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# ST25TA
# product presentation


MMY Division

July 2020

# ST25TA product

- The ST25TA chip belongs to ST25 NFC / RFID Tags & Readers family.
- The ST25TA product is HF Tag based on ISO14443 & NFC forum standards with following main features:
  - NFC Forum Tag Type 4 / ISO14443 RF interface
  - Up to 64kbit EEPROM memory
  - 128-bit password for data protection
  - TruST25 Digital Signature
  - 20-bit counter
  - Configurable General Purpose Output signal for MCU wake-up
  - 200-year data retention & 100Mcycles erase/write
  - SBN12 / SBN075 / DFN5 package versions

# Main ST25TA market segments

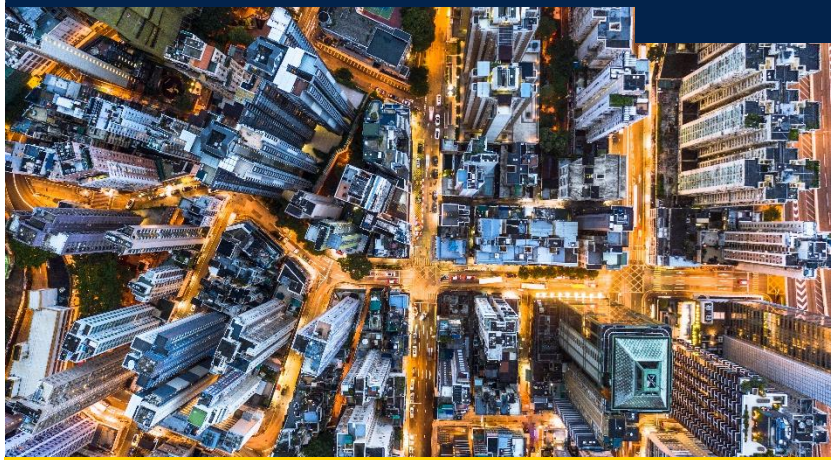
## Smart industry

- Indentification

## Smart things

- Consumer electronics, labelling

## Smart city



- Services : tourism, transport

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# ST25TA use cases

## Asset tracking

- Track & Trace solution

## Brand protection, Accessory recognition

- Based on cloud management

## Product configuration

- Parameter settings

## Wireless pairing

- Bluetooth / Static Wifi

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# Typical RF range

NFC phones

ISO14443 (106kb/s)

Up to 5 cm / 2in.


RFID readers


ISO14443 (106kb/s)

Up to 10cm / 4in.


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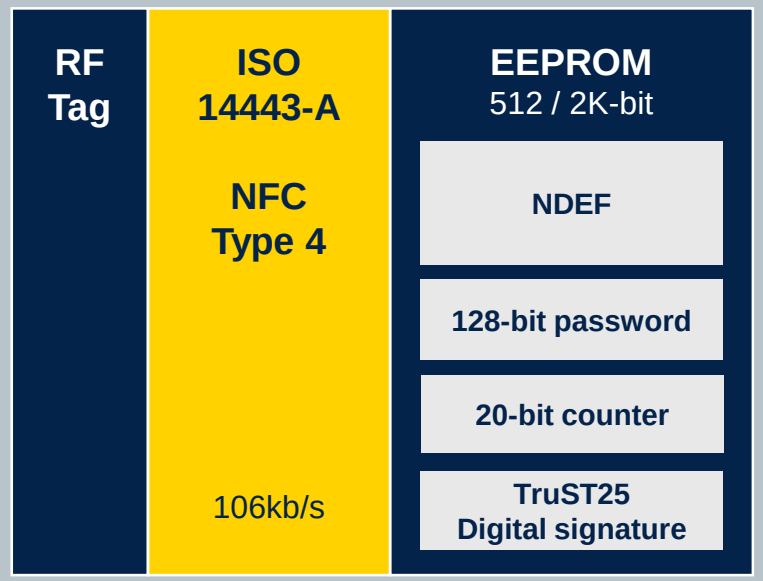
# ST25TA
# low density NFC tag

