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ST25TN512 / ST25TN01K Product Presentation





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Solutions for NFC / RFID Tags & Readers



ST25 SIMPLY MORE CONNECTED



ST25TN512/01K main market segments

Luxury



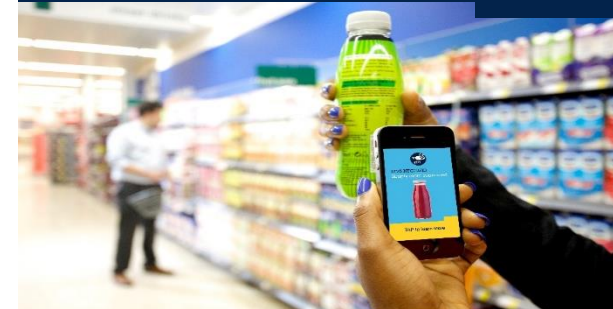
- Product or brand information

Clothing & footwear



- Extended services around a product

Consumer Packaged Goods (CPG)



- Gamification / product information

Wine & Spirits



- Product composition and tasting tips

Gaming



- Add figurine

Healthcare & Wellness



- BLE pairing



ST25TN512/01K main use cases

Product identification



- Product composition and tasting tips

Brand protection / Accessory recognition



- Based on cloud management



Consumer engagement



- Product or brand information

Parameter setting



- Automatic and dynamic product configuration

Access control / Event ticket



- Permanent or temporary access

End-user experience



- Customer warranty registration



Typical RF range

NFC phones



ISO14443 (106kb/s)

Up to 5 cm / 2in.



ST25TN

EEPROM

RFID readers



ISO14443 (106kb/s)

Up to 10cm / 4in.



ST25TN

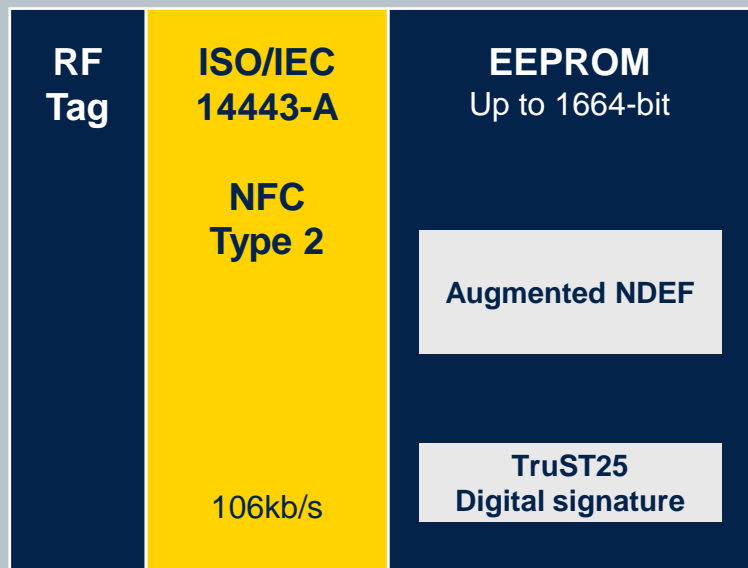
EEPROM



ST25TN512/01K ID card



ST25TN512 / 01K



UFD5



SBN12 / SBN075

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

Use cases

- Product configuration, accessory recognition, smart poster, gaming
- NFC consumer engagement, NFC token

Key Features

- **ISO/IEC 14443-A and NFC Type 2 Tag**
- High speed operations (**106kb/s**)
- **Memory configuration** : 512-bit and 1280-bit (up to 1664-bit depending on features usage)
- 24-bit **Unique Tap Code (UTC)** with anti-tearing
- **Customizable Augmented NDEF** with UID and UTC
- **TruST25** digital signature



Key Benefits

- Tiny DFN5 package (1.7x1.4mm)
- 50pF internal RF tuning capacitor allowing small antenna design
- **40 years** data retention, 100K cycles erase/write
- Low cost application



ST25TN512/01K memory configuration (1/2)

Scalable user memory

The product is proposed with 512-bits or 1.2 Kbits user memory
The AN5677 describes how to extend the user memory up to 1.6 Kbits for specific usage

