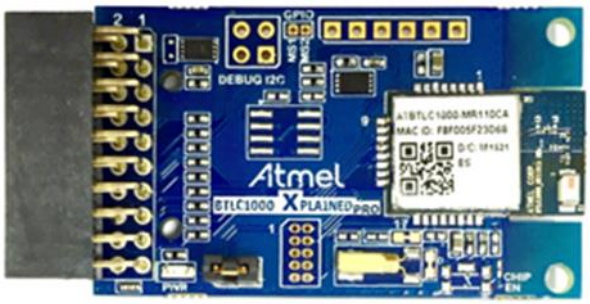
ATBTLC1000 BluSDK

Direct Test Mode - Getting Started Guide

USER GUIDE



Introduction

This document describes how to establish a setup to Test the Direct test mode between two ATBTLC1000 modules. A PC based tool (e.g.: ATBTLC1000 Characterization Software) will be used at both ends. ATBTLC1000 Xplained Pro extensions are connected to a compatible MCU host Xplained Pro kit. (E.g.: SAM L21/SAM D21 or SAM G55.) The PC tool communicates with ATBTLC1000 using a serial bridge application running on the MCU.

- DTM setup procedure
- Downloading DTM Firmware
- Running the setup

Table of Contents

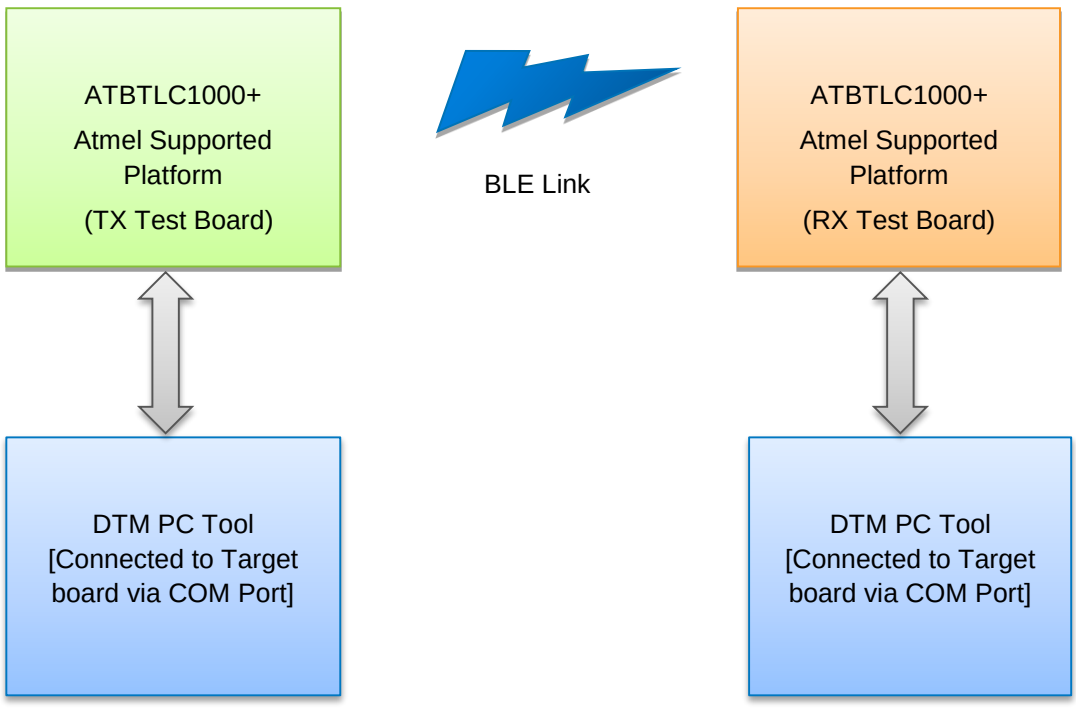
1 Supported Hardware Platforms and IDEs

Table 1-1. BluSDK – Supported Hardware and IDEs

Platform	MCU	Supported BLE device	Supported evaluation kits	Supported IDEs
SAM L21 (MCU)	ATSAML21J18B	ATBTLC1000	ATBTLC1000-XSTK (ATSAML21-XPRO-B + ATBTLC1000 XPRO)	Atmel Studio v7.0
SAM L21 (MCU)	ATSAML21J18A	ATBTLC1000	ATSAML21 XPRO + ATBTLC1000 XPRO	Atmel Studio v7.0
SAM D21 (MCU)	ATSAMD21J18A	ATBTLC1000	ATSAMD21-XPRO + ATBTLC1000 XPRO	Atmel Studio v7.0
SAM G55 (MCU)	ATSAMG55J19	ATBTLC1000	ATSAMG55-XPRO + ATBTLC1000 XPRO	Atmel Studio v7.0
SAM 4S (MCU)	ATSAM4SD32C	ATBTLC1000	ATSAM4S-XPRO + ATBTLC1000 XPRO	Atmel Studio v7.0

2 Demo Setup

Figure 2-1. Demo Setup for Direct Test Mode



3 Hardware Setup

3.1 SAM L21 Xplained Pro Direct Test Mode Setup

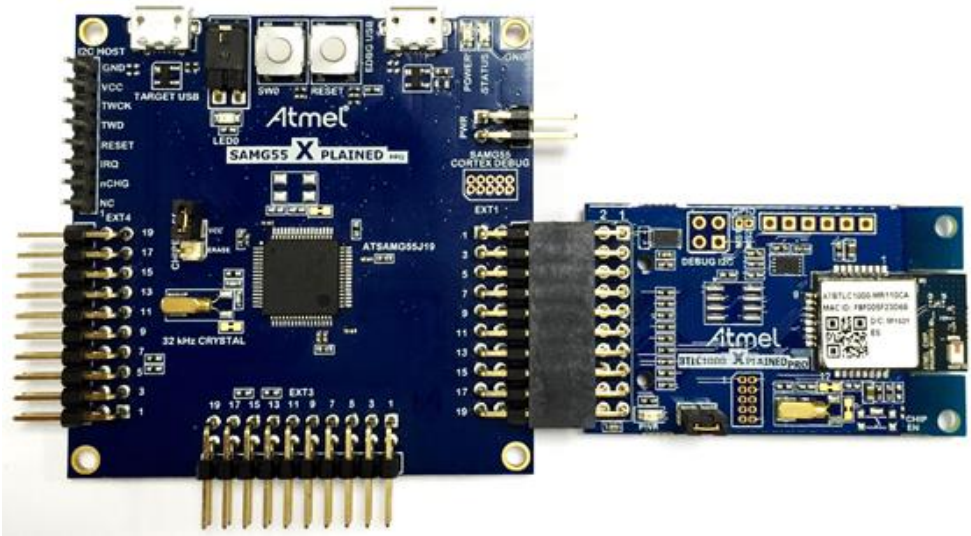
Figure 3-1. ATBTLC1000 Xplained PRO Extension Connected to a SAM L21 Xplained Pro

