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ST25 NFC/RFID产品助力 万物互联

Linda Gao

MMY China Marketing Manager

September 7th, 2022



NFC in our daily life



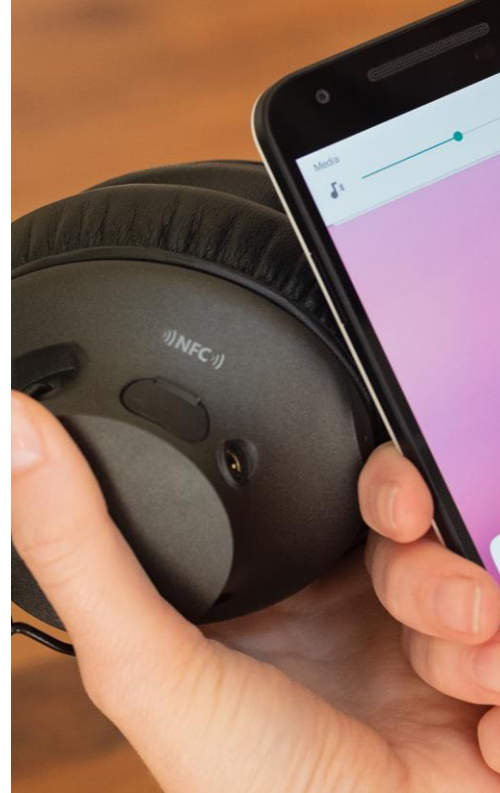
Payment



Ticketing



Digital key



Pairing



Wireless charging



Why NFC ?



Conclusion without NFC



Sales numbers of item A are average
Focus on items B, C and D

Item B supersedes item A
Buying rate of item B is very high
Item A can be ramped down

Conclusion with NFC






Item A is highly popular & critical to product success

Popularity of item B was just a trend, low usage
Item A must be kept in assortment



Why NFC ?

-  Observable trend to **contactless interaction**
-  Desire for **additional features** and **digitized experience**
-  Need for **more connectivity** from customer and manufacturer

CONNECTED DEVICES

17 billion by 2024

ABI Research estimation – April 2019

A massive increase with
~ 15 – 25% annual growth

NFC ENABLED DEVICES

1.6 billion by 2026

ABI Research: \$1.0 billion was shipped in 2021

NFC adopted across all
handsets OEMs
covering all OSS

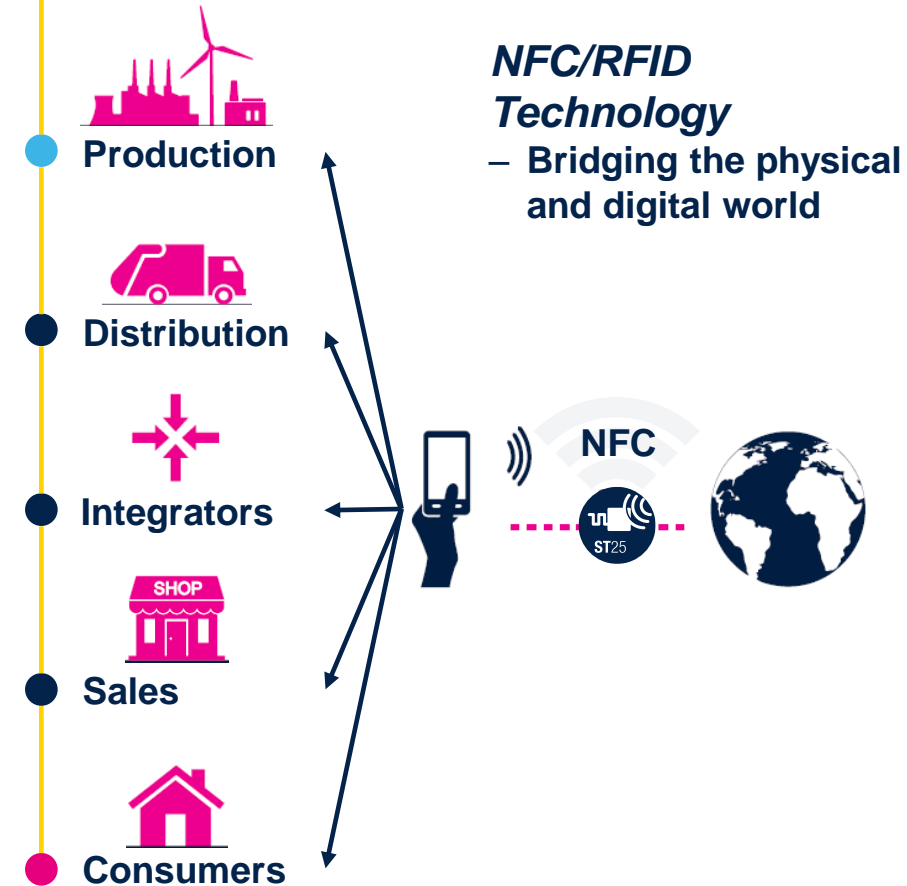
NFC MARKET VALUE

\$47 billion by 2024

ABI Research estimation – April 2019

NFC technology as the
simplest way to create User
Interface and add other smart
functionalities in any 'thing'