Block address		Data bytes			
Dec	Hex	Byte0	Byte1	Byte2	Byte3
0 to 1	00h - 01h	Device identification			
2	02h	Internal	SysBlock	Static Lock	
3	03h	Capability container (CC)			
4 - 43	04h - 2Bh	User memory			
44	2Ch	Dynamic Lock area			SysLock
45	2Dh	Product identification			
46	2Eh	Augmented NDEF configuration			
47	2Fh	Kill password			
48	30h	Kill keyhole			
49 to 59	31h - 3Bh	Internal			
60 to 63	3Ch - 3Fh	Augmented NDEF fields			

Block address		Data bytes			
Dec	Hex	Byte0	Byte1	Byte2	Byte3
4 – 19	04h – 13h	User memory			

ST25TN512 : 16 blocks of 32 bits

ST25TN01K : 40 blocks of 32 bits

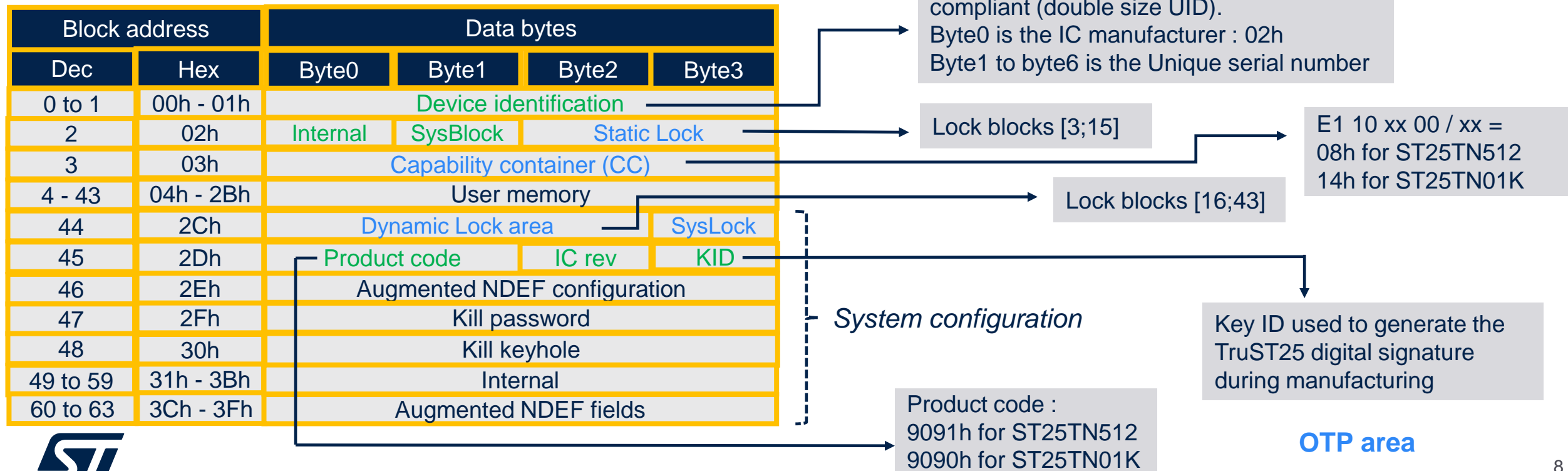
Block address		Data bytes			
Dec	Hex	Byte0	Byte1	Byte2	Byte3
4 – 43	04h – 2Bh	User memory			



ST25TN512/01K memory configuration (2/2)

