



**INDUSTRIAL
SUMMIT 2024**
POWERING YOUR SUSTAINABLE INNOVATION



ST25 NFC & STSAFE & ST4SIM for Industrial Application Connected Security Multimarket Business Line

Charles SUN

Connected Security Multimarket business line



EEPROM

**General purpose EEPROM
Page EEPROM (new)**

NFC tags & readers

ST25 products



Edge authentication

STSAFE-A

M2M cellular

ST4SIM



ST25 NFC



Monitoring

Database

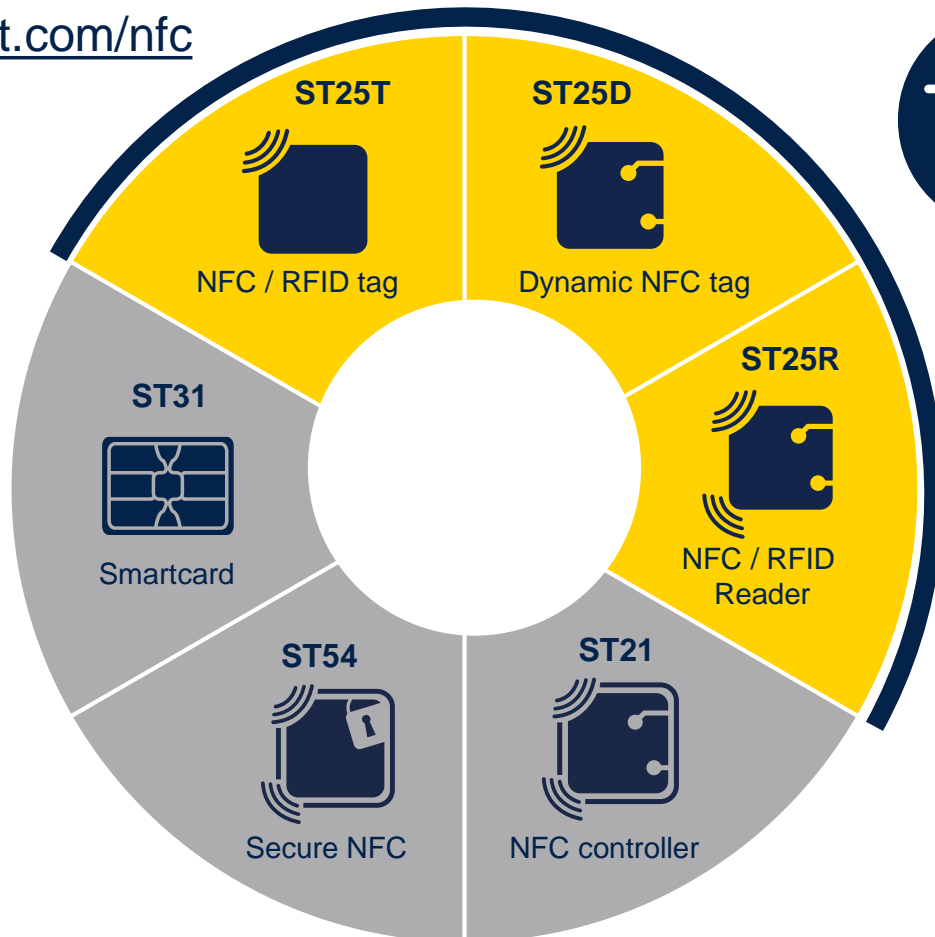
RFID

Lecteur

ST NFC portfolio

Covering all NFC application needs and leveraging a rich ecosystem

 www.st.com/nfc



STMicroelectronics is a member of

- **NFC Forum**
- **ISO organizations**
- **Zhaga consortium**
- **LoRa alliance**
- **EMVCo®** (Europay, Mastercard & Visa Consortium)
- **WPC** (Wireless Power Consortium)
- **CSA** (Connectivity Standards Alliance)



ST25 product families

Consumer engagement, asset tracking, ticketing, Brand protection, access control, gaming...

www.st.com/st25t

Tags



13.56
MHz

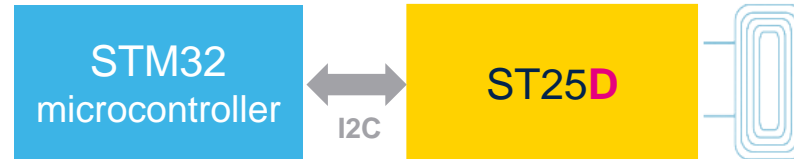


NFC phone / RFID reader

Industrial, lighting, metering, motor control, consumer, appliance, healthcare...

www.st.com/st25d

Dynamic tags



13.56
MHz

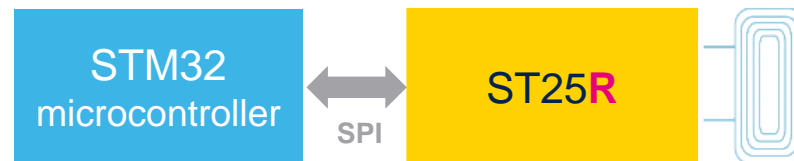


NFC phone / RFID reader

POS & mPOS terminals, automotive, access control, gaming, reader+tag...

www.st.com/st25r

Readers



13.56
MHz



NFC phone





ST25 NFC/RFID portfolio

one-stop-shop for tags and readers

Tags				Dynamic tags			NFC / HF readers				
ST25TA	ST25TB	New ST25TN	New ST25TVC	M24SR	New ST25DVC-I2C *	ST25DV-PWM	ST25R95 ²	ST25R3911B ST25R3912	ST25R3918	ST25R3916B ST25R3917B	New ST25R200 ST25R100
ISO14443-A 106 kbps NFC Type 4	ISO14443-B 106 Kbps	ISO14443-A 106 kbps NFC Type 2	ISO15693 up to 53 Kbps NFC Type 5	ISO14443-A 106 kbps NFC Type 4	ISO15693 up to 53 kbps NFC Type 5	ISO15693 up to 53 kbps 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 ISO15693
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 2 KB 40-year retention 100k cycles	Reader/Writer Card emulation	Reader/Writer P2P EMVco & PBOC	Reader/Writer P2P Card emulation	Reader/Writer P2P Card emulation EMVCo® & PBOC	Reader/Writer
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 Multiantenna	Active wave shaping Dynamic power out Multiantenna	Active wave shaping v2 Auto antenna tuning Dynamic power out Multiantenna	Noise suppression Active wave shaping v2 Improved wake-up Dynamic power out EMD error handling
				I2C 1 MHz 2.4V-5.5V	I2C 1 MHz Write 16B page 1.8V-5.5V	2x PWM 488-31.25 kHz 1.8V-5.5V	SPI 2 Mbps UART 2.7V-5.5V 0.23 W	SPI 6 Mbps 2.4V-5.5V 1.4 W – 1 W	SPI 5 Mbps I2C 3.4 Mbps 2.4V-5.5V 0.5 W	SPI 10 Mbps I2C 3.4 Mbps 2.4V-5.5V 1.6 W	SPI 10 / 6 Mbps 2.7V-5.5V 1.2 / 0.8 W
SBN12 / SBN075 / FPN5	SBN12	SBN12 / SBN075 / FPN5	SBN12 / SBN075 / FPN5	SO-8 / TSSOP8 / FPN8 / SBN12	SO-8 / TSSOP8 / FPN8 / FPN12 / WLCSP10	SO-8 / TSSOP8	32-pin QFN	WF 32-pin QFN / 32-pin QFN / WLCSP-30 / Wafer	WF 32-pin QFN	WF 32-pin QFN / WLCSP-36	4*4 mm 32-pin TQFN

