



Advanced Card Systems Ltd.
Card & Reader Technologies

ACR38 CCID Smart Card Reader



Application Note: Memory Card Access



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1.0. Introduction

The ACS Smart Card Reader/Writer ACR38 CCID acts as an interface for the communication between a computer (for example, a PC) and a smart card. Different types of smart cards have different commands and different communication protocols and this prevents in most cases the direct communication between a smart card and a computer. The ACR38 CCID establishes a uniform interface from the computer to the smart card for a wide variety of cards. By taking care of the card specific particulars, it releases the computer software programmer of getting involved with the technical details of the smart card operation, which are in many cases not relevant for the implementation of a smart card system.

It is connected to the computer through USB interface and uses CCID interface to communicate with the USB port. CCID is the Device Class Specification for USB chip/Smart Card Interface Devices, and defines the communication protocol and commands for the USB chip-card interface devices.

NOTE - Although the ACR38 CCID is a true *card reader/writer* as it can read and write smart cards, the terms *card reader* or *reader* will be used indifferently to refer to the ACR38 CCID, for the sake of readability and because these designations are commonly in use for this kind of devices.



2.0. Features

- Conforms to: EN 60950/IEC 60950, ISO-7816, PC/SC, CCID, CE, FCC, Microsoft WHQL, EMV 2000 Level 1, FIPS 201
- Supports ISO-7816 Class A, B and C (5V, 3V, 1.8V) cards
- Read and write support to all microprocessor cards with T=0 or T=1 protocols
- Supports memory-based smart cards, including I2C bus protocol cards (from 1k bits up to 1024k bits) and Secure memory cards (Atmel AT88SC153 and AT88SC1608) and Memory Card with Security Logic (AT88SC101/102/1003)
- Supports SLE 4404/06/18/28/32/36/42, SLE 5518/28/32/36/42, SLE6636 memory cards
- Support PPS (Protocol and Parameters Selection) with 1,953 – 344,086 bps in reading and writing smart cards
- USB full speed interface to PC
- Short Circuit Protection
- RoHS Compliant



3.0. Memory Card Access via *PC_to_RDR_XfrBlock*

3.1. Supported Memory-based Smart Cards (Synchronous

Interface) List

- Cards following the I2Cbus protocol (free memory cards) with maximum 128 bytes page with capability, including: Atmel AT24C01/02/04/08/16/32/64/128/256/512/1024
- Cards with secure memory IC with password and authentication, including: Atmel AT88SC153 and AT88SC1608
- Cards with intelligent 1k bytes EEPROM with write-protect function, including: Infineon SLE4418, SLE4428, SLE5518 and SLE5528
- Cards with intelligent 256 bytes EEPROM with write-protect function, including: Infineon SLE4432, SLE4442, SLE5532 and SLE5542
- Cards with '104' type EEPROM non-reloadable token counter cards, including: Infineon SLE4406, SLE4436, SLE5536 and SLE6636
- Cards with Intelligent 416-Bit EEPROM with internal PIN check, including: Infineon SLE4404
- Cards with Security Logic with Application Zone(s), including: Atmel AT88SC101, AT88SC102 and AT88SC1003

Memory cards can be accessed via *PC_to_RDR_XfrBlock* command. All memory card functions are mapped into pseudo-APDUs.



4.0. Recollection Card – 1,2,4,8,16 kbit I2C card

4.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	01 _H

Response Data Format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

4.2. SELECT_PAGE_SIZE

This command will choose the page size to read the smart card. The default value is 8-byte page write. It will reset to default value whenever the card is removed or the reader is powered off.

Command Format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Page size
FF _H	01 _H	00 _H	00 _H	01 _H	

Page size = 03_H for 8-byte page write

= 04_H for 16-byte page write

= 05_H for 32-byte page write

= 06_H for 64-byte page write

= 07_H for 128-byte page write



Response Data Format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

4.3. READ_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	Byte Address		MEM_L
		MSB	LSB	
FF _H	B0 _H			

Byte Address Memory address location of the memory card.

MEM_L Length of data to be read from the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

BYTE 1	...	...	BYTE N	SW1	SW2

BYTE x Data read from memory card

SW1, SW2 = 90_H 00_H if no error

4.4. WRITE_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU							
CLA	INS	Byte Address		MEM_L	Byte 1	....	Byte n
		MSB	LSB				
FF _H	D0 _H						

Byte Address Memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

Byte x Data to be written to the memory card.



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error



5.0. Memory Card- 32,64,128,256,512,1024 kbit I2C Card

5.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	02 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

5.2. SELECT_PAGE_SIZE

This command will choose the page size to read the smart card. The default value is 8-byte page write. It will reset to default value whenever the card is removed or the reader is powered off.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Page size
FF _H	01 _H	00 _H	00 _H	01 _H	

Data TPDU to be sent to the card

Page size

- = 03_H for 8-byte page write
- = 04_H for 16-byte page write
- = 05_H for 32-byte page write
- = 06_H for 64-byte page write
- = 07_H for 128-byte page write



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

5.3. READ_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	Byte Address		MEM_L
		MSB	LSB	
FF _H				

INS = B0_H for 32,64,128,256,512kbit iic card

= 1011 000*_b for 1024kbit iic card, where * is the MSB of the 17 bit addressing

Byte Address Memory address location of the memory card.

