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User's Manual

Phase-out/Discontinued

PG-FPL2

Flash Memory Programmer

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- If power was turned on while the USB cable or target system connection was in an unsatisfactory state
- If the USB cable, target cable, or the like was bent or pulled excessively
- If the product got wet
- If the product and target system were connected while a potential difference existed between the GND of the product and the GND of the target system
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PREFACE

- Target Readers** This manual is intended for users who use the PG-FPL2 when designing and developing a system using an NEC Electronics on-chip flash memory microcontroller.
- Purpose** This manual is intended to give users an understanding of the basic specifications and correct use of the PG-FPL2.
By using the PG-FPL2, programs can be easily erased from or written to the flash memory of an NEC Electronics 78K0S/Kx1+ Series on-chip flash memory microcontroller, or can be verified on Windows™ screens, while the microcontroller is mounted on the user board.
- Organization** This manual includes the following sections.
- Overview
 - Hardware installation
 - Software installation
 - Operation using GUI software
 - Usage examples
 - Connectors and cables
 - Notes on target system
 - Circuit diagrams
 - Troubleshooting
- How to Read This Manual** To understand the overall functions and usage of the PG-FPL2, read this manual in the order of the CONTENTS.
Be sure to read **CHAPTER 4 OPERATION USING GUI SOFTWARE** because this chapter presents important information for using the PG-FPL2.
It is assumed that the readers of this manual have general knowledge of electricity, logic circuits, and microcontrollers.
In the explanations of the operation of the applications, it is also assumed that the readers have sufficient knowledge of Windows.
For the usage and terminology of Windows 98, Windows Me, Windows 2000, and Windows XP, refer to each Windows manual.
- The mark ★ shows major revised points.

Conventions

- Note:** Footnote for item marked with **Note** in the text.
- Caution:** Information requiring particular attention
- Remark:** Supplementary information
- Numeral representation: Binary ... xxxx or xxxxB
 Decimal ... xxxx
 Hexadecimal ... 0xxxxH or xxxxH
- “ ”: Any character or item on screen
- OK: Name of button
- []: Menu
- < >: Dialog box name

Terminology

The meanings of the terms used in this manual are as follows.

Term	Meaning
FPL2	Abbreviation of flash memory programmer PG-FPL2
GUI software	Windows application to operate PG-FPL2 using GUI software
Target device	NEC Electronics on-chip flash memory microcontroller
Target system	User-designed board on which NEC Electronics on-chip flash memory microcontroller is mounted
FP4 connector	Abbreviation of PG-FP4 target connector (type A)
FA adapter	Adapter board to write programs to NEC Electronics on-chip flash memory microcontroller ^{Note}
78K0S/Kx1+	Generic name of 78K0S/KU1+, 78K0S/KY1+, 78K0S/KA1+, and 78K0S/KB1+

Note The FA adapter board is a product of Naito Densai Machida Mfg. Co., Ltd.
 If you have any questions about the FA adapter board, contact:
 Naito Densai Machida Mfg. Co., Ltd. Tel: +81-45-475-4191

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CHAPTER 1 OVERVIEW

The PG-FPL2 is a tool that erases and writes programs on an NEC Electronics 78K0S/Kx1+ Series on-chip flash memory single-chip microcontroller on the target board or FA adapter board.

1.1 Features

- The PG-FPL2 is a compact flash memory programmer for an on-chip flash memory microcontroller, and is designed for development.
- The USB interface is available for connection with the host.
- The PG-FPL2 allows on-board programming without removing the target device from the target system.
- Only single-wire UART interface is supported for data transfer to the target device.
- Device-specific parameters required for programming can be read from the parameter file (PRM file).

CHAPTER 2 HARDWARE INSTALLATION

2.1 System Requirements

Host PC	A PC supporting Windows 98, Windows Me, Windows 2000, or Windows XP is required to run the FPL2 in the graphical user interface (GUI) mode. About 2 MB of free hard disk space is required to install the GUI software.
Host machine	IBM PC/AT™ or compatible CPU: Pentium™ 100 MHz or more RAM: 32 MB or more
Host interface	USB interface that enables communication based on USB (Ver. 1.1 or later).
File formats	Program files can be used in Motorola HEX file format or Intel HEX file format.

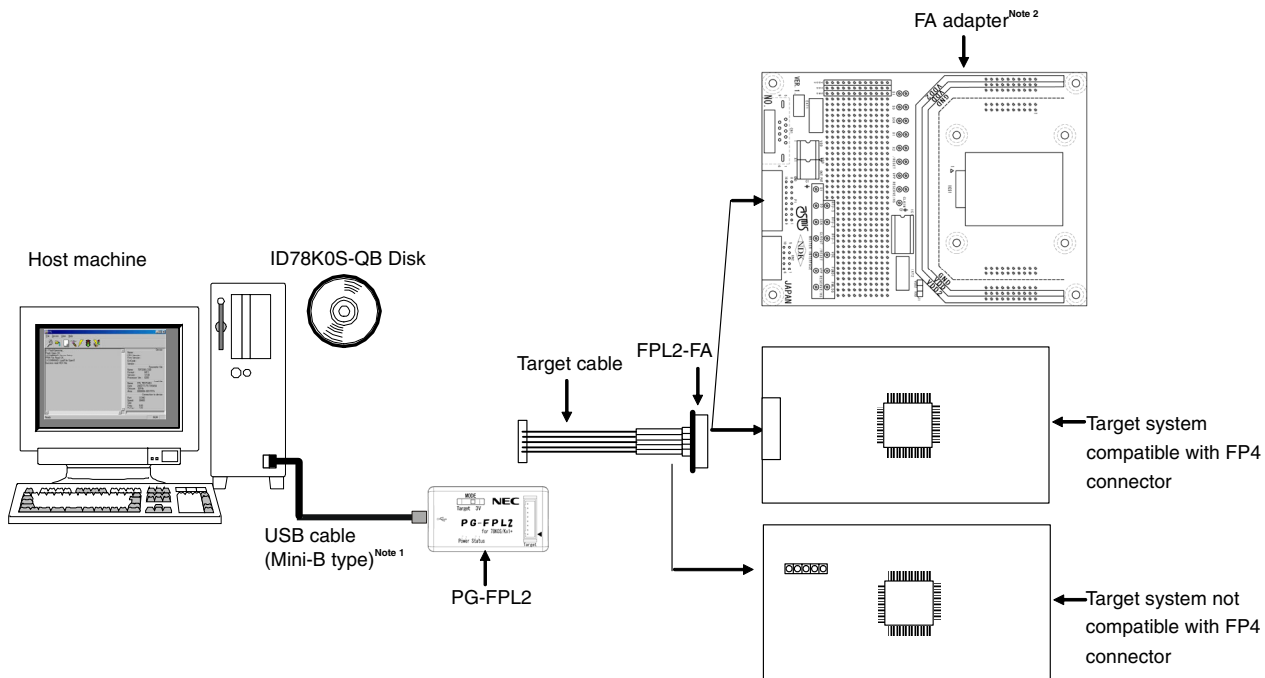
2.2 Package Contents

Please verify that you have received all the parts listed in the package contents list included with the FPL2 package. If any part is missing or seems to be damaged, please contact an NEC Electronics sales representative or distributor.

2.3 System Configuration and Components

The FPL2 system configuration is as given in the diagram below.

Figure 2-1. FPL2 System Configuration

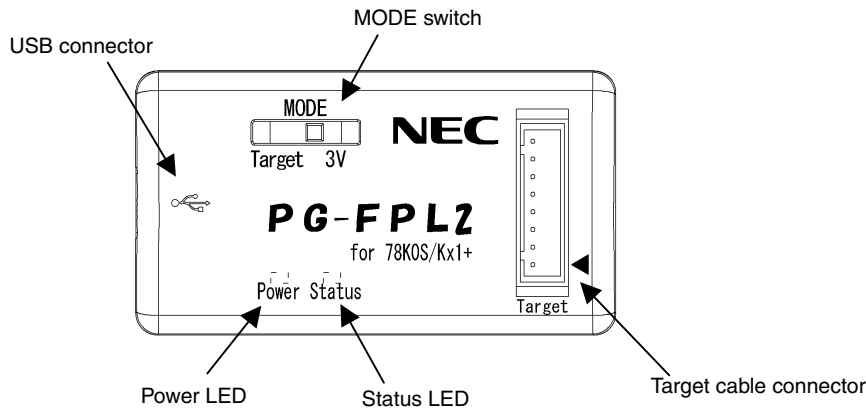


- Notes 1.** Use the USB cable (Mini-B type) included with the QB-78K0SKX1MINI.
- 2.** The FA adapter board is a product of Naito Densai Machida Mfg. Co., Ltd.

The FPL2 is connected to the host machine via the USB cable (Mini-B type). The FPL2 is connected to the user system via the target cable. For the detailed specifications of the target cable and connector, refer to **CHAPTER 6 CONNECTORS AND CABLES**.

2.3.1 FPL2 display specifications, connector, and MODE switch settings

Figure 2-2. Layout Drawing of Connectors and LEDs

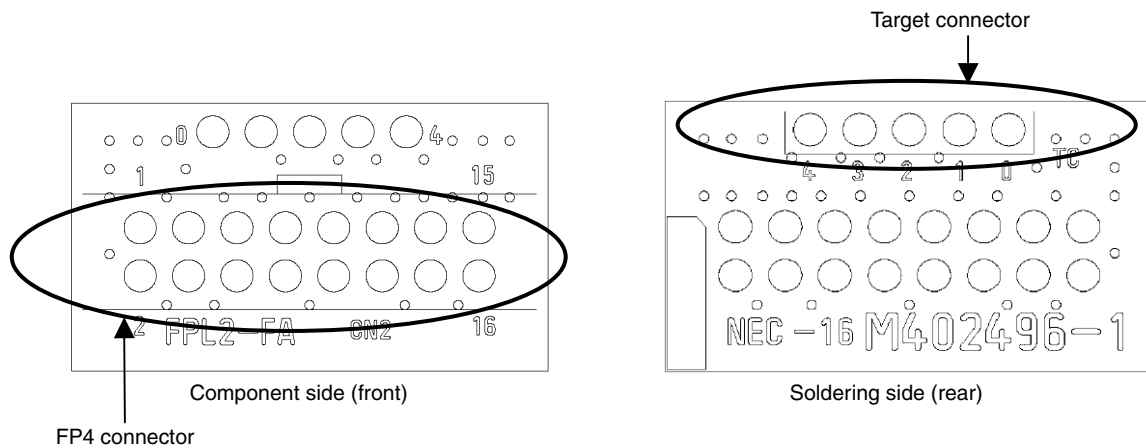


Target cable connector:	Used to connect the connector of the target cable.
USB connector:	Used to connect the USB cable to be connected to the host machine.
Power LED:	Turned on in green when the FPL2 is connected to the host machine.
Status LED:	Blinks in red when the FPL2 is communicating with the target device.
MODE switch:	Switches power to be supplied to the target system.
Target:	Used to supply V_{DD} from the target system.
3 V:	Used to supply power to the target system with 3.0 V V_{DD} from the FPL2.

Caution When the Status LED is blinking, communication with the target device is in progress. Do not disconnect the target cable and USB cable.

2.3.2 FPL2-FA connector

Figure 2-3. Layout Drawing of FPL2 Connectors



Target connector:	Used to connect the tip of the target cable.
FP4 connector:	Used to connect the FA adapter board or target system.

2.3.3 Target system

The target system must be equipped with a device interface that complies with the target cable specifications. Refer to **CHAPTER 6 CONNECTORS AND CABLES** for details.

2.3.4 USB connector

The shape of the USB connector is a Mini-B type. Refer to **CHAPTER 6 CONNECTORS AND CABLES** for details.

2.3.5 Target cable

The tip of the target cable can be connected to the header pin that is 0.635 mm by 0.635 mm. Refer to **CHAPTER 6 CONNECTORS AND CABLES** for details.

2.3.6 Connection procedure

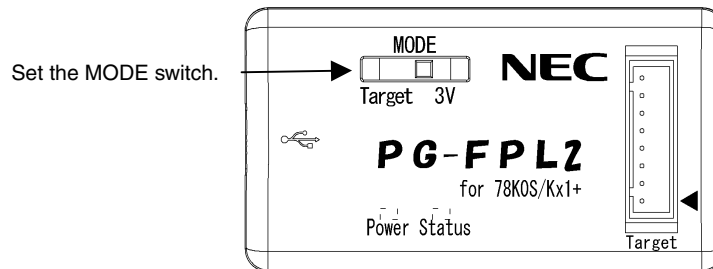
The procedure for connecting the FPL2 is described below.

Caution Be sure to install the software (GUI software driver) before making connections.

- (1) Set the MODE switch according to the power supply of the target system.

Caution Be sure to set the MODE switch before making connections with the host machine and target system. If connections are made based on an incorrect setting, the FPL2 and target system may be damaged.

Figure 2-4. MODE Switch Setting



- (2) Connect the host machine with the FPL2 via the USB cable. (Check that the Power LED is turned on in green.)

Cautions 1. Be sure to perform this step before making a connection with the target system. If connections are made in an incorrect order, the FPL2 and target system may be damaged.

2. When the MODE switch is set to 3 V (power is supplied from the FPL2), the voltage output to the V_{DD} pin when the FPL2 is connected with the host machine.

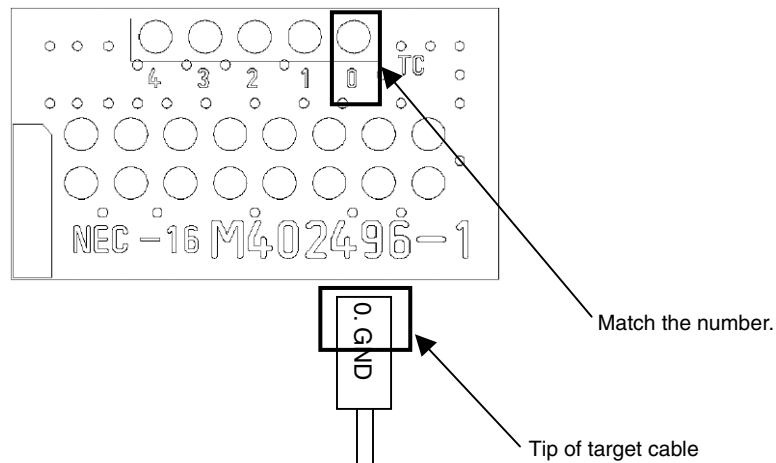
- (3) Connect the target system with the FPL2.

(a) When FPL2 is connected with a target system that has a 16-pin connector usable with the FP4 connector

<1> Connect the tip of the target cable with the target connector of the FPL2-FA.

Connect the tip of the target cable with the target connector of the FPL2-FA so that the number marked on the tip of the target cable matches to the number marked on the FPL2-FA board.

Remark The FPL2-FA is connected with the target cable at shipment.

Figure 2-5. Connecting Target Cable with FPL2-FA

<2> Make sure that the power to the target system is not turned on.

Caution Make sure that the power to the target system is not turned on before connecting the target cable. If the target cable is connected after the power to the target system is turned on, the FPL2 may be damaged.

<3> Connect the FP4 connector with the connector installed in the target system.

Caution When the MODE switch is set to 3 V (power is supplied from the FPL2), V_{DD} is always output from the FP4 connector. Be sure to remove the FP4 connector before inserting or removing a device in the target system.

<4> Be sure to turn on the power to the target system.

(When the MODE switch is set to 3 V, power is supplied from the FPL2, so this step is not required.)

(b) When the FPL2 is connected with the target system without using the FPL2-FA

<1> Disconnect the FPL2-FA from the target cable.

<2> Make sure that the power to the target system is not turned on.

Caution Make sure that the power to the target system is not turned on before connecting the target cable. If the target cable is connected after the power to the target system is turned on, the FPL2 may be damaged.

<3> Connect the tip of the target cable marked "0.GND" to GND of the target system.

Caution Be sure to connect "0.GND" at the beginning. If connections are made in an incorrect order, the FPL2 and target system may be damaged.

<4> Make sure that the power to the target system is not turned on.

<5> Connect the tip of the target cable marked "2.V_{DD}" to V_{DD} of the target system.

Caution Be sure to make connections in the order from "0.GND" to "2.V_{DD}" to "other signals". If connections are made in an incorrect order, the FPL2 and target system may be damaged.

<6> Connect the tips of other target cables to the target system.

<7> Turn on the power to the target system.

(When the MODE switch is set to 3 V, power is supplied from the FPL2, so this step is not required.)

2.3.7 Disconnection procedure

(1) When communication with the target system ends, terminate the GUI software.

(2) Disconnect the FPL2-FA from the target system.

(a) When the FPL2 is connected with the target system by using the FPL2-FA

<1> Turn off the power to the target system.

(When the MODE switch is set to 3 V, power is supplied from the FPL2, so this step is not required.)

<2> Disconnect the FPL2-FA from the target system.

Caution When the MODE switch is set to 3 V, the FPL2 outputs power at all times. Be sure to disconnect the FP4 connector from the target system before disconnecting the target device.

(b) When the FPL2 is connected with the target system without using the FPL2-FA

<1> Turned off the power to the target system.

(When the MODE switch is set to 3 V, power is supplied from the FPL2, so this step is not required.)

<2> Disconnect the tips of the target cables marked "1./RESET", "3.DGCLK", and "4.DGDATA" from the target system.

Caution Be sure to disconnect the target cables in this order. If the target cables are disconnected in an incorrect order, the target system or the FPL2 may be damaged.

<3> Disconnect the tip of the target cable marked "2.V_{DD}" from the target system.

<4> Disconnect the tip of the target cable marked "0.GND" from the target system.

(3) Disconnect the USB cable from the host machine. (Make sure that the Power LED is turned off.)

(4) Disconnect the USB cable from the FPL2.

