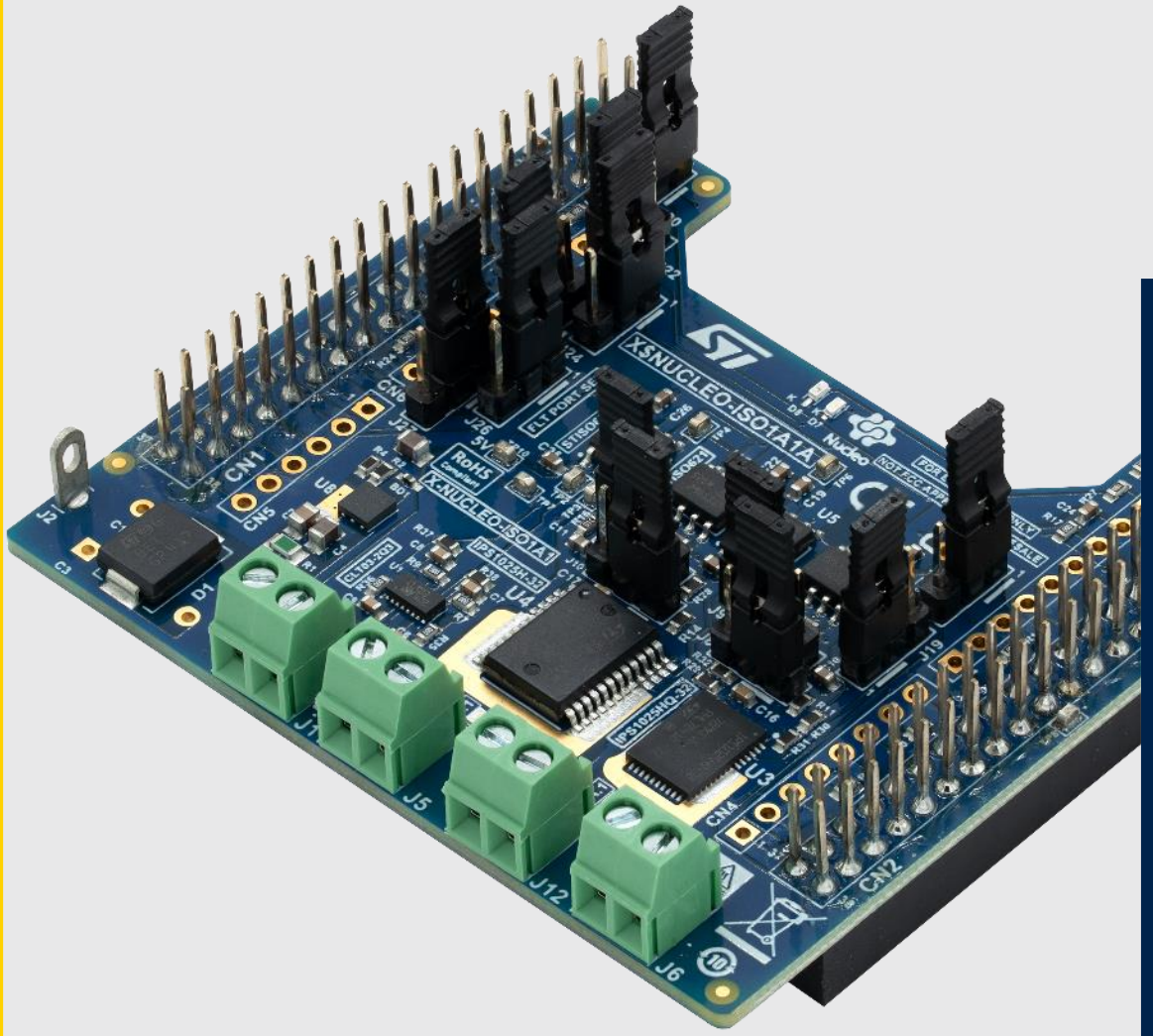

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Quick Start Guide X-NUCLEO-ISO1A1

Industrial isolated input/output expansion board based on STISO620/621, CLT03-2Q3 and IPS1025HQ for STM32 Nucleo

STM32 Open Development Environment

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X-NUCLEO-ISO1A1 expansion board

Hardware overview 1/2

Hardware Description

The X-NUCLEO-ISO1A1 is an evaluation board with isolated industrial input/output designed to expand the STM32 Nucleo board and provide micro-PLC functionality.

