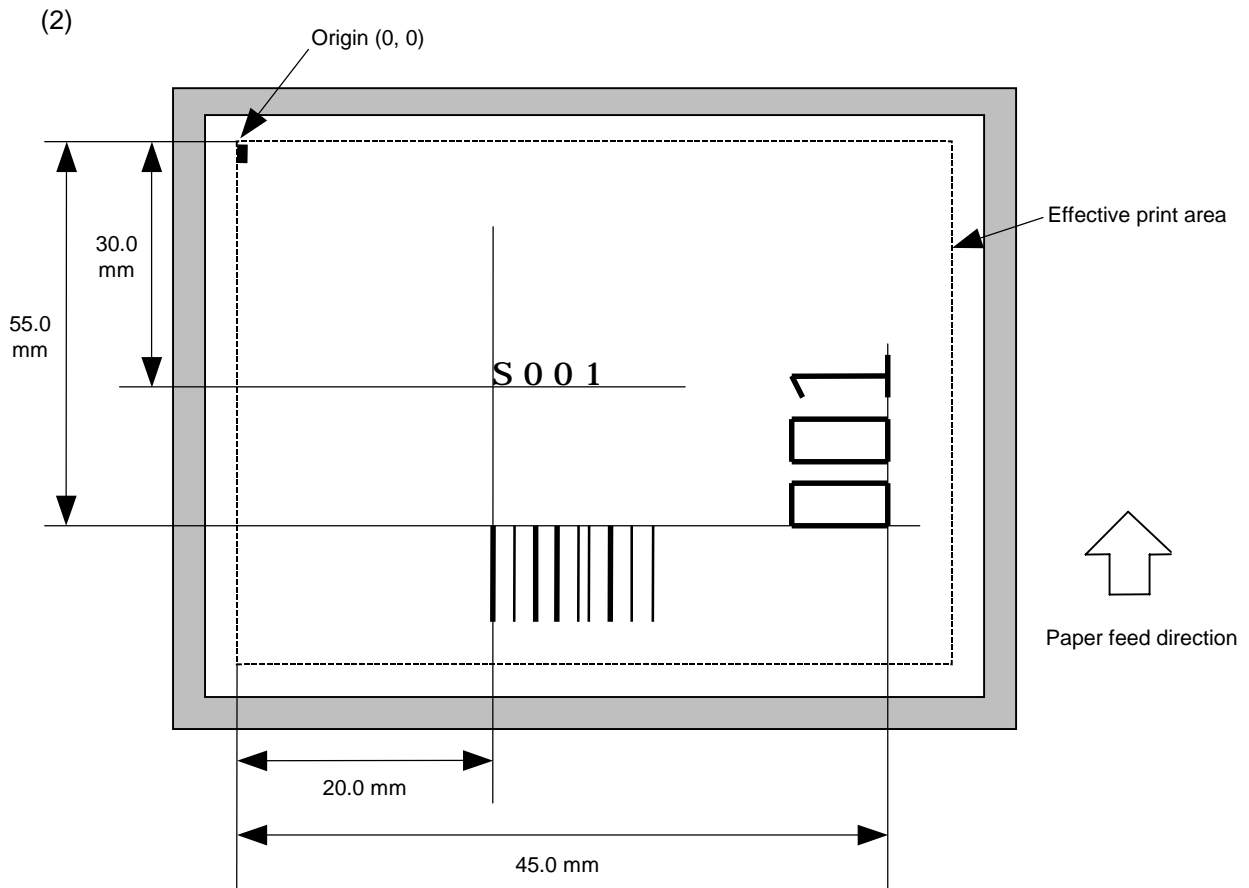
Refer to

Bit Map Font Data Command ([ESC] RC)
Outline Font Format Command ([ESC] PV)
Bar Code/Two-dimensional Code Format Command ([ESC] XB)

Examples



```
[ESC]C[LF][NUL]
[ESC]PC000;0200,0300,1,1,A,00,B=ABCD[LF][NUL]
[ESC]PC001;0200,0125,1,1,C,00,B[LF][NUL]
[ESC]PC002;0450,0550,2,2,G,33,B,+0000000001[LF][NUL]
[ESC]RC001;Sample[LF][NUL]
[ESC]RC002;001[LF][NUL]
[ESC]XS;l,0002,0002C3000[LF][NUL]
```



[ESC] C [LF] [NUL]

[ESC] PC001; 0200, 0300, 1, 1, C, 00, B=S001 [LF] [NUL]

[ESC] PV01; 0450, 0550, 0200, 0150, B, 33, B=001 [LF] [NUL]

[ESC] XB01; 0200, 0550, 3, 1, 03, 03, 08, 08, 03, 0, 0150=S001 [LF] [NUL]

[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]

5.6.3 OUTLINE FONT FORMAT COMMAND**[ESC] PV**

Function	Sets the format to indicate the position on the label, at which the outline font is to be printed and how it is to be printed.
Format	[ESC] PVaa; bbbb, cccc, dddd, eeee, f (, ghhh), ii, j (, Mk) (, lmmmmmmmmmm) (, Znn) (, Po) (= ppp ----- ppp) [LF] [NUL]
Term	<p>aa: Character string number 00 to 99</p> <p>bbbb: Print origin of X-coordinate of the character string Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the character string 4 or 5 digits (in 0.1 mm units)</p> <p>dddd: Character width 0020 to 0300 (in 0.1 mm units)</p> <p>eeee: Height of the character 0020 to 0300 (in 0.1 mm units)</p> <p>f: Type of font A: TEC FONT1 (Helvetica [bold]) B: TEC FONT1 (Helvetica [bold] proportional) F: Price font 2 (* Firmware V1.5 or greater) C, D, E, G, H, I, J: Reserved (If specified, it is processed as "B".)</p> <p>ghhh: Fine adjustment of character-to-character space (Omissible. If omitted, space is adjusted according to the designated font.) g: Designates whether to increase or decrease the character-to-character space. +: Increase -: Decrease</p> <p>hhh: No. of space dots between characters 000 to 099 (in dots)</p> <p>ii: Rotational angles of a character and character string 00: 0° (char.) 0° (char.-string) 11: 90° (char.) 90° (char.-string) 22: 180° (char.) 180° (char.-string) 33: 270° (char.) 270° (char.-string)</p>

j: Character attribution

- B: Black character
- W (aabb): Reverse character
 - aa: 01 to 99 (in units of dots)
 - bb: 01 to 99 (in units of dots)
- F (aabb): Reserved (If specified, it is processed as "B".)
 - aa: 01 to 99
 - bb: 01 to 99
- C (aa): Reserved (If specified, it is processed as "B".)
 - aa: 01 to 99

* Parenthesized descriptions are omissible. If "F" or "C" is specified, it is ignored.

If the parenthesized values for "W: Reverse character" are omitted, the characters are reversed. Thus, increasing the larger of the two black character width or height $\div 8$ dots.

Mk: Reserved area (Omissible)

- k: 0 to 2

Immmmmmmmm: Increment and decrement (Omissible)

- l: Designates whether to increment or decrement.
 - +: Increment
 - : Decrement
- mmmmmmmmmm: Skip value
 - 0000000000 to 9999999999

* If omitted, incrementing/decrementing is not performed.

Znn: Reserved area (Omissible)

- nn: 00 to 20

Po: Alignment (Omissible. If omitted, the alignment is set to the left.)

- o: Designates the character position.
 - 1: Left
 - 2: Center
 - 3: Right
- 4aaaa: Reserved (If specified, it is processed as "1".)
 - aaaa: 0050 to 1040

ppp-----ppp: Data string to be printed (Omissible)

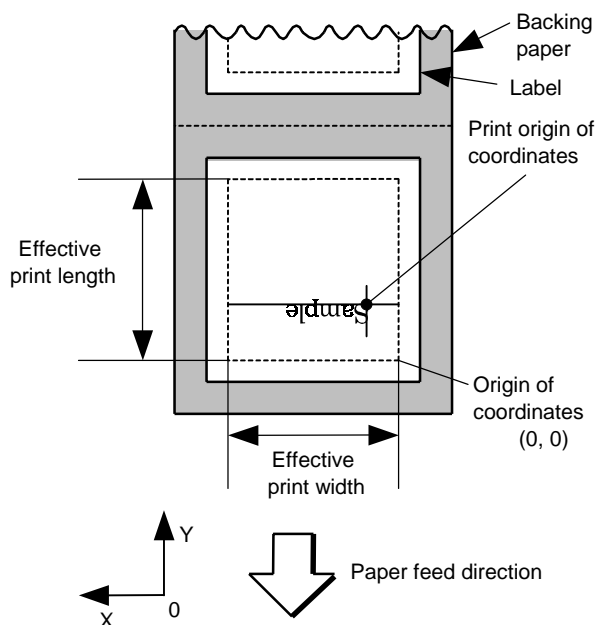
- Max. 100 digits

Explanation

(1) Character string number

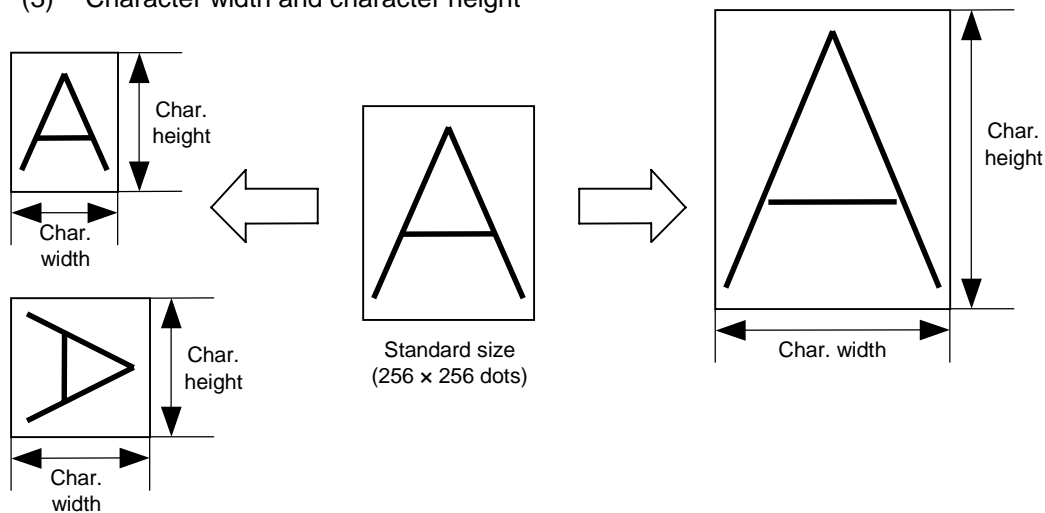
When drawing by the Data Command ([ESC] RV), the format designated by the character string number is selected.

(2) Print origin of coordinates



- The print origin of coordinates must be set so the character drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Character width and character height



(4) Type of font

A: TEC FONT1 (Helvetica [bold])

! " # \$ % & ' () * + , - . /
 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
 @ A B C D E F G H I J K L M N O
 ' a b c d e f g h i j k l m n o
 Ç ü é â ä à å ç ê ë è ì î ï Ä Å

B: TEC FONT1 (Helvetica [bold] proportional)

! " # \$ % & ' () * + , - . /
 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
 @ A B C D E F G H I J K L M N O
 ' a b c d e f g h i j k l m n o
 Ç ü é â ä à å ç ê ë è ì î ï Ä Å

When any value from 01 to 30 is specified, it is processed as "B: TEC FONT1".

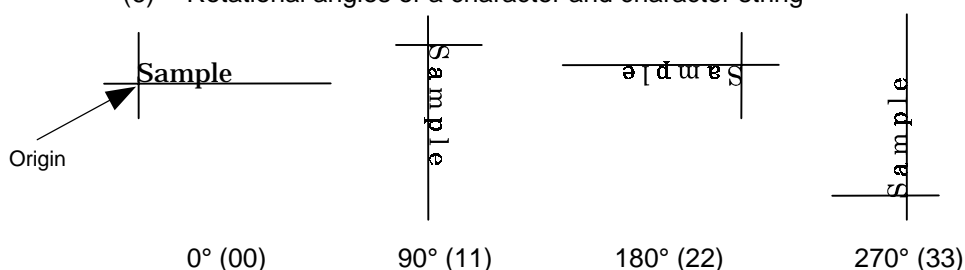
F: Price Font 2

\$ % , - . /
 0 1 2 3 4 5 6 7 8 9

(5) Fine adjustment of character-to-character space

If no character-to-character space is specified or the number of space dots between characters is 0, drawing will take place according to the horizontal spacing/proportional spacing determined for each character. If character-to-character space is specified, drawing will take place according to the value obtained by adding the character spacing/proportional spacing to the specified value.

(6) Rotational angles of a character and character string



(7) Selection of character attribution



If the print ratio of one line (the print head width) is higher than defined, printing may become poor, or the printer may be reset. When "B: Reverses the white/black dot pattern in the designated area" is selected for how to clear and the black dot pattern is increased, note the print ratio.

(8) Increment/decrement

Printing is performed while the data is incremented or decremented each time a label is issued. Where the data row exceeds the maximum number of digits (40), the data row will not be drawn.

Initial value	0000	0000	0000	0000	999999
INC/DEC	+10	+10	+10	+10	+1
1st label	0000	0000	└000	0000	999999
2nd label	0010	0010	└010	0010	└└└000
3rd label	0020	0020	└020	0020	└└└001
4th label	0030	0030	└030	0030	└└└002
5th label	0040	0040	└040	0040	└└└003

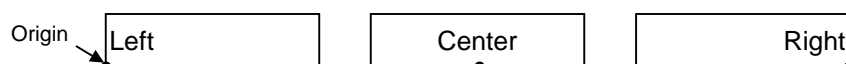
Letters and numerals for increment/decrement

For the data string, up to 40 digits (including letters, numerals, and symbols) are possible. Only the numerals are selected and calculated for incrementing/decrementing, and then are returned to the previous position to draw the data.

Example of increment/decrement calculation

Initial value	00000	A0A0A	7A8/9	A2A0A
INC/DEC	+1	+1	+3	-3
1st label	00000	A0A0A	7A8/9	A2A0A
2nd label	00001	A0A1A	7A9/2	A1A7A
3rd label	00002	A0A2A	7A9/5	A1A4A
4th label	00003	A0A3A	7A9/8	A1A1A
5th label	00004	A0A4A	8A0/1	A0A8A

(9) Alignment



(10) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol “=.” Up to 100 digits can be printed. When the number of digits exceeds the maximum value, the excess data will be discarded. For the character code table, refer to chapter 11 “CHARACTER CODE TABLE”.

(11) Reserved area (Omissible)

The value range of the reserved parameter is described in this specification. However, if values for the reserved parameters are specified, they are not checked.

Notes

- (1) Up to 32 fields for which incrementing/decrementing has been designated can be drawn. If the total bit map font, outline font, and bar code/two-dimensional code increment/decrement fields exceeds 32, drawing will take place without incrementing/decrementing any excess field. The field to be incremented or decremented is incremented or decremented until the Image Buffer Clear Command ([ESC] C) is transmitted.

[Examples]

- 1) Format Command (Increment character string No. 01 (+1))
- 2) Format Command (No incrementing for character string No. 02)
- 3) Format Command (Increment character string No. 03 (+2))
- 4) Image Buffer Clear Command
- 5) Data Command (Character string No. 01 “0001”)
- 6) Data Command (Character string No. 02 “AB-”)
- 7) Data Command (Character string No. 03 “0100”)
- 8) Issue Command (2 labels)

0001

AB-0100

0002

AB-0102

- 9) Issue Command (1 label)

0003

AB-0104

- 10) Image Buffer Clear Command

- 11) Data Command (Character string No. 02 “00000”)

- 12) Issue Command (1 label)

00000

- (2) The Outline Font Format Command may be connected to the Bit Map Font Format Command when transmitted.

[ESC] PC001; 0100, 0150, 1, 1, A, 00, B [LF]

C002; 0350, 0180, 1, 1, A, 00, B [LF]

C005; 0200, 0300, 25, 2, C, +05, 00, B, +0000000001 [LF]

V01; 0400, 0400, 0100, 0100, A, 00, B [LF] [NUL]

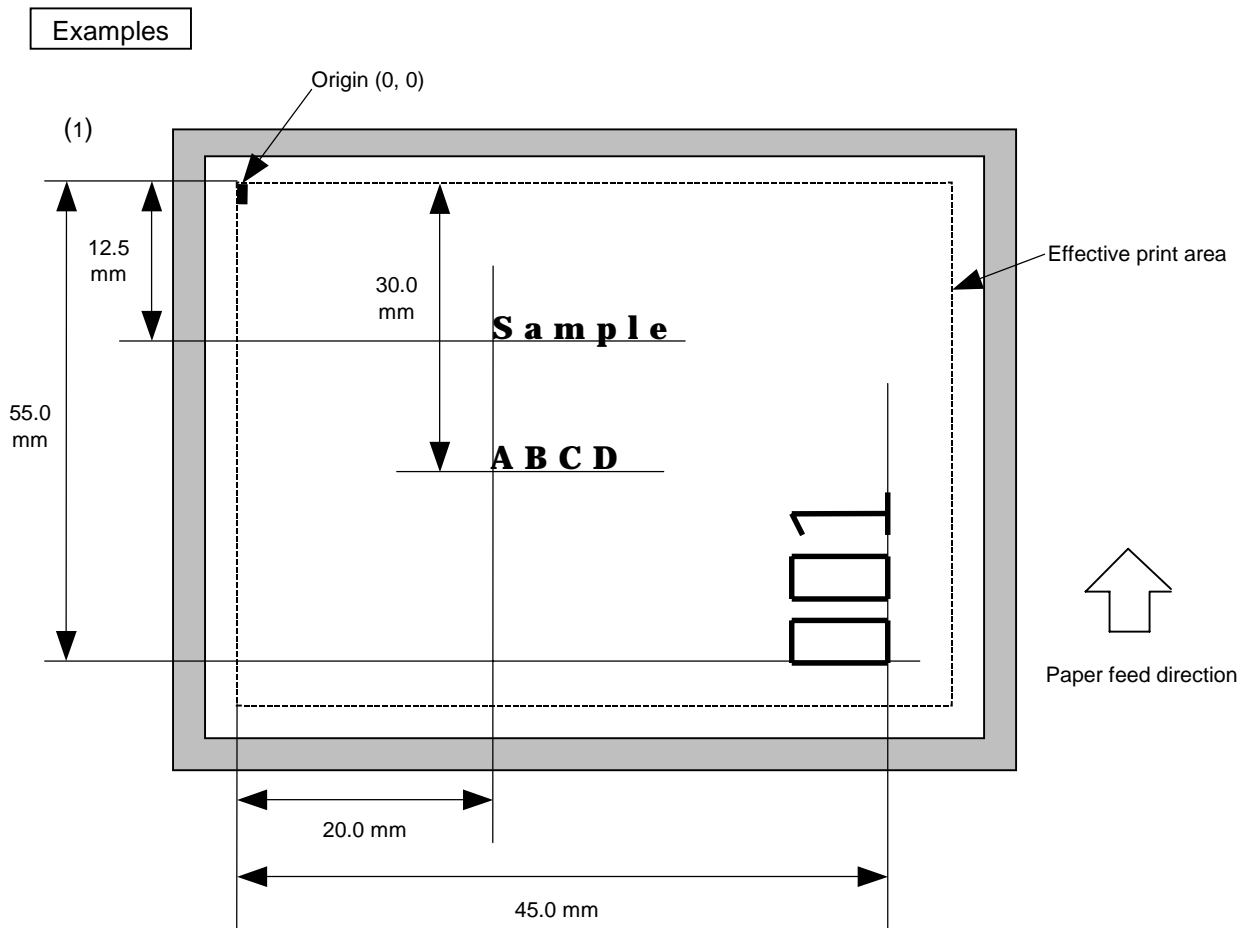
- (3) When the drawing data is changed per label issue during printing, the drawing data field for the previous label is automatically cleared using the character string number, then the next drawing data is printed. Therefore, the character string number which differs according to the drawing fields should be designated. Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same character string number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same character string number are automatically cleared until the Clear Command is sent.)
- (4) When characters overlap due to the character-to-character space fine adjustment, the outline font is not painted properly. Program the fine adjustment value so that characters will not overlap. Also, when drawings such as lines or characters are on the outline font drawing position, the outline font is not painted properly. The fine adjustment value should be set so that other drawings do not overlap the area in which the outline font is to be drawn.

Refer to

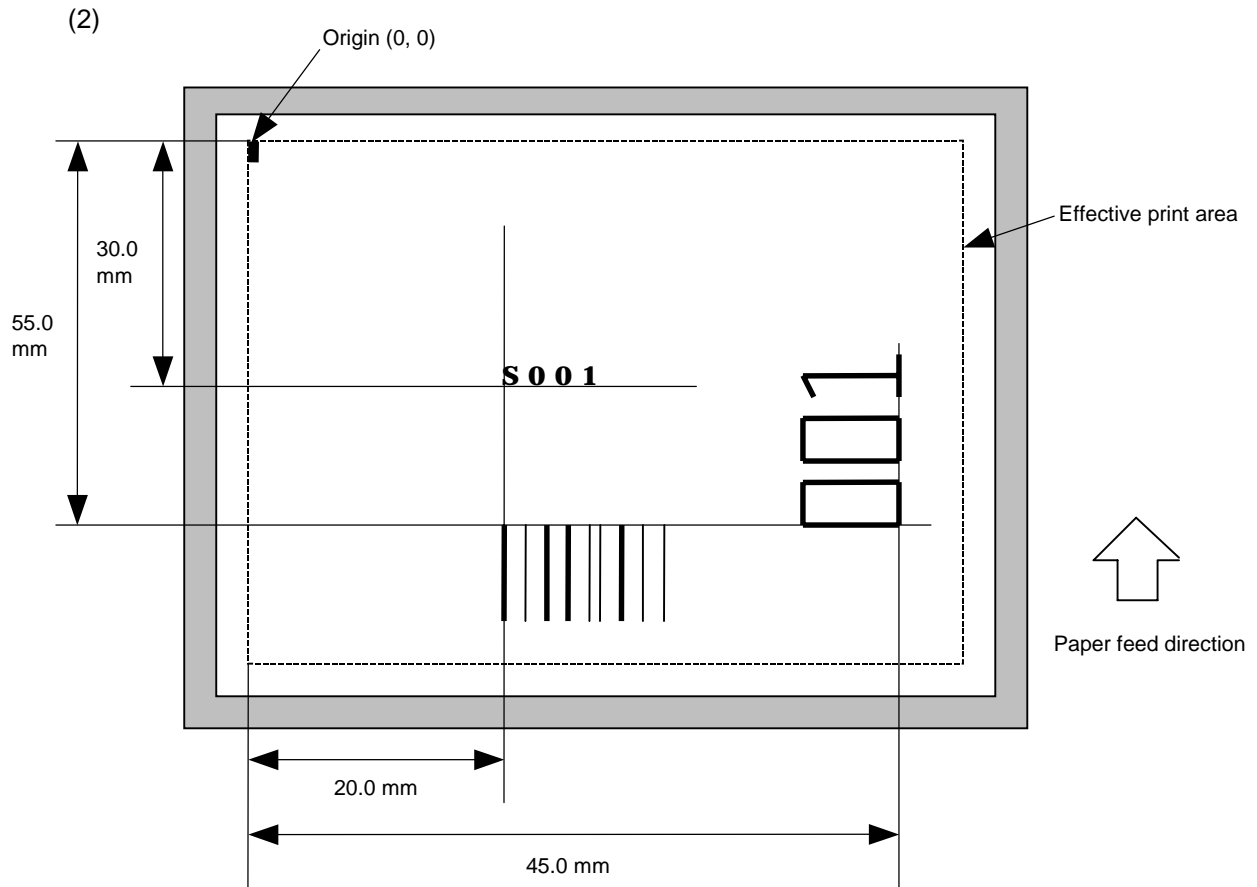
Outline Font Data Command ([ESC] RV)

Bit Map Font Format Command ([ESC] PC)

Bar Code/Two-dimensional Code Format Command ([ESC] XB)



```
[ESC]C[LF][NUL]
[ESC]PV00;0200,0300,0030,0030,B,00,B=ABCD[LF][NUL]
[ESC]PV01;0200,0125,0050,0050,B,00,B[LF][NUL]
[ESC]PV02;0450,0550,0150,0100,B,33,B,+0000000001[LF][NUL]
[ESC]RV01;Sample[LF][NUL]
[ESC]RV02;001[LF][NUL]
[ESC]XS;l,0002,0002C3000[LF][NUL]
```



```
[ESC]C[LF][NUL]
[ESC]PC001;0200,0300,1,1,C,00,B=S001[LF][NUL]
[ESC]PV01;0450,0550,0200,0150,B,33,B=001[LF][NUL]
[ESC]XB01;0200,0550,3,1,02,02,06,06,02,0,0150=S001[LF][NUL]
[ESC]XS;I,0002,0002C3000[LF][NUL]
```

5.6.4 BAR CODE FORMAT COMMAND (WPC, CODE128, EAN128, Customer Bar Code)**[ESC] XB**

Function	Sets the format to indicate the position on the label, at which the bar code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, e, ff, g, hhhh (, ijijijijij, kkk, l, mm) (= nnn ----- nnn) [LF] [NUL]
Term	<p>aa: Bar code number 00 to 31</p> <p>bbbb: Print origin of X-coordinate of the bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the bar code 4 or 5 digits (in 0.1 mm units)</p> <p>d: Type of bar code 0: JAN8, EAN8 5: JAN13, EAN13 6: UPC-E 7: EAN-13 + 2digits (*Firmware V1.5 or greater) 8: EAN-13 + 5digits (*Firmware V1.5 or greater) 9: CODE128 (with auto code selection) A: CODE128 (without auto code selection) G: UPC-E + 2 digits (*Firmware V1.5 or greater) H: UPC-E + 5 digits (*Firmware V1.5 or greater) I: EAN-8 + 2 digits (*Firmware V1.5 or greater) J: EAN-8 + 5 digits (*Firmware V1.5 or greater) K: UPC-A L: UPC-A + 2 digits (*Firmware V1.5 or greater) M: UPC-A + 5 digits (*Firmware V1.5 or greater) N: EAN128 R: Customer bar code (Postal code for Japan) S: Highest priority customer bar code (Postal code for Japan)</p> <p>e: Type of check digit 3: Check digit auto attachment WPC Modulus 10 CODE128 PSEUDO 103 EAN128 PSEUDO 103 Customer code Special check digit</p> <p>ff: 1-module width 01 to 15 (in dots)</p> <p>g: Rotational angle of bar code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>hhhh: Height of the bar code 0000 to 0350 (in 0.1 mm units) For the Customer bar code, the height of the long bar is specified.</p>

ijjjjjjjjj: Increment/decrement (Omissible)

- i: Indicates whether to increment or decrement
 - +: Increment
 - : Decrement

jjjjjjjjjj: Skip value
0000000000 to 9999999999

* If omitted, incrementing/decrementing is not performed.

kkk: Length of WPC guard bar
(Omissible. If omitted, the guard bar is not attached.)
000 to 100 (in 0.1 mm units)

l: Selection of print or non-print of numerals under bars
(Omissible. If omitted, the numerals under the bars are not printed.)
0: Non-print
1: Print

mm: Reserved (Omissible)
00 to 20

nnn ----- nnn: Data string to be printed (Omissible)
Max. 100 digits. However, it varies depending on the type of bar code.

* Omissible parameters (such as "Increment/decrement" and "Selection of print or non-print of numerals under bars") cannot be set when the customer bar code is selected.

* WPC is the generic name for bar codes of JAN, EAN and UPC.

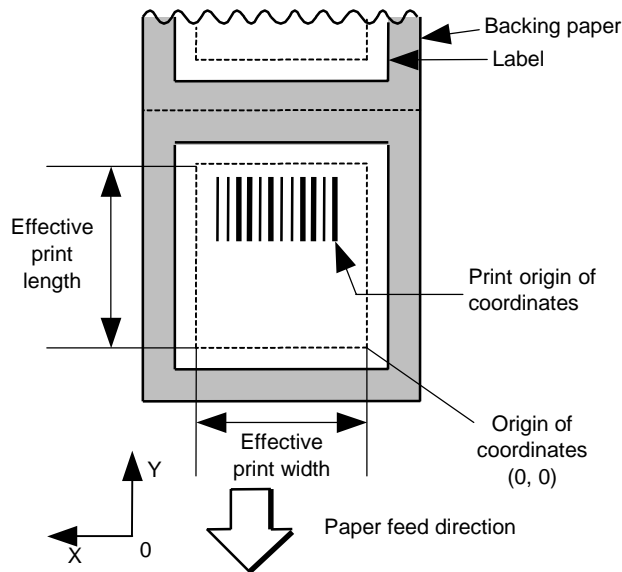
* In the above descriptions, "customer bar code" includes the highest priority customer bar code.

Explanation

(1) Bar code number

When drawing by the Data Command ([ESC] RB), the format designated by the bar code is selected.

(2) Print origin of coordinates



The print origin of coordinates must be set so that the bar code drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Type of bar code

0: JAN8, EAN8



5: JAN13, EAN13



6: UPC-E



7: EAN-13 + 2 digits



8: EAN-13 + 5 digits



9: CODE128



G: UPC-E + 2 digits



H: UPC-E + 5 digits



I: EAN-8 + 2 digits

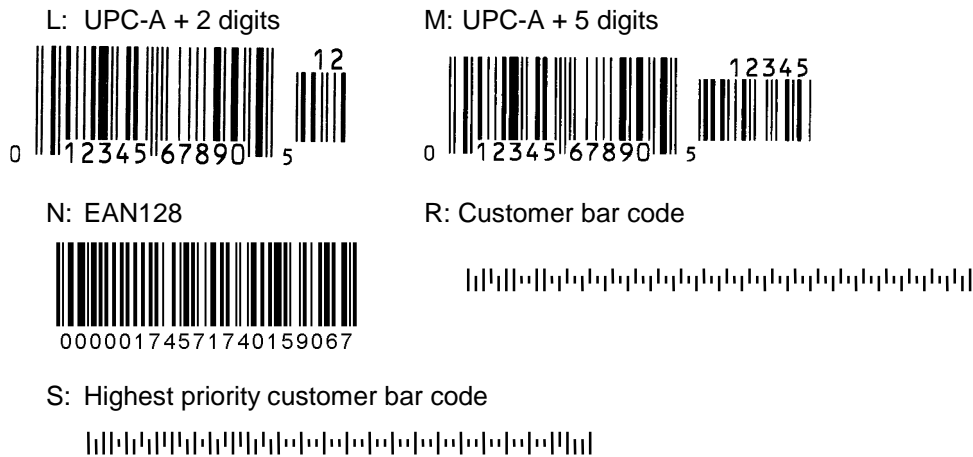


J: EAN-8 + 5 digits



K: UPC-A





(4) Bar width, space width, and character-to-character space

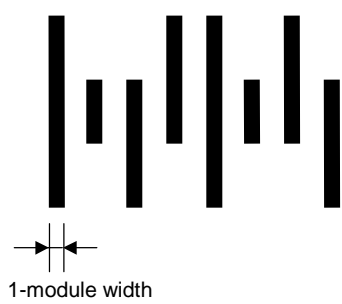
Designate the bar, space, and character-to-character space widths according to the type of bar code. Note that the designated proper value differs according to the rotational angle of bar code, type, number of digits, print speed, paper used, etc. Examples of such designations are listed below. (1 dot = 1/8 mm)

In the case of JAN, EAN, UPC, CODE128, EAN128, a 2- to 4-module width is automatically calculated, when a 1-module width is designated.

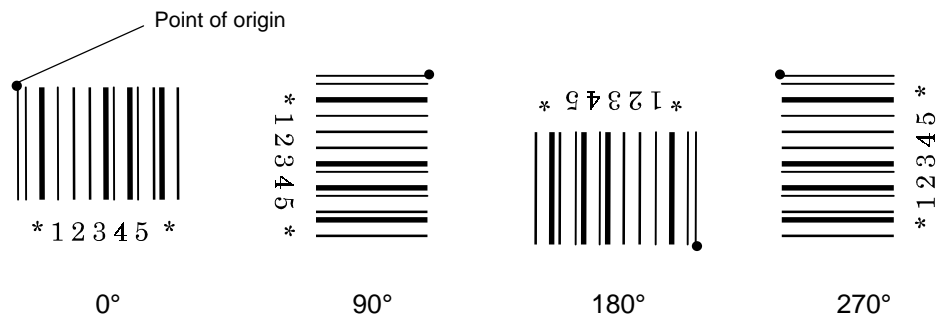
[Example of setting]

Type of bar code	1 module		2 modules		3 modules		4 modules	
	Bar	Space	Bar	Space	Bar	Space	Bar	Space
JAN, EAN, UPC	3		6		9		12	
CODE128, EAN128	2		4		6		8	

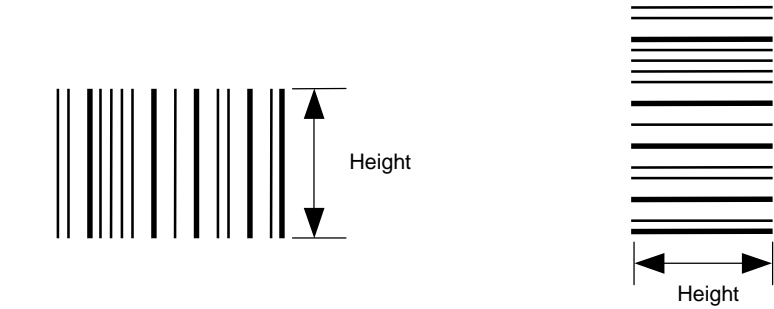
In the case of the customer bar code



(5) Rotational angle of bar code



(6) Bar code height

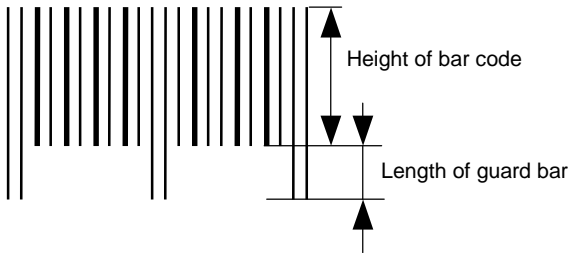


[Postal code]



(7) Length of guard bar

The length of guard bar is valid only when the type of bar code is WPC.
It is ignored in all other cases.



(8) Numerals under bars

Numerals are/are not provided under bars according to the parameter for print/non print of numerals under bars. The contents of numerals under bars to be printed vary according to the type of bar code. The character set of numerals under bars is the standard character. Such numerals are enlarged or reduced only horizontally according to the width of the bar code. They are drawn vertically in the fixed one magnification.

[Drawing positions of numerals under bars]

① In the case of JAN and EAN

(Example) JAN8, EAN8



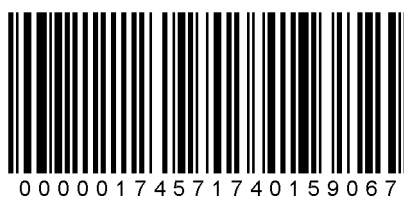
② In the case of UPC

(Example) UPC-E



③ In the case of bar codes other than JAN, EAN, and UPC

(Example) EAN128



(9) Increment/decrement

Printing is performed while the data is incremented or decremented every time a label is issued. Where the data row exceeds the maximum number of digits (40), the data row will not be drawn.

When CODE128 (without auto code selection) is used, the number of the start code (code A, code B, and code C) digits is regarded as 2.

Initial value	0000	0000	0000	0000	999999
INC/DEC	+10	+10	+10	+10	+1
1st label	0000	0000	└000	0000	999999
2nd label	0010	0010	└010	0010	└└└000
3rd label	0020	0020	└020	0020	└└└001
4th label	0030	0030	└030	0030	└└└002
5th label	0040	0040	└040	0040	└└└003

Letters and numerals for increment/decrement

For CODE128, if a data string other than numerals are included in the data, increment/decrement is performed. If any code which does not exist in each bar code table is contained in the data, increment/decrement is not performed.

Up to 40 digits (including letters, numerals, and symbols) are possible. Only the numerals are selected and calculated for incrementing/decrementing, and then are returned to the previous position to draw the data.

Example of increment/decrement calculation

Initial value	00000	A0A0A	7A8/9	A2A0A
INC/DEC	+1	+1	+3	-3
1st label	00000	A0A0A	7A8/9	A2A0A
2nd label	00001	A0A1A	7A9/2	A1A7A
3rd label	00002	A0A2A	7A9/5	A1A4A
4th label	00003	A0A3A	7A9/8	A1A1A
5th label	00004	A0A4A	8A0/1	A0A8A

Example of increment/decrement of data including the special codes of CODE128

Increment/decrement calculation starts from the last digit in the data strings. When the data string to be calculated is numeric, and the next (upper) digit is ">", the data is a special code (shown with underline below). The next digit is calculated without incrementing/decrementing these two digits.

Example of increment/decrement calculation of CODE128

Initial value	00000	00> <u>08</u>	0A> <u>08</u>	0A9> <u>08</u>
INC/DEC	+1	+1	+1	+1
1st label	00000	00> <u>08</u>	0A> <u>08</u>	0A9> <u>08</u>
2nd label	00001	00> <u>09</u>	0A> <u>09</u>	0A9> <u>09</u>
3rd label	00002	01> <u>00</u>	1A> <u>00</u>	1A0> <u>00</u>
4th label	00003	01> <u>01</u>	1A> <u>01</u>	1A0> <u>01</u>
5th label	00004	01> <u>02</u>	1A> <u>02</u>	1A0> <u>02</u>

(10) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol "=". The maximum number of digits to be printed varies according to the types of bar codes. For codes, refer to chapter 12 "BAR CODE/TWO-DIMENSIONAL CODE TABLE".

Notes

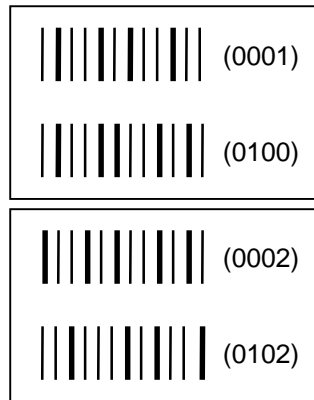
- (1) The check digit attachment and increment/decrement processes are performed according to the following priority. If any of the conditions is improper, no drawing will take place.

Increment/decrement > Attachment of check digit

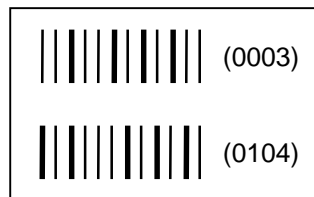
- (2) Up to 32 fields for which incrementing/decrementing has been designated can be drawn. If the total bit map font, outline font, and bar code increment/decrement fields exceeds 32, drawing will take place without incrementing/decrementing any excess field. The field to be incremented or decremented is incremented or decremented until the Image Buffer Clear Command ([ESC] C) is transmitted.

[Example]

- ① Format Command (Increment bar code No. 01 (+1))
- ② Format Command (Increment bar code No. 02 (+2))
- ③ Image Buffer Clear Command
- ④ Data Command (Bar code No. 01 "0001")
- ⑤ Data Command (Bar code No. 02 "0100")
- ⑥ Issue Command (2 labels)



- ⑦ Issue Command (1 label)



- ⑧ Image Buffer Clear Command
- ⑨ Data Command (Bar code No. 02 "3000")
- ⑩ Issue Command (1 label)



- (3) More than one Bar Code Format Command can be connected when transmitted.

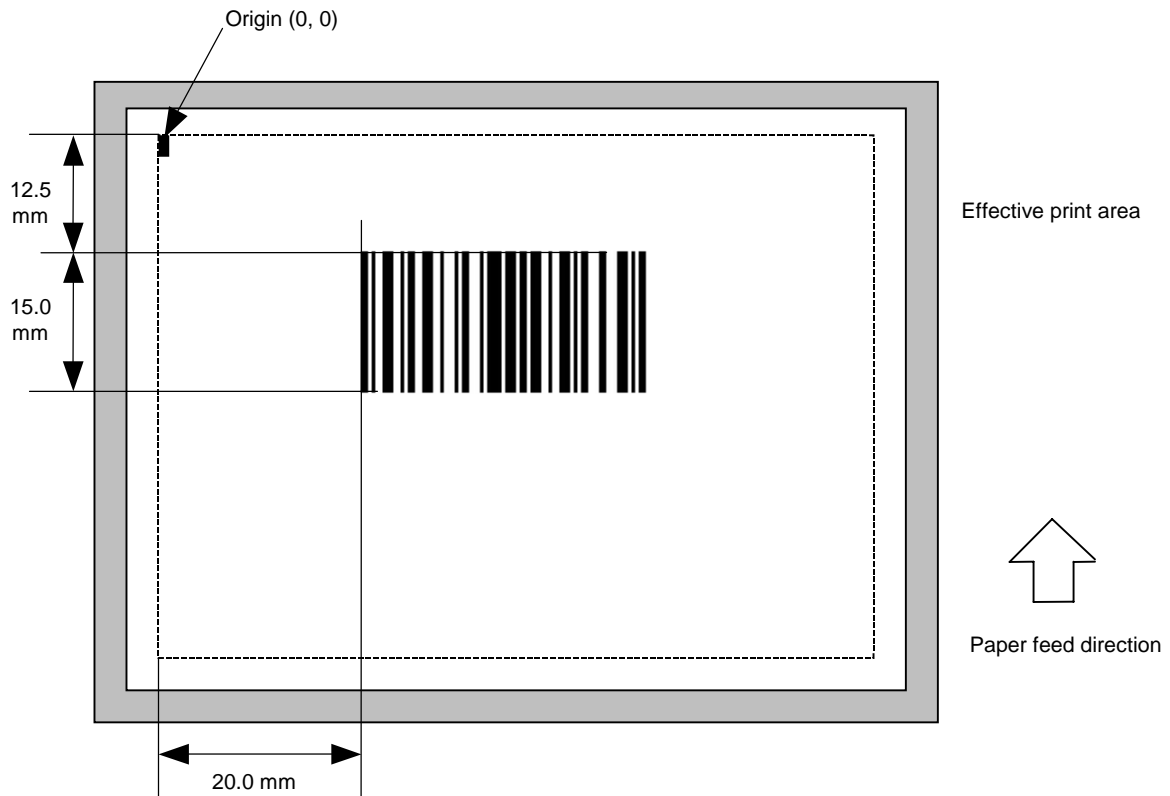
```
[ESC] XB01; 0100, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF]
      B02; 0350, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF] [NUL]
```

- (4) When the drawing data is changed per label issue during printing, the field of the drawing data for the previous label is automatically cleared using the bar code number, then the next drawing data is printed. Therefore, the bar code number which differs according to the drawing fields should be designated.
- (5) Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same bar code number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same bar code number are automatically cleared until the Clear Command is sent.)

Refer to

Bit Map Font Format Command ([ESC] PC)
 Outline Font Format Command ([ESC] PV)
 Bar Code/Two-dimensional Code Data Command ([ESC] RB)

Examples



```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, 9, 3, 02, 0, 0150=12345 [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```

5.6.5 BAR CODE FORMAT COMMAND (MSI, ITF, CODE39, NW7) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the bar code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, e, ff, gg, hh, ii, jj, k, llll (, mnnnnnnnnnn, o, pp) (, q) (= rrr ----- rrr) [LF] [NUL]
Term	<p>aa: Bar code number 00 to 31</p> <p>bbbb: Print origin of X-coordinate of the bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the bar code 4 or 5 digits (in 0.1 mm units)</p> <p>d: Type of bar code 1: MSI 2: Interleaved 2 of 5 (ITF) 3: CODE39 (Standard) 4: NW7</p> <p>e: Type of check digit 1: Without attaching check digit</p> <p>ff: Narrow bar width 01 to 99 (in dots)</p> <p>gg: Narrow space width 01 to 99 (in dots)</p> <p>hh: Wide bar width 01 to 99 (in dots)</p> <p>ii: Wide space width 01 to 99 (in dots)</p> <p>jj: Character-to-character space width 01 to 99 (in dots) * For MSI and ITF: 00</p> <p>k: Rotational angle of bar code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>llll: Height of the bar code 0000 to 0350 (in 0.1 mm units)</p> <p>mnnnnnnnnnn: Increment/decrement (Omissible) m: Indicates whether to increment or decrement +: Increment -: Decrement</p> <p>nnnnnnnnnn: Skip value 0000000000 to 9999999999 * If omitted, incrementing/decrementing is not performed.</p>

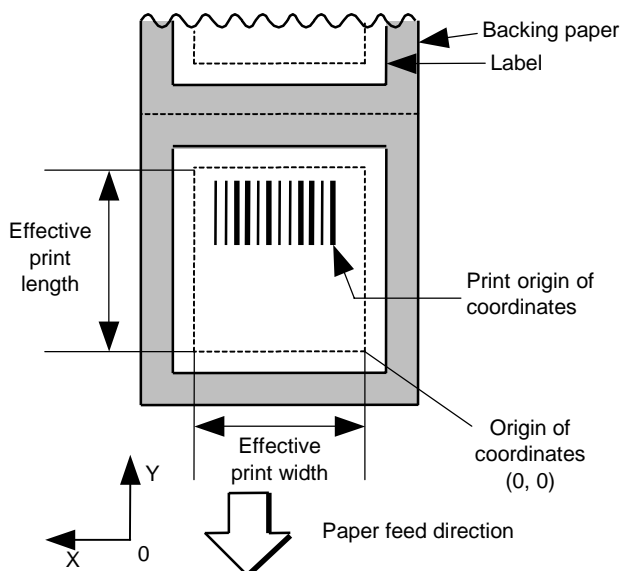
- o: Selection of print or non-print of numerals under bars
(Omissible. If omitted, the numerals under the bars are not printed.)
0: Non-print
1: Print
- pp: Reserved area (Omissible)
00 to 20
- q: Designates the attachment of start/stop code (Omissible)
T, P, N, Omitted: Attached to Code39, not attached to NW7
- rrr-----rrr: Data string to be printed (Omissible)
Max. 100 digits. However, the number of digits varies depending on the type of bar code.

Explanation

(1) Bar code number

When drawing by the Data Command ([ESC] RB), the format designated by the bar code is selected.

(2) Print origin of coordinates



The print origin of coordinates must be set so that the bar code drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Type of bar code

1: MSI



2: Interleaved 2 of 5



3: CODE39 (Standard)



4: NW7



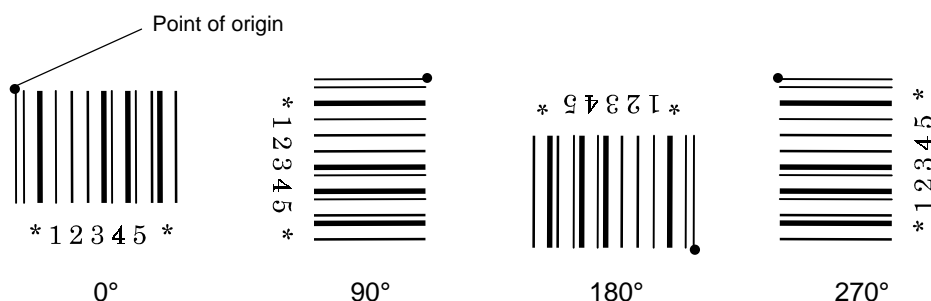
(4) Bar width, space width, and character-to-character space

Designate the bar, space, and character-to-character space widths according to the type of bar code. Note that the designated proper value differs according to the rotational angle of bar code, type, number of digits, print speed, paper used, etc. Examples of such designations are listed below. (1 dot = 1/8 mm)

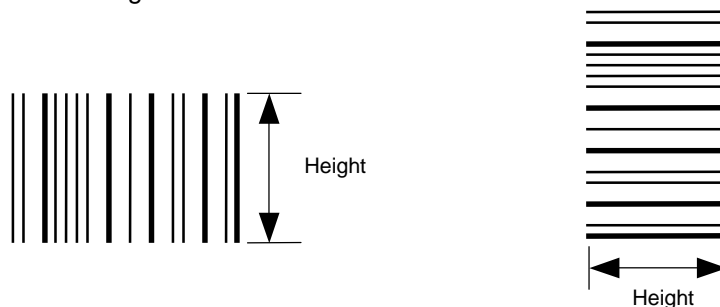
[Example of setting]

Type of bar code	Narrow		Wide		Character-to-character space
	Bar	Space	Bar	Space	
MSI	2	2	6	6	0
ITF	2	2	6	6	0
CODE39	2	2	6	6	2
NW7	2	2	6	6	2

(5) Rotational angle of bar code



(6) Bar code height



(7) Numerals under bars

Numerals are/are not provided under bars according to the parameter for print/non print of numerals under bars. The contents of numerals under bars to be printed vary according to the type of bar code. The character set of numerals under bars is the standard character. Such numerals are enlarged or reduced only horizontally according to the width of the bar code. They are drawn vertically in the fixed one magnification.

[Drawing positions of numerals under bars]

In the case of CODE39



(8) Increment/decrement

Printing is performed while the data is incremented or decremented every time a label is issued. Where the data row exceeds the maximum number of digits (40), the data row will not be drawn.

Initial value	0000	0000	0000	0000	999999
INC/DEC	+10	+10	+10	+10	+1
1st label	0000	0000	└000	0000	999999
2nd label	0010	0010	└010	0010	└└└000
3rd label	0020	0020	└020	0020	└└└001
4th label	0030	0030	└030	0030	└└└002
5th label	0040	0040	└040	0040	└└└003

Letters and numerals for increment/decrement

For CODE39 (Standard) and NW-7, if a data string other than numerals are included in the data, increment/decrement is performed. If any code which does not exist in each bar code table is contained in the data, increment/decrement is not performed.

Up to 40 digits (including letters, numerals, and symbols) are possible. Only the numerals are selected and calculated for incrementing/decrementing, and then are returned to the previous position to draw the data.

Example of increment/decrement calculation

Initial value	00000	A0A0A	7A8/9	A2A0A
INC/DEC	+1	+1	+3	-3
1st label	00000	A0A0A	7A8/9	A2A0A
2nd label	00001	A0A1A	7A9/2	A1A7A
3rd label	00002	A0A2A	7A9/5	A1A4A
4th label	00003	A0A3A	7A9/8	A1A1A
5th label	00004	A0A4A	8A0/1	A0A8A

(9) Start/stop code

[CDOE39]

The top and the bottom characters of data are checked, and “*” will be automatically attached if the characters are not “*”. When the host sends data with “*” attached as the start/stop codes, the bar code will be drawn with “*”.

[NW7]

As the start and stop codes are not attached automatically, they should be attached if necessary. When the data is sent without start and stop codes, the bar code will be drawn without the codes.

(10) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol “=.” The maximum number of digits to be printed varies according to the types of bar codes. For codes, refer to chapter 12 “BAR CODE/TWO-DIMENSIONAL CODE TABLE”.

Notes

- (1) Up to 32 fields for which incrementing/decrementing has been designated can be drawn. If the total bit map font, outline font, and bar code increment/decrement fields exceeds 32, drawing will take place without incrementing/decrementing any excess field. The field to be incremented or decremented is incremented or decremented until the Image Buffer Clear Command ([ESC] C) is transmitted.

[Example]

- ① Format Command (Increment bar code No. 01 (+1))
- ② Format Command (Increment bar code No. 02 (+2))
- ③ Image Buffer Clear Command
- ④ Data Command (Bar code No. 01 "0001")
- ⑤ Data Command (Bar code No. 02 "0100")
- ⑥ Issue Command (2 labels)



- ⑦ Issue Command (1 label)



- ⑧ Image Buffer Clear Command
- ⑨ Data Command (Bar code No. 02 "3000")
- ⑩ Issue Command (1 label)



- (2) More than one Bar Code Format Command can be connected when transmitted.

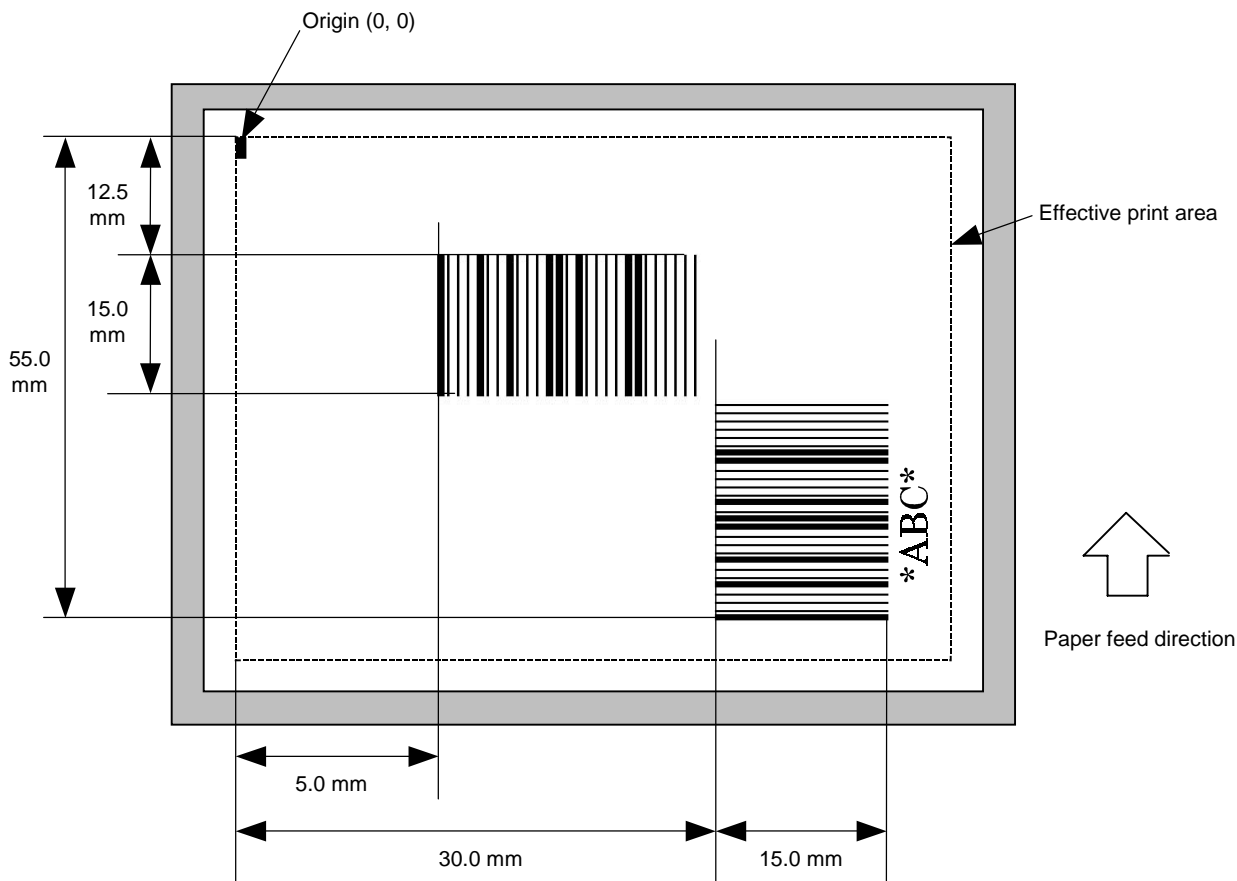
```
[ESC] XB01; 0100,0150,3,1,02,02,06,06,02,0,0150[LF]
      B02; 0350,0150,3,1,02,02,06,06,02,0,0150[LF][NUL]
```

- (3) When the drawing data is changed per label issue during printing, the field of the drawing data for the previous label is automatically cleared using the bar code number, then the next drawing data is printed. Therefore, the bar code number which differs according to the drawing fields should be designated.
- (4) Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same bar code number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same bar code number are automatically cleared until the Clear Command is sent.)

Refer to

Bit Map Font Format Command ([ESC] PC)
 Outline Font Format Command ([ESC] PV)
 Bar Code/Two-dimensional Code Data Command ([ESC] RB)

Examples



```
[ESC]C[LF][NUL]
[ESC]XB01;0050,0125,3,1,02,02,06,06,02,0,0150=12345[LF][NUL]
[ESC]XB02;0300,0550,3,1,02,03,06,07,03,3,0150,+0000000000,1,00,N[LF][NUL]
[ESC]RB02;*ABC*[LF][NUL]
[ESC]XS;I,0002,0002C3000[LF][NUL]
```

5.6.6 BAR CODE FORMAT COMMAND (RSS (Reduced Space Symbology)) [ESC] XB (Firmware V1.2 or greater)

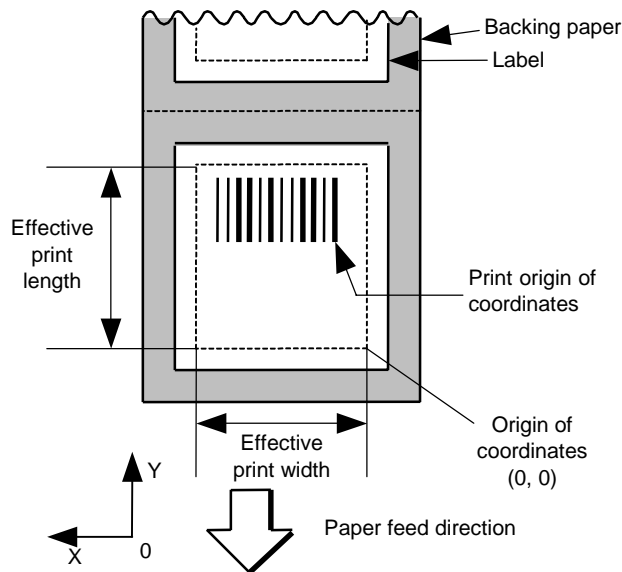
Function	Sets the format to indicate the position on the label, at which the bar code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, e, ff, g, hhhh (, ijxxxxxxxx, kk) (= III ----- III) [LF] [NUL]
Term	<p>aa: Bar code number 00 to 31</p> <p>bbbb: Print origin of X-coordinate of the bar code Fixed to 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the bar code 4 or 5 digits (in 0.1 mm units)</p> <p>d: Type of bar code b: RSS family</p> <p>e: Version (Detailed types) 1: RSS-14 2: RSS-14 Stacked 3: RSS-14 Stacked Omnidirectional 4: RSS Limited 5: RSS Expanded</p> <p>ff: 1-module width 01 to 15 (in dots)</p> <p>g: Rotational angle of bar code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>hhhh: Height of the bar code 0000 to 0350 (in 0.1 mm units)</p> <p>ijxxxxxxxx: Increment/decrement (Omissible) i: Indicates whether to increment or decrement +: Increment -: Decrement j: Skip value 0000000000 to 9999999999 * If omitted, incrementing/decrementing is not performed.</p> <p>kk: Reserved area (Omissible) 00 to 20</p> <p>III-----III: Data string to be printed (Omissible) Max. 70 digits. However, the number of digits varies depending on the bar code version.</p>

Explanation

(1) Bar code number

When drawing by the Data Command ([ESC] RB), the format designated by the bar code is selected.

(2) Print origin of coordinates



The print origin of coordinates must be set so that the bar code drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Type of bar code (Detailed version types)

1: RSS-14



2: RSS-14 Stacked



3: RSS-14 Stacked Omnidirectional



4: RSS Limited



5: RSS Expanded



(4) Bar width, space width, and character-to-character space

Designate the bar, space, and character-to-character space widths according to the type of bar code. Note that the designated proper value differs according to the rotational angle of bar code, type, number of digits, print speed, paper used, etc. Examples of such designations are listed below. (1 dot = 1/8 mm)

[Example of setting]

1 module		2 module		3 module		4 module	
Bar	Space	Bar	Space	Bar	Space	Bar	Space
2		4		6		8	
3		6		9		12	

(5) Rotational angle of bar code

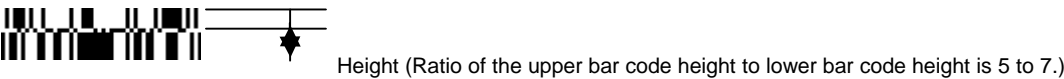


(6) Bar code height

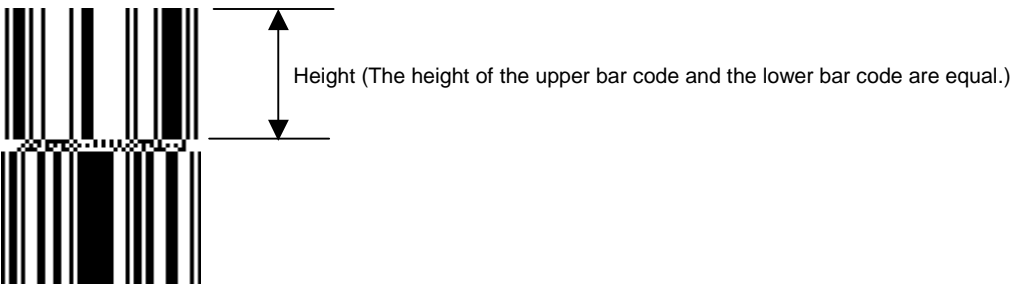
[RSS-14]



[RSS-14 Stacked]



[RSS-14 Stacked omnidirectional]



[RSS-14 Limited]





When the bar code height is set to "0000", the bar code including guard bars and number under bar are not printed.

(7) Increment/decrement

Printing is performed while the data is incremented or decremented every time a label is issued. Where the data row exceeds the maximum number of digits (40), the data row will not be drawn.

Initial value	0000	0000	0000	0000	999999
INC/DEC	+10	+10	+10	+10	+1
1st label	0000	0000	└000	0000	999999
2nd label	0010	0010	└010	0010	└└└000
3rd label	0020	0020	└020	0020	└└└001
4th label	0030	0030	└030	0030	└└└002
5th label	0040	0040	└040	0040	└└└003

Letters and numerals for increment/decrement

Up to 40 digits (including letters, numerals, and symbols) are possible. Only the numerals are selected and calculated for incrementing/decrementing, and then are returned to the previous position to draw the data.

Example of increment/decrement calculation

Initial value	00000	A0A0A	7A8/9	A2A0A
INC/DEC	+1	+1	+3	-3
1st label	00000	A0A0A	7A8/9	A2A0A
2nd label	00001	A0A1A	7A9/2	A1A7A
3rd label	00002	A0A2A	7A9/5	A1A4A
4th label	00003	A0A3A	7A9/8	A1A1A
5th label	00004	A0A4A	8A0/1	A0A8A

(8) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol "=". The maximum number of digits to be printed varies according to the types of bar codes. For codes, refer to chapter 12 "BAR CODE/TWO-DIMENSIONAL CODE TABLE".

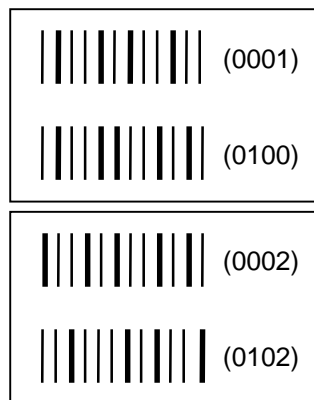
RSS-14:	Fixed to 13 digits
RSS-14 Stacked:	Fixed to 13 digits
RSS-14 Stacked Omnidirectional:	Fixed to 13 digits
RSS Limited:	Fixed to 13 digits
RSS Expanded:	Max. 70 digits

Notes

- (1) Up to 32 fields for which incrementing/decrementing has been designated can be drawn. If the total bit map font, outline font, and bar code increment/decrement fields exceeds 32, drawing will take place without incrementing/decrementing any excess field. The field to be incremented or decremented is incremented or decremented until the Image Buffer Clear Command ([ESC] C) is transmitted.

[Example]

- ① Format Command (Increment bar code No. 01 (+1))
- ② Format Command (Increment bar code No. 02 (+2))
- ③ Image Buffer Clear Command
- ④ Data Command (Bar code No. 01 "0001")
- ⑤ Data Command (Bar code No. 02 "0100")
- ⑥ Issue Command (2 labels)



- ⑦ Issue Command (1 label)



- ⑧ Image Buffer Clear Command
- ⑨ Data Command (Bar code No. 02 "3000")
- ⑩ Issue Command (1 label)



- (2) More than one Bar Code Format Command can be connected when transmitted.

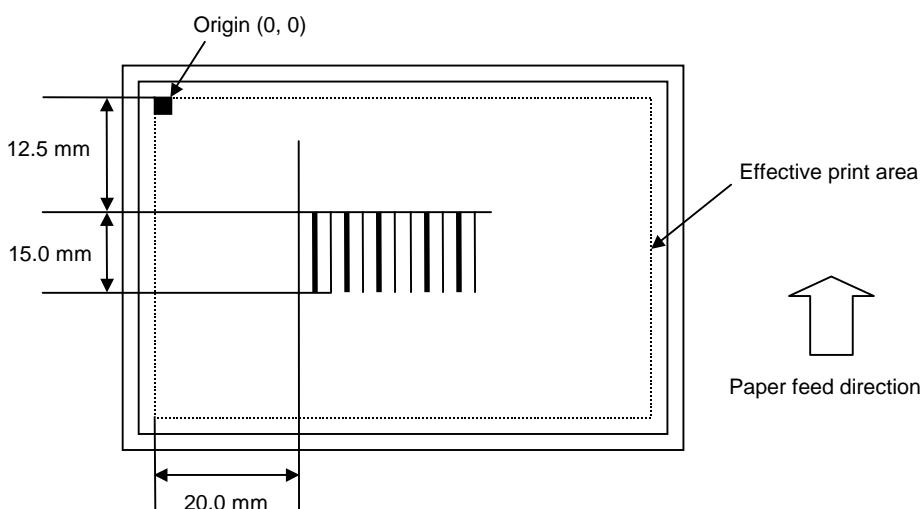
[ESC] XB01; 0100, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF]
 B02; 0350, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF] [NUL]

- (3) When the drawing data is changed per label issue during printing, the field of the drawing data for the previous label is automatically cleared using the bar code number, then the next drawing data is printed. Therefore, the bar code number which differs according to the drawing fields should be designated.
- (4) Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same bar code number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same bar code number are automatically cleared until the Clear Command is sent.)

Refer to

Bit Map Font Format Command ([ESC] PC)
 Outline Font Format Command ([ESC] PV)
 Bar Code/Two-dimensional Code Data Command ([ESC] RB)

Examples



