

# Manual

SIH-2100 v0.7



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## 1 Safety Informations

**As with all electronic systems, the system described hereafter may not be used for any applications critical for maintaining safety. This means, the products may not used in life support applications or any other life critical applications that could involve potential risk of death, personal injury or severe property or environmental damage.**

**The user/operator is solely responsible for any damages resulting from an improper or unintended utilization of the system.**

## 2 General

Scemtec Transponder Technology GmbH (STT) reserves the right to make changes or to discontinue its products or services at any time without notice.

STT takes no responsibility for customer applications, products, or performance relating to systems or applications incorporating with STT products.

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### 3 RFID Systems

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

- 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, absorbing the energy needed for the tag to operate.
- Care must be taken 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

## 4 System Description

This manual describes the 13,56 MHz Handheld Reader system „SIH-2100“, hereafter referred to as "Reader".

The 13,56 MHz Handheld Reader system „SIH-2100“ is designed as a multi-tag system for reading and writing information stored on transponders (TAGs).

The Reader has a Rf transmission output of maximal 500mW conducted at 50 Ohm load of the internal antenna.

Several tags in the field of the reader can be read or written virtually simultaneously via an anti-collision algorithm. 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.

By default the user can select one of three pre-configured operating modes, which are stored as configurations of the so called Smart Read Feature. Furthermore the user can design custom specific operating modes by adding own Smart Read configurations or modifying the stored standard configurations.

For Data transfer between the Reader and a host computer USB and Bluetooth interfaces are available. It is also possible to control the device completely from a host system via these interfaces using STX/ETX protocol commands.

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

## 5 Quick Start

You can use the Reader as Handheld or connected to a Host system (e.g. PC).

### 5.1 Quick Start as Handheld

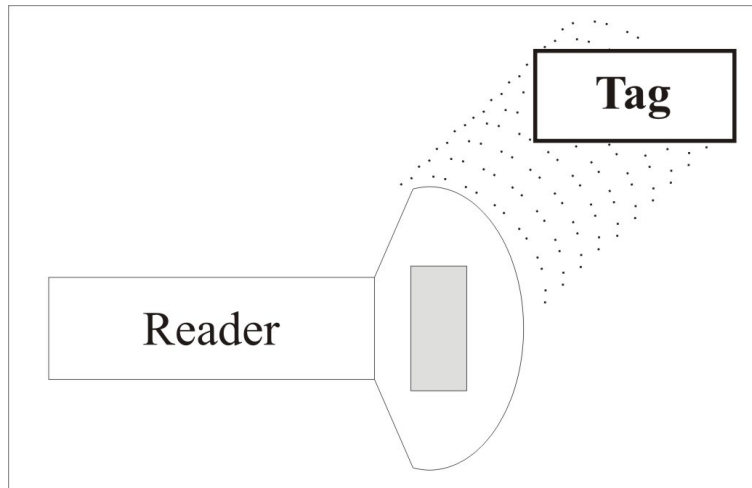


figure 1: Quick Start as Handheld

As Handheld you can start the Reader by pressing the “Power” Button. After this you can push the “Read” Button to read Tags or push the “Mode” Button to change between “Compare Mode”, “Collection Mode” and “Read Mode” (more about the difference mode are explain at the related item).

### 5.2 Quick Start Host – Mode

First Connect the Reader as shown below and press the power button to start up the device:

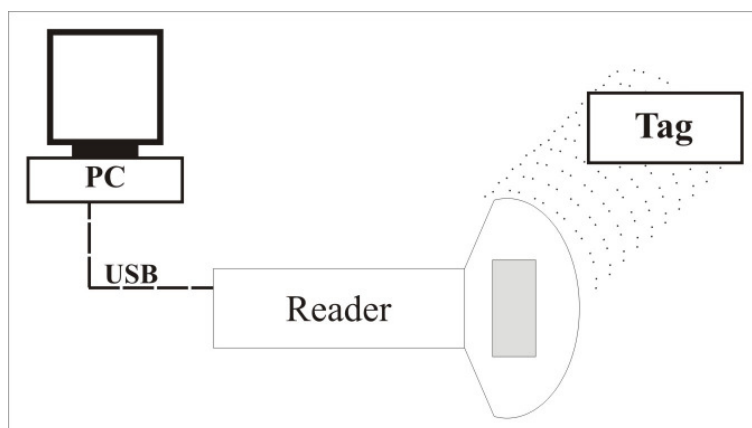


figure 2: Connection example for Host-Mode

Now you can use a Software like “Uni - Demo” to control the Reader. For more details please refer to “Quick Start Guide read”. This Guide is available for download on [www.stt-rfid.com](http://www.stt-rfid.com).

## 6 Hardware

### 6.1 Power Supply/Charging

The Reader is designed for a power supply connectible via an standard 2.1-mm barrel connector.



The reader may only be connected to a power supply with a maximum output current of 1 A, which is tested for safety according to appropriate standard (e.g. EN60950)

A suitable wall plug power supply is available as optional accessory. For best performance and safety, STT strongly recommends to use only this power supply.

#### 6.1.1 Rechargeable Battery

The reader has a integrated battery-pack of 6 NiMH rechargeable-batteries in the size of Mignon AA of 2500mAh capacity. Do only use certified Battery packs from STT.

The battery pack is recharged by connecting an appropriate power supply.

### 6.2 Interfaces

For communication with a host device (e.g. PC), the Reader provides two interfaces (Bluetooth, USB). The interfaces are handled by an separate, built-in interface unit with an ARM7 microprocessor. This interface-unit can also be configured to operate the Reader in stand-alone mode (Smart Read feature).

The interfaces are intended to be used only with connection cables not longer than 3m.

#### 6.2.1 USB

The Reader is equipped with a USB 2.0 full speed (12 Mbits/sec) port. The connection is optional and is made via a standard USB-B connector inside.

Supported profiles	CDC-ACM (virtual COM-Port), HID (Keyboard emulation)
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Appropriate drivers for Windows are available for download on [www.stt-rfid.com](http://www.stt-rfid.com).

#### 6.2.2 Bluetooth

The Reader is equipped with Bluetooth interface compatible with Bluetooth specification 2.0

Class	Bluetooth Class 2
RF output	typ. 0dBm (Class 2)



<b>Rx sensitivity</b>	typ. -80dBm
<b>Antenna</b>	Integrated chip antenna
<b>Integrated profiles</b>	SPP
<b>Supported modes:</b>	Slave mode

### 6.3 RF unit

The RF unit generates the HF-power, which is transmitted to the antenna to generate a magnetic field for powering up and transferring data to TAGs.

The RF unit is controlled by a separate microcontroller.

### 6.4 Antenna

The reader is equipped with an permanent attached antenna of approx. 210 mm diameter.

### 6.5 Display

The reader is equipped with a display (3 lines with 16 characters) with an integrated back light.

### 6.6 Keypad

The reader provides a keypad with the following buttons:

- Power
- Mode
- Read

### 6.7 Memory

The firmware of the incorporated microprocessors are stored in flash memories. They can be updated at any time via the USB interface.

A serial EEPROM to store configuration and user data is also available.

## **7 Operating Modes**

### **7.1 Standard – Stand alone Mode (SMART Read as Handheld)**

In standard mode the Reader is controlled by “Smart Read”. The reader works as Handheld and can be controlled by using the three Buttons.

The standard configuration of the Smart Read feature provides three modes: Read Mode, Compare Mode and Collect Mode.

The Reader will automatically shut down 10 minutes after the last action, if no Button is pressed in the meanwhile.

For further Information about Smart Read please refer to the correspondent Smart Read manual, which can be downloaded from [www.stt-rfid.com](http://www.stt-rfid.com).

### **7.2 Host Mode**

In host mode the Reader is completely controlled by a Host system connected to one of the available Interfaces via STX-ETX commands. For further information, please refer to the STX-ETX protocol description, which can be downloaded from [www.stt-rfid.com](http://www.stt-rfid.com).

