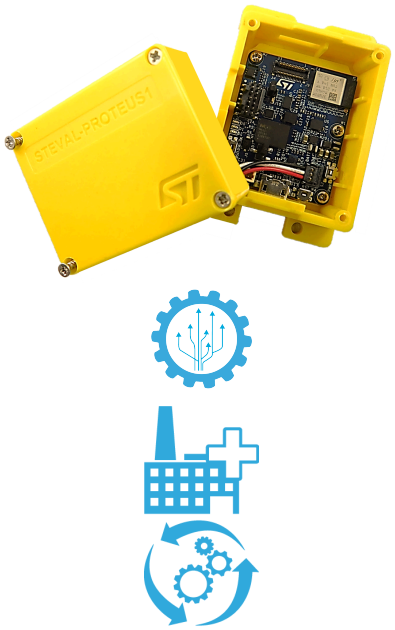
STEVAL-PROTEUS1

Data brief

Industrial sensor evaluation kit for condition monitoring based on the 2.4 GHz STM32WB5MMG module



Product summary	
Industrial sensor evaluation kit for condition monitoring based on the 2.4 GHz STM32WB5MMG module	STEVAL-PROTEUS1
Software package for the STEVAL-PROTEUS1 kit with signal processing to enable predictive maintenance in a WPAN	STSW-PROTEUS
Ultra-low-power dual core Arm Cortex-M4 MCU	STM32WB5MMGH6UTR
Ultra-wide bandwidth, low-noise, 3-axis digital vibration sensor	IIS3DWBTR
iNEMO inertial module with Machine Learning Core	ISM330DHCXTR

Features

- Kit content:
  - the STEVAL-PROTEUS main board
  - LiPo battery 3.7 V, 480 mAh
  - Plastic case and screws
- Main components on the STEVAL-PROTEUS:
  - STM32WB5MMG - ultra-low-power module, dual core 32-bit Arm Cortex-M4 MCU 64 MHz, Cortex-M0+ 32 MHz for real-time radio layer, with 1 Mbyte of flash memory, 256kbyte SRAM, and 2.4GHz RF supporting Bluetooth® Low Energy 5, 802.15.4, Zigbee 3.0, and Thread
  - IIS3DWB - ultra-wide bandwidth up to 6 kHz, low noise, 3-axis digital accelerometer
  - ISM330DHCX - iNEMO inertial module with machine learning core and finite state machine with digital output
  - IIS2DLPC - high-performance ultra-low-power 3-axis digital accelerometer
  - STTS22H - low-voltage, ultra-low-power, 0.5°C accuracy I²C/SMBus 3.0 temperature sensor
  - 2Gb QSPI NOR flash memory for data storage
  - STSAFE-A110 - secure element
  - STBC02 - Li-Ion linear battery charger with LDO
  - ST1PS02 - step-down converter with digital voltage selection
  - Three push-buttons (one reset, one user, one power-on battery)
  - Four LEDs (three user LEDs, one STBC02 LED status)
  - Flexible power supply options - LiPo battery, USB power, and primary battery
  - SWD connector for debugging and programming capability
  - 34-pin expansion connector compliant with STMOD+
- Temperature monitoring and vibration preprocessing data in the time and frequency domain, machine learning, and AI to address industrial asset monitoring
- STBLESensor app support for Android and iOS to ease the board and processing configuration, condition monitoring, and anomaly detection
- Comprehensive software libraries and demonstration examples available

Description

The STEVAL-PROTEUS1 is an evaluation tool designed for temperature and vibration monitoring. It is based on a 2.4 GHz multiprotocol wireless SoC to address machine or facility condition monitoring for industrial applications.

The evaluation board simplifies the prototyping, evaluation and development of wireless industrial sensor nodes to enable the predictive maintenance. It comes with a LiPo battery and a plastic case. All components are mounted exclusively on the top side of the PCB to ensure an easy mounting on other equipment. The included comprehensive software and the firmware libraries with time and frequency domain vibration analysis ease your software customization and can reliably improve your time-to-market.

Product summary	
Low-voltage, ultra-low-power, 0.5°C accuracy I²C/ SMBus 3.0 temperature sensor	STTS22HTR
BLE sensor application for Android and iOS	STBLESensor
Applications	Condition Monitoring/IoT for Smart Industry

The main board includes the STM32WB5MMG ultra-low-power and small form factor wireless radio module. This module is FCC and IC certified (FCC ID: YCP-STM32WB5M001 and IC: 8976A-STM32WB5M01). It is based on the STM32WB55VGY wireless SoC, compliant with the Bluetooth® Low Energy SIG specification v5.2, ZigBee 3.0, and IEEE 802.15.4-2011.

