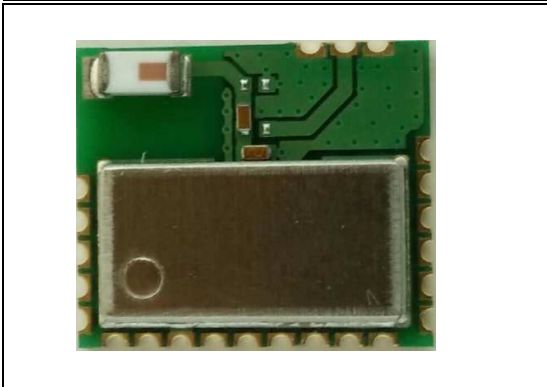




## SPBTLE-1S

### Very low power application module for Bluetooth® Smart v4.2



#### Features

- Bluetooth v4.2 compliant
  - Supports master and slave modes
  - Multiple roles supported simultaneously
- High performance, ultra-low power Cortex-M0 32-bit based architecture core
- Programmable 160 KB Flash
- 24 KB RAM with retention
- Interfaces:
  - 1 x UART, 2 x I2C, 1 x SPI, 14 x GPIO, 2 x multifunction timer, 10-bit ADC, Watchdog & RTC, DMA controller, PDM stream processor, SWD debug Interface
- Bluetooth radio performance:
  - Embedded BlueNRG-1 Bluetooth SoC
  - Max Tx power: + 5 dBm
  - Rx sensitivity: - 88 dBm
  - Provides up to 93 dB link budget with excellent link reliability
- On-board chip antenna
- Small form factor: 11.5mmx13.5mm
- Complemented with Bluetooth low energy protocol stack library (GAP, GATT, SM, L2CAP, LL)
- AES security co-processor
- Bluetooth low energy profiles provided separately
- Certifications:

- EU Type certificate (pending)
- FCC, IC modular approval certification (pending)
- SRRC Chinese Certification (pending)
- BT SIG End Product QDID (pending)
- Pre programmed bootloader via UART
- Operating supply voltage: from 1.7 to 3.6 V
- Operating temperature range: -40 °C to 85 °C

#### Applications

- Internet of Things
- Smart Home
- Building and Industrial Automation
- Smart Lighting
- Remote and access control
- Fitness, wellness and sports
- Consumer medical
- Security and proximity
- Assisted living
- PC and smart phone peripherals

#### Description

The SPBTLE-1S is a Bluetooth® Smart application processor certified module, compliant with BT specifications v4.2 and BQE qualified. The SPBTLE-1S module supports multiple roles simultaneously and can act at the same time as Bluetooth Smart master and slave device.

The SPBTLE-1S is based on BlueNRG-1 system-on-chip and entire Bluetooth Low Energy stack and protocols are embedded into module.

The SPBTLE-1S module provides a complete RF platform in a tiny form factor. Radio, antenna and high frequency oscillators are integrated to offer a certified solution to optimize the time to market of the final applications.

The SPBTLE-1S can be powered directly with a pair of AAA batteries or any power source from 1.7 to 3.6 V.

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# 1 General description

The SPBTLE-1S is a Bluetooth Smart application processor module compliant with Bluetooth® specifications v4.2 with embedded ceramic antenna.

The SPBTLE-1S module has been designed around the ST BlueNRG-1 SoC where its Cortex-M0 core can execute both Bluetooth protocols and customer application. A complete power-optimized Bluetooth stack library provides:

- Master, slave, multiple roles support
- GAP: central, peripheral, observer or broadcaster roles
- simultaneous advertising and scanning
- capability of being slave of up to two masters simultaneously
- ATT/GATT: client and server
- SM: privacy, authentication and authorization
- L2CAP
- Link Layer: AES-128 encryption and decryption

The SPBTLE-1S has 160KB embedded Flash and 24KB embedded RAM memory.

In the module are available 32MHz and 32KHz crystal oscillators. It has been designed to leverage the BlueNRG-1 integrated DC-DC step down converter.

It can be configured to support Single chip application or Network processor application.

Being based on the BlueNRG-1 SoC, the SPBTLE-1S module leverages all the tools and documentation of its ecosystem: Development Kit, Application Notes, User Manuals, Design Notes & Tips. A wide set of sample programs are also available in C source code.

The SPBTLE-1S module has a wide set of peripherals available for customer application (1 x UART interface, 1 x SPI interface, 2 x I2C interface, 14 or 15 GPIO, 2 x multifunction timer, 10-bit ADC, Watchdog & RTC, DMA controller, PDM stream processor).

The SPBTLE-1S module enables wireless connectivity into electronic devices, not requiring any RF experience or expertise for integration into the final product. The SPBTLE-1S module provides a complete RF application platform in a tiny form factor (11.5 x 13.5 x 2.0 mm) and being a certified solution optimizes the time to market of the final applications.

The SPBTLE-1S module allows applications to meet the tight advisable peak current requirements imposed with the use of standard coin cell batteries. Optimized results are obtained with the embedded high-efficiency DC-DC step-down. SPBTLE-1S can be powered directly with a standard 3 V coin cell battery, a pair of AAA batteries or any power source from 1.7 to 3.6 V.