CHAPTER 3 SOFTWARE INSTALLATION

3.1 GUI Software Installation

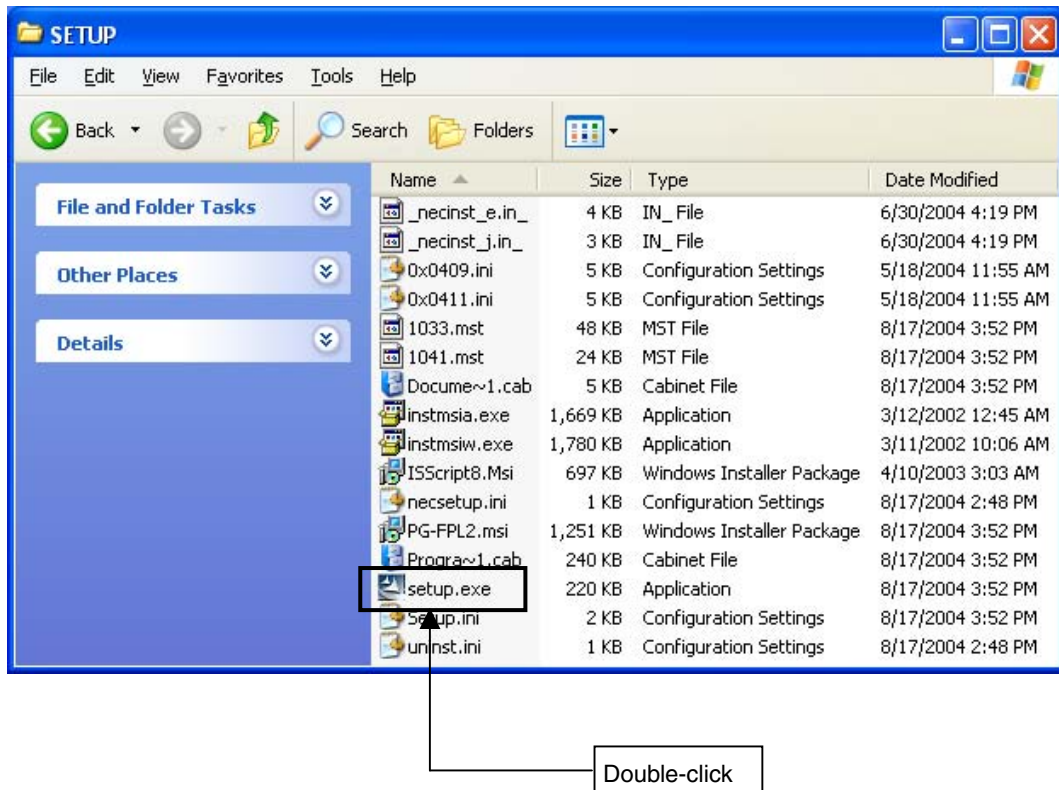
The GUI software allows easy and comfortable access to all features of the FPL2 flash programmer.

The installation program is contained in the CD-ROM (ID78K0S-QB Disk) included with the QB-78K0SKX1MINI package.

Execute the following steps to install the GUI software.

- (1) When using Windows XP, log on as the computer administrator. When using Windows 2000, log on as the Administrator.
- (2) Insert the CD-ROM (ID78K0S-QB Disk) included with the QB-78K0SKX1MINI package into the CD-ROM drive.
- (3) Double-click "My Computer", "CD-ROM", "PG-FPL2", and "SETUP" in that order. Double-click "setup.exe" in the SETUP folder.

Figure 3-1. SETUP Folder



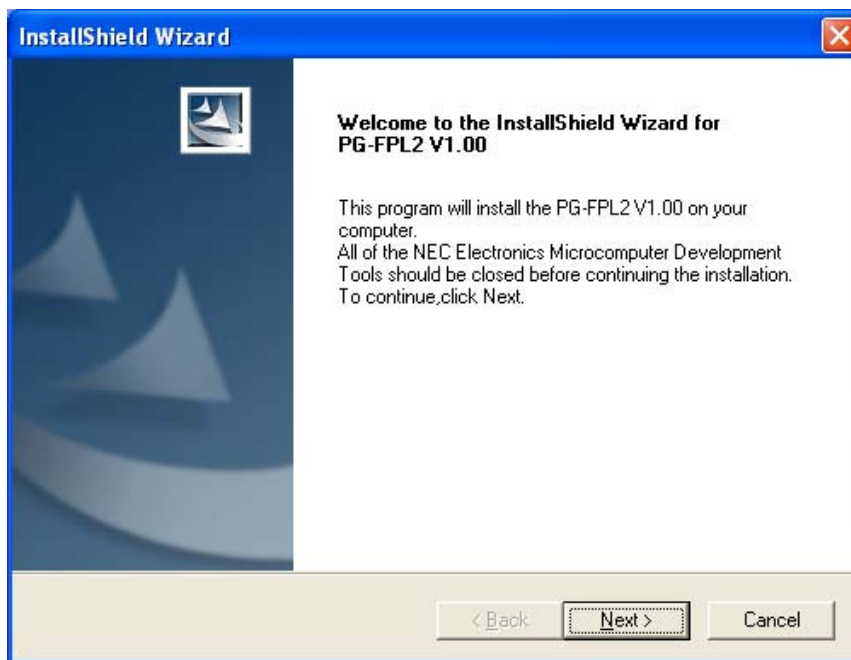
- (4) Select a language to be used for installation ("English" in this example), then click **OK**.

Figure 3-2. Setup Language Selection



- (5) After selecting the language, the window shown below is displayed. Click **Next >** to continue installation.

Figure 3-3. Installation Start



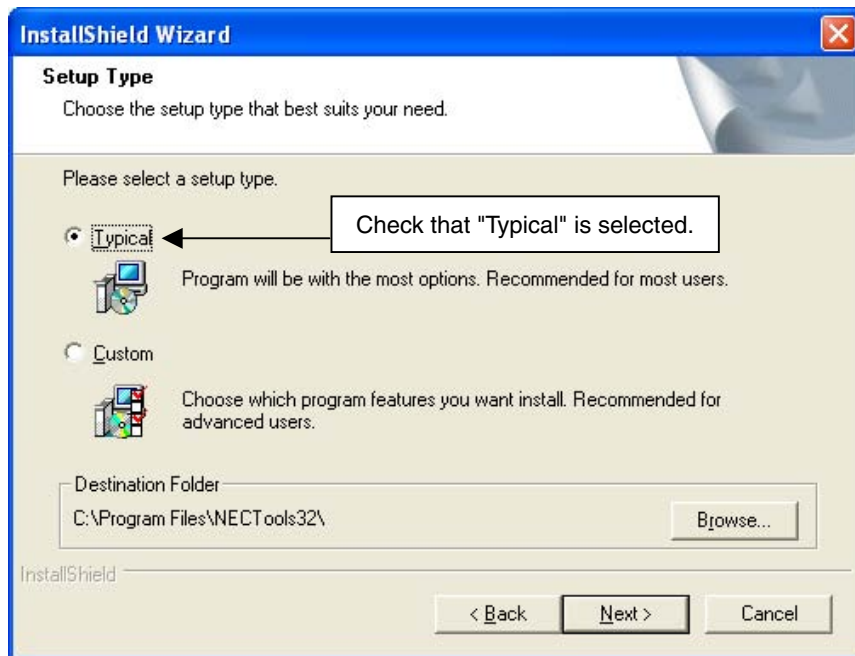
- (6) The software License Agreement window appears. Read the displayed license agreement carefully, then click **Yes** if you accept the agreement. You need to accept the agreement before using the PG-FPL2. If you do not accept the agreement, click **No** to terminate the installation of the software.

Figure 3-4. License Agreement Window



- (7) Check that "Typical" is selected, then click **Next >**.

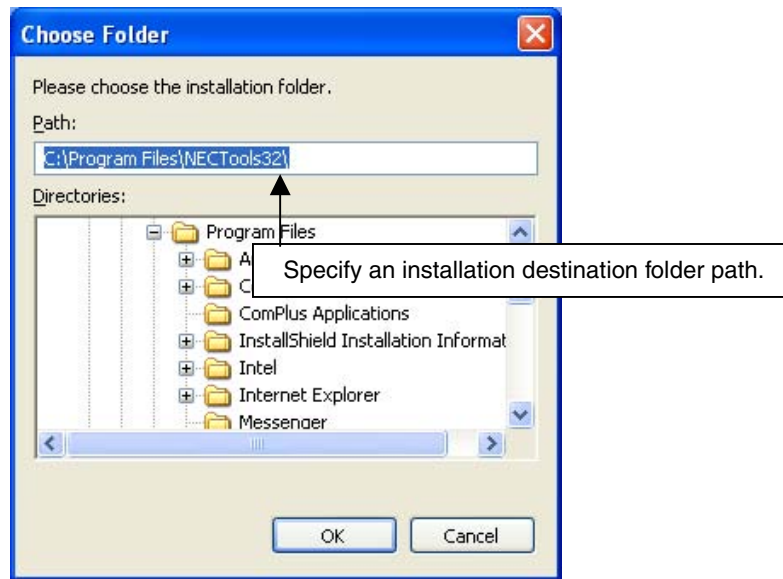
Figure 3-5. Setup Type



Remark By selecting Custom, only the GUI software or document can be installed. The GUI software installation destination can be changed by clicking **Browse...**. This manual assumes the default installation folder.

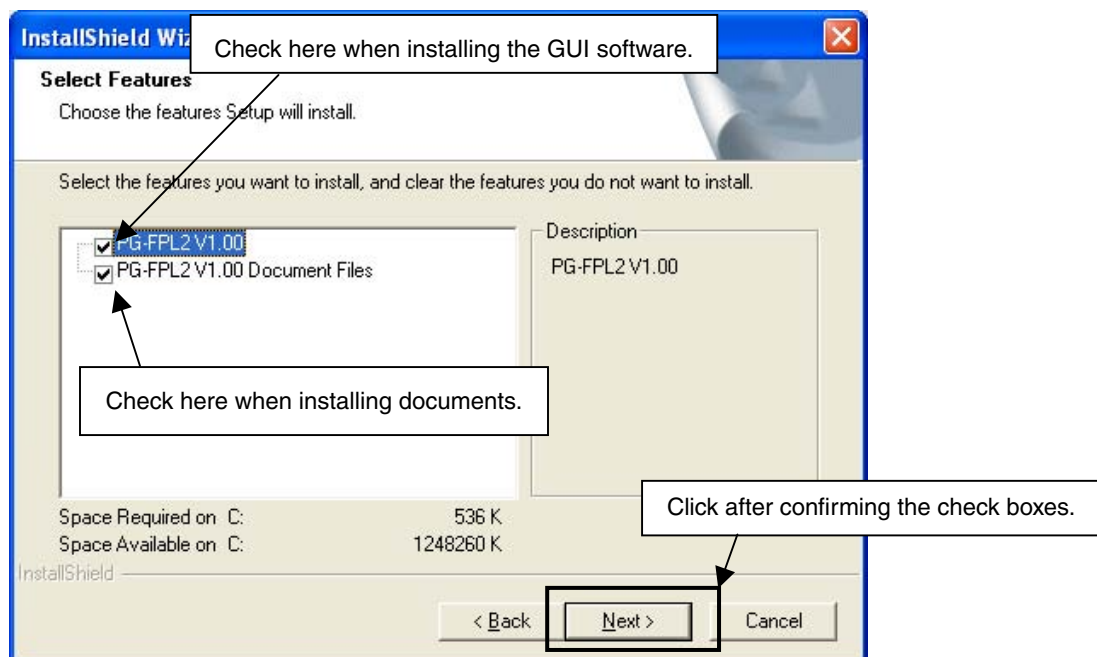
- When **Browse...** is clicked
The directory selection window is displayed. Specify the path for the installation folder and then click **OK**.

Figure 3-6. Changing Installation Folder



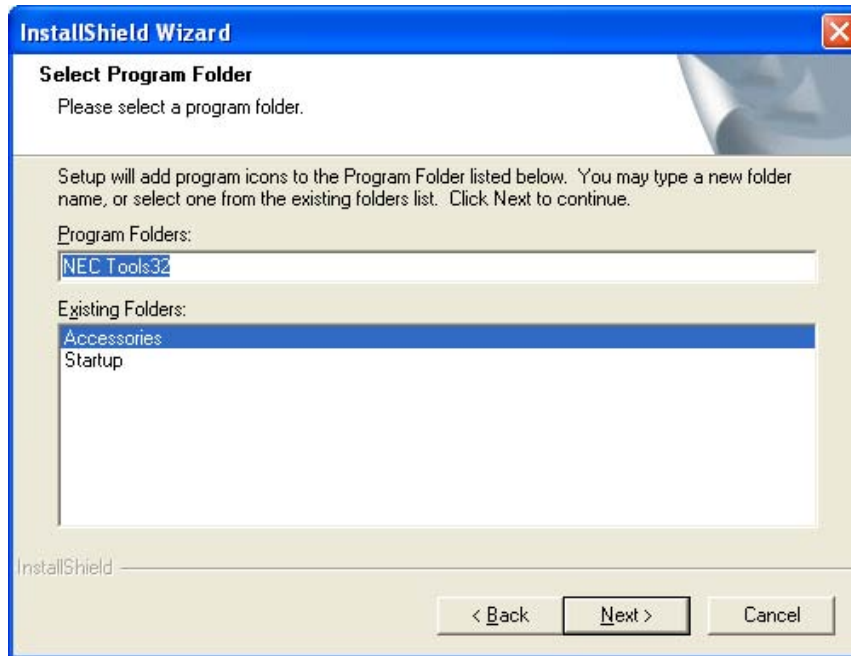
- When Custom is clicked
Select the checkbox of the item to be installed and then click **Next >**.

Figure 3-7. Custom Installation



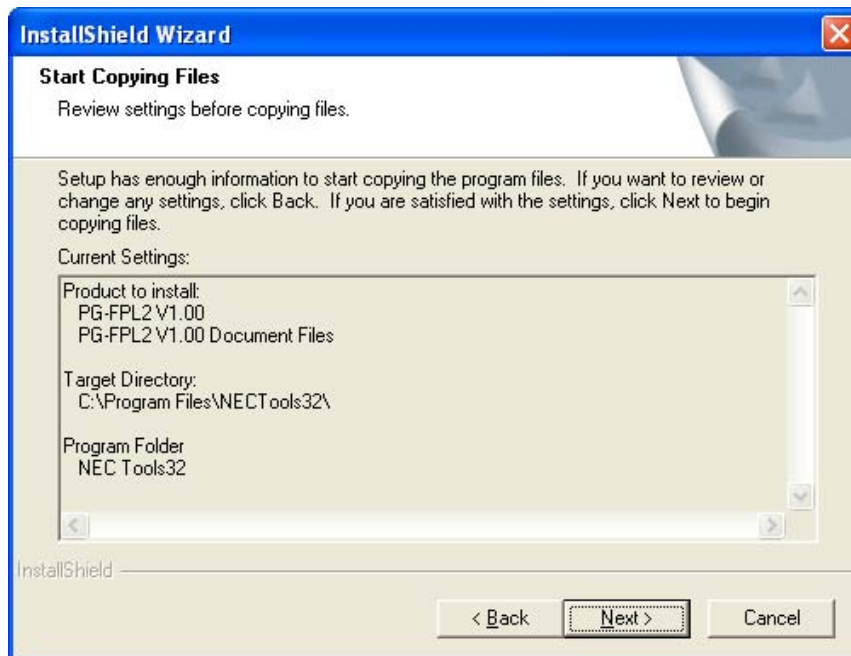
- (8) Specify or select the program folder and then click **Next >**.

Figure 3-8. Program Folder Selection



- (9) Confirm the current setting and then click **Next >**. (Program installation starts.)

Figure 3-9. Start of File Copy Operation



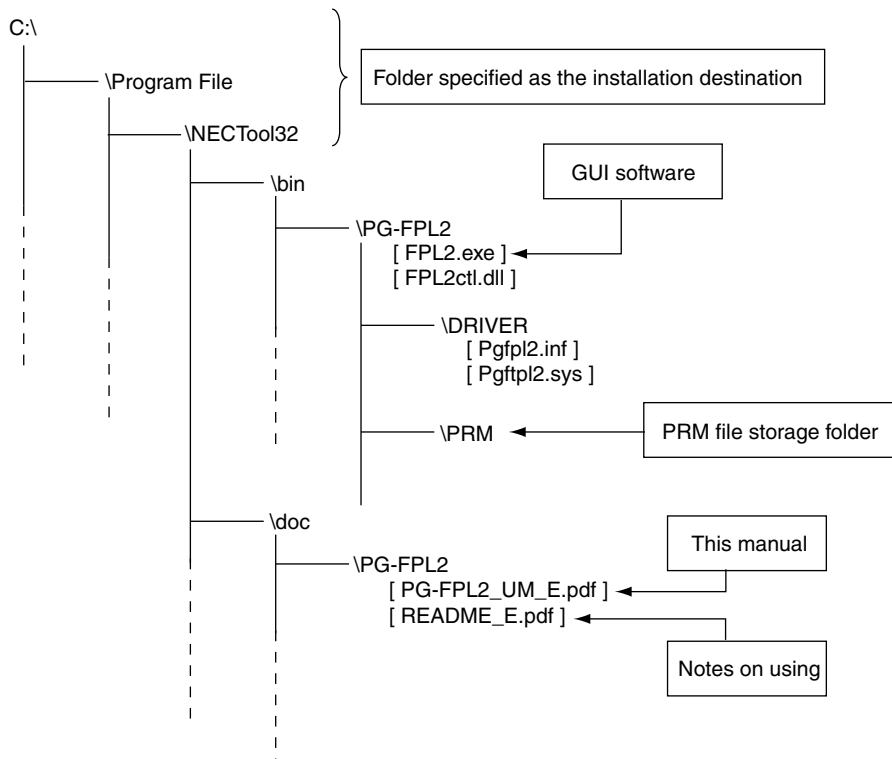
(10) When installation of the GUI software is complete, the screen shown below appears. Click **Finish** to terminate the installer.

