

AN13541

OM-A5000ARD hardware overview

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Application note

Document information

Information	Content
Keywords	OM-A5000ARD, EdgeLock A5000
Abstract	This document describes the OM-A5000ARD development kit and details how to use its jumpers to configure the different communication options with the EdgeLock A5000 secure authenticator.



Revision history

Revision history

Revision number	Date	Description
1.0	2022-03-23	First document release.
1.1	2022-06-20	12NC corrected in table 1.
1.2	2022-11-04	Jumper J14 configuration corrected in chapter 4.3

1 Overview

The OM-A5000ARD is the development kit for the EdgeLock A5000 Plug & Trust product. The OM-A5000ARD kit is equipped with the chip A5000 (with part number A5000R2HQ1/Z016U). This kit allows you to evaluate the EdgeLock A5000 product features and simplifies the development of your custom applications.

The EdgeLock A5000 uses I²C as communication interface with data rates up to 3.4 Mbps. I²C commands are wrapped using the Smartcard T=1 over I²C (T=1oI2C) protocol. [Figure 1](#):

- I²C interface in target mode with data rates up to 3.4 Mbps .

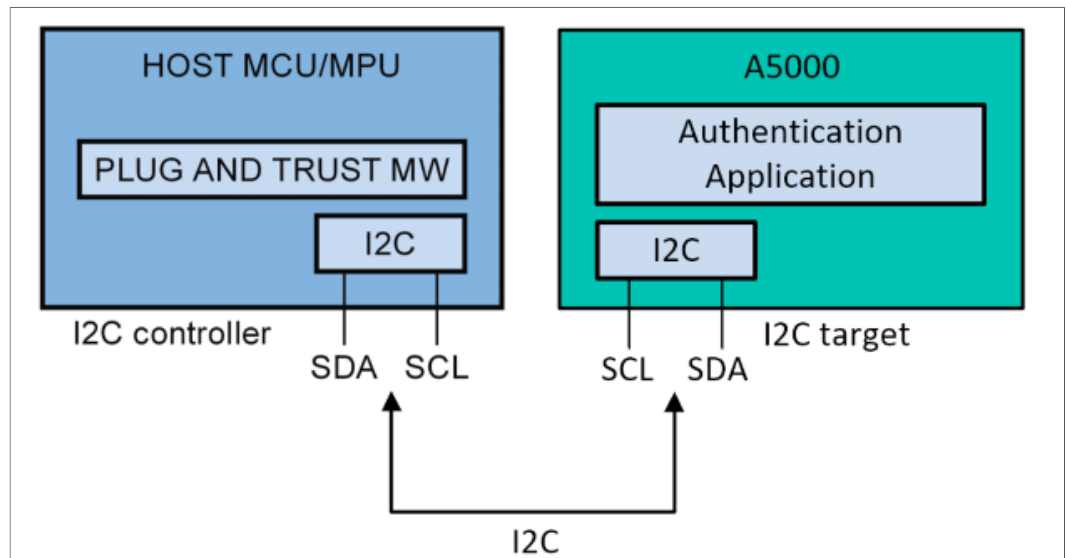
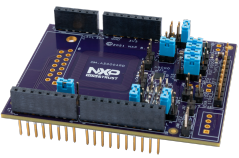


Figure 1. EdgeLock A5000 solution block diagram

Note: EdgeLock A5000 is designed to be used as a part of an IoT or Authentication system. It works as an auxiliary security device attached to a host controller. The host controller communicates with EdgeLock A5000 through an I²C interface (with the host being the controller and the EdgeLock A5000 being the target).

The OM-A5000ARD flexible design makes it possible to access the EdgeLock A5000 interfaces by just changing a few jumper settings. [Table 1](#) indicates the ordering details of the OM-A5000ARD board:

Table 1. OM-A5000ARD development kit details

Part number	12NC	Content	Picture
OM-A5000ARD	935424319598	EdgeLock A5000 development board	

2 Headers and connectors

The OM-A5000ARD is designed with several headers and connectors that allow you to interface with EdgeLock A5000. The OM-A5000ARD is equipped with:

- **Arduino-R3 header:** It allows you to easily attach it to any NXP MCU/MPU development board with Arduino compatible headers such as many Kinetis, LPC and i.MX MCU boards. The Arduino-R3 female connectors come soldered in the OM-A5000ARD.
- **External I²C connector:** It allows you to connect any non-Arduino compatible MCU boards via I²C target interface. The OM-A5000ARD includes the mounting holes for the External I²C connector.
- **10-pin header:** It allows you to access several pins of the EdgeLock A5000. The 10-pin header male connectors come soldered in the OM-A5000ARD.
- **DB15 header:** It allows you to access several pins of the EdgeLock A5000. The OM-A5000ARD includes the mounting holes for the DB15 connector.

Figure 2 shows an overview to OM-A5000ARD headers and connectors together with its corresponding pin description.

