RTKA720115DE0000BU

4-Port USB 2.0 Hub

Description

The RTKA720115DE0000BU evaluation board (previously named ET-D720115-0002) is a 4-port USB 2.0 hub using the μPD720115K8-611-BAK-A USB 2.0 hub controller.

This hub expands four USB 2.0 ports from a PC's USB 2.x port. No specific driver is required for a common OS like Windows 11 and Linux based OS (for example, Ubuntu).

Specifications

- Compliant with Universal Serial Bus Specification Revision 2.0
  - Supports Low-Speed (1.5Mbps), Full-Speed (12Mbps), and Hi-Speed (480Mbps)
  - Supports USB 2.0 link power management (LPM: L0/L1/L2/L3)
- Windows Hardware Certification for Windows 8 and Windows 8.1 (Submission ID = 1617556)
- Certified by USB Implementers Forum
  - μPD720115: TID = 30000066

Features

- 4-Port USB 2.0 Hub
  - 4-Port USB 2.0 Hub Controller: μPD720115K8-611-BAK-A
- Configurable downstream port counts of 2, 3, or 4 ports
- BC support:
  - Port 1: SDP Only
  - Port 2: SDP Only
  - Port 3: SDP Only
  - Port 4: CDP + Auto1
- Power Supply:
  - 5V Power Supply
  - On chip LDO for 3.3V from 5V input and for 1.05V from 3.3V input.
- VBUS control:
  - Individual over-current detection
  - Individual power control
- System clock: 24MHz crystal

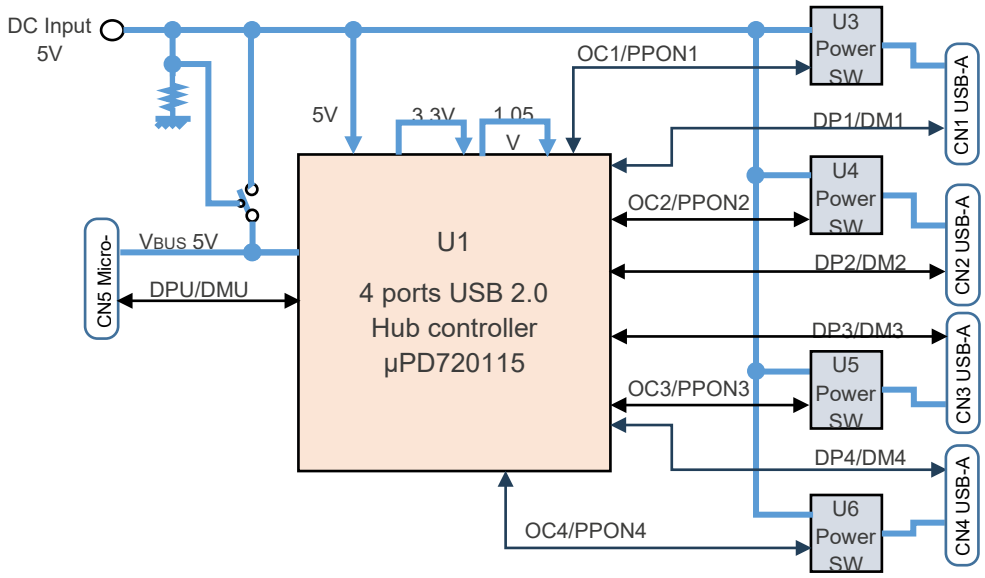

Figure 1. Typical Application Circuit for 4-Port USB 2.0 Hub (RTKA720115DE0000BU)

Contents

Figures

1. Related Documents

Use this document in combination with the following documents.

The related documents mentioned in this publication may include preliminary versions. However, preliminary versions are not marked as such.

- µPD720115 Datasheet (R19DS0078)
- µPD720115 User's Manual (R19UH0099)

Note: Some documents and design information may contain the previous board name ET-D720115-0002, thus, read ET-D720115-0002 as RTKA720115DE0000BU.

2. Functional Description

The evaluation board is a USB 2.0 Hub that supports 4 USB 2.0 downstream ports. Major operating systems, such as Windows and Linux, include standard USB 2.0 drivers so no specific drivers are required to evaluate this board with a PC system.

