



CONTACTLESS
identification portfolio



For further details please refer to:
www.MIFARE.net

MIFARE® contactless tag IC family overview

| Product features | MIFARE Ultralight® | | | MIFARE Classic® | | MIFARE Plus® | | | | | | MIFARE DESFire® | | | | | | | | | | | | |
|------------------------------------|--|----------------|----------------|-----------------|-----------------|---|-----------------|-----------------|-----------------|----------------|----------------|--|-------------|------------|------------|------------|---------------|----------------|----------------|----------------|--------------|--------------|--------------|---------------|
| | Nano | EV1 | C | EV1 | S | SE | X | EV1 | EV1 | EV2 | EV2 | | | | | | | | | | | | | |
| RF Interface | ISO/IEC 14443-3 | | | | | ISO/IEC 14443-2, Type A 13.56 MHz | | | | | | ISO/IEC 14443-4 | | | | | | | | | | | | |
| Protocol | 7-byte UID | | | | | 7-byte UID, 4-byte NUID, Random ID | | | | | | 7-byte UID, Random ID | | | | | | | | | | | | |
| UID - unique identifier | 106 Kbps | | | | | 106-848 Kbps | | | | | | | | | | | | | | | | | | |
| Communication speed | 40 | 48 | 128 | 144 | 1K | 4K | 2K | 4K | 1K | 2K | 4K | 2K | 4K | 2K | 4K | 8K | 2K | 4K | 8K | | | | | |
| Memory size [Bytes] | Compact, 4-byte pages | | | | | Compact, sectors & 16-byte blocks | | | | | | Flexible file system | | | | | | | | | | | | |
| Memory model | TDES | | | | | Crypto-1, AES | | | | | | DES / 3DES / 3KDES / AES | | | | | | | | | | | | |
| Crypto | 112-bit | | | | | 48-bit | | | | | | 128-bit AES, up to 168-bit DES | | | | | | | | | | | | |
| Key length | Password | | | | | 3-pass mutual | | | | | | | | | | | | | | | | | | |
| Authentication | Encrypted | | | | | Plain, CMACed, encrypted w. CMAC | | | | | | Plain, CMACed, encrypted w. CMAC | | | | | | | | | | | | |
| Communication security | - | | | | | - | | | | | | - | | | | | | | | | | | | |
| MisSmartApp | - | | | | | - | | | | | | - | | | | | | | | | | | | |
| Transaction MAC | - | | | | | - | | | | | | - | | | | | | | | | | | | |
| Multi key sets | - | | | | | - | | | | | | - | | | | | | | | | | | | |
| Proximity check | - | | | | | - | | | | | | - | | | | | | | | | | | | |
| Virtual card select | - | | | | | - | | | | | | - | | | | | | | | | | | | |
| Originality check features | ECC signature programmable | ECC signature | - | ECC signature | - | AES originality keys | | | | | | AES originality keys, ECC signature | | | | | | | | | | | | |
| CC Certification | - | | | | | EAL4+ | | | | | | EAL5+ | | | | | | | | | | | | |
| ISO 7816-4 APDU | - | | | | | - | | | | | | - | | | | | | | | | | | | |
| NFC compliance | NFC Forum type 2 tag compliant | | | | | NFC capable in SL3 | | | | | | NFC Forum type 4 tag V2.0 compliant | | | | | | | | | | | | |
| Target applications | Public transport & event ticketing loyalty programs, limited use tickets | | | | | Public transport / campus cards / access management | | | | | | Smart city platform / advanced mobility multi-applications / micropayment / loyalty programs / access management | | | | | | | | | | | | |