Configurable memory

Key product parameters & information





ST25TN512/01K memory protection

Configurable memory access restriction

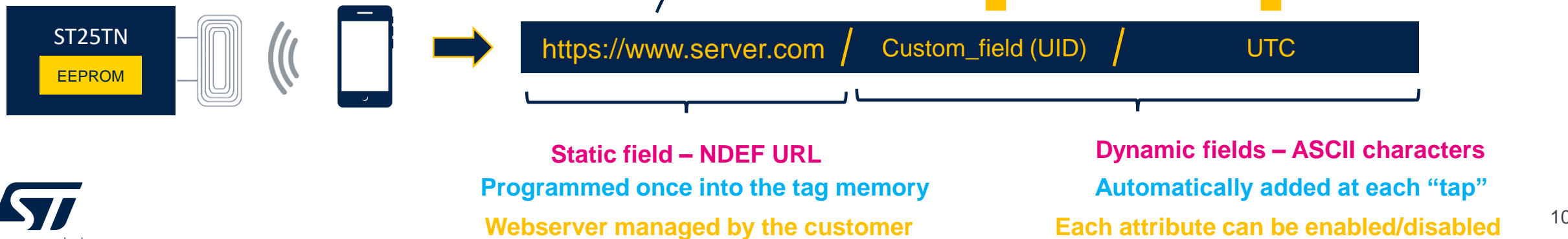
- The memory area (system and user memory) can be permanently write-protected using the lock block mechanism.
- The lock block mechanism complies with NFC Forum T2T specification.
- Several lock bits can be used to configure memory blocks as read-only :
 - Blocks [3 : 15] and [44 : 48] with single block granularity
 - Blocks [16 : 43] and [52 : 63] with double block granularity
 - Note : Blocks [0 : 2] are read-only by default
- The lock bits are OTP and can only be set to 1. Once set to 1, the selected memory area becomes read-only. The lock bit write operation is tearing-proof.



ST25TN512/01K 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 !
- Each ANDEF attribute can be enabled/disabled during the tag configuration
- The ANDEF separator character can be selected during the tag configuration





ST25TN512/01K custom field

Augmented NDEF custom message

- The custom field is :
 - Coded on 14 bytes and can be enabled/disabled.
 - Initialized during manufacturing with the UID content.
 - Not locked during manufacturing and its content can be replaced by another message.
 - Always readable.





ST25TN512/01K 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 on 3 bytes (ASCII format) and can be enabled/disabled.
- A dedicated Application Note AN5628 provides further information about this mechanism.



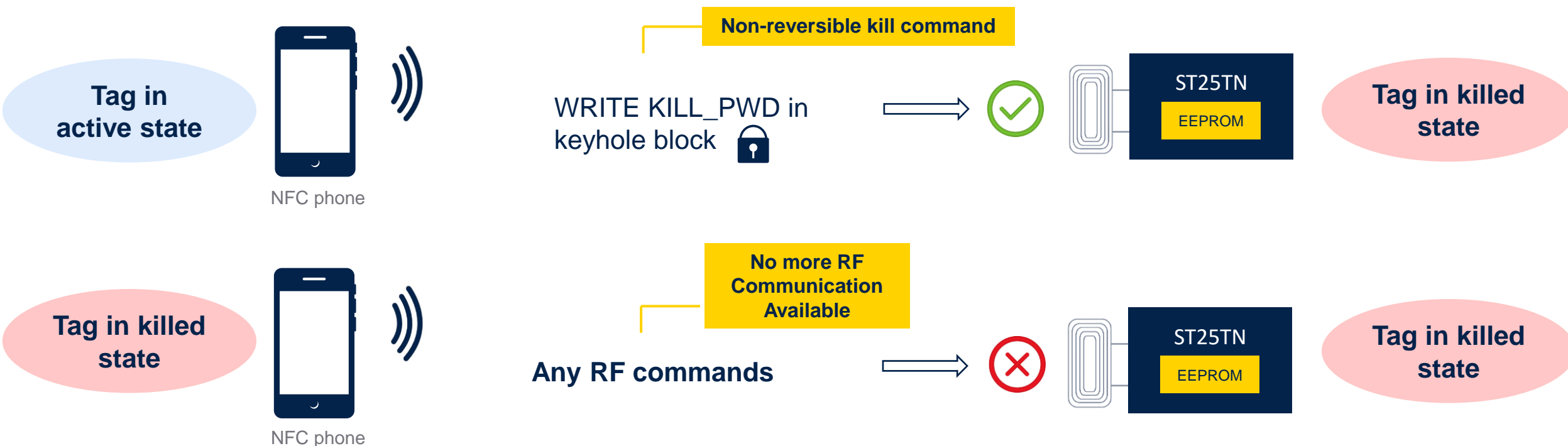
Fresh value generated once per RF session





