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# ST25R3918 product presentation





# ST25R3918 – Key messages

## What it does

- ST25R enables wireless communication features for enhancing product interaction and improving customer experience
- Communication with NFC-enabled smart devices (Android, iOS) with a simple tap in CE mode



**advanced** features allow **best customer experience**

by **tapping** to **start phone applications**

automatically and allow **faster** time to market.

**~0.5W** power for excellent range/power consumption ratio

and **improved** electromagnetic immunity.

Healthcare, Beauty, Kitchen, Consumer, IOT & more

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



or





# ST25R3918 Main Markets

## Medical & Healthcare



lab equipment – medical test kits – dispenser  
drug & asset management

## Beauty & Lifestyle



toothbrush – hair & body care devices  
e-cigarette – aroma diffuser

## Kitchen & Home Appliances



blender – vacuum cleaner – humidifier  
smart fridge – coffee machine

## Home Automation



smart devices – metering – smart lock  
sensing – smart furniture

## Gaming & Education



game consoles – figurines – board games  
RC vehicles – dolls

## Tools



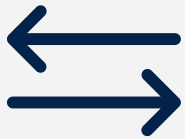
power drill – disk grinder – pressure washer  
buzzsaw – buffer machine



# ST25R3918 main application parameters

## Good interaction range

Dynamic Power Output



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

## Extended user experience

Card emulation mode



Start of temporary smartphone applications like Apple App Clip or Android Instant App with a simple tap of the phone to the ST25R

## Low power consumption

Low Power Tag Detection



Inductive wake-up mode allows low power consumption and increased battery lifetime

## Noise immunity

Noise Suppression Receiver



Increased immunity to interference from noise sources and simplified electro-magnetic immunity to ease certification

## Fast development

RFAL software library



Single SW library for all ST25 products and full integration into STM32 ecosystem



# ST25R3918

## Multi-Purpose NFC Transceiver



### ST25R3918

<b>Reader Writer</b>	<b>ISO14443 ISO15693</b>	<b>RAM BUFFER</b>	<b>SPI/I<sup>2</sup>C</b>
PP2P	<b>NFC</b>  848kb/s	512-Byte	2.4/5.5V
<b>CE</b>			3.4Mb/s 10Mb/s
<b>0.5W</b>	DPO: Dynamic Power Output LPID: Low power inductive card detection AWS: Active Wave shaping NSR: Noise Suppression Receiver DSO: Driver Slope Adjustment EMD: Automatic EMD Error Handling		



QFN32  
Wettable flank

### Use cases

- Ideal for **Reader+Tag**
- Access Control, Gaming, Consumer
- Apple AppClip; Android InstantApp

### Key Features

- **0.5W** dynamic output power
- **Active Waveshaping, Noise Suppression Receiver**
- **Low Power Tag Detection**
- -40°C to **85°C** ambient temperature range

### Key Benefits

- Low power operation & Standby mode
- Works in challenging environment like noisy LCD displays
- Excellent performance for low power applications
- CE mode allows easy start & interface with application on phones



# Product lineup

	ST25R95	ST25R3918	ST25R3911B	ST25R3912	ST25R3916	ST25R3917
<b>Description</b>	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	High-performance NFC & EMVCo Reader
<b>Reader/Writer mode</b>	ISO14443A/B ISO15693 FeliCa	ISO14443A/B ISO15693	ISO14443A/B ISO15693 FeliCa	ISO14443A/B ISO15693 FeliCa	ISO14443A/B ISO15693 FeliCa	ISO14443A/B ISO15693 FeliCa
<b>Card emulation mode</b>	Yes	Yes	-	-	Yes	-
<b>AP2P mode</b>	-	-	Initiator & Target	Initiator & Target	Initiator & Target	-
<b>PP2P mode</b>	-	Initiator & Target	Initiator	Initiator	Initiator & Target	Initiator
<b>RF speed</b>	424kbps	848kbps	6.8Mbps (VHBR)	848kbps	848kbps	848kbps
<b>Market</b>	Consumer	Consumer	Payment EMVCo 2.6, Industrial	Access control, Metering, Consumer	Payment EMVCo 3.0, Industrial, Consumer	Payment EMVCo 3.0, Industrial, Consumer
<b>Advanced features</b>	IWU	DPO, NSR, DSA, AWS, IWU, EMD	AAT, DPO, CIWU	DPO, IWU	AAT, DPO, NSR, DSA, AWS, CIWU, EMD	DPO, NSR, DSA, AWS, IWU, EMD
<b>HW interface</b>	SPI 2Mbps	I <sup>2</sup> C // SPI 10Mbps	SPI 6Mbps	SPI 6Mbps	I <sup>2</sup> C // SPI 10Mbps	I <sup>2</sup> C // SPI 10Mbps
<b>SW interface</b>	RFAL Unified Software Library for Frontends					
<b>Power supply</b>	2.7V - 5.5V	2.4V – 5.5V	2.4V – 5.5V	2.4V – 5.5V	2.4V – 5.5V	2.4V – 5.5V
<b>Output power</b>	0.23W	0.5W	1.4W	1.0W	1.6W	1.6W
<b>Temperature range</b>	-25°C to +85°C <sup>(A)</sup>	-40°C to +85°C <sup>(A)</sup>	-40°C to +125°C <sup>(J)</sup>	-40°C to +125°C <sup>(J)</sup>	-40°C to +105°C <sup>(A)</sup>	-40°C to +105°C <sup>(A)</sup>
<b>Package</b>	32-pin QFN	WF 32-pin QFN	32-pin QFN / Wafer	32-pin QFN / WF 32-pin QFN / WLCSP-30	WF 32-pin QFN / WLCSP-36	WF 32-pin QFN



