

Introduction

This guide describes the setup of the Atmel® ATBTLC1000 to be used in conjunction with supported platforms (see [Table 1-1](#)). The Battery Service application is an example application that is embedded as part of the software release package. This document explains the bring-up of the Battery Service example application.

The Battery service application provides the capability to report battery level of the device using the battery characteristics. Any application discovering the database can access the Battery service instance during discovery services.

This document explains the details about:

1. Getting started with the setting up the ATBTLC1000 Xplained Pro board using supported platforms (see [Table 1-1](#)).
2. To get the battery service example application working, connect the ATBTLC1000 Xplained Pro board to supported platforms (see [Table 1-1](#)).

For the purpose of demonstration, the example simulates battery level of the device. The battery level is changed by 1% every second. The range of battery level is from 0% to 100%. At the start of the demo, the battery level is 0%.

Table of Contents

1	Supported Hardware Platforms and IDEs	3
2	Demo Setup.....	3
3	Hardware Setup	4
3.1	SAM L21 Xplained Pro Battery Service Setup.....	4
3.2	SAM D21 Xplained Pro Battery Service Setup	4
3.3	SAM G55 Xplained Pro Battery Service Setup.....	5
3.4	SAM 4S Xplained Pro Battery Service Setup	5
4	Software Setup.....	6
4.1	Installation Steps	6
4.2	Build Procedure.....	7
5	Running the Demo	10
6	Console Logging	13
7	BluSDK Software Architecture.....	14
8	Adding a BLE Standard Service	15
9	ATMEL EVALUATION BOARD/KIT IMPORTANT NOTICE AND DISCLAIMER	20
10	Revision History	21

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



3 Hardware Setup

3.1 SAM L21 Xplained Pro Battery Service Setup

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



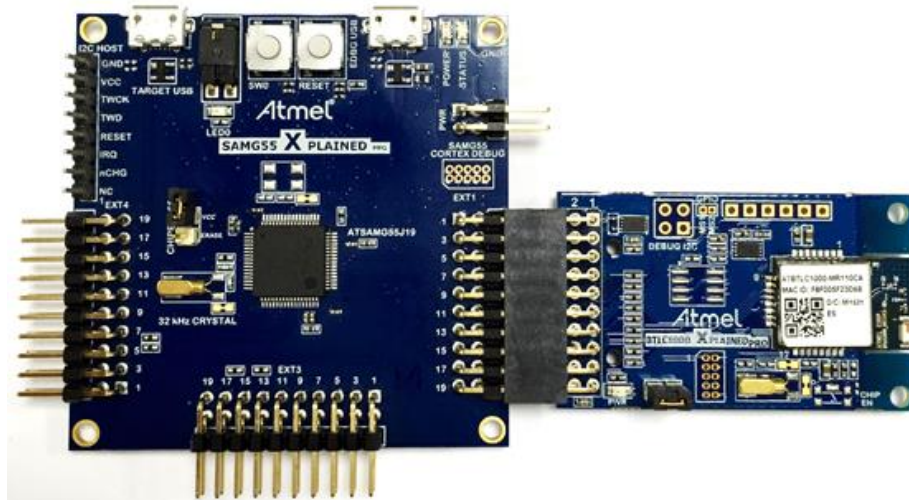
3.2 SAM D21 Xplained Pro Battery Service Setup

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



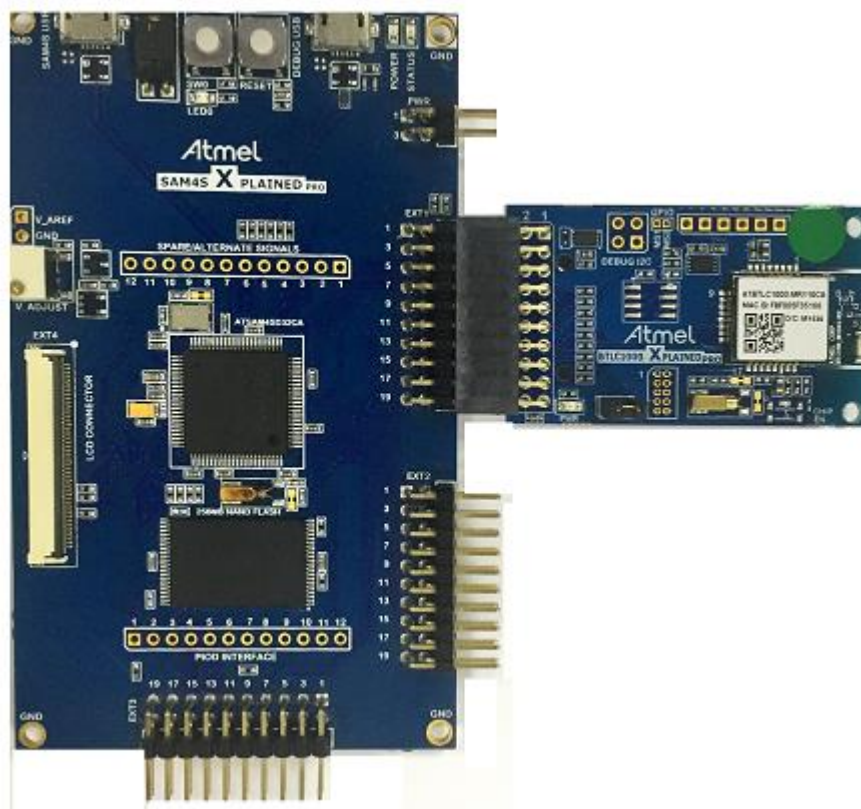
3.3 SAM G55 Xplained Pro Battery Service Setup

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



3.4 SAM 4S Xplained Pro Battery Service 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 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 package will install the following examples within the Atmel Studio environment.