The powerful Arm®-based Cortex-M4 with FPU and large memory allows running the embedded algorithm at node level.

The multiprotocol support ensures the development of applications with different types of connectivity, using a unique hardware. Moreover, the main board integrates the STSAFE-A110 secure element that provides authentication and secure data management services to a local or remote host.

The IIS3DWB high bandwidth (up to 6 kHz) accelerometer, the IIS2DLPC ultra-low power, and the ISM330DHCX inertial module (accelerometer and gyroscope) with MLC make the hardware ideal for a customized vibration monitoring development.

The STTS22H high accuracy temperature sensor has been integrated in the board, far from the heat noise sources (the power management and the microcontroller) to provide a more precise temperature measurement. Its exposed pad sensor feature allows the temperature sensor to be in contact with the surface target equipment.

An on-board external memory is connected via QSPI to the STM32WB5MMG module for data buffering and event storage.

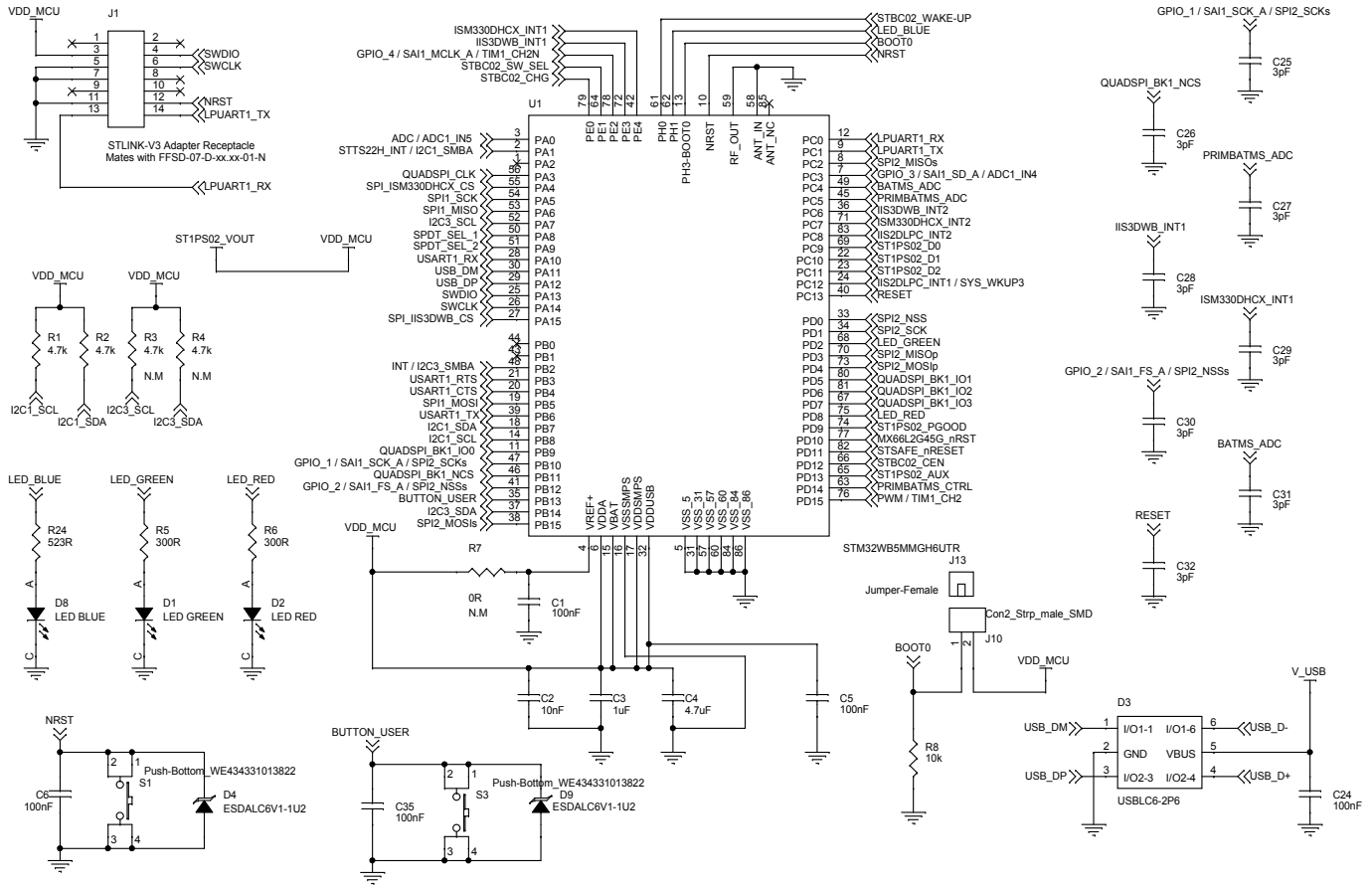
The STEVAL-PROTEUS is LiPo rechargeable battery-powered. It can also be powered via USB (5 V at 500 mA) or via a primary battery (which is not included in the kit).

