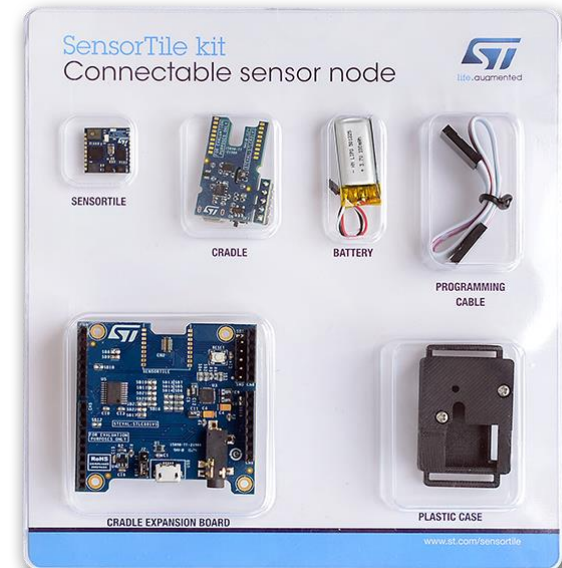


Quick Start Guide

SensorTile Kit - STEVAL-STLKT01V1



www.st.com/sensortile



What do you want to do?

2

Unbox and run
default demo

Page 3



Start designing
your application

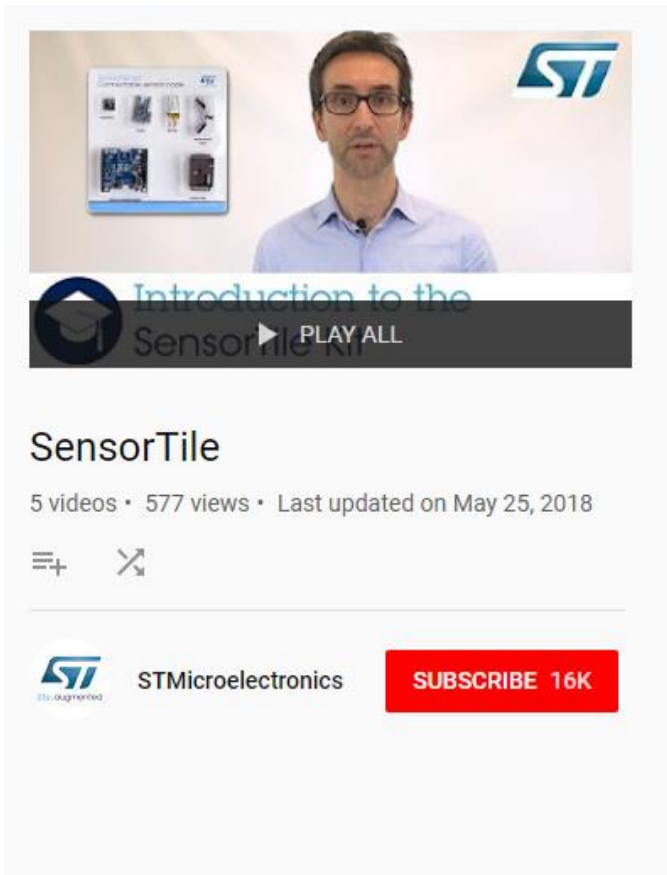
Page 5


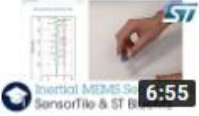



The figure shows the IAR Embedded Workbench IDE interface. The left pane displays the project structure for 'STM32L476IG-SensorTile', including files like 'main.c', 'stm32l476ig.h', and 'stm32l476ig.c'. The right pane shows the C code for 'main.c'.

```
97  /* @brief Main program
98  * @param None
99  * @retval None
100  */
101  int main( void )
102  {
103      uint32_t msTick, msTickPrev = 0;
104      uint8_t doubleTap = 0;
105
106      /* STM32L4xx HAL library initialization:
107       - Configure the Flash prefetch, instruction and Data caches
108       - Configure the SysTick to generate an interrupt each 1 msec
109       - Set NVIC Group Priority to 4
110       - Global MSP (MCU Support Package) initialization
111      */
112      HAL_Init();
113
114      /* Configure the system clock */
115      SystemClock_Config();
116
117      if (SendOverUSB)
118      {
119          Acc X[ng]: -18 Y[ng]: 9 Z[ng]: 983
120          Gy X[ng]: 280 Y[ng]: 280 Z[ng]: 840
121          Mag X[ng]: 350 Y[ng]: 803 Z[ng]: -504
122          ALS_1 [lux]: 625 Prev_1 [m]: 255
123          ALS_2 [lux]: 622 Prev_2 [m]: 255
124          dB Noise [dB]: 46
125          Pinbar: 1003.54 H[x]: 34.34 TIC: 33.49 UV[index]: 0
