

IMF-245 13.56MHZ read & write module

Communication PROTOCOL

(ISO14443A, NTAG)

(V1.0.192)

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Contents

1. Communication Format.....	3
1.1 Command Packet Format	3
1.2 Response Packet Format.....	3
1.3 Default Communication Port Parameter	3
2. Command Code List	4
3. Command Description	5
3.1 SET Baudrate (CMD=0x01)	5
3.2 Query Device Address (CMD=0x02)	5
3.3 SET Device Address (CMD=0x03)	6
3.4 SET Working Mode (CMD=0x04).....	6
3.5 GET Working Mode (CMD=0x05)	7
3.6 SET READ/WRITE KEY (KeyA+Control byte+KeyB) (CMD=0x06)	8
3.7 SET Backup KEY (CMD=0x07)	9
3.8 SET User Data (CMD=0x08)	9
3.9 READ User Data (CMD=0x09).....	10
3.10 BUZ&LED Control (CMD=0x0A)	10
3.11 FACTORY RESET (CMD=0x0E).....	11
3.12 GET VERSION (CMD=0x0F)	11
3.13 Command Upload Data (CMD=0x10)	12
3.14 GET Card UID (CMD=0x11)	12
3.15 Read Data - MIFARE Classic (CMD=0x12)	13
3.16 Write Data - MIFARE Classic (CMD=0x13).....	14
3.17 Sector Encryption (CMD=0x14)	14
3.18 E-Wallet Initialize - MIFARE Classic (CMD=0x15)	15
3.19 E-Wallet Decrement - MIFARE Classic (CMD=0x16)	16
3.20 E-Wallet Increment - MIFARE Classic (CMD=0x17)	17
3.21 E-Wallet Balance - MIFARE Classic (CMD=0x18)	18
3.22 Read Data - MIFARE Ultralight (CMD=0x19).....	18
3.23 Write Data - MIFARE Ultralight (CMD=0x1A)	19
3.24 Reader Antenna RESET (CMD=0x1C)	20
3.25 GET Version - NTAG (CMD=0x1D)	20
3.26 Read Data - NTAG (CMD=0x1E)	21
3.27 Fast Read Data - NTAG (CMD=0x1F)	21
3.28 Write Data - NTAG (CMD=0x20).....	22
3.29 Read Counter Value - NTAG (CMD=0x21).....	22
3.30 KEY AUTHENTICATE - NTAG (CMD=0x22)	23
3.31 ISO14443A RATS (CMD=0x23)	24
3.32 ISO14443-4 APDU (CMD=0x24)	24
3.33 ISO14443 Transfer (CMD=0x25)	25
3.34 KEY AUTHENTICATE - MIFARE Classic 1K/4K (CMD=0x28).....	25
3.35 Write Data - MIFARE Classic 1K/4K (CMD=0x29).....	26
3.36 Read Data - MIFARE Classic 1K/4K (CMD=0x2A)	26
4. AutoListCard MODE.....	27

4.1 Read Card UID Automatically 27

4.2 Read Card Data Automatically 27

4.3 Read Card UID and Data Automatically..... 28

5. Status Code 28

1. Communication Format

1.1 Command Packet Format

Frame Start	Device ID	Data Length	Command	Data	Check
1Byte	1Byte	2Byte	1Byte	nByte	1Byte

Field Description:

Frame Start	Command packets start byte, fixed to 0x60
Device ID	0x00~0xff (All devices can response the command packet with ID 0x00)
Data Length	MSB
Command	Command code
Data	The data and parameter fields in the protocol, which may not exist
Check	The sequential XOR value of all bytes from start frame to the data/parameter field

1.2 Response Packet Format

Frame Start	Device ID	Data Length	Command	Data/Staus	Check
1Byte	1Byte	2Byte	1Byte	nByte	1Byte

Field Description:

Frame Start	Response packets start byte, correct response_0x60, incorrect response_0xE0
Device ID	Physical ID of the device
Data Length	MSB
Command	Command code, consistent with the command packet
Data/Staus	Data returned or execution status, which may not exist
Check	The sequential XOR value of all bytes from start frame to the data/status field

1.3 Default Communication Port Parameter

Baudrate: 9600bps, N,8,1	Device address: 0x20
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2. Command Code List

