Virtual Device-T

User Guide

P1067299-003

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Introduction

This section describes the features and functions of a Zebra printer that is running the Virtual Device-T application.

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Overview

The Virtual Device-T application enables Zebra Link-OS printers to work with many host systems that are using TOSHIBA TEC® printers. In most cases, no changes will be required to the host application. This feature can help customers to make a smooth transition to Zebra printers and save them the time and expense of having to rewrite their host software.

Virtual Device-T Features

The Virtual Device-T application:

- Uses existing features of Zebra printers, when available.
- Offers fonts similar to the original device. These fonts will use 120 KB or more of memory space.
- Supports the Bluetooth®, Serial, Ethernet, WLAN, and USB interfaces.
- Offers many outline fonts, barcodes, and specific commands and features of target printer models (see *Supported Fonts and Barcodes* on page 182).
- Provides support of TOSHIBA TEC commands (see *Commands* on page 36).

Supported Printers

This manual describes the Virtual Device-T language for Zebra Link-OS printers and should be used by any person who needs to support that language on one of the following Zebra printers:

Printer	Firmware
iMZ Series	V73.19.6Z and later
QLn Series	V68.19.6Z and later
ZT200 Series	V72.19.6Z and later
ZT400 Series	V75.19.7Z and later
ZT510	V80.20.02Z and later
ZT600 Series	V80.20.02Z and later
ZD400 Series	V77.19.14Z or V84.20.05Z and later
ZD500 Series	V74.19.6Z and later
ZD600 Series	V84.20.05Z and later
ZQ300 Series	V81.20.06Z and later
ZQ500 Series	V76.19.10Z and later

Note • The Virtual Device-T language is supported only on 203 dpi printers.

For complete printer operation, use this manual in combination with the User Guide for your printer.

Configuring Network Connectivity

Your printer may be equipped with one or more of the following interfaces:

- Bluetooth—For detailed information to connect a Bluetooth device, refer to the *Bluetooth User Guide*.
- Wired print server—For detailed information, refer to the *ZebraNet Wired and Wireless Print Servers User Guide*.
- Wireless print server—For detailed information, refer to the *ZebraNet Wired and Wireless Print Servers User Guide*.

For other connectivity options, refer to the User Guide for your printer. Copies of these manuals are available at http://www.zebra.com/manuals.

Notes

- Other command languages are disabled when running Virtual Device-T. However, Set/Get/Do (SGD) commands and file download all operate properly with Virtual Device-T enabled.
- Virtual Device-T fonts can only be used with Virtual Device-T commands. They cannot be used with other languages.
- The Virtual Device-T mode application will not respond to CPCL, ZPL, or EPL commands. Instead, commands will be processed by the Virtual Device-T application.

Install, Register, and Enable Virtual Device-T

This section provides you with instructions on how to install and enable the Virtual Device-T application on one or more Zebra printers.

Contents

Acquiring the Virtual Device Application

To get the Virtual Device app, perform the following from your computer:

1. Open a web browser and navigate to http://www.zebra.com/virtualdevices.
2. Locate your printer type in the list of printers, and then click **Download Now**.
3. Fill out the information on the Virtual Device Download Request form.
4. Click **Submit**.
5. Read the End User License Agreement.
6. Click **Accept and Begin Download Now**.

   Your browser prompts you to open or save the archive containing the Virtual Device app.
7. Save and store the Virtual Device app archive file to your computer.

   The archive file contains the following:

   - The Virtual Device `.NRD` file to be downloaded to a Zebra printer.
   - A `.txt` file that contains the SGD command for immediately activating the Virtual Device app.
8. Extract the files from the archive to your computer.

Downloading the Virtual Device-T Application

Zebra provides two options to download the Virtual Device-T app to the printer.

- On a computer with the ZDownloader Utility

  The ZDownloader Utility is the only method shown in this manual. For instructions on how to download and install the ZDownloader Utility, see *ZDownloader Utility* on page 252.

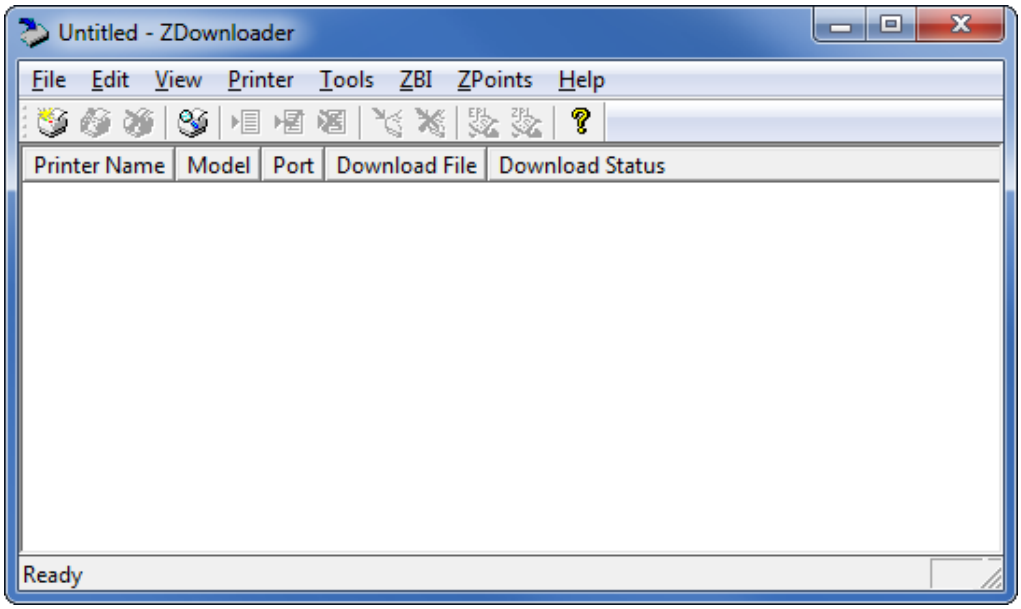
- On an Android device with the Zebra Printer Setup Utility for Android Devices (available for free on Google Play™)

  For information on using the Zebra Printer Setup Utility for Android Devices and to download the user guide, navigate to http://www.zebra.com/setup.

Using ZDownloader

The ZDownloader application can update Virtual Device-T files in Zebra printers connected by Serial, Parallel, USB, and IP Ethernet networks.

Figure 1 • Initial ZDownloader Screen



Adding Printers to the ZDownloader List

There are two ways to add printers to the list:

- Auto-Detect (use for USB or IP Ethernet interfaces)
- Manual add (use for Serial, Parallel, or IP Ethernet interfaces)

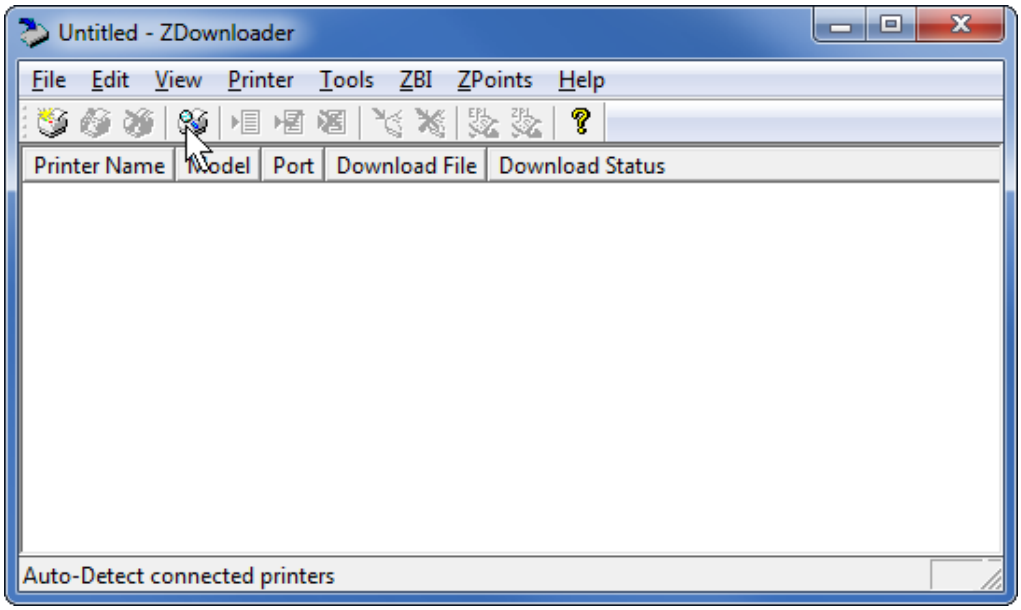
If your printer is connecting via the serial or parallel interfaces, or is not detected by using the Auto-Detect method, use the Manual Add method.

Auto-Detect Printers

Use Auto-Detect for USB or IP Ethernet interfaces.

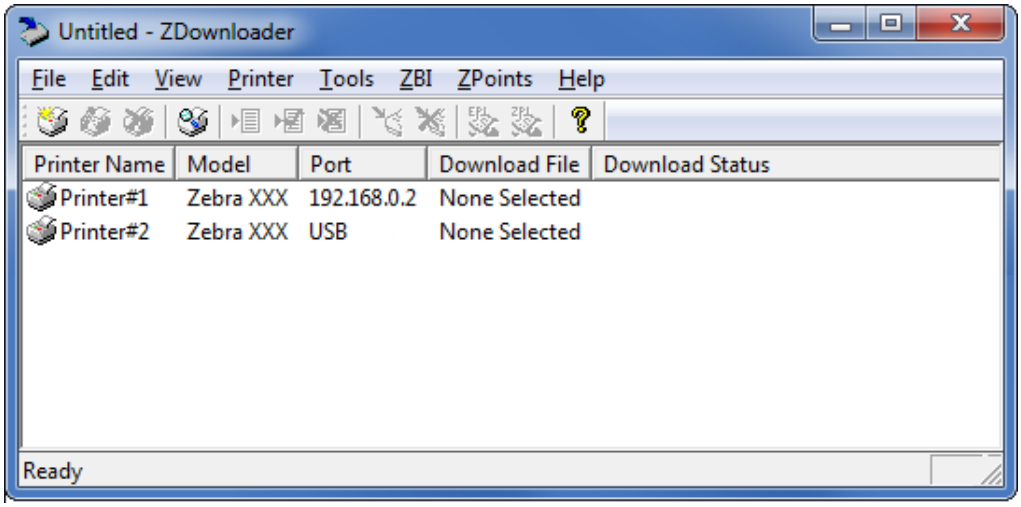
Note • Ethernet connected printers are detected by the application broadcasting a UDP packet out onto the network. UDP port number 4201 is used for the discovery process. Some networks filter out UDP packets. This means that the ZDownloader utility may not be able to detect all of the printers on your network. See your network administrator for more information. If you are not able to Auto-Detect your network printers, follow instructions for manually adding a printer.

USB printers can only be added by using Auto-Detect. The ZDownloader utility can support as many USB printers as your computer can support (most computers typically can support up to 255).



To Auto-Detect printers connected via the USB or IP Ethernet interfaces, perform the following steps:

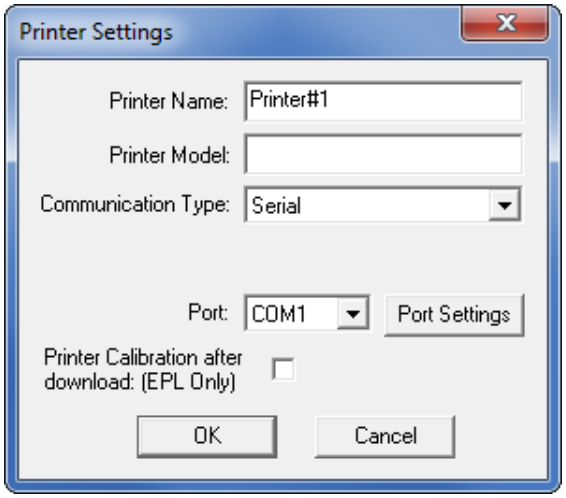
1. In the ZDownloader toolbar, select **Printer** > **Auto-Detect**.
   OR
   Right-click in the ZDownloader window and select **Auto-Detect Printers**.
   The printers detected are added to the printer list.



Manually Add Printers

To manually add printers connected via the Serial, Parallel, or Network interfaces, perform the following steps:

1. In the ZDownloader toolbar, select **Printer** > **Add…**.
   OR
   Right-click in the ZDownloader window and select **Add Printer…**.
   The following window appears.

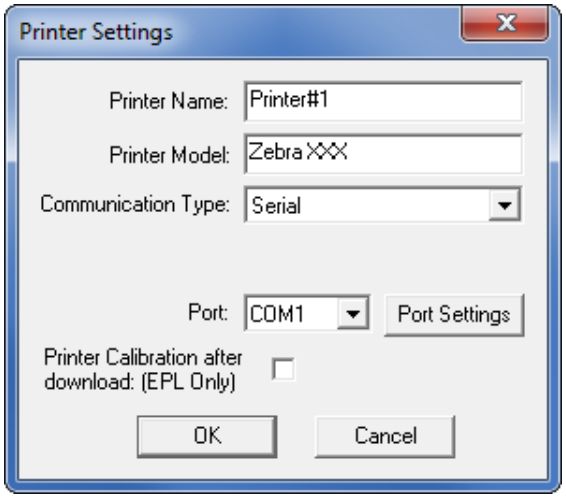


2. Add a printer name and your printer model in the appropriate fields.
3. What type of printer are you adding?

If you are adding a…	Then…
Serial Printer	Go to *Adding a Serial Printer*.
Parallel Printer	Go to *Adding a Parallel Printer* on page 18.
Network Printer	Go to *Adding a Network Printer* on page 19.

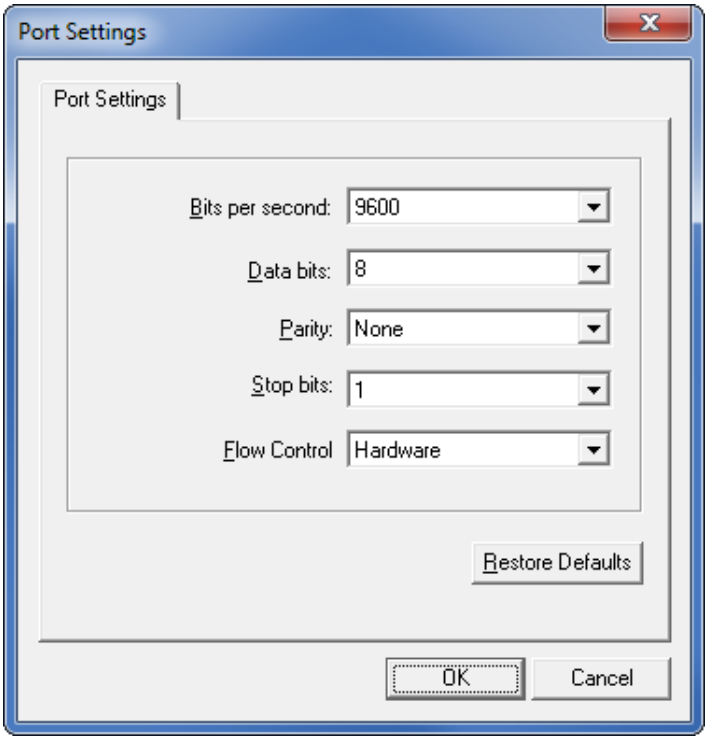
Adding a Serial Printer

4. Select the serial port to which the printer is connected.



5. Click **Port Settings**.

   The following window appears.



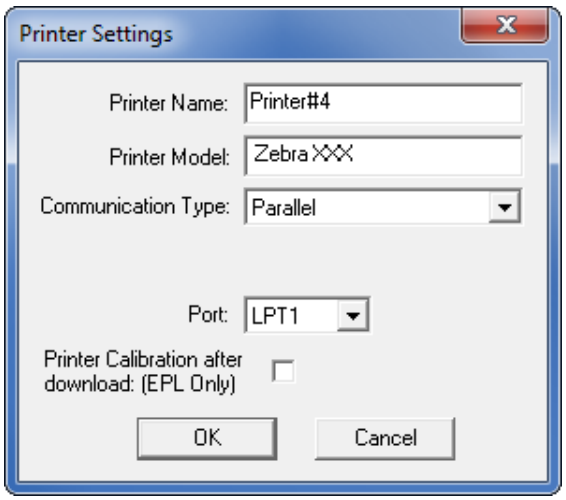
6. Adjust the settings as necessary. The printer's serial port settings must match the computer's serial port settings. For more information about the settings, refer to the User Guide for your printer.

7. Click **OK** to save the port settings.

8. Click **OK** to add the printer.

Adding a Parallel Printer

9. Set **Communication Type** to **Parallel**.
   The available parallel ports will be shown in the Port drop-down box.

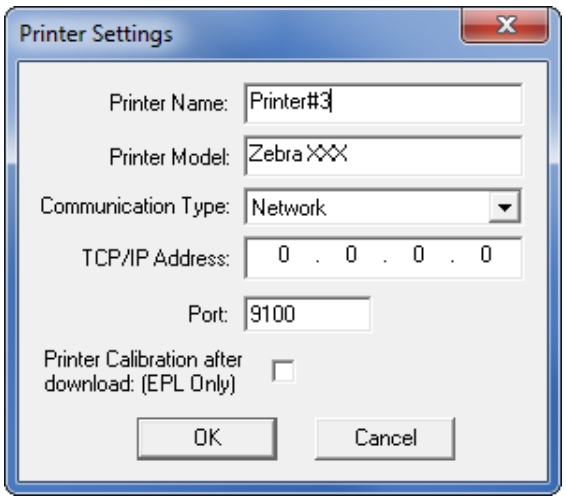


10. Select the port to which the printer is connected. No additional configuration is necessary.

11. Click **OK** to add the printer.

Adding a Network Printer

12. Set **Communication Type** to **Network**.
    The following window appears.

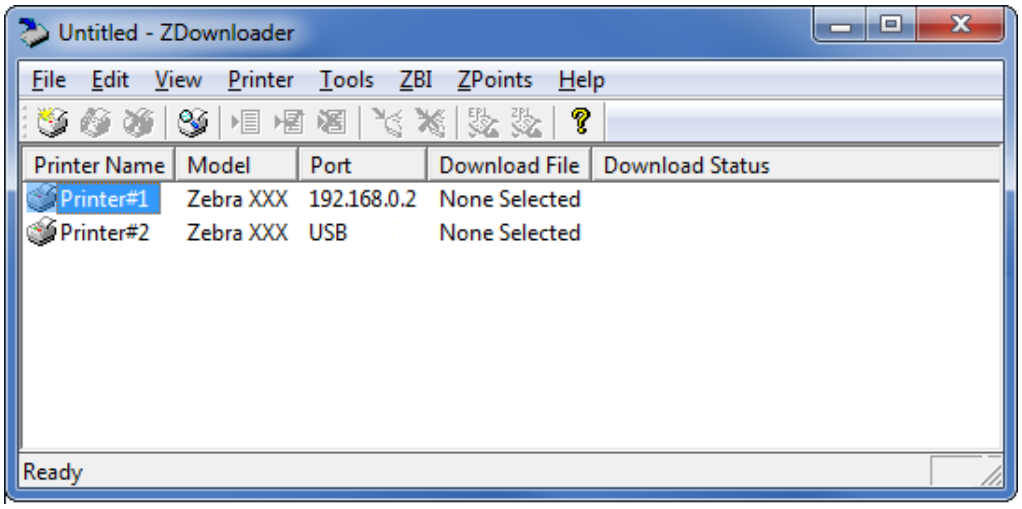


13. Enter the printer's IP address.
14. Click **OK** to save the network settings.
15. Click **OK** to add the printer.

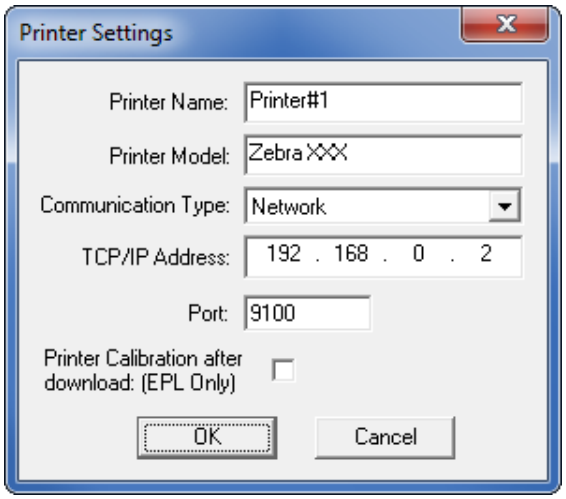
Modifying Printers in the List

To change printer settings for a printer in the list, perform the following steps:

1. Select the printer to modify.



2. In the toolbar, select **Printer** > **Modify Printer…**.
   OR
   Right-click on the printer and select **Modify Printer…**.
   The printer settings for the selected printer are displayed.

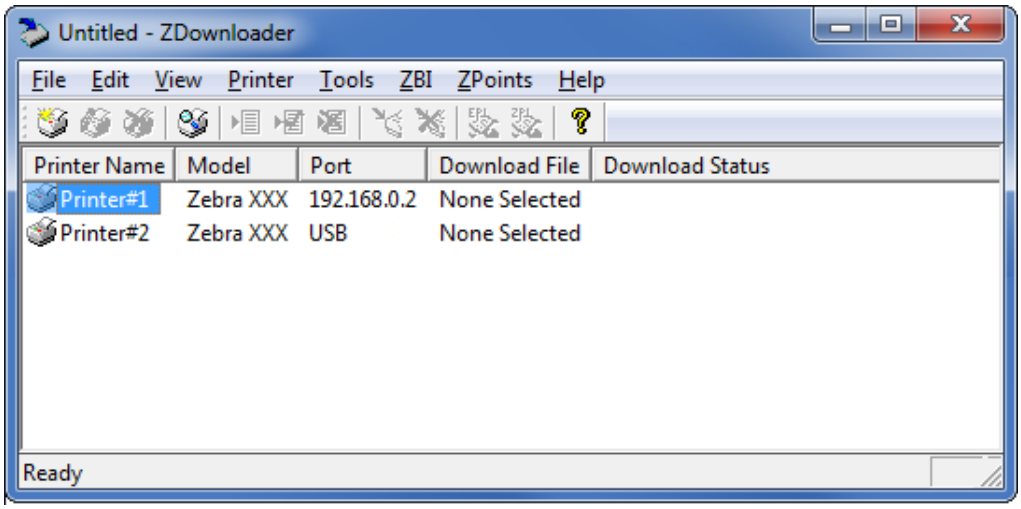


3. Modify the settings as desired.
4. Click **OK** to save the settings.

Deleting Printers from the List

To delete printers from the list, perform the following steps:

1. Select one or more printers to delete.

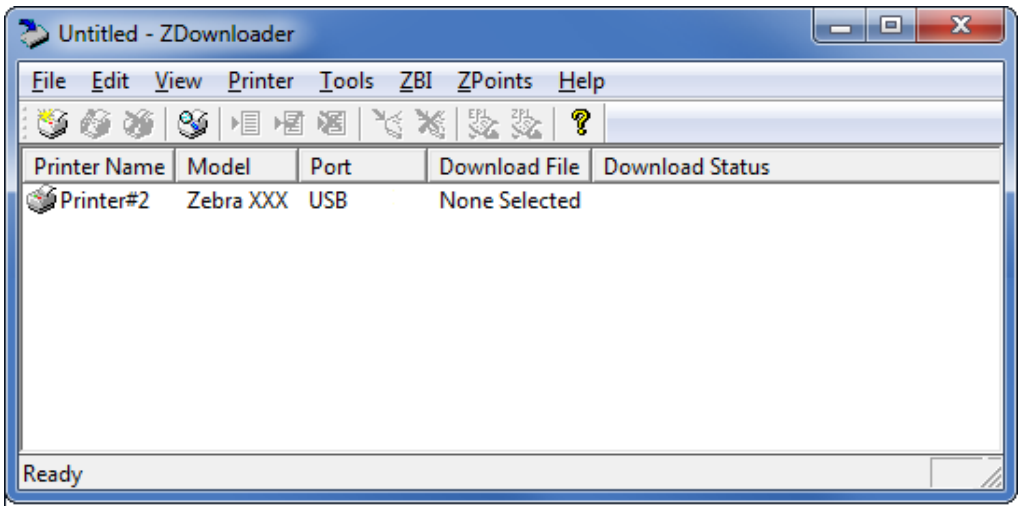


2. In the toolbar, select **Printer** > **Delete**.

   OR

   Right-click on one of the selected printers and select **Delete Printer(s)**.

   The printer is removed from the list.



Downloading the Virtual Device App to Selected Printers

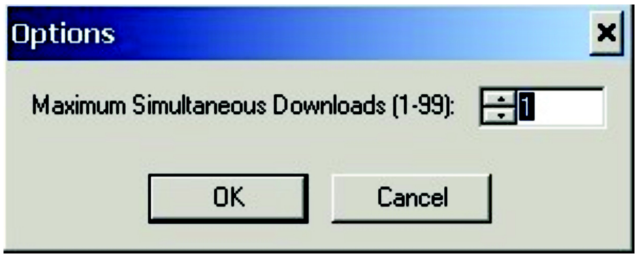
To download the Virtual Device-T app to your printer(s), you must select the file to send to each printer. ZDownloader, by default, downloads files to one printer at a time. If you have multiple printers to update and want to speed up the process, you can increase the number of simultaneous downloads.

Note • More simultaneous downloads require more of your computer resources. Some computers may slow down with simultaneous downloads or as more printers are added for simultaneous downloading.

To allow simultaneous downloads, perform the following step:

1. Click **Tools > Options…**.

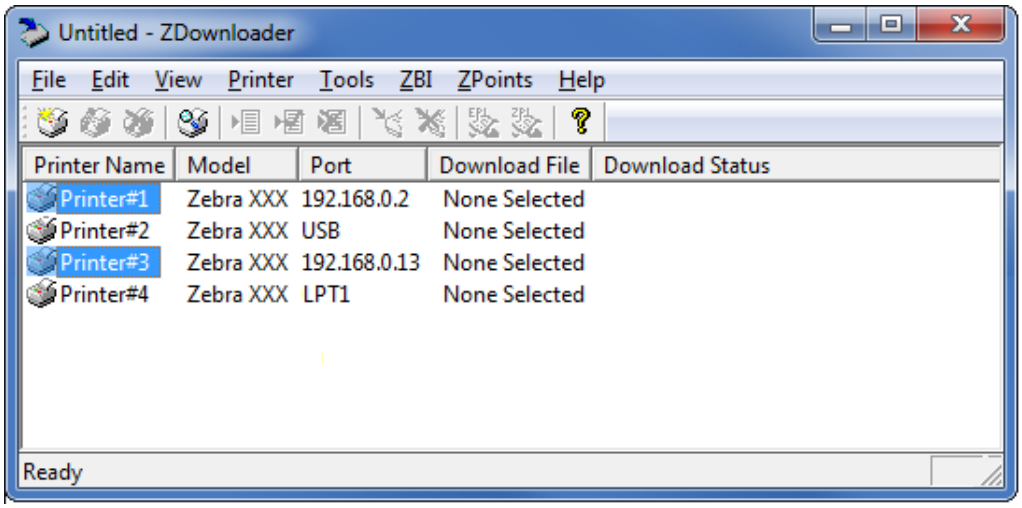
   The following prompt appears.



2. Raise the number shown to allow multiple simultaneous downloads.
3. Click **OK**.

To download the Virtual Device app file to one or more printers, perform the following steps:

1. Select the printers to which you want to download the Virtual Device-T app file. To select multiple printers, hold down the Ctrl or Shift key, and then click on the desired printers.



2. In the toolbar, select **File** > **Select Firmware File…**.

   OR

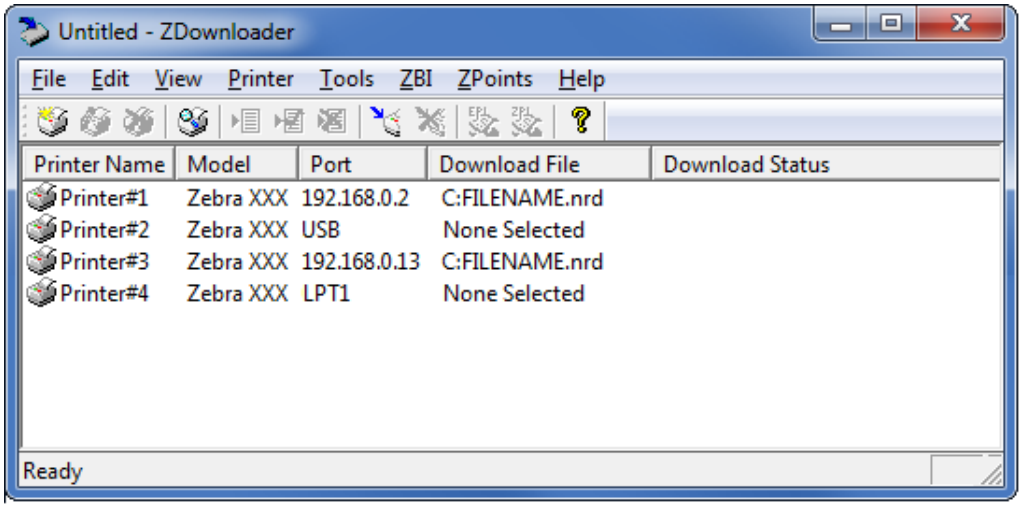
   Right-click on one of the selected printers and select **Select Firmware File…**.

3. Navigate to the Virtual Device app file that you acquired previously.

4. Click Open.

   The file that you selected appears under Download File for the selected printers.

   Printers that are present in the list but that do not have a file selected will be ignored when Downloading starts.

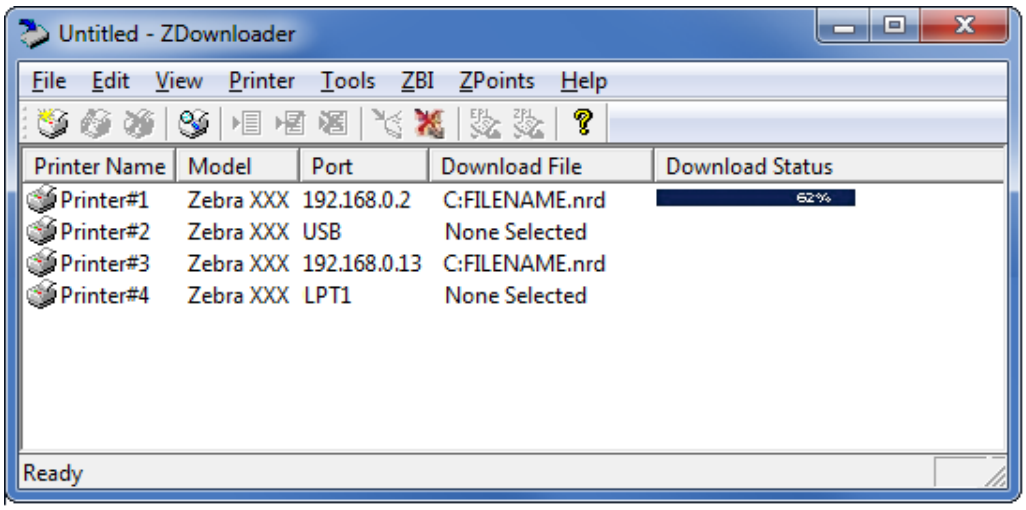


5. Start the download process by doing one of the following:
   - Select **Printer** > **Download to Selected**.
   - Select the printer(s) of interest and select the **Printer** and then select **Download To Selected**.
6. In the toolbar, select **Printer** > **Download All**.

   OR

   Right-click in the ZDownloader window and select **Download All**.

   After downloading has begun, the progress of each printer will be shown in the Download Status column.



Canceling a Download in Progress

The Cancel Download toolbar button and the Printer > Cancel Download menu options become active when the files are downloading.

To cancel downloading to ALL printers in the list, perform the following step:

1. Click **Printer** > **Cancel Download**.

   OR

   Right-click in the ZDownloader window and select **Cancel Download**.

To cancel downloading to SPECIFIC printers in the list, perform the following step:

1. Select one or more printers with a download in progress.
2. Click **Printer** > **Cancel Download.**

   OR

   Right-click on a selected printer and select **Cancel Download**.

Registering the Virtual Device

ZDownloader maintains a log file of all items downloaded to a Zebra printer along with the printer serial number. You can register your Virtual Device installation with Zebra Repair and Tech Support to ensure that a printer sent in for repair is returned with the Virtual Device installed, and when engaging Zebra Tech Support, they will have records of the item being loaded. To register your Virtual Device installation, you must send the log file created by ZDownloader to the Zebra log file management group.

ZDownloader Log File

To send the log file, complete these steps:

1. Based on your operating system, navigate to the appropriate folder:
   - Microsoft® Windows® XP
     `C:\Program Files\Common Files\FirmwareDownloader`
   - Microsoft Windows 7, Windows 8, and Windows 10
     `C:\ProgramData\Zebra Technologies\Firmware Downloader and ZBI Key Manager`
2. Copy the log file (`DownloadLog.txt`), and email to Zdownloader@zebra.com.

   If you are downloading from several computers, you need to send the log file from each computer. If you download files to printers on one day and do not send the file the same day, please note this in your email so that the log file management group picks up the previous load detail. Otherwise, they only pick up the load data for the day that the log file is sent.

Enabling the Virtual Device

You can enable Virtual Device-T by sending a Set/Get/Do (SGD) command to the printer or by selecting the option through the printer's menus.

Using an SGD Command

To enable Virtual Device-T on your printer, send the following command:

```
! U1 setvar "apl.enable" "apl-t"
```

To disable Virtual Devices on your printer and return to normal function, send the following command:

```
! U1 setvar "apl.enable" "none"
```

You must restart the printer after changing the value of `apl.enable`. For more information about this SGD command, see *apl.enable* on page 180.

Using the User Menus

This section includes instructions for the following printers:

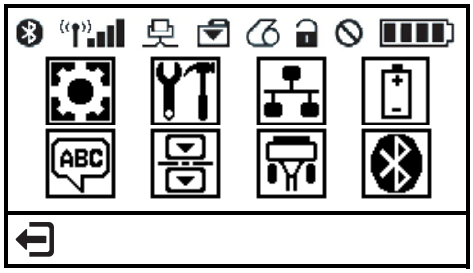
- *QLn420 Printers* on page 26
- *QLn320 and QLn220 Printers* on page 29
- *Supported ZTxxx and ZDxxx Printers with a Display* on page 32

If necessary, refer to the User Guide for your printer for additional information about your printer's control panel.

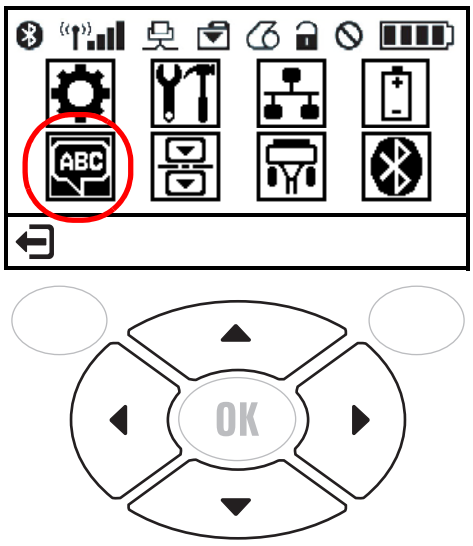
QLn420 Printers

1. From the printer's idle display screen, press the **LEFT SOFT KEY** to select the Home icon.

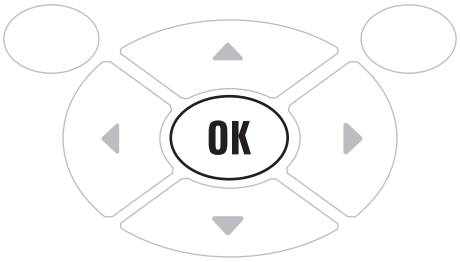
The printer displays the Home Menu.



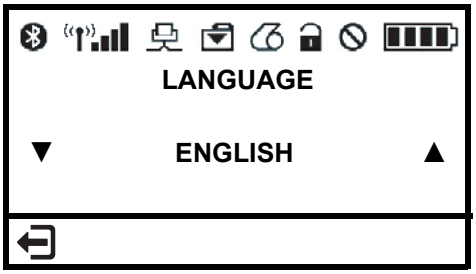
2. Use the **ARROWS** to navigate to the **LANGUAGE** menu.



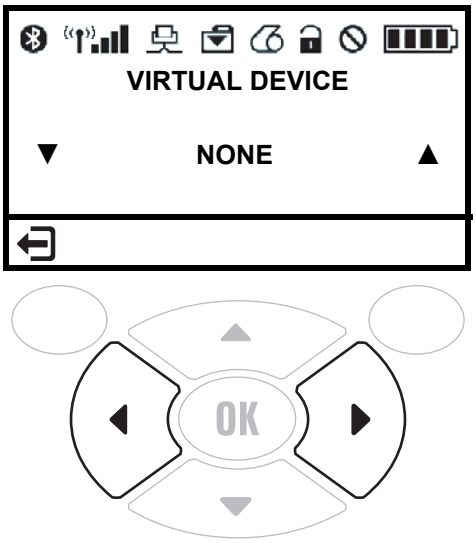
3. Press **OK**.



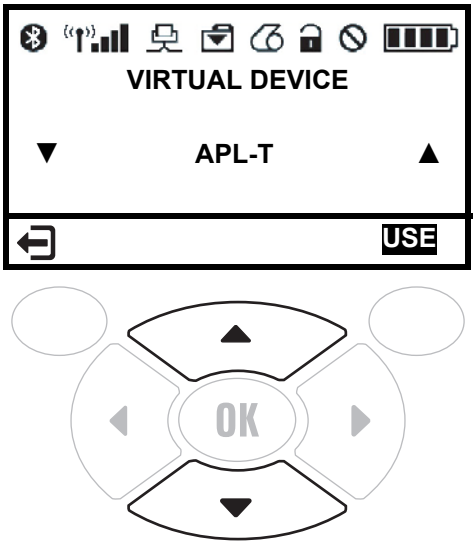
The printer displays the **LANGUAGE** selection screen.



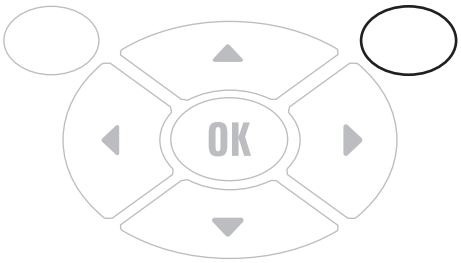
4. Use the **LEFT** or **RIGHT ARROW** to navigate to the **VIRTUAL DEVICE** selection screen.



5. Use the **UP** or **DOWN ARROW** to scroll to the **APL-T** option.



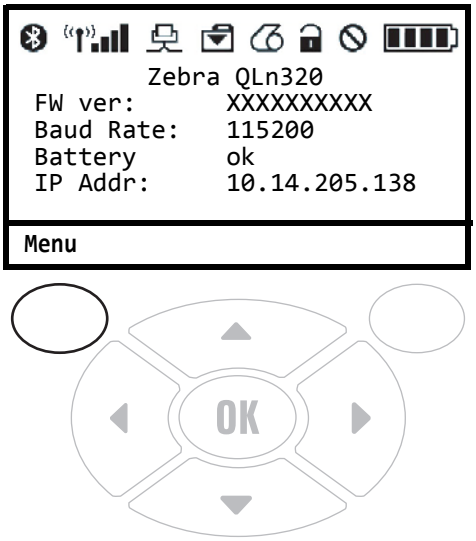
6. Press the **RIGHT SOFT KEY** to select **USE**.



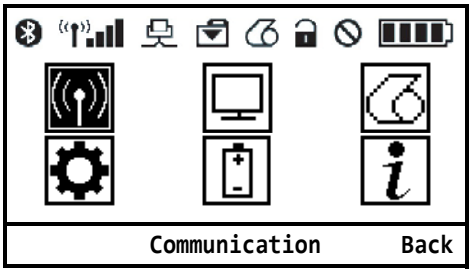
The printer restarts and uses the Virtual Device that you selected.

QLn320 and QLn220 Printers

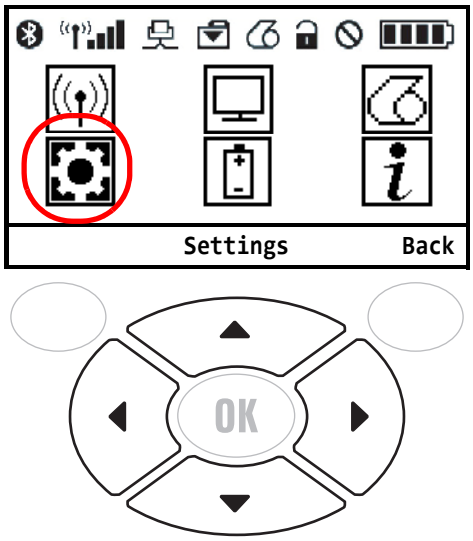
1. From the printer's idle display screen, press the **LEFT SOFT KEY** to select the Home icon.



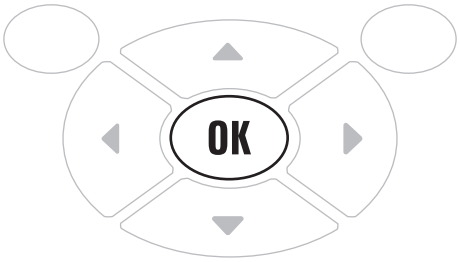
The printer displays the Home Menu.



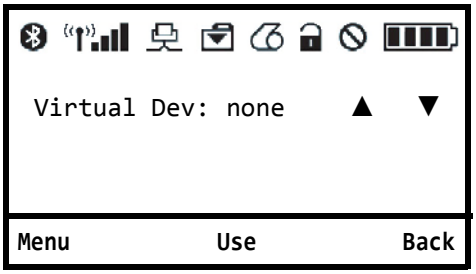
2. Use the **ARROWS** to navigate to the **SETTINGS** menu.



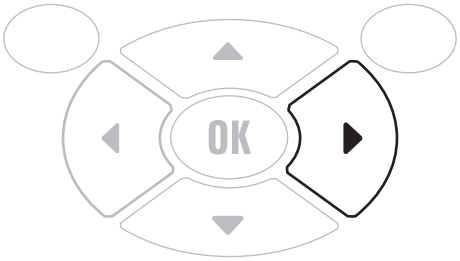
3. Press **OK**.



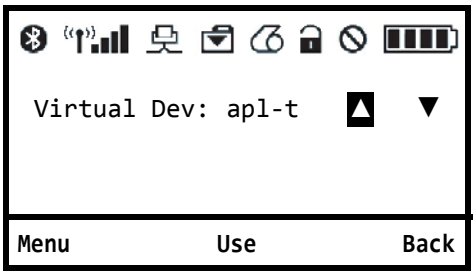
The printer displays the **VIRTUAL DEVICE** selection screen.

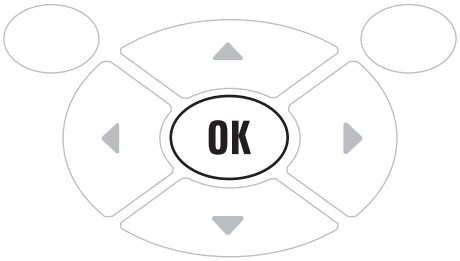


4. Press the **RIGHT ARROW** to highlight the up arrow on the display.

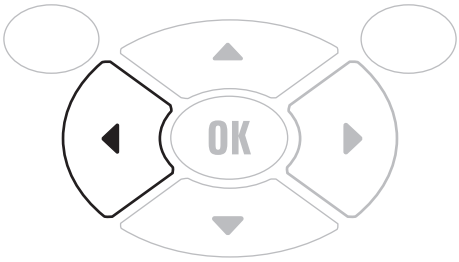


5. With the up arrow highlighted, press the **OK** button until you scroll to the **APL-T** option.

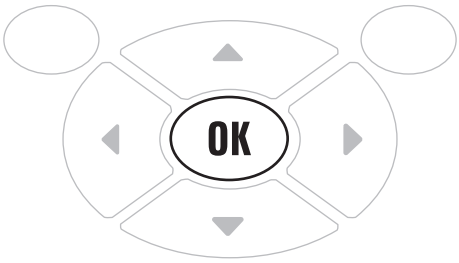




6. Press the **LEFT ARROW** to highlight **APL-T**



7. Press **OK** to select **USE**.



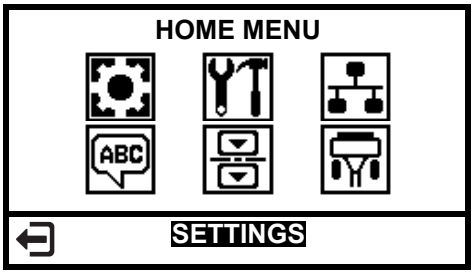
The printer restarts and uses the Virtual Device that you selected.

Supported ZTxxx and ZDxxx Printers with a Display

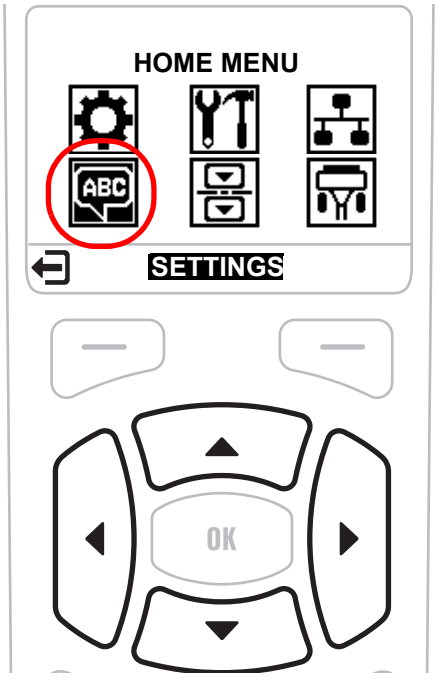
Note • The ZT230 control panel is shown in this procedure. The control panel for the other printers is similar.

1. From the printer's idle display screen, press the **LEFT SELECT KEY** to select the Home icon.

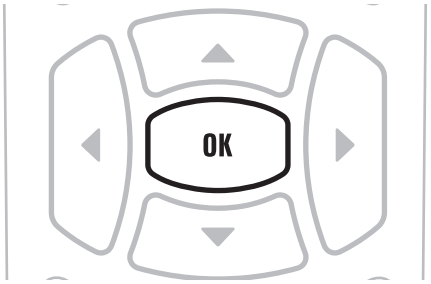
The printer displays the Home Menu.



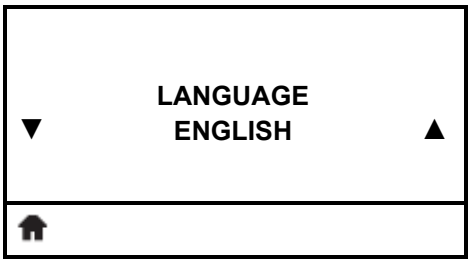
2. Use the **ARROWS** to navigate to the **LANGUAGE** menu.



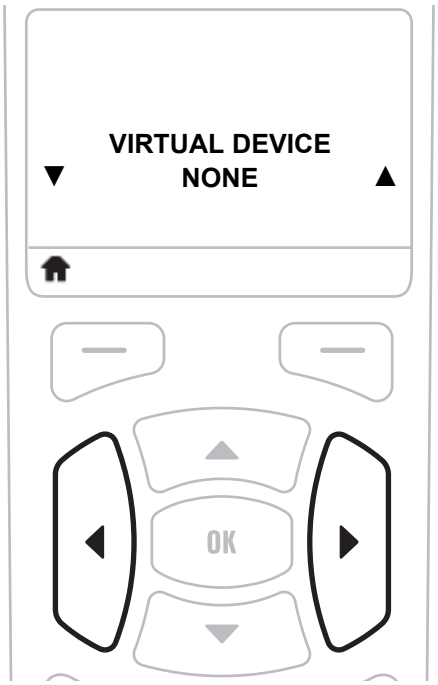
3. Press **OK**.



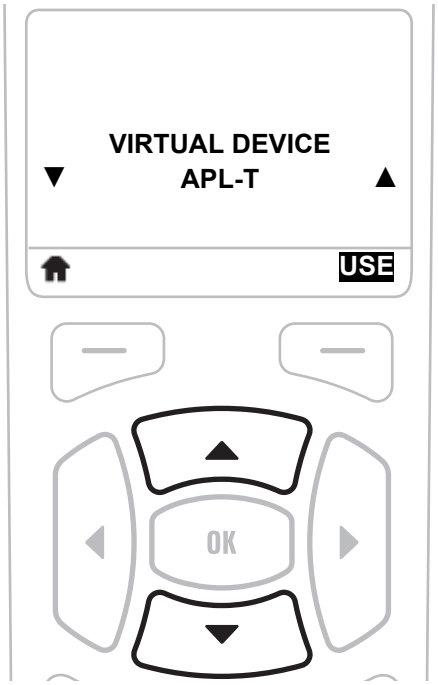
The printer displays the **LANGUAGE** selection screen.