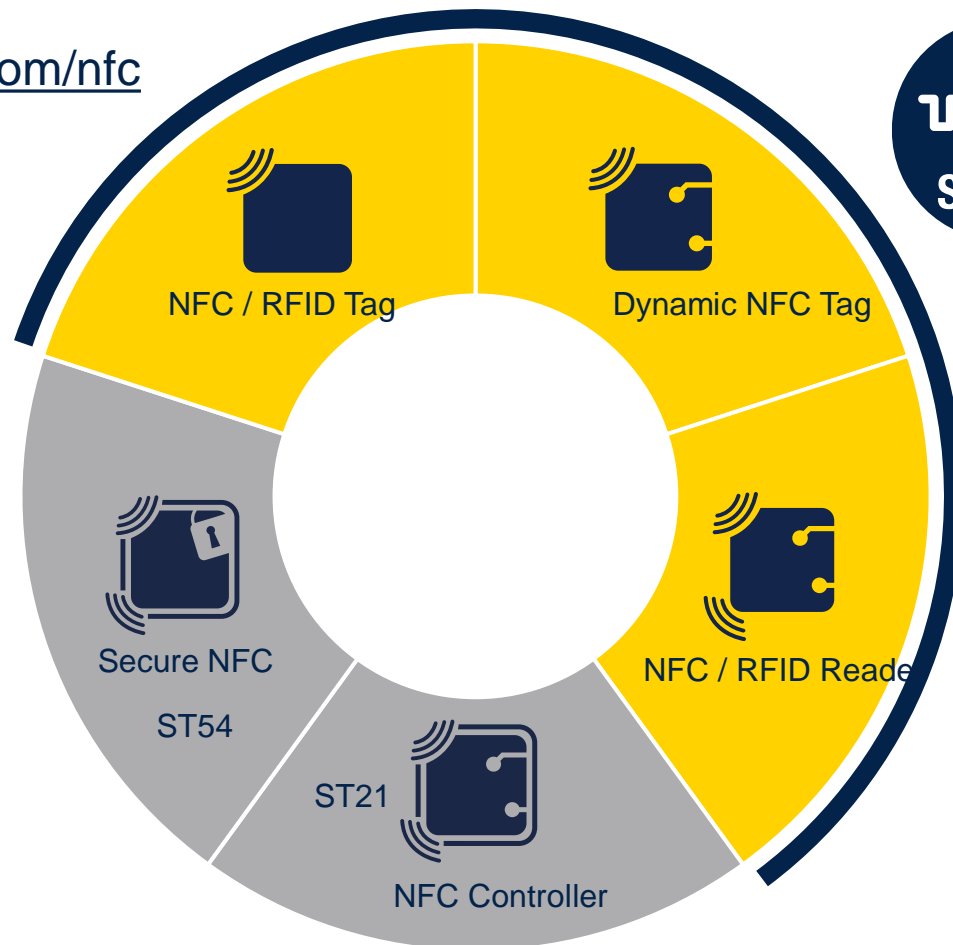
From factory to consumer



ST NFC portfolio

Covering all NFC application needs and leveraging a rich ecosystem

 www.st.com/nfc



STMicroelectronics is Member of

- **NFC Forum**
- **RAIN Alliance**
- **ISO organizations**
- **Zhaga Consortium**
- **CCC** (Car Connectivity Consortium)
- **WPC** (Wireless Power Consortium)
- **CSA** (connectivity standards alliance)
- **LoRa alliance**

ST25 NFC / RFID portfolio

one-stop-shop for tags and readers

Tags				Dynamic Tags			NFC / HF Readers					UHF Readers
ST25TA	ST25TB	ST25TN	ST25TV	M24SR	ST25DV-I2C EVO *	ST25DV-PWM	ST25R95 ²	ST25R3911B ST25R3912	ST25R3914 ST25R3915	ST25R3916 ST25R3917 ST25R3918	ST25R3920	ST25RU3993
ISO14443-A 106kbps NFC Type 4	ISO14443-B 106Kbps	ISO14443-A 106kbps NFC Type 2	ISO15693 up to 53Kbps NFC Type 5	ISO14443-A 106kbps NFC Type 4	ISO15693 up to 53kbps NFC Type 5	ISO15693 up to 53kbps NFC Type 5	ISO14443-A/B ISO15693	ISO14443-A/B Felica ISO15693 ISO18092	ISO14443-A/B Felica ISO15693 ISO18092	ISO14443-A/B Felica ISO15693 ISO18092	ISO14443-A/B Felica ISO15693 ISO18092	ISO18000 6c & b Gen2 Protocol
EEPROM 512b-64Kb 200-year retention 1M cycles	EEPROM 512b-04Kb 40-year retention 1M cycles	EEPROM 512b-1.6Kb 40-year retention 100k cycles	EEPROM 512b-64Kb 60-year retention 100k cycles	EEPROM 2Kb-64Kb 200-year retention 1M cycles	256B Buffer EEPROM 4Kb-64Kb 40-year retention 1M cycles	EEPROM 2Kb 40-year retention 100k cycles	Reader/Writer Card Emulation	Reader/Writer P2P EMVco & PBOC	Reader/Writer P2P AEC-Q100	Reader/Writer P2P Card Emulation EMVco & PBOC	Reader/Writer P2P Card Emulation AEC-Q100	Reader / Writer -90dBm sensitivity Internal VCO
TruST25 digital signature 128b password 20b counter UID RF Field Detect	32b counter Lock OTP bits UID	Augmented NDEF TruST25 digital signature 24b UTC UID	Augmented NDEF TruST25 digital signature 64b password 24b UTC UID Tamper Detect	128b password RF disable RF Detect UID	Fast X-fer Mode 64b password E-Harvesting RF Detect UID	TruST25 digital signature 64b password UID		VHBR Auto Antenna Tuning Dynamic Power Out Multi-antenna	Auto Antenna Tuning Dynamic Power Out Multi-antenna	Active waveshaping Auto Antenna Tuning Dynamic Power Out Multi-antenna	Active waveshaping Auto Antenna Tuning Dynamic Power Out Multi-antenna	Dense Reader Mode Linear RSSI Automatic PSRR Auto ACK
				I2C 1MHz 2.4V-5.5V	I2C 1MHz Write 16B page 1.8V-5.5V	2x PWM 488-31.25 kHz 1.8V-5.5V	SPI 2Mbps UART 2.7V-5.5V 0.23W	SPI 6Mbps 2.4V-5.5V 1.4W – 1W	SPI 6Mbps 2.4V-5.5V 1W	SPI 10Mbps I2C 3.4Mbps 2.4V-5.5V 1.6W – 0.5W	SPI 5Mbps I2C 3.4Mbps 2.4V-5.5V 1.6W	SPI 10Mbps 1.65V-5.5V 0-20dBm
SBN12 / SBN075 / FPN5	SBN12	SBN12 / SBN075 / FPN5	SBN12 / SBN075 / FPN5	SO8 / TSSOP8 / FPN8 / SBN12	SO8 / TSSOP8 / FPN8 / FPN12 / WLCSP10	SO8 / TSSOP8	32-pin QFN	WF 32-pin QFN / 32-pin QFN / WLCSP-30 / Wafer	WF 32-pin QFN / 32-pin QFN	WF 32-pin QFN / WLCSP-36	WF 32-pin QFN	48-pin QFN

