MIFARE, NTAG, ICODE and UCODE

Contactless Card and Reader IC portfolio overview

Business Process : Product Management

Functional Organisation : Segment Marketing

Owner : Martin Liebl

Author : Michael Ganzera

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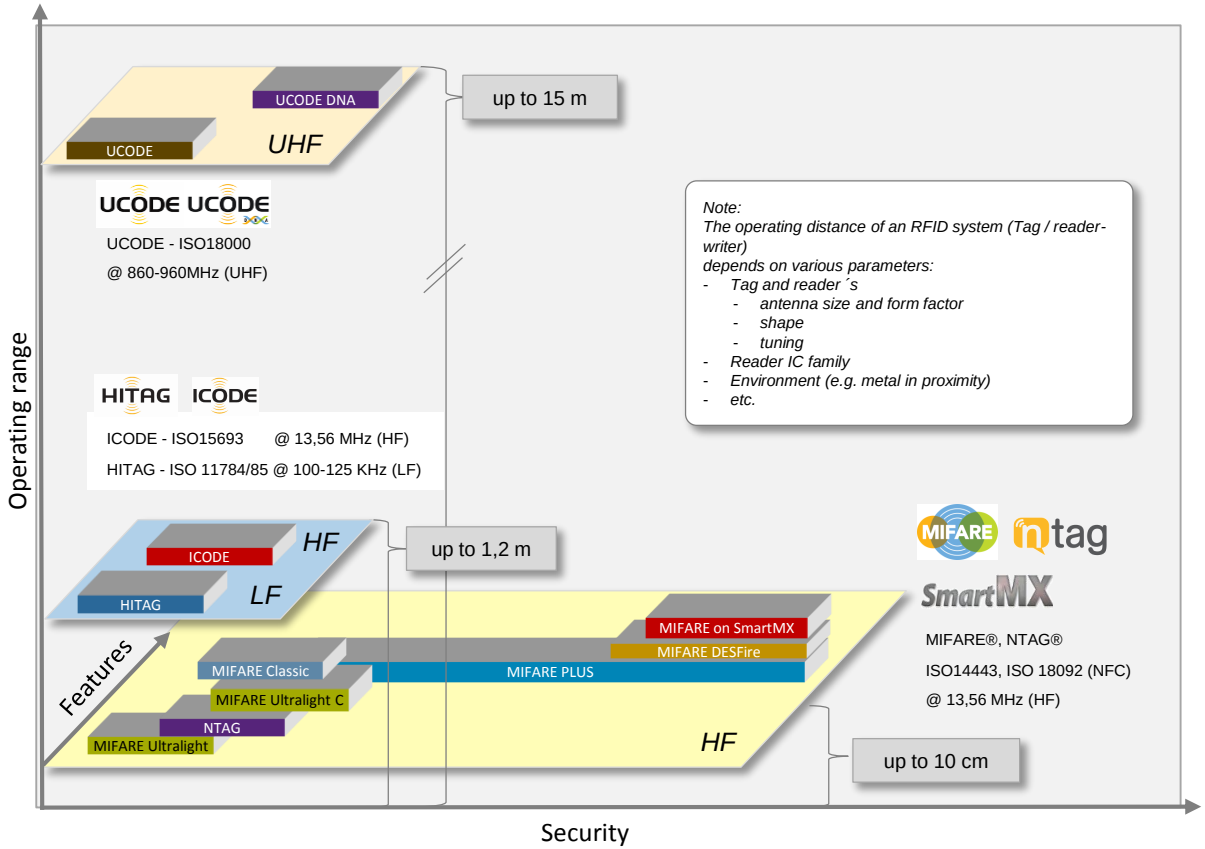
SECURE CONNECTIONS FOR A SMARTER WORLD

NXP Contactless Tag IC families
Relative positioning operating range vs. features and data security