0x01	SET Baud rate	
0x02	Query Device Address	
0x03	SET Device Address	
0x04	SET Working Mode	
0x05	GET Working Mode	
0x06	SET READ/WRITE KEY	
0x07	SET Backup KEY	
0x08	SET User Data	
0x09	READ User Data	
0x0A	BUZ&LED Control	
0x0E	FACTORY RESET	
0x0F	GET VERSION	
0x10	Command Upload Data	
0x11	GET Card UID	
0x12	Read Data - MIFARE Classic	
0x13	Write Data - MIFARE Classic	
0x14	Sector Encryption	
0x15	E-Wallet Initialize	
0x16	E-Wallet Decrement	
0x17	E-Wallet Increment	
0x18	E-Wallet Balance	
0x19	Read Data - MIFARE Ultralight	
0x1A	Write Data - MIFARE Ultralight	
0x1C	Reader Antenna RESET	
0x1D	GET Version - NTAG	
0x1E	Read Data - NTAG	
0x1F	Fast Read Data - NTAG	
0x20	Write Data - NTAG	
0x21	Read Counter Value - NTAG	
0x22	KEY AUTHENTICATE - NTAG	
0x23	ISO14443A RATS	
0x24	ISO14443-4 APDU	
0x25	ISO14443 Transfer	
0x28	KEY AUTHENTICATE - MIFARE Classic	Single-step operation command with 0x11; send KEY AUTHENTICATE command when after GET UID successfully.
0x29	Write Data - MIFARE Classic	Single-step operation command with 0x28; it must do AUTHENTICATE firstly
0x2A	Read Data - MIFARE Classic	Single-step operation command with 0x28; it must do AUTHENTICATE firstly

3. Command Description

3.1 SET Baudrate (CMD=0x01)

Command Packet Format:

0	1	2~3	4	5	6	7
Start Frame	Device ID	Data Length	Command	Beeping Switch	Baudrate	Check
0x60	0x20	0x00 02	0x01	0x00_OFF, 0x01_ON	0x00~0x07	X

NOTE:

Byte6= 0x00, 4800bps
 0x01, 9600bps
 0x02, 14400bps
 0x03, 19200bps
 0x04, 28800bps
 0x05, 38400bps
 0x06, 57600bps
 0x07, 115200bps

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x01	0x41

eg. SET Baudrate to 9600bps

Send: >> 60 20 00 02 01 01 01 43

Return: << 60 20 00 00 01 41

3.2 Query Device Address (CMD=0x02)

Command Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Beeping Switch	Check
0x60	0x20	0x00 01	0x02	0x00_OFF, 0x01_ON	X

Response Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Device Address	Check
0x60	0x20	0x00 01	0x02	X	X

eg: GET the evic address

Send: >> 60 20 00 01 02 01 42

Return: << 60 20 00 01 02 20 63

3.3 SET Device Address (CMD=0x03)

Command Packet Format:

0	1	2~3	4	5	6	7
Start Frame	Device ID	Data Length	Command	Beeping Switch	New Device ID	Check
0x60	0x20	0x00 02	0x03	0x00_OFF, 0x01_ON	X	X

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 01	0x03	0x42

eg. SET the device address to 0x21

Send: >> 60 20 00 02 03 01 21 61

Return: << 60 21 00 00 03 42

3.4 SET Working Mode (CMD=0x04)

Command Packet Format:

0	1	2~3	4	5~13	14
Start Frame	Device ID	Data Length	Command	Working Mode Parameter	Check
0x60	0x20	0x00 09	0x04	XX...XX	X

Working Mode Description (Byte5~Byte13):

Byte5	Beeping switch of current command: 0x00_OFF, 0x01_ON
Byte6	Reader working mode: 0x01, Command mode; 0x02, Read UID of ISO14443A cards actively; 0x03, Read block data of MIFARE Classic card actively; 0x04, Read UID & block data of MIFARE Classic card actively; 0x05, Read UID of ISO15693 cards actively; 0x06, Read block data of ISO15693 cards actively; 0x07, Read UID & block data of ISO15693 cards actively; 0x08, Read UID1 of Chinese ID Card actively; 0x09, Read UID2 of Chinese ID Card actively; 0x0A, Read UID of SRI series cards actively; 0x0B, Read UID of Felica cards actively; 0x0F, Read all the card types.
Byte7	Block address in working mode of automatic reading block data: 0x00~0xFF
Byte8	Upload mode in AutoListCard mode: 0x00_Upload data actively; 0x01 _ Upload data by sending commands

Byte9	Beeping switch in AutoListCard mode: 0x00_OFF, 0x01_ON
Byte10	Beeping duration in AutoListCard mode
Byte11	Reading interval in AutoListCard mode
Byte12	Reading frequency in AutoListCard mode: 0x00_Read only once, 0x01_Read continuously
Byte13	The number of blocks in the modes of Reading block data of ISO15693 cards & Reading UID and block data of ISO15693 cards.

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x04	0x44

eg: SET the working mode

Send: >> 60 20 00 09 04 01 02 00 00 01 1E 0A 00 01 5A

Return: << 60 20 00 00 04 44

3.5 GET Working Mode (CMD=0x05)

Command Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Beeping Switch	Check
0x60	0x20	0x00 01	0x05	0x00_OFF, 0x01_ON	X

Response Packet Format:

0	1	2~3	4	5~12	13
Start Frame	Device ID	Data Length	Command	Working Mode Parameter	Check
0x60	0x20	0x00 08	0x05	XX...XX	X

Working Mode Description (Byte5~Byte12):

