



# BTLC1000 BluSDK HTPT GETTING STARTED GUIDE

Atmel BluSDK v1.3

## BTLC1000 | SAMD21/SAMG55



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### 3 Purpose

This getting started guide describes the setup of BTLC1000 with a SAMD21 and SAMG55 Xplained Pro board and bringing-up an example profile supplied as part of BluSDK v1.0 release. The Bluetooth Health Thermometer Profile is an example profile application that is embedded as part of the software release package. The device advertises itself as a Health Thermometer. The IO1 sensor board with temperature sensor on board is used for the purpose of sensing the ambient temperature.

### 4 Features

- Device Discovery and Disconnection
- Pairing / Bonding
- RSSI Sampling
- Health Thermometer Service
- Health Thermometer Profile iOS Application

### 5 Introduction

The Health Thermometer Profile is used to enable a data collection device to obtain data from a thermometer sensor that exposes the Health Thermometer Service.

The profile defines two roles

:

- Thermometer:

The Thermometer is the device that measures the temperature

- Collector:

The Collector is the device that receives the temperature measurement and other data from a Thermometer.

This document explains the details about

1. Getting Started with the setup of SAMD21 or SAMG55 BTLC1000 Wing Board and IO1 Sensor board to be used as a Thermometer
2. Getting the Health Thermometer Profile Application working on the above mentioned setup.

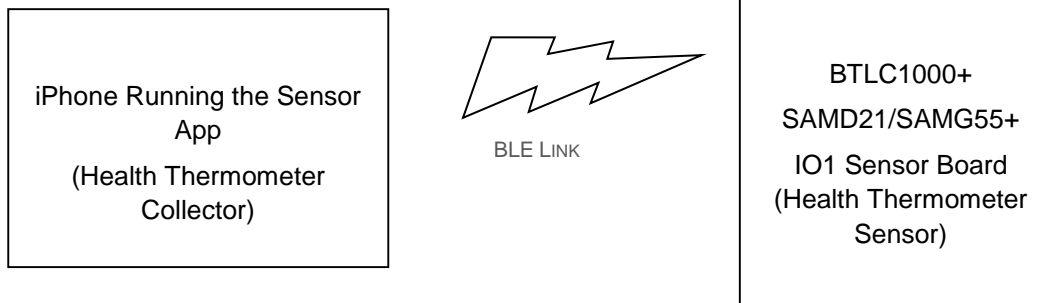
### 6 Services and Characteristics

The Thermometer implements the one and only one Health Thermometer Service in addition to the Device Information Service to display the information about the Thermometer device.

The current Thermometer profile implementation implements the following characteristics.

