

# BLE Light Development Kit Quick Start Guide

## Opening the box and using the BLE Lights

### 1. Kit Contents



- 3 x BLE LED boards
- 3 x micro-USB cables
- Documentation

### 2. Regulatory Information

The BLE Light boards are tested, but not officially certified, to be compliant with FCC CFR47 Part 15 and ETSI EN 300 328 rev. 1.8.1.

The BLE Light has an on-board half wave dipole PCB antenna with added filtering to reduce harmonic emission to within regulatory requirements. Additional information on the RF solution can be found in [Design Note DN041](#).



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

### 3. Purpose of the Kit

The CC2540T BLE Light development kit is intended for customers who would like to evaluate BLE lighting control for LED light products, and develop simple applications and demonstrators based on this standard.

The kit contains the needed hardware to evaluate and develop BLE lighting solutions. The HW works out of the box with the TI BLE Multitool iOS app which can be downloaded from App Store, links are found at the end of this document

### 4. Operating the BLE Light



**Caution!** To minimize the risk of fire or equipment damage, make sure that ambient temperature air is allowed to circulate freely around the BLE Light 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 BLE Light 1.0 CC2540T SW 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 BLE Light boards are powered through the USB connector. It is recommended that they are powered from a dedicated USB power supply capable of supplying at least 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.

### 6. Connecting to the Lights

Enable Bluetooth on your phone. Note that you need a phone supporting Bluetooth 4.0 or higher.

When the lights are connected to power they will automatically start to advertise and should thus be discoverable by the TI BLE Multitool app (See figure 1. The light is shown as beLight 0.2). The lights will automatically show up in the devices list in the app.

By pressing the appropriate beLight in the device list a connection to the light is established and it will be moved to the Connected Devices list. Connections can be made to several BLE Lights simultaneously.

### Connecting to the Lights (cont.)

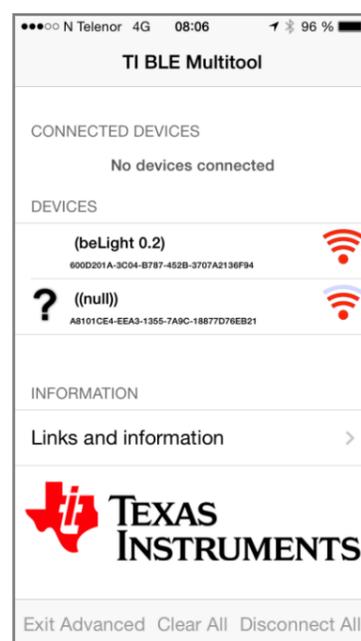


Figure 1: TI BLE Multitool

### 7. Operating the BLE Light

Clicking one of the BLE Lights in the Connected Devices list will open up a panel with control options for that specific BLE Light.

As can be seen in **Error! Reference source not found.** the BLE Light control panel has three main controls.

The slider switch at the top simply turns the light on or off.

The color wheel lets you freely adjust the color (hue) and saturation of the light. Since the RGBW light is provided by four separate LEDs, a diffuser is required to achieve optimum color blending.

The lowermost slider controls the intensity of the light.



## Operating the BLE Light (cont.)

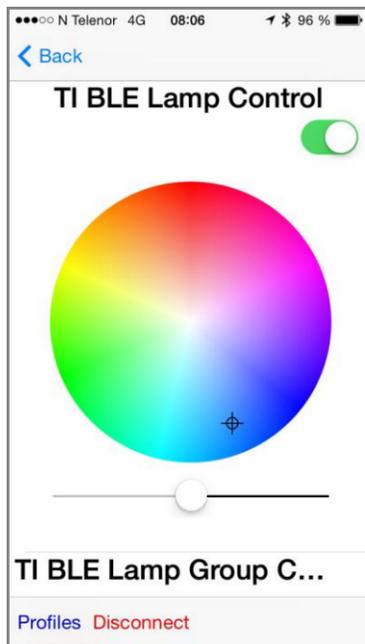


Figure 2: BLE Light Control

## Operating the BLE Light (cont.)

Scrolling further down in the control panel reveals the options shown in Figure 3.

The uppermost option, allows you to group, and thus simultaneously control, multiple BLE lights. To do this, multiple BLE Lights must be connected to the phone as described in part 6. The Lamp Group menu allows you to sort several lights in zones, each with a separate zone control identical to the single light control panel.

Going back out of the Lamp Group menu returns you to single BLE Light control. The BLE Light controlled will be the one you originally selected from the Connected Devices list.

**Additionally Device Information and RSSI from the connected BLE Light is shown.**

## Operating the BLE Light (cont.)



Figure 3: BLE Light Additional Control

## Additional Tools and Links

### CC debugger

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

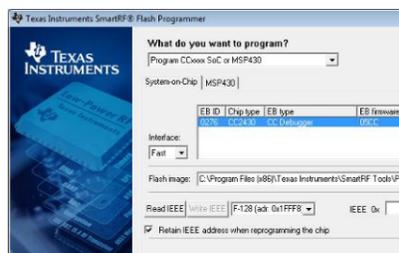
### CC2540 USB dongle

The CC2540 USB dongle can be used as a BLE packet sniffer during development.



### SmartRF Flash Programmer

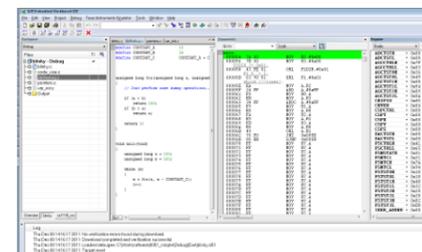
Texas Instruments has a simple tool which can be used to program and flash the BLE Light.



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

### IAR Embedded Workbench

To develop software, program, and debug the BLE Light, 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](http://www.iar.com/ew8051).

### Useful Links

TI BLE wiki page:  
<http://www.ti.com/ble-wiki>

TI E2E BLE Forum:  
<http://www.ti.com/ble-forum>

### Useful Links

CC254x User's Guide  
<http://www.ti.com/lit/swru191>

### Useful Links

TI SensorTag App for iOS:  
<https://appsto.re/no/WWn9G.i>

C2540T BLE Light SW:  
<http://www.ti.com/lit/zip/swrcTBD>

TI Designs BLE Light page:  
<http://www.ti.com/tool/tidc-bluetooth-low-energy-light>

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### Products

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Applications Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>

### Applications

Automotive and Transportation	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
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