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# ST25R200/R100 NFC reader
# Product presentation

# ST25R200/R100 at a glance

## Bringing communication capability to simple objects


**ST25R: family of readers**

- Enables wireless communication features, helps create product interactions and improve customer experience

**Why choose the ST25R200/R100 reader**

- 1.2W/0.8W output power for excellent range/power consumption ratio
- Improved inductive wake-up
- Ideally suited for Reader+Tag solutions
  - In combination with ST25T NFC tags and ST25DV dynamic tags, connectivity to even non-electronic devices can be enabled

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# ST25R200/R100 main markets

## 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 – access control

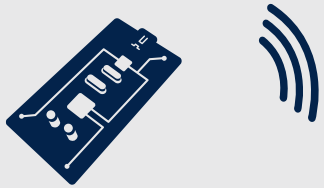
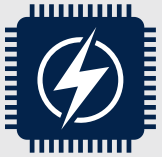
## Gaming & education

Game consoles – figurines – board games RC vehicles – dolls

## Tools

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

# ST25R200/R100 main application parameters

| Easy adoption of NFC technology | Fits every application | Good interaction range | Longer battery lifetime | Complete NFC solution |
|---|---|---|---|---|
| ST25 development ecosystem | 4x4 mm TQFN package | Dynamic power output | Low-power tag detection | Reader+Tag initiative |
|  |  |  |  |  |
| Extensive hardware & software ecosystem and documentation to **ease implementation** and allow a **short time-to-market** | Tiny package and high output power enable design of **size-optimized** NFC solutions | Automatically adjusted output power to optimize power transfer and **stay within certification limits** | Improved inductive wake-up mode allows **low power consumption** and increased battery lifetime | **Well-matched** and **industry proven** product combinations for enabling connectivity in consumer and industrial markets<br>www.st.com/reader-plus-tag |

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# ST25R product lineup

| | ST25R100 | ST25R200 | ST25R3918 | ST25R3911B | ST25R3912 | ST25R3916B |
|---|---|---|---|---|---|---|
| **Description** | Entry-level NFC reader | Powerful multi-purpose 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 | ISO14443A/B ISO15693 FeliCa | ISO14443A/B ISO15693 FeliCa | ISO14443A/B ISO15693 FeliCa |
| **Card emulation mode** | No | No | Yes | - | - | Yes |
| **AP2P mode** | - | - | - | Initiator & Target | Initiator & Target | Initiator & Target |
| **PP2P mode** | - | - | Initiator & Target | Initiator | Initiator | Initiator & Target |
| **RF speed** | 106kbps | 106kbps | 848kbps | 6.8Mbps (VHBR) | 848kbps | 848kbps |
| **Market** | Consumer Industrial | Reader+Tag, Gaming, IoT, Industrial, Consumer | Reader+Tag, IoT, Consumer | Payment EMVCo 2.6, Industrial | Access control, Metering, Consumer | Payment EMVCo 3.0, Industrial, Consumer |
| **Advanced features** | DPO, IWU | DPO, IWU, NSR, EMD, OSP | DPO, NSR, DSA, AWS, IWU, EMD | AAT, DPO, CIWU | DPO, IWU | AAT, DPO, NSR, DSA, AWS, IWU, EMD |
| **HW interface** | SPI 6Mbps | SPI 10Mbps | I²C // SPI 10Mbps | SPI 6Mbps | SPI 6Mbps | I²C // SPI 10Mbps |
| **SW interface** | Unified Software Library for Frontends | | | | | |
| **Power supply** | 2.7V - 5.5V | 2.7V - 5.5V | 2.4V – 5.5V | 2.4V – 5.5V | 2.4V – 5.5V | 2.4V – 5.5V |
| **Output power** | 0.8W | 1.2W | 0.5W | 1.4W | 1.0W | 1.6W |
| **Temperature range** | -25°C to +85°C (A) | -40°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 | 24-pin TQFN | 32-pin QFN | 32-pin QFN / Wafer | 32-pin QFN / WLCSP-30 | 32-pin QFN / WLCSP-36 |

