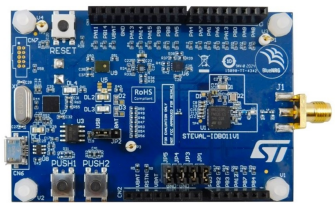

STEVAL-IDB011V1 Evaluation Platform User Guide

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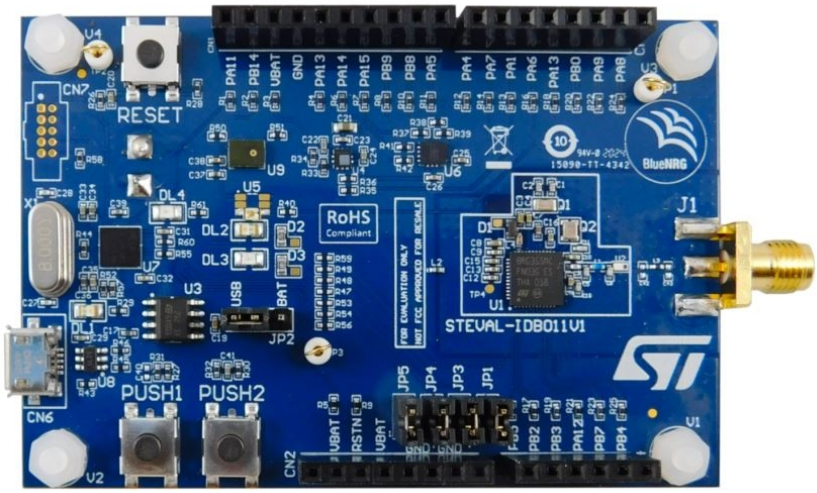


Contents

Introduction

This document provides basic information on BlueNRG-LP, BlueNRG-LPS evaluation kits hardware and software setup operations. It also describes the key information about the associated software development package STSW-BNRGLP-DK and some common troubleshooting cases.

The BlueNRG-LP, BlueNRG-LPS devices are low power Bluetooth® Low Energy (LE) systems-on-chip, compliant with the Bluetooth® specification v5.x and supports master, slave and simultaneous master-and-slave roles. The devices also support the Bluetooth Low Energy data length extension, 2 Mbps, Long Range, extended advertising, GATT caching, LE Ping procedure, Periodic advertising and periodic advertising sync transfer, LE L2CAP connection-oriented channel, LE power control and path loss monitoring features.
The BlueNRG-LPS device also supports the Bluetooth LE direction findings features:

- Angle of Arrival (AoA)
- Angle of Departure (AoD).

The following BlueNRG-LP, BlueNRG-LPS kits are available:

- **STEVAL-IDB011V1, STEVAL-IDB011V2 BlueNRG-LP (QFN48** package) evaluation platforms.
- **STEVAL-IDB012V1, BlueNRG-LPS** (QFN32 package) evaluation platform.

Evaluation platforms

The STEVAL-IDB011V1, STEVAL-IDB011V2, STEVAL-IDB012V1 evaluation platforms embed a CMSIS-DAP programming/debugging interface and features hardware resources for a wide range of application scenarios: sensor data (accelerometer, pressure and temperature sensor), human interface (buttons and LEDs), digital MEMS microphone and serial communication through USB virtual COM.

