MIFARE® contactless tag IC family overview

MIFARE and NFC reader/writer IC solutions

MIFARE embedded card functionality on SmartMX®

MIFARE – SAM (Secure Access Modules)

Development and testing tools

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

NFC tag IC family overview – 13.56 MHz (HF)

Product features	NTAG® 210µ	NTAG® 210	NTAG® 212	NTAG® 213/213F	NTAG® 215	NTAG® 216/216F	NTAG® I²C 1K	NTAG® I²C 2K	NTAG® I²Cplus 1K	NTAG® I²Cplus 2K
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 Type 2 Tag	NFC Type 2 Tag	NFC Type 2 Tag
EEPROM size [byte]	80 (20 pages x 4 byte)	80 (20 pages x 4 byte)	164 (41 pages x 4 byte)	180 (45 pages x 4 byte)	540 (135 pages x 4 byte)	924 (231 pages x 4 byte)	1024	2048	1024	2048
TM memory size [byte]	48	48	128	144	504	888	888	1904	888	1912
Write endurance [cycles]	100,000	100,000	100,000	100,000	100,000	100,000	200,000	200,000	500,000	500,000
Data retention [yrs]	10	10	10	10	10	10	20	20	20	20
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	ISO14443A (up to layer 3) NFC Forum Type 2 Tag	ISO14443A 1-3 NFC Forum Type 2 Tag	ISO14443A 1-3 NFC Forum Type 2 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	106
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	32 bit	32 bit	32 bit	32 bit
Access conditions	–	–	write, read and write	read, read and write	read, read and write	read, read and write	read, read and write	read, read and write	read, read and write	read, read and write
Write protection	–	–	blockwise	blockwise	blockwise	blockwise	blockwise	blockwise	blockwise	blockwise
Security	–	–	password	password	password	password	password	password	password	password
Special features										
Field detection pin	–	–	–	✓ (configurable)	–	✓ (configurable)	✓ (configurable)	✓ (configurable)	✓ (configurable)	✓ (configurable)
I²C interface	–	–	–	–	–	–	✓	✓	✓	✓
Others	• Originality check with customizable (reprogrammable) originality signature	• UID ASCII mirror • Originality check • Fast Read	• 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 via 64 bytes SRAM buffer • Energy harvesting	• Passthrough mode via 64 bytes SRAM buffer • Energy harvesting	• Passthrough mode via 64-byte SRAM • Energy harvesting • Tamb = 105°C	• Passthrough mode via 64-byte SRAM • Energy harvesting • Tamb = 105°C
Packages & capacitance types										
Sawn wafer (Au-Bumped)	NT2L1011F0DUx NT2L1011G0DUx	NT2L1011G0DUD	NT2L1211F0DUD NT2L1311F0DUD	NT2L1311G0DUD NT2L1311F0DTL[1]	NT2H1511G0DUD	NT2H1611G0DUD NT2H1611F0DTL[1]	NT2H1201W0FHK	NTEH2111W0FHK	NT3H2111W0FHK NT3H2211W0FHK	NT3H2111W0FHK NT3H2211W0FHK
MOA4 (SOT1192-1)							NTEH1301W0FHK	NTEH1301FHK	NT3H1101FTT	NT3H2111W0FTT NT3H2211W0FTT
TSSOP8							NTEH1101FTT			
MOA8							NTEH2101G0A8	NTEH2101G0A8		
Crc Capacitance [pF]	17/50	17	17	50	50	50	50	50	50	50

[1] NTAG 213 F embody registration and trademarks.

NTAG is a registered trademark of NXP B.V.

