

# ABLUE TECHNOLOGY

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## STR10

### 2.4G Ultra Small Size 5.3\* 5.2\*1.1mm Wireless Multi-protocol SiP Module

The STR10 ultra-low power Bluetooth 5 and Higher/ANT/2.4GHz Proprietary Multi-protocol module based on the nRF52810 from Nordic Semiconductor. The module with an ARM® Cortex™ M4 32 bit processor, embedded 2.4GHz transceiver, and integrated antenna, provide a complete solution with no additional RF design, allowing faster time to market, while simplifying designs, reducing BOM costs, also reduce the burden of Regulatory approvals to enter the world market. Making you more quickly into the bluetooth smart application and remove the worries. The ultra-small package size is especially suitable for strict requirements on module size.

## Features

- System on Module(SOM) base on Nordic nRF52810
- Bluetooth 5 and Higher/ANT/2.4GHz Proprietary Multi-protocol support
- Complete Bluetooth Low Energy stack/profiles solution
- ARM® Cortex™ M4 32 bit processor, 192 kB flash memory, 24 kB RAM
- 15 General Purpose I/O, Configurable mapping Pins, Simple layout of external application
- 12-bit/200KSPS ADC, PWM, SPI Master/Slave
- Low power comparator, Temperature sensor, Random Number Generator
- 2-wire Master/Slave (I2C compatible)
- UART ( CTS/RTS ) with DMA
- CPU independent Programmable Peripheral Interconnect (PPI)
- Quadrature Demodulator (QDEC)
- 128-bit AES HW encryption
- 3 x 32bit Timers, 2 x 24bit Real Timer Counters (RTC), Watchdog Timer
- Internal RC Oscillator 32.768 kHz(± 250 ppm).
- No external components required
- Dimensions: 5.3mmx5.2mmx1.1mm with On-chip Antenna
- On-chip high-performance antenna, can also expand external antenna

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## Typical Applications:

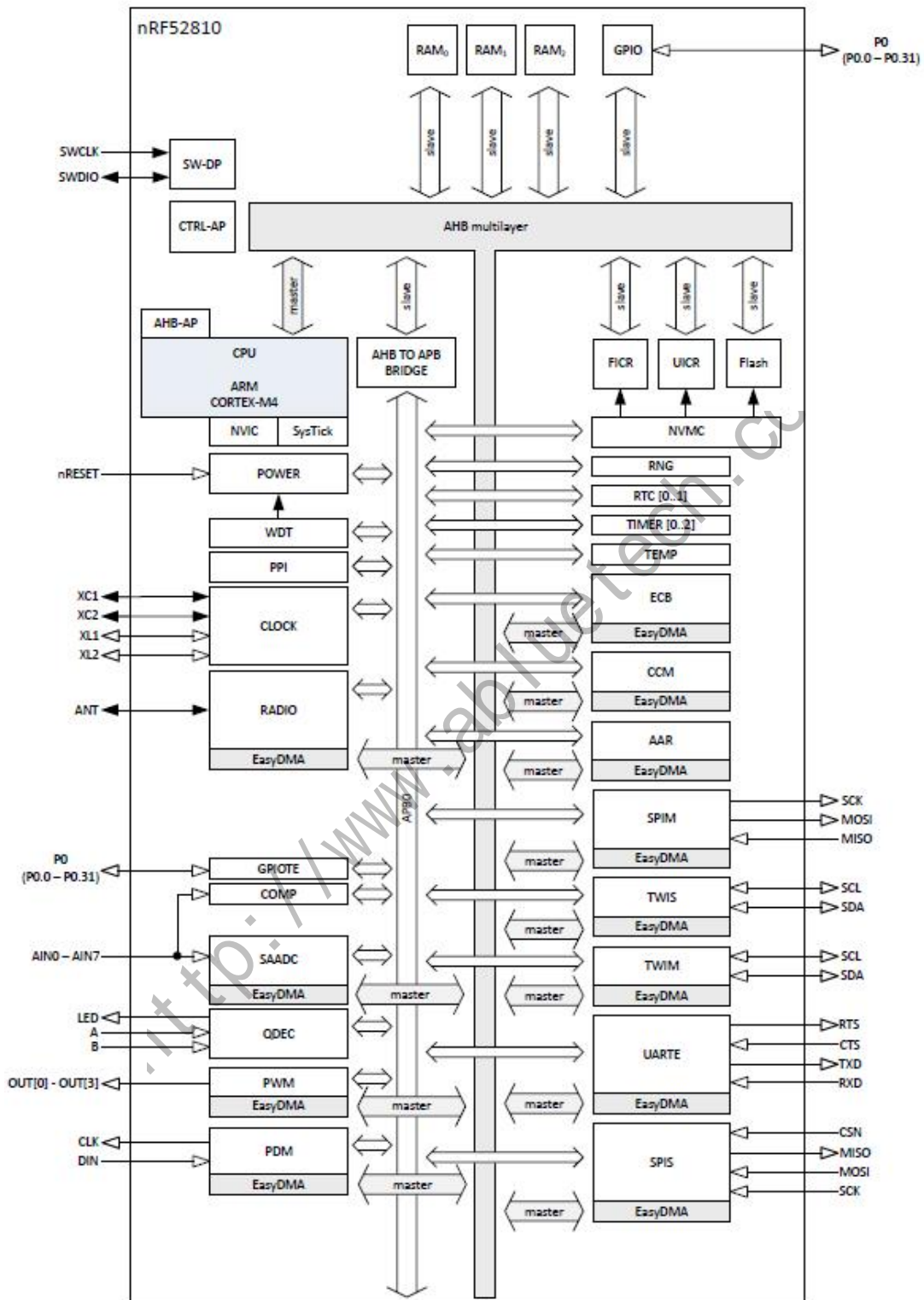
- 2.4 GHz Bluetooth low energy systems
- 2.4 GHz Proprietary systems
- Sports and leisure equipment
- Mobile phone accessories, Connected Appliances
- Health Care and Medical
- Consumer Electronics, Game pads
- Human Interface Devices, Remote control
- Building environment control / monitoring
- RFID, Security Applications, Low-Power Sensors
- Bluetooth Low Energy GateWay
- iBeacons™, Indoor navigation
- Lighting Products
- Fitness devices
- Wearables
- Audio applicaiton
- Hearing Aid application