126          Acc X[ng]: -9 Y[ng]: 11 Z[ng]: 982
127          Gy X[ng]: -630 Y[ng]: 1470 Z[ng]: 630
128          Mag X[ng]: 355 Y[ng]: 805 Z[ng]: -522
129          ALS_1 [lux]: 630 Prev_1 [m]: 255
130          ALS_2 [lux]: 629 Prev_2 [m]: 255
131          dB Noise [dB]: 40
132          Pinbar: 1003.41 H[x]: 34.16 TIC: 33.45 UV[index]: 0
133          Acc X[ng]: -6 Y[ng]: 14 Z[ng]: 982
134          Gy X[ng]: -420 Y[ng]: 1330 Z[ng]: 630
```

YouTube video playlist 3

- Have a look at the SensorTile Video Playlist on YouTube
 - https://www.youtube.com/playlist?list=PLnMKNibPkDnE1cJxYN7Or2VyqJ_iPOAdT



- 1  Introduction to the SensorTile Kit
STMicroelectronics
7:36
- 2  Inertial MEMS Sensors using the SensorTile and the ST BlueMS App
STMicroelectronics
6:55
- 3  Environmental MEMS Sensor using the SensorTile and the ST BlueMS
STMicroelectronics
7:13
- 4  Context Awareness Libraries using the SensorTile and the ST BlueMS
STMicroelectronics
5:56
- 5  Event Detection Logic in the MEMS Accelerometer using the SensorTile
STMicroelectronics
8:31

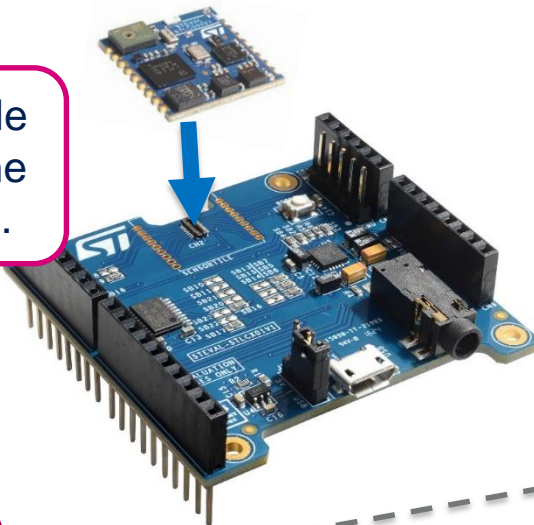
First Setup – Run the preloaded Demo

4

- The preloaded demo on SensorTile Kit is the FP-SNS-ALLMEMS1 *

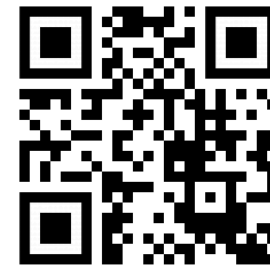
Step 1

Plug the SensorTile Core System on the Expansion Cradle.



Step 2

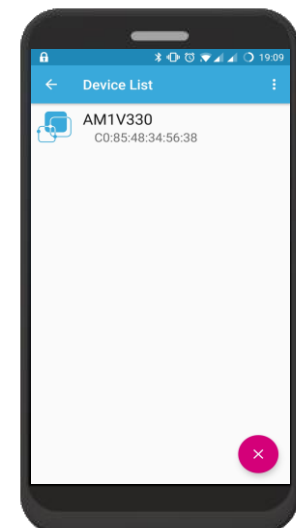
Power it via **USB**



www.st.com/STBLESensor

Step 3

Download and run **ST BLE Sensor App** (Android or iOS)



