UtilLighting

UtilLighting BLE Module

Datasheet

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Document Revision History

Issue No	Issue Date	Revised Part / Page	Reason for Revision
1.4	2015-08-07	Section 4	Delete sections
1.3	2015-07-14	Section 3 Section 7	Updates included - Module picture added - Recommended Land Pattern added - Example Application Circuit added
1.2	2015-01-21	Section 3	Updates included -Mass production of Zig Board version added
1.1	2014-11-21	Section 3	Updates included -Section 3 and 5 changed
1.0	2015-07-14	-	Initial release of this document

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Figure

Table

Features

- Bluetooth v4.1 specification compliant ; Bluetooth Smart ; Bluetooth Low Energy ; BLE
- Small: 17mm x 25mm
- Integrated chip antenna
- RSSI monitoring for proximity applications
- <900nA current consumption in dormant mode
- <20mA peak current consumption in RX active
- Programmable general purpose PIO controller
- 10-bit ADC
- 12 digital PIOs
- 3 analog AIOs
- 1 UART
- shared 1 I2C(only master) or 1 SPI(master/slave)
- 4 PWM modules
- Wake-up interrupt and watchdog timer
- 5 operating modes : Running, Idle, Deep sleep, Hibernate, Dormant
- Over-the-Air Configuration or Firmware Update service (by Smart-phone)

UtilLighting BLE Module

1.   General Description

1.1   Overview

This BLE Module Data Sheet is the operating instruction manual of BLE Module communication using Bluetooth Low Energy. This contains details of Pin assignment and how to operate BLE Module using Android Demo App.

1.2   Document Layout

Table 1-1 Document Summary

Index	Contents
1. General Description	General information on this document
2. Application Document	Description of all information of applied document; government/non-government document, document number, document title, publication date, and place of publication
3. Hardware Design of BLE Module	Information on devices of BLE Module
4. BLE Service Information	Useful information on GATT Service to develop a smartphone application
5. BLE Module Test	BLE Module test instruction using Android Demo App
6. Appendix	Glossaries used in this data sheet and pictures of Zig Board for mass production

1.3   Precautions

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This document may be modified by the approval of the product quality management team at UtilLighting if necessary.

2.   Application Document

Not applicable

3.   Hardware Design of BLE Module

3.1   Block Diagram

Figure 3-1 Block diagram of BLE Module.

3.2   Module Picture

Figure 3-2 BLE Module (Top view)

3.3   Pin out Diagram

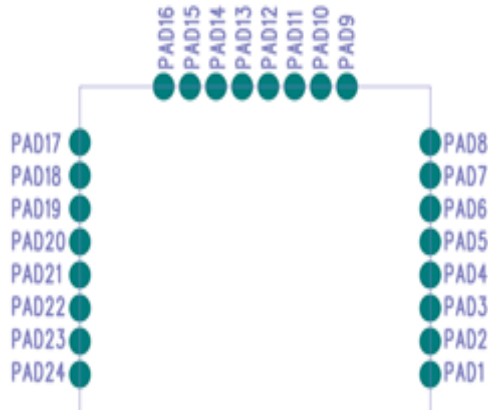Pin out assignment of BLE Module is shown in Figure 3-3.

Figure 3-3 Pin out assignment of BLE Module (Top view)

3.4   Pin Description

오류! 참조 원본을 찾을 수 없습니다. provides pin descriptions for BLE Module.

