

Silica Tusa Board



Quick Start Guide



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Revision History

Rev.	Date	Description
A	30.04.2012	Starting revision

1 General Description

The board is built to be compatible with two different ARM development environments:

- mbed
- LPCXpresso

TUSA is based on the CLRC663 RFID reader chip which supports the following modes:

- Read/write mode supporting ISO/IEC 14443A/MIFARE
- Read/write mode supporting ISO/IEC 14443B
- Read/write mode supporting JIS X 6319-4 (comparable with FeliCa1 (see Section 21.5) scheme)
- Passive initiator mode according to ISO/IEC 18092
- Read/write mode supporting ISO/IEC 15693
- Read/write mode supporting ICODE EPC UID/ EPC OTP
- Read/write mode supporting ISO/IEC 18000-3 mode 3/ EPC Class-1 HF

The CLRC663's internal transmitter is able to drive a reader/writer antenna designed to communicate with ISO/IEC 14443A/MIFARE cards and transponders without additional active circuitry.

The purpose of TUSA board is to give users a quick start in RFID applications, enabling hardware and software evaluation.

NOTE: The board is neither intended to be a tool showing the maximum performance nor an optimal reference design to illustrate how to implement the analog part of the device. A specific antenna design should be considered when trying to reach greater working distance.

For more details see device specifications at http://www.nxp.com/documents/data_sheet/CLRC663.pdf

2 Development Environments

2.1 LPCXpresso

2.1.1 Requirements

Operating system:

- Microsoft® Windows - XP (SP2 or greater)
- Microsoft® Windows - Vista 32-bit
- Microsoft® Windows - Windows 7 32-bit

LPCXpresso (3.3 or greater) - <http://ics.nxp.com/lpcxpresso/>

Integrated Development Environment for LPC MCUs

LPCXpresso board for LPC1100 microcontroller - <http://ics.nxp.com/lpcxpresso/>

Used as JTAG Debugger

2.1.2 Software Installation

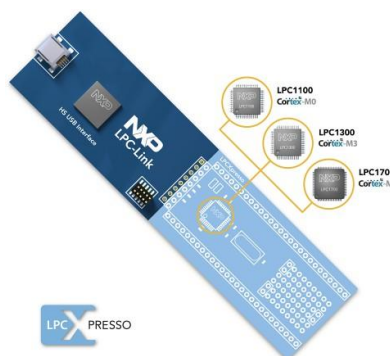
LPCXpresso must be installed on the workstation.

The LPCXpresso project can be downloaded from www.silica.com/TUSA and imported into the LPCXpresso environment.

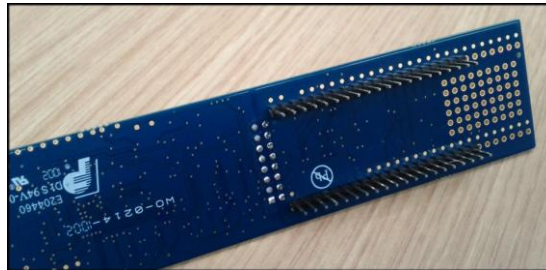
2.1.3 Hardware Installation

LPCXpresso board is made of two parts

1. LPCLink: The emulator for the target microcontroller
2. Target: The application microcontroller running the firmware

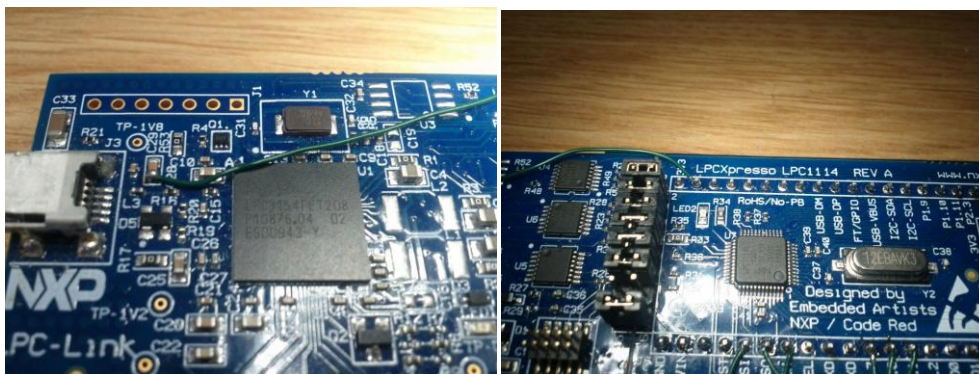


To connect the LPCXpresso board to TUSA, 0.1" pin headers must be soldered to the underside of the board.

