



## **Communication Protocol UART-TTL**

**MPR Series (UHF)**

iDTRONIC GmbH  
Ludwig-Reichling-Straße 4  
67059 Ludwigshafen  
Germany/Deutschland

Phone +49 621 6690094-0  
Fax +49 621 6690094-9  
E-Mail [info@idtronic-rfid.com](mailto:info@idtronic-rfid.com)  
Web <https://idtronic-rfid.com/>

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## 1 Overview

The UHF readers of the MPR Series can communicate with a computer using this communication protocol.

The protocol is based on UART and USB and has a fixed frame format. The standard parameters are as follows

- Baud rate: 115200 bps
- Data bits: 8
- Stop bits: 1
- Parity: No
- Flow control: No

## 2 Data Transmission Frame Format

A data frame consists of a header, address, length, command, data, checksum and an end sequence as shown below.

Table 1: Data transmission frame format

Header	Address	Length	Command	Data	Checksum	End
1 byte	1 byte	2 bytes	1 byte	N bytes	1 byte	2 bytes

Description:

- Header: Indicates the start of a data package; 1 byte long, fixed value 0xAA
- Address: RS485 address byte; 1 byte long, default value 0x00
- Length: Length of the whole data frame; 2 bytes long, calculated as follows:  $Length = 1 + 1 + 2 + 1 + N + 1 + 2$  where N is the length of the data field
- Command: Command byte, see section 2.1 List of commands for the individual values; 1 byte long
- Data: Data bytes, depend on the command; N bytes long
- Checksum: Checksum; 1 byte long, XOR of address, length, command and data bytes
- End: Indicates the end of a data package; 2 bytes long, fixed value 0xD0A (same as "Enter"-Key)

### 2.1 List of commands

Below are the different command bytes and their meaning.

Note: The request and its corresponding response have different command bytes. Not all requests have responses and some command have a subcommand parameter.

Table 2: List of commands

Request Command	Response Command	Description
0x02	0x03	Get the reader firmware version
0x10	0x11	Set transmitting power
0x12	0x13	Get current transmitting power
0x14	0x15	Frequency hopping setting
0x16	0x17	Get current equipment frequency hopping setting status
0x20	0x21	Set Gen2 data
0x22	0x23	Get current Gen2 data settings
0x24	0x25	CW setting
0x26	0x27	Get current CW setting
0x28	0x29	Antenna setting
0x2A	0x2B	Get current antenna setting
0x2C	0x2D	Regional standard setting
0x2E	0x2F	Get regional standard setting
0x32	0x33	Get port return loss
0x3C	0x3D	Set continue inventory time
0x3E	0x3F	Get continue inventory time setting
0x4A	0x4B	Set working time of antenna
0x4C	0x4D	Get working time of antenna
0x4E	0x4F	Set idle time of switch antenna
0x50	0x51	Get idle time of switch antenna
0x52	0x53	Set recommended RF links
0x54	0x55	Get recommended RF links
0x66	0x67	Baud rate setting of modules

Request Command	Response Command	Description
0x68	0x69	Software reset
0x6A	0x6B	Dual and single mode setting
0x6C	0x6D	Get dual and single mode
0x6E	0x6F	Inventory filtering setting
0x70	0x71	Get the EPC and TID simultaneously mode setting
0x72	0x73	Get the EPC and TID simultaneously mode setting status
0x74	0x75	Factory default setting
0x76	0x77	Set inventory mode
0x78	0x79	Get inventory mode status
0x80	0x81	Single Inventory
0x82	0x83	Continuous inventory
0x8C	0x8D	Stop continuous inventory
0x84	0x85	Read data
0x86	0x87	Write data
0x88	0x89	Lock tag
0x8A	0x8B	Kill tag
0x90	0x91	Time frame inventory
0x92		Get time frame inventory result
0x93	0x94	Block write tags
0x95	0x96	Block erase tags
	0xFF	Operation failed

### 3 Command Frame Description

#### 3.1 Version management

##### 3.1.1 Get Reader Firmware Version (0x02; 0x03)

Get the reader firmware version.

**Request:**

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x02		0x0A	0x0D0A

Example:

>> AA 00 00 08 02 0A 0D 0A

**Response:**

3 data bytes: main version, sub-version, comp-version

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000B	0x03	xxx	yyy	0x0D0A

Example: response from a reader with firmware version V2.3.5

<< AA 00 00 0B 03 02 03 05 0C 0D 0A

#### 3.2 Parameters Setting

##### 3.2.1 Set Transmission Power (0x10; 0x11)

Set read and write power for a specific antenna.

**Request:**

6 data bytes:

- 1st byte: Status
- 2nd byte: Antenna number (in hex)
- 3rd and 4th byte: Read power (in 0.01 \* dBm)
- 5th and 6th byte: Write power (in 0.01 \* dBm)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000E	0x10	xxx	yyy	0x0D0A

Remark: Status bit0 means open loop (0) or closed loop (1); bit1 means state will be lost upon power off (0) or saved (1); all other status bits are reserved (set 0)

Example: Set antenna 3 with read power 15dBm, write power 30dBm, open loop and no permanent save

>> AA 00 00 0E 10 00 03 05 DC 0B B8 77 0D 0A

**Response:**

1 data byte: successful (1), operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x11	xxx	yyy	0x0D0A

Example: Successful setting

<< AA 00 00 09 11 01 19 0D 0A

##### 3.2.2 Get Current Transmission Power (0x12; 0x13)

Get the transmission power of each antenna used.



