ZigBee Light Link Development Kit Quick Start Guide

Opening the box and setting up a ZLL network

1. Kit Contents

- 3 x Zlight2 LED boards
- 1 x Remote Control
- 1 x CR2025 Battery
- 3 x micro-USB cables
- Documentation

2. Regulatory Information

The Zlight2 boards and the Remote control are FCC- and IC certified and they are tested to comply with ETSI/R&TTE over temperature from 0 to +35°C. The Remote control has an on-board inverted F PCB antenna while the Zlight2 has an on-board half wave dipole PCB antenna.

FCC/IC Regulatory Compliance
FCC Part 15 Class A Compliant
IC ICES-003 Class A Compliant

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 control the lights individually or as a group. It's also possible to extend the kit with more HW to allow 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. Operating the Zlight2

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 THE 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.

RISK GROUP 2
CAUTION
Possible hazardous optical radiation emitted from this product.
Do not stare at operating lamp. May be 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.

5. Powering the Boards

The Zlight2 boards are powered through the USB connector. It is recommended that they are powered from a dedicated USB power supply capable of supplying 800mA and max 5.5V.

External Power Supply Requirements:
Nom Voltage: 5 VDC
Max Current: 800 mA
Efficiency Level V

Note! When using an external power supply, make sure it meets the listed requirements in addition to complying with applicable regional product regulatory and safety certification requirements such as UL, CSA, VDE, CCC, and PSE.

The Remote control is powered by a 3V CR2025 battery (included). Do not use other battery types.

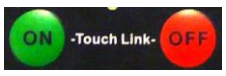
Battery Requirements:
CR2025 UL Recognized Component Battery
Voltage: 3 V
Min Capacity: 165 mAh

NOTE: Only use Varta or Energizer CR2025 battery or equivalent.

- Connect the Zlight2 boards to your USB power supply using the supplied cables.
- Insert the CR2025 battery into the remote control. Follow the instructions on the back of the remote for correct placement.

6. Starting the Network

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



Touch link the first Zlight2 board by holding the remote control close and simultaneously pressing the "on" and "off" buttons.

Quickly release both buttons. After a few seconds, the Zlight2 will flash, and the remote control will give a short beep.

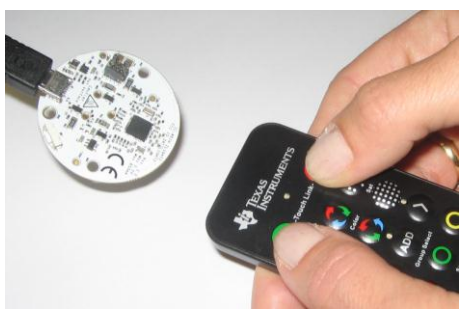


Figure 1: Touch Link

Starting the Network (cont.)

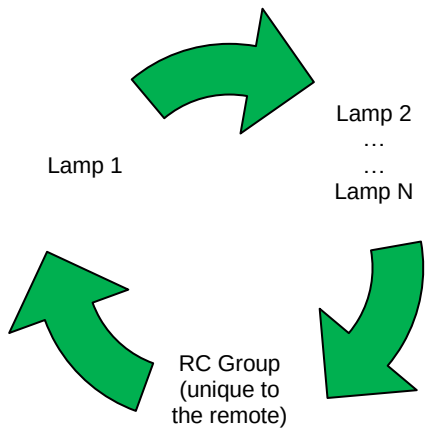
To confirm a successful touch link, you may press the "on" button, and then the "off" button, and verify that the lamp switches on and off accordingly.

Continue by touch linking the remaining 2 Zlight2 boards, one at a time.

Note that if the two buttons are pressed with too much time difference, the "on" or "off" command will be sent to the previously touch linked Zlight2 instead of initiating a new touch link command. Try again.

7. Operating the Zlight2

Once connected to the ZLL network through touch linking, the Zlight2s can be controlled with the remote control. The remote control will always address a target, which can be an individual lamp, or a group of lamps.



Use the < > buttons to select target

Please turn the page

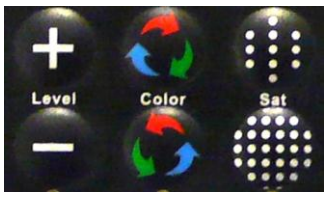
Operating the Zlight2 (cont.)

The touch link operation, in addition to bringing the Zlight2 on to the ZLL network, also adds it to the remote control's own group, the RC Group. When more than one lamp is on the network, repeatedly pressing the ‹ or › button on the remote will cycle through all the individual lights, and the RC Group, in a circular manner (> cycles clockwise and < cycles counter-clockwise).

The lamps will blink to identify when they are selected, and the next command will be sent to the last selected target. Select RC Group by pressing the left or right arrow button until all the lamps blink simultaneously to identify.

Operating the Zlight2 (cont.)

You can now control level, color and saturation on all the lamps. The on/off commands will also be sent to the RC Group.



Level up: Increase intensity
Level down: Decrease intensity
Color (Hue) up: Change colour
Color (Hue) down: Change colour
Sat up: Increase saturation ("more color")
Sat down: Decrease saturation ("more white")

Note: Changing the color (hue) will not produce a visible change in the light if the Saturation is set to minimum, i.e. white light.

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

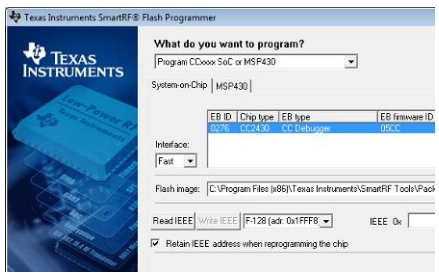
The CC debugger is a tool that allows you to flash and debug the Zlight2 using SmartRF Flash Programmer or IAR Embedded Workbench. It connects to a USB port on your PC and to the debug header on the Zlight2 board.

CC2531 USB dongle

The CC2531 USB dongle plugs into a Linux or Windows host and can serve as a gateway for cloud based lighting control.

SmartRF Flash Programmer

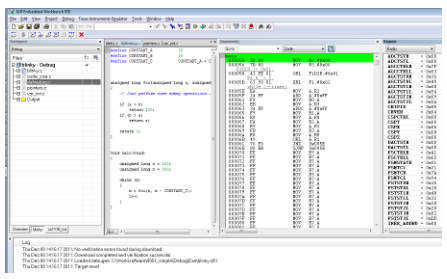
Texas Instruments has a simple tool which can be used to program and flash the Zlight2.



SmartRF Flash Programmer can be downloaded from www.ti.com/tool/flash-programmer

IAR Embedded Workbench

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



More information on IAR EW8051, including a free evaluation version download, can be found at www.iar.com/ew8051.

Useful Links

TI ZigBee Light Link wiki page:

http://processors.wiki.ti.com/index.php/ZStack-Lighting_Kit

Useful Links

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

CC2530 and 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 web site to learn more about LED lighting and ZigBee Light Link wireless control examples.

http://www.ledlightforyou.com/Partners/Highlights/en-ZigBee-Lighting-Control.php

LED Light for you
powered by OSRAM

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265