- Temperature Measurement
- Intermediate Temperature
- Measurement Interval

## 7 Demo Setup



## 8 Hardware Setup

### SAMD21 Health Thermometer setup

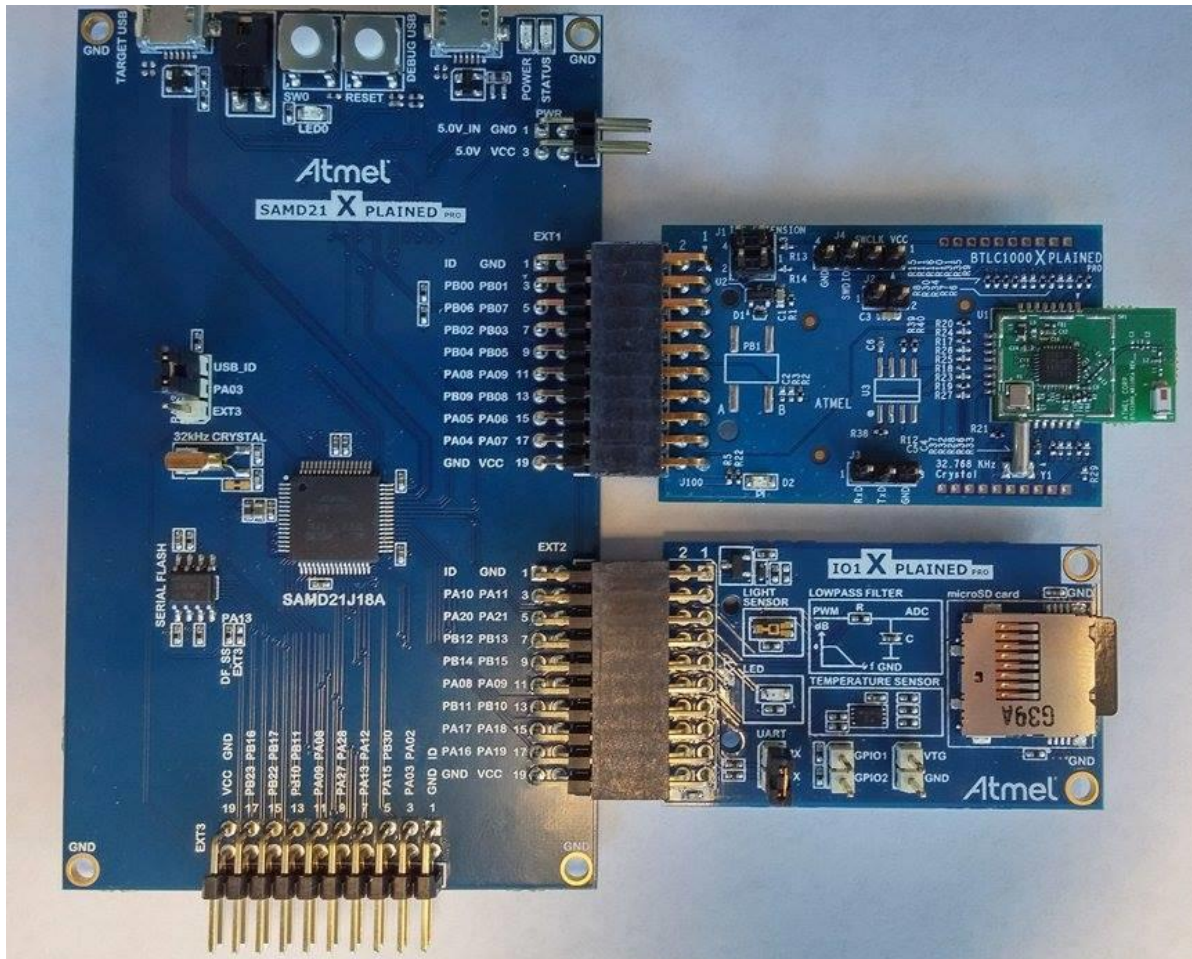


Figure 1: SAMD21 board connected to BTLC1000 and IO1 Sensor board

## SAMG55 setup

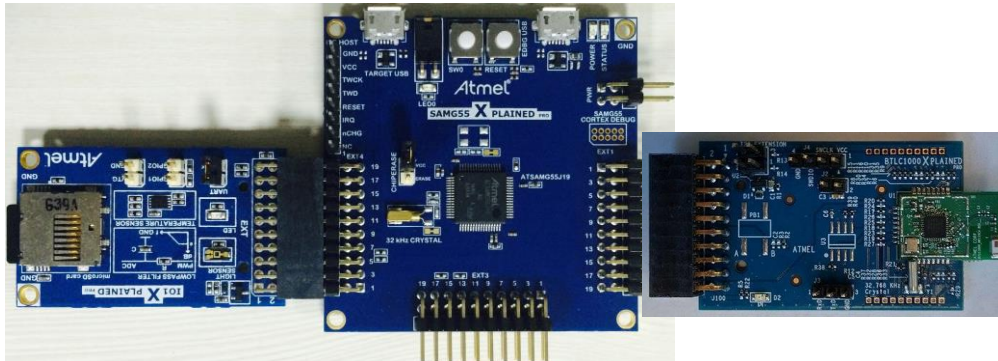


Figure 2 : SAMG55 board connected to BTLC1000 and IO1 Sensor board

## 9 Temperature Measurement Location

Onboard the SAMD21 and SAMG55, the user button is configured to change the temperature measurement location in the human body

The Health Thermometer profile specifies the following locations at which temperature measurements can be read.

