SCIBA2
User & Installation Manual

Version 1.00

On Track Innovations Ltd.
(O T I)

Revision History

Version	Description	Date	Author
1.00	Preliminary data	15/03/04	Avner
1.00	Minor corrections	18/03/04	Hemy
1.00	Minor corrections	21/03/04	Hemy
1.00	Minor corrections	11/04/04	Hemy
1.00	Minor corrections	13/04/04	Avner

NOTICE

This manual contains intellectual property, including but not limited, to trade secrets and know-how, operation procedures and production procedures that belong solely to OTI. Disclosure and/or use and/or reproduction of any part of the above are strictly forbidden, except under a written license from OTI.

FCC Compliance

> **OTI SCIBA2**   **FCC ID: JNX-OTI-SCIBA2**
> **Manufacturer: On Track Innovations Ltd.**
> **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.**

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

*   **Reorient or relocate the receiving antenna.**
*   **Increase the separation between the equipment and receiver.**
*   **Connect the equipment into an outlet on a circuit different from that to which this receiver is connected.**
*   **Consult the dealer or an experienced radio/TV technician for help**

Warning!
Changes or modifications in this equipment, not expressly approved by the party responsible for compliance (On Track Innovations Ltd,) could void the user's authority to operate the equipment.

Warning!
This product was tested with special accessories (shielded cables and/or special connectors or other), which must be used with the unit to insure compliance.

FCC Declaration of Conformity

We, the undersigned,

OTI America

Address: Suite 201, 1601 S. De Anza Blvd., Cupertino, CA 95014

Telephone number: 408-252-0333

Fax number: 408-252-8414

are the Responsible Party for this Declaration, certify and declare under our sole responsibility that the following equipment:

Brand	Type	Product description
OTI	SCIBA2	Contactless card reader

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.

Table of Contents

1 Introduction

The SCIBA2 reader is an inexpensive, compact radio frequency communications electronic interface unit. Bi-directional RF communication to contactless smart cards, serial communication to application controller and rich set of macro commands make it the keystone in contactless smart card systems.

The SCIBA2 can be integrated into existing systems. Using USB interface between reader and Host, the SCIBA2 allows bi-directional**,** communication between the Host and passive, contactless smart card. Optional RS232 or RS485 Host communication link is also available.

The SCIBA2 reader serves as a smart interface unit between the application controller and:

1. ISO 14443 Type B Contactless smart cards.

2. ISO 14443 Type A Contactless smart cards.

3. Mifare Contactless smart cards

4. Optional ICODE contactless smart cards

5. Up to four Secured Applications Modules (SAM)

At the Host's command, the SCIBA2 generates and modulates a 13.56 MHz carrier signal for the transmission of power, commands and data to an in-range smart card. The SCIBA2 detects the, signal encoded by the card automatically choosing the modulation technique required by the card. Read and write operations have equal data rates and range.

By utilizing a matched antenna, the SCIBA2 communication technology is unique in allowing for a **remote antenna** configuration (up to 33 meters).

Secured Transactions
Secured Purse to Purse transactions can be achieved between card and "on board" SAM Secured Applications Module.

Digital IO
The SCIBA2 optionally supports up to 8 Digital Inputs & 16 Digital Outputs via onboard connectors.

Operating Voltage
The SCIBA2 can operate from 7.0 to 15VDC

Antennas

The SCIBA-2 is supplied with a standard antennas with which the system was EMC certified.

WARNING: It is the installer responsibility to ensure that when using the antenna kits in the United States (or where FCC rules apply), only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden in accordance with FCC rules CFR47 part 15.204.

