

NTSecureNode BLE100: Data acquisition platform for stationary IoT networks

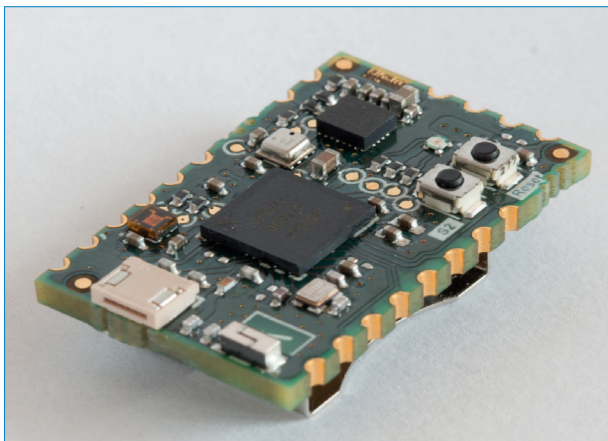
Description

BLE100 is a dual use Bluetooth Low Energy Sensor Module.

BLE100 can either be used as a stand alone BLE sensor Module powered by a 3V coin cell, or as an add on board for customer PCB to enhance it with sensors and BLE functionality. The module provides a full BLE stack and lots of space, for easy addition of customer specific bluetooth profiles and application software. In lowest power sleep mode it consumes less than 10 uA and will wake up in a few hundred microseconds.

Applications

- _ Motion tracking
- _ Environmental monitoring
- _ Predictive maintenance
- _ Cloud connection
- _ Sensor data acquisition and secure transfer into the cloud



Key Features

- _ BLE SOC
- _ Full Bluetooth 5 capable
- _ On board chip antenna
- _ Extremely energy efficient
- _ Equipped with an ARM Cryptocell 310 (all the features of a TPM)
- _ NFC
- _ End-to-end encryption
- _ Over-the-air firmware update
- _ Edge computing platform
- _ Parametrization via mobile app / internet
- _ Data compression, buffering and selection
- _ Extensible through individual application programming
- _ Configurable transmission parameters
- _ Battery powered
- _ 8 general purpose I/O
- _ 2 robust general purpose I/O

Installed sensors:

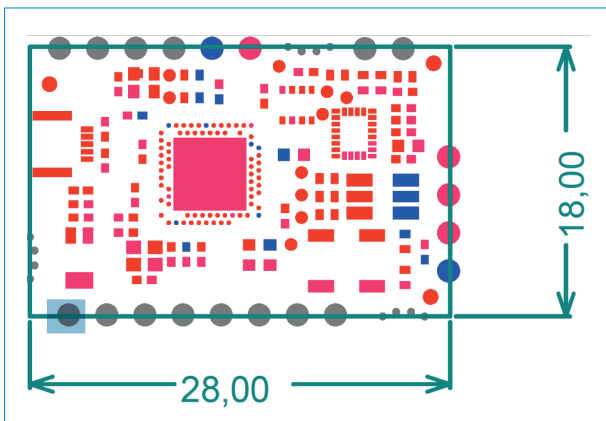
- _ air pressure, humidity, temperature sensors
- _ 9 axis inertial sensor: acceleration, gyro, magnetometer
- _ Digital Ambient Light Sensor
- _ Low Power RGB LED
- _ Can be alternatively operated with a CR1632 button cell as a standalone sensor node (battery holder can be equipped on the bottom side) or used as a system on modules in a circuit.

Operation Conditions

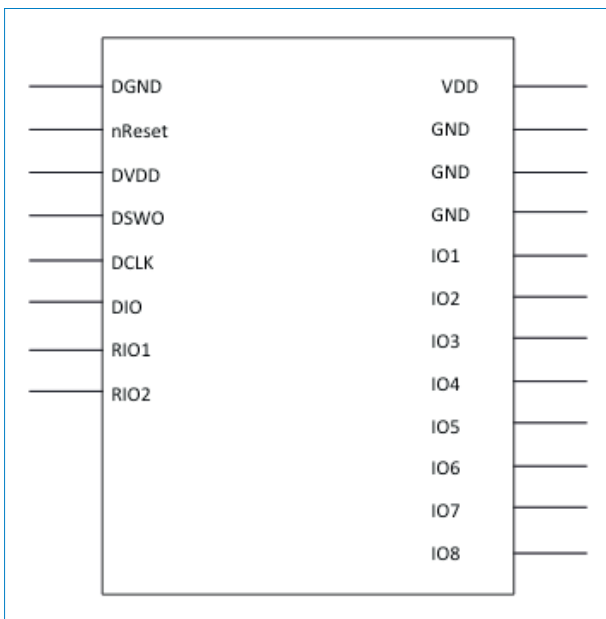
- _ Operating Humidity: from 20% to 95% RH (non-condensing)
- _ Storage Humidity: from 0% to 95% RH (non-condensing)

Physical Dimensions

- _ 18 x 28 mm
- _ 5 gramm



Pinout and Terminal Description



Security and Encryption

- _ Dedicated cryptographic hardware engine (ARM Crypto Cell 310)
- _ Cryptography and security middleware services
- _ Security Library NTSecureCloudConnector
- _ Device Life-Cycle-State management
- _ Key Management infrastructure
- _ Secure Boot
- _ Various supported encryption algorithms, such as AES, RSA, Diffie-Hellman, Elliptic Curve ECC, etc.