Byte5	Reader working mode: 0x01, Command mode; 0x02, Read UID of ISO14443A cards actively; 0x03, Read block data of MIFARE Classic card actively; 0x04, Read UID & block data of MIFARE Classic card actively; 0x05, Read UID of ISO15693 cards actively; 0x06, Read block data of ISO15693 cards actively; 0x07, Read UID & block data of ISO15693 cards actively; 0x08, Read UID1 of Chinese ID Card actively; 0x09, Read UID2 of Chinese ID Card actively; 0x0A, Read UID of SRI series cards actively; 0x0B, Read UID of Felica cards actively; 0x0F, Read all the card types.
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Byte6	Block address in working mode of automatic reading block data: 0x00~0xFF
Byte7	Upload mode in AutoListCard mode: 0x00_Upload data actively; 0x01_Upload data by sending commands
Byte8	Beeping switch in AutoListCard mode: 0x00_OFF, 0x01_ON
Byte9	Beeping duration in AutoListCard mode
Byte10	Reading interval in AutoListCard mode
Byte11	Reading frequency in AutoListCard mode: 0x00_Read only once, 0x01_Read continuously
Byte12	The number of blocks in the modes of Reading block data of ISO15693 cards & Reading UID and block data of ISO15693 cards.

eg. GET working mode parameter

Send: >> 60 20 00 01 05 01 45

Return: << 60 20 00 08 05 02 00 00 01 1E 0A 00 01 5B

3.6 SET READ/WRITE KEY (KeyA+Control byte+KeyB) (CMD=0x06)

Command Packet Format:

0	1	2~3	4	5	6~21	22
Start Frame	Device ID	Data Length	Command	Beeping Switch	KeyA+Control byte+KeyB	Check
0x60	0x20	0x00 11	0x06	0x00_OFF, 0x01_ON	16Byte	X

READ/WRITE KEY Description (Byte6~Byte21):

Byte6~Byte11	Byte12~Byte15	Byte16~Byte21
6Byte KeyA	4Byte Control byte	6Byte KeyB

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x06	0x46

eg. SET KeyA+Control byte+KeyB

Send: >> 60 20 00 11 06 01 FF FF FF FF FF FF FF 07 80 69 FF FF FF FF FF 47

Return: << 60 20 00 00 06 46

3.7 SET Backup KEY (CMD=0x07)

Command Packet Format:

0	1	2~3	4	5	6~11	12
Start Frame	Device ID	Data Length	Command	Beeping Switch	Backup KEY	Check
0x60	0x20	0x00 07	0x07	0x00_OFF, 0x01_ON	6Byte	X

NOTE: Backup KEY reserved for future use

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x07	0x47

eg. SET Backup KEY

Send: >> 60 20 00 07 07 01 FF FF FF FF FF 41

Return: << 60 20 00 00 07 47

3.8 SET User Data (CMD=0x08)

NOTE: The device allows customers to store private data up to 32Byte, for Power-off preservation

Command Packet Format:

0	1	2~3	4	5	6	7~N	N+1
Start Frame	Device ID	Data Length	Command	Beeping	Data Starting Address	Data	Check
0x60	0x20	X X	0x08	0x00_OFF, 0x01_ON	X	XX..XX	X

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x08	0x48

NOTE:

User data is stored in the Flash. As Flash has a limit on the number of erase/write times, frequent operations may cause bad areas or complete damage to the Flash, which will lead to irreversible failure to the device!

eg: To write data 0x11223344 starting from address 0

Send: >> 60 20 00 06 08 01 00 11 22 33 44 0B

Return: << 60 20 00 00 08 48

3.9 READ User Data (CMD=0x09)

Command Packet Format:

0	1	2~3	4	5	6	7~N	N+1
Start Frame	Device ID	Data Length	Command	Beeping	Data Starting Address	Data Length	Check
0x60	0x20	0x0003	0x09	0x00_OFF, 0x01_ON	0x00~0x1F	0x01~ 0x20	X

NOTE: The address space to be read should be in the range of the reader allowed.

Response Packet Format:

0	1	2~3	4	5~n	n+1
Start Frame	Device ID	Data Length	Command	Data	Check
0x60	0x20	X X	0x09	XX..XX	X

eg. To read 4Byte data starting from address 0x00

Send: >> 60 20 00 03 09 01 00 04 4F

Return: << 60 20 00 04 09 11 22 33 44 09

3.10 BUZ&LED Control (CMD=0x0A)

Command Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Controlled time	Check
0x60	0x20	0x00 01	0x0A	X	X

(BUZ&LED controlled time: T=Byte5 * 10ms)

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x0A	0x4A

eg. SET BUZ&LED controlled time to 100ms

Send: >> 60 20 00 01 0A 0A 41

Return: << 60 20 00 00 0A 4A

3.11 FACTORY RESET (CMD=0x0E)

Command Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Beeping Switch	Check
0x60	0x20	0x00 01	0x0E	0x00_OFF, 0x01_ON	X

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x0E	0x4E

NOTE:

BE CAREFUL WHEN DO FACTORY RESET OPERATION! Once executed, all user settings will be lost and the reader will be restored to initial factory defaults. In addition, as Flash has a limit on the number of erase/write times, frequent operations may cause bad areas or complete damage to the Flash, which will lead to irreversible failure to the device!