2.1 Required Equipment

- RTKA720115DE0000BU evaluation board: 1 unit
- USB-A to micro-B Cable: 1 unit
- AC Adapter (if RTKA720115DE0000BU is used as self-powered mode): 1 unit

Table 1. RTKA720115DE0000BU AC Adapter Specifications

DC Output Voltage	5V
Current Rating (Amps)	5A
DC Power Connector	
Configuration	The center contact is the output voltage
Industry Recognized Mating Diameter	2.00mm ID (0.079"), 5.50mm OD (0.217")
Actual Diameter	0.076" (1.93mm ID), 0.248" (6.30mm OD)

Important: Use this board when you understand and agree that Renesas does not have any responsibility, indemnification, or liability for use of this board.

2.2 Required Environment

The RTKA720115DE0000BU evaluation board requires generic USB Hub driver to work. We have checked that it works with the OS in box driver for Windows / Linux OS as of 2023.

Important: Depending on the change of USB control method for both Windows/Linux OS, there is a possibility that the USB host/hub controller operation may be incorrect. Therefore, Renesas can not guarantee that our USB host controller works correctly with future drivers and environments.

The basic evaluation was performed with the following driver and environment:

- Windows 10 20H2 Build 19042 and Ubuntu 23, kernel v6.5.0 with Intel Core i5-6500 (code name: Skylake) on Asus H110M-K MB
- Windows server: Received certification on 2012 RTM, 2012 R2 RTM, and 2022
- Linux: Kylin Ubuntu 16 Kernel 4.9.23 and Ubuntu 18, kernel v5.10.0
- Windows 10 20H1 build 19041 and 21H1 Build 19043
- Windows 11

2.3 Quick Start Guide

The RTKA720115DE0000BU evaluation board allows easy evaluation of the Renesas USB 2.0 hub controllers using a PC system as noted in the following sections.

2.3.1 Connecting to a PC

If RTKA720115DE0000BU evaluation board is used as bus-powered mode, connect the Micro-B connector of the RTKA720115DE0000BU to the USB-A connector of the PC system via a USB cable. Plug and play automatically begins.

If RTKA720115DE0000BU is used as self-powered mode, first supply power to the RTKA720115DE0000BU by connecting a suitable AC adapter to the DC 5V jack. Connect the Micro-B connector of the RTKA720115DE0000BU to the USB-A connector of the PC system via a USB cable. Plug and play automatically begins.

2.3.2 Connecting to USB Peripherals

After connecting the RTKA720115DE0000BU to a PC system, plug and play is initiated when the USB-A connector of the RTKA720115DE0000BU is connected to the USB-B or Micro-B connector of a USB peripheral device via a USB cable.

Note: There are restrictions on the bus-powered peripheral devices that may or may not be connected to the USB-A connector of the RTKA720115DE0000BU in the bus-powered mode.

