

# **IDENTIFICATION**

**MANUAL**



## **ID ISC.LR1002**

**Standard Reader**

**from Firmware-Version 2.01 or higher**



## Note

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## General information's regarding this document

- If bits within one byte are filled with "-", these bit spaces are reserved for future extensions or for internal testing- and manufacturing-functions. These bit spaces must not be changed, as this may cause faulty operation of the reader.
- The following figure formats are used:  
0..9: for decimal figures  
0x00...0xFF: for hexadecimal figures,  
b0...1 for binary figures.
- The hexadecimal value in brackets "[ ]" marks a control byte (command).

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## 1. Safety Instructions / Warning - Read before start-up !

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- The device may only be used for the intended purpose designed by for the manufacturer.
- The operation manual should be conveniently kept available at all times for each user.
- Unauthorized changes and the use of spare parts and additional devices which have not been sold or recommended by the manufacturer may cause fire, electric shocks or injuries. Such unauthorized measures shall exclude any liability by the manufacturer.
- The liability-prescriptions of the manufacturer in the issue valid at the time of purchase are valid for the device. The manufacturer shall not be held legally responsible for inaccuracies, errors, or omissions in the manual or automatically set parameters for a device or for an incorrect application of a device.
- Repairs may only be executed by the manufacturer.
- Installation, operation, and maintenance procedures should only be carried out by qualified personnel.
- Use of the device and its installation must be in accordance with national legal requirements and local electrical codes .
- When working on devices the valid safety regulations must be observed.
- Special advice for carriers of cardiac pacemakers:  
Although this device doesn't exceed the valid limits for electromagnetic fields you should keep a minimum distance of 25 cm between the device and your cardiac pacemaker and not stay in an immediate proximity of the device respective the antenna for some time.

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**Revision History of documentation**

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Revision	Date	Page	Description
0e	xx.08.12		Initial version
		<a href="#">167</a>	NXP SLIX 2 integrated
		<a href="#">74</a>	Additional parameter for LAN settings
1e	08.04.15	<a href="#">33</a>	CFG2: IDLE-STATE changed in ACTIVE-STATE (flashing)
		<a href="#">71</a>	CFG33/34: TCP/IP Hostname implemented
		<a href="#">47</a>	CFG11: TR-DATA2 Input Event added
2e	24.07.18	<a href="#">86</a>	Additional Modes for Get Reader Info
		<a href="#">27</a>	Changed behavior of CFG0 Password
		<a href="#">173</a>	ST25 Transponder implemented
3e	14.11.19	<a href="#">133; 140;</a> <a href="#">38; 105;</a> <a href="#">169</a>	Support of ICode DNA

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**Abbreviations**

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ADR	Address
ASK	Amplitude Shift Keying
CB	Config Block
CFG	Configuration Parameter Block
CRC	Cyclic Redundancy Check
DB	data block
DIP	Dual Inline Plastic
FIFO	First in First out
frq	Frequency
FSK	Frequency Shift Keying
h	Hour
Hz	Hertz
ID	Identification
IN	Input
LEN	Length
LOC	Location
LSB	Least Significant Byte
min	Minutes
ms	Milliseconds
MSB	Most Significant Byte
N	Number
OUT	Output
R/W	Read / Write Access
RD	Read
REL	Relay
RF	Radio Frequency
RSSI	Received Signal Strength Indicator
RTC	Real Time Clock
TAB	Table
TR	Transponder
TS	Timeslot
UID	Unique Identifier (read only Serial Number)
WO	Write Only Access
WR	Write

---

## 2. Introduction

---

The ID ISC.LR1002 Long Range Reader and the ID ISC.LRM1002 Long Range Reader Unit are a member of the line Long Range Reader versions of the HF Product line. The HF product line offers a complete range of products to choose from to address the entire spectrum of RFID data capture applications: from vicinity detection, to proximity and mid-range distances to the absolute limits of HF detection.

The ID ISC.LR1002 and ID ISC.LRM1002 are powerful reader in the HF product line. Both devices have identical RF performance. The ID ISC.LRM1002 differs from the ID ISC.LR1002 in terms of housing only.

Each member of the LR1002 product series have the following key RF features:

- Highly sensitivity receiver increased the tag detection range so that the most transponders can be read over the entire power up, field strength area.
- RF front end has its own power control to protect the read range from external noise sources.
- The reader delivers a DC voltage on the antenna output to source DC powered devices like a LED on the antenna side.
- RF source of the reader meets different national radio regulation up to 60dB $\mu$ A/m according ETSI limits.

In addition to the ID ISC.LR1002 Reader series having a high read range, the platform provides configuration possibilities and reader a command set. The base set of commands and features are compatible with the ISO Host commands used throughout the product line. The configuration possibilities of the ID ISC.LR1002 reader make it easy to adapt the reader to a range of applications by software and hardware configuration.

The reader is able to directly control antenna multiplexing functions to handle complex antennas arrayed in various gate and portal configurations.

The RF section of the reader is controlled by a dedicated DSP based, RF controller. The reader has 3 hardware interface ports: Ethernet, RS232 and USB.

In combination, the powerful and flexible RF transmitter and receiver and intelligent digital controller form the basis of an agile, multi protocol reader that can be updated as future protocols and features are created. The Reader supports the transponder protocols 18000-3-A, ISO15693 and the new ISO`18000-3M3`standard.

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### 3. Data Transmission between ID ISC.LR1002-Reader and Host

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Three different ways of data transmission between Readers and host (terminal, PC) are possible. The **Host Commands**, **Buffered Read Mode** and **Notification Mode** are used for the data exchange between Transponder and host, whereas the **Configuration Commands** and the **Reader Control Commands** serve for adapting the Reader parameters to the individual range of applications. The following chart shows which method of data transmission is supported by which interface:

	interface		
	RS232	LAN	USB
Configuration Commands	√	√	√
Reader Control Commands	√	√	√
Host Commands	√	√	√
Buffered Read Mode	√	√	√
Scan Mode	√	-	√
Notification Mode	-	√	-

---

#### 3.1. Configuration Commands and Control Commands

---

This method of data transmission is used for Reader configuration and the diagnosis via the asynchronous interface or Ethernet Interface

The Reader-configuration parameters will be stored in the Reader memory. To store the current configuration during a power down of the Reader the Reader-Configuration has to be stored in the EEPROM. After power up the Reader reads the configuration out of the EEPROM.

The Reader control is immediately processed and the response from the Reader contains status or data information of the control command.

Host (Terminal / PC / ....)		Reader	
parameter- / control command		→ parameter received and stored / control command processed	
		yes	no
		← status / data	error status
		←	

### 3.2. ISO15693 Host Commands

The ISO Host Commands provide the exchange of data between a host and Transponders via the Reader as long as the Transponder remains in the detection range of the Reader.

**Note:**

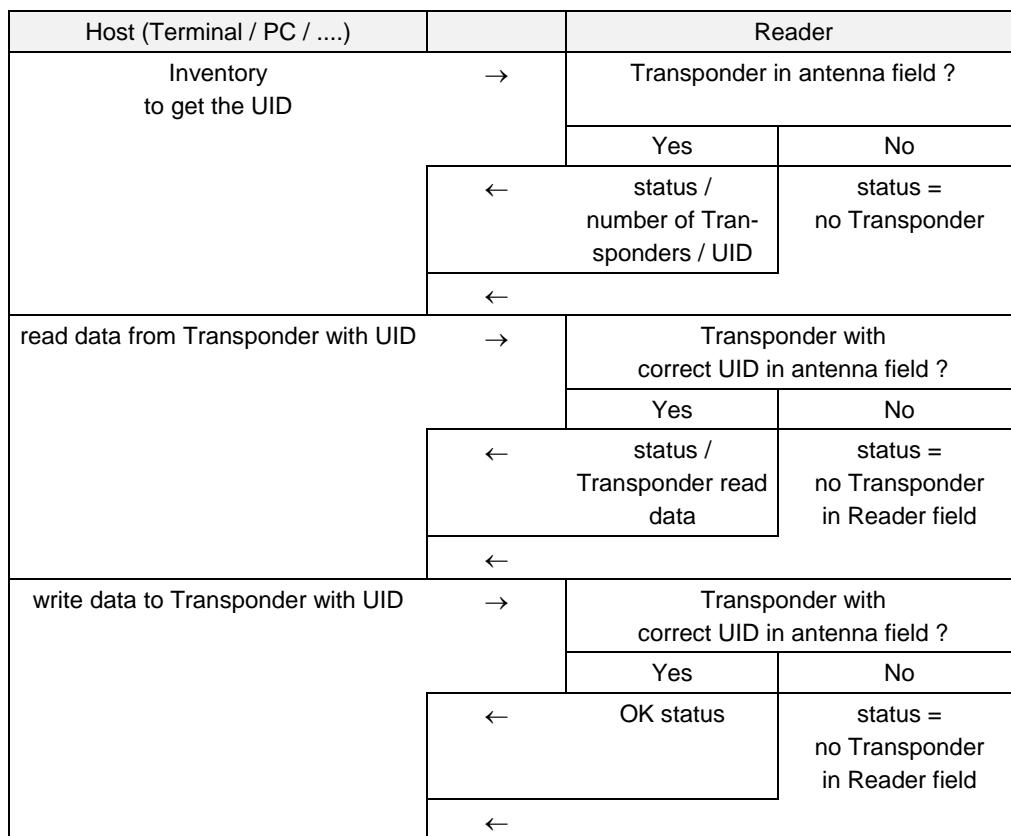
***During the writing of data on a Transponder, it must be ensured that the Transponder is located within the detection range of the Reader during the entire process. If the Transponder removed from detection range of the Reader during a writing process, this will cause a loss of data.***

The Reader distinguishes between three different modes:

**Addressed mode:**

Before reading or writing data in addressed mode, the UID of the Transponder has to be known. This is executed by sending the protocol "[8.1.1. \[0x01\] Inventory](#)". If a Transponder is located within the detection range of the Reader at that time, it answers with its UID. For all following read- / write orders the Transponder must be addressed with its correct UID.

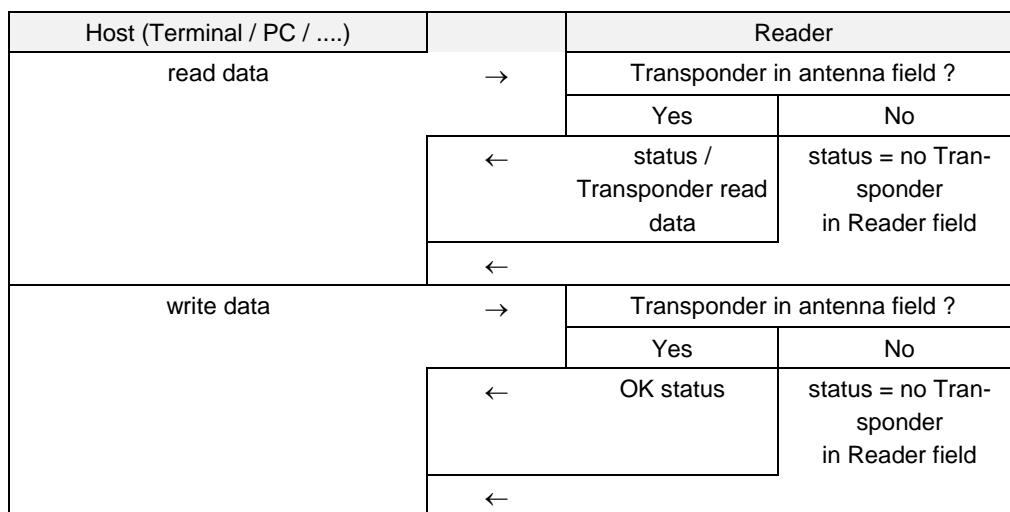
The following chart will show the necessary steps for the communication with a Transponder in addressed mode:



**Non-addressed mode:**

In non-addressed mode, it is not necessary to know the UID of the Transponder. This mode is useful-, if only one Transponder is located within the range of the Reader.

The following chart will show the necessary steps for the communication with a Transponder in non-addressed mode:

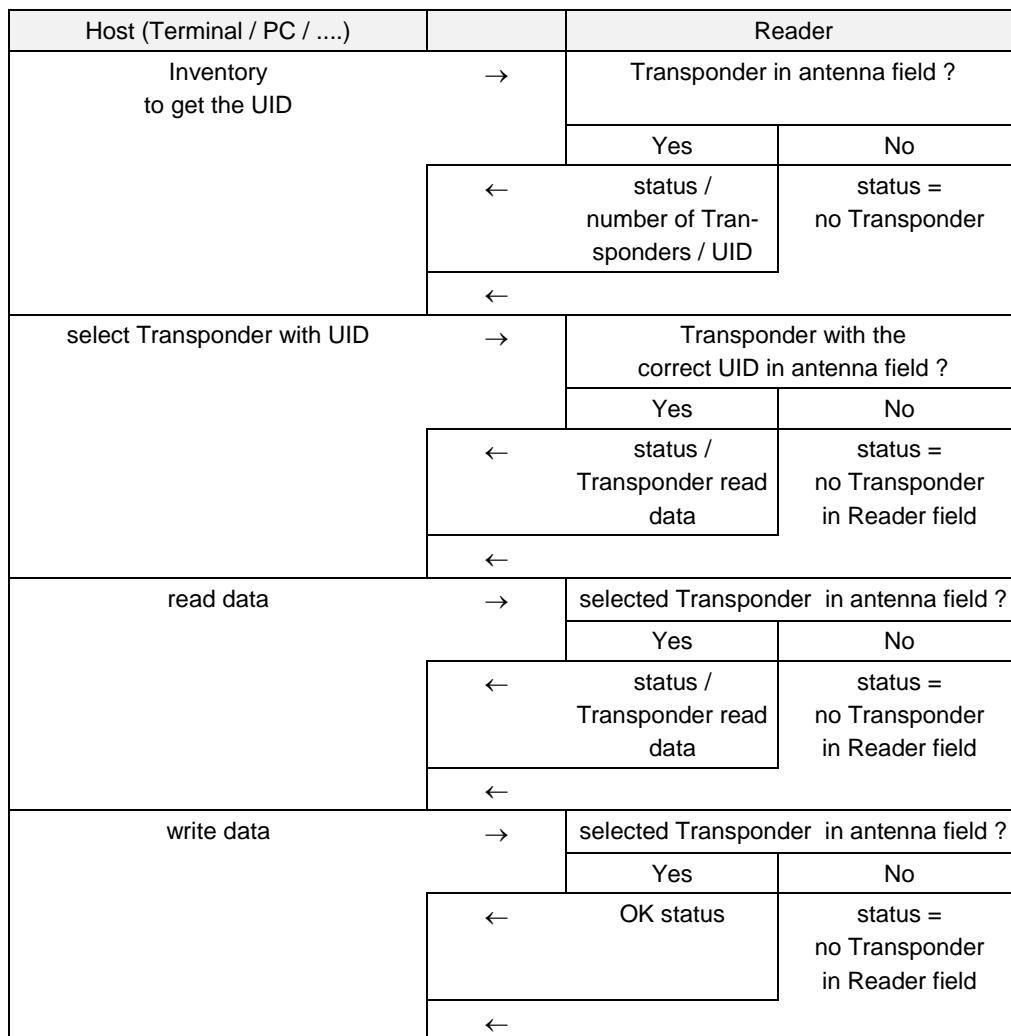


**Selected:**

In this mode the Reader communicates only with the one, selected Transponder.

Before reading or writing data in selected mode, the UID of the Transponder has to be known. This is executed by sending at first the protocol "[8.1.1. \[0x01\] Inventory](#)". In a second step the Transponder must be selected with the select command (see: [8.1.6. \[0x25\] Select](#)) which must include its UID.

The following chart will show the necessary steps for the communication with a Transponder in selected mode:



### 3.3. Buffered Read Mode

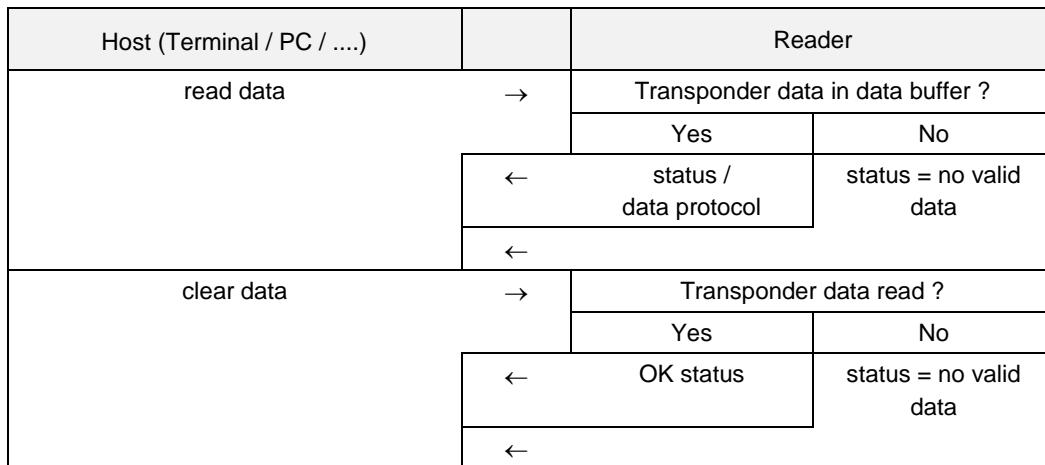
The Buffered Read Mode is a high level operating mode to detect Transponders which are within the detection range of the Reader. This operation mode is especially designed for applications which use Transponders to identify objects. The Buffered Read Mode processes all Transponder read data and filter operations to make the user interface transparent to Transponder data and to minimize data transfers between Reader and host. There are only three commands used to control Buffered Read Mode.

In this operating mode the Reader automatically selects Transponders which are within the detection range of the Reader and reads their requested data. The read Transponder data is stored in a 'FIFO' organized data buffer.

The sampled Transponder data can be read with the [10.3. Transponder Access in the Buffered Read Mode and Notification Mode](#) command. This command always reads the first available data sets from the data buffer. However already read data has to be deleted with the [10.6. \[0x32\] Clear Data Buffer](#) command before the next data sets in the data buffer can be reached with the read command.

If the Buffered Read Mode is enabled in the [5.2. CFG1: Interface](#) configuration block the Reader immediately starts sampling Transponder data after power up. The Buffered Read Mode can be reinitialized with the [10.7. \[0x33\] Initialize Buffer](#) command.

If turned to Buffered Read Mode the Reader answers every valid message with data- or status-protocol. The answer includes the control byte which has been received by the Reader.



**Note:**

- **Only transponder read operations are available with the Buffered Read Mode.**
- **The Buffered Read Mode is only available if Scan Mode is disabled**

### 3.4. Notification Mode

---

The Notification Mode is an extended option of the Buffered Read Mode: queued Transponder data and optionally Input/Status events are notified automatically and asynchronously to a host with the [10.4. \[0x22\] Read Buffer](#) response protocol. The destination address and the notification conditions can be set in [5.26. CFG49: Notification Channel \(only for ID ISC.LR1002-E\)](#) configuration block. In general, the notification channel can be used simultaneously with the host interface.

In difference to the Buffered Read Mode procedure, a notification is normally not acknowledged by the host. Thus, the deletion of the transferred data with the [10.6. \[0x32\] Clear Data Buffer](#) command is not necessary. As an option, this acknowledgement can be enabled to synchronize the notifications with the host to prevent notification overflow in the host application.

The notification message format depends on the settings for the read mode in [5.10. CFG11: Read Mode / Read Data](#) and [5.11. CFG12: Read Mode - Filter](#).

An additional option of the Notification Mode is the Keepalive message, which can be sent periodically to the host. The Keepalive message transports valuable information about the reader hardware and antenna tuning status. Keepalive messages are never acknowledged by the host. The Keepalive message should not be mistake with the keepalive option (s. [5.25. CFG41: LAN Settings, Part 2](#)) of a LAN connection initiated by a host.

### 3.5. Scan Mode

In this operation mode the Reader autonomously sends out data to the Host as soon as a Transponder is within the detection range and valid data could be read.

In Scan Mode the contents of the message block (UID, data block) can be adapted to each user-application. Scan mode is available via the asynchronous Interface.

The Reader starts the output of the protocol block as soon as all required data have been read correctly from the Transponder. If the Reader is not able to read all data of a protocol block completely and without error, it does not send data. For example, if the address of the data block is invalid, the UID of the Transponder will not be sent out.

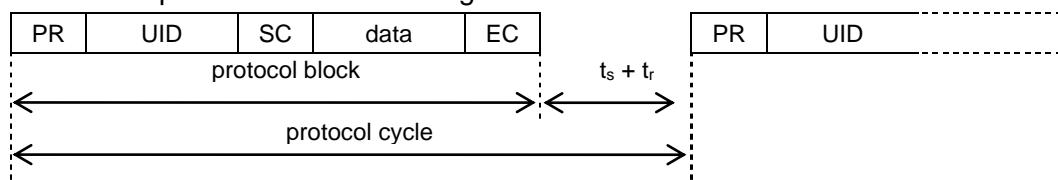
#### Scan-Mode via asynchronous interface:

The data will be sent out depending on their configuration according to the following scheme, the sequence of which cannot be changed.

Depending to the configuration and the number of Transponders in the detection range of the Reader the transmitted protocols have a different format.

##### Example 1:

One Transponder in detection range and UID and data block should be read:



##### Example 2:

3 Transponder in detection range only UID should be read:

PR	UID1	EC	UID2	EC	UID3	EC
----	------	----	------	----	------	----

##### Example 3:

3 Transponder in detection range only data block should be read:

PR	data1	EC	data2	EC	data3	EC
----	-------	----	-------	----	-------	----

##### Example 4:

2 Transponder in detection range UID and data block should be read:

PR	UID1	SC	data1	EC	UID2	SC	data2	EC
----	------	----	-------	----	------	----	-------	----

PR: Com-Prefix (optional)

ts: SCAN-LOCK-TIME

UID: Serial-Number (fix)

tr: time to the next new Transponder reading

data: data blocks (free programmable)

SC Separation character (optional)

EC End character (optional)

**Note:**

- *If configuration protocols shall be sent to the Reader while the Scan Mode is active, no Transponder should be within the detection range of the Reader during this time.*
- *Only transponder read operations are available with the Scan Mode.*
- *Scan Mode is only available if Buffered Read Mode is disabled*

---

## 4. Interface

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The Reader ID ISC.LR1002 has 3 interface ports. The protocol frame of this ports can be different. On the asynchronous serial interface the whole protocol frame is described in [4.2. Serial Data Format and Protocol Frames](#). The TCP/IP protocol frame is described below.

---

### 4.1. Protocol Frames of TCP/IP protocol

---

If the Reader use the Ethernet Interface the data is packaged in a TCP/IP protocol frame. This means the whole data format and protocol frame which is described in 4.2. Serial Data Format and Protocol Frames is packaged as the data of a TCP/IP protocol frame. By using the FETCP.DLL you can easily extract or packaging the application data you receive from the reader or you sent to the Reader.

If you use the TCP/IP protocol please be aware that the data packaged in the TCP/IP frame is transferred with **Protocol frame: Advanced Protocol-Length** as describe below.

LAN and WLAN sockets on the reader side uses the **keepalive option** for detecting interrupted connections. The default parameters for keepalive are initialized as listed in the table:

Parameter	Value	Note
idle time	5 seconds	The reader sends every 5 seconds a keepalive probe which has to be acknowledged by the client
repeat count	2	If a keepalive probe is not acknowledged, the reader repeats the probe only two times with an interval of 5 seconds.
interval	5 second	

If the 15 second time span is expired and no keepalive probe response is obtained from the client the connection is closed and the client application must enable a new connection. The keepalive parameters can be modified in the configuration pages for LAN and WLAN. This keepalive option should not be mistake with the Keepalive message for notification mode.

## 4.2. Serial Data Format and Protocol Frames

The Reader ID ISC.LR1002 can be configured by different interfaces and data may be written on Transponders or read from Transponders. The communication between Reader and connected host (terminal, PC, etc.) is executed by means of fixed protocols. The used protocol is intended for data bus use and is equipped with a bus address.

During data transfer via the asynchronous interface the Reader supplies the required data or a status byte. The reply contains the transmitted control byte.

There is no reply from the Reader if there is a protocol frame failure.

### Protocol frame: Standard Protocol-Length (up to 255 Byte)

### Protocol frame: Advanced Protocol-Length

Reader ← Host

1	2	3	4	5	(6...n-2)
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	CONTROL-BYTE	(DATA)

n-1	n
LSB CRC16	MSB CRC16

Host ← Reader

1	2	3	4	5	6	(7...n-2)
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	CONTROL-BYTE	STATUS	(DATA)

n-1	n
LSB CRC16	MSB CRC16

The Reader supports the advanced protocol frame. If the host application sends a advanced protocol frame the Reader will always response with advanced protocol frame.

**STX:**

If the responded protocol of the Reader starts with the STX sign (0x02) the protocol frame is Advanced Protocol-Length. Then the protocol length is defined by the 2 Byte Parameter ALENGTH.

**ALENGTH (n = 8...65535):**

Number of protocol bytes including STX, ALENGTH and CRC16

**LENGTH (n = 6...255): Standard Protocol-Length (up to 255 Byte)**

Number of protocol bytes including LENGTH and CRC16.

**COM-ADR:**

0..254 address of device in bus mode

**Note:**

***The Reader can be addressed via COM-ADR 255 at any time!***

**CONTROL-BYTE:**

Defines the Command which the Reader should operate.

**STATUS<sup>1</sup>:**

Includes the status message or protocol data from or to the Reader.

**DATA:**

Is a optional data field with variable length. The number of DATA byte depends on the command. The data will be send always as MSB first if the Reader is in the ISO-Host Command Mode.

**CRC16:**

Cyclic redundancy check of the protocol bytes from 1 to n-2, as specified by CCITT-CRC16

Polynom:  $x^{16} + x^{12} + x^5 + 1$  (0x8408)

Start Value: 0xFFFF

Direction: Backward

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

**Data format:**

Start bits:	1
Data bits:	8
Stop bits:	1
Parity:	even (default) odd none

---

**CRC16 Calculation Algorithm**

---

Polynom:  $x^{16} + x^{12} + x^5 + 1 \Rightarrow \text{CRC\_POLYNOM} = 0x8408;$

Start Value: 0xFFFF  $\Rightarrow \text{CRC\_RESET} = 0xFFFF;$

C-Example:

```
unsigned int crc = CRC_RESET;

for (i = 0; i < cnt; i++) /* cnt = number of protocol bytes without CRC */
{
    crc ^= DATA[i];
    for (j = 0; j < 8; j++)
    {
        if (crc & 0x0001)
            crc = (crc >> 1) ^ CRC_POLYNOM;
        else
            crc = (crc >> 1);
    }
}
```

---

## 5. Configuration Parameters (CFG)

---

The configuration memory of the Reader is organized in configuration blocks of 16 byte each. These are divided into 14 byte configuration parameters and a 2 byte CRC16 checksum. Each of these configuration blocks takes a number (CFG 0...CFG n).

Structure of a configuration blocks in Reader configuration memory and Reader EEPROM (CFG):

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Contents	PARAMETER														CRC16	

The parameters are stored in two different configuration memory locations:

Reader RAM

Backup EEPROM (used for storing parameter over power down)

Multiple configuration memory locations can be addressed by the value of the parameter CFG-ADR used in chapter 6. Protocols for Reader Configuration

**CFG-ADR:**

**CFGn:** memory-address of the required configuration block

**LOC:** specifies the location of the configuration block (RAM / EEPROM)

**MODE:** specifies one or all configuration blocks

Bit:	7	6	5	4	3	2	1	0
Function	LOC	MODE	CFGn: address of configuration block					

The EEPROM configuration blocks are protected by a 16 bit CRC-checksum. The examination of these checksums is executed after each reset of the Reader. If an checksum is found, the Reader goes into an error status "EE-Init-Mode" and sets the configuration block which is faulty to the default-values.

While the EE-Init-Mode is active, the LED blinks alternately red and green and the Reader answers external commands with the status "0x10 EEPROM Failure". The "EE-Init-Mode" can be exited now by a new reset (cold start or [7.4. \[0x64\] System Reset](#) command). If after this the checksums of all data records are correct, the Reader shifts to the configured operation mode.

**Notes:**

- Malfunctions may occur if parameters are configured without their described range or if unspecified parameters have been changed!***

Structure of configuration parameter description.

Byte	0	1	2	.....n
contents	RAM-eff.	EEPROM-eff.	00 res	.....

**not marked**

Changing of this parameter becomes immediately effective after writing / saving this configuration block to RAM

**gray marked**

Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a Reader reset

**marked with "00"**

these bits or bytes are reserved for future extensions or for internal testing and manufacturing-functions. These bits or bytes and also any not described bits and bytes **must not be changed**, as this may cause faulty operation of the Reader.

