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# ST25 Ecosystem introductions

吴刚

Nov, 2022

- ST25 design resources
- Customer oriented solutions

# ST25 design resources

# ST25 Ecosystem in China

Easy-to-use and customer-oriented





# ST25 Hardware Ecosystem

## Fast evaluation and easy prototyping

### Discovery kit

- **ST25 NFC IC**
- Onboard STM32 MCU
- Micro-USB connector
- PC GUI available
- MCU source code available for full function evaluation and demo with PC GUI



Example: ST25R3911B-DISCO

### Nucleo shield board

- **ST25 NFC IC**
- Compatible with STM32 Nucleo boards
- Equipped with Arduino™ UNO R3 connector
- MCU source code available for prototype development &



Example: X-NUCLEO-NFC05A1

### Application oriented demo kit

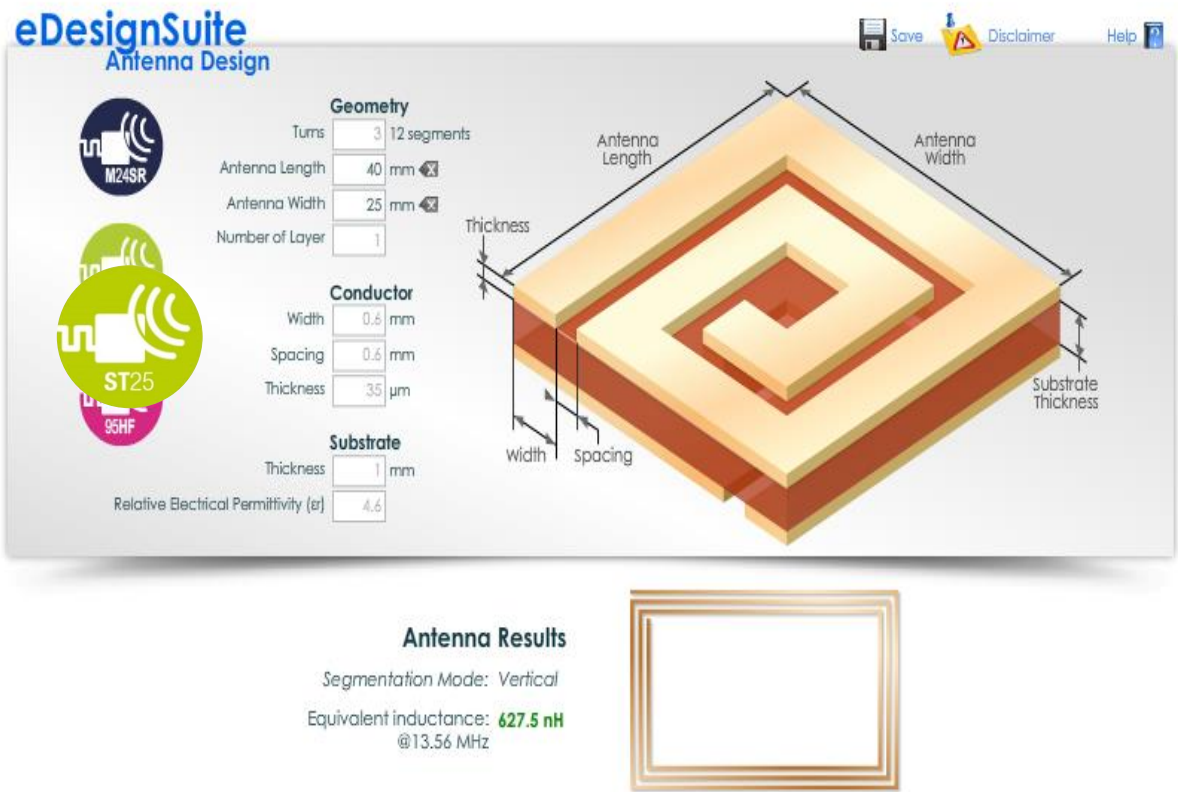
- **ST25 NFC IC**
- Onboard STM32 MCU
- Micro-USB connector
- Comprehensive Device Test Environment (DTE) for EMVCo Level 1 FW control



Example: ST25R3911B-EMVCO

# Design tools and training

Easy to use and user friendly - Antenna eDesign suite



## Antenna design tools: single layer antenna design 15

Available in [www.st.com](http://www.st.com)

