

# **S1R72U06**

# **Development Support Manual**

## NOTICE

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## **Scope**

This document applies to the S1R72U06 serial (UART/SPI) – USB Host/Device bridge LSI, which supports USB 2.0 FS/LS.

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### 1. Overview

This document is the Development Support Manual for the S1R72U06 serial (UART/SPI) – USB Host/Device bridge LSI, which supports USB 2.0 FS/LS (hereinafter referred to as the “LSI”). This document describes various technical aspects pertaining to functions and data.

This document uses the terminology defined in “Terminology” in the *S1R72U06 Technical Manual*.

The LSI includes the following two functions to support development of a system (i.e., a product incorporating the S1R72U06):

- History Display Function
- USB Analog Test Function

The LSI includes functions that allow users to download the data required for USB Host/Device operations to the LSI. Some support tools for creating download data are provided.

The USB Host for the LSI includes an NSF (No Silent Failures) function that meets USB standard.



## 2. History Display Function

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### 2. History Display Function

The LSI retains a history of SIO and USB states that can be viewed using Terminal Software via a RS-232 connection.

The history displays past information in chronological sequence, enabling review of operations leading to the current state.

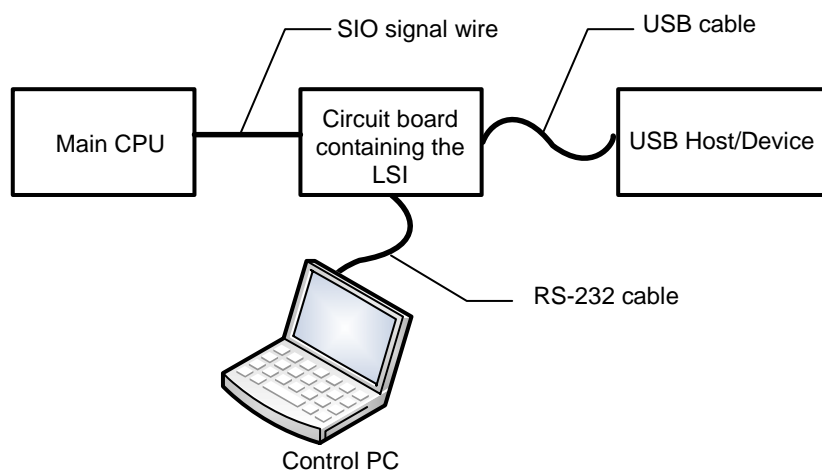
Up to 64 history information items can be displayed.

#### 2.1 Operational Setup

This section describes setup before using the History Display Function.

##### 2.1.1 Hardware configuration

Figure 2.1 illustrates a typical hardware configuration using this function.



**Figure 2.1 Hardware configuration**

- **Circuit board containing the LSI**  
The circuit board on which the LSI is mounted; controlled by the control PC.
- **Main CPU**  
The source from which commands (EI requests) are issued to operate the LSI.
- **USB Host/Device**  
Connected for SIO-USB bridge operations using the LSI.
- **Control PC**  
The PC used for controlling this function. It operates using Terminal Software via an RS-232 connection.  
For more information on RS-232 settings, refer to “2.1.2 RS-232 settings” or “2.1.3 HyperTerminal settings”.

### 2.1.2 RS-232 settings

Set the control PC RS-232 settings as shown in Table 2.1.

If using HyperTerminal, refer to “2.1.3 HyperTerminal settings”.

**Table 2.1 RS-232/Terminal Software settings**

Parameter	Setting
Baud rate (bps)	38400
Data bits	8
Parity	None
Stop bits	1
Flow control	None
Encoding format	Shift-JIS
Local echo	On

### 2.1.3 HyperTerminal settings

The RS-232 connection can be set by HyperTerminal if the control PC runs a Windows (Windows XP, Windows 2000) operating system.

The procedure for setting the RS-232 connection using HyperTerminal is described below.

Step 1: Launch

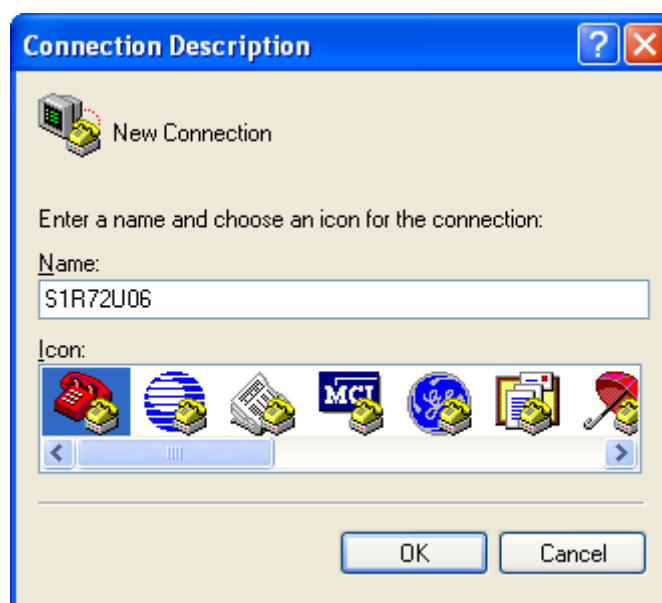
Launch HyperTerminal by selecting **Start** → **Programs** → **Accessories** → **Communications** → **HyperTerminal**.

Step 2: Setting the connection name

Enter the desired name for the connection in **Name**.

Select the desired icon.

Click **OK**.



**Figure 2.2 Setting the connection name**

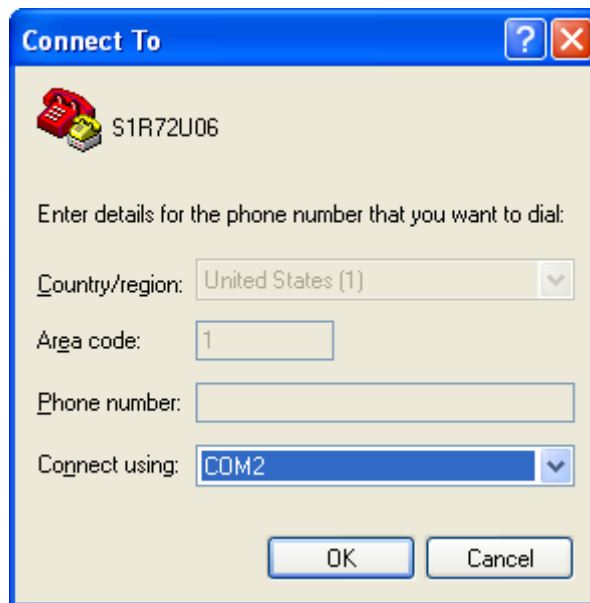
## 2. History Display Function

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Step 3: Checking and selecting the Communications Port

Select the available port in **Connect using**. For more information on checking ports, refer to “Port checking” below.

Click **OK**.



**Figure 2.3** Selecting the Communications Port

- Port checking

The available ports can be checked using **Ports (COM & LPT)** in **Device Manager**.

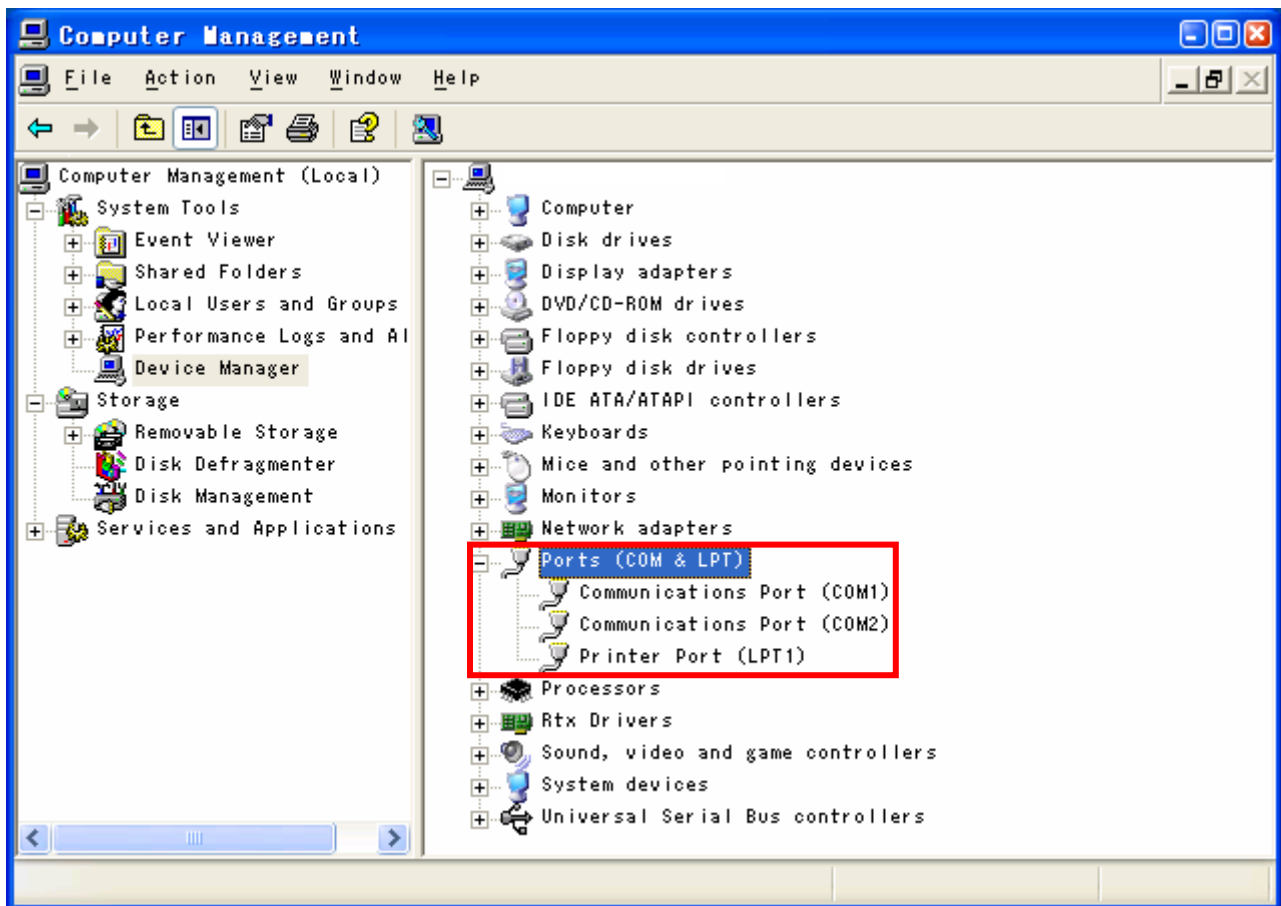


Figure 2.4 Port checking

## 2. History Display Function

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Step 4: Port setting

Set the **Port Settings** items as shown in Figure 2.5. (Refer to “2.1.2 RS-232 settings”.)

Click **OK**.

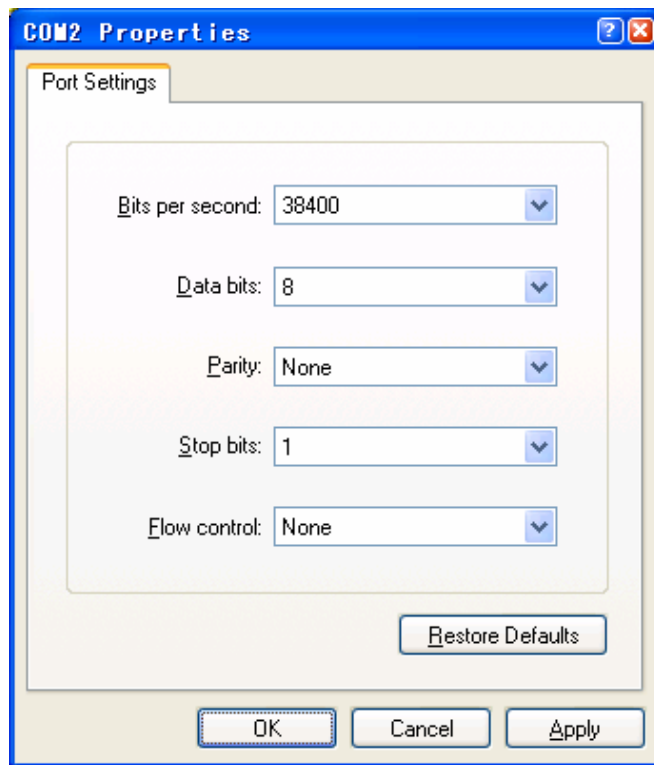


Figure 2.5 Port setting

Step 5: Disconnection

The HyperTerminal connection must be disconnected before changing the encoding format settings, ASCII settings, or settings shown in Step 4 again.