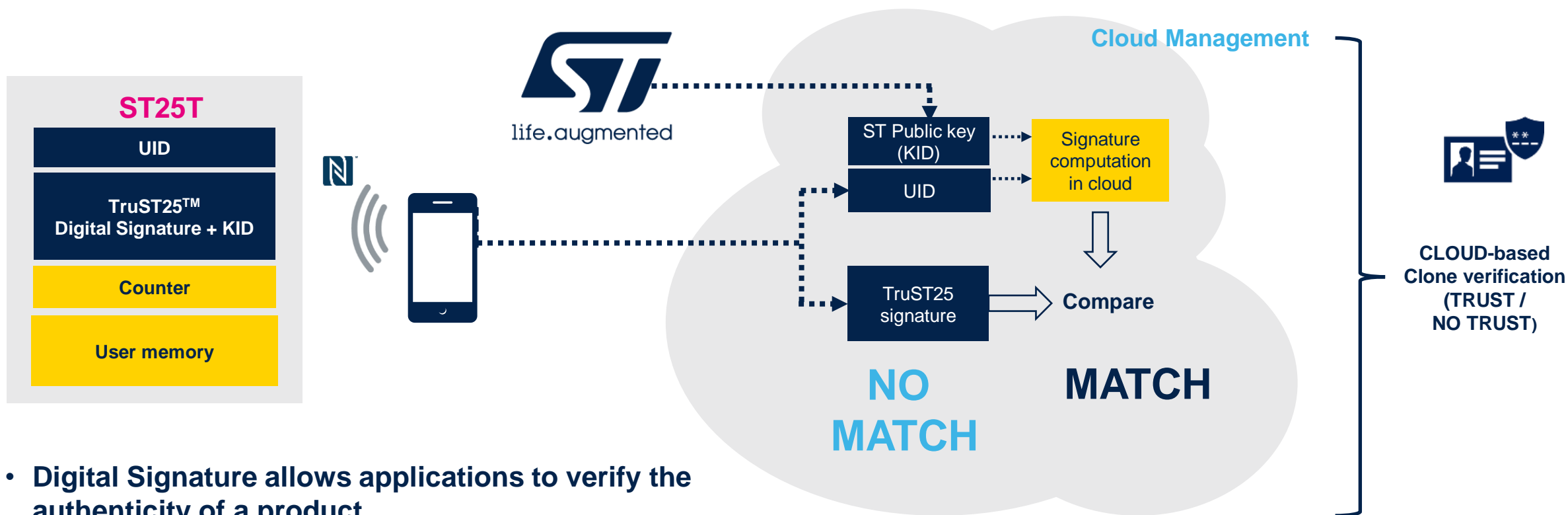
*: successor of M24LR
and ST25DV-I2C

²: same as former CR95HF / ST95HF



TruST25™ digital signature verification

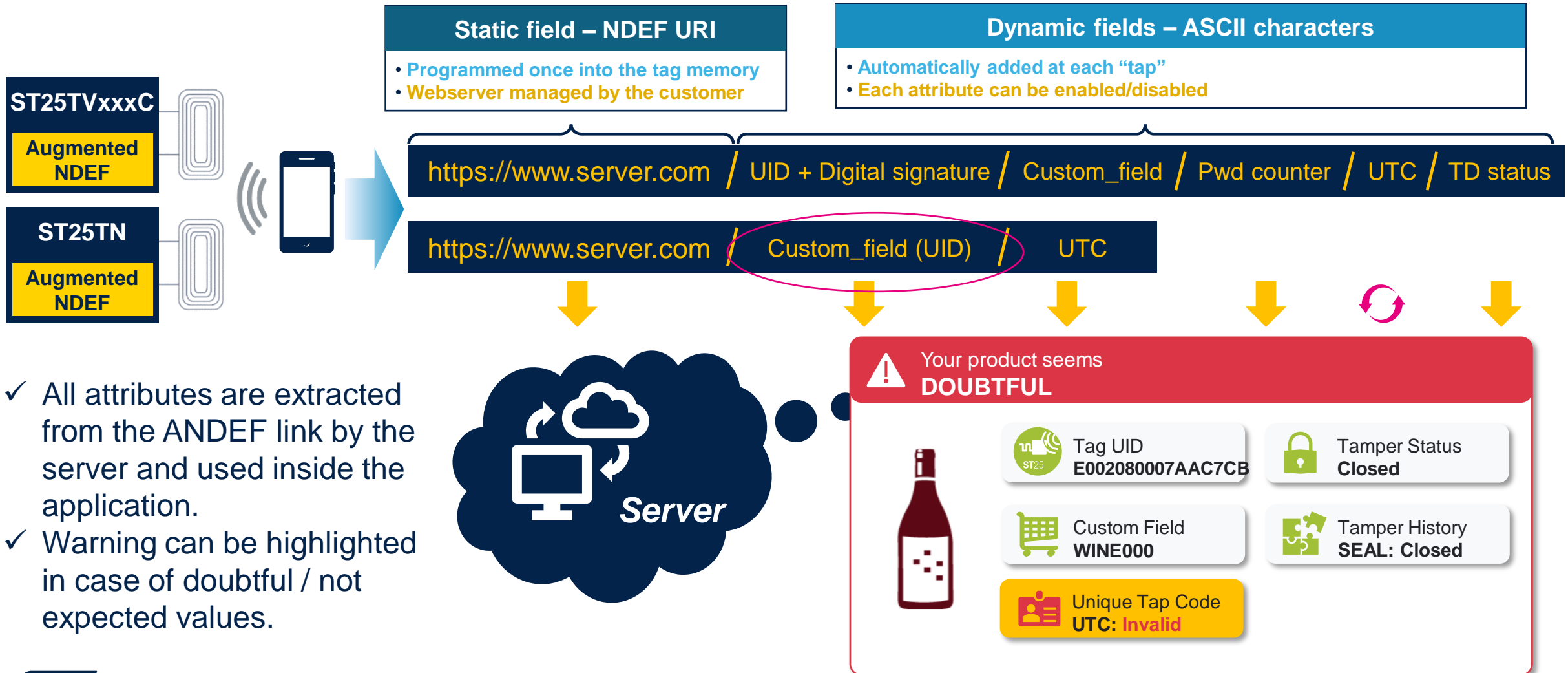
Verify TruST25™ Digital Signature



- Digital Signature allows applications to verify the authenticity of a product



ST25 Augmented NDEF



- ✓ 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.



ST25T 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.