参考网盘4号目录下文档 如何设计单面FR-4 PCB天线.pdf

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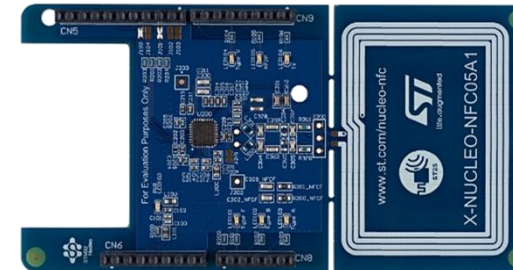
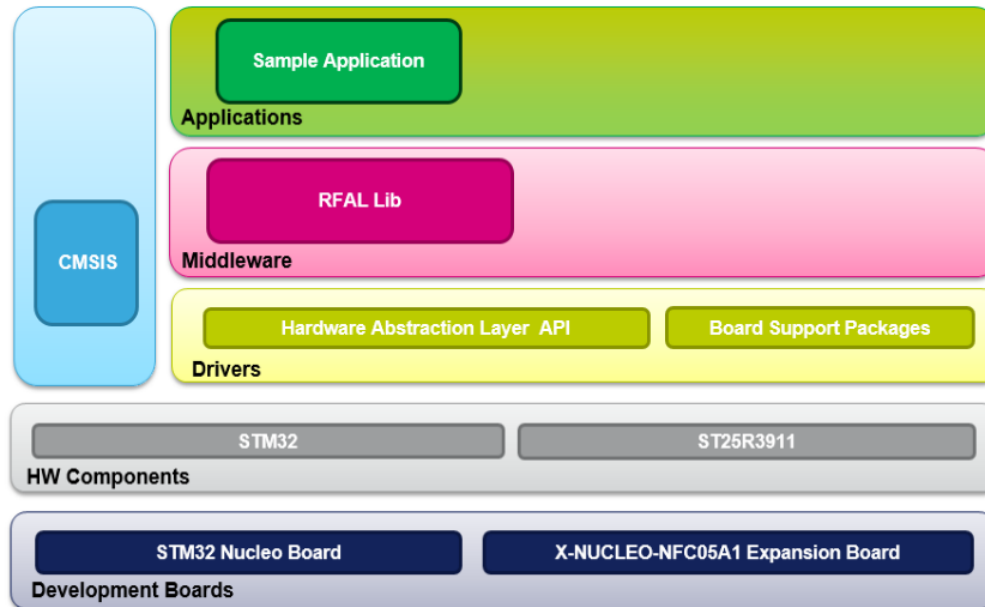
Browse Calculators, Selectors, Simulators →

Calculators	Selectors
<b>DesignSuite</b>	Simulators and Models

# ST25 Software Ecosystem

## STM32Cube expansion, easy-to-use and porting

- Example : Demo of the ST25R3911B wakeup and reader mode
  - Low power Wakeup mode detection of approaching tag
  - Identification and activation of nearby tag/P2P device
  - Displays tag's technology (LED) and UID



