Digital key system

Secure NFC car access

Turnkey solution for secure digital keys compliant with CCC specifications

With the increasing number of connected cars in the automotive industry, digital car access has become the norm.

Digital car keys offer significant benefits for consumers, such as enhanced convenience, improved security, and seamless integration in everyday devices such as smartphones.

ST offers a turnkey solution for secure NFC car access based on an embedded secure element (eSE), a secure gateway, and a contactless NFC reader, implementing the Car Connectivity Consortium (CCC) Digital Key Specification.

DEVICE-TO-VEHICLE CONNECTIVITY

The device (mobile phone, digital car-key fob or smart card) and the vehicle gateway are connected after mutual authentication based on asymmetric cryptography.

DIGITAL KEYS

A mobile phone
- OS with Java Applet

A digital key fob or a smart card
- eSE with NFC card Emulation Mode and energy harvesting capability for power supply

VEHICLE GATEWAY

In-vehicle connectivity
- Secure processing based on SPC58 MCU and ST33-A eSE companion chip for secure storage with ST25R500 / ST25R501 NFC Reader embedded in the door handle
- Automotive-grade solution

KEY BENEFITS
- CCC standard specification compliant
- Implementing NFC-A, a robust and widespread technology
- Secure access based on tamperproof eSE (EAL5+ CC-certified)
- Possible integration in body control or gateway module

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Integrated solution for car access

NFC + Secure Element + Automotive Microcontroller

STSAFE-V500 Secure Element

- Fail-safe secure storage
- CC EAL5+ certified solution
- Reinforced secure car access and cryptographic services
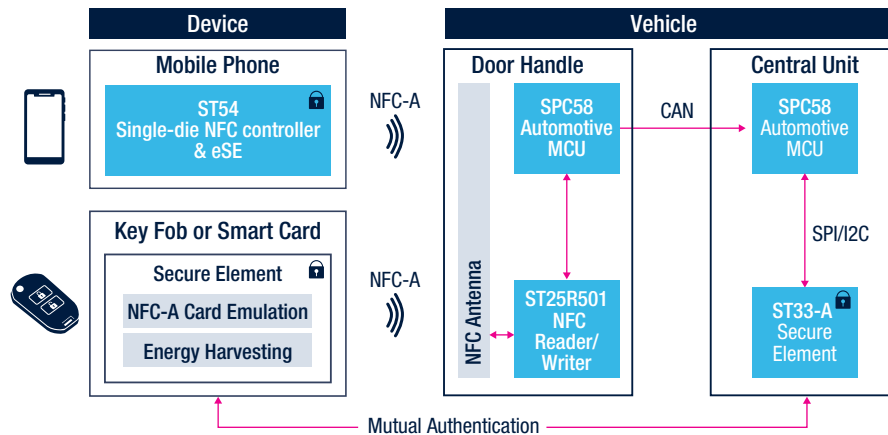- Enhanced platform and software integrity

ST25R500/ST25R501 NFC Reader

- Longer range detection (up to 70% vs. previous generation)
- Improved low power card detection
- Market's smallest automotive package size

SPC58 Automotive MCU

- Scalable MCU family with hardware security module, smart low-power, and gateway capability
- Ensures platform and software integrity as well as secured in-vehicle communication

Mutual authentication between the device and the carDevice summary

Device summary

Part number	Mode	Interface	Features	Output Power[1]	Ambient temp. range	Package
ST25R500	Reader / Writer, PP2P8, Card Emulation	SPI, ISO 14443A/B, ISO 15693, FeliCa	AAT[2], DPO[3], AWS[4], NSR[5], LWU[7]	2 W	-40 to 125°C	32-pin QFN, wettable flank (5 x 5m)
ST25R501	Reader & Writer	SPI, ISO 14443A/B, ISO 15693, FeliCa	DPO, AWS, NSR, LIW[6], LWU	1.6 W	-40 to 125°C	24-pin QFN, wettable flank (4 x 4 mm)
ST54L	NFC controller + eSE/eSIM	SPI, I2C, ISO7816, SWP, ISO/IEC 14443A/B ISO/IEC 18092 ISO/IEC 15693	Arm Cortex® M35P CC EAL6+, EMVCo, MIFARE®, FeliCa® eSIM with MEP support UWB chip interface 3.3-Mbytes Flash memory	-	-	90-pin WLCSP
SPC58ECx	Automotive MCU	8 LINFlexD modules, 8 DSPI, 8 MCAN, dual-channel FlexRay controller, 5 analog to digital converter, 1 Ethernet controller	High performance e200z420n3 dual core up to 180 MHz, HSM 4224 KB on chip Flash memory – 512 KB RAM, ASIL B	-	40°C/+125°C	eTQFP64, ETQFP100, eTQFP144, eLQFP176, FPBGA292
SPC582B50E1	Automotive MCU	6 LINFlexD modules, 4 DSPI, 7 MCAN, 1 analog to digital converter	High performance e200z2 single core up to 80 MHz, 512 KB on chip Flash memory - 96 KB SRAM, ASIL B	-	40°C/+125°C	eTQFP64
STSAFE-V500	Automotive Secure Element	SPI/I2C	Arm Cortex®-MP35 SecurCore®, Targeted certification CC EAL5+, Java®Card 3.0.5 classic OS, GlobalPlatform® 2.3 support, Digital Car Key	-	40°C/+125°C	QFN32 WF, TSSOP20