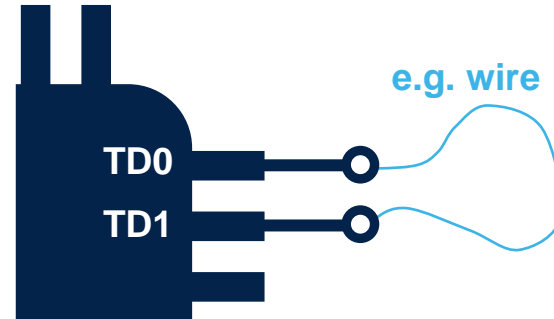
Fresh value generated once per RF session



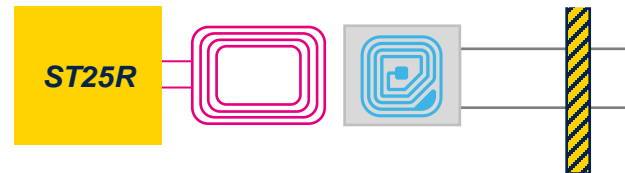


Prevent product tampering

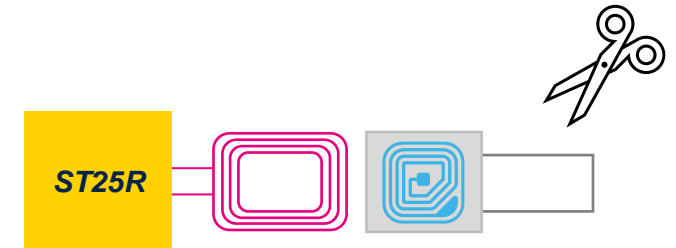
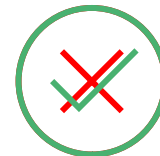
Tamper detection with ST25T tags
Detection of open/circuit on tamper pins



insertion seal
removal of unit will tear insertion seal
and invalidate product for reuse or refill



tear seal
removal of unit will tear seal and
invalidate product for reuse or refill