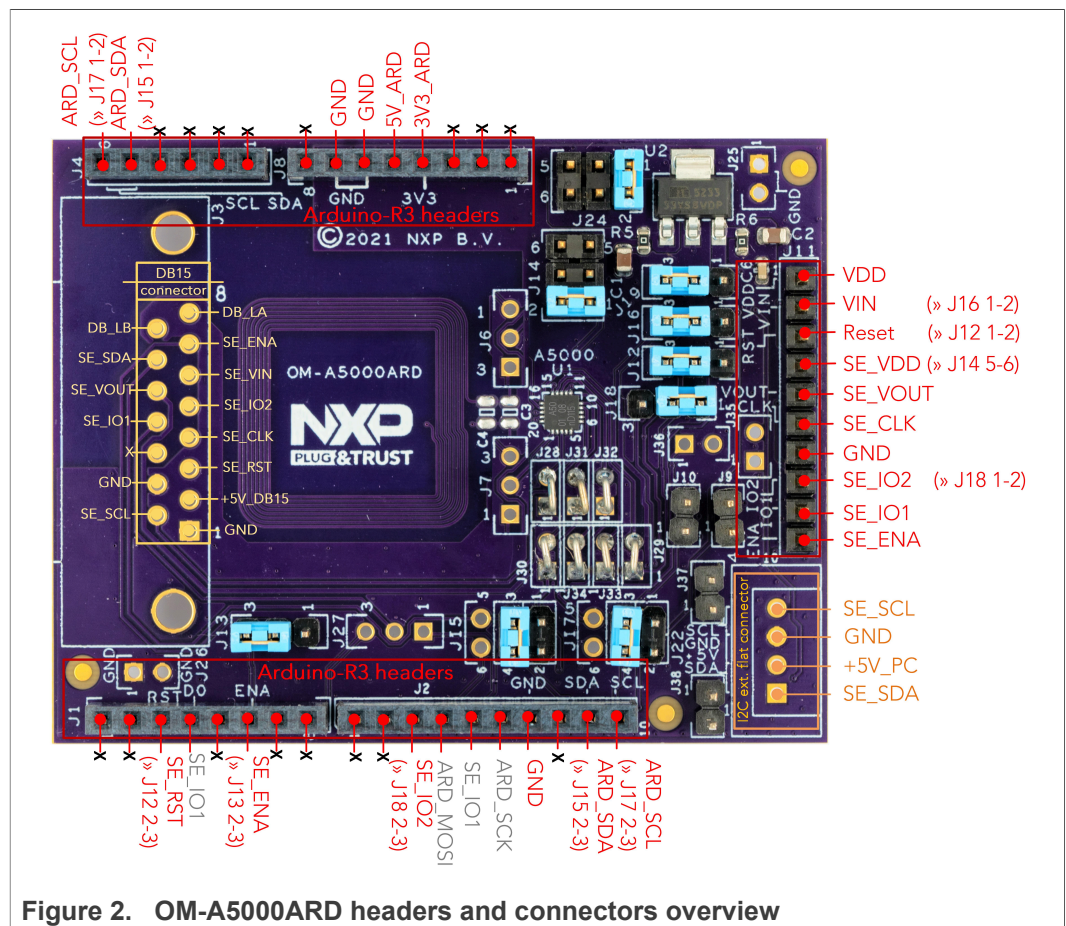


Figure 2. OM-A5000ARD headers and connectors overview

3 OM-A5000ARD board schematics

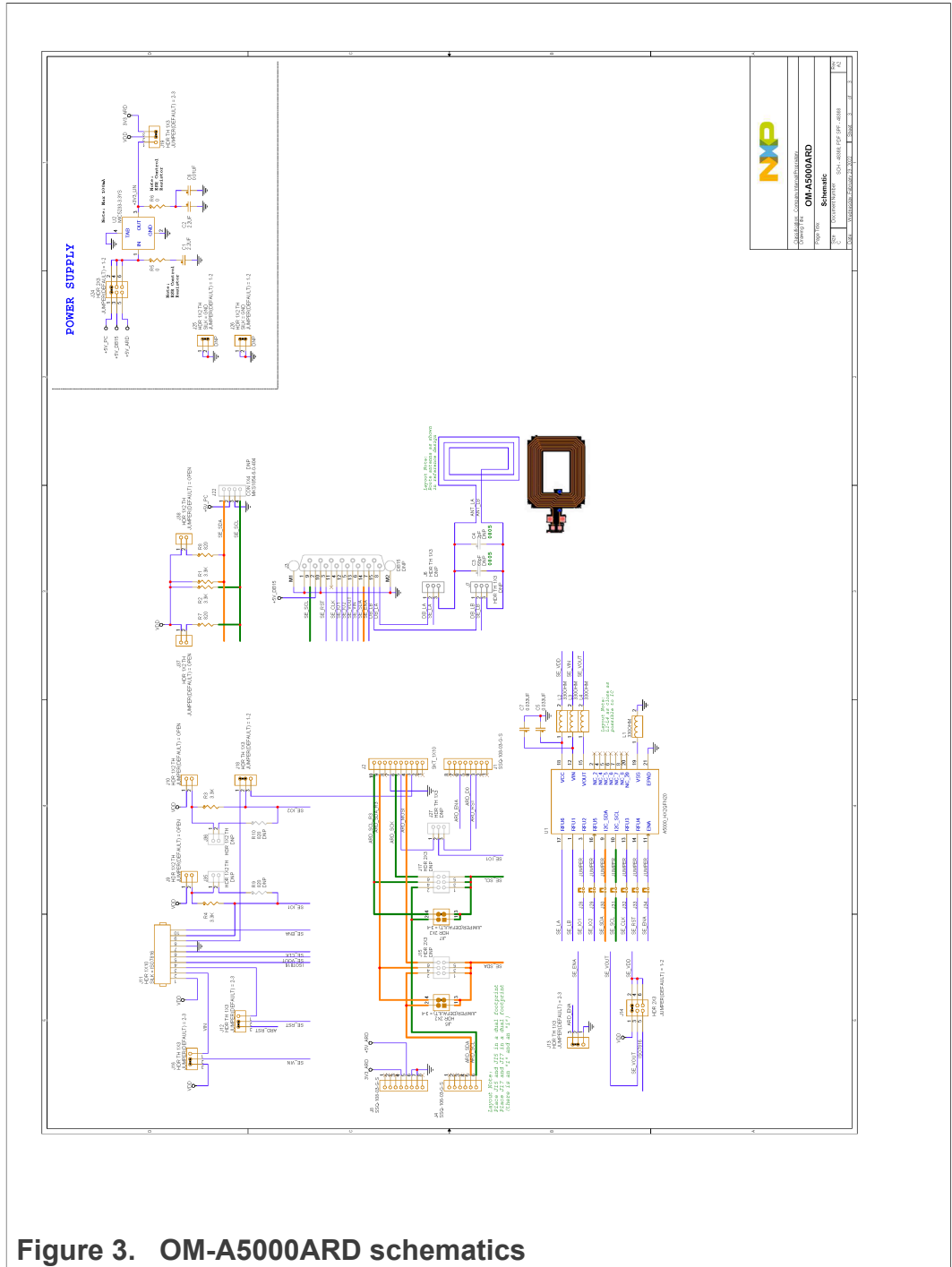


Figure 3. OM-A5000ARD schematics

Note: The OM-A5000ARD schematic is available in [A5000ARD-SCH](#)

4 Jumpers overview

The OM-A5000ARD board uses individual jumpers to configure settings related with the EdgeLock A5000 interfaces, power supply and power modes. This section provides an overview to the OM-A5000ARD jumpers and its configuration options.

4.1 I²C configuration

The OM-A5000ARD has jumpers that allow you to control the configuration of the I²C target interface available in EdgeLock A5000. These jumpers are:

- J15, J17: Configures the I²C target connection.
- J37, J38: Configures the I²C target interface pull up resistor.

[Table 2](#) describes the OM-A5000ARD jumper settings for each I²C setting configuration.

Table 2. Jumpers for I²C configuration

Jumper	Description	Open	1-2	3-4
J9	r.f.u.	not connected (Default)	n.a.	n.a.
J10	r.f.u.	not connected (Default)	n.a.	n.a.
J15	I ² C target SDA connection	not connected	Arduino R3 J4:5	Arduino R3 J2:9 (Default)
J17	I ² C target SCL connection	not connected	Arduino R3 J4:6	Arduino R3 J2:10 (Default)
J18	SE_IO2 routing	n.a	Routed to J11:9 (Default)	Routed to J2:3
J37	I ² C target SCL pull up	3k3 Ohm (Default, FastMode)	660 Ohm (HS-Mode)	n.a.
J38	I ² C target SDA pull up	3k3 Ohm (Default, FastMode)	660 Ohm (HS-Mode)	n.a.

[Figure 4](#) highlights in blue the location of the OM-A5000ARD for I²C settings configuration.

