

Introduction

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.)

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

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

The HID Keyboard device application example supports the following characteristics for HID service:

- Protocol Mode
- Report
- Report Map
- Boot Keyboard Input Report
- Boot Keyboard Output Report
- HID Information
- HID Control Point

For the purpose of demonstration, the example application simulates a function of a keyboard. The HID Keyboard app on ATSAMB11 has a pre-determined set of characters, "Hello Atmel®". Once the handshake and connection procedure between a mobile phone and the ATSAMB11 emulating a keyboard device example is completed, you can press the SW0 button on SAMB11 to send the characters that can be seen on any standard text editor on the mobile phone.

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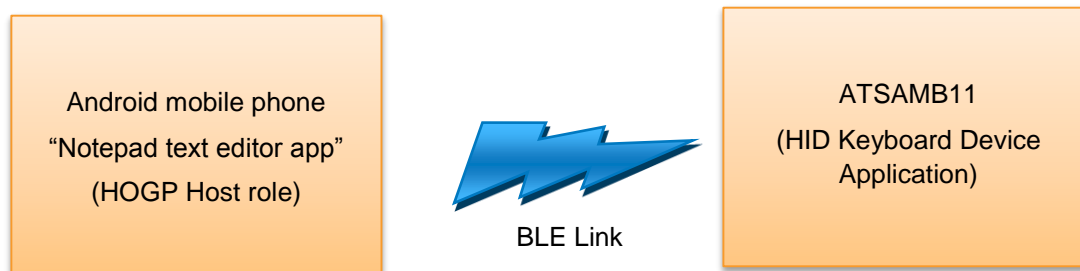
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1 Purpose

This getting started guide describes the setup of an Atmel ATSAMB11 Xplained board and bringing up an example profile supplied as part of BluSDK SMART release. This document explains the bring-up of HOGP Keyboard device example application that is embedded as part of the software release package.

2 Demo Setup

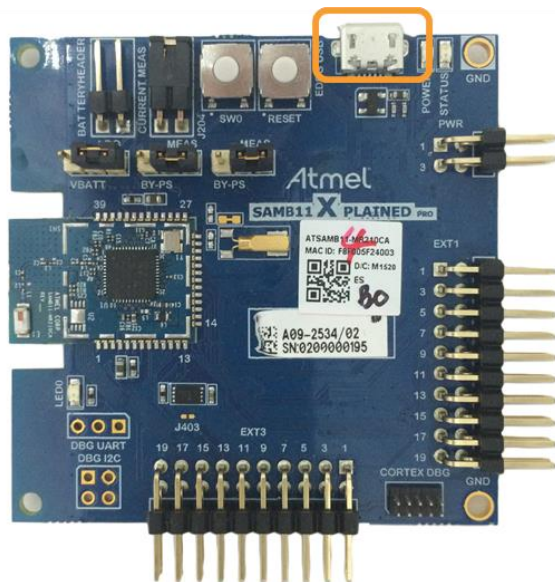
Figure 2-1. Demo Setup of the HID Keyboard Device Application on ATSAMB11



3 Hardware Setup

Connect the ATSAMB11 board to the host PC using a Micro-USB cable.

Figure 3-1. EDBG USB Port



4 Software Setup

4.1 Installation Steps

1. Install the latest Atmel Studio [Atmel Studio 7.0 (build 629 or later) web installer (recommended)]
<http://www.atmel.com/tools/ATMELSTUDIO.aspx>.