**Request:**

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x12		0x1A	0x0D0A

Example:

&gt;&gt; AA 00 00 08 12 1A 0D 0A

**Response:**

1 byte + for each antenna: 5 bytes

- 1st byte: Status
- Repeats for each antenna: 1 byte antenna number, 2 bytes read power, 2 bytes write power (in 0.01\*dBm)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x13	xxx	yyy	0x0D0A

Remark: Status bit0 means open loop (0) or closed loop (1); bit1 means state will be lost upon power off (0) or saved (1); all other values indicate an error

Example: Closed loop status, antenna 1 has read power -7dBm and write power 21dBm; antenna 5 has read power 3dBm and write power 14 dBm

&lt;&lt; AA 00 00 13 13 01 01 FD 44 08 34 05 01 2C 05 78 D0 0D 0A

**3.2.3 Frequency Hopping Setting (0x14; 0x15)**

Set the number of hopping points and the frequencies in the frequency hopping table.

**Request:**

Data bytes show number of hopping points (1st byte) and afterwards the hopping frequencies (each 2 bytes, in KHz)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x14	xxx	yyy	0x0D0A

Remark: When the hopping point number is 1, that means a fixed frequency is used

Example: Set the device to use 5 frequency hopping points

(920125KHz, 921250KHz, 921625KHz, 922375KHz and 924375KHz)

&gt;&gt; AA 00 00 18 14 05 0E 0A 3D 0E 0E A2 0E 10 19 0E 13 07 0E 1A D7 4C 0D 0A

**Response:**

1 data byte: successful (1), operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x15	xxx	yyy	0x0D0A

Example: Setting the frequency hopping table failed

&lt;&lt; AA 00 00 09 15 00 1C 0D 0A

**3.2.4 Get Current Equipment Hopping Status (0x16; 0x17)**

Get the current hopping status and the hopping table.

**Request:**

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x16		0x1E	0x0D0A

Example:

&gt;&gt; AA 00 00 08 16 1E 0D 0A

**Response:**

Data bytes show number of hopping points (1st byte) and afterwards the hopping frequencies (each 2 bytes, in KHz)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x17	xxx	yyy	0x0D0A

Remark: When the hopping point number is 1, that means a fixed frequency is used

Example: The device uses 5 frequency hopping points (920125KHz, 921250KHz, 921625KHz, 922375KHz and 924375KHz)

<< AA 00 00 18 17 05 0E 0A 3D 0E 0E A2 0E 10 19 0E 13 07 0E 1A D7 4F 0D 0A

**3.2.5 Set Gen2 Data (0x20; 0x21)**

Set the Gen2 parameters for session, Q, coding and more.

**Request:**

8 data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0010	0x20	xxx	yyy	0x0D0A

Data bytes in detail:

Byte7				Byte6		Byte5				Byte4			
Target	Action	T	Q	StartQ	MinQ	MaxQ	D	C	P	Sel	Ses	G	LF
Byte3				Byte2		Byte1				Byte0			
Reserved (0)										Permanent save (1), else 0			

**T** setting:

disable truncation (0);  
enable truncation (1)

Target	
S0	0b000
S1	0b001
S2	0b010
S3	0b011
SL	0b100

**Q** setting:

fixed Q calculation (0);  
dynamic calculation (1)

Note: when fixed, MinQ and MaxQ are ignored, and Q is fixed to StartQ

**D** setting: DR data for query command  
8 (0); 64/3 (1)

Action		
Action	Matching	Non-Matching
0b000	assert SL or inventoried → A	de-assert SL or inventoried → B
0b001	assert SL or inventoried → A	do nothing
0b010	do nothing	de-assert SL or inventoried → B
0b011	negate SL or (A→B, B→A)	do nothing
0b100	de-assert SL or inventoried → B	de-assert SL or inventoried → A
0b101	de-assert SL or inventoried → B	do nothing
0b110	do nothing	de-assert SL or inventoried → B
0b111	do nothing	negate SL or (A→B, B→A)

**P** setting: TRext data for query  
No pilot tone (0);  
use pilot tone (1)

Coding	
FM0	0b00
Miller2	0b01
Miller4	0b10
Miller8	0b11

StartQ, MinQ, MaxQ							
0	0b0000	4	0b0100	8	0b1000	12	0b1100
1	0b0001	5	0b0101	9	0b1001	13	0b1101
2	0b0010	6	0b0110	10	0b1010	14	0b1110
3	0b0011	7	0b0111	11	0b1011	15	0b1111

**G** setting: Target data  
A (0); B (1)

Sel	
All	0b00
All	0b01
~SL	0b10
SL	0b11

Ses (session)	
S0	0b00
S1	0b01
S2	0b10
S3	0b11

Link Frequency	
40KHz	0b000
160KHz	0b001
200KHz	0b010
250KHz	0b011
300KHz	0b100
320KHz	0b101
400KHz	0b110
640KHz	0b111

Example: Target setting is S0, Action setting is 0b100, truncate data is disabled, dynamic Q calculation, startQ is 4, minQ is 0, maxQ is 15, D setting is 8, M data is Miller4, TRext data is "no pilot tone", sel data is ALL, session data is S2, target data is A and link frequency is 160 KHz  
>> AA 00 00 10 20 11 40 F4 21 00 00 00 00 B4 0D 0A

**Response:**

1 data byte: successful (1), operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x21	xxx	yyy	0x0D0A

Example: successful

<< AA 00 00 09 21 01 29 0D 0A

**3.2.6 Get Current Gen2 Data Setting (0x22; 0x23)**

Get the current Gen2 settings.

