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Quick Start Guide

Bluetooth Low Energy expansion board based on BlueNRG-M2SP module for STM32 Nucleo (X-NUCLEO-BNRG2A1)

Version 2.0 (July 2, 2020)

Agenda

1. Hardware and Software overview
2. Setup & Demo Examples
3. Documents & Related Resources
4. STM32 Open Development Environment: Overview

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1- Hardware and Software overview

Bluetooth Low Energy expansion board

Hardware Overview

X-NUCLEO-BNRG2A1 Hardware Description

- The X-NUCLEO-BNRG2A1 is a Bluetooth Low Energy (BLE) evaluation and development board system, designed around ST's BLUENRG-M2SP Bluetooth Low Energy module based on BlueNRG-2.
- The BlueNRG-2 processor hosted in the BLUENRG-M2SP module communicates with the STM32 microcontroller, hosted on the Nucleo development board, through an SPI link available on the Arduino UNO R3 connector.

Key Products on board

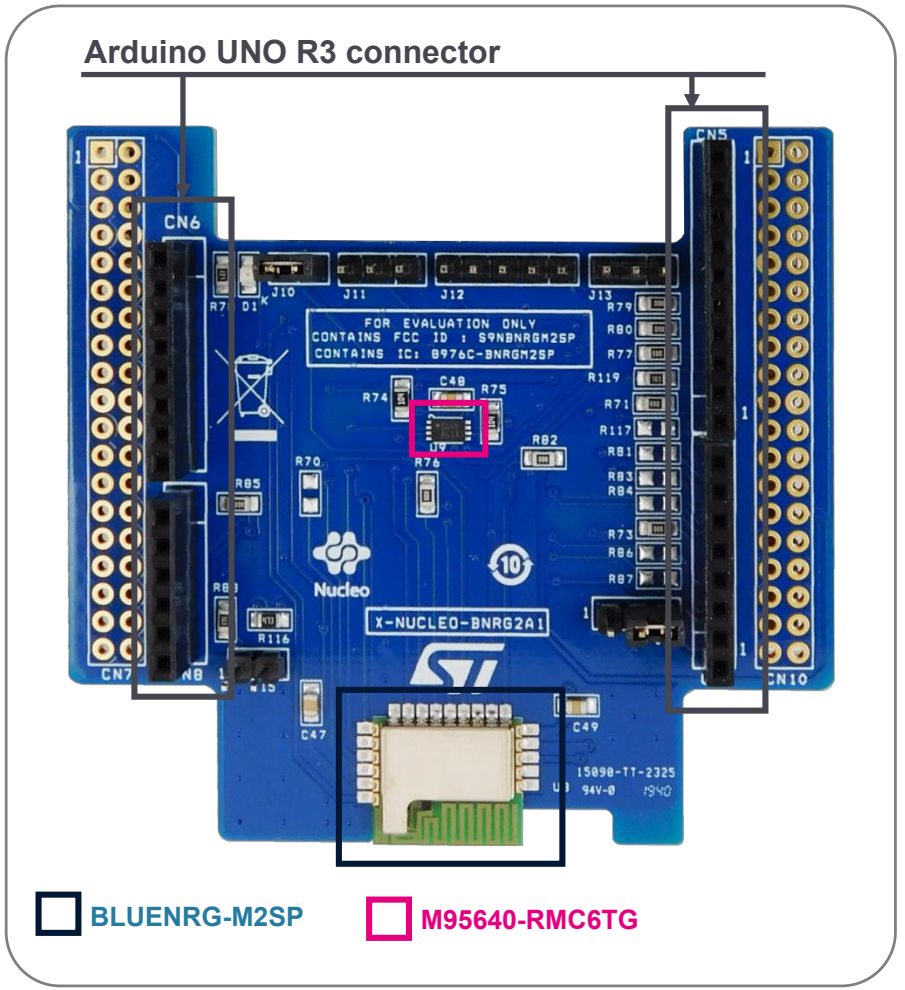
BLUENRG-M2SP

Bluetooth Low Energy, FCC and IC certified (FCC ID: S9NBNRGM2SP, IC: B976C-BNRGM2SP), module based on Bluetooth® Low Energy wireless network processor BlueNRG-2, BLE v5.0 compliant.

