



# **Areus Bluetooth Low Energy Module**

Data Sheet and User's Manual

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## 1. Features

- Fully Bluetooth Low Energy 4.1 compatible
- Small footprint
- Ultra Low-Power-Design
- Nordic Semiconductor nRF8122 controller
- ARM Cortex M0
- Best-in-class radio performance
- Cost-effective single-chip solution
- Full module approval for Europe (ETSI) and North America (FCC, IC)
- Supports Over-the-air (OTA) Update for Bluetooth stack and user application air
- Rich peripheral set, including
  - 8 channel, 10 bit ADC
  - General Purpose I/O Pins
  - One 32 bit and two 16 bit timers with counter mode
  - SPI Master/Slave
  - Low power comparator
  - Temperature sensor
  - Two-wire Master (I2C compatible)
  - UART (CTS/RTS)
  - Quadrature Decoder (QDEC)
  - AES HW encryption
  - Real Time Clock (RTC)
- 256 kB Flash
- 32 kB RAM
- UL94V0 listed PCB

## 2. Description

The Areus Bluetooth Low Energy Module is a versatile solution for ultra low power radio applications. Being fully compatible to the Bluetooth Smart standard, it provides applications access to almost any mobile device like smart phones, tablets and PC, making it the ideal solution for smart devices. The ability to run the application firmware directly on the module removes the need for an external microcontroller, allowing for low latency and minimized BOM cost.

Based on the widely used Nordic nRF8122 Bluetooth SoC, the Areus Bluetooth Low Energy Module uses the standard-setting Bluetooth Low Energy controller, leveraging one of the biggest Bluetooth Low Energy software ecosystems available.

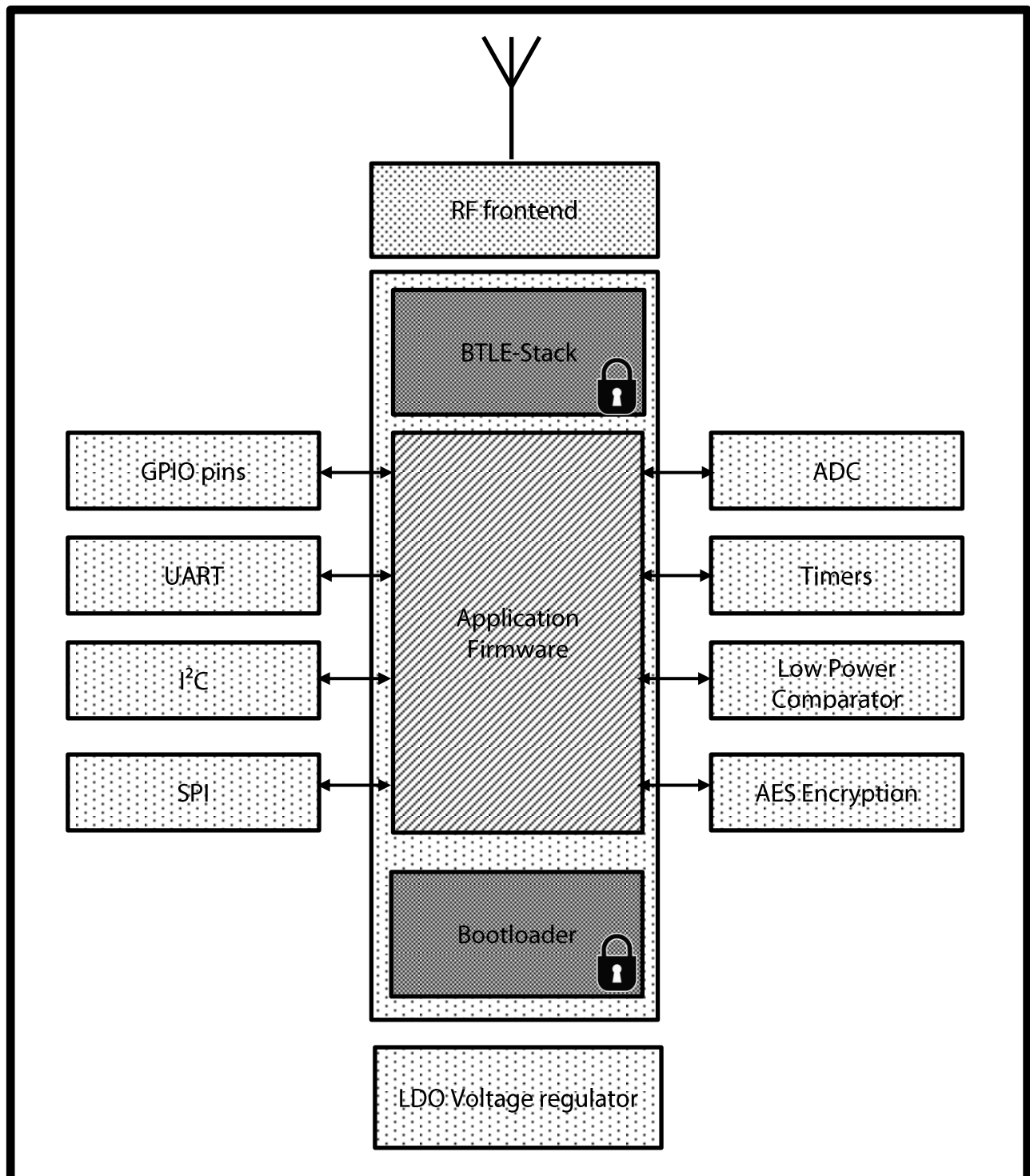
The module's optimized design results in superior radio performance for maximized operating distance and robustness.

