

NFC contactless access control



NFC reader



NFC tags



Biometric card





NFC reader



Driving communication to
access control card





ST25R product lineup

	ST25R100	ST25R3918	ST25R3911B	ST25R3912	ST25R3916B
Description	Entry-level NFC reader	Multi purpose NFC reader	High-performance NFC Forum reader	Mid-range NFC Forum reader	High-performance NFC universal device & EMVCo 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	No	Yes	-	-	Yes
AP2P mode	-	-	Initiator & Target	Initiator & Target	Initiator & Target
PP2P mode	-	Initiator & Target	Initiator	Initiator	Initiator & Target
RF speed	106 kbps	848 kbps	6.8 Mbps (VHBR)	848 kbps	848 kbps
Market	Consumer Industrial	Consumer	Payment EMVCo 2.6, Industrial	Access control, Metering, Consumer	Payment EMVCo 3.0, Industrial, Consumer
Advanced features	DPO, IWU	DPO, NSR, DSA, AWS, IWU, EMD	AAT, DPO, CIWU	DPO, IWU	AAT, DPO, NSR, DSA, AWS, IWU, EMD
HW interface	SPI 6Mbps	I ² C // SPI 10Mbps	SPI 6Mbps	SPI 6Mbps	I ² C // SPI 10Mbps
SW interface		Unified Software Library for Frontends			
Power supply	2.7 V – 3.6 V	2.4 V – 5.5 V	2.4 V – 5.5 V	2.4 V – 5.5 V	2.4 V – 5.5 V
Output power	0.5 W	0.5 W	1.4 W	1.0 W	1.6 W
Temperature range	-25°C to +85°C ^(A)	-40°C to +85°C ^(A)	-40°C to +125°C ^(J)	-40°C to +125°C ^(J)	-40°C to +105°C ^(A)
Package	24-pin TQFN	WF 32-pin QFN	32-pin QFN / Wafer	32-pin QFN / WF 32-pin QFN / WLCSP-30	WF 32-pin QFN / WLCSP-36



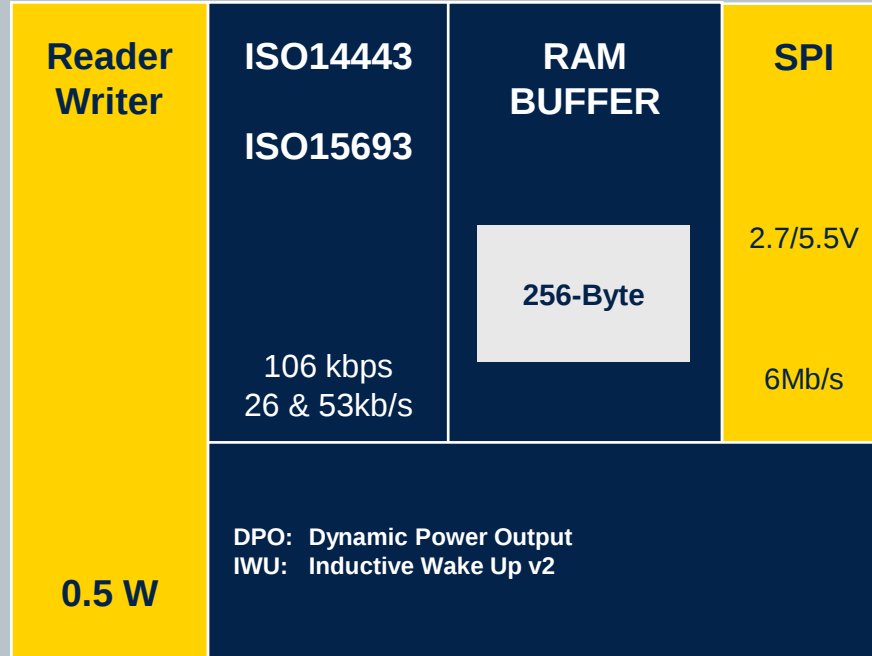


ST25R100

Entry-level NFC reader



ST25R100



TQFN24

Use cases

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

Key features

- **0.5 W** dynamic output power
- -25°C to 85°C ambient temperature
- Up to 165 mA via internal LDO
- **Improved inductive wake-up** function
- Small 4x4mm TQFN package

Key benefits

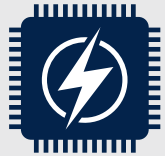
- Tiny package size for easy integration into applications
- Low power operation & great card detection range
- Optimized for cost conscious applications



ST25R100 main application parameters

Fitting into every application

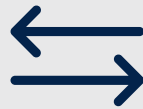
4x4 mm TQFN package



Tiny package size and high output power enable design of **size-optimized** NFC solutions

Good interaction range

Dynamic power output



Automatically adjusted output power to optimize power transfer and **stay within certification limits**

Longer battery lifetime

Low-power tag detection



Improved inductive wake-up mode allows **low power consumption** and increased battery lifetime

Complete NFC solution

Reader+Tag initiative



www.st.com/reader-plus-tag

Well-matched and **industry proven** product combinations for enabling connectivity in consumer and industrial markets



ST25R100 benefits

Improved RF performance



- Larger operating volume with smaller antennas
- Superior RX sensitivity with high output power delivers maximum margin for challenging antenna designs

Improved low-power card detection



- Improved performance of inductive wakeup allows detection of tags and cards over long range while power consumption stays low in card detection mode