BLUENRG-M2SP integrates a BALF-NRG-02D3 balun and a PCB antenna. It embeds 32 MHz crystal oscillator for the BlueNRG-2.

M95640-RMC6TG

64-Kbit serial SPI EEPROM with high-speed clock interface



Latest info available at www.st.com
X-NUCLEO-BNRG2A1

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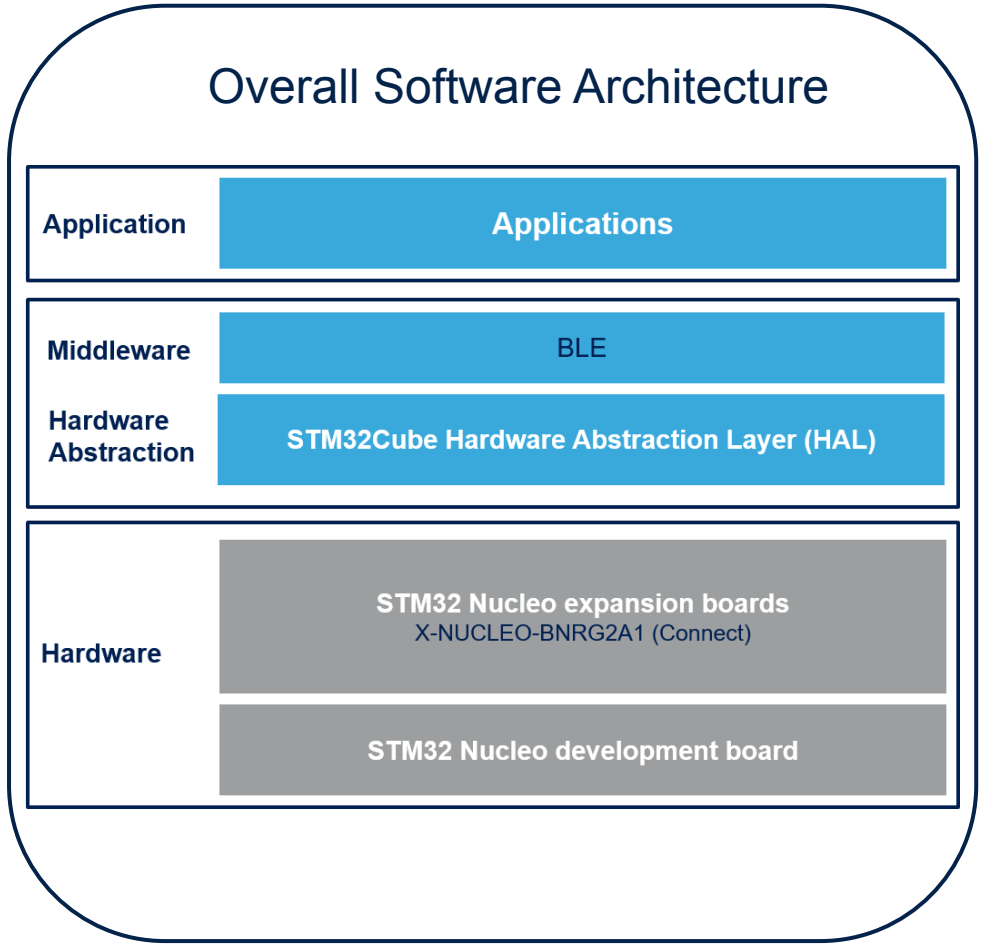
X-CUBE-BLE2
Software Overview

X-CUBE-BLE2 Software Description

- The X-CUBE-BLE2 is a software package which provides STM32 drivers running for the BlueNRG-2 Bluetooth Low Energy device. It is an STM32Cube expansion software package that eases portability across different STM32 MCU families
- Implementation examples are available for the STM32 Nucleo Bluetooth Low Energy expansion board (X-NUCLEO-BNRG2A1) plugged on top of an STM32 Nucleo board (NUCLEO-L476RG)