MIFARE® Family

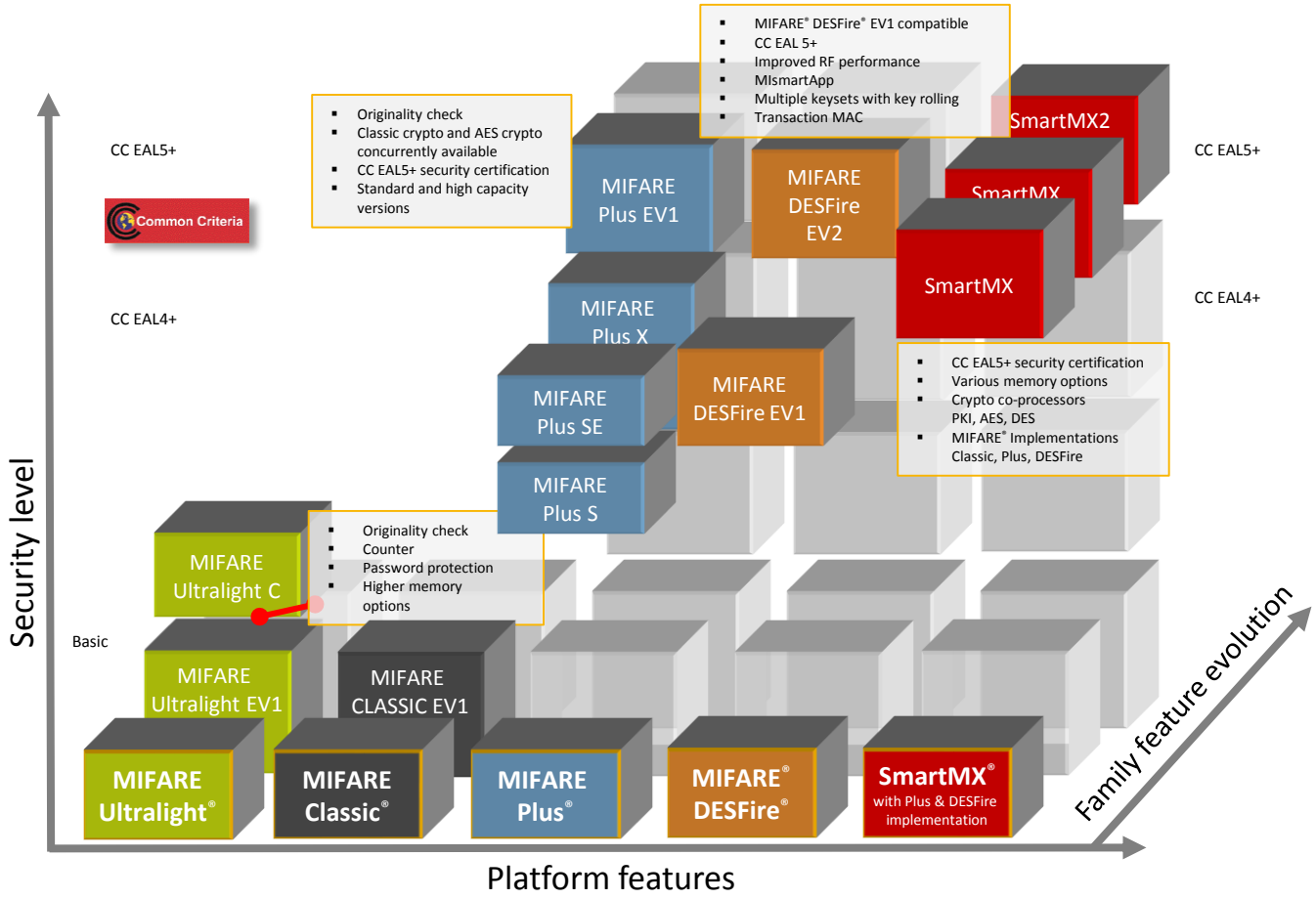
Product Feature Overview

MIFARE Platform

Product Features	MIFARE Ultralight			MIFARE Classic		MIFARE Plus							MIFARE DESFire						
	EV1		C	EV1		S		SE	X		EV1		EV1				EV2		
RF Interface	ISO/IEC 14443-2, Type A																		
Protocol	ISO/IEC 14443-3										ISO/IEC 14443-3&4		ISO/IEC 14443-4						
UID – unique identifier	7-byte UID			7-byte UID, 4-byte NUID, Random ID									7-byte UID						
Communication speed	106 Kbps												106-848 Kbps						
Memory size [Byte]	48	128	144	1K	4K	2K	4K	1K	2K	4K	2K	4K	256B	2K	4K	8K	2K	4K	8K
Memory Model	Compact, 4-byte page			Compact, Sectors & 16-byte block									Flexible file system						
Crypto			TDES	Crypto-1		Crypto-1, AES							DES / 2K3DES / 3K3DES / AES						
Key Length			112-bit	48-bit crypto-1		48-bit crypto-1, 128-bit AES							128-bit AES, up to 168-bit DES						
Authentication	Password			3-pass mutual															
Communication-Security	-			Encrypted		CMACed							Plain, Encrypted and/or CMACed						
MIsmartApp	N/A					N/A							-				✓		
Transaction MAC	N/A					-					✓		-				✓		
Multi Key Sets	N/A												-				✓		
Proximity Check	-										✓		-				✓		
Virtual Card Select	-					✓							-				✓		
Originality check features	ECC signature			ECC signature		AES originality keys					ECC signature						AES originality keys, ECC signature		
CC Certification	-					EAL4+		-	EAL4+		EAL5+		EAL4+				EAL5+		
ISO 7816-4 APDU	-					-							✓						
NFC compliance	NFC Forum Tag Type 2 compliant			No- supported by majority of NFC devices		NFC capabilities in SL3							NFC Forum Tag Type 4 V2.0 compliant						
Target applications	Public Transport & event Ticketing Loyalty Programs, limited use tickets			Multiple applications recommended to move to higher security ICs		Public transport / Campus cards / Access management							Smart City Platform / Advanced Mobility Multi-applications / Micropayment / Loyalty Programs / Access Management						
Input capacitance	17pF or 50pF			17pF or 50pF		17pF					17pF or 70pF		17pF or 70pF						
Secure NFC channel	-			-		in SL3 level					in SL1 & SL3		✓						
Multi applications	-			supported via MAD		supported via MAD							dynamic						
Delivery Types – 7 Byte UID																			
Wafer 120µm / 17 pF	MF0UL1101 DUD	MF0UL2101 DUD	MF0ICU2001 DUD	MF1S5001X DUD[1]	MF1S7001 XDUD[1]	MF1SPLUS6001 DUD[1]	MF1SPLUS8001 DUD[1]	MF1SEP1001 DUD[1]	MF1PLUS6001 DUD[1]	MF1PLUS8001 DUD[1]	MF1P2101 DUD[1]	MF1P4101 DUD[1]	MF3ICDQ101 DUD	MF3ICD2101 DUD	MF3ICD4101 DUD	MF3ICD8101 DUD	MF3D2201 DUD	MF3D4201 DUD	MF3D8201 DUD
Wafer 120 µm / High Cap	MF0ULH1101 DUD	MF0ULH2101 DUD	MF0ICU2101 DUD	-	-	-	-	-	-	-	MF1PH2101 DUD[1]	MF1PH4101 DUD[1]	MF3ICDHQ101 DUD	MF3ICDH2101 DUD	MF3ICDH4101 DUD	MF3ICDH8101 DUD	MF3DH2201 DUD	MF3DH4201 DUD	MF3DH8201 DUD
Wafer 75 µm / 17pF	MF0UL1101 DUF	MF0UL2101 DUF	-	MF1S5001X DUF[1]	MF1S7001 XDUF[1]	-	-	-	-	-	MF1P2101 DUF[1]	MF1P4101 DUF[1]	MF3ICDQ101 DUF	MF3ICD2101 DUF	MF3ICD4101 DUF	MF3ICD8101 DUF	MF3D2201 DUF	MF3D4201 DUF	MF3D8201 DUF
Wafer 75 µm / High Cap	MF0ULH1101 DUF	MF0ULH2101 DUF	-	-	-	-	-	-	-	-	MF1PH2101 DUF[1]	MF1PH4101 DUF[1]	MF3ICDHQ101 DUF	MF3ICDH2101 DUF	MF3ICDH4101 DUF	MF3ICDH8101 DUF	MF3DH2201 DUF	MF3DH4201 DUF	MF3DH8201 DUF
MOA4 / 17pF	-	-	MF0MOU2001 DA4	-	-	MF1SPLUS6001 DA4[1]	MF1SPLUS8001 DA4[1]	MF1SEP1001 DA4[1]	MF1PLUS6001 DA4[1]	MF1PLUS8001 DA4[1]	MF1P2100 DA4[1]	MF1P4100 DA4[1]	-	MF3MOD2101 DA4	MF3MOD4101 DA4	MF3MOD8101 DA4	MF3D2200 DA4	MF3D4200 DA4	MF3D8200 DA4
MOA4 / High Cap	-	-	MF0MOU2101 DA4	MF1S5000 XDA4[1]	MF1S7000 XDA4[1]	-	-	-	-	-	MF1PH2100 DA4[1]	MF1PH4100 DA4[1]	-	MF3MODH210 1DA4	MF3MODH401 DA4	MF3MODH810 1DA4	MF3DH2200 DA4	MF3DH4200 DA4	MF3DH8200 DA4
MOA8 / 17 pF	-	MF0UL2101 DA8	MF0MOU2001 DA8	-	-	MF1SPLUS6001 DA8[1]	MF1SPLUS8001 DA8[1]	MF1SEP1001 DA8[1]	MF1PLUS6001 DA8[1]	MF1PLUS8001 DA8[1]	-	-	MF3MODQ101 DA8	MF3MOD2101 DA8	MF3MOD4101 DA8	MF3MOD8101 DA8	-	-	-
MOA8 / High Cap	-	-	-	MF1S5000 XDA8[1]	MF1S7000 XDA8[1]	-	-	-	-	-	-	-	MF3MODHQ101 DA8	MF3MODH210 1DA8	MF3MODH401 DA8	MF3MODH810 1DA8	-	-	-
MOB6 / 17pF	-	-	-	-	-	-	-	-	-	-	MF1P2100 DA6[1]	MF1P4100 DA6[1]	-	-	-	-	MF3D2200 DA6	MF3D4200 DA6	MF3D8200 DA6
MOB6 / High Cap	-	-	-	-	-	-	-	-	-	-	MF1PH2100 DA6[1]	MF1PH4100 DA6[1]	-	-	-	-	MF3DH2200 DA6	MF3DH4200 DA6	MF3DH8200 DA6

