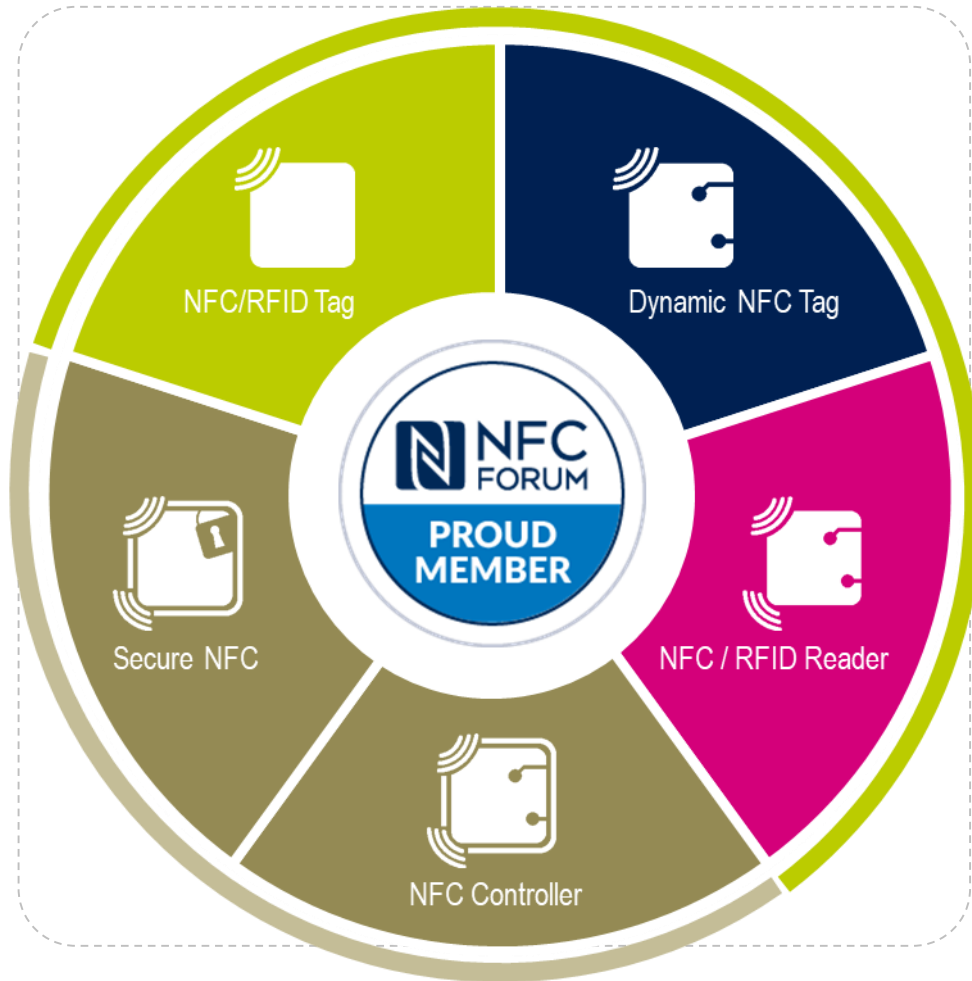


NFC TAGS & READERS



NFC READERS

NFC DYNAMIC
TAGS

NFC TAGS

ECOSYSTEM
EVALUATION KITS

High-Performance NFC/RFID Readers

ST25R





NFC Comprehensive Solutions

Ticketing, Gaming, Medical, Brand protection, Access control, ...

www.st.com/st25t



Tags

ST25T

13.56MHz



NFC phone / RFID Reader

Industrial, Consumer, Metering, Appliance, ...

www.st.com/st25d



Dynamic tags

STM32
microcontroller

I2C

ST25D

13.56MHz



NFC phone / RFID Reader

Infrastructure, EMVCo, Automotive, Consumer, ...

