ATBTLC1000 BluSDK

HID Mouse Device – Getting Started Guide

USER GUIDE

Introduction

This getting started guide describes the setup of ATBTLC1000 with a supported platform bringing up an example profile supplied as part of BluSDK. This document explains the bring-up of HID Mouse device example application that is embedded as part of the software release package.

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1 Description

The HID over GATT (HOGP) profile defined by the Bluetooth SIG enables support of HID services over a Bluetooth Low Energy (BLE) protocol stack using Generic Attribute profile (GATT). This allows devices like keyboard or mouse implementing HOGP to connect to a compatible HOGP/BLE host device (e.g.: Mobile Phone, Tablet, TV, etc.).

This document explains the details about

1. Getting started with the setup of supported platform (see Chapter 3).
2. Demonstration of a HID mouse device functionality using an Android phone.

The HOGP Mouse device application example (referred as HID Mouse device in this document) supports the following features

- Advertisement
- Pairing
- Services: HID Service and Device Information Service
- Report Mode (Mouse)

The HID Mouse device application example supports the following characteristics for HID service.

- Protocol Mode
- Report
- Boot Mouse Input Report
- Report Map
- HID Information
- HID Control Point

For the purpose of demonstration, the example application simulates the function of a mouse. Once the handshake and connection procedure between a mobile phone and the ATBTLC1000 emulating a mouse device example is completed, a mouse cursor will appear on the mobile device's screen. Pressing the button on the SAM L21 platform simulates movement of mouse in a pre-defined pattern as described in later in this document.

2 Demo Setup

Figure 2-1. Demo setup of HID Mouse Device Application on ATBTLC1000

3 Supported Hardware Platforms and IDEs

Table 3-1. 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

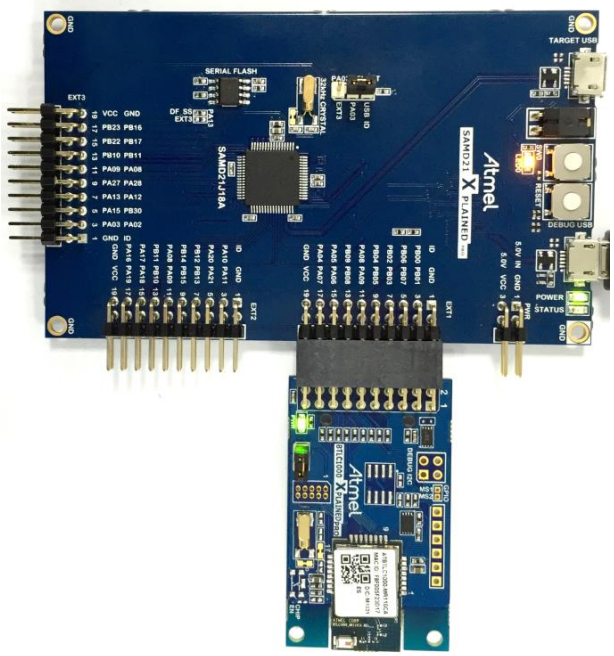
4 Hardware Setup

4.1 SAM L21 Xplained Pro HID Device Setup

Figure 4-1. ATBTLC1000 Xplained Pro Extension Connected to a SAM L21 Xplained Pro

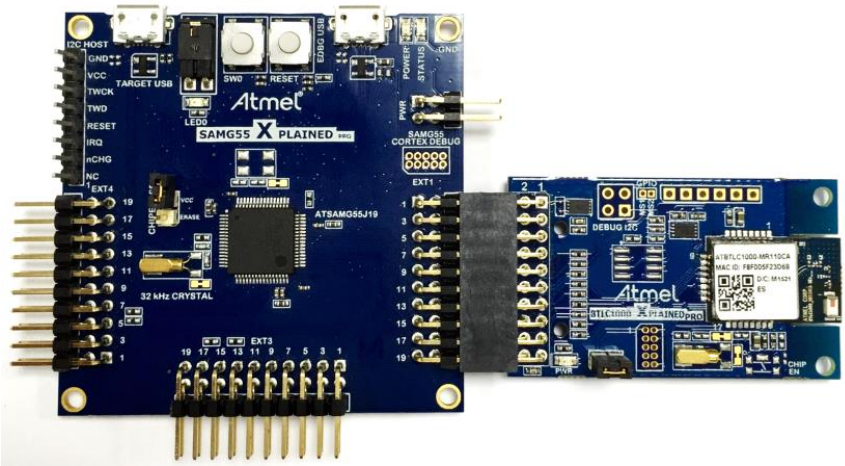
4.2 SAM D21 Xplained Pro HID Device Setup