# STM32 open development environment

A fast track from idea to production with Nucleo boards

NUCLEO-F401RE



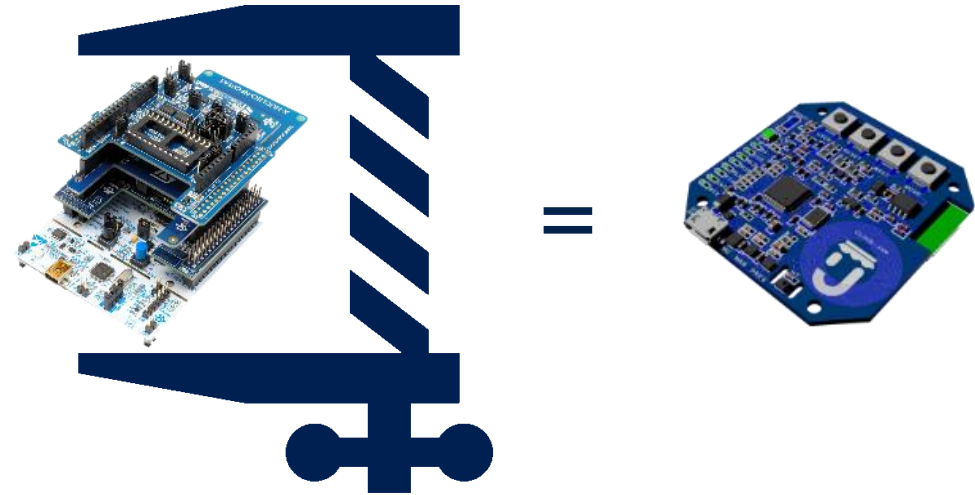
+



X-NUCLEO-IKS01A2



X-NUCLEO-NFC01A1



Idea

Prototype



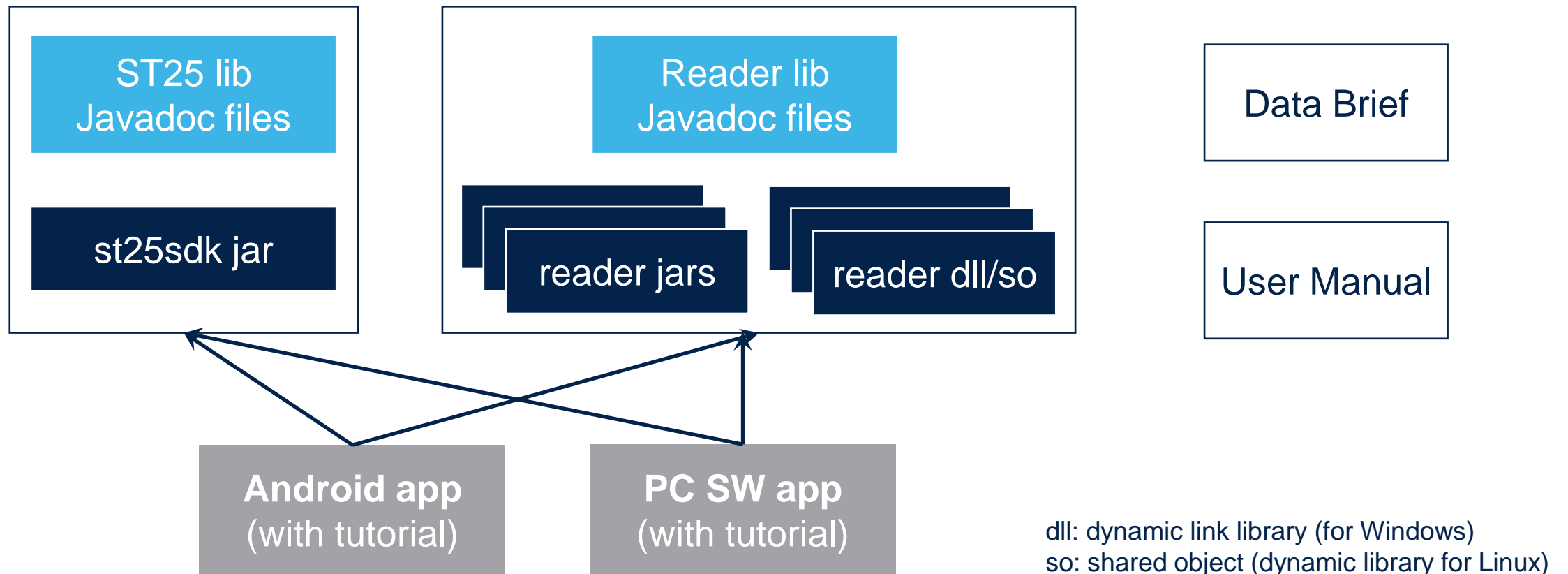
Engineering sample

Product



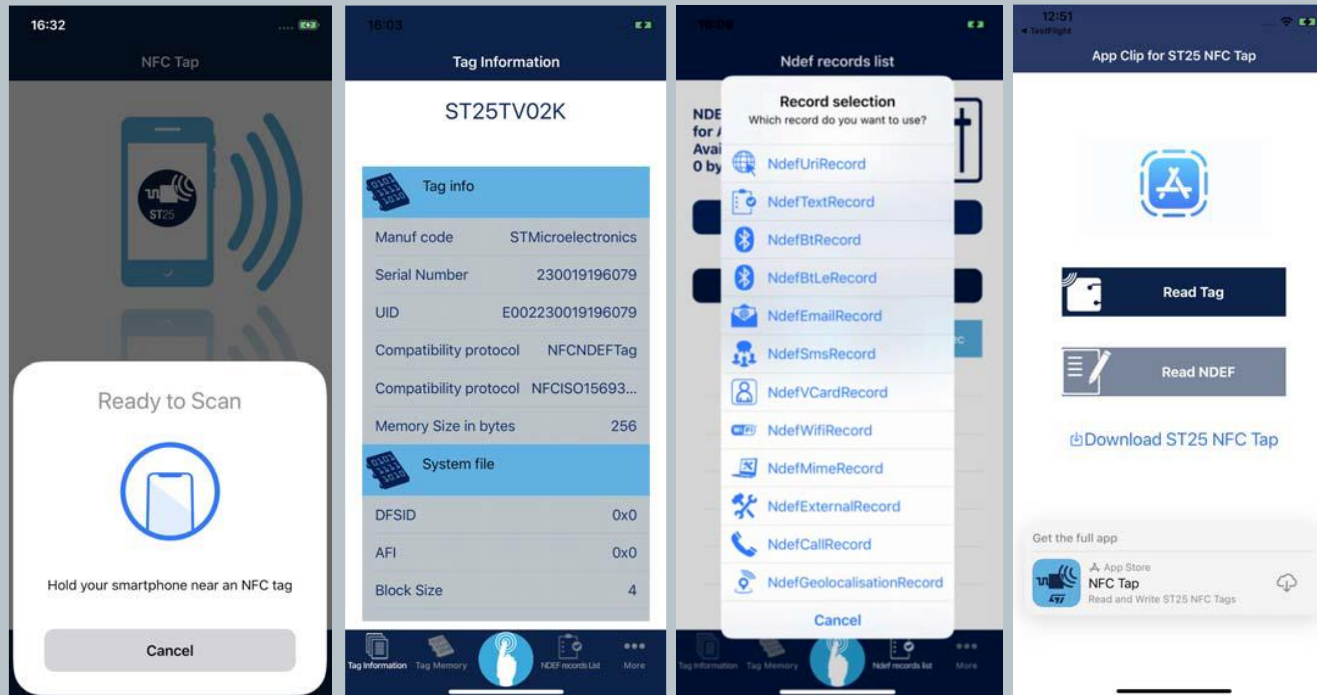