```
[ESC]C[LF][NUL]
```

```
[ESC]XB01;0200,0125,b,1,02,0,0150=1234567890123[LF][NUL]
```

```
[ESC]XS;l,0002,0002C3000[LF][NUL]
```

5.6.7 TWO-DIMENSIONAL CODE FORMAT COMMAND (Data Matrix) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, ee, ff, gg, h (, Ciiijj) (, Jkklmmnnn) (= ooo ----- ooo) [LF] [NUL]
Term	<p>aa: Two-dimensional code number 00 to 31</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code 4 or 5 digits (in 0.1 mm units)</p> <p>d: Type of two-dimensional code Q: Data Matrix</p> <p>ee: ECC type 00: ECC000 01: ECC050 04: ECC050 05: ECC050 06: ECC080 07: ECC080 08: ECC080 09: ECC100 10: ECC100 11: ECC140 12: ECC140 13: ECC140 14: ECC140 20: ECC200</p> <p>ff: 1-cell width 00 to 99 (in dots)</p> <p>gg: Format ID 01: Format ID 1 02: Format ID 2 03: Format ID 3 04: Format ID 4 05: Format ID 5 06: Format ID 6</p>

* When ECC200 is designated as ECC type, the format ID designation is ignored. When format ID of 11 through 16 is designated, the selection of ECC200 is compulsory (to maintain compatibility with the conventional models).

h: Rotational angle of two-dimensional code

- 0: 0°
- 1: 90°
- 2: 180°
- 3: 270°

Ciiijjj: No. of cells

(Omissible. If omitted, it is automatically set.)

iii: No. of cells in the X direction 000 to 144

jjj: No. of cells in the Y direction 000 to 144

* Cell setting varies according to the ECC type.

	ECC000 to ECC140	ECC200
No. of cells to be designated	Odd numbers only	Even numbers only
Min./Max. No. of cells	9 × 9 to 49 × 49	10 × 10 to 144 × 144
Rectangular code	None	18 × 8 32 × 8 26 × 12 36 × 12 36 × 16 48 × 16

- When this parameter is omitted, the number of cells is automatically set. Also, when any data other than the above values are designated for the number of cells in the X and Y directions, the number of cells are automatically set.

Jkkllmmnnn: Connection setting

(Omissible. No connection if this parameter is omitted.)

kk: Code number 01 to 16

ll: No. of divided codes 02 to 16

mmm: ID number 1 001 to 254

nnn: ID number 2 001 to 254

ooo ----- ooo: Data string to be printed (Omissible)

Max. 2000 digits.

* The maximum of 2000 digits of data string to be printed and the maximum of 99 dots of the 1-cell width are acceptable. (The maximum number of digits of the data string to be printed differs depending on the ECC level and the contents of data.) However, note the following limits:

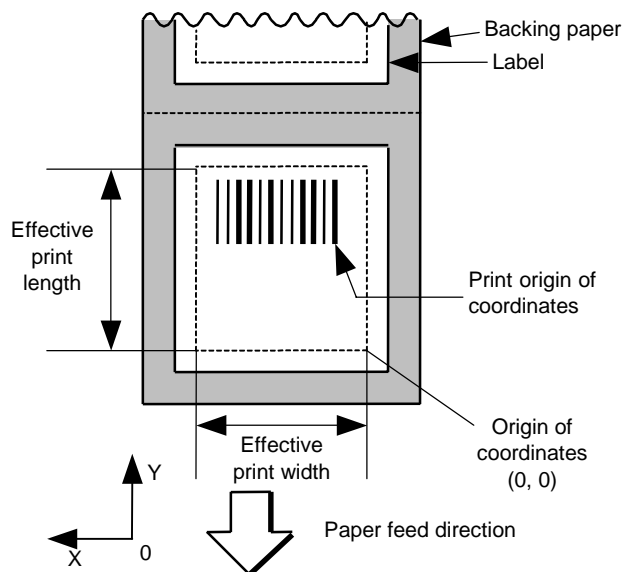
- The maximum of 2000-digit data string to be printed are acceptable. However, it cannot actually be printed, since it cannot be contained within the 2-inch head width.
- If the print ratio of one line (the print head width) is high, printing may become poor, or the printer may be reset. Note the print ratio.
- When a large value is set for the 1-cell width, decrease the number of digits of data to contain the data within the head width.

Explanation

(1) Two-dimensional code number

When drawing by the Data Command ([ESC] RB), the format designated by the two-dimensional code number is selected.

(2) Print origin of coordinates



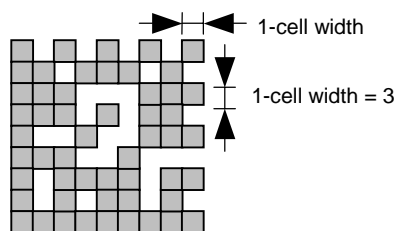
The print origin of coordinates must be set so that the two-dimensional code drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Type of two-dimensional code

Q: Data Matrix



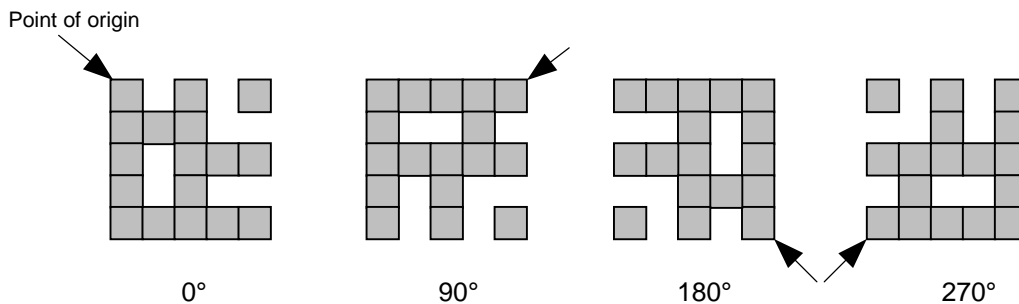
(4) 1-cell width



When 1-cell width is 00 for the Data Matrix, a two-dimensional code is not drawn. However, the two-dimensional code printed on the previous label is cleared.

The maximum cell width is 99 dots. (However, the number of digits of data should be limited so the two-dimensional code can be printed within the 2-inch head width.)

(5) Rotational angle of two-dimensional code



(6) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol “=.” The maximum number of digits to be printed is 2000. (However, the number of digits of data should be limited so the two-dimensional code can be printed within the 2-inch head width.)

(7) ECC type

Data Matrix contains a function to correct a code reading error using an error correction code (ECC) and restore normal data. There are several ECCs. ECC should be designated according to usage. The general correction ability is as follows. However, it may vary according to the error conditions.

ECC type	Error Correction Ability	Overhead by ECC
ECC000	<div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;">Low</div> <div style="display: inline-block; width: 0; height: 0; border-left: 5px solid transparent; border-right: 5px solid transparent; border-bottom: 10px solid black; margin: 5px;"></div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">High</div> </div>	0%
ECC050		25%
ECC080		33%
ECC100		50%
ECC140		75%
ECC200		Approx. 30%

(8) Format ID

Data Matrix can handle all codes including alphanumerics, symbols and Kanji. Since data compression rate varies according to codes, a code to be used is designated using the format ID.

Format ID	Code	Details
1	Numerics	0 to 9 space
2	Letters	A to Z space
3	Alphanumerics, symbols	0 to 9 A to Z space . , - /
4	Alphanumerics	0 to 9 A to Z space
5	ASCII (7 bit)	00H to 7FH
6	ISO (8 bit)	00H to FFH (Kanji)

(9) Maximum number of digits

The maximum number of digits varies according to the ECC type or format ID.

Since each Kanji character uses 2 bytes, the maximum number of digits for it becomes half of the following values.

	ECC000	ECC050	ECC080	ECC100	ECC140
Format ID 1	500	457	402	300	144
Format ID 2	452	333	293	218	105
Format ID 3	394	291	256	190	91
Format ID 4	413	305	268	200	96
Format ID 5	310	228	201	150	72
Format ID 6	271	200	176	131	63

	Numeric	Alphanumeric	8 bit
ECC200	2000	2000	1556

For the maximum number of digits in cell units, see the next page.

(10) Connection setting

The connection setting is used to comprise data with a set of two-dimensional codes when the data cannot be expressed with a two-dimensional code. When three two-dimensional codes are used to comprise data, identification information of 1/3, 2/3, and 3/3 is inserted into each two-dimensional code. The ID number is programmed to include a proper combination of two-dimensional codes when one label contains plural connecting symbols. For example, when there are two kinds of data containing identification information for 1/2 and 2/2 in the same label, combination of two-dimensional codes is unclear. By adding the ID number, the combination is made clearer.

(11) Cell size and the effective data capacity

		ECC000			ECC050			ECC080			ECC100			ECC140		
		Numeric capacity	Alphanum capacity	8-bit byte capacity	Numeric capacity	Alphanum capacity	8-bit byte capacity	Numeric capacity	Alphanum capacity	8-bit byte capacity	Numeric capacity	Alphanum capacity	8-bit byte capacity	Numeric capacity	Alphanum capacity	8-bit byte capacity
Row	Col															
9	9	3	2	1	—	—	—	—	—	—	—	—	—	—	—	—
11	11	12	8	5	1	1	—	—	—	—	—	—	—	—	—	—
13	13	24	16	10	10	6	4	4	3	2	1	1	—	—	—	—
15	15	37	25	16	20	13	9	13	9	6	8	5	3	—	—	—
17	17	53	35	23	32	21	14	24	16	10	16	11	7	2	1	1
19	19	72	48	31	46	30	20	36	24	16	25	17	11	6	4	3
21	21	92	61	40	61	41	27	50	33	22	36	24	15	12	8	5
23	23	115	76	50	78	52	34	65	43	28	47	31	20	17	11	7
25	25	140	93	61	97	65	42	82	54	36	60	40	26	24	16	10
27	27	168	112	73	118	78	51	100	67	44	73	49	32	30	20	13
29	29	197	131	86	140	93	61	120	80	52	88	59	38	38	25	16
31	31	229	153	100	164	109	72	141	94	62	104	69	45	46	30	20
33	33	264	176	115	190	126	83	164	109	72	121	81	53	54	36	24
35	35	300	200	131	217	145	95	188	125	82	140	93	61	64	42	28
37	37	339	226	148	246	164	108	214	143	94	159	106	69	73	49	32
39	39	380	253	166	277	185	121	242	161	106	180	120	78	84	56	36
41	41	424	282	185	310	206	135	270	180	118	201	134	88	94	63	41
43	43	469	313	205	344	229	150	301	201	132	224	149	98	106	70	46
45	45	500	345	226	380	253	166	333	222	146	248	165	108	118	78	51
47	47	500	378	248	418	278	183	366	244	160	273	182	119	130	87	57
49	49	500	413	271	457	305	200	402	268	176	300	200	131	144	96	63

In case of ECC000, when the symbol size of the row and the column is respectively 9, the maximum number of digits of numeric is 3, that of alphanumeric is 2, and that of 8 bit is 1.

		ECC200		
Symbol size		Numeric capacity	Alphanum capacity	8-bit byte capacity
Row	Col			
10	10	6	3	1
12	12	10	6	3
14	14	16	10	6
16	16	24	16	10
18	18	36	25	16
20	20	44	31	20
22	22	60	43	28
24	24	72	52	34
26	26	88	64	42
32	32	124	91	60
36	36	172	127	84
40	40	228	169	112
44	44	288	214	142
48	48	348	259	172
52	52	408	304	202
64	64	560	418	278
72	72	736	550	366
80	80	912	682	454
88	88	1152	862	574
96	96	1392	1042	694
104	104	1632	1222	814
120	120	2000	1573	1048
132	132	2000	1954	1302
144	144	2000	2000	1556

Rectangular code

		ECC200		
Symbol size		Numeric capacity	Alphanum capacity	8-bit byte capacity
Row	Col			
8	18	10	6	3
8	32	20	13	8
12	26	32	22	14
12	36	44	31	20
16	36	64	46	30
16	48	98	72	47

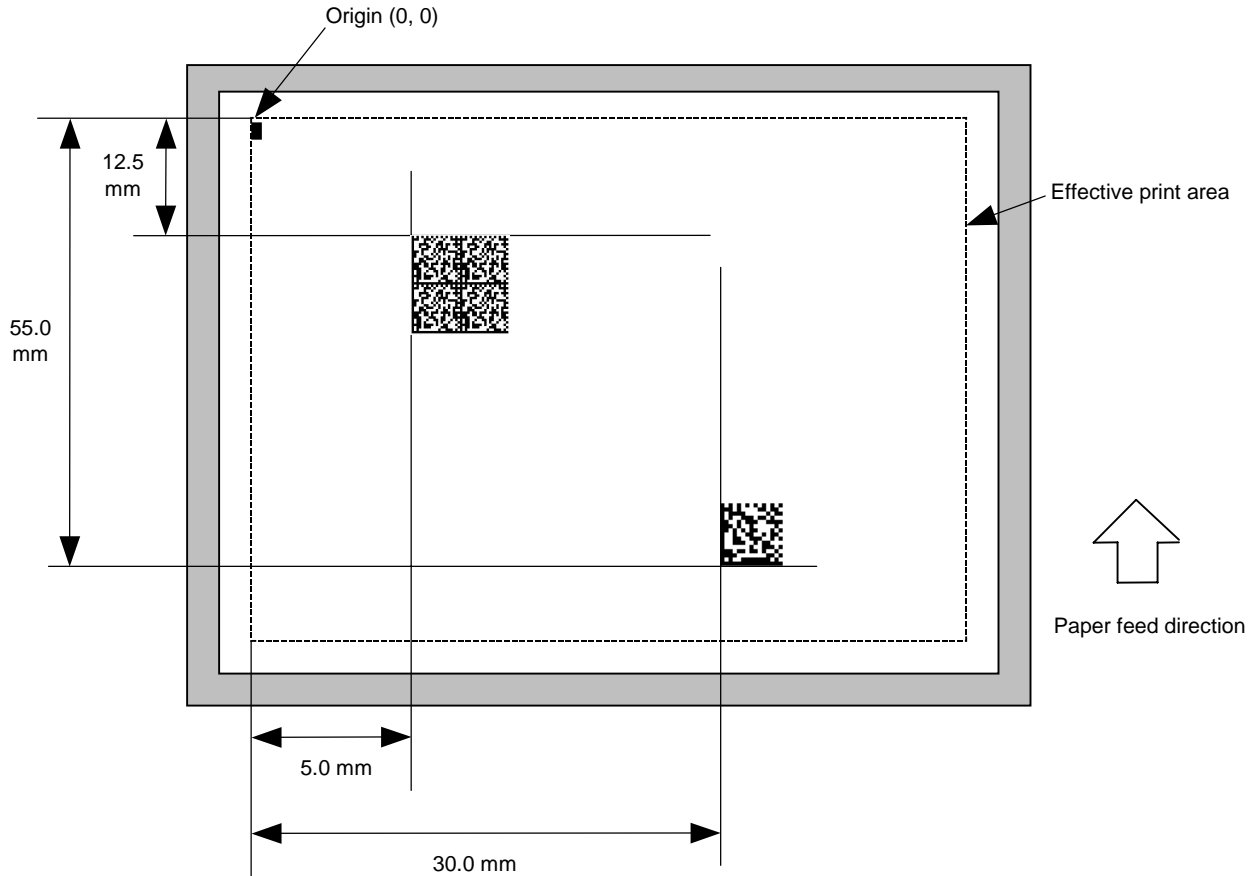
Notes

- (1) More than one two-dimensional Code Format Command can be connected when transmitted.
 [ESC] XB01; 0100, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF]
 B02; 0350, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF] [NUL]
- (2) When the drawing data is changed per label issue during printing, the field of the drawing data for the previous label is automatically cleared using the two-dimensional code number, then the next drawing data is printed. Therefore, the two-dimensional code number which differs according to the drawing fields should be designated.
- (3) Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same two-dimensional code number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same two-dimensional code number are automatically cleared until the Clear Command is sent.)

Refer to

Bit Map Font Format Command ([ESC] PC)
 Outline Font Format Command ([ESC] PV)
 Bar Code/Two-dimensional Code Data Command ([ESC] RB)

Examples



```
[ESC] C [LF] [NUL]
[ESC] XB01; 0050, 0125, Q, 20, 05, 01, 0 [LF] [NUL]
[ESC] XB02; 0300, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; Toshiba TEC [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```

5.6.8 TWO-DIMENSIONAL CODE FORMAT COMMAND (PDF417)**[ESC] XB**

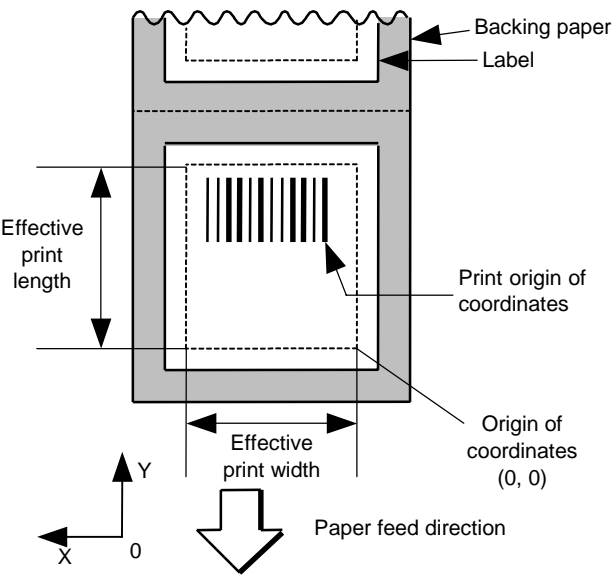
Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, ee, ff, gg, h, iiii (= jjj ----- jjj) [LF] [NUL]
Term	<p>aa: Two-dimensional code number 00 to 31</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code 4 or 5 digits (in 0.1 mm units)</p> <p>d: Type of two-dimensional code P: PDF417</p> <p>ee: Security level 00: Level 0 01: Level 1 02: Level 2 03: Level 3 04: Level 4 05: Level 5 06: Level 6 07: Level 7 08: Level 8</p> <p>ff: 1-module width 01 to 10 (in dots)</p> <p>gg: No. of columns (strings) 01 to 30</p> <p>h: Rotational angle of two-dimensional code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>iiii: Bar height 0000 to 0100 (in 0.1 mm units)</p> <p>jjj-----jjj: Data string to be printed (Omissible) Max. 2,000 digits</p> <p>* The maximum of 2000 digits of data string to be printed are acceptable. (The maximum number of digits of the data string to be printed differs depending on the security level and the contents of data.) However, note the following limits:</p> <ul style="list-style-type: none"> • The maximum of 2000-digit data string to be printed are acceptable. However, it cannot actually be printed, since it cannot be contained within the 2-inch head width. • If the print ratio of one line (the print head width) is high, printing may become poor, or the printer may be reset. Note the print ratio.

Explanation

(1) Two-dimensional code number

When drawing by the Data Command ([ESC] RB), the format designated by the two-dimensional code number is selected.

(2) Print origin of coordinates



The print origin of coordinates must be set so that the two-dimensional code drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Type of two-dimensional code

P: PDF417



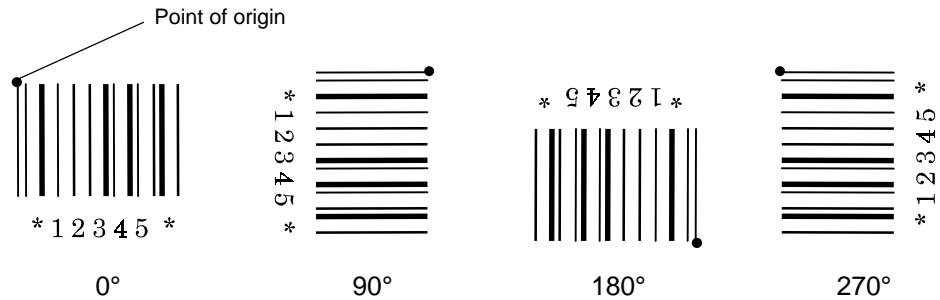
(4) 1-module width

When a 1-module width is designated, 2- to 6-module width is automatically calculated.

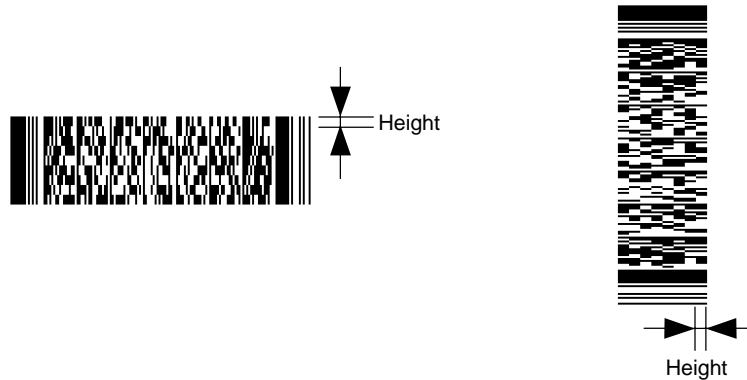
[Example of setting]

Type of 2-D code	1 module		2 modules		3 modules		4 modules		5 modules		6 modules	
	Bar	Space	Bar	Space	Bar	Space	Bar	Space	Bar	Space	Bar	Space
PDF417	2		4		6		8		10		12	

(5) Rotational angle of two-dimensional code



(6) Height of two-dimensional code



(7) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol “=.” The maximum number of digits to be printed is 2000. (However, the number of digits of data should be limited so the two-dimensional code can be printed within the 2-inch head width.)

(8) Security level

The PDF417 contains a function to correct a code reading error using an error correcting code word and restore normal data. The security level should be designated according to usage to perform the error correction function.

Security level	Error Correction Ability	No. of error correction code words
Level 0	<div style="text-align: center;"> <div>Low</div> <div style="margin: 10px 0;">↑↓</div> <div>High</div> </div>	0
Level 1		2
Level 2		6
Level 3		14
Level 4		30
Level 5		62
Level 6		126
Level 7		254
Level 8		510

(9) No. of columns (strings)

The number of rows are variable in the PDF417. The row length (No. of data strings) is also variable. Therefore, a symbol can be created in a form that can be easily printed, by changing the proportion of the height and width. The number of columns (data strings) is varied between 1 and 30.

If the number of columns is too small when the data amount is large and the security level is high, drawing may not be performed. This is because the number of rows exceeds 90 when the number of columns becomes small. (The number of rows of symbols is limited from 3 to 90.)

Notes

- (1) More than one two-dimensional Code Format Command can be connected when transmitted.

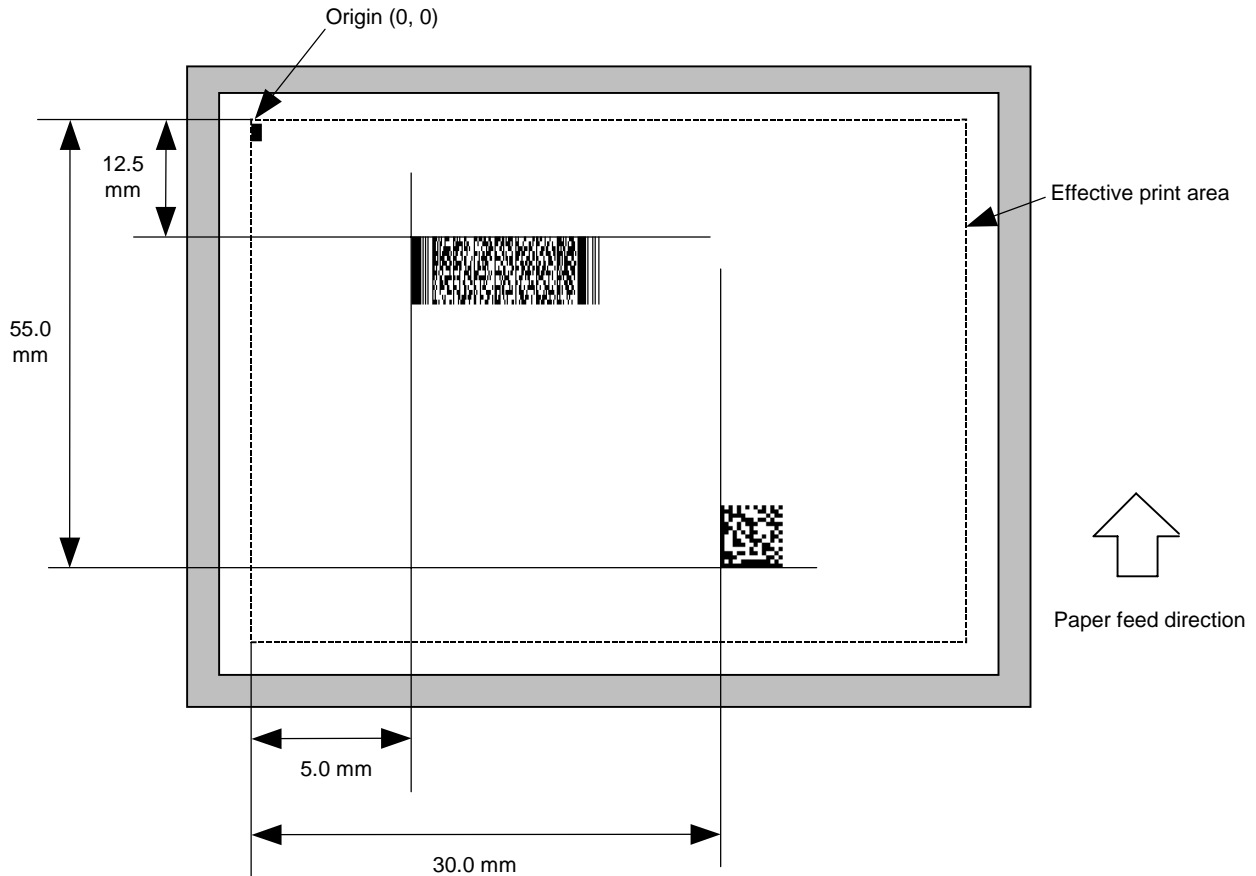
```
[ESC]  XB01; 0100, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF]
        B02; 0350, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF] [NUL]
```

- (2) When the drawing data is changed per label issue during printing, the field of the drawing data for the previous label is automatically cleared using the two-dimensional code number, then the next drawing data is printed. Therefore, the two-dimensional code number which differs according to the drawing fields should be designated.
- (3) Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same two-dimensional code number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same two-dimensional code number are automatically cleared until the Clear Command is sent.)

Refer to

Bit Map Font Format Command ([ESC] PC)
 Outline Font Format Command ([ESC] PV)
 Bar Code/Two-dimensional Code Data Command ([ESC] RB)

Examples



```
[ESC] C [LF] [NUL]
[ESC] XB01; 0050, 0125, P, 04, 02, 03, 0, 0010 [LF] [NUL]
[ESC] XB02; 0300, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; PDF417 [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```

5.6.9 TWO-DIMENSIONAL CODE FORMAT COMMAND (MicroPDF417) [ESC] XB

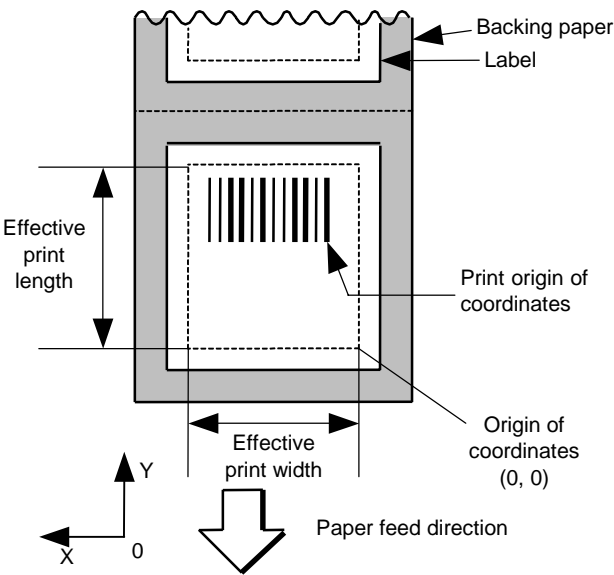
Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, ee, ff, gg, h, iiii (= jjj ----- jjj) [LF] [NUL]
Term	<p>aa: Two-dimensional code number 00 to 31</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code 4 or 5 digits (in 0.1 mm units)</p> <p>d: Type of two-dimensional code X: MicroPDF417</p> <p>ee: Security level 00: Fixed</p> <p>ff: 1-module width 01 to 10 (in dots)</p> <p>gg: No. of columns/rows 00 to 38</p> <p>h: Rotational angle of two-dimensional code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>iiii: Bar height 0000 to 0100 (in 0.1 mm units)</p> <p>jjj-----jjj: Data string to be printed (Omissible) Max. 366 digits</p> <p>* The maximum of 366 digits of data string to be printed are acceptable. (The maximum number of digits of the data string to be printed differs depending on the numbers of columns, the number of rows, and the contents of data.) However, note the following limits:</p> <ul style="list-style-type: none"> • The maximum of 366-digit data string to be printed are acceptable. However, it cannot actually be printed, since it cannot be contained within the 2-inch head width. • If the print ratio of one line (the print head width) is high, printing may become poor, or the printer may be reset. Note the print ratio.

Explanation

(1) Two-dimensional code number

When drawing by the Data Command ([ESC] RB), the format designated by the two-dimensional code number is selected.

(2) Print origin of coordinates



The print origin of coordinates must be set so that the two-dimensional code drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Type of two-dimensional code

X: MicroPDF417



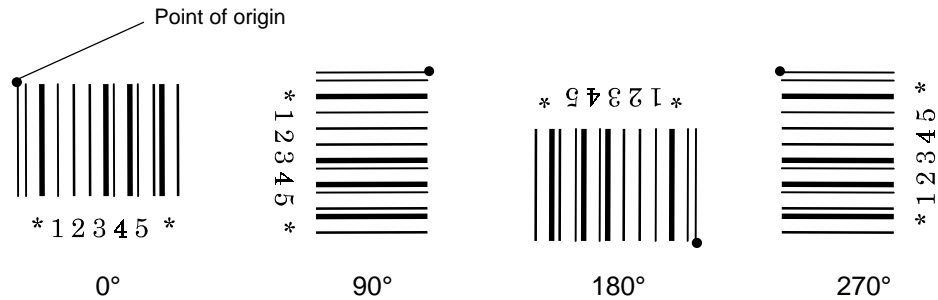
(4) 1-module width

When a 1-module width is designated, 2- to 6-module width is automatically calculated

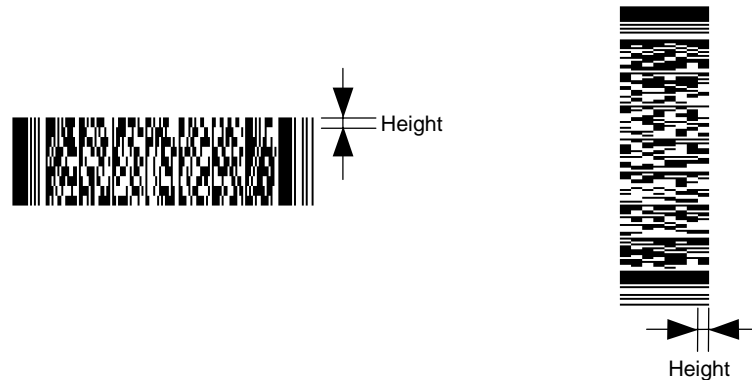
[Example of setting]

Type of 2-D code	1 module		2 modules		3 modules		4 modules		5 modules		6 modules	
	Bar	Space	Bar	Space	Bar	Space	Bar	Space	Bar	Space	Bar	Space
MicroPDF417	2		4		6		8		10		12	

(5) Rotational angle of two-dimensional code



(6) Height of two-dimensional code



(7) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol “=” The maximum number of digits to be printed is 366. (However, the number of digits of data should be limited so the two-dimensional code can be printed within the 2-inch head width.)

(8) Security level

The MicroPDF417 contains a function to correct a code reading error using an error correcting code word and restore normal data. The printer automatically sets the security level.

(9) No. of columns (strings)

For the MicroPDF417, not only the number of columns (data strings) but also the number of rows (data lines) can be designated. When these are to be designated, see the table on the next page. Note that the max. number of digits for the set parameter (gg) varies according to the character type. If data over the max. number of digits for the set parameter (gg) is set, the two-dimensional code is not printed. The number of columns (data strings) is varied from 1 to 4. However, the max. number of lines, which is 44, depends on the number of columns.

(10) The maximum number of columns and rows

Parameter (gg)	No. of columns	No. of rows	Max. number of digits for binary mode	Max. number of digits for upper case letter/space mode	Max. number of digits for numeric mode
00	—	—	150	250	366
01	1	—	22	38	55
02	2	—	43	72	105
03	3	—	97	162	237
04	4	—	150	250	366
05	1	11	3	6	8
06		14	7	12	17
07		17	10	18	26
08		20	13	22	32
09		24	18	30	44
10		28	22	38	55
11	2	8	8	14	20
12		11	14	24	35
13		14	21	36	52
14		17	27	46	67
15		20	33	56	82
16		23	38	64	93
17		26	43	72	105
18	3	6	6	10	14
19		8	10	18	26
20		10	15	26	38
21		12	20	34	49
22		15	27	46	67
23		20	39	66	96
24		26	54	90	132
25		32	68	114	167
26		38	82	138	202
27		44	97	162	237
28	4	4	8	14	20
29		6	13	22	32
30		8	20	34	49
31		10	27	46	67
32		12	34	58	85
33		15	45	76	111
34		20	63	106	155
35		26	85	142	208
36		32	106	178	261
37		38	128	214	313
38		44	150	250	366

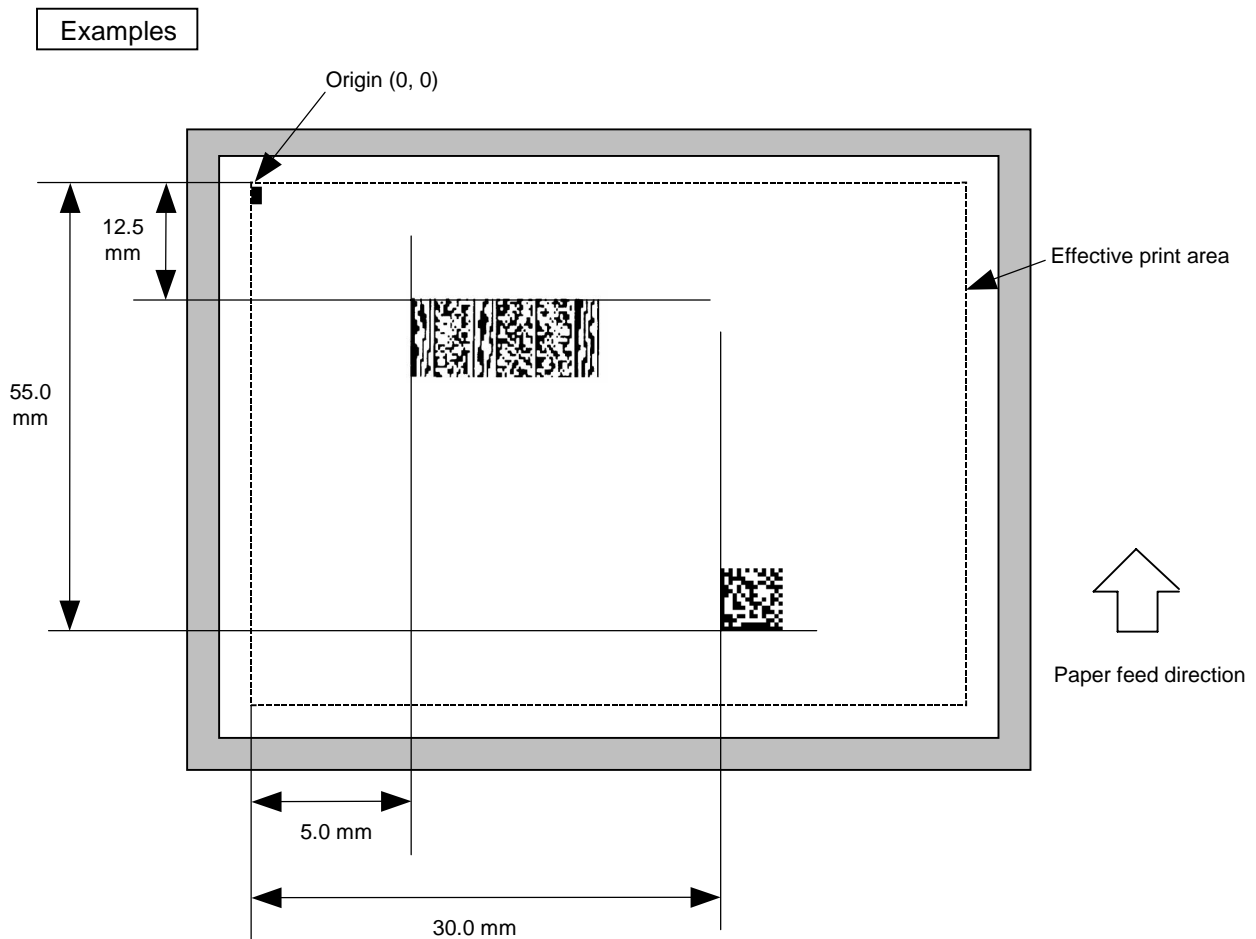
“—” for parameter 00 to 04 indicates the numbers of columns/rows which are automatically set by the printer. In this case, the pattern which has a smaller number of code words is automatically selected. When the numbers of code words is equal, the smaller number of columns are selected.

Notes

- (1) More than one two-dimensional Code Format Command can be connected when transmitted.
[ESC] XB01; 0100, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF]
B02; 0350, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF] [NUL]
- (2) When the drawing data is changed per label issue during printing, the field of the drawing data for the previous label is automatically cleared using the two-dimensional code number, then the next drawing data is printed. Therefore, the two-dimensional code number which differs according to the drawing fields should be designated.
- (3) Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same two-dimensional code number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same two-dimensional code number are automatically cleared until the Clear Command is sent.)

Refer to

Bit Map Font Format Command ([ESC] PC)
Outline Font Format Command ([ESC] PV)
Bar Code/Two-dimensional Code Data Command ([ESC] RB)



```
[ESC] C [LF] [NUL]
[ESC] XB01; 0050, 0125, X, 00, 02, 00, 0, 0010 [LF] [NUL]
[ESC] XB02; 0300, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; MicroPDF417 [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```

5.6.10 TWO-DIMENSIONAL CODE FORMAT COMMAND (QR Code) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, e, ff, g, h (, Mi) (, Kj) (, Jkkllmm) (= nnn --- nnn) [LF] [NUL]
Term	<p>aa: Two-dimensional code number 00 to 31</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code 4 or 5 digits (in 0.1 mm units)</p> <p>d: Type of two-dimensional code T: QR code</p> <p>e: Designation of error correction level L: High density level M: Standard level Q: Reliability level H: High reliability level</p> <p>ff: 1-cell width 00 to 52 (in dots)</p> <p>g: Selection of mode M: Manual mode A: Automatic mode</p> <p>h: Rotational angle of the two-dimensional code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>Mi: Selection of model (Omissible. If omitted, Model 1 is automatically selected.) i = 1: Model 1 2: Model 2</p> <p>Kj: Mask number (Omissible. If omitted, the number is automatically set.) j = 0 to 7: Mask number 0 to 7 8: No mask</p> <p>Jkkllmm: Connection setting (Omissible. No connection if this parameter is omitted.) kk = 01 to 16: Value indicating which divided code is connected. ll = 01 to 16: Number of divided codes mm = 00 to FF: A value for all data to be printed, to which XOR is applied in units of bytes (Not divided)</p>

nnn --- nnn: Data string to be printed (Omissible)
Max. 2000 digits

* The maximum of 2000 digits of data string to be printed and the maximum of 52 dots of the 1-cell width are acceptable. (The maximum number of digits of the data string to be printed differs depending on the ECC level and the contents of data.) However, note the following limits:

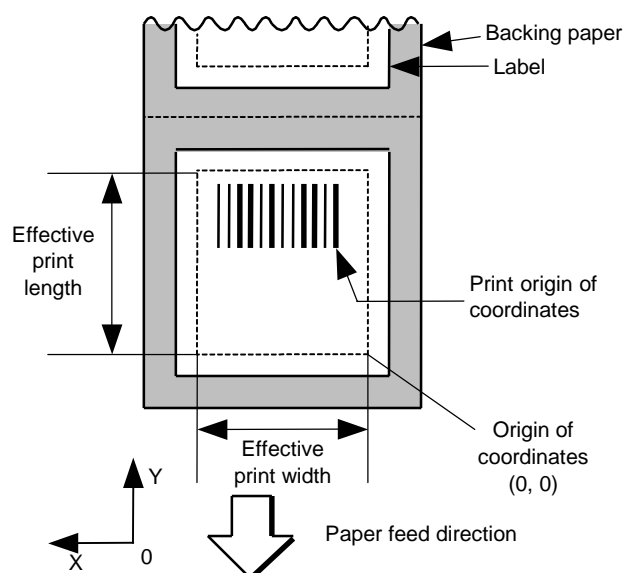
- The maximum of 2000-digit data string to be printed are acceptable. However, it cannot actually be printed, since it cannot be contained within the 2-inch head width.
- If the print ratio of one line (the print head width) is high, printing may become poor, or the printer may be reset. Note the print ratio.
- When a large value is set for the 1-cell width, decrease the number of digits of data to contain the data within the head width.

Explanation

(1) Two-dimensional code number

When drawing by the Data Command ([ESC] RB), the format designated by the two-dimensional code number is selected.

(2) Print origin of coordinates



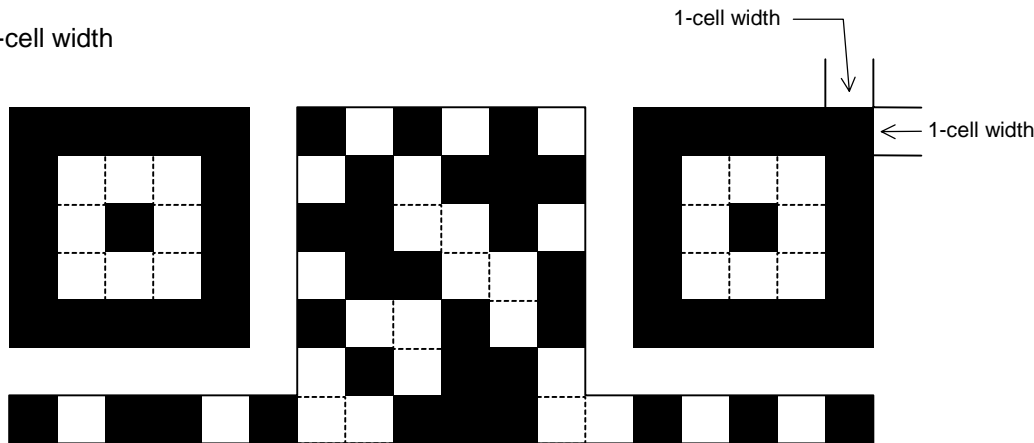
The print origin of coordinates must be set so that the two-dimensional code drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Type of two-dimensional code

T: QR code



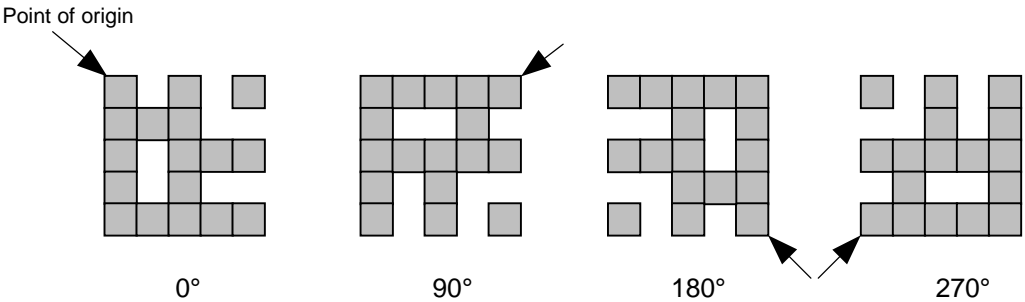
(4) 1-cell width



When the 1-cell width is 0, a two-dimensional code is not drawn. However, the bar code/two-dimensional code printed on the previous label is cleared.

The maximum cell width is 52 dots. (However, the number of digits of data should be limited so the two-dimensional code can be printed within the 2-inch head width.)

(5) Rotational angle of two-dimensional code



(6) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol “=” The maximum number of digits to be printed is 2000. (However, the number of digits of data should be limited so the two-dimensional code can be printed within the 2-inch head width.)

(7) Error correction level

The QR code contains functions to detect and correct an error. If one of the data characters is damaged, the information can be restored when this code is read.

There are 4 levels that can be designated. The level should be specified according to usage. The general correction ability is as follows.

Level	Error correction ability	Overhead by correcting an error
High density level	Low ↑ ↓ High	7%
Standard level		15%
Reliability level		25%
High reliability level		30%

(8) Selection of mode

All codes including alphanumerals, symbols, and Kanji can be used in one QR code. Manual mode or automatic mode can be selected to perform the operation. FFH data cannot be used in the automatic mode, but can be used in the manual mode.

(9) Selection of model

Model 1: Original specification

Model 2: Extended specification which enhances the function of position correction and can contain a large amount of data.

(10) Mask number

To be sure the QR code is read, it is preferable that white and black modules are arranged in this symbol in a balanced manner. This prevents the bit pattern "1011101", which is characteristically seen in the position detecting pattern, from appearing in the symbol as much as possible.

The mask number is 0 to 7. The pattern is determined by placing each masking pattern for the mask number upon the module pattern. When the mask number is set to 8, masking is not performed. When the parameter is omitted, the most appropriate mask number is automatically selected to perform masking.

(11) Connection setting

For QR code, data can be divided into several codes. Even though there is only a narrow print space, the code can be entered in the space by dividing the code. The data can be divided into a max. of 16 codes. Parity data is obtained by XORing all input data in units of bytes before dividing. The input data is calculated based on shift JIS for Kanji, or on JIS 8 for others. Examples are shown below:

"0123456789日本" is divided into "0123", "4567", and "89日本".

Code No. 1	No. of divided codes: 3	Parity data: 84	Data "0123"
Code No. 2	No. of divided codes: 3	Parity data: 84	Data "4567"
Code No. 3	No. of divided codes: 3	Parity data: 84	Data "89日本"

* The parity data is the XORed value for "0123456789日本".

30 31 32 33 34 35 36 37 38 39 93 FA 96 7B = 85

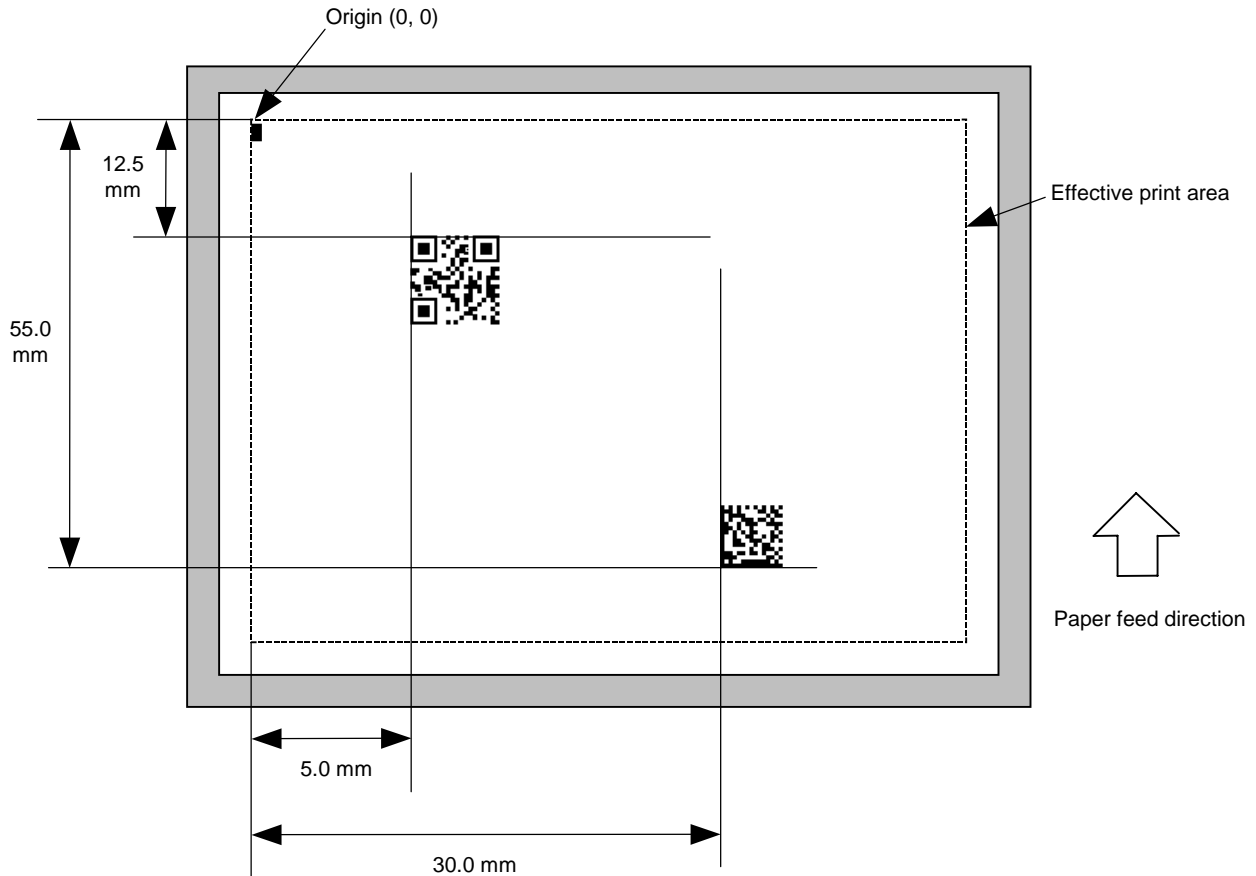
Notes

- (1) More than one two-dimensional Code Format Command can be connected when transmitted.
 [ESC] XB01; 0100, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF]
 B02; 0350, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF] [NUL]
- (2) When the drawing data is changed per label issue during printing, the field of the drawing data for the previous label is automatically cleared using the two-dimensional code number, then the next drawing data is printed. Therefore, the two-dimensional code number which differs according to the drawing fields should be designated.
- (3) Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same two-dimensional code number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same two-dimensional code number are automatically cleared until the Clear Command is sent.)

Refer to

Bit Map Font Format Command ([ESC] PC)
 Outline Font Format Command ([ESC] PV)
 Bar Code/Two-dimensional Code Data Command ([ESC] RB)

Examples



```
[ESC]C[LF][NUL]
[ESC]XB01;0050,0125,T,M,02,A,0[LF][NUL]
[ESC]XB02;0300,0550,Q,08,03,05,3[LF][NUL]
[ESC]RB01;QR Code[LF][NUL]
[ESC]RB02;Data Matrix[LF][NUL]
[ESC]XS;l,0002,0002C3000[LF][NUL]
```

5.6.11 TWO-DIMENSIONAL CODE FORMAT COMMAND (Maxicode) [ESC] XB

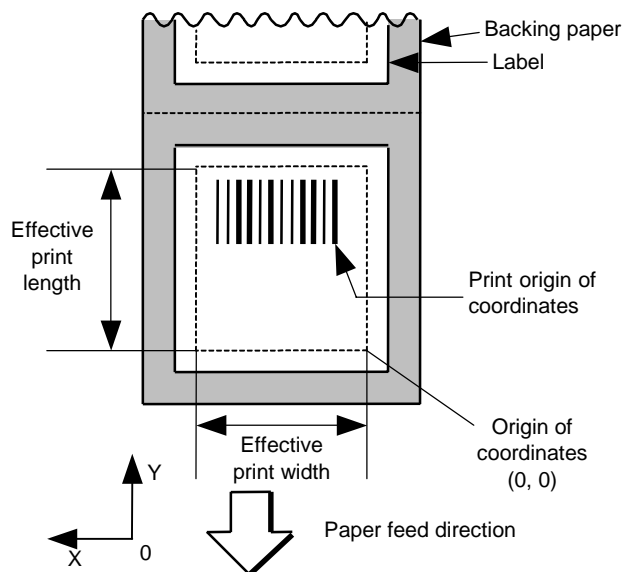
Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d (, e) (, Jffgg) (, Zh) [LF] [NUL]
Term	<p>aa: Two-dimensional code number 00 to 31</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code 4 or 5 digits (in 0.1 mm units)</p> <p>d: Type of two-dimensional code Z: Maxicode</p> <p>e: Mode selection (Omissible) Omitted: Mode 2 0: Mode 2 1: Mode 4 2: Mode 2 3: Mode 3 4: Mode 4 5: Mode 2 6: Mode 6 7: Mode 2 8: Mode 2 9: Mode 2</p> <p>Jffgg: Connection setting (Omissible. No connection if this parameter is omitted.) ff: Code number 01 to 08 gg: No. of divided codes 01 to 08</p> <p>Zh: Attachment of Zipper block and Contrast block (Omissible. If omitted, they are not attached.) h= 0: No attachment of Zipper block and Contrast block 1: Attachment of Zipper block and Contrast block 2: Attachment of Zipper block 3: Attachment of Contrast block</p>

Explanation

(1) Two-dimensional code number

When drawing by the Data Command ([ESC] RB), the format designated by the two-dimensional code number is selected.

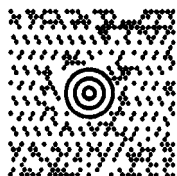
(2) Print origin of coordinates



The print origin of coordinates must be set so that the two-dimensional code drawing result will be within the effective print area set by the Label Size Set Command ([ESC] D).

(3) Type of two-dimensional code

Z: Maxicode



(4) Data string to be printed

Drawing data can be programmed by designating the number of digits after the symbol "=". The maximum number of digits to be printed is 93.

(5) Connection setting

For Maxicode, data can be divided into a max. of 8 codes.

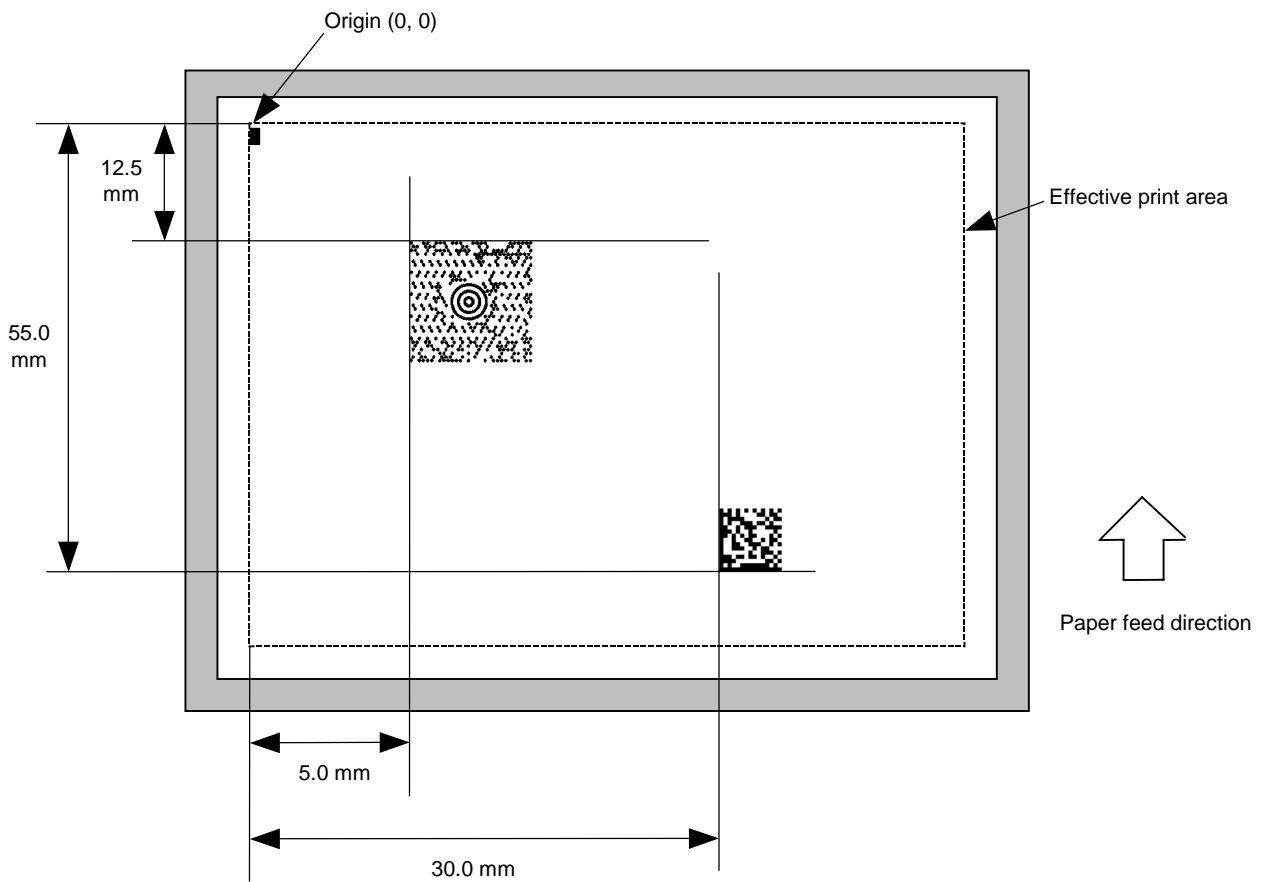
Notes

- (1) More than one two-dimensional Code Format Command can be connected when transmitted.
 [ESC] XB01; 0100, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF]
 B02; 0350, 0150, 3, 1, 02, 02, 06, 06, 02, 0, 0150 [LF] [NUL]
- (2) When the drawing data is changed per label issue during printing, the field of the drawing data for the previous label is automatically cleared using the two-dimensional code number, then the next drawing data is printed. Therefore, the two-dimensional code number which differs according to the drawing fields should be designated.
- (3) Since the automatic field clear is not performed between the Clear Command ([ESC] C) and Issue Command ([ESC] XS), the fixed data may be drawn using the same two-dimensional code number. In this case, the Format Command and Data Command should be sent alternately. (After the Issue Command is sent, the fields with the same two-dimensional code number are automatically cleared until the Clear Command is sent.)

Refer to

Bit Map Font Format Command ([ESC] PC)
 Outline Font Format Command ([ESC] PV)
 Bar Code/Two-dimensional Code Data Command ([ESC] RB)

Examples



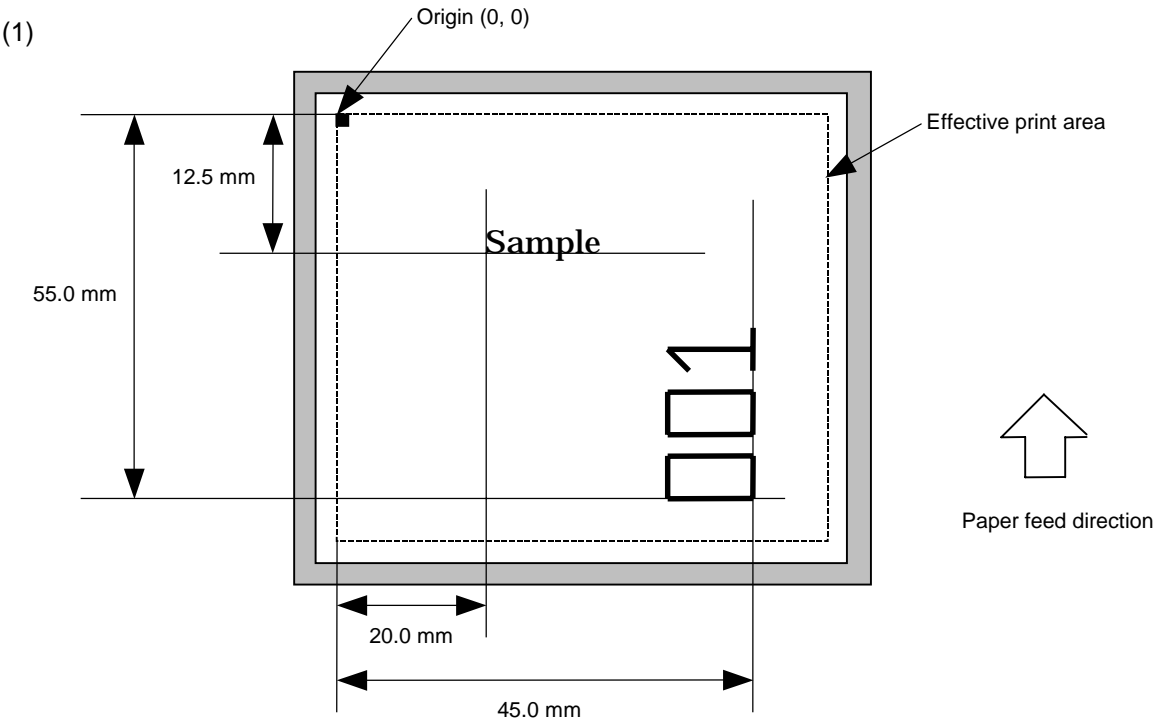
```
[ESC] C [LF] [NUL]
[ESC] XB01; 0050, 0125, P, 04, 02, 03, 0, 0010 [LF] [NUL]
[ESC] XB02; 0300, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; Maxicode [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```

5.7 COMMANDS RELATED TO PRINT DATA

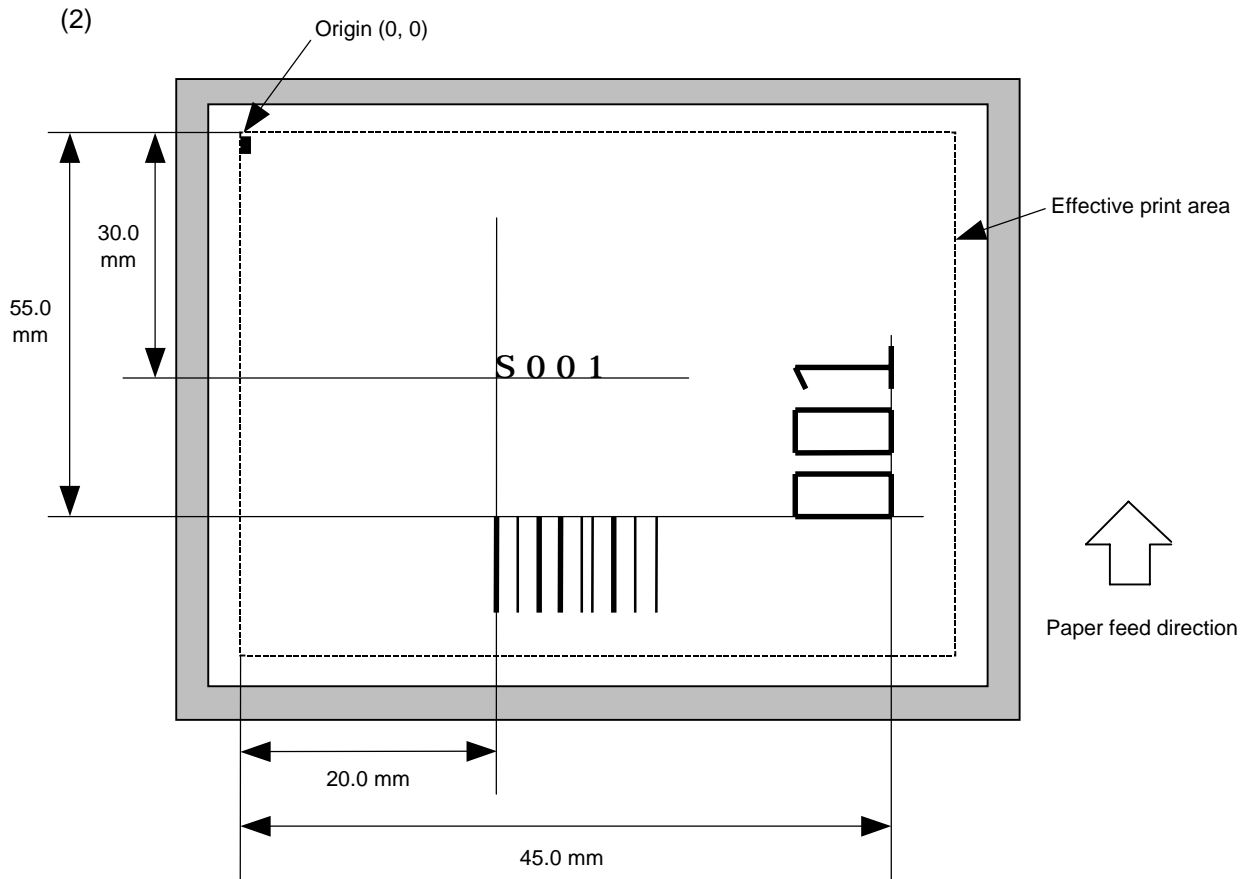
5.7.1 BIT MAP FONT DATA COMMAND

[ESC] RC

Function	Provides data for the bit map font row.
Format	[ESC] RCaaa; bbb ----- bbb [LF] [NUL]
Term	aaa: Character string number 000 to 199 (Two digits, 00 to 99, also acceptable.) bbb ----- bbb: Data string to be printed Max. 100 digits
Explanation	(1) Data string to be printed Any excess data which exceeds the maximum number of digits is discarded. For character codes, refer to chapter 11 "CHARACTER CODE TABLE".
Refer to	Bit Map Font Format Command ([ESC] PC)
Examples	



```
[ESC] C [LF] [NUL]
[ESC] PC001; 0200, 0125, 1, 1, C, 00, B [LF] [NUL]
[ESC] PC002; 0450, 0550, 2, 2, G, 33, B, +0000000001 [LF] [NUL]
[ESC] RC001; Sample [LF] [NUL]
[ESC] RC002; 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```

```
[ESC] C [LF] [NUL]
```

```
[ESC] PC001; 0200, 0300, 1, 1, C, 00, B=S001 [LF] [NUL]
```

```
[ESC] PV01; 0450, 0550, 0200, 0150, B, 33, B=001 [LF] [NUL]
```

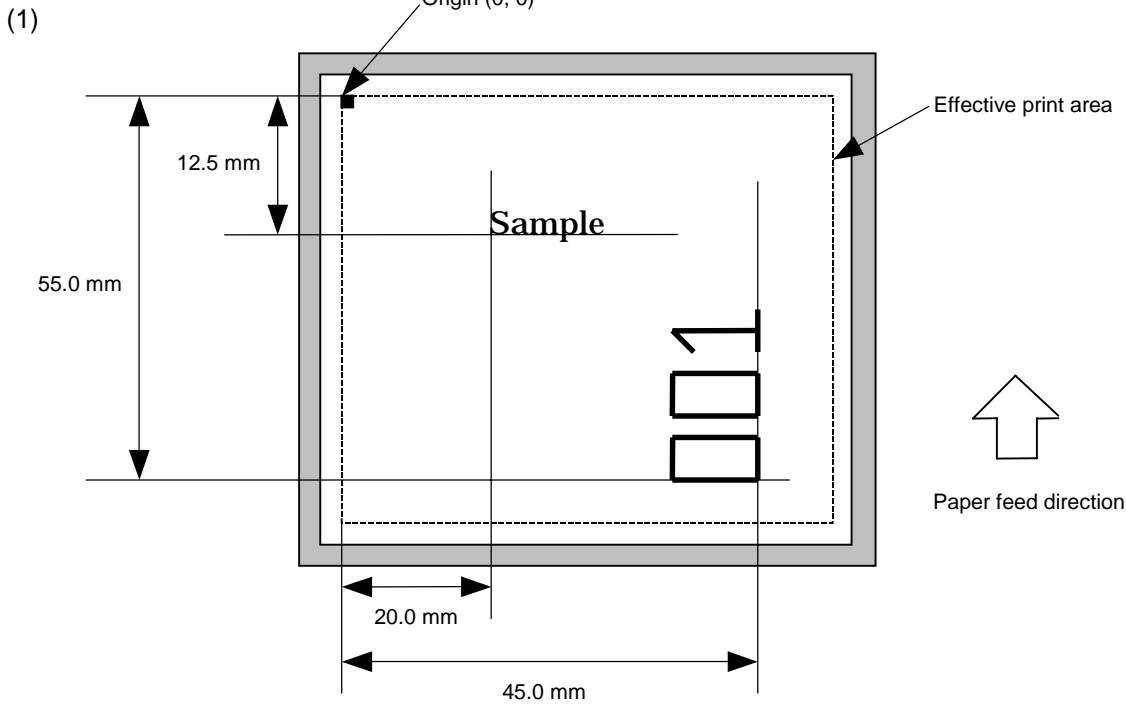
```
[ESC] XB01; 0200, 0550, 3, 1, 03, 03, 08, 08, 03, 0, 0150=S001 [LF] [NUL]
```

```
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```

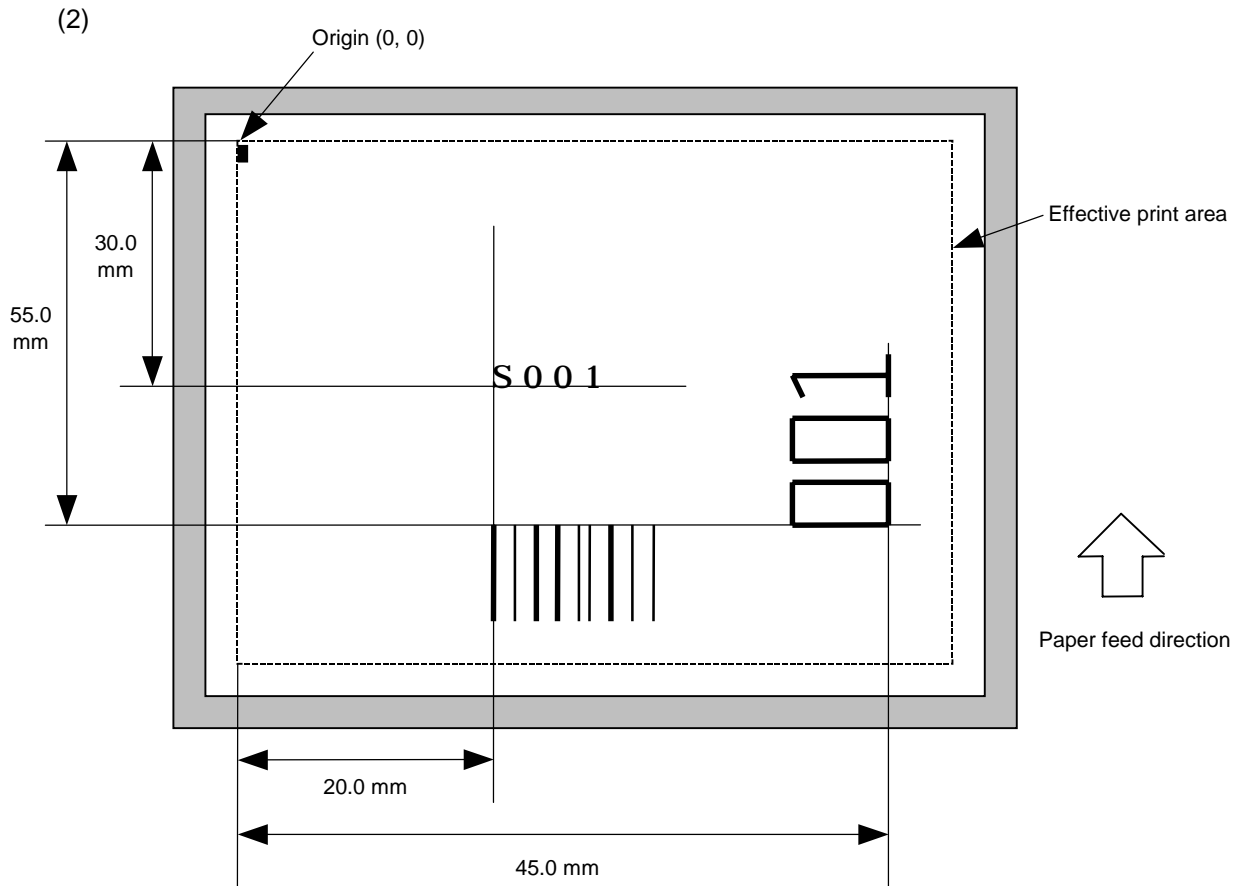
5.7.2 OUTLINE FONT DATA COMMAND

[ESC] RV

Function	Provides data for the outline font row.
Format	[ESC] RVaa; bbb ----- bbb [LF] [NUL]
Term	aa: Character string number 00 to 99 bbb ----- bbb: Data string to be printed Max. 100 digits Any excess data will be discarded. For the character codes, refer to chapter 11 "CHARACTER CODE TABLE".
Refer to	Outline Font Format Command ([ESC] PV)
Examples	



```
[ESC] C [LF] [NUL]
[ESC] PV01; 0200, 0125, 0100, 0100, B, 00, B [LF] [NUL]
[ESC] PV02; 0450, 0550, 0200, 0150, B, 33, B, +0000000001 [LF] [NUL]
[ESC] RV01; Sample [LF] [NUL]
[ESC] RV02; 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```



[ESC] C [LF] [NUL]

[ESC] PC001; 0200, 0300, 1, 1, C, 00, B=S001 [LF] [NUL]

[ESC] PV01; 0450, 0550, 0200, 0150, B, 33, B=001 [LF] [NUL]

[ESC] XB01; 0200, 0550, 3, 1, 02, 02, 06, 06, 02, 0, 0150=S001 [LF] [NUL]

[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]

5.7.3 BAR CODE/TWO-DIMENSIONAL CODE DATA COMMAND (Any codes other than Maxicode) [ESC] RB

Function	Provides data for the bar code/two-dimensional code.
Format	[ESC] RBaa; bbb ----- bbb [LF] [NUL]
Term	aa: Bar code/two-dimensional code number 00 to 31 bbb ----- bbb: Data string to be printed The maximum number of digits varies according to the type of bar code/two-dimensional code.

