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ST25TV512C/02KC
Product presentation

ST25TV512C/02KC main market segments

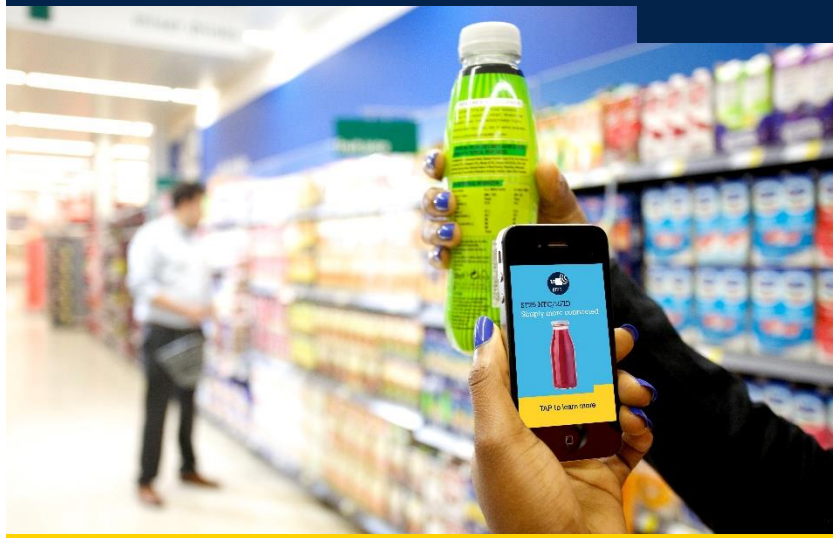
Luxury

Asset tracking, Brand recognition

Wine & Spirits

Product Identification, tamper proof application

Consumer Packaged Goods



Consumer engagement

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ST25TV512C/02KC use cases

Tamper detection, anti-counterfeiting

- **Detects** if the bottle has been **opened**

Brand protection, Accessory recognition

- Based on cloud management

Traceability, Product identification

- Consumer engagement

Parameter setting

- Automatic and dynamic product configuration

Access control

- NFC / RFID badges to get access

Device personalization in production

- **In-the-box** quick personalization thanks to **Long range**

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Typical RF range

NFC phones

ISO15693 (26kb/s)

Up to 7 cm / 3in.

RFID readers

Up to 40cm / 1.3ft

ISO15693 (26kb/s)

Up to 1.0 m / 3ft

Reduce your antenna dimension and make your product more robust thanks to ISO15693

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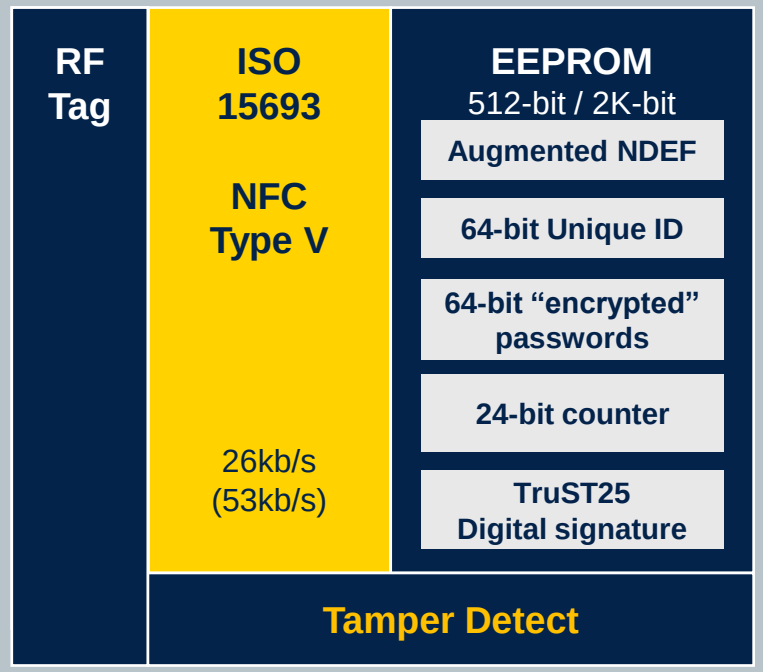
ST25TV512C/02KC ID card

ST25TV512C / 02KC



FPN5

SBN12 / SBN075
Die form, sawn and Bumped inkless 8" wafer, 120µm/75um thickness

Use cases

- Product Identification, asset tracking, consumer engagement, access control
- Tamper proof application, brand protection