DPO dynamic power output

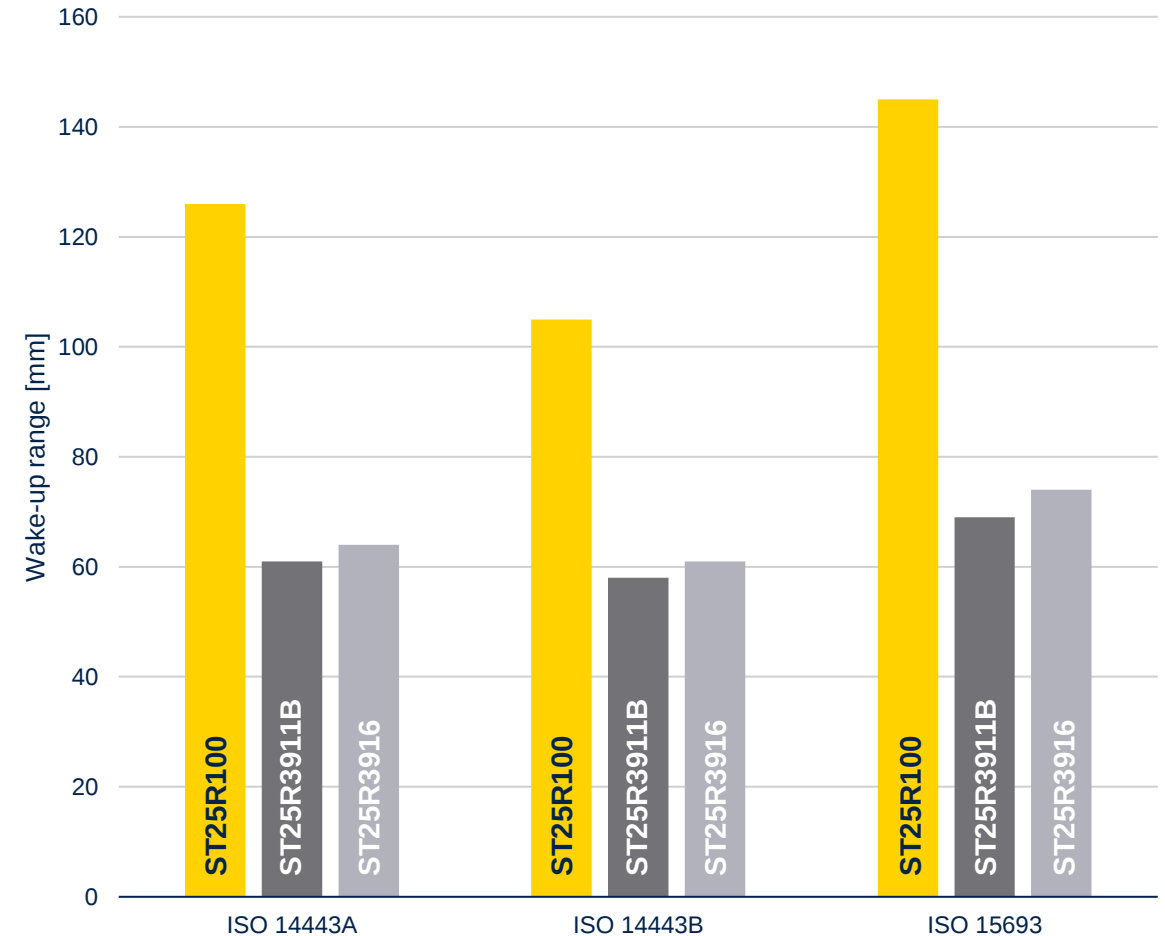


- The output power is adjusted automatically to reduce power and stay within certification limits
- Increase efficiency and achieve min/max limits



Excellent inductive wake-up performance

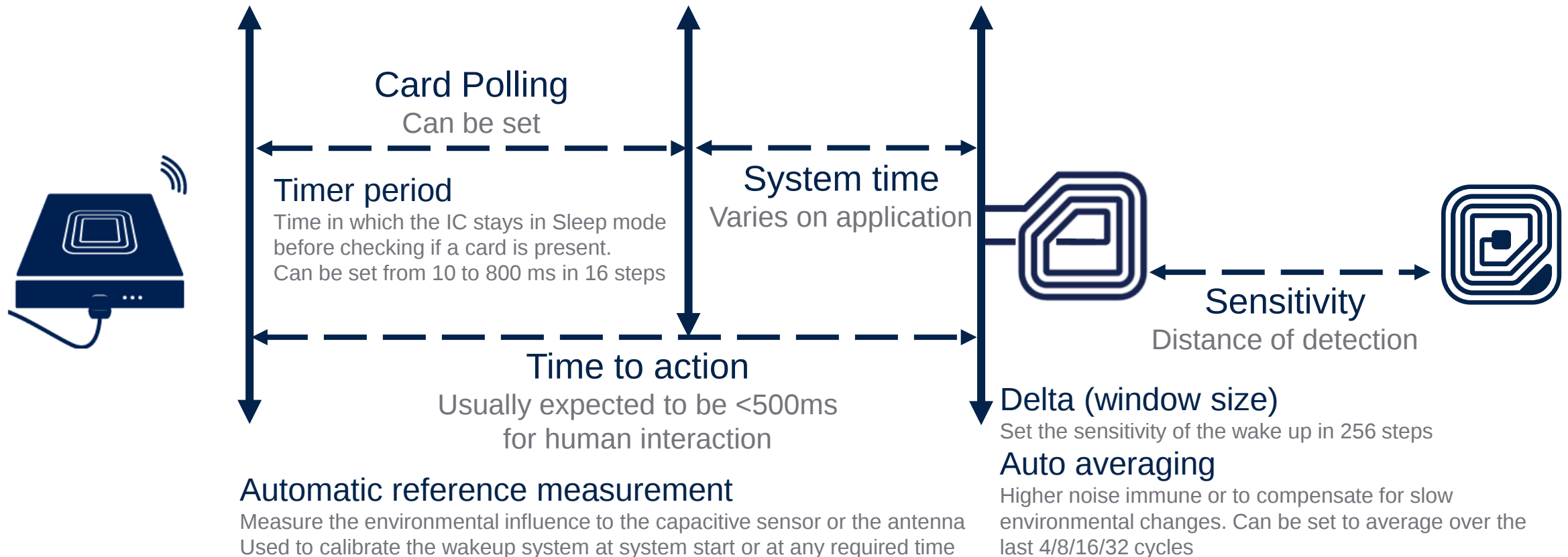
- ST25R100 features improved **inductive wake-up v2**
- Fully configurable high-sensitive wakeup scheme
 - Inductive ping every 10 to 1700 ms in 16 configurations
 - Automatic average over the last 4/8/16/32 cycles
 - Configurable pulse duration 10.6us up to 43.7us
- Detection of card movement
 - Configure wake up to trigger at card approach, card removal or both
- No MCU required to run the wake up