# ST25 SDK content

## ST25 SDK easy-to-use and customer-oriented



# ST25 iOS mobile apps

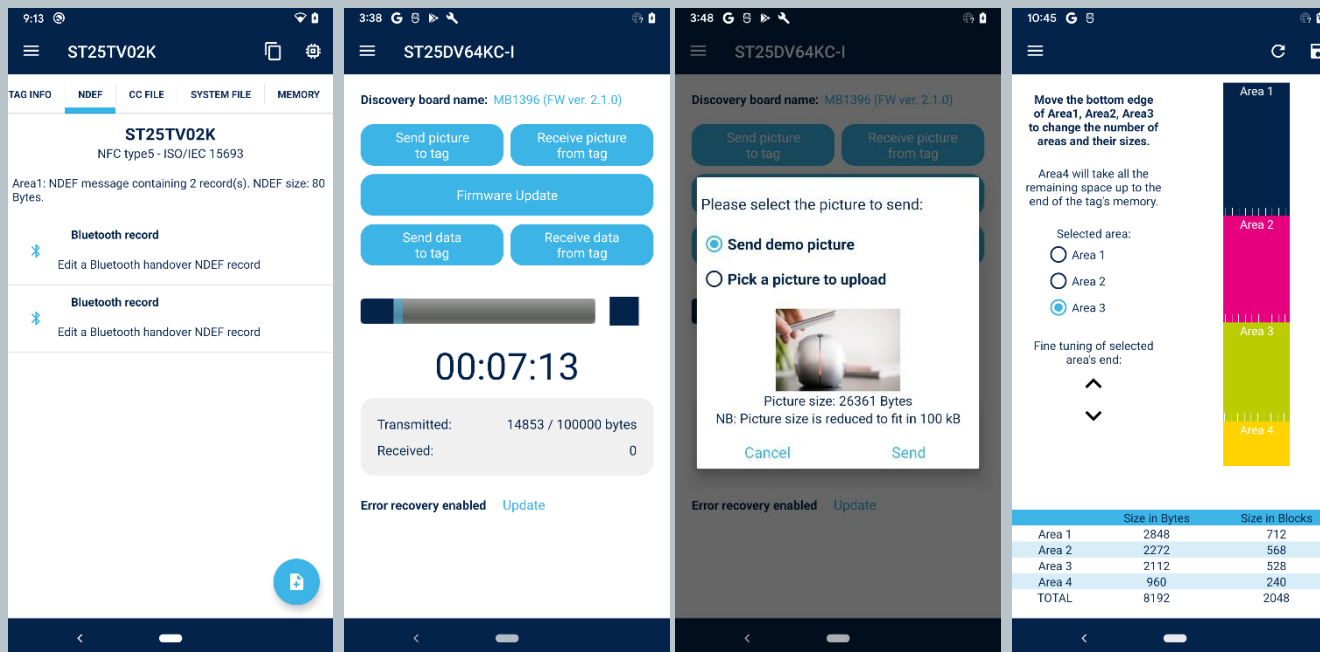
## ST25 NFC Tap for iOS



- 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, Bluetooth pairing and PWM
- Support of NFC background tag reading
- Automatic launch of iOS app
- ST25 NFC tap open-source code ([STSW-ST25/OS002](#))
- Support iOS14 & iOS15 beta