The power management features the ST1PS02 400 mA step down converter for low-power applications and the STBC02 for battery charging.

An application example firmware with dedicated algorithms is preloaded in the STM32WB5MMG flash memory for easy demonstration of wireless vibration and temperature node monitoring.

1 Schematic diagrams

Figure 1. STEVAL-PROTEUS circuit schematic (1 of 5)



This kit features a specific STM32 device version, which allows the operation of any bundled commercial stack/library available.
This STM32 device shows a "U" marking option at the end of the standard part number and is not available for sales.
To use the same commercial stack in his/her application, a developer may need to purchase a part number specific to this stack/library.
The price of those part numbers includes the stack/library royalties.

Figure 2. **STEVAL-PROTEUS circuit schematic (2 of 5)**

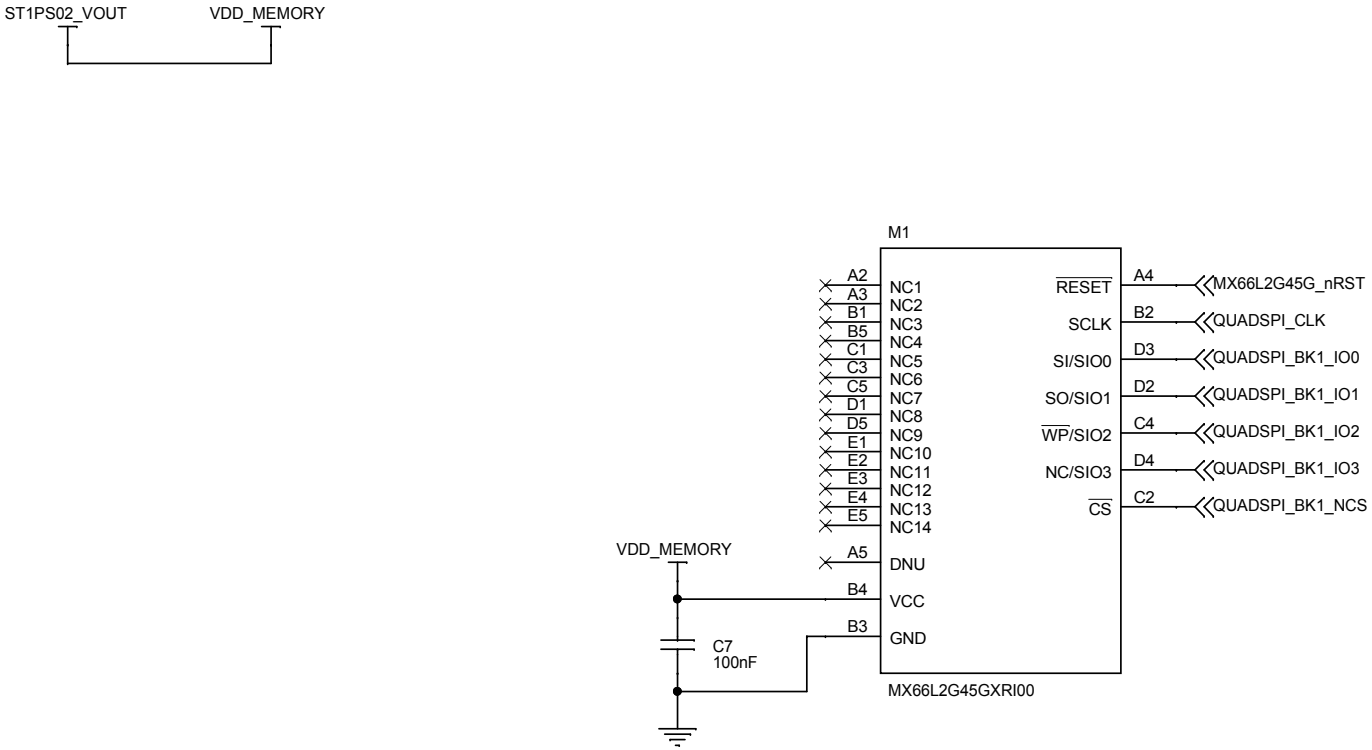


Figure 3. STEVAL-PROTEUS circuit schematic (3 of 5)

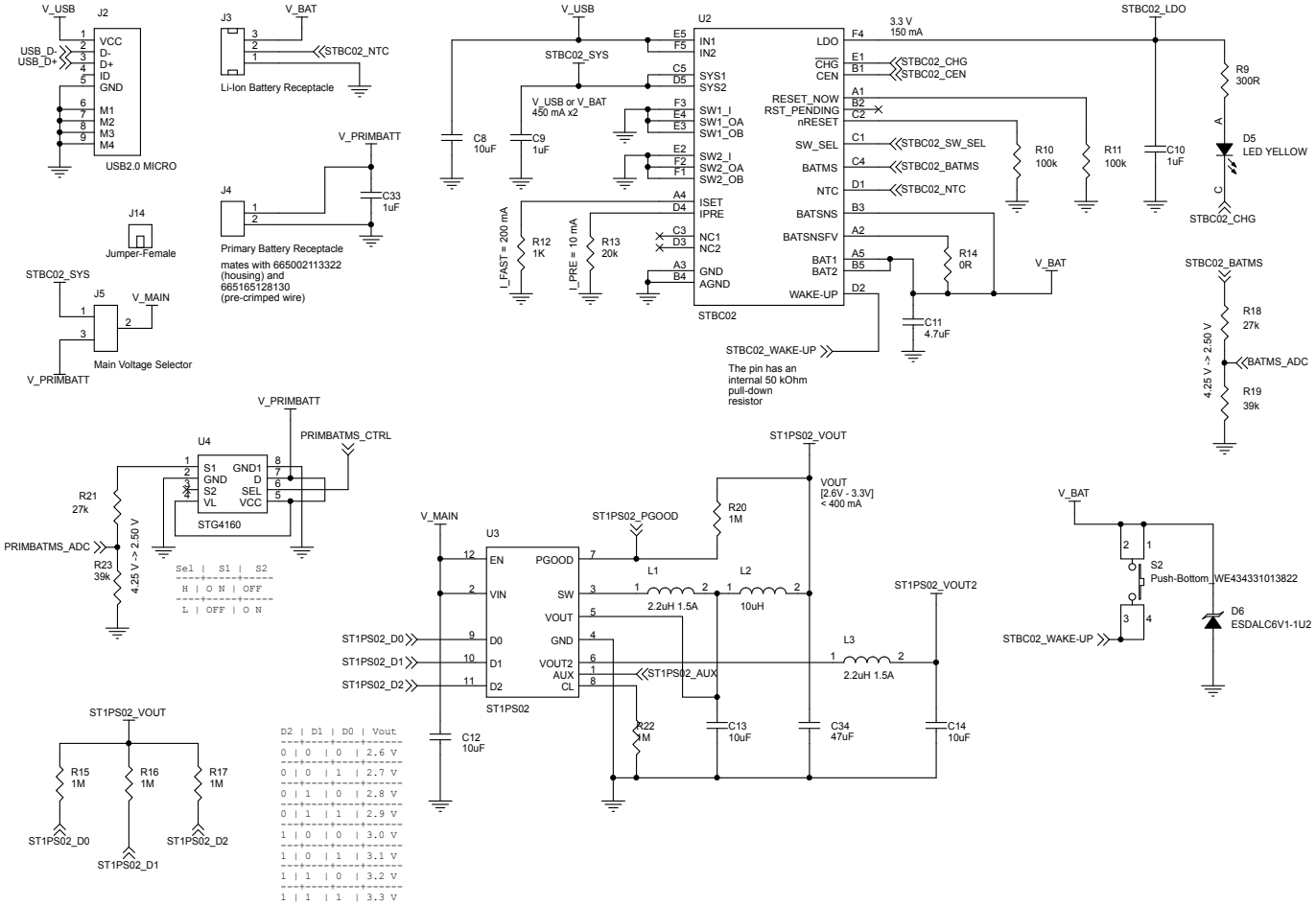


Figure 4. STEVAL-PROTEUS circuit schematic (4 of 5)

