RX600 Series

USB Host Communication Device Class Driver Installation Guide

R01AN0530EJ0110
Rev.1.10
Sep 01, 2011

Introduction

This document is an installation guide for the USB Host Communication Device Class Driver (herein referred to as HCDC).

This document is intended for use with the Application Note for the Renesas USB Device USB Basic firmware, the USB Host Communication Device Class Driver (HCDC) and hardware manual when developing software.

The HCDC (Application Notes and Sample codes) are available for download from the Renesas web.

Renesas Website: http://www.renesas.com/

Product Name:

Renesas USB Device USB Host Communication Device Class Driver (HCDC)

File Name:

an_r01an0275ej_rx_ usb_device.zip

Target Device

RX62N Group

Contents

1. Introduction

1.1 Feature Overview

This class driver is a sample USB Host Communications Device Class Driver (HCDC).

The HCDC functions comply with the Abstract Control Model of the USB Communication Device Class specification (herein refered to as CDC) and carry out communications with CDC peripheral devices.

The HCDC class driver is developed to be used in combination with Renesas USB Basic firmware (nonOS version) Rev1.10 (Document No.R01AN0512EJ).

The HCDC is equipped with the following functions:

- Carries out communication class data transfer when the host is connected to a CDC peripheral device.
- Sample application included (see Section 2. Sample Application for more details).

1.2 Preparation

The following describes the evaluation environment required to operate this firmware, including the list of necessary devices.

Evaluation Board

— RX62N Group/RX621 Group : Renesas Starter Kit + for RX62N (RX62N-RSK):
Renesas Starter Kit for + RX62N: a complete development kit for Renesas RX62N and RX62N RSK micrcontrollers (manufactured by Renesas Electronics)
→Refer to the Starter Kit Instruction Manual for setup details.

Development Environment

— High-performance Embedded Workshop 4, the integrated development environment (manufactured by Renesas Electronics)
— C/C++ Compiler Package for RX Family (manufactured by Renesas Electronics)
— E1 Emulator or E20 Emulator (manufactured by Renesas Electronics)
→Refer to the corresponding instruction manual for details concerning each Renesas development environment.

Other

— Emulator Host PC (Windows® 2000, Windows® XP)
— Peripheral CDC device
— PC with built-in serial port or Serial port communication target device
— Terminal application program (Tera Term, etc.)
— USB cable
— user cable(It is included to the E1 emulator or the E20 emulator.)

1.3 Setup

1.3.1 Hardware

Figure 1.1 shows the example of the system operating environment of HCDC.

Please refer to the corresponding Application Note concerning evaluation board setup, emulator use, etc.

