

Lighting Communications

Demonstration Board for Lighting communication data protocols

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- If the product was disassembled, altered, or repaired by the customer
- If it was dropped, broken, or given another strong shock
- Use at overvoltage, use outside guaranteed temperature range, storing outside guaranteed temperature range
- If the cable of the power adapter, the USB interface cable or the like was bent or pulled excessively
- If a power adapter other than the supplied product was used
- If the product got wet
- If this product is connected to the target system when there is a potential difference between the GND of this product and GND of the target system.
- If the connectors or cables are plugged/unplugged while this product is in the power-on state.
- If excessive load is applied to the connectors or sockets
- If a metal part of the power connection, or another such part comes in contact with an electrostatic charge.
- If the product is used or stored in an environment where an electrostatic or electrical noise is likely to occur.

2. Safety precautions

- Parts of board can become hot during operation!
- Do not look into the LEDs directly; doing so may cause weakening eyesight!
- Be careful of electrical shock. There is a danger of electrical shock if the product is used as described above in **1. Circumstances not covered by product guarantee**.
- The power adapter supplied with the product is exclusively for this product, so do not use it with other products.

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Chapter 1 Introduction

This board can be used as communication master in case controlling each lighting evaluation board by communication. DMX512, DALI (digital addressable lighting interface), and IR are supported.

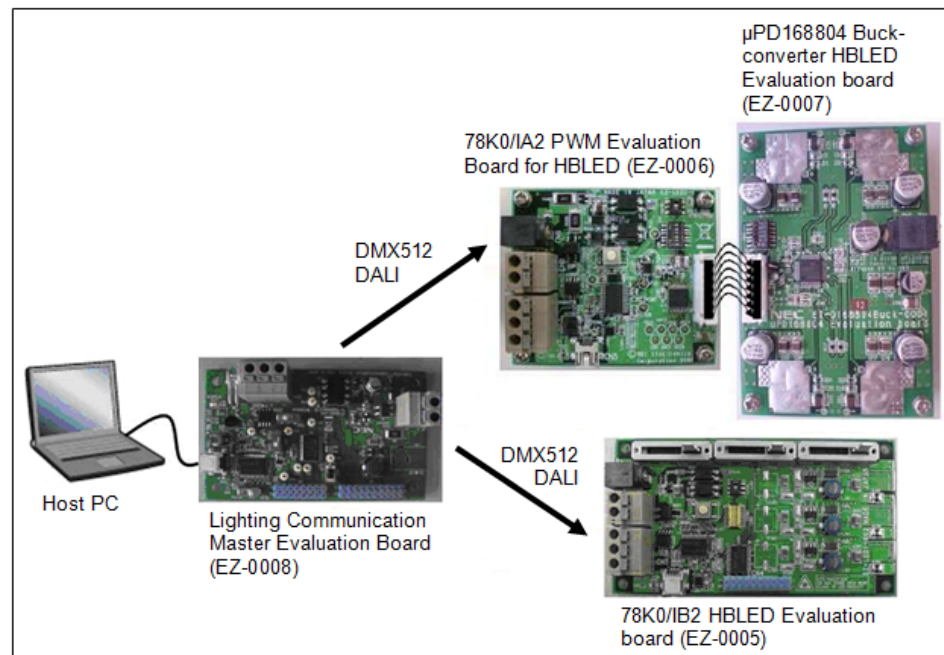
Each lighting evaluation board can be controlled via this communication master board by using a GUI program. Control GUI programs for DALI and DMX512 are available on the CD-ROM included in this demonstration kit. This board is using USB bus power for its operation.

Note: Following boards can be controlled

78K0/IB2 HBLED Evaluation board (EZ-LED1-002) Part number: EZ-0005

78K0/IA2 PWM Evaluation board (EZ-LED2-001) Part number: EZ-0006

Figure 1-1 System setup example



1.1 Package contents

- Lighting Communication Master Evaluation board (EZ-0008)
- USB cable
- One set of plastic stands and screws
- CD-ROM with DALI and DMX512 Master Control GUI software

Please verify that you have received all parts listed in the package contents list attached to the *Lighting Communications* package. If any part is missing or seems to be damaged, please contact the dealer from whom you received your *Lighting Communications* demonstration kit.

1.2 Features

- USB power supply.
 - 5V supply voltage
 - 15V for DALI communication generated by switching regulator
- 3 kinds of operation mode supported
 - DMX512 protocol communication interface
 - DALI protocol communication interface
 - IR remote control interface

1.3 System requirements

HOST PC	A PC supporting Windows XP (32bit), Windows Vista (32bit) or Windows 7 (32bit) is required. A Pentium processor with at least 1 GHz CPU performance, with at least 256 Mbytes of RAM, allowing you to fully utilize and take advantage of the product features. 500 Mbytes of free disk space and an additional 10 Mbytes of free disk space on the Windows system drive.
Host interface	A web browser and Adobe Reader to be able to access all the product documentation. USB interface that enables communication based on USB (Ver1.1 or later)

Note: Updates of the GUI programs, documentation and/or utilities for the *Lighting Communications* demonstration Kit, if available, may be downloaded from the Renesas WEB page(s) at <http://www.renesas.eu/78K0-LIGHTCOMMS>

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Chapter 2 Hardware

This chapter describes the specification of Lighting Communication Master Evaluation Board (EZ-0008) delivered with the *Lighting Communications* demonstration kit.

The *Lighting Communications* demonstration kit is assembled with a Renesas μ PD78F0503DA 8-bit microcontroller and connectors for DALI and DMX512 as well as an IR diode for IR communication.