Table 3-1 Pin Description

No	Pin Name	Description
1	GND	Ground
2	AIO2	Analogue Programmable I/O #2
3	AIO1	Analogue Programmable I/O #1
4	AIO0	Analogue Programmable I/O #0
5	PIO0_UART_TX	Programmable I/O #0 or UART TX
6	PIO1_UART_RX	Programmable I/O #1 or UART RX
7	PIO3	Programmable I/O #3
8	PIO4	Programmable I/O #4
9	GND	Ground
10	PIO5_DBG_CLK	Programmable I/O #5 or Debug SPI CLK
11	PIO6_DBG_CS#	Programmable I/O #6 or Debug SPI CS#
12	PIO7_DBG_MOSI	Programmable I/O #7 or Debug SPI MOSI
13	PIO8_DBG_MISO	Programmable I/O #8 or Debug SPI MISO
14	PIO9	Programmable I/O #9
15	PIO10	Programmable I/O #10
16	PIO11	Programmable I/O #11
17	SPI_PIO#	Selects SPI debug on PIO[8:5]
18	VDD_PADS	3.3V DC input
19	GND	Ground
20	VDD_BAT	3.3V DC input
21	GND	Ground
22	GND	Ground
23	N.C	No Connected
24	WAKE	Input to Wake Module

3.5 Dimensions

Figure 3-4 and Figure 3-5 provide top view dimension and side view dimension of BLE module.
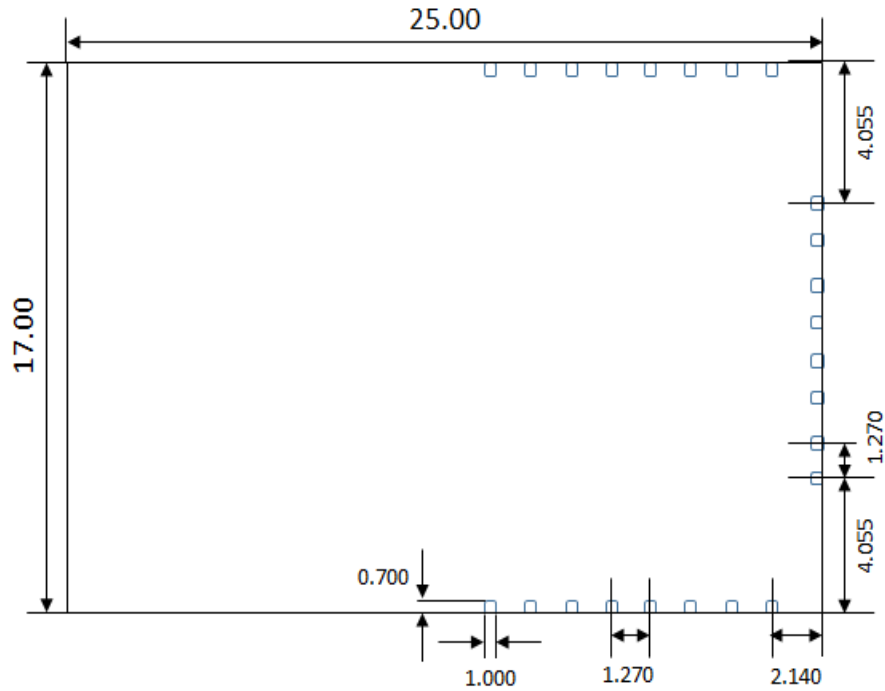

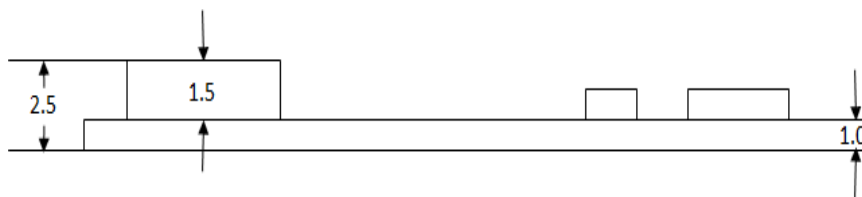Figure 3-4 Dimension of BLE Module (Top View)

Figure 3-5 Dimension of BLE Module (Side View)