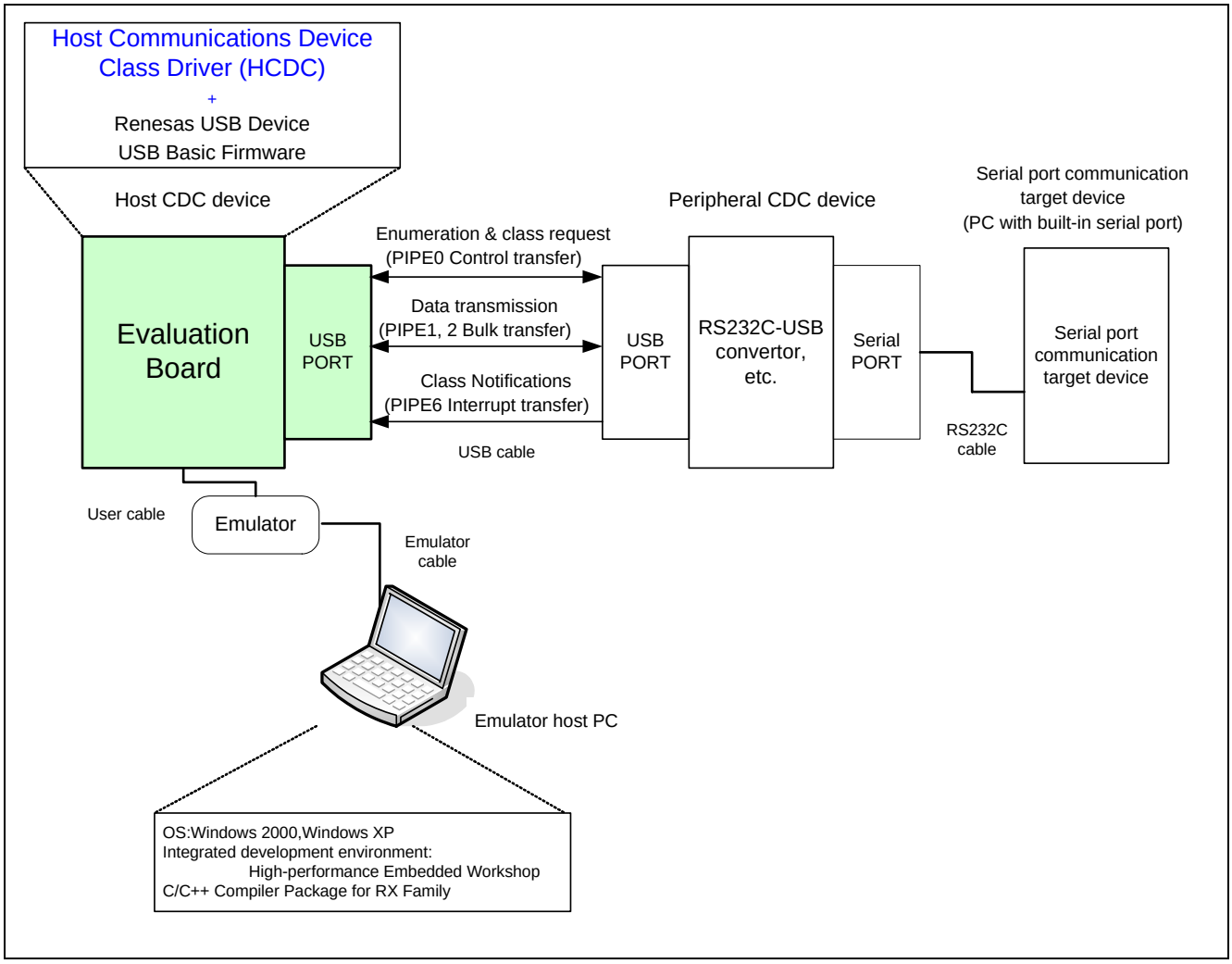

Figure 1.1 Operating Environment Example

Table 1.1 shows the evaluation board of the confirmed operation.

Table 1.1 The evaluation board of confirmed operation

Evaluation Board	MCU	USB port
RX62N-RSK	RX62N	USB1

Software PC environment setup

When using a PC with a built-in serial port, install Tera Term, Hyper Terminal or other general-purpose transmission software. Complete all serial port settings (baud rate, etc.) as shown below.

1.3.2 Software startup

The workspace for HCDC is set up to be compiled, linked and debugged using HEW.Double click on file "Fw .hew".

The project/configuration are created so that the specified source file is the target of the compile.

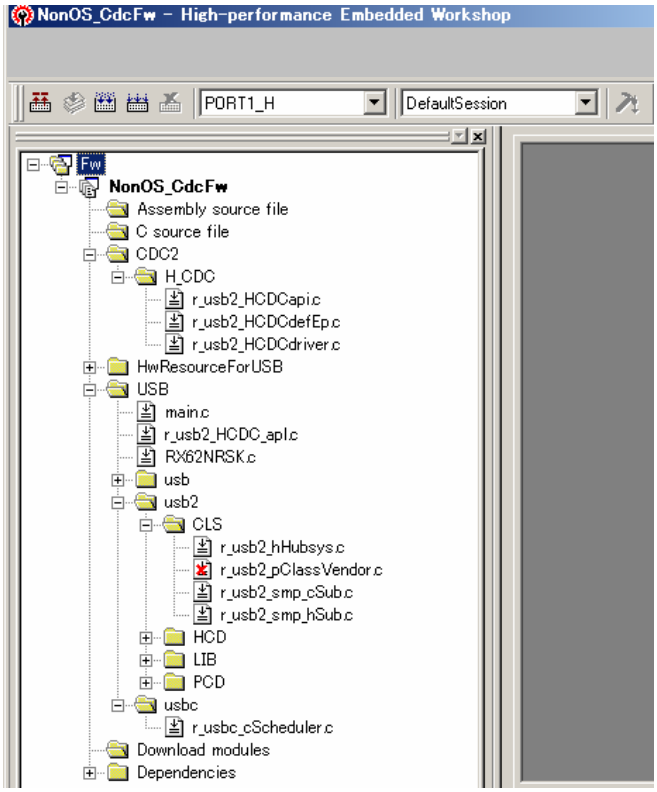

Figure 1.2 Project Selection Example (using HEW)