Figure 2-1 Appearance of Lighting Communication Master Evaluation Board (Top View)

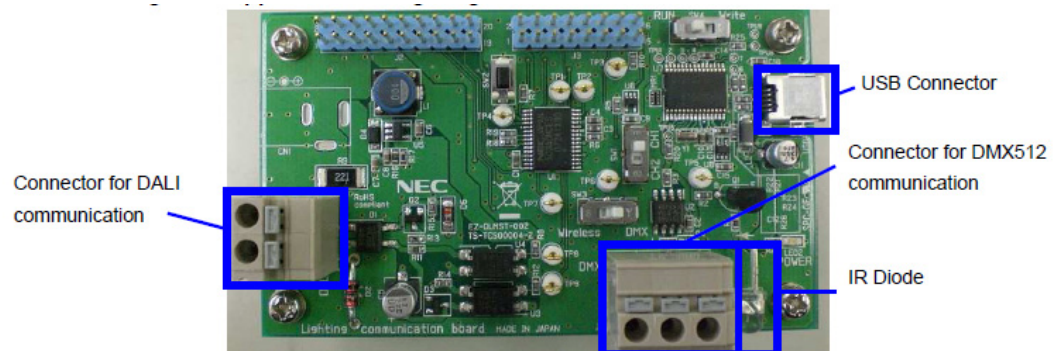
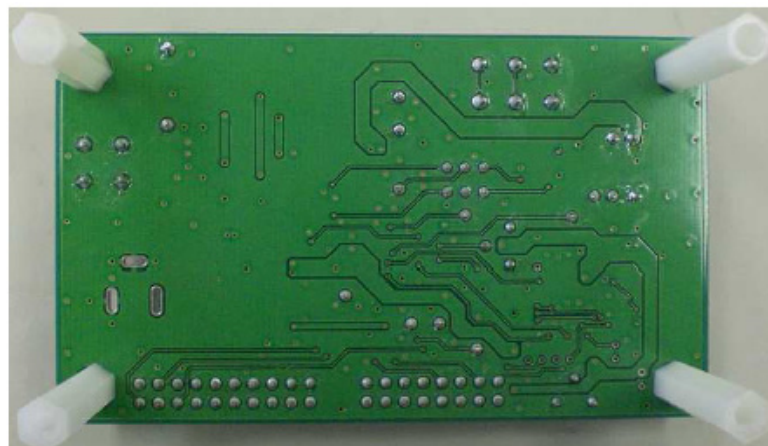


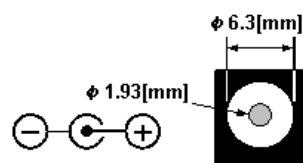
Figure 2-2 Appearance of Lighting Communication Master Evaluation Board (Bottom View)



2.1 Power supply

The following AC adaptor or dc power supplier is recommended to be applied to the Lighting Communication Master Evaluation board via the Switchcraft RAPC722 (Center pin f 1.93mm, Plug f 6.3mm (max) connector).

Figure 2-3 Polarity and shape of DC plug



- DC power supplier
Output voltage: 15 V
Connector: refer to [figure 2-3](#)

Note: Use DC adapter adapted to safety standard of each country.

2.2 Switch settings

Different switches are assembled to the Lighting Communication Master Evaluation Board to set up the wanted communication mode. The functionality of these switches is described below.

2.2.1 SW1 (IR remote control)

With **SW1** the IR remote control code is chosen.

Table 2-1 SW1 settings

Position	Communication protocol
CH1	DMX512 interface
CH2	DALI interface

2.2.2 SW2 (IR remote signal send)

SW2 is a push button to send the selected IR remote signal.

2.2.3 SW3 (DMX512 mode select)

SW3 enables or disables the DMX512 communication operation.

Table 2-2 SW3 settings

Position	Communication protocol
DMX512	Enable DMX512 communication operation
Wireless	Disable DMX512 communication operation

2.2.4 SW4 (Operation mode select)

With **SW4** the wanted operation mode can be selected.

Table 2-3 SW4 settings

Position	Communication protocol
RUN	Enable communication operation
Write	Disable communication operation Reserved for USB microncontroller firmware updating

2.3 Switch setting for communication protocol evaluation

SW3 and **SW4** have to be set to following settings for the regarding communication protocols.

Table 2-4 SW4 settings

Communication protocol	SW3	SW4
DMX512 protocol	DMX	RUN
DALI protocol	Don't care	RUN
IR protocol	Don't care	RUN

2.4 DMX512 Interface

The Lighting Communication Master evaluation board provides a DMX512 connector to communicate with other hardware via the DMX512 communication standard. Therefore the connector is connected to the UART0 interface of the μ PD78F0503DA microcontroller via the SW3 switch.

Table 2-5 DMX512 Connectors

Pin Number	Communication protocol
1	Ground
2	D+
3	D-

Chapter 3 *Lighting Communications* installation and operation

3.1 Getting started

The *Lighting Communications* demonstration kit comes with a PC based DMX512 and DALI master GUI. To be able to run these tools the Microsoft .net framework 3.5 is needed to be installed on the host PC. If it is not already installed on your host system please install it before installing the DMX512 or DALI master GUIs.

As communication interface between the PC host system and the Lighting Communication Master evaluation board a standard USB interface line is needed. Before you can communicate with via the DMX512 and DALI master software tools, software and hardware have to be installed properly.

3.2 CD-ROM contents

The CD-ROM shows following directory structure:

Table 3-1 *78K0/1x2 LED Control* CD-ROM directory structure

78K0IX2-LED	CD-ROM ROOT
 Acrobat	1. Acrobat Reader for 32Bit Windows OS
 Doc	2. Documentation
 dotnet	3. Microsoft .net package
 Driver	4. <i>78K0/1x2 LED Control</i> USB driver files
 Master tools	5. GUI programs for DALI and DMX512
 Renesas Flash Programmer	6. Flash Programming GUI
 sample program	7. Master control firmware

3.3 Pre-programmed firmware program

The pre-programmed firmware allows the user to use this Lighting Communication Master evaluation board as DALI or DMX512 master controller in order of the hardware setting chosen. If the firmware is damaged or erased by mistake from the device it can be programmed again by using the Renesas Flash Programmer GUI. The firmware "master.hex" can be found on the CD-ROM in the sample program folder.