## 5.1. CFG0: Passwords

The parameters of the CFG0 configuration block contain the identification codes to personalize the Reader for a user to prevent outside access to some features of the Reader. For security reasons reading data from this configuration block requires a Reader login if a password is defined different to 00 00 00 00.

Byte	0	1	2	3	4	5	6
Contents	READER-ID				0x00	0x00	0x00
Default	0x00000000						

Byte	7	8	9	10	11	12	13
Contents	0x00	CFG_ACCESS				0x00	0x00
Default	0x00000000						

### READER-ID: (*AccessProtection.Password*)

Defines the password with which the host logs into the Reader for a read / write access to the configuration parameter blocks.

### CFG\_ACCESS: (*AccessProtection.Lock\_CFGx*)

Defines the Configuration blocks which are accessible only if the user has had a successful login to the Reader.

Byte:	8								9							
Bit:	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
CFG No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Byte:	10								11							
Bit:	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
CFG_NO.	16	17	18	19	20	21	22-29	30-39	40-49	-	-	-63	-	-	-	-
0																

### CFG\_NO

The Bit in CFG\_NO defines if the access to the configuration block is free or if the user should login to the Reader to get access to the configuration block.

b0 ⇒ Access if free

b1 ⇒ Access need a login

To change the READER-ID you must write to the CFG0 immediately after the Login to the Reader with the command [7.14. \[0xA0\] Reader-Login](#)

**Notes:**

- A READER-ID = 0x00000000 disables the password function.
- A changed password becomes valid after a Reader reset.
- The command [7.14. \[0xA0\] Reader-Login](#) is used to enable configuration data access.
- It is possible to disable the READER-ID with an activation code, if the READER-ID is unknown. The activation code must be ordered by your supplier or FEIG Electronic GmbH.

### Config Protection

By means of Config Protection, the access to the configuration parameters stored within the Reader is protected by a 32-bit password, the "READER-ID". This means that only after a "Login" with a valid READER-ID with the command [7.14. \[0xA0\] Reader-Login](#) can configuration parameters in the EEPROM of the Reader may be read and changed in the EEPROM of the Reader.

## 5.2. CFG1: Interface

The parameters of the CFG1 configuration block contains the data communication settings.

Byte	0	1	2	3	4	5	6
Contents	COM-ADR	0x00	BAUD <sup>1</sup>	TRANS-FORM <sup>1</sup>	0x00	0x00	TR-RESPONSE-TIME
Default	0x00 0x00		0x08 38400 Baud	0x01 e,8,1			0x01
Byte	7	8	9	10	11	12	13
Contents	TR-RESPONSE-TIME	0x00	0x00	0x00	SCAN-INTERFACE	INTERFACE	READER-MODE
Default	0x2C			0x02	0x95	0x00	1,5 sec.

### COM-ADR: (*HostInterface.Serial.BusAddress*)

Bus address of the Reader (0 .. 254) for communication via the asynchronous interface, especially for applications with the RS485 interface.

#### Notes:

- **Do not configure address 255!**
- **Via the COM-Adr 255 in the send protocol, the Reader is able to be addressed at any time. It answers then with the configured address.**
- **Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the RFC.**

<sup>1</sup> A reasonableness check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = 0x11.

**BAUD<sup>1</sup>:** (*HostInterface.Serial.Baudrate*)

By means of this byte the baud rate of the asynchronous interface can be defined.

- 0x05: 4800 baud
- 0x06: 9600 baud
- 0x07: 19200 baud
- 0x08: 38400 baud (default)
- 0x09: 57600 baud
- 0x0A: 115200 baud

**Note:**

- ***Changing of BAUD only becomes effective after writing / saving configuration block CFG1 to EEPROM and a reset of the Reader.***
- ***The Reader sets the baud rate to 38400 baud, if the user sets an invalid baudrate.***

**TRANS-FORM<sup>1</sup>:** (*HostInterface.Serial...*)

By means of this byte, several parameters for the data transmission format of the asynchronous interface can be defined.

Bit:	7	6	5	4	3	2	1	0
Function:	0	0	0	0	S	D	P	

**P:** (*HostInterface.Serial.Parity*)

Kind of Parity

- b00: non Parity
- b01: even Parity
- b10: odd Parity
- b11: - do not use -

**D:** (*HostInterface.Serial.Databits*)

Number of Data Bits

- b0: 8 Data Bits
- b1: - do not use -

**S:** (*HostInterface.Serial.Stopbits*)

Number of Stop Bits

- b0: 1 Stop Bit
- b1: - do not use -

---

<sup>1</sup> A reasonableness check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = 0x11.

**Note:**

- ***Changing of TRANS-FORM only becomes effective after writing configuration block CFG1 to EEPROM and reset of the Reader.***
- ***Always 8 Data Bits and 1 Stop Bits should be used***

**TR-RESPONSE-TIME: (*AirInterface.TimeLimit*)**

By means of this parameter the maximum duration for the Transponder command can be defined.

The TR-RESPONSE-TIME starts after the Reader has received a new command. At the latest after the TR-RESPONSE-TIME elapsed the Reader will send an answer protocol. In this case, the current commands between Reader and Transponder are aborted. If this time is too short the Interface Status “0x83 RF Communication Error” will appear.

	max. response duration
TR-RESPONSE-TIME	0...65535 * 5 ms

**Note:**

- ***TR-RESPONSE-TIME has no effect with the protocols for Reader Configuration and the protocols for Reader Control.***
- ***The TR-RESPONSE Time must be < “Block Timeout” in the Host COM-Port settings.***

**SCAN-INTERFACE: (*OperatingMode.ScanMode.Interface*)**

Selection of the communication port for Scan-Mode

Bit:	7	6	5	4	3	2	1	0
Function:	-	-		DC Format			IF-NO	

**IF-NO:** Interface Number

b000: RS232

b010: USB

b1xx: - do not use -

**Note:**

- ***The reader with USB interface in Scan Mode works like a Human Interface Device (HID).***
- ***The reader with USB interface in Scan Mode sends the data in USB-Keycode.***

**INTERFACE:** (*HostInterface.Interfaces*)

Flags for enabling the communication ports

Bit:	7	6	5	4	3	2	1	0
Function:	-	-	-	USB	-	LAN	-	RS232

**RS232:** b0: disable

b1: enable

**LAN:** b0: disable

b1: enable

**USB:** b0: disable

b1: enable

**READER-MODE:** (*OperatingMode.Mode*)

By means of this byte, the Reader mode can be defined.

Bit:	7	6	5	4	3	2	1	0
Function:	BRM-E	NF-E	0	0	0	0	0	SCAN-E

**SCAN-E:**

By setting of this bit the Scan-Mode can be enabled

b0: **Host Mode** (see chapter [8. Protocols for ISO15693 Host Commands](#))

b1: **Scan Mode**

**BRM-E:**

By setting of this bit the Buffered Read Mode can be enabled

b0: **Host Mode or Scan Mode**

b1: **BRM-Mode**

**NF-E:**

By setting of this bit the Notification Mode can be enabled

b0: **Off**

b1: **On (only together with BRM-Mode)**

The following table lists the bit combinations for the reader modes:

		Bit							
		7	6	5	4	3	2	1	0
Reader Mode	Host-Mode	0	0	0	0	0	0	0	0
	Scan Mode	0	0	0	0	0	0	0	1
	Buffered Read Mode	1	0	0	0	0	0	0	0
	Notification Mode	1	1	0	0	0	0	0	0

### 5.3. CFG2: Inputs/Output

The parameters of the CFG2 configuration block contains the digital-input and -output settings.

Byte	0	1	2	3	4	5	6
Contents	IDLE-MODE		FLASH-IDLE		IN-ACTIVE	0x00	REL1-TIME
Default	0x80AB		0x0000		0x00		0x00

Byte	7	8	9	10	11	12	13
Contents	REL1-TIME	0x00	0x00	0x00	0x00	0x00	0x00
Default	0x00						

#### IDLE-MODE: (*DigitalIO.Output.No1.IdleMode*), (*DigitalIO.Relay.Nox.IdleMode*)

Defines the status of the signal emitters (OUT1 and RELx) during the idle mode.

Bit:	15	14	13	12	11	10	9	8
Function:	REL1 mode		0	0	0	0	0	0

Bit:	7	6	5	4	3	2	1	0
Function:	0	0	0	0	0	0	0	0

Mode	Function							
b 0 1	ON							
b 1 0	OFF							

#### ACTIVE-STATE: (*DigitalIO.Output.No1.IdleFlashMode*), (*DigitalIO.Relay.Nox.IdleFlashMode*)

Allocates its own flashing-frequency to each output.

Bit:	15	14	13	12	11	10	9	8
Function:	REL1 frq		0	0	0	0	0	0

Bit:	7	6	5	4	3	2	1	0
Function:	0	0	0	0	0	0	0	0

Bit combination	flashing frequency
b 1 1	1 Hz
b 1 0	2 Hz
b 0 1	4 Hz
b 0 0	No Flash (0Hz)

**IN-ACTIVE: (*DigitalIO.Input.NoX.Mode*)**

Determines if the input is active with the closed or open contact:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	0	IN1

Bit = 0 ⇒ closed contact activates input

Bit = 1 ⇒ open contact activates input

**REL1-TIME: (*DigitalIO.Relay.No1.SettlingTime*)**

Defines the holding time of the digital output REL1. If the Reader receives a valid Transponder response the antenna the Relay is activated for the value in REL1-TIME.

If REL1-TIME is zero the function is disabled.

If REL1 is high in idle mode, REL1 will low for REL1-TIME.

If the flash mode is enabled, the output goes low.

**Range: 0x0000 ... 0xFFFF ( \* 100ms ) = 0s ... 6553,5s.**

- **Note:**

*BRM-mode (reading of serial number and data):*

*if the serial number was read OK and the data not, no data set will be transferred, but the assigned REL1 will be active.*

---

### 5.3.1. Dedicated Input / Output Functions

---

The LED's are used for system monitoring.

LED	Color	Dedicated Function
1	green	<ol style="list-style-type: none"><li>1 second blink.</li><li>Alternately blink alternating with LED4 after an EEPROM error.</li></ol>
2	blue	<ol style="list-style-type: none"><li>The RF interface has an faultless communication with a Transponder.</li></ol>
3	yellow	The interface sends data to the host
4	red	<ol style="list-style-type: none"><li>The Reader is initializing after power up or a <a href="#">7.3. [0x63]</a> command.</li><li>RF-Warning:<ul style="list-style-type: none"><li>- mismatch of the antenna tuning</li><li>- See chapter <a href="#">7.9. [0x6E] Reader Diagnostic</a> for details.</li></ul></li><li>Alternately blink with LED1 after an EEPROM error.</li></ol>

**Notes:**

- LED1 (green) and LED4 (red) are blinking alternately if a read error of the EEPROM occurred after power-up or a [7.3. \[0x63\] RF-Controller Reset](#) command.***

## 5.4. CFG3: RF-Interface

The parameters of the CFG3 configuration block contain global Transponder drivers and Reader settings.

Byte	0	1	2	3	4	5	6
Contents	TAG-DRV <sup>1</sup>		RF-POWER <sup>1</sup>	0x00	0x00	0x00	0x00
Default	0x0008 0x0208 (3M3)		0x04 4W				

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	FU-COM
Default							0x00

### TAG-DRV<sup>1</sup>: (*Transponder.Driver.HF.Drivers.*)

Defines the Transponder types that are operated by the Reader.

Byte:	0								1							
Bit:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Driver	0	0	0	0	0	0	.J	0	0	0	0	0	.D	0	0	0

b0 ⇒ Driver for the Transponder type is inactive

b1 ⇒ Driver for the Transponder type is active

#### .D: (*Transponder.Driver.HF.ISO\_15693*)

Driver for ISO15693

#### .J: (*Transponder.Driver.HF.ISO\_18000-3M3*)

Driver for ISO18000-3M3

In principle, only those Transponder drivers should be active that are used in the actual application. Thus, the reaction time of the Reader for Transponder read- / write-operations is reduced and the danger of a parasitic Transponder access is minimized.

<sup>1</sup> A reasonableness check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = [0x11].

**RF-POWER<sup>1</sup>:** (*AirInterface.Antenna.HF.No1.OutputPower*)

Defines the RF output power.

Bit:	7	6	5	4	3	2	1	0
Function	0	0						LEVEL

**LEVEL**

Level of the RF output power, range: (1Watt – 5Watt)

LEVEL	RF-POWER
001	1 Watt
010	2 Watt
011	3 Watt
100	4 Watt
101	5 Watt

**Notes:**

- A monitor is continuously checking the RF hardware and if an error occurs the Reader answers every command with the error code 0x84.
- Changing of RF-POWER only becomes effective after writing configuration block CFG3 to EEPROM and a CPU reset of the Reader

**FU-COM:** (*AirInterface.Antenna.HF.Miscellaneous.Enable\_DCPower*)

Defines if the Reader itself try to controls a function unit in the RF Line.

Bit:	7	6	5	4	3	2	1	0
Function	DC ON /OFF	0	0	0	0	0	0	0

**DC ON/OFF**

defines whether the Reader provides DC voltage on the antenna output for an external LED, e.g. for ID ISC.ANTS370/270-A. (See also Mounting Instruction)

b0 disabled  
b1 enabled

**Notes:**

- The DC voltage on the antenna output cannot support a ID ISC.DAT tuning board.

<sup>1</sup> A plausibility check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = [0x11].

## 5.5. CFG4: Transponder Parameters

The parameters of the CFG4 configuration block contain general Transponder settings.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	TAG_AUTHENT	ISO 15693 MODE	ISO 15693 AFI1	ISO15693 OPTION
Default					0x0B	0x00	0x00
Byte	7	8	9	10	11	12	13
Contents	0x00	ISO 15693 AFI2	ISO 15693 AFI3	ISO 15693 AFI4	TID-LENGTH	IDDIB	ISO-Blocksize
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x04

### TAG\_AUTHENT: (*Transponder HF.ISO\_15693.Miscellaneous.TagAuthent*)

Defines if an automatic Tag-authentication is performed in Buffered Read or Notification Mode. Only if the authentication was successfully, the data exchange between reader and transponder can be successful executed.

Bit	7	6	5	4	3	2	1	0
Contents	-	-	-	KEY-ID	AUTHENT-TYPE			

#### AUTHENT-TYPE:

- b000: Tag-authentication disabled
- b010: Tag-authentication (TAM1) for AES encrypted tags according ISO 29167-10 (e.g.ICODE DNA)
- b011: Mutual-authentication (MAM1, MAM2) for AES encrypted tags according ISO 29167-10 (e.g.ICODE DNA)

#### KEY-ID:

- b00: Authentication with Key 0
- b01: Authentication with Key 1
- b10: Authentication with Key 2
- b11: Authentication with Key 3

#### NOTE:

- **Only one authentication mode is possible.**
- **To store the Key0-3 in the reader see [7.15. \[0xA3\] Write AES Reader Keys](#)**

- If the authentication was not successfully status 0x08 (Authent Error) will set in ISO-Host Mode

### ISO 15693 MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	AFI	NO-TS	DATA-RATE	0	0	0

### DATA-RATE

- b0 - do not use -  
 b1 high

### NO-TS (*Transponder.HF.ISO\_15693.Anticollision.NoOfTimeslots*)

- b0 16 timeslots  
 b1 1 timeslot

### AFI (*Transponder.HF.ISO\_15693.SelectionMask.Enable\_AFI*)

- b0 Disabled  
 b1 Enabled

### ISO 15693 AFI1: (*Transponder.HF.ISO\_15693.SelectionMask.AFI1*)

First Application Family Identifier to select a Transponder

### ISO 15693 OPTION:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	WR-OPTION	0	0	0

### WR-OPTION: (*Transponder.HF.ISO\_15693.Miscellaneous.WriteOption*)

- b00: automatically set  
 b10: Tag Option = 0  
 b11: Tag Option = 1

**Note:**

- **If WR-OPTION is automatically set, the Reader sets the WR-OPTION to 0, if the ISO15693 Host Command is in non-addressed mode**

**ISO 15693 AFI2: (*Transponder.HF.ISO\_15693.SelectionMask.AFI2*)**

Second Application Family Identifier to select a Transponder

**ISO 15693 AFI3: (*Transponder.HF.ISO\_15693.SelectionMask.AFI3*)**

Third Application Family Identifier to select a Transponder

**ISO 15693 AFI4: (*Transponder.HF.ISO\_15693.SelectionMask.AFI4*)**

Third Application Family Identifier to select a Transponder

**Note:**

**If the AFI2/3/4 is different to 0x00 a second and a third or fourth Inventory with different AFI-Bytes will be performed.**

**TID-LENGTH: (*Transponder.Miscellaneous.TID-Length*)**

Defines the length of the TID to be expected when IDDB is EPC and TID.

- 0x00 – automatic Mode
- 0x20 – 32 Bits
- 0x40 – 64 Bits
- 0x60 – 96 Bits

**Notes:**

If TID-Length is 0x00 the reader will automatically add the complete content of the TID memory bank

**IDDB (*Transponder.Miscellaneous.IdentifierInterpretationMode*)**

(Identifier Data Interpretation Byte):

Defines in which way the Reader interprets and display the Identifier data read during inventory process by using the inventory command.

- 0x00 – automatic Mode (IDD Type is automatic set by the Reader)
- 0x02 – EPC and TID

**Notes:**

If IDDB is 0x02 then only the TID must be used to address commands (e.g. read, write...) to the tag

**ISO-Blocksize:**

Bit:	7	6	5	4	3	2	1	0
Function	Read Mode		Blocksize	DB-Blocksize				

**DB-Blocksize:** (*Transponder.HF.ISO\_15693.Miscellaneous.ReadOption.BlockSize*)

Defines the block size of an ISO-transponder which is not listed in the MFR-table (see: 9.3. Supported ISO15693 Host commands for [ISO15693 Transponders](#)) or if the transponder is used in the non-addressed mode.

Range: 0x01 ... 0x1F

A value of 0x00 will be automatically set to a block size of 4byte.

**Blocksize:****(Transpond-****er.HF.ISO\_15693.Miscellaneous.ReadOption.BlockSizeSelection)**

- b0: Automatic (If transponder is known)  
b1: Manuel (As specified in DB-Blocksize)

**Read Mode:** (*Transponder.HF.ISO\_15693.Miscellaneous.ReadOption.ReadMode*)

- b00: Automatic Mode (If transponder is known)  
b01 Single Read  
b10 Multiple Read

## **5.6. CFG5: Anticollision**

The parameters of the CFG5 configuration block contain anticollision settings.

## Default

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	reserved	Anticollision	0x00	0x00

Default 0x02 0x04

## Anticollision:

Defines which Transponder will sent to the host.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	ACOLL	0	1

**ACOLL:** (*Transponder.Anticollision.Enable*)

This bit activates the Anticollision Mode. In Anticollision Mode the Reader automatically sets Transponder specific communication parameters.

b0: disabled

In this case the Reader doesn't processes any anticollision procedure with the Transponders inside the antenna field.

b1: enabled (default)

In this case the Reader processes the anticollision procedure with the Transponders inside of the antenna field.

---

## 5.7. CFG6: Customer Command Option Bytes

---

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	<b>FUJITSU</b>	0x00	0x00	0x00	<b>NXP</b>
Default			0x00				0x00

Byte	7	8	9	10	11	12	13
Contents	<b>ST</b>	0x00	0x00	0x00	0x00	0x00	0x00
Default		0x00					

**Note:**

*There are application notes available from FEIG ELECTRONIC GmbH for the description of the customer commands.*

*It is also recommended to read the transponder specification from the according transponder manufacturer.*

---

## 5.8. CFG7-9 Reserved

---

The configuration blocks CFG7 .. 9 are reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00						

Default

Byte	7	8	9	10	11	12	13
Contents	0x00						

Default

## 5.9. CFG10: Trigger

The configuration blocks contains parameters for the trigger configuration.

Byte	0	1	2	3	4	5	6
Contents	TRIGGER-MODE	0x00	TRIGGER_1-HOLD-TIME 0x00	0x00	0x00	0x00	0x00
Default	0x00		0x0005 500ms				

Byte	7	8	9	10	11	12	13
Contents	0x00						

Default

### TRIGGER-MODE

defines the mode of the scanner.

Bit:	7	6	5	4	3	2	1	0
Function	Trigger	0	Condition	0	0	0	0	Unlimited Valid Time

#### Trigger:

*(OperatingMode.ScanMode.Trigger.Enable)*

*(OperatingMode.NotificationMode.Trigger.Enable)*

*(OperatingMode.BufferedReadMode.Trigger.Enable)*

b0: **Trigger disabled:**

The Reader RF Power is on and the Reader scans all the time in BRM Mode.

b1: **Trigger enabled:**

The Reader start the RF Power and the scan, if the trigger is activated by the external switch.

#### Note

**If Trigger is enabled and not activated by the external switch, the RF-field will be switched off.**

**Condition:** *(OperatingMode.BufferedReadMode.Trigger.Condition)*  
*(OperatingMode.NotificationMode.Trigger.Condition)*  
*(OperatingMode.ScanMode.Trigger.Condition)*

- b0: Level Triggered:  
RF Field will be switched on with the rising edge. Trigger Hold Time starts to run with the falling edge
- b1: Edge Triggered  
RF Field will be switched on with the rising edge. Trigger Hold Time starts to run with the rising edge.

**Unlimited Valid Time:**

*(OperatingMode.ScanMode.Trigger.Enable\_UnlimitTransponderValidTime)*  
*(Oeraing-*  
*Mode.NotificationMode.Trigger.Enable\_UnlimitTransponderValidTime)*  
*(Operating-*  
*Mode.BufferedReadMode.Trigger.Enable\_UnlimitTransponderValidTime)*

- b0: **Valid Time limited to one Trigger Period:**  
The Valid Time (s. CFG12) is restarted with each Trigger Period and thus not longer than one Trigger Period.
- b1: **Unlimited Valid Time:**  
The Valid Time (s. CFG12) is applicable for more than one Trigger Period.

**TRIGGER\_1-HOLD-TIME:**

*(OperatingMode.ScanMode.Trigger.Source.Input.No1.HoldTime)*  
*(OperatingMode.NotificationMode.Trigger.Source.Input.No1.HoldTime)*  
*(OperatingMode.BufferedReadMode.Trigger.Source.Input.No1.HoldTime)*

Input 1 is used as a trigger  
(1 ... 65535 \* 100 ms = 100 ms ... 6553,5 sec)

The TRIGGER-HOLD-TIME defines the period in which the Reader performs inventory commands and hold the RF Power active.

## 5.10. CFG11: Read Mode / Read Data

The parameters of the CFG11 configuration block contain settings for a reader automatic mode. To enable a reader automatic mode (Buffered read Mode, Scan Mode, Notification Mode), the according bit in the READER-MODE register of the configuration block [5.2. CFG1: Interface](#) must be set. It is useful to enable "Anticollision Select Mode" in

[5.6. CFG5: Anticollision](#) if there is a large or unknown number of Transponders in the antenna field. The reader automatic mode can be used with the Antenna Multiplex Mode, the parameters for this function have to be configured in [5.14. CFG15: Antenna Multiplexing I](#) and [5.16. CFG17: Antenna Multiplexing II](#)

Byte	0	1	2	3	4	5	6
Contents	TR-DATA-1	TR-DATA-2	TR-DATA-3	Bank	DB-ADR		0x00
Default	0x01	0x00	0x00	0x03	0x0000		

Byte	7	8	9	10	11	12	13
Contents	0x00	DB-N		EAS-MODE	D-START	D-LGT	
Default		0x0001		0x00	0x00	0x0004	

**TR-DATA-1:** *(OperatingMode.ScanMode.DataSelector.Selector)*  
*(OperatingMode.NotificationMode.DataSelector.Selector)*  
*(OperatingMode.BufferedReadMode.DataSelector.Selector)*

Selects the data types for read operation.

Bit:	7	6	5	4	3	2	1	0
Function	Exten- sion	-	TIMER	ANT	Byte Order DB	EAS	DB	SNR

**SNR** *(OperatingMode.ScanMode.DataSelector.Uid)*  
*(OperatingMode.NotificationMode.DataSelector.Uid)*  
*(OperatingMode.BufferedReadMode.DataSelector.Uid)*

b0: no Serial Number will be stored  
b1: Serial Number will be stored

**DB** *(OperatingMode.ScanMode.DataSelector.Data)*  
*(OperatingMode.NotificationMode.DataSelector.Data)*  
*(OperatingMode.BufferedReadMode.DataSelector.Data)*

b0: no data block will be stored  
b1: data block will be stored

**EAS** (only I-Code SLI)

*(OperatingMode.ScanMode.DataSelector.EAS)  
(OperatingMode.NotificationMode.DataSelector.EAS)  
(OperatingMode.BufferedReadMode.DataSelector.EAS)*

- b0: no EAS function  
b1: Performs EAS command

**Byte Order DB** *(OperatingMode.ScanMode.DataSource.ByteOrderOfData)*

*(OperatingMode.NotificationMode.DataSource.ByteOrderOfData)  
(OperatingMode.BufferedReadMode.DataSource.ByteOrderOfData)*

- b0: MSB first  
b1: LSB first

**ANT** *(OperatingMode.ScanMode.DataSelector.AntennaNo)  
(OperatingMode.NotificationMode.DataSelector.AntennaNo)  
(OperatingMode.BufferedReadMode.DataSelector.AntennaNo)*

- b0: the number of the antenna will not be stored  
b1: the number of the antenna (1-8) where the Transponder has been detected, will be stored.

**TIMER** *(OperatingMode.ScanMode.DataSelector.Time)  
(OperatingMode.NotificationMode.DataSelector.Time)  
(OperatingMode.BufferedReadMode.DataSelector.Time)*

- b0: no internal system timer  
b1: internal system timer will be active

**Extension**

If this flag is set TR-DATA-2 is present

**Note:**

*The internal system timer is not a real time clock (RTC) and the accuracy cannot be guaranteed.*

*EAS and simultaneous reading of serial numbers and data blocks are possible.*

**TR-DATA-2:**

Selects the data types for read operation.

Bit:	7	6	5	4	3	2	1	0
Function	Exten-	-	-	ANT_	-	-	-	IN

**IN**      (*OperatingMode.ScanMode.DataSelector.InputEvents*)  
           (*OperatingMode.NotificationMode.DataSelector.InputEvents*)  
           (*OperatingMode.BufferedReadMode.DataSelector.InputEvents*)

- b0:      no Input states will be stored and transferred  
       b1:     Input states from IN1 and IN2 will be stored and transferred

**ANT\_Ext: Antenna Extended**

(*OperatingMode.Buffered ReadMode.DataSelector.RSSI*)  
           (*OperatingMode.NotificationMode.DataSelector.RSSI*)

- b0:      no RSSI  
       b1:     Antenna number with RSSI

**Extension**

If this flag is set TR-DATA-3 is present

**Notes:**

**If Antenna Extended is enabled the bit for number of antenna must be disabled**

**TR-DATA-3:**

Selects the data types for read operation.

Bit:	7	6	5	4	3	2	1	0
Function	-	-	-	READ_	-	-	-	COM-
				COMPL				PREFIX
				ETE_				
				BANK				

**COM-PREFIX: (Scan Mode only)**

(*OperatingMode.ScanMode.DataFormat.BusAddressPrefix*)

- b0:      no COM Prefix is send  
       b1:     The Reader will transmit the COM-ADR in front of each data set.

**READ\_COMPLETE\_BANK:**

*(OperatingMode.ScanMode.DataSelector.Mode.Read\_Complete\_Bank)*  
*(OperatingMode.BufferedReadMode.DataSelector.Mode.Read\_Complete\_Bank)*  
*(OperatingMode.NotificationMode.DataSelector.Mode.Read\_Complete\_Bank)*

If this bit is set the reader will read out all memory blocks from the selected Memory BANK.

- |     |  |
|-----|--|
| b00 | Reader reads out the memory blocks according to the settings in DB-ADR, DB-N, D-Start and D-LGT. |
| b01 | Reader reads out all blocks of the selected memory bank  |

**Notes:**

- **This functionality is limited to memory banks with a maximum size of 255 Byte.**

**BANK:**

Memory bank of the Transponder which will be accessed by the Reader

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	BANK_NR	

**BANK\_NR:** *(OperatingMode.ScanMode.DataSource.BankNo)*

*(OperatingMode.BufferedReadMode.DataSource.BankNo)*

*(OperatingMode.NotificationMode.DataSource.BankNo)*

In case of ISO18000-3M3 Transponder BANK\_NR is defined as follows:

- |     |                  |
|-----|------------------|
| b00 | reserved         |
| b01 | EPC memory bank  |
| b10 | TID memory bank  |
| b11 | User memory bank |

**DB-ADR<sup>1</sup>:** *(OperatingMode.ScanMode.DataSource.FirstDataBlock)*

*(OperatingMode.NotificationMode.DataSource.FirstDataBlock)*

*(OperatingMode.BufferedReadMode.DataSource.FirstDataBlock)*

0x00...0xFF

Address of first data block. Range: 0x00...0xFF.