Key Features

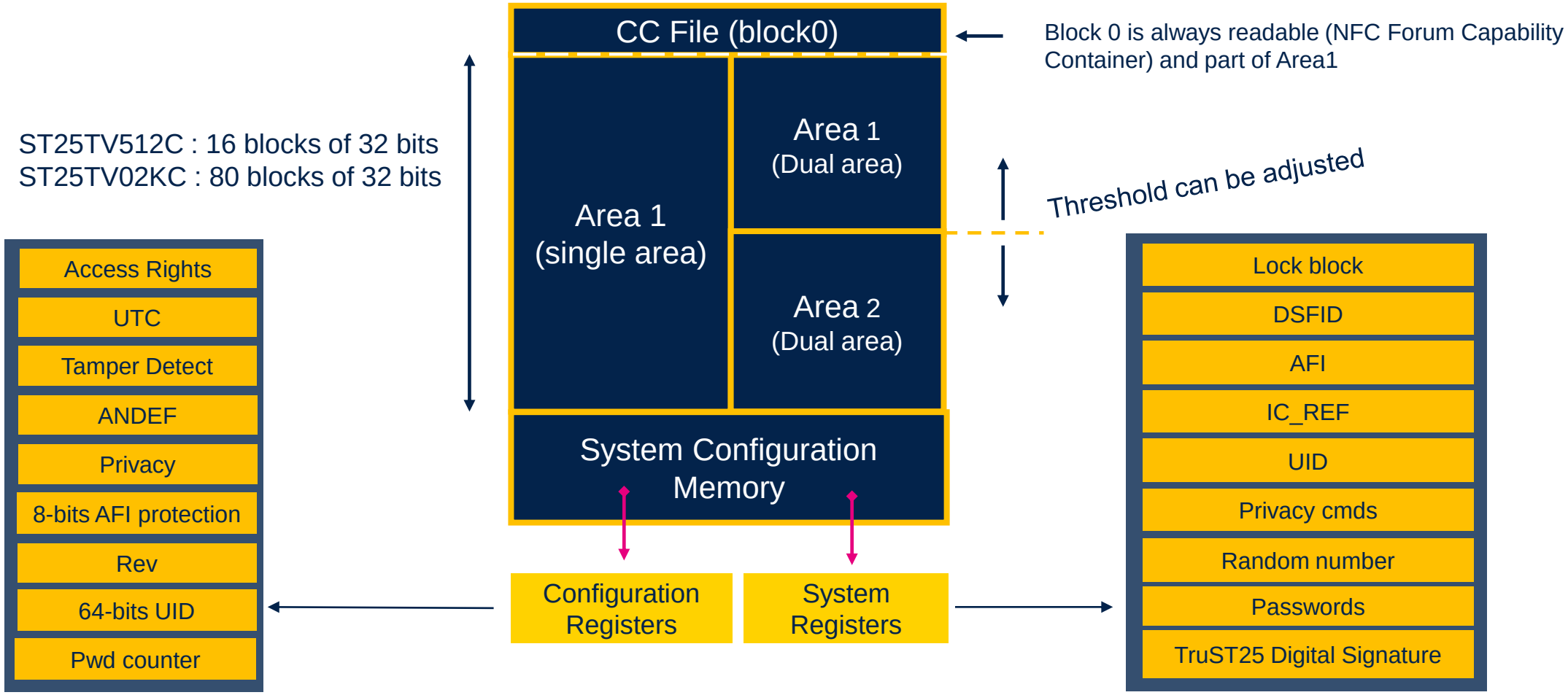
- **ISO15693** and **NFC Type V** (long range operations, 26kb/s)
- **Memory configuration** : 512-bit and up to 2560-bit
- **TruST25 Digital Signature** (can be used into ANDEF : 2K-bit only)
- 24-bit **Unique Tap Code (UTC)** with anti-tearing
- 64-bit **Unique Identifier (UID)** complies with ISO/IEC 15693 and ISO/IEC 7816-6
- **Untraceable** (by default possible) & Kill modes
- **Tamper Detect pin** for open / short detection
- **Augmented NDEF**: UID, signature, UTC, Tamper, ctm field, PWD counter

Key Benefits

- **Configurable User Memory Area**
- 23pF and 99pF internal RF tuning capacitance allowing all antenna design
- Cloning Protection with **Digital Signature** (Cloud management)
- **60 years** data retention, **100k cycles** erase/write

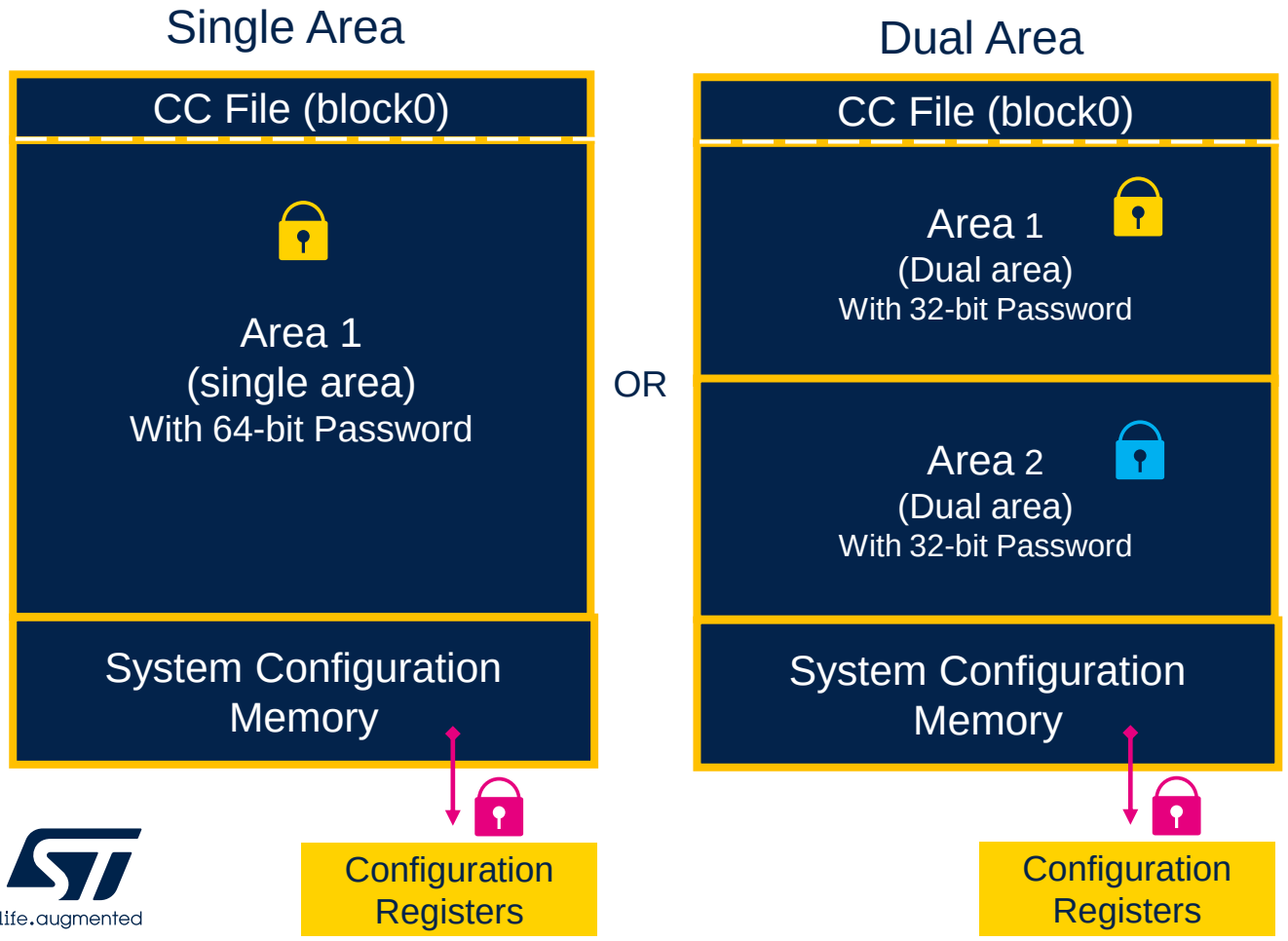
ST25TV512C/02KC memory configuration (1/2)