3.2 SAM D21 Xplained Pro Direct Test Mode Setup

Figure 3-2. ATBTLC1000 Xplained PRO Extension Connected to a SAM D21 Xplained Pro

3.3 SAM G55 Xplained Pro Direct Test Mode Setup

Figure 3-3. ATBTLC1000 Xplained PRO Extension Connected to a SAM G55 Xplained Pro



3.4 SAM 4S Xplained Pro Direct Test Mode Setup

Figure 3-4. ATBTLC1000 Xplained PRO Extension Connected to a SAM 4S Xplained Pro

4 Software Setup

4.1 Installation Steps

1. Atmel Studio installation [Atmel Studio 7.0 (build 594) Installer – with .NET] http://www.atmel.com/tools/atmelstudio.aspx.

   (Note: SAM L21 Rev B/SAM D21/SAM G55/SAM 4S part pack is built-in as part of Atmel Studio 7.0)
2. Atmel USB Driver Installer http://www.atmel.com/tools/atmelstudio.aspx.
3. Install the standalone ASF package from http://www.atmel.com/tools/AVRSOFTWAREFRAMEWORK.aspx.

Note: Refer to the BluSDK release notes for updates to version numbers of the components mentioned above.

This package will install the following examples within the Atmel Studio environment.

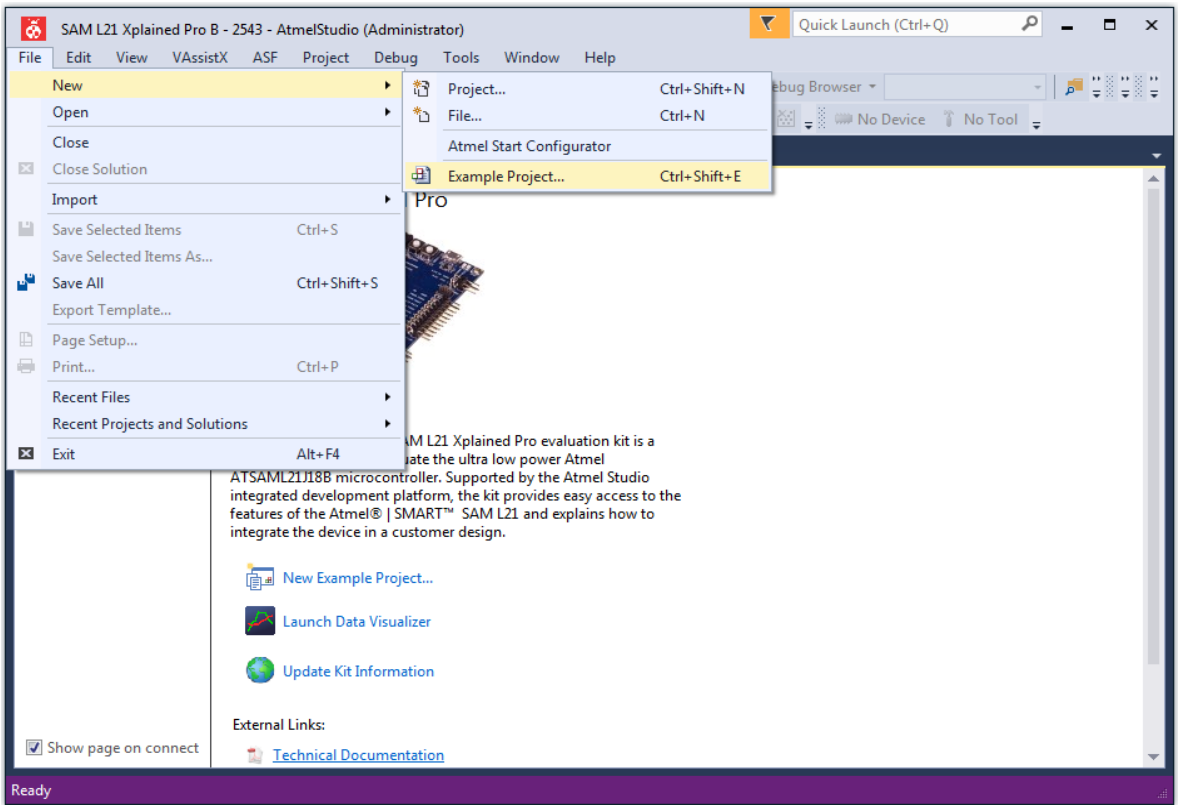
1. Direct Test Mode Application for SAM L21.
2. Direct Test Mode Application for SAM D21.
3. Direct Test Mode Application for SAM G55.
4. Direct Test Mode Application for SAM 4S.

4.2 Build Procedure

The following procedure is explained for SAM L21 application example. The same procedure is valid for the case of all the other supported platforms (see Chapter 1) as well.

