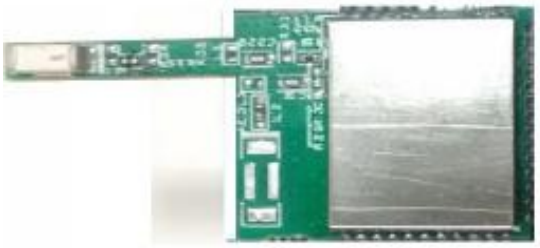
Model: ILUMIBLEH

General Description:



BLE modules from Ilumi make it easy to add single-mode Bluetooth Low Energy (BLE), high range application devices. The fully approved, programmable modules feature ilumi innovative technology, which significantly simplifies BLE module integration in range constrained environment. The DUT with a very small factor of 19.50x12.50x2.4mm^3 consist of two ceramic antennas out of which one can be used at a time in the product to provide two assembly options.

Features:

- **Up to 16 dBm TX power/ -96dBm RX sensitivity, RSSI monitoring for proximity applications**
- **Power Configurable in 4dB step**
- **Supports master and slave configurations**
- **Support GATT-based Profile such as Proximity, Find Me, Heart Rate, HIDand, etc.**
- **UART/I2C master/SPI master interfaces**
- **SMT pads for easy and reliable PCB mounting with internal chip antenna**

Applications

- **Sports and fitness**
- **Healthcare**
- **Home entertainment**
- **Home automation**
- **Commercial applications**

Automotive applications

SPECIFICATION SUMMARY

Categories	Feature	Implementation
Wireless	Bluetooth	
	Frequency	2.402 – 2.480 GHz
	Max Transit Power	16dBm
	Min Transit Power	0dBm
	TX Wisper Mode Transmit	-10dBm
	Receiver Sensitivity	-96dBm
	Link Budget	112dB
	Range	More than 250 Meters in Free Space

Host Interface	**Total**	**26 Multifunction I/O Lines**
	UART	**1 UART**
	GPIO	**14 GPIO Lines**
	I2C	**1 I2C**
	SPI	**2 SPI Lines**
Supply Voltage	**Supply**	**2.8V to 3.3V**
Antenna Option	**Horizontal**	**Optional either use Horizontal**
	Vertical	**or vertical**
Physical	**Dimension**	**37X17.8X3.5mm**
	Weight	**TBD**
Environmental	**Operating**	**- 20°C to 70°C**
	Storage	**- 40°C to 125°C**
Miscellaneous	**Lead Free**	**Lead Free and RoHS Compliance**

Module Keep-Out Area : - An area of 1.5mm around the module should be reversed as akeep-out area. No component should be placed in this area.

Application Notes

1. **Ensure there is no copper in the antenna keep out area on any layer of the host PCB. Also keep all mounting hardware or any metal clear of the area to prevent affecting proper radiation pattern.**
2. **For best antenna performance the module should be placed on the edge of the host PCB and preferably in the corner with the antenna facing the corner.**
3. **Antenna keep out area definition comes from the module design document or can be referred to the antenna datasheet.**
4. **Ensure no exposed copper under module on host PCB to avoid shorting to bottom on the underside of the module.**

PIN CONFIGURATION:

Pin Description		
Pin No	Pin Name	Function
1	GPIO29	General purpose input/output
2	GPIO30	General purpose input/output
3	GPIO0/AREF0	General purpose input/output/ ADC reference input
4	GPIO2/AIN3	General purpose input/output/ ADC input 3
5	GPIO4/AIN5	General purpose input/output/ ADC input 5
6	GPIO1 /AIN2	General purpose input/output/ ADC input 2
7	GPIO3/AIN4	General purpose input/output/ ADC input 4
8	GPIO5/AIN6	General purpose input/output/ ADC input 6
9	GPIO6/AIN7	General purpose input/output/ ADC input 7
10	GPIO7/SSPI/CLK	General purpose input/output/ Slave SPI clock input
11	GPIO8	General purpose input/output
12	GPIO9/UART/TX	General purpose input/output /UART TXD
13	GPIO1 1 /UART/RX	General purpose input/output /UART RXD
14	GPIO1 0/SSPI/CS	General purpose input/output/ Slave SPI chip Select
15	GPIO1 3/SSPI/MOSI	General purpose input/output/ Slave SPI Master Out Slave In
16	GPIO1 4/SSPI/MISO	General purpose input/output/ Slave SPI Master in Slave Out
17	GPIO1 5/MSPI/MOSI	General purpose input/output/Master SPI Master out slave in
18	GPIO1 6/MSPI/CLK	General purpose input/output/Master SPI clock out
19	SWDIO/RESET#	SWD data input/output/reset
20	SWDCLK	SWD Clock
21	GPIO12/MI2C/CLK	General purpose input/output/ Master I2C clock out
22	GPIO1 7/MI2C/DATA	General purpose input/output/ Slave I2C data input output
23	VSS1	GND
24	VSS2	GND
25	VSS3	GND