eg. FACTORY RESET

Send: >> 60 20 00 01 0E 01 4E

Return: << 60 20 00 00 0E 4E

3.12 GET VERSION (CMD=0x0F)

Command Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Beeping Switch	Check
0x60	0x20	0x00 01	0x0F	0x00_OFF, 0x01_ON	X

Response Packet Format:

0	1	2~3	4	5~n	n+1
Start Frame	Device ID	Data Length	Command	Version	Check
0x60	0x20	X X	0x0F	X	X

eg. GET VERSION

Send: >> 60 20 00 01 0F 01 4F

Return: << 60 20 00 13 0F 69 52 65 61 64 65 72 32 32 2D 56 31 2E 30 20 39 30 30 31 6C //

"iReader22-V1.0 9001"

3.13 Command Upload Data (CMD=0x10)

Command Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Beeping Switch	Check
0x60	0x20	0x00 01	0x10	0x00_OFF, 0x01_ON	X

Success Response Format:

0	1	2~3	4	5~n	n+1
Start Frame	Device ID	Data Length	Command	Data	Check
0x60	0x20	X X	0x10	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x10	X	X

eg. Send >> 60 20 00 01 10 01 50

Success - << 60 20 00 07 10 02 04 00 DA 72 64 55 C8

Failure - << E0 20 00 01 10 A0 71

(Automatically upload data command and according response format, please refer to Part 4)

3.14 GET Card UID (CMD=0x11)

Command Packet Format:

0	1	2~3	4	5	6	7~N	N+1
Start Frame	Device ID	Data Length	Command	Beeping	Request Card	Antenna Reset Time	Check
0x60	0x20	0x0003	0x11	0x00_OFF, 0x01_ON	IDLE=0x26, ALL=0x52	X	X

Byte6 Request Card: IDLE=0x26, ALL=0x52

Byte7 Antenna Reset Time: (unit:ms); If this byte is not 0, the reader will execute RF reset first, which means that the card will be off and back to IDLE status.

Success Response Format:

0	1	2~3	4	5~n	n+1
Start Frame	Device ID	Data Length	Command	Cardtype Code + UID	Check
0x60	0x20	X X	0x11	XX..XX	X

Length of cardtype code: 2Byte

Card UID: 4Byte/7Byte/10Byte

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x11	X	X

Status Code: error code for the command executed, please refer to Part 5- Error Code

eg. Read UID of MIFARE Classic card

Send >> 60 20 00 03 11 01 26 00 75

Success << 60 20 00 06 11 04 00 DA 72 64 55 CA (04 00 is cardtype code, DA 72 64 55 is card UID)

Failure << E0 20 00 01 11 A2 72 (status code is 0xA2)

3.15 Read Data - MIFARE Classic (CMD=0x12)

(using the READ/WRITE KEY stored in the reader)

Command Packet Format:

0	1	2~3	4	5	6	7	8	9
Start Frame	Device ID	Data Length	Command	Beeping	Request Card	Authenticate	Data Block Address	Check
0x60	0x20	0x0004	0x12	0x00_OFF 0x01_ON	IDLE=0x26 ALL=0x52	KEYA=0x60 KEYB=0x61	0x00~ 0xFF	X

Before write data, make sure the read/write KEY has been set and input the right KEY value for the card using.

Success Response Format:

0	1	2~3	4	5~20	21
Start Frame	Device ID	Data Length	Command	Card Data	Check
0x60	0x20	0x0010	0x12	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x12	X	X

eg. Read data Block1 of MIFARE Classic card, in IDLE mode, authenticate KEYA

Send >> 60 20 00 04 12 01 26 60 01 10

Success - << 60 20 00 10 12 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 43

Failure - << E0 20 00 01 12 A2 71

3.16 Write Data - MIFARE Classic (CMD=0x13)

(using the READ/WRITE KEY stored in the reader)

Command Packet Format:

0	1	2~3	4	5	6	7	8	9~24	n+1
Start Frame	Device ID	Data Length	Command	Beeping	Request Card	Authenticate	Data Block Address	Data to be written	Check
0x60	0x20	0x0014	0x13	0x00_OFF 0x01_ON	IDLE=0x26 ALL=0x52	KEYA=0x60 KEYB=0x61	X	XX..XX	X

1) Data Block Address: 0x00~0xFF. Please check the datasheet of using card, in case of misoperation of the KEY block then cause a damage to the sector of card; And the number of data blocks contained is not the same as the cards of different capacities, please refer to datasheet for more details.

2) Data to be written: 16 Byte

NOTE: Before write data, make sure the read/write KEY has been set and input the right KEY value for the card using.