VHBR: Very High Baud Rate  
P2P: Peer to Peer mode  
AAT: Automatic Antenna Tuning  
AWS: Active Wave Shaping

EMD: Automatic EMD suppression  
VHBR: Very High Baud Rate  
DPO: Dynamic Power Output  
CIWU: Capacitive & Inductive Wakeup

DSA: Drive Slope Adjustment  
\* Peak output power  
NSR: Noise Suppression Receiver  
IWU: Inductive Wakeup



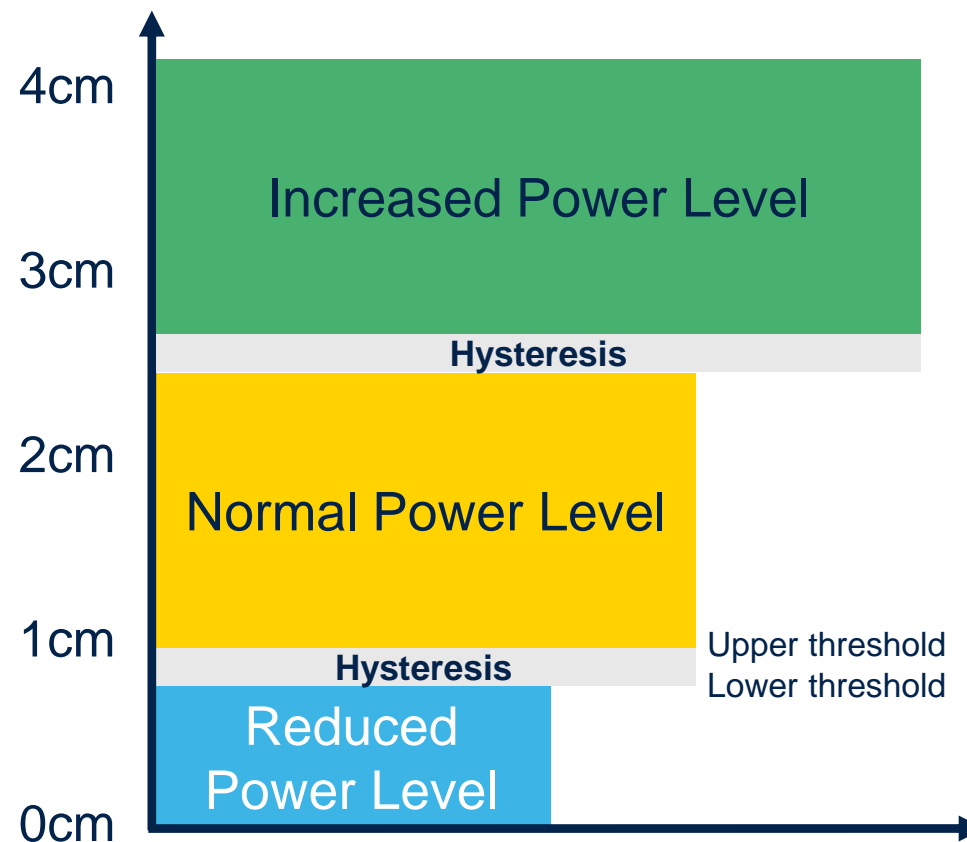
# ST25R3916/17/18 Lineup

Features	ST25R3916	ST25R3917	ST25R3918
Power	1.6W		0.5W
ISO/IEC 14443 Type-A		Yes	
ISO/IEC 14443 Type-B		Yes	
ISO/IEC 15693		Yes	
FeliCa™	Yes		No
NFC Tag read support		Yes	
ISO/IEC 18092 Passive Initiator mode		Yes	
ISO/IEC 18092 Passive Target mode	Yes	No	Yes
ISO/IEC 18092 Active Initiator and Target mode	Yes		No
Card Emulation	Yes	No	Yes
Automatic antenna tuning (AAT)	Yes		No
Capacitive sensor wakeup	Yes		No
Low Power Tag Detection		Yes	



# ST25 Reader DPO: Dynamic Power Output

- **Achieve min/max power limits easier**  
The ST25R series allows to adjust the output power dynamically via Dynamic Power Output
- **Optimal performance from weak to strong card response**  
ST25R series allows to adopt to different power levels of card responses via Active Gain Control
- **Improved noise immunity**  
Squelch feature allows to scale the signal level to have improved immunity against noise