Configurable memory



ST25TV512C/02KC memory configuration (2/2)

Flexible user memory configuration versus use cases



For passwords 1 and 2 :

Configuration	Access rights for Area1 & Area2
00	Area (1 or 2) readable and writable
01	Area (1 or 2) protected in Write by password
10	Area (1 or 2) protected in Read and Write by password
11	Area (1 or 2) protected in Read Area (1 or 2) disabled in Write

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ST25TV512C/02KC data protection

64-bits encrypted password & LockBlock mechanism

- Encrypted password
  - Access to group of data are controlled by security sessions based on password
  - 4 passwords are available on the product :

Password	Access rights	Pwd size
PWD_CFG	Configuration registers & kill mode	32-bits
PWD_A1	Area1 blocks in user memory	32-bits in dual area 64-bits in single area
PWD_A2	Area2 blocks in user memory	32-bits in dual area N/A in single area
PWD_UNTR	Untraceable mode	32-bits

  - The password data transmitted is **always** encrypted
  - A limit on attempts of password presentation can be enabled and configured

- LockBlock
  - It permanently protects a single block content against new writing
  - A single block is 4 bytes
  - Prerequisite : the addressed block must be available and write access granted
  - LockBlock command must be used

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ST25TV512C/02KC Augmented NDEF

Advanced NDEF message services

- The Augmented NDEF feature is a contextual automatic NDEF message service, allowing the tag to respond dynamic content without an explicit EEPROM update.
- Native operation : no mobile application required !

✓ All attributes are extracted from the ANDEF link by the server and used inside the application.

✓ Warning can be highlighted in case of doubtful / not expected values.

https://www.server.com / UID + Digital signature / Custom_field / Pwd counter / UTC / TD status

Static field – NDEF URI

Programmed once into the tag memory

Webserver managed by the customer

Dynamic fields – ASCII characters

Automatically added at each “tap”

Each attribute can be enabled/disabled

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ST25TV512C/02KC Unique Tap Code (UTC)

Unique code generator

- The UTC is a code generated by the tag itself at each new RF session that makes the ANDEF message (see ANDEF slide) unique and dynamic.
- The UTC is coded in ASCII format and can be enabled/disabled.
- A dedicated Application Note AN5578 provides further information about this mechanism.

https://www.server.com / UID + Digital signature / Custom_field / Pwd counter / UTC / TD status

Fresh value generated during each RF boot sequence

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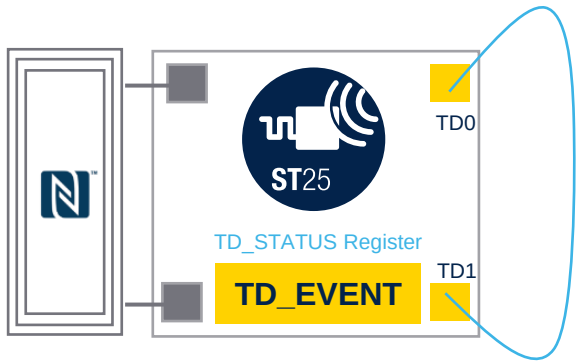
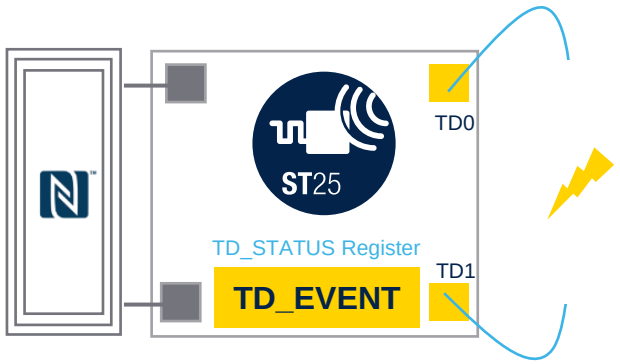
ST25TV02KC-T tamper detect indication

Open or Close loop? / Only available on ST25TV02KC-T devices

- Overview
  - The short impedance is under ~7.5 kΩ.
  - State of tamper indication (Open / Close) can be read in a dedicated register
    - User need to use EEPROM to log the different states of the Tamper detect register
    - The first opening can be triggered



SHORT state



OPEN state

Provided by TD_STATUS Register (configuration register)

State	TD_EVENT	Meaning
SHORT	TD_SEAL	TD0 & TD1 connected
OPEN	TD_UNSEAL	TD0 & TD1 not connected
OPEN	TD_RESEAL	TD0 & TD1 connected and TD_UNSEAL already occurred

1) *The information is kept during power off (permanent storage)*
2) *Tamper events occurring outside the field or during the current RF session are not detected*

- Tamper detect function is considered as an indicator only and not a protection.
- Adding of physical protection and usage of a cloud reinforce the robustness of the solution

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ST25TV512C/02KC kill mode

Kill mode : permanent deactivation of the tag

1) Before

The tag is ready/selected/quiet state

NFC phone

Kill request command

using PWD_CFG

Non-reversible

PREREQUISITE

- PWD_CFG password must be set
- Kill command must be enabled

1) *If the Kill command is disabled (DIS_KILL register is 1h), Kill request is ignored and ST25TVxxxC cannot be deactivated. By default, the Kill command is enabled (DIS_KILL register is 0h).*
2) *After an invalid presentation of PWD_CFG value through the Kill command, the GetRandomNumber command shall be called before attempting another password presentation*