2. Install the latest Atmel Software Framework.

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

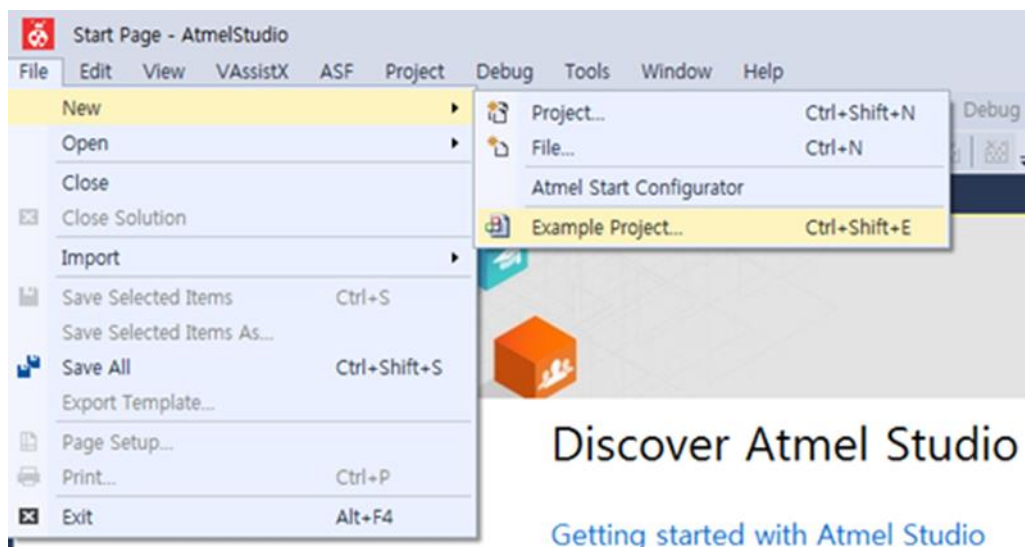
- HID Device Application for ATSAMB11

4.2 Build Procedure

The following procedure is explained for ATSAMB11 application example.

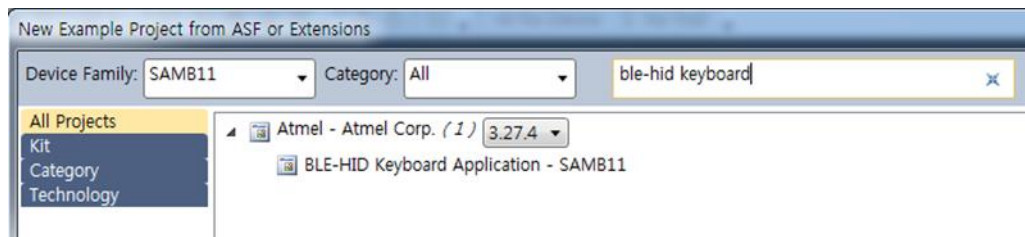
1. Select New Example Project.

Figure 4-1. Creating a New Example Project



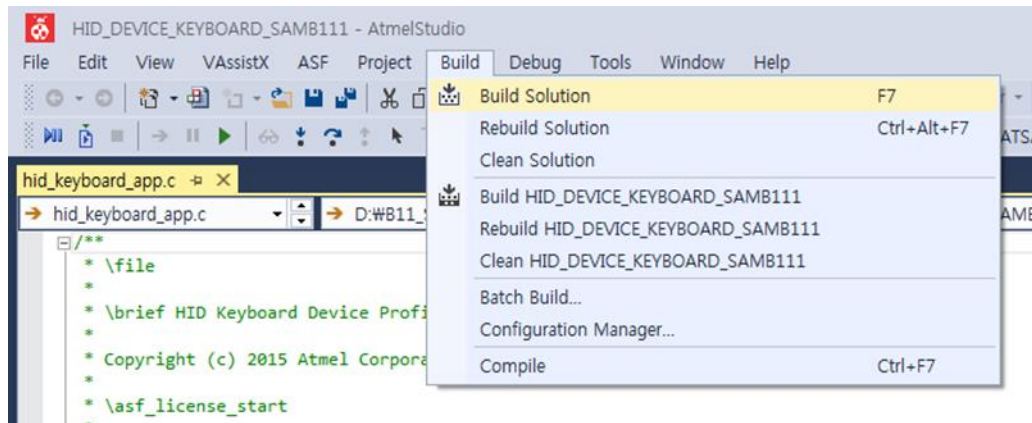
2. Select "SAMB11" in device family, enter "ble-hid keyboard" in the search window, and expand Atmel Corp Projects. The location and the name of the project can be selected in the respective fields. Click OK.

Figure 4-2. Selecting HID Device Application from Example Projects



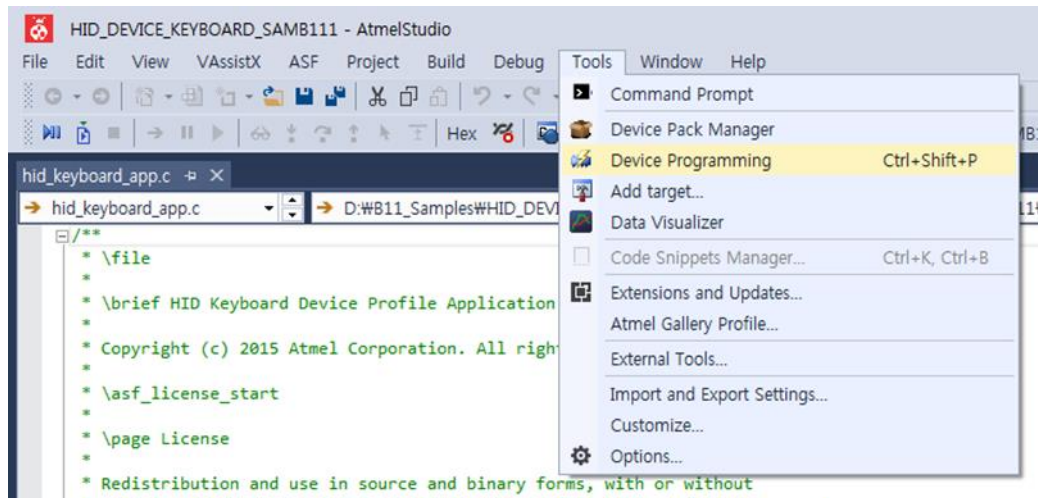
3. Accept the license Agreement. The studio will generate the BLE-HID Keyboard project for ATSAMB11.
4. Build the solution.

