



Manual

SIR-2720 (-MUX2/4)

Product name	Version	
SIR-2720 (-MUX2/4)	3.0	
Last Change	Author	Document revision
03.03.17	J. Kalbitzer	0.9

© scemtec Transponder Technology GmbH

Contents

1 General	4
1.1 RoHS and WEEE Directives.....	4
1.1.1 RoHS.....	4
1.1.2 WEEE (Waste Electrical and Electronic Equipment).....	4
1.2 RFID Systems.....	4
2 Safety Information.....	6
3 System Description.....	7
4 Quick Start.....	8
5 Hardware.....	9
5.1 Safeguarding, fuse-requirements.....	9
5.2 Reader Connections.....	9
5.2.1 Rear Panel.....	9
5.2.2 Front Panel.....	10
5.2.3 Power Supply	10
5.2.4 Ethernet.....	10
5.2.5 USB.....	10
5.2.6 RS 232 Interface.....	11
5.2.7 External Antenna.....	11
Reader Versions	12
Single Antenna Port (SIR-2720).....	12
Internal Multiplexer (SIR-2720-MUX2/4).....	12
5.2.8 Binary Inputs.....	12
5.2.9 Binary Outputs.....	12
5.2.10 IO connection example.....	13
5.3 Diagnosis LEDs.....	13
5.4 Memory.....	14
6 Operating Modes.....	15
6.1 Standard (Host) Mode.....	15
6.2 Stand alone Mode (SMART Read).....	15
7 Software.....	16
7.1 Software utilities.....	16
7.2 Firmware	16
7.3 STX-ETX Interface Protocol	16
8 Electrical specification.....	17
9 Mechanical Specification & Mounting.....	19
9.1 Dimensions.....	19
9.2 Mounting.....	19
10 FCC Conformity: Information for USA.....	20
11 Delivery Scope / Optional Equipment and Accessories.....	21
11.1 Delivery Scope	21
11.2 Optional Accessories.....	21
12 Related Documents.....	22
13 Contact sttID.....	23
14 Document History.....	24

1 General

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

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

sttID assumes no liability and is not responsible for infringement of patents and/or any other intellectual or industrial property rights of third parties, which may result from assistance provided by sttID.

Please note, that the user is responsible for conformity with regulation issues (e.g. radio approval), when using antennas not provided by sttID or using the system in countries, where the conformity with local regulations is not tested by sttID.

All other products mentioned in this document might be brands or brand names of the different suppliers.

1.1 RoHS and WEEE Directives

1.1.1 RoHS

sttID certifies that this product is compliant with the European Directive 2011/65/EU (RoHS II) for the restriction in Electrical and Electronic Equipment's (RoHS) of the use of the following hazardous substances:

- Cadmium
- Hexavalent Chromium
- Lead
- Polybrominated biphenyl flame retardants
- Polybrominated diphenyl ether flame retardants
- Mercury

This declaration is based on information provided by our suppliers and subcontractors.

1.1.2 WEEE (Waste Electrical and Electronic Equipment)

This product bears the selective sorting symbol for waste electrical and electronic equipment (WEEE).

This means that this product must be handled pursuant to European Directive 2011/65/EU in order to be recycled or dismantled to minimize its impact on the environment. For further information, please contact your local or regional authorities.

1.2 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

2 Safety Information

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 be 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.

3 System Description

This manual describes the 13,56 MHz Midrange Reader System „SIR-2720 (-MUX2/4)“, hereafter referred to as "Reader".

The 13,56 MHz Midrange Reader system „SIR-2720 (-MUX2/4)“ is designed as a multi-tag system for reading and writing information stored on transponders (TAGs). The operating frequency of 13,56 MHz permits a reading range up to 700 mm depending on antenna system and transponder type and size.

The Reader is available with single antenna port („SIR-2720“) or with integrated antenna multiplexer („SIR-2720-MUX2/4“).

Transfer of data between the Reader and a host computer is possible via Ethernet, USB and an asynchronous RS232 interface. Furthermore a configurable “stand-alone” operation via so called Smart Read Feature is possible.