Click the **Disconnect** icon shown in Figure 2.6.

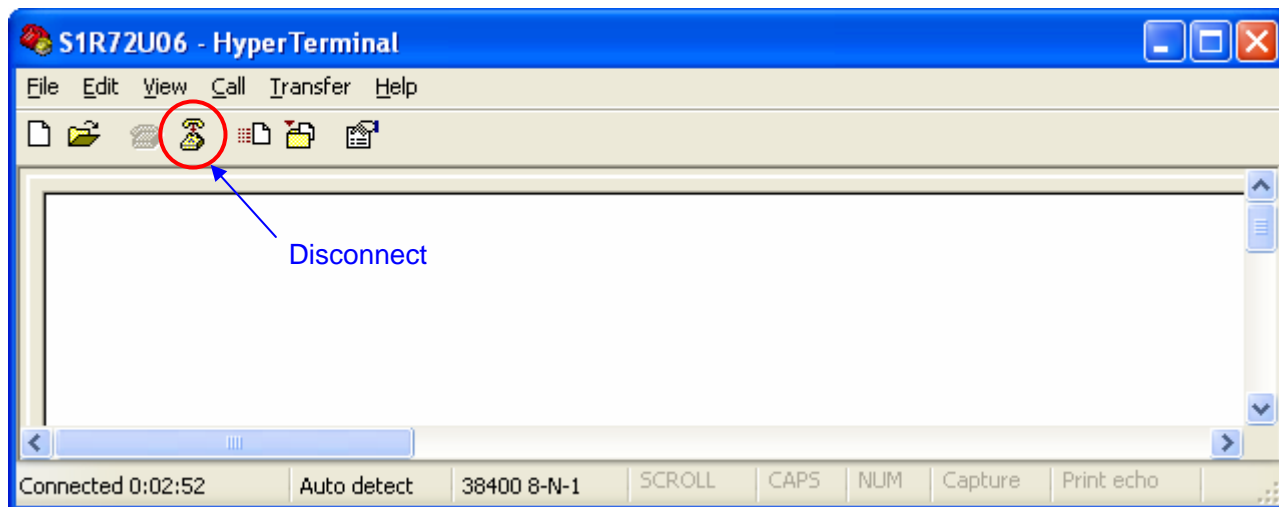


Figure 2.6 Main screen (Disconnection)

Step 6: Encoding method setting

Select **File** → **Properties** → **Settings** in Figure 2.6 and set as shown in Figure 2.7.

Click **Input Translation...**, check **Shift-JIS** as shown in Figure 2.8, and click **OK**.

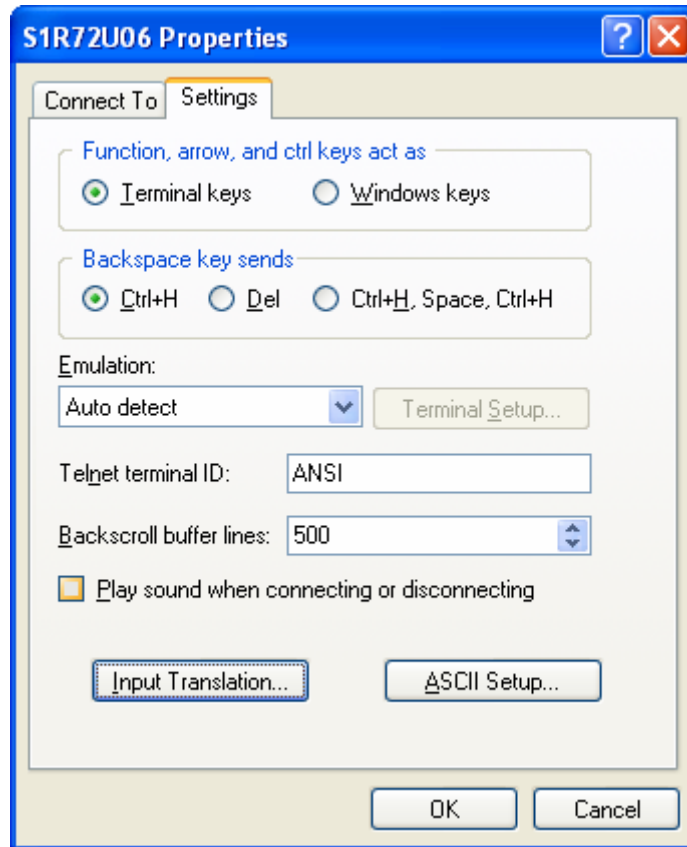


Figure 2.7 Properties

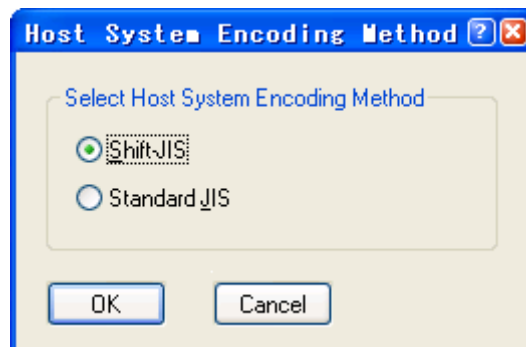


Figure 2.8 Encoding method setting

## 2. History Display Function

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Step 7: ASCII setting

Click **ASCII Setup** in the Properties screen shown in Figure 2.7, set as shown in Figure 2.9.

Click **OK**.

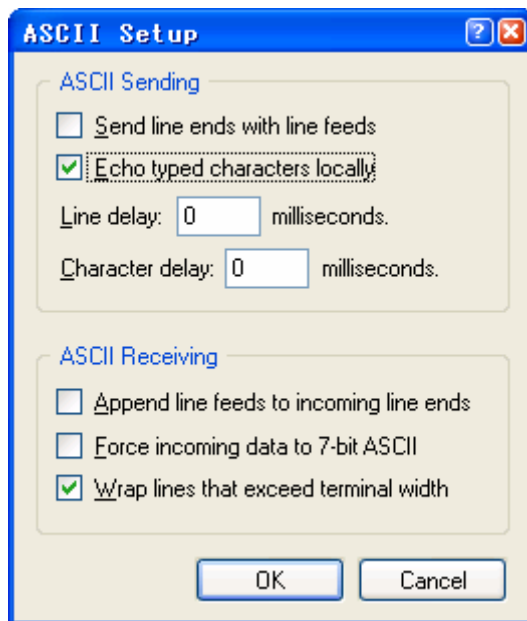


Figure 2.9 ASCII setting

Step 8: Connection

Select **File** → **Save** to save the settings. Once saved, these settings can be reloaded later.

Click the **Call** icon shown in Figure 2.10 to start the connection and use the History Display Function.

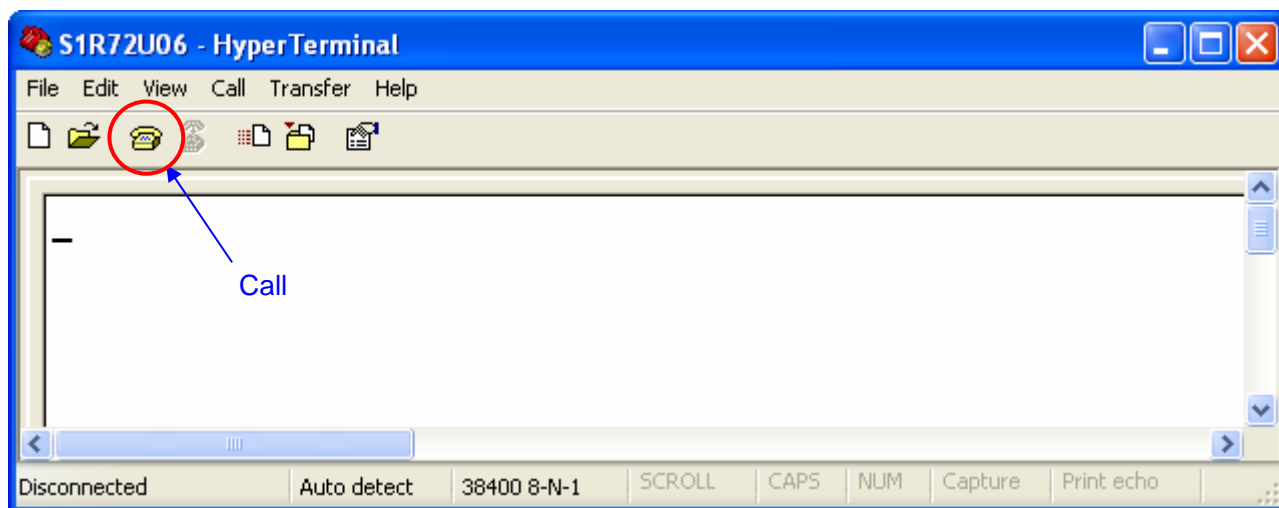


Figure 2.10 Main screen (Connection)

2.2 Usage Instructions

This section describes how to use the History Display Function.

2.2.1 Procedure

This function can be operated as shown in the procedures in Figure 2.11.

For more information on key input procedures, refer to “2.2.3 Key input specifications”.

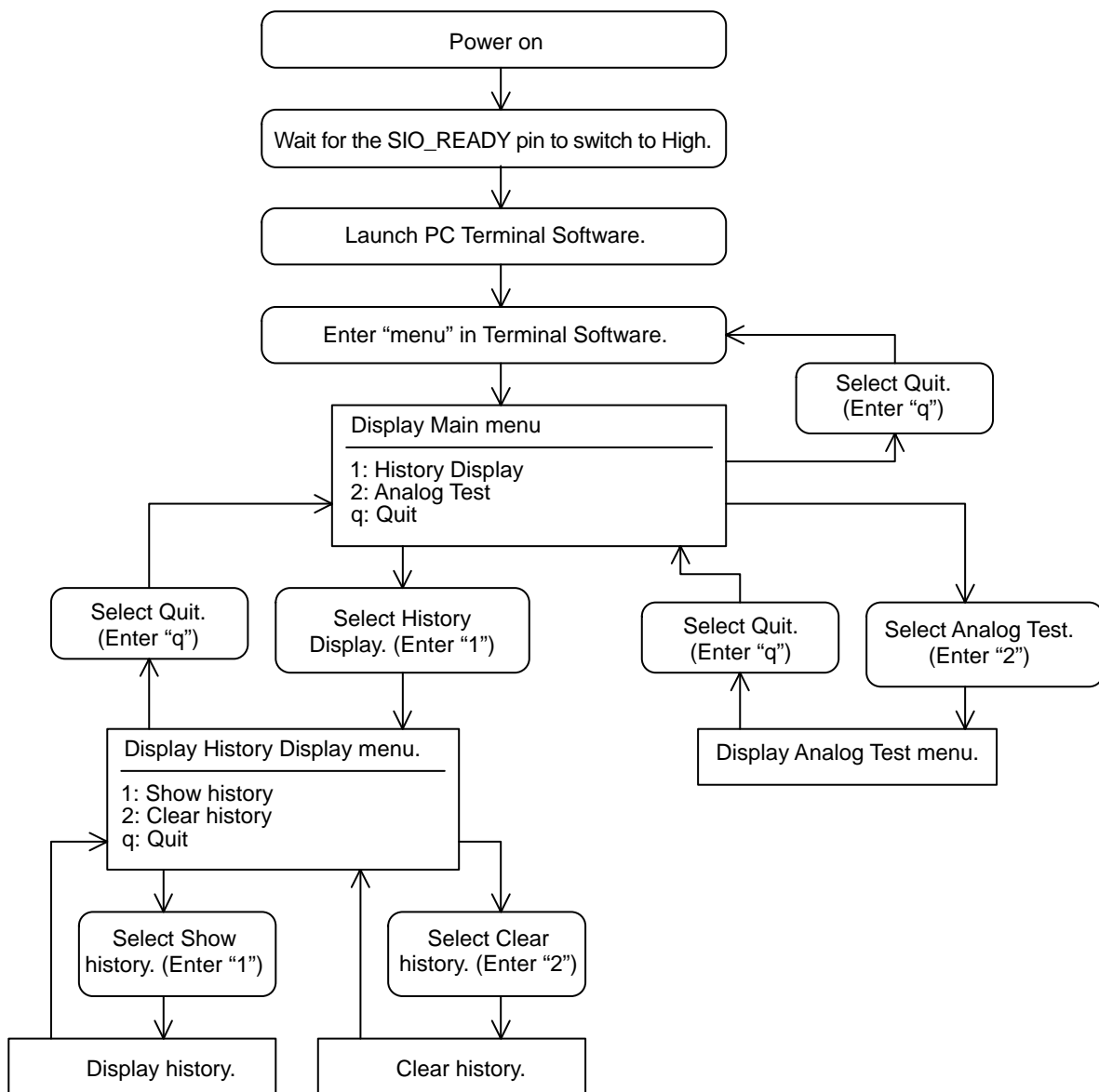


Figure 2.11 Procedures



## 2. History Display Function

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### 2.2.2 Precautions

1. Before using this function, check that the SIO\_READY pin is at High after power has been turned on for the LSI. If the SIO\_READY pin has not been switched to High, the power supply or clock source may fail to meet the electrical characteristics given in the *S1R72U06 Data Sheet*.
2. This function cannot be used if the LSI switches to Sleep state while the function is in use. For more information on recovering from Sleep state, refer to the *S1R72U06 Technical Manual*.