Success Response Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x13	0x53

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x13	X	X

eg. Write data into Block1

Send >> 60 20 00 14 13 01 26 60 01 11 22 33 44 55 66 77 88 99 aa bb cc dd ee ff 10 11

Success - << 60 20 00 00 13 53

Failure - << E0 20 00 01 13 A2 70

3.17 Sector Encryption (CMD=0x14)

Command Packet Format:

0	1	2~3	4	5	6	7	8	9~14	15
Start Frame	Device ID	Data Length	Command	Beeping	Request Card	Authenticate	Sector Address	Current KEY	Check
0x60	0x20	0x000A	0x14	0x00_OFF 0x01_ON	IDLE=0x26 ALL=0x52	KEYA=0x60 KEYB=0x61	X	XX..XX	X

Sector Address:

MIFARE Classic 1K card, address range 0x00~0x0F, 16 sectors in total;

MIFARE Classic 4K card, address range 0x00~0x27, 40 sectors in total.

Current KEY: Default value is 0xFF FF FF FF FF FF for new card. If the KEY has been changed, please input the right KEY value which changed before.

NOTE:

1) When the sector encryption command be called, the reader will write the KEY into according sector based on presetting of internal storage. The KEY stored in the reader can be set by users themselves, please refer to <3.6 SET READ/WRITE KEY> for details.

2) Sector encryption, is to write data into KEY block of the card. It's also available for user to call the command of writing data for MIFARE Classic card, and to write directly 16Byte <KeyA + Control byte + KeyB> into the KEY block for encryption. Please refer to <3.16 Write Data (MIFARE Classic)>.

Success Response Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x14	0x54

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x14	X	X

eg. Change the KEY of sector 0, current KEY is 0xFF FF FF FF FF FF

Send >> 60 20 00 0A 14 01 26 60 00 FF FF FF FF FF 19

Success - << 60 20 00 00 14 54

Failure - << E0 20 00 01 14 A2 77

3.18 E-Wallet Initialize - MIFARE Classic (CMD=0x15)

Command Packet Format:

0	1	2~3	4	5	6	7	8	9~12	13
Start Frame	Device ID	Data Length	Command	Beeping	Request Card	Authenticate	Block Address	Initial Value	Check

0x60	0x20	0x0008	0x15	0x00_OFF 0x01_ON	IDLE=0x26 ALL=0x52	KEYA=0x60 KEYB=0x61	X	XX..XX	X
------	------	--------	------	---------------------	-----------------------	------------------------	---	--------	---

Block Address: Please refer to card's datasheet for details. Address can only use the user data area, which except for sector 0, block 0 and all the KEY block.

Initial Value: LSB, and negative numbers can be represented by inverse code

NOTE: Before this command, make sure the read/write KEY has been set and input the right KEY value for the card using.

Success Response Format:

0	1	2~3	4	5~8	9
Start Frame	Device ID	Data Length	Command	Balance	Check
0x60	0x20	0x00 04	0x15	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x15	X	X

eg. E-Wallet Initialize, Block 1, initial value 100

Send >> 60 20 00 08 15 01 26 60 01 64 00 00 00 7F

Success - << 60 20 00 04 15 64 00 00 00 35

Failure - << E0 20 00 01 15 A2 76

3.19 E-Wallet Decrement - MIFARE Classic (CMD=0x16)

Command Packet Format:

0	1	2~3	4	5	6	7	8	9~12	13
Start Frame	Device ID	Data Length	Command	Beeping	Request Card	Authenticate	Block Address	Decrement Value	Check
0x60	0x20	0x0008	0x16	0x00_OFF 0x01_ON	IDLE=0x26 ALL=0x52	KEYA=0x60 KEYB=0x61	X	XX..XX	X

Block Address: please refer to card's datasheet. Address can only use the user data area, which except for sector 0, block 0 and all the KEY block. Make sure the block to be operated has been initialized to E-wallet.

Decrement Value: The value of the E-wallet to be deducted, LSB, and negative numbers can be represented by inverse code.

NOTE: Before this command, make sure the read/write KEY has been set and input the right KEY value for the card using.

Success Response Format:

0	1	2~3	4	5~8	9
Start Frame	Device ID	Data Length	Command	Balance	Check
0x60	0x20	0x00 04	0x16	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x16	X	X

eg. E-Wallet Decrement, Block 1, value 58

Send >> 60 20 00 08 16 01 26 60 01 3A 00 00 00 22

Success - << 60 20 00 04 16 2A 00 00 00 78

Failure - << E0 20 00 01 16 A2 75

3.20 E-Wallet Increment - MIFARE Classic (CMD=0x17)

Command Packet Format:

0	1	2~3	4	5	6	7	8	9~12	13
Start Frame	Device ID	Data Length	Command	Beeping	Request Card	Authenticate	Block Address	Increment Value	Check
0x60	0x20	0x0008	0x17	0x00_OFF 0x01_ON	IDLE=0x26 ALL=0x52	KEYA=0x60 KEYB=0x61	X	XX..XX	X

Block Address: please refer to card's datasheet. Address can only use the user data area, which except for sector 0, block 0 and all the KEY block. Make sure the block to be operated has been initialized to E-wallet.

Increment Value: The value of the E-wallet to be recharged, LSB, and negative numbers can be represented by inverse code.

