

**IDS**

**UHF**

**Custom and  
Proprietary Commands**

## 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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## 2. Introduction

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This documents describes the IDS custom and proprietary commands for EPC G2 Transponder

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## 3. Host Commands for EPC G2 Transponder

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### 3.1. [0xB4] EPC G2 Custom and Proprietary Commands

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This command sends custom defined commands to the transponder.

Host → Reader

1	2	3	4	5...n-2	n-1,n
n	COM-ADR	[0xB4]	MFR	REQUEST-DATA	CRC16

Host ← Reader

1	2	3	4	5...n-2	n-1,n
n	COM-ADR	[0xB4]	STATUS <sup>1</sup>	RESPONSE-DATA	CRC16

#### MFR:

Manufacturer code

MFR	
0x36	IDS

#### REQUEST-DATA:

Manufacturer specific request

#### RESPONSE-DATA:

Manufacturer specific response

#### Note:

- *Data is only transferred if STATUS = {0x00, 0x83, 0x84, 0x94, 0x95}.*
- *This command isn't available if the Buffered Read Mode is switched on.*

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<sup>1</sup> see System Manual, Annex D: Index of Status Bytes

3.1.1. IDS Custom Commands

3.1.2. [0xA0] Set Password

The Set Password command writes a 32-bit password to the EEPROM. The password protection for the specified area is automatically enabled if the password is any other value except 0.

REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1Byte
0xA0	MODE	EPC_LNG	EPC	BANK



1 Byte	A_PW_LNT Bytes	1 Byte	4 Bytes
A_PW_LNG	A_PW	PW_LEVEL	PASSWORD



RESPONSE-DATA (STATUS = 0x95)

5
ISO-ERROR

MODE:

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

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

**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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**PW\_LEVEL:**

The password level bits are:

b1 b0	Password Level
0 1	System
1 0	Application
1 1	Measurement

Bits b7 – b2 are x

**PASSWORD:**

32 Bit password

### 3.1.3. [0xA1] Set Log Mode

The Set Log Mode command sets the logging form, storage rule, enables sensors that are used in the logging process and sets the logging interval (in 1 second steps).

**REQUEST-DATA**

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA1	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	3 Bytes
A_PW_LNG	A_PW	LOG_MODE



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

5
ISO-ERROR

**MODE:**

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

**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

**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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**LOG\_MODE:**

Bit:	23...21	20	19	18	17	16	15...1	0
Function	Logging Form	Storage Rule	Ext. 1 Sensor enable	Ext. 2 Sensor enable	Temp. Sensor enable	Battery Check enable	Log Interval	RFU

**Logging Form:**

Sets the Logging Form.

- Dense form with internal temperature sensor
- Dense form with external sensors
- Limits modes with internal sensor
- Limits mode with external sensor
- Interrupt mode

**Log Interval:**

Defines the Log interval in seconds (1s - 32767s)

### 3.1.4. [0xA2] Set Log Limits

The Set Log Limits command writes the 4 limits that are used in the logging process. All 4 limits are 10 bits long.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA2	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	5 Bytes	
A_PW_LNG	A_PW	LOG_LIMITS	



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

5
ISO-ERROR

#### MODE:

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

#### 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

#### 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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**LOG\_LIMITS:**

Bit:	39...30	29...20	19...10	9...0
Function	Extreme lower limit	Lower limit	Upper limit	Extreme upper limit

### 3.1.5. [0xA3] Get Measurement Setup

This command will read the current system of the chip.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA3	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes
A_PW_LNG	A_PW



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

5
ISO-ERROR

#### RESPONSE-DATA (STATUS = 0x00)

5...9	10	11...12	13...14	15...16
LOG_LIMITS	LOG_MODE	LOG_ INTERVAL	DELAY_TIME	APP_DATA

#### MODE:

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

#### 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

**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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

### 3.1.6. [0xA4] Set SFE Parameters

This command writes the Sensor Front End parameters to the memory.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA4	MODE	EPC_LNG	EPC	Bank

1 Byte	A_PW_LNT Bytes	2 Bytes
A_PW_LNG	A_PW	SFE_PARA

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

5
ISO-ERROR

#### MODE:

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

#### 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

#### 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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**SFE\_PARA:**