Two of the X-NUCLEO-ISO1A1 boards can be stacked together on top of an STM32 Nucleo board with appropriate selection of jumpers on the expansion board to avoid conflict in GPIO interfaces.

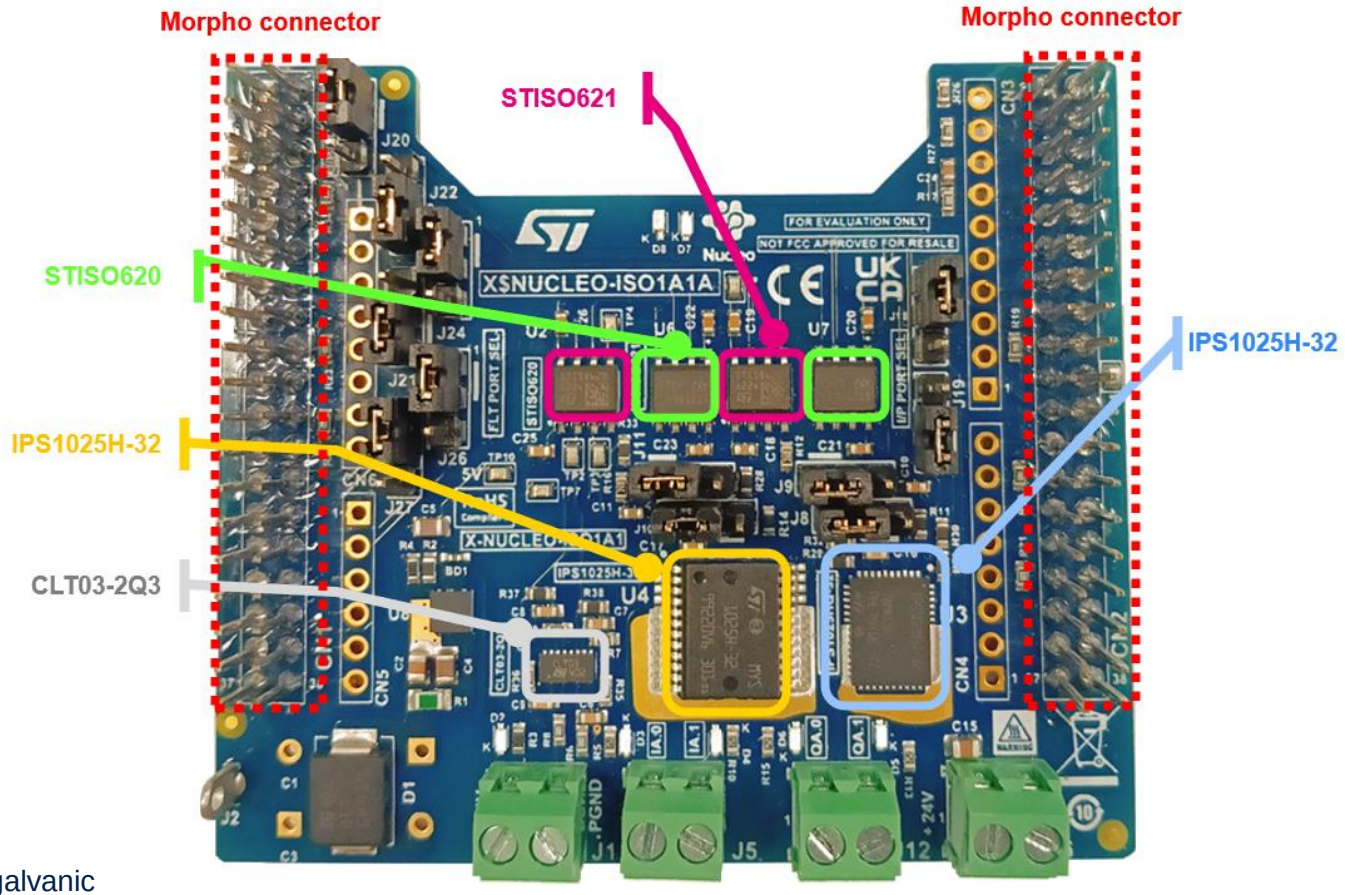
The UL1577 certified digital isolators STISO620 and STISO621 provide isolation between logic and process side components.

