



ST25 NFC Tags & Readers solutions



NFC Technology



NFC technology at a glance

An interactive technology enabling engagement with IoT devices



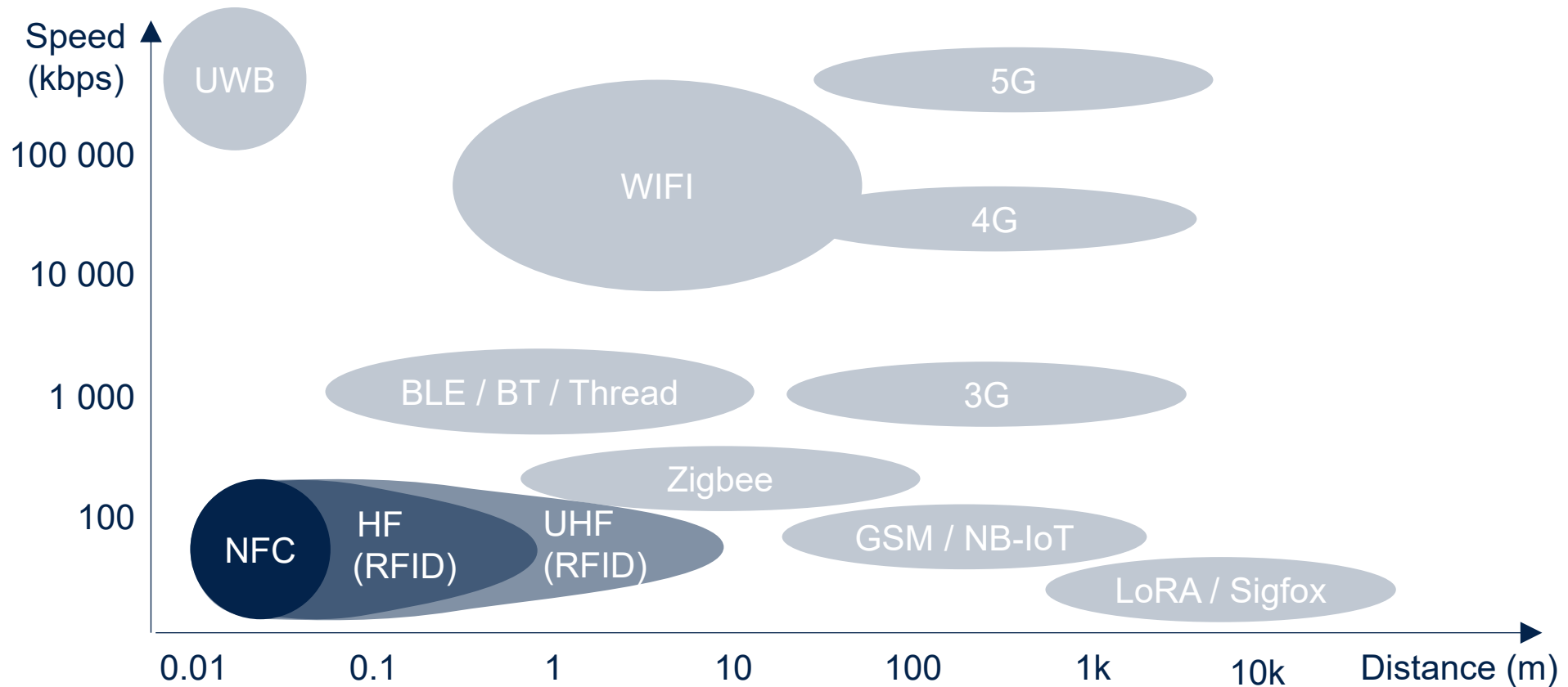
- Near Field Communication, a **short range** wireless technology
 - Operating at **13.56MHz**
 - Based on the RFID HF standard (ISO14443 & ISO15693)
- **Interactive** and **zero power**, enabling a convenient connection to the Internet of Things
→ **NFC-enabled mobile phones can engage with items by a simple tap**
- NFC is developed by the NFC Forum
 - **Interoperability** between devices
 - **Standardized** use cases (web link, Bluetooth handover, etc.)
- Fast growing NFC deployment in mobile phones
 - In 20245 more than 75% phones come with NFC
 - NFC is used for Mobile payment (EMVCo®) like Apple Pay or Google Pay
 - Apple added in 2017 support of NFC reader mode from iOS11 onward and support of NFC writer mode from iOS13 in September 2019





NFC in the wireless spectrum

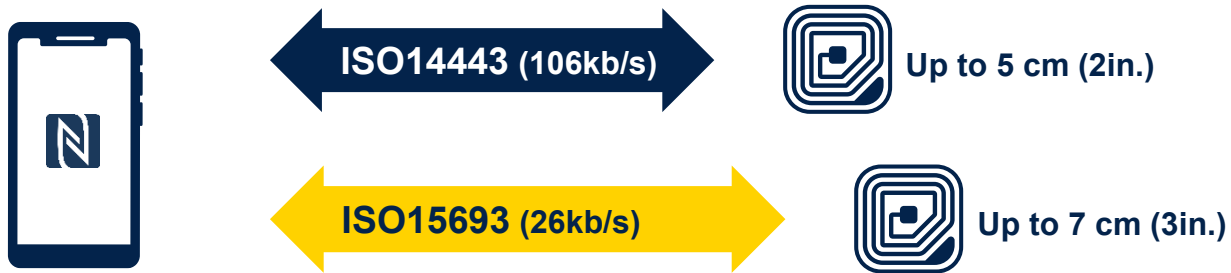
**NFC is unique in the wireless spectrum:
short distance, low data-rate and zero power for the application**



Typical NFC / RFID range

- **ISO14443** (NFC Forum type 2 & type 4) is called "**contactless short range**" standard with higher RF speed.
- **ISO15693** (NFC Forum type 5) is called "**contactless long range**" standard.

NFC phones



RFID readers

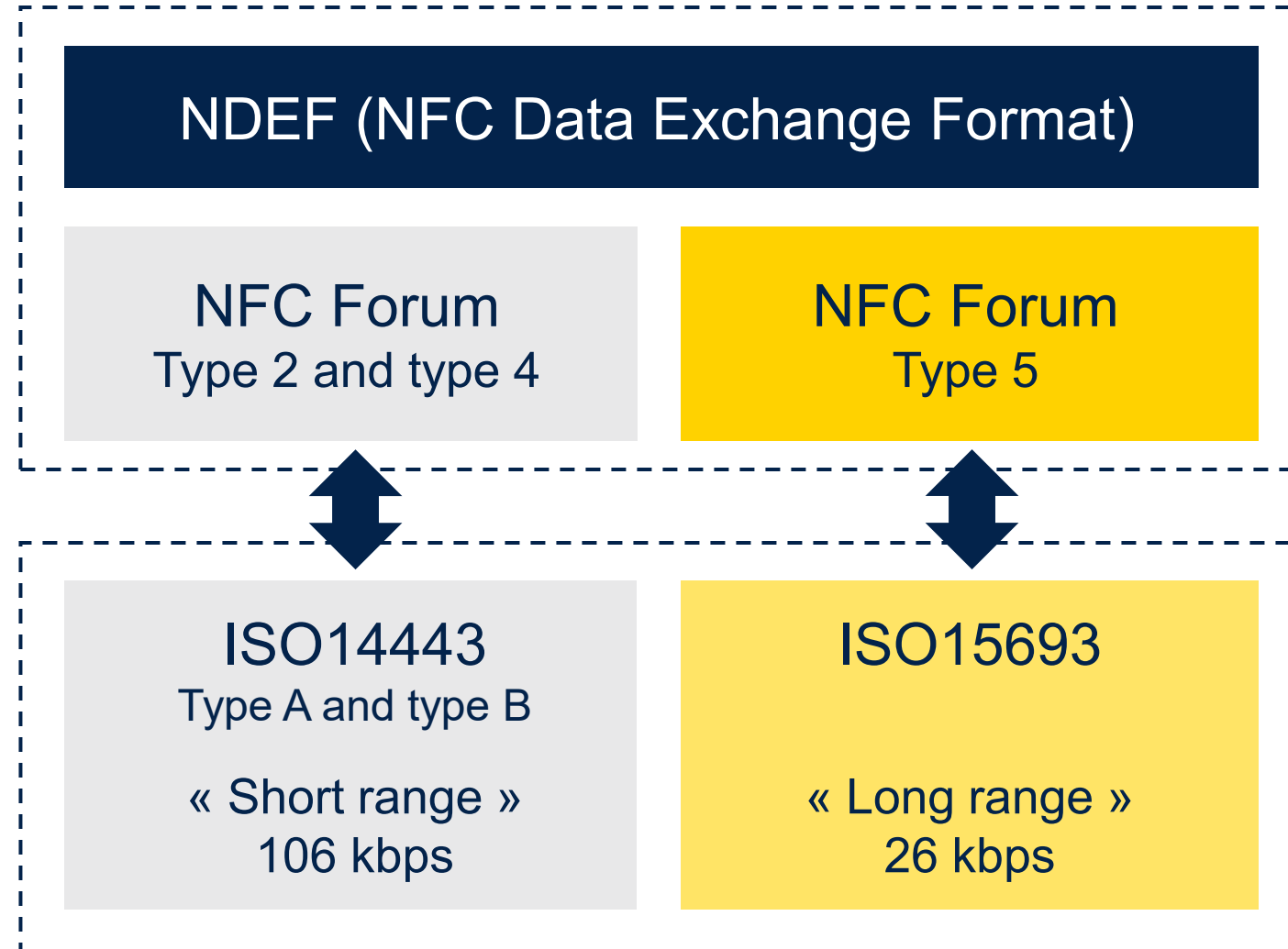


NFC Forum standards

NFC specification
→ **Upper layer SW**



RFID HF ISO standards
→ **HW / SW protocol**



From factory to consumer bridging RFID and NFC



ISO
15693



NFC
Type 5



Introduction to the NFC Wayfinding Mark



- N-Mark remains the official logo of NFC Forum, used for certified products.
- The Wayfinding Mark is made to ensure optimal NFC User experience.



Directional

- Occasional use
- Tapping point



Instructional

- One-time use
- Learning to tap



Simplified

- Everyday use
- For users already familiar with NFC



Charging

- Everyday use
- Device charging antenna location

More details: <https://nfc-forum.org/wayfinding-mark/>

How to use the wayfinding mark: <https://nfc-forum.org/wp-content/uploads/2021/11/Wayfinding-Mark-Guidelines.pdf>

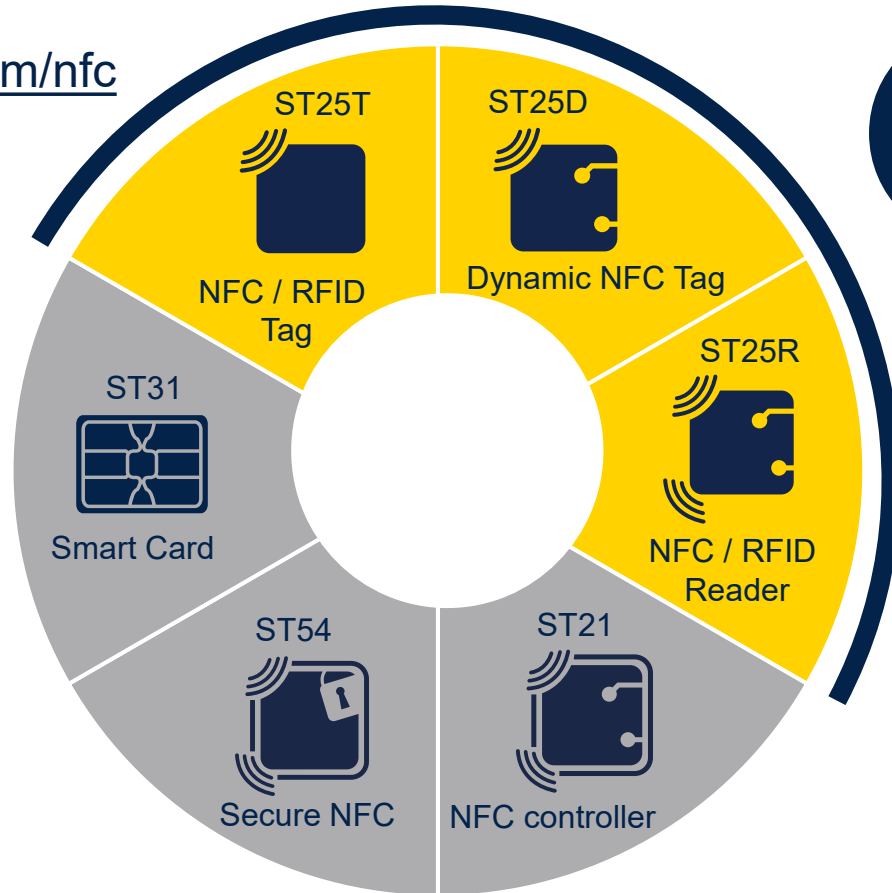
ST25 NFC Portfolio



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** for Lighting
- **CEN CENELEC JTC24** for DPP (digital product passport)
- **EMVCo®** (Europay, Mastercard & Visa Consortium)
- **WPC** (Wireless Power Consortium) for Ki kitchen and Qi charging
- **CSA** (Connectivity Standards Alliance) for Matter and Aliro

ST25 product family

Passive tag - EEPROM with contactless NFC interface

www.st.com/st25t

Tags



NFC phone
or RFID reader

Passive connected tag – EEPROM with contactless NFC and wired I2C interfaces

www.st.com/st25d

Dynamic tags



NFC phone
or RFID reader

Active reader – Provides power to NFC devices and initiates the communication as a controller

www.st.com/st25r

Readers



NFC phone



ST25 NFC / RFID portfolio

one-stop-shop for tags and readers

Tags				Dynamic tags			Readers		
ST25TA-EB	ST25TB	ST25TN	ST25TVC	M24SR	ST25DVC-I2C *	ST25DV-PWM	ST25R200 ST25R100	ST25R300 ST25R210	ST25RN300
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 ISO15693 Felica ISO18092	ISO14443-A/B ISO15693 Felica ISO18092
Flash 2Kb 25-year retention 500k cycles	EEPROM 512b-4Kb 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	Reader/Writer P2P Card Emulation EMVCo® (R300)	Reader/Writer P2P Card Emulation
Augmented NDEF Edge TruST25 digital signature ECC crypto engine 4-digit UTC 24b counter UID	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	Dynamic Power Out (DPO) OverShoot Protection (OSP) Dual-antenna	Active wave shaping (AWS+) Dynamic Power Out (DPO+) Auto Antenna Tuning (AAT) Dual-antenna	NFC Controller Interface (NCI) Active wave shaping (AWS) Dynamic Power Control (DPC) Active Load Modulation (ALM)
				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 10 / 6Mbps 2.7V-5.5V 1.2W - 0.8W	SPI 10Mbps 2.7V-6.0V 2.2W - 1.6W	I2C 1MHz 2.5V-5.1V 2.2W
SBN14 / SBN075	SBN12 / SBN075	SBN12 / SBN075 / FPN5	SBN12 / SBN075 / FPN5	SO8 / TSSOP8 / FPN8 / SBN12	SO8 / TSSOP8 / FPN8 / FPN12 / WLCSP10	SO8 / TSSOP8	24-pin QFN	32-pin QFN / 28-pin QFN	WLCSP-49



*: successor of M24LR
and ST25DV-I2C

ST25 series enriching our lives!