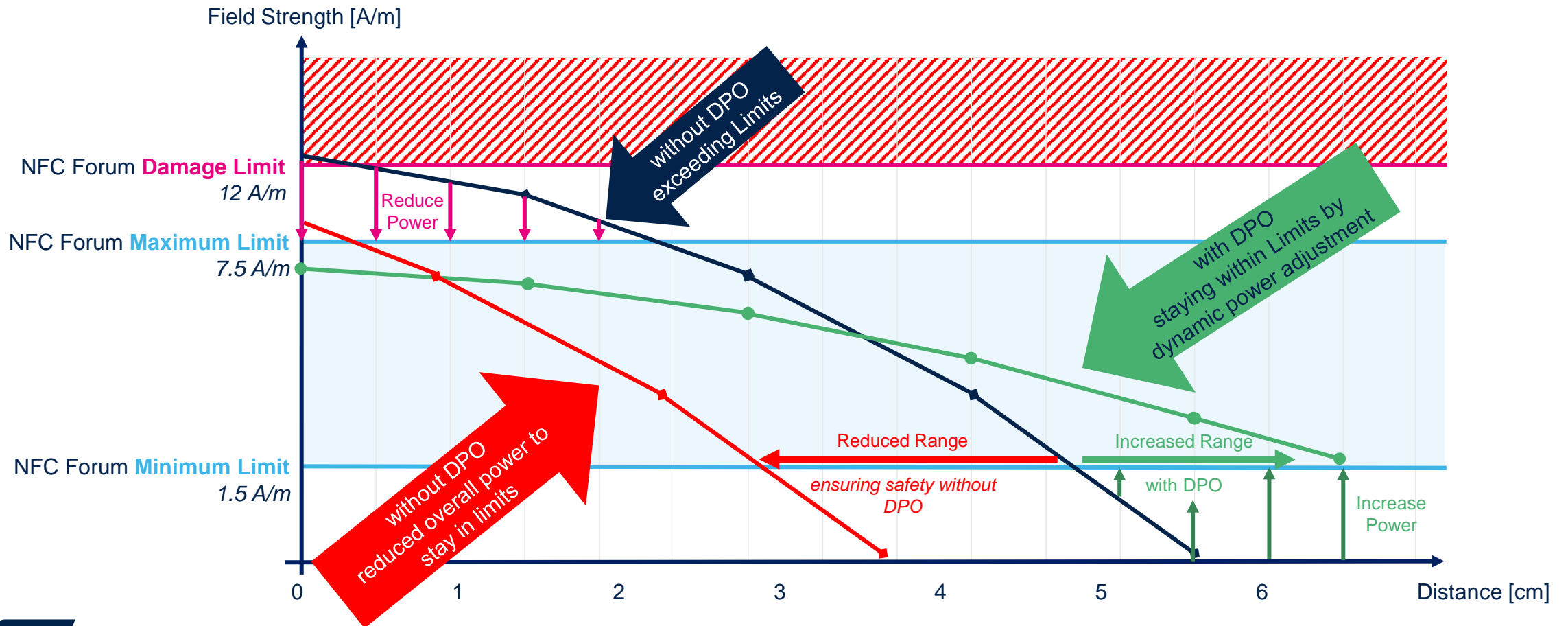






# ST25 Reader DPO: Dynamic Power Output

DPO of reader will keep power levels within requirements & limits





# NSR: noise suppression receiver

- Proper decoding