- Body (general)
- Ear (usually ear lobe)
- Finger
- Gastro-intestinal Tract
- Mouth
- Rectum
- Toe
- Tympanum (ear drum)

So in order to simulate the change of temperature measurement location from the Thermometer Sensor device (the SAMD21+ BTLC1000 + IO1 sensor board), the user button had been programmed. So, every time the user button is pressed, the temperature location will be changed as per the above list.

This can clearly be observed on a Health Thermometer Collector (Mobile Application).

## 10 Temperature Type

One more parameter that needs to be simulated is the temperature measurement type which contains two values, Centigrade and Fahrenheit.

To simulate this change on the peripheral side, as there is only one user button available on board which had already been used for changing the temperature location, the trigger that is used for this is to run through all the locations once. Then the application shall toggle the temperature type.

B



## 11 Software Setup

### 11.1 Installation Steps

1. Atmel Studio installation [**Atmel Studio 6.2 sp2 (build 1563) Installer – with .NET**]  
<http://www.atmel.com/tools/atmelstudio.aspx>  
(Note: SAMD21 part pack is built-in as part of Atmel Studio 6.2 sp2)
2. Install SAMG55 Part pack <http://www.atmel.com/images/as-partpack-ATSAMG55-6.2.13.zip>  
(Note: This installer is needed only if the bring-up is being done on the SAMG55 platform)
3. Atmel USB Driver Installer 7.0.712 <http://www.atmel.com/tools/atmelstudio.aspx>
4. Install the package **BLU-SDK-msi package** that is supplied. Defaults can be selected during installation.

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

1. Health Thermometer Application for SAMD21
2. Health Thermometer Application for SAMG55

## 11.2 Build Procedure

The following procedure is explained for SAMD21 application example. The same procedure is valid for the case of SAMG55 as well.