Main applications for ST25 series



Consumer
Gaming



Healthcare
Medical, wellness



Brand protection
Accessory recognition



Smart home
Home appliance



Industrial
Lighting, metering



Asset tracking



Access control



Point of sale



Transport

Certification & interoperability status



Tags

ST25TV

ST25TN



Dynamic tags

ST25DV-I2C

ST25DV-PWM



Readers

ST25R200

ST25R300

ST25RN300

NFC Forum



NFC Forum



iOS app



RFAL SW



Android app



Application
SW



Contactless market: booming opportunities

ST25 NFC tags & readers pervasion

Comprehensive portfolio:
Short range – Long range

Growing contactless markets:
> 10% CAGR 2024-2029*

ST25 Ecosystem

for easy
adoption
and fast
development



Readers ST25R



Tags ST25T



Dynamic tags ST25D



Best-in-class RF performance



- Payment
- Lighting
- Metering
- Healthcare
- Smart home
- Appliances
- Access control
- Transportation
- Consumer electronics
- Consumer brands

Active member
at standards



ST25 product series overview





ST25 tags & dynamic tags DNA

Comprehensive portfolio

Standard compliant



NFC Forum
ISO14443A
ISO14443B
ISO15693

Feature-rich

13.56 MHz
Digital signature TruST25
Counter / Unique tap code
ECC-based crypto
I2C interface
Fast transfer mode
Energy harvesting

Best-in-class memory

From 512-bit to 64-Kbit
1M erase-write cycles
Up to 200 years retention
128-bit password
OTP bits

High volume & quality

In-house manufacturing
Leverage automotive
EEPROM quality
Leverage consumer
EEPROM volume



ST25 readers DNA

Comprehensive portfolio

Standard compliant



NFC Forum
ISO14443A/B
ISO15693
Felica

High performing

RF 13.56MHz
Very high bit rate (6.8Mbit/s)
High output power (2.2W)
Temperature -40°C to 105°C

Advanced features

Active wave shaping
Automatic antenna tuning
Low power wake-up modes
Dynamic power output
Noise suppression receiver
Active Load Modulation

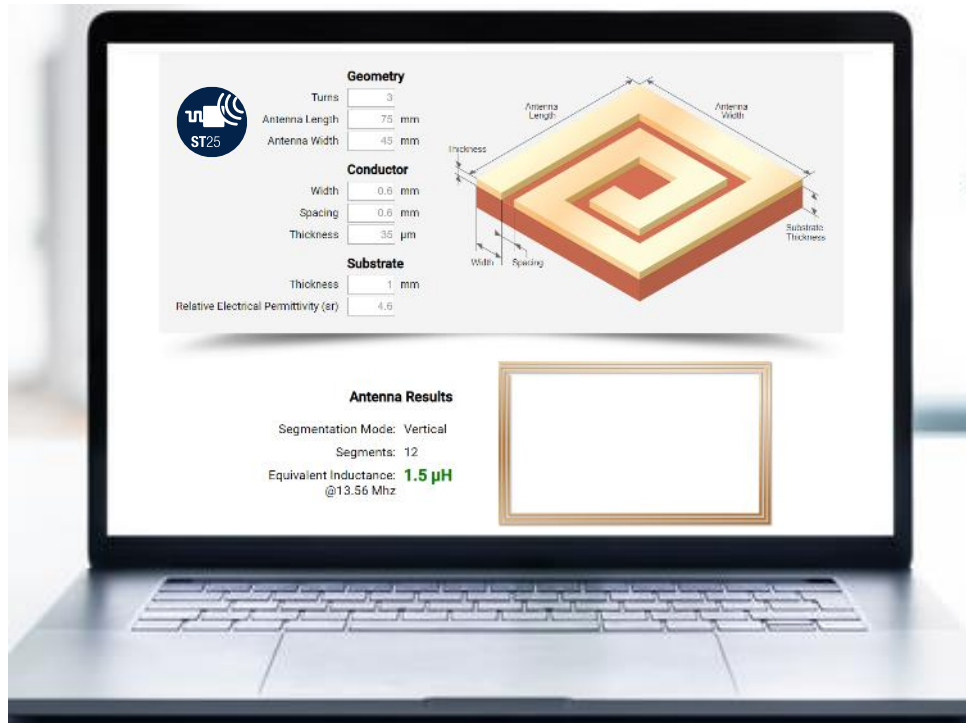
Certification

EMVCo®
PBOC
FCC
CE mark

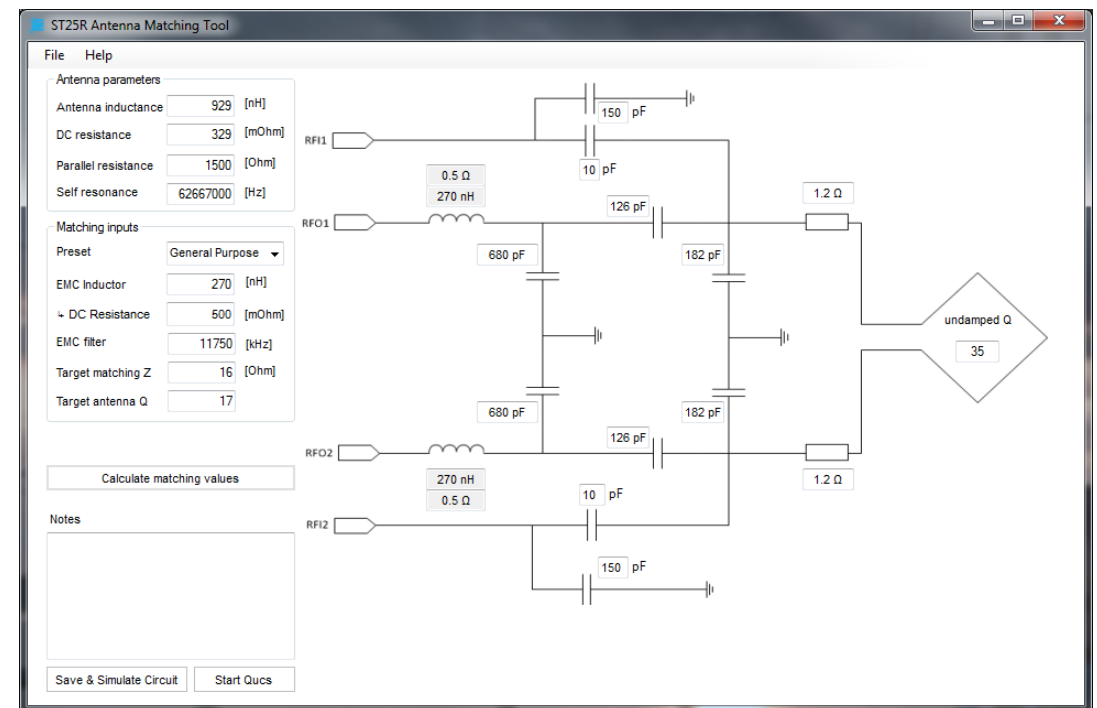
Antenna e-design and matching tools

Fast and easy prototyping

Antenna eDesign suite



ST25R antenna matching tool



ST25 ecosystem DNA

Easy-to-use and customer-oriented



STM32 Nucleo
HW ecosystem



Discovery kit
STM32 based



Antenna
e-design tool



Schematic,
BOM, Gerber



Mobile apps
ST25 SDK



STM32Cube
SW ecosystem



PC software tool
ST25 SDK



Documentation

ST25T product ID cards





NFC / RFID tags product family

	ST25TA-EB	ST25TB	ST25TN	ST25TVC	
RF protocol	ISO14443A NFC type 4	ISO14443B	ISO14443A NFC type 2	ISO15693 NFC type 5	ISO15693 NFC type 5
RF speed	106kbps	106kbps	106kbps	26kbps (53kbps)	26kbps (53kbps)
Memory format	Flash	EEPROM	EEPROM (preformatted NDEF)	EEPROM (preformatted NDEF)	EEPROM
Memory size	2k-bit	512-bit / 2k / 4k-bit	512-bit / 1.6k-bit	512-bit / 2k-bit	16k / 64k-bit
Data protection	Password 64-bit	OTP bits	Lock blocks	Password 64-bit	Password 64-bit
Digital signature	On-chip Edge TruST25	-	Off-chip TruST25	Off-chip TruST25	-
Digital output	-	-	-	Tamper Detect	-
Counter / UTC	24-bit counter 4-digit UTC	32-bit (x2) counters	24-bit UTC	24-bit UTC	-
Extra features	ECC-based crypto engine	Tag for transport ticket	Augmented NDEF	Augmented NDEF Untraceable mode	-
RF tuning capacitor	68pF	64pF	50pF	23.5pF & 99.7pF	28.5pF
Temperature range	-25°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Package	SBN14" / SBN075 ²	SBN12* / SBN075 ²	SBN12* / SBN075 ² FPN5	SBN12* / SBN075 ² FPN5	SBN12*

¹ SBN14: Die form, Sawn and Bumped wafer, 140µm thickness, inkless 12" wafer

^{*} SBN12: Die form, Sawn and Bumped wafer, 120µm thickness, inkless 8" wafer

² SBN075: Die form, Sawn and Bumped wafer, 75µm thickness, inkless 8" wafer

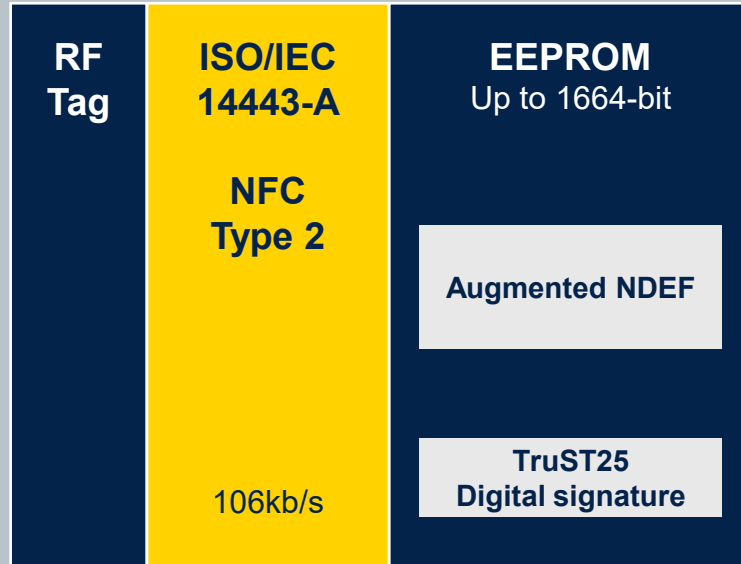


ST25TN

Entry level NFC type 2 tag



ST25TN512 / 01K



UFDPN5



SBN12 / SBN075

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

Use cases

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

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
- Cost effective applications

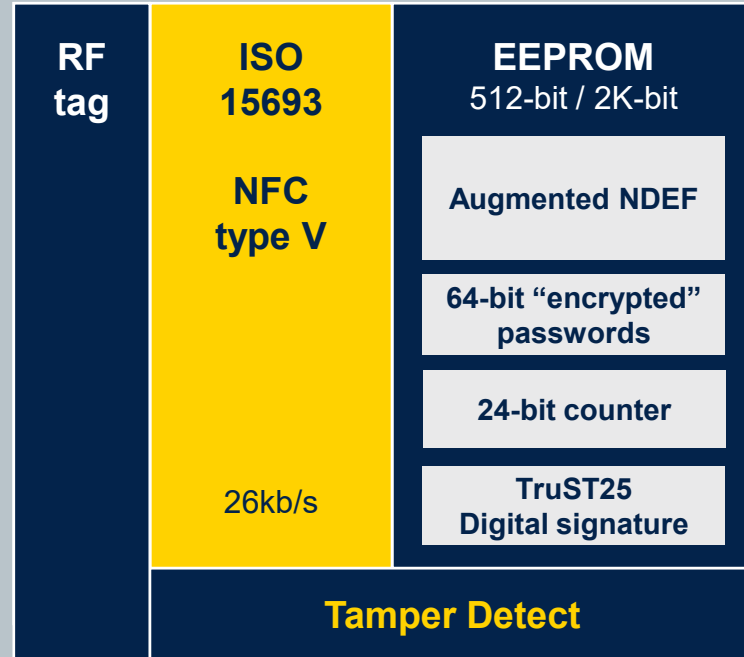


ST25TVC

NFC type 5 tag with Augmented NDEF



ST25TV512C / 02KC



UFDPN5



SBN12 / SBN075

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

Use cases

- Consumer engagement, product identification, accessory recognition, wireless pairing, asset tracking, access control, gaming
- 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
- Untraceable (possible by default) & Kill modes
- Tamper Detect pin for open / short detection
- **Augmented NDEF**: UID, UTC, tamper status, signature, password counter...