*: successor of M24LR and ST25DV-I2C

²: same as former CR95HF / ST95HF





ST25T NFC tag family

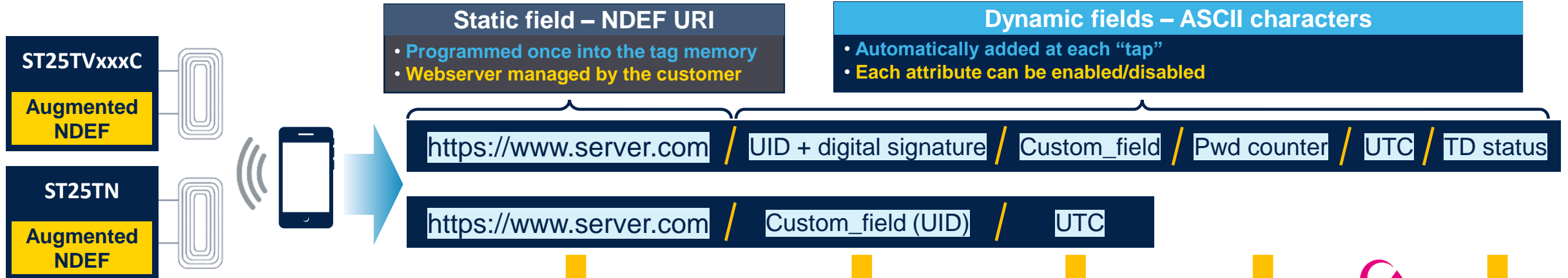
ISO 14443-A	ST25TA512B ST25TA02KB <ul style="list-style-type: none"> NFC Forum type 4 Password + dig signature Capacitance: 50 pF 	Packaged chip - GPO ST25TA02KB-P ST25TA02KB-D <ul style="list-style-type: none"> NFC Forum Type 4 Password+Digi signature GPO: Field detect/Wake up Capacitor: 50 pF 	ST25TA16K ST25TA64K <ul style="list-style-type: none"> NFC Forum Type 4 Password 128-bit Capacitance: 25 pF 	New ST25TN512 ST25TN01K <ul style="list-style-type: none"> NFC Forum Type 2 (CR12) Memory up to 16,640 bits Augmented NDEF Digital signature Capacitance: 50 pF Cost-effective 	
	ST25TB512-AC ST25TB02K-AC ST25TB04K-AC <ul style="list-style-type: none"> ISO14443B proprietary Resettable OTP Capacitance: 68 pF 	ST25TB512-AT <ul style="list-style-type: none"> ISO14443B proprietary Dedicated to transport Antitearing Capacitance: 68 pF 			
	ISO 14443-B				
	ISO 15693	ST25TV512 ST25TV02K <ul style="list-style-type: none"> NFC Forum Type 5 Digital signature Untraceable & kill modes Tamper detect Capacitance: up to 99.7 pF 	Packaged chip - EH ST25TV04K-PE <ul style="list-style-type: none"> NFC Forum Type 5 Digital signature Energy harvesting Configurable GPO Capacitance: up to 99.7 pF 	High density ST25TV16K ST25TV64K <ul style="list-style-type: none"> NFC Forum Type 5 Digital signature Untraceable & kill modes Tamper detect Capacitance: 28.5 pF 	Large capacitance ST25TV512C ST25TV02KC <ul style="list-style-type: none"> NFC Forum Type 5 (CR12) Memory up to 2560 bits Augmented NDEF Digital signature, UTC, untraceable mode Capacitance: up to 99 pF

Product Information	Asset Tracking
Access Control	Anti-Counterfeit
Brand Protection	Gaming
Consumer Engagement	Transport

ST25T roadmap



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.



! Your product seems DOUBTFUL!

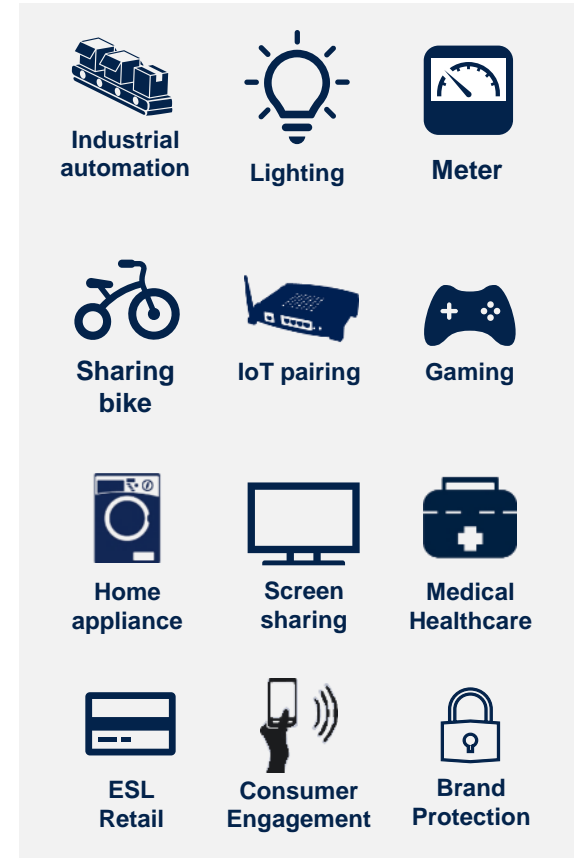
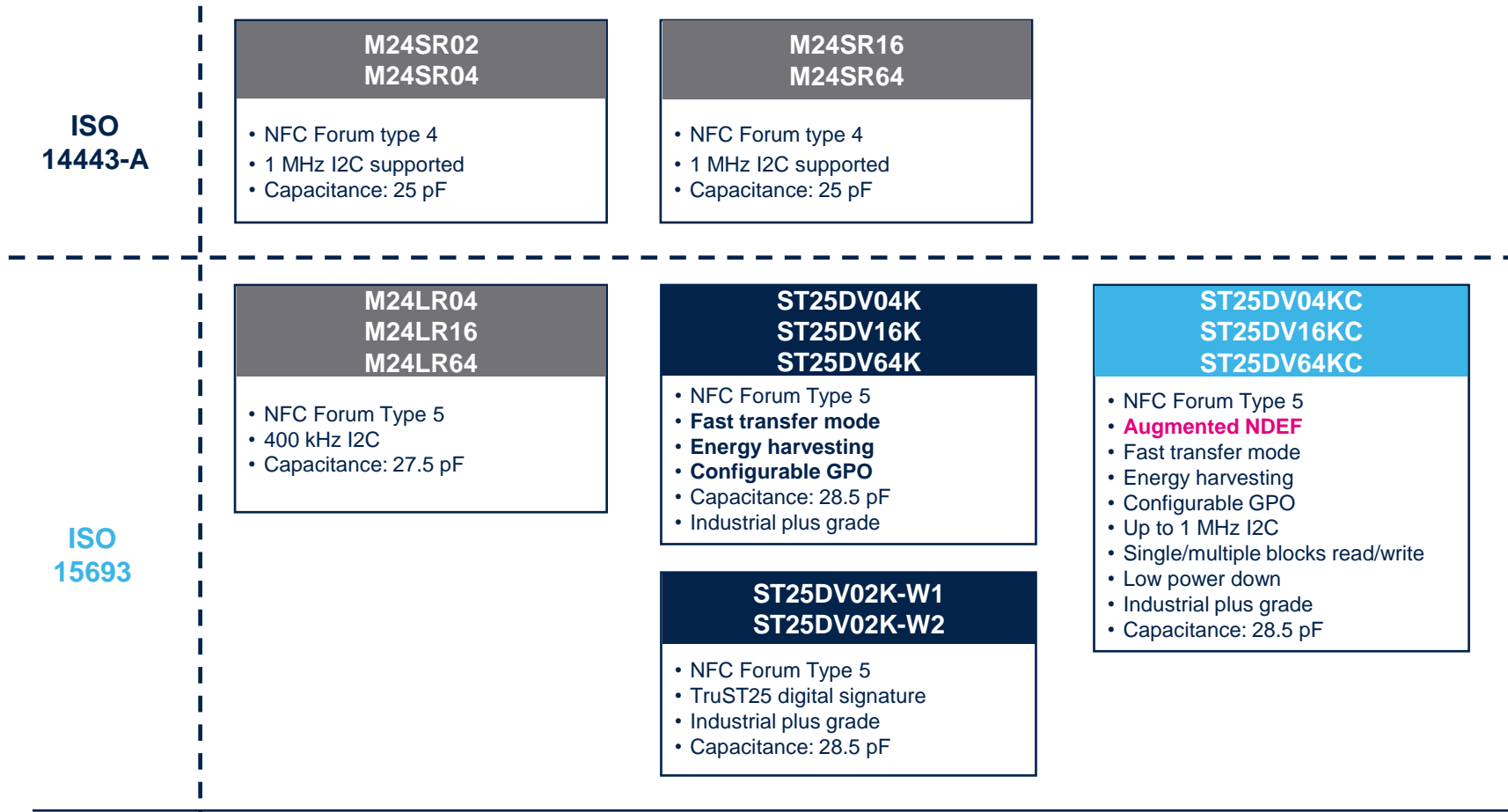
Tag UID E002080007AAC7CB	Tamper status Closed
Custom Field WINE000	Tamper history SEAL: Closed
Unique tap code UTC: Invalid	