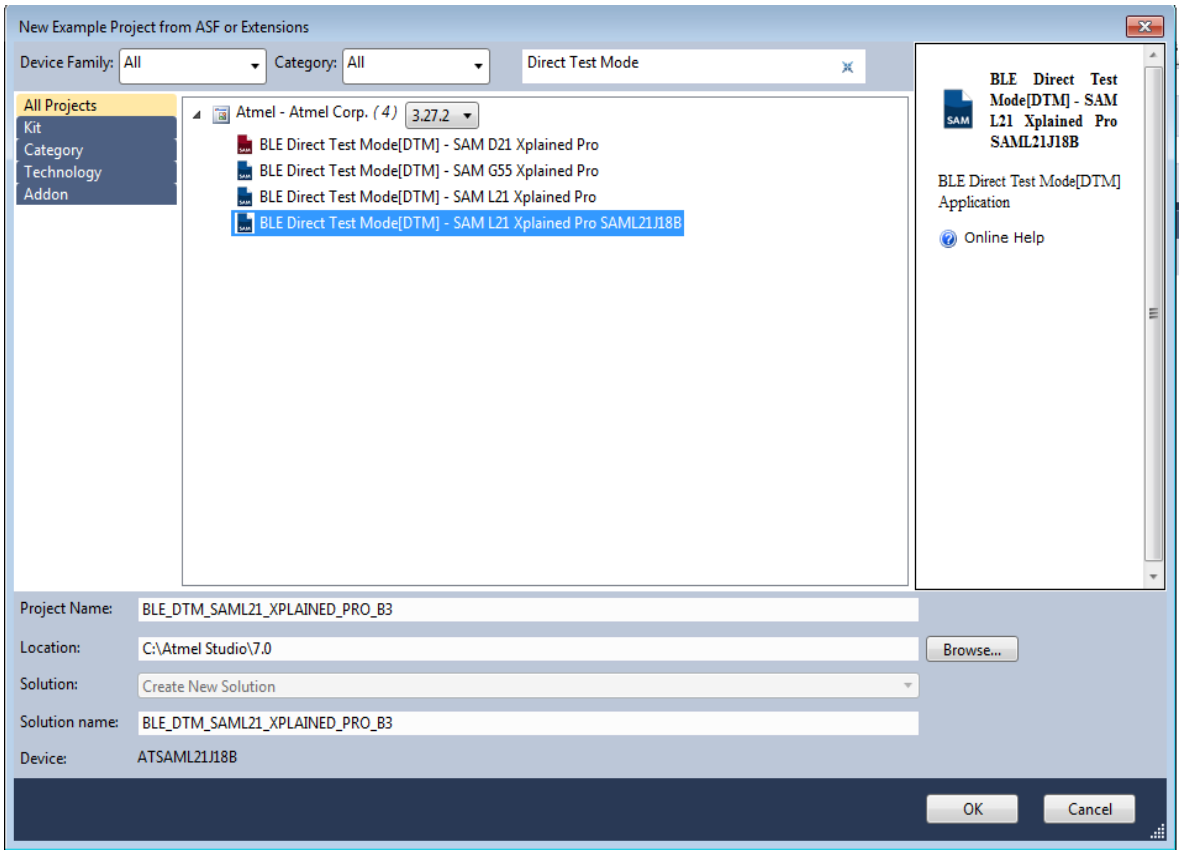
1. Select New Example Project.

Figure 4-1. Creating a New Project



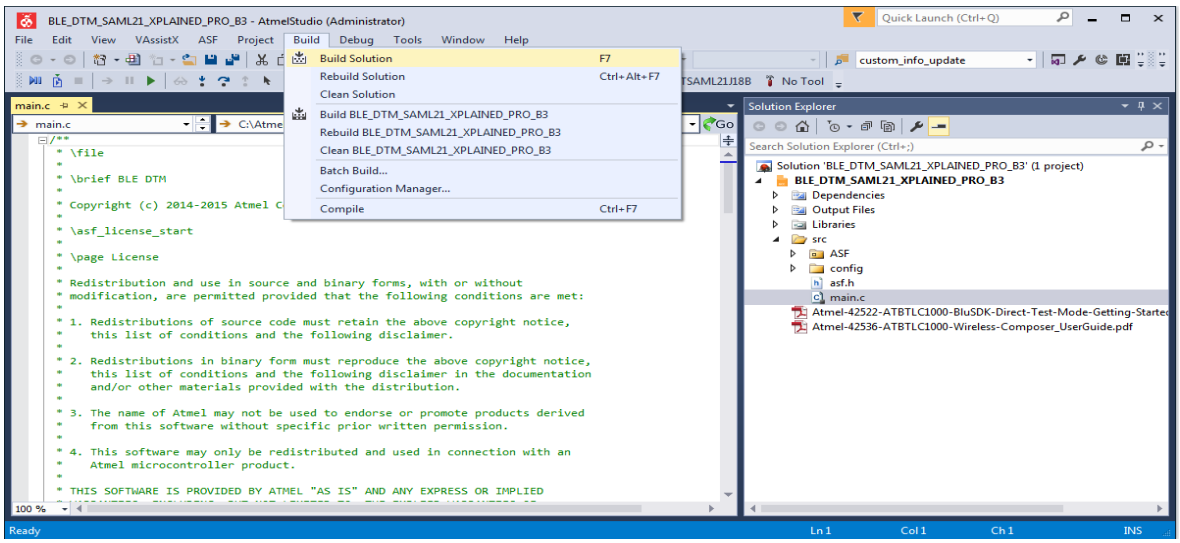
2. In search box enter “DTM” in search window and expand Atmel Corp Projects. The location and the name of the project can be selected in the respective fields. Click **OK**.

Figure 4-2. Searching for DTM Example Application



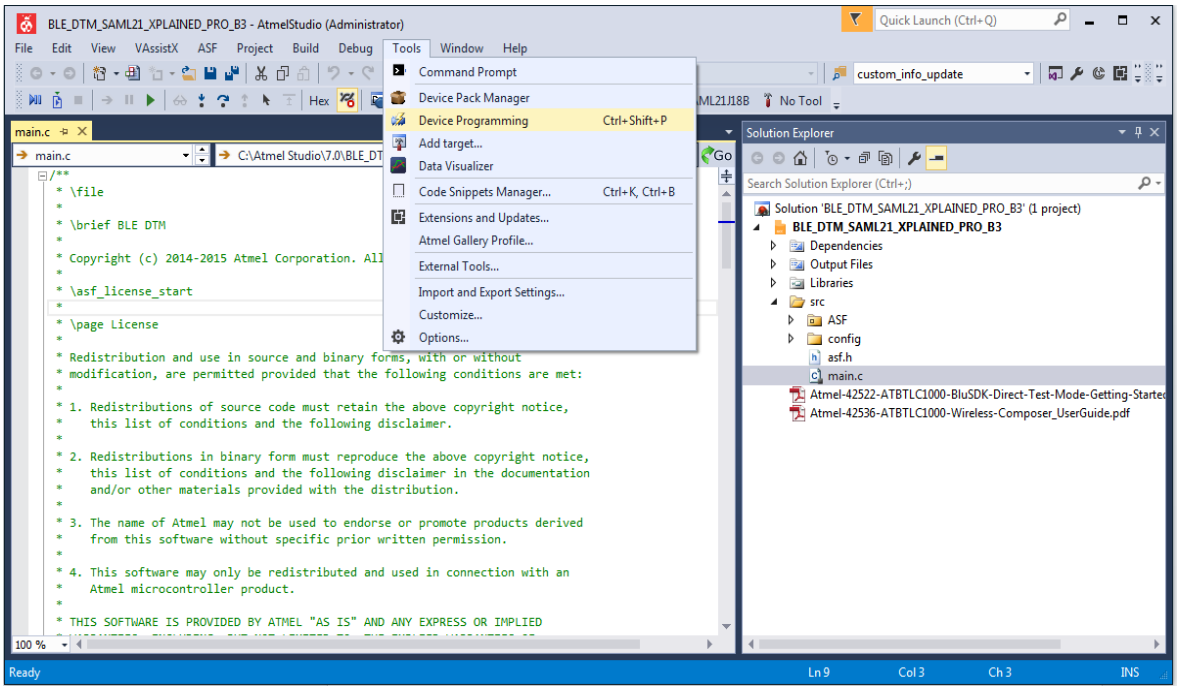
3. Accept the license Agreement. The Atmel studio will generate the Direct Test Mode Example project for SAM L21.
4. Build the solution.