Figure 3-10. Completion of Installation



(11) The following folders are created upon completion of installation.

Figure 3-11. Folder Configuration After Installation



3.2 USB Driver Installation

The driver needs to be installed in the host machine before using the FPL2. Install the driver according to the following procedure:

Installation in Windows 98/Me: See **3.2.1 Installation in Windows 98/Me**

Installation in Windows 2000: See **3.2.2 Installation in Windows 2000**

Installation in Windows XP: See **3.2.3 Installation in Windows XP**

3.2.1 Installation in Windows 98/Me

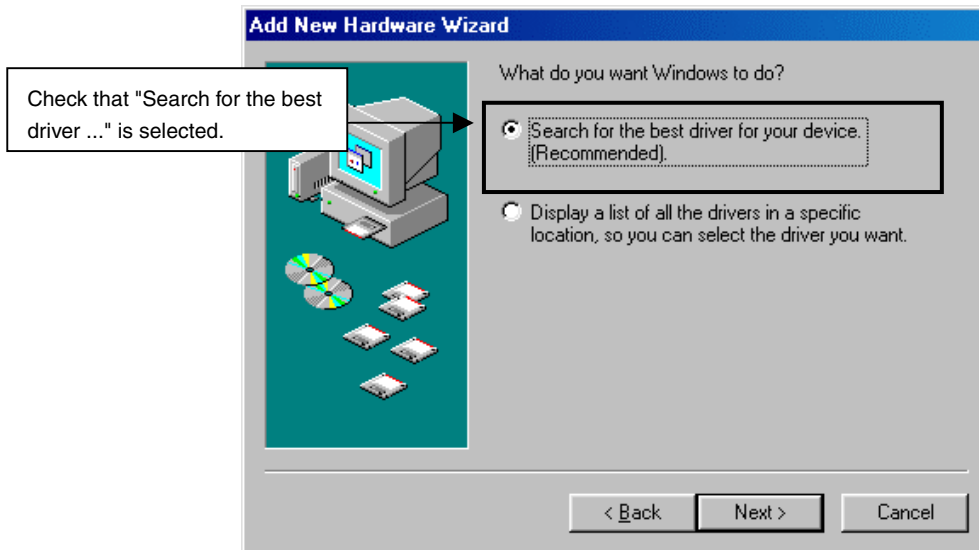
- (1) When the FPL2 is connected with the host machine, the FPL2 is recognized by Plug and Play, and the wizard for adding new hardware is started. Click **Next >**.

Figure 3-12. Add New Hardware Wizard (Windows 98)



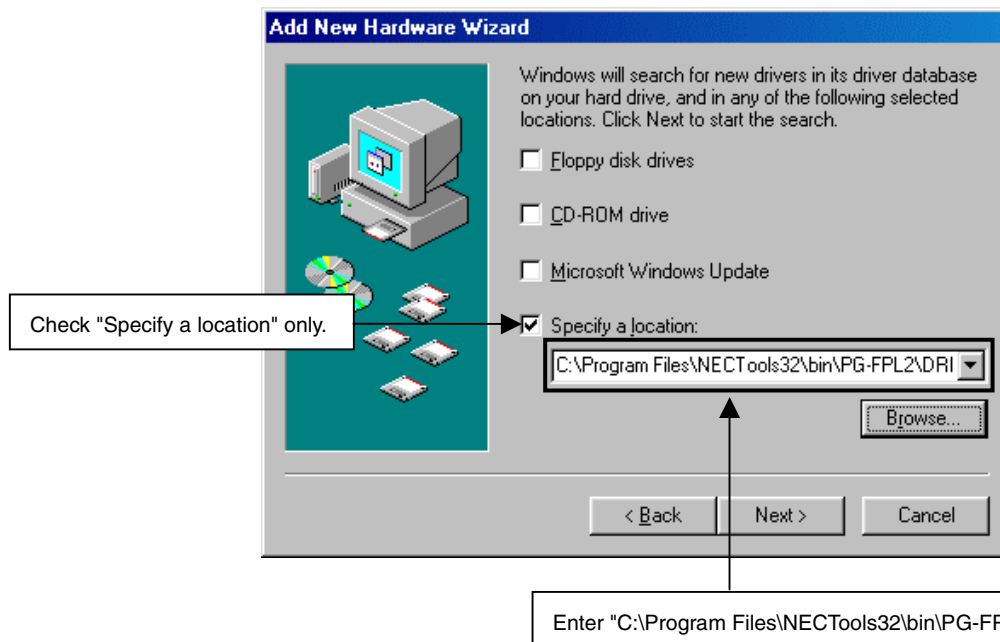
(2) The window below is displayed. Check that "Search for the best driver ..." is selected, then click **Next >**.

Figure 3-13. Search Method (Windows 98)



(3) Check the "Specify a location" check box only and enter "C:\Program Files\NECTools32\bin\PG-FPL2\DRIVER" in the address bar, then click **Next >**.

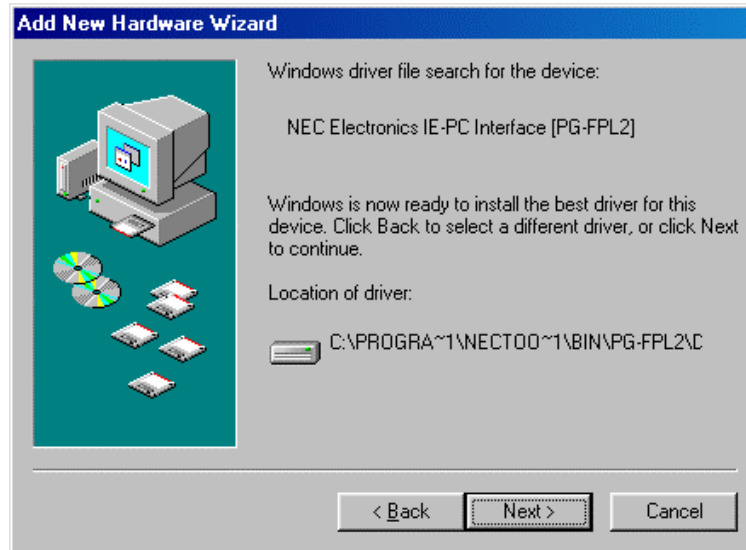
Figure 3-14. Search Location Specification (Windows 98)



Remark If the installation destination folder is changed for GUI software installation, enter "*new-folde*\bin\PG-FPL2\DRIVER".

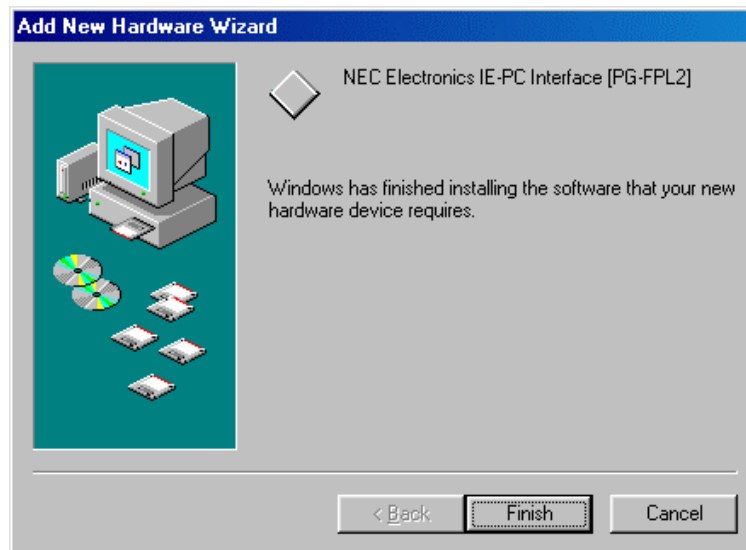
- (4) The window below is displayed. Confirm the contents and click **Next >**.

Figure 3-15. Checking Driver to Be Installed (Windows 98)



- (5) When installation of the USB driver is complete, the screen shown below appears. Click **Finish** to complete installation.

Figure 3-16. Completion of Installation (Windows 98)



3.2.2 Installation in Windows 2000

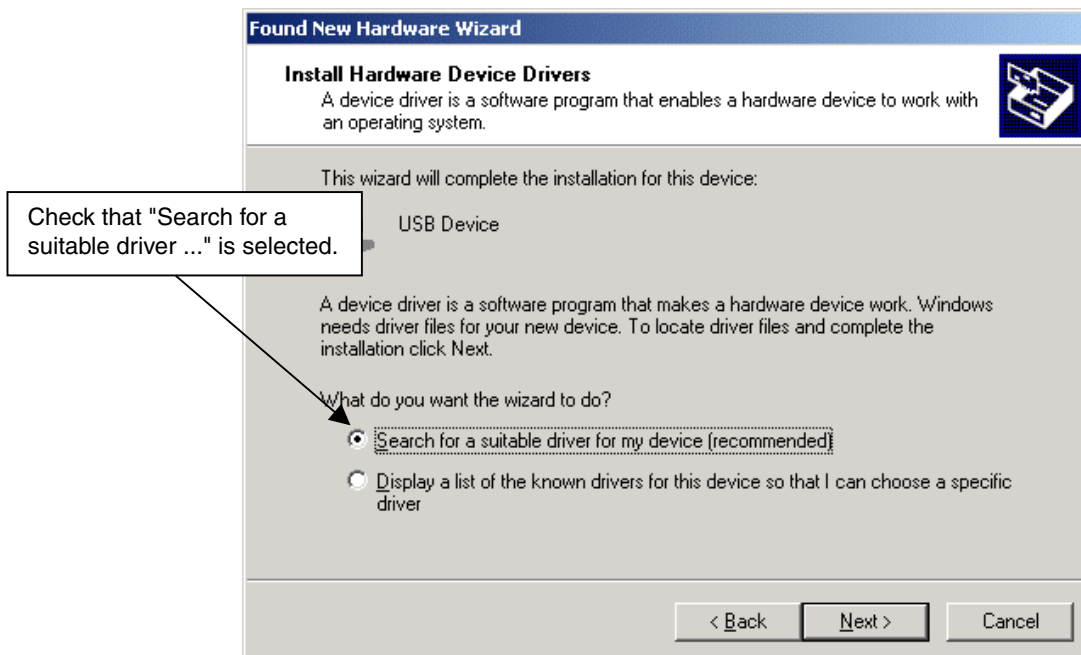
- (1) When the FPL2 is connected with the host machine, the FPL2 is recognized by Plug and Play, and the wizard for finding new hardware is started. Click **Next >**.

Figure 3-17. Found New Hardware Wizard (Windows 2000)



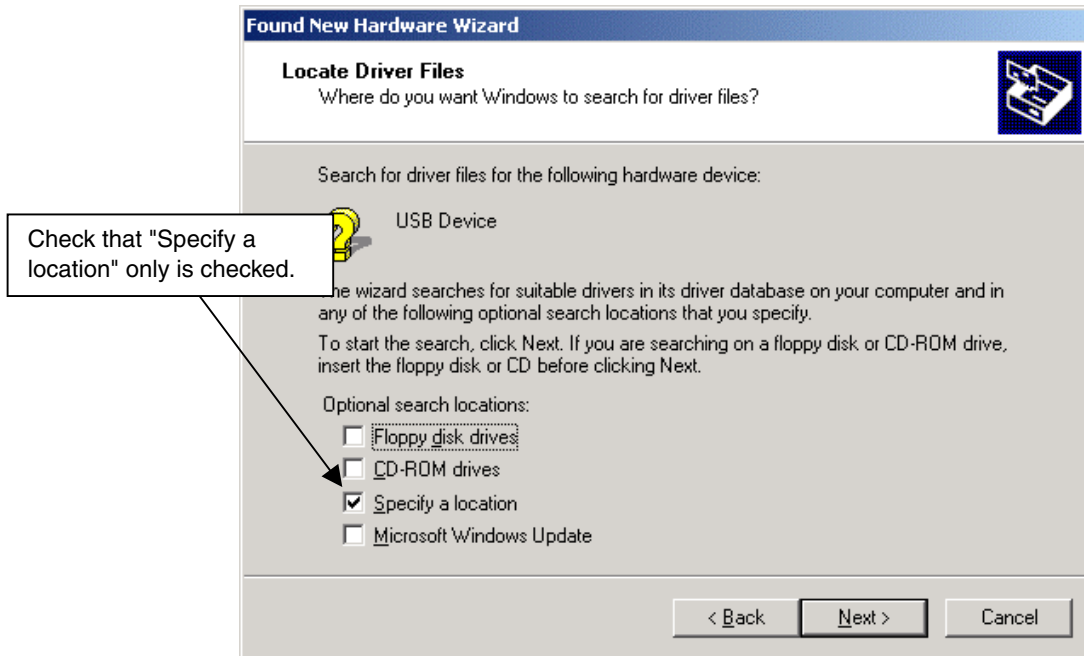
- (2) The window below is displayed. Check that "Search for a suitable driver ..." is selected, then click **Next >**.

Figure 3-18. Search Method (Windows 2000)



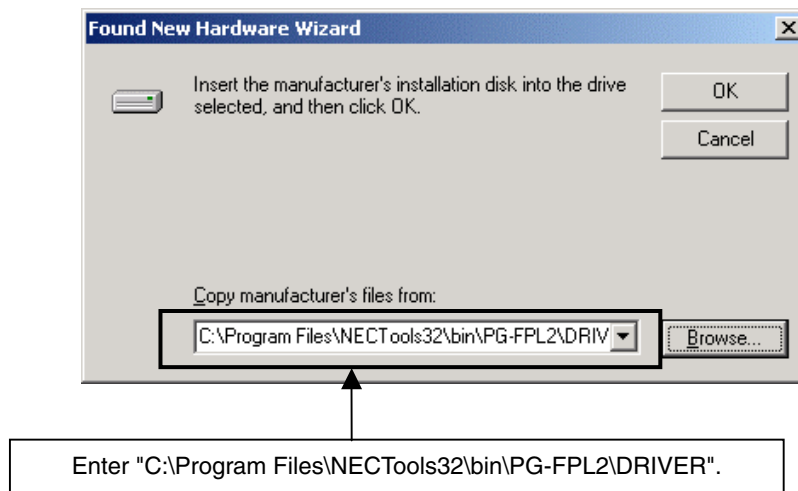
- (3) Check the "Specify a location" check box only, then click **Next >**.

Figure 3-19. Driver File Location (Windows 2000)



- (4) Enter "C:\Program Files\NECTools32\bin\PG-FPL2\DRIVER" in the address bar, then click **Next >**.

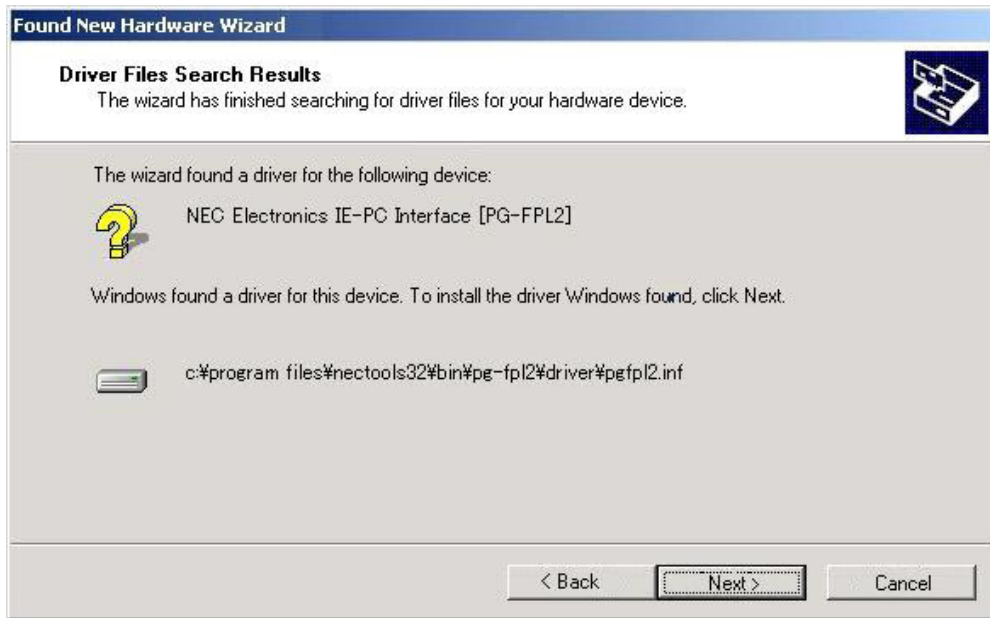
Figure 3-20. Address Specification (Windows 2000)



Remark If the installation destination folder is changed for GUI software installation, enter "new-folder\bin\PG-FPL2\DRIVER".

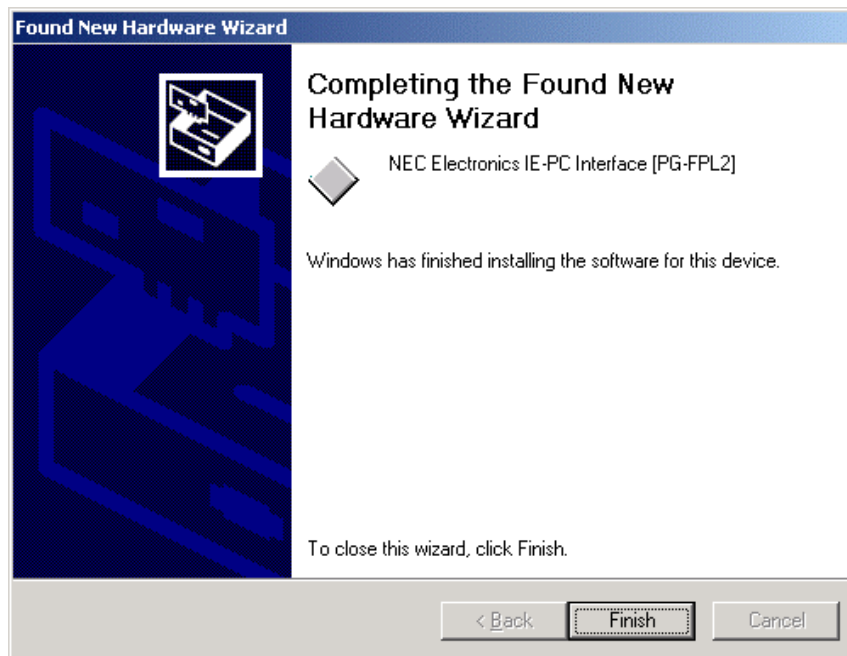
- (5) The driver file is searched and the window below is displayed. Click **Next >**.