Chapter 4 Hardware Installation

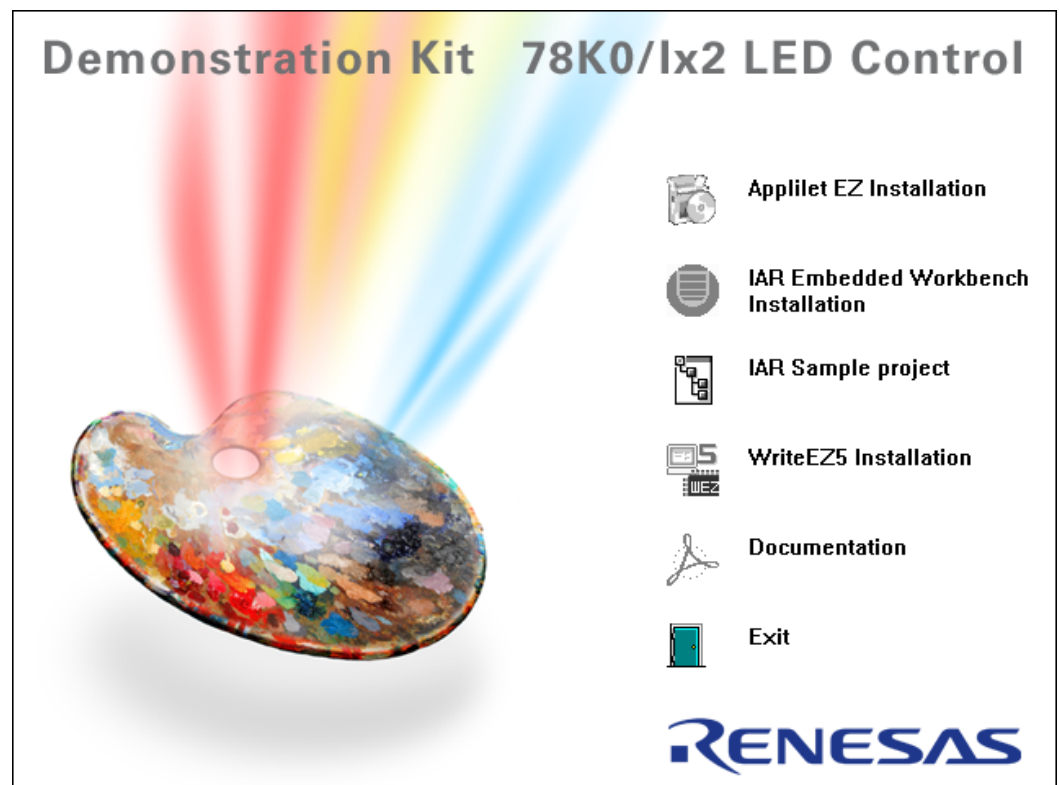
After unpacking the *Lighting Communications* Starter kit, connect the board via the USB connector to your host computer using the provided USB interface cable. When Lighting Communication Master evaluation board is connected, the USB driver needs to be installed on the host machine. Please refer to the following [Chapter 5 Software Installation](#).

Chapter 5 Software Installation

The *Lighting Communications* package comes with the following software packages:

- DMX512 Master Controller GUI
- DALI Master Controller GUI
- Microsoft .net Framework 3.5
- Renesas Flash Programmer GUI including the PRM file for μ PD78F0503

Figure 5-1 78K0IX2-LED CDROM autorun.exe



5.1 Microsoft .net Framework 3.5

Microsoft .net Framework 3.5 is needed for the DMX512 and the DALI Master Controller GUI. If not installed already please install this tool before installing the above mentioned programs. To install the Microsoft .net Framework 3.5 just press the regarding button from the Autorun of the CD-ROM provided within the *Lighting Communications* demonstration kit package. The setup dialogue will guide you through the installation process. The installation can also be started by executing the `dotNetFx35setup.exe` in the directory "`\dotnet`" of the CD-ROM.

5.2 DMX512 Master Controller GUI installation

To install the DMX512 Master Controller GUI just press the regarding button from the Autorun of the CD-ROM provided within the *Lighting Communications* demonstration kit package. The setup dialogues will guide you through the installation process. The installation can also be started by executing the `DMX512MCGUI_V100E.msi` in the directory "`\Master tools`" of the CD-ROM.

Note: Make sure that Microsoft .net Framework 3.5 is installed on your host PC before installing the DMX512 Master Controller GUI.

5.3 DALI Master Controller GUI installation

To install the DALI Master Controller GUI just press the regarding button from the Autorun of the CD-ROM provided within the *Lighting Communications* demonstration kit package. The setup dialogues will guide you through the installation process. The installation can also be started by executing the `DALIMCGUI_V100E.msi` in the directory "`\Master tools`" of the CD-ROM.

5.4 Renesas Flash Programmer installation

To install Renesas Flash Programmer just press the regarding button from the Autorun of the CD-ROM provided within the *Lighting Communications* demonstration kit package. The setup dialogues will guide you through the installation process. The installation can also be started by executing the `RFP-EE_V10200.exe` in the directory "`\Renesas Flash Programmer`" of the CD-ROM.

5.5 USB Driver Installation

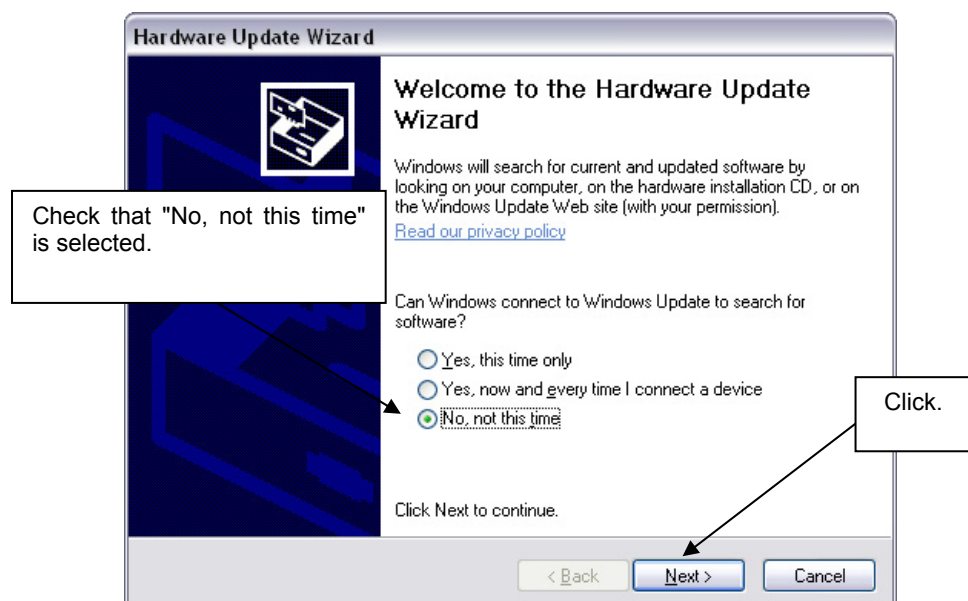
In order to use the Lighting Communication Master evaluation board the USB driver needs to be installed on the host machine. Install the driver according to the following procedure:

Installation on Windows XP	Page 13
Installation on Windows 7	Page 16

5.5.1 Installation on Windows XP

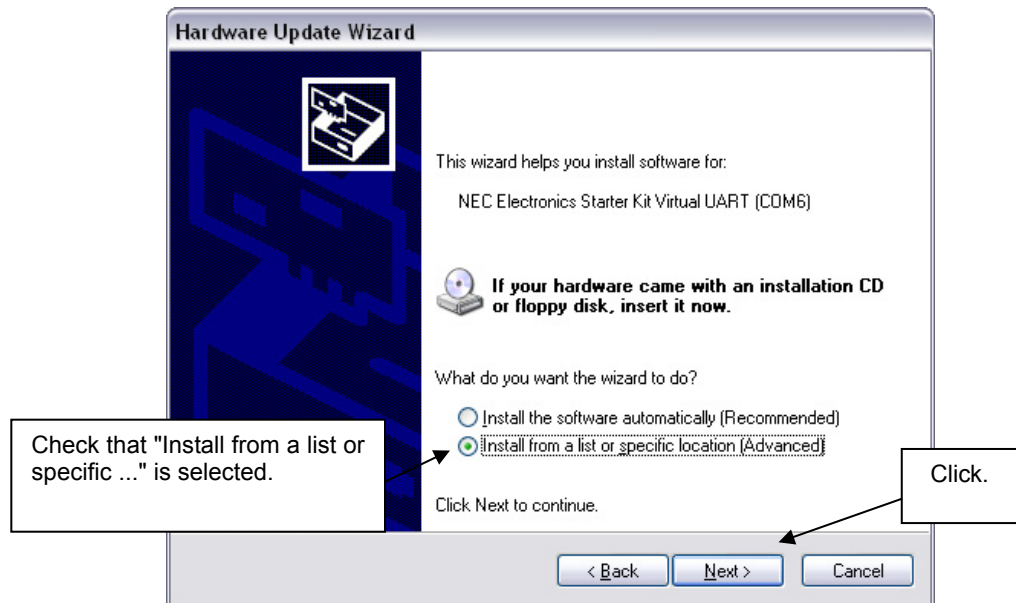
1. When the Lighting Communications evaluation board is connected with the host machine, the board is recognized by Plug and Play, and the wizard for finding new hardware is started. At first the hardware wizard will ask if windows should search on the windows update web, check "No, not this time" and then click Next>.

Figure 5-4 Found New Hardware Wizard 1 (Windows XP)



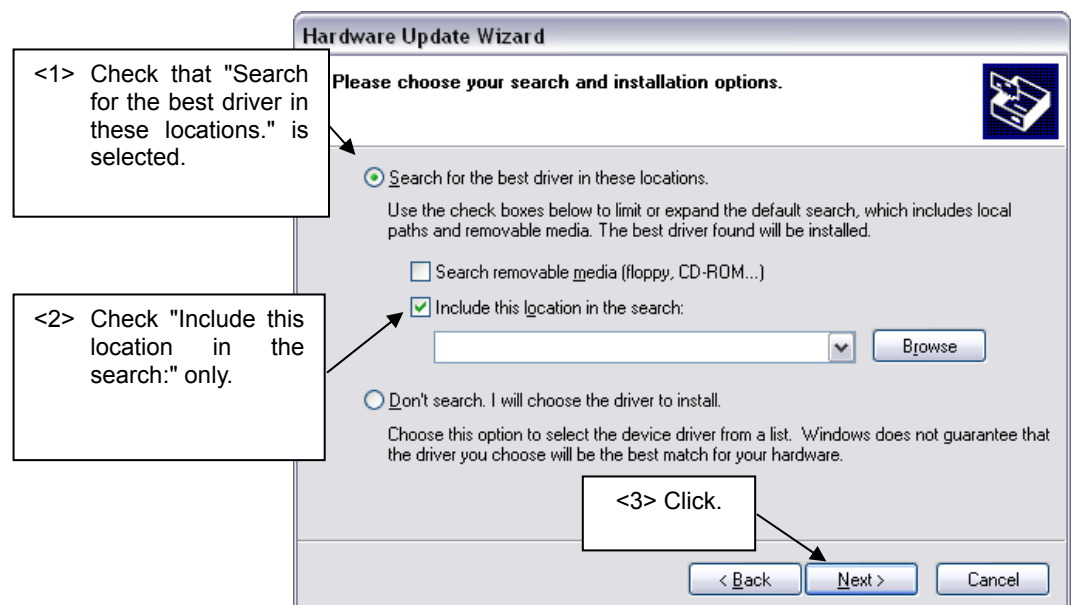
2. Check that "Install from a list or specific location (Advanced)" is selected, then click **Next>**.