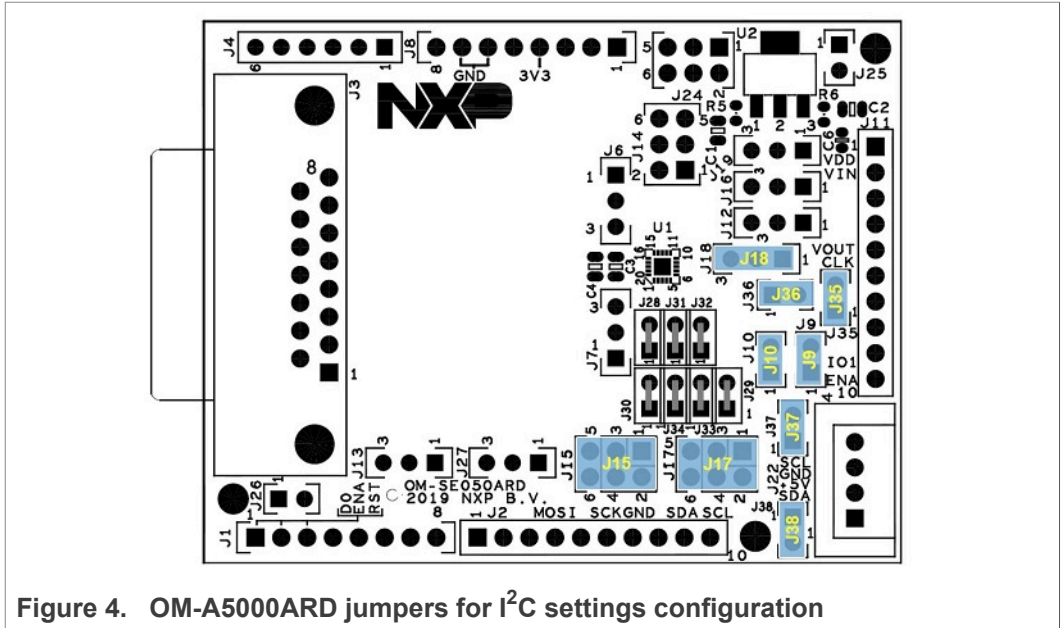


Figure 4. OM-A5000ARD jumpers for I²C settings configuration

4.2 Power supply options

The jumpers that allow you to change the OM-A5000ARD power supply settings are:

- J19: Configures V_{DD} supply voltage options.
- J16: Configures SE_V_{IN} supply options.
- J24: Configures V_{DD} supply voltage options in case the LDO is used.

[Table 3](#) describes the OM-A5000ARD jumper settings for each power supply settings configuration.

Table 3. Jumpers for power supply settings configuration

Jumper	Description	1-2	2-3	3-4	5-6
J16	SE_V _{in} supply	Supplied by J11:2 pin	Supplied by the V _{DD} (see J19) (Default)	n.a.	n.a.
J19	V _{DD} supply voltage	From LDO	From 3V3_ARD pin (Default)	n.a.	n.a.
J24	V _{DD} supply voltage (if LDO is used)	From 5V_PC (External I ² C connector - Default)	n.a.	From 5V_DB15 pin	From 5V_ARD pin

[Figure 5](#) shows the power supply unit schematics.