## Quick Specifications:

Bluetooth	
Version	Bluetooth 5 and Higher /ANT/2.4GHz
Security	AES-128
Radio	
Frequency	2.360GHz to 2.500GHz
Modulations	GFSK at 1 Mbps, 2 Mbps data rates
Transmit power	-20~+4 dBm
Receiver sensitivity	-96 dBm (BLE mode)
Antenna	On-chip/ External antenna
Current Consumption	
TX only @ 0 dBm, @ 3V, DC/DC enabled	4.6 mA
TX only @ 0 dBm	10.1 mA
RX only @ 1 Mbps @ 3V, DC/DC enabled	4.6 mA
RX only @ 1 Mbps	10.0 mA
System On (with full 24 kB RAM retention)	1.5 μA
System Off (with full 24 kB RAM retention)	0.5μA
Power supply	1.7~3.6V
Operating temperature	-25~+85 °C

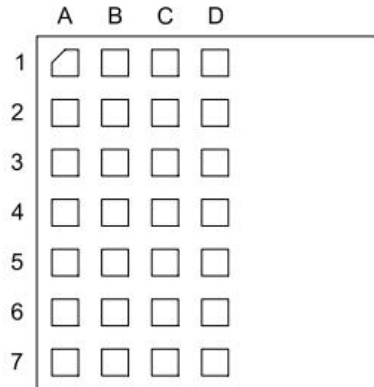
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## Block diagram:



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## Pin Description of Module ( Bottom View ) :



