



## Datasheet

Bluetooth Low Energy(BLE)/Smart 4.1 Module

### Product Benefits

- **Ultra low power consumption**
- **Fast Time to Market**
- **FCC, CE, IC; other regulatory certifications on request**
- **Over the Air Firmware Update**
- **No external components required**
- **Compact Footprint**
- **A10 - Compact size with chip antenna**
- **A20 - With trace antenna**
- **Based on Nordic nRF51822 chipset**
- **Bluetooth 4.1 compliant low energy single-mode protocol stack**
  - Link layer
  - L2CAP, ATT and SM protocols
  - GATT and GAP APIs
  - Concurrent Central, Observer, Peripheral and Broadcaster roles
    - 3 central connections
    - 1 peripheral connection
    - 1 observer
    - 1 broadcaster
  - GATT Client and Server
  - Full SMP support including MITM and OOB pairing
- **2.4 GHz transceiver**
  - -93 dBm sensitivity in Bluetooth® low energy mode
  - 250 kbps, 1 Mbps, 2 Mbps supported data rates
  - TX Power -20 to +4 dBm in 4 dB steps
  - TX Power -30 dBm Whisper mode
  - 13 mA peak RX, 10.5 mA peak TX (0 dBm)
  - 9.7 mA peak RX, 8 mA peak TX (0 dBm) with DC/DC
  - RSSI (1 dB resolution)
- **ARM® Cortex™-M0 32 bit processor**
  - 275 µA/MHz running from flash memory
  - 150 µA/MHz running from RAM
  - Serial Wire Debug (SWD)
- **Memory**
  - 256 kB embedded flash program memory
  - 16 kB RAM
- **Flexible Power Management**
  - Supply voltage range 2.1 V to 3.6 V
  - 4.2 µs wake-up using 16 MHz RCOSC
  - 0.6 µA at 3 V OFF mode

- 1.2  $\mu$ A at 3 V in OFF mode + 1 region RAM retention
- 2.6  $\mu$ A at 3 V ON mode, all blocks IDLE
- **31 General Purpose I/O Pins**
  - Each GPIO can be accessed individually with the following user configurable features:
    - Input/output direction
    - Output drive strength
    - Internal pull-up and pull-down resistors
    - Wake-up from high or low level triggers on all pins
    - Trigger interrupt on all pins
    - All pins can be used by the PPI task/event system; the maximum number of pins that can be interfaced through the PPI at the same time is limited by the number of GPIOE channels
    - All pins can be individually configured to carry serial interface or quadrature demodulator signals
- **8/9/10 bit ADC - 8 configurable channels**
  - The 10 bit incremental Analog to Digital Converter (ADC) enables sampling of up to 8 external signals through a front-end multiplexer. The ADC has configurable input and reference pre-scaling, and sample resolution (8, 9, and 10 bit).
  - **Note:** The LPCOMP module uses the same analog inputs as the ADC module. Only one of the modules can be enabled at the same time.
- **SPI Master/Slave**
  - The SPI interfaces enable full duplex synchronous communication between devices. They support a three wire (SCK, MISO, MOSI) bi-directional bus with fast data transfers. The SPI Master can communicate with multiple slaves using individual chip select signals for each of the slave devices attached to a bus. Control of chip select signals is left to the application through use of GPIO signals. SPI Master has double buffered I/O data. The SPI Slave includes EasyDMA for data transfer directly to and from RAM allowing Slave data transfers to occur while the CPU is IDLE.
  - The GPIOs used for each SPI interface line can be chosen from any GPIO on the device and are independently configurable. This enables great flexibility in device pinout and efficient use of printed circuit board space and signal routing.
  - The SPI peripheral supports SPI mode 0, 1, 2, and 3.

Instance	Master/Slave
SPI0	Master
SPI1	Master
SPIS1	Slave

- **Low power comparator (LPCOMP)**
  - In System ON, the block can generate separate events on rising and falling edges of a signal, or sample the current state of the pin as being above or below the threshold. The block can be configured to use any of the analog inputs on the device. Additionally, the low power comparator can be used as an analog wakeup source from System OFF or System ON. The comparator threshold can be programmed to a range of fractions of the supply voltage.
  - **Note:** The LPCOMP module uses the same analog inputs as the ADC module. Only one of the modules can be enabled at the same time.
- **Temperature sensor**
  - The temperature sensor measures die temperature over the temperature range of the device

with 0.25° C resolution.