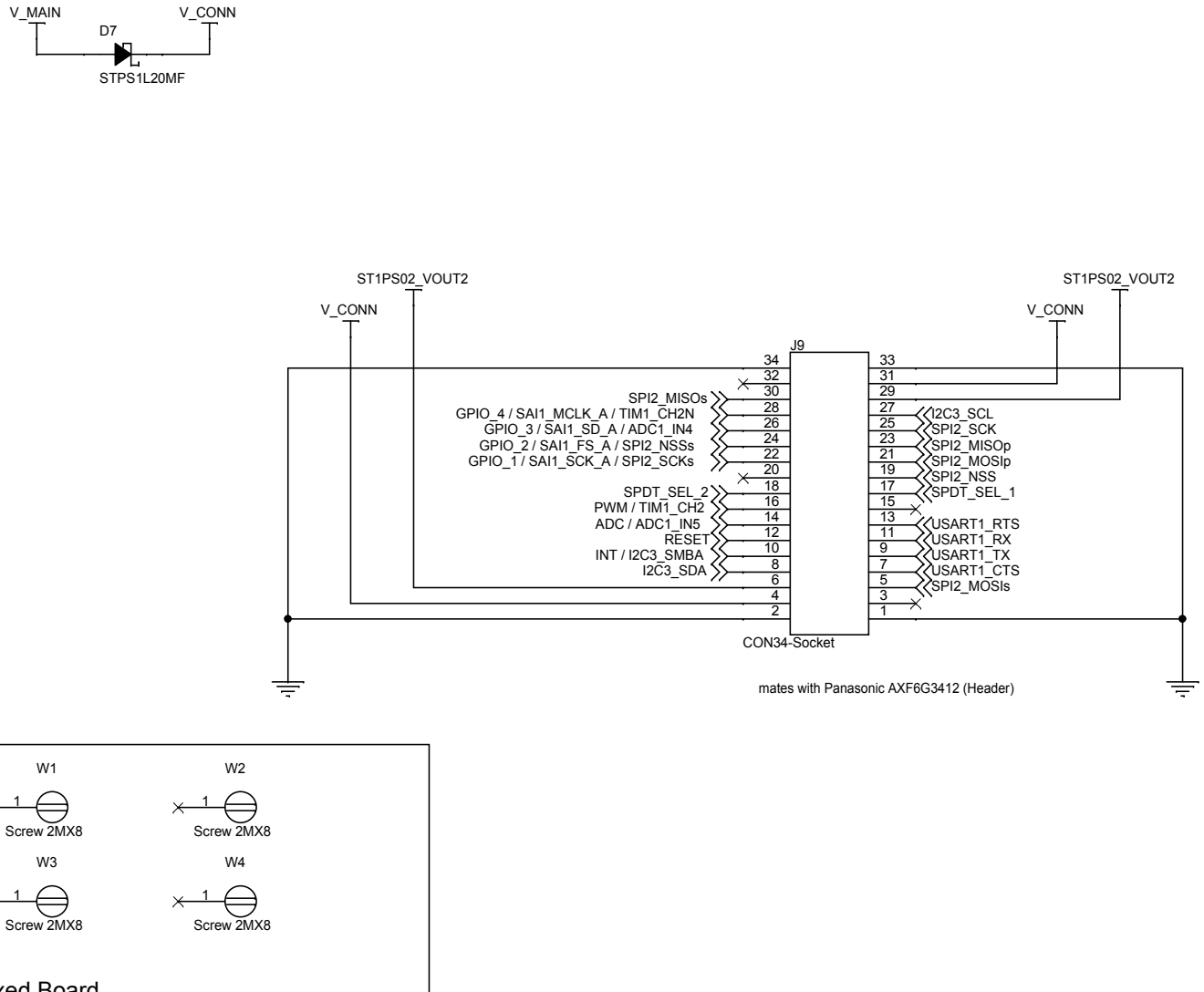
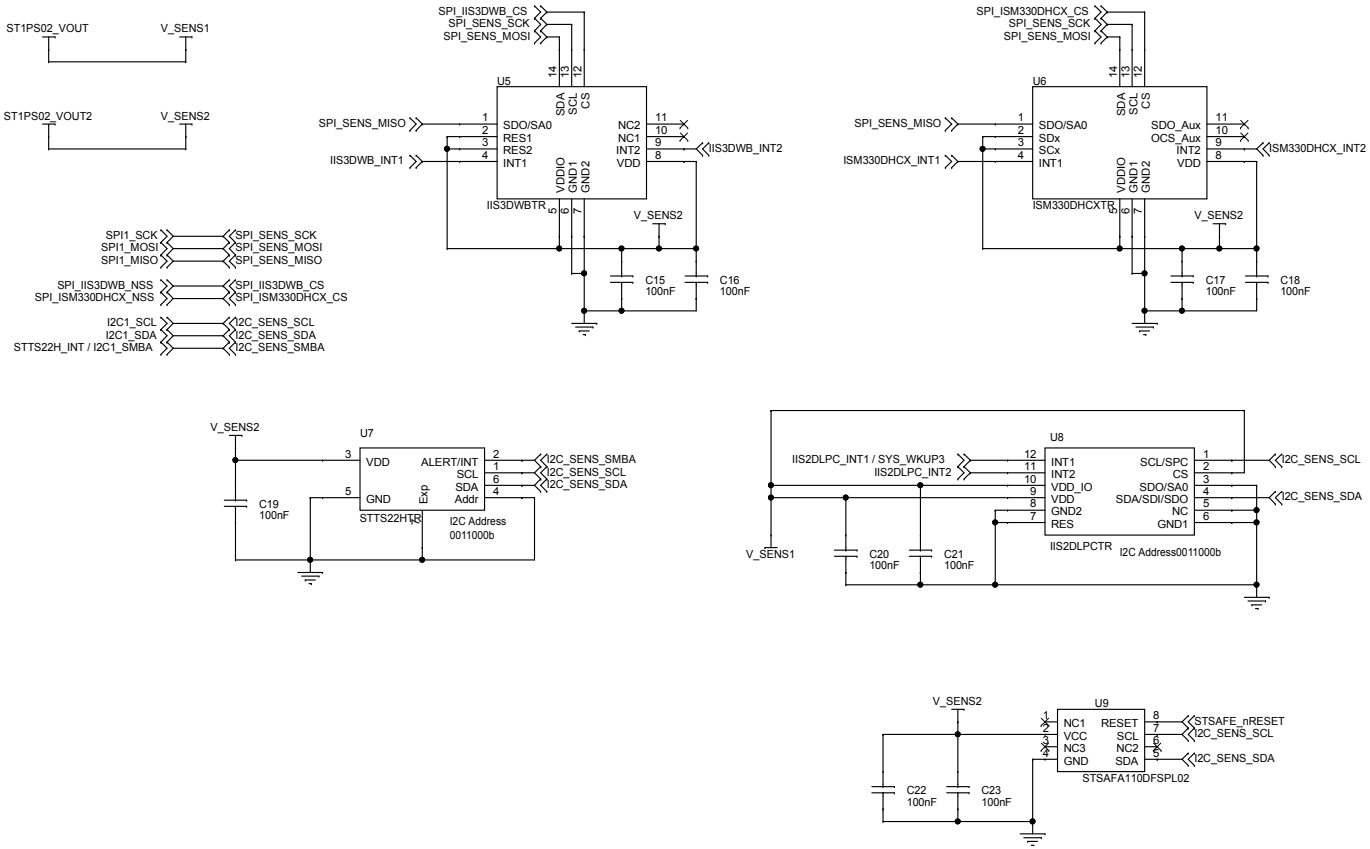


Figure 5. STEVAL-PROTEUS circuit schematic (5 of 5)



2 Kit versions

Table 1. STEVAL-PROTEUS1 versions

PCB version	Schematic diagrams	Bill of materials
STEVAL$PROTEUS1A (1)	STEVAL$PROTEUS1A schematic diagrams	STEVAL$PROTEUS1A bill of materials

1. *This code identifies the STEVAL-PROTEUS1 evaluation kit first version.*

Revision history

Table 2. **Document revision history**

Date	Revision	Changes
24-Jun-2022	1	Initial release.

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