1) available also in legacy 4 Byte NUID

MIFARE Platform Feature positioning



MIFARE implementations on the SmartMX Platform

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 FNUID	4Byte Random ID		incomplete SAK	Time out UART RF-Field	
P5Cx145 CD128Cx081 CD051 CD041 CD021/CD016	✓	✓	-	-	-	-	-	✓	✓	✓	ATQA,SAK,ATS	-	✓	N/A
P5Cx081V1D/CD041V1D CD021V1D CD016V1D	-	-	-	-	✓	✓	✓	✓	-	-	ATS	-		N/A
P5Cx144 Cx080/CD040 CD020/CD012	✓	✓	-	-	-	-	-	✓	-	-	ATQA,SAK,ATS	-	-✓	N/A
P5Cx145 CD128	✓	✓			✓	✓	✓	✓	✓	✓	ATQA,SAK,ATS		✓	N/A
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	✓	✓	✓

NTAG Family

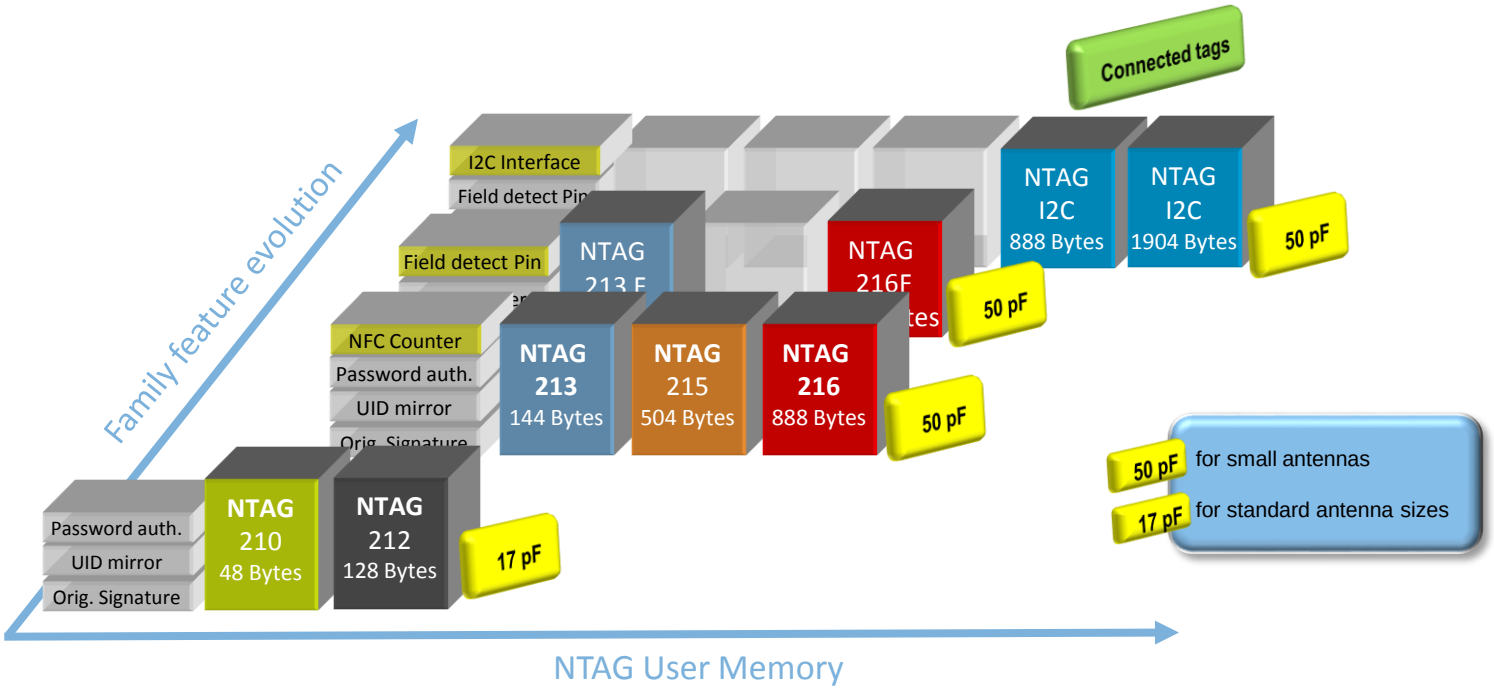
Product Feature Positioning

NTAG® family overview

Product Features	NTAG210	NTAG212	NTAG213 / 213F	NTAG215	NTAG216 / 216F	NTAG I²C 1K	NTAG I²C 2K
Memory							
NFC Forum Type	Tag Type 2	Tag Type 2	Tag Type 2	Tag Type 2	Tag Type 2	Tag Type 2	Tag Type 2
EEPROM size [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)	2048 (32 sectors à 64 byte)	2048 (32 sectors à 64 byte)
User memory [byte]	48	128	144	504	888	888	1904
Write Endurance [cycles]	100.000	100.000	100.000	100.000	100.000	200 000	200 000
Data Retention [yrs]	10	10	10	10	10	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
Frequency [MHz]	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
Anticollision	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
Access Keys	32 bit	32 bit	32 bit	32 bit	32 bit	32 bit	32 bit
Access Conditions	write, read and write	write, 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
Security	Password	Password	Password	Password	Password	-	-
Special Features							
Field detection pin	-	-	✓[1] (configurable)	-	✓[1] (configurable)	✓ (configurable)	✓ (configurable)
I²C interface	-	-	-	-	-	✓	✓
Others	▪ 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 64 bytes SRAM buffer ▪ Energy harvesting	▪ Passthrough mode 64 bytes SRAM buffer ▪ Energy harvesting
Packages & Capacitance types							
Sawn Wafer (Au-Bumped)	NT2L1011G0DUD	NT2L1211G0DUD	NT2H1311G0DUD	NT2H1511G0DUD	NT2H1611G0DUD	-	-
HXSON4 (SOT1192-1)	-	-	NT2H1311F0DTL [1]	-	NT2H1611F0DTL [1]	-	-
XQFN8	-	-	-	-	-	NT3H1101FHK	NT3H1201FHK
TSSOP8	-	-	-	-	-	NT3H1101FTT	NT3H1201FTT
MOA8	-	-	NT2H1311G0DA8	NT2H1511G0DA8	NT2H1611G0DA8	-	-
Cres Capacitance [pF]	17	17	50	50	50	50	50

[1] NTAG21x F version only [2] NTAG213/216 only

NTAG® family feature overview



NTAG® ordering information

NTAG21x			
Wafer	12NC	TYPE	Delivery Type
NTAG210	9352 996 63005	NT2L1011G0DUD	5 wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 17pF
	9352 996 81003		Single wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 17pF
NTAG212	9352 996 82005	NT2L1211G0DUD	5 wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 17pF
	9352 996 83003		Single wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 17pF
NTAG213	9352 99912005	NT2H1311G0DUD	5 wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 50pF
	9353 015 61003		Single wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 50pF
