

NXP Contactless Reader Systems

Product Features	Reader ICs								Evaluation kits			
	MF RC500	MF RC530	MF RC531	CLRC632	SLRC400	MF RC522	MF RC523	CLRC643	CLRD701	MF EV170	MF EV552	
Operating distance up to [m] (m)	100	100	100	100 / 150 ^a	100	100	100	100	70 / 150 ^a	100 ^a	100 ^a	
RFID depth [bytes]	64	64	64	64	64	64	64	512	64	64	64	
Host interface	8-bit parallel	8-bit parallel	SPI	SPI	SPI	SPI	SPI	2x I ² C	USB	USB, Ethernet, Jtag	USB, Ethernet, Jtag	
			8-bit parallel	8-bit parallel	8-bit parallel	RS232	RS232	RS232		(with additional connection board)	(with additional connection board)	
RF interface												
Analog interface	fully integrated	fully integrated	fully integrated	fully integrated	fully integrated	fully integrated	fully integrated	fully integrated	CLRC632	RC523	RC552	
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	
Modulation	100% ASK	100% ASK	100% & 100% ASK	100% & 100% ASK	100% & 100% ASK	100% ASK	100% & 100% ASK	100% & 100% ASK	100% & 100% ASK	100% & 100% ASK	100% & 100% ASK	
Baudrate ISO 14443 [bits/s]	106	106/212/424	106/212/424	106/212/424	106/212/424	106/212/424/848	106/212/424/848	106/212/424/848	106/212/424	106/212/424/848	106/212/424/848	
Baudrate ISO 15693 [bits/s]	-	-	-	1.66/26.5/53	1.66/26.5/53	-	-	1.66/26.5/53	-	-	-	
Standards & Protocols	-	-	-	-	-	-	-	-	-	-	-	
NFC Tag Type Reader	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
ISO 14443 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
ISO 14443 B	-	-	yes	yes	-	yes	yes	yes	-	yes	yes	
ISO 15693	-	-	yes	yes	-	yes	yes	yes	-	yes	yes	
MIFARE Classic support	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
iCODE 1 protocol	-	yes	-	yes	-	-	-	yes	-	-	-	
HF EPIC protocol	-	-	-	yes	-	yes	-	yes	yes	-	-	
ISO 18092 (NFC)	-	-	-	-	-	-	yes ^a	-	-	-	-	
Security Features												
MIFARE Classic	yes	yes	yes	yes	-	yes	yes	yes	yes	yes	yes	
Additional Product Information												
Supply voltage digital [V]	5	3.3 or 5	3.3 or 5	3.3 or 5	5	3.3	3.3	3.3	5	5	5	
Supply voltage analog [V]	5	5	5	5	5	3.3	3.3	3.3	5	5	5	
Power down mode current, typ. [uA]	2	2	2	2	2	1	1	1	n.a.	n.a.	n.a.	
Temperature range [°C]	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85	0/+70	0/+70	0/+70	
Package	S032	S032	S032	S032	S032	HVOFN32	HVOFN32	HVOFN32	-	-	-	
Approvals												
EMC	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	CE, FCC	CE, FCC	CE, FCC	

⁽¹⁾ Depending on antenna, coil size, tuning, and environment ⁽²⁾ Only passive mode initiator support ⁽³⁾ For ISO15693 ⁽⁴⁾ With external booster