User case





ST25DV NFC dynamic tag family



ST25DV roadmap



What's new for ST25DV-I2C-EVO?



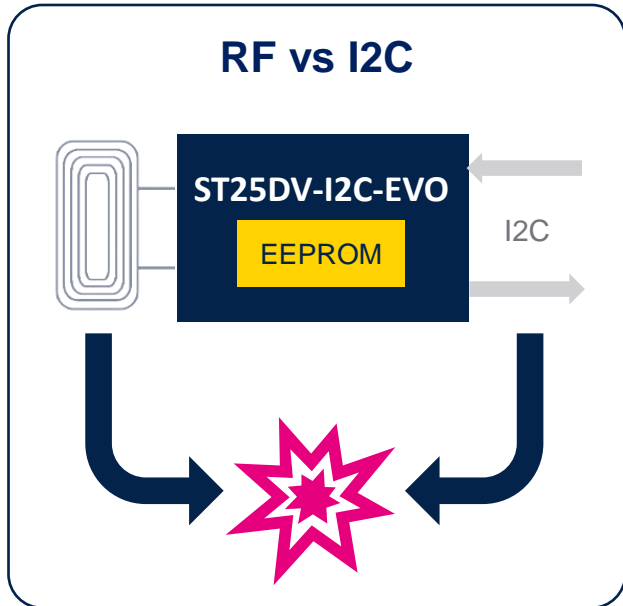
**ST25DV
I2C-EVO**

I2C enhanced features

Improved GPO

GPO
RF user(Set / reset)
RF activity
RF interrupt
RF Field detect
RF PutMessage
RF GetMessage
RF write
I2C write
RF switch off from I2C

Access priority



Introduce arbitration mechanism to avoid operation collision

I2C write time improved

I2C address configurable

Write time comparison (ms)

Nb bytes to write	ST25DV-I2C	ST25DV-I2C EVO
64	81	21
256	325	86
512	651	172
1024	1303	343

Write time divided by 4

Thanks to 16-Byte page I2C access, write time is equivalent on 16 KB standard EEPROMs



ST25 - NFC论坛认证的NFC产品

NFC FORUM						
CERTIFIED PRODUCTS						
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	
STMicroelectronics	*ST25TV02KC 25x20mm		Certification Release 12	02/01/21	58684	
STMicroelectronics	*ST25TV02KC 64x49mm	1.0	Certification Release 12	01/27/21	58685	
Belkin International	*Wemo DE Smart Plug, WSP100		Certification Release 11	09/21/21	59707	
Belkin International	*Wemo US Smart Plug, WSP100		Certification Release 11	09/21/21	59706	
Shanghai Fudan Microelectronics Group Co. Ltd	*FM13HF01		Certification Release 11	08/16/21	59701	
Infineon Technologies AG	*NFC4TC304		Certification Release 11	06/29/21	59696	
Infineon Technologies AG	*NFC4TCxK0		Certification Release 11	06/29/21	58695	
Shanghai Fudan Microelectronics Group Co. Ltd	*FM11NT082DI	V01	Certification Release 11	04/29/21	58693	

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

NFC Forum certified
Performance + quality
Interoperability



ST25TA-E secure NFC tag IC

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 13.2

Device Class: NFC Tag Device
Tag Type: Type 4A Tag – Mapping, Version 2.0
Tested Reference Pollers: P0, P3, P6

Date Certified: 2024-04-17
Certification ID: 60327

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://nfc-forum.org/products/certified-products>. The NFC Forum Certification Program is operated by the NFC Forum.



life.augmented



ST25R NFC reader family



ST25R3914/15

- AEC-Q100 Grade 1
- CCC 2.0
- High performance
- 1.0 W output power

ST25R3920

- AEC-Q100 Grade 2
- CCC 2.0
- 1.6 W, AWS, EMD, DPO
- Card Emulation/P2P

ST25R3920B

- AEC-Q100 Grade 2
- CCC 3.0 (NFC Forum CR13)
- Excellent performance
- Card emulation



ST25R3911B

- EMVCo® 2.6
- 1.4 W output power
- Full feature (AAT, LPD, DPO)