## 8 Handheld Modes / Functions

The standard configurations for the SIH-2100 hand held reader is designed, to give the user a simple possibility to scan tags as well as using all the extended functionality of this readers.

Therefore one of the 3 pre-configured modes can be used:

- Read Mode (R): Read Tag and show the contents on the display.
- Collect Mode (C): Read Tags and store the content in the internal memory.
- Compare Mode (=): Read Tags and compare with the internal memory.

The Modes can also be changed by pressing the Mode Button.

The actual selected mode is shown in the last row of the display

There are a lot of opportunities to change the functions of the modes or to create new modes. All this is done by adding or modifying Smart Read configurations.

For further Information about Smart Read please refer to the correspondent Smart Read manual, which can be downloaded from [www.stt-rfid.com](http://www.stt-rfid.com).

### 8.1 Read Mode

In this mode it is possible to read the ID of a TAG.

Pressing the Read Button starts a reading cycle. The ID of the first read TAG is displayed in the first row. The total number of read TAGs is shown in the second row of the display. In addition a buzzer signal sounds for every read TAG . When all TAGs within the reading range are detected, the reader switch off the RF unit. Pressing the Read Button again will start a new reading cycle.

### 8.2 Collect Mode

In this mode it is possible to collect TAG IDs and store them in the so called TAG Buffer in a non volatile memory of the reader. Afterwards, the IDs stored in the TAG Buffer can be read out by a host system via the USB or Bluetooth interface.

Pressing the Read Button starts a reading cycle. The Reader then tries to read TAG IDs for at least 10 s or as long as TAGs are recognized. If a TAG is read, its ID is shown in the first row of the display and it is stored in the TAG buffer. When another TAG is read the new ID is displayed and it will also be stored in the TAG Buffer (e.g. always the last read ID is shown). In the second row of the display the total number of TAGs, which are actually detected in the reading range, as well as the total number of TAG IDs currently stored in the TAG buffer are shown. If no more TAGs are detected, the reader switches off the RF unit approx. 10 s after the last TAG is read. Pressing the Read Button again will start a new reading cycle.

### 8.3 Compare Mode

In Compare Mode the ID of a detected TAG will only be shown in the display, if the TAGs ID is listed in the TAG buffer.

Pressing the Read Button starts the reading cycle. The Reader then tries to read TAG IDs for at least 10 s or as long as TAGs are recognized. The device will only display TAG IDs, which are previously transferred to the TAG Buffer via USB or Bluetooth interface. In the second row of the display the total number of TAGs, which are actually detected in the reading range, as well as the total number of TAG IDs currently stored in the TAG buffer are shown. Additionally, a buzzer signal will occur every time a stored TAG ID is recognized. If a TAG ID is read, which is not stored in the TAG Buffer, its ID will not be displayed and there will be no buzzer sound. Only the counter value of actually read TAGs in the second row will be incremented as long as such a TAG is recognized. If no more TAGs are detected, the reader switches off the RF unit approx. 10 s after the last TAG is read. Pressing the Read Button again will start a new reading cycle.

## 9 Software

### 9.1 Software utilities

Various software utilities for Windows for the Reader are available for download on [www.stt-rfid.com](http://www.stt-rfid.com). Linux Versions are available on request.

Available Software utilities:

- UniDemo: Universal Demo Software for easily controlling the Reader with a Host system.
- STXTerm: Terminal program for controlling the Reader with a Host system by directly submitting STX-ETX commands. For submitting multiple STX-ETX commands a comprehensive Script utility is implemented
- Flasher: Utility for updating firmware on the incorporated Microprocessor
- SmartManager: Utility for configuration and using the Reader in Standalone mode (Smart Read).

### 9.2 Firmware

The firmware of the Reader contains all basic functions for reading and writing tags of different manufacturers (air protocol), numerous control and configuration functions, as well as different diagnosis routines.