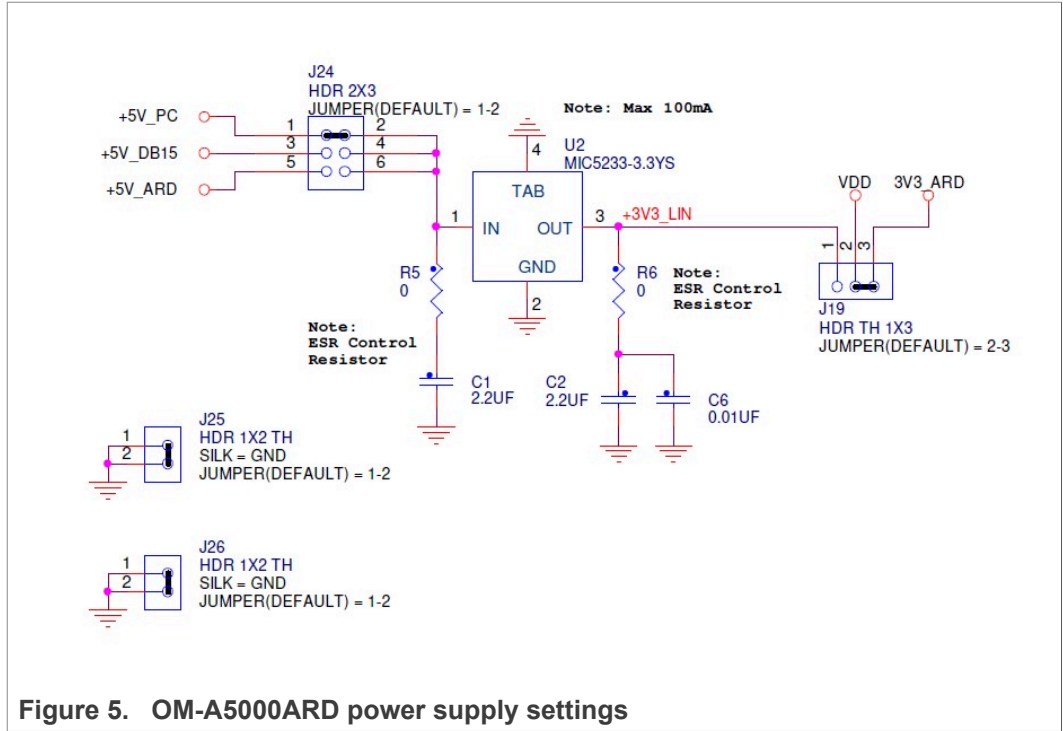
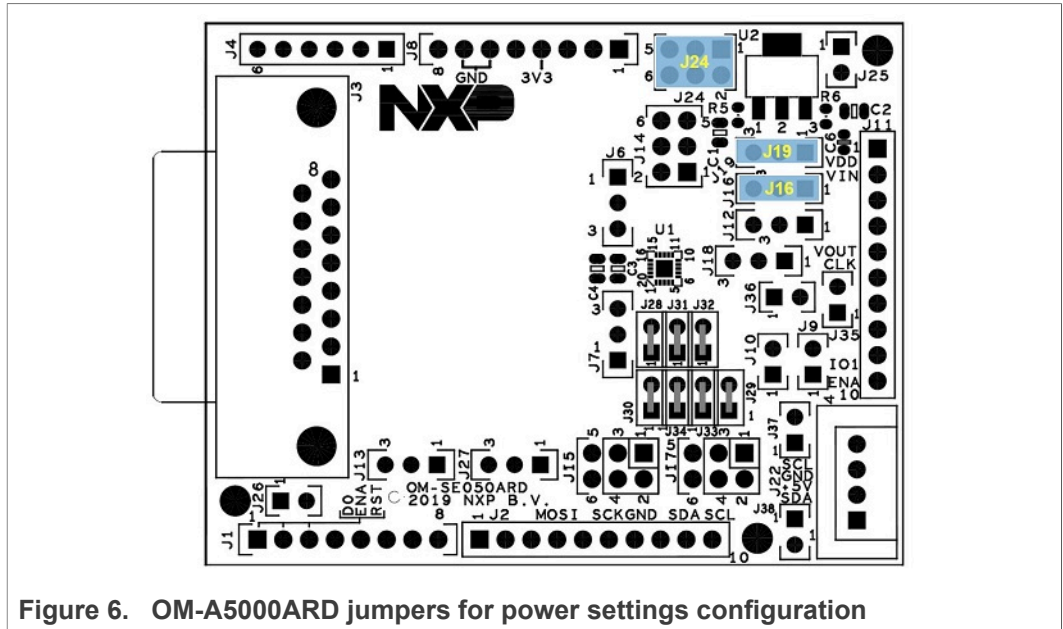


Figure 6 highlights in blue the location of the OM-A5000ARD for power supply settings configuration.



4.3 Deep power-down mode

The deep power-down mode reduces the EdgeLock A5000 power consumption to the minimum. In this mode, only I²C pads stay supplied via V_{in}. The deep power-down mode

is enabled by setting the ENA pin to a logic zero. In addition, it is required to supply V_{in} pin and connect V_{out} and V_{cc} pins at the PCB level.

The ENA pin controls an internal switch between V_{out} and V_{in} as shown in [Figure 7](#). Therefore, if V_{out} is connected to V_{cc} , the ENA pin can effectively switch the power on and off to V_{cc} .

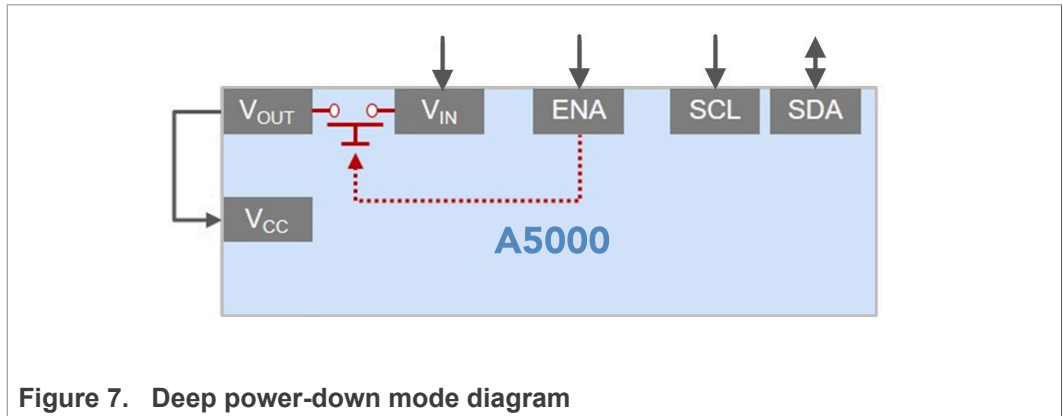


Figure 7. Deep power-down mode diagram

The jumpers J13 and J14 of the OM-A5000ARD allow you to control the EdgeLock A5000 deep power-down mode. To enable the deep power-down mode using the OM-A5000ARD:

- J13: Must be set to position 2-3.
- J14: Must be set to position 3-4.