## 2 Block diagram

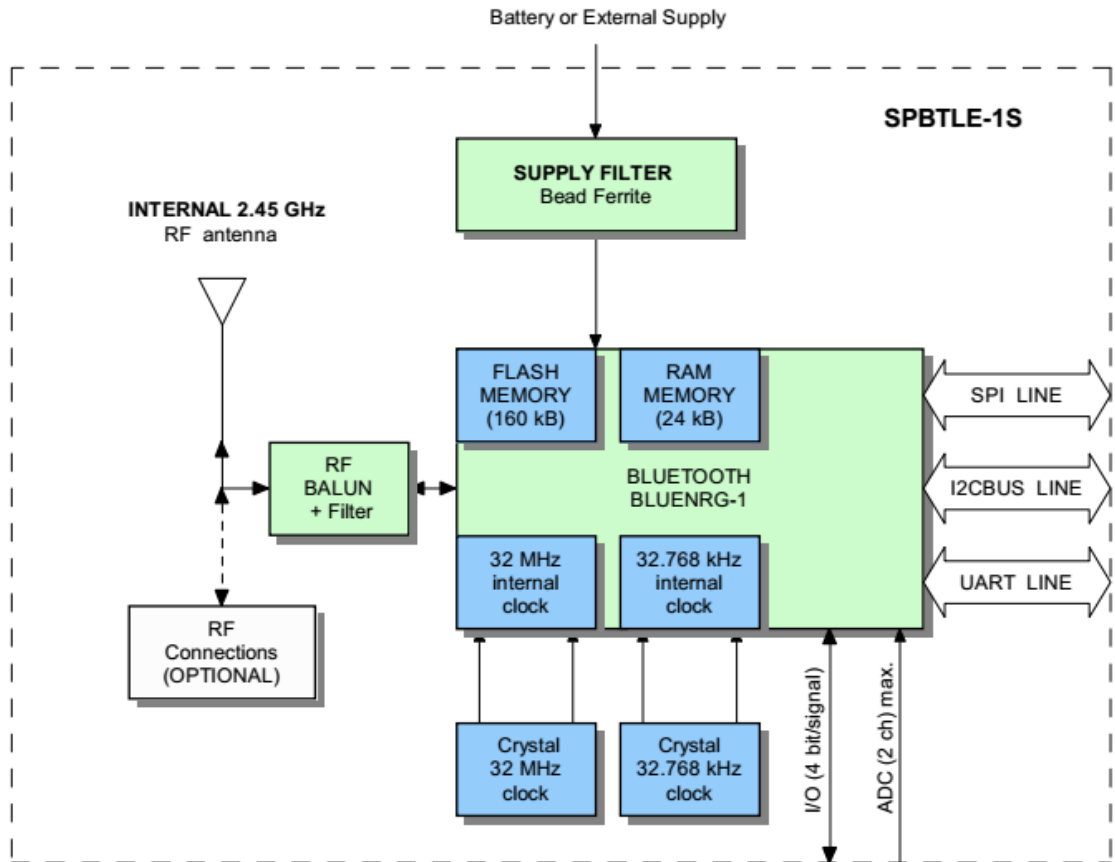


Figure 1: HW block diagram

## 3 Software Development

### 3.1 Software development Kit

The SPBTLE-1S module embeds the BlueNRG-1 application processor. Refer to the BlueNRG-1 web page (<http://www.st.com/en/wireless-connectivity/bluenrg-1.html>) to get access to:

- BlueNRG-1 datasheet
- development kit
- application notes
- user manuals
- tools & software
- design note and tips

Software and firmware should be configured taking into account the SPBTLE-1 specific configuration as described in the block diagram chapter. In particular the SPBTLE-1 module has:

- 32 MHz crystal oscillator
- 32 KHz crystal oscillator
- SMPS DC-DC converter
- 10  $\mu$ H SMPS inductor

The projects provided with the development kit should be customized defining as following:

- HS\_SPEED\_XTAL=HS\_SPEED\_XTAL\_32MHZ
- LS\_SOURCE=LS\_SOURCE\_EXTERNAL\_32KHZ
- SMPS\_INDUCTOR=SMPS\_INDUCTOR\_10uH

### 3.2 Software Architecture

There are two possible software architectures:

1. Host-less mode: customer application runs on the SPBTLE-1S module. Many sample projects are available in the Development Kit.

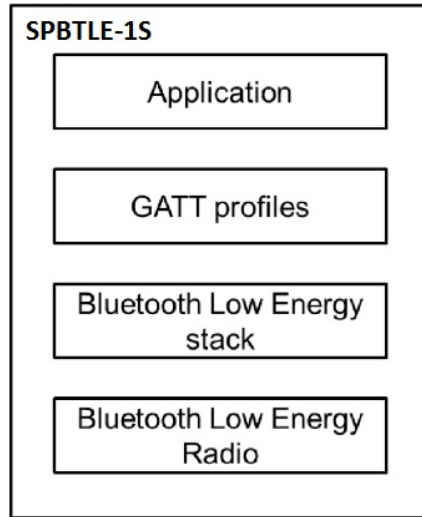


Figure 2: SPBTLE-1S Host less mode

2. Hosted mode: the module is configured as network module controlled by an external host connected via SPI or UART. A project named DTM is available in the Development Kit that configures the SPBTLE-1S module as a network module.