Flexible IO configuration and a minimized footprint allow easy integration into virtually any application.

The module works over a wide supply voltage range and covers the extended automotive temperature range from -40°C to +105°C.

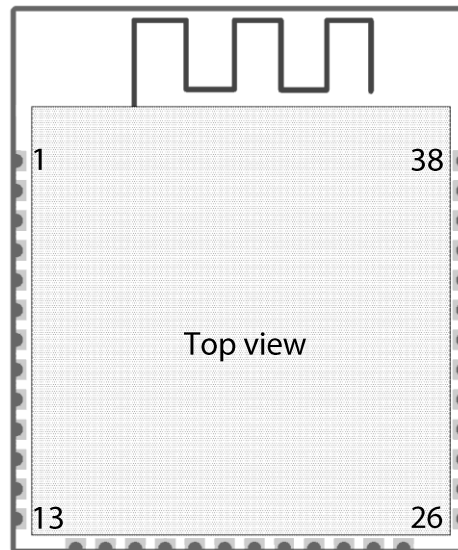
Being fully certified, using the Areus Bluetooth Low Energy Module is a true plug-in solution and eliminates the burden of RF certification. As of today, the module is certified for Europe, USA and Canada. Certification for other regions can be done upon customer's request.

### 3. Block Diagram



Note: All IO-Interfaces and Data pins are handled by the application firmware only. The BTLE-Stack is shielded from the application firmware to prevent unwanted RF modulation or interference by external data sources.

## 4. Pinout and Pin Descriptions



Pin	Type	Signal	Description <sup>1</sup>
1	Power	GND	Signal Ground
2	I/O	P0.21	General purpose I/O
3	I/O	P0.22	General purpose I/O
4	I/O	P0.23	General purpose I/O
5	I/O	P0.24	General purpose I/O
6	I/O	P0.25	General purpose I/O
7	I/O	P0.28	General purpose I/O
8	I/O	P0.29	General purpose I/O
9	I/O	P0.30	General purpose I/O
10	I/O	P0.00	General purpose I/O
11	I/O	P0.01	General purpose I/O
12	I/O	P0.02	General purpose I/O
13	Power	V <sub>DD</sub>	Positive Power Supply
14	Power	GND	Signal Ground
15	I/O	P0.03	General purpose I/O
16	I/O	P0.04	General purpose I/O
17	I/O	P0.05	General purpose I/O
18	I/O	P0.06	General purpose I/O
19	I/O	P0.07	General purpose I/O
20	I/O	P0.08	General purpose I/O
21	I/O	P0.09	General purpose I/O
22	I/O	P0.10	General purpose I/O

<sup>1</sup> Refer to the nRF51822 data sheet for detailed pin description and peripheral mapping.