NOTE: Before this command, make sure the read/write KEY has been set and input the right KEY value for the card using.

Success Response Format:

0	1	2~3	4	5~8	9
Start Frame	Device ID	Data Length	Command	Balance	Check
0x60	0x20	0x00 04	0x17	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x17	X	X

eg. E-Wallet increment, Block 1, value 58

Send >> 60 20 00 08 17 01 26 60 01 3A 00 00 00 23

Success - << 60 20 00 04 17 64 00 00 00 37

Failure - << E0 20 00 01 17 A2 74

3.21 E-Wallet Balance - MIFARE Classic (CMD=0x18)

Command Packet Format:

0	1	2~3	4	5	6	7	8	13
Start Frame	Device ID	Data Length	Command	Beeping	Request Card	Authenticate	Block Address	Check
0x60	0x20	0x0004	0x18	0x00_OFF 0x01_ON	IDLE=0x26 ALL=0x52	KEYA=0x60 KEYB=0x61	X	X

Block Address: please refer to card's datasheet. Address can only use the user data area, which except for sector 0, block 0 and all the KEY block. Make sure the block to be operated has been initialized to E-wallet.

Success Response Format:

0	1	2~3	4	5~8	9
Start Frame	Device ID	Data Length	Command	Balance	Check
0x60	0x20	0x00 04	0x18	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x18	X	X

eg. Read out E-Wallet Balance, Block 1

Send >> 60 20 00 04 18 01 26 60 01 1A

Success - << 60 20 00 04 18 64 00 00 00 38

Failure - << E0 20 00 01 18 A2 7B

3.22 Read Data - MIFARE Ultralight (CMD=0x19)

Command Packet Format:

0	1	2~3	4	5	6	7
Start Frame	Device ID	Data Length	Command	Beeping	Data Page Address	Check
0x60	0x20	0x0002	0x19	0x00_OFF 0x01_ON	0x00~ 0xFF	X

NOTE:

1. Data Page Address range 0x00~0xFF, the address range differ from various card type, please refer to card's datasheet.
2. Returns four continuous pages data at one time.

Success Response Format:

0	1	2~3	4	5~20	21
Start Frame	Device ID	Data Length	Command	Data	Check
0x60	0x20	0x00 10	0x19	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x19	X	X

eg: Read data of Page 4 <Returns four continuous pages data at one time>

Send >> 60 20 00 02 19 01 04 5E

Success - << 60 20 00 10 19 11 22 33 44 55 66 77 88 99 AA BB CC DD EE FF 10 59

Failure - << E0 20 00 01 19 A2 7A

3.23 Write Data - MIFARE Ultralight (CMD=0x1A)

Command Packet Format:

0	1	2~3	4	5	6	7~10	11
Start Frame	Device ID	Data Length	Command	Beeping	Data Page Address	Data to be written	Check
0x60	0x20	0x0006	0x1A	0x00_OFF 0x01_ON	0x00~ 0xFF	XX..XX	X

Success Response Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x1A	5A

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x1A	X	X

eg: Write data into Page4

Send >> 60 20 00 06 1A 01 04 11 22 33 44 1D

Success - << 60 20 00 00 1A 5A

Failure - << E0 20 00 01 1A A2 79

3.24 Reader Antenna RESET (CMD=0x1C)

Command Packet Format:

0	1	2~3	4	5	6	7
Start Frame	Device ID	Data Length	Command	Beeping	Reset Time	Check
0x60	0x20	0x00 02	0x1C	0x00_OFF 0x01_ON	X	X

Response Packet Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x00 00	0x1C	0x5C

eg: Antenna reset, 16ms

Send >> 60 20 00 02 1C 01 10 4F

Return << 60 20 00 00 1C 5C

3.25 GET Version - NTAG (CMD=0x1D)

Command Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Beeping Switch	Check
0x60	0x20	0x00 01	0x1D	0x00_OFF, 0x01_ON	X

Success Response Format:

0	1	2~3	4	5~12	13
Start Frame	Device ID	Data Length	Command	Version Information	Check
0x60	0x20	0x00 08	0x1D	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x1D	X	X

eg: Get version of NTAG card

Send >> 60 20 00 01 1D 00 5C

Return << 60 20 00 08 1D 00 04 04 02 01 00 60 20 16

3.26 Read Data - NTAG (CMD=0x1E)

Command Packet Format:

0	1	2~3	4	5	6	7
Start Frame	Device ID	Data Length	Command	Beeping	Data Page Address	Check
0x60	0x20	0x0002	0x1E	0x00_OFF 0x01_ON	0x00~ 0xFF	X

NOTE:

1. Data Page Address range 0x00~0xFF, the address range differ from various card type, please refer to card's datasheet.
2. Returns four continuous pages data at one time.

