



Smart solutions for smart services

**NXP**  
founded by Philips



ISO 15693

ISO 18000

ISO 11784/85

## NXP Smart Label and Tag ICs

Product Features	ICODE SLI-S ICODE SLI-S HC*	ICODE SLI	ICODE SLI-L ICODE SLI-L HC*	ICODE UID-OTP	ICODE UID	ICODE EPC	ICODE 1 ICODE 1 HC*	UCODE HSL	UCODE EPC G2	UCODE G2XL	UCODE G2XM	HITAG™ 1	HITAG™ 2	HITAG™ 5
	SL2 ICS53 SL2 ICS54*	SL2 ICS20	SL2 ICS50 SL2 ICS51*	SL2 ICS12	SL2 ICS11	SL2 ICS10	SL1 ICS30 SL1 ICS31*	SL3 ICS30	SL3 ICS10					
<b>Memory</b>														
Size [bit]	2048	1024	512	192	192	136	512	2048	512	368	880	2048	256	256, 2048
Write Endurance [cycles]	100 000	100 000	100 000	-	10 000	-	100 000	100 000	100 000	10 000	10 000	100 000	100 000	100 000
Data Retention [yrs]	10	10	10	5	5	5	10	10	10	10	10	10	10	10
Organisation	16 pages each 4 blocks á 4 bytes	32 blocks á 4 bytes	4 pages each 4 blocks á 4 bytes	24 blocks á 1 byte	24 blocks á 1 byte	17 blocks á 1 byte	16 blocks á 4 bytes	64 blocks á 4 bytes	32 blocks á 2 bytes	23 blocks á 2 bytes	55 blocks á 2 bytes	64 blocks á 4 bytes	8 blocks á 4 bytes	64 blocks á 4 bytes
<b>RF-Interface</b>														
According to	ISO 15693, ISO 18000, EPC**	ISO 15693, ISO 18000	ISO 15693, ISO 18000	EPC**	EPC**	EPC**	ICODE 1	ISO 18000	EPC class 1 Gen2	EPC Class 1 Gen2	EPC Class 1 Gen2	HITAG 1	HITAG 2, ISO 11784/85	HITAG 1+, ISO 11784/85
Frequency	13.56 MHz	13.56 MHz	13.56 MHz	13.56 MHz	13.56 MHz	13.56 MHz	13.56 MHz	UHF / 2.45 GHz	860 - 960 MHz	840...960 MHz	840...960 MHz	100 ... 150 kHz	100 ... 150 kHz	100 ... 150 kHz
Baudrate [kbit/s]	up to 53	up to 53	up to 53	up to 53	up to 53	up to 53	up to 26.5	up to 40	up to 640	up to 640	up to 640	up to 4	up to 4	up to 8
Anticollision	acc. ISO 15693, ISO 18000, EPC**	acc. ISO 15693, ISO 18000	acc. ISO 15693, ISO 18000	acc. EPC**	acc. EPC**	acc. EPC**	acc. EPC**	adapted binary tree	slotted ALOHA	slotted ALOHA	slotted ALOHA	yes, collision detection up to 1.5	-	yes, collision detection up to 2.0
Operating Distance [m]	up to 2.0***	up to 1.5	up to 2.0***	up to 1.5	up to 1.5	up to 1.5	up to 1.5	up to 7.0	up to 7.0	up to 7.0	up to 7.0	up to 1.5	up to 1.5	up to 2.0
<b>Security</b>														
Unique Serial Number [byte]	8	8	8	5	5	-	8	8	TID: 8 including SN (4)	TID: 8 incl. 4 byte SN	TID: 8 incl. 4 byte SN	4	4	4
Write Protection	blockwise	blockwise	blockwise	OTP	-	OTP	blockwise	bitwise	blockwise	blockwise	blockwise	blockwise	blockwise	blockwise, multi user mode
Access Keys	32-bit	-	-	-	-	-	-	-	32-bit	32-bit	32-bit	32-bit	48-bit	48-bit
Access Conditions	Plain, Password Pagewise configurable password protection read/write	-	-	-	-	-	-	-	Plain, Password	Plain, Password	Plain, Password	32-bit Encrypted Mutual Authentication or Plain	48-bit Encrypted Mutual Authentication or Plain	48-bit Encrypted Mutual Authentication or Plain
Encryption Algorithm	-	-	-	-	-	-	-	-	-	-	-	yes	yes	yes, for authentication only
<b>Special Features</b>														
EAS	yes (Plain, Password)	yes	yes (Plain, Password)	-	-	-	yes	-	yes	yes	yes	-	-	-
AFI	yes	yes	yes	-	-	-	yes	yes	yes	no	no	-	-	-
EPC	yes	-	-	yes	yes	yes	yes	yes	yes, 96-bit	yes, up to 240 bit	yes, up to 240 bit	-	-	-
TTF Modes	-	-	-	-	-	-	-	-	-	-	-	-	yes	yes
Destroy Command	yes	-	yes	yes	yes	yes	yes	yes	yes	yes	yes	-	-	-
Privacy Command	yes	-	yes	-	-	-	-	-	-	-	-	-	-	-
<b>Packaging</b>														
Sawn Wafer	-	-	-	-	-	-	-	-	-	-	-	HT1CS3002W/N5A	HT2ICS2002W/N5A	-
Sawn Wafer (Au-Bumped)	SL2 ICS5301EW/V7 SL2 ICS5401EW/V7*	SL2 ICS2001DW/V1D	SL2 ICS5001EW/V7 SL2 ICS5101EW/V7*	SL2 ICS1201DW/V1	SL2 ICS1101DW/V4	SL2 ICS1001DW/V4	SL1 ICS3001W/N4D SL1 ICS3101W/N4D*	SL3 ICS3001W/V4	SL3 ICS1001FW/V7AJ	SL3 ICS1202FUG/V7AF	SL3 ICS1002FUG/V7AF	-	-	HTSICHxx01EW/V4**
MOA2 Module	SL2 MOS5301EV SL2 MOS5401EV*	SL2 MOS2001DV	SL2 MOS5001EV SL2 MOS5101EV*	-	-	-	-	-	-	-	-	HT1MOA2S30/E/3	HT2MOA2S20/E/3	HTSMOHxx01EV**
FCP2 Module	SL2 FCS5301EV/DH SL2 FCS5401EV/DH*	SL2 FCS2001DW/DH	SL2 FCS5001EV/DH SL2 FCS5101EV/DH*	-	SL2 FCS1101DW/DH	SL2 FCS1001DW/DH	-	-	SL3 FCS1001FW/DH	SL3 FCS1202FC	SL3S1002FTT	-	-	HTSFCHxx01EV/DH**
Stick SOT 385-1	-	-	-	-	-	-	-	-	-	-	-	-	HT2DC20S20/F	-
TSSOP8	-	-	-	-	-	-	-	SL3S3001FTT	SL3 S1001FTT	SL3S1202FTT	SL3FCS1002FC	-	-	-
HVSON2	-	-	-	-	-	-	-	-	-	-	-	-	-	HTSHxx01ETK

