

UM2131 User manual

ST25 Android™ NFC tap application

Introduction

This document describes the functionalities of the ST25 Android™ NFC tap application, helping the user to understand the application features and how to use them.

The ST25 Android™ NFC tap application is linked to the STSW-ST25001 and STSW-ST25002 software categories, and operates with products belonging to the ST25 NFC / RFID Tags and ST25 Dynamic NFC tags.

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1 List of acronyms and definitions

AAR: Android™ Application Record

BLE: Bluetooth® Low Energy

CC: Capability container **DAR**: Display aspect ratio

FW: Firmware

I²C: Inter-integrated circuit

IEC: International Electro-technical Commission **ISO**: International Organization for Standardization

ISO/IEC 14443: Proximity standard ISO/IEC 15693: Vicinity standard NDEF: NFC data exchange format NFC: Near field communication

NFC Forum: Association of industry actors promoting the NFC technology

PWD: Password

PWM: Pulse-width modulation

RF: Radio frequency

Tag: PICC in form of a patch, key fob or any similar device, without own power source and not generating RF electromagnetic field, capable of communicating with a reader / writer

PICC (VICC): Proximity (vicinity) IC card: a technology subset, defined in ISO/IEC standards for cards, with a defined set of commands

URI: Unified resource identifier **URL**: Unified resource locator



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2 Overview

2.1 Prerequisites

The prerequisites to run the Android™ application are:

- an Android[™] mobile phone or reader with NFC enabled
- minimum Android version: API level 15 corresponding to Android™ 4.0.4 (Ice Cream Sandwich)

The ST25 Android™ NFC tap application is available on:

- ST site: www.st.com
- Google play: https://play.google.com/store/apps/details?id=com.st.st25nfc

Note:

Pictures used within this document illustrate the various application features. They are based on version 1.0.0 of the application. Some discrepancies may be noticed between this documentation and the application itself.



Figure 1. ST25 Android™ NFC tap application overview

Note:

For more details regarding ST25 devices, refer to their corresponding datasheets (available on www.st.com).

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Overview UM2131

2.2 Functionalities overview

Thanks to the ST25 Android™ NFC tap application the user can manage the following STMicroelectronics products:

- Tags:
 - ST25TN series NFC Tags
 - ST25TV series NFC Tags
 - ST25TA series NFC/RFID Tags
 - LRI EEPROM tags
- · Dynamic tags:
 - ST25DV-I2C series Dynamic NFC Tags
 - ST25DV-PWM series Dynamic NFC Tags
 - M24SR series Dynamic NFC Tags
 - M24LR series Dynamic NFC Tags

The application supports the ISO14443 protocol to communicate with NFC tags (ST25TA and ST25TN series) and Dynamic NFC tags (M24SR series), and the ISO15693 protocol to communicate with NFC tags (ST25TV and LRI series) and Dynamic NFC tags (ST25DV-I2C, ST25DV-PWM and M24LR series).

The ST25 Android™ NFC tap application demonstrates the following product features:

- Read / Write NDEF message, NFC forum compliant example
 - Text, URI, SMS, Email, VCard, AAR, Wi-Fi[®], Bluetooth[®]
- Tag information retrieval (CC file, System file^(a))
- Tools functionalities (counters and GPO control according to tag)^(a)
- Password management (password authentication, tag Read Only/Write Only)^(a)
- Energy harvesting^(a)
- Specific use cases usually implemented to work with STMicroelectronics Discovery boards and kits^(a)

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a. For ST products

3 Application description

The application is composed of the following main activities:

- Welcome screen (refer to Section 3.1)
- NDEF editor screen (refer to Section 3.3)
- Tag detail screen (refer to Section 3.2) with a series of tabs dedicated to main features:
 - Tag info (refer to Section 3.2.1)
 - NDEF (refer to Section 3.2.2)
 - CC file (refer to Section 3.2.3)
 - SYSTEM file (refer to Section 3.2.4)
 - Memory dump (refer to Section 3.2.5)
- Drawer menu allowing access to tag available features
 - NFC forum:
 - Tag info, NDEF editor (refer to Section 3.3.1), and CC file
 - Tag features (refer mostly to Section 4):
 System file, memory dump, register management, areas management, areas content editor, areas security status, mailbox management, data transfer, counter, tamper detection, Lock block, Untraceable mode, Kill tag and Electronic article surveillance.
 - Tag demonstrations (refer to Section 5):
 Stopwatch transfer, firmware update and picture transfer

The following sections describe the main activities and associated functionalities or demonstration use cases included in each tab.



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3.1 Welcome screen

When the application is started, the welcome screen is displayed (see *Figure 2*), inviting the user to "tap" a tag.

When the tag has been discovered, and depending on the product discovered, sections including tabs become available or not.

Note: If NFC is not enabled, a message is displayed inviting to use the NFC configuration menu.



Figure 2. Welcome screen

If a tag is tapped, the application starts the tag detail activity (refer to Section 3.2).

The drawer menu is updated according to tag and features. Demonstrations, if any, can be started from drawer menus.



3.2 Tag detail

This activity is started when a tag is discovered. Available screen and tabs are shown in *Figure 3*. Tab availabilities depend on the product discovered.

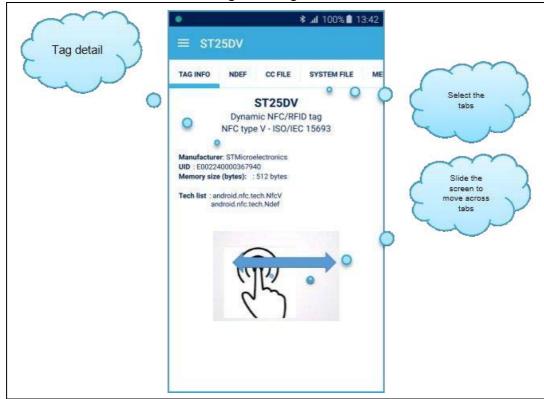


Figure 3. Tag detail

The following subsections describe the main features of each tab.

- TAG INFO: Provides information dealing with the tag (Manufacturer, Memory size, and UID among others)
- NDEF: Displays the content of the NDEF, if any, according to the application implemented ones. Refers to the NDEF editor section for available list and screens.
- CC FILE: Provides CC file information if any
- SYSTEM FILE: Provides System file information if any (ST products)
- MEMORY DUMP: Provides ways to Write/Read memory or dump/fill memory to/from file

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3.2.1 Tag info

Provides information related to the tag such as the manufacturer, the memory size or the UID as shown in *Figure 4*.

