Quick Start Guide

EZ-0008

Lighting Communication Master Evaluation Board

ZUD-CE-09-0018-E

Data Published March 2009

© NEC Electronics Corporation

- The information in this document is current as of March, 2009. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets or data books, etc., for the most up-to-date specifications of NEC Electronics products. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.
- No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Electronics. NEC Electronics assumes no responsibility for any errors that may appear in this document.
- NEC Electronics does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC Electronics products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Electronics or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of a customer's equipment shall be done under the full responsibility of the customer. NEC Electronics assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC Electronics endeavors to enhance the quality, reliability and safety of NEC Electronics products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC Electronics products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment and anti-failure features.
- NEC Electronics products are classified into the following three quality grades: "Standard", "Special" and "Specific".

  The "Specific" quality grade applies only to NEC Electronics products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of an NEC Electronics product depend on its quality grade, as indicated below. Customers must check the quality grade of each NEC Electronics product before using it in a particular application.

  "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots.

  "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support).

  "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

- The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

(Note)

(1)"NEC Electronics" as used in this statement means NEC Electronics Corporation and also includes its majority-owned subsidiaries.

(2)"NEC Electronics products" means any product developed or manufactured by or for NEC Electronics (as defined above).

Safety Precautions

This document explains matters to be noted for safe use of Lighting Communication Master Evaluation Board. Be sure to read this document before using Lighting Communication Master Evaluation Board.

- Be sure to observe all dangers, warnings, cautions, and other instructions contained herein when using this evaluation board.
- This document should be kept handy at all times for ready reference.

Symbols used

This document uses the following symbols for matters to be observed for the safe use of the unit.

The symbols are followed by a brief explanation of the possible extent of problems which may occur if the notices are not observed.

Danger	The user may suffer death or serious injury and it's risk is high if the warning is not observed.
Warning	The user may suffer death or serious injury if the warning is not observed.
Caution	Human injury or property damage may occur if the caution is not observed.

The following symbols express matters which are prohibited in order to prevent injury or accident.

General prohibition The action mentioned is prohibited.	**Do not touch** Touching the specified location may cause injury.	**Do not disassemble** Disassembly may cause a problem such as electrical shock or product failure.
Keep away from water Use near water poses the risk of electrical shock or product failure if moisture were to contact the unit.	**Flammable** A nearby flame may cause the unit to catch fire.	**Do not touch with wet hands** Touching with wet hands may cause electric shock or product failure.

The following symbols are used for cautions to prevent product failure and accidents.

General caution Unspecified general cautions.	**Caution Hot** Human injury by high temperature may occur.

The following symbols are used for instructions to prevent product failure and accidents.

Compulsory action based on an instruction for the user.	Instruction to unplug the AC adapter.

Warnings

Warning	
	Do not use this board in the purpose except the evaluation of MCU. This board does not take safety measures or anti-EMI measures required for lighting equipment.
	Do not heat the board or expose it to fire, and do not short the terminals. Doing so may cause product failure, generation of heat, fire, or rupture.
	Do not disassemble or modify the board. Doing so may cause product failure, emission of smoke, fire, or electric shock.
	Do not touch with wet hands. Doing so while power is supplied cause product failure or electrical shock.
	Do not drop or jolt the board. Doing so may break or damage the board, causing fire or electric shock.
	Do not turn on power switch in insufficient state of cable connection such as USB cable, interface cable. Doing so may cause product failure, generation of heat, fire or electric shock.
	Do not plug in or unplug a connector or cable with power applied to the board. Doing so may cause product failure, generation of heat, fire or rupture.
	Do not carry this board with connecting USB cable and any cable. Doing so may cause damage of cable and cause product failure, generation of heat, fire or electric shock.
	Use this board with spacer and on the isolated bench. In case conductor contact to the board, it may cause product failure, generation of heat, fire or electric shock.
	If smoke or an abnormal smell or sound is emitted, or heating occurs, promptly unplug USB cable. Using the board in such a state poses a risk of fire, burning, or electric shock.

Cautions

Caution	
	Do not use or store this board in any of the following locations. - Environments with copious water, humidity, steam, dust, fumes, etc. - Environments where static electricity or electrical noise is readily generated. Such influences can lead to electric shock or product failure. In case liquid enters the board, cut the power supply, and consult your dealer or NEC Electronics sales representative. Even if the unit appears to be dry, internal moisture may remain.
	To prevent static electricity damage, guard against energizing when touching metal parts such as the connector. Static electricity can cause product failure.