Two current limited (CL) high-side inputs from the process side are realized through CLT03-2Q3.

The CLT03-2Q3 provides protection, isolation, and energy-less status indication for industrial conditions, designed to meet standards such as IEC61000-4-2, IEC61000-4-4, and IEC61000-4-5.

Each of high-side (HS) switches, IPS1025H-32 provides protected output up to 5.6A with diagnostics and smart driving features. These can drive capacitive, resistive, or inductive loads.

The X-NUCLEO-ISO1A1 allows rapid evaluation of the onboard ICs using the X-CUBE-ISO1 software package. The board has provision for Arduino connections.



Main features

- 2x input equipped with CLT03-2Q3 high-speed protected digital termination array
- 2x output features IPS1025H and IPS1025H-32 high-efficiency, high-side switches
- Dual-channel digital isolators include 2x STISO621 isolators providing up to 6 kV galvanic isolation
- Dual-channel digital isolators include 2x STISO620 isolators offering up to 4 kV galvanic isolation
- Interfaces with STM32 Nucleo board via 34-pin ST morpho
- Free comprehensive development firmware library and examples compatible with STM32Cube firmware, X-CUBE-ISO1

Latest info available at www.st.com
X-NUCLEO-ISO1A1

Key Products on the Nucleo expansion board:

IPS1025Hx, CLT03-2Q3, STISO62x

Respectively are: intelligent power switches, current limited termination and digital isolators