Figure 3-21. Driver File Search (Windows 2000)



- (6) When installation of the USB driver is complete, the screen shown below appears. Click **Finish** to complete installation.

Figure 3-22. USB Driver Installation Completion (Windows 2000)



3.2.3 Installation in Windows XP

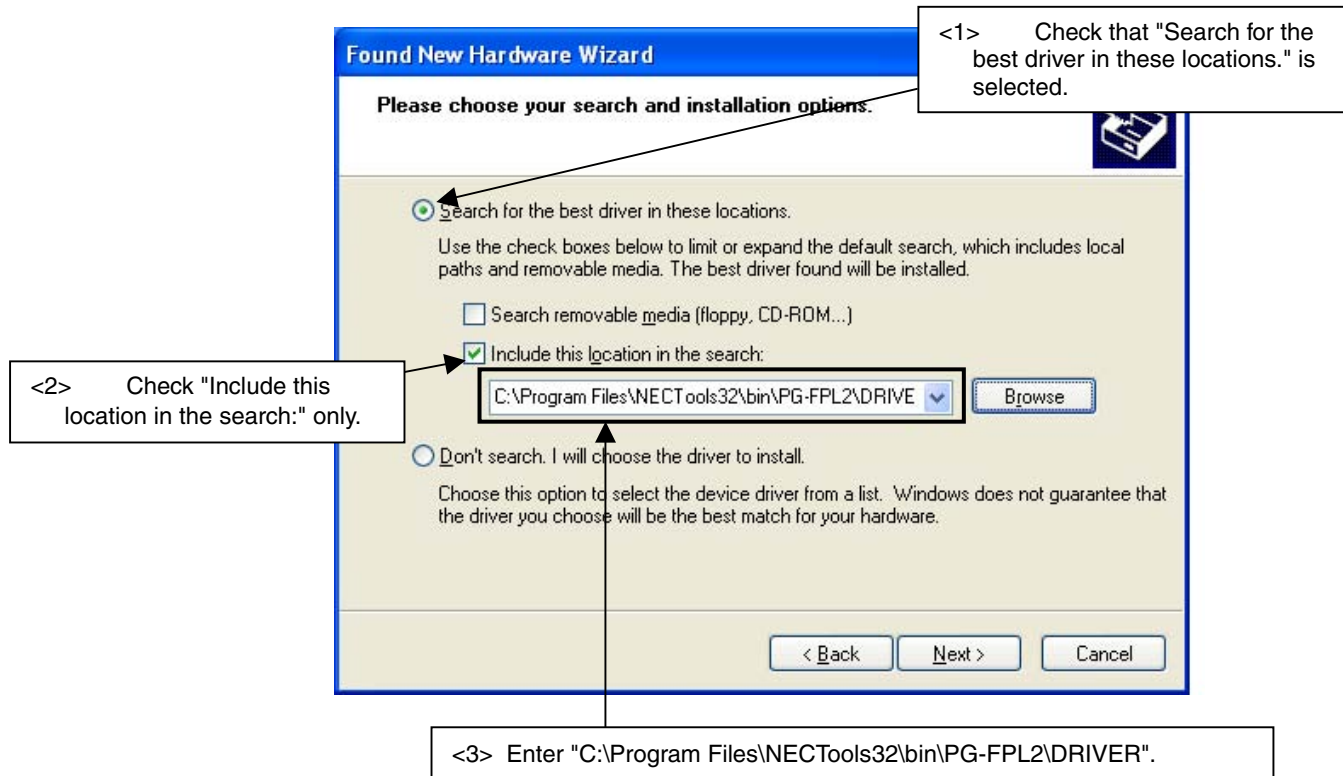
- (1) When the FPL2 is connected with the host machine, the FPL2 is recognized by Plug and Play, and the wizard for finding new hardware is started. Check that "Install from a list or specific ..." is selected, then click **Next >**.

Figure 3-23. Found New Hardware Wizard (Windows XP)



- (2) Check that "Search for the best driver in these locations." is selected. Check the "Include this location in the search:" check box and enter "C:\Program Files\NECTools32\bin\PG-FPL2\DRIVER" in the address bar, then click **Next >**.

Figure 3-24. Search Method (Windows XP)



- (3) When installation of the USB driver is complete, the screen shown below appears. Click **Finish** to complete installation.

Figure 3-25. USB Driver Installation Completion (Windows XP)

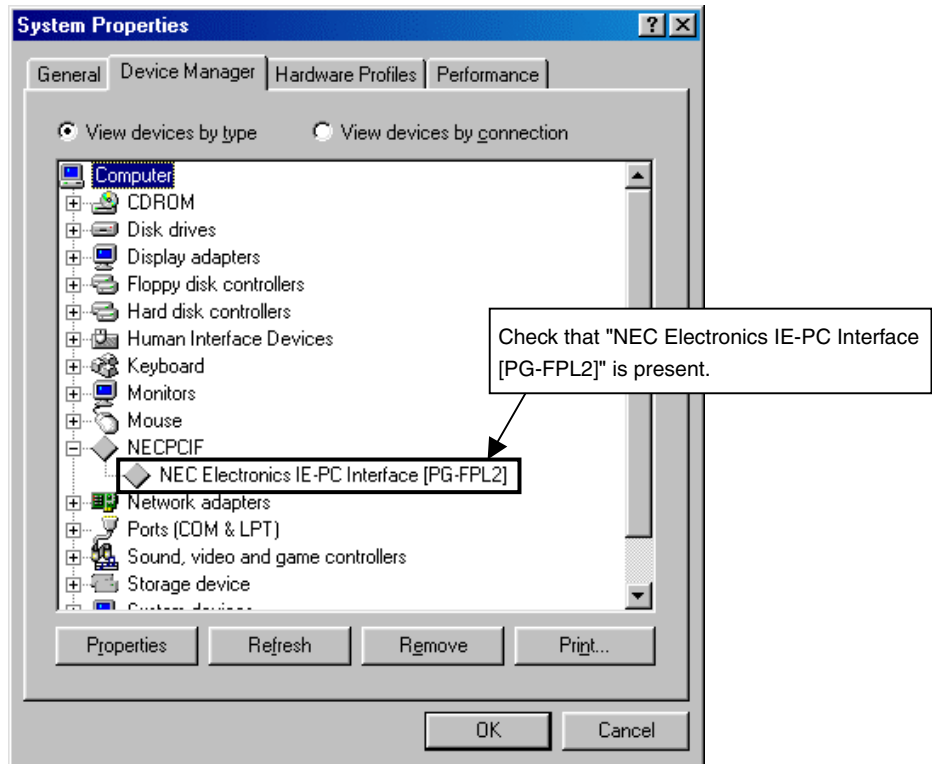


3.3 Confirmation of USB Driver Installation

After installing the two types of drivers, check that the drivers have been installed normally, according to the procedure below. When using the FPL2, the information to be checked here is needed.

Click the "Device Manager" tab and check that the drivers are installed normally.

Figure 3-26. Device Manager



- Cautions**
1. When using the FPL2 in Windows 98/Me, do not select **Refresh** or **Remove** when communicating with the target device.
 2. When using the FPL2 in Windows 2000/XP, do not perform "Scan for hardware changes" when communicating with the target device.

Remark If the drivers above are not displayed, or the mark "x" or "!" is prefixed, refer to **CHAPTER 9 TROUBLESHOOTING**.

3.4 Uninstallation

3.4.1 Driver uninstallation

Uninstall the driver by manually deleting "NEC Electronics IE-PC Interface [PG-FPL2]" on the "Device Manager" tab while the FPL2 is connected.

After deletion, Find New Hardware wizard may start. At this time, click Cancel.

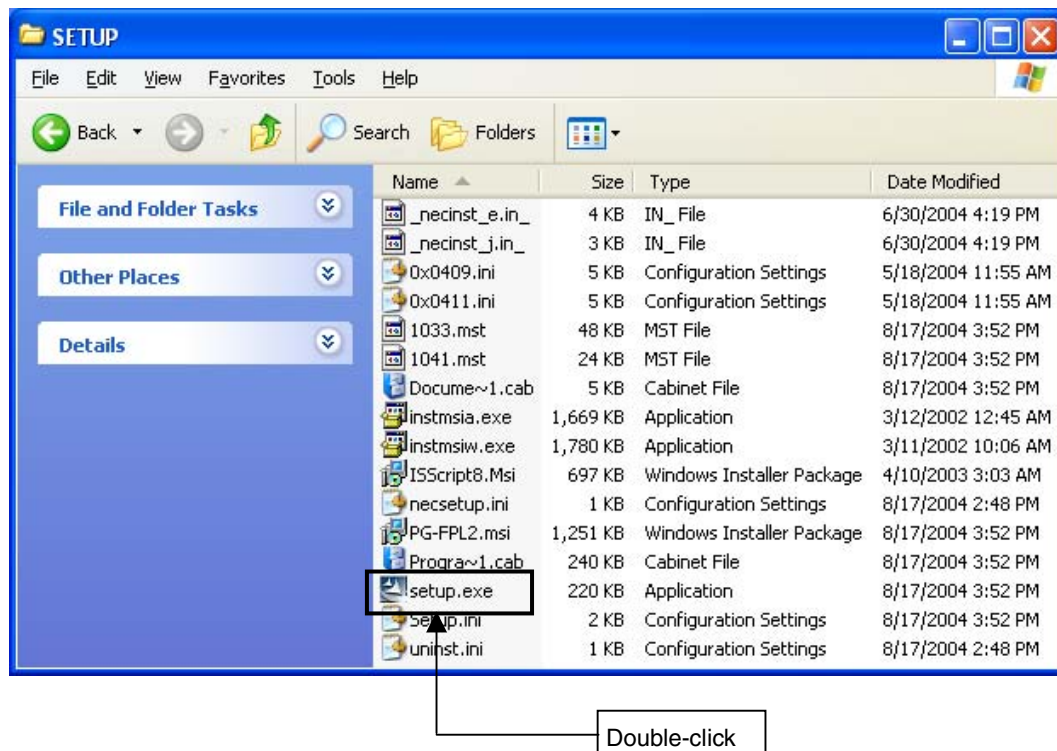
3.4.2 GUI software uninstallation

The driver uninstallation program is contained in the CD-ROM (ID78K0S-QB Disk) included with the QB-78K0SKX1MINI package (this program is used commonly as the installer).

Use the procedure below for driver uninstallation.

- (1) When using Windows XP, log on as the computer administrator. When using Windows 2000, log on as the Administrator.
- (2) Insert the CD-ROM (ID78K0S-QB Disk) included with the QB-78K0SKX1MINI package into the CD-ROM drive.
- (3) Double-click "My Computer", "CD-ROM", "PG-FPL2", and "SETUP" in that order. Double-click "setup.exe" in the SETUP folder.

Figure 3-27. SETUP Folder



- (4) Select a language to be used for installation ("English" in this example), then click **OK**.

Figure 3-28. Setup Language Selection



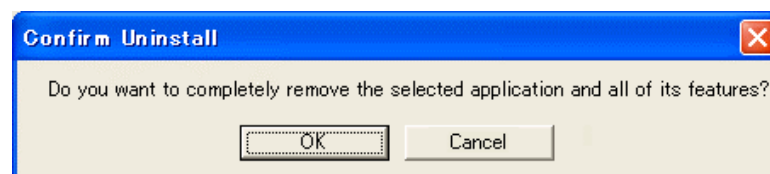
- (5) Select "Remove", then click **Next >**.

Figure 3-29. Program Modification



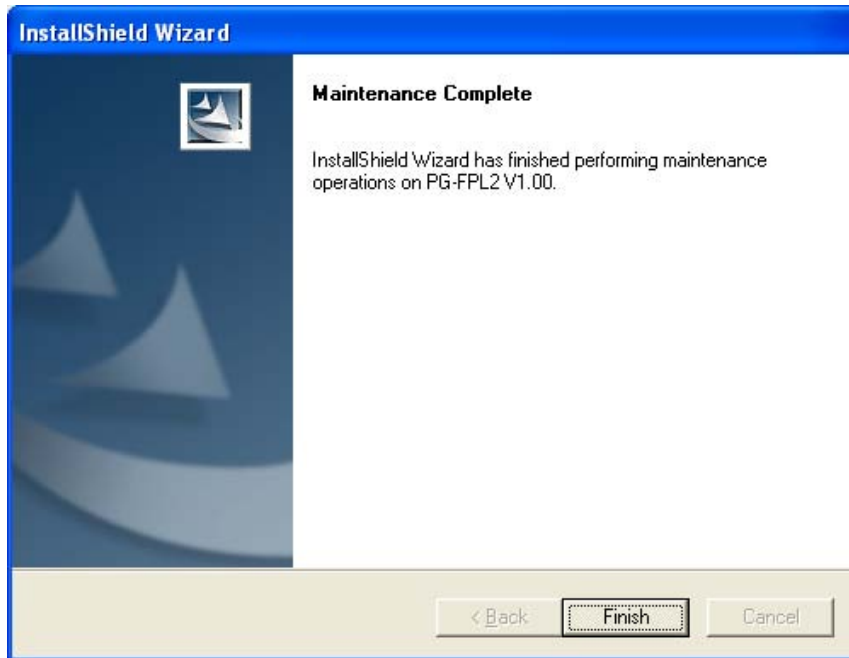
- (6) Click **OK** to start uninstallation.

Figure 3-30. Confirmation of File Deletion



- (7) When uninstallation of the GUI software is complete, the screen shown below appears. Click to complete uninstallation.

Figure 3-31. Completion of Maintenance



CHAPTER 4 OPERATION USING GUI SOFTWARE

4.1 Introduction

Before you start using the FPL2, download the parameter file for the target device (.PRM) to the PRM folder.

<Downloading the parameter file>

The PRM file is not part of the FPL2 software package.

It has to be downloaded from the following NEC Electronics website.

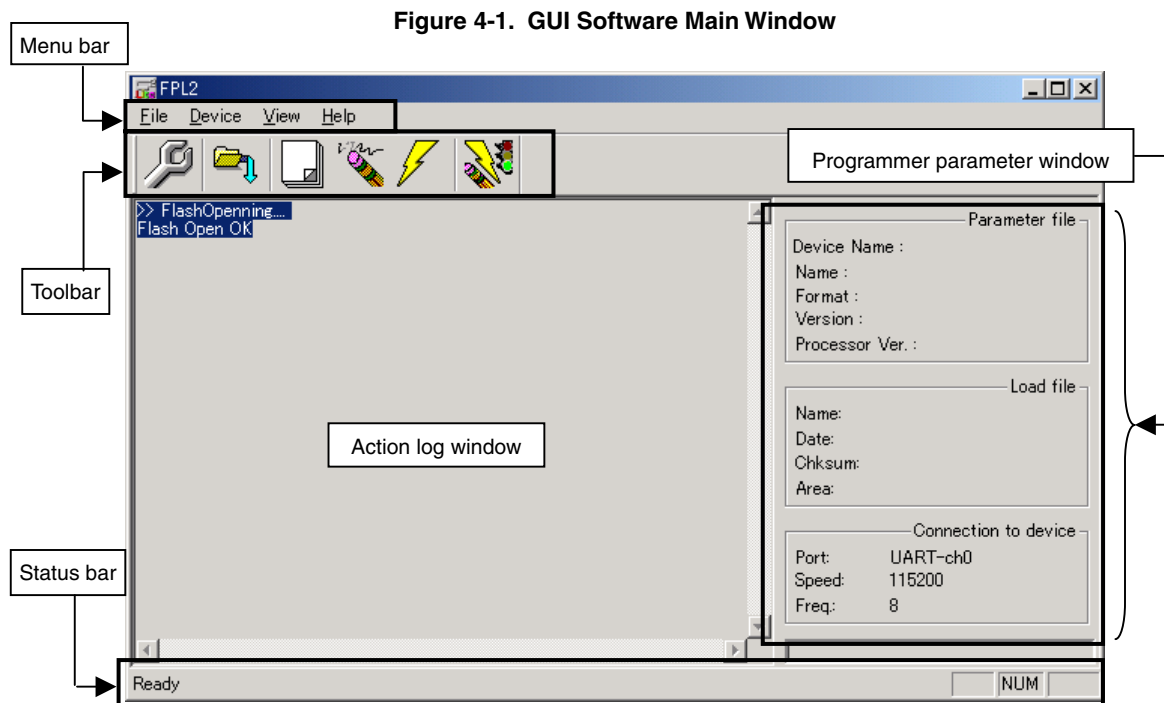
<http://www.necel.com/micro/ods/eng/index.html> (website in English)

<http://www.necel.com/micro/ods/jpn/index.html> (website in Japanese)

The PRM file downloaded from the NEC Electronics website must be copied into the sub-directory <FPL2.EXE-installation-path>\PRM which was created during GUI software setup (see **CHAPTER 3 SOFTWARE INSTALLATION**).

4.2 Starting up GUI Software

- GUI software startup
 - Select FPL2.EXE in the Start menu to start the FPL2 GUI software.
 - When the GUI software is started normally, the following screen appears.