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 +	HITAG® RO
Memory								
Size [bit]	2048	256	256	2048	128	512	1760	64
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	10
Organisation	64 blocks x 4 bytes	8 blocks x 4 bytes	8 blocks x 4 bytes	64 blocks x 4 bytes	4 blocks x 4 bytes	16 blocks x 4 bytes	55 blocks x 4 bytes	–
RF interface								
According to	HITAG 1	HITAG 2	HITAG 1+ ISO11784/85	HITAG 1+ ISO11784/85	ISO11784/85	ISO11784/85 ISO14223	ISO11784/85 ISO14223	–
Frequency	100-150 kHz	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	5
Security								
Unique ID [byte]	–	4	4	4	6	6	6	5
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 for authentication only	Authentication or plain for authentication only	Plain, password	Plain, password	Plain, password	–
Encryption algorithm	✓	✓	–	–	–	–	–	–
Special features								
TIF modes	✓	✓	✓	✓	✓	✓	✓	–
RTF modes	✓	✓	✓	✓	✓	✓	✓	–
Writer (ISO 11785)	–	–	✓	✓	✓	✓	✓	–
Delivery Types								
Sawn wafer (Au Morphing)	HT1 IC S30 D2W/V6V	HT2 IC S2002W/V6V/R	HT5 IC C56 01EW/C7	HT5 IC C48 01EW/C7				
Sawn wafer (Au bump)	HT1 M04A S30/D/S	HT2 M04A S30/ED/R	HT5 IC H66 01EW/V7	HT5 IC H48 01EW/V7	HTM5S01R1/AF	HTM5S01R1/AF	HTM5S01TR/AF	HITCC64EH/AG/AM
MOA4			HT5 M01 H66 02EV	HT5 M01 H48 02EV	HTM5S01R1/AF	HTM5S01R1/AF	HTM5S01TR/AF	
SOT301-5 (Stick)	–	–						
SOT1122								
HV0N2								
SOT1122-1 HC	–	–	HT5 H66 01 ETK	HT5 H48 01 ETK	HTM5S01FR/AM	HTM5S01FR/AM	HTM5S01FR/AM	
Capacitance 210pF +/- 10%	–	–	✓	✓				
Capacitance 210pF +/- 5%	–	–	✓	✓	HTM5K001TR/AM	HTM5K001TR/AM	HTM5K001TR/AM	HTM5K001FG/AM
SOT902-3 (ADT84)	–	–						

[1] EPglobal Specification. [2] EPglobal/Auto-ID Center Specification. [3] HF RFID Air Interface Protocol.

HITAG is a registered trademark of NXP B.V.

Smart label IC family overview – 13.56 MHz (HF)