MEM_L Length of data to be read from the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

BYTE 1	...	...	BYTE N	SW1	SW2

BYTE x Data read from memory card

SW1, SW2 = 90_H 00_H if no error

5.4. WRITE_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU							
CLA	INS	Byte Address		MEM_L	Byte 1	Byte n
		MSB	LSB				
FF _H							

INS = D0_H for 32,64,128,256,512kbit iic card

= 1101 000*_b for 1024kbit iic card, where * is the MSB of the 17 bit addressing

Byte Address Memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

Byte x Data to be written to the memory card.



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error



6.0. Memory Card – ATMEL AT88SC153

6.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset. It will also select the page size to be 8-byte page write.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	03 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

6.2. READ_MEMORY_CARD

Command Format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	Byte Address	MEM_L
FF _H		00 _H		

INS

- = B0_H for reading zone 00_b
- = B1_H for reading zone 01_b
- = B2_H for reading zone 10_b
- = B3_H for reading zone 11_b
- = B4_H for reading fuse

Byte Address Memory address location of the memory card.

MEM_L Length of data to be read from the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

BYTE 1	BYTE N	SW1	SW2

BYTE x Data read from memory card



SW1, SW2 = 90_H 00_H if no error

6.3. WRITE_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU							
CLA	INS	P1	Bye Address	MEM_L	Byte 1	...	Byte n
FF _H		00 _H					

INS

- = D0_H for writing zone 00_b
- = D1_H for writing zone 01_b
- = D2_H for writing zone 10_b
- = D3_H for writing zone 11_b
- = D4_H for writing fuse

Byte Address Memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

MEM_D Data to be written to the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

6.4. VERIFY_PASSWORD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU							
CLA	INS	P1	P2	Lc	Pw(0)	Pw(1)	Pw(2)
FF _H	20 _H	00 _H		03 _H			

Pw(0),Pw(1),Pw(2) Passwords to be sent to memory card.

P2 = 0000 00_{rp}_b

where the two bits “rp” indicate the password to compare

r = 0 : Write password,

r = 1: Read password,

p: Password set number,

rp = 01 for the secure code.



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2
	ErrorCnt
90 _H	

SW1 = 90_H

SW2 (ErrorCnt) = Error Counter. FF_H indicates the verification is correct. 00_H indicates the password is locked (exceed maximum number of retries). Other values indicate the current verification is failed.

6.5. INITIALIZE_AUTHENTICATION

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	P1	P2	Lc	Q(0)	Q(1)	...	Q(7)
FF _H	84 _H	00 _H	00 _H	08 _H				

Q(0),Q(1)...Q(7) Host random number, 8 bytes.

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

6.6. VERIFY_AUTHENTICATION

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	P1	P2	Lc	Ch(0)	Ch(1)	...	Ch(7)
FF _H	82 _H	00 _H	00 _H	08 _H				

Ch(0),Ch(1)...Ch(7) Host challenge, 8 bytes.



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error



7.0. Memory Card- ATMEL AT88C1608

7.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset. It will also select the page size to be 16-byte page write.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	04 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

7.2. READ_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	Zone Address	Byte Address	MEM_L
FF _H				

INS = B0_H for reading user zone

= B1_H for reading configuration zone or reading fuse

Zone Address = 0000 0A₁₀A₉A₈ b, where A₁₀ is the MSB of zone address

= don't care for reading fuse

Byte Address = A₇A₆A₅A₄ A₃A₂A₁A₀ b is the memory address location of the memory card.

= 1000 0000_b for reading fuse

MEM_L Length of data to be read from the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

BYTE 1	BYTE N	SW1	SW2

BYTE x Data read from memory card



SW1, SW2 = 90_H 00_H if no error

7.3. WRITE_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	Zone Address	Byte Address	MEM_L	Byte 1	Byte n
FF _H								

INS = D0_H for writing user zone

= D1_H for writing configuration zone or writing fuse

Zone Address = 0000 0A₁₀A₉A₈_b, where A₁₀ is the MSB of zone address

= don't care for writing fuse

Byte Address = A₇A₆A₅A₄ A₃A₂A₁A₀_b is the memory address location of the memory card.

= 1000 0000_b for writing fuse

MEM_L Length of data to be written to the memory card.

Byte x Data to be written to the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

7.4. VERIFY_PASSWORD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	P1	P2	Lc	Data			
FF _H	20 _H	00 _H	00 _H	04 _H	RP	Pw(0)	Pw(1)	Pw(2)

Pw(0),Pw(1),Pw(2) Passwords to be sent to memory card.

RP = 0000 r₂p₁p₀_b

where the four bits “r₂p₁p₀” indicate the password to compare:

r = 0: Write password,

r = 1: Read password,

p₂p₁p₀: Password set number.

(r₂p₁p₀ = 0111 for the secure code).



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2 ErrorCnt
90 _H	

SW1 = 90_H

SW2 (ErrorCnt) = Error Counter. FF_H indicates the verification is correct. 00_H indicates the password is locked (exceed maximum number of retries). Other values indicate the current verification is failed.

7.5. INITIALIZE_AUTHENTICATION

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	P1	P2	Lc	Q(0)	Q(1)	...	Q(7)
FF _H	84 _H	00 _H	00 _H	08 _H				

Byte Address Memory address location of the memory card.

Q(0),Q(1)...Q(7) Host random number, 8 bytes.

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

7.6. VERIFY_AUTHENTICATION

Command format (abData field in the PC_to_RDR_XfrBlock)

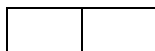
Pseudo-APDU								
CLA	INS	P1	P2	Lc	Q1(0)	Q1(1)	...	Q1(7)
FF _H	82 _H	00 _H	00 _H	08 _H				

Byte Address Memory address location of the memory card.