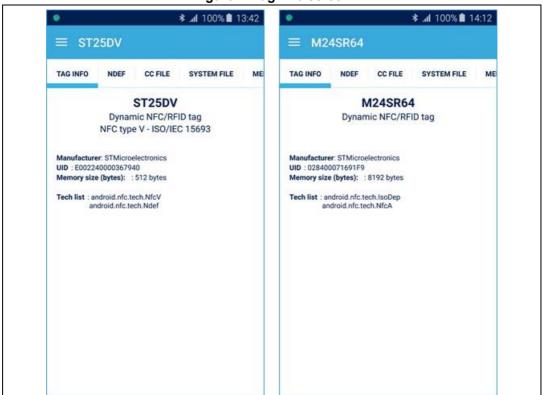


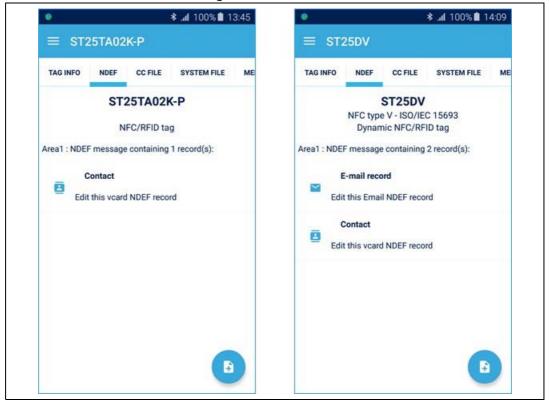
Figure 4. Tag info screen

3.2.2 NDEF

The NDEF tab displays the content of the NDEF, if any decoded, according to the application implemented ones as shown in *Figure 5*.

Available lists and screens are detailed in Section 3.3.





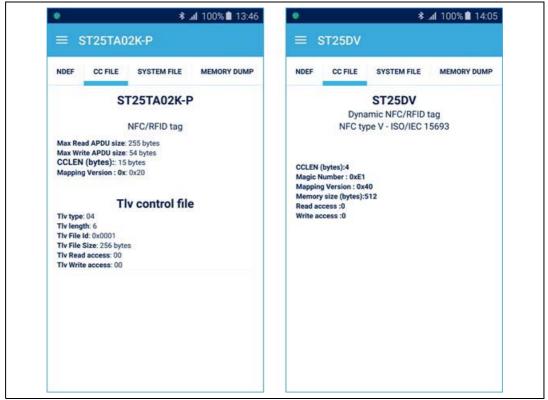


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3.2.3 CC file

Provides CC file information (if any), as shown in Figure 6.

Figure 6. CC file screen



3.2.4 SYSTEM file

Provides information retrieved from the System file and more (registers, counter) associated with the product discovered. as shown in *Figure 7*.

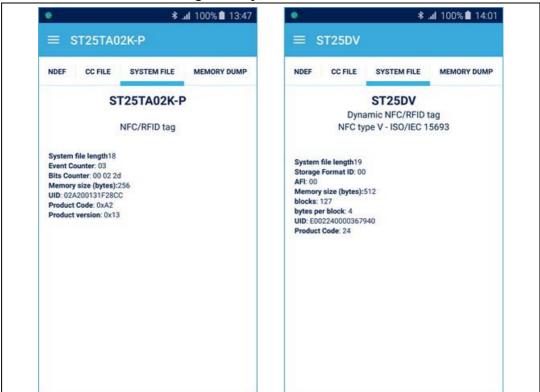


Figure 7. System file screen



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3.2.5 Memory dump

Refer to *Section 4.1* for details about the possibilities provided by this activity. The memory dump screen is shown in *Figure 8*.

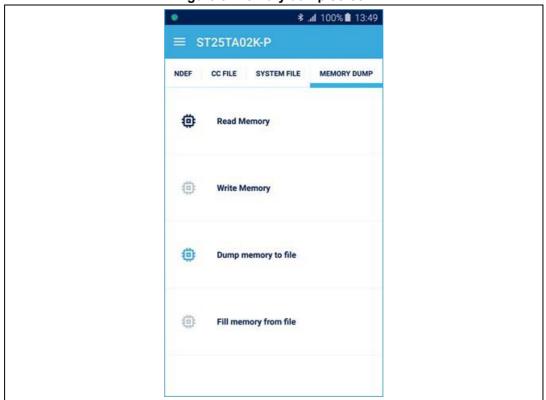


Figure 8. Memory dump screen

3.3 NDEF editor

The NDEF editor screen enables to create, build, and modify NDEF messages containing one or more records.

3.3.1 NDEF editor access

The NDEF editor can be started from the following main screens:

- Drawer > NDEF editor in the NFC forum menu group for NFC related topics related to Area 1
- Drawer > Areas Content Editor for tag full features in case of multiple areas available
 on the tag. This feature first presents the tag areas for selection, then the NDEF editor
 for the edition of functionalities.

Figure 9 shows NDEF editor access screens.

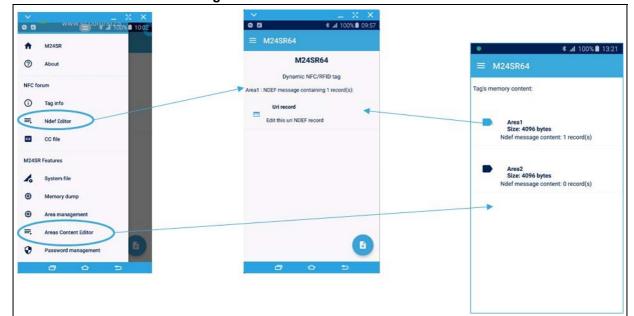


Figure 9. NDEF editor access screens

3.3.2 NDEF editor operations

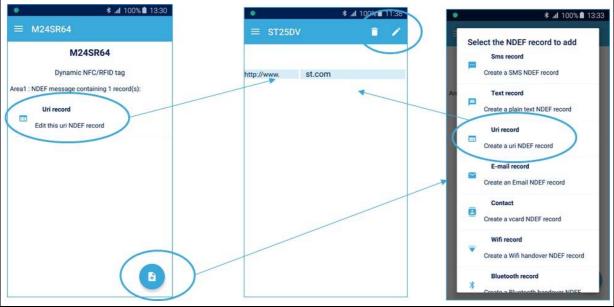
The NDEF editor screen enables to read the NDEF content of an NFC tag or write an NDEF message (made of one or more NDEF records) into it. The NDEF editor screen displays all the NDEF records present in the tag.