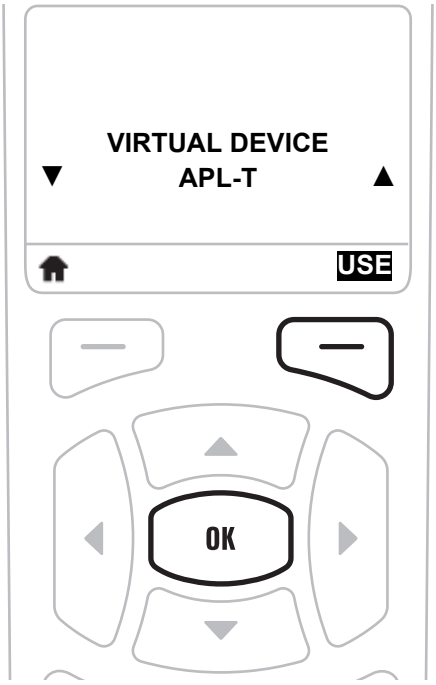
4. Use the **LEFT** or **RIGHT ARROW** to navigate to the **VIRTUAL DEVICE** selection screen.



5. Use the **UP** or **DOWN ARROW** to scroll to the **APL-T** option.



6. Press the **RIGHT SOFT KEY** or **OK** to select **USE**.



The printer restarts and uses the Virtual Device that you selected.

Commands

This section provides a detailed listing of commands for use on your Zebra printer with the Virtual Device-T app.

Contents

Interface Command Format

The commands are sent to the printer in the following format:

ESC	Command and Data	LF	NUL

Alternately, the following syntax may be used:

{	Command and Data	|	}

The command length from [ESC] to [LF] [NUL} must conform to what is specified for each command.

The two following kinds of control codes exist:

```
ESC (1BH), LF (0AH), NUL (00H)
{   (7BH), |  (7CH), }   (7DH)
```

Command Format

The commands in this section are presented in the following format.

Command

Description Command Function

Syntax Command format in ASCII followed by Hexadecimal and decimal equivalents (example below for EOT). Variable values are denoted by *n* and other letters.

EOT*n*

ASCII	EOT	*n*
Hex	04	*n*
Decimal	4	*n*

Range The values that can be used for *n* or other variables (if any).

Default Initial value of *n* (if any).

Notes In-depth description of the command function.

TPCL Mode Supported Commands

Command	Function
Setting Commands	
[ESC] D on page 41	Set Label Size
[ESC] ID on page 44	Set the Printer ID
[ESC] M on page 45	Select the Print Mode
Fine Adjustment Commands	
[ESC] AX on page 46	Fine Adjust the Print Start Position
[ESC] AY on page 48	Fine Adjust Print Density That Was Set Automatically
[ESC] AH on page 49	Adjust the Strip Sensor
Clear Commands	
[ESC] C on page 50	Clear the Image Buffer
[ESC] XR on page 51	Clear or Reverse a Specified Area
Drawing Format Commands	
[ESC] LC on page 53	Draw a Line or Rectangle
[ESC] PC on page 58	Specify a Bitmap Font Format
[ESC] PV on page 71	Specify an Outline Font Format
[ESC] XB	Specify a Barcode or Two-Dimensional Code Format
[ESC] XB on page 82	WPC, CODE93, CODE128, UCC/EAN128, EAN128, POSTNET
[ESC] XB on page 92	MSI, Interleaved 2 of 5, CODE39, NW7, Industrial 2 of 5
[ESC] XB on page 101	GS1 Databar
[ESC] XB on page 108	Two-Dimensional Code Format (Data Matrix)
[ESC] XB on page 117	Two-Dimensional Code Format (PDF417)
[ESC] XB on page 123	Two-Dimensional Code Format (MicroPDF417)
[ESC] XB on page 129	Two-Dimensional Code Format (QR Code)
[ESC] XB on page 135	Two-Dimensional Code Format (MaxiCode)
Print Data Commands	
[ESC] RC on page 140	Specify Bitmap Font Data
[ESC] RV on page 143	Specify Outline Font Data
[ESC] RB	Specify Data for a Barcode or Two-Dimensional Code
[ESC] RB on page 146	Barcode/Two-Dimensional Code Data (any codes other than MaxiCode)
[ESC] RB on page 154	Two-Dimensional Code Data (MaxiCode)

Command	Function
Issue and Feed Commands	
[ESC] XF	Storage Area Allocation. Consumed but not processed.
[ESC] XS on page 155	Issue Labels
[ESC] T on page 157	Feed Media
[ESC] U1 or [ESC] U2 on page 158	Forward/Reverse Feed *Support for these commands was added after the initial release. To use the commands, download the latest version of the* Virtual Device-T *app.*
Format Commands	
[ESC] J1 on page 159	Format Flash Memory
Writable Character Commands	
[ESC] XE	2-Byte Writable Character Code Range. Consumed but not processed.
[ESC] XD on page 160	Store Bitmap Writable Character
Graphics Commands	
[ESC] SG on page 164	Draw Graphic
PC Command Saving Commands	
[ESC] XO on page 171	Start Save Operation
[ESC] XP on page 173	Terminate Save Operation
[ESC] XQ on page 173	Read Saved Data
Check Commands	
[ESC] HD	Check Printhead for Broken Dots. Consumed but not processed.
[ESC] XJ	Display Message on LCD. Consumed but not processed.
[ESC] WR on page 174	Reset the Printer
[ESC] Z0 (zero) on page 174	Reset Device
Status Commands	
[ESC] WS, [ESC] FM, [ESC] v on page 175	Request Printer Status
[ESC] WB on page 176	Request Printer Status and Free Buffer Space
[ESC] WX on page 176	Acquire Mode Information
[ESC] WV on page 177	Acquire Version Information

Command	Function
Bluetooth and Wireless LAN Commands	
[ESC] IT on page 179	Acquire the Device Address
[ESC] WT	Acquire Bluetooth Parameters. Consumed but not processed.

Setting Commands

[ESC] D

Description Set Label Size

Syntax `[ESC] Da, b, c(, d) [LF] [NUL]`

Range

a = length (pitch) of the label or tag from 10.0 to 999.9 mm (0.39 to 39.37 in.) in 0.1 mm (0.0039 in.) increments. Must be four or five digits.

4 digits = `0100` to `9999`

5 digits = `00100` to `09999`

b = print width in 0.1 mm (0.0039 in.) increments. Must be four digits.

c = print length from 7.0 to 997.0 mm (0.28 to 39.25 in.) in 0.1 mm (0.0039 in.) increments. Must be four or five digits.

4 digits = `0070` to `9970`

5 digits = `00070` to `09970`

d = optional reserved area. Must be four digits.

`0300` to `1120`

Notes This command specifies the length (pitch) of a label or tag, including backing. The values set with this command are retained even if the printer is power cycled.

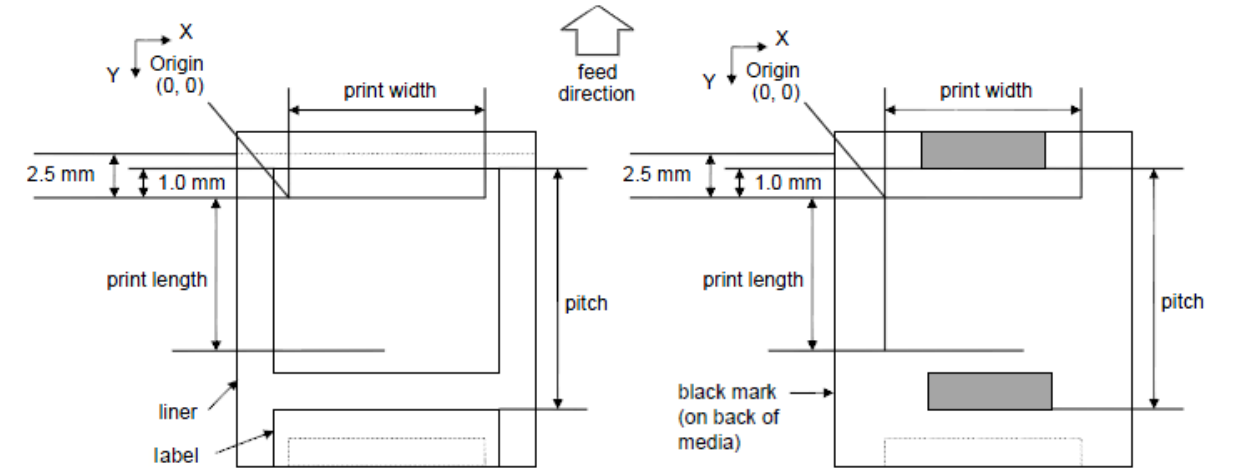
If the value specified for parameter *a*, *b*, or *c* is greater than the printer can support, the maximum value is used. If a value is smaller than the printer can support, the minimum value is used. Refer to the User Guide for your printer for the exact print specifications for your printer. The value for the optional reserved area is not checked. Values outside of the supported area may be ignored, or an error may occur.

If you change the size of the labels that you are using or the label sensor type, you must first transmit this command. After that, feed one label by *[ESC] T* on page 157 to position the label properly prior to printing. After transmitting this command, you must clear the image buffer using *[ESC] C* on page 50.

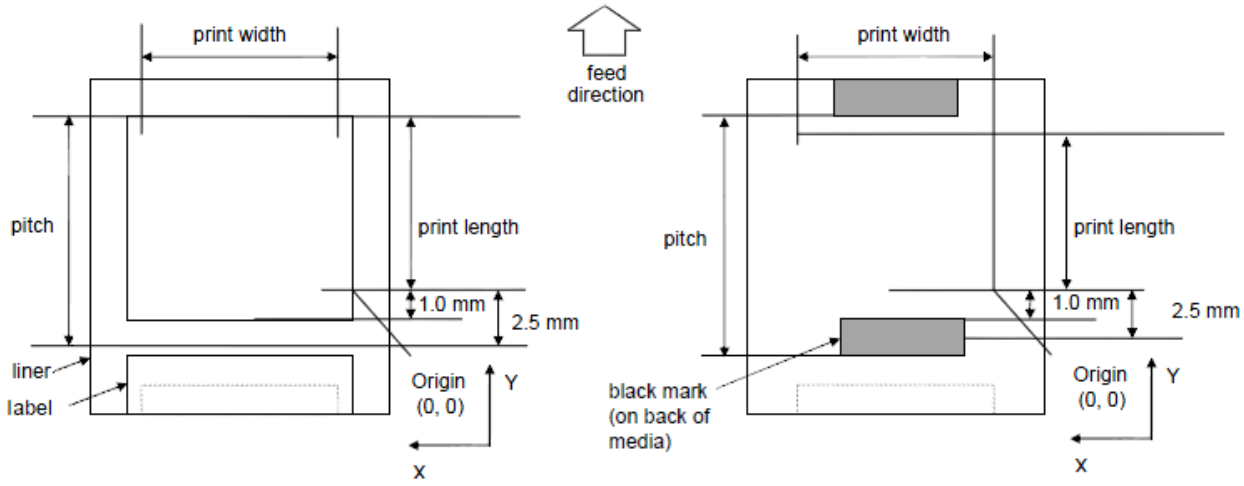
The origin of drawing coordinates and the print stop position (printhead position when printing stops) are adjustable by the *Fine Adjustment Commands* on page 46.

If you change the print position or if the gap between labels is not 3 mm, use *[ESC] AX* on page 46 as required.

Top-First Printing

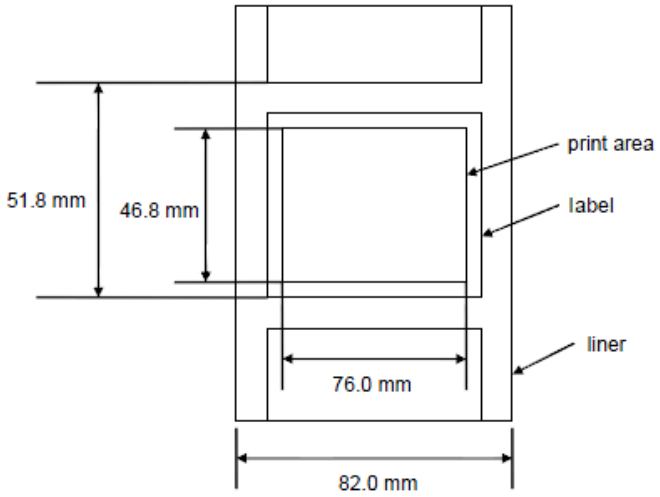


Bottom-First Printing



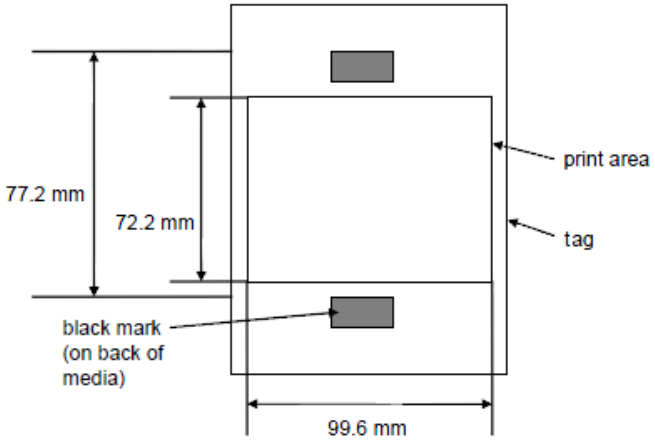
Example 1 • Label with 51.8 mm pitch, 46.8 mm print length, and 76 mm print width

```
[ESC] D0518, 0760, 0468, 0820 [LF] [NUL]
[ESC] T20C40 [LF] [NUL]
```



Example 2 • Tag with 77.2 mm pitch, 72.2 mm print length, and 99.6 mm print width

```
[ESC] D0772, 0996, 0722 [LF] [NUL]
[ESC] T10C40 [LF] [NUL]
```



[ESC] ID

Description Set the Printer ID

Syntax `[ESC] ID ; a(,b) [LF] [NUL]`

Range

a = a 5-digit printer ID value (2-byte hex data)
`0000H` to `FFFFH`

b = reserved (can be omitted; any value other than `0` causes an error)
Fixed at `0`

Notes This command sets the ID for the printer, which is used by the host to identify each printer. The printer ID is retained even if *[ESC] WR* on page 174 is executed or if the printer is power cycled.

Example • To set `03H 51H` as the ID of the printer, send

```
[ESC] ID; [03H] [51H] [LF] [NUL]
```

In this example, the printer ID would be `00849`.

[ESC] M

Description Select the Print Mode

Syntax `[ESC] M; a (,b) [LF] [NUL]`

Range
a = print mode designation

HEX	ASCII	Print Mode	How received data is dealt with after an error is cleared
30H	0	`LABEL`	Discarded
31H	1	`RECEIPT`	Discarded
32H	2	`RECEIPT1`	Continues printing
41H	A	`TPCL` (default mode)	Continues printing

b = Reserved.

Notes This command specifies the print mode. The value set with this command is retained even if the printer is power cycled.

Fine Adjustment Commands

[ESC] AX

Description Fine Adjust the Print Start Position

Syntax [ESC] AX; *ab*, *cd*(, *ef*, *gh*) [LF] [NUL]

Range

a = whether the direction of the print position should be adjusted forward or backward.
- \+ = Backward
- – = Forward

b = value by which to change the print position (in 0.1 mm units)
- 000 to 500 (0 to ±50 mm)

c = whether the direction of the strip position should be adjusted forward or backward.
- \+ = Backward
- – = Forward

d = value by which to change the strip position (in 0.1 mm units)
- 000 to +030 (0 to 3.0 mm)
- 000 to –020 (0 to –2.0 mm)

e = Reserved. (Can be omitted.)

f = Reserved. (Can be omitted.)

g = Reserved. (Can be omitted.)

h = Reserved. (Can be omitted.)

h = Reserved. (Can be omitted.)

Notes This command adjusts the feed value so that the label shifts forward or backward from the automatically set print start position. The values set with this command are retained even if the printer is power cycled. The factory default value is 0.0 mm.

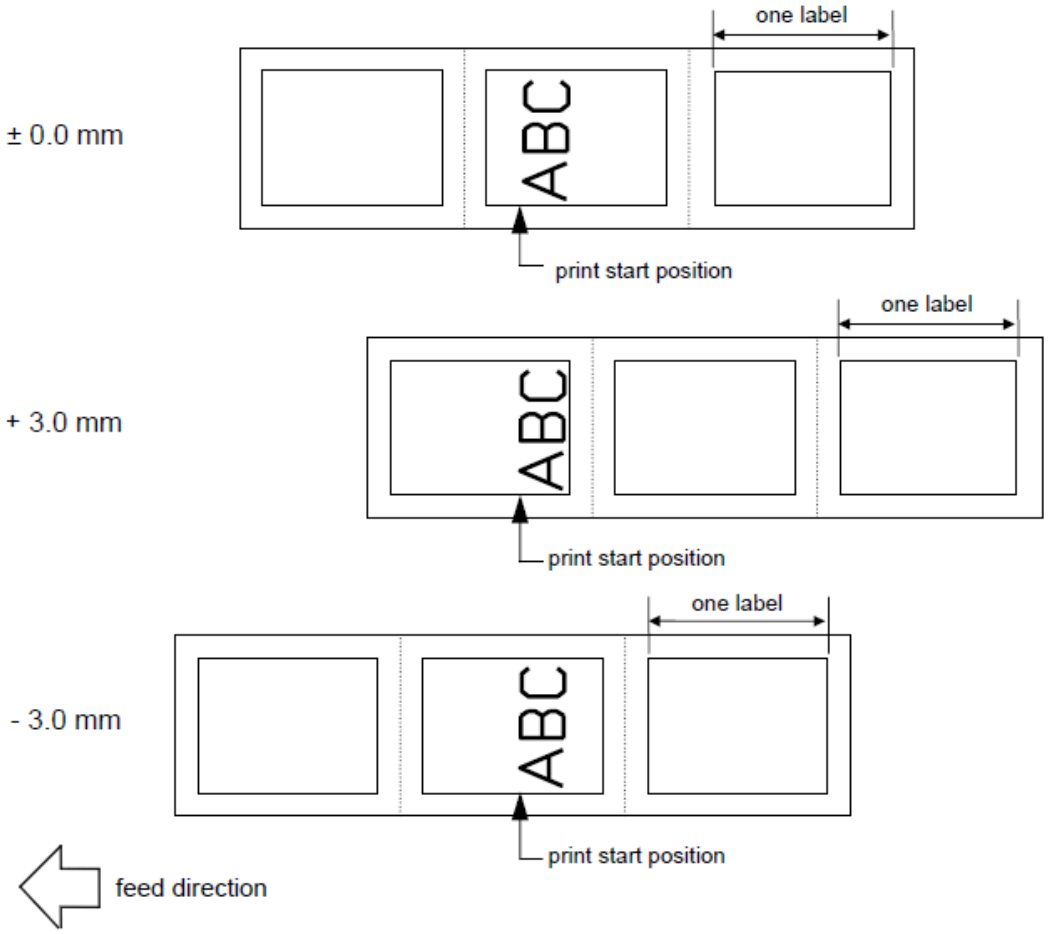
The fine adjustment values changed by this command in LABEL mode, are also effective in TPCL mode.

A command error occurs in the following instances:

- When parameter *a* or *c* is set to anything other than + or –
- When any out-of-range value is specified for parameter *b* or *d*.

When the label pitch is 20.0 to 24.0 mm and the print length is 15.0 mm or more or when the label pitch is 24.0 mm or more, the printer backfeeds before printing.

Example 1 • Print position fine adjustment



[ESC] AY

Description Fine Adjust Print Density That Was Set Automatically

Syntax [ESC] AY ; *ab*, *c* (, *d*) [LF] [NUL]

Range

a = makes the print density higher or lower, resulting in darker or lighter print
- \+ = Increase the density (darker print)
- – = Decrease the density (lighter print)

b = value by which to change the print density
- 00 to 30

c = print mode
- 0 = Reserved
- 1 = direct thermal

d = Reserved

2-inch printhead width

- 0 = Auto (divided by 2 or 3)
- 1 = Reserved (if specified, Auto (divided by 2 or 3))
- 2 = Fixed at divided by 3
- 3 = Auto1 (not divided/divided by 2 or 3)
- 4 = Reserved (if specified, fixed at divided by 3)
- 5 = Auto2 (not divided/divided by 2 or 3)

Default = 3

The Auto1 selection is print-quality oriented, while Auto2 is print-speed oriented. Auto2 uses a higher print speed and may result in lighter print.

4-inch printhead width

- 0 = Auto (divided by 2, 3, or 6)
- 1 = Reserved (if specified, Auto (divided by 2, 3, or 6))
- 2 = Reserved (if specified, Auto (divided by 2, 3, or 6))
- 3 = Auto1 (not divided/divided by 2, 3, or 6)
- 4 = Fixed at divided by 6

Default = 3

Notes This command adjusts print density that was set automatically. The values set with this command are retained even if the printer is power cycled. A command error occurs when any out-of-range fine adjustment value is specified.

The fine adjustment values changed by this command in TPCL mode, are also effective in LABEL, RECEIPT, and ESC/POS modes.

Example 1 • Send the following to set the density to –2:

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

Example 2 • Send the following to set the density to +3:

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

[ESC] AH

Description Adjust the Strip Sensor

Syntax `[ESC] AH; a [LF] [NUL]`

Range

a = one of the following settings

- 0 = operation in conformance with the strip sensor
- 1 = operation in conformance with the strip sensor
- 2 = batch mode only
- 3 = strip mode only
- 4 = Reserved (The command is ignored if this is specified.)

Default = 0

Notes This command sets the sensor threshold value that switches between strip and batch modes. The values set by this command are stored and used when the printer is powered up.

Clear Commands

[ESC] C

Description Clear the Image Buffer

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

Notes This command clears the image buffer of drawing characters, lines, barcodes, and graphics. Use this command after you change the label size using *[ESC] D* on page 41.

When this command is transmitted, the increment/decrement designation and the link field designations are reset.

Example • This example shows how `[ESC] C` is used after changing the label size.

```
[ESC] D0508, 0760, 0468 [LF] [NUL]
[ESC] T20C41 [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, 0002C1000 [LF] [NUL]
```

[ESC] XR

Description Clear or Reverse a Specified Area

Syntax `[ESC] XR; a, b, c, d, e [LF] [NUL]`

Range

a = the X coordinate of the start point of the area to be cleared. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

`0100` to `1057`

Fixed at 4 digits (in 0.1 mm units)

b = the Y coordinate of the start point of the area to be cleared. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = `0100` to `9999`

5 digits = `00100` to `09999`

c = the X coordinate of the end point of the area to be cleared. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

`0100` to `1057`

d = the Y coordinate of the end point of the area to be cleared. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = `0100` to `9999`

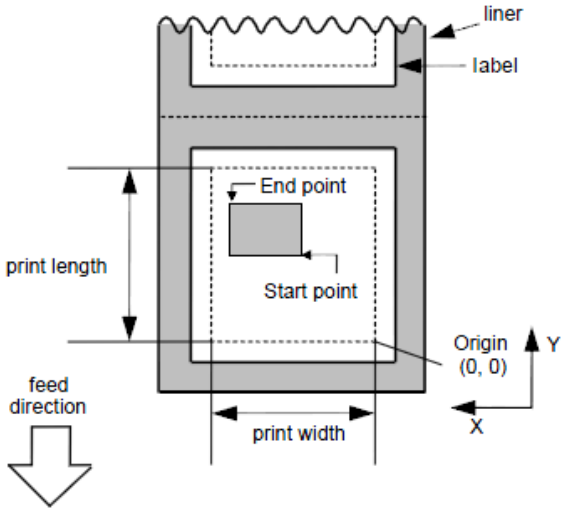
5 digits = `00100` to `09999`

e = how to clear the specified area (If a value other than `A` or `B` is specified, an error occurs.)

`A` = clear the contents in the designated area

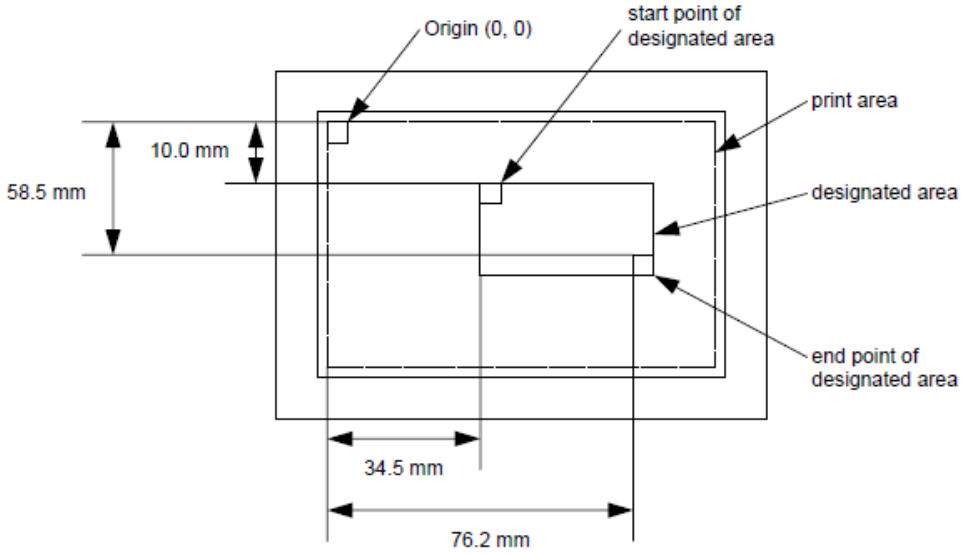
`B` = reverse black/white in the designated area.

Notes This command clears a designated area or reverses black/white printing in the designated area in the drawing area. The start and end point coordinates specified must be set within the print area set by the *[ESC] D* on page 41. The results of this command are the same when the start and end point coordinates are reversed.



Example • This example shows how to clear a specified area.

```
[ESC] XR; 0345, 0100, 0762, 0585, A [LF] [NUL]
[ESC] XS; I, 0001, 0002C4000 [LF] [NUL]
```


Origin (0, 0)
start point of designated area
print area
10.0 mm
58.5 mm
designated area
end point of designated area
34.5 mm
76.2 mm

Drawing Format Commands

[ESC] LC

Description Draw a Line or Rectangle

Syntax `[ESC] LC; a, b, c, d, e, f (, g) [LF] [NUL]`

Range

a = the X coordinate of the start point. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

`0100` to `1057`

Fixed at 4 digits (in 0.1 mm units)

b = the Y coordinate of the start point. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = `0100` to `9999`

5 digits = `00100` to `09999`

c = the X coordinate of the end point. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

`0100` to `1057`

d = the Y coordinate of the end point. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = `0100` to `9999`

5 digits = `00100` to `09999`

e = type of line or rectangle to draw (A command error occurs if the specified value is anything other than `0` to `6`.)

`0` = line (horizontal, vertical)

`1` = rectangle

`2` = Reserved (If specified, processed as `0`.)

`3` = Reserved (If specified, processed as `1`.)

`4` = Reserved (If specified, processed as `1`.)

`5` = Reserved (If specified, processed as `0`.)

`6` = Reserved (If specified, processed as `1`.)

f = thickness of the line to be drawn. Specified in 0.1 mm (0.0039 in.) increments. A command error occurs if this is set to zero.

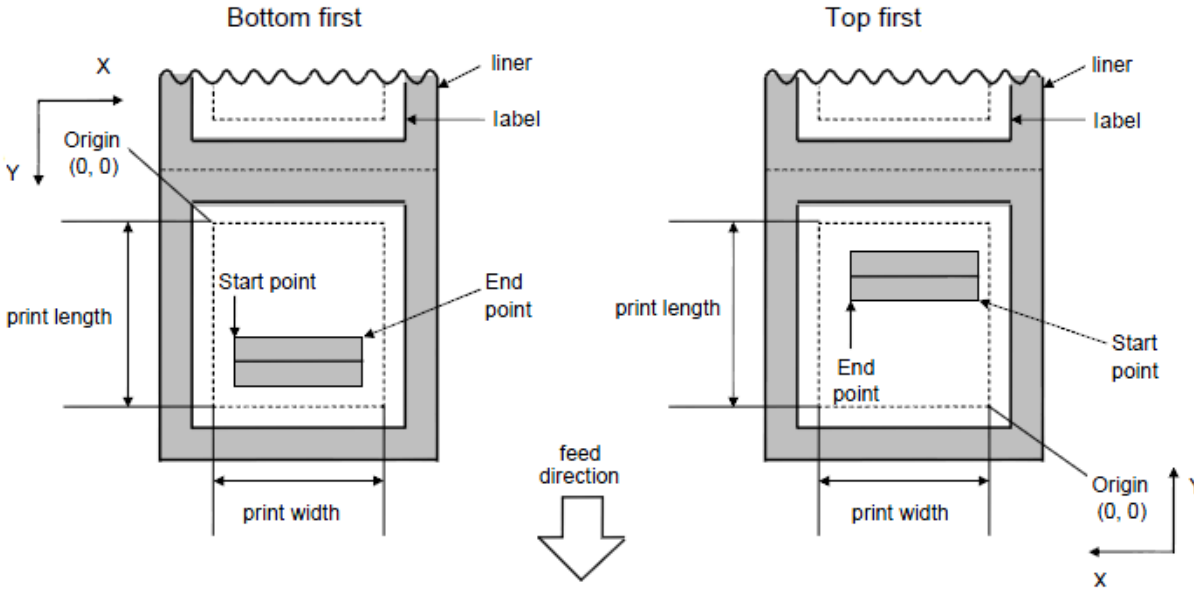
`1` to `9` or `01` to `99`

g = radius of rounded corners of a rectangle (Can be omitted. If omitted, the rectangle corners are drawn square, not rounded.) Must be three digits. Specified in 0.1 mm (0.0039 in.) increments. This parameter is ignored unless parameter *e* is set to `1` or `3`.

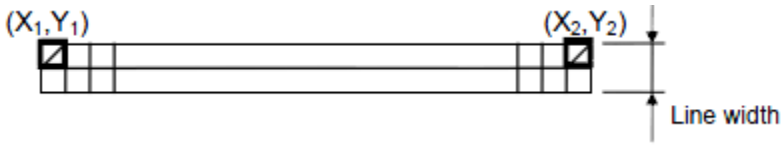
`000` to `999`

Notes This command specifies the parameters for drawing a line or rectangle. The start and end point coordinates specified must be set within the print area set by the *[ESC] D* on page 41. The results of this command are the same when the start and end point coordinates are reversed.

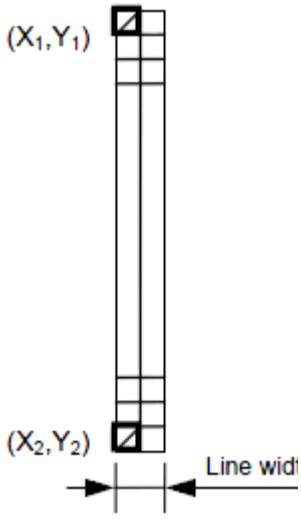
Example 1 • This example shows the different results based on whether the top or bottom of the label is printed first.



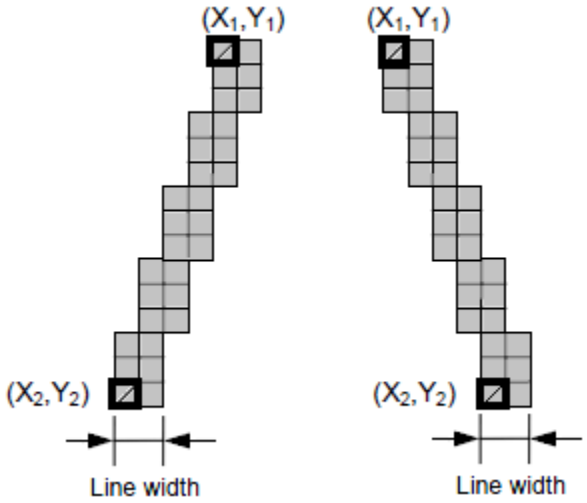
Example 2 • A horizontal line is drawn when $|Y_2 - Y_1| = 0$.



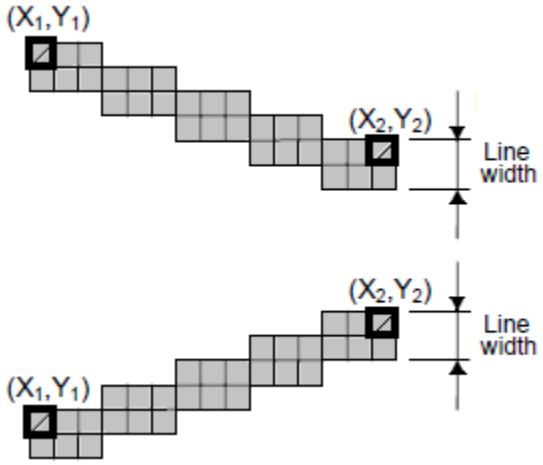
Example 3 • A vertical line is drawn when $|X_2 - X_1| = 0$.



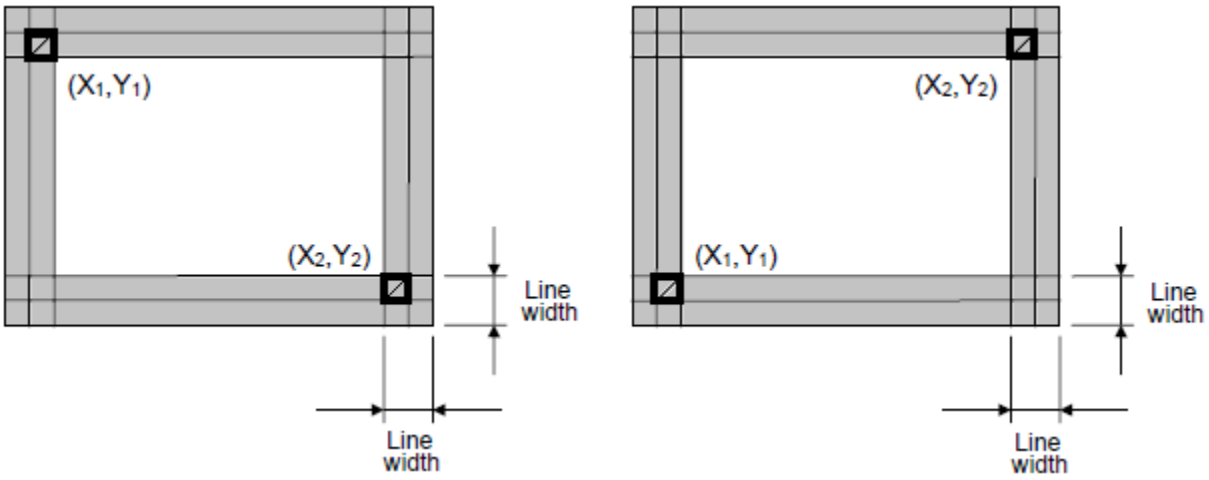
Example 4 • A slanted line is drawn when |X2 - X1| < |Y2 - Y1|.



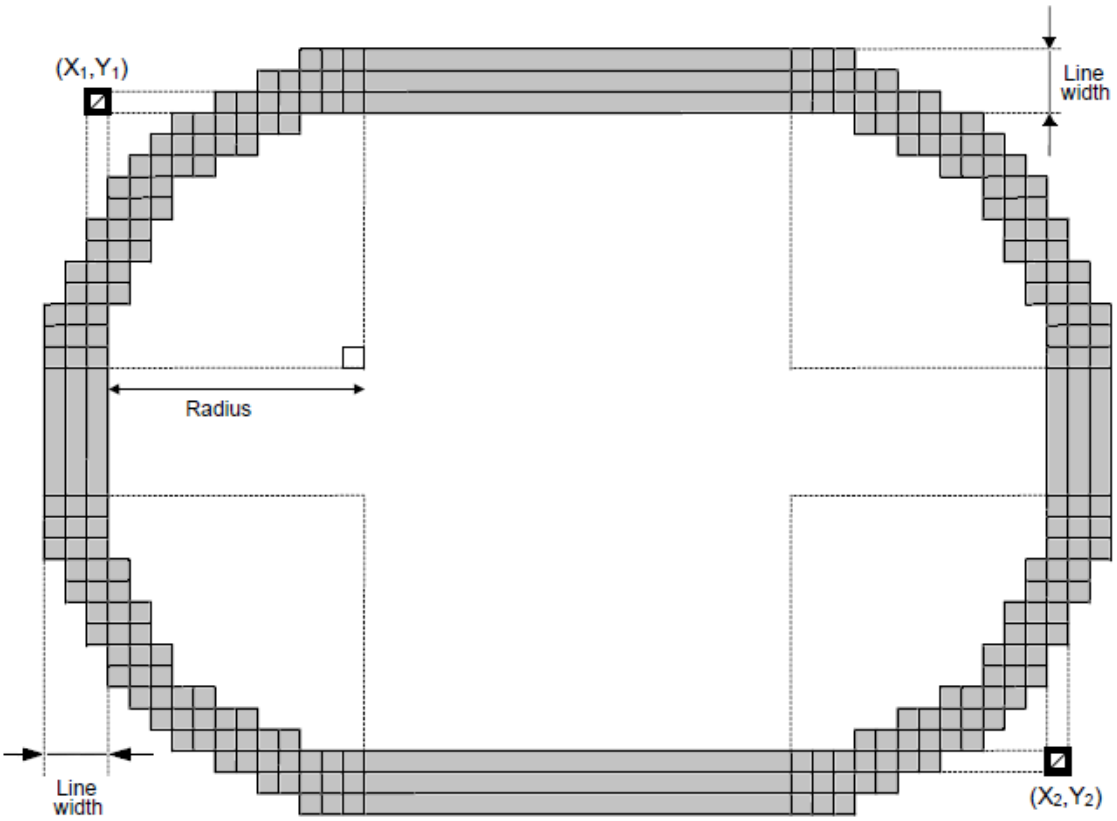
Example 5 • A slanted line at a different angle results when |X2 - X1| > |Y2 - Y1|.



Example 6 • A rectangle with square corners is drawn when the corner radius is specified as `000` or by default when a corner radius is not specified.



Example 7 • A rectangle with rounded corners is drawn when a corner radius other than `000` is specified.

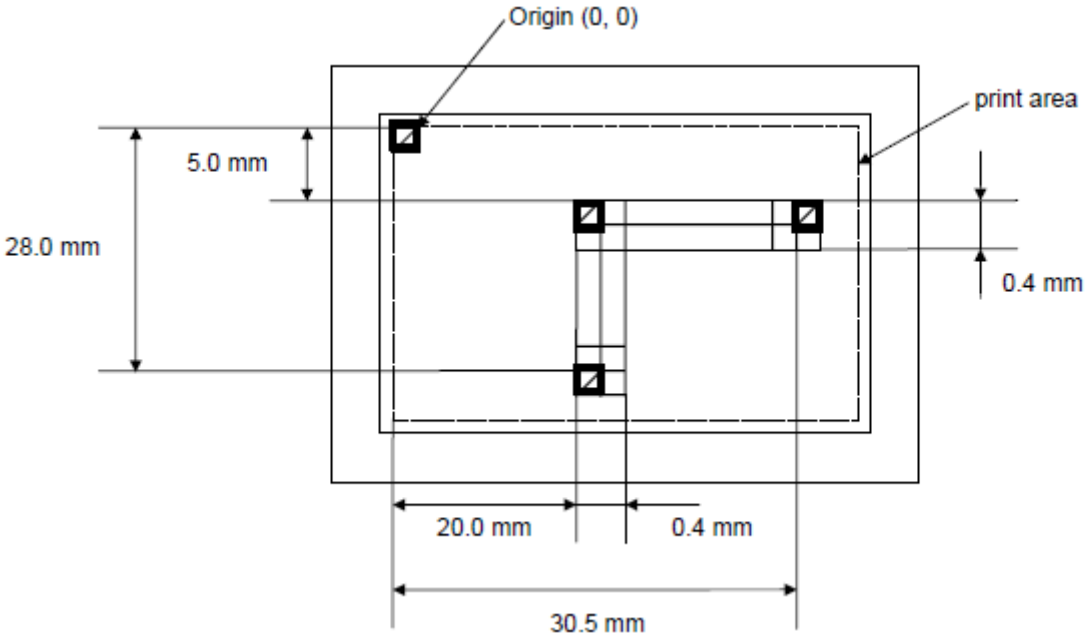


To draw a circle, use coordinates that meet the following criteria:

$$\frac{|X_2 - X_1|}{2} = \frac{|Y_2 - Y_1|}{2} \quad ? \quad \text{the radius of the rounded corners}$$

Example 8 • This example shows how to draw a horizontal line and a vertical line that start at the same point.

```
[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; I, 0001, 0002C4000 [LF] [NUL]
```



[ESC] PC

Description Specify a Bitmap Font Format

Syntax This command has two possible formats:

```
[ESC] PCa; b, c, d, e, f (, gh), i, j (, Jkl) (, Mm) (, no)
(, Zp) (, Pq) (= r ------ r) [LF] [NUL]
```

```
[ESC] PCa; b, c, d, e, f (, gh), i, j (, Jkl) (, Mm) (, no)
(, Zp) (, Pq) (; s1, s2, s3, ------ , s20) [LF] [NUL]
```

Range

a = character string number. Can be two or three digits.
000 to 199 or 00 to 99

b = the X coordinate of the print origin of the character string. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.
0100 to 1057

c = the Y coordinate of the print origin of the character string. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.
4 digits = 0100 to 9999
5 digits = 00100 to 09999

d = the character horizontal magnification factor
1 digit indicates the number of times to magnify = 1 to 9
2 digits indicate that the magnification is in fractional increments =
05 to 95 (0.5 to 9.5 in 0.5 unit increments)
06 to 09 (0.6 to 0.9 in 0.1 unit increments)

e = the character vertical magnification factor
1 digit indicates the number of times to magnify = 1 to 9
2 digits indicate that the magnification is in fractional increments =
05 to 95 (0.5 to 9.5 in 0.5 unit increments)
06 to 09 (0.6 to 0.9 in 0.1 unit increments)

f = the type of bitmap font (See Table 5, *Supported Bitmap Fonts* on page 183 for examples.)

Font	Description	Size (203-dpi printhead)
A	Times Roman (Medium)*	12 points
B	Times Roman (Medium)*	15 points
C	Times Roman (Bold)*	15 points
D	Times Roman (Bold)*	18 points
E	Times Roman (Bold)*	21 points
F	Times Roman (Italic)*	18 points
G	Helvetica (Medium)*	9 points
H	Helvetica (Medium)*	15 points
I	Helvetica (Medium)*	18 points
J	Helvetica (Bold)*	18 points
K	Helvetica (Bold)*	21 points

Font	Description	Size (203-dpi printhead)
L	Helvetica (Italic)	18 points*
M	Presentation (Bold)	27 points
N	Letter Gothic (Medium)	14.3 points
O	Prestige Elite (Medium)	10.5 points
P	Prestige Elite (Bold)	15 points
Q	Courier (Medium)	15 points
R	Courier (Bold)	18 points
S	OCR-A	12 points
T	OCR-B	12 points
q	Gothic725 Black *	6 points

* Indicates proportional fonts

gh = fine adjustment of character-to-character space (Can be omitted, in which case space is adjusted according to the designated font.)

g = increases or decreases the character-to-character space.
+ = Increase the space
– = Decrease the space

h = number of dots between characters. Must be two digits.
00 to 99 dots

i = rotational angle of a single character and character strings

	Single Character	Character String
00	0°	0°
11	90°	90°
22	180°	180°
33	270°	270°

j = character attributes

B = black characters

W (*xy*) = reverse characters* **

x = number of dots horizontally from the character string to the end of the black background. Must be two digits.
01 to 99

y = number of dots vertically from the character string to the end of the black background. Must be two digits.
01 to 99

F (*xy*) = boxed characters* ***

x = number of dots horizontally from the character string to the surrounding box. Must be two digits.
01 to 99

y = number of dots vertically from the character string to the surrounding box. Must be two digits.
01 to 99

C (*x*) = strike-through characters* ***

x = number of dots horizontally from the character string to the end of the strike-through line. Must be two digits.
01 to 99

* Specifications in parentheses can be omitted, in which case the value used is the character magnification (horizontal or vertical, whichever is larger) x 6 dots.

J*kl* = bold character shift* (may be omitted, in which case characters are not shifted)

k = distance in dots to shift horizontally. Must be two digits.
00 to 16

l = distance in dots to shift vertically. Must be two digits.
00 to 16

M*m* = attach the specified check digit* (Can be omitted, in which case no check digit is drawn. If any data other than numerals are included for the fonts listed below, no drawing is performed.)

m = the type of check digit*

0 = Modulus 10 (draws data and check digit)—Data must include only numerals.

1 = Modulus 43 (draws data and check digit)—Data must include only CODE39.

2 = DBP Modulus 10** (draws only the check digit)—Data must include only numerals.

* The check digit cannot be specified if the font type is U, V, r, s, or w. If a value is specified, the printer ignores it.

** DBP Modulus 10 is Modulus 10 for Deutsche Bundespost Postdienst only.

no = increment and decrement* (Can be omitted, in which case no increment/decrement is performed.)

n = specifies whether to increment or decrement

\+ = Increment

– = Decrement

o = skip value. Must be ten digits.

0000000000 to 9999999999

* Increment/decrement cannot be specified if the font type is U, V, r, s, w, or a (for JA type only). If a value is specified, the printer ignores it.

Z*p* = zero suppression* (Can be omitted, in which case zero suppression is not performed.)

p = number of digits after zero suppression. Must be two digits.

00 to 20

P*q* = alignment* (Can be omitted, in which case left alignment is used.)

q = specifies the character position.

1 = left

2 = center

3 = right

4*a* = justified

a = character string in the X direction (in 0.1 mm units)

0050 to 1040

5*abc* = automatic line feed

Note: Lines may not be divided exactly the same as they are with TOSHIBA TEC® printers.

a = character string in the X direction (in 0.1 mm units)

0050 to 1040

b = line feed spacing (in 0.1 mm units)

010 to 500

c = number of lines

01 to 99

* When the rotational angle of a character or character string is set to 01, 12, 23, or 30, the printer ignores alignment and automatic line feed input.

r = a data string to be printed (Can be omitted.)
255 digits maximum

s1, *s2*, *s3*, ..., *s20* = up to 20 link field numbers, separated by commas (Can be omitted.)
01 to 99 or 1 to 99

Notes This command specifies where and how a bitmap font is to be printed on a label. When drawing using the Data Command (*[ESC] RC* on page 140), the format specified by the character string number is used.

The Bitmap Font Format Command (*[ESC] PC* on page 58) may be connected to the Outline Font Format Command (*[ESC] PV* on page 71) when transmitted. For example:

```
[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]
```

When the drawing data is different between labels, the drawing data field for the previous label is cleared automatically using the character string number, and then the next drawing data field is printed. Therefore, you should specify the character string number so that they differ for the drawing fields.

Because the automatic field clearing is not performed between the Clear command (*[ESC] C* on page 50) and the Issue command (*[ESC] XS* on page 155), 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 you send the Issue command, the fields with the same character string number are automatically cleared until you send the Clear command.)

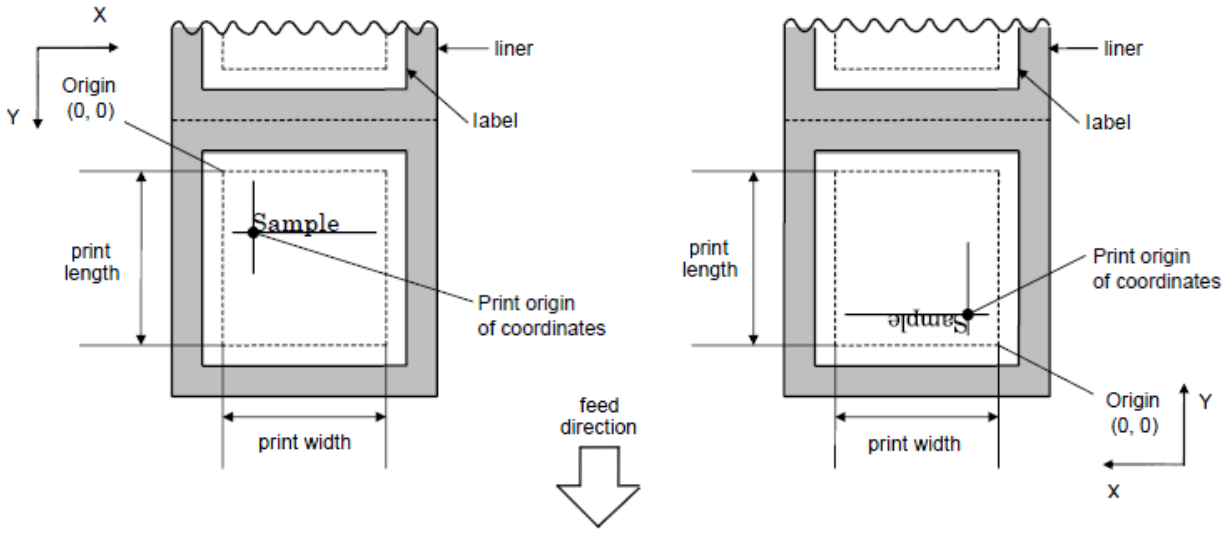
The link field designation is cleared by omitting the link field designation using the same character string number and reformatting data. The link field designation can be also cleared by *[ESC] C* on page 50.

A print data string and link field number cannot be programmed at the same time.