Pin	Type	Signal	Description <sup>2</sup>
23	I/O	P0.11	General purpose I/O
24	I/O	P0.12	General purpose I/O
25	Power	GND	Signal Ground
26	Power	GND	Signal Ground
27	Power	V <sub>DD</sub>	Positive Power Supply
28	I/O	P0.13	General purpose I/O
29	I/O	P0.14	General purpose I/O
30	I/O	P0.15	General purpose I/O
31	I/O	P0.16	General purpose I/O
32	SWD	SWDIO	Programming Interface, Serial Data
33	SWD	SWCLK	Programming Interface, Serial Clock
34	I/O	P0.17	General purpose I/O
35	I/O	P0.18	General purpose I/O
36	I/O	P0.19	General purpose I/O
37	I/O	P0.20	General purpose I/O
38	Power	GND	Signal Ground

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<sup>2</sup> Refer to the nRF51822 data sheet for detailed pin description and peripheral mapping.

## 5. Electrical Specifications

### 5.1 Absolute Maximum Ratings

Maximum ratings are the extreme limits the module can be exposed to without causing permanent damage. Exposure to absolute maximum ratings for prolonged periods of time may affect the reliability of the module. Refer to the Nordic nRF51822 product specification for details.

Parameter	Symbol	Min.	Max.
Supply Voltage	$V_{DD}$	-0.2V	+3.8V
I/O Pin Voltage	$V_{IO}$	-0.2V	$V_{DD} + 0.3V$
Storage Temperature	$T_{Storage}$	-40 °C	+125 °C
ESD Human Body Model	ESD HBM	-	4 kV <sup>3</sup>
ESD Charged Device Model	ESD CDM	-	500 V <sup>4</sup>

### 5.2 Operating Conditions

Operating conditions are the physical parameters that the module can operate within specification. Refer to the Nordic nRF51822 product specification for details.

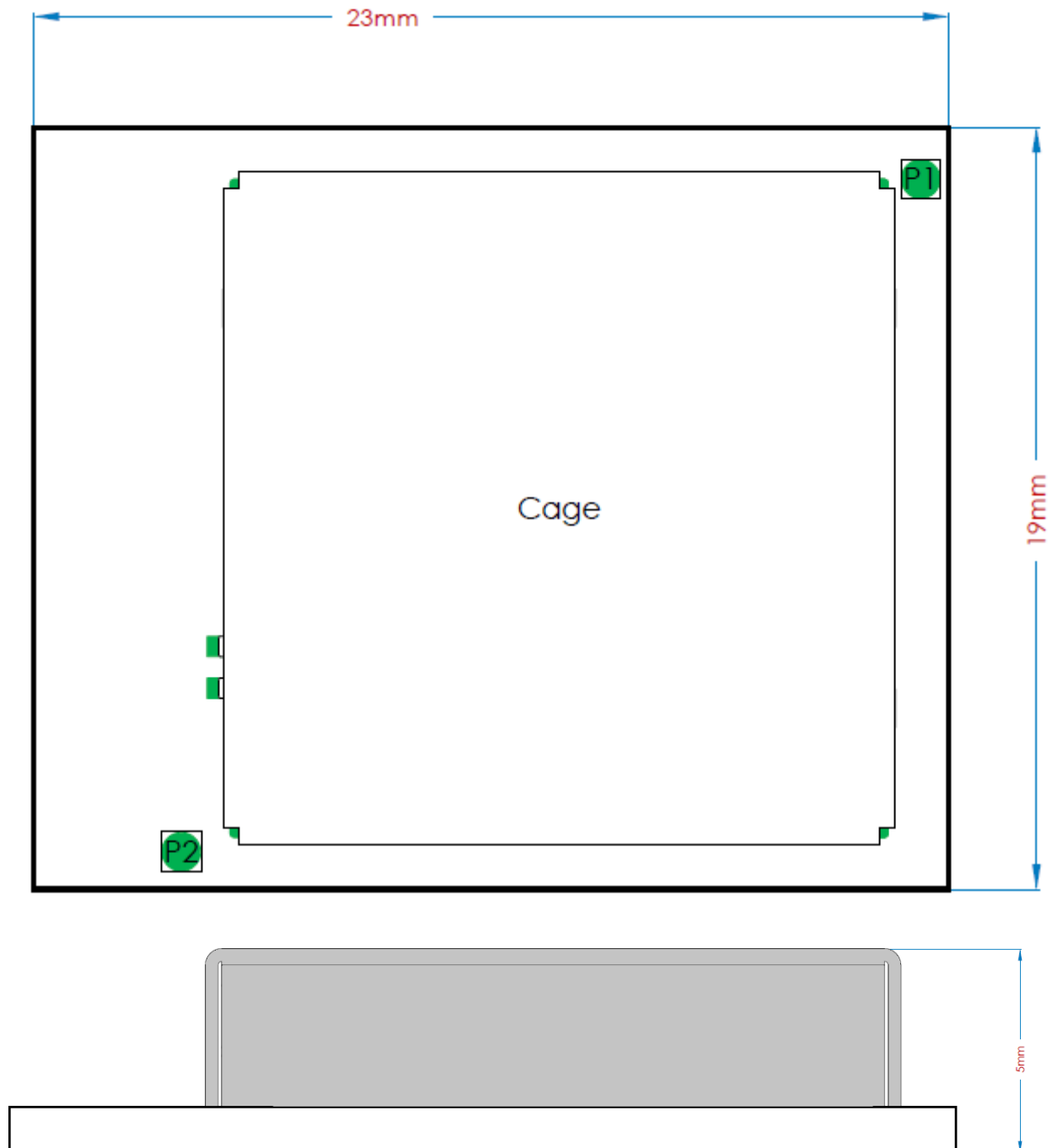
Parameter	Symbol	Min.	Max.
Supply Voltage	$V_{DD}$	+1.8 V	+3.6 V
Supply Rise Time	$t_{VDD;Rise}$	-	75 ms
Operating Temperature	$T_{Ambient}$	-40 °C	+105 °C