Figure 4-2. BTLC1000 Xplained Pro Extension Connected to a SAM D21 Xplained Pro



4.3 SAM G55 Xplained Pro HID Device Setup

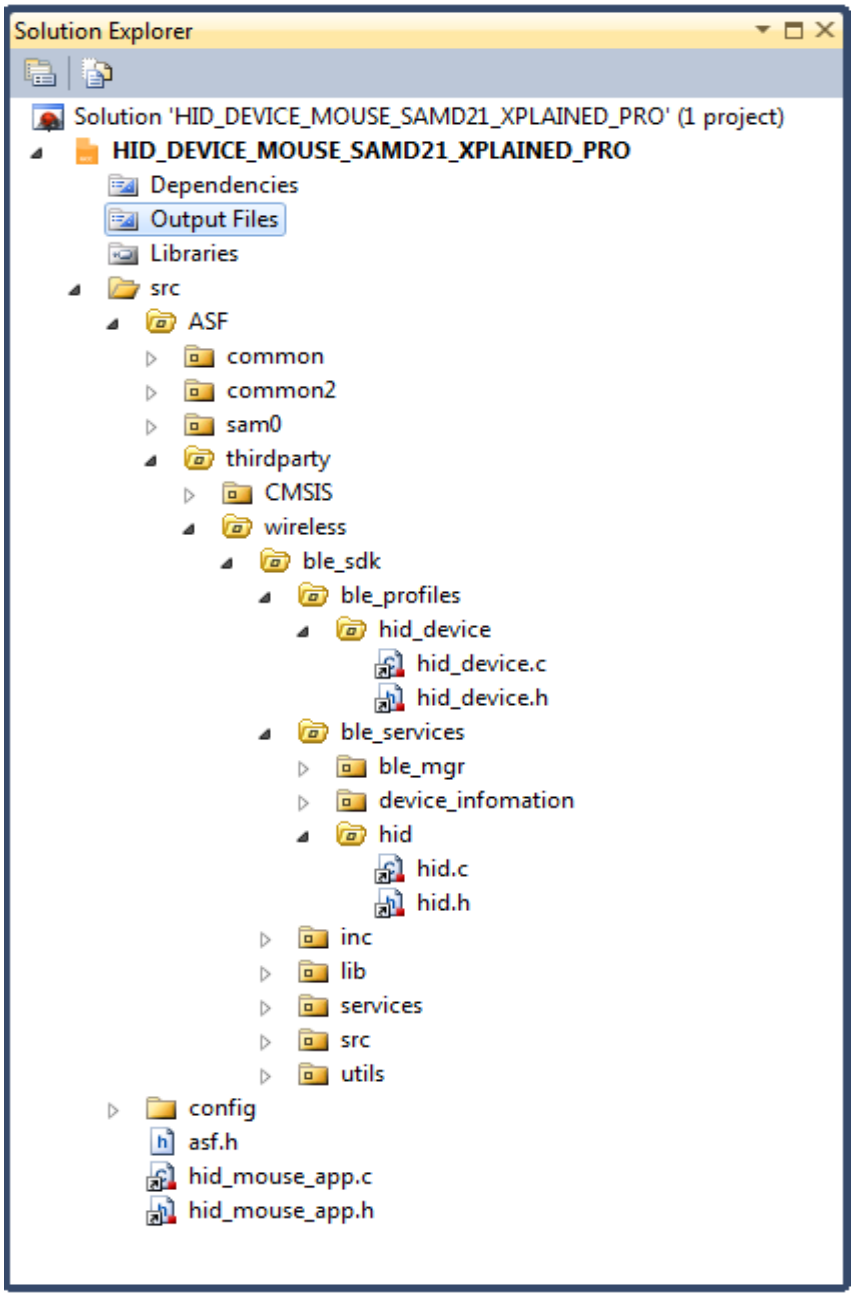
Figure 4-3. ATBTLC1000 Xplained Pro Extension Connected to a SAM G55 Xplained Pro



5 Configuration for HID Mouse Application

The user may need to modify few macros in hid_device.h (HID Profile) for configuring the profile for HID Mouse application as per the desired application use-case.

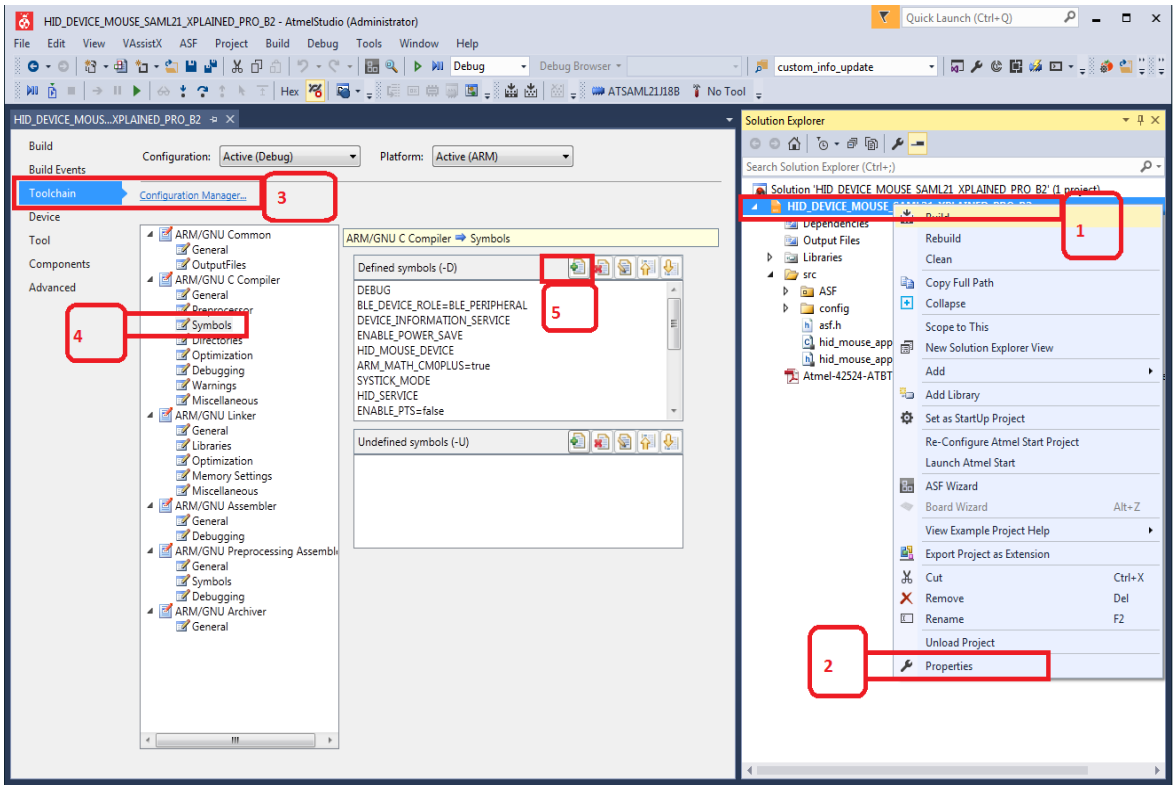
Figure 5-1. HID Code Hierarchy



List of macro need to be modified by user mentioned below:

1. By default the application supports Report mode. In the case the application requires support for only boot mode, the user can add the macro "BOOT_MODE" in the compiler/symbols tabs shown below

Figure 5-2. Enabling Boot Mode Support



2. User should configure the desired number of reports to be supported support in the application. Currently the maximum number of report supported is 10.

```
#define HID_NUM_OF_REPORT                (1)
```

3. User should configure the desired number of service instances. Currently the maximum number of service supported is 2.

```
#define HID_SERV_INST                    (1)
```

6 Software Setup

6.1 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 part pack is built-in as part of Atmel Studio 7.0)
2. Atmel USB Driver Installer from 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 ASF msi package will install the following examples within the Atmel Studio environment.

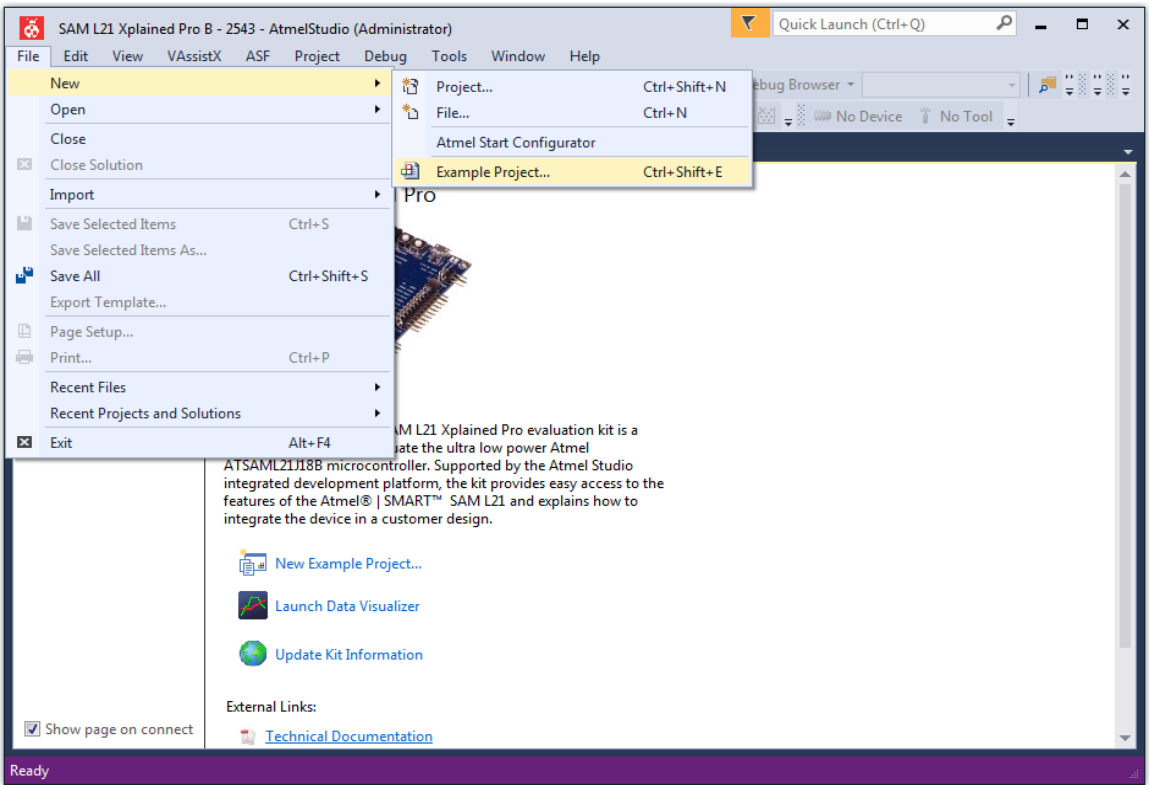
1. HID Profile Device Application for SAM L21.
2. HID Profile Device Application for SAM D21.
3. HID Profile Device Application for SAM G55.

6.2 Build Procedure

The following procedure is explained for SAML21 application example. The same procedure is valid for the case of all the other supported platform as well.