Programming the SensorTile – Two choices

5

Starter Firmware

Page 6

- Very simple to use
- Basic features
- 3 example projects
 - DataLog: USB or SDCard
 - AudioLoop: microphone acquisition and audio output
 - BLE_SampleApp: Bluetooth Low Energy sample app (compatible with ST BLE Sensor App)

FP-SNS-ALLMEMS1

Page 7

- More complex to use
- Complete source code of the preloaded demo
- Advanced features
 - Compiled libraries
 - Advanced algorithms
- Compatible with STM32 Open Development Environment

See also:

Hardware Setup for
board programming

Page 8

Starter Firmware – STSW-STLKT01

6

Step 1

Download the Starter Firmware from www.st.com/sensortile

Tools and Software

EMBEDDED SOFTWARE

EVALUATION TOOL SOFTWARE

Part Number	Manufacturer	Description
STSW-STLKT01	ST	Basic firmware application for STEVAL-STLKT01V1

Step 2

Unzip the package on your PC

Step 3

Open one of the the projects examples with your favorite IDE

- ▶ AudioLoop
- ▶ BLE_SampleApp
- ▶ DataLog

EWARM

IAR Embedded Workbench

Inc

MDK-ARM

ARM KEIL μVision IDE

Src

SW4STM32

System Workbench for STM32



- STSW-STLKT01
 - _htmresc
 - binary
 - Documentation
 - Drivers
 - Middlewares
 - Projects
 - SensorTile
 - Applications
 - AudioLoop
 - BLE_SampleApp
 - DataLog
 - Utilities



Advanced Firmware – FP-SNS-ALLMEMS1

7

Step 1

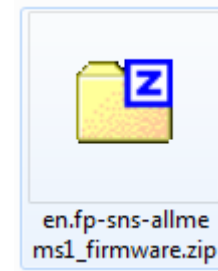
Download the FP-SNS-ALLMEMS1 Firmware from www.st.com/sensortile

MCUS EMBEDDED SOFTWARE

Part Number	Manufacturer	Description
FP-SNS-ALLMEMS1	ST	STM32 ODE func environmental and
FP-SNS-MOTENV1	ST	STM32 ODE function pack for IoT node with BLE connectivity and environmental and motion sensors

