



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	SE	EV2		Light	EV3	EV2						
RF Interface	ISO/IEC 14443-2, Type A 13.56 MHz																
Protocol	ISO/IEC 14443-3				ISO/IEC 14443-3B4			ISO/IEC 14443-4									
UID - unique identifier	7-byte UID				7-byte UID, 4-byte NUID, Random ID			7-byte UID, Random ID									
Communication speed	106 Kbps							106-848 Kbps									
Memory size [Bytes]	40	48	128	144	1K	4K	1K	2K	4K	640	2K	4K	8K	16K	32K		
Memory model	Compact, 4-byte pages				Compact, sectors & 16-byte blocks			Pre-configured file system			Flexible file system						
Crypto	-				3KDES		Crypto-1		Crypto-1, AES			AES/LRP		DES/2K3DES/3K3DES/AES			
Key length	-				112-bit		48-bit		48-bit Crypto-1, 128-bit AES			128-bit AES		128-bit AES, up to 168-bit DES			
Authentication	-				Password				3-pass mutual								
Communication security	-				Encrypted				Plain, CMACed, encrypted w. CMAC								
MisMARTApp	-				-		-		-			✓					
Transaction MAC	-				-		-		-			✓					
Transaction Timer	-				-		-		-			✓					
Security Level upgrade	-				-		card		sector per sector			-					
SL1SL3MixMode	-				-		-		-			-					
Multi key sets	-				-		-		-			✓					
Proximity check	-				-		-		-			✓					
Virtual card concept	-				-		-		-			✓					
Restrict update operations in SL1	-				-		-		-			-					
Originality check features	ECC signature programmable	ECC signature		-		ECC signature	-		AES originality keys	AES originality keys, ECC signature		-		AES originality keys, ECC signature			
CC Certification	-				-		-		EAL5+			EAL4		EAL5+			
ISO 7816-4 APDU	-				-		-		-			-		-			
NFC compliance	NFC Forum type 2 tag compliant				-		Not supported by majority of NFC devices		NFC capable in SL3		NFC capable in SL1 and SL3		NFC Forum type 4 tag V2.0 compliant				
Target applications	Public transport & event ticketing loyalty programs, limited use tickets				-		Single application - not recommended for new design		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			17/50		17/70			
Multi applications	-				-		Supported via MAD		Supported via MAD			Fixed, single application		Dynamic			

* MIFARE Ultralight EV1 and MIFARE Classic EV1 wafer deliveries are next to 8 inch as well available on 12 inch

MIFARE and NFC reader/writer IC solutions selection

Product	NFC frontend solutions				NFC controller solutions		HITAG
	SLRC610	MFR630	CLRC663	PN5180	PN7150	PN7462	HTRC110
Integrated microcontroller	High-performance ISO/IEC 15693 IC CODE				Full NFC Forum-compliant controller with integrated FW and NCI interface		Highly integrated optimized HITAG short range reader/writer
Carrier frequency [MHz]	-				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 ISO/IEC 18000-3M3 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						
Felica Bit-rate [KBit/s]	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	200	200
Host interface	SPI, I ² C, UART	SPI, I ² C, UART	SPI, I ² C, UART	SPI	I ² C	USB, HSUART, SPI, I ² C	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, typ [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	MFR63002HN	CLRC66302HN	PN5180A0HN	PN7150B0HN	PN7462AUHN	HTRC11001T/02EE
Software	-						
NFC Reader library	✓	✓	✓	✓	N/A	✓	-

