Manual

SIH-2100

Manual and Specification

SIH-2100 0.4

scemtec

Transponder Technology GmbH

Project name		Version		
SIH-2100		**0.4**		
Build date	Author	Last change	Author	
16.07.08	**Jürgen Kalbitzer**	**21.01.08**	**Michael Radermacher**	
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0000.000.000				
Project manager	Development manager		Director	

1 Contents

2 General

As this technology is based on radio frequency, one must exercise the following operational and mounting instructions to achieve best operation:

- Metal affects radio signals. Normally the antenna has to be as far away as possible from any metal object and it's damping influence on the magnetic field. Only this leads to the best distribution of the magnetic field in the reading range. Very important as well is not to have "short circuits", in the vicinity of the antenna, damping the magnetic field. A "short circuit" is any metal near the antenna, building a "metallic ring", so that currents introduced by the RF-field can flow, destroying the energy needed for the tag to operate.
- Care must be exercised to reduce or eliminate unwanted signals (so called interference or noise) from external sources. The reading range may be reduced by following noise sources:
  - portable two way radio
  - cellular phones
  - switching power supplies
  - computer monitors
  - frequency converters (e.g. motor control systems)
- The read range is depending upon
  - performance of the reader
  - size of the antenna
  - size of the tag (the bigger the better)
  - orientation of the tag antenna plane to the reader antenna plane
  - quality of the tag
  - matching of reader antenna size and tag (-antenna) size
  - environmental, electrical noise
- If influence of metal can not be fully avoided a tuning of the antenna is required and will improve reading range

Important notice:

Scemtec reserves the right to make changes to the product described in this specification without notice.
This product is not developed to be used in safety-critical applications and therefore must not be used in such applications.

2.1 System Description

This manual describes the electronic-parts of the **SIH-2100 HHR** 13.56 MHz Reader System. This **H**and-**H**eld-**R**eader "**HHR**" electronics are designed as a multi-tag System to read and write information stored on transponders (tags). A USB 2.0 full speed compatible interface and a Blue-tooth interface-port is available as well.

2.2 Supported Transponder Types

The reader-electronic is compatible with standards ISO/IEC 15693- 2 and ISO18000-3 "A."

2.3 Reading / Writing TAGs

Several tags in the field can be read or written simultaneously (**anti-collision**). The duration of the reading/writing process depends on the number of tags in the field. Generally, there is no max. number of tags that are permitted in the field at the same time.
Other operating-modes see respective software manual.

3 Interface and Electrical Characteristics

3.1 Keypad

The reader is fitted with a keypad with the following buttons:
- Power
- Mode
- Read

3.2 Display

3 Line with 16 Characters and optional back light

Dimensions	
Width	50 mm
Hight	16 mm

3.3 USB

USB 2.0 full speed compatible interface via an USB-Type B connector :

USB 2.0 full speed compatible interface	
Pin 1	NC
Pin 2	D -
Pin 3	D +
Pin 4	GND

3.4 Bluetooth

Bluetooth	
Class	Bluetooth Class 2
	Bluetooth Specification 2.0 compatible
RF output	typ. 0dBm (Class 2)
Rx sensitivity	typ. –80dBm

Bluetooth

Antenna	Integrated chip antenna
Integrated profiles	SPP
Supported modes:	Slave mode

3.5 Power Supply

Power supply over Loading-connector	
Input-Voltage:U-load	12 Volt DC ± 5%
minimal supply-current @ U-load	500 mA @ 12 Volt DC

3.6 Rechargeable-batteries

The reader has a integrated battery-pack of 6 NiMH rechargeable-batteries in the size of Mignon AA of 2500mAh capacity.

3.7 Power Consumption

Power consumption @7.5V Supply Voltage	
Read/Write Tag ● without data transmission to host ● without LCD back light	Typ 540 mA
Data Transmission to Host ● with RFID function ● without LCD back light	Typ 550 mA
Full operation ● with Bluetooth ● with Back light	Typ 565 mA
Data Transmission to Host only	Typ 270 mA
IDLE Mode	Typ 105 mA
Offline	Typ < 1mA

3.8   HF Output

HF Output	
Operating frequency	13,56 MHz
Min. Rf Output Power	500 mW @ 50 Ohm (depends on the actual battery-capacity)
Modulation	20% / 100% ASK

3.9   Antenna

The reader fit out with an antenna of approx. 210 mm diameter.