Figure 5-5 Found New Hardware Wizard 2 (Windows XP)



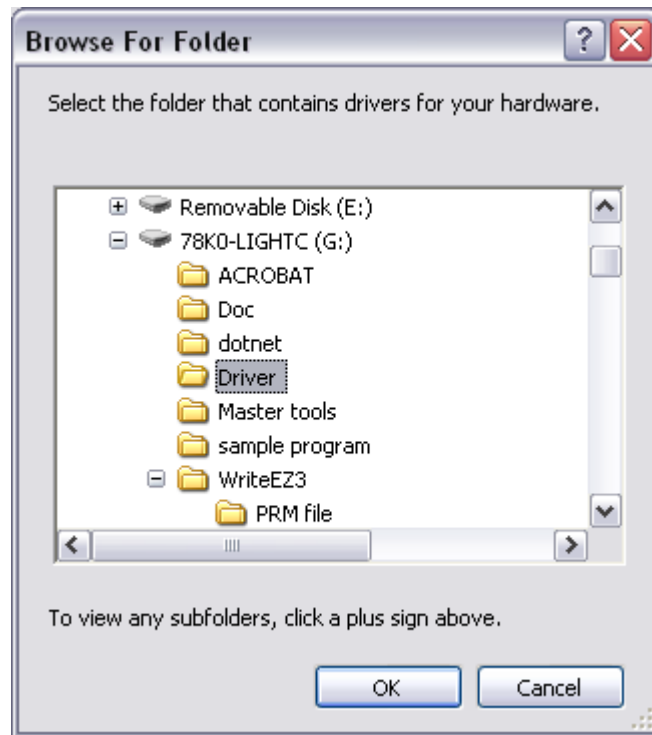
3. Check that "Search for the best driver in these locations." is selected. Select the "Include this location in the search:" check box and then click **Browse**.

Figure 5-6 Search Location Specification 1 (Windows XP)



4. Locate the folder "C **CDROM**:\Driver" and click **OK**.

Figure 5-7 Search Location Specification 2 (Windows XP)



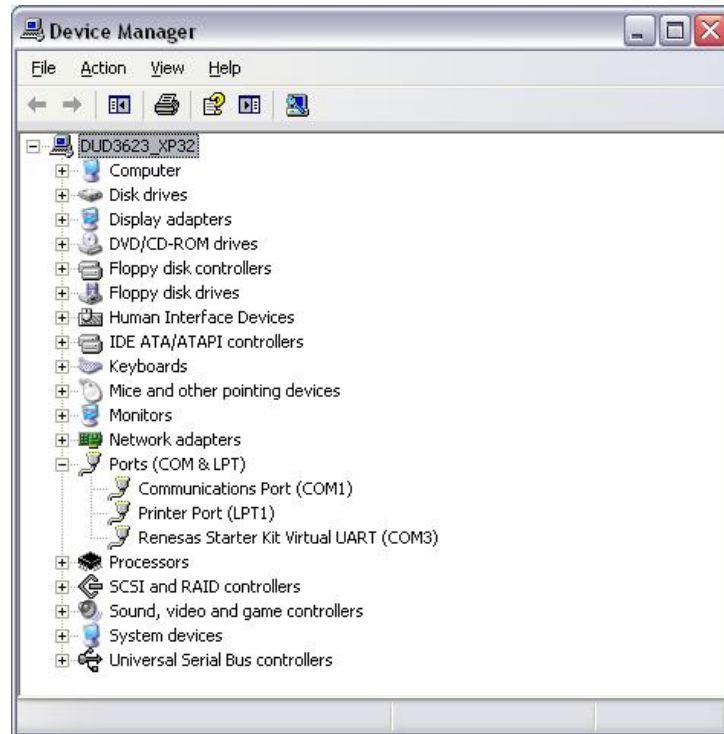
5. After the installation of the USB driver is completed the window below is displayed. Click **Finish** to close the hardware wizard.

Figure 5-8 USB Driver Installation Completion (Windows XP)



6. After installing the USB driver, check that the driver has been installed normally, according to the procedure below. When using the Lighting Communications evaluation board the "Renesas Electronics Starter Kit Virtual UART" should be present like in the figure below.

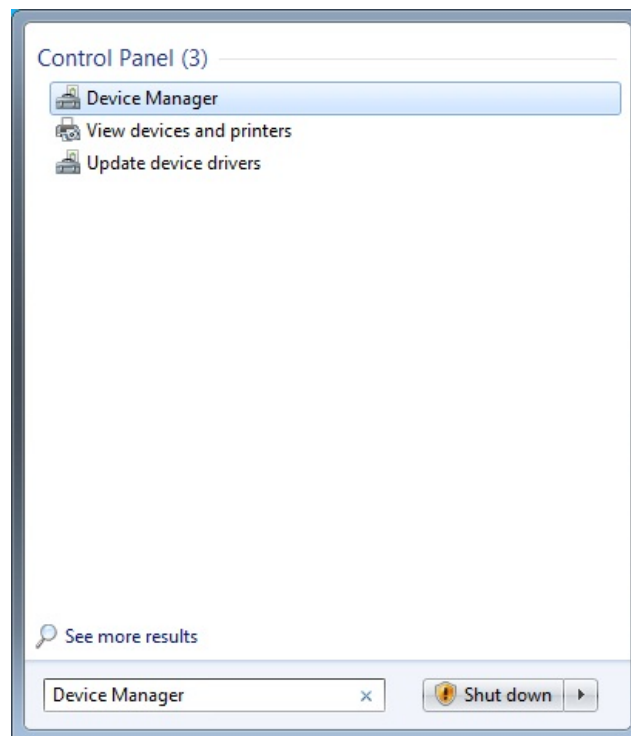
Please check in the Windows "Device Manager" within the Windows Properties ("Hardware" tab), that the driver is installed normally.

Figure 5-9 Device Manager driver correctly installed (Windows XP)