### 2.2.3 Key input specifications

The key input specifications on the Terminal Software screen are as follows:

1. Use the Enter key to enter text input.
2. Only single-byte alphanumeric input is accepted. Double-byte (Japanese) input is not accepted.
3. Text input is not case-sensitive.

The following error message will appear if the text input is incorrect.

[It is an input value error. Try to input it.]

Refer to “2.2.1 Procedure” or the corresponding menu item and enter the correct text.

### 2.2.4 Main menu

Enter **“menu”** on the Terminal Software screen and press the Enter key to display the Main menu, as shown in Figure 2.12.

If text cannot be entered on the screen, review the operational setup. For more information, refer to “2.1 Operational Setup”.

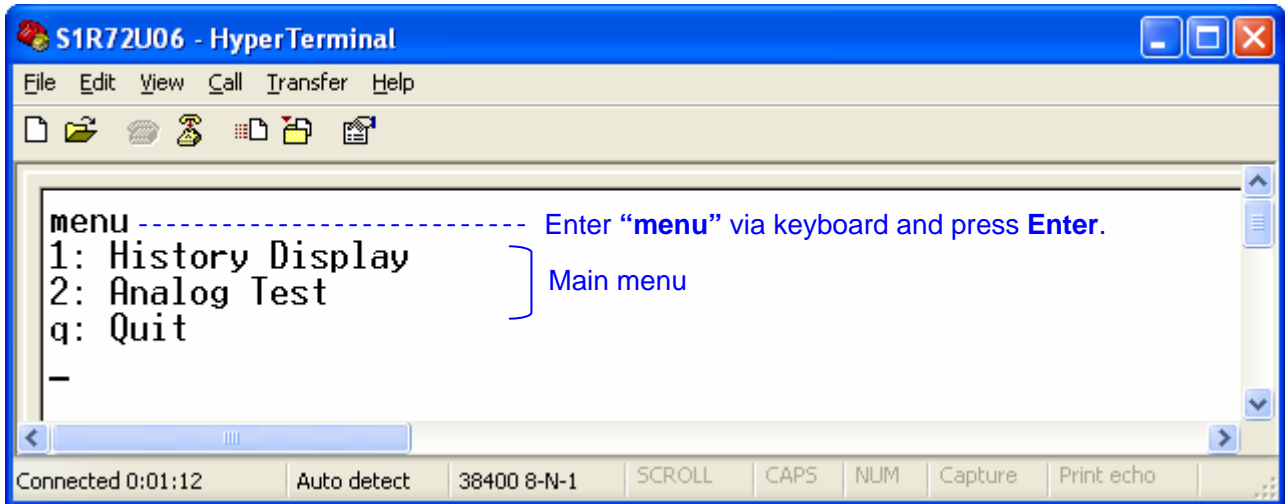


Figure 2.12 Main menu

- History Display  
Starts the History Display Function.  
For more information, refer to “2.2.5 History Display menu”.
- Analog Test  
For more information, refer to “2.2.6 Analog Test menu”.
- Quit  
Enter **“q”** and press the Enter key to quit the Main menu.  
To display the Main menu again, enter **“menu”** and press the Enter key.

## 2. History Display Function

### 2.2.5 History Display menu

Enter “1” in the Main menu and press the Enter key to display the menu as shown in Figure 2.13.

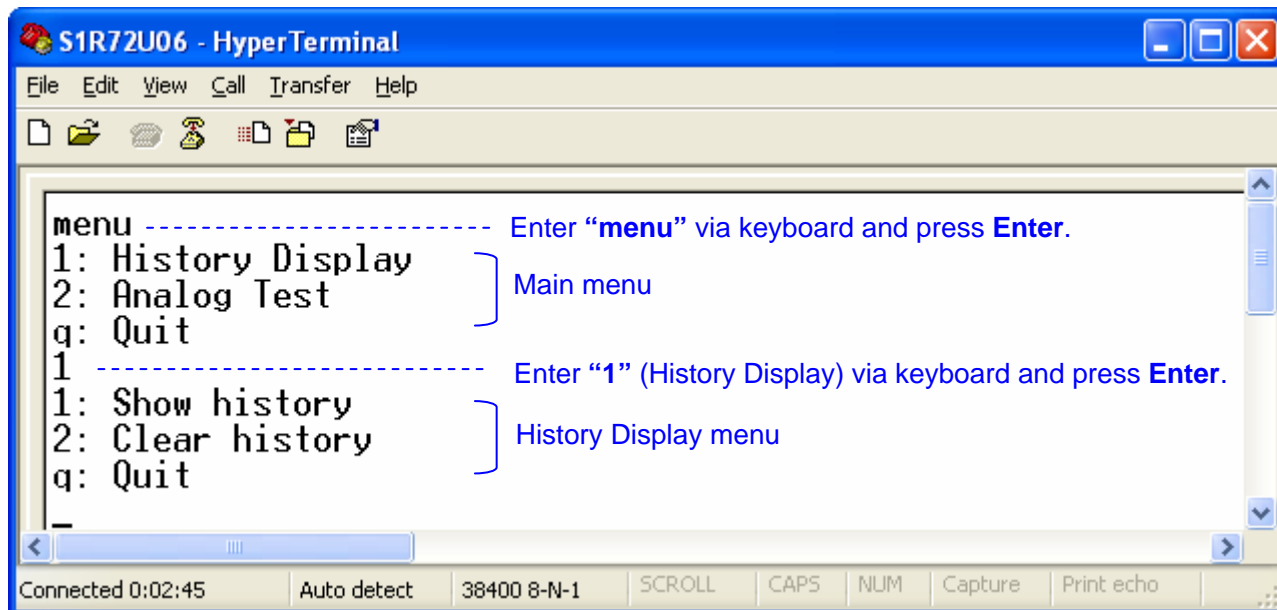


Figure 2.13 History Display menu

- Show history  
Displays history information.  
For more information, refer to “2.2.5.1 Show history”.
- Clear history  
Clears history information stored in the LSI.  
For more information, refer to “2.2.5.2 Clear history”.
- Quit  
Enter “q” and press the Enter key to quit the History Display menu and display the Main menu.

### 2.2.5.1 Show history

Enter “1” in the History Display menu and press the Enter key to display the history and to display the History Display menu once again.

For more information on the history displayed, refer to “2.3 History specifications”.

Figure 2.14 shows an example.

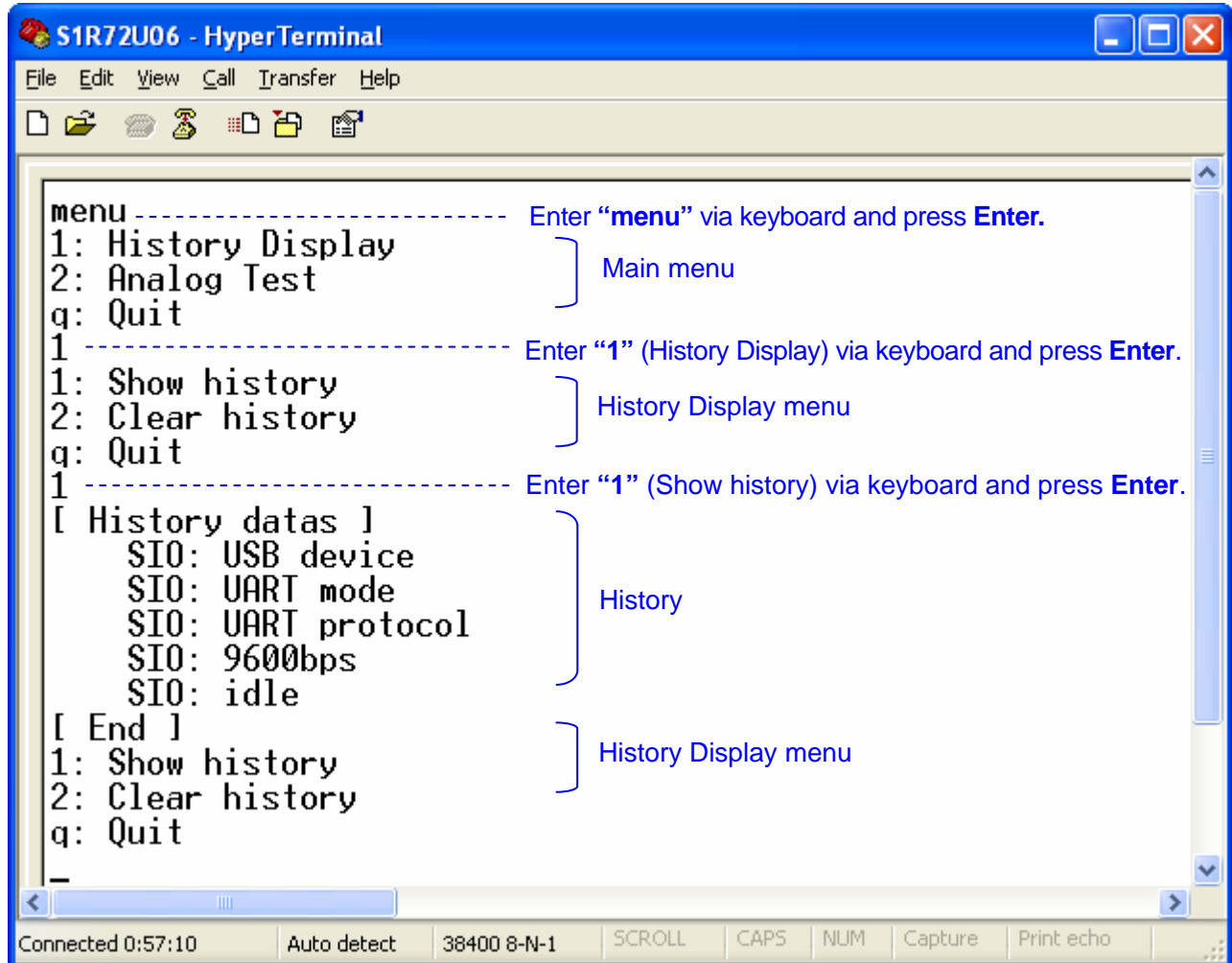


Figure 2.14 Show history

## 2. History Display Function

### 2.2.5.2 Clear history

Enter “2” in the History Display menu and press the Enter key to clear the entire history information held in the LSI and to display the History Display menu once again.

Selecting **Show history** after clearing the history will not display the history previously displayed.

Figure 2.15 shows an example.

