STEVAL-STLKT01V1

Data brief

SensorTile development kit





Product summary	
SensorTile development kit	STEVAL-STLKT01V1
Ultra-low-power microcontroller with FPU ARM Cortex-M4	STM32L476JG
Bluetooth low energy network processor supporting Bluetooth 4.1 core specification	BlueNRG-MS
MEMS audio sensor omnidirectional digital microphone	MP34DT05-A

Features

- Included in the development kit package:
  - SensorTile module (STEVAL-STLCS01V1) with STM32L476JG, LSM6DSM, LSM303AGR, LPS22HB, MP34DT05-A, BlueNRG-MS, BALF-NRG-02D3 and LD39115J18R
  - SensorTile expansion Cradle board equipped with audio DAC, USB port, STM32 Nucleo, Arduino UNO R3 and SWD connector
  - SensorTile Cradle with battery charger, humidity and temperature sensor, SD memory card slot, USB port and breakaway SWD connector
  - 100 mAh Li-Ion battery
  - Plastic box
  - SWD programming cable
- Software libraries and tools
  - STSW-STLKT01: SensorTile firmware package that supports sensors raw data streaming via USB, data logging on SDCard, audio acquisition and audio streaming.
  - FP-SNS-ALLMEMS1 and FP-SNS-MOTENV1: STM32Cube function packs
  - STBLESensor: iOS and Android demo Apps
  - BlueST-SDK: iOS and Android Software Development Kit
- CE certified
- RoHS and China RoHS compliant
- WEEE compliant
- FCC (ID: S9NSTILE01) certified
- IC (IC: 8976C-STILE01) certified with PMN: STEVAL-STLKT01V1; HVIN: STEVAL-STLCS01V1; HMN: STEVAL-STLCX01V1; FVIN: bluenrg_7_1_e_Mode_2-32MHz-XO32K_4M.img
- TYPE certified (006-000482)

Description

The STEVAL-STLKT01V1 is a comprehensive development kit designed to support and expand the capabilities of the SensorTile and comes with a set of cradle boards enabling hardware scalability.

The development kit simplifies prototyping, evaluation and development of innovative solutions. It is complemented with software, firmware libraries and tools, including a dedicated mobile App.

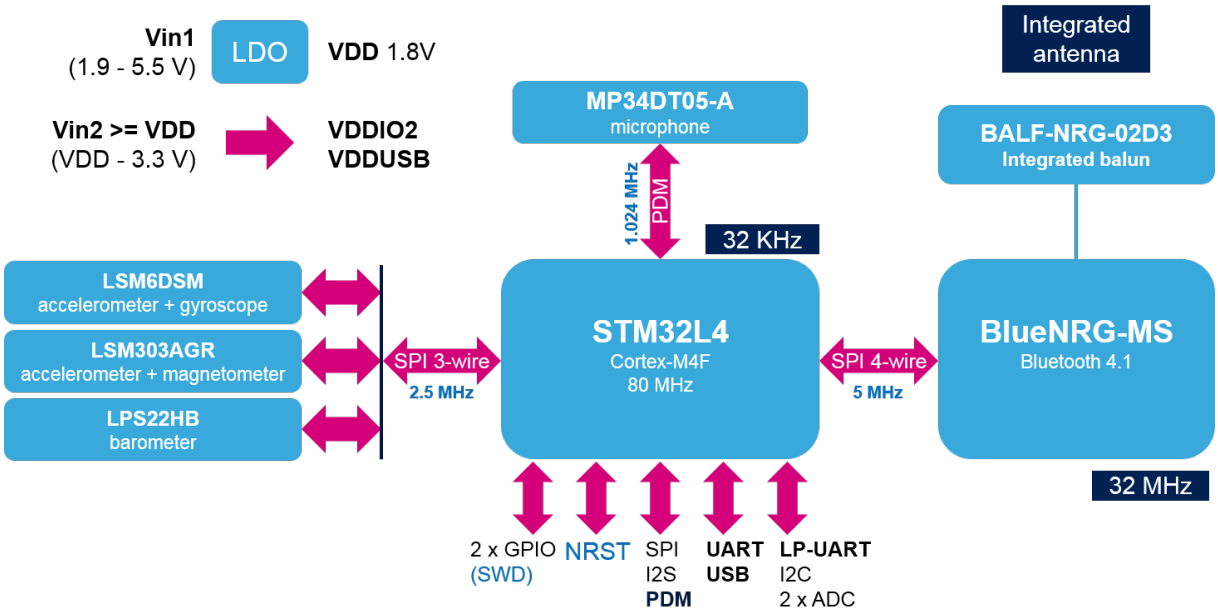
The SensorTile is a tiny, square-shaped IoT module that packs powerful processing capabilities leveraging an 80 MHz STM32L476JGY microcontroller and Bluetooth low energy connectivity based on BlueNRG-MS network processor as well as a wide spectrum of motion and environmental MEMS sensors, including a digital microphone.