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Frontends
+
Controllers

STM32
microcontroller

SPI

ST25R

SoC
NCI 2.0

I2C

UART

ST25N

13.56MHz



or



or



NFC phone



ST NFC/RFID Front-end Portfolio

	CR95HF	ST25R3912/13	ST25R3911B	ST25R3914/15	ST25R3916/19
Description	Entry-Level Reader	Mid-Range Reader & NFC initiator	High-Perf Reader & NFC Frontend	High-Perf Reader & NFC Frontend for Automotive	Ultimate NFC Frontend
Reader/Writer mode	ISO14443A/B ISO15693 FeliCa	ISO14443A/B ISO15693 FeliCa	ISO14443A/B ISO15693 FeliCa	ISO14443A/B ISO15693 FeliCa	ISO14443A/B ISO15693 FeliCa
Card emulation mode	Yes (ST95HF)	-	-	-	Yes
P2P mode	-	Yes	Yes	Yes	Yes
RF speed	848kbps	848kbps	6.8Mbps (VHBR)	848kbps	848kbps
Market certification	-	Payment (EMVco, PBOC, mini-pay)	Payment (EMVco, PBOC, mini-pay)	Automotive AEC-Q100 Grade 1	Payment, Automotive AEC-Q100 Grade 1
Advanced features	Ind wake-up	AAT (3913 only) DPO, Ind wake-up	AAT, DPO, Cap & Ind wake-up	AAT (3914) DPO, Cap & Ind wake-up	AAT, DPO, Cap & Ind wake-up
HW Interface	SPI 2Mbps, UART	SPI 6Mbps	SPI 6Mbps	SPI 6Mbps	SPI 6Mbps
SW Interface	Unified Software Library for Frontends				
Power supply	2.7V - 5.5V	2.4V – 5.5V	2.4V – 5.5V	2.4V – 5.5V	2.4V – 5.5V
Output power	0.23W	1.0W	1.4W	1.0W	1.6W
Temperature range	-25°C to +85°C	-40°C to +125°C	-40°C to +125°C	-40°C to +125°C	-40°C to +125°C
Package	QFN32 (5x5 mm)	QFN32 (5x5 mm) / WLCSP (3912 only)	QFN32 (5x5 mm) / Wafer	QFN32 (5x5 mm) / WF	QFN32 (5x5 mm) / WF /WLP

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

Cap & Ind wake-up: Capacitive & Inductive wake-up
VHBR: Very High Baud Rate
DPO: Dynamic Power Output
DSA: Drive Slope Adjustment

ALM Active Low Modulation
NCI NFC Controller Interface
ANS: Active Noise Suppression





Key Use Cases

Accessory IDs



Automotive



Payment Terminals



Access Control (Physical/Logical)



Gaming / Entrainment



Smart Home / Smart Building



Peer-to-Peer



NFC + Qi



FW Upgrade / Streaming



Transport





ST25R UHF Readers

ST25RU3993

ST25RU3980

Description	UHF RFID Reader for Mobile and Fast Moving Consumer Goods applications	UHF RFID Reader for Mobile and Fast Moving Consumer Goods applications
Contactless interface	ISO18000-6c/b	ISO18000-6c
Market certification	EPC Gen 2	-
Sensitivity	-90dBm	-90dBm
Advanced features	Internal VCO Dense Reader Mode Linear RSSI & Phase Bit Automatic PSRR regulation Auto ACK	Internal VCO Dense Reader Mode Linear RSSI & Phase Bit Automatic PSRR regulation Auto ACK
Interface	SPI 5Mbps	SPI 5Mbps
Power supply	1.65V – 5.5V	1.65V – 5.5V
Output power	0dBm / 20dBm	0dBm
Temperature range	-40 to +85°C	-40 to +85°C
Package	48-pin QFN (7x7mm)	48-pin QFN (7x7mm)

VCO: Voltage Controlled Oscillator
RSSI: Received Signal Strength Indicator

PSRR: Power Supply Rejection Ratio
ACK: ACKnowledge



NFC Dynamic Tags ST25D





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Ticketing, Gaming, Medical, Brand protection, Access control, ...