Step 2

Unzip the package on your PC

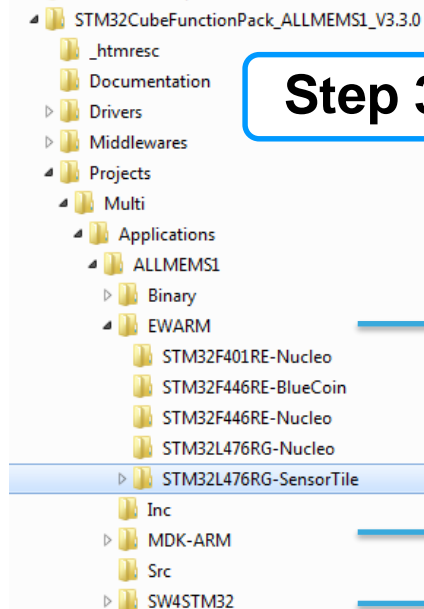


Step 3 Open the SensorTile version of the project with your favorite IDE

IAR Embedded Workbench

ARM KEIL μ Vision

System Workbench for STM32

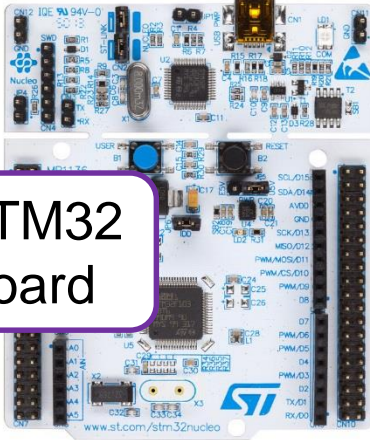


Hardware Setup for board programming

8

Step 1

Take an STM32 Nucleo board



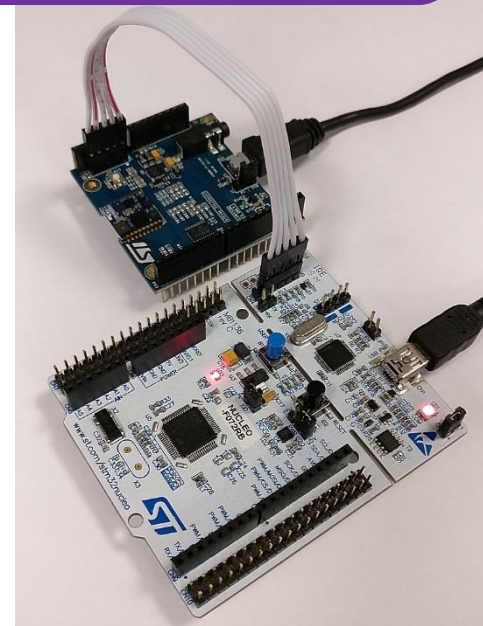
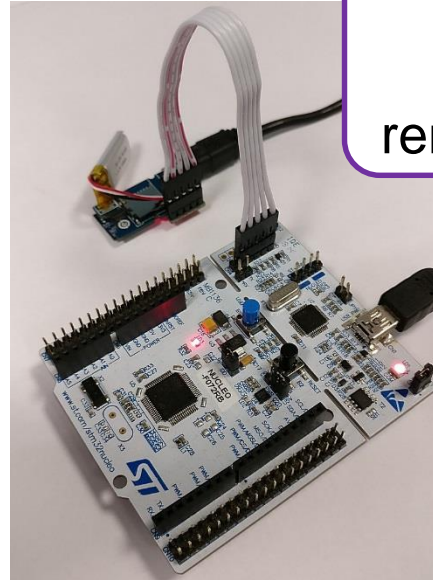
Step 3