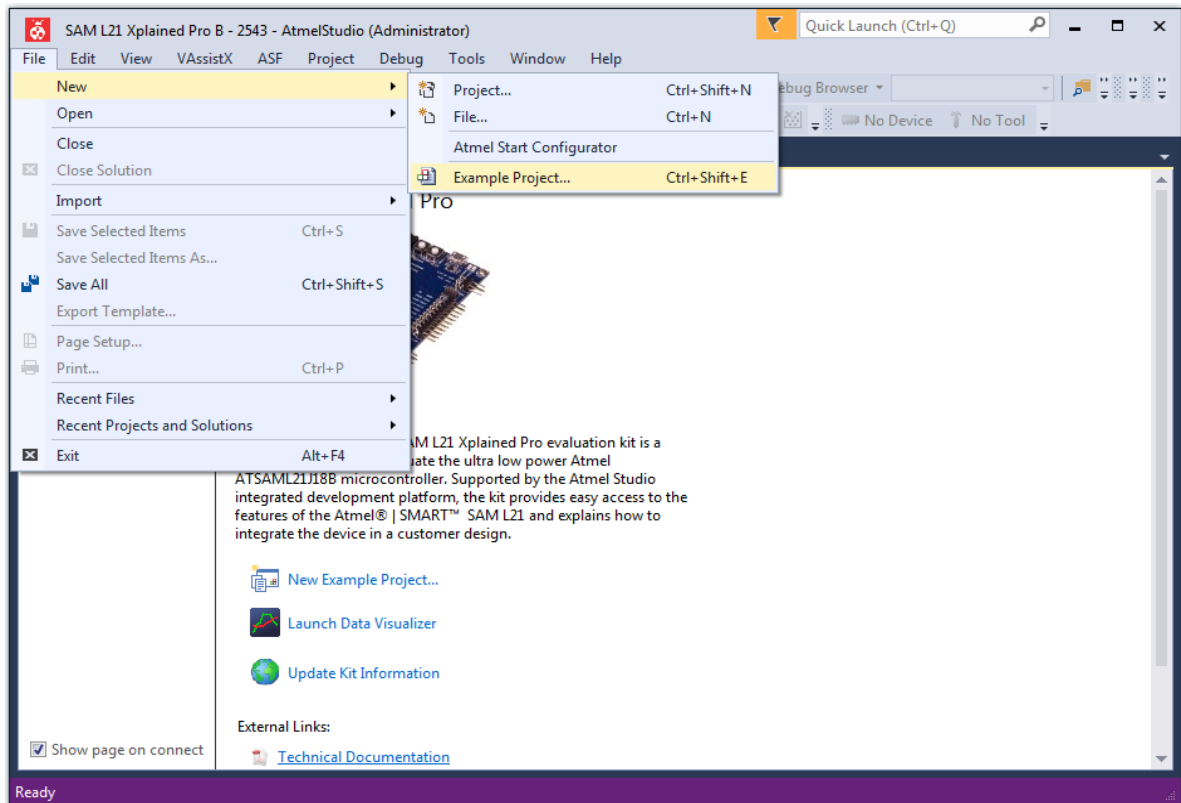
1. Battery Service Application for SAM L21.
2. Battery Service Application for SAM D21.
3. Battery Service Application for SAM G55.
4. Battery Service Application for SAM 4S.

4.2 Build Procedure

The following procedure is explained for SAM L21 application example. The same procedure is valid for the case other supported platforms (see [Table 1-1](#)) as well.

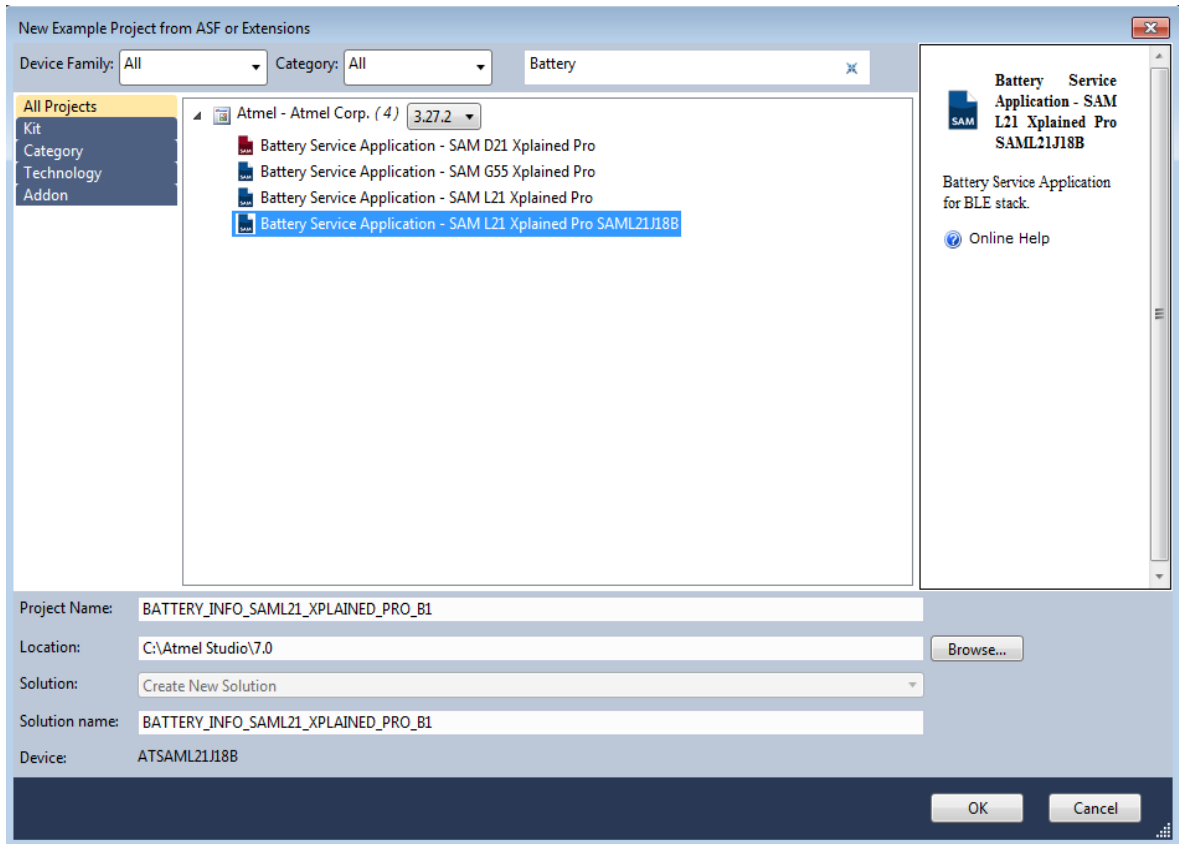
1. Select New Example Project.