**Request:**

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x22		0x2A	0x0D0A

Example:

>> AA 00 00 08 22 2A 0D 0A

**Response:**

8 data bytes: see 3.2.5 for more information, note: Byte0 does not contain any specific data and is part of reserved.

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0010	0x23	xxx	yyy	0x0D0A

Example: Target setting is S0, Action setting is 0b100, truncate data is disabled, dynamic Q calculation, startQ is 4, minQ is 0, maxQ is 15, D setting is 8, M data is Miller4, Ttext data is "no pilot tone", sel data is ALL, session data is S2, target data is A and link frequency is 160 KHz

>> AA 00 00 10 23 11 40 F4 21 00 00 00 00 B7 0D 0A

**3.2.7 CW Setting (0x24; 0x25)**

Turn the continuous wave on or off.

**Request:**

1 data byte: on (1), off (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x24	xxx	yyy	0x0D0A

Example: Power on CW

>> AA 00 00 09 24 01 2C 0D 0A

**Response:**

1 data byte: successful (1), operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x25	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 25 01 2D 0D 0A

**3.2.8 Get Current Equipment CW Setting (0x26; 0x27)**

Get the current setting of continuous wave.

**Request:**

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x26		0x2E	0x0D0A

Example:

&gt;&gt; AA 00 00 08 26 2E 0D 0A

**Response:**

1 data byte: on (1), off (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x27	xxx	yyy	0x0D0A

Example: CW is on

&lt;&lt; AA 00 00 09 27 01 2F 0D 0A

**3.2.9 Antenna Setting (0x28; 0x29)**

Select antennas for operations.

**Request:**

9 data bytes: each bit represents an antenna; antenna selected (1) or not selected (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0011	0x28	xxx	yyy	0x0D0A

Data bytes in detail:

Byte8							
Permanent save (0x01); not (0x00)							
Byte7							
Ant16	Ant15	Ant14	Ant13	Ant12	Ant11	Ant10	Ant9
Byte6							
Ant8	Ant7	Ant6	Ant5	Ant4	Ant3	Ant2	Ant1
Byte5							
Ant24	Ant23	Ant22	Ant21	Ant20	Ant19	Ant18	Ant17
Byte4							
Ant32	Ant31	Ant30	Ant29	Ant28	Ant27	Ant26	Ant25
Byte3							
Ant40	Ant39	Ant38	Ant37	Ant36	Ant35	Ant34	Ant33
Byte2							
Ant48	Ant47	Ant46	Ant45	Ant44	Ant43	Ant42	Ant41
Byte1							
Ant56	Ant55	Ant54	Ant53	Ant52	Ant51	Ant50	Ant49
Byte0							
Ant64	Ant63	Ant62	Ant61	Ant60	Ant59	Ant58	Ant57

Example: Select antenna 2 and antenna 14, set permanent save

&gt;&gt; AA 00 00 11 28 01 20 02 00 00 00 00 00 00 1A 0D 0A

**Response:**

1 data byte: successful (1), operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x29	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 29 01 21 0D 0A

### 3.2.10 Get Current Equipment Antenna Setting (0x2A; 0x2B)

Get current antenna used by the device.

#### Request:

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x2A		0x22	0x0D0A

Example:

>> AA 00 00 08 2A 22 0D 0A

#### Response:

8 data bytes: each bit represents one antenna; antenna selected (1) or not selected (0); see 3.2.9 data bytes 7 to 0 for reference

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0010	0x2B	xxx	yyy	0x0D0A

Example: Currently antenna 1, 5, 10 and 14 are selected.

<< AA 00 00 10 2B 22 11 00 00 00 00 00 00 08 0D 0A

### 3.2.11 Regional Standard Setting (0x2C; 0x2D)

Set the region.

#### Request:

2 data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x2C	xxx	yyy	0x0D0A

Data bytes in detail:

Byte1	Byte0
Permanent save (1), else 0	Region

Example: Permanent save, region USA

>> AA 00 00 0A 2C 01 08 2F 0D 0A

Region	
China1	0x01
China2	0x02
Europe	0x04
USA	0x08
Korea	0x16
Japan	0x32

#### Response:

1 data byte: successful (1), operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x2D	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 0009 2D 01 25 0D 0A

### 3.2.12 Get Regional Standard Setting (0x2E; 0x2F)

Get the current set region.

#### Request:

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x2E		0x26	0x0D0A

Example:

>> AA 00 00 08 2E 26 0D 0A

#### Response:

2 data bytes: successful (1), operation failed (0) and the region (see 3.2.11 for reference)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x2F	xxx	yyy	0x0D0A

Example: The current region is set to China2

<< AA 00 00 0A 01 2F 02 26 0D 0A

### 3.2.13 Get Port Return Loss – SWR (0x32; 0x33)

Get the reflected power.