3. Board Design

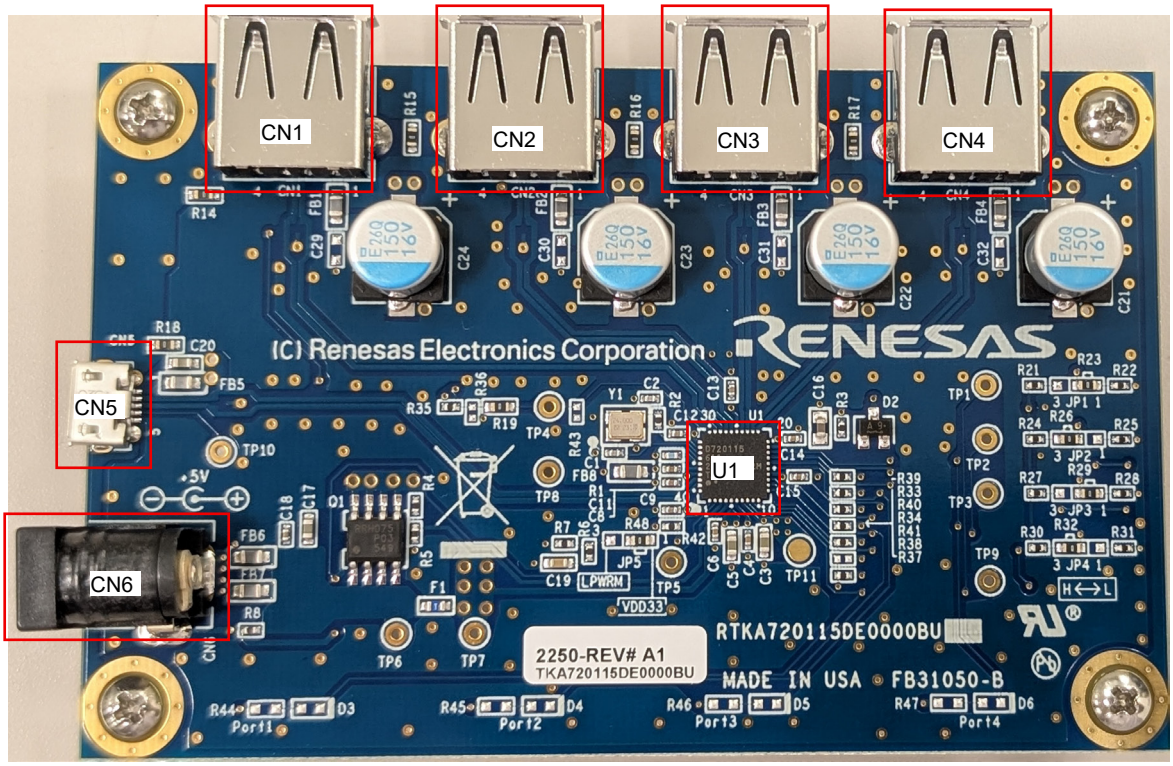

Figure 2. Highlighted Main Parts on the RTKA720115DE0000BU Evaluation Board (top)

Table 2. RTKA720115DE0000BU Evaluation Board Connectors

Label	Description
CN1	USB-A receptacle for USB downstream facing Port 1
CN2	USB-A receptacle for USB downstream facing Port 2

Label	Description
CN3	USB-A receptacle for USB downstream facing Port 3
CN4	USB-A receptacle for USB downstream facing Port 4
CN5	Micro USB-B receptacle for USB upstream facing Port
CN6	DC 5V jack

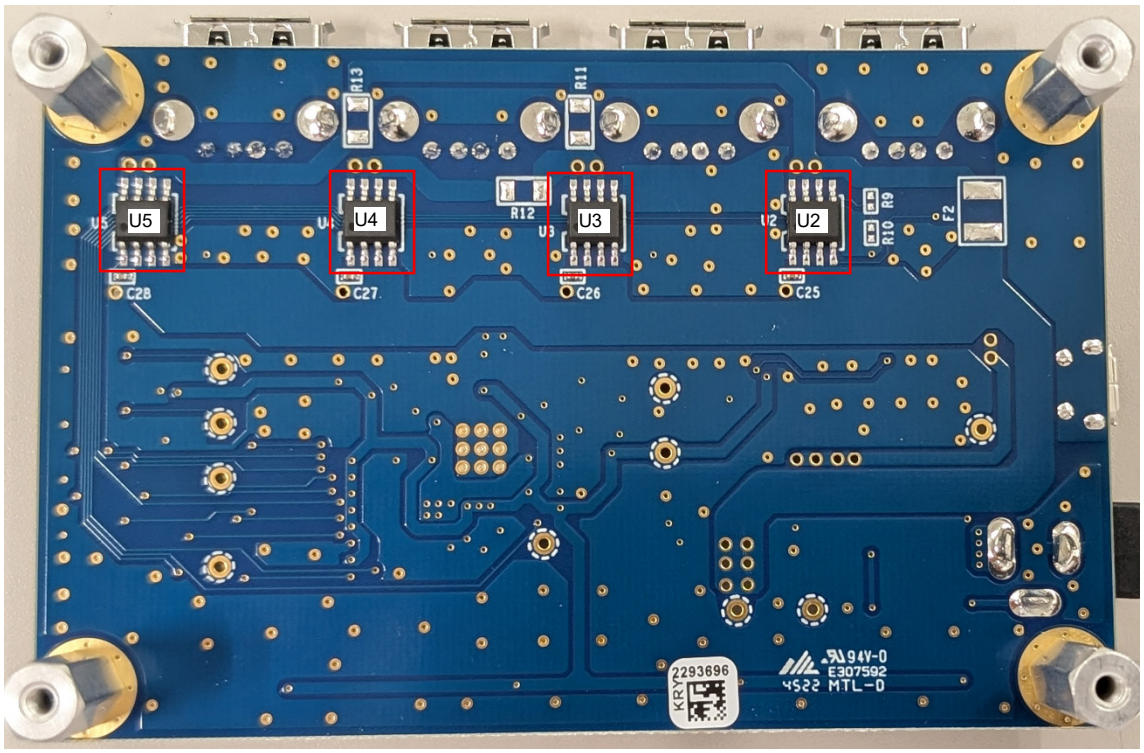

Figure 3. Highlighted Main Parts on the RTKA720115DE0000BU Evaluation Board (bottom)

Table 3. RTKA720115DE0000BU Evaluation Board ICs

Label	Description
U1	µPD720115 (4-Port USB 2.0 Hub Controller) (see Figure 2)
U2	USB VBUS power switch for USB downstream facing Port 1
U3	USB VBUS power switch for USB downstream facing Port 2
U4	USB VBUS power switch for USB downstream facing Port 3
U5	USB VBUS power switch for USB downstream facing Port 4

3.1 Pin and Function Assignment for µPD720115

Table 4 shows the pin and function descriptions of the µPD720115 on the RTKA720115DE0000BU evaluation board.