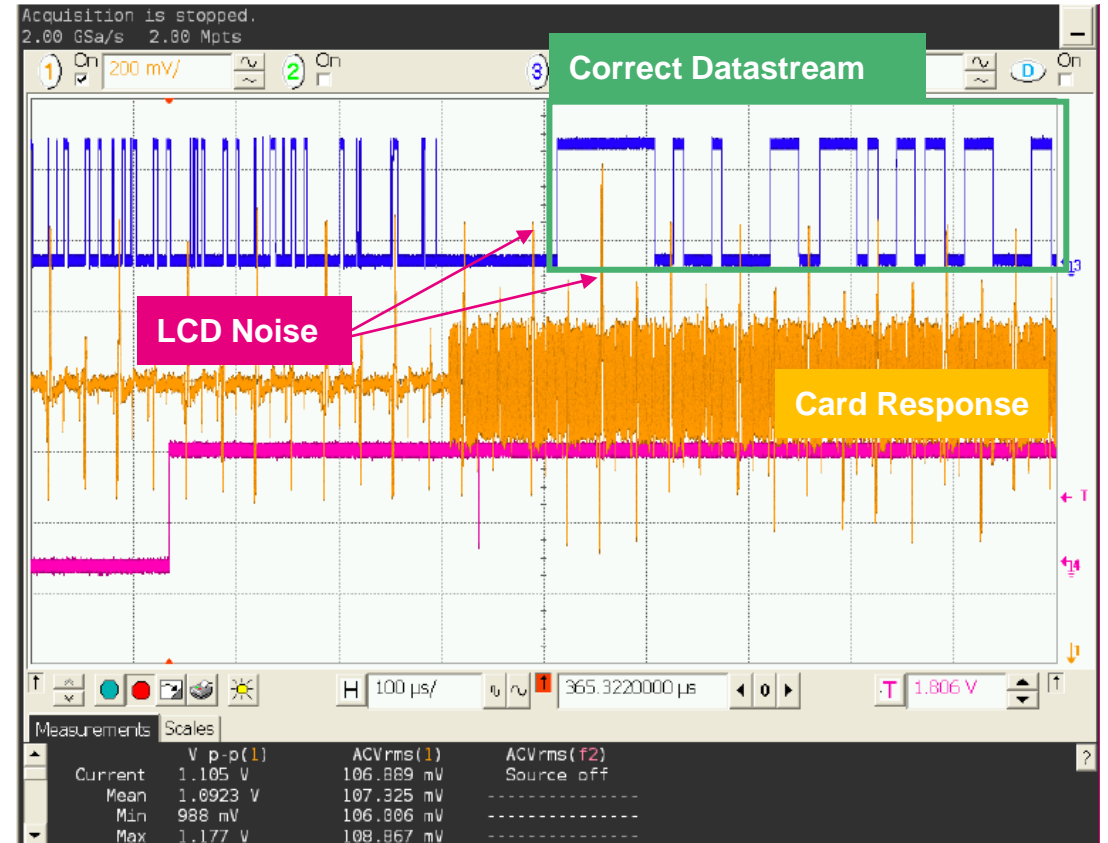
Proper decoding still possible even though LCD noise level exceeds card signal strength

ANS jumps in as soon as the receiver locks on a card response.