ST25R3916/17

- EMVCo® 3.0
- 1.6 W
- AWS, EMD, DPO, LPD
- Card emulation & P2P

ST25R3916B/17B

- EMVCo® 3.1
- Excellent performance (AWS, EMD, DPO, LPD)
- Card emulation & P2P



ST25R95

- All standard support
- Card emulation
- SPI & UART
- Low cost

ST25R668

- ISO14443A/B & ISO15693
- Low cost

ST25R3912

- All standard support
- 1.0 W output power
- WLCSP-small package

ST25R3918

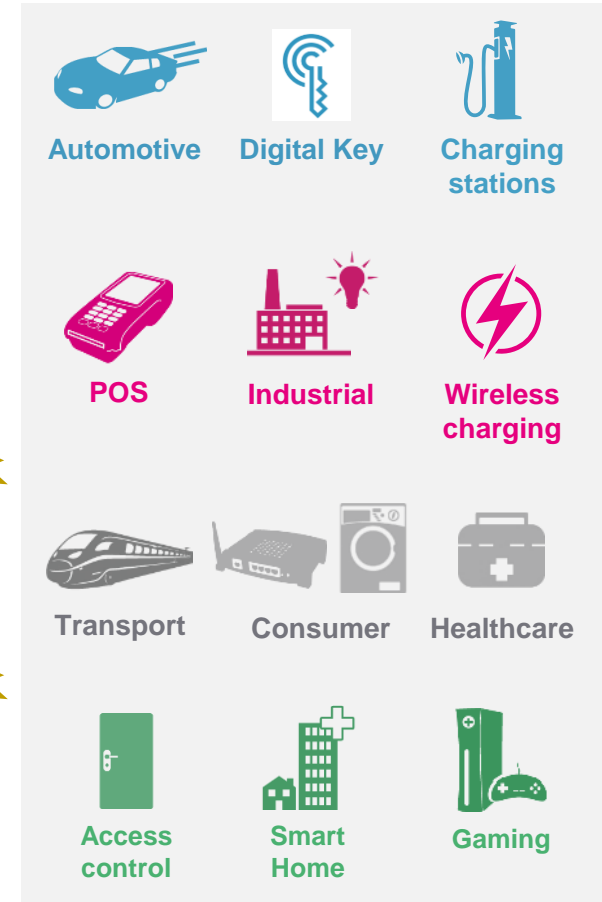
- ISO14443A/B & ISO15693
- 0.5 W, SPI & I²C interface
- Card emulation
- Cost-effective

ST25R200 *New*

- NFC-A/B/V reader mode
- 1.2 W output power
- AWS, NSR, enhanced LPD
- Automatic EMD handling
- QFN 4x4mm