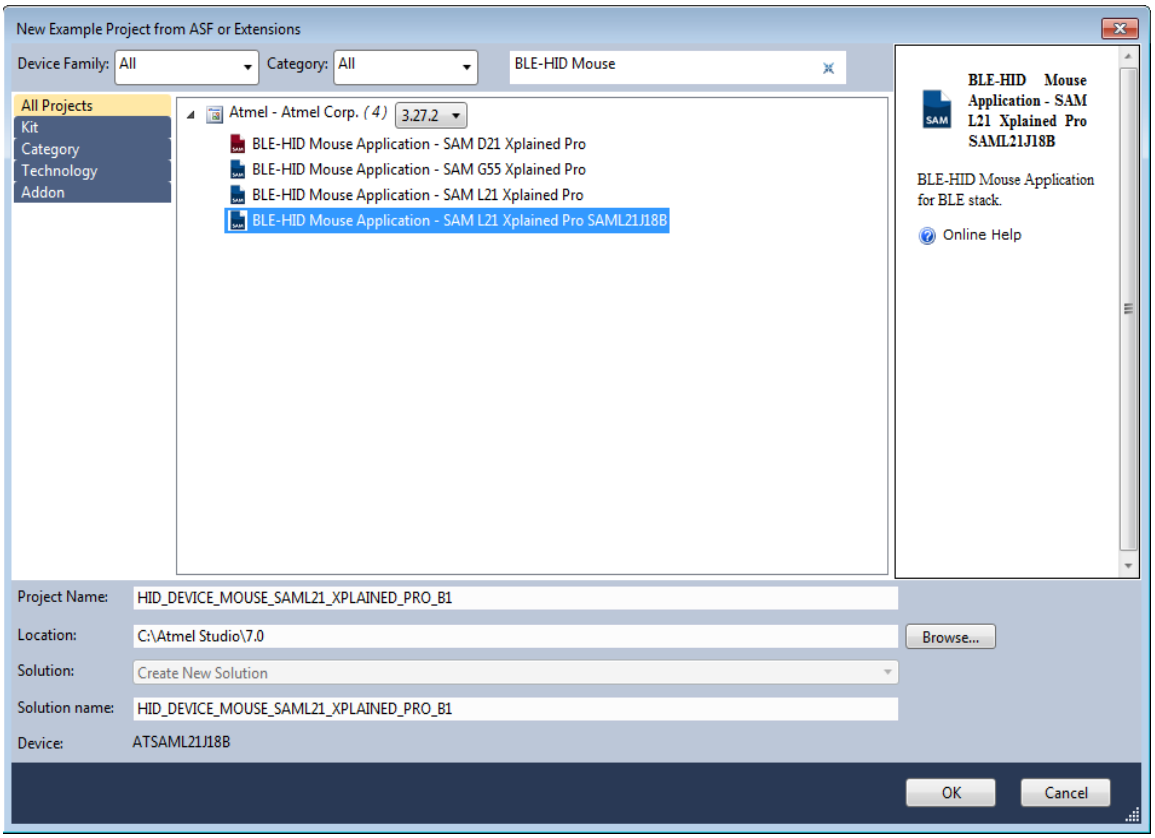
1. Select New Example Project.

Figure 6-1. Creating a New Project



2. Enter “BLE-HID” 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**.

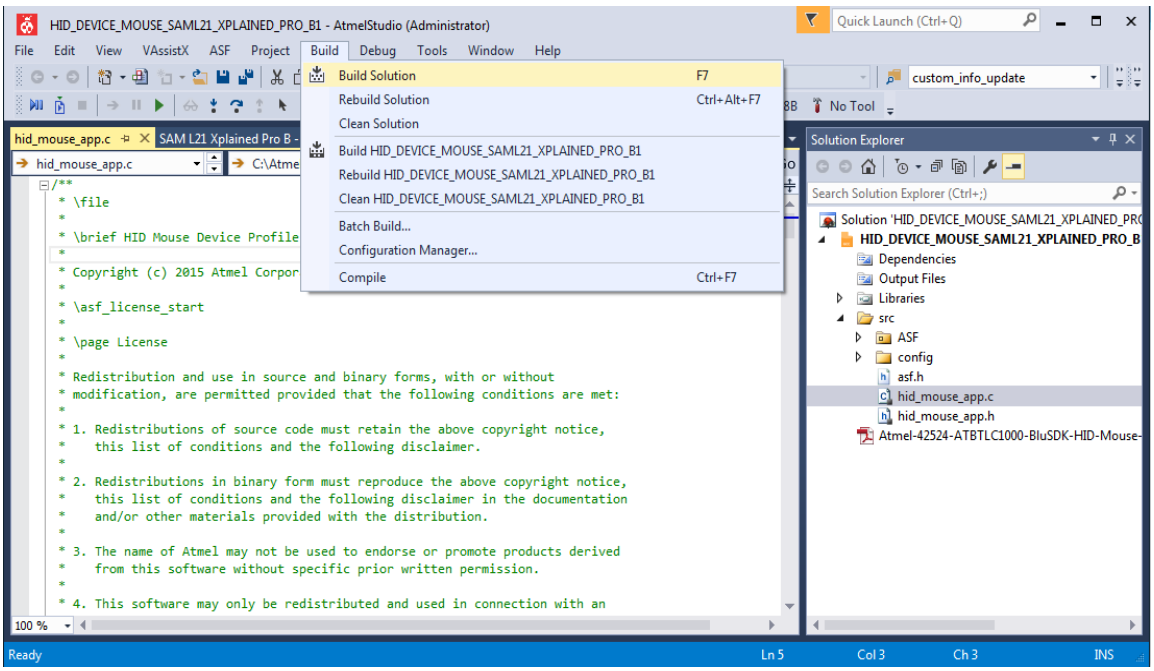
Figure 6-2. Selecting HID Device Application from Example Projects