NTAG215	9352 999 27005	NT2H1511G0DUD	5 wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 50pF
	9353 015 65003		Single wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 50pF
NTAG216	9352 999 29005	NT2H1611G0DUD	5 wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 50pF
	9353 015 66003		Single wafer box- FFC bumped (120µm, 8"), UV tape, laser diced, 50pF
MOA8	12NC	TYPE	Delivery Type
NTAG213	9353 046 24118	NT2H1311G0DA8	MOA8 package, 50pF, reel
NTAG215	9353 046 25118	NT2H1511G0DA8	MOA8 package, 50pF, reel
NTAG216	9353 046 26118	NT2H1611G0DA8	MOA8 package, 50pF, reel
NTAG21xF			
SOT package	12NC	TYPE	Delivery Type
NTAG213F	9353 015 88125	NT2H1311F0DTL	HXSON4 package, 50pF, tape on reel
NTAG216F	9353 000 51125	NT2H1611F0DTL	HXSON4 package, 50pF, tape on reel
NTAG I2C			
SOT package	12NC	TYPE	Delivery Type
NTAGI2C 1K	9353 028 42125	NT3H1101W0FHK	XQFN8 Plastic package,50pF input capacitance SOT902-3
NTAGI2C 2K	9353 028 43125	NT3H1201W0FHK	XQFN8 Plastic package,50pF input capacitance SOT902-3
NTAGI2C 1K	9353 054 81118	NT3H1101W0FTT	TSSOP8 Plastic thin shrink small outline package, 50pF, SOT505-1
NTAGI2C 2K	9353 054 83118	NT3H1201W0FTT	TSSOP8 Plastic thin shrink small outline package, 50pF, SOT505-1

ICODE® Family

Product Feature Overview

ICODE® family overview

Product Features	SLI-L	SLIX-L	SLI	SLIX	SLI-S	SLIX-S	SLIX 2	ILT	ILT-M
Standard	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693	ISO 18000-3M1 ISO 15693 [2] EPC Class 1	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
User Memory [bit]	256	256	896	896	1280	1280	2528	-	512
EPC Code Size [bit]	-	-	-	-	96	-	-	up to 240	up to 240
UID (TID[1]) size[bit]	64	64	64	64	64	64	64	96 (TID)	96 (TID)
Data Retention [Years]	10	50	10	50	10	50	50	50	50
Write Endurance [cycles]	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	90 units/s [3]	up to700 units/s	up to700 units/sc
Fast Inventory	✓	✓	✓	✓	✓	✓	✓		
Security Functions									
EAS	✓	✓	✓	✓	✓	✓	✓	✓	✓
EAS Password Protection	✓	✓	-	✓	✓	✓	✓	✓	✓
EAS Selective	✓	✓	-	-	✓	✓	✓	-	-
AFI	✓	✓	✓	✓	✓	✓	✓	-	-
AFI Password Protection	-	✓	-	✓	-	✓	✓	-	-
Persistent Qiet	-	-	-	-	-	-	✓	-	-
Memory write Lock	✓	✓	✓	✓	✓	✓	✓	✓	✓
Memory access Password Protection	-	-	-	-	✓	✓	✓	-	-
Privacy Password Protection	✓	✓	-	-	✓	✓	✓	✓	✓
Destroy Password Protection	✓	✓	-	-	✓	✓	✓	-	-
Counter	-	-	-	-	-	-	✓	-	-
Originality Signature	-	-	-	-	-	-	✓	-	-
Cres Capacitance [pF]	23 / 97	23 / 97	23	no / 23 / 97	23 / 97	23 / 97	23	0 / 23 / 97	0 / 23 / 97
Delivery Types									
Wafer FFC	SL2ICS5001EW/V7	SL2S5002FUD	SL2ICS2001DW/V1D	SL2S2002FUD	SL2ICS5301EW/V7	SL2S5302FUD	SL2S2602FUD	SL2S1502FUD	SL2S1512FUD
Wafer FCC – HC	SL2ICS5101EW/V7	SL2S5102FUD	-	SL2S2102FUD	SL2ICS5401EW/V7	SL2S5402FUD		SL2S1602FUD	SL2S1612FUD
Wafer FCC- NC	-	-	-	SL2S2202FUD	-			SL2S1402FUD	SL2S1412FUD
SOT1122	-	SL2S5002FTB	-	SL2S2002FTB	-	SL2S5302FTB	-	SL2S1502FTB	SL2S1512FTB
SOT1122- HC	-	-	-	SL2S2102FTB	-				SL2S1612FTB
SOT1122- NC	-	-	-	-	-				SL2S1412FTB
MOA8	-	-	-	SL2S2002FA8	-	-	-	-	-

