Bluetooth® modules

Modules and turnkey solutions with embedded
Bluetooth firmware and AT command

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2012

- The SPBT2532 and SPBT2632 micro-sized **Blue Modules** offer the most advanced Bluetooth® technology on a highly-reliable and affordable platform

- The series includes modules for short and long range (class 2 and class 1), with and without antenna, embedding different FW subsets to meet the requirements of a wide range of applications.

Blue Modules series

SPBT2532 Modules without antenna

SPBT2532C2.AT   (Class 2 profile)
SPBT2532C2.AT2 (Class 2 profile, enhanced FW*)

SPBT2632 Modules with antenna embedded

SPBT2632C2A.AT 2 (Class 2 profile, enhanced FW*)
SPBT2632C1A.AT 2 (Class 1 profile, enhanced FW*)

* Supports communication with smartphones and Apple iOS Bluetooth enabled devices

Key factors

- Compliant with Bluetooth 2.1 or latest Bluetooth version 3.0
- BQB certified and listed and End Product Listing (EPL)
- Bluetooth radio, microprocessor, memories and RF design fully integrated in a unique device
- Pre-qualified and tested
- RF certified CE, FCC, IC
- Low power mode supported
- Smart cable featured
- Remote mode supported
- No need of a driver or SW stack in the host
- Micro-sized form factor

Key benefits

- Future-ready module, enhanced security, easier paring, compatible with Apple products
- Enables EPL without further BQB process; Bluetooth logo can be used on final product
- Easier design saves development resources and time, shortens time-to-market
- High-reliable solution not requiring specific RF and Bluetooth knowledge on customer side
- Reduces effort and cost on customer side
- Reduces power consumption, increasing final application's battery life
- Realizes automatic connection between predefined devices
- Enables GPIOs and UART setting via Bluetooth link from a remote device
- Easier integration in final application not requiring further Bluetooth qualification
- SMD–like component to fit miniaturized applications

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ST's series of Bluetooth modules offers a high performance, robust and flexible answer to a variety of applications.

Wireless cable replacement for:

- Point-to-point and multipoint between portable equipment and monitoring stations
- Service diagnostics
- Security
- Cable free robotics
- Data acquisition equipment
- Machine control
- Sensor monitoring
- Mobile health
  - Patient monitoring
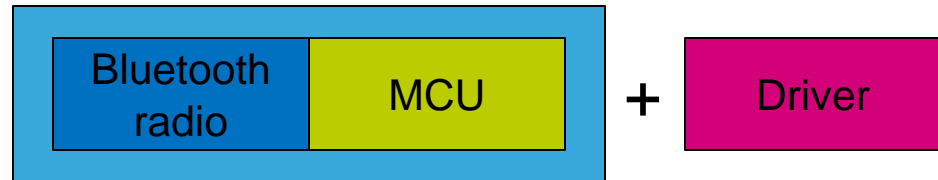 - Body gateway
  - Wearable equipment

Security

Data streaming

Service diagnostics

Healthcare

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> Other solutions on the market

Hosted solution

| Bluetooth radio | + | MCU | + | Driver |

Remote solution

| Bluetooth radio | MCU | + | Driver |

> Blue Modules

SBT2532 and SBT2632 series

Integrated solution

| Bluetooth radio | MCU | Driver |
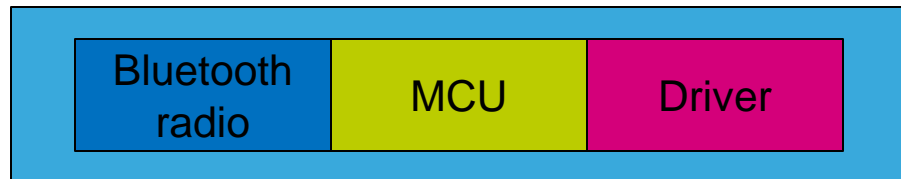
SPBT2632CyA.AT2 series - what's new

Fully qualified

- SPBT2632 series is **BQB qualified and listed**. Ready to enable your end product Listing (EPL) at SIG website

- EPL enables use of Bluetooth logo in just a few clicks - easy, fast and free of charge

- SPBT2632 series is **modular approved FCC** qualified and **IC qualified**

- SPBT2632 series is **CE 1051 approved**

Key features

- Based on STM32 ARM-Cortex-M3 microcontroller and STE *Bluetooth* Radio

- Compliant with *Bluetooth* 3.0

- Equipped with high speed UART, SPI, I^{2}C and GPIOs

- FW upgradable via UART

- Integrated antenna

- Supporting low-power mode

- Implement cable replacement through SPP and AT2 command

- AT2 embedded FW enabling communication with most Bluetooth enabled devices (supporting SPP), Android smartphones and Apple iOS Bluetooth enabled devices. *

- The smallest form factor

* The external Apple authentication coprocessor and MFI certification are required.