3.10 Application Memory

For storing Application specific data 1MBit of non-volatile memory can be used.

4 Software Function

The standard firmware SIH-2xxx hand-held device is designed to give the user a simple possibility to scan tags as well as using all the extend functionality of this readers.

Therefore one of the 3 Modes can be used:

- Interface Mode: Using the scemtec's stx/etx protocol the reader will execute all supported stx/etx commands like "Get Inventory", "Read Tag", "Write Tag", "Print Message on the Display" etc. The data collected in collect mode can transferred to a host and cleared via stx/etc commands.
- Collect Mode: Read Tags and store the content in the internal memory.
- Read Mode: Read Tags and show the contents on the display.

The Default Mode can be set with STX/ETX Command. After pressing the Power Button, the HHR starts up in the Default Mode.
The Modes can also changed with the Mode Button.

4.1 Bluetooth

The HHR can be connected to a PC by evaluation the blue-tooth workspace and connecting to the service serial interface or comport.
Once the connection is established data can transferred from/to HHR.

4.2 USB

Connecting the device to a PC a virtual comport is available.
The Interface can be used to configure the HHR as well as transferring data from the HHR to the Host.

4.3 Collect Mode

In this mode it's possible to collect transponder data and store it in the non volatile memory of the reader.
Each reading will create a dataset.
The content of the dataset can be configured and the data can be transferred to the host via the USB-interface or Bluetooth.

4.3.1 Function

If the Default Mode is set to Collect Mode, the HHR starts up in Collect Mode after pressing the Power Button.
Now it's ready to collect data.
Pressing the Read Button starts the reading of Transponders. If no Transponders are read for "Read Off Time" the HHR switch off the reading unit. Pressing the Read Button again will start a new reading.
The HHR will switch off after the "Reader IDLE Time" if no Transponder are read or Button pressed.

4.3.2 Display content:

1....0: Tag Content
nnn: Number of Tags in field
mmmm: Number of stored Datasets

A: Battery state.
C: Collect Mode selected.

```
1234567890123456
nnn/mmmm
         AC
```

No.	[Time Stamp]	[Tag ID]	[Data 0]	...	[Data n]
1	6 byte				
2	6 byte				
...					
N	6 byte				

- No.
  Reflects the number of the memory position.
- Time Stamp
  This Field is optional.
  Time Stamp of reading time.
  Format: ssmmhhddMMyy
  s: seconds   1 byte
  m: minutes   1 byte
  h: hours   1 byte
  d: day   1 byte
  M: month   1 byte
  y: year   1 byte
- Tag ID
- Data

4.3.3 Settings for Collect Mode

These settings can be modified with the STX/ETX function 1055 (page 16).
1. Time Stamp: Yes /No
   If this option is set, a time stamp will be stored with each dataset
2. Store Tag data: Yes/No
3. Tag content: first byte
   First byte to be read and stored.
4. Tag content: number of bytes
   Number of bytes to be read.
   On a value of 0 no page will be read.

If the settings are changed, all data in the memory will be cleared.

4.4 Read Mode

In this mode it's possible to read transponder data. The contents will shown on display.

4.4.1 Function

If the Default Mode is set to Read Mode, the HHR starts up in Read Mode after pressing the Power Button.
Pressing the Read Button starts the reading of Transponders. The content of the first read Transponder is displayed.
After reading the HHR switch off the reading unit. Pressing the Read Button again will start a new reading.
The HHR will switch off after the "Reader IDLE Time" if no Transponder are read or Button pressed.

4.4.2 Display content:

1....0: Tag Content
nnnn: Number of Transponders in the field

```
1234567890123456
nnnn
         AR
```

A: Battery state.
R: Read Mode selected.

4.4.3 Settings for Read Mode:

These Settings can be modified with the STX/ETX function 1053 (page 15).
1. Displayed data: Tag-ID or Tag data.
2. Start and length of tag data.