#### Request:

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x32		0x3A	0x0D0A

Example:

>> AA 00 00 08 32 3A 0D 0A

#### Response:

5 data bytes: successful (1), operation failed (0); 2 bytes for reflected power (in dBm/100) and 2 bytes for return loss

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000D	0x33	xxx	yyy	0x0D0A

Example: Successful, return loss is -10dB.

<< AA 00 00 0D 33 01 FC 18 FF F6 D2 0D 0A

### 3.2.14 Set Continuous Inventory Time and Delay (0x3C; 0x3D)

#### Request:

5 data bytes: in ms

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000D	0x3C	xxx	yyy	0x0D0A

Data bytes in detail:

Min value is 0, max value is 65535 ms (0xFFFF).

Byte4: permanent save (1), not (0)

Byte3 and 2: working time (MSB first)

Byte1 and 0: delay time (MSB first)

Example: Working time is 50 ms, delay time is 100 ms and permanent save

>> AA 00 00 0D 3C 01 00 32 00 64 66 0D 0A

**Response:**

1 data byte: successful (1), operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x3D	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 3D 01 35 0D 0A

### 3.2.15 Get Continuous Inventory Time and Delay (0x3E; 0x3F)

**Request:**

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x3E		0x36	0x0D0A

Example:

>> AA 00 00 08 3E 36 0D 0A

**Response:**

5 data bytes: successful (1) or operation failed (0), working time (2 bytes in ms), delay time (2 bytes in ms), MSB first

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000B	0x3F	xxx	yyy	0x0D0A

Example: Successful, working time is 50 ms and delay time is 100 ms

<< AA 00 00 0D 3F 01 00 32 00 64 65 0D 0A

### 3.2.16 Set Working Time of Antenna (0x4A; 0x4B)

Set the working time of a single antenna.

**Request:**

3 data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000B	0x4A	xxx	yyy	0x0D0A

Data bytes in detail:

Byte2			Byte1	Byte0
Reserved (3)	Permanent save (1), not (0)	Antenna no. (4)	Working time (ms)	

Example: Set the working time of antenna 3 to 300 ms and permanent save

>> AA 00 00 0B 4A 13 01 2C 7F 0D 0A

**Response:**

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x4B	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 4B 01 43 0D 0A

**3.2.17 Get Working Time of Antenna (0x4C; 0x4D)****Request:**

2 data bytes: Antenna number (1 byte) and Rev (1 byte, 0x00)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x4C	xxx	yyy	0x0D0A

Example: Get the working time of antenna 1

>> AA 00 00 0A 4C 01 00 47 0D 0A

**Response:**

4 data bytes: successful (1) or operation failed (0); antenna number (1 byte); working time (2 bytes)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000C	0x4D	xxx	yyy	0x0D0A

Example: Successful for antenna 2 and working time is 400 ms

<< AA 00 00 0C 4D 01 02 01 90 D3 0D 0A

**3.2.18 Set Idle Time of Switch Antenna (0x4E; 0x4F)**

Set idle time between two antennas being active.

**Request:**

3 data bytes: Permanent save (1) or not (0); Idle time (2 bytes in ms)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000B	0x4E	xxx	yyy	0x0D0A

Example: Idle time is 300 ms and permanent save

>> AA 00 00 0B 4E 01 01 2C 69 0D 0A

**Response:**

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x4F	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 4F 01 47 0D 0A

**3.2.19 Get Idle Time of Switch Antenna (0x50; 0x51)****Request:**

2 data bytes: Rev (2 bytes, 0x00)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x50	xxx	yyy	0x0D0A

Example:

>> AA 00 00 0A 50 00 00 5A 0D 0A

**Response:**

3 data bytes: successful (1) or operation failed (0); Idle time (2 bytes in ms)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000B	0x51	xxx	yyy	0x0D0A

Example: Idle time is 400 ms

<< AA 00 00 0B 51 01 01 90 CA 0D 0A



### 3.2.20 Set Recommend RF Links (0x52; 0x53)

#### Request:

3 data bytes: Rev (1 byte, 0x00); Permanent save (1) or not (0); RF Links (1 byte as below)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000B	0x52	xxx	yyy	0x0D0A

Data bytes in detail:

RF Links	
0x00	DSB_ASK /FM0/ 40 KHz
0x01	PR_ASK /Miller4/ 250KHz
0x02	PR_ASK /Miller4/ 300KHz
0x03	DSB_ASK /FM0/ 400KHz
else	illegal

Example: Set the RF links to be DSB\_ASK/FM0/40KHz and no permanent save

>> AA 00 00 0B 52 00 00 00 59 0D 0A

#### Response:

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x53	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 53 01 5B 0D 0A

### 3.2.21 Get Recommend RF Links (0x54; 0x55)

#### Request:

2 data bytes: Rev (2 bytes, 0x00)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x54	xxx	yyy	0x0D0A

Example:

>> AA 00 00 0A 54 00 00 5E 0D 0A

#### Response:

3 data bytes: successful (1) or operation failed (0); Rev (1 byte, 0x00); RF Link (see 3.2.20)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000B	0x55	xxx	yyy	0x0D0A

Example: The RF link is DSB\_ASK/FM0/400KHz

<< AA 00 00 0B 55 01 00 03 58 0D 0A

### 3.2.22 Baud Rate Setting of Reader Module (0x66; 0x67)

#### Request:

1 data byte: baud rate

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x66	xxx	yyy	0x0D0A

Data byte in detail:

Baud rate			
0x00	9600	0x04	115200
0x01	19200	0x05	230400
0x02	38400	0x06	460800
0x03	57600	0x07	921600

Other values are invalid.