CONTENTS

CHAPTER 1 OVERVIEW ····· 7

CHAPTER 2 SPECTIFICATION ····· 8

CHAPTER 3 OPERATION ····· 11

APPENDIX A REVISION HISTORY ····· 15

1. Overview

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 GUI. Control GUI can be downloaded from NEC Electronics WEB site.

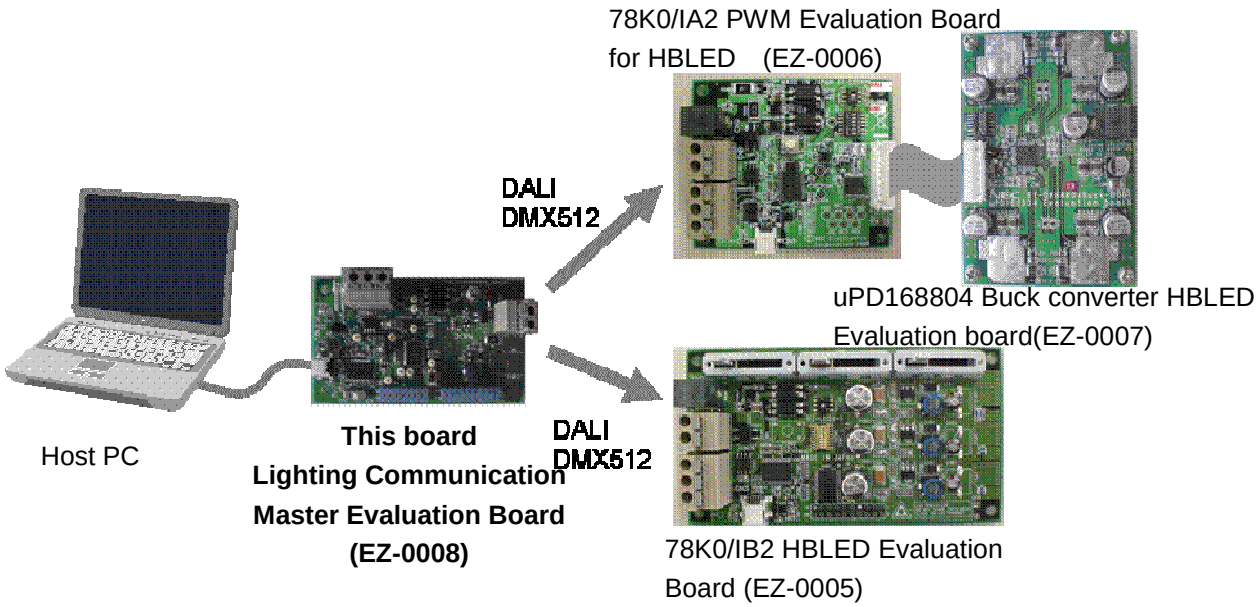
This board is using USB bus power for its operation.

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. System setup example



1.1 Feature

- 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

1.2 Related product information

As for the information of related products for this board, please see NEC Electronics Web site.

URL **http://www.necel.com/micro/en/solution/lighting/index.html**

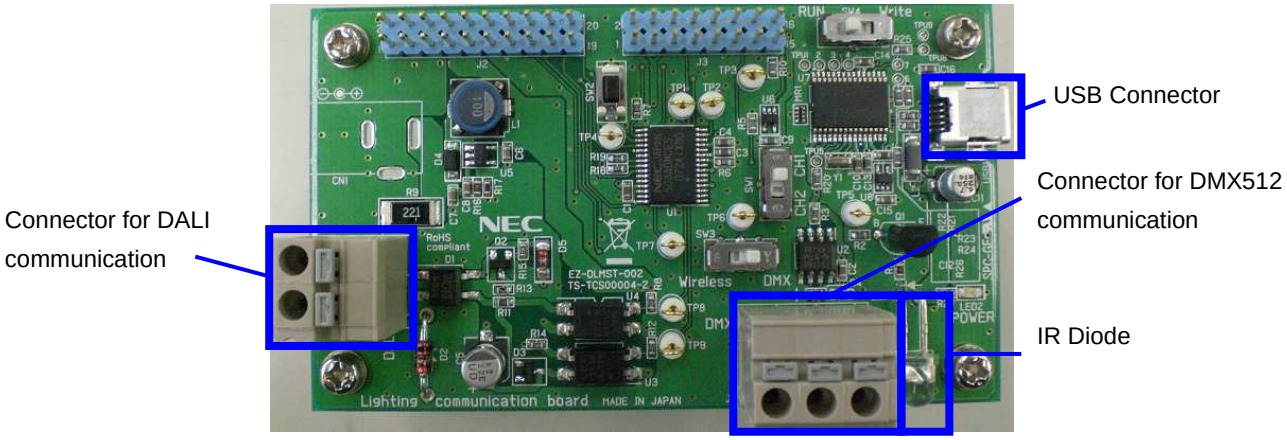
2. Specification

This chapter described the specification of Lighting Communication Master Evaluation Board.