Inductive low-power card detection

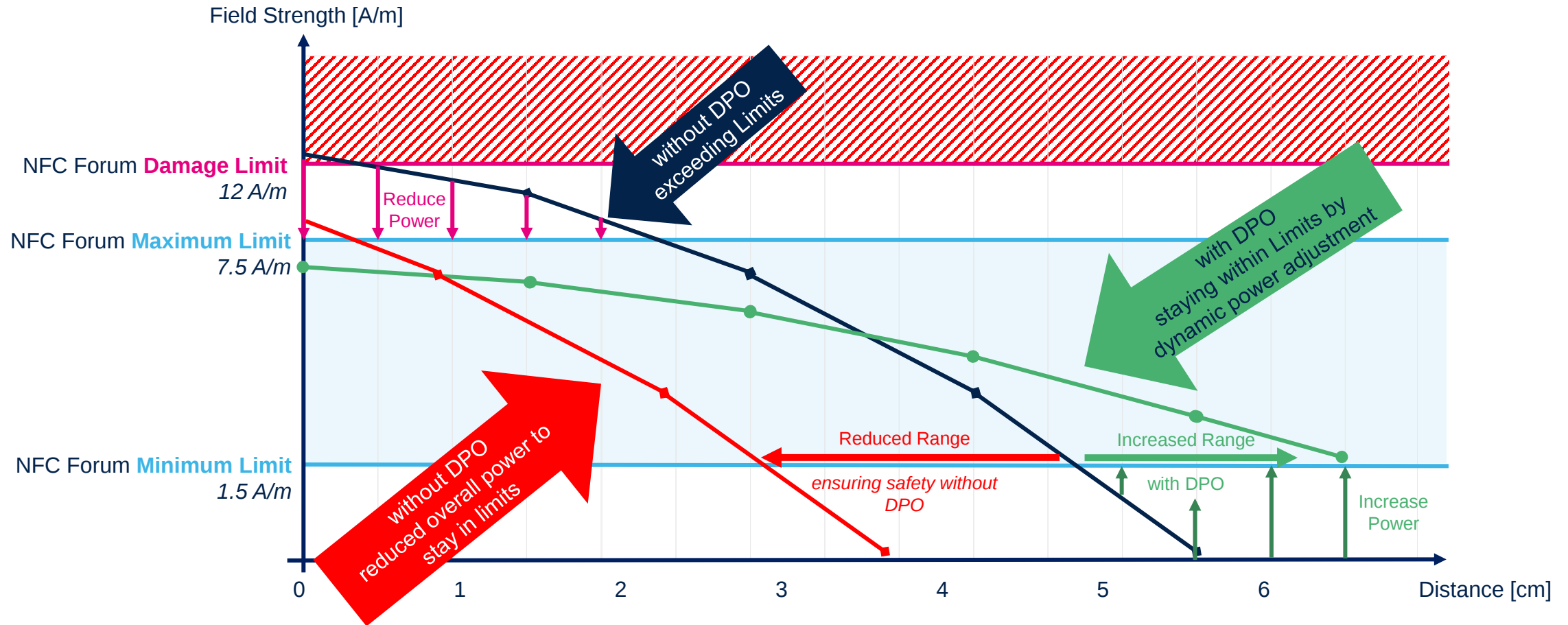
Consider reaction time/sensitivity of the system





ST25R100 DPO (dynamic power output)

DPO of reader will keep power levels within requirements & limits

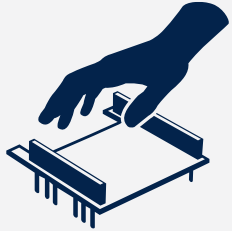


Evaluation boards & ecosystem





ST25R100 rich ecosystem



- STEVAL kits based on STM32 MCU
- STM32 Nucleo boards ecosystem
- STM32Cube software ecosystem



- Antenna e-design tool
- Schematic, BOM, Gerber
- Applications notes



- PC software tool ST25
- MCU drivers firmware
- Evaluation boards



- Documentation
- e2e community
- Webinar
- MOOC



X-NUCLEO-NFC09

Nucleo development kit

The X-NUCLEO-NFC09 is a Nucleo shield based on the ST25R100 entry-level NFC transceiver.

