ZigBee Light Link Development Kit Quick Start Guide

Opening the Box and Setting up a ZLL Network in 3 Simple Steps

1. Kit Contents

- 3 x Zlight2 LED boards
- 1 x CC2531 USB dongle
- 3 x micro-USB cables
- Documentation

2. Regulatory Information

The Zlight2 boards and the CC2531 USB dongle are FCC- and IC certified and are tested/compliant with ETSI/R&TTE over temperature from 0 to +35°C. The CC2530 USB dongle has an on-board meandered inverted F PCB antenna while the Zlight2 has an on-board half wave dipole PCB antenna.

Caution! The kit contains ESD sensitive components. Handle with care to prevent permanent damage.

3. Purpose of the Kit

The CC2531 ZigBee Light Link (ZLL) development kit is intended for customers who would like to evaluate ZLL lighting control for LED light products, and develop simple applications and demonstrators based on this standard.

The kit contains everything needed to set up a ZLL network and switch the lights on and off individually or in groups. More advanced ZLL control such as hue, saturation, groups and scenes can be tested using a command line tool, or even cloud based control solutions such as Ninja blocks (http://www.ninjablocks.com). Information about this can be found by following the links supplied at the end of the document.

4. Power Options

The lights and the USB dongle are powered through the USB connector. It is recommended that the lights are powered from a dedicated USB power supply capable of supplying at least 800mA and max 5.5V.

The CC2531 USB dongle is used to control the lights, and can be powered from most USB ports. In order to use the command line control tool, it is recommended that the USB dongle is connected to the USB port of a PC.

5. Powering the Boards (Step 1)

- Connect the Zlight2 boards to your USB power supply using the supplied cables.
- Connect CC2531 USB dongle to an available USB port on your PC.

Do not leave the boards powered when not in use or unattended.

6. Starting the Network (Step 2)

In ZLL, the process of pairing a new lamp with a remote control is called touch linking.

During the touch linking process described in the next paragraph, beware that it is important not to release S1 until the light has completed its single flash and the LEDs on the dongle have given a small series of green flashes. This takes about 5 sec. (continued)

7. Operating the Zlight2 (Step 3)

Caution! To minimize the risk of fire or equipment damage, make sure that ambient temperature air is allowed to circulate freely around the Zlight2 board when operating. Avoid touching components during operation if symbolized as hot. A thermal shutdown routine is implemented in the included firmware running on the lights. Always make sure that this routine is implemented if you flash your own firmware. The easiest way to do that is to base it on ZStack-Lighting-1.0.2 or later releases from Texas Instruments.

Caution! DO NOT STARE DIRECTLY INTO LED LIGHT SOURCE. Intense light sources have a high secondary exposure potential due to their blinding effect. A temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation. Always consider the use of light filtering/darkening protective eyewear and be fully aware of surrounding laboratory type set-ups when viewing intense light sources to minimize/eliminate such risks in order to avoid accidents related to temporary blindness.

Starting the Network (cont.)

Touch link the Zlight2 boards one at a time by holding the light close to the CC2531 USB dongle (see picture above) and pressing and holding button S1 on the dongle until the LED on the dongle has flashed green.

When this has been done for all 3 Zlight2 boards, they will all be on the same network, controlled by the dongle.

Switch S2
- Short press (<2s): Toggle on/off
- Long press (>2s): Select next device

Switch S1
- Touch Link

RISK GROUP 2

CAUTION
Possible hazardous optical radiation emitted from this product. Do not stare at operating lamp. Maybe harmful to eyes.

- Do not stare at operating LEDs – (Risk Group 1 (RG1) @ 0.9m)
- Per IEC 62471 ed 1.0: 2006-07 ("Photobiological Safety of Lamps and Lamp Systems") this product has been classified in Risk Group 2. Products classified as Risk Group 2 do not pose a hazard due to the aversion response to very bright light sources or due to thermal discomfort. It should be noted that INTENTIONALLY staring at the lamp for extended lengths of time from short distances could lead to a potential risk of eye damage due to a retinal blue-light hazard. In order to reduce the potential of exposure to a retinal blue-light hazard, the operator must avoid any direct view of the LEDs while in operation, from a distance of 0.9m, or closer.

Web sites: www.ti.com/lprf
E2E Forum: www.ti.com/lprf-forum

Make sure to subscribe to the Low-Power RF Newsletter to receive information about updates to documentation, new product releases, and more. Sign up on the TI web pages.
Operating the Zlight2 (cont.)

Once connected to the ZLL network by touch linking, the Zlight2s can be toggled on/off by quickly pressing and releasing S2 on the dongle.

The on/off commands will be sent to the selected light, or group of lights. When a light is touch linked, it becomes the selected light, and it is also automatically added to group 1 in the ZLL network.

When more than one light has joined the network, the lights can be selected by pressing S2 for more than 2 seconds. This will cause the selected light to identify by blinking.

Consecutive >2s presses will cycle through the available lights and groups, that will identify in the same way. When the USB dongle is power cycled, it will revert to a state where group 1 is selected.

A simple way to bring your network to a state where you can switch all the lamps on or off simultaneously, is to do the following: Power cycle (unplug and then re-plug) the USB dongle. Wait a few seconds for the network to re-join. Quickly press and release S2 on the dongle to toggle.

8. Next Steps

For more advanced use and colour control, go to the TI ZigBee Light Link wiki page by following the link found at the end of this document.

Additional Tools and Links

CC Debugger

The CC debugger is a tool that allows you to flash and debug the Zlight2 using SmartRF Flash Programmer or IAR Embedded Workbench. It connects to a USB port on your PC and to the debug header on the Zlight2 board.

SmartRF Flash Programmer

Texas Instruments has a simple tool which can be used to program and flash the Zlight2.

IAR Embedded Workbench

To develop software, program, and debug the Zlight2, you should use IAR Embedded Workbench for 8051.

Useful Links

TI ZigBee Light Link wiki page:

Kit Product Page
http://www.ti.com/tool/cc2530zdk-zll

CC2531 User’s Guide
http://www.ti.com/lit/swru191

For additional help, visit the TI E2E Forum
www.ti.com/lprf-forum

The Zlight2 lights supplied in this kit are powered by OSLON LEDs from Osram. Please visit the LED Light for you website to learn more about LED lighting and ZigBee Light Link wireless control examples.

http://www.ledlightforyou.com/Partners/Highlights/en-ZigBee-Lighting-Control.php
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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
FCC Interference Statement for Class B EVM devices
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For EVMs annotated as IC – INDUSTRY CANADA Compliant
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Concerning EVMs including detachable antennas
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This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

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1. Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry’s Rule for Enforcement of Radio Law of Japan,
2. Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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