Q1(0),Q1(1)...Q1(7) Host challenge, 8 bytes.

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2



SW1, SW2 = 90_H 00_H if no error

8.0. Memory Card – SLE4418/SLE4428/SLE5518/SLE5528

8.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	05 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

8.2. READ_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	Byte Address		MEM_L
		MSB	LSB	
FF _H	B0 _H			

MSB Byte Address = 0000 00A₉A₈_b is the memory address location of the memory card.

LSB Byte Address = A₇A₆A₅A₄ A₃A₂A₁A₀_b is the memory address location of the memory card.

MEM_L Length of data to be read from the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

BYTE 1	BYTE N	SW1	SW2

BYTE x Data read from memory card

SW1, SW2 = 90_H 00_H if no error

8.3. READ_PRESENTATION_ERROR_COUNTER_MEMORY_CARD (only SLE4428 and SLE5528)

To read the presentation error counter for the secret code.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	P2	MEM_L
FF _H	B1 _H	00 _H	00 _H	03 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

ERRCNT	DUMMY 1	DUMMY 2	SW1	SW2

ERRCNT The value of the presentation error counter. FF_H indicates the last verification is correct. 00_H indicates the password is locked (exceed maximum number of retries). Other values indicate the last verification is failed.

DUMMY Two bytes dummy data read from the card.

SW1, SW2 = 90_H 00_H if no error

8.4. READ_PROTECTION_BIT

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	Byte Address		MEM_L
		MSB	LSB	
FF _H	B2 _H			

MSB Byte Address = 0000 00A₉A₈ b is the memory address location of the memory card.

LSB Byte Address = A₇A₆A₅A₄ A₃A₂A₁A₀ b is the memory address location of the memory card.

MEM_L Length of protection bits to be read from the card, in multiples of 8 bits. Maximum value is 32.

$$\text{MEM_L} = 1 + \text{INT}((\text{number of bits}-1)/8)$$

For example, to read eight protection bits starting from memory 0x0010, the following pseudo-APDU should be issued:

0xFF 0xB1 0x00 0x10 0x01

Response data format (abData field in the RDR_to_PC_DataBlock)

PROT 1	PROT L	SW1	SW2

PROT y Bytes containing the protection bits

SW1, SW2 = 90_H 00_H if no error

The arrangement of the protection bits in the PROT bytes is as follows:

PROT 1								PROT 2								....						
P8	P7	P6	P5	P4	P3	P2	P1	P16	P15	P14	P13	P12	P11	P10	P9	..	..	..	..	..	..	P18	P17

Px is the protection bit of BYTE x in the response data

'0' byte is write protected

'1' byte can be written

8.5. WRITE_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU							
CLA	INS	Byte Address		MEM_L	Byte 1	....	Byte N
		MSB	LSB				
FF _H	D0 _H						

MSB Byte Address = 0000 00A₉A₈_b is the memory address location of the memory card.

LSB Byte Address = A₇A₆A₅A₄ A₃A₂A₁A₀_b is the memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

Byte x Data to be written to the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

8.6. WRITE_PROTECTION_MEMORY_CARD

Each of the bytes specified in the command is internally in the card compared with the byte stored at the specified address and if the data match, the corresponding protection bit is irreversibly programmed to '0'.



Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU							
CLA	INS	Byte Address		MEM_L	Byte 1	....	Byte N
		MSB	LSB				
FF _H	D1 _H						

MSB Byte Address = 0000 00A₉A₈ b is the memory address location of the memory card.

LSB Byte Address = A₇A₆A₅A₄ A₃A₂A₁A₀ b is the memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

Byte x Byte values to be compared with the data in the card starting at Byte Address. BYTE 1 is compared with the data at Byte Address; BYTE N is compared with the data at (Byte Address+N-1).

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

8.7. PRESENT_CODE_MEMORY_CARD (only SLE 4428 and SLE5528)

To submit the secret code to the memory card to enable the write operation with the SLE4428 and SLE5528 card. The following actions are executed:

- search a '1' bit in the presentation error counter and write the bit to '0'
- present the specified code to the card
- try to erase the presentation error counter

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU						
CLA	INS	P1	P2	MEM_L	CODE	
					Byte 1	Byte 2
FF _H	20 _H	00 _H	00 _H	02 _H		

CODE Two bytes secret code (PIN)



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2 ErrorCnt
90 _H	

SW1 = 90_H

SW2 (ErrorCnt) = Error Counter. FF_H indicates the verification is correct. 00_H indicates the password is locked (exceed maximum number of retries). Other values indicate the current verification is failed.



9.0. Memory Card – SLE4432/SLE4442/SLE5532/SLE5542

9.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	06 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

9.2. READ_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	Byte Address	MEM_L
FF _H	B0 _H	00 _H		

Byte Address = A₇A₆A₅A₄ A₃A₂A₁A₀ b is the memory address location of the memory card.

MEM_L Length of data to be read from the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)ok

BYTE 1	BYTE N	PROT 1	PROT 2	PROT 3	PROT 4	SW1	SW2

BYTE x Data read from memory card

PROT y Bytes containing the protection bits from protection memory

SW1, SW2 = 90_H 00_H if no error

The arrangement of the protection bits in the PROT bytes is as follows:



PROT 1								PROT 2								...							
P8	P7	P6	P5	P4	P3	P2	P1	P16	P15	P14	P13	P12	P11	P10	P9	..	..	..	..	..	..	P18	P17

Px is the protection bit of BYTE x in the response data

'0' byte is write protected

'1' byte can be written

9.3. READ_PRESENTATION_ERROR_COUNTER_MEMORY_CARD (only SLE4442 and SLE5542)

To read the presentation error counter for the secret code.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	P2	MEM_L
FF _H	B1 _H	00 _H	00 _H	04 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

ERRCNT	DUMMY 1	DUMMY 2	DUMMY 3	SW1	SW2

ERRCNT The value of the presentation error counter. 07_H indicates the last verification is correct. 00_H indicates the password is locked (exceed maximum number of retries). Other values indicate the last verification is failed.