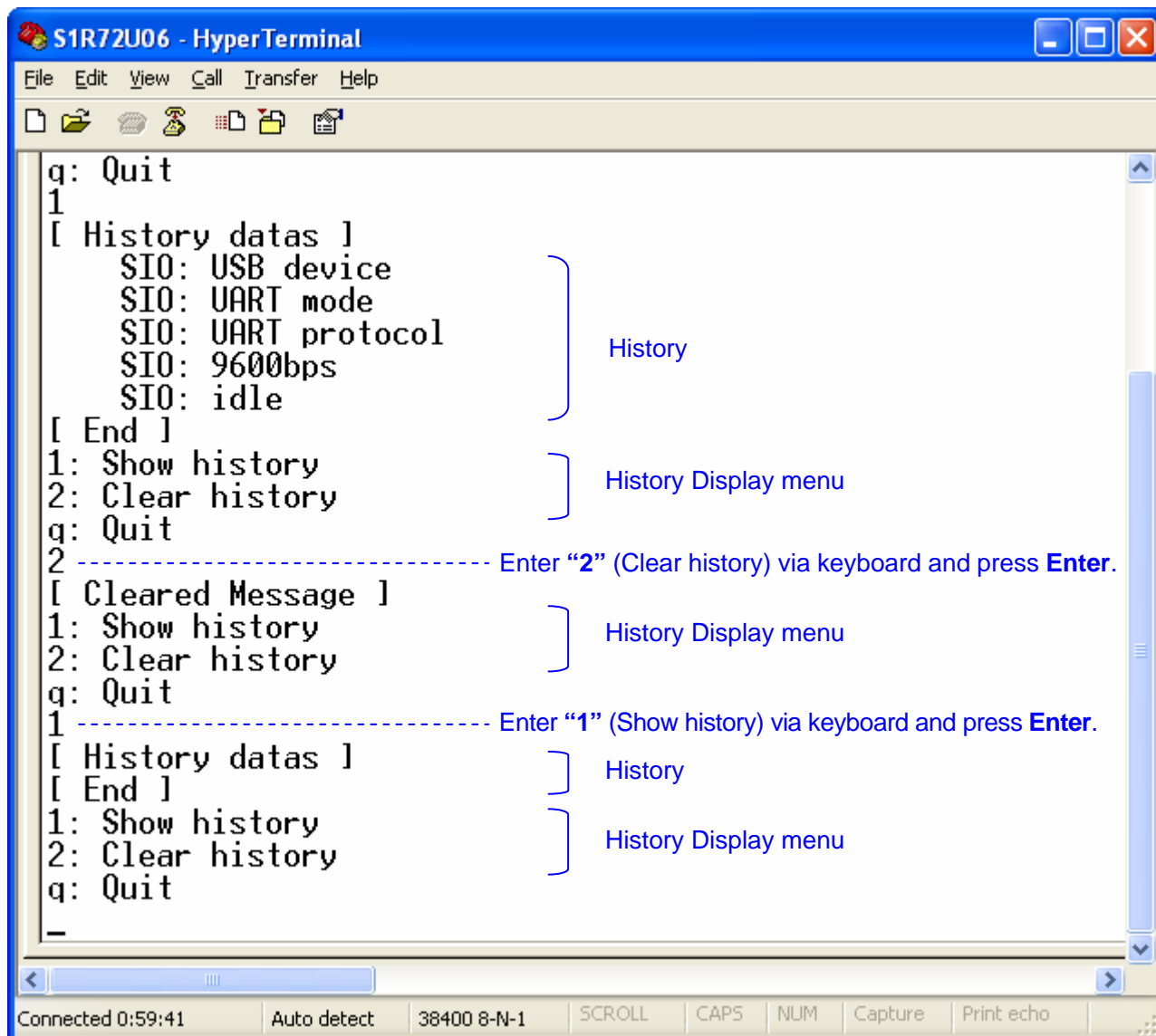


Figure 2.15 Clear history

### 2.2.6 Analog Test menu

Enter “2” in the Main menu and press the Enter key to display the menu, as shown in Figure 2.16. This menu appears only if the LSI is operating as a USB Host. It cannot be displayed when operating as a USB Device.

For more information on USB analog tests, refer to “3. USB Analog Test Function”.

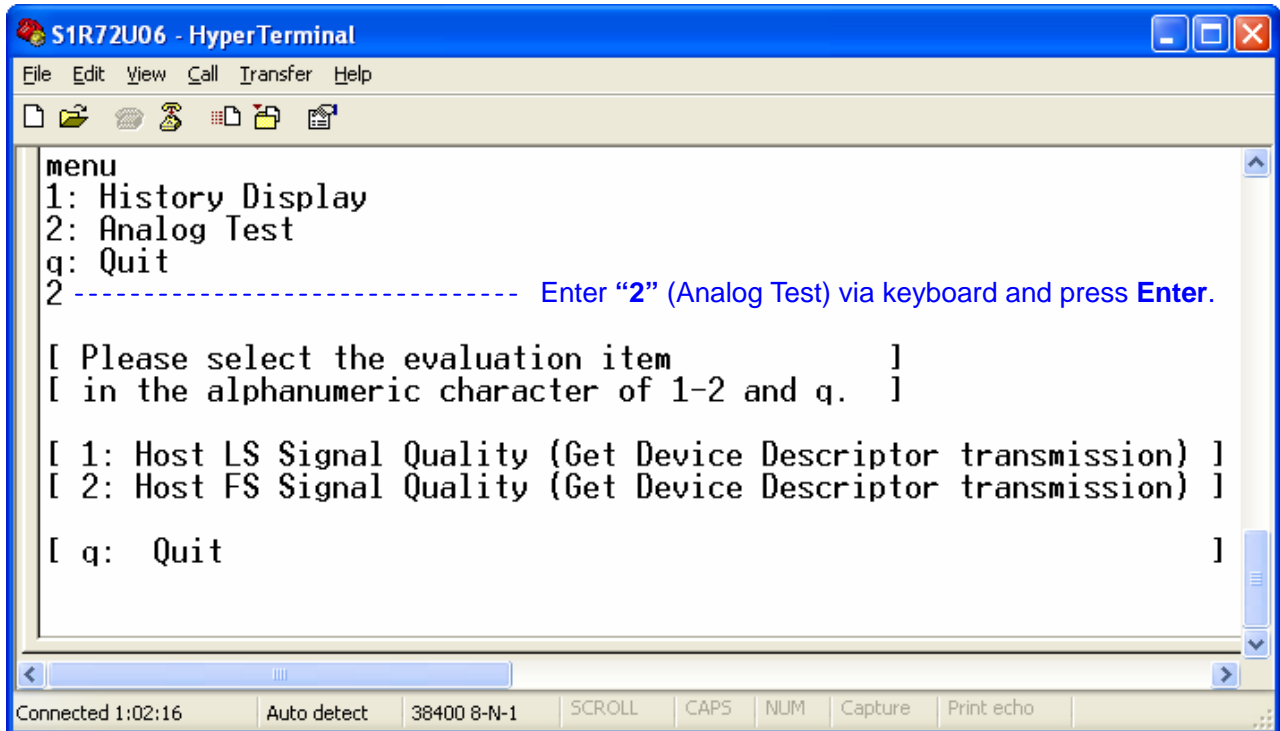


Figure 2.16 Analog Test menu

## 2. History Display Function

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### 2.3 History specifications

This section describes the history information displayed.

The same history can be displayed multiple times, depending on the LSI operating state.

Up to 64 history items can be displayed. If the history exceeds 64 items, the newest items displayed will overwrite the oldest items.

#### 2.3.1 Terminology

The terminology used in history information is defined as follows.

CBW ..... USB packets including information related to SCSI/ATAPI command blocks in MSC data transmission and reception. Stands for **C**ommand **B**lock **W**rapper.

CSW ..... USB packets including SCSI/ATAPI command block status in MSC data transmission and reception. Stands for **C**ommand **S**tatus **W**rapper.

Data IN..... Data transfer from the MSC Device to this LSI.

Data OUT..... Data transfer from this LSI to the MSC Device.

### 2.3.2 USB Host history list

The USB Host history information is shown below.

#### 2.3.2.1 HID Class

Table 2.2 shows HID Class history information.

**Table 2.2 USB Class history information**

History	Details
USBH: HID device	HID Class Device was connected. *1
USBH: LS device	LS Device was connected. *1, *2
USBH: FS device	FS Device was connected. *1, *2
USBH: hub device	Device with HUB function was connected. *1
USBH: unsupported device	Unsupported Devices were connected. *1
USBH: more than 2 support devices	Two or more HID Class Devices were connected. *1
USBH: more than 2 hubs	Two or more Devices with HUB function were connected. *1
USBH: VBUS overcurrent	VBUS overcurrent was detected.
USBH: send Output Report	Output Report data was transmitted to an HID Class Device.
USBH: recv Input Report	Input Report data was received from an HID Class Device.
USBH: send Feature Report	Feature Report data was transmitted to an HID Class Device.
USBH: recv Feature Report	Feature Report data was received from an HID Class Device.
USBH: Report error	Error occurred in Report data transmission/reception.

\*1 The LSI recognizes up to three connected Devices (including HUBs and unsupported Devices). This history will not appear if four or more Devices are connected.

If this history does not appear when three or less Devices are connected, refer to “2.6 Not Displayed”.

\*2 This history will not appear when Devices are connected to HUBs connected to the LSI.



## 2. History Display Function

### 2.3.2.2 MSC

Table 2.3 shows MSC history information.

**Table 2.3 MSC history information**

History	Details
USBH: storage device	MSC Device was connected. *1
USBH: LS device	LS Device was connected. *1, *2
USBH: FS device	FS Device was connected. *1, *2
USBH: hub device	Device with HUB function was connected. *1
USBH: unsupported device	Unsupported Devices were connected. *1
USBH: more than 2 support devices	Two or more HID Class Devices were connected. *1
USBH: more than 2 hubs	Two or more Devices with HUB function were connected. *1
USBH: VBUS overcurrent	VBUS overcurrent was detected.
USBH: CBW[0xXX]	CBW was transmitted to MSC Device. [0xXX] is SCSI/ATAPI command Operation Code (*3).
USBH: Data IN	Data reception from MSC Device started.
USBH: Data OUT	Data transmission to MSC Device started.
USBH: CSW	CSW reception from MSC Device started.
USBH: phase error	Error occurred in data transmission/reception with MSC Device.
USBH: cleared STALL	STALL cleared to reset communication error in MSC Device.
USBH: Mass Storage Reset	Reset MSC Device.

\*1 The LSI recognizes up to three connected Devices (including HUBs and unsupported Devices). This history will not appear if four or more Devices are connected.

If this history does not appear when three or less Devices are connected, refer to “2.6 Not Displayed”.

\*2 This history will not appear when Devices are connected to HUBs connected to the LSI.

\*3 For more information, refer to the USB standard described under “Compliance” in the *S1R72U06 Technical Manual*.

### 2.3.3 USB Device history list

Table 2.4 shows the USB Device history information.

**Table 2.4 USB Device history information**

History	Details
USBD: Connected	Was connected to Host. *1
USBD: Disconnect	Not connected to Host. *2
USBD: RESET[XX]	USB BUS reset was detected. [XX] is LS or FS.
USBD: SUSPEND	USB Suspend was detected.
USBD: RESUME	USB Resume was detected.
USBD: SETUP[0xXX]	SETUP packet was received from Host. [0xXX] is SETUP packet value (*3).
USBD: send Input Report	Input Report data was transmitted to Host.
USBD: recv Output Report	Output Report data was received from Host.
USBD: send Feature Report	Feature Report data was transmitted to Host.
USBD: recv Feature Report	Feature Report data was received from Host.
USBD: set protocol[0xXX]	Protocol changes were received from Host. [0xXX] is set value of protocol mode (*4).
USBD: Report error	Error occurred in Report data transmission/reception.
USBD: Transfer error[0xXX]	Error occurred in USB transfer. [0xXX] is Endpoint Address (*3).

\*1 This history is displayed when power is supplied to the VBUS.

\*2 This history is displayed when power is no longer supplied to the VBUS.

\*3 For more information, refer to the USB standard described under “Normative Standard” in the *S1R72U06 Technical Manual*.

\*4 For more information, refer to “Data” described for “GET PROTOCOL MODE” (25h) in the *S1R72U06 UART Interface Manual* or *S1R72U06 SPI Interface Manual*.

## 2. History Display Function

### 2.3.4 SIO history list

The SIO history information is shown below.

#### 2.3.4.1 UART

Table 2.5 shows UART history information.

**Table 2.5 UART history information**

History	Details
SIO: idle	State in which EI requests can be received from Main CPU.
SIO: rcv EIReq[0xXX]	EI request was received from Main CPU. [0xXX] is EI request EIreq code (*1).
SIO: send data	Data transmission to Main CPU started.
SIO: rcv data	Data reception from Main CPU started.
SIO: set serial port[0xXX]	Serial Port setting was received from Main CPU. [0xXX] is set value of serial port (*2).
SIO: EIReq error[0xXX]	An error occurred in EI request. [0xXX] is error information (*3).
SIO: parity error	Parity error was detected.
SIO: framing error	Framing error was detected.
SIO: noise detection	Noise was detected in data.
SIO: buffer overflow	Overflow occurred in receive buffer.
SIO: USB host	USB is set as Host.
SIO: USB device	USB is set as Device.
SIO: UART mode	SIO is set to UART Mode (H/W setting).
SIO: UART protocol	SIO is set to UART Protocol. *4
SIO: 300bps	UART protocol initial baud rate is set to 300 bps.
SIO: 9600bps	UART protocol initial baud rate is set to 9600 bps.