Figure 4-3. Building the DTM Application



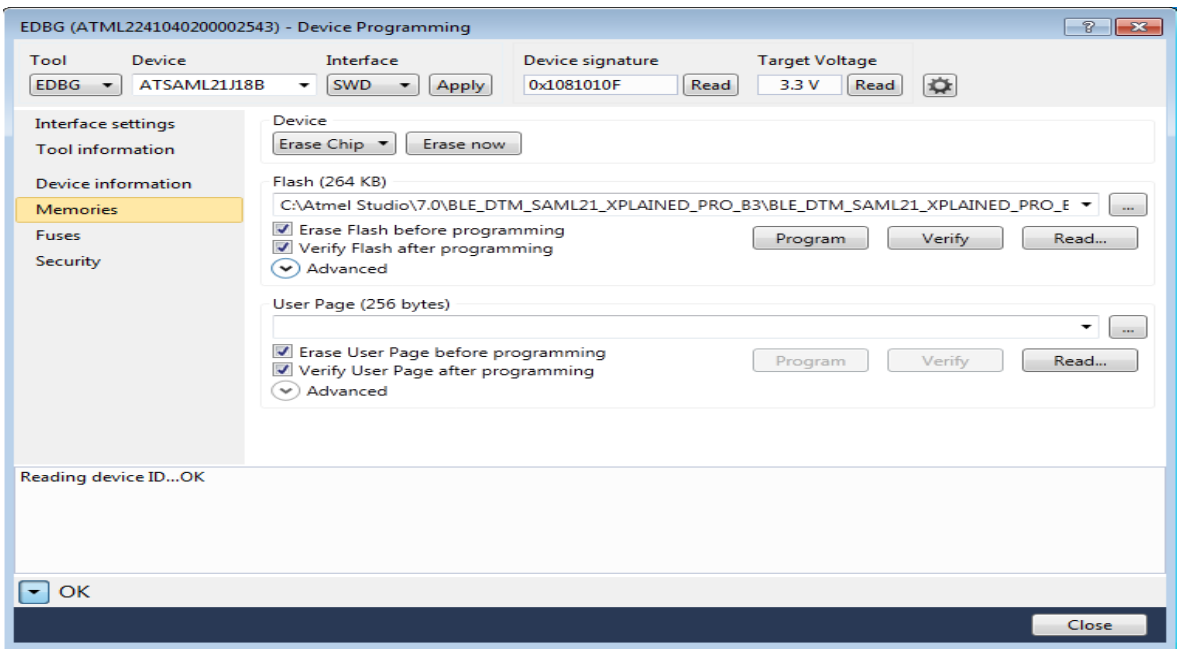
5. Download the application via the USB to the SAM L21 board using Device Programming option available in Tools as mentioned below.

Figure 4-4. Select Device Programming



6. Inside device programming user have to select the correct configuration for device and finally program the device using program button.

Figure 4-5. Flash Programming



7. Once the application is flashed, the Direct Test Mode application is ready for use.

5 Serial Bridge Application

In order to allow the DTM PC Application send the DTM commands to BTLC1000, supported platforms (see Chapter 1) will act as serial bridge between BTLC1000 and DTM Tool. As soon as the supported platforms (see Chapter 1) powered on or reset, it initializes the Wakeup, Chip Enable and downloads the patch file to BTLC1000, then completes the Initialization procedure of the BLE module. After the BTLC1000 initialization application will initialize the serial bridge. Then onwards supported platforms (see Chapter 1) will be acting as serial bridge.