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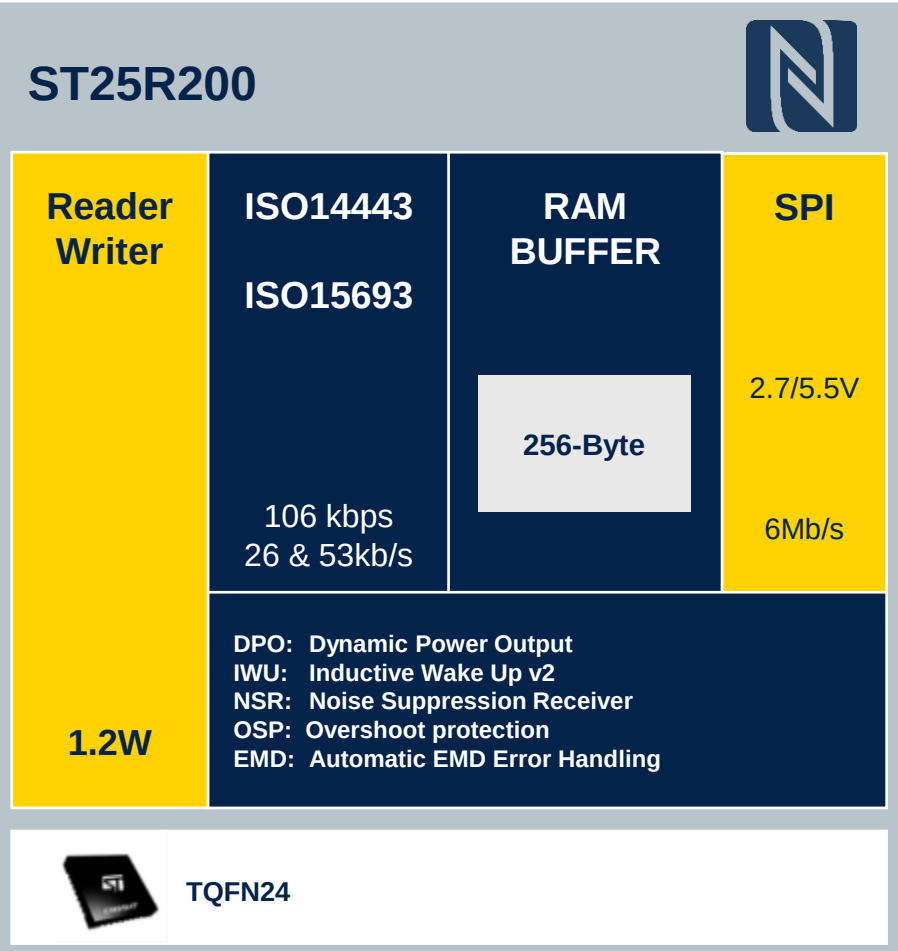
# ST25R200
# Powerful multi-purpose NFC reader




## Use cases

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

## Key features

- **1.2W** dynamic output power
  - Up to 250mA/5V via internal LDO
- **Improved inductive wake-up** function & **overshoot protection**
- -40°C to 85°C ambient temperature
- 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

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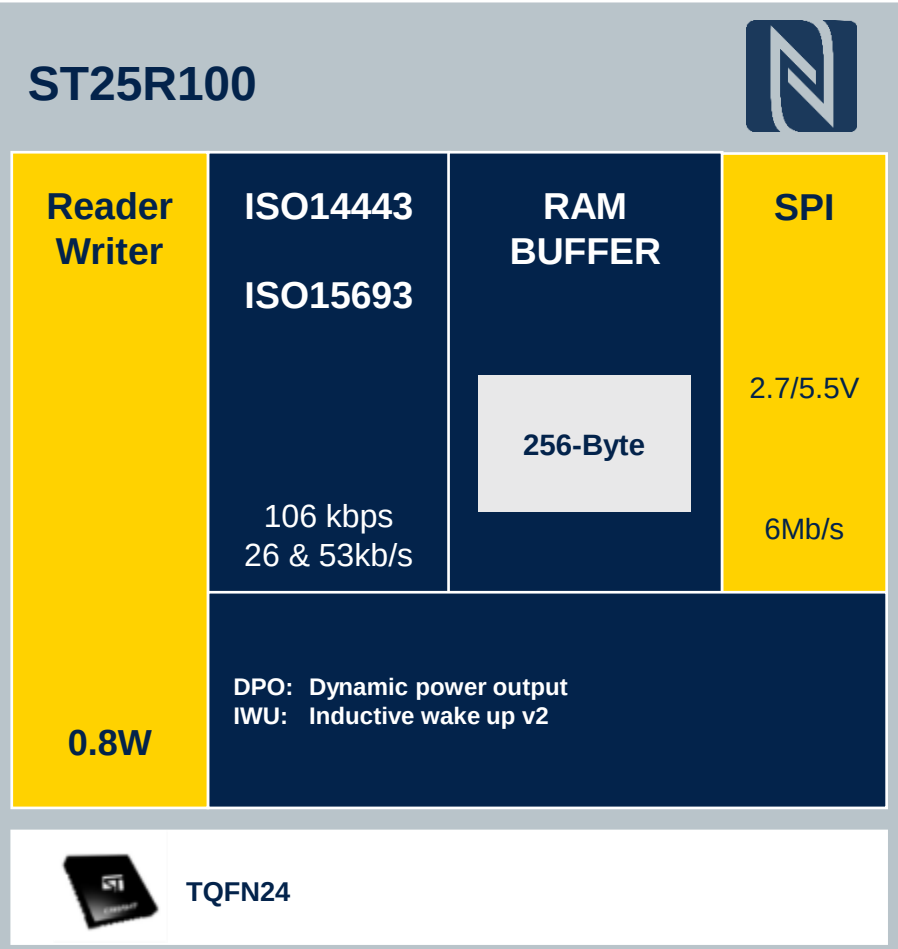
# ST25R100
# Entry-level NFC reader