Figure 4-1. Creating a New Project



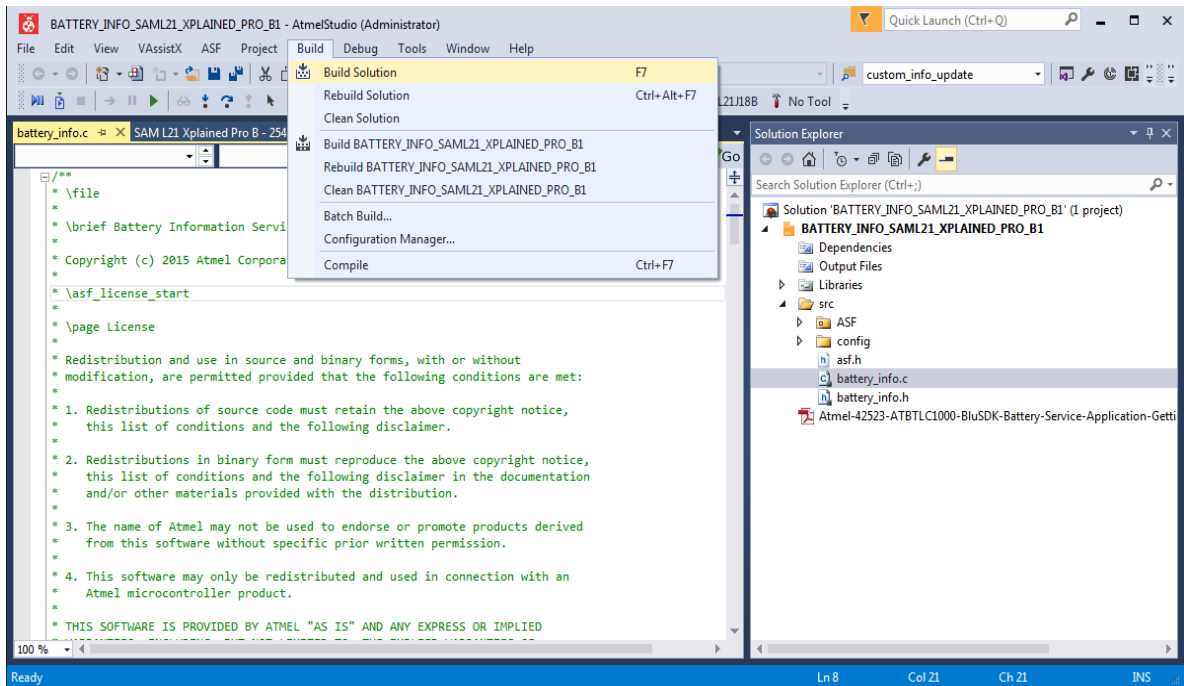
2. In the search box, enter “battery” in the search window and expand Atmel Corp Projects. The location and the name of the project can be selected in the respective fields. Click **OK**.

Figure 4-2. Searching for Battery Service Application Example



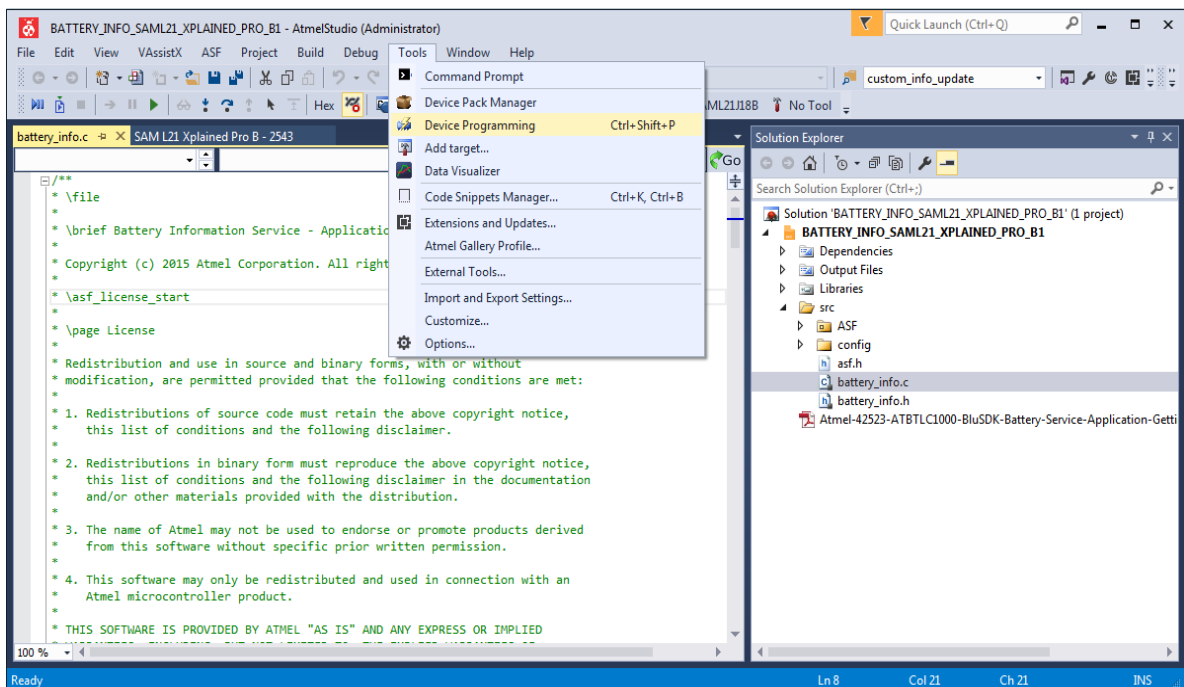
3. Accept the license Agreement. The Atmel Studio will generate the Battery Service Example project for SAM L21.
4. Build the solution by selecting menu option as shown below.