DUMMY Three bytes dummy data read from the card.

SW1, SW2 = 90_H 00_H if no error

9.4. READ_PROTECTION_BITS

To read the protection bits for the first 32 bytes.

Command format (*abData* field in the *PC_to_RDR_XfrBlock*)

Pseudo-APDU				
CLA	INS	P1	P2	MEM_L
FF _H	B2 _H	00 _H	00 _H	04 _H

Response data format (*abData* field in the *RDR_to_PC_DataBlock*)

PROT 1	PROT 2	PROT3	PROT 4	SW1	SW2

PROT y Bytes containing the protection bits from protection memory

SW1, SW2 = 90_H 00_H if no error

The arrangement of the protection bits in the PROT bytes is as follows:

PROT 1								PROT 2								...							
P8	P7	P6	P5	P4	P3	P2	P1	P16	P15	P14	P13	P12	P11	P10	P9	..	..	..	..	..	..	P18	P17

Px is the protection bit of BYTE x in the response data

'0' byte is write protected

'1' byte can be written

9.5. WRITE_MEMORY_CARD

Command format (*abData* field in the *PC_to_RDR_XfrBlock*)

Pseudo-APDU								
CLA	INS	P1	Byte Address	MEM_L	Byte 1	....	....	Byte N
FF _H	D0 _H	00 _H						

Byte Address = A₇A₆A₅A₄ A₃A₂A₁A₀ b is the memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

Byte x Data to be written to the memory card.



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

9.6. WRITE_PROTECTION_MEMORY_CARD

Each of the bytes specified in the command is internally in the card compared with the byte stored at the specified address and if the data match, the corresponding protection bit is irreversibly programmed to '0'.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	P1	Byte Address	MEM_L	Byte 1	....	....	Byte N
FF _H	D1 _H	00 _H						

Byte Address= 000A₄ A₃A₂A₁A₀ b (00_H to 1F_H) is the protection memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

Byte x Byte values to be compared with the data in the card starting at Byte Address. BYTE 1 is compared with the data at Byte Address; BYTE N is compared with the data at (Byte Address+N-1).

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

9.7. PRESENT_CODE_MEMORY_CARD (only SLE 4442 and SLE5542)

To submit the secret code to the memory card to enable the write operation with the SLE4442 and SLE5542 card. The following actions are executed:

- search a '1' bit in the presentation error counter and write the bit to '0'
- present the specified code to the card
- try to erase the presentation error counter

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU



CLA	INS	P1	P2	MEM_L	CODE		
					Byte 1	Byte 2	Byte 3
FF _H	20 _H	00 _H	00 _H	03 _H			

CODE Three bytes secret code (PIN)

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2
	ErrorCnt
90 _H	

SW1 = 90_H

SW2 (ErrorCnt) = Error Counter. 07_H indicates the verification is correct. 00_H indicates the password is locked (exceed maximum number of retries). Other values indicate the current verification is failed.

9.8. CHANGE_CODE_MEMORY_CARD (only SLE 4442 and SLE5542)

To write the specified data as new secret code in the card.

The current secret code must have been presented to the card with the PRESENT_CODE command prior to the execution of this command!

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU							
CLA	INS	P1	P2	MEM_L	CODE		
					Byte 1	Byte 2	Byte 3
FF _H	D2 _H	00 _H	01 _H	03 _H			

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error



10.0. Memory Card – SLE4406/SLE4436/SLE5536/SLE6636

10.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	07 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

10.2. READ_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	Byte Address	MEM_L
FF _H	B0 _H	00 _H		

Byte Address = Memory address location of the memory card.

MEM_L Length of data to be read from the memory card.



Response data format (abData field in the RDR_to_PC_DataBlock)

BYTE 1	...	...	BYTE N	SW1	SW2

BYTE x Data read from memory card

SW1, SW2 = 90_H 00_H if no error

10.3. WRITE_ONE_BYTE_MEMORY_CARD

To write one byte to the specified address of the inserted card. The byte is written to the card with LSB first, i.e., the bit at card address 0 is regarded as the LSB of byte 0.

Four different WRITE modes are available for this card type, which are distinguished by a flag in the command data field:

a) Write

The byte value specified in the command is written to the specified address. This command can be used for writing personalization data and counter values to the card.

b) Write with carry

The byte value specified in the command is written to the specified address and the command is sent to the card to erase the next lower counter stage. This write mode can therefore only be used for updating the counter value in the card.

c) Write with backup enabled (SLE4436, SLE5536 and SLE6636 only)

The byte value specified in the command is written to the specified address. This command can be used for writing personalization data and counter values to the card. Backup bit is enabled to prevent data loss when card tearing occurs.

d) Write with carry and backup enabled (SLE4436, SLE5536 and SLE6636 only)

The byte value specified in the command is written to the specified address and the command is sent to the card to erase the next lower counter stage. This write mode can therefore only be used for updating the counter value in the card. Backup bit is enabled to prevent data loss when card tearing occurs.