As shown in Figure 10, the user can:

- Click on an NDEF record to view its content and edit it using the *pencil* icon, or delete it using the *recycle bin* icon
- Click on the bottom-right '+' button to add an NDEF record, to be selected among all possible types.

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Figure 10. NDEF edition



When a click on a disk pictogram is performed as shown in Figure 11, the built message is written on the tag as an NDEF message that can contain multiple records.

* ...d 100% **≜** 13:54 * ⊿l 100% **i** 09:57 Select the NDEF record to add ST25DV M24SR64 NFC type V - ISO/IEC 15693 Dynamic NFC/RFID tag Create a SMS NDEF record Write Ndef text Dynamic NFC/RFID tag Text record Area1 : NDEF message containing 2 record(s): Test Create a plain t Text record Edit this plain text NDEF record Create a uri NDEF record Uri record E-mail record Edit this uri NDEF record Add a record Create an Email NDEF record 1 2 3 4 5 6 7 8 9 0 qwertyuiop Create a voard NDEF record asdfghjkl Create a Wifi handover NDEF record ↑ z x c v b n m 🖾 Sym

English(US)

Figure 11. Discover an NDEF multi record

3.3.3 NDEF records

This section describes the main available NDEF records that can be used to compose an NDEF message within the NDEF editor activity.

TEXT

Displays NDEF TEXT edition fields and enables to write a text NDEF message, as shown in *Figure 12*.

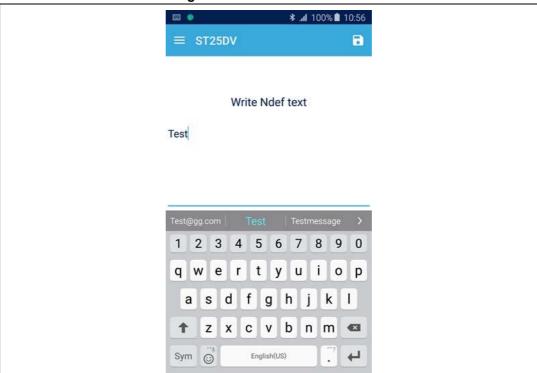


Figure 12. NDEF TEXT screen

URI

Displays NDEF URI edition fields and enables to write a URI NDEF message, as shown in *Figure 13*.

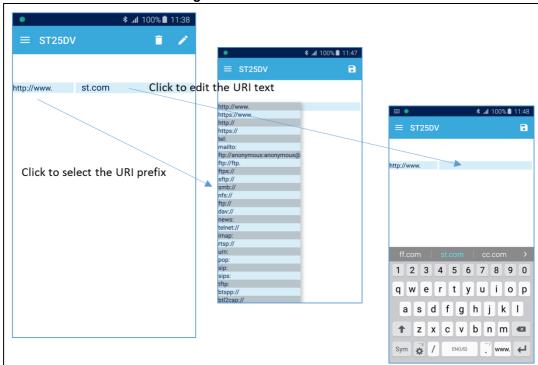


Figure 13. NDEF URI screens



Contact

Displays NDEF VCard edition fields and enables to write a VCard NDEF message, as shown in *Figure 14*.

★ .al 100% ■ 11:53 ≡ ST25DV 8 **Get Contact** Kent Clark With Pic Name 750-1234 Number clark.kent@daily-Email planet.com 5th Street and Concord Address Lane, Metropolis Kent @gmail.com WebSite Export Photo: Capture [*] Low QA[0] High QA[100] PhotoQuality Capture feature depends on phone capabilities Photo weight processing is by default set to 80 Adjust the photo weight for VCard writing feature with the

Figure 14. NDEF VCard screen

Options:

- GetContact button to get a contact from the phone list and initiate all fields from the selected contact
- Capture from camera
- Export photo check box used to include the image into the NDEF message
- A slider is available under the picture to adjust the image size to fit within the tag available size

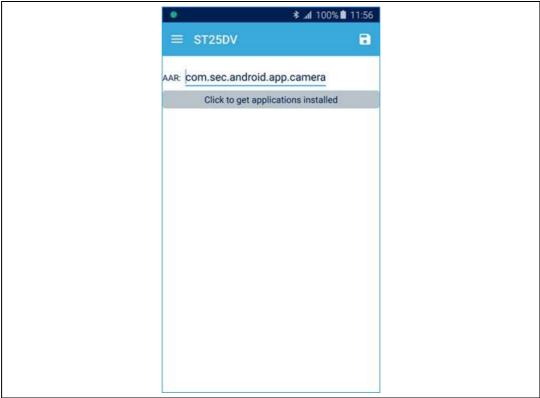
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AAR

Displays NDEF AAR edition fields and enables to write an AAR NDEF message.



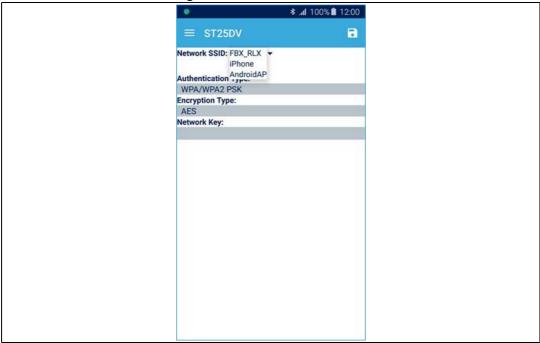


The selection of an installed application helps to retrieve the AAR message from an already installed application.

Wi-Fi[®]

Displays NDEF Wi-Fi $^{\rm \tiny IR}$ edition fields and enables to write a Wi-Fi $^{\rm \tiny IR}$ NDEF message.

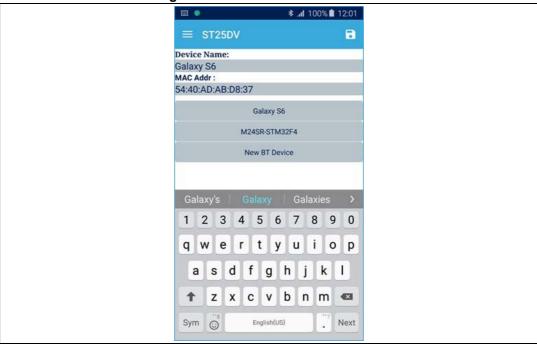




Bluetooth®

Displays NDEF Bluetooth® edition fields and enables to write a Bluetooth® NDEF message.