4.5 Data Transmission Protocol

4.5.1 Supported Functions

Function number	Description	See document
1000	Reset Request	[STXETX]
1001	Request Version Number	[STXETX]
1002	Interface Test	[STXETX]
1003	Change Baud rate	[STXETX]
100A	Request Supported Transponder Types	[STXETX]
1010	Request System Setting	[STXETX]
1011	Edit System Setting	[STXETX]
102E	Get Local Device Name	[STXETX]
102F	Set Local Device Name	[STXETX]
200A	Get System Time (Read Realtime Clock)	[STXETX]
200B	Set System Time (Write Realtime Clock)	[STXETX]
200F	Activate Buzzer	
2010	Set LCD Text (Low Level)	[STXETX]
2012	Set LCD Text (High Level)	4.5.4
F003	Switch off Device	[STXETX]
	ISO 15693	
1C30	Request Setting	[STXETX]
1C31	Edit Setting	[STXETX]
4C10	Read Single Block	[STXETX]
4C12	Read Multiple Blocks	[STXETX]
4C16	Get System Information	[STXETX]
4C18	Get Security Status	[STXETX]
5C10	Write Single Block	[STXETX]
5C12	Write Multiple Blocks	[STXETX]
5C16	Write AFI	[STXETX]
5C17	Write DSFID	[STXETX]
6C10	Single Anticollision Round	[STXETX]
6C12	Select	[STXETX]
6C14	Lock Block	[STXETX]
6C16	Lock AFI	[STXETX]

Function number	Description	See document
6C17	Lock DSFID	[STXETX]
6C18	Stay Quiet	[STXETX]
6C1A	Reset To Ready	[STXETX]
6C1E	Custom Read Command	[STXETX]
6C1F	Custom Read Command	[STXETX]
6C20	Create Inventory	[STXETX]
6C21	Get Inventory	[STXETX]
4C20	Advanced Read Single Block	[STXETX]
4C2A	Looped Address Scan	[STXETX]
5C20	Advanced Write Single Block	[STXETX]
6C22	Get ID Range from Inventory	[STXETX]
6C23	Realtime Inventory	[STXETX]
6C24	Create/Get Inventory	[STXETX]
6C26	Advanced Lock Single Block	[STXETX]
	EPC/UID	
1A32	Request Setting	[STXETX]
1A33	Edit Setting	[STXETX]
1A34	Get ID Mask	[STXETX]
1A35	Set ID Mask	[STXETX]
5A80	Write Block	[STXETX]
6A80	Single Round	[STXETX]
6A84	Destroy	[STXETX]
5A90	Write Block	[STXETX]
6A90	Single Round	[STXETX]
6A94	Destroy	[STXETX]
4AA8	Looped Read	[STXETX]
5AA0	Write User Data	[STXETX]
5AA1	Write Destroy Code	[STXETX]
6AA0	Create Inventory	[STXETX]
6AA1	Get Inventory	[STXETX]
6AA2	Get ID Range from Inventory	[STXETX]
6AA3	Realtime Inventory	[STXETX]
6AA4	Create/Get Inventory	[STXETX]
4AB8	Looped Read	[STXETX]

Function number	Description	See document
5AB0	Write User Data	[STXETX]
5AB1	Write Destroy Code	[STXETX]
6AB0	Create Inventory	[STXETX]
6AB1	Get Inventory	[STXETX]
6AB2	Get ID Range from Inventory	[STXETX]
6AB3	Realtime Inventory	[STXETX]
6AB4	Create/Get Inventory	[STXETX]

4.5.2 SIH-2100 specific functions

Function number	Description	See page
1050	Request Handheld Settings	13
1051	Edit Handheld Settings	14
1052	Request Read Mode Configuration	14
1053	Edit Read Mode Configuration	15
1054	Request Collect Mode Configuration	15
1055	Edit Collect Mode Configuration	16
1058	Clear Buffer	16
1059	Get Entry Count	16
105A	Read Entry	17

1050: Request Handheld Settings

Using a key/value combination, this function allows access to several handheld mode settings. Numeric values are unsigned 16bit hex values; switch values are „0000" for „false" or „0001" for „true".

Host to RF System Request	
STX "1050" <kk>	
ETX {c}	
Request Parameters	
k	Key (see below).

RF System *to* Host Response
ACK
STX `"1050"` `<vvvv>`
ETX `{c}`
Response Data
v	Value.