Figure 4-3. Building the HID Device Application



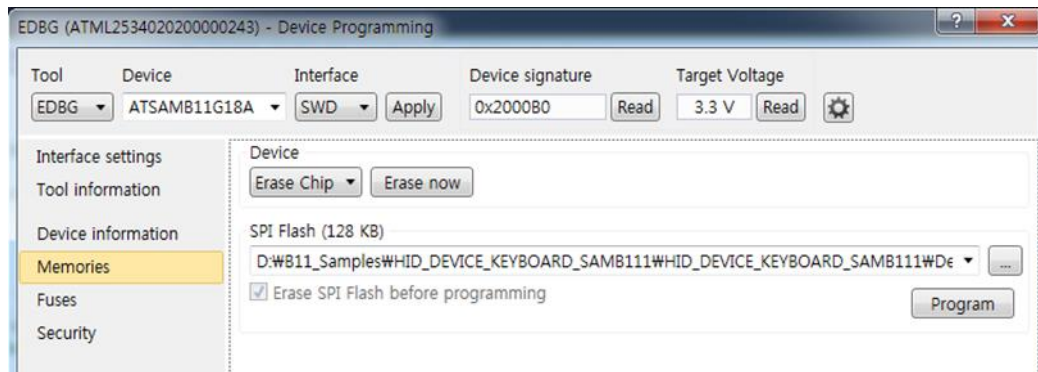
5. Download the application via the USB to the ATSAMB11 board by using the Device Programming option available in Tools as shown below.

Figure 4-4. Selecting Device Programming Option



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

Figure 4-5. Flashing the Application on Atmel MCU



5 Console Display

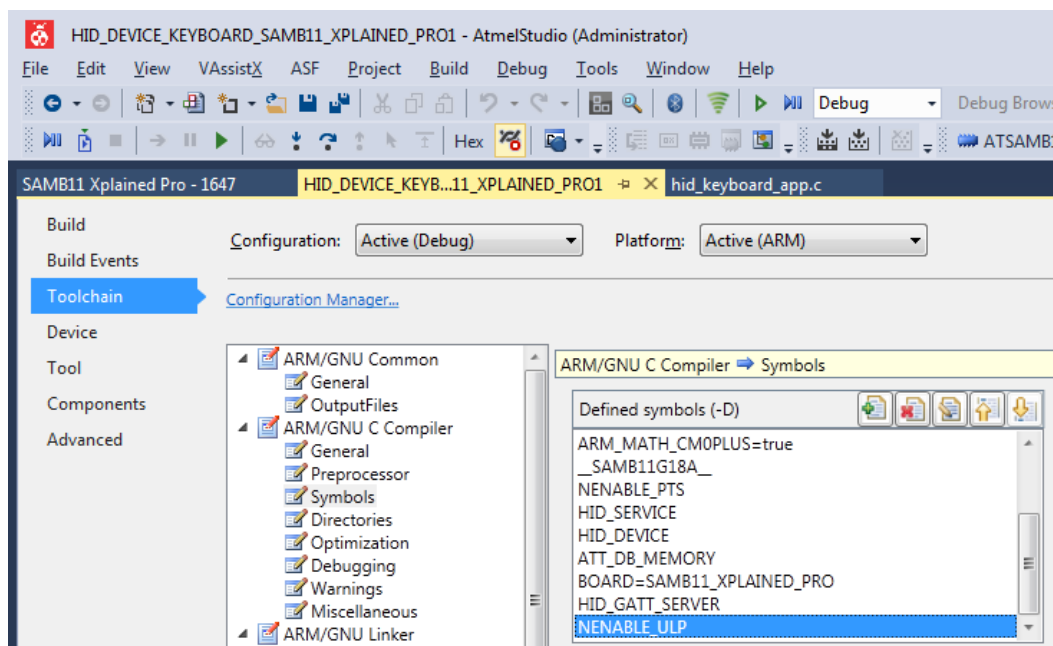
For the purpose of debugging, logging is made available through a serial console. The logging interface utilizes the same COM port that connects to ATSAMB11. A serial port monitor application (for example TeraTerm) shall be opened and attached to the appropriate COM port enumerated by the device on the PC.