\* HC: high capacitance (97pF);

\*\* HF EPC Class 1: EPCglobal/Auto-ID Center Specification;

\*\*\* based on ECC regulations

HITAG™ Reader ICs		
Product Features	HTRC110 HITAG™ Reader ICs	PCF7921, HITAG Reader Security Controller
Modulation Type	100 % ASK	not applicable
Dimensions [mm]	6.2 x 8.75 x 1.45	SSOP20
Interface	CMOS	programmable IO Pins
Supply Voltage [V]	5 ±10%	2.1V ... 3.6
Antenna Driver Current [mA]	200 continuous	not applicable
Clock Osc. Frequency [MHz]	4 ... 16	up to 2.2 (single clock instruction)
Operating Temperature [°C]	-40 ... +85	-40 ... +85
Power Down Current [µA typ.]	7	0.1 ; max: 0.5 (RUN: 300 ; IDLE:20 ; PD: 100nA)
Memory	-	4 Kbyte EROM (Flash) 512 Byte EEPROM 128 Byte RAM
<b>Supported Products</b>		
HITAG™ 1	yes	-
HITAG™ 2	yes	yes
HITAG™ 5	yes	yes
<b>Security</b>		
HITAG™ 1 data encryption	-	-
HITAG™ 2 data encryption	-	yes
HITAG™ 5 data encryption	-	yes
<b>Package</b>		
SO14, Tube	HTRC110 01T/02EE	-
SO14, Reel	HTRC110 01T/03EE	-
SSOP20	-	PCF7921ATS/3391