SPBT2632C1A.AT2

SPBT2632C2A.AT2

SPBT2532C2.AT
SPBT2532C2.AT2

V supply

Antenna

LPO clock

Bandpass filter

BT radio

Crystal

Voltage regulator

µP

Flash RAM

GPIOs

UART
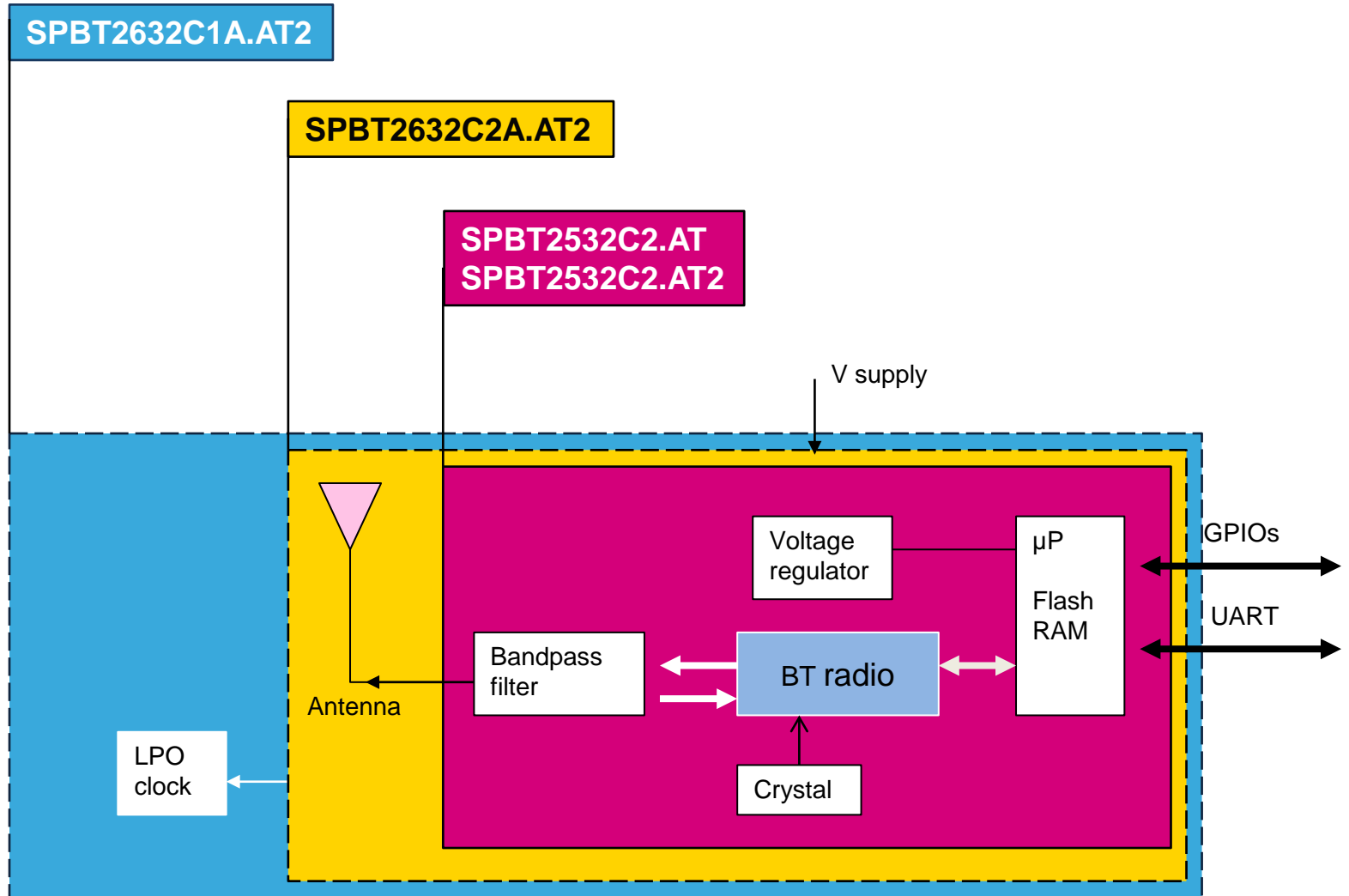
Blue Modules characteristics (1/3)