6 Running the Demo

6.1 Disabling ULP mode

1. Before building the project, make sure that `NENABLE_ULP` symbol must be used like the image below.

Figure 6-1. Using `NENABLE_ULP` Symbol Not to Use ULP Mode



2. Power on the ATSAMB11 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 ATSAMB11 board.
5. The board is now in advertising mode as shown below.

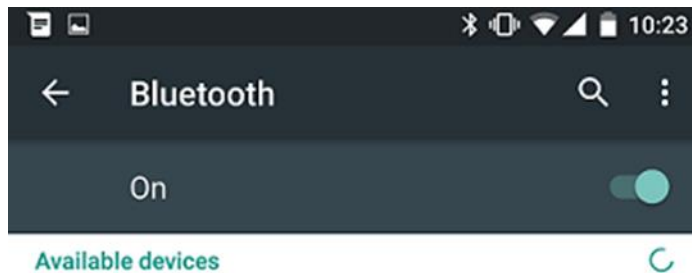
Figure 6-2. HID Keyboard Device in Advertising Mode

```
Initializeing HID Keyboard Application
HID Profile configured
Intializing SAMB11
BD Address:0xA12345678912, Address Type:0
Device Started Advertisement
```

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. On the mobile phone,

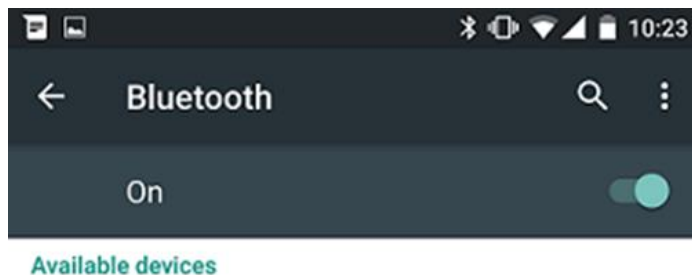
go to the Bluetooth settings page and scan for the devices. A device with “ATMEL-HID” will be found as shown below. Click on “ATMEL-HID” to get connected.

Figure 6-3. HID Keyboard Instance on Bluetooth Setting Page



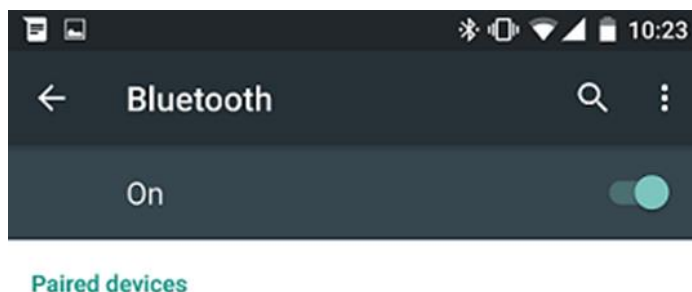
7. Once the user clicks on “ATMEL-HID”, the pairing procedure is initiated.

Figure 6-4. Pairing Procedure with HID Device



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

Figure 6-5. ATMEL-HID Device Shown as Connected



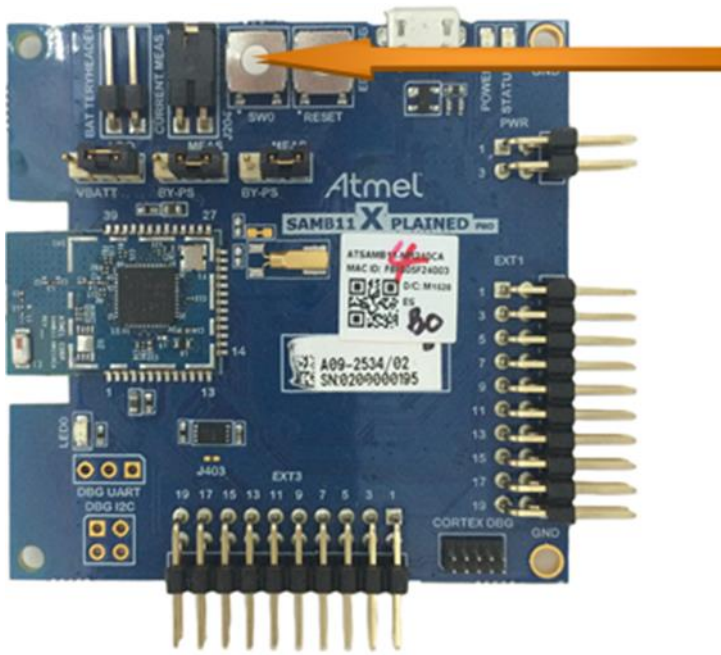
9. Console logs showing the device connected to the peer.