See for valid addresses: [9.3. Supported ISO15693 Host commands for ISO15693 Transponders](#)

**DB-N<sup>1</sup>:** *(OperatingMode.ScanMode.DataSource.NoOfDataBlocks)*  
*(OperatingMode.NotificationMode.DataSource.NoOfDataBlocks)*  
*(OperatingMode.BufferedReadMode.DataSource.NoOfDataBlocks)*

Number of data blocks. Range: 0x01...0x20. The data block size in the Buffered Read Mode is always 4 bytes. (see Annex : [9.3. Supported ISO15693 Host commands for ISO15693 Transponders.](#))

#### EAS-MODE:

The EAS-MODE defines settings for the automatic Read Modes.

Bit:	7	6	5	4	3	2	1	0
Function:	-	ALARM-MODE	-	-				TAG-TYPE

**ALARM-MODE:** *(OperatingMode.ScanMode.EAS.AlarmMode)*  
*(OperatingMode.NotificationMode.EAS.AlarmMode)*  
*(OperatingMode.BufferedReadMode.EAS.AlarmMode)*

- b00 MODE 0 (Relay will become active only if EAS has been detected.)
- b01 MODE 1 (Relay will become active if EAS was detected and/or a UID has been read.)

**TAG-TYPE:** *(OperatingMode.ScanMode.EAS.TagType)*  
*(OperatingMode.NotificationMode.EAS.TagType)*  
*(OperatingMode.BufferedReadMode.EAS.TagType)*

Defines which tagtype will be supported.

Bit	Tag-Type
b0000	NXP
b0001	NXP
b0010	Fujitsu

#### D-START: *(OperatingMode.ScanMode.DataSource.FirstByte)*

This parameter defines the first byte in the raw data (defined by DB-ADR and D-LGT), which will be transferred in Scan-Mode. To transfer the whole data block D-START must be set to 0.

---

<sup>1</sup> A plausibility check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = [0x11].

**Note:**

***The size of one data block depends on the type of Transponder.***

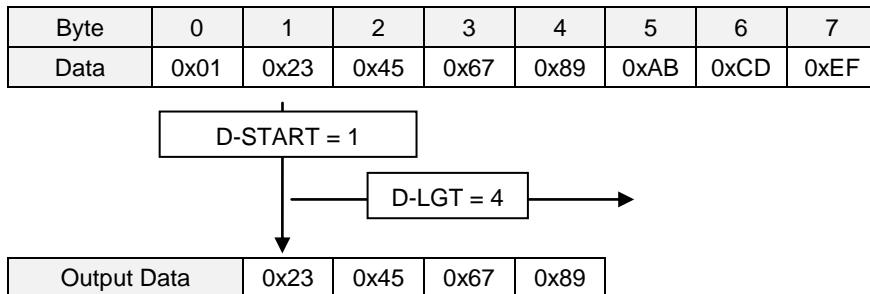
**D-LGT:** (*OperatingMode.ScanMode.DataSource.NoOfBytes*)

D-LGT defines the length of raw data which are transmitted in the Scan-Mode.

Number of **data bytes** to be transferred, starting with the D-START.

Example:

data block



### **5.11. CFG12: Read Mode - Filter**

Byte	0	1	2	3	4	5	6
0x00	VALID-TIME <sup>1</sup>			TR-ID			0x00

Default 0x0037 0x01 0x00 0x00 0x01  
5,5sec.

Byte	7	8	9	10	11	12	13
Contents	0x00						
Default							

**VALID-TIME:** (0...65535 x 100 ms = 0 ms ... 6553.5 sec)

*(OperatingMode.ScanMode.Filter.TransponderValidTime)*

*(OperatingMode.NotificationMode.Filter.TransponderValidTime)*

**(OperatingMode.BufferedReadMode.Filter.TransponderValidTime)**

The period of time during which a Transponder can't be read a 2<sup>nd</sup> time.

**Note:-**

- *Changing of VALID-TIME only becomes effective after writing configuration block CFG12 to EEPROM and a CPU-Reset*

**TR-ID:** (only for Buffered Read Mode and Notification Mode)

TR-ID sets the parameters for Transponder identification.

If several Transponders have the same content in the addressed data block, only one dataset will be generated.

Byte:	2	3	4	5
Function	TR-ID-SOURCE	TR-ID-DB-ADR		TR-ID-DB-N

**TR-ID-SOURCE:**

**(OperatingMode.Miscellaneous.TransponderIdentification.Source)**

Sets the data source for Transponder identification.

b0 data block

b1 Serial Number

TR-ID-DB-ADR

**(OperatingMode.Miscellaneous.TransponderIdentification.DataBlockNo)**

Sets the address of the data block for Transponder identification. If ID-SOURCE selects the Serial Number as data source, the ID-DB-ADR will be ignored.

**TR-ID-DB-N**

*(OperatingMode.Miscellaneous.TransponderIdentification.NoOfDataBlocks)*

Sets the number of data blocks to be read for Transponder identification. If ID-SOURCE selects the Serial Number as data source, the ID-DBN will be ignored.

**Notes:**

- *Changing of TR-ID only becomes effective after writing configuration block CFG12 to EEPROM and CPU-Reset.*
- *The address TR-ID-DB-ADR must be in the range of the selected data blocks: DB-ADR<sup>1</sup> ≤ TR-ID-DB-ADR ≤ DB-ADR<sup>1</sup> + DB-N<sup>1</sup> – 1.*
- *If the TR-ID-Source “data block” is used instead of “Serial Number” it is also necessary to enable and configuring the reading of data blocks [in 5.10. CFG11: Read Mode / Read Data](#).*

---

<sup>1</sup> DB-ADR, DB-N of CFG11

---

## 5.12. CFG13: Scan-Mode

---

Byte	0	1	2	3	4	5	6
Contents	DB-USE	SEP-CHAR	SEP-USER	END-CHAR	END-USR1	END-USR2	END-USR3
Default	0x02	0x20	0x2C	0x01	0x00	0x00	0x00

Byte	7	8	9	10	11	12	13
Contents	0x00	HEADER-USR1	HEADER - USR2	HEADER - USR3	HEADER - USR4	0x00	LEN-USR
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x00

**DB-USE:**

Defines the data format of the data and the value of the data.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	DB-FORMAT			

**DB-FORMAT** (*OperatingMode.ScanMode.DataFormat.Format*)**b0000 unformatted hex-data**

In this case the data are transferred as they were read by the reader

**b0010 ASCII formatted hex-data**

In this case the raw data from the Transponder were converted to ASCII - Code before transfer. For this purpose, the data bytes first are separated into their Nibbles and then changed into ASCII signs according the following table.

raw data (hex / binary)		ASCII data (ASCII / hex)	
0x0	b0000	'0'	0x30
0x1	b0001	'1'	0x31
0x2	b0010	'2'	0x32
0x3	b0011	'3'	0x33
0x4	b0100	'4'	0x34
0x5	b0101	'5'	0x35
0x6	b0110	'6'	0x36
0x7	b0111	'7'	0x37
0x8	b1000	'8'	0x38
0x9	b1001	'9'	0x39
0xA	b1010	'A'	0x41
0xB	b1011	'B'	0x42
0xC	b1100	'C'	0x43
0xD	b1101	'D'	0x44
0xE	b1110	'E'	0x45
0xF	b1111	'F'	0x46

**SEP-CHAR:** (*OperatingMode.ScanMode.DataFormat.SeparationChar*)

Selects the separation character between two data types for the send data.

Bit:	7	6	5	4	3	2	1	0
Function	USER	“	‘	‘‘	TAB	CR	LF	CR+LF

ASCII	Hex
CR+LF	0x0D and 0x0A
LF	0x0A
CR	0x0D
TAB	0x09
‘‘	0x3B
‘‘	0x2C
‘‘	0x20
USER	user defined in SEP-USR
none	0x00

**Note:**

**Only one option can be selected.**

**SEP-USR:** (*OperatingMode.ScanMode.DataFormat.UserSeparationChar*)

User defined separation character.

**END-CHAR:** (*OperatingMode.ScanMode.DataFormat.EndChar*)

Selects the end character between two data types for the send data.

Bit:	7	6	5	4	3	2	1	0
Function	USER	“	‘	‘‘	TAB	CR	LF	CR+LF

ASCII	Hex
CR+LF	0x0D and 0x0A
LF	0x0A
CR	0x0D
TAB	0x09
‘‘	0x3B
‘‘	0x2C
‘‘	0x20
USER	user defined in SEP-USR
none	0x00

**Note:**

**Only one option can be selected.**

**END-USR1...3: (*OperatingMode.ScanMode.DataFormat.UserEndCharx*)**

User defined end character.

**HEADER-USR1...4: (*OperatingMode.ScanMode.DataFormat.UserHeaderCharx*)**

User defined Header character.

**LEN-USR:**

Defines the length of the HEADER character and END character.

Bit:	7	6	5	4	3	2	1	0
Function	HEADER-LEN				END-LEN			

**END-LEN      (*OperatingMode.ScanMode.DataFormat.NoOfUserEndChars*)**

- b0000** END-USR1
- b0001** END-USR1
- b0010** END-USR1 +2
- b0011** END-USR1 + 2 + 3

**HEADER-LEN    (*OperatingMode.ScanMode.DataFormat.NoOfUserHeaderChars*)**

- b0000** no HEADER byte
- b0001** HEADER-USR1
- b0010** HEADER-USR1 +2
- b0011** HEADER-USR1 + 2 + 3
- b0100** HEADER-USR1 + 2 + 3 + 4

Example of scan data:

Header				UID	Separation Character	Blocks	Separation Character	Timer
USR1	USR2	USR3	USR4	UID	SEP-CHAR	DB	SEP-CHAR	Timer
↙ ↘								
Separation Character	Antenna	Separation Character	END Character					
SEP-CHAR	ANT No	SEP-CHAR	USR1	USR2	USR3			

---

**5.13. CFG14: Reserved**

---

The configuration block CFG14 is reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00						

Default

Byte	7	8	9	10	11	12	13
Contents	0x00						

Default

## 5.14. CFG15: Antenna Multiplexing I

The parameters in CFG15 are used to configure for multiplexing of antennas in reader automatic mode in conjunction with antenna multiplexer ID ISC ANT.MUX.

Byte	0	1	2	3	4	5	6
Contents	MUX-MODE	Output-Channels		Mux-Valid-Time-ANT_1	Mux-Valid-Time-ANT_2	Mux-Valid-Time-ANT_3	
Default	0x00	0x04		0x00C8	0x00C8		

200 x 5ms = 1000ms

Byte	7	8	9	10	11	12	13
Contents	Mux-Valid-Time-ANT_3		Mux-Valid-Time-ANT_4	Mux-Valid-Time-ANT_5	0x00	INPUT-CHANNELS	
Default	0x00C8		0x00C8	0x00C8		0x01	

### MUX-MODE:

Activates or deactivates multiplexing and determines when the next output is selected.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	MUX Switch Condition	Multiplexing

#### Multiplexing: (*AirInterface.Multiplexer.Enable*)

- b0: disable
- b1: enable

#### MUX Switch Condition: (*AirInterface.Multiplexer.HF.External.SwitchCondition*)

Specifies when the next output is selected.

- b0: no response (when communication on the RF interface ends)
- b1: reserved

#### OUTPUT-CHANNELS: (*AirInterface.Multiplexer.HF.External.NoOfOutputChannels*)

Specifies the number of output channels which are used for the multiplexing.

The allocation between the input channels and the output channels is fixed if the Dual Mode (2 input channels) is used.

The following table shows the allocation between the input channel and the output channel in the Dual Mode.

Dual Mode:		Physical Input Channels	
OUTPUT-CHANNELS	Physical Output Channels	1	2
1	→	1 - 8	
2	→	1 - 8 2 - 7	
3	→	1 - 8 2 - 7 3 - 6	
4	→	1 - 8 2 - 7 3 - 6 4 - 5	

**MUX-VALID-TIME-ANT\_x:***(AirInterface.Multiplexer.HF.External.Antenna.Nox.ActiveTime)*

Immediately this time has expired (value x 5ms), the next antenna output is selected.

If **MUX Switch Condition** is “no response” the Reader switches from the active antenna to the next antenna if there is no response from any Transponder on the active antenna. If the Transponder communication time on the active antenna exceed the MUX-VALID-TIME-ANT\_x the Transponder communication on the active antenna is stopped, and the Reader switches to the next antenna. If „fixed“ is selected under Switch Condition, the switch to the next channel is always made in this time.

**INPUT-CHANNELS:** *(AirInterface.Multiplexer.HF.External.InputChannelMode)*

Specifies the number of inputs

b00: -

b01: 1 input (Single Mode)

b10: 2 inputs (Dual Mode)

> b10: reserved

The multiplexer has two inputs (for receiving RF power from the Reader) and eight outputs (which can be connected to the antenna). Each output can be assigned (by jumper in the MUX Hardware) to one of the two inputs. Only one output per input can be active at a time. In Single Mode only one channel is enabled, whereas in Dual Mode two channels are enabled.

---

### 5.15. CFG16: Persistence Reset

---

The parameters in CFG16 are used to configure the Reader reset timing of the persistence flags of the Transponders. The timing for reset of the persistence flags is used by the Reader in ISO Host Mode, Scan Mode , Buffered Read Mode and Notification Mode.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	PER-RESET-TIME	0x00	0x00	0x00	0x00
Default			0x0028				

40 x 5ms = 200ms

Byte	7	8	9	10	11	12	13
Contents	0x00						
Default							

**PER-RESET-TIME:** *(Transponder.PersistenceReset.Antenna.No1.PersistenceResetTime)*

The timer value specifies a time which determines the reset of the Transponder select state by a RF reset from the Reader. The timer PER-RESET-TIME starts after the Reader gets a response from any Transponder. After this time has expired the Reader generates a RF reset. The PER-RESET-Time has an effect only if the Reader does not use the MUX. If a MUX is used the switching from one antenna to an other antenna resets the Transponder state.

Timer ticks = 5ms

Maximum timer value = 5ms x 65534[0xFFFF] = 5,46125 min.

The value 65535 [0xFFFF] indicates that no RF reset is performed by the Reader

---

## 5.16. CFG17: Antenna Multiplexing II

---

The parameters in CFG17 are used to configure for multiplexing of antennas in reader automatic mode in conjunction with antenna multiplexer ID ISC ANT.MUX.

Byte	0	1	2	3	4	5	6
Contents	Mux-Valid-Time-ANT_6		Mux-Valid-Time-ANT_7		Mux-Valid-Time-ANT_8		0x00
Default	0x00C8		0x00C8		0x00C8		

200 x 5ms = 1000ms

Byte	7	8	9	10	11	12	13
Contents	0x00						

Default

### MUX-VALID-TIME-ANT\_x:

*(AirInterface.Multiplexer.HF.External.Antenna.No.x.ActiveTime)*

Immediately this time has expired (value x 5ms), the next antenna output is selected.

If **MUX Switch Condition** is “no response” the Reader switches from the active antenna to the next antenna if there is no response from any Transponder on the active antenna. If the Transponder communication time on the active antenna exceed the MUX-VALID-TIME-ANT\_x the Transponder communication on the active antenna is stopped, and the Reader switches to the next antenna. If „fixed“ is selected under Switch Condition, the switch to the next channel is always made in this time.

---

**5.17. CFG18-19: Reserved**

---

The configuration block CFG18-19 is reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00						

Default

Byte	7	8	9	10	11	12	13
Contents	0x00						

Default

---

## 5.18. CFG20: RF-Parameter

---

The parameters of the CFG20 configuration block contain the receiver settings.

Byte	0	1	2	3	4	5	6
Contents	reserved	0x00	0x00	0x00	0x00	0x00	0x00

**Default** 0x02

Byte	7	8	9	10	11	12	13
Contents	Ignore-Error	0x00	0x00	0x00	0x00	0x00	0x00

Default 0x01

### IGNORE-ERROR :

Defines whether a error has valid data or not.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	Weak Collision ISO18000-3M3	Weak Collision ISO15693

#### Weak Collision ISO15693:

*(AirInterface.Miscellaneous.HF.ISO\_15693\_ICode1.ErrorHandling.WeakCollision)*

- b1: a weak collision has valid data
- b0: a weak collision has corrupted data and the data will be ignored

#### Weak Collision ISO18000-3M3:

*(AirInterface.Miscellaneous.HF.ISO\_18000\_3M3.ErrorHandling.WeakCollision)*

- b1: a weak collision has valid data
- b0: a weak collision has corrupted data and the data will be ignored

---

**5.19. CFG21: Reserved**

---

The configuration block CFG21 is reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00						

Default

Byte	7	8	9	10	11	12	13
Contents	0x00						

Default

---

## 5.20. CFG22-23: Selection mask for ISO18000-3M3

---

The configuration blocks CFG22 ... 23 hold a selection mask for selection ISO18000-3M3 Transponders..

**CFG 22:**

Byte	0	1	2	3	4	5	6
Contents	S_MASK_LGT	S_MODE	S_START_POINTER	S_MASK_MSB			
Default	0x00	0x01	0x0010	0x30	0x00	0x00	0x00

Byte	7	8	9	10	11	12	13
Contents	S_MASK						
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x00

**CFG 23:**

Byte	0	1	2	3	4	5	6
Contents	S_MASK						
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Byte	7	8	9	10	11	12	13
Contents	S_MASK						
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x00

**S\_MASK\_LGT: (*Transponder.HF.ISO\_18000\_3M3.SelectionMask.No1.MaskLength*)**

Defines the length of the mask in Bit

If S\_MASK\_LGT is 0 the selection mask is disabled

**S\_MODE: (*Transponder.HF.ISO\_18000\_3M3.SelectionMask.....*)**

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	S_BANK	

**S\_BANK: (*Transponder.HF.ISO\_18000\_3M3.SelectionMask.No1.Bank*)**

Defines whether mask applies to EPC, TID, User memory

b00 reserved

b01 EPC memory bank

b10 TID memory bank

b11 User memory bank

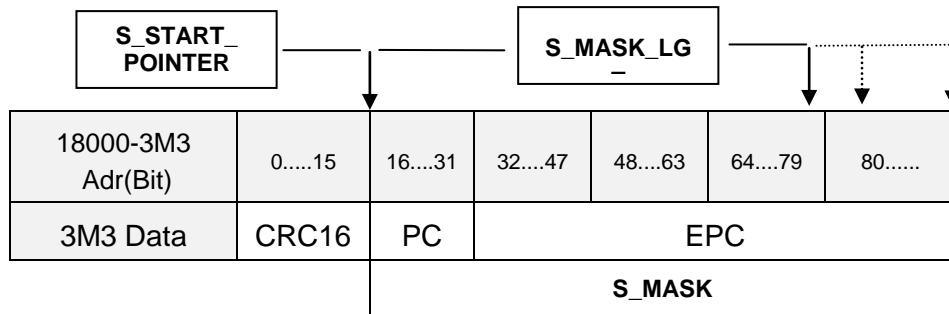
**S\_START\_POINTER: (*Transponder.HF.ISO\_18000\_3M3.SelectionMask.No1.FirstBit*)**

Defines the memory bit address on which the bit String of the Mask is compared to the

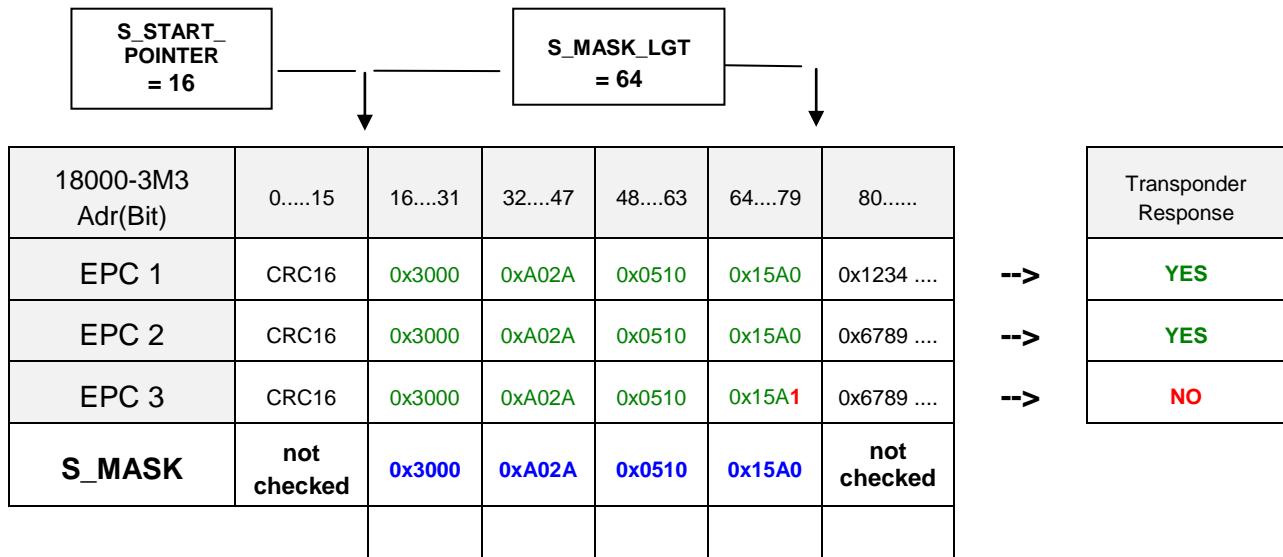
memory of the Tag.

**S\_MASK:** (*Transponder.HF.ISO\_18000\_3M3.SelectionMask.No1.Mask*)

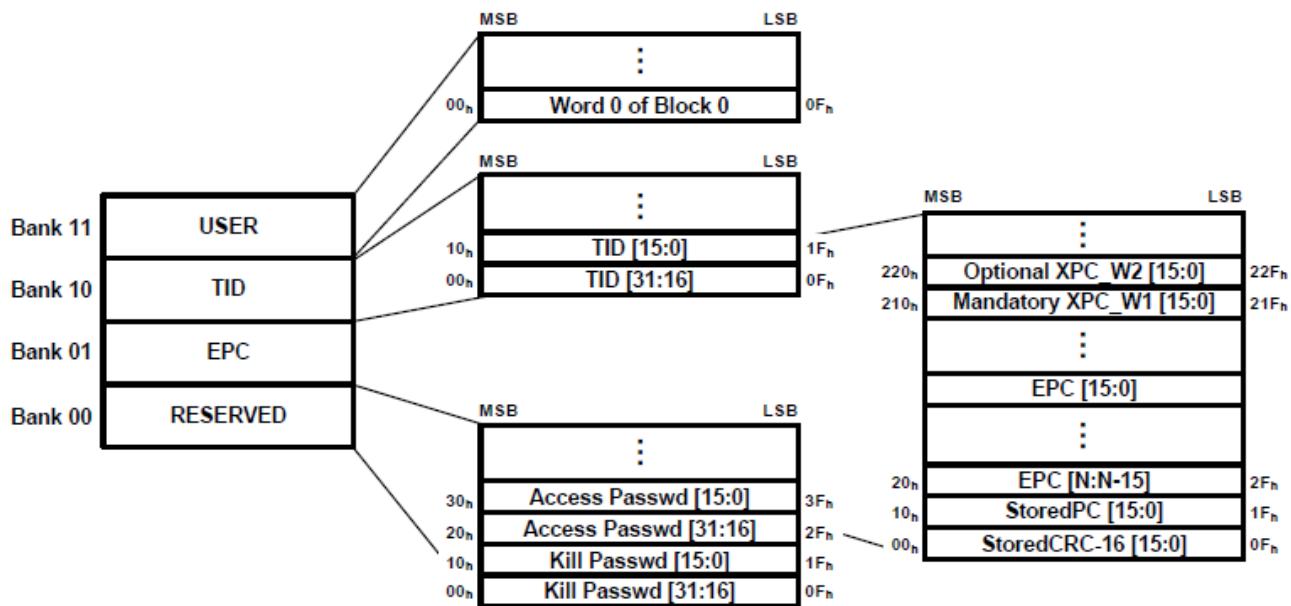
contains the bit string that the Tag compares against the memory location.



Example:



18000-3M3 Memory specification:



---

**5.21. CFG24-32: Reserved**

---

The configuration blocks CFG24 ...39 are reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0xXX						

Default

Byte	7	8	9	10	11	12	13
Contents	0xXX						

Default

---

## 5.22. CFG33-34: LAN-Hostname

---

The configuration block CFG33 and 34 hold the LAN-Hostname.

**CFG 33:**

Byte	0	1	2	3	4	5	6
Contents	LENGTH	LAN-HOSTNAME					

Default 0x0B 0x6C7231303032  
LR1002.FEIG

Byte	7	8	9	10	11	12	13
Contents	LAN-HOSTNAME						

Default 0x2E666569670000

**CFG 34:**

Byte	14	15	16	17	18	19	20
Contents	LAN-HOSTNAME						

Default 0x0000000000000000

Byte	21	22	23	24	25	26	27
Contents	LAN-HOSTNAME						

Default 0x0000000000000000

**LENGTH: (*HostInterface.LAN.Hostname.Length*)**

Defines the length of the LAN-Hostname

0x00 disabled

0x01 1 Byte

0x02 2 Bytes

...

0x1B 27 Bytes

**NOTE:**

***The LAN-Hostname can have a maximum length of 27 Bytes.***

**LAN-HOSTNAME: (*HostInterface.LAN.Hostname.Name*)**

Defines the LAN-Hostname

---

**5.23. CFG35-39: Reserved**

---

The configuration blocks CFG24 ...39 are reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00						

Default

Byte	7	8	9	10	11	12	13
Contents	0x00						

Default

---

## 5.24. CFG40: LAN Settings, Part 1

---

Byte	0	1	2	3	4	5	6
Contents		IP_ADDRESS_LAN			-	-	-
Default	0xC0 192	0xA8 168	0x0A 10	0x0A 10	0x00	0x00	0x00

Byte	7	8	9	10	11	12	13
Contents	-	IP_PORT_NUMBER_LAN		-	-	-	-
Default	0x00	0x27	0x11	0x00	0x00	0x00	0x00

10001

**IP\_ADDRESS\_LAN: (*HostInterface.LAN.IPv4.IPAddress*)**

Defines the IP address for wired LAN connection. Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the LAN-adapter.

**IP\_PORT\_NUMBER:\_LAN (*HostInterface.LAN.PortNumber*)**

Defines the port number for wired LAN connection. Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the LAN-adapter.

---

## 5.25. CFG41: LAN Settings, Part 2

---

Byte	0	1	2	3	4	5	6
Contents	SUBNET-MASK-LAN			LAN-OPTIONS	KEEP-CNT	GW-ADDRES-LAN	
Default	0xFF 255	0xFF 255	0x00 0	0x00 0	0x01	0x02	0x00

Byte	7	8	9	10	11	12	13
Contents	GW-ADDRES-LAN		0x00	reserved	KEEP-INTERVAL		
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x05

### SUBNET\_MASK\_LAN: (*HostInterface.LAN.IPv4.SubnetMask*)

Defines the subnet mask for wired TCP/IP connection. Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the RFC

### GW\_ADDRESS\_LAN: (*HostInterface.LAN.IPv4.GatewayAddress*)

Defines the gateway address for TCP/IP connection. Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the RFC

### LAN-OPTIONS:

Bit:	7	6	5	4	3	2	1	0
Function:	DHCP	Speed	Duplex	Host-name	Auto Negotiation	0	0	KEEP-ALIVE

### KEEP-ALIVE: (*HostInterface.LAN.Keepalive.Enable*)

b0: Keep-Alive option disabled.

b1: Keep-Alive option enabled.

### AUTO-NEGOTIATION:

b0: enabled

b1: disabled

### HOST-NAME:

b0: disabled

b1: enabled

**DUPLEX:**

b0: half

b1: full

**SPEED:**

b0: 10 MBit/s

b1: 100 MBit/s

**DHCP: (*HostInterface.LAN.IPv4.Enable\_DHCP*)**

b0: dhcp-client disabled.

b1: dhcp-client enabled.

**KEEP-CNT: (*HostInterface.LAN.Keepalive.RetransmissionCount*)**

Specifies the maximum number of retransmissions. This is the number of times that the reader re-transmits a keepalive packet to the host to check for connectivity. The valid range is 1..255.