Key features

- Complete middleware to build applications using the BlueNRG-2 network processor
- Easy portability across different MCU families thanks to the STM32Cube
- Sample applications that the developer can use to start experimenting with the code
- References to free Android and iOS app that can be used along with the sample applications
- Free, user-friendly license terms



Latest info available at www.st.com
X-CUBE-BLE2

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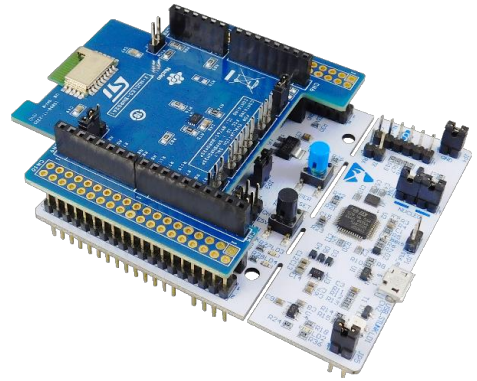
2- Setup & Demo Examples

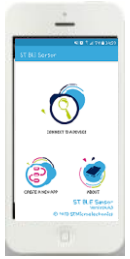
Setup & Application Examples

HW prerequisites for X-NUCLEO-BNRG2A1

- 1x X-NUCLEO-BNRG2A1 Bluetooth Low Energy expansion board
- 1x STM32 Nucleo development board (Nucleo-L476RG)
- 1 x BLE-enabled smartphone and associated apps

Nucleo-L476RG +
X-NUCLEO-BNRG2A1



Smartphone requirements	App for Demo	App for Hands On
Android OS device 	ST BLE Sensor	BLE Scanner
iOS device 	https://play.google.com/store/apps/details?id=com.st.bluems https://apps.apple.com/it/app/st-bluems/id993670214	https://play.google.com/store/apps/details?id=com.macdom.ble.blescanner https://apps.apple.com/us/app/ble-scanner-4-0/id1221763603

Google play

Available on the App Store

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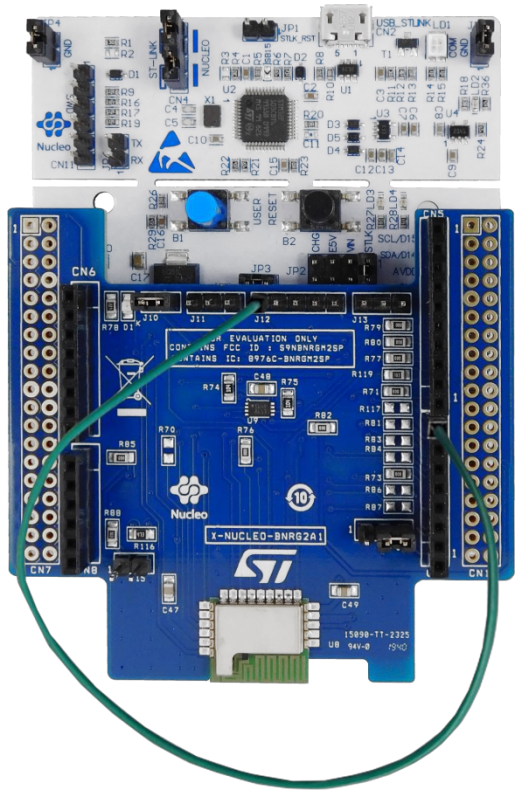
Setup & Application Examples

HW limitation

- Warning Even if not strictly required for the correct working of the BlueNRG-2 module, to correctly set the BlueNRG-2 RESET pin on pin D7 of the Arduino connector a 0 Ohm resistor must be soldiered on R117. Alternatively, the D7 pin and the pin #5 of the J12 on the X-NUCLEO-BNRG2A1 expansion board must be bridged (as shown in the picture).



Setup & Application Examples

Software and Other prerequisites

- **STSW-LINK009**
  - ST-LINK/V2-1 USB driver
- **STSW-LINK007**
  - ST-LINK/V2-1 firmware upgrade
- **X-CUBE-BLE2**
  - Copy the zip file content into the “c:\Program Files (x86)\STMicroelectronics\” folder on your PC
  - The package contains the source code examples (Keil, IAR EWARM, STM32CubeIDE) based on NUCLEO-L476RG
- **BlueNRG GUI SW package**
  - The BlueNRG GUI SW package contains the Graphical User interface (GUI) and script launcher PC applications which supports BlueNRG-2, BlueNRG-1, BlueNRG-MS and BlueNRG Bluetooth Low Energy (BLE) devices.