NXP Contact Smart Card Reader ICs

Product Features	Analog Interface						Analog & UART	Analog & UART & CPU
	TDA8020	TDA8023	TDA8024	TDA8025	TDA8026	TDA8034		
Analog interfaces	2	1	-	-	5	1	1	-
ISO 7816 UART	no	no	no	no	no	no	no	yes
ISO 7816 dedicated timers	no	no	no	no	no	no	yes	yes
µC	-	-	-	-	-	-	-	80C51RB+
ROM(byte) / RAM(byte)	-	-	-	-	-	-	-	16/768
Flexible sequence programming	no	yes	no	no	yes	no	no	-
I/O interface	PC	PC	I/O lines	I/O lines	I/O lines	I/O lines	I/O lines	8 bit parallel
ESD protection on ISO pads [kV]	0	2	6	6	7	6	6	6
Analog protection lines for C&D and C&B contacts	0	2	2	2	2 (on slot 1)	2	2	2
Vcc card supply [V]	3.6-5	3.6-5	5	1.2 & 1.8 & 3.5	5	1.8 & 3.6-5	2	1.8 & 3.6-5
Card supply current @ 5 V Vcc [mA]	2450	55	80	-	55	65	65	55
Card supply current @ 3 V Vcc [mA]	2450	55	65	-	55	65	65	55
Card supply current @ 1.8 V Vcc [mA]	-	35	65	-	35	35	35	30
Card supply voltage @ 21 V Vcc [mA]	-	-	-	30	-	-	-	-
Card clock frequency max. [MHz]	20	20	26	20	26	26	26	26
Card activation time max. [µs]	135	135	240	225	240	135	240	135
Card deactivation time max. [µs]	110	110	100	100	100	250	90	100
Pin/LED support	-	-	-	-	-	-	-	-
Synchronous card management	-	yes	-	-	yes	yes	yes	yes
Asynchronous protocol T=0 and T=1	-	yes	-	-	yes	yes	yes	yes
Security Features	yes	yes	yes	yes	yes	yes	yes	yes
Voltage supervisor and over current detection	yes	yes	yes	yes	yes	yes	yes	yes
Current protection on I/O, I/O, RST, CLK	-	-	-	-	-	-	-	-
Additional Product Information								
Power supply interface VDDI [V]	-	1.5 - 6.5	-	1.6 - 3.3	-	1.6 - 3.6	-	-
Power supply (V)	2.7 - 5.5	2.7 - 6.5	2.7 - 6.5	3.6 - 5.5	2.7 - 5.5	2.7 - 5.5	2.7 - 6.0	2.7 - 6.0
Power down current max. (µA)	150	20	20	20	25	12	1	350
Temperature range (°C)	-20	-40/85	-40/85	-25/85	-25/85	-25/85	-25/85	-25/85
Package	LOFP32	TSSOP28	SO28 & TSSOP28	HVQFN32	TBGA64	HVQFN28 & S016	HVQFN32	LOFP32
Software libraries (EMV 4.2)	-	-	-	yes	-	yes	yes	yes
NEOS compliance	-	-	-	yes	-	yes	yes	yes

NXP MIFARE™ SAMs for Reader Systems

Product Features	MiFare SAM AV1 MF3 IC D81 SAM	MiFare SAM AV2	MF1RB52
Memory			
EEPROM size [byte]	72 K	81 K	72 K
OTP area [bit]	-	-	-
Write Endurance [cycles]	100 000	10 000	100 000
Data Retention [years]	10	10	10
Secure key storage	up to 128 key entries	up to 128 key entries	up to 128 key entries
Serial interface			
UART	ISO 7816, T=1	ISO 7816, T=1	ISO 7816, T=1
Frequency [MHz]	1 ... 10	1 ... 10	1 ... 10
Baudrate [Nbit/s]	9.6 ... 1500	9.6 ... 1500	9.6 ... 1500
Security			
Unique Serial Number [byte]	7	7	7
Random Number Generator	yes	yes	yes
Access Conditions	per key entry	per key entry	per key entry
Access Keys	per key entry	per key entry	per key entry
MIFARE Classic Security	MACing / Encipherment	MACing / Encipherment	MACing / Encipherment
DES & DES3 Security	MACing / Encipherment	MACing / Encipherment	MACing / Encipherment
AES 128 Security	MACing / Encipherment	MACing / Encipherment	MACing / Encipherment
PGI	-	-	-
RSA	-	-	-
Packaging			
PCM1: 1 module	PSDF072EV2/TP0D4090	PSDF081X0/1A12D805	-
HVICF1 package	HVQFN32: PSDF072ZH/H/TP0D4090	HVQFN32: PSDF081H/H/1A12D805	HVQFN48

NXP HITAG™ Reader ICs

Product Features	HTIRC10 HITAG™ Reader ICs
Modulation Type	100% ASK
Dimensions [mm]	6.2 x 3.75 x 1.45
Interface	CMOS
Supply Voltage [V]	5 ±10%
Antenna Driver Current [mA]	200 continuous
Clock Out Frequency [MHz]	4 - 16
Operating Temperature [°C]	-40 ~ +85
Power Down Current [µA typ.]	7
Supporting Products	
HITAG™ 1	yes
HITAG™ 2	yes
HITAG™ 5	yes
HITAG™ 5u	yes
Security	
HITAG™ 1 data encryption	-
HITAG™ 2 data encryption	-
HITAG™ 5 data encryption	-
Package	
S014, Tube	HTIRC10 D17/02SE
S014, Reel	HTIRC10 D17/02SE