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

MIFARE embedded card functionality on SmartMX®

Product	MIFARE implementations								Features					
	Available card IC functionality								UID options			Parameters	Exit on	
	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	4 Byte Random ID		incomplete SAK	Time out UART RF-Field	
P5Cx145														
CD128Cx081	✓	✓	-	-	-	-	-	✓	✓	✓	ATQA,SAK,ATS	-	✓	N/A
CD051														
CD041														
CD021/CD016														
P5Cx081V1D/CD041V1D														
CD021V1D	-	-	-	-	✓	✓	✓	✓	-	-	ATS	-	-	N/A
CD016V1D														
P5Cx144														
Cx080/CD040	✓	✓	-	-	✓	✓	✓	✓	✓	✓	ATQA,SAK,ATS	-	✓	N/A
CD020/CD012														
P5Cx145	✓	✓	-	-	✓	✓	✓	✓	✓	✓	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 AV3
Communication interface	Host Interface: ISO/IEC 7816, Class A, B and C, T=1, up to 1.5 Mbps Optional I ² C slave Standard and Fast Mode (HVQFN32 only) X-Mode Interface: MFRCS2x, PN51x and CLRC6xx
Cryptographic algorithms	TDEA 112-bit and 168-bit key MIFARE Crypto-1 AES-128, AES-192 and AES-256 RSA up to 2048-bit key, ECDSA up to 256-bit key
Public key infrastructure (PKI)	✓
Hash function	SHA-1, SHA-224 and SHA-256
Supported cryptography	MIFARE Classic, MIFARE Ultralight, MIFARE Plus (up to EV1), MIFARE DESFire (up to EV2), NTAG DNA, ICODE DNA, UCODE DNA
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 key pairs, 1 public key
No of ECC key and curve entry	8 keys, 4 curves
No of EMV key entry and RID	24 keys, 4 RIDs
Access conditions	per entry
Key usages counter	16
Key diversification	Encryption based, CMAC based
RSA	MACing/ Encipherment/ Signature
ECC	Signature
DES/3DES security	MACing/ Encipherment
AES 128 security	MACing/ Encipherment
Programmable Logic	✓

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
TapLinX	Facilitates App Development by providing a JAVA API for MIFARE, NTAG, ICODE families	MIFARE NTAG ICODE

Delivery types	MIFARE SAM AV3
Contact module	PCM1.5
HVQFN	HVQFN32
Part Type	MF4SAM3

NFC tag IC family overview – 13,56 MHz (HF)