Figure 1 STEVAL-IDB011V1 evaluation platform

Figure 2 STEVAL-IDB011V2 evaluation platform

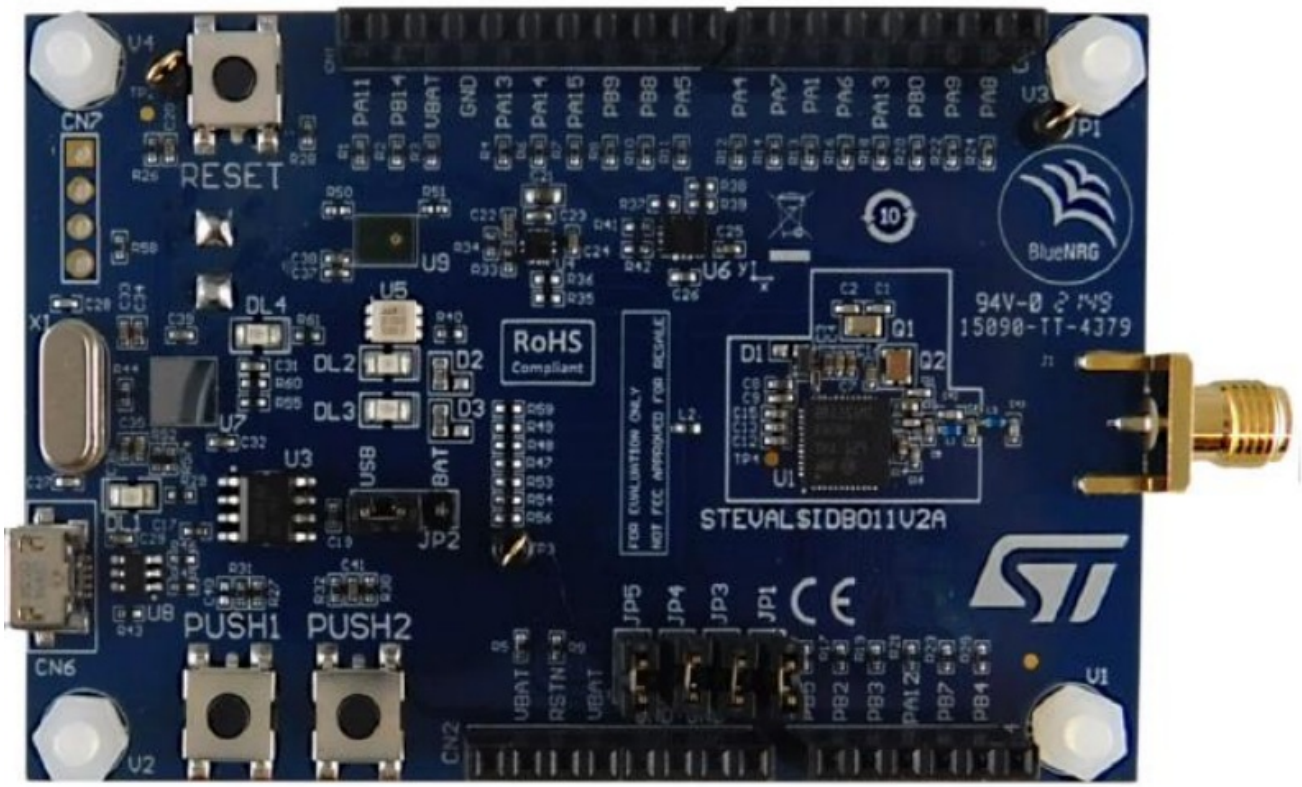
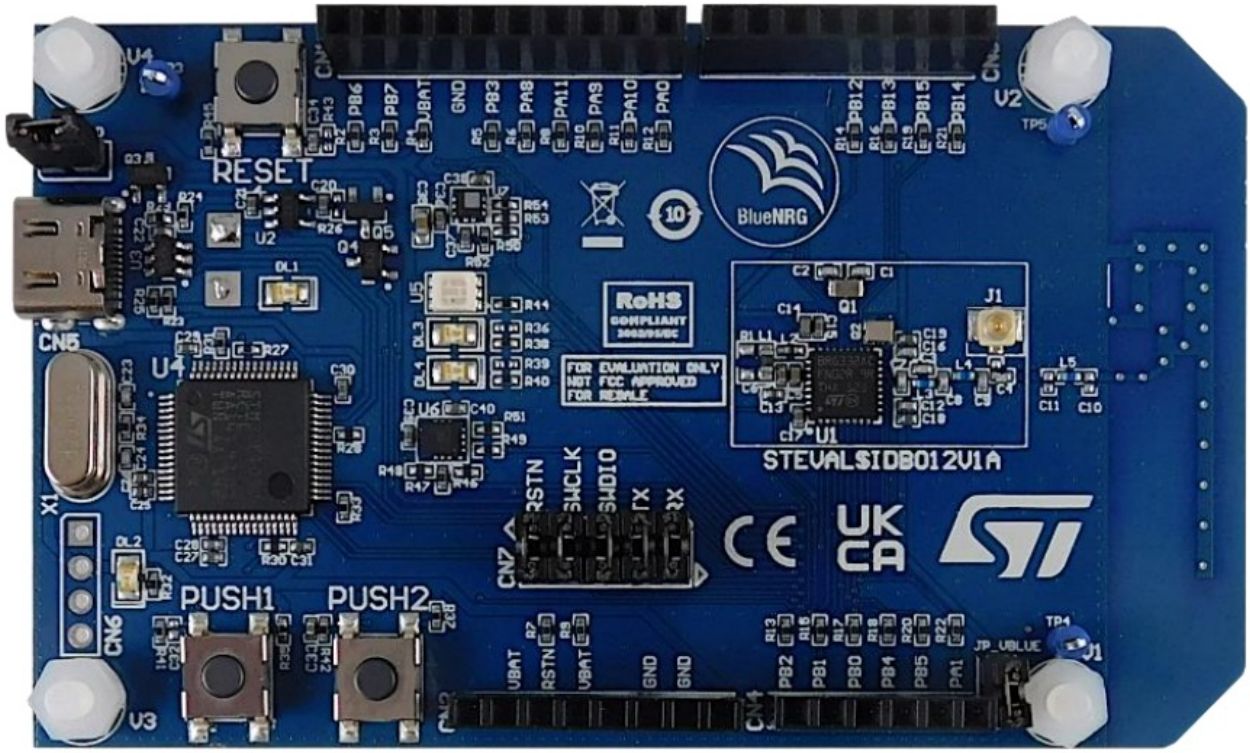