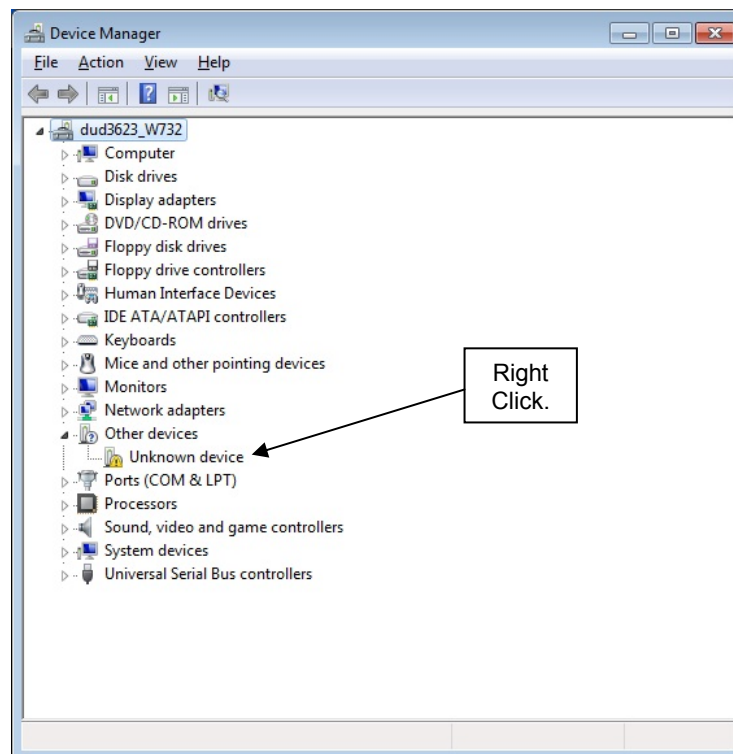
5.5.2 Installation on Windows 7

When the Lighting Communications evaluation board is connected with the host machine, the board is recognized by Plug and Play, and the wizard for finding new hardware is started. When firstly installing a Renesas Demonstration Kit, that uses the Virtual COM port driver, the automatic installation will fail. Therefore the USB driver has to be installed manually. To do so please follow the instructions below:

1. Press the Start Button and type "Device Manager" into the text box. Select the Device Manager from the available search results

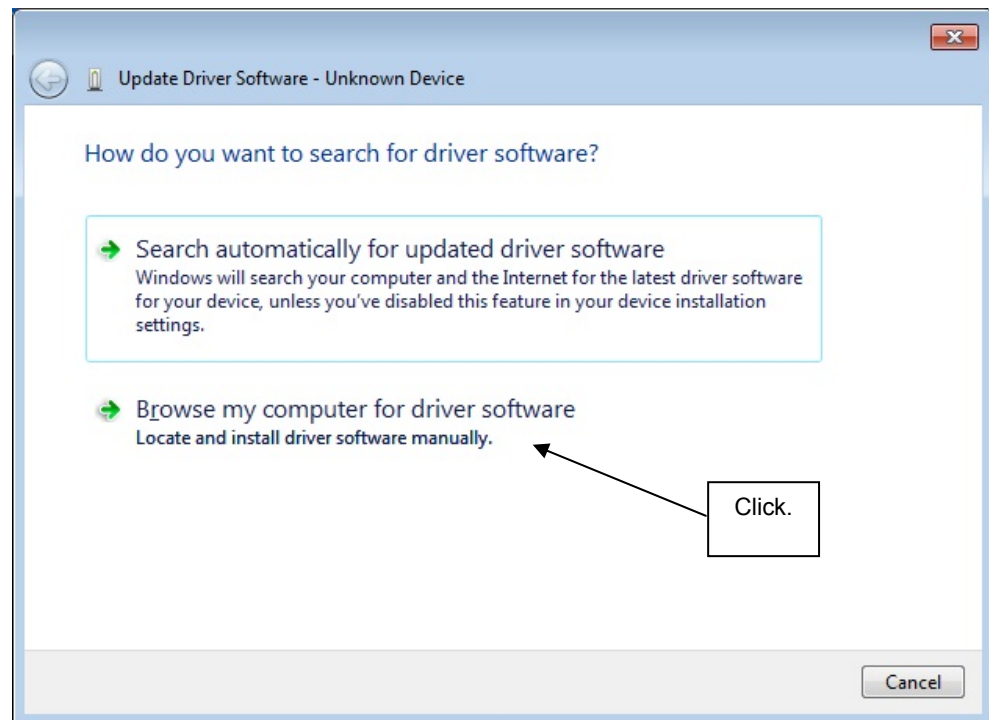
Figure 5-10 Open device manager (Windows 7)

2. The Lighting Communications evaluation board is listed as “Unknown device”. Right click on the “Unknown device” entry and select “Update driver”.

Figure 5-11 Locate Device to manually install USB driver (Windows 7)

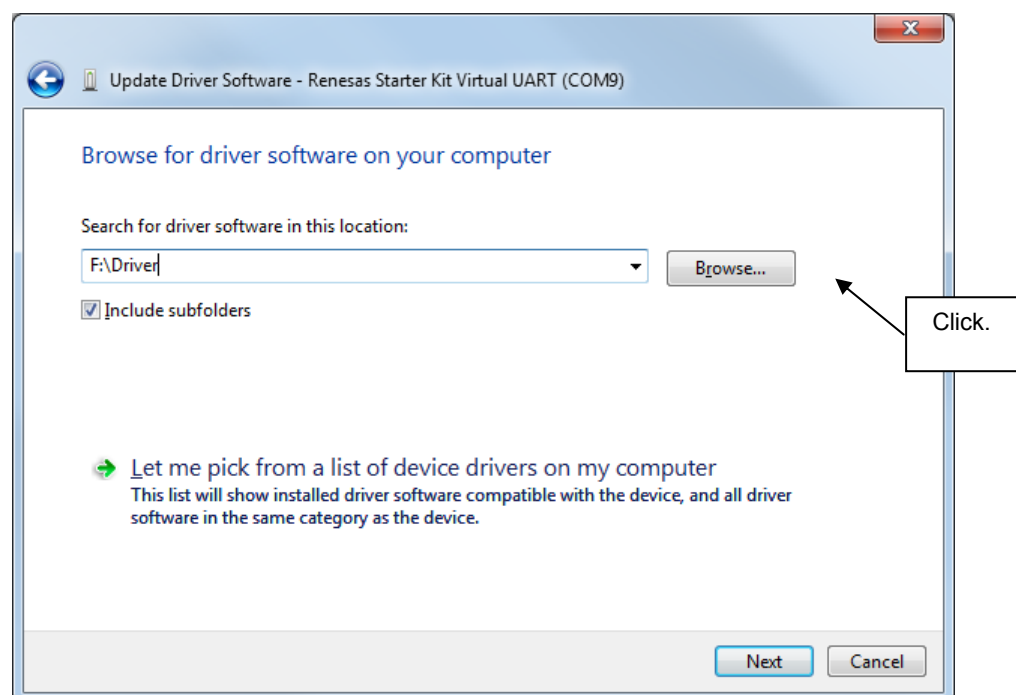
3. Select "Browse my computer for driver software" to locate and install the driver software manually