3. Accept the license Agreement. The studio will generate the BLE-HID Mouse project for SAM L21.

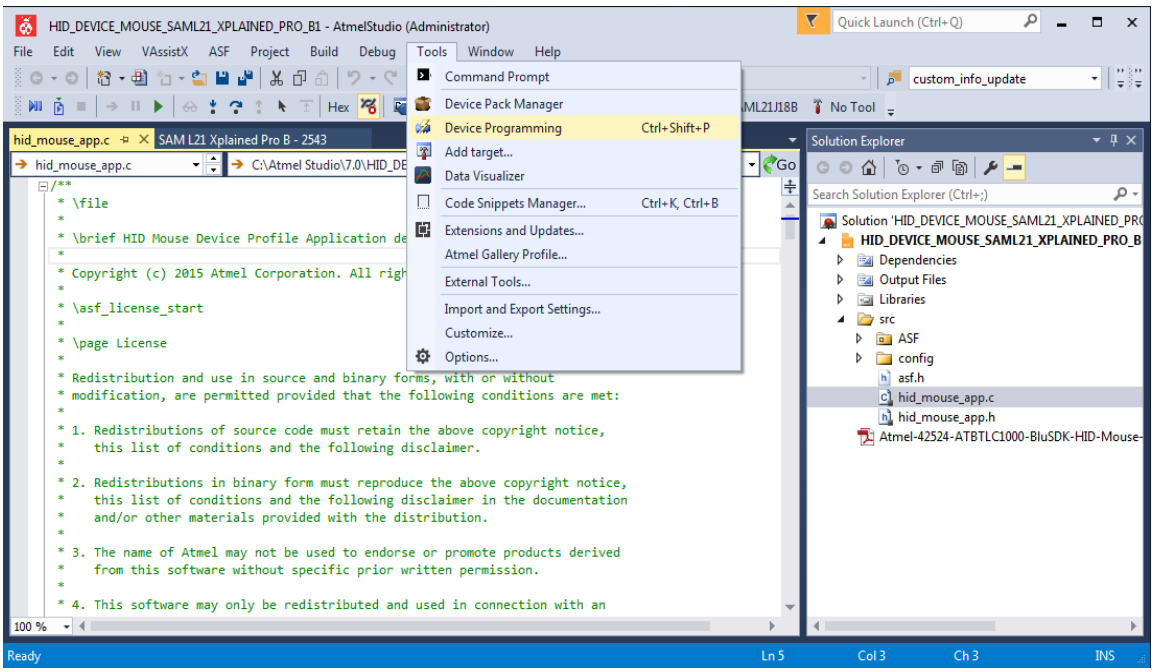
4. Building the solution.

Figure 6-3. Building the HID Device Application



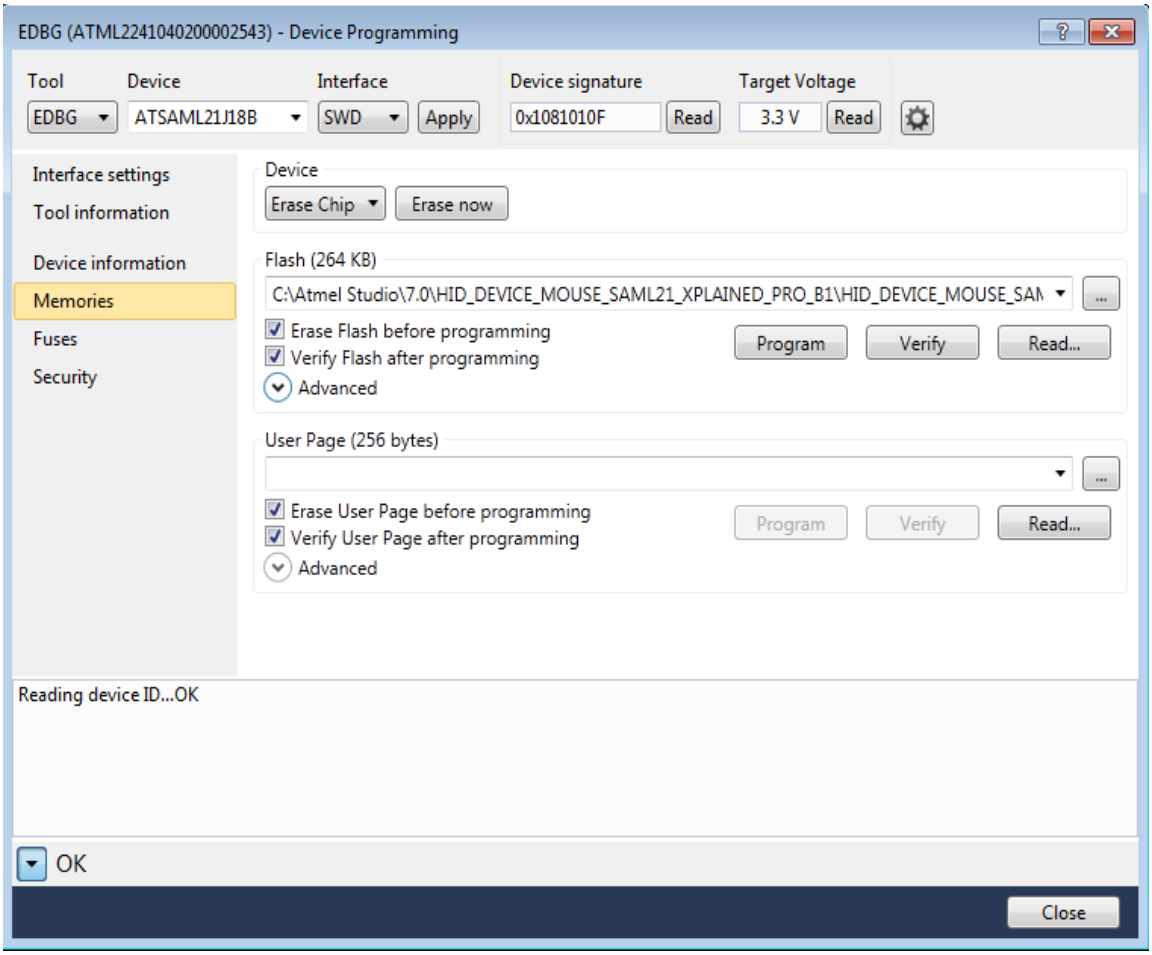
5. Download the application via the DEBUG USB to the SAM L21 board using Device Programming option available in Tools as shown below

Figure 6-4. Selecting Device Programming Option



6. Program the device to download the HID Device application as shown below.

Figure 6-5. Flashing the Application on Atmel MCU



7 Console Logging

For the purpose of debugging, logging is made available through a serial console. The logging interface utilizes the same COM port that connects to supported platform (see Chapter 3). A serial port monitor application (for example TeraTerm) shall be opened and attached to the appropriate COM port enumerated by the device on the PC.