Product features	NTAG® 210µ	NTAG® 210/212	NTAG® 213/213F	NTAG® 215	NTAG® 216/216F	NTAG® I²C 1K/2K	NTAG® I²C plus 1K/2K	NTAG® 213 TagTamper	NTAG® 424 DNA	NTAG® 424 DNA TagTamper
Memory										
NFC Forum type	NFC Type 2 Tag	NFC Type 2 Tag	NFC Type 2 Tag	NFC Type 2 Tag	NFC Type 2 Tag	NFC Type 2 Tag	NFC Type 2 Tag	NFC Forum Type 2 Tag	NFC Forum Type 4 Tag	NFC Forum Type 4 Tag
EEPROM size [byte]	80 (20 pages à 4 byte)	80 (20 pages à 4 byte) 164 (41 pages à 4 byte)	180 (45 pages à 4 byte)	540 (135 pages à 4 byte)	924 (231 pages à 4 byte)	1024/2048	1024/2048	184 (46 pages à 4 byte)	416	416
User memory [byte]	48	48/128	144	504	888	888/1904	888/1912	144	416	416
Write endurance [cycles]	100.000	100.000	100.000	100.000	100.000	200.000	500.000	100.000	200.000	200.000
Data retention [yrs]	10	10	10	10	10	20	20	10	50	50
RF-Interface										
According to	ISO14443A (up to layer 3) NFC Forum Type 2 Tag	ISO14443A (up to layer 3) NFC Forum Type 2 Tag	ISO14443A (up to layer 3) NFC Forum Type 2 Tag	ISO14443A (up to layer 3) NFC Forum Type 2 Tag	ISO14443A (up to layer 3) NFC Forum Type 2 Tag	ISO14443A (up to layer 3) NFC Forum Type 2 Tag	ISO14443A (up to layer 3) NFC Forum Type 2 Tag	ISO/IEC14443A (up to layer 3) NFC Forum Type 2 Tag	ISO/IEC14443A (up to layer 4) NFC Forum Type 4 Tag	ISO/IEC14443A (up to layer 4) NFC Forum Type 4 Tag
Frequency [MHz]	13.56	13.56	13.56	13.56	13.56	13.56	13.56	13.56	13.56	13.56
Baud-rate[KBit/s]	106	106	106	106	106	106	106	106	106/212/424/848	106/212/424/848
Anticollision	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise
Security										
Unique serial number [byte]	7, cascaded	7, cascaded	7, cascaded	7, cascaded	7, cascaded	7, cascaded	7, cascaded	7, cascaded	7, cascaded	7, cascaded
Access keys	-	32 bit	32 bit	32 bit	32 bit	-	32 bit	32 bit	5 x 128 bit	5 x 128 bit
Access conditions	-	write, read and write	write, read and write	write, read and write	write, read and write	write, read and write	write, read and write	write, read and write	read, write, read & write	read, write, read & write
Write protection	-	blockwise	blockwise	blockwise	blockwise	blockwise	blockwise	blockwise	-	-
Security	-	password	password	password	password	-	password	password	128-bit AES, LRP	128-bit AES, LRP
Special features										
Field detection pin	-	-	✓ 1 (configurable)	-	✓ 1 (configurable)	✓ 1 (configurable)	✓ 1 (configurable)	-	-	-
I²C interface	-	-	-	-	-	✓	✓	-	-	-
Others	• Originality check with customizable (reprogrammable) originality signature	• UID ASCII mirror • Originality check • Fast Read	• UID ASCII mirror • NFC counter • NFC counter ASCII mirror • Originality check • Fast Read • Sleep mode via FD pin ¹	• UID ASCII mirror • NFC counter • NFC counter ASCII mirror • Originality check • Fast Read	• UID ASCII mirror • NFC counter • NFC counter ASCII mirror • Originality check • Fast Read • Sleep mode via FD pin ¹	• Passthrough mode 64 bytes SRAM buffer • Energy harvesting	• Passthrough mode 64 bytes SRAM buffer • Energy harvesting • T _{amb} = 105° C	• UID ASCII mirror • NFC counter • NFC counter ASCII mirror • Programmable Originality Signature • Fast Read • Tag Tamper detection • Current loop status command	• SUN (Secure Unique NFC) message • NFC counter • Flexible mirroring offset for UID, NFC tap counter, CMAC • File encryption and mirroring • 128-byte Proprietary file • Originality Signature • Anti brute-force attack design	• SUN (Secure Unique NFC) message • NFC counter • Flexible mirroring offset for UID, NFC tap counter, CMAC • File encryption and mirroring • 128-byte Proprietary file • Originality Signature • Tag Tamper detection and mirroring
Certification	NFC Forum	-	NFC Forum	NFC Forum	NFC Forum	-	NFC Forum	NFC Forum	NFC Forum, CC EAL4	NFC Forum, CC EAL4
Packages & capacitance types										
Sawn wafer (Au-Bumped)	NT2L1001G0DUD NT2H1001G0DUD	NT2L1011G0DUD	NT2H1311G0DUD	NT2H1511G0DUD	NT2H1611G0DUD	NT3H1101W0FUG NT3H1201W0FUG	NT3H2111W0FUG NT3H2211W0FUG	-	NT4H2421G0DUD NT4H2421G0DUF	NT4H2421TTDUD NT4H2421TTDUF
HXS0N4 (SOT1192-1)	-	-	NT2H1311F0DTL ¹	-	NT2H1611F0DTL ¹	-	-	-	-	-
XQFN8	-	-	-	-	-	NT3H1101FHK NT3H1201FHK	NT3H2111W0FHK NT3H2211W0FHK	-	-	-
TSSOP8	-	-	-	-	-	NT3H1101FTT NT3H1201FTT	NT3H2111W0FTT NT3H2211W0FTT	-	-	-
MOA8	-	-	NT2H1311G0DA8	NT2H1511G0DA8	NT2H1611G0DA8	-	NT3H2111W0FT1 NT3H2211W0FT1	-	NT4H2421G0DA8	-
Cres Capacitance [pF]	17/50	17	50	50	50	50	50	50	50	50