\*1 For more information, refer to “Command Specifications” in the *S1R72U06 UART Interface Manual*.

\*2 For more information, refer to “Information data” described for the “SERIAL PORT” (F8h) in the *S1R72U06 UART Interface Manual*.

\*3 For more information, refer to “Host error information” or “Device error information” in the *S1R72U06 Technical manual*.

\*4 Automatically set according to UART Mode (H/W setting).

### 2.3.4.2 SPI

Table 2.6 shows SPI history information.

**Table 2.6 SPI history information**

History	Details
SIO: idle	State in which EI requests can be received from Main CPU.
SIO: rcv EIReq[0xXX]	EI request was received from Main CPU. [0xXX] is EI request EIreq code. (*1)
SIO: send data	Data transmission to Main CPU started.
SIO: rcv data	Data reception from Main CPU started.
SIO: EIReq error[0xXX]	An error occurred in EI request. [0xXX] is error information. (*2)
SIO: USB host	USB is set as Host.
SIO: USB device	USB is set as Device.
SIO: send short data	Transmission of data under burst size started to Main CPU using SPI protocol.
SIO: SRST	SRST was received from Main CPU.
SIO: invalid Reg access code[0xXX]	Register access occurred which does not exist in SPI protocol. [0xXX] is register address. (*1)
SIO: protocol error	Error occurred during SPI protocol register access.
SIO: SPI mode	SIO is set to SPI Mode (H/W setting).
SIO: SPI protocol	SIO is set to SPI Protocol. *3

\*1 For more information, refer to “Command Specifications” in the *S1R72U06 SPI Interface Manual*.

\*2 For more information, refer to “Host error information” or “Device error information” in the *S1R72U06 Technical Manual*.

\*3 Automatically set according to SPI Mode (H/W setting).

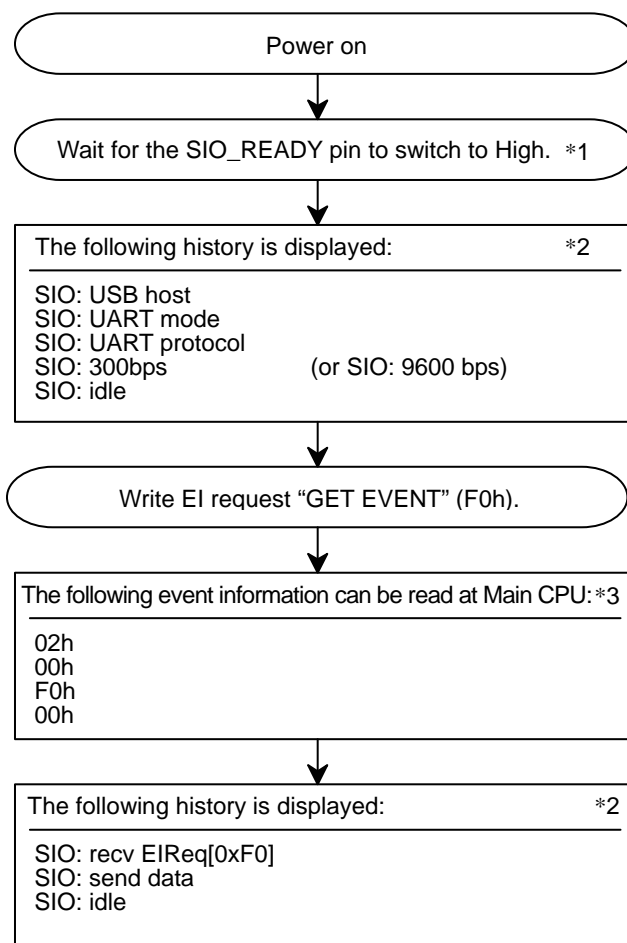
## 2. History Display Function

### 2.4 System Startup Checking Procedure

The History Display Function can be used to check the SIO settings and communication state. The procedure for checking at system startup is shown below.

Check the details described in the procedure. If all of the review items can be performed as described in the procedure, the settings and basic communication state are correct.

#### 2.4.1 UART - USB Host

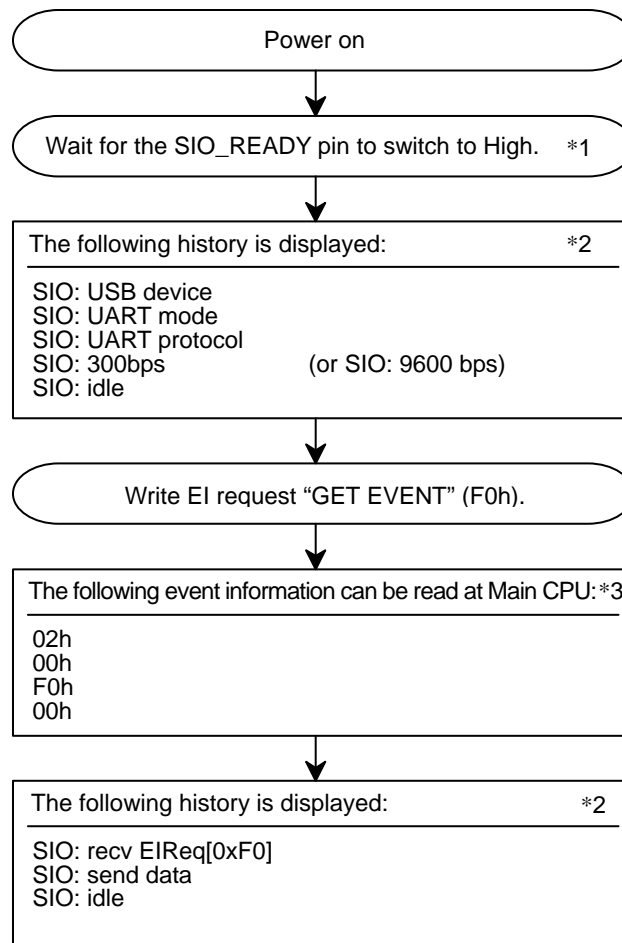


**Figure 2.17 Checking procedure at UART - USB Host system startup**

If unable to confirm the details of the system startup checking procedure, check the following:

- \*1 Check the details in "2.2.2 Precautions".
- \*2 Refer to "2.5 Unrequested Display" or "2.6 Not Displayed".
- \*3 Check the following details:
  - (1) "UART setting" in the *S1R72U06 Technical Manual*.
  - (2) UART signal quality
  - (3) Connection between Main CPU and LSI (circuit board wiring, etc.)

### 2.4.2 UART - USB Device



**Figure 2.18** Checking procedure at UART - USB Device system startup

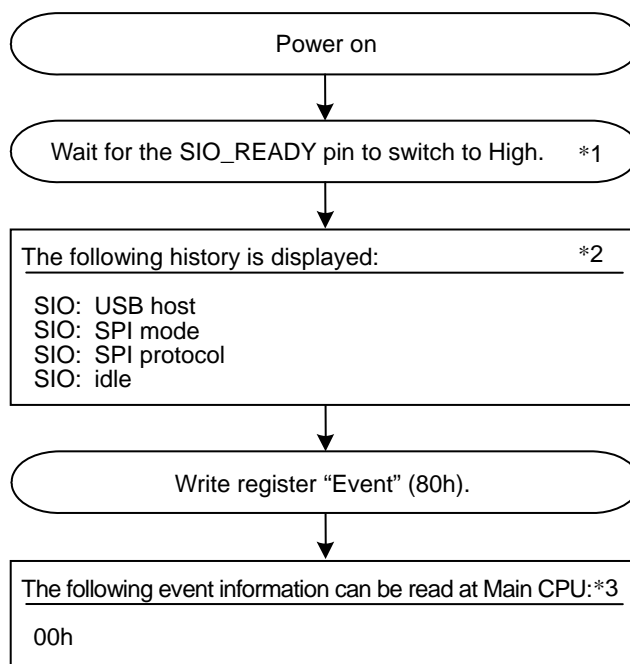
If unable to confirm the details of the system startup checking procedure, check the following:

- \*1 Check the details in "2.2.2 Precautions".
- \*2 Refer to "2.5 Unrequested Display" or "2.6 Not Displayed".
- \*3 Check the following details:
  - (1) "UART setting" in the *S1R72U06 Technical Manual*.
  - (2) UART signal quality
  - (3) Connection between Main CPU and LSI (circuit board wiring, etc.)

## 2. History Display Function

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### 2.4.3 SPI - USB Host

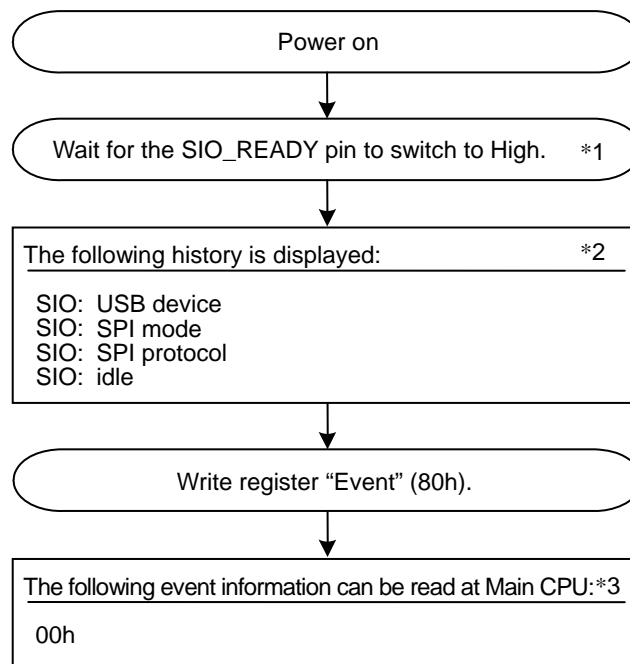


**Figure 2.19** Checking procedure at SPI - USB Host system startup

If unable to confirm the details of the system startup checking procedure, check the following:

- \*1 Check the details in "2.2.2 Precautions".
- \*2 Refer to "2.5 Unrequested Display" or "2.6 Not Displayed".
- \*3 Check the following details:
  - (1) "SPI setting" in the *S1R72U06 Technical Manual*.
  - (2) SPI signal quality
  - (3) Connection between Main CPU and LSI (circuit board wiring, etc.)

### 2.4.4 SPI - USB Device



**Figure 2.18** Checking procedure at SPI - USB Device system startup

If unable to confirm the details of the system startup checking procedure, check the following:

- \*1 Check the details in "2.2.2 Precautions".
- \*2 Refer to "2.5 Unrequested Display" or "2.6 Not Displayed".
- \*3 Check the following details:
  - (1) "SPI setting" in the *S1R72U06 Technical Manual*.
  - (2) SPI signal quality
  - (3) Connection between Main CPU and LSI (circuit board wiring, etc.)



## 2. History Display Function

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### 2.5 Unrequested Display

This section describes how to perform reviews when the history appears without prompting (hereafter referred to as the “unrequested display”) during review using the History Display Function.

#### 2.5.1 USB HID Class Host

Check the corresponding history if the unrequested display occurs when the LSI operates as a HID Class Host.

##### 2.5.1.1 USBH: Report error

- (1) The information registered for the LSI in “REPORT ID REGISTRATION” (11h) may not match the descriptor information obtained from the Device by the Main CPU. Check the information registered.
- (2) The information registered for the LSI in (1) may not match the Report data written by the Main CPU. Check the information registered.
- (3) The information registered for the LSI in (1) may not match the Report data received from the Device. Check the information registered.
- (4) There may be a problem with the circuit board wiring or USB cable signal quality. Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.

##### 2.5.1.2 USBH: unsupported device

- (1) The descriptor size or Interface Descriptor from the HID Class Device connected to the LSI may fall outside specifications.

Check “HID Class Device connection” or “Precautions” described for USB HID Class Host control in the *S1R72U06 Application Note*.

- (2) A Device other than an HID Class Device may be connected to the LSI.

##### 2.5.1.3 USBH: LS device

There may be a problem with the circuit board wiring or USB cable signal quality. Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.

##### 2.5.1.4 USBH: FS device

Refer to “2.5.1.3 USBH: LS device”.

### 2.5.2 USB MSC Host

Check the corresponding history if the unrequested display occurs when the LSI operates as an MSC Host.