## ST25TA512B / 02KB




**SBN12 / SBN075**
Die form, sawn and Bumped inkless 8" wafer, 120µm/75µm thickness

## Use cases

- NFC token, NFC tag, Smart poster
- Gaming
- NFC business card (name card, vcard)


## Key Features

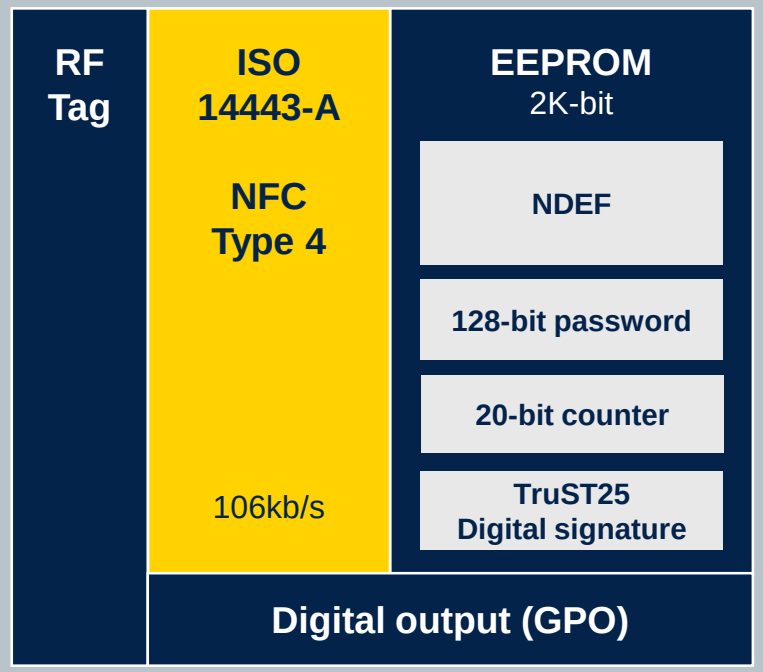
- **ISO14443-A** Type A and **NFC type 4**
- High speed operations (**106kb/s**)
- **TruST25** digital signature
- Data protection thanks to **128-bit password**
- Counter 20-bit with anti-tearing

## Key Benefits

- Optimized PCB footprint
- 50pF internal RF tuning capacitor allowing small antenna design
- **200 years** data retention, **1M cycles** erase/write

# ST25TA with GPO NFC tag

## ST25TA02KB-P / -D




FPN5

## Use cases

- Convenient wireless **pairing**
  - Bluetooth pairing
  - Wi-Fi static pairing

## Key Features

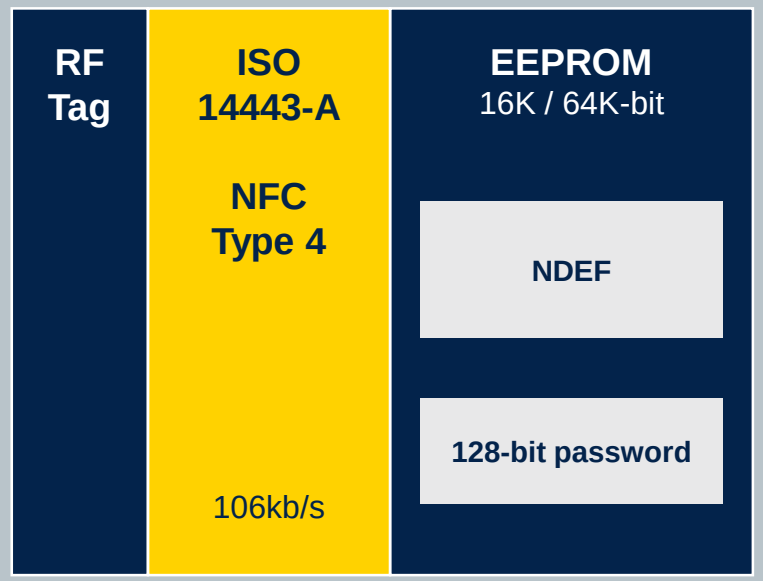
- **ISO14443-A** Type A and **NFC type 4**
- Data protection thanks to **128-bit** password
- **TruST25** Digital Signature
- **Digital output GPO** feature (for MCU wake-up)
  - -P: CMOS_P GPO (active high, no external resistor)
  - -D: Open Drain GPO (active low, pull-up resistor)