6 DTM PC Tool

1. Start The DTM Tool by clicking “DTM-Tool.exe”.

Figure 6-1. Selecting the DTM PC Tool

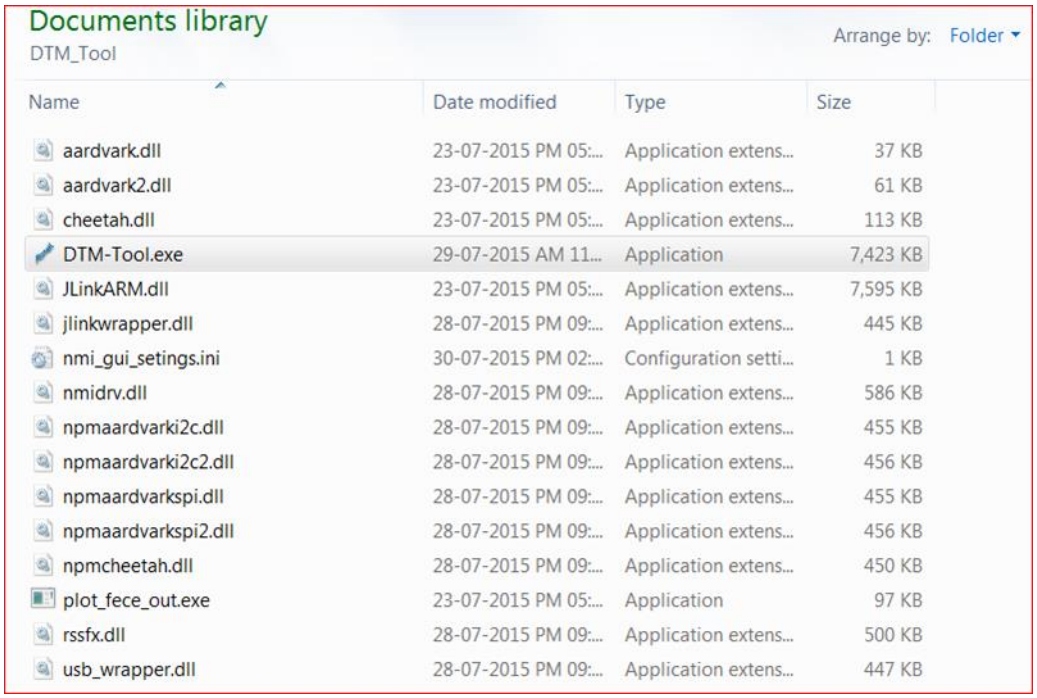
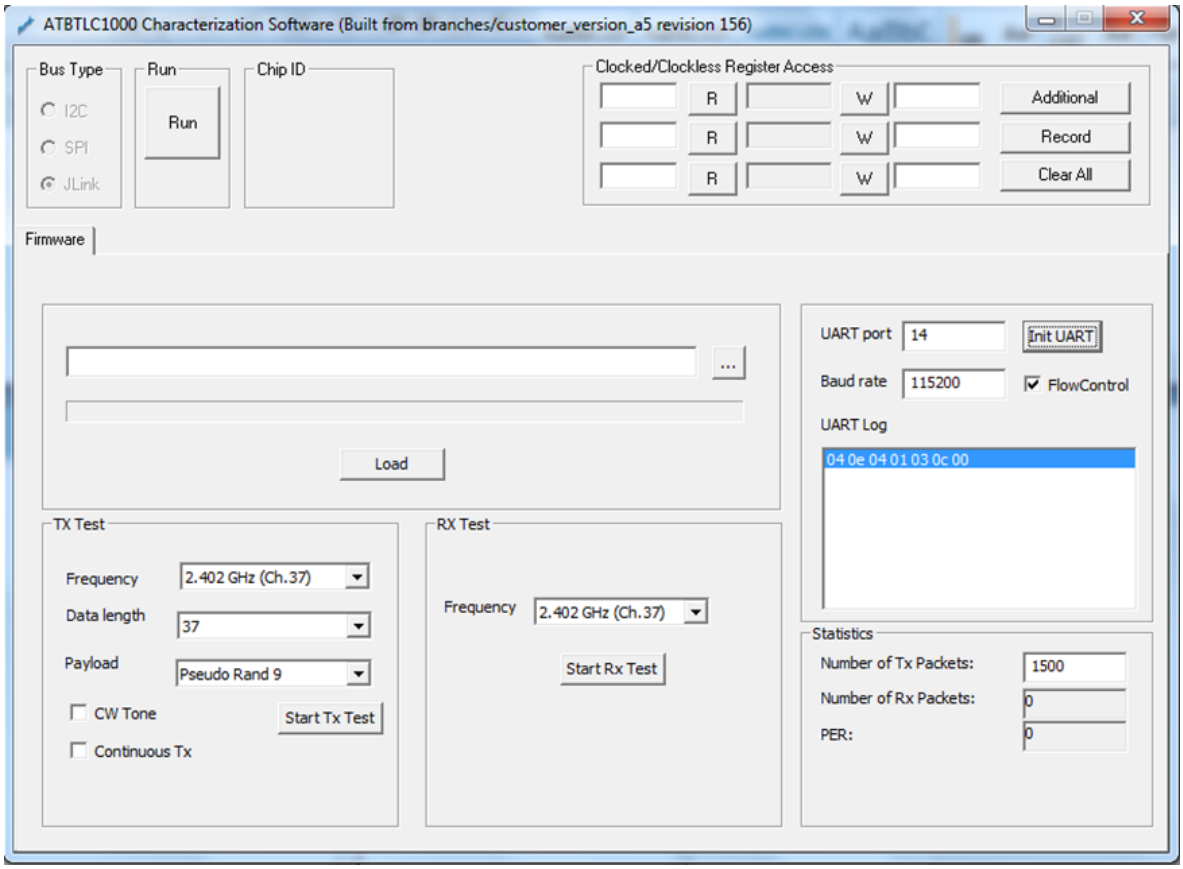


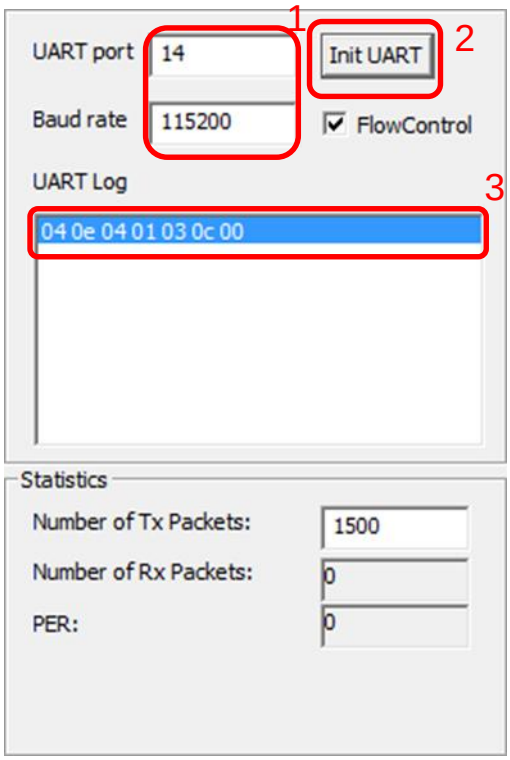
Figure 6-2. DTM PC Tool Window



2. Next, initialize UART. Enter the COM port number and press “Init UART”. A successful initialization is indicated by receiving a chip response as shown below.

TIP **Check the COM Port Number from device Manager.**

Figure 6-3. Init UART



3. Start the Direct Test Mode, configuring one board as TX and the other one as RX. Note that any side can be replaced by a standard compliant test equipment. Make sure to select the same RF Channel for both during the Test and to start the Rx test before the TX Test in order not to miss any packets. You should see the chip response after each Start/Stop to make sure that the UART communication is still working fine.