www.st.com/st25t



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13.56MHz



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13.56MHz



NFC phone

or



or





Product Line-up by Key Features

	M24SR	ST25DV
Contactless Interface	ISO14443A / NFC T4	ISO15693 / NFC T5
RF range	Short range (up to 10cm)	Long range (up to 1m)
RF speed	106kbps	26kbps
Serial Interface	I2C @1MHz	I2C @1MHz
Fast Transfer mode	No	Yes (256B buffer)
Energy Harvesting	No	Yes
Digital output	Open-Drain GPO	OD or CMOS GPO
Extra features	RF Disable	RF Disable-Sleep / Low Power Down Mode
Memory format	EEPROM (preformatted NDEF file)	EEPROM data
Memory size	2 / 4 / 16 / 64-Kbit	4 / 16 / 64-Kbit
Data protection	Password 128-bit	Password 64-bit
Temperature range	-40°C to +85°C	
Package	SO8 / TSSOP8 / FPN8 / SBN12 / FPN12* / WLCSP10 *	
Availability	In production	



Key Use Cases

In-Line Customization

(no cable, no power needed @ factory or warehouse)

IDs Storage (SN/manufacturing history)



Static and Dynamic Wireless Pairing



Commissioning (to home/private network)



Transfer Settings (by users or installers)



Data/Event Logging



Smart Sensing (full or Semi-Passive)



Battery Less Operations



**FW Upgrade
Maintenance**



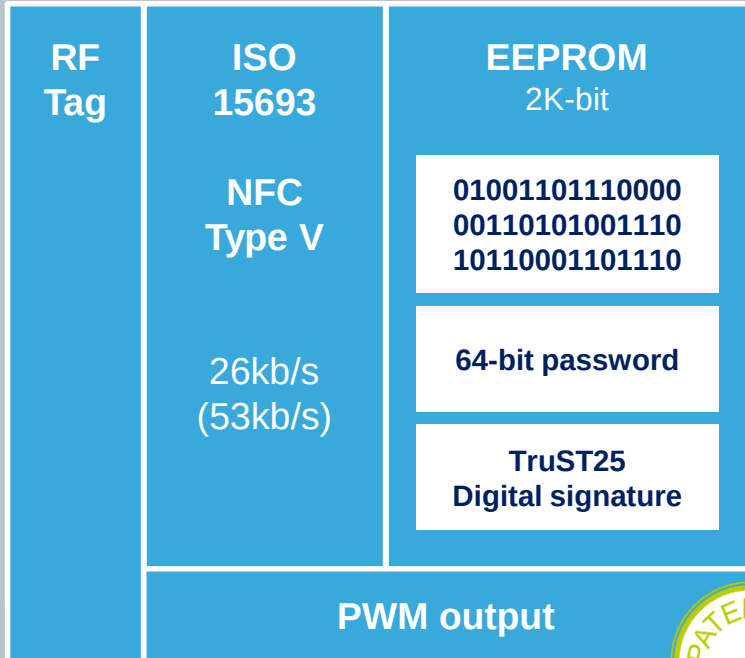
Smart **Sensing**, Smart **Home**, Smart **Packaging**, **Cold Chain/Logistic** Monitoring, **Medical Patches**, Smart **Clothing**, Smart **City**, Smart **Meters**, Smart **Accessories/Refills**, Figurine **Gaming**,



ST25DV-PWM Dynamic NFC Tag



ST25DV02K-W1 / -W2



SO8



TSSOP8



Use cases

- Industrial applications like Lighting LED driver, Motor control

Key Features

- ISO15693 and NFC Type V
- 2K-bit memory
- Up to 2 PWM signal (push pull)
- Up to 15 bits resolution (62.5ns resolution step)
- Power Supply 1.8V - 5.5V
- 40°C to +105°C (PWM) temperature range
- TruST25 digital signature



Key Benefits

- 2 in 1 chip, putting NFC connectivity with PWM functionality
- Cost optimized solution to address low end Lighting market
 - Significant BOM reduction as no MCU is required to drive the system



NFC Tags

ST25T



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Dynamic tags

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Frontends
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ST25N

13.56MHz



NFC phone

or



or





NFC Forum Standards

NFC specification
→ **Upper layer SW**



NDEF (NFC Data Exchange Format)