Explanation	<p>(1) Data check</p> <p>If there is data in the data row, which does not meet the type of bar code/two-dimensional code, the bar code/two-dimensional code will not be drawn. If wrong code selection takes place in the data row of CODE128 (without auto code selection), the bar code will not be drawn.</p> <p>If there is data different from the one designated using the format ID when Data Matrix is used, the symbol is not drawn.</p> <p>(2) No. of digits of data</p> <p>When data exceeding the maximum number of digits is sent, the excess data will be discarded. For the maximum number of digits for each bar code/two-dimensional code, see below.</p> <table> <tr> <td>Data Matrix, PDF417, QR code:</td><td>2000 digits</td></tr> <tr> <td>MicroPDF417:</td><td>366 digits</td></tr> <tr> <td>Customer bar code:</td><td>20 digits</td></tr> <tr> <td>Highest priority customer bar code:</td><td>19 digits</td></tr> <tr> <td>Bar codes other than the above</td><td>100 digits</td></tr> </table> <p>When the number of digits does not correspond to the bar code/two-dimensional code type, the bar code/two-dimensional code is not drawn.</p> <p>(3) The maximum number of digits for Data Matrix varies according to the settings for ECC type, format ID, and the cell size. In the case of Kanji, the maximum number of digits is half those of the values described below since a Kanji character occupies 2 bytes.</p>	Data Matrix, PDF417, QR code:	2000 digits	MicroPDF417:	366 digits	Customer bar code:	20 digits	Highest priority customer bar code:	19 digits	Bar codes other than the above	100 digits
Data Matrix, PDF417, QR code:	2000 digits										
MicroPDF417:	366 digits										
Customer bar code:	20 digits										
Highest priority customer bar code:	19 digits										
Bar codes other than the above	100 digits										

Max number of digits for Data Matrix

	ECC000	ECC050	ECC080	ECC100	ECC140
Format ID 1	500	457	402	300	144
Format ID 2	452	333	293	218	105
Format ID 3	394	291	256	190	91
Format ID 4	413	305	268	200	96
Format ID 5	310	228	201	150	72
Format ID 6	271	200	176	131	63

	Numeric	Alphanumeric	8 bit
ECC200	2000	2000	1556

Cell Size and Effective Data Capacity

Symbol size		ECC000			ECC050			ECC080			ECC100			ECC140		
		Numeric capacity	Alphanum capacity	8-bit byte capacity	Numeric capacity	Alphanum capacity	8-bit byte capacity	Numeric capacity	Alphanum capacity	8-bit byte capacity	Numeric capacity	Alphanum capacity	8-bit byte capacity	Numeric capacity	Alphanum capacity	8-bit byte capacity
Row	Col															
9	9	3	2	1	—	—	—	—	—	—	—	—	—	—	—	—
11	11	12	8	5	1	1	—	—	—	—	—	—	—	—	—	—
13	13	24	16	10	10	6	4	4	3	2	1	1	—	—	—	—
15	15	37	25	16	20	13	9	13	9	6	8	5	3	—	—	—
17	17	53	35	23	32	21	14	24	16	10	16	11	7	2	1	1
19	19	72	48	31	46	30	20	36	24	16	25	17	11	6	4	3
21	21	92	61	40	61	41	27	50	33	22	36	24	15	12	8	5
23	23	115	76	50	78	52	34	65	43	28	47	31	20	17	11	7
25	25	140	93	61	97	65	42	82	54	36	60	40	26	24	16	10
27	27	168	112	73	118	78	51	100	67	44	73	49	32	30	20	13
29	29	197	131	86	140	93	61	120	80	52	88	59	38	38	25	16
31	31	229	153	100	164	109	72	141	94	62	104	69	45	46	30	20
33	33	264	176	115	190	126	83	164	109	72	121	81	53	54	36	24
35	35	300	200	131	217	145	95	188	125	82	140	93	61	64	42	28
37	37	339	226	148	246	164	108	214	143	94	159	106	69	73	49	32
39	39	380	253	166	277	185	121	242	161	106	180	120	78	84	56	36
41	41	424	282	185	310	206	135	270	180	118	201	134	88	94	63	41
43	43	469	313	205	344	229	150	301	201	132	224	149	98	106	70	46
45	45	500	345	226	380	253	166	333	222	146	248	165	108	118	78	51
47	47	500	378	248	418	278	183	366	244	160	273	182	119	130	87	57
49	49	500	413	271	457	305	200	402	268	176	300	200	131	144	96	63

In case of ECC000, when the symbol size of the row and the column is respectively 9, the maximum number of digits for numeric is 3, that of alphanumeric is 2, and that of 8 bit is 1.

		ECC200		
Symbol size		Numeric capacity	Alphanum capacity	8-bit byte capacity
Row	Col			
10	10	6	3	1
12	12	10	6	3
14	14	16	10	6
16	16	24	16	10
18	18	36	25	16
20	20	44	31	20
22	22	60	43	28
24	24	72	52	34
26	26	88	64	42
32	32	124	91	60
36	36	172	127	84
40	40	228	169	112
44	44	288	214	142
48	48	348	259	172
52	52	408	304	202
64	64	560	418	278
72	72	736	550	366
80	80	912	682	454
88	88	1152	862	574
96	96	1392	1042	694
104	104	1632	1222	814
120	120	2000	1573	1048
132	132	2000	1954	1302
144	144	2000	2000	1556

Rectangular code

		ECC200		
Symbol size		Numeric capacity	Alphanum capacity	8-bit byte capacity
Row	Col			
8	18	10	6	3
8	32	20	13	8
12	26	32	22	14
12	36	44	31	20
16	36	64	46	30
16	48	98	72	47

- (4) When PDF417 or MicroPDF417 is used, the number of symbol characters called code words is limited to 928 or less. Moreover, the data compression rate varies according to the contents of data. Therefore, the maximum number of digits according to modes is as follows.

When letters and numerics are mixed in data in EXC mode, for example, the maximum values become smaller than the values below, since the internal mode selection code is used.

To correct a reading error by designating the security level, the maximum value becomes smaller, since the error correction code words below are used.

When the number of the code words exceeds 928, or when the number of rows exceeds 90, the symbols are not drawn.

For the MicroPDF417, the numbers of rows and columns can be specified.

The maximum number of digits varies according to the setting.

In the case of PDF417

- Extended Alphanumeric Compaction (EXC) mode: 1850 digits
- Binary/ASCII Plus mode: 1108 digits
- Numeric compaction mode: 2000 digits

In the case of MicroPDF417

- Binary mode: 150 digits
- Upper case letter/space mode: 250 digits
- Numeric compaction mode: 366 digits

No. of Error Correction Code Words of PDF417

[For the MicroPDF417, the printer sets the security level automatically.]

Security level	Error Correction Ability	No. of error correction code words
Level 0	<div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 60px;">Low</div> <div style="font-size: 2em; margin: 10px auto;">↑</div> <div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 60px;">High</div> </div>	0
Level 1		2
Level 2		6
Level 3		14
Level 4		30
Level 5		62
Level 6		126
Level 7		254
Level 8		510

The maximum number of columns and rows for the MicroPDF417

Parameter (gg)	No. of columns	No. of rows	Max. number of digits for binary mode	Max. number of digits for upper case letter/space mode	Max. number of digits for numeric mode
00	—	—	150	250	366
01	1	—	22	38	55
02	2	—	43	72	105
03	3	—	97	162	237
04	4	—	150	250	366
05	1	11	3	6	8
06		14	7	12	17
07		17	10	18	26
08		20	13	22	32
09		24	18	30	44
10		28	22	38	55
11	2	8	8	14	20
12		11	14	24	35
13		14	21	36	52
14		17	27	46	67
15		20	33	56	82
16		23	38	64	93
17		26	43	72	105
18	3	6	6	10	14
19		8	10	18	26
20		10	15	26	38
21		12	20	34	49
22		15	27	46	67
23		20	39	66	96
24		26	54	90	132
25		32	68	114	167
26		38	82	138	202
27		44	97	162	237
28	4	4	8	14	20
29		6	13	22	32
30		8	20	34	49
31		10	27	46	67
32		12	34	58	85
33		15	45	76	111
34		20	63	106	155
35		26	85	142	208
36		32	106	178	261
37		38	128	214	313
38		44	150	250	366

* The maximum of 2000 digits of data string to be printed are acceptable. However, note the following limits:

- The maximum of 2000-digit data string to be printed are acceptable. However, it cannot actually be printed, since it cannot be contained within the 2-inch head width.
- If the print ratio of one line (the print head width) is high, printing may become poor, or the printer may be reset. Note the print ratio.

(5) CODE128 code selection

In the case of CODE128 (with auto code selection), code selection is performed in the following manner. (Conforming to USS-128 APPENDIX-G)

- ① Determining the start character
 - (a) If the data begins with four or more consecutive numerals, the start code to be used is (CODE C).
 - (b) In any case other than (a) in ①, if a control character appears before a small letter (see ④.) or four or more consecutive numerals, the start code is (CODE A).
 - (c) In none of the above cases, the start code is (CODE B).
- ② If the data begins with an odd number of digits in (a), ①:
 - (a) Insert the (CODE A) or (CODE B) character just before the last numeric data. When (FNC1), if found in the number, breaks a pair of digits in the number, insert the (CODE A) or (CODE B) character before the numeric data preceding the (FNC1). Selection of (CODE A) or (CODE B) should conform to (b) and (c) in ①.
- ③ If four or more digits of numeric data continue in (CODE A) or (CODE B).
 - (a) When the numeric data is an even number of digits, insert the (CODE C) character just before the first numeric data.
 - (b) When the numeric data is an odd number of digits, insert the (CODE C) character immediately after the first numeric data.
- ④ If a control character appears in (CODE B):
 - (a) In the subsequent data, when a small letter appears before the next control character or four or more consecutive digits, insert the (SHIFT) character before the first control character.
 - (b) When not so, insert the (CODE B) character just before the first control character.
- ⑤ If a small letter appears in (CODE A):
 - (a) In the subsequent data, when a control character appears before the next small letter or four or more consecutive digits, insert the (SHIFT) character before the first small letter.
 - (b) When not so, insert the (CODE B) character just before the first small letter.
- ⑥ If any data other than the numerals appears in (CODE C):
 - (a) Insert the (CODE A) or (CODE B) character just before the data other than the numerals. Selection of (CODE A) or (CODE B) should conform to (b) and (c) in ①.

(6) CODE128 code selection check

Check if selection of (CODE A), (CODE B), or (CODE C) of CODE128 has been set correctly. If an error is found, the bar code will not be drawn.

[Conditions causing an error]

- ① No start code is designated.
- ② A small letter (including { , | , } , ~ , _) is found in (CODE A).
- ③ A control character is found in (CODE B).
- ④ Any data other than the numerals, (FNC1), (CODE A), and (CODE B) is found in (CODE C).
- ⑤ There are two or more consecutive (SHIFT) characters.
- ⑥ The number in (CODE C) is an odd number of digits.
- ⑦ (SHIFT) is followed by (CODE A), (CODE B) or (CODE C).

(7) Kanji code selection

- In the case of Data Matrix, PDF417, and QR code, Kanji codes can be printed. Shift JIS and JIS 8 codes can be mixed.

(8) When manual mode is selected in the Format Command for a QR code

- ① Numeric mode, alphanumeric and symbol mode, Kanji mode

Mode selection	Data to be printed
----------------	--------------------

- ② Binary mode

Mode selection	No. of data strings (4 digits)	Data to be printed
----------------	-----------------------------------	--------------------

- ③ Mixed mode

Data	“,” (comma)	Data	“,” (comma)	Data
------	-------------	------	-------------	------

The QR code can handle all codes including alphanumerics, symbols, and Kanji. Since data compression rate varies according to codes, the code to be used is designated when the mode is selected.

Mode	Code	Details
N	Numerals	0 to 9
A	Alphanumerics, symbols	A to Z 0 to 9 space \$ % * + - . / :
B	Binary (8-bit)	00H to FFH
K	Kanji	Shift JIS, JIS hexadecimal

If mixed mode is selected, up to 200 modes can be selected in a QR code.

- (9) When the automatic mode is selected in the Format Command for a QR code.

Data to be printed

① How to send the control code data

NUL (00H)	=	> @ (3EH, 40H)
SOH (01H)	=	> A (3EH, 41H)
STX (02H)	=	> B (3EH, 42H)

⋮

GS (1DH)	=	>] (3EH, 5DH)
RS (1EH)	=	> ^ (3EH, 5EH)
US (1FH)	=	> _ (3EH, 5FH)

② How to send the special codes

> (3EH)	=	> 0 (3EH, 30H)
---------	---	----------------

(10) Transfer code for QR code

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p								
1	SOH	DC1	!	1	A	Q	a	q								
2	STX	DC2	"	2	B	R	b	r								
3	ETX	DC3	#	3	C	S	c	s								
4	EOT	DC4	\$	4	D	T	d	t								
5	ENQ	NAK	%	5	E	U	e	u								
6	ACK	SYN	&	6	F	V	f	v								
7	BEL	ETB	'	7	G	W	g	w								
8	BS	CAN	(8	H	X	h	x								
9	HT	EM)	9	I	Y	i	y								
A	LF	SUB	*	:	J	Z	j	z								
B	VT	ESC	+	;	K	[k	{								
C	FF	FS	,	<	L	\	l									
D	CR	GS	-	=	M]	m	}								
E	SO	RS	•	>	N	^	n	~								
F	SI	US	/	?	O	_	o	DEL								

* The shaded parts are Japanese.
They are omitted here.

FFH data cannot be used in the automatic mode, but can be used in the manual mode.

(11) Examples of data designation for QR code

① Alphanumeric mode: ABC123

A A B C 1 2 3
 ↑
 Data to be printed
 Designation of mode

② Binary mode: 01H, 03H, 05H

B 0 0 0 6 > A > C > E
 ↑
 Data to be printed
 No. of data strings
 Designation of mode

③ Mixed mode

Numeric mode : 123456
 Kanji mode : Kanji data
 Binary mode : a ア i イ u ウ e エ o オ
 Alphanumeric mode : ABC

N 1 2 3 4 5 6, K Kanji data, B 0 0 1 0 a ア i イ u ウ e エ o オ, A A B C
 ↑ Data to be printed ↑ Data to be printed ↑ No. of data strings Data to be printed ↑ Data to be printed
 Designation of mode

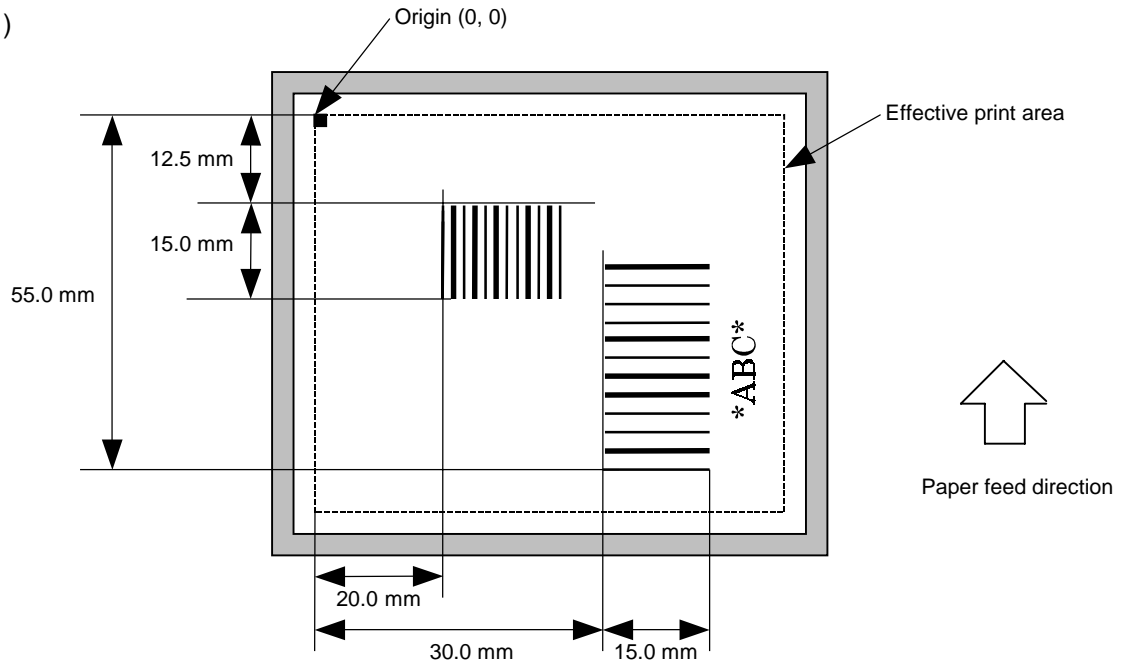
④ Automatic mode

When the data above (③) is designated in automatic mode:

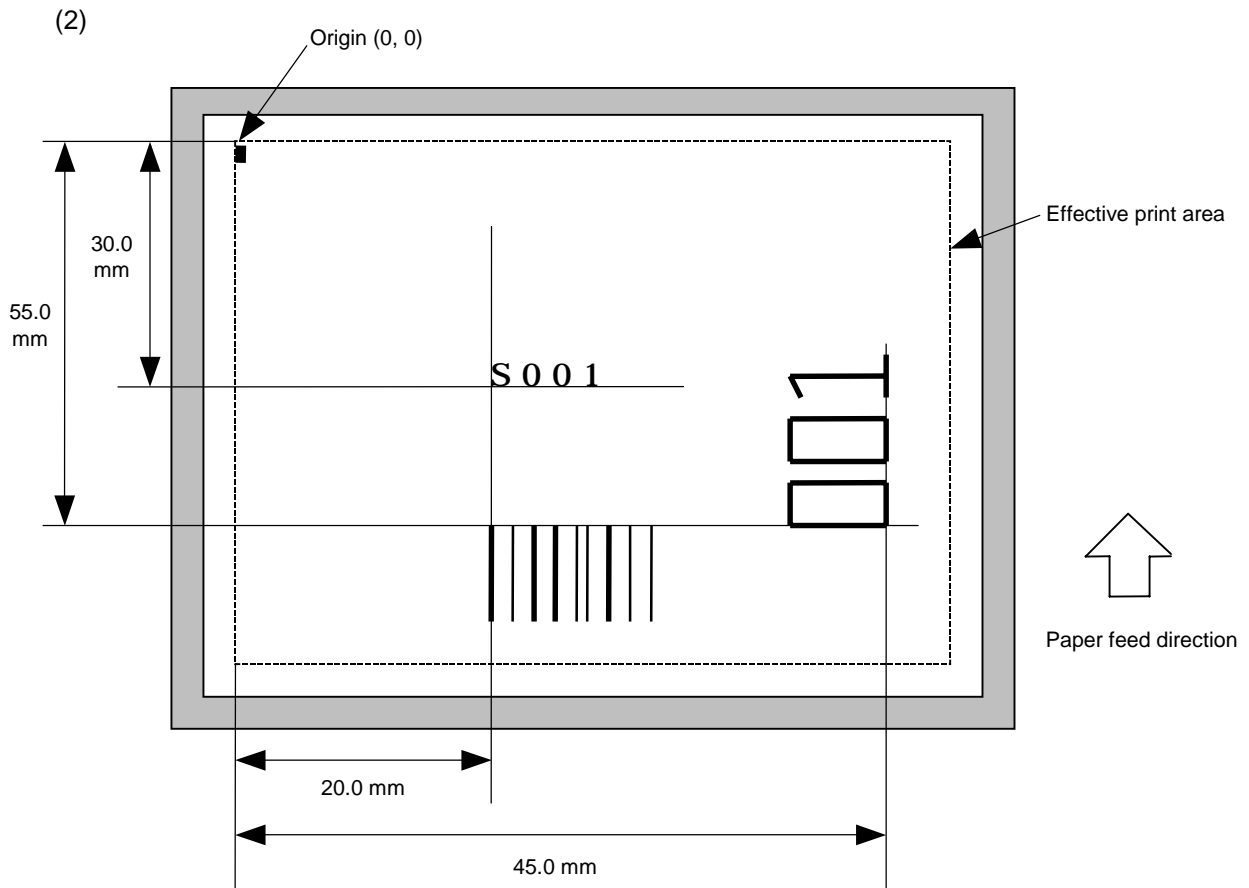
1 2 3 4 5 6 Kanji data a ア i イ u ウ e エ o オ A B C
 Data to be printed

Examples

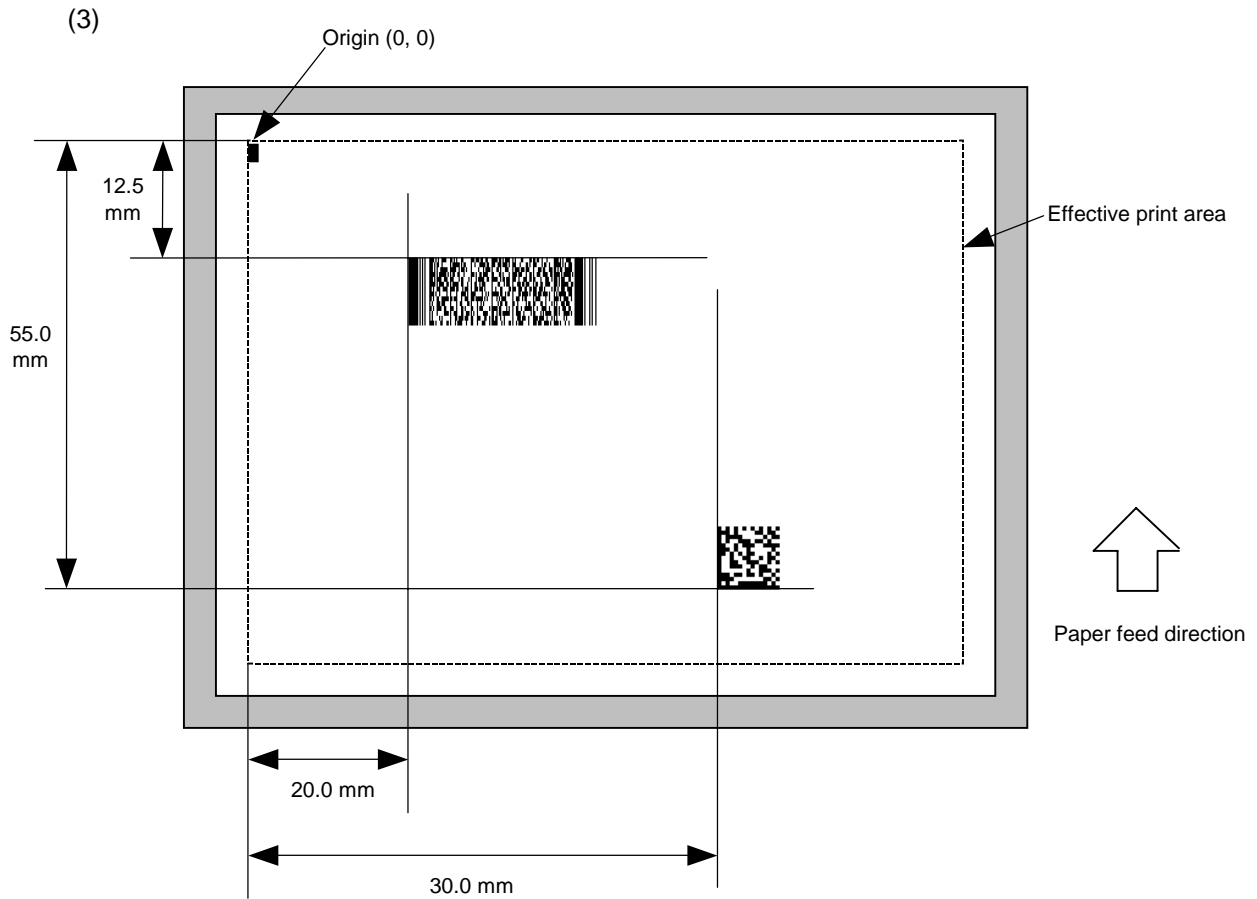
(1)



```
[ESC]C[LF][NUL]
[ESC]XB01;0100,0125,3,1,02,02,06,06,02,0,0150[LF][NUL]
[ESC]XB02;0300,0550,3,1,02,04,07,08,04,3,0150,+0000000000,1,00,N[LF][NUL]
[ESC]RB01;12345[LF][NUL]
[ESC]RB02;*ABC*[LF][NUL]
[ESC]XS;l,0002,0002C3000[LF][NUL]
```



```
[ESC] C [LF] [NUL]
[ESC] PC001; 0200, 0300, 1, 1, C, 00, B=S001 [LF] [NUL]
[ESC] PV01; 0450, 0550, 0200, 0150, B, 33, B=001 [LF] [NUL]
[ESC] XB01; 0200, 0550, 3, 1, 02, 02, 06, 06, 02, 0, 0150=S001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```



```
[ESC]C[LF][NUL]
[ESC]XB01;0100,0125,P,04,02,03,0,0010[LF][NUL]
[ESC]XB02;0300,0550,Q,08,03,05,3[LF][NUL]
[ESC]RB01;PDF417[LF][NUL]
[ESC]RB02;Data Matrix[LF][NUL]
[ESC]XS;l,0002,0002C3000[LF][NUL]
```

5.7.4 TWO-DIMENSIONAL CODE DATA COMMAND (Maxicode) [ESC] RB

Function	Provides data for the two-dimensional code.
Format	<p>For mode 2 or 3: [ESC] RBaa; bbbbbbccccdddeeee --- eeee [LF] [NUL]</p> <p>For mode 4 or 6: [ESC] RBaa; ffffffffggggg --- ggggg [LF] [NUL]</p>
Term	<p>aa: Two-dimensional code number</p> <p>bbbbbbb: Postal code Fixed as 9 digits</p> <ul style="list-style-type: none"> Mode 2: <ul style="list-style-type: none"> b1b2b3b4b5: Zip code Fixed as 5 digits (Numerics) b6b7b8b9: Zip code extension Fixed as 4 digits (Numerics) Mode 3: <ul style="list-style-type: none"> b1b2b3b4b5b6: Zip code Fixed as 6 digits (Character "A" of code set) b7b8b9: Vacant Fixed as 3 digits (20H) <p>ccc: Class of service Fixed as 3 digits (Numerics)</p> <p>ddd: Country code Fixed as 3 digits (Numerics)</p> <p>eee --- eee: Message data strings 84 digits</p> <p>fffffff: Primary message data strings 9 digits</p> <p>ggg --- ggg: Secondary message data strings 84 digits</p>
Explanation	<p>(1) When any value other than numerics is included in the data string of zip code (mode 2), zip code extension, class of service, or country code, a Maxicode is not drawn.</p> <p>(2) If the message data is less than 84 digits when mode 2 or 3 is selected, the printer adds a CR (000000) at the end of the data, and the remaining digits will be padded with FSs (011100). When message data exceeding 84 digits is received, the excess data will be discarded before drawing a Maxicode.</p> <p>(3) If the message data is less than 93 digits (9 digits + 84 digits) when mode 4 or 6 is selected, the printer adds a CR (000000) at the end of the data, and the remaining digits will be padded with FSs (011100). When message data exceeding 93 digits is received, the excess data will be discarded before drawing a Maxicode.</p> <p>(4) Mode 6 should not be used for usual operation since it is used for scanner programming.</p> <p>(5) No. of digits of data</p> <p>The data exceeding the maximum number of digits, the excess data will be discarded.</p> <p>The maximum number of digits varies according to the mode. In mode 2 or 3 and mode 4 or 6, the maximum number of digits is 84 and 93, respectively.</p>

5.8 COMMANDS RELATED TO ISSUE AND FEED

5.8.1 ISSUE COMMAND

[ESC] XS

Function	Issues labels according to the print conditions programmed.	
Format	[ESC] XS; l, aaaa, bbbcd efgh [LF] [NUL]	
Term	aaaa:	Number of labels to be issued 0001 to 9999
	bbb:	Reserved area 000 to 100
	c:	Type of sensor 0: No sensor 1: Reflective sensor 2: Transmissive sensor (when using normal labels) 3: Reserved (If specified, it is processed as "2".) 4: Reserved (If specified, it is processed as "1".)
	d:	Reserved area C, D, E
	e:	Reserved area 1 to 9, A
	f:	Reserved area 0 to 2
	g:	Reserved area Fixed as 1
	h:	Type of status response 0: No status response 1: Status response
Explanation	(1)	Number of labels to be issued <ul style="list-style-type: none"> ① If increment/decrement is not specified, the designated number of pieces with the same drawing data will be issued. ② If increment/decrement is specified, the designated number of pieces will be issued while incrementing/decrementing the piece of the designated drawing area. ③ In strip mode, one label is forcefully printed, regardless of the specified number of labels to be issued. <p>* The increment/decrement designation is valid until the Image Buffer Clear Command ([ESC] C) is transmitted.</p>

(2) Type of sensor

① No sensor: Printing takes place according to the parameter designated by the Label Size Set Command.

② Reflective sensor:

Printing takes place according to the parameter designated by the Label Size Set Command. However, the black mark provided on the back side of the tag paper is automatically sensed by the reflective sensor and the paper position is finely adjusted for every piece.

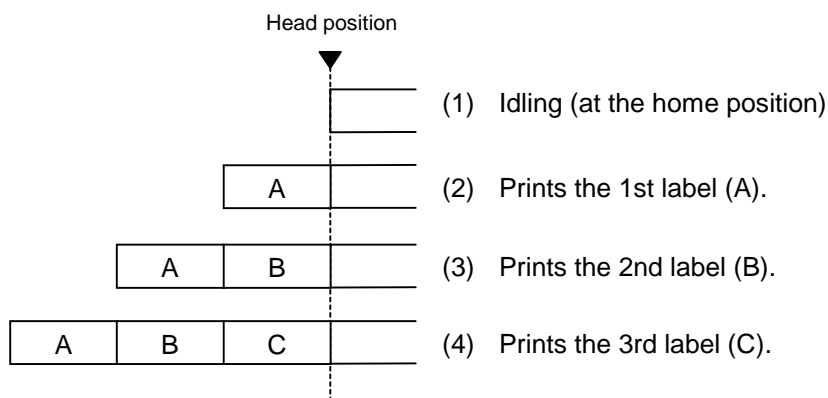
③ Transmissive sensor (when using normal labels):

Printing takes place according to the parameter designated by the Label Size Set Command. However, the label-to-label gap is automatically sensed by the transmissive sensor and the paper position is finely adjusted for every piece.

(3) Issue mode

[C: Batch mode (Issue count: 3)]

- “Automatic forward feed standby” is set to OFF in the system mode.



(4) Status response

When the option with status response has been selected, a status response is made at the end of printing or if an error occurs.

In the batch mode, the print end status response is made after printing on the designated number of labels.

In the strip mode, the status response is made after printing one label.

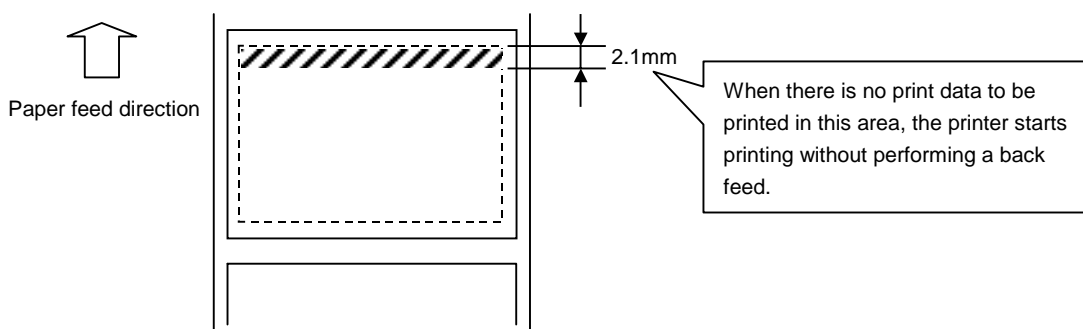
* Do not change the parameter for status response/no status response during printing. Otherwise the status response may not be performed properly.

(5) Reserved area (Omissible)

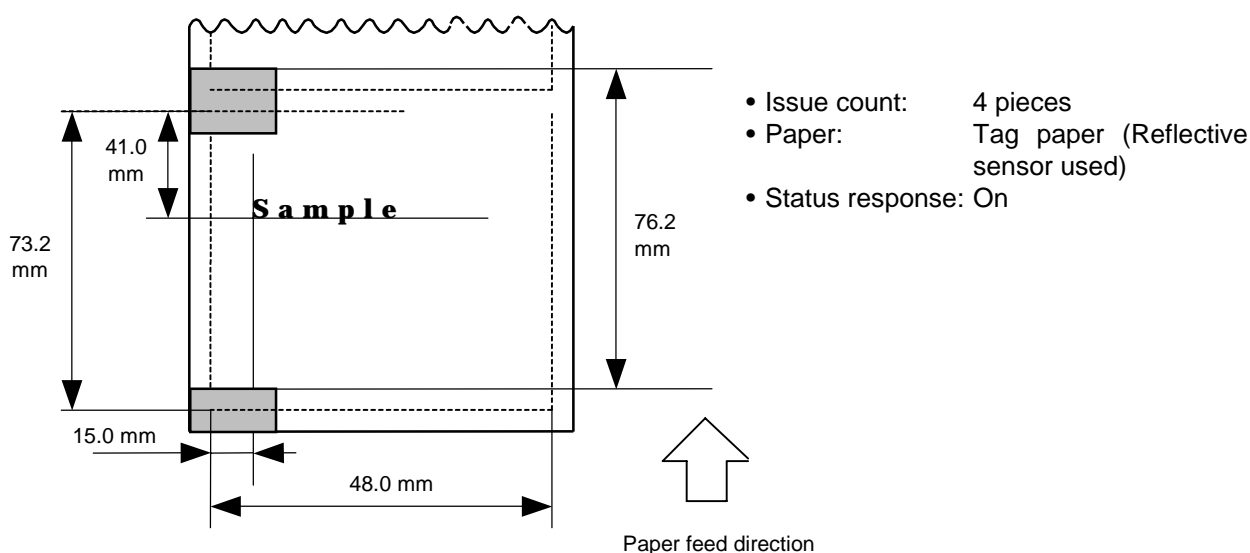
The reserved parameters are not checked.

Notes

- (1) The settings for the type of sensor and the status response are protected in memory (even if the power is turned off).
- (2) When the sensor is specified, even if a gap or a black mark is detected within less than 90% of the effective print length specified by the Label Size Set Command, it is ignored.
However, this is not applicable when the programmed media pitch is less than 40mm. When this media is used and a gap or a black mark is detected within less than 90% of the effective print length, the detected gap or black mark will be effective. As a result, printing will stop even if it is halfway.
- (3) The printer supports the two issue modes: batch mode and strip mode. In the batch mode, the printer starts printing after performing a back feed regardless of the selected sensor type. In the strip mode, a back feed is not performed.
* With the firmware V1.3 or greater, a back feed is not performed even in batch issue mode if there is no print data to be printed within 2.1 mm from the top of the print area.



Examples

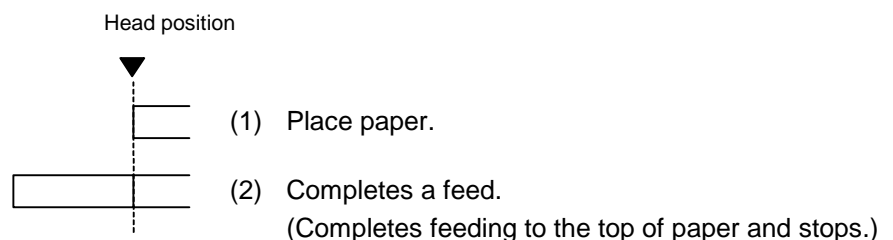


```
[ESC] D0762, 0480, 0732 [LF] [NUL]
[ESC] T11C30 [LF] [NUL]
[ESC] C [LF] [NUL]
[ESC] PC001; 0150, 0410, 1, 1, A, 00, B [LF] [NUL]
[ESC] RC001; Sample [LF] [NUL]
[ESC] XS; I, 0004, 0011C8001 [LF] [NUL]
```

5.8.2 FEED COMMAND**[ESC] T**

Function	Feeds the paper.
Format	[ESC] Tabcde [LF] [NUL]
Term	a: Type of sensor 0: No sensor 1: Reflective sensor 2: Transmissive sensor (when using normal labels) 3: Reserved (If specified, it is processed as "2".) 4: Reserved (If specified, it is processed as "1".) b: Reserved area 0 to 1 c: Reserved area C, D, E d: Reserved area 1 to 9, A e: Reserved area 0 to 2

Explanation	(1) Type of sensor ① No sensor: Feeding takes place according to the parameter designated by the Label Size Set Command. ② Reflective sensor: Feeding takes place according to the parameter designated by the Label Size Set Command. However, the black mark provided on the back side of the tag paper is automatically sensed by the reflective sensor and the stop position is finely adjusted. ③ Transmissive sensor (when using normal labels): Feeding takes place according to the parameter designated by the Label Size Set Command. However, the label-to-label gap is automatically sensed by the transmissive sensor and the stop position is finely adjusted.
-------------	--

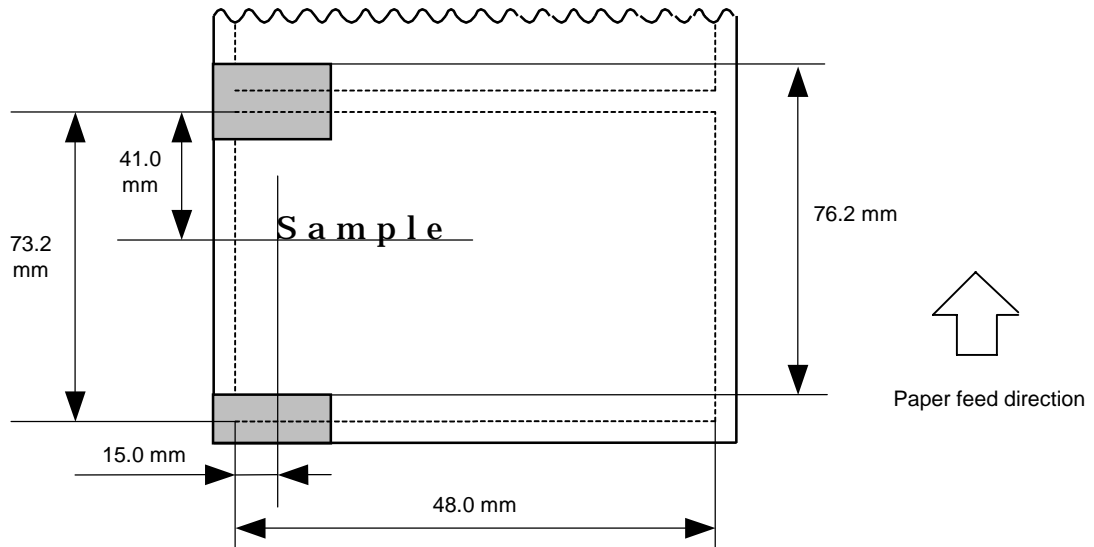
(2) Feed mode**(3) Reserved area (Omissible)**

The reserved parameters are not checked.

Notes

- (1) If a change of label size or type of sensor, or the position fine adjustment is made, one label must be fed to align the paper with the first print position prior to printing.
- (2) The setting for the "type of sensor" is protected in memory (even if the power is turned off).
- (3) When "status response" is specified by the Issue Command, a status response is made after the end of feed or when an error occurs.

Examples



```
[ESC] D0762, 0480, 0732 [LF] [NUL]
[ESC] AX; +010, +000, +10 [LF] [NUL]
[ESC] T11C30 [LF] [NUL]
[ESC] C [LF] [NUL]
[ESC] PC001; 0150, 0410, 1, 1, A, 00, B [LF] [NUL]
[ESC] RC001; Sample [LF] [NUL]
[ESC] XS; I, 0004, 0011C3001 [LF] [NUL]
```

5.9 COMMANDS RELATED TO FORMAT

5.9.1 FLASH MEMORY FORMAT COMMAND

[ESC] J1

Function	Formats (initializes) the flash memory for storage.
Format	[ESC] J1; a (, b) [LF] [NUL]
Term	<p>a: Formatting (initializing) range</p> <p>A: All area of flash memory</p> <p>B: PC save area of flash memory</p> <p>C: Writable character storage area of flash memory</p> <p>b: Reserved area (Omissible)</p> <p>0 to 2</p>
Explanation	<p>(1) The storage area of flash memory can be roughly divided into the PC save area and the writable character storage area. They can be formatted (initialized) either separately or at the same time.</p> <p>(2) When using flash memory for the first time, the area to be used must be formatted (initialized) before the PC interface command is saved or writable characters are stored.</p> <p>(3) After flash memory is formatted, the remaining memory is the PC save area (192 Kbytes) and the writable character storage area (64 Kbytes).</p> <p>(4) When the already stored data (PC interface commands or writable characters) is stored again, memory is consumed with every storing unless the Flash Memory Format Command ([ESC] J1) is transmitted.</p> <p>(5) When the label issue operation is performed after the Flash Memory Format Command is sent, the image buffer is automatically cleared.</p> <p>(6) Reserved area (Omissible)</p> <p>The reserved parameters are not checked.</p>
Notes	<p>(1) The storage area is automatically optimized.</p> <p>(2) The writable character storage area is shared between the TPCL-LE mode and the LABEL mode. Therefore, if flash memory is initialized, writable characters stored in the LABEL mode are also erased.</p>
Refer to	<ul style="list-style-type: none"> • Bit Map Writable Character Command ([ESC] XD) • Save Start Command ([ESC] XO) • Save Terminate Command ([ESC] XP)
Example	[ESC] J1; A, 1 [LF] [NUL]

5.10 COMMANDS RELATED TO WRITABLE CHARACTERS

5.10.1 BIT MAP WRITABLE CHARACTER COMMAND

[ESC] XD

Function	Stores writable characters and logos into flash memory.
Format	[ESC] XD; (Sj,) aa, b, ccc, ddd, eee, fff, ggg, h, iii ----- iii [LF] [NUL]
Term	<p>Sj: Reserved area (Omissible) j: 0 to 2</p> <p>aa: Writable character set 01 41 16 × 16 dots 42 24 × 24 dots</p> <p>b: Writable character code 20H to FFH (Set in hex.) 40H to 7EH, 80H to FCH (When the writable character set is 41 or 42)</p> <p>ccc: Left offset 000 to 719 (in dots)</p> <p>ddd: Top offset 000 to 719 (in dots)</p> <p>eee: Character width 001 to 720 (in dots)</p> <p>fff: Character height 001 to 720 (in dots)</p> <p>ggg: Horizontal spacing/proportional spacing 000 to 999 (in dots)</p> <p>h: Type of writable character data 0: Nibble mode (4 bits/byte) 1: Hex. mode (8 bits/byte)</p> <p>iii --- iii: Writable character data to be stored</p> <p>* If each parameter for left offset, top offset, character width, character height, and horizontal spacing/proportional spacing is fixed as “000”, the setting is ignored when the writable character set is 41 or 42.</p>

Explanation

(1) Type of writable character

The maximum number of characters varies depending on the writable character size and number of characters because of the limited memory capacity. For writable character sets 41 or 42, each writable character size is fixed.

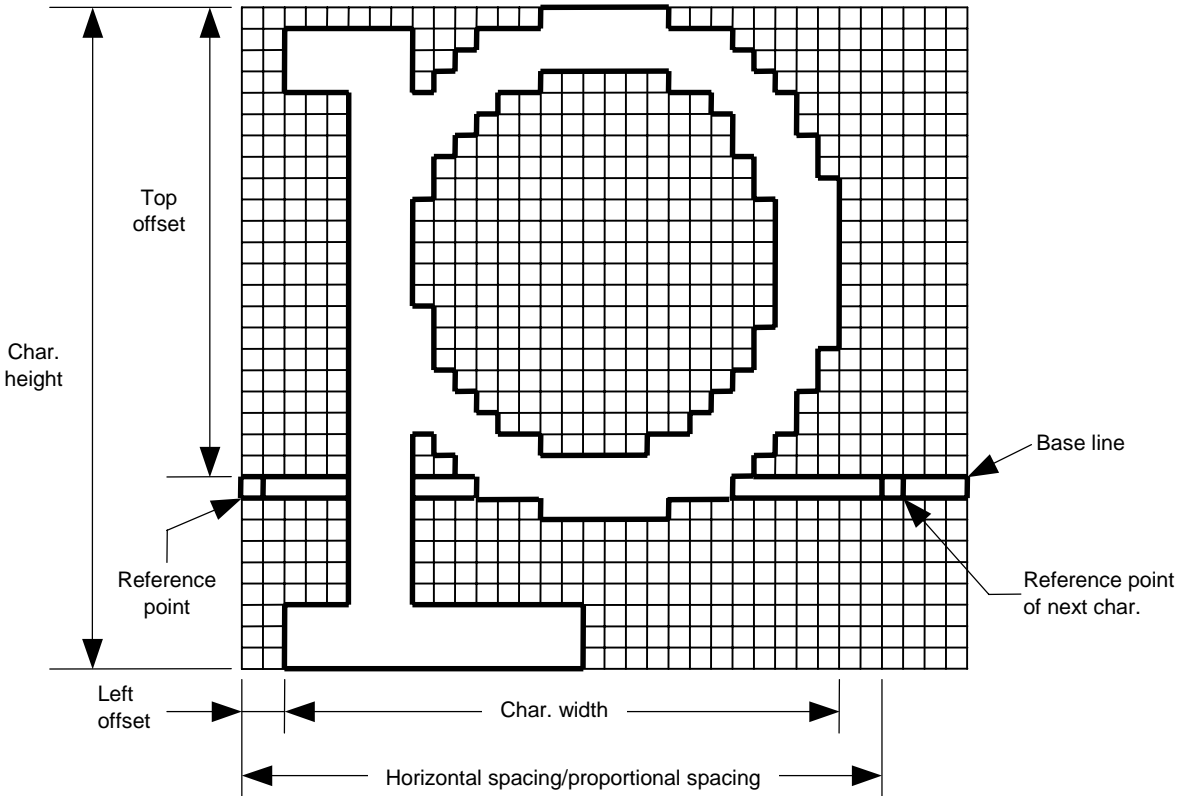
(2) Character code

Up to 224 characters can be stored per character set. The maximum number of characters are 1 set × 224 characters = 224 characters. It varies depending on the writable character size and the number of characters because of the limited memory capacity. For character sets 41 and 42, a character code consisting of 1 byte is stored. However, when the character code is called up, F0H is added to the upper digit of it, and consists of 2 bytes. In this case, up to 188 characters can be stored per character set.

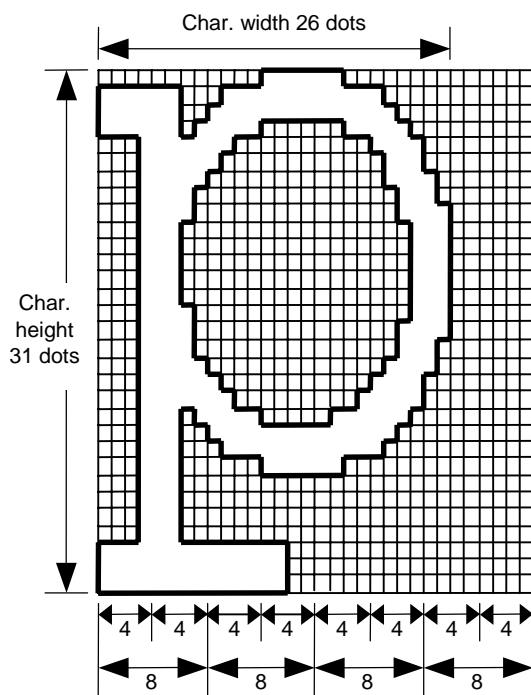
(3) Reserved area

Even if any value is set regardless of the value range, it is accepted.

(4) Each parameter



(5) Writable character set: 01



Nibble mode															
1	30H	2	30H	3	30H	4	3FH	5	3CH	6	30H	7	30H	8	30H
9	3FH	10	3CH	11	37H				.						
									.						
									.						
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Hex. mode			
1	00H	2	0FH
3	C0H	4	00H
5	FCH	6	7FH
			.
			.
			.
			.
			.
			.
			.
			.
			120 00H
121	FFH	122	FCH
123	00H	124	00H

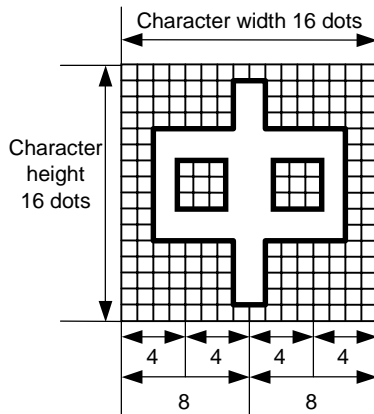
[Nibble mode]

- (1) The writable character data to be stored is separated into four dot units and sent in the following order (**1** → **248**). (High order digit: “3”)
- (2) The data of writable characters to be stored is 30H to 3FH.
- (3) The minimum unit of character width is 8 dots. Dots with no data are transmitted as data 0.
- (4) The number of bytes of the writable character to be stored must be as follows:
The number of bytes of the writable character to be stored =
 $\{(\text{No. of char. width dots} + 7) / 8 \} \times \text{No. of char. height dots} \times 2$
* The value in the brackets is rounded down to the nearest whole number.

[Hex. mode]

- (1) The writable character data to be stored is separated into eight dot units and sent in the following order (**1** → **124**).
- (2) The data of writable characters to be stored is 00H to FFH.
- (3) The minimum unit of character width is 8 dots. Dots with no data are transmitted as data 0.
- (4) The number of bytes of the writable character to be stored must be as follows:
 The number of bytes of the writable character to be stored =
 $\{(\text{No. of char. width dots} + 7) / 8 \} \times \text{No. of char. height dots}$
* The value in the brackets is rounded down to the nearest whole number.

(6) Writable character set: 41 (16×16 dots)



Nibble mode			
1	30H	2	30H
3	30H	4	30H
5	30H	6	31H
		7	38H
			.
			.
			.
		58	31H
		59	38H
		60	30H
61	30H	62	30H
		63	30H
		64	30H

Hex. mode			
1	00H	2	00H
3	01H	4	80H
5	01H	6	80H
		7	01H
			.
			.
			.
		26	80H
		27	01H
		28	80H
29	01H	30	80H
31	00H	32	00H

[Nibble mode]

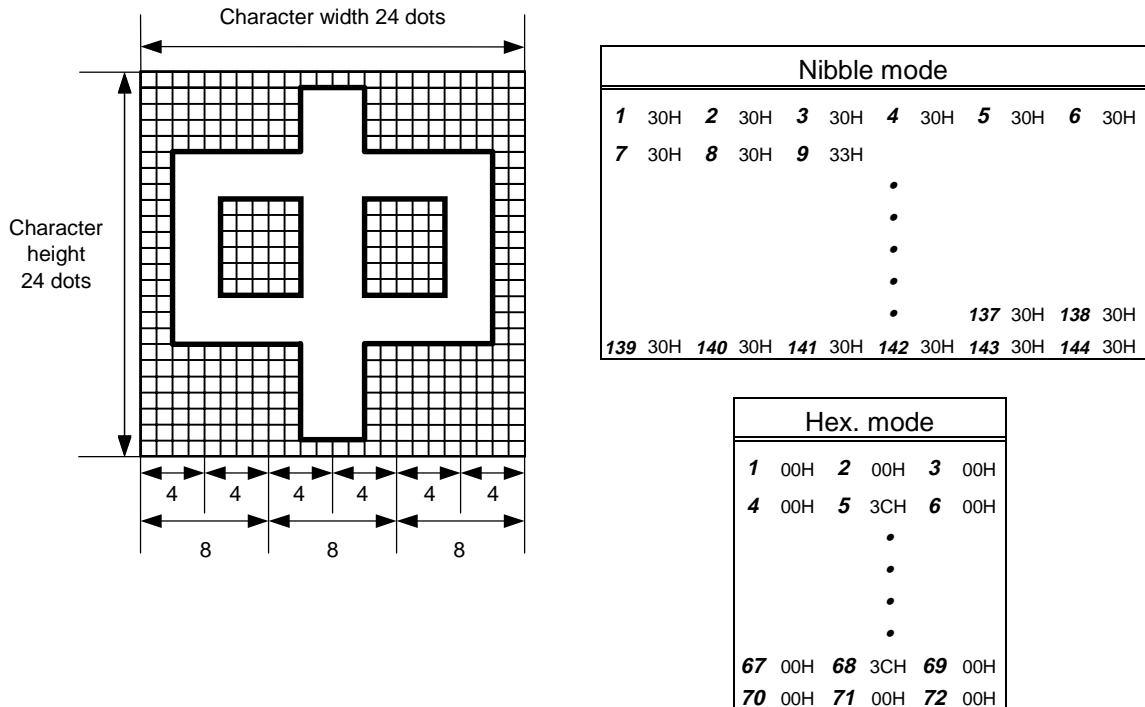
- (1) The writable character data to be stored is separated into four dot units and sent in the following order (**1** → **64**). (High order digit: “3”)
- (2) The data of writable characters to be stored is 30H to 3FH.
- (3) The number of bytes of the writable character to be stored should be 64 bytes.

[Hex. mode]

- (1) The writable character data to be stored is separated into eight dot units and sent in the following order (**1** → **32**).
- (2) The data of writable characters to be stored is 00H to FFH.
- (3) The number of bytes of the writable character to be stored should be 32 bytes.

* When writable character 41 is designated, the width and height of the character are both 16 dots.

(7) Writable character set: 42 (24x24 dots)



[Nibble mode]

- (1) The writable character data to be stored is separated into four dot units and sent in the following order (**1** → **144**). (High order digit: "3")
- (2) The data of writable the writable character to be stored should be 144 bytes.

[Hex. mode]

- (1) The writable character data to be stored is separated into eight dot units and sent in the following order (**1** → **72**).
- (2) The data of writable characters to be stored is 00H to FFH.
- (3) The number of bytes of the writable character to be stored should be 72 bytes.

* When writable character 42 is designated, the width and height of the character are both 24 dots.

- (8) No matter what character set or character code is selected, no memory will be wasted.
- (9) A character code already stored can be stored in flash memory again, if the Bit Map Writable Character Store Command ([ESC] XD) is transmitted. However, memory will be consumed with every storage. Memory can be efficiently used by sending the Flash Memory Format Command ([ESC] J1) before storing.

Notes

- (1) With the same writable character set designated, character width and character height can be designated for each writable character code. In other words, character size can be changed for each character, thus saving memory.
- (2) Proportional spacing and descending characters are possible by the parameters of horizontal spacing/proportional spacing, left offset, and top offset.
- (3) When top offset is 000, the reference coordinates are at the above left when drawing because the base line is at the top. (Coordinate setting is facilitated for logos.)
- (4) The resolution of the width and height is 8 dots/mm respectively. Writable character 01 can be printed in a size of up to 48 mm x 90 mm. (This is because the effective print width is 384 dots though the character width is settable up to 720 dots.)

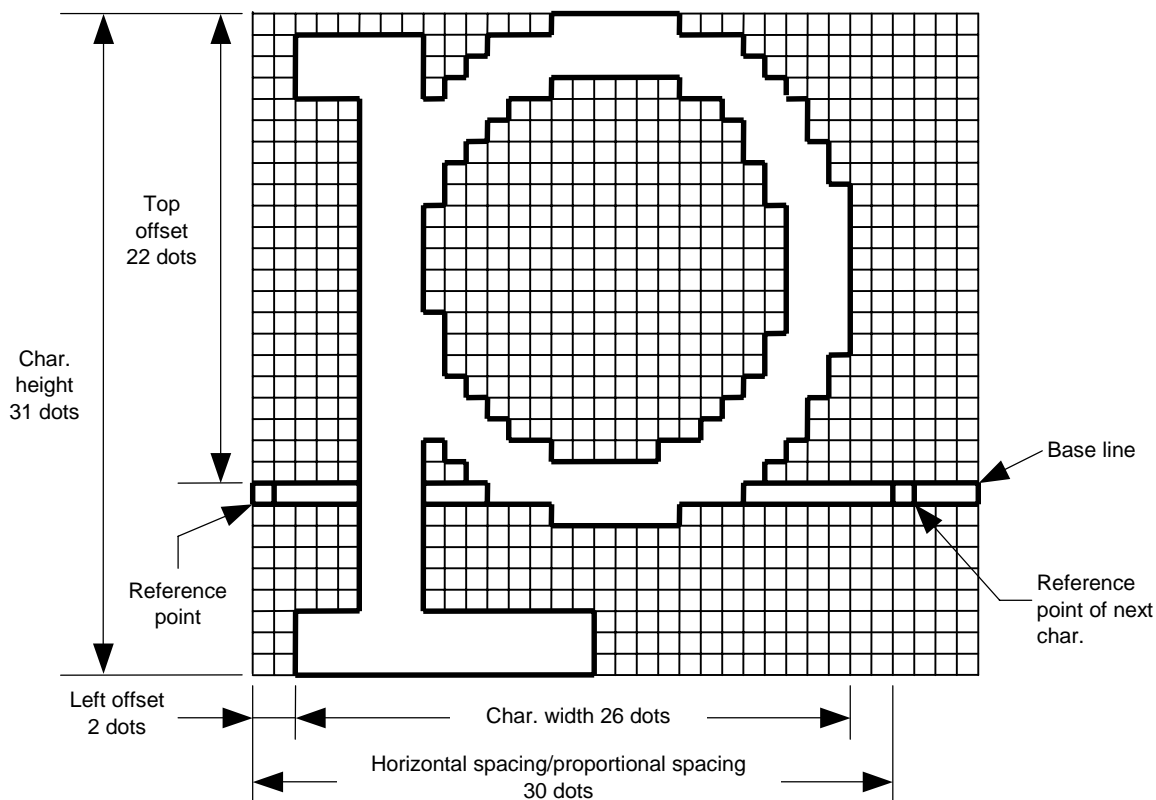
Refer to

Flash Memory Format Command ([ESC] J1)

Examples

Writable character set: 01

Writable character code: 70H