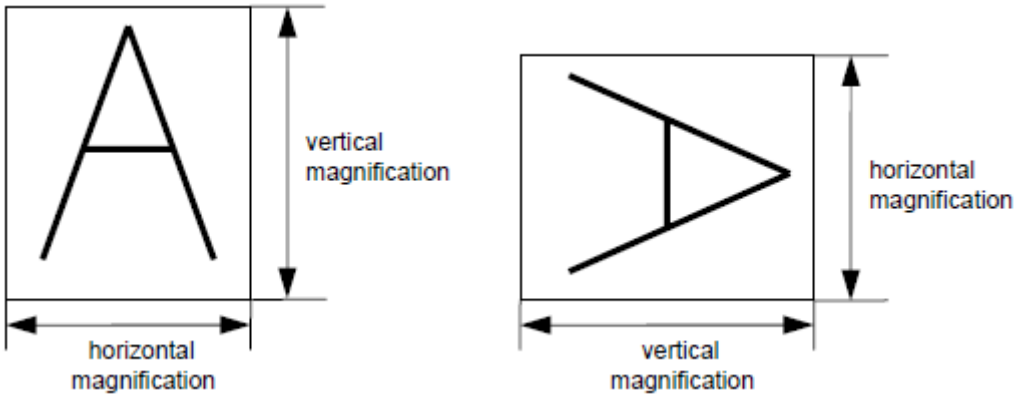
When a reserved font type is designated, a bitmap font format is not specified.

You can program drawing data by designating a number of digits after the = symbol. With most fonts, up to 255 digits of characters can be printed. If the number of characters exceeds the maximum number of digits, the excess data will be discarded. For the character codes, refer to *Character Code Tables* on page 194.

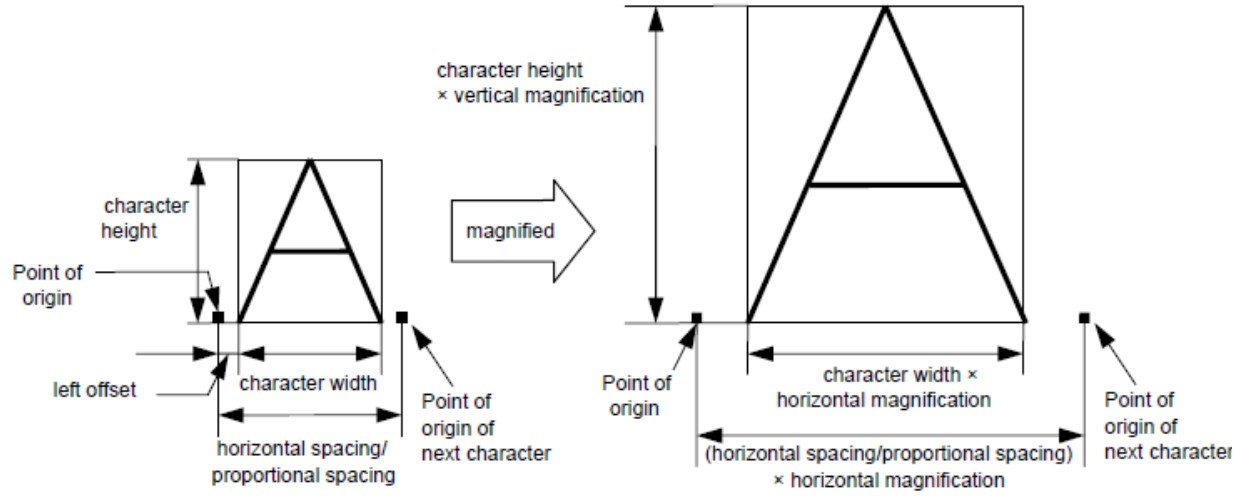
Example 1 • The print origin of coordinates must be set so that the character drawing result is within the print area set by *[ESC] D* on page 41.



Example 2 • Examples of horizontal and vertical magnification, based on text orientation

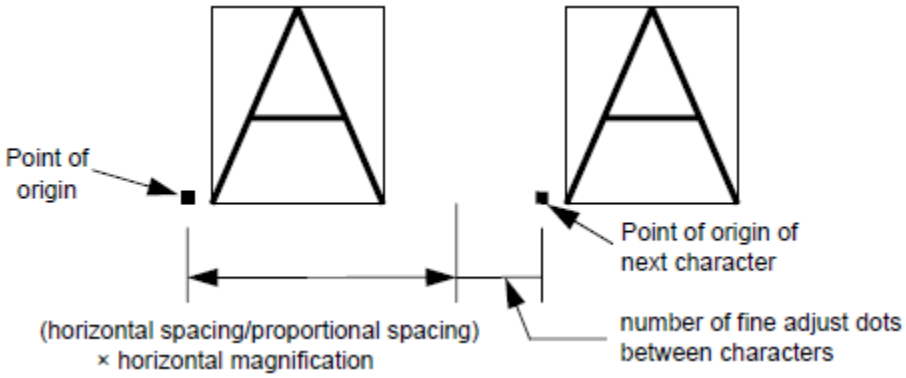


Example 3 • Example of the relationship between drawing coordinates and magnification.

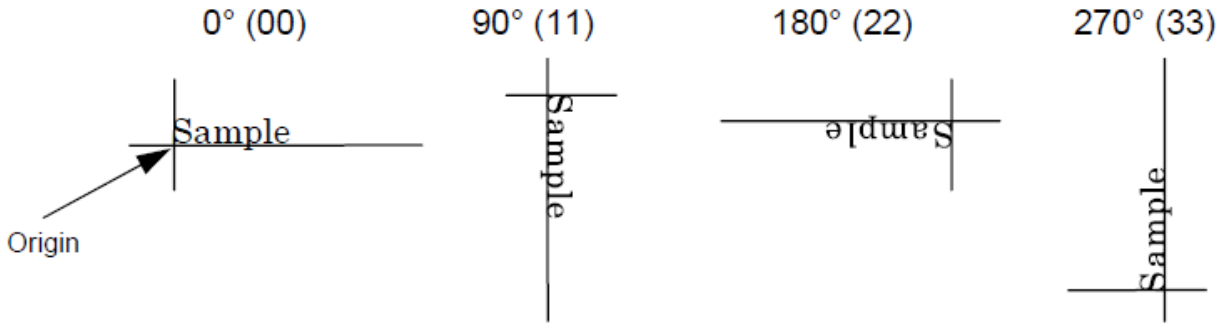


Example 4 • Example of fine adjustment of character-to-character space

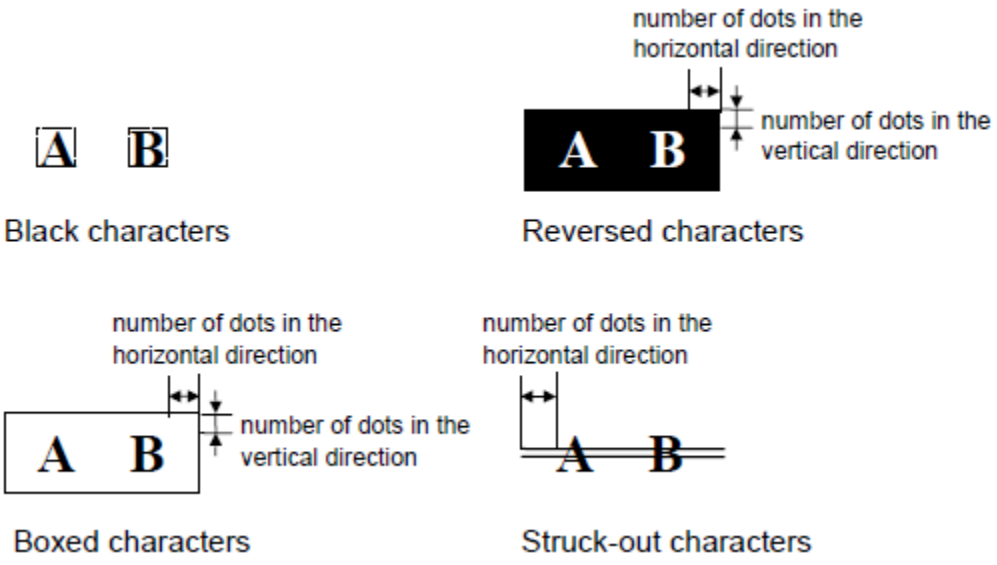
If no character-to-character space is specified or if the number of dots of space between characters is zero, drawing takes place according to horizontal spacing/proportional spacing determined for each character. If a character-to-character space is specified, this value is added to the character spacing/proportional spacing.



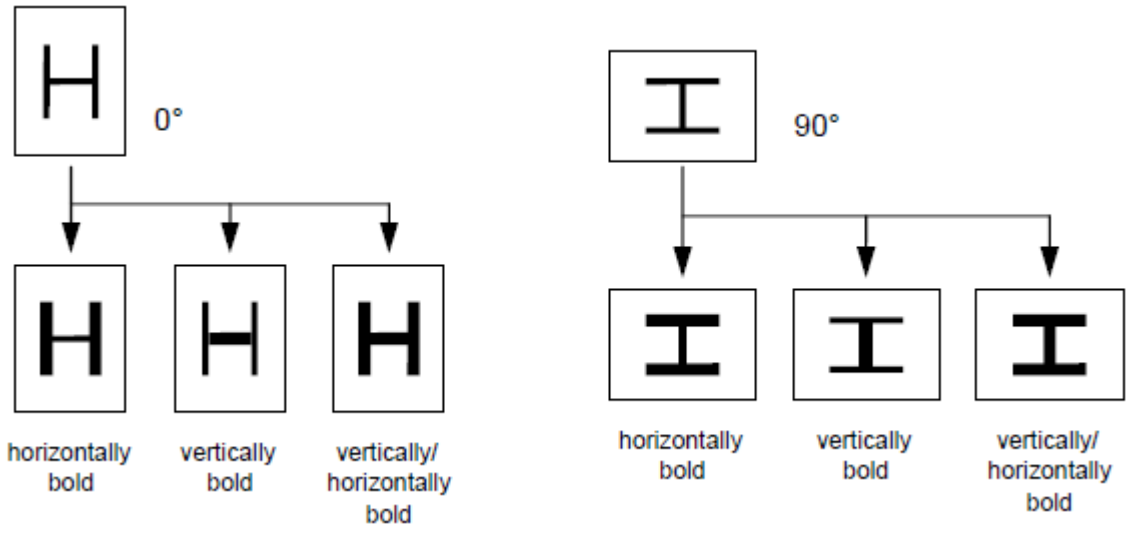
Example 5 • Example of rotational angles



Example 6 • Example of character attributes



Example 7 • Example of bold character designation



Example 8 • The printer prints while data is incremented or decremented each time that a label format is sent. If a data row exceeds 40 digits, the row is not drawn.

Initial value	0000	0000	0000	0000	999999
INC/DEC	+10	+10	+10	+10	+1
Zero suppression	not designated	5	3	0	3
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

(? indicates a space but does not print.)

Example 9 • Handling of letters and numerals for incrementing/decrementing

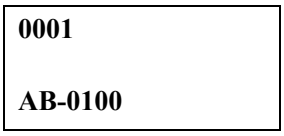
The data string can include up to 40 digits of letters, numerals, and symbols. Only the numerals are subjected to incrementing/decrementing. The incremented/decremented value is returned to the position of the original numeral for printing.

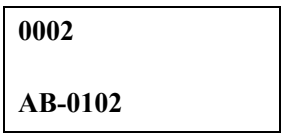
Initial value	00000	A0A0A	7A8/9	A2A0A
INC/DEC	+1	+1	+3	–3
1st label	00000	A0A0A	7A8/9	A2A0A
2nd label	00001	A0A1A	7A9/2	A1A7A
3rd label	00002	A0A2A	7A9/5	A1A4A
4th label	00003	A0A3A	7A9/8	A1A1A
5th label	00004	A0A4A	8A0/1	A0A8A

Example 10 • The printer can draw up to 32 fields for which increment/decrement has been designated. If the total number of bitmap font, outline font, and barcode increment/decrement fields is greater than 32, drawing takes place without incrementing/decrementing more than the first 32 fields. The fields are incremented or decremented as specified until the Image Buffer Clear command (*[ESC] C* on page 50) is transmitted.

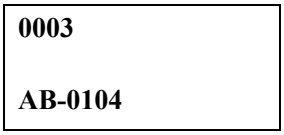
This sample shows how you would send commands to increment/decrement different fields on labels:

1. Command: Format (incrementing character string number 001 (+1))
2. Command: Format (non-incrementing character string number 002)
3. Command: Format (incrementing character string number 003 (+2))
4. Command: Image Buffer Clear
5. Command: Data (character string number 001 “0001”)
6. Command: Data (character string number 002 “AB-”)
7. Command: Data (character string number 003 “0100”)
8. Command: Issue (2 labels)

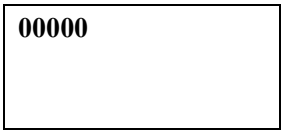




9. Command: Issue (1 label)



10. Command: Image Buffer Clear
11. Command: Data (character string number 02 “00000”)
12. Command: Issue (1 label)

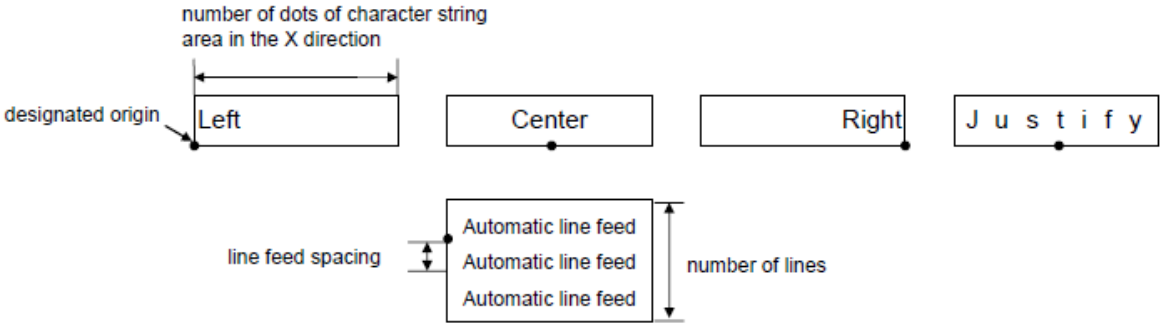


Example 11 • Zero suppression works by replacing leading zeroes with spaces, according to the specified number of digits. In instances where the number of digits after zero suppression is greater than the data row, the printer draws the data row without performing zero suppression. If a data row exceeds 40 digits, the data row is not drawn.

Number of digits after zero suppression	0	1	2	2	3	4	5
data	0000	0000	0000	0A12	0123	0123	0123
print result	0000	???0	??00	?A12	?123	0123	0123

(? indicates a space but does not print.)

Example 12 • How alignment affects text placement



If characters are not all on one line when justification and automatic line feed are specified, the printer does the following:

1. The character-to-character space is decreased.
2. If the characters do not fit on one line even if the character-to-character space value is set to 0, that value returns to its default. Then the horizontal magnification is reduced for a character by 0.5.
3. If the characters still do not fit on one line, the value of the character-to-character space is repeatedly decreased, and the horizontal magnification is reduced.
4. If the characters do not fit on one line after the character magnification is set to 0.5 and the character-to-character space is set to 0, the field is not drawn.

Example 13 • The check digit attachment, increment/decrement, and zero suppression are prioritized as follows. If any of the conditions is invalid, no drawing takes place.

increment/decrement > zero suppression > attachment of check digit

Example 14 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

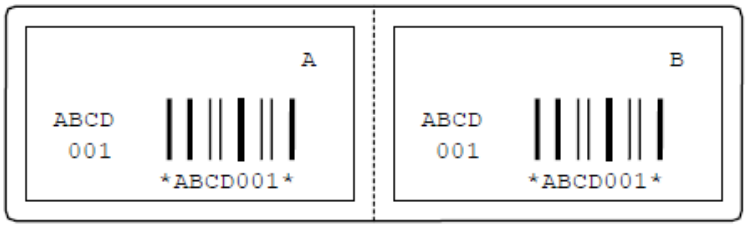
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

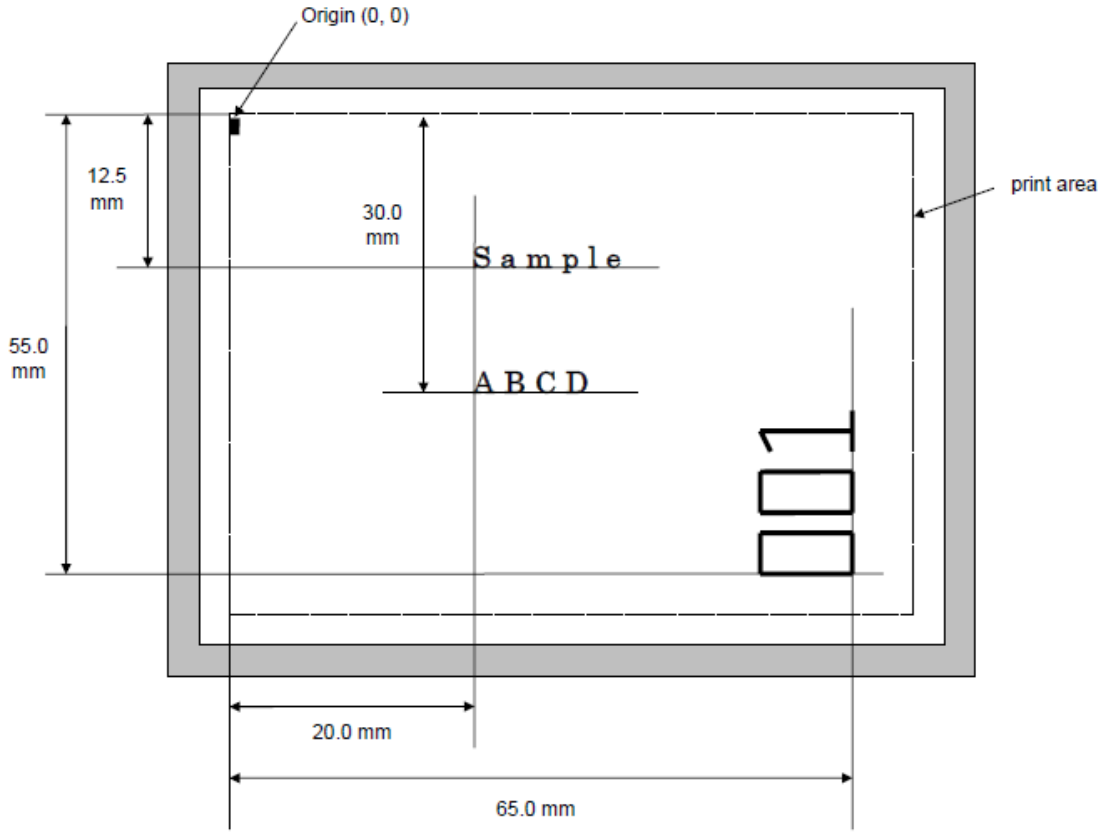
[ESC] RC; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



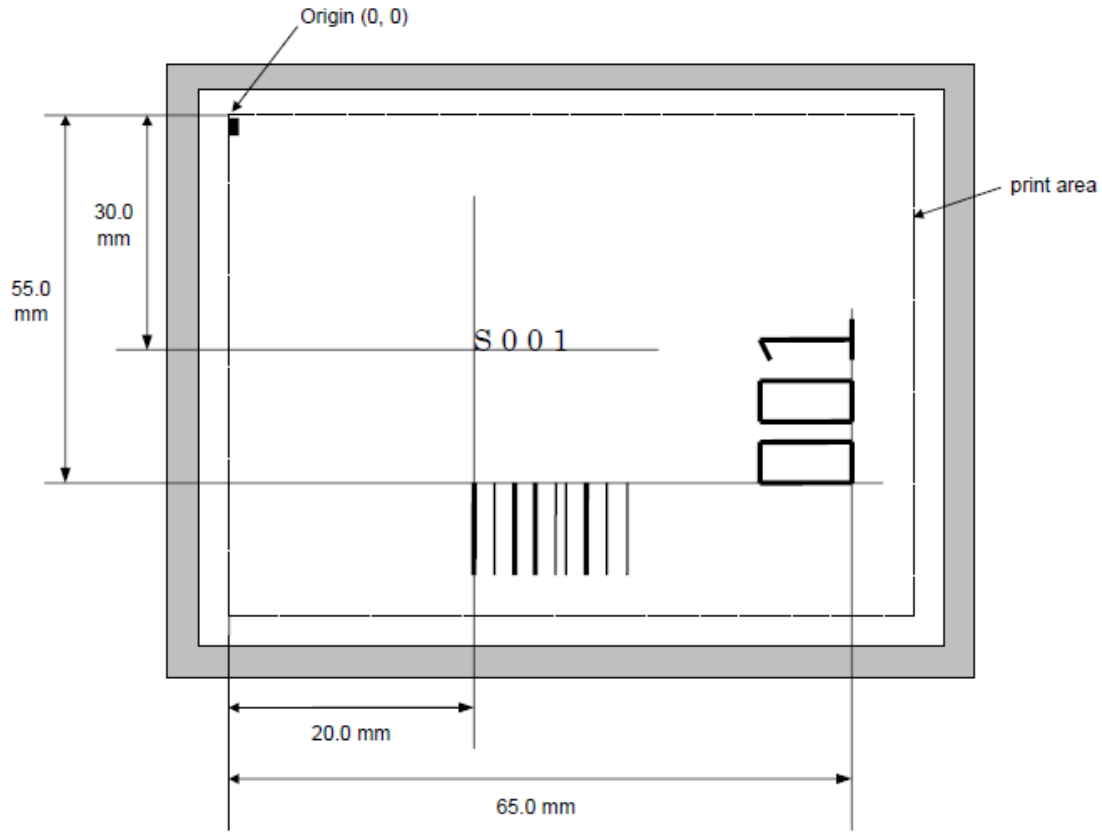
Example 15 • The following sample code would result in a label as shown.

```
[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; 0650, 0550, 2, 2, G, 33, B, +0000000001 [LF]
[NUL]
[ESC] RC001; Sample [LF] [NUL]
[ESC] RC002; 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



Example 16 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] PC001; 0200, 0300, 1, 1, C, 00, B; 01, 02 [LF] [NUL]
[ESC] PV01; 0650, 0550, 0200, 0150, B, 33, B; 02 [LF]
[NUL]
[ESC] XB01; 0200, 0550, 3, 1, 03, 03, 08, 08, 03, 0, 0150;
01, 02 [LF] [NUL]
[ESC] RC; S [LF] 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] PV

Description Specify an Outline Font Format

Syntax This command has two possible formats:

```
[ESC] PVa; b, c, d, e, f (, gh), i, j (, Mk) (, Lm) (, Zn)
(, Po) (, Qq, Rr) (= s ------ s) [LF] [NUL]
```

```
[ESC] PVa; b, c, d, e, f (, gh), i, j (, Mk) (, Lm) (, Zn)
(, Po) (, Qq, Rr) (; t1, t2, t3, ------ , t20) [LF] [NUL]
```

Range

a = character string number. Must be two digits.
00 to 99

b = the X coordinate of the print origin of the character string. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.
0100 to 1057

c = the Y coordinate of the print origin of the character string. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.
4 digits = 0100 to 9999
5 digits = 00100 to 09999

d = the character width. Specified in 0.1 mm (0.0039 in.) increments. Must be four digits.
0020 to 0850

e = the character height. Specified in 0.1 mm (0.0039 in.) increments. Must be four digits.
0020 to 0850

f = the type of font (See Table 6, *Supported Outline Fonts* on page 189 for examples.)
A = TEC FONT1 (Helvetica [bold])
B = TEC FONT1 (Helvetica [bold], proportional)
E = Price font 1
F = Price font 2
G = Price font 3
K = Reserved
C, D, H, I, J: = Reserved (If one of these is specified, it is processed as B.)

gh = fine adjustment of character-to-character space (Can be omitted, in which case space is adjusted according to the designated font.)
g = increases or decreases the character-to-character space.
+ = Increase the space
– = Decrease the space
h = number of dots between characters. Must be three digits.
000 to 512 dots

i = rotational angle of characters and character strings

00	0°
11	90°
22	180°
33	270°

j = character attributes

B = black characters

W (*xy*) = reverse characters* **

x = number of dots horizontally from the character string to the end of the black background
01 to 99

y = number of dots vertically from the character string to the end of the black background
01 to 99

F (*xy*) = boxed characters*

x = number of dots horizontally from the character string to the surrounding box
01 to 99

y = number of dots vertically from the character string to the surrounding box
01 to 99

C (*x*) = strike-through characters*

x = number of dots horizontally from the character string to the end of the strike-through line
01 to 99

* Specifications in parentheses can be omitted, in which case the value used is the character size (character height or width, whichever is larger) ÷ 8 dots.

** If the print ratio of a line (the printhead width) is too high, printing may become poor, or the printer may reset. When you specify to print reversed characters, be aware of the print ratio being used.

M*k* = attach the specified check digit* (Can be omitted, in which case no check digit is drawn. If any data other than numerals are included for the fonts listed below, no drawing is performed.)

k = the type of check digit*

0 = Modulus 10 (draws data and check digit)—Data must include only numerals.

1 = Modulus 43 (draws data and check digit)—Data must include only CODE39.

2 = DBP Modulus 10** (draws only the check digit)—Data must include only numerals.

* The check digit cannot be specified if the font type is U, V, r, s, or w. If it is specified, the printer ignores it.

** DBP Modulus 10 is Modulus 10 for Deutsche Bundespost Postdienst only.

lm = increment and decrement (Can be omitted, in which case no increment/decrement is performed.)

l = specifies whether to increment or decrement
\+ = Increment
– = Decrement

m = skip value. Must be ten digits.
0000000000 to 9999999999

Z*n* = zero suppression (Can be omitted, in which case zero suppression is not performed.)

n = number of digits after zero suppression. Must be two digits.
00 to 20

`Po` = alignment (Can be omitted, in which case left alignment is used.)
- *o* = specifies the character position
  - `1` = left
  - `2` = center
  - `3` = right
  - `4`*a* = justified*
    - *a* = character string in the X direction (in 0.1 mm units)
      `0050` to `1040`

`Q`*q* = character string width (in 0.1 mm units) (Can be omitted, in which case `0000` is used.)
- *q* = specifies the character width. Must be four digits.
  `0000` to `1600`

`R`*r* = the number of digits in the character string (Can be omitted, in which case `00` is used.)
- *r* = specifies the number of digits. Must be two digits.
  `00` to `99`

s = a data string to be printed (Can be omitted.)
255 digits maximum

t1, *t2*, *t3*, ..., *t20* = up to 20 link field numbers, separated by commas (Can be omitted.)
`01` to `99` or `1` to `99`

Notes This command specifies where and how an outline font is to be printed on a label. When drawing using the Data Command (*[ESC] RC* on page 140), the format specified by the character string number is used.

The Bitmap Font Format Command (*[ESC] PC* on page 58) may be connected to the Outline Font Format Command (*[ESC] PV* on page 71) 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]
```

You can program drawing data by designating a number of digits after the = symbol. Up to 255 digits of characters can be printed. If the number of characters exceeds the maximum number of digits, the excess data will be discarded. For the character codes, refer to *Character Code Tables* on page 194.

A print data string and link field number cannot be programmed at the same time.

When a reserved font type is designated, a bitmap font format is not specified.

The link field designation is cleared by omitting the link field designation using the same character string number and reformatting data. The link field designation can be also cleared by *[ESC] C* on page 50.

When the drawing data is different between labels, the drawing data field for the previous label is cleared automatically using the character string number, and then the next drawing data field is printed. Therefore, you should specify the character string number so that they differ for the drawing fields.

Because the automatic field clearing is not performed between the Clear command (*[ESC] C* on page 50) and the Issue command (*[ESC] XS* on page 155), 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 you send the Issue command, the fields with the same character string number are automatically cleared until you send the Clear command.)

The link field designation is cleared by omitting the link field designation using the same character string number and reformatting data. The link field designation can be also cleared by *[ESC] C* on page 50.

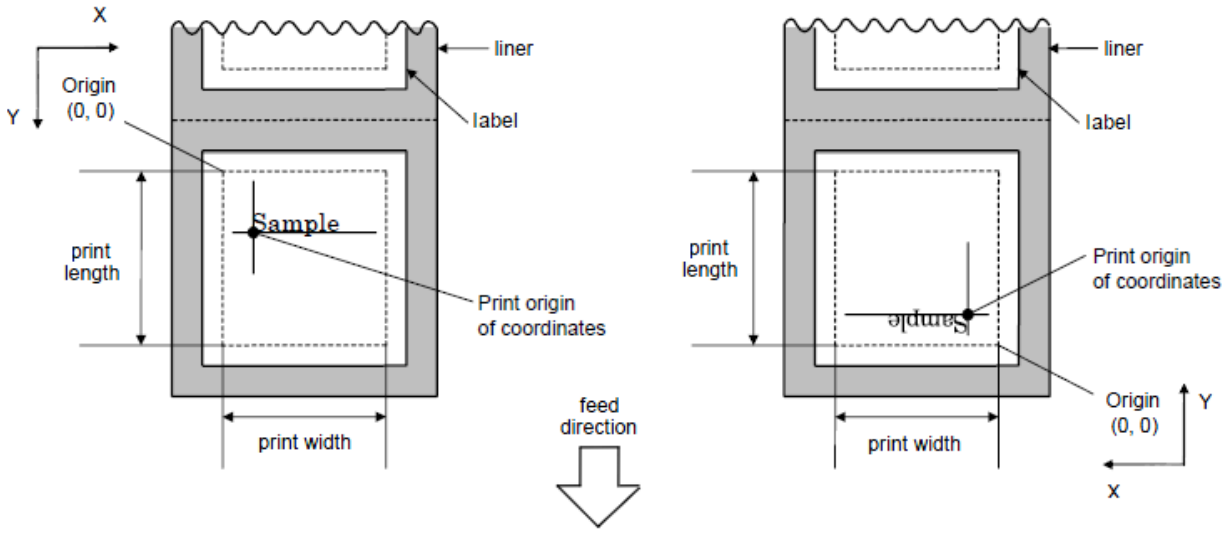
The outline font does not print properly in the following situations:

- *When characters overlap because of fine adjustments to the character-to-character space.* Use fine adjustment values that do not cause the characters to overlap.
- *When items such as lines or characters are positioned over the outline font area.* For font types A, B, and K, set the fine adjustment value so that other items do not overlap the area in which the outline font is to be drawn. For font types E, F, and G, set the fine adjustment value so that other items do not overlap the area designated by the character width and height.

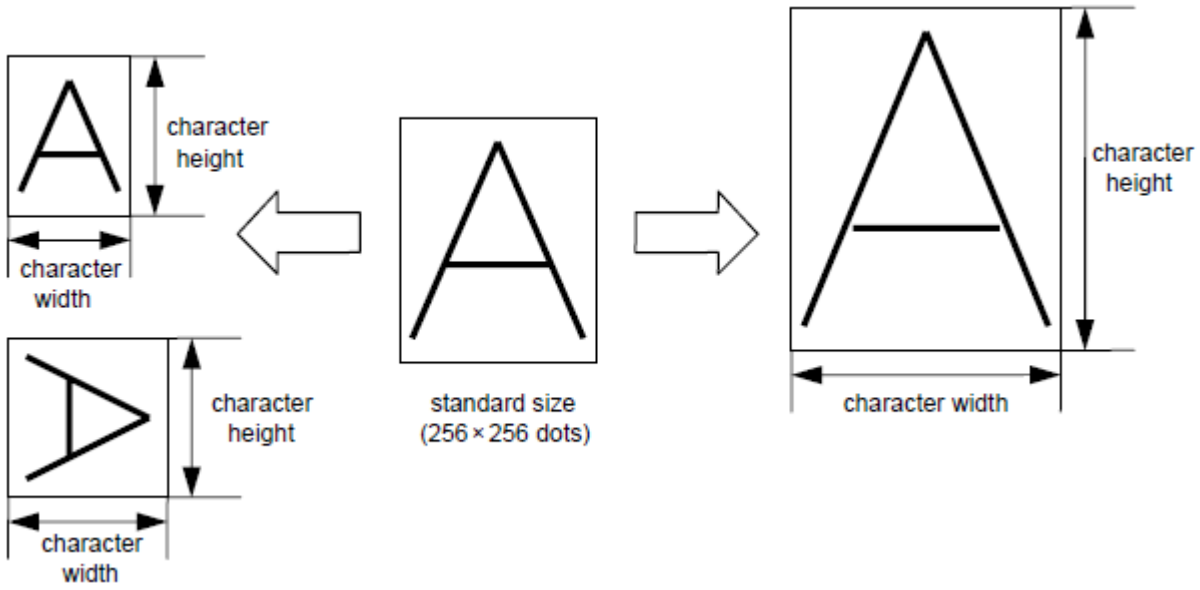
The check digit attachment, increment/decrement, and zero suppression are prioritized as follows. If any of the conditions is invalid, no drawing takes place.

increment/decrement > zero suppression > attachment of check digit

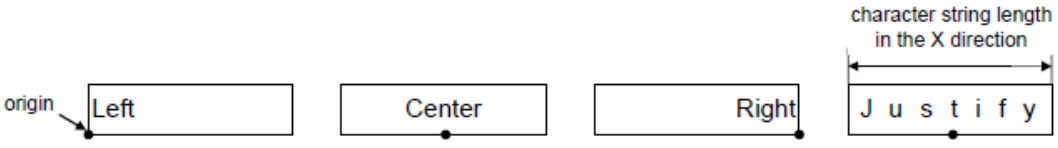
Example 1 • The print origin of coordinates must be set so that the character drawing result is within the print area set by *[ESC] D* on page 41.



Example 2 • Examples of character width and character height, based on text orientation



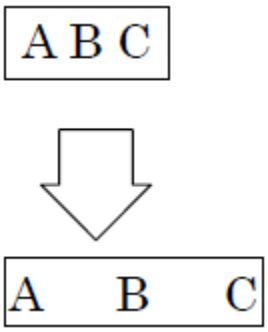
Example 3 • How alignment affects text placement



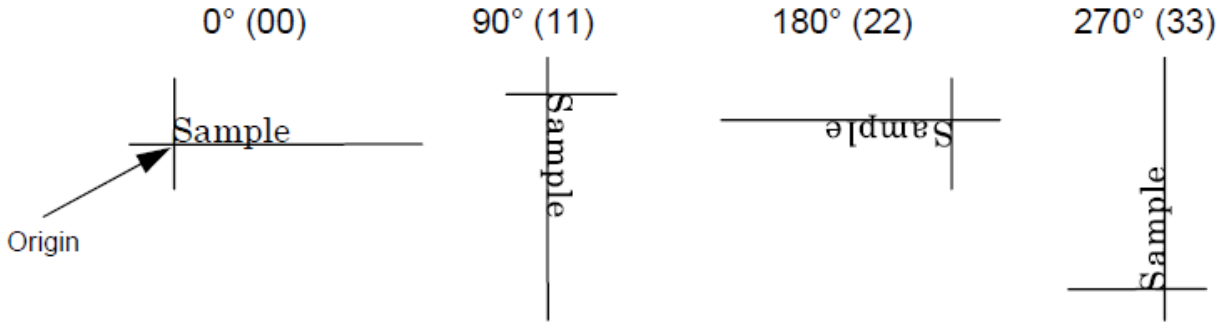
If characters are not all on one line when justification and automatic line feed are specified, the printer calculates the width automatically. If the width is less than the 2-mm minimum for the outline font, the printer does not draw that field.

Example 4 • Example of fine adjustment of character-to-character space

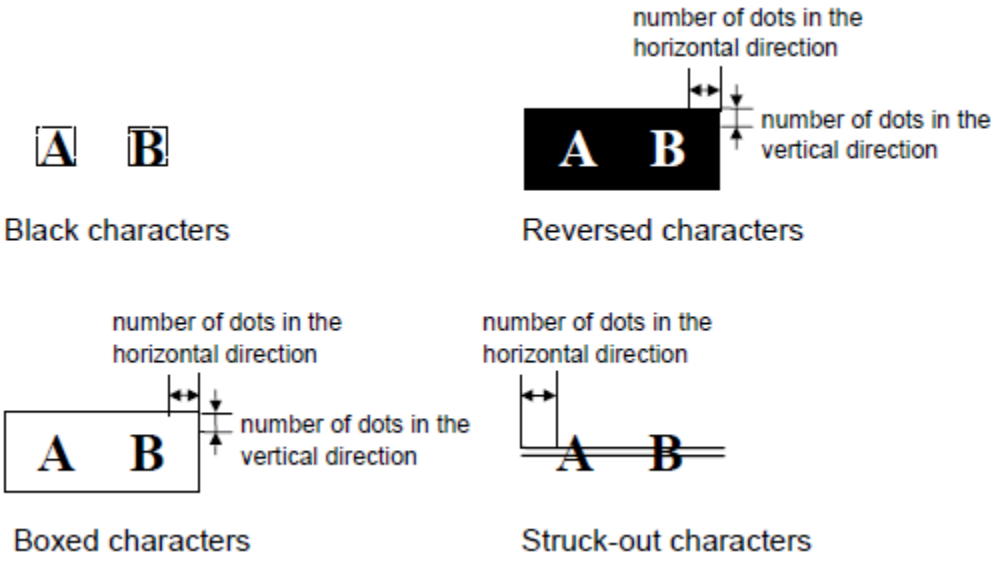
If no character-to-character space is specified or if the number of dots of space between characters is zero, drawing takes place according to horizontal spacing/proportional spacing determined for each character. If a character-to-character space is specified, this value is added to the character spacing/proportional spacing. If alignment is set to justify, the character-to-character spacing is ignored. The amount that horizontal spacing/proportional spacing is changed depends on the character size.



Example 5 • Example of rotational angles



Example 6 • Example of character attributes



Example 7 • The printer prints while data is incremented or decremented each time that a label format is sent. If a data row exceeds 40 digits, the row is not drawn.

Initial value	0000	0000	0000	0000	999999
INC/DEC	+10	+10	+10	+10	+1
Zero suppression	not designated	5	3	0	3
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

(? indicates a space but does not print.)

Example 8 • Handling of letters and numerals for incrementing/decrementing

The data string can include up to 40 digits of letters, numerals, and symbols. Only the numerals are subjected to incrementing/decrementing. The incremented/decremented value is returned to the position of the original numeral for printing.

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 9 • Zero suppression works by replacing leading zeroes with spaces, according to the specified number of digits. In instances where the number of digits after zero suppression is greater than the data row, the printer draws the data row without performing zero suppression. If a data row exceeds 40 digits, the data row is not drawn.

Number of digits after zero suppression	**0**	**1**	**2**	**2**	**3**	**4**	**5**
data	0000	0000	0000	0A12	0123	0123	0123
print result	0000	???0	??00	?A12	?123	0123	0123

(? indicates a space but does not print.)

Example 10 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PV01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PV02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PV03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

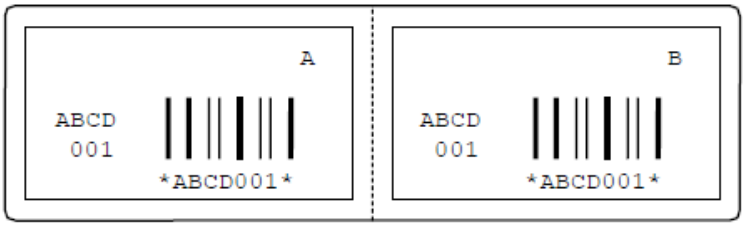
[ESC] PV04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PV05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PV06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

[ESC] RV; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

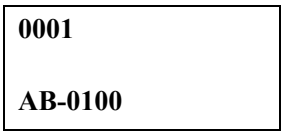
Link field 4
Link field 3
Link field 2
Link field 1

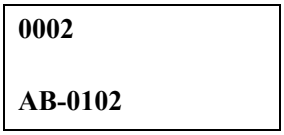


Example 11 • The printer can draw up to 32 fields for which increment/decrement has been designated. If the total number of bitmap font, outline font, and barcode increment/decrement fields is greater than 32, drawing takes place without incrementing/decrementing more than the first 32 fields. The fields are incremented or decremented as specified until the Image Buffer Clear command (*[ESC] C* on page 50) is transmitted.

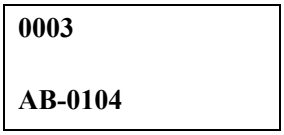
This sample shows how you would send commands to increment/decrement different fields on labels:

1. Command: Format (incrementing character string number 001 (+1))
2. Command: Format (non-incrementing character string number 002)
3. Command: Format (incrementing character string number 003 (+2))
4. Command: Image Buffer Clear
5. Command: Data (character string number 001 “0001”)
6. Command: Data (character string number 002 “AB-”)
7. Command: Data (character string number 003 “0100”)
8. Command: Issue (2 labels)

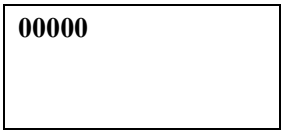




9. Command: Issue (1 label)

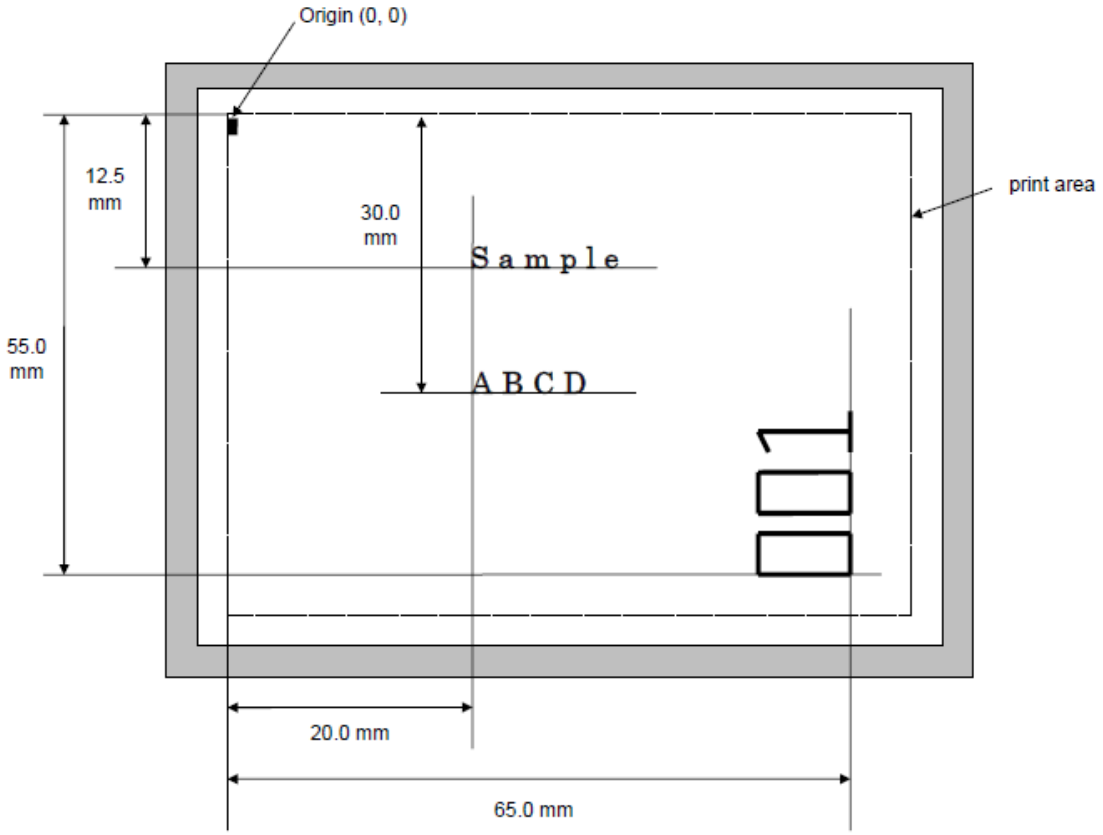


10. Command: Image Buffer Clear
11. Command: Data (character string number 02 “00000”)
12. Command: Issue (1 label)



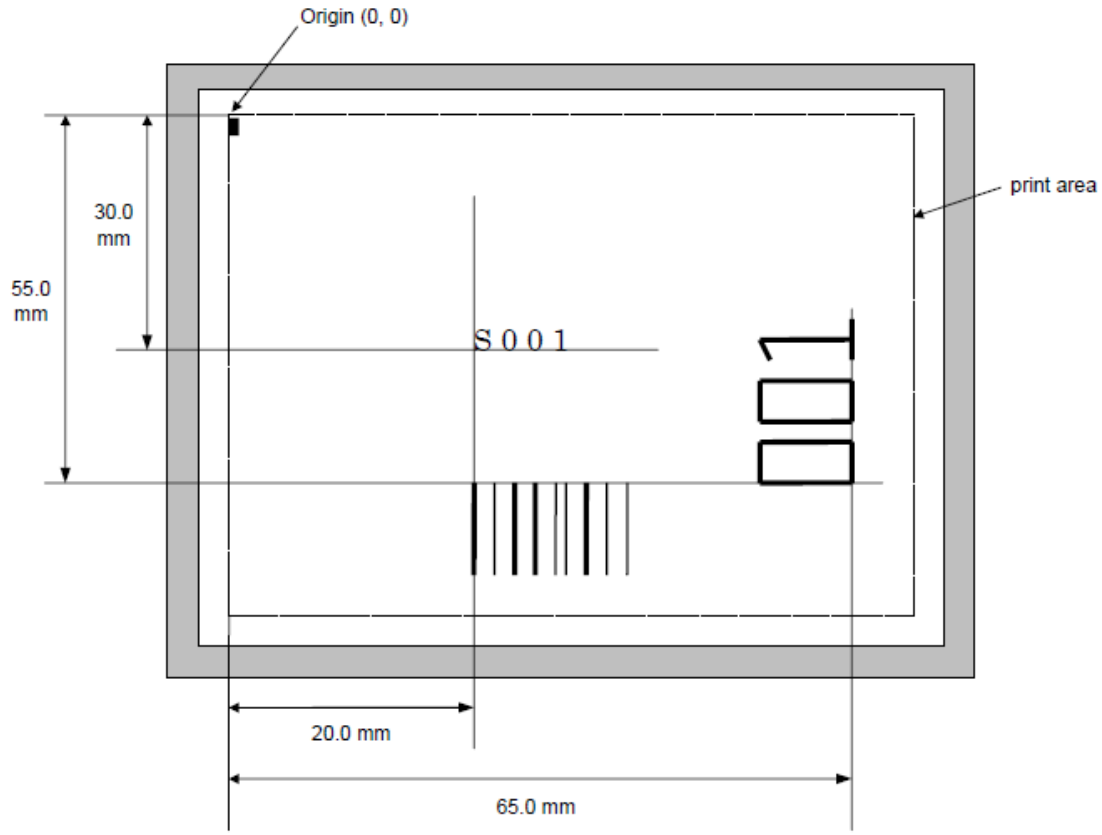
Example 12 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] PV00; 0200, 0300, 0080, 0080, B, 00, B=ABCD [LF]
[NUL]
[ESC] PV01; 0200, 0125, 0100, 0100, B, 00, B [LF] [NUL]
[ESC] PV02; 0650, 0550, 0200, 0150, B, 33, B, +0000000001
[LF] [NUL]
[ESC] RV01; Sample [LF] [NUL]
[ESC] RV02; 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



Example 13 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] PC001; 0200, 0300, 1, 1, C, 00, B; 01, 02 [LF] [NUL]
[ESC] PV01; 0650, 0550, 0200, 0150, B, 33, B; 02 [LF]
[NUL]
[ESC] XB01; 0200, 0550, 3, 1, 03, 03, 08, 08, 03, 0, 0150;
01, 02 [LF] [NUL]
[ESC] RV; S [LF] 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] XB

Description Specify a Barcode or Two-Dimensional Code Format

[ESC] XB — WPC, CODE93, CODE128, UCC/EAN128, EAN128, POSTNET

(WPC is the generic name for JAN, EAN, and UPC barcodes.)

Syntax This command has two possible formats:

```
[ESC] XBa; b, c, d, e, f, k, l (, mn, o, p, q) (= s ------ s)
[LF] [NUL]
```

```
[ESC] XBa; b, c, d, e, f, k, l (, mn, o, p, q)
(; t1, t2, t3, ------, t20) [LF] [NUL]
```

Range

a = the barcode number. Must be two digits.

00 to 31

b = the X coordinate of the print origin of the barcode. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

0100 to 1057

Fixed at 4 digits (in 0.1 mm units)

c = the Y coordinate of the print origin of the barcode. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = 0100 to 9999

5 digits = 00100 to 09999

d = the type of barcode (See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples.)

Barcode	Description
0	JAN8, EAN8
5	JAN13, EAN13
6	UPC-E
7	EAN-13 + 2digits
8	EAN-13 + 5digits
9	CODE128 (with auto code selection)
A	CODE128 (without auto code selection)
C	CODE93
G	UPC-E + 2 digits
H	UPC-E + 5 digits
I	EAN-8 + 2 digits
J	EAN-8 + 5 digits
K	UPC-A
L	UPC-A + 2 digits
M	UPC-A + 5 digits
N	UCC/EAN128
U	POSTNET (Postal code for U.S.A.)

e = the type of check digit

1 = continue without attaching check digit

2 = perform check digit check

WPC	Modulus 10
CODE93	Modulus 47
CODE128	PSEUDO 103

3 = check digit auto attachment 1*

WPC	Modulus 10
CODE93	Modulus 47
CODE128	PSEUDO 103
UCC/EAN128 or EAN128	PSEUDO 103
POSTNET	Special check digit

4 = check digit auto attachment 2

WPC	Modulus 10 + Price C/D 4 digits

5 = check digit auto attachment 3

WPC	Modulus 10 + Price C/D 5 digits

* For the POSTNET barcode, only option 3 is available.

f = 1-module width (in dots). Must be two digits.

01 to 15

k = rotational angle of barcodes

0	0°
1	90°
2	180°
3	270°

l = the barcode height. Specified in 0.1 mm (0.0039 in.) increments.