[Table 4](#) describes the OM-A5000ARD jumper settings for the deep power-down mode configuration

Table 4. Jumpers for deep power-down mode configuration

Jumper	Description	1-2	2-3	3-4	5-6
J13	SE_ENA pin routing	ENA low. Switch disabled	ENA controlled by Arduino R3 (Default)	n.a.	n.a.
J14	SE_V _{CC} pin routing	Routed to V _{DD} supply voltage (Default)	n.a.	Routed to SE_V _{out} pin	Routed to J11:4 pin

[Figure 8](#) highlights in blue the location of jumper J13 and J14.

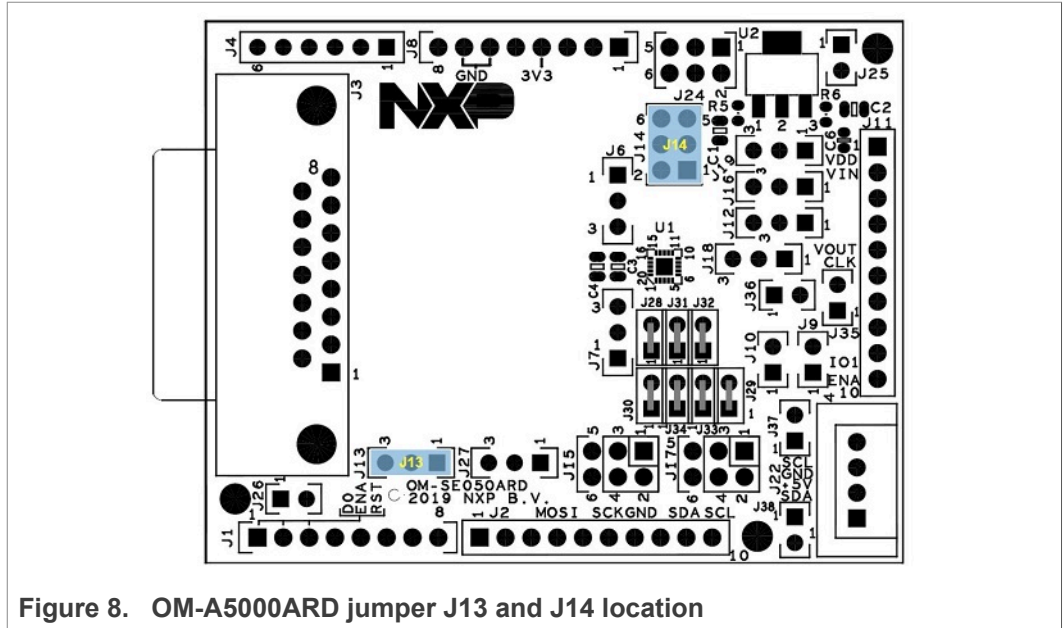


Figure 8. OM-A5000ARD jumper J13 and J14 location

4.4 Reset pin routing

Jumper J12 allows you to control the I²C reset pin routing of the EdgeLock A5000. [Table 5](#) indicates the J12 configuration.

Note: The EdgeLock A5000 reset pin does not apply for the I²C interface.

Table 5. Jumpers for reset pin routing configuration

Jumper	Description	Open	1-2	2-3
J12	SE_RST pin	Not connected	Routed to J11:3 strip pin connector	Routed to Arduino R3 (Default)

[Figure 9](#) highlights in blue the location of Jumper J12.