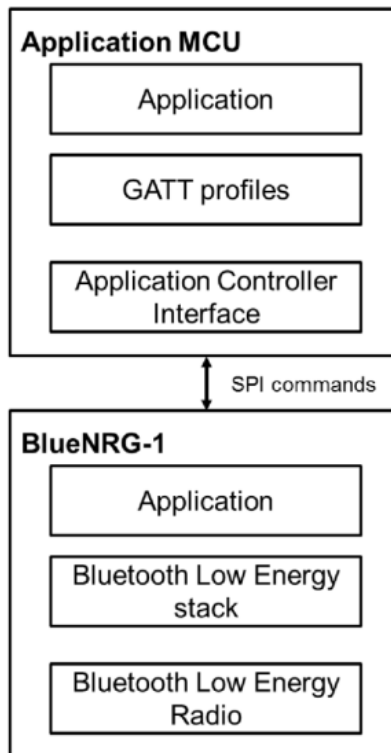


Figure 3: Hosted mode

## 4 Hardware specifications

General conditions ( $V_{IN}= 3.3\text{ V}$  and  $25\text{ }^{\circ}\text{C}$ )

### 4.1 Absolute maximum ratings

| Rating   | Min  | Typ. | Max | Unit               |
|--|------|------|-----|--------------------|
| Storage temperature range                          | -40  | -    | +85 | $^{\circ}\text{C}$ |
| Supply voltage, $V_{IN}$                           | -0.3 | -    | 3.9 | V                  |
| I/O pin Voltage ( $V_{IO}$ five-volt tolerant pin) | -0.3 | -    | 3.9 | V                  |
| RF saturation input power                          | -    | 8    | -   | dBm                |

Table 1: Absolute maximum ratings

### 4.2 Recommended operating conditions

| Rating  | Min  | Typ. | Max  | Unit               |
|---|------|------|------|--------------------|
| Storage temperature range                               | -40  | -    | +85  | $^{\circ}\text{C}$ |
| Supply voltage, $V_{IN}$                                | 1.7  | 3.3  | 3.6  | V                  |
| Signals & I/O pin voltage<br>(according supply voltage) | 1.7  | -    | 3.6  | V                  |
| RF Frequency  | 2402 | -    | 2480 | MHz                |

Table 2: Recommended operating conditions

### 4.3 Current consumption

Characteristics measured over recommended operating conditions unless otherwise specified. Typical value are referred to  $T_A = 25\text{ }^{\circ}\text{C}$ ,  $V_{in} = 3.0\text{ V}$

| Symbol | Parameter      | Test conditions | Typ. | Unit          |
|--------|----------------|-----------------|------|---------------|
| IDD    | Supply current | Reset           | 5    | nA            |
|        |                | Standby         | 500  | nA            |
|        |                | Sleep mode      | 0.9  | $\mu\text{A}$ |
|        |                | Active Mode     | 1.9  | mA            |
|        |                | RX              | 7.7  | mA            |
|        |                | TX: +5dBm       | 15   | mA            |
|        |                | TX: 0 dBm       | 11   | mA            |

Table 3: Current consumption table



## SPBTLE-1S

Current consumption values has been taken using the “BlueNRG current consumption estimation tool”, configured to match the SPBTLE-1S configuration.

The tool is available on ST.com at:

<http://www.st.com/en/embedded-software/stsw-bnrg001.html>

### 4.4 Pin assignment

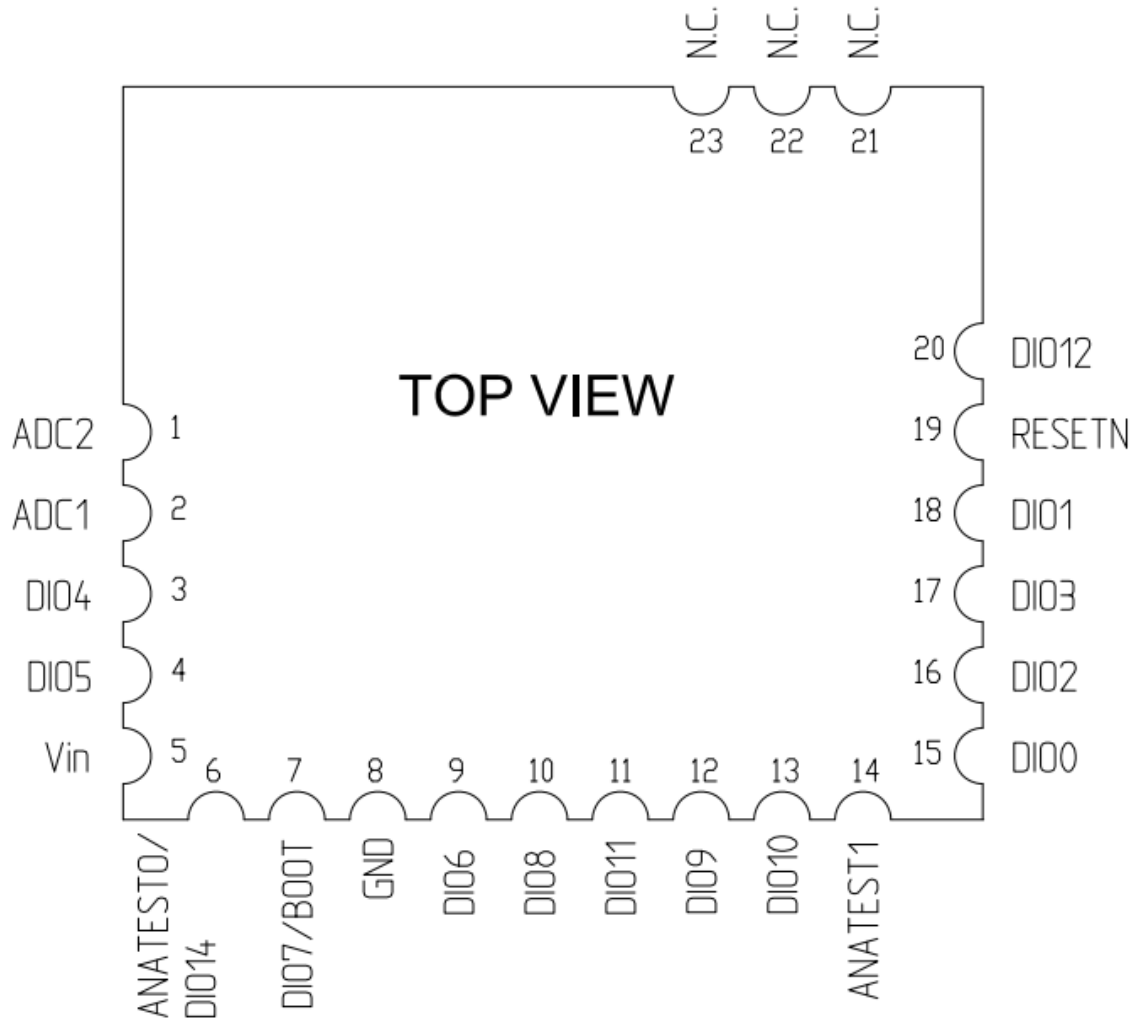


Figure 4: Pin connection

| Module Pin # | Module Pin Name     | BlueNRG-1 Pin (CSP package) | Function              |             |             |             |
|--------------|---------------------|-----------------------------|-----------------------|-------------|-------------|-------------|
|              |                     |                             | Mode: "000"           | Mode: "001" | Mode: "100" | Mode: "010" |
| 1            | ADC2                | D5                          | ADC input 2           |             |             |             |
| 2            | ADC1                | B4                          | ADC input 1           |             |             |             |
| 3            | DIO4                | C3                          | GPIO4                 | UART_RXD    | I2C2_CLK    | PWM0        |
| 4            | DIO5                | C2                          | GPIO5                 | UART_TXD    | I2C2_DAT    | PWM1        |
| 5            | Vin                 | A3, E6                      | Supply pin            |             |             |             |
| 6            | ANATEST0/<br>DIO14/ | A5                          | GPIO14                | I2C1_CLK    | SPI_CLK     | ADC_DATA    |
| 7            | DIO7/BOOT(*)        | D2                          | GPIO7                 | UART_CTS    | I2C2_DAT    | PDM_CLK     |
| 8            | GND                 | A4, B6, C1, F5              | Ground                |             |             |             |
| 9            | DIO6                | D1                          | GPIO6                 | UART_RTS    | I2C2_CLK    | PDM_DATA    |
| 10           | DIO8                | D3                          | GPIO8                 | UART_TXD    | SPI_CLK     | PDM_DATA    |
| 11           | DIO11               | E2                          | GPIO11                | UART_RXD    | SPI_CS1     | -           |
| 12           | DIO9                | E1                          | GPIO9                 | SWCLK       | SPI_IN      |             |
| 13           | DIO10               | F1                          | GPIO10                | SWDIO       | SPI_OUT     |             |
| 14           | ANATEST1            | D4                          | Anatest1              |             |             |             |
| 15           | DIO0                | A2                          | GPIO0                 | UART_CTS    | SPI_CLK     | -           |
| 16           | DIO2                | A1                          | GPIO2                 | PWM0        | SPI_OUT     | PDM_CLK     |
| 17           | DIO3                | B1                          | GPIO3                 | PWM1        | SPI_IN      | ADC_CLK     |
| 18           | DIO1                | B2                          | GPIO1                 | UART_RTS    | SPI_CS1     | PDM_DATA    |
| 19           | RESETN              | B3                          | Reset Pin             |             |             |             |
| 20           | DIO12               | F2                          | GPIO12                | -           | I2C1CLK     |             |
| 21           | N.C                 | N/A                         | Must be left floating |             |             |             |
| 22           | N.C                 | N/A                         | Must be left floating |             |             |             |
| 23           | N.C                 | N/A                         | Must be left floating |             |             |             |

Table 4: Pin assignment

(\*) The pin DIO7/BOOT is monitored by bootloader after power up or hardware Reset and it should be low to prevent unwanted bootloader activation

The Table 4 provides the association between SPBTLE-1S module pin and the related BlueNRG-1 pin. Refer to the BlueNRG-1 datasheet for detailed description.

## 4.5 Mechanical dimensions

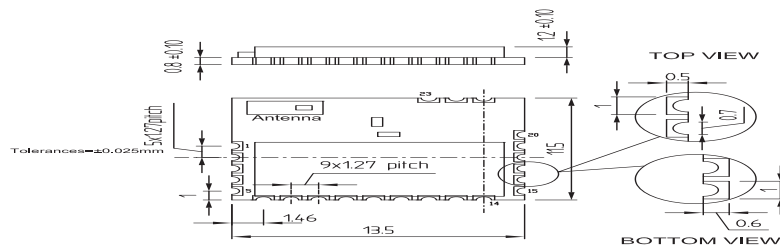


Figure 5: Mechanical dimensions



Figure 6: Recommend land pattern top view

## 5 Hardware design

Note:

- All unused pins should be left floating; do not ground.
- GND pin must be well grounded.
- Traces should not be routed underneath the module.
- **The area around the module should be free of any ground planes, power planes, trace routings, or metal for 6 mm from the module antenna position, in all directions.**

### 5.1 Reset Circuitry

The SPBTLE-1S module requires an external pull-up reset circuitry to ensure proper operation at power on. Refer to the “Reset management” chapter of the BlueNRG-1 datasheet for details.