With all write modes, the byte at the specified card address is not erased prior to the write operation and, hence, memory bits can only be programmed from '1' to '0'.

The backup mode available in the SLE4436 and SLE5536 card can be enabled or disabled in the write operation.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU						
CLA	INS	P1	Byte Address	MEM_L	MODE	BYTE
FF _H	D0 _H	00 _H		02 _H		

Byte Address = Memory address location of the memory card.



MODE Specifies the write mode and backup option

00_H : write

01_H : write with carry

02_H : write with backup enabled (SLE4436, SLE5536 and SLE6636 only)

03_H : write with carry and with backup enabled (SLE4436, SLE5536 and SLE6636 only)

BYTE Byte value to be written to the card

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

10.4. PRESENT_CODE_MEMORY_CARD

To submit the secret code to the memory card to enable the card personalization mode. The following actions are executed:

- search a '1' bit in the presentation counter and write the bit to '0'
- present the specified code to the card

The ACR38 CCID does not try to erase the presentation counter after the code submission! This must be done by the application software through a separate 'Write with carry' command.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	P1	P2	MEM_L	CODE			
					ADDR	Byte 1	Byte 2	Byte 3
FF _H	20 _H	00 _H	00 _H	04 _H	09 _H			

ADDR Byte address of the presentation counter in the card

CODE Three bytes secret code (PIN)

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error



10.5. AUTHENTICATE_MEMORY_CARD (SLE4436, SLE5536 and SLE6636 only)

To read a card authentication certificate from a SLE5536 or SLE6636 card. The following actions are executed by the ACR38 CCID:

- select Key 1 or Key 2 in the card as specified in the command
- present the challenge data specified in the command to the card
- generate the specified number of CLK pulses for each bit of authentication data computed by the card
- read 16 bits of authentication data from the card
- reset the card to normal operation mode

The authentication has to be performed in two steps. The first step is to send the Authentication Certificate to the card. The second step is to get back two bytes of authentication data calculated by the card.

Step 1: Send Authentication Certificate to the Card

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU											
CLA	INS	P1	P2	MEM_L	CODE						
					KEY	CLK_CNT	Byte1	Byte 2	.....	Byte 5	Byte 6
FF _H	84 _H	00 _H	00 _H	08 _H							

KEY

Key to be used for the computation of the authentication certificate:

00_H : key 1 with no cipher block chaining

01_H : key 2 with no cipher block chaining

80_H : key 1 with cipher block chaining (SLE5536 and SLE6636 only)

81_H : key 2 with cipher block chaining (SLE5536 and SLE6636 only)

CLK_CNT

Number of CLK pulses to be supplied to the card for the computation of each bit of the authentication certificate. Typical value is 160 clocks (A0_H)

BYTE 1...6

Card challenge data

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2
61 _H	02 _H

SW1, SW2 = 61_H 02_H if no error, meaning two bytes of authentication data are ready. The authentication data can be retrieved by "Get_Response" command.



Step 2: Get back the Authentication Data (Get_Response)

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	P2	MEM_L
FF _H	C0 _H	00 _H	00 _H	02 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

CERT		SW1	SW2

CERT 16 bits of authentication data computed by the card. The LSB of BYTE 1 is the first authentication bit read from the card.

SW1, SW2 = 90_H 00_H if no error



11.0. Memory Card – SLE4404

11.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	08 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

11.2. READ_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	Byte Address	MEM_L
FF _H	B0 _H	00 _H		

Byte Address = Memory address location of the memory card.

MEM_L Length of data to be read from the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

BYTE 1	BYTE N	SW1	SW2

BYTE x Data read from memory card

SW1, SW2 = 90_H 00_H if no error

11.3. WRITE_MEMORY_CARD

To write data to the specified address of the inserted card. The byte is written to the card with LSB first, i.e., the bit at card address 0 is regarded as the LSB of byte 0.

The byte at the specified card address is not erased prior to the write operation and, hence, memory bits can only be programmed from '1' to '0'.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU							
CLA	INS	P1	Byte Address	MEM_L	Byte 1	....	Byte N
FF _H	D0 _H	00 _H					

Byte Address = Memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

BYTE Byte value to be written to the card

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

11.4. ERASE_SCRATCH_PAD_MEMORY_CARD

To erase the data of the scratch pad memory of the inserted card. All memory bits inside the scratch pad memory will be programmed to the state of '1'.

To erase error counter or user area, please use the VERIFY_CODE command as specified in Section 8.3.8.5.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	Byte Address	MEM_L
FF _H	D2 _H	00 _H		00 _H

Byte Address = Memory byte address location of the scratch pad. Typical value is 0x02.



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

11.5. VERIFY_USER_CODE

To submit User Code (2 bytes) to the inserted card. User Code is to enable the memory access of the card.

The following actions are executed:

- present the specified code to the card
- search a '1' bit in the presentation error counter and write the bit to '0'
- erase the presentation error counter. The User Error Counter can be erased when the submitted code is correct.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU						
CLA	INS	Error Counter LEN	Byte Address	MEM_L	CODE	
					Byte 1	Byte 2
FF _H	20 _H	04 _H	08 _H	02 _H		

Error Counter LEN Length of presentation error counter in bits.

Byte Address Byte address of the key in the card.

CODE 2 bytes User Code

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error.

= 63_H 00_H if there is no more retry chance

Note: After SW1SW2 = 0x9000 has been received, read back the User Error Counter can check whether the VERIFY_USER_CODE is correct. If User Error Counter is erased and equals to "0xFF", the previous verification is success.