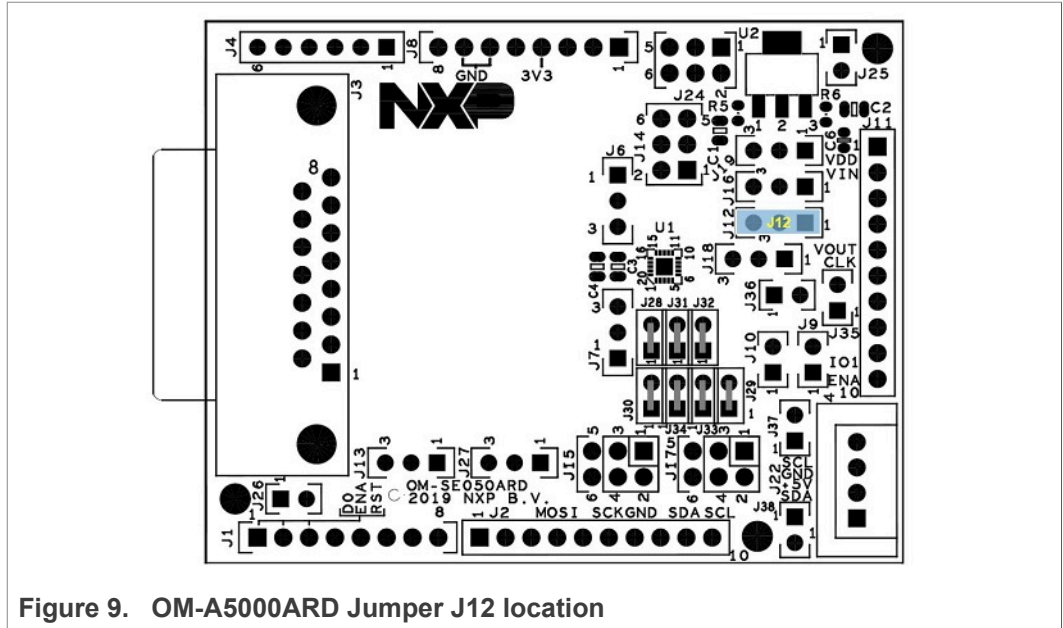


Figure 9. OM-A5000ARD Jumper J12 location

4.5 ISO/IEC14443 contactless interface

The contactless interface is not supported at the EdgeLock A5000. Jumper J6 and J7 should be kept open.

5 OM-A5000ARD board use cases

This section details the jumper settings to configure the different interfaces and to enable specific use cases with the OM-A5000ARD board.

5.1 EdgeLock A5000 via Arduino header

This section details the jumper configuration to enable the I²C target interface in the Arduino header. The related jumpers of the OM-A5000ARD for I²C target interface configuration are:

- J37 and J38: Configure the pull up resistors of the I²C interface.
- J19: Configures V_{DD} supply voltage options.
- J24: Configures V_{DD} supply voltage options in case the LDO is used.

Table 6. Jumper settings for I²C target interface configuration

Jumper	Configuration	Comment
J6	Set to 1-2 (Default)	Open
J7	Set to 2-3 (Default)	Open
J9, J10	Set to "Open" (Default)	r.f.u.
J12	Set to 2-3 (Default)	SE_RST routed to ARD_RST on J1:3
J13	Set to 2-3 (Default)	SE_ENA set to ARD_ENA on J1:6
J14	Set to 1-2 (Default)	SE_V _{DD} as SE_V _{DD}
J15	Set to 3-4 (Default)	I²C_SDA routed to ARD_SDA_R3 (J2:9)
	Set to 1-2	I ² C_SDA routed to ARD_SDA (J4:5)
J16	Set to 2-3	V _{DD} as SE_V _{IN}
J17	Set to 3-4 (Default)	I²C_SCL routed to ARD_SCL_R3 (J2:10)
	Set to 1-2	I ² C_SCL routed to ARD_SCL (J4:6)
J18	Set to 1-2	SE_IO2 to pin 9 of header J11
J19	Set to 2-3 (Default)	V_{DD} supply voltage from Arduino-R3 voltages
	Set to 1-2	V _{DD} supply voltage from LDO.
J24	Set to 1-2 (Default)	No input LDO
	Set to 5-6	5V_ARD to LDO
J25, J26	Do not care	Dummy jumpers
J37, J38	Set to "Open" (Default)	3k3 pull-up resistor for I²C standard mode

Table 6. Jumper settings for I²C target interface configuration...continued

Jumper	Configuration	Comment
	Set to "Closed"	560 Ohm parallel pull-up resistor for I ² C high speed mode

Figure 10 shows the jumper settings to configure the I²C target in standard mode and 3.3V_ARD supply voltage (no LDO).

In this example, the jumper configuration used in Figure 10 correspond to the values highlighted in bold in Table 6 (J15, J17, J19, J24, J37 and J38).