2) After

The tag is in Killed state

NFC phone

Any RF commands

No more RF Communication Available

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ST25TV512C/02KC untraceable mode (1/2)

Untraceable mode : to respect privacy

1) Before

The tag is ready/selected/quiet state

NFC phone or Reader

ToggleUntraceable command

Using PWD_UNTR

PREREQUISITE

- PWD_UNTR password must be set

1) *After an invalid presentation of PWD_UNTR value through the ToggleUntraceable command, the GetRandomNumber command shall be called before attempting another password presentation*
2) *By default, the ST25TVxxxC boots in standard mode.*
3) *It is possible to configure the ST25TVxxxC to boot in Untraceable mode. If so, a mask is applied to the UID register (Untraceable UID)*

2) After

The tag is in Untraceable state

Reader

ToggleUntraceable command

Using PWD_UNTR

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ST25TV512C/02KC untraceable mode (2/2)

Untraceable mode : to respect privacy

1) Before

The tag is ready/selected/quiet state

NFC phone or reader

ToggleUntraceable command

Using PWD_UNTR

PREREQUISITE

- PWD_UNTR password must be set

1) *After an invalid presentation of PWD_UNTR value through the ToggleUntraceable command, the GetRandomNumber command shall be called before attempting another password presentation*
2) *By default, the ST25TVxxxC boots in standard mode.*
3) *It is possible to configure the ST25TVxxxC to boot in Untraceable mode. If so, a mask is applied to the UID register (Untraceable UID)*

2) After

The tag is in Untraceable state

NFC phone

Inventory command supported with Untraceable UID

ToggleUntraceable command
Using PWD_UNTR

Inventory command NOT supported

No RF communication possible

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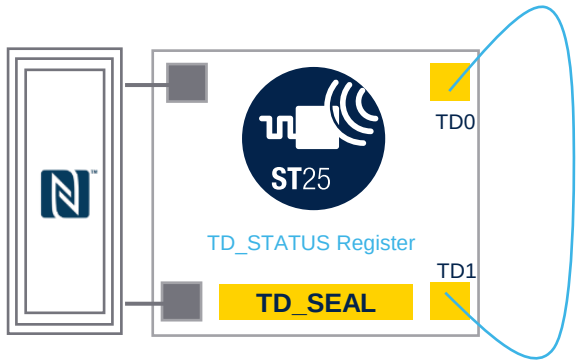
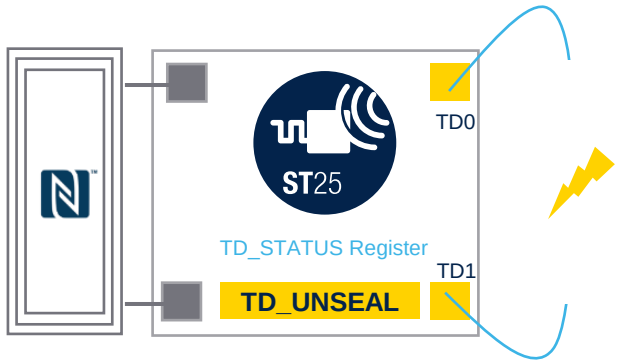
ST25TV02KC-T untraceable mode

Untraceable mode : further privacy services with ST25TV02KC-T series

- 1) ST25TV02KC-T can be configured to boot in untraceable state when tamper loop is open :

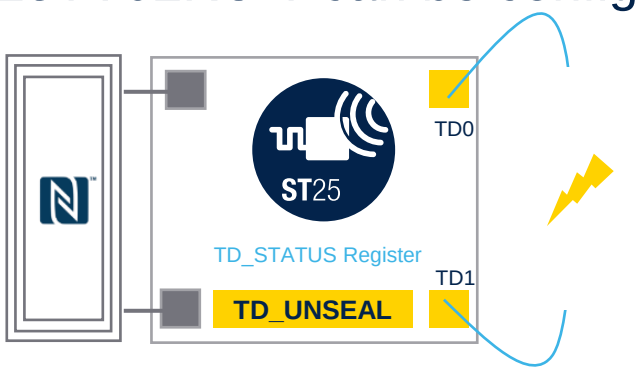


Not tampered : boot in standard mode

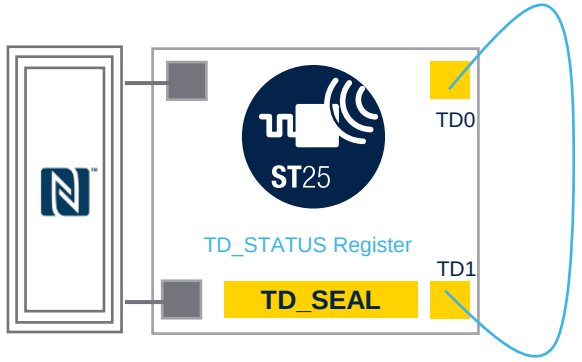


Tampered : next boot in untraceable mode

- 2) ST25TV02KC-T can be configured to enter the untraceable state when tamper loop is closed :



Tampered : boot in standard mode



Not tampered : next boot in untraceable mode

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TruST25™ digital signature overview

Chip proven authenticity services

- TruST25™ encompasses industrialization processes and tools deployed by STMicroelectronics to create and write Digital Signature in house and that benefits from Secure product environment (HSM FIPS140-2)
- TruST25 is a STMicroelectronics trademark
- Digital Signature allows applications to verify the authenticity of a product
- A dedicated application note AN5104 describes the digital Signature and how to read and verify the TruST25TM Digital Signature. Application note distributed under NDA
- Public Key will be sent to customers

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RF characteristics

NFC tuning frequency and internal tuning capacitance

	ST25TV512C ST25TV02KC
Standard	Based on ISO15693 + amendments 3 & 4 NFC Forum type V
Main carrier frequency	13.56MHz
Data sub-carrier frequency	423kHz / 484KHz
Optimal frequency tuning	13.6MHz – 14MHz
Internal capacitor (measured at 2V peak to peak)	23pF, 99pF

