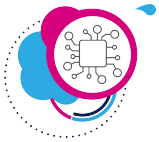
STEVAL-MKSBOX1V1

SensorTile.box wireless multi-sensor development kit with user-friendly app for IoT and wearable sensor applications



Product summary	
Low-voltage local digital temperature sensor	STTS751
iNEMO 6DoF inertial module	LSM6DSOX
3-axis MEMS accelerometer	LIS2DW12
Three-axis digital output accelerometer	LIS3DHH
Digital 3-axis magnetometer	LIS2MDL
Digital nano pressure sensor	LPS22HH
MEMS analog bottom-port microphone	MP23ABS1
Capacitive digital sensor for relative humidity and temperature	HTS221
Applications	Cloud connectivity/ Wearable

Features

- Easy-to-use app with immediate functionality for the following motion and environmental sensor applications:
  - Pedometer optimized for belt positioning
  - Baby crying detection with Cloud AI learning
  - Barometer / environmental monitoring
  - Vehicle / goods tracking
  - Vibration monitoring
  - Compass and inclinometer
  - Sensor data logger
- Expert Mode with additional sensor app parameter settings
- Compact board with the following high precision sensors:
  - Digital temperature sensor (STTS751)
  - 6-axis inertial measurement unit (LSM6DSOX)
  - 3-axis accelerometers (LIS2DW12 and LIS3DHH)
  - 3-axis magnetometer (LIS2MDL)
  - Altimeter / pressure sensor (LPS22HH)
  - Microphone / audio sensor (MP23ABS1)
  - Humidity sensor (HTS221)
- Ultra-low-power ARM Cortex-M4 microcontroller with DSP and FPU (STM32L4R9)
- Bluetooth application processor v5.2 (BlueNRG-M2) which replaces the SPBTLE-1S Bluetooth Smart connectivity v4.2 module of the board previous batches
- Programming and debugging interface for professional firmware development

Description

The STEVAL-MKSBOX1V1 (SensorTile.box) is a ready-to-use box kit with wireless IoT and wearable sensor platform to help you use and develop apps based on remote motion and environmental sensor data, regardless of your level of expertise.

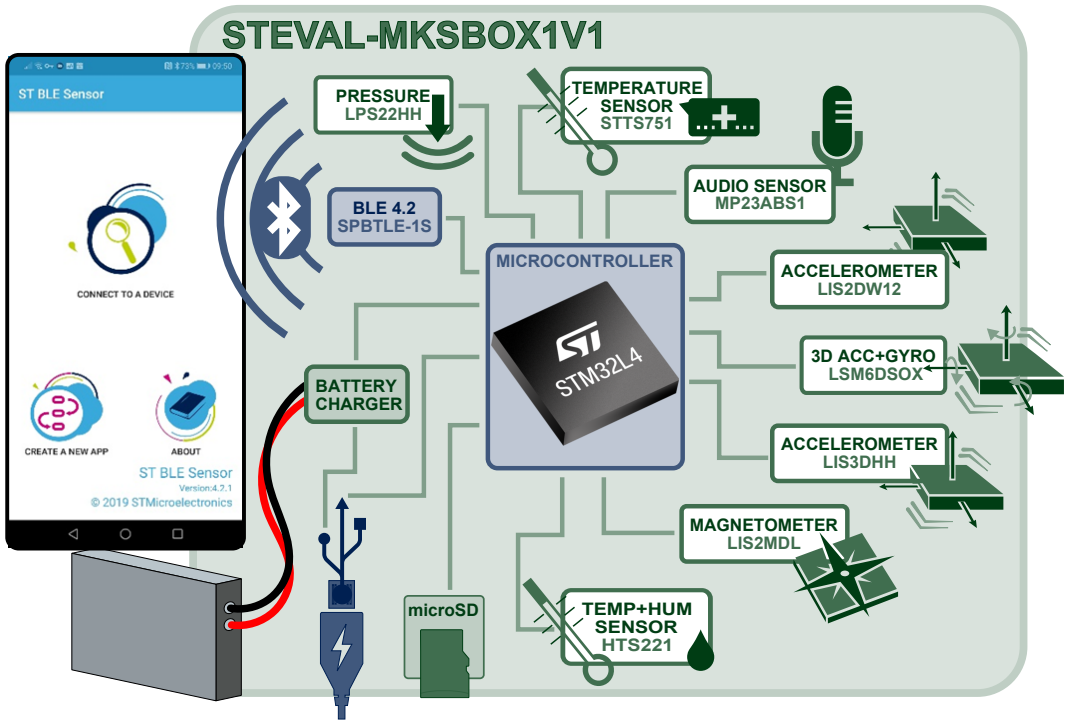
The SensorTile.box board fits into a small plastic box with a long-life rechargeable battery, and the ST BLE Sensor app on your smartphone connects via Bluetooth to the board and allows you to immediately begin using the wide range of default IoT and wearable sensor applications.