```
[ESC] J1; C [LF] [NUL]
```

```
[ESC] XD; 03, p, 002, 022, 026, 031, 030, 0, 000?<000?<7??800?<???<00?=?03>001?<00?001?8007001?0007801>0003801>0003<01<0001<01<0001<01<0001<01<0001<01>001<01>0003<01>0003801?0007801?800?001?<01?001=?07>001<???<001<7??8001<0?<0001<0000001<0000001<0000001<000000?<0000???<0000???<0000 [LF] [NUL]
```

- * 30H = "0"
- 31H = "1"
- 32H = "2"
- 33H = "3"
- 34H = "4"
- 35H = "5"
- 36H = "6"
- 37H = "7"
- 38H = "8"
- 39H = "9"
- 3AH = "."
- 3BH = ","
- 3CH = "<"
- 3DH = "="
- 3EH = ">"
- 3FH = "?"

5.11 COMMANDS RELATED TO GRAPHICS

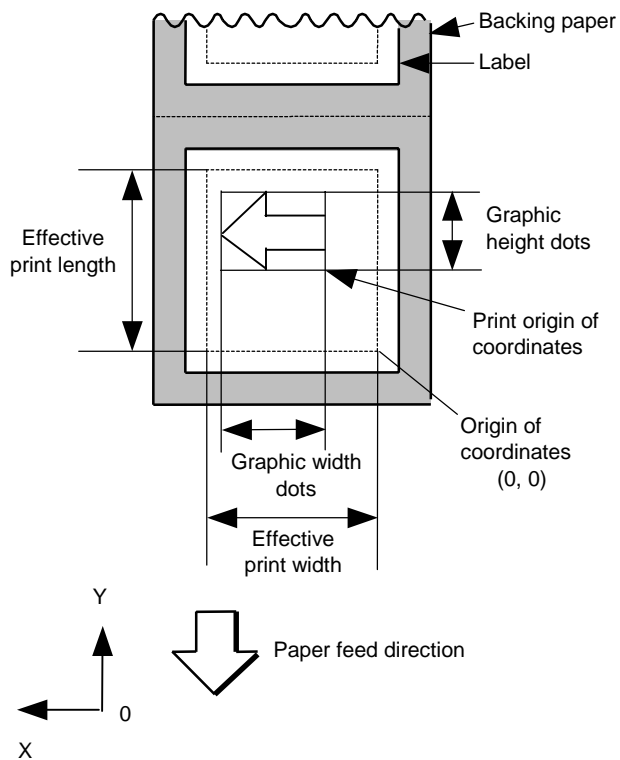
5.11.1 GRAPHIC COMMAND

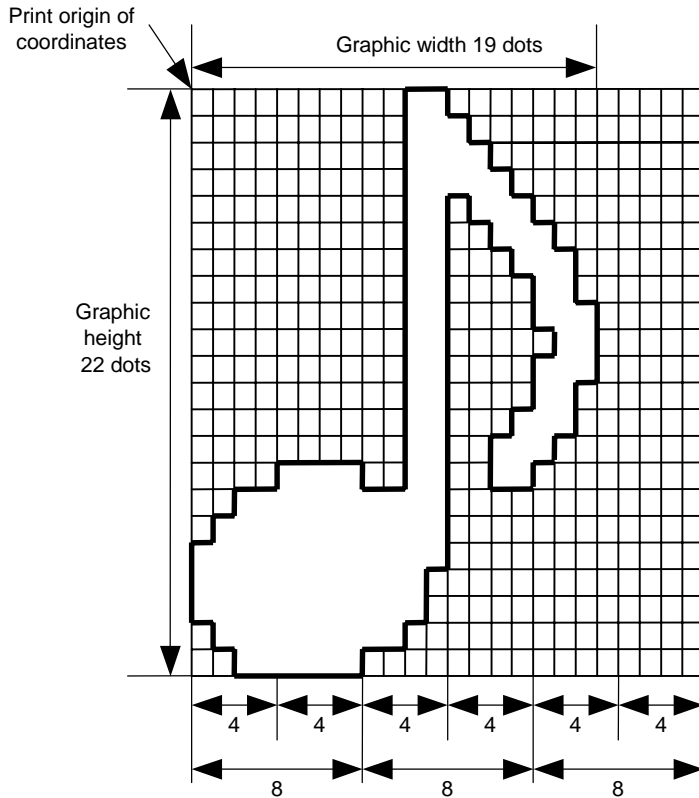
[ESC] SG

Function	Draws graphic data.																
Format	[ESC] SG; aaaa(D), bbbb(D), cccc, dddd, e, fff --- fff [LF] [NUL]																
Term	<p>aaaa(D): Print origin of X-coordinate for drawing graphic data Fixed as 4 digits (in 0.1 mm units) * If "D" is attached after a 4-digit value, the coordinate is specified in dots. 0000D ~</p> <p>bbbb(D): Print origin of Y-coordinate for drawing graphic data 4 or 5 digits (in 0.1 mm units) * If "D" is attached after a 4- or 5-digit value, the coordinate is specified in dots. 0000D ~</p> <p>cccc: No. of graphic width dots Fixed as 4 digits (in dots) However, when the graphic data "2: BMP file" or "6: PCX file" is selected, this designation is ignored. (The information of the graphic width is contained in the graphic data.)</p> <p>dddd: No. of graphic height dots 4 or 5 digits (in dots) However, when the graphic data "2: BMP file" or "6: PCX file" is selected, this designation is ignored. (The information of the graphic width is contained in the graphic data.) When "3: TOPIX compression mode" is selected for the type of graphic data: Resolution of graphic data: *only two types { 0150: 150 DPI (The data is drawn in double resolution.) 0300: 300 DPI (The data is drawn in single resolution.)</p> <p>e: Type of graphic data</p> <table><tr><td>0: Nibble mode (4 dots/byte)</td><td>Overwrite drawing</td></tr><tr><td>1: Hex. mode (8 dots/byte)</td><td>Overwrite drawing</td></tr><tr><td>2: BMP file mode</td><td>Overwrite drawing</td></tr><tr><td>3: TOPIX compression mode</td><td>Overwrite drawing</td></tr><tr><td>4: Nibble mode (4 dots/byte)</td><td>OR drawing</td></tr><tr><td>5: Hex. mode (8 dots/byte)</td><td>OR drawing</td></tr><tr><td>6: PCX file mode</td><td>Overwrite drawing</td></tr><tr><td>7: TOPIX compression mode</td><td>XOR drawing</td></tr></table> <p>fff --- fff: Graphic data</p>	0: Nibble mode (4 dots/byte)	Overwrite drawing	1: Hex. mode (8 dots/byte)	Overwrite drawing	2: BMP file mode	Overwrite drawing	3: TOPIX compression mode	Overwrite drawing	4: Nibble mode (4 dots/byte)	OR drawing	5: Hex. mode (8 dots/byte)	OR drawing	6: PCX file mode	Overwrite drawing	7: TOPIX compression mode	XOR drawing
0: Nibble mode (4 dots/byte)	Overwrite drawing																
1: Hex. mode (8 dots/byte)	Overwrite drawing																
2: BMP file mode	Overwrite drawing																
3: TOPIX compression mode	Overwrite drawing																
4: Nibble mode (4 dots/byte)	OR drawing																
5: Hex. mode (8 dots/byte)	OR drawing																
6: PCX file mode	Overwrite drawing																
7: TOPIX compression mode	XOR drawing																

Explanation

- (1) When the graphic data "0", "1", "2", "3", or "6" is selected, the graphic data is drawn by overwriting the image buffer.
- (2) When the graphic data "4" or "5" is selected, the graphic data is drawn by carrying out OR between the graphic data and the data in the image buffer.
- (3) When the graphic data "7" is selected, the graphic data is drawn by carrying out OR between the graphic data and the data in the image buffer.



[illegible]

Hex. mode			
1	00H	2	30H
3	00H		
4	00H	5	38H
			•
			•
			•
			•
			•
			63 00H
64	3FH	65	00H
		66	00H

[Nibble mode]

- (1) The graphic data is separated into four dot units and sent in the following order (**1** → **132**). (High order digit: “3”)
- (2) The graphic data is 30H to 3FH.
- (3) The minimum unit of graphic width is 8 dots. Dots with no data are transmitted as data 0.
- (4) The number of bytes of the graphic to be transmitted must be as follows:
The number of bytes of the graphic to be transmitted = {(No. of graphic width dots + 7)/8} × No. of graphic height dots × 2

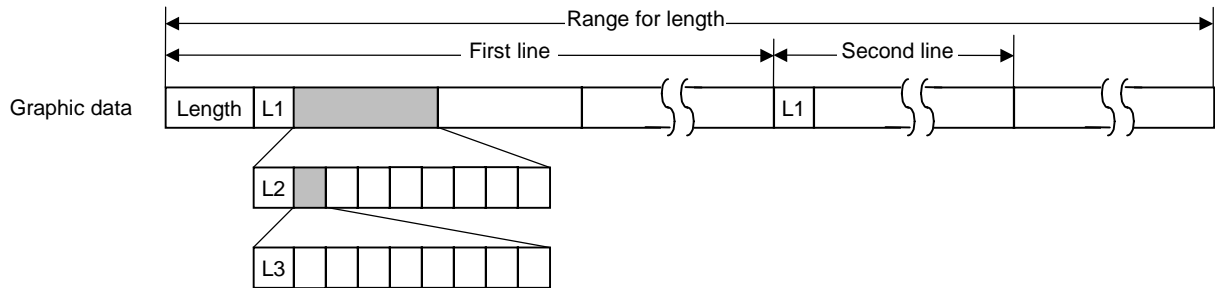
* The value in the brackets is rounded down to the nearest whole number.

[Hex. mode]

- (1) The graphic data is separated into eight dot units and sent in the following order (**1** → **66**).
- (2) The graphic data is 00H to FFH.
- (3) The minimum unit of graphic width is 8 dots. Dots with no data are transmitted as data 0.
- (4) The number of bytes of the graphic to be transmitted must be as follows:
The number of bytes of the graphic to be transmitted = {(No. of graphic width dots + 7)/8} × No. of graphic height dots

* The value in the brackets is rounded down to the nearest whole number.

[When TOPIX compression mode is selected]

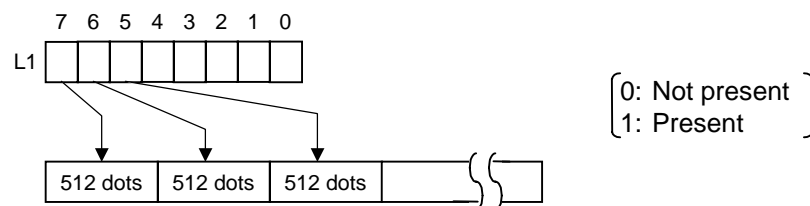


- (1) Length: Total number of bytes of the graphic data (0001H ~)

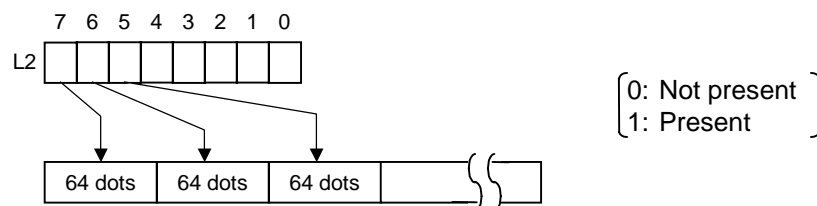
Ex. Length = 20 bytes:

00	14
----	----

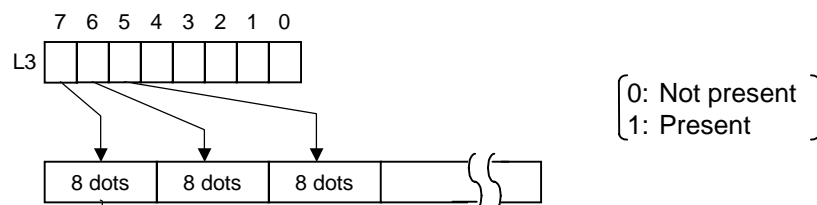
- (2) L1 parameter: Shows in which large block (512 dots/block) the changed data is contained.



- (3) L2 parameter: Shows in which medium block (64 dots/block) the changed data is contained (of the L1 large block).



- (4) L3 parameter: Shows in which small block (8 dots/block) the changed data is contained (of the L2 medium block).



Exclusive-OR is carried out between the current image data and the image data one line previous. Only the changed bit is set to ON (1). The alignment of dots is MSB (left dots) and LSB (right dots).

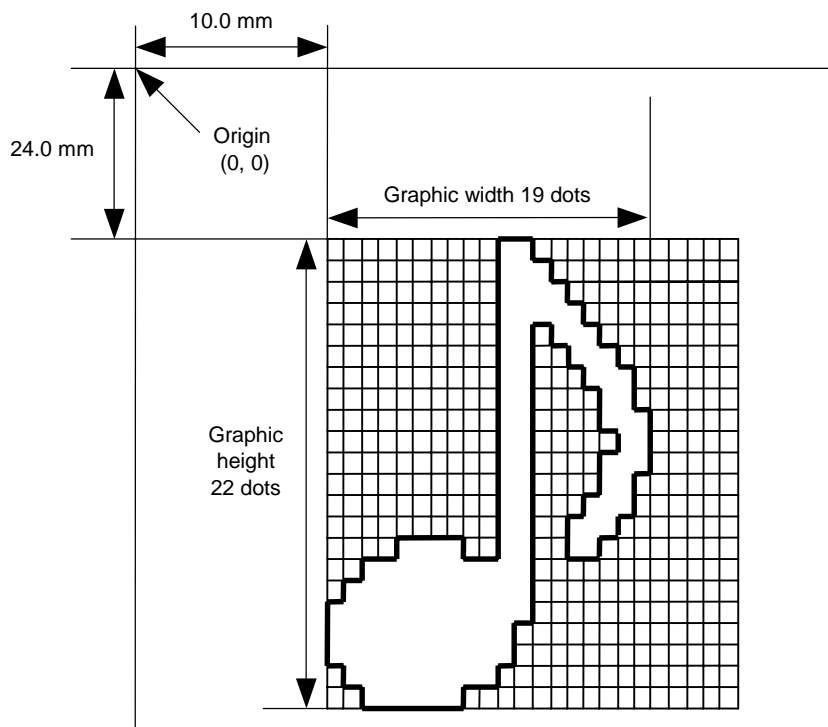
* The graphic width for only the smaller value of either the designated value or the max. buffer size (512 KB) is drawn. The minimum unit of the data drawing is 8 dots (1 byte). If the graphic width is set to 3 dots, it will be reset to 8 dots (1 byte).

Notes

- (1) The print origin of coordinates must be set so that the result of drawing the graphic data will be within the effective print area set by the Label Size Set Command ([ESC] D).
- (2) The number of graphic width dots and the number of graphic height dots must also be set so that the result of drawing the graphic data will be within the effective print area set by the Label Size Set Command ([ESC] D) in the same manner as the above.
- (3) Both width and height are 8 dots/mm. The maximum graphic size is 48 mm x 90 mm.
- (4) The actual result of drawing may deviate within ± 0.5 in the X direction with respect to the designated print origin of the X-coordinate.

To draw the received graphic data at high speed, the data is directly developed in the image buffer without applying correction to each bit with respect to the designated X-coordinate. Consequently, a variation of up to 4 bits occurs.

Examples



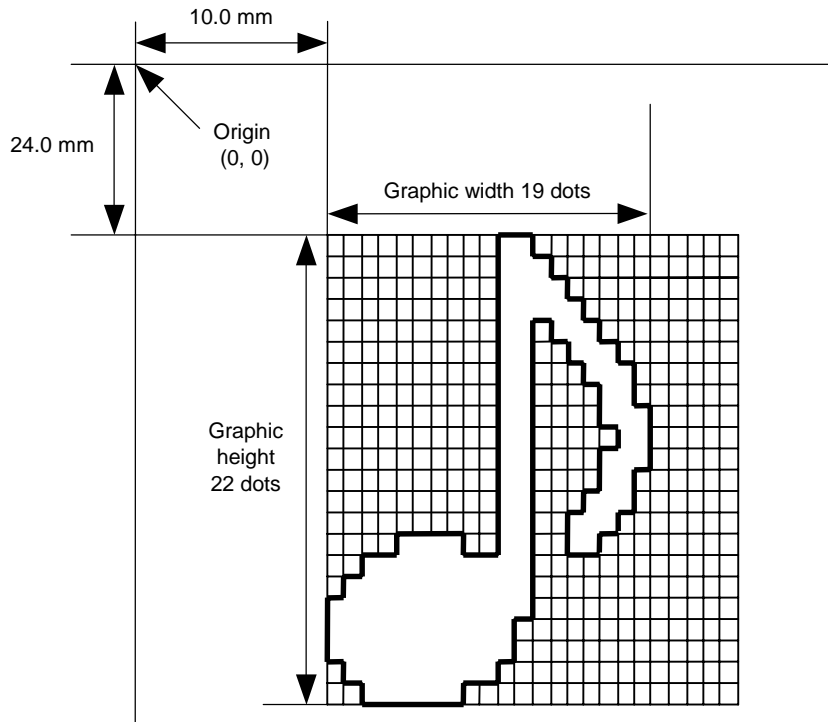
[ESC] C [LF] [NUL]

[ESC] SG; 0100, 0240, 0019, 0022, 0, 003000003800003<00003>000037000033800031
<00030<00030>00030600030>00030<00031<00033800?33003??0007??000??000??
>000??>0007? <0003?0000 [LF] [NUL]

[ESC] XS; I, 0001, 0002C3000 [LF] [NUL]

* 30H = "0"	38H = "8"
31H = "1"	39H = "9"
32H = "2"	3AH = "."
33H = "3"	3BH = ","
34H = "4"	3CH = "<"
35H = "5"	3DH = "="
36H = "6"	3EH = ">"
37H = "7"	3FH = "?"

[TOPIX compression mode]



[ESC] SG; 0100, 0240, 0019, 0300, 3, 00 5C 80 80 40 30
 Length L1 L2 L3 Data (1st line)

80 80 40 08 80 80 40 04 80 80 40 02 80 80 40 09
 (2nd line) (3rd line) (4th line) (5th line)

80 80 60 04 80 80 80 60 02 40 80 80 40 01 80 80 20 20
 (6th line) (7th line) (8th line) (9th line)

80 80 20 80 80 80 20 80 80 80 20 20 80 80 40 01
 (10th line) (11th line) (12th line) (13th line)

80 80 60 02 40 80 80 A0 0F 80 80 80 C0 30 C3 80 80 80 40
 (14th line) (15th line) (16th line) (17th line)

80 80 80 80 80 80 40 10 00 80 80 C0 80 20 80 80 C0 40 C0 [LF] [NUL]
 (18th line) (19th line)(20th line) (21st line) (22nd line)

5.12 COMMANDS RELATED TO PC COMMAND SAVING

5.12.1 SAVE START COMMAND

[ESC] XO

Function	Declares the start of saving PC interface commands. (Places the printer in the mode where PC interface commands can be written in flash memory.)
Format	[ESC] XO; aa, (Sb,) c [LF] [NUL]
Term	aa: Identification number to be used for saving in flash memory or calling 01 to 99 Sb: Reserved area (Omissible) b: 0 to 2 c: Status response at save time 0: No status response made 1: Status response made
Explanation	(1) Reserved area (Omissible) The reserved parameters are not checked.
Notes	(1) After sending the Save Start Command ([ESC] XO), any command other than the following will be saved into flash memory without being analyzed. <ul style="list-style-type: none"> • Save Start Command ([ESC] XO) • Save Terminate Command ([ESC] XP) • Saved Data Call Command ([ESC] XQ) • Bit Map Writable Character Command ([ESC] XD) • Reset Command ([ESC] WR) • Status Request Command ([ESC] WS, [ESC] FM, [ESC] v) • Flash Memory Format Command ([ESC] J1) • Mode Information Acquire Command ([ESC] WX) • Version Information Acquire Command ([ESC] WV) • Device Address Acquire Command ([ESC] IT) • Strip Sensor Threshold Value Set Command ([ESC] AH) • Printer ID Set Command ([ESC] ID) • Mode Select Command ([ESC] M) (2) No error check is made for the commands at save time. (3) Up to 64 KB can be saved per a save.
Refer to	<ul style="list-style-type: none"> • Save Terminate Command ([ESC] XP) • Flash Memory Format Command ([ESC] J1)
Examples	<pre>[ESC]J1;B[LF][NUL] [ESC]XO;01,0[LF][NUL] [ESC]D0508,0480,0468[LF][NUL] [ESC]T20C30[LF][NUL] [ESC]C[LF][NUL] [ESC]PC001;0200,0125,1,1,A,00,B[LF][NUL] [ESC]PC002;0650,0350,2,2,G,33,B,+0000000001[LF][NUL] [ESC]XP[LF][NUL]</pre>

5.12.2 SAVE TERMINATE COMMAND

[ESC] XP

Function	Declares the termination of saving PC interface commands.
Format	[ESC] XP [LF] [NUL]
Note	After the PC interface command is stored, the image buffer will be automatically cleared.
Refer to	Save Start Command ([ESC] XO)

5.12.3 SAVED DATA CALL COMMAND**[ESC] XQ**

Function	Calls PC interface commands saved in flash memory.
Format	[ESC] XQ; aa, (Sb,) c, d [LF] [NUL]
Term	aa: Identification number of the file to be called from flash memory. 01 to 99 Sb: Reserved area (Omissible) b: 0 to 2 c: Status response when the data is called up 0: No status response made 1: Status response made d: Reserved area L, M
Explanation	(1) Reserved area (Omissible) The reserved parameters are not checked.
Notes	(1) If the relevant save identification number is not found, an error will result. (2) The printer enters the online mode (label issue operation) when the Save Data Call Command is sent after the Save Terminate Command.
Refer to	<ul style="list-style-type: none"> • Save Start Command ([ESC] XO) • Save Terminate Command ([ESC] XP)
Examples	[ESC] XQ; 01, 0, L [LF] [NUL] [ESC] RC001; Sample [LF] [NUL] [ESC] RC002; 100 [LF] [NUL] [ESC] XS; I, 0002, 0002C3000 [LF] [NUL]

5.13 COMMANDS RELATED TO CHECK

5.13.1 HEAD BROKEN DOTS CHECK COMMAND

[ESC] HD

Function	Checks the thermal head for broken dots.
Format	[ESC] HD001 (, a) [LF] [NUL].....All broken dots check
Term	a: Check result status response (Omissible) A: Status response made (If omitted, the check result status response is not made.)
Explanation	<p>(1) The Head Broken Dots Check Command is subject to batch processing. If the Label Issue Command for 100 labels is transmitted, followed by the Head Broken Dots Check Command, the head broken dots check will be executed after issuing 100 labels.</p> <p>(2) The head broken dots check will be made on all the heating elements of the thermal head.</p> <p>(3) When the check result status response is not specified, if the check result is found to be normal, the next command is processed. If the check result is found to be abnormal, an error occurs. Whether or not the status is sent when an error occurs is determined according to the setting for the status response specified by the Issue Command.</p> <p>When the check result status response is specified, if the check result is found to be normal, a head broken dots check normal end status is sent, and then the next command is processed. If the check result is found to be abnormal, the head broken dots error status is sent, and then the printer stops.</p> <p>Status for normal end (for IrDA: IrCOMM, RS-232C, Bluetooth, wireless LAN) [SOH] [STX] "0020000" [EXT] [EOT] [CR] [LF]</p> <p>Status for head broken dots error (for IrDA: IrCOMM, RS-232C, Bluetooth, wireless LAN) [SOH] [STX] "1720000" [EXT] [EOT] [CR] [LF]</p> <p>(4) All broken dots check takes approx. 1 second.</p>
Examples	<pre> [ESC]C[LF][NUL] [ESC]PC001;0200,0125,1,1,C,00,B[LF][NUL] [ESC]PC002;0450,0550,2,2,G,33,B[LF][NUL] [ESC]RC001;Sample[LF][NUL] [ESC]RC002;001[LF][NUL] [ESC]XS;I,0002,0002C3000[LF][NUL] [ESC]HD001[LF][NUL] </pre>

5.14 COMMANDS RELATED TO CONTROL

5.14.1 RESET COMMAND

[ESC] WR

Function	Returns the printer to its initial state.
Format	[ESC] WR [LF] [NUL]
Explanation	<p>(1) The printer is returned to the same state as when the power is turned on.</p> <p>(2) If the printer receives this command during printing, the printer prints the label which is being printed, then performs initialization.</p> <p>(3) After the Reset Command is sent (or after printing is completed, if printing is performed when the Reset Command is sent), the next command must not be sent within 5 seconds. In IrDA: TEC Protocol, if ACK/status transmission is specified by the Issue Command, the printer returns an ACK, which indicates the command process end, to the EOT after the printer is initialized. In RS-232C, when the status response is specified, the printer returns the status (34H 30H). After this status is received, the next command may be sent. In IrDA: IrCOMM, Bluetooth, or Wireless LAN, the printer does not return the status.</p> <p>(4) When this command is sent through the IrDA interface, only this command should be sent. After the command is sent, the link should be terminated. Even if the host does not terminate the link, the printer performs the termination process. Therefore, after initialization is completed, the host should establish the link again.</p> <p>(5) When receiving this command during data transmission, the printer is initialized after transmission is completed.</p>
Notes	<p>(1) After the code of the Bit Map Writable Character Command ([ESC] XD) or the Graphic Command ([ESC] SG) is received, the Reset Command is not processed until the printer receives the data specified for the type of data.</p>
Example	[ESC] WR [LF] [NUL]

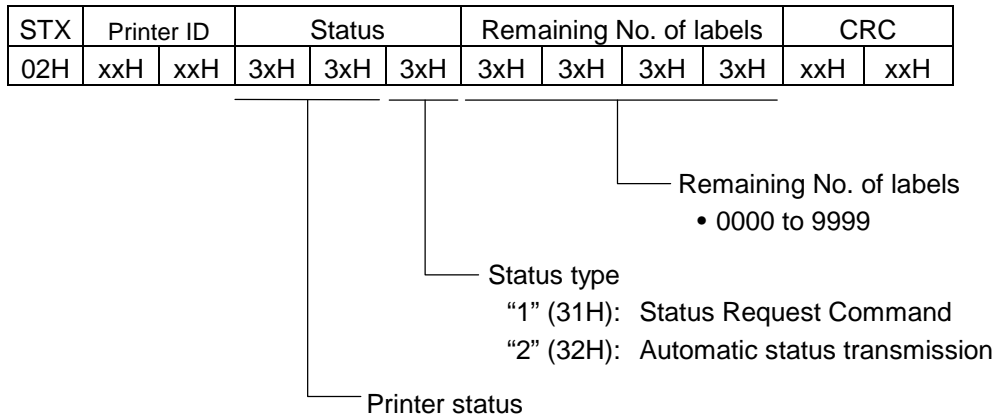
5.15 COMMANDS RELATED TO STATUS

5.15.1 STATUS REQUEST COMMAND

[ESC] WS, [ESC] FM, [ESC] v

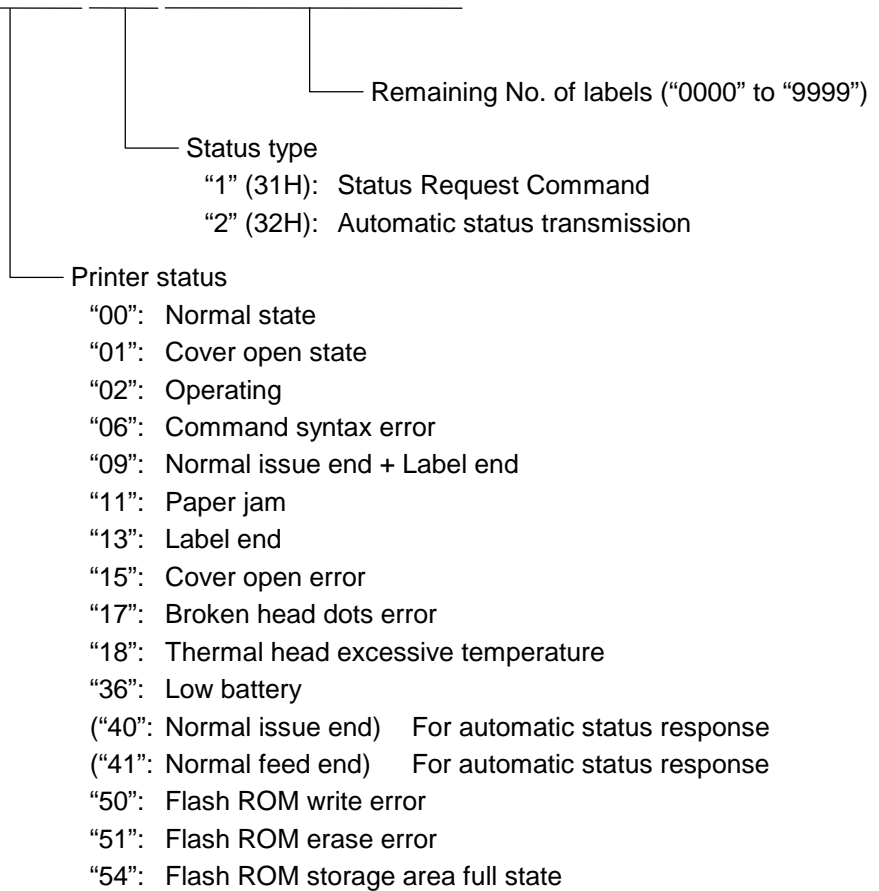
Function	Sends the printer status to the host computer.
Format	[ESC] WS [LF] [NUL] [ESC] FM (aa) [LF] [NUL] [ESC] v
Term	aa: Reserved area (Omissible) 00 to 99
Explanation	(1) This command makes the printer send its status regardless of the setting of “status response/no status response.” The status to be transmitted is the current printer status, and indicates the latest status only. The remaining count indicates the remaining count of the batch currently being printed. No count remaining of the batch waiting to be printed is transmitted.

[IrDA: TEC Protocol]



[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

SOH	STX	Status			Remaining No. of labels				ETX	EOT	CR	LF
01H	02H	3xH	3xH	3xH	3xH	3xH	3xH	3xH	03H	04H	0DH	0AH



Notes

- (1) The status is returned only to the interface which sent this command.
- (2) After the code of the Bit Map Writable Character Command ([ESC] XD) or Graphic Command ([ESC] SG) is received, the Status Request Command is not processed until the printer receives the data specified for the type of data.
- (3) In IrDA: TEC Protocol or RS-232c, a max. delay of 20 msec may occur until the printer sends the status after receiving the Status Request Command.
- (4) The interval from when the Status Request Command is sent to when the next Status Request Command is sent should be 20 msec or more. If the interval is less than 20 msec, the printer may fail to receive the Status Request Command.

Example

[ESC] WS [LF] [NUL]

5.15.2 MODE INFORMATION ACQUIRE COMMAND**[ESC] WX**

Function	Sends the printer mode information to the host.
----------	---

Format	[ESC] WX [LF] [NUL]
--------	---------------------

Explanation	(1) The mode information format to be sent to the host, is as follows:
-------------	--

[IrDA: TEC Protocol]

STX	Mode information (16 bytes)																CRC	CRC
	T	P	C	L	-	L	E	SP	SP	SP	SP	SP	SP	SP	SP	SP		
02H	54H	50H	43H	4CH	2DH	4CH	45H	20H	20H	20H	20H	20H	20H	20H	20H	20H	xxH	xxH

[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

SOH	STX	Mode information (16 bytes)																ETX	EOT	CR	LF
		T	P	C	L	-	L	E	SP	SP	SP	SP	SP	SP	SP	SP	SP				
01H	02H	54H	50H	43H	4CH	2DH	4CH	45H	20H	20H	20H	20H	20H	20H	20H	20H	20H	03H	04H	0DH	0AH

The above is an example where the message is received in the TPCL-LE mode. In addition, the message of "LABEL", "RECEIPT", or "RECEIPT1" is returned. In case of the TPCL-LE1 mode, the message will be "TPCL-LE1".

- TPCL-LE mode (Mode = A): "TPCL-LE"
- TPCL-LE1 mode (Mode = B): "TPCL-LE1"

Example	[ESC] WX [LF] [NUL]
---------	---------------------

5.15.3 VERSION INFORMATION ACQUIRE COMMAND**[ESC] WV**

Function	Sends information such as the program version of the printer.
Format	[ESC] WV [LF] [NUL]
Explanation	(1) The format of the program version data to be returned to the host, is as follows.

[IrDA: TEC Protocol]

STX		02H	
Creation date	"1"	31H	Creation date of program: 9 bytes of data indicated in order of Day- Month-Year
	"0"	30H	
	"M"	4DH	
	"A"	41H	
	"R"	52H	
	"2"	32H	
	"0"	30H	
	"0"	30H	
	"3"	33H	
Model	"B"	42H	Model: 7 bytes of ASCII code indicating the model
	"_"	2DH	
	"S"	53H	
	"P"	50H	
	"2"	32H	
	"D"	44H	
	SP	20H	
Version	"V"	56H	Program version: 5 bytes of data: Vx.xx └─ Revision └─ Version
	"1"	31H	
	"."	2EH	
	"0"	30H	
	"A"	41H	
CRC		xxH	
CRC		xxH	

[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

SOH		01H
STX		02H
Creation date	"1"	31H
	"0"	30H
	"M"	4DH
	"A"	41H
	"R"	52H
	"2"	32H
	"0"	30H
	"0"	30H
	"3"	33H
Model	"B"	42H
	"."	2DH
	"S"	53H
	"P"	50H
	"2"	32H
	"D"	44H
	SP	20H
Version	"V"	56H
	"1"	31H
	"."	2EH
	"0"	30H
	"A"	41H
ETX		03H
EOT		04H
CR		0DH
LF		0AH

Creation date of program:

9 bytes of data indicated in order of Day-
Month-Year

Model:

7 bytes of ASCII code indicating the
model

Program version:

5 bytes of data: Vx.xx

└─ Revision
└─ Version

Example

[ESC] WV [LF] [NUL]

5.16 COMMANDS RELATED TO Bluetooth AND WIRELESS LAN

5.16.1 DEVICE ADDRESS ACQUIRE COMMAND

[ESC] IT

Function	Calls up the device address of the Bluetooth module or MAC address of the wireless LAN module connected to the printer.
Format	[ESC] IT [LF] [NUL]
Explanation	(1) This command calls up the device address of the Bluetooth or MAC address of the wireless LAN module. On receiving this command, the printer returns the Bluetooth device address or MAC address with the complements of the following information field. When using the IrDA: TEC Protocol, the following information field is placed in the information frame and sent in packets.

[Information field to be sent when IrDA: TEC Protocol is used]

STX	Bluetooth device address	CRC	
02H	12 bytes	xxH	xxH

[Information field to be sent when IrDA: IrCOMM, RS-232C, Bluetooth, or wireless LAN is used]

SOH	STX	Bluetooth device address	ETX	EOT	CR	LF
01H	02H	12 bytes	03H	04H	0DH	0AH

Example	[ESC] IT [LF] [NUL]
---------	---------------------

When Bluetooth device address is 0001ccf0042b, the printer sends the following information.

Bluetooth device address:

[30H]	[30H]	[30H]	[31H]	[63H]	[63H]	[66H]	[30H]	[30H]	[34H]	[32H]	[62H]
0	0	0	1	c	c	f	0	0	4	2	b

6. LABEL MODE (INTERFACE COMMANDS)

6.1 GENERAL DESCRIPTION

This chapter describes details regarding the interface commands for the LABEL mode of the print mode. There are two issue types, “Batch issue” and “Strip issue”. In batch issues, a back feed is basically not performed before printing, regardless of the selected sensor type. However, when the parameter of the back feed is selected by the Position Fine Adjust Command, a back feed is performed before printing. (Firmware V1.4 or greater)

In strip issues, a back feed is not performed regardless of the parameter setting.

[Command List]

Format	Command	Automatic ACK/Status Response (conditionally)
[ESC]D	Label Size Set Command	No
[ESC]ID	Printer ID Set Command	Yes
[ESC]M	Mode Select Command	No, when the mode is changed to TPCL-LE.
[ESC]AX	Position Fine Adjust Command	No, when it is included in storage of forms.
[ESC]AY	Print Density Fine Adjust Command	No, when it is included in storage of forms.
[ESC]AZ	Strip Sensor Adjust Command	Yes
[ESC]LC	Line Format Command	No
[ESC]PC	Bit Map Font Format Command	No
[ESC]PV	Outline Font Format Command	No
[ESC]XB	Bar Code Format Command	No
X ([ESC]X)	Data Print Command	Yes
[ESC]T	Feed Command	Yes
[ESC]J1	Flash Memory Format Command	Yes
[ESC]XD	Bit Map Writable Character Command	Yes
[ESC]SG	Graphic Command	No
[ESC]N	Graphic Field Command	No
[ESC]XO	Save Start Command	No
[ESC]XP	Save Terminate Command	Yes
[ESC]XQ	Saved Data Call Command	No
[ESC]HD	Head Broken Dots Check Command	Yes
[ESC]WR [ESC]@	Initialize Command	Yes, only when the interface is IrDA (TEC Protocol) or RS-232C.
[ESC]WS [ESC]FM [ESC]v	Status Request Command	---
[ESC]WX	Mode Information Acquire Command	---
[ESC]IT	Device Address Acquire Command	---

6.2 OUTLINE OF COMMANDS

6.2.1 FORMAT OF INTERFACE COMMAND

ESC	Command & Data	LF	NUL
-----	----------------	----	-----

- The length from [ESC] to [LF] [NUL] must be as specified by each command.
- There is the following control code:
ESC (1BH), LF(0AH), NUL(00H)

6.2.2 HOW TO USE REFERENCE

Function	Describes the outline of the function of the command.
Format	Shows the format of the command. The format designation method should conform to the following rules: <ul style="list-style-type: none"> • Each set of small letters (such as aa, bbbb) indicates a parameter item. • An item enclosed in parentheses may be omitted. • “---” indicates the repetition of an item. • Brackets and parentheses are used only in coding, and must not be transmitted in practice. • Other symbols must always be inserted at designated positions before being transmitted.
Term	Explains the term(s) used in the format. * “0 to 999” described in the entry range indicates that up to 3-digit variable-length entry is allowed. (Entry of “001” or “009” is also possible.) “000 to 999” indicates that the entry must be fixed as 3 digits.
Explanation	Explains the command in detail.
Note	Supplementary explanation of the command.
Refer to	Related commands
Examples	Explains the command examples. <div style="border: 1px solid black; padding: 2px; display: inline-block;">[ESC] FM [LF] [NUL]</div> The above corresponds to the transfer of the following: <div style="text-align: center; margin-top: 10px;"> $\begin{array}{ccccccc} \underline{1B} & \underline{46} & \underline{4D} & \underline{0A} & \underline{00} \\ \text{[ESC]} & \text{F} & \text{M} & \text{[LF]} & \text{[NUL]} \end{array}$ </div>

6.2.3 PRECAUTIONS

The commands and parameters described in this specification must always be used. If any command or parameter other than those covered in this specification are used, the printer's operation will not be guaranteed.

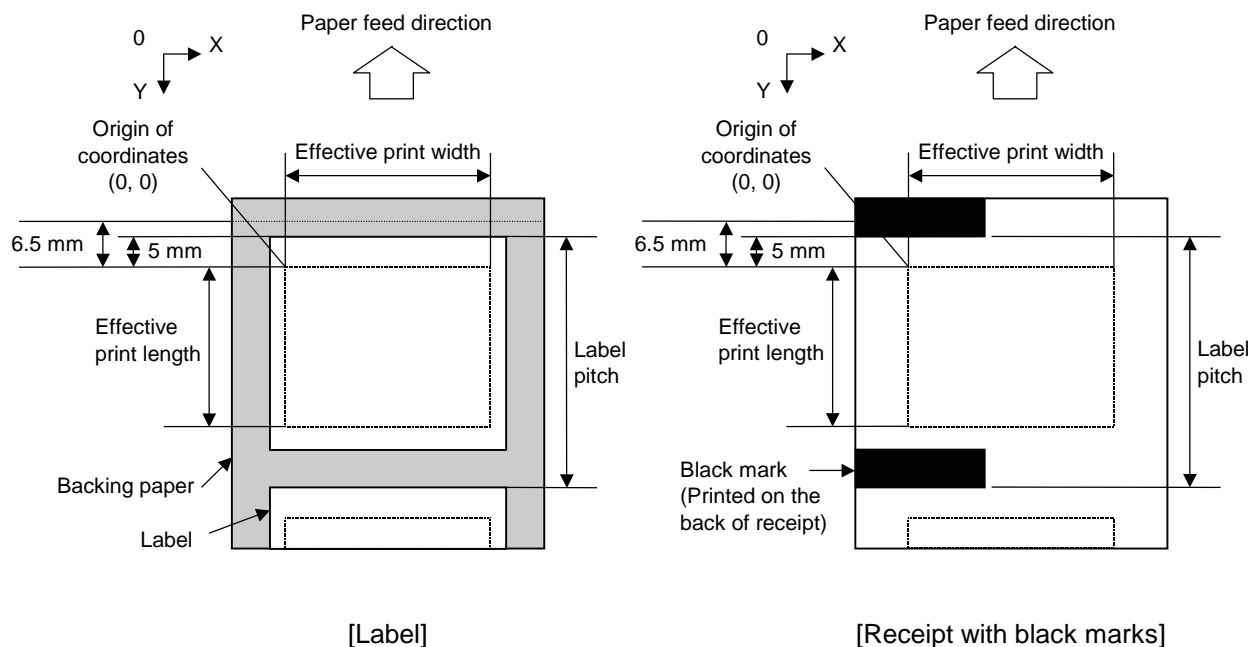
6.3 COMMANDS RELATED TO SETTING

6.3.1 LABEL SIZE SET COMMAND

[ESC] D

Function	Sets the size of a label or tag.
Format	[ESC] Daaaa, bbbb, cccc [LF] [NUL]
Term	aaaa: Pitch length of the label or tag 0100 to 5070 (in 0.1 mm units) bbbb: Effective print width Fixed as 0480 cccc: Effective print length 0070 to 5000 (in 0.1 mm units)

Explanation	<p>(1) After the Form Store Start Command is sent, the Label Size Set Command must be sent before each field command, the Print Density Fine Adjust Command, or the Position Fine Adjust Command is sent.</p> <p>(2) To print data in non-print area at 5 mm from the leading edge of the label, the print start position can be changed by using the Position Fine Adjust Command. However, it is necessary to enlarge the gap between the labels.</p> <p>(3) The print origin of coordinates in the Y direction is at 6.5 mm from the center of the gap (black mark). When the gap (black mark) is 3 mm, the print origin of coordinates in the Y direction is at 5 mm from the leading edge of the label. (Refer to the figure below.)</p>
-------------	---

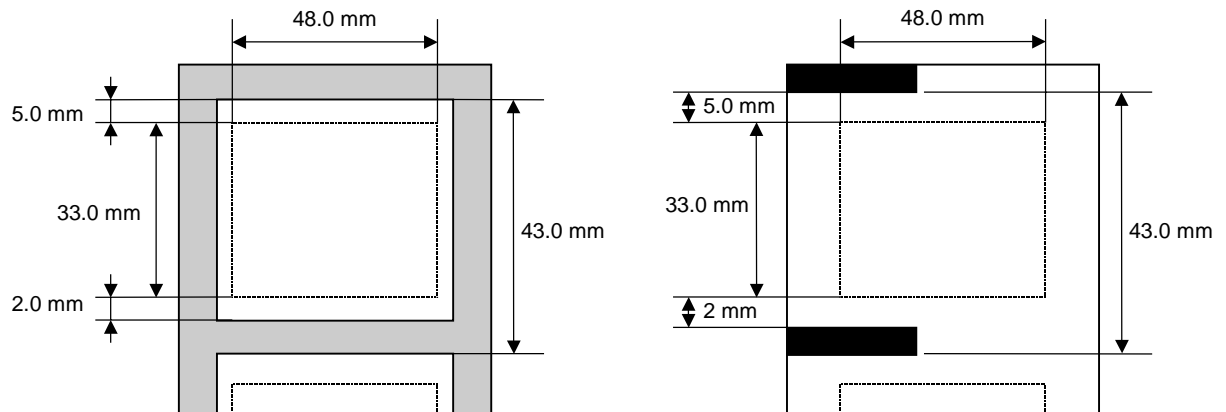


Notes

- (1) The label pitch length is protected in memory (even if the power is turned off).

Example

[ESC] D0430, 0480, 0330 [LF] [NUL]



Programmable value range by the software

[mm]

Item	Paper	Label		Receipt
	Issue	Batch	Strip	with black marks
Label pitch	Min.	10.0	13.0	10.0
	Max.	167.0	67.0	507.0
Label length	Min.	7.0	10.0	7.0
	Max.	160.0	60.0	500.0
Backing paper width	Min.	28.0, 31.0, 34.0, 37.0, 40.0, 43.0,		—
	Max.	46.0, 49.0, 52.0, 55.0, 58.0 ± 0.5		
Label width	Min.	25.0		—
	Max.	55.0		
Paper width	Min.	—		28.0, 31.0, 34.0, 37.0, 40.0, 43.0, 46.0, 49.0, 52.0, 55.0, 58.0 ± 0.5
	Max.	—		
Gap length	Min.	3.0		
	Max.	7.0		
Black mark length	Min.	—		3.0
	Max.	—		7.0
Margins of backing paper	Min.	1.5		—
	Max.	7.0		—
Effective print width	Min.	48.0		
	Max.	—		
Effective print length	Min.	7.0		
	Max.	160.0	60.0	500.0
Slow up interval		2.25		
Non-printable area	Min.	1.0 (when the gap or black mark length is 7.0 mm)		
	Max.	5.0 (when the gap or black mark length is 3.0 mm)		

6.3.2 ID SET COMMAND**[ESC] ID**

Function	Sets the ID for the printer.
Format	[ESC] ID ; aa(,b) [LF] [NUL]
Term	aa: Printer ID (2-byte hex data) 0000H to FFFFH b: Reserved area (Omissible) (* Firmware V1.3 or greater) Fixed to 0
Explanation	(1) The printer ID is necessary information to identify each printer in RF communications
Notes	(1) The set printer ID is backed up in memory (even if the power is turned off). (2) The last 5 digits of the printer's serial number have been set as the printer ID, at the time of shipment from the factory. (3) In IrDA: TEC Protocol, the printer checks the set ID against the ID in the received command packet. If they do not match, the printer discards the command packet. However, when the ID in the command packet is "0", the printer accepts the command packet without checking the set IDs.
Example	To set "03H 51H" as the ID of the printer: [ESC] ID ; [03H] [51H] [LF] [NUL] In this case, the printer ID in status printing is "00849".

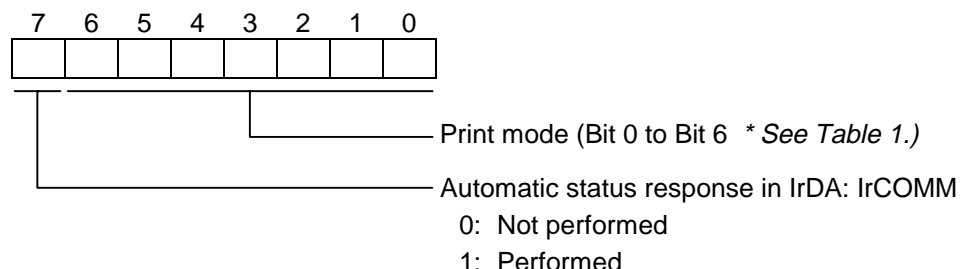
6.3.3 MODE SELECT COMMAND

[ESC] M

Function	Changes the print mode.
----------	-------------------------

Format	[ESC] M; a,(b) [LF] [NUL]
--------	---------------------------

Term	a: Print mode designation
------	---------------------------



* Table 1 Print mode

HEX	Mode	How to deal with the received data after an error is cleared
30H	LABEL	Discards
31H	RECEIPT	Discards
32H	RECEIPT1	Continues printing
33H	RECEIPT	Discards
41H	TPCL-LE	Continues printing
42H	TPCL-LE1	Continues printing (Firmware V1.5 or greater)

- b: Print position detection feed (Omissible. If omitted, the print position detection feed is not performed.) (Firmware V1.1 or greater)
- 0: When the mode change from RECEIPT or RECEIPT1 to LABEL is requested, a print position detection feed is not performed after the mode is changed.
- 1: When the mode change from RECEIPT or RECEIPT1 to LABEL is requested, a print position detection feed is performed after the mode is changed.

- | | |
|-------------|--|
| Explanation | <p>(1) There are 3 types of the print mode: "LABEL", "RECEIPT", and "TPCL-LE".</p> <p>(2) Both 31H and 33H are used for the "RECEIPT" mode. 33H is provided to maintain the compatibility with RECEIPT2 used for the conventional models. On the B-SP2D, the RECEIPT mode operation of 33H is the same as the 31H. Therefore, both 31H and 33H are defined as "RECEIPT".</p> <p>(3) "Automatic status response in IrDA: IrCOMM" is the function for the specifications which do not allow the printer to spontaneously send the status through IrDA; IrCOMM. This function enables the printer to forcefully send the status to the host, if the link between the printer and the host is established. However, if the link between the printer and the host is not established upon the status transmission, the printer cannot send the status. Therefore, the status is discarded. (In the next connection to the host, the printer does not send the status to the host.)</p> <p>(4) "Print position detection feed" is a function that automatically feeds the label to the print start position after the print mode is changed from RECEIPT or RECEIPT1 to LABEL. The sensor is not used when issuing in RECEIPT or RECEIPT 1 mode, therefore, after mode is changed to LABEL, the print start position cannot be detected. This is useful when using sensor detectable paper in both RECEIPT and LABEL modes.</p> <p>(5) In the TPCL-LE1 mode, it is possible to re-print the last print data by pressing the FEED button.</p> |
|-------------|--|

Notes

- (1) The print mode designation (the specified print mode and the automatic status response in IrDA: IrCOMM) is backed up in memory (even if the power is turned off).
- (2) The factory default is "30H: LABEL mode" and "Automatic status response in IrDA: IrCOMM is not performed". (The IrDA protocol is "TEC Protocol".)
- (3) When the print mode is changed, the type of sensor is automatically changed.

LABEL mode (0):	The previously backed up sensor is designated.
TPCL-LE mode (A):	The previously backed up sensor is designated.
TPCL-LE1 mode (B):	The previously backed up sensor is designated.
RECEIPT mode (1 or 3):	No sensor is designated.
RECEIPT1 mode (2):	No sensor is designated.
- (4) If the RECEIPT mode is selected or no sensor is designated in the LABEL or TPCL-LE mode, an initial feed is not performed when the cover is closed.
- (5) When the mode change is finished, the printer sends the normal end status or an ACK to the host. However, when the mode is changed to the TPCL-LE mode, the printer does not send the status. In IrDA: IrCOMM, only when bit 7 of the print mode designation is set to "1", the printer sends the status.
- (6) The print mode can be changed by the printer itself. However, since the setting for the automatic status response in IrDA: IrCOMM cannot be changed, the setting remains as the same.
- (7) The print position detection feed is performed according to the conditions, such as, label pitch, fine adjustment, and sensor selection, which were set in the LABEL or TPCL-LE mode before the printer is operated in RECEIPT or RECEIPT1 mode. If no sensor is selected, the print position detection feed will not be performed.
- (8) After performing a print position detection feed, the printer does not send a process end status. If an error occurs during the print position detection feed, the printer does not feed after the error is cleared. However, when the error is cleared by opening/closing the cover, the print position detection feed is performed.
- (9) When changing the print mode by the printer itself, the print position detection feed parameter cannot be set.
- (10) When the mode select command is designated with the print position detection feed at the end of a print data issued in RECEIPT1 mode, and if an error occurs while printing, the printing will restart after the error is cleared and then, the print mode will be changed to the LABEL mode and a print position detection feed is performed.
- (11) When the LABEL mode is selected in the mode select command and the print position detection feed parameter is set 0 (not performed), and if an error occurs while the printer issues in RECEIPT1 mode, the print mode is changed to the LABEL mode after the error is cleared. (The mode select command is executed.)



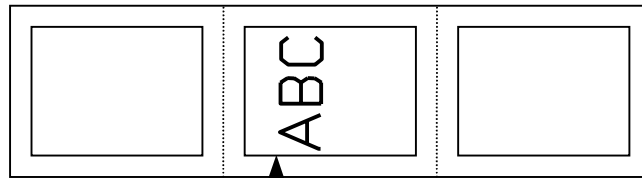
6.4 COMMANDS RELATED TO FINE ADJUSTMENT

6.4.1 POSITION FINE ADJUST COMMAND

[ESC] AX

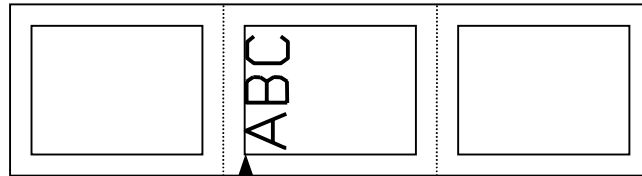
Function	Adjusts the feed value so that the label will be shifted forward or backward from the standard print start position.
Format	[ESC] AX; abbb (,cddd, eff) [LF] [NUL]
Term	<p>a: Indicates the direction, forward or backward, in which a fine adjustment is to be made. +: Backward -: Forward</p> <p>bbb: Feed value to be finely adjusted. 000 to 150 (in 0.1 mm units)</p> <p>cddd: Reserved area (Omissible) (* Firmware V1.4 or greater) +000 (Fixed.) * This parameter must be set when the back feed is performed.</p> <p>eff: Back feed amount fine adjustment value (Omissible) (* Firmware V1.4 or greater) +20 (Fixed.) * If omitted, the back feed is not performed.</p>
Explanation	<p>(1) The print start position is adjusted to stop backward or forward from the standard print start position.</p> <p>(2) When the back feed amount fine adjustment value is set, the print start position moves backward by 2mm from the standard position, which enlarges the effective print area.</p> <p>(3) When any value other than the above is set, a command error will occur.</p> <p>(4) If this command is stored in a form, the print position is automatically adjusted when the form is invoked.</p> <p>(5) If this command is not stored in a form, the print position is adjusted when the command is received.</p> <p>(6) When the power is turned on again, the backed up fine adjustment value is set.</p> <p>(7) When the print position is changed, or when the gap between the labels is not 3 mm, the Position Fine Adjust Command should be used as required. (When the gap between the labels is 3 mm, the standard print start position is 5 mm from the leading edge of the label.)</p>

Paper feed direction

 ± 0 mm

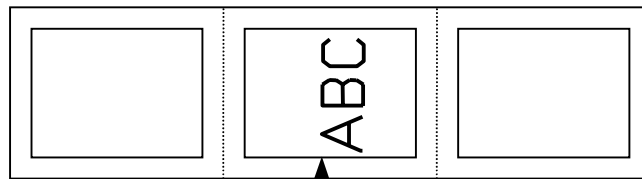
Print start position
(Standard: 5 mm from the leading edge of the label)

+5 mm



Print start position

-5 mm



Print start position

Notes

- (1) The set print position fine adjustment value is protected in memory (even if the power is turned off).
- (2) The factory default value is 0.0 mm.
- (3) The fine adjustment values changed by the Position Fine Adjust Command in the TPCL-LE mode, are also effective for the LABEL mode.
- (4) When the back feed amount fine adjustment value is set, the printing starts at 3 mm from the leading edge of the label.
- (5) The back feed amount fine adjustment value will be effective only when it is transmitted between the Form Store Start Command and the Form Store Terminate Command. Otherwise, the value will be ignored.

6.4.2 PRINT DENSITY FINE ADJUST COMMAND**[ESC] AY**

Function	Adjusts the automatically set print density.
Format	[ESC] AY ; abb, c (, d) [LF] [NUL]
Term	<p>a: Indicates whether to increase or decrease the density +: Increase (Darker) -: Decrease (Lighter)</p> <p>bb: Print density fine adjustment value 00 to 10 (in units of 1 step)</p> <p>c: Print mode 1 (Fixed): Direct thermal</p> <p>d: Head output division designation (Omissible) 0: Auto (Divided by 2 or 3) 1: Divided by 2 (Default) 2: Divided by 3 3: Auto1 (Not divided/Divided by 2 or 3)</p>
Explanation	<p>(1) The default value for the head output division designation is “1”.</p> <p>(2) The standard density is finely adjusted to increase or decrease.</p> <p>(3) When any print density fine adjustment value out of the above range is set, a command error will occur.</p> <p>(4) If this command is stored in a form, the print density is automatically adjusted when the form is invoked.</p> <p>(5) If this command is not stored in a form, the print density is adjusted when this command is received.</p> <p>(6) The print density may become lower if the print ratio per line is high. When “Divided by 3” is designated in the head output division designation, the print density may be improved. However, the issue speed when “Divided by 3” is set, may be slower than when “Divided by 2” is set.</p> <p>(7) When “0: Auto” is designated, “Divided by 3” or “Divided by 2” is automatically selected for every line according to the print ratio. The width of half a dot may not be printed on the line when switching between “Divided by 2” and “Divided by 3”. Therefore, do not designate “0: Auto” when a serial bar code is printed.</p> <p>(8) When “3: Auto1” is designated, it will be automatically changed to “Divided by 3” if the battery level becomes 2, in order to stable the print quality. As a result, the print speed will be reduced.</p>
Notes	<p>(1) The set print density fine adjustment value and the head output division designation, are protected in memory (even if the power is turned off).</p> <p>(2) The fine adjustment values changed by the Print Density Fine Adjust Command in the TPCL-LE mode, are also effective for the LABEL mode.</p> <p>(3) When the head output division designation is omitted, the backed up value in memory is used.</p>

6.4.3 STRIP SENSOR ADJUST COMMAND [ESC] AZ

Function	Sets the sensor threshold value to switch the mode between strip and batch.
Format	[ESC] AZ; a [LF] [NUL]
Term	a: Setting 0: Default value (3.2 V) 1: Threshold value 2: Fixed as the batch mode 3: Fixed as the strip mode 4: Reserved
Explanation	(1) If the issue mode is not properly switched when using thin backing paper, "1: Threshold value" should be set, as required. (2) This command is sent after the backing paper of the label to be used, is positioned on the strip issue path and the cover is closed. The printer reads the sensor adjustment value for the backing paper, and then sets the threshold value to switch the mode between strip and batch. (When this command is sent, the backing paper must be loaded on the strip issue path. If the backing paper is loaded on the batch issue path, or the label is loaded, and the command is sent, the mode will not be switched properly.)
Notes	(1) The set threshold value is backed up and kept until a new value is set using this command. When the power is turned on, the backed up value is retrieved and set (2) "0: Default value" has been set as the default at the time of shipment from the factory. (3) This command is used for sensor adjustment. Therefore, it must not be included in issue operations. (4) When either "2: Fixed as the batch mode" or "3: Fixed as the strip mode" for parameter "a", is selected, the printer operates in the specified mode, without automatically switching between the batch and strip modes. Particularly when the printer is used without the strip roller module, the strip sensor value becomes unstable. Additionally, the stop position for the label becomes misaligned, and the issue count is corrected to "1". Therefore, "2: Fixed as the batch mode" or "3: Fixed as the strip mode" for parameter "a" must be specified in this command.

6.5 COMMANDS RELATED TO DRAWING FORMAT

6.5.1 LINE FORMAT COMMAND

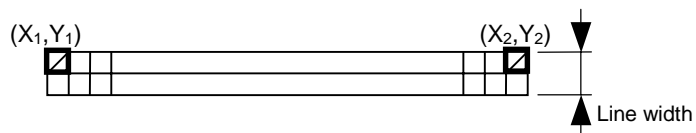
[ESC] LC

Function	Sets the line format and draws the line.
Format	[ESC] LC; aaaa, bbbb, cccc, dddd, e, f [LF] [NUL]
Term	<p>aaaa: Start point X-coordinate Fixed as 4 digits (in 0.1 mm units)</p> <p>bbbb: Start point Y-coordinate 4 or 5 digits (in 0.1 mm units)</p> <p>cccc: End point X-coordinate Fixed as 4 digits (in 0.1 mm units)</p> <p>dddd: End point Y-coordinate 4 or 5 digits (in 0.1 mm units)</p> <p>e: Type of line 0: Line (horizontal, vertical) 1: Rectangle</p> <p>f: No. of line width dots 1 to 9 (in 0.1 mm units)</p>

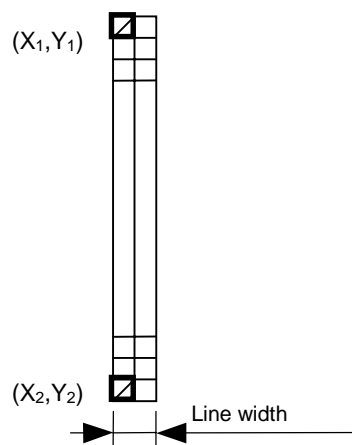
Explanation

- (1) The relation between the coordinates of the start and end points and the width of the line, is as follows:

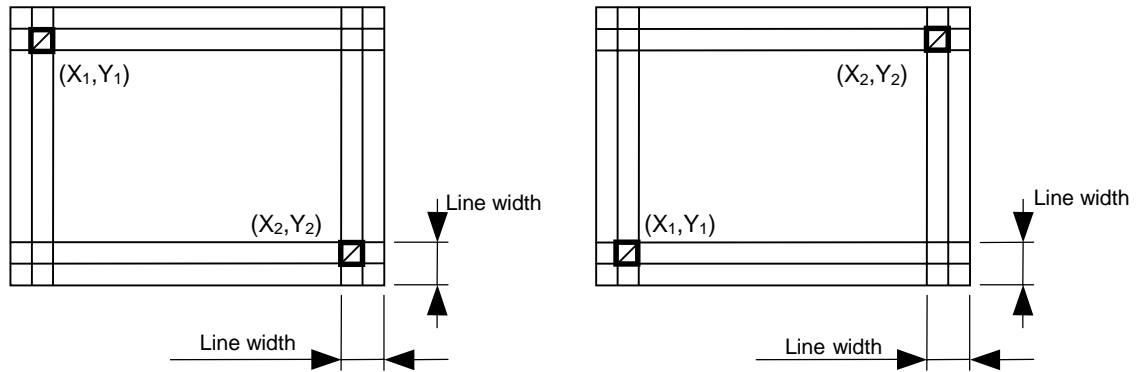
- ① Horizontal line (In the case of $|Y_2 - Y_1| = 0$)



- ② Vertical line (In the case of $|X_2 - X_1| = 0$)



③ Rectangle



- (2) When the start and end point coordinates which make a slant line are specified, a rectangle is drawn, even if "Line" is selected for the line type.
- (3) If the print ratio of one line (the print head width) is higher than defined, printing may become poor, or the printer may be reset. When a horizontal line is to be drawn, note the print ratio.
- (4) When the coordinates, which make data over the head width, is specified, printing is not guaranteed.

6.5.2 BIT MAP FONT FIELD COMMAND**[ESC] PC**

Function	Sets the format indicating the position on the label at which the bit map font is to be printed and how it is to be printed.
Format	[ESC] PCaa ; bbbb, cccc, d, e, f, gg, h, ii, j, k (, PI) [LF] [NUL]
Term	<p>aa: Character string No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the bar code/two-dimensional field.)</p> <p>bbbb: Print origin of X-coordinate of character string Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of character string Fixed as 4 digits (in 0.1 mm units)</p> <p>d: Character horizontal magnification 1: 0.5 magnification 5: 2.5 magnification 2: 1 magnification 6: 3 magnification 3: 1.5 magnification 7: 3.5 magnification 4: 2 magnification 8: 4 magnification</p> <p>e: Character vertical magnification 1: 0.5 magnification 5: 2.5 magnification 2: 1 magnification 6: 3 magnification 3: 1.5 magnification 7: 3.5 magnification 4: 2 magnification 8: 4 magnification</p> <p>f: Type of font A: Standard (12×24 dots) B: Bold Character (48×96 dots) C: Writable Character (24×24 dots) D: Price Font 1 (16×40 dots) E: Price Font 2 (32×48 dots) F: Times Roman (Bold) (21 point) G: Helvetica (Bold) (18 point) H: Letter Gothic (Medium) (14.3 point) I: Courier (Medium) (15 point) J: Presentation (Bold) (27 point) O: GOTHIC725 Black (6 point)</p> <p>gg: Rotational angles of a character or character string 00: 0° (chara.) 0° (chara.-string) 01: 90° (chara.) 90° (chara.-string) 02: 180° (chara.) 180° (chara.-string) 03: 270° (chara.) 270° (chara.-string)</p> <p>h: Selects black character or reverse character B (Fixed value): Black character</p>

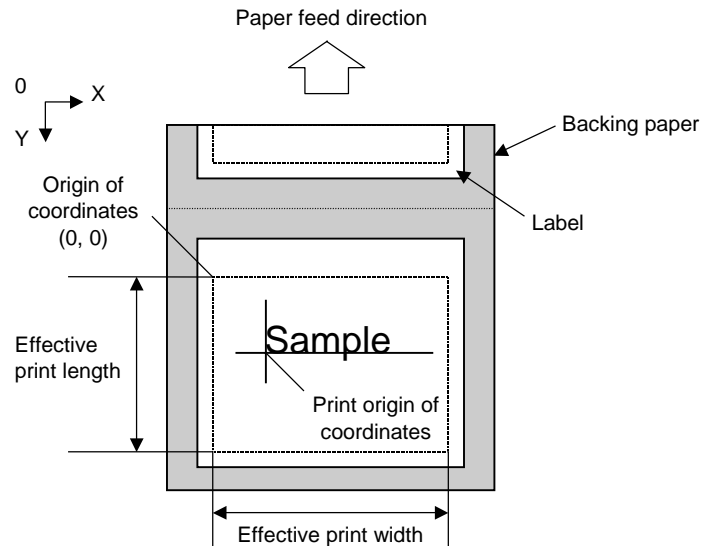
- ii: Data length
00 to 99 **NOTE:** When "00" is designated, the length is equivalent to the data sent by the Data Print Command.
JIS 8 code: Data which is separated by [LF]
Packed BCD code: Data which is delimited by "F"
- j: Data code
1: JIS 8 code (Fixed as 1 when the type of font is "C" (Writable character).)
2: Packed BCD code (only for IrDA: TEC Protocol)
- k: Fixed data No.
0 (Fixed value)
- Pl: Print position (Omissible. If omitted, the print position is left-aligned.)
0: Left
1: Center
2: Right

Explanation

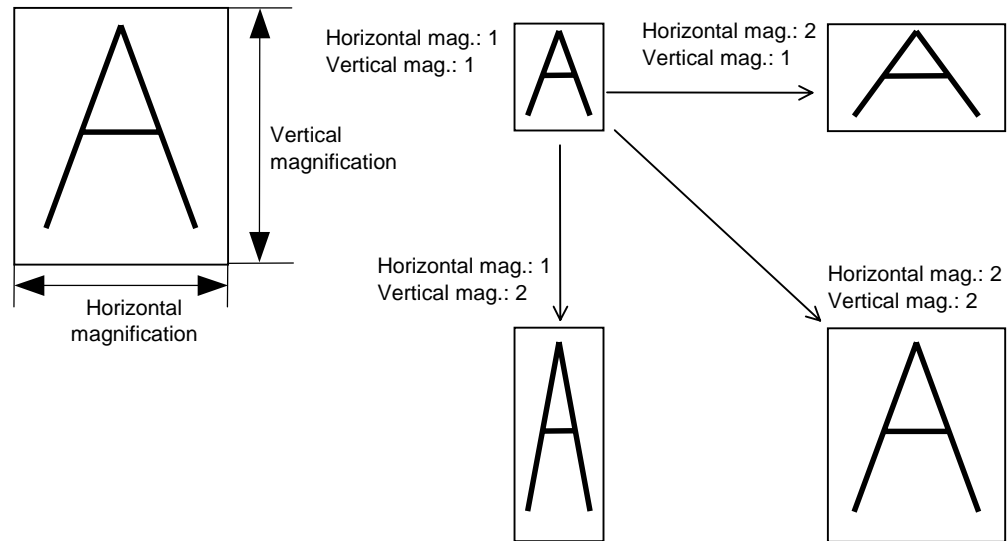
(1) Character string No.

The data in the Data Print Command (X) is selected and linked in the order of this character string No. (The format of character string Nos. 00 and 01 is linked to the first and second data, respectively. In the same order, the format is linked to the data.) Therefore, the Nos. of the bit map font character string, the outline font character string, and the bar code/two-dimensional code, should be consecutive, starting from 00 (in ascending order). The same No. must not be used in one form for the bit map font character string field, the outline font character string field, and the bar code/two-dimensional code field.

(2) Print origin of coordinates



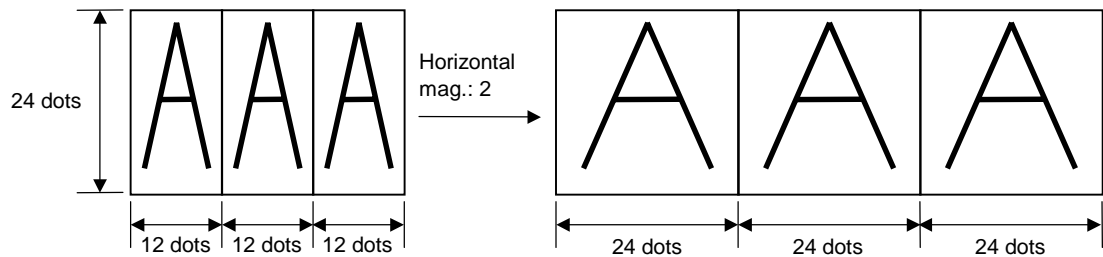
(3) Horizontal magnification and vertical magnification



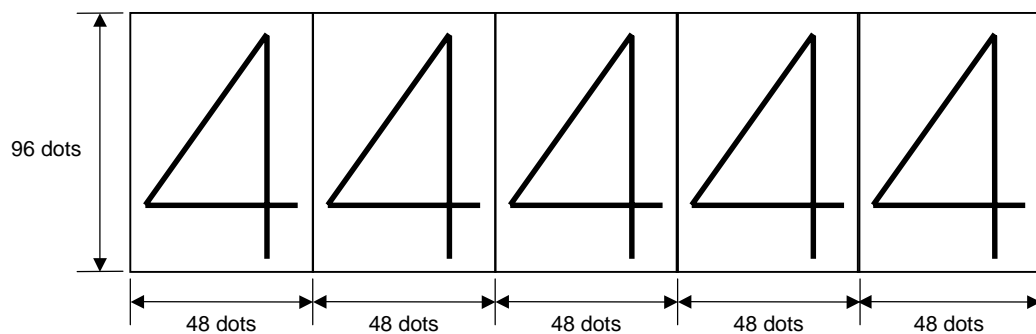
NOTE: When a large character or many characters is/are printed, the print density may become lower. (When the print ratio per line is high, the print density may become lower.)

(4) Space between characters is described below.

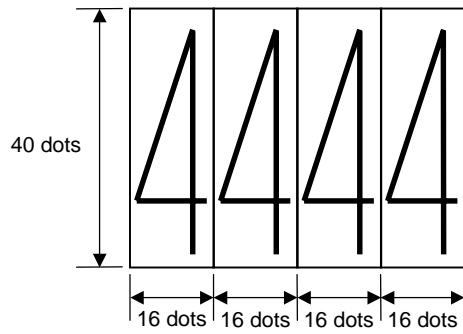
[Standard character]



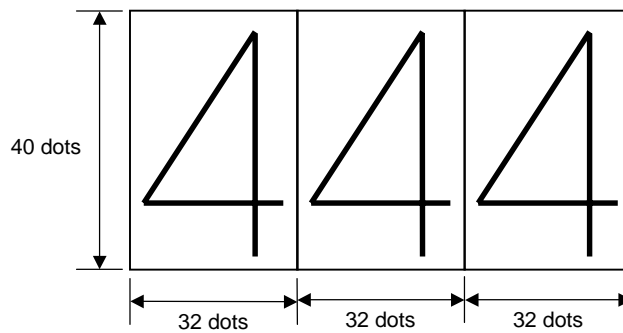
[Bold character]



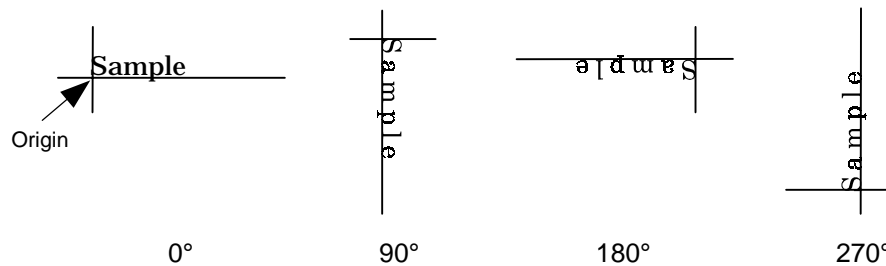
[Price font 1 (Horizontal mag.: 1)]



[Price font 1 (Horizontal mag.: 2)]



(5) Rotational angles of a character and character string



(6) Data length, Data code

JIS 8 code The length that one-byte data is counted as one digit

Packed BCD..... The length before packed

Data code	Data	Data to be sent	Data length
JIS 8	1 2 3 4 5	31H 32H 33H 34H 35H	5
Packed BCD	1 2 3 4 5	12H 34H 50H	5

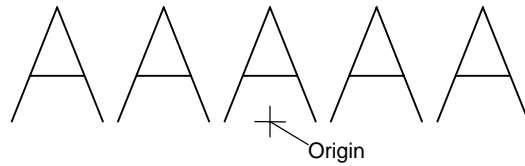
* When the same data is sent, the data length to be set is the same value in both data codes, JIS 8 and Packed BCD.

(7) Print position

• Left (Default)



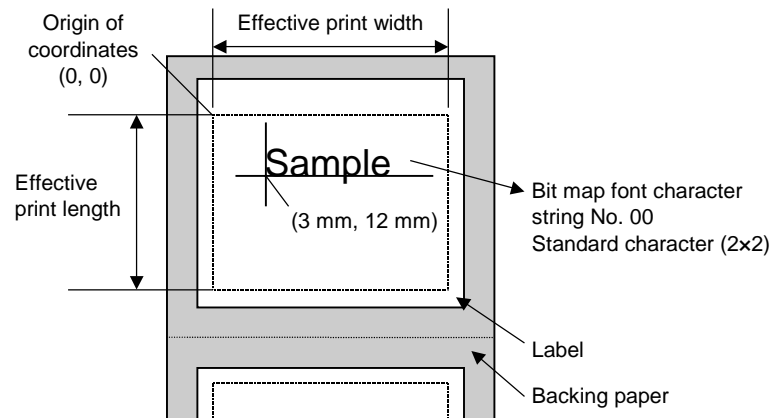
• Center



• Right



Example