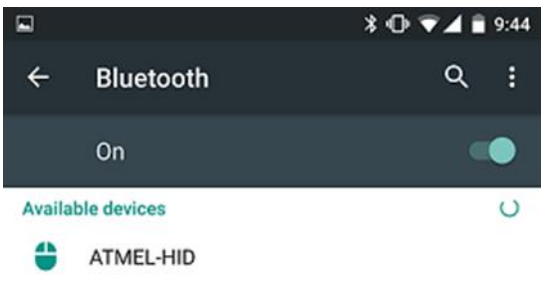
8 Running the Demo

1. Connect the ATBTLC1000 Xplained Pro Board to SAM L21 Xplained Pro EXT1 as indicated in Figure 4-1. (The steps mentioned below use SAM L21 as reference. If SAM G55 or SAM D21 is used for the demo, the same steps are applicable.)
2. Power on the SAM L21 by connecting the USB Cable.
3. On the PC, open any Terminal Application (e.g. TeraTerm). Select the appropriate COM Port. (Settings: Baudrate 115200, None Parity, one Stop bit, one Start bit, no Hardware Handshake.)
4. Press the Reset button on the SAM L21 or supported platform (see Chapter 3) board.
5. The device is now in advertising mode as shown below.

Figure 8-1. HID Mouse Device in Advertising Mode

6. The demo requires use of an Android mobile phone supporting HOGP. The HOGP profile is natively supported in Android from version 4.4 (Android KitKat) and upwards. The phone must include support a Bluetooth chipset supporting BT 4.0 or upwards on the mobile phone, In Bluetooth settings scan for the devices, device with “ATMEL-HID” will be found as shown below. Click on “ATMEL-HID” to get connected.

Figure 8-2. Atmel HID (Mouse) Device Discovery on Bluetooth Settings Page



7. Once the user clicks on “ATMEL-HID”, pairing procedure started.

Figure 8-3. Pairing Process with HID Device

```
Initializing HID Mouse Application
HID Profile Configured
Initializing BTLC1000
BD Address:0xF8F005F23E03, Address Type:0
 Library Descriptor Handle 15
Device Started Advertisement
Connected to peer device with address 0x49c89f34a2b7
Connection Handle 0
Peer device request pairing
Sending pairing response
Please Enter the following Pass-code(on other Device):123456
```

Figure 8-4. Enter PIN as Indicated by the Terminal Console on the Device Side

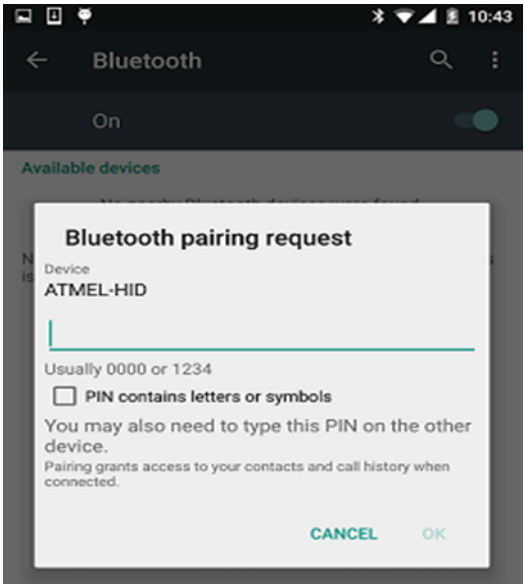
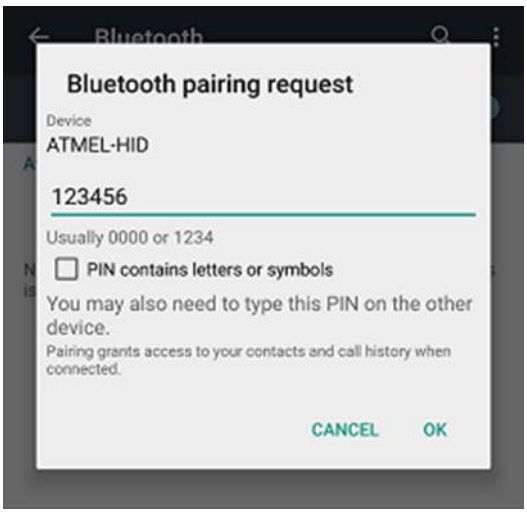
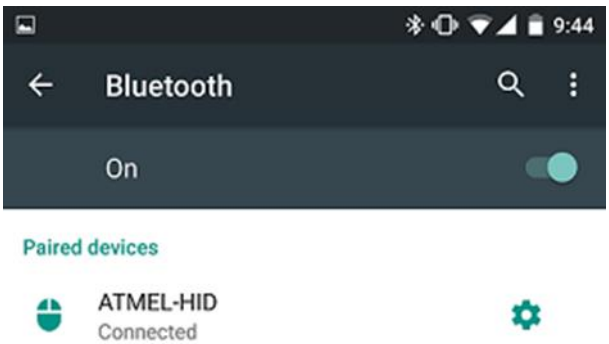