<sup>3</sup> According to nRF51822 Data Sheet, not tested by Areus

<sup>4</sup> According to nRF51822 Data Sheet, not tested by Areus



## 6. Mechanical Dimensions



## 7. Part numbering and Ordering Information

Part Nummer	Description
102122	Areus Bluetooth Low Energy Module

For pricing and availability, please contact Areus sales: [vertrieb@areus.de](mailto:vertrieb@areus.de) +49 7032 32098-0

## 8. Regulatory and Safety Information

This device complies with Industry Canada licence-exempt RSS standard(s) and part 15 of the FCC Rules. 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.

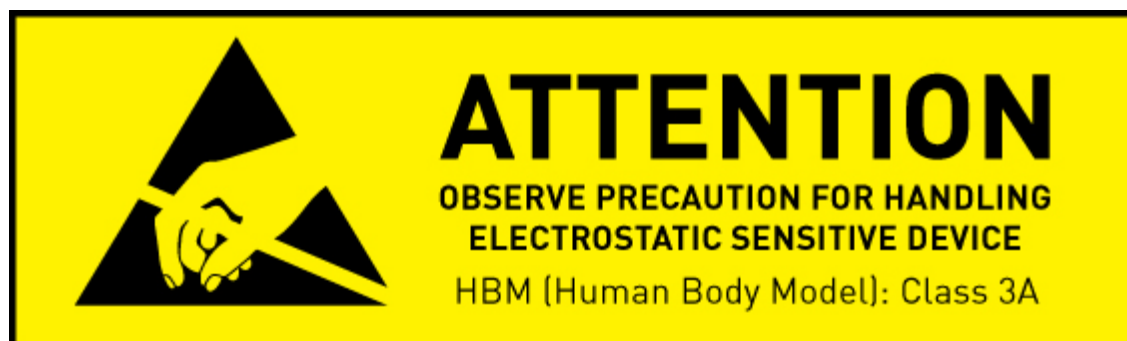
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.



FCC ID: 2AIO7BLE

IC: 21720-BLE



## 9. Revision History

Version	Issue Date	Author	Modifications
1.0	5.7.2016	O. Dengler	Initial version
1.1	7.7.2016	O. Dengler	Added French FCC / IC regulation statement
1.2	28.9.2016	O. Dengler	Added final FCC / IC ID
1.3	6.10.2016	O. Dengler	Revised block diagram and added IO pin note
1.4	7.11.2016	O. Dengler	Updated regulatory requirements