



BLED112 *Bluetooth*® Smart USB Dongle

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Key Features



- **Bluetooth v.4.0, single mode compliant**
 - Supports master and slave modes
 - Up to 8 connections
- **Integrated *Bluetooth Smart* stack**
 - GAP, GATT, L2CAP and SMP
 - *Bluetooth Smart* profiles
- **Radio performance**
 - Transmit power : +0 dBm
 - Receiver sensitivity: -93dBm
- **USB host interface**
 - Supports USB/CDC (virtual COM port)
- **Programmable 8051 processor for stand-alone operation**
- ***Bluetooth*, CE, FCC, IC, Japan and South-Korea qualified**

Benefits



- **Integrated *Bluetooth* stack**
 - No *Bluetooth* stack needed on the host
 - Operating system independent
- **Wide Operating System support**
 - Windows®
 - Linux
 - MAC OS
 - Android
- **BGAPI™ software interface**
 - An OS independent API between the dongle and the host
- **On-dongle applications**
 - Developed with simple BGScript™ scripting language
 - Enables stand-alone operation
- ***Bluetooth*, CE, FCC, IC, South-Korea and Japan qualified**
 - Proven interoperability
 - No qualification costs

BLED112 Overview



- **Bluetooth low energy radio**
 - Frequency: 2402 – 2480 MHz
 - TX power: 0 dBmRX
 - sensitivity: -93 dBm
 - Modulation: GFSK
 - Symbol rate: 1 Mbps
- **Antenna**
 - Integrated PCB antenna
- **Typical line of sight range:**
 - +0dbm: 20-40 meters
 - -20 dBm: ~5 meters

BLED112 Overview

A programmable 8051 microcontroller

- **Architecture**
 - 8-bit, 8051 architecture
- **SRAM**
 - 8 kB
- **Flash**
 - 128kB