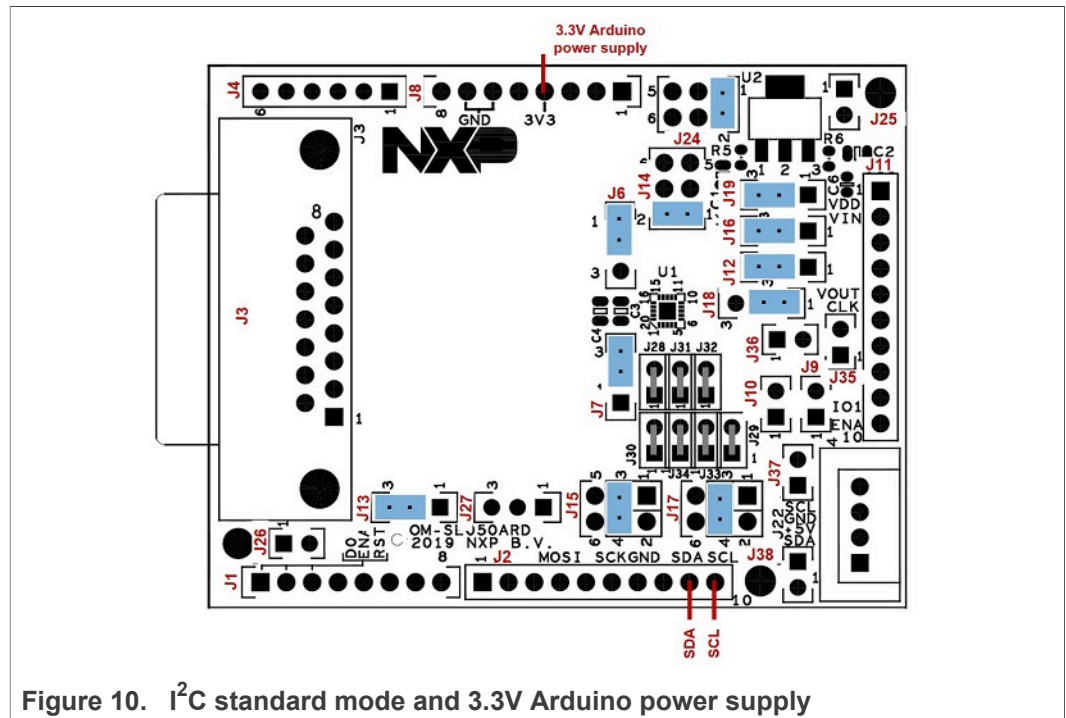


Figure 10. I²C standard mode and 3.3V Arduino power supply

You may modify the I²C mode or power supply settings just changing the jumper settings accordingly as indicated in Table 6.

5.2 EdgeLock A5000 via external I²C connector

Figure 11 shows the jumper settings to configure EdgeLock A5000 communication via external I²C connector:

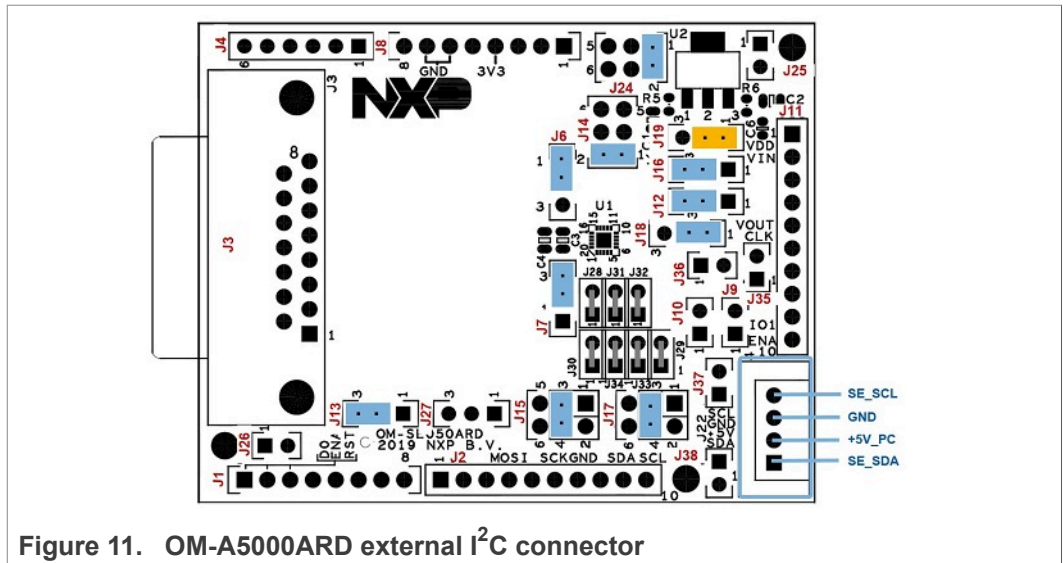


Figure 11. OM-A5000ARD external I²C connector

Table 7 details the jumper settings for this configuration (External I²C connector).

Table 7. OM-A5000ARD external I²C connector

Jumper	Configuration	Comment
J6	Set to 1-2 (Default)	Open
J7	Set to 2-3 (Default)	Open
J9, J10	Set to open (Default)	r.f.u.
J12	Set to 2-3 (Default)	SE_RST routed to ARD_RST on J1:3
J13	Set to 2-3 (Default)	SE_ENA set to ARD_ENA on J1:6
J14	Set to 1-2 (Default)	SE_VDD as SE_VDD
J15	Set to 3-4 (Default)	I2C_SDA routed to ARD_SDA_R3 (J2:9)
J16	Set to 2-3 (Default)	VDD as SE_VIN
J17	Set to 3-4 (Default)	I2C_SCL routed to ARD_SCL_R3 (J2:10)
J18	Set to 1-2 (Default)	SE_IO2 to pin 9 of header J11
J19	Set to 1-2	3.3V from LDO as V_{DD} supply voltage
J24	Set to 1-2 (Default)	5V_PC from external MCU board to LDO
J25, J26	Do not care	Dummy jumpers
J37, J38	Set to "Open" (Default)	3k3 pull-up resistor for I ² C standard mode

6 OM-A5000ARD technical operation description

Please refer to application note 'AN13256 - Get started with EdgeLock A5000 support package' how to get started with the OM-A5000ARD board and for getting familiar with EdgeLock A5000 support package. The document is available at this location: www.nxp.com/A5000.

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