# BLED112

DATA SHEET

Friday, 04 November 2022

Version 1.6

## VERSION HISTORY

| Version | Comment |
|---|---|
| 1.0 | First version |
| 1.1 | Current consumption added |
| 1.2 | Certification updates |
| 1.3 | Updated certification information |
| 1.4 | Renamed "Bluetooth Smart" to "Bluetooth Low Energy" according to the official Bluetooth SIG nomenclature |
| 1.5 | Updated CE and UKCA certification information |
| 1.6 | Removed section 4.8 |

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# BLED112 *Bluetooth*® Low Energy USB Dongle

## DESCRIPTION

BLED112 *Bluetooth* Low Energy Dongle integrates all *Bluetooth* Low Energy features. The USB dongle can a virtual COM port that enables simple host application development using a simple application programming interface. The BLED112 can be used for *Bluetooth* Low Energy development. With two BLED112 dongles you can quickly prototype new *Bluetooth* Low Energy application profiles by utilizing Bluegiga Profile Toolkit™ and also automate in module software functions with Bluegiga BGScript™ .

**Figure 1: BLED112 Bluetooth Low Energy USB dongle**

**KEY FEATURES:**

- *Bluetooth* v.4.0, single mode compliant
  - Supports master and slave modes
  - Supports up to eight connections
- Integrated *Bluetooth* Low Energy stack
  - GAP, GATT, L2CAP and SMP
  - *Bluetooth* Low Energy profiles
- Radio performance
  - Transmit power : +0 dBm to -27 dBm
  - Receiver sensitivity: -91 dBm
- Host interfaces
  - USB (virtual COM port emulation)
- Programmable 8051 processor for stand-alone operation
- Simple Bluegiga BGScript™ scripting language for quick application development
- Bluegiga Profile Toolkit™ allowing the quick development of GATT based profiles
- Free Software Development Kit
- *Bluetooth*, CE, FCC, IC, South-Korea, Japan, Brazil and Taiwan qualified

# 1 BLED112 Product Numbering

**Available products and product codes**

| Product code | Description |
|---|---|
| BLED112-V1 | BLED112 USB dongle |

# 2 Electrical Characteristics

## 2.1 Absolute Maximum Ratings

Note: These are absolute maximum ratings beyond which the module can be permanently damaged. These are not maximum operating conditions. The maximum recommended operating conditions are in the table 6.

| Rating | Min | Max | Unit |
|---|---|---|---|
| Storage Temperature | -40 | +85 | °C |
| VBUS | -0.3 | 6.5 | V |

**Table 1: Absolute Maximum Ratings**

## 2.2 Recommended Operating Conditions

| Rating | Min | Max | Unit |
|---|---|---|---|
| Operating Temperature Range | -40 | +85 | °C |
| VBUS | 3.6 | 5.5 | V |

**Table 2: Recommended Operating Conditions**

## 2.3 Current Consumption

| Rating | | AVG | Peak | Unit |
|---|---|---|---|---|
| Idle | | 12.1 | | mA |
| Scan | | | 44 | mA |
| Advertising | TX | | 44 | mA |
| | RX | | 33 | mA |

**Table 3: Current Consumption**

# 3 Block Diagram

BLED112 is based on TI's CC2540 chip. Embedded 32 MHz and 32.678 kHz crystals are used for clock generation..