Connect to the PC and download the firmware with your IDE

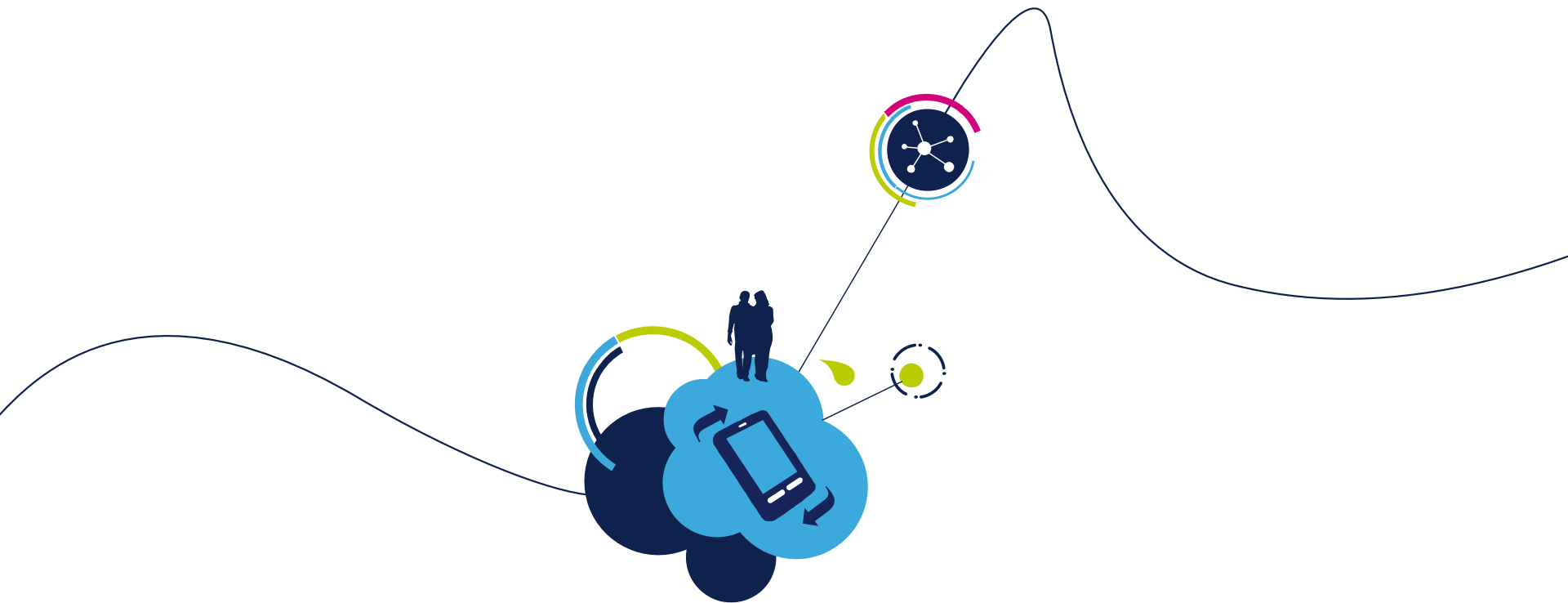


Step 2

Connect it to the SensorTile and remove CN2* jumpers



* See page 14 for details



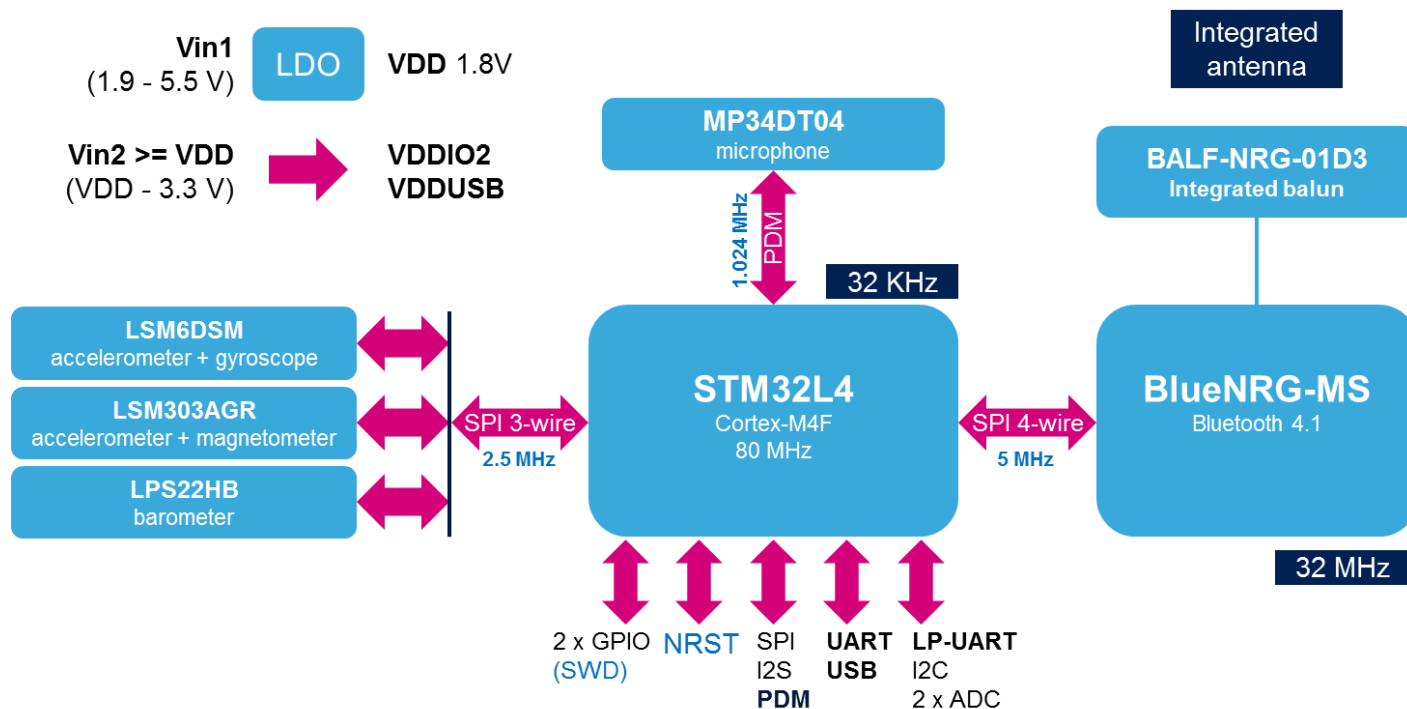
More information

SensorTile Platform – Hardware overview

10

- STEVAL-STLKT01V1 is the development kit for the SensorTile board (STEVAL-STLCS01V1), a highly Integrated Development Platform with a broad range of functionalities aiming to improve system design cycle and accelerate delivery of results
- Two host boards are also provided as part of the kit, both featuring SWD programming interface