- Noise immunity compared to non NSR

Type A 106 display noise immunity improved by a factor of 3.3 vs ST25R3912

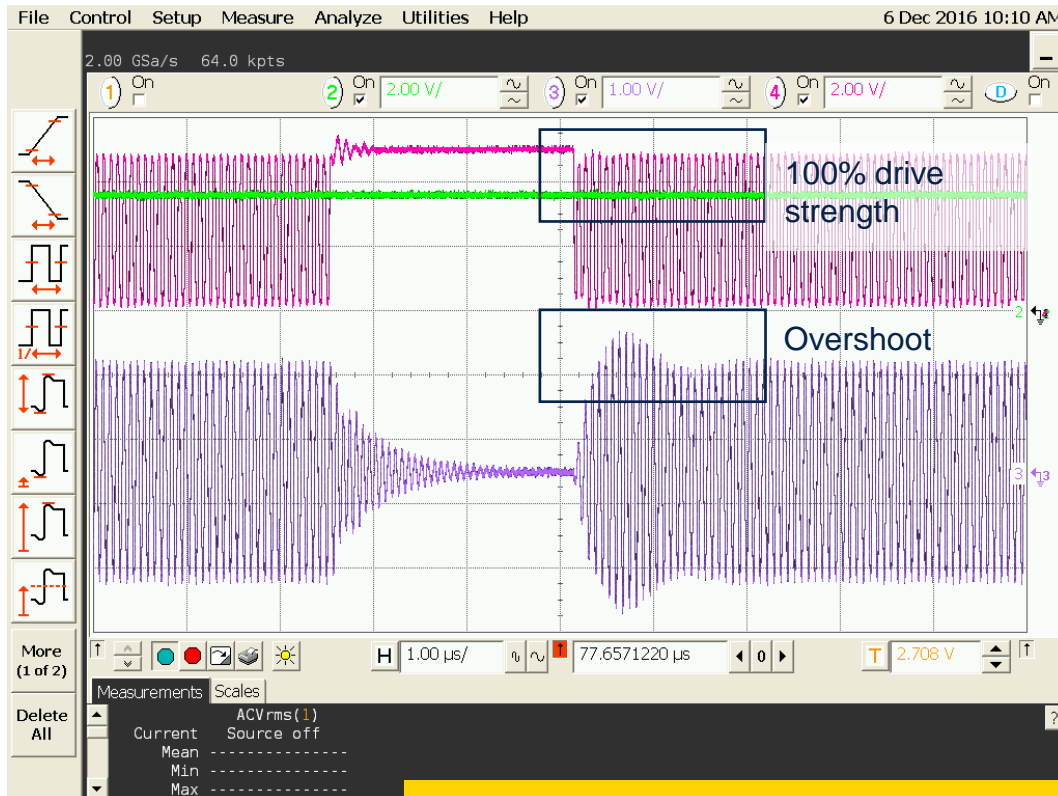
Type B 106 display noise immunity improved by a factor of 9.2 vs ST25R3912



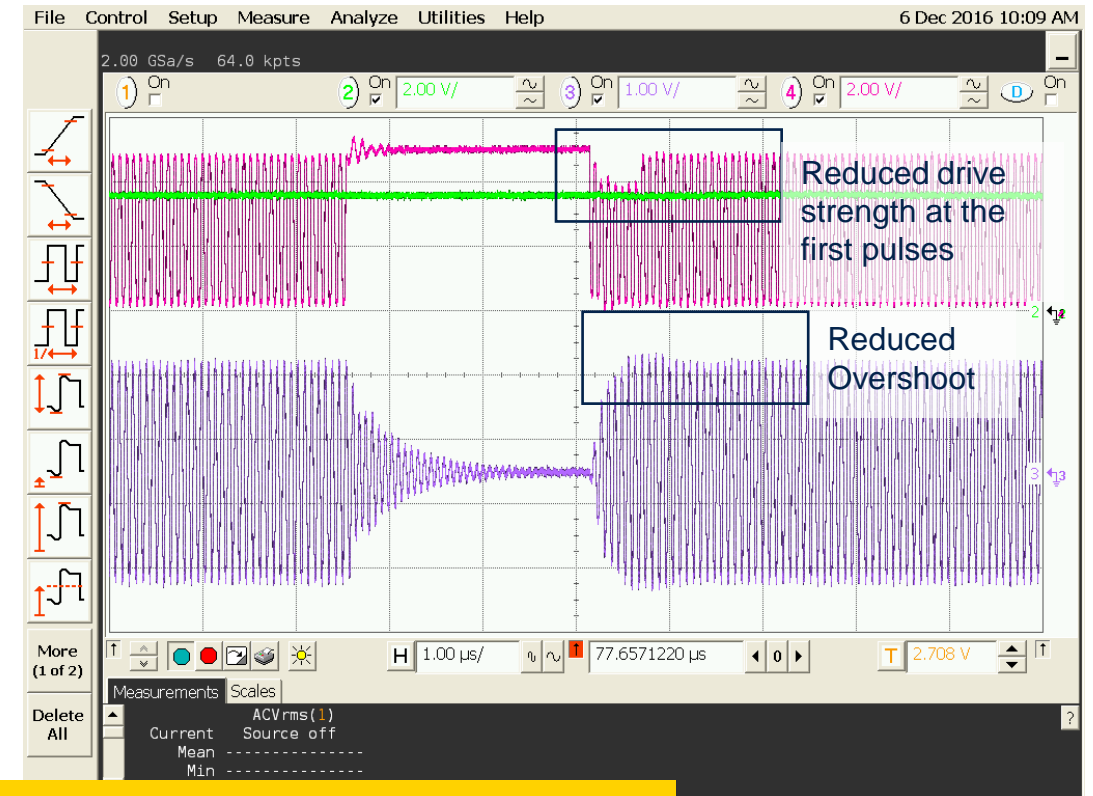


# AWS: active waveshaping

- Traditional A 106 modulation pulse



- Improved A106 modulation pulse with Over/Undershoot Protection



Over/Undershoots can be solved with register settings  
No rematching of antenna required