Firmware can be updated by the user via USB Interface. Therefore the latest Firmware files are available for download on [www.stt-rfid.com](http://www.stt-rfid.com).

### 9.3 STX-ETX Interface Protocol

For communication with the Reader STT STX-ETX protocol is used.

The required STX/ETX protocol description can be downloaded from [www.stt-rfid.com](http://www.stt-rfid.com)

A list of supported STX-ETX commands can be read out from the Reader via the STX-ETX command '100E' or via STX-ETX script 'Get Fn List.stx' (which will be installed together STXTerm software ).

## 10 Electrical specification

Electrical specification (Ambient temperature: 25°C)						
Parameter	Test condition	Symbol	Min.	Typ.	Max.	Unit
Battery voltage	–	$U_{Bat}$		7,2		V
DC charging voltage	–	$U_{load}$	11,5	12	12,5	V
Current consumption	while charging	$I_{load}$	500	-	-	mA
Operating frequency	–	$F_{RF}$	-	13,56	-	MHz
RF power (internal)	–	$P_{internal}$	- 1db	500	+ 1db	mW
Operating (ambient) temperature range	–	$T_{amb}$	0	-	50	°C
Storage temperature range	–	$T_{stg}$	-20	-	70	°C

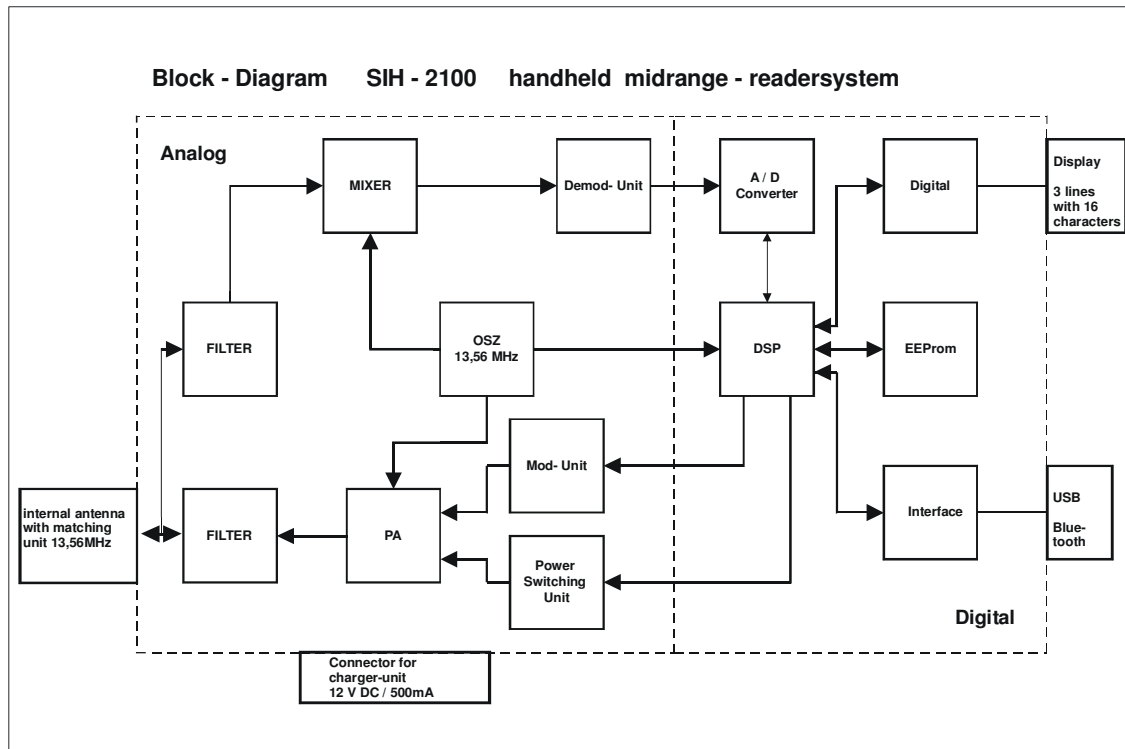
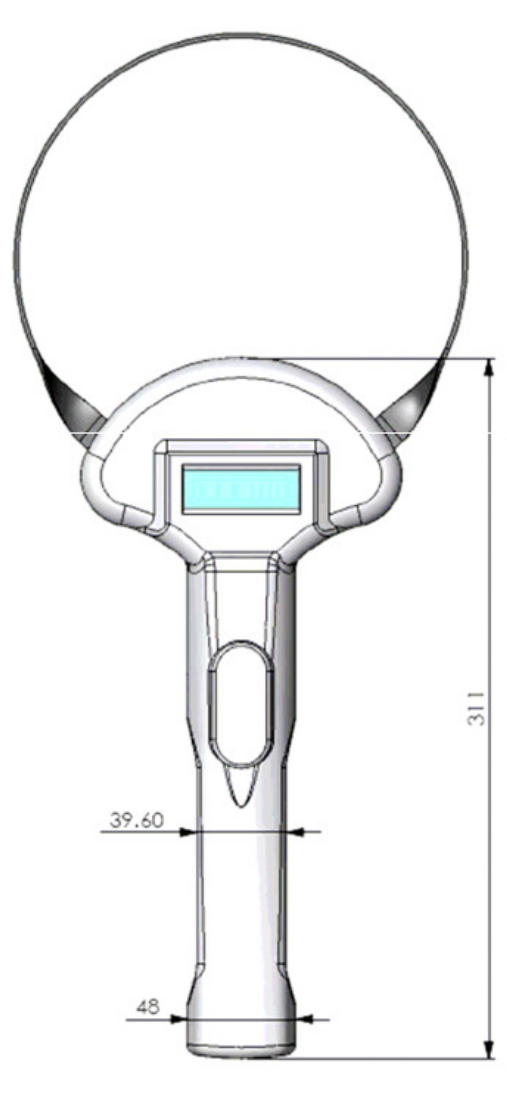