## ISO 7816

## NXP Contact Smart Card Reader ICs

Product Features	Analog Interface					Analog & UART	Analog & UART & $\mu$ C
	TDA8023	TDA8020	TDA8026	TDA8024	TDA8025	TDA8007B	TDA8029
Analog interfaces	1 card	2 cards	5 cards	1 card	1 card	2 cards	1 card
ISO 7816 UART	-	-	-	-	-	yes	yes
ISO 7816 dedicated timers	-	-	-	-	-	yes	yes
$\mu$ C-core	-	-	-	-	-	-	80C51RB+
ROM/OTP [kbyte]	-	-	-	-	-	-	16 [ROM]
RAM [byte]	-	-	-	-	-	-	768
Host interface	I <sup>2</sup> C	I <sup>2</sup> C	I <sup>2</sup> C	I/O lines	I/O lines	8-bit parallel	serial
ESD protection on ISO pads [kV]	6	6	6	6	6	6	6
Auxiliary protected lines for C4 and C8 contacts	2	-	2 (on slot 1&2)	2	2	2x2	-
Vcc card power supply [V]	1.8 & 3 & 5	3 & 5	1.8 & 3 & 5	3 & 5	1.2 & 1.8 & 3	1.8 & 3 & 5	1.8 & 3 & 5
Card supply current @ 5V Vcc [mA]	55	2 x 55	55	80	6	2 x 55	65
Card supply current @ 3V Vcc [mA]	55	2 x 50	55	65	65	2 x 50	50
Card supply current @ 1.8V Vcc [mA]	35	-	35	-	65	35	30
Card clock frequency max. [MHz]	20	20	20	26	26	20	20
Card activation time max. [ $\mu$ s]	135	135	135	220	220	130	225
Card deactivation time max. [ $\mu$ s]	110	110	110	100	100	150	100
<b>Protocol Support</b>							
Synchronous card management	yes	-	yes	-	-	yes	yes
Asynchronous protocol T=0 and T=1	yes	yes	yes	yes	yes	yes	yes
<b>Security Features</b>							
Voltage supervisor and over current detection	yes	yes	yes	yes	yes	yes	yes
Current protection on VCC, I/O, RST, CLK	yes	yes	yes	yes	yes	yes	yes
<b>Additional Product Information</b>							
Power supply [V]	2.7 ... 6.5	2.5 ... 6.5	2.7 ... 5.5	2.7 ... 6.5	2.7 ... 5.5	2.7 ... 6	2.7 ... 6
Power down mode current max. [ $\mu$ A]	2	150	2	-	100	350	20 (shut down)
Temperature range [°C]	-40 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-40 ... +85	-25 ... +85
Package	TSSOP28	LQFP32	TFBGA	SO28 / TSSOP28	HVQFN32	LQFP48	LQFP32
Software Support (EMV)	-	-	-	-	-	yes	yes
EMV compliance	EMV4.0	EMV4.0	EMV4.0	EMV4.0	EMV4.0	EMV4.0	EMV4.0
NDS compliance				yes	yes		yes

ISO 7816

ISO 14443

## NXP Contactless MIFARE Smart Card ICs

Product Features	MIFARE Ultralight MF0 IC U1X	MIFARE Mini MF1 IC S20	MIFARE Std 1k MF1 IC S50	MIFARE Std 4k MF1 IC S70	MIFARE DESFire 2k MF3 IC D21	MIFARE DESFire 4k MF3 IC D41	MIFARE DESFire 8k MF3 IC D81	MIFARE SAM MF3 IC D40 SAM	MIFARE DESFire8 SAM-X MF3 IC D81 SAM
<b>Memory</b>									
EEPROM size [byte]	64	320	1024	4096	2048	4096	8192	72k	72k
OTP area [bit]	32	-	-	-	-	-	-	-	-
Write Endurance [cycles]	10 000	100 000	100 000	100 000	500 000	500 000	500 000	100 000	100 000
Data Retention [yrs]	5	10	10	10	10	10	10	10	10
Organization	16 pages á 4 byte	5 sectors á 64 byte	16 sectors á 64 byte	32 sectors á 64 byte 8 sectors á 256 byte	flexible file system	flexible file system	flexible file system	128 key entries	128 key entries
<b>RF-Interface</b>									
Acc. to ISO 14443A	yes - up to layer 3	yes - up to layer 3	yes - up to layer 3	yes - up to layer 3	yes - up to layer 4	yes - up to layer 4	yes - up to layer 4	ISO 7816, T=1	ISO 7816, T=1
Frequency [MHz]	13.56	13.56	13.56	13.56	13.56	13.56	13.56	1 ... 10	1 ... 10
Baudrate [kbit/s]	106	106	106	106	106 ... 848	106 ... 848	106 ... 848	9.6 ... 1000	9.6 ... 1500
Anticollision	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise	bit-wise
Operating Distance [mm]	up to 100	up to 100	up to 100	up to 100	up to 100	up to 100	up to 100	-	-
<b>Security</b>									
Unique Serial Number [byte]	7, cascaded	4	4	4	7, cascaded	7, cascaded	7, cascaded	7	7
Random Number Generator	-	yes	yes	yes	yes	yes	yes	yes	yes
Access Keys	-	2 keys per sector	2 keys per sector	2 keys per sector	14 keys per application	14 keys per application	14 keys per application	128 key entries	128 key entries
Access Conditions	per page	per sector	per sector	per sector	per application	per application	per application	per key entry	per key entry
MIFARE Classic Security	-	supported	supported	supported	-	-	-	-	supported
DES & DES3 Security	-	-	-	-	MACing / Encipherment	MACing / Encipherment	MACing / Encipherment	MACing / Encipherment	MACing / Encipherment
AES 128 Security	-	-	-	-	MACing / Encipherment	MACing / Encipherment	MACing / Encipherment	-	MACing / Encipherment
Anti-tear supported by chip	-	for value blocks	for value blocks	for value blocks	yes	yes	yes	-	-
<b>Special Features</b>									
Multi-application	-	supports MAD*	supports MAD*	supports MAD2**	28 applications, MAD3***	28 applications, MAD3***	28 applications, MAD3***	-	-
Purse Functionality	-	Value block format	Value block format	Value block format	Value file	Value file	Value file	-	-
Secure Transport Transaction	48 byte read 16 byte write	n.a.	512 byte read 16 byte write	512 byte read 128 byte write	512 byte read 128 byte write	512 byte read 128 byte write	512 byte read 128 byte write	-	-
Transaction Time [ms]	31.4	-	164	140	89	89	89	-	-
<b>Packaging</b>									
Sawn Wafer	-	MF1ICS2007W/V6D	MF1ICS5005W/V9D	MF1ICS7001W/V9D	-	-	-	-	-
Sawn Wafer (Au-Bumped)	MF0ICU1X01W/V1D	MF1ICS2005W/U7D	MF1ICS5005W/V1D	MF1ICS7001W/V1D	MF3ICD2101DUD/01	MF3ICD4101DUD/01	MF3ICD8101DUD/01	-	-
MOA2 Module	-	-	MF1MOA2550/D3(F/N)	-	-	-	-	-	-
MOA4 Module	-	MF1MOA4520/D	MF1MOA4550/D	MF1MOA4570/D	MF3MOD2101DA4/01	MF3MOD4101DA4/01	MF3MOD8101DA4/01	-	-
FCP2 Module	MF0FCP2U1X/DH	-	MF1FCP2550/DH	-	-	-	-	-	-
PDM1.1 Module	-	-	-	-	-	-	-	P5DF972EV2/T0PD2050	P5DF072EV2/T0PD4090
PCM1.1 Module	-	-	-	-	-	-	-	P5DF072EV2/T0PD2060	P5DF072EV2/T0PD4100