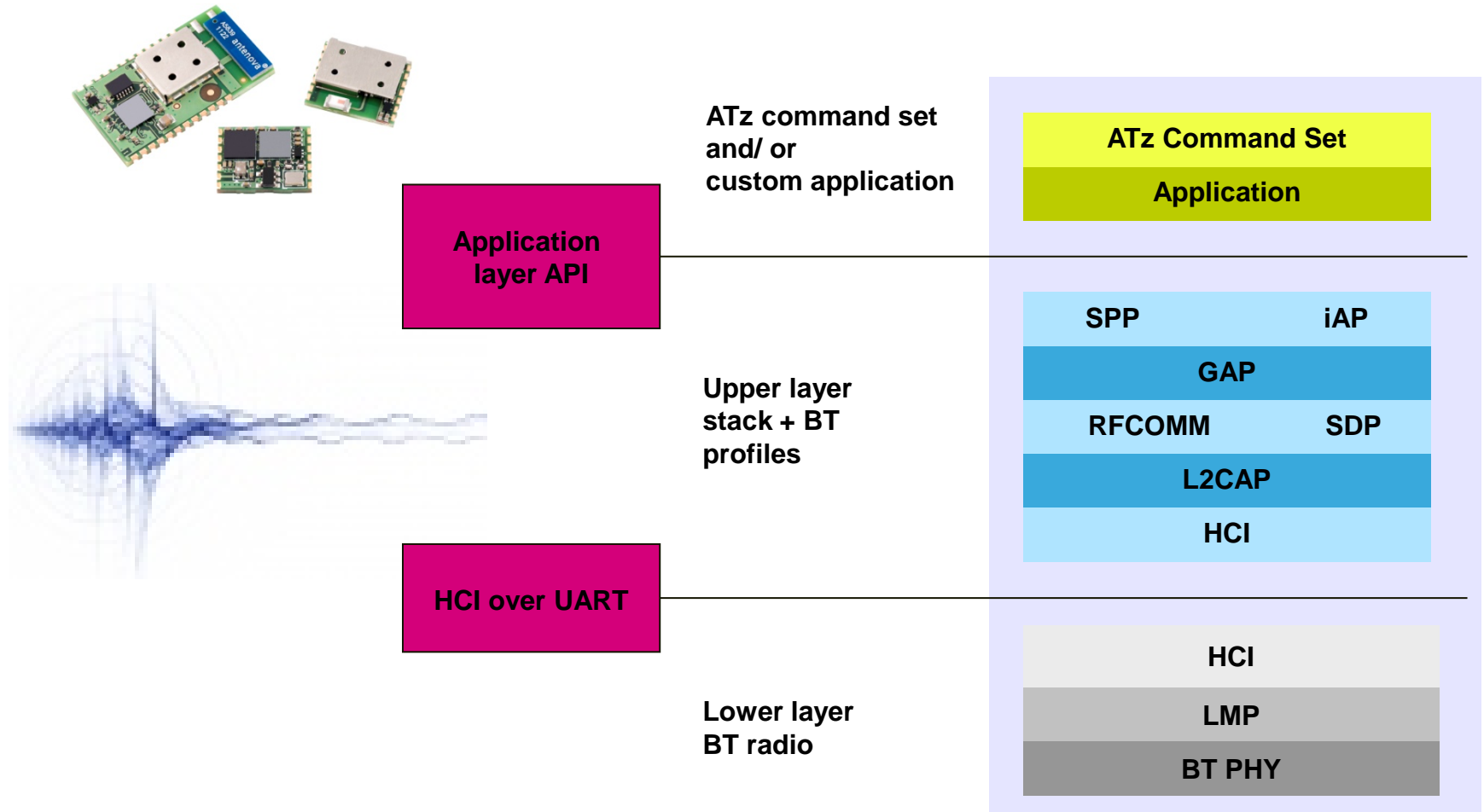| Key features	SPBT2532C2.AT SPBT2532C2.AT2	SPBT2632C2A.AT2	SPBT2632C1A.AT2
Core devices	STM32 ARM-Cortex-M3 MCU + STE STLC2500DB* *Bluetooth* IC	STM32 ARM-Cortex-M3 MCU + STE STLC2690* *Bluetooth* IC	STM32 ARM-Cortex-M3 MCU + STE STLC2690* *Bluetooth* IC
Class	Class 2, typ output 0dBm	Class 2, typ output 0dBm	Class 1, typ output 10dBm
BT standard	*Bluetooth* 2.1 + EDR	*Bluetooth* 3.0	*Bluetooth* 3.0
SPP and ATz command	■	■	■
Antenna and shield	-	■	■
Low power mode	-	■ with external LPO	■
Pin count	14	16	24
Form factor	Best-in-class: 10.5 x 13.5 mm	Micro-sized : 11.6 x 13.5 mm	Small : 15 x 27 mm
Supply voltage	3.3 V	2.5 V	2.5 V
Voltage regulator	■	■	■
Clock integrated	■	■	■
WLAN coexistence	■	■	■
Operating temperature	- 40 85 ºC	- 40 85 ºC	- 40 85 ºC