Figure 6-4. TX Side Test Start

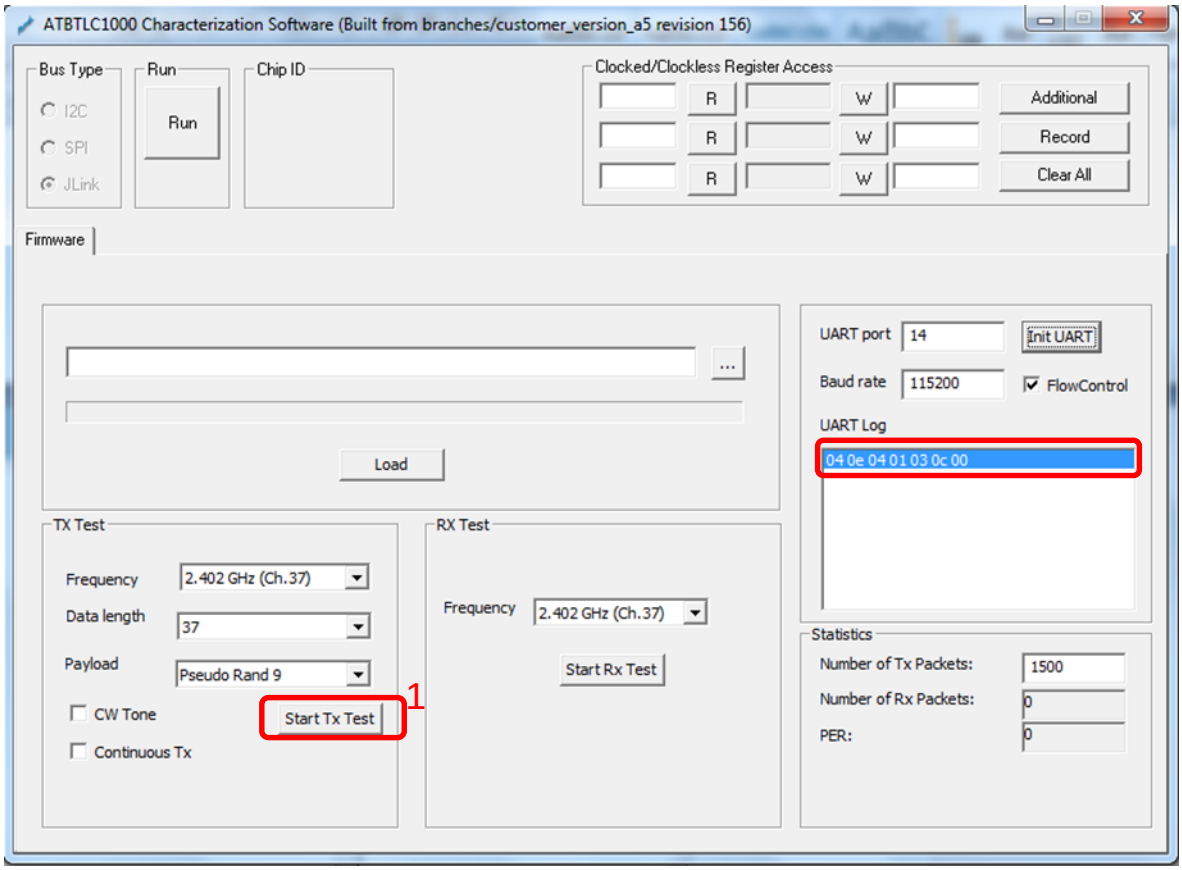
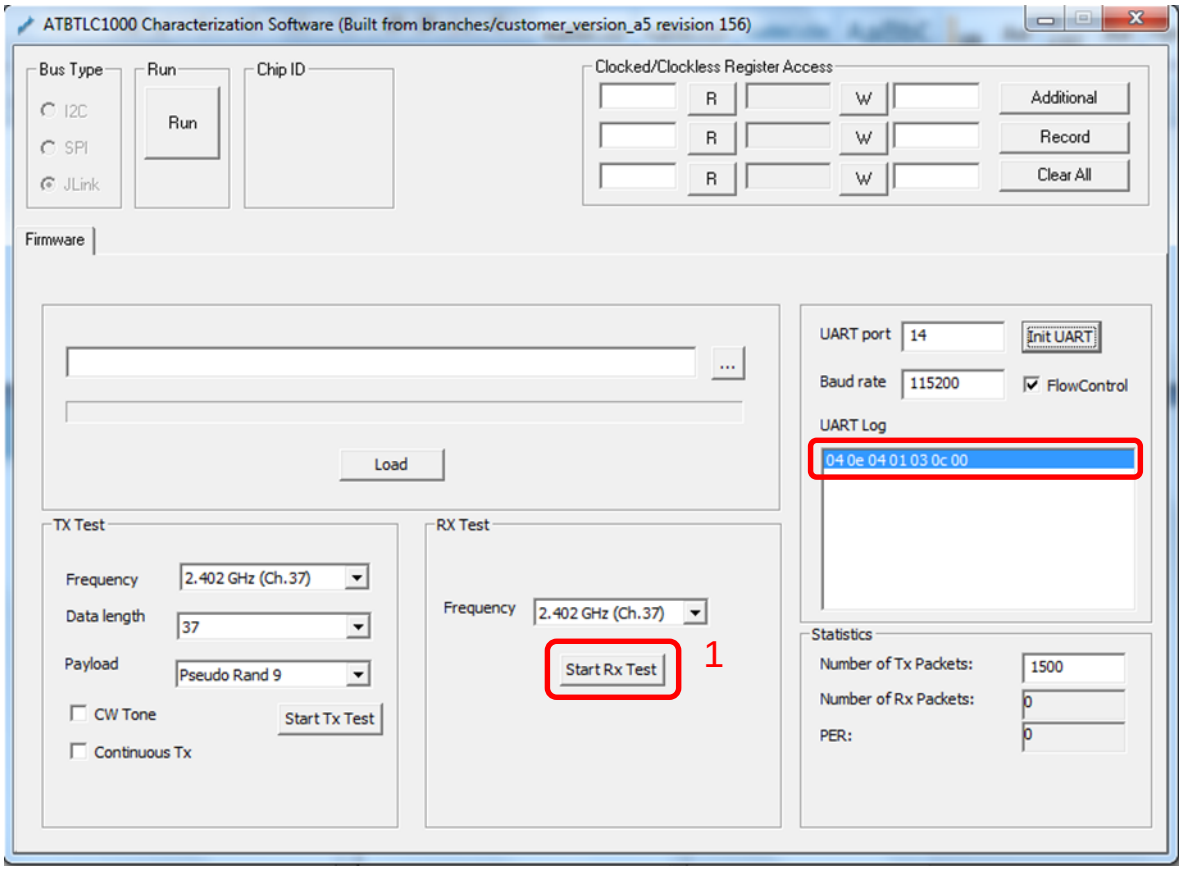
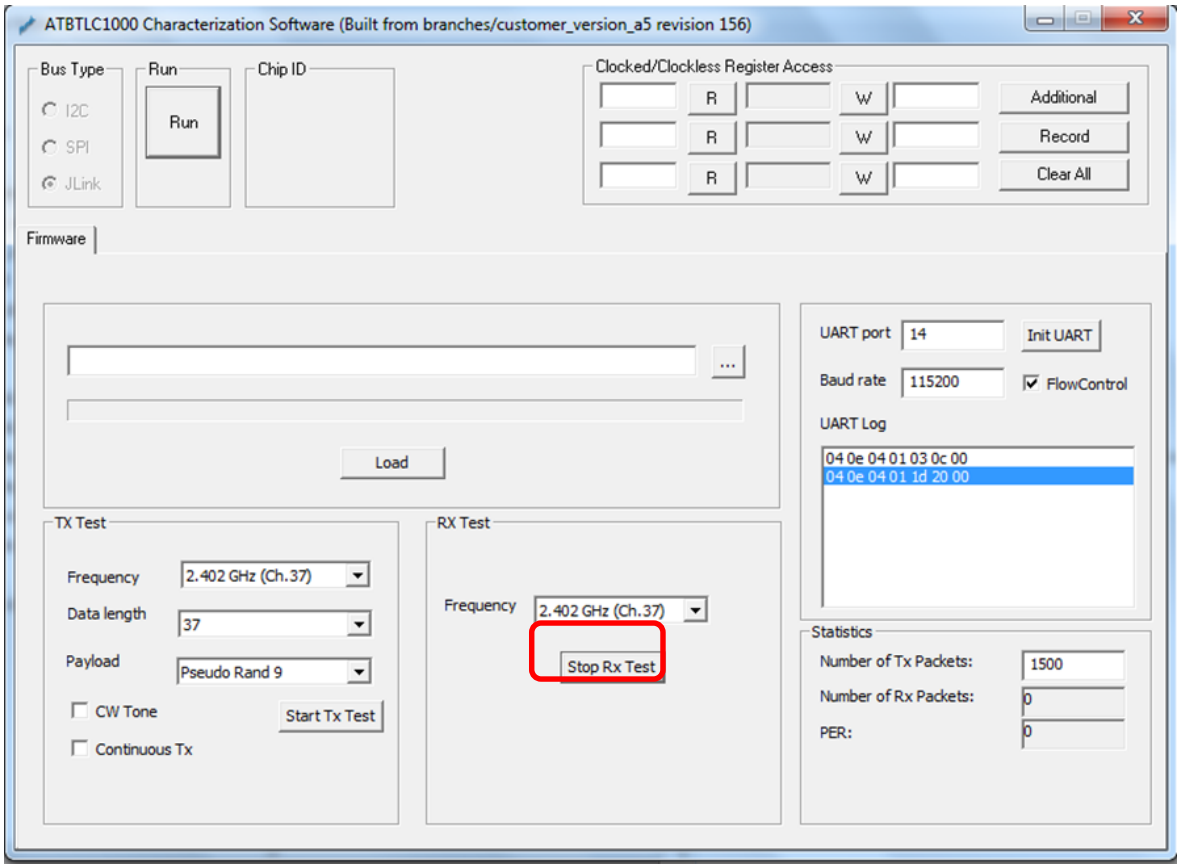