<Perspective from the top side>

Pin No.	Name	Description	Note
A1	P0.08	I/O	
A2	P0.05/AIN3	I/O/Analog input	
A3	P0.03/AIN1	I/O/Analog input	
A4	VCC_IN	Power Supply	1.7~3.6V
A5	GND	Power Ground	
A6	P0.00/XL1	I/O	Reserve for external 32.768KHz use
A7	P0.01/XL2	I/O	Reserve for external 32.768KHz use
B1	P0.16	I/O	
B2	P0.04/AIN2	I/O/Analog input	
B3	P0.14	I/O	
B4	P0.15	I/O	
B5	P0.11	I/O	
B6	P0.12	I/O	
B7	P0.17	I/O	
C1	GND	Power Ground	
C2	P0.18	I/O	
C3	GND	Power Ground	
C4	GND	Power Ground	
C5	GND	Power Ground	
C6	GND	Power Ground	
C7	P0.21/nRESET	IO/Reset	Configurable as pin reset
D1	ANT_INTERNAL	Antenna on board	Antenna Port
D2	ANT_OUT	Antenna	Connect to external antenna or onboard antenna
D3	GND	Power Ground	
D4	GND	Power Ground	
D5	SWDCLK	HW debug and programming	
D6	SWDIO	HW debug and programming	
D7	P0.20	I/O	

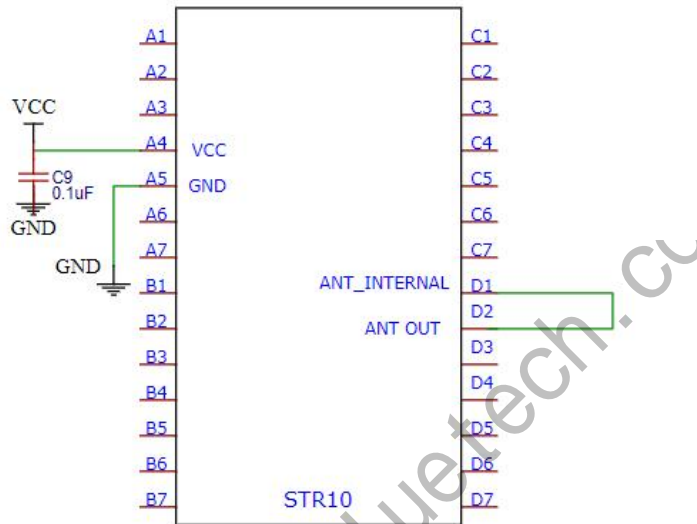
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## Application Schematic:

The module provide a flexible design,which can choose to use on-board antenna or external antenna according to the application.

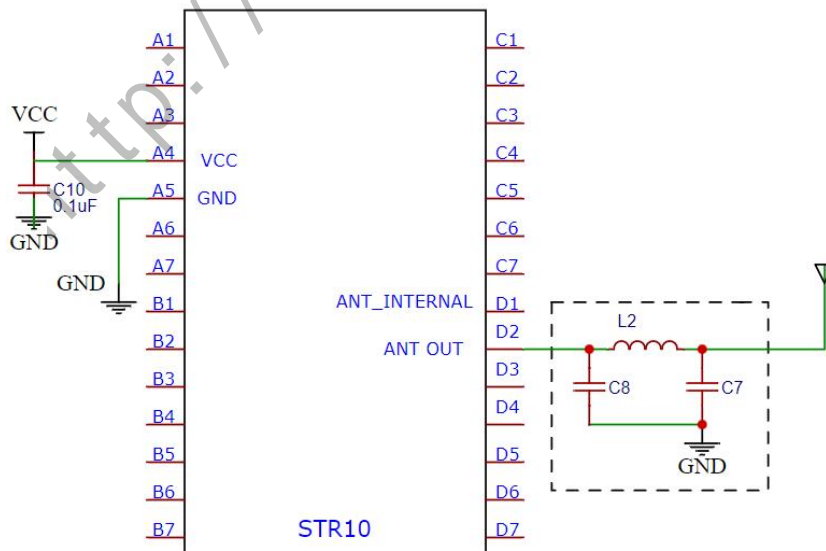
To make sure the best performance of the module, the LDO power supply of no noise is needed.

### 1、 Using on-board antenna



The on board high-gain antenna, if you need to use the onboard antenna, you should short the ANT\_OUT and ANT\_INTERNAL pins.

### 2、 Using external antenna



For longer distance application, use the ANT\_OUT pin to connect an external antenna. In the case, pi-network is a very flexible way to tune an antenna, which can be used to adjust the RF matching parameters .This is optional circuit, but recommended to use.