SensorTile can fit snugly in your IoT hub or sensor network node and become the core of your solution.

To upload new firmware onto the SensorTile, an external SWD debugger (not included in the kit) is needed. It is recommended to use ST-LINK/V2-1 found on any STM32 Nucleo-64 development board.

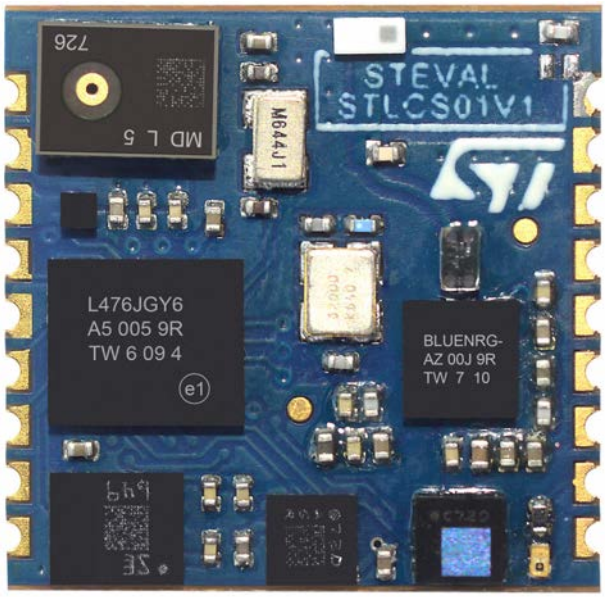
1 Block diagram

Figure 1. **Functional block diagram**



2 Boards included in the kit

Figure 2. **STLCS01V1 board photo**



STLCS01V1 SensorTile component board features

- Very compact module for motion, audio, environmental sensing and Bluetooth® low energy connectivity with a complete set of firmware examples
- Mobile connectivity via the STBLESensor app, available for iOS™ and Android™
- Main components:
  - STM32L476JG – 32-bit ultra-low-power MCU with Cortex®M4F
  - LSM6DSM – iNEMO inertial module: 3D accelerometer and 3D gyroscope
  - LSM303AGR – Ultra-compact high-performance eCompass module: ultra-low power 3D accelerometer and 3D magnetometer
  - LPS22HB – MEMS nano pressure sensor: 260-1260 hPa absolute digital output barometer
  - MP34DT05-A – 64 dB SNR digital MEMS microphone
  - BlueNRG-MS – Bluetooth low energy network processor
  - BALF-NRG-02D3 – 50 Ω balun with integrated harmonics filter
  - LD39115J18R – 150 mA low quiescent current low noise LDO 1.8 V
- 2 V - 5.5 V power supply range
- External interfaces: UART, SPI, SAI (serial audio interface), I²C, DFSDM, USB OTG, ADC, GPIOs
- Pluggable or solderable interface
- SWD interface for debugging and programming capability
- CE certified
- RoHS and China RoHS compliant
- WEEE compliant
- FCC certified
- IC certified
- TYPE certified

STLCS01V1 SensorTile component board description

The STEVAL-STLCS01V1 (SensorTile) is a highly integrated reference design that can be plugged into form-factor prototypes to add sensing and connectivity capabilities to new designs through a smart hub solution. It can

also easily support development of monitoring and tracking applications as standalone sensor node connected to iOS/Android smartphone applications.

The SensorTile comes in a very small square shape 13.5 x 13.5 mm. All the electronic components are on the top side of the pcb, while the bottom side has a small connector through which it is possible to easily plug and unplug it from a motherboard. The connector pinout is also replicated on 18 pcb pads that render the SensorTile a solderable system on module as well.