ST25R100 *New*

- NFC-A/B/V reader mode
- 0.8 W output power
- inductive wake up v2
- QFN 4x4mm



ST25R roadmap



AAT: Automatic antenna tuning
DPO: Dynamic power output
LPD: Low power detection

AWS: Active wave shaping
EMD: Automatic EMD suppression

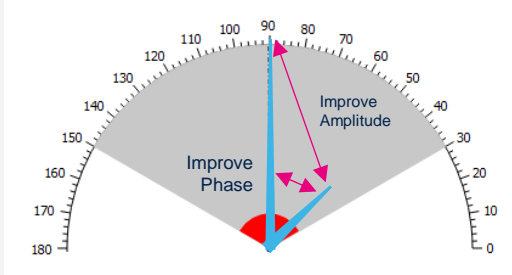


ST25R characteristics

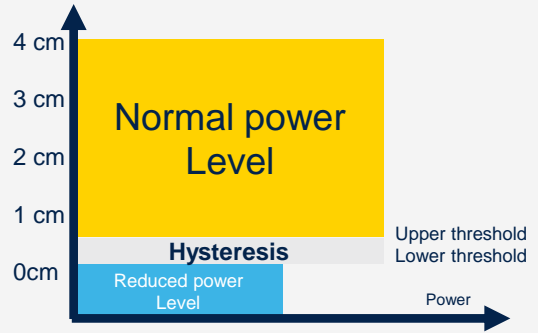
All standard supported

- ISO14443 A/B
- ISO15693
- Felica
- ISO18092

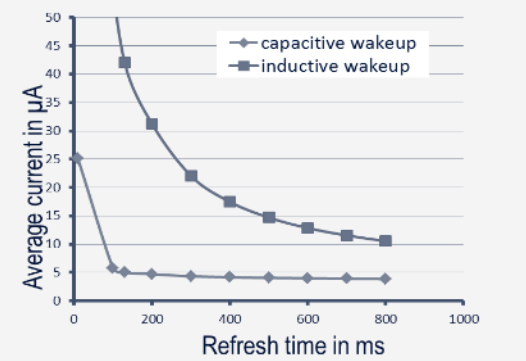
AAT Automatic antenna tuning



DPO Dynamic power output



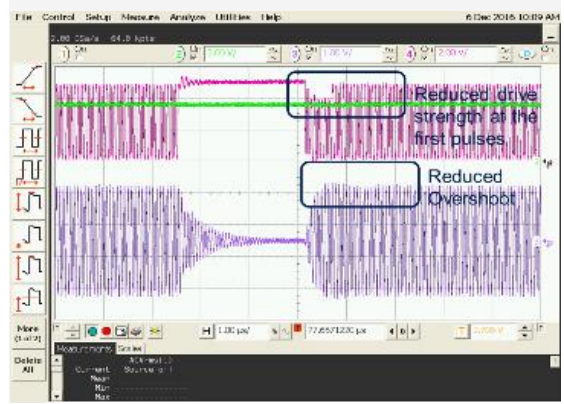
CIWU Capacitive & inductive wake up



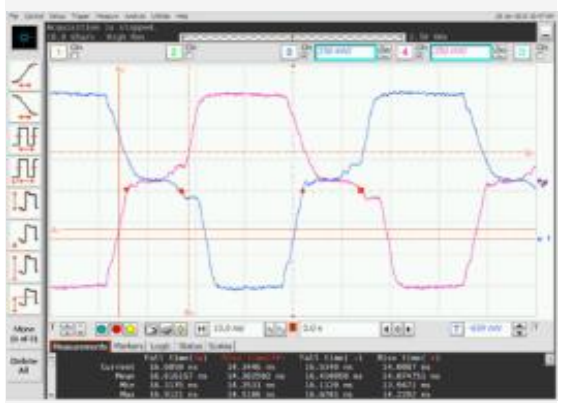
NSR: Noise suppression receiver



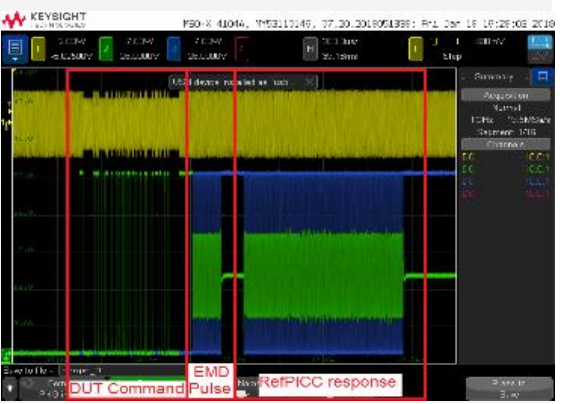
AWS Active wave shaping



DSA Driver slope adjustment



EMD Automatic EMD suppression





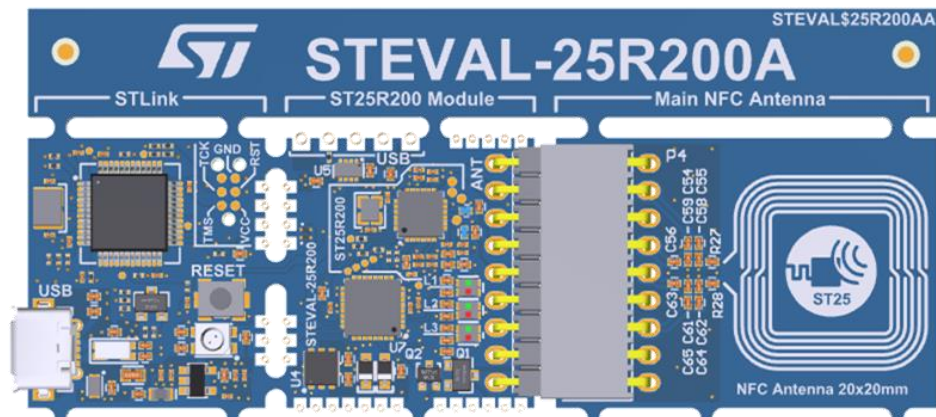
New NFC reader - ST25R200/100

Key features and advantages



Powerful multipurpose NFC reader for consumer & industrial applications

- ISO14443A/B, ISO15693 supported
- 1.2 W dynamic output power
- Improved inductive wake-up function & active wave shaping
- 10 Mbps SPI interface
- -40°C to 85°C ambient temperature
- Up to 250 mA via internal LDO
- Small 4x4mm TQFN package



20x20mm ANT



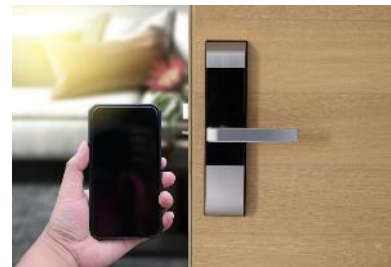
1.2 W output power for excellent range/power consumption ratio and **improved** inductive **wake-up**

Tiny footprint allows **easy implementation** into small size products

Cost efficiency makes it more **competitive** to win high-volume but cost sensitive opportunities

Ideally suited for **reader + tag** solutions

Target applications



Smart Lock



Beauty & lifestyle



EV charger



Access control



Gaming / Toy



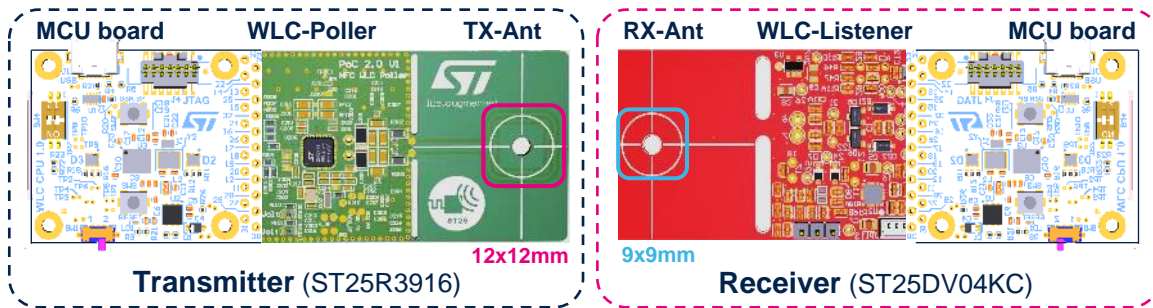
NFC digital key



ST25 NFC wireless charging

NFC WLC makes charging smaller and smarter

ST25 wireless charging solution



Key features and advantages

Rx power up to **500 mW**

Tiny antenna size

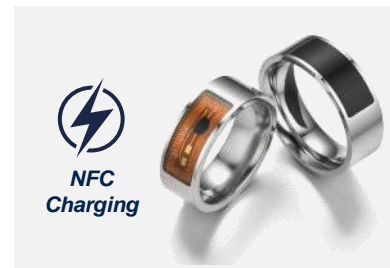
Static and **negotiated** mode

Stronger data transfer capability

Fully **NFC Forum** compliant

Safer based on FOD & control frame

Applications



Smart wearables



Stylus



ESL for retail



Smart Glass



Hearing aids & earbuds



Batteryless smart-lock

ST25 series enriching our lives!



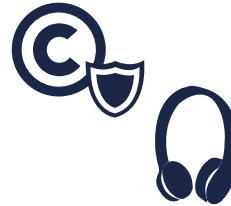
Consumer
Home appliance



Healthcare
Gaming



Brand recognition
Accessory



Asset
Tracking



Transport



Main applications



Industrial



Smart home
Smart city



Access
control



Automotive



Point of
sales





ST25 Reader in Payments

Products

ST25R3916 / 3917

- EMVCo® 3.0

ST25R3916B / 3917B

- EMVCo® 3.1

Key success factors

- NFC is a **mandatory** feature for contactless payment
- More **secure** with better **user experience**
- Phone makers push payment using mobile phones
- EMVCo® standard pushed by payment consortium
- Contactless payment is now the preferred payment method in most shops

Competitive advantages

- Noise suppression receiver (NSR): allows operation in noisy environment caused by LCD
- Active Wave-Shaping (AWS): smoothen over & undershoot passing EMVCo® requirements easier
- Comprehensive EMVCo® L1 support library and technical support teams of EMVCo® experts

Applications



Cash machine



Traditional POS



Mobile POS

Key use cases



Payment



Digital currency



EV charger



Access control



ST25 Reader + Tag in Industrial

Products

Readers

ST25R3916B
ST25R3918

Tags

ST25DV04/16/64KC
ST25TV512C / 02KC

Key success factors

- Increasing trend for intellectualization in industrial appliances
- More flexibilities brought by NFC enabled field programming capability
- Benefits from NFC/RFID tech through all product life cycle is more accepted

Competitive advantages

- TruST25 digital signature for brand protection
- Industrial grade 8 (temperature range up to +125°C)
- Excellent fast transfer performance for configuration and FW update
- Reader+tag ecosystem for fast development

Applications



Network
Provisioning



Enhanced tracking
& warehouse



Parameter
setting



Firmware
upgrade

Key use cases



IO-Link industrial RFID



BMS



Parameter setting



Consumable anticounterfeit



ST25 Dynamic Tag in Industrial

Products

ST25DV04KC / 16KC / 64KC (EVO)
ST25DV02K-W (PWM)

Key success factors

- Increasing trend for intellectualization in industrial appliances
- Benefits from multiple use-cases: calibration, maintenance, FW upgrade, through all product life cycle
- NFC well adopted in many industry standards, like Zhaga and Thread

Competitive advantages

- Industrial grade 8 (temperature range up to +125°C)
- Excellent fast transfer performance for configuration and FW update
- Reader+tag ecosystem for fast development

Applications



Parameter setting



Enhanced tracking & warehouse



Firmware upgrade



Field programming

Key use cases



Lighting



Metering



Circuit breaker



Industrial sensor



ST25 for parameter setting

ST25 NFC brings more value through product life cycle



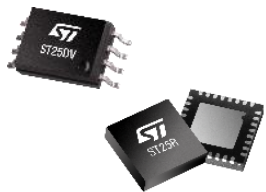
Parameter setting
Parameter setting without power on