## Use cases

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

## Key features

- **0.8W** dynamic output power
  - Up to 180mA/5V via internal LDO
- **Improved inductive wake-up** function
- -25°C to 85°C ambient temperature
- 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

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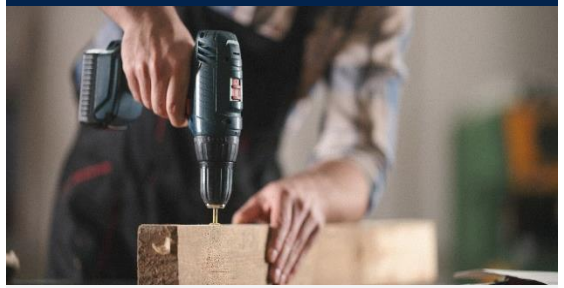
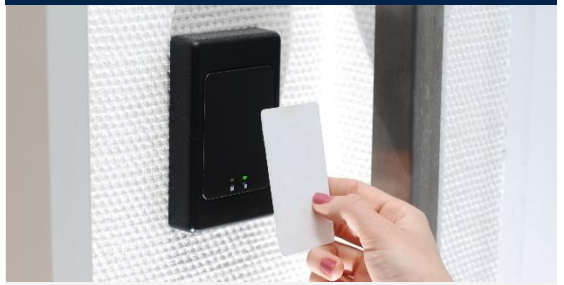
# ST25R200 benefits

## 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

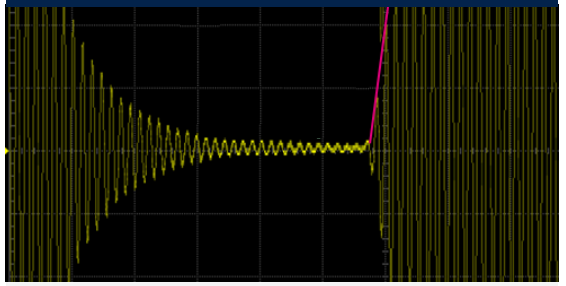


- Improved performance of inductive wakeup allows detection of tags and cards over long range while power consumption stays low in card detection mode

## Dynamic Power Output (DPO)

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

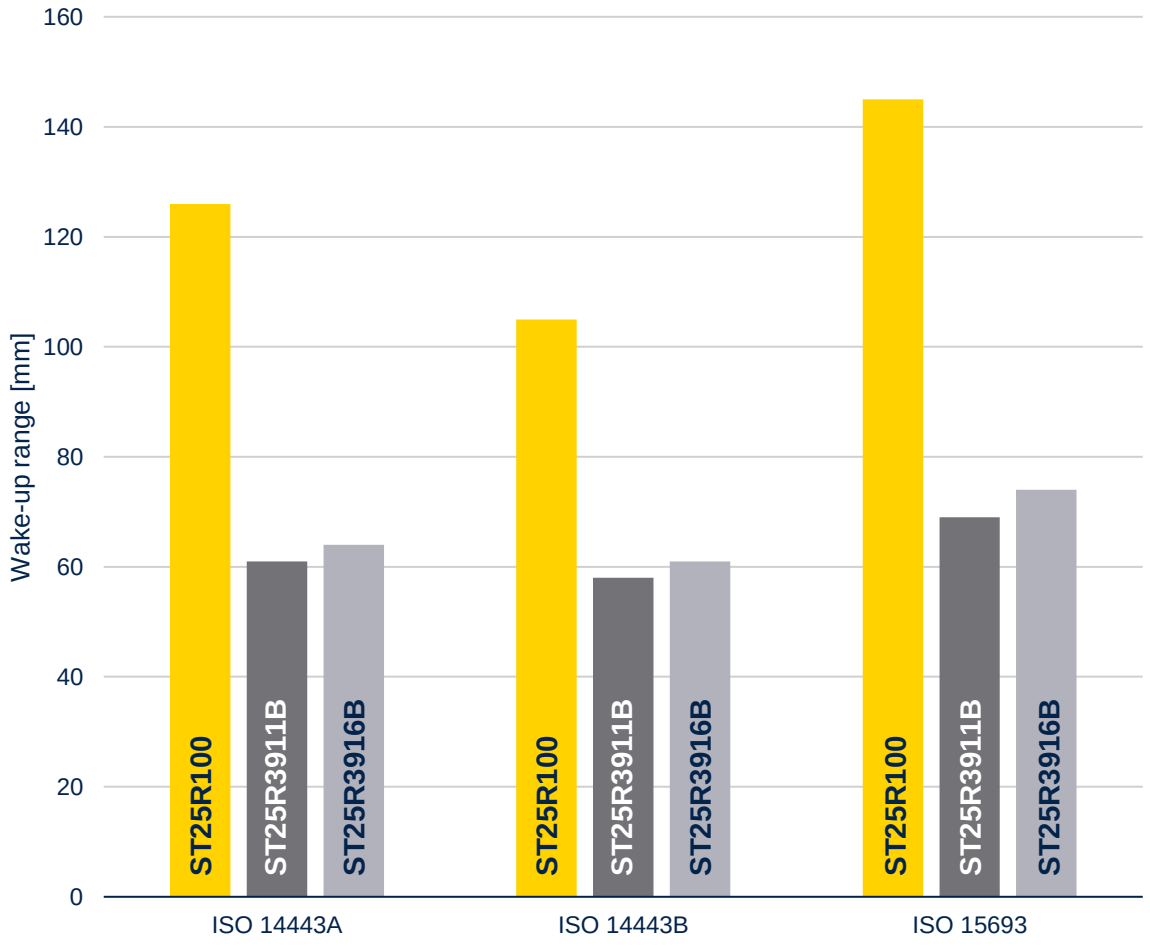
## OverShoot Protection (OSP) (R200 only)