11.6. VERIFY_MEMORY_CODE

To submit Memory Code (4 bytes) to the inserted card. Memory Code is used to authorize the reloading of the user memory, together with the User Code.

The following actions are executed:

- present the specified code to the card
- search a '1' bit in the presentation error counter and write the bit to '0'
- erase the presentation error counter. Please note that Memory Error Counter cannot be erased.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	Error Counter LEN	Byte Address	MEM_L	CODE			
					Byte 1	Byte 2	Byte 3	Byte 4
FF _H	20 _H	40 _H	28 _H	04 _H				

Error Counter LEN Length of presentation error counter in bits.

Byte Address Byte address of the key in the card.

CODE 4 bytes Memory Code

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

= 63_H 00_H if there is no more retry chance

Note: After SW1SW2 = 0x9000 has been received, read back the Application Area can check whether the VERIFY_MEMORY_CODE is correct. If all data in Application Area is erased and equals to "0xFF", the previous verification is success.

12.0. Memory Card – AT88SC101 / AT88SC102 / AT88SC1003

12.1. SELECT_CARD_TYPE

This command powers down and up the selected card inserted in the card reader and performs a card reset.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU					
CLA	INS	P1	P2	Lc	Card Type
FF _H	A4 _H	00 _H	00 _H	01 _H	09 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

12.2. READ_MEMORY_CARD

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU				
CLA	INS	P1	Byte Address	MEM_L
FF _H	B0 _H	00 _H		

Byte Address = Memory address location of the memory card.

MEM_L Length of data to be read from the memory card.

Response data format (abData field in the RDR_to_PC_DataBlock)

BYTE 1	BYTE N	SW1	SW2

BYTE x Data read from memory card

SW1, SW2 = 90_H 00_H if no error

12.3. WRITE_MEMORY_CARD

To write data to the specified address of the inserted card. The byte is written to the card with LSB first, i.e., the bit at card address 0 is regarded as the LSB of byte 0.

The byte at the specified card address is not erased prior to the write operation and, hence, memory bits can only be programmed from '1' to '0'.

Command format (*abData* field in the *PC_to_RDR_XfrBlock*)

Pseudo-APDU							
CLA	INS	P1	Byte Address	MEM_L	Byte 1	....	Byte N
FF _H	D0 _H	00 _H					

Byte Address = Memory address location of the memory card.

MEM_L Length of data to be written to the memory card.

BYTE Byte value to be written to the card

Response data format (*abData* field in the *RDR_to_PC_DataBlock*)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

12.4. ERASE_NON_APPLICATION_ZONE

To erase the data in Non-Application Zones. The EEPROM memory is organized into 16 bit words. Although erases are performed on single bits the ERASE operation clears an entire word in the memory. Therefore, performing an ERASE on any bit in the word will clear ALL 16 bits of that word to the state of '1'.

To erase Error Counter or the data in Application Zones, please refer to:

- ERASE_APPLICATION_ZONE_WITH_ERASE command as specified in Section 8.3.9.5
- ERASE_APPLICATION_ZONE_WITH_WRITE_AND_ERASE command as specified in Section 8.3.9.6
- VERIFY_SECURITY_CODE commands as specified in Section 8.3.9.7

Command format (*abData* field in the *PC_to_RDR_XfrBlock*)

Pseudo-APDU				
CLA	INS	P1	Byte Address	MEM_L
FF _H	D2 _H	00 _H		00 _H



Byte Address= Memory byte address location of the word to be erased.

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

12.5. ERASE_APPLICATION_ZONE_WITH_ERASE

This command can be used in the following cases:

- AT88SC101: To erase the data in Application Zone with EC Function Disabled
- AT88SC102: To erase the data in Application Zone 1
- AT88SC102: To erase the data in Application Zone 2 with EC2 Function Disabled
- AT88SC1003: To erase the data in Application Zone 1
- AT88SC1003: To erase the data in Application Zone 2 with EC2 Function Disabled
- AT88SC1003: To erase the data in Application Zone 3

The following actions are executed for this command:

- present the specified code to the card
- erase the presentation error counter. The data in corresponding Application Zone can be erased when the submitted code is correct.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU									
CLA	INS	Error Counter LEN	Byte Address	MEM_L	CODE				
					Byte 1	Byte 2	.....	.....	Byte N
FF _H	20 _H	00 _H							

Error Counter LEN Length of presentation error counter in bits. The value should be 0x00 always.

Byte Address Byte address of the Application Zone Key in the card. Please refer to the table below for the correct value.

MEM_L Length of the Erase Key. Please refer to the table below for the correct value.

CODE N bytes of Erase Key

	Byte Address	LEN
AT88SC101: Erase Application Zone with EC function disabled	96 _H	04 _H



AT88SC102: Erase Application Zone 1	56 _H	06 _H
AT88SC102: Erase Application Zone 2 with EC2 function disabled	9C _H	04 _H
AT88SC1003: Erase Application Zone 1	36 _H	06 _H
AT88SC1003: Erase Application Zone 2 with EC2 function disabled	5C _H	04 _H
AT88SC1003: Erase Application Zone 3	C0 _H	06 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error.

Note: After SW1SW2 = 0x9000 has been received, read back the data in Application Zone can check whether the ERASE_APPLICATION_ZONE_WITH_ERASE is correct. If all data in Application Zone is erased and equals to "0xFF", the previous verification is success.