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## General Purpose I/O:

The general purpose I/O is organized as one port enabling access and control of the 32 available GPIO pins through one port. 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 GPIOTE channels
- All pins can be individually configured to carry serial interface or quadrature demodulator signals

## Hardware RESET:

There is on-chip power-on reset circuitry, But can still be used in external reset mode, in this case, GPIO pin P0.21 as an external hardware reset pin(Active Low). In order to utilize P0.21 as a hardware reset, the UICR registers PSELRESET[0] and PSELRESET[1] must be set alike, to the value of 0x7FFFFFFF15. When P0.21 is programmed as RESET, the internal pull-up is automatically enabled.

## HW debug and flash programming of Module :

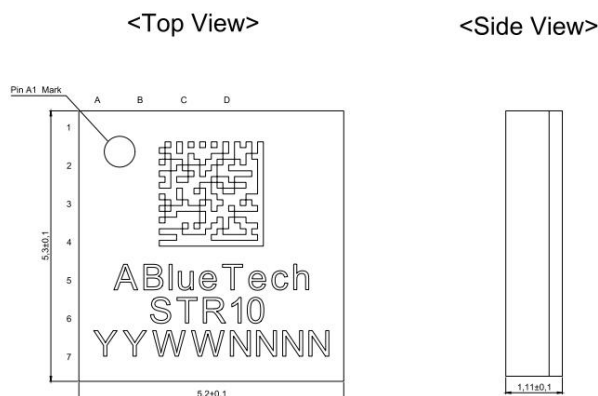
The Module support the two pin Serial Wire Debug (SWD) interface and offers flexible and powerful mechanism for non-intrusive debugging of program code. Breakpoints, single stepping, and instruction trace capture of code execution flow are part of this support.

Pin	Flash Program interface
SWDIO	Debug and flash programming I/O
SWCLK	Debug and flash programming I/O

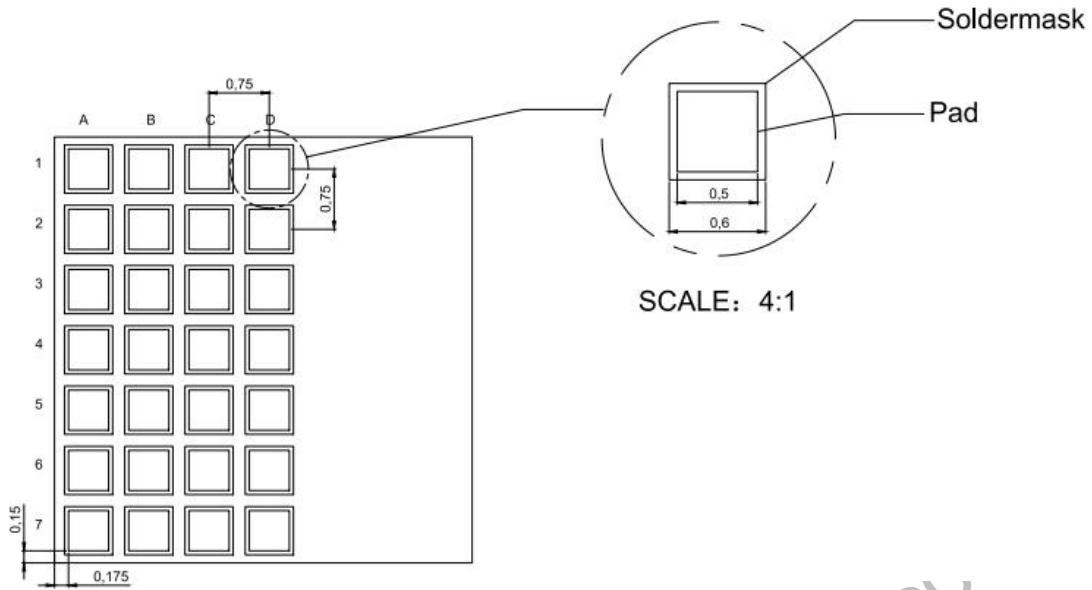
This is the hardware debug and flash programming of module, J-Link Lite support, please refer [www.segger.com](http://www.segger.com).