Figure 17. NDEF Bluetooth® screen



SMS

Displays NDEF SMS edition fields and enables to write an SMS NDEF message.

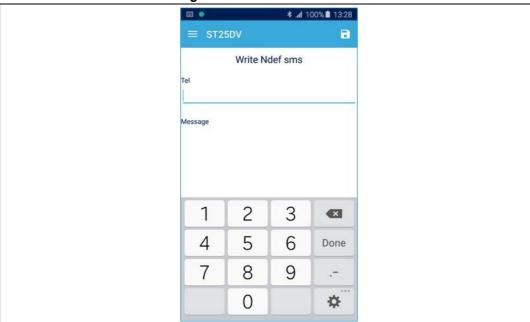
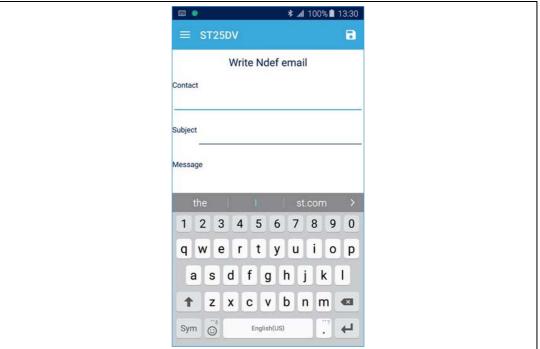


Figure 18. NDEF SMS screen

Email

Displays NDEF Email edition fields and enables to write an email NDEF message.



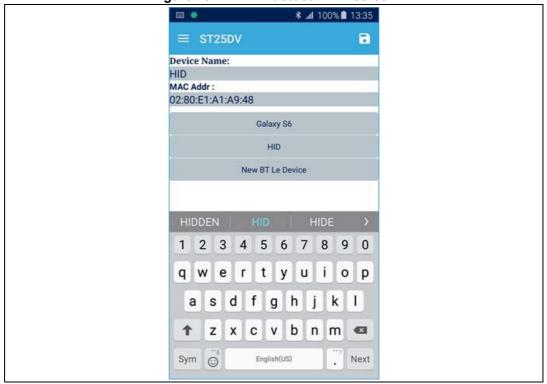




Bluetooth[®] Low Energy

Displays NDEF Bluetooth[®] Low Energy edition fields and enables to write a BLE NDEF message, as shown in *Figure 20*.

Figure 20. NDEF Bluetooth® LE screen



UM2131 Tag main features

4 Tag main features

This section describes the tag main features that can be reached from the **Drawer** > <**Tag name**> **features** menu. Examples for various tags are shown in **Figure 21**.

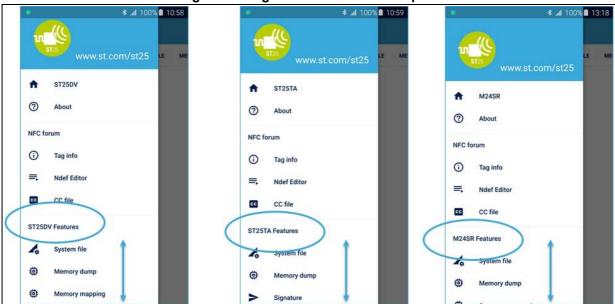


Figure 21. Tag features access examples

4.1 Memory features

The memory features illustrated in Section 4.1.1 to Section 4.1.4 provide ways of reading or writing to tag memory with the possibility to store or restore memory content to or from a file.

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Tag main features UM2131

4.1.1 Read memory

The read memory feature enables to dump a number of bytes from the memory starting at a given address. Read memory screen examples are shown in *Figure 22*.

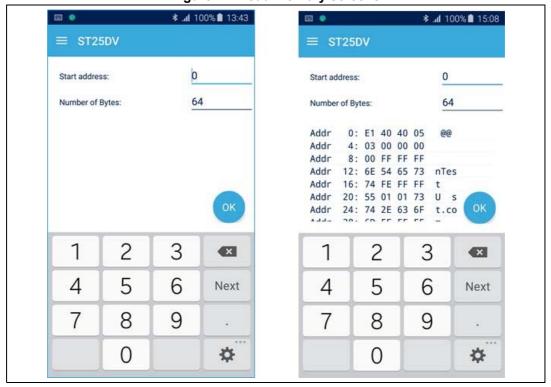


Figure 22. Read memory screens

UM2131 Tag main features

4.1.2 Write memory

The write memory feature enables to write a given value to the memory at a given address. A write memory screen example is shown in *Figure 23*.

≱ ... 100% 15:16 ≡ ST25DV 10 Byte address: 13 Value Addr 8: 00 FF 0D FF Addr 12: 00 FF FF FF Addr 16: 74 FE FF FF t Addr 20: 55 01 01 73 U s 3 1 2 × 4 5 6 Done 8 9 0 *

Figure 23. Write memory screen

Tag main features UM2131

4.1.3 Dump memory

The dump memory feature enables to write to a given file a number of bytes from the memory starting at a given address. A dump memory screen example is shown in *Figure 24*.

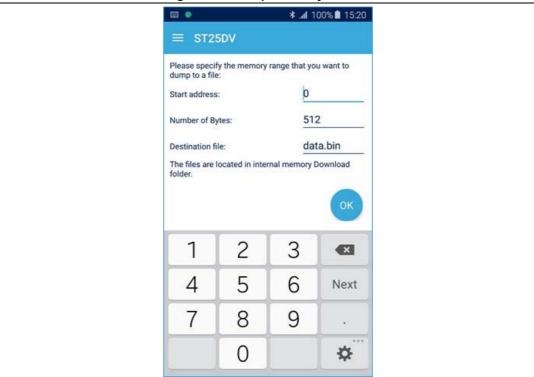


Figure 24. Dump memory screen

UM2131 Tag main features

4.1.4 Fill memory

The fill memory feature enables to write the content of a given file to the memory starting at a given address. A fill memory screen example is shown in *Figure 25*.

≱ .d 100% 15:23 **≡** ST25DV Please select a source file and specify the destination offset at which you want to write those data in Tag's Select source file Source file: Destination offset (hex): 0000 3 4 5 6 7 QW E R Т YU 1 0 P G H S D F J K Z X C В ٧ M €3 4 Sym English(US) 0

Figure 25. Fill memory screen

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4.2 Registers management

This section illustrates the way to configure tag registers if any. The configuration of tag registers is tag-implementation specific including:

- Display of registers values
- · Change of registers values
- Refresh of registers values
- Tag update and write of values to tag

Registers management examples are shown in Figure 26.