The Reader is compatible with the ISO/IEC 15693-2 and ISO 18000/3 “A” standards.

4 Quick Start

First connect the Reader as shown below:

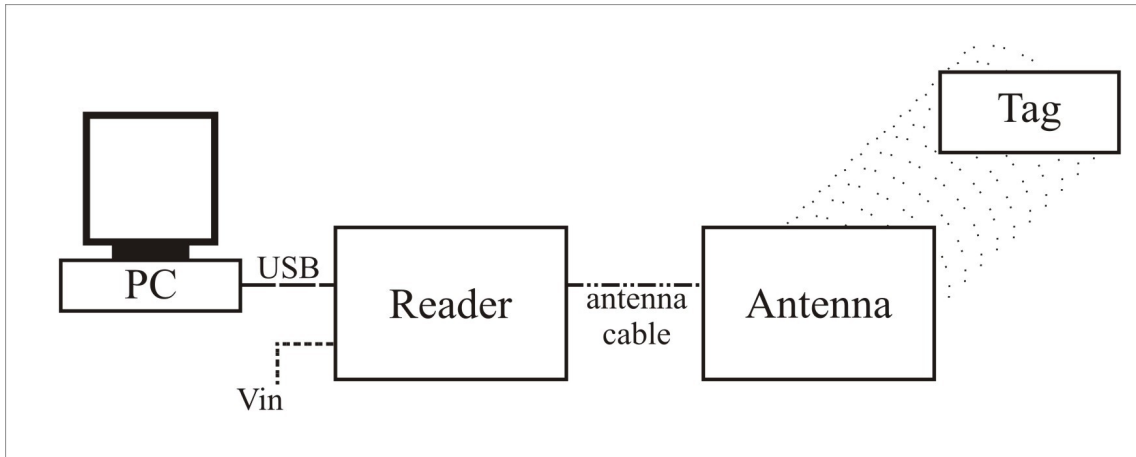


figure 1: Reader connection example

As example you can use the sttID antenna “SAT-A40-LR-O-13MHz” [400.4020].

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.

5 Hardware

5.1 Safeguarding, fuse-requirements

Regarding the safety requirements for the SIR-2720 a standard TR5-fuse T1A / 250V (slow blow fuse) is used to protect the complete electronics inside against short circuits or overcurrent .

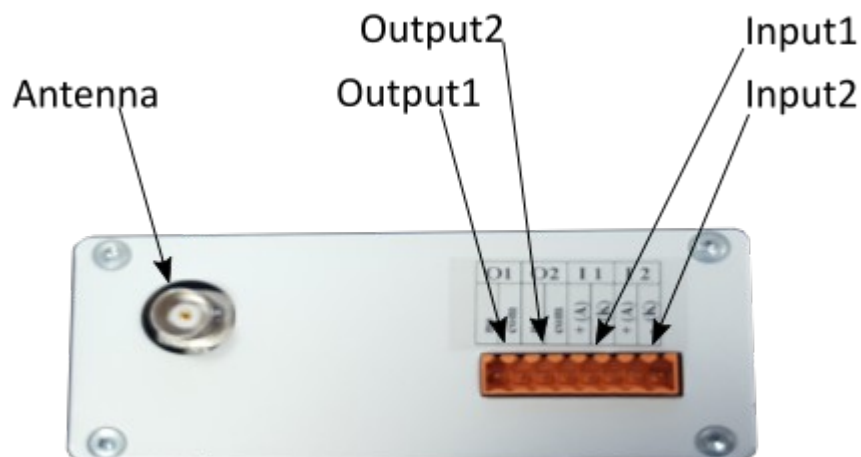
It is required that this fuse should only be changed by trained technician or skilled personnel !