This window consists of the following items.

Name	Description of Display
Menu bar (displayed at the top)	Displays menu items executable by the FPL2.
Toolbar (displayed under the menu bar)	Displays frequently used commands as icons.
Action log window (displayed under the toolbar)	Displays an FPL2 action log.
Programmer parameter window (displayed to the right of the action log window)	Displays programming parameter settings.
Status bar	Displays status.

4.3 Toolbar

The toolbar contains buttons to start the most important procedures of the FPL2.

Table 4-1. Toolbar Buttons

	[Device] – [Setup...] button
	[File] – [Load...] button
	[Device] – [Blank check] button
	[Device] – [Erase] button
	[Device] – [Program] button
	Device Erase – [Autoprocedure (EPV)] button

4.4 Menus

Depending on the actual device status or device type, some menu items may be enabled or disabled.

4.4.1 [File] menu

After clicking the [File] menu, the following pull-down menu is displayed.

Commands related to file operation appear here.

Figure 4-2. [File] Menu

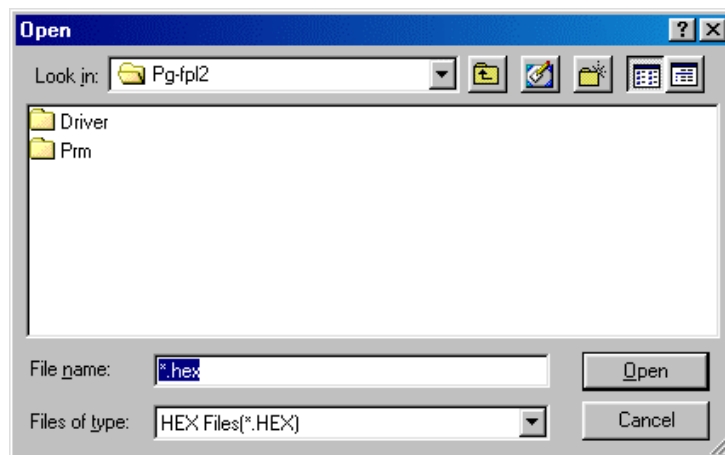


(1) [Load] command



The [Load] command allows you to select a program file. The selected program file will be programmed into the device's flash memory by executing the [Program] command or [Autoprocedure (EPV)] command.

Figure 4-3. HEX File Selection Window



The most recently used directory from which a file has been loaded will be offered in this window as the default selection. After loading the user program, the checksum is calculated and the result is displayed in the programmer parameter window.

[Open] button]

Selects a user program as a program to be written to the target device.

[Cancel] button]

Closes the window without selecting a program.

(2) [Quit] command

The [Quit] command terminates the FPL2 GUI software. Clicking the [X] button on the right side of the task bar also terminates the FPL2 GUI software.

User settings are saved in the FPL2.INI^{Note} file so that the GUI software will start up next time with the same settings.

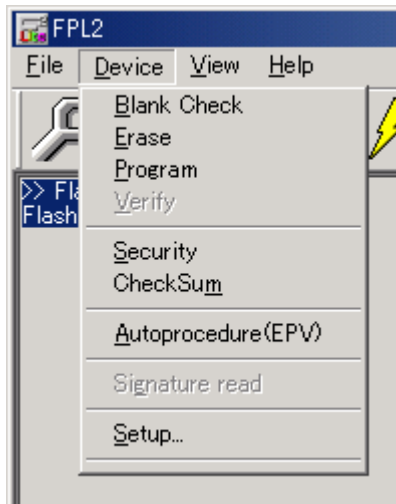
Note FPL2.INI is created in the Windows folder when Windows 98, Windows Me, or Windows XP is used. When Windows 2000 is used, FPL2.INI is created in the Winnt folder.

4.4.2 [Device] menu

Clicking the [Device] menu displays the following pull-down menu.

This pull-down menu mainly consists of commands for programming the target device, such as erase, program, and verify.

Figure 4-4. [Device] Menu



(1) [Blank Check] command



The [Blank Check] command initiates a blank check of the target device connected to the FPL2. If the flash memory of the target device is erased, the blank check terminates successfully. If the flash memory is not completely erased, "not blank" is displayed. Erase the flash memory of the target device before starting programming.

(2) [Erase] command



The [Erase] command initiates the erase procedure for the target device connected to the FPL2. While erasing the contents in the flash memory is in progress, the progress is displayed in the action log window, indicating the operation of the programmer. The [Blank Check] command that is executed before the [Erase] command is executed in accordance with the setting of 'Command options' on the Advance tab of the [Device] > [Setup...] menu. After completing the [Erase] command, the GUI software displays the target device command execution result.

Caution During an erase operation, the Status LED is not turned on. Do not disconnect the target cable and USB cable until the GUI software displays "Erase finished". Otherwise, the target device may be damaged.

(3) [Program] command



The [Program] command transmits the specified user program and writes them to the flash memory. After execution of the [Program] command, to display and verify the checksum values of the target device and the user program to detect a communication error of the user program while it is being transmitted, set 'Command options' on the Advance tab of the [Device] > [Setup...] menu.

While programming is in progress, the progress is displayed in the action log window, indicating the operation of the programmer. This progress indicates the progress of programming the target device as a percentage. After completing the [Program] command, the GUI software displays the target device command execution result.

(4) [Verify] command

This command is not supported.

(5) [Security] command

The [Security] command initiates the programming of the security flag of the target device connected to the FPL2. Set 'Security flag settings' on the Advance tab of the [Device] > [Setup...] menu.

(6) [Checksum] command

The [Checksum] command initiates the displaying and verifying of the checksum values of the target device connected to the FPL2 and the user program. "OK" is displayed if the values match, and "ERROR: checksum does not match" if the values do not match.

(7) [Autoprocedure (EPV)] menu



The [Autoprocedure (EPV)] command sequentially executes the [Erase] and [Program] commands explained above.

After execution of the [Autoprocedure (EPV)] command, to verify the checksum values of the data written to the flash memory of the target device and the program file to detect a communication error of the user program while it is being transmitted, specify automatic execution of the [Checksum] command after execution of the [Program] command, using the Command options on the Advance tab of the [Device] > [Setup...] menu.

During EPV, the progress status of the programmer operation is displayed in the action log window. Refer to **CHAPTER 5 USAGE EXAMPLE** for the selected command, and its execution operation and message.

After completing the [Autoprocedure (EPV)] command, the GUI software displays the target device command execution result.

(8) [Signature read] command

This command is not supported.

(9) [Setup...] command



The [Setup...] command is used to perform flash memory writing settings in accordance with the user environment, and command option settings. Each time the GUI software is started, the parameter file (.PRM) and customized setup file (.SET) that were used last are read, and their setting contents are displayed. Settings can be changed in accordance with the user environment, except for the parameters that are dimmed. In addition, new settings can be saved to the customized setup file (the data of the parameter file cannot be changed).

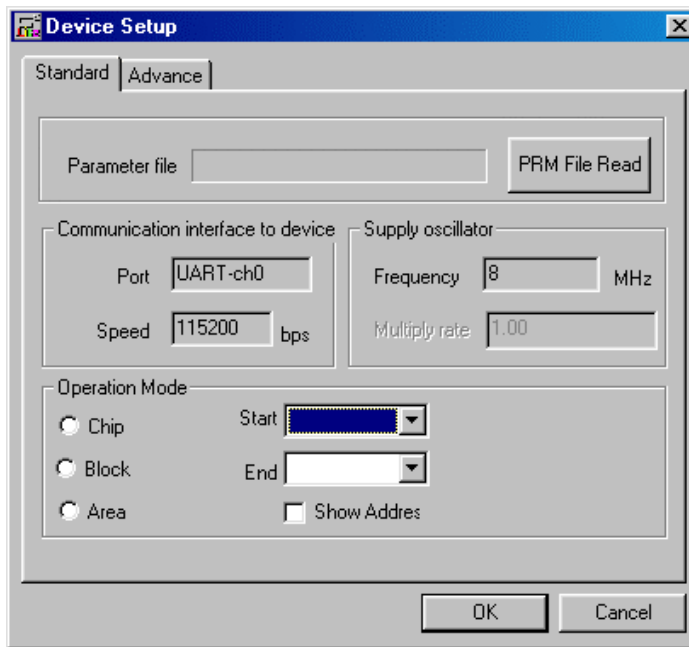
(a) Standard setup

This menu is used to set the rewriting environment of the target device's flash memory.

The mode of communication with the target device and the operating clock of the device differ depending on the device used. Refer to the manual of the device used for details.

The following window opens.

Figure 4-5. Device Setup Window – Standard Tab



This window shows all basic options that can be set in accordance with the user environment and target device.

[OK button]

Saves the settings in the Standard and Advance tabs and closes the window.

[Cancel button]

Closes the window without saving the settings in the Standard and Advance tabs.

<1> Parameter file

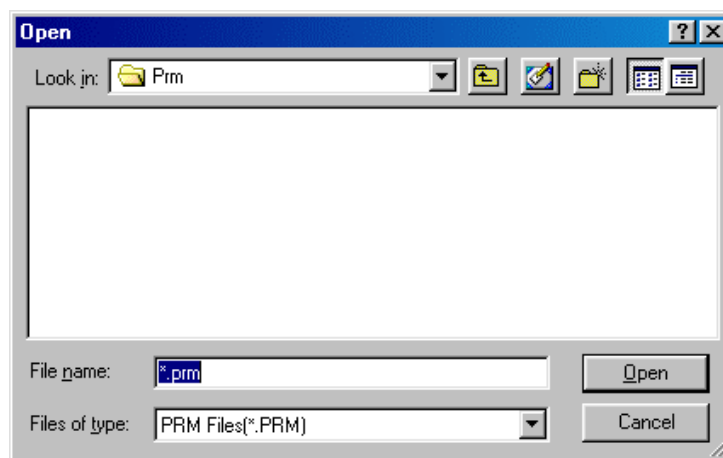
This file holds parameters and timing data required to rewrite the flash memory of the target device. Do not modify the data in the parameter file because the data is related to the guarantee of rewrite data.

The parameter file is protected by the checksum function. If the checksum result indicates an error, the FPL2 does not accept the parameter file.

Figure 4-6. Device Setup Window – Parameter File Selection



Figure 4-7. Parameter File Selection Window



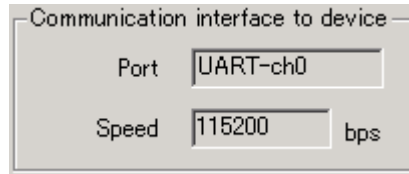
[PRM File Read button]

A window for specifying a parameter file is displayed. Specify the target file and click **[Open]**.

<2> Communication interface to device

Select the channel for communication between the FPL2, target device, and host machine, in this area.

Figure 4-8. Device Setup Window – Communication Interface to Device

**[Port box]**

Displays the communication channel between the FPL2 and target device.

- UART-ch0

Remark Since the target device of the FPL2 is the 78K0S/Kx1+, the port is fixed to UART-ch0.

[Speed box]

Displays the communication rate of the communication channel.

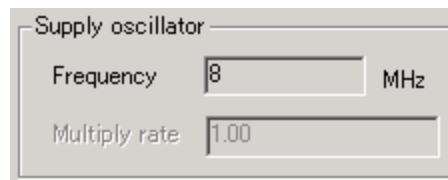
- 115,200 bps

Remark Since the target device of the FPL2 is the 78K0S/Kx1+, the communication rate is fixed to 115,200 bps.

<3> Supply oscillator

Select the clock that determines the programming, data transfer, and transfer rates, in this area.

Figure 4-9. Device Setup Window – Supply Oscillator

**[Frequency box]**

Sets the clock frequency of the target system.

Remark Since the target device of the FPL2 is the 78K0S/Kx1+, the clock frequency is fixed to 8 MHz.

[Multiply rate]

Specifies the division rate or multiplication rate of the target device.

Remark Since the target device of the FPL2 is the 78K0S/Kx1+, this item is fixed to 1.00.

<4> Operation Mode

The flash memory may be divided into blocks or areas depending on the target device.

This menu is used to select the operation mode of the flash memory. Some devices do not have either or both division modes Block and Area. In this case, a mode that is not available cannot be selected.

Figure 4-10. Device Setup Window – Operation Mode Selection

**[When Chip is selected]**

The entire flash memory area of the target device is subject to rewrite processing.

[When Block is selected]

Specify the Block number range subject to rewrite processing by using Start/End.

The Start/End list boxes display the Block number where the flash memory of the target device is configured.

Remark The Start Block number is fixed to 000. Specify the End Block number only.

[When Area is selected]

This item is not supported.

[Show Address check box]

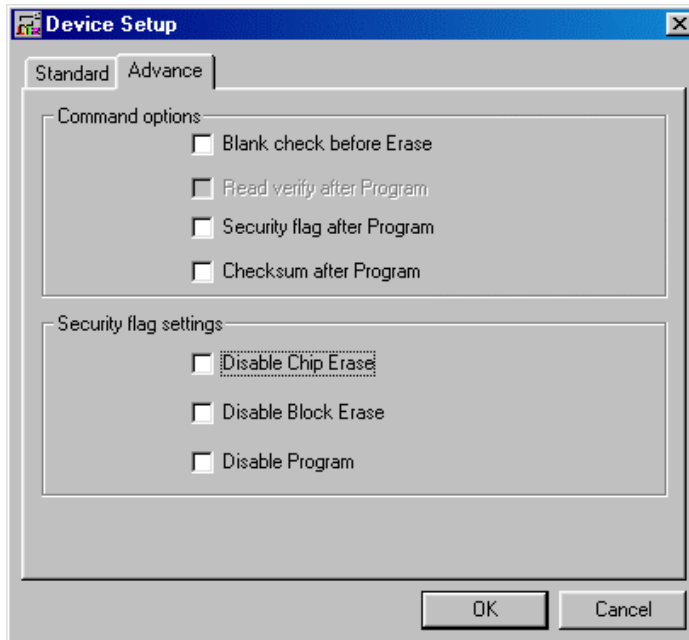
Specifies whether numbers or addresses are displayed in the Start/End list boxes.

If this check box is checked, addresses are displayed.

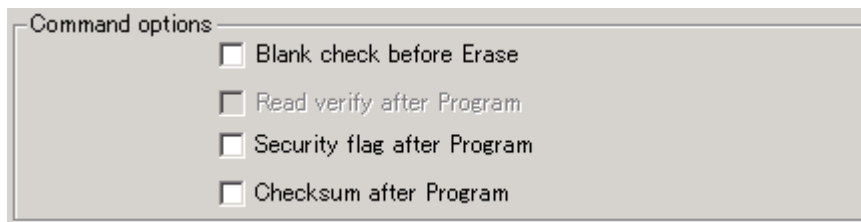
If it is not checked, numbers are displayed.

(b) Advance setup

This menu is used to specify command options and security flag setting.
The Advance tab is displayed by clicking Advance.

Figure 4-11. Device Setup Window – Advance Tab**<1> Command options**

Specify the options for the FPL2 flash processing commands in this area.

Figure 4-12. Device Setup Window – Command Options**[Blank check before Erase check box]**

If this check box is checked, a blank check is performed before execution of the [Erase] and [Autoprocedure (EPV)] commands. If the result of the blank check is OK, erase processing is not executed.

[Read verify after Program check box]

This item is not supported.

[Security flag after Program check box]

If this check box is checked, automatic programming of the selected security flag is executed after execution of the [Program] and [Autoprocedure (EPV)] commands.

[Checksum after Program check box]

If this check box is checked, the checksum values of the target device connected to the FPL2 and the user program are displayed and verified after execution of the [Program] and [Autoprocedure (EPV)] commands.

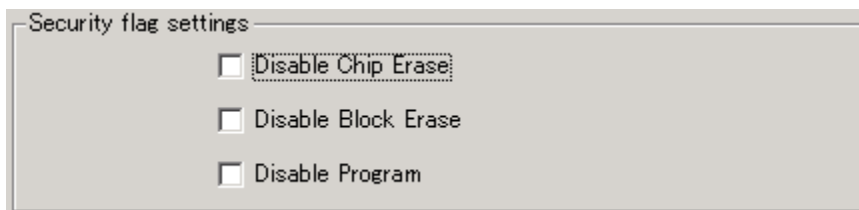
The value shown in this box differs from the value displayed in the parameter window in the main window.

"OK" is displayed if the values match, and "ERROR: checksum does not match" if the values do not match.

<2> Security flag settings

The <Security flag settings> dialog box is used to specify which security function is valid.

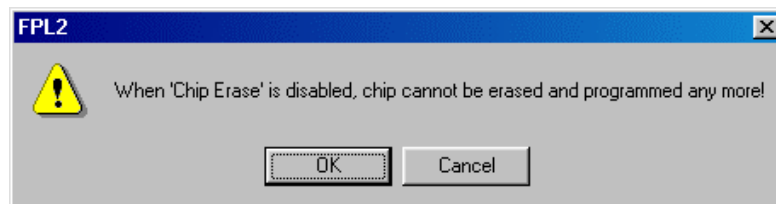
Figure 4-13. Device Setup Window – Security Flag Settings

**[Disable Chip Erase check box]**

If this check box is checked, the [Erase] command becomes invalid in the entire flash memory area of the target device.

At this time, the warning message shown below is displayed.

Figure 4-14. Device Setup Window – Disable Chip Erase Warning



Caution Be aware that if the security flag is set in the target device, neither erasing nor writing to the device can be enabled afterward.

[Disable Block Erase check box]

If this check box is checked, the [Erase] command becomes invalid in all the blocks of the flash memory selected under Operation Mode in the Standard Setup menu.

This setting is cleared by the [Erase] command when Chip was selected under Operation Mode.

[Disable Program check box]

If this check box is checked, the [Program] command becomes invalid, as does the [Erase] command in all the blocks of the flash memory selected under Operation Mode in the Standard Setup menu.

The [Erase] command for the entire flash memory area is valid.