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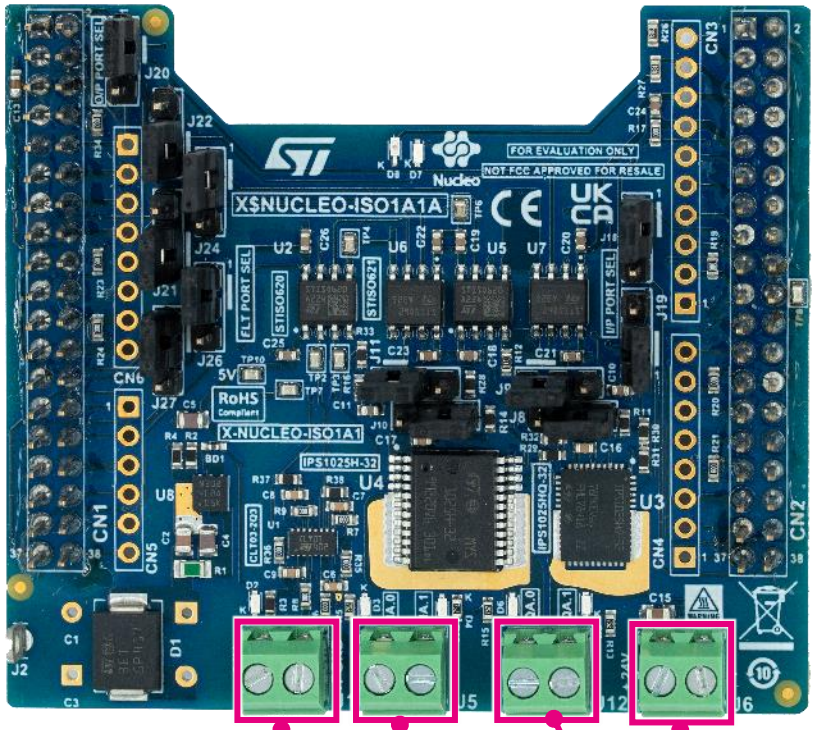
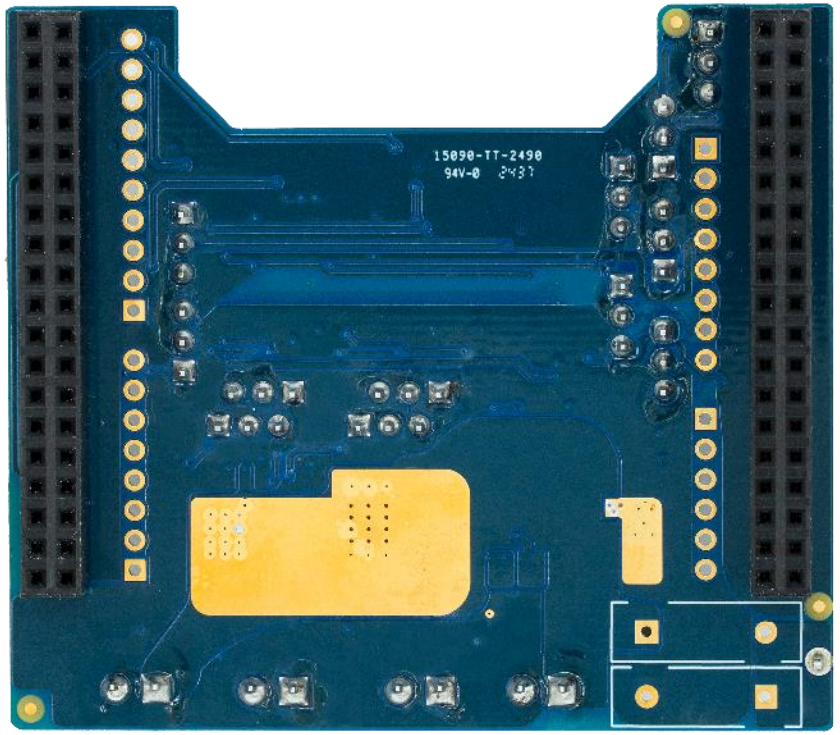
X-NUCLEO-ISO1A1 expansion board
Hardware overview 2/2