- **Two-wire Master (I2C compatible)**
  - The two-wire interface can communicate with a bi-directional wired-AND bus with two lines (SCL, SDA). The protocol makes it possible to interconnect up to 127 individually addressable devices. The interface is capable of clock stretching, supporting data rates of 100 kbps and 400 kbps.
  - The GPIOs used for each two-wire interface line can be chosen from any GPIO on the device and are independently configurable. This enables great flexibility in device pinout and efficient use of board space and signal routing.
- **UART (CTS/RTS)**
  - It offers fast, full-duplex, asynchronous serial communication with built-in flow control (CTS, RTS) support in hardware up to 1 Mbps baud. Parity checking is supported.
  - The GPIOs used for each UART interface line can be chosen from any GPIO on the device and are independently configurable.
- **Real Timer Counter (RTC)**
  - The Real Time Counter (RTC) module provides a generic, low power timer on the low-frequency clock source(LFCLK). The RTC features a 24 bit COUNTER, 12 bit (1/X) prescaler, capture/compare registers, and a tick event generator for low power, tickless RTOS implementation.

## PIN DESCRIPTIONS

Module Pin	Name	I/O Type	Description
1	P0.21	DIO	GPIO
2	P0.22	DIO	GPIO
3	P0.23	DIO	GPIO
4	P0.24	DIO	GPIO
5	P0.25	DIO	GPIO
6	P0.28	DIO	GPIO
7	P0.29	DIO	GPIO
8	P0.30	DIO	GPIO
9	P0.00	DIO/AI/LPComp p	GPIO/ADC/LPComp input 0
10	P0.01	DIO/AI/LPComp p	GPIO/ADC/LPComp input 2
11	VCC	Power	Power Supply (2.1V-3.6V)
12	VCC	Power	Power Supply (2.1V-3.6V)
13	P0.02	DIO/AI/LPComp p	GPIO/ADC/LPComp input 3
14	P0.03	DIO/AI/LPComp p	GPIO/ADC/LPComp input 4
15	P0.04	DIO/AI/LPComp p	GPIO/ADC/LPComp input 5
16	P0.05	DIO/AI/LPComp p	GPIO/ADC/LPComp input 6
17	P0.06	DIO/AI/LPComp p	GPIO/ADC/LPComp input 7
18	P0.07	DIO	GPIO
19	P0.08	DIO	GPIO
20	P0.09	DIO	Reserved for flash programming
21	P0.10	DIO	GPIO
22	P0.12	DIO	GPIO
23	P0.11	DIO	Reserved for flash programming
24	P0.13	DIO	GPIO
25	SWDIO/nRST	DIO	System reset(active)

			low)/Flash programming I/O
26	SWDCLK	DI	Flash programming I/O
27	P0.14	DIO	GPIO
28	P0.15	DIO	GPIO
29	P0.16	DIO	GPIO
30	P0.17	DIO	GPIO
31	P0.18	DIO	GPIO
32	P0.19	DIO	GPIO
33	P0.20	DIO	GPIO
34,35	GND	GND	GROUND
36-39	GND	GND	GROUND (A20 DOES NOT HAVE PIN36-39)

**If attachable antenna used:**

Approved Antenna for Blenie-A20 : TRF1001,  
Manufacturer: MicroChip. Average gain: 2 dBi

**OEM Responsibilities to comply with FCC Regulations:**

The Blenie-A20 module has been certified for integration into products only by OEM integrators under the following condition: The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter. As long as the condition above is met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirement required with this module installed.

## **End Product Labeling**

The Blenie-A20 module is labeled with its own FCC ID. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

**“Contains Transmitter module FCC ID: 2ADYQ-BLENIEA20“**

## **Liability disclaimer**

Vensi, Inc. reserves the right to make changes without further notice to the product to improve reliability, function or design. Vensi does not assume any liability arising out of the application or use of any product or circuits described herein. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

## **Life support applications**

Vensi's products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Vensi customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vensi for any damages resulting from such improper use or sale.

**Please see [www.blenie.com](http://www.blenie.com) Information regarding product updates, downloads.**

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## FCC Information and Copyright

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 or more 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.

### 15.19 Labelling requirements.

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.

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

**FCC RF warning** statement: the device has been evaluated to meet general RF exposure requirement , The device can be used in portable exposure condition without restriction.