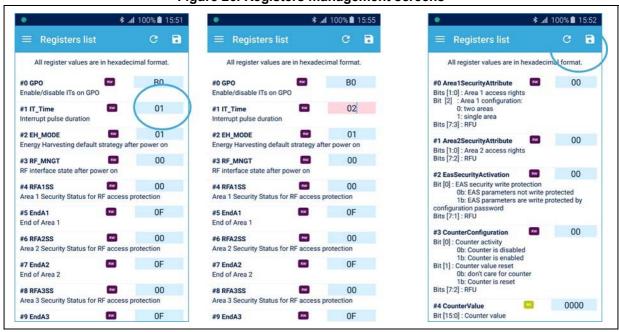


Figure 26. Registers management screens

4.3 Configuration protection

The configuration protection screen is specific to some tags like ST25DV-I2C and ST25TV. The configuration password is needed each time the user wants to change a configuration register.

This screen can be used for:

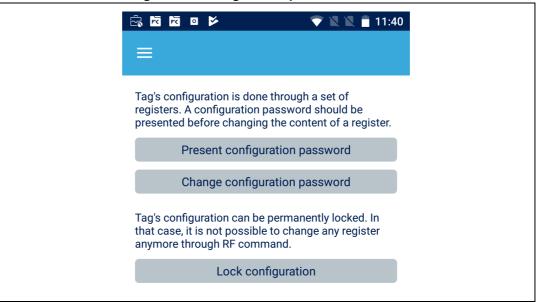
- The presentation of the configuration password
- · Changing the configuration password
- Permanently locking the configuration. In that case, it is not be possible anymore to change any register through RF.

Note: it is still possible to unlock the products with an I^2C interface, like the ST25DV-I2C tags, through their I^2C interface.

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UM2131 Tag main features

Figure 27. Configuration protection screen



4.4 Areas management

This section illustrates the way to configure the tag memory with areas. This configuration is tag-dependent and tag-implementation specific.

Areas management example screens are shown in Figure 28.

★ .dl 100% **1** 15:44 **★ .dl** 100% **1** 15:45 **≱** ... 100% 15:46 8 Move the bottom edge of Area1, Area2, Area3 to change the number of areas and their sizes. Select a memory configuration: Select a memory configuration: O 1 single area 1 single area of 2 Kbits. (Area protected by a 64 bits password) 2 areas Area4 will take all the 2 independent areas of 1 Kbits each.
(Each area protected by a 32 bits pass) remaining space up to the end of the tag's O 3 areas Update TAG O 4 areas Selected area: O Area 1 O 5 areas O Area 2 Area 3 O 7 areas Fine tuning of selected area's end: O 8 areas ^ Update TAG Area 2 192 48 96 96 24 Area 4 128 512

Figure 28. Areas management screens

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4.5 Areas security status

This section and its sub-sections illustrate the way to configure the tag areas security status, usually composed of a password and R/W permission. The configuration of tag areas security status is tag-dependent and tag-implementation specific including:

- Change of area password
- Change of area R/W permission
- Password presentation
- Password change

The area security status main screen is shown in Figure 29.



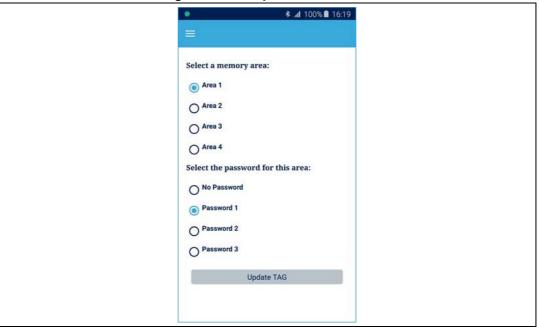
Figure 29. Area security status screen

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4.5.1 Area password

Figure 30 shows a tag area password configuration example.

Figure 30. Area password screen



4.5.2 R/W permissions

Figure 31 shows a tag R/W attributes configuration example.

★ .d 100% 16:21 **≱** ... 100% 16:22 Select a memory area: Select a memory area: Area 1 Area 1 O Area 2 O Area 2 Select the permissions for this area: O Area 3 O Area 4 Area readable and writable Area readable. Write protected by password Select the permissions for this area: Read and Write protected by password Area readable and writable Read protected by password. Write impossible (even with password) Area readable. Write protected by password Read and Write protected by password Update TAG Read protected by password. Write impossible (even with password) Update TAG

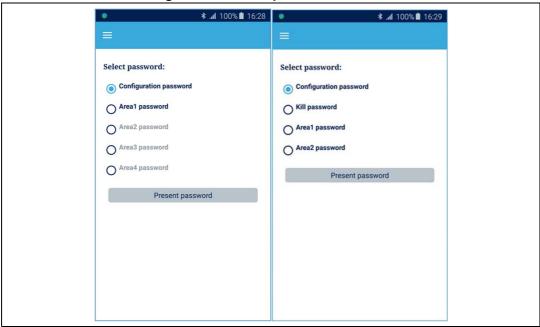
Figure 31. R/W permissions screens

Tag main features UM2131

4.5.3 Present password

Figure 32 shows a tag password presentation example.

Figure 32. Present password screens



4.5.4 Change password

Figure 33 illustrates how to change tag passwords.

* .d 100% 16:39 * .d 100% 16:39 **≱** ... 100% **1**6:44 Select password: Select password: Select password: Select password: Configuration password O Configuration password Password 1 O Password 2 O Area1 password Enter Area1 password (32 bits hexadecimal format) O Password 3 O Area2 password 00 00 00 00 00 00 00 00 00 Byte 3 Byte 2 Byte 1 Byte 0 CANCEL ок CANCEL OK

Figure 33. Change password screens

4.6 Mailbox management

This section illustrates the way to configure the tag mailbox. The configuration of the tag mailbox is specific to the tag and possible for ST25DV-I2C products only. The main configuration items are listed below.

- Mailbox field status
- Refresh status
- Mailbox reset
- Mailbox enable

The mailbox management screen is shown in Figure 34.