Figure 3 STEVAL-IDB012V1 evaluation platform



Getting Started

The STEVAL-IDB011V1, STEVAL-IDB011V2, STEVAL-IDB012V1 evaluation boards are preprogrammed with Bluetooth LE Sensor demonstration application for ST BLE Sensor app which allows to set and establish a connection with a smartphone (iOS or Android) running the ST BLE Sensor smartphone app (previously known as ST BlueMS).

Once connected, the BlueNRG-LP, BlueNRG-LPS device sends the data collected from the accelerometer sensor and environmental sensor (pressure and temperature) to the ST BLE Sensor smartphone app, which displays this

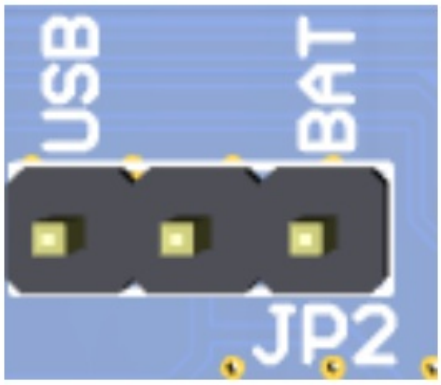
information.

Powering up the evaluation board

Three power options are available:

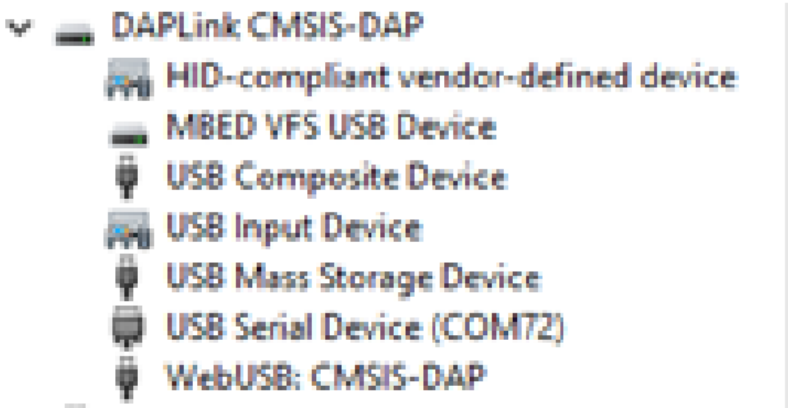
- Batteries – To power the selected evaluation board using batteries, 2 AAA batteries must be inserted into the battery holder placed at the rear of the board or, alternatively, a coin cell battery (CR2032) must be soldered Jumper JP2 set to position BAT on STEVALIDB011V{1|2}. No change is required on STEVAL-IDB012V1 JP_VBRD jumper.
- USB – To power the selected evaluation board through USB, jumper JP2 set to position USB on STEVAL-IDB011V{1|2}. No change is required on STEVAL-IDB012V1 JP_VBRD jumper. Connect a USB cable to the available USB connector and to a PC USB port.
- External DC voltage: The supply voltage must be provided through JP2 pin 2 on STEVAL-IDB011V{1|2}. The supply voltage must be provided through JP_VBRD pin 1 on STEVAL-IDB012V1. The USB connection is not needed.

Figure 4 . STEVAL-IDB011V{1|2} boards power options jumper JP2



When powered through USB, the evaluation board is also recognized on Windows Device Manager as CMSIS-DAP device.

Figure 5 Windows Device Manager – CMSIS-DAP



NOTES:

1. In Windows 10, no specific driver installation is required.
2. The composite device (WebUSB: CMSIS-DAP) installation is not required, as this functionality is not used.

In this context, once the evaluation platform has been recognized, it should also appear under Device and drivers as a ST IDB011VX (BlueNRG-LP kits) or a ST IDB012VX (BlueNRG-LPS kit) mass storage device:

Once powered (batteries or USB), the Sensor Demo application for ST BLE Sensor app starts advertising, waiting for a smartphone to connect to it.

Install the ST BLE Sensor app for smartphones (central role)

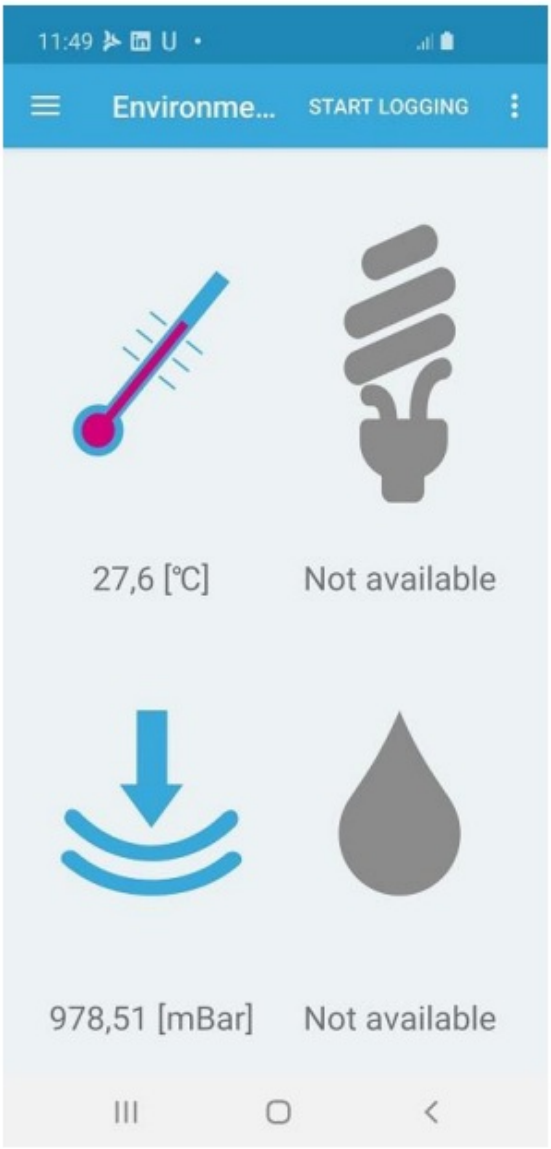
Two versions (Android and iOS) of the smartphone ST BLE Sensor app are available for download on the specific web pages (Table 2. Reference information, Android & iOS Sensor App).
Install the ST BLE Sensor App on the selected smartphone.