Figure 5-12 Select driver search method (Windows 7)



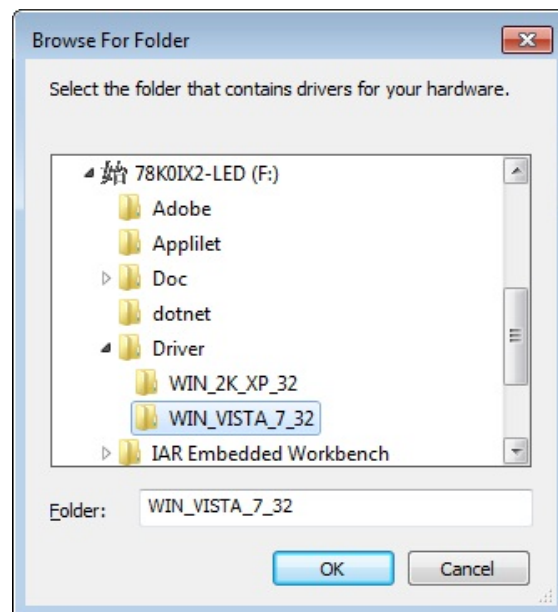
4. Click **Browse** to locate the USB driver location.

Figure 5-13 Search Location Specification 1 (Windows 7)



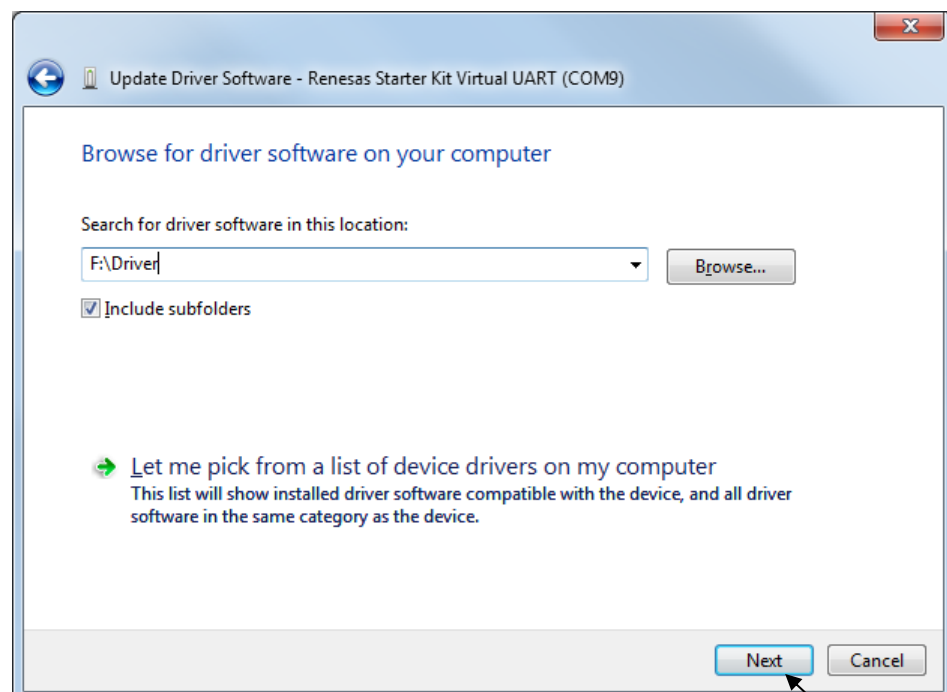
5. Locate the folder "**CDROM:\Driver**" and click **OK**.

Figure 5-14 Search Location Specification 2 (Windows 7)



6. Press **Next** when the correct search path is inserted in the "Search for driver in this location:" field.

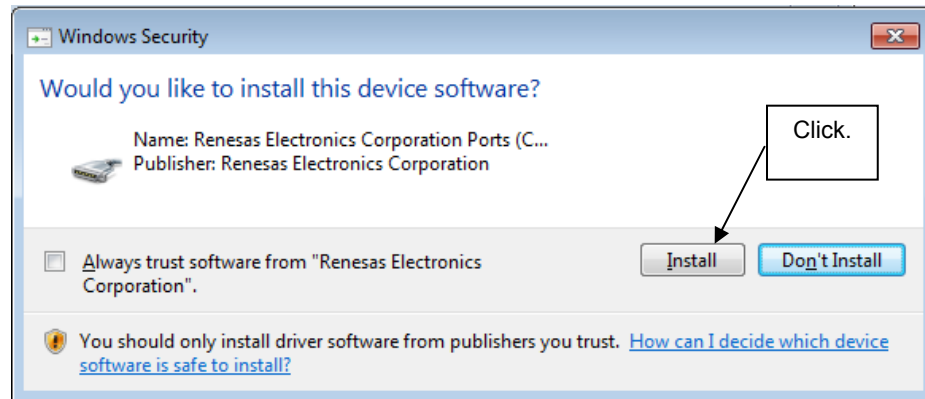
Figure 5-15 Search Location Specification 3 (Windows 7)



Click.

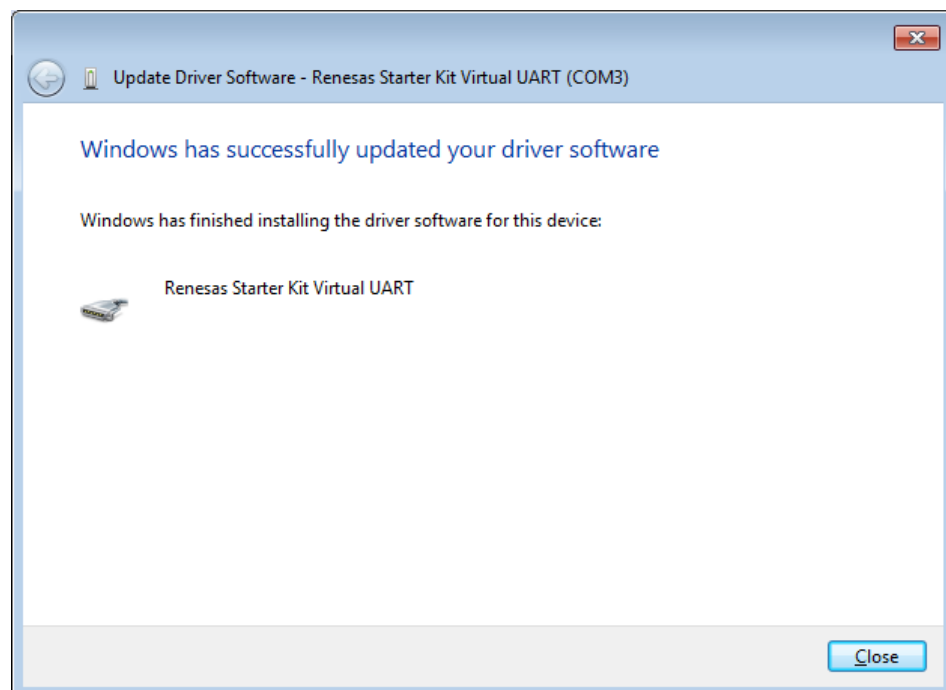
7. Based on the Windows 7 security settings the "Would you like to install this device software" dialogue can pop up. If so press **Install**.