2 Technical Specifications

- Power input from 7.0 to 15VDC.
- Operating temperature range -20° to 70°C (-4° to 158°F).
- Up to two antenna RF channels.
- 13.56 MHz transmission frequency conforming to ISO 14443 standard.
- ISO 14443 Type A/B and Mifare cards support.
- Bi-directional radio frequency interface between Host and Contactless Smart Cards
- USB (or optional RS232/485) Communications interface to Host computer.
- Flexible, software configurable microcomputer-based design.
- Integrated, sophisticated Smart Card Operating System on board.
- High security encryption system (DES/RSA) in the board's Operating System (with SAM option on-board).
- Signal penetrates virtually any non-conductive material - no contact or line-of-sight required.
- Unique passive "electronics free" remote antenna for added security and easy physical integration.
- Up to two serial COM ports.
- Up to four EMV2000 compliant "on-board" SAMs.
- Indicator Leds for Power ON, good USB link and five programmable leds. (Two of these leds are usually used as transmit indicators for the two RF channels)
- Up to 8 optional Digital Inputs & 16 Digital Outputs
- Compliance with FCC Section 15 and I-ETS 300 330 emission limit requirements.
- In system programming of reader firmware to 128KB flash memory via standard Host communication link.
- Optional open collector output (100mA max) for operation of external relay or buzzer.
- Embedded watchdog timer and full reset on brownout.
- There are no connections with exposed plant leads. All lines are indoor only.
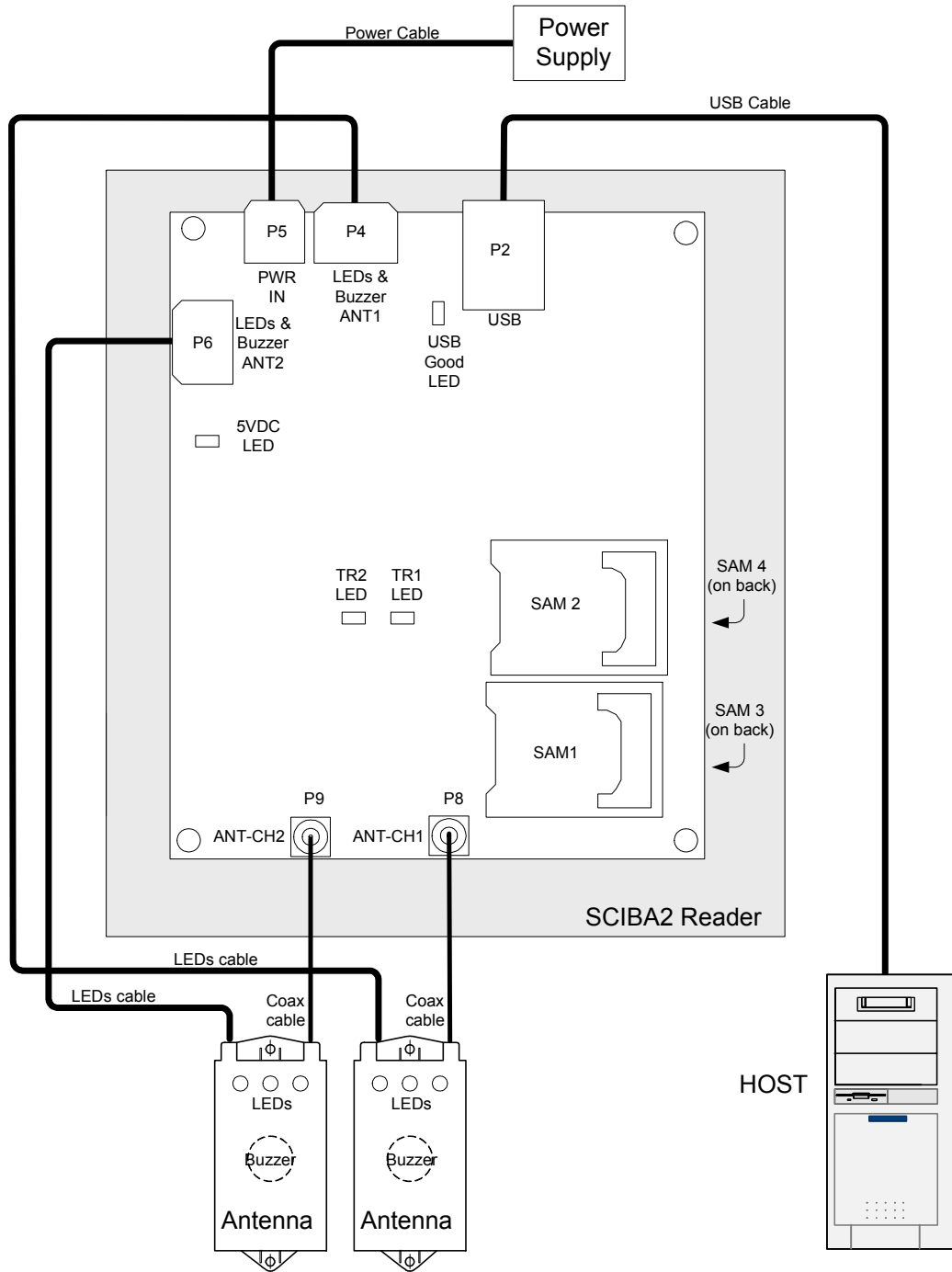
3 System Configuration