\*MAD: MIFARE Application Directory

\*\*MAD2: MAD Extension for 4 kbyte EEPROM size

\*\*\*MAD3: MAD2 Extension for DESFire

## ISO/IEC 18092

## ISO/IEC 14443

## NFC devices

Product features	NFC Transceivers		NFC Controllers		
	PN511	PN512	PN531	PN532	PN533
Operating distance typ [mm]	Up to 100 depending on mode, coil...	Up to 100 depending on mode, coil...	Up to 100 depending on mode, coil...	Up to 100 depending on mode, coil...	Up to 100 depending on mode, coil...
<b>Interfaces</b>					
Serial interface [Mbits/s]	up to 1.228	up to 1.228	up to 1.228	up to 1.228	up to 1.228
I <sup>2</sup> C interface [bits/s]	400k /3.4 M	400k /3.4 M	400k	400k	-
SPI interface [Mbits/s]	up to 5	up to 5	up to 5	up to 5	-
8 bits parallel interface	yes (with HVQFN40)	yes (with HVQFN40)	-	-	-
USB 2.0 (full speed) interface	no	no	yes	-	yes
CL FIFO depth [bytes]	64	64	64	64	64
Serial/SPI FIFO [bytes]	-	-	180	180	180
S <sup>2</sup> C interface	yes	yes	yes	yes	yes
CPU	no	no	80C51	80C51	80C51
RAM/ROM [bytes]	-	-	1k / 32k	1k / 40 k	1.2k / 44 k
<b>RF interface</b>					
Carrier Frequency [MHz]	13.56	13.56	13.56	13.56	13.56
Analog Interface	fully integrated	fully integrated	fully integrated	fully integrated	fully integrated
<b>Standard and Protocols</b>					
ISO 18092 Peer-to-peer (active/passive)	yes	yes	yes	yes	yes
ISO 14443-A Reader/Writer	yes	yes	yes	yes	yes
ISO 14443-B Reader/Writer	no	yes	no	yes	yes
Felica Reader/Writer	yes	yes	yes	yes	yes
Card emulation	FeliCa RF, ISO 14443-A, MIFARE	FeliCa RF, ISO 14443-A, MIFARE	FeliCa RF, ISO 14443-A, MIFARE	FeliCa RF, ISO 14443-A, MIFARE	FeliCa RF, ISO 14443-A, MIFARE
Baudrate [kbits/s]	106 / 212 / 424	106 / 212 / 424	106 / 212 / 424	106 / 212 / 424	106 / 212 / 424
<b>Security features</b>					
MIFARE classic	yes	yes	yes	yes	yes
Interface to smart card controller	S <sup>2</sup> C	S <sup>2</sup> C	S <sup>2</sup> C	S <sup>2</sup> C	S <sup>2</sup> C
<b>Additional Product information</b>					
Embedded firmware	no	no	yes	yes	yes
Middleware	HAL, NFC forum reference implementation	HAL, NFC forum reference implementation	HAL, NFC forum reference implementation	HAL, NFC forum reference implementation	HAL, NFC forum reference implementation
Integrated LDO voltage regulator	no	no	no	yes	no
Low battery mode	no	no	no	yes	no
Supply voltage [V]	2.5 - 3.6	2.5 - 3.6	2.5 - 4.0	2.7 - 5.5	2.5 - 3.6
Min. Host interface voltage[V]	1.6	1.6	1.6	1.6	1.6
USB bus power supply [V]	-	-	4.2 - 5.5	-	4.2 - 5.5
Supply voltage for secure device integrated	no	no	yes	yes	yes
Power down mode typ. [uA]	5	5	10	12	12
Power down mode with RF level detector on [uA]	10	10	30	15	30
Transmitter supply current typ. [mA]	60	60	60	60	60
Temperature range [C]	-25 / +85	-25 / +85	-25 / +85	-25 / +85	-25 / +85
Package thickness	0.85 mm	0.85 mm	0.85 mm	0.85 mm	0.85 mm
Package size	5x5 or 6x6 mm <sup>2</sup>	5x5 or 6x6 mm <sup>2</sup>	6x6 mm <sup>2</sup>	6x6 mm <sup>2</sup>	6x6 mm <sup>2</sup>
Package type	HVQFN32 or HVQFN40	HVQFN32 or HVQFN40	HVQFN40	HVQFN40	HVQFN40
Design In kit	OM5561	OM5571	OM5555	OM5581	planned

