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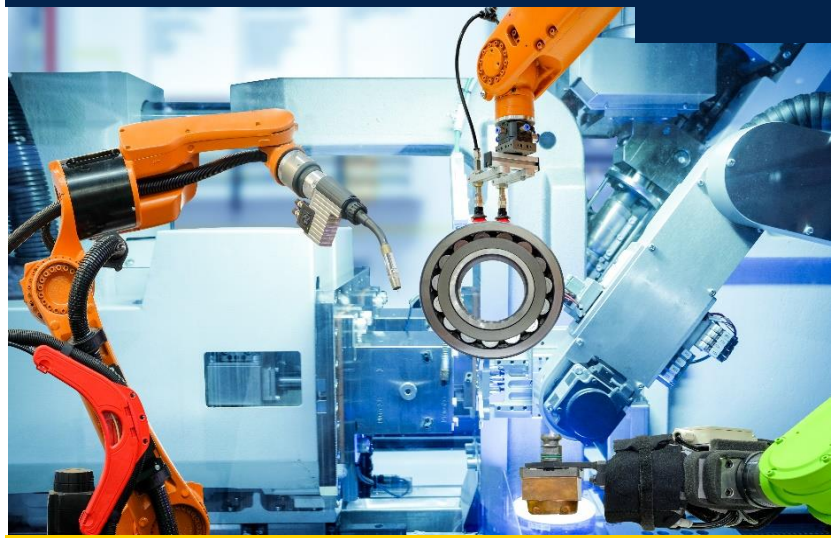
ST25TV04K-PE / 16K / 64K product presentation

Main ST25TV market segments

Smart things

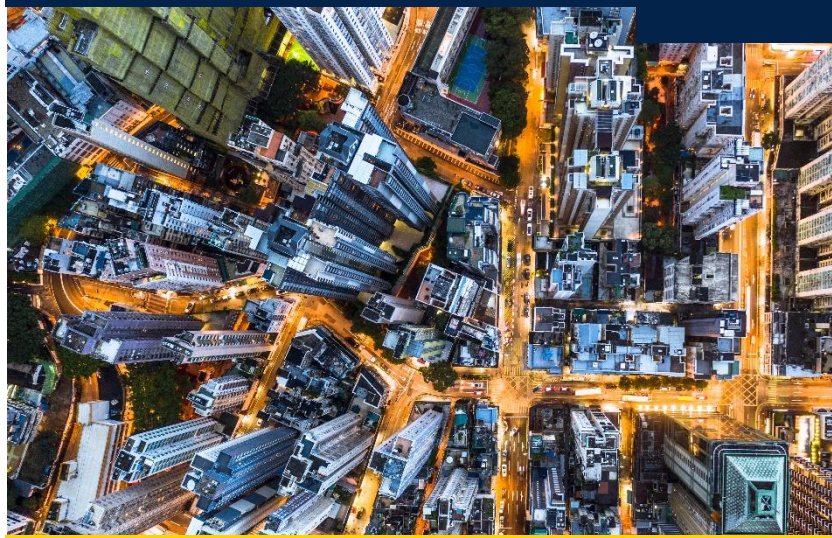
Consumer engagement, Authentication

Smart industry



Identification, Asset tracking

Smart city



Library, Access control

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ST25TV use cases

NFC figurine for gaming

- Figurines **configuration** before starting the game

Access control

- NFC / RFID badges to get access

Device personalization in production

- **In-the-box** quick personalization thanks to **Long range**

Product information / User manual

- **Big data storage** thanks to **high memory density**

Business card / voter's card

- Product / personal information

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Typical RF range

NFC phones

ISO15693 (26kb/s)

Up to 7 cm / 3in.