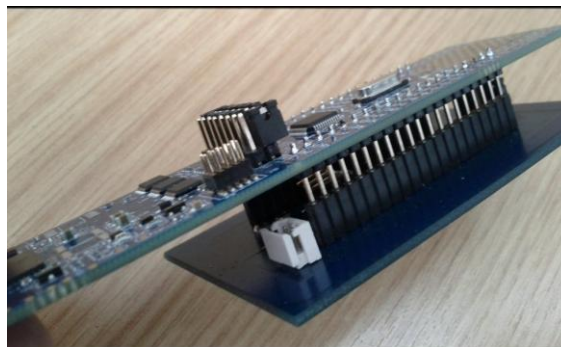


A wire is also needed to power the TUSA board from the 5 V coming from the USB port: solder a wire from C28/C29 (USB_VBUS) and J6-29 (ee LPC1114 schematics)

<http://ics.nxp.com/support/documents/microcontrollers/pdf/lpcxpresso.lpc1114.schematic.pdf>



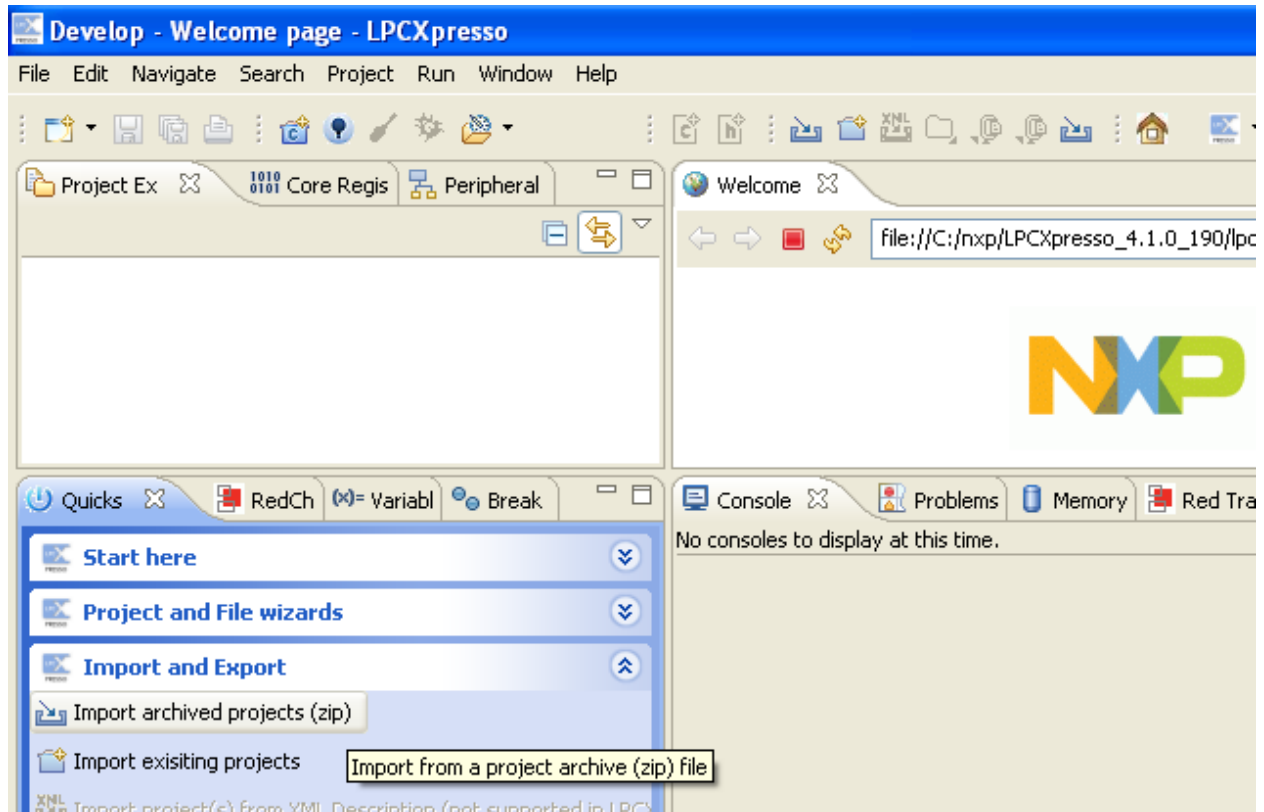
The TUSA can then be connected to the LPCXpresso board as shown.