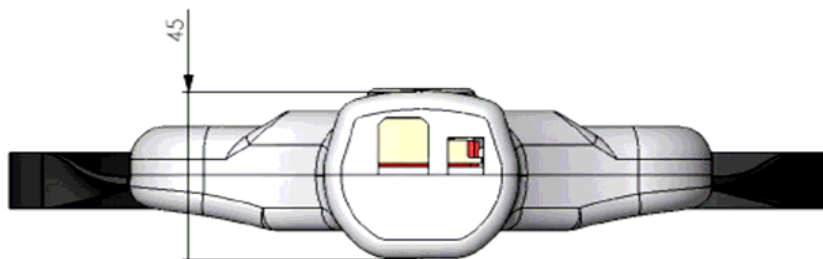
figure 3: Block Diagram

## 11 Mechanical Specification

### 11.1 Dimensions



*figure 4: Dimension 1*



*figure 5: Dimension 2*

## 12 Related Documents

- QuickStart Guide read
  - Short introduction for using the Reader with UniDemo
- Quick guide to STXETX-protocol
  - Short introduction of basic structure of STX-ETX protocol
- STX/ETX Protocol description
  - Detailed Description of command structure and available commands for controlling the Reader with a Host system
- SmartRead Manual
  - Description of functionality for stand alone operation
- SmartManager Manual
  - Description for using the SmartManager to configure a Reader for stand alone operation
- C# Demo with source code
  - Example code for integrating the Reader in your own application software

All documents are available for download on [www.stt-rfid.com](http://www.stt-rfid.com).



## 13 Contact STT

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If you have any questions about our products, please do not hesitate to call us. Our specialists are always available for you and will provide professional support to find a solution to your specific problem.

## 14 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
0.5	13.08.2009	Pauls	Compare mode added Functions 105C, 105D added Function 1050 updated
0.6	13.01.2012	Pauls	Memory content table removed
0.7	26.09.2014	A.Auras/B.Bröhl	Adapted to new template and design