Figure 3-1: SCIBA2 System Configuration

3.1 SCIBA2 Reader

Enclosure   ABS Plastic

Protection   IP20

3.1.1   Standard Connectors

Antenna # 1 RF Connector P8

MCX type coax connector

Antenna #1 External LEDs connector P4

6-pin Molex connector pin-to-pin compatible with LEDs connector on
Antenna
1.   Pin 1 – LED1
2.   Pin 2 – LED2
3.   Pin 3 – LED3
4.   Pin 4 – Buzzer
5.   Pin 5 – GND
6.   Pin 6 – +5V

Antenna # 2 RF Connector P9

MCX type coax connector

Antenna #2 External LEDs connector P6

6-pin Molex connector pin-to-pin compatible with LEDs connector on
Antenna
1.   Pin 1 – LED1
2.   Pin 2 – LED2
3.   Pin 3 – LED3
4.   Pin 4 – Buzzer
5.   Pin 5 – GND
6.   Pin 6 – +5V

Power IN connector P5

4-pin reader power supply input connector
1.   Pin 1 – Vin -
2.   Pin 2 – Vin + (7.0 – 15VDC)
3.   Pin 3 – GND
4.   Pin 4 – Regulated 5VDC

USB connector P2

USB Device (B) connector
1.   – VCC
2.   – CD-
3.   – CD+
4.   – GND

3.1.2 Optional Connectors

External Buzzer connector P3
> 2-pin Molex Microfit connector
> 1. Pin 1 – GND/+5V
> 2. Pin 2 – Open collector output

COM1 RS232 connector P1
> RJ45 connector.
> 1. Pin 4 – GND
> 2. Pin 5 – RXD
> 3. Pin 6 – TXD

External I/O connector P7 (Optional)
> 10-pin Molex connector
> 1. Pin 1 –GND
> 2. Pin 2 – +5V
> 3. Pin 3 – IN/OUT
> 4. Pin 4 – IN/OUT
> 5. Pin 5 – IN/OUT
> 6. Pin 6 – IN/OUT
> 7. Pin 7 – IN
> 8. Pin 8 – IN
> 9. Pin 9 – IN
> 10. Pin 10 – IN

Antenna Channel 1 connector P10 (Optional)
> 3-pin Molex connector

Antenna Channel 2 connector P11 (Optional)
> 3-pin Molex connector

CH2 RS232 connector P12 (Optional)
> 3-pin Molex connector
> 1. Pin 1 – GND
> 2. Pin 2 – RXD
> 3. Pin 3 – TXD

COM1 RS485 terminal TB1 (Optional)
> Terminal block.
> 1. – D
> 2. – D*
> 3. – GND

3.1.3 LEDs

LED1
> Green - USB link good

LED2
> Red – user programmable

LED3
> Red – user programmable

LED4
> Red – user programmable

LED5
> Red – 5V power

LED6
> Green – channel 1 Antenna ON, optionally user programmable

LED7
> Green – channel 2 Antenna ON, optionally user programmable

3.1.4 Jumpers

J1
> Emergency jumper used to reset flash.