0000 to 1000

For the POSTNET barcode, this parameter sets the height of the long bar.

mn = increment and decrement* (Can be omitted, in which case no increment/decrement is performed.)

m = specifies whether to increment or decrement

\+ = Increment

– = Decrement

n = skip value. Must be ten digits.

0000000000 to 9999999999

* Cannot be set when the POSTNET barcode is specified.

o =Reserved. Any value specified is ignored.

p = specify whether to print numerals under barcodes* (Can be omitted, in which case no numerals are printed.)

0 = do not print the numerals

1 = print the numerals

* Cannot be set when the POSTNET barcode is specified.

q = zero suppression* (Can be omitted, in which case zero suppression is not performed.)

q = number of digits after zero suppression. Must be two digits.

00 to 20

* Cannot be set when the POSTNET barcode is specified.

s = a data string to be printed* (Can be omitted.)
126 digits maximum

* The actual number of digits that you can use varies according to the barcode type.

t1, *t2*, *t3*, ..., *t20* = up to 20 link field numbers, separated by commas (Can be omitted.)
01 to 99 or 1 to 99

Notes This command specifies where and how a specific barcode is to be printed. When drawing using the Data Command (*[ESC] RB* on page 146), the format specified by the barcode number is used.

This command and its parameters allow you to do the following:

- You can specify whether numerals are printed under barcode bars. How numerals print under the bars varies according to the barcode type, but the font used is always OCR-B. These numerals may be enlarged or reduced horizontally based on the barcode width. If the numerals are drawn vertically, they are not enlarged or reduced. See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for samples of barcodes with numerals under the bars.
- You can transmit more than one Barcode Format (`[ESC] XB`) command at a time:

```
[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]
```

- You can program drawing data by designating a number of digits after the = symbol. The barcode number determines the number of digits of digits that can be printed. If the number of characters exceeds the maximum number of digits, the excess data will be discarded.

In situations where the drawing data changes for each label during printing, the printer automatically clears the data from the previous label and then prints the next instance of drawing data.

Because the drawing data field is not cleared between the Clear command (*[ESC] C* on page 50) and Issue command (*[ESC] XS* on page 155), fixed data may be drawn using the same barcode number that was used for the last drawing. Because of this, the Format command and Data command should be sent alternately.

You can clear the link field designation by omitting the link field designation while using the same barcode number and reformatting data. You can also use the Clear command (*[ESC] C* on page 50). A print data string and a link field number cannot be programmed at the same time.

The check digit attachment, increment/decrement, and zero suppression are prioritized as follows. If any of the conditions is invalid, no drawing takes place.

increment/decrement > zero suppression > attachment of check digit

Check Digits

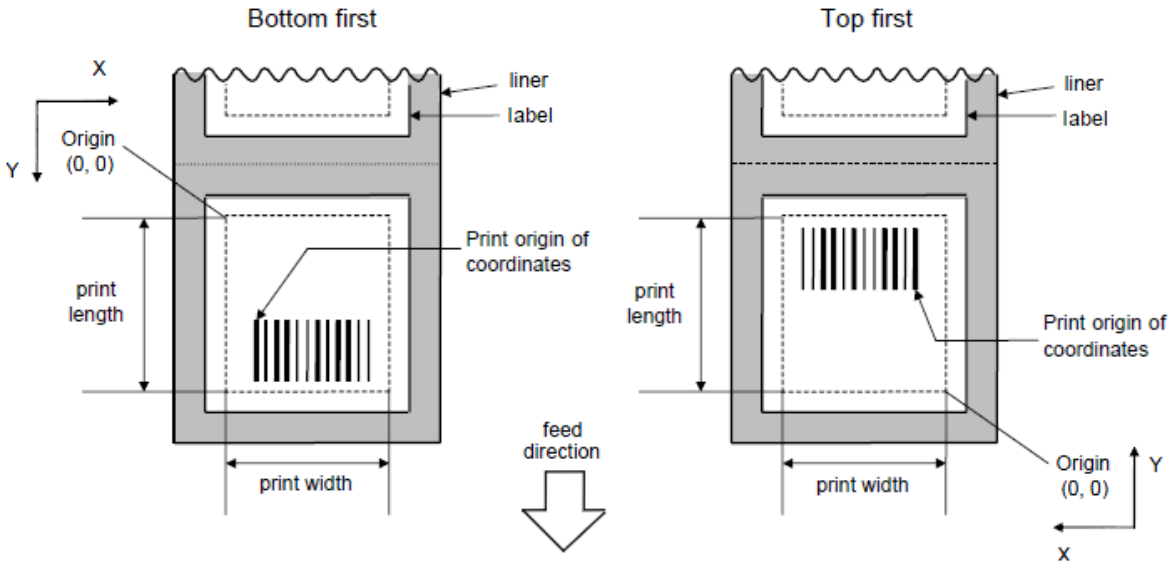
If no check digit is attached, the printer draws a barcode of the data row.

For those instances where a check digit check is performed, the check is performed according to the type of barcode. If the results are normal, the printer draws a barcode. If the results are improper, the printer does not draw a barcode.

For those instances where the check digit is attached automatically, each check digit is attached according to the type of barcode when a barcode is drawn.

With barcode types CODE93, CODE128 (with auto code selection), and UCC/EAN128 or EAN128, the check digit is always attached regardless of the designation of the type of check digit. With barcode types JAN, EAN, or UPC, the designation of no check digit attachment automatically assumes the check digit check.

Example 1 • The print origin of coordinates must be set so that the drawing result is within the print area set by *[ESC] D* on page 41. See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples of the barcodes.



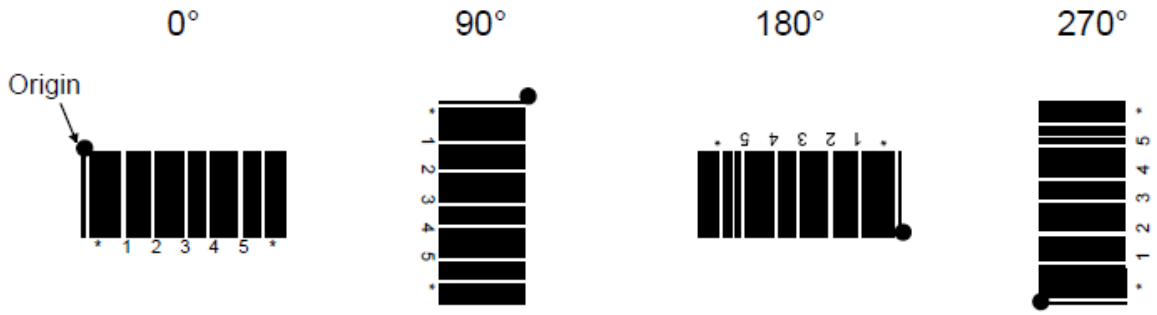
Example 2 • Bar width, space width, and character-to-character space width

The width of bars, spaces, and character-to-character spaces are designated according to the type of barcode. The correct values to use differ based on factors such as the rotational angle of the barcode, the barcode type, the number of digits, the print speed, and the media used.

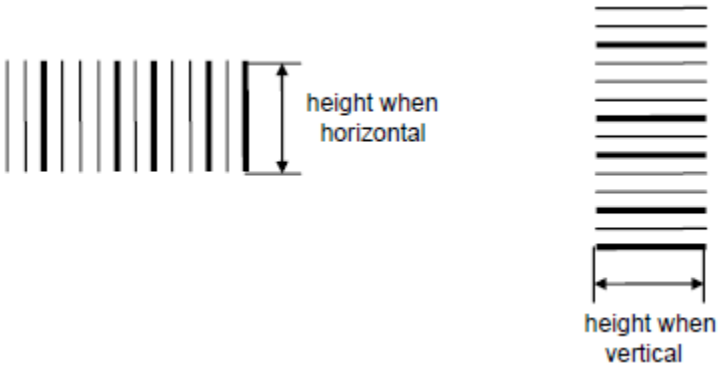
With the barcodes in the following example, the width of modules 2 to 6 is calculated automatically based on what you designate for a 1-module width. With a 203-dpi printhead, one dot = 1/8 mm.

Barcode type	1 module		2 modules		3 modules		4 modules		5 modules		6 modules	
	bar	space	bar	space	bar	space	bar	space	bar	space	bar	space
JAN, EAN, UPC	3		6		9		12		-		-	
CODE93	2		4		6		8		-		-	
CODE128, UCC/EAN128, EAN128	2		4		6		8		-		-	

Example 3 • Rotational angle of barcodes



Example 4 • Barcode height determination



Example 5 • The printer prints while data is incremented or decremented each time that a label format is sent. If a data row exceeds 40 digits, the row is not drawn. If you

use CODE128 (without auto code selection), 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
Zero suppression	not designated	5	3	0	3
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

(? indicates a space but does not print.)

Example 6 • Handling of letters and numerals for incrementing/decrementing

The data string can include up to 40 digits of letters, numerals, and symbols. Only the numerals are subjected to incrementing/decrementing. The incremented/decremented value is returned to the position of the original numeral for printing.

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

With CODE93 and CODE128, increment/decrement is performed even if a data string other than numerals are included in the data. However, increment/decrement is not performed if code that does not exist in barcode table is contained in the data. See *Barcode/Two-Dimensional Code Tables* on page 201 for more information.

Example 7 • Incrementing/decrementing of data, including the special codes of CODE128

Incrementing/decrementing calculation starts from the rightmost digit in the data strings. If the data string to be calculated is numeric and the next digit to the left is a > symbol (such as that shown underlined in the following table), these two digits are skipped, and the next digit is incremented/decremented.

Example of increment/decrement calculation of CODE128

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

Example 8 • Zero suppression works by replacing leading zeroes with spaces, according to the specified number of digits. In instances where the number of digits after zero suppression is greater than the data row, the printer draws the data row without performing zero suppression. If a data row exceeds 40 digits, the data row is not drawn.

Number of digits after zero suppression	**0**	**1**	**2**	**2**	**3**	**4**	**5**
data	0000	0000	0000	0A12	0123	0123	0123
print result	0000	???0	??00	?A12	?123	0123	0123

(? indicates a space but does not print.)

When you send print data that includes start/stop codes, the start/stop codes are each counted as one digit. Zero suppression is not performed when the barcode type is JAN, EAN, UPC, UCC/EAN 128, or EAN128.

Example 9 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

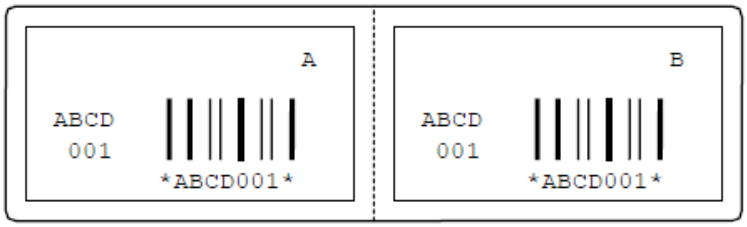
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

[ESC] RB; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



Example 10 • The printer can draw up to 32 fields for which increment/decrement has been designated. If the total number of bitmap font, outline font, and barcode increment/decrement fields is greater than 32, drawing takes place without incrementing/decrementing more than the first 32 fields. The fields are incremented or decremented as specified until the Image Buffer Clear command (*[ESC] C* on page 50) is transmitted.

This sample shows how you would send commands to increment/decrement different fields on labels:

1. Command: Format (incrementing barcode number 01 (+1))
2. Command: Format (incrementing barcode number 02 (+2))
3. Command: Image Buffer Clear
4. Command: Data (barcode number 01 “0001”)
5. Command: Data (barcode number 02 “0100”)
6. Command: Issue (2 labels)

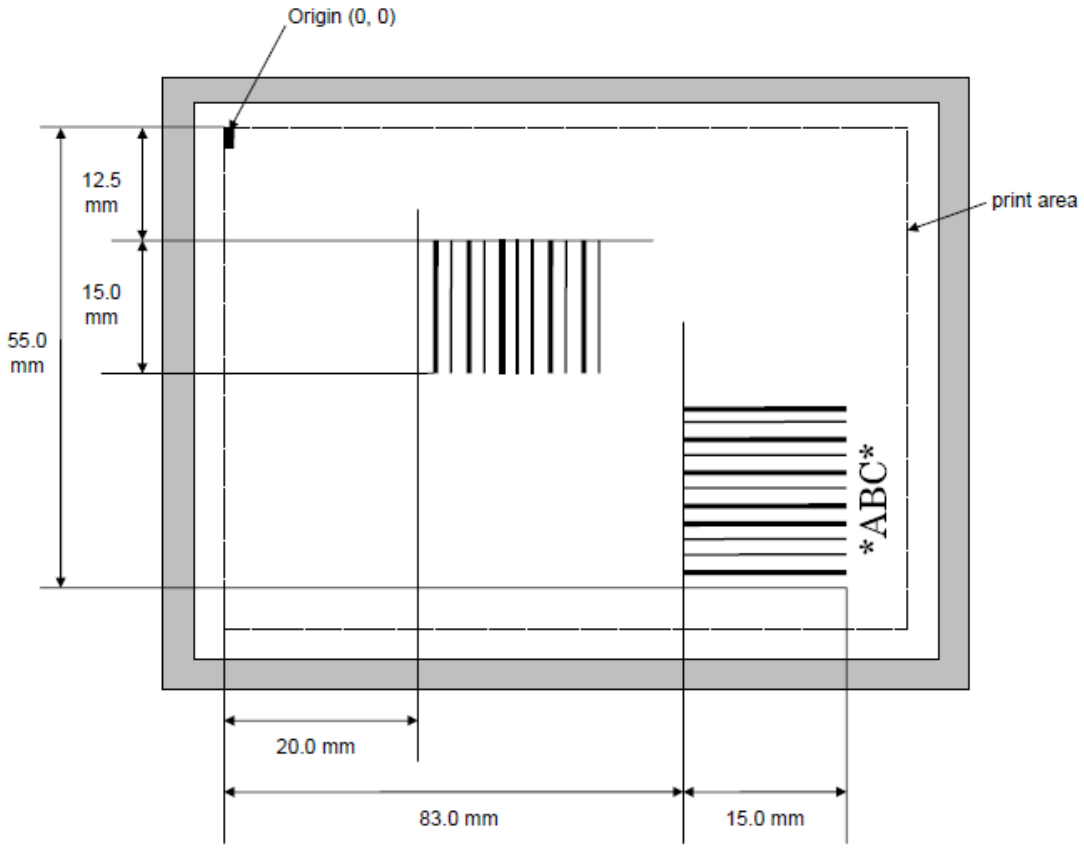
7. Command: Issue (1 label)

8. Command: Image Buffer Clear
9. Command: Data (barcode number 02 “3000”)

10. Command: Issue (1 label)

Example 11 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, 9, 3, 02, 0, 0150, +0000000000,
010, 0, 00 = 12345 [LF] [NUL]
[ESC] XB02; 0830, 0550, 3, 1, 02, 04, 07, 08, 04, 3, 0150,
+0000000000, 1, 00, N [LF] [NUL]
[ESC] RB02; *ABC* [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] XB — MSI, Interleaved 2 of 5, CODE39, NW7, Industrial 2 of 5

Syntax This command has two possible formats:

```
[ESC] XBa; b, c, d, e, f, g, h, i, j, k, l (, mn, p, q) (,
r)
(= s ------ s) [LF] [NUL]
```

```
[ESC] XBa; b, c, d, e, f, g, h, i, j, k, l (, mn, p, q) (,
r)
(; t1, t2, t3, ------, t20) [LF] [NUL]
```

Range

a = the barcode number. Must be two digits.

00 to 31

b = the X coordinate of the print origin of the barcode. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

0100 to 1057

Fixed at 4 digits (in 0.1 mm units)

c = the Y coordinate of the print origin of the barcode. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = 0100 to 9999

5 digits = 00100 to 09999

d = the type of barcode (See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples.)

1 = MSI

2 = Interleaved 2 of 5 (ITF)

3 = CODE39 (standard)

4 = NW7

B = CODE39 (full ASCII) O: Industrial 2 of 5

e = the type of check digit

1 = continue without attaching check digit

2 = perform check digit check

CODE39	Modulus 43
MSI	IBM modulus 10
ITF	Modulus 10
Industrial 2 of 5	Modulus check character

3 = check digit auto attachment 1

CODE39	Modulus 43
MSI	IBM modulus 10
ITF	Modulus 10
Industrial 2 of 5	Modulus check character

4 = check digit auto attachment 2

MSI	IBM modulus 10 + IBM modulus 10
ITF	DBP Modulus 10*

5 = check digit auto attachment 3

MSI	IBM modulus 11 + IBM modulus 10

* DBP Modulus 10 is Modulus 10 for Deutsche Bundespost Postdienst only.

f = the narrow bar width (in dots)

01 to 99

g = the narrow space width* (in dots)

01 to 99

* For Industrial 2 of 5, designate an element-to-element space.

h = the wide bar width (in dots)

01 to 99

i = the wide space width* (in dots)

01 to 99

For Industrial 2 of 5, the value is fixed at 00.

j = the character-to-character space width* (in dots)

01 to 99

* For MSI and ITF, the character-to-character space width is fixed at 00.

k = rotational angle of barcodes

0	0°
1	90°
2	180°
3	270°

l = the barcode height. Specified in 0.1 mm (0.0039 in.) increments.

0000 to 1000

For the POSTNET barcode, this parameter sets the height of the long bar.

mn = increment and decrement (Can be omitted, in which case no increment/decrement is performed.)

l = specifies whether to increment or decrement

\+ = Increment

– = Decrement

m = skip value. Must be ten digits.

0000000000 to 9999999999

p = specify whether to print numerals under barcodes (Can be omitted, in which case no numerals are printed.)

0 = do not print the numerals

1 = print the numerals

q = zero suppression (Can be omitted, in which case zero suppression is not performed.)

q = number of digits after zero suppression. Must be two digits.

00 to 20

r = specify whether to attach start/stop codes* (Can be omitted, in which case the start/stop codes are attached automatically.) For more information, see *Automatic Addition of Start/Stop Codes* on page 249.

T = attach start code only

P = attach stop code only

N = do not attach start/stop codes

* Applies only when the barcode type is CODE39 or NW7.
For CODE39, “*” is added. For NW7, “a” is added.

s = a data string to be printed* (Can be omitted.)
126 digits maximum

* The actual number of digits that you can use varies according to the barcode type.

t1, *t2*, *t3*, ..., *t20* = up to 20 link field numbers, separated by commas (Can be omitted.)
01 to 99 or 1 to 99

Notes This command specifies where and how a specific barcode is to be printed. When drawing using the Data Command (*[ESC] RB* on page 146), the format specified by the barcode number is used.

This command and its parameters allow you to do the following:

- You can specify whether numerals are printed under barcode bars. How numerals print under the bars varies according to the barcode type, but the font used is always OCR-B. These numerals may be enlarged or reduced horizontally based on the barcode width. If the numerals are drawn vertically, they are not enlarged or reduced. See *Barcode Fonts* on page 190 for samples of barcodes with numerals under the bars.
- You can transmit more than one Barcode Format (`[ESC] XB`) command at a time:

  ```
  [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]
  ```

- You can program drawing data by designating a number of digits after the = symbol. The barcode number determines the number of digits of digits that can be printed. If the number of characters exceeds the maximum number of digits, the excess data will be discarded.

In situations where the drawing data changes for each label during printing, the printer automatically clears the data from the previous label and then prints the next instance of drawing data.

Because the drawing data field is not cleared between the Clear command (*[ESC] C* on page 50) and Issue command (*[ESC] XS* on page 155), fixed data may be drawn using the same barcode number that was used for the last drawing. Because of this, the Format command and Data command should be sent alternately. (After you send the Issue command, the fields with the same barcode number are automatically cleared until you send the Clear command.)

You can clear the link field designation by omitting the link field designation while using the same barcode number and reformatting data. You can also use the Clear command (*[ESC] C* on page 50). A print data string and a link field number cannot be programmed at the same time.

The check digit attachment, increment/decrement, and zero suppression are prioritized as follows. If any of the conditions is invalid, no drawing takes place.

increment/decrement > zero suppression > attachment of check digit

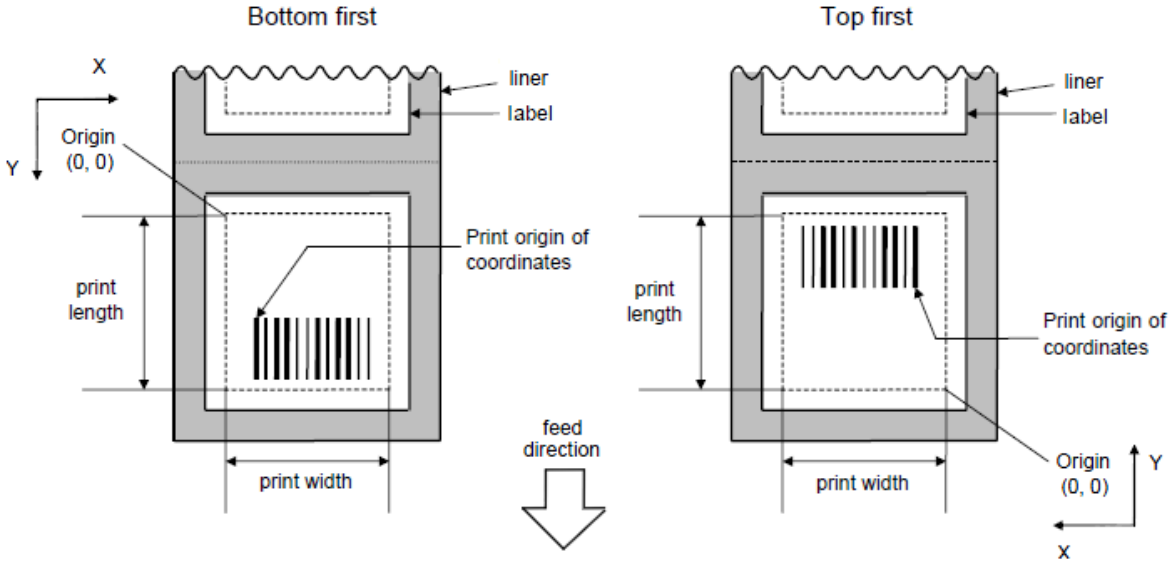
Type of Check Digit

If no check digit is attached, the printer draws a barcode of the data row.

For those instances where a check digit check is performed, the check is performed according to the type of barcode. If the results are normal, the printer draws a barcode. If the results are improper, the printer does not draw a barcode.

For those instances where the check digit is attached automatically, each check digit is attached according to the type of barcode when a barcode is drawn.

Example 1 • The print origin of coordinates must be set so that the drawing result is within the print area set by *[ESC] D* on page 41. See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples of the barcodes.



Example 2 • Bar width, space width, and character-to-character space width

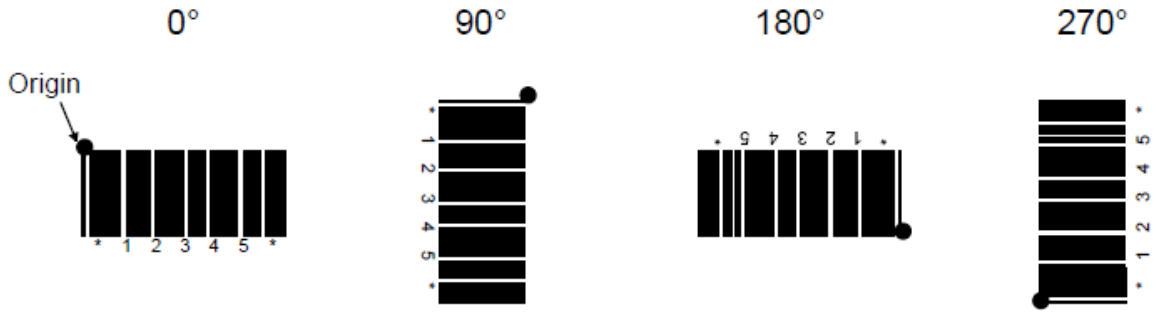
The width of bars, spaces, and character-to-character spaces are designated according to the type of barcode. The correct values to use differ based on factors such as the rotational angle of the barcode, the barcode type, the number of digits, the print speed, and the media used.

With a 203-dpi printhead, one dot = 1/8 mm.

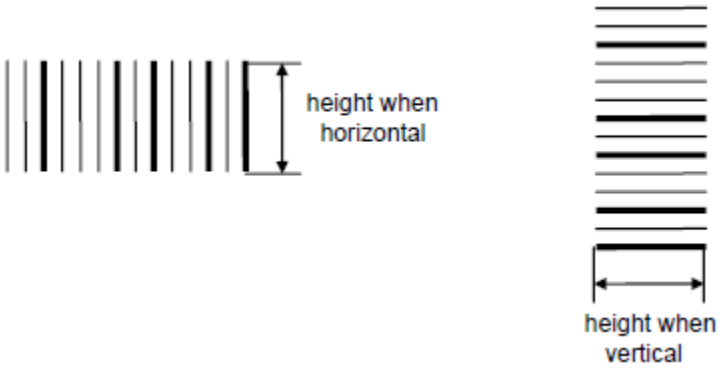
Barcode type	narrow		wide		character-to-character space
	bar	space	bar	space	
MSI	2	2	6	6	0
ITF	2	2	6	6	0
CODE39	2	2	6	6	2
NW7	2	2	6	6	2
Industrial 2 of 5	2	2	6	0	2

With NW7, when the space character is transmitted, the printer assumes that a space equals the width of a narrow space x 12 dots. The maximum width is 255 dots.

Example 3 • Rotational angle of barcodes



Example 4 • Barcode height determination



Example 5 • The printer prints while data is incremented or decremented each time that a label format is sent. If a data row exceeds 40 digits, the row is not drawn.

Initial value	0000	0000	0000	0000	999999
INC/DEC	+10	+10	+10	+10	+1
Zero suppression	not designated	5	3	0	3
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

(? indicates a space but does not print.)

Example 6 • Handling of letters and numerals for incrementing/decrementing

The data string can include up to 40 digits of letters, numerals, and symbols. Only the numerals are subjected to incrementing/decrementing. The incremented/decremented value is returned to the position of the original numeral for printing.

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

For CODE39 (standard), CODE39 (full ASCII), and NW-7, even if a data string other than numerals are included in the data, increment/decrement is performed. However, if any code which does not exist in each barcode table is contained in the data, increment/decrement is not performed. See *Barcode/Two-Dimensional Code Tables* on page 201 for more information.

Example 7 • Zero suppression works by replacing leading zeroes with spaces, according to the specified number of digits. In instances where the number of digits after zero suppression is greater than the data row, the printer draws the data row without performing zero suppression. If a data row exceeds 40 digits, the data row is not drawn.

Number of digits after zero suppression	**0**	**1**	**2**	**2**	**3**	**4**	**5**
data	0000	0000	0000	0A12	0123	0123	0123
print result	0000	???0	??00	?A12	?123	0123	0123

(? indicates a space but does not print.)

When you send print data that includes start/stop codes, the start/stop codes are each counted as one digit.

Example 8 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

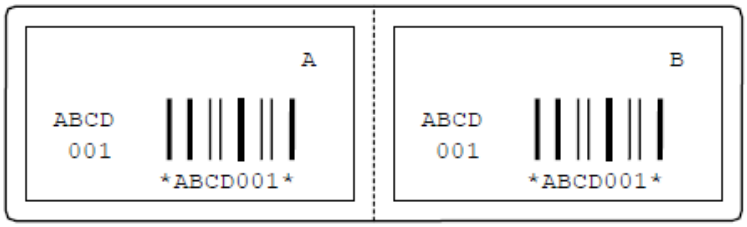
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

[ESC] RB; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



Example 9 • The printer can draw up to 32 fields for which increment/decrement has been designated. If the total number of bitmap font, outline font, and barcode increment/decrement fields is greater than 32, drawing takes place without incrementing/decrementing more than the first 32 fields. The fields are incremented or decremented as specified until the Image Buffer Clear command (*[ESC] C* on page 50) is transmitted.

This sample shows how you would send commands to increment/decrement different fields on labels:

1. Command: Format (incrementing barcode number 01 (+1))
2. Command: Format (incrementing barcode number 02 (+2))
3. Command: Image Buffer Clear
4. Command: Data (barcode number 01 “0001”)
5. Command: Data (barcode number 02 “0100”)
6. Command: Issue (2 labels)

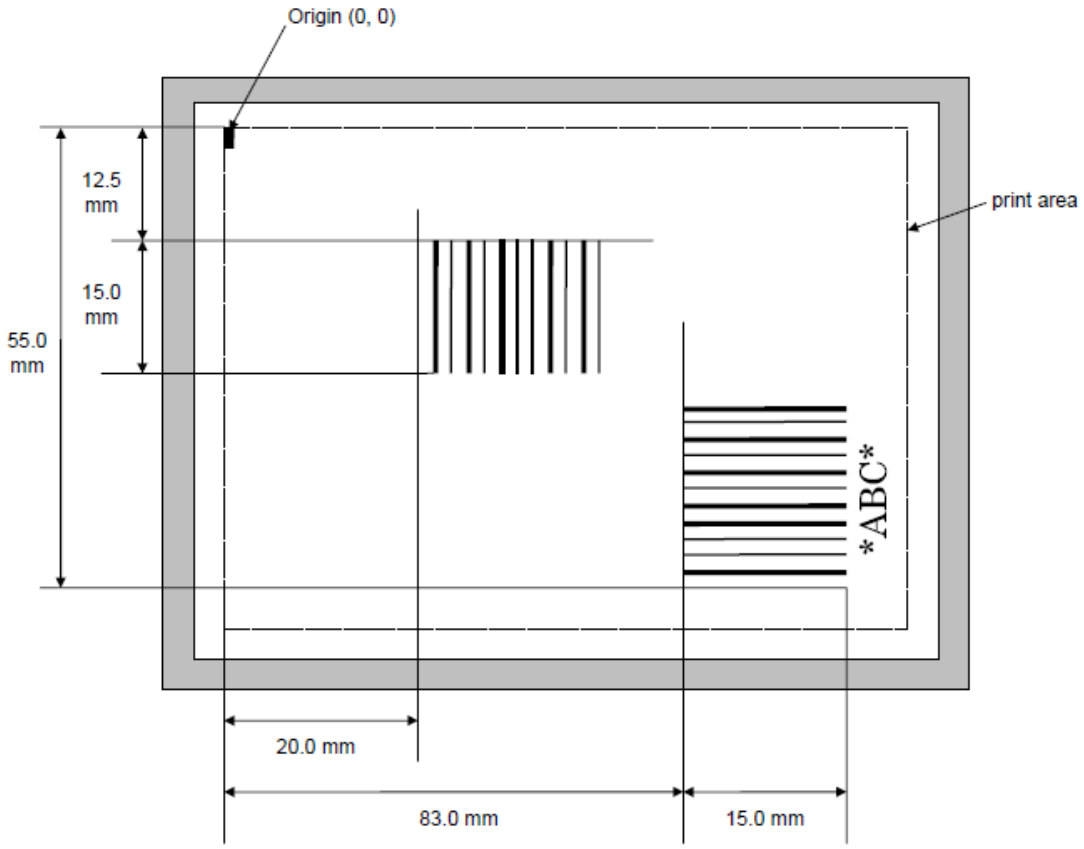
7. Command: Issue (1 label)

8. Command: Image Buffer Clear
9. Command: Data (barcode number 02 “3000”)

10. Command: Issue (1 label)

Example 10 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, 3, 1, 02, 02, 06, 06, 02, 0, 0150
= 12345 [LF] [NUL]
[ESC] XB02; 0830, 0550, 3, 1, 02, 04, 07, 08, 04, 3, 0150,
+0000000000, 1, 00, N [LF] [NUL]
[ESC] RB02; *ABC* [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] XB — GS1 Databar

Syntax This command has two possible formats:

```
[ESC] XBa; b, c, d, e, f, g, h (, ij, k) (= s ------ s)
[LF] [NUL]
```

```
[ESC] XBa; b, c, d, e, f, g, h (, ij, k) (; t1, t2, t3, -
-----, t20) [LF] [NUL]
```

Range

a = the barcode number. Must be two digits.

00 to 31

b = the X coordinate of the print origin of the barcode. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

0100 to 1057

Fixed at 4 digits (in 0.1 mm units)

c = the Y coordinate of the print origin of the barcode. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = 0100 to 9999

5 digits = 00100 to 09999

d = the type of barcode (See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples.)

b = GS1 Databar family

e = GS1 Databar version

1 = GS1 Databar Omni-directional

2 = GS1 Databar Stacked

3 = GS1 Databar Stacked Omni-directional

4 = GS1 Databar Limited

5 = GS1 Databar Expanded

6 = GS1 Databar Expanded Stacked

f = 1-module width (in dots). Must be two digits.

01 to 15

g = rotational angle of barcodes

0	0°
1	90°
2	180°
3	270°

h = the height of the barcode. Must be four digits.

0000 to 1000 (in 0.1 mm/0.0039 in. increments)

ij = increment and decrement (Can be omitted, in which case no increment/decrement is performed.)

i = specifies whether to increment or decrement

\+ = Increment

– = Decrement

j = skip value. Must be ten digits.

0000000000 to 9999999999

k = zero suppression (Can be omitted, in which case zero suppression is not performed.)
k = number of digits after zero suppression. Must be two digits.
00 to 20
s = a data string to be printed* (Can be omitted.)
126 digits maximum
* The actual number of digits that you can use varies according to the barcode type.
t1, *t2*, *t3*, ..., *t20* = up to 20 link field numbers, separated by commas (Can be omitted.)
01 to 99 or 1 to 99

Notes This command specifies where and how a specific barcode is to be printed. When drawing using the Data Command (*[ESC] RB* on page 146), the format specified by the barcode number is used.

If the barcode height is set to 0000, the printer clears the previous barcode's information from memory but does not print a barcode.

This command and its parameters allow you to do the following:

- You can transmit more than one Barcode Format ([ESC] XB) command at a time:

```
[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]
```

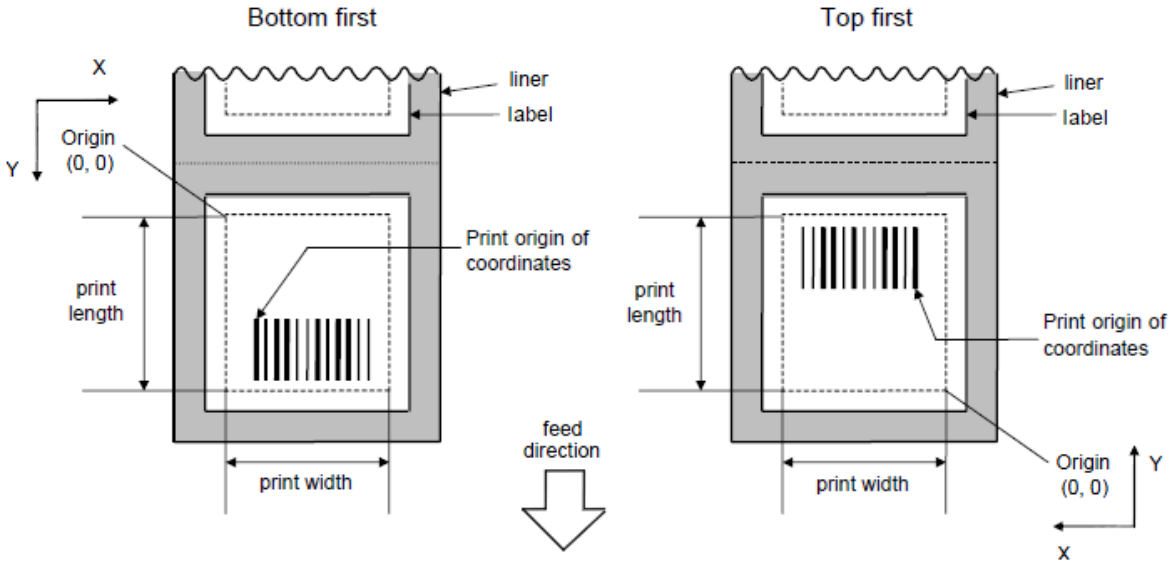
- You can program drawing data by designating a number of digits after the = symbol. The barcode number determines the number of digits of digits that can be printed. If the number of characters exceeds the maximum number of digits, the excess data will be discarded.

In situations where the drawing data changes for each label during printing, the printer automatically clears the data from the previous label and then prints the next instance of drawing data.

Because the drawing data field is not cleared between the Clear command (*[ESC] C* on page 50) and Issue command (*[ESC] XS* on page 155), fixed data may be drawn using the same barcode number that was used for the last drawing. Because of this, the Format command and Data command should be sent alternately. (After you send the Issue command, the fields with the same barcode number are automatically cleared until you send the Clear command.)

You can clear the link field designation by omitting the link field designation while using the same barcode number and reformatting data. You can also use the Clear command (*[ESC] C* on page 50). A print data string and a link field number cannot be programmed at the same time.

Example 1 • The print origin of coordinates must be set so that the drawing result is within the print area set by *[ESC] D* on page 41. See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples of the barcodes.



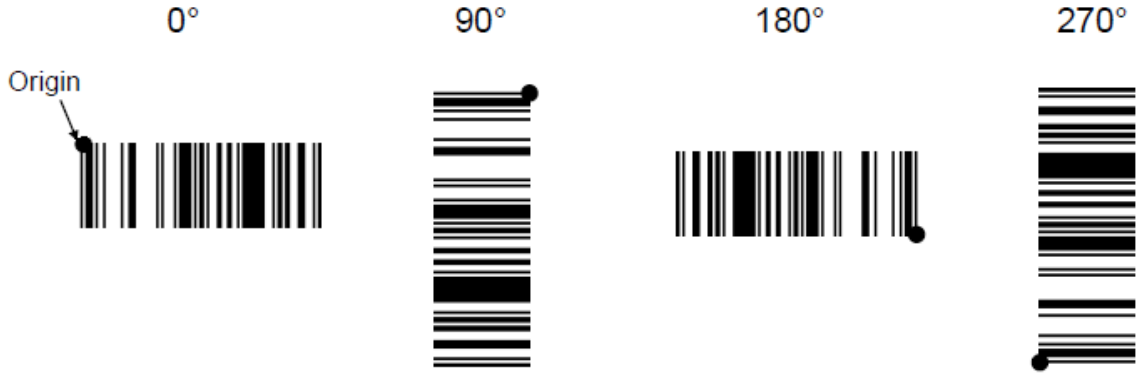
Example 2 • Bar width, space width, and character-to-character space width

The width of bars, spaces, and character-to-character spaces are designated according to the type of barcode. The correct values to use differ based on factors such as the rotational angle of the barcode, the barcode type, the number of digits, the print speed, and the media used.

With GS1 Databar, the width of modules 2 to 4 is calculated automatically based on what you designate for a 1-module width. With a 203-dpi printhead, one dot = 1/8 mm.

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

Example 3 • Example of rotational angles



Example 4 • The printer prints while data is incremented or decremented each time that a label format is sent. If a data row exceeds 40 digits, the row is not drawn. If you use CODE128 (without auto code selection), 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
Zero suppression	not designated	5	3	0	3
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

(? indicates a space but does not print.)

Example 5 • Handling of letters and numerals for incrementing/decrementing

The data string can include up to 40 digits of letters, numerals, and symbols. Only the numerals are subjected to incrementing/decrementing. The incremented/decremented value is returned to the position of the original numeral for printing.

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 6 • Zero suppression works by replacing leading zeroes with spaces, according to the specified number of digits. In instances where the number of digits after zero suppression is greater than the data row, the printer draws the data row without performing zero suppression. If a data row exceeds 40 digits, the data row is not drawn.

Number of digits after zero suppression	**0**	**1**	**2**	**2**	**3**	**4**	**5**
data	0000	0000	0000	0A12	0123	0123	0123
print result	0000	???0	??00	?A12	?123	0123	0123

(? indicates a space but does not print.)

When you send print data that includes start/stop codes, the start/stop codes are each counted as one digit.

Example 7 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

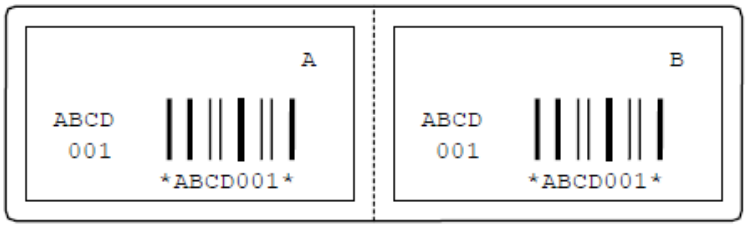
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

[ESC] RB; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



Example 8 • The printer can draw up to 32 fields for which increment/decrement has been designated. If the total number of bitmap font, outline font, and barcode increment/decrement fields is greater than 32, drawing takes place without incrementing/decrementing more than the first 32 fields. The fields are incremented or decremented as specified until the Image Buffer Clear command (*[ESC] C* on page 50) is transmitted.

This sample shows how you would send commands to increment/decrement different fields on labels:

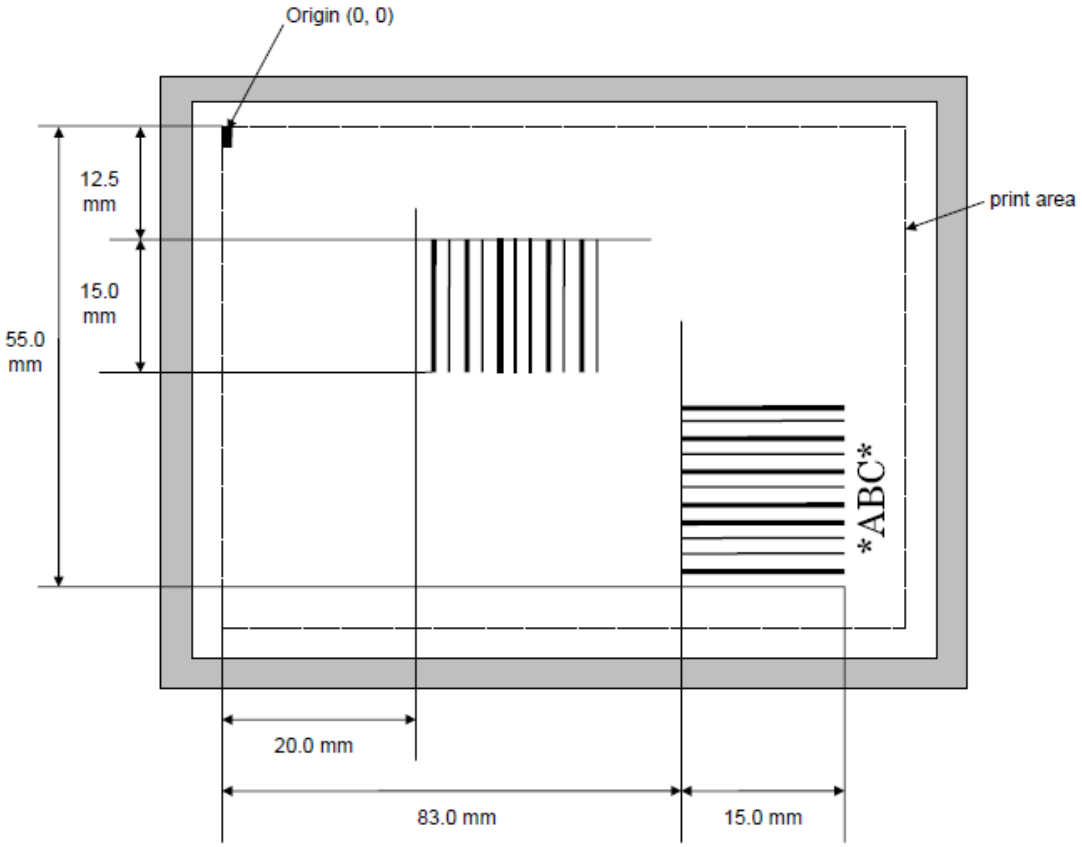
1. Command: Format (incrementing barcode number 01 (+1))
2. Command: Format (incrementing barcode number 02 (+2))
3. Command: Image Buffer Clear
4. Command: Data (barcode number 01 “0001”)
5. Command: Data (barcode number 02 “0100”)
6. Command: Issue (2 labels)

7. Command: Issue (1 label)

8. Command: Image Buffer Clear
9. Command: Data (barcode number 02 “3000”)
10. Command: Issue (1 label)

Example 9 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, 3, 1, 03, 03, 08, 08, 03, 0, 0150
= 12345 [LF] [NUL]
[ESC] XB02; 0830, 0550, 3, 1, 02, 04, 07, 08, 04, 3, 0150,
+0000000000, 1, 00, N [LF] [NUL]
[ESC] RB02; *ABC* [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] XB — Two-Dimensional Code Format (Data Matrix)

Syntax This command has two possible formats:

```
[ESC] XBa; b, c, d, e, f, g, h (, Cij) (, Jklmn)
(= o ------ o) [LF] [NUL]
```

```
[ESC] XBa; b, c, d, e, f, g, h (, Cij) (, Jklmn)
(; p1, p2, p3, ------ , p20) [LF] [NUL]
```

Range

a = the two-dimensional code number. Must be two digits

00 to 31

b = the X coordinate of the print origin of the two-dimensional code. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

0100 to 1057

Fixed at 4 digits (in 0.1 mm units)

c = the Y coordinate of the print origin of the two-dimensional code. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = 0100 to 9999

5 digits = 00100 to 09999

d = the type of two-dimensional code (See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples.)

Q = Data Matrix

e = Error Correction Code (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

f = 1-cell width (in dots)

00 to 99

g = the format ID*

01 = format ID 1
02 = format ID 2
03 = format ID 3
04 = format ID 4
05 = format ID 5
06 = Reserved

* This parameter is ignored when ECC200 is specified for the ECC type. If format IDs of 11 through 16 are designated, ECC200 is automatically selected to ensure backward compatibility with the old model.

h = rotational angle of the two-dimensional code

0	0°
1	90°
2	180°
3	270°

C*ij* = the number of cells* (Can be omitted, in which case the number is set automatically. This number also is set automatically if an invalid value is specified.)

i = the number of cells in the X direction. Must be three digits.
000 to 144

j = the number of cells in the Y direction. Must be three digits.
000 to 144

* The ECC type affects the cell setting as follows:

	ECC000 to ECC140	**ECC200**
The number of cells to be designated	Odd numbers only	Even numbers only
The minimum and maximum number 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

Jklmn = Reserved

o = a data string to be printed* ** (Can be omitted.)
2000 digits maximum

* The actual number of digits that you can use varies according to the ECC type and the content of the data. While 2000 digits of the data string may be accepted and the maximum of 99 dots of the 1-cell width is acceptable, that number of digits cannot be printed because the limitations of the printhead

width. When using a large value for the 1-cell width, decrease the number of digits of data to give the data enough room to print.

** If the print ratio of a line (the printhead width) is too high, printing may become poor, or the printer may reset. When you specify a data string to print, be aware of the print ratio being used.

p1, *p2*, *p3*, ..., *p20* = up to 20 link field numbers, separated by commas (Can be omitted.)

01 to 99 or 1 to 99

Notes This command specifies where and how a specific two-dimensional code is to be printed. When drawing using the Data Command (*[ESC] RB* on page 146), the format specified by the two-dimensional code number is used.

You can program drawing data by designating a number of digits after the = symbol. For this code, you can specify up to 2000 digits, although you should limit the number of digits to what can be printed, based on the width of your printer's printhead. If the number of characters exceeds the maximum number of digits, the excess data will be discarded.

You can transmit more than one Two-Dimensional Code Format ([ESC] XB) command at a time:

```
[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]
```

In situations where the drawing data changes for each label during printing, the printer automatically clears the data from the previous label and then prints the next instance of drawing data.

Because the drawing data field is not cleared between the Clear command (*[ESC] C* on page 50) and Issue command (*[ESC] XS* on page 155), fixed data may be drawn using the same two-dimensional code number that was used for the last drawing. Because of this, the Format command and Data command should be sent alternately. (After you send the Issue command, the fields with the same barcode number are automatically cleared until you send the Clear command.)

You can clear the link field designation by omitting the link field designation while using the same two-dimensional code number and reformatting data. You can also use the Clear command (*[ESC] C* on page 50). A print data string and a link field number cannot be programmed at the same time.

Effect of ECC Type

The Data Matrix code contains a function that corrects a code-reading error using an error correction code (ECC), restoring normal data. The approximate error correction ability, which may vary according to the error conditions, is shown in the following table.

ECC type	Error Correction Ability	Overhead by ECC
ECC000	Low	0%
ECC050		25%
ECC080	to	33%
ECC100		50%
ECC140	High	75%
ECC200		Approx. 30%

1-Cell Width

If the 1-cell width is set to `00` for the Data Matrix code, the printer clears the barcode information that was printed on the previous label, but it does not print a new code. The maximum cell width is 99 dots, although you should limit the number of digits of data to what can be printed, based on the width of your printer's printhead.

Format ID

Data Matrix supports all codes, including alphanumerics and symbols. Because the data compression rate varies for each code, the code to be used is designated using the format ID.