Top view



Bottom view



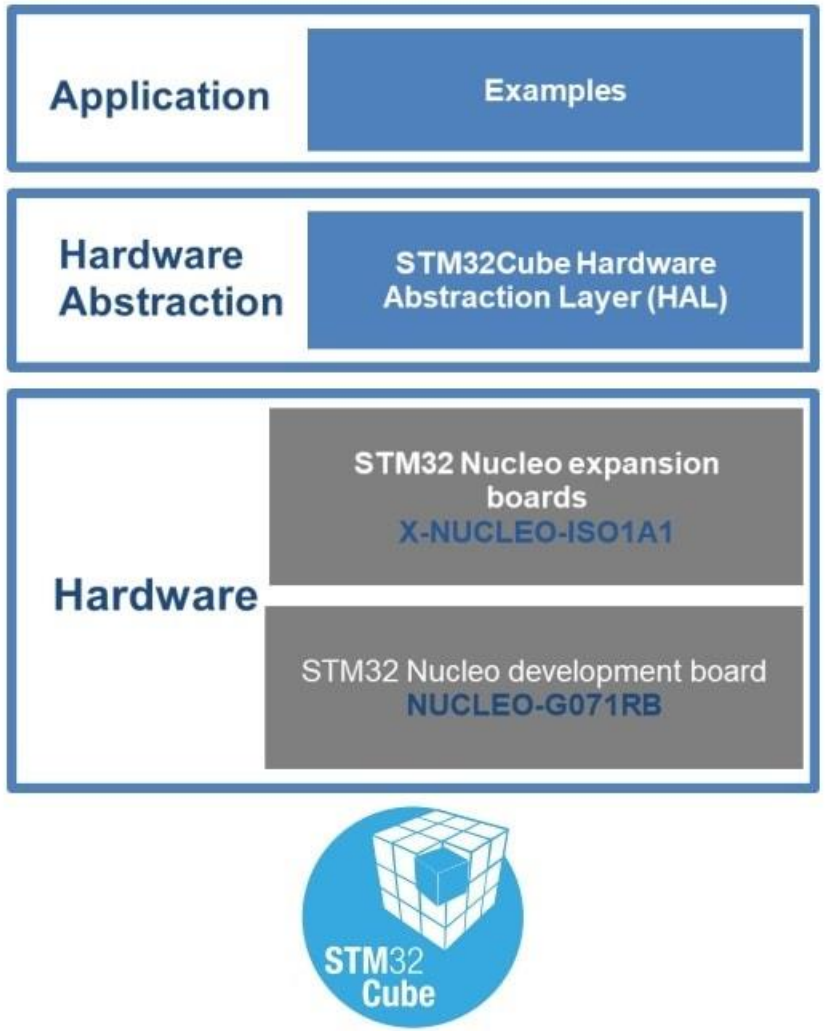
X-CUBE-ISO1 software package
SW architecture overview

Software Description

The X-CUBE-ISO1 expansion software package for STM32Cube runs on the STM32 and includes APIs and sample applications in order to perform tasks such as digital input to output mirroring, PWM generation through timers, output fault detection, board test case and other input output functions.
The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers.
The software comes with a sample implementation of the drivers running on the X-NUCLEO-ISO1A1 expansion boards connected to a NUCLEO-G071RB development board (or either a NUCLEO-G0B1RE or a NUCLEO-G070RB).

Key Features

- Firmware to use the industrial isolated input/output expansion board, X-NUCLEO-ISO1A1, based on STISO620, STIS0621, CLT03-2Q3 and IPS1025HQ
- Simple user APIs to
  - monitor industrial digital inputs via GPIO
  - control high side digital outputs individually or collectively, or alternatively, configure and start PWM signals on outputs
  - monitor output faults and board status through UART present on the NUCLEO board
  - control LEDs on the board
- Functionality to support stacking of two X-NUCLEO-ISO1A1 boards
- Pre-compiled binaries available on the X-NUCLEO-ISO1A1 board connected to a NUCLEO-G071RB development board (other compatible development boards are NUCLEO-G0B1RE and NUCLEO-G070RB)
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms



Latest info available at www.st.com
X-CUBE-ISO1

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Demo Example: Bill Of Material
HW pre-requisites

- 1x *description* expansion board:
  X-NUCLEO-ISO1A1
- 1x STM32 Nucleo development board:
  NUCLEO-G071RB, NUCLEO-G0B1RE, NUCLEO-G070RB
- 1x USB Type-C® to micro-B cable (for any of the NUCLEO board)
- 1x Laptop/PC with Windows 7, 8 or above

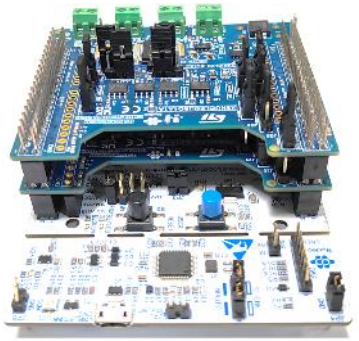
X-NUCLEO-ISO1A1

+

NUCLEO-G071RB or

NUCLEO-G0B1RE or

NUCLEO-G070RB



NUCLEO stacked solution

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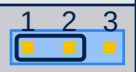
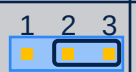
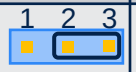
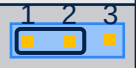
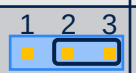
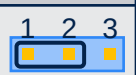
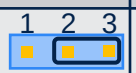
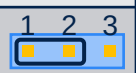
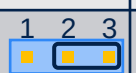
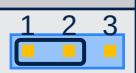
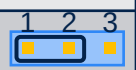
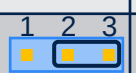
Hardware setup
Jumper and switches configuration