**KEEP-INTERVAL: (*HostInterface.LAN.Keepalive.IntervalTime*)**

Set the Keepalive Interval. This is the polling frequency used to determine if a keepalive exchange is needed. This interval is used when the connection failed. The valid range is 1..255 sec.

**Notes:**

- **The command 6.3. [0x83] Set Default Configuration (Reset) has no effect on this setting**
- **Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the RFC.**

---

**5.26. CFG49: Notification Channel (only for ID ISC.LR1002-E)**


---

Byte	0	1	2	3	4	5	6
Contents	MODE	0x00	0x00	0x00	KEEP-ALIVE	KEEP-ALIVE-TIME	
Default	0x00 <i>continuously</i>			0x00 <i>Off</i>	0x00 <i>0s</i>		0x02

Byte	7	8	9	10	11	12	13
Contents	DEST-IP-ADDRESS				DEST-IP-PORT	HOLD-Time	
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x05

**MODE:**

Defines the basic settings for the notification channel.

Bit:	7	6	5	4	3	2	1	0
Function	ACK	0	0	0	0	0	0	0

**ACK: Acknowledge Notification**

(*OperatingMode.NotificationMode.Transmission.Enable\_Acknowledg*

e)

b0: Notification must not be acknowledged

b1: Notification must be acknowledged with protocol [0x32] Clear Data Buffer

**KEEP-ALIVE:**

Mode for keep alive notification.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	0	EN

**EN:** (*OperatingMode.NotificationMode.Transmission.KeepAlive.Enable*)

b0: disabled

b1: enabled

**KEEP-ALIVE-TIME:** (*OperatingMode.NotificationMode.Transmission.KeepAlive.IntervalTime*)

Defines the cycle time for keep alive notification.

	max. time period
KEEP-ALIVE-TIME	0...65535 * 1s

**DEST-IP-ADDRESS:**

*(OperatingMode.NotificationMode.Transmission.Destination.IPv4.IPAAddre*

*ss)*

Defines the destination IP address.

**DEST-IP-PORT-NUMBER:**

*(OperatingMode.NotificationMode.Transmission.Destination.PortNumber)*

Defines the destination port number.

**HOLD-Time:**

*(OperatingMode.NotificationMode.Transmission.Destination.ConnectionHoldTi*

*me)*

Defines the connection hold time.

---

## 5.27. CFG63: Customer Parameter

---

The configuration block CFG63 is used for customer parameter.

Any kind of customer hex data can be stored in this EEPROM or RAM memory area.

Byte	0	1	2	3	4	5	6
Contents	0x00						

Default

Byte	7	8	9	10	11	12	13
Contents	0x00						

Default

- ***Changing of this parameter only becomes effective after writing this configuration block to EEPROM and a CPU-Reset.***

---

## 6. Protocols for Reader Configuration

---

Via the protocols for the Reader configuration, the Reader may be adapted to individual conditions of application within wide limits.

---

### 6.1. [0x80] Read Configuration

---

By using the Read Configuration the actual configuration of the Reader can be detected. In order to do this, the configuration is read in blocks of 14 bytes each and addressed by CFGn in the byte CFG-ADR.

Host → Reader

1	2	3	4	5	6	7-8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x80]	CFG-ADR	CRC16

Host ← Reader

1	2	3	4	5	6	7 .. 20	21-22
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x80]	STATUS <sup>1</sup>	CFG-REC	CRC16

**CFG-ADR<sup>2</sup>:**

Bit:	7	6	5	4	3	2	1	0
Function	LOC	0	CFGn: Address of Configuration Block					

**CFGn:** memory-address of the required configuration block

**LOC:** specifies the location of the configuration block

b0 RAM

b1 EEPROM

**CFG-REC:**

14 bytes configuration block read from address CFGn in CFG-ADR.

**Note:**

**A read configuration from EEPROM with reserved configuration blocks will cause an 0x15 error code.**

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

<sup>2</sup> see Chapter 5. Configuration Parameters (CFG)

---

## 6.2. [0x81] Write Configuration

---

The configuration of the Reader can be changed by means of the Write Configuration command. In order to do this, the configuration memory is written to with 14 bytes long blocks and addressed by CFGn in the byte CFG-ADR. The description of parameters can be taken from Chapter 5. Configuration Parameters (CFG)

Host → Reader

1	2	3	4	5	6	7...20	21-22
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x81]	CFG-ADR	CFG-REC	CRC16

Host ← Reader

1	2	3	4	5	6	7-8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x81]	STATUS <sup>1</sup>	CRC16

**CFG-ADR<sup>2</sup>:**

Bit:	7	6	5	4	3	2	1	0
Function	LOC	0	CFGn: Address of Configuration Block					

**CFGn:** memory-address of the required configuration block

**LOC:** specifies the location of the configuration block

b0 RAM

b1 RAM and EEPROM

**CFG-REC:**

14 bytes configuration block stored in the configuration memory of the Reader at address CFGn.

**Note:**

**A write configuration to EEPROM with reserved configuration blocks will cause an 0x16 error code.**

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

<sup>2</sup> see chapter 5. Configuration Parameters (CFG)

---

### 6.3. [0x83] Set Default Configuration (Reset)

---

Using the command Set Default Configuration each configuration block can be reset to the manufacturer's setting.

Host → Reader

1	2	3	4	5	6	7...8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x83]	CFG-ADR	CRC16

Host ← Reader

1	2	3	4	5	6	7...8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x83]	STATUS	CRC16

**CFG-ADR:**

Bit:	7	6	5	4	3	2	1	0
Function	LOC	MODE	CFGn: Address of Configuration Block					

**CFGn:** memory-address of the required configuration block

**MODE:** specifies one or all configuration blocks

b0 configuration block specified by CFGn

b1 all configuration blocks

**LOC:** specifies the location of the configuration block

b0 RAM

b1 RAM and EEPROM

**Notes:**

- A set default configuration with reserved configuration blocks will cause an error code.

---

## 7. Protocols for Reader Control

---

The Reader configuration protocols allow the Reader to be adapted to the conditions found in individual applications.

Access to the configuration parameters is gained only after a [7.14. \[0xA0\] Reader-Login](#) command with the correct READER-ID.

In order to avoid unauthorized data access, the Reader is equipped with the following protection mechanism:

- **Config-Protection:**

Access locking for the configuration parameters stored in the EEPROM of the Reader.

---

## 7.1. [0x52] Baud Rate Detection

---

This protocol serves to determine the actual baud rate of the Reader's asynchronous interface.

Host → Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x52]	0x00	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x52]	0x00	CRC16

**Note:**

- **The return protocol will only be sent if the inquiry is executed with the baud rate and actual parity of the Reader.**
- **A USB reader will send status 0x00 (OK) if reader can be detected.**

---

## 7.2. [0x55] Start Flash Loader

---

This protocol starts the Flash Loader inside the Reader. Use the windows program "OBIDFirmwareUpdateTool" to process the firmware update. Please refer to the Application Note "N30300-....pdf" for details.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	0x00	[0x55]	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	0x00	[0x55]	0x00	CRC16

**Note:**

- **This command is only available if the correct COM-ADR of the Reader is used. (Do not use 0xFF)**

---

### 7.3. [0x63] RF-Controller Reset

---

This protocol allows you to perform a reset of Reader CPU.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x63]	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x63]	STATUS <sup>1</sup>	CRC16

**Note:**

- ***The RF-field will be switched off after a “CPU Reset”.***
- ***The communication interface will not be reset.***
- ***LED V1 and V4 will flash 5 times synchronously.***

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

---

## 7.4. [0x64] System Reset

---

This protocol allows you to reset the RF Controller.

Host → Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x64]	Mode	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x64]	STATUS <sup>1</sup>	CRC16

**MODE:**

Defines the controller which will be reset.

MODE	Controller
0x00	RF Controller

**Note:**

- **The RF-field will be switched off after a “CPU Reset”**
- **The communication interface will be reset.**

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

---

## 7.5. [0x66] Get Reader Info

---

This protocol allows you to determine, the Firmware version, its type and the types of the Transponders which are supported by the Firmware, and some other hard- and firmware options of the Reader. Also the Device\_ID can be determined.

Host → Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	MODE	CRC16

Host ← Reader

Depending on the MODE Parameter the Reader response has a differing structure with several information's:

**MODE = 0x00 (Controller Firmware)**

1	2	3	4	5	6	7,8	9
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS <sup>1</sup>	SW-REV	D-REV
	10	11	12,13	14,15	16,17	18,19	

↳ HW-TYPE      SW-TYPE      TR-TYPE      RX-BUF      TX-BUF      CRC16

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

**Mode = 0x10 (Hardware Information)**

1	2	3	4	5	6	7...8	9...10
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS	reserved	reserved
	11...12	13	14	15	16	17	18,19
↳ reserved	reserved	PORT_TYPE	reserved	reserved	reserved	reserved	CRC16

**Mode = 0x40 / 0x41 (CFG Info for read and write permission)**

Every bit marks the permission to read (write) the configuration block. The reader must send always complete bytes, but no more bytes as necessary. The flag fields are independent of configurable password protection

1	2	3	4	5	6	7...8	9...n-2	n-1...n
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS	NR_OF_PAGES	PERMISSION	CRC16

**PERMISSION:**

Byte	7							
Bit:	7	6	5	4	3	2	1	0
CFG_NO	0	1	2	3	4	5	6	7

Byte	8							
Bit:	7	6	5	4	3	2	1	0
CFG_NO	8	9	10	11	12	13	14	15

Byte	9							
Bit:	7	6	5	4	3	2	1	0
CFG_NO	16	17	18	19	20	21	22	23

...

**Mode = 0x80 (Device\_ID)**

1	2	3	4	5	6	7 ..10	11..14
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS	DEV_ID	Custom_L

15,16	17, 18	19,20	21,22	23,24
FW_L	TR_DRV_L	FNC_L	-	CRC16

**MODE:**

Via the Parameter MODE different information can be requested from the Reader.

- 0x00: General hard- and firmware information of the Reader Firmware
- 0x04: Additional firmware functionality (unsupported)
- 0x05: RFC Bootloader version
- 0x10: Hardware information
- 0x12: RFC CPU information
- 0x15: RF stack firmware version
- 0x16: IDT stack version
- 0x40: CFG Info for read permission
- 0x41: CFG Info for write permission
- 0x50: **LAN-Information: MAC**
- 0x51: **LAN-Information: IP-Address**
- 0x52: **LAN-Information: Netmask**
- 0x53: **LAN-Information: Gateway-Address**
- 0x60: I/O Capabilities**
- 0x80: Device-ID (Information is required for firmware upgrades)
- 0xFF: All (reads all available information at once)

**SW-REV:**

Revision status of the Firmware. Depending on the Mode and Reader type different controller's are meant.

**D-REV:**

Revision status of the development Firmware. D-REV is set to '0' in customized Firmware revisions.

**HW-TYPE:**

Displays options which are supported by the Reader Hardware

**SW-TYPE:**

Type of Reader Firmware  
0x2B ID ISCLR1002 (43)

**TR-TYPE:**

Displays the Transponders supported by the software.

Bit:	15	14	13	12	11	10	9	8
Function:	-	-	-	-	-	-	ISO180 00-3M3	-

Bit:	7	6	5	4	3	2	1	0
Function:	-	-	-	-	ISO 15693	-	-	-

**PORT\_TYPE:**

Flags for supported communication ports

Bit:	7	6	5	4	3	2	1	0
Function:	DISC	-	-	USB	-	LAN	-	RS232

**RS232:** b0: not supported

b1: supported

**LAN:** b0: not supported

b1: supported

**USB:** b0: not supported

b1: supported

**DISC:** b0: Discovery not supported

b1: Discovery supported

**RX-BUF:**

RX-BUF is the maximum receive buffer size of the Reader. If a protocol from the host exceeds the RX-BUF size the Reader responds with 0x81 PROTOCOL LENGTH ERROR.

**TX-BUF:**

TX-BUF is the maximum transmit buffer size of the Reader. The Host has to take in to account that a response protocol of the Reader can have this length.

**DEV\_ID:**

Individual device identifier of the Reader.

**CUSTOM\_L**

Indicates which customer Firmware is licensed on the Reader.

**FW\_L:**

Indicates which Firmware version is licensed on the Reader.

**TR\_DRV\_L:**

Indicates which Transponder drivers are licensed on the Reader.

**FNC\_L**

Indicates which optional functions are licensed on the Reader.

---

## 7.6. [0x69] RF Reset

---

The RF-field of the Reader antenna can be switched off for  $t_{rf} = 10-15 \text{ ms}$  by the command RF Reset. Thus, all Transponders which are within the antenna field of the Reader will be reset to their base setting.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x69]	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x69]	STATUS <sup>1</sup>	CRC16

**Notes:**

- **After a RF Reset the Reader is not able to receive a new Transponder before expiration of  $t_{rf}$ .**
- **After a RF Reset, a Transponder which is located within the field has to be re-selected.**
- **The response of this command will be sent after the RF Reset was completed.**

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

---

## 7.7. [0x6A] RF Output ON/OFF

---

The command RF ON/OFF switches the RF field of the Reader antenna ON and OFF.

If the reader works in Auto Read Mode1 the RF communication can be interrupted by transmitting RF OFF and continued with RF ON. After RF OFF, the reader accepts every Host command and the RF communication is handled on the last selected antenna. For selecting a specific antenna without continuing the Auto Read Mode, the option flag HM must be set.

Host → Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6A]	RF-Output	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6A]	STATUS <sup>2</sup>	CRC16

### RF-OUTPUT:

Set RF and DC power of the antenna output.

Bit:	7	6	5	4	3	2	1	0
Function	HM	0	0	0	0	0	0	RF

### RF

Set RF output active or RF Power OFF

RF	Description
b0	RF OFF
b1	RF ON

**HM**      Maintain Host Mode (applicable only for Auto Read Mode)

b0: Auto Read Mode is continued, if Antenna Output is greater than zero

b1: Host Mode is maintained and Antenna Output is selected, if greater than zero

---

<sup>1</sup> Scan Mode, Buffered Read Mode or Notification Mode

<sup>2</sup> see ANNEX E: Index of Status Bytes

---

## 7.8. [0x6D] Get Noise Level

---

The command Get Noise Level reads the actual Noise Levels from the Reader.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6D]	CRC16

Host ← Reader

1	2	3	4	5	6	7...12	13...14
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6D]	STATUS <sup>1</sup>	NOISE-LEVEL	CRC16

### NOISE-LEVEL:

Byte	7,8	9,10	11,12
NOISE-LEVEL	min. NL	avg. NL	max. NL

Value min.NL, avg.NL and max.NL in mV.

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

---

## 7.9. [0x6E] Reader Diagnostic

---

The command Reader Diagnostic performs several hardware diagnostics on the Reader.

Host → Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	MODE	CRC16

Host ← Reader

1	2	3	4	5	6	7...n-2	n-1...n
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	STATUS	DATA	CRC16

**MODE:**

Reader Diagnostic Modes

- 0x01 Listing of detail information for STATUS = 0x84.  
(Reader and antenna status)
- 0x03 Listing of detail information for Multiplexer status  
(Multiplexer status)
- 0x04 Listing of detail information for STATUS = 0x10 (EEPROM-Failure)
- 0x05 Listing of detail information for Flags A (control,<|Z|>)  
(Mux channel impedance status)
- 0xFF All

**DATA:**

Response for Reader Diagnostic Modes

**MODE = 0x01:**

7	8
FLAGS A	FLAGS B

**FLAGS A:**

Bit:	7	6	5	4	3	2	1	0
Function:	TEMP-ALARM	-	TEMP-WARN	CONTROL	-	< Z >	Noise	-

**FLAGS B:**

Bit:	7	6	5	4	3	2	1	0
Function:	-	-	-	-	-	DC-POWER	DAT	MUX

## Error Conditions (FLAGS A):

Error	Set condition	Clear condition	RF Power	LED 4
<b>Noise</b>	Noise error	tune antenna / check cable	ON	ON
<b>&lt; Z &gt;</b>	Z out of control range	tune antenna / check cable	ON	ON
<b>CONTROL</b>	RF-Power out of control range	tune antenna / check cable	OFF	ON
<b>TEMP-WARN</b>	temp $\geq$ warning level $\geq 100^{\circ}\text{C}$	temp < warning level	ON, decrement	ON
<b>TEMP-ALARM</b>	temp $\geq$ alarm level $\geq 110^{\circ}\text{C}$	temp < alarm level	OFF	ON

## Error Conditions (FLAGS B):

Error	Set condition	Clear condition	RF Power	LED 4
<b>MUX</b>	Status != OK	Status = OK	ON	ON
<b>DAT</b>	Status DAT=Tuning necessary after Reader power up	Status DAT = OK after Reader power up	ON	ON
<b>DC-POWER</b>	Short circuit DC Power	CPU reset	OFF	ON

**Note:**

***Status != OK (b1) will be set if the multiplexer sends an error status or if there is no response from the multiplexer.***

**MODE = 0x03:**

7	8	9	10	11
MUX-Status Chn1	MUX-Status Chn2	MUX-Status Chn3	MUX-Status Chn4	MUX-Status Chn5

12	13	14
MUX-Status Chn6	MUX-Status Chn7	MUX-Status Chn8

**Notes:**

- **If the channel has not been selected the status is 0xFF.**  
*For further information about the ID ISC.ANT.MUX see manual "H30701-xde-ID-B.pdf" and "M30201-xde-ID-B.pdf"*
- **This mode is only useable in Buffered Read Mode, Scan Mode or Notification Mode and if a ID ISC.ANT.MUX is connected.**

**MODE = 0x04:**

7-8
INT_ERROR

**INT\_ERROR:**

Bit:	15	14	13	12	11	10	9	8
Function:	-	-	-	-	-	-	-	-

Bit:	7	6	5	4	3	2	1	0
Function:	-	-	-	-	-	-	-	EE DEV1

**EE\_DEV1:**

*Error during the communication with EEPROM Dev 1*

**Note:**

**Should be used if status 0x10 " EEPROM-Failure " appears. See: [ANNEX E: Index of Status Bytes](#)**

**MODE = 0x05:** Detail information of Flags A if ID ISC.ANT.MUX is used

3	4	5
Control	< Z >	0x00

**Control, <|Z|>:**

Bit:	8	7	6	5	4	3	2	1
Function:	Chn8	Chn7	Chn6	Chn5	Chn4	Chn3	Chn2	Chn1

## 7.10. [0x72] Set Output

The command Set Output serves temporary limited or unlimited activation of the outputs of the Reader.

Each output takes on the state defined by the byte OUTx-mode for the period of time (OUT-TIME) included in the protocol. The flashing frequency is defined by the byte OUTx-frq. Via this protocol the outputs can be switched on or off for the indicated period of time. If the Reader receives a command Set Output, all times that have been active until then are being overwritten by the new times included in the protocol if they are > 0.

Host → Reader

1	2	3	4	5	6	7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x72]	Mode	OUT-N



8	9	10,11	n-1...n
OUT-NR	OUT-S	OUT-TIME	CRC16
Repeated OUT-N times			

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x72]	STATUS	CRC16

### Mode:

0x01 (reserved)

### OUT-N:

Defines the number of output records.

### OUT-NR:

Defines the type and the number of the output

Bit:	7	6	5	4	3	2	1	0
Function:	OUT-Typ			0	OUT-Number			

### OUT-Typ:

- b000 Output
- b100 Relay

### OUT-Number:

- b0001 (blue LED on ID ISC.ANTS370270)
- b0001 Relay 1

**Notes:**

- The blue LED on ID ISC.ANTS370270 need a active H-field and must be configured in [5.4. CFG3: RF-Interface](#)**

**OUT-S:**

OUT-S (Output State) defines the status of the output during the time defined in OUT-TIME and provides the possibility to allocate its own flashing-frequency to each output.

Bit:	7	6	5	4	3	2	1	0
Function:	0	0	0	0	OUTx-frq	OUTx-mode		

**OUTx-mode:**

b00	not used
b01	ON
b10	OFF
b11	FLASH

output for OUT-TIME = active

output for OUT-TIME = inactive

output for OUT-TIME = with OSF alternating

**OUTx-frq:**

b11	1 Hz
b10	2 Hz
b01	4 Hz
b00	8 Hz

**OUT-TIME:**

By the values defined by "OUT-TIME", the outputs can be activated temporary limited or unlimited.

An exception are the time values 0 and 65535 (0xFFFF) (see following table).

0x0001	1 x 100ms	-> 100ms
...	...	
0xFFFFE	65534 x 100ms	-> 1:49:13 h
0xFFFF	continuously active	

**Notes:**

- In order to reset a continuously active time, OUT-TIME = 1 has to be sent to the Reader, which effects a change to the idle status after 100 ms.**

- *The continuous activation is being set back after a reset or a power failure.*

---

7.10.1. Set Output Examples

---

**Example No. 1:**

Blue LED on ID ISC.ANTS370270OUT1 is alternating with 4 Hz for 500 ms.

REL1 is activated for 200 ms.

OUT-N	OUT-NR	OUT-S	OUT-TIME
0x0002	0x01	0x07	0x0005
↳	OUT-NR	OUT-S	OUT-TIME
	0x81	0x01	0x0002

---

### 7.11. [0x74] Get Input

---

With this protocol the current status of the digital inputs IN1 ... IN3 can be inquired at any time.

Host → Reader

1	2	3	4	5	6...8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x74]	CRC16

Host ← Reader

1	2	3	4	5	6	7	8...9
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x74]	STATUS <sup>1</sup>	INPUTS	CRC16

#### INPUTS:

Bit:	7	6	5	4	3	2	1	0
Function:	-	-	-	-	-	-	-	IN1

b0      digital input = inactive

b1      digital input = active

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

---

### 7.12. [0x85] Set System Timer

---

The Set System Timer command sets the internal system timer of the CPU. The actual internal system time is stored in each data set after a Transponder select, read or write command.

Host → Reader

1	2	3	4	5	6-9	10,11
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x85]	TIMER	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x85]	STATUS	CRC16

**TIMER:**

Byte	6	7	8,9
TIME	h	min	ms

0...23

0...59

0...59999

**Note:**

- ***The internal system timer is not a real-time clock (RTC) and the accuracy cannot be guaranteed.***

---

### 7.13. [0x86] Get System Timer

---

The Get System Timer command reads the internal system timer of the CPU.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x86]	CRC16

Host ← Reader

1	2	3	4	5	6	7...10	11...12
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x86]	STATUS <sup>1</sup>	TIMER	CRC16

**TIMER:**

Byte	7	8	9,10
TIME	h	min	ms

0...23

0...59

0...59999

**Note:**

- The internal system timer is not a real-time clock (RTC) and the accuracy cannot be guaranteed.

## 7.14. [0xA0] Reader-Login

---

The Reader-Login must be executed after every power up or [7.3. \[0x63\]](#) command, if an access to the configuration parameters is desired.

Host → Reader:

1	2	3	4	5	6-9	10,11
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xA0]	READER-ID	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xA0]	STATUS <sup>1</sup>	CRC16

### READER-ID:

The READER-ID is a password which protects the configuration parameters from any read and write access.

The READER-ID can be changed in the configuration block [5.1. CFG0: Passwords](#).

### NOTE:

- A *Reader-Login with wrong READER-ID cause a "Logout"*.
- A "Logout" can be affected via the command [7.4. \[0x64\] System Reset](#)

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

---

### 7.15. [0xA3] Write AES Reader Keys (ICode DNA)

---

The keys which are required by the Reader in order to authenticate itself to an AES encrypted transponder (e.g. ICODE DNA) will be stored in the reader by this command. Only if the keys of the reader and the transponder correspond, the data exchange between reader and transponder can be successful executed.

#### REQUEST-DATA

1 MODE	1 READER- KEY-IDX	1 AUTH-MODE	1 KEY-LEN	KEY-LEN KEY
-----------	-------------------------	----------------	--------------	----------------

#### RESPONSE-DATA

0
-

#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	0	LOC

#### LOC:

Specifies the location where the KEY should be stored in the reader

**b0:** reserved.

**b1:** EEPROM

The KEY will be stored in the EEPROM and in the RAM of the reader.

The key can be used also after the supply power was interrupted. This option can be used, if the reader is used on a secured place.

**NOTICE:**

***The keys in the EEPROM are not strong protected against hacking its content.***

#### READER-KEY-IDX (0...3):

Address where the key is stored in the reader.

**AUTH-MODE:**

This parameter defines the authentication mode which will be performed by the reader with this key

AUTH-MODE	authentication method	KEY-LEN
5	AES	16 Byte

**KEY-LEN :**

This parameter defines the length of the following key (fix 16 bytes).

**KEY:**

Key which has to be used for authentication.

---

## 8. Protocols for ISO15693 Host Commands

---

Some ISO15693 Host commands can be used to access ISO15693 and ISO18000-3M3 Transponders. The following commands are possible:

	Transponder Types	
	ISO15693	ISO18000-3M3
8.1. [0xB0] Host commands for ISO15693 Mandatory and Optional Commands	√	√
8.1.1. [0x01] Inventory	√	√
8.1.2. [0x02] Stay Quiet	√	-
8.1.3. [0x22] Lock Multiple Blocks	√	-
8.1.4. [0x23] Read Multiple Blocks	√	√
8.1.5. [0x24] Write Multiple Blocks	√	√
8.1.6. [0x25] Select	√	-
8.1.7. [0x26] Reset to Ready	√	-
8.1.8. [0x27] Write AFI	√	-
8.1.9. [0x28] Lock AFI	√	-
8.1.10. [0x29] Write DSFI	√	-
8.1.11. [0x2A] Lock DSFI	√	-
8.1.12. [0x2B] Get System Information	√	-
8.1.13. [0x2C] Get Multiple Block Security Status	√	-
[0xB3] EPC Commands	-	√
9.1.1. [0xB3] [0x18] Kill	-	√
9.1.2. [0xB3] [0x22] Lock	-	√

---

## 8.1. [0xB0] Host commands for ISO15693 Mandatory and Optional Commands

---

These command sends ISO 15693 defined RF commands to the Transponder.

Host → Reader

1	2	3	4	5	6...n-2	n-1,n
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xB0]	REQUEST- DATA	CRC16

Host ← Reader

1	2	3	4	5	6	7...n-2	n-1,n
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xB0]	STATUS	RESPONSE -DATA	CRC16

**REQUEST-DATA:**

Command specific request

**RESPONSE-DATA:**

Command specific response

**Notes:**

- ***Data is only transferred if STATUS = 0x00, 0x83, 0x94, 0x95.***
- ***This commands aren't available if Scan-Mode, Buffered Read Mode or Notification Mode is active.***

---

### 8.1.1. [0x01] Inventory

---

This command reads the UID and EPC of all Transponders inside the antenna field. If the Reader has detected a new Transponder, that Transponder will be automatically set in the quiet state by the Reader. In this state the Transponder does not send back a response until the next inventory command.

The Transponder sends back a response every time:

- if the Transponder has left the antenna and reentered the antenna field or
- if a [7.6. \[0x69\] RF Reset](#) command was send to the Reader or
- if the Persistence Rest Time is set to 0x00 or has expired, see [5.15. CFG16: Persistence Reset](#)

#### REQUEST-DATA

6	7	(8)
0x01	MODE	ANT_SEL

#### RESPONSE-DATA (**ISO15693 Transponder**)

##### RESPONSE-DATA if ANT = 0

7	8	9	10...17
DATA-SETS	TR-TYPE	DSFID	IDD (UID)
Repeated DATA-SETS times			

##### RESPONSE-DATA if ANT = 1

7	8	9	10	11	12...19	n+1
DATA-SETS	FLAGS	TR-TYPE	DSFID	IDD_LEN	IDD (UID)	reserved
Repeated DATA-SETS times						



n+2	n+3	n+4	n+5...n+8
ANT_NR	ANT_STATUS	RSSI	reserved
Repeated DATA-SETS times			

**RESPONSE-DATA (ISO18000-3M3 Transponder)**

RESPONSE-DATA if ANT = 0

7	8	9	10	11...n
DATA-SETS	TR-TYPE	IDDT	IDD_LEN	IDD
Repeated DATA-SETS times				

RESPONSE-DATA if ANT = 1

7	8	9	10	11	12...n	n+1
DATA-SETS	FLAGS	TR-TYPE	IDDT	IDD_LEN	IDD	reserved
Repeated DATA-SETS times						



n+2	n+3	n+4	n+5...n+8
ANT_NR	ANT_STATUS	RSSI	reserved
Repeated ANT_CNT times			
Repeated DATA-SETS times			

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	MORE	0	0	0	0	0	0	0

**MORE:**

- b0 new Inventory requested
- b1 more data requested (If Status 0x94 appears-> more data sets are available)

**ANT-SEL:**

Is a bit field and defines the corresponding bits of antenna where the reader starts an Inventory. ANT-SEL will be only transmitted if Bit "ANT" is set in Mode-Byte.

