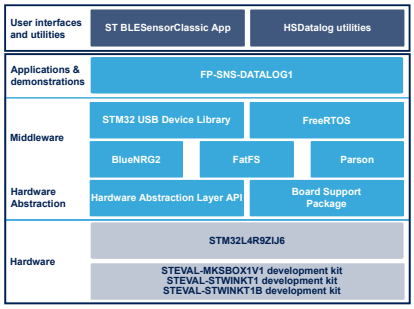
FP-SNS-DATALOG1

Data brief

STM32Cube High Speed Datalog function pack



STM32 Open Development Environment

STM32 Cube

Product summary	
High Speed Datalog function pack	FP-SNS-DATALOG1
SensorTile.box wireless multi sensor development kit	STEVAL-MKSBOX1V1
STWIN SensorTile Wireless Industrial Node development kit	STEVAL-STWINKT1/ STEVAL-STWINKT1B
Firmware runs on:	STM32L4R9ZIJ6
FW development environments	- Keil - IAR Embedded Workbench - STM32CubeIDE
Other utilities	STBLESensClassic mobile Android/iOS app
Applications	Condition Monitoring / Predictive Maintenance Sensing

Features

- High-rate (up to 6 Mbit/s) data capture software suite:
  - Bluetooth® Low Energy app for system setup and real-time control
  - Python and C++ real-time control applications
  - Dedicated HSDPython_SDK for sensor data analysis, in common with FP-SNS-DATALOG2
  - Host developer's API enables integration into any data science design flow
  - Compatible with Unico-GUI which enables configuration of LSM6DSOX (available on STEVAL-MKSBOX1V1) and ISM330DHCX (available on STEVAL-STWINKT1 and STEVAL-STWINKT1B) Machine Learning Core unit
  - Timestamping for sensor data synchronization
- Embedded software, middleware and drivers:
  - FatFS third-party FAT file system module for small embedded systems
  - FreeRTOS third-party RTOS kernel for embedded devices
  - STWIN low-level BSP drivers
- Based on STM32Cube software development environment for STM32 microcontrollers

Description

The FP-SNS-DATALOG1 function pack implements High Speed Datalog application for STEVAL-MKSBOX1V1, STEVAL-STWINKT1, and STEVAL-STWINKT1B. It provides a comprehensive solution to save data from any combination of sensors and microphones configured up to the maximum sampling rate.

The application also allows configuring LSM6DSOX (available on STEVAL-MKSBOX1V1) and ISM330DHCX (available on STEVAL-STWINKT1 and STEVAL-STWINKT1B) Machine Learning Core unit and reading its output.

Sensor data can be stored onto a microSD™ card (Secure Digital High Capacity - SDHC) formatted with the FAT32 file system, or streamed to a PC via USB (WinUSB class) using the companion host software (cli_example) provided for Windows and Linux.

The FP-SNS-DATALOG1 allows configuring the board via a JSON file as well as starting and controlling data acquisition. Commands can be sent from a host via the command line interface.

The application can be controlled via Bluetooth using the STBLESensClassic app (for both Android and iOS - v4.17 and above) which lets you manage the board and sensor configurations, start/stop data acquisition on an SD card, control data labeling and display the output of the Machine Learning Core.

To read sensor data acquired using FP-SNS-DATALOG1, easy-to-use scripts in Python and MATLAB® are provided within the software package. The scripts have been successfully tested with MATLAB® v2019a and Python 3.10.

The software is available also on GitHub, where the users can signal bugs and propose new ideas through [**Issues**] and [**Pull Requests**] tabs.

1 Detailed description

1.1 What can you do with STM32Cube function packs?

STM32Cube function packs leverage the modularity and interoperability of STM32 Nucleo and X-NUCLEO boards together with STM32Cube and X-CUBE software to create function examples for some of the most common use cases of different application technologies.

These software function packs are designed to exploit the underlying STM32 ODE hardware and software components as much as possible to best satisfy the requirements of final user applications.

Moreover, function packs may include additional libraries and frameworks that are not present in the original X-CUBE packages, thus enabling new functionalities allowing real and usable system for developers.

1.2 What is STM32Cube?

STM32Cube is a combination of a full set of PC software tools and embedded software blocks running on STM32 microcontrollers and microprocessors:

- STM32CubeMX configuration tool for any STM32 device; it generates initialization C code for Cortex-M cores and the Linux device tree source for Cortex-A cores
- STM32CubeIDE integrated development environment based on open-source solutions like Eclipse or the GNU C/C++ toolchain, including compilation reporting features and advanced debug features
- STM32CubeProgrammer programming tool that provides an easy-to-use and efficient environment for reading, writing and verifying devices and external memories via a wide variety of available communication media (JTAG, SWD, UART, USB DFU, I2C, SPI, CAN, etc.)
- STM32CubeMonitor family of tools (STM32CubeMonRF, STM32CubeMonUCPD, STM32CubeMonPwr) to help developers customize their applications in real-time
- STM32Cube MCU and MPU packages specific to each STM32 series with drivers (HAL, low-layer, etc.), middleware, and lots of example code used in a wide variety of real-world use cases
- STM32Cube expansion packages for application-oriented solutions.

1.3 How does this function pack complement STM32Cube?

This software is based on the STM32CubeHAL. It extends STM32Cube by providing a board support package (BSP) for the STWIN SensorTile Wireless Industrial Node evaluation kits.

The drivers abstract low-level details of the hardware and allow the middleware components and applications to access data in a hardware-independent manner.

The package includes some middleware libraries to store data onto a micro SD card (through third-party FatFS module) and stream data to a PC via USB (thanks to the SensorStreaming WCID USB class).

The application also takes advantage of the FreeRTOS module, thus enabling a real-time operating system into an STM32 microcontroller.

To enable Bluetooth® low energy communication, the package exploits also the capabilities of BlueNRG-2 middleware.

Revision history

Table 1. **Document revision history**

Date	Version	Changes
10-Nov-2020	1	Initial release.
15-Dec-2020	2	Updated cover page features and How does this function pack complement STM32Cube.
20-Jun-2022	3	Updated title. Added references to STEVAL-MKSBOX1V1.
03-Aug-2022	4	Minor text changes.
20-Jun-2023	5	Updated cover image, features, description and product summary.