With its Arduino U3 connector it fits to the STM32 Nucleo, Raspberry Pi, and other platforms.

- Onboard 47 mm x 34 mm, four turns antenna with connection point for external antennas
- RF operation
 - NFC-A/B / ISO14443A/B up to 106 kbit/s
 - NFC-V / ISO15693 up to 53 kb/s
- Free comprehensive development library and schematics/Gerber files available
- Free Raspberry Pi Linux driver



Available Q2 2024

SW ecosystem - ST25 HF readers





ST25R software overview

Software development tools for ST25R HF Reader IC

Graphical User Interface (GUI)



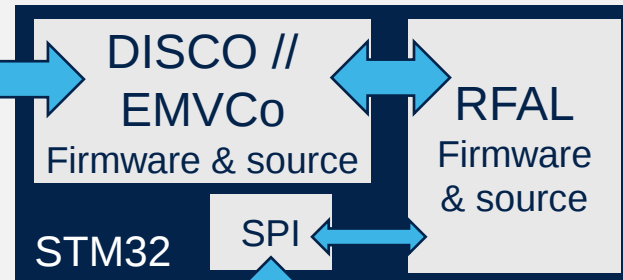
USB

GUI for ST25R
PC software for Windows

On request:
GUI for ST25R EMVCo
PC software for Windows

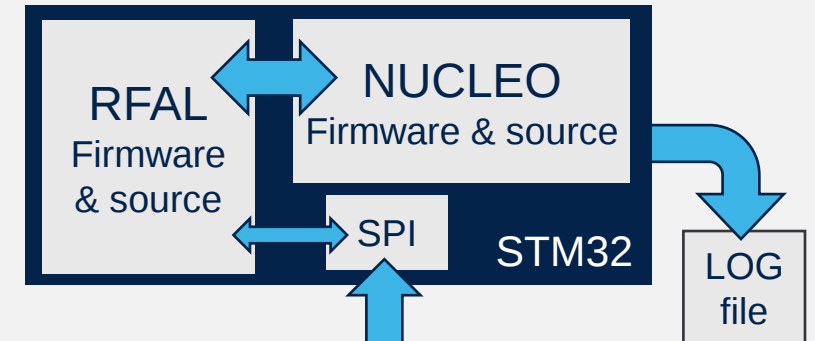
Firmware

DISCO board



ST25R

NUCLEO board



ST25R

ST solutions



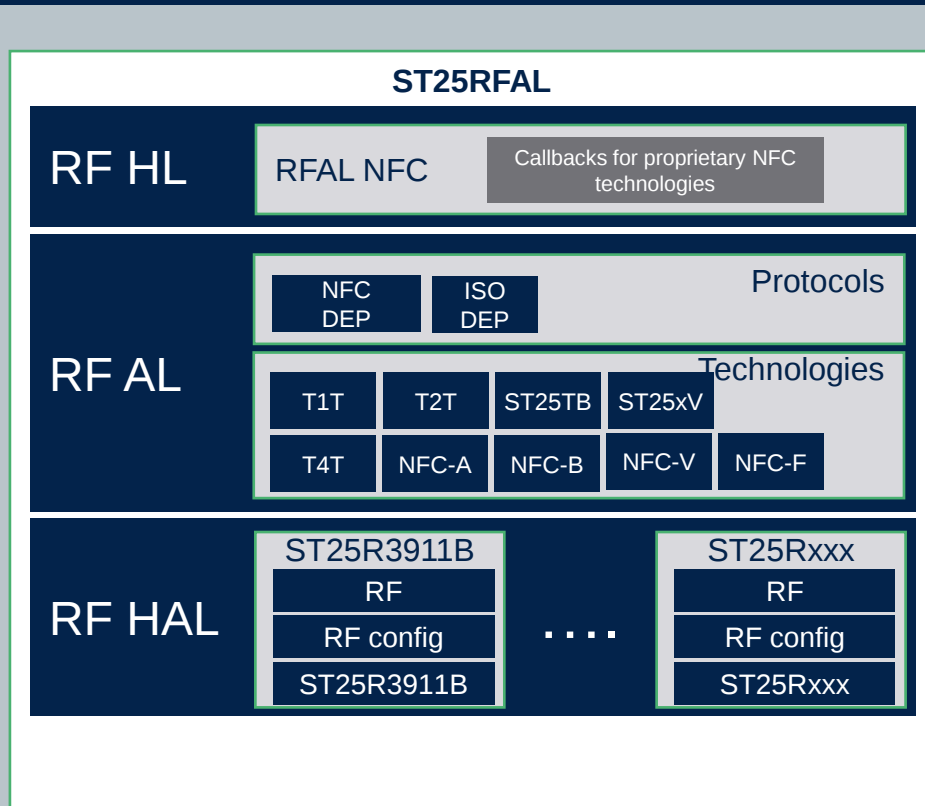
• ST25 HF reader



ST25R RFAL software suite



ST NFC reader “RFAL” software suite



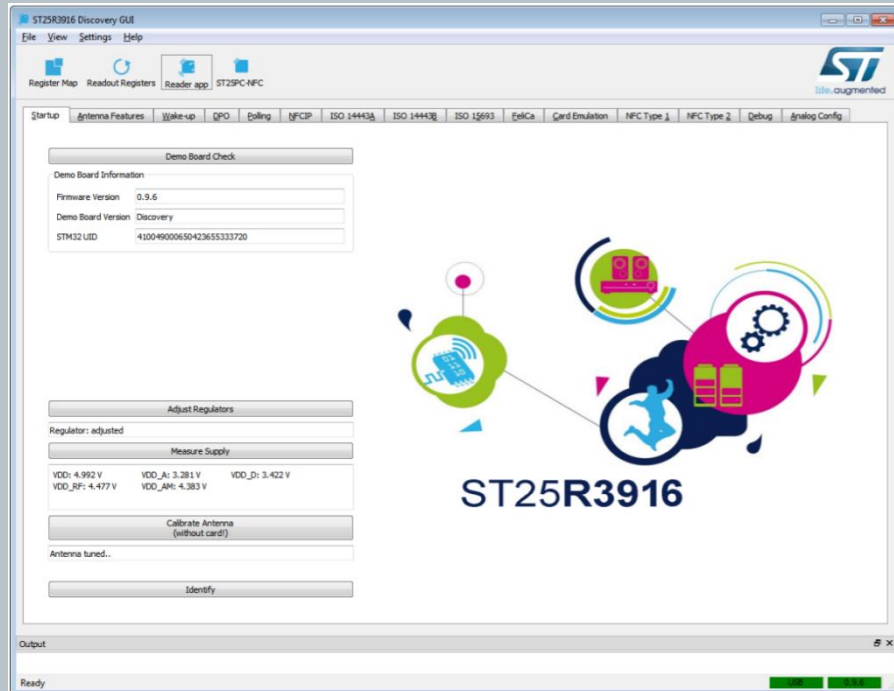
- Comprehensive device driver and middleware to build NFC enabled applications for reader devices based on ST25R NFC Readers
- Written in pure ANSI C
- Straightforward portability across different platforms (MCU/RTOS/OS) with non-blocking API
- Compliant with main HF/NFC standards (NFC Forum, ISO)
- Source code example implementations 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
- ST25R100 RFAL SW (available soon), ST25R3916 RFAL SW ([STSW-ST25RFAL002](#)) and ST25R3911B RFAL SW ([STSW-ST25RFAL01](#))





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 and 424 kbps)
- Wake up feature, analog configuration and register access of ST25R3916
- Support of Automatic Antenna Tuning (AAT) & Dynamic Power Output (DPO)
- Access to all ST25 Tag features thanks to ST25PC NFC SW ([STSW-ST25PC001](#))
- ST25R100 PC GUI (available soon), ST25R3916 PC GUI SW ([STSW-ST25R010](#)) and ST25R3911B PC GUI SW ([STSW-ST25R001](#))