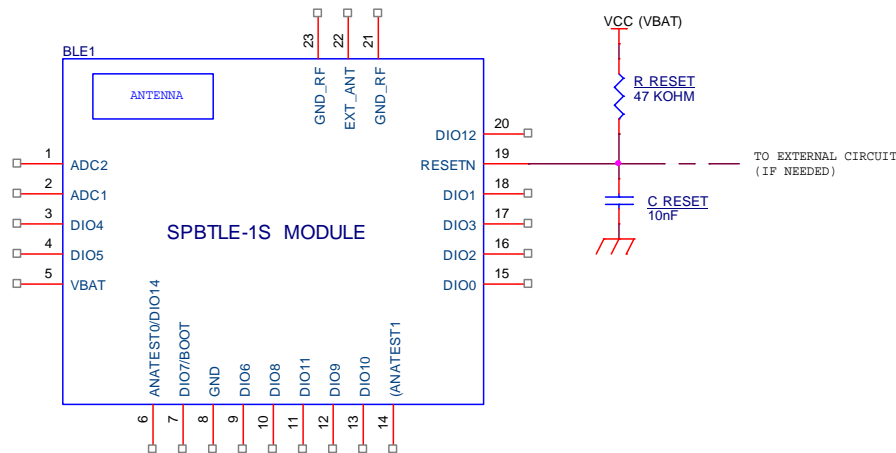


Figure 7: Reset circuitry

### 5.2 Debug Interface

The SPBTLE-1S embeds the ARM serial wire debug (SWD) port. It is two pins (clock and single bi-directional data) debug interface, providing all the debug functionality plus real time access to system memory without halting the processor or requiring any target resident code.

| Pin Functionality | Module PIN | Pin description  |
|-------------------|------------|------------------|
| SWCLK             | 12         | SWD clock signal |
| SWDIO             | 13         | SWD data signal  |

Table 5: Debug interface pin

For more information refer to the BlueNRG-1 technical documentation

(<http://www.st.com/en/wireless-connectivity/bluenrg-1.html>)

### 5.3 Reflow soldering

The SPBTLE-1S is a high temperature strength surface mount Bluetooth® module supplied on a 23 pin, 4-layer PCB. The final assembly recommended reflow profiles are indicated here below.

Soldering phase has to be executed with care: in order to avoid undesired melting phenomenon, particular attention has to be taken on the set up of the peak temperature.

Here following some suggestions for the temperature profile based on following recommendations.

**Table 6. Soldering**

| Profile feature                                       | PB-free assembly |
|---|------------------|
| Average ramp up rate ( $T_{S\text{MAX}}$ to $T_P$ )   | 3°C/ sec max     |
| Preheat   |                  |
| Temperature min ( $T_S$ mn)                           | 150 °C           |
| Temperature max ( $T_S$ max)                          | 200 °C           |
| Time ( $t_S$ min to $t_S$ max) ( $t_S$ )              | 60-100 sec       |
| Time maintained above:                                |                  |
| Temperature $T_L$                                     | 217 °C           |
| Time $t_L$  | 60-70 sec        |
| Peak temperature ( $T_P$ )                            | 240 + 0 °C       |
| Time within 5 °C of actual peak temperature ( $T_P$ ) | 10-20 sec        |
| Ramp down rate  | 6 °C/sec         |
| Time from 25 °C to peak temperature                   | 8 minutes max    |

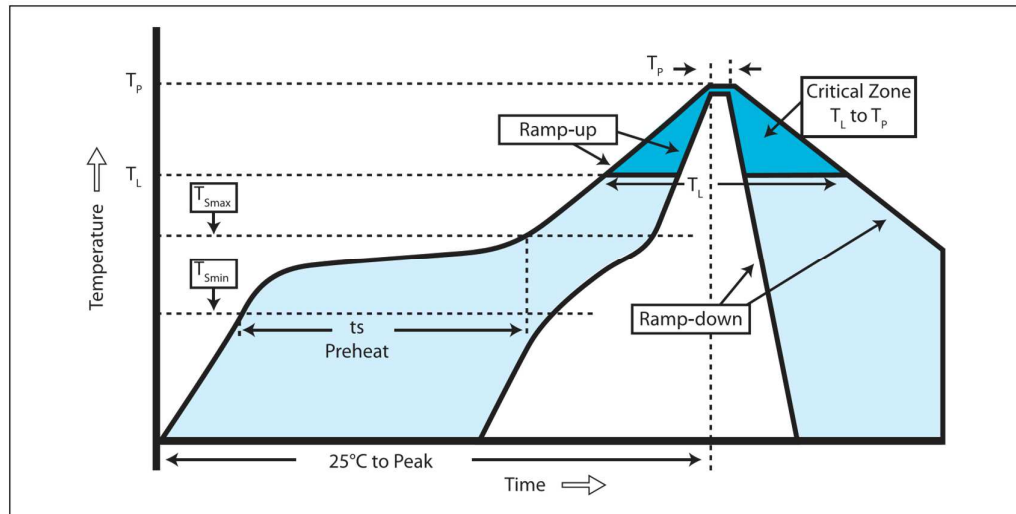


Figure 8: Soldering profiles

## 6 Regulatory compliance

### 6.1 FCC certification

This module has been tested and found to comply with the FCC part 15 rules. These limits are designed to provide reasonable protection against harmful interference in approved installations. 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 may not occur in a particular installation.

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.

Modifications or changes to this equipment not expressly approved by STMicroelectronics may render void the user's authority to operate this equipment.

#### **Modular approval**

FCC ID: S9NSPBTLE1S

In accordance with FCC part 15, the SPBTLE-1S is listed as a modular transmitter device.