1) Designate configuration.
In case of RX62N:PORT1_H
2) Connect the emulator after building the project.
3) Download the program by selecting [**Debug → Download.→ All Download Modules**].
4) Execute the program by selecting [**Debug → Execute after Reset**]

2. Sample Application

2.1 Application Specification

The sample application of HCDC (herein referred to as APL) operates by RX62N-RSK.

In APL, USB PORT1 of RX62N-RSK is used as USB host port.

The main APL functions are as follows.

1) Receive data sent from the peripheral CDC device connected to the host.
2) Loopback transmission for received data.

Figure 2.1 shows the data transfer image.

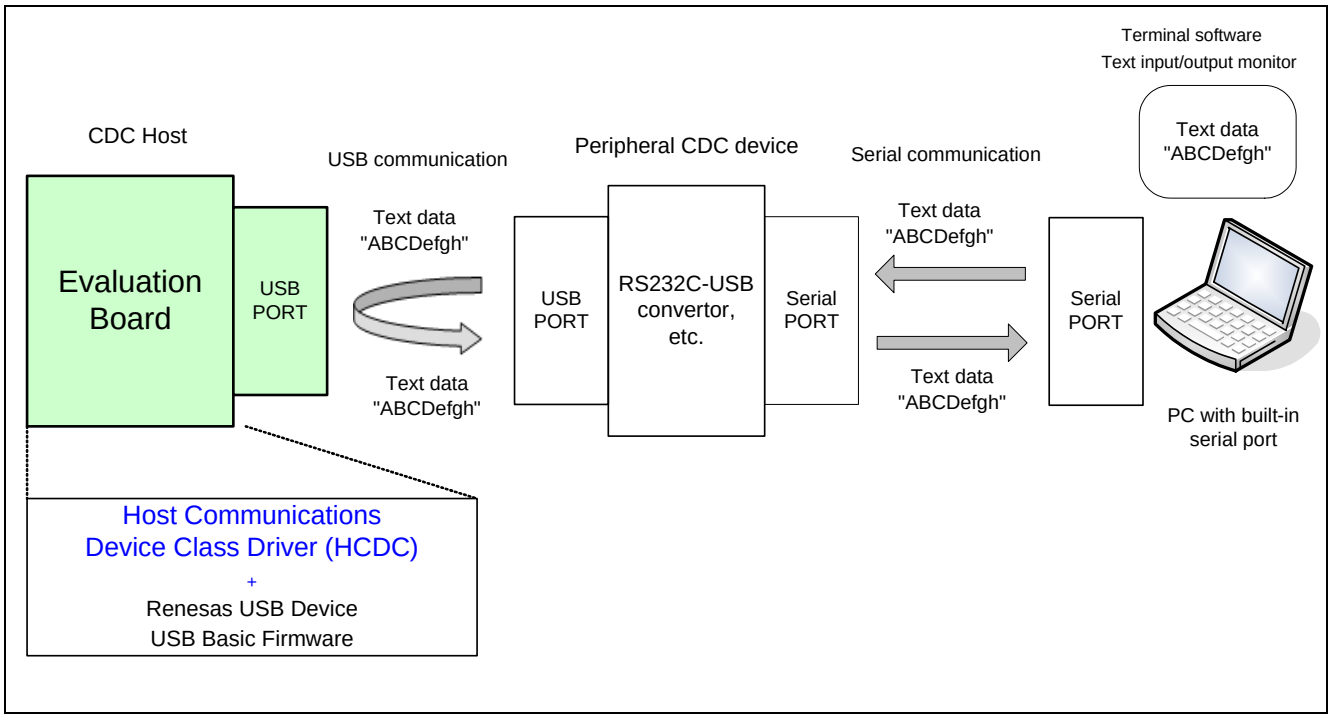

Figure 2.1 Data Transfer (loopback transmission) Conceptual Image

2.2 Explanations for APL processes

Explanations for APL processes are provided below.