¹ NTAG 21x F version only

Low frequency IC family overview – 100-150 KHz (LF)

Product features	HITAG® 1	HITAG® 2	HITAG® S 256	HITAG® S 2048	HITAG® µ	HITAG® µ Advanced	HITAG® µ Advanced +
Memory							
Size [bit]	2048	256	256	2048	128	512	1760
Write endurance [cycles]	100.000	100.000	100.000	100.000	100.000	100.000	100.000
Data retention [yrs]	10	10	10	10	10	10	10
Organisation	64 blocks à 4 bytes	8 blocks à 4 bytes	8 blocks à 4 bytes	64 blocks à 4 bytes	4 blocks à 4 bytes	16 blocks à 4 bytes	55 blocks à 4 bytes
RF Interface							
According to	HITAG 1	HITAG 2 ISO 11784/85	HITAG 1+ ISO 11784/85	HITAG 1+ ISO 11784/85	ISO 11784/85	ISO 11784/85 ISO 14223	ISO 11784/85 ISO 14223
Frequency	100-150 kHz	100-150 kHz	100-150 kHz	100-150 kHz	100-150 kHz	100-150 kHz	100-150 kHz
Baud-rate[KBit/s]	up to 4	up to 4	up to 8	up to 8	up to 8	up to 8	up to 8
Anti-collision	collision detection	-	collision detection	collision detection	-	collision detection	collision detection
Security							
Unique ID [byte]	4	4	4	4	6	6	6
Access keys	32 bit	48 bit	48 bit	48 bit	32 bit	32 bit	32 bit
Access conditions	Encrypted mutual authentication or plain	Encrypted mutual authentication or plain	Authentication or plain	Authentication or plain	Plain, password	Plain, password	Plain, password
Encryption algorithm	✓	✓	for authentication only	for authentication only	-	-	-
Special features							
TTF modes	-	✓	✓	✓	✓	✓	✓
RTF modes	✓	✓	✓	✓	-	✓	✓
Write ISO 11785	-	-	-	-	✓	✓	✓
Delivery types							
Sawn wafer (Au Megabump)	-	-	HTS IC C56 01EW/C7	HTS IC C48 01EW/C7	✓	✓	✓
Sawn wafer (Au bump)	HT1 IC S30 02W/V6F	HT2 IC S2002W/V6F/R	HTS IC H56 01EW/V7	HTS IC H48 01EW/V7	-	-	-
MOA4	HT1 MOA4 S30/E/3	HT2 MOA4 S20/E/3/R	HTS MO H56 02EV	HTS MO H48 02EV	-	-	-
SOT385-1 (Stick)	-	HT2 DC20 S20/F/R	-	-	-	-	-
SOT1122	-	-	-	-	HTMS8001FTB/AF	HTMS8101FTB/AF	HTMS8201FTB/AF
HVSON2	-	-	HTS H56 01 ETK	HTS H48 01 ETK	HTMS8001FTK/AF	HTMS8101FTK/AF	HTMS8201FTK/AF
Capacitance 210pF +/- 10%	✓	✓	-	-	-	-	-
Capacitance 210pF +/- 5%	-	-	✓	✓	-	-	-
Capacitance 280pF +/- 5%	-	-	-	-	HTMS8001FUG/AM	HTMS8101FUG/AM	HTMS8201FUG/AM



Smart label IC family overview – 13.56 MHz (HF)

