



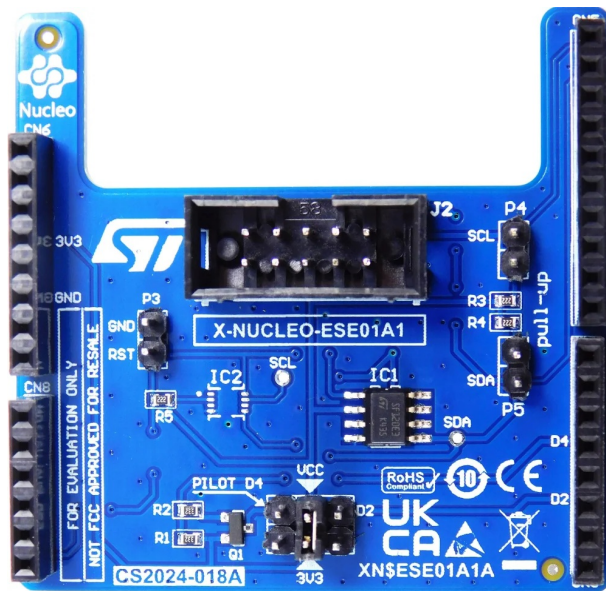
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STMicroelectronics UM3531 Nucleo Expansion Board