SensorTile Block Diagram



SensorTile Core System

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SensorTile Core System: STEVAL-STLCS01V1

MP34DT05-A *

Microphone

64dB SNR, 122.5 dB SPL AOP

STM32L476

Cortex-M4

Up to 100DMIPS 80MHz

100uA/MHz@24MHz in run mode

LSM6DSM

3DAcc+3DGyro

0.65mA @ 1.6kHz - 9µA @ 12.5Hz

LSM303AGR

3DAcc+3DMag

200µA @ 20 Hz (HR mode)

Accel/Mag independent
power down mode

LPS22HB

Barometer

1-75Hz, 3-12µA @ 1Hz

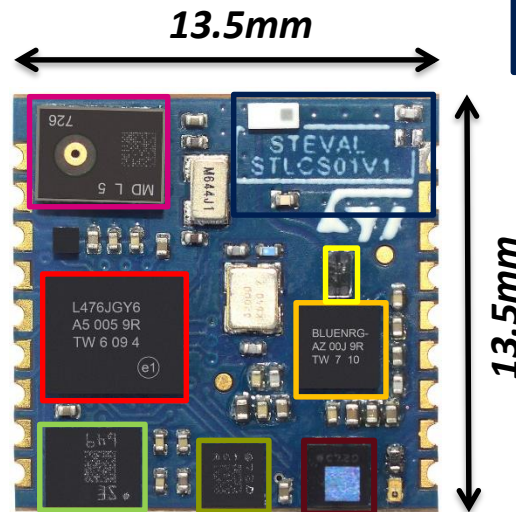
Antenna
Clearance Area

BALF-NRG-02D3 *

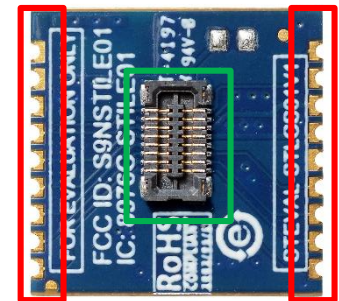
Balun

BlueNRG-MS

Bluetooth low-energy
Concurrent master/slave BT4.1



Solderable



Pluggable

SensorTile Cradle: STEVAL-STLCR01V1

SensorTile Footprint

Solderable

HTS221

Humidity and
Temperature sensor

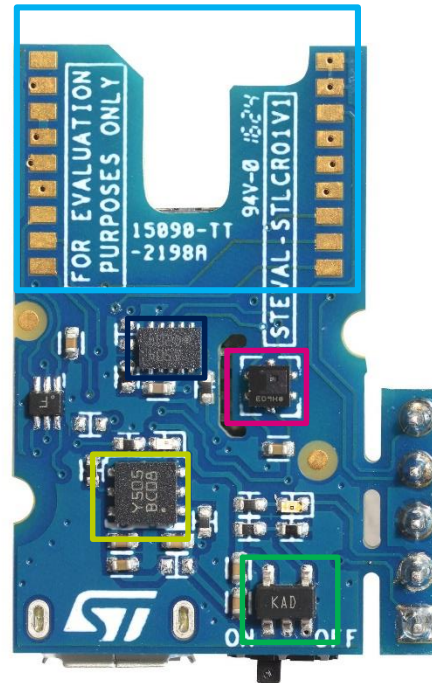
STC3115

Gas gauge IC with
alarm output

STBC08

Li-Ion Battery charger
with thermal regulation

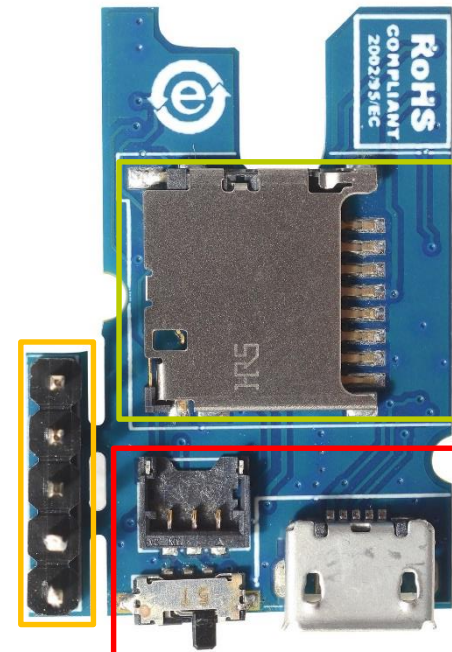
TOP VIEW



LDK120

200 mA very low
noise LDO

BOTTOM VIEW



**Micro-SD
Card slot**

**Micro USB
ON/OFF switch
Battery Plug**

SWD

SWD programming
interface

SensorTile Expansion Cradle

13

SensorTile Expansion Cradle: STEVAL-STLCX01V1

SensorTile Footprint

ST2378ETTR

8-Bit Level Translator
3.3V \leftrightarrow 1.8V

Arduino Connectors

SWD & Reset

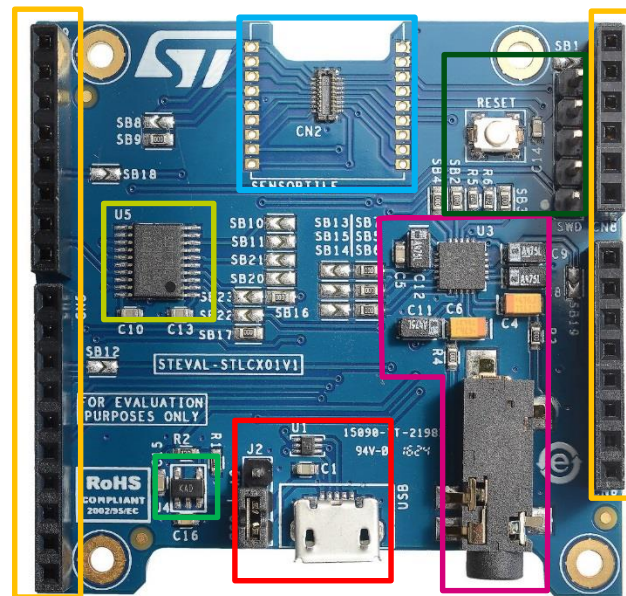
SWD programming interface
and reset button