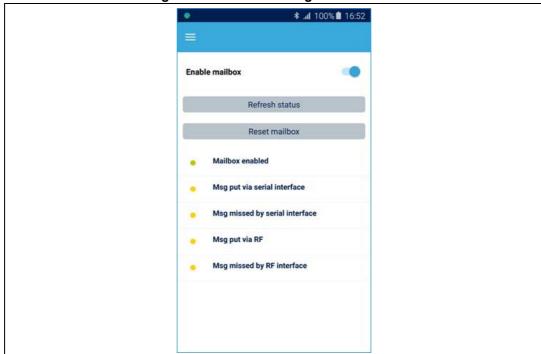


Figure 34. Mailbox management screen

4.7 Data transfer

The Fast Transfer Mode basic demonstration illustrates the data transfer features of ST25DV-I2C products. This demonstration is dedicated to the ST25DV-I2C tag and requires a specific firmware driving the TAG through I²C on a Discovery board. The firmware reads and/or writes the data to transfer.

Note:

Refer to ST25DV-DISCOVERY firmware for details. The Mailbox must be enabled first through firmware or RF (refer to the mailbox management features introduced in Section 4.6).

The data transfer features are:

- Send data to tag
- · Receive data from tag

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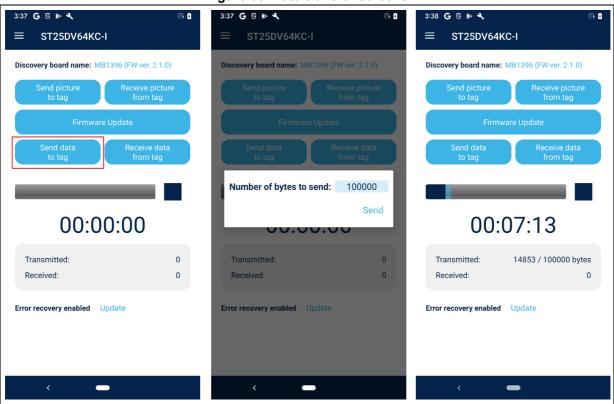
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Data transfer is observable by means of:

- A progression bar displayed during the transfer
- A stopwatch counter displayed and triggered by actions

Figure 35 shows examples of data transfer screens.

Figure 35. Data transfer screens



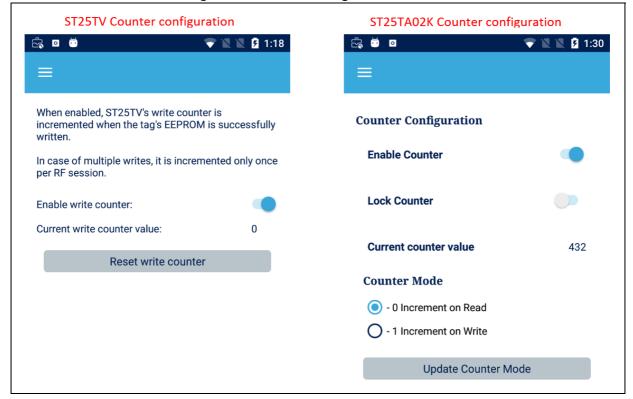
4.8 Counter

Some tags (like ST25TA02K and ST25TV) have their counter incremented when the user reads from, or writes to their memory, with slight differences (tag-dependent).

- Depending on the features of the tag, the counter configuration screen allows:
- Activating the counter
- Displaying the current value of the counter
- Locking the counter
- Resetting the counter
- Selecting if the counter is incremented by read or write operations

Figure 36 shows the counter configuration screens for an ST25TV tag as well as for an ST25TA02K tag.

Figure 36. Counter configuration screens



4.9 Tamper detect

The tamper detection feature is specific to ST25TV tags.

Each time the ST25TV tag is powered on, it checks if there is a closed loop between pins TD0 and TD1. This feature can be used to check if a good, for example a bottle, has been opened (tampered).

Figure 37 shows the tamper detect screens for an ST25TV tag with the corresponding register for each of the two detection cases.

Figure 37. Tamper detect screens (ST25TV tags)



4.10 Lock block

This feature is specific to NFC Type 5 tags.

In NFC Type 5 tags, the memory is divided into blocks of a given number of bytes. For STMicroelectronics Type 5 products, each block is made of 4 bytes.

Thanks to the *Lock block* screen it is possible to read the status of each block (locked or unlocked) and the permanent lock of any block in the memory. This action is irreversible. It can be used when the user wants to be sure that the content of the block(s) will never be changed.

Figure 38 shows a Lock block screen example.

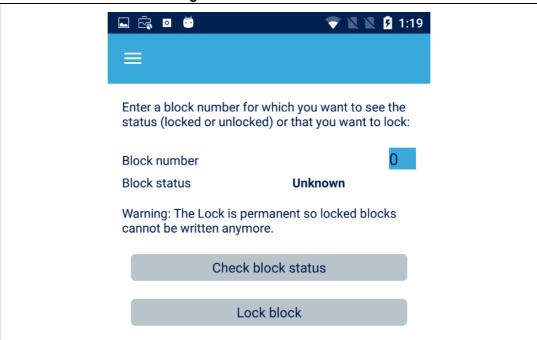


Figure 38. Lock block screen

The Lock block and Area Read/Write permissions described in Section 4.5.2 are two possible means to prevent the modification of parts of the memory:

- Lock block is permanent and must be done for each block one by one
- Area configuration is global and applicable to a whole area. The area can be protected
 by password for read, write, or both. It also offers a mode for which the content of the
 area cannot be written anymore. This is the mode for which the reading of the memory
 is protected by password and the writing is impossible, even if the password is
 presented.

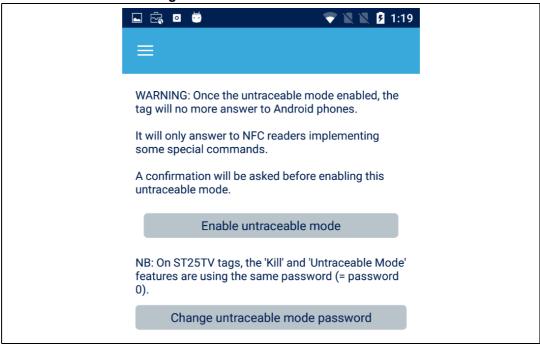
4

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4.11 Untraceable mode

This feature is specific to ST25TV products, it is enabled through the *Untraceable mode* screen. Once enabled, the tag is no longer seen by NFC Type 5 inventory. However, it is possible to communicate with it if its UID is known. For doing so, the *Untraceable mode* password must be presented (the UID must be specified in the command). The tag answers to every command.