12.6. ERASE_APPLICATION_ZONE_WITH_WRITE_AND_ERASE

This command can be used in the following cases:

- AT88SC101: To erase the data in Application Zone with EC Function Enabled
- AT88SC102: To erase the data in Application Zone 2 with EC2 Function Enabled
- AT88SC1003: To erase the data in Application Zone 2 with EC2 Function Enabled

With EC or EC2 Function Enabled (that is, ECEN or EC2EN Fuse is unblown and in "1" state), the following actions are executed:

- present the specified code to the card
- search a '1' bit in the presentation error counter and write the bit to '0'
- erase the presentation error counter. The data in corresponding Application Zone can be erased when the submitted code is correct.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	Error Counter LEN	Byte Address	MEM_L	CODE			
					Byte 1	Byte 2	Byte 3	Byte 4
FF _H	20 _H	80 _H		04 _H				

Error Counter LEN Length of presentation error counter in bits. The value should be 0x80 always.



Byte Address

Byte address of the Application Zone Key in the card.

	Byte Address
AT88SC101	96 _H
AT88SC102	9C _H
AT88SC1003	5C _H

CODE

4 bytes Erase Key

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2

= 90_H 00_H if no error.

= 63_H 00_H if there is no more retry chance

Note: After SW1SW2 = 0x9000 has been received, read back the data in Application Zone can check whether the ERASE_APPLICATION_ZONE_WITH_WRITE_AND_ERASE is correct. If all data in Application Zone is erased and equals to "0xFF", the previous verification is success.

12.7. VERIFY_SECURITY_CODE

To submit Security Code (2 bytes) to the inserted card. Security Code is to enable the memory access of the card.

The following actions are executed:

- present the specified code to the card
- search a '1' bit in the presentation error counter and write the bit to '0'
- erase the presentation error counter. The Security Code Attempts Counter can be erased when the submitted code is correct.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU						
CLA	INS	Error Counter LEN	Byte Address	MEM_L	CODE	
					Byte 1	Byte 2
FF _H	20 _H	08 _H	0A _H	02 _H		

Error Counter LEN

Length of presentation error counter in bits.

Byte Address

Byte address of the key in the card.

CODE

2 bytes Security Code



Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error.
= 63_H 00_H if there is no more retry chance

Note: After SW1SW2 = 0x9000 has been received, read back the Security Code Attempts Counter (SCAC) can check whether the VERIFY_USER_CODE is correct. If SCAC is erased and equals to "0xFF", the previous verification is success.

12.8. BLOWN_FUSE

To blow the fuse of the inserted card. The fuse can be EC_EN Fuse, EC2EN Fuse, Issuer Fuse or Manufacturer's Fuse.

Note: The blowing of Fuse is an irreversible process.

Command format (abData field in the PC_to_RDR_XfrBlock)

Pseudo-APDU								
CLA	INS	Error Counter LEN	Byte Address	MEM_L	CODE			
					Fuse Bit Addr (High)	Fuse Bit Addr (Low)	State of FUS Pin	State of RST Pin
FF _H	05 _H	00 _H	00 _H	04 _H			01 _H	00 _H or 01 _H

Fuse Bit Addr (2 bytes) Bit address of the fuse. Please refer to the table below for the correct value.

State of FUS Pin State of the FUS pin. Should be 0x01 always.

State of RST Pin State of the RST pin. Please refer to below table for the correct value.

		Fuse Bit Addr (High)	Fuse Bit Addr (Low)	State of RST Pin
AT88SC101	Manufacturer Fuse	05 _H	80 _H	01 _H
	EC_EN Fuse	05 _H	C9 _H	01 _H
	Issuer Fuse	05 _H	E0 _H	01 _H
AT88SC102	Manufacturer Fuse	05 _H	B0 _H	01 _H
	EC2EN Fuse	05 _H	F9 _H	01 _H



	Issuer Fuse	06 _H	10 _H	01 _H
AT88SC1003	Manufacturer Fuse	03 _H	F8 _H	00 _H
	EC2EN Fuse	03 _H	FC _H	00 _H
	Issuer Fuse	03 _H	E0 _H	00 _H

Response data format (abData field in the RDR_to_PC_DataBlock)

SW1	SW2

SW1, SW2 = 90_H 00_H if no error

13.0. Other Commands Access via *PC_to_RDR_XfrBlock*

13.1. GET_READER_INFORMATION

This command returns relevant information about the particular ACR38 CCID model and the current operating status, such as, the firmware revision number, the maximum data length of a command and response, the supported card types, and whether a card is inserted and powered up.

Note: This command can only be used after the logical smart card reader communication has been established using the SCardConnect() API. For details of SCardConnect() API, please refer to PC/SC specification.

Command format (*abData* field in the *PC_to_RDR_XfrBlock*)

Pseudo-APDU				
CLA	INS	P1	P2	Lc
FF _H	09 _H	00 _H	00 _H	10 _H

Response data format (*abData* field in the *RDR_to_PC_DataBlock*)

FIRMWARE										MAX_C	MAX_R	C_TYPE	C_SEL	C_STAT

FIRMWARE 10 bytes data for firmware version

MAX_C The maximum number of command data bytes.

MAX_R The maximum number of data bytes that can be requested to be transmitted in a response.

C_TYPE The card types supported by the ACR38U-11c. This data field is a bitmap with each bit representing a particular card type. A bit set to '1' means the corresponding card type is supported by the reader and can be selected with the *SELECT_CARD_TYPE* command. The bit assignment is as follows:

Byte	1								2							
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0

See Appendix A for the correspondence between these bits and the respective card types.

C_SEL The currently selected card type. A value of 00_H means that no card type has been selected.