wire seal
cutting of wire or strand will
invalidate product for reuse or refill





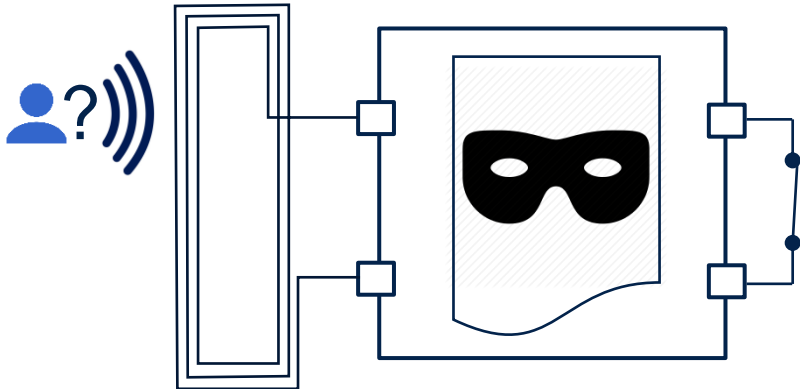
ST25T privacy mode

Privacy protection with untraceable + tamper detection



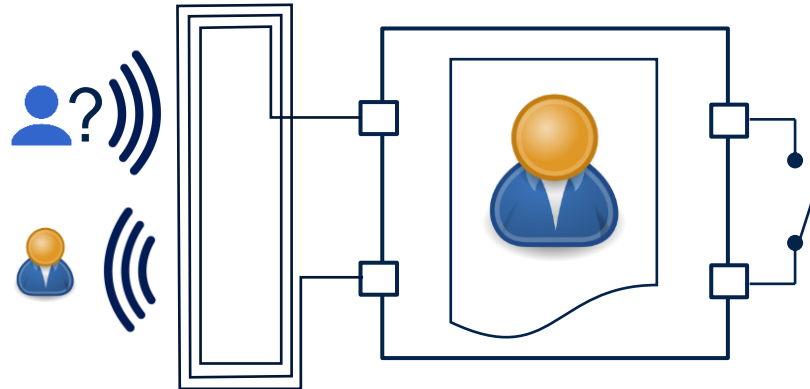
Sealing

- No response to standard command
- Privacy data was protected



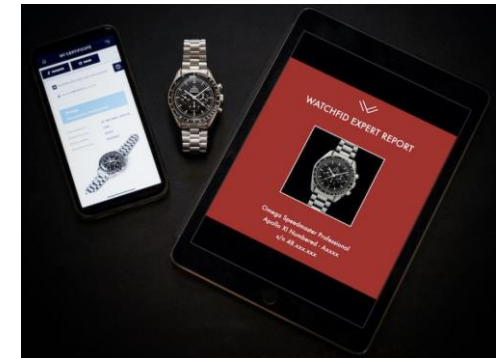
Unsealing

- Privacy data can be read by end-users only after unsealing



User case

- Privacy protection for luxury
- Info need to be protected before unsealing



✓ Traceable/Untraceable was triggered by TD status

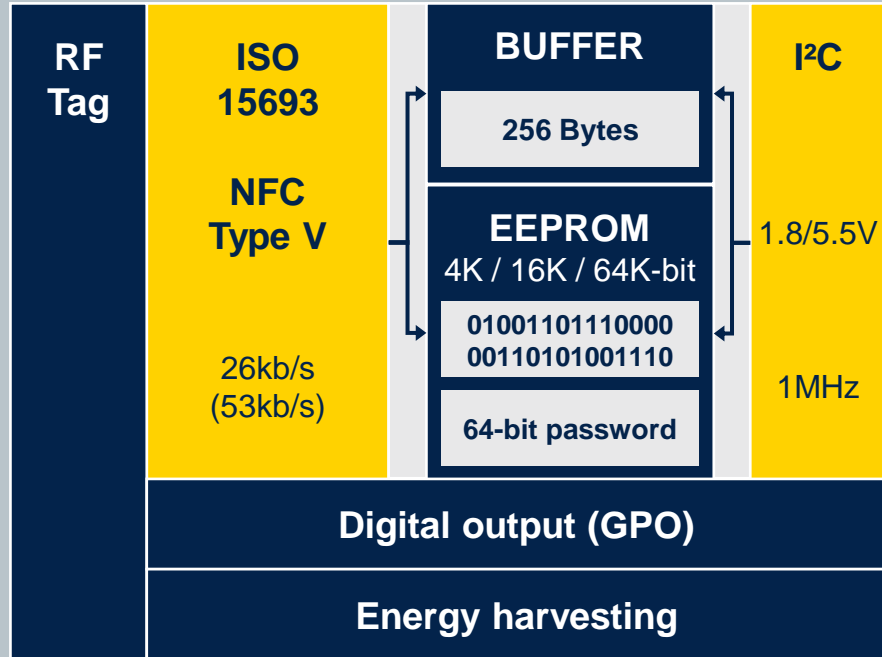


ST25DV-I2C-EVO

Enhanced dynamic NFC type 5 tag



ST25DV04KC / 16KC / 64KC



SO8



FPN8



WLCSP10



TSSOP8



FPN12

Use cases

- Fast data exchange with NFC phones / HF readers
 - Fast data transfer for MCU FW upgrade, fast data exchange
 - Parameters settings and update, with in-the-box programming
 - Data log download

Key Features

- **ISO15693** and **NFC Type V**
- **Fast data transfer** thanks to 256 Bytes buffer
- I2C write on **16-Byte page**
- Low Power mode, < 1µA power consumption in Standby
- -40 to **+125°C** (I2C) industrial Grade 8 temperature range
- **Energy harvesting** function through RF
- I2C enhanced features (write time improved, address configurable, access priority...)