X-NUCLEO-ISO1A1	Serigraphy on board	Schematic name	Jumper	Default configuration		Alternate configuration	
				Header setting	Name	Header setting	Name
Input CLT03-2Q3	IA.0	IA0_IN_L	J18	CN2-PIN-18 	IA0_IN_1	CN2-PIN-38 	IA0_IN_2
	IA.1	IA1_IN_L	J19	CN2-PIN-36 	IA1_IN_2	CN2-PIN-4 	IA1_IN_1
Output IPS1025xx	QA.0	QA0_CNTRL_L	J22	CN2-PIN-19 	QA0_CNTRL_1	CN1-PIN-2 	QA0_CNTRL_2
	QA.1	QA1_CNTRL_L	J20	CN1-PIN-1 	QA1_CNTRL_2	CN1-PIN-10 	QA1_CNTRL_1
Fault PIN configuration		FLT1_QA0_L	J21	CN1-PIN4 	FLT1_QA0_2	CN1-PIN-15 	FLT1_QA0_1
		FLT1_QA1_L	J27	CN1-PIN-17 	FLT1_QA1_2	CN1-PIN-37 	FLT1_QA1_1
		FLT2_QA0_L	J24	CN1-PIN-3 	FLT2_QA0_2	CN1-PIN-26 	FLT2_QA0_1
		FLT2_QA1_L	J26	CN1-PIN-27 	FLT2_QA1_1	CN1-PIN-35 	FLT2_QA1_2

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Either Default or Alternate jumper can be used while using single X-NUCLEO-ISO1A1 board.
When 2 X-NUCLEO-ISO1A1 boards are stacked onto a NUCLEO board, they must have different jumper selection to avoid clash.

Demo Example: software tools

SW pre-requisites

- STM32CubeProg: All-in-one multi-OS software tool for programming STM32 products
- The Nucleo board includes debugger/programmer:
  - On-board ST-LINK (STLINK/V2-1, STLINK-V3E, STLINK-V2EC, or STLINK-V3EC) debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port
- X-CUBE-ISO1: software package including the application examples for NUCLEO-G071RB development board (or either a NUCLEO-G0B1RE or a NUCLEO-G070RB).
  - It is associated to X-NUCLEO-ISO1A1 expansion board

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Documents & related resources

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

- **X-NUCLEO-ISO1A1 webpage**
- **Databrief – DB5427**: Industrial isolated input/output expansion board based on STISO620/621, CLT03-2Q3 and IPS1025HQ for STM32 Nucleo
- **User manual – UM3483**: Getting started with the X-NUCLEO-ISO1A1 industrial input/output expansion board for STM32 Nucleo
- **Gerber files**
- **Bill of Material**
- **Schematics**
- **X-CUBE-ISO1**
  - **Databrief** – **DB5479**: Micro-PLC software expansion for STM32Cube
  - **User manual** – **UM3469**: Getting started with the X-CUBE-ISO1 software expansion for STM32Cube