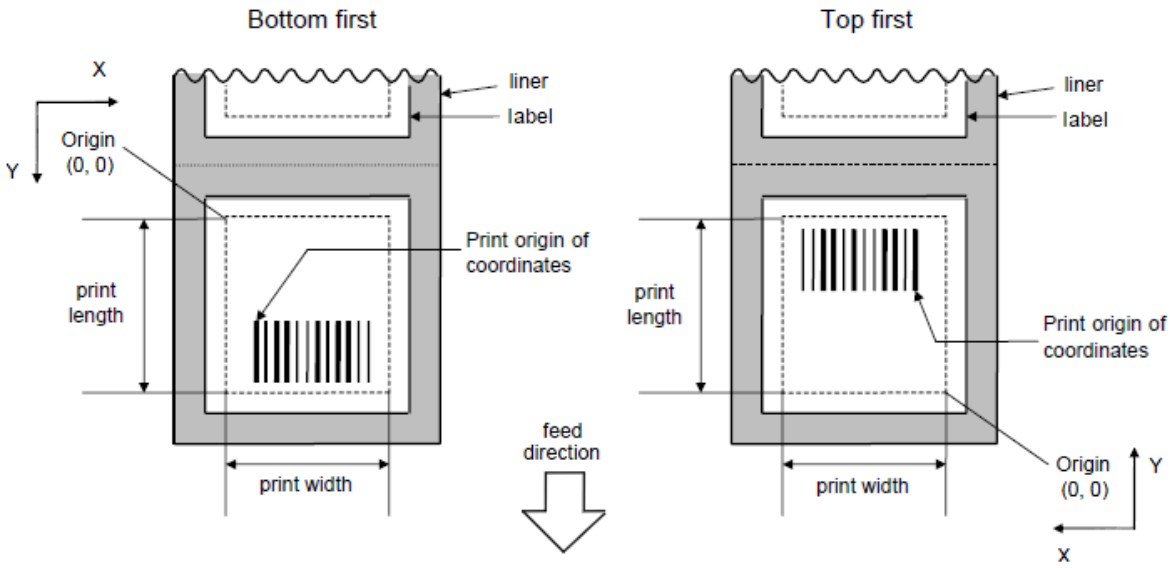
Format ID	Code	Details
1	numerics	0 to 9 space
2	letters	A to Z space
3	alphanumerics, symbols	0 to 9 A to Z space . , - /
4	alphanumerics	0 to 9 A to Z space
5	ASCII (7 bit)	00H to 7FH

Maximum Number of Digits of Data

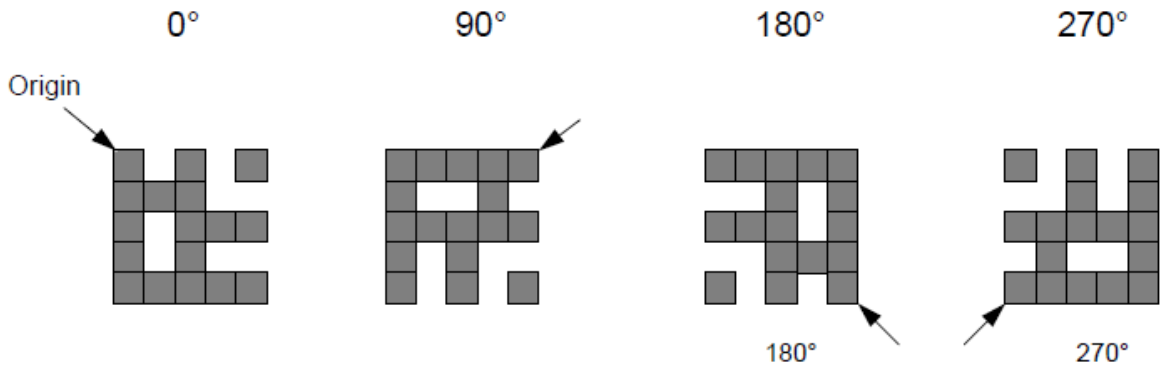
The maximum number of digits varies by ECC type.

	ECC000	ECC050	ECC080	ECC100	ECC140	ECC200
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	—	—	—	—	—	2000
Alphanumeric	—	—	—	—	—	2000
8-bit	—	—	—	—	—	1556

Example 1 • The print origin of coordinates must be set so that the drawing result is within the print area set by *[ESC] D* on page 41.



Example 2 • Example of rotational angles



Example 3 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

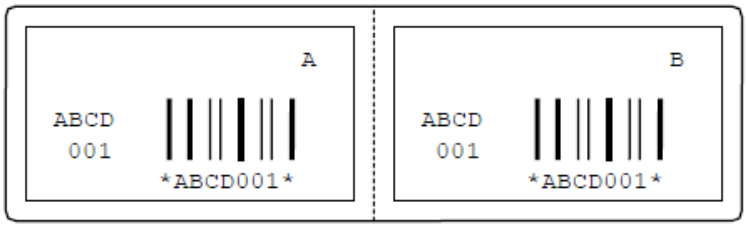
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

[ESC] RB; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



Example 4 • The effective data capacity based on cell size

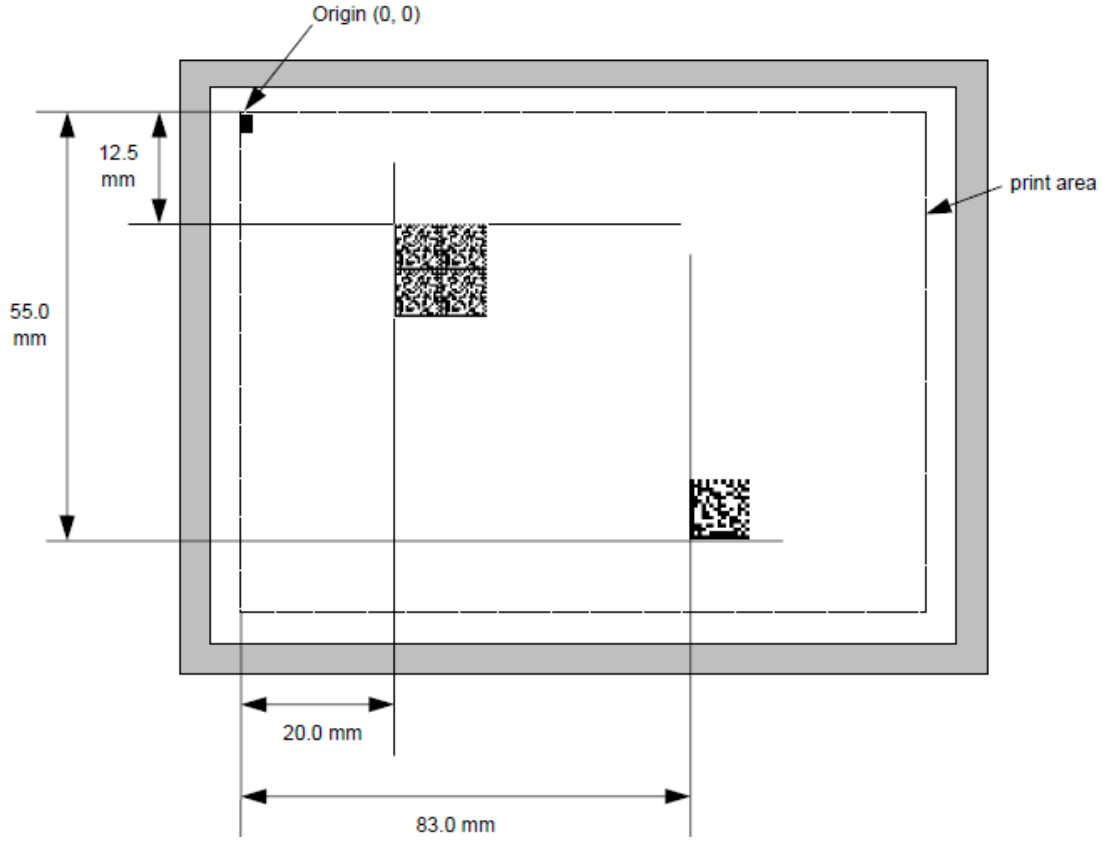
		ECC000			ECC050			ECC080			ECC100		
symbol size		numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity
row	col				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

		ECC140					ECC200					ECC200 (rectangular code)		
symbol size		numeric capacity	alpha-numeric capacity	8-bit byte capacity	symbol size		numeric capacity	alpha-numeric capacity	8-bit byte capacity	symbol size		numeric capacity	alpha-numeric capacity	8-bit byte capacity
row	col				row	col				row	col			
9	9	–	–	–	10	10	6	3	1	8	18	8	18	10
11	11	–	–	–	12	12	10	6	3	8	32	8	32	20
13	13	–	–	–	14	14	16	10	6	12	26	12	26	32
15	15	–	–	–	16	16	24	16	10	12	36	12	36	44
17	17	2	1	1	18	18	36	25	16	16	36	16	36	64
19	19	6	4	3	20	20	44	31	20	16	48	16	48	98
21	21	12	8	5	22	22	60	43	28	–	–	–	–	–
23	23	17	11	7	24	24	72	52	34	–	–	–	–	–
25	25	24	16	10	26	26	88	64	42	–	–	–	–	–
27	27	30	20	13	32	32	124	91	60	–	–	–	–	–
29	29	38	25	16	36	36	172	127	84	–	–	–	–	–
31	31	46	30	20	40	40	228	169	112	–	–	–	–	–
33	33	54	36	24	44	44	288	214	142	–	–	–	–	–
35	35	64	42	28	48	48	348	259	172	–	–	–	–	–
37	37	73	49	32	52	52	408	304	202	–	–	–	–	–

39	39	84	56	36	64	64	560	418	278	–	–	–	–	–
41	41	94	63	41	72	72	736	550	366	–	–	–	–	–
43	43	106	70	46	80	80	912	682	454	–	–	–	–	–
45	45	118	78	51	88	88	1152	862	574	–	–	–	–	–
47	47	130	87	57	96	96	1392	1042	694	–	–	–	–	–
49	49	144	96	63	104	104	1632	1222	814	–	–	–	–	–
–	–	–	–	–	120	120	2000	1573	1048	–	–	–	–	–
–	–	–	–	–	132	132	2000	1954	1302	–	–	–	–	–
–	–	–	–	–	144	144	2000	2000	1556	–	–	–	–	–

Example 5 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, Q, 20, 05, 01, 0 [LF] [NUL]
[ESC] XB02; 0830, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; Zebra Technologies [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] XB — Two-Dimensional Code Format (PDF417)

Syntax This command has two possible formats:

```
[ESC] XBa; b, c, d, e, f, g, h, i (= j ------ j) [LF]
[NUL]
```

```
[ESC] XBa; b, c, d, e, f, g, h, i (; k1, k2, k3, ------ ,
k20) [LF] [NUL]
```

Range

a = the two-dimensional code number. Must be two digits.

00 to 31

b = the X coordinate of the print origin of the two-dimensional code. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

0100 to 1057

Fixed at 4 digits (in 0.1 mm units)

c = the Y coordinate of the print origin of the two-dimensional code. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = 0100 to 9999

5 digits = 00100 to 09999

d = the type of two-dimensional code (See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples.)

P = PDF417

e = the level of security

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

f = 1-module width (in dots). Must be two digits.

01 to 15

g = the number of data columns to encode. You can specify the number of code-word columns, giving control over the width of the symbol. The printer defaults to a 1:2 row-to-column aspect ratio.

01 to 30

h = rotational angle of the two-dimensional code

0	0°
1	90°
2	180°
3	270°

i = the bar height. Specified in 0.1 mm (0.0039 in.) increments. Must be four digits.

0000 to 1000

j = a data string to be printed* (Can be omitted.)
126 digits maximum
* The actual number of digits that you can use varies according to the barcode type)

k1, *k2*, *k3*, ..., *k20* = up to 20 link field numbers, separated by commas (Can be omitted.)
01 to 99 or 1 to 99

Notes This command specifies where and how a specific two-dimensional code is to be printed. When drawing using the Data Command (*[ESC] RB* on page 146), the format specified by the two-dimensional code number is used.

You can transmit more than one Two-Dimensional Code Format ([ESC] XB) command at a time:

```
[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]
```

You can program drawing data by designating a number of digits after the = symbol. For this code, you can specify up to 2000 digits, although you should limit the number of digits to what can be printed, based on the width of your printer's printhead. If the number of characters exceeds the maximum number of digits, the excess data will be discarded.

In situations where the drawing data changes for each label during printing, the printer automatically clears the data from the previous label and then prints the next instance of drawing data.

Because the drawing data field is not cleared between the Clear command (*[ESC] C* on page 50) and Issue command (*[ESC] XS* on page 155), fixed data may be drawn using the same two-dimensional code number that was used for the last drawing. Because of this, the Format command and Data command should be sent alternately. (After you send the Issue command, the fields with the same barcode number are automatically cleared until you send the Clear command.)

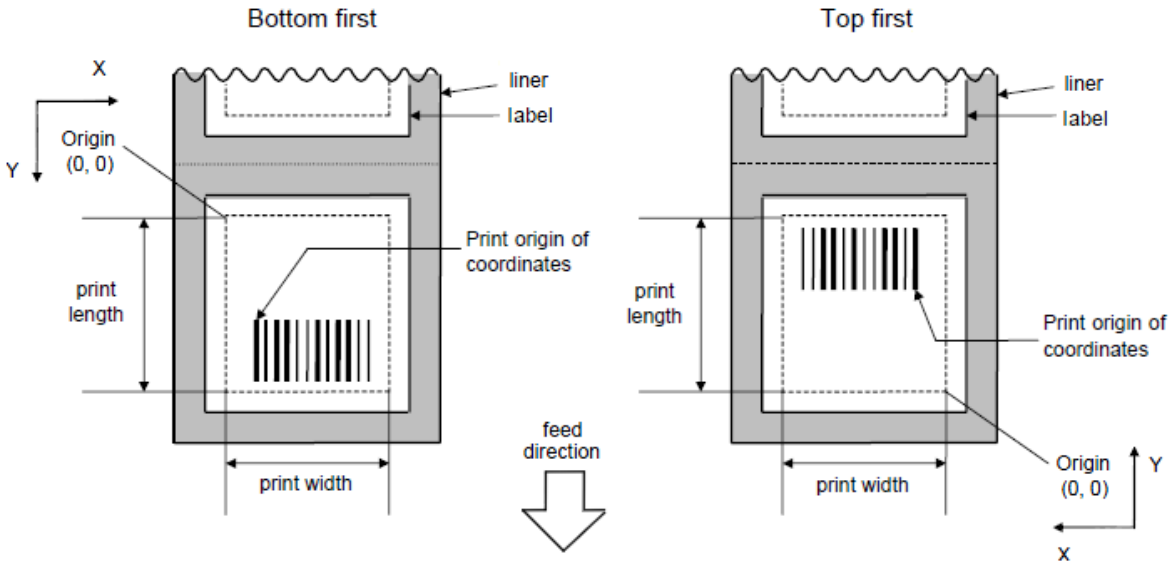
You can clear the link field designation by omitting the link field designation while using the same two-dimensional code number and reformatting data. You can also use the Clear command (*[ESC] C* on page 50). A print data string and a link field number cannot be programmed at the same time.

Security Level

The PDF417 code contains a function that corrects a code-reading error using an error correction code word, restoring normal data. Designate an appropriate security level based on the information in the following table.

Security level	Error Correction Ability	Number of error correction code words
Level 0	Low	0
Level 1		2
Level 2		6
Level 3	to	14
Level 4		30
Level 5		62
Level 6		126
Level 7	High	254
Level 8		510

Example 1 • The print origin of coordinates must be set so that the drawing result is within the print area set by *[ESC] D* on page 41.

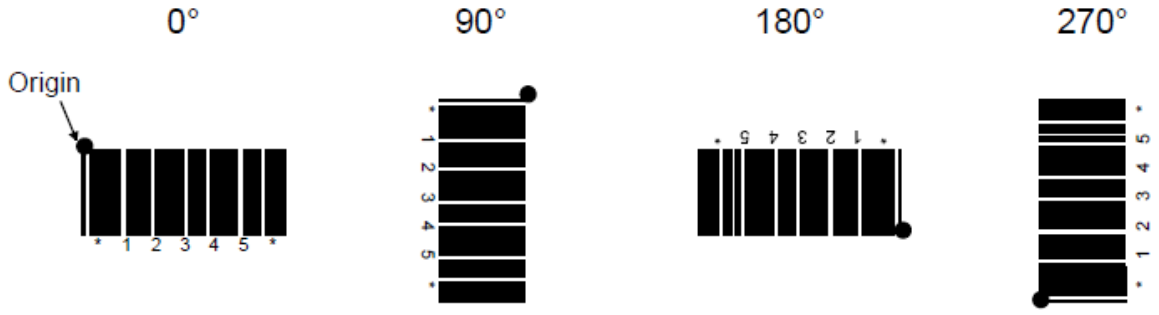


Example 2 • One-module width

With PDF417, the width of modules 2 to 6 is calculated automatically based on what you designate for a 1-module width. With a 203-dpi printhead, one dot = 1/8 mm.

1 module		2 modules		3 modules		4 modules		5 modules		6 modules	
bar	space	bar	space	bar	space	bar	space	bar	space	bar	space
2		4		6		8		10		12	

Example 3 • Rotational angle of barcodes



Example 4 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

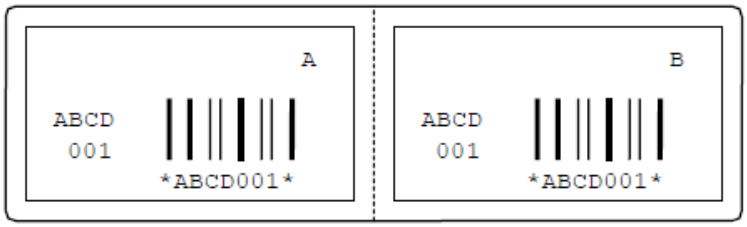
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

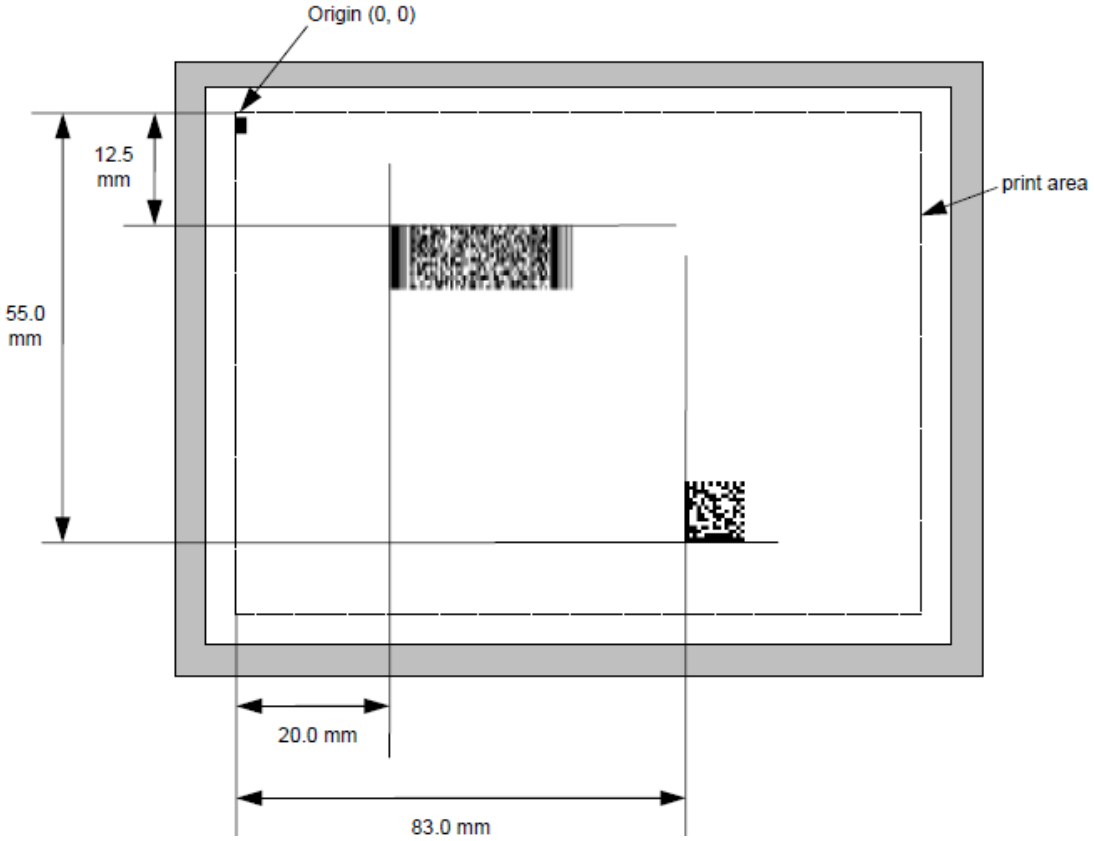
[ESC] RB; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



Example 5 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, P, 04, 02, 03, 0, 0010 [LF] [NUL]
[ESC] XB02; 0830, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; PDF417 [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] XB — Two-Dimensional Code Format (MicroPDF417)

Syntax This command has two possible formats:

```
[ESC] XBa; b, c, d, e, f, g, h, i (= j ------ j) [LF]
[NUL]
```

```
[ESC] XBa; b, c, d, e, f, g, h, i
(; k1, k2, k3, ------ , k20) [LF] [NUL]
```

Range

a = the two-dimensional code number. Must be two digits.

00 to 31

b = the X coordinate of the print origin of the two-dimensional code. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

0100 to 1057

Fixed at 4 digits (in 0.1 mm units)

c = the Y coordinate of the print origin of the two-dimensional code. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = 0100 to 9999

5 digits = 00100 to 09999

d = the type of two-dimensional code (See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples.)

X = MicroPDF417

e = the level of security

00 = Level 0 (fixed)

f = 1-module width (in dots). Must be two digits.

01 to 15

g = the number of columns/rows

01 to 38

h = rotational angle of the two-dimensional code

0	0°
1	90°
2	180°
3	270°

i = the bar height. Specified in 0.1 mm (0.0039 in.) increments.

0000 to 1000

j = a data string to be printed* ** (Can be omitted.)
366 digits maximum

* The actual number of digits that you can use varies according to the number of columns, the number of rows, and the content of the data. While 366 digits may be accepted, that number of digits cannot be printed because the limitations of the printhead width.

** If the print ratio of a line (the printhead width) is too high, printing may become poor, or the printer may reset. When you specify a data string to print, be aware of the print ratio being used.

k1, *k2*, *k3*, ..., *k20* = up to 20 link field numbers, separated by commas (Can be omitted.)

01 to 99 or 1 to 99

Notes This command specifies where and how a specific two-dimensional code is to be printed. When drawing using the Data Command (*[ESC] RB* on page 146), the format specified by the two-dimensional code number is used.

You can transmit more than one Two-Dimensional Code Format (`[ESC] XB`) command at a time:

```
[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]
```

You can program drawing data by designating a number of digits after the = symbol. For this code, you can specify up to 366 digits, although you should limit the number of digits to what can be printed, based on the width of your printer's printhead. If the number of characters exceeds the maximum number of digits, the excess data will be discarded.

In situations where the drawing data changes for each label during printing, the printer automatically clears the data from the previous label and then prints the next instance of drawing data.

Because the drawing data field is not cleared between the Clear command (*[ESC] C* on page 50) and Issue command (*[ESC] XS* on page 155), fixed data may be drawn using the same two-dimensional code number that was used for the last drawing. Because of this, the Format command and Data command should be sent alternately. (After you send the Issue command, the fields with the same barcode number are automatically cleared until you send the Clear command.)

You can clear the link field designation by omitting the link field designation while using the same two-dimensional code number and reformatting data. You can also use the Clear command (*[ESC] C* on page 50). A print data string and a link field number cannot be programmed at the same time.

Security Level

The MicroPDF417 code contains a function that corrects a code-reading error using an error correction code word, restoring normal data. The security level is set automatically by the printer.

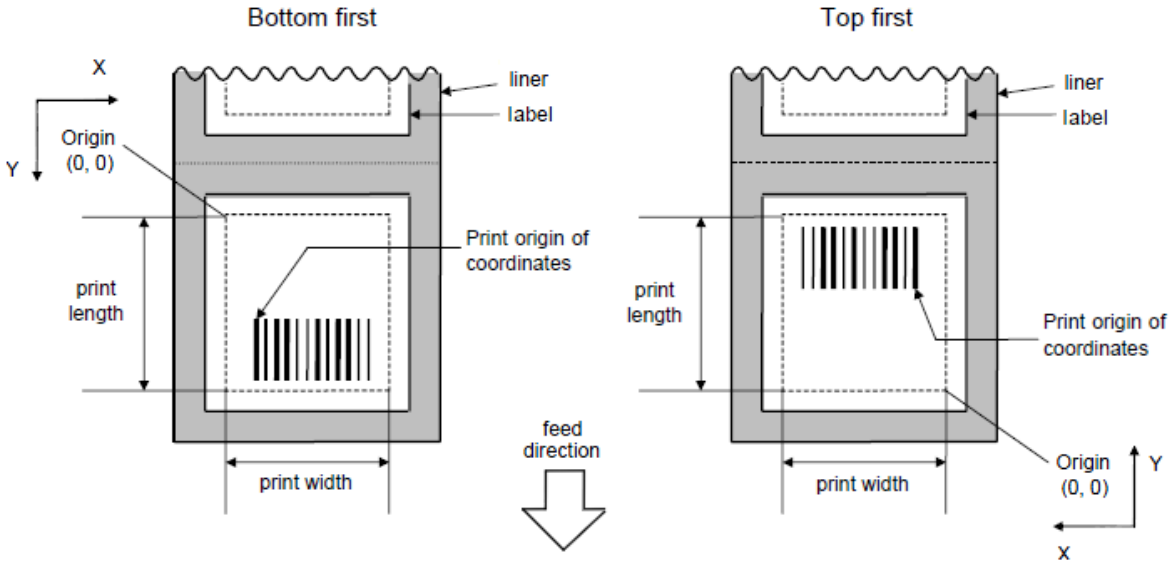
Number of Columns and Rows

For the MicroPDF417 code, you can designate the number of columns (data strings) and also the number of rows (data lines). The numbers of each, which are based on what you designate for parameter *g*, are shown in the following table.

The maximum number of digits varies according to the character type. If data exceeds the maximum allowed based on parameter *g* and the character type, the two-dimensional code is not printed.

parameter *g* value	number of columns	number of rows	maximum number of digits		
			binary mode	uppercase letter/space mode	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

Example 1 • The print origin of coordinates must be set so that the drawing result is within the print area set by *[ESC] D* on page 41.

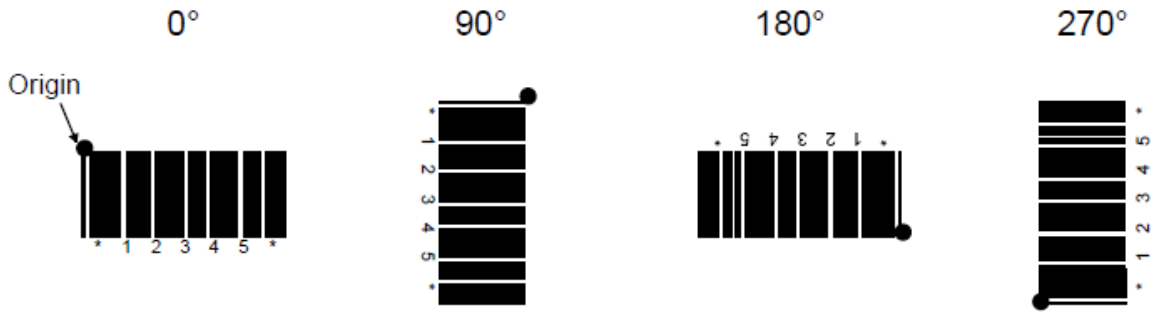


Example 2 • One-module width

With MicroPDF417, the width of modules 2 to 6 is calculated automatically based on what you designate for a 1-module width. With a 203-dpi printhead, one dot = 1/8 mm.

1 module		2 modules		3 modules		4 modules		5 modules		6 modules	
bar	**space**	**bar**	**space**	**bar**	**space**	**bar**	**space**	**bar**	**space**	**bar**	**space**
2		4		6		8		10		12	

Example 3 • Rotational angle of barcodes



Example 4 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

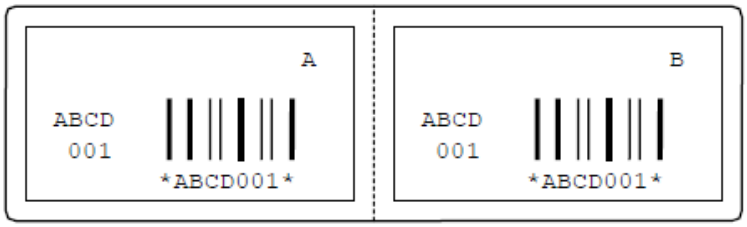
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

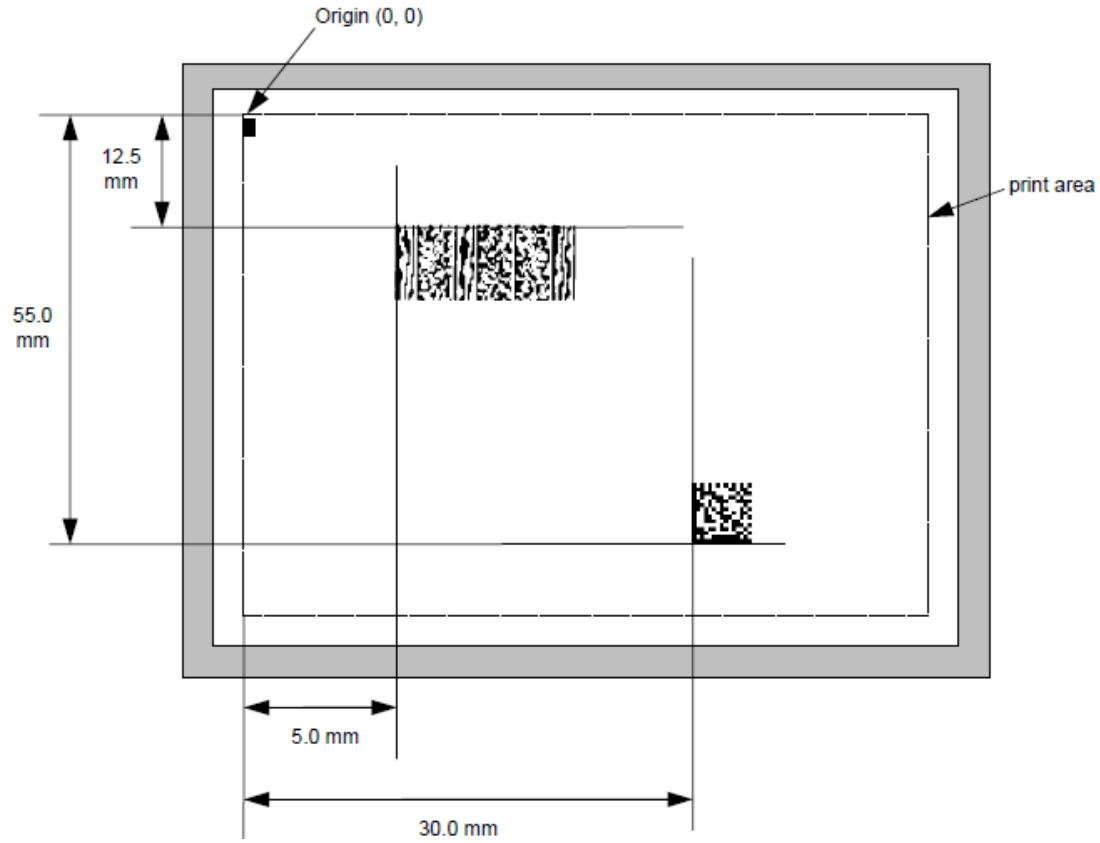
[ESC] RB; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



Example 5 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, X, 00, 02, 00, 0, 0010 [LF] [NUL]
[ESC] XB02; 0830, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; MicroPDF417 [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] XB — Two-Dimensional Code Format (QR Code)

Syntax This command has two possible formats:

```
[ESC] XBa; b, c, d, e, f, g, h (, Mi) (, Kj) (, Jklm)
(= n --- n) [LF] [NUL]
```

```
[ESC] XBa; b, c, d, e, f, g, h (, Mi) (, Kj) (, Jklm)
(; o1, o2, o3, ---, o20) [LF] [NUL]
```

Range

a = the two-dimensional code number. Must be two digits.

00 to 31

b = the X coordinate of the print origin of the two-dimensional code. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

0100 to 1057

Fixed at 4 digits (in 0.1 mm units)

c = the Y coordinate of the print origin of the two-dimensional code. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = 0100 to 9999

5 digits = 00100 to 09999

d = the type of two-dimensional code (See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples.)

T = QR code

e = the error correction level

L = high-density

M = standard

Q = reliability

H = high-reliability

Level	Error Correction Ability	Overhead from Correcting an Error
high density	Low	7%
standard		15%
reliability	to	25%
high reliability	High	30%

f = 1-cell width (in dots)

00 to 52

g = mode selection method

M = Manual mode

A = Automatic mode

h = Reserved

M*i* = model selection (Can be omitted, in which case Model 1 is selected automatically.)

i = the model number

1 = Model 1 (original specification)

2 = Model 2 (extended specification—position correction is enhanced, and a large amount of data can be contained)

Kj = the mask number (Can be omitted, in which case a mask number is set automatically.)

j = the mask number

0 to 7 = mask 1 to 7

8 = no mask

A mask prevents as much as possible the bit pattern 1011101, which usually appears in the position detecting pattern, from appearing in the symbol.

Jklm = Reserved

n = a data string to be printed* ** (Can be omitted.)
2000 digits maximum

* The actual number of digits that you can use varies according to error correction level and the content of the data. While 2000 digits of the data string may be accepted and the maximum of 52 dots of the 1-cell width is acceptable, that number of digits cannot be printed because the limitations of the printhead width. When using a large value for the 1-cell width, decrease the number of digits of data to give the data enough room to print.

** If the print ratio of a line (the printhead width) is too high, printing may become poor, or the printer may reset. When you specify a data string to print, be aware of the print ratio being used.

o1, o2, o3, ..., o20 = up to 20 link field numbers, separated by commas (Can be omitted.)

01 to 99 or 1 to 99

Notes This command specifies where and how a specific two-dimensional code is to be printed. When drawing using the Data Command (*[ESC] RB* on page 146), the format specified by the two-dimensional code number is used.

You can use alphanumeric characters and symbols in one QR code. QR code data can be divided into a maximum of 16 codes that are printed in the space for the code. As shown in the following example, parity data is obtained by XORing all input data in units of bytes before dividing. The input data is calculated based on JIS 8.

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

Code 1	Number of divided codes: 3	Parity data: 85	Data 0123
Code 2	Number of divided codes: 3	Parity data: 85	Data 4567
Code 3	Number of divided codes: 3	Parity data: 85	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

You can transmit more than one Two-Dimensional Code Format ([ESC] XB) command at a time:

```
[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]
```

You can program drawing data by designating a number of digits after the = symbol. For this code, you can specify up to 2000 digits, although you should limit the number of digits to what can be printed, based on the width of your printer's printhead. If the number of characters exceeds the maximum number of digits, the excess data will be discarded.

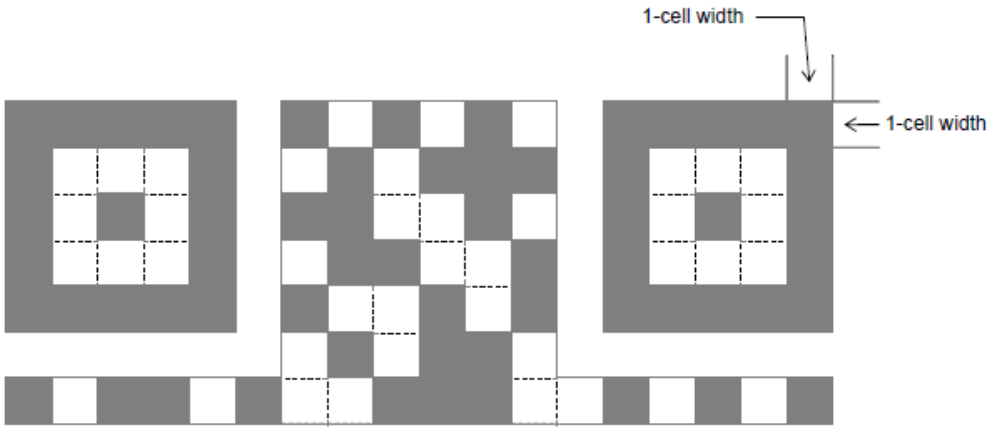
In situations where the drawing data changes for each label during printing, the printer automatically clears the data from the previous label and then prints the next instance of drawing data.

Because the drawing data field is not cleared between the Clear command (*[ESC] C* on page 50) and Issue command (*[ESC] XS* on page 155), fixed data may be drawn using the same two-dimensional code number that was used for the last drawing. Because of this, the Format command and Data command should be sent alternately. (After you send the Issue command, the fields with the same barcode number are automatically cleared until you send the Clear command.)

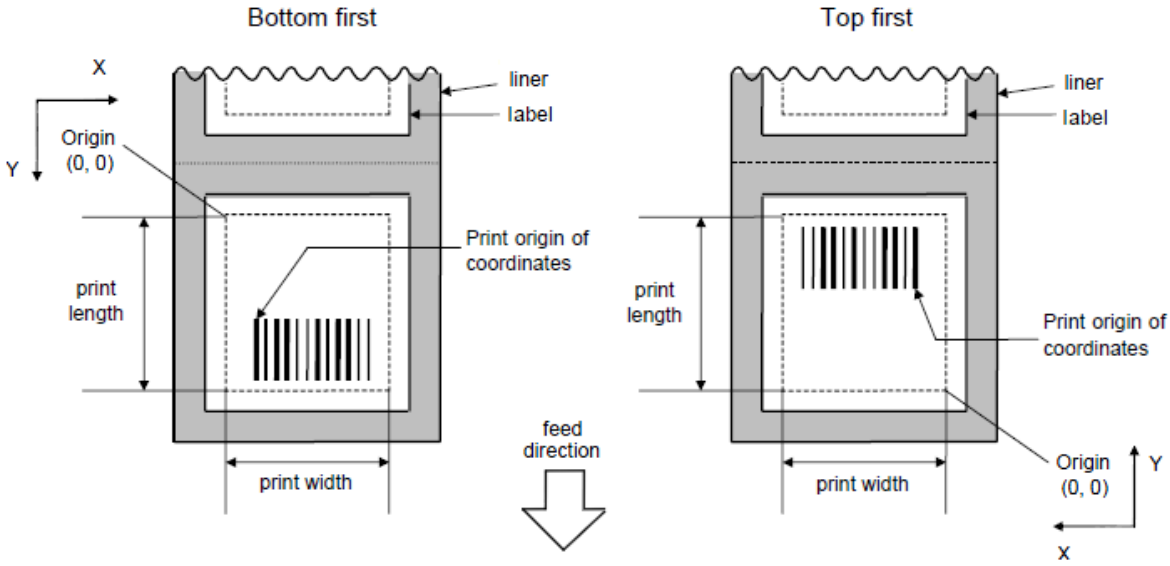
You can clear the link field designation by omitting the link field designation while using the same two-dimensional code number and reformatting data. You can also use the Clear command (*[ESC] C* on page 50). A print data string and a link field number cannot be programmed at the same time.

1-Cell Width

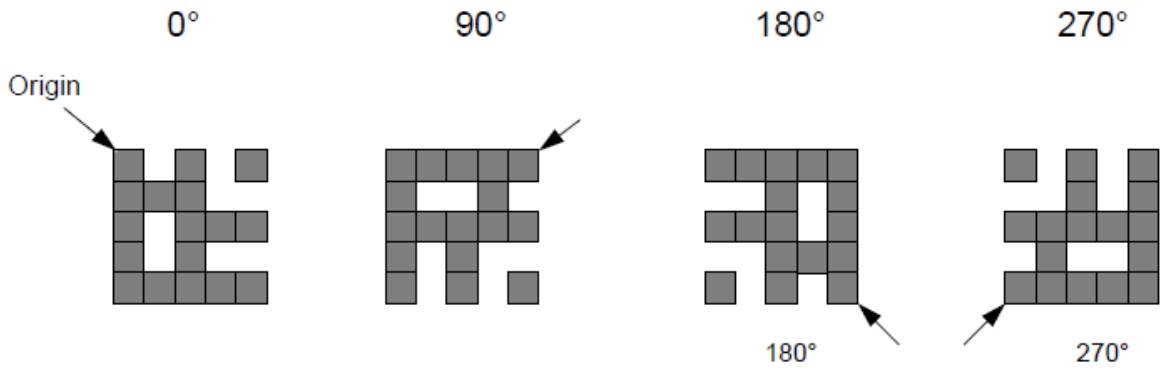
If the 1-cell width is set to `0` for the QR code, the printer clears the barcode information that was printed on the previous label, but it does not print a new code.



Example 1 • The print origin of coordinates must be set so that the drawing result is within the print area set by *[ESC] D* on page 41.



Example 2 • Example of rotational angles



Example 3 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

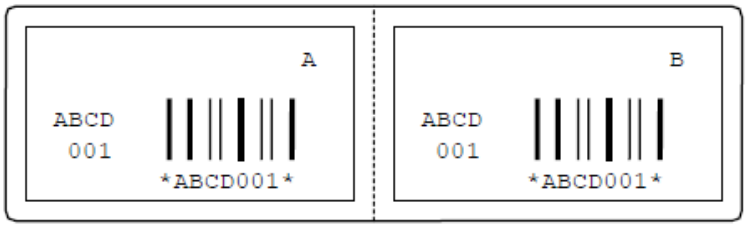
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

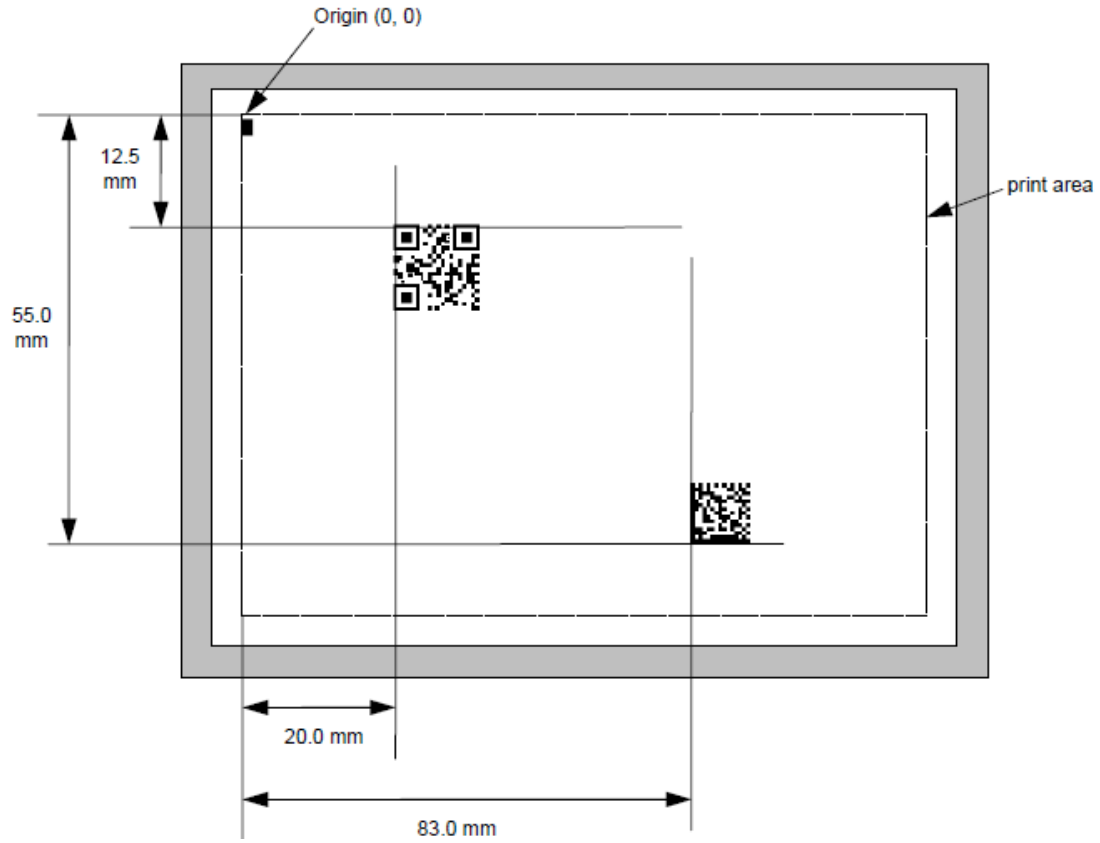
[ESC] RB; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



Example 4 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, T, M, 02, A, 0 [LF] [NUL]
[ESC] XB02; 0830, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; QR Code [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] XB — Two-Dimensional Code Format (MaxiCode)

Syntax This command has two possible formats:

```
[ESC] XBa; b, c, d (, e) (, Jfg) (, Zh) (= m ------ m)
[LF] [NUL]
```

```
[ESC] XBa; b, c, d (, e) (, Jfg) (, Zh) (; n1, n2, n3, --
----, n20) [LF] [NUL]
```

Range

a = the two-dimensional code number. Must be two digits.

`00` to `31`

b = the X coordinate of the print origin of the two-dimensional code. Must be four digits. Specified in 0.1 mm (0.0039 in.) increments.

`0100` to `1057`

Fixed at 4 digits (in 0.1 mm units)

c = the Y coordinate of the print origin of the two-dimensional code. Must be four or five digits. Specified in 0.1 mm (0.0039 in.) increments.

4 digits = `0100` to `9999`

5 digits = `00100` to `09999`

d = the type of two-dimensional code (See Table 7, *Supported Barcode Fonts and Two-Dimensional Codes* on page 190 for examples.)

`Z` = MaxiCode

e = the mode selection (Can be omitted, in which case a mode is assigned automatically.)

When the MaxiCode specification was set to `TYPE1: Compatible with the current version` in System mode, the following apply:

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

When the MaxiCode specification was set to `TYPE2: Special specification` in System mode the following apply:

omitted: Mode 2 or Mode 3*
`0` = Mode 2 or Mode 3*
`1` = Mode 4
`2` = Mode 2
`3` = Mode 3
`4` = Mode 4
`5` = Mode 2 or Mode 3*
`6` = Mode 6
`7` = Mode 2 or Mode 3*
`8` = Mode 2 or Mode 3*
`9` = Mode 2 or Mode 3*

* Whether to use Mode 2 or Mode 3 depends on the country code of the data command. When the country code is 840, Mode 2 is used. For codes other than 840, Mode 3 is used.

`Jfg` = Reserved

`Z`*`h`* = Reserved

`m` = a data string to be printed (Can be omitted.)
93 digits maximum

`n1`, *`n2`*, *`n3`*, ..., *`n20`* = up to 20 link field numbers, separated by commas (Can be omitted.)

Notes This command specifies where and how a specific two-dimensional code is to be printed. When drawing using the Data Command (*[ESC] RB* on page 146), the format specified by the two-dimensional code number is used.

MaxiCode data can be divided into a maximum of 8 codes that are printed in the space for the code.

You can transmit more than one Two-Dimensional Code Format (`[ESC] XB`) command at a time:

```
[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]
```

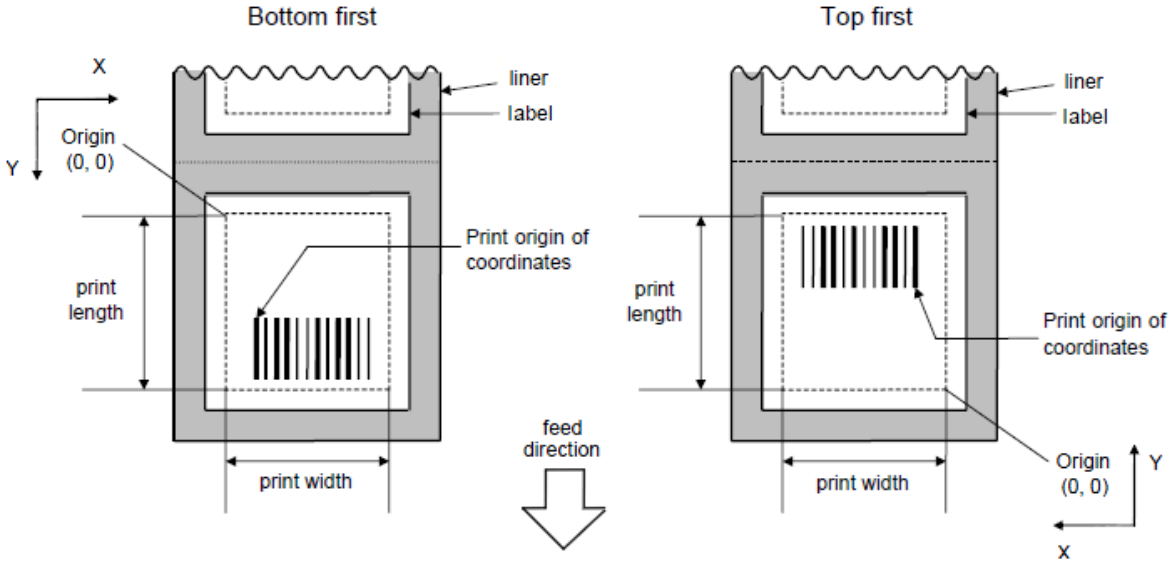
You can program drawing data by designating a number of digits after the = symbol. For this code, you can specify up to 93 digits. If the number of characters exceeds the maximum number of digits, the excess data will be discarded.

In situations where the drawing data changes for each label during printing, the printer automatically clears the data from the previous label and then prints the next instance of drawing data.