ST25TN512/01K kill mode

Kill mode : permanent deactivation of the tag



- The kill command is enabled (and is functional) only if the *kill keyhole* (block 30h) is not locked
- When kill command is disabled, the tag device cannot be killed
- The kill command may be disabled by locking the *kill keyhole*



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 AN5660 describes the digital Signature and how to read and verify the TruST25™ Digital Signature. Application note distributed under NDA





NFC tuning frequency and internal tuning capacitance

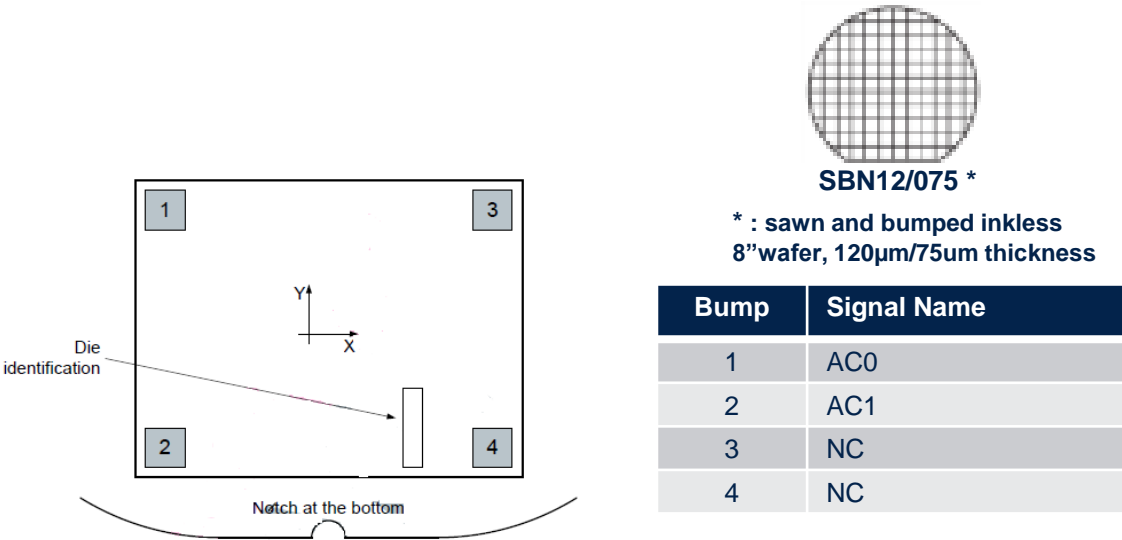
	ST25TN512 ST25TN01K
Standard	NFC Forum Type 2 Tag based on ISOIEC 14443
Main carrier frequency	13.56 MHz
Data sub-carrier frequency	848 kHz
Optimal frequency tuning	13.6MHz – 14MHz
Internal capacitor (measured at 2V peak to peak)	50pF



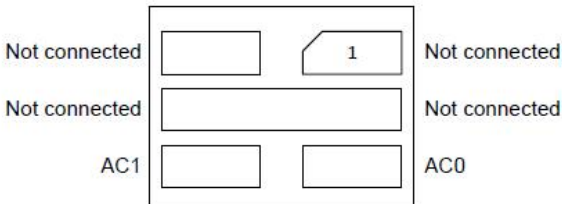
ST25TN512/01K packages

Bump and DFN5 packages

- Sawn & Bumped wafer



- UFDFPN5 (DFN5) package



Bottom view

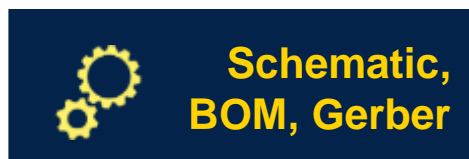
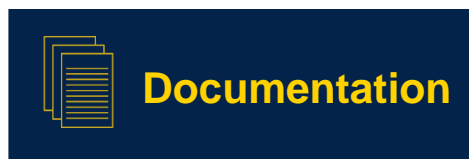