- Universal adjustment of waveshape to remove under/overshoot simply by parameter setting and no need to redo matching

# Excellent inductive wake-up performance

- ST25R200/R100 features improved **inductive wake-up v2**
- Fully configurable high-sensitive wakeup scheme
  - Inductive ping every 10 to 1700ms 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 wakeup to trigger at card approach, card removal or both
- No MCU required to run the wakeup

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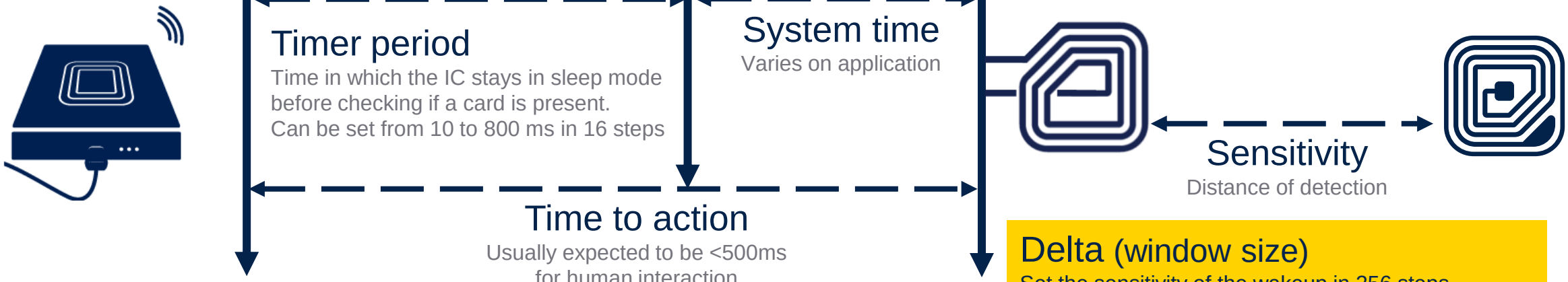
# Inductive low-power card detection

## Considers reaction time/sensitivity of the system




### Automatic reference measurement

Measures the environmental influence on the antenna
Used to calibrate the wakeup system at system start or at any required time

### Delta (window size)

Set the sensitivity of the wakeup in 256 steps

### Auto averaging

Higher noise immunity / compensate for slow environmental changes.
Can be set to average over the last 4/8/16/32 cycles