3.6 Recommended Land Pattern
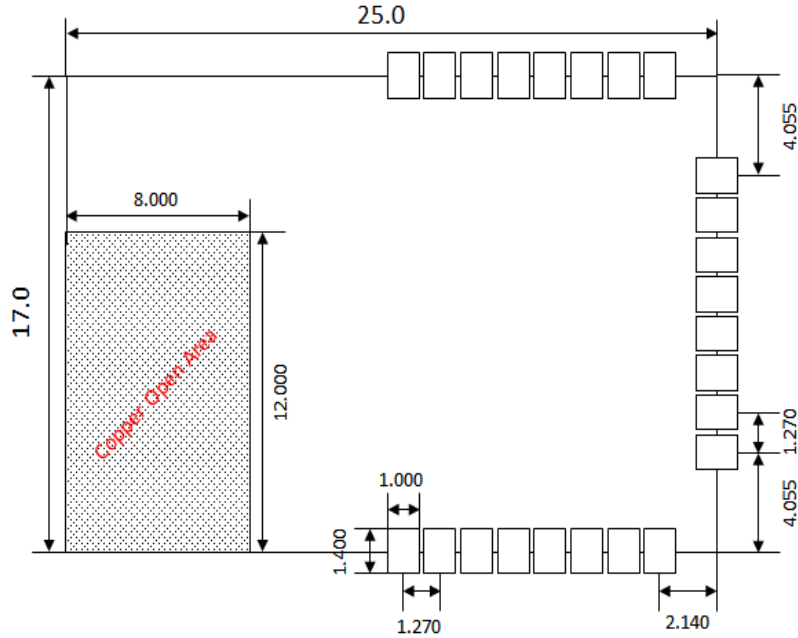
Figure 3-6 Recommended Land Pattern

3.7 Example of Application Circuit
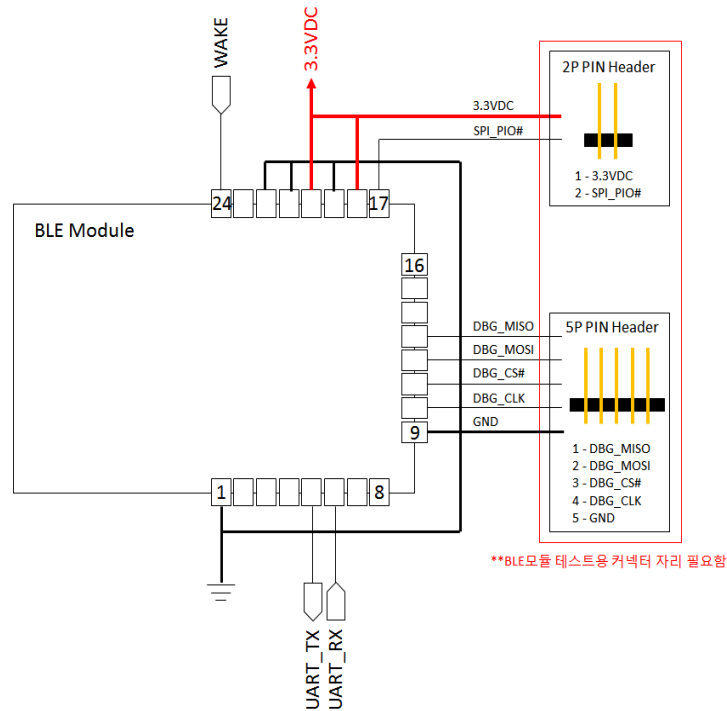
Figure 3-7 Example of Application Circuit

3.8   Recommended Operating Conditions

Recommended Operating Conditions are shown in Table 3-2

Table 3-2 Recommended Operating Conditions

Operating Conditions	Min	Typ	Max	Unit
Operating temperature range	-30	-	85	℃
Battery (VDD_BAT) operation	1.8	-	3.6	V
I/O supply voltage (VDD_PADS)	1.2	-	3.6	V