NFC Forum
Type 2 and Type 4

NFC Forum
Type 5 *

RFID HF ISO standards
→ **HW / SW protocol**



ISO14443
Type A and Type B

« Short Range »
106kbps

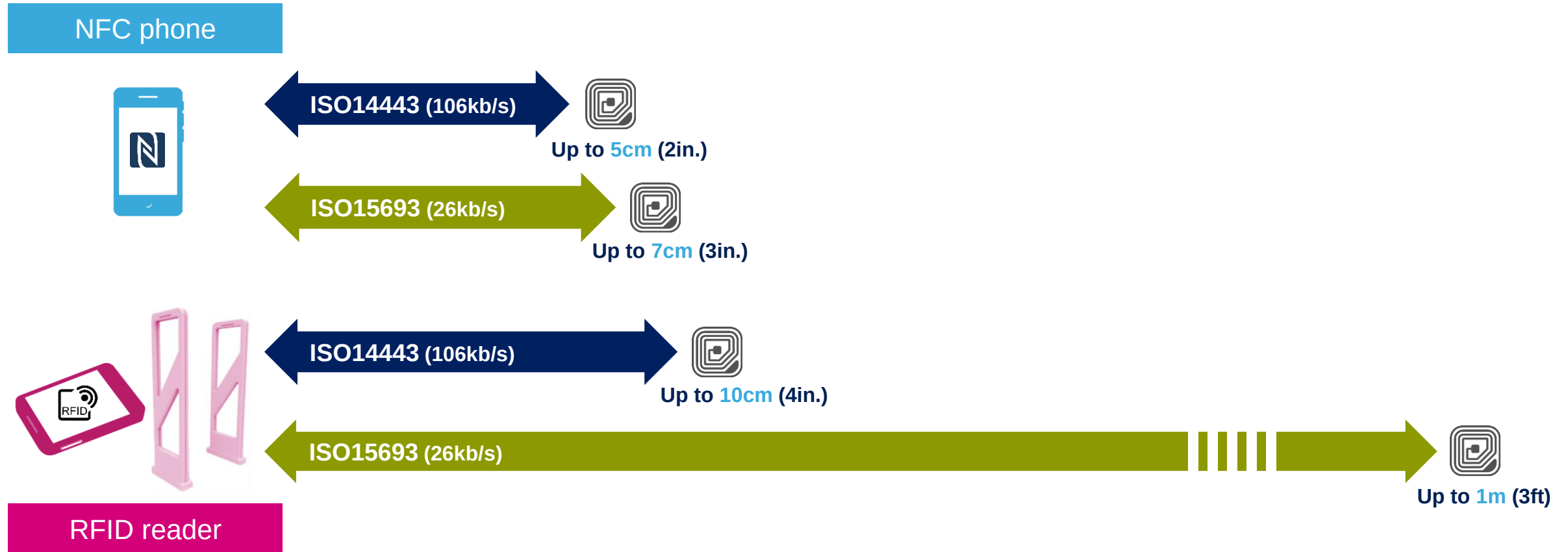
ISO15693

« Long Range »
26kbps

(*) ISO15693 integrated in NFC Forum specifications in October 2015 as NFC Forum type 5 (aka type V)



Typical NFC / RFID Range



- ISO14443 (NFC Forum Type 2 & Type 4) is called « **short range** » standard while with higher RF speed
- ISO15693 (NFC Forum Type 5) is called « **long range** » standard



ST25T NFC/RFID Tags Product Line-up

	ST25TB	ST25TA Low Density	ST25TA High Density	ST25TV Low Density	ST25TV Energy Harvesting	ST25TV High Density
Contactless Interface	ISO14443B	ISO14443A NFC Forum Type 4		ISO15693 NFC Forum Type 5		
RF range	Short range (up to 10cm)			Long range (up to 100cm)		
RF speed	106kbps			26kbps (53kbps)		
Memory format	EEPROM data	EEPROM (preformatted NDEF)		EEPROM (preformatted NDEF)	EEPROM data	
Memory size	512-bit & 2k / 4k-bit	512-bit / 2k-bit	16k / 64k-bit	512-bit / 2k-bit	4k-bit	16k / 64k-bit
Data protection	OTP bits	Pwd 128-bit	Pwd 128-bit	Pwd 64-bit	Pwd 64-bit	Pwd 64-bit
Digital signature	No	Yes, TruST25	No	Yes, TruST25	No	No
Digital output	No	GPO Field detect CMOS_P / Open-drain	No	Tamper Detect	GPO Field detect CMOS_P	No
Counter	32-bit (x2)	20-bit	No	16-bit	No	No
Extra features	No	No	No	Untraceable & Kill modes	Energy Harvesting	No
RF tuning capacitor	64pF	50pF	25pF	23.5pF & 97pF	28.5pF	28.5pF
Temperature range	-40°C to +85°C			-40°C to +85°C		
Package	SBN12* / SBN075²	SBN12* / SBN075² FPN5 (1.7x1.4mm)	SBN12*	SBN12* / SBN075² FPN5 (1.7x1.4mm)	SBN12*	SBN12*