Figure 6-5. RX Side Test Start



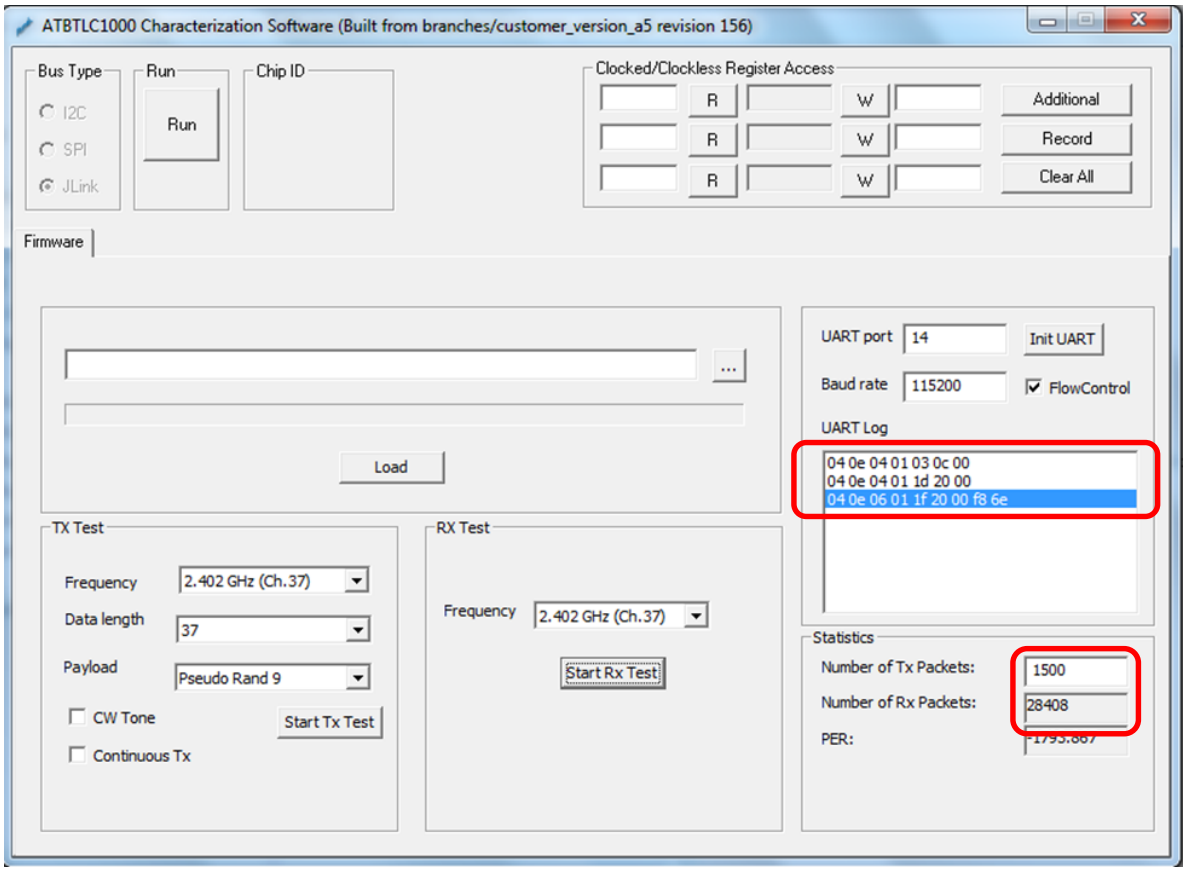
4. On the RX board, Press Stop RX Test button, the number of successful received packets is displayed after pressing “Stop Rx”.