From DIP switch / resistor to contactless setting
Get rid of manual operation

In Box "programming"
Simple & flexible

Upload new setting to powered off devices
Personalize your boxed devices on the production belt

ST solutions



- Dynamic tag
- HF reader



LED lighting



Metering



Breaker

Convenient data-logging

Data-log on the spot or off-line data access for consumer & industrial applications

STEVAL-SMARTAG1



The diagram shows the STEVAL-SMARTAG1 development board with various components and their connections:

- ST25** (represented by a smartphone icon) connected to **ST25DV64K**
- STM32** (represented by a butterfly icon) connected to **STM32L031**
- LIS2DW12** accelerometer
- LPS22HB** pressure sensor
- HTS221** temperature & humidity sensor

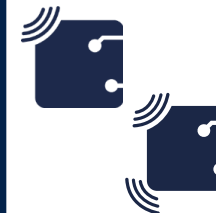
www.st.com/smartag

Convenient access to your monitored data
Easy to do with a smartphone as display

Broad range of application
Logistics, maintenance assistance, consumer

Data accessible even when system is powered off
Tag acting as a “black box” tool

ST solutions



- Dynamic tag
- HF reader

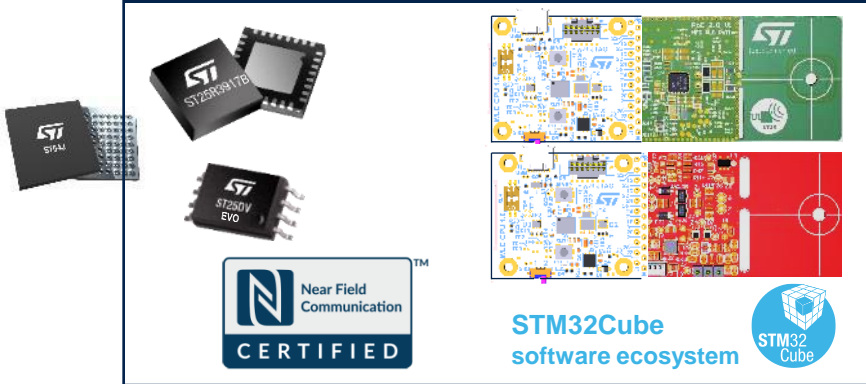


Why choose ST NFC?