Figure 39. Untraceable mode screen



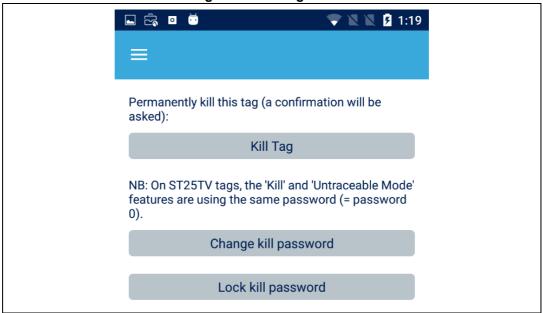
Caution: If the *Untraceable mode* is enabled, the tag cannot be discovered by smartphones.

4.12 Kill tag

This feature is specific to ST25TV products. It can be used to permanently kill the tag.

The *Lock kill password* button allows preventing modifications of the kill password. Once activated, it is not possible anymore to change the kill password.

Figure 40. Kill tag screen



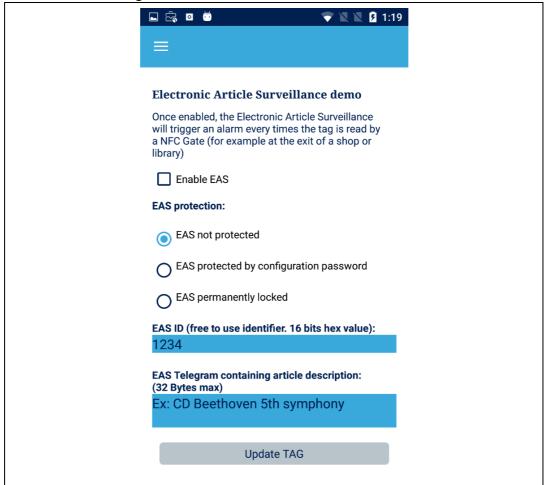
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4.13 Electronic article surveillance

This feature is specific to ST25TV products.

Electronic article surveillance (EAS) can be used to control goods (e.g. books, CDs, DVDs, and others in a library). NFC gate readers at the library exit raise an alarm each time an article, with EAS enabled, goes through the gate.

Figure 41. Electronic article surveillance screen



With this screen, the user can:

- Enable Electronic article surveillance
- Set the *Electronic article surveillance* protection:
 - This protection is needed to prevent a user of the library to disable the alarm. Only library employees are able to disable the EAS protection when an article is rented thanks to the configuration password.
 - The EAS can be permanently locked. In such a case, it is not possible to disable it
 and the only way to turn the alarm off is to kill the tag. This can be used when the
 EAS is used to protect a product in a shop. Once the product is purchased, the tag
 can be killed.
- The EAS ID is a 16-bit identifier, which can be set freely to identify the article.
- The EAS Telegram is a text limited to 32 characters describing the article.

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The ST25 Android™ NFC tap application demonstrates how the EAS alarm can be handled. Each time a ST25TV tag is found by the inventory, the application checks if the EAS is enabled. If it is enabled, it raises an alarm, as illustrated in *Figure 42*.

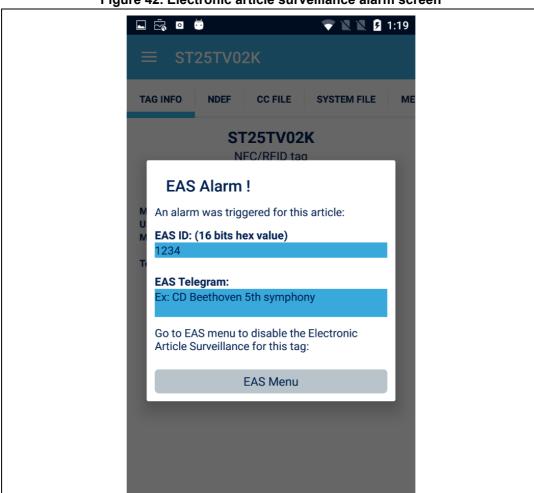


Figure 42. Electronic article surveillance alarm screen

4.14 Pulse-width modulation configuration

This feature is specific to ST25DV-PWM products.

Due to RF high-sensitivity levels, and because of the switching noise generated by a PWM output (by construction), the adjustment of different PWM parameters is proposed to improve the coexistence between the PWM interface and the RF interface:

- PWM output driver trimming
- PWM output coexistence with RF interface

Also available in the configuration, the PWM control access rights, to define R/W permissions and password for PWM control area.

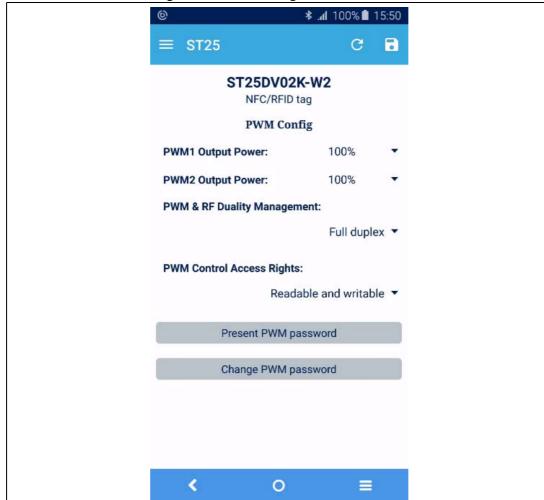


Figure 43. PWM configuration features

4.15 Pulse-width modulation control

This feature is specific to ST25DV-PWM products.

PWM control enables to set PWM registers using the following main setting attributes:

- Disable/Enable PWM
- Period value
- Pulse-width value

Four profiles are available, with different level of detail and features:

- **Normal**: sets the duty cycle of each PWM with simple bar sliders (frequency already set through the Expert mode).
- Expert: provides detail setting for PWM attributes and corresponding registers values.
- Auto: demonstrator use case for autonomous changing of the duty cycle on the two
 channels, like one going up and the other down. Same as the normal profile with
 automatic setting.
- Musics: demonstrator use case that enables the playback of music note using frequency/period setting. A simple finite music list is available for selection (a buzzer must be connected to the PWM1 output for playback).

The PWM controls are shown in figures 44 to 46.