| Input capacitance [pF] | 17 / 50 | | | | | 17 | | | | | | 17 / 70 | | | | | | | | | | | | |
| Multi applications | - | | | | | supported via MAD | | | | | | dynamic | | | | | | | | | | | | |
| Delivery types - 7 Byte UID | | | | | | | | | | | | | | | | | | | | | | | | |
| Wafer 120µm / 17 pF | MF0UN001DUD | MF0UL1101DUD* | MF0UL2101DUD* | MF0ICU2001DUD | MF1S001XDUD/V1* | MF1S701XDUD/V1* | MF1SPLUS6001DUD | MF1SPLUS8001DUD | MF1SEPH1001DUD1 | MF1PLUS6001DUD | MF1PLUS8001DUD | MF1P2101DUD | MF1P4101DUD | MF1P101DUD | MF1P201DUD | MF1P401DUD | MF3C0D101DUD | MF3C0D2101DUD | MF3C0D4101DUD | MF3C0D8101DUD | MF3D2201DUD | MF3D4201DUD | MF3D8201DUD | MF3D16201DUD |
| Wafer 120µm / high cap | MF0UN001DUF | MF0ULH1101DUD | MF0ULH2101DUD | MF0ICUH2001DUD | - | - | - | - | MF1SEPH1001DUD1 | - | - | MF1P2101DUD | MF1P4101DUD | MF1P101DUD | MF1P201DUD | MF1P401DUD | MF3C0DH101DUD | MF3C0DH2101DUD | MF3C0DH4101DUD | MF3C0DH8101DUD | MF3DH2201DUD | MF3DH4201DUD | MF3DH8201DUD | MF3DH16201DUD |
| Wafer 75µm / 17pF | MF0UNH0001DUD | MF0ULH1101DUF* | MF0ULH2101DUF* | MF0ICUH2001DUF | MF1S001XDUF/V1* | MF1S701XDUF/V1* | - | - | - | - | - | MF1P2101DUF | MF1P4101DUF | MF1P101DUF | MF1P201DUF | MF1P401DUF | MF3C0DH101DUF | MF3C0DH2101DUF | MF3C0DH4101DUF | MF3C0DH8101DUF | MF3DH2201DUF | MF3DH4201DUF | MF3DH8201DUF | MF3DH16201DUF |
| Wafer 75µm / high cap | MF0UNH0001DUF | MF0ULH1101DUF | MF0ULH2101DUF | MF0ICUH2001DUF | - | - | - | - | - | - | - | MF1P2101DUF | MF1P4101DUF | MF1P101DUF | MF1P201DUF | MF1P401DUF | MF3C0DH101DUF | MF3C0DH2101DUF | MF3C0DH4101DUF | MF3C0DH8101DUF | MF3DH2201DUF | MF3DH4201DUF | MF3DH8201DUF | MF3DH16201DUF |
| MOA4 / 17pF | - | - | - | MF0MOU2001D44 | MF1S000XD44/V1 | MF1S700XD44/V1 | MF1SPLUS6001D44 | MF1SPLUS8001D44 | MF1SEPH1001D44 | MF1PLUS6001D44 | MF1PLUS8001D44 | MF1P2100D44 | MF1P4100D44 | MF1P100D44 | MF1P200D44 | MF1P400D44 | MF3M0DQ101D44 | MF3M0D2101D44 | MF3M0D4101D44 | MF3M0D8101D44 | MF3DH2200D44 | MF3DH4200D44 | MF3DH8200D44 | MF3DH16200D44 |
| MOA4 / high cap | - | - | - | MF0MOUH2101D44 | - | - | - | - | MF1SEPH1001D44 | - | - | MF1P2100D44 | MF1P4100D44 | MF1P100D44 | MF1P200D44 | MF1P400D44 | MF3M0DH101D44 | MF3M0DH2101D44 | MF3M0DH4101D44 | MF3M0DH8101D44 | MF3DH2200D44 | MF3DH4200D44 | MF3DH8200D44 | MF3DH16200D44 |
| MOA8 / 17 pF | - | - | - | MF0MOU2101D48 | - | - | MF1SPLUS6001D48 | MF1SPLUS8001D48 | MF1SEPH1001D48 | MF1PLUS6001D48 | MF1PLUS8001D48 | - | - | - | - | - | MF3M0DQ101D48 | MF3M0D2101D48 | MF3M0D4101D48 | MF3M0D8101D48 | - | - | - | - |
| MOA8 / high cap | - | - | - | MF0MOUH2101D48 | - | - | MF1SPLUS6001D48 | MF1SPLUS8001D48 | MF1SEPH1001D48 | MF1PLUS6001D48 | MF1PLUS8001D48 | - | - | - | - | - | MF3M0DH101D48 | MF3M0DH2101D48 | MF3M0DH4101D48 | MF3M0DH8101D48 | - | - | - | - |
| MOB6 / 17pF | - | - | - | - | - | - | - | - | - | - | - | MF1P2100D46 | MF1P4100D46 | MF1P100D46 | MF1P200D46 | MF1P400D46 | - | - | - | - | MF3D2200D46 | MF3D4200D46 | MF3D8200D46 | MF3D16200D46 |
| MOB6 / high cap | - | - | - | - | - | - | - | - | - | - | - | MF1P2100D46 | MF1P4100D46 | MF1P100D46 | MF1P200D46 | MF1P400D46 | - | - | - | - | MF3DH2200D46 | MF3DH4200D46 | MF3DH8200D46 | MF3DH16200D46 |