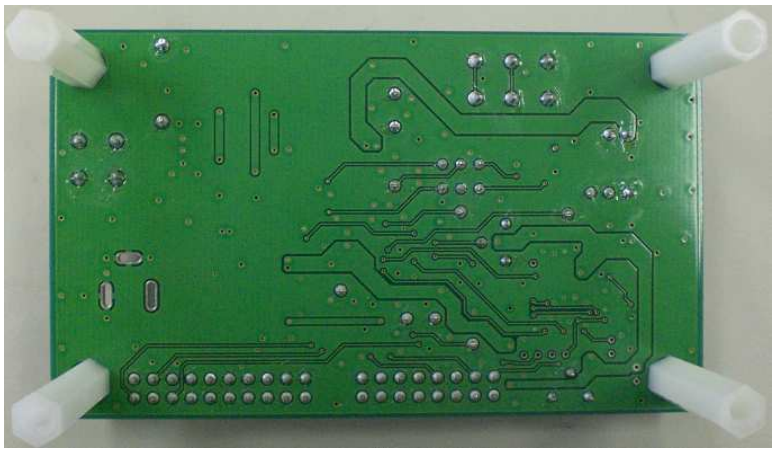
2.1 Appearance of the board

The following figure shows the appearance of Lighting Communication Master Evaluation Board.

Figure 2. Appearance of Lighting Communication Master Evaluation Board



Surface appearance（Top view）

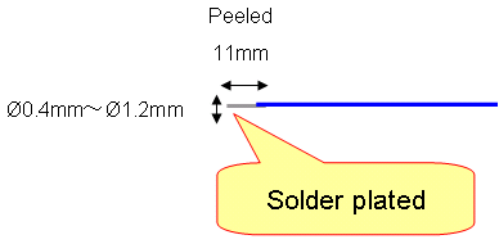


Surface appearance（Bottom view）

2.2 Detail specification

Board name : EZ-DLMST-002
Power supply : DC5[V]
Microcontroller : UPD78F0503AD
Connector : ML-800-S1V-nP (n=2, 3)
Recommend communication cable: refer to figure 3

Figure 3. Recommend communication cable specification

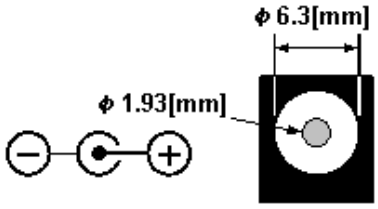


2.3 Power supply

Lighting Communication Master Evaluation Board uses USB cable for power supply as well as communication.

Note: When more than 10 slaves are supposed to be connected, please mount a DC plug to CN1 by yourself and get power supply from CN1.
Power supply : DC15[V]
DC plug : Switchcraft RAPC722 (Center pin ϕ 1.93mm, Plug ϕ 6.3mm (max))

Figure 4. Polarity and shape of DC plug



Warning	
	Use AC adapter adapted to safety standard of each county. Using non-adopt AC adapter cause product failure, generation of heat, fire or electric shock.

2.4 Switch setting

Table1. Switch setting

No.	Description
SW1	IR remote control code selecting switch. “CH1”: Send custom code 0x0000＋data code 0x5AA5 “CH2”: Send custom code 0x0000＋data code 0xDA25
SW2	Push button. Send remote control signal by IR diode
SW3	DMX512 mode selecting switch “DMX”: Enable DMX512 communication operation “Wireless”: Disable DMX512 communication operation
SW4	Operation mode switch “RUN”: Enable communication operation. “Write”: Disable communication operation. Reserve for USB microcontroller firmware updating

Note1. NEC format is used as IR remote control signal.

Note2. Setting of SW3 and SW4 for each communication protocol evaluation should be set as follows.

Communication protocol	SW3	SW4
DMX512 protocol	“DMX”	“RUN”
DALI protocol	Don’t care	“RUN”
IR remote control	Don’t care	“RUN”

3. Operation

3.1 Preparation

3.1.1 Driver installation

Install the driver when connecting the Lighting Communication Master Evaluation Board (EZ-0008) to the PC by using a USB cable for the first time.