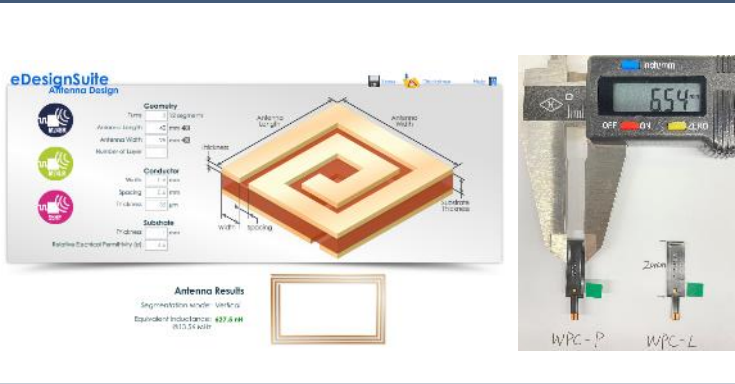
Product & solutions

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



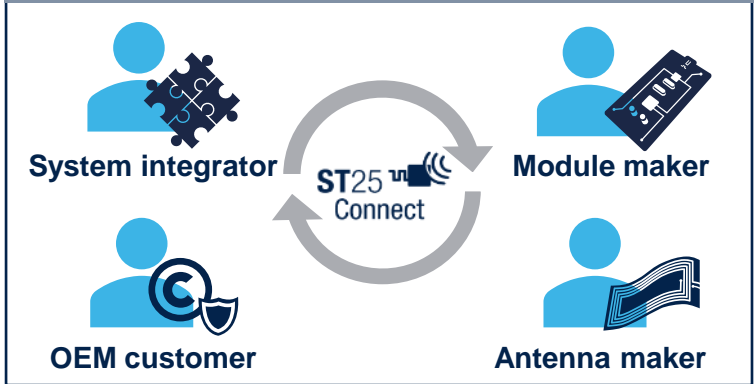
Support

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

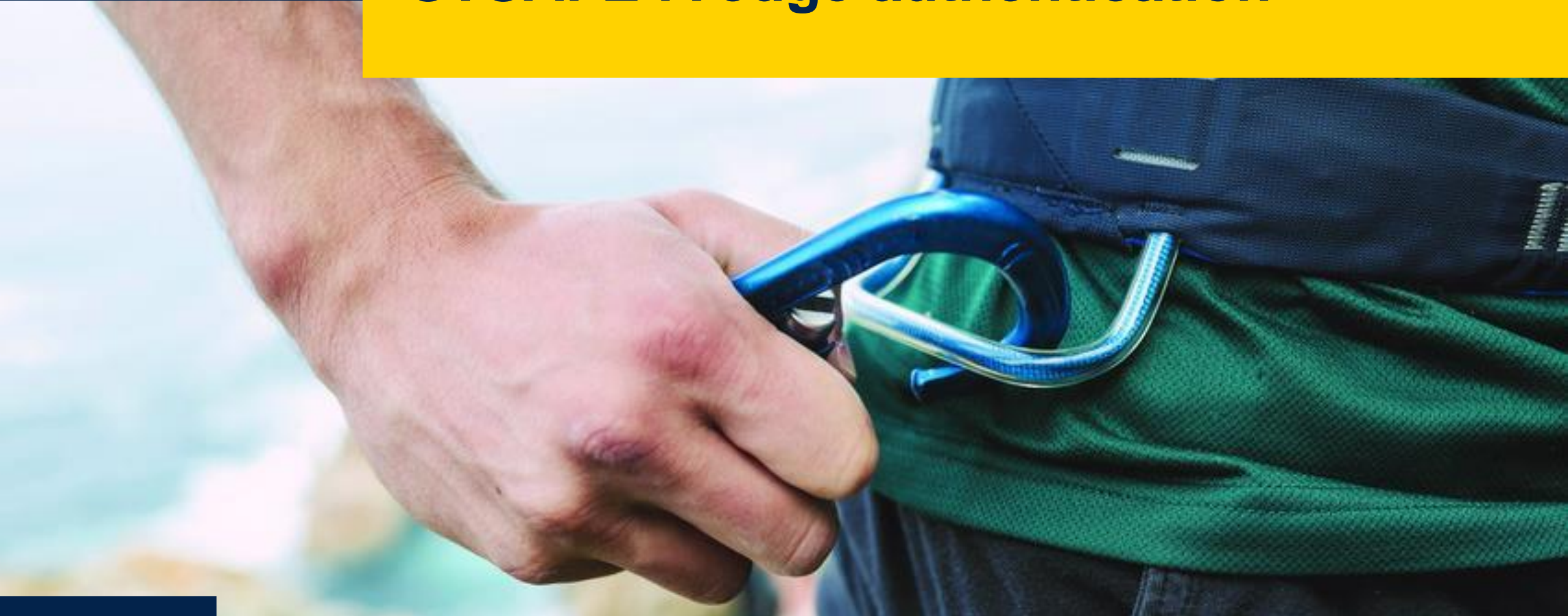


Ecosystem

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



STSAFE-A edge authentication



life.augmented



The right solution for HW security



Fact-based security evaluated by independent third parties
CC EAL5+

STSAFE-A110 certified CC EAL5+

Authentication
Identification

STSAFE-A

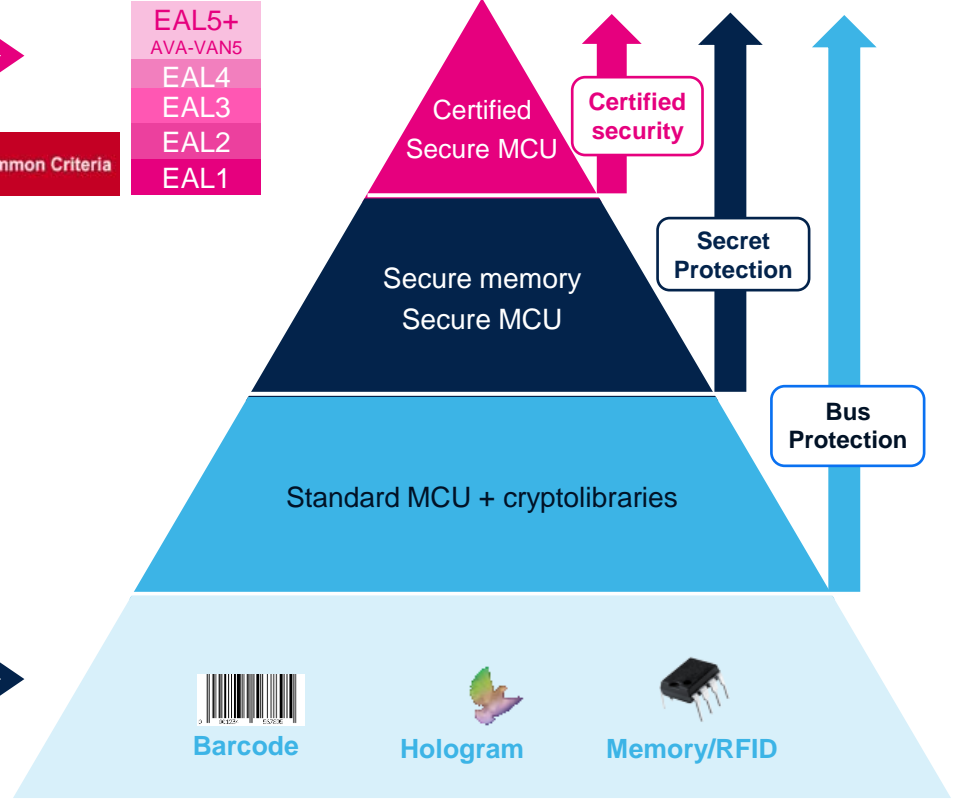
Common Criteria
EAL5+ AVA-VAN5
EAL4
EAL3
EAL2
EAL1

ST25 NFC

Reader Tags

Barcode Hologram Memory/RFID

Turn-key solution on NFC/RFID





STSAFE-A features & applications

Best-in-class embedded secure element (eSE)

CC EAL5+ certified



Key applications

- Smart Home (matter)
- Healthcare
- Power supply (open compute project)
- Metering
- Industrial equipment
- Wireless charging (Qi)

Rich feature set

- Authentication with personalized certificate
- Secure connection establishment
- Secure data storage
- Signature verification

Best-in-class hardware

- Highly secure MCU, CC EAL5+ AVA_VAN5 certified
- 6kBytes EEPROM
- 30 years data retention, 500kcycles
- Temperature range: -40 to 105°C
- 1µA consumption in hibernate mode

Personalization

- Customer certificate and keys personalization at ST secure factory



Secure provisioning

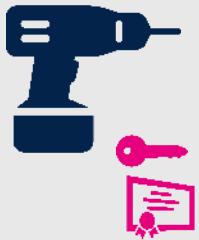




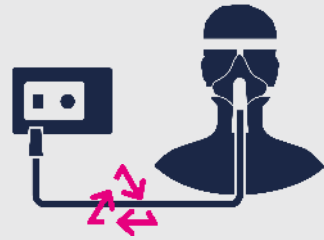
STSAFE-A use cases

Brand protection

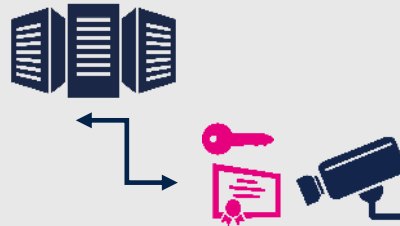
Verify a consumable or a peripheral is genuine



Control the number of consumable used



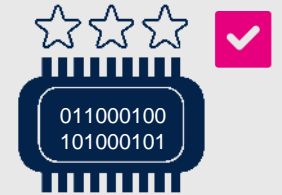
Verify device is genuine or its access rights



Ensure confidentiality & integrity of exchanged data



Ensure embedded firmware integrity





STSAFE-A applications

Authentication For certified devices



- SE(Secure Element) is mandatory for Qi certified chargers (Qi 2.0 EPP and MPP)
- ST is one of the CA service providers certified by WPC

Authentication For accessories



- STSAFE-A provides HW security in level of CC EAL5+
- Valuable for use in valued accessories, e.g. power tools, batteries, to realize brand protection

Security For access & connection



- Remote devices need to be authenticated by the cloud server before joining the network
- SE offers a secure way to build TLS(Transport Layer Security)