Key benefits

- Configurable User Memory Area
- Cloning Protection with Digital Signature (Cloud management)
- **60 years** data retention, **100k cycles** erase/write



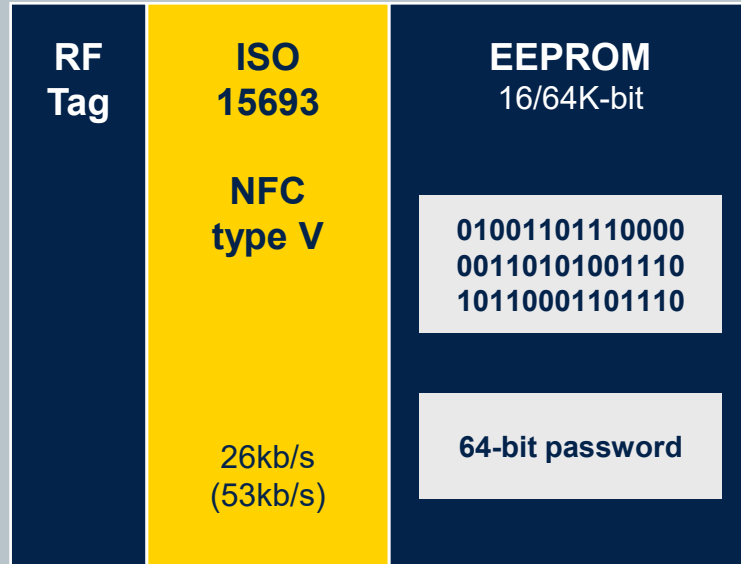


ST25TVC

High density NFC type 5 tag



ST25TV16/64K



SBN12

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

Use cases

- Asset tracking, product identification
- Maintenance, repair and operations
- Gaming

Key features

- **ISO15693** and **NFC type V**
- **Long range** operations, up to 53kb/s speed
- **16/64K-bit** EEPROM density

Key benefits

- Temperature range -40°C to +85°C
- Enhanced protection with multiple **64-bit password**
- **40 years** data retention, **1M cycles** erase/write
- Same RF tuning capacitor as in M24LR / ST25DV-I2C (28.5pF)



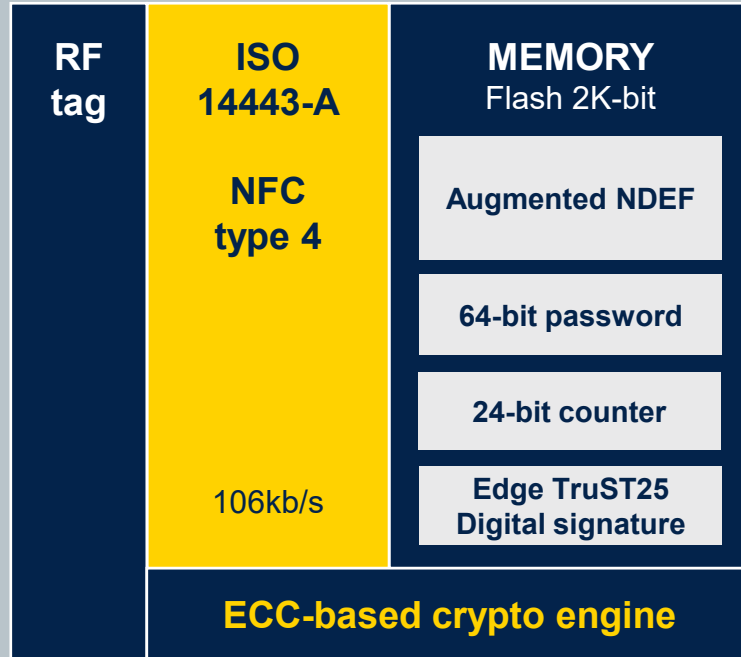


ST25TA-EB

Secure Tag for product authentication



ST25TA-EB



SBN14

Die form, sawn and Bumped inkless 12" wafer, 140µm thickness

Use cases

- Product authentication, brand protection, anticloning, asset tracking

Key features

- **ISO14443-A** and **NFC type 4**
- Short-range operations, up to 106kb/s speed
- Data protection using password-based authentication
- **Cloning protection** thanks to Edge TruST25™ digital signature
- Configurable general-purpose counter
- **Privacy-enabled** communication modes
- Tag-related credential appended dynamically to NDEF (ANDEF)
- **Internal or external personalization flow**



Key benefits

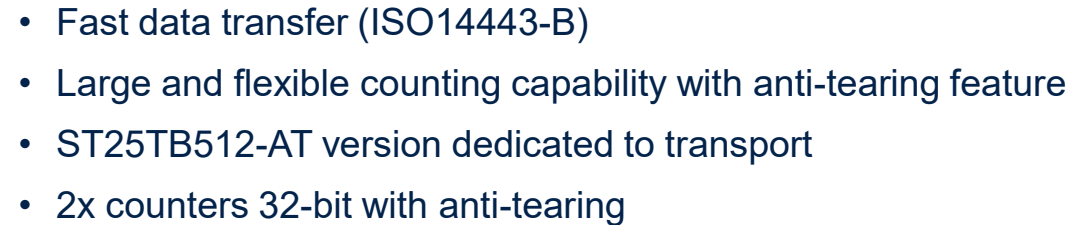
- **Strong product authentication** thanks to on-chip ECDSA signature
- **Blockchain compatibility**



RF Tag	ISO 14443-B	EEPROM 512-bit / 2K / 4K-bit 01001101110000 00110101001110 10110001101110 32-bit counter x2 64-bit UID
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- Mass transit and **transport**
- Event ticketing
- Asset tracking
- Brand protection, identification



- Temperature range **-40°C to +85°C**
- 40 years data retention, **1M cycles** erase/write



ST25T part numbers

ST25T NFC / RFID tags

ST25TA-EB	Package			2k-bit			
NFC type 4 / ISO14443-A Secured Tag (ECC crypto)	SBN14			ST25TAEBxxx-AIE6 ST25TAEBxxx-AOE6	xxx: customer code		
ST25TB	Package	512-bit	2k-bit	4k-bit			
RFID ISO14443-B Tag	SBN12 SBN12 SBN075	ST25TB512-AC6G6 ST25TB512-AT6G6 ST25TB512-AT6F6	ST25TB02K-AC6G6	ST25TB04K-AC6G6			
ST25TN	Package	512-bit	1.6k-bit				
NFC type 2 / ISO14443-A Tag	SBN12 SBN075 UDFPN5	ST25TN512-AFG5	ST25TN01K-AFG5 ST25TN01K-AFF5 ST25TN01K-AFH5				
ST25TVC	Package	512-bit	2k-bit			16k-bit	64k-bit
NFC type 5 / ISO15693 Tag (+ Tamper Detect)	SBN12 SBN12 SBN075 UDFPN5	ST25TV512C-AFG3 ST25TV512C-AFF3	ST25TV02KC-AFG3 ST25TV02KC-TFG3 ST25TV02KC-AFF3 ST25TV02KC-TFH3			ST25TV16KC-APG3	ST25TV64KC-APG3



ST25D product ID cards





Dynamic NFC / RFID tags product family

	ST25DVC-I2C	ST25DV-PWM	M24SR	ST25DA-C
RF protocol	ISO15693 NFC type 5	ISO15693 NFC type 5	ISO14443A NFC type 4	ISO14443 NFC type 4
RF speed	26kbps	26kbps	106kbps	848kbps
Serial interface	I2C @1MHz Write 16-Byte page size	No	I2C @1MHz	I2C @400kHz
Fast Transfer Mode	Yes (256B buffer)	No	No	No
Energy harvesting	Yes	No	No	No
Digital output	OD or CMOS GPO	2x PWM	Open-Drain GPO	Ctrl pin
Extra features	Low Power mode	-	RF Disable	Secure functions
Memory type	EEPROM	EEPROM	EEPROM (preformatted NDEF)	NVM
Memory size	4k / 16k / 64k-bit	2k-bit	2k / 4k / 16k / 64k-bit	3KB secure storage
Data protection	Password 64-bit	Password 64-bit Digital signature	Password 128-bit	Generate/Verify signature, Secure channel
Temperature range	-40°C to +125°C	-40°C to +105°C	-40°C to +105°C	-25°C to +85°C
Package	SO8 / TSSOP8 / FPN8 / FPN12 / WLCSP10	SO8 / TSSOP8	SO8 / TSSOP8 / FPN8 / SBN12*	FPN8

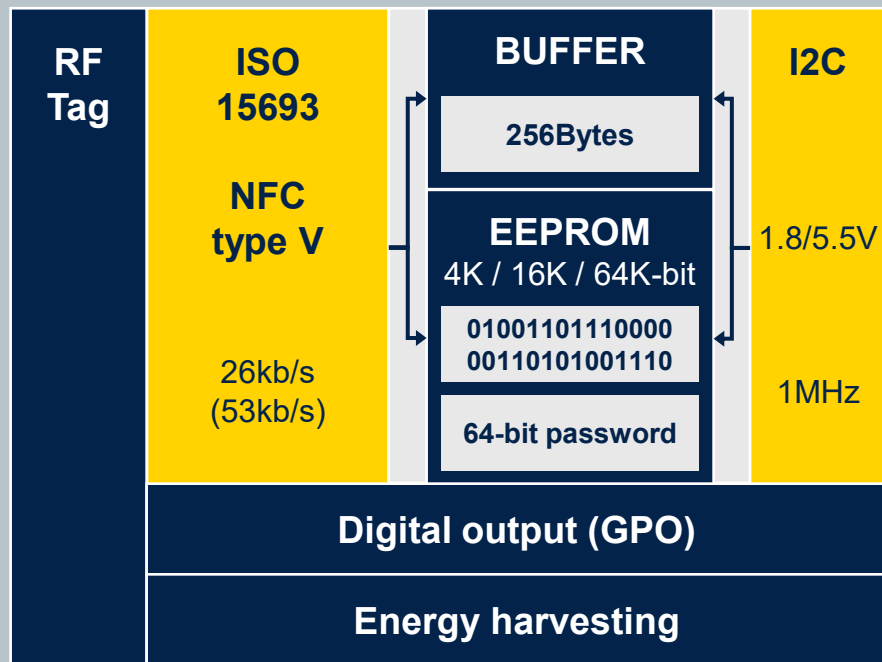


ST25DVC-I2C

Enhanced dynamic NFC type 5 tag



ST25DV04KC / 16KC / 64KC



SO8



UFDFPN8



WLCSP10



TSSOP8



UFDFPN12

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 256Bytes 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



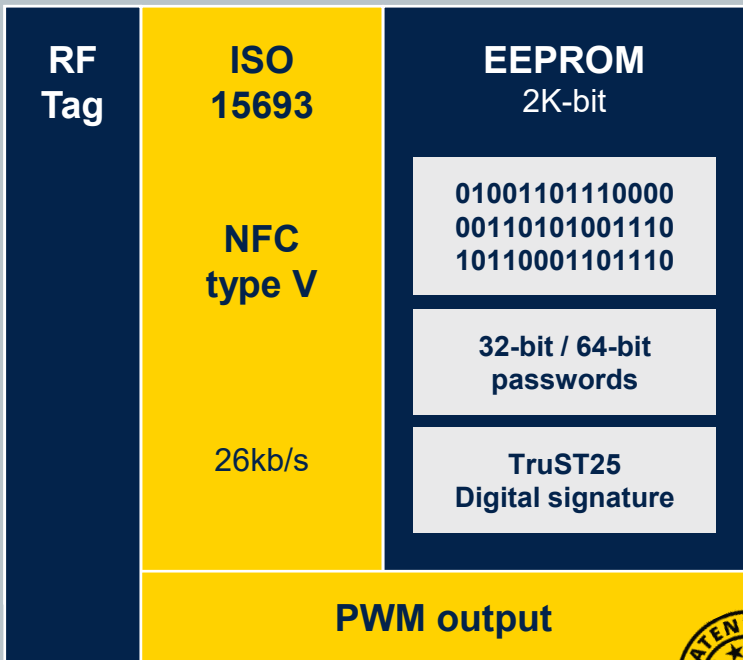


ST25DV-PWM

Dynamic NFC type 5 tag with PWM



ST25DV02K-W1 / -W2



SO8



TSSOP8



Use cases

- Targeted industrial applications such as lighting LED driver, motor control, power supply unit

Key features

- ISO15693** and **NFC type V**
- 2K-bit memory
- Up to **2 PWM** signal (push pull)
- Up to 15 bits resolution (62.5ns resolution step)
- Power Supply 1.8V - 5.5V
- 40°C to **+105°C** (PWM) temperature range
- TruST25 Digital Signature**

Key benefits

- 2 in 1 chip, putting NFC connectivity with PWM functionality
- Cost optimized solution to address low end Lighting market
 - Significant BOM reduction as no MCU is required to drive the system

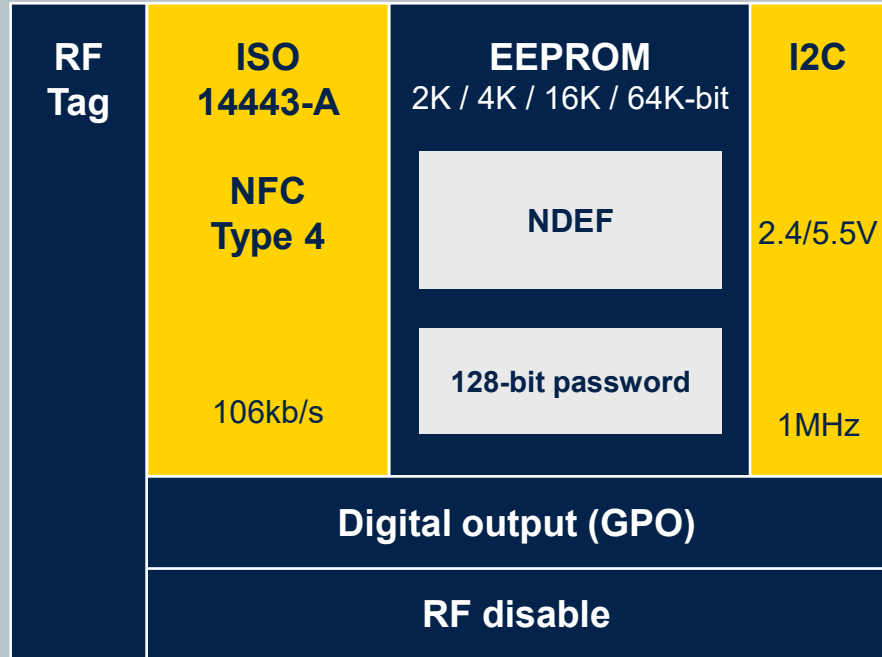


M24SR

Dynamic NFC type 4 tag



M24SR02 / 04 / 16 / 64



SO8



TSSOP8



UFDFPN8



SBN12

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

Use cases

- Convenient wireless pairing (Bluetooth, Wi-Fi)
- Dynamic data exchange with NFC phone
 - User settings update, information log download, etc.