Product features	ICODE® SLI-L	ICODE® SLIX-L	ICODE® SLI	ICODE® SLIX	ICODE® SLI-S	ICODE® SLIX-S	ICODE® SLI-L 2	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 1,2	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	EPC Class 1 HF ISO 18000-3M3	EPC Class 1 HF ISO 18000-3M3	ISO 18000-3M1 ISO 15693-2, 3
Memory											
Size [bit]	256	256	896	896	2048	1280	512	2528	–	512	2016
Write endurance [cycles]	32 bit password	32 bit password	✓	✓	32 bit password	32 bit password	32 bit password	32 bit password	up to 240	up to 240	–
EAS selective	✓	✓	✓	✓	✓	✓	✓	✓	96 (TID)	96 (TID)	46
AFI	✓	✓	✓	✓	✓	✓	✓	✓	50	50	50
RF interface											
EPC code size [bit]	64	64	64	64	64	64	64	64	AES - 128 bit	AES - 128 bit	AES - 128 bit
UID / TID [bit size]	32	32	32	32	32	32	32	32	AES - 128 bit	AES - 128 bit	AES - 128 bit
Data retention [Years]	32	32	32	32	32	32	32	32	AES - 128 bit	AES - 128 bit	AES - 128 bit
Write endurance [cycles]	100,000	100,000	100,000	100,000	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	up to 60 units/s	up to 60 units/s up to 200 units/s[2]	up to 60 units/s up to 200 units/s[2]	90 units/s[3]	90 units/s[3]	up to 700 units/s	up to 700 units/s	up to 90 units/s[3]
Fast inventory	✓	✓	✓	✓	✓	✓	✓	✓	re-programmable	re-programmable	✓
Security Functions											
EAS	✓	✓	✓	✓	✓	✓	✓	✓	23.5	23.5	
EAS password protection	32 bit password	32 bit password	–	✓	32 bit password	32 bit password	32 bit password	32 bit password			
EAS selective	✓	✓	✓	✓	✓	✓	✓	✓			
AFI	✓	✓	✓	✓	✓	✓	✓	✓			
AFI password protection	32 bit password	32 bit password	–	–	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	–	–	32 bit password	32 bit password	32 bit password	32 bit password			
Privacy password protection	32 bit password	32 bit password	–	–	–	–	32 bit password	32 bit password			
Destroy password protection	32 bit password	32 bit password	–	–	32 bit password	32 bit password	32 bit password	32 bit password			
Counter	–	–	–	–	–	–	–	✓			
Originality signature	–	–	–	–	–	–	✓	✓			
Crc capacitance [pF]	23 / 97	23 / 97	23 / 97	no / 23 / 97	23 / 97	23 / 97	23 / 97	23 / 97	0 / 23 / 97	0 / 23 / 97	23.5
Delivery Types											
Wafer FFC	SL2ICS5001EW/V7	SL2ICS5301EW/V7	SL2S5002D/D	SL2ICS20 V0W/V1D	SL2S2002D/D	SL2ICS5301EW/V7	SL2S5002D/D	SL2S1502D/D	SL2S1512D/D	SL2S1512D/D	SL2S6602D/D/BG
Wafer FFC – HC	SL2ICS5001EW/V7	SL2ICS5301EW/V7	SL2S20D2TD	SL2S20D2TD	SL2S20D2TD	SL2ICS5401EW/V7	SL2S20D2TD	SL2S2040D/D	SL2S2562D/D	SL2S2562D/D	–
SOT1122	SL2ICS20D2TPB	SL2ICS30D2TPB	SL2S20D2TB	–	SL2S20D2TB	SL2S30D2TB	SL2S20D2TB	SL2S1542TD	SL2S1512TB	SL2S1512TB	–
SOT1122-1 HC			SL2S20D2TB		SL2S20D2TB			SL2S1542TB	SL2S2562TB	SL2S2562TB	SL2S6602ND/DG
SOT1122-1 NC									SL2S1562TB	SL2S1562TB	
MOA8					SL2S20D2M4						SL2S4011HK

[1] EPglobal Specification. EPC Class 1 HF RFID Air Interface Protocol.

ICODE is a registered trademark of NXP B.V.

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® 7m	UCODE® 7xm+	UCODE® I²C	UCODE® DNA*	UCODE® DNA+
RF interface														
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	1,2.0	1,2.0	GS1 Gen2 v2.0 ISO29167-10 ISO18000-63
User memory [bit]	–	512	–	512	–	512	32	1024	2048	32	1024	2048	3072	3072
EPC code size [bit]	240	240	128	128	256	256	96	128	448	96	128	448	160	224
TID size [bit]	64	64	64	64	64	64	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
Kill password [bit]	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
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
Feature set														
Read protection (hardlock)	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Block permalock	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tag authentication	–	–	–	–	–	–	–	–	–	–	–	–	AES - 128 Bit	AES - 128 Bit
Privacy protection	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Block write	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Segmented user memory	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PSF (Product Status Flag - EAS)	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Automatic self-jam protection	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓
Parallel encoding	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tag-power indicator	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tag tamper alarm	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Digital switch	–	–	–	–	–	–	–	–	–	–	–	–	–	–
External single mode	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Backscatter strength reduction	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Digital read (single bit reduction)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Packages														
Wafer FFC 150µm	SL3ICS1202/UG	SL3ICS1002/UG												
Wafer FFC120µm	SL3S1203FUB/1	SL3S1003FUB/1												

UCODE is a registered trademark of NXP B.V.