NXP Smart Label and Tag IC

Product Features	HITAG™ 1	HITAG™ 2	HITAG™ 5	HITAG™ μ	HITAG™ μ Advanced HITAG™ μ Advanced	HITAG™ μ 18000	HITAG™ R064	ICODE SL-S1 ICODE SL-S5	ICODE SL1	ICODE SL-L	ICODE SLX	ICODE SLX-S	ICODE SLX-L	ICODE UID-OTP	ICODE UID	ICODE EPC	ICODE HSL	ICODE G2XL	ICODE G2XM	ICODE G2L / G2L+
Total Memory	2048	256	256, 2048	128	512, 1760	1760	64	2048	1024	512	1024	2048	512	192	192	136	2048	368	880	256
Size [bit]	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	10 000	10 000	100 000	100 000	100 000	100 000	10 000
Write Endurance [cycles]	10	10	10	10	10	10	10	10 / 40 ¹⁾	10	10 / 40 ¹⁾	10	50	50	5	5	10	50	100 000	50	20
Data Retention [yrs]	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Organisation	64 blocks ã 4 bytes	8 blocks ã 4 bytes	8 blocks ã 4 bytes 64 blocks ã 4 bytes	4 blocks ã 4 bytes	16 blocks ã 4 bytes 55 blocks ã 4 bytes	55 blocks ã 4 bytes	2 blocks ã 4 bytes	16 pages each 4 blocks ã 4 bytes	32 blocks ã 4 bytes	4 pages each 4 blocks ã 4 bytes	32 blocks ã 4 bytes	16 pages each 4 blocks ã 4 bytes	32 blocks ã 4 bytes	4 pages each 4 blocks ã 4 bytes	24 blocks ã 1 byte	24 blocks ã 1 byte	17 blocks ã 1 byte	64 blocks ã 4 bytes	23 blocks ã 2 bytes	55 blocks ã 2 bytes 16 blocks ã 2 bytes
RF-Interface																				
According to	HITAG 1	HITAG 2, ISO 11784/85	HITAG 1+, ISO 11784/85	ISO 11784/85 acc. HITAG μ	ISO 11784/85 acc. HITAG μ	ISO 18000	-	ISO 15693, ISO 18000, EPC ¹⁾	ISO 15693, ISO 18000	ISO 15693, ISO 18000	ISO 15693, ISO 18000	ISO 15693, ISO 18000	ISO 15693, ISO 18000	EPC ¹⁾	EPC ¹⁾	EPC ¹⁾	ISO18000-68	EPC Class 1 Gen2	EPC Class 1 Gen2	EPC Class 1 Gen2
Frequency	100 ... 150 kHz up to 4	100 ... 150 kHz up to 4	100 ... 150 kHz up to 8	100 ... 150 kHz up to 8	100 ... 150 kHz up to 8	100 ... 150 kHz up to 8	100 ... 150 kHz up to 8	13.56 MHz up to 53	13.56 MHz up to 53	13.56 MHz up to 53	13.56 MHz up to 53	13.56 MHz up to 53	13.56 MHz up to 53	13.56 MHz up to 53	13.56 MHz up to 53	13.56 MHz up to 53	UHF/2.4 GHz up to 40	840 ... 960 MHz up to 640	840 ... 960 MHz up to 640	840 ... 960 MHz up to 640
Baudrate [bit/s]	yes, collision detection up to 1.5	-	-	yes, collision detection up to 2.0	yes, collision detection up to 2.0	yes, collision detection up to 2.0	yes, collision detection up to 2.0	acc. ISO 15693, ISO 18000, EPC ¹⁾ up to 1.5	acc. ISO 15693, ISO 18000 up to 2.0 ¹⁾	acc. ISO 15693, ISO 18000 up to 2.0 ¹⁾	acc. ISO 15693, ISO 18000 up to 2.0 ¹⁾	acc. ISO 15693, ISO 18000 up to 2.0 ¹⁾	acc. ISO 15693, ISO 18000 up to 2.0 ¹⁾	acc. EPC ¹⁾ up to 1.5	acc. EPC ¹⁾ up to 1.5	acc. EPC ¹⁾ up to 1.5	binary tree up to 7	slotted ALPHA	slotted ALPHA	slotted ALPHA
Operating Distance [m]	up to 1.5	up to 1.5	up to 1.5	up to 2.0	up to 2.0	up to 2.0	up to 2.0	up to 1.5	up to 2.0 ¹⁾	up to 2.0 ¹⁾	up to 2.0 ¹⁾	up to 2.0 ¹⁾	up to 2.0 ¹⁾	up to 1.5	up to 1.5	up to 1.5	up to 7	up to 10	up to 10	>10
Security																				