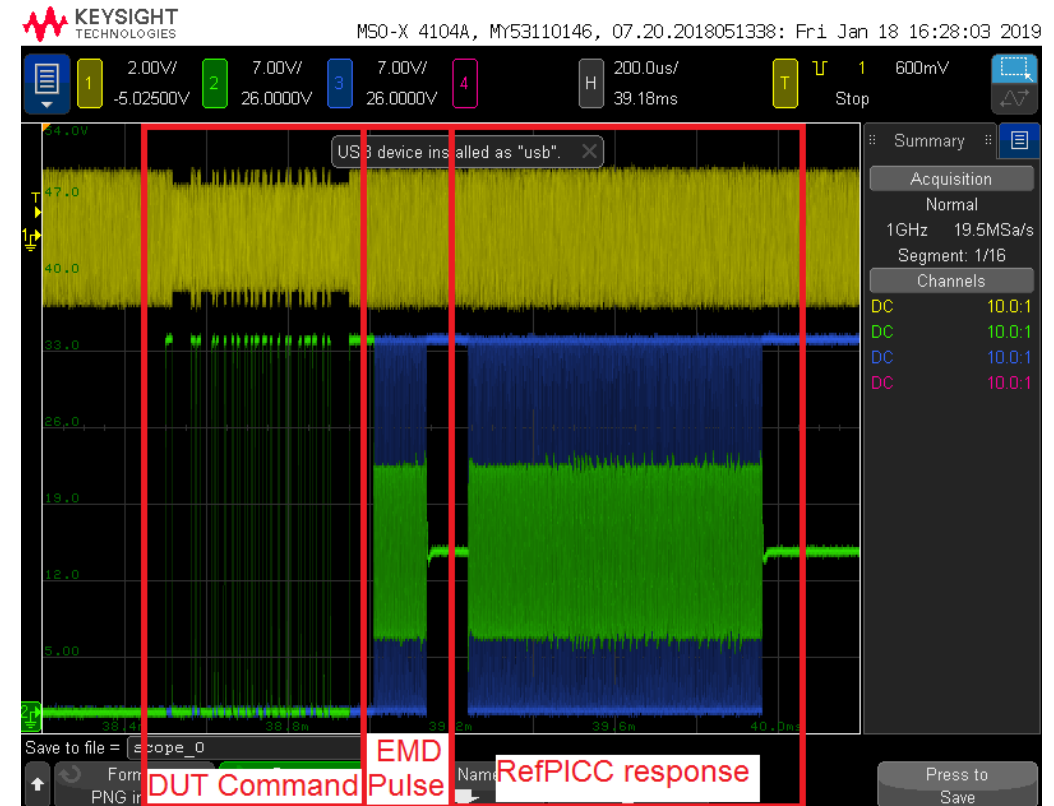
# Automatic EMD suppression

- Automatic PCD EMD handling

When the ST25R3918 receives a PICC frame it is checked for transmission errors. Transmission errors are detected in real time and if the number of received bytes when a transmission error is detected is less than 4, then the PCD shall ignore the transmission and be ready to receive a new PICC frame.