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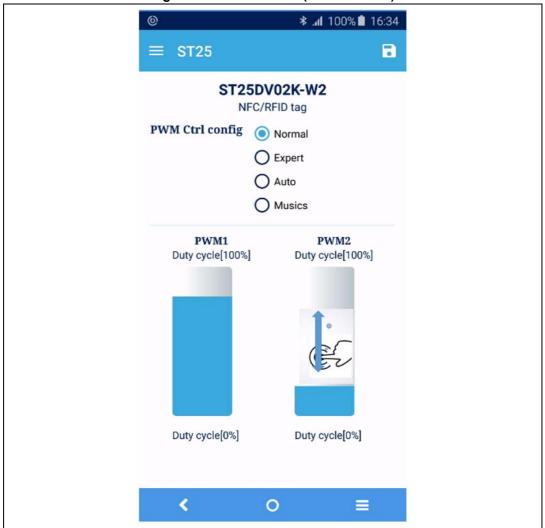


Figure 44. PWM control (normal mode)



Figure 45. PWM control (expert mode)



Figure 46. PWM control (musics mode)

5 Demonstrations use cases

The demonstrations are product specific. The available demonstrations related to a given product can be reached through the tag drawer demonstration menu.

Note: Some demonstrations require boards with specific firmwares associated.

5.1 Stopwatch

Stopwatch demonstration (ST25DV-I2C product only) - Discovery board

This demonstration is dedicated to the ST25DV-I2C tag and requires a specific firmware driving the TAG through I²C on a Discovery board. The firmware reads and/or writes the data to transfer.

Note: Refer to ST25DV-DISCOVERY firmware for details.

The stopwatch feature is:

Stopwatch information transfer between phone and board

Stopwatch observability is provided thanks to a counter, displayed and triggered by actions The stopwatch screen is shown in *Figure 47*.

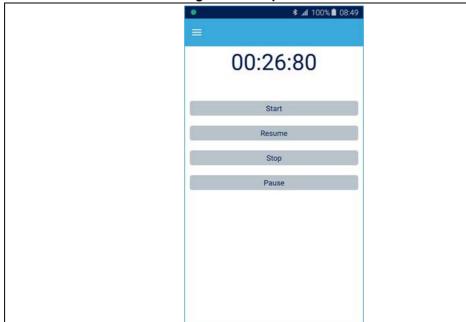


Figure 47. Stopwatch screen

5.2 Firmware update

Firmware update demonstration (ST25DV-I2C product only) - Discovery board

This demonstration is dedicated to the ST25DV-I2C tag and requires a specific firmware driving the TAG through I²C on a Discovery board. The firmware reads and/or writes the data to transfer.

Note: Refer to ST25DV-DISCOVERY firmware for details.

The firmware update feature is:

Pick a firmware to upload: enables to send file content to host through tag
 Password exchange is part of the transfer protocol. Refer to ST25DV-DISCOVERY
 firmware documentation for default settings

Firmware update can be monitored thanks to:

- a progression bar displayed during the transfer
- a stopwatch counter displayed and triggered by actions

Figure 48 shows examples of firmware update screens.

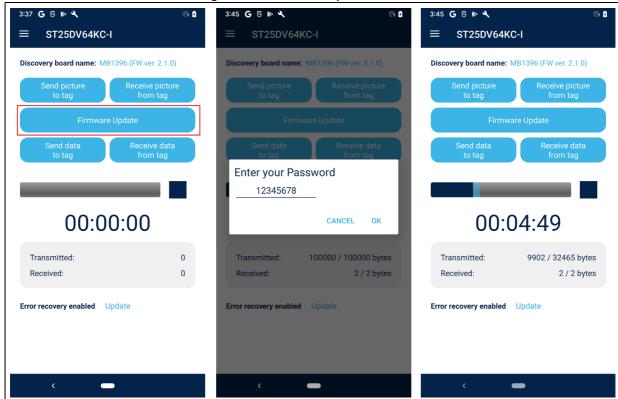


Figure 48. Firmware update screens

5.3 Picture transfers

Picture transfer demonstration (ST25DV-I2C product only) - Discovery board

This demonstration is dedicated to the ST25DV-I2C tag and requires a specific firmware driving the TAG through I²C on a Discovery board. The firmware reads and/or writes the data to transfer.

Note: Refer to ST25DV-DISCOVERY firmware for details.

The picture transfer features are:

- · Send picture to tag
- Receive picture from tag

Picture transfer observability is provided by means of the following status:

- · A progression bar is displayed during the transfer
- A stopwatch counter is displayed and triggered by actions

Figure 49 shows examples of picture transfer screens.

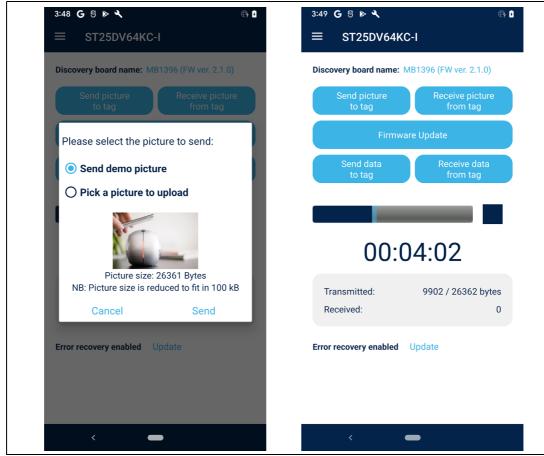


Figure 49. Picture transfer screens

Note:

For download features, start the demonstration on board first, and then click on the start button of the application.

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6 Revision history

Table 1. Document revision history

Date	Revision	Changes
27-Feb-2017	1	Initial release.
30-May-2017	2	Full document update in relation with the application update: sections updated and reordered in all chapters. All figures updated.
08-Jun-2017	3	Updated application URL in Section 2.1: Prerequisites.
10-Apr-2018	4	Document scope extended to the ST25TV series NFC tags and new feature descriptions added or updated: - Updated Section 2.2: Functionalities overview - Updated Section 3.3.2: NDEF editor operations - Added Section 4.3: Configuration protection - Added Section 4.8: Counter - Added Section 4.9: Tamper detect - Added Section 4.10: Lock block - Added Section 4.11: Untraceable mode - Added Section 4.12: Kill tag - Added Section 4.13: Electronic article surveillance Application renamed "ST25 Android™ NFC tap application".
26-Jun-2018	5	Document scope extended to PWM features: - Updated Introduction - Updated Section 2.2: Functionalities overview - Added Section 4.14: Pulse-width modulation configuration - Added Section 4.15: Pulse-width modulation control
05-Aug-2021	6	Updated Introduction, Section 2.2: Functionalities overview, Section 4.7: Data transfer, Section 5.1: Stopwatch, Section 5.2: Firmware update and Section 5.3: Picture transfers. Updated Figure 35: Data transfer screens, Figure 48: Firmware update screens and Figure 49: Picture transfer screens. Minor text edits across the whole document.

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