Figure 6-6. HID Keyboard Device Connected

```
Initializing HID Keyboard Application
HID Profile configured
Initializing SAMB11
BD Address:0xA12345678912, Address Type:0
Device Started Advertisement
Connected to peer device with address 0x142312312112
Connection Handle 0
Pairing procedure completed successfully
```

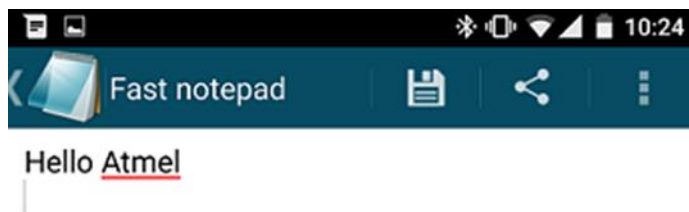
10. Once the device is connected, start any notepad application on the mobile phone.
11. Click the button "SW0" on ATSAMB11 as shown below.

Figure 6-7. Button "SW0" on ATSAMB11



12. The user can see a letter for each press in the application "Fast notepad" as shown below.
13. The user can see a complete "Hello Atmel" as shown below.

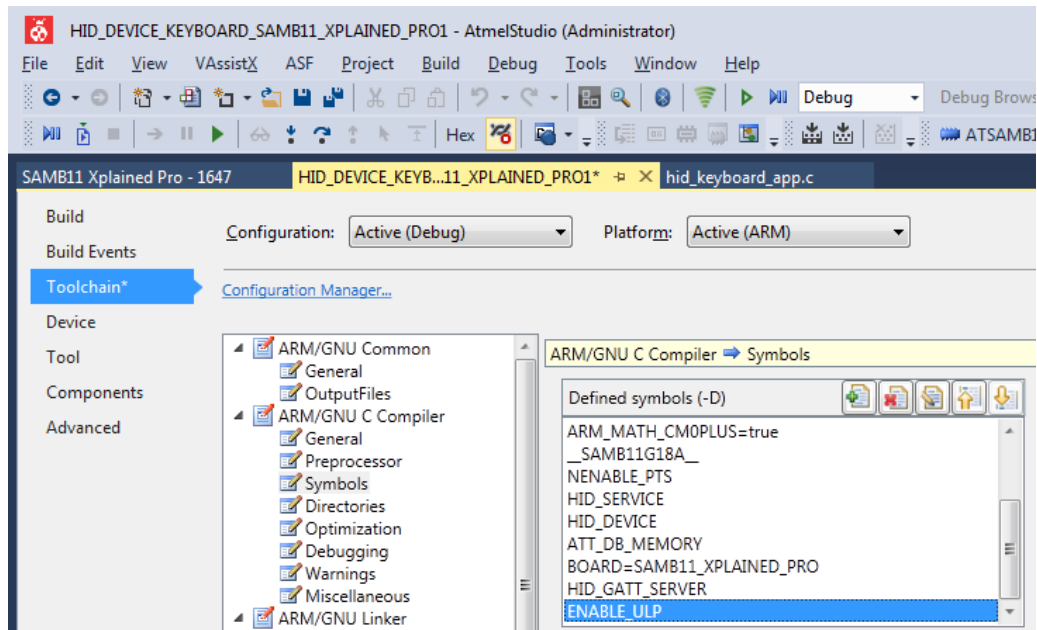
Figure 6-8. "Hello Atmel" Displayed in the Application