1 EPCglobal Specification: EPC Class-1 HF RFID Air Interface Protocol
2 EPCglobal/Auto-ID Center Specification: 13.56 MHz ISM Band Class 1Radio Frequency Identification Tag Interface
3 With extended Fast Inventory Read

More information at: http://www.nxp.com/products/identification_and_security/smart_label_and_tag_ics/icode/

ICODE® ordering information

ICODE SLIX			
Wafer	12NC	Type	Delivery Type
SLIX	9352 909 96003	SL2S2002FUD	120µm, bumped, sawn, 8", UV-Tape
SLIX HC	9352 914 33003	SL2S2102FUD	120µm, bumped, sawn, 8", UV-Tape
SLIX NC	9352 923 49003	SL2S2202FUD	120µm, bumped, sawn, 8", UV-Tape
SOT1122	12NC	Type	Delivery Type
SLIX	9352 934 48115	SL2S2002FTB	SOT1122 package, reel
SLIX HC	9352 934 52115	SL2S2102FTB	SOT1122 package, reel
MOA8	12NC	Type	Delivery Type
ICODE SLIX	9353 047 94118	SL2S2002FA8	MOA8 package, reel

ICODE SLIX 2			
Wafer	12NC	Type	Delivery Type
SLIX 2	9353 031 11003	SL2S2602FUD	120µm, bumped, sawn, 8", UV-Tape

ICODE SLI			
Wafer	12NC	Type	Delivery Type
SLI	9352 7956 1003	SL2ICS2001DW/V1D	150 µm, bumped, 8" wafer UV-Tape

ICODE SLI-L			
Wafer	12NC	Type	Delivery Type
SLI-L	9352 842 05003	SL2ICS5001EW/V7	150 µm, bumped, 8" wafer UV-Tape
SLI-L HC	9352 842 02005	SL2ICS5101EW/V7	150 µm, bumped, 8" wafer UV-Tape

ICODE ILT			
Wafer	12NC	Type	Delivery Type
ILT NC	9352 961 47003	SL2S1402FUD	120µm, bumped, sawn, 8", UV-Tape
ILT SC	9352 961 67003	SL2S1502FUD	120µm, bumped, sawn, 8", UV-Tape
ILT HC	9352 961 72003	SL2S1602FUD	120µm, bumped, sawn, 8", UV-Tape
SOT1122	12NC	Type	Delivery Type
ILT SC	9353 002 99115	SL2S1502FTB	SOT1122 package, reel

ICODE SLIX-S			
Wafer	12NC	Type	Delivery Type
SLIX-S	9352 909 99003	SL2S5302FUD	120µm, bumped, sawn, 8", UV-Tape
SLIX-S HC	9352 914 31003	SL2S5402FUD	120µm, bumped, sawn, 8", UV-Tape
SOT1122	12NC	Type	Delivery Type
SLIX-S	9353 010 04115	SL2S5302FTB	SOT1122 package, reel

ICODE SLIX-L			
Wafer	12NC	Type	Delivery Type
SLIX-L	9352 909 98003	SL2S5002FUD	120µm, bumped, sawn, 8", UV-Tape
SLIX-L HC	9352 914 32003	SL2S5102FUD	120µm, bumped, sawn, 8", UV-Tape
SOT1122	12NC	Type	Delivery Type
SLIX-L	9352 934 49115	SL2S5002FTB	SOT1122 package, reel

ICODE SLI-S			
Wafer	12NC	Type	Delivery Type
SLI-S	9352 837 46003	SL2ICS5301EW/V7	150 µm, bumped, 8" wafer UV-Tape
SLI-S HC	9352 837 45005	SL2ICS5401EW/V7	151 µm, bumped, 8" wafer UV-Tape

ICODE ILT-M			
Wafer	12NC	Type	Delivery Type
ILT-M NC	9352 961 48003	SL2S1412FUD	120µm, bumped, sawn, 8", UV-Tape
ILT-M SC	9352 961 68003	SL2S1512FUD	120µm, bumped, sawn, 8", UV-Tape
ILT-M HC	9352 961 73003	SL2S1612FUD	120µm, bumped, sawn, 8", UV-Tape
SOT1122	12NC	Type	Delivery Type
ILT-M NC	9353 010 05115	SL2S1412FTB	SOT1122 package, reel
ILT-M SC	9353 003 02115	SL2S1512FTB	SOT1122 package, reel
ILT-M HC	9353 013 93115	SL2S1612FTB	SOT1122 package, reel

UCODE® Family

Product Feature Overview

UCODE® family overview

Product Features	UCODE G2XL	UCODE G2XM	UCODE G2iL	UCODE G2iL+	UCODE G2iM	UCODE G2iM+	UCODE 7	UCODE 7m	UCODE 7xm	UCODE 7xm+	UCODE I²C	UCODE DNA
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	GS1 Gen2 v2.0 ISO29167-10 ISO18000-63
User Memory [bit]	-	512	-	-	512	up to 640 dep. on EPC size	-	32	1024	2048	3328	3072
EPC Code Size [bit]	240	240	128	128	256	256-448	128	128	448	448	160	224
TID size[bit]	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
Kill password [bit]	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
Write Endurance [cycles]	100.000	100.000	10 000	10 000	10 000	10 000	100.000	100.000	100.000	100.000	50 000	100.000
Feature set												
Read Protection (bankwise)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Block perma lock	-	✓	-	-	✓	✓	-	-	✓	✓	-	✓
Tag authenticaten	-	-	-	-	-	-	-	-	-	-	-	AES – 128 Bit
Privacy protection	-	-	-	-	-	-	-	-	-	-	-	✓
Block Write	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Segmented User memory	-	-	-	-	-	✓	-	-	-	-	-	✓
PSF (Product Status Flag- EAS)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Automatic self pre-serialization	-	-	-	-	-	-	✓	✓	✓	✓	-	✓
Parallel encoding	-	-	-	-	-	-	✓	✓	✓	✓	-	✓
Tag Power Indicator	-	-	-	-	-	-	✓	✓	✓	✓	-	✓
Tag Tamper Alarm	-	-	-	✓	-	✓	-	-	-	-	-	-
Digital Switch	-	-	-	✓	-	✓	-	-	-	-	✓	-
External supply mode	-	-	-	✓	-	✓	-	-	-	-	✓	-
Backscatter strength reduction	-	-	✓	✓	-	✓	✓	✓	✓	✓	✓	✓
Real Read Range Reduction (4R)	-	-	✓	✓	-	✓	-	-	-	-	✓	✓
Digital Signature [bit]	-	-	-	-	-	-	-	-	-	✓	-	-
Untraceable	-	-	-	-	-	-	-	-	✓	✓	-	✓
Data transfer	-	-	-	✓	-	✓	-	-	-	-	✓ (I^2C)	-
Bridge mode for fast data transfer	-	-	-	-	-	-	-	-	-	-	✓	-
2 UHF Front Ends	-	-	-	-	-	-	-	-	-	-	✓	-
I^2C Interface	-	-	-	-	-	-	-	-	-	-	✓	-
Trust Provisioning Service	-	-	-	-	-	-	-	-	-	-	-	✓
Packages												
Wafer FFC 150µm	SL3ICS1202UG	SL3ICS1002FUG	-	-	-	-	-	-	-	-	-	-
Wafer FCC 120µm	-	-	SL3S1203FUD	SL3S1213FUD	SL3S1003FUD	SL3S1013FUD	SL3S1204FUD/BG	SL3S1214FUD	SL3S1004FUD	SL3S1014FUD	-	SL3S5002N0FUD
SOT1122	SL3S1202FTB1	SL3S1002FTB1	-	-	-	-	-	-	-	-	-	-
SOT886	-	-	SL3S1203FTB0	-	-	SL3S1013FTB0	SL3S1204FTB0	SL3S1214FTB0	-	-	-	-
SOT 902-3 (XQFN8)	-	-	-	-	-	-	-	-	-	-	SL3S4011FHK	-