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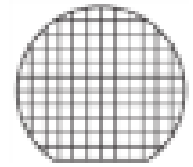
ST25TV512C/02KC packages

Bump and FPN5 packages

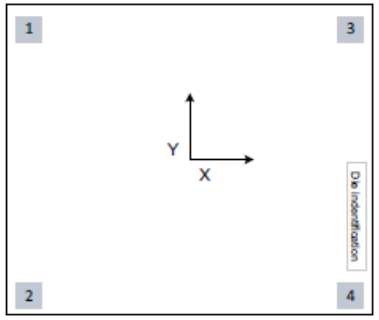
Sawn & Bumped wafer



SBN12/075 *

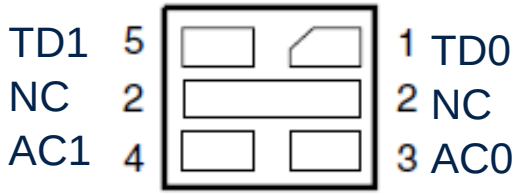
*** : sawn and bumped inkless**
8”wafer, 120µm/75um thickness

- ST25TV512C/02KC



Bump	Signal Name
1	AC0
2	AC1
3	NC or TD0 for ST25TV02KC-T
4	NC or TD1 for ST25TV02KC-T

UFDFPN5 (DFN5) package



Bottom view

1.7 x 1.4mm / 0.55mm thickness

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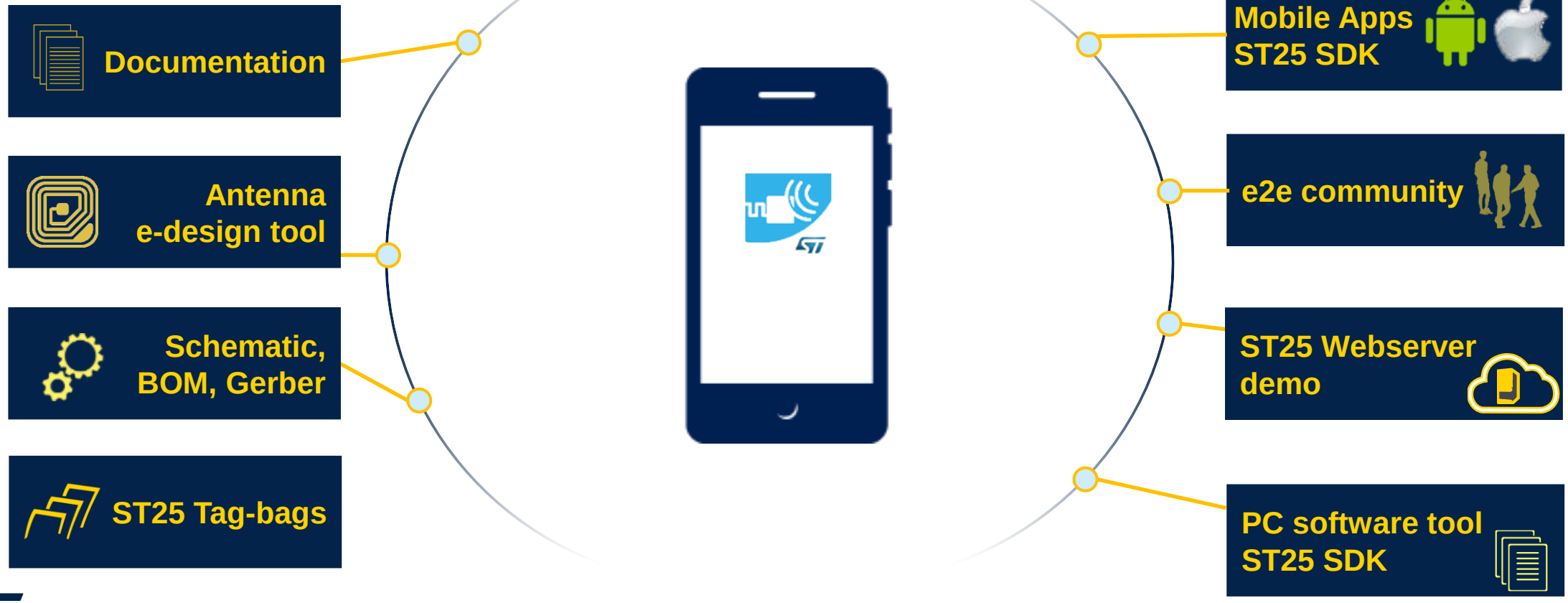
ST25T512C/02KC support eco-system