Figure 4-3. Building Battery Service Application



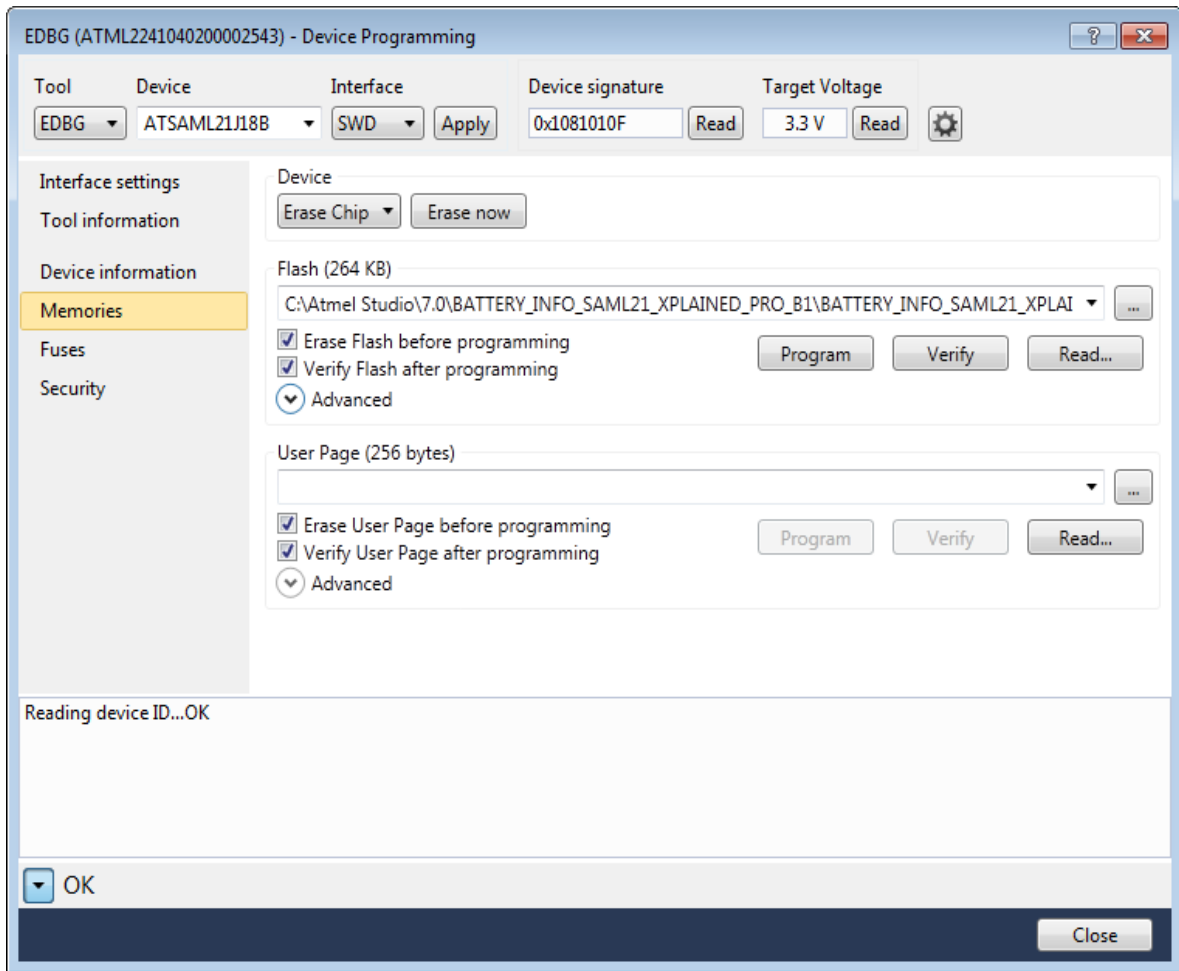
5. Download the application via the DEBUG-USB to the SAM L21 board using Device Programming option available in Tools as mentioned below.

Figure 4-4. Selecting Device Programming



6. Inside device programming the user has to select the correct configuration for the device and finally program the device by clicking the “Program” button.

Figure 4-5. Flash Programming



7. Once the application is flashed, it is ready to be used as a BLE device supporting Battery Service.

5 Running the Demo

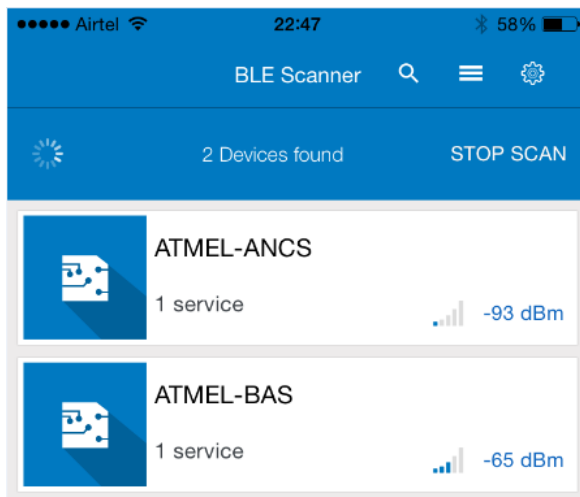
1. Connect the ATBTLC1000 Xplained Pro Board to SAM L21 Xplained Pro EXT1 as indicated in [Figure 3-2](#).
2. Power on the SAM L21 by connecting the USB Cable.
3. Open any Terminal Application (e.g. TeraTerm) Select the COM Port with the following settings: Baudrate 115200, Parity None, one Stop bit, one Start bit, no Hardware Handshake.
4. Press the Reset button on the SAM L21 board or supported platforms (see [Table 1-1](#)).
5. The device is now in advertising mode.

Figure 5-1. Console Display for Device in Advertising Mode

```
Initializing Battery Service Application
Initializing BTLC1000
BD Address:0xF8F005F23E06, Address Type:0
BLE Started Adv
```

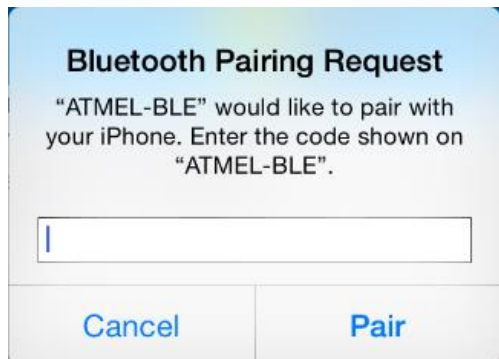
6. Enable Bluetooth® from the Settings page on a BLE compatible Android device or iPhone®. Use the Atmel Smart Connect application to scan for peripheral devices. A device with the name 'ATMEL-BAS' will appear in the list of scanned devices.