## Key Benefits

- Tiny **FPN5** package (1.7x1.4mm)
- 50pF internal RF tuning capacitor allowing small antenna design
- **200 years** data retention, **1M cycles** erase/write

# ST25TA high density NFC tag

## ST25TA16K / 64K




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

## Use cases

- Smart poster, Gaming, NFC token
- NFC business card (name card, vcard) with ID picture, web-link and extra digital contents

## Key Features

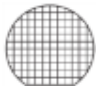
- **ISO14443-A** Type A and **NFC type 4**
- High speed operations (**106kb/s**)
- NDEF memory format
- Data protection thanks to **128-bit password**

## Key Benefits

- **Large memory size** (up to 64k-bit)
- Same RF antenna design as M24SR product
- **200 years** data retention, **1M cycles** erase/write

# ST25TA key features

| | ST25TA512B<br>ST25TA02KB | ST25TA02KB-P<br>ST25TA02KB-D | ST25TA16K<br>ST25TA64K |
|---|---|---|---|
| **Contactless Interface** | ISO14443A / NFC Forum Type 4 | | |
| **RF range** | Short range, up to 10cm | | |
| **RF speed** | 106kbps | | |
| **Memory format** | EEPROM preformatted NDEF file | | |
| **Memory size** | 512-bit / 2k-bit | 2k-bit | 16k / 64k-bit |
| **Counter** | 20-bit counter | 20-bit counter | NA |
| **RF tuning Capacitor** | 50pF | 50pF | 25pF |
| **Digital output (GPO)** | NA | Field detect / Wake up<br>CMOS_P or Open-drain | NA |
| **Data protection** | Password 128-bit<br>Digital signature | Password 128-bit<br>Digital signature | Password 128-bit |
| **Temperature range** | -40°C to +85°C | -40°C to +85°C | -40°C to +85°C |
| **Package** | SBN12 * / SBN075* | FPN5 / FPN8<br>/ SBN12* / SBN075 * | SBN12 * / SBN075* |



- SBN12: Die form, sawn and Bumped wafer, 120µm thickness, inkless 8” wafer
- SBN075: Die form, sawn and Bumped wafer, 75µm thickness, inkless 8” wafer

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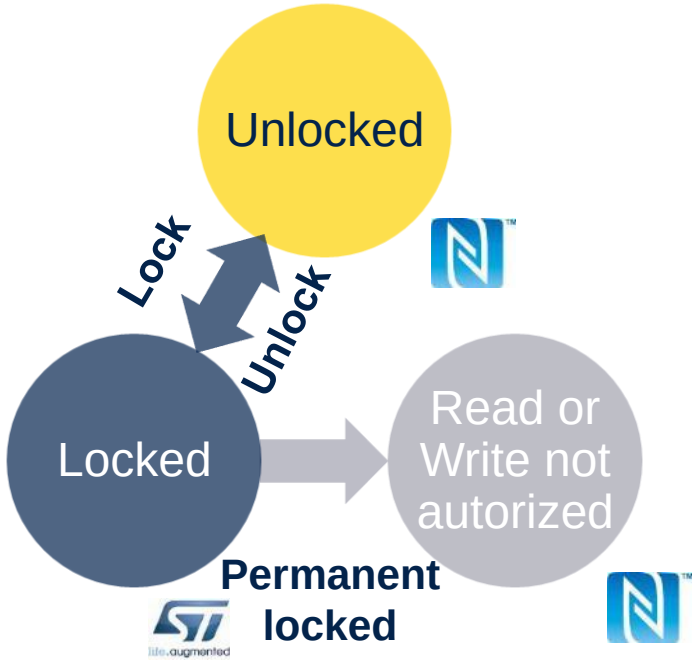
# Counter feature
# ST25TA512B / ST25TA02KB / ST25TA02KB-x