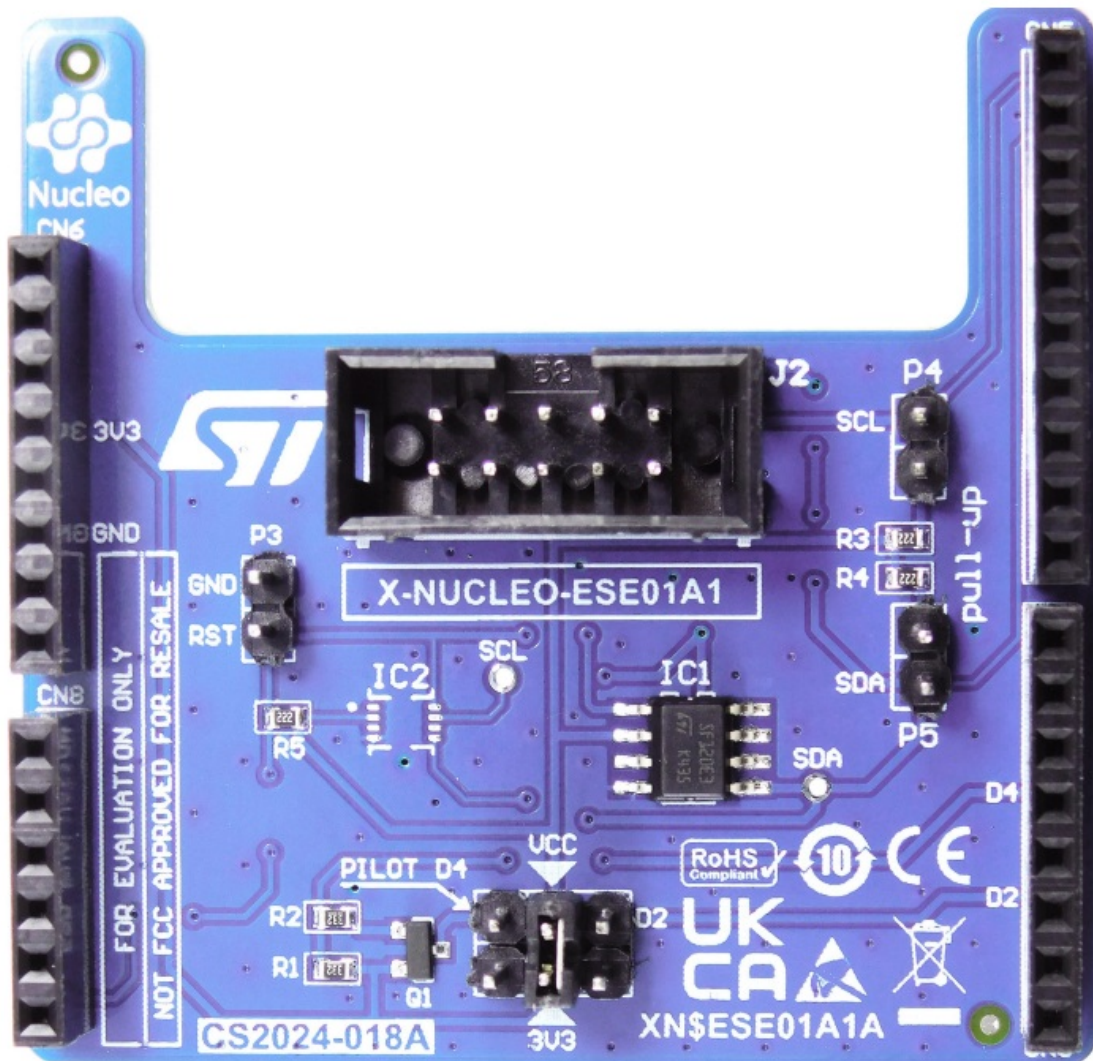
Introduction

The X-NUCLEO-ESE01A1 expansion board is based on the STSAFE-A120 secure element. It can be used with any STM32Nucleo development board.

The on-board STSAFE-A120 is customized with a standard profile for evaluation and is compatible with the Arduino UNO R3 connector.

The X-NUCLEO-ESE01A1 expansion board is used with free X-CUBE-STSE01 or X-CUBE-SBSFU software packages containing sample code to demonstrate how to implement security applications.

Figure 1. X-NUCLEO-ESE01A1 expansion board



Notice: For dedicated assistance, submit a request through our online support portal at www.st.com/support.

Getting started

Hardware requirements

The [X-NUCLEO-ESE01A1](#) expansion board can be connected to any STM32 Nucleo development board through the matching Arduino UNO R3 connector pins.

Note: Handle the X-NUCLEO-ESE01A1 with care and avoid bending or damaging the pins as the board has male/ female pass-through connectors and ESD-sensitive components.

System requirements

To complete the system setup, you need:

- Computer with STM32 Cube IDE (multi-OS development tool) or one of the compatible software development environments: IAR, Arm Keil, software package ([X-CUBE-STSE01](#)) installed on the user PC.

Hardware description

The X-NUCLEO-ESE01A1 expansion board has an embedded STSAFE-A120 secure element to allow you to evaluate its authentication and data management services connected to a local or remote host. This STSAFE-A120 is factory personalized with a generic sample profile.

The main features of the X-NUCLEO-ESE01A1 expansion board are:

- On-board STSAFE-A120 customized with a standard evaluation profile
- HE10 extension connector to mount additional STSAFE devices
- Arduino UNO R3 connector
- Free drivers, middleware and software samples compatible with the STM32 ODE
- RoHS and WEEE compliant

The X-NUCLEO-ESE01A1 interfaces with the STM32 Nucleo microcontrollers via the I²C communication bus.

Jumpers and solder bridges

Table 1. X-NUCLEO-SAFE01A expansion board jumper and solder bridge functions

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Jumper	Alternative soldering point	function
P4	SB1	Connects embedded 2.2kΩ pull-ups to I ² C bus for SCL
P5	SB2	Connects embedded 2.2kΩ pull-ups to I ² C bus for SDA
P3	SB5	Can be used to drive the STSAFE-A120 reset pin via the STM32 MCU PC0 GPIO
P1		Selection of STSAFE-A120 power supply mode (+3.3 V from Nucleo, from Nucleo D2 GPIO or from Q1 transistor through D4 GPIO)
P2		

Connector (optional)

X-NUCLEO-ESE01A1 Nucleo expansion board has an HE10 extension connector (J2) footprint to mount an additional STSAFE-A1xx secure element or any other use case.

Note: If you use the connector to accommodate new generation STSAFE-A devices, be sure that you populate jumper P3 in order to place the current STSAFE-A120 secure element soldered on the board in reset mode.