- RTS and DTR are set by class request SET_CONTROL_LINE_STATE.
- The transmission rate, the number of data bits, the stop bit length, and the parity bit is set by class request SET_LINE_CODING.
- A network transmission setting and a set value are acquired by class request GET_LINE_CODING.
- The callback function that notifies the change in the state of the line is registered.
- Issues receive request (BULK IN transfer) for CDC device, obtains received data.
- Sends received data to CDC devbice in BULK OUT transfer (loopback).
- When received data cannot be obtained from the CDC device, or when the loopback transmission to the CDC device is completed, a receive request (BULK IN transfer) is issued to the CDC device, and the receive state continues.

2.3 APL process outline flow

The following shows the APL process outline flow. For full details, refer to “r_usb2_HCDC_apl.c”.

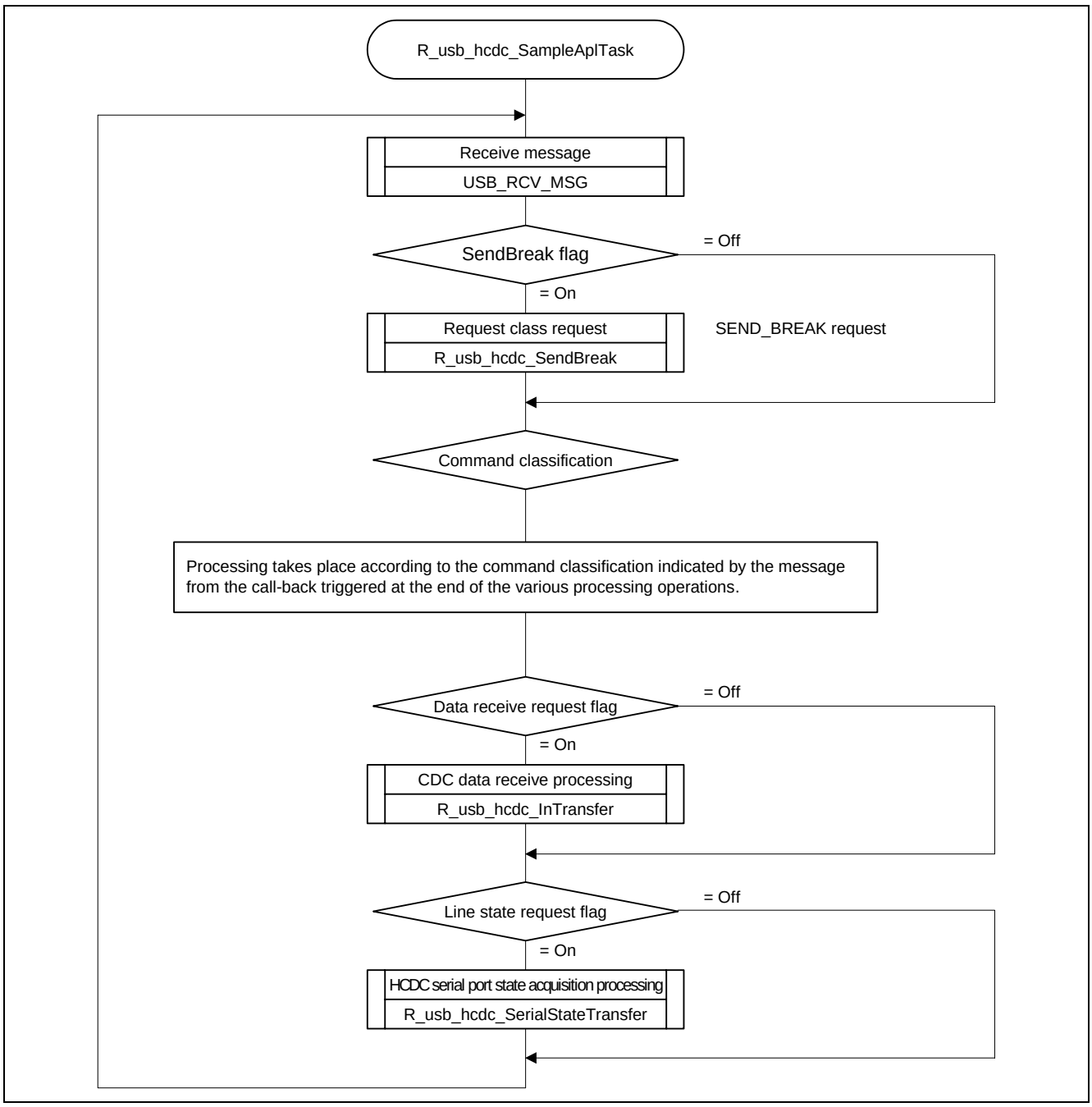

Figure 2.2 Application Task Process Outline Flow

3. Communication Device Class Driver Overview

3.1 Class Request

(1) Class Request (host → device request)

Table 3.1 shows class requests supported by the HCDC.

Table 3.1 HCDC-supported Basic Requests and CDC Class Specific Requests

Request	Code	Description	Supported
SendEncapsulatedCommand	0x00	Sends protocol-defined commands such as AT.	Yes
GetEncapsulatedResponse	0x01	Requests response to command sent in SendEncapsulatedCommand.	Yes
SetCommFeature	0x02	Sets enable/disable for device-specific 2-byte code and country code.	Yes
GetCommFeature	0x03	Sets enable/disable for device-specific 2-byte code and country code.	Yes
ClearCommFeature	0x04	Returns enable/disable status for device-specific 2-byte code and country code to default settings.	Yes
SetLineCoding	0x20	Sets transmission line coding (transmission speed, data length, parity bit, stop bit length)	Yes
GetLineCoding	0x21	Obtains transmission line coding status.	Yes
SetControlLineState	0x22	Sets control signals RTS and DTR for transmission line.	Yes
SendBreak	0x23	Sends break signal.	Yes

(2) Class notification (device → host notification)

Table 3.2 shows class notifications supported by the HCDC.

Table 3.2 CDC Class Specific Notifications

Notification	Code	Description	Supported
NETWORK_CONNECTION	0x00	Notifies network connection state	No
RESPONSE_AVAILABLE	0x01	Response to GET_ENCAPSLATED_RESPONSE	Yes