5.2 Reader Connections

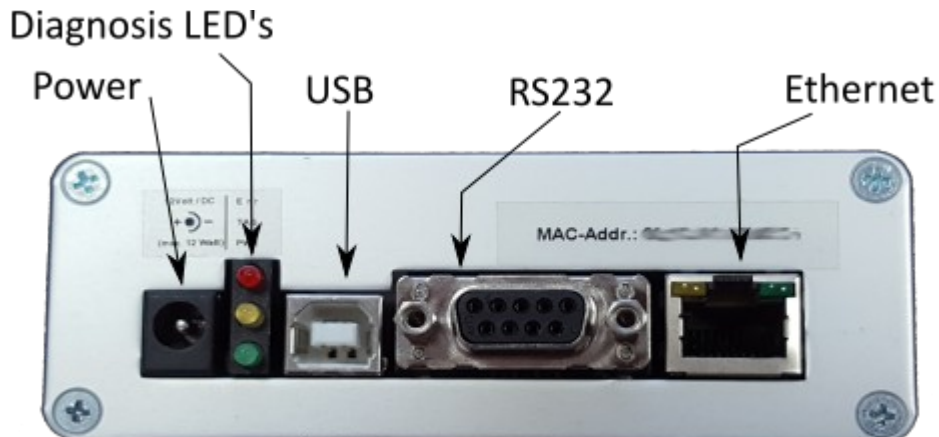
For communication with a host device (e.g. PC), the Reader provides three interfaces (RS232, USB, Ethernet). The interfaces are handled by an separate, built-in interface unit. This interface-unit can also be configured to operate the Reader in stand-alone mode (Smart Read feature).

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

5.2.1 Rear Panel



5.2.2 Front Panel



5.2.3 Power Supply

The Reader is designed for a power supply connectable 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.

5.2.4 Ethernet

The Reader is equipped with a 10/100 T-Ethernet interface.

By default the Reader gets his IP Address via DHCP. Nevertheless the Reader can also be configured with a static IP Address. Configuration can be done via a simple integrated web server, which can be reached by typing the actual IP Address in the address line of browser. After Login, configuration page for of Network settings is available.

Default Login Settings:

Username: admin

Password: scemtec

The actual assigned IP address of the reader can be determined using Scemtec Demo Software (e.g. Unidemo). Clicking the "Search" Button in Ethernet connection window of the STX/ETX connector will show the actual IP address as well as MAC address of all Scemtec devices available in the local network.

Network settings may also be configured by using STX-ETX commands. For details please refer to STX-ETX protocol description.

5.2.5 USB

The Reader is equipped with a USB 2.0 full speed (12 Mbits/sec) port. The connection is made

via a standard USB-B connector.

Supported profiles	CDC-ACM (virtual COM-Port), HID (Keyboard emulation)
--------------------	--

Appropriate drivers for Windows are available for download on www.stt-rfid.com.

5.2.6 RS 232 Interface

The Reader is equipped with a RS232 interface. The connection is made via a standard 9 pin D-Sub connector .

Terminal designation:	SUB-D Connector Pin	Terminal Function
TxD	2	Transmit Data
RxD	3	Receive Data
GND	5	Ground

The data transfer rate is adjustable via STX-ETX commands.

Configuration	8 Data Bits, 1 Stop Bit, no Parity, no flow control
Supported Data Rates [baud]	1200, 2400, 4800, 9600 (default), 19200, 38400 57600, 115200, 230400

In addition to the primary RS232 Interface described above, the Reader provides a secondary RS232 Interface, intended to be used in stand alone mode as interface for connecting auxiliary equipment (e.g. additional RFID reader, bar code scanner, ...). The connection to the secondary RS232 is also made via the 9 pin SUB D connector. Please contact STT for further Information regarding usage of the second RS232 in your application.

Terminal designation:	SUB-D Connector Pin	Terminal Function
TxD2	8	Transmit Data Secondary RS232
RxD2	7	Receive Data Secondary RS232
GND	5	Ground

Special Adapters cables for connecting external devices to the secondary RS232 are available from sttID.

5.2.7 External Antenna

The carrier frequency of 13.56 MHz is generated in the HF unit. The final stage generates an output of typical 1.4 watt on nominal $Z_F = 50 \text{ Ohm}$.

The Reader is only operational with external antenna(s).

Some key parameters of the Reader such as reading range for example depends on the used antenna, the used transponder type,size and quality, and the resulting magnetic coupling between the transponder resonant circuit and the transmission/receiver antenna.