4. BLE Module Test

4.1 Android Demo App Installation

Search "BLE Device Monitor" in Google Play and install it as follows.
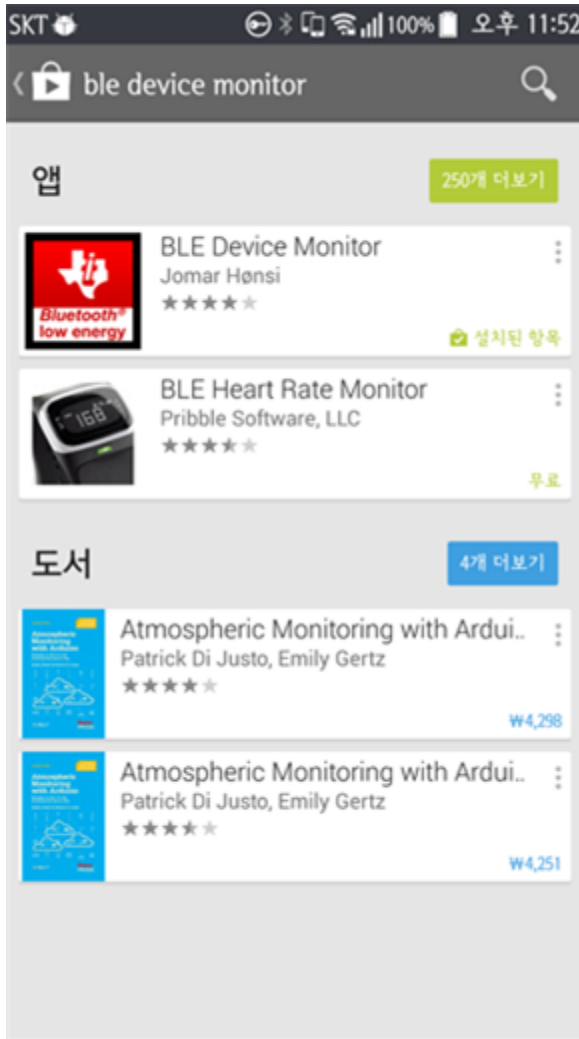
Figure 4-1 Search "BLE Device Monitor"

Figure 4-2 Installation of BLE Device Monitor

4.2   Example of BLE Module Communication using ″BLE Device Monitor″

″Scan″ and access BLE Module, and communicate with it as follows.
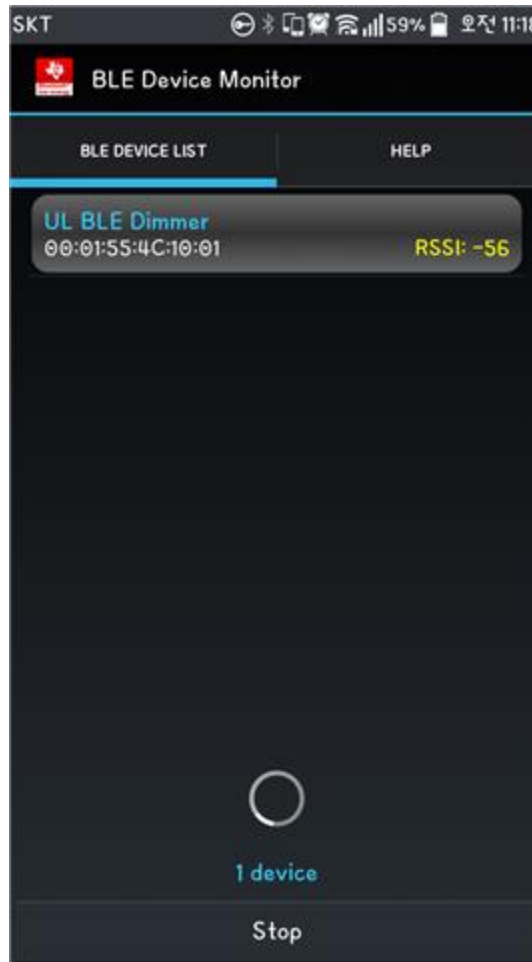
Figure 4-3 BLE Device List Scanned