Easy-to-use and customer-oriented



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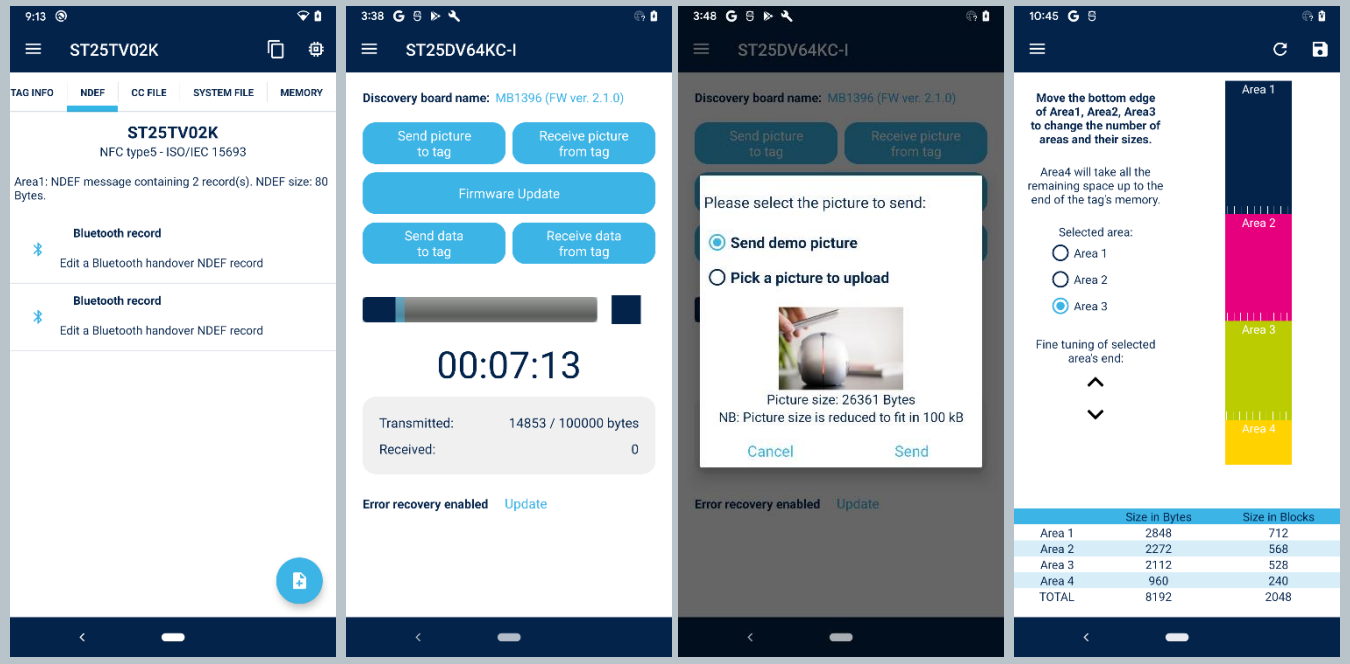
ST25 Android mobile apps

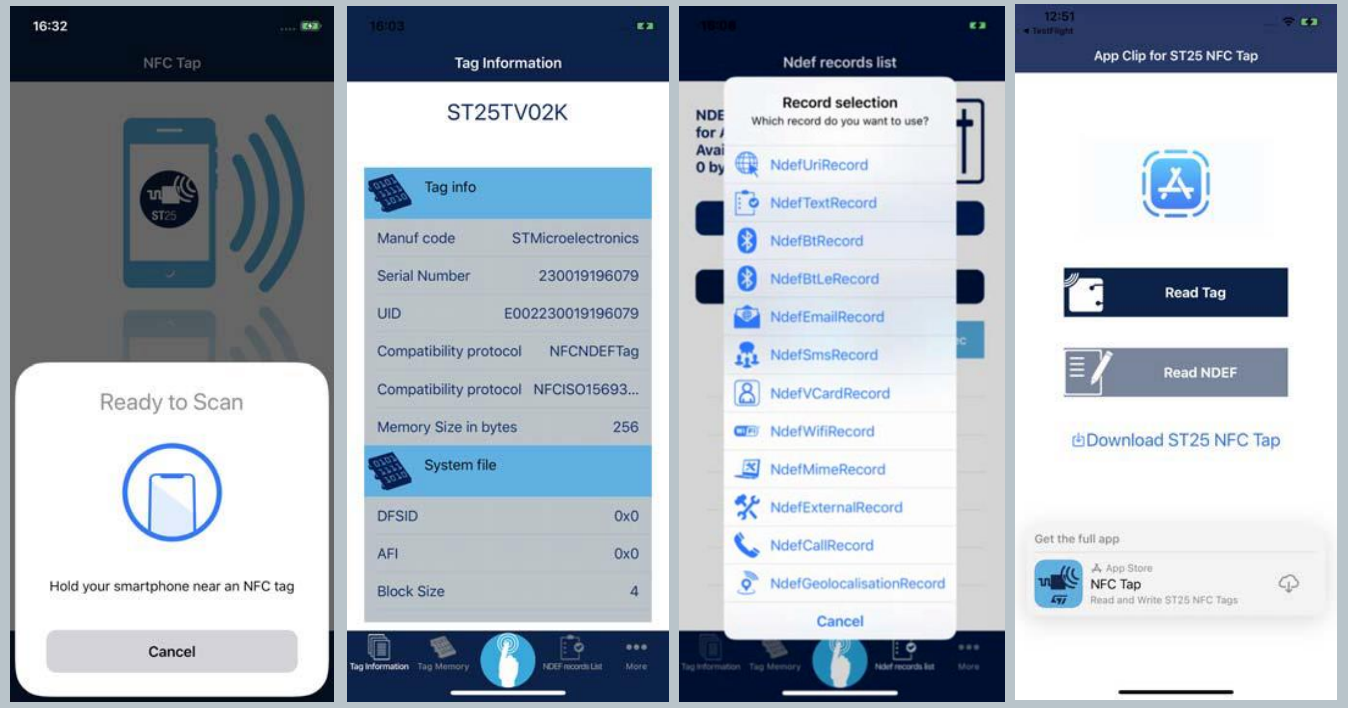
ST25 NFC Tap for Android



- Read/Write NDEF and User memory of ST25 tags
- Support of specific functionalities of ST25 tags (Tamper detect, Augmented NDEF, PWM output, TruST25 digital signature…)
- Includes demos for Fast Transfer Mode, PWM and Wifi or Bluetooth pairing
- Automatic launch of Android app
- ST25 NFC tap apk file (*STSW-ST25001*)
- ST25 NFC tap open-source code (*STSW-ST25002*)