RFID readers

Up to 40cm / 1.3ft

ISO15693 (26kb/s)

Up to 1.0 m / 3ft

Reduce your antenna dimension and make your product more robust thanks to ISO15693

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ST25TV04K-PE product

ST25TV04K-PE chip belongs to ST25 NFC / RFID Tags & Readers family

- **The ST25TV04K-PE main features:**
  - NFC Forum Tag Type 5 / ISO15693 RF interface
  - 4-kbit EEPROM memory with Lock per memory blocks
  - Multiple 64-bit passwords for data protection
  - Unique Identifier for each device (64-bit UID)
  - Configurable General Purpose Output signal for MCU wake-up
  - Energy Harvesting
  - 40-year data retention & 1Mcycles erase/write
  - SBN12 package version

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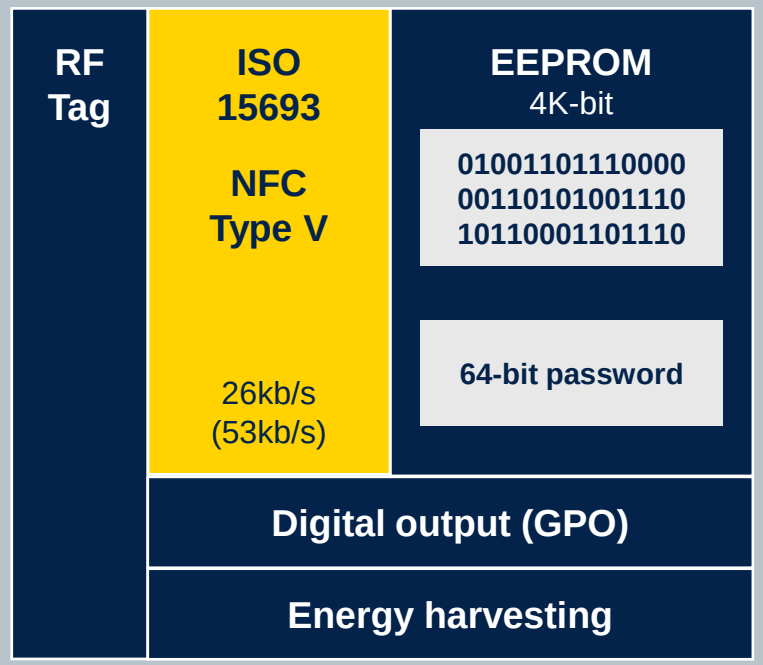
ST25TV04K-PE energy harvesting NFC tag

ST25TV04K-PE



SBN12
Die form, sawn and Bumped inkless 8" wafer, 120µm thickness

Use cases

- Asset tracking, Product identification
- Inventory management
- Gaming

Key Features

- **ISO15693** and **NFC Type V**
- **Long range** operations, up to 53kb/s speed
- **Energy Harvesting** function through RF
- **Configurable output GPO** pin providing RF activity information

Key Benefits

- Temperature range -40°C to +85°C
- Enhanced protection with multiple **64-bit password**
- **40 years** data retention, **1M cycles** erase/write