# ST25 Android mobile apps

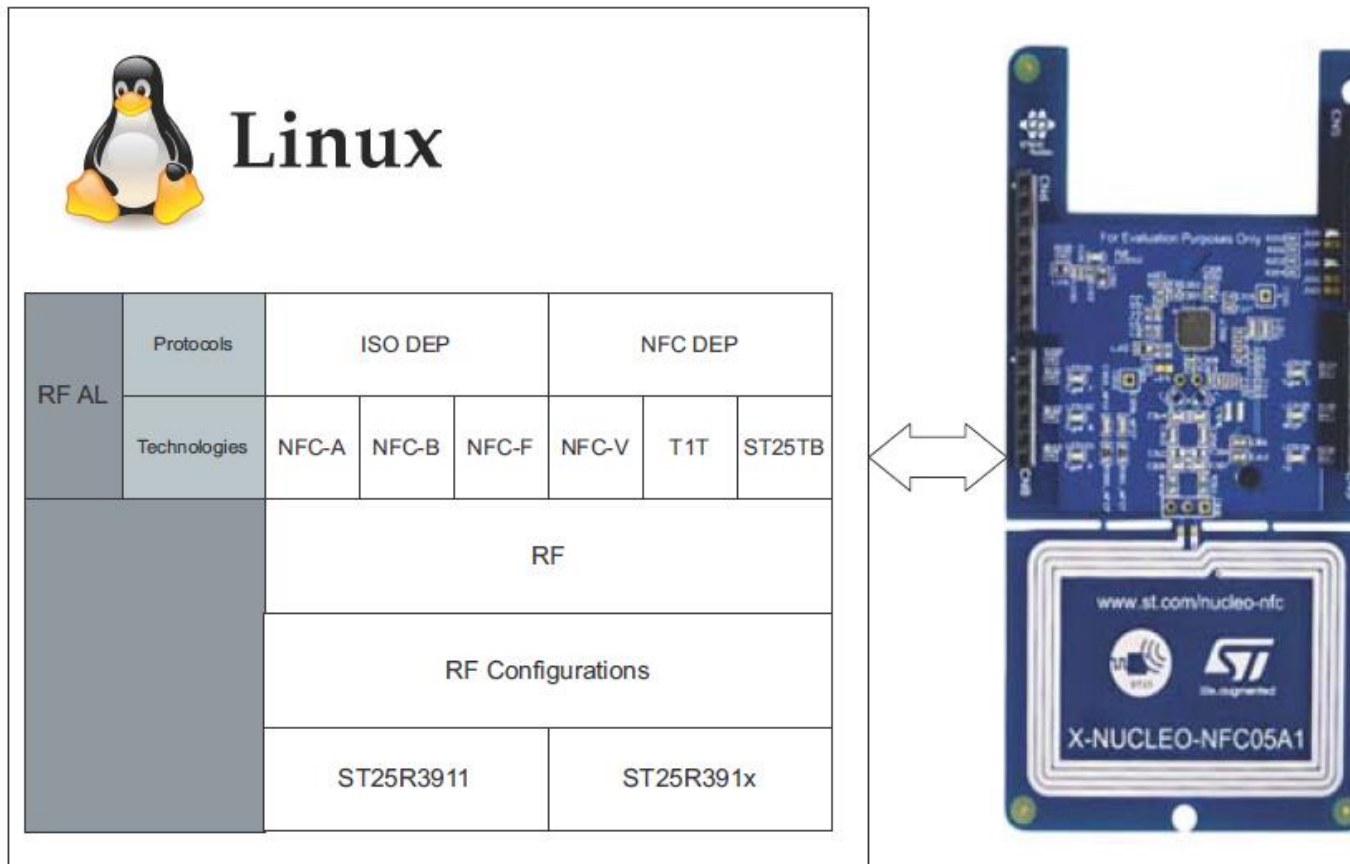
## ST25 NFC Tap for Android



- 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...)
- Includes demos for Fast Transfer Mode, PWM and Wifi or Bluetooth pairing
- Automatic launch of Android app
- ST25 NFC tap apk file ([STSW-ST25001](#))
- ST25 NFC tap open-source code ([STSW-ST25002](#))

# Linux® driver for the ST25R391x

Simple implementation with the Raspberry Pi 3 to operate with the reader



# ST China Community

<https://shequ.stmicroelectronics.cn/>



life.augmented ST 中文论坛

ST 官网 / STM32 中文官网 / ST 全球论坛 / 天猫旗舰店 / 京东生态店 / [登录/注册](#)

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## ST NFC团队

意法半导体作为RFID和NFC技术的先行者之一，提供包括NFC / RFID标签、动态NFC标签、NFC / RFID读写器 & NFC控制器，安全NFC应用的安全组件和整套解决方案等在内的HF RFID/NFC产品。

群主 zxzheng 成员 12

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**【数据摘要】**用于资产跟踪的基于 Amazon 的网络云应用  
物联网、追踪器、物流、电子标签、标签  
发布时间：7 天前

**【数据手册】**读写器ST25RU3993

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1

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资源 4



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第18集 教程\_如何使用ST25 NFC例程

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第17集 ST25R NFC读卡器设计方法

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第13集 ST25 NFC产品硬件开发资...

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第11集 基于ST25的NFC应用简介 6 ...

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第6集 基于ST25的NFC应用简介 1



第5集 ST25 NFC产品系列简介 4 - S...



第4集 ST25 NFC产品系列简介 3 - S...

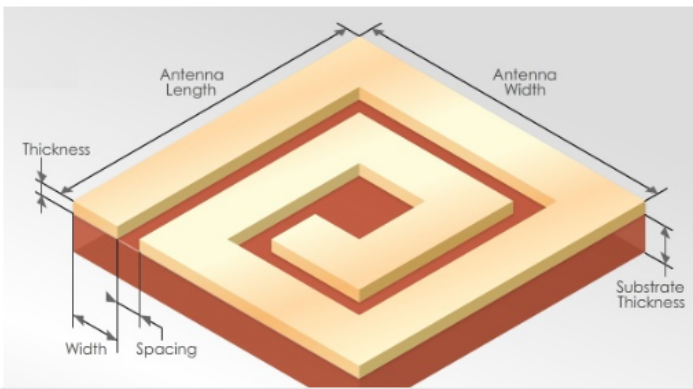


第3集 ST25 NFC产品系列简介 2 - S...

# Reference designs

23 dynamic tag antenna designs have been validated for customers

Antenna parameters



Title	Antenna length (mm)	Antenna Width (mm)	Antenna turns	Width (mm)	Spacing (mm)	Thickness (mm)	Substrate thickness	Number of PCB layer	Antenna inductance
ANT14x14_Dual layers <span>NEW</span>	14	13.5	11	0.2	0.2	35	1.6	2	ANT7
ANT15x15_Dual layers <span>NEW</span>	15	15	7	0.2	0.2	35	0.8	2	4.48
ANT_D15_circular_Dual layers <span>NEW</span>	15/Diameter	-	10	0.254	0.2	35	0.8	2	4.67
ANT17x17_Dual layers <span>NEW</span>	17	17	7	0.3	0.25	35	0.8	2	4.53
ANT20x15_Dual layers <span>NEW</span>	20	15	6	0.2	0.2	35	0.8	2	4.62
ANT20x20_Single layer <span>NEW</span>	20	20	15	0.2	0.2	35	0.8	1	4.5
ANT_D20_circular_Dual layers <span>NEW</span>	20/Diameter	-	8	0.3	0.3	35	1.6	2	ANT13
ANT25x20_Single layer <span>NEW</span>	25	20	11	0.2	0.2	35	0.8	1	4.2
ANT25x25_Single layer <span>NEW</span>	25	25	10	0.2	0.2	35	0.8	1	4.45
ANT_D25_circular_Single layer <span>NEW</span>	25/Diameter	-	13	0.2	0.254	35	0.8	1	4.62
ANT30x20_Single layer <span>NEW</span>	30	20	13	0.254	0.3	35	0.8	1	4.37
ANT30x25_Single layer <span>NEW</span>	30	25	9	0.2	0.2	35	0.8	1	4.47
ANT_D30_circular_Single layer <span>NEW</span>	30/Diameter	-	10	0.2	0.2	35	0.8	1	4.93
ANT31x30_Single layer <span>NEW</span>	31	30	5	0.6	0.6	35	1.6	2	ANT14
ANT40x25_Single layer <span>NEW</span>	40	25	8	0.3	0.2	35	0.8	1	4.32
ANT40x30_Single layer <span>NEW</span>	40	30	7	0.2	0.2	35	0.8	1	4.47
ANT40x40_Single layer <span>NEW</span>	40	40	7	0.4	0.25	35	0.8	1	4.44
ANT40x20_Single layer <span>NEW</span>	40	20	9	0.3	0.15	35	0.8	1	ANT2
ANT50x50_Single layer <span>NEW</span>	50	50	7	0.7	0.4	35	0.8	1	4.8
ANT60x60_Single layer <span>NEW</span>	60	60	6	0.8	0.5	35	0.8	1	4.8
ANT70x70_Single layer <span>NEW</span>	70	70	6	1.4	0.6	35	0.8	1	4.7
ANT75x40_Single layer <span>NEW</span>	75	40	6	0.6	0.6	35	0.8	1	ANT1
ANT80x80_Single layer <span>NEW</span>	80	80	5	1.4	0.5	35	0.8	1	4.8
Antenna parameters description: Antenna length/Antenna width/Width/Spacing/Thickness/Substrate Thickness <span>NEW</span>	-	-	-	-	-	-	-	-	-