For details about “STORAGE COMMAND THROUGH”, refer to the *S1R72U06 UART Interface Manual* or *S1R72U06 SPI Interface Manual*.

#### 2.5.2.1 USBH: phase error

The “command protocol” “transfer specification” may include an error for the “STORAGE COMMAND THROUGH” EI request.

#### 2.5.2.2 USBH: unsupported device

- (1) The descriptor size or Interface Descriptor from the MSC Device connected to the LSI may fall outside specifications.

Check “MSC Device connection” or “Precautions” described for USB MSC Host control in the *S1R72U06 Application Note*.

- (2) A Device other than an MSC Device may be connected to the LSI.

#### 2.5.2.3 USBH: LS device

There may be a problem with the circuit board wiring or USB cable signal quality.

Check “Other” described for the MSC Overview in the *S1R72U06 Technical Manual*.

#### 2.5.2.4 USBH: cleared STALL

- (1) The SCSI/ATAPI command transmitted by the “STORAGE COMMAND THROUGH” EI request may not support the MSC Device.
- (2) The MSC Device may have completed data transmission/reception for fewer transfer cycles than the number of cycles specified by the Main CPU.
- (3) The MSC Device may be in communication error state. Use “DEVICE RESET” (33h) if this history is displayed continuously.

#### 2.5.2.5 USBH: Mass Storage Reset

The MSC Device may be in error state.

## 2. History Display Function

---

### 2.5.3 USB Device

Check the corresponding history if the unrequested display occurs when the LSI operates as a Device.

#### 2.5.3.1 USB: Report error

- (1) The Report data written by the Main CPU may not match the Report information downloaded to the LSI.  
Check the Report information.
- (2) The Report data received from the Host may not match the Report information downloaded to the LSI.  
Check the Report information.

#### 2.5.3.2 USB: Transfer error[0xXX]

- (1) There may be a problem with the circuit board wiring or USB cable signal quality. Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.
- (2) The electrical characteristics may fail to meet the specifications given in the *S1R72U06 Data Sheet*.

#### 2.5.3.3 USB: Disconnect

The USB cable may not have been connected or may be broken.

#### 2.5.3.4 USB: RESET[XX]

Refer to “2.5.3.3 USB: Disconnect”.

#### 2.5.3.5 USB: SUSPEND

Refer to “2.5.3.3 USB: Disconnect”.

#### 2.5.3.6 USB: RESUME

Refer to “2.5.3.3 USB: Disconnect”.

### 2.5.4 SIO UART

Check the corresponding history if the unrequested display related to UART occurs.

#### 2.5.4.1 SIO: EIReq error[0xXX]

- (1) The EI request written to the LSI may not comply with command specifications. Refer to the *S1R72U06 UART Interface Manual*.
- (2) An error may have occurred in the USB connected to the LSI. Check the corresponding USB history.

#### 2.5.4.2 SIO: parity error

- (1) Recheck the UART settings.
- (2) There may be a problem with the circuit board wiring or SIO signal quality. Check the following details.
  - HID Class  
Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.
  - MSC  
Check “Other” described for the MSC Overview in the *S1R72U06 Technical Manual*.

#### 2.5.4.3 SIO: framing error

Refer to “2.5.4.2 SIO: parity error”.

#### 2.5.4.4 SIO: noise detection

Refer to “2.5.4.2 SIO: parity error”.

#### 2.5.4.5 SIO: buffer overflow

Set the UART baud rate to low speed.

## 2. History Display Function

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### 2.5.5 SIO SPI

Check the corresponding history if the unrequested display related to SPI occurs.

#### 2.5.5.1 SIO: EIReq error[0xXX]

- (1) The EI request written to the LSI may not comply with command specifications. Check the *S1R72U06 SPI Interface Manual*.
- (2) An error may have occurred in the USB connected to the LSI. Check the corresponding USB history.

#### 2.5.5.2 SIO: invalid Reg access code[0xXX]

- (1) The Main CPU may be attempting to access a non-existent register. Check the *S1R72U06 SPI Interface Manual*.
- (2) There may be a problem with the circuit board wiring or SIO signal quality. Check “Precautions” described for the SPI functions in the *S1R72U06 Technical Manual*.
- (3) The Main CPU transfer frequency may be outside the specified range for the LSI. Check “SPI Overview” described for the SPI functions in the *S1R72U06 Technical Manual*.

#### 2.5.5.3 SIO: protocol error

- (1) The register accessed by the Main CPU may not comply with the protocol. Check the *S1R72U06 SPI Interface Manual*.
- (2) Refer to “2.5.5.2 SIO: invalid Reg access code[0xXX]” (2) to (3).

### 2.6 Not Displayed

This section describes how to perform reviews when the history does not appear as desired (hereafter referred to as the “not displayed”) during review using the History Display Function.

#### 2.6.1 USB HID Class Host

Check the corresponding condition if the history information described below is not displayed when the LSI operates as a HID Class Host.

##### 2.6.1.1 USBH: HID device

- (1) A Device other than an HID Class Device may be connected to the LSI.
- (2) Recognition of the connected HID Class Device may have failed. Check by the following methods.
  - A) Reconnect the HID Class Device.
  - B) Connect a different HID Class Device.
  - C) Use a different USB cable.
- (3) Four or more Devices may be connected to the LSI. For more information, refer to “2.3.2 USB Host history list”.
- (4) Multiple Interface Descriptors may be mounted in the HID Class Device connected to the LSI. Check “HID Class Device connection” or “Precautions” described for USB HID Class Host control in the *S1R72U06 Application Note*.
- (5) The HID Class Device connected may not match the protocol of the LSI. Check “Precautions” described for HID Class EI requests in the *S1R72U06 UART Interface Manual* or *S1R72U06 SPI Interface Manual*.

##### 2.6.1.2 USBH: LS device

Refer to “2.6.1.1 USBH: HID device” (2) to (5).

##### 2.6.1.3 USBH: FS device

Refer to “2.6.1.1 USBH: HID device” (2) to (5).

##### 2.6.1.4 USBH: hub device

Refer to “2.6.1.1 USBH: HID device” (2) to (5).

##### 2.6.1.5 USBH: unsupported device

Refer to “2.6.1.1 USBH: HID device” (2).

##### 2.6.1.6 USBH: more than 2 support devices

Refer to “2.6.1.1 USBH: HID device” (2) to (5).

##### 2.6.1.7 USBH: more than 2 hubs

Refer to “2.6.1.1 USBH: HID device” (2) to (5).

## 2. History Display Function

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### 2.6.1.8 USBH: VBUS overcurrent

VBUS overcurrent detection may be prohibited.

### 2.6.1.9 USBH: send Output Report

- (1) The EI request written to the LSI may not comply with command specifications. Refer to the *S1R72U06 UART Interface Manual* or *S1R72U06 SPI Interface Manual*.
- (2) The information registered for the LSI in “REPORT ID REGISTRATION” (11h) may not match the Report data written by the Main CPU. Check the information registered.

### 2.6.1.10 USBH: recv Input Report

- (1) The EI request written to the LSI may not comply with command specifications. Refer to the *S1R72U06 UART Interface Manual* or *S1R72U06 SPI Interface Manual*.
- (2) The information registered for the LSI in “REPORT ID REGISTRATION” (11h) may not match the Report data received from the Device. Check the information registered.

### 2.6.1.11 USBH: send Feature Report

Refer to “2.6.1.9 USBH: send Output Report”.

### 2.6.1.12 USBH: recv Feature Report

Refer to “2.6.1.10 USBH: recv Input Report”.

### 2.6.2 USB MSC Host

Check the corresponding condition if the history information described below is not displayed when the LSI operates as an MSC Host.

For details about “STORAGE COMMAND THROUGH”, refer to the *S1R72U06 UART Interface Manual* or *S1R72U06 SPI Interface Manual*.

#### 2.6.2.1 USBH: storage device

- (1) A Device other than an MSC Device may be connected to the LSI.
- (2) Recognition of the connected MSC Device may have failed. Check by the following methods.
  - A) Reconnect the MSC Device.
  - B) Connect a different MSC Device.
  - C) Connect a different USB cable.
- (3) Four or more USB Devices may be connected to the LSI. For more information, refer to “2.3.2 USB Host history list”.
- (4) Multiple Interface Descriptors may be mounted in the MSC Device connected to the LSI. Check “MSC Device connection” described for USB MSC Host control in the *S1R72U06 Application Note*.

#### 2.6.2.2 USBH: FS device

Refer to “2.6.2.1 USBH: storage device” (2) to (4).

#### 2.6.2.3 USBH: hub device

Refer to “2.6.2.1 USBH: storage device” (2) to (4).

#### 2.6.2.4 USBH: unsupported device

Refer to “2.6.2.1 USBH: storage device” (2).

#### 2.6.2.5 USBH: more than 2 support devices

Refer to “2.6.2.1 USBH: storage device” (2) to (4).

#### 2.6.2.6 USBH: more than 2 hubs

Refer to “2.6.2.1 USBH: storage device” (2) to (4).

#### 2.6.2.7 USBH: VBUS overcurrent

VBUS overcurrent detection may be prohibited.

#### 2.6.2.8 USBH: Data IN

- (1) The CBW transmitted by the LSI may not have been recognized by the MSC Device. Reconnect the MSC Device using “DEVICE RESET” (33h).
- (2) The “transfer specification” for the “command protocol” may be set to “Write” by the “STORAGE COMMAND THROUGH” EI request.



## 2. History Display Function

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### 2.6.2.9 USBH: Data OUT

- (1) The CBW transmitted by the LSI may not have been recognized by the MSC Device. Reconnect the MSC Device using “DEVICE RESET” (33h).
- (2) The “transfer specification” for the “command protocol” may be set to “Read” by the “STORAGE COMMAND THROUGH” EI request.

### 2.6.2.10 USBH: CSW

- (1) The CBW transmitted by the LSI may not have been recognized by the MSC Device. Reconnect the MSC Device using “DEVICE RESET” (33h).
- (2) The DATA IN/DATA OUT transmitted by the LSI may not have been recognized by the MSC Device. Reconnect the MSC Device using “DEVICE RESET” (33h).
- (3) The MSC Device may have been disconnected when the CSW was received from the MSC Device.

### 2.6.3 USB Device

Check the corresponding condition if the history information described below is not displayed when the LSI operates as a Device.

#### 2.6.3.1 USBD: Connected

- (1) HID Class may not have started.

For more information on starting HID Class method, refer to the *S1R72U06 Technical Manual*.

- (2) Check the descriptor downloaded to the LSI.
- (3) The USB cable may not have been connected or may be broken.

#### 2.6.3.2 USBD: Disconnect

Refer to “2.6.3.1 USBD: Connected” (1) and (2).

#### 2.6.3.3 USBD: RESET[XX]

- (1) The USB BUS may not be in the Reset state.
- (2) The USB cable may not have been connected or may be broken.
- (3) There may be a problem with the circuit board wiring or USB cable signal quality. Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.

#### 2.6.3.4 USBD: SUSPEND

- (1) The USB BUS may not be in the Suspend state.
- (2) Refer to “2.6.3.3 USBD: RESET[XX]” (2) and (3).

#### 2.6.3.5 USBD: RESUME

- (1) The USB BUS may not be in the Resume state.
- (2) Refer to “2.6.3.3 USBD: RESET[XX]” (2) and (3).

#### 2.6.3.6 USBD: SETUP[0xXX]

- (1) There may be a problem with the circuit board wiring or USB cable signal quality. Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.
- (2) The electrical characteristics may fail to meet the specifications given in the *S1R72U06 Data Sheet*.
- (3) The Host may not have transmitted a SETUP packet.

#### 2.6.3.7 USBD: send Input Report

- (1) The Host may not have accessed the LSI to acquire Input Report data.
- (2) The Report data written by the Main CPU may not match the Report information downloaded to the LSI. Check the Report information.

## 2. History Display Function

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### 2.6.3.8 USB: recv Output Report

- (1) The Main CPU may not have read the Output Report data.
- (2) The Host may not have transmitted the Output Report data.
- (3) Check the descriptor downloaded to the LSI.

### 2.6.3.9 USB: send Feature Report

- (1) The Host may not have accessed the LSI to acquire the Feature Report data.
- (2) The Report data written by the Main CPU may not match the Report information downloaded to the LSI.  
Check the Report information.

### 2.6.3.10 USB: recv Feature Report

- (1) The Main CPU may not have read the Feature Report data.
- (2) The Host may not have transmitted the Feature Report data.
- (3) Check the descriptor downloaded to the LSI.