Figure 8-5. Click OK to Start Pairing



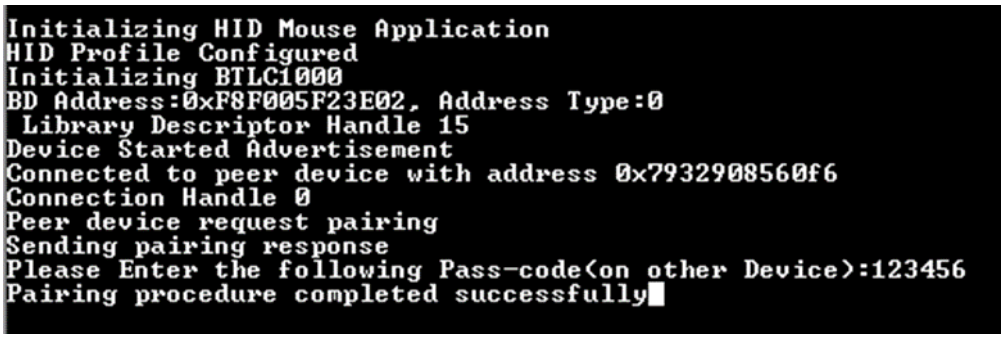
8. Once the pairing done connected device is listed in paired device.

Figure 8-6. ATMEL-HID Device Shown as Connected



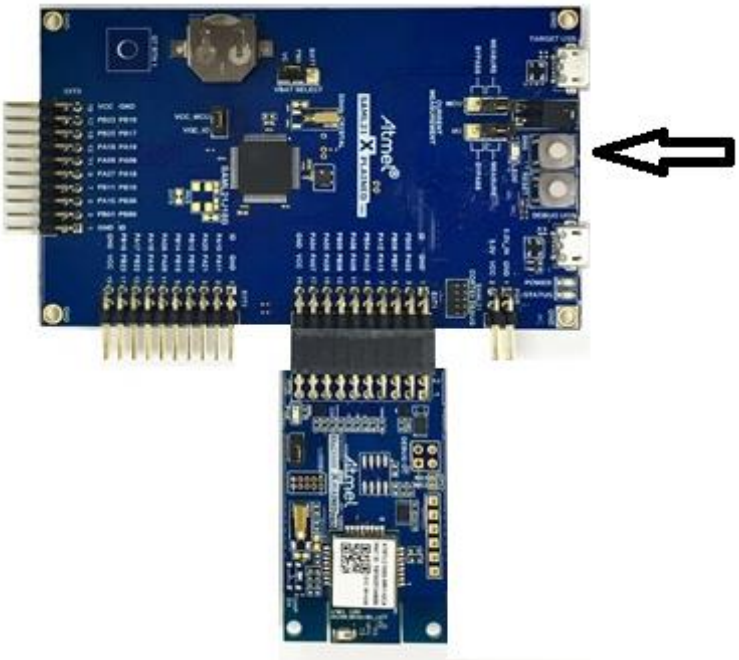
9. Console log on HID device side for pairing and connection procedure.

Figure 8-7. HID Mouse Device Console Log after Connection and Pairing Completion



10. Once the device connected to host (Phone). User can click on SW0 button for simulating mouse movement.

Figure 8-8. SW0 Button for Mouse Movement Simulation



11. For every press on button, the user can see corresponding cursor movement on HID host as described below:

First 5 Button Press:	Cursor moves right
Next 5 Button Press:	Cursor moved down
Next 5 Button Press:	Cursor moves left
Next 5 Button Press:	Cursor moved up

The same sequence is repeated based on user input. A snapshot of the console logs are shown below.

Figure 8-9. HID Device Console Log for Movement

Figure 8-10. Mouse Cursor Position on Phone

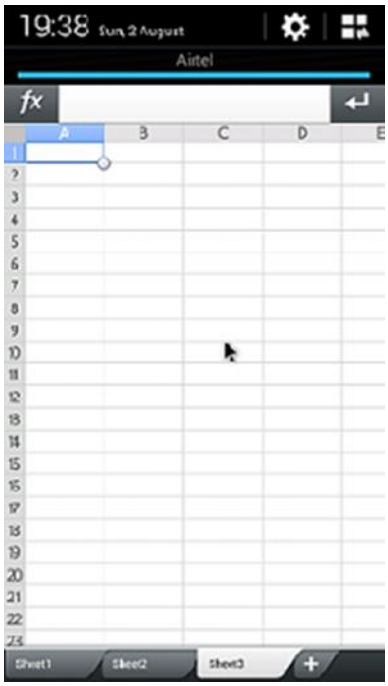
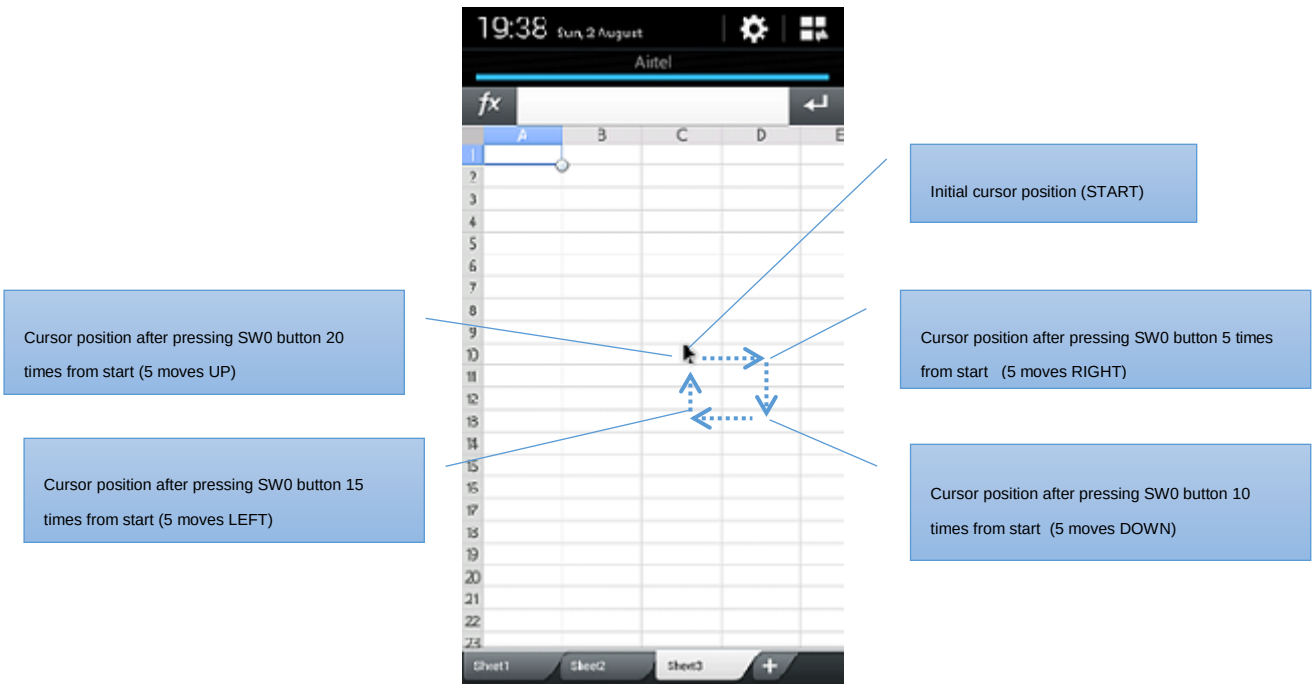