Figure 5-2. Atmel-BLE Device Discovered by Atmel Smart Connect Application



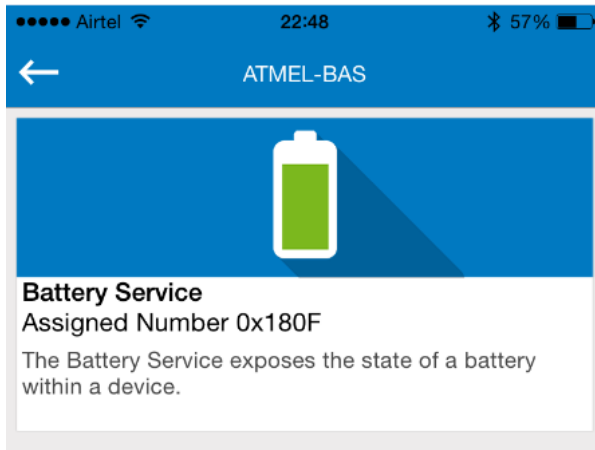
7. Click on the "ATMEL-BAS" device. A pop-up will appear requesting pass-key. Enter "123456" and click on 'Pair'.

Figure 5-3. Pairing Pop-up Screen



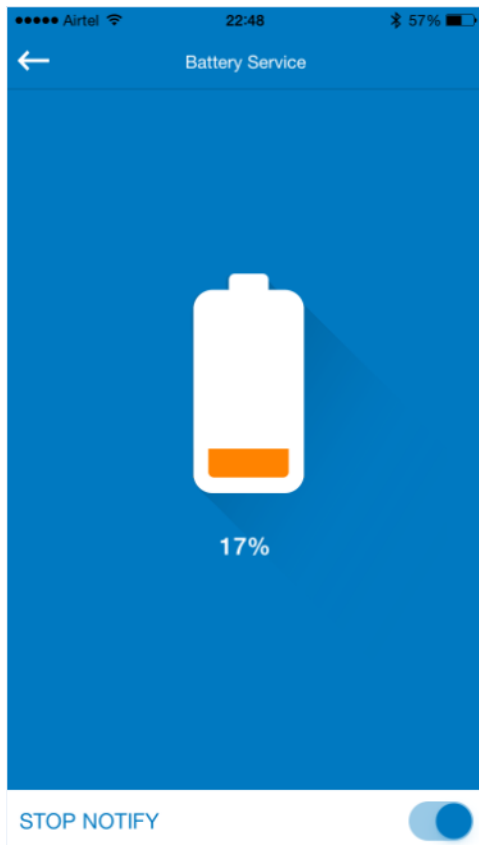
8. Once paired, the application displays the battery service as shown in [Figure 5-4](#).

Figure 5-4. Display of Battery Service



9. Once the “Battery Service” is clicked user gets notifications for battery level characteristic. User can stop receiving the notifications by disabling notifications as shown in [Figure 5-5](#).

Figure 5-5. Battery Level Characteristic Notification Options



6 Console Logging

For the purpose of debugging, a logging interface had been implemented in the Battery Service application. The logging interface utilizes the same EDBG port that connects to supported platforms (see [Table 1-1](#)). A serial port monitor application (e.g. TeraTerm) shall be opened and attached to the EDBG COM port.

[Figure 6-1](#) shows the information about BLE initialization and the periodic battery level updates.

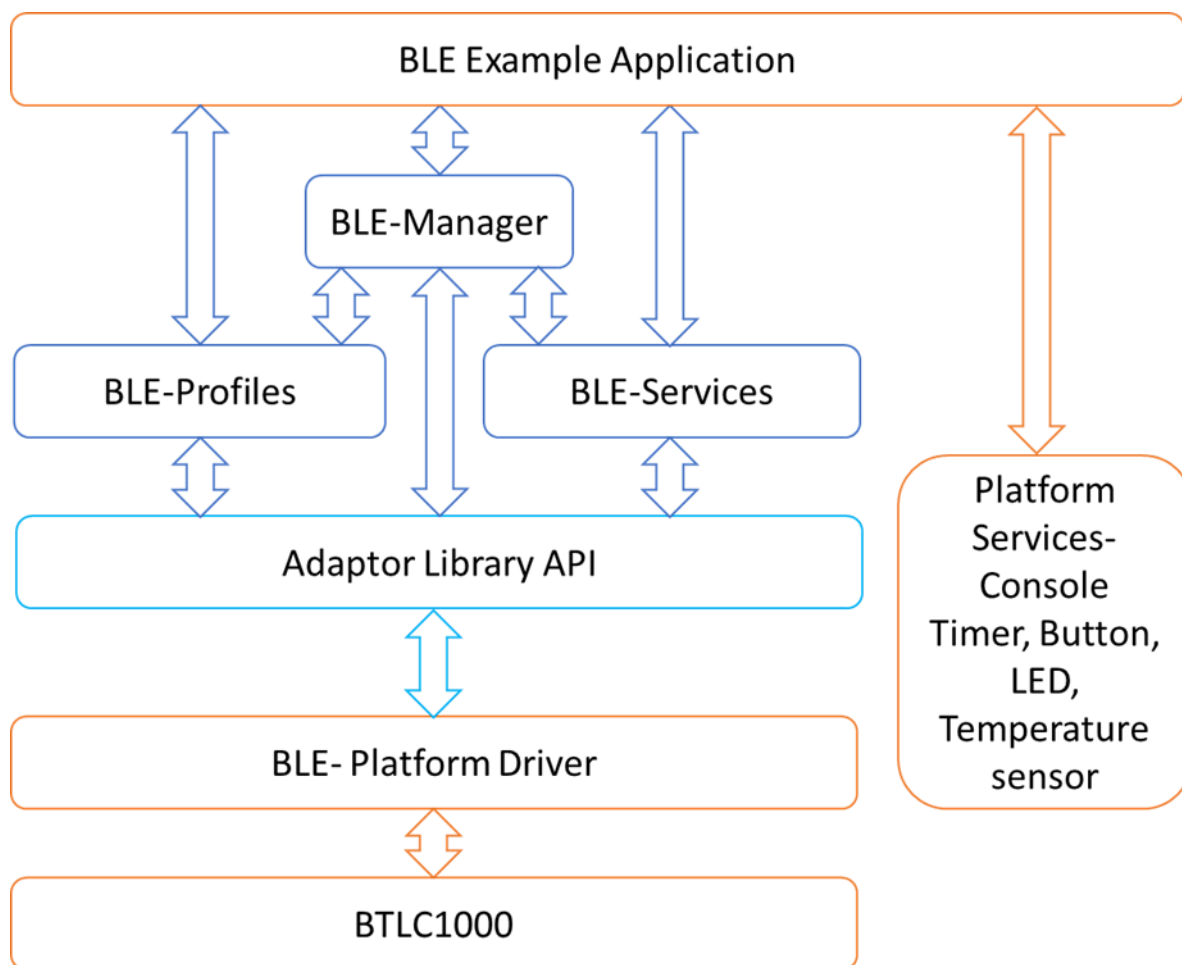
Figure 6-1. Battery Service Application Console

```
Initializing Battery Service Application
Initializing BTLC1000
BD Address:0xF8F005F23E06, Address Type:0
BLE Started Adv
Connected to peer device with address 0xecb42821056b
Connection Handle 0
Peer device request pairing
Sending pairing response
Please Enter the following Pass-code(on other Device):123456
Pairing procedure completed successfully
Battery Level:0%
Battery Level:1%
Battery Level:2%
Battery Level:3%
Battery Level:4%
Battery Level:5%
Battery Level:6%
Battery Level:7%
Battery Level:8%
Battery Level:9%
Device disconnected Reason:0x13 Handle=0x0
BLE Started Adv
```