Key Benefits

- Smart applications using a **flexible interrupt GPO**
- Enhanced protection with multiple **64-bit passwords**
- Same 28.5pF internal RF tuning capacitor, as in ST25DV-I2C & M24LR





NFC Forum CR12 certificated

<https://nfc-forum.org/our-work/compliance/certification-program/certification-register/>

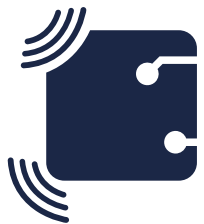
CERTIFIED PRODUCTS						
Universal Devices		Mobile Devices		Reader Devices		Tag Devices
Supplier	Model	Version	Certification Requirements	Date of Listing	ID	File
STMicroelectronics	*ST25TN01K Class 6		Certification Release 12	09/28/21	59709	Download
STMicroelectronics	*ST25TN01K Class 1		Certification Release 12	09/28/21	59708	Download
STMicroelectronics	*ST25DV64KC Class 1		Certification Release 12	09/09/21	59704	Download
STMicroelectronics	*ST25DV04KC Class 6	1.0	Certification Release 12	07/29/21	59697	Download
STMicroelectronics	*ST25TV02KC 25x20mm		Certification Release 12	02/01/21	58684	Download
STMicroelectronics	*ST25TV02KC 64x49mm	1.0	Certification Release 12	01/27/21	58685	Download
Belkin International	*Wemo DE Smart Plug, WSP100		Certification Release 11	09/21/21	59707	Download
Belkin International	*Wemo US Smart Plug, WSP100		Certification Release 11	09/21/21	59706	Download
Shanghai Fudan Microelectronics Group Co. Ltd	*FM13HF01		Certification Release 11	08/16/21	59701	Download
Infineon Technologies AG	*NFC4TC304		Certification Release 11	06/29/21	59696	Download
Infineon Technologies AG	*NFC4TCxK0		Certification Release 11	06/29/21	58695	Download
Shanghai Fudan Microelectronics Group Co. Ltd	*FM11NT082DI	V01	Certification Release 11	04/29/21	58693	Download

1st NFC Forum CR12 certificated

- ST25TN01K
- ST25TV02KC
- ST25DV04KC, ST25DV64KC

Ensure interoperability

- ST25TN can directly replace Type 2 tags, while reader is standard
- ST25T more suitable for new applications



ST25R3916B/17B

High-perf. NFC universal device & EMVCo reader



ST25R3916B

Reader Writer	ISO14443 ISO15693 FeliCa	RAM BUFFER	SPI/I²C
AP2P PP2P	NFC	512-Byte	2.4/5.5V
Card Emulation	848kb/s		3.4Mb/s 10Mb/s
1.6W	DPO: Dynamic Power Output IWU: Inductive Wake Up (LPCD) AWS: Active Wave shaping NSR: Noise Suppression Receiver AAT: Automatic Antenna Tuning DSO: Driver Slope Adjustment EMD: Automatic EMD Error Handling		



QFN32
Wettable flank



WLCSP

Use cases

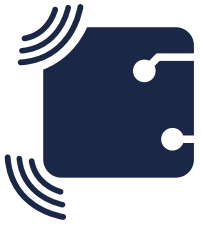
- Ideal for **Payment** applications with CE mode for additional functions
- Apple ECP, Access Control, Gaming, IOT and pairing

Key Features

- NFC Forum Universal Device (with CE mode)
- **1.6W** output power with **Dynamic Power Output**
- **EMVCo 3.1a** certification without external power amplifier
- Improved **Active Waveshaping v2, Noise Suppression Receiver**
- **Automatic Antenna Tuning**
- -40°C to **105°C** ambient temperature range (QFN)

Key Benefits

- Low power operation & Standby mode (low power card detection)
- Works in challenging environment like noisy LCD displays
- Ideal for passing newest EMVCo standards

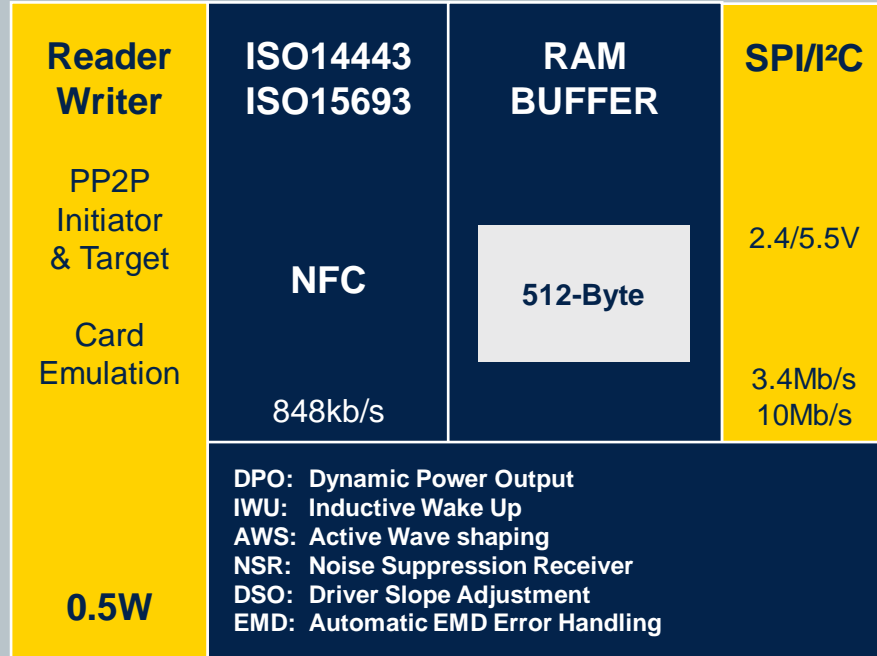


ST25R3918

Multi-Purpose NFC Transceiver



ST25R3918



QFN32
Wettable flank

Use cases

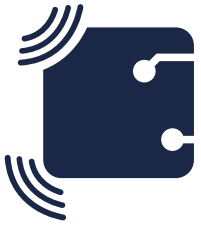
- Ideal for **Reader+Tag** applications
- Access Control, Gaming, Consumer
- Apple AppClip, Android InstantApp