This setting is cleared by the [Erase] command when Chip was selected under the Operation Mode.

Caution The following is the correspondence between the [Erase] and [Program] commands when the security functions of a 78K0S/Kx1+ Series microcontroller are valid.

	CHIP Erase Command	Block Erase Command	Program Command
Disable Chip Erase	Invalid	Invalid	Valid ^{Note}
Disable Block Erase	Valid	Invalid	Valid
Disable Program	Valid	Invalid	Invalid

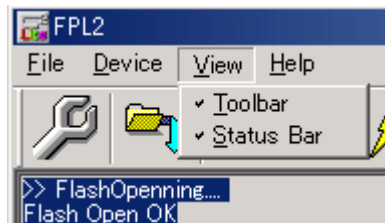
Note Since the Erase command is invalid, the data that differs from the data already written in the flash memory cannot be written.

4.4.3 [View] menu

Clicking the [View] menu displays the following pull-down menu.

This menu consists of commands for setting whether to display the toolbar and status bar.

Figure 4-15. [View] Menu



(1) [Toolbar] command

Checking the [Toolbar] command displays the toolbar. Unchecking the command hides the toolbar.

(2) [Status Bar] command

Checking the [Status Bar] command displays the status bar. Unchecking the command hides the status bar.

4.4.4 [Help] menu

Clicking the [Help] menu displays the following pull-down menu.

Figure 4-16. [Help] Menu



(1) [About FPL2] command

The [About FPL2] command opens the following program entry window and indicates the version. Clicking terminates the display.

Figure 4-17. About FPL2 Window



4.5 Programmer Parameter Window

This window displays the settings of the programming parameters.

Figure 4-17. Programmer Parameter Window

The screenshot shows a window titled 'Programmer Parameter Window' with three distinct sections:

- Parameter file:** Contains fields for 'Device Name :', 'Name :', 'Format :', 'Version :', and 'Processor Ver. :'. The 'Device Name' field is currently empty, while the others contain text.
- Load file:** Contains fields for 'Name:', 'Date:', 'Chksum:', and 'Area:'. All these fields are currently empty.
- Connection to device:** Contains fields for 'Port:', 'Speed:', and 'Freq:'. The 'Port' is set to 'UART-ch0', 'Speed' is '115200', and 'Freq' is '8'.

[Parameter file]

Displays information about a parameter file updated and read after [Setup] command execution.

[Load file]

Selects information about a program file updated and selected after [Load] command execution.

[Connection to device]

Display information about the connection with the target device.

Remark Since the target device of the FPL2 is the 78K0S/Kx1+, this item is fixed so it cannot be changed.

CHAPTER 5 USAGE EXAMPLE

This chapter explains a series of basic operations of the FPL2 with the GUI software, taking a case where the μ PD78F9222 is used as the target device as an example. This chapter covers how to start the system, execute the [Autoprocedure (EPV)] command, and program the target device.

Refer to **CHAPTER 4 OPERATION USING GUI SOFTWARE** for the other commands and applications.

O Series of operations described in this chapter

The conditions of the series of operations described in this chapter are as follows:

- Target system
 - Target device: μ PD78F9222
 - Voltage level: 3 V
 - Communication: UART CH0

- FPL2
 - Parameter file: 78F9222.PRM
 - Clock setting: 8 MHz
 - Port: UART-ch0 (115,200 bps)
 - MODE switch: 3 V
 - Operation mode: Chip
 - Write HEX: FPL2_TEST.HEX
 - Option setting: Blank check before Erase
Checksum after Program

(1) Installing the GUI software

Install the FPL2 GUI software in the host machine you are using, by referring to **CHAPTER 3 SOFTWARE INSTALLATION** (if the software has not been installed yet).

(2) Installing the driver

Install the USB driver in the host machine you are using, by referring to **CHAPTER 3 SOFTWARE INSTALLATION** (if the driver has not been installed yet).

(3) Installing the parameter file

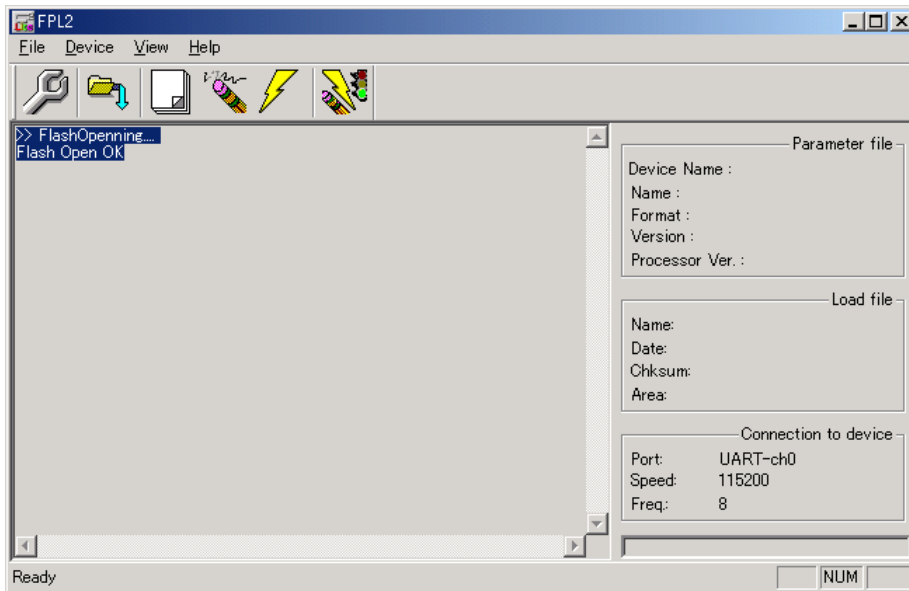
Copy the parameter file for the μ PD78F9222 to the hard disk and install it in *<FPL2-installation-path>*\PRM.
Download the parameter file from the following:

<http://www.necel.com/micro/ods/eng/index.html> (website in English)

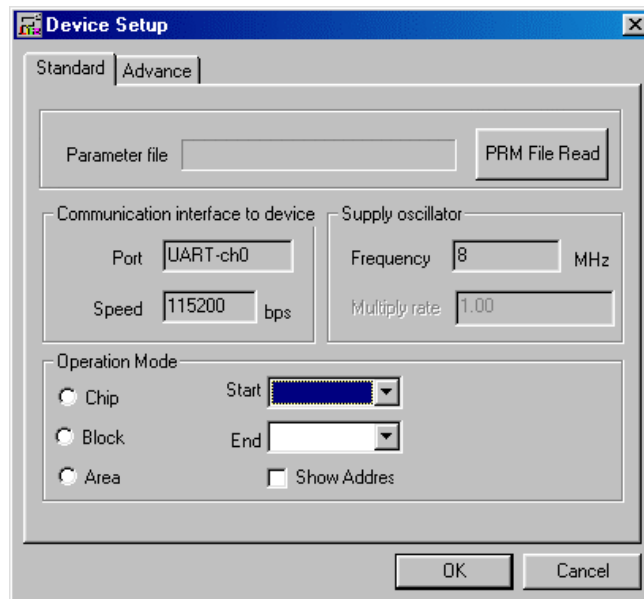
<http://www.necel.com/micro/ods/jpn/index.html> (website in Japanese)

(4) Connecting and starting the system

- <1> Set the MODE switch to "3 V".
- <2> Connect the FPL2 with the host machine via the USB cable.
- <3> Check that the Power LED is turned on.
- <4> Check that the power to the target system is not turned on, then connect the FPL2 with the target system via the target cable.
- <5> Start the GUI software.

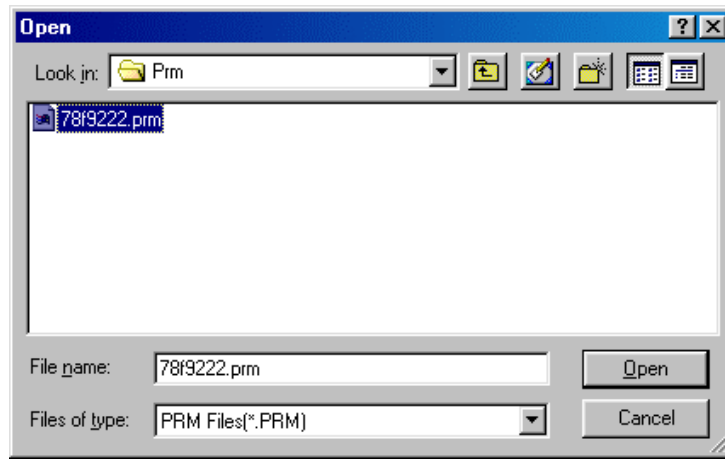
Figure 5-1. GUI Software Main Window**(5) Setting the programming environment**

- <1> Select [D]evice → [S]etup from the menu bar.
- <2> The Device Setup window for device setup is activated.

Figure 5-2. Device Setup Window – Standard Tab

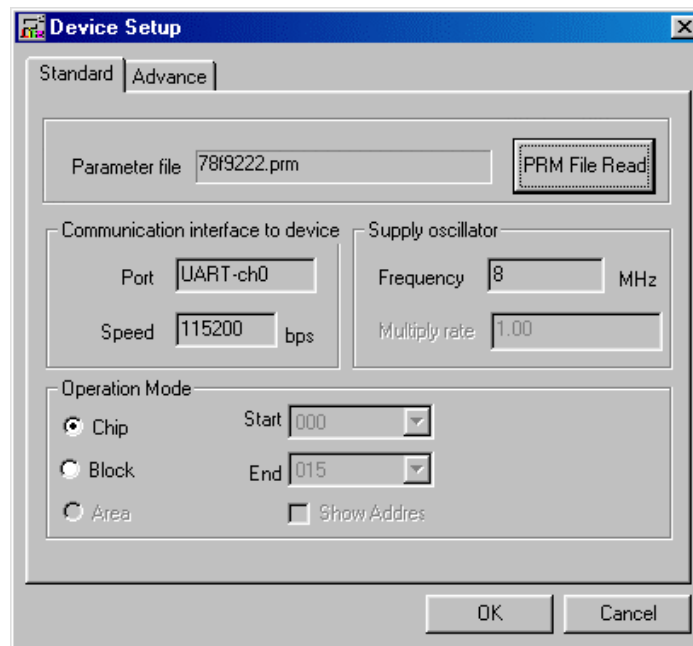
- <3> Click **PRM File Read** to open the parameter file selection window.
 In this case, select the parameter file for the μ PD78F9222 then click **Open**.

Figure 5-3. Parameter File Selection



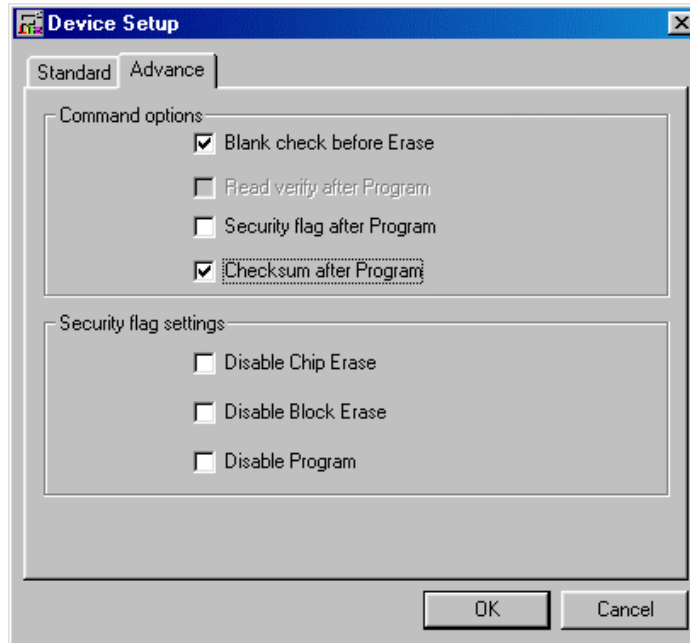
- <4> Set the items in the Operation Mode field so that the FPL2 is adjusted to the user programming environment.
 Here, assume that the settings shown below are set.

Figure 5-4. Device Setup Window – Standard Tab <After Setting>



<5> Switch to the Advance tab.

Figure 5-5. Device Setup Window – Advance Tab



<Command options>

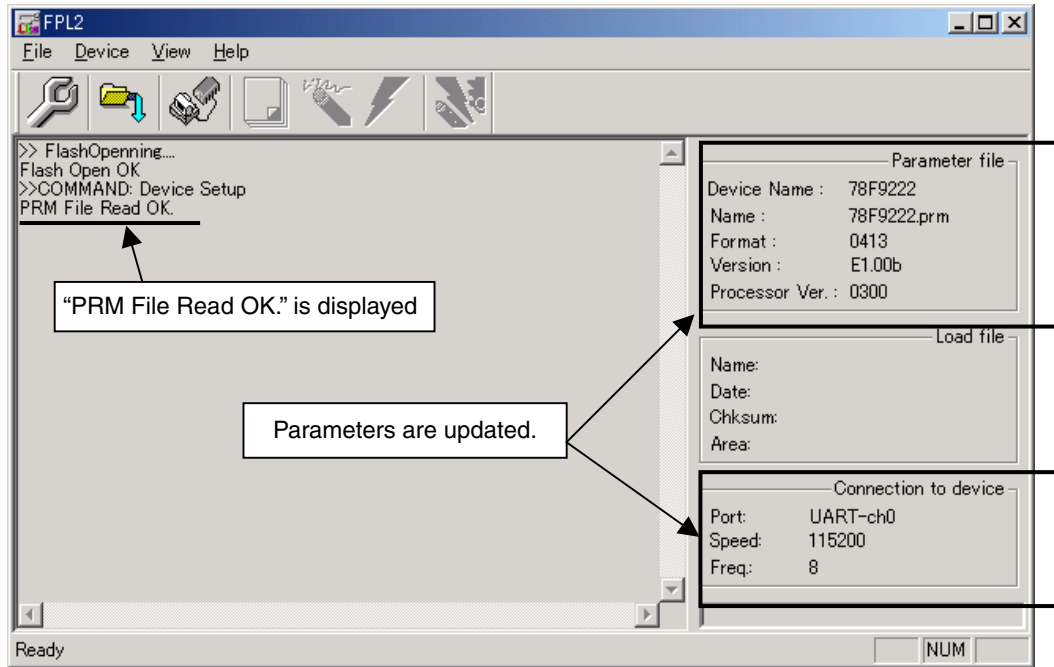
Blank check before Erase: Checked

Security flag after Program: Not checked

Checksum after Program: Checked

- <6> Click **OK**. The GUI software sets the parameters.
When the settings are completed, the following screen is displayed.

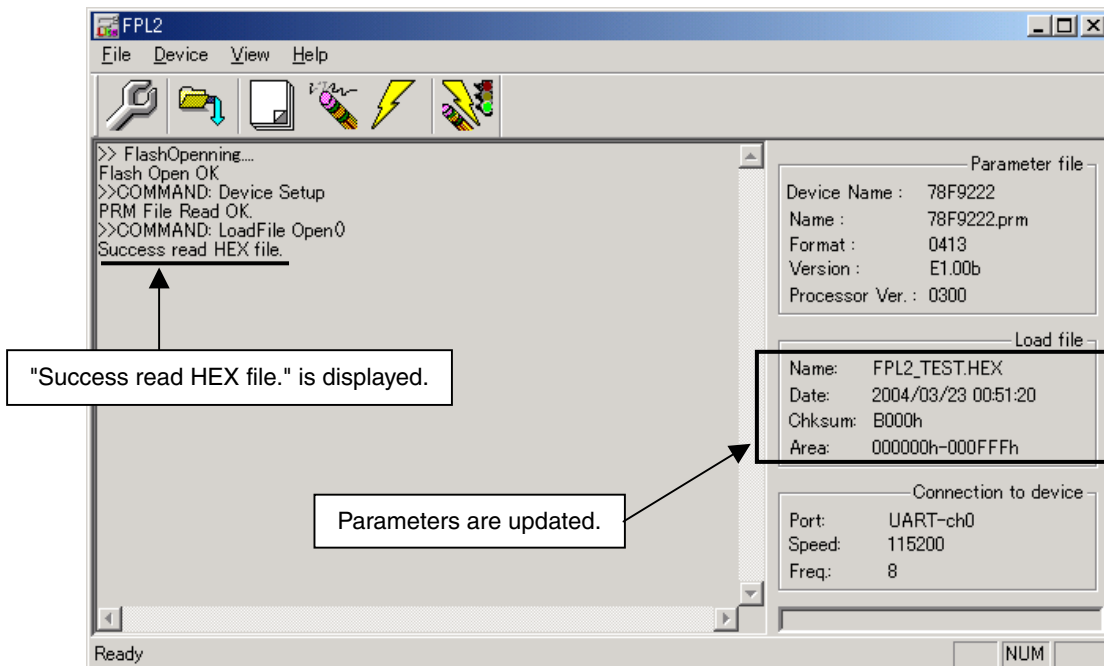
Figure 5-6. Completion of Parameter Setting



(6) Selecting a user program

- <1> Select [File] → [Load].
<2> Select a program file to be written to the target device, then click **Open**.

