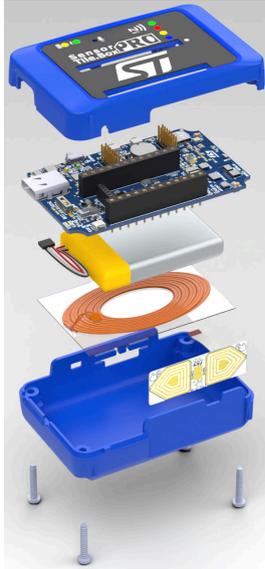


SensorTile.box PRO with multi-sensors and wireless connectivity for any intelligent IoT node



Features

Key solution advantages

- All-in-one sensor node, which fits into the palm of your hand (40x63 mm) for any IoT applications
- Ready-to-go development kit
- Ultra-low-power with FPU Arm-Cortex-M33 with TrustZone® microcontroller (STM32U585AI)
- microSD™ card slot for standalone data logging applications
- On-board Bluetooth® Low Energy 5.2 (BlueNRG-LP) and NFC tag (ST25DV04K)
- High precision sensors to gather high-quality data:
 - Low-voltage local digital temperature sensor (STTS22H)
 - Six-axis inertial measurement unit (LSM6DSV16X)
 - Three-axis low-power accelerometer (LIS2DU12)
 - 3-axis magnetometer (LIS2MDL)
 - Pressure sensor (LPS22DF)
 - Digital microphone/audio sensor (MP23DB01HP)
- User interface:
 - Hardware power switch
 - Green and orange system LED to display the power supply state
 - 4 programmable status LEDs (green, red, orange, blue)
 - 2 programmable push-buttons
 - Audio buzzer
 - Reset button
 - Qvar with electrodes for user interface experience
 - Interface J-Link/SWD debug-probe
 - Interface for extension board
 - Socket for DIL24 sensor adapters
- Power and charging options: USB Type-C® charging and connecting, 5 W wireless charging and rechargeable long-life 480 mAh battery
- Develop apps quickly regardless of your level of expertise:
 - **Entry mode:** wide range of default IoT and wearable applications
 - **Expert mode:** create your own app in a simple graphic environment
 - **Pro mode:** develop code in an intuitive way using STM32 Open Development Environment (ODE) and ST function pack libraries
- STBLESensor app on the smartphone (both on the Google Play and Apple Store) allows you to immediately connect to the box kit (the required PIN for pairing with the app is 123456)
- Windows, LINUX, and MacOS ST software compatibility
- Firmware over-the-air (FOTA) upgrade
- Certifications: CE, FCC, UKCA, IC

Product summary

SensorTile.box PRO with multi-sensors and wireless connectivity	STEVAL-MKBOXPRO
Low-voltage, ultra-low-power, temperature sensor	STTS22H
Ultra-low-power with FPU Arm Cortex-M33 MCU	STM32U585AI
MEMS digital output motion sensor	LIS2DU12
iNEMO 3D accelerometer and 3D gyroscope	LSM6DSV16X
Magnetic sensor 3-axis magnetometer	LIS2MDL
Applications	IoT applications

Description

The [STEVAL-MKBOXPRO](#) (SensorTile.box PRO) is the new ready-to-use programmable wireless box kit for developing any IoT application based on remote data gathering and evaluation, exploit the full kit potential by leveraging both motion and environmental data sensing, along with a digital microphone, and enhance the connectivity and smartness of whatever environment you find yourself into.

You can entirely enjoy the SensorTile.box PRO experience regardless of your level of expertise, the box kit could be exploited according to three different modalities:

Entry mode: run a wide range of already embedded IoT applications on your box.

You can download the free [STBLESensor App](#) on your smartphone and immediately begin commanding the board with any of the following applications that have been specifically designed to work with the board sensors:

- 1) Motion: Compass, Free-fall detection, Level, Pedometer, Sensor-fusion - Quaternion
- 2) Environmental: Barometer
- 3) Log: Data recorder
- 4) AI and MLC: Baby crying detector, Human activity recognition
- 5) User interface: Qtouch
- 6) Connectivity: NFC Tag