Run ST BLE Sensor app for smartphones

Launch the ST BLE Sensor app on the smartphone

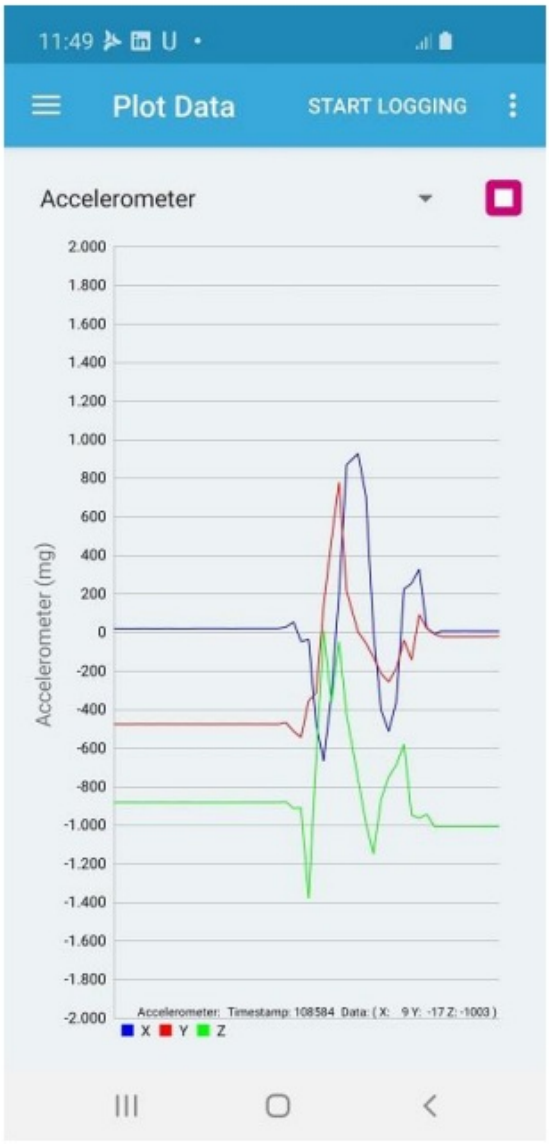
- It starts scanning for the BlueNRG-LP, BlueNRG-LPS Sensor Demo peripheral device. A device called “BlueNRGLP” appears on the screen for both BlueNRG-LP and BlueNRG-LPS devices.
- Tap on the “BlueNRGLP” name to connect to the selected platform. The ST BLE Sensor app enables notifications on the acceleration characteristic and on the environment characteristics (pressure and temperature) and it displays the received environment characteristics values on the screen.

Figure 7 ST BLE Sensor smartphone app environment characteristic notifications



User can also plot the received acceleration values, by selecting the ST BLE Sensor app, Plot Data window, Accelero meter option. The kit platform accelerometer sensor values (X, Y, Z) are displayed on a graphical chart.

Figure 8 ST BLE Sensor smartphone app acceleration notifications plot



Software demonstration applications

In order to develop a software application for the evaluation board, it is recommended to start with the reference demonstration applications provided within the BlueNRG-LP, BlueNRG-LPS Development Kit SW package for BlueNRG-LP, BlueNRG-LPS devices (STSW-BNRGLP-DK) available on the STEVAL-IDB011V1, STEVAL-IDB011V2, STEVAL-IDB012V1 web pages:

- Unzip the file, launch the related installer and follow installation steps.
- Wait for the package installation to complete.
- The Projects folder in SW package contains the available demonstration applications, projects, sources and header files.