```
[ESC]XO;01,1[LF][NUL]
[ESC]D0430,0480,0400[LF][NUL]
[ESC]PC00;0030,0120,4,4,A,00,B,00,1,0,P0[LF][NUL]
[ESC]XP[LF][NUL]
```

Data Print Command (only for IrDA: TEC Protocol)

```
X[01H][01H][01H]SAMPLE[LF]
```

6.5.3 OUTLINE FONT FIELD COMMAND

[ESC] PV

Function	Sets the format to indicate the position on the label, at which the outline font is to be printed and how it is to be printed.
Format	[ESC] PVaa ; bbbb, cccc, dddd, eeee, f, (,ghh), ii, j, kk, l, m, (,Pn) (,Qoooo,Rppp) [LF] [NUL]
Term	<p>aa: Character string No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the bar code/two-dimensional code field.)</p> <p>bbbb: Print origin of X-coordinate of character string Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of character string Fixed as 4 digits (in 0.1 mm units)</p> <p>dddd: Character width 0020 to 0300 (in units of 0.1 mm)</p> <p>eeee: Character height 0020 to 0300 (in units of 0.1 mm)</p> <p>f: Type of font A: TEC Font 1 (Helvetica: Bold) B: TEC Font 1 (Helvetica: Bold, Proportional) C: Reserved D: Reserved E: Reserved F: Price Font 2 (* Firmware V1.2 or greater)</p> <p>ghh: Character-to-character space width (Omissible. If omitted, the character-to-character space width depends on the designated font.) g: +, - hh: 00 to 99 (dot)</p> <p>ii: Rotational angles of a character and character string 00: 0° (chara.) 0° (chara.-string) 01: 90° (chara.) 90° (chara.-string) 02: 180° (chara.) 180° (chara.-string) 03: 270° (chara.) 270° (chara.-string)</p> <p>j: Selects black character or reverse character B (Fixed value): Black character</p> <p>kk: Data length 00 to 99 NOTE: When "00" is designated, the length is equivalent to the data sent by the Data Print Command. JIS 8 code: Data which is delimited by [LF] Packed BCD code: Data which is delimited by "F"</p> <p>l: Data code 1: JIS 8 code (Fixed as 1 when the type of font is "C".) 2: Packed BCD code (only for IrDA: TEC Protocol)</p>

m: Fixed data No.
0 (Fixed value)

Pn: Print position (Omissible. If omitted, the print position is left-aligned.)
P0: Left
P1: Center
P2: Right

Qoooo: Character string width (Omissible. If omitted, the width is set to 0000.)
0000 to 1600 (in units of 0.1mm)

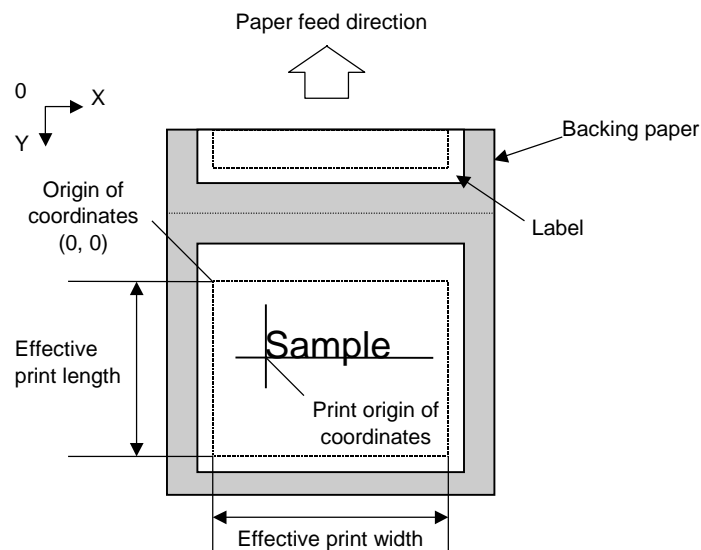
Rpp: No. of character string digits (Omissible. If omitted, the number of digits is 00.)
00 to 99

Explanation

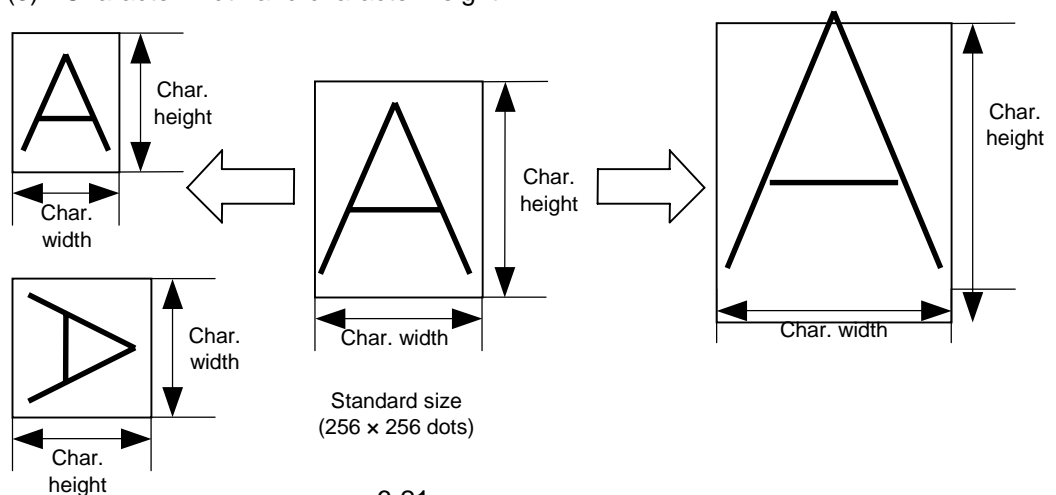
(1) Character string No.

The data in the Data Print Command (X) is selected and linked in the order of this character string No. (The format of character string Nos. 00 and 01 is linked to the first and second data, respectively. In the same order, the format is linked to the data.) Therefore, the Nos. of the bit map font character string, the outline font character string, and the bar code/two-dimensional code, should be consecutive, starting from 00 (in ascending order). The same No. must not be used in one form for the bit map font character string field, the outline font character string field, and the bar code/two-dimensional code field.

(2) Print origin of coordinates

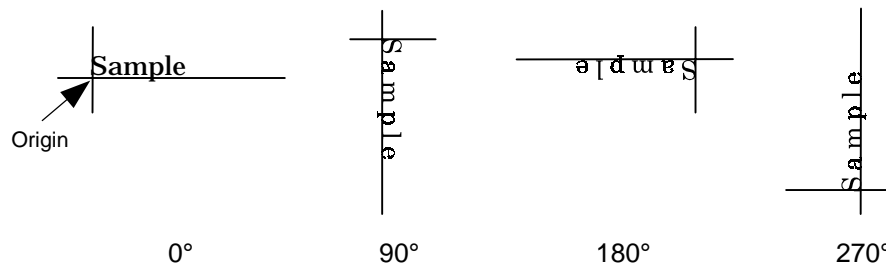


(3) Character width and character height



NOTE: When a large character or many characters is/are printed, the print density may become lower. (When the print ratio per line is high, the print density may become lower.)

(4) Rotational angles of a character and character string

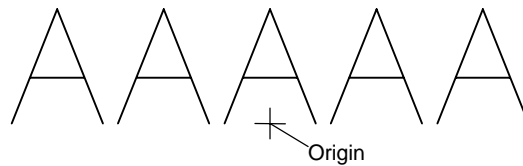


(5) Print position

• Left (Default)



• Center



• Right



(6) Character string width and number of character string digits

Usually, one character size is determined by the character width and height. When the character string width and number of character string digits are specified, the character width will be automatically changed when printed. If the following conditions are satisfied, however, these parameter settings become ineffective, and the characters are printed in normal size.

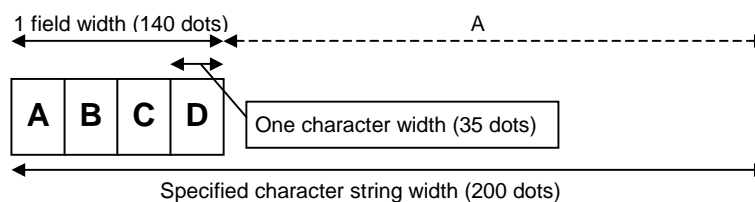
• Conditions of ineffectiveness

- (1) These parameters are omitted.
- (2) The character string width is set to "0".
- (3) No. of print data \geq No. of specified character string digits

Conditions that these parameters become effective are described on the following pages.

- ① When one field width < specified character string width
(Space between characters = 0, Specified character string digits = 6)

■ Print image when the parameter setting is omitted.

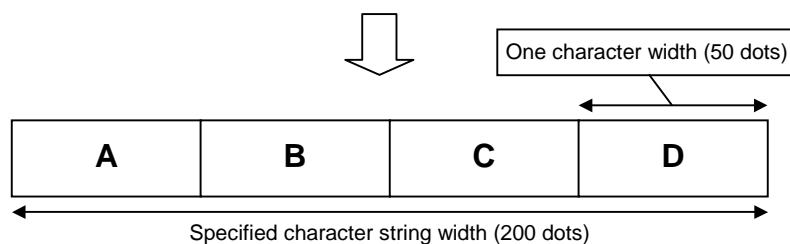


$A = \text{Specified character string width} - 1 \text{ field width} = 200 \text{ dots} - 140 \text{ dots} = 60 \text{ dots}$

$B = A / \text{Data length} = 60 \text{ dots} / 4 = 15 \text{ dots}$

$\text{One character width} = 1 \text{ character width} + B = 35 \text{ dots} + 15 \text{ dots} = 50 \text{ dots}$

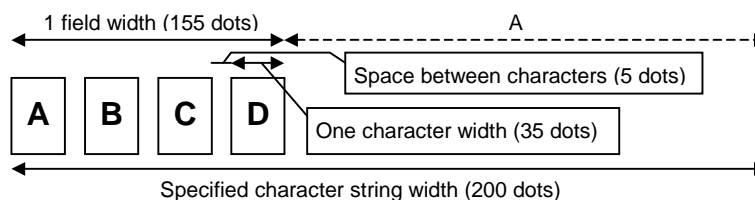
■ Print image when the parameter setting is specified.



* When the number of print data is 6 digits or more, the condition of ineffectiveness (3) is satisfied. In this case, the characters are printed in normal width.

- ② When one field width < specified character string width
(Space between characters ≥ 0 , Specified character string digits = 5)

■ Print image when the parameter setting is omitted.

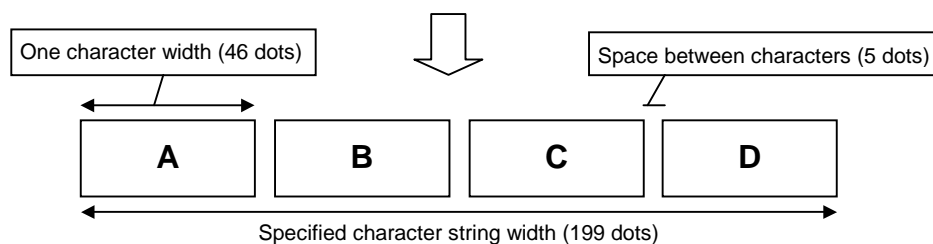


$A = \text{Specified character string width} - 1 \text{ field width} = 200 \text{ dots} - 155 \text{ dots} = 45 \text{ dots}$

$B = A / \text{Data length} = 45 \text{ dots} / 4 \approx 11 \text{ dots}$

$\text{One character width} = 1 \text{ character width} + B = 35 \text{ dots} + 11 \text{ dots} = 46 \text{ dots}$

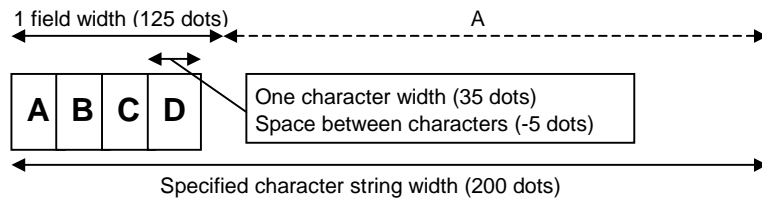
■ Print image when the parameter setting is specified.



* When the number of print data is 5 digits or more, the condition of ineffectiveness (3) is satisfied. In this case, the characters are printed in normal width.

- ③ When one field width < specified character string width
(Space between characters < 0, Specified character string digits = 8)

■ Print image when the parameter setting is omitted.



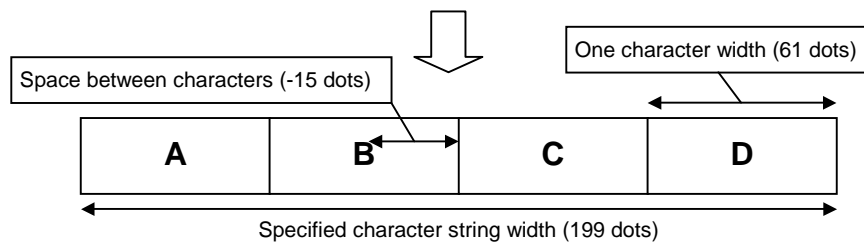
Corrected space between characters = ((Specified character string digits – data length × 0.5 + 1) × Space between characters) = -15 dots

A = Specified character string width – (1 character width × Data length + (corrected space between characters × (Data length – 1))) = 200 dots – 95 dots = 105 dots

B = A / Data length = 105 dots / 4 ≈ 26 dots (rounded down)

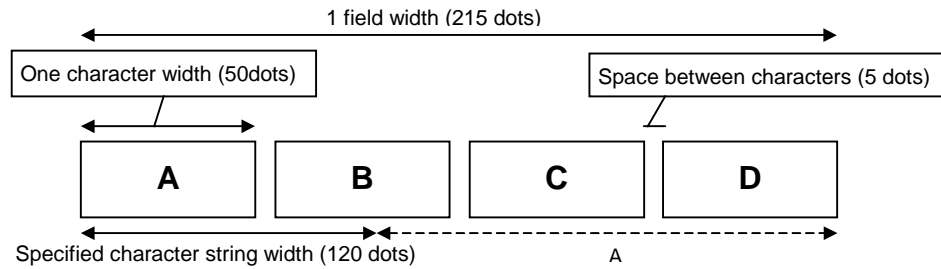
One character width = 1 character width + B = 35 dots + 26 dots = 61 dots

■ Print image when the parameter setting is specified.



* When the number of print data is 8 digits or more, the condition of ineffectiveness (3) is satisfied. In this case, the characters are printed in normal width.

- ④ When one field width \geq specified character string width
 (Space between characters ≥ 0 , Specified character string digits = 6)
 ■ Print image when the parameter setting is omitted.

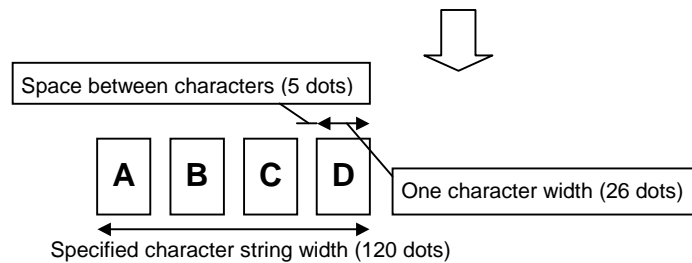


$A = 1 \text{ field width} - \text{Specified character string width} = 215 \text{ dots} - 120 \text{ dots} = 95 \text{ dots}$

$B = A / \text{Data length} = 95 \text{ dots} / 4 \approx 24 \text{ dots (rounded up)}$

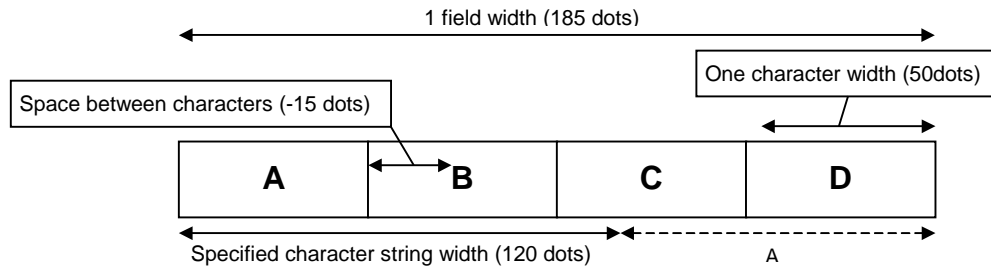
$\text{One character width} = 1 \text{ character width} - B = 50 \text{ dots} - 24 \text{ dots} = 26 \text{ dots}$

- Print image when the parameter setting is specified.



* When the number of print data is 6 digits or more, the condition of ineffectiveness (3) is satisfied. In this case, the characters are printed in normal width.

- ⑤ When one field width \geq specified character string width
 (Space between characters < 0 , Specified character string digits = 5)
 ■ Print image when the parameter setting is omitted.

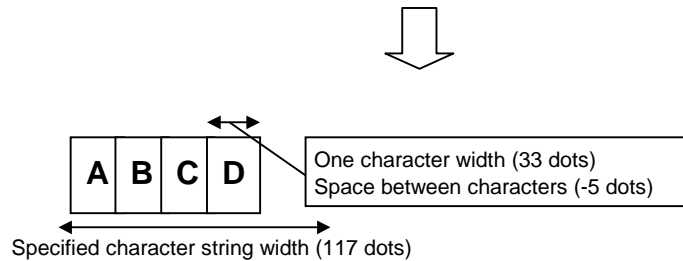


$A = 1 \text{ field width} - \text{Specified character string width} = 185 \text{ dots} - 120 \text{ dots} = 65 \text{ dots}$

$B = A / \text{Data length} = 65 \text{ dots} / 4 = 17 \text{ dots (rounded up)}$

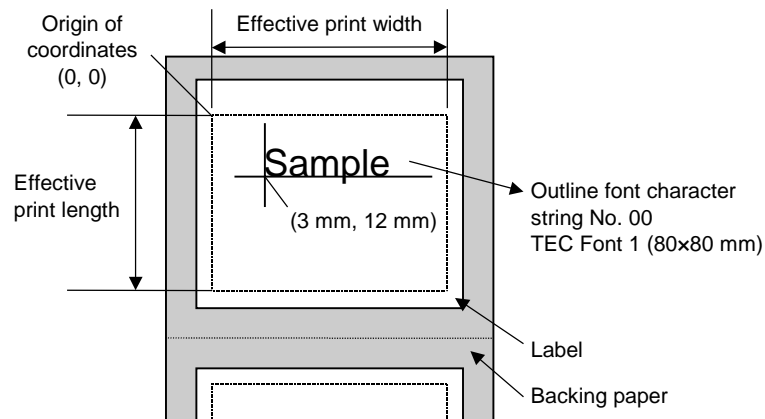
$\text{One character width} = 1 \text{ character width} - B = 50 \text{ dots} - 17 \text{ dots} = 33 \text{ dots}$

- Print image when the parameter setting is specified.



- * When the number of print data is 5 digits or more, the condition of ineffectiveness (3) is satisfied. In this case, the characters are printed in normal width.

Example



```
[ESC]XO;01,1[LF][NUL]
```

```
[ESC]D0430,0480,0400[LF][NUL]
```

```
[ESC]PV00;0030,0120,0050,0050,A,00,B,00,1,0,P0[LF][NUL]
```

```
[ESC]XP[LF][NUL]
```

Data print command (Only for IrDA: Tec Protocol)

```
X[01H][01H][01H]SAMPLE[LF]
```


Commands to be registered

```
[ESC]XO;05,1[LF][NUL]
[ESC]D0780,0480,0750[LF][NUL]
[ESC]AY;+00,1,0[LF][NUL]
[ESC]AX;+000[LF][NUL]
[ESC]PV01;0325,0350,0080,0100,F,-08,03,B,00,1,0,P2,Q0300,R07[LF][NUL]
[ESC]PV02;0165,0000,0030,0060,F,02,B,00,1,0[LF][NUL]
[ESC]XB03;0270,0290,5,3,02,2,0100,000,0,00,1,0[LF][NUL]
[ESC]XB04;0270,0170,5,3,02,2,0100,000,0,00,1,0[LF][NUL]
[ESC]XP[LF][NUL]
```

Issue command (in case of IrDA)

i)

```
X[05H][01H][01H]
$12.00[LF]
$12.00[LF]
214901881186[LF]
291890001200[LF]
```



ii)

```
X[05H][01H][01H]
$80[LF]
$80[LF]
214901881186[LF]
291890001200[LF]
```



6.5.4 BAR CODE FORMAT COMMAND (MSI, ITF, CODE39, NW7) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the bar code is to be printed and how it is to be printed.
Format	[ESC] XBaa ; bbbb, cccc, d, e, ff, gg, hh, ii, jj, k, lll, m, nn, o, p [LF] [NUL]
Term	<p>aa: Bar code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the bar code field.)</p> <p>bbbb: Print origin of X-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>d: Type of bar code 1: MSI 2: Interleaved 2 of 5 (ITF) 3: CODE39 (Standard) 4: NW7</p> <p>e: Type of check digit 1 (Fixed value): Without attaching check digit</p> <p>ff: Narrow bar width 02 to 03: 2 to 3 dots</p> <p>gg: Narrow space width 02 to 03: 2 to 3 dots</p> <p>hh: Wide bar width 05 to 09: 5 to 9 dots</p> <p>ii: Wide space width 05 to 09: 5 to 9 dots</p> <p>jj: Character-to-character space width 02 to 03: 2 to 3 dots * Only for MSI and ITF, "00" can be set. If any value is set, the printer automatically changes it to "00".</p> <p>k: Rotational angle of bar code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>lll: Height of bar code 0001 to 0350 (in 0.1 mm units)</p> <p>m: Selection to print numerals under bars 0: Non-print 1: Print</p>

- nn: Data length (including start/stop codes)
00 to 32 **NOTE:** *When "00" is designated, the length is equivalent to the data sent by the Data Print Command.*
JIS 8 code: Data which is delimited by [LF]
Packed BCD code: Data which is delimited by "F"
- o: Data code
1: JIS 8 code
2: Packed BCD code (only for IrDA: TEC Protocol)
- p: Fixed data No.
0 (Fixed value)

6.5.5 BAR CODE FORMAT COMMAND (JAN8/EAN8, JAN13/EAN13) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the bar code is to be printed and how it is to be printed.
Format	[ESC] XBaa ; bbbb, cccc, d, e, ff, g, hhhh, iii, j, kk, l, m [LF] [NUL]
Term	<p>aa: Bar code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the bar code field.)</p> <p>bbbb: Print origin of X-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>d: Type of bar code 0: JAN/8EAN8 5: JAN13/EAN13</p> <p>e: Type of check digit 3 (Fixed value): Check digit auto attachment</p> <p>ff: 1-module width 02 to 03 (in units of dots)</p> <p>g: Rotational angle of bar code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>hhhh: Height of bar code 0001 to 0350 (in 0.1 mm units)</p> <p>iii: Length of guard bar 000 to 050 (in 0.1 mm units)</p> <p>j: Selection to print numerals under bars 0: Non-print 1: Print</p> <p>kk: Data length 07: JAN8/EAN8 12: JAN13/EAN13 00: NOTE: When "00" is designated, the length is equivalent to the data sent by the Data Print Command. JIS 8 code: Data which is delimited by [LF] Packed BCD code: Data which is delimited by "F"</p> <p>l: Data code 1: JIS 8 code 2: Packed BCD code (only for IrDA: TEC Protocol)</p> <p>m: Fixed data No. 0 (Fixed value)</p>

6.5.6 BAR CODE FORMAT COMMAND (EAN128)**[ESC] XB**

Function	Sets the format to indicate the position on the label, at which the bar code is to be printed and how it is to be printed.
Format	[ESC] XBaa ; bbbb, cccc, d, e, ff, g, hhhh, iii, j, kk, l, m [LF] [NUL]
Term	<p>aa: Bar code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the bar code field.)</p> <p>bbbb: Print origin of X-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>d: Type of bar code N: EAN128</p> <p>e: Type of check digit 3 (Fixed value): Check digit auto attachment</p> <p>ff: 1-module width 02 to 03 (in units of dots)</p> <p>g: Rotational angle of bar code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>hhhh: Height of bar code 0001 to 0350 (in 0.1 mm units)</p> <p>iii: Length of guard bar 000 (Fixed value)</p> <p>j: Selection to print numerals under bars 0: Non-print 1: Print</p> <p>kk: Data length 00 to 32 (only even numbers)</p> <p style="text-align: center;">NOTE: When "00" is designated, the length is equivalent to the data sent by the Data Print Command. JIS 8 code: Data which is delimited by [LF] Packed BCD code: Data which is delimited by "F"</p> <p>l: Data code 1: JIS 8 code 2: Packed BCD code (only for IrDA: TEC Protocol)</p> <p>m: Fixed data No. 0 (Fixed value)</p>

6.5.7 BAR CODE FORMAT COMMAND (CODE128)**[ESC] XB**

Function	Sets the format to indicate the position on the label, at which the bar code is to be printed and how it is to be printed.
Format	[ESC] XBaa ; bbbb, cccc, d, e, ff, g, hhhh, iii, j, kkk, l, m [LF] [NUL]
Term	<p>aa: Bar code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the bar code field.)</p> <p>bbbb: Print origin of X-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>d: Type of bar code 9: CODE128</p> <p>e: Type of check digit 3 (Fixed value): Check digit auto attachment</p> <p>ff: 1-module width 02 to 03 (in units of dots)</p> <p>g: Rotational angle of bar code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>hhhh: Height of bar code 0001 to 0350 (in 0.1 mm units)</p> <p>iii: Length of guard bar 000 (Fixed value)</p> <p>j: Selection to print numerals under bars 0: Non-print 1: Print</p> <p>kkk: Data length 00 to 100 (Both odd and even numbers)</p> <p>NOTES: 1. A two-digit value can be entered. 2. When "00" or "000" is designated, the length is equivalent to the data sent by the Data Print Command. JIS 8 code: Data which is delimited by [LF] Packed BCD code: Data which is delimited by "F"</p> <p>l: Data code 1: JIS 8 code 2: Packed BCD code (only for IrDA: TEC Protocol)</p> <p>m: Fixed data No. 0 (Fixed value)</p>

Examples of using commands in EAN128/CODE128

⊙ Form storage

[ESC] ID; 01H23H [LF] [NUL] : ID setting
 [ESC] XO; 01, 1 [LF] [NUL] : Declaration of the start of form storage
 [ESC] D0360, 0480, 0330 [LF] [NUL] : Label size setting
 [ESC] XB00; 0000, 0080, N, 3, 2, 0, 0090, 000, 0, 24, 2, 0 [LF] [NUL] : Format of bar code No. 00

{ EAN128: 00 ~ 32
 { CODE128: 00 ~ 100

{ 9: CODE128
 { N: EAN128

[ESC] XP [LF] [NUL] : Declaration of the termination of form storage

⊙ Drawing and issue (for IrDA: TEC Protocol)

[STX] 01H 23H 10H X 01H 00H 03H 97H 15H 01H 83H 06H 32H 13H 11H 50H 00H 50H 01H [CRC] [CRC]

— Printer ID (0123H)
 — Packet length (10H = 16 bytes)
 — Form No.: 1
 — Transmissive sensor designated, No status response made
 — No. of labels to be issued: 3
 — Bar code data (971501830632131150005001)
 (*1) Check digit of Modulus 10 is not attached by the printer. Therefore, the check digit should be calculated in advance, then be sent as data.

(*1) How to calculate the Modulus 10 check digit (When bar code data is 971501830632131150005001.)

9	7	1	5	0	1	8	3	0	6	3	2	1	3	1	1	5	0	0	0	5	0	0	1
-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ

Sum up the numbers in the column of '-': 33

33 x 3 (fixed number) = 99

Sum up the numbers in the column of 'Δ': 29

29 x 1 (fixed number) = 29

Add the above two numbers: 99 + 29 = 128

Subtract the lowest digit of 128 from 10 (fixed number): 10 - 8 = 2

The obtained number '2' is attached to the end of the bar code data.

9	7	1	5	0	1	8	3	0	6	3	2	1	3	1	1	5	0	0	0	5	0	0	1	2
Bar code data																							Check digit of Modulus 10	

6.5.8 BAR CODE FORMAT COMMAND (Customer Bar Code)**[ESC] XB**

Function	Sets the format to indicate the position on the label, at which the bar code is to be printed and how it is to be printed.
Format	[ESC] XBaa ; bbbb, cccc, d, e, ff, g, hhhh, iii, j, kk, l, m [LF] [NUL]
Term	<p>aa: Bar code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the bar code field.)</p> <p>bbbb: Print origin of X-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of bar code Fixed as 4 digits (in 0.1 mm units)</p> <p>d: Type of bar code R: Customer bar code (Postal code for Japan) S: Highest priority customer bar code (Postal code for Japan)</p> <p>e: Type of check digit 3 (Fixed value): Check digit auto attachment</p> <p>ff: 1-module width 01 to 15 (in units of dots)</p> <p>g: Rotational angle of bar code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>hhhh: Height of long bars 0001 to 0350 (in 0.1 mm units)</p> <p>iii: Reserved area 000 (Fixed value)</p> <p>j: Reserved area 0 (Fixed value)</p> <p>kk: Data length 00 to 20: Customer bar code 00 to 19: Highest priority customer bar code NOTE: When "00" is designated, the length is equivalent to the data sent by the Data Print Command Data which is delimited by [LF]</p> <p>l: Data code 1: JIS 8 code</p> <p>m: Fixed data No. 0 (Fixed value)</p>

6.5.9 TWO-DIMENSIONAL CODE FORMAT COMMAND (PDF417) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa ; bbbb, cccc, d, ee, ff, gg, h, iii, kk, l, m [LF] [NUL]
Term	<p>aa: Two-dimensional code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the two-dimensional code field.)</p> <p>bbbb: Print origin of X-coordinate of two-dimensional code Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of two-dimensional code Fixed as 4 digits (in 0.1 mm units)</p> <p>d: Type of two-dimensional code P: PDF417</p> <p>ee: Security level 00: Level 0 01: Level 1 02: Level 2 03: Level 3 04: Level 4 05: Level 5 06: Level 6 07: Level 7 08: Level 8</p> <p>ff: 1-module width 02 to 03 (in units of dots)</p> <p>gg: No. of columns (strings) 01 to 30</p> <p>h: Rotational angle of two-dimensional code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>iii: Bar height 0001 to 0100 (in 0.1 mm units)</p>

kk: Data length
00 to 99

- NOTES:**
1. *The value should consist of 2 digits*
 2. *When "00" is designated, the length is equivalent to the data sent by the Data Print Command.
(JIS 8 code: Data which is delimited by [LF])
Data having a max. of 2000 digits is acceptable.*
 3. *In IrDA: TEC Protocol, when the data length value is set to 250 or more, it can be sent by using the multiple packet format for the Data Print Command in several packets.*

l: Data code
1 (Fixed value): JIS 8 code

m: Fixed data No.
0 (Fixed value)

Examples of using commands in PDF417

⊙ Form storage

[ESC] ID; 01H23H [LF] [NUL]	: ID setting
[ESC] XO; 01, 1 [LF] [NUL]	: Declaration of the start of form storage
[ESC] D0360, 0480, 0330 [LF] [NUL]	: Label size setting
[ESC] XB00; 0000, 0000, P, 00, 02, 06, 0, 0010, 00, 1, 0 [LF] [NUL]	: Format of two-dimensional code No. 00
[ESC] XP [LF] [NUL]	: Declaration of the termination of form storage

⊙ Drawing and issue (for IrDA: TEC Protocol)

Command packet in the case that 300-byte issue data is designated in PDF417

(Since the data length is 250 bytes or more, the data is sent by using the command packet in the RECEIPT mode.)

[Example]

[STX] 01H 23H deH Y 10H X 01H 00H 03H ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

No. of labels to be issued: 3

Transmissive sensor designated,
No status response made

Form No.: 1

Flag (Middle block)

Mode (Fixed as "Y": Indicates the RECEIPT mode.)

Packet length (deH = 222 bytes)

Printer ID (0123H)

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 [CRC] [CRC]

[STX] 01H 23H 57H Y 01H ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
ABCDEFGHIJKL [CRC] [CRC]

Flag (Middle block)

Packet length (57H = 87 bytes)

6.5.10 TWO-DIMENSIONAL CODE FORMAT COMMAND (QR Code) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, e, ff, g, h (, Mi) (, Kj) (, Jkklmm), nn, o, p [LF] [NUL]
Term	<p>aa: Two-dimensional code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the two-dimensional code field.)</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in units of 0.1 mm)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code Fixed as 4 digits (in units of 0.1 mm)</p> <p>d: Type of two-dimensional code T: QR code</p> <p>e: Designation of error correction level L: High density level M: Standard level Q: Reliability level H: High reliability level</p> <p>ff: 1-cell width 01 to 09 (in units of dots)</p> <p>g: Selection of mode M: Manual mode A: Automatic mode</p> <p>h: Rotational angle of two-dimensional code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>Mi: Selection of model (If this parameter is omitted, Model 1 is automatically selected.) i = 1: Model 1 2: Model 2</p> <p>Kj: Mask number (If this parameter is omitted, the number is automatically set.) i = 0 to 7: Mask number 0 to 7 8: No mask</p> <p>Jkklmm: Connection setting (No connection if this parameter is omitted.) kk = 01 to 16: Value indicating which divided code is connected. ll = 01 to 16: Number of divided codes mm = 00 to FF: A value for all data to be printed, to which XOR is applied in units of bytes (Not divided)</p>

nn: Data length
00 to 99

NOTES: 1. A two-digit value can be entered.
2. When "00" is designated, the length is equivalent to the data sent by the Data Print Command. It corresponds for up to 2000 digits.

o: Data code
1 (Fixed value): JIS 8 code

p: Data code
0 (Fixed value)

6.5.11 TWO-DIMENSIONAL CODE FORMAT COMMAND (Data Matrix) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, ee, ff, gg, h (, Ciiijj) (, Jkkllmmnnn), ooo, p, q [LF] [NUL]
Term	<p>aa: Two-dimensional code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the two-dimensional code field.)</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in units of 0.1 mm)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code Fixed as 4 digits (in units of 0.1 mm)</p> <p>d: Type of two-dimensional code Q: Data Matrix</p> <p>ee: ECC type 00: ECC000 05: ECC050 08: ECC080 10: ECC100 14: ECC140 20: ECC200</p> <p>ff: 1-cell width 01 to 09 (in units of dots)</p> <p>gg: Format ID 01: Format ID 1 02: Format ID 2 03: Format ID 3 04: Format ID 4 05: Format ID 5 06: Format ID 6</p> <p>h: Rotational angle of two-dimensional code 0: 0° 1: 90° 2: 180° 3: 270°</p>

Ciiijjj: No. of cells (If this parameter is omitted, it is automatically set.)

iii: No. of cells in the X direction 000 to 144

jjj: No. of cells in the Y direction 000 to 144

NOTE: Cell setting varies according to the ECC type.

	ECC000 to ECC140	ECC200
No. of cells to be designated	Odd numbers only	Even numbers only
Min./Max. No. of cells	9 × 9 to 49 × 49	10 × 10 to 144 × 144
Rectangular code	None	18 × 8 32 × 8 26 × 12 36 × 12 36 × 16 48 × 16

- When this parameter is omitted, the number of cells is automatically set. Also, when data except for the above values is designated for Nos. of cells in the X and Y directions, the number of cells is automatically set.

Jkklmmnnn: Connection setting

(Omissible: No connection if this parameter is omitted)

kk: Code number 01 to 16

ll: No. of divided codes 01 to 16

mmm: ID number 1 001 to 254

nnn: ID number 2 001 to 254

NOTE: It is effective only when ECC200 is selected.

ooo: Data length
000 to 100

- NOTES:**
1. "00 to 99" indicated in 2 digits, is also available.
 2. When "00" is designated, the length is equivalent to the data sent by the Data Print Command (data which is delimited by [LF].)
 3. When "00" is designated, the length is equivalent to the data sent by the Data Print Command. It corresponds for up to 2000 digits.

p: Data code
1 (Fixed value): JIS 8 code

q: Reserved area
0: Fixed value

6.5.12 TWO-DIMENSIONAL CODE FORMAT COMMAND (MircoPDF417) [ESC] XB

Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, ee, ff, gg, h, iii, jjj, k, l [LF] [NUL]
Term	<p>aa: Two-dimensional code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the two-dimensional code field.)</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in units of 0.1 mm)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code Fixed as 4 digits (in units of 0.1 mm)</p> <p>d: Type of two-dimensional code X: MicroPDF417 (Two-dimensional code)</p> <p>ee: Security level 00: Fixed value</p> <p>ff: 1-module width 01 to 09 (in units of dots)</p> <p>gg: No. of columns (strings) 01 to 38</p> <p>h: Rotational angle of two-dimensional code 0: 0° 1: 90° 2: 180° 3: 270°</p> <p>iii: Bar height 0001 to 0100 (in units of 0.1 mm)</p> <p>jjj: Data length 000 to 100</p> <p>NOTES:</p> <ol style="list-style-type: none"> 1. "00 to 99" indicated in 2 digits, is also available. 2. When "00" is designated, the length is equivalent to the data sent by the Data Print Command (data which is delimited by [LF].) 3. When "00" is designated, the length is equivalent to the data sent by the Data Print Command. It corresponds for up to 366 digits. <p>k: Data code 1 (Fixed value): JIS 8 code</p> <p>l: Reserved area 0: Fixed value</p>

6.5.13 TWO-DIMENSIONAL CODE FORMAT COMMAND (Maxicode) [ESC] XB

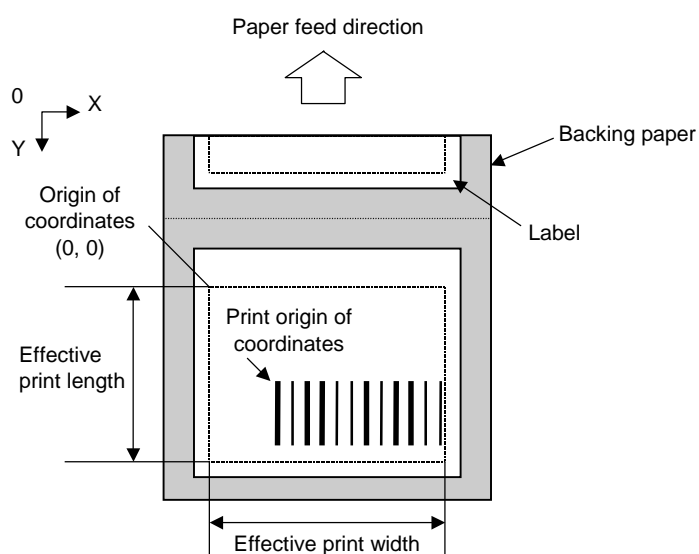
Function	Sets the format to indicate the position on the label, at which the two-dimensional code is to be printed and how it is to be printed.
Format	[ESC] XBaa; bbbb, cccc, d, e (, Jffgg) (, Zh), iii, j, k [LF] [NUL]
Term	<p>aa: Two-dimensional code No. 00 to 99 (The same No. must not be used in one form for the bit map font field, the outline font field, and the two-dimensional code field.)</p> <p>bbbb: Print origin of X-coordinate of the two-dimensional code Fixed as 4 digits (in units of 0.1 mm)</p> <p>cccc: Print origin of Y-coordinate of the two-dimensional code Fixed as 4 digits (in units of 0.1 mm)</p> <p>d: Type of two-dimensional code Z: Maxicode</p> <p>e: Mode selection 2: Mode 2 3: Mode 3 4: Mode 4 6: Mode 6</p> <p>Jffgg: Connection setting (Omissible. If omitted, no connection is made.) ff: Code number 01 to 08 gg: No. of divided codes 01 to 08</p> <p>Zh: Attachment of Zipper block and Contrast block (Omissible. If omitted, the Zipper block and Contrast block are not attached.) h: 0: No attachment of Zipper block and Contrast block 1: Attachment of Zipper block and Contrast block 2: Attachment of Zipper block 3: Attachment of Contrast block</p> <p>iii: Data length 000 to 100 NOTES: 1. "00 to 99" indicated in 2 digits, is also available. 2. When "00" is designated, the length is equivalent to the data sent by the Data Print Command (data which is delimited by [LF].)</p> <p>j: Data code 1 (Fixed value): JIS 8 code</p> <p>k: Reserved area 0: Fixed value</p>

Explanation

(1) Bar code/two-dimensional code No.

The data in the Data Print Command (X) is selected and linked in the order of this bar code/two-dimensional code No. (The format of bar code/two-dimensional code Nos. 00 and 01 is linked to the first and second data, respectively. In the same order, the format is linked to the data.) Therefore, the Nos. of the bit map font character string, the outline font character string, and the bar code/two-dimensional code, should be consecutive, starting from 00 (in ascending order). The same No. must not be used in one form for the bit map font character string field, the outline font character string field, and the bar code/two-dimensional code field.

(2) Print origin of coordinates

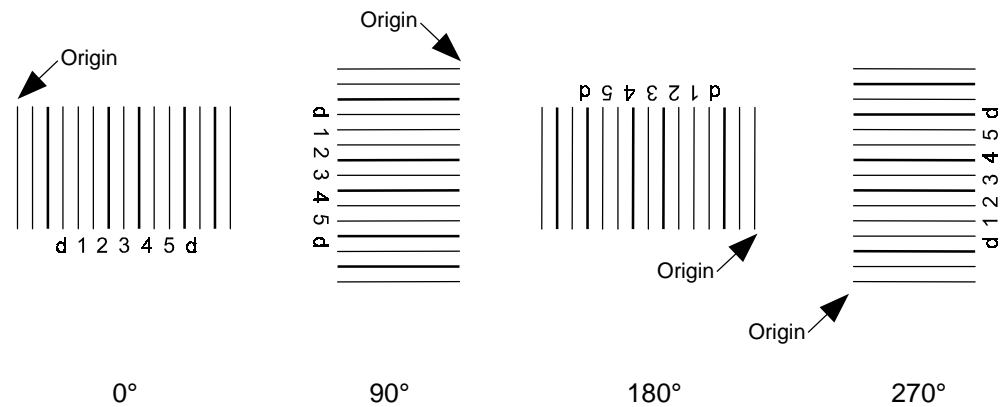


(3) Type of check digit

The check digit is automatically attached according to the type designation as shown below.

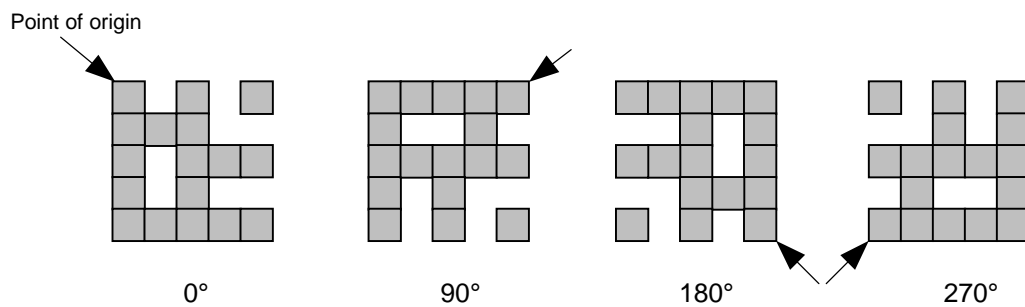
Bar code type C/D type	NW7, CODE39, Interleaved 2 of 5	JAN8/EAN8, JAN13/EAN13	EAN128, CODE128
1	Without attaching check digit	No designation	No designation
3	No designation	Auto attachment of Modulus 10	Auto attachment of PSEUDO103

(4) Rotational angles of a bar code

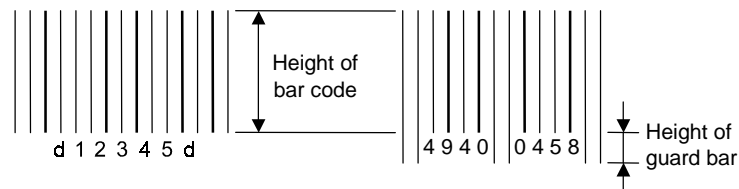


NOTE: If a bar code is rotated at 90° or 270°, the print density may become lower in relation to the bar height. A bar code with a height of 14 mm or less should be used. When a bar code with a height of over 14 mm is used, the print quality is not guaranteed.

Rotational angle of a two-dimensional code



(5) Bar code height



(6) Numerals under bars

Numerals are provided under bars depending on the parameter for numerals under bars. Standard fonts are used.

(7) Since the start/stop codes are not automatically attached, it should be included in the data to be sent. If the start/stop codes are not attached to data for CODE39 or NW7, the bar code is not drawn.

(8) When Interleaved 2 of 5 is selected and the number of data length digits is odd, 0 is automatically added to the beginning of the data, to change the number of data length digits to even.

(9) Explanation for QR code

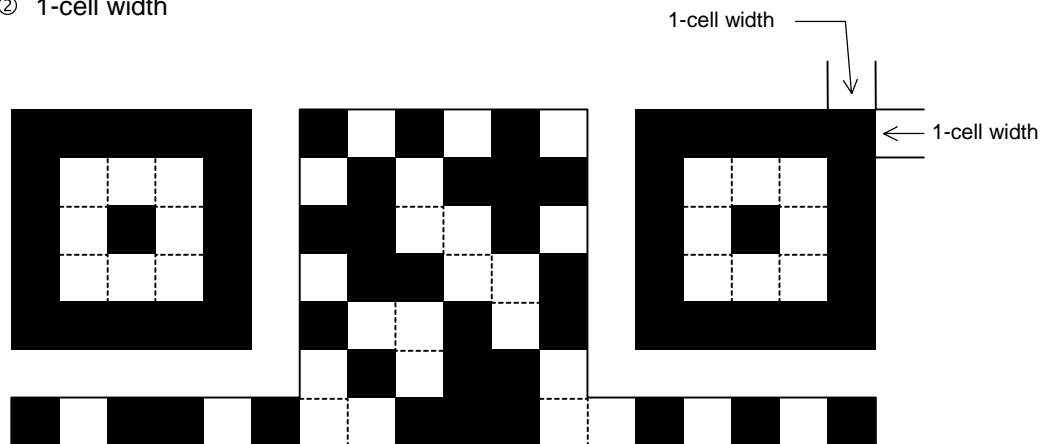
① Error correction level

The QR code contains functions to detect and correct an error. If one of the data characters is damaged, the information can be restored when this code is read.

There are 4 levels that can be designated. The level should be specified according to usage. The general correction ability is as follows.

Level	Error correction ability	Overhead by correcting an error
High density level	<div style="text-align: center;"> Low ↑↓ High </div>	7%
Standard level		15%
Reliability level		25%
High reliability level		30%

② 1-cell width



③ Selection of mode

All codes including alphanumerics, symbols, and Kanji can be used in one QR code. Manual mode or automatic mode can be selected to perform the operation.

④ Selection of model

Model 1: Original specification

Model 2: Extended specification which enhances the function of position correction and can contain a large amount of data.

⑤ Mask number

To be sure the QR code is read, it is preferable that white and black modules are arranged in this symbol in a balanced manner. This prevents the bit pattern “1011101”, which is characteristically seen in the position detecting pattern, from appearing in the symbol as much as possible.

The mask number is 0 to 7. The pattern is determined by placing each masking pattern for the mask number upon the module pattern. When the mask number is set to 8, masking is not performed. When the parameter is omitted, the most appropriate mask number is automatically selected to perform masking.

⑥ Connection setting

For QR code, data can be divided into several codes. Even though there is only a narrow print space, the code can be entered in the space by dividing the code. The data can be divided into a max. of 16 codes. Parity data is obtained by XORing all input data in units of bytes before dividing. The input data is calculated based on shift JIS for Kanji, or on JIS 8 for others. Examples are shown below:

“0123456789日本” is divided into “0123”, “4567”, and “89日本”.

Code No. 1	No. of divided codes: 3	Parity data: 84	Data “0123”
Code No. 2	No. of divided codes: 3	Parity data: 84	Data “4567”
Code No. 3	No. of divided codes: 3	Parity data: 84	Data “89日本”

* The parity data is the XORed value for “0123456789日本”.

30 31 32 33 34 35 36 37 38 39 93 FA 96 7B = 85

Note

When the QR code is printed, note the setting for the coordinates positions. If the specified coordinates are close to the maximum effective print length, the QR code may not be included within the maximum effective print length, depending on the 1-cell width or the data count. If the QR code is not included within the maximum effective print width, one part of the printed QR code may be missing. Be sure to check to see if the QR code is included within the effective print length.

(For example, when the maximum effective print length is 97 mm, if the Y-coordinate of the QR code is set to 90 mm, one part of the printed QR code may be missing, depending on the QR code size.

(10) Security level

The PDF417 contains a function to correct a code reading error using an error correcting code word and restore normal data. The security level should be designated according to usage to perform the error correction function.

Security level	Error Correction Ability	No. of error correction code words
Level 0	<div style="text-align: center;"> <div style="border: 1px solid black; padding: 2px; margin: 0 auto; width: 50px;">Low</div> <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;"> <div style="border-left: 1px solid black; border-right: 1px solid black; width: 10px; height: 50px;"></div> </div> <div style="border: 1px solid black; padding: 2px; margin: 0 auto; width: 50px;">High</div> </div>	0
Level 1		2
Level 2		6
Level 3		14
Level 4		30
Level 5		62
Level 6		126
Level 7		254
Level 8		510

(11) No. of columns (strings)

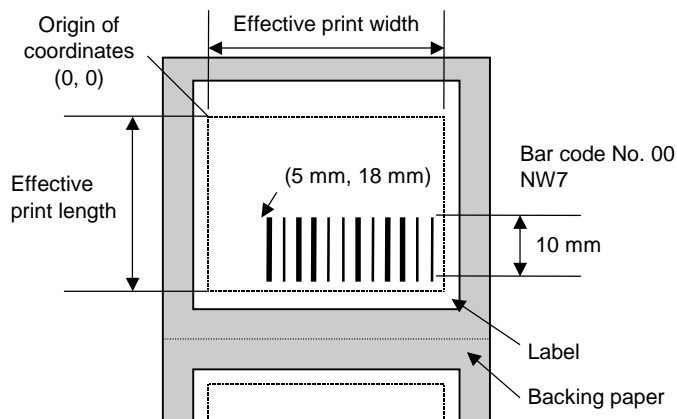
The number of lines is variable in the PDF417. The line length (No. of data strings) is also variable. Therefore, a symbol can be created in a form that can be easily printed, by changing the proportion of the height and width.

The number of columns (data strings) is variable between 1 and 30.

If a small value for the number of columns is set when the data is large and the security level is high, drawing may not be performed. This is because the number of lines exceeds 90 when the number of columns becomes small. If the number of lines exceeds 90, a label is issued without being printed.

(When the PDF417 is used, the number of lines of symbols is limited from 3 to 90.)

Example



[ESC] XB00 ; 0050, 0180, 4, 1, 02, 02, 05, 05, 02, 0, 0100, 0, 07, 1, 0 [LF] [NUL]

6.6 COMMANDS RELATED TO ISSUE AND FEED

6.6.1 DATA PRINT COMMAND

[ESC] X

Function	Draws or prints the data.
----------	---------------------------

Format	[IrDA: TEC Protocol]
--------	----------------------

Xabcddd --- eee --- nnn ---

[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

[ESC] Xabcddd --- eee --- nnn --- [NUL]

Term

- a: Form No.
01H to 14H (1 to 20)
- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | | | | | | | |
- Form No. (Bit 0 to Bit 6) 01H to 14H (1 to 20)
Reprint key enabled or disabled (Bit 7)

Selection of the reprint key function

0: Enabled

1: Disabled

When the form No. is 81H to 8AH (1 to 10) and if an error occurs during printing, the reprint key will be enabled until a label is successfully issued.

When the form No. is 8BH to 94H (11 to 20), the reprint key will be disabled if an error occurs during printing.

- b: Sensor designation and ACK (IrDA: TEC Protocol) /status transmission (IrDA: IrCOMM, RS-232C, Bluetooth) to notify the issue end
- 00H: Transmissive sensor, No ACK/status transmission
01H: Transmissive sensor, ACK/status transmission
10H: Reflective sensor, No ACK/status transmission
11H: Reflective sensor, ACK/status transmission
20H: No sensor designation, No ACK/status transmission
21H: No sensor designation, ACK/status transmission

- c: No. of labels to be issued
01H to FFH (1 to 255)
- In the strip issue mode, one label is issued. If the number of labels is designated, it will be ignored.

ddd ---: Data of character/bar code/2-D code No. 00	} When a delimiter is required, it should be added to the end of data. (Refer to "Explanation".)
eee ---: Data of character/bar code/2-D code No. 01	
nnn ---: Data of character/bar code/2-D code No. nn	

Explanation

- (1) When the printer receives this command, the following operations will be performed.
 - ① The printer clears the drawing buffer.
 - ② The printer links the form to the data.
 - ③ The printer draws the data in the drawing buffer.
 - ④ The printer draws the data if invocation of graphics is set in the form.
 - ⑤ The printer sets the print density/position fine adjustment values stored in the form.
 - ⑥ The printer starts printing
- (2) Data is indicated in JIS 8 code or packed BCD code. The type of data code is set by the Bit Map Font Field Command, the Outline Font Field Command, or the Bar Code/Two-dimensional Code Format Command.
- (3) When the length and the data code set by the Bit Map Font Field Command, the Outline Font Field Command, or the Bar Code/Two-dimensional Code Format Command is "00" and JIS 8 code, respectively, the delimiter [LF] (0AH) should be entered at the end of the field data. When the packed BCD is used as the data code, the delimiter "F" (4 bits) should be entered at the end of the field data. When the data length stored in the form is anything other than "00", a delimiter such as [LF] or "F" should not be attached, since the length of the data is linked.
- (4) If the length of the data corresponding to one field (including a delimiter) is an odd number of digits when the packed BCD code is used, the last 4 bits of the final data in the field should be "0".
- (5) When there is data which does not match the type of bar code/two-dimensional code in the data string for the bar code/two-dimensional code, the bar code/two-dimensional code is not drawn. When the bar code/two-dimensional code digit is fixed, and the type of bar code/two-dimensional code does not match the number of the data digit, the bar code/two-dimensional code is not drawn.
- (6) If an error occurs while printing two or more labels, the printer stops printing, lights up the LED, discards the remaining data, and reverts to a wait state for a command.
- (7) If the form which corresponds to the form No. designated is not stored, a syntax error will occur.
- (8) When the form No. is other than 01H to 14H, the Data Print Command is discarded.
- (9) When the number of labels to be printed is other than 01H to FFH, a syntax error will occur.
- (10) If the battery capacity becomes low while printing two or more labels, the printer may stop after issuing every label (for Max. 3 seconds).

- (11) Automatic status transmission (IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN)

When the status response is designated, the printer automatically sends the printer status and the battery status after issuing labels.

Data to be sent (Fixed as 5 bytes)

STX	Printer ID		Printer status	Battery status
02H	xxH	xxH	xxH	xxH

Printer ID 2-byte hex data (in order from High to Low)

Printer status Printer status is indicated in 1-byte data.

- 02H: Command syntax error
- 03H: Paper jam
- 04H: Label end
- 05H: Cover open error
- 06H: Broken thermal head dots error
- 07H: Thermal head excessive temperature
- 08H: Flash ROM write error
- 09H: Flash ROM erase error
- 0AH: Low battery (Print failure)
- 0DH: Normal end + Label end (See **NOTE**.)
- 0EH: Flash ROM storage area full state
- 10H: Normal issue end
- 0DH: Normal issue end + Label end

This is a state when the printer runs out of labels, after the effective print length is printed.

Battery status..... The battery charge status is indicated in 5 levels.

- 01H: 7.2 V or less (Print failure)
- 02H: 7.3 V to 7.4 V
(Remaining No. of printable labels: Approx. 20 or less)
- 03H: 7.5 V to 7.7 V
(Remaining No. of printable labels: Approx. 20 to 100)
- 04H: 7.8 V to 7.9 V
(Remaining No. of printable labels: Approx. 100 to 200)
- 05H: 8.0 V or more
(Remaining No. of printable labels: Approx. 200 or more)

* The remaining number of printable labels may vary according to the contents to be printed and the ambient environment.

- (12) If an error occurs when 99% of print data has been printed, pressing the FEED key after clearing the error causes the printer to reprint, even when the restart key is set to disabled and the form number is selected from 1 to 10.
- (13) If an error occurs before printing, the printer will not reprint by pressing the FEED key after clearing the error, when the restart key is set to disabled and the form number is selected from 11 to 20.
- (14) In case of "normal issue end + label end", pressing the FEED key after clearing the error causes the printer to reprint even when the restart key is set to disabled and the form number is selected from 1 to 10.

- (15) When the sensor is specified, even if a gap or a black mark is detected within less than 90% of the effective print length specified by the Label Size Set Command, it is ignored.

However, this is not applicable when the programmed media pitch is less than 40mm. When this media is used and a gap or a black mark is detected within less than 90% of the effective print length, the detected gap or black mark will be effective. As a result, printing will stop even if it is halfway.

• The definition of packed BCD code

Code	Character string				Bar code			
	Standard/ Presentation	Bold	Price	Others	EAN8/13 ITF EAN128 MIS	NW7	CODE39	CODE128
0000 (0) ~ 1001 (9)	"0" ~ "9"							
1010 (A)	Reserved	" - "	" \$ "	" £ "	Reserved	" a "	" * "	" "
1011 (B)	Reserved	Reserved	Reserved	" p "	Reserved	" b "	" _ "	" "
1100 (C)	" . "	Reserved	" . "	" . "	Reserved	" c "	" . "	" "
1101 (D)	" "	" "	" "	" "	Reserved	" d "	" "	" "
1110 (E)	Reserved							
1111 (F)	Delimiter							

* E (H) is reserved for expansion. F (H) is used as the delimiter for each field in the Data Print Command (only when the data length and the data code are "00" and "Packed BCD code", respectively).

[Example] Bar code data = "a 1 2 3 4 5 6 7 8 9 0 d"

[A1H]	[23H]	[45H]	[67H]	[89H]	[0DH]
a1	23	45	67	89	0d

- When the manual mode is selected in the Format Command for a QR code

- Numeric mode, alphanumeric and symbol mode, Kanji mode

Mode selection	Data to be printed
----------------	--------------------

- Binary mode

Mode selection	No. of data strings (4 digits)	Data to be printed
----------------	-----------------------------------	--------------------

- Mixed mode

Data	“,” (comma)	Data	“,” (comma)	Data
------	-------------	------	-------------	------

The QR code can handle all codes including alphanumerics, symbols and Kanji. Since data compression rate varies according to codes, the code to be used is designated when the mode is selected.

Mode	Code	Details
N	Numerals	0 to 9
A	Alphanumerics, symbols	A to Z 0 to 9 space \$ % * + - . / :
B	Binary (8-bit)	00H to FFH
K	Kanji	Shift JIS

If mixed mode is selected, up to 200 modes can be selected in a QR code.

- When the automatic mode is selected in the Format Command for a QR code.

Data to be printed

① How to send the control code data

NUL (00H)	=	> @ (3EH, 40H)
SOH (01H)	=	> A (3EH, 41H)
STX (02H)	=	> B (3EH, 42H)
⋮		
GS (1DH)	=	>] (3EH, 5DH)
RS (1EH)	=	> ^ (3EH, 5EH)
US (1FH)	=	> _ (3EH, 5FH)

② How to send the special codes

> (3EH)	=	> 0 (3EH, 30H)
---------	---	----------------

[Transfer code]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p								
1	SOH	DC1	!	1	A	Q	a	q								
2	STX	DC2	"	2	B	R	b	r								
3	ETX	DC3	#	3	C	S	c	s								
4	EOT	DC4	\$	4	D	T	d	t								
5	ENQ	NAK	%	5	E	U	e	u								
6	ACK	SYN	&	6	F	V	f	v								
7	BEL	ETB	'	7	G	W	g	w								
8	BS	CAN	(8	H	X	h	x								
9	HT	EM)	9	I	Y	i	y								
A	LF	SUB	*	:	J	Z	j	z								
B	VT	ESC	+	;	K	[k	{								
C	FF	FS	,	<	L	\	l									
D	CR	GS	-	=	M]	m	}								
E	SO	RS	•	>	N	^	n	~								
F	SI	US	/	?	O	_	o	DEL								

* The shaded parts are Japanese.
They are omitted here.

When the automatic mode is selected in the Format Command, FFH data cannot be used. It is available when the manual mode is selected.

Examples of data designation for QR code

- ① Alphanumeric mode: ABC123

A A B C 1 2 3
 ↑
 Data to be printed
 Designation of mode

- ② Binary mode: 01H, 03H, 05H

B 0 0 0 6 > A > C > E
 ↑
 Data to be printed
 No. of data strings
 Designation of mode

- ③ Mixed mode

Numeric mode : 123456
 Kanji mode : Kanji data
 Binary mode : a ア i イ u ウ e エ o オ
 Alphanumeric mode : ABC

N 1 2 3 4 5 6, K Kanji data, B 0 0 1 0 a ア i イ u ウ e エ o オ, A A B C
 ↑ Data to be printed ↑ Data to be printed ↑ No. of data strings Data to be printed ↑ Data to be printed
 Designation of mode

- ④ Automatic mode

When the data above (③) is designated in automatic mode:

1 2 3 4 5 6 Kanji data a ア i イ u ウ e エ o オ A B C
 Data to be printed

6.7 COMMANDS RELATED TO FORMAT

6.7.1 FLASH MEMORY STORAGE AREA FORMAT COMMAND [ESC] J1

Function	Formats (Initializes) the form storage area in flash memory.
Format	[ESC] J1; a [LF] [NUL]
Term	a: Format (Initialization) designation A: Form storage area B: Writable character storage area C: Graphic storage area D: All storage areas (Form, Writable character, Graphic)
Explanation	(1) When the storage area in flash ROM becomes full, the old data is automatically deleted and only the newest data is left. Only the form storage area in flash ROM can be forcefully cleared by this command. However, if this command is sent, all data of the stored forms, including the newest data, is deleted (initialized).
Refer to	Form Store Start Command ([ESC] XO)

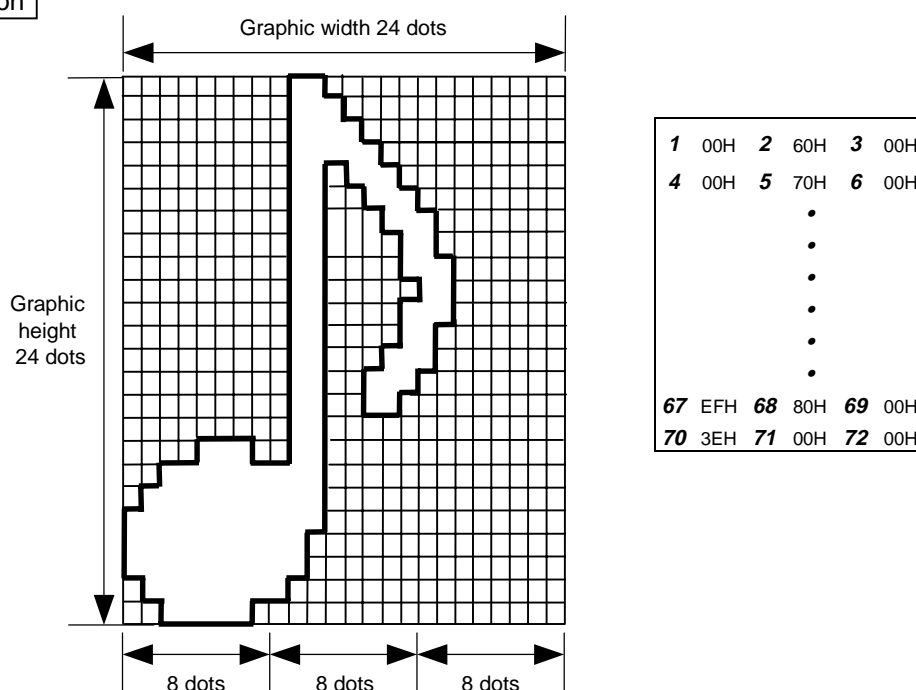
6.8 COMMANDS RELATED TO WRITABLE CHARACTERS

6.8.1 WRITABLE CHARACTER DATA STORE COMMAND [ESC] XD

Function	Stores writable characters and logos into flash memory.
Format	[ESC] XD ; aa, bbb --- bbb [LF] [NUL]
Term	aa: Writable character code FF40H to FF71H

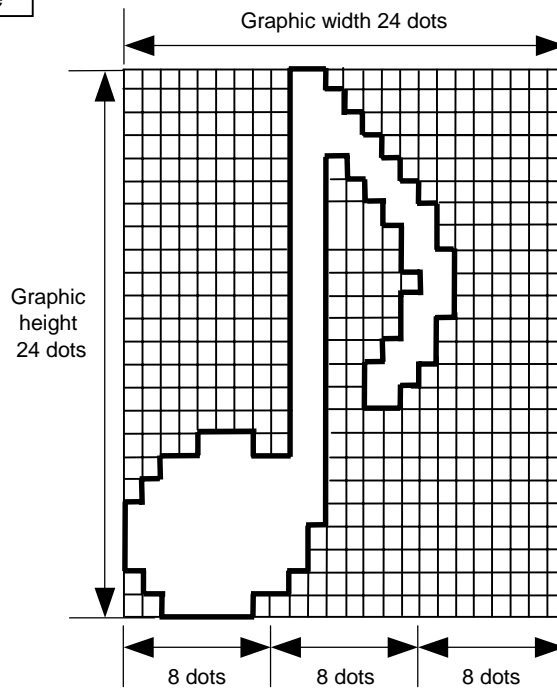
bbb---bbb: Writable character data (Fixed as 72 bytes)

Explanation



- (1) The writable character data should be separated into units of 8 dots and sent in the above order (**1** to **72**).
- (2) The writable character data is 00H to FFH.
- (3) The number of dots of a writable character width and a writable character height are fixed as 24 dots. Dots with no data are transmitted as data 0. 72-byte data should be sent.
- (4) Max. 50 types of writable character data can be stored. The writable character data is backed up in memory (even if the power is turned off).
- (5) Writable character data is assigned from FF40H to FF71H. Therefore, to read the code, the code (2 bytes) which was stored by this command should be designated.
- (6) A new writable character can be stored in codes which have been stored in an already existing code.

Example