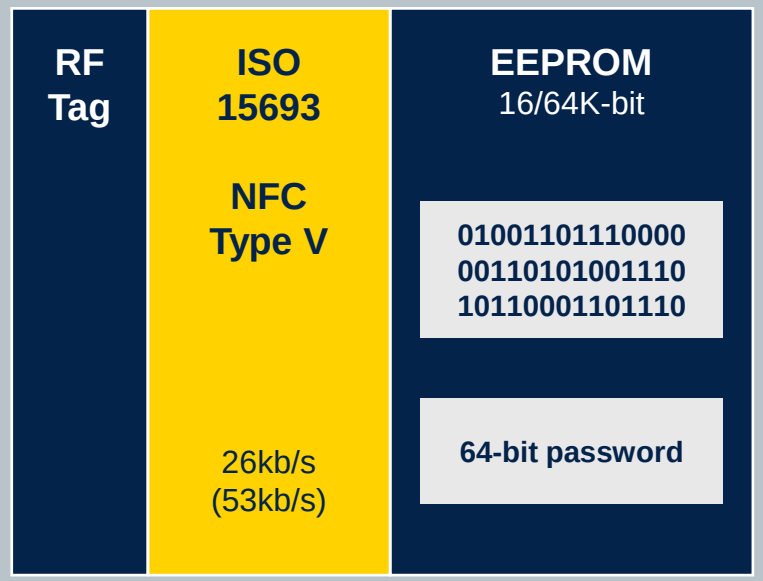
ST25TV16K/64K product

ST25TV16K/64K chip belongs to ST25 NFC / RFID Tags & Readers family

- **The ST25TV16K / ST25TV64K main features:**
  - NFC Forum Tag Type 5 / ISO15693 RF interface
  - 16-kbit and 64-kbit EEPROM memory with Lock per memory blocks
  - Multiple 64-bit passwords for data protection
  - Unique Identifier for each device (64-bit UID)
  - 40-year data retention & 1Mcycles erase/write
  - SBN12 package version

ST25TV16K/64K high density NFC tag

ST25TV16K/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

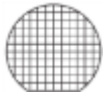
- **ISO15693** and **NFC Type V**
- **Long range** operations, up to 53kb/s speed
- **16/64K-bit** EEPROM density

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)

Key features

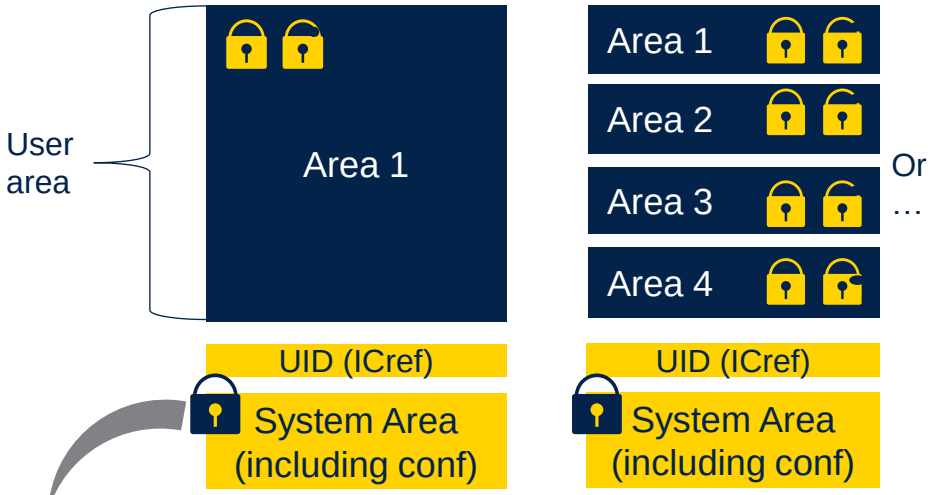
	ST25TV04K-PE	ST25TV16K / ST25TV64K
Contactless Interface	ISO15693 NFC Forum Type 5	ISO15693 NFC Forum Type 5
RF range	Long range (up to 100cm)	Long range (up to 100cm)
RF speed	26kbps (53kbps)	26kbps (53kbps)
Memory format	EEPROM data	EEPROM data
Memory size	4k-bit	16k / 64k-bit
Data protection	Password 64-bit	Password 64-bit
Digital signature	No	No
Digital output	GPO Field detect CMOS_P	No
Counter	No	No
Extra features	Energy Harvesting	No
RF tuning capacitor	28.5pF	28.5pF
Temperature range	-40°C to +85°C	-40°C to +85°C
Package	SBN12*	SBN12*