Product features	ICODE® SLIX-L	ICODE® SLIX	ICODE® SLIX-S	ICODE® SLIX 2	ICODE® ILT	ICODE® ILT-M	ICODE® DNA
Standard	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	EPC Class-1 HF ¹ ISO 18000-3M3	EPC Class-1 HF ¹ ISO 18000-3M3	ISO 18000-3M1 ISO 15693-2, 3
User memory [bit]	256	896	1280	2528	-	512	2016
EPC code size [bit]	-	-	-	-	up to 240	up to 240	-
UID (TID) ² size [bit]	64	64	64	64	96 (TID)	96 (TID)	64
Data retention [Years]	50	50	50	50	50	50	50
Write endurance [cycles]	100.000	100.000	100.000	100.000	100.000	100.000	100.000
Anticollision speed	up to 60 units/s	up to 60 units/s	up to 60 units/s	90 units/s ³	up to 700 units/s	up to 700 units/s	up to 90 units/s ³
Fast inventory	✓	✓	✓	✓	-	-	✓
Security functions							
EAS protection	✓	✓	✓	✓	✓	✓	✓
EAS password protection	32 bit password	32 bit password	32 bit password	32 bit password	32 bit password	32 bit password	AES - 128 bit
EAS selective	✓	-	✓	✓	-	-	✓
AFI protection	✓	✓	✓	✓	-	-	AES - 128 bit
AFI password protection	32 bit password	32 bit password	32 bit password	32 bit password	-	-	✓
Persistent quiet	-	-	-	✓	-	-	✓
Memory write lock	✓	✓	✓	✓	✓	✓	✓
Memory access password protection	-	-	32 bit password	32 bit password	-	-	AES - 128 bit
Privacy password protection	32 bit password	-	32 bit password	32 bit password	32 bit password	32 bit password	AES - 128 bit
Destroy password protection	32 bit password	-	32 bit password	32 bit password	-	-	AES - 128 bit
Counter	-	-	-	✓	-	-	✓
Originality signature	-	-	-	✓	-	-	re-programmable
Cres capacitance [pF]	23.5/97	no/23.5/97	23.5/97	23.5	0/23.5/97	0/23.5/97	23.5
Delivery types							
Wafer FCC	SL2S5002FUD	SL2S2002FUD	SL2S5302FUD	SL2S2602FUD/BG	SL2S1502FUD	SL2S1512FUD	SL2S6002FUD/BG
Wafer FCC – HC	SL2S5102FUD	SL2S2102FUD	SL2S5402FUD	-	SL2S1602FUD	SL2S1612FUD	-
Wafer FCC-NC	-	SL2S2202FUD	-	SL2S2602FTB	SL2S1402FUD	SL2S1412FUD	-
SOT1122	SL2S5002FTB	SL2S2002FTB	SL2S5302FTB	-	SL2S1502FTB	SL2S1512FTB	-
SOT1122- HC	-	SL2S2102FTB	-	-	-	SL2S1612FTB	-
SOT1122- NC	-	-	-	SL2S2602FA8	-	SL2S1412FTB	-
MOA8	-	SL2S2002FA8	-	-	-	-	-



For further details
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¹ EPCglobal Specification: EPC Class-1 HF RFID Air Interface Protocol

² EPCglobal/Auto-ID Center Specification: 13.56 MHz ISM Band Class 1 Radio Frequency Identification Tag Interface

³ With extended fast inventory read

UHF tag IC family overview – 840-960 MHz (UHF)