Unique Serial Number [byte]	4	4	4	6	6	6	5	8	8	8	8	8	8	5	5	-	8	TID-64 bit incl. 32 bit serial number	TID-64 bit incl. 32 bit serial number	TID-64 bit incl. 32 bit serial number
Write Protection	blockwise	blockwise	blockwise	blockwise, multi user mode	blockwise	blockwise	-	blockwise	blockwise	blockwise	blockwise	blockwise	blockwise	OTP	-	OTP	bitwise	blockwise	blockwise	blockwise
Access Keys	32-bit	48-bit	48-bit	32-bit	32-bit	32-bit	-	32-bit	-	-	-	-	-	-	-	-	32-bit	32-bit	32-bit	32-bit
Access Conditions	Encrypted Mutual Authentication or Plain	Encrypted Mutual Authentication or Plain	Authentication or Plain	Plain, Password	Plain, Password	Plain, Password	-	Plain, Password Pagewise configurable password protection read/write	-	-	-	-	-	-	-	-	-	Plain, Read/Write Password	Plain, Read/Write Password	Plain, Read/Write Password
Encryption Algorithm	yes	yes	yes, for authentication only	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Special Features																				
EAS	-	-	-	-	-	-	-	yes (Plain, Password)	yes	yes (Plain, Password)	yes (Plain, Password)	yes (Plain, Password)	yes (Plain, Password)	yes (Plain, Password)	-	-	-	yes	yes	yes
API	-	-	-	-	-	-	-	yes	yes	yes	yes	yes	yes	yes	-	-	-	yes	yes	yes
EPC	-	-	-	-	-	-	-	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
User Memory [bit]	1792	128	192, 1984	128	512, 1760	1760	yes	1280	896	256	896	1280	256	96 bit	96 bit	96 bit	1728	240 bit	512	128 bit
TTF Modes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Destroy Command	-	-	-	-	-	-	-	yes	-	-	-	-	-	yes	-	-	-	yes	yes	yes
Privacy Command	-	-	-	-	-	-	-	yes	-	-	-	-	-	yes	-	-	-	Read Protect	Read Protect	Read Protect, Read Range Reduction (RR)
Others	RTF	RTF & TTF	RTF & TTF	RTF & TTF, Fast Write	RTF & TTF, Fast Write	RTF	TTF	fast inventory	fast inventory	fast inventory	fast inventory	fast inventory	fast inventory	fast inventory	fast inventory	fast inventory	fast inventory	fast inventory	fast inventory	Tag tamper alarm, digital switch, data transfer, battery ass mode
Packaging																				
Sawn Wafer	HT1CS3002W/VF	HT2CS2002W/VF	HTSICH501EW/V1 HTSICH4801EW/V1	HTMS1001FUG/ AM ¹⁾ HTMS8001FUG/ AM ¹⁾ HTMS1201FUG/ AM ¹⁾ HTMS201FUG/ AM ¹⁾	HTMS1001FUG/ AM ¹⁾ HTMS801FUG/ AM ¹⁾ HTMS1201FUG/ AM ¹⁾ HTMS201FUG/ AM ¹⁾	HTMS1301FUG/ AM ¹⁾ HTMS8301FUG/ AM ¹⁾ HTMS1301FUG/ AM ¹⁾	HTCIC6A02FUG/ AM ¹⁾ HTCIC6A03FUG/ AM ¹⁾	SL2 IC5S3101EW/V7 SL2 IC5S401EW/ V7 ¹⁾ SL2 IC3S113EW/ V7 ¹⁾	SL2 IC5S201DW/ V1D	SL2 IC5S01EW/V7 SL2 IC5S101EW/V7 ¹⁾	SL2 S2002FUD SL2 S2102FUD ¹⁾	SL2 S2302FUD SL2 S5402FUD ¹⁾	SL2 S5002FUD SL2 S5102FUD ¹⁾	SL2 IC51201DW/V1	SL2 IC51101DW/V1	SL2 IC51001DW/V1	SL3ICS301FW/V4	SL3ICS1202FUG/ V7AF	SL3ICS1202FUG/ V7AF	SL3S1203FUF (G2L) SL3S1213FUF (G2L+)
Other Packages	MOA2	MOA2, SOT 385-1	FCP2, HVSON2,	HVSON2, SOT-1122	HVSON2, SOT-1122	HVSON2	FCP2, MOA2	FCP2, MOA2, FCP2-A, FC52-CU	FCP2, MOA2	SOT-1122	SOT-1122	-	SOT-1122	-	-	-	TSSOP8	FC52-A1, FC52-CU, SOT-1122, TSSOP8	FC52-A1, FC52-CU, SOT-1122, TSSOP8	FC52-A1, FC52-CU, SOT-1122, TSSOP8