Figure 5-16 Windows security information (Windows 7)

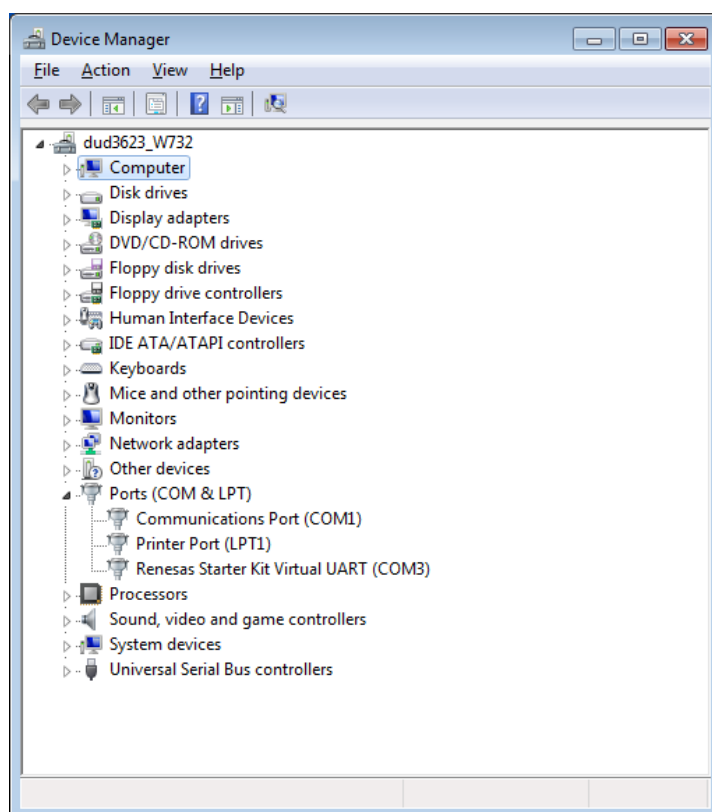


8. After the installation of the USB driver is completed the window below is displayed. Click **Close** to close the hardware wizard.

Figure 5-17 USB driver installation completion (Windows 7)



9. After installing the USB driver, check that the driver has been installed normally, according to the procedure below. When using the Lighting Communications evaluation board the "Renesas Electronics Starter Kit Virtual UART" should be present like in the figure below.

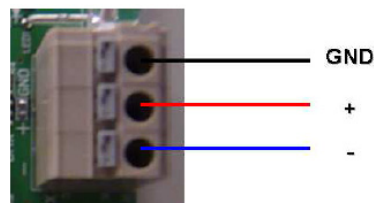
Figure 5-18 Device Manager driver correctly installed (Windows 7)

Chapter 6 DMX512 Master Controller GUI

In this chapter you will find a description how to set up the hardware settings to be able to use the DMX512 Master Controller GUI. For further information how to use the software tool please refer to the DMX512 Master Controller GUI User's manual (U19596EJ1V0UM00.pdf) in the "\Doc" folder of the delivered CD-ROM.

1. Make sure that SW4 is on "RUN" and SW3 on "DMX" side
2. Connect the lighting communication master evaluation board with DMX512 slave board or your own evaluation board supporting DMX512 protocol via interface J1.
3. Connect lighting communication master evaluation board with PC by a USB cable.

Figure 6-1 DMX interface connector



4. Insert power supply to the slave board.
5. Send DMX512 codes to slaves by DMX512 Master Controller GUI or your own software.
6. Disconnect the DC power of slave board.
7. Disconnect the lighting communication master evaluation board and the host PC.
8. Disconnect the lighting communication master evaluation board and the slave board.

When using a communication line longer than 1m, a twisted pair wire is recommended to be used for the '+' and '-' lines.

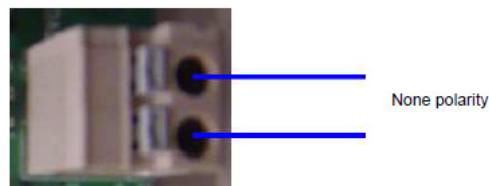
Note: Do not plug or unplug a connector or cable while power is applied to the board.

Chapter 7 DALI Master Controller GUI

In this chapter you will find a description how to set up the hardware settings to be able to use the DALI Master Controller GUI. For further information how to use the software tool please refer to the DALI Master Controller GUI User's manual (U19607EJ1V1UM00.pdf) in the "\\Doc" folder of the CD-ROM.

1. Confirm SW4 is set to "RUN" side.
2. Connect the lighting communication master evaluation board (EZ-0008) with DALI slave board or your own evaluation board supporting DALI protocol via interface J4.

Figure 7-1 DALI interface connector



3. Connect lighting communication master evaluation board with PC by a USB cable
4. Insert power supply to the slave board.
5. Send DALI codes to slaves by DALI Master Controller GUI or your own software.
6. Disconnect the DC power of slave board.
7. Disconnect the lighting communication master evaluation board and the host PC.
8. Disconnect the lighting communication master evaluation board and the slave board.

Note: Do not plug or unplug a connector or cable while power is applied to the board.

[MEMO]

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