Bit:	15...11	10...6	5...4	3	2	1...0
Function	Rang	Seti	EXT1	EXT2	Autorange preset	Verify sensor ID

**Rang:**

resistor feedback ladder (for external sensor 2)

**Seti:**

current source value (for external sensor 1)

**EXT1:**

Defines the type of external sensor 1

b5 b4	Password Level
0 0	Linear resistive sensor
0 1	High impedance input (voltage follower), bridge
1 0	Capacitive sensor with DC
1 1	Capacitive sensor without DC

**EXT2:**

Defines the type of external sensor 2

b3	Password Level
0	Linear conductive sensor
1	High impedance input (voltage follower), bridge

**Autorange preset:**

1: Autorange function is turned off

0: Autorange function is turned on

**Verify sensor ID:**

Defines the sensor used in limit check

b1 b0	Password Level
0 0	first selected sensor
0 1	second selected sensor
1 0	third selected sensor
1 1	fourth selected sensor

### 3.1.7. [0xA5] Set Calibration Data

This command writes to the configuration block in the EEPROM memory.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA5	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	7 Bytes
A_PW_LNG	A_PW	CALIB_DATA



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

5
ISO-ERROR

#### MODE:

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

#### 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

#### 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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**CALIB\_DATA:**

56 Bit Calibration Data

Bit:	55-51	50-48	47-43	42-40	39	38-37	36-32	31-24
Function	AD1	COARS1	AD2	COARS2	GND_ SWITCH	SELP12	ADF	DF

Bit:	23	22-21	20-19	18-14	13-7	6-3	2-0
Function	SW_EXT _EN	SELP22	IRLEV	RING_ CALL	OFF_INT	REFTC	RFU

**AD1: (do not modify)**

AD lower voltage reference

Step: 0,625mV

min: -10mV

max: +10mV

**COARS1:**

AD lower voltage reference

Step: 50mV

min: 160mV

max: 510mV

**AD2: (do not modify)**

AD higher voltage reference

Step: 0,625mV

min: -10mV

max: +10mV

**COARS2:**

AD higher voltage reference

Step: 50mV

min: 260mV

max: 610mV

**GND\_SWITCH:**

Switches the lower AD voltage reference to ground

(Default = 1)

**SELP12:**

POR voltage level for 1,5V system

**ADF: (do not modify)**

Main reference voltage calibration

Step: 0,86mV

min: 622mV

max: 648mV

**DF:**

RTC oscillator calibration

Step: 1Hz (non linear)

min: 800Hz

max: 1165Hz

**SW\_EXT\_EN:**

Controlled battery supply for external sensor

1: the battery voltage is connected to the EXC pin

**SELP22:**

POR voltage level for 3V system

**IRLEV:**

Voltage interrupt level for external sensor

00: 8% of VBat

01: 25% of VBat

10: 35% of VBat

11: 43% of Vbat

**RING\_CALL: (do not modify)**

Main system clock oscillator calibration

Step: 31kHz

min: 1585kHz

max: 2590kHz

**OFF\_INT:**

Temperature conversion offset calibration: (do not modify)

Step: 1LSb

min: -32LSb

max: +32LSb

**REFTC: (do not modify)**

Bangap voltage temperature coefficient calibration

Step: 18ppm/°C

min: 450mV  
max: 472mV

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### 3.1.8. [0xA6] End Log

---

The End Log commands stops the logging procedure and turns off the real time clock.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA6	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes
A_PW_LNG	A_PW



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

5
ISO-ERROR

#### MODE:

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

#### 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

#### 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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

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### 3.1.9. [0xA7] Start Log

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The Start Log command starts the logging process.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA7	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	4 Bytes
A_PW_LNG	A_PW	START_TIME



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

5
ISO-ERROR

#### MODE:

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

#### 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

#### 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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**START\_TIME:**

Bit:	31...26	25...21	20...16	15...11	10...6	5...0
Function	Year	Month	Day	Hour	Minute	Second

### 3.1.10. [0xA8] Get Log State

The Get Log State command reads the status of the logging process.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA8	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes
A_PW_LNG	A_PW