- Incremented on each read or write events on the NDEF file
- Counter size : 20 bits
  - Means more than 1 million events
- Configured exclusively for Read or Write events
- Anti-tearing mechanism ensures the consistency of the counter
  - Even if electrical problem during its increment happens
- Its value can be checked through an application on NFC phone
  - By reading suitable bytes in the system file (as not defined in NFC standards)
- One configuration byte in System file, that allows to :
  - Enable or Disable this counter
  - Configure it for Read or Write events (Read XOR Write)
  - Definitively lock this configuration byte (when locked, no anymore change allowed)

# Data protection

- Data protection thanks to 2 passwords.
  - To lock an NDEF file
- Password size : 128 bits
  - 1,70 . 10 38 combinations before finding the right password…
- 2 passwords,
  - One for read access
  - One for write access
- Possible to lock permanently in read or write
- 2 bytes in the  CCFile helps also to define the locked or unlocked access



# TruST25™ for digital signature

## Overview

- TruST25™ encompasses industrialization processes and tools deployed by STMicroelectronics to create and write Digital Signature in house and that benefits from Secure product environment (HSM FIPS140-2)
- TruST25 is a STMicroelectronics trademark
- Digital Signature allows applications to verify the authenticity of a product
- A dedicated application note describes the digital Signature and how to read and verify the TruST25TM Digital Signature. Application note distributed under NDA
- Public Key will be sent to customers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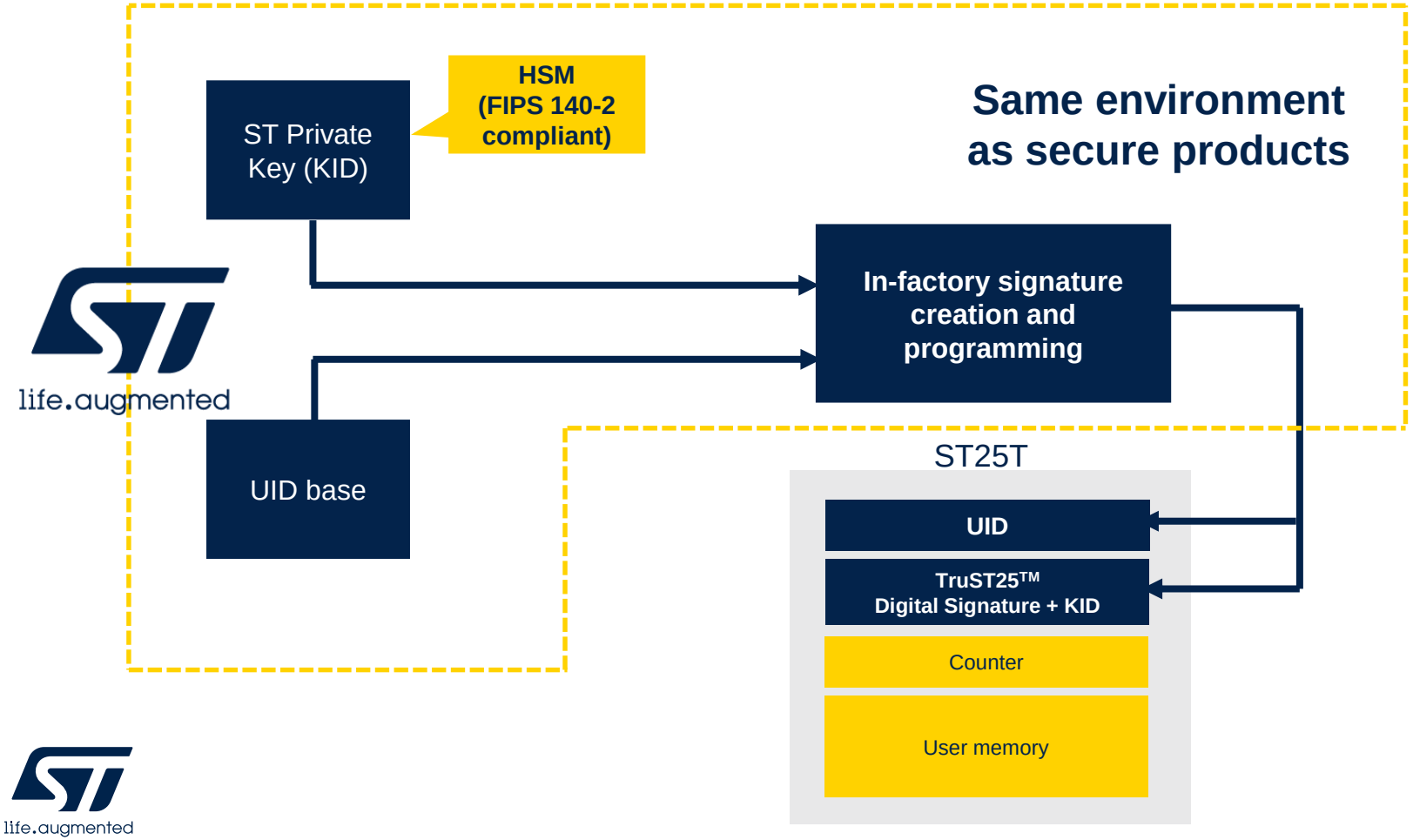
# TruST25™ signature creation