Key features

- **ISO14443-A** type A and **NFC type 4**
- High speed operations (**106kb/s**)
- NDEF memory format
- Data protection thanks to **128-bit password**

Key benefits

- Easy of use (limited BOM, 8-pin package)
- Flexible interrupt pin (configurable GPO)
- **200 years** data retention, **1M cycles** erase/write

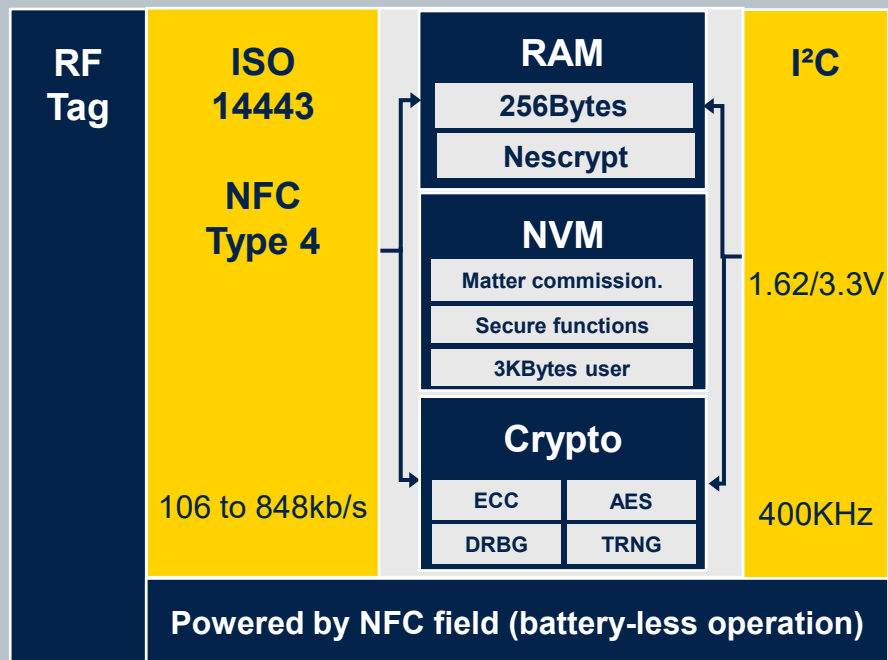


ST25DA-C

Secure Dynamic NFC tag



ST25DAC-GENx-AC7



FPN8

Use cases

- Battery-less commissioning for CSA Matter
- FW upgrade over I2C (Matter OTA)
- Secure storage for keys & certificates

Key features

- NFC Type 4 (106/212/424/848kb/s)
- I2C target, up to 400kHz, 1.62V to 3.3V operating voltage
- ECC, AES 128b, TRNG, SPAKE2+ Password Authenticated Key Exchange
- Secure storage up to 3KBytes for user, Secure channel SCP03
- Temperature range -25°C to +85°C
- Powered by NFC field (battery-less / power-less operation)

Key benefits

- Commission battery-less devices on Matter network
- Secure storage, signature generation/verification over I2C



ST25D part numbers

ST25D Dynamic NFC tags

ST25DVC-I2C	Package		4k-bit	16k-bit	64k-bit
Dynamic NFC type 5 Tag ISO15693 + I2C IF (16Bytes write) + GPO + Fast Transfer Mode + Energy Harvesting + Extended Temperature	SO8 SO8 TSSOP8 TSSOP8 UFDFPN8 UFDFPN8 UFDFPN12 UFDFPN12 WLCSP10		ST25DV04KC-IE6S3 ST25DV04KC-IE8S3 ST25DV04KC-IE6T3 ST25DV04KC-IE8T3 ST25DV04KC-IE6C3 ST25DV04KC-IE8C3 ST25DV04KC-JF6D3 ST25DV04KC-JF8D3 ST25DV04KC-JF6L3	ST25DV16KC-IE6S3 ST25DV16KC-IE8S3 ST25DV16KC-IE6T3 ST25DV16KC-IE8T3 ST25DV16KC-IE6C3 ST25DV16KC-IE8C3 ST25DV16KC-JF6D3 ST25DV16KC-JF8D3	ST25DV64KC-IE6S3 ST25DV64KC-IE8S3 ST25DV64KC-IE6T3 ST25DV64KC-IE8T3 ST25DV64KC-IE6C3 ST25DV64KC-IE8C3 ST25DV64KC-JF6D3 ST25DV64KC-JF8D3
ST25DV-PWM	Package	2k-bit			
Dynamic NFC type 5 Tag ISO15693 + 1x or 2x PWM IF + Extended Temperature	SO8 SO8 TSSOP8 TSSOP8	ST25DV02K-W1R8S3 ST25DV02K-W2R8S3 ST25DV02K-W1R8T3 ST25DV02K-W2R8T3			
M24SR	Package	2k-bit	4k-bit	16k-bit	64k-bit
Dynamic NFC type 4 Tag ISO14443-A I2C IF + GPO + RF disable + Extended Temperature	SO8 TSSOP8 UFDFPN8 SBN12 SO8 TSSOP8	M24SR02-YMN6T/2 M24SR02-YDW6T/2 M24SR02-YMC6T/2 M24SR02-YSG12I/2	M24SR04-YMN6T/2 M24SR04-YDW6T/2 M24SR04-YMC6T/2	M24SR16-YMN6T/2 M24SR16-YDW6T/2 M24SR16-YMC6T/2	M24SR64-YMN6T/2 M24SR64-YDW6T/2 M24SR64-YMC6T/2 M24SR64-YSG12I/2 M24SR64-YMN8T/2 M24SR64-YDW8T/2
ST25DAC	Package	Matter commiss.			
Dynamic NFC type 4 Tag ISO14443-A Matter comm. + Secure	FPN8	ST25DAC-GENx-AC7			



ST25R product ID cards





ST25R NFC readers product family

	ST25R100	ST25R200	ST25R210	ST25R300	ST25RN300
Description	Entry-level NFC Reader	Entry-level NFC Reader	Mid-range NFC Reader	High-performance NFC & EMVCo® Reader	High-performance NCI Reader
Reader/Writer mode	ISO14443A/B, ISO15693	ISO14443A/B, ISO15693	ISO14443A/B, ISO15693, FeliCa	ISO14443A/B, ISO15693, FeliCa	ISO14443A/B, ISO15693, FeliCa
Card emulation mode	-	-	Yes	Yes	Yes
AP2P mode	-	-	-	-	-
PP2P mode	-	-	Initiator & Target	Initiator & Target	Initiator & Target
RF speed	106kbps	106kbps	848kbps	848kbps	848kbps
Market	Reader+Tag, IoT, Gaming, Industrial, Consumer	Reader+Tag, IoT, Gaming, Industrial, Consumer	Reader+Tag, IoT, Gaming, Industrial, Consumer	Payment EMVCo® 3.x, Industrial, Consumer	Payment EMVCo® 3.x, Industrial, Consumer
Advanced features	DPO, IWU	DPO, IWU, NSR, EMD, OSP	AAT, DPO, NSR, DSA, AWS+, IWU, EMD	AAT, DPO, NSR, DSA, AWS+, IWU, EMD	ALM, DPO, NSR, LRCD, AWS, EMD
HW interface	SPI 6Mbps	SPI 10Mbps	SPI 10Mbps	SPI 10Mbps	I2C 1MHz
SW interface	REAL Unified Software Library for NFC Front Ends				NCI (NFC Controller Interface)
Power supply	2.4V – 5.5V	2.4V – 5.5V	2.7V – 5.5V	2.7V – 6.0V	2.5V – 5.1V
Output power	0.8W	1.2W	1.6W	2.2W	2.2W
Temperature range	-25°C to +85°C	-40°C to +85°C	-40°C to +105°C	-40°C to +105°C	-40°C to +85°C
Package	24-pin QFN 4x4	24-pin QFN 4x4	28-pin QFN 4x4	32-pin QFN 5x5	WLCSP-49



EMD: Automatic EMD suppression
P2P: Peer to Peer mode
AAT: Advanced Antenna Tuning
AWS: Active Wave Shaping

DSA: Drive Slope Adjustment
ALM: Active Load Modulation
DPO: Dynamic Power Output
CIWU: Capacitive & Inductive wake-up

NSR: Noise Suppression Receiver
IWU: Inductive wake-up
(J) Junction / (A) Ambient

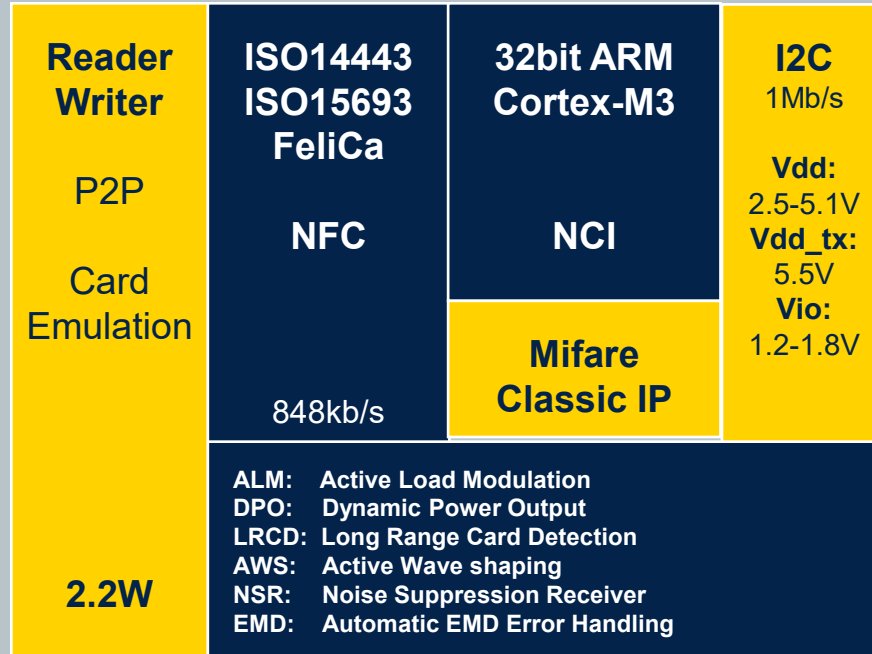


ST25RN300

NCI reader



ST25RN300



7x7 grid ball array
0.35mm pitch
WLCSP package

Use cases

- EMVCo payment (POS & mPOS) => best solution for Android based POS
- Access control, NFC charging, standard NCI reader

Key Features

- Compliant with EMVCo 3.1a and CR13/CR14 NFC Forum Universal Device
- **NCI (NFC Controller Interface)** through I2C interface
- **Mifare Classic IP** integrated (optional)
- **2.2W** output power with DPO, **Active Waveshaping**
- **Active load modulation (ALM)** for CE mode
- **Noise Suppression & synchronization pin** for antenna behind display
- WLCSP-49 0.35mm pitch package, **-40°C to +85°C** ambient temperature

Key Benefits

- Excellent output power & sensitivity + synchro display refresh for EMVCo
- EMVco L1 stack integrated and NCI interface
- Mifare Classic IP for POS terminals and access control



ST25R300

High-perf NFC reader & EMVCo® reader



ST25R300

Reader Writer	ISO14443 ISO15693 FeliCa	RAM BUFFER	SPI
P2P	NFC	256-Byte	Vdd: 2.7-6V Vio: 1.65-5.5V
Card Emulation	848kb/s		10Mb/s >2.7V 5Mb/s <2.7V
2.2W	DPO: Dynamic Power Output LRCD: Long Range Card Detection AWS: Active Wave shaping NSR: Noise Suppression Receiver AAT: Automatic antenna tuning EMD: Automatic EMD Error Handling		



5x5 QFN-32

Use cases

- EMVCo payment, NFC charging, Access control, Industrial & Consumer

Key Features

- EMVCo and CR15 NFC Forum reader Device
- **2.2W** output power with DPO, **Active Waveshaping**
- **Noise Suppression** for antenna behind or close to displays
- **Long Range LPCD**
- Vdd 2.7-6V with reduced capacitor BOM
- SPI interface: Vio 1.65V to 5.5V
- QFN-32 5x5mm package
- -40°C to +**105°C** ambient temperature range



Key Benefits

- Excellent output power and sensitivity for EMVCo applications and several different use cases



ST25R210

Mid-range NFC reader device



ST25R210

Reader Writer	ISO14443 ISO15693 FeliCa	RAM BUFFER	SPI
Card Emulation	NFC	256-Byte	Vdd: 2.7-5.5V Vio: 1.65-5.5V
Passive P2P	848kb/s		10Mb/s >2.7V 5Mb/s <2.7V
1.6W	DPO: Dynamic Power Output LRCD: Long Range Card Detection AWS: Active Wave shaping NSR: Noise Suppression Receiver AAT: Automatic antenna tuning EMD: Automatic EMD Error Handling		



4x4 QFN-28

Use cases

- Access control, Reader+Tag, Industrial & Consumer applications

Key Features

- CR13 NFC Forum reader Device
- **1.6W** output power with DPO, **Active Waveshaping**
- **Noise Suppression** for antenna behind or close to displays
- **Long Range LPCD**
- Vdd 2.7-5.5V with reduced capacitor BOM
- SPI interface: Vio 1.65V to 5.5V
- QFN-28 4x4mm package
- -40°C to +**105°C** ambient temperature range



Key Benefits

- Smallest tiny footprint NFC reader with cost efficiency suitable for access control applications and various other use cases.

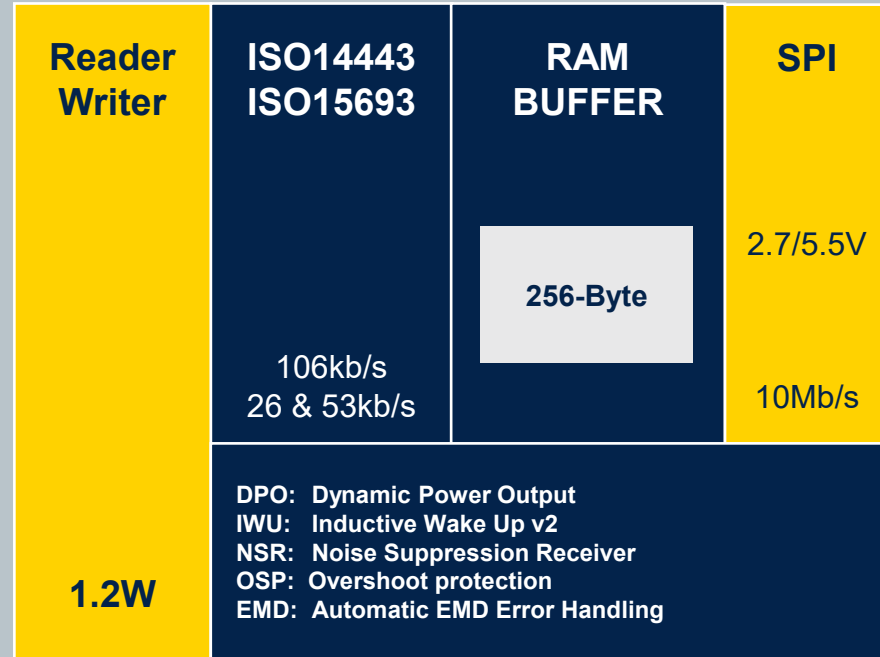




ST25R200

Powerful multi-purpose NFC reader

ST25R200



4x4 QFN-24

Use cases

- Ideal for **Reader+Tag** applications 
- Consumer and industrial applications, Access control, Transportation
- Accessory recognition, Brand protection, Parameter setting

Key Features

- **1.2W** dynamic output power
- Up to 250mA via internal LDO
- **Improved inductive wake-up** function & **overshoot protection**
- -40°C to 85°C ambient temperature
- Small 4x4mm TQFN-24 package



Key Benefits

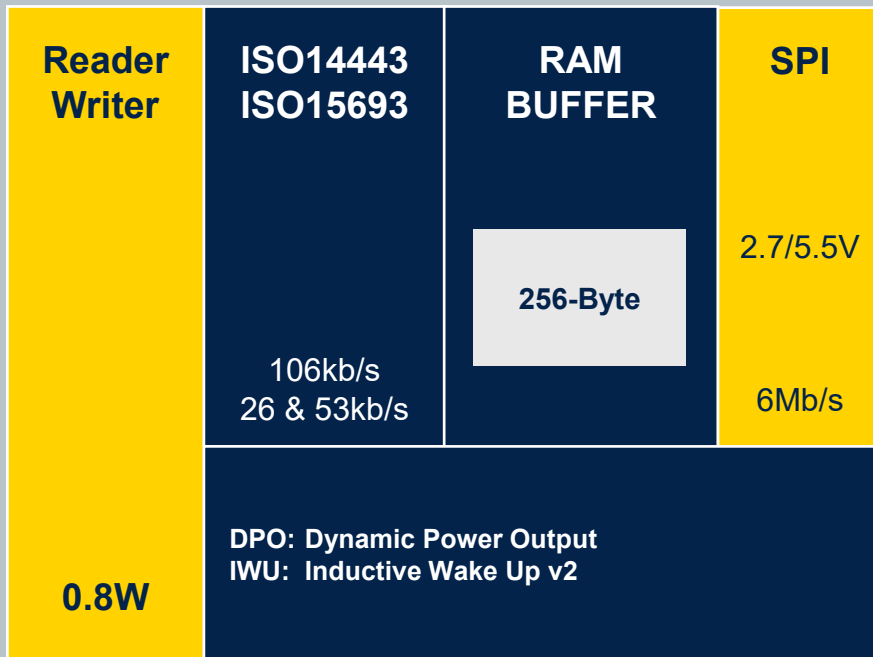
- **Tiny package size** for easy integration into applications
- Low power operation & great card detection range
- Cost efficient and powerful at the same time