X-CUBE-BLE2 sample applications

Start coding in just a few minutes

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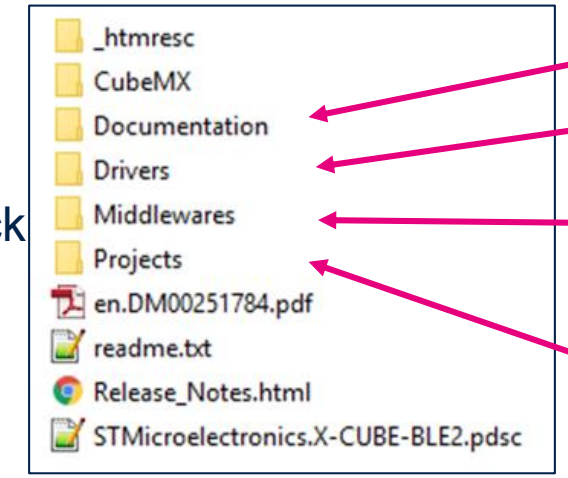
1. www.st.com/stm32ode
2. Select Expansion Pack: X-CUBE-BLE2
3. Download & unpack

X-CUBE-BLE2 package structure



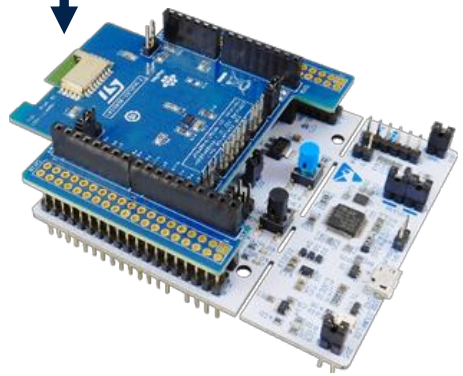
Docs

BSP, HAL drivers

BLE HCI stack

Sample applications, binary

4



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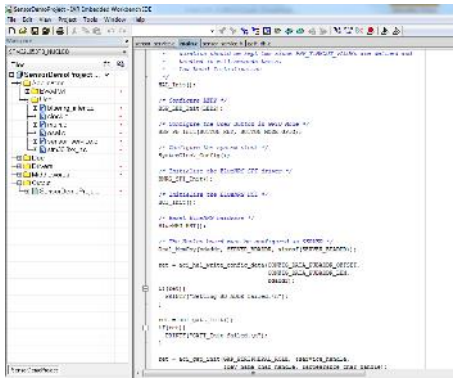
Open project example (e.g. SensorDemo_BLESensor-App)

KEIL Tools by ARM | IAR SYSTEMS | STM32 CubeIDE

6

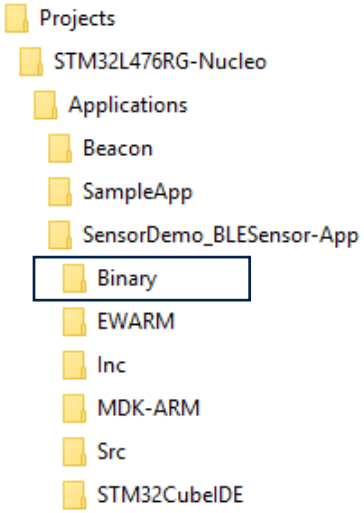
Evaluate / modify / build the code



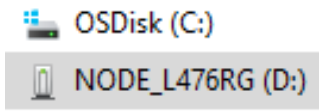
X-CUBE-BLE2 sample applications

Evaluate in just a few minutes (1/2)

1

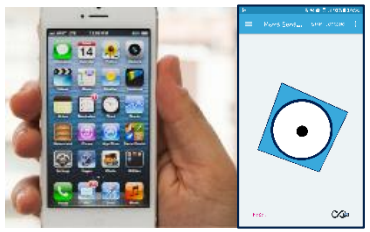


From X-CUBE-BLE2 software resource package drag and drop **SensorDemo_BLESensor-App_L476RG.bin** on Nucleo drive