## ST in-Factory Digital Signature creation in secure environment

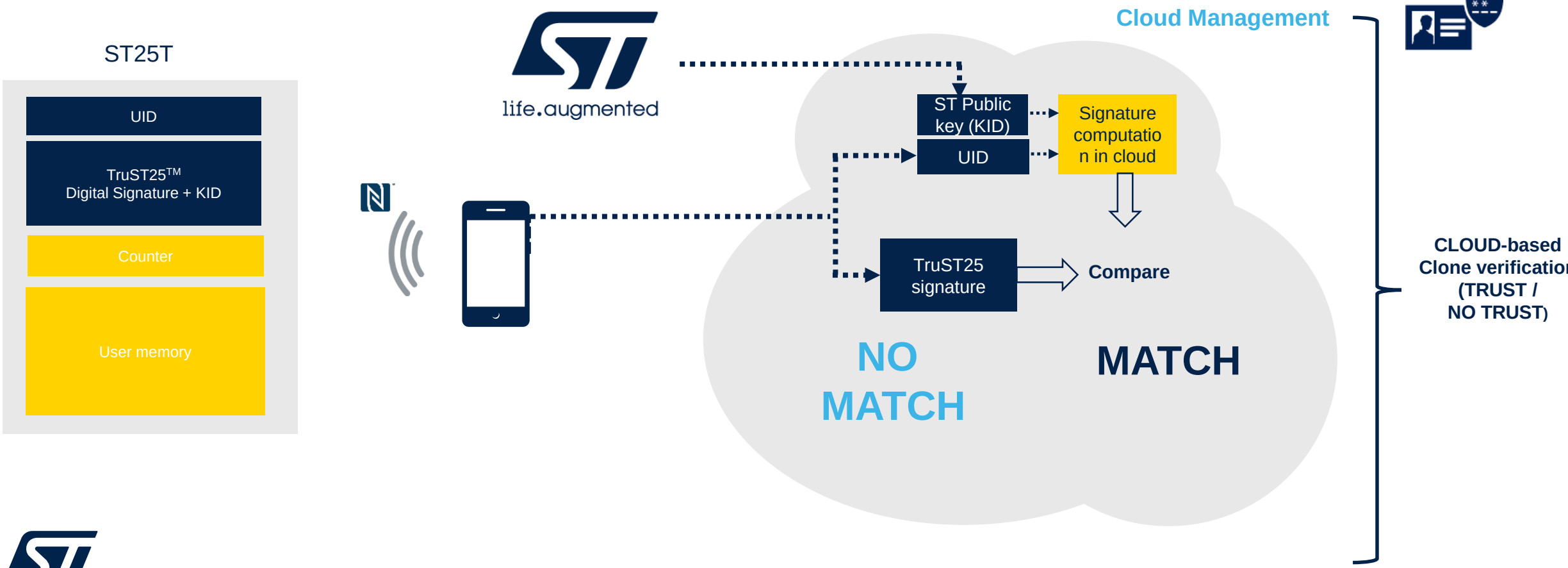



### For higher protection

Digital Signature protect ST customers (inlay makers) against copy.
This is a protection in the supply chain.
To protect consumer the SI has to embed the signature of applicative data

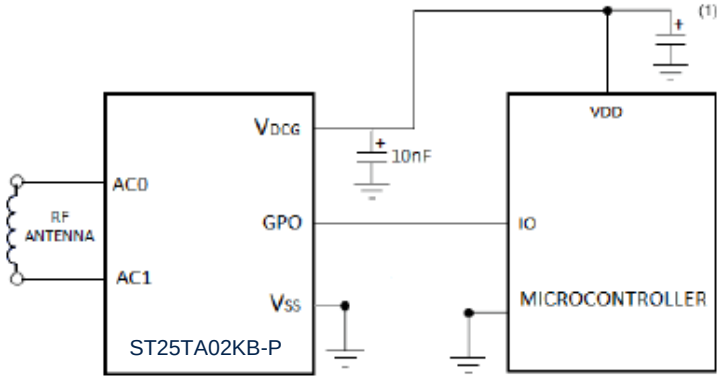
# TruST25™ digital signature verification

## Verify TruST25™ Digital Signature



# ST25TA02KB-P GPO feature

- 7 configurations of GPO CMOS_P
  - **Session Open**
    - RF session ongoing.
  - **MIP** (NDEF Message updating In Progress)
    - RF host writing an NDEF length different from 0x0000.
  - **WIP** (Writing In Progress)
    - ST25TA02KB-P executing a writing operation.
  - **INT** (interrupt)
    - RF host can force ST25TA02KB-P to send an alternate pulse.
  - **State mode**
    - RF host can control the state of the GPO pad during the RF session.
  - **RF busy**
    - RF host communicating with ST25TA02KB-P.
  - **Field detection**
    - RF field is sufficient to establish a RF communication with ST25TA02KB-P.




CMOS_P interrupt signal
=> Active High

- GPO
  - CMOS_P interrupt active at High level: signal moving from Low to high level (rising edge)
  - No need of external pull-up resistor: Vcc and Gnd required. Vcc to set the high level voltage (1.8V or 3V or 5V…)