```
[ESC]XD;<FFH><40H>,
[00H][60H][00H][00H][70H][00H][00H][78H][00H]
[00H][7CH][00H][00H][6EH][00H][00H][67H][00H]
[00H][63H][80H][00H][61H][80H][00H][61H][C0H]
[00H][60H][C0H][00H][61H][C0H][00H][61H][80H]
[00H][63H][80H][00H][67H][C0H][00H][66H][00H]
[0FH][60H][00H][0EH][60H][00H][3FH][E0H][00H]
[7FH][FEH][00H][FFH][E0H][00H][FFH][C0H][00H]
[FFH][C0H][00H][EFH][80H][00H][3EH][00H][00H]
[LF][NUL]
```

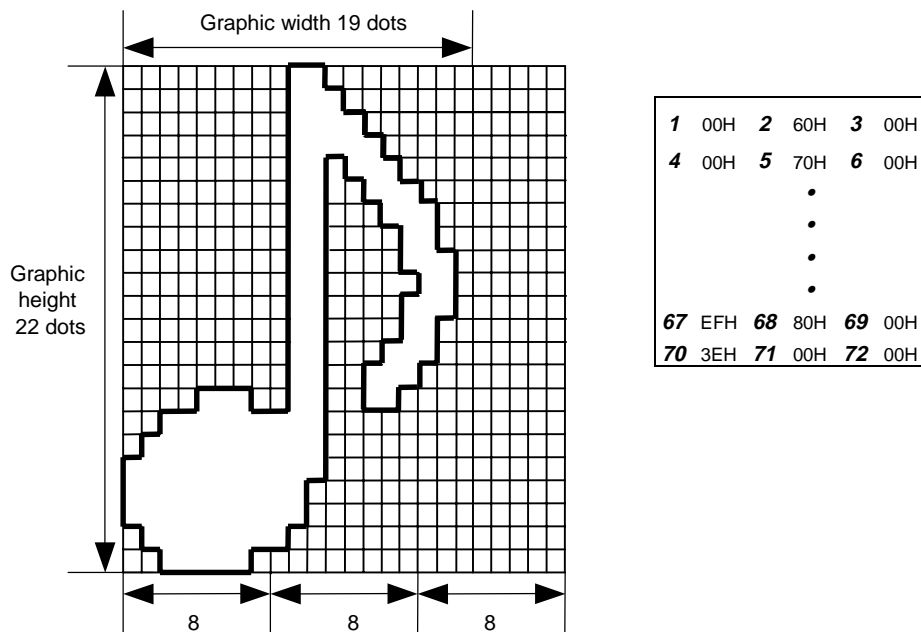
6.9 COMMANDS RELATED TO GRAPHICS

6.9.1 GRAPHIC DATA STORE COMMAND

[ESC] SG

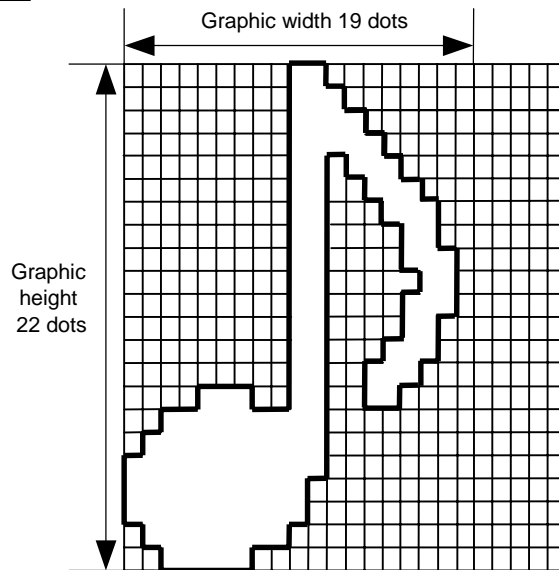
Function	Stores the graphic data on the printer.	
Format	[ESC] SG ; a, bbbb, cccc, ddd --- ddd [LF] [NUL]	
Term	a:	Graphic No. 1 to 2
	bbbb:	No. of graphic width dots to be stored 0001 to 0384 (in units of dots)
	cccc:	No. of graphic height dots to be stored 0001 to 0720 (in units of dots)
	ddd --- ddd:	Graphic data

Explanation



- (1) The graphic data should be separated into units of 8 dots and sent in the above order (**1** to **72**).
- (2) The graphic data is 00H to FFH.
- (3) The minimum unit of a graphic width is 8 dots. Dots with no data are transmitted as data 0.
- (4) The number of bytes of the graphic to be transmitted must be as follows;
The number of bytes of the graphic to be transmitted = {(No. of graphic width dots + 7)/8} × No. of graphic height dots
* The value in the brackets is rounded down to the nearest whole number.

Example



```
[ESC]SG;1,0019,0024,
[00H][60H][00H][00H][70H][00H][00H][78H][00H]
[00H][7CH][00H][00H][6EH][00H][00H][67H][00H]
[00H][63H][80H][00H][61H][80H][00H][61H][C0H]
[00H][60H][C0H][00H][61H][C0H][00H][61H][80H]
[00H][63H][80H][00H][67H][C0H][00H][66H][00H]
[0FH][60H][00H][0EH][60H][00H][3FH][E0H][00H]
[7FH][FEH][00H][FFH][E0H][00H][FFH][C0H][00H]
[FFH][C0H][00H][EFH][80H][00H][3EH][00H][00H]
[LF][NUL]
```

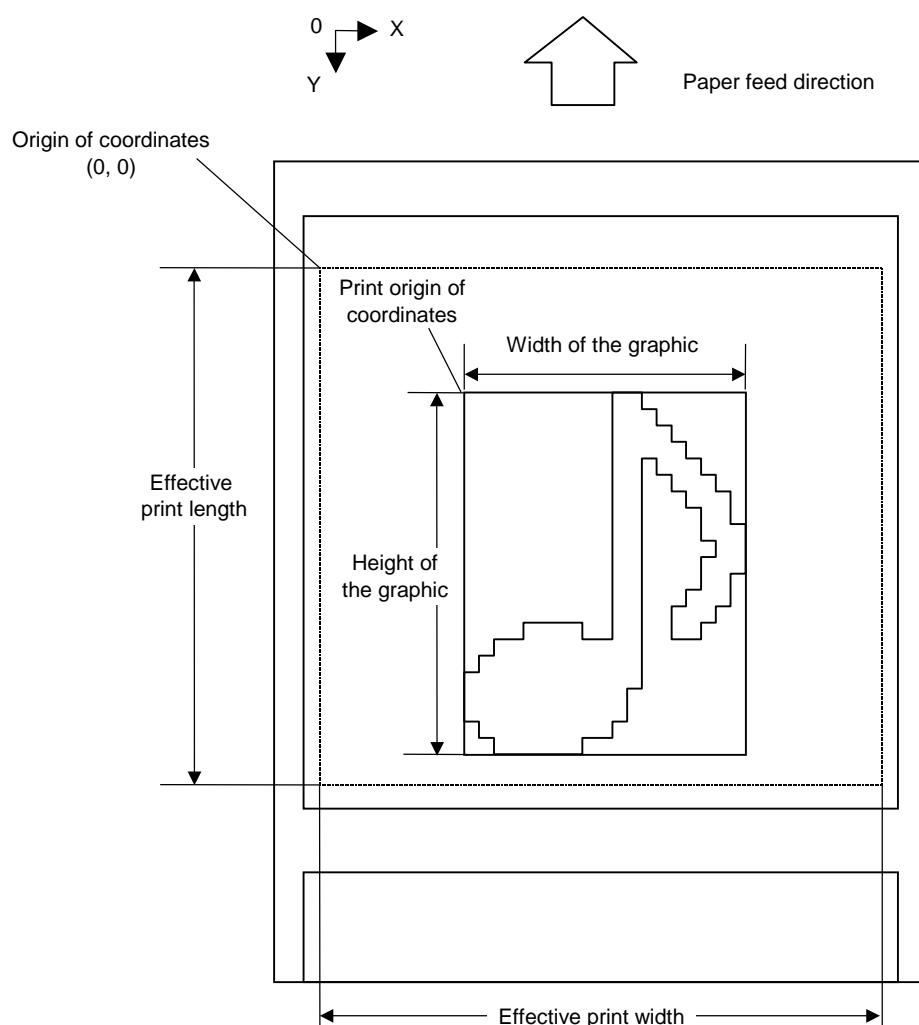
6.9.2 GRAPHIC FIELD COMMAND**[ESC] N**

Function	Sets how the graphic data is to be printed on the label.
----------	--

Format	[ESC] N ; a, bbbb, cccc [LF] [NUL]
--------	------------------------------------

Term	<p>a: Graphic No. to be invoked and drawn 1 to 2</p> <p>bbbb: Print origin of X-coordinate of graphic data Fixed as 4 digits (in 0.1 mm units)</p> <p>cccc: Print origin of Y-coordinate of graphic data Fixed as 4 digits (in 0.1 mm units)</p>
------	--

Explanation	<p>(1) If the Graphic Field Command is stored in a form, like the Bit Map Font Field Command, the Outline Font Field Command, or the Bar Code/Two-dimensional Code Format Command, the graphic data is automatically drawn, when the stored form is invoked by the Data Print Command.</p> <p>(2) When no graphic data has been stored, the printer does not print any graphics even if a graphic data number is specified by the Graphic Field Command.</p>
-------------	--



6.10 COMMANDS RELATED TO PC COMMAND SAVING

6.10.1 FORM STORE START COMMAND

[ESC] XO

Function	Declares the start of form storage.
Format	[ESC] XO ; aa, b [LF] [NUL]
Term	aa: Form No. 01 to 20 b: Form version No. 0 to 9 (It is not stored when "0" is designated)
Notes	(1) Max. 20 types can be stored. However, since the memory capacity is limited, the maximum number may vary depending on the form size to be stored. (2) The data which is stored most recently is the newest in spite of the version No. (3) When the form number which has been stored is stored again, the new form can be stored if the Form Store Start Command ([ESC] XO) is sent. However, memory is used every time a form is stored again. (4) Until the Form Store Terminate Command ([ESC] XP) is received after the Form Store Start Command ([ESC] XO) is received, any command other than below is not stored and is ignored. <ul style="list-style-type: none"> • Label Size Set Command ([ESC] D) • Print Density Fine Adjust Command ([ESC] AY) • Position Fine Adjust Command ([ESC] AX) • Bit Map Font Field Command ([ESC] PC) • Outline Font Field Command ([ESC] PV) • Bar Code/Two-dimensional Code Format Command ([ESC] XB) • Graphic Field Command ([ESC] N) • Line Format Command ([ESC] LC) (5) If the Form Store Start Command is not sent, the Label Size Set Command ([ESC] D), the Bit Map Font Field Command ([ESC] PC), the Outline Font Field Command ([ESC] PV), the Bar Code/Two-dimensional Code Format Command ([ESC] XB), and the Graphic Field Command ([ESC] N) are ignored and discarded. After the Form Store Start Command is sent, the Label Size Set Command should be sent before each field command, the Print Density Fine Adjust Command, or the Position Fine Adjust Command is sent. (6) When there is no free space in the form storage area in flash ROM because of storing a form, this area is automatically initialized. However, the latest version of each form is held.
Refer to	Form Store Terminate Command ([ESC] XP)
Example	To start storing version 3 of form No. 2. [ESC] XO ; 02, 3 [LF] [NUL]

6.10.2 FORM STORE TERMINATE COMMAND**[ESC] XP**

Function	Declares the termination of form storage.
Format	[ESC] XP [LF] [NUL]
Note	(1) If the Form Store Start Command ([ESC] XO) is not previously received when this command is received, this command is ignored.
Refer to	Form Store Start Command ([ESC] XO)

6.11 COMMANDS RELATED TO CONTROL

6.11.1 INITIALIZE COMMAND

[ESC] WR, [ESC] @

Function	Returns the printer to its initial state.
Format	[ESC] WR [LF] [NUL] [ESC] @
Explanation	<ol style="list-style-type: none"> (1) The printer is returned to the same state as when the power is turned on. (2) If the printer receives this command during printing, the printer prints the label which is being printed, then performs initialization. (3) The host should not send the next command within 5 second after sending the Initialize Command (or after the printer completes printing if receiving the Initialize Command during printing). In IrDA: TEC Protocol, if ACK/status transmission is specified by the Issue Command, the printer returns an ACK, which indicates the command process end, to the EOT after the printer is initialized. In RS-232C, when the status response is specified, the printer returns the status (10H). After this status is received, the next command may be sent. In IrDA: IrCOMM, Bluetooth, or Wireless LAN, the printer does not return the status. (4) To use IrDA interface for sending this command to the printer, only this command should be sent. After the command is sent, the link should be terminated. Even if the host does not terminate the link, the printer performs the termination process. Therefore, after initialization is completed, the host should establish the link again. (5) When receiving this command during data transmission, the printer is initialized after transmission is completed.

6.12 COMMANDS RELATED TO STATUS

6.12.1 STATUS REQUEST COMMAND

[ESC] FM, [ESC] WS, [ESC] v

Function	Sends the printer status to the host computer.
Format	[ESC] FM [LF] [NUL] [ESC] WS [LF] [NUL] [ESC] v
Explanation	When receiving this command, the printer sends the printer status and battery status to the host.

- For IrDA: TEC Protocol: Data to be sent (Fixed as 27 bytes)

STX	Printer ID		Version No. of each form				Printer status	Battery status	CRC	
02H	xxH	xxH	V01	V02	V20	xxH	xxH	xxH	xxH

- For IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN: Data to be sent (Fixed as 5 bytes)

STX	Printer ID		Printer status	Battery status
02H	xxH	xxH	xxH	xxH

Printer ID 2-byte hex data (in order from High to Low)

Printer status Printer status is indicated in 1-byte data.

- 00H: Normal status (Idling)
- 01H: Cover open status
- 02H: Command syntax error
- 03H: Paper jam
- 04H: Label end
- 05H: Cover open error
- 06H: Broken thermal head dots error
- 07H: Thermal head excessive temperature
- 08H: Flash ROM write error
- 09H: Flash ROM erase error
- 0AH: Low battery (Print failure)
- 0BH: Operating
- 0DH: Normal end + Label end (See **NOTE**.)
- 0EH: Flash ROM storage area full state

(10H: Normal termination): A response sent from the printer only when the automatic status transmission is designated.

NOTE: This is a state when the printer runs out of labels, after the effective print length is printed.

Battery status.....The battery charge status is indicated in 5 levels.

01H: 7.2 V or less (Print failure)

02H: 7.3 V to 7.4 V

(Remaining No. of printable labels: Approx. 1 to 20)

03H: 7.5 V to 7.7 V

(Remaining No. of printable labels: Approx. 20 to 100)

04H: 7.8 V to 7.9 V

(Remaining No. of printable labels: Approx. 100 to 200)

05H: 8.0 V or more

(Remaining No. of printable labels: Approx. 200 or more)

* The remaining number of printable labels may vary according to the contents to be printed and the ambient environment.

CRC.....2-byte hex data (in order from Low to High)

6.12.2 MODE INFORMATION ACQUIRE COMMAND**[ESC] WX**

Function	Sends the printer mode information to the host.
----------	---

Format	[ESC] WX [LF] [NUL]
--------	---------------------

Explanation	(1) The mode information format to be sent to the host, is as follows:
-------------	--

[IrDA: TEC Protocol]

STX	Mode information (16 bytes)															CRC	CRC
	L	A	B	E	L	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP		
02H	4CH	41H	42H	45H	4CH	20H	20H	20H	20H	20H	20H	20H	20H	20H	20H	xxH	xxH

[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

STX	Mode information (16 bytes)														
	L	A	B	E	L	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
02H	4CH	41H	42H	45H	4CH	20H	20H	20H	20H	20H	20H	20H	20H	20H	20H

The above is an example where the message is received in the LABEL mode. In addition, the message of "TPCL-LE", "TPCL-LE1", "RECEIPT", or "RECEIPT1" is returned.

6.13 COMMANDS RELATED TO Bluetooth AND WIRELESS LAN

6.13.1 DEVICE ADDRESS ACQUIRE COMMAND

[ESC] IT

Function

Calls up the device address of the Bluetooth interface or MAC address of the wireless LAN interface connected to the printer.

Format

[ESC] IT [LF] [NUL]

Explanation

- (1) This command calls up the device address of the Bluetooth or MAC address of the wireless LAN. On receiving this command, the printer returns the Bluetooth device address or MAC address with the complements of the following information field. When using the IrDA: TEC Protocol, the following information field is placed in the information frame and sent in packets.

[Information field to be sent when IrDA: TEC Protocol is used]

STX	Bluetooth device address	CRC	
02H	12 bytes	xxH	xxH

[Information field to be sent when IrDA: IrCOMM, RS-232C, Bluetooth, wireless LAN is used]

STX	Bluetooth device address
02H	12 bytes

Example

[ESC] IT [LF] [NUL]

When Bluetooth device address is 0001ccf0042b, the printer sends the following information.

Bluetooth device address:

[30H]	[30H]	[30H]	[31H]	[63H]	[63H]	[66H]	[30H]	[30H]	[34H]	[32H]	[62H]
0	0	0	1	c	c	f	0	0	4	2	b

7. RECEIPT MODE (INTERFACE COMMANDS)

7.1 GENERAL DESCRIPTION

This chapter describes details on the interface commands for the RECEIPT and RECEIPT1 modes of the print mode. If operations are the same between the RECEIPT mode and the RECEIPT1 mode, only “RECEIPT mode” is described in explanations, and the RECEIPT1 mode is included. If operations are different between them, the RECEIPT mode (Mode = 1 or 3) or the RECEIPT1 mode (Mode = 2) is specified. In the RECEIPT mode, only batch issues are supported.

[Command List]

Format	Command	Automatic ACK/Status Response (conditionally)
[ESC]M	Mode Select Command	No, when the mode is changed to TPCL-LE.
[ESC]3	Line Feed Length Set Command	No
[ESC]a	Print Position Align Command	No
[ESC]L	Line Format Command	No
[ESC]K	Font Type Command	No
[ESC]KV	Outline Font Format Command	No
[GS]k	Bar Code/Two-Dimensional Code Print Command	No
[ESC]!	Character Magnification Command	No
[GS]W	Bar Code Horizontal Size Command	No
[GS]h	Bar Code Height Command	No
[GS]Hn	Numerals Under Bars Command	No
[GS]s	Security Level Command	No
[GS]c	No. of Columns (Strings) Command	No
[ESC]W	Print Width Command	No
[ESC]H	Horizontal Print Position Command	No
[ESC]O	Horizontal Offset Position Command	No
[ESC]R	Character Rotate Command	No
[GS]q	Error Correction Level Set Command	No
[GS]r	QR Code Model Set Command	No
[LF]	Print Line Feed Command	No
[ESC]B	Back Feed Omission Command	No
[ESC]SG	Graphic Data Store Command	Yes
[GS]/	Graphic Print Command	No
[ESC]WR [ESC]@	Initialize Command	Yes, only when the interface is IrDA (TEC Protocol) or RS-232C
[ESC]WS [ESC]FM [ESC]v	Status Request Command	---
[ESC]WX	Mode Information Acquire Command	---
[ESC]WV	Version Information Acquire Command	---
[ESC]IT	Device Address Acquire Command	---
[GS]:	Macro Definition Command	No
[GS]^	Macro Execute Command	No

7.2 OUTLINE OF COMMANDS

7.2.1 FORMAT OF INTERFACE COMMAND

ESC	Command
-----	---------

GS	Command
----	---------

ESC	Command	LF	NUL
-----	---------	----	-----

7.2.2 HOW TO USE REFERENCE

Function	Describes the outline of the function of the command.
Format	Shows the format of the command The format designation method should conform to the following rules: <ul style="list-style-type: none"> • “n” indicates a parameter item. • Brackets and parentheses are used only in coding, and must not be transmitted in practice. • Other symbols must always be inserted at the designated positions before being transmitted.
Term	Explains the term(s) used in the format.
Initial value	Indicates the initial value of the parameter (when turning the power on, or changing the print mode to the RECEIPT mode.)
Explanation	Explains the command in detail.
Refer to	Related commands

7.2.3 PRECAUTIONS

- (1) The host should send the print data and the Print Line Feed Command for printing. Commands other than these should be sent as required.

- (2) Character type

Only standard characters are used when printing the data.

[Ex] 1 2 3 4 5 A B C D E

[31H]	[32H]	[33H]	[34H]	[35H]	[41H]	[42H]	[43H]	[44H]	[45H]
1	2	3	4	5	A	B	C	D	E

- (3) While the RECEIPT mode is selected, the print density fine adjustment cannot be performed, and the writable character data cannot be stored. To perform the print density fine adjustment, or to store the writable character data, change the print mode from the RECEIPT mode to the LABEL or the TPCL-LE mode.

- (4) [FEED] switch

In the RECEIPT mode, if the [FEED] switch is pressed, the receipt is not printed again. A 20-mm feed is performed. To cut a receipt using the tear bar after issuing it, a receipt can be fed to the position at which the receipt can be easily cut by pressing the [FEED] switch.

- (5) Error processing

[RECEIPT mode]

When an error occurs while the printer is issuing a receipt, the LED blinks. The printer discards all data and commands which have been received, and enters a wait state for a command. Therefore, if an error occurs, the print data or a command should be sent again after clearing the error.

[RECEIPT1 mode]

After the label end error or the cover open error is cleared, the printer automatically continues printing the data which has been received before the error occurred.

- (6) Status response

In the RECEIPT mode, the printer does not automatically send a status indicating the normal end. Therefore, the host should send the Status Request Command to check the printer status. However, when the Mode Select Command or the Graphic Command is sent, or if an error occurs, the printer sends the status. In IrDA: IrCOMM communications, only when the status transmission is specified, the printer sends the status.

- (7) Initial values

When the power is turned on or when RECEIPT mode or RECEIPT1 mode is selected, the initial values will be set. The initial values are also set when the mode is switched between RECEIPT mode and RECEIPT1 mode, or when the mode is switched from RECEIPT mode to RECEIPT mode, or from RECEIPT1 mode to RECEIPT1 mode.

7.3 COMMANDS RELATED TO SETTING

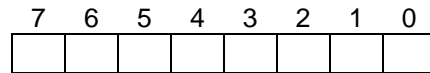
7.3.1 MODE SELECT COMMAND

[ESC] M

Function	Changes the print mode.
----------	-------------------------

Format	[ESC] M; a(b) [LF] [NUL]
--------	--------------------------

Term	a: Print mode designation
------	---------------------------



Print mode (Bit 0 to Bit 6 * See Table 1.)

Automatic status response in IrDA: IrCOMM

0: Not performed

1: Performed

* Table 1 Print mode

HEX	Mode	How to deal with the received data after an error is cleared
30H	LABEL	Discards
31H	RECEIPT	Discards
32H	RECEIPT1	Continues printing
33H	RECEIPT	Discards
41H	TPCL-LE	Continues printing
42H	TPCL-LE1	Continues printing (* Firmware V1.5 or greater)

b: Print position detection feed (Omissible. If omitted, the print position detection feed is not performed.) (Firmware V1.1 or greater)

0: When the mode change from RECEIPT or RECEIPT1 to LABEL is requested, a print position detection feed is not performed after the mode is changed.

1: When the mode change from RECEIPT or RECEIPT1 to LABEL is requested, a print position detection feed is performed after the mode is changed.

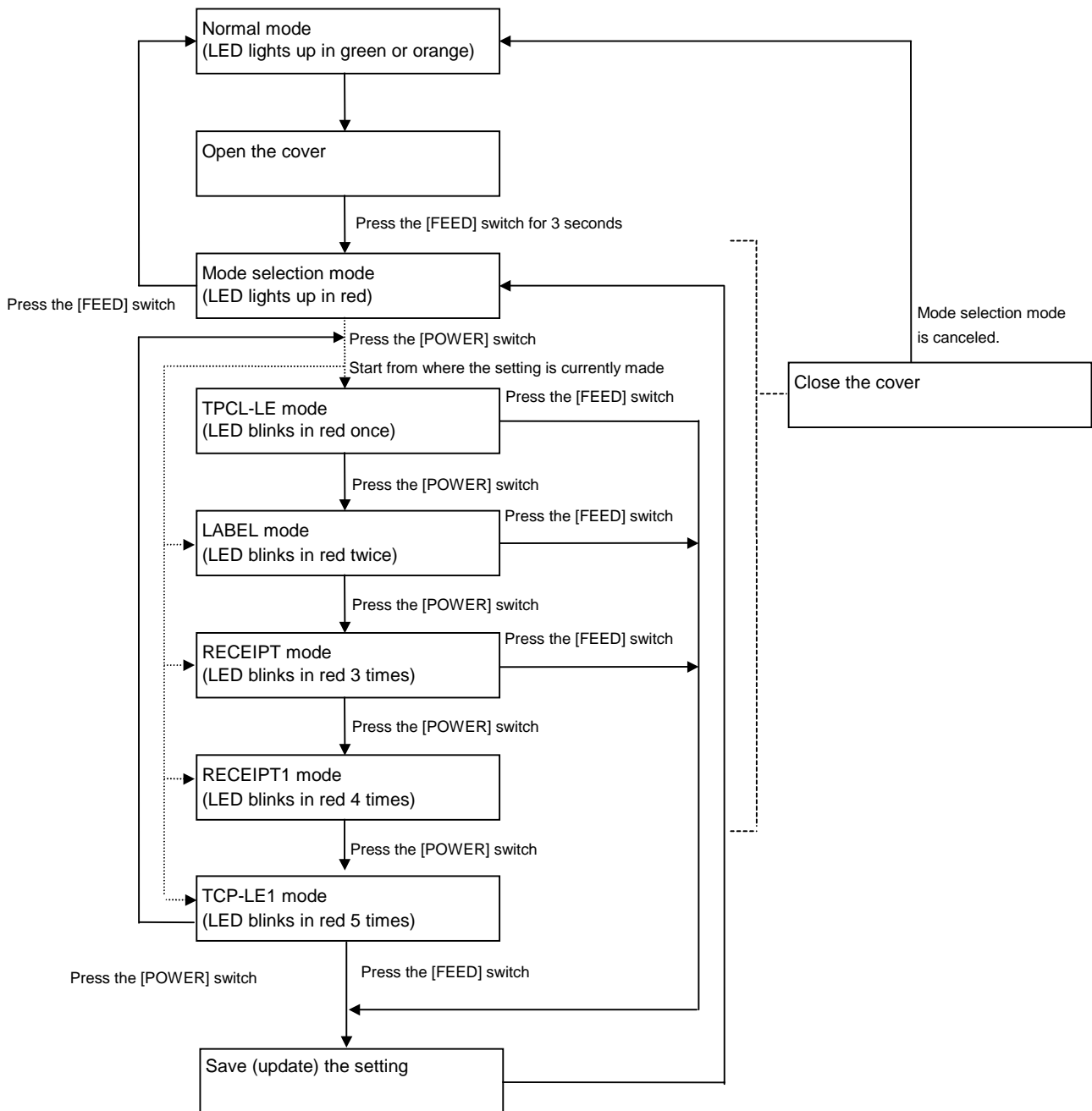
Explanation

- (1) There are 3 types of the print mode: "LABEL", "RECEIPT", and "TPCL-LE".
- (2) Both 31H and 33H are used for the "RECEIPT" mode. 33H is provided to maintain the compatibility with RECEIPT2 used for the conventional models. On the B-SP2D, the RECEIPT mode operation of 33H is the same as the 31H. Therefore, both 31H and 33H are defined as "RECEIPT".
- (3) "Automatic status response in IrDA: IrCOMM" is the function for the specifications which do not allow the printer to spontaneously send the status thorough IrDA; IrCOMM. This function enables the printer to forcefully send the status to the host, if the link between the printer and the host is established. However, if the link between the printer and the host is not established upon the status transmission, the printer cannot send the status. Therefore, the status is discarded. (In the next connection to the host, the printer does not send the status to the host.)
- (4) "Print position detection feed" is a function that automatically feeds the label to the print start position after the print mode is changed from RECEIPT or RECEIPT1 to LABEL. The sensor is not used when issuing in RECEIPT or RECEIPT 1 mode, therefore, after mode is changed to LABEL, the print start position cannot be detected. This is useful when using sensor detectable paper in both RECEIPT and LABEL modes.

- (5) In the TPCL-LE1 mode, it is possible to re-print the last print data by pressing the FEED button.

Notes

- (1) The print mode designation (the specified print mode and the automatic status response in IrDA: IrCOMM) is backed up in memory (even if the power is turned off).
- (2) The factory default is "30H: LABEL mode" and "Automatic status response in IrDA: IrCOMM is not performed". (The IrDA protocol is "TEC Protocol".)
- (3) When the print mode is changed, the type of sensor is automatically changed.
- | | |
|------------------------|--|
| LABEL mode (0): | The previously backed up sensor is designated. |
| TPCL-LE mode (A): | The previously backed up sensor is designated. |
| TPCL-LE1 mode (B): | The previously backed up sensor is designated. |
| RECEIPT mode (1 or 3): | No sensor is designated. |
| RECEIPT1 mode (2): | No sensor is designated. |
- (4) If the RECEIPT mode is selected or no sensor is designated in the LABEL or TPCL-LE mode, an initial feed is not performed when the cover is closed.
- (5) When the mode change is finished, the printer sends the normal end status or an ACK to the host. However, when the mode is changed to the TPCL-LE mode, the printer does not send the status. In IrDA: IrCOMM, only when bit 7 of the print mode designation is set to "1", the printer sends the status.
- (6) The print mode can be changed by the printer itself. However, since the setting for the automatic status response in IrDA: IrCOMM cannot be changed, the setting remains as the same.
- (7) As the print position detection feed parameter is effective only when changing the print mode to LABEL, this parameter status will be ignored when changing the mode to TPCL-LE.
- (8) The print position detection feed is performed according to the conditions, such as, label pitch, fine adjustment, and sensor selection, which were set in the LABEL or TPCL-LE mode before the printer is operated in RECEIPT or RECEIPT1 mode. If no sensor is selected, the print position detection feed will not be performed.
- (9) After performing a print position detection feed, the printer does not send a process end status. If an error occurs during the print position detection feed, the printer does not feed after the error is cleared. However, when the error is cleared by opening/closing the cover, the print position detection feed is performed.
- (10) When changing the print mode by the printer itself, the print position detection feed parameter cannot be set.
- (11) When the mode select command is designated with the print position detection feed at the end of a print data issued in RECEIPT1 mode, and if an error occurs while printing, the printing will restart after the error is cleared and then, the print mode will be changed to the LABEL mode and a print position detection feed is performed.
- (12) When the LABEL mode is selected in the mode select command and the print position detection feed parameter is set 0 (not performed), and if an error occurs while the printer issues in RECEIPT1 mode, the print mode is changed to the LABEL mode after the error is cleared. (The mode select command is executed.)

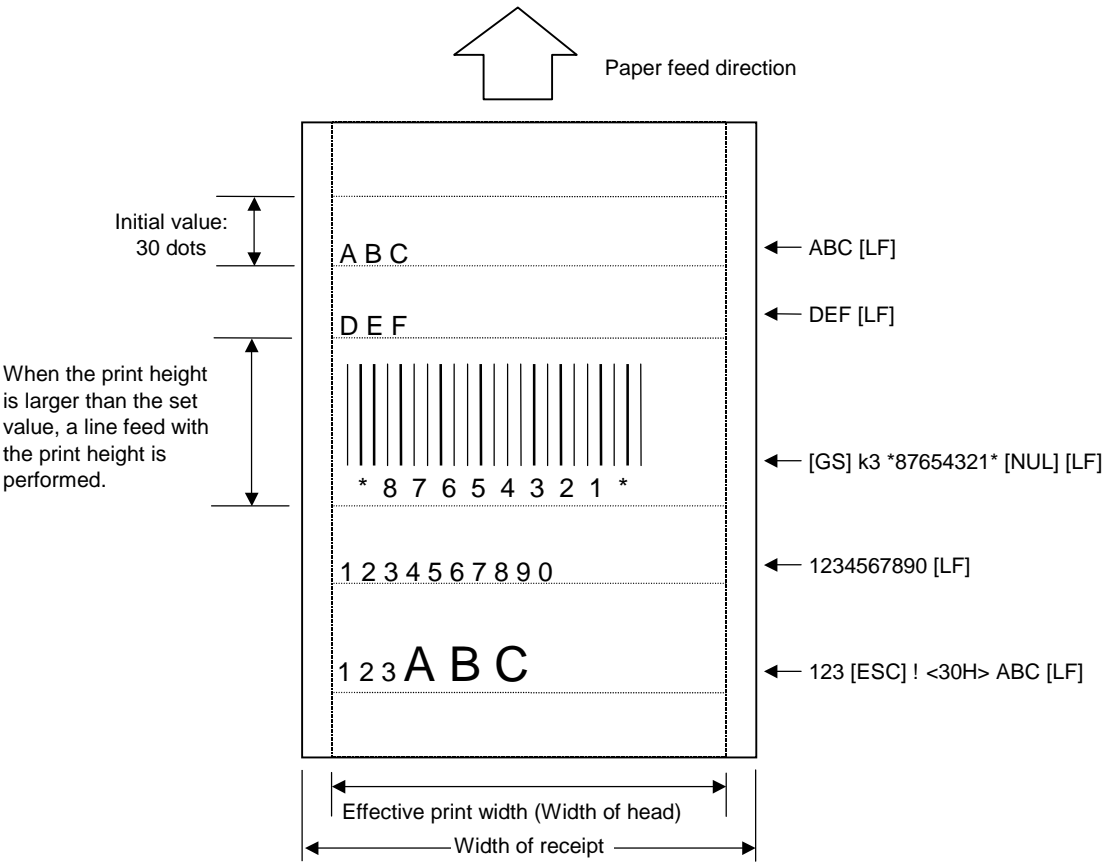


7.4 COMMANDS RELATED TO FINE ADJUSTMENT

7.4.1 LINE FEED LENGTH SET COMMAND

[ESC] 3

Function	Sets the length of the line feed (the number of dots) which is performed by the Print Line Feed Command ([LF]).
Format	[ESC] 3n
Term	n: Length of line feed (1 byte) 00H to FFH (0 to 255 dots)
Initial value	n: 1EH (30 dots)
Explanation	(1) When the power is turned on or the printer enters the RECEIPT mode, the initial value is 30 dots (2) When the specified length of the line feed is larger than the character on the next line or the height of the bar code plus 6 dots, a line feed with the specified length is performed. (3) When the specified length of the line feed is smaller than the character on the next line or the height of the bar code plus 6 dots, the specified length of the line feed is ignored, and a line feed with the height of the character or the bar code to be printed is performed.

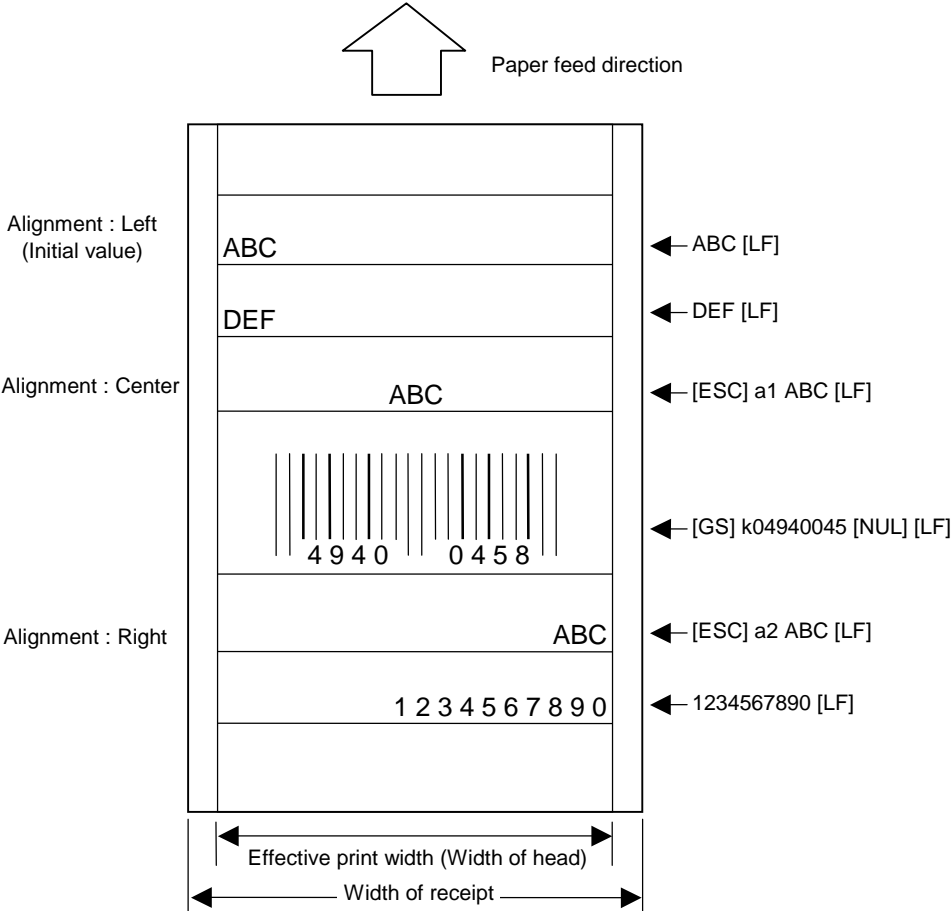


Refer to	Print Line Feed Command ([LF])
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7.4.2 PRINT POSITION ALIGN COMMAND

[ESC] a

Function	Aligns the print position on the left, the right, or at the center.
Format	[ESC] an
Term	n: Alignment 0: Left 1: Center 2: Right
Initial value	n: 0 (Left)
Explanation	(1) When “n” is set to any value other than the above, a command error will occur. (2) This command is effective for all lines which are printed after the command is received. (3) For CODE128 and EAN128, the print position should be aligned on the left.

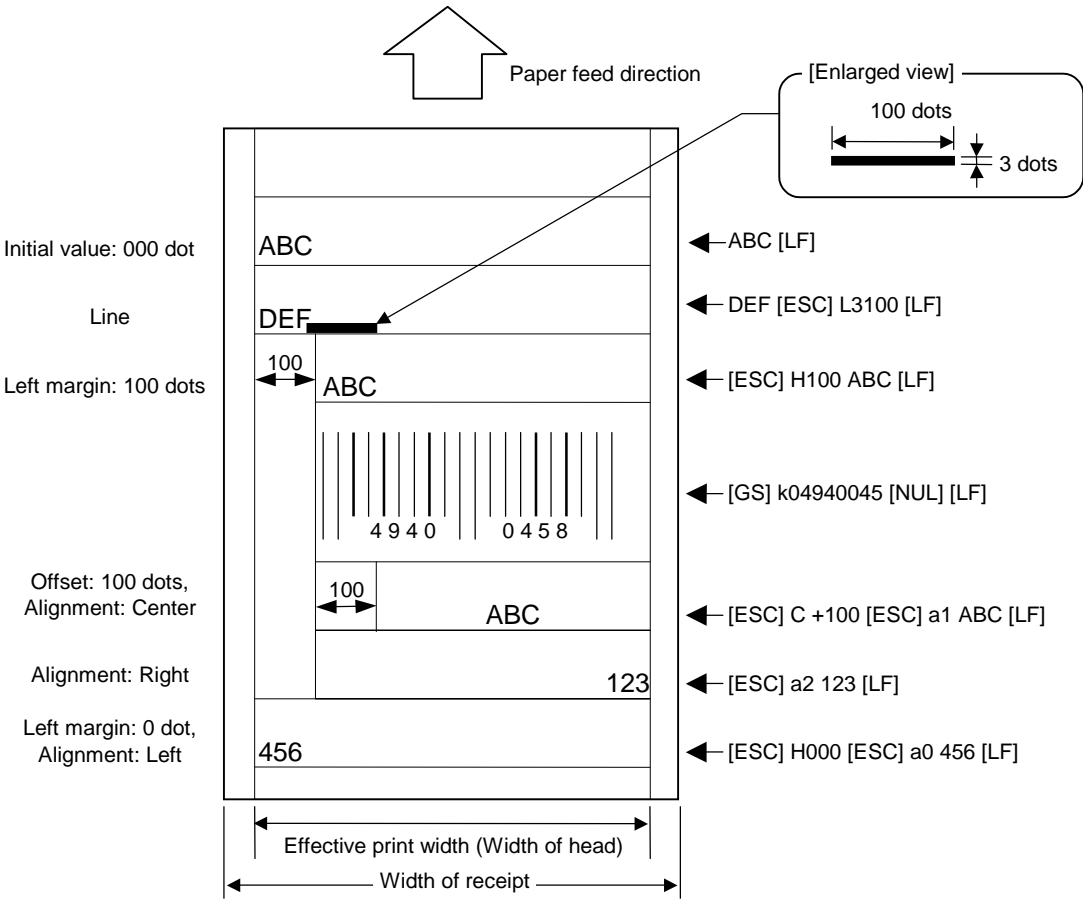


7.5 COMMANDS RELATED TO DRAWING FORMAT

7.5.1 LINE FORMAT COMMAND

[ESC] L

Function	Specifies the line format and draws it.
Format	[ESC] Labbb
Term	a: Line width 1 to 9 (in units of dots) bbb: Line length 001 to 384 (in units of dots)
Explanation	(1) The print position of the line is shown below:



Note	(1) If the print ratio of one line (the print head width) is higher than defined, printing may become poor, or the printer may be reset. When a horizontal line is to be drawn, note the print ratio.
------	---

7.5.2 FONT TYPE COMMAND

[ESC] K

Function	Specifies the font used for printing.		
Format	[ESC] Kn		
Initial value	n:	A: Standard character	
Term	n:	Font type	
	A:	Standard Character	(12×24 dots)
	B:	Bold Character	(48×96 dots)
	C:	Writable Character	(24×24 dots)
	D:	Price Font 1	(16×40 dots)
	E:	Price Font 2	(32×48 dots)
	F:	Time Roman (Bold)	(21 point)
	G:	Helvetica (Bold)	(18 point)
	H:	Letter Gothic (Medium)	(14.3 point)
	I:	Courier (Medium)	(15 point)
	J:	Presentation (Bold)	(27 point)
	O:	GOTHIC 725 Black	(6 point)
Explanation	(1)	When “n” is set to any value other than the above, a command error will occur.	

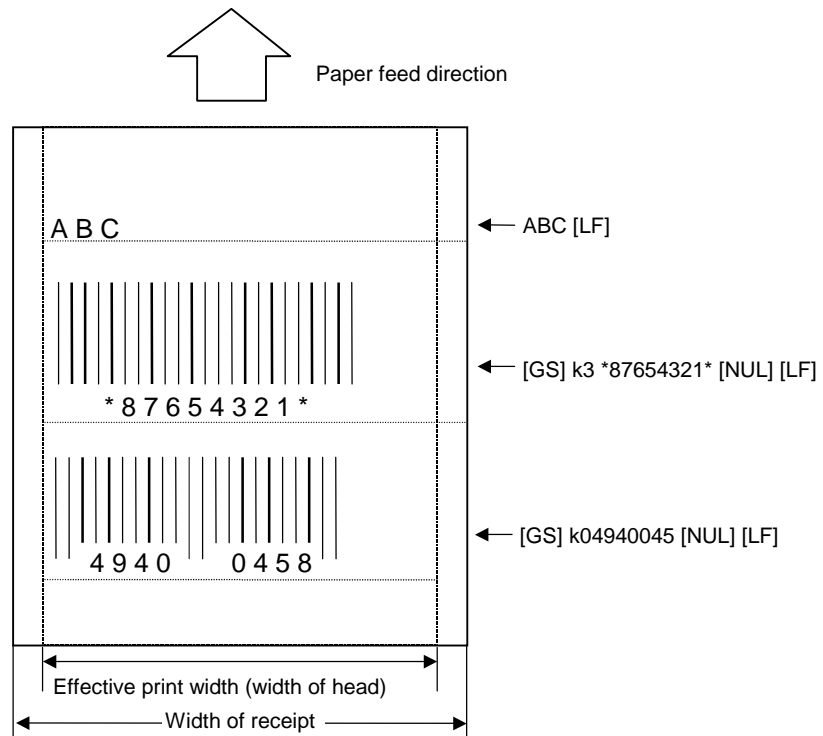
7.5.3 OUTLINE FONT FORMAT COMMAND

[ESC] KV

Function	Sets the outline font.
Format	[ESC] KVabbbccc
Initial value	None
Term	a: Font type A: TEC Font 1 (Helvetica: Bold) B: TEC Font 1 (Helvetica: Bold, Proportional) bbb: Character width 016 to 240 (in units of dots) ccc: Character height 016 to 240 (in units of dots)
Explanation	(1) When “a”, “bbb”, and “ccc” are set to any value other than the above, a command error will occur.

7.5.4 BAR CODE/TWO-DIMENSIONAL CODE PRINT COMMAND [GS] k

Function	Prints the specified bar code/two-dimensional code.										
Format	[GS] kn <bar data> [NUL]										
Term	<p>n: Type of bar code/two-dimensional code</p> <table> <tr> <td>0: JAN8/EAN8</td><td>9: CODE128</td></tr> <tr> <td>2: Interleaved 2 of 5</td><td>N: EAN128</td></tr> <tr> <td>3: CODE39</td><td>P: PDF417</td></tr> <tr> <td>4: NW7</td><td>T: QR code</td></tr> <tr> <td>5: JAN13/EAN13</td><td></td></tr> </table> <p><bar data>: Bar code/two-dimensional code data</p>	0: JAN8/EAN8	9: CODE128	2: Interleaved 2 of 5	N: EAN128	3: CODE39	P: PDF417	4: NW7	T: QR code	5: JAN13/EAN13	
0: JAN8/EAN8	9: CODE128										
2: Interleaved 2 of 5	N: EAN128										
3: CODE39	P: PDF417										
4: NW7	T: QR code										
5: JAN13/EAN13											
Explanation	<p>(1) When “n” is set to any value other than the above, a command error will occur.</p> <p>(2) When the type of bar code is JAN8, EAN8, JAN13, EAN13, EAN128, or CODE128, a check digit is automatically attached.</p> <p>(3) When the type of bar code is CODE39, NW7 or Interleaved 2 of 5, a check digit is not attached. When a CODE39 or NW7 is used, the start/stop codes are not attached. Therefore, the host should attach them to the data.</p> <p>(4) Characters or another bar code/two-dimensional code should not be printed on the same line including a PDF417.</p> <p>(5) For CODE128 and EAN128, only bar codes aligned on the left can be printed.</p> <p>(6) For QR code, the mode, the mask number, and the connection settings are as follows: Automatic mode, automatically-set mask number, no connection.</p> <p>(7) Characters or another bar code/two-dimensional code should not be printed on the same line as a QR code.</p>										



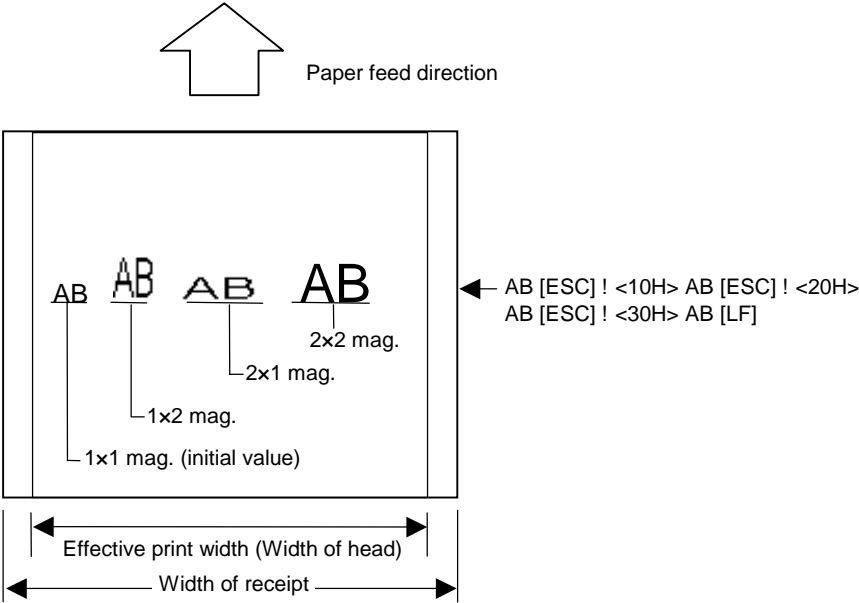
Refer to

Bar Code Horizontal Size Command ([GS] w)
 Bar Code Height Command ([GS] h)
 Numerals Under Bars Command ([GS] H)
 Security Level Command ([GS] s)
 No. of Columns (Strings) Command ([GS] c)
 Error Correction Level Set Command (for QR code) ([GS] q)
 QR Code Model Set Command ([GS] r)

7.5.5 CHARACTER MAGNIFICATION COMMAND

[ESC] !

Function	Designates the magnification of the character to be printed.
Format	[ESC] !n
Term	<div>n: Character magnification (1 byte)</div> <div>00H: 1 magnification (horizontal) × 1 magnification (vertical)</div> <div>10H: 1 magnification (horizontal) × 2 magnification (vertical)</div> <div>20H: 2 magnification (horizontal) × 1 magnification (vertical)</div> <div>30H: 2 magnification (horizontal) × 2 magnification (vertical)</div> <div>40H: 2 magnification (horizontal) × 3 magnification (vertical)</div> <div>50H: 3 magnification (horizontal) × 2 magnification (vertical)</div> <div>60H: 3 magnification (horizontal) × 3 magnification (vertical)</div> <div>70H: 3 magnification (horizontal) × 4 magnification (vertical)</div> <div>80H: 4 magnification (horizontal) × 3 magnification (vertical)</div> <div>90H: 4 magnification (horizontal) × 4 magnification (vertical)</div>
Initial value	n: 00H (1 magnification (horizontal) × 1 magnification (vertical))
Explanation	<div>(1) When “n” is set to any value other than the above, a command error will occur.</div> <div>(2) After this command is received, it is effective until the setting is changed again by the Character Magnification Command in spite of a line feed or printing.</div>



7.5.6 BAR CODE HORIZONTAL SIZE COMMAND**[GS] w**

Function	Sets the horizontal size of the bar code. For QR code, the 1-cell width is set.
Format	[GS] wn
Term	n: Horizontal size of the bar code (1 byte) 02H to 05H
Initial value	n: 02H
Explanation	(1) When “n” is set to any value other than the above, a command error will occur. (2) The horizontal size designated by this command is as follows. (1 dot = 1/8 mm)

[JAN8, EAN8, JAN13, EAN13, EAN128, CODE128]

n	1 module		2 modules		3 modules		4 modules	
	Bar	Space	Bar	Space	Bar	Space	Bar	Space
02H	2		4		6		8	
03H	3		6		9		12	

(Unit: dots)

[PDF417]

n	1 module		2 modules		3 modules		4 modules		5 modules		6 modules	
	Bar	Space	Bar	Space	Bar	Space	Bar	Space	Bar	Space	Bar	Space
02H	2		4		6		8		10		12	
03H	3		6		9		12		15		18	

(Unit: dots)

[NW7, CODE39, Interleaved 2 of 5]

n	Narrow		Wide		Character-to-character space
	Bar	Space	Bar	Space	
02H	2	2	5	5	2
03H	2	2	6	6	2
04H	3	3	8	8	3
05H	3	3	9	9	3

(Unit: dots)

* The character-to-character space does not exist in the Interleaved 2 of 5.

[QR code]

n	1-cell size
02H	2
03H	3
04H	4
05H	5

(Unit: dots)

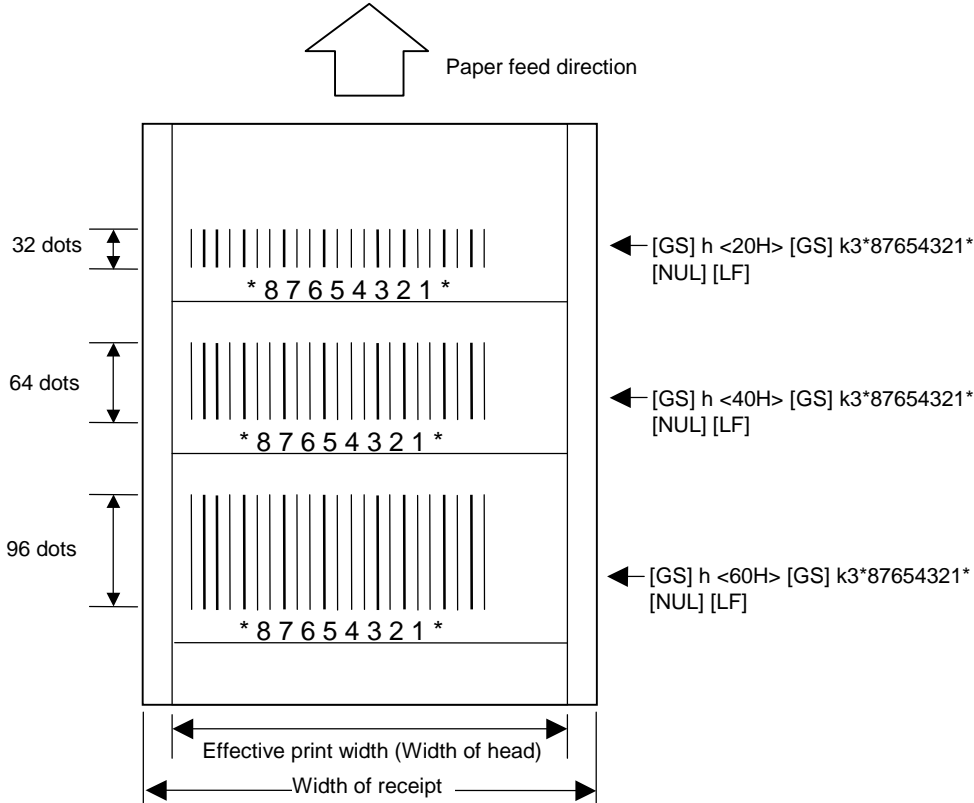
Refer to:	Bar Code/Two-Dimensional Code Print Command ([GS] k)
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7.5.7 BAR CODE HEIGHT COMMAND

[GS] h

Function	Sets the bar code height.
Format	[GS] hn
Term	n: Bar code height (1 byte) 01H to FFH (1 to 255 dots)
Initial value	n: 68H (104 dots)
Explanation	(1) When “n” is set to any value other than the above, a command error will occur.

* For the PDF417, the bar height for one row is set by this command. Note that the height of the whole bar code cannot be set by this command. The PDF417 can have the maximum of 90 rows. Therefore, if 16 or more dots are specified, the PDF417 may not be able to be stored in the image buffer, since the PDF417 is too large. When the PDF417 cannot be stored in the image buffer, the printer’s operation is not guaranteed.

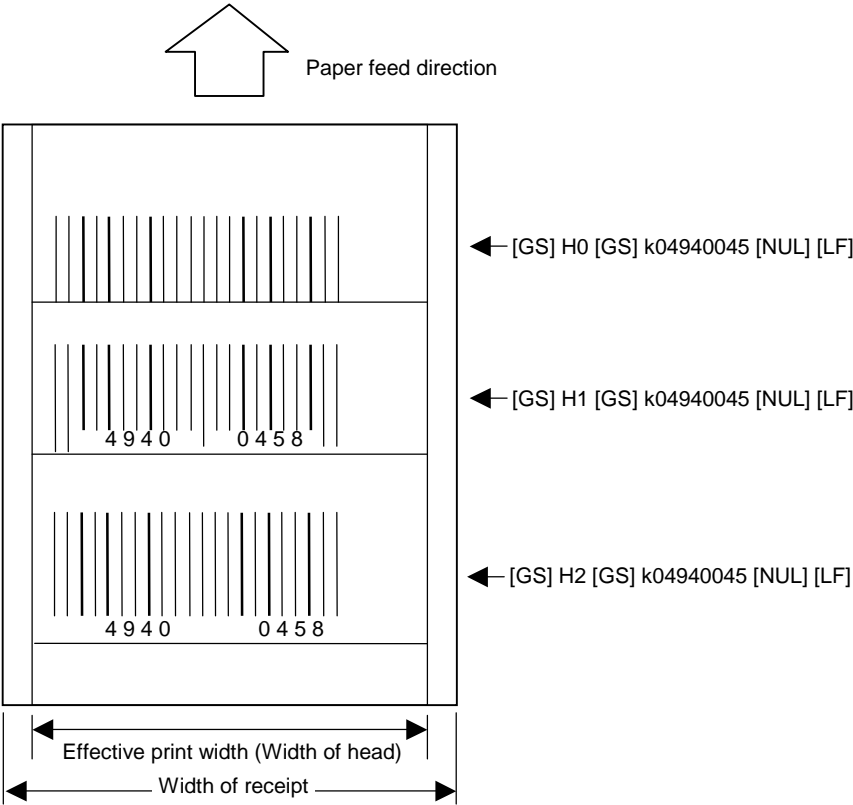


Refer to	Bar Code/Two-Dimensional Code Print Command ([GS] k)
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7.5.8 NUMERALS UNDER BARS COMMAND

[GS] Hn

Function	Sets numerals under bars.
Format	[GS] Hn
Term	n: Selection to print numerals under bars 0: Non-print 1: Print (with EAN guard bar) 2: Print (without EAN guard bar)
Initial value	n: 1: Print (with EAN guard bar)
Explanation	(1) When “n” is set to any value other than the above, a command error will occur. (2) For NW7, CODE39, and Interleaved 2 of 5, if “n” is set to “1” or “2”, printing is the same. (3) The length of the guard bar is fixed as 16 dots (2 mm).



Refer to	Bar Code/Two-Dimensional Code Print Command ([GS] k)
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7.5.9 SECURITY LEVEL COMMAND

[GS] s

Function	Sets the security level.
Format	[GS] sn
Initial value	n: 00H
Term	<div>n: Security level to be set</div> <div>00: Level 0</div> <div>01: Level 1</div> <div>02: Level 2</div> <div>03: Level 3</div> <div>04: Level 4</div> <div>05: Level 5</div> <div>06: Level 6</div> <div>07: Level 7</div> <div>08: Level 8</div>
Explanation	<div>(1) When “n” is set to any value other than the above, a command error will occur.</div> <div>(2) This command is effective for the PDF417 only. If this command is send for printing other bar code/two-dimensional codes, the command will be ignored.</div>
Refer to	Bar Code/Two-Dimensional Code Print Command ([GS] k)

7.5.10 NO. OF COLUMNS (STRINGS) COMMAND**[GS] c**

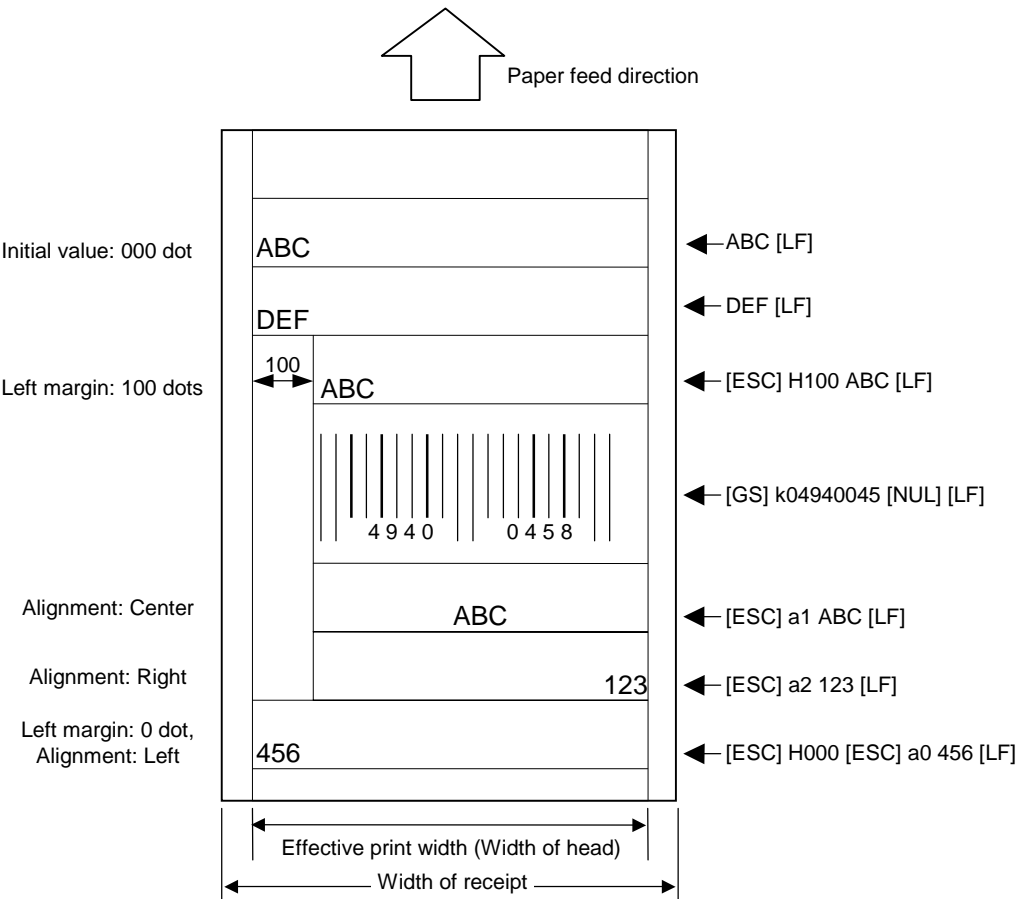
Function	Sets the number of columns (strings).
Format	[GS] cn
Initial value	n: 06H
Term	n: No. of columns (strings) 01 to 30
Explanation	<p>(1) When “n” is set to any value other than the above range, a command error will occur.</p> <p>(2) This command is effective for the PDF417 only. If this command is sent for printing other bar code/two-dimensional codes, the command will be ignored.</p>
Refer to:	Bar Code/Two-Dimensional Code Print Command ([GS] k)

7.5.11 PRINT WIDTH COMMAND**[ESC] W**

Function	Sets the print width.
Format	[ESC] Wnnn
Initial value	nnn: 384
Term	nnn: No. of dots for the print width matching the receipt width. 216 ≤ nnn ≤ 384 (dots)
Explanation	<p>(1) When “nnn” is set to any value other than the above range, a command error will occur.</p> <p>(2) The print width can be set, matching the receipt width. Using this command, the data can be printed properly at the position where the alignment (right or center) is specified.</p> <p>(3) If the printer receives this command while receiving one part of 1-line data, the printer prints the data which has been received before receiving this command, then sets the print width. However, printing of the line is not guaranteed.</p> <p>(4) If the data is not included in the specified print width, the excess data is not printed.</p>

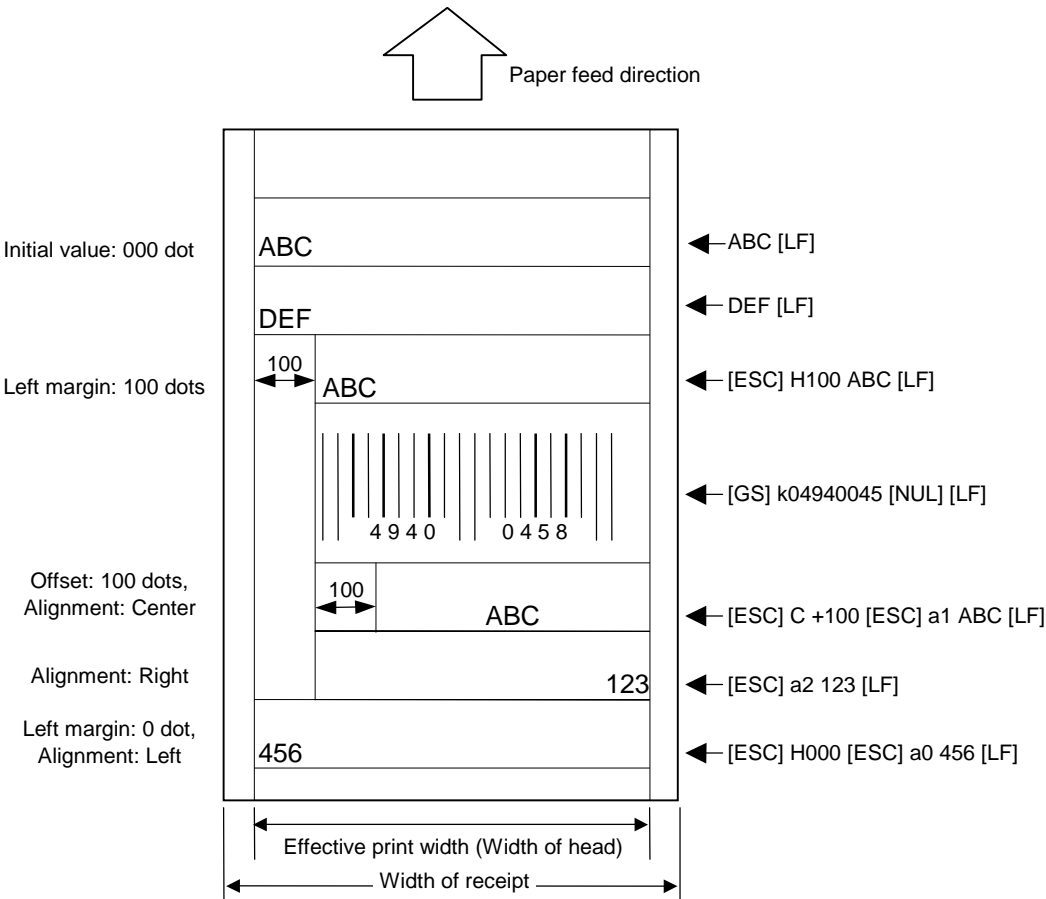
7.5.12 HORIZONTAL PRINT POSITION COMMAND**[ESC] H**

Function	Sets the left margin of the line (space from the left edge).
Format	[ESC] Hnnn
Initial value	nnn: 000 dot
Term	nnn: No. of dots for the margin (space) from the left edge of the paper to the print start position (3 bytes) 000 to 383 (dots)
Explanation	<p>(1) When “nnn” is set to any value other than the above range, a command error will occur.</p> <p>(2) This command is effective for all lines to be printed after it is received, until this command is received again, the setting is initialized by the Mode Select Command, or the power is turned off.</p> <p>(3) When the alignment (left, right, center) is specified by the Position Align Command, the alignment is performed within the effective range excluding the left margin set by this command.</p> <p>(4) In the case that the left margin is set for printing character strings and bar codes, if the data is not included within one line excluding the left margin, the excess data may be printed in the left margin on the next line. Do not send the data which is not included within one line.</p> <p>(5) When this command is received while one part of 1-line data is being received, it becomes effective from the next line.</p> <p>(6) If the print start position specified by this command is on the right of the right end of the print width specified by the Print Width Command ([ESC] W), a command error will occur.</p>



7.5.13 HORIZONTAL OFFSET POSITION COMMAND**[ESC] O**

Function	Sets the left margin (space from the left edge) of only the line.
Format	[ESC] Oabbb
Initial value	abbb: +000
Term	<p>a: Indicates whether the number of offset dots is increased or decreased +: Increased -: Decreased</p> <p>bbb: No. of offset dots from the position specified by [ESC] H -383 to +383 dots</p>
Explanation	<p>(1) When “a” or “bbb” is set to any value other than the above range, a command error will occur.</p> <p>(2) If other data is received after the horizontal offset position is specified again by this command even though the data has already been drawn on the line, it is printed at the position specified by this command. Therefore, it is printed over the already drawn data.</p> <p>(3) This command is effective until a line feed is performed. After a line feed is performed, printing is performed at the print start position specified by the Horizontal Print Position Command ([ESC] H).</p> <p>(4) If the print start position specified by this command is on the right of the right end of the print width specified by the Print Width Command ([ESC] W), a command error will occur.</p> <p>(5) If the print start position specified by this command is on the left of the print start position specified by the Horizontal Print Position Command ([ESC] H), or the left edge of the paper, a command error will occur.</p>



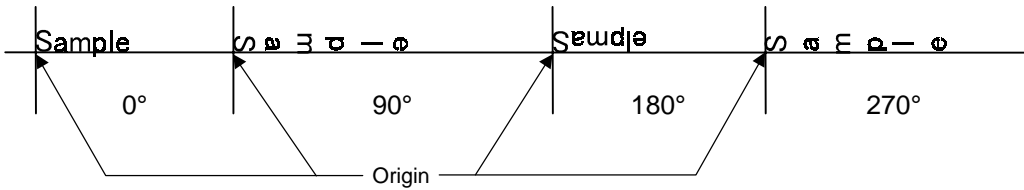
7.5.14 CHARACTER ROTATE COMMAND

[ESC] R

Function	Specifies the rotational angle of characters.
Format	[ESC] Rn
Initial value	n: 0
Term	n: Rotational angle of characters 0: 0° 1: 90° 2: 180° 3: 270°

- Explanation
- (1) When “n” is set to any value other than the above, a command error will occur.

(2) The characters are rotated as shown below:



* When characters are rotated, they are not aligned to the reference line, because each font has a different parameter for the print position. If the character magnification is changed, they are not aligned to the reference line either.

7.5.15 ERROR CORRECTION LEVEL SET COMMAND (For QR Code) [GS] q

Function	Sets the error correction level.
Format	[GS] qn
Term	n: Error correction level to be set L: High density level M: Standard level Q: Reliability level H: High reliability level
Initial value	n: M (Standard level)
Explanation	(1) When “n” is set to any value other than the above, a command error will occur. (2) This command is effective for the QR code only. If this command is set when printing other bar code/two-dimensional codes, the command will be ignored.
Refer to	Bar Code/Two-Dimensional Code Print Command ([GS] k)

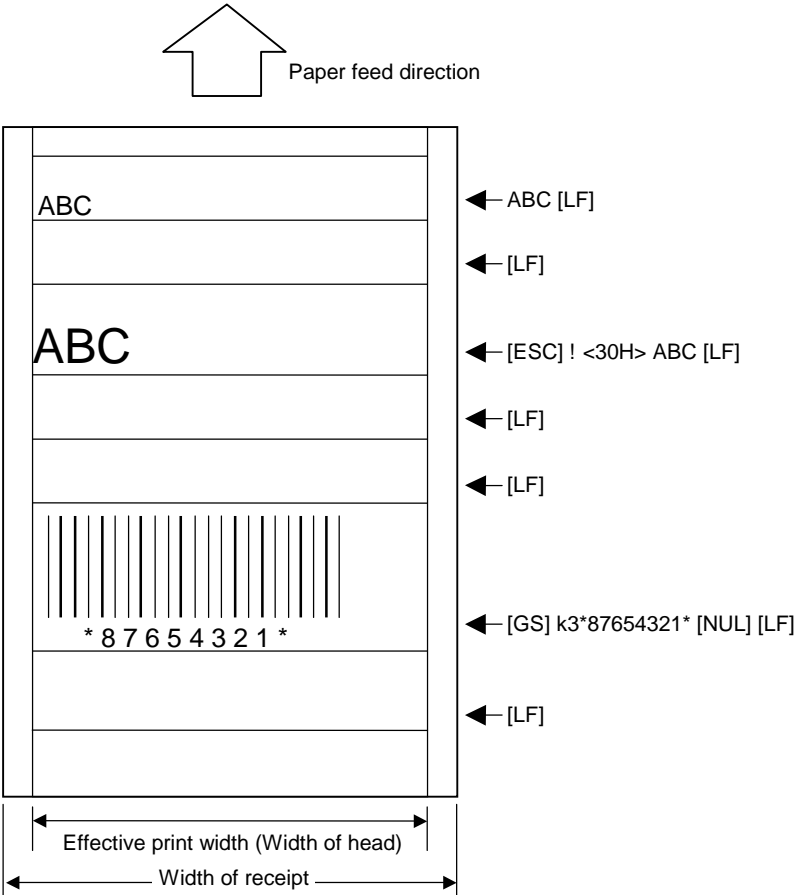
7.5.16 QR CODE MODEL SET COMMAND**[GS] r**

Function	Sets the model of the QR code.
Format	[GS] rn
Term	n: Model to be set 1: Model 1 2: Model 2
Initial value	n: 1 (Model 1)
Explanation	(1) When “n” is set to any value other than the above, a command error will occur. (2) This command is effective for the QR code only. If this command is set when printing other bar code/two-dimensional codes, the command will be ignored.
Refer to	Bar Code/Two-Dimensional Code Print Command ([GS] k)

7.6 COMMANDS RELATED TO ISSUE AND FEED

7.6.1 PRINT LINE FEED COMMAND [LF]

Function	Prints the received data and performs a line feed.
Format	[LF]
Explanation	<p>(1) When the Print Line Feed Command is received without data to be printed, only the length of the line feed which has been set is performed.</p> <p>(2) In the RECEIPT mode, the printer is operated without designating the sensor.</p> <p>(3) Since the printer does not perform a line feed automatically, be sure to send the Print Line Feed Command for each data which can be included within one line. If data which is not included within one line is received, characters cannot be printed in the proper position.</p>



Refer to	Line Feed Length Set Command ([ESC] 3)
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7.6.2 BACK FEED OMISSION COMMAND (Firmware V1.3 or greater)

[ESC]B

Function	Omits a back feed before printing.
Format	[ESC]B
Explanation	<p>(1) Usually, in the RECEIPT mode, the printer feeds for about 3-mm backward before starting to print or before printing after a pause. This is intended to adjust the print start position (line feed), however, the first back feed may be unnecessary depending on the print layout. Also, a back feed can reduce the throughput. So, the first back feed can be omitted by this command, if unnecessary.</p> <p>(2) This command can be sent only once for one receipt prior to other receipt commands or print data. If this command is sent in the middle of other commands, the printer operation is not guaranteed (Necessary back feeds are not performed, and, as a result, the print may be overlapped or the print position is misaligned.) This command is effective in the first receipt to be printed after the command is received. That is, this command needs to be issued for every receipt before printing because the command is effective only one receipt.</p> <p>NOTE: When printing more than one receipt continuously, the printer does not stop at the top of each receipt because the printer does not recognize the receipt one by one. In this case, the Back Feed Omission Command should be issued only for the first receipt, not for every receipt. (The printer recognizes the Back Feed Omission Command is sent in the middle of other commands, and it may print improperly.)</p> <p>(3) If a cover open error or a paper end error occurred before printing, a back feed is performed after the error is cleared, even if this command has been issued. Also, the printer performs a back feed when printing is restarted after clearing an error which occurred during printing.</p>

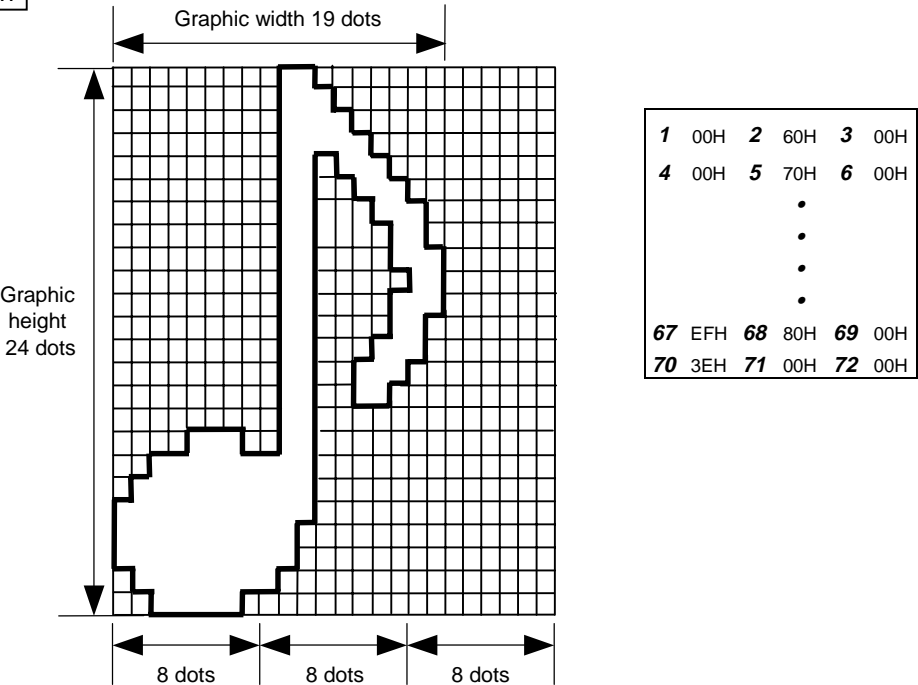
7.7 COMMANDS RELATED TO GRAPHICS

7.7.1 GRAPHIC DATA STORE COMMAND

[ESC] SG

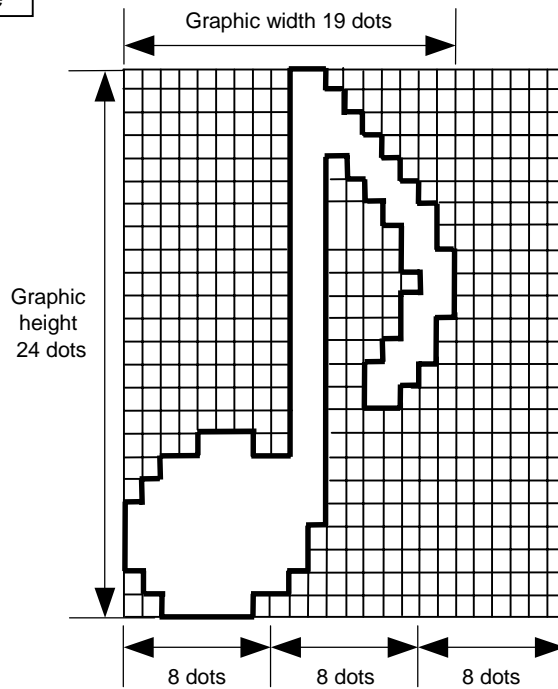
Function	Stores the graphic data on the printer.
Format	[ESC] SG ; a, bbbb, cccc, ddd --- ddd [LF] [NUL]
Term	a: Graphic No. 1 or 2
	bbbb: No. of graphic width dots to be stored 0001 to 0384 (in units of dots)
	cccc: No. of graphic height dots to be stored 0001 to 0720 (in units of dots)
	ddd --- ddd: Graphic data

Explanation



- (1) The graphic data should be separated into units of 8 dots and sent in the above order (1 to 72).
- (2) The graphic data is 00H to FFH.
- (3) The minimum unit of a graphic width is 8 dots. Dots with no data are transmitted as data 0.
- (4) The number of bytes of the graphic to be transmitted must be as follows;
The number of bytes of the graphic to be transmitted = {(No. of graphic width dots + 7)/8} × No. of graphic height dots
* The value in the brackets is rounded down to the nearest whole number.

Example

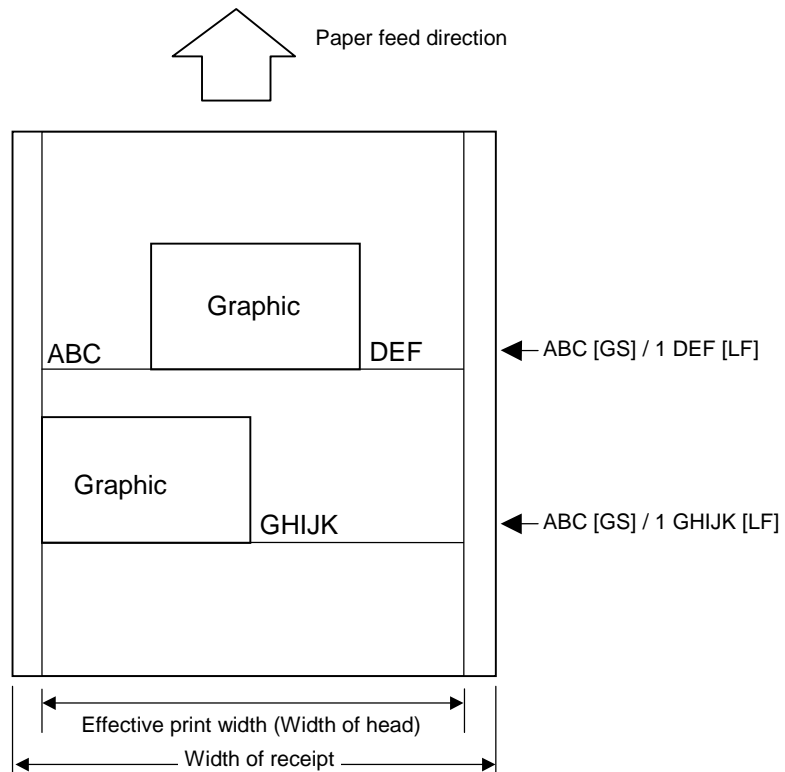