To see the device list, click ″Scan″ button at the bottom of BLE Device Monitor and search ″BLE Device″. Figure 4-3 provides BLE device list in BLE Device Monitor.
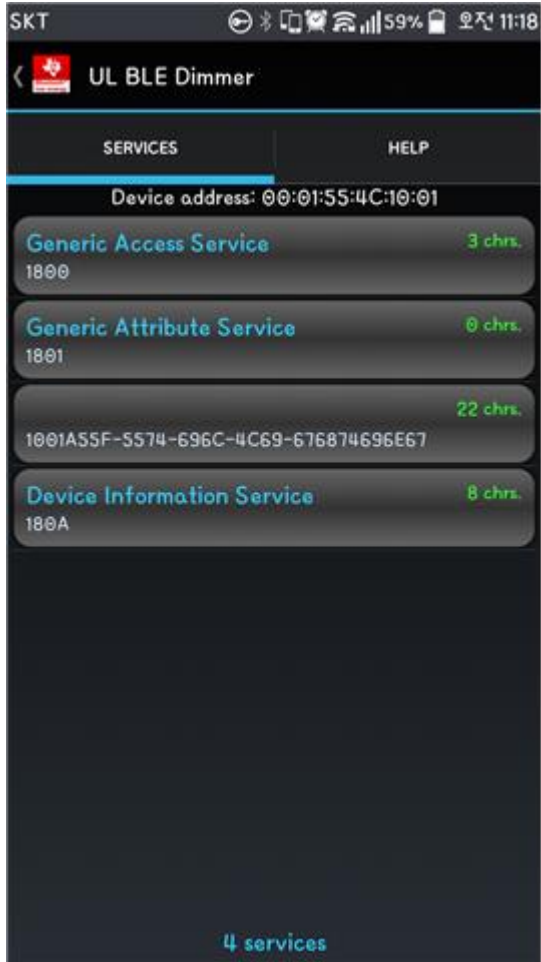
Figure 4-4 Service List of UL BLE Dimmer Connected

Click the displayed BLE device and see the service lists of the clicked BLE device, as follows in Figure 4-4.

Customer Service is displayed below ″Generic Attribute Service″ without the title, which is provided additionally for users of BLE Module and is made according to the purpose to use BLE Module. Customer Service is classified by UUID.

″Device Information Service″ includes basic information on BLE Module.
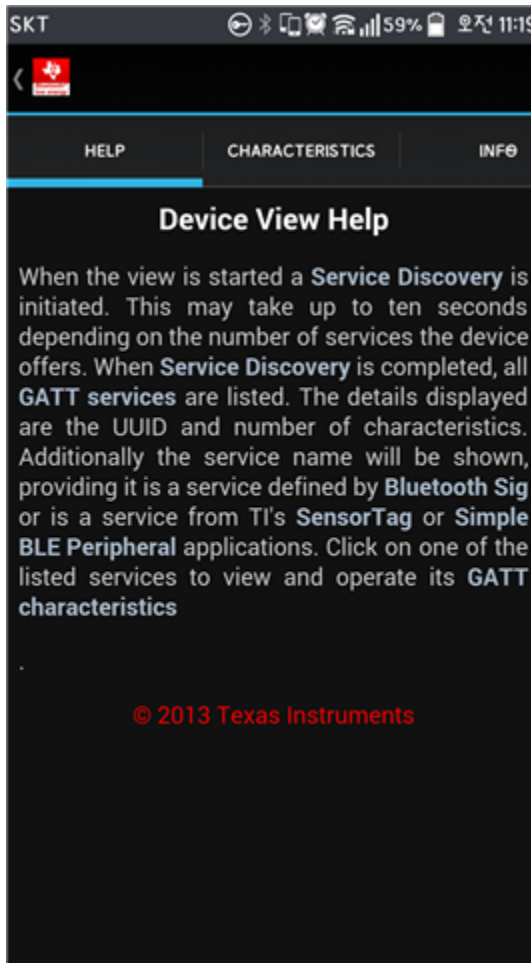
Figure 4-5 Customer Service Connected

Figure 4-5 shows the connected Customer Service in BLE Module.