* ST-Ericsson part number

Blue Modules characteristics (2/3)

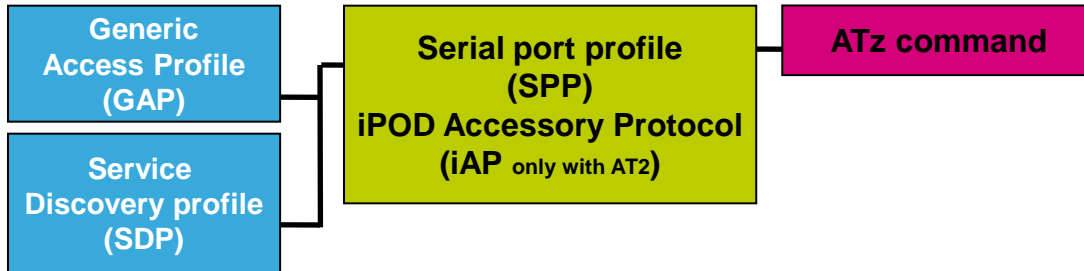| Key features	SPBT2532C2.AT SPBT2532C2.AT2	SPBT2632C2A.AT2	SPBT2632C1A.AT2
High Speed CPU Mode 32 MHz	Average Values		
ACL data 115KBaud UART at max throughput (Master)	39.0 mA	23 mA	23 mA
ACL data 115KBaud UART at max throughput (Slave)	39.0 mA	27.5 mA	27.5 mA
Connection, no data traffic, Master	28.9 mA	9.1 mA	9.1 mA
Connection, no data traffic, Slave	34.5 mA	11.2 mA	11.2 mA
Connection 375 ms sniff with LPO	----	490 µA (*)	490 uA
Page/inquiry scan, without deep sleep	33.2 mA	9.5 mA	9.5 mA
Page/inquiry scan, with deep sleep, no LPO	7.2 mA	2.7 mA	------
Page/inquiry scan, with deep sleep and LPO	------	520 µA (*)	520 µA
Standby, without deep sleep	28.3 mA	8.6 mA	8.6 mA
Standby with deep sleep, no LPO	2.1 mA	1.7 mA	------
Standby with deep sleep and LPO	-----	70 µA (*)	60 µA
Bluetooth power down / CPU standby	25 µA	9 µA (*)	6 µA

(*) with external clock

Key features	SPBT2532C2.AT SPBT2532C2.AT2	SPBT2632C2A.AT2	SPBT2632C1A.AT2
Memories			
Flash memory	256 kB	256 kB	256 kB
Flash memory free	60 kB	60 kB	60 kB
Ram memory	48 kB	48 kB	48 kB
Ram memory free	5 kB	5 kB	5 kB
RF characteristics			
Antenna Load	50 ohm	50 ohm	50 ohm
Sensitivity Level (BER<.001 with DH5)	-85 dBm	-86 dBm	-90 dBm
Maximum Output Power (50 ohm load)	+4 dBm	0 dBm	+10 dBm
Interfaces			
High speed UART	■	■	■
GPIOs	4	7 and LPO input	16
SPI (not available with AT FW version)	Only for data transfer (no AT Commands available)	Only for data transfer (no AT Commands available)	Only for data transfer (no AT Commands available)
I²C (not available with AT FW version)	Only for Apple code processor interface	Only for Apple code processor interface	Only for Apple code processor interface

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Blue Modules firmware architecture

ATz command set and/ or custom application

ATz Command Set
Application

Application layer API

Upper layer stack + BT profiles

SPP	iAP
GAP	
RFCOMM	SDP
L2CAP	
HCI	

HCI over UART

Lower layer BT radio

HCI
LMP
BT PHY

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Blue Modules FW profile and application

| Generic Access Profile (GAP) | | |
| Service Discovery profile (SDP) | Serial port profile (SPP) iPOD Accessory Protocol (iAP only with AT2) | ATz command |

Key features	AT command	AT2 command	
Bluetooth version (**)	2.1 + EDR	2.1 +EDR	3.0
Point-to-point communication	■	■	
Multipoint communication	-	■	
Profiles			
SPP	■	■	
iAP	-	■	
Phone support			
BlackBerry	-	■	
Android	-	■	
iPhone	-	■	

Generic Access Profile (GAP)

- Discovers and connects to other devices
- Security (authentication)
- idle mode procedure: inquiry
- linking, paging, connection

Service Discovery Profile (SDP)

- Locates/describes services from/to other devices

Serial Port Profile (SPP)

- Emulates legacy serial communication
- Cable replacement

iPOD Accessory Protocol (iAP)

- Supports communication with Apple iOS Bluetooth enabled device*

(*) The external Apple Authentication coprocessor and MFI certification are required

(**) depending on BT radio chipset.
 - STLC2500DB supports BT V2.1 +EDR
 - STLC2690 supports   BT V3.0

Blue Modules are CE and Bluetooth® certified. Radio type compliant for US and Canada.

