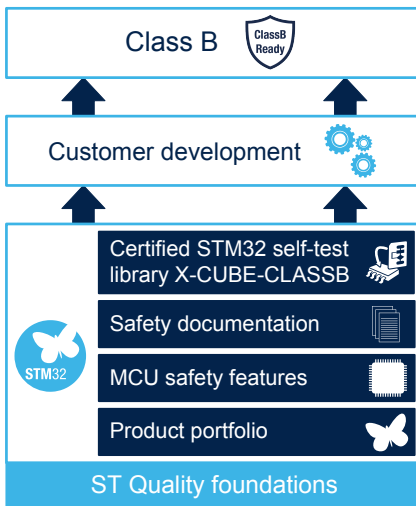


Class B 60730-1 and 60335-1 functional safety package with software expansion for STM32Cube

ACHIEVING CLASS B WITH STM32



Product status link

X-CUBE-CLASSB

Features

- X-CUBE-CLASSB version 2.2.0 supports the STM32L0 Series, STM32L1 Series, STM32L4 Series, STM32L4+ Series, STM32F0 Series, STM32F1 Series, STM32F2 Series, STM32F3 Series, STM32F4 Series, and STM32F7 Series
- X-CUBE-CLASSB version 2.3.0 supports the STM32G0 Series, STM32G4 Series, STM32WB Series (Cortex[®]-M4 core only), and STM32H7 Series (Cortex[®]-M7 core only)
- X-CUBE-CLASSB version 2.4.0 supports the STM32L5 Series
- X-CUBE-CLASSB version 3.0.0 extends the package for dual-core microcontrollers commonly:
 - Suitable when both embedded cores contribute to safety function
 - Includes safety status exchange between cores
 - Deals with internal resources overlay
 - Certified upon STM32H7x7 dual-core microcontrollers
- Based on STM32Cube HAL
- Optimized portability among different microcontrollers through STM32Cube
- Partially optimized code
- Support for compilers associated with IAR Systems[®] IAR Embedded Workbench[®], Keil[®] MDK-ARM, and GCC compiler-based integrated development environments such as STMicroelectronics STM32CubeIDE or SW4STM32
- Certified by UL[®]
- Coverage of worldwide standards (IEC, UL, CSA)



1 Description

The IEC 60730-1 and IEC 60335-1 safety standards define the test and the diagnostic methods, effective to detect random hardware failures, that ensure the safe operation of hardware and software embedded in household appliances under control of electronic programmable devices.

With its **X-CUBE-CLASSB** functional safety package based on robust built-in STM32 safety features, STMicroelectronics provides a comprehensive set of certified software self-test libraries and documentation for manufacturers to significantly reduce the development efforts, time and cost to achieve the UL/CSA/IEC 60335-1 and the 60730-1 worldwide safety certifications for their STM32-based applications up to Class B level.

A set of test APIs focused on generic safety-critical core components (CPU, SRAM, Flash memory, clock and watchdog system) is provided exclusively in the firmware package. The associated examples suggest a possible integration of this set in a final application where simple code demonstrates sequential polling of the APIs and checking results of the performed partial tests.

Only the testing methods applied are the subject of the certification. The API integration provided, the extensions to the test of other application-specific core components, and the necessary configuration of all associated hardware through HAL drivers are inspected but not certified for safety. This is supposed to be subject to further modification, extension and verification entirely under the end-user's responsibility (such as the replacement of HAL drivers with sequences calling LL drivers directly).

All the APIs and examples are delivered as open source, which leads to dependence on the compilers and HAL driver versions available at the time of the certification process. Users must consider this point when combining the certified API sources with their latest versions as described in the associated user manual.

The **X-CUBE-CLASSB** functional safety package consists of a set of expansion software for **STM32Cube** (self-test libraries and their integration examples), and a dedicated user guide, the application note *Guidelines for obtaining UL/CSA/IEC 60730-1/60335-1 Class B certification in any STM32 application (AN4435)*.

Common safety principles described in the microcontroller series safety manuals, available with the **X-CUBE-STL** functional safety package, are mostly applicable as well, despite the fact that these manuals target different industry-oriented standards. This is due to the significant overlay between these safety standards.

2 General information

The X-CUBE-CLASSB functional safety 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.



2.1 Ordering information

X-CUBE-CLASSB is available for free download from the www.st.com website.

2.2 What is STM32Cube?

STM32Cube is an STMicroelectronics original initiative to significantly improve designer's productivity 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
 - 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 STM32CubeH7 for the STM32H7 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 USB, TCP/IP, FAT file system, RTOS, and graphics
 - 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

3 License

X-CUBE-CLASSB is delivered under the *Mix Ultimate Liberty+OSS+3rd-party V1* software license agreement (SLA0048).

The software components provided in this package come with different license schemes as shown in [Table 1](#).

Table 1. Software component license agreements

Software component	Copyright	License
Class B library	STMicroelectronics	Proprietary
Cortex [®] -M CMSIS	Arm Limited	Apache License 2.0
HAL STM32	STMicroelectronics	BSD-3-Clause
Board support package (BSP)	STMicroelectronics	BSD-3-Clause
Project examples	STMicroelectronics	Proprietary

Revision history

Table 2. Document revision history

Date	Revision	Changes
02-Feb-2016	1	Initial release.
24-Oct-2017	2	<p>Updated <i>Features</i>:</p> <ul style="list-style-type: none"> Added compatibility with STM32L4, STM32F1 and STM32F7 Series Added support of GCC-based AC6 compiler <p>Added <i>Ordering information</i>.</p>
15-Nov-2019	3	<p>Updated <i>Features</i>:</p> <ul style="list-style-type: none"> Added the support of the STM32L4+, STM32G0, STM32G4, STM32WB and STM32H7 Series Discriminated between version 2.2.0 and version 2.3.0 <p>Added <i>License</i>.</p>
20-Apr-2021	4	<p>Updated <i>Features</i>:</p> <ul style="list-style-type: none"> Support for the STM32L5 Series with version 2.4.0 Support for dual-core microcontrollers with version 3.0.0 <p>Updated <i>Description</i>:</p> <ul style="list-style-type: none"> APIs for safety-critical core components and associated examples Certification subject Certification dependence on open source Commonality with X-CUBE-STL

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