```
[ESC]SG;1,0019,0024,
[00H][60H][00H][00H][70H][00H][00H][78H][00H]
[00H][7CH][00H][00H][6EH][00H][00H][67H][00H]
[00H][63H][80H][00H][61H][80H][00H][61H][C0H]
[00H][60H][C0H][00H][61H][C0H][00H][61H][80H]
[00H][63H][80H][00H][67H][C0H][00H][66H][00H]
[0FH][60H][00H][0EH][60H][00H][3FH][E0H][00H]
[7FH][FEH][00H][FFH][E0H][00H][FFH][C0H][00H]
[FFH][C0H][00H][EFH][80H][00H][3EH][00H][00H]
[LF][NUL]
```


7.7.2 GRAPHIC PRINT COMMAND

[GS] /

Function	Prints the graphic data which is stored on the printer.
Format	[GS] /n
Term	n: Graphic No. 1 or 2
Explanation	(1) When “n” is set to any value other than the above, a command error will occur. (2) When the graphic data is not stored, this command is ignored.



Refer to	Graphic Data Store Command ([ESC] SG) Mode Select Command ([ESC] M)
----------	--

7.8 COMMANDS RELATED TO CONTROL

7.8.1 INITIALIZE COMMAND

[ESC] @, [ESC] WR

Function	Returns the printer to its initial state.
Format	[ESC] WR [LF] [NUL] [ESC] @
Explanation	<ol style="list-style-type: none"> (1) The printer is returned to the same state as when the power is turned on. (2) If the printer receives this command during printing, the printer prints the label which is being printed, then performs initialization. (3) The host should not send the next command within 5 second after sending the Initialize Command (or after the printer completes printing if receiving the Initialize Command during printing). In IrDA: TEC Protocol, if ACK/status transmission is specified by the Issue Command in the LABEL mode, the printer returns an ACK, which indicates the command process end, to the EOT after the printer is initialized. In IrDA: IrCOMM, RS-232C, Bluetooth, or wireless LAN, the printer does not return the status. (4) To use IrDA interface for sending this command to the printer, only this command should be sent. After the command is sent, the link should be terminated. Even if the host does not terminate the link, the printer performs the termination process. Therefore, after initialization is completed, the host should establish the link again. (5) When receiving this command during data transmission, the printer is initialized after transmission is completed.

7.9 COMMANDS RELATED TO STATUS

7.9.1 STATUS REQUEST COMMAND

[ESC] v, [[ESC] FM, [ESC] WS

Function	Requests that the printer sends back the printer status and the battery status to the host.
Format	[ESC] v, [ESC] FM [LF] [NUL], or [ESC] WS [LF] [NUL]
Explanation	When this command is received, the printer sends the printer status and battery status to the host.

- For IrDA: TEC Protocol: Data to be sent (Fixed as 27 bytes)

STX	Printer ID		Version No. of each form				Printer status	Battery status	CRC	
02H	xxH	xxH	V01	V02	V20	xxH	xxH	xxH	xxH

- For IrDA; IrCOMM, RS-232C, Bluetooth, or Wireless LAN:

Data to be sent (Fixed as 5 bytes)

STX	Printer ID		Printer status	Battery status
02H	xxH	xxH	xxH	xxH

Printer ID.....2-byte hex data (in order from High to Low)

Printer status.....Printer status is indicated in 1-byte data.

00H: Normal status (while idling)

01H: Cover open status

02H: Command syntax error

03H: Paper jam

04H: Label end

05H: Cover open error

06H: Broken thermal head dots error

07H: Thermal head excessive temperature

08H: Flash ROM write error

09H: Flash ROM erase error

0AH: Low battery (Print failure)

0BH: Operating

For RS-232C only

0CH: Communication error (Parity, overrun, framing error)

0DH: Normal end + Label end (See **NOTE**.)

0EH: Flash ROM storage area full state

(10H: Normal termination): A response sent from the printer only when the automatic status transmission mode is designated.

NOTE: This is a state when the printer runs out of labels, after the effective print length is printed.

Battery status.....The battery charge status is indicated in 5 levels.

01H: 7.2 V or less (Print failure)

02H: 7.3 V to 7.4 V

(Remaining No. of printable labels: Approx. 1 to 20)

03H: 7.5 V to 7.7 V

(Remaining No. of printable labels: Approx. 20 to 100)

04H: 7.8 V to 7.9 V

(Remaining No. of printable labels: Approx. 100 to 200)

05H: 8.0 V or more

(Remaining No. of printable labels: Approx. 200 or more)

* The remaining number of printable labels may vary according to the contents to be printed and the ambient environment.

CRC.....2-byte hex data (in order from Low to High)

7.9.2 MODE INFORMATION ACQUIRE COMMAND**[ESC] WX**

Function	Sends the printer mode information to the host.
Format	[ESC] WX [LF] [NUL]
Explanation	(1) The mode information format to be sent to the host, is as follows:

[IrDA: TEC Protocol]

STX	Mode information (16 bytes)															CRC	CRC
	R	E	C	E	I	P	T	SP	SP	SP	SP	SP	SP	SP	SP		
02H	52H	45H	43H	45H	49H	50H	54H	20H	20H	20H	20H	20H	20H	20H	20H	xxH	xxH

[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

STX	Mode information (16 bytes)														
	R	E	C	E	I	P	T	SP	SP	SP	SP	SP	SP	SP	SP
02H	52H	45H	43H	45H	49H	50H	54H	20H	20H	20H	20H	20H	20H	20H	20H

The above is an example where the message is received in the RECEIPT mode (Mode = 1 or 3). When the RECEIPT1 mode is selected, the message is "RECEIPT1". In addition, the message of "LABEL", "TPCL-LE", or "TPCL-LE1" is returned.

RECEIPT mode (Mode = 1, 3): "RECEIPT"

RECEIPT mode (Mode = 2): "RECEIPT1"

- (2) This command is one of the command types which are processed as they are received. Processing takes place starting from the ones received first. Until the process of the command previously sent is completed, the next command is not processed. Therefore, if the printer is not in the idle state when this command is sent, the mode information data may not be returned immediately.

7.10 COMMANDS RELATED TO Bluetooth AND WIRELESS LAN

7.10.1 DEVICE ADDRESS ACQUIRE COMMAND

[ESC] IT

Function	Calls up the device address of the Bluetooth module or MAC address of the Wireless LAN module connected to the printer.
----------	---

Format	[ESC] IT [LF] [NUL]
--------	---------------------

Explanation	(1) This command calls up the device address of the Bluetooth module or MAC address of the Wireless LAN module. On receiving this command, the printer returns the Bluetooth device address or MAC address of the Wireless LAN module with the complements of the following information field. When using the IrDA: TEC Protocol, the following information field is placed in the information frame and sent in packets.
-------------	---

[Information field to be sent when IrDA: TEC Protocol is used]

STX	Bluetooth device address	CRC	
02H	12 bytes	xxH	xxH

[Information field to be sent when IrDA: IrCOMM, RS-232C, Bluetooth, or Wireless LAN is used]

STX	Bluetooth device address
02H	12 bytes

Example	[ESC] IT [LF] [NUL]
---------	---------------------

When Bluetooth device address is 0001ccf0042b, the printer sends the following information.

Bluetooth device address:

[30H]	[30H]	[30H]	[31H]	[63H]	[63H]	[66H]	[30H]	[30H]	[34H]	[32H]	[62H]
0	0	0	1	c	c	f	0	0	4	2	b

7.11 COMMANDS RELATED TO MACRO SETTING

7.11.1 MACRO DEFINITION COMMAND

[GS] :

Function	Defines the print position and the items to be printed at the fixed position.
Format	[GS] : aaaaa####bbbbbbbbbb#####cccccc [GS] :
Term	aaaaa, bbbbbbbbb, cccccc: Fixed data #####: Variable data (The character codes are specified by the Macro Execute Command.)
Explanation	<ol style="list-style-type: none"> (1) The macro definition can be made by entering the character code or [LF] (Print Line Feed Command) between “[GS] :” and “[GS] :”. (2) From the start to end of the macro definition, must be a maximum of 253 bytes. (3) The macro definition data is kept until the power is turned off. (4) The number of digits indicated using “#” must match that for the macro to be actually executed. (5) Character code designated by the Macro Definition Command is sent to the printer for printing it on the receipt. Use of the macro function reduces the number of data transmissions by the standard format and transmission time, and increases the number of printable lines at one transmission.

7.11.2 MACRO EXECUTE COMMAND

[GS] ^ <Data> [NUL]

Function	Stores data for items for which the macro definitions are made.
Format	[GS]^ aaaaabbbbbccccc [NUL]
Term	aaaaa: 1st data to be printed bbbbb: 2nd data to be printed ccccc: 3rd data to be printed
Explanation	(1) If this command is sent without making a macro definition by the Macro Definition Command, a syntax error will occur. (2) The receipt is printed by transferring the character code specified by the Macro Definition Command. The No. of times of data transfer and transfer time for printing in a fixed format, can be saved. Also, the printable No. of lines per batch transfer can be increased by using the macro function.

[Ex.] [GS] ^0023071T1 A Label 1 ¥9,000 [NUL]

```
[GS]: NO.### (####)[LF]
##### [LF]
Quantity ##### [LF]
Price ##### [LF]
-----[LF][GS]:
```

The print position and items to be printed at the fixed position are defined by making a macro definition.



```
NO.### (####)
#####
Quantity #####
Price #####
-----
```

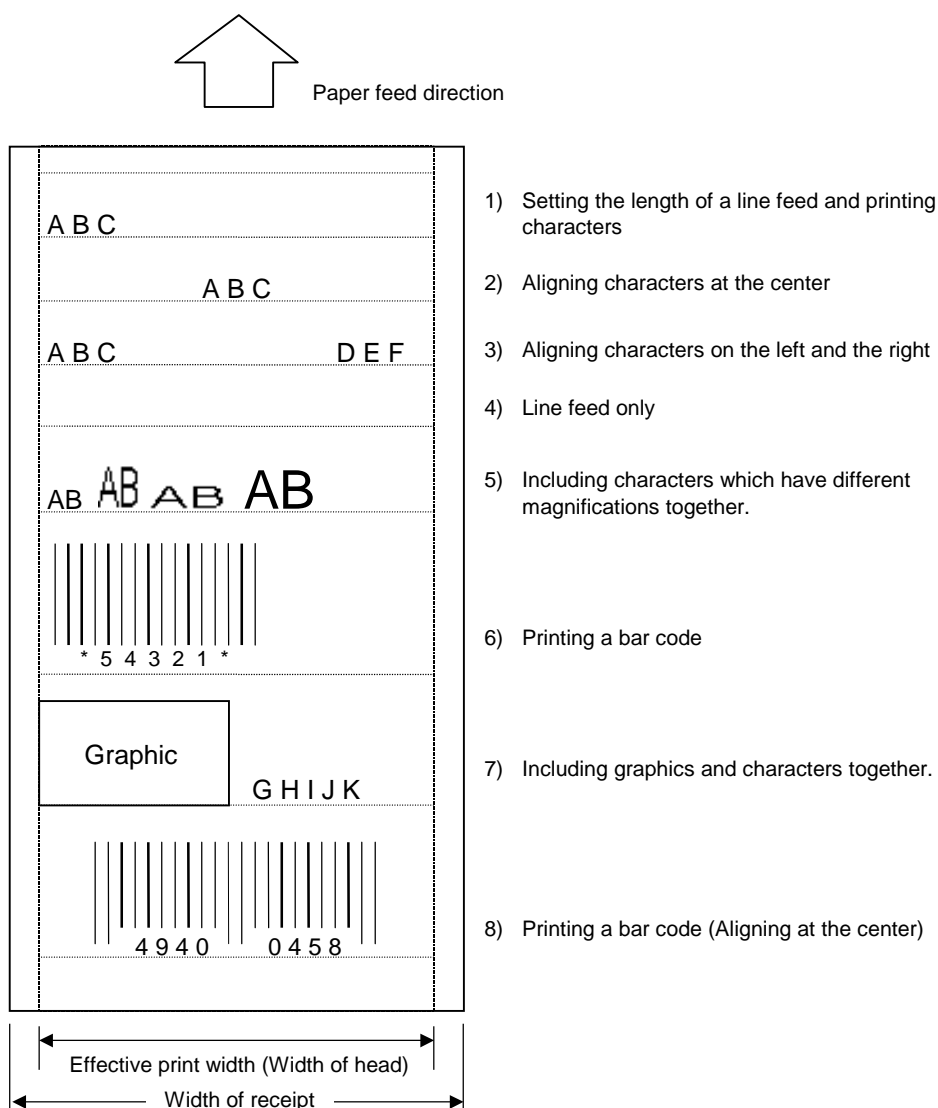
To print data on two or more lines, only the variable data specified by "#", is sent using the Macro Execute Command.