- Increased Robustness

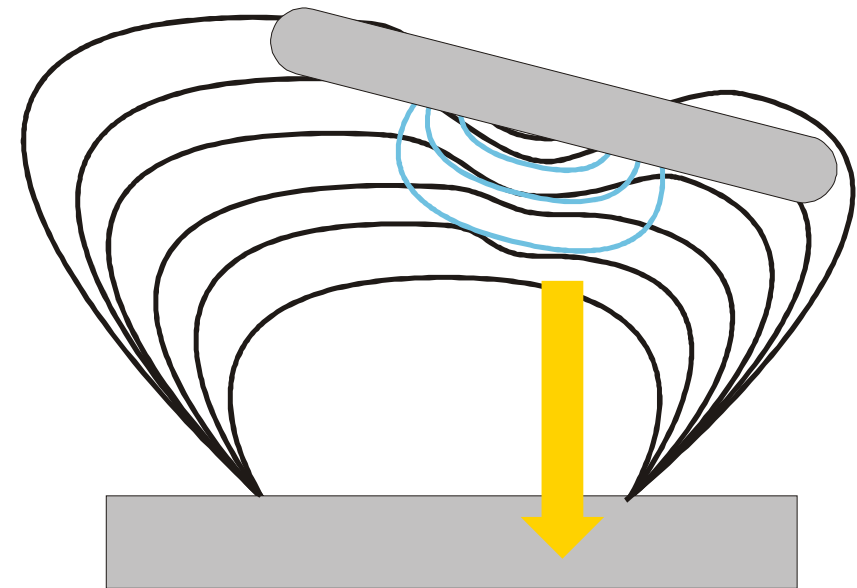
EMD handling enhances the robustness of the contactless communication between ST25R3918 and the PICC against PICC generated electromagnetic disturbance (EMD)





# Inductive low power card detection

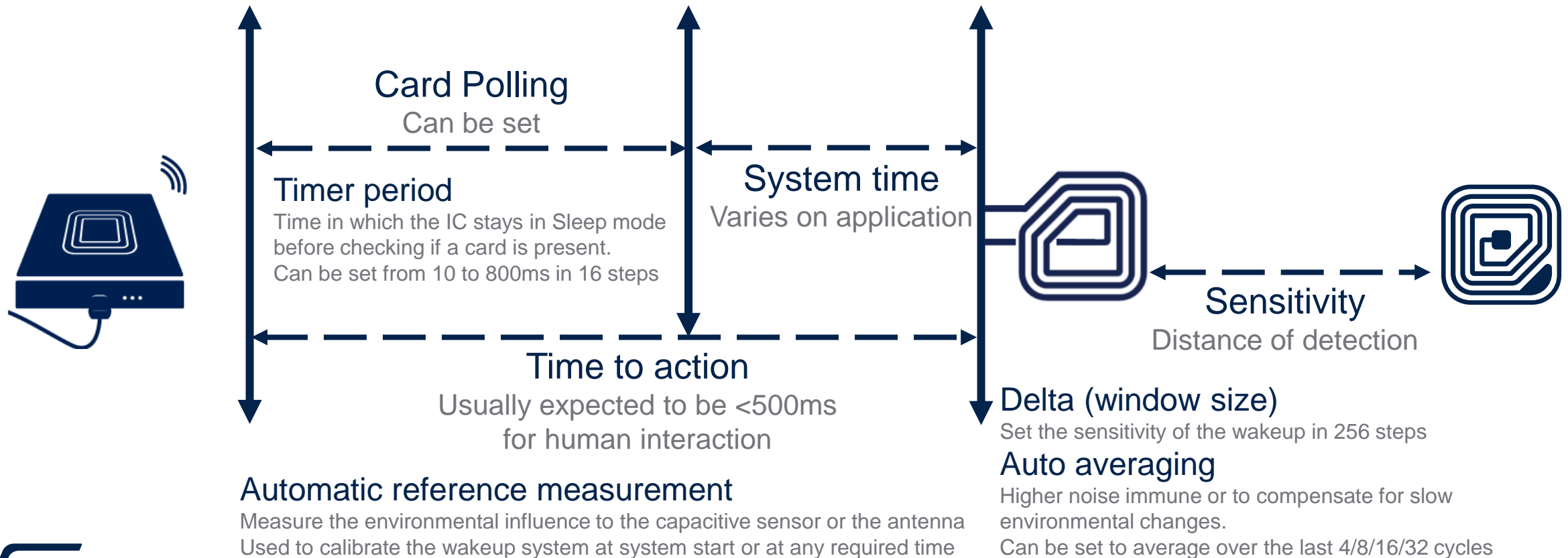
- Internal wakeup circuitry
  - The ST25R3918 includes a fully programmable wakeup scheme. All relevant parameters like cycle time & sensitivity can be programmed.
    - Inductive ping every 10 to 800ms in 16 steps
    - Sensitivity of the wakeup adjusted in 256 steps
    - Automatic average over the last 4/8/16/32 cycles
- No MCU required to run the wakeup
- The inductive wakeup is dedicated to detect approaching cards only





# Inductive low power card detection

Consider reaction time/sensitivity of the system





# Use CE mode to open temporary phone applications

- ST25R3918 features a CE (card emulation) mode beside standard NFC reader functionality
- Enables new way of customer interaction: Temporary phone apps
  - Accessible via simple tap on NFC device e.g. ST25R3918
  - Small and lightweight for opening quickly within seconds
  - No installation process required
- Use cases
  - (Re-) ordering processes
  - Access to product information
  - Device setup and parameter setting
  - Pairing
  - ...