ST25R100

Entry-level NFC reader

ST25R100



4x4 TQFN-24

Use cases

- Ideal for **Reader+Tag** applications 
- Consumer applications, Access control, Transportation
- Accessory recognition, Brand protection, Parameter setting

Key Features

- **0.8W** dynamic output power
- Up to 180mA via internal LDO
- **Improved inductive wake-up** function
- -25°C to 85°C ambient temperature
- Small 4x4mm-24 TQFN package

Key Benefits

- **Tiny package size** for easy integration into applications
- Low power operation & great card detection range
- Optimized for cost conscious applications



ST25R part numbers

ST25R NFC readers

ST25RN300	Package	Features	Part Number
High-perf NCI reader	WLCSP49	R/W & CE, ALM, DPO, CIWU, AWS, NSR, EMD, Mifare Classic (optional)	ST25RN300A-BWLT (wo Mifare Classic) ST25RN300B-BWLT (w/ Mifare Classic)
ST25R300	Package	Features	Part Number
High-perf NFC reader EMVCo® compliant	QFN32	R/W & CE, AAT, DPO, CIWU, AWS+, NSR, EMD	ST25R300-AQET
ST25R210	Package	Features	Part Number
Mid-range NFC reader	QFN28	R/W & CE, AAT, DPO, CIWU, AWS+, NSR, EMD	ST25R210-ANET
ST25R200/100	Package	Features	Part Number
Powerful multi-purpose NFC readers	QFN24 QFN24	R/W, IWU, DPO, NSR, EMD, OSP R/W, IWU, DPO	ST25R200-BMET ST25R100-CMET



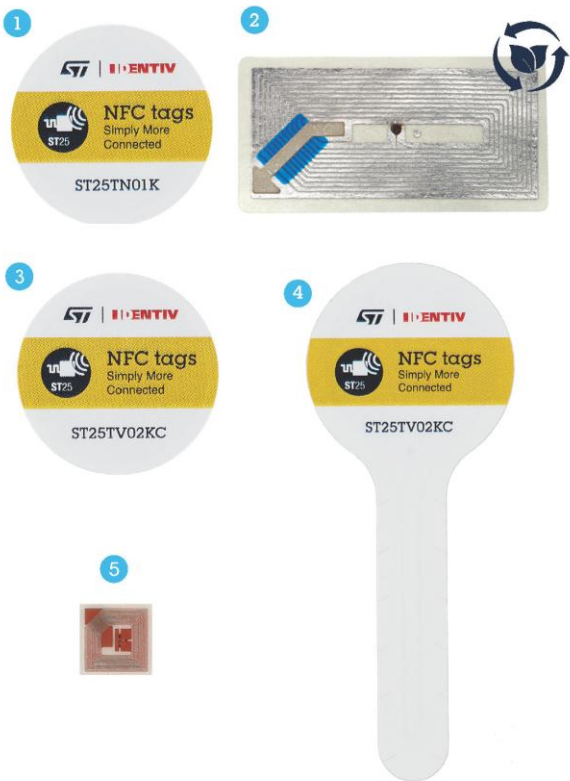
ST25 HW ecosystem





ST25T tag bag kits

ST25 tag bag AME



ST25-TAG-BAG-UI1

ST25 tag bag APAC



ST25-TAG-BAG-AB

ST25 tag bag EMEA



ST25-TAG-BAG-EC





ST25TVC evaluation board

ST25TV02KC ASEAL board



ST25TV02KC-ASEAL

- UDFPN5 package
- Class-6 18 turns single layer antenna
- 256-Byte (2-kbit) NDEF EEPROM
- Tamper detect capability
- TruST25 digital signature
- Augmented NDEF (ANDEF)

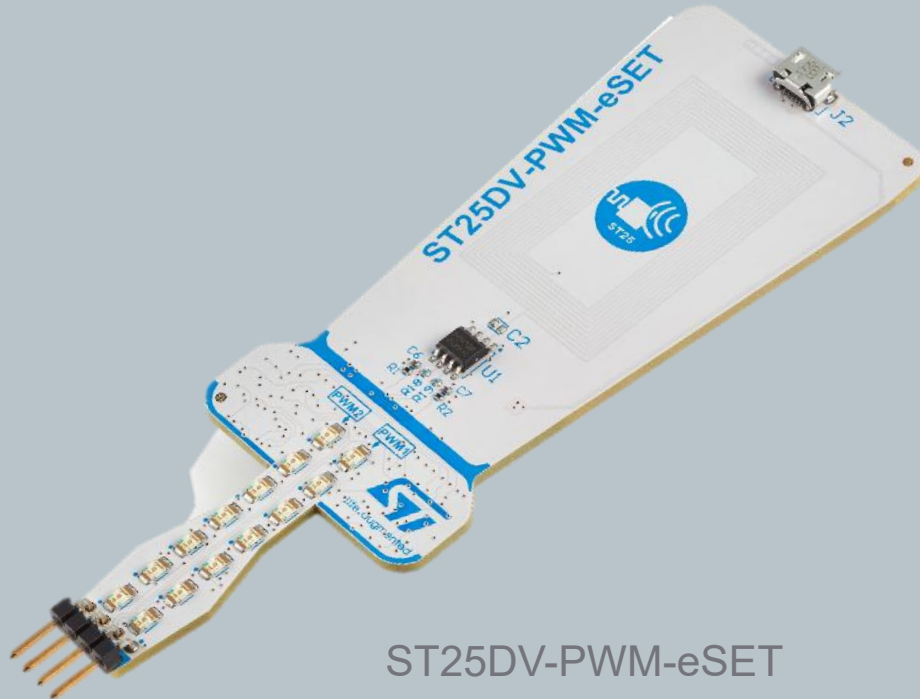
ST25 IC

ST25TV02KC NFC tag IC



ST25DV-PWM evaluation board

ST25DV-PWM discovery kit



- 49x26mm 8 turns antenna
- PWM frequency and duty cycle through Android App or PC Software
- Duty cycle illustration with LED ramp
- Connector to ST25DV-DISCOVERY kit to monitor the PWM signal on display

ST25DV-PWM-eSET

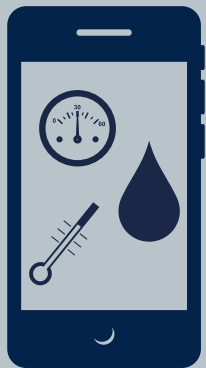
ST25 IC

ST25DV02K-W2 dynamic NFC tag IC



NFC sensor tag evaluation board

NFC Dynamic tag sensor and processing node



STEVAL-SMARTAG2

NFC sensor tag

- STM32L4 ultralow-power MCU
- ST25DV64KC dynamic NFC tag IC
- LIS2DUXS12 ultralow-power 3-axis smart accelerometer
- H3LIS331DL low-power high-g 3-axis accelerometer
- LPS22DF nano pressure sensor
- VD6283TX ambient light sensor
- 40x40mm 8 turns antenna
- Optional CR2032 / LIR2032 battery

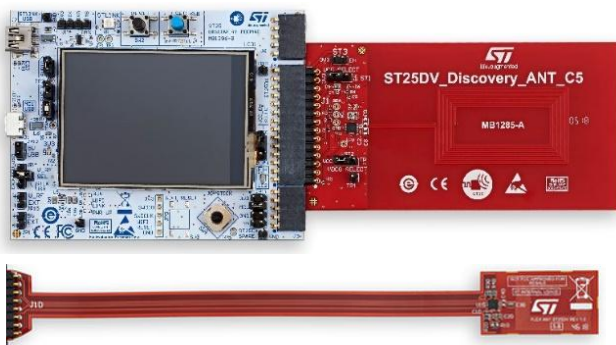
ST25 IC

ST25DV64KC dynamic NFC tag



ST25DVC-I2C evaluation boards

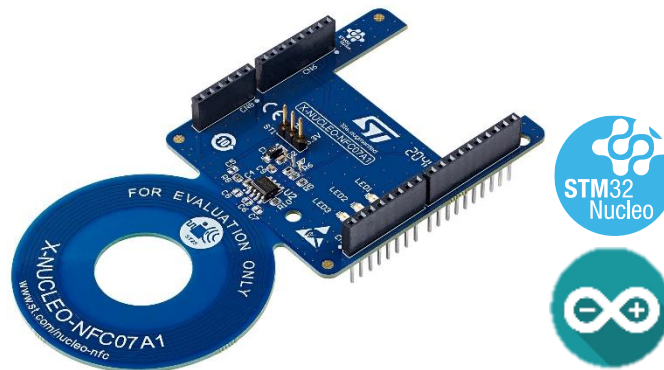
ST25DVC-I2C discovery kit



ST25DV64KC-DISCO

- **ST25DV64KC** dynamic NFC tag IC
- 49x37mm 8 turns antenna (ANT Class3)
- STM32F405 MCU
- 2.4" TFT LCD Touch screen
- I2C & SWIP connectors
- Daughter board connector
- 14.5x24mm 15 turns antenna (Flex antenna)
- 5 samples ST25DV64KC

ST25DVC-I2C Nucleo shield



X-NUCLEO-NFC07A1

- **ST25DV64KC** Dynamic NFC tag IC
- Ø54mm 8 turns single layer antenna
- energy harvesting, Low power mode, GPO
- Compatible with STM32 Nucleo boards
- I2C interface to MCU & Powered through Arduino™ connector

ST25DVC-I2C tiny antenna



ANT7-T-25DV64KC

- **ST25DV64KC** Dynamic NFC tag IC
- Ready-to-use PCB including:
- 14x14 mm, dual layer etched antenna
- I2C test points
- RF event configurable GPO
- Analog energy harvesting (EH) output



M24SR evaluation boards

M24SR discovery kit



M24SR-DISCO-PREM

- **M24SR64** Dynamic NFC tag IC
- 30x30mm 5 turns double layer antenna
- STM32F1 MCU
- LCD Color display + Joystick + LEDs
- USB & JTAG connectors
- BT / Audio module with audio headset

M24SR Nucleo shield



X-NUCLEO-NFC01A1

- **M24SR64** Dynamic NFC tag IC
- 31x30mm 5 turns double layer antenna
- Compatible with STM32 Nucleo boards
- I2C interface to MCU through Arduino™ connector
- Open drain output for MCU wake-up

M24SR tiny antenna



ANT7-T-M24SR64

- **M24SR64** Dynamic NFC tag IC
- 14x14mm dual layer antenna
- I2C test points to connect to MCU
- GPO open drain user configurable output to indicate an ongoing RF operation



ST25R300 evaluation boards

ST25R300 discovery kit



STEVAL-25R300

- **ST25R300** NFC reader IC
- 66x66mm 2 turns antenna etched on PCB
- STM32L476 LP 32-bit MCU
- Micro-USB connector
- Additional UART / I²C host interfaces, as well as NFC SPI and JTAG/SWD points

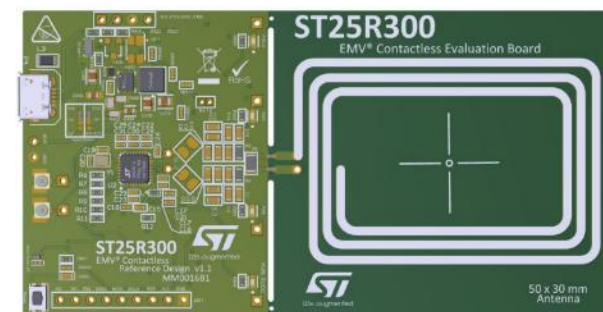
ST25R300 Nucleo shield



X-NUCLEO-NFC12A1

- **ST25R300** NFC reader IC
- 47x34mm 4 turns antenna etched on PCB
- Compatible with STM32 Nucleo boards
- Equipped with Arduino® UNO R3 connector

ST25R300 EMVCo® kit



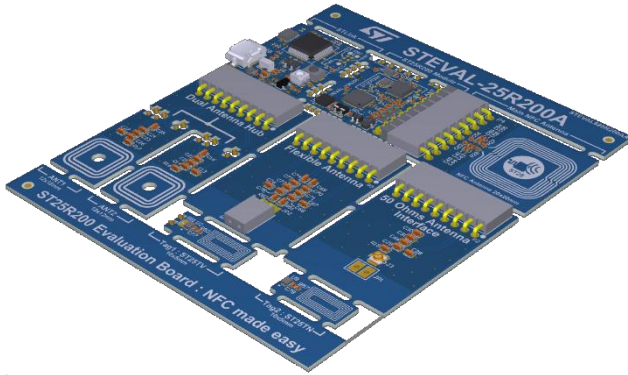
ST25R300-EMVCO

- **ST25R300** NFC reader IC
- 50x30mm 3 turns antenna etched on PCB
- STM32U575 ULP 32-bit MCU
- Micro-USB connector
- Comprehensive device test environment (DTE) for EMVCo® Level 1 FW control



ST25R200/100 evaluation boards

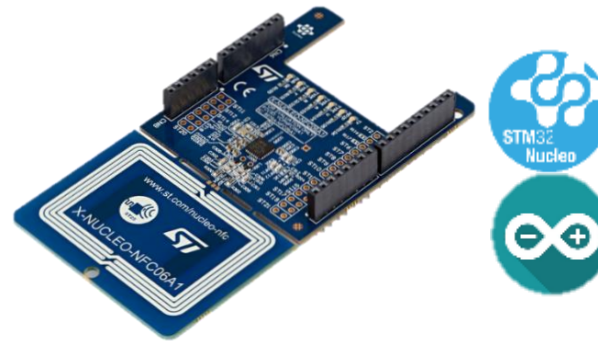
ST25R200 discovery kit



STEVAL-25R200

- **ST25R200** NFC reader IC
- Onboard antennas: 20x20mm, 12x12mm dual antennas, flex antenna & 50Ohm antenna interface
- Onboard NFC tags: ST25TV & ST25TN, 10x5mm antenna
- STM32G0B1KE 32-bit MCU
- Stand-alone module or control with PC GUI through USB connector