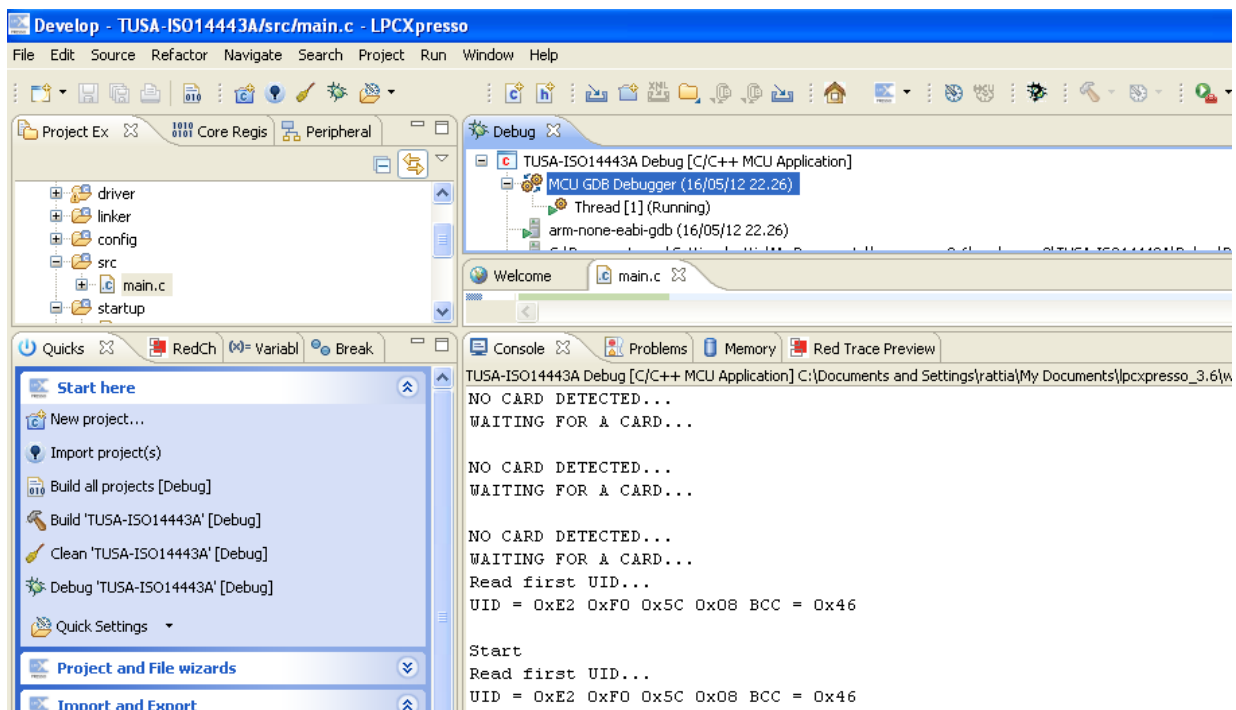
2.1.4 Running the Demo

The demo shows the UID of any ISO14443A card within the RF field of TUSA.

- After downloading the firmware, import the application TUSA-ISO14443A.zip using the LPCXpresso “import archive project”



- connect the LPCXpresso/TUSA assembly to a PC.
- Run the application. Debug messages will be displayed in the “console” window of the IDE
- If a card is in the TUSA field, its UID will be shown.



2.1.5 Source Code

For more complex applications use the NXP's freely available reader library, for more details see:

<http://www.nxp.com/documents/software/200310.zip>

2.2 mbed

mbed is an ARM 32-bit Cortex-M MCU based rapid prototyping platform supported by online tools. For more information see <http://mbed.org>

2.2.1 Requirements

Operating system:

- Windows [XP/Vista/7]
- Mac OSX
- GNU/Linux

Supported browsers:

- Internet Explorer
- Firefox
- Chrome
- Safari

The TUSA is compatible with either the NXP LPC1114 or NXP LPC1114 mbeds

<http://mbed.org/handbook/mbed-Microcontrollers>

2.2.2 Software installation

1. Connect the mbed microcontroller to the USB port of your PC
2. The mbed will enumerate as a USB Drive. Click on the link on the drive labeled MBED.THM
3. Follow the instructions to register