6.2 Enabling ULP Mode

1. Before building the project, make sure that ENABLE_ULP symbol must be used like the image below.

Figure 6-9. Using ENABLE_ULP Symbol to Use ULP Mode



2. Configure the circuit below with a switch.

Figure 6-10. Materials, Cables and a Switch

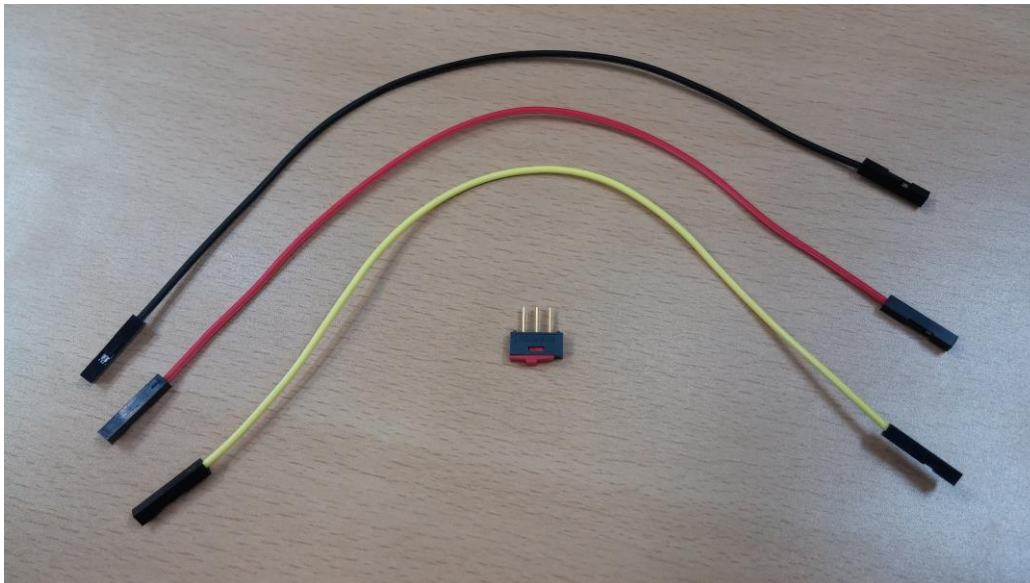
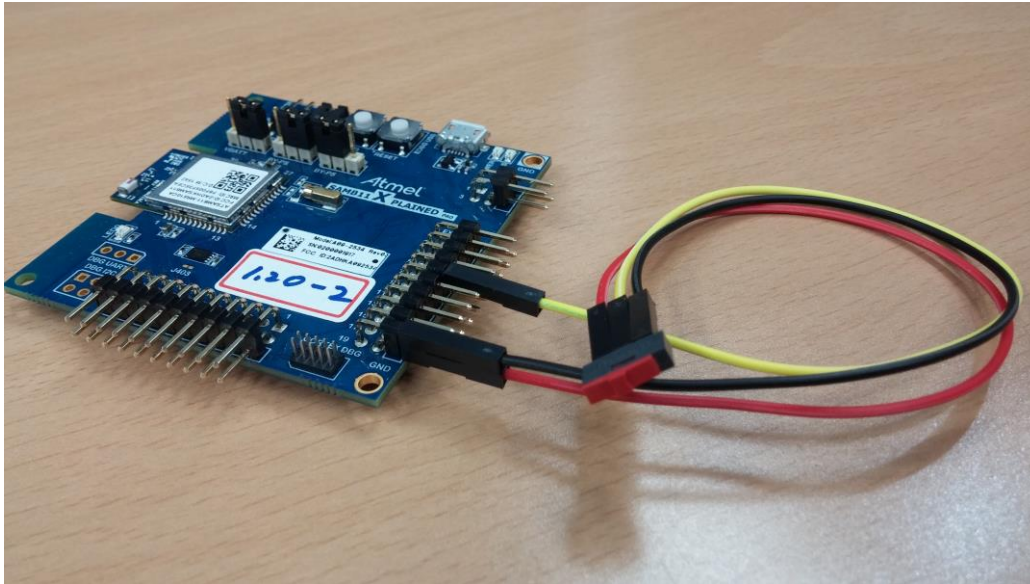


Figure 6-11. The Circuit to Control ULP Mode



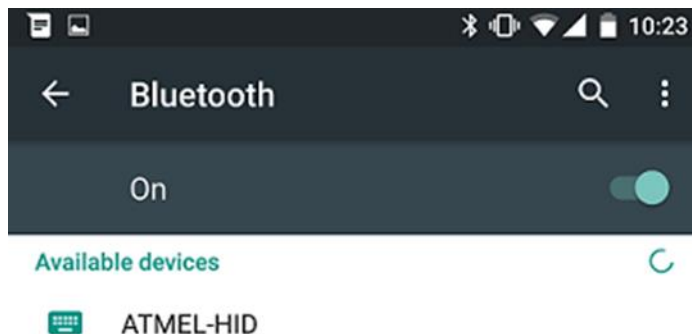
3. Adjust the switch to connect pin 9 (AON_GPIO_0) to pin 19 (GND) to enable ULP mode.
4. Power on the ATSAM-B11 by connecting the USB cable.
5. On the PC, open any Terminal Application (e.g. TeraTerm). Select the appropriate COM Port (Settings: Baudrate 115200, None Parity, one Stop bit, one Start bit, no Hardware Handshake).
6. Press the Reset button on the ATSAM-B11 board.
7. The board is now in advertising mode as shown below.