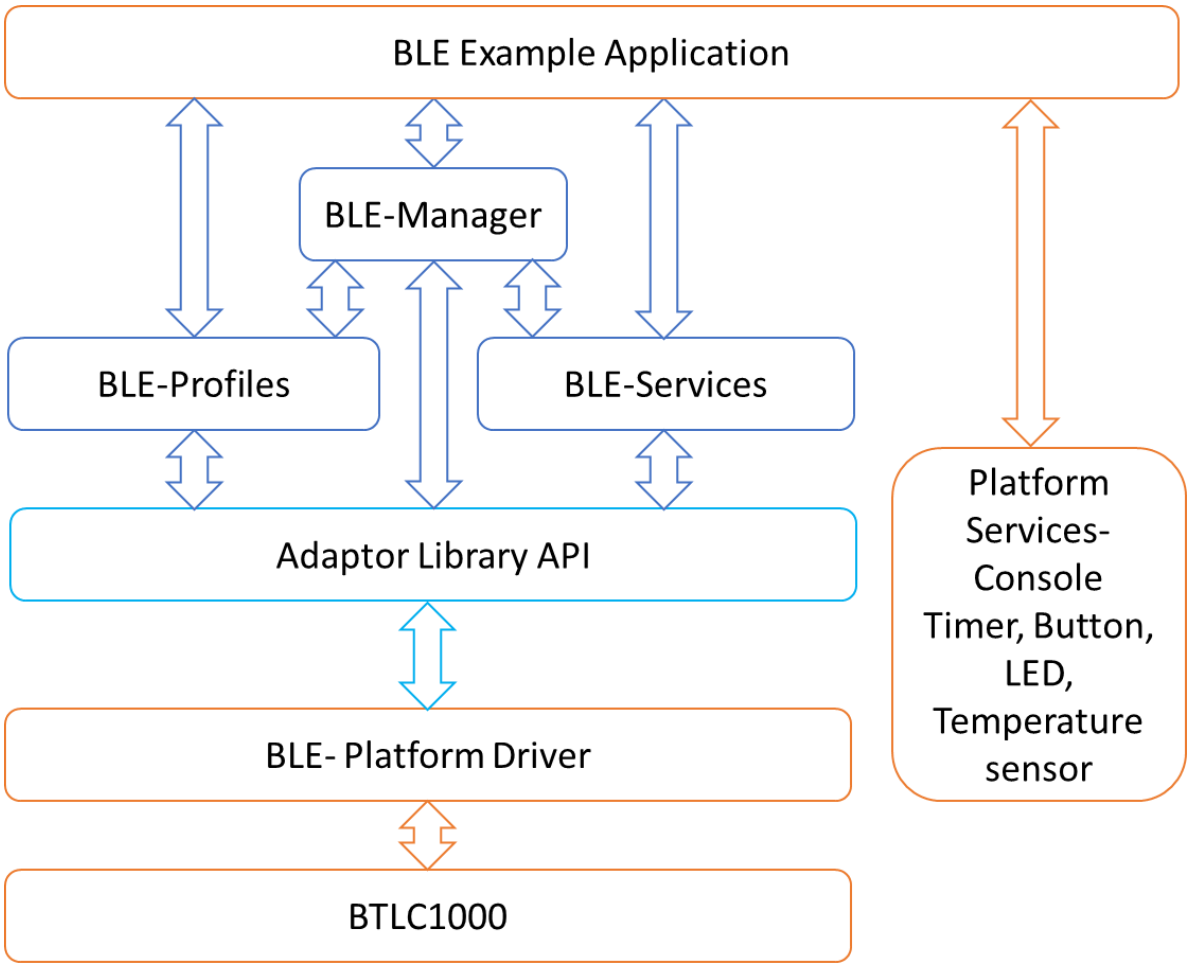
Figure 8-11. Mouse Move Simulation



9 BluSDK Software Architecture

The following diagram illustrates the various layers in the BLE subsystem for the ATBTLC1000 configuration. The External host can be supported platform.

Figure 9-1. BluSDK Software Architecture



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11 Revision History

Doc Rev.	Date	Comments
42524B	11/2015	Figure 3-1 is updated. The screenshots in Chapter 6 are updated.
42524A	09/2015	Initial document release.

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