## PCB Footprint :

LGA Package, Pad Pitch Lateral 0.75mm, portrait 0.75mm.Details as blow.



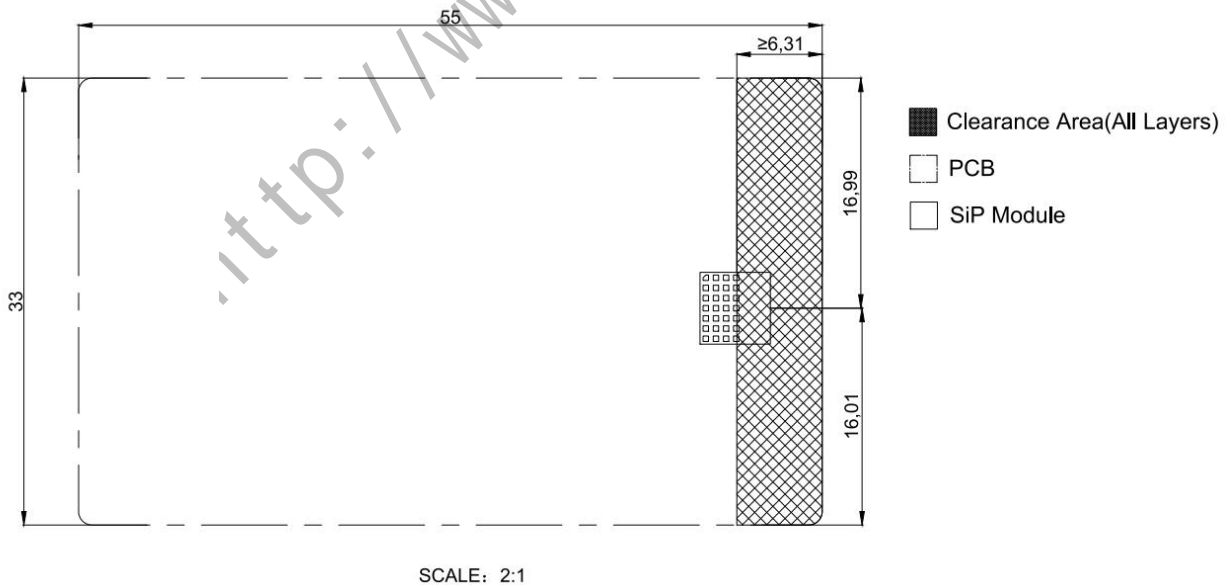
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Perspective from the top side  
<Recommend Pad Design>

## Recommended Module Placement:

To make sure the best RF performance of the module, the area under and extending out from the antenna portion of the module should be kept clear of copper and other metal, and the placement area should be clear, no ground or PCB layout. The recommended module placement is below.



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## Absolute Maximum Ratings:

Symbol	Parameter	Min.	Max.	Unit
VCC_MAX	Voltage on supply pin	-0.3	3.9	V
VIO_MAX	Voltage on GPIO pins (VCC > 3.6V)	-0.3	3.9	V
VIO_MAX	Voltage on GPIO pins (VCC ≤ 3.6V)	-0.3	VCC + 0.3V	V
TS	Storage Temperature Range	-40	125	°C

**Note:** Exceeding one or more of the limiting values may cause permanent damage to the module.

## Important Notice:

- Reserves the right to make corrections, modifications, and/or improvements to the product and/or its specifications at any time without notice.
- Assumes no liability for the user's product and/or applications.
- Products are not authorized for use in safety-critical applications, including but not limited to life-support applications.
- We have a strict and careful check and collation, but can not guarantee this manual without any errors and omissions.
- The contents of this manual by copyright protection laws and regulations, without our prior written authorization of any person shall, in any way to copy the copy or manual, this manual will all or any part of any form in any cable or wireless network transmission, or be compiled and translated into any other format, text or code.

## ATTENTION!

Electrostatic Sensitive Device  
Observe Precaution for handling.



## Ordering Information:

Part Number	Description
STR10	Bluetooth Low Energy System on Module
STR10-EVB	Evaluation boards for module, with key, LED, I/O extend, sock for coin cell battery.