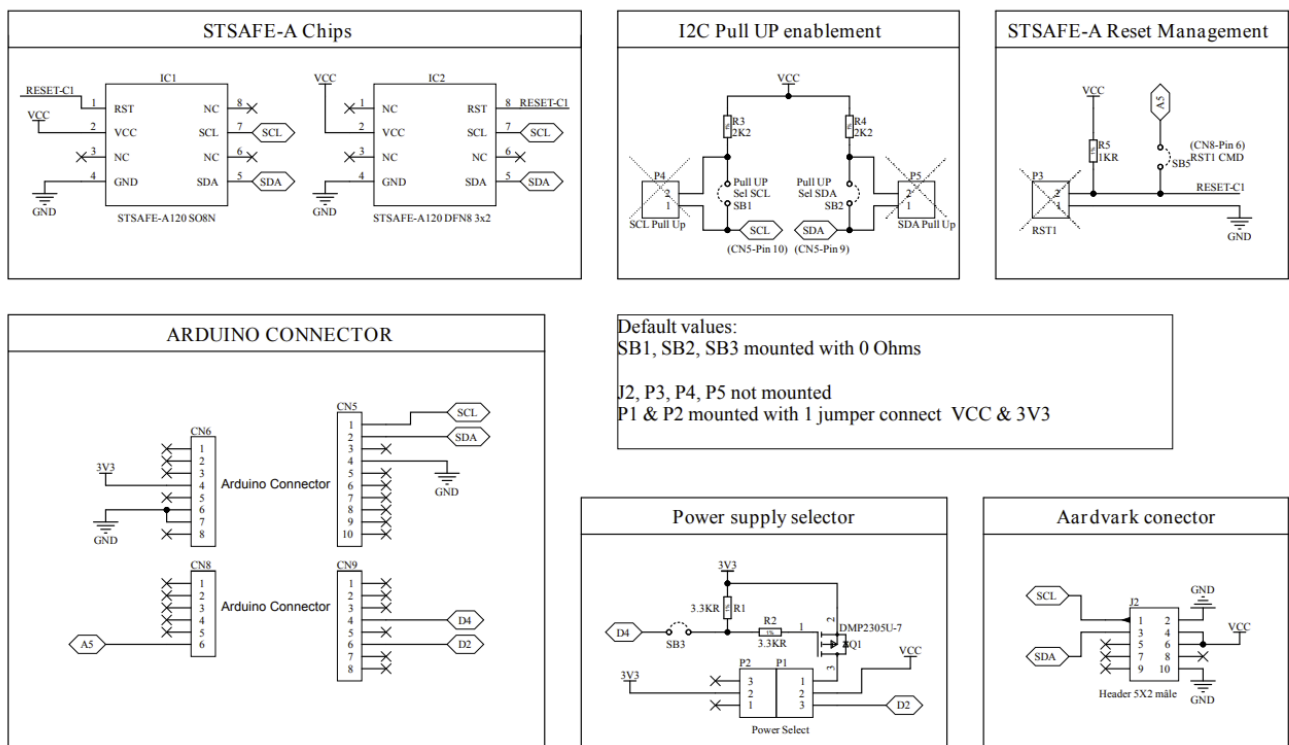
STM32 series microcontroller software

The STM32 ODE software package [X-CUBE-STSE01](#) provides demonstration source code for any NUCLEO development board with [X-NUCLEO-ESE01A1](#) expansion. The X-CUBE-STSE01 package includes drivers, middleware and several demonstration codes that implement the features of the [STSAFE-A120](#) device through a host microcontroller. The demonstration codes use the STSAFE-A1xx middleware built on the STM32Cube software technology. They illustrate authentication, key pair generation, key establishment, local envelope wrapping and pairing features.

Schematic diagrams

Figure 2. X-NUCLEO-ESE01A1 circuit schematic

Figure 2. X-NUCLEO-ESE01A1 circuit schematic



Bill of materials

Table 2. X-NUCLEO-ESE01A1

Table 2. X-NUCLEO-ESE01A1

Item	Q.ty	Ref.	Part/value	Description	Manufacturer	Order code
1	1	CN5		'SAMTEC - SSQ-110-24-G-S - EMBASE. 2.54MM. VERTICAL THT. 10 VOIES	SAMTEC	SSQ-110-24-G-S
2	1	CN6		'SAMTEC - SSQ-108-24-G-S - EMBASE. 2.54MM. VERTICAL THT. 8 VOIES	SAMTEC	SSQ-108-24-G-S
3	1	CN8		'SAMTEC - SSQ-106-24-G-S - EMBASE. 2.54MM. VERTICAL THT. 6 VOIES	SAMTEC	SSQ-106-24-G-S
4	1	CN9		'SAMTEC - SSQ-108-24-G-S - EMBASE. 2.54MM. VERTICAL THT. 8 VOIES	SAMTEC	SSQ-108-24-G-S
5	1	IC2	STSAFA120DFSPL05 - DFN8 2x3	STSAFA120DFSPL05 - DFN8 2x3 (not mounted)	ST	STSAFA120DFSPL05
6	1	IC1	STSAFA120S8SPL05, SO8N	STSAFA120S8SPL05 SO8N 5x6	ST	STSAFA120S8SPL05
7	1	J2		3M-30310-6002HB-Connecteur embase 10 voies	3M	3M-30310-6002HB
8	1	P1		2211S-03G MULTICOMP, Header, male, 2.54mm, 3 contacts, traversant	MULTICOMP	2211S-03G
9	1	P2		2211S-03G MULTICOMP, Header, male, 2.54mm, 3 contacts, traversant	MULTICOMP	2211S-03G
10	1	P3		2211S-02G MULTICOMP, Header, male, 2.54mm, 2contacts, traversant	MULTICOMP	2211S-02G
11	1	P4		2211S-02G MULTICOMP, Header, male, 2.54mm, 2contacts, traversant	MULTICOMP	2211S-02G