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

5
ISO-ERROR

#### RESPONSE-DATA (STATUS = 0x00)

5...8	9...12	13...20	21..23	24
LIMIT_ COUNTER	SYSTEM_ STATUS	SL_BLOCK_ 01	CURRENT_ SHELF_LIFE	STATUS_ FLAG

#### MODE:

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

#### 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

**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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

### 3.1.11. [0xA9] Get Calibration Data

This command reads the calibration data filed and the SFE parameters field.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xA9	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes
A_PW_LNG	A_PW



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

5
ISO-ERROR

#### RESPONSE-DATA (STATUS = 0x00)

5...13
CALIB_DATA + SFE_PARA

#### MODE:

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

#### 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

**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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

### 3.1.12. [0xAA] Get Battery Level

The Get Battery Level command starts the AD conversion on the battery voltage and returns the voltage level with the battery type.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xAA	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	1 Byte
A_PW_LNG	A_PW	BATTERY_ RETRIGGER



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

5
ISO-ERROR

#### RESPONSE-DATA (STATUS = 0x00)

5...6
BATTERY_ INFO

#### MODE:

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

#### 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

**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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**BATTERY\_RETRIGGER:**

This field needs to have the value 0.

### 3.1.13. [0xAB] Set Shelf Life

The Set Shelf Life command programs parameters for the dynamic shelf life algorithm.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xAB	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	4 Bytes	4 Bytes
A_PW_LNG	A_PW	SL_BLOCK_0	SL_BLOCK_1



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

5
ISO-ERROR

#### MODE:

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

#### 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

#### 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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**SL\_BLOCK\_0:**

Bit:	31...24	23...16	15...8	7...0
Function	Tmax	Tmin	Tstd	Ea

**SL\_BLOCK\_1:**

Bit:	31...16	15...6	5...4	3	2	1...0
Function	Slinit	Tinit	Shelf life Sensor ID	Enable negative shelf life	Shelf life algorithm enable	RFU

**Shelf life Sensor ID:**

Defines the sensor used with the shelf life algorithm

b1 b0	Sensor Type
0 0	Temperature sensor
0 1	External sensor 1
1 0	External sensor 2
1 1	Battery voltage

### 3.1.14. [0xAC] Initialize

The Initialize command clears the System status field, the Limit counters and sets the Delay time field and the Application data field.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xAC	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	2 Bytes	2 Bytes
A_PW_LNG	A_PW	DELAY_TIME	APP_DATA



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

5
ISO-ERROR

#### MODE:

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

#### 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

#### 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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**DELAY\_TIME:**

Bit:	15..4	3..2	1	0
Function	Delay time	RFU	Delay mode	IRQ+ timer enable

**Delay mode:**

0: timer

1: external switch

**APP\_DATA:**

Bit:	15..7	6..5	4..3	2..0
Function	Number of words	Led indicator mode	RFU	Broken word pointer

### 3.1.15. [0xAD] Get Sensor Value

This command starts the AD conversion on the specified sensor and returns the value.

#### REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xAD	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	1 Byte
A_PW_LNG	A_PW	SENSOR_ VALUE



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

5
ISO-ERROR

#### RESPONSE-DATA (STATUS = 0x00)

5...6
SENSOR_ INFO

#### MODE:

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

#### 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

**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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**SENSOR\_VALUE:**

Bit:	7...2	1...0
Function	RFU	Sensor Type

**Sensor Type:**

- 0: Temperature sensor
- 1: External sensor 1
- 2: External sensor 2
- 3: Battery voltage

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**3.1.16. [0xAE] Open Area**


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The Open Area command opens the specified are (System, Application and Measurement) that is protected by a password.

## REQUEST-DATA

5	6	1 Byte	EPC_LNG Bytes	1 Byte
0xAE	MODE	EPC_LNG	EPC	Bank



1 Byte	A_PW_LNT Bytes	1 Byte
A_PW_LNG	A_PW	PW_LEVEL

## RESPONSE-DATA (STATUS = 0x95)

5
ISO-ERROR

## MODE:

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

## 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

## 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.

**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	0	0

**A\_FLAG:**

Indicates whether the reader tries to read a Gen 2 tag in Secured State. If A\_FLAG is set the protocol contains the access password.

**A\_PW\_LNG:**

Length of Access Password.

**A\_PW:**

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

**PW\_LEVEL:**

The password level bits are:

b1 b0	Password Level
0 1	System
1 0	Application
1 1	Measurement

Bits b7 – b2 are x

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**ANNEX**

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**ANNEX A**

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