UCODE® ordering information

UCODE G2X			
Wafer	12NC	Type	Delivery Type
G2XL	9352 843 69005	SL3ICS1202 FUG/V7AF	8" Wafer on FFC, 150 µm, bumped
G2XM	9352 843 68005	SL3ICS1002 FUG/V7AF	8" Wafer on FFC, 150 µm, bumped
SOT-1122	12NC	Type	Delivery Type
G2XL	9352 902 55115	SL3S1202FTB1	SOT1122 package on reel
G2XM	9352 902 54115	SL3S1002FTB1	SOT1122 package on reel

UCODE G2i			
Wafer	12NC	Type	Delivery Type
G2iL	9352 944 13003	SL3S1203FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
G2iL+	9352 944 14003	SL3S1213FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
G2iM	9352 944 04003	SL3S1003FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
G2iM+	9352 944 05003	SL3S1013FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
SOT-886	12NC	Type	Delivery Type
G2iL	9352 910 37115	SL3S1203FTB0	SOT886 package on reel
G2iM+	9352 965 29115	SL3S1013FTB0	SOT886 package on reel

UCODE DNA			
Wafer	12NC	Type	Delivery Type
UCODE DNA	935306376003	SL3S5002N0FUD	8" Wafer, 120µm, 7µm PI coating, bumped

UCODE 7			
Wafer	12NC	Type	Delivery Type
UCODE 7	9352 999 32003	SL3S1204FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
UCODE 7	9352 999 32005	SL3S1204FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
SOT-886	12NC	Type	Delivery Type
UCODE 7	935305851115	SL3S1204FTB0	SOT886 package on reel

UCODE 7m			
Wafer	12NC	Type	Delivery Type
UCODE 7m	9353 003 89003	SL3S1214FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
UCODE 7m	9353 003 89005	SL3S1214FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
SOT-886	12NC	Type	Delivery Type
UCODE 7m	935305852115	SL3S1214FTB0	SOT886 package on reel

UCODE 7xm			
Wafer	12NC	Type	Delivery Type
UCODE 7xm	9353 065 68003	SL3S1004FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped
UCODE 7xm+	9353 065 69003	SL3S1014FUD/BG	8" Wafer, 120µm, 7µm PI coating, bumped

UCODE I²C			
XQFN8	12NC	Type	Delivery Type
Single FE	9352 962 08125	SL3S4011FHK	XQFN8 thin quad flat package on reel
Dual FE	9352 997 82125	SL3S4021FHK	XQFN8 thin quad flat package on reel

HITAG® Family

Product Feature Overview

HITAG® family overview

Product Features	Hitag 1	Hitag 2	Hitag S 256	Hitag S 2048	Hitag µ	Hitag µ Advanced	Hitag µ Advanced +	HitagRO
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 á 4 bytes	8 blocks á 4 bytes	8 blocks á 4 bytes	64 blocks á 4 bytes	4 blocks á 4 bytes	16 blocks á 4 bytes	55 blocks á 4 bytes	2 blocks á 4 bytes
RF Interface								
According to	HITAG 1	HITAG 2 ISO 11784/85	HITAG 1+ ISO 11784/85	HITAG 1+ ISO 11784/85	ISO 11784/84	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	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 detecion	-	collision detecion	collision detecion	-	collision detecion	collision detecion	-
Security								
Unique ID [byte]	4	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	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 210pF +/- 3%	-	-	-	-	HTMS1001FUG/AM	-	-	HTCICC6402FUG/AM
Capacitance 280pF +/- 5%	-	-	-	-	HTMS8001FUG/AM	HTMS8101FUG/AM	HTMS8201FUG/AM	HTCICC6403FUG/AM