The Bluetooth LE Sensor Demo application for ST BLE Sensor app projects and header and source files are available on.

- Projects\BLE_Examples\BLE_SensorDemo_BlueMSapp folder

IAR Embedded Workbench for ARM (EWARM) and Keil MDK-ARM tools are needed for building the software applications running on the BlueNRGLP, BlueNRG-LPS microcontrollers.
WiSE-Studio IDE (GCC toolchain) is also supported from STSW-BNRGLP-DK v1.1.0 or later.

Reference demonstrations applications are also provided.

NOTES:

1. The BlueNRG-LP, BlueNRG-LPS patches for IAR, EWARM and KEIL, MDK-ARM toolchains are available on Project/Utility folder.
2. For a description of the available BlueNRG-LP, BlueNRG-LPS demonstration applications and supported platforms, refer to BlueNRG-LP, BlueNRG-LPS development kits user manual (Table . Reference information, UM2735).
3. The BLE_SensorDemo_BlueMSapp.hex prebuilt binary image for BlueNRG-LP, BlueNRG-LPS platforms are also provided within the Development Kit software package, in the Firmware\BLE_Examples\BLE_SensorDemo_BlueMSapp folder.

Troubleshooting

The following section reports some tips to be followed if the STEVAL-IDB011V1/STEVALIDB011V2/STEVAL-IDB012V1 platform is not recognized as a CMSIS-DAP device once connected to a PC USB port, or if user is not able to connect/debug to the selected platform through a CMIS-DAP programmer/debug tool. STEVAL-IDB011V1 platform is used as reference on following guidelines:

1. The STEVAL-IDB011V1 platform starts always in “MAINTENANCE” mode.
    - The USB_CMSISDAP firmware is not loaded. Follows the instructions in the UM2735 manual (Table 2. Reference information, UM2735), section 2.9.4 “USB_CMSISDAP firmware update” in order to load the USB_CMSISDAP firmware. Please notice that this condition is not expected , since the USB_CMSISDAP_LP firmware is programmed at STEVAL-IDB011V1 manufacturing time.
    - The application loaded in the BlueNRG-LP device makes the device continuously reset. Since the RTSN signal is used at the startup by the USB_CMSISDAP firmware for choosing to start in “MAINTENANCE” mode or not, it is necessary to disconnect the RSTN signal of the BlueNRG-LP from the USB_CMSISDAP. In order to do it, user must perform the following steps:
        1. Remove the jumper JP5.
        2. Unplug the USB cable (if plugged).
        3. Plug the USB cable.
        4. The mass storage device “ST IDB011VX” should be present among the devices in Windows “Devices and drives”.
        5. Put back the jumper JP5 (fitted position).
        6. Now user should able to use the USB_CMSISDAP firmware in order to fix the code in the BlueNRG-LP.
2. It is not possible to connect to the STEVAL-IDB011V1, BlueNRG-LP device with the on board CMSIS-DAP debugger/programmer.
    - The BlueNRG-LP could be under reset, or the SWD pins have been configured in a different mode at the startup of the application, or the application sets the device in DEEPSTOP modes which powers off the debug port.

In such cases, it is possible to recover the BlueNRG-LP status as follow:

1. Plug the USB cable in order to power up the board.
2. Press and hold the PUSH1 button.
3. Press the RESET button.
4. This operation activates the internal UART bootloader: now it is possible to connect the CMSIS-DAP debugger/programmer to the BlueNRG-LP.

NOTES:

1. Please refer to the STSW-BNRGLP-DK, C:{Installation_Path}\ ST\BlueNRG-LP_LPS DK x.x.x\Docs\BlueNRGLP_Debugging_Guidelines\BlueNRG-LP_Debugging_Guidelines.html document for useful guidelines to be followed in these scenarios:
   - CMSIS-DAP programming vs BlueNRG-LP, BlueNRG-LPS running application in low power modes
   - Debugging vs BlueNRG-LP, BlueNRG-LPS running application in low power modes.