## How To Design Single Side N (NFC)



### 前言

介绍 NFC 单面天线的工作原理和设计过程。

### 问题

客户希望了解 NFC 天线的工作原理和如何设计 NFC 单面天线。

### 原理简介

- 在 NFC 通信系统中，读卡器（Reader）和标签（Tag）天线性能的好坏直接决定 NFC 的工作距离，在设计中需要
- Tag 天线表现为电感特性，可以看作一个电感和电阻串联，以看作为一个电容和芯片内阻串联。
- 图 1 是 NFC Tag 等效电路图，芯片和天线组成一个并联谐振  $f_s = \frac{1}{2\pi\sqrt{LC}}$ ；而电阻则是耗能器件，会消耗 Tag 捕获的能量。
- 等效电容由芯片本身决定，设计 NFC Tag 天线时，我们要
- 为了方便客户和提高工作效率，ST 官方网站提供了免



### 电感参考选择

Brand	type	Series	Part #	L [nH]	Q@fwork	DRC [mOhm]	IRMS [mA]	SFR [MHz]	Footprint
TDK	MultiLayer	MLJ1608	MLJ1608WR22J	220	28	290	550	350	0603
Vishay	shielded	IHHP0806	IHHP0806AZERR24M01	240	20	20.5	4200		0806
Taiyo Yuden	MultiLayer	MCFK1608	MCFK1608TR24M	240		50	2100		0603
muRata	wire wound	LQW15	LQW15CAR27J00D	270		380	480	1200	0402
muRata	wire wound	LQW18	LQW18CNR27J00D	270		160	750		0603
Taiyo Yuden	MultiLayer	MCKK2012	MCKK2012TR24M	240		25	4000		0805
Taiyo Yuden	MultiLayer	MC	MCFK1608TR24M	240		50	2100		0603