Figure 6-12. HID Keyboard Device in Advertising Mode

```
Initializeing HID Keyboard Application
HID Profile configured
Intializing SAMB11
BD Address:0xA12345678912, Address Type:0
Device Started Advertisement
```

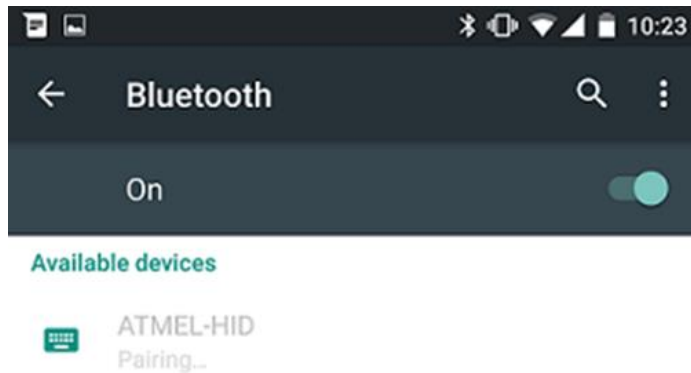
8. The demo requires use of an Android mobile phone supporting HOGP. The HOGP profile is natively supported in Android from version 4.4 (Android KitKat) and upwards. On the mobile phone, go to the Bluetooth settings page and scan for the devices. A device with “ATMEL-HID” will be found as shown below. Click on “ATMEL-HID” to get connected.

Figure 6-13. HID Keyboard Instance on Bluetooth Setting Page



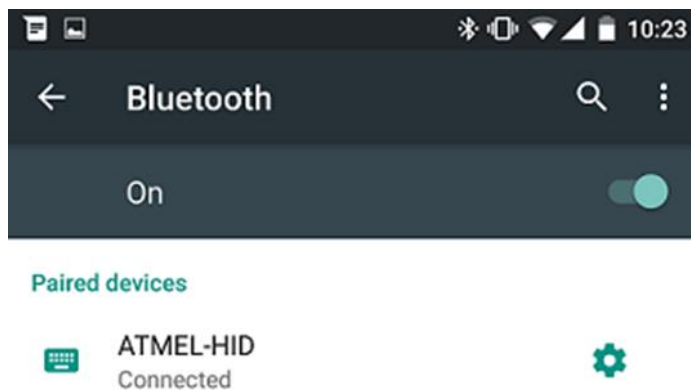
9. Once the user clicks on “ATMEL-HID”, the pairing procedure is initiated.

Figure 6-14. Pairing Procedure with HID Device



10. Once the pairing is done, the connected device is listed in the paired devices section.

Figure 6-15. ATMEL-HID Device Shown as Connected



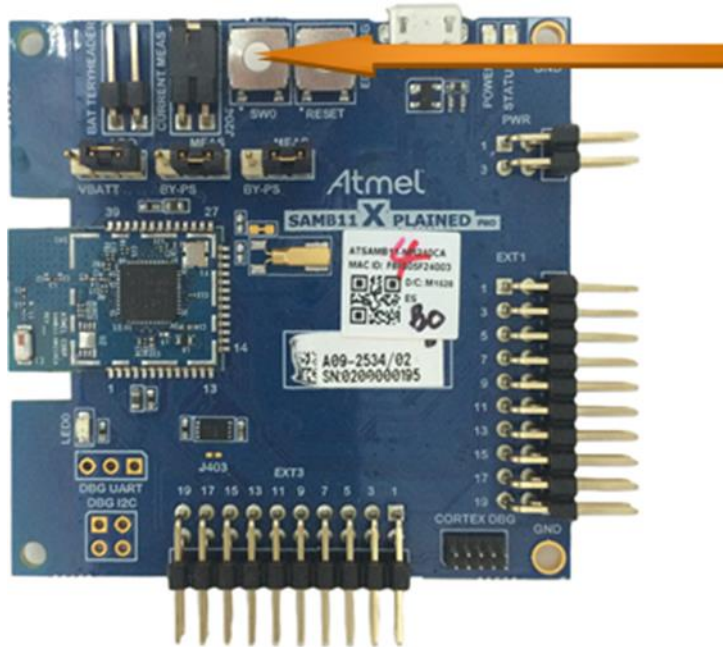
11. Console logs showing the device connected to the peer.