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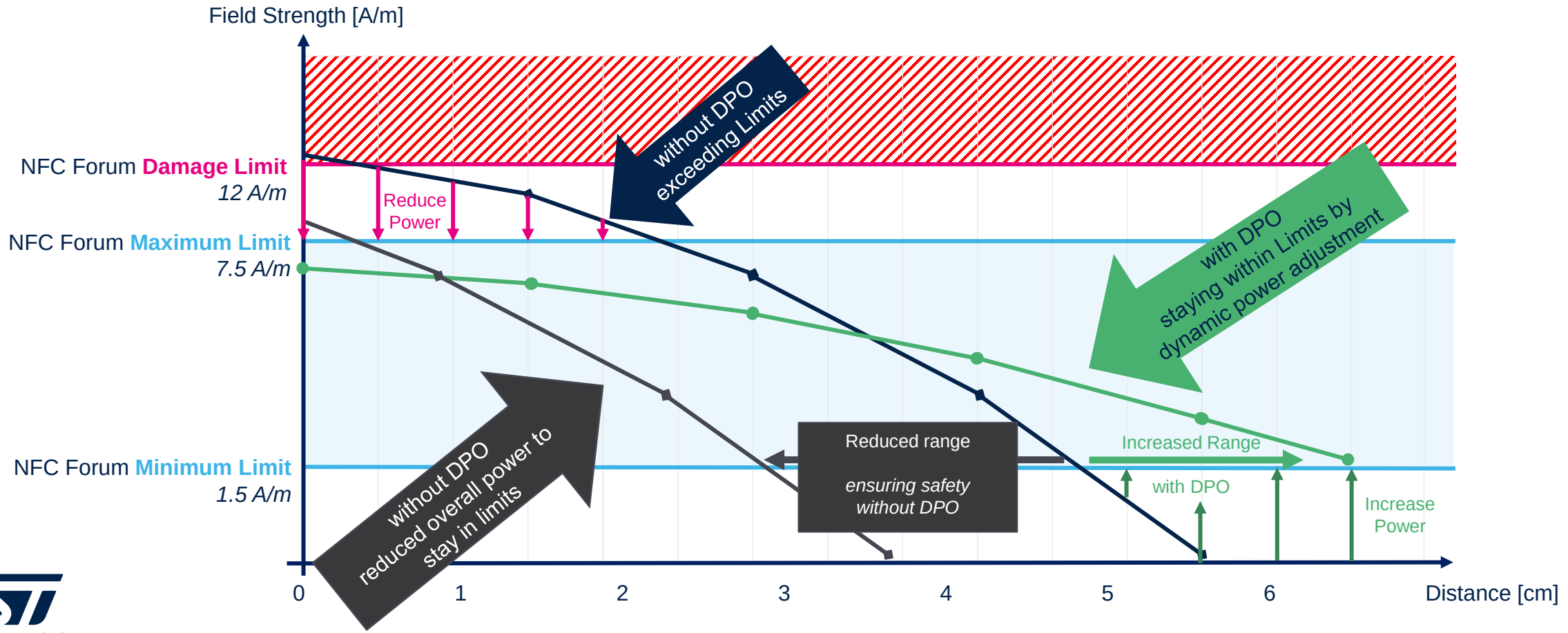
# Dynamic power output (DPO)

## DPO of reader keeps power levels within requirements and limits

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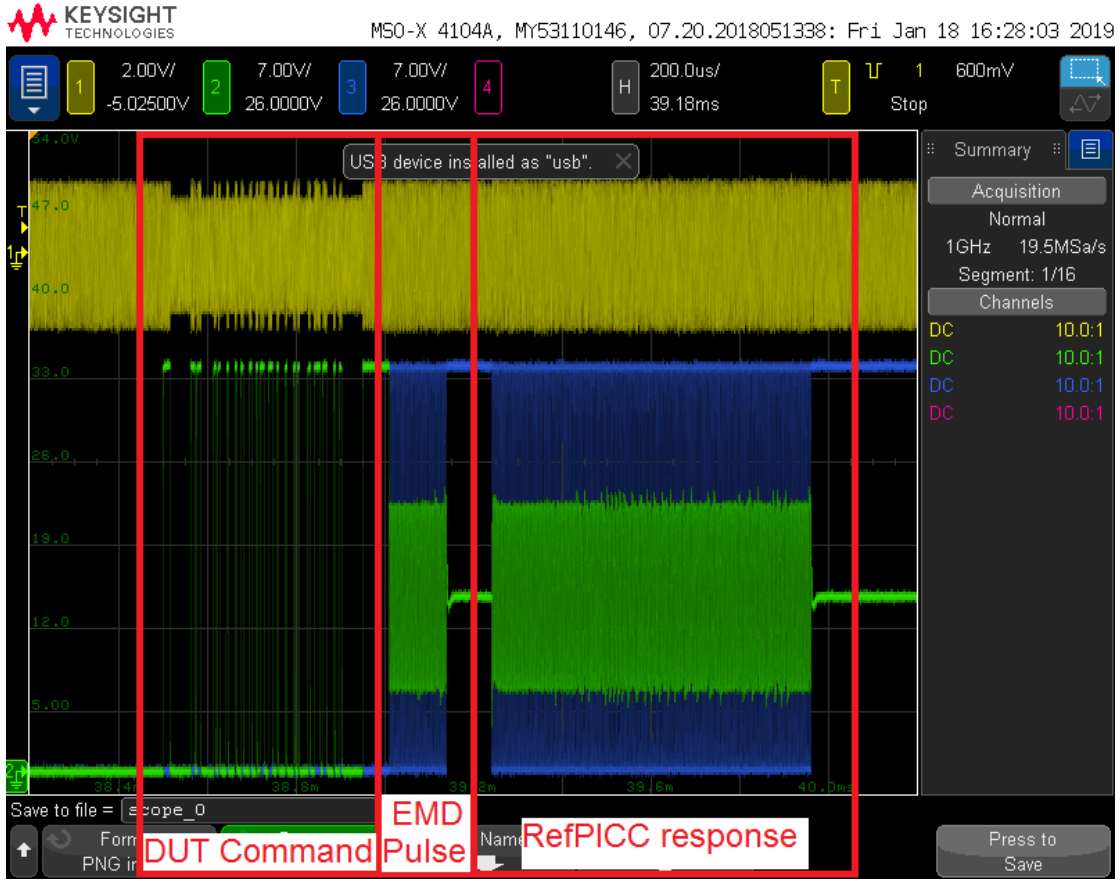
# Automatic EMD suppression
## ST25R200 only