The connected antenna(s) should be configured for the optimal resonance frequency of 13.56MHz with ohmic adjustment (nominal $Z_F = 50 \text{ Ohm}$) to ensure the best possible system performance. The resulting SWR value should be well below 2.

Antenna tuning should be checked at the final installation. Furthermore antenna detuning caused by heating of the antenna matching unit should also be observed.

When using antennas not provided by STT, please make sure that the antenna quality factor is in the range between 20 and 50 and the antenna is optimally tuned.

Reader Versions

Single Antenna Port (SIR-2720)

The standard reader version has a single antenna Port equipped with a BNC antenna connector.

Internal Multiplexer (SIR-2720-MUX2/4)

In this version up to 2/4 antennas (Depending on the stage of expansion of the integrated MUX) can be connected to the Reader. The user can select each connected antennas with software commands.

The MUX2 version is equipped with two BNC connectors whereas the MUX4 Version is equipped with SMA antenna connectors. For usage with BNC or N connectors, SMA-BNC or SMA-N Adapters are available from STT

5.2.8 Binary Inputs

Two binary inputs are available for customer-specific tasks. Both inputs are accessible with indirect-connected opto-couplers and screw terminals (see terminal description below).

The state of both binary inputs must be imported unambiguously via software command.

In stand alone mode (SMART Read) the behavior of the Inputs can be configured freely (e.g. trigger Read event).

Input designation:	Terminal designation:	Internal opto-coupler assignment:
Input 1	I1 + (A)	Anode of the opto-coupler input 1
	I1 – (K)	Cathode of the opto-coupler input 1
Input 2	I2 + (A)	Anode of the opto-coupler input 2
	I2 – (K)	Cathode of the opto-coupler input 2

All screw terminals are clearly marked with their specific designation at the terminal. The screw terminals accepts wires of maximum conductor cross-section of 2.5mm².

The electrical data can be found in the table 'electrical specification'.

5.2.9 Binary Outputs

Two binary outputs in the form of potential-free contacts are available for customer-specific tasks. Both outputs are accessible with indirect-connected relays and screw terminals (see terminal description below). They are freely configurable via software commands.

In stand alone mode (SMART Read) the behavior of the outputs can be configured freely (e.g. Change state when TAG is read).

Terminal assignment:

Input designation:	Terminal designation:	Internal assignment:

Output 1 (normally open)	O1.1 (no)	Contact 1 of the potential-free Output-port 1
	O1.2 (com)	Contact 2 of the potential-free Output-port 1
Output 2 (normally close)	O2.1 (nc)	Contact 1 of the potential-free Output-port 2
	O2.2 (com)	Contact 2 of the potential-free Output-port 2

All screw terminals are clearly marked with their specific designation at the terminal. The screw terminals accepts wires of maximum conductor cross-section of 2.5mm².

The electrical data can be found in the table 'electrical specification'.

5.2.10 IO connection example

The following schematic is an example how to connect the Inputs and Outputs.

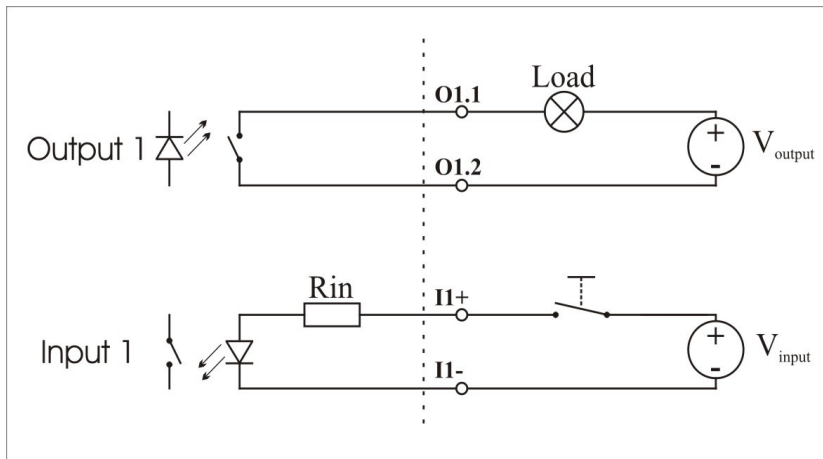


figure 2: IO connection example

5.3 Diagnosis LEDs

Three external LEDs provide users with a diagnosis of the most important monitoring functions "Power", "Tag Detect" and "EAS".