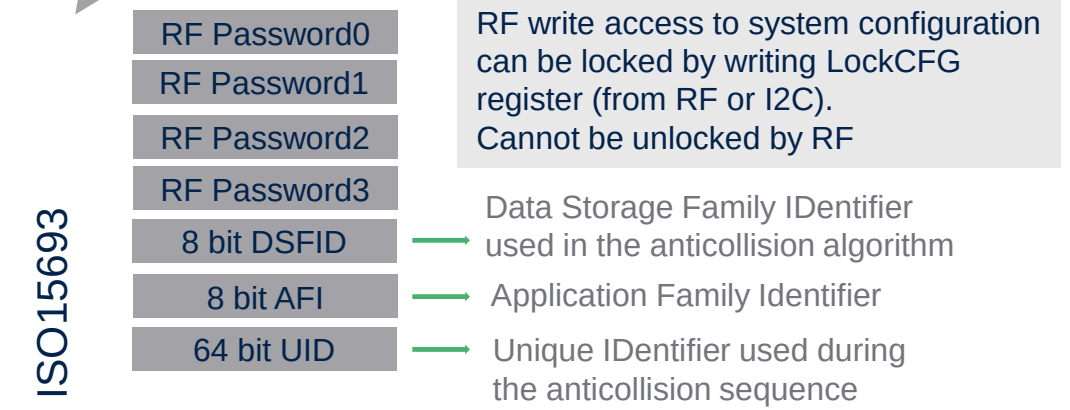


* SBN12: Die form, sawn and Bumped wafer, 120µm thickness, inkless 8” wafer

ST25TV04K-PE / 16K / 64K memory mapping & password management

- EEPROM density
  - 04k-bit / 16k-bit / 64k-bit
- User EEPROM area configurable in flexible areas (up to 4, granularity 32 bytes)
  - Each area is individually read-/write- protected by password command ➔ **64-bit password**
- System EEPROM area
  - Access protected by **64-bit password** (Write)
- Specific block used to store a **64-bit UID**
  - Unique Identifier
  - Its value is written by ST on the production line
  - used during the anticollision sequence (Inventory)
- 5 additional **64-bit** blocks that stores:
  - 1 RF configuration password (access from RF),
  - 3 RF area access password codes (access from RF)





ST25TV04K-PE energy harvesting for battery less design

- The ST25TV04K-PE offers Energy Harvesting mode to power external components
  - Part of the non necessary RF power received by the ST25TV04K-PE on the AC0-AC1 RF input is delivered through the V_EH pin in order to supply external devices.

- The ***analog output pin*** will be able to deliver the analog voltage ***V_EH*** whenever the RF field strength is sufficient
  - Delivery of Harvest Energy (**up to a few tens µW**) on V_EH pin depends on the value of the EH_enable bit located in the dynamic register EH_Dyn
  - Harvest Energy is available at host as soon as surplus energy is available (just limited by RF communication needs)
  - Available Energy depends on antenna, Reader's modulation rate, load and whether RF communication is simultaneously required

- Energy harvesting from NFC RF field
- NFC connectivity
- Up to a few mA with NFC reader
- ST one-stop-shop with low power MCU and sensors

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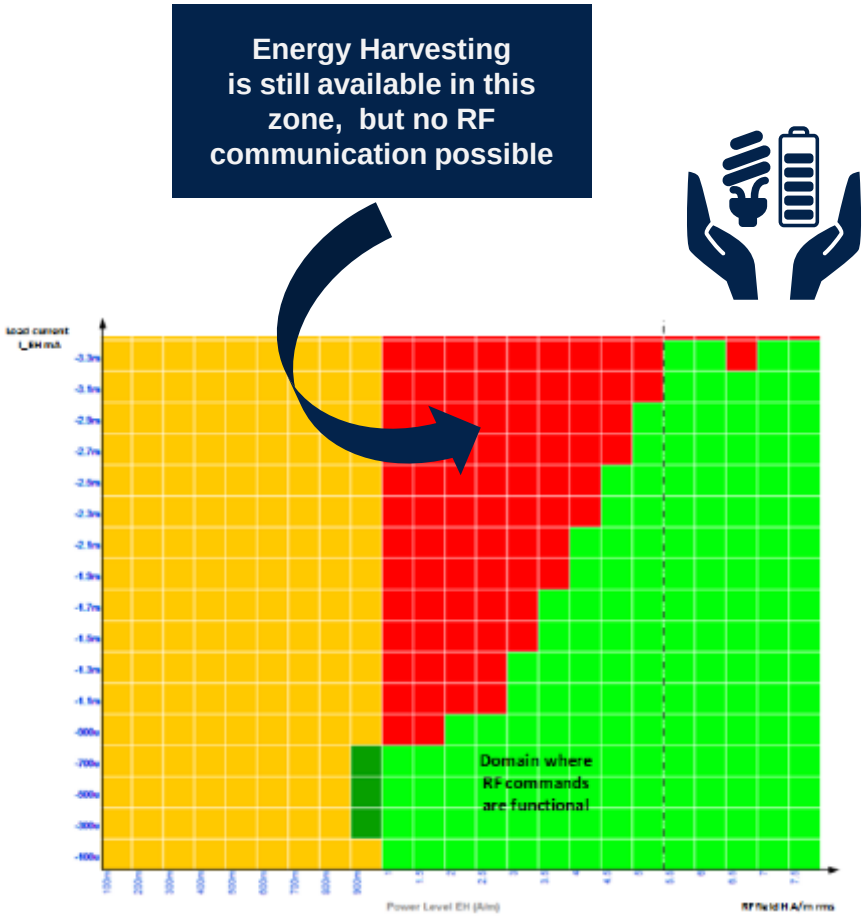
ST25TV04K-PE energy harvesting capabilities