Bit:	7	6	5	4	3	2	1	0
Function	-	-	-	-	-	-	-	ANT1

**ANT1**

- b0 ***no reading on this antenna output***
- b1 ***reading on this antenna output***

**DATA-SETS:**

Number of Transponder data sets to be transferred in this Reader response.

**FLAGS:**

Is a bit field and defines which data will be send.

Bit:	7	6	5	4	3	2	1	0
Function	-	-	-	ANT	-	-	-	IDD

**IDD:**

b1      IDD will be send

**ANT:**

*b1      antenna informations (ANT\_CNT, ANT\_NR, ANT\_STATUS) will be send*

**TR-TYPE:**

Bit:	7	6	5	4	3	2	1	0
Function	RF_TEC	-	-					TYPE_NO

**RF\_TEC:**

Indicates the RFID - Technology of the present Transponder:

- b00:    13,56 MHz Transponder
- b10:    ISO18000-3M3 Transponder

**TYPE\_NO**

Displays the Transponder type of the present Transponder  
(see: ANNEX A: Codes of Transponder Types).

**IDDT:** (only ISO18000-3M3)

Identifier Data Type

Defines the type of Data transmit beginning at Byte 9. Possible Inventory Data Type See:

[ANNEX B: Codes of Identifier Data Types \(IDDT\)](#)

**DSFID:** (only ISO15693 Transponders)

Data Storage Family Identifier.

**IDD-LEN:**

Identifier Data Length defines the length of the IDD in Byte.

**IDD:**

Identifier Data of the Transponder

**ANT\_NR:**

Number of the antenna (1)

**ANT\_STATUS:**

The ANT\_STATUS can be 0x00 (OK) or  
0x83 (RF communication error) See: [ANNEX E: Index of Status Bytes](#)

**RSSI:**

Received Signal Strength Identification

**Note:**

- *The Anticollision of the ID ISC.LR1002 reader can support up to 665 ISO15693 transponder at the same time*

---

8.1.2. [0x02] Stay Quiet

---

This command sets one Transponder to Quiet State.

REQUEST-DATA

6	7	8-15
Bit:	Function	UID
0x02	MODE	

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0			ADR

**ADR:**

b001      addressed

**UID:**

Read only UID of the Transponder.

**Note:**

- ***This command is only available for ISO15693 Transponders.***

---

### 8.1.3. [0x22] Lock Multiple Blocks

---

This command locks one or more data blocks.

The supported ISO15693 Host commands depend on the different ISO15693Transponder types, they are described in chapter [9.3. Supported ISO15693 Host commands for ISO15693 Transponders](#).

- Note:

This command is only available for ISO15693Transponders.

- **REQUEST-DATA**

6	7	8	9	1 or 2 Bytes ( def. by EXT_ADR)	1 Byte
0x22	MODE	UID	BANK	DB-ADR	DB-N



#### RESPONSE-DATA (STATUS = 0x03)

7
DB-ADR-E

#### RESPONSE-DATA (STATUS = 0x95)

7	8
ISO15693 ERROR	DB-ADR-E

#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	EXT_ADR	0	0		ADR	

#### ADR:

- b000 non-addressed
- b001 addressed
- b010 selected

#### EXT\_ADR:

If this bit is set the command includes extended address fields.

b0: Transponder memory addressing is done by the 1 byte DB-ADR Field.

b1: Transponder memory addressing is done by BANK and 2 byte DB-ADR Field

#### UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

**BANK:**

Memory bank of the Transponder which will be accessed by the Reader

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0		BANK_NR

**BANK\_NR:**

Defines the memory area on the transponder.

b00 reserved

b01 reserved

b10 reserved

b11 User memory bank

**DB-ADR:**

First block number to be locked. Depending on EXT\_ADR. First block can be any value between 0 and 255 or 0 and 65535.

**DB-N:**

Number of data blocks to be locked from the Transponder, starting at DB-ADR.

The maximum number of DB-N is 255.

**ISO15693 ERROR:**

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95.

**DB-ADR-E:**

Block number where the error occurred.

---

### 8.1.4. [0x23] Read Multiple Blocks

---

This command reads one or more data blocks. The supported Host commands depend on the different Transponder types.

#### REQUEST-DATA

6	7	1 Byte	UID_LNG Bytes	1Byte
0x23	MODE	UID_LNG	UID	BANK



1 Byte	A_PW_LGT Bytes	1 or 2 Bytes ( def. by EXT_ADDR)	1 Byte
A_PW_LGT	A_PW	DB-ADR	DB-N

#### RESPONSE-DATA (STATUS = 0x95)

7
TAG ERROR

#### RESPONSE-DATA

7	8	9	10...n
DB-N	DB-SIZE	SEC-STATUS	DB
Repeated DB-N times			

#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	READ_COMPLETE_BANK	EXT_ADDR	UID_LF	SEC	ADR		

#### ADR:

- b000 non-addressed
- b001 addressed
- b010 selected

#### SEC:

- b0 SEC-STATUS always = 0x00
- b1 security status of followed data block in SEC-STATUS

#### UID\_LF:

If this bit is set the parameter UID\_LNG must inserted into the protocol.

b0: The protocol UID\_LNG doesn't include the UID\_LNG byte and the UID field has a fixed length of 8 byte, from byte 6 to byte 13.

- b1: The protocol includes the parameter UID\_LNG. The UID has a variable length as defined in UID\_LNG.

**EXT\_ADR:**

If this bit is set the command includes extended address fields.

- b0: Transponder memory addressing is done by the 1 byte DB-ADR Field.

- b1: Transponder memory addressing is done by BANK and 2 byte DB-ADR Field

**READ\_COMPLETE\_BANK: (ISO18000-3M3)**

If this bit is set the reader will automatically read out all blocks of the selected memory bank. Only available in the extended address mode.

- b0: Reader reads out the memory blocks according to the settings for DB-ADR and DB-N

- b1: Read reads out the compete memory bank

**Notes:**

- This functionality is limited to memory banks with a maximum size of 340 Byte.***

**UID\_LNG:**

Is a optional parameter and depends on the setting of UID\_LF (see MODE). UID\_LNG defines the length of the following UID field.

**UID:**

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

**BANK:**

Memory bank of the Transponder which will be accessed by the Reader

Bit:	7	6	5	4	3	2	1	0
Function	A_FLAG	0	0	0	0	0		BANK_NR

**BANK\_NR:**

In case of ISO18000-3M3 Transponder BANK\_NR is defined as follows:

- b00 reserved
- b01 EPC memory bank
- b10 TID memory bank
- b11 User memory bank

**A\_FLAG:**

Indicates whether the reader tries to read a ISO18000-3M3 tag in Secured State.  
If A\_FLAG is set the protocol contains the access password.

**A\_FLAG:**

b0 no access password in protocol  
b1 access password and access password length in protocol. Reader execute access command

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

Access password which is used to access to the secured state of the Tag.

**DB-ADR:**

First block number to be read. Depending on EXT\_ADR. First block can be any value between 0 and 255 or 0 and 65535.

**DB-N:**

Number of data blocks to be read from the Transponder, starting at DB-ADR.

The maximum number of DB-N depends on DB-Size.

DB-Size	Max. DB-N
2	200
4	100
8	50
x	= 400 / x

**DB-SIZE:**

Number of bytes of one data block. This value depends on the specification of the Transponder

**SEC-STATUS: (only ISO15693 Transponder)**

Block security status of followed data block. If supported by the ISO15693 transponder.

**DB:**

Requested data block. The block size is defined by DB-SIZE.

**TAG ERROR:**

TAG ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: [ANNEX F: Transponder Error Codes](#)

**Notes:**

- **Only one Transponder can be read in the non-addressed mode.**

- ***ISO15693:***

- ***A read from 1 block uses a Read Single Block command to the ISO15693 Transponder.***
  - ***If a ISO15693 Transponder does not support Read Multiple Blocks commands several Read Single Block commands are used for this Transponder.***

---

### 8.1.5. [0x24] Write Multiple Blocks

---

This command writes one or more data blocks.

REQUEST-DATA

6	7	1 Byte	UID_LNG Bytes	1Byte
0x24	MODE	UID_LNG	UID	BANK



	1 Byte	A_PW_LGT Bytes	1 or 2 Bytes ( def. by EXT_ADR)	1 Byte	1 Byte	DB-N times DB-SIZE Bytes
	A_PW_LGT	A_PW	DB-ADR	DB-N	DB-SIZE	DB
						Repeated DB-N times

RESPONSE-DATA (STATUS = 0x03)

7	(8)
DB-ADR-E	(DB-ADR-E) <sup>1</sup>

RESPONSE-DATA (STATUS = 0x95)

7	8	(9)
TAG ERROR	DB-ADR-E	(DB-ADR-E) <sup>1</sup>

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	0	0	EXT_ADR	UID_LF				ADR

**ADR:**

- b000 non-addressed
- b001 addressed
- b010 selected

**UID\_LF:**

If this bit is set the parameter UID\_LNG must inserted into the protocol.

b0: The protocol UID\_LNG doesn't include the UID\_LNG byte and the UID field has a fixed length of 8 byte, from byte 6 to byte 13.

---

<sup>1</sup> used in extended address mode

b1: The protocol includes the parameter UID\_LNG. The UID has a variable length as defined in UID\_LNG.

**EXT\_ADR:**

If this bit is set the command includes extended address fields.

b0: Transponder memory addressing is done by the 1 byte DB-ADR Field.

b1: Transponder memory addressing is done by BANK and 2 byte DB-ADR Field

**UID\_LNG:**

Is a optional parameter and depends on the setting of UID\_LF (see MODE). UID\_LNG defines the length of the following UID field.

**UID:**

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

**BANK:**

Memory bank of the Transponder which will be accessed by the Reader

Bit:	7	6	5	4	3	2	1	0
Function	A_FLAG	0	0	0	0	0		BANK_NR

**BANK\_NR:**

In case of ISO18000-3M3 Transponder BANK\_NR is defined as follows:

b00 reserved

b01 EPC memory bank

b10 TID memory bank

b11 User memory bank

**A\_FLAG:**

Indicates whether the reader tries to read a ISO18000-3M3 tag in Secured State.

If A\_FLAG is set the protocol contains the access password.

**A\_FLAG:**

b0 no access password in protocol

b1 access password and access password length in protocol. Reader execute access command

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

Access password which is used to access to the secured state of the Tag.

**DB-ADR:**

First block number to be read. Depending on EXT\_ADR First block can be any value between 0 and 255 or 0 and 65535.

**DB-N:**

Number of data blocks to be written to the Transponder, starting at DB-ADR.  
The maximum number of DB-N depends on DB-Size.

DB-Size	Max. DB-N
2	128
4	64
8	32
x	= 256 / x

**DB-SIZE:**

Number of bytes of one data block.

**DB:**

Data of the data block to be written to the Transponder. The required block size is defined by DB-SIZE. The number of the expected bytes are DB-N \* DB-SIZE.

**TAG ERROR:**

TAG ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: [ANNEX F: Transponder Error Codes](#)

**DB-ADR-E:**

Block number where the error occurred.

**Notes:**

- **If an error occurred during a write command, the number of the block were the error occurred will be send to host**
- **ISO15693:**
  - A write to 1 block uses a Write Single Block command to the Transponder. This will be managed by the Reader internally.
  - If a Transponder does not support Write Multiple Blocks commands several Write Single Block commands are used for this Transponder.

---

8.1.6. [0x25] Select

---

This command sets one Transponder to the Select State. Only one ISO15693 Transponder can be selected at once. An already selected Transponder will automatically be set to Ready State.

## REQUEST-DATA

6	7	8...15
0x25	MODE	UID

## RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	ADR		

**ADR:**

b001     addressed

**UID:**

Read-only UID of the Transponder.

**ISO15693 ERROR:**

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. [ANNEX F: Transponder Error Codes](#)

**Note:**

- ***This command is only available for ISO15693 Transponders.***

---

8.1.7. [0x26] Reset to Ready

---

This command sets one Transponder to Ready State.

REQUEST-DATA

6	7	(8...15)
0x26	MODE	UID

RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	ADR		

**ADR:**

- b000 non-addressed  
b001 addressed  
b010 selected

**UID:**

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

**ISO15693 ERROR:**

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. [ANNEX F: Transponder Error Codes](#)

**Note:**

- ***This command is only available for ISO15693 Transponders.***

---

### 8.1.8. [0x27] Write AFI

---

This command writes a new AFI code to one Transponders (or if using non-addressed mode and there is more than 1 tag in field) codes to more than one Transponder.

The supported ISO15693 Host commands depends on the different ISO15693 Transponder Types, which are described in chapter [9.3. Supported ISO15693 Host commands for ISO15693 Transponders](#).

#### REQUEST-DATA

6	7	(8...15)	8 / (16)
0x27	MODE	UID	AFI

#### RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0			ADR

#### ADR:

- b000 non-addressed
- b001 addressed
- b010 selected

#### UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

#### AFI:

Application Family Identifier of the Transponder.

#### ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. [ANNEX F: Transponder Error Codes](#)

#### Note:

- *This command is only available for ISO15693 Transponders.*

---

### 8.1.9. [0x28] Lock AFI

---

This command locks the AFI register in one or more Transponders.

The supported ISO15693 Host commands depends on the different ISO15693 Transponder types, which are described in chapter 9.3. Supported ISO15693 Host commands for [ISO15693 Transponders](#).

#### REQUEST-DATA

6	7	(8...15)
0x28	MODE	UID

#### RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0			ADR

#### ADR:

- b000 non-addressed
- b001 addressed
- b010 selected

#### UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

#### ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. [ANNEX F: Transponder Error Codes](#)

#### Note:

- ***This command is only available for ISO15693 Transponders.***

---

### 8.1.10. [0x29] Write DSFID

---

This command writes the DSFID code to one Transponders (or if using unaddressed mode and there is more than 1 tag in field) codes to more than one transponder.

The supported ISO15693 Host commands depends on the different ISO15693 Transponder types, which are described in chapter 9.3. Supported ISO15693 Host commands for [ISO15693 Transponders](#).

#### REQUEST-DATA

6	7	(8...15)	8 / (16)
0x29	MODE	UID	DSFID

#### RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0			ADR

#### ADR:

- b000 non-addressed
- b001 addressed
- b010 selected

#### UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

#### DSFID:

Data Storage Format Identifier of the Transponder.

#### ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. [ANNEX F: Transponder Error Codes](#)

#### Note:

- ***This command is only available for ISO15693 Transponders.***

---

### 8.1.11. [0x2A] Lock DSFID

---

This command locks the DSFID register in one Transponders.

The supported ISO15693 Host commands depends on the different ISO15693 Transponder types, which are described in chapter 9.3. Supported ISO15693 Host commands for [ISO15693 Transponders](#).

#### REQUEST-DATA

6	7	(8...15)
0x2A	MODE	UID

#### RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0			ADR

#### ADR:

- b000 non-addressed
- b001 addressed
- b010 selected

#### UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

#### ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. [ANNEX F: Transponder Error Codes](#)

#### Note:

- ***This command is only available for ISO15693 Transponders.***

---

### 8.1.12. [0x2B] Get System Information

---

This command reads the system information from one Transponder.

**REQUEST-DATA**

6	7	(8...15)
0x2B	MODE	UID

**RESPONSE-DATA (STATUS = 0x95)**

7
ISO-ERROR

**RESPONSE-DATA**

7	8...15	16	17...18	19	
DSFID	UID	AFI	MEM-SIZE	IC-REF	←ISO

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	ADR		

**ADR:**

- b000 non-addressed
- b001 addressed
- b010 selected

**UID:**

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

**ISO-ERROR:**

ISO15693 error code of Transponder response. This byte is only available if STATUS = 0x95. [ANNEX F: Transponder Error Codes](#)

**DSFID:**

Data Storage Format Identifier of the Transponder.

**UID:**

The LSB (32bits) from the Read only Serial Number of the Transponder.

**AFI:**

Application Family Identifier. If not supported by the Transponder, this value will return 0x00.

**Manufacturer Code:**

Manufacturer specific code (see: [ANNEX A: Codes of Transponder Types](#))

**MEM-SIZE:**

Memory size of the Transponder. If not supported by the Transponder, this value will return 0x0000.

Byte	17		18
Bit:	7 .. 5	4 .. 0	7 .. 0
content	res.	Block size in Bytes	Number of blocks

**IC-REF:**

IC reference (version) of the Transponder. If not supported by the Transponder, this value will return 0x00.

**Chip Version:**

Chip version of the Transponder

**Note:**

***This command is only available for ISO15693 Transponders.***

---

### 8.1.13. [0x2C] Get Multiple Block Security Status

---

This command reads the public block security status from one Transponder.

#### REQUEST-DATA

6	7	8	9	1 or 2 Bytes ( def. by EXT_ADR)	1 Byte
0x2C	MODE	UID	BANK	DB-ADR	DB-N

#### RESPONSE-DATA (STATUS = 0x95)

7
ISO15693
ERROR

#### RESPONSE-DATA

7	8
DB-N	SEC-STATUS
Repeated DB-N times	

#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	EXT_ADR	0	0			ADR

#### ADR:

- b000 non-addressed
- b001 addressed
- b010 selected

#### EXT\_ADR:

If this bit is set the command includes extended address fields.

- b0: Transponder memory addressing is done by the 1 byte DB-ADR Field.
- b1: Transponder memory addressing is done by BANK and 2 byte DB-ADR Field

#### BANK:

Memory bank of the Transponder which will be accessed by the Reader

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0		BANK_NR

#### BANK\_NR:

Defines the memory area on the transponder.

- b00 reserved
- b01 reserved

b10 reserved  
b11 User memory bank

**UID:**

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

**DB-ADR:**

First block number from which security status is requested. First block number can be any value between 0 and 255 or 0 and 65535.

**DB-N:**

Number of Security data blocks to be read from the Transponder, starting at DB-ADR. The maximum number of DB-N is 250.

**ISO15693 ERROR:**

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. [ANNEX F: Transponder Error Codes](#)

**SEC-STATUS:**

Block security status .

**Note:**

***This command is only available for ISO15693 Transponders***

---

### 8.1.14. [0x35] Authenticate (ICode DNA)

---

This command performs tag, reader, or mutual authentication.

REQUEST-DATA

Byte	6	7	1 Byte	UID_LNG Bytes
Contents	0x35	MODE	UID_LNG	UID



1 Byte	1 Byte	1 Byte	2 Byte
AUTH_MODE	CSI	CRYPTO_ TIME	RSP_LEN



2 Bytes	n Bytes
MSG_LEN	MSG

RESPONSE-DATA (STATUS = 0x95)

7
TAG ERROR

RESPONSE-DATA (STATUS = 0x00) for Key management in the reader

7-8	9 .. (9+DATA_LEN/8)
DATA_LEN	DATA

RESPONSE-DATA (STATUS = 0x00) for Key management in the Host system

7-8	9..(9+DATA_LEN/8)
DATA_LEN	CRYPTOGRAPHIC RESPONSE

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	0			UID_LF			ADR	

**ADR:**

- b000 non-addressed
- b001 addressed
- b010 selected

**UID\_LF:**

If this bit is set the parameter UID\_LNG must inserted into the protocol.

- b0: The protocol UID\_LNG doesn't include the UID\_LNG byte and the UID field has a fixed length of 8 byte, from byte 6 to byte 13.
- b1: The protocol includes the parameter UID\_LNG. The UID has a variable length as defined in UID\_LNG.

**UID LNG:**

Is a optional parameter and depends on the setting of UID\_LF (see MODE). UID\_LNG defines the length of the following UID field.

**UID:**

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

**AUTH\_MODE:**

Defines the format of the request and the response

Bit:	7	6	5	4	3	2	1	0
Function	KEY-LOC	0	0	0	RSP_LEN_FLAG	CRYPTO_FLAG	0	0

**KEY-LOC:**

Defines the key store

- b0: Keys are stored in the reader. Authentication of the transponder is done by the reader
- b1: Keys are stored in the host system. Authentication of the transponder is done by the host system

**CRYPTO\_FLAG:**

If CRYPTO FLAG is set the protocol contains the crypto exexcution time.

- b0: no crypto execution time in protocol
- b1: crypto execution time in protocol.

**RSP\_LEN\_FLAG:**

If RSP\_LEN FLAG is set the protocol contains the length of the response in bits

- b0: 2 Byte for RSP\_LEN in protocol
- b1: No RSP\_LEN in protocol.

**CSI:**

Crypto Suite Identifier

CSI	Part	Crypto Suite
0x00	ISO/IEC 29167 - 10	AES128
0x01	ISO/IEC 29167 – 11	PRESENT 80
0x02	ISO/IEC 29167 – 12	ECC-DH
0x03	ISO/IEC 29167 - 13	GRAIN 128
0x04	ISO/IEC 29167 – 14	AES128-OFB
0x05	ISO/IEC 29167 – 15	XOR
0x06	ISO/IEC 29167 – 16	ECSDA-ECDH
0x07	ISO/IEC 29167 - 17	GPS
0x08	ISO/IEC 29167 – 18	Humming Bird 2
0x09	ISO/IEC 29167 - 19	RAMON

**CRYPTO\_TIME:**

crypto execution time in ms. (Not applicable for ICODE-DNA)

**RSP\_LEN:**

Length of the response in bits. (Not applicable for ICODE-DNA)

**MSG\_LEN:**

Length of the message in bytes

**MSG:**

Message defined by the crypto suite specified by the CSI

**DATA\_LEN:**

Number of bits

**DATA:**

Requested decrypted data

---

### 8.1.14.1. Message TAM1

---

Send Interrogator challenge and request Tag authentication response.

Message TAM1 format

1	1	10
MSG_CMD	KEY_ID	CHALLENGE

**MSG\_CMD:**

Defines Authent Methode and Custom Data

Bit	7	6	5	4	3	2	1	0
Contents	AuthMethode		Custom Data	TAM1_RFU				
Default	00	0	0	00000				

AuthMethod:

00b: specifies the use of TAM

CustomData:

0b: indicate that no custom data is requested (TAM1)

TAM1\_RFU:

00000b: reserved

**KEY\_ID:**

Defines which Key is used for TAM1

Bit	7	6	5	4	3	2	1	0
Contents	KEY-TYPE							

KEY-TYPE:

- 0x00: Key 0 is used
- 0x01: Key 1 is used
- 0x02: Key 2 is used
- 0x03: Key 3 is used

**CHALLENGE:**

Random integrator challenge, only neccasary when authentication is done by the host system

---

### 8.1.14.2. Message MAM1

---

Sends Mutual Authentication Part 1.

Message MAM1 format if **KEY-LOC = b1**

1	1	10
MSG_CMD	KEY_ID	CHALLENGE

Message MAM1 format if **KEY-LOC = b0**

1	1	1
MSG_CMD	KEY_ID	PURPOSE_MAM2

#### **MSG\_CMD:**

Defines Authent Methode and Custom Data

Bit	7	6	5	4	3	2	1	0	
Contents	AuthMethode		Step		MAM1_RFU				
Default	10		00		0000				

AuthMethod:

10b: specifies the use of Mutual Authentication

Step:

00b: indicates the step of the mutual authentication (MAM1)

MAM1\_RFU:

0000b: reserved

#### **KEY\_ID:**

Defines which Key is used for TAM1

Bit	7	6	5	4	3	2	1	0
Contents	KEY-TYPE							

KEY-TYPE:

0x00: Key 0 is used

0x01: Key 1 is used

0x02: Key 2 is used

0x03: Key 3 is used

**PURPOSE-MAM2:**

Vendorspecific authent methods, **only necessary when authentication is done by the reader. The reader sends the MAM2-message automatically after the MAM1 response from the transponder.**

- b0000: Standard mutual authentication.
- b1000: Disable privacy until HF-Reset (ICODE DNA).
- b1001: Enable privacy (ICODE DNA).
- b1010: Disable privacy (ICODE DNA).
- b1011: Destroy (ICODE DNA).

**CHALLENGE:**

Random integrator challenge, **only necessary when authentication is done by the host system.**

---

### 8.1.14.3. Message MAM2

---

Sends Mutual Authentification Part 2. Send this message is only when authentication is done by the host.

Message MAM2format if **KEY-LOC = b1**

1	1	n (16)
MSG_CMD	KEY_ID	IRESPONSE

#### MSG\_CMD:

Defines Authent Methode and Custom Data

Bit	7	6	5	4	3	2	1	0
Contents	AuthMethode		Step			MAM2_RFU		
Default	10		01			0000		

AuthMethod:

10b: specifies the use of Mutual Authentication

Step:

01b: indicates the step of the mutual authentification (MAM2)

MAM2\_RFU:

- b0000: Standard mutual authentification.
- b1000: Disable privacy until HF-Reset (ICODE DNA).
- b1001: Enable privacy (ICODE DNA).
- b1010: Disable privacy (ICODE DNA).
- b1011: Destroy (ICODE DNA).

#### IRESPONSE:

**Only necessary when authentication is done by the host.**

This is encrypted Message for the transponder, to authenticate the host.

---

### 8.1.15. [0x39] Challenge (ICode DNA)

---

This command allows an interrogator to instruct multiple tags to simultaneously yet independently precompute and store a cryptographic value.

No response is send from tag on a challenge command.

#### REQUEST-DATA

Byte	6	7	1 Byte	UID_LNG Bytes
Contents	0x39	MODE	UID_LNG	UID



1 Byte	1 Byte	1 Byte	2 Byte
AUTH_MODE	CSI	CRYPTO-TIME	RSP_LEN



2 Byte	n Bytes
MSG_LEN	MSG



#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	UID_LF	0		ADR	

#### ADR:

- b000 non-addressed
- b001 addressed
- b010 selected

#### UID\_LF:

If this bit is set the parameter UID\_LNG must inserted into the protocol.

- b0: The protocol UID\_LNG doesn't include the UID\_LNG byte and the UID field has a fixed length of 8 byte, from byte 6 to byte 13.
- b1: The protocol includes the parameter UID\_LNG. The UID has a variable length as defined in UID\_LNG.

#### UID\_LNG:

Is a optional parameter and depends on the setting of UID\_LF (see MODE). UID\_LNG defines the length of the following UID field.

#### UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

#### NOTE:

**NXP ICODE DNA supports only non addressed Mode.**

#### AUTH\_MODE:

Defines the format of the request and the response

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	RSP_LEN_FLAG	CRYPTO_FLAG	0	0

#### CRYPTO\_FLAG:

If CRYPTO FLAG is set the protocol contains the crypto execution time.

- b0: no crypto execution time in protocol
- b1: crypto execution time in protocol.

#### RSP\_LEN\_FLAG:

If RSP\_LEN FLAG is set the protocol contains the length of the response in bits

- b0: 2 Byte for RSP\_LEN in protocol
- b1: No RSP\_LEN in protocol.

#### CSI:

Crypto Suite Identifier

CSI	Part	Crypto Suite
0x00	ISO/IEC 29167 - 10	AES128
0x01	ISO/IEC 29167 – 11	PRESENT 80
0x02	ISO/IEC 29167 – 12	ECC-DH
0x03	ISO/IEC 29167 - 13	GRAIN 128
0x04	ISO/IEC 29167 – 14	AES128-OFB
0x05	ISO/IEC 29167 – 15	XOR
0x06	ISO/IEC 29167 – 16	ECSDA-ECDH
0x07	ISO/IEC 29167 - 17	GPS
0x08	ISO/IEC 29167 – 18	Humming Bird 2
0x09	ISO/IEC 29167 - 19	RAMON

#### CRYPTO\_TIME:

crypto execution time in ms. (For ICODE-DNA the Crypto\_TIME is 20 ms).

#### RSP\_LEN:

Length of the response in bits (For ICODE-DNA the response is 0 bit).

**MSG\_LEN:**

Length of the message in bytes

**MSG:**

Message defined by the crypto suite specified by the CSI

---

### 8.1.15.1. Message TAM1

---

Send Interrogator challenge and request Tag authentication response.

Message TAM1 format

1	1	10
MSG_CMD	KEY_ID	CHALLENGE

**MSG\_CMD:**

Defines Authent Methode and Custom Data

Bit	7	6	5	4	3	2	1	0
Contents	AuthMethode		Custom Data	TAM1_RFU				
Default	00	0	0	00000				

AuthMethod:

00b: specifies the use of TAM

CustomData:

0b: indicate that no custom data is requested (TAM1)

TAM1\_RFU:

00000b: reserved

**KEY\_ID:**

Defines which Key is used for TAM1

Bit	7	6	5	4	3	2	1	0
Contents	KEY-TYPE							

KEY-TYPE:

0x00: Key 0 is used

0x01: Key 1 is used

0x02: Key 2 is used

0x03: Key 3 is used

**CHALLENGE:**

80-bit random challenge that the Interrogator has generated for use in TAM1.