Product features	UCODE® G2XL	UCODE® G2XM	UCODE® G2iL	UCODE® G2iL+	UCODE® G2iM	UCODE® G2iM+	UCODE® 7	UCODE® 7m	UCODE® 7xm	UCODE® 7xm+	UCODE® 8	UCODE® 8m	UCODE® I°C	UCODE® DNA Track	UCODE® DNA City	UCODE® DNA®	
RF Interface	840 - 960 MHz																
EPC global standard	1.0.9/1.1.0	1.0.9/1.1.1	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0	2.0.1	2.0.1	1.2.0	GS1 Gen2 v2.0 ISO29167-10	GS1 Gen2 v2.0 ISO29167-10	GS1 Gen2 v2.0 ISO29167-10	
User memory [bit]	-	512	-	-	512	up to 640 dep. on EPC size	-	32	1024/2048	2048	-	32	3328	256	1024	3072	
EPC code size [bit]	240	240	128	128	256	256-448	128	128	448	448	128	96	160	448	224	224	
TID size[bit]	64	64	64	64	96	96	96	96	96	96	96	96	96	96	96	96	
Access password [bit]	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
Kill password [bit]	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
User password	-	-	-	-	-	32	-	-	-	-	-	-	-	-	-	-	
Data retention [Years]	50	50	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
Write endurance [cycles]	100.000	100.000	10.000	10.000	10.000	10.000	100.000	100.000	100.000	100.000	100.000	100.000	50.000	100.000	100.000	100.000	
Feature set																	
Brand Identifier	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-	-	
Self Adjust	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-	-	
Read protection (bankwise)	✓	✓	✓	✓	✓	✓	-	-	-	-	-	-	✓	-	-	-	
Block perma lock	-	✓	-	-	✓	✓	-	-	✓	✓	-	-	-	✓	✓	✓	
Tag authenticaten	-	-	-	-	-	-	-	-	-	-	-	-	-	AES - 128 bit, 1 key	AES - 128 bit, 1 key	AES - 128 bit, 2 keys	
Block write	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Segmented user memory	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	
PSF (Product Status Flag- EAS)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Pre-serialization of 96-bit EPC	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Parallel encoding	-	-	-	-	-	-	✓	✓	✓	✓	-	-	-	✓	✓	✓	
Tag power indicator	-	-	-	-	-	-	✓	✓	✓	✓	-	-	-	✓	✓	✓	
Tag tamper alarm	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-	-	
Digital switch	-	-	-	✓	-	✓	-	-	-	-	-	-	✓	-	-	-	
External supply mode	-	-	-	✓	-	✓	-	-	-	-	-	-	✓	-	-	-	
Backscatter strength reduction	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Read range reduction	-	-	✓	✓	-	✓	-	-	-	-	✓	✓	✓	✓	✓	✓	
Digital signature [bit]	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	
Untraceable	-	-	-	-	-	-	-	-	-	✓	✓	✓	-	✓	✓, with crypto	✓, with crypto	
Data transfer	-	-	-	✓	-	✓	-	-	-	-	-	-	✓	-	-	-	
Bridge mode for fast data transfer	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	
2 UHF Front Ends	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	
I°C Interface	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	
Trust provisioning service	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	
Packages																	
Wafer FCC 150µm, 8"	SL3ICS120ZUG	SL3ICS1002FUG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wafer FCC 120µm, 8"	-	-	SL3S1203FUD	SL3S1213FUD	SL3S1003FUD	SL3S1013FUD	SL3S1204FUD/BG1	SL3S1214FUD/BG1	SL3S1004FUD/BG1	SL3S1024FUD/BG1	SL3S1014FUD/BG1	SL3S1205FUD/HA	SL3S1215FUD/HA	-	SL3S5005N0FUD/00BG1	SL3S5005N0FUD/00BG1	SL3S5002N0FUD/00BG1
Wafer FCC 120µm, 12"	-	-	-	-	-	-	SL3S1204FUD2/BG1	SL3S1214FUD2/BG1	-	-	-	SL3S1205FUD2/HA	SL3S1215FUD2/HA	-	-	-	-
SOT1122	SL3S1202FTB1	SL3S1002FTB1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SOT886	-	-	SL3S1203FTB0	-	-	SL3S1013FTB0	SL3S1204FTB0/01	SL3S1214FTB0/1	-	-	-	-	-	-	-	-	-
SOT 902-3 (XQFN8)	-	-	-	-	-	-	-	-	-	-	-	-	SL3S4011FHK	-	-	-	-