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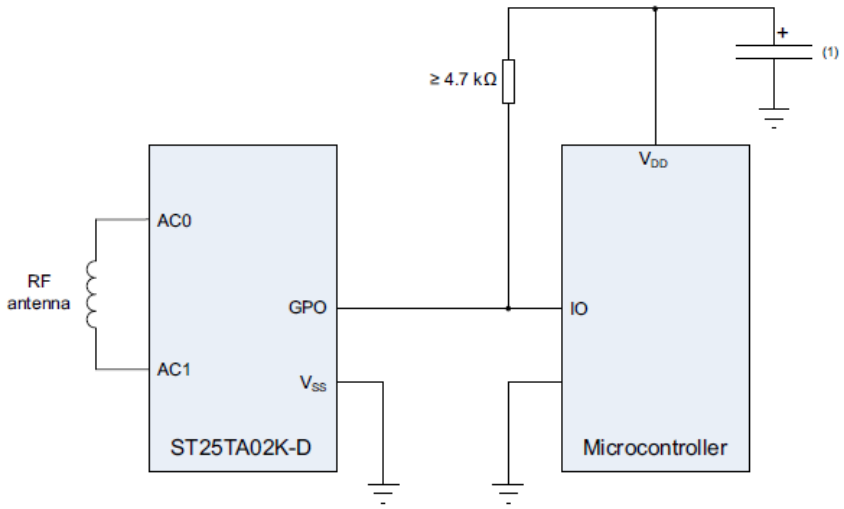
# ST25TA02KB-D GPO feature

- 7 configurations of GPO Open Drain
  - **Session Open**
    - RF session ongoing
  - **MIP** (NDEF Message updating In Progress)
    - RF host writing an NDEF length different from 0x0000
  - **WIP** (Writing In Progress)
    - ST25TA02KB-D executing a writing operation
  - **INT** (interrupt)
    - RF host can force ST25TA02KB-D to send an alternate pulse
  - **State mode**
    - RF host can control the state of the GPO pad during the RF session
  - **RF busy**
    - RF host communicating with ST25TA02KB-D
  - **Field detection**
    - RF field is sufficient to establish a RF communication with ST25TA02KB-D




Open-Drain interrupt signal
=> Active Low

- GPO
  - Open drain interrupt active at Low level: Signal moving from High to Low level (falling edge)
  - Need of external pull-up resistor: External pull resistor higher than 4.7K Ohm

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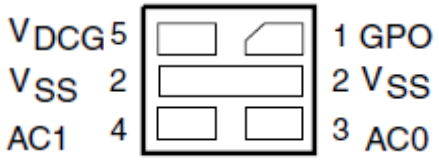
# RF tuning capacitance

- Internal RF tuning capacitance allows antenna design from Class 1 to Class 6 form factor

| | ST25TA512B/02KB | ST25TA16K/64K |
|---|---|---|
| Standard | ISO14443 | ISO14443 |
| Main carrier frequency | 13.56MHz | 13.56MHz |
| Data sub-carrier frequency | 848kHz | 848kHz |
| Optimal frequency tuning | 14.2MHz | 14.2MHz |
| Internal capacitor (measured at 2V peak to peak) | **50pF** | **25pF** |
| Targeted coil value | 2.5uH | 5uH |

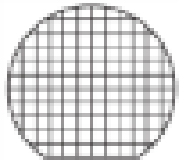
# ST25TA packages

- UFDFPN5 Package – 1.7 x 1.4mm




Bottom view

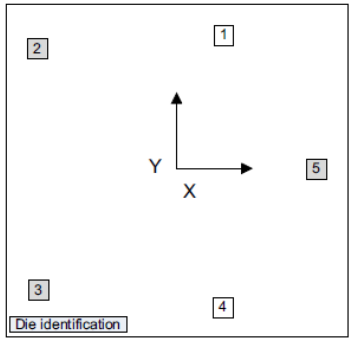

- Sawn & Bumped for wafer



**SBN12/075 ***

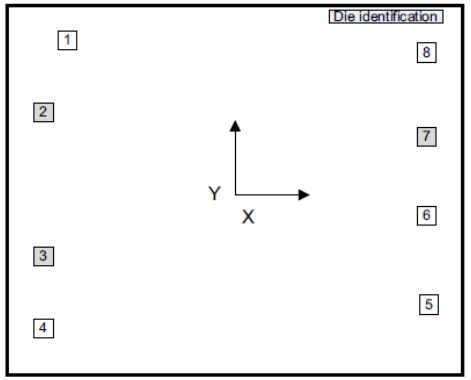
*** : sawn and bumped inkless 8”wafer, 120µm/75um thickness**