12	1	P5		2211S-02G MULTICOMP, Header, male, 2.54mm, 2contacts, traversant	MULTICOMP	2211S-02G
13	1	P2.2, P1.2		Connected P2.2, P1.2 VCC - 3V3 => JUMPER 2contacts 2,54mm	ASSMANN WSW	AKSPLTZ BLACK
14	1	Q1		DMP2305U-7 - DIODES INC. - PMOS 20V 4A RDSon45 mOhm SOT23	Diodes Incorporated	DMP2305U-7
15	1	R1	3.3k Ohm	MULTICOMP MCWR06X3301FTL Résistance CMS 0603 3.3KOhm	MULTICOMP	MCWR06X3301FTL
16	1	R2	3.3k Ohm	MULTICOMP MCWR06X3301FTL Résistance CMS 0603 3.3KOhm	MULTICOMP	MCWR06X3301FTL
17	1	R3	2.2k Ohm	MULTICOMP MCWR06X2201FTL Résistance CMS 0603 2.2KOhm	MULTICOMP	MCWR06X2201FTL
18	1	R4	2.2k Ohm	MULTICOMP MCWR06X2201FTL Résistance CMS 0603 2.2KOhm	MULTICOMP	MCWR06X2201FTL
19	1	R5	1k Ohm	MULTICOMP MCWR06X1001FTL Résistance CMS 0603 1KOhm	MULTICOMP	MCWR06X1001FTL
20	1	SB1		SOLDER BRIDGE (connected)	SOLDER BRIDGE	SOLDER BRIDGE

Item	Q.ty	Ref.	Part/value	Description	Manufacturer	Order code
21	1	SB2		SOLDER BRIDGE (connected)	SOLDER BRIDGE	SOLDER BRIDGE
22	1	SB3		SOLDER BRIDGE (connected)	SOLDER BRIDGE	SOLDER BRIDGE
23	1	SB5		SOLDER BRIDGE (not connected)	SOLDER BRIDGE	SOLDER BRIDGE

Board versions

Table 3. X-NUCLEO-ESE01A1 versions

Table 3. X-NUCLEO-ESE01A1 versions

Finished good	Schematic diagrams	Bill of materials
XN\$ESE01A1A ⁽¹⁾	XN\$ESE01A1A schematic diagrams	XN\$ESE01A1A bill of materials

1. This code identifies the X-NUCLEO-ESE01A1 evaluation board first version.

Regulatory compliance information

Notice for US Federal Communications Commission (FCC)

For evaluation only; not FCC approved for resale

FCC NOTICE – This kit is designed to allow:

1. Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and
2. Software developers to write software applications for use with the end product.

This kit is not a finished product and when assembled, may not be resold or otherwise marketed unless all\ required FCC equipment authorizations are first obtained.

Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter 3.1.2. Notice for Innovation, Science and Economic Development Canada (ISED) For evaluation purposes only. This kit generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to Industry Canada (IC) rules.

Notice for the European Union

This device is in conformity with the essential requirements of Directive 2014/30/EU (EMC) and of the Directive 2011/65/EU (RoHS II), including subsequent revisions and additions, as well as amended by the Delegated Directive 2015/863/EU (RoHS III).

Notice for the United Kingdom

This device is in compliance with the UK Electromagnetic Compatibility Regulations 2016 (UK S.I. 2016 No. 1091) and with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (UK S.I. 2012 No. 3032).

Revision history

Table 4. Document revision history


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Date	Version	Changes
02-Jul-2025	1	Initial release.

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Documents / Resources

	<p>STMicroelectronics UM3531 Nucleo Expansion Board [pdf] User Manual</p> <p>UM3531, UM3531 Nucleo Expansion Board, Nucleo Expansion Board, Expansion Board</p>
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References

- [User Manual](#)

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