Product Line-up by Key Features

Smart Factory



Inventory Management



Register Warranty, Web redirect

(customer engagement/ commerce)



Clone Detection



Tap & **Download** or **Launch APK**



Static Wireless Pairing



Accessories IDs + Usage monitoring



Check-in into Games



Product information



Item Check-in/Out



Ticketing



Smart **Packaging**, Smart **Clothing**,
Smart **City**, **Accessories** and
Refills, Smart **Buildings**, Figurine
Gaming, **Transport**, Smart
Library/Retail,....



ST25 Certification & Interoperability

	 ST25T			 ST25D		
	Tags			Dynamic tags		
	ST25TV	ST25TA	ST25TB	ST25DV	M24LR	M24SR
NFC Forum			Not for NFC applications (RFID, ticketing)		Legacy product, not focusing on NFC applications	All parameters OK except chaining during write operations (**)
Android			Not for NFC applications (RFID, ticketing)			
iOS			Not for NFC applications (RFID, ticketing)			

(*) M24LR: 04E interoperable with iOS11 - 16E and 64E not iOS. ST25DV16K or ST25DV64K as replacement product for iOS interoperability

(**) Chaining during write operations is not used by Smartphones

ECOSYSTEM & EVALUATION KITS



Ecosystem

 STM32Nucleo
hardware ecosystem

 Discovery kit
STM32 based

 Antenna
e-design tool

 Schematic,
BOM, Gerber



Mobile Apps
ST25 SDK  

STM32Cube
software ecosystem 

PC software tool
ST25 SDK 

Documentation 



ST25TA Evaluation Boards & Kits

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



CLOUD-ST25TA02KB

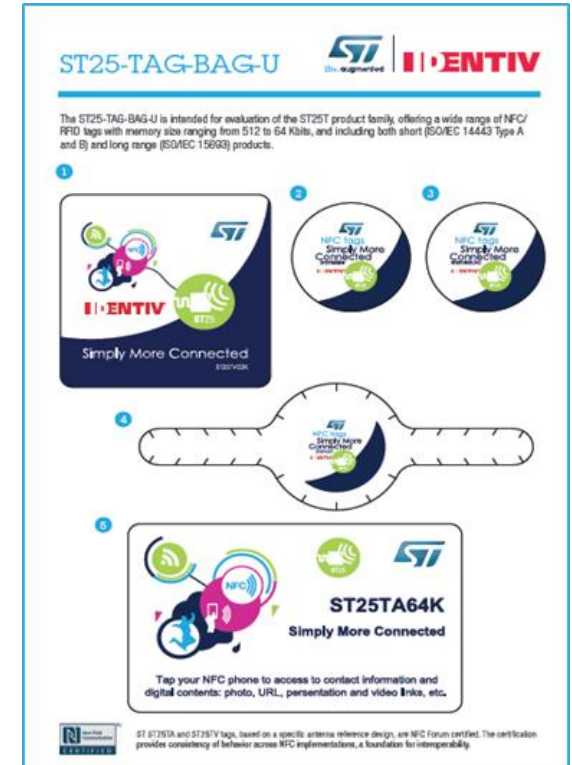
ST25TV eSeal Board

- ST25TV02K NFC/RFID tag IC
- UDFPN5 package
- 48x39 mm 9-turn antenna
- Custom Fast read access up to 53 Kbit/s
- Featuring Tamper detect loop