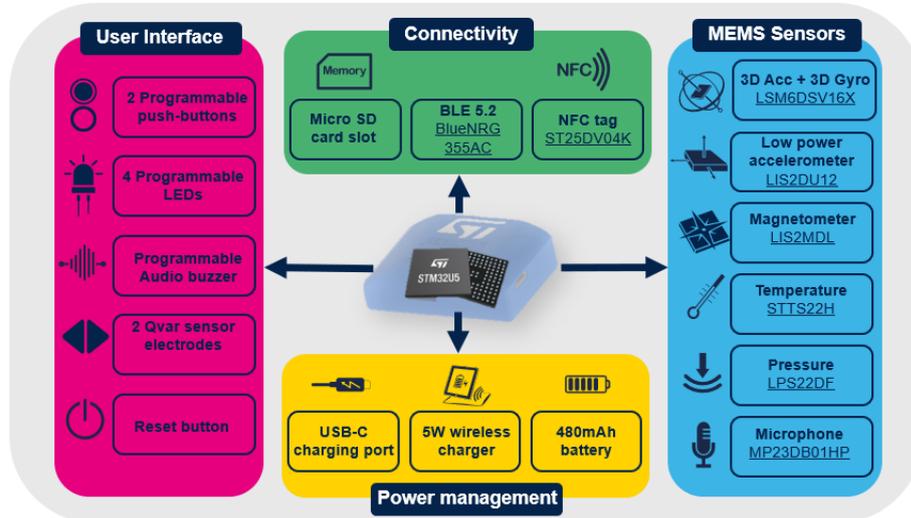
Expert mode: build custom applications through the [STBLESensor App](#) by selecting specific input data and operating parameters from corresponding available in-box sensors, functions to assess/compute those data, and output types that you need, while leveraging on the available powerful algorithms.

Pro mode: develop quickly your own tailored IoT application taking advantage of STM32 open development environment (ODE) and ST function pack libraries, including sensing AI function pack with neural network libraries, without the need to perform any coding activity.

The SensorTile.box PRO board fits into a small plastic box with a long-life 480mAh rechargeable battery, for the first time leveraging also on a wireless charger and a programmable NFC tag. The board can be easily connected via Bluetooth to the ST BLE Sensor app on your smartphone, from which the box kit can be enjoyed in Entry and Expert mode. In Pro mode, professional users can exploit the firmware programming and debugging interface in the [STM32 ODE](#) for developing their firmware from scratch.

1 Solution overview

Figure 1. Solution block diagram



The **STEVAL-MKBOXPRO** solution enables the user to collect environmental and motion data through a wide range of intelligent, low-power MEMS sensors and to process them thanks to the **STM32U585AI** microcontroller. Connectivity is guaranteed by a ST Bluetooth® Low Energy module for wireless communication with a BLE-enabled smartphone, an NFC module to enable near-field applications and a microSD™ card slot for data-logging.

The box kit is equipped with a long-life 480mAh rechargeable battery, a USB Type-C® battery charging interface, and is compatible with a new 5W wireless charging option.

User experience is enhanced by a new user interface composed of two programmable push-buttons, four programmable LEDs, a programmable audio buzzer, one battery status LED, a reset button, and Qvar sensor electrodes.

The small compact box and long-life battery, together with the enhanced user interface and connectivity, make the kit suitable for testing wearable and remote monitoring/tracking for IoT applications while relying on high-quality data gathered.

2 Board versions

Table 1. STEVAL-MKBOXPRO versions

PCB version	Schematic diagrams	Bill of materials
STEVAL\$MKBOXPROA	STEVAL\$MKBOXPROA schematic diagrams	STEVAL\$MKBOXPROA bill of materials
STEVAL\$MKBOXPROB	STEVAL\$MKBOXPROB schematic diagrams	STEVAL\$MKBOXPROB bill of materials

There are available two revisions of STEVAL-MKBOXPRO, these host two different near field communication ICs, and specifically U17 has been replaced from revision A to revision B: ST25DV04K-IER8C3 to ST25DV04KC-IE8C3.

This modification is completely transparent in the firmware and mobile app software packages; they manage both the ICs and automatically set the code for the installed NFC.

For sake of clarity, the two revisions can be distinguished by the label on back and its FG code:

- STEVAL\$MKBOXPROA for revision A of the board, hosting ST25DV04K-IER8C3.
- STEVAL\$MKBOXPROB for revision B of the board, hosting ST25DV04KC-IE8C3.

Figure 2. Label visible on back of the box


Revision history

Table 2. Document revision history

Date	Revision	Changes
10-Mar-2023	1	Initial release.
04-Sep-2024	2	Updated features in cover page. Added Section 2: Board versions .

IMPORTANT NOTICE – READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgment.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2024 STMicroelectronics – All rights reserved