⁽¹⁾ 210 pF ±3% ⁽²⁾ 280 pF ±5% ⁽³⁾ HC: high capacitance (97 pF) ⁽⁴⁾ HF EPC Class 1: EPCglobal/Auto-ID Center Specification ⁽⁵⁾ Based on ECC regulations ⁽⁶⁾ ICODE SLI-SY

ISO 7816 ISO 14443

Product Features	MF1ARE UltraHigh™	MF1ARE UltraHigh™ C	MF1ARE Classic 1K	MF1ARE Classic 4K	MF1ARE Plus™ S 2K	MF1ARE Plus™ S 4K	MF1ARE Plus™ X 2K	MF1ARE Plus™ X 4K	MF3 IC D21	MF3 IC D41	MF3 IC D81
	MF0 IC U1X	MF0 IC U2X	MF1 S50	MF1 S70	MF1 SPLUS 60	MF1 SPLUS 80	MF1 PLUS 60	MF1 PLUS 80	MF3 IC D21	MF3 IC D41	MF3 IC D81
Memory											
EEPROM size (byte)	64	192	1024	4096	2048	4096	4096	4096	2048	4096	8192
OTP area [bit]	32	32	-	-	-	-	-	-	-	-	-
Write Endurance [cycles]	10 000	10 000	100 000	100 000	200 000	200 000	200 000	200 000	500 000	500 000	500 000
Data Retention [yrs]	5	5	10	10	10	10	10	10	10	10	10
Organization	16 pages à 4 byte	48 pages à 4 byte	16 sectors à 64 byte	32 sectors à 256 byte	32 sectors à 64 byte	32 sectors à 64 byte	32 sectors à 64 byte	32 sectors à 64 byte	flexible file system	flexible file system	flexible file system
RF-Interface											
Anc. 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	yes - up to layer 4	yes - up to layer 4	yes - up to layer 4	yes - up to layer 4
Frequency [MHz]	13.56	13.56	13.56	13.56	13.56	13.56	13.56	13.56	13.56	13.56	13.56
Baudrate [kb/s]	106	106	106	106	106... 848	106... 848	106... 848	106... 848	106... 848	106... 848	106... 848
Anticollision	bit-wise	bit-wise	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	up to 100	up to 100	up to 100	up to 100
Security											
Serial Number [byte]	7 B UID	7 B UID	4 B NUID or 7 B UID with optional random ID*	4 B NUID or 7 B UID with optional random ID*	4 B NUID or 7 B UID, optional random ID yes	4 B NUID or 7 B UID, optional random ID yes	4 B NUID or 7 B UID, optional random ID yes	4 B NUID or 7 B UID, optional random ID yes	7 B UID	7 B UID	7 B UID
Random Number Generator	-	yes	yes	yes	2 CRYPT01 or AES keys per sector	2 CRYPT01 or AES keys per sector	2 CRYPT01 or AES keys per sector	2 CRYPT01 or AES keys per sector	yes	yes	yes
Access Keys	1 key	1 key	2 keys per sector	2 keys per sector	per sector supported in security level 1&2	per sector supported in security level 1&2	per sector supported in security level 1&2	per sector supported in security level 1&2	14 keys per application	14 keys per application	14 keys per application
Access Conditions	per page	per page	per sector	per sector	per sector supported in security level 1&2	per sector supported in security level 1&2	per sector supported in security level 1&2	per sector supported in security level 1&2	per file	per file	per file
MF1ARE Classic™ Security (Crypto1)	-	MF1ARE Classic™ Security (Crypto1)	-	-	CMACing for AES keys, sector trailers and configuration	CMACing for AES keys, sector trailers and configuration	CMACing for AES keys, sector trailers and configuration	CMACing for AES keys, sector trailers and configuration	CMACing / Encryption	CMACing / Encryption	CMACing / Encryption
DES & DES3 Security	-	authentication	-	-	-	-	-	-	CMACing / Encryption	CMACing / Encryption	CMACing / Encryption
AES 128 Security	-	-	-	-	-	-	-	-	yes	yes	yes
Anti-tear supported by chip	-	-	for value blocks	for value blocks	-	-	-	-	-	-	-
Special Features											
Multi-application	-	-	supports MAD*	supports MAD**	supports MAD**	supports MAD**	supports MAD**	supports MAD**	28 applications, MAD3**	28 applications, MAD3**	28 applications, MAD3**
Special Functionalities	-	-	-	-	Multi-sector authentication	Multi-sector authentication	Multi-sector authentication	Multi-sector authentication	Automatic backup mechanism Random ID (optional)	Automatic backup mechanism Random ID (optional)	Automatic backup mechanism Random ID (optional)
Purse Functionality	-	16-bit counter	Value block format	Value block format	-	-	-	-	Value file	Value file	Value file
Packaging											
Sawn Wafer	-	-	4 B NUID MF1S503SDUH	4 B NUID MF1S703SDUB	-	-	-	-	-	-	-
Sawn Wafer (Au-Bumped)	MF0ICU1001W/STDL (17 pF, 75 µm)	MF0ICU1001W/STDL (50 pF, 75 µm)	MF0ICU2001DU0L (17 pF)	7 B UID MF1S503XJOLU** 4 B NUID MF1S503XJOLDU*	7 B UID MF1S703XJOLU** 4 B NUID MF1S703XJOLDU*	7 B UID MF1SPLUS6001DU03 4 B NUID MF1SPLUS6031DU03	7 B UID MF1SPLUS8001DU03 4 B NUID MF1SPLUS8031DU03	7 B UID MF1PLUS6001DU03 4 B NUID MF1PLUS6031DU03	MF3ICD2011DU0D/05 (17 pF) MF3ICD2H101DU0D/05 (70 pF)	MF3ICD4011DU0D/05 (17 pF) MF3ICD4H101DU0D/05 (70 pF)	MF3ICD8011DU0D/05 (17 pF) MF3ICD8H101DU0D/05 (70 pF)
MOA2 Module	-	-	4 B NUID MF1S503QDA3	4 B NUID MF1S703QDA3	-	-	-	-	-	-	-
MOA4 Module	MF0MOU201DA4 (17 pF)	MF0MOU201DA4 (50 pF)	7 B UID MF1S5000QDA4* 4 B NUID MF1S5003QDA4*	7 B UID MF1S7000QDA4* 4 B NUID MF1S7003QDA4*	7 B UID MF1SPLUS6001DA4/03 4 B NUID MF1SPLUS6031DA4/03	7 B UID MF1SPLUS8001DA4/03 4 B NUID MF1SPLUS8031DA4/03	7 B UID MF1PLUS6001DA4/03 4 B NUID MF1PLUS6031DA4/03	7 B UID MF1PLUS8001DA4/03 4 B NUID MF1PLUS8031DA4/03	MF3MOD2011DA4/05 (17 pF) MF3MOCH2H101DA4/05 (70 pF)	MF3MOD4011DA4/05 (17 pF) MF3MOCH4H101DA4/05 (70 pF)	MF3MOD8011DA4/05 (17 pF) MF3MOCH8H101DA4/05 (70 pF)
MOA8 Module	-	-	7 B UID MF1S5000QDA8* 4 B NUID MF1S5003QDA8*	7 B UID MF1S7000QDA8* 4 B NUID MF1S7003QDA8*	-	-	-	-	-	-	-