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STM32 ODE Ecosystem

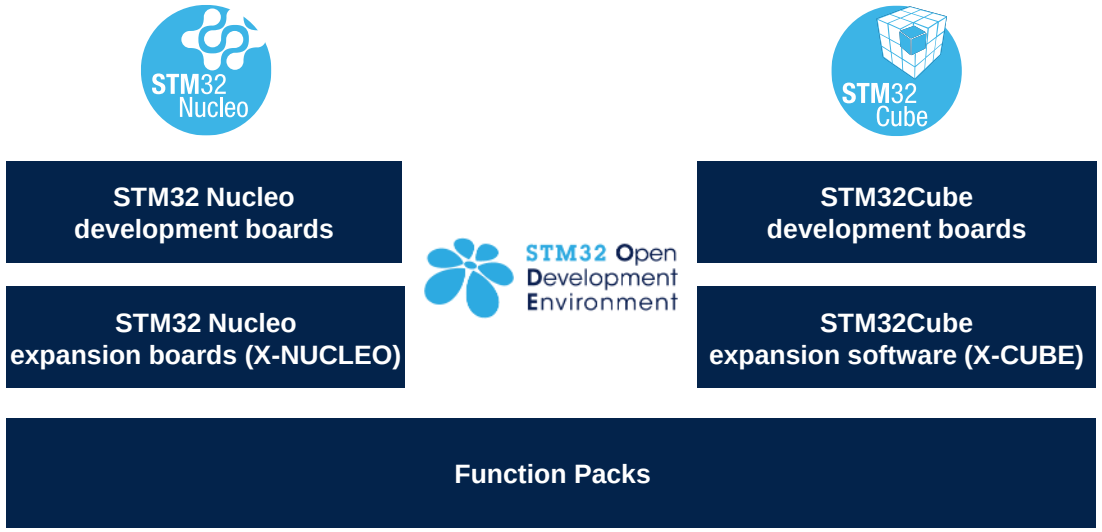
FAST, AFFORDABLE PROTOTYPING AND DEVELOPMENT

The STM32 Open Development Environment (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.

The STM32 ODE includes the following five elements:

- STM32 Nucleo development boards. A comprehensive range of affordable development boards for all STM32 microcontroller series, with unlimited unified expansion capability, and with integrated debugger/programmer
- STM32 Nucleo expansion boards. Boards with additional functionality to add sensing, control, connectivity, power, audio or other functions as needed. The expansion boards are plugged on top of the STM32 Nucleo development boards. More complex functionalities can be achieved by stacking additional expansion boards
- STM32Cube software. A set of free-of-charge tools and embedded software bricks to enable fast and easy development on the STM32, including a Hardware Abstraction Layer, middleware and the STM32CubeMX PC-based configurator and code generator
- STM32Cube expansion software. Expansion software provided free of charge for use with STM32 Nucleo expansion boards, and compatible with the STM32Cube software framework
- STM32Cube Function Packs. Set of function examples for some of the most common application cases built by leveraging the modularity and interoperability of STM32 Nucleo development boards and expansions, with STM32Cube software and expansions.

The STM32 Open Development Environment is compatible with a number of IDEs including IAR EWARM, Keil MDK, mbed and GCC-based environments.