ST solutions



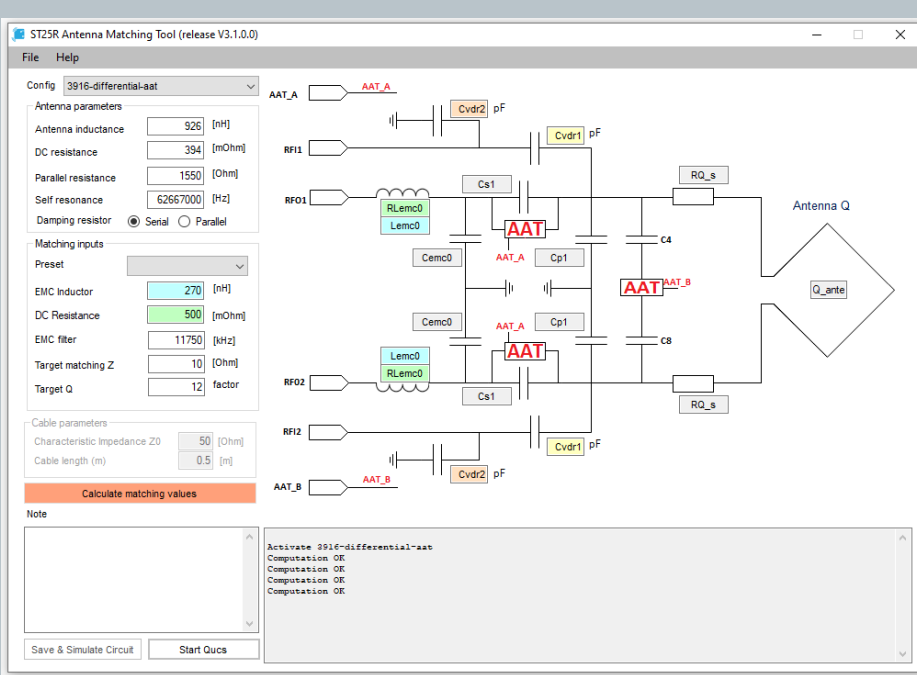
- ST25 HF reader





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



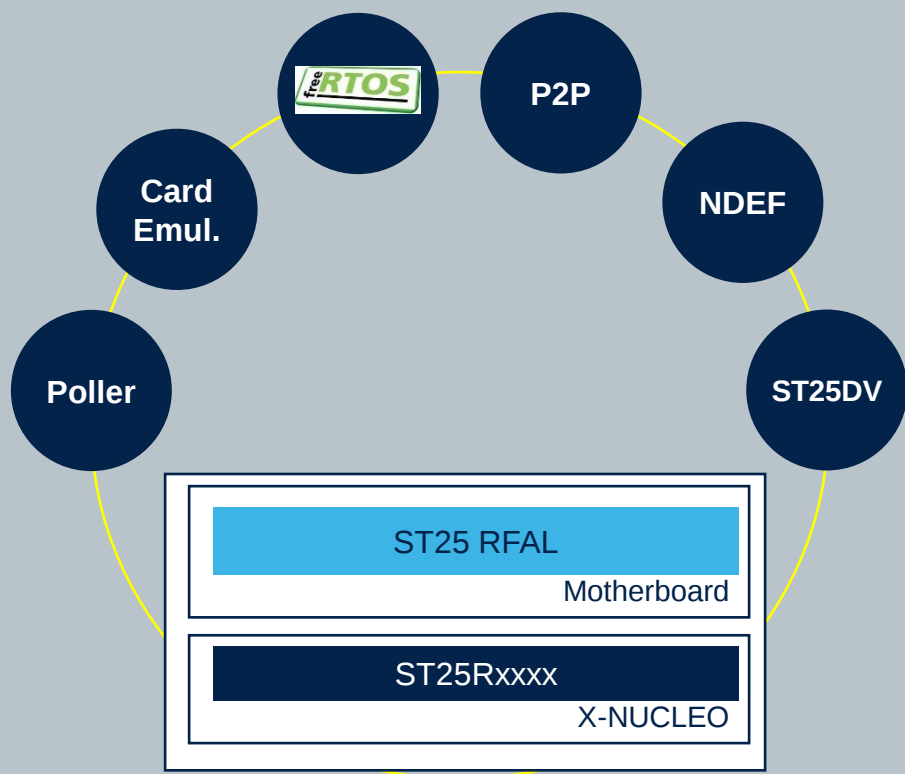
• ST25 HF reader





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)

ST solutions



- ST25 HF reader





NFC / RFID tags product family

	ST25TB	ST25TN	ST25TA	ST25TVC	ST25TV
Contactless interface	ISO14443B	ISO14443A NFC type 2	ISO14443A NFC type 4	ISO15693 NFC type 5	ISO15693 NFC type 5
RF range	Short range	Short range	Short range	Long range	Long range
RF speed	106 kbps	106 kbps	106 kbps	26 kbps (53 kbps)	26 kbps (53 kbps)
Memory format	EEPROM data	EEPROM (preformatted NDEF)	EEPROM (preformatted NDEF)	EEPROM (preformatted NDEF)	EEPROM data
Memory size	512-bit / 2k / 4k-bit	512-bit / 1.6k-bit	512-bit / 2k / 16k / 64k-bit	512-bit / 2k-bit	4k / 16k / 64k-bit
Data protection	OTP bits	Lock blocks	Password 128-bit	Password 64-bit	Password 64-bit