- Automatic PCD EMD handling

  When the ST25R200 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 ST25R200 and the PICC against PICC generated ElectroMagnetic Disturbance (EMD)

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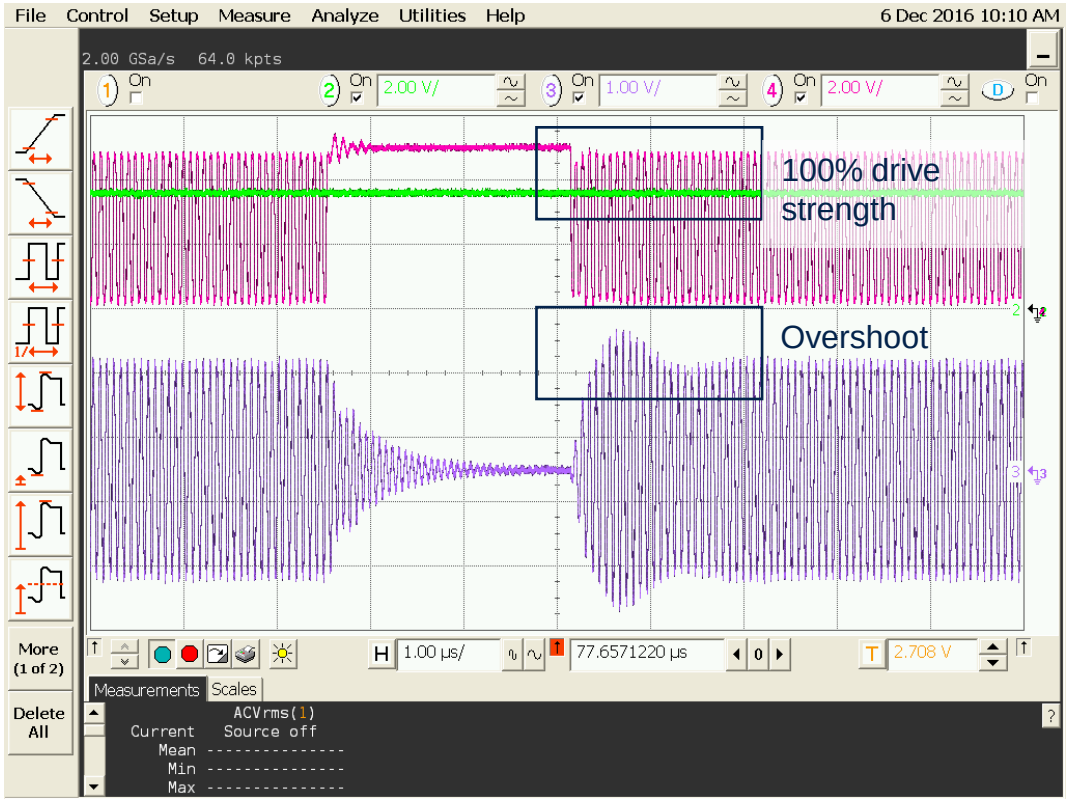
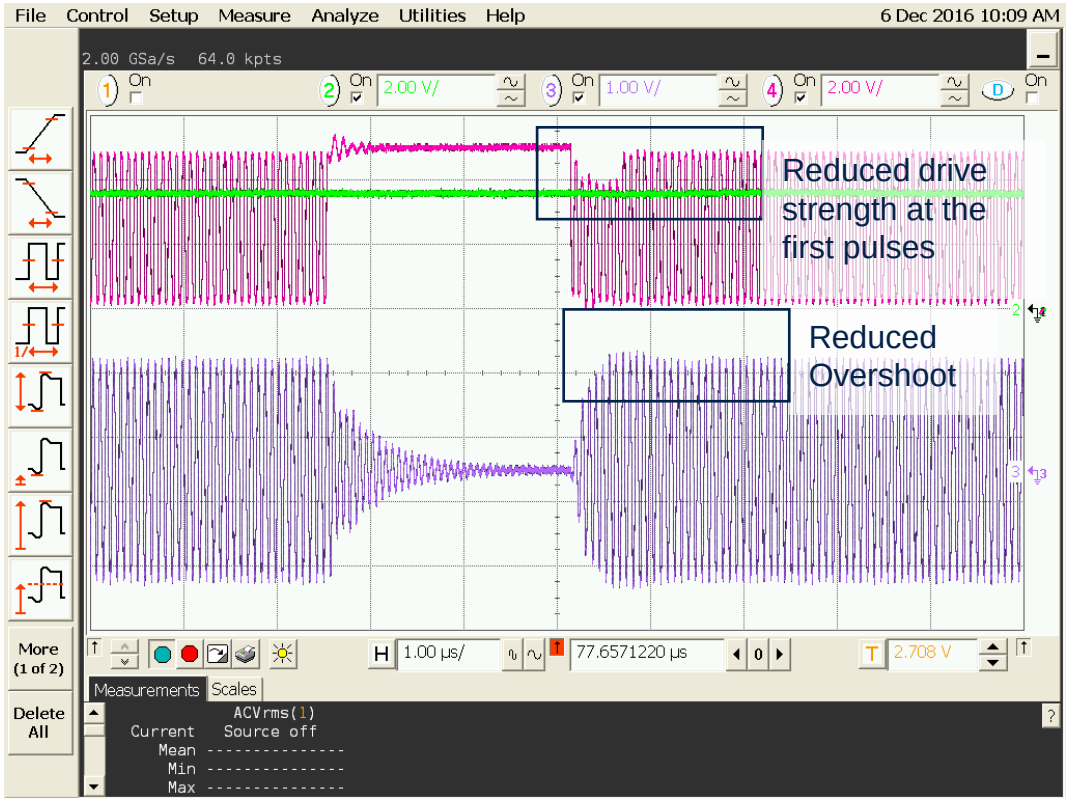
# Overshoot protection (OSP)
## ST25R200 only