HITAG® ordering information

HITAG™ 1			
Wafer	12NC	Type	Delivery Type
HITAG™1	9352 941 94003	HT1 IC S30 02W/V6F	sawn bumbed wafer, 150µ, 8 inch; 1 wafer
HITAG™1	9352 941 94005	HT1 IC S30 02W/V6F	sawn wafer on ffc, 150µ, 8 inch; 5 wafer
MOA4	12NC	Type	Delivery Type
HITAG™1	9353 039 44118	HT1 MOA4 S30/E/3	metal lead frame, reel
HITAG™S ICs			
Wafer Standard Bumps	12NC	Type	Delivery Type
HITAG S 256 bit	9352 941 88003	HTS IC H56 01EW/V7	sawn,bumped Wafer,150µ, 8 inch, ; 1 wafer
HITAG S 256 bit	9352 941 88005	HTS IC H56 01EW/V7	sawn,bumped Wafer,150µ, 8 inch, ; 5 wafer
HITAG S 2048 bit	9352 941 87003	HTS IC H48 01EW/V7	sawn,bumped Wafer,150µ, 8 inch, ; 1wafer
HITAG S 2048 bit	9352 941 87005	HTS IC H48 01EW/V7	sawn,bumped Wafer,150µ, 8 inch, ; 5 wafer
Wafer Mega Bumps	12NC	Type	Delivery Type
HITAG S 256 bit	9352 941 91003	HTS IC C56 01EW/C7	sawn,mega bumped Wafer, 8 inch, ; 1 wafer
HITAG S 256 bit	9352 941 91005	HTS IC C56 01EW/C7	sawn,mega bumped Wafer, 8 inch, ; 5 wafer
HITAG S 2048 bit	9352 941 93003	HTS IC C48 01EW/C7	sawn, mega bumped Wafer, 8 inch, ; 1 wafer
HITAG S 2048 bit	9352 941 93005	HTS IC C48 01EW/C7	sawn, mega bumped Wafer, 8 inch, ; 5 wafer
Mega Bumps IC in Blister	12NC	Type	Delivery Type
HITAG S 256 bit	9352 941 91026	HTS IC C56 01EW/C7	sawn,mega bumped Wafer, 8 inch,, blister
HITAG S 2048 bit	9352 941 93026	HTS IC C48 01EW/C7	sawn, mega bumped Wafer, 8 inch, ; blister
MOA4	12NC	Type	Delivery Type
HITAG S 256 bit	9353 039 47118	HTS MO H56 02EV	metal lead frame, reel
HITAG S 2048 bit	9353 039 49118	HTS MO H48 02EV	metal lead frame, reel
HVSON2	12NC	Type	Delivery Type
HITAG S 256 bit	9352 799 49118	HTS H56 01 ETK	HVSON2, SOT899-1
HITAG S 2048 bit	9352 799 48118	HTS H48 01 ETK	HVSON2, SOT899-1

HITAG™ 2			
Wafer	12NC	Type	Delivery Type
HITAG™2	9353 031 28003	HT2 IC S20 02W/V6F/R	sawn wafer on ffc, 150µ, 8 inch; 1 wafer
HITAG™2	9353 031 28005	HT2 IC S20 02W/V6F/R	sawn wafer on ffc, 150µ, 8 inch; 5 wafer
MOA4	12NC	Type	Delivery Type
HITAG™2	9353 039 45118	HT2 MOA4 S20/E/3/R	metal lead frame, reel
Stick	12NC	Type	Delivery Type
HITAG™2	9353 031 32122	HT2 DC20 S20/F/R	stick transponder
HITAG™µ Cres: 210pF (+/-3%)			
Wafer	12NC	Type	Delivery Type
HITAG µ 128 bit	9352 887 02005	HTMS1001FUG/AM	sawn, megabumped wafer, 150µ, 8 inch, UV
HITAG™µ Cres: 280pF (+/-5%)			
Wafer	12NC	Type	Delivery Type
HITAG µ 128 bit	9352 887 09005	HTMS8001FUG/AM	sawn, megabumped wafer, 150µ, 8 inch, UV
HITAG µ Advanced 512 bit	9352 887 11005	HTMS8101FUG/AM	sawn, megabumped wafer, 150µ, 8 inch, UV
HITAG µ Advanced+ 1760 bit	9352 887 12005	HTMS8201FUG/AM	sawn, megabumped wafer, 150µ, 8 inch, UV
SOT-1122	12NC	Type	Delivery Type
HITAG µ 128 bit	9352 900 71115	HTMS8001FTB/AF	SOT1122, reel
HITAG µ Advanced 512 bit	9352 900 72115	HTMS8101FTB/AF	SOT1122, reel
HITAG µ Advanced+ 1760 bit	9352 900 73115	HTMS8201FTB/AF	SOT1122, reel
HVSON2	12NC	Type	Delivery Type
HITAG µ 128 bit	9352 901 35115	HTMS8001FTK/AF	HVSON2, SOT899-1
HITAG µ Advanced 512 bit	9352 901 36115	HTMS8101FTK/AF	HVSON2, SOT899-1
HITAG µ Advanced+ 1760 bit	9352 901 37115	HTMS8201FTK/AF	HVSON2, SOT899-1
HITAG™RO64			
Wafer based on Hitag µ	12NC	Type	Delivery Type
HITAG RO64, 210pF	9352 887 01005	HTCICC6402FUG/AM	sawn, megabumped wafer, 150µ, 8 inch, UV
HITAG RO64, 280pF	9352 887 08005	HTCICC6403FUG/AM	sawn, megabumped wafer, 150µ, 8 inch, UV