Figure 5-7. After Loading File

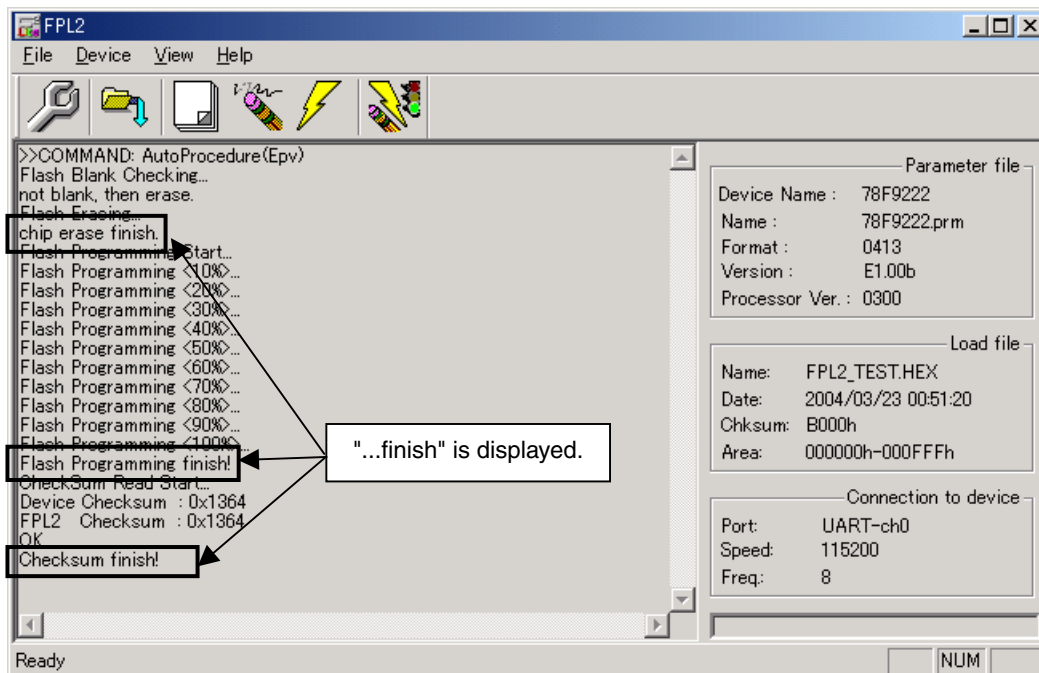


(7) [Autoprocedure (EPV)] command execution

Select [D]evice → [Autoprocedure (EPV)] from the menu bar.

When the [Autoprocedure (EPV)] command is executed, [E]rase → [P]rogram are executed sequentially for the μ PD78F9222. In this example, “Blank check before Erase” and “Checksum after Program” are checked. So, blank check is performed before the execution of the [Autoprocedure (EPV)] command, and checksum is performed after the execution of the [Autoprocedure (EPV)] command.

Figure 5-8. After EPV Execution

**(8) Terminating the system**

<1> If other devices need not be programmed, select [E]ile → [Q]uit to terminate the GUI software.

All settings executed so far are saved in the FPL2.INI file, so that those settings can be reused when the GUI software is restarted.

<2> Disconnect the target cable from the target system.

<3> Disconnect the USB cable from the FPL2.

(9) Restart

When the system is restarted, the same screen as shown in Figure 5-6 appears.

CHAPTER 6 CONNECTORS AND CABLES

6.1 USB Connector (FPL2)

Figure 6-1. Pin Layout of Power Supply Connector

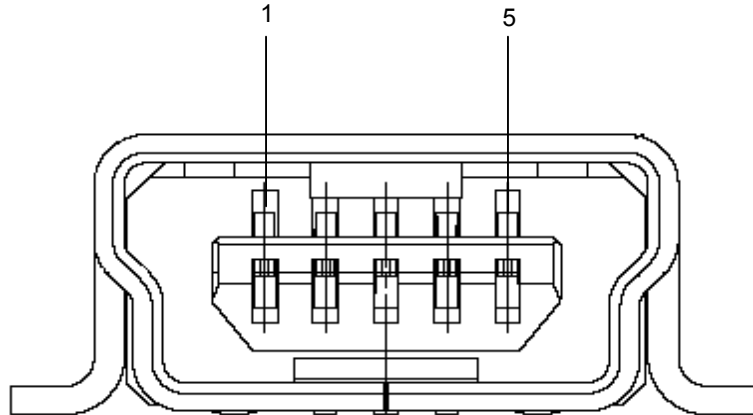
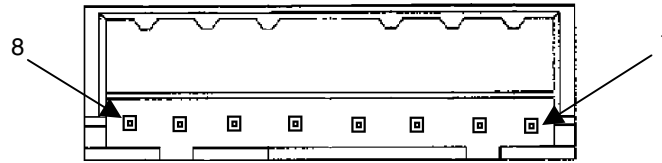


Table 6-1. Pin Assignment of USB Connector

USB Connector	FPL2 Signal Name
1	5 V
2	DM
3	DP
4	N.C.
5	GND

Connector part number: UX60A-MB-5ST (made by Hirose Electric)

Caution The recommended USB cable (Mini-B type) for connection with the host machine is the USB cable included with the QB-78K0SKX1MINI.

6.2 Target Cable Connector (FPL2)**Figure 6-2. Pin Layout of Target Connector****Table 6-2. Pin Assignment of Target Cable Connector**

Target Connector	FPL2 Signal Name
1	GND
2	$\overline{\text{RESET}}$
3	V _{DD}
4	GND
5	DGCLK
6	GND
7	DGDATA
8	GND

Connector part number: DF3A-8P-2DSA (made by Hirose Electric)

6.3 Target Cable Specifications

Figure 6-3. External View of Target Cable



Table 6-3. Pin Assignment of Target Cable

Cable Specification			Display Specification
No. 1	Black	GND	0. GND
No. 2	Brown	$\overline{\text{RESET}}$	1. $\overline{\text{RESET}}$
No. 3	Red	V _{DD}	2. V _{DD}
No. 5	Yellow	DGCLK	3. DGCLK
No. 7	Blue	DGDATA	4. DGDTA

Supported header pin specification: 0.635 × 0.635 mm (length: 6 mm)

Remark The recommended header pin that can be used with the target cable is FFC-5AMEP1 (made by Honda Tsushin Kogyo).

6.4 Target Connector (FPL2-FA)

Figure 6-4. External View of Target Connector

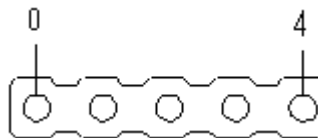


Table 6-4. Pin Assignment of Target Connector

Target Connector	FPL2-FA Signal Name
0	GND
1	$\overline{\text{RESET}}$
2	V _{DD}
3	DGCLK
4	DGDATA

Connector part number: FFC-5AMEP1 (made by Honda Tsushin Kogyo)

6.5 FP4 Connector (FPL2-FA)

Figure 6-5. External View of FP4 Connector

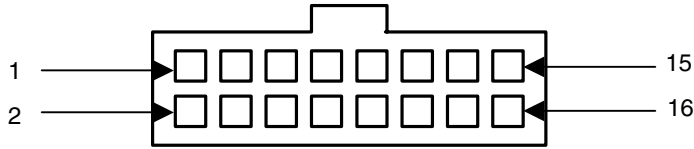


Table 6-5. Pin Assignment of FP4 Connector

FP4 Connector	FPL2-FA Signal Name (Inside Parentheses: FP4 Signal Name)
1	GND
2	$\overline{\text{RESET}}$
3	DGDATA (RXD)
4	V_{DD}
5	DGDATA (TXD)
9	DGCLK (CLKOUT)
14	DGCLK (FLMD0)
6, 7, 8, 10, 11, 12, 13, 15, 16	N.C.

Connector part number: 8516-4500SC (made by Sumitomo 3M)

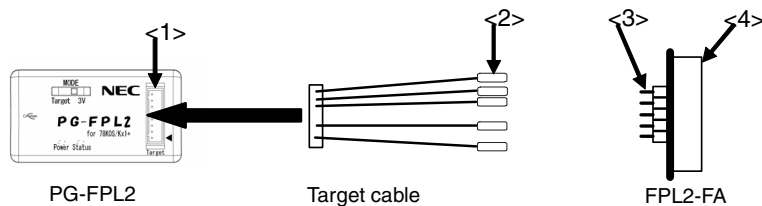
Remark The recommended receptacle connect that can be used with the FP4 connector is 8516-4500SC (made by Sumitomo 3M).

6.6 List of Interface Connections

Table 6-6. List of Interface Connections

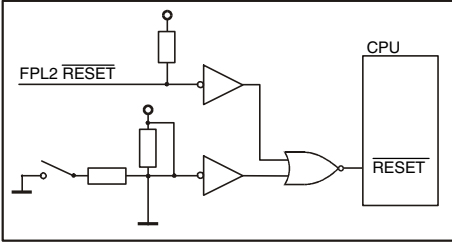
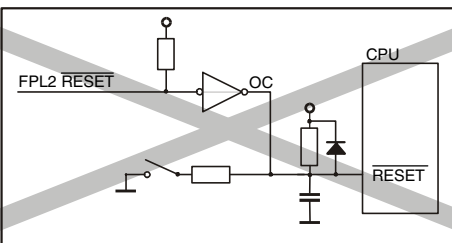
Signal Name	<1> Target Cable Connector	<2> Tip of Target Cable	<3> Target Connector	<4> FP4 Connector
GND	1, 4, 6, 8	0. GND	0	1
RESET	2	1. RESET	1	2
V _{DD}	3	2. V _{DD}	2	4
DGCLK	5	3. DGCLK	3	9, 14
DGDATA	7	4. DGDATA	4	3, 5

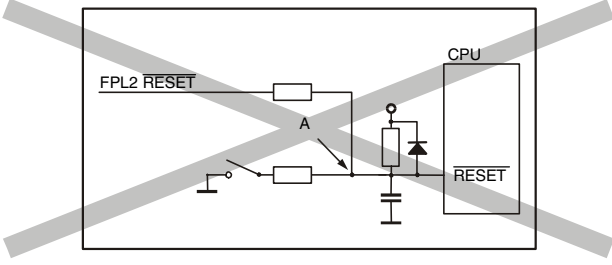
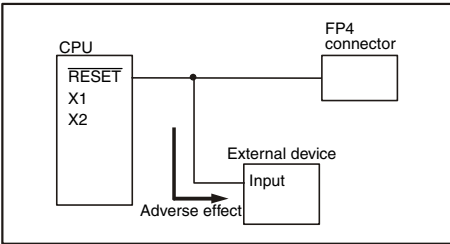
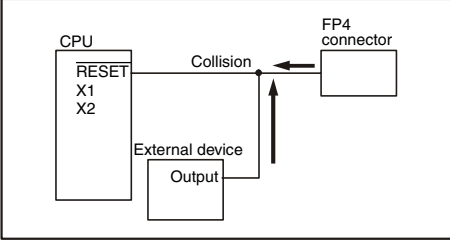
Figure 6-6. Target Interface



CHAPTER 7 NOTES ON TARGET SYSTEMS

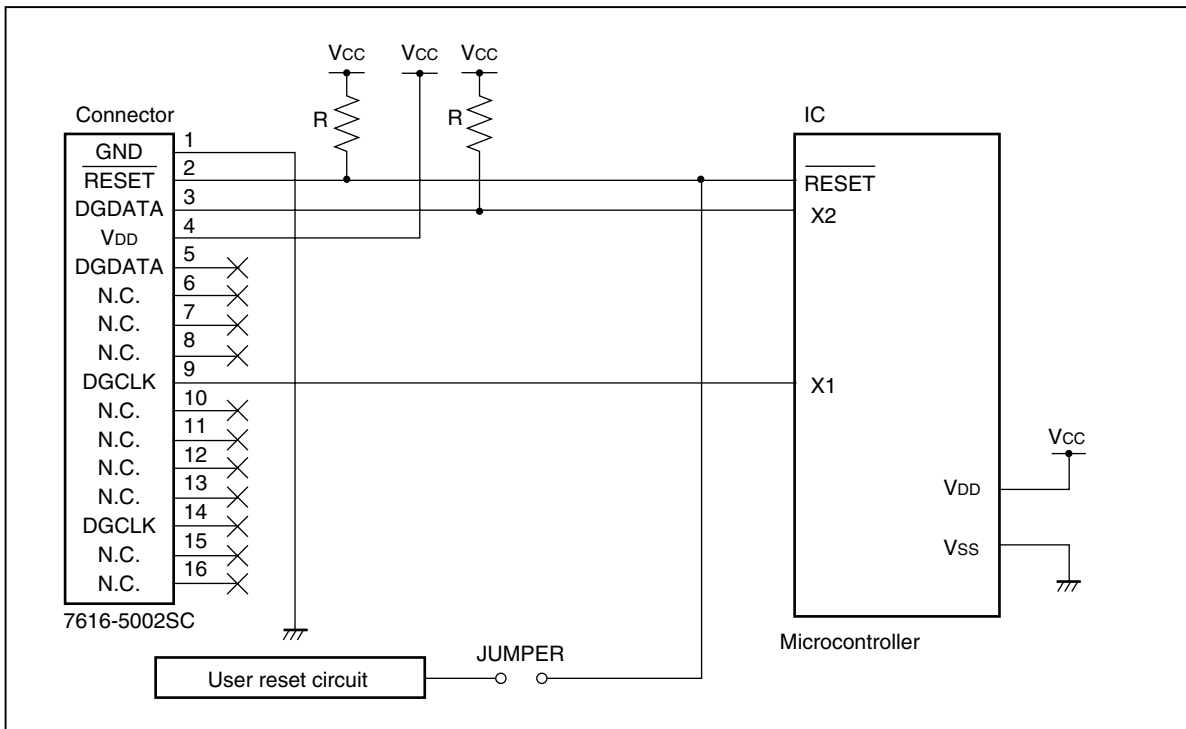
This chapter explains the basic notes on the target system for rewriting the flash memory in the microcontroller using the FPL2.

CPU Pin	Design Proposal
<p>$\overline{\text{RESET}}$</p>	<p>Do not connect the $\overline{\text{RESET}}$ signal generator on the target system to the $\overline{\text{RESET}}$ signal of the FPL2. Otherwise, a signal conflict will occur. To avoid the conflict, isolate the $\overline{\text{RESET}}$ signal generator from the $\overline{\text{RESET}}$ signal of the FPL2.</p> <p>Do not generate $\overline{\text{RESET}}$ while the FPL2 is connected. This must be especially noted in a system that uses an external watchdog timer.</p> <p>Connect the $\overline{\text{RESET}}$ signal of the FPL2 at a point where the status of the programmer $\overline{\text{RESET}}$ signal and that of the CPU $\overline{\text{RESET}}$ pin are the same.</p> <p>Correct connection:</p>  <p>Avoid the following $\overline{\text{RESET}}$ signal connection.</p> <ul style="list-style-type: none"> • Connection to a point where the target CPU $\overline{\text{RESET}}$ rise time is slower than the FPL2 $\overline{\text{RESET}}$ rise time. <p>Incorrect connection:</p>  <p>It takes time for the CPU $\overline{\text{RESET}}$ pin to go high after the FPL2 $\overline{\text{RESET}}$ level goes from low to high.</p>

CPU Pin	Design Proposal
<p>$\overline{\text{RESET}}$</p>	<ul style="list-style-type: none"> • Connection to a point where the target CPU $\overline{\text{RESET}}$ pin cannot be driven to low level by the FPL2 $\overline{\text{RESET}}$ signal. <p>Incorrect connection:</p>  <p>When the FPL2 $\overline{\text{RESET}}$ is driven low, the level of the voltage at point A does not fall.</p>
<p>Serial interface pin</p>	<p>When the CPU port used by the FPL2 is also connected to the input of an external device, and if that device malfunctions, disconnect the external device or make it output high impedance.</p> <p>Example:</p>  <p>While the CPU port used by the FPL2 is also connected to the output of an external device, and if a signal collision occurs, disconnect the external device.</p> <p>Example:</p> 
<p>Other</p>	<p>For the unused pins, refer to the user's manual of the device.</p>

The following show examples of the interface circuits of UART (asynchronous communication port). Refer to the above design proposal for the pin processing of the device to be used.

Figure 7-1. UART Interface Circuit Example



Cautions 1. The FPL2 generally performs normally without pin connection.

2. If the signals (X1, X2, $\overline{\text{RESET}}$) used by the FPL2 are connected, pull up (or pull down), referring to CHAPTER 8 CIRCUIT DIAGRAMS.
3. Isolate the oscillator.
4. Pin 3 and pin 5 (DGDATA) are functionally equivalent. Pin 9 and pin 14 (DGCLK) are functionally equivalent. Connect the respective pins.