- 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

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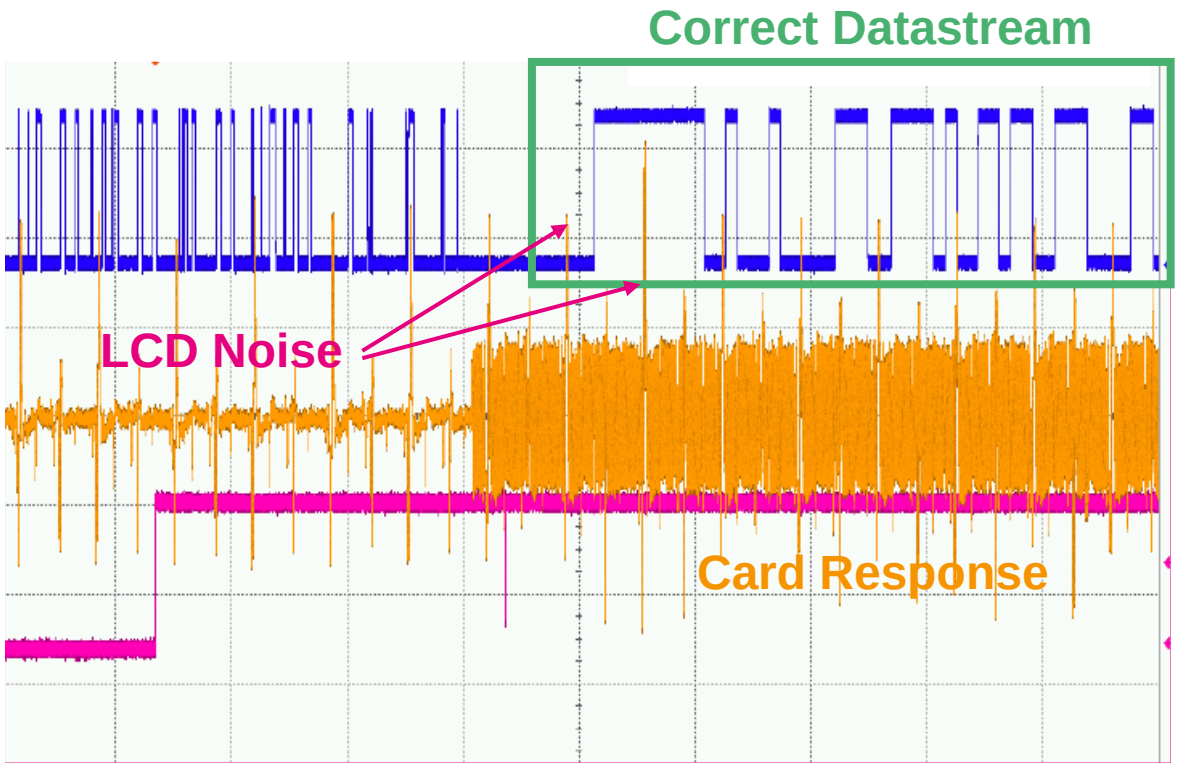
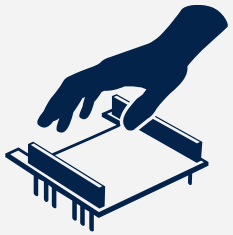
# Noise suppression receiver (NSR)
## ST25R200 only