This module is evaluated for stand-alone use only. Finished products incorporating multiple transmitters must comply with colocation and RF exposure requirements in accordance with FCC multi-transmitter product procedures. Collocated transmitters operating in portable RF Exposure conditions (e.g. <20 cm from persons including but not limited to body worn and hand held devices) may require separate approval.

#### 6.1.1 Labeling instructions

When integrating the SPBTLE-1S into the final product, the OEM must ensure that the FCC labeling requirements are satisfied. A statement must be included on the exterior of the final product which indicates the product includes a certified module. The label should state the following (or similar wording that conveys the same meaning):

Contains FCC ID: S9NSPBTLE1S

OR

This product contains FCC ID: S9NSPBTLE1S

The OEM must include the following statements on the exterior of the final product unless the product is too small (e.g. less than 4 x 4 inches):

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 any interference that may cause  
undesired operation.

### 6.1.2 Product manual instructions

This section applies to OEM final products containing the SPBTLE-1S module, subject to FCC compliance. The final product manual must contain the following statement (or a similar statement that conveys the same meaning):

---

**Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. (Part. 15.21)**

---

In the case where an OEM seeks Class B (residential) limits for the final product, the following statement must be included in the final product manual:

*Note: 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.

In the case where an OEM seeks the lesser category of a Class A digital device for the final product, the following statement must be included in the final product manual:

*Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense.*



## 6.2 IC certification

The SPBTLE-1S module has been tested and found compliant with the IC RSS-210 rules. These limits are designed to provide reasonable protection against harmful interference in approved installations. 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 may not occur in a particular installation.

This device complies with RSS-210 of the IC 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.

Modifications or changes to this equipment not expressly approved by STMicroelectronics may render void the user's authority to operate this equipment.

### Modular approval

IC: 8976C-SPBTLE1S

In accordance with IC RSS-210, the SPBTLE-1S is listed as a modular transmitter device.

This module is evaluated for stand-alone use only. Finished products incorporating multiple transmitters must comply with collocation and RF exposure requirements in accordance with IC multi-transmitter product procedures. Collocated transmitters operating in portable RF Exposure conditions (e.g. <20cm from persons including but not limited to body worn and hand held devices) may require separate approval.

### 6.2.1 Labeling instructions

When integrating the SPBTLE-1S into the final product, the OEM must ensure that the IC labeling requirements are satisfied. A statement must be included on the exterior of the final product which indicates that the product includes a certified module. The label should state the following (or similar wording that conveys the same meaning):

Contains IC: 8976C-SPBTLE1S

OR

This product contains IC: 8976C-SPBTLE1S

The OEM must include the following statements on the exterior of the final product unless the product is too small (e.g. less than 4 x 4 inches):

This device complies with RSS-210 of the IC 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 any interference that may cause undesired operation.

## 6.2.2 Product manual instructions

This section applies to OEM final products containing the SPBTLE-1S module, subject to IC compliance. The final product manual must contain the following statement (or a similar statement that conveys the same meaning):

---

**Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. (RSS-210)**

---

In the case where an OEM seeks Class B (residential) limits for the final product, the following statement must be included in the final product manual:

*Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to RSS-210 of the IC 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.

In the case where an OEM seeks the lesser category of a Class A digital device for the final product, the following statement must be included in the final product manual:

*Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to RSS-210 of the IC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense.*

**(Please see APPENDIX A for the French translation)**

### 6.3 EU Type approval for SPBTLE-1S module

This module complies with the following European EMI/EMC and safety directives and standards:

- EN 62479:2010
- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
- ETSI EN 301 489-17 V3.1.1 (2017-02)
- ETSI EN 301 489-1 V2.1.1 (2017-02)
- ETSI EN 300 328 v 2.1.1 (2016-11)

#### 6.3.1 Labeling instructions

Pending

#### 6.3.2 Product manual instructions

Pending

### 6.4 Bluetooth certification

The module with embedded stack and profile has been qualified in accordance with SIG qualification rules:

- Declaration ID: pending
- Qualified design ID: pending
- Product type: End Product
- Core spec version: 4.2
- Product description: Bluetooth Smart v4.2 module

## Appendix A

### Déclaration de conformité

#### A.1 Certification FCC

Le module SPBTLE-1S a été testé et déclaré conforme avec la section 15 de la Règlementation FCC. Ces limitations sont stipulées afin de procurer une protection raisonnable contre les interférences gênantes dans les installations approuvées. Cet appareil génère, utilise et diffuse des ondes radio et, s'il n'est pas installé et utilisé en conformité avec les instructions dont il fait l'objet, peut causer des interférences gênantes sur les communications radio.

Il n'y a cependant pas de garantie qu'une interférence ne se produira pas dans une installation particulière.

Cet appareil est en conformité avec la section 15 des règlements FCC. L'utilisation est soumise aux deux conditions suivantes: (1) cet appareil ne doit pas causer d'interférences nocives, et (2) Cet appareil doit supporter toute interférence reçue, y compris des interférences qui peuvent provoquer un fonctionnement non désiré.

Tout changement ou modification fait(e) à cet appareil et non expressément approuvé(e) par STMicroelectronics peut annuler l'autorisation pour l'utilisateur de faire fonctionner l'appareil.

#### Approbation du module

FCC ID: S9NSPBTLE1S

Conformément à la section 15 des règlements FCC, le module SPBTLE-1S est répertorié comme un dispositif émetteur modulaire.