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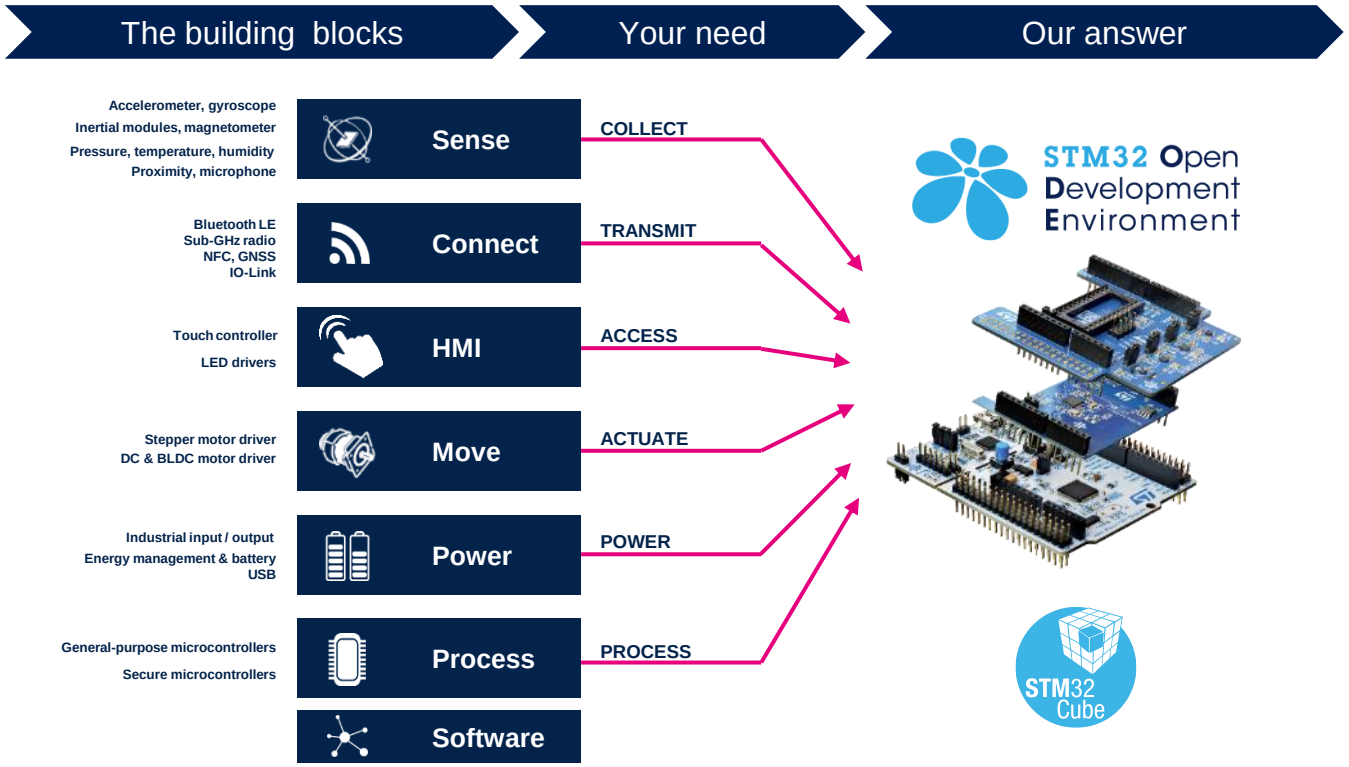
STM32 Open Development Environment: all that you need

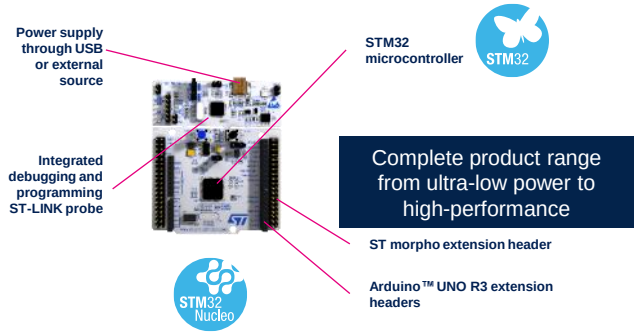
The combination of a broad range of expandable boards based on leading-edge commercial products and modular software, from driver to application level, enables fast prototyping of ideas that can be smoothly transformed into final designs.

To start your design:

- Choose the appropriate STM32 Nucleo development board (MCU) and expansion (X-NUCLEO) boards (sensors, connectivity, audio, motor control etc.) for the functionality you need
- Select your development environment (IAR EWARM, Keil MDK, and GCC-based IDEs) and use the free STM32Cube tools and software.
- Download all the necessary software to run the functionality on the selected STM32 Nucleo expansion boards.
- Compile your design and upload it to the STM32 Nucleo development board.
- Then start developing and testing your application.

Software developed on the STM32 Open Development Environment prototyping hardware can be directly used in an advanced prototyping board or in and end product design using the same commercial ST components, or components from the same family as those found on the STM32 Nucleo boards.





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