### 2.6.3.11 USB: set protocol[0xXX]

- (1) The Host may not have transmitted the set protocol.
- (2) Check the descriptor downloaded to the LSI.

### 2.6.4 SIO UART

Check the corresponding history if the UART history is not displayed.

#### 2.6.4.1 SIO: idle

- (1) If NAK continues to be sent from the Device when the LSI operates as a Host, perform a hardware reset (XRESET).
- (2) Access from the Host may have ceased when the LSI operates as a Device.
- (3) If (1) and (2) are normal, perform a hardware reset (XRESET).

#### 2.6.4.2 SIO: recv EReq[0xXX]

- (1) There may be a problem with the circuit board wiring or SIO signal quality. Check the following details.
  - HID Class  
Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.
  - MSC  
Check “Other” described for the MSC Overview in the *S1R72U06 Technical Manual*.
- (2) Check that the actual communication matches the UART settings.

#### 2.6.4.3 SIO: send data

- (1) The Host or Device connected to the LSI may be malfunctioning.
- (2) The Host or Device connected to the LSI may not comply with USB standard. Check the following details.
  - HID Class  
Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.
  - MSC  
Check “Other” described for the MSC Overview in the *S1R72U06 Technical Manual*.
- (3) Check the USB signal quality.

#### 2.6.4.4 SIO: recv data

Refer to “2.6.4.2 SIO: recv EReq[0xXX]”.

#### 2.6.4.5 SIO: set serial port[0xXX]

Refer to “2.6.4.2 SIO: recv EReq[0xXX]”.

## 2. History Display Function

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### 2.6.5 SIO SPI

Check the corresponding history if the SPI history is not displayed.

#### 2.6.5.1 SIO: idle

- (1) If NAK continues to be sent from the Device when the LSI operates as a Host, perform a hardware reset (XRESET).
- (2) Access from the Host may have ceased when the LSI operates as a Device.
- (3) If (1) and (2) are normal, perform a hardware reset (XRESET).

#### 2.6.5.2 SIO: recv EIReq[0xXX]

There may be a problem with the circuit board wiring or SIO signal quality. Check the following details.

- HID Class

Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.

- MSC

Check “Other” described for the MSC Overview in the *S1R72U06 Technical Manual*.

#### 2.6.5.3 SIO: send data

- (1) The Host or Device connected to the LSI may be malfunctioning.
- (2) The Host or Device connected to the LSI may not comply with USB standard. Check the following details.
  - HID Class  
Check “Other” described for the HID Class Overview in the *S1R72U06 Technical Manual*.
  - MSC  
Check “Other” described for the MSC Overview in the *S1R72U06 Technical Manual*.
- (3) Check the USB signal quality.

#### 2.6.5.4 SIO: recv data

Refer to “2.6.5.2 SIO: recv EIReq[0xXX]”.

#### 2.6.5.5 SIO: send short data

Refer to “2.6.5.3 SIO: send data”.

### 3. USB Analog Test Function

For more information on this function, refer to the *S1R72U06 Embedded Host Compliance Guide*.

This function is for the Host only.

The LSI should be subjected to a hardware reset (XRESET) after analog testing ends.

## 4. Download Function

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### 4. Download Function

This function allows downloading of TPL and descriptors.

For more information on download commands, refer to the *S1R72U06 UART Interface Manual* or *S1R72U06 SPI Interface Manual*.

A tool is provided to allow the user to create download data. Refer to “4.4 Support Tools” for specifics.

#### 4.1 Download Data

Download data is comprised of a **Header** and **Data**, as shown in Figure 4.1.

The **Data** may be **TPL** or a **Descriptor**. For more information, refer to “4.1.1 Data structure”.

For more information on data, refer to “4.2 TPL” and “4.3 Descriptor”.

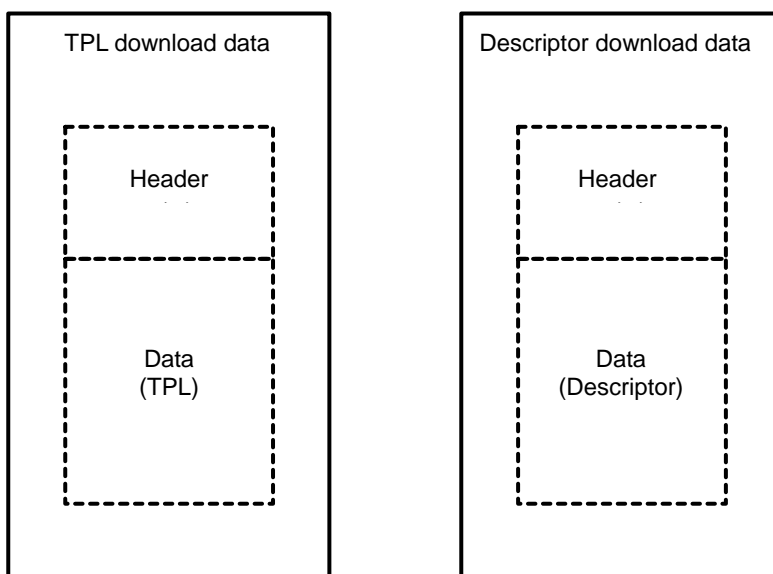


Figure 4.1 Download data

## 4.1.1 Data structure

Table 4.1 shows the structure of the download data.

“00h” in Table 4.1 is a fixed value. Fields appearing as “xxh” must be set.

Table 4.1 Data structure

Type	Offset	Setting	Value	Remarks
Header	00h	TPL : D8h Descriptor : D9h	xxh	Set to suit data.
	01h	Download data CRC value	xxh	Refer to “4.1.2 CRC” for CRC calculation method.
	02h	Fixed value	01h	
	03h	Fixed value	01h	
	04h	TPL : 7F00h Descriptor : 7B00h	xxh	Set to suit data. (Offset 07h: MSB, 04h: LSB)
	05h		xxh	
	06h		00h	
	07h		00h	
	08h	Download data size	xxh	Will be a multiple of 12 for TPL. (Offset 0Bh: MSB, 08h: LSB)
	09h		xxh	
	0Ah		00h	
	0Bh		00h	
	0Ch	Fixed value	00h	
	0Dh	Reserved	00h	
	0Eh	Reserved	00h	
0Fh	Reserved	00h		
Data	10h	Data	xxh	Maximum data size TPL: 192 bytes Descriptor: 1012 bytes
	:	:	:	
	:	:	:	
	:	:	:	



## 4. Download Function

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### 4.1.2 CRC

CRC (Cyclic Redundancy Check) is an error-detection method used for data transfers. The LSI uses CRC-8 (not CCITT CRC-8), and the generating polynomial (Bit 8 is not used) is as shown below. Figure 4.2 shows the C language CRC calculation method.

Generating polynomial:  $X^8 + X^2 + X^1 + X^0 = 2^8 + 2^2 + 2^1 + 2^0 = 0x07$

```
unsigned char Func(unsigned char *pDat, unsigned long dLen )
{
    unsigned char  crc;
    unsigned char  bit;
    unsigned long  index;

    crc = 0xFF;          ..... Initial setting

    for( index=0; index<dLen; index++) {
        crc ^= pDat[index];

        for( bit=0; bit<8; ++bit ){
            if( crc & 0x80 ){
                crc = (crc << 1) ^ 0x07;  ..... Highest-order Bit=1 processing
            }else{
                crc = (crc << 1);          ..... Highest-order Bit=0 processing
            }
        }
    }

    return crc;
}
```

Figure 4.2 CRC calculation method

### 4.2 TPL

TPL is a list of supported USB Devices used by the LSI in USB Host operations.

Embedded Host Compliance requires the inclusion of a TPL, and it must be set to acquire logos from certification body. For TPL inquiries or details, consult the certification body.

USB Devices failing to meet the standards set for the TPL are treated as unsupported Devices.

A default TPL is registered with the LSI. Create a TPL if the provision of another TPL is required.

#### 4.2.1 HID Class

The HID Class TPL is configured as shown in Table 4.2 and can include up to 16 settings (12-byte units) in list form.

**Table 4.2 HID Class Data structure**

Component	Size (Byte)	Setting value	Description	Default
idVendor	2	xxxxh	Set the value assigned by USB-IF.	0000h
idProduct	2	xxxxh	Set a number for product identification.	0000h
bcdDevice	2	xxxxh	Set a number for product version.	0000h
bClass	1	03h	Set the Class ID (03h).	03h
bSubClass	1	00h: No subclass 01h: Boot Protocol	Set 00h for Devices not supporting the boot protocol and 01h for Devices supporting the boot protocol.	00h
bProtocol	1	00h: None 01h: Keyboard 02h: Mouse	Set 01h when supporting keyboard only, and set 02h when supporting mouse only.	00h
bPower	1	00h: BUS powered 40h: Self powered	Set the power supply method.	00h
bSpeed	1	01h: Low speed [LS] 02h: Full speed [FS]	Set to 01h or 02h.	00h
Flag	1	xxxx xxx1b: idVendor xxxx xx1xb: idProduct xxxx x1xxb: bcdDevice xxxx 1xxxb: bPower xxx1 xxxxb: bClass xx1x xxxxb: bSubClass x1xx xxxxb: bProtocol 1xxx xxxxb: bSpeed	Select the enabled components.  E.g.: 03h Enables idVendor and idProduct only. Devices not corresponding to idVendor and idProduct set are not recognized.	10h

## 4. Download Function

### 4.2.2 MSC

The MSC TPL is configured as shown in Table 4.3 and can include up to 16 settings (12-byte units) in list form.

**Table 4.3 MSC Data structure**

Component	Size (Byte)	Setting value	Description	Default
idVendor	2	xxxxh	Set the value assigned by USB-IF.	0000h
idProduct	2	xxxxh	Set a number for product identification.	0000h
bcdDevice	2	xxxxh	Set a number for product version.	0000h
bClass	1	08h	Set the Class ID (08h).	08h
bSubClass	1	01h: RBC 02h: SFF-8020i, MMC2(ATAPI) 03h: QIC-157 05h: SFF-8070i 06h: SCSI transparent command set *	Set the Sub Class Code. *	00h
bProtocol	1	50h	Set Bulk-Only Transport (50h).	50h
bPower	1	00h: BUS powered 40h: Self powered	Set the power supply method.	00h
bSpeed	1	02h	Set Full speed [FS] (02h).	00h
Flag	1	xxxx xxx1b: idVendor xxxx xx1xb: idProduct xxxx x1xxb: bcdDevice xxxx 1xxxb: bPower xxx1 xxxxb: bClass xx1x xxxxb: bSubClass x1xx xxxxb: bProtocol 1xxx xxxxb: bSpeed	Select the enabled components.  E.g.: 50h Enables bClass and bProtocol only. Devices not corresponding to bClass and bProtocol set are not recognized.	50h

\* The corresponding standards for the settings above are listed below. For more information, refer to “Compliance” in the *S1R72U06 Technical Manual*.

01h:RBC	Reduced Block Commands Revision 10a (RBC)
02h:SFF-8020i, MMC2 (ATAPI)	SFF-8020i, Multi-Media Commands -5 (MMC-5)
03h:QIC-157	QIC 157 Revision D
05h:SFF-8070i	INF - 8070i
06h:SCSI transparent command set	Multi-Media Commands -5 (MMC-5), SCSI Primary Commands -3 (SPC-3), SCSI Block Commands -3 (SBC-3)

### 4.3 Descriptor

The LSI requires a descriptor complying with USB standard to permit operation as a USB Device.

For more information, refer to “Device operation setting” described for USB Device function in the *S1R72U06 Technical Manual*.

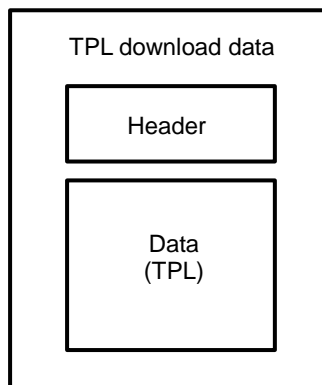
### 4.4 Support Tools

This section describes the support tools and how to use them.

The following support tools are provided:

1. TPLCreateXXX.exe (“XXX” indicates version)

This tool can be used to create TPL download data. It provides support for the areas enclosed within the solid border in Figure 4.3.