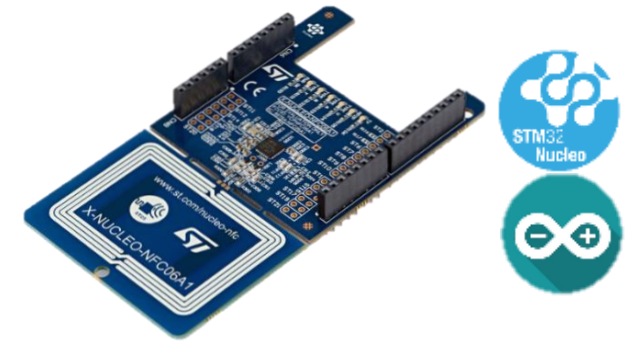
ST25R200 Nucleo shield



X-NUCLEO-NFC10A1

- **ST25R200** NFC reader IC
- 47x34mm 4 turns antenna on PCB
- Compatible with STM32 Nucleo boards
- Equipped with Arduino® UNO R3 connector fitting to STM32 Nucleo, Raspberry Pi and other platforms

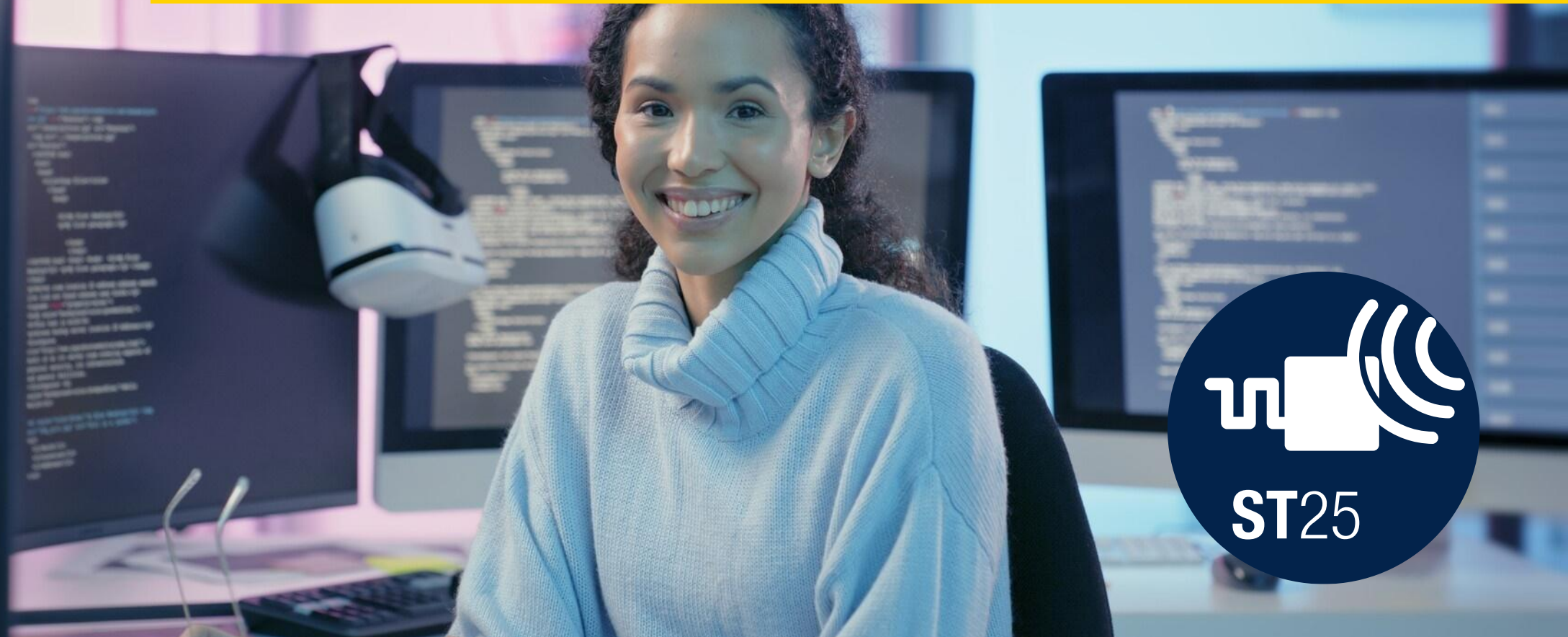
ST25R100 Nucleo shield



X-NUCLEO-NFC09A1

- **ST25R100** NFC reader IC
- 47x34mm 4 turns antenna on PCB
- Compatible with STM32 Nucleo boards
- Equipped with Arduino® UNO R3 connector fitting to STM32 Nucleo, Raspberry Pi and other platforms

ST25 SW ecosystem





ST25T & ST25D software overview

SW supporting ST25 NFC tags and dynamic NFC tags

ST25 Mobile apps



 ST25 NFC Tap app for Android

 ST25 NFC Tap app for iOS

- Based on ST25 SDK



ST25 PC Software

- ST25 PC Software for NFC readers
- Support of tags and dynamic tags functionalities including TruST25 services
- Based on ST25 SDK



ST25 Webserver

- Demo for ST25 NFC tags



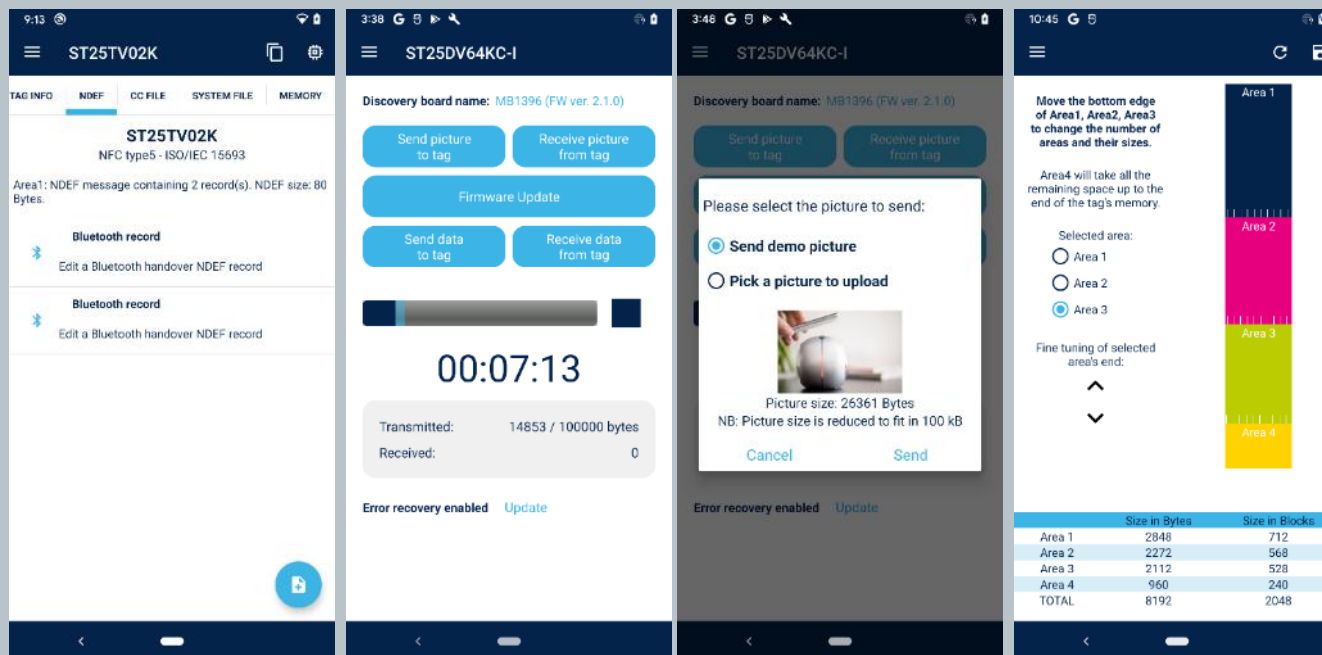
Firmware for MCU

- Firmware for STM32 microcontrollers
- SW driver for Dynamic NFC tags IC
- Including demos



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, etc.)
- Includes demos for Fast Transfer Mode (FTM), PWM and Wi-Fi or Bluetooth pairing
- Automatic launch of Android app
- ST25 NFC tap APK file ([STSW-ST25001APK](#))
- ST25 NFC tap open-source code ([STSW-ST25001SC](#))



ST solutions

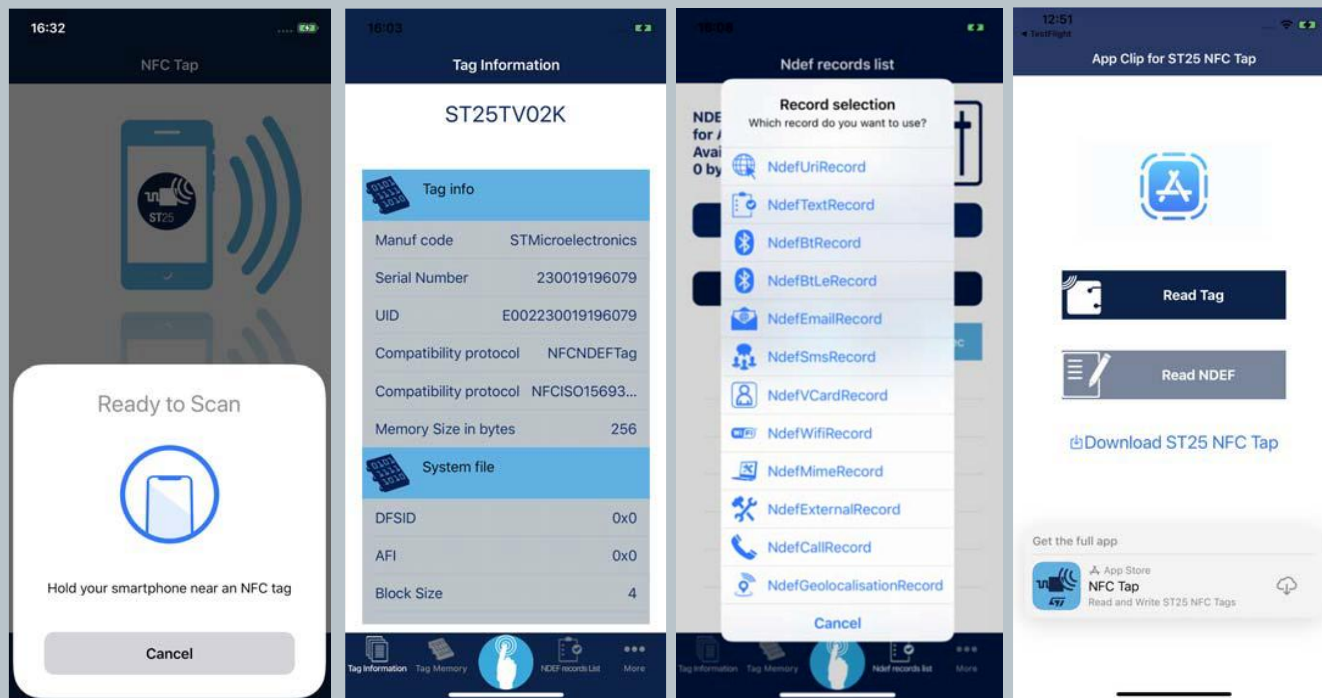


- ST25 Dynamic Tags
- ST25 Tags



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 (FTM), Bluetooth pairing and PWM
- Support of NFC background tag reading
- Automatic launch of iOS app
- ST25 NFC Tap ([STSW-ST25IOS001](#))
- ST25 NFC Tap open-source code ([STSW-ST25IOS002](#))



ST solutions

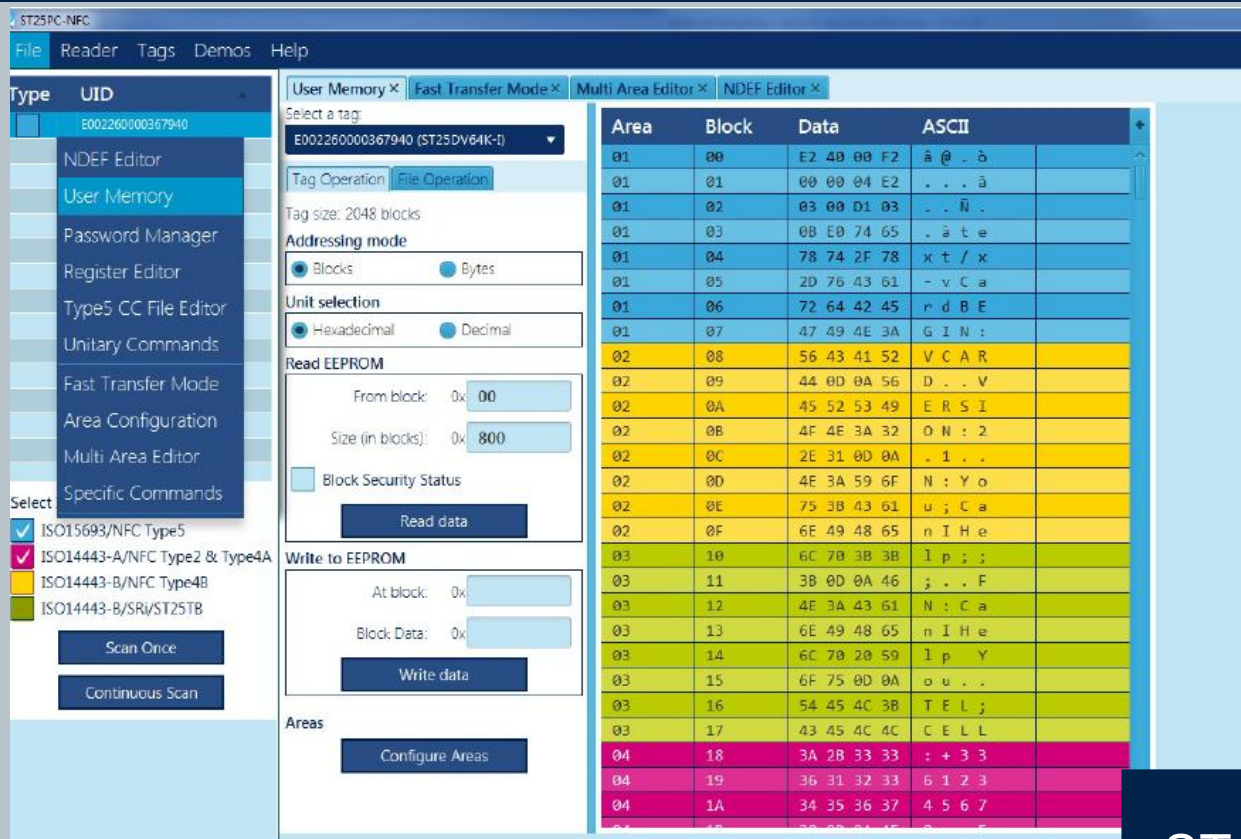


- ST25 Dynamic Tags
- ST25 Tags



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 ST25R300 & ST25R200 STEVAL 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](#))