Ce module n'est évalué que pour une utilisation autonome. Les produits finis incorporant plusieurs émetteurs doivent être conformes à la colocation et aux exigences d'exposition RF en concordance avec les procédures FCC multi-émetteurs. D'autres émetteurs fonctionnant dans des dispositifs portables exposés aux RF (par exemple, situés à moins de 20 cm des personnes avec dispositifs portatifs ou portés contre le corps) peuvent nécessiter d'une approbation séparée.

### A.1.1 Instructions d'étiquetage

Lors de l'intégration du module SPBTLE-1S dans le produit final, le fabricant doit s'assurer que les exigences en matière d'étiquetage de la FCC sont satisfaites. Une déclaration doit être placée sur l'étiquette extérieure du produit final indiquant que le produit comprend un module certifié. L'étiquette doit comporter les informations suivantes (ou une mention analogue que recouvre la même notion):

Contient FCC ID: S9NSPBTLE1S

OU Ce produit contient FCC ID: S9NSPBTLE1S

Le sous-traitant doit inclure les énoncés suivants sur l'étiquette extérieure du produit final à moins que le produit ne soit trop petit (par exemple moins de 4 x 4 pouces):

Cet appareil est en conformité avec la section 15 des règlements FCC. L'utilisation est soumise aux deux conditions suivantes:

(1) cet appareil ne doit pas causer d'interférences nocives, et

(2) Cet appareil doit supporter toute interférence reçue, y compris des interférences qui peuvent provoquer un fonctionnement non désiré.

### A.1.2 Instructions pour l'utilisation du produit

La présente section concerne les produits finis contenant le module SPBTLE-1S, assujettis aux normes FCC. Le manuel du produit final doit contenir la déclaration suivante (ou une mention analogue que recouvre la même notion):

*“ Avertissement: Les changements ou modifications non expressément approuvés par la partie responsable de la conformité pourraient annuler l'autorisation de l'utilisateur de faire fonctionner cet équipement. (Section 15.21)”*

Dans le cas où le produit finis d'un fabricant OEM rentre dans les limites de la Classe B (résidentiel), les énoncés suivants doivent être inclus dans le manuel du produit finis:

*“Remarque : Cet équipement a été testé et déclaré conforme aux limitations prévues dans le cadre de la classe B des appareils numériques, définies par la section 15 du règlement de la FCC. Ces limites sont conçues pour fournir une protection raisonnable contre toute interférence dangereuse issue d'une installation résidentielle. Cet équipement produit, utilise et peut émettre de l'énergie radio électrique et, s'il n'est pas installé et utilisé conformément aux présentes instructions, peut causer des interférences nuisibles aux communications radio. Cependant, il se peut que des interférences se produisent dans une installation particulière. Si cet appareil cause des interférences nuisibles à la réception des signaux de radio ou de télévision, ce qui peut être déterminé en allumant et en éteignant l'appareil, on encourage l'utilisateur d'essayer de corriger ces interférences par l'un des moyens suivants:*

- Réorienter ou repositionner l'antenne de réception.*
- Augmenter la distance séparant l'équipement du récepteur.*
- Connecter l'équipement à une prise appartenant à un circuit différent de celui sur lequel le récepteur est connecté.*
- Consulter le revendeur ou un technicien radio/TV expérimenté pour obtenir de l'aide.”*

Dans le cas où le produit fini d'un sous-traitant rentre dans les limites imposées aux appareils numériques de classe A, les énoncés suivants doivent être inclus dans le manuel du produit finis:

*“REMARQUE : Cet appareil a été testé et certifié conforme aux spécifications d'un appareil électronique de classe A (class A digital device), conformément à la partie 15 du règlement de la FCC. Ces contraintes sont destinées à fournir une protection raisonnable contre les interférences nuisibles quand l'appareil est utilisé dans une installation commerciale. Cet équipement produit, utilise et peut émettre de l'énergie radio électrique et, s'il n'est pas installé et utilisé conformément aux présentes instructions, peut causer des interférences nuisibles aux communications radio. L'utilisation de cet appareil dans une installation résidentielle peut entraîner des interférences nuisibles et l'utilisateur devra corriger les interférences à ses propres frais.”*

## A.2 Certification IC <sup>(a)</sup>

Le module SPBTLE-1S a été testé et déclaré conforme avec la Règlementation IC CNR-210. Ces limitations sont stipulées afin de procurer une protection raisonnable contre les interférences gênantes en installations approuvées. Cet appareil génère, utilise et diffuse des ondes radio et, s'il n'est pas installé et utilisé en conformité avec les instructions dont il fait l'objet, peut causer des interférences gênantes sur les communications radio.

Il n'y a cependant pas de garantie qu'une interférence ne se produira pas dans une installation particulière.

Ce produit répond aux exigences de la norme CNR-210 d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes:

- (1) cet appareil ne doit pas causer d'interférences nocives, et
- (2) Cet appareil doit supporter toute interférence reçue, y compris des interférences qui peuvent provoquer un fonctionnement non désiré.

Tout changement ou modification fait(e) à cet appareil et non expressément approuvé(e) par STMicroelectronics peut annuler l'autorisation pour l'utilisateur de faire fonctionner l'appareil.

### Approbation du module

IC: 8976C-SPBTLE1S

Conformément à IC CNR-210, le module SPBTLE-1S est répertorié comme un dispositif émetteur modulaire

Ce module n'est évalué que pour une utilisation autonome. Les produits finis incorporant plusieurs émetteurs doivent être conformes à la colocation et aux exigences d'exposition RF en concordance avec les procédures FCC multi-émetteurs. D'autres émetteurs fonctionnant dans des dispositifs portables exposés aux RF (par exemple, situés à moins de 20 cm des personnes avec dispositifs portatifs ou portés contre le corps) peuvent nécessiter d'une approbation séparée.