0)	10 ms range (wur=1)
	10 ms
	20 ms
	30 ms
	40 ms
	50 ms
	60 ms
	70 ms
	80 ms



## ST25R3911B 低功耗模式电流计算

### 前言

本篇文章主要介绍 ST25R3911B 低功耗模式电流的计算。低功耗模式主要分为电容式唤醒和电感式唤醒。电感式唤醒又可以通过幅值和相位检测两种模式来检测。

### 低功耗模式

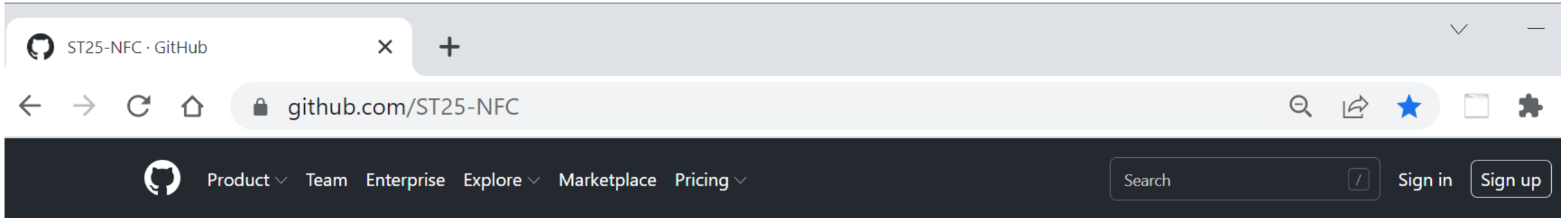
#### 电容式唤醒

在 *Tout* 输入唤醒时间间隔，可以在 10ms-800ms 之间的 16 个设定内选择，单位为秒。右侧 C 这一栏可以得到使用电容式



# ST FAE on-site: ST25-NFC GitHub

<https://github.com/ST25-NFC>



ST25-NFC

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## Popular repositories

**ST25R3916**

包括例程应用指南, Video和代码

☆ 1

Public

**ST25DV**

包括例程应用指南, Video和代码

Public

**ST25R3911B**

包括例程应用指南, Video和代码

Public

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Public

# SW example code introductions

☰ README.md

## 例程解析

### • 代码实现

- o 代码实现在应用层，体现在“demo.c”这个文件上
- o 而实现tagV的相关内容都放在demoNfcv( rfaINfcvListenDevice \*nfcvDev )这个函数内。



```
262 *****
263 * \brief Demo NFC-V Exchange
264 *
265 * Example how to exchange read and write blocks on a NFC-V tag
266 *
267 *****
268 */
269 static void demoNfcv( rfaINfcvListenDevice *nfcvDev )
270 {
271     ReturnCode      err;
272     uint16_t         rxvLen;
273     uint8_t          blockNum = 0x1F;
274     uint8_t          rxBuf[ 1 + DEMO_NFCV_BLOCK_LEN + RFAL_CRC_LEN ];
275     uint8_t          uid;
276     #if DEMO_NFCV_WRITE_TAG
277     uint8_t          wrData[DEMO_NFCV_BLOCK_LEN] = { 0x11, 0x22, 0x33, 0x44 };
278     #endif /* DEMO_NFCV_WRITE_TAG */
279     uid = nfcvDev->InvRes.UID;
280     /*
281     * Read block using Read Single Block command
282     * with addressed mode (uid != NULL) or selected mode (uid == NULL)
283     */
284     err = rfaINfcvPollerReadSingleBlock(RFAL_NFCV_REQ_FLAG_DEFAULT, uid, blockNum, rxBuf, sizeof(rxBuf), &rxvLen);
285     platformLog(" Read Block 0x%02X: %s\n", blockNum, (err != ERR_NONE) ? "FAIL: \"OK Data!\" : (err != ERR_NONE) ? \"\" : be";
286     #if DEMO_NFCV_WRITE_TAG /* Writing example */
287     err = rfaINfcvPollerWriteSingleBlock(RFAL_NFCV_REQ_FLAG_DEFAULT, uid, blockNum, wrData, sizeof(wrData));
288     platformLog(" Write Block 0x%02X: %s\n", blockNum, (err != ERR_NONE) ? "FAIL: \"OK Data!\" : (err != ERR_NONE) ? \"\" : be";
289     err = rfaINfcvPollerReadSingleBlock(RFAL_NFCV_REQ_FLAG_DEFAULT, uid, blockNum, rxBuf, sizeof(rxBuf), &rxvLen);
290     platformLog(" Read Block 0x%02X: %s\n", blockNum, (err != ERR_NONE) ? "FAIL: \"OK Data!\" : (err != ERR_NONE) ? \"\" : be";
291     #endif /* DEMO_NFCV_WRITE_TAG */
292 }
```

### • 相关API函数

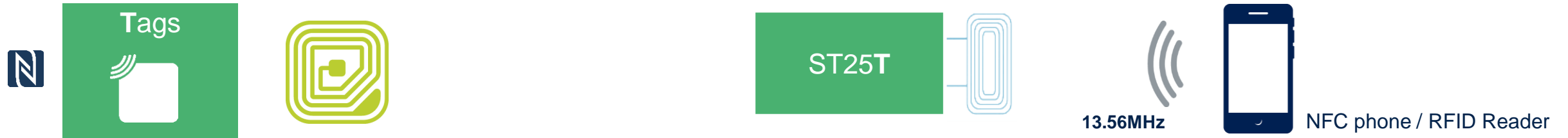
- o ReturnCode rfaINfcvPollerReadSingleBlock( uint8\_t flags, const uint8\_t\* uid, uint8\_t blockNum, uint8\_t\* rxBuf, uint16\_t rxBufLen, uint16\_t\*rcvLen ) : 读取单一block
- o ReturnCode rfaINfcvPollerWriteSingleBlock( uint8\_t flags, const uint8\_t\* uid, uint8\_t blockNum, const uint8\_t\* wrData, uint8\_blockLen ) : 写入单一block

# Application oriented solutions

# NFC application block diagram

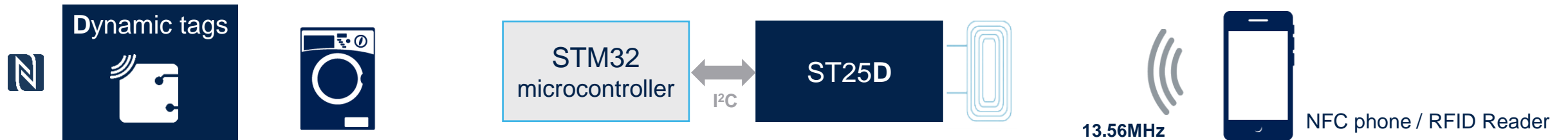
Consumer engagement, Asset tracking, Ticketing, Gaming, Brand protection, Access control, ...