Key	Alias	N/S	Def.	Description
`00`		n	`0001`	Default start-up mode. (1: Collect Mode, 2: Read Mode)
`01`		n	`000A`	Read timeout (seconds).
`02`		n	`00F0`	Power timeout (seconds).

1051: Edit Handheld Settings

This function is used to change system constants. See „Edit Handheld Settings" („1050")
for further information.

Host *to* RF System Request
STX `"1051"` `<kk>` `<vvvv>`
ETX `{c}`
Request Parameters
k	Key.
v	Value.

RF System *to* Host Response
ACK
STX `"1051"`
ETX `{c}`
Response Data
−	None.

1052: Request Read Mode Configuration

Requests the current Read mode configuration.

Host *to* RF System Request
STX `"1052"`
ETX `{c}`
Request Parameters
−	None.

RF System *to* Host Response
ACK
STX `"1052"` `<m>` `[ <bb> <ll> ]`
ETX `{c}`

Response Data	
m	Mode: 'i': Transponder-ID will be displayed. 'a': Transponder data will be displayed as null-terminated string. 'h': Transponder data will be displayed as hex values.
b	First Byte of transponder data.
l	Length of transponder data (in bytes).

1053: Edit Read Mode Configuration

This function is used to configure the Read mode.

Host *to* RF System Request	
STX "1053" <m> [<bb> <ll>] **ETX** {c}	
Request Parameters	
m	Mode: 'i': Transponder-ID will be displayed. 'a': Transponder data will be displayed as null-terminated string. 'h': Transponder data will be displayed as hex values.
b	First Byte of transponder data.
l	Length of transponder data (in bytes).

RF System *to* Host Response	
ACK **STX** "1053" **ETX** {c}	
Response Data	
–	None.

1054: Request Collect Mode Configuration

Requests the current Collect mode configuration.

Host *to* RF System Request	
STX "1054" **ETX** {c}	
Request Parameters	
–	None.

RF System *to* Host Response	
ACK **STX** "1054" <ff> [<bb> <ll>] **ETX** {c}	
Response Data	
f	Binary coded fields: 01: Store Transponder ID. 02: Store Timestamp.

	`04`: Store Transponder data.
b	First byte of transponder data
l	Length of transponder data (in bytes)

1055: Edit Collect Mode Configuration

This function is used to configure the Collect mode. This will clear the transponder buffer.

Host to RF System Request		
STX `"1055"` `<ff>` `[ <bb> <ll> ]`		
ETX `{c}`		
Request Parameters		
f	Binary coded fields:	
	`01`: Store Transponder ID.	
	`02`: Store Timestamp.	
	`04`: Store Transponder data.	
b	First byte of transponder data	
l	Length of transponder data (in bytes)	

RF System to Host Response
ACK
STX `"1055"`
ETX `{c}`
Response Data
−   None.

1058: Clear Buffer

This function clears the transponder buffer. All stored information will be erased.

Host to RF System Request
STX `"1058"`
ETX `{c}`
Request Parameters
−   None.

RF System to Host Response
ACK
STX `"1058"`
ETX `{c}`
Response Data
−   None.

1059: Get Entry Count

This function returns the number of stored entries in the transponder buffer.

Host to RF System Request
STX `"1059"`
ETX `{c}`
Request Parameters
–   None.

RF System to Host Response
ACK
STX `"1059"` `<cccc>` `<ssss>`
ETX `{c}`
Response Data

c	Current inventory size.
s	Maximum inventory size (depends on configuration).

105A: Read Entry

Host to RF System Request
STX `"105A"` `<iiii>`
ETX `{c}`
Request Parameters
–   None.

RF System to Host Response
ACK
STX `"105A"` `<ff>` `<iiiiiiiiiiiiiiii>` `[ <ss> <mm> <hh> <DD> <MM>` `<YY> ] [ <dd...> ]`
ETX `{c}`
Response Data

f	Binary coded fields:
	`01`: Store Transponder ID.
	`02`: Store Timestamp.
	`04`: Store Transponder data.
i	Tag ID in reverse byte order.
s	Timestamp (seconds).
m	Timestamp (minutes).
h	Timestamp (hours).
D	Timestamp (day of month).
M	Timestamp (month).
Y	Timestamp (year).
d	Tag Data

4.5.3 Buzzer signals

With this command the buzzer is going to be switched on for the defined time and then switched off for the defined time. The same process can be repeated automatically as defined in the command.