Product features	NFC secure modules
Embedded NFC IC	PN65L
Available host interfaces	serial, SPI, I <sup>2</sup> C
Embedded Secure IC	P5CN072
OS for secure device	JCOP or 3rd party
Stacked passive component IC	yes
Package thickness	1.2 mm
Package size	7x7 mm <sup>2</sup>
Package type	HLOFN48

Transceiver: RF front-end

Controller: RF front-end + microcontroller on single die

NFC secure module: NFC IC + Smart card IC in 1 package

**NXP SmartMX  
Dual Interface Security/PKI Controllers**

Product Features	PSSD005	PSSD009	P5CD009	P5CD036	P5CD072	P5CN072	P5CT072	P5CD012	P5CD020	P5CD040	P5CN080	P5CD080	P5CN144	P5CD144
CPU	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51
ISO Contact Interface	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816
ISO Contactless Interface	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	-	ISO 14443	ISO 14443	ISO 14443	ISO 14443	-	ISO 14443	-	ISO 14443
USB Interface	-	-	-	-	-	-	USB 2.0 (low speed)	-	-	-	-	-	-	-
NFC Interface type	-	-	-	-	-	S2C	-	-	-	-	S2C	-	S2C	-
ROM [byte]	64 K	96 K	96 K	160 K	160 K	160 K	160 K	200 K	200 K	200 K	200 K	200 K	200 K	200 K
RAM (linear addressable) [byte]	2.25 K	2.25 K	4.5 K	4.5 K	4.5 K	4.5 K	4.5 K	6 K	6 K	6 K	6 K	6 K	6 K	6 K
- Standard RAM [byte]	2.25 K	2.25 K	3.25 K	3.25 K	3.25 K	3.25 K	3.25 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K
- RAM accessible by FameXE [byte]	-	-	1.25 K	1.25 K	1.25 K	1.25 K	1.25 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K
EEPROM [byte]	6 K	12 K	12 K	36 K	72 K	72 K	72 K	12 K	20 K	40 K	80 K	80 K	144 K	144 K
<b>Security Features</b>														
PKI Crypto-Engine (FameXE)	-	-	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
(RSA key length up to 4096-bit)	-	-	yes	yes	yes	yes	yes	-	-	-	-	-	-	-
(RSA key length up to 8192-bit)	-	-	-	-	-	-	-	yes	yes	yes	yes	yes	yes	yes
RSA (1024 bit) signature generation	-	-	135 / 3 ms	135 / 3 ms	135 / 3 ms	135 / 3 ms	135 / 3 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms
(CRT)/verification, Exponent: 216+1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ECC (192-bit signature) generation/ verification	-	-	25 / 35 ms	25 / 35 ms	25 / 35 ms	25 / 35 ms	25 / 35 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms
DES-Engine	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs	DES3 < 40 μs
AES-Engine key length 128/192/256-bit	-	-	-	-	-	< 12/13/15 μs	< 12/13/15 μs	< 12/13/15 μs	< 12/13/15 μs	< 12/13/15 μs	< 12/13/15 μs	< 12/13/15 μs	< 12/13/15 μs	< 12/13/15 μs
Exception Sensors	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light
Memory Management Unit (Firewall)	-	-	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<b>Additional Product Information</b>														
UART for implemented interfaces	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
CRC-Engine	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Supply voltage [V]	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5
External Clock [MHz]	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 6	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10	1 ... 10 (13.56)	1 ... 10	1 ... 10 (13.56)
Internal Clock [MHz]	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30
Temperature range [°C]	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85
EEPROM page mode granularity [byte]	1 ... 64	1 ... 64	1...64	1...64	1...64	1...64	1...64	1...128	1...128	1...128	1...128	1...128	1...128	1...128
16-bit Timer/Counter	2	2	2	2	2	2	2	2	2	2	2	2	2	2
True Random Number Generator	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)
Technology	0,18 μm	0,18 μm	0,18 μm	0,18 μm	0,18 μm	0,18 μm	0,18 μm	0,18 μm	0,18 μm	0,14 μm	0,14 μm	0,14 μm	0,14 μm	0,14 μm
MIFARE** emulation (option)	yes, 1K or 4K sawn (75μ/150μ), unsawn	yes, 1K or 4K sawn (75μ/150μ), unsawn	yes, 1K or 4K sawn (75μ/150μ), unsawn	yes, 1K or 4K sawn (75μ/150μ), unsawn	yes, 1K or 4K sawn (75μ/150μ), unsawn	yes, 1K or 4K sawn/unsawn	yes, 1K or 4K sawn (75μ/150μ), unsawn	yes	yes	yes	yes	yes	yes	yes
Delivery Type Wafer	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	-	Contact, Dual Interface, Contactless	Contactless	Contactless	Contactless	Contactless	Contactless	Contactless	Contactless
Delivery Type Module	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	-	Contact, Dual Interface, Contactless	Contactless	Contactless	Contactless	Contactless	Contactless	Contactless	Contactless
<b>Evaluation and Certification</b>														
3rd Party Hardware Evaluation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Security Certificates*	EMVCo	EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo

\* Common Criteria (CC), EMVCo, ZKA and other evaluations planned depending on application requirements

\*\* MIFARE is a trademark of NXP B.V.

## NXP JCOP Product Range

Product Features	JCOP S10	JCOP S20	JCOP S30	JCOP10	JCOP21	JCOP31	JCOP41
JavaCard 2.2.1	+	+	+	+	+	+	+
GlobalPlatform 2.1.1	+	+	+	+	+	+	+
Visa Card Implementation Requirements 2.1.1 (Visa Errata 2.1.1)	+	+	+	+	+	+	+
MasterCard Requirements	+	+	+	+	+	+	+
EMVCo EMV 4.1 Book1	+	+	+	+	+	+	+
Visa Contactless payment spec			1.4.2 / 2.01			1.4.2 / 2.01	1.4.2 / 2.01
Common Criteria Security Certificates**					EAL 4+	EAL 4+	EAL 4+
VISA Type Approval	VISA	VISA	VISA	VISA	EAL 4+ VISA	VISA	
T=0 / T=1	ISO 7816-3	+	+	+	+	+	+
T=CL	ISO 14443-4		+			+	+
USB 2.0 LS	ISO7816-12						+
NFC Interface type	S2C					+	+
<b>Crypto support</b>							
DES3, DES	+	+	+	+	+	+	+
RSA up-to 2432 bit		+	+		+	+	+
RSA Key Generation		+	+		+	+	+
ECC GF(2n)					+	+	+
ECC GF(p)						+++	
SEED		+	+		+	+	+
SHA1		+	+		+	+	+
MD5					+	+	+
AES					+		+
MIFARE 1KB / 4KB emulation [byte]**			1KB			1KB / 4KB	1KB / 4KB
Available EEPROM options [byte]	10K	12K	12K	18K / 36K	18K / 36K / 72K	36K / 72K / 80K**	72K
Applets for payment included in ROM**	Visa	Visa	Visa	Visa	Visa	Visa	
Applets for eGovernment						BAC (EAL4+)	
Custom Masking for Applets in ROM	+	+	+	+	+		+
Delivery Type Wafer**	+	+	+	+	+	+	+
Delivery Type Module**	PCM1.1	PCM1.1	PDM1.1	PCM1.1	PCM1.1	PDM1.1 / MOB4 / SSOP20	PDM1.1
<b>Supported Application Features</b>							
Extended Access Control (EAC)						+	+
Basic Access Control (BAC)			+			EAL4+***	EAL4+***
Dynamic Data Authentication (DDA)		+	+		+	+	+
Static Data Authentication (SDA)	+	+	+	+	+	+	+
Multiple Security Domains					+	+	+
Data Authentication Pattern					+	+	+

\* Available on 72K version only

\*\* Not all possible combinations may be commercially available

\*\*\* planned



## NXP Contactless Payment

	Contactless Payment
<b>Product Features</b>	<b>P3SR008</b>
pre-installed applications	
PayPass Mag Stripe	v3.2
Visa c'less payment specification	v2.0.2
<b>Memory</b>	
EEPROM [byte]	8 K
Write Endurance [cycles]	500
Data Retention [years]	10
<b>RF Interface</b>	
Standard	ISO 14443 A
Frequency [MHz]	13.56
Baudrate [kbit/s]	106 / 212 / 424 / 848
Anticollision	True deterministic
Operating Distance [cm]	10
<b>Security</b>	
Unique Serial Number [byte]	7
Anti-tear supported by chip	yes
DES Engine	Triple-DES
Exception Sensors	V, f, T, light
Full MasterCard CAST certification	Yes
<b>General Product Information</b>	
Operating Temperature Range [°C]	-25 ... +85
<b>Packaging</b>	
MOB6 module	Standard
MOB4 module	Standard
Sawn wafer (8" on UV irradiated FFC)	120/75 um (Optional)