### 1. Select New Example Project

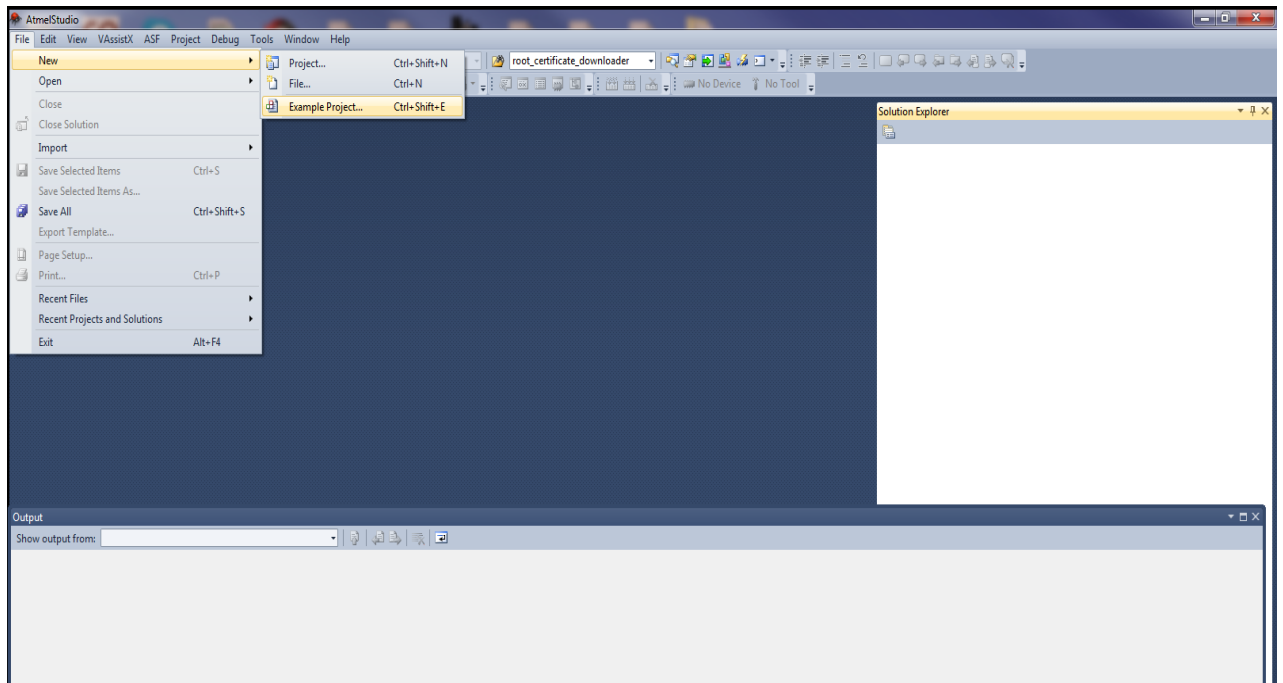


Figure 3 Creating a new project

2. Select "SAMD,32-bit" in device family, enter "BLE" 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

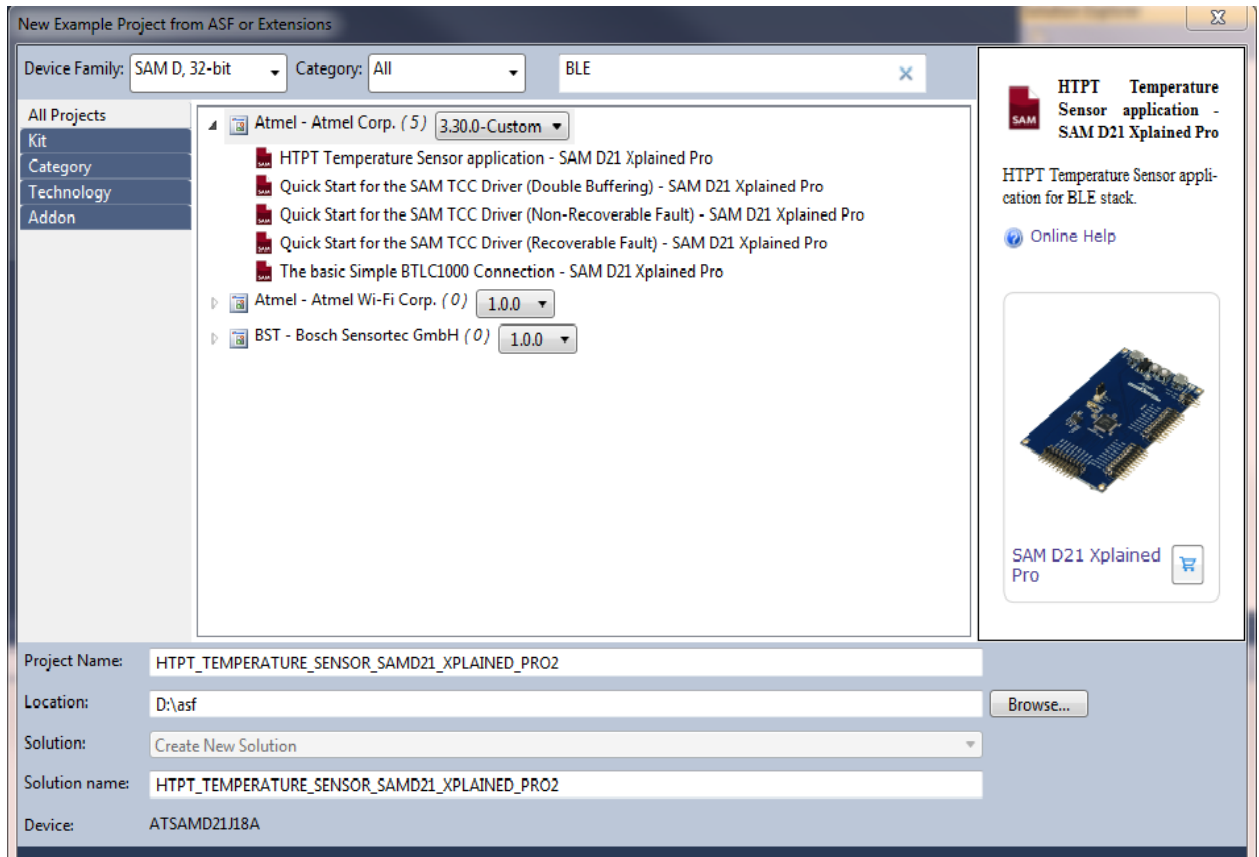


Figure 4 Selecting HTPT Sensor Application from example projects

3. Accept the license Agreement. The studio will generate the Health Thermometer Profile project for SAMD21.

#### 4. Build the solution.

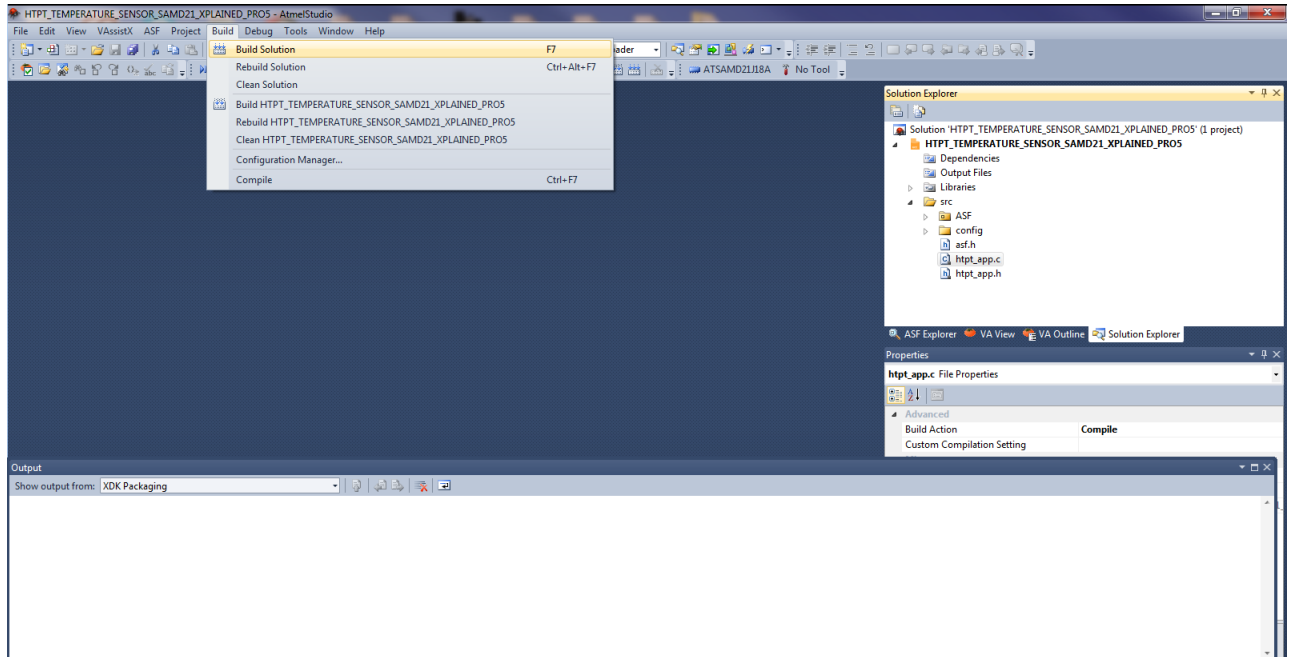