1.7 x 1.4mm / 0.55mm thickness



ST25TN support eco-system

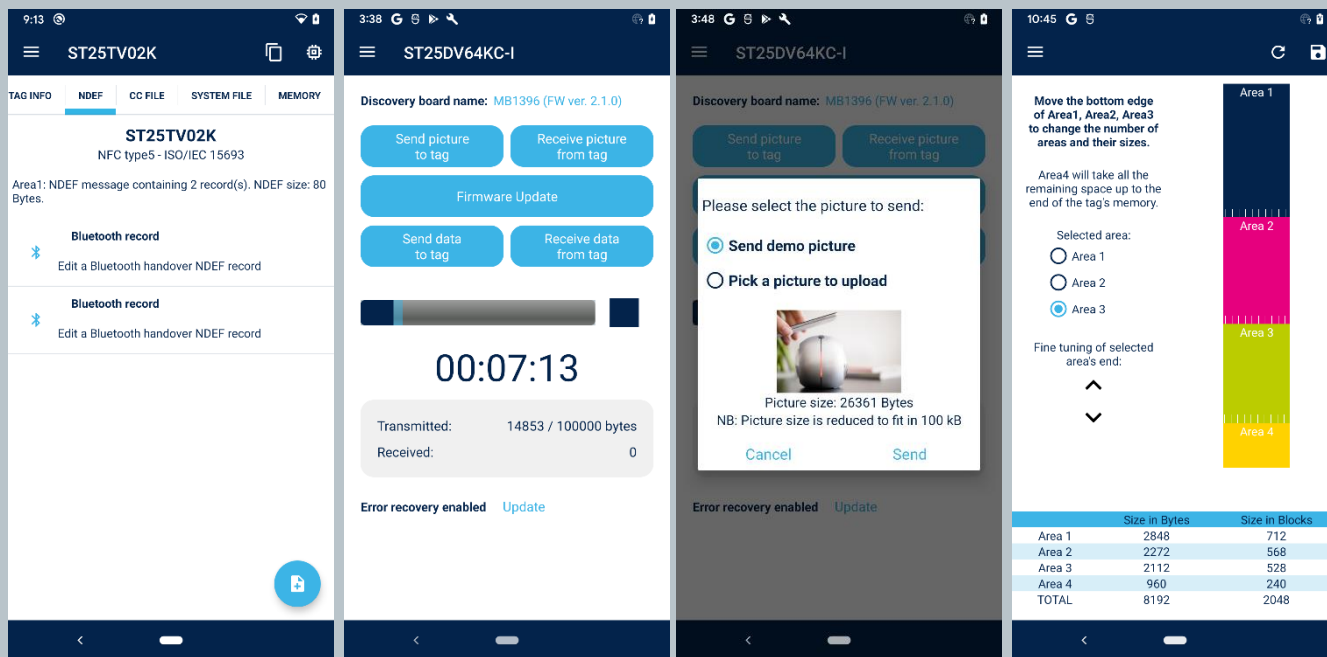
Easy-to-use and customer-oriented





ST25 Android mobile apps

ST25 NFC Tap for Android

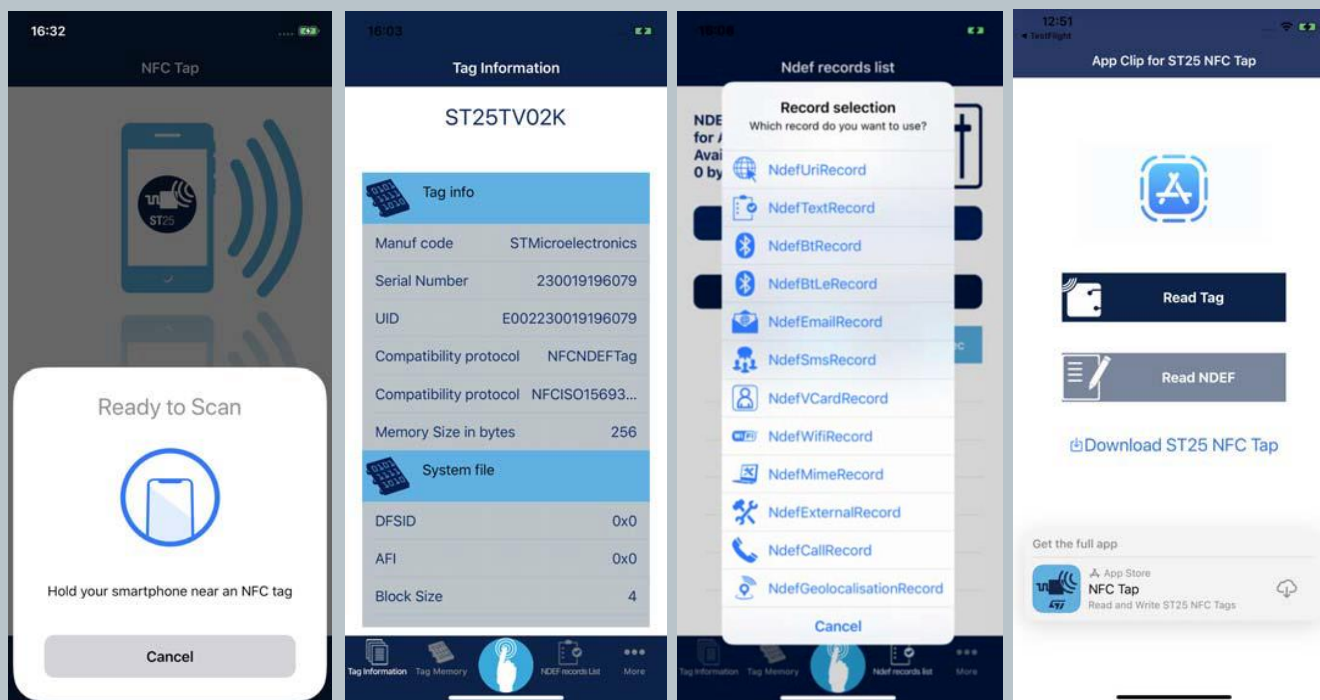


- Read/Write NDEF and User memory of ST25 tags
- Support of specific functionalities of ST25 tags (Tamper detect, Augmented NDEF, PWM output, TruST25 digital signature...)
- Includes demos for Fast Transfer Mode, PWM and Wifi or Bluetooth pairing
- Automatic launch of Android app
- ST25 NFC tap apk file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