**NXP SmartMX**  
**Contact Interface Security / PKI Controllers**

Product Features	P5SC020	P5CC009	P5CC018	P5CC036	P5CU036	P5CC072	P5CC012	P5CC020	P5CC021	P5CC024	P5CC037	P5CC040	P5CC052	P5CC073	P5CC080	P5CC144
CPU	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51	Secure_MX51
ISO Contact Interface	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816	ISO 7816
ISO Contactless Interface	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USB Interface	-	-	-	-	USB 2.0 (low speed)	-	-	-	-	-	-	-	-	-	-	-
ROM [byte]	160 K	96 K	128 K	128 K	160 K	160 K	160 K	160 K	200 K	160 K	200 K	200 K	264 K	200 K	200 K	200 K
RAM (linear addressable) [byte]	3,5 K	4,5 K	4,5 K	4,5 K	4,5 K	4,5 K	6 K	6 K	6 K	6 K	6 K	6 K	6 K	6 K	6 K	6 K
- Standard RAM [byte]	3,5 K	3,25 K	3,25 K	3,25 K	3,25 K	3,25 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K	3,5 K
- RAM accessible by FameXE [byte]	-	1,25 K	1,25 K	1,25 K	1,25 K	1,25 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K	2,5 K
EEPROM [byte]	20 K	10 K	18 K	36 K	36 K	72 K	12 K	20 K	20 K	24 K	36 K	40 K	52 K	72 K	80 K	144 K
<b>Security Features</b>																
PKI Crypto-Engine (FameXE)	-	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
(RSA key length up to 4096-bit)	-	yes	yes	yes	yes	yes	-	-	-	-	-	-	-	-	-	-
(RSA key length up to 8192-bit)	-	-	-	-	-	-	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
RSA (1024 bit) signature generation (CRT)/verification, Exponent: 216+1	-	135 / 3 ms	135 / 3 ms	135 / 3 ms	135 / 3 ms	135 / 3 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms	99 / 2 ms
ECC (192-bit signature) generation/verification	-	25 / 35 ms	25 / 35 ms	25 / 35 ms	25 / 35 ms	25 / 35 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms	20 / 30 ms
DES-Engine	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs	DES3 < 40 µs
AES-Engine key length 128/192/256-bit	-	-	-	-	-	< 12/13/15 µs	-	< 12/13/15 µs	-	< 12/13/15 µs	-	< 12/13/15 µs	-	< 12/13/15 µs	< 12/13/15 µs	< 12/13/15 µs
Exception Sensors	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light	V, f, T, Light
Memory Management Unit (Firewall)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<b>Additional Product Information</b>																
UART for implemented interfaces	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
CRC-Engine	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Supply voltage [V]	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5	1.62 ... 5.5
External Clock [MHz]	1 ... 10	1 ... 10	1 ... 10	1 ... 10	1 ... 6	1 ... 6	1 ... 10	1 ... 10	1 ... 10	1 ... 10	1 ... 10	1 ... 10	1 ... 10	1 ... 10	1 ... 10	1 ... 10
Internal Clock [MHz]	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30
Temperature range [°C]	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85
EEPROM page mode granularity [byte]	1 ... 64	1...64	1...64	1...64	1...64	1...64	1 ... 64	1 ... 64	1...128	1 ... 64	1 ... 64	1...128	1 ... 64	1...128	1...128	1...128
16-bit Timer/Counter	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
True Random Number Generator	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)	yes, acc. to FIPS 140-2 / AIS 31 (Class P2)
Technology	0,14 µm	0,18 µm	0,18 µm	0,18 µm	0,18 µm	0,18 µm	0,14 µm	0,14 µm	0,14 µm	0,14 µm	0,14 µm	0,14 µm	0,14 µm	0,14 µm	0,14 µm	0,14 µm
Delivery Type Wafer	sawn (150µ)	sawn/unsawn (150µ)	sawn/unsawn (150µ)	sawn/unsawn (150µ)	sawn/unsawn (150µ)	sawn/unsawn (150µ)	sawn (150µ)	sawn (150µ)	sawn (150µ)	sawn (150µ)	sawn (150µ)	sawn (150µ)	sawn (150µ)	sawn (150µ)	sawn (150µ)	sawn (150µ)
Delivery Type Module	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact	Contact
Delivery Type SMD package	HVQFN32	SSOP20	-	SSOP20	-	SSOP20	HVQFN32	HVQFN32	HVQFN32	HVQFN32	HVQFN32	HVQFN32	HVQFN32	HVQFN32	HVQFN32	HVQFN32
<b>Evaluation and Certification</b>																
3rd Party Hardware Evaluation	planned	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Security Certificates*	CC EAL5+ planned EMVCo planned	CC EAL5+ EMVCo	EMVCo	CC EAL5+ EMVCo	-	CC EAL5+ EMVCo	CC EAL5+ planned EMVCo planned	CC EAL5+ planned EMVCo planned	CC EAL5+ EMVCo	CC EAL5+ planned EMVCo planned	CC EAL5+ planned EMVCo planned	CC EAL5+ EMVCo	CC EAL5+ planned EMVCo planned	CC EAL5+ EMVCo	CC EAL5+ EMVCo	CC EAL5+ EMVCo

\* Common Criteria (CC), EMVCo, ZKA and other evaluations planned depending on application requirements