Figure 5 Building the HTPPT Temperature Sensor Application

#### 5. Download the application via the USB to the SAMD21 board

#### 6. Once the application is flashed, it is ready to be simulated as Health Thermometer Device.

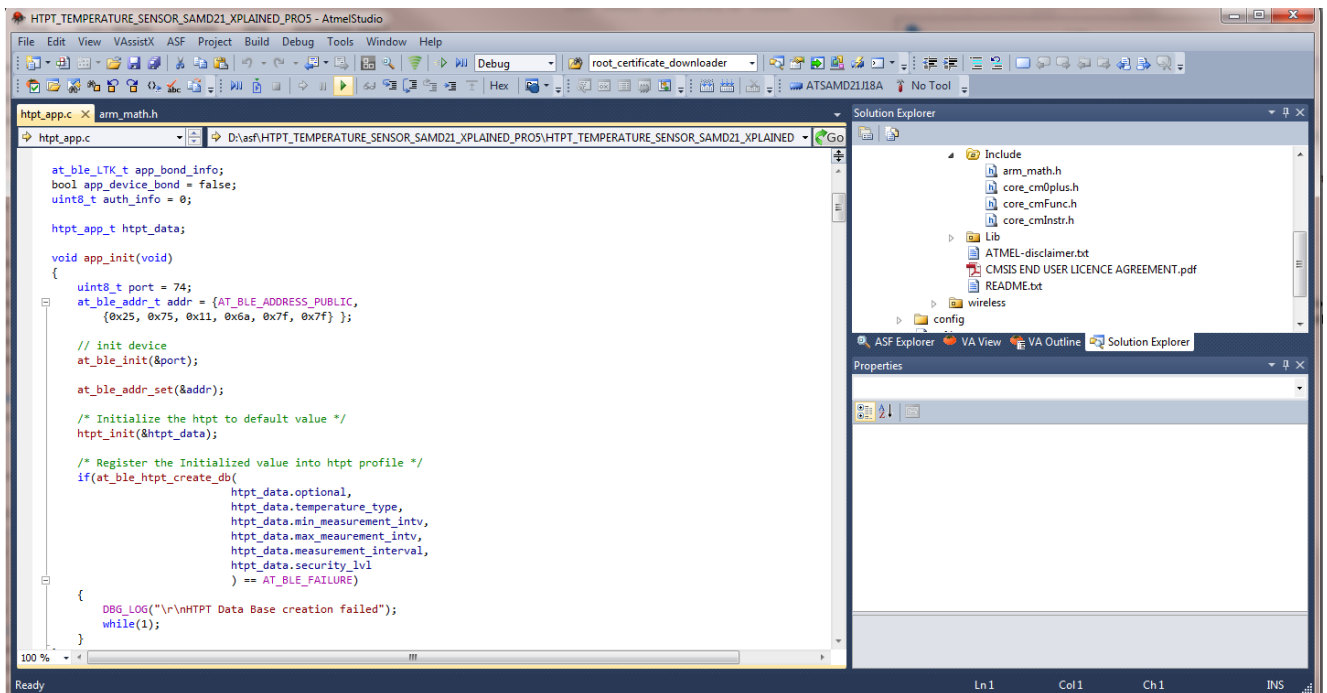


Figure 6 Flashing the Application on Atmel MCU

## 12 Running the demo

1. Power on the BTLC1000 board first by connecting the USB cable to J300 as shown in Figure1 (This step is not required if we are using a BTLC1000 Wing Board)
2. Power on the SAMD21 by connecting the USB Cable as indicated in Fig1
3. Open the console using teraterm or any serial port monitor application and connect to the corresponding COM port of “EDBG”.
4. Press the Reset button on the SAMD21 board.
5. Wait for around 10 seconds for the patches to be downloaded from SAMD21 to BTLC1000 board.
6. The board should be in advertising mode. Ensure that the console log looks as shown below.