- The ST25TV04K-PE offers Energy Harvesting suited for your battery less application
  - Guidelines
  - Reader's ***AM= 100%*** (NFC Forum & ISO15693)

H_EH	A/m rms	1	1,5	2	2,5	3	3,5	4	4,5	5
V_EH	V	3,25	3,25	3,2	3,15	3,1	2,99	3,05	3,13	3,31
I_EH	mA	0,7	0,7	0,9	1,1	1,3	1,9	2,1	2,7	3,1
P_EH	mW	2,275	2,275	2,88	3,465	4,03	5,681	6,405	8,451	10,26

  - Reader's ***AM= 10%*** (ISO15693)

H_EH	A/m rms	1	1,5	2	2,5	3	3,5	4	4,5	5
V_EH	V	3,25	3,25	3,2	3,15	3,1	2,99	3,05	3,13	3,31
I_EH	mA	0,7	0,7	0,9	1,1	1,3	1,9	2,5	3,3	4,3
P_EH	mW	2,275	2,275	2,88	3,465	4,03	5,681	7,625	10,33	14,23



These measurements have been done with a class1 antenna

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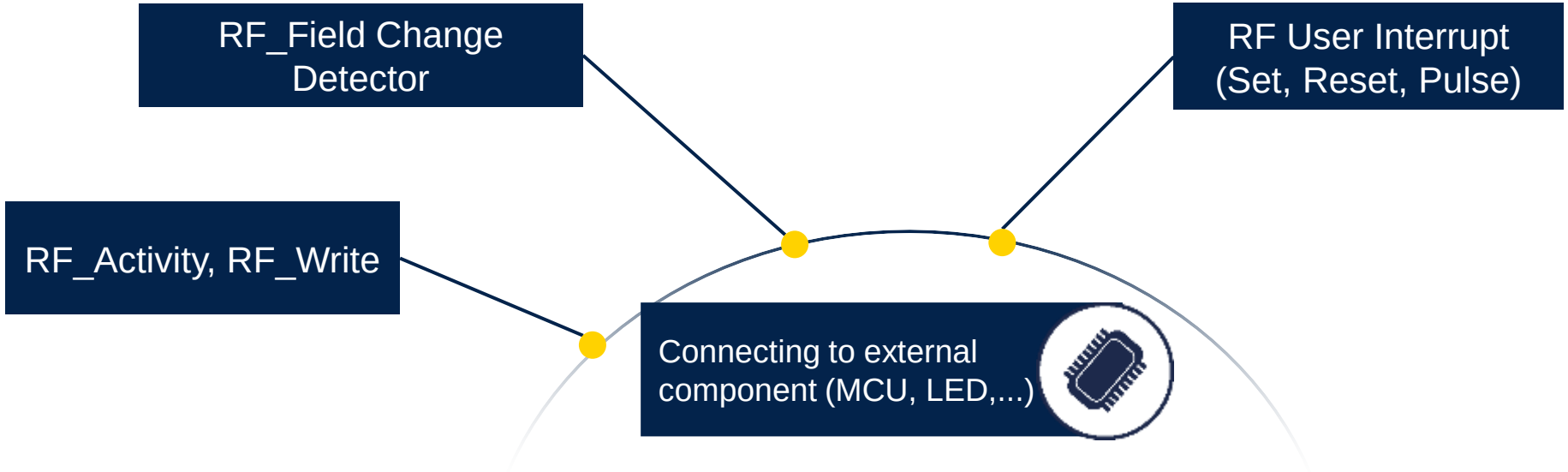
ST25TV04K-PE
flexible interrupts for more usages