7 BluSDK Software Architecture

Figure 7-1 illustrates the various layers in the BLU-SDK Architecture. The external host can be supported platforms (see Table 1-1).

Figure 7-1. BluSDK Software Architecture

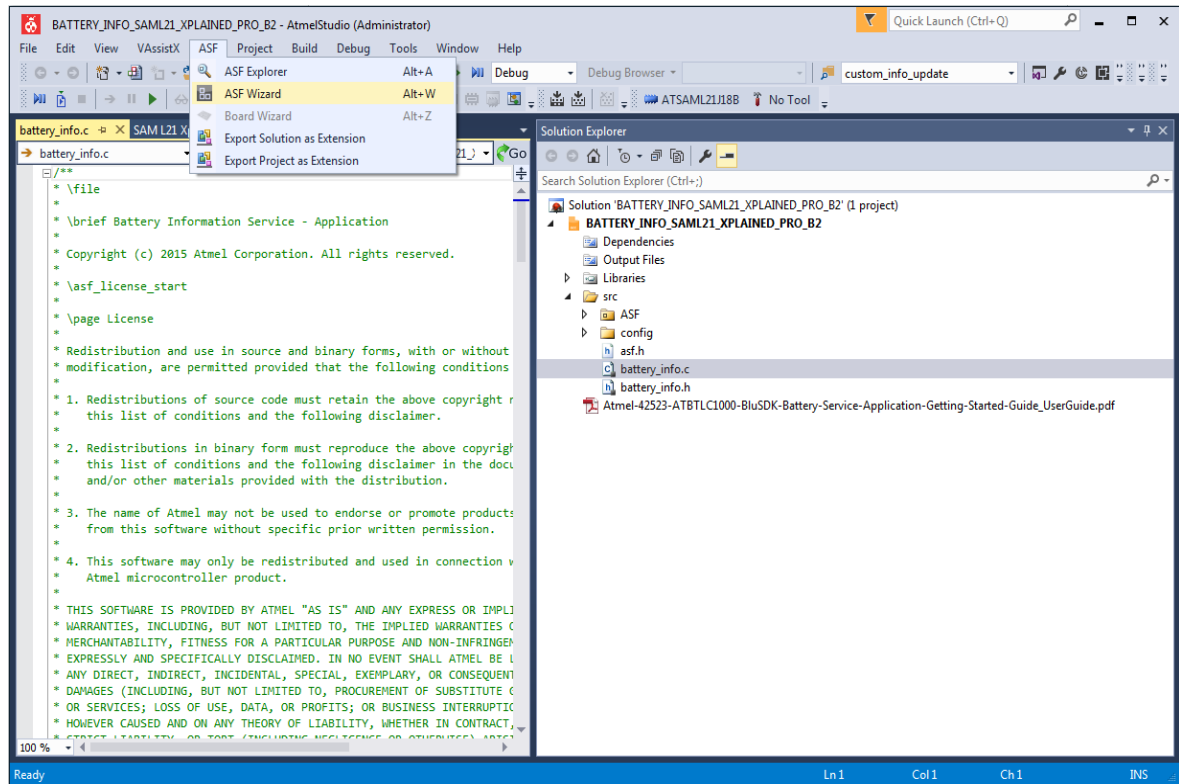


8 Adding a BLE Standard Service

The user can add another service such as “Device Information Service” to the application by using the ASF wizard as mentioned below:

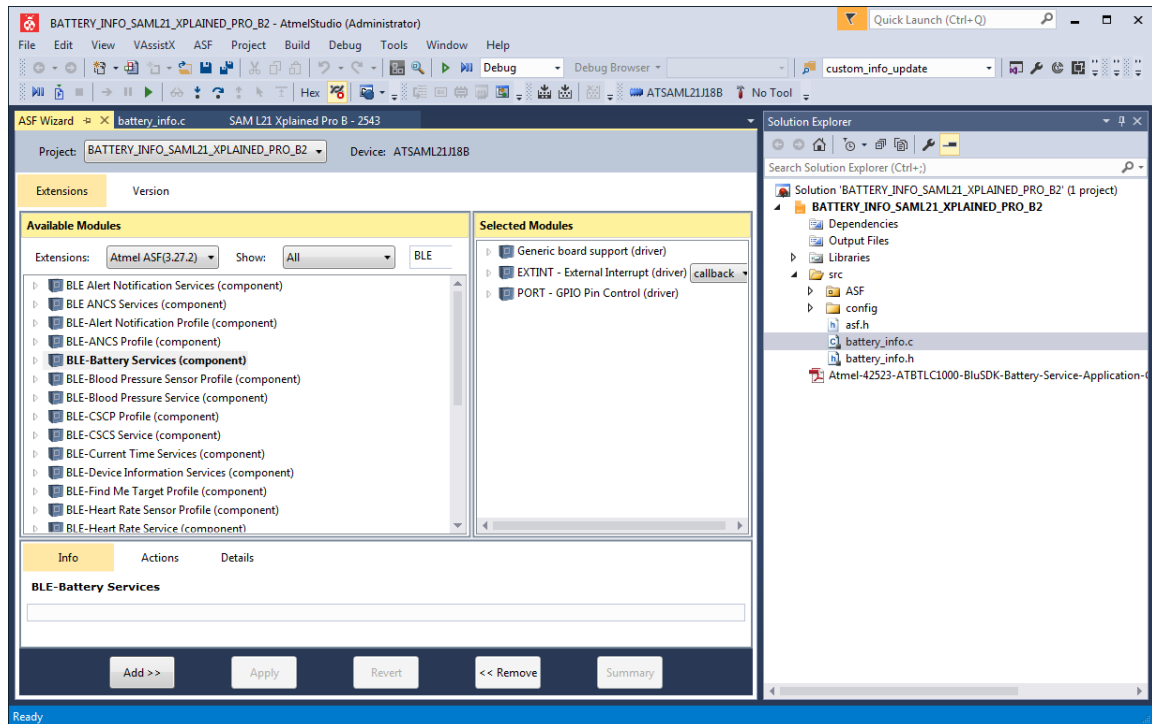
1. Select ASF → ASF Wizard as shown in [Figure 8-1](#).

Figure 8-1. Invoking ASF Wizard



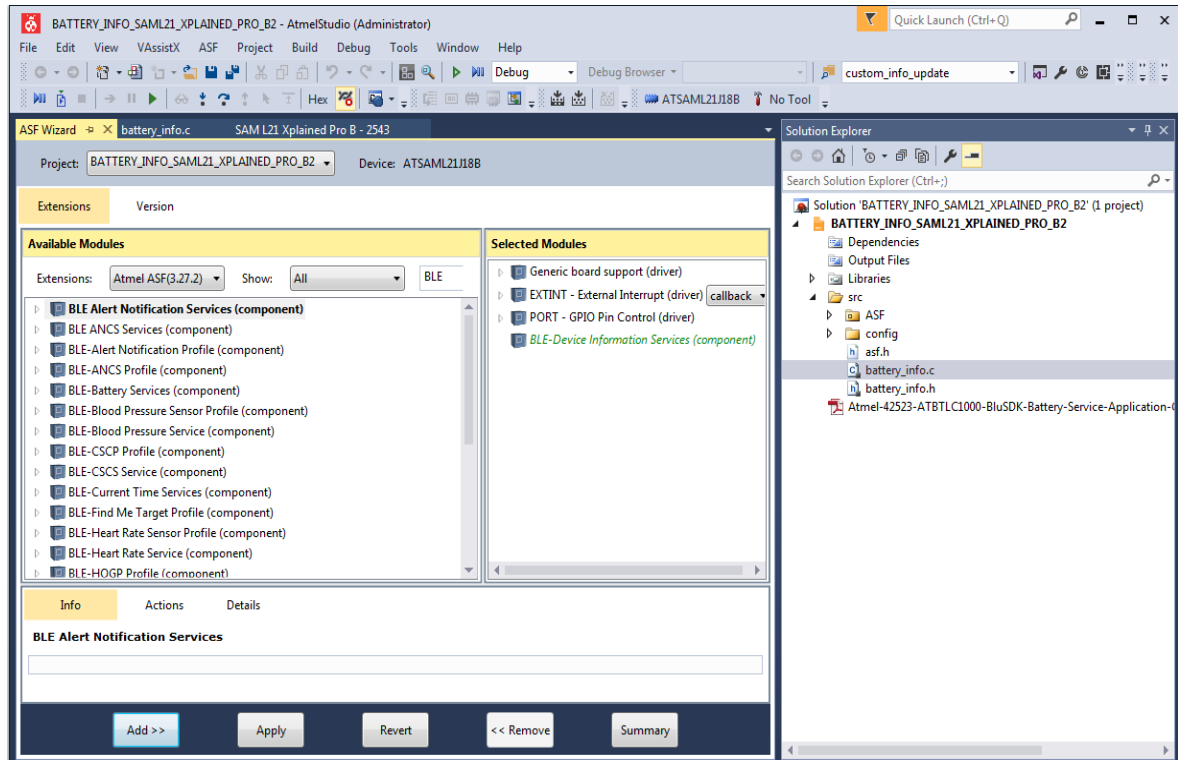
2. In the ASF Wizard, enter the “BLE” text in the search area as shown in [Figure 8-2](#).