Digital signature	No	Yes, TruST25	Yes, TruST25	Yes, TruST25	No
Digital output	No	No	GPO Field Detect CMOS_P / Open-drain (2k only)	Tamper Detect	GPO Field detect CMOS_P (4k only)
Counter	32-bit (x2)	UTC 24-bit	20-bit	UTC 24-bit	No
Extra features	-	Augmented NDEF	-	Augmented NDEF Untraceable mode	Energy harvesting (4k only)
RF tuning capacitor	64 pF	50 pF	50 pF / 25 pF	23.5 pF & 99.7 pF	28.5 pF
Temperature range	-40°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	SBN12* / SBN075 ²	SBN12* / SBN075 ² FPN5	SBN12*	SBN12* / SBN075 ² FPN5	SBN12*

* SBN12: Die form, sawn and bumped wafer, 120 µm thickness, inkless 8" wafer

² SBN075: Die form, sawn and bumped wafer, 75 µm thickness, inkless 8" wafer

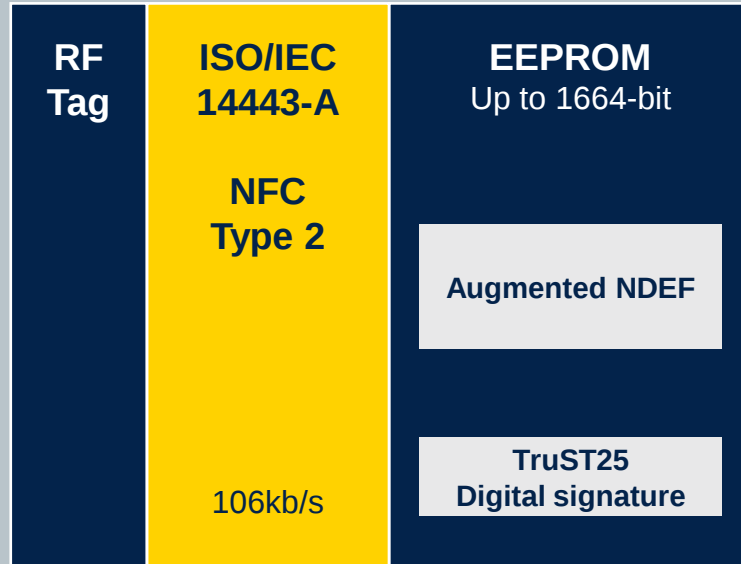




ST25TN512/01K ID card



ST25TN512 / 01K



UDFPN5



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 antitearing
- **Customizable Augmented NDEF** with UID, UTC, and custom field
- **TruST25** digital signature