Key Features

- **0.5W** output power
- **Active Waveshaping**
- **Noise Suppression Receiver**
- -40°C to **85°C** ambient temperature range

Key Benefits

- Low power operation & Standby mode
- Works in challenging environment like noisy LCD displays
- Excellent performance for low power applications



ST25R3920B

High-perf AEC-Q100 NFC universal device



ST25R3920B

Reader Writer AP2P Initiator & Target PP2P Initiator & Target Card Emulation 1.6W	ISO14443 ISO15693 FeliCa NFC 848kb/s	RAM BUFFER 512-Byte	SPI/I²C 2.4/5.5V 5Mb/s 3.4Mb/s
DPO: Dynamic Power Output CIWU: Capacitive & Inductive Wake Up AWS: Active Wave shaping NSR: Noise Suppression Receiver AAT: Automatic Antenna Tuning DSO: Driver Slope Adjustment EMD: Automatic EMD Error Handling			



QFN32
Wettable flank

Use cases

- Ideal for **CCC Digital Key** applications
- IOT and pairing in the car

Key Features

- NFC Forum Device-CR13 certified
- **1.6W** output power
- **Active Waveshaping**
- Automatic Antenna Tuning
- **Noise Suppression Receiver**
- -40°C to **105°C** ambient temperature range

Key Benefits

- Low power operation & Standby mode (capacitive wake-up)
- Works in challenging environment like small antennas



NFC Forum CR13 certificated

1st NFC Forum CR13 Certificated

<https://nfc-forum.org/our-work/compliance/certification-program/certification-register/>



***ST25R3916B**

This is to certify that

STMicroelectronics

has successfully achieved certification in the NFC Forum Certification Program indicating that their product has demonstrated its conformance to the Applicable Certification Requirements listed below.

Certification Requirements:
Certification Release 13
Test Release 13.0

Device Class: Reader Device

RF Collision Avoidance: No

Date certified: 2022-04-13
Certification ID: 59751

The NFC Certification Mark may be used only in relation to products that have been certified under this program.
The register of NFC Forum Certified products may be viewed at <https://info-forum.org/products/certified-products>
The NFC Forum Certification Program is operated by the NFC Forum.



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Certification Requirements:
Certification Release 13
Test Release 13.0

Device Class: CCC Digital Key Reader Device
Tag Operation: Type 3/4B Tag
Platforms: NDEF Support:
Avoidance: No

Date certified: 2022-04-13
Certification ID: 59751

This product has also been certified for the following device classes: (list of device classes - delete if not used)

The NFC Certification Mark may be used only in relation to products that have been certified under this program.
The register of NFC Forum Certified products may be viewed at <https://info-forum.org/our-work/compliance/certification-program/certification-register/>
The NFC Forum Certification Program is operated by the NFC Forum.



NFC reader + tag for accessory identify

Let your wearables be smarter

Kits
for different scenarios

Main body of
smart device



3912 inside



Tag inside



Application scenarios



Accessory Identification

- NFC reader embedded inside the controller; tag embedded inside the accessories
- Controller identify the accessory by NFC



Automatic configuration

- The product can work as a sport watch when you exercising, or a data logger when you cycling, or more roles.



ST25 NFC wireless charging for portable device

Products

Readers

ST25R3916/17

Tags

ST25DV04KC

Key success factors

- Digitalization brings more value to retail
- Smartphone as user interface is more welcomed
- Battery less application is more favorable and reliable
- NFC is supported by both iOS & Android

Competitive advantages

- Stronger driving power capability than energy harvesting
- Capable to handle more batteryless application scenarios
- Fully compliant to NFC Forum ST25 devices ensure interoperability
- Capable for value added functions brought by NFC data exchange, as well as power transmission

Applications



Power



Data transfer



Maintenance & Services



Recycle

Key use cases



ESL for retail



Pharmaceutical & Medical



Electronic badge



Batteryless smart-lock

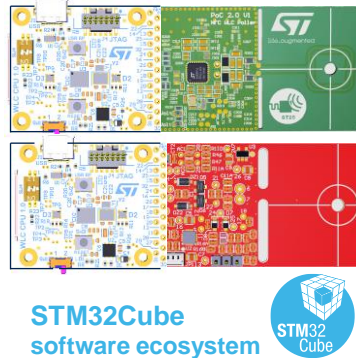


Why choose ST NFC?