2

Download and install the ST BLE Sensor application on your smartphone from Google Play or App Store



Google play

Available on the App Store

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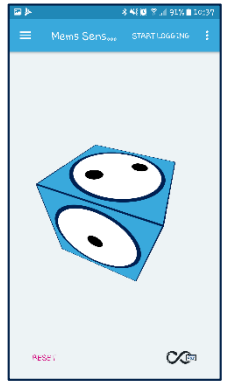
X-CUBE-BLE2 sample applications

Evaluate in just a few minutes (2/2)

3. Connect your smartphone application to the BlueNRG-2 device and control the cube on the smartphone

4. Simulated environmental and motion data are sent periodically from the STM32 Nucleo board to the smartphone app



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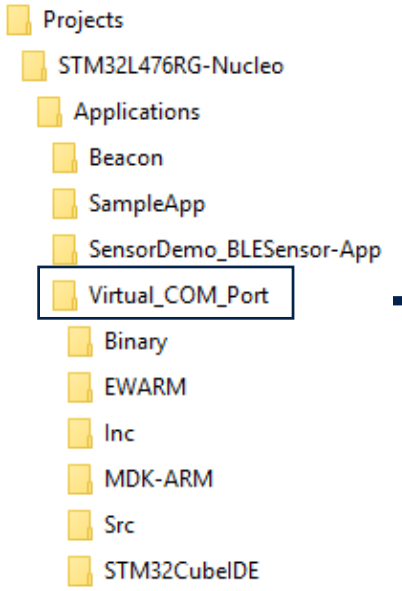
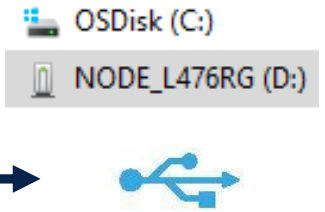
X-CUBE-BLE2 sample applications

Evaluate using the BlueNRG GUI

1

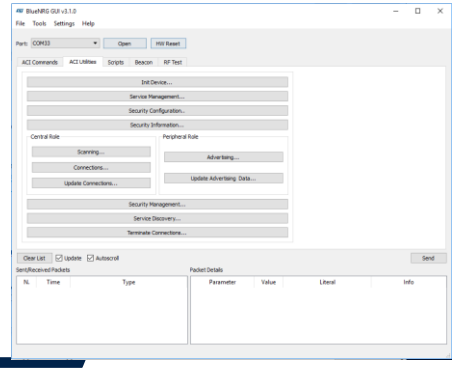


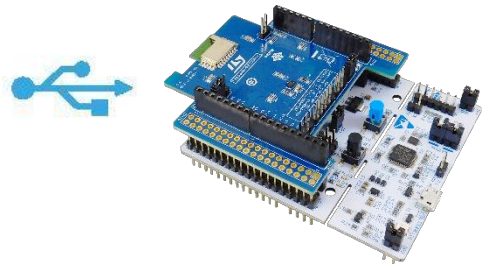
Drag and drop
Virtual_COM_Port_L476RG.bin
on Nucleo drive



2 Download the BlueNRG GUI from st.com and install it on your PC

3





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Restoring the BlueNRG-2 firmware image

- To restore the BlueNRG-2 firmware image on the BlueNRG-2 device, download and install the STSW-BNRGUI
- Execute all steps described in previous slide at point **8**, loading (**8.c**) the DTM_SPI.hex firmware contained in the STSW-BNRGUI installation folder (usually C:\Program Files (x86)\STMicroelectronics\BlueNRG GUI 3.2.1\Firmware\BlueNRG2\DTM for version 3.2.1)

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3- Documents & Related Resources

Documents & Related Resources

All documents are available in the DESIGN tab of the related products webpage

X-NUCLEO-BNRG2A1:

- **Gerber files, BOM, Schematic**
- **DB4086:** Bluetooth Low Energy expansion board based on BLUENRG-M2SP module for STM32 Nucleo – **data brief**
- **UM2667:** Getting started with the X-NUCLEO-BNRG2A1 BLE expansion board based on BLUENRG-M2SP module for STM32 Nucleo – **user manual**