GPO pin ➔ one pin, several options

- User set / reset, pulse
  - External component driving, Microcontroller wake up
- RF related actions
  - Signaling RF activity / write from RF into EEPROM.
- Field detect
- Output in CMOS

CMOS GPO benefits:

- No external pull-up resistor
- Dedicated power supply connected to external power supply or energy harvesting output
- Interrupt active at High level.

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RF characteristics

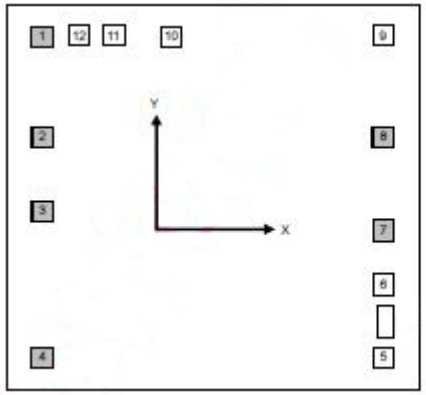
NFC tuning frequency and internal tuning capacitance

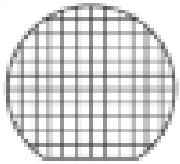
	ST25TV04K-PE ST25TV16K ST25TV64K
Standard	Based on ISO15693 + amendments 3 & 4 NFC Forum type V
Main carrier frequency	13.56MHz
Data sub-carrier frequency	423kHz / 484KHz
Optimal frequency tuning	13.6MHz – 14MHz
Internal capacitor (measured at 2V peak to peak)	28.5pF

ST25TV packages

Sawn & Bumped wafer configuration

- ST25TV04K-PE

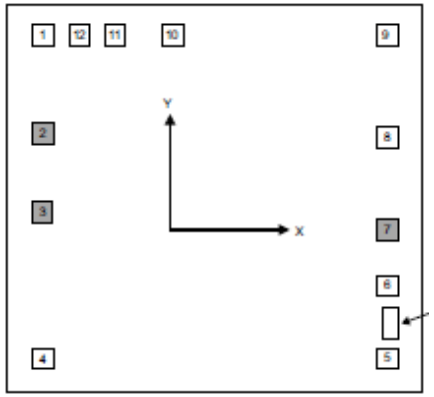


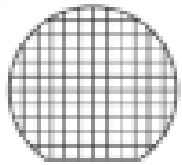


SBN12*
*** : sawn and bumped inkless**
8”wafer, 120um thickness

Bump	Signal Name
1	V_EH
2	AC0
3	AC1
4	Vss
7	Vdcg
8	GPO

- ST25TV16K/64K





SBN12*
*** : sawn and bumped inkless**
8”wafer, 120um thickness

Bump	Signal Name
2	AC0
3	AC1
7	Do not connect

ST25TV Rich Eco-System

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

- PC software tool based on ST25 SDK
- Mobile Apps ST25 SDK (Android & iOS)
- Evaluation board

- Documentation
- Training
- Webinar / MOOC
- E2E community

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Product part numbers

ST25TV	Package	4k-bit	16k-bit	64k-bit
NFC Type 5 Tag ISO15693	SBN12	ST25TV04K-PE6G3	ST25TV16K-AP6G3	ST25TV64K-AP6G3

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Solutions for NFC / RFID Tags & Readers

ST25

ST25 SIMPLY MORE CONNECTED

Thank you

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