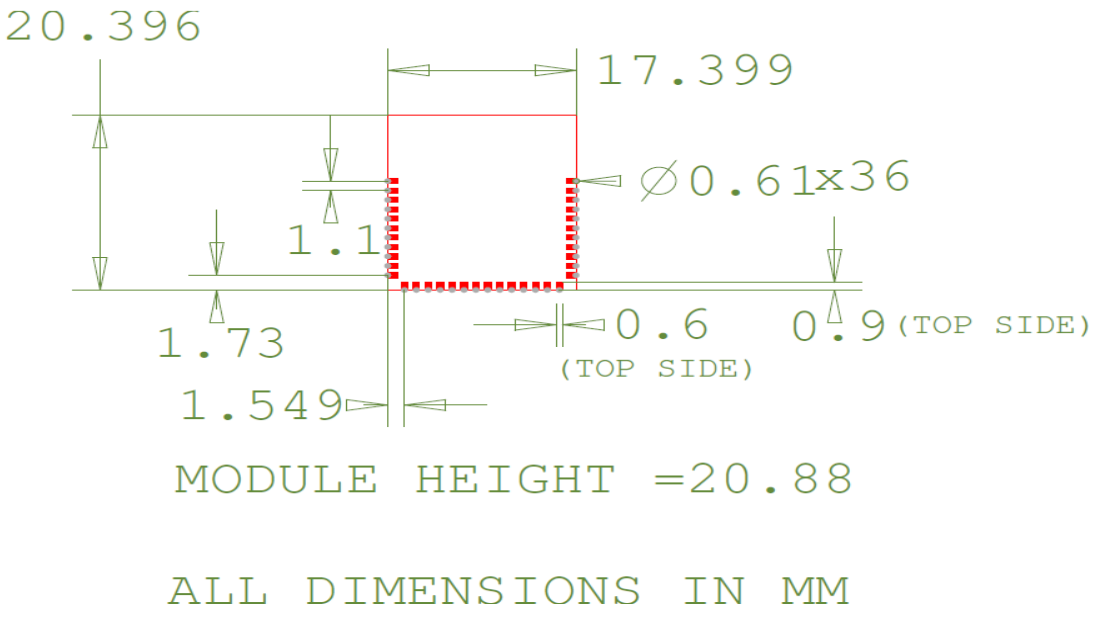
26	VSS4	GND
27	VDD4	3.3V Power supply input
28	VDD3	3.3V Power supply input
29	VDD1	3.3V Power supply input
30	VDD2	3.3V Power supply input
31	GPIO21 /MSPI/MISO	General purpose input/output/ Master SPI Master in Slave out
32	GPIO24	General purpose input/output
33	GPIO25	General purpose input/output
34	GPIO26/XL2	General purpose input/output RTC_Output
35	GPIO26/XL1	General purpose input/output RTC_Input
36	GPIO28	General purpose input/output

ELECTRICAL CHARACTERISTICS

Recommended Operational Parameters

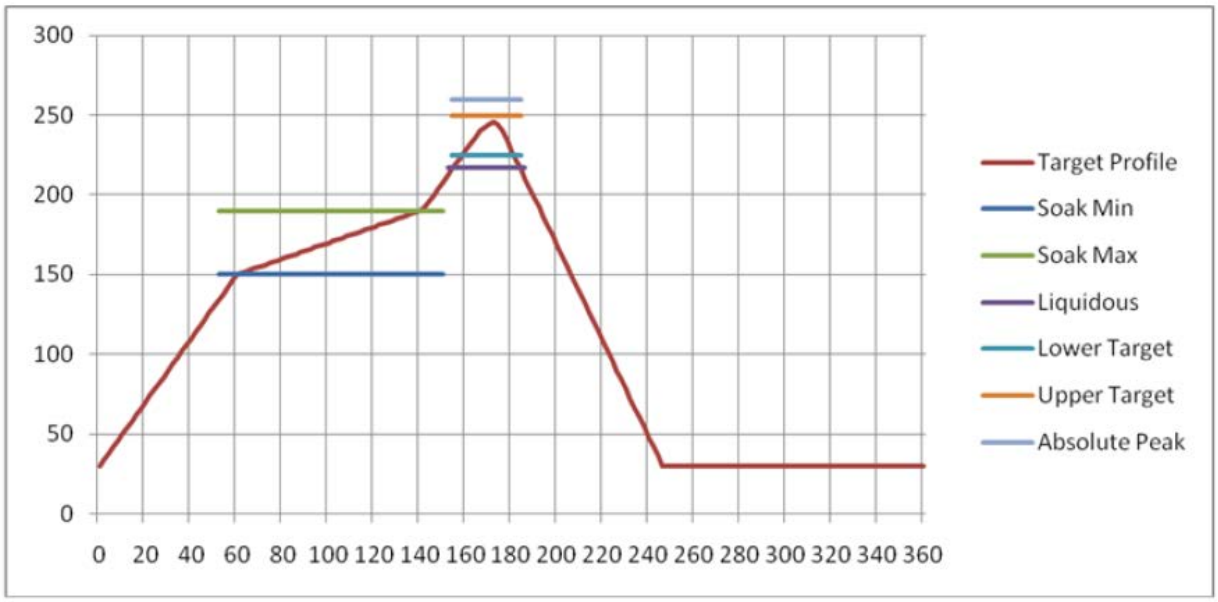
	Conditions	Min	Typ.	Max
Supply voltage(VCC)		2.8 V	3.3V	3.4V
Supply current(Normal)	VCC=3.3V	-	15mA	16.5mA
Supply current(Rx)	VCC=3.3V	-	28.3mA	29.3mA
Supply current(Tx)	VCC=3.3V	-	98mA	117mA
Supply current(Advertising)	VCC=3.3V	-	21.5mA	26.8mA