- Proper decoding
  - Proper decoding still possible even though noise level (e.g. from LCD displays) exceeds card signal strength
  - Active noise suppression jumps in as soon as the receiver locks on a card response



# ST25R200/R100 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

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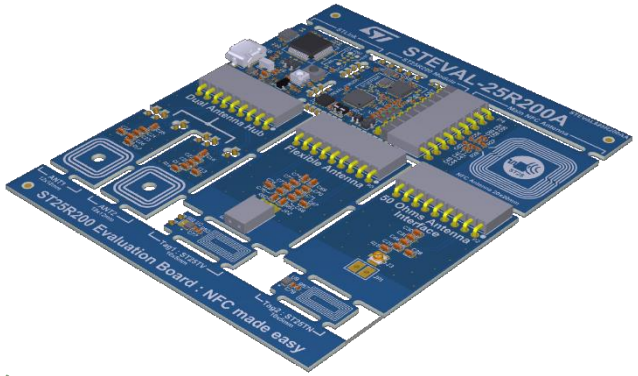
# ST25R200/100 evaluation boards

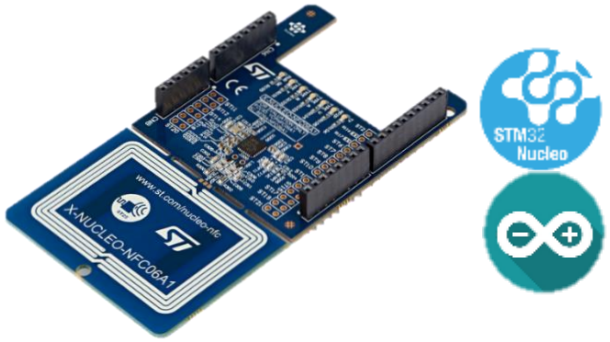
## ST25R200 discovery kit




STEVAL-25R200

- **ST25R200** NFC reader IC
- Onboard antennas: 20x20mm, 12x12mm dual antennas, flex antenna & 50Ohm antenna interface
- Onboard NFC tags: ST25TV & ST25TN, 10x5mm antenna
- STM32G0B1KE 32-bit MCU
- Stand-alone module or control with PC GUI through USB connector

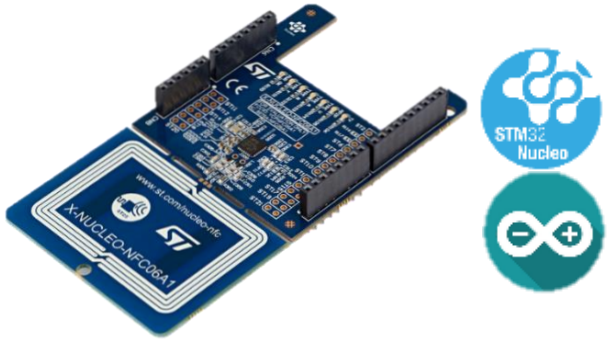
## ST25R200 Nucleo shield




X-NUCLEO-NFC10A1

- **ST25R200** NFC reader IC
- 47x34mm 4 turns antenna on PCB
- Compatible with STM32 Nucleo boards
- Equipped with Arduino® UNO R3 connector fitting to STM32 Nucleo, Raspberry Pi and other platforms

## ST25R100 Nucleo shield




X-NUCLEO-NFC09A1

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# Our technology starts with You

Find out more at st.com/st25r200



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