```
NO.002 (3071)
T1 A Label
Quantity 1
Price ¥9,000
-----
```

[GS]^0023071T1 A Label 1 ¥9,000 [NUL]

7.12 EXAMPLES OF USING COMMANDS



[Examples of transmitted data]

	Command/Print data	Result
1)	[ESC]3[20H] ABC [LF]	Setting the length of a line feed (32 dots) Printing characters and a line feed
2)	[ESC]a1ABC[LF]	Alignment of the print position (Center) + Printing and a line feed
3)	[ESC]a0ABC [ESC]a2DEF[LF]	Alignment of the print position (Left) Alignment of the print position (Right) + Printing and a line feed
4)	[LF]	Line feed
5)	[ESC]a0 AB [ESC]![10H]AB [ESC]![20H]AB [ESC]![30H]AB[LF]	Alignment of the print position (Left) Printing characters (1x1 magnification) * Default (00H) Printing characters (1x2 magnification) Printing characters (2x1 magnification) Printing characters (2x2 magnification) + printing and a line feed
6)	[GS]k3*54321*[NUL][LF]	Printing CODE39 + printing and a line feed
7)	[GS]/1 [ESC]![00H]GHIJK[LF]	Printing a graphic Printing characters (1x1 magnification) + printing and a line feed
8)	[ESC]a1 [GS]h[50H] [GS]k04940045[NUL][LF]	Alignment of the print position (Center) Setting the height of the bar code (80 dots) Printing EAN8 + printing and a line feed

8. ERROR PROCESSING

8.1 GENERAL DESCRIPTION

This chapter describes details of the printer errors.

8.2 OPERATIONS WHEN AN ERROR OCCURS

If the printer detects an error, the LED will blink (at intervals of 0.1 seconds), the printer stops the operation, and reverts to a wait state for a command.

8.3 OPERATIONS AFTER AN ERROR IS CLEARED

8.3.1 LABEL MODE

If the [FEED] switch is pressed, the remaining number of labels is not issued. Since the printer issues only the same label as one which is being printed when the error occurs, issue the required number of labels by pressing the [FEED] switch.

8.3.2 RECEIPT MODE (Mode = 1 or 3)

If the [FEED] switch is pressed, the printer performs a 20-mm feed.

8.3.3 RECEIPT1 MODE (Mode = 2)

After the label end error or the cover open error is cleared, the printer automatically continues printing the data which has been received before the error occurred. After paper is replaced, the error is cleared when the cover is closed. Then, the printer automatically continues printing. If the sensor is designated, the printer feeds the paper to the print start position, then continues printing. When the cover is closed, if the printer has run out of the paper, the printer neither clears the error nor continues printing. It remains in the error state. In any state other than the above, the printer performs a 20-mm feed by pressing the [FEED] switch.

8.3.4 TPCL-LE MODE

After the label end error or the cover open error is cleared, the printer automatically continues printing the data which has been received before the error occurred. After paper is replaced, the error is cleared when the cover is closed. Then, the printer automatically continues printing. If the sensor is designated, the printer feeds the paper to the print start position, then continues printing. When the cover is closed, if the printer has run out of the paper, the printer neither clears the error nor continues printing. It remains in the error state. In any state other than the above, if the sensor is designated, when the cover is closed and the [FEED] switch is pressed, the printer performs the specified label pitch length of the feed. If no sensor is designated, the printer performs a 20-mm feed.

8.4 SYNTAX ERRORS OF COMMANDS

- ① An error results if a command length error or parameter designation error is found in analyzing the command. When the form for the form number designated by the Data Print Command is not stored, and the form length designated by the Data Print Command is different from the stored form length, an error will occur.
- ② If the block number is not consecutive, starting from "0" in the ascending order, an error occurs.

8.5 PAPER JAM

If the gap is not detected in spite of feeding 1.5 times the length of the label pitch which is designated by the command, an error will occur. (Only in the LABEL and TPCL-LE modes)

8.6 LABEL END

8.6.1 LABEL MODE, RECEIPT MODE (Mode = 1 or 3), TPCL-LE MODE

- ① If no label is loaded when an issue or a feed is attempted, an error will occur.
- ② If the backing paper is detected for 14 mm continuously, an error will occur.
- ③ If the label end state is detected for 1 mm continuously, an error will occur.

8.6.2 RECEIPT1 MODE (Mode = 2)

- ① If no label is loaded when an issue or a feed is attempted, an error will occur.
- ② If non-printing area is detected for 1.5 mm continuously and the label end state is detected, an error will occur.
- ③ If the label end state is detected for 14 mm continuously, an error will occur.

8.7 NORMAL END + LABEL END

8.7.1 LABEL MODE, TPCL-LE MODE

- ① If the label end is detected after printing the effective print length of the current label, an error will occur.

8.7.2 RECEIPT MODE

- ① If the label end is detected after printing the effective print length of the current receipt, an error will occur. (e.g. When the 170-mm long print data is printed after printing 170 mm, if the label end state is detected, an error will occur.)

8.8 COVER OPEN ERROR

- ① If the cover open state is detected for 5 mm continuously while printing or feeding, an error will occur.
- ② When printing is attempted even though the cover is opened, an error will occur.

8.9 BROKEN THERMAL HEAD DOTS ERROR

- ① If broken head dots are detected by the broken head dots check when turning the power on or closing the cover, an error will occur.
- ② If the thermal head driver fails, an error will occur.

8.10 THERMAL HEAD EXCESSIVE TEMPERATURE

- ① If the thermistor detects a high temperature, an error will occur.

8.11 FLASH ROM WRITE ERROR

- ① The printer recognizes an error when writing data in flash ROM fails.

8.12 FLASH ROM ERASE ERROR

- ② The printer recognizes an error when erasing data in flash ROM (initialization) fails.

8.13 FLASH ROM STORAGE AREA FULL

- ① The printer recognizes an error when the form storage areas, (for form, PC saving, writable character, and graphic) in flash ROM become full.

8.14 LOW BATTERY

- ① The LED lights up in red, if printing is disabled because the battery is low.

8.15 OTHER ERRORS

- ① If an undefined command execution error occurs, the printer is automatically reset.

8.16 STATUS VALUES

* Values in the upper cell are provided for the LABEL/RECEIPT mode (1 byte)

Values in the lower cell are provided for the TPCL-LE mode (3 bytes)

State	LED indication	Status by the Status Request Command	Auto status transmission	Status when the command is received during an error state	To turn LED off	Condition of clearing error
		IrDA: TEC Protocol IrDA: IrCOMM RS-232C Bluetooth Wireless LAN	IrDA: IrCOMM RS-232C Bluetooth Wireless LAN	IrDA: TEC Protocol IrDA: IrCOMM RS-232C Bluetooth Wireless LAN	RS-232C IrDA Bluetooth Wireless LAN	RS-232C IrDA Bluetooth Wireless LAN
Power is turned on.	Blink in red for several seconds → Blink in green (or orange) for several seconds → ON in green (or orange)	—	—	—	—	—
Normal state (Idling)	ON in green (or orange)	00H 30H, 30H, 31H	—	—	—	—
Cover open	ON in green (or orange)	01H 30H, 31H, 31H	—	01H 30H, 31H, 32H	—	—
Syntax errors of commands	Blink in red (at intervals of 0.1 seconds)	02H 30H, 36H, 31H	02H 30H, 36H, 32H	02H 30H, 36H, 32H	Close the cover.	Close the cover.
Paper jam		03H 31H, 31H, 31H	03H 31H, 31H, 32H	03H 31H, 31H, 32H	In power save mode	
Label end		04H 31H, 33H, 31H	04H 31H, 33H, 32H	04H 31H, 33H, 32H		
Cover open error		05H 31H, 35H, 31H	05H 31H, 35H, 32H	05H 31H, 35H, 32H		
Broken thermal head dots error		06H 31H, 37H, 31H	06H 31H, 37H, 32H	06H 31H, 37H, 32H	In power save mode	Turn the power off. Replace the thermal head.
Thermal head excessive temperature		07H 31H, 38H, 31H	07H 31H, 38H, 32H	07H 31H, 38H, 32H	Close the cover.	Close the cover.
Flash ROM write error		08H 35H, 30H, 31H	08H 35H, 30H, 32H	08H 35H, 30H, 32H	In power save mode	
Flash ROM erase error		09H 35H, 31H, 31H	09H 35H, 31H, 32H	09H 35H, 31H, 32H		
Low battery		0AH 33H, 36H, 31H	0AH 33H, 36H, 32H	0AH 33H, 36H, 32H	In power save mode	Charge the battery.
Operating		0BH 30H, 32H, 31H	—	—	—	—
Communication error	Blink in red (at intervals of 0.1 seconds)	0CH 30H, 37H, 31H	0CH 30H, 37H, 32H	0CH 30H, 37H, 32H	Close the cover.	Close the cover.
Normal end + Label end		0DH 30H, 39H, 31H	0DH 30H, 39H, 32H	0DH 30H, 39H, 32H	In power save mode	
Sleep	ON in green (orange)	—	—	—	—	—
Flash ROM storage area full	Blink in red (at intervals of 0.5 seconds)	0EH 35H, 34H, 31H	0EH 35H, 34H, 32H	0EH 35H, 34H, 32H	Close the cover. In power save mode	Format the relevant storage area.

* The LED goes OFF when:

- The auto power-off function is performed. (This is the same state when the printer is turned OFF.)
- The auto power-off time is set to any value other than 1 minute. The LED goes OFF in 5 minutes. (This is the same state when the printer is turned OFF.)

* When the low battery state occurs, the LED remains ON until the printer is turned OFF.

* If the state changes, the status will be the latest state which has occurred.

9. SYSTEM MODE

9.1 GENERAL DESCRIPTION

This chapter describes details regarding the interface commands for the SYSTEM mode and the specifications for the key operations to change the setting.

9.2 STARTING THE PRINTER IN SYSTEM MODE

Unlike the TPCL-LE mode, LABEL mode, RECEIPT mode, and RECEIPT1 mode, the SYSTEM mode cannot be accessed by the Mode Change Command. The System mode can be accessed by turning on the printer while holding down the FEED switch. The FEED switch must be held down until the self diagnosis test label is printed. The self diagnosis test label will be printed when the paper has been loaded on the printer. When the paper has not been loaded or the cover is opened, however, the LED will blink in red. This status can be cleared by closing the cover.

9.3 COMMUNICATIONS CONDITIONS

The fixed communications protocol is used for the SYSTEM mode.

9.3.1 IrDA

IrCOMM: 9600 bps or faster, NONE Parity

TEC Protocol: 19200 bps, NONE parity

* The IrDA window (upper or front) to be used is according to the setting.

9.3.2 RS-232C

9600 bps, EVEN parity

9.3.3 Bluetooth

115200 bps, NONE Parity

9.3.4 WIRELESS LAN

115200 bps, NONE Parity

9.4 LIMITATIONS IN SYSTEM MODE

When the SYSTEM mode is selected, the printer does not enter into the power save mode.

When the SYSTEM mode is selected, the auto power-off function is not performed.

The settings specified by any Set Commands are stored into flash ROM, when the printer is turned OFF or is initialized by the Initialize Command. They take effect when the printer is turned ON, or after initialization is completed. Do not remove the battery during storing the settings, or the data cannot be written into flash ROM.

9.5 OUTLINE OF COMMANDS

9.5.1 FORMAT OF INTERFACE COMMAND

ESC	Command & Data	LF	NUL
-----	----------------	----	-----

- The length from [ESC] to [LF] [NUL] must be as specified by each command.
- There is the following control code:
ESC (1BH), LF (0AH), NUL (00H)

9.5.2 HOW TO USE REFERENCE

Function	Describes the outline of the function of the command.
Format	Shows the format of the command. The format designation method should conform to the following rules: <ul style="list-style-type: none"> • Each set of small letters (such as aa, bbbb) indicates a parameter item. • An item enclosed in parentheses may be omitted. • “---” indicates the repetition of an item. • Brackets and parentheses are used only in coding, and must not be transmitted in practice. • Other symbols must always be inserted at designated positions before being transmitted.
Term	Explains the term(s) used in the format. * “0 to 999” described in the entry range indicates that up to 3-digit variable-length entry is allowed. (Entry of “001” or “009” is also possible.) “000 to 999” indicates that the entry must be fixed as 3 digits.
Explanation	Explains the command in detail.
Note	Supplementary explanation of the command.
Refer to	Related commands
Examples	Explains the command examples. <div style="border: 1px solid black; padding: 2px; display: inline-block;">[ESC] FM [LF] [NUL]</div> The above corresponds to the transfer of the following: <div style="text-align: center;"> <u>1B</u> <u>46</u> <u>4D</u> <u>0A</u> <u>00</u> [ESC] F M [LF] [NUL] </div>

9.5.3 PRECAUTIONS

The commands and parameters described in this specification must always be used. If any command or parameter other than those covered in this specification are used, the printer's operation will not be guaranteed.

9.6 COMMANDS RELATED TO SETTING

9.6.1 ID SET COMMAND

[ESC] ID

Function	Sets the ID for the printer.
Format	[ESC] ID ; aa(,b) [LF] [NUL]
Term	aa: Printer ID (2-byte hex data) 0000H to FFFFH b: Wireless LAN IP Address Invalid Setting (Omissible. If omitted, IP address setting is effective.) 0: IP Address setting is invalid.
Explanation	(1) The printer ID is necessary information to identify each printer in RF communications
Notes	(1) The set printer ID is backed up in memory (even if the power is turned off). (2) The last 5 digits of the printer's serial number have been set as the printer ID, at the time of shipment from the factory. (3) In IrDA: TEC Protocol, the printer checks the set ID against the ID in the received command packet. If they do not match, the printer discards the command packet. However, when the ID in the command packet is "0", the printer accepts the command packet without checking the set IDs. (4) In case of the wireless LAN model, the printer's ID will be set as the lower 2-byte number of the IP address unless "0" is set to the Wireless LAN IP Address Invalid Setting parameter. The upper 2 bytes are fixed to "172.16". At this time, the subnet mask will be set to "255.255.0.0".
Example	To set "03H 51H" as the ID of the printer: [ESC] ID ; [03H] [51H] [LF] [NUL] In this case, the printer ID in status printing is "00849". In case of the wireless LAN model, the IP address is "172.16.3.81".

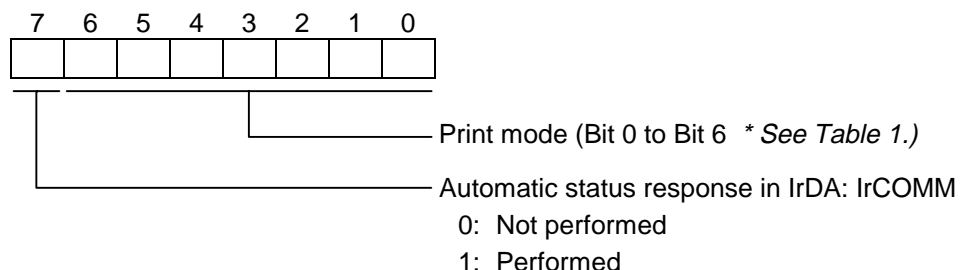
9.6.2 MODE SELECT COMMAND

[ESC] M

Function	Changes the print mode.
----------	-------------------------

Format	[ESC] M; a(b) [LF] [NUL]
--------	--------------------------

Term	a: Print mode designation
------	---------------------------



* Table 1 Print mode

HEX	Mode	How to deal with the received data after an error is cleared
30H	LABEL	Discards
31H	RECEIPT	Discards
32H	RECEIPT1	Continues printing
33H	RECEIPT	Discards
41H	TPCL-LE	Continues printing
42H	TPCL-LE1	Continues printing (*Firmware V1.5 or greater)

b: Print position detection feed (Omissible. If omitted, the print position detection feed is not performed.) (Firmware V1.1 or greater)

- 0: When the mode change from RECEIPT or RECEIPT1 to LABEL is requested, a print position detection feed is not performed after the mode is changed.
- 1: When the mode change from RECEIPT or RECEIPT1 to LABEL is requested, a print position detection feed is performed after the mode is changed.

- | | |
|-------------|--|
| Explanation | <p>(1) There are 3 types of the print mode: "LABEL", "RECEIPT", and "TPCL-LE".</p> <p>(2) Both 31H and 33H are used for the "RECEIPT" mode. 33H is provided to maintain the compatibility with RECEIPT2 used for the conventional models. On the B-SP2D, the RECEIPT mode operation of 33H is the same as the 31H. Therefore, both 31H and 33H are defined as "RECEIPT".</p> <p>(3) "Automatic status response in IrDA: IrCOMM" is the function for the specifications which do not allow the printer to spontaneously send the status thorough IrDA; IrCOMM. This function enables the printer to forcefully send the status to the host, if the link between the printer and the host is established. However, if the link between the printer and the host is not established upon the status transmission, the printer cannot send the status. Therefore, the status is discarded. (In the next connection to the host, the printer does not send the status to the host.)</p> <p>(4) "Print position detection feed" is a function that automatically feeds the label to the print start position after the print mode is changed from RECEIPT or RECEIPT1 to LABEL. The sensor is not used when issuing in RECEIPT or RECEIPT 1 mode, therefore, after mode is changed to LABEL, the print start position cannot be detected. This is useful when using sensor detectable paper in both RECEIPT and LABEL modes. However, the feed is not performed even if this parameter is set to 1 in the system mode.</p> |
|-------------|--|

- (5) In the TPCL-LE1 mode, it is possible to re-print the last print data by pressing the FEED button.

Notes

- (1) The print mode designation (the specified print mode and the automatic status response in IrDA: IrCOMM) is backed up in memory (even if the power is turned off).
- (2) The factory default is "30H: LABEL mode" and "Automatic status response in IrDA: IrCOMM is not performed". (The IrDA protocol is "TEC Protocol".)
- (3) When the print mode is changed, the type of sensor is automatically changed.
- | | |
|------------------------|--|
| LABEL mode (0): | The previously backed up sensor is designated. |
| TPCL-LE mode (A): | The previously backed up sensor is designated. |
| TPCL-LE1 mode (B): | The previously backed up sensor is designated. |
| RECEIPT mode (1 or 3): | No sensor is designated. |
| RECEIPT1 mode (2): | No sensor is designated. |
- (4) If the RECEIPT mode is selected or no sensor is designated in the LABEL or TPCL-LE mode, an initial feed is not performed when the cover is closed.
- (5) When the mode change is finished, the printer sends the normal end status or an ACK to the host. However, when the mode is changed to the TPCL-LE mode, the printer does not send the status. In IrDA: IrCOMM, only when bit 7 of the print mode designation is set to "1", the printer sends the status.
- (6) The print position detection feed is ignored when it is specified in the System mode.

9.7 COMMANDS RELATED TO FINE ADJUSTMENT

9.7.1 PRINT DENSITY FINE ADJUST COMMAND

[ESC] AY

Function	Adjusts the automatically set print density.
Format	[ESC] AY ; abb, c (, d) [LF] [NUL]
Term	<p>a: Indicates whether to increase or decrease the density +: Increase (Darker) -: Decrease (Lighter)</p> <p>bb: Print density fine adjustment value 00 to 10 (in units of 1 step)</p> <p>c: Print mode 0: Reserved 1: Direct thermal</p> <p>d: Head output division designation (Omissible) 0: Auto (Divided by 2 or 3) 1: Divided by 2 (Default) 2: Divided by 3 3: Auto1 (Not divided/Divided by 2 or 3)</p>
Explanation	<p>(1) If the print mode is set to any value other than “1”, it should be changed to “1”</p> <p>(2) The default value for the head output division designation is “1”.</p> <p>(3) The standard density is finely adjusted to increase or decrease.</p> <p>(4) When any print density fine adjustment value out of the above range is set, a command error will occur.</p> <p>(5) The print density may become lower if the print ratio per line is high. When “Divided by 3” is designated in the head output division designation, the print density may be improved. However, the issue speed when “Divided by 3” is set, may be slower than when “Divided by 2” is set.</p> <p>(6) When “0: Auto” is designated, “Divided by 3” or “Divided by 2” is automatically selected for every line according to the print ratio. The width of half a dot may not be printed on the line when switching between “Divided by 2” and “Divided by 3”. Therefore, do not designate “0: Auto” when a serial bar code is printed.</p> <p>(7) If the battery level becomes Level 2 when “3: Auto1” is designated for the head output division designation, the printer will automatically operate with “divided by 3” to keep the print quality. As a result, the issue speed becomes slower.</p>

9.7.2 STRIP SENSOR THRESHOLD VALUE SET COMMAND [ESC] AH, [ESC] AZ

Function	Sets the sensor threshold value to switch the mode between strip and batch.
Format	[ESC] AH; a [LF] [NUL] [ESC] AZ; a [LF] [NUL]
Term	a: Setting 0: Default value (3.2 V) 1: Threshold value 2: Fixed as the batch mode 3: Fixed as the strip mode 4: Reserved
Explanation	(1) If the issue mode is not properly switched when using thin backing paper, “1: Threshold value” should be set, as required. (2) When “1: Threshold value” is set, this command is sent after the backing paper of the label to be used, is positioned on the strip issue path and the cover is closed. The printer reads the sensor adjustment value for the backing paper, and then sets the threshold value to switch the mode between strip and batch. (When this command is sent, the backing paper must be loaded on the strip issue path. If the backing paper is loaded on the batch issue path, or the label is loaded, and the command is sent, the mode will not be switched properly.)
Notes	(1) The set threshold value is backed up and kept until a new value is set using this command. When the power is turned on, the backed up value is retrieved and set (2) “0: Default value” has been set as the default at the time of shipment from the factory. (3) This command is used for sensor adjustment. Therefore, it must not be included in issue operations. (4) When either “2: Fixed as the batch mode” or “3: Fixed as the strip mode” for parameter “a”, is selected, the printer operates in the specified mode, without automatically switching between the batch and strip modes. Particularly when the printer is used without the strip roller module, the strip sensor value becomes unstable. Additionally, the stop position for the label becomes misaligned, and the issue count is corrected to “1”. Therefore, “2: Fixed as the batch mode” or “3: Fixed as the strip mode” for parameter “a” must be specified in this command.

9.8 COMMANDS RELATED TO CONTROL

9.8.1 INITIALIZE COMMAND

[ESC] WR, [ESC] @

Function	Returns the printer to its initial state.
Format	[ESC] WR [LF] [NUL] [ESC] @
Explanation	<ol style="list-style-type: none"> (1) The printer is returned to the same state as when the power is turned on. (2) If the printer receives this command during printing, the printer prints the label which is being printed, then performs initialization. (3) The host should not send the next command within 5 second after sending the Initialize Command (or after the printer completes printing if receiving the Initialize Command during printing). Even if ACK/status transmission is specified by the Issue Command, the printer does not return the status to the host. (4) To use IrDA interface for sending this command to the printer, only this command should be sent. After the command is sent, the link should be terminated. Even if the host does not terminate the link, the printer performs the termination process. Therefore, after initialization is completed, the host should establish the link again. (5) When receiving this command during data transmission, the printer is initialized after transmission is completed.
Examples	[ESC] WR [LF] [NUL]

9.9 COMMANDS RELATED TO STATUS

9.9.1 STATUS REQUEST COMMAND

[ESC] FM, [ESC] WS, [ESC] v

Function	Sends the printer status to the host computer.
----------	--

Format	[ESC] FM [LF] [NUL] [ESC] WS [LF] [NUL] [ESC] v
--------	---

Explanation	
-------------	--

[LABEL/RECEIPT modes]

When receiving this command, the printer sends the printer status and battery status to the host.

- For IrDA: TEC Protocol: Data to be sent (Fixed as 27 bytes)

STX	Printer ID		Version No. of each form				Printer status	Battery status	CRC	
02H	xxH	xxH	V01	V02	V20	xxH	xxH	xxH	xxH

- For IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN: Data to be sent (Fixed as 5 bytes)

STX	Printer ID		Printer status	Battery status
02H	xxH	xxH	xxH	xxH

Printer ID 2-byte hex data (in order from High to Low)

Printer status Printer status is indicated in 1-byte data.

- 00H: Normal status (Idling)
- 01H: Cover open status
- 02H: Command syntax error
- 03H: Paper jam
- 04H: Label end
- 05H: Cover open error
- 06H: Broken thermal head dots error
- 07H: Thermal head excessive temperature
- 08H: Flash ROM write error
- 09H: Flash ROM erase error
- 0AH: Low battery (Print failure)
- 0BH: Operating
- 0DH: Normal end + Label end (See **NOTE**.)
- 0EH: Flash ROM storage area full state

(10H: normal termination) A response sent from the printer only when the automatic status transmission mode is designated.

NOTE: In the LABEL mode, this is a state when the printer runs out of labels, after the effective print length is printed. In the RECEIPT mode, this status is returned to the host when the printer runs out of labels after a receipt is issued.

Battery status.....The battery charge status is indicated in 5 levels.

01H: 7.2 V or less (Print failure)

02H: 7.3 V to 7.4 V

(Remaining No. of printable labels: Approx. 1 to 20)

03H: 7.5 V to 7.7 V

(Remaining No. of printable labels: Approx. 20 to 100)

04H: 7.8 V to 7.9 V

(Remaining No. of printable labels: Approx. 100 to 200)

05H: 8.0 V or more

(Remaining No. of printable labels: Approx. 200 or more)

* The remaining number of printable labels may vary according to the contents to be printed and the ambient environment.

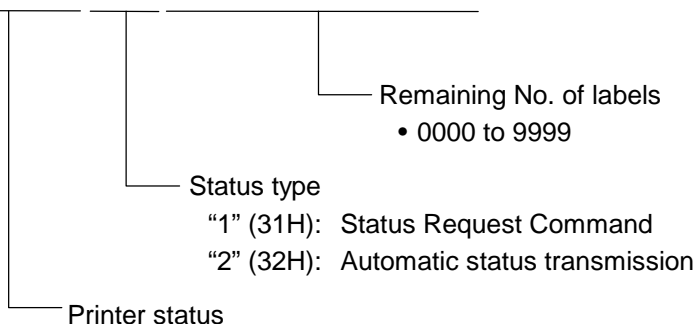
CRC.....2-byte hex data (in order from Low to High)

[TPCL-LE mode]

This command makes the printer send its status regardless of the status response setting. The status to be transmitted is the current printer status, and indicates the latest status only. The remaining count indicates the remaining count of the batch currently being printed. No remaining count of the batch waiting to be printed is transmitted.

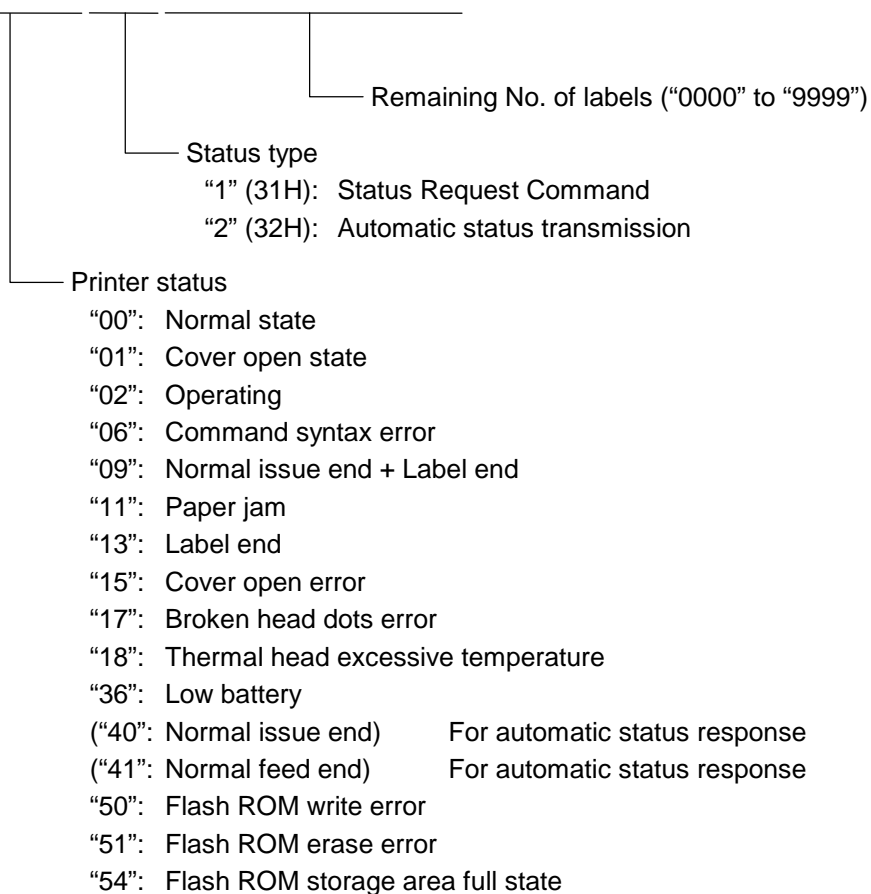
[IrDA: TEC Protocol]

STX	Printer ID		Status			Remaining No. of labels				CRC	
02H	xxH	xxH	3xH	3xH	3xH	3xH	3xH	3xH	3xH	xxH	XXH



[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

SOH	STX	Status			Remaining No. of labels				ETX	EOT	CR	LF
01H	02H	3xH	3xH	3xH	3xH	3xH	3xH	3xH	03H	04H	0DH	0AH



Notes

- (1) The status is returned only to the interface which sent this command.
- (2) A max. delay of 20 msec may occur until the printer sends the status after receiving the Status Request Command.
- (3) The interval from when the Status Request Command is sent to when the next Status Request Command is sent should be 20 msec or more. If the interval is less than 20 msec, the printer may fail to receive the Status Request Command.

Example

[ESC] WS [LF] [NUL]

9.9.2 MODE INFORMATION ACQUIRE COMMAND**[ESC] WX**

Function	Sends the printer mode information to the host.
Format	[ESC] WX [LF] [NUL]
Explanation	(1) The mode information format to be sent to the host, is as follows:

[TPCL-LE mode]

[IrDA: TEC Protocol]

STX	Mode information (16 bytes)																CRC	CRC
	S	Y	S	T	E	M	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP		
02H	53H	59H	53H	54H	45H	4DH	20H	20H	20H	20H	20H	20H	20H	20H	20H	20H	xxH	xxH

[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

SOH	STX	Mode information (16 bytes)																ETX	EOT	CR	LF
		S	Y	S	T	E	M	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP				
01H	02H	53H	59H	53H	54H	45H	4DH	20H	20H	20H	20H	20H	20H	20H	20H	20H	20H	03H	04H	0DH	0AH

The above is an example where the message is received in the SYSTEM mode. In addition, the message of "LABEL", "RECEIPT", or "TPCL-LE" is returned.

[LABEL/RECEIPT modes]

[IrDA: TEC Protocol]

STX	Mode information (16 bytes)																CRC	CRC
	S	Y	S	T	E	M	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP		
02H	53H	59H	53H	54H	45H	4DH	20H	20H	20H	20H	20H	20H	20H	20H	20H	20H	xxH	xxH

[IrDA: IrCOMM, RS-232C, Bluetooth, Wireless LAN]

STX	Mode information (16 bytes)															
	S	Y	S	T	E	M	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
02H	53H	59H	53H	54H	45H	4DH	20H	20H	20H	20H	20H	20H	20H	20H	20H	20H

The above is an example where the message is received in the SYSTEM mode. In addition, the message of "LABEL", "RECEIPT", or "TPCL-LE" is returned.

9.10 COMMANDS RELATED TO PARAMETER SETTING

9.10.1 PARAMETER SET COMMAND

[ESC] ZZ

Function	Sets each parameter on the printer.
Format	[ESC] ZZ; a, b, c, d, e, f, g, h, I [LF] [NUL]
Term	<p>a: Time to the power save mode (* Firmware V1.5 or greater)</p> <p>0: 3 sec.</p> <p>1: 5 sec.</p> <p>2: 10 sec.</p> <p>3: 20 sec.</p> <p>4: 30 sec.</p> <p>b: Model type (Destination)</p> <p>1: Fixed</p> <p>c: Character code</p> <p>0: PC-850</p> <p>d: Font of "0"</p> <p>0: 0 (without slash)</p> <p>e: Baud rate</p> <p>0: 9600 bps (for RS-232C)</p> <p>19200 bps (for IrDA: TEC Protocol)</p> <p>1: 9600 bps (for RS-232C and IrDA: TEC Protocol)</p> <p>2: 19200 bps (for RS-232C and IrDA: TEC Protocol)</p> <p>3: 38400 bps (for RS-232C and IrDA: TEC Protocol)</p> <p>4: 115200 bps (for RS-232C and IrDA: TEC Protocol)</p> <p>f: Parity (only for RS-232C)</p> <p>0: EVEN</p> <p>1: NONE</p> <p>g: IrDA protocol type</p> <p>0: TEC Protocol</p> <p>1: IrCOMM</p> <p>h: IrDA window</p> <p>0: Upper</p> <p>1: Front</p> <p>I: Auto power-off time</p> <p>0: 1 min.</p> <p>1: 5 min.</p> <p>2: 30 min.</p> <p>3: 120 min.</p> <p>4: No function (The auto power off function is inactivated.)</p> <p>(* Firmware V1.5 or greater)</p>

Explanation

(1) This command is used for making various settings for printer's operations. After this command is sent, the printer must be restarted by pressing the [POWER] switch. If the printer is not restarted, the operations are not guaranteed.

(2) Communications conditions

The IrDA window to be used for communications is according to the setting.

Communication type	Specifications			
	Baud rate	Stop bit	Data length	Parity
IrDA: IrCOMM	9600, 19200, 38400, 115200 bps ^{*1}	1 bit	8 bits	None
IrDA: TEC Protocol	19200 bps ^{*2}			
RS-232C	9600 bps ^{*2}			
Bluetooth	115200 bps ^{*2}			
Wireless LAN	115200 bps ^{*2}			

*1: The value is according to the communications protocol setting

*2: The communications conditions are fixed. Therefore, they cannot be changed.

(3) Update of the settings

The settings are updated when the printer is turned OFF then ON.

(4) Factory default settings

Each factory default setting is described below:

Item	Factory default value
Character code	0: PC-850
Font of "0"	0: 0 without a slash
Baud rate	0: 9600 bps (for RS-232C) 19200 bps (for IrDA: TEC Protocol)
Parity	0: EVEN
IrDA protocol	1: IrCOMM
IrDA window	1: Front
Auto power-off time	3: 120 min.
Time to the power save mode	0: 3 sec.

9.11 COMMANDS RELATED TO Bluetooth AND WIRELESS LAN

9.11.1 DEVICE ADDRESS ACQUIRE COMMAND

[ESC] IT

Function	Calls up the device address of the Bluetooth interface or MAC address of the wireless LAN module connected to the printer.
Format	[ESC] IT [LF] [NUL]
Explanation	(1) This command calls up the device address of the Bluetooth or MAC address of the wireless LAN module. On receiving this command, the printer returns the Bluetooth device address or MAC address with the complements of the following information field. When using the IrDA: TEC Protocol, the following information field is placed in the information frame and sent in packets.

[TPCL-LE mode]

[Information field to be sent when IrDA: TEC Protocol is used]

STX	Bluetooth device address	CRC	
02H	12 bytes	xxH	xxH

[Information field to be sent when IrDA: IrCOMM, RS-232C, Bluetooth, or wireless LAN is used]

SOH	STX	Bluetooth device address	ETX	EOT	CR	LF
01H	02H	12 bytes	03H	04H	0DH	0AH

[LABEL/RECEIPT modes]

[Information field to be sent when IrDA: TEC Protocol is used]

STX	Bluetooth device address	CRC	
02H	12 bytes	xxH	xxH

[Information field to be sent when IrDA: IrCOMM, RS-232C, Bluetooth or wireless LAN is used]

STX	Bluetooth device address
02H	12 bytes

Example	[ESC] IT [LF] [NUL] When Bluetooth device address is 0001ccf0042b, the printer sends the following information.
---------	--

Bluetooth device address:

[30H] [30H] [30H] [31H] [63H] [63H] [66H] [30H] [30H] [34H] [32H] [62H]
 0 0 0 1 c c f 0 0 4 2 b

9.12 STATUS PRINTING

9.12.1 GENERAL DESCRIPTION

When the printer is turned on while the [FEED] switch is being held down, status printing is performed. The [FEED] switch must be held down until the status printing starts. After status printing is performed, every time the [FEED] switch is pressed, the slanted line pattern is printed.

9.12.2 CONTENTS TO BE PRINTED

- Product name
- Part number of the printer software (MAIN, BOOT)
- Version (MAIN, BOOT)
- Creation date (MAIN, BOOT)
- Checksum of Kanji
- Checksum of FONT
- Printer ID
- Version No. of each form for the LABEL mode
- Sensor status
- Battery charge state
- Print density fine adjustment value
- Print position fine adjustment value
- Strip sensor threshold value
- Result for the broken head dots check
- Print mode
- Head output division
- Model type (Destination)
- IrDA protocol
- Optional device
- IrDA window
- Auto power-off time
- Time to the power save mode
- Each parameter
- PCB loop back check
- Slanted line pattern

9.12.3 PRINT SAMPLE

① Self-test printing (B-SP2D-GH20-QM)

B-SP2D	ID 01234
7FM00434001	HEAD OK (2)
MAIN V1.0 :xx00	BATT 8.2V (5)
10MAR2003	ADJ. +00 +0.0mm
BOOT V1.0 :xx00	P/W 120min (0)
10MAR2003	FORM 0000000000
FONT xx00	0000000000
漢字 xx00	MODE LABEL
SENS R:4.3V	PARA [PC850][0]
T:1.2V	LOOP IR:OK RS:OK
P:1.0V	IrDA IrCOMM
H:+30 °C	FRONT
A:+24 °C	OP. RS-232C
PEEL 3.2V	9600 EVEN
TYPE QM	

② Self-test printing (B-SP2D-GH30-QM)

B-SP2D	ID 01234
7FM00434001	HEAD OK (2)
MAIN V1.0 :xx00	BATT 8.2V (5)
10MAR2003	ADJ. +00 +0.0mm
BOOT V1.0 :xx00	P/W 120min (0)
10MAR2003	FORM 0000000000
FONT xx00	0000000000
漢字 xx00	MODE LABEL
SENS R:4.3V	PARA [PC850][0]
T:1.2V	LOOP IR:OK BT:OK
P:1.0V	IrDA IrCOMM
H:+30 °C	FRONT
A:+24 °C	OP. Bluetooth
PEEL 3.2V	0001cc400020
TYPE QM	

③ Self-test printing (B-SP2D-GH40-QM)

B-SP2D	ID 01234
7FM00434000	HEAD OK (2)
MAIN V1.0 :xx00	BATT 8.2V (5)
10MAR2003	ADJ. +00 +0.0mm
BOOT V1.0 :xx00	P/W 120min (0)
10MAR2003	FORM 0000000000
FONT xx00	0000000000
漢字 xx00	MODE LABEL
SENS R:4.3V	PARA [PC850][0]
T:1.2V	LOOP IR:OK LN:OK
P:1.0V	IrDA IrCOMM
H:+30 °C	FRONT
A:+24 °C	OP. WirelessLAN
PEEL 3.2V	000940887630
TYPE QM	

	<u>B-SP2D</u>	Product name
	<u>7FM00434000</u>	Part number of the printer software
MAIN	<u>10MAR2003</u> <u>V1.0</u> <u>:xx00</u>	Checksum Version Creation date
BOOT	<u>10MAR2003</u> <u>V1.0</u> <u>:xx00</u>	Checksum Version Creation date
FONT	<u>9100</u>	Checksum of C/G area
KANJI	<u>1100</u>	Checksum of Kanji area
FORM	8315427090 2554300000	Version of form No. (Upper line: No. 10, Lower line: No. 20) Version of form No. (Upper line: No. 9, Lower line: No. 19) Version of form No. (Upper line: No. 8, Lower line: No. 18) Version of form No. (Upper line: No. 7, Lower line: No. 17) Version of form No. (Upper line: No. 6, Lower line: No. 16) Version of form No. (Upper line: No. 5, Lower line: No. 15) Version of form No. (Upper line: No. 4, Lower line: No. 14) Version of form No. (Upper line: No. 3, Lower line: No. 13) Version of form No. (Upper line: No. 2, Lower line: No. 12) Version of form No. (Upper line: No. 1, Lower line: No. 11)
SENS	R: 4.3V T: 1.2V P: 1.0V H: +30°C A: +24°C	Reflective sensor Transmissive sensor Sensor for switching between the strip and batch sensors Thermal head temperature sensor Ambient temperature sensor
HEAD	<u>OK (2)</u>	Head output division (Auto, 2, 3, Auto1) Broken head dot check result: (OK: No broken head dots, NG: Broken head dots)

BATT 8.2V (5)
 Battery charge status in 5 levels
 Remaining battery capacity

ADJ. +03
 Print density fine adjustment value

FEED +10.0mm
 Print position fine adjustment value

Set value	Actual print	Set value	Actual print
x.0 mm	x.0 mm	x.5 mm	x.5 mm
x.1 mm	x.1 mm	x.6 mm	x.6 mm
x.2 mm	x.2 mm	x.7 mm	x.7 mm
x.3 mm	x.2 mm ^{*1}	x.8 mm	x.7 mm ^{*1}
x.4 mm	x.4 mm	x.9 mm	x.9 mm

*1: The reason why "x.3 mm" and "x.8 mm" are actually printed as "x.2 mm" and "x.7 mm", respectively is that the dot density of the print head is 8 dots/mm. The value "x.3 mm" will be automatically changed to "x.2 mm", and "x.8 mm" will be changed to "x.7 mm".

PEEL +3.0V
 Strip sensor threshold value (BATCH MODE, STRIP MODE)

MODE LABEL
 Print mode (LABEL, RECEIPT, RECEIPT1, TPCL-LE)

TYPE QM
 Model type (Destination) (QM)

IrDA TEC 115,200
 Baud rate (only for TEC Protocol) (9,600, 19,200, 38,400, 115,200)
 Protocol designation (TEC, IrCOMM)

UPPER
 IrDA window (UPPER, FRONT)

OP. RS-232C
 Optional device (RS-232C, Bluetooth, Wireless LAN)

9,600 EVEN (only for RS-232C)
 Parity (EVEN, NON)
 Baud rate (9,600, 19,200, 38,400, 115,200)

0001cc400eb6
 BD address (for Bluetooth) or MAC address (for Wireless LAN)

P/W 120min (0)
 Time to the power save mode
 (3 sec. ⇒ 0, 5 sec. ⇒ 1, 10 sec. ⇒ 2, 20 sec. ⇒ 3, 30 sec. ⇒ 4)
 Auto power-off time (1min, 5min, 30min, 120min, OFF)

LOOP

IR: OK RS: OK

- Option check (RS-232C \Rightarrow RS, Bluetooth \Rightarrow BT, Wireless LAN \Rightarrow LN) (OK, NG)

- IrDA check (OK, NG)

* The special jig is needed to check the RS-232C. Therefore, the result of RS-232C check will usually be NG.

PARA

[PC850] [0]

“0” without a slash (/)

Character code

9.13 SETUP MODE

9.13.1 GENERAL DESCRIPTION

The settings can be changed not only by commands but also by the key operations from the printer. This section describes how to change the settings by the key operations from the printer.

9.13.2 PRINTER CONDITIONS TO CHANGE SETTINGS

SYSTEM mode

Blank position of the receive buffer (There are no commands to be processed in the receive buffer)

3 or more of the battery levels (When the battery level is 2, the settings cannot be changed.)

9.13.3 HOW TO ENTER INTO SETUP MODE

Hold down the [FEED] switch for 3 seconds, with the cover open.

* Since the switch is held down with the cover open, the cover open error occurs. However, ignore it and keep holding down the [FEED] switch. When the printer enters into the setup mode, the LED, which is lit in red, will go off.

* Care must be taken not to keep holding down the [FEED] switch for more 7 seconds after the printer enters into the setup mode, as this changes the IrDA interface mode to the forced IrCOMM mode. (*Firmware V1.2 or greater)

9.13.4 HOW TO RETURN TO SYSTEM MODE DURING SETTING

During the setup mode, when the LED is ON in orange, press the [FEED] switch.

9.13.5 AUTO POWER-OFF FUNCTION DURING SETTING

Not performed

9.13.6 HOW TO CANCEL EACH SETUP MODE

Close the cover. If the cover is closed while the LED is blinking in green, the printer determines the setting to be incomplete. Therefore, the setting is not updated (saved).

9.13.7 HOW TO CHECK EACH MODE SETTING

Perform self-test printing and check the result printout.

9.13.8 OTHER

The printer does not enter into the power save mode during the setup mode.

In the setup mode, the [POWER] switch works as the operation key. It does not work to turn the printer ON or OFF. After the cover is closed, the [POWER] switch enables to turn the printer ON or OFF.

If the setting is the same as before, it is not written into flash ROM.

During the setup mode, transmission and reception interrupts through the IrDA, the RS-232C, the Bluetooth, or wireless LAN driver are masked. Therefore, communications are disabled.

The setting made takes effect, after the printer is turned OFF then ON by pressing the [POWER] switch in the SYSTEM mode, or when the printer is restarted by the Reset Command.

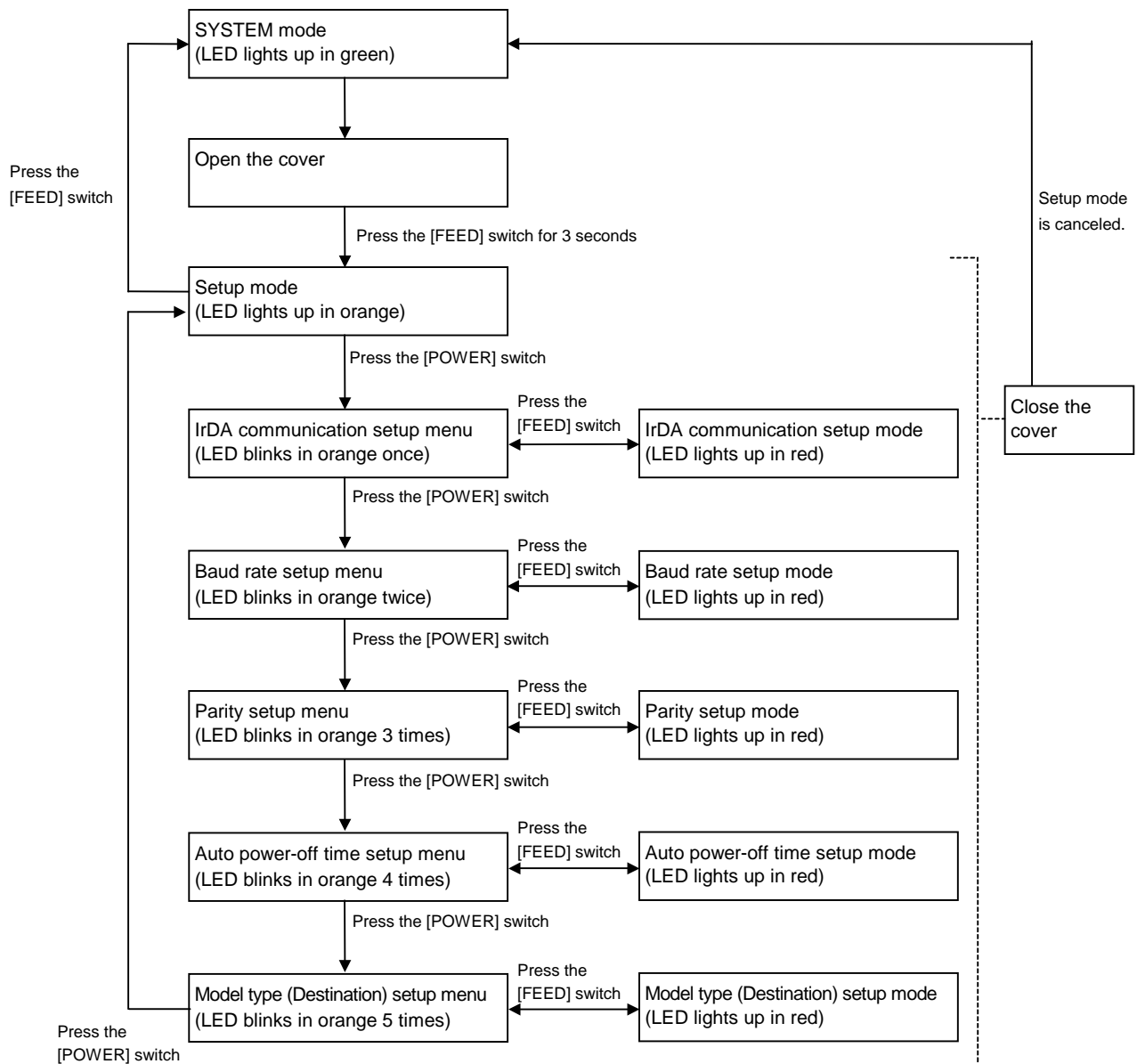
9.13.9 FORCED IrCOMM MODE (*Firmware V1.2 or greater)

When changing the printer settings by using the setup tool, the TEC Protocol, which is supposed to be used in normal operation, is temporarily changed to the IrCOMM until the printer is turned off.

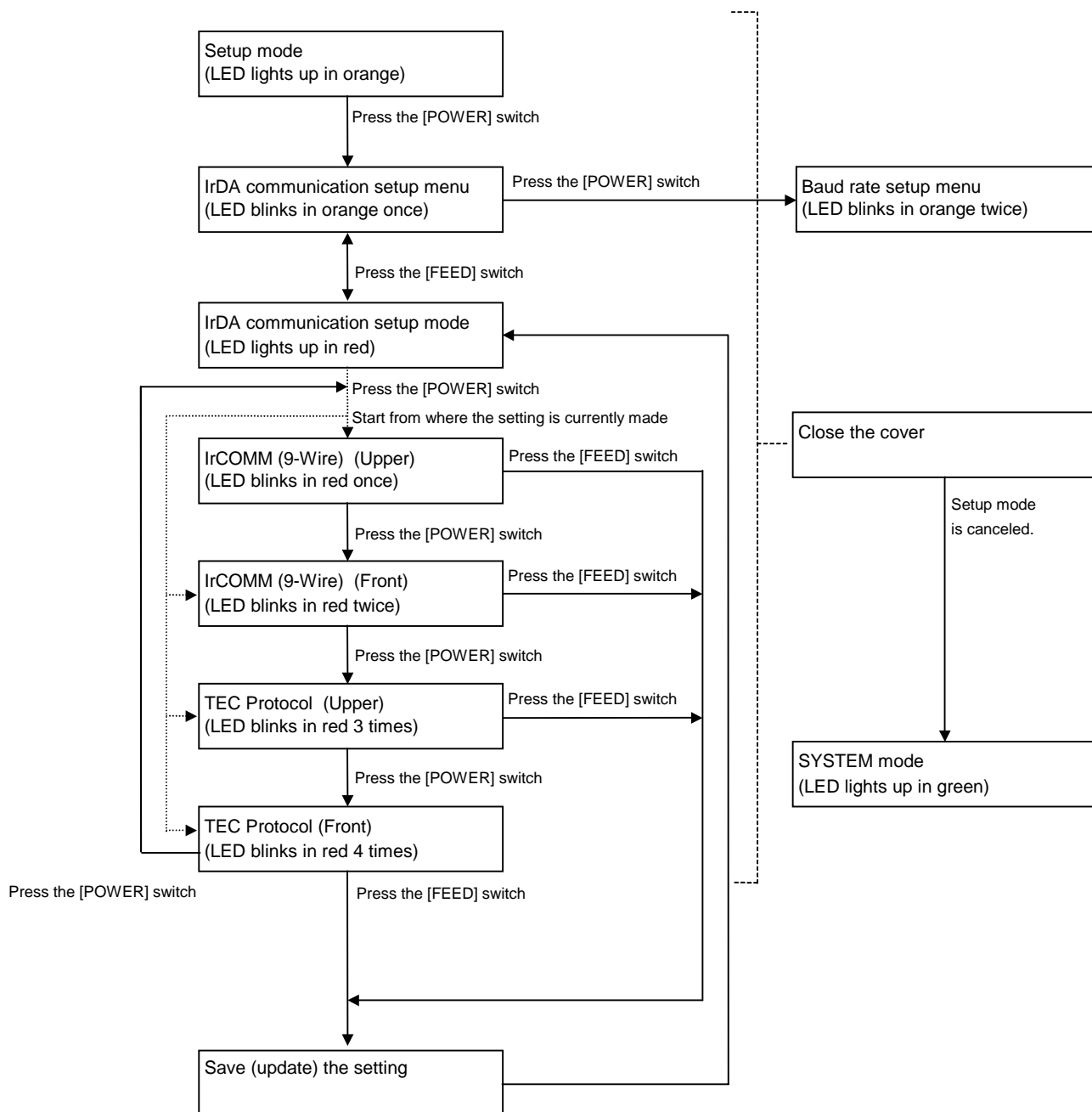
After printing the self test label, hold down the [FEED] switch for 10 seconds with the cover open. Though the printer enters into the setup mode in 3 seconds, keep holding down the [FEED] switch for more 7 seconds. When the printer enters into the IrCOMM mode, the LED will be ON in green.

9.13.10 SETUP MENU

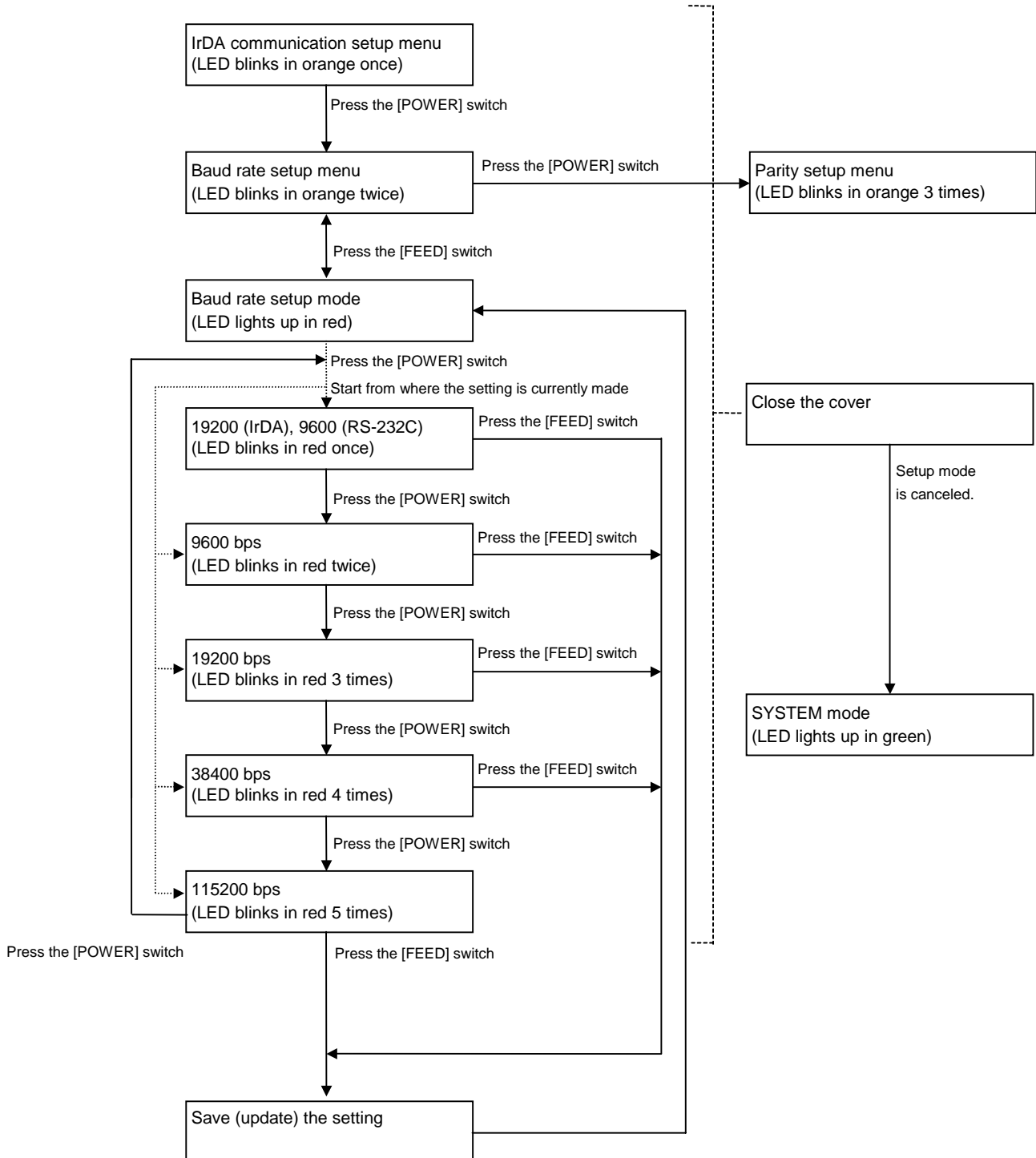
The detailed operations of each setup menu are described below.



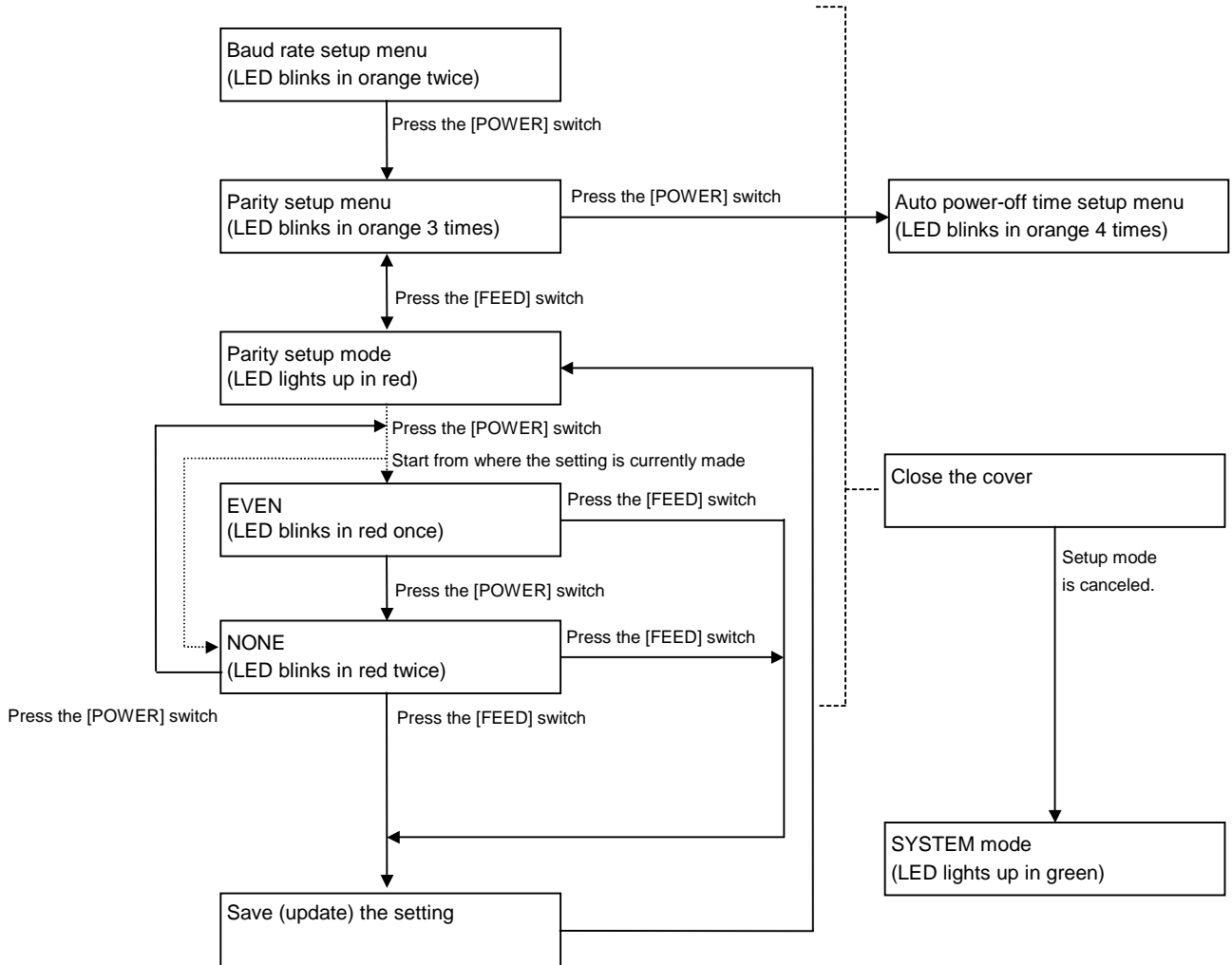
9.13.11 IrDA COMMUNICATION SETUP MENU



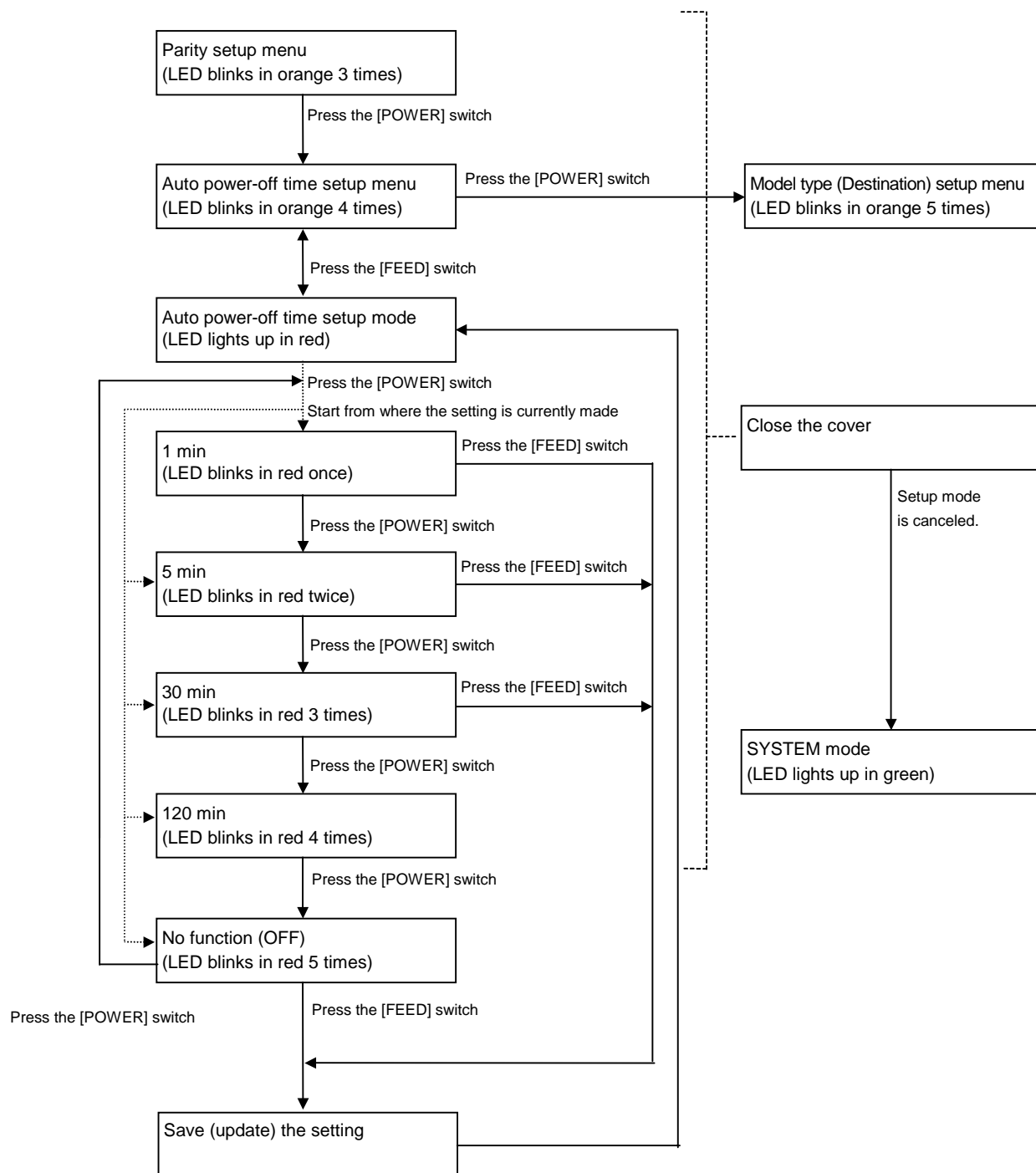
9.13.12 BAUD RATE SETUP MENU



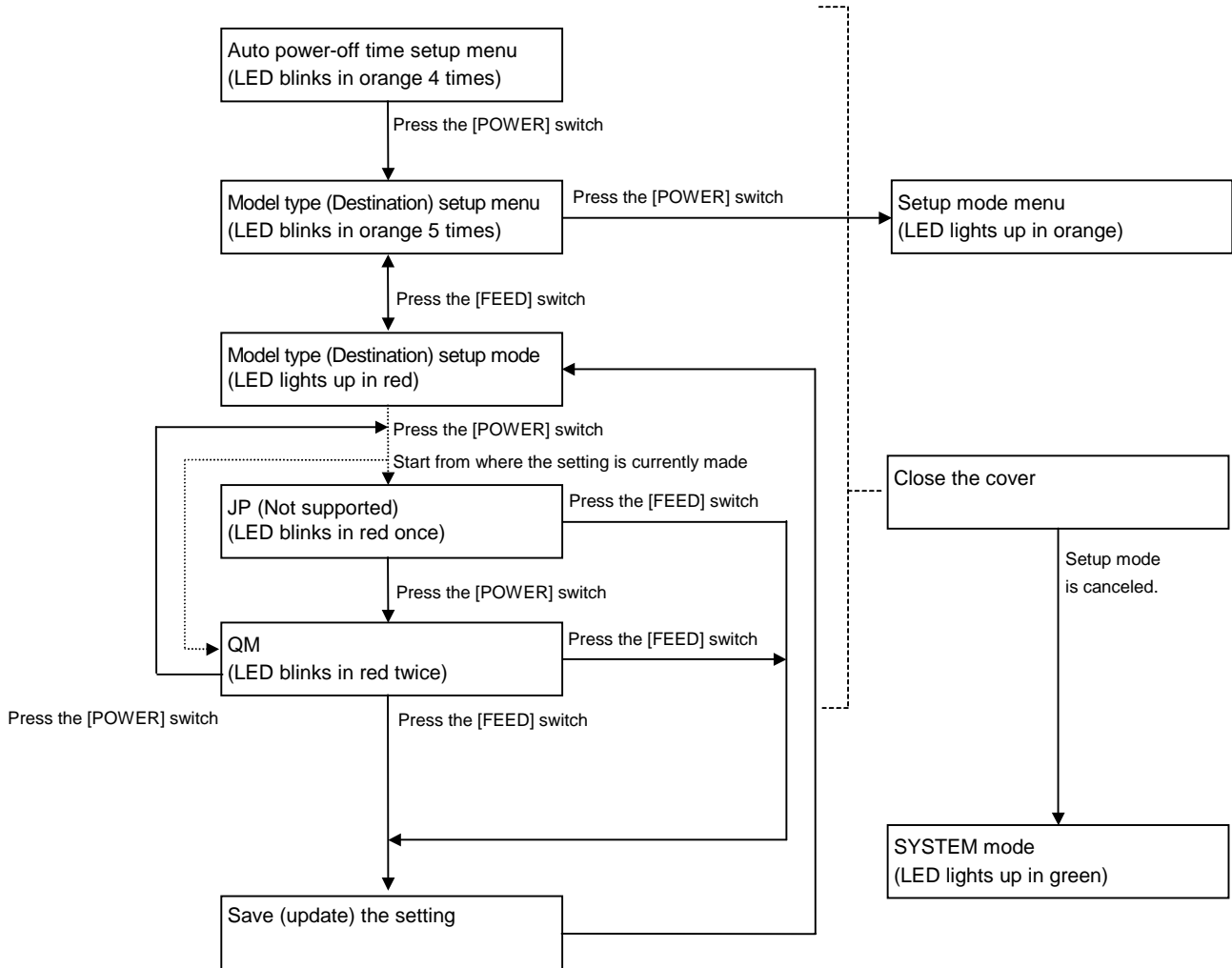
9.13.13 PARITY SETUP MENU



9.13.14 AUTO POWER-OFF TIME SETUP MENU



9.13.15 MODEL TYPE (DESTINATION) SETUP MENU



NOTE: There are two options for the model type (destination). However, "JP" is not supported.

10. OTHER FUNCTIONS

10.1 GENERAL DESCRIPTION

This chapter describes the functions of the printer in detail.

10.2 REPRINT FUNCTION

10.2.1 LABEL MODE, TPCL-LE1 MODE

When the batch issue mode is selected, the same label as the last one issued is printed out by pressing the [FEED] switch. When this switch is pressed if no label has been printed, the specified label pitch length of one label is fed. (If no sensor is designated, a 20-mm feed is performed.)

In the strip issue mode, since the designation for the number of labels to be issued is ignored, one label is issued. Therefore, the required number of labels should be issued by repeatedly pressing the [FEED] switch.

If an error occurs, key entries are ignored. However, the drawing buffer data is kept until the next Data Print Command is received. After the error is cleared, one label can be issued, every time the [FEED] switch is pressed.

10.2.2 RECEIPT MODE

A label is not issued again, even if the [FEED] switch is pressed. A 20-mm feed is performed, every time the [FEED] switch is pressed.

10.2.3 TPCL-LE MODE

A label is not issued again, even if the [FEED] switch is pressed. The specified label pitch length of a feed is performed, every time the [FEED] switch is pressed. (If no sensor is designated, a 20-mm feed is performed.)

10.3 POWER SAVE MODE

This printer will enter the power save mode after the printer has been in an idle state for the specified 'time to the power save mode' (factory setting: 3 sec.) to save the power consumption. When the printer enters the power save mode, all data in the receive buffer is cleared. During an error state (including a low battery state), the printer does not enter the power save mode, but turns off according to the auto power off time setting. If the time setting is 5 minutes or longer, however, the printer will turn off in 5 minutes.

The power save mode is cleared when:

- The IrDA link is established. (TEC Protocol, IrCOMM)
- RS-232C communications are started.
- Bluetooth communications are started.
- Wireless LAN communications are started.
- The cover is opened or closed.
- The [FEED] switch is pressed.
- The [POWER] switch is pressed.

10.4 AUTOMATIC LABEL PRINT POSITIONING

10.4.1 LABEL MODE, TPCL-LE MODE

When the cover is closed, the label is automatically fed to the first print position. However, if no sensor is designated, a feed is not performed.

10.4.2 RECEIPT MODE

Even if the cover is closed, the label is not automatically fed to the first print position.

10.5 CONTINUOUS PRINTING FUNCTION

10.5.1 LABEL MODE, RECEIPT MODE (Mode = 1 or 3)

The continuous printing function is not supported. When an error occurs, the receive buffer is entirely cleared.

10.5.2 RECEIPT1 MODE (Mode = 2), TPCL-LE MODE

After the label end error or the cover open error is cleared, the printer automatically continues printing the data which has been received before the error occurred. After paper is replaced, the error is cleared when the cover is closed. Then, the printer automatically continues printing. If the sensor is designated, the printer performs a feed to position the label at the first print position, then continues printing. When the cover is closed, if the printer has run out of the paper, the printer neither clears the error nor continues printing. It remains in the error state.

10.6 AUTOMATIC LABEL PRINT POSITIONING AT POWER ON TIME

If the sensor is designated, the printer performs a feed to position the label at the first print position.

10.7 BD ADDRESS PRINTING FUNCTION

When the printer which supports Bluetooth interface is turned ON by holding down the [POWER] switch for approximately 5 seconds, the bar code below is printed, regardless of the print mode. However, if the bar code is not properly printed due to an error caused by the label end or paper jam, the printer does not reprint it. Clear the error, and then try to reprint it by performing the procedure from the beginning (the power off state).


[Bar code sample of Bluetooth device address]



10.8 WIRELESS LAN PARAMETER SETTINGS PRINTING FUNCTION

When the printer on which the wireless LAN module is installed is turned ON by holding down the [POWER] switch while the power is off, the printer turns on and prints a wireless LAN parameter settings label regardless of the issue mode. If the label is not printed successfully due to an error like no paper or feed jam, it is required to load the media correctly, turn off the power, and then retry from the beginning. This is because the printer will not print the label even if the error is cleared.

[Sample of the wireless LAN parameter setting printout]

RF-LAN PARAMS [100]	TYPE[EU]
IP [172.016.000.010]	LPR [ON]
GW [000.000.000.000]	DHCP[ON]
SUB [255.255.000.000]	CON [INF]
SOCK[ON][65535]	AUTH[SKEY]
WEP [128]SECU[MD5]	CHAN[07]
WINS [ON][000.000.000.000]	
HOST [TTEC]
[]
ESSID[TEC]
[]
MAC:0010C61CCDA9	
	
172016000010	

11. CHARACTER CODE TABLE

11.1 GENERAL DESCRIPTION

In this chapter, the character code tables are provided.

11.2 TIMES ROMAN

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	€		ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í			Ð	ß	±
2			"	2	B	R	b	r	é	Æ	ó			Ê	Ô	=
3			#	3	C	S	c	s	â	ô	ú			Ë	Ò	¾
4			\$	4	D	T	d	t	ä	ö	ñ			È	õ	¶
5			%	5	E	U	e	u	à	ò	Ñ	Á		1	Õ	§
6			&	6	F	V	f	v	â	û	ª	Â	ã	í	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	î	þ	¸
8			(8	H	X	h	x	ê	ÿ	¿	©		Ï	ƒ	°
9)	9	I	Y	i	y	ë	Ö	®			Ú	ˆ	ˆ
A			*	:	J	Z	j	z	è	Ü	¬			Û	•	•
B			+	;	K	[k	{	ï	ø	½			Ü	1	1
C			,	<	L	\	l		î	£	¼			ý	3	3
D			-	=	M]	m	}	ì	Ø	¡	¢		ì	Ý	2
E			.	>	N	^	n	~	Ä	x	«	¥		ì	-	■
F			/	?	O	_	o	¸	Å	f	»		¤		'	

On the JP model, code 5CH indicates "¥".

11.3 HELVETICA

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	€		ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í			Ð	ß	±
2			"	2	B	R	b	r	é	Æ	ó			Ê	Ô	=
3			#	3	C	S	c	s	â	ô	ú			Ë	Ò	¾
4			\$	4	D	T	d	t	ä	ö	ñ			È	õ	¶
5			%	5	E	U	e	u	à	ò	Ñ	Á		1	Õ	§
6			&	6	F	V	f	v	â	û	ª	Â	ã	í	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	î	þ	¸
8			(8	H	X	h	x	ê	ÿ	¿	©		Ï	ƒ	°
9)	9	I	Y	i	y	ë	Ö	®			Ú	ˆ	ˆ
A			*	:	J	Z	j	z	è	Ü	¬			Û	•	•
B			+	;	K	[k	{	ï	ø	½			Ü	1	1
C			,	<	L	\	l		î	£	¼			ý	3	3
D			-	=	M]	m	}	ì	Ø	¡	¢		ì	Ý	2
E			.	>	N	^	n	~	Ä	x	«	¥		ì	-	■
F			/	?	O	_	o	¸	Å	f	»		¤		'	

On the JP model, code 5CH indicates "¥".

Some characters may not be printed, depending on point sizes.

11.4 LETTER GOTHIC

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	€		ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í			Ð	ß	±
2			"	2	B	R	b	r	é	Æ	ó			Ê	Ô	=
3			#	3	C	S	c	s	â	ô	ú			Ë	Ò	
4			\$	4	D	T	d	t	ä	ö	ñ			È	õ	
5			%	5	E	U	e	u	à	ò	Ñ	Á		1	Õ	§
6			&	6	F	V	f	v	â	û	ª	Â	ã	í		
7			'	7	G	W	g	w	ç	ù	º	À	Ã	î	þ	¸
8			(8	H	X	h	x	ê	ÿ	¿			Ï	ƒ	°
9)	9	I	Y	i	y	ë	Ö				Ú	ˆ	
A			*	:	J	Z	j	z	è	Ü				Û	•	
B			+	;	K	[k	{	ï	ø	½			Ù		
C			,	<	L	\	l		î	£	¼			ý		
D			—	=	M]	m	}	ì	Ø	¡	¢		Ý		
E			.	>	N	^	n	~	Ä	x	«	¥		ì	-	■
F			/	?	O	_	o	¸	Å	f	»		¤		'	

On the JP model, code 5CH indicates "¥".

11.5 PRESTIGE ELITE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	€		ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í			Ð	ß	±
2			"	2	B	R	b	r	é	Æ	ó			Ê	Ô	=
3			#	3	C	S	c	s	â	ô	ú			Ë	Ò	
4			\$	4	D	T	d	t	ä	ö	ñ			È	õ	
5			%	5	E	U	e	u	à	ò	Ñ	Á		1	Õ	§
6			&	6	F	V	f	v	â	û	ª	Â	ã	í		
7			'	7	G	W	g	w	ç	ù	º	À	Ã	î	þ	¸
8			(8	H	X	h	x	ê	ÿ	¿			Ï	ƒ	°
9)	9	I	Y	i	y	ë	Ö				Ú	ˆ	
A			*	:	J	Z	j	z	è	Ü				Û	•	
B			+	;	K	[k	{	ï	ø	½			Ù		
C			,	<	L	\	l		î	£	¼			ý		
D			—	=	M]	m	}	ì	Ø	¡	¢		Ý		
E			.	>	N	^	n	~	Ä	x	«	¥		ì	-	■
F			/	?	O	_	o	¸	Å	f	»		¤		'	

On the JP model, code 5CH indicates "¥".

Some characters may not be printed, depending on point sizes.

11.6 COURIER

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	€		ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í			Ð	ß	±
2			"	2	B	R	b	r	é	Æ	ó			Ê	Ô	=
3			#	3	C	S	c	s	â	ô	ú			Ë	Ò	¾
4			\$	4	D	T	d	t	ä	ö	ñ			È	õ	¶
5			%	5	E	U	e	u	à	ò	Ñ	Á		1	Õ	§
6			&	6	F	V	f	v	â	û	ª	Â	ã	í	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	î	þ	¸
8			(8	H	X	h	x	ê	ÿ	¿	©		Ï	ƒ	°
9)	9	I	Y	i	y	ë	Ö	®			Ú	ˆ	ˆ
A			*	:	J	Z	j	z	è	Ü	¬			Û	•	•
B			+	;	K	[k	{	ï	ø	½			Ü	1	1
C			,	<	L	\	l		î	£	¼			ý	3	3
D			-	=	M]	m	}	ì	Ø	¡	¢		ì	Ý	2
E			.	>	N	^	n	~	Ä	x	«	¥		ì	-	■
F			/	?	O	_	o	¸	Å	f	»		¤		'	

On the JP model, code 5CH indicates "¥".

11.7 GOTHIC725 BLACK

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	€		ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í			Ð	ß	±
2			"	2	B	R	b	r	é	Æ	ó			Ê	Ô	=
3			#	3	C	S	c	s	â	ô	ú			Ë	Ò	¾
4			\$	4	D	T	d	t	ä	ö	ñ			È	õ	¶
5			%	5	E	U	e	u	à	ò	Ñ	Á		1	Õ	§
6			&	6	F	V	f	v	â	û	ª	Â	ã	í	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	î	þ	¸
8			(8	H	X	h	x	ê	ÿ	¿	©		Ï	ƒ	°
9)	9	I	Y	i	y	ë	Ö	®			Ú	ˆ	ˆ
A			*	:	J	Z	j	z	è	Ü	¬			Û	•	•
B			+	;	K	[k	{	ï	ø	½			Ü	1	1
C			,	<	L	\	l		î	£	¼			ý	3	3
D			-	=	M]	m	}	ì	Ø	¡	¢		ì	Ý	2
E			.	>	N	^	n	~	Ä	x	«	¥		ì	-	■
F			/	?	O	_	o	¸	Å	f	»		¤		'	

On the JP model, code 5CH indicates "¥".

11.8 PRESENTATION

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			0	@	P	`	p					€				-
1			!	1	A	Q	A	Q								
2			"	2	B	R	B	R								
3			#	3	C	S	C	S								
4			\$	4	D	T	D	T								
5			%	5	E	U	E	U								
6			&	6	F	V	F	V								
7			'	7	G	W	G	W								
8			(8	H	X	H	X								
9)	9	I	Y	I	Y								
A			*	:	J	Z	J	Z								
B			+	;	K	[K	{								
C			,	<	L	\	L									
D			-	=	M]	M	}				¢				
E			.	>	N	^	N	~				¥				
F			/	?	O	_	O	⌘								

On the JP model, code 5CH indicates "¥".

Some characters may not be printed, depending on point sizes.

11.9 STANDARD (12×24)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			0	@	P	`	p					€				
1			!	1	A	Q	a	q								
2			"	2	B	R	b	r								
3			#	3	C	S	c	s								
4			\$	4	D	T	d	t								
5			%	5	E	U	e	u								
6			&	6	F	V	f	v								
7			'	7	G	W	g	w								
8			(8	H	X	h	x								
9)	9	I	Y	i	y								
A			*	:	J	Z	j	z								
B			+	;	K	[k	{								
C			,	<	L	\	l									
D			-	=	M]	m	}								
E			.	>	N	^	n	~								
F			/	?	O	_	o	¥								

* The shaded parts are Japanese. They are omitted here.

11.10 OCR-A

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0		P	rl									-
1				1	A	Q										
2			"	2	B	R										
3				3	C	S										
4			\$	4	D	T										
5				5	E	U										
6				6	F	V										
7				7	G	W										
8				8	H	X										
9				9	I	Y										
A					J	Z										
B			+		K											
C				<	L											
D			-		M											
E			.	>	N							¥				
F			/		O			¥								

On the JP model, code 5CH indicates “¥”, and code 7FH is “ ”.

11.11 OCR-B

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0		P			0							-
1				1	A	Q			1							
2			"	2	B	R			2							
3				3	C	S			3							
4			\$	4	D	T			4							
5				5	E	U			5							
6				6	F	V			6							
7				7	G	W			7							
8				8	H	X			8							
9				9	I	Y			9							
A					J	Z										
B			+		K											
C				<	L											
D			-		M											
E			.	>	N							¥				
F			/		O			¥								

On the JP model, code 5CH indicates “¥”, and code 7FH is “ ”.

The size of the numerals of codes 80h ~ 89h are reduced to 80%.

11.12 PRICE FONT 1/PRICE FONT 2

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0												-
1				1												
2				2												
3				3												
4			\$	4												
5				5												
6				6												
7				7												
8				8												
9				9												
A																
B																
C			,													
D			-													
E			.									¥				
F								円								

On the JP model, code
5CH indicates “¥”.

11.13 BOLD CHARACTER

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0												-
1				1												
2				2												
3				3												
4				4												
5				5												
6				6												
7				7												
8				8												
9				9												
A																
B																
C																
D			-													
E																
F																

11.14 OUTLINE FONT TEC FONT 1

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	€				-
1			!	1	A	Q	a	q	ü	æ	í	€			ß	±
2			"	2	B	R	b	r	é	Æ	ó					
3			#	3	C	S	c	s	â	ô	ú					
4			\$	4	D	T	d	t	ä	ö	ñ				õ	
5			%	5	E	U	e	u	à	ò	Ñ					§
6			&	6	F	V	f	v	â	û	ª		ã		µ	÷
7			'	7	G	W	g	w	ç	ù	º					
8			(8	H	X	h	x	ê	ÿ	¿					°
9)	9	I	Y	i	y	ë	Ö						
A			*	:	J	Z	j	z	è	Ü	¬					•
B			+	;	K	[k	{	ï	ø	½					
C			,	<	L	\	l		î	£	¼					
D			—	=	M]	m	}	ì	Ø	¡	¢				²
E			.	>	N	^	n	~	Ä		«	¥				■
F			/	?	O	_	o	△	Å	f	»		α			

On the JP model, code 5CH indicates “¥”.

Some characters may not be printed, depending on point sizes.

11.15 OUTLINE FONT PRICE FONT 2

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	円											
1				1												
2				2												
3				3												
4			\$	4												
5			%	5												
6				6												
7				7												
8				8												
9				9												
A																
B																
C			,			¥										
D			-													
E			.					~								
F			/													

On the JP model, code 5CH indicates “¥”.

Some characters may not be printed, depending on point sizes.

12. BAR CODE/TWO-DIMENSIONAL CODE TABLE

12.1 GENERAL DESCRIPTION

In this chapter, the bar code/two-dimensional code tables are provided. Note that there are some bar codes/two-dimensional codes which are not supported, depending on the print mode.

12.2 JAN8/EAN8, JAN13/EAN13, UPC-A, UPC-E, ITF, EAN128, MSI, RSS-14, RSS-14 STACKED, RSS-14 STACKED OMNIDIRECTIONAL, RSS-LIMITED

	2	3	4	5	6	7
0		0				
1		1				
2		2				
3		3				
4		4				
5		5				
6		6				
7		7				
8		8				
9		9				
A						
B						
C						
D						
E						
F						

12.3 CODE39 (STANDARD)

	2	3	4	5	6	7
0	SP	0		P		
1		1	A	Q		
2		2	B	R		
3		3	C	S		
4	\$	4	D	T		
5	%	5	E	U		
6		6	F	V		
7		7	G	W		
8		8	H	X		
9		9	I	Y		
A	*		J	Z		
B	+		K			
C			L			
D	—		M			
E	•		N			
F	/		O			

NOTE: “*” in the above table is used only as the start/stop codes.

12.4 NW-7

	2	3	4	5	6	7
0	SP	0				
1		1	A		a	
2		2	B		b	
3		3	C		c	
4	\$	4	D		d	t
5		5			e	
6		6				
7		7				
8		8				
9		9				
A	*	:				
B	+					
C						
D	—					
E	•				n	
F	/					

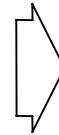
12.5 CUSTOMER BAR CODE, HIGHEST PRIORITY CUSTOMER BAR CODE

	2	3	4	5	6	7
0		0		P		
1		1	A	Q		
2		2	B	R		
3		3	C	S		
4		4	D	T		
5		5	E	U		
6		6	F	V		
7		7	G	W		
8		8	H	X		
9		9	I	Y		
A			J	Z		
B			K			
C			L			
D	—		M			
E			N			
F			O			

12.6 CODE128

12.6.1 TRANSFER CODE

	–	–	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(8	H	X	h	x
9	HT	EM)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[k	{
C	FF	FS	,	<	L	\	l	
D	CR	GS	–	=	M]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	△



[Drawing code]

Value Code Table

12.6.2 HOW TO SEND CONTROL CODE DATA

NUL (00H)	→	>@ (3EH, 40H)
SOH (01H)	→	>A (3EH, 41H)
STX (02H)	→	>B (3EH, 42H)
to		
GS (1DH)	→	>] (3EH, 5DH)
RS (1EH)	→	>^ (3EH, 5EH)
US (1FH)	→	>_ (3EH, 5FH)

12.6.3 HOW TO SEND SPECIAL CODES

Value		
30 (Character >)	→	>0
95	→	>1
96	→	>2
97	→	>3
98	→	>4
99	→	>5
100	→	>6
101	→	>7
102	→	>8

12.6.4 DESIGNATION OF START CODE

START (CODE A)	→	>7
START (CODE B)	→	>6
START (CODE C)	→	>5

12.6.5 VALUE CODE TABLE

VALUE	CODE A	CODE B	CODE C
0	SP	SP	00
1	!	!	01
2	"	"	02
3	#	#	03
4	\$	\$	04
5	%	%	05
6	&	&	06
7	'	'	07
8	((08
9))	09
10	*	*	10
11	+	+	11
12	,	,	12
13	—	—	13
14	.	.	14
15	/	/	15
16	0	0	16
17	1	1	17
18	2	2	18
19	3	3	19
20	4	4	20
21	5	5	21
22	6	6	22
23	7	7	23
24	8	8	24
25	9	9	25
26	:	:	26
27	;	;	27
28	<	<	28
29	=	=	29
30	>	>	30
31	?	?	31
32	@	@	32
33	A	A	33
34	B	B	34
35	C	C	35

VALUE	CODE A	CODE B	CODE C
36	D	D	36
37	E	E	37
38	F	F	38
39	G	G	39
40	H	H	40
41	I	I	41
42	J	J	42
43	K	K	43
44	L	L	44
45	M	M	45
46	N	N	46
47	O	O	47
48	P	P	48
49	Q	Q	49
50	R	R	50
51	S	S	51
52	T	T	52
53	U	U	53
54	V	V	54
55	W	W	55
56	X	X	56
57	Y	Y	57
58	Z	Z	58
59	[[59
60	\	\	60
61]]	61
62	^	^	62
63	_	_	63
64	NUL	`	64
65	SOH	a	65
66	STX	b	66
67	ETX	c	67
68	EOT	d	68
69	ENQ	e	69
70	ACK	f	70
71	BEL	g	71

VALUE	CODE A	CODE B	CODE C
72	BS	h	72
73	HT	i	73
74	LF	j	74
75	VT	k	75
76	FF	l	76
77	CR	m	77
78	SO	n	78
79	SI	o	79
80	DLE	p	80
81	DC1	q	81
82	DC2	r	82
83	DC3	s	83
84	DC4	t	84
85	NAK	u	85
86	SYN	v	86
87	ETB	w	87
88	CAN	x	88
89	EM	y	89
90	SUB	z	90
91	ESC	{	91
92	FS		92
93	GS	}	93
94	RS	~	94
95	US	DEL	95
96	FNC3	FNC3	96
97	FNC2	FNC2	97
98	SHIFT	SHIFT	98
99	CODE C	CODE C	99
100	CODE B	FNC4	CODE B
101	FNC4	CODE A	CODE A
102	FNC1	FNC1	FNC1

103	START CODE A
104	START CODE B
105	START CODE C

12.7 RSS EXPANDED

	2	3	4	5	6	7
0	SP	0		P		p
1	!	1	A	Q	a	q
2	“	2	B	R	b	r
3	FNC1	3	C	S	c	s
4		4	D	T	d	t
5	%	5	E	U	e	u
6	&	6	F	V	f	v
7	‘	7	G	W	g	w
8	(8	H	X	h	x
9)	9	I	Y	i	y
A	*	:	J	Z	j	z
B	+	;	K		k	
C	,	<	L		l	
D	—	=	M		m	
E	•	>	N		n	
F	/	?	O	—	O	

12.8 DATA MATRIX

12.8.1 FORMAT ID

The code to be used is designated using the format ID.

Format ID	Code	Details
1	Numerics	0 to 9 space
2	Letters	A to Z space
3	Alphanumerics, symbols	0 to 9 A to Z space . , - /
4	Alphanumerics	0 to 9 A to Z space
5	ASCII (7-bit)	00H to 7FH
6	ISO (8-bit)	00H to FFH (Kanji)

12.8.2 TRANSFER CODE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p								
1	SOH	DC1	!	1	A	Q	a	q								
2	STX	DC2	"	2	B	R	b	r								
3	ETX	DC3	#	3	C	S	c	s								
4	EOT	DC4	\$	4	D	T	d	t								
5	ENQ	NAK	%	5	E	U	e	u								
6	ACK	SYN	&	6	F	V	f	v								
7	BEL	ETB	'	7	G	W	g	w								
8	BS	CAN	(8	H	X	h	x								
9	HT	EM)	9	I	Y	i	y								
A	LF	SUB	*	:	J	Z	j	z								
B	VT	ESC	+	;	K	[k	{								
C	FF	FS	,	<	L	\	l									
D	CR	GS	-	=	M]	m	}								
E	SO	RS	.	>	N	^	n	~								
F	SI	US	/	?	O	_	o	△								

12.8.3 HOW TO SEND CONTROL CODE DATA

NUL (00H)	→	>@	(3EH, 40H)
SOH (01H)	→	>A	(3EH, 41H)
STX (02H)	→	>B	(3EH, 42H)
to			
GS (1DH)	→	>]	(3EH, 5DH)
RS (1EH)	→	>^	(3EH, 5EH)
US (1FH)	→	>_	(3EH, 5FH)

12.8.4 HOW TO SEND SPECIAL CODES

>	(3EH)	→	>0	(3EH, 30H)
---	-------	---	----	------------

12.9 PDF417, MicroPDF417

12.9.1 MODE/CODE

The following modes are automatically selected according to the code used.

[PDF417]

Mode	Code	Details
EXC mode	Alphanumerics, symbols	0 to 9 A to Z a to z space ! " # \$ % & ' () * + , - . / : ; < = > ? @ [\] ^ _ ` { } ~ △ CR HT
Binary/ASCII Plus mode	Binary International Character Set	00H to FFH
Numeric Compaction mode	Numerics	0 to 9

[MicroPDF417]

Mode	Details
Upper case letters, space	A to Z, space
Binary international character set	00H to FFH (Kanji)
Numerics	0 to 9

12.9.2 TRANSFER CODE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p								
1	SOH	DC1	!	1	A	Q	a	q								
2	STX	DC2	"	2	B	R	b	r								
3	ETX	DC3	#	3	C	S	c	s								
4	EOT	DC4	\$	4	D	T	d	t								
5	ENQ	NAK	%	5	E	U	e	u								
6	ACK	SYN	&	6	F	V	f	v								
7	BEL	ETB	'	7	G	W	g	w								
8	BS	CAN	(8	H	X	h	x								
9	HT	EM)	9	I	Y	i	y								
A	LF	SUB	*	:	J	Z	j	z								
B	VT	ESC	+	;	K	[k	{								
C	FF	FS	,	<	L	\	l									
D	CR	GS	-	=	M]	m	}								
E	SO	RS	.	>	N	^	n	~								
F	SI	US	/	?	O	_	o	△								

12.9.3 HOW TO SEND CONTROL CODE DATA

NUL (00H)	→	>@	(3EH, 40H)
SOH (01H)	→	>A	(3EH, 41H)
STX (02H)	→	>B	(3EH, 42H)
to			
GS (1DH)	→	>]	(3EH, 5DH)
RS (1EH)	→	>^	(3EH, 5EH)
US (1FH)	→	>_	(3EH, 5FH)

12.9.4 HOW TO SEND SPECIAL CODES

>	(3EH)	→	>0	(3EH, 30H)
---	-------	---	----	------------

12.10 Maxicode

Symbol Character Value		Code Set A		Code Set B		Code Set C		Code Set D		Code Set E	
Decimal	Binary	Character	Decimal	Character	Decimal	Character	Decimal	Character	Decimal	Character	Decimal
0	000000	CR	13	'	96	À	192	à	224	NUL	0
1	000001	A	65	a	97	Á	193	á	225	SOH	1
2	000010	B	66	b	98	Â	194	â	226	STX	2
3	000011	C	67	c	99	Ã	195	ã	227	ETX	3
4	000100	D	68	d	100	Ä	196	ä	228	EOT	4
5	000101	E	69	e	101	Å	197	å	229	ENQ	5
6	000110	F	70	f	102	Æ	198	æ	230	ACK	6
7	000111	G	71	g	103	Ç	199	ç	231	BEL	7
8	001000	H	72	h	104	È	200	è	232	BS	8
9	001001	I	73	i	105	É	201	é	233	HT	9
10	001010	J	74	j	106	Ê	202	ê	234	LF	10
11	001011	K	75	k	107	Ë	203	ë	235	VT	11
12	001100	L	76	l	108	Ì	204	ì	236	FF	12
13	001101	M	77	m	109	Í	205	í	237	CR	13
14	001110	N	78	n	110	Î	206	î	238	SO	14
15	001111	O	79	o	111	Ï	207	ï	239	SI	15
16	010000	P	80	p	112	Ð	208	ð	240	DLE	16
17	010001	Q	81	q	113	Ñ	209	ñ	241	DC1	17
18	010010	R	82	r	114	Ò	210	ò	242	DC2	18
19	010011	S	83	s	115	Ó	211	ó	243	DC3	19
20	010100	T	84	t	116	Ô	212	ô	244	DC4	20
21	010101	U	85	u	117	Õ	213	õ	245	NAK	21
22	010110	V	86	v	118	Ö	214	ö	246	SYN	22
23	010111	W	87	w	119	×	215	÷	247	ETB	23
24	011000	X	88	x	120	Ø	216	ø	248	CAN	24
25	011001	Y	89	y	121	Ù	217	ù	249	EM	25
26	011010	Z	90	z	122	Ú	218	ú	250	SUB	26
27	011011	[EC]		[EC]		[EC]		[EC]		[EC]	
28	011100	FS	28	FS	28	FS	28	FS	28	[Pad]	
29	011101	GS	29	GS	29	GS	29	GS	29	[Pad]	
30	011110	RS	30	RS	30	RS	30	RS	30	ESC	27
31	011111	[NS]		[NS]		[NS]		[NS]		[NS]	
32	100000	Space	32	(123	Û	219	û	251	FS	28
33	100001	[Pad]		[Pad]		Ü	220	ü	252	GS	29
34	100010	"	34)	125	Ý	221	ý	253	RS	30
35	100011	#	35	~	126	Þ	222	þ	254	US	31
36	100100	\$	36	DEL	127	ß	223	ÿ	255	{C159}	159
37	100101	%	37	;	59	à	170	ï	161	NBSP	160
38	100110	&	38	<	60	ı	172	ı	168	¢	162
39	100111	'	39	=	61	±	177	«	171	£	163
40	101000	(40	>	62	²	178	¬	175	¤	164
41	101001)	41	?	63	³	179	°	176	¥	165
42	101010	"	42	[91		181	'	180		166
43	101011	+	43	\	92	¹	185	•	183	§	167
44	101100	,	44]	93	º	186		184	©	169
45	101101	-	45	^	94	¼	188	»	187	SHY	173
46	101110	.	46	_	95	½	189	¿	191	®	174
47	101111	/	47	Space	32	¾	190	{C138}	138	¶	182
48	110000	0	48	,	44	{C128}	128	{C139}	139	{C149}	149
49	110001	1	49	.	46	{C129}	129	{C140}	140	{C150}	150
50	110010	2	50	/	47	{C130}	130	{C141}	141	{C151}	151
51	110011	3	51	:	58	{C131}	131	{C142}	142	{C152}	152
52	110100	4	52	@	64	{C132}	132	{C143}	143	{C153}	153
53	110101	5	53	!	33	{C133}	133	{C144}	144	{C154}	154
54	110110	6	54		124	{C134}	134	{C145}	145	{C155}	155
55	110111	7	55	[Pad]		{C135}	135	{C146}	146	{C156}	156
56	111000	8	56	[2 Shift A]		{C136}	136	{C147}	147	{C157}	157
57	111001	9	57	[3 Shift A]		{C137}	137	{C148}	148	{C158}	158
58	111010	:	58	[Pad]		[Latch A]		[Latch A]		[Latch A]	
59	111011	[Shift B]		[Shift A]		Space	32	Space	32	Space	32
60	111100	[Shift C]		[Shift C]		[Lock In C]		[Shift C]		[Shift C]	
61	111101	[Shift D]		[Shift D]		[Shift D]		[Lock In D]		[Shift D]	
62	111110	[Shift E]		[Shift E]		[Shift E]		[Shift E]		[Lock In E]	
63	111111	[Latch B]		[Latch A]		[Latch B]		[Latch B]		[Latch B]	

12.10.1 HOW TO SEND CONTROL CODE DATA

SOH (01H)	→	>A	(3EH, 41H)
STX (02H)	→	>B	(3EH, 42H)
to			
GS (1DH)	→	>]	(3EH, 5DH)
RS (1EH)	→	>^	(3EH, 5EH)
US (1FH)	→	>_	(3EH, 5FH)

12.10.2 HOW TO SEND SPECIAL CODES

>	(3EH)	→	>0	(3EH, 30H)
---	-------	---	----	------------

NOTE: "NUL" code in the table cannot be used.

12.11 QR CODE

12.11.1 MODE SELECTION

The QR code can handle all codes including alphanumerics, symbols, and Kanji. However, since the data compression rate varies depending on the codes, the code to be used should be designated by selecting the mode.

Mode	Code	Details
N	Numerals	0 to 9
A	Alphanumerics, symbols	A to Z 0 to 9 space \$ % * + - . / :
B	Binary (8-bit)	00H to FFH
K	Kanji	Shift JIS

12.11.2 TRANSFER CODE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p								
1	SOH	DC1	!	1	A	Q	a	q								
2	STX	DC2	"	2	B	R	b	r								
3	ETX	DC3	#	3	C	S	c	s								
4	EOT	DC4	\$	4	D	T	d	t								
5	ENQ	NAK	%	5	E	U	e	u								
6	ACK	SYN	&	6	F	V	f	v								
7	BEL	ETB	'	7	G	W	g	w								
8	BS	CAN	(8	H	X	h	x								
9	HT	EM)	9	I	Y	i	y								
A	LF	SUB	*	:	J	Z	j	z								
B	VT	ESC	+	;	K	[k	{								
C	FF	FS	,	<	L	\	l									
D	CR	GS	-	=	M]	m	}								
E	SO	RS	•	>	N	^	n	~								
F	SI	US	/	?	O	_	o	DEL								

* The shaded parts are Japanese. They are omitted here.

FFH data cannot be used when the automatic mode is selected for the mode selection. However, it is possible to use the FFH data when in the manual mode.

12.11.3 HOW TO SEND CONTROL CODE DATA

NUL (00H) → >@ (3EH, 40H)
 SOH (01H) → >A (3EH, 41H)
 STX (02H) → >B (3EH, 42H)
 to
 GS (1DH) → >] (3EH, 5DH)
 RS (1EH) → >^ (3EH, 5EH)
 US (1FH) → >_ (3EH, 5FH)

12.11.4 HOW TO SEND SPECIAL CODES

> (3EH) → >0 (3EH, 30H)

12.12 START/STOP CODE

Bar code type	Start/stop specification	Input data	Printout
CODE39	No Start/Stop Code is attached. (V1.0 to V1.1A)	12345ABC	No print
		* 12345ABC	No print
		12345ABC *	No print
		* 12345ABC *	* 12345ABC *
		12345 * ABC	No print
		** 12345ABC	No print
		* 12345ABC **	No print
		* 12345 * ABC *	No print
	Automatically attached. (V1.2 or greater)	12345ABC	* 12345ABC *
		* 12345ABC	* 12345ABC *
		12345ABC *	* 12345ABC *
		* 12345ABC *	* 12345ABC *
		12345 * ABC	* 12345 * ABC *
		** 12345ABC	** 12345ABC *
		* 12345ABC **	* 12345ABC **
		* 12345 * ABC *	* 12345 * ABC *
NW7	Omitted (not specified). (V1.0 to V1.1A)	12345678	No print
		a12345678	No print
		12345678c	No print
		b12345678d	B12345678d
		12345a678	No print
		ab12345678	No print
		a12345678bc	a12345678bc
		d12345b678c	d12345b678c
	No start/stop code is attached. (V1.2 or greater)	12345678	12345678
		a12345678	a12345678
		12345678c	12345678c
		b12345678d	b12345678d
		12345a678	12345a678
		ab12345678	ab12345678
		a12345678bc	a12345678bc
		d12345b678c	d12345b678c

(M) Presentation (Bold) 27 point (LABEL/RECEIPT Mode: J)

!"#\$%&'()*+,-./0123456789
 :;<=>?@ABCDEFGHIJKLMNOPS
 TUVWXYZ[¥]^_`'ABCDEFGHIJKLM
 NOPQRSTUVWXYZ{|}~■¥-€

(N) Letter Gothic (Medium) 14.3 point (LABEL/RECEIPT Mode: H)

!"#\$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPS
 TUVWXYZ[¥]^_`'abcdefghijklmnopqrstuvwxyz{|}~ÇüéâäåçêëèîïîÄÅÉæÆôöùûÿÖÜø£ø×f
 áíóúñÑªº;¼½;«»ÁÂÀ ç¥ãÃ¤ÐÊËÈÌÍÎ Ì ÓÐÒóÕ þÞÚÛÜýÝ´-±= \$
 °´. ■€

(O) Prestige Elite (Medium) 10.5 point

!"#\$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPS
 TUVWXYZ[¥]^_`'abcdefghijklmnopqrstuvwxyz{|}~ÇüéâäåçêëèîïîÄÅÉæÆôöùûÿÖÜø£ø×f
 áíóúñÑªº;¼½;«»ÁÂÀ ç¥ãÃ¤ÐÊËÈÌÍÎ Ì ÓÐÒóÕ þÞÚÛÜýÝ´-±= \$÷
 °´. ■€

(P) Prestige Elite (Bold) 10.5 point

!"#\$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
 OPQRSTUVWXYZ[¥]^_`'abcdefghijklmnopqrstuvwxyz{|}
 ~ÇüéâäåçêëèîïîÄÅÉæÆôöùûÿÖÜø£ø×fáíóúñÑªº;¼½;
 ;«»ÁÂÀ ç¥ãÃ¤ÐÊËÈÌÍÎ Ì ÓÐÒóÕ þÞÚÛÜýÝ´-±= \$
 °´. ■€

(Q) Courier (Medium) 15 point (LABEL/RECEIPT Mode:

!"#\$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
 OPQRSTUVWXYZ[¥]^_`'abcdefghijklmnopqrstuvwxyz{|}
 ~ÇüéâäåçêëèîïîÄÅÉæÆôöùûÿÖÜø£ø×fáíóúñÑªº;®-½¼;
 ;«»ÁÂÀ©ç¥ãÃ¤1ÍÎ Ì Ì ÓÐÒóÕ þÞÚÛÜýÝ´-±=¾π\$÷,
 °´. 1 3 2 ■€

(R) Courier (Bold) 18 point

!"#\$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI
 HIJKLMNOPQRSTUVWXYZ[¥]^_`'abcdefghijklmnop
 pqrstuvwxyz{|}~ÇüéâäåçêëèîïîÄÅÉæÆôöùû
 ÿÖÜø£ø×fáíóúñÑªº;®-½¼;«»ÁÂÀ©ç¥ãÃ¤ÐÊËÈÌÍ
 Î Ì Ì ÓÐÒóÕ þÞÚÛÜýÝ´-±=¾π\$÷, °´. 1 3 2 ■€