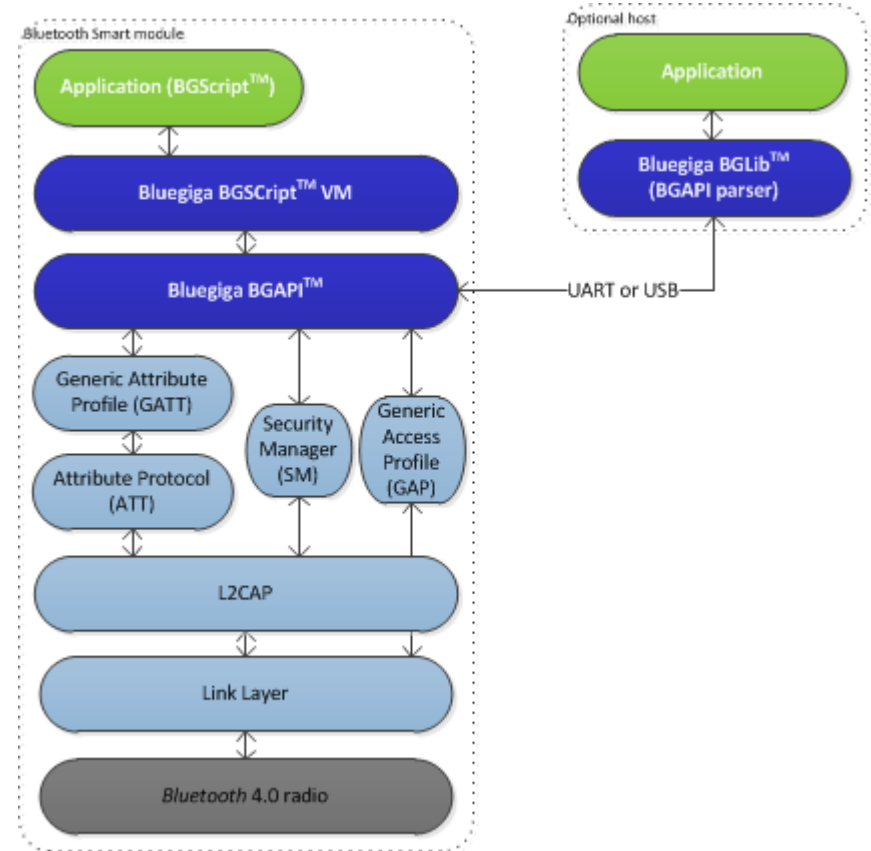




Bluetooth® Smart Software

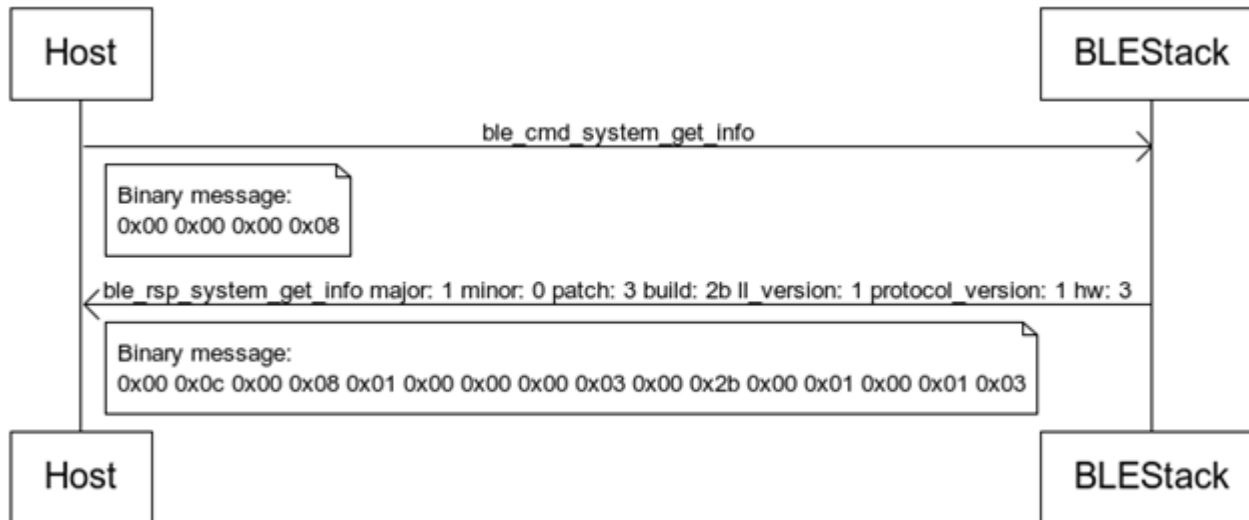
Bluetooth Smart Software

- **Bluetooth v.4.0, single mode compliant**
 - Supports master and slave modes
 - Up to 8 simultaneous connections
- **Implements all Bluetooth Smart functionality**
 - GAP, L2CAP, ATT, GATT
 - Security manager: bonding, encryption
 - Bluetooth Smart profiles
- **Simple API for external host processors**
 - BGAPI™ : A simple protocol over UART or USB interfaces
 - BGLib™ : A C library for host processors implementing BGAPI
- **Supports standalone applications as well**
 - BGScript™ : A simple scripting language for writing applications
 - **No separate host needed**
- **Bluetooth Smart Profile Toolkit™**
 - XML based development tool for Bluetooth Smart profiles
 - Fast and simple profile development
- **Small memory requirements**
 - ~4kB RAM
 - ~70kB flash (depending of used features/profiles)
- **Bluetooth qualified**



**Bluegiga Bluetooth®
Smart Software**

- **BGAPI™ protocol** : A simple binary command, response and event protocol between the host and the stack
 - Used when a separate host (MCU) is used to control BLE112 over USB
 - Very small memory requirements size requirement and low implementation overhead



- **BGLib™ library** : A portable ANSI C library, which implements the BGAPI protocol
 - Easy to port to various architectures such as : ARM Cortex, PIC16/32 etc.
 - Uses fuction–call back architecture

C Functions

```
/* Function */
void ble_cmd_gap_connect_direct(
    bd_addr address ,
    uint8 addr_type ,
    uint16 conn_interval_min ,
    uint16 conn_interval_max ,
    uint16 timeout
);

/* Callback */
void ble_rsp_gap_connect_direct(
    uint16 result ,
    uint8 conn
);
```

- **BGScript™ scripting language** : A very simple BASIC-like application scripting language
 - Used when applications are implemented on the BLE112's 8051 controller
 - Enables very fast application development and allows programs to be executed directly on the BLE112 without the need of an external MCU

```
# System boot event listener : Executed when BLE112 is started
event system_boot(major ,minor ,patch ,build ,ll_version ,protocol_version ,hw )

    # Configure ADV interval to 1000ms and start advertisements on all channels
    call gap_set_adv_parameters(1600, 1600, 7)

    # Start generic advertisement and enable connections
    call gap_set_mode(2,2)

    #Start a continuous software timer, which generates interrupts every 1000ms
    call hardware_set_soft_timer(32768, 1, 0)
end
```

- **Why to use BGScript™?**
- **Very simple to use**
 - Fast development of simple *Bluetooth* Smart applications
 - Examples: Pairing, simple user interfaces, simple sensors
- **Free software development tools**
 - Code developed with any text or source code editor
 - Code compiled with Bluegiga's free compiler
- **Several example scripts available**
 - Heart Rate sensor
 - Proximity reporter
 - FindMe tag
 - Medical devices such as blood glucose
- **Cuts out the need for external MCU**
 - Reduced product eBoM
 - Smaller footprint
 - Faster time-to-market

- **Bluetooth Smart Profile Toolkit™**: A tool for creating *Bluetooth Smart* profiles
 - *Bluetooth Smart* profiles are very simple
 - Can be describes with a single file of XML
 - Profile toolkit is a Simple description language of *Bluetooth Smart Profiles*
- **Several example profiles and services available**
 - Heart Rate Sensor
 - Proximity Reporter
 - FindMe
 - Blood glucose

```
<?xml version="1.0" encoding="UTF-8" ?>
- <configuration>
+ <service>
- <service>
  <uuid>3a00</uuid>
  <description>Heartrate Service</description>
- <characteristic id="heartrate">
  - <properties>
    <read />
    <notify />
  </properties>
  <uuid>3a01</uuid>
  <value type="UINT8" />
  <description>Beats per minute</description>
</characteristic>
- <characteristic id="rr_interval">
+ <properties>
  <uuid>3a02</uuid>
  <value type="UINT16" />
  <description>R-R Interval</description>
</characteristic>
- <characteristic>
  <uuid>3a03</uuid>
+ <properties>
  <value type="SFLOAT" unit="kJ" />
  <description>Energy Expended</description>
</characteristic>
- <characteristic>
  <uuid>3a04</uuid>
+ <properties>
  <value type="UINT8" />
  <description>Sensor Status</description>
</characteristic>
+ <characteristic type="aggregate">
</service>
</configuration>
```

Certifications



- **Bluetooth 4.0**
 - BLED112: Controller subsystem
 - Software : Host subsystem
- **CE**
 - EN300328
 - EMC330489
- **FCC**
 - FCC Modular approval
- **Industry Canada**
 - IC modular certification
- **South Korea**
 - KCC certification
- **Japan**
 - ARIB-STD-66





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