Figure 8-2. Showing ASF BLE Services and Components



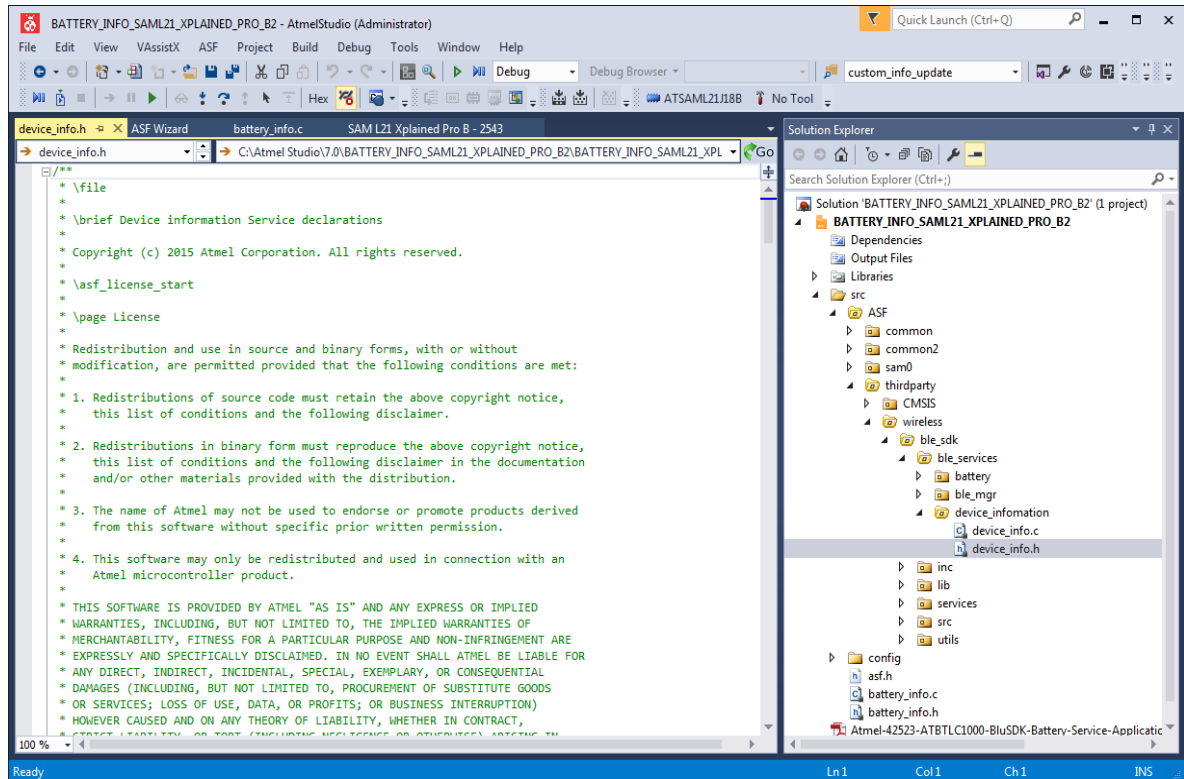
3. Select the required BLE Services/Profiles Component as shown in [Figure 8-3](#) (e.g. Device Information Services), press the “Add >>” button, and then press the “Apply” button and press “OK”.

Figure 8-3. Selecting BLE-Device Information Service ASF Component



4. Added New BLE Service component will be shown as under
src\thirdparty\wireless\ble_sdk\ble_services\device_information as shown in [Figure 8-4](#).

Figure 8-4. Viewing Newly Added ASF BLE-Service Component



5. Use the APIs which is mentioned as included in. Device Information Service (`device_info.h`) for incorporating this functionality if required in the application.

```

/**@brief Update the DIS characteristic value after defining the services using dis_primary_service_define
 *
 * @param[in] dis_serv dis service instance
 * @param[in] info_type dis characteristic type to be updated
 * @param[in] info_data data need to be updated
 * @return @ref AT_BLE_SUCCESS operation completed successfully.
 * @return @ref AT_BLE_FAILURE Generic error.
 */
at_ble_status_t dis_info_update(dis_gatt_service_handler_t *dis_serv , dis_info_type info_type,
dis_info_data* info_data, at_ble_handle_t conn_handle);

/**@brief DIS service and characteristic initialization (Called only once by user).
 *
 * @param[in] device_info_serv dis service instance
 *
 * @return none
 */
void dis_init_service(dis_gatt_service_handler_t *device_info_serv );

/**@brief Register a dis service instance inside stack.
 *
 * @param[in] dis_primary_service dis service instance
 *
 * @return @ref AT_BLE_SUCCESS operation completed successfully
 * @return @ref AT_BLE_FAILURE Generic error.
 */
at_ble_status_t dis_primary_service_define(dis_gatt_service_handler_t *dis_primary_service);

```

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

This evaluation board/kit is intended for user's internal development and evaluation purposes only. It is not a finished product and may not comply with technical or legal requirements that are applicable to finished products, including, without limitation, directives or regulations relating to electromagnetic compatibility, recycling (WEEE), FCC, CE or UL. Atmel is providing this evaluation board/kit "AS IS" without any warranties or indemnities. The user assumes all responsibility and liability for handling and use of the evaluation board/kit including, without limitation, the responsibility to take any and all appropriate precautions with regard to electrostatic discharge and other technical issues. User indemnifies Atmel from any claim arising from user's handling or use of this evaluation board/kit. Except for the limited purpose of internal development and evaluation as specified above, no license, express or implied, by estoppel or otherwise, to any Atmel intellectual property right is granted hereunder. ATMEL SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RELATING TO USE OF THIS EVALUATION BOARD/KIT.

ATMEL CORPORATION
1600 Technology Drive
San Jose, CA 95110
USA

10 Revision History

Doc Rev.	Date	Comments
42523C	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.
42523B	11/2015	Figure 3-1 is updated. The screenshots in Chapter 5 and Chapter 8 are updated.
42523A	09/2015	Initial document release.



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

© 2016 Atmel Corporation. / Rev.: Atmel-42523C-ATBTLC1000-BluSDK-Battery-Service-Application-Getting-Started-Guide_UserGuide_022016.

Atmel®, Atmel logo and combinations thereof, Enabling Unlimited Possibilities®, and others are registered trademarks or trademarks of Atmel Corporation in U.S. and other countries. ARM®, ARM Connected® logo, and others are the registered trademarks or trademarks of ARM Ltd. Other terms and product names may be trademarks of others.

DISCLAIMER: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. EXCEPT AS SET FORTH IN THE ATMEL TERMS AND CONDITIONS OF SALES LOCATED ON THE ATMEL WEBSITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS AND PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and products descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

SAFETY-CRITICAL, MILITARY, AND AUTOMOTIVE APPLICATIONS DISCLAIMER: Atmel products are not designed for and will not be used in connection with any applications where the failure of such products would reasonably be expected to result in significant personal injury or death ("Safety-Critical Applications") without an Atmel officer's specific written consent. Safety-Critical Applications include, without limitation, life support devices and systems, equipment or systems for the operation of nuclear facilities and weapons systems. Atmel products are not designed nor intended for use in military or aerospace applications or environments unless specifically designated by Atmel as military-grade. Atmel products are not designed nor intended for use in automotive applications unless specifically designated by Atmel as automotive-grade.