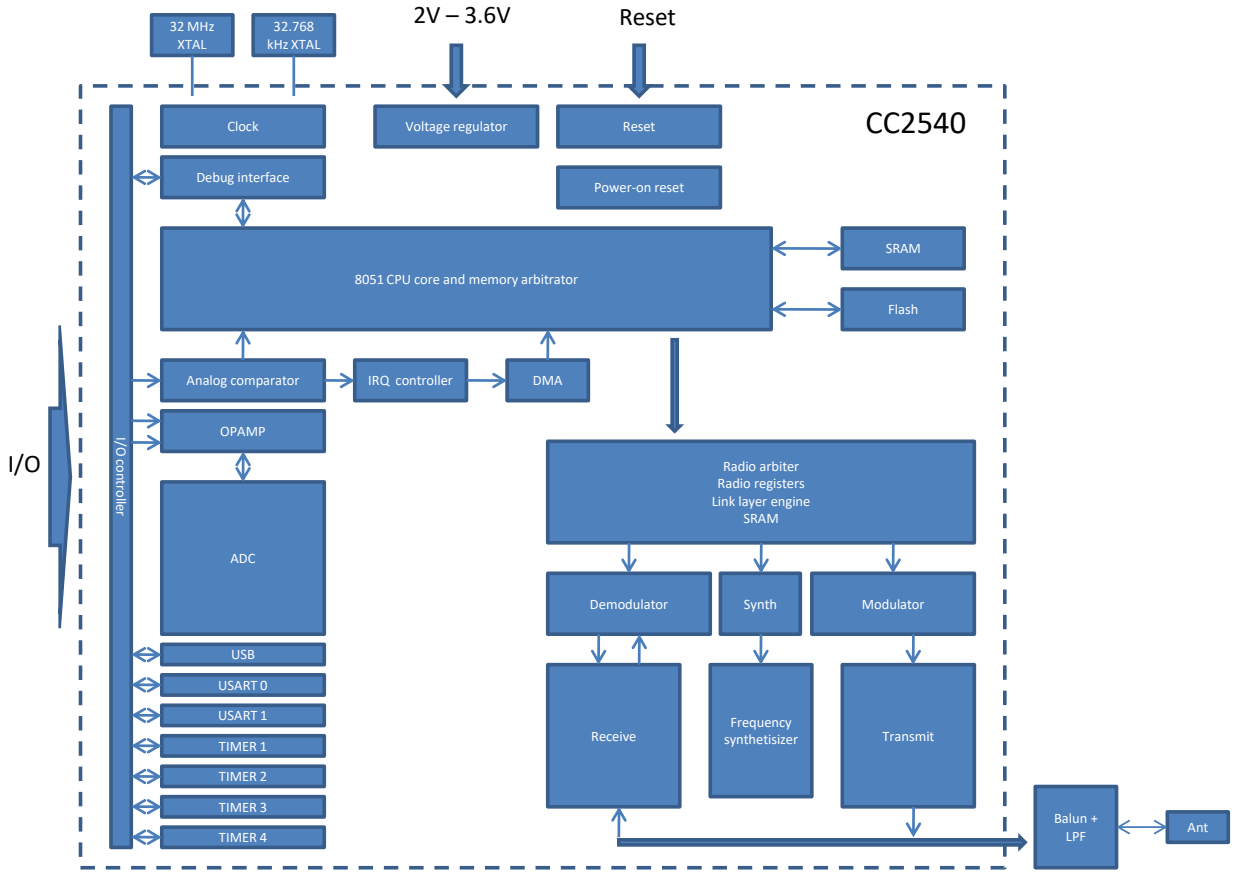


**Figure 2: Simplified block diagram of BLE112**

***CPU and Memory***

The 8051 CPU core is a single-cycle 8051-compatible core. It has three different memory access buses (SFR, DATA, and CODE/XDATA), a debug interface, and an 18-input extended interrupt unit.

The memory arbiter is at the heart of the system, as it connects the CPU and DMA controller with the physical memories and all peripherals through the SFR bus. The memory arbiter has four memory-access points, access of which can map to one of three physical memories: an SRAM, flash memory, and XREG/SFR registers. It is responsible for performing arbitration and sequencing between simultaneous memory accesses to the same physical memory.

The SFR bus is a common bus that connects all hardware peripherals to the memory arbiter. The SFR bus also provides access to the radio registers in the radio register bank, even though these are indeed mapped into XDATA memory space.

The 8-KB SRAM maps to the DATA memory space and to parts of the XDATA memory spaces. The SRAM is an ultralow-power SRAM that retains its contents even when the digital part is powered off (power modes 2 and 3).

The 128KB flash block provides in-circuit programmable non-volatile program memory for the device, and maps into the CODE and XDATA memory spaces.

# 4 Certifications

## *4.1 Bluetooth*

BLED112 Bluetooth low energy module is *Bluetooth* qualified and listed as an End Product.

## 4.2 FCC and ISED (Formerly IC)

The BLED112 dongle is approved for the USA and Canada markets and comes with the following grant and certificate IDs:

FCC ID: QOQBLED112

IC: 5123A-BGTBLED112

### 4.2.1 FCC

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

***FCC Caution*** : To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

#### *FCC Radiation Exposure Statement*

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. 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.

### 4.2.2 ISED (Formerly IC)

## *IC Statements:*

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. 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 necessary for successful communication.

## *Déclaration d'IC :*

Ce dispositif est conforme aux normes RSS exemptes de licence d'Industrie Canada. Son fonctionnement est assujetti aux deux conditions suivantes : (1) ce dispositif ne doit pas provoquer de perturbation et (2) ce dispositif doit accepter toute perturbation, y compris les perturbations qui peuvent entraîner un fonctionnement non désiré du dispositif.

Selon les réglementations d'Industrie Canada, cet émetteur radio ne doit fonctionner qu'avec une antenne d'une typologie spécifique et d'un gain maximum (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Pour réduire les éventuelles perturbations radioélectriques nuisibles à d'autres utilisateurs, le type d'antenne et son gain doivent être choisis de manière à ce que la puissance isotrope rayonnée équivalente (P.I.R.E.) n'excède pas les valeurs nécessaires pour obtenir une communication convenable.

## 4.3 CE and UKCA – EU and UK

The BLED112 has been tested against the relevant harmonized/designated standards and is in conformity with the essential requirements and other relevant requirements of the EU's Radio Equipment Directive (RED) (2014/53/EU) and of the UK's Radio Equipment Regulations (RER) (S.I. 2017/1206).

The dongles are entitled to carry the CE and UKCA compliance marks, and a formal Declaration of Conformity (DoC) is available at the product web page which is reachable starting from https://www.silabs.com/.

## 4.4 South-Korea

BLED112 is certified in South-Korea with certification number: KCC-CRM-BGT-BLED112

## 4.5 Japan

BLED112 has MIC Japan type certification with certification number: 003WWA111471

## 4.6 Brazil

BLED112 is certified in Brazil with Anatel certification number: 06875-18-03402

This equipment is not entitled to protection against harmful interference and may not cause interference to other duly authorized systems.

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

## 4.7 Taiwan

The BLED112 is certified in Taiwan with NCC certification number CCAM15LP0570T2.

BLED112通過了臺灣NCC認證, 認證號為CCAM15LP0570T2.

| According to NCC Low Power Radio Wave Radiation Equipment Management Regulations: | |
|---|---|
| Article 12 | A low-power RF equipment that has passed the type approval shall not change the frequency, increase the power or change the characteristics and functions of the original design without permission. |
| Article 14 | The use of low-power RF equipment shall not affect flight safety and interfere with legal communications; if interference is found, it shall be immediately deactivated and improved until no interference is found.<br>Legal communication in the preceding paragraph refers to radio communications operating in accordance with the provisions of the Telecommunications Act.<br>Low-power RF equipment must withstand interference from legitimate communications or radiological, radiated electrical equipment for industrial, scientific, and medical applications. |

| 根據 NCC 低功率電波輻射性電機管理辦法 規定: | |
|---|---|
| 第十二條 | 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。 |
| 第十四條 | 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。<br>前項合法通信，指依電信法規定作業之無線電通信。<br>低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。 |

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