Foot Print Description



Reflow Parameters

Ilumi Inc. surface mount BLE Module is designed to be manufactured easily, including solder flow. Ultimately it is responsibility of the customer to use the appropriate solder paste and ensure the oven temperature during reflow meet the requirement of the solder paste.



Recommended Reflow Temp

Module FCC ID: 2AEHU-ILUMIBLEH

Statement of compliance:

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.
This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

CE Regulation

Module ILUMIBLEH has been tested for compliance with relevant standards for the EU market. ILUMIBLEH modules were tested with a -0.0dBi antenna. The OEM can operate the ILUMIBLEH with any type of antenna but ensure that gain doesn't exceed 0.0dBi to maintain ILUMI Solution approval.
The OEM should consult with a qualified test house before entering their device into a EU member country to make sure all regulatory requirement have been met for their complete device

AGENCY CERTIFICATIONS

FCC ID: 2AEHU-ILUMIBLEH

IC ID: 20059-ILUMIBLEH

CE: Compliant to standards …….. ,……., and ……

SAR: This wireless mobile and/or portable device has been shown to be compliant for localized specific absorption rate (SAR) for uncontrolled environment/general exposure limits specified in ANSI/IEEE Std. C95.1-1999 and had been tested in accordance with the measurement procedures specified in IEEE 1528-2003, OET Bulletin 65 Supp. C, RSS-102 and Safety Code 6.

AGENCY STATEMENTS
Federal Communication Commission Interference Statement

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 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.**

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.

FCC CAUTION: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada Statements

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.
This device has been designed to operate with the antenna listed below, and having a maximum gain of 0.0dBi (Johanson Chip). Antenna not included in this list or having a gain greater than 0.0dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

List of all Antenna Acceptable for use with the Transmitter

1. **Johanson 2450AT42B100 chip antenna.**

OEM RESPONSIBILITIES TO COMPLY WITH FCC AND INDUSTRY CANADA REGULATIONS

The ILUMIBLEH Module has been certified for integration into products only by OEM integrators under the following conditions:
This device is granted for use in Mobile only configurations in which the antennas used for this transmitter must be installed to provide a separation distance of at least 20cm from all person and not be co-located with any other transmitters except in accordance with FCC and Industry Canada multi-transmitter product procedures.
As long as the two conditions above are met, further transmitter testing will not be required.
However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions cannot be met (for certain configurations or co-location with another transmitter), then the FCC and Industry Canada authorizations are no longer considered valid and the FCC ID and IC Certification Number cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC and Industry Canada authorization.

OEM LABELING REQUIREMENTS FOR END-PRODUCT

The ILUMIBLEH module is labeled with its own FCC ID and IC Certification Number. The FCC ID and IC certification numbers are not visible when the module is installed inside another device, as such the end device into which the module is installed must display a label referring to the enclosed module. The final end product must be labeled in a visible area with the following:

"Contains Transmitter Module FCC ID: 2AEHU-ILUMIBLEH"

"Contains Transmitter Module IC: 20059-ILUMIBLEH"

Or

"Contains FCC ID: 2AEHU-ILUMIBLEH"

"Contains IC: 20059-ILUMIBLEH"

The OEM of the ILUMIBLEH Module must only use the approved antenna listed above, which have been certified with this module.

OEM END PRODUCT USER MANUAL STATEMENTS

The OEM integrator should not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user manual of the end product.
The user manual for the end product must include the following information in a prominent location:

This device is granted for use in Mobile only configurations in which the antennas used for this transmitter must be installed to provide a separation distance of at least 20cm from all person and not be co-located with any other transmitters except in accordance with FCC and Industry Canada multi-transmitter product procedures.