### A.2.1 Instructions d'étiquetage

Lors de l'intégration du module SPBTLE-1S dans le produit final, le fabricant doit s'assurer que les exigences en matière d'étiquetage de la IC sont satisfaites. Une déclaration doit être placée sur l'étiquette extérieure du produit final indiquant que le produit comprend un module certifié.

L'étiquette doit comporter les informations suivantes (ou une mention analogue que recouvre la même notion):

Contient IC ID: 8976C-SPBTLE1S

OU Ce produit contient IC ID: 8976C-SPBTLE1S

Le sous-traitant doit inclure les énoncés suivants sur l'étiquette extérieure du produit final à moins que le produit ne soit trop petit (par exemple moins de 4 x 4 pouces):

Cet appareil est en conformité aux normes IC. L'utilisation est soumise aux deux conditions suivantes:

- (1) cet appareil ne doit pas causer d'interférences nocives, et
- (2) Cet appareil doit supporter toute interférence reçue, y compris des interférences qui peuvent provoquer un fonctionnement non désiré

## A.2.2 Instructions pour l'utilisation du produit

La présente section concerne les produits finis contenant le module SPBTLE-1S, assujettis aux normes IC. Le manuel du produit final doit contenir la déclaration suivante (ou une mention analogue que recouvre la même notion):

*“Avertissement: Les changements ou modifications non expressément approuvés par la partie responsable de la conformité pourraient annuler l'autorisation de l'utilisateur de faire fonctionner cet équipement. (CNR-210)”*

Dans le cas où le produit finis d'un fabricant OEM rentre dans les limites de la Classe B (résidentiel), les énoncés suivants doivent être inclus dans le manuel du produit finis:

*“ Remarque : Cet équipement a été testé et déclaré conforme aux limitations prévues dans le cadre de la classe B des appareils numériques, définies par la norme CNR-210 d'Industrie Canada.*



*Ces limites sont conçues pour fournir une protection raisonnable contre toute interférence dangereuse issue d'une installation résidentielle. Cet équipement produit, utilise et peut émettre de l'énergie radio électrique et, s'il n'est pas installé et utilisé conformément aux présentes instructions, peut causer des interférences nuisibles aux communications radio. Cependant, il se peut que des interférences se produisent dans une installation particulière. Si cet appareil cause des interférences nuisibles à la réception des signaux de radio ou de télévision, ce qui peut être déterminé en allumant et en éteignant l'appareil, nous encourageons l'utilisateur à essayer de corriger ces interférences par l'un des moyens suivants:*

- Réorienter ou repositionner l'antenne de réception.*
- Augmenter la distance séparant l'équipement du récepteur.*
- Connecter l'équipement à une prise appartenant à un circuit différent de celui sur lequel le récepteur est connecté.*
- Consulter le revendeur ou un technicien radio/TV expérimenté pour obtenir de l'aide."*

Dans le cas où le produit fini d'un fabricant OEM rentre dans le cadre des limites imposées aux appareils numériques de classe A, les énoncés suivants doivent être inclus dans le manuel du produit fini:

*" REMARQUE: Cet appareil a été testé et certifié conforme aux spécifications d'un appareil électronique de classe A (class A digital device), conformément à la norme CNR-210 d'Industrie Canada. Ces contraintes sont destinées à fournir une protection raisonnable contre les interférences nuisibles quand l'appareil est utilisé dans une installation commerciale. Cet équipement produit, utilise et peut émettre de l'énergie radio électrique et, s'il n'est pas installé et utilisé conformément aux présentes instructions, peut causer des interférences nuisibles aux communications radio. L'utilisation de cet appareil dans une installation résidentielle peut entraîner des interférences nuisibles et l'utilisateur devra corriger les interférences à ses propres frais."*

### A.3 Certification CE

Le module SPBTLE-1S a obtenu une certification de conformité aux normes suivantes:-

- EN 62479:2010
- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
- ETSI EN 301 489-17 V3.1.1 (2017-02)
- ETSI EN 301 489-1 V2.1.1 (2017-02)
- ETSI EN 300 328 v 2.1.1 (2016-11)

Le module est certifié CE:



## 7 Ordering information

| Order code | Description                  | Packing | MOQ |
|------------|------------------------------|---------|-----|
| SPBTLE-1S  | Bluetooth® V4.2 smart module | TBD     | TBD |

Figure 9: Ordering information

## 8 ECOPACK®

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

## 9 Traceability

Each module is univocally identified by serial number stored in a 2D data matrix laser marked on the bottom side of the module itself.

The serial number has the following format:

| Letter | Meaning                                    |
|--------|--|
| WW     | Week                                       |
| YY     | Year                                       |
| D      | Product ID family                          |
| FF     | Production panel coordinate identification |
| NNN    | Progressive serial number.                 |

*Figure 10: Traceability information*

Each module bulk is identified by a bulk ID.

BULK ID and module 2D data matrix are linked by a reciprocal traceability link.

The module 2D data matrix traces the lot number of any raw material used.

## 10 Revision history

| Date        | Revision | Changes   |
|-------------|----------|---|
| 02-Feb-2017 | 1        | Initial release.                                      |
| 15-Feb-2017 | 2        | Pinout updated. Certification updated. Minor updates. |

*Figure 11: Document revision history*

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