Each buzzer signal is defined as:
Buzzer on time [x100ms], buzzer off time [y100ms], number of repeats [z]
With x = 1...10, y = 1...10, z = 0...10
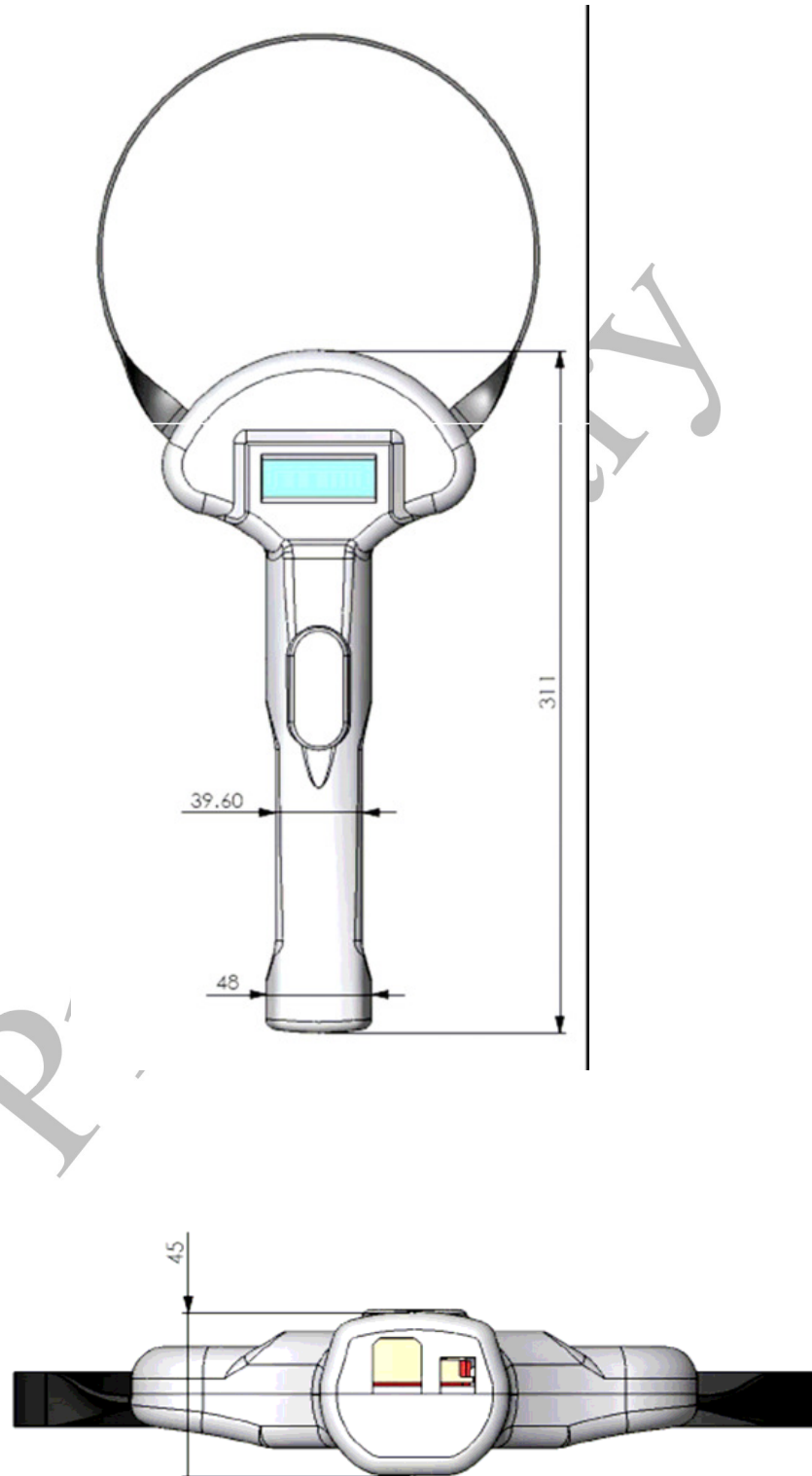
4.5.4 Display features

Any alphanumeric information with a maximum length of 255 characters can be sent to the display of the reader. By pressing the mode button the information has to be acknowledged by the user. Information with more characters than available on the display will be shifted slowly and in an auto repeat mode until user acknowledgement.
For setting the display text see function 2011 in the stx/etx protocol description.
If the text exceeds the display size it will be shifted.
Only Western characters are possible.