Success Response Format:

0	1	2~3	4	5~20	21
Start Frame	Device ID	Data Length	Command	Card Data	Check
0x60	0x20	0x00 10	0x1E	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x1E	X	X

eg: Read data of Page 4~7

Send >> 60 20 00 02 1E 00 04 58

Return << 60 20 00 10 1E 66 22 33 55 10 55 60 20 00 10 1E 66 22 33 55 10 55

3.27 Fast Read Data - NTAG (CMD=0x1F)

Command Packet Format:

0	1	2~3	4	5	6	7	8
Start Frame	Device ID	Data Length	Command	Beeping	Start Page Address	End Page Address	Check
0x60	0x20	0x0003	0x1F	0x00_OFF 0x01_ON	X	X	X

NOTE: Data Page Address range 0x00~0xFF, the address range differ from various card type, please refer to card's datasheet.

Success Response Format:

0	1	2~3	4	5~N	N+1
Start Frame	Device ID	Data Length	Command	Card Data	Check
0x60	0x20	XX	0x1F	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x1F	X	X

eg: Read data of Page 4~5

Send >> 60 20 00 03 1F 00 04 05 5D

Return <<60 20 00 08 1F 11 22 33 44 10 55 60 20 16

eg: Read data of Page 4~10

Send >> 60 20 00 03 1F 00 04 0A 52

Return << 60 20 00 1C 1F 11 22 33 44 10 55 60 20 00 1C 1F 11 22 33 44 10 55 60 20 00 1C 1F 11 22 33 44 10 55 42

3.28 Write Data - NTAG (CMD=0x20)

Command Packet Format:

0	1	2~3	4	5	6	7~10	11
Start Frame	Device ID	Data Length	Command	Beeping	Data Page Address	Data to be written	Check
0x60	0x20	0x0006	0x20	0x00_OFF 0x01_ON	X	XX..XX	X

Success Response Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x0000	0x20	5A

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x20	X	X

eg: Write data into Page4

Send >> 60 20 00 06 20 00 04 11 22 33 44 26

Return << 60 20 00 00 20 60

3.29 Read Counter Value - NTAG (CMD=0x21)

Command Packet Format:

0	1	2~3	4	5	6	7
Start Frame	Device ID	Data Length	Command	Beeping	CNT No.	Check
0x60	0x20	0x0002	0x21	0x00_OFF 0x01_ON	X	X

NOTE: CNT No. for card range from 0x00~0x04. And the CNT No. may be different or may not exist for different models of NTAG cards.

Success Response Format:

0	1	2~3	4	5~7	8
Start Frame	Device ID	Data Length	Command	Counter Value	Check
0x60	0x20	0x0003	0x21	XXX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x21	X	X

eg: Read Counter Value of NTAG card

Send >> 60 20 00 02 21 00 01 62

Return << 60 20 00 03 21 00 00 00 62

3.30 KEY AUTHENTICATE - NTAG (CMD=0x22)

Command Packet Format:

0	1	2~3	4	5	6~9	10
Start Frame	Device ID	Data Length	Command	Beeping	KEY	Check
0x60	0x20	0x0005	0x22	0x00_OFF 0x01_ON	XX..XX	X

Success Response Format:

0	1	2~3	4	5~6	7
Start Frame	Device ID	Data Length	Command	Authenticate Response PACK	Check
0x60	0x20	0x0002	0x22	X X	X

Failure Response Format:

0	1	2~3	4	5	6
---	---	-----	---	---	---

Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x22	X	X

eg: KEY AUTHENTICATE

Send >> 60 20 00 05 22 00 FF FF FF FF 67

Return << 60 20 00 02 22 00 00 60

3.31 ISO14443A RATS (CMD=0x23)

Command Packet Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Beeping	Check
0x60	0x20	0x0001	0x23	0x00_OFF 0x01_ON	X

Success Response Format:

0	1	2~3	4	5~N	N+1
Start Frame	Device ID	Data Length	Command	ATS Data	Check
0x60	0x20	X X	0x23	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x23	X	X

eg:

Send >> 60 20 00 01 23 01 63

Success - << 60 20 00 10 23 10 78 B3 B1 02 4D 49 4E 47 57 41 48 20 18 07 09 7E

Failure - << E0 20 00 01 23 A9 4B

3.32 ISO14443-4 APDU (CMD=0x24)

Command Packet Format:

0	1	2~3	4	5	6~N	N+1
Start Frame	Device ID	Data Length	Command	Beeping	APDU Command	Check
0x60	0x20	X X	0x24	0x00_OFF 0x01_ON	XX..XX	X

Success Response Format:

0	1	2~3	4	5~N	N+1
Start Frame	Device ID	Data Length	Command	APDU Response	Check
0x60	0x20	X X	0x24	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x24	X	X

eg: GET 8 Byte random number

Send >> 60 20 00 06 24 01 00 84 00 00 08 EF

Success - << 60 20 00 0A 24 56 29 25 F5 64 C2 10 DF 90 00 38

Failure - << E0 20 00 01 24 AA 4F

3.33 ISO14443 Transfer (CMD=0x25)

Command Packet Format:

0	1	2~3	4	5	6~N	N+1
Start Frame	Device ID	Data Length	Command	Beeping	Command supported	Check
0x60	0x20	X X	0x25	0x00_OFF 0x01_ON	XX..XX	X