*MAD: MIFARE Application Directory **MAD2: MAD Extension for 4 kbyte EEPROM size ***MAD3: MAD2 Extension for DESFire
 / Available from Q1 2011 onwards/X-Types available from Q2 2011 onwards ** <y> indicating the silicon source

Specification subject to change without notice.

Date of Release: November 2010

Document order number: 9397 750 17001

All rights reserved. Reproduction in whole or in part is prohibited without prior written permission.

consent of the copyright owner.

© NXP Semiconductors N.V.

 Z-CARD® PocketMedia® (trade marks used by Z by licence.) This product is a doubly-folded sheet card.

associated machinery and processes are subject to European patents granted and pending, copyright, trade marks and

property rights including European patent numbers 8
Z Industries Ltd. Produced under licence by Z-CAL

Z-CARD Tel: +44 (0)207 924 5147. DDM, Hertsdreel 5, 2
Tel: 014 72 80 71 Fax: 014 45 37 32 belgium@zcard

www.zcard.com

ICs with DPA Countermeasures functionality

LICENSED
DPA
COUNTERMEASURES

measures functionality

NXP ICs containing functionality implementing countermeasures to Differential Power Analysis and Simple Power Analysis are produced and sold under applicable license from Cryptography Research, Inc.

Z-CARD PocketMiles® (trade marks used by Z Industries Ltd.) This product is a double-sided sheet card associated machinery and processes are subject to European patents granted and pending, copyright, trade marks and property rights including European patent numbers 1 210 419 and 1 210 420. Produced under licence by Z-CARD Ltd. Tel: +44 (0)203 824 5547, 0208, Herford Street 5, 2010. Tel: 014 72 80 78 Fax: 014 45 37 32 bdgman@zcard.com
www.zcard.com