ST25 iOS mobile apps

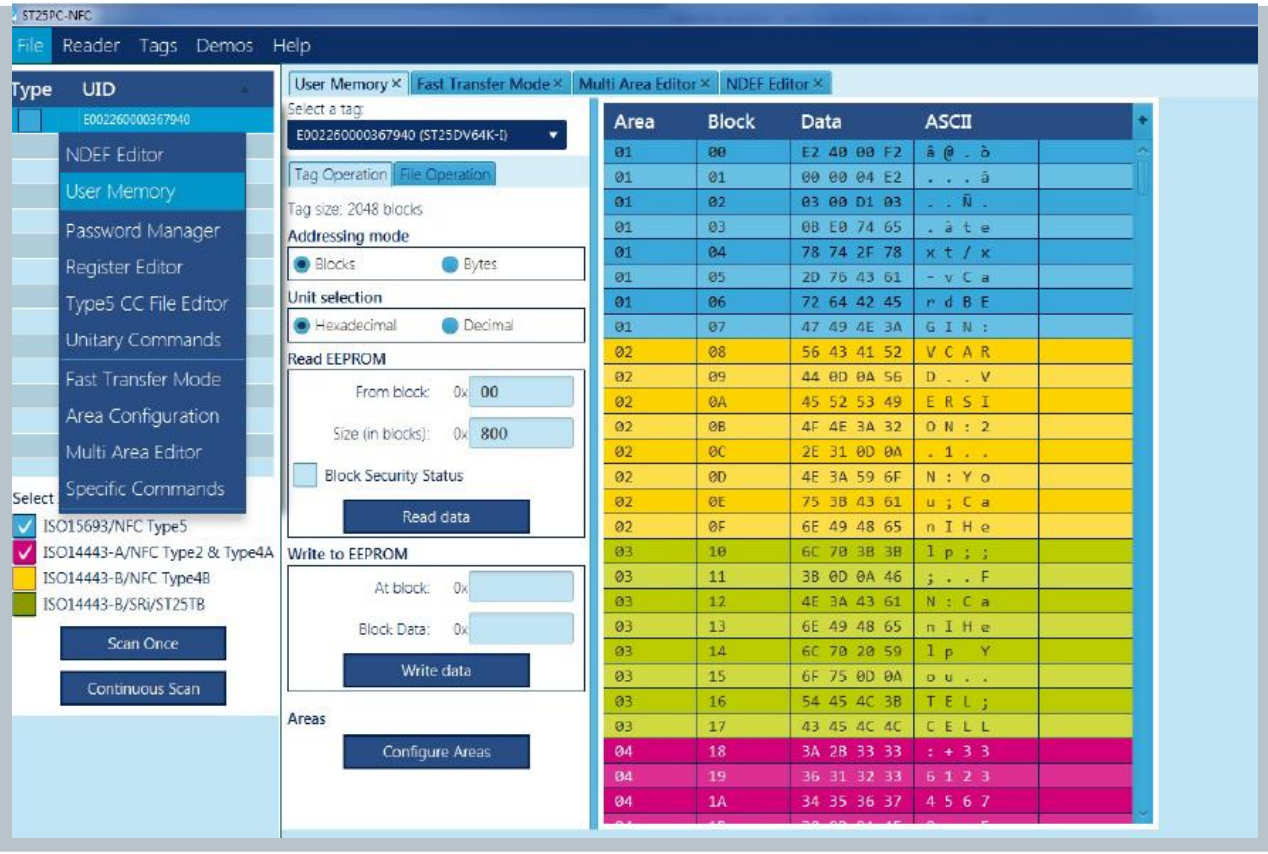
ST25 NFC Tap for iOS



- App Clip for User Experience
- Read/Write NDEF and User memory of ST25 tags
- Support of specific functionalities of ST25 tags (PWM output, TruST25 digital signature…)
- Includes demos for Fast Transfer Mode, Bluetooth pairing and PWM
- Support of NFC background tag reading
- Automatic launch of iOS app
- ST25 NFC tap open-source code (*STSW-ST25IOS002*)
- Support iOS14 & iOS15 beta

ST25 PC software

ST25 PC software for ISO15693, ISO14443-A/B & NFC readers



- Feature set support of ST25 NFC Tags and Dynamic tags
- PC SW for Windows
- Read/Write NDEF records on multiple tags
- Support of TruST25 digital signature feature
- Compatible with ST25R3916, ST25R3911B & CR95HF demo boards and industrial readers (FEIG)
- Fast Transfer Mode (FTM) demo with ST25DV-Discovery board
- Free to use demo PC SW (*STSW-ST25PC001*) and open-source code (*STSW-ST25PC002*)

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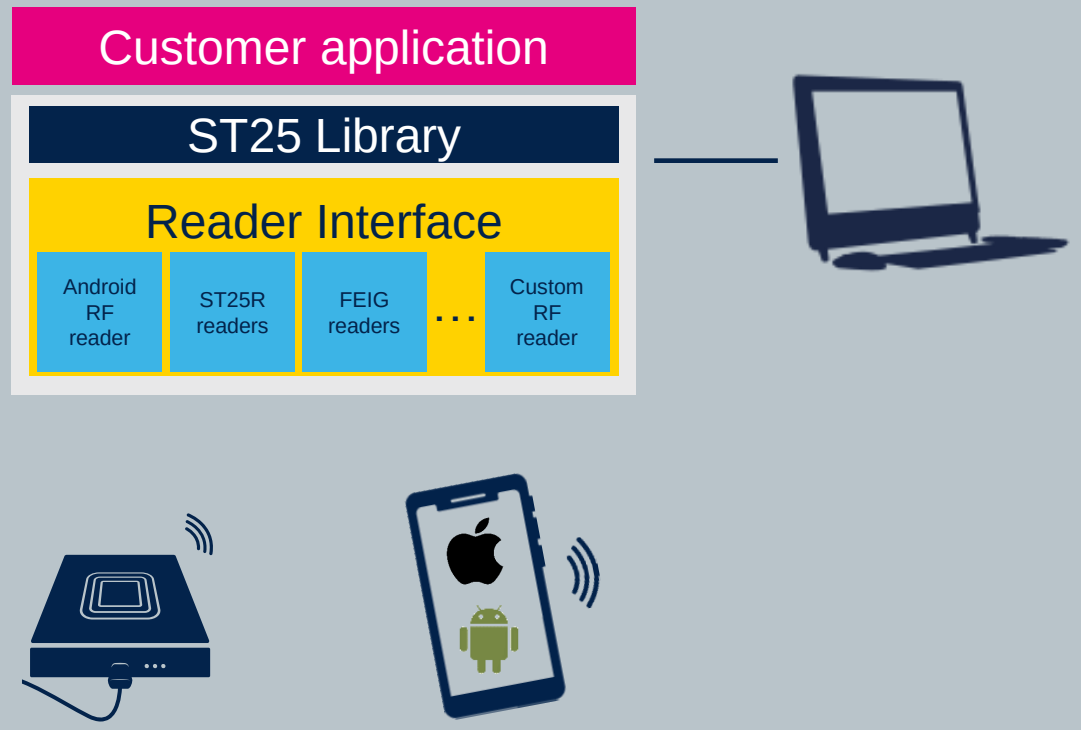
ST25 SDK