For more information see <http://mbed.org/handbook/Setup-guide>

4. Install the mbed serial port driver to enable mbed to output data to the terminal console

For more information see <http://mbed.org/handbook/Windows-serial-configuration>

Starting from the http://mbed.org/users/silica_avnet_company/ you can find:

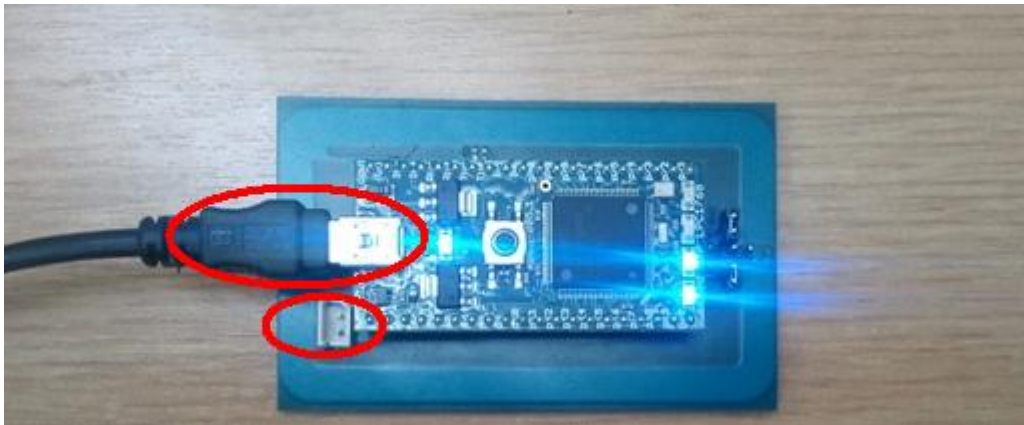
- The TUSA board description
- SILICATUSA-ISO14443A source code
- SILICATUSA-ISO14443B source code
- SILICATUSA-ISO15693 source code

2.2.3 Hardware installation

Connect the mbed microcontroller to the TUSA board as shown below.

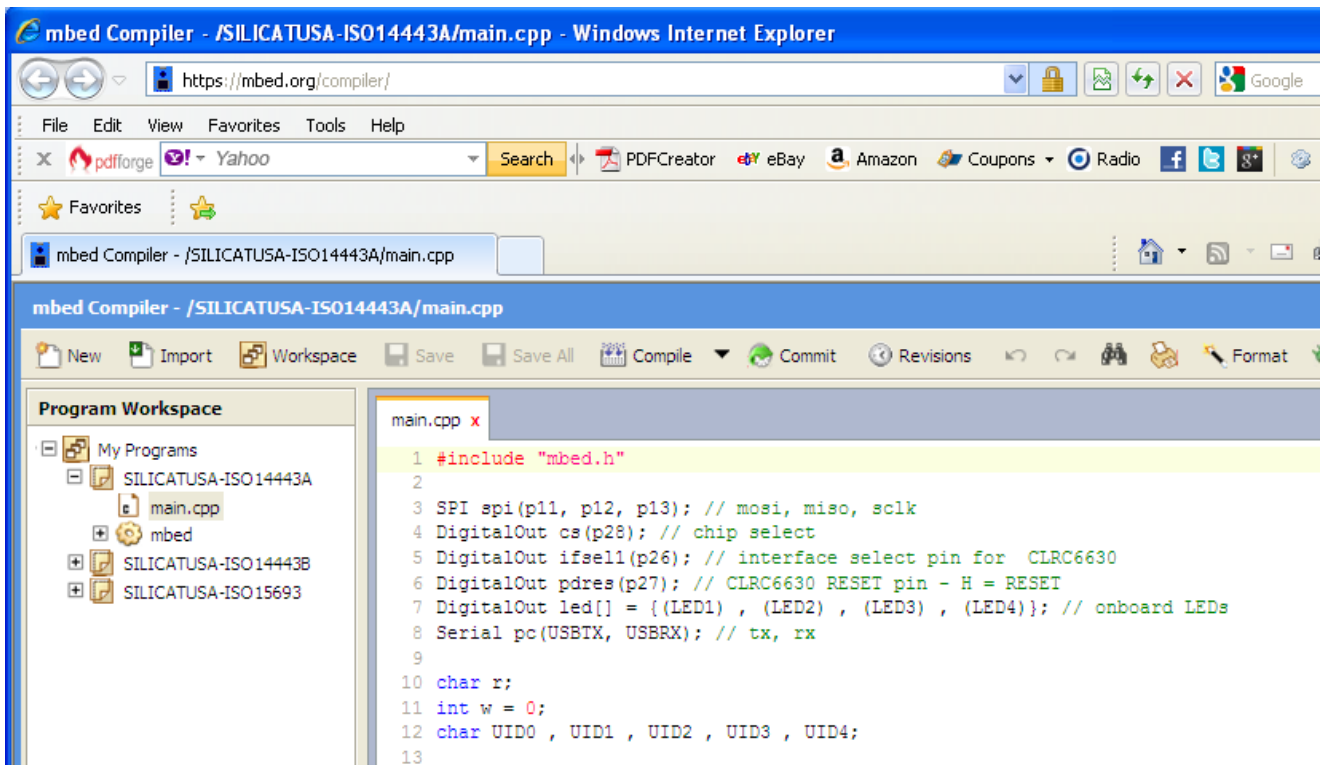
Please ensure the correct orientation of the mbed and TUSA!