ST25 iOS mobile apps

ST25 NFC Tap for iOS

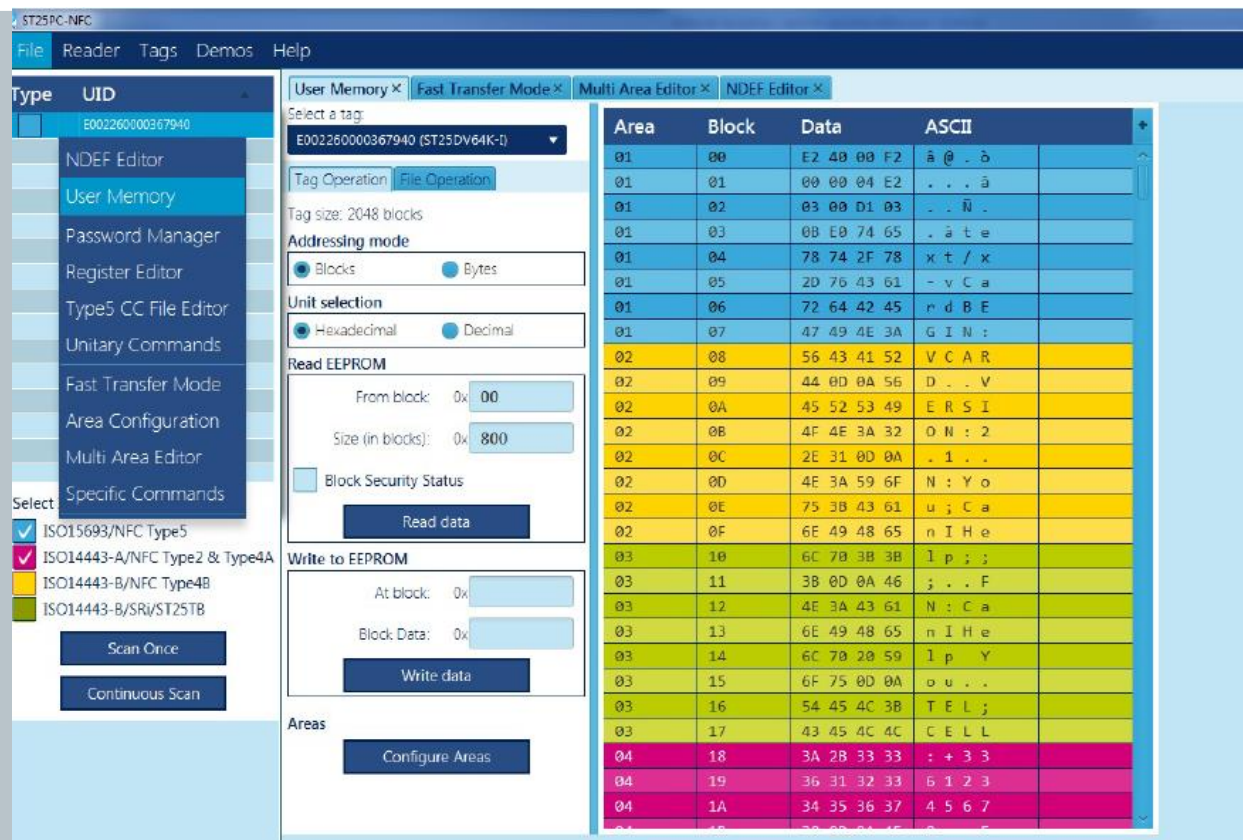


- App Clip for User Experience
- Read/Write NDEF and User memory of ST25 tags
- Support of specific functionalities of ST25 tags (PWM output, TruST25 digital signature...)
- Includes demos for Fast Transfer Mode, Bluetooth pairing and PWM