Because the drawing data field is not cleared between the Clear command (*[ESC] C* on page 50) and Issue command (*[ESC] XS* on page 155), fixed data may be drawn using the same two-dimensional code number that was used for the last drawing. Because of this, the Format command and Data command should be sent alternately. (After you send the Issue command, the fields with the same barcode number are automatically cleared until you send the Clear command.)

You can clear the link field designation by omitting the link field designation while using the same two-dimensional code number and reformatting data. You can also use the Clear command (*[ESC] C* on page 50). A print data string and a link field number cannot be programmed at the same time.

Example 1 • The print origin of coordinates must be set so that the drawing result is within the print area set by *[ESC] D* on page 41.



Example 2 • Programming link field numbers

A link field number can be designated after a semicolon (;) in a Format command. After the link field number is designated, the data strings are linked by a Link Field Data command to draw an image.

Up to 20 fields can be linked. An error occurs if the number of link fields exceeds 20.

The following example shows linked fields on two continuous labels.

[Format Command]

[ESC] PC01;	; 01 [LF] [NUL]	: Designates link field 1.
[ESC] PC02;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC03;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB01;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

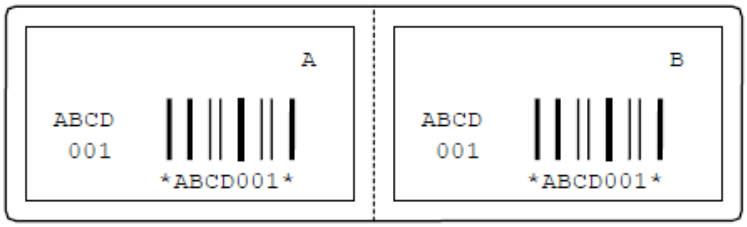
[ESC] PC04;	; 02 [LF] [NUL]	: Designates link field 2.
[ESC] PC05;	; 03 [LF] [NUL]	: Designates link field 3.
[ESC] PC06;	; 04 [LF] [NUL]	: Designates link field 4.
[ESC] XB02;	; 03, 04 [LF] [NUL]	: Designates link fields 3 and 4.

link field numbers

[Data Command]

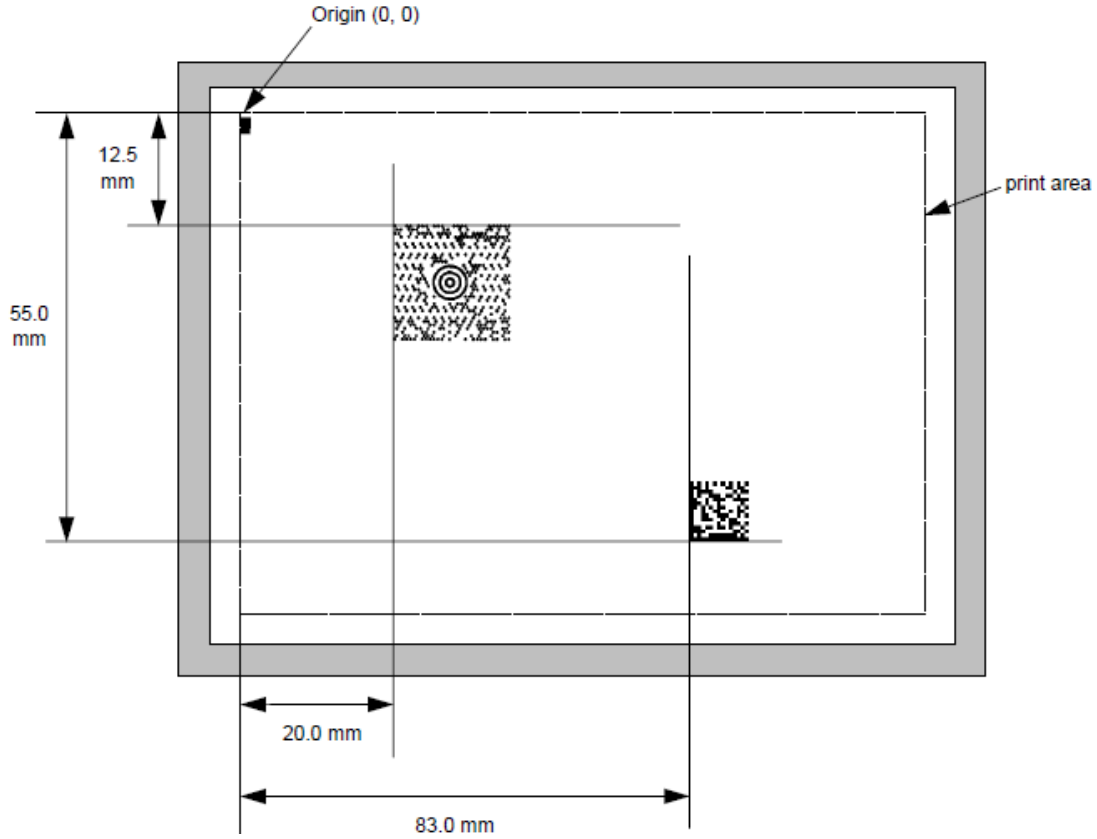
[ESC] RB; A [LF] B [LF] ABCD [LF] 001 [LF] [NUL]

Link field 4
Link field 3
Link field 2
Link field 1



Example 3 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, Z [LF] [NUL]
[ESC] XB02; 0830, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; 123456789123123MaxiCode [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



Print Data Commands

[ESC] RC

Description Specify Bitmap Font Data

Syntax This command has two possible formats:

Specify a data string to print

```
[ESC] RCa; b ------- b [LF] [NUL]
```

Specify link field data to print

```
[ESC] RC; c --- c [LF] d --- d [LF] --- [LF] x --- x [LF]
[NUL]
```

Range

a = Character string number

000 to 199 or 00 to 99

If 000 and 00 are designated at the same time, the data designated later are selected automatically.

b = a data string to be printed. Any data in excess of the maximum supported is discarded.

255 character maximum for most font types

c ---- *c* = the data string of link field number 1. Any data in excess of the maximum supported is discarded.

255 character maximum for most font types

d ---- *d* = the data string of link field number 2

...

x ---- *x* = the data string of link field number 99

Notes This command provides a data string or linked data for the bitmap font row.

For the character codes, refer to *Character Code Tables* on page 194.

Link Field Data Command

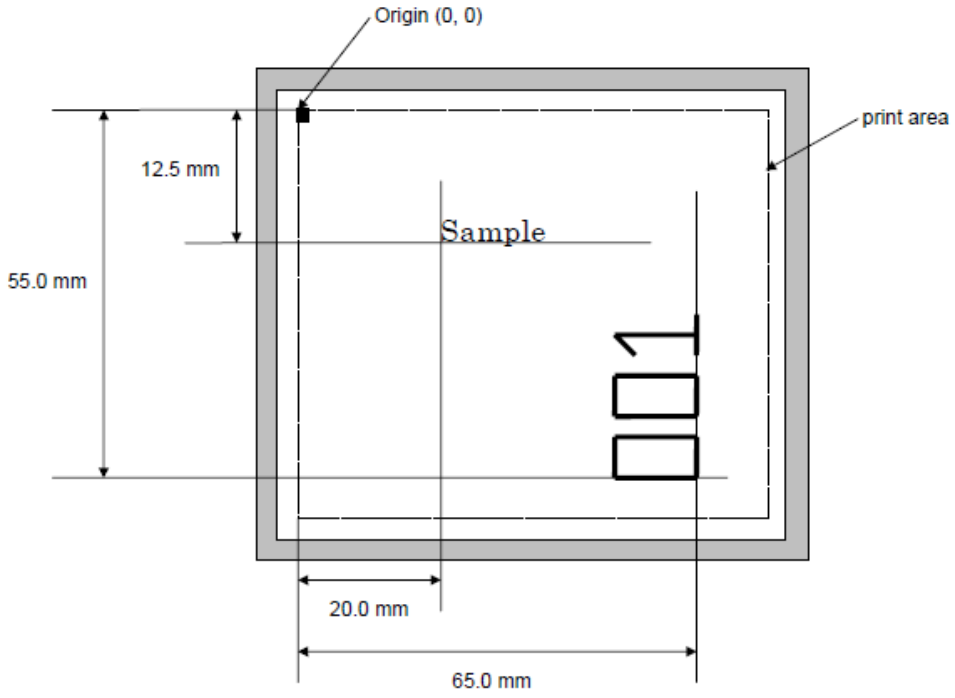
After link field numbers are designated using the Format Command (*[ESC] PC* on page 58), the second format of [ESC] RC is used to link data strings to link field numbers and draw an image. You can link a maximum of 99 data strings up to 2048 bytes for the command length ([ESC] to [NUL]).

This command can be used for bitmap font fields, outline font fields, and barcode fields. The same results are obtained whether [ESC] RC, RV, or RB command codes are designated.

When the data string is missing from the Link Field Data Command, the printer takes no action for the field that contains no print data. The remaining data is processed as print data.

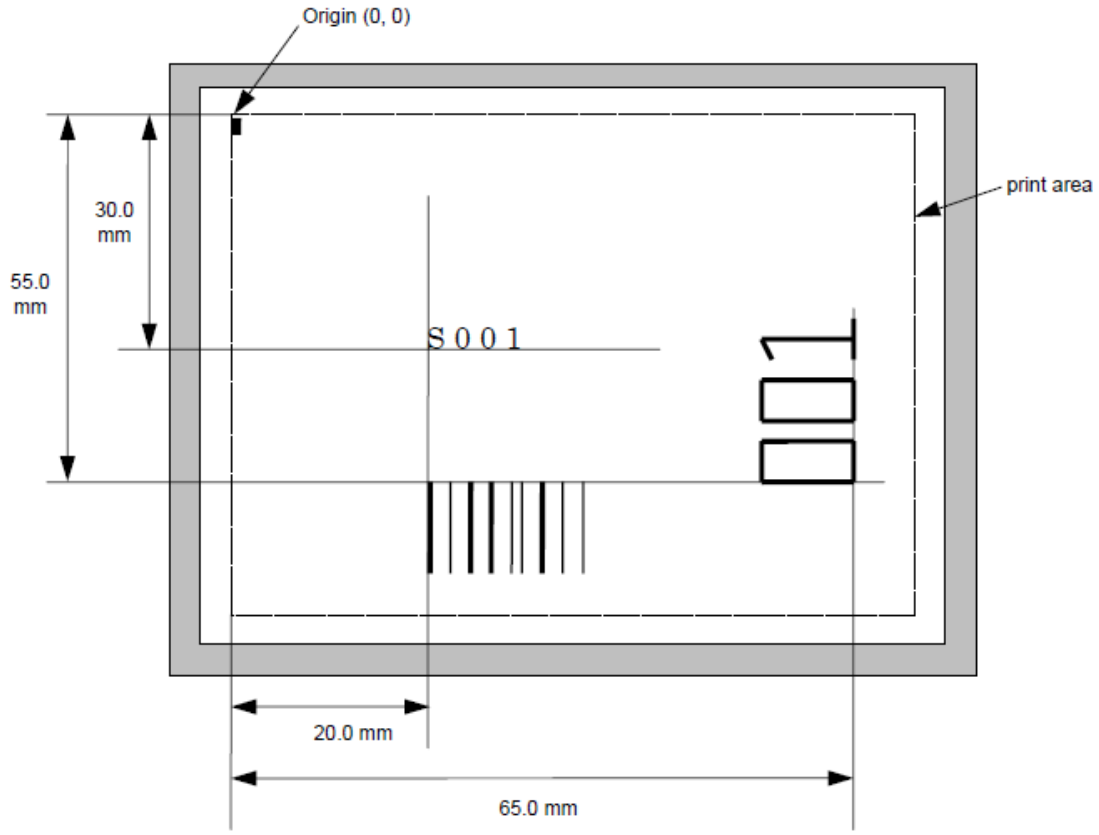
Example 1 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] PC001; 0200, 0125, 1, 1, C, 00, B [LF] [NUL]
[ESC] PC002; 0650, 0550, 2, 2, G, 33, B, +0000000001 [LF]
[NUL]
[ESC] RC001; Sample [LF] [NUL]
[ESC] RC002; 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



Example 2 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] PC001; 0200, 0300, 1, 1, C, 00, B; 01, 02 [LF] [NUL]
[ESC] PV01; 0650, 0550, 0200, 0150, B, 33, B; 02 [LF]
[NUL]
[ESC] XB01; 0200, 0550, 3, 1, 03, 03, 08, 08, 03, 0, 0150;
01, 02 [LF] [NUL]
[ESC] RC; S001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] RV

Description Specify Outline Font Data

Syntax This command has two possible formats:

Specify a data string to print

```
[ESC] RVa; b ------- b [LF] [NUL]
```

Specify link field data to print

```
[ESC] RV; c --- c [LF] d --- d [LF] ------- [LF] x --- x
[LF] [NUL]
```

Range

a = Character string number

00 to 99

If 000 and 00 are designated at the same time, the data designated later are selected automatically.

b = a data string to be printed. Any data in excess of the maximum supported is discarded.

255 character maximum

c ---- *c* = the data string of link field number 1. Any data in excess of the maximum supported is discarded.

255 character maximum for most font types

127 characters for font C

d ---- *d* = the data string of link field number 2

...

x ---- *x* = the data string of link field number 99

Notes This command provides a data string or linked data for the outline font row.

For the character codes, refer to *Character Code Tables* on page 194.

Link Field Data Command

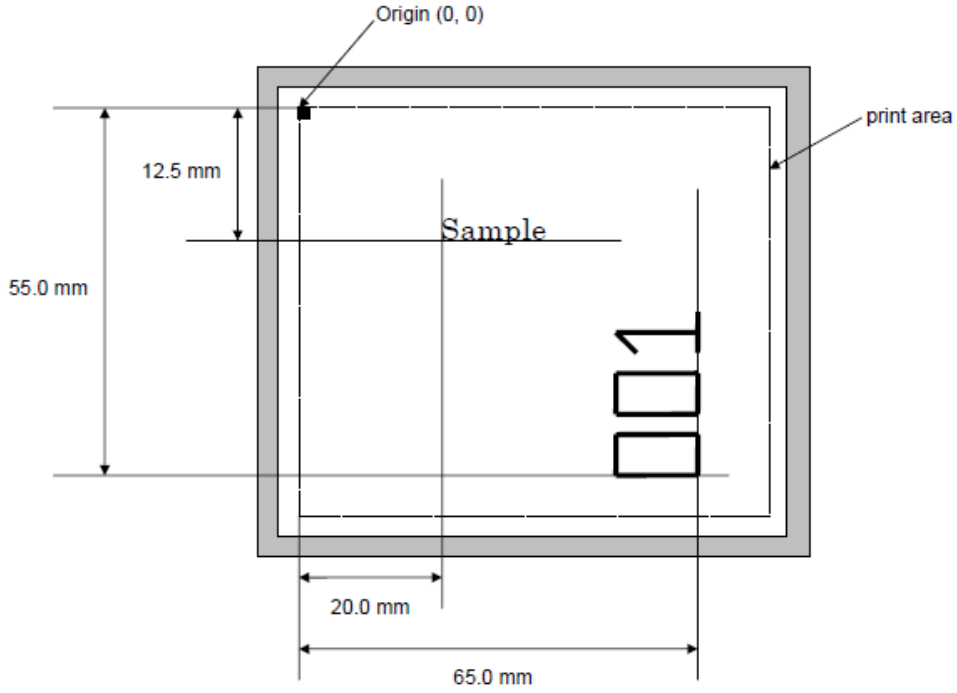
After link field numbers are designated using the Format Command (*[ESC] PV* on page 71), the second format of [ESC] RV is used to link data strings to link field numbers and draw an image. You can link a maximum of 99 data strings up to 2048 bytes for the command length ([ESC] to [NUL]).

This command can be used for bitmap font fields, outline font fields, and barcode fields. The same results are obtained whether [ESC] RC, RV, or RB command codes are designated.

When the data string is missing from the Link Field Data Command, the printer takes no action for the field that contains no print data. The remaining data is processed as print data.

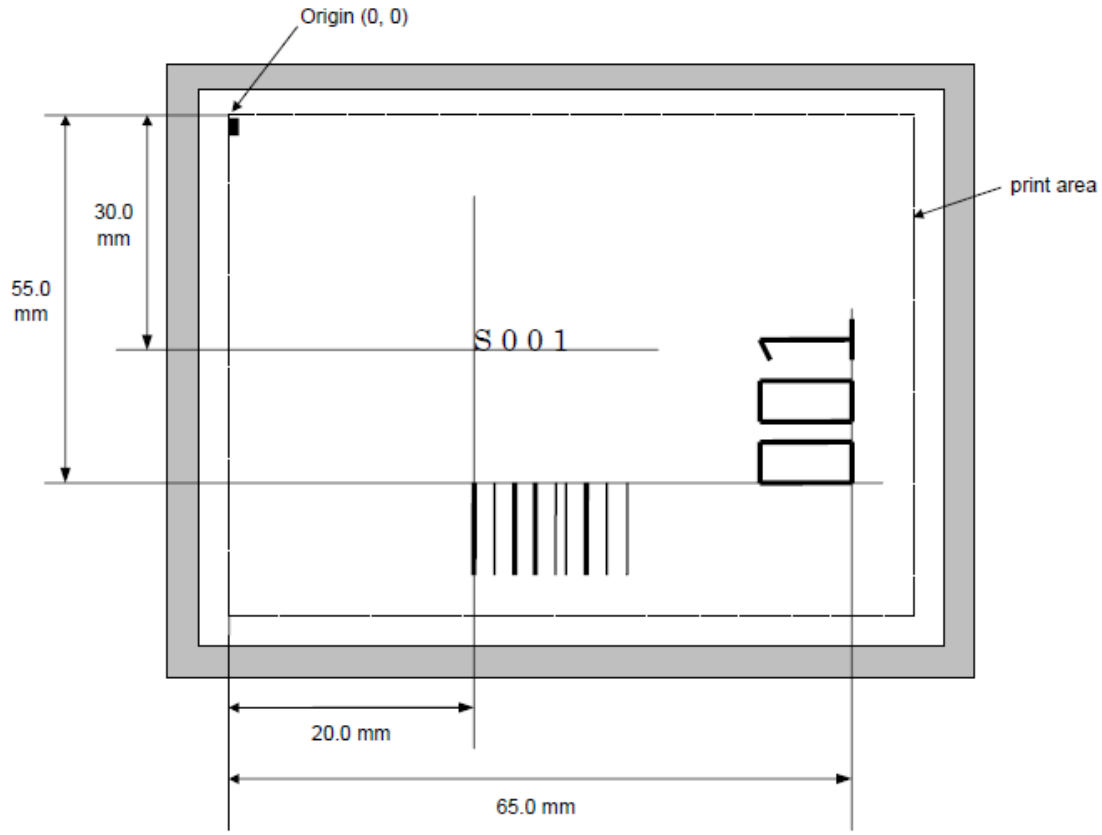
Example 1 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] PV01; 0200, 0125, 0100, 0100, B, 00, B [LF] [NUL]
[ESC] PV02; 0650, 0550, 0200, 0150, B, 33, B, +0000000001
[LF] [NUL]
[ESC] RV01; Sample [LF] [NUL]
[ESC] RV02; 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



Example 2 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] PC001; 0200, 0300, 1, 1, C, 00, B; 01, 02 [LF] [NUL]
[ESC] PV01; 0650, 0550, 0200, 0150, B, 33, B; 02 [LF]
[NUL]
[ESC] XB01; 0200, 0550, 3, 1, 03, 03, 08, 08, 03, 0, 0150;
01, 02 [LF] [NUL]
[ESC] RV; S [LF] 001 [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] RB

Description Specify Data for a Barcode or Two-Dimensional Code

[ESC] RB — Barcode/Two-Dimensional Code Data (any codes other than MaxiCode)

Syntax This command has two possible formats:

Specify a data string to print

```
[ESC] RBa; b ------- b [LF] [NUL]
```

Specify link field data to print

```
[ESC] RB; c --- c [LF] d --- d [LF] ------- [LF] x --- x
[LF] [NUL]
```

Range

a = the barcode or two-dimensional code number. Must be two digits.
00 to 31

b = a data string to be printed. The maximum number of characters varies based on the barcode or two-dimensional code. If the number of characters is invalid for the code type, the code is not drawn. Any data in excess of the maximum supported is discarded.
2000 digits: Data Matrix*, PDF417**, QR code
366 digits: MicroPDF417**
5, 9, 11 digits: POSTNET
126 digits: barcodes not specified
* See *Maximum Number of Characters for Data Matrix* on page 147 for more information.
** See *Maximum Number of Characters (Code Words) for PDF417 or MicroPDF417* on page 149 for more information.

c ---- *c* = the data string of link field number 1

d ---- *d* = the data string of link field number 2

...

x ---- *x* = the data string of link field number 99

Notes This command provides a data string or linked data for a barcode or two-dimensional code (other than MaxiCode) row.

Link Field Data Command

After link field numbers are designated using the Format Command (*[ESC] XB* on page 82), the second format of [ESC] RB is used to link data strings to link field numbers and draw an image. You can link a maximum of 99 data strings up to 2048 bytes for the command length ([ESC] to [NUL]).

This command can be used for bitmap font fields, outline font fields, and barcode fields. (The same results are obtained whether [ESC] RC, RV, or RB command codes are designated.)

When the data string is missing from the Link Field Data Command, the printer takes no action for the field that contains no print data. The remaining data is processed as print data.

Barcodes or symbols will not be drawn in the following circumstances:

- If the data row contains invalid data for the code type
- With CODE128 (without auto code selection), if wrong code selection takes place in the data row
- With Data Matrix, if the data is different than that specified by the format ID

Maximum Number of Characters for Data Matrix

The maximum number of characters for Data Matrix varies by ECC type, format ID, and cell size.

Table 1 • Data Matrix Maximum Number of Characters Based on ECC Type and Format ID

	ECC000	ECC050	ECC080	ECC100	ECC140	ECC200
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	—	—	—	—	—	2000
Alphanumeric	—	—	—	—	—	2000
8-bit	—	—	—	—	—	1556

Table 2 • Data Matrix Effective Data Capacity Based on Cell Size

symbol size		ECC000			ECC050			ECC080			ECC100		
row	col	numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity
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
19	19	72	48	31	46	30	20	36	24	16	25	17	11
21	21	92	61	40	61	41	27	50	33	22	36	24	15
23	23	115	76	50	78	52	34	65	43	28	47	31	20
25	25	140	93	61	97	65	42	82	54	36	60	40	26
27	27	168	112	73	118	78	51	100	67	44	73	49	32

Table 2 • Data Matrix Effective Data Capacity Based on Cell Size (Continued)

symbol size		ECC000			ECC050			ECC080			ECC100		
row	col	numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity	numeric capacity	alpha-numeric capacity	8-bit byte capacity
29	29	197	131	86	140	93	61	120	80	52	88	59	38
31	31	229	153	100	164	109	72	141	94	62	104	69	45
33	33	264	176	115	190	126	83	164	109	72	121	81	53
35	35	300	200	131	217	145	95	188	125	82	140	93	61
37	37	339	226	148	246	164	108	214	143	94	159	106	69
39	39	380	253	166	277	185	121	242	161	106	180	120	78
41	41	424	282	185	310	206	135	270	180	118	201	134	88
43	43	469	313	205	344	229	150	301	201	132	224	149	98
45	45	500	345	226	380	253	166	333	222	146	248	165	108
47	47	500	378	248	418	278	183	366	244	160	273	182	119
49	49	500	413	271	457	305	200	402	268	176	300	200	131

Table 3 • Data Matrix Effective Data Capacity Based on Cell Size

		ECC140					ECC200					ECC200 (rectangular code)		
symbol size		numeric capacity	alpha-numeric capacity	8-bit byte capacity	symbol size		numeric capacity	alpha-numeric capacity	8-bit byte capacity	symbol size		numeric capacity	alpha-numeric capacity	8-bit byte capacity
row	col				row	col				row	col			
9	9	–	–	–	10	10	6	3	1	8	18	8	18	10
11	11	–	–	–	12	12	10	6	3	8	32	8	32	20
13	13	–	–	–	14	14	16	10	6	12	26	12	26	32
15	15	–	–	–	16	16	24	16	10	12	36	12	36	44
17	17	2	1	1	18	18	36	25	16	16	36	16	36	64
19	19	6	4	3	20	20	44	31	20	16	48	16	48	98
21	21	12	8	5	22	22	60	43	28	–	–	–	–	–
23	23	17	11	7	24	24	72	52	34	–	–	–	–	–
25	25	24	16	10	26	26	88	64	42	–	–	–	–	–
27	27	30	20	13	32	32	124	91	60	–	–	–	–	–
29	29	38	25	16	36	36	172	127	84	–	–	–	–	–
31	31	46	30	20	40	40	228	169	112	–	–	–	–	–
33	33	54	36	24	44	44	288	214	142	–	–	–	–	–
35	35	64	42	28	48	48	348	259	172	–	–	–	–	–
37	37	73	49	32	52	52	408	304	202	–	–	–	–	–
39	39	84	56	36	64	64	560	418	278	–	–	–	–	–
41	41	94	63	41	72	72	736	550	366	–	–	–	–	–
43	43	106	70	46	80	80	912	682	454	–	–	–	–	–
45	45	118	78	51	88	88	1152	862	574	–	–	–	–	–
47	47	130	87	57	96	96	1392	1042	694	–	–	–	–	–
49	49	144	96	63	104	104	1632	1222	814	–	–	–	–	–
–	–	–	–	–	120	120	2000	1573	1048	–	–	–	–	–
–	–	–	–	–	132	132	2000	1954	1302	–	–	–	–	–
–	–	–	–	–	144	144	2000	2000	1556	–	–	–	–	–

Maximum Number of Characters (Code Words) for PDF417 or MicroPDF417

With PDF417 or MicroPDF417, the maximum number of symbol characters (called code words) is 928. If the number of the code words exceeds 928, or when the number of rows exceeds 90, a symbol is not drawn.

The data compression rate varies according to the data, so the maximum number of digits varies. For example, a mix of letters and numbers in Extended Alphanumeric Compaction (EXC) mode causes the maximum value to be smaller, as does using a high number of error correction code words.

The PDF417 code contains a function that corrects a code-reading error using an error correction code word, restoring normal data. Designate an appropriate security level based on the information in the following table. For MicroPDF, the security level is set automatically.

Security level	Error Correction Ability	Number of error correction code words
Level 0	Low	0
Level 1		2
Level 2		6
Level 3	to	14
Level 4		30
Level 5		62
Level 6		126
Level 7		254
Level 8	High	510

PDF417 maximum number of digits:

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

For MicroPDF, the maximum number of digits varies according to the character type.

[ESC] XB parameter *g* value	number of columns	number of rows	maximum number of digits		
			binary mode	uppercase letter/space mode	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

[ESC] XB parameter *g* value	number of columns	number of rows	maximum number of digits		
			binary mode	uppercase letter/space mode	numeric mode
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

QR Code—Manual Mode

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

Mode	Code	Details
N	numerics	0 to 9
A	alphanumerics, symbols	A to Z 0 to 9 [space] $ % * + - . / :
B	binary (8-bit)	00H to FFH

- Numeric mode, alphanumeric, and symbol mode.

mode selection	data to be printed

- Binary mode

mode selection	number of data strings (4 digits)	data to be printed

- Mixed mode

data	“,” (comma)	data	“,” (comma)	data

With mixed mode, up to 200 modes can be selected in a single QR code.

QR Code—Automatic Mode

data to be printed

- Transmitting 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)

- Transmitting special codes

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

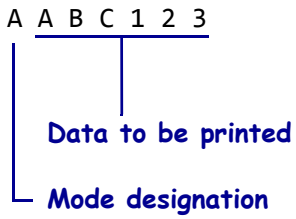
Transfer Code for QR Code

	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								

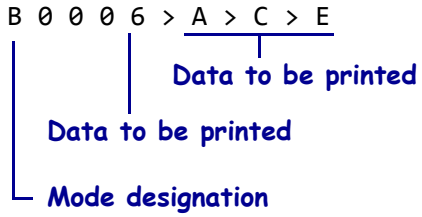
* The shaded parts are Japanese. They are omitted here.

Example 1 • Data Designation

- Alphanumeric mode: ABC123

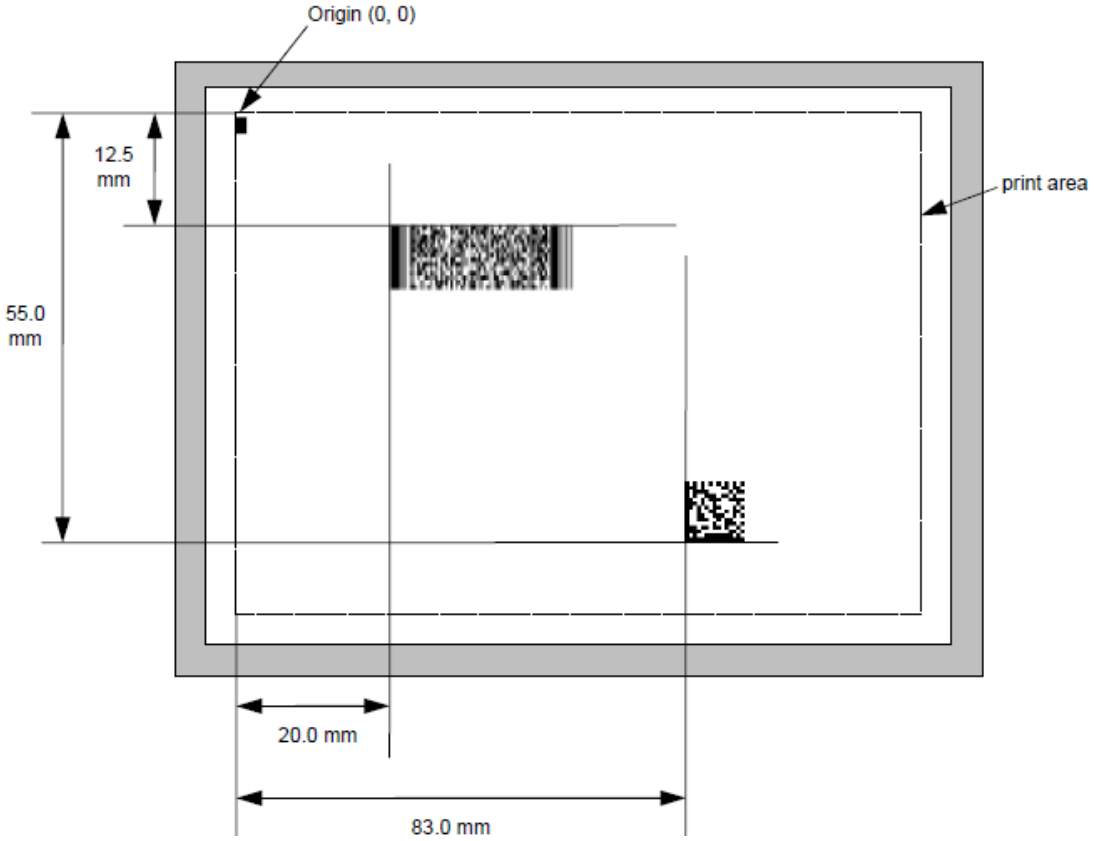


- Binary mode: 01h, 03h, 05h



Example 2 • The following sample code would result in a label as shown.

```
[ESC] C [LF] [NUL]
[ESC] XB01; 0200, 0125, Q, 20, 05, 01, 0 [LF] [NUL]
[ESC] XB02; 0830, 0550, Q, 08, 03, 05, 3 [LF] [NUL]
[ESC] RB01; PDF417 [LF] [NUL]
[ESC] RB02; Data Matrix [LF] [NUL]
[ESC] XS; I, 0002, 0002C4000 [LF] [NUL]
```



[ESC] RB — Two-Dimensional Code Data (MaxiCode)

Syntax This command has two possible formats:

For Mode 2 or 3

```
[ESC] RBa; bcde --- e [LF] [NUL]
```

For Mode 4 or 6 (Mode 6 is used for scanner programming)

```
[ESC] RBa; fg --- g [LF] [NUL]
```

Range

a = the two-dimensional code number. Must be two digits.

00 to 31

For Mode 2 or 3

b = the postal code (9 digits)

Mode 2

digits 1 to 5: the Zip code (5 numeric digits)

digits 6 to 9: Zip code extension (4 numeric digits)

Mode 3

digits 1 to 6: the Zip code (6 digits, character "A" of code set)

digits 7 to 9: vacant (3 digits, 20H)

c = the class of service (3 numeric digits)

d = the country code (3 numeric digits)

e --- e = the message data strings (84 digits)

For Mode 4 or 6

f = the primary message data strings (9 digits)

g --- g = the secondary message data strings (84 digits)

Notes A MaxiCode is not drawn when any data that is not numeric is included in the data string for Zip code (Mode 2), Zip code extension, class of service, or country code.

For Mode 2 or 3

If the message data is less than 84 digits, the printer adds one digit of CR (000000) to the end of the data, and the remaining digits are filled with FS (011100). If the printer receives message data exceeding 84 digits, it discards the excess data before drawing a MaxiCode.

For Mode 4 or 6

If the message data is less than 93 digits (9 + 84), printer adds one digit of CR (000000) to the end of the data, and the remaining digits are filled with FS (011100). If the printer receives message data exceeding 93 digits, it discards the excess data before drawing a MaxiCode.

Issue and Feed Commands

[ESC] XS

Description Issue Labels

Syntax `[ESC] XS; I, a, bcdefgh [LF] [NUL]`

Range

a = the number of labels to issue. Must be four digits.
`0001` to `9999`

b = reserved area. Must be three digits.
`000` to `100`

c = the sensor type
`0` = no sensor. Printing occurs based on the label size values set with *[ESC] D* on page 41.
`1` = reflective sensor. Printing occurs based on the label size values set with *[ESC] D* on page 41. The printer senses the black mark on the label liner and fine-tunes the paper position for each label.
`2` = transmissive sensor. Printing occurs based on the label size values set with *[ESC] D* on page 41. The printer senses the interlabel gaps and fine-tunes the paper position for each label.

d = optional reserved area
`C`, `D`, `E`

e = optional reserved area
`1` to `9`, `A`

f = optional reserved area
`0` to `2`

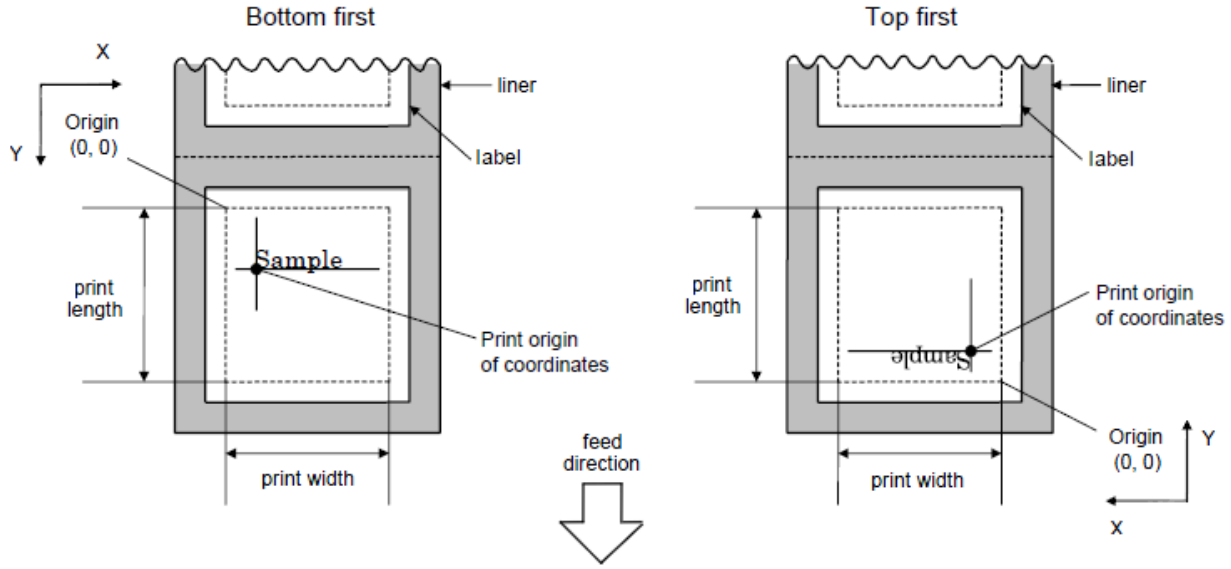
g = the print orientation and mirror printing
`0` = bottom-first printing
`1` = top-first printing
`2` = Reserved
`3` = Reserved

h = Reserved

Notes This command issues labels according to the print conditions programmed.

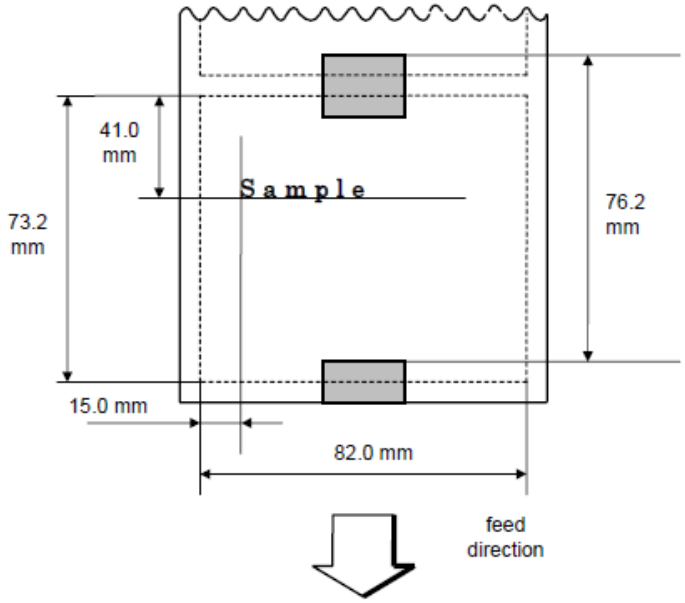
If no increment/decrement is specified, the same data print on the designated number of labels. If increment/decrement is specified, the designated number of labels prints while performing the incrementing/decrementing as specified by the label format. The increment/decrement designation remains in effect until the Image Buffer Clear command (*[ESC] C* on page 50) is transmitted.

The origin of coordinates and print direction change based on tag rotation settings.



Example 1 • The following sample code would result in a label as shown.

```
[ESC] D0762, 0820, 0732 [LF] [NUL]
[ESC] T11C40 [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, 0011C4101 [LF] [NUL]
```



- Issue count: 4 pieces
- Paper: tag stock (reflective sensor used)
- Print speed: 4 ips
- Status response: On

[ESC] T

Description Feed Media

Syntax `[ESC] T`*`abcde`* `[LF] [NUL]`

Range

a = the sensor type

- `0` = no sensor. Printing occurs based on the label size values set with *[ESC] D* on page 41.
- `1` = reflective sensor. Printing occurs based on the label size values set with *[ESC] D* on page 41. The printer senses the black mark on the label liner and fine-tunes the paper position for each label.
- `2` = transmissive sensor. Printing occurs based on the label size values set with *[ESC] D* on page 41. The printer senses the interlabel gaps and fine-tunes the paper position for each label.

b = optional reserved area

`0` or `1`

c = optional reserved area

`C`, `D`, `E`

d = optional reserved area

`1` to `9`, `A`

e = optional reserved area

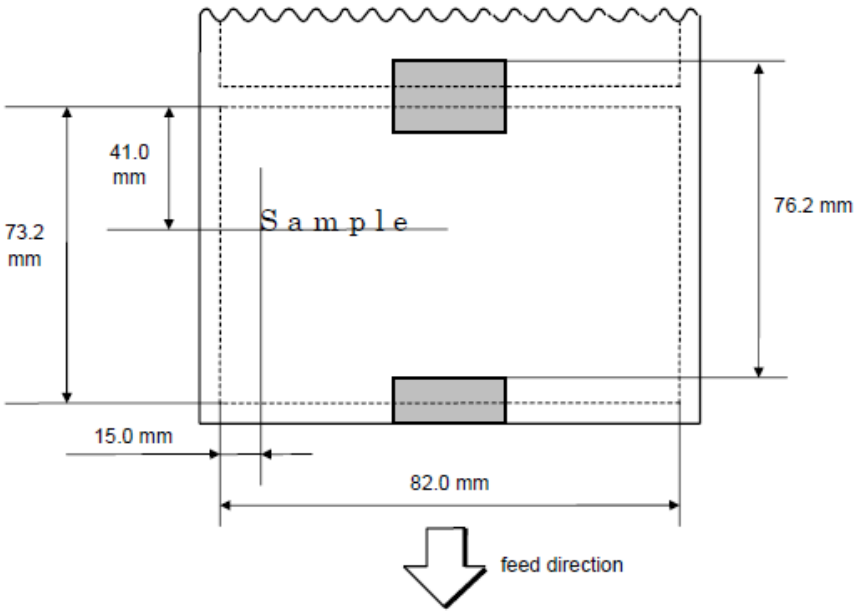
`0` to `2`

Notes This command feeds the media. If you adjust the label size, the sensor type, or the feed fine adjustment values, you must send this command to feed a label and adjust the print start position before you print a label.

The values set with this command are retained even if the printer is power cycled.

Example 1 • The following sample code would result in a label as shown.

```
[ESC] D0762, 0820, 0732 [LF] [NUL]
[ESC] AX; +010, +000, +10 [LF] [NUL]
[ESC] T11C40 [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, 0011C43001 [LF] [NUL]
```



[ESC] U1 or [ESC] U2

Description Forward/Reverse Feed

Syntax One of the following:

Feed Forward

```
[ESC] U1; a [LF] [NUL]
```

Reverse Feed

```
[ESC] U1; a [LF] [NUL]
```

Range

a = the distance to move the media forward or backward (in 0.1 mm increments). Must be four digits.

0030 to 2000

Notes This command moves the media forward or backward by the specified amount.

Format Commands

[ESC] J1

Description Format Flash Memory

Syntax `[ESC] J1; a (, b) [LF] [NUL]`

Range

a = the formatting (initializing) range

- `A` = all downloaded TEC formats and any downloaded TEC fonts
- `B` = all downloaded TEC formats
- `C` = any downloaded TEC fonts

b = optional reserved area

- `0` to `2`

Notes This command deletes downloaded TEC formats and fonts.

Writable Character Commands

[ESC] XD

Description Store Bitmap Writable Character

Syntax `[ESC] XD; (Sj, ) a, b, c, d, e, f, g, h, i ----- i [LF] [NUL]`

Range

`Sj` = an optional reserved area. An error occurs if parameter *j* is set to anything outside of its range.
- *j* = `0` to `2`

a = the writable character set. Must be two characters. An error occurs if an invalid number is specified.
- `01` to `40`

b = the writable character code
- `20H` to `FFH` (set in hexadecimal)

c = the left offset. Must be three digits.
- `000` to `719` dots

d = the top offset. Must be three digits.
- `000` to `719` dots

e = the character width. Must be three digits.
- `001` to `720` dots

f = the character height. Must be three digits.
- `001` to `720` dots

g = the character-to-character or proportional spacing. Must be three digits.
- `000` to `999` dots

h = the type of writable character data
- `0` = nibble mode (4 bits/byte)
- `1` = Hexadecimal mode (8 bits/byte)

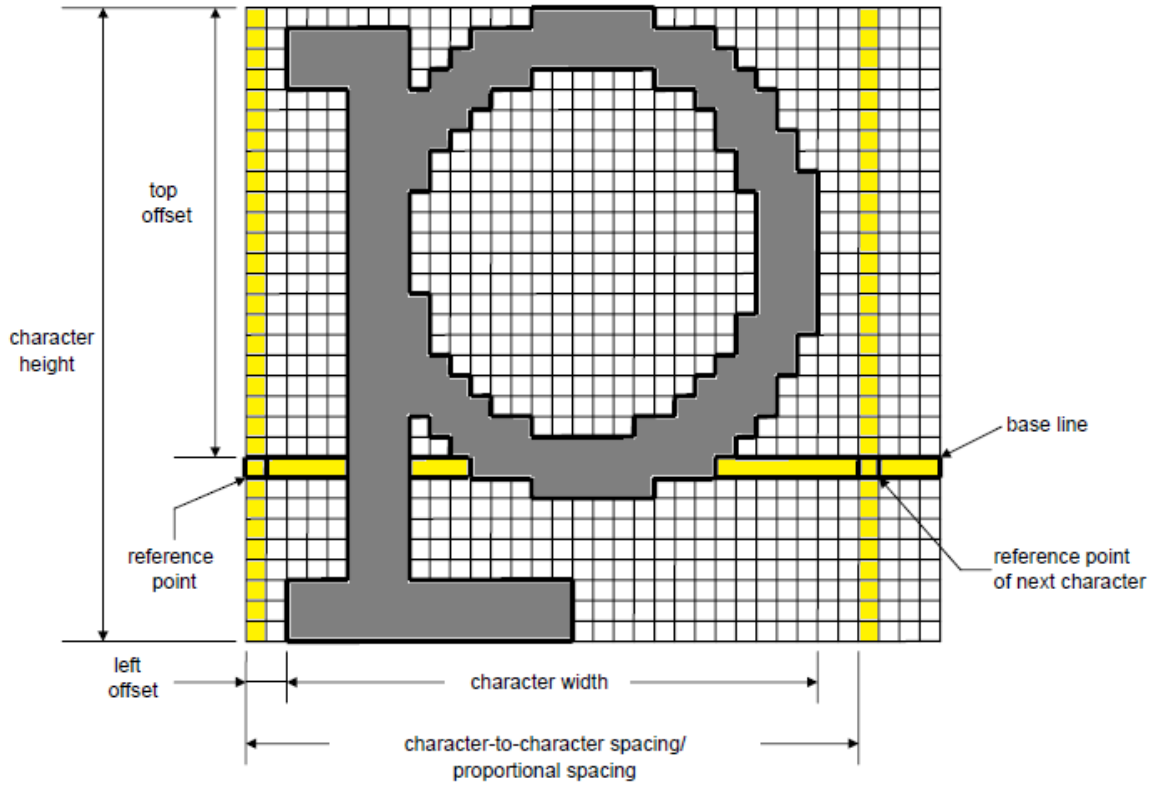
i `-----` *i* = the writable character data to be stored

Notes This command stores writable characters and logos in the Flash ROM on the main logic board. All characters for a single font must be downloaded at the same time. Other commands cannot be processed at the same time.

When you send this command for a character code that is already stored in the Flash memory, the character code is stored again, but it consumes additional memory for each time that it is stored. For more efficient storage, send *[ESC] J1* on page 159 first to format the Flash memory. When you store a new writable character, you must first transmit *[ESC] J1* on page 159.

When the Flash memory is used and a label issue operation is performed after you send this command, the printer clears the image buffer automatically.

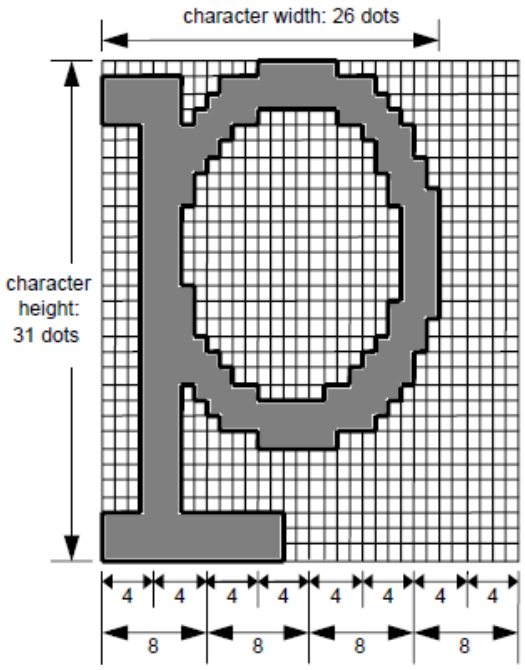
The following shows how parameters *c*, *d*, *e*, *f*, and *g* apply to a character.



Up to 224 characters can be stored per character set, but the actual number stored for each varies based on the writable character sizes. The maximum number of characters is 8960 characters (40 types × 224 characters each). You can save memory space by specifying applicable character width and character height settings for the different writable character codes.

You can account for proportional spacing and descending characters based on what you specify for parameters *c*, *d*, and *g*. Because the baseline is at the top when the top offset (parameter *d*) is `000`, the reference point is at the upper left when drawing. This ability facilitates the drawing of logos.

Example 1 • Writable character types 01 to 40



Nibble mode

1	30H	*2*	30H	*3*	30H	*4*	3FH	*5*	3CH	*6*	30H	*7*	30H	*8*	30H
9	3FH	*10*	3CH	*11*	37H										
								•							
								•							
								•							
								•							
								•							
								•							
								•						*240*	30H
241	3FH	*242*	3FH	*243*	3FH	*244*	3CH	*245*	30H	*246*	30H	*247*	30H	*248*	30H

Hexadecimal 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

- The printer separates the writable character data to be stored into 4-dot units and sends it in the order mentioned above (1–248). (Upper digit = “3”)
- The data of writable characters to be stored = 30H to 3FH.
- The minimum unit in the X direction is 8 dots. Dots without data are transmitted as data 0.
- The data count of writable characters to be stored must be as follows:

  data count of writable characters to be stored =

  {(number of character width dots + 7)/8}
  × number of character height dots × 2

  The value in brackets rounds down to the nearest whole number.