* MIFARE Ultralight EV1 and MIFARE Classic EV1 wafer deliveries are next to Binch as well available on 12inch

MIFARE and NFC reader/writer IC solutions selection

| Product | NFC frontend solutions | | | | NFC controller solutions | | | HITAG |
|---|--------------------------------------|---|--|--|--|--|---|-------|
| | SLRC610 | MFRC630 | CLRC663 | PN5180 | PN7150 | PN7462 | HTRC110 | |
| Integrated microcontroller | High-performance ISO/IEC 15693 ICODE | High-performance ISO/IEC 14443A MIFARE and NTAG | High-performance multi-protocol NFC frontend | High-performance multi-protocol NFC frontend | Full NFC Forum-compliant controller with integrated FW and NCI interface | Full NFC open microcontroller Cortex M0 - with contact smartcard interface and 160K Flash for user's application | Highly integrated optimized HITAG short range reader/writer | |
| Carrier frequency [MHz] | 13.56 | | | | 13.56 | | | 0.125 |
| Standards & protocols | | | | | | | | |
| Reader / writer | ISO/IEC 15693 ISO/IEC 18000-3M3 | ISO/IEC 14443 A | ISO/IEC 18092 ISO/IEC 14443 ISO/IEC 15693 ISO/IEC 18000-3M3 Felica | ISO/IEC 18092 ISO/IEC 14443 ISO/IEC 15693 Felica | ISO/IEC 18092 ISO/IEC 14443 ISO/IEC 15693 Felica | ISO/IEC 18092 ISO/IEC 14443 ISO/IEC 15693 ISO/IEC 18000-3M3 Felica | HITAG | |
| NFC tag type reader | 5 | 1, 2, 4 | 1, 2, 3, 4, 5 | 1, 2, 3, 4, 5 | 1, 2, 3, 4, 5 | 1, 2, 3, 4, 5 | - | |
| ISO/IEC 14443 Bit-rate [KBit/s] | - | - | 106/212/424/848 | 106/212/424/848 | 106/212/424/848 | 106/212/424/848 | - | |
| Felica Bit-rate [KBit/s] | - | - | 212/424 | 212/424 | 212/424 | 212/424 | - | |
| MIFARE Classic support (license included) | - | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| ISO/IEC 15693 Bit-rate [KBit/s] | 26.5/53 | - | 26.5/53 | 26.5/53 | 26.5 | 26.5/53 | - | |
| EPC class-1 HF / ISO/IEC 18000-3M3 | ✓ | - | ✓ | ✓ | - | ✓ | - | |
| EMVCo compliance | - | - | ✓ | ✓ | ✓ | ✓ | - | |
| Card emulation | - | - | - | ✓ | ✓ | ✓ | - | |
| NFC tag type emulation | - | - | - | 4A | 3, 4A, 4B | 4A | - | |
| NFC tag type Bit-rate [KBit/s] | - | - | - | 106/212/424/848 | 106/212/424 | 106/212/424/848 | - | |
| Peer-to-peer (ISO/IEC 18092) | - | - | ✓ | ✓ | ✓ | ✓ | - | |
| Passive communication | - | - | Initiator | Initiator/Target | Initiator/Target | Initiator/Target | - | |
| Active communication | - | - | - | Initiator/Target | Initiator/Target | Initiator/Target | - | |
| Operating distance up to [mm] | 160 | 120 | 120/160 | 120/160 | 120/160 | 120/160 | up to 200 w.o. booster | |
| RF transmitter supply voltage [V] | 3.0 - 5.5 | 3.0 - 5.5 | 3.0 - 5.5 | 2.7 - 5.5 | 2.7 - 4.75 | 3.0 - 5.5 | 5 | |
| Transmitter supply current, typ [mA] | 250 | 250 | 250 | 250 | 180 | 250 | 200 | |
| Host interface | SPI, I2C, UART | SPI, I2C, UART | SPI, I2C, UART | SPI | I2C | USB, HSUART, SPI, I2C | Serial 2/3 wire | |
| Supply voltage host interface [V] | 3.3 - 5.0 | 3.3 - 5.0 | 3.3 - 5.0 | 1.8 - 3.3 | 1.8 - 3.3 | 1.8 or 3.3 | 5 | |
| Standby mode current, typ [µA] | 3 | 3 | 3 | 15 | 20 | 18 | 200 | |
| Power-down mode current, type [µA] | 0.008 | 0.008 | 0.008 | 10 | 10 | 12 | 7 | |
| Dynamic power contr./Adaptive modulation contr. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| Lower-power card detection mode | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| Temperature range [°C] | -25 to +85 | -25 to +85 | -25 to +85 | -30 to +85 | -30 to +85 | -40 to +85 | -40 to +85 | |
| Security features | | | | | | | | |
| MIFARE SAM support | - | In X-mode | In X-mode | ✓ | - | via UART ISO 7816 | - | |
| MIFARE Classic security (CRYPTO1 HW) | - | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| Product support & ordering information | | | | | | | | |
| Package | HVQFN32 | HVQFN32 | HVQFN32 | HVQFN40 TFBGA64 | HVQFN40 | HVQFN64 | S014 | |
| Product type | SLRC61002HN | MFRC63002HN | CLRC66302HN | PN5180A0HN | PN7150B0HN | PN7462A0HN | HTRC11011/02EE | |
| Software | | | | | | | | |
| NFC Reader library | ✓ | ✓ | ✓ | ✓ | N/A | ✓ | - | |