Three LEDs to indicate important operating states			
Led	Color	Designation	Description
1	green	Power	The voltage supply for the CPU is ensured
2	yellow	Tag Detect	A read or write process for the transponders has concluded successfully
3	red	EAS	EAS*Alarm is deployed

*EAS is an abbreviation of Electronic Article Surveillance

5.4 Memory

The firmware of the incorporated microprocessor is stored in a flash memory. It can be updated at any time via the USB or RS232 interface.

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

6 Operating Modes

6.1 Standard (Host) Mode

In standard 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.

6.2 Stand alone Mode (SMART Read)

In addition to controlling the Reader with a host system via one of the interfaces, it can also be configured for stand alone operation. Therefore the "Smart Read" feature is implemented.

For further Information about Smart Read please refer to the correspondent Smart Read manual, which can be downloaded from www.stt-rfid.com.

7 Software

7.1 Software utilities

Various software utilities for Windows for the Reader are available for download on 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).

7.2 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 or RS232 Interface. Therefore the latest Firmware files are available for download on www.stt-rfid.com.

7.3 STX-ETX Interface Protocol

For communication with the Reader sttID's STX-ETX protocol is used.

The required STX/ETX protocol description can be downloaded from 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).

8 Electrical specification

Electrical specification (Ambient temperature: 25°C)						
Parameter	Test condition	Symbol	Min.	Typ.	Max.	Unit
DC input voltage	-	Vin	11	12	13	Volt
Current consumption	Carrier on VIN = 12 V	lin	-	700	850	mA
Current consumption	Idle - mode VIN = 12 V	lin	-	120	150	mA
Operating frequency	-	fRF	-	13,56	-	MHz
RF power (internal)	-	Pinternal	- 1db	1500	+ 1db	mW
Input voltage binary inputs I1/I2	-	Vinput	6,5	12	30	Volt DC
Input current binary inputs I1/I2	V input = 12 V/DC	Iinput	-	11	-	mA
Series resistors binary inputs I1/I2	-	Rlin	950	1000	1050	Ohm
Output switching voltage binary outputs O1/O2	-	Voutput (AC/DC)	-	-	40	Volt AC/DC
Output switching current binary outputs O1/O2	V output =12 V/DC	Iout	-	-	100	mA
Output power dissipation binary outputs O1/O2	V output =12 V/DC	Pout	-	-	800	mW
On resistance binary outputs O1/O2	-	Ron	-	25	35	Ohm
Operating (ambient) temperature range	-	Tamb	-10	-	60	°C
Storage temperature range	-	Tstg	-20	-	70	°C