[www.st.com/st25t](http://www.st.com/st25t)



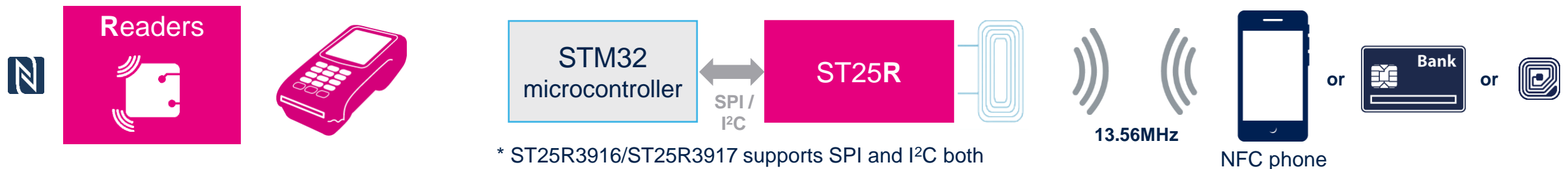
Industrial, Lighting, Consumer, Metering, Appliance, Healthcare, ... (Fast Transfer Mode and SW upgrade)

[www.st.com/st25d](http://www.st.com/st25d)



POS & mPOS Terminals, Automotive, Access control, Gaming, ...

[www.st.com/st25r](http://www.st.com/st25r)



\* ST25R3916/ST25R3917 supports SPI and I<sup>2</sup>C both

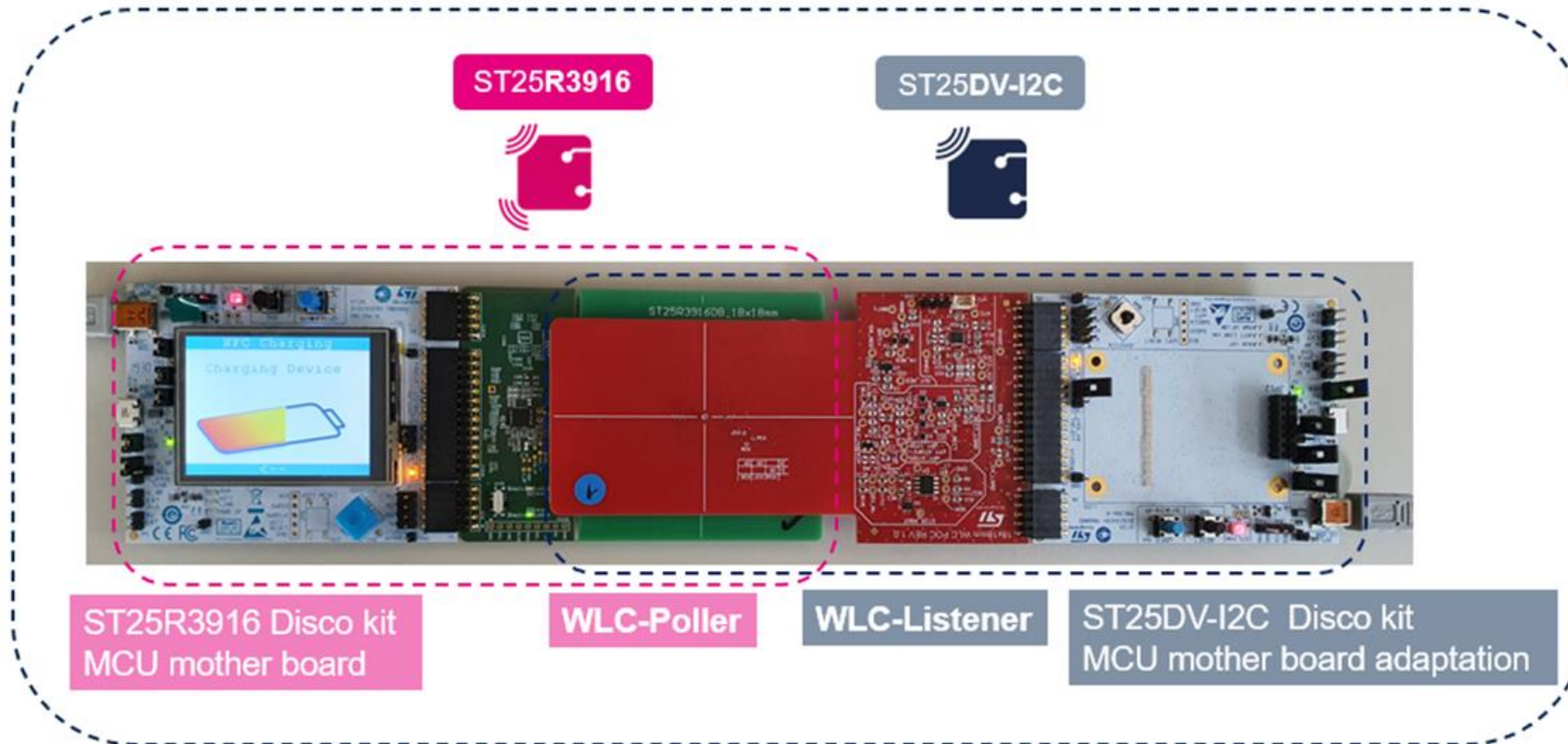
\* ST25R3911B/3912/3913/3914/3915 and ST25R95 support SPI only

# ST25 for brand protection

- Anti fake ( Accessory)
- Categorizing  
(Temperature, volume)
- FW/Parameter setting



# ST25 for NFC charger







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# Solutions for NFC / RFID Tags & Readers



**ST25 SIMPLY MORE CONNECTED**

# Thank you



Find out more at [www.st.com/st25](http://www.st.com/st25)

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