ST25TV-eSeal

ST25T tag bag



ST25-TAG-BAG-U



ST25DV-I2C Evaluation Boards

ST25DV-I2C Discovery kit

- **ST25DV04K** Dynamic NFC tag IC
- 40x24mm 10 turns antenna (ANT Class5)
- STM32F405 MCU
- 2.4" TFT LCD Touch screen
- I2C & SWIP connectors
- Daughter board connector



ST25DV-DISCOVERY

ST25DV-I2C Nucleo shield

- **ST25DV04K** Dynamic NFC tag IC
- Ø54mm 8 turns single layer antenna etched
- Energy harvesting, Low Power mode, GPO
- Compatible with STM32 Nucleo boards
- I2C interface to MCU & Powered through Arduino™ connector



X-NUCLEO-NFC04A1

ST25DV-I2C Antenna kit

- **ST25DV04K** Dynamic NFC tag IC
- Ready-to-use PCB including:
- 45x75mm (ST25DV_Discovery_ANT_C1)
- 18x24 mm (ST25DV_Discovery_ANT_C6)
- Energy Harvesting output (Vout)
- Mates with ST25Dx_Discovery MBoard



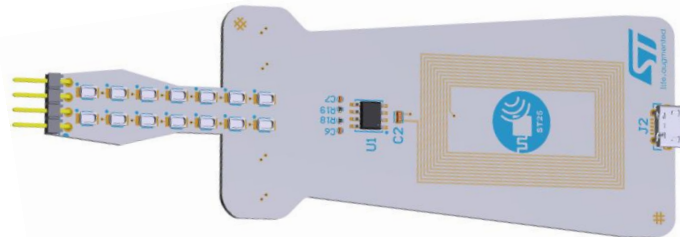
ANT-1-6-ST25DV



ST25DV-PWM Evaluation Board

ST25DV-PWM Discovery kit

- **ST25DV02K-W** Dynamic NFC tag IC
- 49x26mm 8 turns antenna
- PWM frequency and duty cycle through Android App or PC Software
- Duty cycle illustration with LED ramp
- Connector to ST25DV-DISCOVERY kit to monitor the PWM signal on display



ST25DV-PWM-eSET



ST25R3911B Evaluation Boards

ST25R3911B Discovery kit

- **ST25R3911B** HF reader / NFC initiator IC
- 105x52mm 2 turns antenna and associated VHBR tuning circuit
- STM32L476RET6 32-bit MCU
- Micro-USB connector
- Additional UART / I²C Host interfaces, as well as NFC SPI and JTAG/SWD points



ST25R3911B-DISCO

ST25R3911B Nucleo shield board

- **ST25R3911B** HF reader / NFC initiator IC
- 47x34mm 4 turns antenna
- Compatible with STM32 Nucleo boards
- Equipped with Arduino™ UNO R3 connector



X-NUCLEO-NFC05A1

ST25R3911B EMVCo Demo kit

- **ST25R3911B** HF reader / NFC initiator IC
- 65x74mm 2 turns antenna etched on PCB
- STM32L476 32-bit MCU
- Micro-USB connector
- Comprehensive Device Test Environment (DTE) for EMVCo Level 1 FW control
- S-Touch controller



ST25R3911B-EMVCO



ST25R3916 Evaluation Boards

ST25R3916 Discovery kit

ST25R3916-DISCO Antenna
Gerber, BOM, Altium
ST25R3916 DISCO GUI + new Tag Editor PC GUI
ST25R3916 DISCO FW



ST25R3916-DISCO

ST25R3916 Nucleo shield board

- X-NUCLEO-NFC06A1 HW
- Databrief, User Manual, Schematic, Gerber, BOM, Altium
- X-NUCLEO- NFC06A1 FW



X-NUCLEO-NFC06A1

ST25R3916 EMVCo Demo kit

- ST25R3916-EMVCo-RD
- Databrief, User Manual, Schematic, Gerber, BOM, Altium
- ST25R3916 EMVCo L1 GUI
- ST25R3916 EMVCo L1 FW
- ST25R3916 EMVCo L2 FW
- EMVCo Cookbook
- EMVCo L2 Demo App



ST25R3916-EMVCO