Figure 6-16. HID Keyboard Device Connected

```
Initializeing HID Keyboard Application
HID Profile configured
Intializing SAMB11
BD Address: 0xA12345678912, Address Type:0
Device Started Advertisement
Connected to peer device with address 0x142312312112
Connection Handle = 0
Pairing procedure completed successfully
```

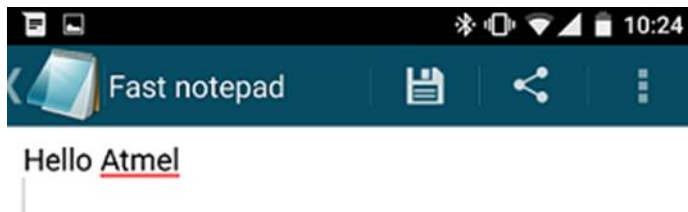
12. Once the device is connected, start any notepad application on the mobile phone.
13. Adjust the switch to connect pin 9 (AON_GPIO_0) to pin 20 (VCC) to disable ULP mode. If user don't do this step, user cannot do next steps.
14. Click the button "SW0" on ATSAMB11 as shown below.

Figure 6-17. Button "SW0" on ATSAMB11



15. The user can see a letter for each press in the application "Fast notepad" as shown below.
16. The user can see a complete "Hello Atmel" as shown below.

Figure 6-18. "Hello Atmel" Displayed in the Application

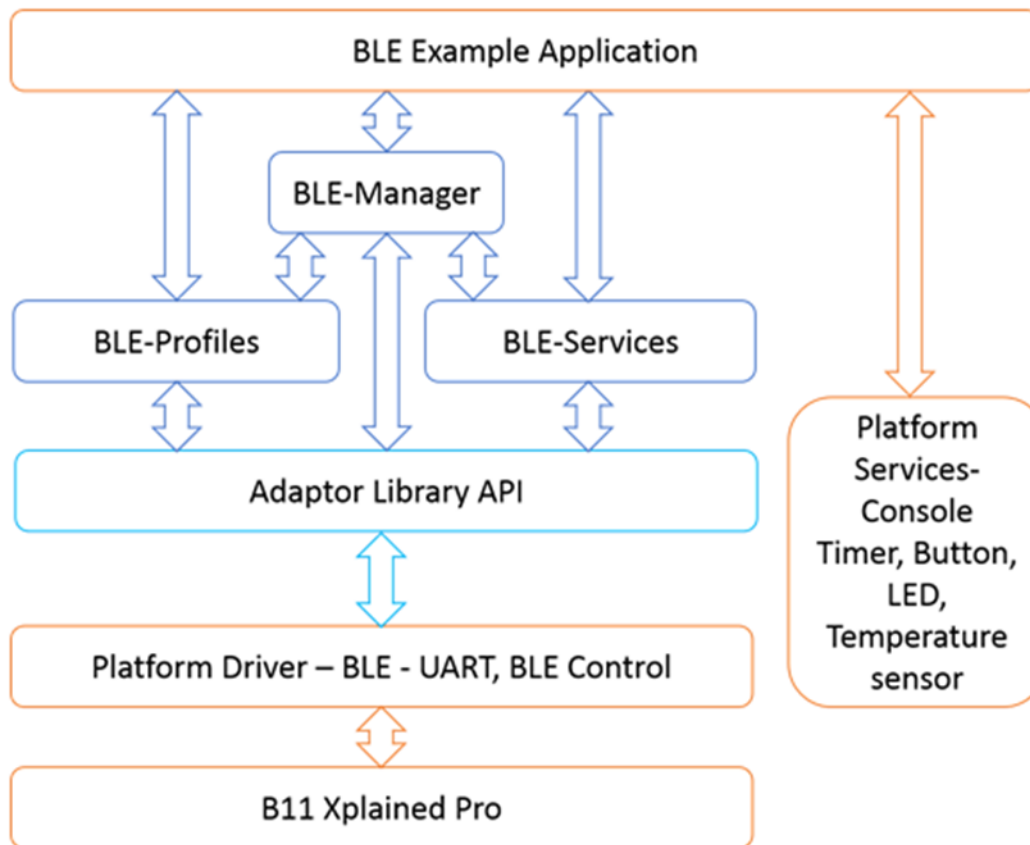


17. For your information, in order to enable ULP mode again, adjust the switch to connect pin 9 (AON_GPIO_0) to pin 19 (GND).

7 BluSDK SMART Software Architecture

Figure 7-1 illustrates the top level diagram for the ATSAMB11 configuration.

Figure 7-1. ATSAMB11 Software Architecture



8 **ATMEL EVALUATION BOARD/KIT IMPORTANT NOTICE AND DISCLAIMER**

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9 Revision History

Doc Rev.	Date	Comments
42602B	03/2016	Section 6 is updated.
42602A	11/2015	Initial document release.



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