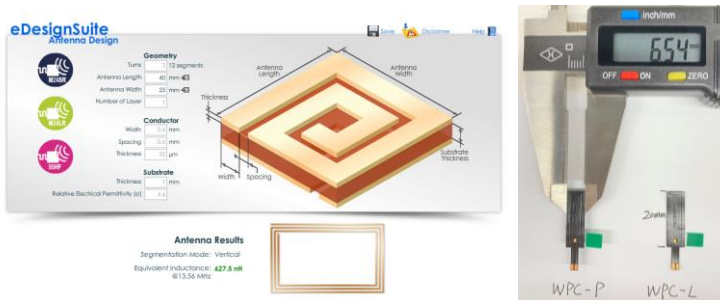
Product & Solution

- Comprehensive NFC products
- Advanced **ST25** NFC performance
- Full NFC Forum compliancy
- Fast productization thanks to mature reference design
- Open source for all



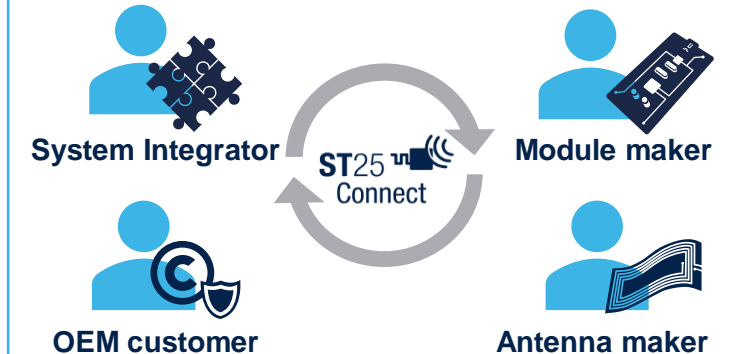
Support

- Antenna design and matching tools available, makes design easier
- Demo antennas to fit your design
- Expertise and patents to improve power efficiency



Ecosystem

- Core member of NFC standard groups
- Extensive coverage of NFC market
- Strong partnership with extensive customer base
- ST25Connect program



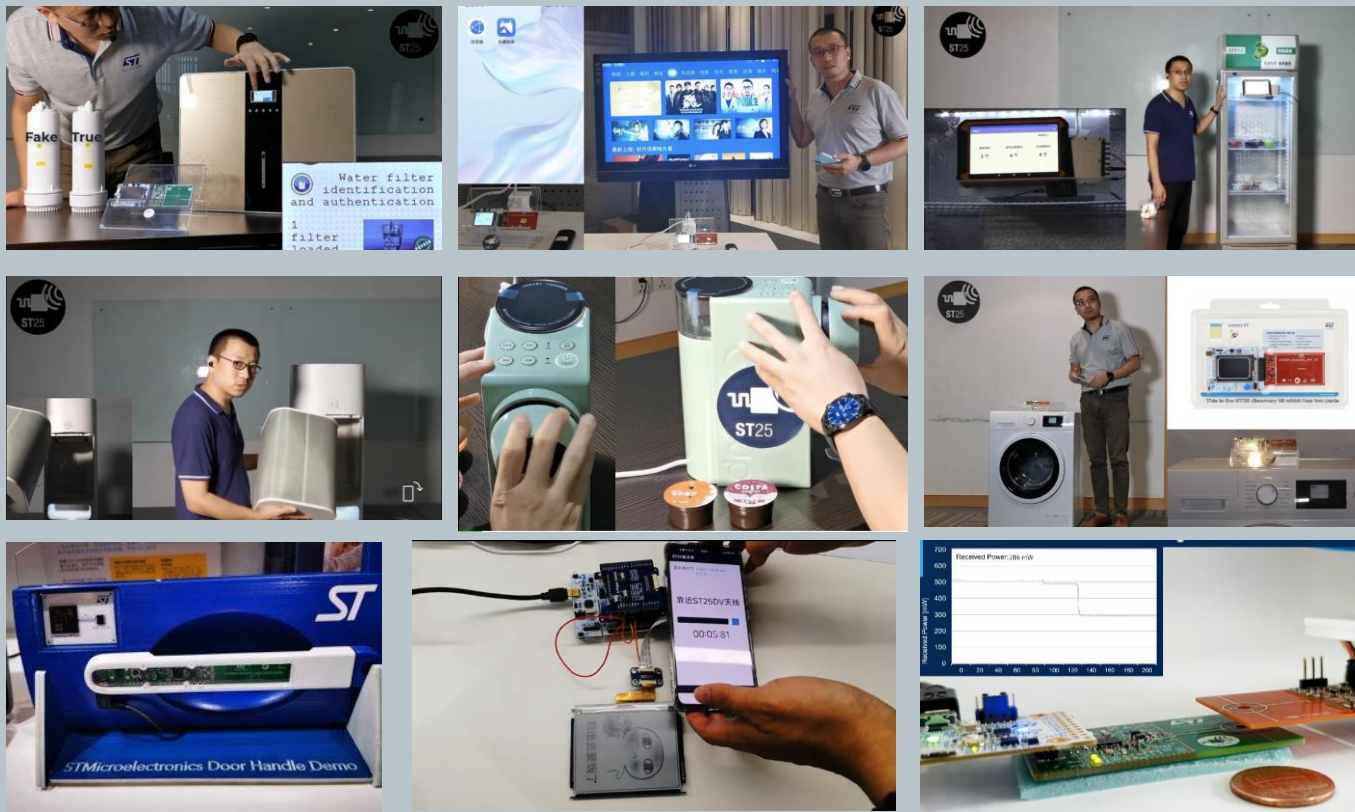
End Products





ST25 customized solution

ST25 customized demo for reference



- Open-source: WeChat
- Demonstrate ST25 function in specified product
- Experience the convenience brought by ST25
- Shared with customers on specific request and through MFT platform (SLA0085 process)
- **Source code can be shared** on request



Product life cycle with NFC



Our technology starts with You



Find out more at www.st.com

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