Success Response Format:

0	1	2~3	4	5~N	N+1
Start Frame	Device ID	Data Length	Command	Card Response	Check
0x60	0x20	X X	0x25	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x25	X	X

eg: GET 8 Byte random number of Chinese ID card

Send >> 60 20 00 06 25 01 00 84 00 00 08 EE

Success - << 60 20 00 0A 25 DA C8 A7 F7 75 B3 43 11 90 00 29

Failure - << E0 20 00 01 25 AB 4F

3.34 KEY AUTHENTICATE - MIFARE Classic 1K/4K

(CMD=0x28)**Command Packet Format:**

0	1	2~3	4	5	6	7	8~11	12~17	18
Start Frame	Device ID	Data Length	Command	Beeping	KEY Type	Data Block Address	UID	KEY	Check
0x60	0x20	0x000D	0x28	0x00_OFF 0x01_ON	KEYA=0x60 KEYB=0x61	0x01~ 0xFF	XX..XX	XX..XX	X

Success Response Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x0000	0x28	68

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x28	X	X

3.35 Write Data - MIFARE Classic 1K/4K (CMD=0x29)**Command Packet Format:**

0	1	2~3	4	5	6	7~22	23
Start Frame	Device ID	Data Length	Command	Beeping	Data Block Address	Data	Check
0x60	0x20	0x0012	0x29	0x00_OFF 0x01_ON	X	XX..XX	X

Success Response Format:

0	1	2~3	4	5
Start Frame	Device ID	Data Length	Command	Check
0x60	0x20	0x0000	0x29	69

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x29	X	X

3.36 Read Data - MIFARE Classic 1K/4K (CMD=0x2A)**Command Packet Format:**

0	1	2~3	4	5	6	7
Start Frame	Device ID	Data Length	Command	Beeping	Data Block Address	Check
0x60	0x20	0x0002	0x2A	0x00_OFF 0x01_ON	X	X

Success Response Format:

0	1	2~3	4	5~20	21
Start Frame	Device ID	Data Length	Command	Block Data	Check
0x60	0x20	0x10	0x2A	XX..XX	X

Failure Response Format:

0	1	2~3	4	5	6
Start Frame	Device ID	Data Length	Command	Status Code	Check
0xE0	0x20	0x0001	0x2A	X	X

4. AutoListCard MODE

4.1 Read Card UID Automatically

Output Format as below:

0	1	2~3	4	5	6~7	8~N	N+1
Start Frame	Device ID	Data Length	Command	Working Mode	Cardtype Code	Card UID	Check
0x60	0x20	X X	0x10	0x02	X X	XX..XX	X

eg. 4Byte UID : 60 20 00 07 10 02 04 00 DA 72 64 55 C8

7Byte UID : 60 20 00 0A 10 02 44 03 04 42 52 A2 B0 65 80 FC

4.2 Read Card Data Automatically

Output Format as below:

0	1	2~3	4	5	6~21	22
Start Frame	Device ID	Data Length	Command	Working Mode	Data	Check
0x60	0x20	0x0011	0x10	0x03	XX..XX	X

Data: Fixed to read a block of data actively, 16 Byte length.

eg. 60 20 00 11 10 03 DA 72 64 55 99 88 04 00 85 00 B4 2E F0 BB 6A A8 58

4.3 Read Card UID and Data Automatically

Output Format as below:

0	1	2~3	4	5	6~n	n+1~n+16	n+17
Start Frame	Device ID	Data Length	Command	Working Mode	Card UID	Data	Check
0x60	0x20	X X	0x10	0x04	XX..XX	XX..XX	X

Card UID: 4Byte/7Byte/10Byte length

Data: Fixed to read a block of data actively, 16 Byte length

eg. 60 20 00 17 10 04 04 00 DA 72 64 55 DA 72 64 55 99 88 04 00 85 00 B4 2E F0 BB 6A A8 C4

Therein, working mode: 0x04, card type code: 04 00, card UID: DA 72 64 55

data: DA 72 64 55 99 88 04 00 85 00 B4 2E F0 BB 6A A8

5. Status Code

0x00	Executed successfully
0xA0	Failed to upload data automatically, data does not exist
0xA1	Parameter Error
0xA2	Failed to active card / No card
0xA3	KEY authenticate failure
0xA4	MIFARE Classic read data failure
0xA5	MIFARE Classic write data failure
0xA6	MIFARE Classic E-Wallet decrement failure
0xA7	MIFARE Classic E-Wallet increment failure
0xA8	MIFARE Classic E-Wallet read balance failure
0xA9	14443A-4 RATS failure
0XAA	14443A-4 APDU failure
0xAB	Operation Timeout
0XAC	Unknown Error
0XAD	NTAG/Ultralight read data failure
0XAE	NTAG/Ultralight write data failure
0XAF	UltralightC authenticate failure
0xB0	Ntag/Ultralight EVx authenticate failure