Table 4. Pin and Function Descriptions for µPD720115 on the RTKA720115DE0000BU Evaluation Board

Pin No.	Pin Name	Function	Descriptions
1	OCI1B	OCI	Over current input for USB downstream facing Port 1
2	LPWRM	LPWRM	Local power monitor input
3	VBUSM	VBUSM	Upstream port VBUS monitor
4	VDD50IN	VDD5	LDO 5V input

Pin No.	Pin Name	Function	Descriptions
5	VDD33OUT	VDD33	LDO 3.3V output
6	VDD33IN	VDD33	LDO 3.3V input
7	VDD10OUT	VDD10	LDO 1.05V output
8	SUSPEND	SUSPEND	SUSPEND state output
9	PPON2B	PPON	Port power control for USB downstream facing Port 2
10	OCI2B	OCI	Over current input for USB downstream facing Port 2
11	LED2B	Open	Unused
12	PPON3B	PPON	Port power control for USB downstream facing Port 3
13	OCI3B	OCI	Over current input for USB downstream facing Port 3
14	VDD33	VDD33	Power supply (+3.3V) for I/O buffer
15	LED3B	Open	Unused
16	PPON4B	PPON	Port power control for USB downstream facing Port 4
17	OCI4B	OCI	Over current input for USB downstream facing Port 4
18	LED4B	Open	Unused
19	RESETB	RESET	Chip reset input
20	VDD10	VDD10	Power supply (+1.05V) for core logic
21	DM4	DFP_D-	DM signaling for USB 2.0 downstream facing Port 4
22	DP4	DFP_D+	DP signaling for USB 2.0 downstream facing Port 4
23	DM3	DFP_D-	DM signaling for USB 2.0 downstream facing Port 3
24	DP3	DFP_D+	DP signaling for USB 2.0 downstream facing Port 3
25	VDD33	VDD33	Power supply (+3.3V) for I/O buffer
26	DM2	DFP_D-	DM signaling for USB 2.0 downstream facing Port 2
27	DP2	DFP_D+	DP signaling for USB 2.0 downstream facing Port 2
28	DM1	DFP_D-	DM signaling for USB 2.0 downstream facing Port 1
29	DP1	DFP_D+	DP signaling for USB 2.0 downstream facing Port 1
30	PPON1B	PPON	Port power control for USB downstream facing Port 1
31	VDD33	VDD33	Power supply (+3.3V) for I/O buffer
32	XT2	XTO	24MHz external oscillator output
33	XT1	XTI	24MHz external oscillator input
34	IC(L)	Pull-down	Unused
35	RREF	RREF	Reference voltage input for USB 2.0
36	AVDD33	AVDD33	Power supply (+3.3V) for analog circuit
37	VDD10	VDD10	Power supply (+1.05V) for core logic
38	DMU	UFP_D-	DM signaling for USB 2.0 upstream facing Port
39	DPU	UFP_D+	DP signaling for USB 2.0 upstream Facing Port
40	VDD33	VDD33	Power supply (+3.3V) for I/O buffer
GND PAD	GND	GND	Ground

3.2 Schematic Diagrams

For the schematic diagram (PDF) and DSN file, see RTKA720115DE0000BU 4-Port USB 2.0 Hub Design Files.

3.3 Bill of Materials

For the Bill of Materials (BOM), see RTKA720115DE0000BU 4-Port USB 2.0 Hub Design Files.

3.4 Board Layout

For the Gerber files and BRD file, see RTKA720115DE0000BU 4-Port USB 2.0 Hub Design Files.

4. Ordering Information

Part Number	Description
RTKA720115DE0000BU	4-Port USB 2.0 Hub Evaluation Board

5. Revision History

Revision	Date	Description
2.00	Nov 14, 2025	Reformatted document to the latest template.
1.00	Jan 22, 2025	Initial release.