X-CUBE-BLE2:

- **DB4087:** Bluetooth Low Energy software expansion for STM32Cube – **databrief**
- **UM2666:** Getting started with the X-CUBE-BLE2 Bluetooth Low Energy software expansion for STM32Cube – **user manual**

4- STM32 Open Development Environment: Overview

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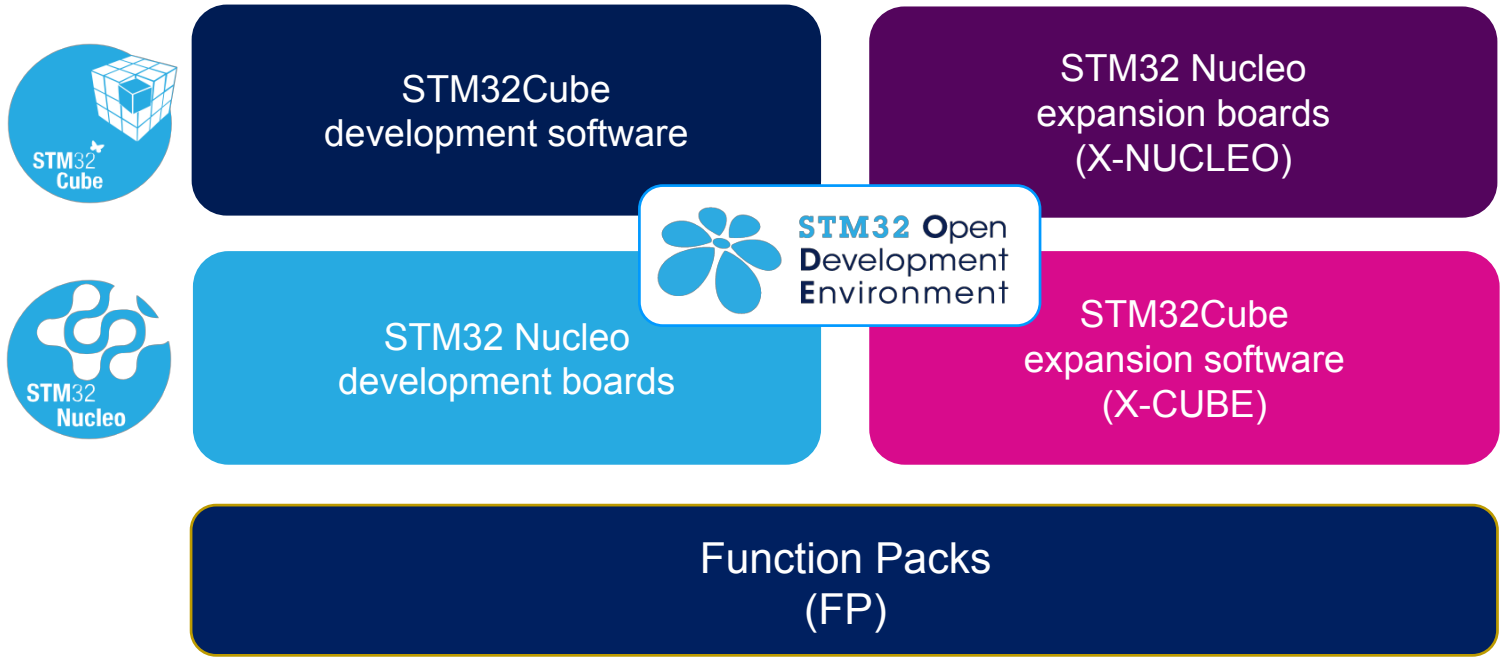
STM32 Open Development Environment
Fast, affordable Prototyping and Development

- The STM32 Open Development Environment (STM32 ODE) is an open, flexible, easy, and affordable way to develop innovative devices and applications based on the STM32 32-bit microcontroller family combined with other state-of-the-art ST components connected via expansion boards. It enables fast prototyping with leading-edge components that can quickly be transformed into final designs



For further information, please visit www.st.com/stm32ode

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Thank you

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