After the baud rate is set successfully, it will take effect after power off and restart

Example: Set baud rate to 19200

>> AA 00 00 09 66 01 6E 0D 0A

#### Response:

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x67	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 67 01 6F 0D 0A

### 3.2.23 Software Reset (0x68; 0x69)

#### Request:

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x68		0x60	0x0D0A

Example:

>> AA 00 00 08 68 60 0D 0A

#### Response:

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x69	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 69 01 61 0D 0A

### 3.2.24 Dual and Single Mode Setting (0x6A; 0x6D)

#### Request:

2 data bytes: permanent save (1) or not (0); Single mode (1) or Dual mode (0), the multi-tag performance for single mode is better than for dual mode

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x6A	xxx	yyy	0x0D0A

Example: Set single mode and permanent save

>> AA 00 00 0A 6A 01 01 60 0D 0A

#### Response:

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x6B	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 6B 01 63 0D 0A

### 3.2.25 Get Dual and Single Mode (0x6C; 0x6D)

#### Request:

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x6C		0x64	0x0D0A

Example:

>> AA 00 00 08 6C 64 0D 0A

#### Response:

2 data bytes: successful (1) or operation failed (0); Single mode (1) or Dual mode (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x6D	xxx	yyy	0x0D0A

Example: Reader device is in Dual mode

<< AA 00 00 0A 6D 01 00 66 0D 0A

### 3.2.26 Inventory Filter Setting (0x6E; 0x6F)

#### Request:

N data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x6E	xxx	yyy	0x0D0A

Data bytes in detail:

1st byte: Permanent save (1) or not (0)

2nd byte: Number of memory bank (EPC: 0x01, TID: 0x02, USER: 0x03, other values are invalid)

3rd + 4th byte: Start address of the filtering operation (in bits)

5th + 6th byte: Data length of the filtering operation (in bits; 0x00 indicates no filtering)

7th to Nth byte: Data for filtering operation (length must be integer multiple of a byte)

Example: Filtering memory bank is TID, starting at address 0 for 96 bits with filter data 0xE2003414013301001038D2B5 and permanent save

>> AA 00 00 1A 6E 01 02 00 00 00 60 E2 00 34 14 01 33 01 00 10 38 D2 B5 A9 0D 0A

Example: No filtering and permanent save

>> AA 00 00 0E 6E 00 00 00 00 61 0D 0A

#### Response:

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x6F	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 6F 01 67 0D 0A

### 3.2.27 Get the Tag Data Simultaneously Mode Setting (0x70; 0x71)

#### Request:

6 data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000E	0x70	xxx	yyy	0x0D0A

Data bytes in detail:

1st byte: permanent save (1) or not (0)

2nd byte: only EPC is read (0x00) or

EPC and TID memory bank are read simultaneously, TID length is default 12 bytes (0x01) or

EPC and USER bank are read simultaneously, must provide starting address for USER and the length, unit is word (0x02)

EPC, TID and USER are read, TID length is default 12 bytes, must provide start address and length for USER in words (0x03)

EPC, TID and RFU are read, TID length is default 12 bytes, RFU default length is 8 bytes (access and kill password) (0x04)

EPC and RFU are read, must provide start address and length for RFU, unit is word (0x05)

3rd byte: start address

4th byte: data length

5th + 6th byte: Rev (0x00)

Example: Read EPC and TID simultaneously and permanently save

>> AA 00 00 0E 70 01 01 00 00 00 00 7E 0D 0A

Example: Read EPC, TID and USER simultaneously. The read length of USER is 8 words, and the start address is 2. Permanent save

>> AA 00 00 0E 70 01 03 02 08 00 00 76 0D 0A

#### Response:

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x71	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 71 01 79 0D 0A

### 3.2.28 Get the Tag Data Simultaneously Mode Setting Status (0x72; 0x73)

#### Request:

2 data bytes: Rev (2 bytes; 0x00)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x72	xxx	yyy	0x0D0A

Example:

>> AA 00 00 0A 72 00 00 78 0D 0A

#### Response:

6 data bytes: successful (1) or operation failed (0); bytes 2 to 6 same as in 3.2.27)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000E	0x73	xxx	yyy	0x0D0A

Example: Successful, currently EPC and USER are read with start address 0 and length of 8 words

<< AA 00 00 0E 74 0102 00 08 00 00 76 0D 0A

### 3.2.29 Factory Default Setting (0x74; 0x75)

Restores the reader and module's settings. After successful restore, the reader will self-reset and the settings will be changed as follows:

Setting	Factory default	Remark
RF Power	30 dBm	
Temperature protection	OPEN	

Setting	Factory default	Remark
Continuous Inventory and waiting time	Working time = 0 Waiting time = 0	No waiting time during continuous inventory.
Working time for antenna	No change	
Interval time for antenna	No change	
Recommended link	PR_ASK/Miller4/250 KHz	
Buzzer Status	No buzzer	
FastID function	Disabled	
Tagfocus function	Disabled	
Baud rate of the reader module	115200	
Dual and Single mode	Dual	
Inventory filtering	Length of filter data = 0	No filtering during inventory
Get tag data simultaneously	Disabled	only EPC

**Request:**

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x74		0x7C	0x0D0A

Example:

&gt;&gt; AA 00 00 08 74 7C 0D 0A

**Response:**

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x75	xxx	yyy	0x0D0A

Example: Successful

&lt;&lt; AA 00 00 09 75 01 7D 0D 0A

**3.2.30 Set Inventory Mode (0x76; 0x77)****Request:**

2 data bytes: Permanent save (1) or not (0); mode (as described below)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x76	xxx	yyy	0x0D0A

Data bytes in detail:

Mode	Name	Description	Advantage/Disadvantage	Recommended Application
0x01	Multi-tag mode	Working at full speed, default Session 1 (configurable), duty cycle 100%	Adv: high accurate tag reading for large number of tags Dis: high power consumption	Mass tag inventory and UHF performance comparison test
0x02	Fast read mode	Full speed, default Session 1 (configurable), duty cycle 100%	Adv: fast tag reading rate Dis: high power consumption	single tag long-distance reading, streamline application and fast-moving items
0x03	Ultra-low power mode	Adaptive work, default Session 2 (not configurable), automatically adjusts duty cycle (10% to 50%)	Adv: ultra-low power consumption Dis: low reading speed	High volume multi-tag reading, warehousing, logistics

Mode	Name	Description	Advantage/Disadvantage	Recommended Application
0x04	Test mode	Internal test use		
0x05	Adaptive mode	Adaptive work, default Session 0 and 1 (not configurable), automatically adjusts duty cycle (30% to 90%)	Adv: Performance similar to mode 1; saves power	Recommended to select this mode by default, suitable for most scenarios

Example: Fast reading mode and permanent save

>> AA 00 00 0A 76 01 01 7C 0D 0A

**Response:**

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x77	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 77 01 7F 0D 0A

### 3.2.31 Get Inventory Mode Status (0x78; 0x79)

**Request:**

2 data bytes: Rev (2 bytes; 0x00)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x78	xxx	yyy	0x0D0A

Example:

>> AA 00 00 0A 78 00 00 72 0D 0A

**Response:**

2 data bytes: successful (1) or operation failed (0); mode (see 3.2.30)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x79	xxx	yyy	0x0D0A

Example: Successful, multi-tag mode

<< AA 00 00 0A 79 01 00 72 0D 0A

## 3.3 Tag Operations

### 3.3.1 Single Inventory (0x80; 0x81)

**Request:**

2 data bytes: Timeout (2 bytes, MSB first, in ms)

optionally a 3rd data byte containing the ant number for the operation.

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x80	xxx	yyy	0x0D0A

Example: Timeout for 100 ms

>> AA 00 00 0A 80 00 64 EE 0D 0A

**Response:**

21 data bytes:

Header	Address	Length	Command	Data	Checksum	End
--------	---------	--------	---------	------	----------	-----

0xAA	0x00	zzz	0x81	xxx	yyy	0x0D0A
------	------	-----	------	-----	-----	--------

Data bytes in detail:

2 bytes: PC (the highest 5 bit determine the length of the EPC, e.g. PC = 0x3400, highest 5 bit = 0b00110 = 6, EPC has length of 6x2=12 bytes)

n bytes: EPC

2 bytes: RSSI – expressed in complement and times 10, e.g. real value is -65.7 dBm, then RSSI=0xFD6F

1 byte: Antenna number

3 bytes: Frequency (in MHz) – only available when frequency information is activated, else omitted

1 byte: Phase – range 0-180 degrees, not currently supported

If a mode is activated to read more tag data at a time (see 3.2.27), the order of the data is as follows:

PC, EPC, TID, USER / RFU

In mode 0x04, after the 8 bytes of RFU, the next byte is a status bit. If the status bit is 0, then the area is locked and the RFU data should be ignored. After the status byte the RSSI, antenna number and optional frequency are following.

Example: PC=0x3000, EPC=0xE2003411B802011383258566, RSSI=-65.7 dBm, Antenna number 2 found the tag, Frequency is 915.25 MHz, Phase=45 degree

<< AA 00 00 1D 81 30 00 E2 00 34 11 B8 02 01 13 8325 85 66 FD 6F 02 0D F7 32 2D F3 0D 0A

### 3.3.2 Continuous Inventory (0x82; 0x83)

The reader cannot respond to other commands during continuous inventory. A stop command must be sent first.

#### Request:

2 data bytes: Number of times of inventory (set to 0 to repeat infinitely)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x82	xxx	yyy	0x0D0A

Example: Number of searching times is 10000 (0x2710)

>> AA 00 00 0A 82 27 10 BF 0D 0A

#### Response:

21 data bytes: same as in 3.3.1

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x83	xxx	yyy	0x0D0A

Example: data reporting mode 0x00, PC=0x3000, EPC=0xE2003411B802011383258566, RSSI=-65.7 dBm, antenna 2 found the tag, frequency=915.25 MHz

<< AA 00 00 20 83 30 00 E2 00 34 11 B8 02 01 13 83 2585 66 FD 6F 02 0D F7 32 00 00 00 00 E1 0D 0A

Example: data reporting mode 0x04, PC=0x3000, EPC=0xE2003411B802011383258566,

TID=0xE20034120133FB0009134E8C, RFU=0x0000000000000000 (not locked), RSSI=-65.7 dBm, antenna 2 found the tag, no frequency information