Hexadecimal Mode

- The printer separates the writable character data into 8-dot units and sends them in the following order: 1–124.
- The data of writable characters to be stored is 00H to FFH.
- The minimum unit of character width is 8 dots. Dots without data are transmitted as data 0.
- The number of bytes of the writable character to be stored must be as follows:

  number of bytes of the writable character to be stored =

  {(number of character width dots + 7)/8} × number of character height dots

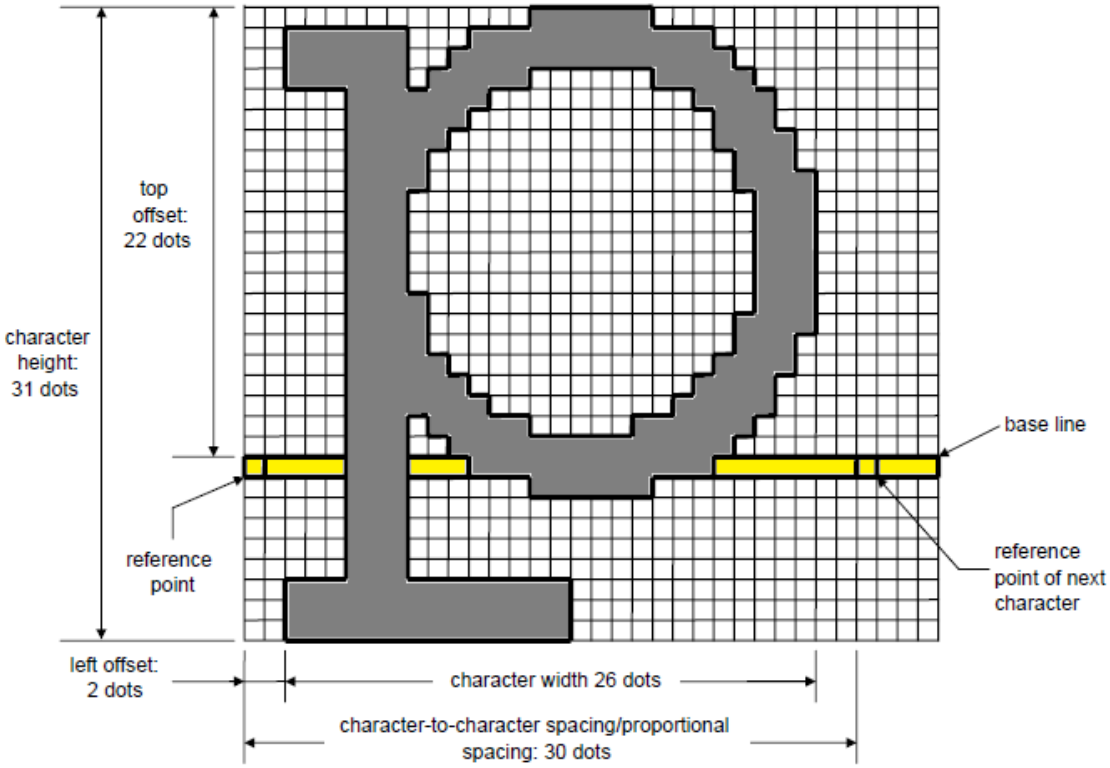
  The value in brackets rounds down to the nearest whole number.

Example 2 • Writable character type 03 and 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>0001<01>0003<01>00038
01?0007801?800?001?<01?001=?07>001<???<001<7??8001<0?<000
1<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 = “?”



Graphics Commands

[ESC] SG

Description Draw Graphic

Syntax `[ESC] SG; a(D), b(D), c, d, e, g --- g [LF] [NUL]`

Range

a or *a* D = the X coordinate of the print origin for drawing graphic data. Must be four digits. The letter D can be attached to indicate that the coordinate is being specified in dots. Otherwise, the coordinate is assumed to be specified in 0.1 mm (0.0039 in.) increments.

0000 (or 0000D) or greater

b or *b*D = the Y coordinate of the start point of the area to be cleared. Must be four or five digits. The letter D can be attached to indicate that the coordinate is being specified in dots. Otherwise, the coordinate is assumed to be specified in 0.1 mm (0.0039 in.) increments.

4 digits = 0000 (or 0000D) or greater

5 digits = 00000 (or 00000D) or greater

c = the graphic width in dots.* Must be four digits.

* When "2: BMP file" or "6: PCX file" is specified for graphic data, this designation is ignored because the graphic dimensions are contained in the graphic data.

d = the graphic height in dots.* Must be four or five digits.

* When "2: BMP file" or "6: PCX file" is specified for graphic data type, this designation is ignored because the graphic dimensions are contained in the graphic data.

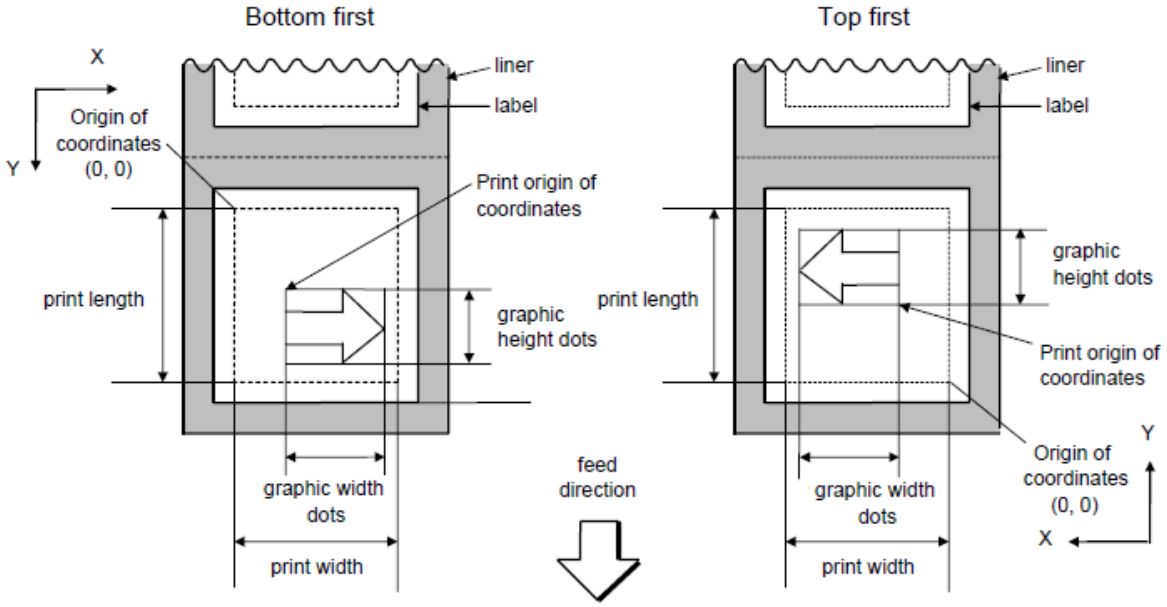
e = the type of graphic data

0 = Nibble mode (4 dots/byte)	Overwrite drawing
1 = Hexadecimal 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 = Hexadecimal mode (8 dots/byte)	OR drawing
6 = PCX file mode	Overwrite drawing
7 = TOPIX compression mode	XOR drawing

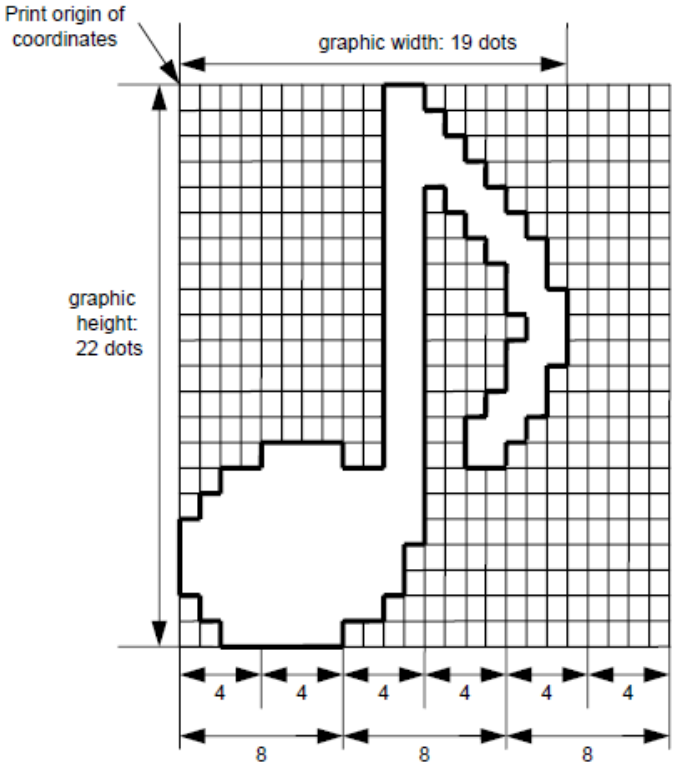
g --- g = the data about the graphic

Notes This command draws the graphic data. Both width and height are 8 dots/mm with a 203 dpi-printhead model.

Example 1 • The print origin of coordinates must be set so that the character drawing result is within the print area set by *[ESC] D* on page 41. This also applies to the settings for the graphic width dots and the graphic height dots.



Example 2 • Nibble and hexadecimal modes



Nibble mode											
1	30H	*2*	30H	*3*	33H	*4*	30H	*5*	30H	*6*	30H
7	30H	*8*	30H								
						•					
						•					
						•					
						•					
						•					
						•					
						•					
						•				*126*	30H
127	33H	*128*	3FH	*129*	30H	*130*	30H	*131*	30H	*132*	30H

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

Nibble Mode

- The printer separates the writable character data to be stored into 4-dot units and sends it in the order mentioned above (1–132). (Upper digit = “3”)
- The graphic data = 30H to 3FH.
- The minimum unit in the X direction is 8 dots. Dots without data are transmitted as data 0.
- The graphic data count must be as follows:

  graphic data count =
  {(number of graphic width dots + 7)/8}
  × number of graphic height dots × 2

  The value in brackets rounds down to the nearest whole number.

Hexadecimal Mode

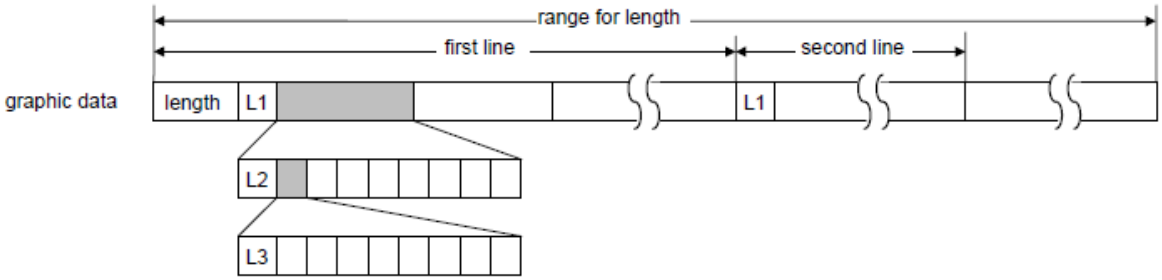
- The printer separates the graphic data into 8-dot units and sends them in the following order: 1–66.
- The graphic data is 00H to FFH.
- The minimum unit in the X direction is 8 dots. Dots without data are transmitted as data 0.
- The graphic data count must be as follows:

  graphic data count =

  {(number of graphic width dots + 7)/8} × number of graphic height dots

  The value in brackets rounds down to the nearest whole number.

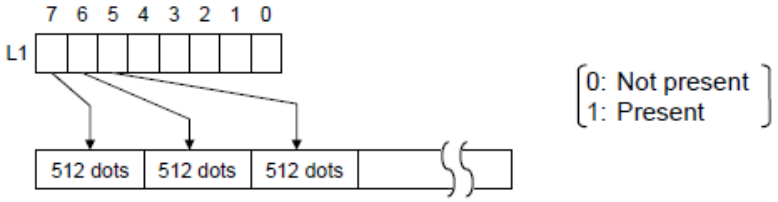
Example 3 • TOPIX compression mode



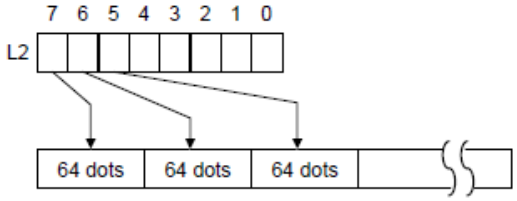
1. Length: the total number of bytes of the graphic data (0001H ~)

   For example: Length = 20 bytes: | 00 | 14 |

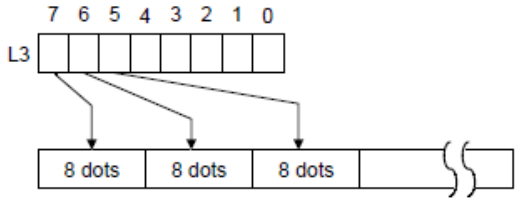
2. The L1 parameter shows which large block contains the changed data (512 dots/block).



3. The L2 parameter shows which medium block of the large L1 block contains the changed data (64 dots/block).



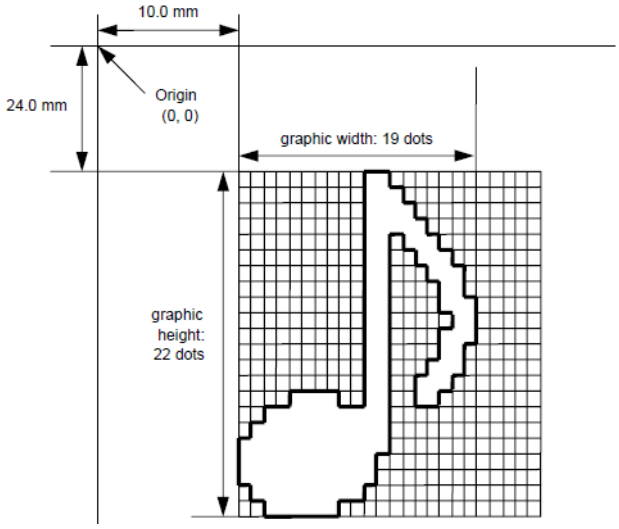
4. The L3 parameter shows which small block of the medium L2 block contains the changed data (8 dots/block).



The Exclusive-OR (XOR) operation occurs between the current image data and the image data one line prior. The changed bit is set to ON (1). The dot alignment is MSB (left dots) and LSB (right dots).

The printer draws only the smaller value of either the designated graphic width or 512 KB, which is the maximum buffer size. The minimum drawing unit is 8 dots (1 byte). If the graphic width is set to less, the printer resets it to 8 dots.

Example 4 • Nibble and TOPIX Compression Modes



Nibble Mode

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

[ESC] SG; 0100, 0240, 0019, 0022, 0,
003000003800003<00003>
000037000033800031<00030<00030>00030600030>00030<00031<00
033800?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

```
5C] 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    3rd 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  21st line       21st line
```

PC Command Saving Commands

[ESC] XO

Description Start Save Operation

Syntax [ESC] XO; *a*, (S*b*,) *c* [LF] [NUL]

Range
a = the identification number to be used to save in Flash memory
01 to 99
S*b* = an optional reserved area.
b = 0 to 2
c = Reserved.

Notes This command specifies where to start saving PC interface commands, which places the printer in the mode where PC interface commands are written in the Flash memory. The printer can save up to 64 KB per save.

After you send this command, any commands other than the following are saved into Flash memory without being analyzed:

- Save Start command ([ESC] XO)
- Save Terminate command ([ESC] XP)
- Saved Data Read command ([ESC] XQ)
- Bitmap 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)
- Bluetooth Device Address Acquire command ([ESC] IT)
- Printer ID Set command ([ESC] ID)
- Mode Select command ([ESC] M)

The printer does not perform an error check for the commands when saving them.

Example • This example shows how this command would be used.

```
[ESC] J1; B [LF] [NUL]
[ESC] XO; 01, 0 [LF] [NUL]
[ESC] D0508, 0760, 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, 0550, 2, 2, G, 33, B, +0000000001 [LF]
[NUL]
[ESC] XP [LF] [NUL]
[ESC] XP [LF] [NUL]
```

[ESC] XP

Description Terminate Save Operation

Syntax [ESC] XP [LF] [NUL]

Notes This command specifies where to stop saving PC interface commands

[ESC] XQ

Description Read Saved Data

Syntax [ESC] XQ; a, (Sb,) c, d [LF] [NUL]

Range

a = the identification number of the file to be read from Flash memory
01 to 99

S*b* = an optional reserved area.
b = 0 to 2

c = Reserved.

d = Reserved.

Notes This command reads the PC interface commands that are saved in Flash memory.

When you issue this command, if a file with the identification number that you provided is not found, an error occurs.

If the printer encounters an error in a PC interface command that is read by this command, a command error occurs.

Example • This example shows how this command would be used.

```
[ESC] XQ; 01, 0, L [LF] [NUL]
[ESC] RC001; Sample [LF] [NUL]
[ESC] RC002; 100 [LF] [NUL]
[ESC] XS; I, 0002, 0002C3000 [LF] [NUL]
```

Check Commands

[ESC] WR

Description Reset the Printer

Syntax `[ESC] WR [LF] [NUL]`

Notes This command resets the printer to its initial state.

- If the printer is printing a label when it receives this command, the reset occurs after the label is printed.
- If the printer is transmitting data when it receives this command, the reset occurs after transmission is complete.
- If the printer has received code from the Store Bitmap Writable Character command (*[ESC] XD* on page 160) or the Draw Graphic command (*[ESC] SG* on page 164), the reset occurs after the printer receives the information specifying the type of data.

Allow enough time for the printer to finish rebooting before sending another command.

[ESC] Z0 (zero)

Description Reset Device

Syntax `[ESC] Z0 [LF] [NUL]`

Notes This command, which resets the printer, is executed when the printer enters an idle state.

Status Commands

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

Description Request Printer Status

Syntax One of the following:

```
[ESC] WS [LF] [NUL]
[ESC] FM [LF] [NUL]
[ESC] v
```

Notes This command tells the printer to send its current status to the host computer, regardless of the setting of the status response parameter.

The printer returns the status only to the interface that sent this command.

The printer status is returned in 2-byte format.

`01` = cover open
`04` = printer paused
`05` = wait for strip
`13` = label end/media out
`18` = printhead over temperature
`36` = low battery

If the printer has received code from the Store Bitmap Writable Character command (*[ESC] XD* on page 160) or the Draw Graphic command (*[ESC] SG* on page 164), the status request command is processed after the printer receives the information specifying the type of data.

[ESC] WB

Description Request Printer Status and Free Buffer Space

Syntax [ESC] WB [LF] [NUL]

Notes This command tells the printer to send its current status and the free space of the receive buffer to the host computer, regardless of the setting of the status response parameter.

The printer returns the status only to the interface that sent this command.

The response is returned in the following format:

<SOH><STX>13 3 0000 23 00512 00512<CR><LF>
a b c d e f

where
a = the printer status in 2-byte format:
- 01 = cover open
- 04 = printer paused
- 05 = wait for strip
- 13 = label end/media out
- 18 = printhead over temperature
- 36 = low battery

b = the status type
c = the remaining number of labels
d = the length. Fixed at 23.
e = the receiving buffer space. Fixed at 00512.
f = the entire receiving buffer space. Fixed at 00512.

If the printer has received code from the Store Bitmap Writable Character command (*[ESC] XD* on page 160) or the Draw Graphic command (*[ESC] SG* on page 164), the status request and free buffer space command is processed after the printer receives the information specifying the type of data.

[ESC] WX

Description Acquire Mode Information

Syntax [ESC] WX [LF] [NUL]

Notes This command sends the printer mode information to the host computer. The mode information sent is as follows:

Table 4 • TPCL mode (Mode = A) Batch issue mode

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

[ESC] WV

Description Acquire Version Information

Syntax `[ESC] WV [LF] [NUL]`

Notes This command retrieves information such as the printer model and firmware version.

The format of the program version data to be returned to the host is as follows:

SOH		01H
STX		02H
Creation date of program 9 bytes of data in format: DD-MMM-YYYY	“1”	31H
	“8”	38H
	“A”	41H
	“U”	50H
	“G”	52H
	“2”	32H
	“0”	30H
	“1”	31H
	“1”	31H
Model • QLn320-200dpi	“Q”	51H
	“L”	4CH
	“n”	6EH
	“3”	33H
	“2”	32H
	“0”	30H
	“-”	2DH
	“2”	32H
	“0”	30H
	“0”	30H
	“d”	64H
	“p”	70H
	“i”	69H

Version	“V”	56H
data in format Vxx.xx.xx	“6”	36H
	“8”	38H
	“.”	2EH
	“1”	31H
	“9”	39H
	“.”	2EH
	“6”	36H
	“Z”	5AH
ETX		03H
EOT		04H
CR		0DH
LF		0AH

This command is processed in the order in which it is received, after the printer has processed any commands that were sent prior to it.

Bluetooth and Wireless LAN Commands

[ESC] IT

Description Acquire the Device Address

Syntax `[ESC] IT [LF] [NUL]`

Notes This command reads the Bluetooth® device address or the wireless LAN MAC address.

Information field to be sent:

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

The printer returns addresses such as the following examples:

Bluetooth device address:0015b5aa0005

Wireless LAN MAC address:000940387630

Bluetooth device address:

[30H]	[30H]	[31H]	[35H]	[62H]	[35H]	[61H]	[61H]	[30H]	[30H]	[30H]	[35H]
0	0	1	5	b	5	a	a	0	0	0	5

Wireless LAN MAC address:

[30H]	[30H]	[30H]	[39H]	[34H]	[30H]	[33H]	[38H]	[37H]	[36H]	[33H]	[30H]
0	0	0	9	4	0	3	8	7	6	3	0

Set/Get/Do (SGD) Commands

The following SGD commands were added for use with your Virtual Device app. For more detailed information on SGD commands, see the Programming Guide for ZPL II®, ZBI 2, Set/Get/Do, Mirror, and WML (formerly the ZPL II Programming Guide).

apl.enable

Description This command enables or disables a Virtual Device app.

Note •
- ZPL and CPCL may not function normally when a Virtual Device app is enabled.
- You must restart the printer after changing the value of `apl.enable`.

Type `setvar`

Commands	Details
`setvar`	This command instructs the printer to enable a virtual device. *Format:* `! U1 setvar "apl.enable" "value"` *Values:* `"apl-t"` = enable Virtual Device-T `"none"` = disable any Virtual Device app (ZPL and CPCL function normally)

Example 1 • This example shows how to enable the Virtual Device-T app:

```
! U1 setvar "apl.enable" "apl-t"
```

Example 2 • This example shows how to disable the Virtual Device-T app:

```
! U1 setvar "apl.enable" "none"
```

apl.version

Description This command returns the version of the currently running Virtual Device app.

Type `getvar`

Commands	Details
`getvar`	*Format:* `! U1 getvar "apl.version"`

apl.framework_version

Description This command returns the level of support for Virtual Devices in the printer operating system.

Type `getvar`

Commands	Details
`getvar`	*Format:* `! U1 getvar "apl.framework_version"`

Supported Fonts and Barcodes

This section provides you with examples of the fonts, barcodes, and two-dimensional codes available on the Zebra printers with Virtual Device-T.

Contents

Bitmap Fonts

Table 5 • Supported Bitmap Fonts

Font	Description	Example
A	Times Roman (Medium)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
B	Times Roman (Medium)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
C	Times Roman (Bold)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
D	Times Roman (Bold)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ

Table 5 • Supported Bitmap Fonts (Continued)

Font	Description	Example
E	Times Roman (Bold)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
F	Times Roman (Italic)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
G	Helvetica (Medium)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
H	Helvetica (Medium)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ

Table 5 • Supported Bitmap Fonts (Continued)

Font	Description	Example
I	Helvetica (Medium)	!"#$%&'()* + ,-./ 0123456789:;< = >?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
J	Helvetica (Bold)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
K	Helvetica (Bold)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ

Table 5 • Supported Bitmap Fonts (Continued)

Font	Description	Example
L	Helvetica (Italic)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
M	Presentation (Bold)	Shown at 90% of actual size. !"#$%&'()*+,-./ 0123456789 :;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ ABCDEFGHIJKLM NOPQRSTUVWXYZÅîØ
N	Letter Gothic (Medium)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ

Table 5 • Supported Bitmap Fonts (Continued)

Font	Description	Example
O	Prestige Elite (Medium)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
P	Prestige Elite (Bold)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
Q	Courier (Medium)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzŒÛß
R	Courier (Bold)	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ

Table 5 • Supported Bitmap Fonts (Continued)

Font	Description	Example
S	OCR-A	! " # $ % & ' ( ) * + , - . / 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 P Q R S T U V W X Y Z
T	OCR-B	! " # $ % & ' ( ) * + , - . / 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 P Q R S T U V W X Y Z a b c d e f g h i j k l m n o p q r s t u v w x y z Å î Ø
q	Gothic725 Black	!"#$%&'()*+,-./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ

Outline Fonts

Table 6 • Supported Outline Fonts

Font	Description	Example
A	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 P Q R S T U V W X Y Z a b c d e f g h i j k l m n o p q r s t u v w x y z Å î Ø
B	Helvetica (Bold, proportional)	!"#$%&'()*+,–./ 0123456789:;<=>?@ ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyzÅîØ
E	Price font 1	#$0123456789
F	Price font 2	$0123456789
G	Price font 3	$0123456789

Barcode Fonts

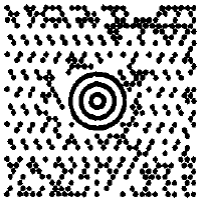
Table 7 • Supported Barcode Fonts and Two-Dimensional Codes

Font	Description	Example
0	JAN8, EAN8	
1	MSI	
2	Interleaved 2 of 5	
3	CODE39 (standard)	
4	NW7	
5	JAN13, EAN13	
6	UPC-E	
7	EAN13 + 2 digits	
8	EAN13 + 5 digits	
9, A	CODE128	

Table 7 • Supported Barcode Fonts and Two-Dimensional Codes (Continued)

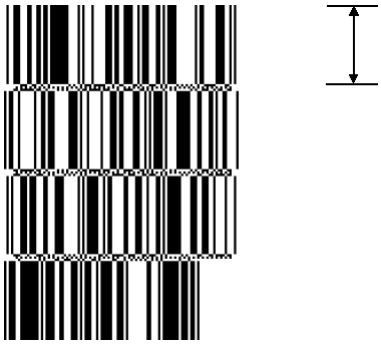
Font	Description	Example
B	CODE39 (full ASCII)	
C	CODE93	
G	UPC-E + 2 digits	
H	UPC-E + 5 digits	
I	EAN8 + 2 digits	
J	EAN8 + 5 digits	
K	UPC-A	
L	UPC-A + 2 digits	
M	UPC-A + 5 digits	
N	UCC/ EAN128	

Table 7 • Supported Barcode Fonts and Two-Dimensional Codes (Continued)

Font	Description	Example
N	EAN128	
O	Industrial 2 of 5	
P	PDF417	
Q	Data Matrix	
T	QR code	
U	POSTNET	
X	MicroPDF417	
Z	MaxiCode	
b	GS1 Databar*	1 = GS1 Databar Omni-directional  2 = GS1 Databar Stacked  The height of the top row is the specified height. The height of the bottom row is the specified height x 7/5.

* Arrows indicate the height based on the height parameter.

Table 7 • Supported Barcode Fonts and Two-Dimensional Codes (Continued)

Font	Description	Example
b	GS1 Databar* (continued)	3 = GS1 Databar Stacked Omni-directional  The top and bottom rows are equal in height.
		4 = GS1 Databar Limited 
		5 = GS1 Databar Expanded 
		6 = GS1 Databar Expanded Stacked 

* Arrows indicate the height based on the height parameter.

Character Code Tables

This section provides the supported character code tables. For additional code page support, contact your Zebra representative.

How to Find the Character Code In the following code lists, the high bytes are plotted along the vertical coordinate while the low bytes are plotted along the horizontal coordinate.

Contents

Times Roman, Helvetica, Letter Gothic, Prestige Elite, Courier, Gothic725 Black

For bit map font type: A, B, C, D, E, F, G, H, I, J, K, L, N, O, P, Q, R, q

Table 8 • PC-850

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	€		ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í			Đ	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			Õ	§
6			&	6	F	V	f	v	å	Û		Â	ã	Í	µ	÷
7			’	7	G	W	g	w	ç	ù		À	Ã	Î	þ	¸
8			(	8	H	X	h	x	ê	ÿ	¿	©		Ï	Þ	°
9			)	9	I	Y	i	y	ë	Ö	®				Ú	¨
A			*	:	J	Z	j	z	è	Ü	¬				Û	•
B			+	;	K	[	k	{	ï	ø	½				Ù	¹
C			,	<	L	\	l	|	î	£	¼			ý	³
D			–	=	M	]	m	}	ì	Ø	¡	¢		¦	Ý	²
E			.	>	N	^	n	~	Ä	×	«	¥		Ì	¯	■
F			/	?	O	_	o	▒	Å	ƒ	»		¤		´	

PRESENTATION

Bitmap Font Type: M

Table 9 • PC-850

	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	▩								

OCR-A

Bitmap Font Type: S

Table 10 • PC-850

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
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											

OCR-B

Bit map font type: T

Table 11 • PC-850

	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											

* The size of the numerals of codes 80h ~ 89h are reduced to 80%.

TEC OUTLINE FONT 1

Outline font type: A, B

Table 12 • PC-850

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				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	å	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	Δ	Å	ƒ	»		¤			

PRICE FONT 1, 2, 3

Outline font type: E, F, G

Table 13 • PC-850

	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			/													

Barcode/Two-Dimensional Code Tables

This section provides barcode/two-dimensional code tables.

Note • Some barcodes/two- dimensional codes are not supported depending on the print mode.

Contents

WPC, Interleaved 2 of 5 (ITF), MSI, Industrial 2 of 5, GS1 Databar, GS1 Databar Stacked, GS1 Databar Stacked Omni-directional, GS1 Databar Limited

WPC is the generic name for JAN, EAN, and UPC barcodes.

	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						

POSTNET

	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						

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			

CODE39 (Full ASCII)

Transfer Code						
	2	3	4	5	6	7
0	SP	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	⌂

⇒

Drawing Code						
	2	3	4	5	6	7
0	SP	0	%V	P	%	+P
1	/A	1	A	Q	+A	+Q
2	/B	2	B	R	+B	+R
3	/C	3	C	S	+C	+S
4	/D	4	D	T	+D	+T
5	/E	5	E	U	+E	+U
6	/F	6	F	V	+F	+V
7	/G	7	G	W	+G	+
8	/H	8	H	X	+H	+X
9	/I	9	I	Y	+I	+Y
A	/	/Z	J	Z	+J	+Z
B	/K	%F	K	%K	+K	%
C	/L	%	L	%L	+L	%
D	–	%H	M	%M	+M	%
E	.	%I	N	%N	+N	%
F	/O	%J	O	%O	+O	%

NW7

	2	3	4	5	6	7
0	S	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	/					

CODE93

Transfer Code						
	2	3	4	5	6	7
0	0	SP	0	@	P	`
1	1	!	1	A	Q	a
2	2	“	2	B	R	b
3	3	#	3	C	S	c
4	4	$	4	D	T	d
5	5	%	5	E	U	e
6	6	&	6	F	V	f
7	7	'	7	G	W	g
8	8	(	8	H	X	h
9	9	)	9	I	Y	i
A	A	*	:	J	Z	j
B	B	+	;	K	[	k
C	C	,	<	L	¥	l
D	D	–	=	M	]	m
E	E	.	>	N	^	n
F	F	/	?	O	_	o

Drawing Code						
	2	3	4	5	6	7
0	SP	0	%V	P	%	+P
1	/A	1	A	Q	+A	+Q
2	/B	2	B	R	+B	+R
3	/C	3	C	S	+C	+S
4	/D	4	D	T	+D	+T
5	/E	5	E	U	+E	+U
6	/F	6	F	V	+F	+V
7	/G	7	G	W	+G	+
8	/H	8	H	X	+H	+X
9	/I	9	I	Y	+I	+Y
A	/	/Z	J	Z	+J	+Z
B	+	%F	K	%K	+K	%
C	/L	%	L	%L	+L	%
D	–	%H	M	%M	+M	%
E	.	%I	N	%N	+N	%
F	/	%J	O	%O	+O	%

CODE128

	–	–	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

How to Transmit 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)

How to Transmit the Special Codes

Value		
30 (Character >)	?	> 0
95	?	> 1
96	?	> 2
97	?	> 3
98	?	> 4
99	?	> 5
100	?	> 6
101	?	> 7
102	?	> 8

Designation of Start Code

START (CODE A)	?	> 7
START (CODE B)	?	> 6
START (CODE C)	?	> 5

Value	Code A	Code B	Code C	Value	Code A	Code B	Code C	Value	Code A	Code B	Code C
0	SP	SP	00	36	D	D	36	72	BS	h	72
1	!	!	01	37	E	E	37	73	HT	i	73
2	"	"	02	38	F	F	38	74	LF	j	74
3	#	#	03	39	G	G	39	75	VT	k	75
4	$	$	04	40	H	H	40	76	FF	l	76
5	%	%	05	41	I	I	41	77	CR	m	77
6	&	&	06	42	J	J	42	78	SO	n	78
7	'	'	07	43	K	K	43	79	SI	o	79
8	(	(	08	44	L	L	44	80	DLE	p	80
9	)	)	09	45	M	M	45	81	DC1	q	81
10	*	*	10	46	N	N	46	82	DC2	r	82
11	+	+	11	47	O	O	47	83	DC3	s	83
12	,	,	12	48	P	P	48	84	DC4	t	84
13	–	–	13	49	Q	Q	49	85	NAK	u	85
14	.	.	14	50	R	R	50	86	SYN	v	86

Value	Code A	Code B	Code C	Value	Code A	Code B	Code C	Value	Code A	Code B	Code C
15	/	/	15	51	S	S	51	87	ETB	w	87
16	0	0	16	52	T	T	52	88	CAN	x	88
17	1	1	17	53	U	U	53	89	EM	y	89
18	2	2	18	54	V	V	54	90	SUB	z	90
19	3	3	19	55	W	W	55	91	ESC	{	91
20	4	4	20	56	X	X	56	92	FS	|	92
21	5	5	21	57	Y	Y	57	93	GS	}	93
22	6	6	22	58	Z	Z	58	94	RS	~	94
23	7	7	23	59	[	[	59	95	US	DEL	95
24	8	8	24	60	\	\	60	96	FNC3	FNC3	96
25	9	9	25	61	]	]	61	97	FNC2	FNC2	97
26	:	:	26	62	^	^	62	98	SHIFT	SHIFT	98
27	;	;	27	63	_	_	63	99	CODE C	CODE C	99
28	<	<	28	64	NUL	`	64	100	CODE B	FNC4	CODE B
29	=	=	29	65	SOH	a	65	101	FNC4	CODE A	CODE A
30	>	>	30	66	STX	b	66	102	FNC1	FNC1	FNC1
31	?	?	31	67	ETX	c	67				
32	@	@	32	68	EOT	d	68	103	START CODE A		
33	A	A	33	69	ENQ	e	69	104	START CODE B		
34	B	B	34	70	ACK	f	70	105	START CODE C		
35	C	C	35	71	BEL	g	71				

GS1 Databar Expanded/GS1 Databar Expanded Stacked

			2	3	4	5	6	7								
0			S	0		P		p								
1			!	1	A	Q	a	q								
2			“	2	B	R	b	r								
3			FN	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									

Data Matrix

The code to be used is designated using the format ID.

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

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NU	DLE	SP	0	@	P	`	p								
1	SO	DC	!	1	A	Q	a	q								
2	STX	DC	”	2	B	R	b	r								
3	ETX	DC	#	3	C	S	c	s								
4	EO	DC	$	4	D	T	d	t								
5	EN	NA	%	5	E	U	e	u								
6	AC	SY	&	6	F	V	f	v								
7	BEL	ETB	’	7	G	W	g	w								
8	BS	CA	(	8	H	X	h	x								
9	HT	EM	)	9	I	Y	i	y								
A	LF	SU	*	:	J	Z	j	z								
B	VT	ES	+	;	K	[	k	{								
C	FF	FS	,	<	L	\	l	|							
D	CR	GS	–	=	M	]	m	}								
E	SO	RS	.	>	N	^	n	~								
F	SI	US	/	?	O	_	o									

How to Transmit 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)

How to Transmit the Special Codes

> (3EH) ? 0 (3EH, 30H)

PDF417, MicroPDF417

The following modes are automatically selected according to the code used.

Mode	Code	Details
EXC mode	Alphanumerics, symbols	0 to 9A to Z a to z space ! ” #$%& ’() *+, - . /:;<= >? @[\ ] ^ _`{|} ~Δ CRHT
Numeric Compaction mode	Numerics	0 to 9

Mode	Details
Upper case letters, space	A to Z space
Numerics	0 to 9

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p								
1	SO	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	EN	NAK	%	5	E	U	e	u								
6	ACK	SYN	&	6	F	V	f	v								
7	BEL	ETB	’	7	G	W	g	w								
8	BS	CA	(	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	Δ								

How to Transmit 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)

How to Transmit the Special Codes

> (3EH)	?	0 (3EH, 30H)

QR Code

Mode Selection When manual mode is selected in the Format Command

- Numeric mode, alphanumeric, and symbol mode

Mode selection	Data to be printed

- Binary mode

Mode selection	Number of data strings (4 digits)	Data to be printed

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

Mode	Code	Details
N	Numerics	0 to 9
A	Alphanumerics, symbols	A to Z 0 to 9 space $ % * + - . / :
B	Binary (8-bit)	00H to FFH

When the automatic mode is selected in the Format Command for a QR code:

Data to be printed

	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								

How to Transmit 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)

How to Transmit the Special Codes

> (3EH) ? 0 (3EH, 30H)

MaxiCode

Symbol Character Value		Code Set A Character		Code Set B Character		Code Set C Character		Code Set D Character		Code Set E Character	
Decimal	Binary	Decimal		Decimal		Decimal		Decimal		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	ª	170	¡	161	NBSP	160
38	100110	&	38	<	60	¬	172	¨	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

Symbol Character Value		Code Set A Character		Code Set B Character		Code Set C Character		Code Set D Character		Code Set E Character	
Decimal	Binary	Decimal		Decimal		Decimal		Decimal		Decimal	
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]	

How to Transmit the Control Code Data

SOH (01H) ? > A (3EH, 41H)
STX (02H) ? > B (3EH, 42H)
?
GS (1DH) ? >] (3EH, 5DH)
RS (1EH) ? > ^ (3EH, 5EH)
US (1FH) ? > _ (3EH, 5FH)

How to Transmit the Special Codes

> (3EH) ? 0 (3EH, 30H)

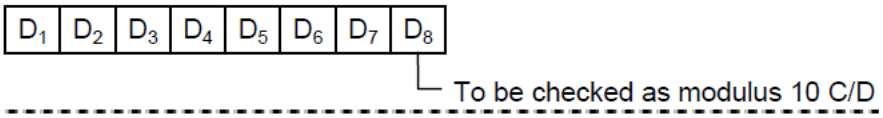
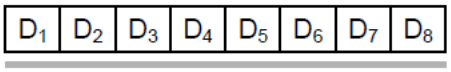
Note • “NUL” code in the table cannot be used; however, it can be designated. If it is designated, data following “NUL” code is not printed.

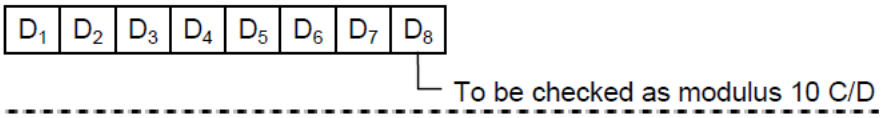
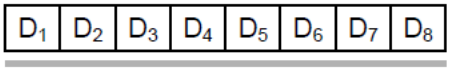
Drawing of Barcode Data

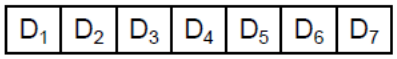
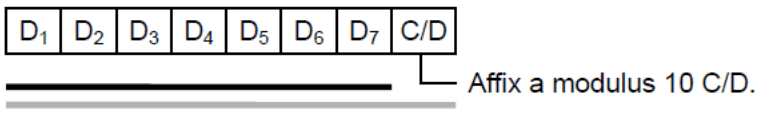
Field to be incremented/decremented.
(The absence of a solid line invalidates incrementing/decrementing.)

Field subject to printing numerals under bars.

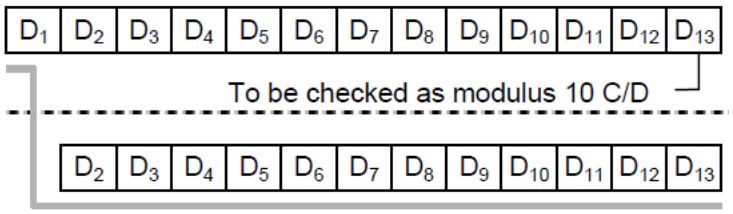
Type of Barcode: JAN8, EAN8

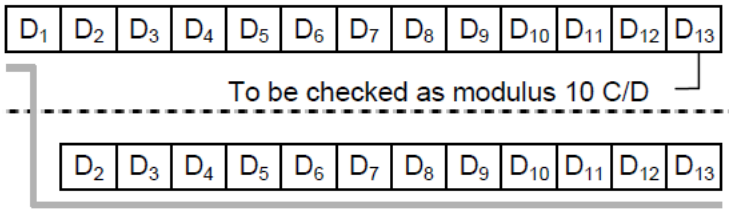
Number of Input Digits		
8 digits	Input Data	
	Drawing Data	
Other than 8		Not to be drawn

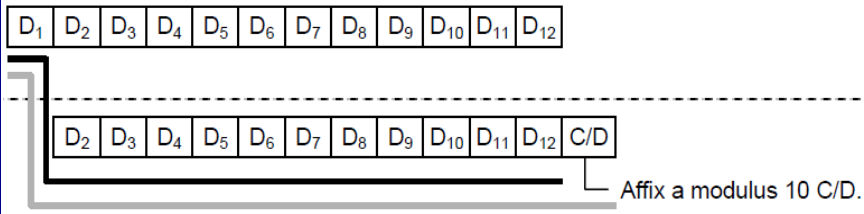
Number of Input Digits		
8 digits	Input Data	
	Drawing Data	
Other than 8		Not to be drawn

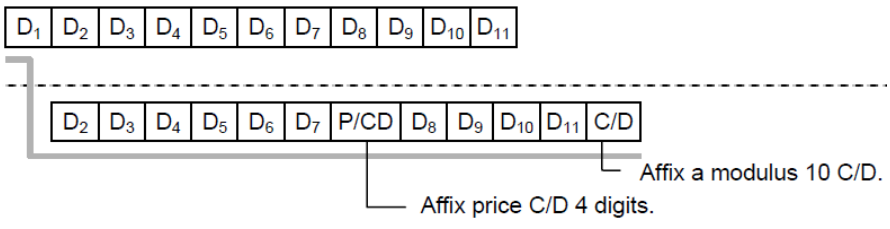
Number of Input Digits		
8 digits	Input Data	
	Drawing Data	
Other than 8		Not to be drawn

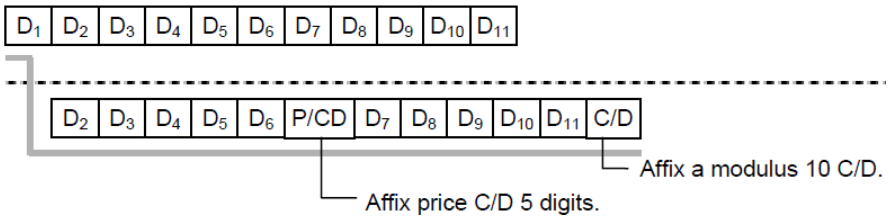
Type of Barcode: JAN13, EAN13

Number of Input Digits		
13 digits	Input Data Drawing Data	
Other than 13		Not to be drawn

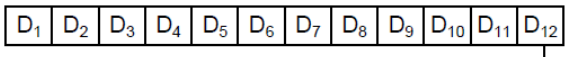
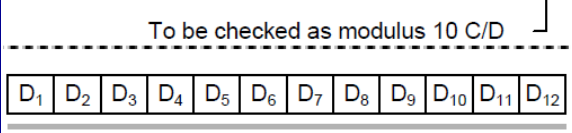
Number of Input Digits		
13 digits	Input Data Drawing Data	
Other than 13		Not to be drawn

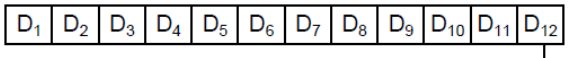
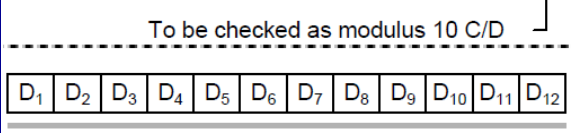
Number of Input Digits		
12 digits	Input Data Drawing Data	
Other than 12		Not to be drawn

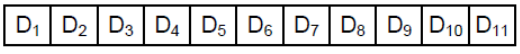
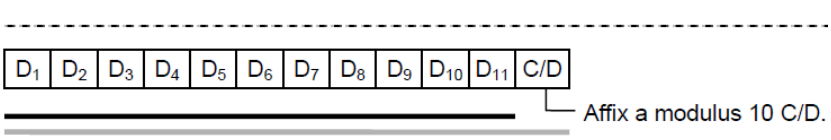
Number of Input Digits		
11 digits	Input Data Drawing Data	
Other than 11		Not to be drawn

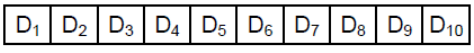
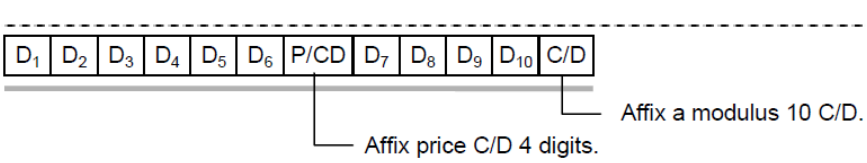
Number of Input Digits		
11 digits	Input Data Drawing Data	
Other than 11		Not to be drawn

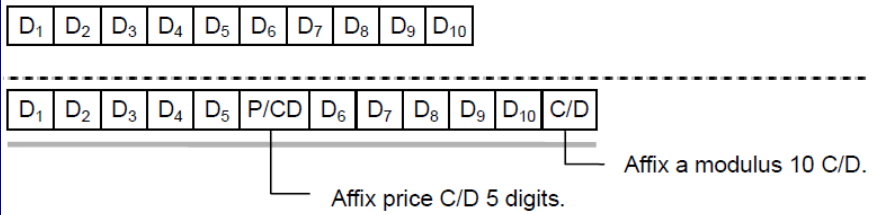
Type of Barcode: UPC-A

Number of Input Digits		
12 digits	Input Data	
	Drawing Data	
Other than 12		Not to be drawn

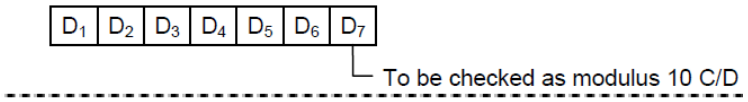
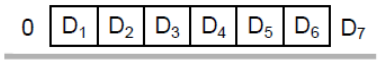
Number of Input Digits		
12 digits	Input Data	
	Drawing Data	
Other than 12		Not to be drawn

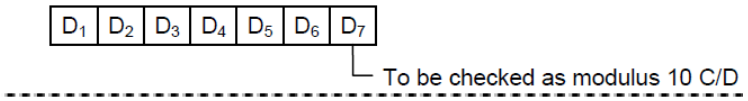
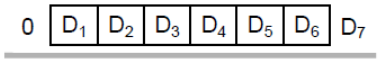
Number of Input Digits		
11 digits	Input Data	
	Drawing Data	
Other than 11		Not to be drawn

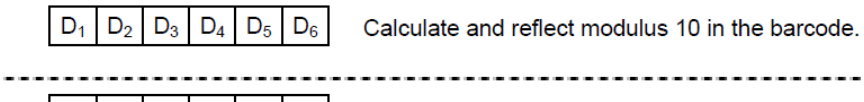
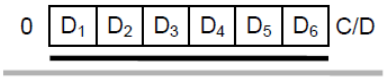
Number of Input Digits		
11 digits	Input Data	
	Drawing Data	
Other than 11		Not to be drawn

Number of Input Digits		
10 digits	Input Data Drawing Data	
Other than 10		Not to be drawn

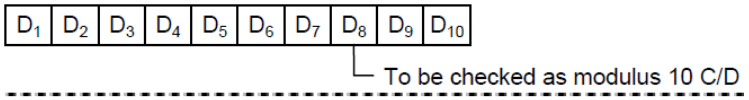
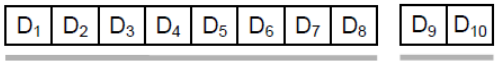
Type of Barcode: UPC-E

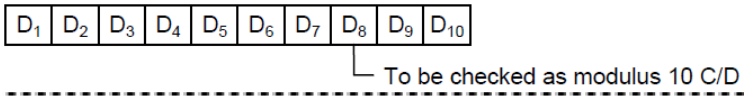
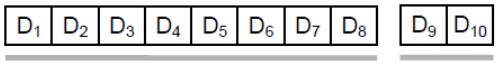
Number of Input Digits		
7 digits	Input Data	
	Drawing Data	
Other than 7		Not to be drawn