C_STAT Indicates whether a card is physically inserted in the reader and whether the card is powered up:

00_H: no card inserted

01_H: card inserted, not powered up

03_H: card powered up



Appendix A. Supported Card Types

The following table summarizes the card type returned by GET_READER_INFORMATION correspond with the respective card type.

wala ak	Card Type
00 _H	Auto-select T=0 or T=1 communication protocol
01 _H	I2C memory card (1k, 2k, 4k, 8k and 16k bits)
02 _H	I2C memory card (32k, 64k, 128k, 256k, 512k and 1024k bits)
03 _H	Atmel AT88SC153 secure memory card
04 _H	Atmel AT88SC1608 secure memory card
05 _H	Infineon SLE4418 and SLE4428
06 _H	Infineon SLE4432 and SLE4442
07 _H	Infineon SLE4406, SLE4436 and SLE5536
08 _H	Infineon SLE4404
09 _H	Atmel AT88SC101, AT88SC102 and AT88SC1003
0C _H	MCU-based cards with T=0 communication protocol
0D _H	MCU-based cards with T=1 communication protocol



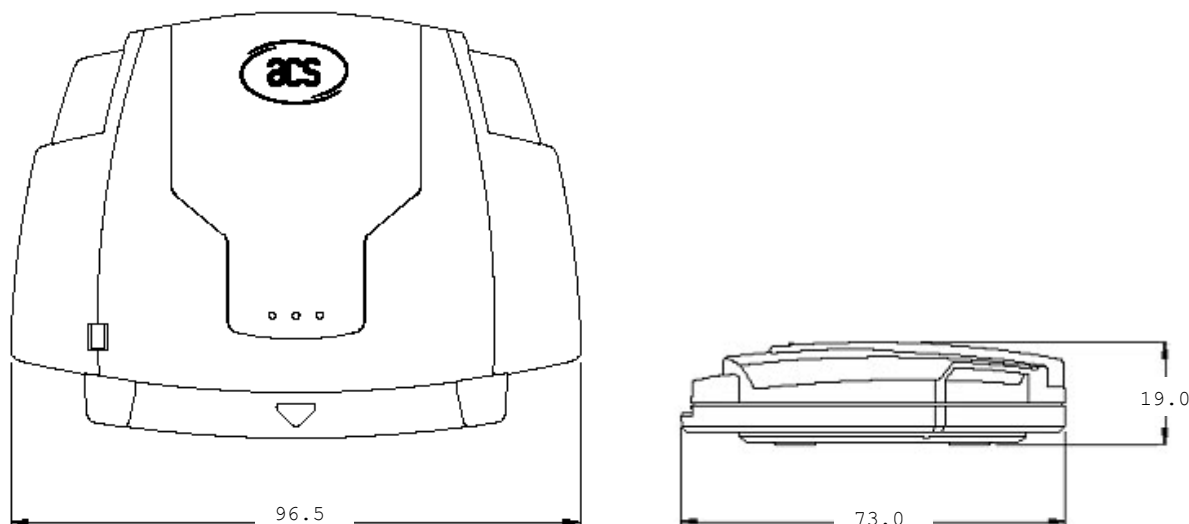
Appendix B. Response Error Codes

The following table summarizes the possible error code returned by the ACR38 CCID:

Error Code	Status
FF _h	SLOTERROR_CMD_ABORTED
FE _h	SLOTERROR_ICC_MUTE
FD _h	SLOTERROR_XFR_PARITY_ERROR
FC _h	SLOTERROR_XFR_OVERRUN
FB _h	SLOTERROR_HW_ERROR
F8 _h	SLOTERROR_BAD_ATR_TS
F7 _h	SLOTERROR_BAD_ATR_TCK
F6 _h	SLOTERROR_ICC_PROTOCOL_NOT_SUPPORTED
F5 _h	SLOTERROR_ICC_CLASS_NOT_SUPPORTED
F4 _h	SLOTERROR_PROCEDURE_BYTE_CONFLICE
F3 _h	SLOTERROR_DEACTIVATED_PROTOCOL
F2 _h	SLOTERROR_BUSY_WITH_AUTO_SEQUENCE
E0 _h	SLOTERROR_CMD_SLOT_BUSY



Appendix C. Technical Specifications



Universal Serial Bus Interface

TypeUSB full speed, four lines: +5V, GND, D+ and D-
Power source.....From USB
Speed.....12 Mbps

Smart Card Interface

StandardISO-7816 Class A, B and C (5V, 3V, 1.8V), T=0 and T=1
Supply currentmax. 50mA
Smart card read / write speed.....1,953 – 344,086 bps
Short circuit protection+5V / GND on all pins
The presence of the smart card power supply voltage is indicated through a green LED on the reader
CLK frequency.....4 MHz
Card connectorContact
Card insertion cycles.....min. 100,000

Physical Specifications

Dimensions73.0mm (L) x 96.5mm (W) x 19.0mm (H)
ColorSilver
Weight.....95g (± 5g allowance for cable) - Spaceship casing
Cable length, cord, connector.....1.5 meters, Fixed (non-detachable), USB A

Operating Conditions

Temperature0 - 50° C
Humidity40% - 80%

Certifications/Compliance

EN 60950/IEC 60950, RoHS Compliant, EMV 2000 Level 1, ISO-7816, PC/SC, CCID, FIPS201 Certified, CE, FCC
USB Full Speed, Microsoft WHQL 2000, XP, Vista

Device Driver Operating System Support

Windows © 98, ME, 2000, XP, Vista, Server 2003,