① Download driver from following URL.
URL **www.necel.com/micro/en/solution/lighting/download.html**

② When connecting this board to PC by using USB cable,"Found New Hardware Wizard" dialog box is displayed.
Select"Yes, now and every time I connect a device", and click [Next].

③ Select"Install from a list or specific location (Advanced)", and clock [Next].

④ Select "Include this location in the search" and then click [Browse]
Specify the folder to which download files are saved, and click [Next]

⑤ Installation starts
Click [Continue Anyway] while "Hardware Installation" dialog is displayed.

⑥ Click [Finish]. Installation is complete.

3.1.2 Communication GUI installation

① Download DMX512 or DALI GUI from the following URL.
URL **www.necel.com/micro/en/solution/lighting/download.html**

② Install the GUI for the communication protocol which is supposed to be used.
For detail, please refer following User's Manual
DALI master controller GUI User's Manual (U19607)
DMX512 master controller GUI User's Manual (U19596)

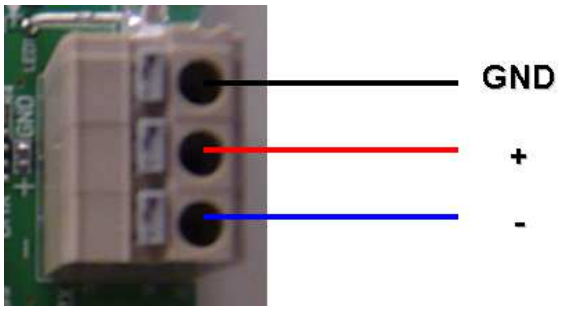
3.2 Operation

3.2.1 Operate with DMX512 interface

① Confirm SW4 is set to “RUN“side and SW3 is set to “DMX” side.

② Connect the lighting communication master evaluation board (EZ-0008) with DMX512 slave board or your own evaluation board supporting DMX512 protocol via interface J1.

Figure 5. DMX512 interface (J1)



③ Connect lighting communication master evaluation board with PC by a USB cable.

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.

Note1: To find details of DMX512 Master Controller GUI, please refer to User’s Manual of DMX512 Master Controller GUI (U19596).

Note2: If the communication line is supposed to be longer than 1 meter, a twisted pair wire is recommend to be used for “+”, “-” pin.

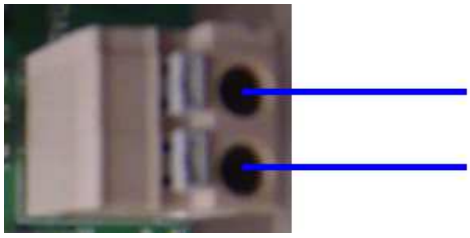
Warning	
	Do not plug in or unplug a connector or cable with power applied to the board. Doing so may cause product failure, generation of heat, fire or rupture

3.2.2 Operate with DALI interface

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 6 . DALI interface (J4)



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.

Note1: To find details of GUI, please refer to the User’s Manual of DALI Master Controller GUI (U19607).

Warning	
	Do not plug in or unplug a connector or cable with power applied to the board. Doing so may cause product failure, generation of heat, fire or rupture

3.2.3 Operate with IR remote control interface

① Confirm SW4 is set to “RUN” side.

② Set SW1 to the expected channel.
The output code is based on NEC IR remote control protocol
CH1: Send custom code 0x0000＋data code 0x5AA5
CH2: Send custom code 0x0000＋data code 0xDA25

③ Connect lighting communication master evaluation board with PC by a USB cable

④ Insert power supply to the slave board which has IR receiving interface and support the code set in step ②

⑤ Push SW2 to send IR code.

⑥ Disconnect the lighting communication master evaluation board and the host PC when finished evaluation.

⑦ Disconnect the USB cable.

Warning	
	Do not plug in or unplug a connector or cable with power applied to the board. Doing so may cause product failure, generation of heat, fire or rupture.

Appendix A Revision History

Revision	Modified Points	Page
Rev.1.0	First edition	

For further information,
please contact:

NEC Electronics Corporation
1753, Shimonumabe, Nakahara-ku,
Kawasaki, Kanagawa 211-8668,
Japan
Tel: +81-44-435-111
http://www.necel.com/

[Technical Support]
Multipurpose Microcomputer System Division, NEC Electronics Tel: +81-44-435-9452

Data Published March 2009