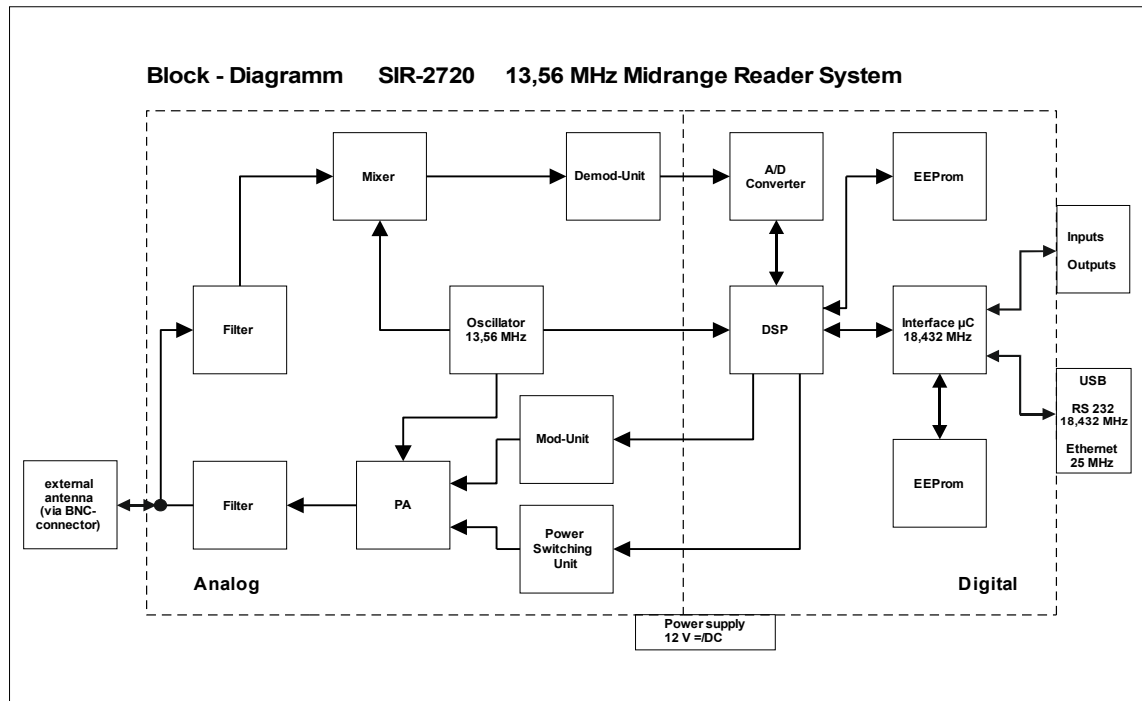


figure 3: Block diagram

9 Mechanical Specification & Mounting

9.1 Dimensions

An aluminum housing protection type IP 20 (in acc. with DIN EN 60529) is used. This housing is equipped with two lateral covers attached with screws. For mounting the Reader the two included mounting brackets can be attached.

Housing dimensions	
Length	185 mm
Width	130 mm (without brackets)
High	44 mm
Color	Natural matte aluminum
Weight	Approx. 500 gramm

9.2 Mounting

When mounting the Reader on a wall or ceiling, only the provided screw-holes has to be used. Fixing to the wall/ceiling has to be done with appropriate installation material (not included) using all of the foreseen mounting points.

10 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.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Professional Installation: To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

Attention: FCC conformity is only valid for the standard version (SIR-2720 with single antenna port)

11 Delivery Scope / Optional Equipment and Accessories

11.1 Delivery Scope

- SIL-2720 Reader system
- 2 mounting brackets

11.2 Optional Accessories

For the SIR-2720 Reader system a suitable wall plug 12 volt =DC / max. 1000mA power supply as optional accessory is available and contactable to the SIR-2720 over a 2.1-mm standard barrel connector.

For connecting sttID standard antennas (normally equipped with BNC Connectors) to the MUX4 versions of the Reader, suitable SMA-BNC adapter cables are available.

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.

13 Contact sttID

scemtec Transponder Technology GmbH
Wehrstr. 1
D-51645 Gummersbach

Phone: + 49 (0) 22 61 / 80407 - 0
Fax: + 49 (0) 22 61 / 80407 - 55

e-Mail: info@stt-rfid.com
Website: www.stt-rfid.com

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	26.11.10	M.Radermacher	– Initial Version
0.2	1.12.10	M.Radermacher	– added safeguarding/fuse-requirements (5.2)
0.3	17.01.11	M.Radermacher	– added new block diagram, new safeguarding-information and new FCC conformity-information for Class A digital device
0.4	31.01.11	M.Radermacher	– added professional installation-information under chapter 10.2 FCC conformity
0.5	19.8.14	A.Auras	– Adapted to new template and design
0.6	05.10.15	B. Bröhl	– Added information about second RS232 Interface – MUX 4 description added – general corrections and typo edit
0.7	11.11.15	J.Kalbitzer	– Minor corrections
0.8	16.06.2016	B. Bröhl	– Block diagram updated
0.9	10.02.17	J.Kalbitzer	– Minor corrections – added RoHS and WEEE Directives