	BQB qualified design	**CE Statement of opinion***	**FCC and IC**
SPBT2532C2.AT SPBT2532C2.AT2	QD ID: **B016360** Product type: End Product TGP Version: Core 2.1/2.1 + EDR TCRL-2009-1 Core Spec Version: 2.1/2.1 +EDR Product Description: Bluetooth Module	**0307-ARAJ00079** Measurements in accordance with : EN 300 328 V 1.7.1 (2004-11) EN 301 489-17 V 1.2.1:2002 EN 60950-1 CE 0051 ⓘ	**Not Applicable** FCC qualification is strictly related to RF section design; therefore it doesn't apply to module without antenna on board. For this reason SPBT2532C2.AT module is not formally qualified, however it is FCC ready.
SPBT2632C1A.AT2	QD ID: **B019224** Product type: End Product TGP Version: Core 3.0 Core Spec Version: 3.0 Product Description: Bluetooth Module, spec V3.0	**0447-ARAM00002** Measurements in accordance with: EN 300 328 V 1.7.1 (2006-10) EN 301 489-17 V 2.1.1 (2009) EN 60950-1:2006 +A11:2009+A1:2010 CE 0051 ⓘ	FCC ID: **X3ZBTMOD3** IC: **8828A-MOD3** In accordance with FCC part 15, the SPBT2632C1A.AT2 is listed above as a modular transmitter device
SPBT2632C2A.AT2	QD ID: **B019224** Product type: End Product TGP Version: Core 3.0 Core Spec Version: 3.0 Product Description: Bluetooth Module, spec V3.0	**0307-ARMJ00003** Measurements n accordance with : EN 300 328 V 1.7.1 (2006-10) EN 301 489-17 V 2.1.1 (2009) EN 60950-1:2006 +A11:2009+A1:2010 CE 0051 ⓘ	FCC ID: **X3ZBTMOD4** IC: **8828A-MOD4** In accordance with FCC part 15, the SPBT2632C2A.AT2 is listed above as a modular transmitter device

* Reports available on request

ST modules are Bluetooth SIG qualified

Part numbering schema

S	P	B	T	X	X	3	2	C	Y	N	Z	Z	Z

SPBT = Bluetooth subsystem module
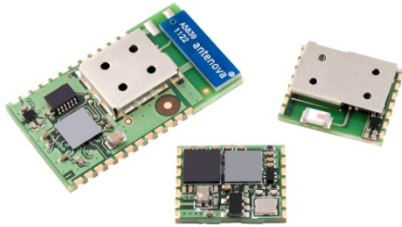
MCU
32 = STM32F

Antenna
N= A with antenna
N= Blank no antenna

BT chip
XX= 25 Bluetooth radio STLC2500DB
XX= 26 Bluetooth radio STLC2690

Bluetooth class
 W= 1 class 1
 W= 2 class 2

Firmware version
ZZ= FW version

Order codes

Order code	Description
SPBT2532C2.AT	Bluetooth V2.1+EDR, Class2, antennaless, AT command FW
SPBT2532C2.AT2	Bluetooth V2.1+EDR, Class2, antennaless, AT2 command FW
SPBT2632C2A.AT2	Bluetooth V3.0, Class2, antenna, AT2 command FW
SPBT2632C1A.AT2	Bluetooth V3.0, Class1, antenna, AT2 command FW

Evaluation boards

Order code	Description
STEVAL-SPBT2ATV2	USB dongle, evaluation board for SPBT2532C2.AT
STEVAL-SPBT2ATV3	USB dongle, evaluation board for SPBT2532C2.AT2
STEVAL-SPBT3ATV3	USB dongle, evaluation board for SPBT2632C2A.AT2
STEVAL-SPBT4ATV3	USB dongle, evaluation board for SPBT2632C1A.AT2

Other tools

Documentation
Datasheets
Application note
AT command user manual

Technical support
Contact us @ onlinesupport@st.com

For more information visit:

www.st.com/bluemodules