Figure 6-6. RX Side Test Stop



5. After pressing Stop RX Test button, user can see the total number of received packets. The number of successful received packets is displayed after pressing “Stop Rx”.

Figure 6-7. Number of Packets Received



IMPORTANT

The PER is calculated assuming that the transmitter side sends 1500 packets for testing using R&S CBT equipment. For peer testing, please ignore the PER reading

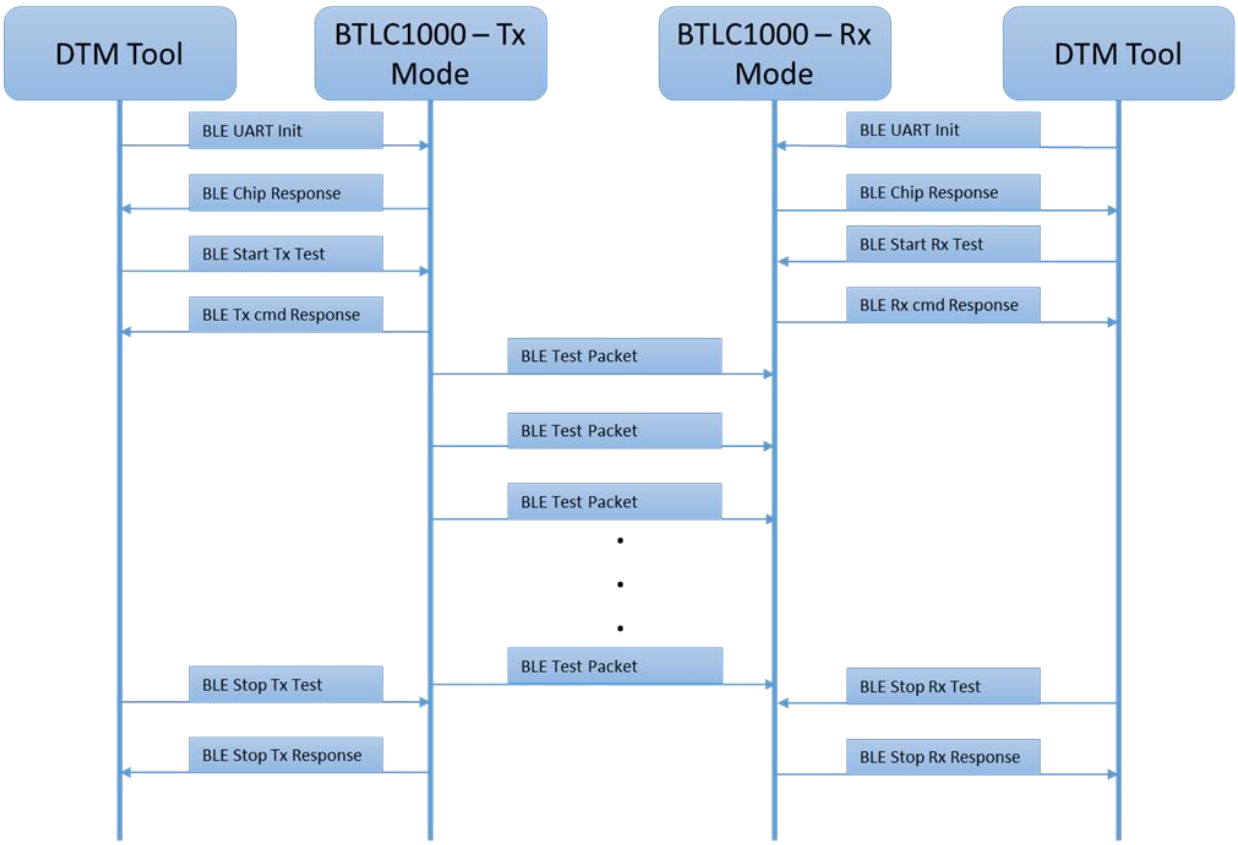
TO DO

Some part of the UI buttons and options are left for later implementation. Using those options will lead to undetermined behavior of the DTM-Tool

7 DTM Test Sequence

The sequence diagram below depicts the Direct Test Mode between the two ATBTLC1000 devices. The DTM commands are initiated from DTM Tool. To create the test sequence shown below, open two instances of the DTM PC Tool. Enter the COM Port of respective ATBTLC1000 devices. The first command issued from the tool is 'UART Init' for which response is received from the respective ATBTLC1000 device. The rest of the commands can be used as shown below on either side.

Figure 7-1. DTM RX/TX Test Sequence



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ATMEL CORPORATION
1600 Technology Drive
San Jose, CA 95110
USA

9 Revision History

Doc Rev.	Date	Comments
42522C	02/2016	Table 1.1 is updated with SAM4S support. Figure 3.4 is updated with SAM4S Xplained Pro Image. Section 4.1 installation Steps are updated.
42522B	11/2015	Figure 3-1 is updated. The screenshots in Chapter 4 are updated.
42522A	09/2015	Initial document release.

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Atmel Corporation 1600 Technology Drive, San Jose, CA 95110 USA **T:** (+1)(408) 441.0311 **F:** (+1)(408) 436.4200 | **www.atmel.com**