ST solutions



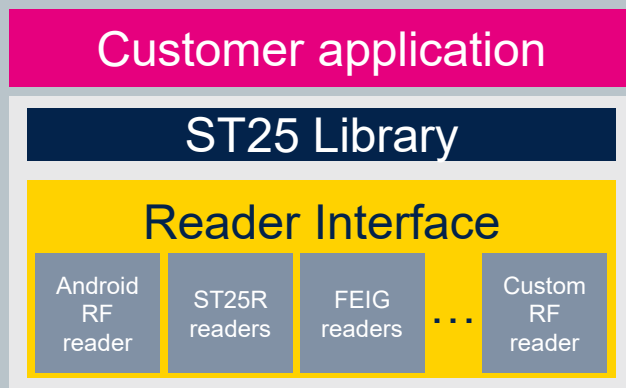
- ST25 Dynamic Tags
- ST25 Tags



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](#))



ST solutions



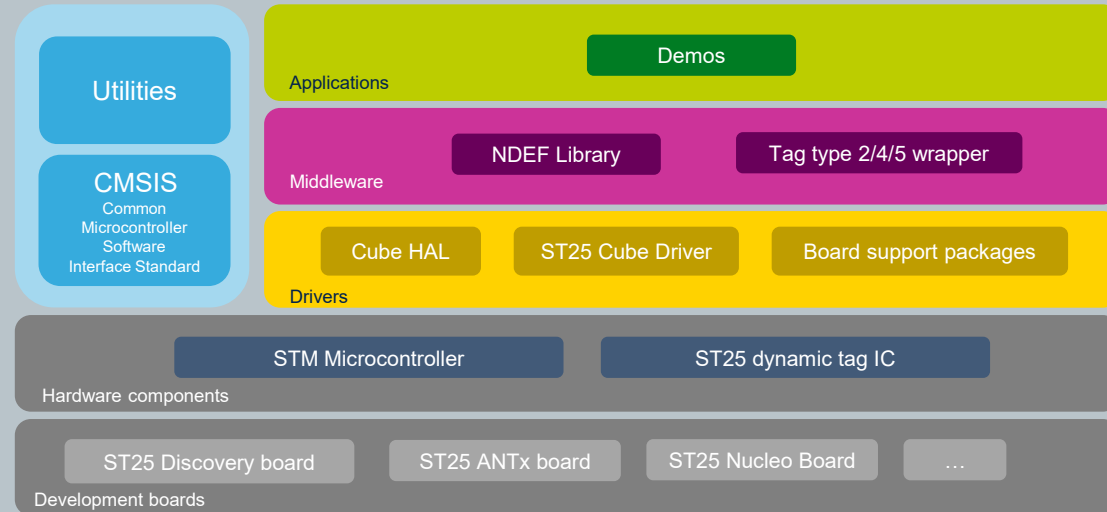
- ST25 Dynamic Tags
- ST25 Tags



ST25D Firmware for MCU



Firmware for ST25D Discovery, Nucleo & ANT7 boards



- Complete set of source files to compile firmware for development boards (Discovery, Nucleo...)
- Includes Fast Transfer Mode (FTM) demo
- Read/store NDEF messages
- Supports specific features of ST25 dynamic tags IC (Energy harvesting, interrupts, states...)
- Compatible with any NFC Readers
- Compatible with any NFC smartphones, using the *ST25 NFC Tap* app
- ST25DV-I2C-EVO Discovery kit FW ([STSW-ST25DV002](#)) and Nucleo board FW ([X-CUBE-NFC7](#))



ST solutions

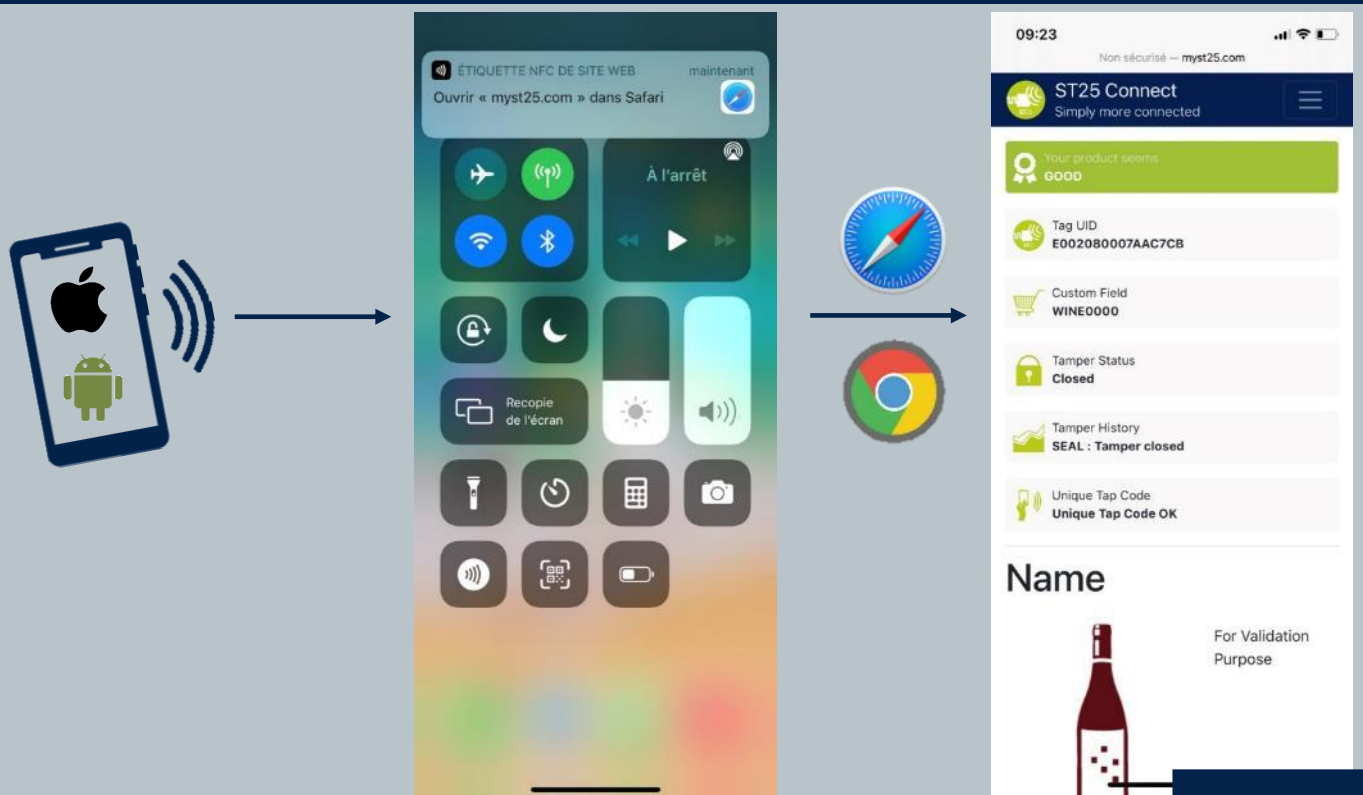


• ST25 Dynamic Tags



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





ST25R software overview

Software development tools for ST25R HF Reader IC

Graphical User Interface (GUI)

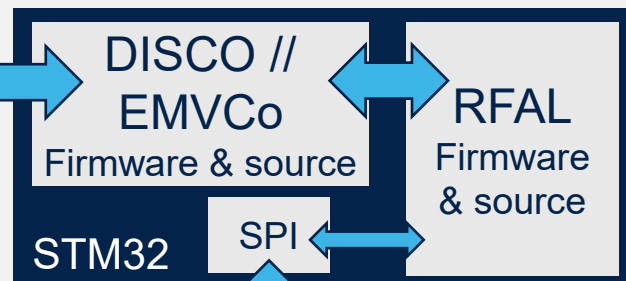


USB

GUI for ST25R
PC software for Windows

On request:
GUI for ST25R EMVCo
PC software for Windows

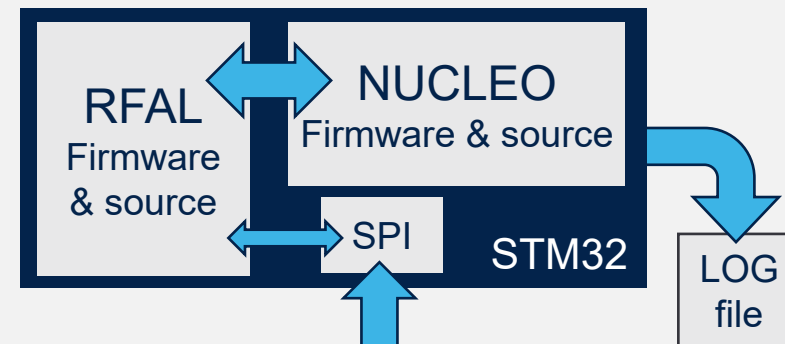
DISCO board



ST25R

Firmware

NUCLEO board



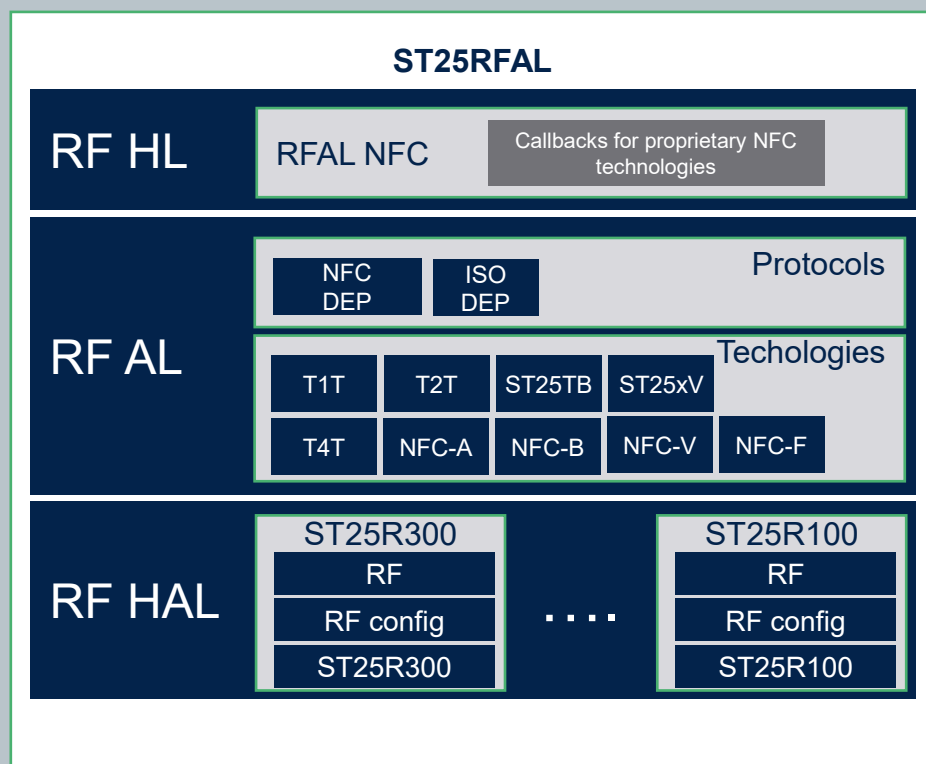
ST25R





ST25R RFAL SW suite

ST NFC Reader “RFAL” software suite



- Comprehensive device driver / middleware to build NFC enabled applications for reader devices based on ST25R NFC Readers
- Written in pure ANSI C
- Straightforward portability across different platforms (MCU/RTOS/OS) with non-blocking API
- Compliant with main HF/NFC standards (NFC Forum, ISO)
- Source code example available: embedded (STM32, STM8 device, SPC5 on request) and Linux® (Raspberry Pi)
- Easy callback function for proprietary NFC technologies on application layer like Apple™ Mfi (delivered under Mfi conditions) and other technologies
- ST25R300 RFAL SW ([STSW-ST25RFAL005](#)), ST25R200/R100 RFAL SW ([STSW-ST25RFAL004](#))



ST solutions

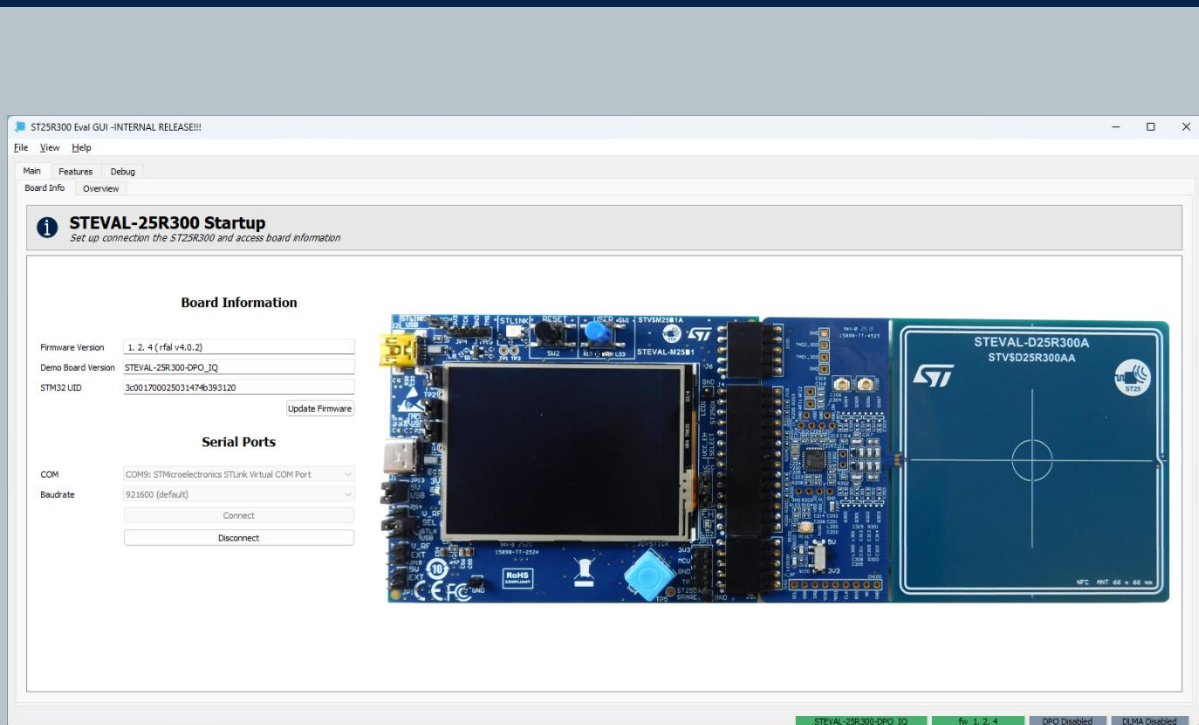


• ST25 Reader



ST25R PC GUI software

ST NFC Reader “Discovery” software suite



- Supports several RF protocols (ISO14443-A / NFC-A, ISO14443-B / NFC-B, FeliCa™ / NFC-F and ISO15693 / NFC-V)
- Active P2P (peer to peer) according to ISO18092, including SNEP
- Card emulation in NFC-A (106kbps) and NFC-F (212 / 424kbps)
- Wakeup feature, analog configuration and register access
- Support of Automatic Antenna Tuning (AAT) & Dynamic Power Output (DPO)
- Access to all ST25 Tag features thanks to ST25PC NFC SW ([STSW-ST25PC001](#))
- PC GUI SW: ST25R300 ([STSW-ST25R023](#)) & ST25R200 ([STSW-ST25R019](#))