- Support of NFC background tag reading
- Automatic launch of iOS app
- ST25 NFC tap open-source code ([STSW-ST25/OS002](#))
- Support iOS14 & iOS15 beta



ST25 PC software

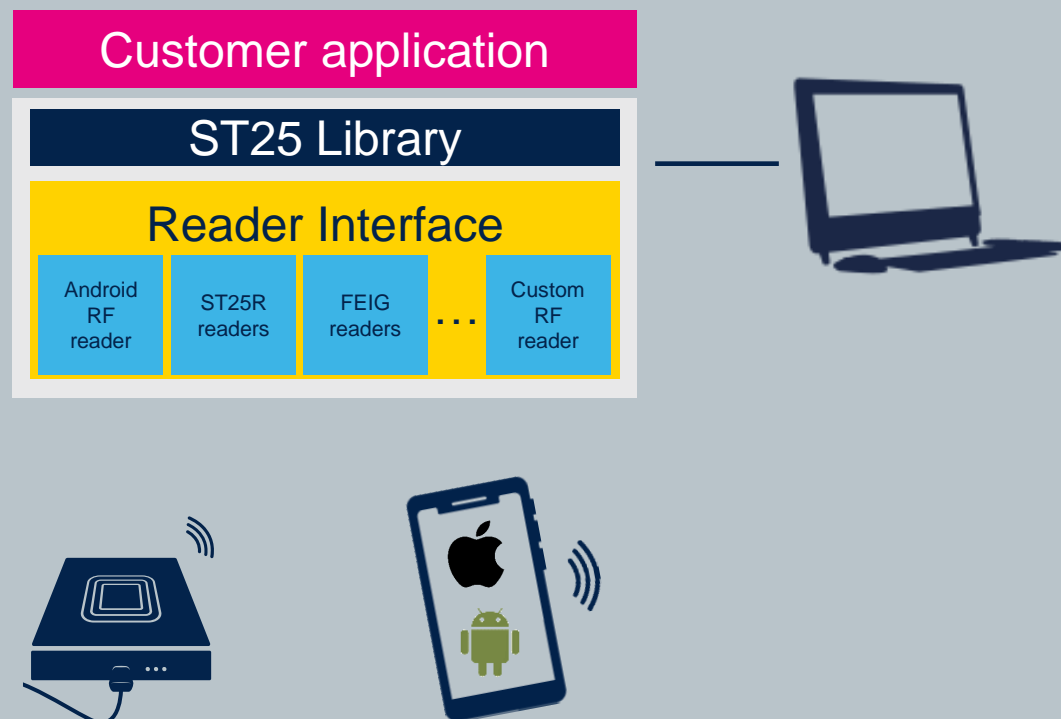
ST25 PC software for ISO15693, ISO14443-A/B & NFC readers