---

### 8.1.16. [0x3A] ReadBuffer

---

This command allows to read data stored in a tag response buffer.

REQUEST-DATA

Byte	6	7	1 Byte	UID_LNG Bytes
Contents	0x33	MODE	UID_LNG	UID



RESPONSE-DATA (STATUS = 0x95)

7
ISO-ERROR

RESPONSE-DATA (STATUS = 0x00)

7..8	9 .. (9+DATA_LEN)
DATA_LEN	DATA

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	UID_LF	0			ADR

**ADR:**

- b000 non-addressed
- b001 addressed
- b010 selected

**UID\_LF:**

If this bit is set the parameter UID\_LNG must inserted into the protocol.

- b0: The protocol UID\_LNG doesn't include the UID\_LNG byte and the UID field has a fixed length of 8 byte, from byte 6 to byte 13.
- b1: The protocol includes the parameter UID\_LNG. The UID has a variable length as defined in UID\_LNG.

**UID\_LNG:**

Is a optional parameter and depends on the setting of UID\_LF (see MODE). UID\_LNG defines the length of the following UID field.

**UID:**

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

**DATA\_LEN:**

Number of bytes

**DATA:**

Requested data

---

## 9. [0xB3] Host commands for EPC Transponders

---

This command sends special commands to EPC Transponder.

Host → Reader

1	2	3	4	5	6...n-2	n-1,n
0x02	n	COM-ADR	[0xB3]	REQUEST-DATA	CRC16	

Host ← Reader

1	2	3	4	5	6	7...n-2	n-1,n
0x02	n	COM-ADR	[0xB3]	STATUS	RESPONSE- -DATA	CRC16	

**REQUEST-DATA:**

EPC specific request

**RESPONSE-DATA:**

EPC specific response

**Notes:**

- ***Data is only transferred if STATUS = 0x00, 0x83, 0x94, 0x95.***

---

## 9.1. ISO18000-3M3 Commands [0xB3]

---

This command supports the functions of the ISO18000-3M3 Transponder

**References:**

For a detailed description of the mandatory Kill command refer to “EPC Radio-Frequency Identity Protocols Class-1 Generation-2 HF RFID Protocol”.

<http://www.gs1.org/epcrid/epc-rfid-hf-air-interface-protocol/2-0-3>

---

### 9.1.1. [0xB3] [0x18] Kill

---

For a detailed description of the mandatory Kill command refer to “[References](#)”.

REQUEST-DATA

6	7	1 Byte	EPC_LNG Bytes
0x18	MODE	EPC_LF	EPC



1 Byte	K_PW_LNG Bytes	1 Byte
K_PW_LNG	K_PW	RECOM Bits



**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	EPC_LF	RECOM	ADR		

**ADR:**

- b000 non-addressed
- b001 addressed

**EPC\_LF:**

If this bit is set the parameter EPC\_LNG must be inserted into the protocol.

b1: The protocol includes the parameter EPC\_LNG. The EPC has a variable length as defined in EPC\_LNG.

**RECOM**

b1: If this bit is set the Recommissioning Bits will be inserted into the protocol.

**EPC\_LNG:**

Is an optional parameter and depends on the setting of EPC\_LF (see MODE). EPC\_LNG defines the length of the following EPC field.

**EPC:**

EPC of the Transponder. The EPC is required only in the addressed mode.

**K\_PW\_LNG:**

Length of Kill Password.

**K-PW:**

Kill Password.

**RECOM Bits:**

Recommissioning Bits according to EPC Global description.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	3SB	2SB	LSB

**Notes:**

- ISO18000-3M3
  - A ISO18000-3M3 Transponder can be killed in addressed mode only
  - Kill password K\_PW has to contain the kill code.
  - Kill password length K\_PW\_LGT=1

---

### 9.1.2. [0xB3] [0x22] Lock

---

This command Lock different memory portions of a ISO18000-3M3 Transponder.

For a detailed description of the mandatory Lock command refer to "[References](#)"

#### REQUEST-DATA

6	7	1 Byte	EPC_LNG Bytes
0x22	MODE	EPC_LNG	EPC



1 Byte	1 Byte	LOCK_LNG Bytes	1 Byte	A_PW_LNT Bytes
EPC_TYPE	LOCK_LNG	LOCK_DATA	A_PW_LNG	A_PW



#### MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	EPC_LF	0	ADR		

#### ADR:

b000 non-addressed

b001 addressed

#### EPC\_LF:

If this bit is set the parameter EPC\_LNG must inserted into the protocol.

b1: The protocol includes the parameter EPC\_LNG. The EPC has a variable length as defined in EPC\_LNG.

#### EPC\_LNG:

Is a optional parameter and depends on the setting of EPC\_LF (see MODE). EPC\_LNG defines the length of the following EPC field.

#### EPC:

Read-only serial number of the Transponder. The EPC is required only in the addressed mode.

#### EPC\_Type:

Type of Transponder according [ANNEX A: Codes of Transponder Types](#).

#### LOCK\_LNG:

Length of LOCK\_DATA Field

#### LOCK\_DATA:

Lock data which will be written to the Tag.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

Access password which is used to access to the secured state of the Tag.

**Notes:**

- ISO18000-3M3
  - A ISO18000-3M3 Transponder can be locked in non addressed mode only
  - Lock data LOCK\_DATA has to contain the kill code which is written to the Transponder.
  - Lock data length Lock\_LNG=1

---

## 9.2. [0xBF] ISO15693 Transparent Command

---

This command sends user transparent commands to the Transponder.

Host → Reader

1	2	3	4	5	6	7...8	
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xBF]	MODE	RSP-LENGTH	↙

<b>MODE 1+2+6</b>	9...10	11...n-2	n-1,n
	CMD-RSP- DELAY	REQUEST- DATA	CRC16

<b>MODE 3+4</b>	11...12	13...14	15...n-2	n-1,n
	CMD-RSP- DELAY	EOF-PULSE- DELAY	REQUEST- DATA	CRC16

<b>MODE 5</b>	9...10	11 – 12	13 ... n-2	n-1,n
	CMD-RSP- DELAY	MULTIPLE 302 GRIDS	REQUEST- DATA	CRC16

Host ← Reader

1	2	3	4	5	6	7...n-2	n-1,n
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xBF]	STATUS <sup>1</sup>	RESPONSE -DATA	CRC16

**MODE:**

Bit:	7	6	5	4	3	2	1	0
Function	TxCRCEn	0	0	0	X		Options	

**Options:**

Options for request.

b001 = read request

Response is sampled corresponding to CMD-RES-DELAY

b010 = write request with Option “0”

The Reader tries to sample the response after CMD-RES-DELAY + a

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

multiple of 302µs. If there is no response within 20ms the command sends back Status "no Transponder" 0x01

b011 = write request with Option "1"

The Reader tries to sample the response after CMD-RES-DELAY. If there is no response the Reader sends a EOF after EOF-PULSE-DELAY and tries to sample the response after CMD-RES\_DELAY

b100 = inventory request

The Reader tries to sample the response after CMD-RES-DELAY. If ISO15693 "Nb\_slot\_flag" Flag is:

"0" the Reader sends a EOF after EOF-PULSE-DELAY and tries again to sample the response in the next timeslot ( after CMD-RES\_DELAY). This is done 16 times.

In this case the RSP-LENGTH defines the response length in one timeslot. Transponder responses with other response length will be ignored. If there is a CRC error in one of the timeslots the protocol status is set to 0x02 [CRC error]. The user should calculate which Transponder data hold the CRC error.

"1" the Reader sends back the received data.

b101= request with grid position of response

The Reader tries to sample the response after ISO15693-3 CMD-RES-DELAY. If there is no response the Reader sample at the time/grid specified in MULTIPLE 302us GRIDS. If there is no response the command sends back status "no Transponder" 0x01. The maximum value for MULTIPLE 302us GRIDS is 125 ( $\rightarrow 302,08\mu s * 125 = 37,76ms$ )

Depending on the Error-Flag in the Transponder response the length of the sample data is:

- 4 Byte if Error-Flag is "1"
- REP-LENGTH if Error-Flag is "0"

b110= read request without any ISO15693 specific data checks and ISO15693 data interpretation

Response is sampled corresponding to CMD-RES-DELAY. cause by the fact that no data check is performed inside of the Reader all data with response length same as response length specified in the Host command to the Reader will be transfers with status 0x00. If response length of data from Transponder and response length specified in the Host command to the Reader are unequal, status 0x01 "No Transponder" will be the response of the Reader.

The user of the command mode 6 has to control the data coding and decoding option of the Reader by setting CFG4/Byte 4 – ISO-Mode in the manner the Reader should code the data in the RF forward link and decode the data in the RF return link.

**TxCRCEn:**

- |    |   |
|----|---|
| b0 | A CRC is calculated over the transmitted data and the CRC byte(s) are appended to the data stream |
| b1 | No CRC is inserted/transmitted  |

**RSP-LENGTH:**

Length of the Transponder response in bits without SOF and EOF. If the Error-Flag in the Transponder response is set, the length of the sample data is 4 Byte.

**CMD-RSP-DELAY:**

Response delay for Transponder response (ISO15693: t1)  
e.g. ISO15693 average value:  $0x021F * 590\text{ns} = 320,4 \mu\text{s}$

**Note:**

*If the parameter is set to "0x0000 the default value 0x021F will be used.*

**EOF-PULSE-DELAY:**

EOF Pulse delay is used in write operations with ISO15693 write option "1". EOF to define the response delay for Transponder response (ISO15693: t1)  
e.g. ISO15693 maximum value:  $0x846A * 590\text{ns} = 20\text{ms}$

**REQUEST-DATA:**

Complete Transponder request without SOF, CRC16 and EOF.

**Note:**

*The read and write option FLAGS in the REQUEST-DATA must correspond to the MODE Byte in the request protocol. Reader is always forcing the command in the way specified by MODE Byte in the request protocol*

**RESPONSE-DATA:**

Complete Transponder response without SOF and EOF. A CRC16 check is performed inside the Reader. However the Transponder CRC16 is transferred with the response data.

**Notes:**

- ***Data is only transferred if STATUS = 0x00, 0x02, 0x83, 0x84, 0x94.***
- ***The response data always contains the in RSP-LENGTH defined number of data bytes.***

**Note:**

- ***This command is only available for ISO15693 Transponders.***
- ***This command is not available if the Scan Mode or Buffered Read Mode is switched on.***

---

## Supported ISO15693 Host commands

---

### 9.3. Supported ISO15693 Host commands for ISO15693 Transponders

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The command codes listed in the following table supports the various Transponder commands and operations that are available for each ISO15693 Transponder type.

#### 9.3.1. EM Microelectronics (EM4034)

---

Chip ID: 1h = x00001xxb (Bit 46 - 42 of UID)

**Memory organization: 14 x 4 Byte = 448Bit**

Number of blocks	14 (user area: 3 – 11)
Block size	4 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	✓	-	-	
0x02	Stay Quiet	✓	-	✓	-
0x22	Lock Multiple Blocks	-	-	-	-
0x23	Read Multiple Blocks	✓	✓*	✓	- DB-Size = 4
0x24	Write Multiple Blocks**	✓	✓	✓	- DB-Size = 4, WR-OPTION = 0
0x25	Select	-	-	-	-
0x26	Reset to Ready	✓	✓	✓	-
0x27	Write AFI	-	-	-	-
0x28	Lock AFI	-	-	-	-
0x29	Write DSFID	-	-	-	-
0x2A	Lock DSFID	-	-	-	-
0x2B	Get System Information	-	-	-	-
0x2C	Get Multiple Block Security Status	-	-	-	-

\* Reading of one block in non addressed mode is only possible, if parameter “Read Mode” in “CFG4 Transponder Parameters” is set to “b10: Multiple Read“.

\*\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “CFG4 Transponder Parameters” is set to “00: automatically set”.

---

### 9.3.2. EM Microelectronics (EM4135)

---

Chip ID: 4h = 000100xx (Bit 47 - 42 of UID)

**Memory organization: 38 x 8 Byte = 2432Bit**

Number of blocks	36 (user area: 13 – 48)
Block size	8 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	✓	-	-	
0x02	Stay Quiet	✓	-	✓	-
0x22	Lock Multiple Blocks	✓	✓	✓	✓
0x23	Read Multiple Blocks	✓	✓	✓	✓
0x24	Write Multiple Blocks**	✓	✓	✓	✓
0x25	Select	✓	-	✓	-
0x26	Reset to Ready	✓	✓	✓	✓
0x27	Write AFI	-	-	-	-
0x28	Lock AFI	-	-	-	-
0x29	Write DSFID	-	-	-	-
0x2A	Lock DSFID	-	-	-	-
0x2B	Get System Information	✓	✓	✓	✓
0x2C	Get Multiple Block Security Status	-	-	-	-

\*\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

---

### 9.3.3. Fujitsu (MB89R116)

---

IC manufacturer identifier: 0x08

Chip ID: 0h = 00000000b (Bit 47 - 40 of UID)

**Memory organization: 256 x 8 Byte = 16kBit**

Number of blocks	256 (user area: 0 – 249)
Block size	8 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 or 1
0x23	Read Multiple Blocks *	√	√	√	√ Security Status is always 0x00
0x24	Write Multiple Blocks **	√	√	√	√ WR-OPTION = 0 or 1
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 or 1
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 or 1
0x29	Write DSFID	√	√	√	√
0x2A	Lock DSFID	√	√	√	√
0x2B	Get System Information	√	√	√	√
0x2C	Get Multiple Block Security Status	√	√	√	√

\* The Custom Specific Commands Read Multiple Blocks Unlimited [0xA3] will be used automatically by the Reader. In non addressed Mode only one or two blocks can be read and the parameter DB-Blocksize in "CFG4 Transponder Parameters" should be set to 8.

\*\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter is set to "00: automatically set" in "CFG4 Transponder Parameters". Up to two blocks of data can be written for one request.

- 10% Modulation ASK SUB-CARRIER and Datacoding 1 of 4 must be configured in the reader.

---

### 9.3.4. Fujitsu (MB89R118)

---

IC manufacturer identifier: 0x08

Chip ID: 1h = 00000001b (Bit 47 - 40 of UID)

**Memory organization: 256 x 8 Byte = 16kBit**

Number of blocks	256 (user area: 0 – 249)
Block size	8 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	✓	-	-	
0x02	Stay Quiet	✓	-	✓	-
0x22	Lock Multiple Blocks	✓	✓	✓	✓
0x23	Read Multiple Blocks*	✓	✓	✓	✓
0x24	Write Multiple Blocks**	✓	✓	✓	✓
0x25	Select	✓	-	✓	-
0x26	Reset to Ready	✓	✓	✓	✓
0x27	Write AFI	✓	✓	✓	✓
0x28	Lock AFI	✓	✓	✓	✓
0x29	Write DSFID	✓	✓	✓	✓
0x2A	Lock DSFID	✓	✓	✓	✓
0x2B	Get System Information	✓	✓	✓	✓
0x2C	Get Multiple Block Security Status	✓	✓	✓	✓

\* The Custom Specific Commands Read Multiple Blocks Unlimited [0xA3] will be used automatically by the Reader. In non addressed Mode only one or two blocks can be read and the parameter DB-Blocksize in “CFG4 Transponder Parameters” should be set to 8.

\*\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter is set to “00: automatically set” in “CFG4 Transponder Parameters”. Up to two blocks of data can be written for one request.

- 10% Modulation and ASK SUB-CARRIER and Datacoding 1 of 4 must be configured in the reader.

---

### 9.3.5. Fujitsu (MB89R119)

---

IC manufacturer identifier: 0x08

Chip ID: 2h = 00000010b (Bit 47 - 40 of UID)

**Memory organization: 64 x 4 Byte = 2kBit**

Number of blocks	64 (user area: 0 – 57)
Block size	4 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	✓	-	-	
0x02	Stay Quiet	✓	-	✓	-
0x22	Lock Multiple Blocks	✓	✓	✓	- WR-OPTION = 0 or 1
0x23	Read Multiple Blocks	✓	✓	✓	- Security Status is always 0x00
0x24	Write Multiple Blocks*	✓	✓	✓	- WR-OPTION = 0 or 1
0x25	Select	-	-	-	-
0x26	Reset to Ready	✓	✓	✓	-
0x27	Write AFI	✓	✓	✓	- WR-OPTION = 0 or 1
0x28	Lock AFI	✓	✓	✓	- WR-OPTION = 0 or 1
0x29	Write DSFID	✓	✓	✓	-
0x2A	Lock DSFID	✓	✓	✓	-
0x2B	Get System Information	✓	✓	✓	-
0x2C	Get Multiple Block Security Status	-	-	-	-

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter is set to “00: automatically set” in “CFG4 Transponder Parameters”. Up to two blocks of data can be written for one request.

- ASK SUB-CARRIER and Datacoding 1 of 4 must be configured in the reader.

---

 9.3.6. Infineon (ISO address mode) 0xE0
 

---

IC manufacturer identifier: 0x05

**memory organization:**

**SRF55V10P: 256 x 4 Byte = 8kBit**

**SRF55V02P: 64 x 4 Byte = 2kBit**

Number of blocks	256 (user area: 0...249)
Block size	4 byte

Number of blocks	64 (user area: 0...57)
Block size	4 byte

Command Code	Function	Mode			Comment
		non ad-dressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 *
0x29	Write DSFID	-	-	-	-
0x2A	Lock DSFID	-	-	-	-
0x2B	Get System Information	-	-	-	-
0x2C	Get Multiple Block Security Status	√	√	√	√

- \* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “b00: automatically set”

---

### 9.3.7. Infineon (My-d Light)

---

Chip ID: A1h = 10100001b (Bit 47 - 40 of UID)

**Memory organization: 18 x 4 Byte = 576Bit**

Number of blocks	18 (user area: 0...12)
Block size	4 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√ **	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 *
0x29	Write DSFID	-	-	-	-
0x2A	Lock DSFID	-	-	-	-
0x2B	Get System Information	-	-	-	-
0x2C	Get Multiple Block Security Status	-	-	-	-

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “CFG4 Transponder Parameters” is set to “b00: automatically set”.

\*\* Reading of one block in non addressed mode is only possible, if parameter “Read Mode” in “CFG4 Transponder Parameters” is set to “b01: Single Read”.

---

### 9.3.8. NXP (I-Code SLI)

---

Chip ID: 1h = 00000001b (Bit 47 - 40 of UID)

**Memory organization: 32 x 4 Byte = 1kBit**

Number of blocks	32 (user area: 0 – 27)
Block size	4 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√ WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√ WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√
0x2C	Get Multiple Block Security Status	√	√	√	√

- \* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

---

### 9.3.9. NXP (I-Code SLI-S)

---

Chip ID: 2h = 00000010b (Bit 47 - 40 of UID)

**Memory organization: 40 x 4 Byte = 1280Bit**

Number of blocks	40 (user area: 0 – 39)
Block size	4 byte

Number of pages	10 (user area: 0 – 9)
Page size	16 byte = 4 Blocks

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√ **	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√ WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√ WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√
0x2C	Get Multiple Block Security Status	-	-	-	-

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

\*\* Reading of one block in non addressed mode is only possible, if parameter “Read Mode” in “CFG4 Transponder Parameters” is set to “b01: Single Read“.

---

### 9.3.10. NXP (I-Code SLI-L)

---

Chip ID: 3h = 00000110b (Bit 47 - 40 of UID)

**Memory organization: 16 x 4 Byte = 512Bit**

Number of blocks	16 (user area: 0 – 7)	Number of pages	4 (user area: 0 – 1)
Block size	4 byte	Page size	16 byte = 4 Blocks

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√ **	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√ WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√ WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√
0x2C	Get Multiple Block Security Status	-	-	-	-

- \* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “CFG4 Transponder Parameters” is set to “00: automatically set”.
- \* Reading of one block in non addressed mode is only possible, if parameter “Read Mode” in “CFG4 Transponder Parameters” is set to “b01: Single Read”.

---

### 9.3.11. NXP (I-Code SLIX)

---

Chip ID: 2h = 00000001b (Bit 47 - 40 of UID)

**Memory organization: 32 x 4 Byte = 1280Bit**

Number of blocks	28 (user area: 0 – 27)	Number of pages	10 (user area: 0 – 9)
Block size	4 byte	Page size	16 byte = 4 Blocks

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√ **	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√ WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√ WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√
0x2C	Get Multiple Block Security Status	-	-	-	-

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “CFG4 Transponder Parameters” is set to “00: automatically set”.

\*\* Reading of one block in non addressed mode is only possible, if parameter “Read Mode” in “CFG4 Transponder Parameters” is set to “b01: Single Read”.

---

### 9.3.12. NXP (I-Code SLIX-S)

---

Chip ID: 2h = 00000010b (Bit 47 - 40 of UID)

**Memory organization: 64 x 4 Byte = 2048Bit**

Number of blocks	40 (user area: 0 – 39)
Block size	4 byte

Number of pages	10 (user area: 0 – 9)
Page size	16 byte = 4 Blocks

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	✓	-	-	
0x02	Stay Quiet	✓	-	✓	-
0x22	Lock Multiple Blocks	✓	✓	✓	✓ WR-OPTION = 0 *
0x23	Read Multiple Blocks	✓	✓ **	✓	✓ DB-Size = 4
0x24	Write Multiple Blocks	✓	✓	✓	✓ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	✓	-	✓	-
0x26	Reset to Ready	✓	✓	✓	✓
0x27	Write AFI	✓	✓	✓	✓ WR-OPTION = 0 *
0x28	Lock AFI	✓	✓	✓	✓ WR-OPTION = 0 *
0x29	Write DSFID	✓	✓	✓	✓ WR-OPTION = 0 *
0x2A	Lock DSFID	✓	✓	✓	✓ WR-OPTION = 0 *
0x2B	Get System Information	✓	✓	✓	✓
0x2C	Get Multiple Block Security Status	-	-	-	-

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

\*\* Reading of one block in non addressed mode is only possible, if parameter “Read Mode” in “CFG4 Transponder Parameters” is set to “b01: Single Read“.

---

### 9.3.13. NXP (I-Code SLIX-L)

---

Chip ID: 2h = 00000011b (Bit 47 - 40 of UID)

**Memory organization: 16 x 4 Byte = 512Bit**

Number of blocks	8 (user area: 0 – 7)	Number of pages	2 (user area: 0 – 1)
Block size	4 byte	Page size	16 byte = 4 Blocks

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√ **	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√ WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√ WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√
0x2C	Get Multiple Block Security Status	-	-	-	-

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

\*\* Reading of one block in non addressed mode is only possible, if parameter “Read Mode” in “CFG4 Transponder Parameters” is set to “b01: Single Read“.

---

### 9.3.14. NXP (I-Code SLIX2)

---

Chip ID: 1h = 00000001b (Bit 47 - 40 of UID)

Type indicator bits: 01b (Bit 36 – 35 of UID)

**Memory organization: 80 x 4 Byte = 2560Bit**

Number of blocks	80 (user area: 0 – 79)
Block size	4 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√ WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√ WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√ WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√
0x2C	Get Multiple Block Security Status	√	√	√	√

- \* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

---

### 9.3.15. NXP ICode ILT-M (ISO18000-3M3)

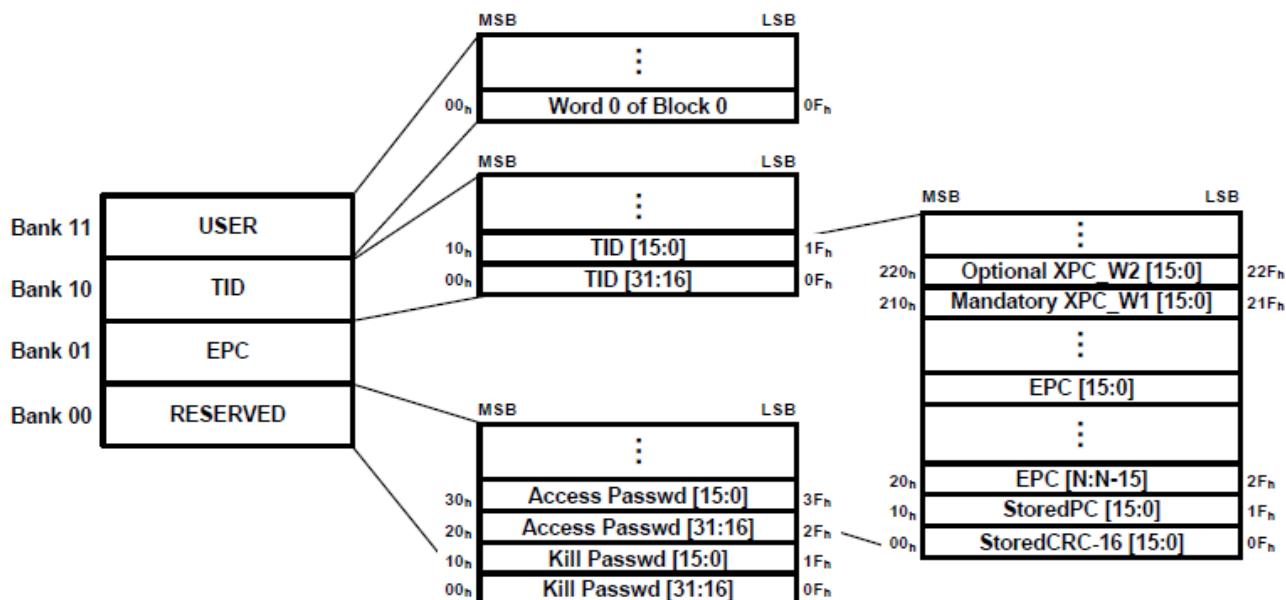
---

**Memory organization:**

Reserved memory (32 bit ACCESS and 32 bit KILL password)	64 bit
EPC (excluding 16 bit CRC-16 and 16 bit PC)	240 bit
TID (including unique 48 bit serial number)	96 bit
User memory	512 bit

Command Code	Function		Mode		Comment
			non-addressed	addressed	
0xB0 0x01	Inventory	√	-	-	
0xB0 0x23	Read Multiple Blocks	√	√	√	
0xB0 0x24	Write Multiple Blocks	√	√	√	
0xB3 0x18	Kill	√		√	
0xB3 0x22	Lock	√		√	

For a detailed description of the mandatory Kill command refer to "[References](#)".



---

### 9.3.16. NXP ICode DNA

---

Chip ID: 4h = 00000100b (Bit 47 - 40 of UID)

Type indicator bits: 11b (Bit 36 – 35 of UID)

**memory organization: 63 x 4 Byte = 2016 Bit**

Number of blocks	63 (user area: 0...62)
Block size	4 byte

Command Code	Function	Mode			Comment
		non-addressed	addressed	select	
0xB0 0x01	Inventory	√	-	-	
0xB0 0x23	Read Multiple Blocks	√	√	√	√ DB-Size = 4
0xB0 0x24	Write Multiple Blocks	√	√	√	DB-Size = 4, WR-OPTION = 0 *
0xB0 0x39	Challenge	√	√	√	√
0xB0 0x35	Authenticate	√	√	√	√

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

---

### 9.3.17. STMicroelectronics (LRI64)

---

IC manufacturer identifier: 0x02

**memory organization: 16 x 1 Byte = 128Bit**

Number of blocks	5 (user area: 10...14)
Block size	1 byte

Command Code	Function	Mode			Comment
		non addressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	-	-	-	WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√	√	In non addressed mode DB-N must be 1
0x24	Write Multiple Blocks	√	√	√	DB-Size = 1, WR-OPTION = 0 *
0x25	Select	-	-	-	
0x26	Reset to Ready	-	-	-	
0x27	Write AFI	-	-	-	WR-OPTION = 0 *
0x28	Lock AFI	-	-	-	WR-OPTION = 0 *
0x29	Write DSFID		-	-	
0x2A	Lock DSFID		-	-	
0x2B	Get System Information	√	√	√	-
0x2C	Get Multiple Block Security Status		-	-	

- \* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

---

### 9.3.18. STMicroelectronics (LRI2k, LRIS2k)

---

Chip ID: 8h = 001000xxb (Bit 47 - 42 of UID)

*Product Code for LRI2k and LRIS2k:*

Bit 63-48 = E0 02 , Bit 47-42: Product ID

LRI2k	0010 00
LRIS2k	0010 10

**memory organization: 64 x 4 Byte = 2kBit**

Number of blocks	64 (user area: 0...63)
Block size	4 byte

Command Code	Function		Mode			Comment
			non addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√	√	√	DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√	DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	√	√	√	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”.