NXP SmartMX Secure Microcontrollers													
Product Features	PSCD012	PSCD016	PSCD020	PSCD021	PSCD040	PSCD041	PSCD080	PSCD081	PSCD081	PSCD128	PSCD144	PSCD144	PSCD145
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
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 Contactless Interface	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443	ISO 14443
NFC Interface type	-	-	-	-	-	-	S2C	-	-	S2C	-	-	-
ROM [Byte]	200 K	264 K	200 K	264 K	200 K	264 K	200 K	264 K	264 K	200 K	264 K	200 K	264 K
RAM (non-addressable) [Byte]	6.8 K	7.5 K	6.8 K	7.5 K	6.8 K	7.5 K	6.8 K	7.5 K	7.5 K	6.8 K	7.5 K	6.8 K	7.5 K
- Standard RAM [Byte]	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	3.5 K	3.5 K	3.5 K
- RAM accessible by FAMEXE [Byte]	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	2.5 K	2.5 K	2.5 K
EEPROM [Byte]	12 K	16 K	20 K	20 K	40 K	40 K	80 K	80 K	80 K	144 K	144 K	144 K	144 K
Security Features													
PK Crypto-Engine (FAMEXE)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
DES-AES key length up to 8192-bit	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
RSA (1024 bit) signature generation (CRT)/verification, Exponent: 216+1	99 / 2 ms	71 / 2 ms	99 / 2 ms	71 / 2 ms	99 / 2 ms	71 / 2 ms	99 / 2 ms	99 / 2 ms	71 / 2 ms	99 / 2 ms	99 / 2 ms	71 / 2 ms	99 / 2 ms
ECC (192-bit signature) generation/verification	32 / 60 ms	17 / 33 ms	32 / 60 ms	17 / 33 ms	32 / 60 ms	17 / 33 ms	32 / 60 ms	17 / 33 ms	17 / 33 ms	32 / 60 ms	32 / 60 ms	17 / 33 ms	17 / 33 ms
DES-Engine	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us	DES3 < 40 us
AES-Engine key length 128/192/256-bit	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us	< 10/11/12 us
Exception Sensors	V, f, T, Light	yes	yes	yes	V, f, T, Light	yes	yes	yes	yes	V, f, T, Light	yes	yes	yes
Memory Management Unit (Firewall)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Additional Product Information													
UART for implemented interfaces	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
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
External Clock [MHz]	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)
Internal Clock [MHz]	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 30	1 ... 62	1 ... 62	1 ... 62	1 ... 62	1 ... 62	1 ... 62	1 ... 62
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
EEPROM page mode granularity [Byte]	1 ... 128	1 ... 128	1 ... 128	1 ... 128	1 ... 128	1 ... 128	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
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)
Technology	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	0.14 µm	0.14 µm	0.14 µm
MIFARE® emulation (option)	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K	yes, 1 K or 4 K
Delivery Type Wafer	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)
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	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless
Evaluation and Certification													
3 rd Party Hardware Evaluation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Security Certificates*	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	CC EAL5+ EMVCo

* Common Criteria (CC), EMVCo, ZKA and other evaluations planned depending on application requirements ** MIFARE is a trademark of NXP Semiconductors N.V.

NXP SmartMX2 Secure Microcontrollers									
Product Features	P6D0D24	P6D0D40	P6D0D80	P6D0D144	P6D0N144	P6D0C040	P6D0C080	P6D0C144	
CPU (enhanced 8/16/24/32 bit instruction set)	Secure_SMX2	Secure_SMX2	Secure_SMX2	Secure_SMX2	Secure_SMX2	Secure_SMX2	Secure_SMX2	Secure_SMX2	Secure_SMX2
ISO Contactless Interface	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				
NFC Interface type	-	-	-	-	S2C	-	-	-	
Concurrent contactless/contact operation	yes	yes	yes	yes	yes	yes	yes	yes	
User ROM [Byte]	264 K	300 K	384 K	384 K	384 K	300 K	384 K	384 K	
RAM (linear addressable) [Byte]*	8.125 K	8.125 K	8.125 K	8.125 K	8.125 K	8.125 K	8.125 K	8.125 K	
- Standard RAM accessible by CPU [Byte]	5.5 K	5.5 K	5.5 K	5.5 K	5.5 K	5.5 K	5.5 K	5.5 K	
- RAM accessible by FAME2 and CPU [Byte]	2.625 K	2.625 K	2.625 K	2.625 K	2.625 K	2.625 K	2.625 K	2.625 K	
EEPROM [Byte]*	24 K	40 K	80 K	144 K	144 K	40 K	80 K	144 K	
Security Features									
PKC: New Crypto-Engine (FAME2) for ECC/RSA	yes	yes	yes	yes	yes	yes	yes	yes	
SBC: Dual/triple key DES-Engine	yes	yes	yes	yes	yes	yes	yes	yes	
SBC: AES-Engine key length 128/192/256-bit	yes	yes	yes	yes	yes	yes	yes	yes	
Sensor/Glue Logic/Secure Fetch	yes	yes	yes	yes	yes	yes	yes	yes	
Memory Management Unit (Firewall)	yes	yes	yes	yes	yes	yes	yes	yes	
Additional Product Information									
UART for implemented interfaces	yes	yes	yes	yes	yes	yes	yes	yes	
Copy Machine and 16/32-bit CRC-Engine	yes	yes	yes	yes	yes	yes	yes	yes	
Supply voltage [V] (continuous operation)	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 ... 10 (13.56)	1 ... 10 (13.56)	1 ... 10 (13.56)	
Internal Clock (1 CPU cycle/clock) ** [MHz]	1 ... 20	1 ... 20	1 ... 20	1 ... 20	1 ... 20	1 ... 20	1 ... 20	1 ... 20	
Temperature range [°C]	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85	
EEPROM page mode granularity [Byte]	1 ... 128	1 ... 256	1 ... 256	1 ... 256	1 ... 256	1 ... 256	1 ... 256	1 ... 256	
16-bit Timer/Counter	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)	
Technology	0.09 µm	0.09 µm	0.09 µm	0.09 µm	0.09 µm	0.09 µm	0.09 µm	0.09 µm	
MIFARE Plus™ implementation (option)	yes, 2 K or 4 K	yes, 2 K or 4 K	yes, 2 K or 4 K	yes, 2 K or 4 K	yes, 2 K or 4 K	yes, 2 K or 4 K	yes, 2 K or 4 K	yes, 2 K or 4 K	
MIFARE DESFire EV1™ implementation (option)	yes, 2 K, 4 K or 8 K	yes, 2 K, 4 K or 8 K	yes, 2 K, 4 K or 8 K	yes, 2 K, 4 K or 8 K	yes, 2 K, 4 K or 8 K	yes, 2 K, 4 K or 8 K	yes, 2 K, 4 K or 8 K	yes, 2 K, 4 K or 8 K	
Delivery Type Wafer	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (75 µ/150 µ)	12 inch sawn (150 µ)	12 inch sawn (150 µ)	12 inch sawn (150 µ)	
Delivery Type Module	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact, Dual Interface, Contactless	Contact	Contact	Contact	
Evaluation and Certification									
3 rd Party Hardware Evaluation	yes	yes	yes	yes	yes	yes	yes	yes	
Security Certificates***	CC EAL6+ EMVCo planned	CC EAL6+ EMVCo planned	CC EAL6+ EMVCo planned	CC EAL6+ EMVCo planned	CC EAL6+ EMVCo planned	CC EAL6+ EMVCo planned	CC EAL6+ EMVCo planned	CC EAL6+ EMVCo planned	