  - ST25TA512B/02KB




| Bump | Signal name |
|---|---|
| 1 | Not used |
| 2 | AC1 |
| 3 | AC0 |
| 4 | Not used |
| 5 | Do not connect |

  - ST25TA16K/64K




| Bump | Signal name |
|---|---|
| 1 | Not used |
| 2 | AC1 |
| 3 | AC0 |
| 4 | Not used |
| 5 | Not used |
| 6 | Not used |
| 7 | Do not connect |
| 8 | Not used |



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# ST25TA 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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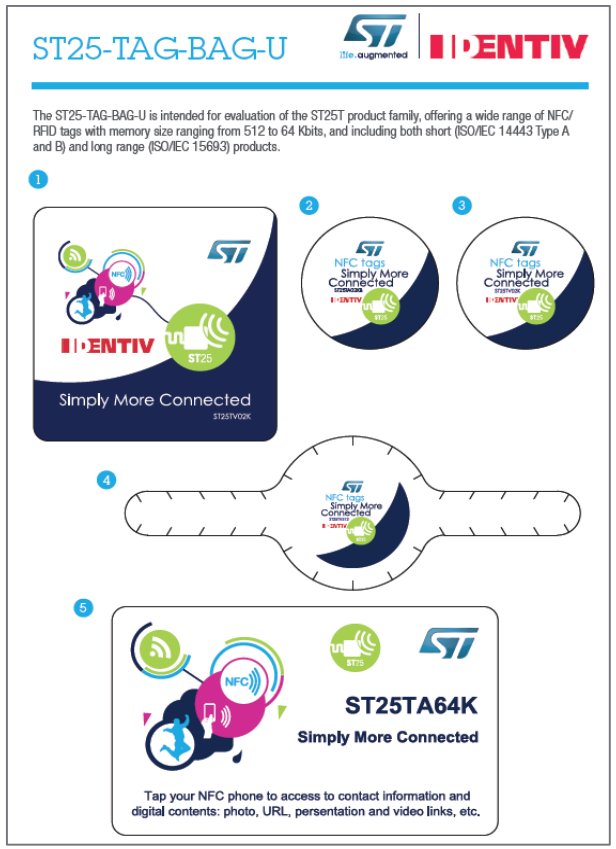
# ST25T tag bag kits




ST25-TAG-BAG-U

**ST25TA Tag Bag US**


ST25-TAG-BAG-A

**ST25TA Tag Bag APAC**


ST25-TAG-BAG-E

**ST25TA Tag Bag EMEA**

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# ST25TA evaluation board


CLOUD-ST25TA02KB

## Cloud ST25TA Eval Board

- **ST25TA02KB-P** NFC/RFID tag IC
- UDFPN5 package
- 18mm diameter 12 turns antenna
- 256-Byte (2-kbit) NDEF EEPROM
- Configurable GPO (Field Detection) with connector on PCB

# ST25TA product part numbers

| ST25TA | Package | 512-bit | 2k-bit | 16k-bit | 64k-bit |
|---|---|---|---|---|---|
| NFC / RFID tag<br>RF ISO14443 interface<br>+ Digital Signature | SBN12<br>SBN075 | ST25TA512B-AC6G5<br>ST25TA512B-AC6F5 | ST25TA02KB-AC6G5<br>ST25TA02KB-AC6F5 | ST25TA16K-AB6G3 | ST25TA64K-AB6G3 |

| ST25TA | Package | 2k-bit |
|---|---|---|
| NFC / RFID tag<br>RF ISO14443 interface<br>+ Digital Signature<br>+ GPO | FPN5 | ST25TA02KB-PC6H5<br>ST25TA02KB-DC6H5 |

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# Solutions for NFC / RFID tags & readers

ST25

## ST25 SIMPLY MORE CONNECTED


# Thank you



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