---

**9.3.19. STMicroelectronics (M24LR64-R)**


---

IC manufacturer identifier: 0x02

**Product Code for M24LR64-R:** Bit 47-42 of UID

Bit 47 - 42	Product ID
001011xxb	Bh

**memory organization: 64 x 32 x 4 Byte = 64kBit**

Number of sectors	64 (0...63)
Number of blocks	2048 (user area: 0...2047) 32 blocks per sector
Block size	4 byte

Command Code	Function	Mode			Comment
		non addressed	addressed	select	
0x01	Inventory	✓	-	-	
0x02	Stay Quiet	✓	-	✓	-
0x22	Lock Multiple Blocks	✓	✓	✓	✓ WR-OPTION = 0 *
0x23	Read Multiple Blocks	✓	✓	✓	✓
0x24	Write Multiple Blocks	✓	✓	✓	✓ WR-OPTION = 0 *
0x25	Select	✓	✓	✓	✓
0x26	Reset to Ready	✓	✓	✓	✓
0x27	Write AFI	✓	✓	✓	✓ WR-OPTION = 0 *
0x28	Lock AFI	✓	✓	✓	✓ WR-OPTION = 0 *
0x29	Write DSFID	✓	✓	✓	✓
0x2A	Lock DSFID	✓	✓	✓	✓
0x2B	Get System Information	✓	✓	✓	✓
0x2C	Get Multiple Block Security Status	✓	✓	✓	✓

**Note:**

- The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “CFG4 Transponder Parameter is set to “00: automatically set”
- Each sector (32 blocks) must be read separately. For reading data from different sectors a Read Multiple Block command for each sector must be used.

---

9.3.20.STMicroelectronics (ST25DVxxK-IE/JF)

---

IC manufacturer identifier: 0x02

**Product Code:** Bit 47-40 of UID

Bit 47 - 42	Product ID	Type
00100100b	24h	ST25DV04K-IE
00100101b	25h	ST25DV04K-JF
00100110b	26h	ST25DV16K-IE ST25DV64K-IE
00100111b	27h	ST25DV16K-JF ST25DV64K-JF

**memory organization for ST25DV64K: 64 x 32 x 4 Byte = 64kBit**

Number of blocks	2048 (user area: 0...2047)
Block size	4 byte

**memory organization for ST25DV16K: 16 x 32 x 4 Byte = 16kBit**

Number of blocks	512 (user area: 0...511)
Block size	4 byte

**memory organization for ST25DV04K: 4 x 32 x 4 Byte = 4kBit**

Number of blocks	128 (user area: 0...127)
Block size	4 byte

Command Code	Function		Mode			Comment
			non ad-dressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	-	-	-	-	
0x23	Read Multiple Blocks	√	√	√	√	
0x24	Write Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x25	Select	√	√	√	√	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√	WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√	WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	

\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “CFG4 Transponder Parameter” is set to “00: automatically set” (see the according System Manual).

**Note:**

Reading / Writing of more than 255 data blocks requires the new extended address mode with 2 bytes address length.

---

 9.3.21. Texas Instruments (Tag-it HFI Pro / Standard)
 

---

IC manufacturer identifier: 0x07

Chip ID: Ch = 1100xxxxb (Bit 47 - 44 of UID)

**Standard:**

Product ID: 0h = 000b (Bit 43 – 41 of UID)

**memory organization:** 11 x 4 Byte = 48Byte (8 \* 4 Byte = 256 Bit user data)

Number of blocks	11 (user area: 0 – 7)
Block size	4 byte

**Pro:**

Product ID: 0h = 100b (Bit 43 – 41 of UID)

**memory organization:** 12 x 4 Byte = 48Byte (8 \* 4 Byte = 256 Bit user data)

Number of blocks	12 (user area: 0 – 7)
Block size	4 byte

Command Code	Function		Mode			Comment
			non ad-dressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	-	WR-OPTION = 1 **
0x23	Read Multiple Blocks *	√	√	√	-	DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	-	DB-Size = 4 WR-OPTION = 1 **
0x25	Select	-	-	-	-	
0x26	Reset to Ready	-	-	-	-	
0x27	Write AFI	-	-	-	-	
0x28	Lock AFI	-	-	-	-	
0x29	Write DSFID	-	-	-	-	
0x2A	Lock DSFID	-	-	-	-	
0x2B	Get System Information	-	-	-	-	
0x2C	Get Multiple Block Security Status	-	-	-	-	

0xA3	Inventory Read Multiple Blocks	-	-	-	-	
0xAB	Inventory Get System Information	-	-	-	-	
0xAC	Inventory Get Multiple Block Security Status	-	-	-	-	
0xA2	Write 2 Blocks	-	-	-	-	
0xA3	Lock 2 Blocks	-	-	-	-	
0xA4	Kill (only Tag-it HFI Pro)	√		√		
0xA5	WriteBlockPwd (only Tag-it HFI Pro)	√		√		

**Note:**

- \* **Reading of more than one block in non addressed mode is only possible, if parameter “Read Mode” in CFG4 is set to “01: Single Read”.**
- \*\* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “ CFG4 Transponder Parameters ” is set to “00: automatically set”. When using the “non-addressed” mode the WR-OPTION must be set manually to “WR-OPTION = 1”.**

---

### 9.3.22. Texas Instruments (Tag-it HFI Plus)

---

IC manufacturer identifier: 0x07

Chip ID: 0h = 0000xxxxb oder 8h = 1000xxxxb (Bit 47 - 44 of UID)

**memory organization: 64 x 4 Byte = 2kBit user data**

Number of blocks	64 (user area: 0 – 63)
Block size	4 byte

Command Code	Function	Mode			Comment
		non ad-dressed	addressed	select	
0x01	Inventory	√	-	-	
0x02	Stay Quiet	√	-	√	-
0x22	Lock Multiple Blocks	√	√	√	√ WR-OPTION = 1 **
0x23	Read Multiple Blocks	√	√	√	√ DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√ DB-Size = 4 WR-OPTION = 1 **
0x25	Select	√	-	√	-
0x26	Reset to Ready	√	√	√	√
0x27	Write AFI	√	√	√	√ WR-OPTION = 1 **
0x28	Lock AFI	√	√	√	√ WR-OPTION = 1 **
0x29	Write DSFID	√	√	√	√ WR-OPTION = 1 **
0xA2	Lock DSFID	√	√	√	√ WR-OPTION = 1 **
0x2B	Get System Information	√	√	√	√
0x2C	Get Multiple Block Security Status	√	√	√	√
0xA3	Inventory Read Multiple Blocks	√	-	-	-
0xAB	Inventory Get System Information	√	-	-	-
0xAC	Inventory Get Multiple Block Security Status	√	-	-	-
0xA2	Write 2 Blocks	√	√	√	√ WR-OPTION = 1 **
0xA3	Lock 2 Blocks	√	√	√	√ WR-OPTION = 1 **

\*\* The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in “CFG4 Transponder Parameters” is set to “00: automatically set”. When using the “non-addressed” mode the WR-OPTION must be set manually to “WR-OPTION = 1”.

**Note:**

- *The “Write\_2\_Blocks” command and “Lock\_2\_Blocks” command will be used automatically by the reader. This will only become an effect if the block address starts with an even-numbered address.*
- *In the case of writing / locking an odd number of blocks the “Write\_2\_Blocks”/“Lock\_2\_Blocks” command will be combined with the “write single Block”/ “Lock single Block” command.*

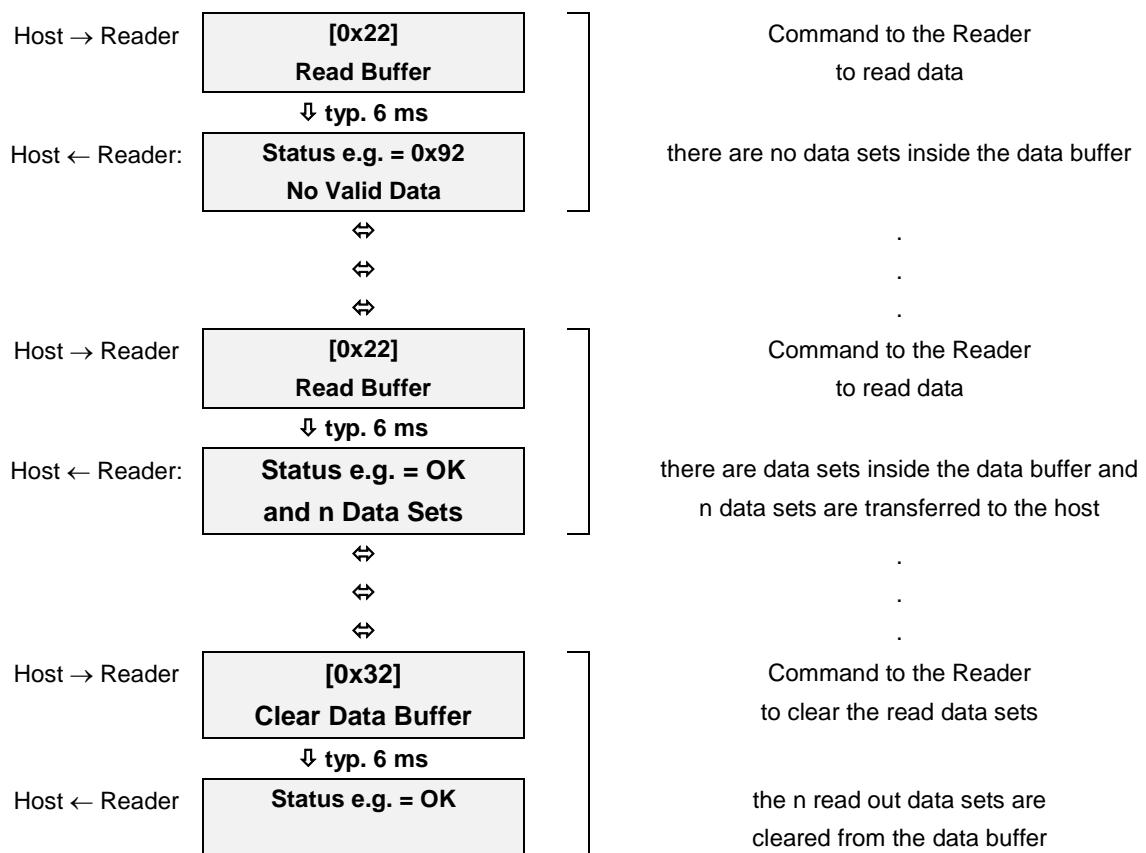
## 10. Protocols for Buffered Read Mode and Notification Mode

### 10.1. The Buffered Read Mode Procedure

By using the “BRM” the Reader itself reads data from every Transponder which is inside the antenna field. This mode must be enabled in the [5.2. CFG1: Interface](#) configuration block and configured in the [5.10. CFG11: Read Mode / Read Data](#) and [5.11. CFG12: Read Mode - Filter](#) configuration blocks.

The sampled Transponder data sets are stored in a FIFO organized data buffer inside the Reader. The buffered read mode runs offline from any host commands and it is immediately started after power up or a [7.4. \[0x64\] System Reset](#) command.

Only two commands are necessary to read out sampled Transponder data sets. The figure below illustrates the Buffered Read Mode procedure:



↓: Host waits for an answer from the Reader

↔: Host is able to do other jobs e.g. to communicate with other Readers

Additional information about the capacity of the data buffer can be determined with the [10.5. \[0x31\] Read Data Buffer Info](#) command.

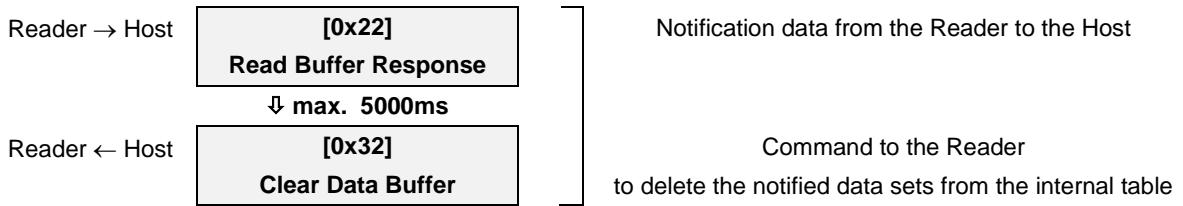
## 10.2. The Notification Mode Procedure

By using Notification Mode together with the Buffered Read Mode the Reader itself reads data from every Transponder which is inside the antenna field **and** enables a connection to a host to send the queued data asynchronously. This mode must be enabled in the [5.2. CFG1: Interface](#) configuration block and configured in [5.26. CFG49: Notification Channel](#) configuration block. The settings for the Read Mode defines the notification information sent to the host.

Only one command is necessary to send sampled Transponder data sets. The figure below illustrates the Notification Mode procedure:



The reader sends notifications as fast as possible, if the notification trigger is set to continuously or a very short cycle time in time-triggered mode is defined. To prevent a notification overflow in a host application the acknowledgement option can be set. In this case the notification must be acknowledged by the host with an response protocol to synchronize the notification process with the host application. The figure below illustrates this procedure:



The acknowledge protocol [0x32] Clear Data Buffer must be in the space of 5 seconds. If no acknowledge is received the Reader repeats the notification as it is configured.

Additional information about the capacity of the data buffer can be determined with the [10.5. \[0x31\] Read Data Buffer Info](#) command.

As an additional option Keepalive messages can be sent periodically to a host. Keepalive notifications are never acknowledged. The information sent by a Keepalive notification is identical with the command [7.9. \[0x6E\] Reader Diagnostic](#) with mode = 0x01.

### 10.3. Transponder Access in the Buffered Read Mode and Notification Mode

---

The Buffered Read Mode only reads data blocks from the Transponders in the antenna field

The anticollision procedure can be configured in the configuration block [5.6. CFG5: Anticollision](#).

After power up or a [7.4. \[0x64\] System Reset](#) command the buffered read mode starts with transponder reading.

## 10.4. [0x22] Read Buffer

The command Read Buffer reads a number of data sets from the data buffer.

Host → Reader

1	2	3	4	5	6 .. 7	8...9
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x22]	DATA-SETS	CRC16

Host ← Reader

1	2	3	4	5	6	7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x22]	STATUS <sup>1</sup>	TR-DATA1

(8)	8, 9 (9, 10)	(10 or 11 ... n-2)	n-1, n
TR-DATA2	DATA-SETS	DATA	CRC16

### DATA-SETS:

Number of data sets to be transferred from the data buffer. If the data buffer does not contain the requested number of data sets, the Reader responds with all available data sets.

### TR-DATA1:

Selects the data types for read operation.

Bit:	7	6	5	4	3	2	1	0
Function	ExFlag	-	TIME	ANT	Byte Order	-	DB	IDD

**IDD** = Identifier Data (UID or EPC)

**DB** = data block

**Byte Order** = b0:MSB first, b1:LSB first

**ANT** = Antenna number

**TIME** = internal system time

**ExFlag** = Extension flag, if b1= TR-DATA2 will be send

### Notes:

**If the ANT bit in TR\_DATA (CFG11) is set in Buffer-Info-Mode:**

**When a Transponder is detected by multiple antennas, only one data set is stored.**

**The Valid-Time is only set at the first detection. If a data set is transferred to the host and the same Transponder is detected in another antenna but the Valid-Time has not yet elapsed, no other data set is stored.**

<sup>1</sup> see ANNEX E: Index of Status Bytes

**If the ANT bit in TR\_DATA (CFG11) is not set in Buffer-Info-Mode and a Transponder is detected by multiple antennas, the data set for each antenna is stored.**

### TR-DATA2:

Selects the data types for read operation.

Bit:	7	6	5	4	3	2	1	0
Function	-	-	-	ANT_Ext	-	-	-	IN

**IN = Input**

**ANT-Ext = Antenna Extended**

Antenna number with RSSI

### DATA:

Requested number of data sets from the data buffer. Only selected data will be transferred to the host. See chapter [5.10. CFG11: Read Mode](#) for details.

Each data set has the following structure:

Data Type		DATA			
Record Length	byte no.	1	2	3	
		MSB RecLen	LSB RecLen		
Serial Number	byte no.	1	2	3+LEN	
		TR-TYP	IDDT	IDD-LEN	IDD
Data Blocks	byte no.	1	2	3	4...4+DB-N*DB-SIZE
		DB-N		DB-SIZE	DB
Timer	byte no.	1...4	Repeated ANT-CNT times		
		TIMER			
Antenna	byte no.	1	Repeated ANT-CNT times		
		ANT-NO			
Input	byte no.	1	1	Repeated ANT-CNT times	
		IN	STATUS		
Antenna-Extended	byte no.	1	2	3	4...7
		ANT-CNT	ANTx	RSSIx	reserved

**ANT-NO = Antenna number**

ANT is a bit field. If the tag is read on more than one antenna and the configuration option "all antenna ports act as one reading point" is set, the corresponding bits of each antenna where the Transponder is read will be set in the bit field.

Bit:	7	6	5	4	3	2	1	0
Function	ANT8	ANT7	ANT6	ANT5	ANT4	ANT3	ANT2	ANT1

***ANT1...8***

- b0**      *this antenna has not read transponder data*  
**b1**      *this antenna has read transponder data*

**IN** = Input number

Bit:	7	6	5	4	3	2	1	0
Function	-	-	-	-	-	-	-	Input1

**Input1**

- b0**      Input inactive  
**b1**      Input active

**ANT-CNT** = antenna counter

Shows the antennas on which a transponder was read.

**ANTx** = antenna number

The antenna number depends on the number of the output of the multiplexer and the connection of that multiplexer in the structure. The decimal places of the antenna number describe the active outputs of the multiplexers on all 3 levels to switch to the antenna.

$$\text{ANT-CNT} = (\text{Level 2 Mux Channel}) * 10 + (\text{Level 1 Mux Channel}) * 1$$

Example:

- Mux on output 2 Level 1
- Mux on output 4 Level 2

$$\text{ANT-CNT} = 4 * 10 + 2 * 1 = 42$$

**RSSIx** = Receive signal strength identification**Notes:**

- This command reads the same data sets until they are cleared with the **10.6. [0x32] Clear Data Buffer** command.
- This command is only available in the Buffered Read Mode.
- Data are only transferred if STATUS = 0x00, 0x83, 0x84, 0x93, 0x94.
- If STATUS = 0x83, 0x84, 0x85 the TR-DATA and DATA SETS will be always transferred.

---

## 10.5. [0x31] Read Data Buffer Info

---

The command Read Data Buffer Info reads the actual parameters of the data buffer.

Host → Reader

1	2	3	4	5	6...7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x31]	CRC16

Host ← Reader

1	2	3	4	5	6
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x31]	STATUS <sup>1</sup>
↳		7...8	9,10	11,12	13,14
↳		TAB-SIZE	TAB-START	TAB-LEN	CRC16

**TAB-SIZE:**

Maximum count of Transponder data sets in the data buffer.

**TAB-START:**

Address of first Data Set in the data buffer.

**TAB-LEN:**

Number of Transponder data sets reserved in the data buffer.

**Notes:**

- Additional information about the data table status is transferred if STATUS = 0x00, 0x84, 0x85, 0x93.

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

---

## 10.6. [0x32] Clear Data Buffer

---

The command Clear Data Buffer clears the data sets from the data buffer which were transferred with the command [10.4. \[0x22\] Read Buffer](#).

Host → Reader

1	2	3	4	5	6...7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x32]	CRC16

Host ← Reader

1	2	3	4	5	6	7...8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x32]	STATUS <sup>1</sup>	CRC16

---

## 10.7. [0x33] Initialize Buffer

---

The command Initialize Buffer clears the data buffer to an initial state. It does not matter if the data sets in the data buffer were read or not.

Host → Reader

1	2	3	4	5	6...7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x33]	CRC16

Host ← Reader

1	2	3	4	5	6	7...8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x33]	STATUS <sup>2</sup>	CRC16

---

<sup>1</sup> see ANNEX E: Index of Status Bytes

<sup>2</sup> see ANNEX E: Index of Status Bytes

**ANNEX****ANNEX A: Codes of Transponder Types**

Value	Transponder type
0x03	ISO15693 Tags
0x84	ISO18000-3M3

The Information will be send by performing the [8.1.1. \[0x01\] Inventory](#) command.

**ANNEX B: Codes of Identifier Data Types (IDDT)**

Value	IDDT
0x00	EPC
0x02	EPC and TID (UID)

The Information will be send by performing the [8.1.1. \[0x01\] Inventory](#) command or using the Buffered Reader Mode.

**ANNEX C: Time Behavior of the Asynchronous Interface**

**The execution times of the asynchronous interface depends on:**

- The extent of the data that needs to be read or written
- Type and amount of Transponders supported by the Reader
- Position of the Transponder at the time of the request
- Probable local electromagnetic interference present
- The success or failure of the request

	min.	max.	Unit
EE-Parameter change 1 Block (16 Bytes) all ( 8 ) Blocks	5	300 600	ms ms
7.6.		15	ms
8.1. [0xB0] Host commands for ISO15693 Mandatory and Optional Commands	5	1	ms

<sup>1</sup> as configured in [5.2. CFG1: Interface TR-RESPONSE-TIME](#)

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## ANNEX D: Time Behavior of ISO15693 Host Commands

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The execution times for ISO15693 Host Commands depends on:

- Amount of Transponders in the antenna field (duration of the anticollision process),
- The extent of the data that needs to be read or written
- Types of Transponders supported by the Reader,
- Position of the Transponder at the time of the requirement,
- Probable local electromagnetic interferences present.

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### Time Behaviour for [0x01] Inventory and ISO15693 Transponders

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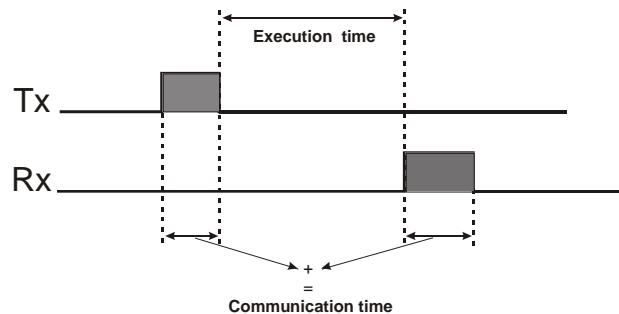
All times apply to the following parameters: ISO15693 MODE = 0x0B (see 5.5. CFG4: Transponder Parameters)

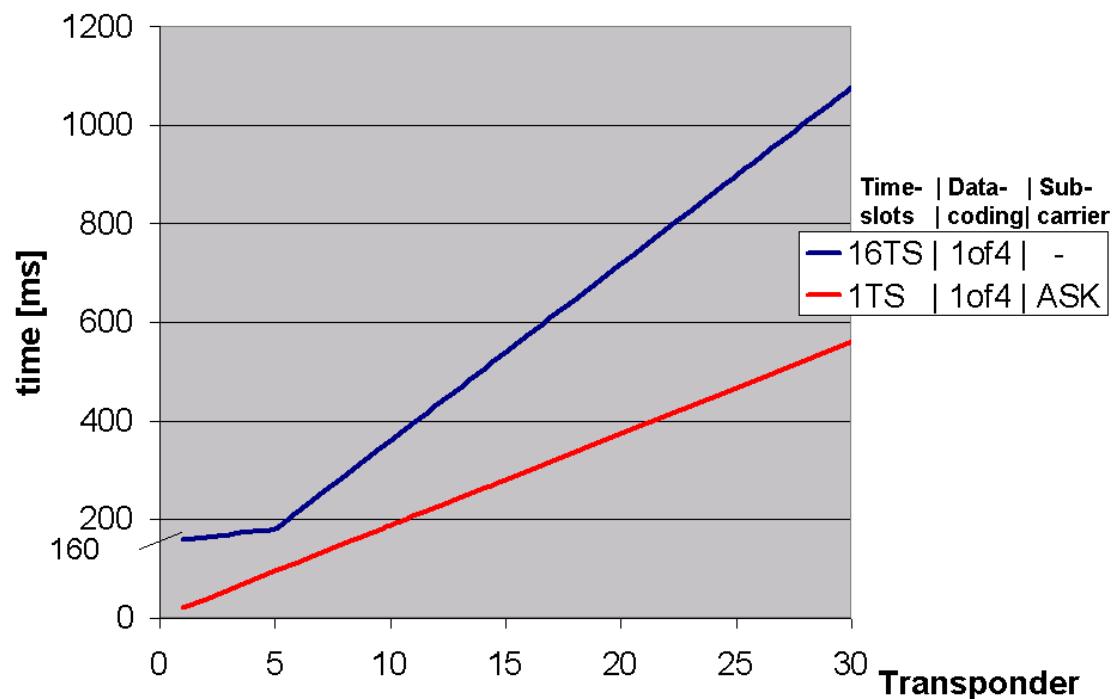
- AFI disabled
- 16 timeslot
- only ISO15693 Transponder driver active

The modulation and the subcarrier have a negligible influence on the reaction time.

The following diagrams shows the average value of timing behavior, dependent on the number of Transponders. For certain UID's the real timing can be higher or lower as show below.

The timing is measured inclusive of the communication time at 38,4Kbaud. A modified baud rate will slightly increase the timing but the Inventory timing is mostly determine by the anticollision so you may neglect the communication time.