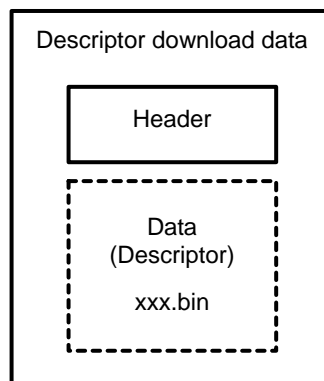
**Figure 4.3 Supported areas**

2. HeaderMakerXXX.exe (“XXX” indicates version)

This tool can be used to add Header to data (Descriptors) and create Descriptor download data.

Data must be created beforehand when using this tool. Any filename is acceptable (with the extension “.bin”).

This tool provides support for the areas enclosed within the solid border in Figure 4.4.



**Figure 4.4 Supported areas**

## 4. Download Function

### 4.4.1 TPL tool

This section describes how to use the TPL support tool.

Step 1: Launch TPLCreateXXX.exe. The example given here is for HID Class.

Step 2: Select **File** → **New** to set **TPL Value** and **Code**, as shown in Figure 4.5.

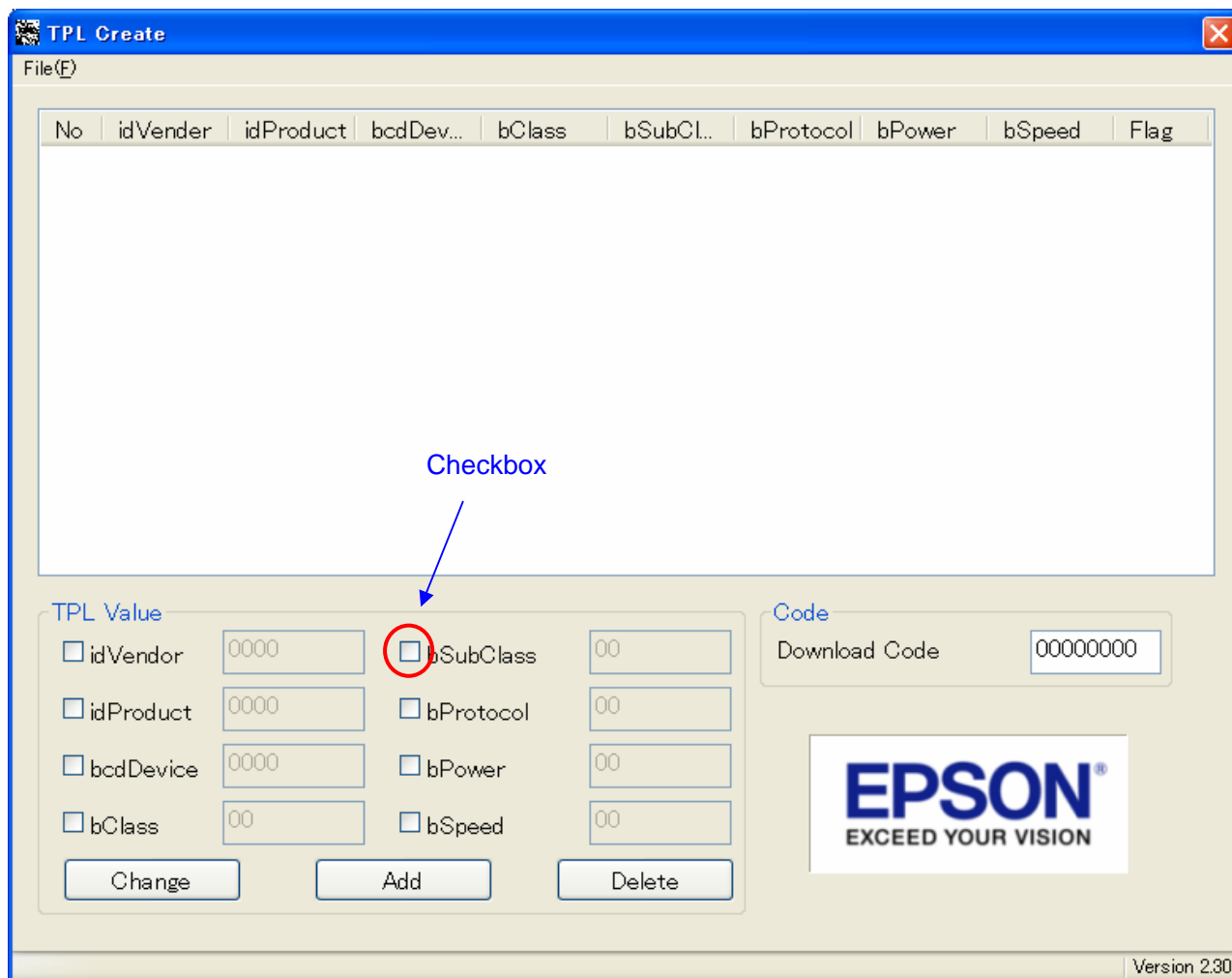


Figure 4.5 Main screen

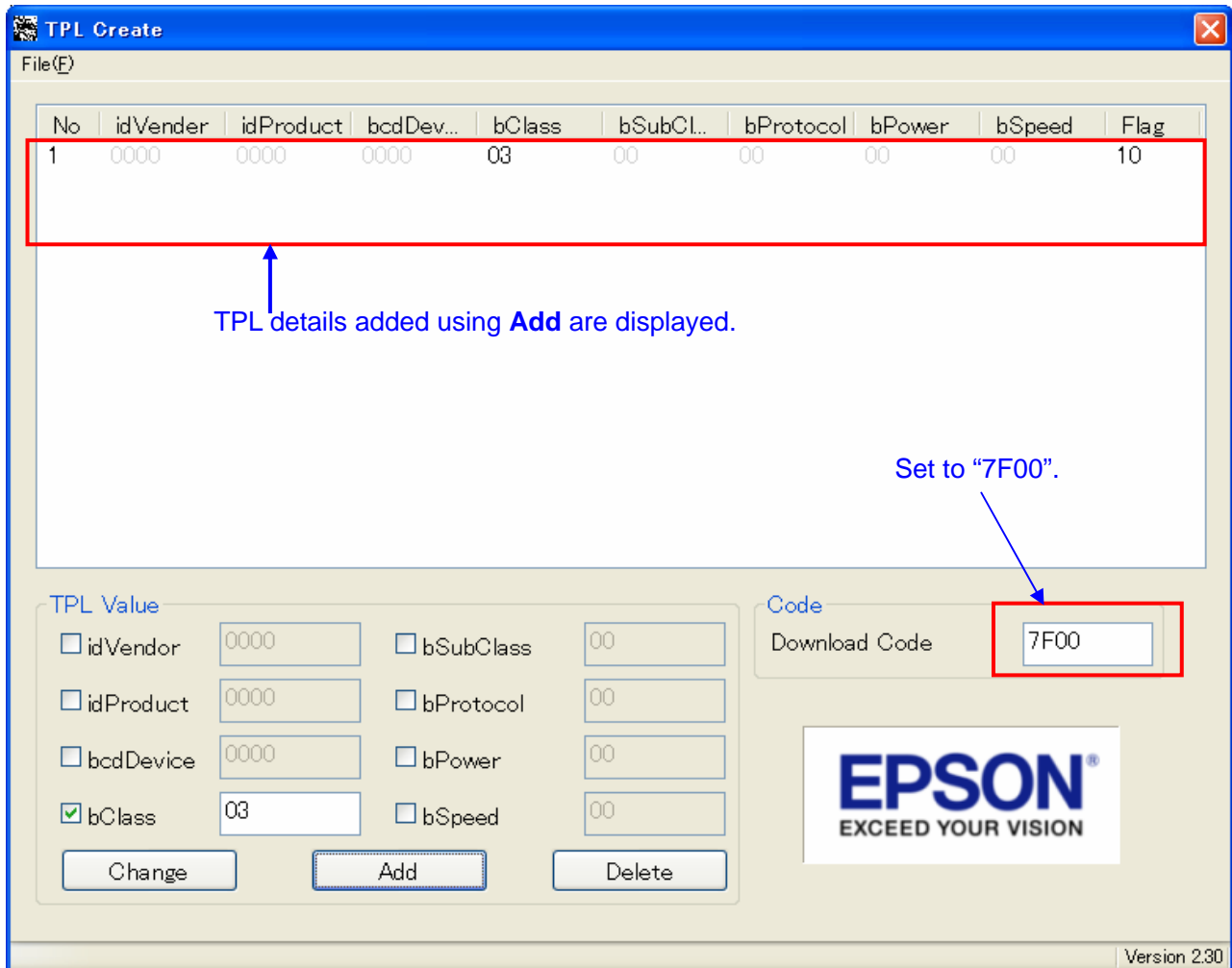
Step 3: Check the setting items under **TPL Value** before making any setting values. (For more information on TPL structure, refer to “4.2 TPL”.)

Step 4: Set “7F00” for **Download Code**.

Step 5: Once settings are complete for one data structure, click **Add**.

Check that the data structure set appears in the list at the top of the screen.

Figure 4.6 shows the display after setting “03” for **bClass** in **TPL Value** and clicking **Add**.



**Figure 4.6 Download data creation example**

Step 6: Repeat steps 3 to 5 to set the required TPLs.

Up to 16 TPLs can be set.

Step 7: Select **File** → **Save** to save the TPLs created.

All data added using **Add** will be saved as TPL download data.

## 4. Download Function

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### 4.4.2 Descriptor tool

This section describes how to use the descriptor support tool.

Step 1: Launch HeaderMakerXXX.exe.

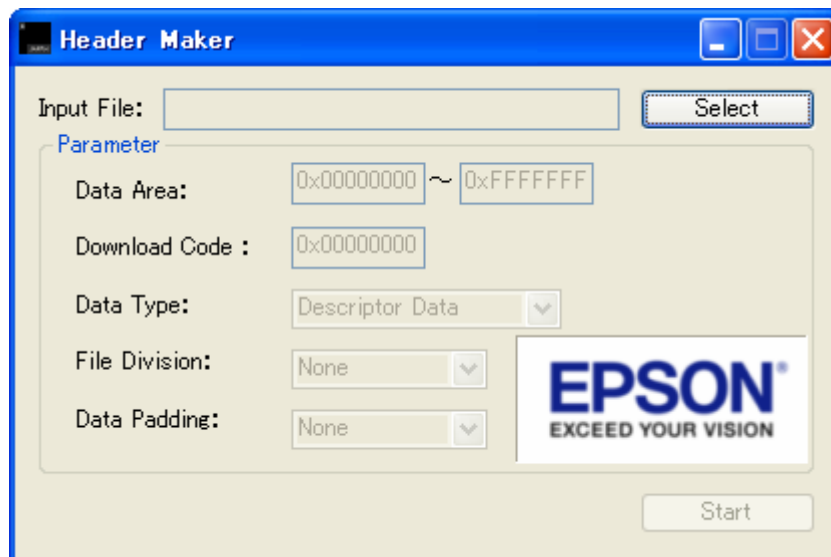


Figure 4.7 Main screen

Step 2: Click **Select** and specify the descriptor file.

The specified file should be backed up, since future saves will overwrite it.

Step 3: Set the **Parameter** as shown in Table 4.4.

Table 4.4 Parameter settings

Parameter	Setting
Data Area	–
Download Code	7B00h
Data Type	Descriptor Data
File Division	None
Data Padding	None

Step 4: Click **Start**.

The header is added to the file specified in **Input File**. The descriptor download data is created.

### 5. NSF Function

The USB Host for the LSI incorporates an NSF function to notify the Main CPU of errors occurring in the USB. The NSF notifies the Main CPU via a dedicated pin on the LSI. For more information on the pin and status, refer to “Notification Function” in the *S1R72U06 Technical Manual*.

#### 5.1 TPL

This indicates an unsupported Device has been detected.

Check the following details if this notification does not function correctly.

- HID Class  
Check “2.5.1.2 USBH: unsupported device”.
- MSC  
Check “2.5.2.2 USBH: unsupported device”.

#### 5.2 ManyDev

This indicates two or more Devices have been detected.

If this notification does not function correctly, check the operating status using “2. History Display Function”.

#### 5.3 ManyHub

This indicates a Device with two or more HUBs has been detected.

If this notification does not function correctly, check the operating status using “2. History Display Function”.

#### 5.4 VBUS\_Cur

This indicates an overcurrent has been detected in VBUS.

Note that this notification indicates that system faults or malfunction may result from overcurrents.

Check for the following system problems.

- Overall system (including LSI) malfunction due to overcurrent.
- VBUS consumption in circuits other than USB.
- Use of self-powered USB Device.
- VBUS power SW is externally attached. For information on the VBUS power SW, refer to the *S1R72U06 Data Sheet*.





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