4.6 Error Messages

see also (1), scemtec STX/ETX Protocol Version 4.00 or above

5   Dimensions

6   Conformity

6.1   CE - Conformity

The reader has to be compliant to the following standards with the basic require-
ments of Directive

1999/5/EC

of the European Council.

The following standards were used as the basis for this evaluation:

EN 300 330 (Part Radiated Spurious Emission)

EN 301 489-1, -3

EN 60950

EN 50357, EN50364

6.2   FCC – Conformity: Information for USA

This device complies with Part 15 of the FCC Rules. Operation is subject to the
following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including
     Interference that may cause undesired operation.
Usually this is followed by the following FCC caution:
Any changes or modifications not expressly approved by the party
responsible for compliance could void the user's authority to operate this
equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled
environment.

6.3 RSS – Conformity: Information for CANADA

Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that
may cause undesired operation of the device.

Usually this is followed by the following RSS caution:

Any changes or modifications not expressly approved by the party

responsible for compliance could void the user's authority to operate this

equipment

6.4 Bluetooth: Declaration of Conformity for bluetooth-interface

C E

DECLARATION OF CONFORMITY
Directive 1999/5/EG (R&TTE)

The manufacturer: AMBER wireless GmbH
Albin-Köbis-Straße 18
51147 Köln
Tel. +49-2203-699-1950

declares on its sole responsibility, that the following product:

Type-designation: **BlueNiceCom 4 (AMB2300)**

Intended purpose: 2,4GHz-Bluetooth™ wireless data modem
Transfer of digital messages

satisfies all the technical regulations applicable to the product
within the scope of council directives 2006/95/EC, 2004/108/EC
and 99/5/EC if used for its intended purpose and that the following
norms, standards or documents have been applied:

EN 300 328 V1.7.1 (2006-10)
EN 301 489-1 V1.6.1 (2005-09)
EN 301 489-17 V1.2.1 (2002-08)
EN 50371 (2002)
EN 60950 (2006)

FCC 47 CFR Part 15C - Intentional Radiators ANSI C63.4-1992
FCC-ID R7TAMB2300
RSS210 Issue 6 (09-2005), RSS-GEN Issue 1 (09-2005)

Köln, 04.09.2008
place and date of issue

Manufacturer/Authorized representative
Ulf Knoblich

7 Datasheet

<div align="center">

Hand-Held-Reader SIH-2100
13,56 MHz Hand-Held

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RFID Multi Protocol Hand-Held Reader SIH-2100

- Multi standard hand-held reader
- Contactless reading of 13,56 MHz Transponder ISO-15693, ISO18000-3 "A."
- Bluetooth and USB Interface
- CE

Technical Data:

Dimensions:	(l x h) (453x45) mm
Display:	LCD display (3 x 16 characters), option: back light
Push-buttons:	3 keys
Transmit frequency:	13,56 MHz
Antenna:	diameter 215mm
Output Power	500mW @ 50Ohm
Transponders:	ISO 15693, ISO18000-3 "A."
Operation distances:	t.b.d
Interface:	Bluetooth Class2, USB
Power supply:	Integrated battery and charging unit External power supply
Operating temperature:	0-50°C

Order Information

SIH-2100   Order-No.:

8 Related Documents

[STXETX]
STX/ETX Protocol description
Scemtec's STX/ETX Protocol description is distributed with every Reader on the product CD

9 Document History

Version	Date	Changed by	Description
0.1	16.07.2008	Kalbitzer	Initial Version
0.2	19.11.2008	Pauls	STX/ETX-Functions added
0.3	15.01.2009	Kalbitzer	Data sheet corrected Capacity of batteries is now 2500mAh
0.4	21.01.2009	Radermacher	Conformity-Information added for USA/CA/BT