In Expert Mode, you can build customs apps from your selection of SensorTile.box sensors, operating parameters, data and output types, and special functions and algorithms available. This multi sensor kit therefore allows you to design wireless IoT and wearable sensor applications quickly and easily, without performing any programming.

SensorTile.box includes a firmware programming and debugging interface that allows professional developers to engage in more complex firmware code development using the STM32 Open Development Environment (STM32 ODE), which includes a sensing AI function pack with neural network libraries.

1 Solution overview

Figure 1. **SensorTile.box block diagram**



Note: The SPBTLE-1S module has been replaced by the BlueNRG-M2 Bluetooth application processor v5.2 in the latest production batches.

The STEVAL-MKSBOX1V1 solution features a board with a wide range of intelligent, low power MEMS sensors recently released by ST, three interface buttons and three LEDs, an STM32L4 microcontroller to manage sensor configuration and process sensor output data, a micro-USB battery charging interface and an ST Bluetooth Low Energy module for wireless communication with a BLE-enabled smartphone. The kit's small protective shroud and long life battery render it suitable for testing wearable and remote monitoring and tracking IoT applications.

You can download the free ST BLE Sensor app on your smartphone and almost immediately begin commanding the board with any of the following applications that have been specifically designed to work with the board sensors:

- **Barometer app**: allows you to configure the STTS751 temperature, LPS22HH pressure and HTS221 humidity sensors to monitor environmental information in real time on your smartphone, or collect and graph the data against time on a plot screen.
- **Compass and level app**: allows you to configure the LSM6DSOX accelerometer and gyroscope and LIS2MDL magnetometer sensors to monitor real time bearing and inclination sensor feedback data and plot the information over time.
- **Step counter app**: allows you to configure the LSM6DSOX accelerometer to monitor you walking and running speeds and plot the information over time.
- **Baby crying app**: allows you to configure the MP23ABS1 microphone sensor to detect human voice events such as a baby crying and send an alert to your smartphone as well as activate a LED on the sensor board.
- **Vibration monitoring app**: allows you to configure the LSM6DSOX accelerometer and set up your board to "learn" the normal operation of motorized domestic or industrial equipment, and then monitor the same equipment for anomalous vibration for predictive maintenance purposes.
- **Data recorder and vehicle/goods tracking app**: allows you to select and configure appropriate environmental and motion sensors to log the transportation and storage conditions that selected merchandise is subject to over time.
- **Compensated magnetometer app**: allows you to build additional apps from the magnetometer output and a sensor fusion algorithm to compensate for disturbances from external magnetic fields

The app and the board support extended functionality in Export Mode, where you can build custom applications by selecting and configuring certain sensors, defining outputs and event triggers, and applying further data processing algorithms.

Revision history

Table 1. **Document revision history**

Date	Version	Changes
24-Apr-2019	1	Initial release.
03-May-2019	2	Updated cover page features.
06-Apr-2021	3	Added BlueNRG-M2 module compatibility information.