<< AA 00 00 32 83 30 00 E2 00 34 11 B8 02 01 13 83 2585 66 E2 00 34 12 01 33 FB 00 09 13 4E 8C 00 00 00 00 0000 00 01 FD 6F 02 00 00 00 00 EF 0D 0A

### 3.3.3 Stop Continuous Inventory (0x8C; 0x8D)

#### Request:

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x8C		0x84	0x0D0A

Example:

>> AA 00 00 08 8C 84 0D 0A

#### Response:

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0009	0x8D	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 09 8D 01 85 0D 0A

### 3.3.4 Read Data (0x84; 0x85)

#### Request:

N data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x84	xxx	yyy	0x0D0A

Data bytes in detail:

4 bytes: Access password

1 byte: Memory bank for filtering – EPC=0x01, TID=0x02, USER=0x03, other values are invalid

2 bytes: Start address for filtering (in bits)

2 bytes: Data length for filtering (in bits, 0x00 indicates no filtering)

m bytes: Data for filtering (in bytes, depends on data length)

1 byte: Memory bank for reading

2 bytes: Start address for reading (in words)

2 bytes: Data length for reading (in words)

Example: No filtering, read 3 words from TID memory bank, start address is 2 and the access password is 0x55555555

>> AA 00 00 16 84 55 55 55 55 00 00 00 00 02 00 02 00 03 91 0D 0A

Example: TID memory bank filter, start address is 2, filtering length is 13 bits, filter data is 0b1110001000000, read 6 words from EPC memory bank, start address is 2 and access password is 0x00000000

>> AA 00 00 18 84 00 00 00 00 02 00 02 00 0D E2 00 01 00 02 00 06 76 0D 0A

#### Response:

N data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x85	xxx	yyy	0x0D0A

Data bytes in detail:

1 byte: Successful (1) or operation failed (0)

1 byte: Error flag

2 bytes: Data length

m bytes: Data

Example: Successfully read 3 words in the TID memory bank (0x123456789ABC)

<< AA 00 00 12 85 01 00 00 03 12 34 56 78 9A BC BB 0D 0A

Error flag	
0x00	Successful
0x01	No tag found
0x02	Access password is wrong
0x03	Tag memory overrun
0x04	Tag is locked
0x15	Read operation failed



### 3.3.5 Write Data (0x86; 0x87)

#### Request:

N data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x86	xxx	yyy	0x0D0A

Data bytes in detail:

4 bytes: Access password

1 byte: Memory bank for filtering - EPC=0x01, TID=0x02, USER=0x03, other values are invalid

2 bytes: Start address for filtering (in bits)

2 bytes: Data length for filtering (in bits, 0x00 indicates no filtering)

m bytes: Data for filtering (in bytes)

1 byte: Memory bank to write

2 bytes: Start address to write (in words)

2 bytes: Data length to write (in words)

k bytes: Data to write

Example: No filtering, write 6 words to the EPC memory bank, data=0x00112233445566778899AABB, start address=2, access password=0x12345678

>> AA 00 00 22 86 00 00 00 00 02 00 00 00 01 00 02 00 06 00 11 22 33 44 55 66 77 88 99 AA BB A9 0D 0A

Example: TID memory bank filter, start address is 0, filter length is 96 bits, write 6 words to EPC memory bank, data=0x00112233 445566778899AABB, start address=2, access password=0x00000000

>> AA 00 00 2E 86 00 00 00 00 02 00 00 00 60 E2 00 34 14 01 33 01 00 10 38 D2 B5 01 00 02 00 06 00 11 22 33 44 55 66 77 88 99 AA BB 71 0D 0A

#### Response:

2 data bytes: successful (1) or operation failed (0); error flag (see below)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x87	xxx	yyy	0x0D0A

Example: Writing data fails with error flag 0x03

<< AA 00 00 0A 87 00 03 8E 0D 0A

Error flag	
0x00	Successful
0x01	No tag found
0x02	Access password is wrong
0x03	Tag memory overrun
0x04	Tag is locked
0x05	Not enough energy
0x0F	Write operation failed
0x10	Multiple tags detected

### 3.3.6 Lock Tag (0x88; 0x89)

#### Request:

N data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x88	xxx	yyy	0x0D0A

Data bytes in detail:

4 bytes: Access password

1 byte: Memory bank for filtering - EPC=0x01, TID=0x02, USER=0x03, other values are invalid

2 bytes: Start address for filtering (in bits)

2 bytes: Data length for filtering (in bits)

m bytes: Data for filtering (in bytes)

3 bytes: Lock data (highest 4 bits are invalid, lowest 10 bits are action bits, the next 10 bits are mask bits)

Example: TID memory bank filter, start address 0, filter length is 96 bits, filter data= 0xE2003414013301001038D2B5, lock EPC and RFU memory banks (lock data=0x0FC2A0) and access password=0x760039AD

>> AA 00 00 20 88 76 00 39 AD 02 00 00 00 60 E2 00 34 14 01 33 01 00 10 38 D2 B5 0F C2 A0 FB 0D 0A

#### Response:

2 data bytes: successful (1) or operation failed (0), error flag (successful 0x00; no tag 0x01; access password incorrect 0x02; operation failed 0x03)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x89	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 0A 89 01 00 82 0D 0A

### 3.3.7 Kill Tag (0x8A; 0x8B)

#### Request:

N data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x8A	xxx	yyy	0x0D0A

Data bytes in detail:

4 bytes: Kill password

1 byte: Memory bank for filtering - EPC=0x01, TID=0x02, USER=0x03, other values are invalid

2 bytes: Start address for filtering (in bits)

2 bytes: Data length for filtering (in bits)

m bytes: Data for filtering (in bytes)

Example: EPC memory bank filter, start address=32, filter length=96 bits, filter data=0x00112233445566778899AABB, kill password=0x760039AD

>> AA 00 00 1D 8A 76 00 39 AD 01 00 20 00 60 00 11 22 33 44 55 66 77 88 99 AA BB 34 0D 0A

#### Response:

2 data bytes: successful (1) or operation failed (0); error flag (successful 0x00; no tag 0x01; operation failed 0x03)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x8B	xxx	yyy	0x0D0A

Example: Successful

<< AA 00 00 0A 8B 01 00 80 0D 0A

### 3.3.8 Time Frame Inventory (0x90; 0x91)

Inventory for a period of time, the number of read tags will be reported. To get the EPC data, the user must send the command described in 3.3.9.

#### Request:

2 data bytes: Time frame (10 ms – 30000 ms)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x90	xxx	yyy	0x0D0A

Example: 500 ms for the time frame

>> AA 00 00 0A 90 01 F4 6F 0D 0A

#### Response:

4 data bytes: Number of tags (4 bytes)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000C	0x91	xxx	yyy	0x0D0A

Example: 10 tags were read in the specified time frame

<< AA 00 00 0C 91 00 00 00 0A 97 0D 0A

### 3.3.9 Get Time Frame Inventory Result (0x92)

#### Request:

No data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x0008	0x92		0x9A	0x0D0A

Example:

>> AA 00 00 08 92 9A 0D 0A

#### Response:

1 data byte: successful (1) or operation failed (0)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00			xxx	yyy	0x0D0A

Example:

<< AA 00 00

### 3.3.10 Block Write Tags (0x93; 0x94)

#### Request:

N data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x93	xxx	yyy	0x0D0A

Data bytes in detail:

4 bytes: Access password

1 byte: Memory bank for filtering - EPC=0x01, TID=0x02, USER=0x03, other values are invalid

2 bytes: Start address for filtering (in bits)

2 bytes: Data length for filtering (in bits; 0x00 indicates no filtering)

m bytes: Data for filtering

1 byte: Memory bank to write

2 bytes: Start address to write (in words)

2 bytes: Data length to write (in words)

k bytes: Data to write

Example: EPC=0xE2003411B802011383258566, write 6 words to EPC bank, Data=0x00112233445566778899aabb, start address is 2, password is 0x74290fd8

>> AA 00 00 xx 93 74 29 0F D8 01 00 20 00 60 E2 00 34 11 B8 02 01 13 83 25 85 66 01 00 02 00 06 00 11 22 33 44 55 66 77 88 99 AA BB 2D 0D 0A

**Response:**

2 data bytes: successful (1) or operation failed (0) and error flag (1 byte)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A		xxx	yyy	0x0D0A

Example: Data is written but it failed with error flag 0x01

<< AA 00 00 0A 94 00 01 9F 0D 0A

Error flag	
0x00	Successful
0x01	No tag found
0x02	Access password is wrong
0x03	Tag memory overrun
0x04	Tag is locked
0x05	Not enough energy
0x0F	Write operation failed
0x10	Multiple tags detected

**3.3.11 Block Erase Tags (0x95; 0x96)****Request:**

N data bytes

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	zzz	0x95	xxx	yyy	0x0D0A

Data bytes in detail:

4 bytes: Access password

1 byte: Memory bank for filtering - EPC=0x01, TID=0x02, USER=0x03, other values are invalid

2 bytes: Start address for filtering (in bits)

2 bytes: Data length for filtering (in bits; 0x00 indicates no filtering)

m bytes: Data for filtering

1 byte: Memory bank to erase

2 bytes: Start address to erase (in words)

2 bytes: Data length to erase (in words)

Example: Tag PC=0x3000, EPC=0xE2003411B802011383258566, write 6 words to the EPC area, starting address is 2, password is 0x74290fd8

>> AA 00 00 1F 95 74 29 0f d8 30 00 E2 00 34 11 B8 02 01 13 83 25 85 66 01 00 02 00 06 1F 0D 0A

**Response:**

2 data bytes: successful (1) or operation failed (0) and error flag (1 byte)

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0x96	xxx	yyy	0x0D0A

Example: Data erase successful

<< AA 00 00 0A 96 01 00 9D 0D 0A

Error flag	
0x00	Successful
0x01	No tag found
0x02	Access password is wrong
0x03	Tag memory overrun
0x04	Tag is locked
0x05	Not enough energy
0x0F	Erase operation failed

### 3.4 Operation failed response (0xFF)

2 data bytes: error code

Header	Address	Length	Command	Data	Checksum	End
0xAA	0x00	0x000A	0xFF	xxx	yyy	0x0D0A

Example: Inventory failed

<< AA 00 00 0A FF 00 01 F4 0D 0A

Error flag	
0x0001	Inventory failed
0x0002	Checksum error
0x0003	Temperature too high
0x0004	Reflect power too high

4 Revision History

Version	Date	Description
1.0	30.09.2025	First draft.
1.1	25.11.2025	Format changes and rephrasing in all sections.