# ST25 Ecosystem



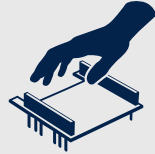
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# Development & design support

## Hardware



### Evaluation Boards

*Discovery kits*

*based on STM32 MCU*

*Nucleo boards ecosystem*

*based on STM32 MCU*

**Tag bags**

**Antenna kits**

## Software Tools



**Antenna design tool**

**Antenna matching tool**

**ST25 PC GUI**

**Software development kit**

## Documentation



### Documentation

*Datasheets*

*Application Notes*

*Open Source Libraries*

*Code Examples*

*Schematics*

*BOMs*

*Gerber Files*

## Support



**e2e community**

**Trainings**

**Webinar**

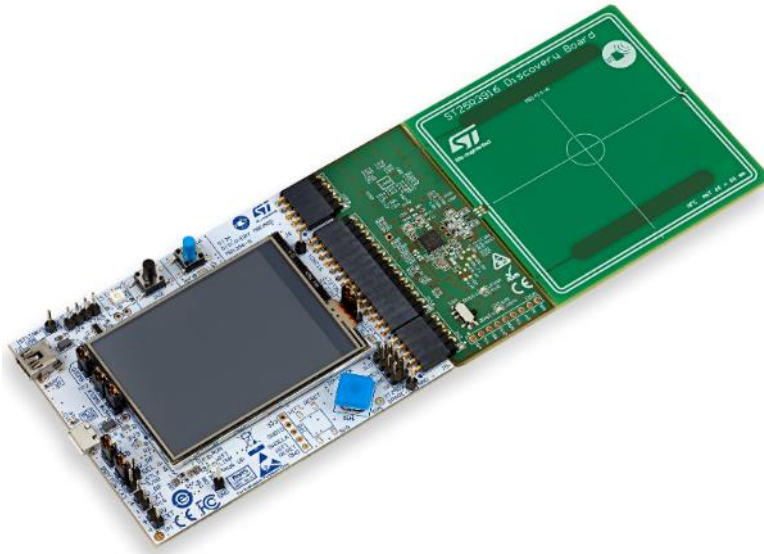
**MOOC**



**Community**



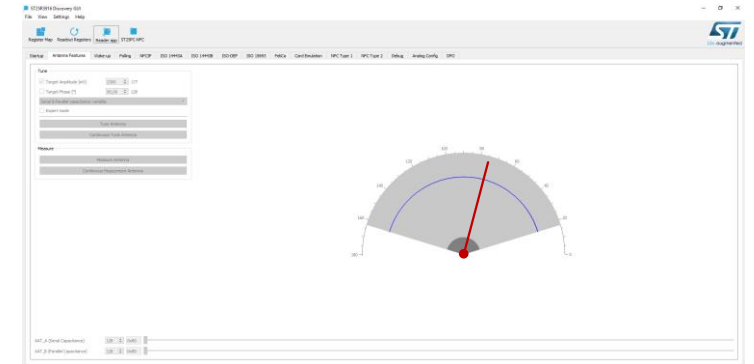
# ST25R evaluation boards



ST25R3916-DISCO



X-NUCLEO-NFC06A1



## ST25R3916 discovery kit

- ST25R3916 High perf NFC universal device and EMVCo reader
- 66x66mm 2 turns antenna etched on PCB
- STM32L476 ULP 32-bit MCU
- Micro-USB connector
- Additional UART / I<sup>2</sup>C Host interfaces, as well as NFC SPI and JTAG/SWD points
- Pin compatible with ST25R3918

## ST25R3916 Nucleo shield

- ST25R3916 High perf NFC universal device and EMVCo reader
- 47x34mm 4 turns antenna etched on PCB
- Compatible with STM32 Nucleo boards
- Equipped with Arduino™ UNO R3 connector
- Pin compatible with ST25R3918

## PC software

- GUI to evaluate the features of the ST25R3916/17/18
- ST25R3916/17/18 register access
- Analog configuration of the ST25R3916/17/18
- Visualizations of DPO, wake up mode and more
- Access all features of ST25 Tags



# Thank you