CHAPTER 8 CIRCUIT DIAGRAMS

Figure 8-1. Circuit Diagram of FPL2-FA Main Unit

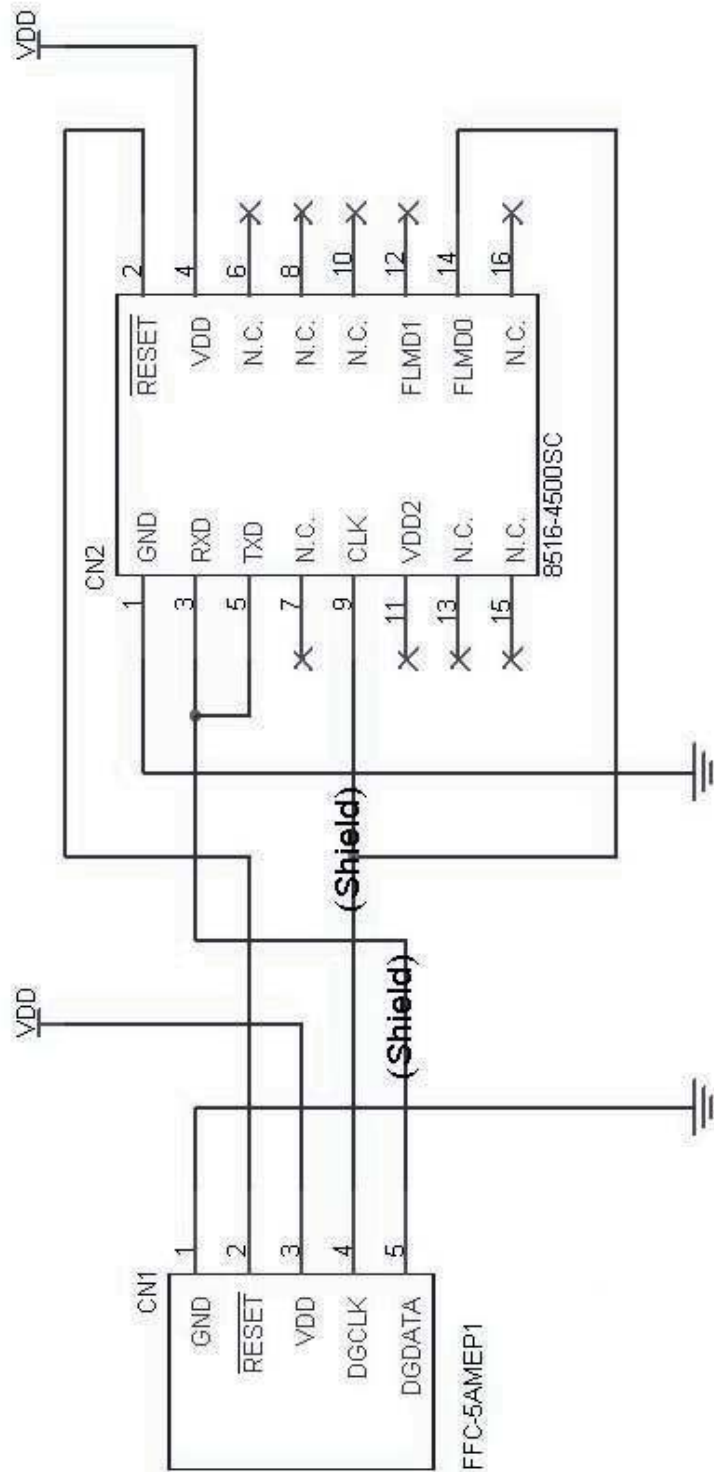
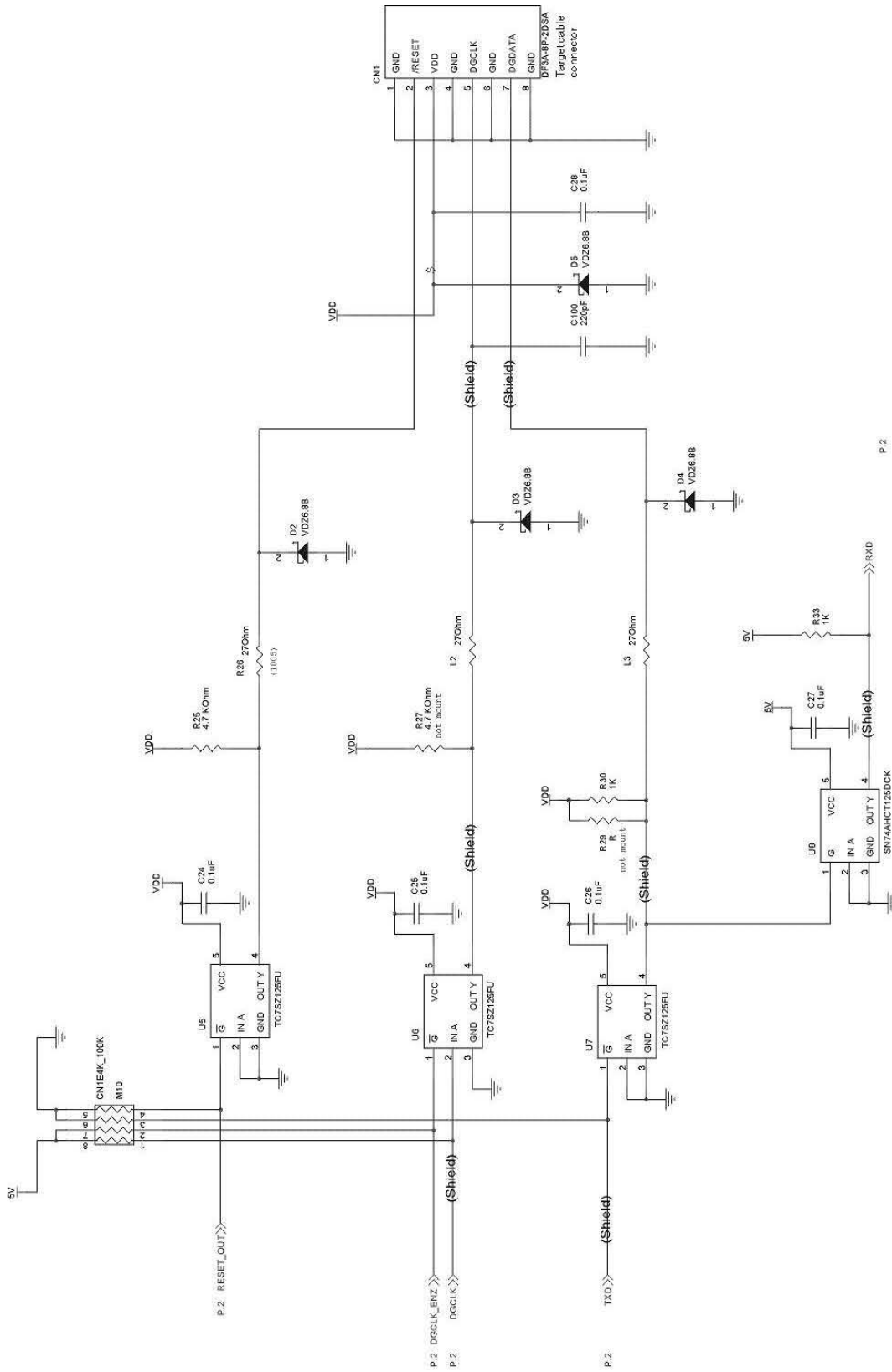


Figure 8-2. Target Interface Block



CHAPTER 9 TROUBLESHOOTING

9.1 Trouble During Setup

- (1) When installing the driver, the driver is not recognized by Plug and Play.

Cause:

The USB connector may not be inserted normally into the USB port of the personal computer.

Action:

Check that the USB connector is inserted fully into the USB port of the personal computer.

Alternatively, disconnect the USB connector, then insert the USB connector again after a while.

- (2) The driver file cannot be found at a specified location.

Cause:

The GUI software of the FPL2 may not be installed correctly.

Action:

Install the GUI software again by referring to **3.1 GUI Software Installation**.

- (3) "NEC Electronics IE-PC Interface [PG-FPL2]" is not displayed in the Device Manager. Alternatively, the "!" or "x" is prefixed.

Cause:

The USB connector may not be inserted normally into the USB port of the personal computer.

Action:

Check that the USB connector is inserted fully into the USB port of the personal computer.

Alternatively, disconnect the USB connector, then insert the USB connector again after a while.

Cause:

The driver may not be installed correctly.

Action:

- <1> Right-click the driver marked with "!" or "x" when the FPL2 is connected to the personal computer and select **Remove** in the right-click menu.
- <2> Execute [Hardware Modification Scan] in the Device Manager.
- <3> Install the driver again with Plug and Play.

Cause:

The device may not be recognized (in the case of connection with the USB hub).

Action:

Try the following:

- Disconnect the USB connector, then insert the USB connector again.
- Connect the USB connector to another port of the USB hub.

If the same symptom occurs, do not use the USB hub, but directly connect the connector to the USB port of the personal computer.

9.2 Trouble During Operation (Main Unit)

- (1) When the FPL2 is connected to the personal computer but the Power LED is not turned on.

Cause:

The FPL2 or the USB port of the personal computer may be damaged.

Action:

Try a connection to another personal computer.

- (2) The "Add New Hardware Wizard" screen is displayed when the FPL2 is connected with a personal computer.

Cause:

If the USB connector of the FPL2 is not inserted into the USB port during installation but into another USB port, the FPL2 may be recognized as a new hardware item.

Action:

Install the driver by referring to **3.2 Driver Installation**.

9.3 Trouble During Operation (Communication)

- (1) Communication with the target device is not possible.

Cause:

The driver may not be installed correctly.

Action:

Check if "NEC Electronics IE-PC Interface [PG-FPL2]" is installed correctly by referring to **3.2 Driver Installation**.

Cause:

There may be an incorrect connection between the target cable and target system.

Action:

Check if the connection is correct.

Pay special attention to the following connections because the connections are confusing:

Connect DGCLK of the target cable to X1 of target device

Connect DGDATA of the target cable to X2 of target device

Cause:

The power may not be supplied to the target device correctly.

Action:

<1> Check that the power is supplied in the target system.

<2> If the power is supplied from the FPL2, check if the setting of the MODE switch is correct.

Cause:

The PRM file selected in the Device Setup window may be incorrect.

Action:

Use a PRM file that matches the target device.

Refer to **CHAPTER 4 OPERATION USING GUI SOFTWARE** for information about PRM files.

Remark A parameter file (.prc) for FlashPro3 is unusable.

Cause:

The power supply capacity of the USB port of the personal computer may be low (when the MODE switch is set to 3 V).

Action:

Try using another personal computer or supply power from the target system by setting the MODE switch to Target.

Cause:

Security may be set.

Action:

Check that security is not set.

- (2) The Status LED does not blink during erase operation.

In accordance with the specifications of the FPL2, the Status LED may not blink during erase operation. To confirm the erasure status, check the following message in the action log window of the GUI software:

Message during erase operation: "Flash Erasing..."

Message for completion of erasure: "chip erase finish." or "all block erase finish."

Cause:

The power supply capacity of the USB port of the personal computer may be low (when the MODE switch is set to 3 V).

Action:

Try using another personal computer or supply power from the target system by setting the MODE switch to Target.

APPENDIX A PRODUCT SPECIFICATIONS

A.1 Hardware Specifications

Table A-1. Specifications of the Main Unit

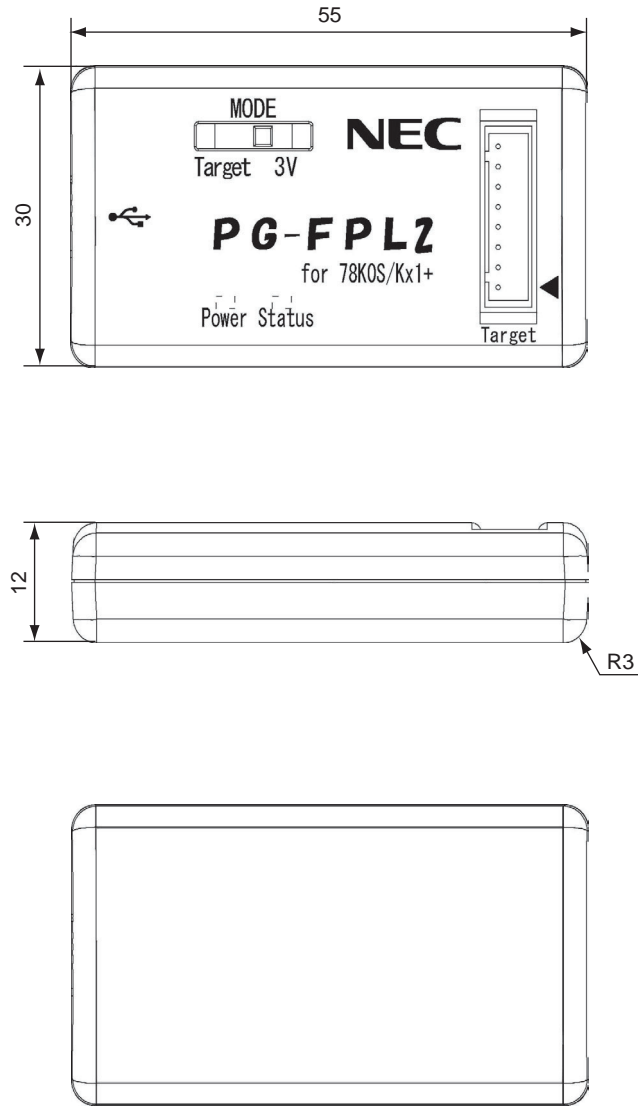
	MIN.	TYP.	MAX.
Operating supply voltage (V _{DD_USB})	4.4 V	5.0 V	5.25 V
Supply current (V _{DD_USB})	–	–	500 mA
Current consumption of the main unit	–	175 mA	–
3 V output ^{Note}	2.9 V	3.1 V	3.4 V
Target V _{DD} voltage	2.7 V	–	5.5 V
V _{DD} output current	–	–	200 mA

Note The 3 V output of the FPL2 depends on the USB port of the host machine. If the supply power of the USB port is unstable or does not satisfy the specifications of the target device, set the MODE switch to Target to use the power supplied from the target system.

A.2 Dimensions

(1) FPL2

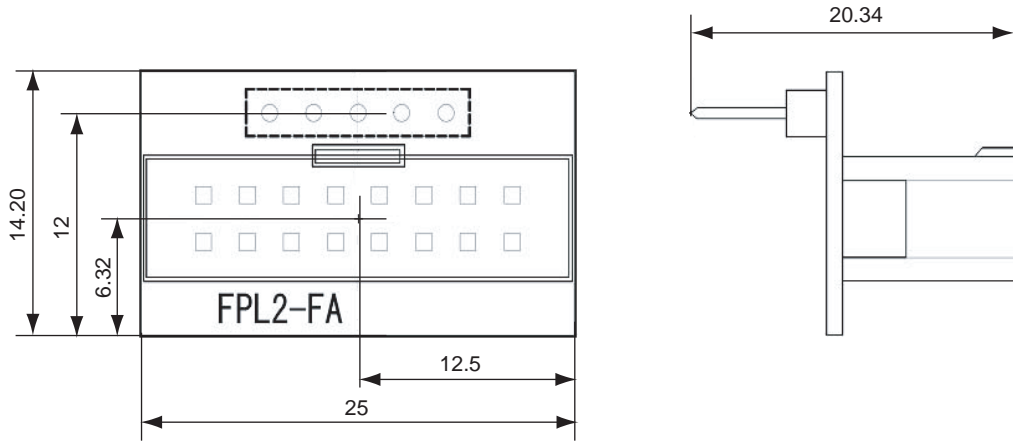
Figure A-1. Dimensions of FPL2 Main Unit



Unit: mm

(2) FPL2-FA

Figure A-2. Dimensions of FPL2-FA Main Unit



Unit: mm

(3) Target cable

Figure A-3. Dimensions of Target Cable

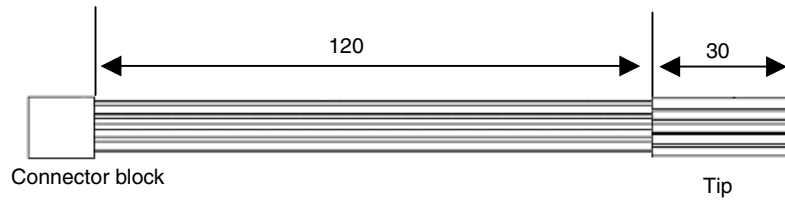
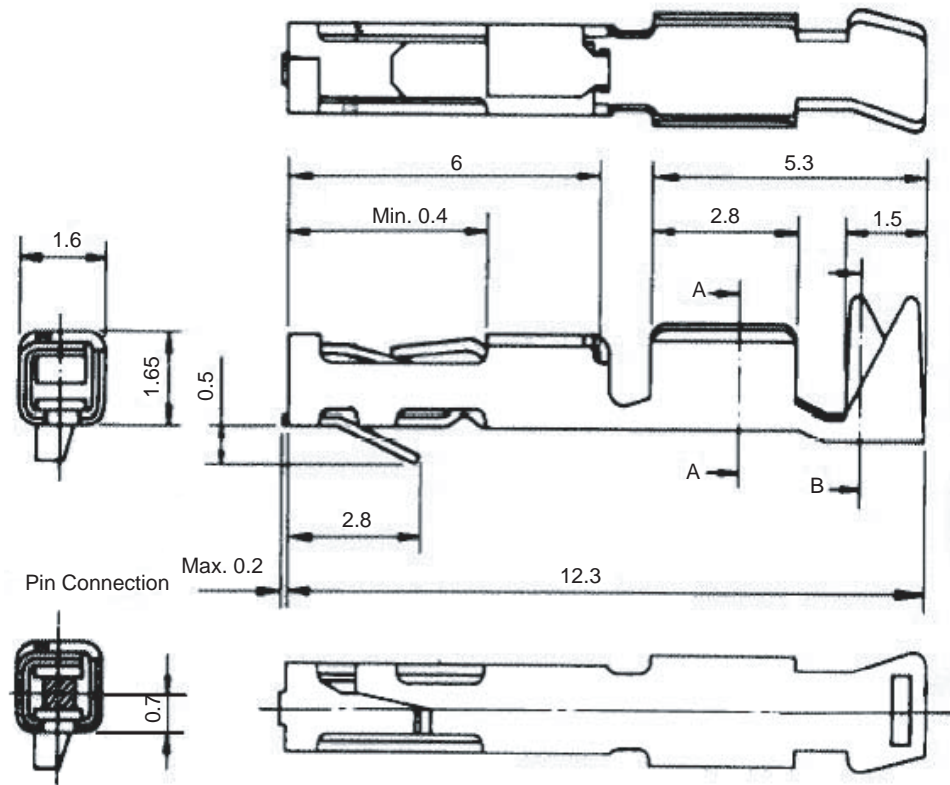


Figure A-4. Dimensions of Tip of Target Cable



Unit: mm

Connector part number: PS-SF-C2-1 (manufactured by JAE)

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APPENDIX B WARRANTY AND SUPPORT

B.1 Warranty

This product (including hardware and software) is replaced free of charge in the case of an initial failure only. No warranty is provided for failures other than initial failures.

B.2 Support

No support is provided for this product.

Visit the following site to obtain the latest information about this product:

Site: <http://www.necel.com/micro/ods/eng>

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APPENDIX C REVISION HISTORY

The revision history is shown below. Applicable Chapter refers to the chapter in each version.

Version	Revised Points	Applicable Chapter
Second	Addition of APPENDIX B WARRANTY AND SUPPORT	APPENDIX B WARRANTY AND SUPPORT