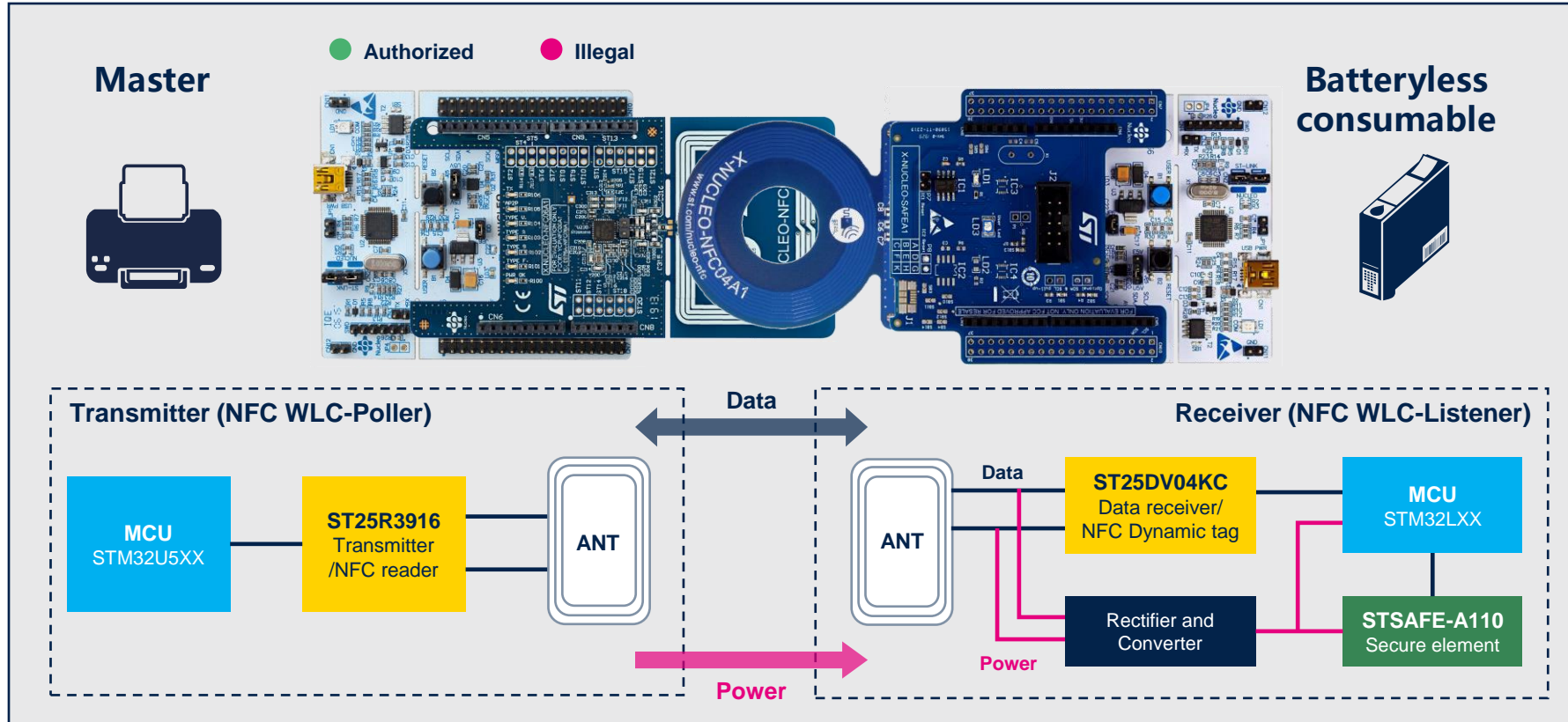
Secure boot



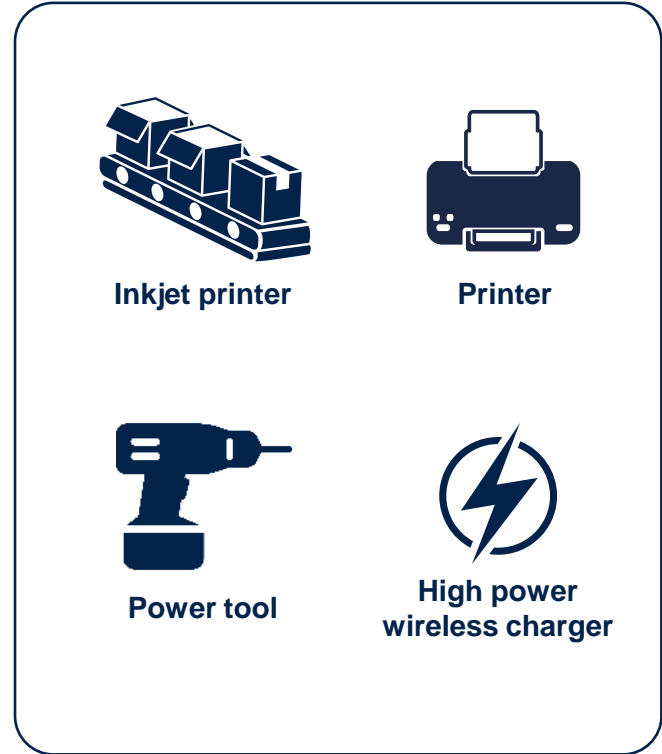
- STSAFE-A working with secure MCU, to improve the workflow of secure boot



Contactless authentication solution STM32U5 + ST25 + STSAFE-A



应用场景



Features:

- The STSAFE-A110 is CC EAL5+ certificated and offers customized security service for brand protection.
- Wireless data and energy transmission through ST25 NFC realizes a battery-less solution for the cartridge (Receiver).
- Compared with traditional contact solutions, it completely removes wired interface, which can effectively overcome reliability issues of contact interface caused by aging and vibration.

ST4SIM M2M Cellular





ST4SIM value proposition

An 8-pin solderable eSIM enabling cellular connectivity for industrial and IoT

LTE, 5G, and LPWA (NB-IOT, Cat-M) cellular connectivity (*)

CC EAL5+ certified hardware

Optimized for low power applications (ETSI Suspend/Resume)

Agreement w/ MNO (Verizon, ATT) and MVNO (Wireless logic, Truphone)

Secure provisioning service by ST



MFF2 (DFN8)
standardized package



M2M industrial & IoT Wireless connectivity applications

EV charging

Metering

Asset tracking

Medical



Introducing the SIM & eSIM concept

From the removable SIM to the soldered and interoperable eSIM

Traditional SIM card Removable

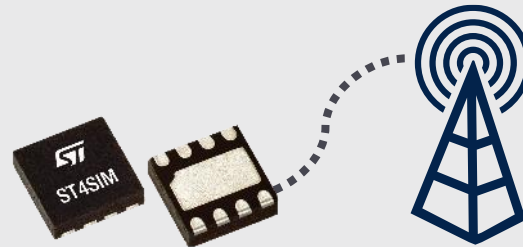
Traditional SIM concept inherited from mobile phone



1 SIM card = 1 operator

Embedded SIM (eSIM) Soldered

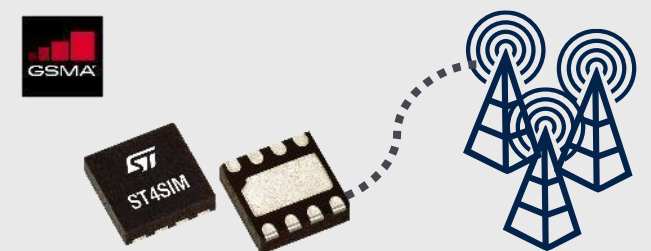
An optimized footprint and reliable package as soldered



1 eSIM card = 1 operator

GSMA-certified eSIM Soldered & interoperable

Possibility to change remotely the operator without replacing the SIM



1 eSIM card = X operator

ST4SIM portfolio

Internet of Things



ST4SIM-S

Industrial



ST4SIM-M

Basic SIM & eSIM ST4SIM-100x

Optimized and cost effective

ST4SIM-100S

ST4SIM-100M

Crypto 5G SIM & eSIM ST4SIM-110x / -111x

Advanced secure communication

ST4SIM-110S / **ST4SIM-111S**

ST4SIM-110M / **ST4SIM-111M**

GSMA eSIM ST4SIM-200x

Scalable & interoperable solution

ST4SIM-200S

ST4SIM-200M

GSMA 5G eSIM ST4SIM-201x

5G, scalable & interoperable solution

ST4SIM-201S

ST4SIM-201M



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