For further details please refer to www.nxp.com/products/identification-and-security/nfc-and-reader-ics

MIFARE embedded card functionality on SmartMX®

| Product | MIFARE implementations | | | | | | | Features | | | | | |
|---------------------|---------------------------------|-------------------|------------------|------------------|-----------------------|-----------------------|-----------------------|-------------|-------------|-----------------|----------------|------------------------|-----|
| | Available card IC functionality | | | | | | | UID options | | Parameters | Exit on | MIFARE select | |
| | MIFARE Classic 1K | MIFARE Classic 4K | MIFARE Plus X 2K | MIFARE Plus X 4K | MIFARE DESFire EV1 2K | MIFARE DESFire EV1 4K | MIFARE DESFire EV1 8K | 7 Byte UID | 4 Byte NUID | 4Byte Random ID | incomplete SAK | Time out UART RF-Field | |
| P5Ck145 | | | | | | | | | | | | | |
| CD128Cx081 | | | | | | | | | | | | | |
| CD051 | ✓ | ✓ | - | - | - | - | ✓ | ✓ | ✓ | ATQA, SAK, ATS | - | ✓ | N/A |
| CD041 | | | | | | | | | | | | | |
| CD021/CD016 | | | | | | | | | | | | | |
| P5Ck081V1D/CD041V1D | | | | | | | | | | | | | |
| CD021V1D | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ATS | - | - | N/A |
| CD016V1D | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| P5Ck144 | | | | | | | | | | | | | |
| Cx080/CD040 | ✓ | ✓ | - | - | - | - | - | - | - | ATQA, SAK, ATS | - | ✓ | N/A |
| CD020/CD012 | | | | | | | | | | | | | |
| P5Ck145 | ✓ | ✓ | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ATQA, SAK, ATS | - | ✓ | N/A |
| CD128 | | | | | | | | | | | | | |
| P60D144M | ✓ | ✓ | ✓ | ✓ | - | - | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | - |
| P60D080M | ✓ | ✓ | ✓ | ✓ | - | - | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | - |
| P60D024M | ✓ | ✓ | ✓ | ✓ | - | - | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | - |
| P60D144D | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | - |
| P60D080D | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | - |
| P60D024D | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | - |
| P60N144J | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | ✓ |
| P60D144J | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | ✓ |
| P60D080J | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ATQA, SAK, ATS | ✓ | ✓ | ✓ |



MIFARE - SAM (Secure Access Modules)

| Product features | MIFARE SAM |
|---------------------------------|--|
| | AV2 |
| Communication interface | ISO/IEC 7816, Class A, B T = 1, up to 1.5 Mbps I2C interface to MFRC52X, PN51X, CLRC66x TDEA 112-bit and 168-bit key |
| Cryptographic algorithms | MIFARE Crypto-1 AES-128 and AES-192 RSA-up to 2048-bit key |
| Public key infrastructure (PKI) | ✓ |
| Hash function | SHA-1, SHA-224 and SHA-256 |
| Supported cryptography | MIFARE Classic, MIFARE Ultralight C, MIFARE Plus MIFARE DESFire, MIFARE DESFire EV1 |
| Secure host communication | ✓ |
| X-functionalities | ✓ |
| Unique serial number [Bytes] | 7 |
| True random number generator | ✓ |
| No of symmetric key entry | 128 (3 keys per key entry) |
| No of RSA key entry | 2.5 pair |
| Access conditions | per entry |
| Key usages counter | 16 |
| Key diversification | Encryption based, CMAC based |
| RSA | Signature, Encryption for updating symmetric key entry |
| DES / 3DES security | MACing/Encipherment |
| AES 128 security | MACing/Encipherment |
| Delivery types | |
| PCM1.1 contact module | ✓ |
| HVQFN | HVQFN32 |
| | PSDF081 |

Development and testing tools

| Products | Short description | Supported NXP platforms |
|--|--|-------------------------|
| NXP Originality Checker reader (Windows) | Enables anyone in the supply chain to check the originality of NXP contactless ICs | MIFARE NTAG ICODE SLIX2 |
| MIFARE Reader-Writer Kit (Windows) | Consists of the Pegoda II MIFARE reference design reader-writer, a set of MIFARE family tag samples and the RFID Discover tool | MIFARE NTAG ICODE |
| RFID Discover (Windows) | Allows easy access to the commands of any NXP 13.56MHz contactless IC with the click of a button | MIFARE NTAG ICODE |
| TapLinux (TapLinux) | Facilitates App Development by providing a JAVA API for MIFARE, NTAG, ICODE families | MIFARE NTAG ICODE |

For the complete portfolio please refer to:

www.nxp.com
www.MIFARE.net