**Audio DAC
&
3.5mm jack**

LDK120

200 mA very low
noise LDO

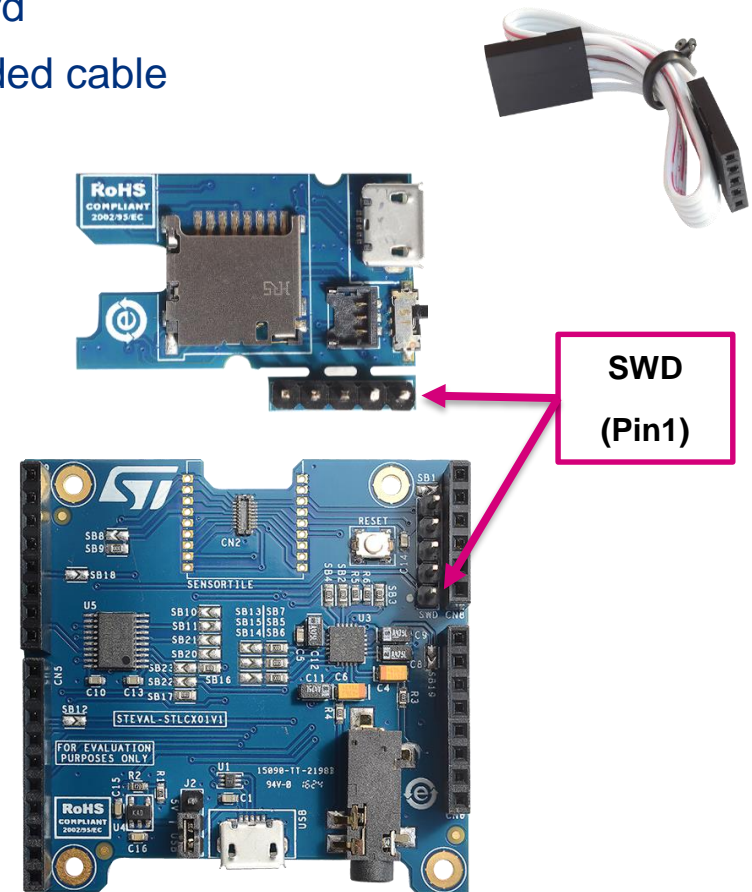
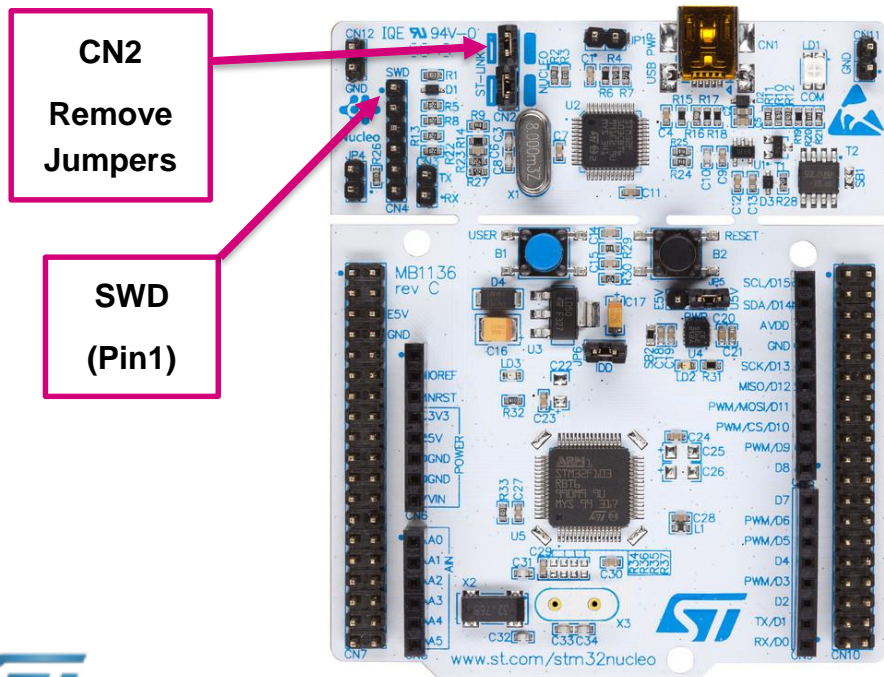
**Micro USB
and power selector**



SensorTile Programming/Debugging

14

- Connect an external ST-Link to the cradles SWD connectors. A 5pin flat cable is provided within the SensorTile Kit package
 - The easiest way is to get an STM32-Nucleo board which includes an ST-Link V2.1
 - Remove CN2 Jumpers from the Nucleo Board
 - Connect the SWD interfaces using the provided cable

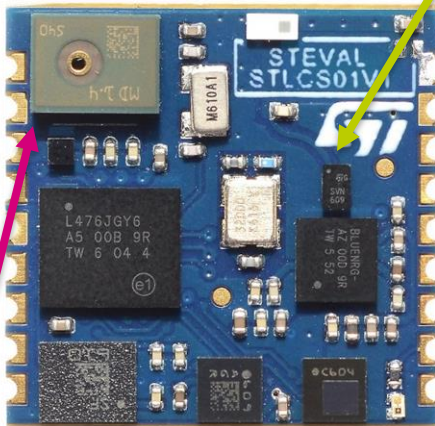


How to recognize the different generations

15

First generation

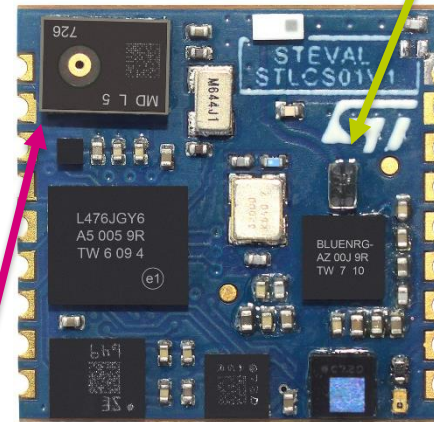
- Balun package is black (opaque)
 - BALF-NRG-01D3 (U4)



- MEMS Microphone
 - MP34DT04 (U11)

Second generation

- Balun package is transparent
 - BALF-NRG-02D3 (U4)



- Microphone
 - MP34DT05-A (U11)