- 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](#))



ST25 Software Development Kit

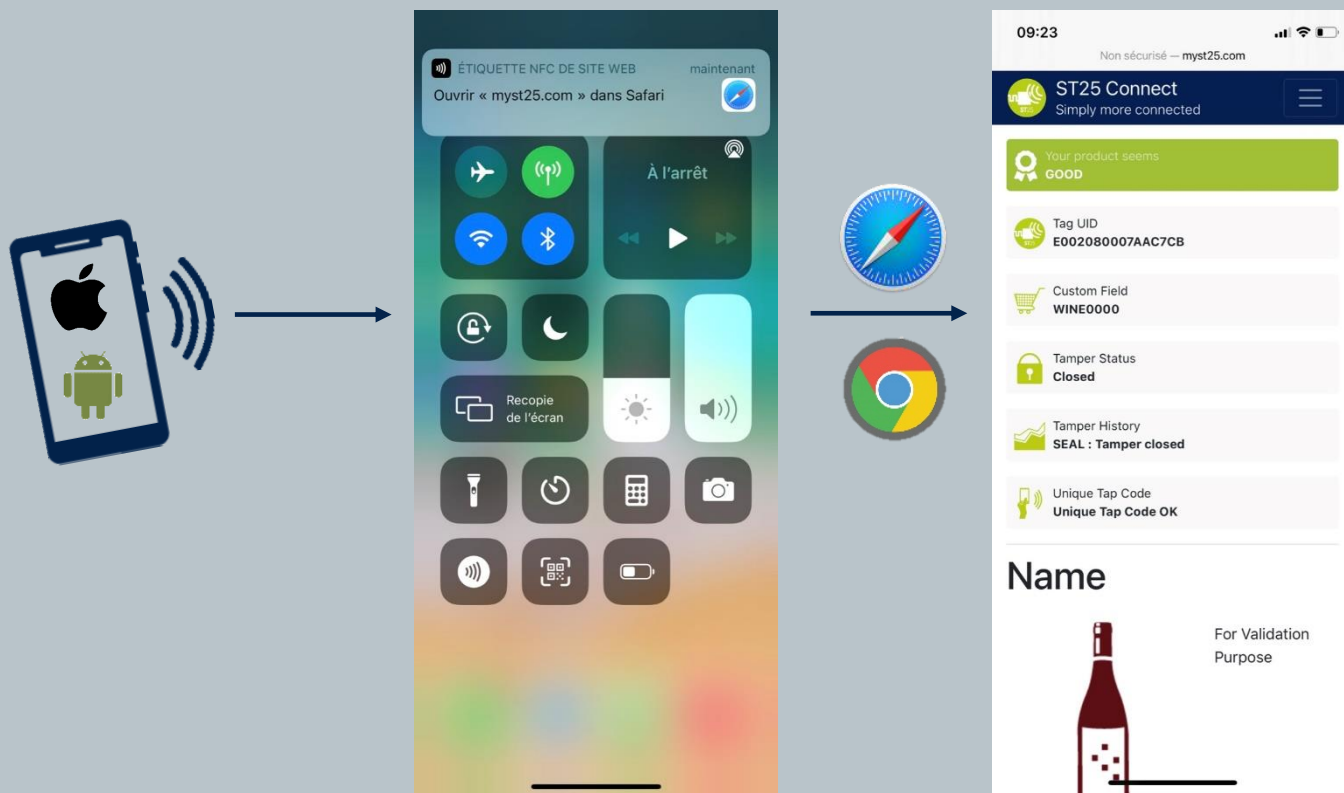


- SW library for Java™ applications development
- Multiplatform (Windows, Linux...)
- RF Library used in Android & iOS *ST25 NFC Tap* apps as well as PC software
- Includes examples and readers reference implementations
- API documentation
- ST25 SDK SW package ([*STSW-ST25SDK001*](#))



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



Product part numbers



ST25TNxxx	Package	512-bit	1k-bit
NFC Type 2 Tag ISO14443	SBN12 SBN075 UFDFPN5	ST25TN512-AFG5	ST25TN01K-AFG5 ST25TN01K-AFF5 ST25TN01K-AFH5



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