3.1.5 SAMs

SAM 1
> SIM Connector on PCB front

SAM 2 (Optional)
> SIM Connector on PCB front

SAM 3 (Optional)
> SIM Connector on PCB back
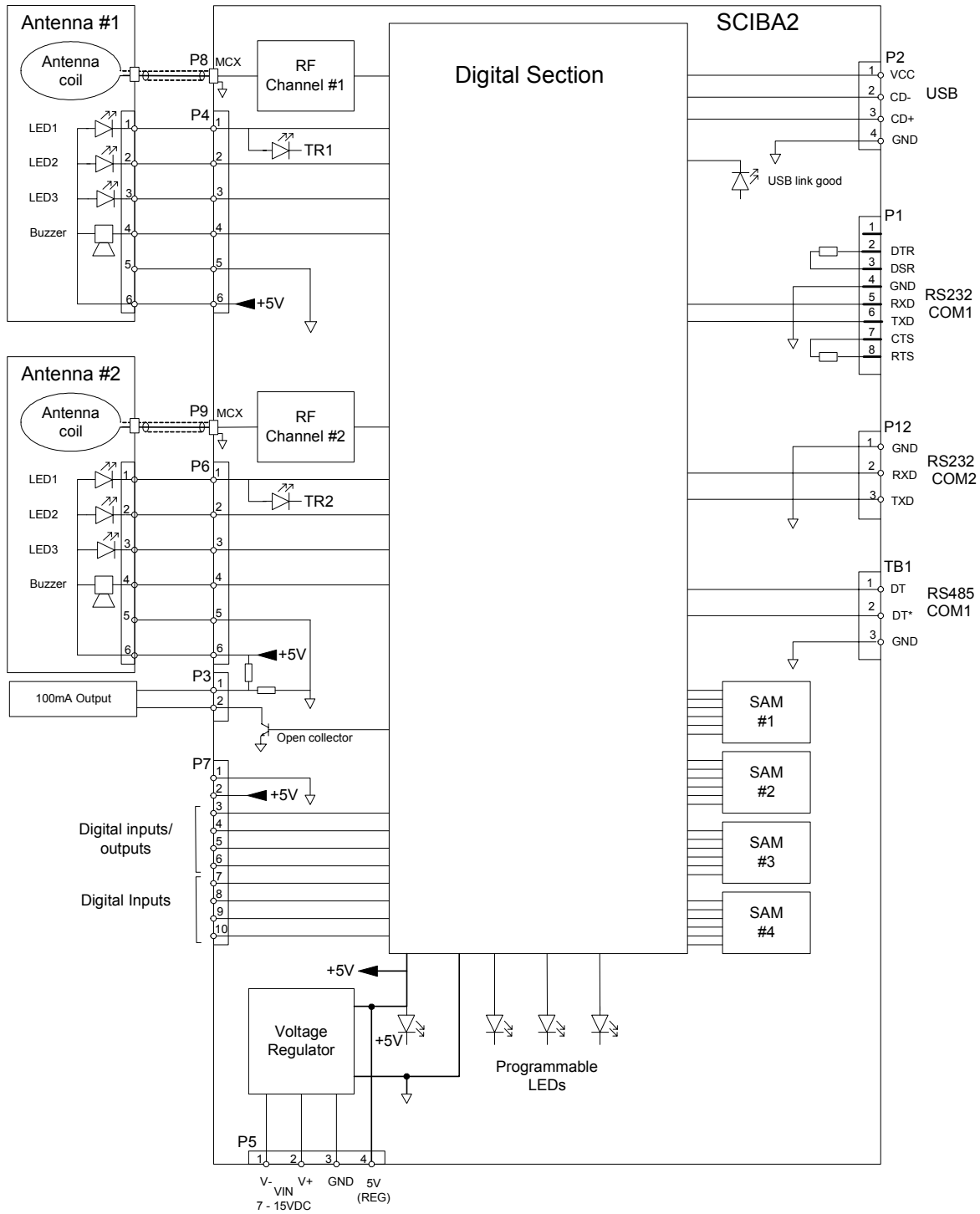
SAM 4 (Optional)
> SIM Connector on PCB back