Acronyms and abbreviations

Table 1 List of acronyms

Acronym	Description
Bluetooth LE	Bluetooth Low Energy
DK	Development kit
SW	Software
USB	Universal serial bus

References

Table 2 References

What	Where	Description
BlueNRG-LP Bluetooth Low Energy wireless System on Chip	www.st.com/bluenrg-lp	BlueNRG-LP device web page

BlueNRG-LPS Bluetooth Low Energy wireless System on Chip	www.st.com/bluenrg-lps	BlueNRG-LPS device web page
STEVAL-IDB011V1	www.st.com/bluenrg-lp, Tools and Software, Solution Evaluation Tools section	STEVAL-IDB011V1 platform web page
STEVAL-IDB011V2	www.st.com/bluenrg-lp, Tools and Software, Solution Evaluation Tools section	STEVAL-IDB011V2 platform web page
STEVAL-IDB012V1	www.st.com/bluenrg-lps, Tools and Software, Solution Evaluation Tools section	STEVAL-IDB012V1 platform web page
Bluetooth Low Energy Specification	https://www.bluetooth.com/specifications/bluetooth-core-specification/	Bluetooth Low Energy specification web page
ST BLE Sensor app for Android	https://www.st.com/en/embedded-software/stblesensor.html	ST BLE Sensor app web page
ST BLE Sensor app for IoS	https://www.st.com/en/embedded-software/stblesensor.html	ST BLE Sensor app web page

STSW-BNRGLP-DK	www.st.com/bluenrg-lp, www.st.com/bluenrg-lps: Tools and Software, Evaluation Tool Software section	BlueNRG-LP, BlueNRG-LPS DK SW package web page
UM2735	https://www.st.com/resource/en/user_manual/dm00711446-bluenrglp-development-kits-stmicroelectronics.pdf	BlueNRG-LP, BlueNRG-LPS Development Kits user manual
STSW-WISE- STUDIO	https://www.st.com/content/st_com/en/products/embedded-software/wireless-connectivity-software/stsw-wise-studio.html	WiSE-Studio free IDEs for Windows, Linux and MAC OS

Revision history

Date	Revision	Change
19-Oct-2020	1	Initial release
25-May-2021	2	Updated Introduction section. Added reference to WiSE-Studio free IDE for Windows.
09-May-2022	3	Added reference to BlueNRG- LPS device. Added references to STEVAL- IDB011V2 and STEVAL- IDB012V1 kits.

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Documents / Resources

	ST STEVAL-IDB011V1 Evaluation Platform [pdf] User Guide BlueNRG-LP, STEVAL-IDB011V1, Evaluation Platform, STEVAL-IDB011V1 Evaluation Platform

References

- BlueNRG-LP - Programmable Bluetooth® LE 5.2 Wireless SoC - STMicroelectronics
- BlueNRG-LPS - Programmable Bluetooth Low Energy Wireless SoC - STMicroelectronics
- STMicroelectronics Trademark List - STMicroelectronics
- Core Specification 5.3 – Bluetooth® Technology Website
- STSW-BNRGLP-DK - BlueNRG-LP, BlueNRG-LPS DK SW package - STMicroelectronics
- STSW-WISE-STUDIO - WiSE-Studio free IDE for Windows, Linux, MAC OS - STMicroelectronics
- STEVAL-IDB011V1 - Evaluation platform based on BlueNRG-355MC system-on-chip - STMicroelectronics
- STEVAL-IDB011V2 - Evaluation platform based on the BLUENRG-355MC system-on-chip - STMicroelectronics
- STEVAL-IDB012V1 - Evaluation platform based on the BlueNRG-LPS system-on-chip - STMicroelectronics
- STBLESensor - BLE sensor application for Android and iOS - STMicroelectronics