ST solutions

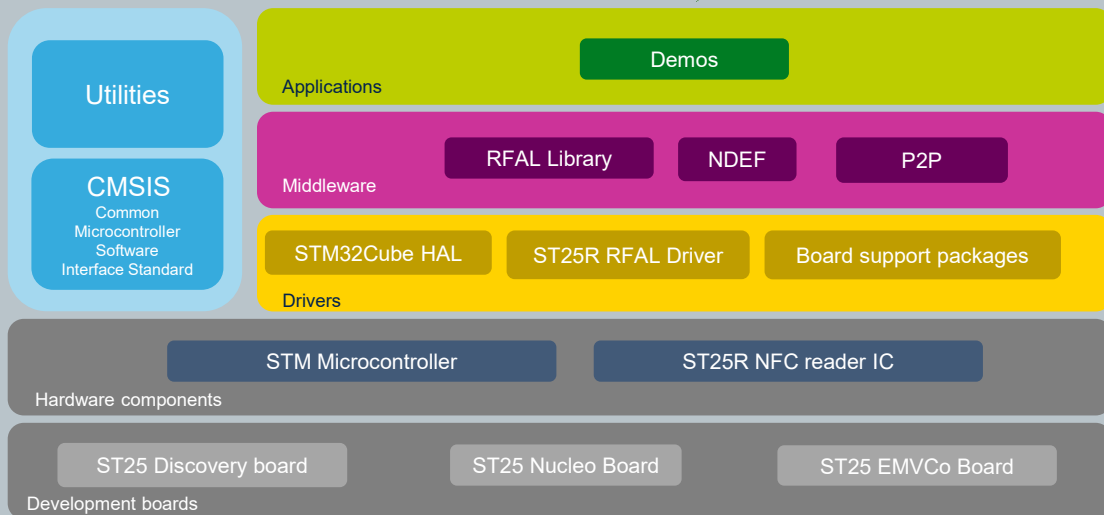
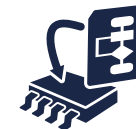


• ST25 Reader



ST25R Firmware for MCU

Firmware for ST25R Discovery, Nucleo & EMVCo boards



Complete set of source files to compile firmware for development boards (Discovery, Nucleo...)

- Reader / Writer demonstration
 - Tag inventory, read and write (all NFC standard protocols supported)
 - Dynamic power output, NFC Forum NDEF messages
- Card emulation demonstration
 - NFC Type 4A Tag emulation (all tag types supported in USB mode)
 - NFC Forum NDEF messages, possibility to be written by a reader or a phone
- Peer to peer (P2P) demonstration
- EMVCo Layer 1 support FW, on request
- STEVAL-25R300 kit FW ([STSW-ST25R022](#)), ST25R300 Nucleo boards FW ([X-CUBE-NFC12](#))
- STEVAL-25R200 kit FW ([STSW-ST25R020](#)), ST25R200/R100 Nucleo boards FW ([X-CUBE-NFC10](#) & [X-CUBE-NFC9](#))



ST solutions

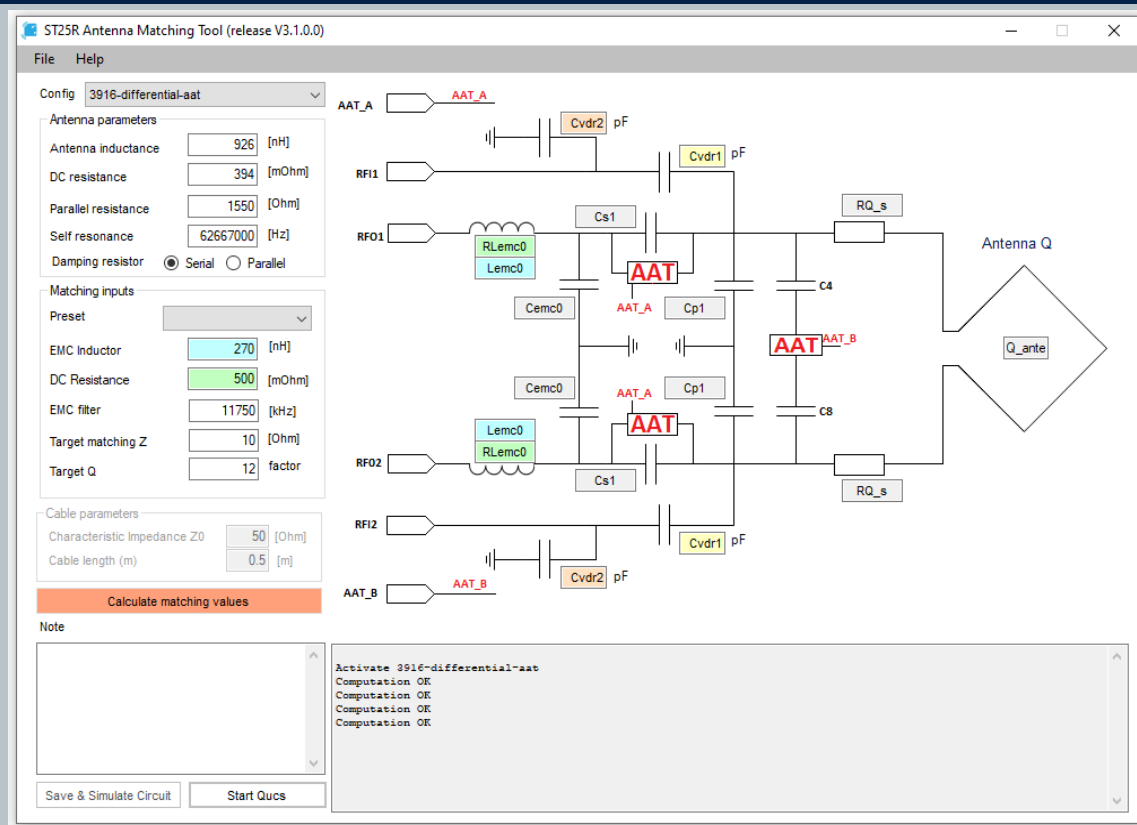


• ST25 Reader



ST25R antenna matching software kit

ST NFC Reader “Antenna Matching” software kit



- Comprehensive antenna matching tool with GUI to find the right external component values for a chosen configuration
- Available for the entire ST25R HF Reader product line
- Allows configuration with or without AAT functionality
- Integrates circuit simulator (QUCS), automatic component value selection and generates the Smith Chart
- Standalone version for Windows PC and online tool available
- Antenna Matching tool for ST25R NFC/HF Reader ([STSW-ST25R004](#))



ST solutions

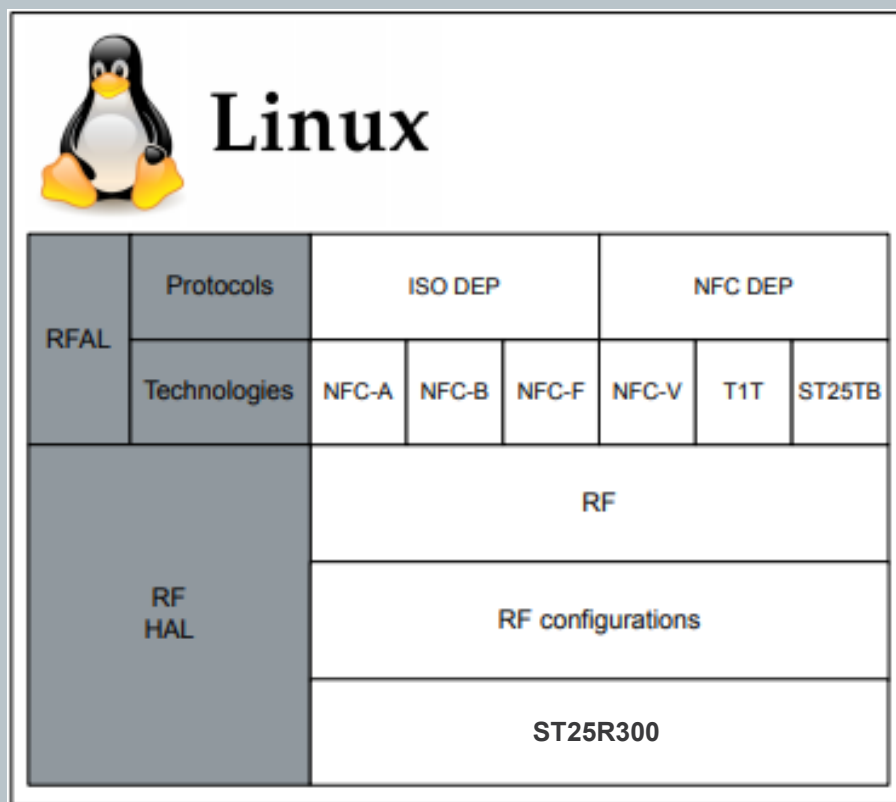


• ST25 Reader



ST25R Linux software kit

ST NFC Reader “Linux” software kit



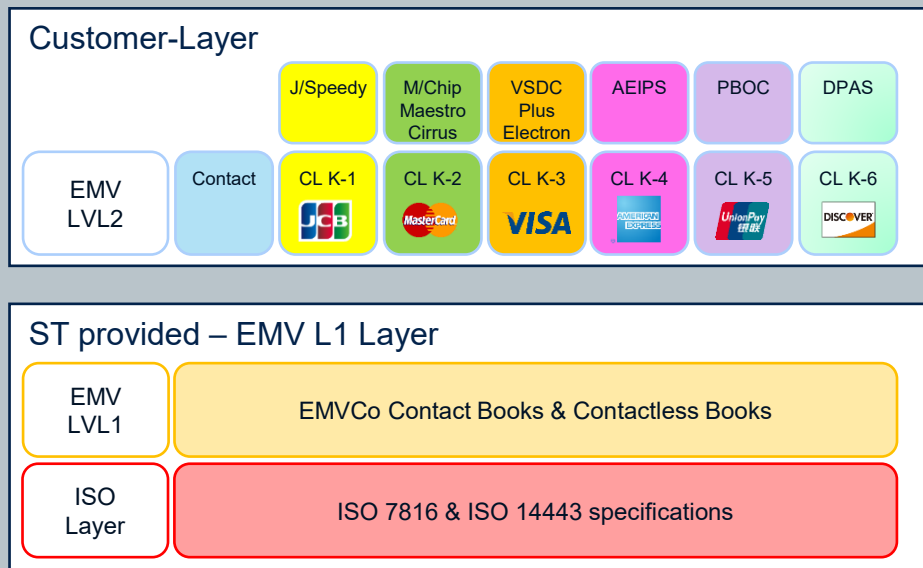
- Provides a pure user space port of the RFAL onto Raspberry Pi 3 and 4
- Support ST25R HF Readers
- Sample applications demonstrating Poller (R/W-mode) and Listener (Card Emulation)
- Linux host communication through SPI
- Free, user-friendly license terms
- Linux on Raspberry Pi for ST25R300 with X-NUCLEO-NFC12A1 ([STSW-ST25R024](#)), ST25R200/R100 with X-NUCLEO-NFC10A1/X-NUCLEO-NFC09A1 ([STSW-ST25R021](#))





ST25R EMVCo software kit

ST NFC Reader “EMVCo” software Kit



- ST provides EMVL1 firmware stack for contact-less products, as is
- Stack accessible under NDA for usage with ST25R series and available as source code
- Firmware accompanied by a GUI which allows easy configuration the device as well as active waveshaping and dynamic power output
- Written in pure ANSI C based on RFAL
- EMV L1 layer pre-validated (kept up to date)
- Portable on various architectures thanks to the abstraction layers which are integrated in the delivery
- Stack available with our POS demo kits on request



ST solutions

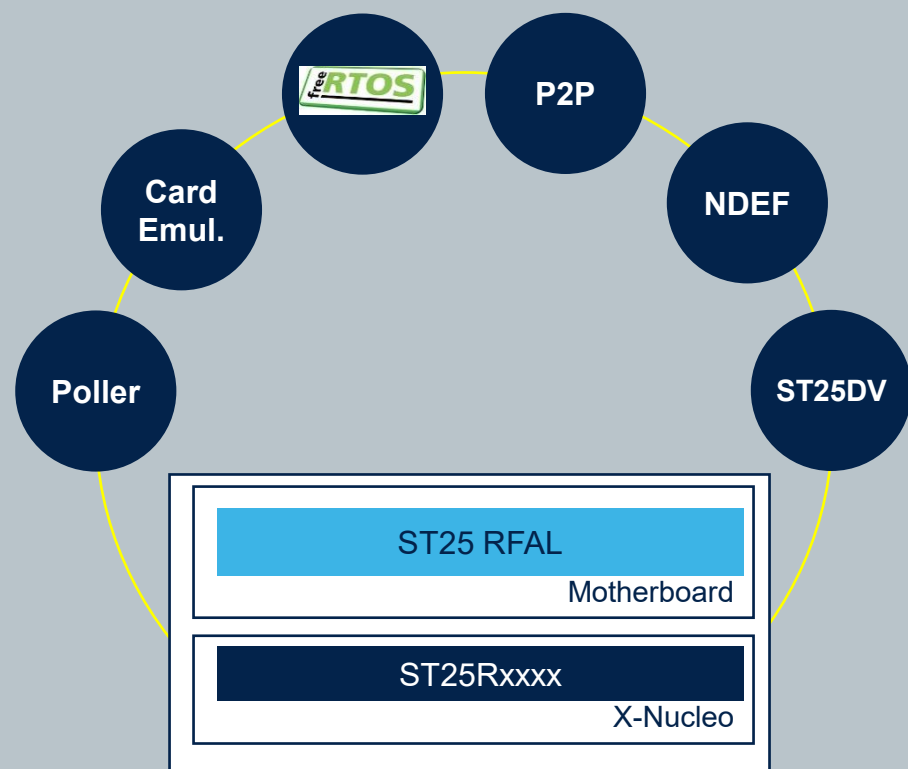


• ST25 HF Reader



ST25R embedded NFC library software kit

ST NFC Reader “NFC Lib” software kit



- Collection of middleware to build advanced NFC enabled applications such as
 - NFC poller
 - NDEF reader / writer
 - FreeRTOS poller
 - Proprietary active peer-to-peer & Card emulation
- Support for ST25 Tag and Dynamic Tag features
- ST25 Fast Transfer Mode (for ST25 Readers and Dynamic Tags)
- Easy portability across different platforms (MCUs / RTOSs / OSs)
- Available for all ST25R HF Readers, on request (free and user-friendly license terms)





Solutions for NFC / RFID Tags & Readers



ST25 SIMPLY MORE CONNECTED



Our technology starts with You



Find out more at www.st.com/st25

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