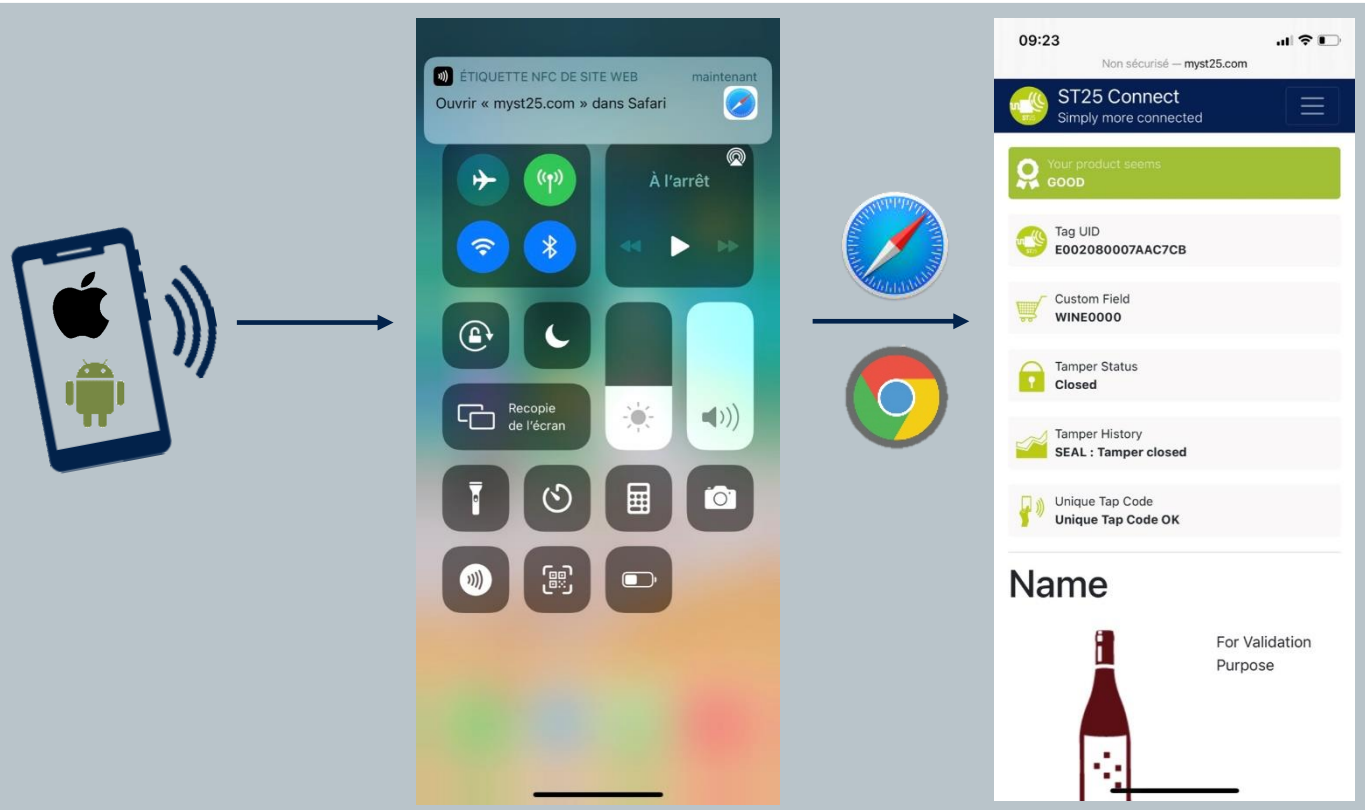
ST25 Software Development Kit



- SW library for Java™ applications development
- Multiplatform (Windows, Linux…)
- RF Library used in Android & iOS *ST25 NFC Tap* apps as well as PC software
- Includes examples and readers reference implementations
- API documentation
- ST25 SDK SW package (*STSW-ST25SDK001*)

ST25 Webserver

ST25 Webserver demo for ST25 NFC Tags



- Open-source webserver: www.myst25.com
- Compatible with ST25TV and ST25TN product series
- Augmented NDEF experience
- Native and automatic access to NDEF records
- Shared with customers on specific request and through MFT platform (SLA0085 process)
- Developed in HTML5 and PHP7.0 – Uses MySQL database
- Source code can be shared on request

ST25TV02KC evaluation board

Removable area → can be integrated into a bottle cap for demo purpose

ST25TV02KC-ASEAL board

- **ST25TV02KC** NFC/RFID tag IC
- UDFPN5 package
- 22mm diameter - 18 turns antenna
- Featuring Tamper detect loop

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Product part numbers

ST25TVxxxC-A	Package	512-bit	2k-bit
NFC Type 5 Tag ISO15693	SBN12 SBN075 SBN12 SBN075	ST25TV512C-AFG3 ST25TV512C-AFF3 ST25TV512C-AFG9 ST25TV512C-AFF9	ST25TV02KC-AFG3 ST25TV02KC-AFF3 ST25TV02KC-AFG9 ST25TV02KC-AFF9

ST25TV02KC-T	Package	2k-bit
NFC Type 5 Tag ISO15693 + Tamper Detect	SBN12 UFDFPN5 SBN12 UFDFPN5	ST25TV02KC-TFG3 ST25TV02KC-TFH3 ST25TV02KC-TFG9 ST25TV02KC-TFH9

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Solutions for NFC / RFID Tags & Readers

ST25

ST25 SIMPLY MORE CONNECTED