## NXP 32-bit HiPerSmart Smart Computing Platform

	<b>Security Controller</b>
<b>Product Features</b>	<b>P9SC648</b>
CPU	32-bit MIPS RISC CPU
ISO Contact Interface	ISO 7816
ROM [byte]	-
Flash [byte]	512 K
RAM total [byte]*	16 K
Instruction Cache [byte]	2 K
Data Cache [byte]	1 K
EEPROM [byte]	142 K
<b>Security Features</b>	
Exception Sensors	V, f, T, Light
Memory Management Unit	yes
Hardware Firewall	yes
<b>Additional Product Information</b>	
UART for implemented interface	yes
GSM Power Control Mode	yes
Supply voltage [V]	1.62 ... 5.5
External Clock [MHz]	1 ... 8
Temperature Range [°C]	-25 ... +85
EEPROM page mode granularity [byte]	128 bytes
32-bit Timer/Counter	2
True Random Number Generator	yes, according to FIPS140-2 / AIS31
Technology	0,18 µm
Delivery Type Wafer	sawn/unsawn
Delivery Type Module	-
<b>Evaluation and Certification</b>	
3rd Party Hardware Evaluation	yes*
Certificates	
<b>Software</b>	
Secure Cryptolibrary	yes*

\* Common Criteria (CC), Mastercard, VISA, ZKA evaluations planned depending on application requirements

## NXP Contactless Smart eID Products

Product Features	Smart eID P304G002	Smart eID P308G002	Smart eID P310G002	Smart eID P332G004
pre-installed applications				
ICAO 9303 file system types	LDS, BAC	LDS, BAC	LDS, BAC	LDS, BAC
Enhanced file system types	BAC+	BAC+	BAC+	BAC+
Maximum number of files (DFs + EFs)	35	35	35	tbd
<b>Memory</b>				
EEPROM [byte]	4 K	8 K	10 K	32K
Write Endurance [cycles]	100	100	100	500
Data Retention [years]	20	20	20	20
<b>RF Interface</b>				
Standard	ISO 14443 A	ISO 14443 A	ISO 14443 A	ISO 14443 A
Frequency [MHz]	13.56	13.56	13.56	13.56
Baudrate [kbit/s]	106 / 212 / 424 / 848	106 / 212 / 424 / 848	106 / 212 / 424 / 848	106 / 212 / 424 / 848
Anticollision	True deterministic	True deterministic	True deterministic	True deterministic
Operating Distance [cm]	10	10	10	10
<b>Security</b>				
Unique Serial Number [byte]	7	7	7	7 (4 for MIFARE 1k emulation)
DES Engine	DES3 <40ms	DES3 <40ms	DES3 <40ms	DES3
Exception Sensors	V, f, T, light	V, f, T, light	V, f, T, light	V, f, T, light
<b>General Product Information</b>				
Operating Temperature Range [°C]	-25 ... +85	-25 ... +85	-25 ... +85	-25 ... +85
MIFARE emulation (option)	n/a	n/a	4k optional	1k or 4k optional
Availability	2007	2007	2007	Q3 / 2008
<b>Packaging</b>				
MOB6 module	n/a	n/a	n/a	P332G004tbd
MOB4 module	P304G002A4	P308G002A4	P310G002A4	P332G004A4
MOB2 module	P304G002A3	P308G002A3	n/a	n/a
Sawn wafer (8" on UV irradiated FFC)	P304G002UA	P308G002UA	n/a	n/a

## Development Tools Overview NXP Smart Card Controller Families

Product Family	Tool Components					
	Software Tools	Hardware Tools				
	C-Compiler, Assembler, Linker/Locator	Simulator	Source-Level Debugger, Integrated Development Environment	In-Circuit Emulator	Prototyping Kit	Smart Card Probe
<b>Extended 8051 Architecture</b>						
MIFARE ProX Family	Keil	Keil*	Ashling	Ashling	Ashling	Ashling
SmartMX Family	Keil	Keil*	Keil	Ashling	Ashling	Ashling
P5Sxyyy			Ashling	Philips	Keil	Keil
P5Cxyyy						
<b>Smart MIPS Architecture</b>						
HiPerSmart Family	MIPS, Distribution via Ashling	MIPS, Distribution via Ashling	Ashling	Ashling	Ashling	Ashling
P9Sxyyy		HPS FPGA Board, distributed via NXP		Philips		

\* Product specific simulator extensions are available from NXP free of charge

### Development Tool Packages available via NXP Sales

12NC	Type
<b>SmartMX Family</b>	
9352 767 14122	OM3700/5ULTRA51SQA
9352 767 15122	OM3702/5EPKSC
9352 767 16122	OM3703/5PKSC
9352 767 17122	OM3704/5CONVKIT
9352 775 22122	OM3730/5ULTRA51
9352 771 99122	OM3740/5DBOX
<b>HiPerSmart Family</b>	
9352 767 07122	OM3720/9VITRA
9352 767 08122	OM3721/9GENIA
9352 767 09122	OM3722/9OPELLA
9352 767 11122	OM3723/9PKSC
9352 767 13122	OM3729/9DEVCD
9352 771 31122	OM3748/9XC2V6000

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Identification product range

**NXP**  
founded by Philips