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ANNEX E: Index of Status Bytes

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Hex-value	General
0x00	<p><b>OK:</b></p> <ul style="list-style-type: none"> <li>• Data / parameters have been read or stored without error</li> <li>• Control command has been executed</li> </ul>

Hex-value	Transponder Status
0x01	<p><b>No Transponder:</b></p> <ul style="list-style-type: none"> <li>• No Transponder is located within the detection range of the Reader.</li> <li>• The Transponder in the detection range has been switched to mute.</li> <li>• The communication between Reader and Transponder has been interfered and the Reader is not able to read the Transponder anymore.</li> </ul>
0x02	<p><b>Data False:</b></p> <ul style="list-style-type: none"> <li>• CRC16 data error at received data.</li> </ul>
0x03	<p><b>Write-Error:</b></p> <p>Negative plausibility check of the written data:</p> <ul style="list-style-type: none"> <li>• Attempt to write on a read-only storing-area.</li> <li>• Too much distance between Transponder and Reader antenna.</li> <li>• Attempt to write in a noise area.</li> </ul>
0x04	<p><b>Address-Error:</b></p> <p>The required data are outside of the logical or physical Transponder-address area:</p> <ul style="list-style-type: none"> <li>• The address is beyond the max. address space of the Transponder.</li> <li>• The address is beyond the configured address space of the Transponder.</li> </ul>
0x05	<p><b>Wrong Transponder-type:</b></p> <p>This command is not applicable at the Transponder:</p> <ul style="list-style-type: none"> <li>• Attempt to write on or read from a Transponder.</li> <li>• A special command is not applicable to the Transponder.</li> </ul>

Hex-value	Parameter Status
0x10	<b>EEPROM-failure:</b> <ul style="list-style-type: none"> <li>The EEPROM of the Reader is not able to be written on.</li> <li>Before writing onto the EEPROM a faulty checksum of parameters has been detected.</li> </ul>
0x11	<b>Parameter-Range-Error:</b> <ul style="list-style-type: none"> <li>The value range of the parameters was exceeded.</li> </ul>
0x13	<b>Login-Request:</b> <ul style="list-style-type: none"> <li>Configuration access without having logged in to the Reader before.</li> </ul>
0x14	<b>Login-Error:</b> <ul style="list-style-type: none"> <li>Login attempt with wrong password.</li> </ul>
0x15	<b>Read Protect:</b> <ul style="list-style-type: none"> <li>The configuration block is reserved for future use.</li> </ul>
0x16	<b>Write Protect:</b> <ul style="list-style-type: none"> <li>The configuration block is reserved for future use.</li> </ul>
0x17	<b>Firmware activation required:</b> <p>The firmware must be activated first using ISOStart demo program and the command “Set Firmware Upgrade”. The update code must be ordered by Feig Electronic.</p> <ol style="list-style-type: none"> <li>1. Read the Device-ID using the command [0x66] Firmware version (Mode 0x80)</li> <li>2. Send the Device-ID and the serial number of the reader to Feig Electronic</li> <li>3. Write the upgrade code into the reader using the command [0x5F] Set Firmware Update</li> </ol>

Hex-value	Interface Status
0x80	<b>Unknown Command:</b> <ul style="list-style-type: none"> <li>The Reader does not support the selected function.</li> </ul>
0x81	<b>Length-Error:</b> <ul style="list-style-type: none"> <li>Protocol is too short or too long</li> </ul>
0x82	<b>Command not available:</b> <ul style="list-style-type: none"> <li>Reader is set to a wrong mode</li> <li>Command is not supported</li> </ul>

0x83	<p><b>RF communication error:</b></p> <p>This error indicates that there is an error in communication between the Transponder and the Reader. Reason for this can be:</p> <ul style="list-style-type: none"> <li>The collision handling algorithm was not continued until no collision is detected, reasons for the break: <ul style="list-style-type: none"> <li>- TR-RESPONSE-TIME in CFG1: Interface is to short</li> <li>- Transponder is in the limit reading range</li> <li>- too much noise in the antenna field</li> </ul> </li> </ul>
0x84	<p><b>RF-Warning:</b></p> <p>Detailed status information can be read with the command <a href="#">7.9. [0x6E] Reader Diagnostic</a>.</p> <ul style="list-style-type: none"> <li>The antenna configuration isn't correct. Check the antenna cables and the antenna matching.</li> <li>The environment is too noisy.</li> <li>The RF power doesn't have the configured value.</li> </ul>
0x92	<p><b>No valid Data:</b></p> <ul style="list-style-type: none"> <li>There is no valid data in the Buffered Read Mode.</li> <li>There is no Transponder in the antenna field.</li> <li>The <b>VALID-TIME</b><sup>1</sup> hasn't elapsed for Transponders in the antenna field.</li> </ul>
0x93	<p><b>Data Buffer Overflow:</b></p> <ul style="list-style-type: none"> <li>A data buffer overflow occurred.</li> </ul>
0x94	<p><b>More Data:</b></p> <ul style="list-style-type: none"> <li>There are more Transponder data sets requested than the response protocol can transfer at once.</li> </ul>
0x95	<p><b>Tag Error</b></p> <ul style="list-style-type: none"> <li>A Tag error code was sent from the transponder. The Tag error code is shown in the following byte. Tag Errors for ISO15693 and ISO18000-3M3 Transponder are listed below.</li> </ul>

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<sup>1</sup> see 5.10. CFG11: Read Mode

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**ANNEX F: Transponder Error Codes**

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**Error-Code for ISO15693 Transponder**

<b>Hex-value</b>	<b>Response error code definition</b>
0x01	The command is not supported, i.e. the request code is not recognized
0x02	The command is not recognized, for example: a format error occurred
0x03	The option is not supported
0x0F	Unknown error
0x10	The specified block is not available (doesn't exist)
0x11	The specified block is already locked and thus cannot be locked again
0x12	The specified block is locked and its content cannot be changed
0x13	The specified block was not successfully programmed
0x14	The specified block was not successfully locked
0xA0 - 0xDF	Custom command error codes
all others	reserved for future use

**Error-Code for ISO18000-3M3 Transponder**

<b>Hex-value</b>	<b>Response error code definition</b>
0x03	Memory overrun: The specified memory location does not exist or the EPC length field is not supported by the tag
0x04	Memory locked: The specified memory location is locked and/or permalocked and is either not writeable or not readable
0x0B	Insufficient power: The tag has insufficient power to perform the memory-write operation
0x0F	Non-specific error: The tag does not support error-specific codes
0x00	Other error: "Catch-all" for errors not covered by other codes
all others	reserved for future use

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**ANNEX G: Codes of Reader Types**

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No.	Reader Type
11	ID ISC.DAT
12	ID ISC.UMUX
13	ID ISC.GPC
20	ID RW40.30-U
30	ID ISC.M01
31	ID ISC.M02
33	ID ISC.M02M8
40	ID ISC.LR100
41	ID ISC.LR200
42	ID ISC.LR2000
43	ID ISC.LR2500-B
44	ID ISC.LR2500-A
45	ID ISC.LR1002
50	ID ISC.MU02
54	ID ISC.MRU102
55	ID ISC.MRU200
56	ID ISC.MRU200-U
60	ID ISC.PRH101
61	ID ISC.PRH101-U (USB-Version)
62	ID ISC.PRHD102
63	ID ISC.PRH102
71	ID ISC.PRH100-U (USB-Version)
72	ID ISC.PRH100
73	ID ISC.MR100-U (USB-Version)
74	ID ISC.MR100 / .PR100
75	ID ISC.MR200-A / -E
76	ID ISC.MR101-A
77	ID ISC.MR102
78	ID ISC.MR101-U
80	ID CPR.M02
81	ID CPR.02
82	ID CPR40.30-Ux
83	ID CPR40.0x-Ax / -Cx
84	ID CPR.M03 (586/#)
85	ID CPR.03 (584/#)
86	ID CPR30
87	ID CPR.52
88	ID CPR.04-U
92	ID ISC.LRU1000
93	ID ISC.LRU2000
94	ID ISC.LRU3000
100	ID MAX50

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**ANNEX H: Examples for Read Data**

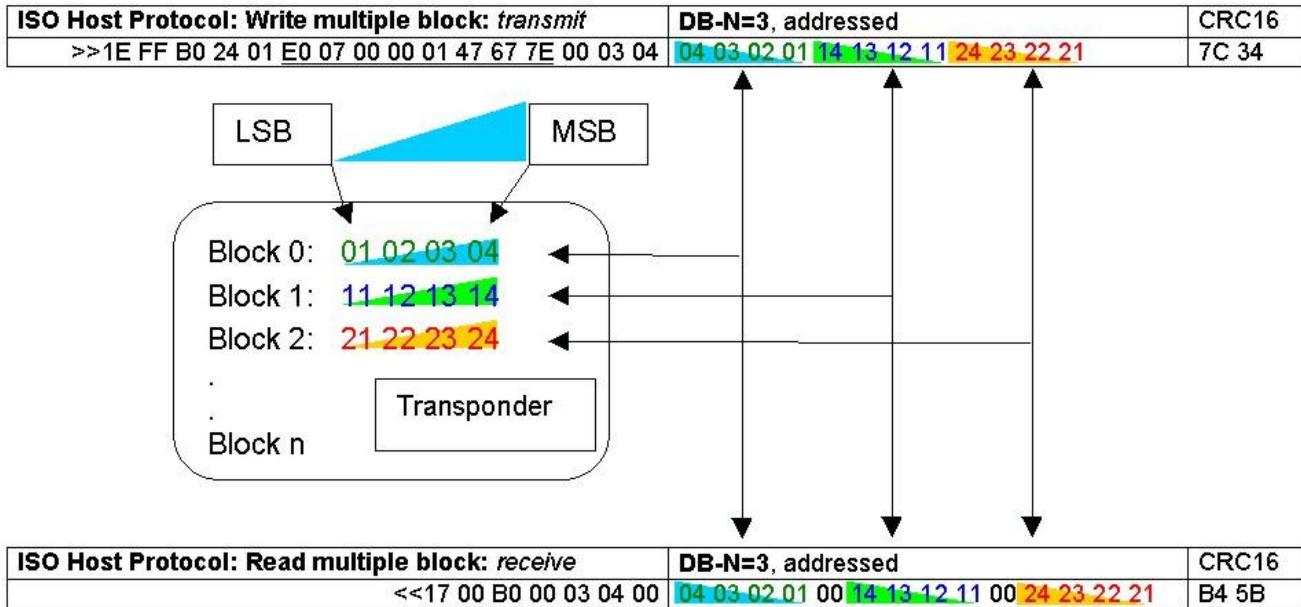

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The setting "LSB first" and "MSB first" gives the direction of the received data bytes

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**ISO15693 Host Command (DB-Size of the Transponder = 4 bytes)**

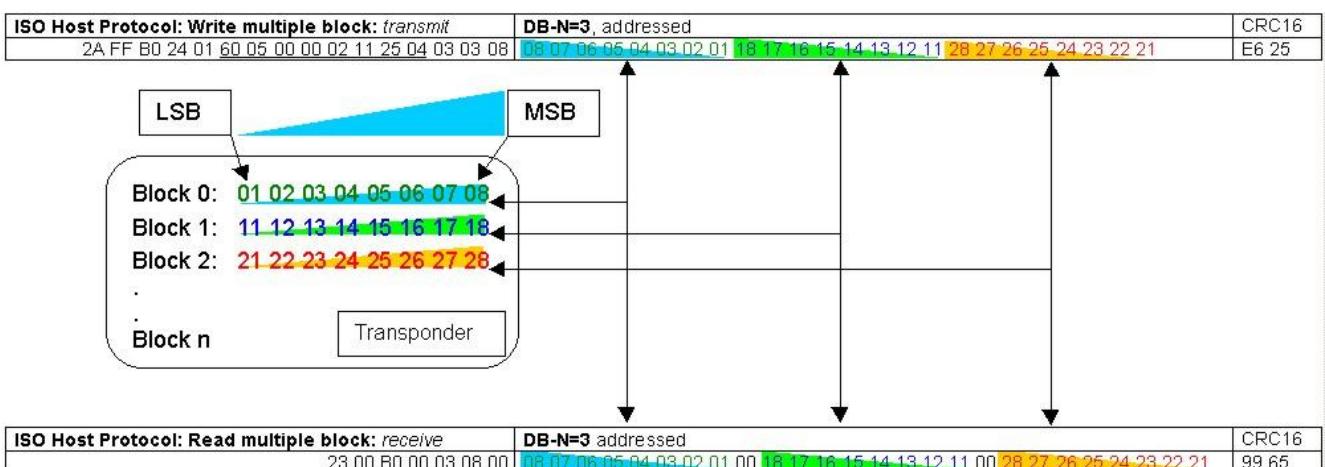

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**ISO15693 Host Command (DB-Size of the Transponder = 8 bytes)**


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**ANNEX I: Labeling of configuration parameter**

Label	Namespace	Filter	CFG-Block	Byte-No.	No. of Bytes	Bit-No.	No. of Bits
READER-ID	AccessProtection.Password	<i>Expert</i>	0	0	4		
CFG_ACCESS	AccessProtection.Lock_CFG0	<i>Expert</i>	0	8	1	0	1
CFG_ACCESS	AccessProtection.Lock_CFG1	<i>Expert</i>	0	8	1	1	1
CFG_ACCESS	AccessProtection.Lock_CFG2	<i>Expert</i>	0	8	1	2	1
CFG_ACCESS	AccessProtection.Lock_CFG3	<i>Expert</i>	0	8	1	3	1
CFG_ACCESS	AccessProtection.Lock_CFG4	<i>Expert</i>	0	8	1	4	1
CFG_ACCESS	AccessProtection.Lock_CFG5	<i>Expert</i>	0	8	1	5	1
CFG_ACCESS	AccessProtection.Lock_CFG6	<i>Expert</i>	0	8	1	6	1
CFG_ACCESS	AccessProtection.Lock_CFG7	<i>Expert</i>	0	8	1	7	1
CFG_ACCESS	AccessProtection.Lock_CFG8	<i>Expert</i>	0	9	1	0	1
CFG_ACCESS	AccessProtection.Lock_CFG9	<i>Expert</i>	0	9	1	1	1
CFG_ACCESS	AccessProtection.Lock_CFG10	<i>Expert</i>	0	9	1	2	1
CFG_ACCESS	AccessProtection.Lock_CFG11	<i>Expert</i>	0	9	1	3	1
CFG_ACCESS	AccessProtection.Lock_CFG12	<i>Expert</i>	0	9	1	4	1
CFG_ACCESS	AccessProtection.Lock_CFG13	<i>Expert</i>	0	9	1	5	1
CFG_ACCESS	AccessProtection.Lock_CFG14	<i>Expert</i>	0	9	1	6	1
CFG_ACCESS	AccessProtection.Lock_CFG15	<i>Expert</i>	0	9	1	7	1
CFG_ACCESS	AccessProtection.Lock_CFG16	<i>Expert</i>	0	10	1	0	1
CFG_ACCESS	AccessProtection.Lock_CFG17	<i>Expert</i>	0	10	1	1	1
CFG_ACCESS	AccessProtection.Lock_CFG18	<i>Expert</i>	0	10	1	2	1
CFG_ACCESS	AccessProtection.Lock_CFG19	<i>Expert</i>	0	10	1	3	1
CFG_ACCESS	AccessProtection.Lock_CFG20	<i>Expert</i>	0	10	1	4	1
CFG_ACCESS	AccessProtection.Lock_CFG21	<i>Expert</i>	0	10	1	5	1
CFG_ACCESS	AccessProtection.Lock_CFG22_29	<i>Expert</i>	0	10	1	6	1
CFG_ACCESS	AccessProtection.Lock_CFG40_49	<i>Expert</i>	0	11	1	0	1
CFG_ACCESS	AccessProtection.Lock_CFG63	<i>Expert</i>	0	11	1	3	1
COM-ADR	HostInterface.Serial.BusAddress		1	0	1		
BAUD	HostInterface.Serial.Baudrate		1	2	1		
TRANS-FORM (P)	HostInterface.Serial.Parity		1	3	1	0	2
TRANS-FORM (D)	HostInterface.Serial.Databits		1	3	1	2	1
TRANS-FORM (S)	HostInterface.Serial.Stopbits		1	3	1	3	1
TR-RESPONSE-TIME	AirInterface.TimeLimit		1	6	2		
SCAN-INTERFACE	OperatingMode.ScanMode.Interface		1	11	1	0	3
INTERFACE	HostInterface.Interfaces		1	12	1		
READER-MODE	OperatingMode.Mode		1	13	1		

IDLE-MODE	DigitalIO.Relay.No1.IdleMode		2	0	1	6	2
FLASH-IDLE	DigitalIO.Relay.No1.IdleFlashMode		2	2	1	6	2
IN-ACTIVE	DigitalIO.Input.No1.Mode		2	4	1	0	1
REL1-TIME	DigitalIO.Relay.No1.SettlingTime		2	6	2		
TAG-DRV (J)	Transponder.Driver.HF.ISO_18000_3M3		3	0	1	1	1
TAG-DRV (D)	Transponder.Driver.HF.ISO_15693		3	1	1	3	1
RF-POWER	AirInterface.Antenna.HF.No1.OutputPower		3	2	1		
FU-COM (DC)	AirInterface.Antenna.HF.Miscellaneous.Enable_DCPower	Expert	3	13	1	7	1
ISO 15693 MODE (NO-TS)	Transponder.HF.ISO_15693.Anticollision.NoOfTimeslots	Expert	4	4	1	4	1
ISO 15693 MODE (AFI)	Transponder.HF.ISO_15693.SelectionMask.Enable_AFI	Expert	4	4	1	5	1
ISO 15693 AFI1	Transponder.HF.ISO_15693.SelectionMask.AFI1	Expert	4	5	1		
ISO 15693 OPTION (WR-OPTION)	Transponder.HF.ISO_15693.Miscellaneous.WriteOption		4	6	1	2	2
ISO 15693 AFI2	Transponder.HF.ISO_15693.SelectionMask.AFI2	Expert	4	8	1		
ISO 15693 AFI3	Transponder.HF.ISO_15693.SelectionMask.AFI3	Expert	4	9	1		
ISO 15693 AFI4	Transponder.HF.ISO_15693.SelectionMask.AFI4	Expert	4	10	1		
TID-Length	Transponder.Miscellaneous.TIDLength	Expert	4	11	1		
IDDIB	Transponder.Miscellaneous.IdentifierInterpretationMode	Expert	4	12	1		
ISO-Blocksize (DB-Blocksize)	Transponder.HF.ISO_15693.Miscellaneous.ReadOption.BlockSize	Expert	4	13	1	0	5
ISO-Blocksize (Blocksize)	Transponder.HF.ISO_15693.Miscellaneous.ReadOption.BlockSizeSelection	Expert	4	13	1	5	1
ISO-Blocksize (Read Mode)	Transponder.HF.ISO_15693.Miscellaneous.ReadOption.ReadMode	Expert	4	13	1	6	2
Anticollision	Transponder.Anticollision.Enable		5	11	1	2	1
FUJITSU (FAST)	Transponder.HF.CustomerCommandOptions.Fujitsu.FastInventory	Expert	6	2	1	0	1
FUJITSU (FCmds)	Transponder.HF.CustomerCommandOptions.Fujitsu.FastCommands	Expert	6	2	1	1	2
NXP (FAST)	Transponder.HF.CustomerCommandOptions.NXP.FastReturnLink	Expert	6	6	1	0	1
NXP (INV_RD_PAGE)	Transponder.HF.CustomerCommandOptions.NXP.InventoryReadPage	Expert	6	6	1	5	1
NXP (INV_RD_BLK)	Transponder.HF.CustomerCommandOptions.NXP.InventoryReadBlock	Expert	6	6	1	6	1
NXP (LRC)	Transponder.HF.CustomerCommandOptions.NXP.LongRangeCommand	Expert	6	6	1	7	1
ST (STMicroelectronics) (Initiate:)	Transponder.HF.CustomerCommandOptions.STMicroelectronics.InitiateInventory	Expert	6	7	1	0	1
ST (STMicroelectronics) (FCmds)	Transponder.HF.CustomerCommandOptions.STMicroelectronics.FastCommands	Expert	6	7	1	1	2
TR-DATA1 (SNR)	OperatingMode.ScanMode.DataSelector.UID		11	0	1	0	1

TR-DATA1 (SNR)	OperatingMode.BufferedReadMode.DataSelector.UID	11	0	1	0	1
TR-DATA1 (SNR)	OperatingMode.NotificationMode.DataSelector.UID	11	0	1	0	1
TR-DATA1 (DB)	OperatingMode.ScanMode.DataSelector.Data	11	0	1	1	1
TR-DATA1 (DB)	OperatingMode.BufferedReadMode.DataSelector.Data	11	0	1	1	1
TR-DATA1 (DB)	OperatingMode.NotificationMode.DataSelector.Data	11	0	1	1	1
TR-DATA1 (EAS)	OperatingMode.ScanMode.DataSelector.EAS	11	0	1	2	1
TR-DATA1 (EAS)	OperatingMode.BufferedReadMode.DataSelector.EAS	11	0	1	2	1
TR-DATA1 (EAS)	OperatingMode.NotificationMode.DataSelector.EAS	11	0	1	2	1
TR-DATA1 (Byte Order DB)	OperatingMode.ScanMode.DataSource. ByteOrderOfData	11	0	1	3	1
TR-DATA1 (Byte Order DB)	OperatingMode.BufferedReadMode.DataSource. ByteOrderOfData	11	0	1	3	1
TR-DATA1 (Byte Order DB)	OperatingMode.NotificationMode.DataSource. ByteOrderOfData	11	0	1	3	1
TR-DATA1 (ANT)	OperatingMode.BufferedReadMode.DataSelector. AntennaNo	11	0	1	4	1
TR-DATA1 (ANT)	OperatingMode.NotificationMode.DataSelector. AntennaNo	11	0	1	4	1
TR-DATA1 (ANT)	OperatingMode.ScanMode.DataSelector.AntennaNo	11	0	1	4	1
TR-DATA1 (TIMER)	OperatingMode.ScanMode.DataSelector.Time	11	0	1	5	1
TR-DATA1 (TIMER)	OperatingMode.BufferedReadMode.DataSelector.Time	11	0	1	5	1
TR-DATA1 (TIMER)	OperatingMode.NotificationMode.DataSelector.Time	11	0	1	5	1
TR-DATA2 (IN)	OperatingMode.ScanMode.DataSelector.InputEvents	11	1	1	0	1
TR-DATA2 (IN)	OperatingMode.BufferedReadMode.DataSelector.InputEvents	11	1	1	0	1
TR-DATA2 (IN)	OperatingMode.BufferedReadMode.DataSelector.InputEvents	11	1	1	0	1
TR-DATA2 (RSSI)	OperatingMode.BufferedReadMode.DataSelector.RSSI	11	1	1	4	1
TR-DATA2 (RSSI)	OperatingMode.NotificationMode.DataSelector.RSSI	11	1	1	4	1
TR-DATA-3 (COM Prefix)	OperatingMode.ScanMode.DataFormat.BusAddressPrefix	11	2	1	0	1
TR-DATA-3 (READ_COMPLETE_BANK)	OperatingMode.BufferedReadMode.DataSelector.Mode. ReadCompleteBank	11	2	1	3	1
TR-DATA-3 (READ_COMPLETE_BANK)	OperatingMode.NotificationMode.DataSelector.Mode. ReadCompleteBank	11	2	1	3	1
TR-DATA-3 (READ_COMPLETE_BANK)	OperatingMode.ScanMode.DataSelector.Mode. ReadCompleteBank	11	2	1	3	1
BANK (BANK No)	OperatingMode.ScanMode.DataSource.BankNo	11	3	1	0	2

BANK (BANK No)	OperatingMode.BufferedReadMode.DataSource.BankNo	11	3	1	0	2
BANK (BANK No)	OperatingMode.NotificationMode.DataSource.BankNo	11	3	1	0	2
DB-ADR	OperatingMode.ScanMode.DataSource.FirstDataBlock	11	4	2		
DB-ADR	OperatingMode.BufferedReadMode.DataSource.FirstDataBlock	11	4	2		
DB-ADR	OperatingMode.NotificationMode.DataSource.FirstDataBlock	11	4	2		
DB-N	OperatingMode.ScanMode.DataSource.NoOfDataBlocks	11	8	2		
DB-N	OperatingMode.BufferedReadMode.DataSource.NoOfDataBlocks	11	8	2		
DB-N	OperatingMode.NotificationMode.DataSource.NoOfDataBlocks	11	8	2		
EAS-MODE (TAG-TYPE)	OperatingMode.BufferedReadMode.EAS.TagType	11	10	1	0	4
EAS-MODE (TAG-TYPE)	OperatingMode.ScanMode.EAS.TagType	11	10	1	0	4
EAS-MODE (ALARM-MODE)	OperatingMode.ScanMode.EAS.AlarmMode	11	10	1	6	1
EAS-MODE (ALARM-MODE)	OperatingMode.BufferedReadMode.EAS.AlarmMode	11	10	1	6	1
D-START	OperatingMode.ScanMode.DataSource.FirstByte	11	11	1		
D-LGT	OperatingMode.ScanMode.DataSource.NoOfBytes	11	12	2		
VALID-TIME	OperatingMode.ScanMode.Filter.TransponderValidTime	12	0	2		
VALID-TIME	OperatingMode.BufferedReadMode.Filter.TransponderValidTime	12	0	2		
VALID-TIME	OperatingMode.NotificationMode.Filter.TransponderValidTime	12	0	2		
TR_ID (TR-ID-SOURCE)	OperatingMode.Miscellaneous.TransponderIdentification.Source	Expert	12	2	1	
TR_ID (TR-ID-DB-ADR)	OperatingMode.Miscellaneous.TransponderIdentification.DataBlockNo	Expert	12	3	2	
TR_ID (TR-ID-DB-N)	OperatingMode.Miscellaneous.TransponderIdentification.NoOfDataBlocks	Expert	12	5	1	
DB-USE (DB-FORMAT)	OperatingMode.ScanMode.DataFormat.Format	13	0	1	0	4
DB-USE (SEP-CHAR)	OperatingMode.ScanMode.DataFormat.SeparationChar	13	1	1		
DB-USE (SEP-USR)	OperatingMode.ScanMode.DataFormat.UserSeparationChar	13	2	1		
DB-USE (END-CHAR)	OperatingMode.ScanMode.DataFormat.EndChar	13	3	1		
DB-USE (END-USR1)	OperatingMode.ScanMode.DataFormat.UserEndChar1	13	4	1		
DB-USE (END-USR2)	OperatingMode.ScanMode.DataFormat.UserEndChar2	13	5	1		
DB-USE (END-USR3)	OperatingMode.ScanMode.DataFormat.UserEndChar3	13	6	1		
DB-USE (HEADER-USR1)	OperatingMode.ScanMode.DataFormat.UserHeaderChar1	13	8	1		

Identification	System-Manual	ID ISC.LR1002					
DB-USE (HEADER-USR2)	OperatingMode.ScanMode.DataFormat.UserHeaderChar2	13	9	1			
DB-USE (HEADER-USR3)	OperatingMode.ScanMode.DataFormat.UserHeaderChar3	13	10	1			
DB-USE (HEADER-USR4)	OperatingMode.ScanMode.DataFormat. UserHeaderChar4	13	11	1			
LEN-USR (END-LEN)	OperatingMode.ScanMode.DataFormat. NoOfUserEndChars	13	13	1	0	4	
LEN-USR (HEADER-LEN)	OperatingMode.ScanMode.DataFormat. NoOfUserHeaderChars	13	13	1	4	4	
MUX-MODE (Multiplexing)	AirInterface.Multiplexer.Enable	15	0	1	0	1	
OUTPUT-CHANNELS	AirInterface.Multiplexer.HF.External. NoOfOutputChannels	Expert	15	1	1		
MUX-VALID-TIME-ANT_1	AirInterface.Multiplexer.HF.External.Antenna. No1.ActiveTime	15	2	2			
MUX-VALID-TIME-ANT_2	AirInterface.Multiplexer.HF.External.Antenna. No2.ActiveTime	15	4	2			
MUX-VALID-TIME-ANT_3	AirInterface.Multiplexer.HF.External.Antenna. No3.ActiveTime	15	6	2			
MUX-VALID-TIME-ANT_4	AirInterface.Multiplexer.HF.External.Antenna. No4.ActiveTime	15	8	2			
MUX-VALID-TIME-ANT_5	AirInterface.Multiplexer.HF.External.Antenna. No5.ActiveTime	15	10	2			
INPUT-CHANNELS	AirInterface.Multiplexer.HF.External.InputChannelMode	Expert	15	13	1		
PER-RESET-TIME	Transponder.PersistenceReset.Antenna.No1. PersistenceResetTime	Expert	16	2	2		
MUX-VALID-TIME-ANT_6	AirInterface.Multiplexer.HF.External.Antenna. No6.ActiveTime	17	0	2			
MUX-VALID-TIME-ANT_7	AirInterface.Multiplexer.HF.External.Antenna. No7.ActiveTime	17	2	2			
MUX-VALID-TIME-ANT_8	AirInterface.Multiplexer.HF.External.Antenna. No8.ActiveTime	17	4	2			
IGNORE-ERROR ISO15693	AirInterface.Miscellaneous.HF.ISO_15693_ICode1. ErrorHandling.WeakCollision	Expert	20	7	1	0	1
IGNORE-ERROR ISO18000-3M3	AirInterface.Miscellaneous.HF.ISO_18000_3M3. ErrorHandling.WeakCollision	Expert	20	7	1	1	1
S_MASK_LGT	Transponder.HF.ISO_18000_3M3.SelectionMask.No1. MaskLength	22	0	1			
S_MODE	Transponder.HF.ISO_18000_3M3.SelectionMask.No1. Bank	22	1	1	0	2	
S_START_POINTER	Transponder.HF.ISO_18000_3M3.SelectionMask.No1. FirstBit	22	2	2			
S_MASK_MSB	Transponder.HF.ISO_18000_3M3. SelectionMask.No1.Mask	22/23	4	24			
HOSTNAME (Length of host-name)	HostInterface.LAN.Hostname.Length	33	0	1			
HOSTNAME (hostname)	HostInterface.LAN.Hostname.Name	33/34	1	27			
IP_ADDRESS_LAN	HostInterface.LAN.IPv4IPAddress	40	0	4			
IP_PORT_NUMBER:_LAN	HostInterface.LAN.PortNumber	40	8	2			

SUBNET-MASK-LAN	HostInterface.LAN.IPv4.SubnetMask	41	0	4			
LAN Option (KEEP-ALIVE)	HostInterface.LAN.Keepalive.Enable	41	4	1	0	1	
DISABLE AUTONEGOTIATION	HostInterface.LAN.Autonegotiation.Disable	41	4	1	3	1	
ENABLE HOSTNAME	HostInterface.LAN.Hostname.Enable	41	4	1	4	1	
DUPLEX	HostInterface.LAN.Autonegotiation.Duplex	41	4	1	5	1	
SPEED	HostInterface.LAN.Autonegotiation.Speed	41	4	1	6	1	
LAN Option (DHCP)	HostInterface.LAN.IPv4.Enable_DHCP	41	4	1	7	1	
KEEP-CNT	HostInterface.LAN.Keepalive.RetransmissionCount	41	5	1			
GW-ADDRESS-LAN	HostInterface.LAN.IPv4.GatewayAddress	41	6	4			
KEEP-INTERVAL	HostInterface.LAN.Keepalive.IntervalTime	41	12	2			
MODE (ACK)	OperatingMode.NotificationMode.Transmission.Enable_Acknowledge	49	0	1	7	1	
KEEP-ALIVE (EN)	OperatingMode.NotificationMode.Transmission.KeepAlive.Enable	49	4	1	0	1	
KEEP-ALIVE-TIME	OperatingMode.NotificationMode.Transmission.KeepAlive.IntervalTime	49	5	2			
DEST-IP-ADDRESS	OperatingMode.NotificationMode.Transmission.Destination.IPv4.IPAddress	49	7	4			
DEST-IP-PORT-NUMBER	OperatingMode.NotificationMode.Transmission.Destination.PortNumber	49	11	2			
HOLD-Time	OperatingMode.NotificationMode.Transmission.Destination.ConnectionHoldTime	49	13	1			