Main Controller Features

- _ Advanced Single chip 2.4 GHz multi-protocol SoC
- _ 32-bit ARM Cortex-M4F Processor
- _ 1.7v to 5.5v operation
- _ 1MB flash + 256kB RAM
- _ Bluetooth 5 support for long range and high throughput
- _ 802.15.4 radio support
- _ On-chip NFC
- _ PPI –Programmable Peripheral Interconnect
- _ Automated power management system with automatic power management of each peripheral
- _ Configurable I/O mapping for analog and digital I/O
- _ 48 x GPIO
- _ 1 x QSPI
- _ 4 x Master/Slave SPI
- _ 2 x Two-wire interface (I²C)
- _ I²S interface
- _ 2 x UART
- _ 4 x PWM
- _ USB 2.0 controller
- _ ARM TrustZone CryptoCell-310 Cryptographic and security module
- _ AES 128-bit ECB/CCM/AAR hardware accelerator
- _ Digital microphone interface (PDM)
- _ Quadrature decoder
- _ 12-bit ADC
- _ Low power comparator
- _ On-chip 50Ω balun
- _ On-air compatible with nRF52, nRF51 and nRF24 Series
- _ Power consumption in lowest sleep mode: 1uA

Sensor Features

Temperature/Humidity/Pressure Sensor

This device is a combined humidity, pressure and temperature sensor. The humidity and pressure sensor can be independently enabled / disabled. Typical applications are: Air quality measurement, GPS enhancement, indoor navigation support, weather forecast.

Parameter	Condition	Min	Typ	Max	Unit
Temperature accuracy	25 °C		+/- 0.5		°C
	0...65 °C		+/- 1		°C
Humidity accuracy	20...80 %RH, 25 °C		+/- 3		%RH
Pressure operating range	0...65 °C	300		1100	hPa
Pressure accuracy	0...65 °C, 300...1100 hPa		+/- 1		hPa

Digital Ambient Light Sensor

This device provides ambient light sensing that approximates human eye response under a variety of lighting conditions. The devices have three selectable integration times and provide a direct 16-bit lux output. The wide dynamic range of the ALS makes it particularly useful in outdoor applications where it is exposed to direct sunlight.

Parameter	Condition	Min	Typ	Max	Unit
Dynamic Range		3		220k	lux

9-Axis Inertial Sensor

This device is a system-in-package sensor system with 3 dimension linear acceleration sensor, 3 dimension digital angular rate sensor and a 3 dimension digital magnetic sensor. Magnetic, accelerometer and angular rate sensor can be enabled / disabled separately. For smart power saving, programmable interrupts and advanced motion detection is available. Typical applications are: Indoor/outdoor navigation, Advanced gesture recognition, movement detection

Parameter	Condition	Min	Typ	Max	Unit
Accelerometer measurement range		+/- 2		+/- 8	g
Acceleration sensitivity	measurement range +/- 2 g		0.061		mg/LSB
Magnetic measurement range		+/- 4		+/- 16	gauss
Magnetic sensitivity	measurement range +/- 4 gauss		0.14		gauss/LSB
Angular rate measurement range		+/- 245		+/- 2000	dps
Angular rate sensitivity	measurement range +/- 245 dps		8.75		mdps/LSB

I/O Ports

	Pin Number	Pad Type	Description
VDD	1	Supply voltage	Supply voltage 2V-3.6V
GND	2, 3, 4	GND	
RIO1	5	Robust Digital I/O	Configurable I/O port
RIO2	6	Robust Digital I/O	Configurable I/O port
DGND	7	JTAG	
DVDD	8	JTAG	
nReset	9	JTAG	Configurable as system RESET
DSWO	10	JTAG	
DIO	11	JTAG	
DCLK	12	JTAG	
IO1	13	Digital I/O /Analog In	Configurable I/O port
IO2	14	Digital I/O /Analog In	Configurable I/O port
IO3	15	Digital I/O /Analog In	Configurable I/O port
IO4	16	Digital I/O /Analog In	Configurable I/O port
IO5	17	Digital I/O /Analog In	Configurable I/O port
IO6	18	Digital I/O /Analog In	Configurable I/O port
IO7	19	Digital I/O	Configurable I/O port
IO8	20	Digital I/O	Configurable I/O port

Electrical Characteristics

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.

Rating	Min	Max	Unit
Storage Temperature	- 40	85	°C
VDD	-0.3	3.3	V
Current Consumption (sleep)	3.0	4.8	µA
Current Consumption (operational)	750	4,200	µA

Recommended Operating Conditions

Rating	Min	Max	Unit
Operating Temperature Range	-15	70	°C
VDD	2.3	3.3	V

Block Diagram