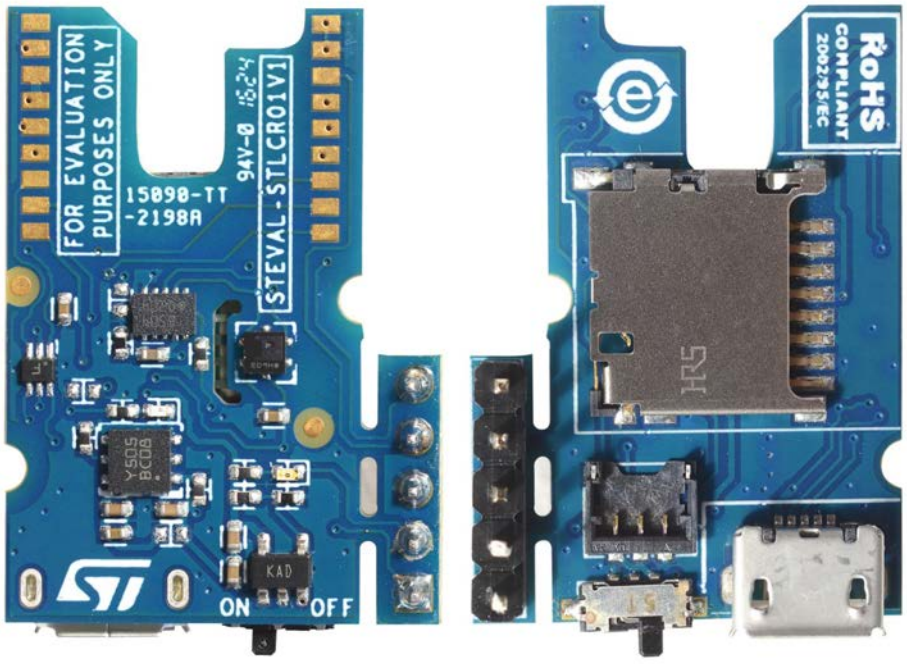
The module comes with pre-loaded FP-SNS-ALLMEMS1 (former BLUEMICROSYSTEM2) software that initializes all the sensors and the Bluetooth low energy radio. The STBLESensor app, available free of charge on the respective Google and Apple stores, is the easiest and fastest way to start using the SensorTile board and to experience a real activity monitoring system.

The SensorTile firmware package STSW-STLKT01, built on the STM32Cube software technology, includes all the low level drivers to manage the on-board devices and system-level interfaces. It has been designed in order to be easily extended and personalized as starting point for development and customization of new dedicated applications.

All the firmware packages are freely available on www.st.com.

The Bluetooth radio power output is set by default at 0 dBm. The FCC and IC certifications refer to this operating value. The power output can be changed up to 8 dBm by reprogramming the device firmware, but the change of this operating value will require an update of the FCC and IC certifications, with additional radio emission tests to be performed.

Figure 3. STLCR01V1 board photo



STLCR01V1 SensorTile component board features

- Sensortile Cradle board with SensorTile footprint (solderable)
- STBC08PMR – 800 mA standalone linear Li-Ion battery charger
- HTS221 – capacitive digital sensor for relative humidity and temperature
- LDK120M-R – 200 mA low quiescent current very low noise LDO
- STC3115 – Gas gauge IC
- USBLC6-2P6 – very low capacitance ESD protection
- USB type A to Mini-B USB connector for power supply and communication
- microSD card socket
- SWD connector for programming and debugging

Figure 4. **STLCX01V1 board photo**



STLCX01V1 SensorTile component board features

- Sensortile Cradle expansion board with SensorTile plug connector
- Compatible with STM32 Nucleo boards through Arduino UNO R3 connector
- LDK120M-R – 200 mA low quiescent current very low noise LDO
- ST2378ETTR – 8-bit dual supply 1.71 to 5.5 V level translator
- USBLC6-2P6 – very low capacitance ESD protection
- 16-Bit, low-power stereo audio DAC
- Micro-USB connector for power supply and communication
- Reset button
- SWD connector for programming and debugging

Revision history

Table 1. **Document revision history**

Date	Version	Changes
24-May-2016	1	Initial release.
01-Jun-2016	2	Updated board photo on the cover page.
02-Aug-2016	3	Updated board photo on the cover page, Figure 1: "STLCS01V1 board photo", Figure 2: "STLCR01V1 board photo" and Figure 3: "STLCX01V1 board photo".
03-Nov-2016	4	Updated: figure, features and description on the cover page.
28-Mar-2017	5	Updated: features on the cover page and Section 2.
15-Nov-2017	6	Updated features and description on the cover page and Section 2: Boards included in the kit.
17-Jul-2018	7	Updated cover page features, Figure 1. Functional block diagram and Figure 2. STLCS01V1 board photo.
06-Mar-2019	8	Added references to STBLESensor app.

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