SERIAL_STATE	0x20	Notifies serial line status	Yes

3.2 PIPE Definition

Pipe definitions are defined in “r_usb_hCDCdefEp.c”. The HCDC analyzes the descriptor (Endpoint Descriptor) obtained from the Peripheral HID device and updates the pipe information table. For more details, refer to the USB-Basic-F/W Application Note (Document No.R01AN0512EJ).

The pipe configuration used when connected to a general PCDC device is shown below.

Table 3.3 PIPE Configuration

PIPE No.	Endpoint No.	Transfer type	Max. Packet Size	Description
PIPE0	EP0	Control In/Out	64	Standard request, class request
PIEP1	EP1	Bulk In	64	Data transfer from device to host
PIPE2	EP2	Bulk Out	64	Data transfer from host to device
PIPE6	EP3	Intterrupt In	16	Status notification from device to host

3.3 Register the HCD

The HCD registration information (HCDREGIST structure) for this sample application is registered as follows in the “R_usb_hstd_DriverRegistration ()” function.

For more details, refer to the Renesas USB Basic Firmware Application Note (Document No.R01AN0512EJ).

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Revision Record

Rev.	Date	Description	
		Page	Summary
1.00	Apr.15.11	—	First edition issued
1.10	Sep.01.11	—	Change Document title name
		—	Change “2.2 Application Program Processing”

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins
   Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.
   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.
2. Processing at Power-on
   The state of the product is undefined at the moment when power is supplied.
   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.
3. Prohibition of Access to Reserved Addresses
   Access to reserved addresses is prohibited.
   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.
4. Clock Signals
   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.
   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.
5. Differences between Products
   Before changing from one product to another, i.e. to one with a different type number, confirm that the change will not lead to problems.
   — The characteristics of MPU/MCU in the same group but having different type numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different type numbers, implement a system-evaluation test for each of the products.

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