* Without implemented MIFARE Plus resp. MIFARE DESFire EV1 implementation

** Equivalent to up to 120 MHz in the SmartMX P5 Family

*** MIFARE and DESFire are a trademark of NXP Semiconductors N.V.

**** Common Criteria (CC), EMVCo, ZXK and other Evaluations depending on application requirements

* Without implemented MIFARE Plus resp. MIFARE DESFire EV1 implementation. ** Equivalent to up to 120 MHz in the SmartMX P5 Family
*** MIFARE and DESFire are a trademark of NXP Semiconductors N.V. **** Common Criteria (CC), EMVCo, ZKA and other evaluations planned depending on application requirements

NXP Contactless SmartID Products					
Product Features	SmartID 4K	SmartID 8K	SmartID 10K	SmartID 24K	SmartID 32K
Pre-installed applications	P3340G003	P336G003	P3310G002	P3342G004	P332G004
ICAO 9303 file system types	ICAO-like eID LDS, BAC BAC+	ICAO-like eID LDS, BAC BAC+	ICAO-like eID LDS, BAC BAC+	ICAO-like eID LDS, BAC BAC+	ICAO-like eID LDS, BAC BAC+
Memory					
EEPROM [byte]	4 K	8 K	11 K	24 K	32 K
Write Endurance [cycles]	500 K	500 K	100 K	500 K	500 K
Data Retention [years]	20	20	20	20	20
RF Interface					
Standard	ISO 14443 A	ISO 14443 A	ISO 14443 A	ISO 14443 A	ISO 14443 A
Frequency [MHz]	13.56	13.56	13.56	13.56	13.56
Baudrate [bit/s]	106/212/424	106/212/424	106/212/424	106/212/424/848	106/212/424/848
Anticollision	True deterministic	True deterministic	True deterministic	True deterministic	True deterministic
Operating Distance [cm]	10	10	10	10	10
Security					
Unique Serial Number [byte]	7	7	7 (4 for MIFARE 4K emulation)	7	7
DES Engine	DES3 <40ms	DES3 <40ms	DES3 <40ms	DES3 <40ms	DES3 <40ms
Exception Sensors	V, I, T, light	V, I, T, light	V, I, T, light	V, I, T, light	V, I, T, light
General Product Information					
Operating Temperature Range [°C]	-25/+85	-25/+85	-25/+85	-25/+85	-25/+85
MIFARE or DESFire implementation (optional)	n/a	n/a	MIFARE 4K optional	MIFARE 4K	MIFARE 4K
Packaging					
MOA module	P3340G003A4	P336G003A4	P3310G002A4	P3342G004A4	P332G004A4
Smart module	P3340G003A6	P336G003A6	P3310G002A6	P3342G004A6	P332G004A6
Sticker module (8" on UV irradiated FPC)	P3340G003U4	P336G003U4	n/a	n/a	n/a