Key benefits

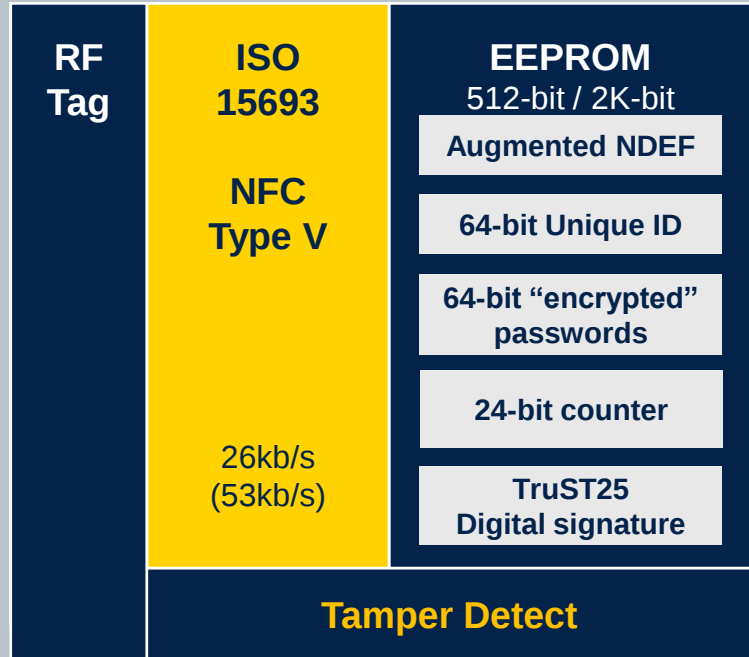
- Tiny DFN5 package (1.7x1.4mm)
- 50 pF internal RF tuning capacitor allowing small antenna design
- **40 years** data retention, 100 K cycles erase/write
- Cost sensitive applications



ST25TV512C/02KC ID card



ST25TV512C / 02KC



FPN5



SBN12 / SBN075

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

Use cases

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

Key features

- **ISO15693** and **NFC type V** (long range operations, 26 kb/s)
- **Memory configuration** : 512-bit and up to 2560-bit
- **TruST25 Digital Signature** (can be used into ANDEF: 2 K-bit only)
- 24-bit **Unique Tap Code (UTC)** with anti-tearing
- 64-bit **Unique Identifier (UID)** complies with ISO/IEC15693 and ISO/IEC 7816-6
- **Untraceable** (by default possible) & kill modes
- **Tamper Detect pin** for open / short detection
- **Augmented NDEF**: UID, signature, UTC, Tamper, ctm field, PWD counter

Key benefits

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



User experience

Simply place
your finger on the card
to identify yourself



Security

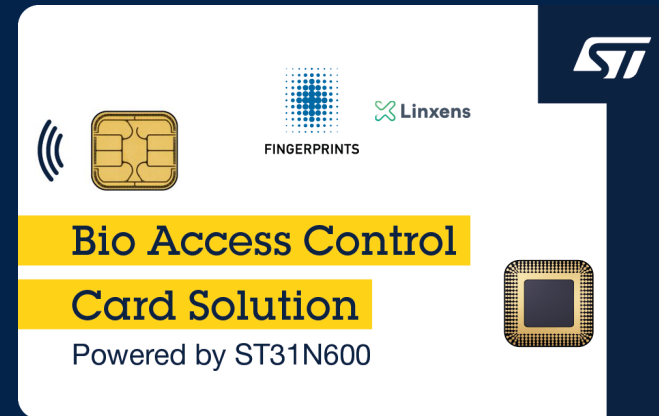
Going beyond authentication
(PIN)