Figure 3-2: SCIBA2 – Reader Block Diagram

3.2 Antenna

The SCIBA-2 is supplied with standard antennas with which the system was EMC certified.
The use of other antennas requires re-testing and certification.

> Enclosure   ABS Plastic
>
> Protection   IP__

The antenna is provided with two cable tails

1. Six-wire cable tail with Molex 6 pole connector connected to the antenna's three
    LEDs and buzzer

2. Coax cable tail with the MCX connector which is connected to the antenna's RF
    coil.
    Important!
    Use coax cable in length provided.
    Do not shorten or lengthen coax cable.

3.3 Power Supply

Power supply voltage should be in the range of 7.0 to 15VDC.
If the power supply may provide current more than 5A a fuse of 4.5A should be used, if
the maximum power supply current less than 5A there are no special requirements.

Standard power adapter, mains/(9 to 12 V DC) is recommended for use:

9VDC or 12VDC 500mA

.

4 Installation Instructions

4.1 Reader Installation

Install the reader in a location where it will not be subjected to excessive heat, humidity or vibration.

Heavy electrical equipment should not be installed close to the reader.

4.2 Antenna Installation

Mount antenna on non-metallic surface. Distance between antenna and closest metal surface should be at least 30 millimeters.

Route antenna cables to reader in protective conduit.

5 Flash Memory Programming

5.1 Introduction

The SCIBA2 reader's program is stored in its non-volatile Flash Memory. Application versions and updates to the SCIBA2 reader's program may be written only at OTI.

The application versions and updates can be programmed into the SCIBA2 reader's Flash memory by the customer through use of the Flash Memory Programmer software, described in the following paragraphs.

5.2 PC requirements

- Flash Memory Programmer software runs on Windows 95 or Windows NT 32bit operating systems.
- PC should be at least a 486 DX2.
  Program loading time depends on the speed of PC.

5.3 Programmer Software Installation

1. Run the setup.exe file from CD.

2. Follow the instructions on the PC screen.

5.4 Hardware Setup

1. Connect RS232 cable between PC and SCI interface.
   Note: DTR and DSR as well as CTS and RTS in the PC connector should be shorted. For 25-pin D type connector, short between 4 & 5 and between 6 & 20.
   For 9-pin D type connector, short between 4 & 6 and between 7 & 8.

2. Apply power to the reader

5.5 Programming

5.5.1 Flash Memory Files

The flash memory files, written at OTI can be loaded into the PC from CD or through the Internet.

The prefix of the flash memory files is SCI5, followed by a four-character application code, followed by the date.

5.5.2 Programming Procedure

1. Run the Flash Programmer software

2. Choose the communication port

3. Press the "Load" button.
   A dialogue window opens,

4. Select the file to be programmed into the SCIBA2 reader.
   The selected file is validated as an SCI5flash memory file.

5. Press the "Program" button.
   The programmer will start programming the selected file into the flash memory.
   If the SCIBA2 reader is already programmed, the programmer will issue a warning and wait for an approval to continue by pressing the "yes" button
   The system automatically finds and switches to the fastest Baud rate possible.

6. After programming the file into the flash memory, the programmed file is verified, and a " valid version" flag in the SCIBA2 reader's memory is set.

7. The SCIBA2 reader is ready to operate with the new program file.

5.6 Help

A comprehensive Help section provides the user with detailed explanations regarding the operation of the Flash Memory Programmer software.