NXP NFC & contactless reader solutions

Product Feature Overview

Contactless reader IC solutions

	NFC frontend solutions							NFC controller solutions				HITAG
Product	**MFRC522**	**MFRC523**	**MFRC630**	**MFRC631**	**CLRC663**	**PN512**	**PN5180**	**PN532**	**PN533**	**PN7120**	**PR601**	**HTRC110**
	Standard 3 V ISO/IEC14443A MIFARE frontend,	Standard 3 V ISO/IEC 14443 frontend	High-performance ISO/IEC 14443A MIFARE	High-performance ISO/IEC 14443	High-performance multi-protocol NFC frontend	Full NFC Forum compliant frontend	High-performance multi-protocol, fully NFC Forum-compliant	NFC controller with integrated FW	USB NFC controller with integrated FW	Full NFC Forum-compliant controller with NCI interface	High-performance multi-protocol NFC controller	Highly integrated optimized HITAG short range reader/writer
Integrated microcontroller	-	-	-	-	-	-	-	Integrated FW	integrated FW	integrated FW	LPC1227 for customer FW	-
Carrier frequency [MHz]	13.56	13.56	13.56	13.56	13.56	13.56	13,56	13.56	13.56	13.56	13.56 [1]	0,125
Standards & protocols												
Reader/writer	ISO/IEC 14443 A	ISO/IEC 14443	ISO/IEC 14443 A	ISO/IEC 14443	ISO/IEC 18092 ISO/IEC 14443 ISO/IEC 15693 FeliCa	ISO/IEC 18092 ISO/IEC 14443 FeliCa	ISO/IEC 18092 ISO/IEC 14443 ISO/IEC 15693 FeliCa	ISO/IEC 18092 ISO/IEC 14443 FeliCa	ISO/IEC 18092 ISO/IEC 14443 FeliCa	ISO/IEC 18092 ISO/IEC 14443 ISO/IEC 15693 FeliCa	ISO/IEC 18092 ISO/IEC 14443 ISO/IEC 15693 FeliCa	HITAG
NFC tag type support	1, 2, 4	1, 2, 4	1, 2, 4	1, 2, 4	1, 2, 3, 4	1, 2, 3, 4	1,2,3,4,5	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	-
ISO/IEC 14443 Baud-rate [KBit/s]	106/212/424/848	106/212/424/848	106/212/424/848	106/212/424/848	106/212/424/848	106/212/424	106/212/424/848	106/212/424	106/212/424/848	106/212/424/848	106/212/424/848	Up to 4K
FeliCa Baud-rate [KBit/s]	-	-	-	-	212/424	212/424	212/424	212/424	212/424	212/424	212/424	-
MIFARE Classic support (license included)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
ISO/IEC 15693 Baud-rate [KBit/s]	-	-	-	-	26.5/53	-	26.5/53	-	-	1.66/26.5	26.5/53	-
EPC class-1 HF / ISO/IEC 18000-3M3	-	-	-	-	✓	-	✓	-	-	-	✓	-
EMVCo compliance	-	✓	-	✓	✓	✓	✓	✓	-	✓	✓	-
Card emulation	-	-	-	-	-	✓	✓	✓	✓	✓	-	-
NFC tag type emulation	-	-	-	-	-	2, 3, 4	1, 2, 3, 4, 5	2, 3, 4	2, 3, 4	1, 2, 3, 4	-	-
NFC tag type Baud-rate [KBit/s]	-	-	-	-	-	106/212/424	106/212/424/848	106/212/424	106/212/424	106/212/424	-	-
Peer-to-peer (ISO/IEC 18092)	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	-
Passive communication	-	-	-	-	Initiator	Initiator/Target	Initiator/Target	Initiator/Target	Initiator/Target	Initiator/Target	Initiator	-
Active communication	-	-	-	-	-	Initiator/Target	Initiator/Target	Initiator/Target	Initiator/Target	Initiator/Target	-	-
Product features												
Operating distance up to [mm]	70	70	120	120	120/160	70	120/160	70	70	70	120/160	up to 200 w.o. booster
RF transmitter supply voltage [V]	3.6	3.6	3.3 to 5	3.3 to 5	3.3 to 5	3.6	5.5	3.6	2.5 to 3.6	3,1	3.3 to 5	5
Transmitter supply current, typ [mA]	100	100	250	250	250	100	250	60	60	60	200	200
Host interface	SPI, I²C, UART	SPI, I²C, UART	SPI, I²C, UART	SPI, I²C, UART	SPI, I²C, UART	SPI, I²C, UART	SPI	SPI, I²C, UART	USB, UART	I²C	SPI, I²C, UART	Serial 2/3 wire
Supply voltage host interface [V]	2.5 to 3.6	2.5 to 3.6	3.3 to 5.0	3.3 to 5.0	3.3 to 5.0	2.5 to 3.6	1.8 or 3.3	2.5 to 3.6	UART: 1.8 or 3.3 USB: 5	1.8 or 3.3	3.3 to 5.0	5
Idle mode current, typ [µA]	-	-	6	6	6	-	2.5	-	-	-	6	200
Power-down mode current, typ [µA]	5	5	0.008	0.008	0.008	5	10	2	10	10.5	0.008	7
Power-down mode with RF level detector on [µA]	-	-	-	-	-	10	.	25	30	20	-	-
Low-power card detection mode [µA]	-	-	0.5	0.5	0.5	-	0.5	-	-	150	0.5	-
Temperature range [°C]	-25 to +85	-25 to +85	-25 to +85	-25 to +85	-25 to +85	-30 to +85	-30 to +85	-25 to +85	-25 to +85	-30 to +85	-25 to +70	-40 to +85
Security features												
MIFARES SAM support in X-mode	SAM AV1 & AV2	SAM AV1 & AV2	SAM AV 2.6	SAM AV 2.6	SAM AV 2.6	SAM AV1 & AV2	-	-	-	-	SAM AV 2.6	-
MIFARE Classic security (CRYPTO1 HW)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
Product support & ordering information												
Package	HVQFN32	HVQFN32	HVQFN32	HVQFN32	HVQFN32	HVQFN32 HVQFN40 TFBGA64	HVQFN40, TFBGA64	HVQFN40	HVQFN40	VFBGA49	LQFP100	SO14
Product type	MFRC52202HN1	MFRC52302HN1	MFRC63002HN	MFRC63102HN	CLRC66302HN	PN5120A0HN1/C2	PN5180A0HN/C1	PN5321A3HN/106	PN5331B3HN/270	PN7120A0EV/C10801Y	PR601HL/C1	HTRC11001T/02EE
Software												
NFC Reader Library	✓	✓	✓	✓	✓	✓	✓			✓	✓	-
NFC Forum reference implementation						✓		✓	✓			-
other								HAL, card emulation example	HAL, card emulation example, USB PCSC driver		Various implementation examples	Control library HTRC110

SAM (Secure Access Module) Solutions

Product Features	MIFARE SAM	MIFARE SAM AV1	MIFARE SAM AV2
Communication Interface	ISO/IEC 7816, Class A, B, C T = 1, up to 1.5 Mbps	ISO/IEC 7816, Class A, B, C T = 1, up to 1.5 Mbps I²C interface to MFRC52X, PN51X	ISO/IEC 7816, Class A, B T = 1, up to 1.5 Mbps I²C interface to MFRC52X, PN51X, CLRC66x
Cryptographic Algorithms	TDEA 112-bit key MIFARE Crypto1	TDEA 112-bit and 168-bit key MIFARE Crypto1 AES-128 and AES-192	TDEA 112-bit and 168-bit key MIFARE Crypto1 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 DESFire	MIFARE Classic MIFARE Ultralight C MIFARE DESFire MIFARE DESFire EV1	MIFARE Classic MIFARE Ultralight C MIFARE Plus MIFARE DESFire MIFARE DESFire EV1
Secure host communication	-	-	✓
X- functionalities	-	✓	✓
Unique serial number [Bytes]	7	7	7
True random number generator	✓	✓	✓
No of symmetric key entry	128 (3 keys per key entry)	128 (3 keys per key entry)	128 (3 keys per key entry)
No of RSA key entry			2.5 pair
Access conditions	per entry	per entry	per entry
Key Usages Counter	16	16	16
Key Diversification	Encryption based	Encryption based	Encryption based CMAC based
RSA			Signature, Encryption for updating symmetric key entry
DES/ 3DES security	MACing/Encipherment	MACing/Encipherment	MACing/Encipherment
AES 128 security	MACing/Encipherment	MACing/Encipherment	MACing/Encipherment
Delivery Types			
PCM1.1 contact module	-	✓	✓
HVQFN	HVQFN48	HVQFN32	HVQFN32
	P5DF072EV2/T0PD2050	P5DF072EV2/T0PD4090	P5DF081