Strengthen your security
with advanced biometry



ST31N600 secure MCU
STM32L443 MCU

Access control
applet



Java virtual machine with
biometry system manager

FPC sensor



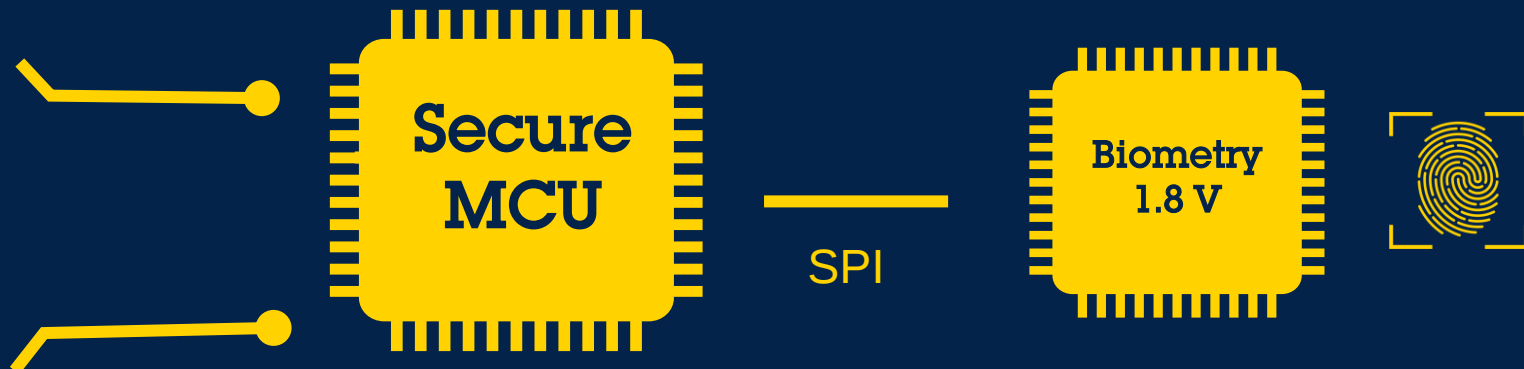


ST31N600

Core of the system

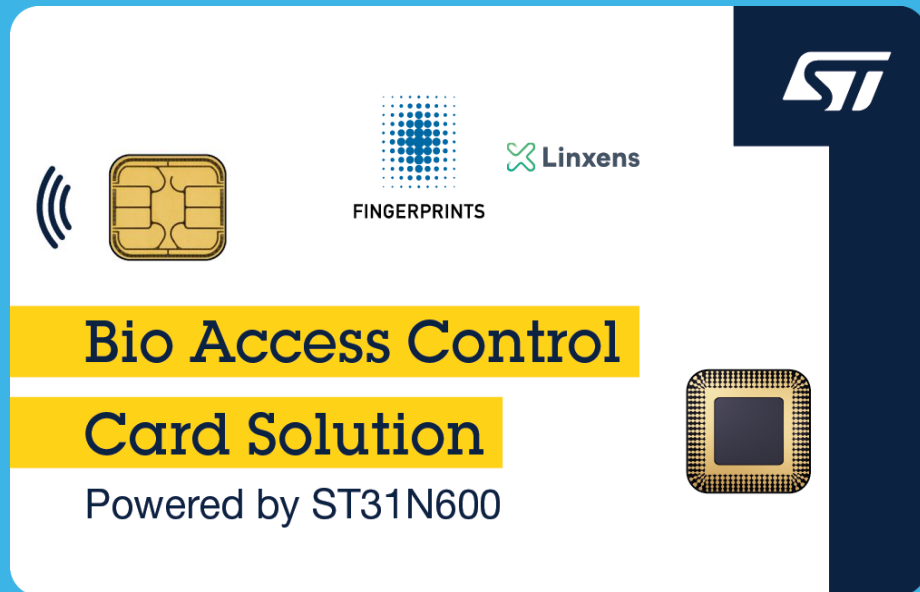
Energy harvesting

Large memory &
biometry manager



Driven by secure MCU

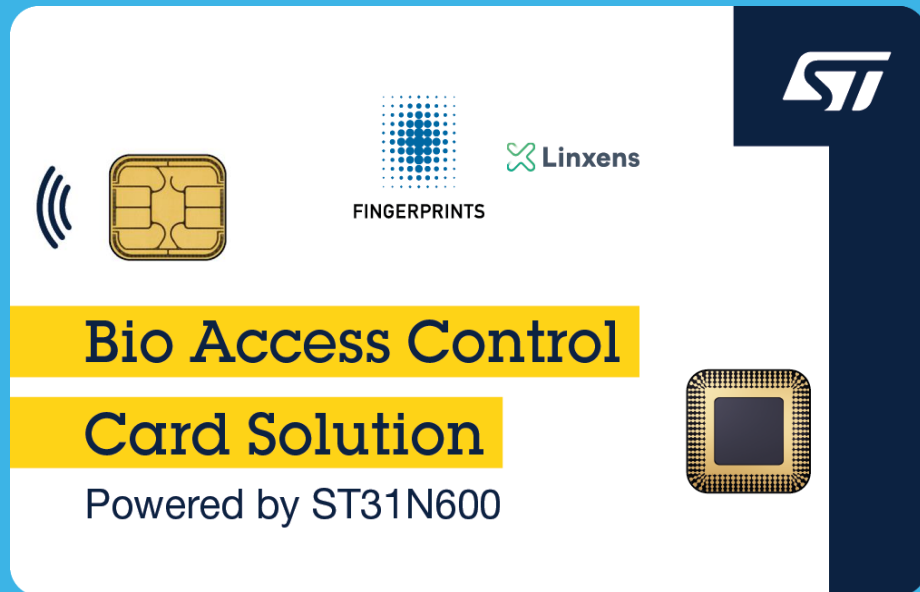




Innovation

ST31N600 secure MCU
powers & drives biometry

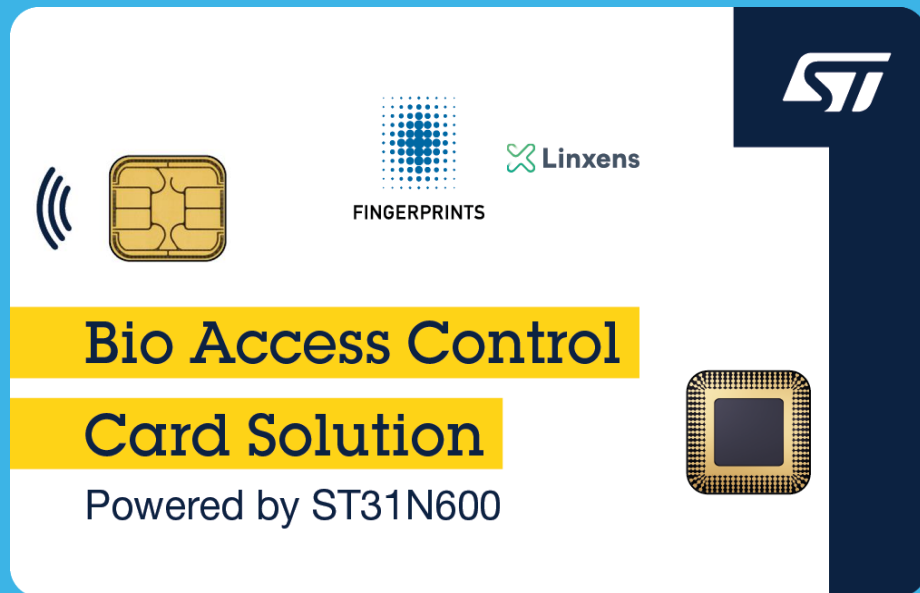




Energy harvesting

No battery required





Proven technology