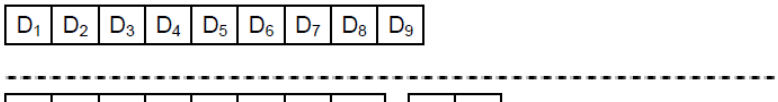
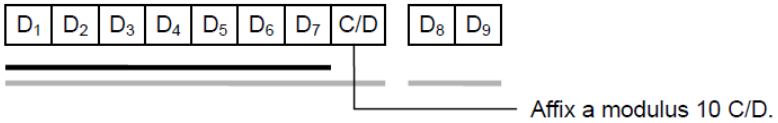
Number of Input Digits		
7 digits	Input Data	
	Drawing Data	
Other than 7		Not to be drawn

Number of Input Digits		
6 digits	Input Data	
	Drawing Data	
Other than 6		Not to be drawn

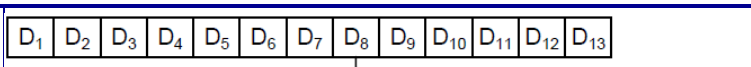
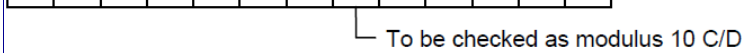
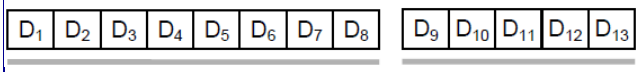
Type of Barcode: JAN8 + 2 digits, EAN8 + 2 digits

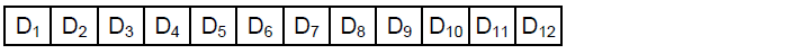
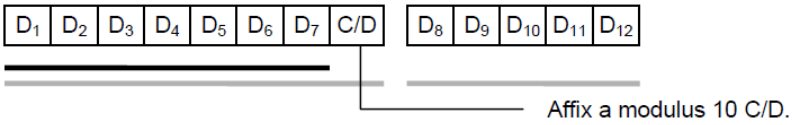
Number of Input Digits		
10 digits	Input Data	
	Drawing Data	
Other than 10		Not to be drawn

Number of Input Digits		
10 digits	Input Data	
	Drawing Data	
Other than 10		Not to be drawn

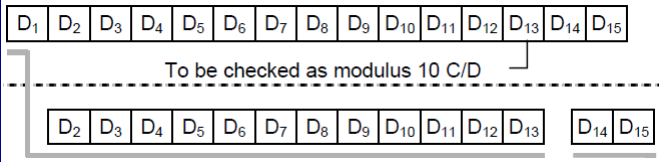
Number of Input Digits		
9 digits	Input Data	
	Drawing Data	
Other than 9		Not to be drawn

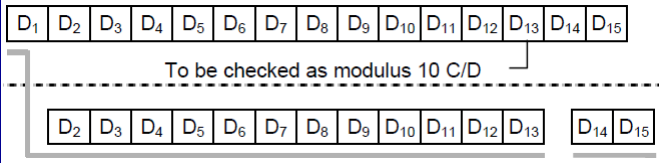
Type of Barcode: JAN8 + 5 digits, EAN8 + 5 digits

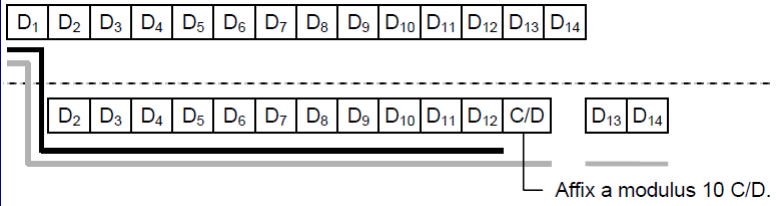
Number of Input Digits		
13 digits	Input Data	 
	Drawing Data	
Other than 13		Not to be drawn

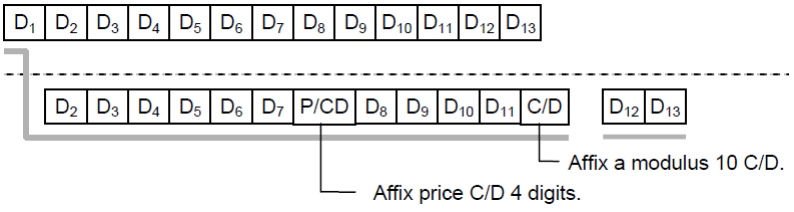
Number of Input Digits		
12 digits	Input Data	
	Drawing Data	
Other than 12		Not to be drawn

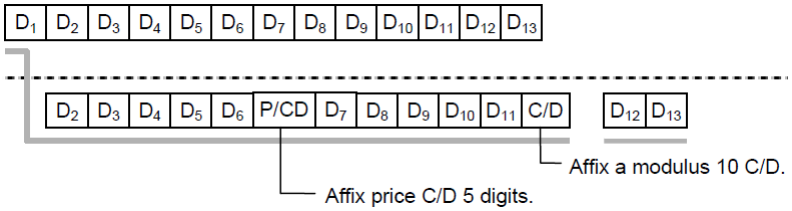
Type of Barcode: JAN13 + 2 digits, EAN13 + 2 digits

Number of Input Digits		
15 digits	Input Data Drawing Data	
Other than 15		Not to be drawn

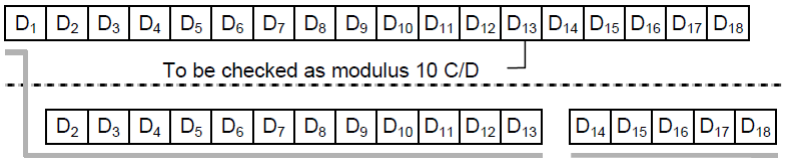
Number of Input Digits		
15 digits	Input Data Drawing Data	
Other than 15		Not to be drawn

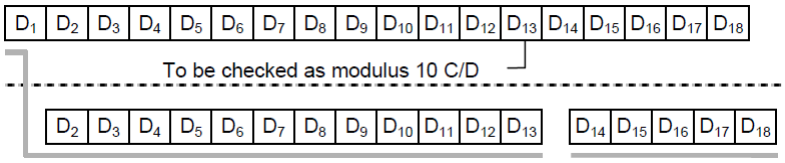
Number of Input Digits		
14 digits	Input Data Drawing Data	
Other than 14		Not to be drawn

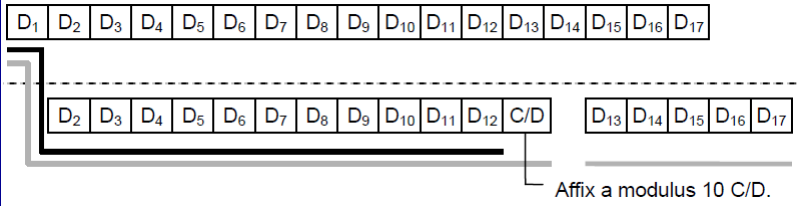
Number of Input Digits		
13 digits	Input Data Drawing Data	
Other than 13		Not to be drawn

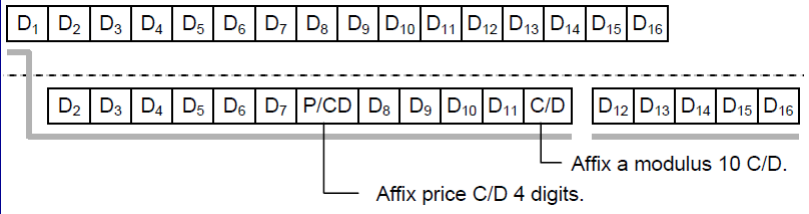
Number of Input Digits		
13 digits	Input Data Drawing Data	
Other than 13		Not to be drawn

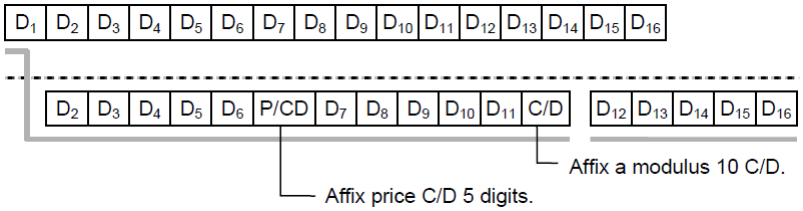
Type of Barcode: JAN13 + 5 digits, EAN13 + 5 digits

Number of Input Digits		
18 digits	Input Data Drawing Data	
Other than 18		Not to be drawn

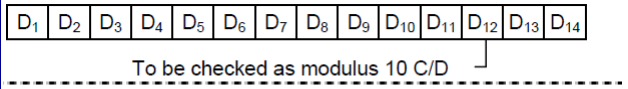
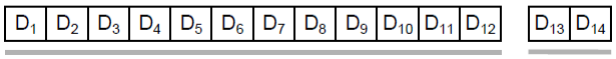
Number of Input Digits		
18 digits	Input Data Drawing Data	
Other than 18		Not to be drawn

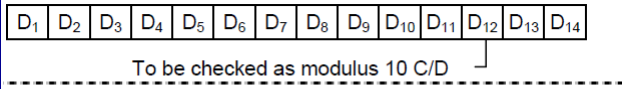
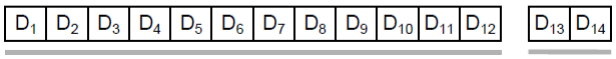
Number of Input Digits		
17 digits	Input Data Drawing Data	
Other than 17		Not to be drawn

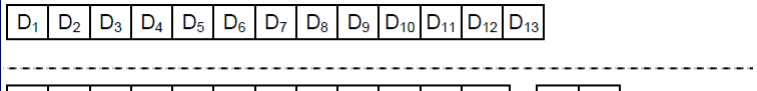
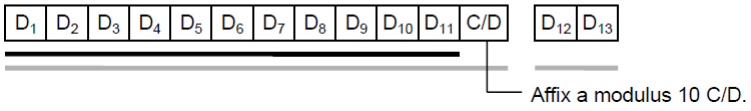
Number of Input Digits		
16 digits	Input Data Drawing Data	
Other than 16		Not to be drawn

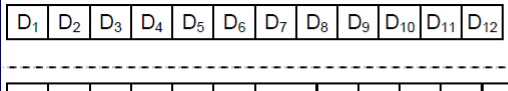
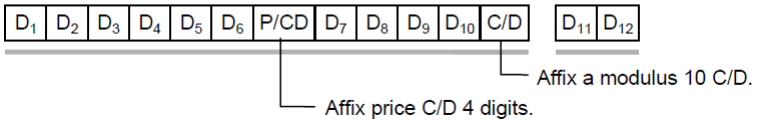
Number of Input Digits		
16 digits	Input Data Drawing Data	
Other than 16		Not to be drawn

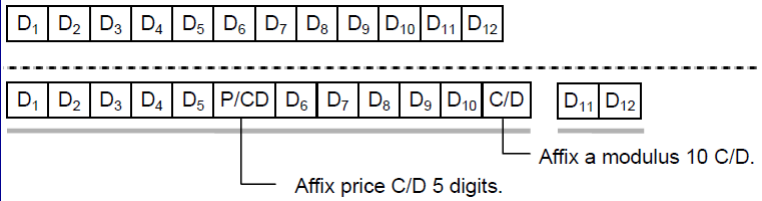
Type of Barcode: UPC-A + 2 digits

Number of Input Digits		
14 digits	Input Data	
	Drawing Data	
Other than 14		Not to be drawn

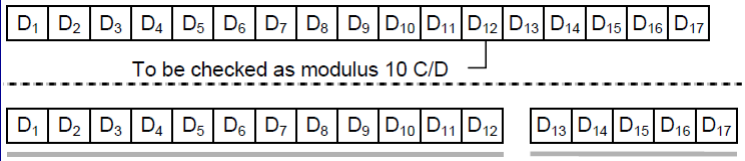
Number of Input Digits		
14 digits	Input Data	
	Drawing Data	
Other than 14		Not to be drawn

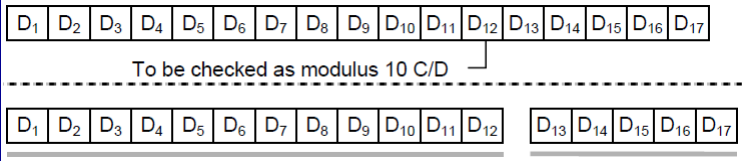
Number of Input Digits		
13 digits	Input Data	
	Drawing Data	
Other than 13		Not to be drawn

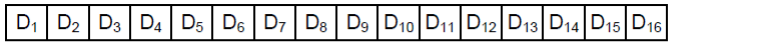
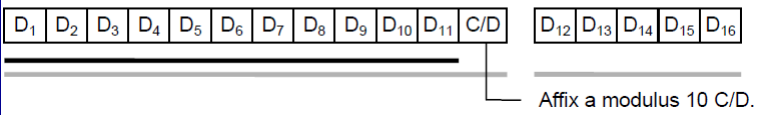
Number of Input Digits		
12 digits	Input Data	
	Drawing Data	
Other than 12		Not to be drawn

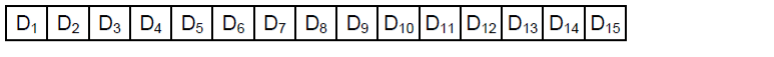
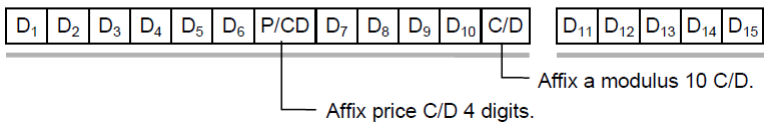
Number of Input Digits		
12 digits	Input Data Drawing Data	
Other than 12		Not to be drawn

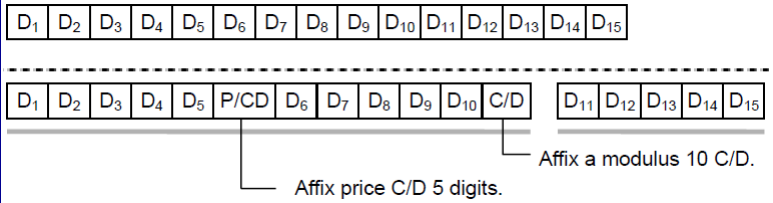
Type of Barcode: UPC-A + 5 digits

Number of Input Digits		
17 digits	Input Data	
	Drawing Data	
Other than 17		Not to be drawn

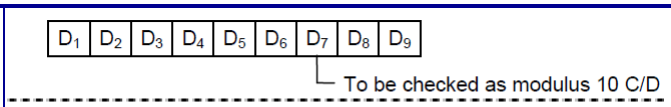
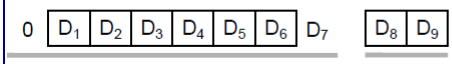
Number of Input Digits		
17 digits	Input Data	
	Drawing Data	
Other than 17		Not to be drawn

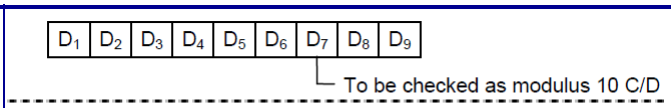
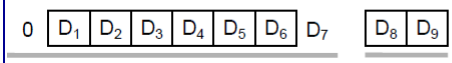
Number of Input Digits		
16 digits	Input Data	
	Drawing Data	
Other than 16		Not to be drawn

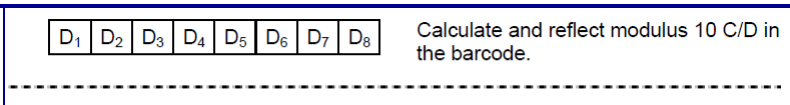
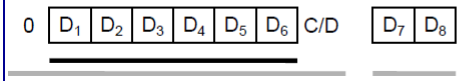
Number of Input Digits		
15 digits	Input Data	
	Drawing Data	
Other than 15		Not to be drawn

Number of Input Digits		
15 digits	Input Data Drawing Data	
Other than 15		Not to be drawn

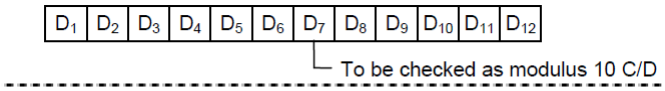
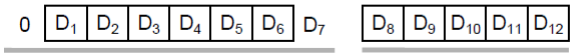
Type of Barcode: UPC-E + 2 Digits

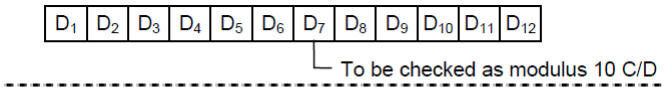
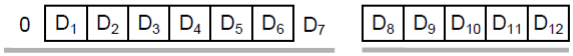
Number of Input Digits		
9 digits	Input Data	
	Drawing Data	
Other than 9		Not to be drawn

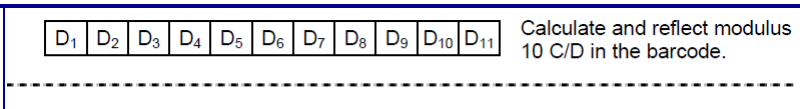
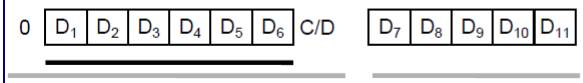
Number of Input Digits		
9 digits	Input Data	
	Drawing Data	
Other than 9		Not to be drawn

Number of Input Digits		
8 digits	Input Data	
	Drawing Data	
Other than 8		Not to be drawn

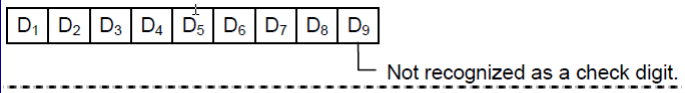
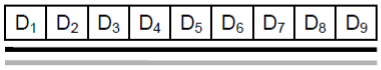
Type of Barcode: UPC-E + 5 Digits

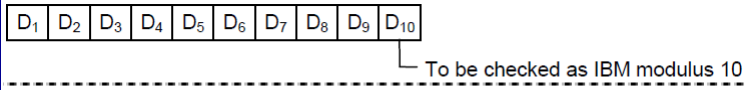
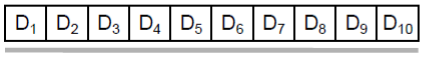
Number of Input Digits		
12 digits	Input Data	
	Drawing Data	
Other than 12		Not to be drawn

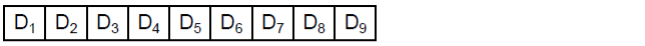
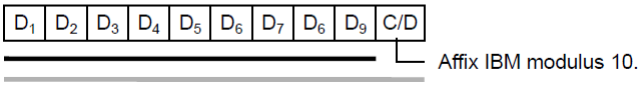
Number of Input Digits		
12 digits	Input Data	
	Drawing Data	
Other than 12		Not to be drawn

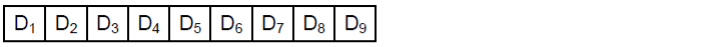
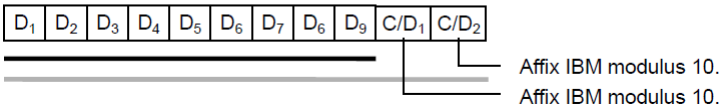
Number of Input Digits		
11 digits	Input Data	
	Drawing Data	
Other than 11		Not to be drawn

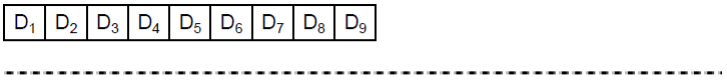
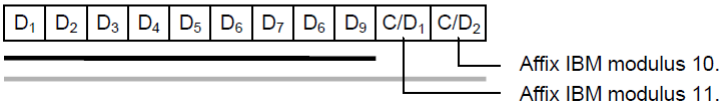
Type of Barcode: MSI

Number of Input Digits		
Max. 15 digits	Input Data	
	Drawing Data	
16 digits or more		Not to be drawn

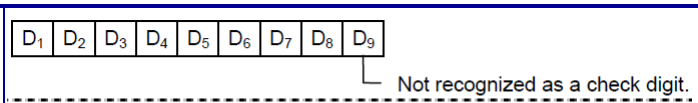
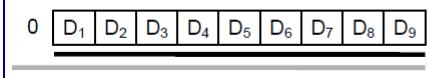
Number of Input Digits		
Min. 2 digits Max. 15 digits (including CD)	Input Data	
	Drawing Data	
1 digit 16 digits or more		Not to be drawn

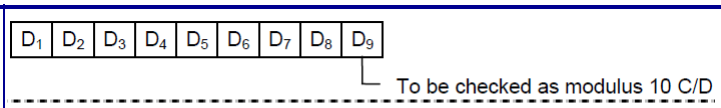
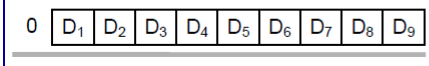
Number of Input Digits		
Max. 14 digits	Input Data	
	Drawing Data	
15 digits or more		Not to be drawn

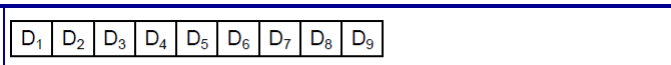
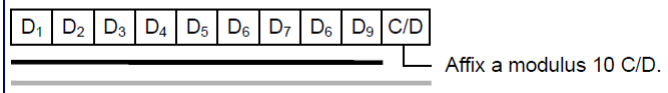
Number of Input Digits		
Max. 13 digits	Input Data	
	Drawing Data	
14 digits or more		Not to be drawn

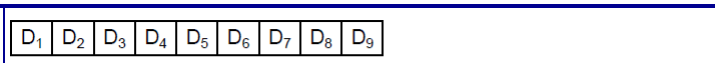
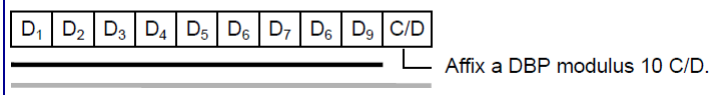
Number of Input Digits		
Max. 13digits	Input Data	
	Drawing Data	
14 digits or more		Not to be drawn

Type of Barcode: Interleaved 2 of 5

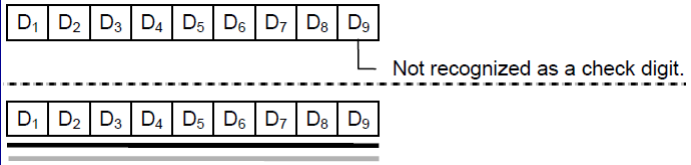
Number of Input Digits		
Max. 126 digits	Input Data	
	Drawing Data	
127 digits or more		Not to be drawn

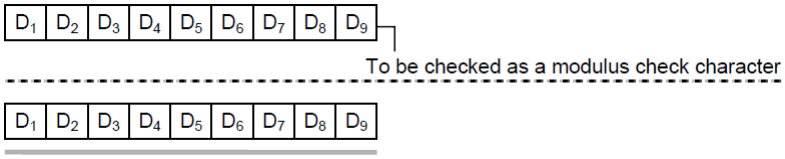
Number of Input Digits		
Min 2 digits Max. 126 digits (including C/D)	Input Data	
	Drawing Data	
1 digit 127 digits or more		Not to be drawn

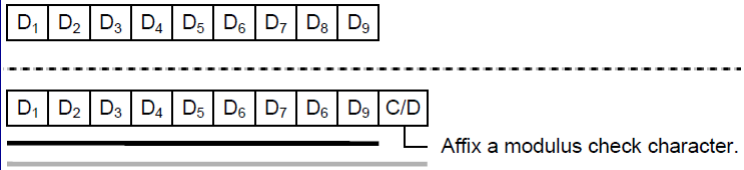
Number of Input Digits		
Max. 125 digits	Input Data	
	Drawing Data	
126 digits or more		Not to be drawn

Number of Input Digits		
Max. 125 digits	Input Data	
	Drawing Data	
126 digits or more		Not to be drawn

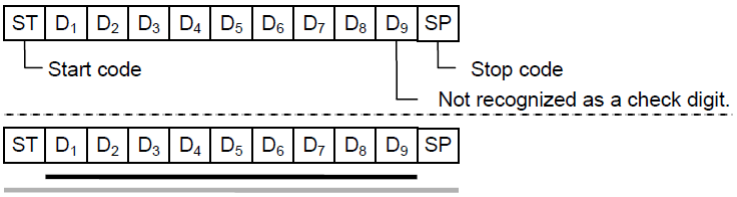
Type of Barcode: Industrial 2 of 5

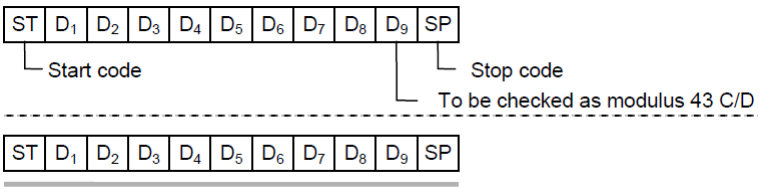
Number of Input Digits		
Max. 126 digits	Input Data Drawing Data	
127 digits or more		Not to be drawn

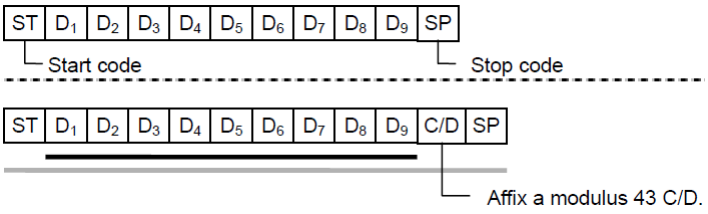
Number of Input Digits		
Min 2 digits Max. 126 digits (including C/D)	Input Data Drawing Data	
1 digit 127 digits or more		Not to be drawn

Number of Input Digits		
Max. 125 digits	Input Data Drawing Data	
126 digits or more		Not to be drawn

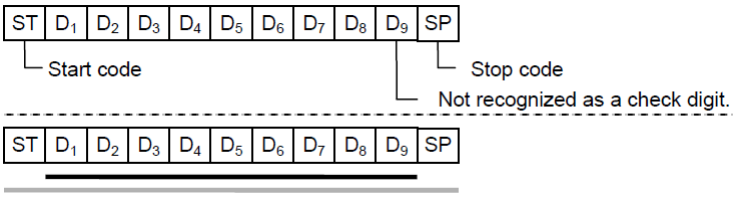
Type of Barcode: CODE39 (Standard)

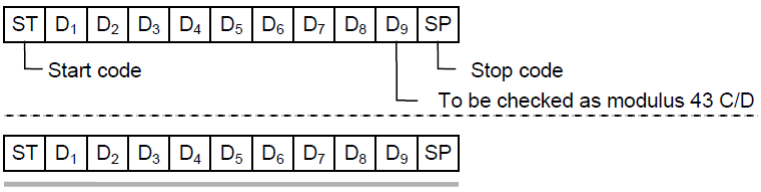
Number of Input Digits		
Max. 123 digits	Input Data Drawing Data	
124 digits or more		Not to be drawn

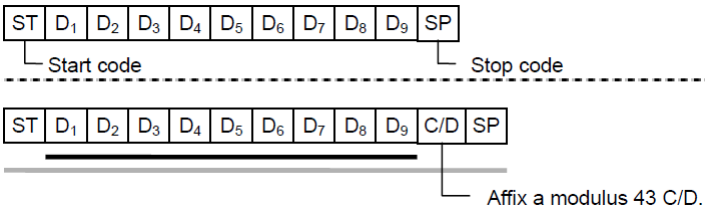
Number of Input Digits		
Min 2 digits Max. 123 digits (including C/D)	Input Data Drawing Data	
1 digit 124 digits or more		Not to be drawn

Number of Input Digits		
Max. 122 digits	Input Data Drawing Data	
123 digits or more		Not to be drawn

Type of Barcode: CODE39 (Full ASCII)

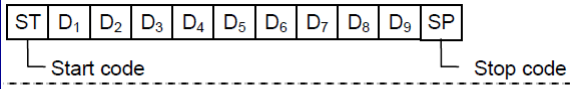
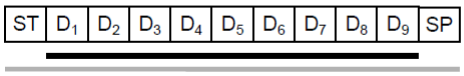
Number of Input Digits		
Max. 60 digits	Input Data Drawing Data	
61 digits or more		Not to be drawn

Number of Input Digits		
Min 2 digits Max. 60 digits (including C/D)	Input Data Drawing Data	
1 digit 61 digits or more		Not to be drawn

Number of Input Digits		
Max. 60 digits	Input Data Drawing Data	
61 digits or more		Not to be drawn

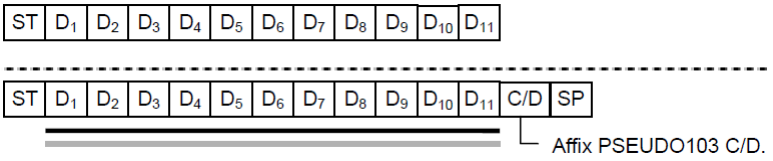
Note • Numerals under bars are not characters corresponding to the bars but the characters of the codes received are drawn.

Type of Barcode: NW7

Number of Input Digits		
Max. 125 digits	Input Data	
	Drawing Data	
126 digits or more		Not to be drawn

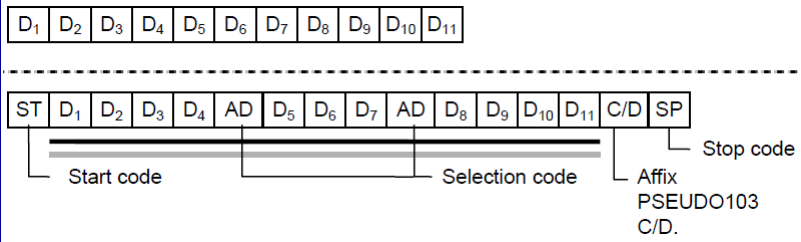
Type of Barcode: No Auto Selection of CODE128

Character “>” to be also counted as a digit.

Number of Input Digits		
Min 3digits Max. 125digits (including start code)	Input Data Drawing Data	
2 digits or less 126 digits or more		Not to be drawn

Note • The following characters are not drawn as numerals under bars.:
NUL (00H) to US (1FH), FNC1, FNC2, FNC3, SHIFT, CODE A, CODE B, CODE C

Type of Barcode: Auto Selection of CODE128

Number of Input Digits		
Max. 60 digits	Input Data Drawing Data	
61 digits or more		Not to be drawn

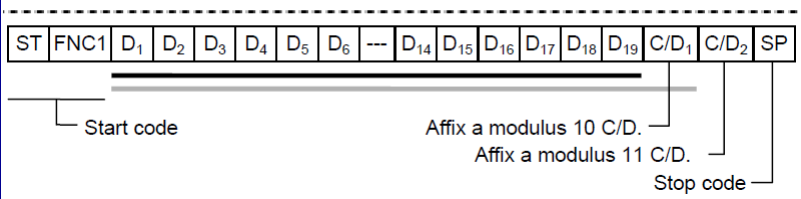
Note • The following characters are not drawn as numerals under bars.:
NUL (00H) to US (1FH), FNC1, FNC2, FNC3, SHIFT, CODE A, CODE B, CODE C

Type of Barcode: CODE93

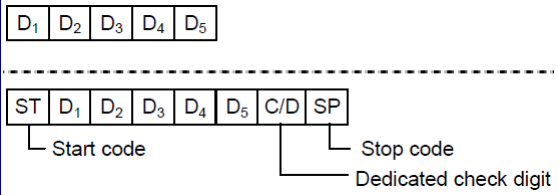
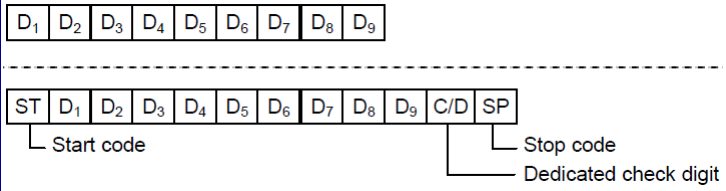
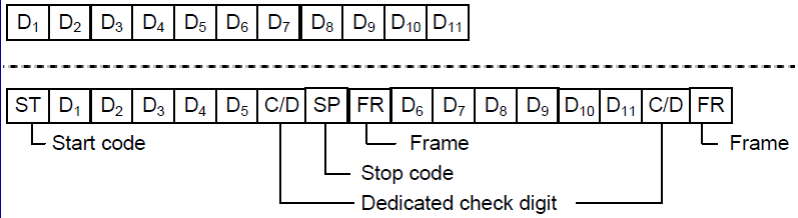
Number of Input Digits		
Max. 60 digits	Input Data	D1 D2 D3 D4 D5 D6 D7 D8 D9
	Drawing Data	ST D1 D2 D3 D4 D5 D6 D7 D8 D9 C/D1 C/D2 SP Start code Affix a modulus 47 “C” C/D. Affix a modulus 47 “K” C/D. Stop code
61 digits or more		Not to be drawn

Note • Numerals under bars are not characters corresponding to the bars but the characters of the codes received are drawn.

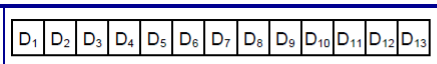
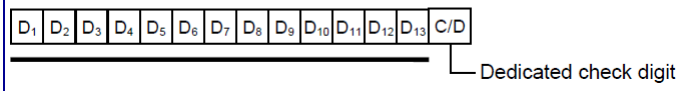
Type of Barcode: UCC/EAN128

Number of Input Digits		
19 digits	Input Data	D_1 D_2 D_3 D_4 D_5 D_6 --- D_{14} D_{15} D_{16} D_{17} D_{18} D_{19}
	Drawing Data	
Other than 19 digits		Not to be drawn

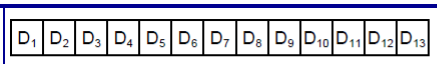
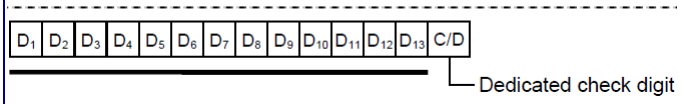
Type of Barcode: POSTNET

Number of Input Digits		
5 digits	Input Data	
	Drawing Data	
9 digits	Input Data	
	Drawing Data	
11 digits	Input Data	
	Drawing Data	
Other than 5, 9, and 11 digits		Not to be drawn

Type of Barcode: GS1 Databar, GS1 Databar Stacked, GS1 Databar Stacked Omni-directional, GS1 Databar Limited

Number of Input Digits		
13 digits	Input Data	
	Drawing Data	
14 digits or more		Not to be drawn

Type of Barcode: GS1 Databar Expanded

Number of Input Digits		
70 digits	Input Data	
	Drawing Data	
71 digits or more		Not to be drawn

Note • Some data cannot be drawn even if the number of input digits is less than 70.

Automatic Addition of Start/Stop Codes

CODE39 and NW7 Barcodes

Designation of Start/Stop Codes	Input Data	Drawing Data	
Omit (No designation)	12345ABC	Standard	*12345ABC*
		Full ASCII	*12345ABC*
	*12345ABC	Standard	*12345ABC*
		Full ASCII	*12345ABC*
	12345ABC*	Standard	*12345ABC*
		Full ASCII	*12345ABC*
	12345ABC	Standard	*12345ABC*
		Full ASCII	*12345ABC*
	12345*ABC	Standard	*12345*ABC*
		Full ASCII	*12345/JABC*
	**12345ABC	Standard	**12345ABC*
		Full ASCII	*/J12345ABC*
	*12345ABC**	Standard	*12345ABC**
		Full ASCII	*12345ABC/J*
	*12345*ABC*	Standard	*12345*ABC*
		Full ASCII	*12345/JABC*
Add start code	12345ABC	Standard	*12345ABC
		Full ASCII	*12345ABC
	*12345ABC	Standard	**12345ABC
		Full ASCII	*/J12345ABC
	12345ABC*	Standard	*12345ABC*
		Full ASCII	*12345ABC*
	12345ABC	Standard	**12345ABC*
		Full ASCII	*/J12345ABC*
	12345*ABC	Standard	*12345*ABC
		Full ASCII	*12345/JABC
	**12345ABC	Standard	***12345ABC
		Full ASCII	*/J/J12345ABC
	*12345ABC**	Standard	**12345ABC**
		Full ASCII	*/J12345ABC/J*
	*12345*ABC*	Standard	**12345*ABC*
		Full ASCII	*/J12345/JABC*

Designation of Start/Stop Codes	Input Data	Drawing Data	
Add stop code	12345ABC	Standard	12345ABC*
		Full ASCII	12345ABC*
	*12345ABC	Standard	*12345ABC*
		Full ASCII	*12345ABC*
	12345ABC*	Standard	12345ABC**
		Full ASCII	12345ABC/J*
	12345ABC	Standard	*12345ABC**
		Full ASCII	*12345ABC/J*
	12345*ABC	Standard	12345*ABC*
		Full ASCII	12345/JABC*
	**12345ABC	Standard	**12345ABC*
		Full ASCII	*/J12345ABC*
	*12345ABC**	Standard	*12345ABC***
		Full ASCII	*12345ABC/J/J*
	*12345*ABC*	Standard	*12345*ABC**
		Full ASCII	*12345/JABC/J*
Start/stop code not added	12345ABC	Standard	12345ABC
		Full ASCII	12345ABC
	*12345ABC	Standard	*12345ABC
		Full ASCII	*12345ABC
	12345ABC*	Standard	12345ABC*
		Full ASCII	12345ABC*
	12345ABC	Standard	*12345ABC*
		Full ASCII	*12345ABC*
	12345*ABC	Standard	12345*ABC
		Full ASCII	12345/JABC
	**12345ABC	Standard	**12345ABC
		Full ASCII	*/J12345ABC
	*12345ABC**	Standard	*12345ABC**
		Full ASCII	*12345ABC/J*
	*12345*ABC*	Standard	*12345*ABC*
		Full ASCII	*12345/JABC*

Designation of Start/Stop Codes	Input Data	Drawing Data
Omit (No designation)	12345678	a12345678a
	a12345678	a12345678
	12345678c	12345678c
	b12345678d	b12345678d
	12345a678	a12345a678a
	ab12345678	ab12345678
	a12345678bc	a12345678bc
	d12345b678c	d12345b678c
Add start code	12345678	a12345678
	a12345678	aa12345678
	12345678c	a12345678c
	b12345678d	ab12345678d
	12345a678	a12345a678
	ab12345678	aab12345678
	a12345678bc	aa12345678bc
	d12345b678c	ad12345b678c
Add stop code	12345678	12345678a
	a12345678	a12345678a
	12345678c	12345678ca
	b12345678d	b12345678da
	12345a678	12345a678a
	ab12345678	ab12345678a
	a12345678bc	a12345678bca
	d12345b678c	d12345b678ca
Start/stop code not added	12345678	12345678
	a12345678	a12345678
	12345678c	12345678c
	b12345678d	b12345678d
	12345a678	12345a678
	ab12345678	ab12345678
	a12345678bc	a12345678bc
	d12345b678c	d12345b678c

ZDownloader Utility

This section provides you with the instructions for downloading and installing the ZDownloader Utility.

Contents

Downloading the ZDownloader Utility

To download the ZDownloader Utility, perform the following from your computer:

1. Open a web browser and navigate to http://www.zebra.com.
2. Click on the **Support & Downloads** header on the web page.
3. Select a printer.
4. When the printer page opens, locate and select the **Software Utilities** tab.
5. Scroll down to the ZDownloader Utility and select the **Download** link.

Note • You will be prompted to create a user profile or login to http://www.zebra.com with an existing profile to download the ZDownloader Utility.

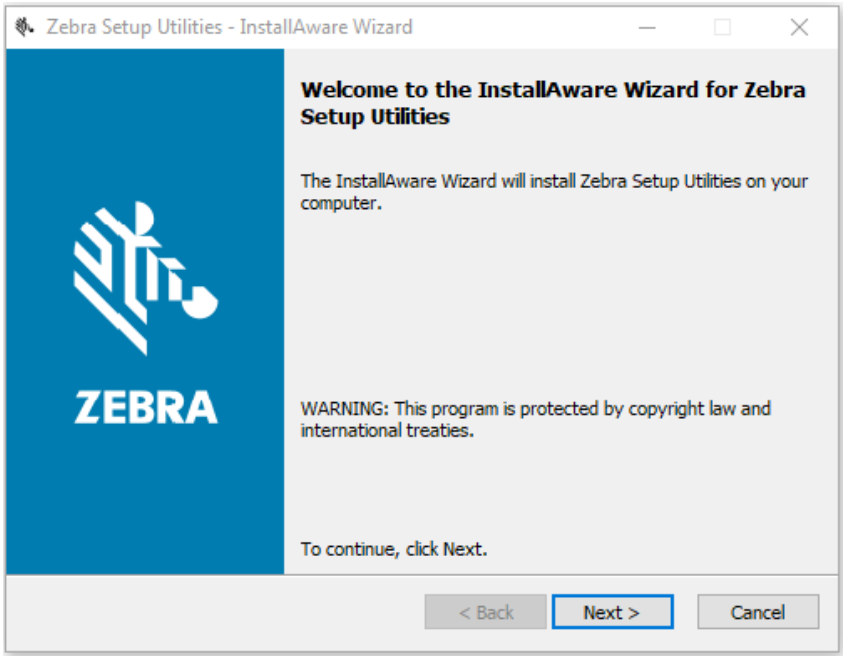
6. Click on the **Accept and Begin Download Now** button.
   The installation file download will begin.

Installing the ZDownloader Utility

To install the ZDownloader Utility, perform the following from your computer:

1. Run the installation file after the download is complete.
2. If you are prompted to allow the application to make changes to your computer, click **Yes**.

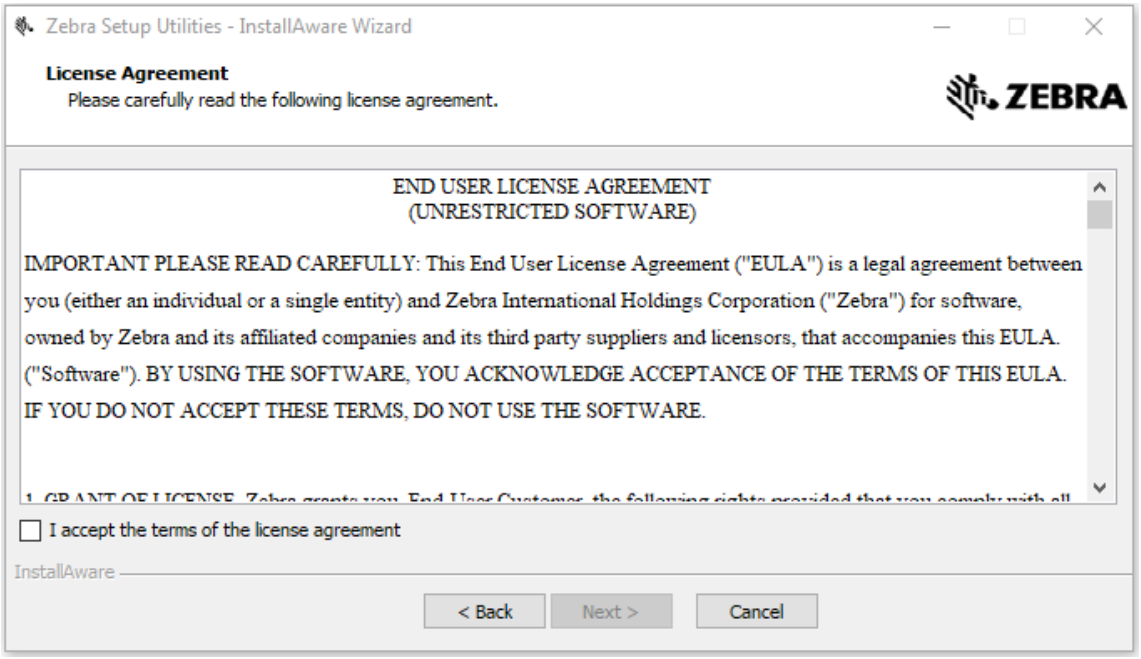
   The utility installs on your computer. When installation is complete, the Firmware Downloader and ZBI Key Manager installation wizard appears.



3. Click **Next**.

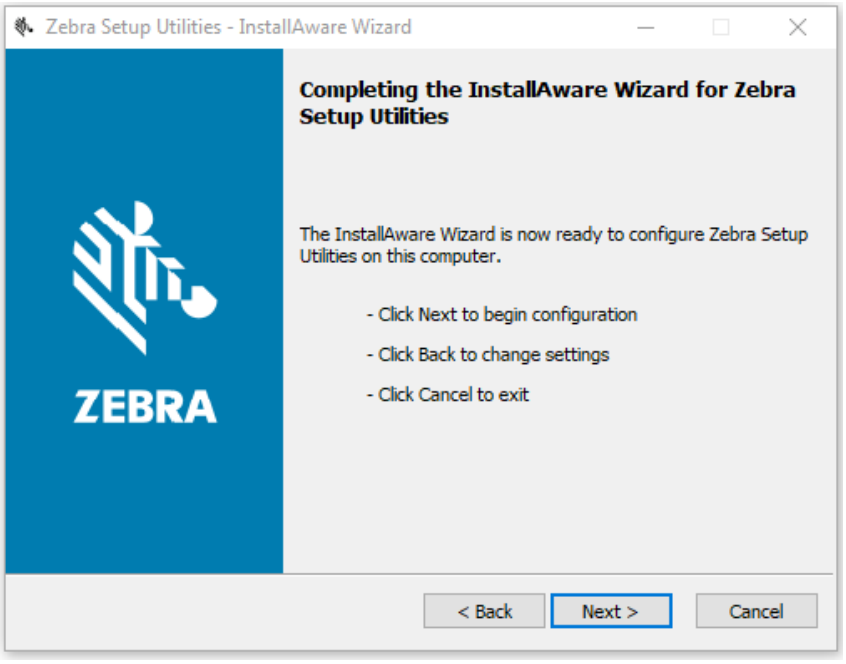
   The End User License Agreement appears.

4. Read the terms of the agreement.



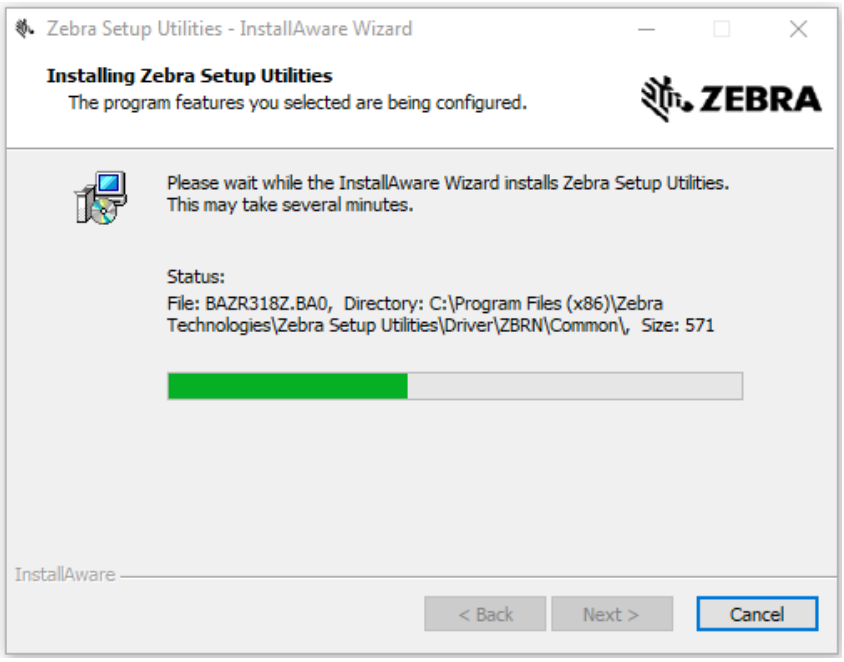
5. Click the **checkbox** to accept the terms.
6. Click **Next**.

   The installation wizard displays information about the installation.

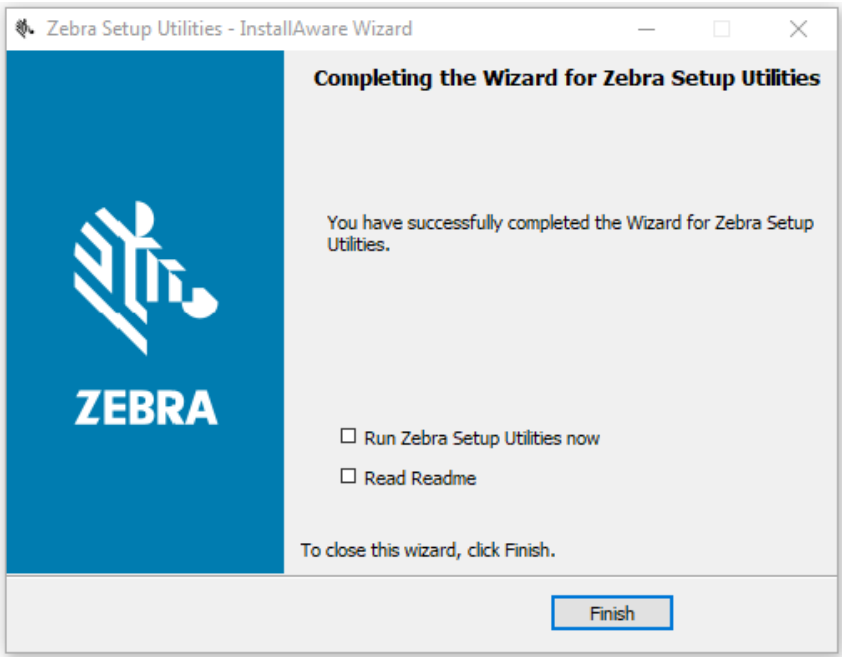


7. Click **Next**.

   The installation wizard installs the application.



8. Click **Finish** to close the wizard.



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