

## Internal oscillator calibration software expansion for STM32Cube



### Features

- **STM32C0 series** microcontrollers:
  - Calibrated oscillators: HSI16, MSI, HSI48
  - Measured oscillator: LSI
- **STM32G0 series** microcontrollers:
  - Calibrated oscillators: HSI16, MSI, HSI48
  - Measured oscillator: LSI
- **STM32H5 series** microcontrollers:
  - Calibrated oscillators: HSI16, MSI, HSI48
  - Measured oscillator: LSI
- **STM32L0 series** microcontrollers:
  - Calibrated oscillators: HSI16, MSI, HSI48
  - Measured oscillator: LSI
- **STM32L4 series** microcontrollers:
  - Calibrated oscillators: HSI16, MSI, HSI48 (only for STM32L432xx microcontrollers)
  - Measured oscillator: LSI
- **STM32U5 series** microcontrollers:
  - Calibrated oscillators: HSI16, MSI, HSI48
  - Measured oscillator: LSI

### Description

The X-CUBE-RC-CALIB Expansion Package describes how to measure and calibrate internal oscillators. It also describes which internal features are used for calibration or measurement.

Each oscillator trimming functionality is implemented in a separate file, so that users can easily select the file they need, without using the whole software package.

The X-CUBE-RC-CALIB Expansion Package is built on top of the STM32Cube HAL drivers.

For more details, refer to the application notes available on [www.st.com](http://www.st.com):

- *Using X-CUBE-RC-CALIB software to calibrate STM32C0 Series internal RC oscillator (AN5857)*
- *How to calibrate internal oscillators on STM32G0 MCUs (AN5126)*
- *How to calibrate internal RC oscillators on STM32H5 MCUs (AN6202)*
- *How to calibrate an STM32L0xx internal RC oscillator (AN4631)*
- *How to calibrate STM32L4 Series microcontrollers internal RC oscillator (AN4736)*
- *How to calibrate internal RC oscillators on STM32U3 and STM32U5 series MCUs (AN5676)*

## 1 General information

The X-CUBE-RC-CALIB Expansion Package runs on STM32 microcontrollers based on Arm® cores.

*Note:* Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.



### 1.1 Ordering information

X-CUBE-RC-CALIB is available for free download from the [www.st.com](http://www.st.com) website.

### 1.2 What is STM32Cube?

STM32Cube is an STMicroelectronics original initiative to improve designer productivity significantly by reducing development effort, time, and cost. STM32Cube covers the whole STM32 portfolio.

STM32Cube includes:

- A set of user-friendly software development tools to cover project development from conception to realization, among which are:
  - STM32CubeMX, a graphical software configuration tool that allows the automatic generation of C initialization code using graphical wizards
  - STM32CubeIDE, an all-in-one development tool with peripheral configuration, code generation, code compilation, and debug features
  - STM32CubeCLT, an all-in-one command-line development toolset with code compilation, board programming, and debug features
  - STM32CubeProgrammer (STM32CubeProg), a programming tool available in graphical and command-line versions
  - STM32CubeMonitor (STM32CubeMonitor, STM32CubeMonPwr, STM32CubeMonRF, STM32CubeMonUCPD), powerful monitoring tools to fine-tune the behavior and performance of STM32 applications in real time
- STM32Cube MCU and MPU Packages, comprehensive embedded-software platforms specific to each microcontroller and microprocessor series (such as STM32CubeH5 for the STM32H5 series), which include:
  - STM32Cube hardware abstraction layer (HAL), ensuring maximized portability across the STM32 portfolio
  - STM32Cube low-layer APIs, ensuring the best performance and footprints with a high degree of user control over hardware
  - A consistent set of middleware components such as ThreadX, FileX, LevelX, NetX Duo, USBX, USB PD, mbed-crypto, MCUboot, and OpenBL
  - All embedded software utilities with full sets of peripheral and applicative examples
- STM32Cube Expansion Packages, which contain embedded software components that complement the functionalities of the STM32Cube MCU and MPU Packages with:
  - Middleware extensions and applicative layers
  - Examples running on some specific STMicroelectronics development boards



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## **2 License**

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X-CUBE-RC-CALIB is delivered under the [SLA0048](#) software license agreement and its Additional License Terms.

## Revision history

**Table 1. Document revision history**

Date	Revision	Changes
10-Apr-2015	1	Initial release.
24-Nov-2015	2	Updated <i>Features</i> and <i>Description</i> .
06-Oct-2016	3	Updated <i>Features</i> to add calibration information for STM32L432 line.
30-Sep-2021	4	Extended document scope to the STM32U5 series. Updated the entire document: <ul style="list-style-type: none"> <li>Updated title and cover page</li> <li>Updated <i>Features</i> and <i>Description</i></li> <li>Added <i>What is STM32Cube?</i> and <i>License</i></li> </ul>
21-Mar-2025	5	Extended document scope to the STM32C0 series, STM32G0 series, and STM32H5 series: <ul style="list-style-type: none"> <li>Updated the cover image</li> <li>Updated <i>Features</i> and <i>Description</i></li> <li>Updated <i>License</i> and <i>What is STM32Cube?</i></li> </ul>

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