The USB connector must be on the same side of the white 2 pin connector



2.2.4 Running the Demo

The Silica TUSA source code can be imported into your workspace, compiled and downloaded to your mbed.



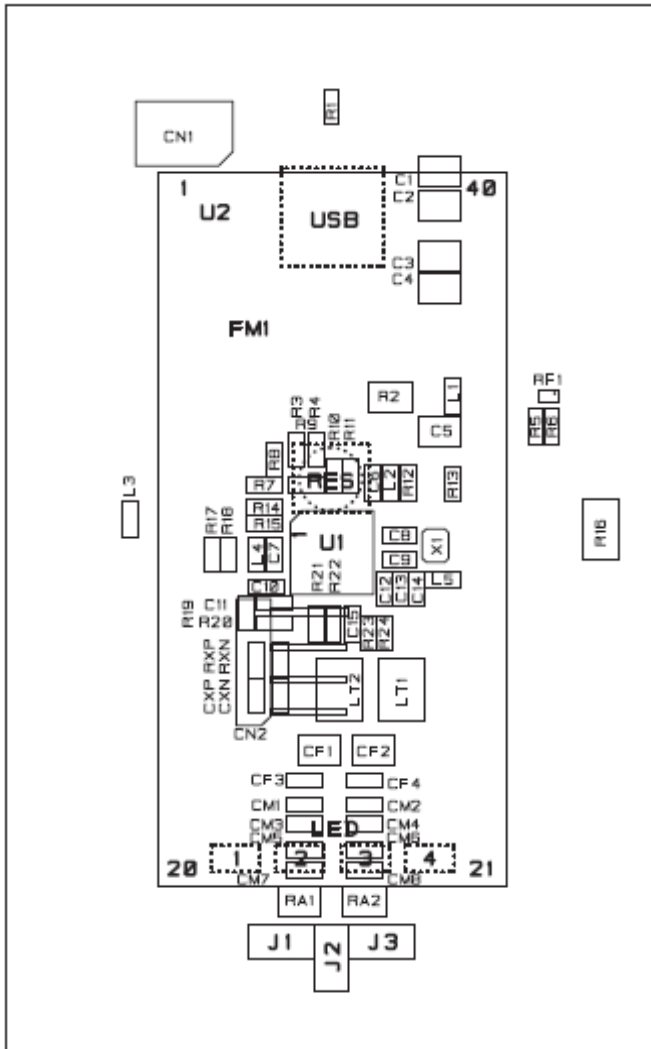
Configure the Terminal Application com port setting to the appropriate serial port number of the mbed.

The application will display the UID of any card depending on which firmware downloaded on the mbed - ISO14443A, or B or ISO15693.

2.2.5 Source code

The source code for the mbed application is all included in a single file, which will program the CLRC663 with the minimum configuration needed to read the UID in the different standards.

3 TUSA Connectors/ Switches Description



CN1 : 5 V input when not powered via MBED

CN2 : Test points for AUX/SIGOUT pins

J1, J2, J3 : Open to connect and external antenna

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