Figure 4-6 Customer Service Characteristics

Figure 4-6 provides Customer Service Characteristics of ″UL BLE Dimmer″. Characteristics of Customer Service are different in their own UUID and access authorities.

Figure 4-7 Writing Values to Characteristics

To test data communication with another BLE Module using BLE, select Customer Service Characteristics having ″W″flag (write access), enter hexadecimal number, and click ″Write″button. Figure 4-7 shows writing value to Characteristics. The value is transferred into BLE Module using BLE.

5. Appendix

5.1 Abbreviation

Table 5-1 provides abbreviations used in this document.

Table 5-1 Abbreviations

Term	Description
BLE	**B**luetooth **L**ow **E**nergy
CSR	**C**ambridge **S**ilicon **R**adio
DIM	**Dim**mer
DRD	**D**evelmpment **R**elated **D**ocumnet, which related development
NPDL	**N**on-**P**lanned **D**ocuments **L**ist, which is not planned for project management.
OTA	**O**ver **T**he **A**ir; which are management modules for software configuration and update using wireless communication.
PDL	**P**lanned **D**ocuments **L**ist, which is planned for project management
UART	**U**niversal **A**synchronous **R**eceiver/**T**ransmitter
USART	**U**niversal **S**ynchronous and **A**synchronous serial **R**eceiver and **T**ransmitter

5.2 Zig Board for Mass Production

Figure 5-1 Zig Board for Mass Production (1)

Figure 5-2 Zig Board for Mass Production (2)

6.   Application

6.1   LED lighting system

6.1.1   Description

LED lighting system which automatically adjusts preset illuminance of each LED light through detecting the illuminance around each light can reduce electricity charge up to averagely 75% compared to fluorescent lights. In addition, LED lighting system doesn't need to have any additional equipment separately for the network communication and all the functions of LED lighting system can be easily controlled by only remote control.

Figure 6-1 LED lighting System

6.1.2   Features

- Motion & light sensor
- Network communication by Infrared without additional devices
- Easy replacement by retrofit installation
- Maximum brightness with minimal Unified Glare Rating(UGR)
- Lighting product made in Korea
- Life to 70% lumen maintenance – 50,000 hours / 5 Years warranty
- Remarkable energy saving – 70%
- 100-277VAC / 40W Dimming / PF > 0.9 / CRI > 80 / CCT 5300K 4000K 3000K 2700K

6.1.3 Specification

Table 6-1 Specification for LED lighting System

Model No.	Control Mode	CCT	Power Consumption	Input Voltage	Power Efficiency
JUIDPL-S40-CZ	Remote Control	5000K	40W	AC100-277V	>0.9
JUIDPL-S40-NZ	Remote Control	4000K	40W	AC100-277V	>0.9
JUIDPL-S40-WZ	Remote Control	3000K	40W	AC100-277V	>0.9
JUIDPL-S40-WWZ	Remote Control	2700K	40W	AC100-277V	>0.9

FCC ID : 2AFNU-ULBM-01

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

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

Caution : Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Warning

This equipment should be installed and operated with separation distance of at least 20 cm from all persons.

Do not simultaneously emit.

Module Integration Instructions

This module has been granted modular approval for mobile applications. OEM integrators for host products may use the module in their final products without additional FCC certification if they meet the following conditions. Otherwise, additional FCC approvals must be obtained.

- The host product with the module installed must be evaluated for simultaneous transmission requirements.

- The user manual for the host product must clearly indicate the operating requirements and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.

- To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed. Chip antenna, Max. gain:3.5 dBi

- A label must be affixed to the outside of the host product with the following statements:

  Contains FCCID: 2AFNU-ULBM-01

The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

If the final host / module combination is intended for use as a portable device (see classifications below) the host manufacturer is responsible for separate approvals for the SAR requirements from FCC Part 2.1093 and RSS-102.