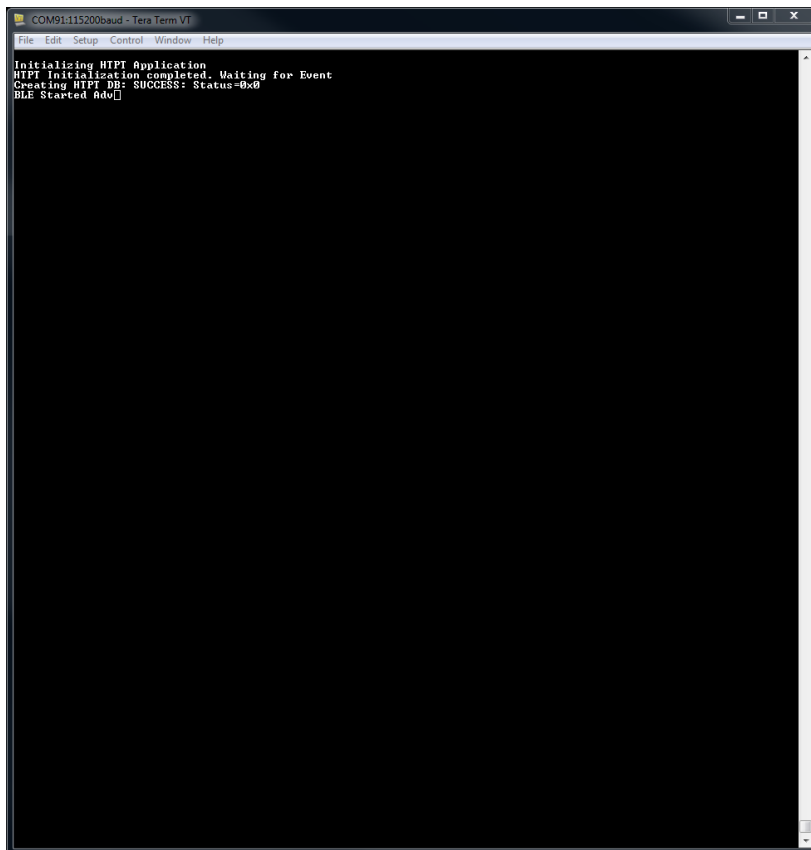


Figure 7: Console log for advertisting mode

7. Start the Thermometer application on the iPhone:

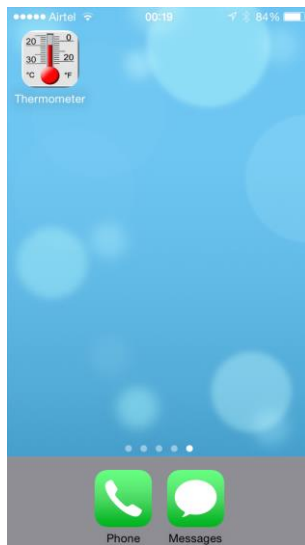


Figure 8 iOS Thermometer Profile App Launch Screen

8. Enable the scan option through the sliding switch. The application is implemented in such a way that it filters out all the other UUID's and connects to only those peripherals that advertise with Health Thermometer UUID (0x1809)

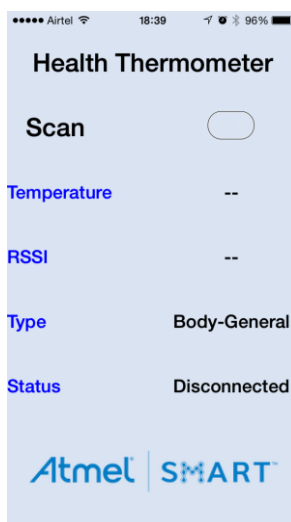


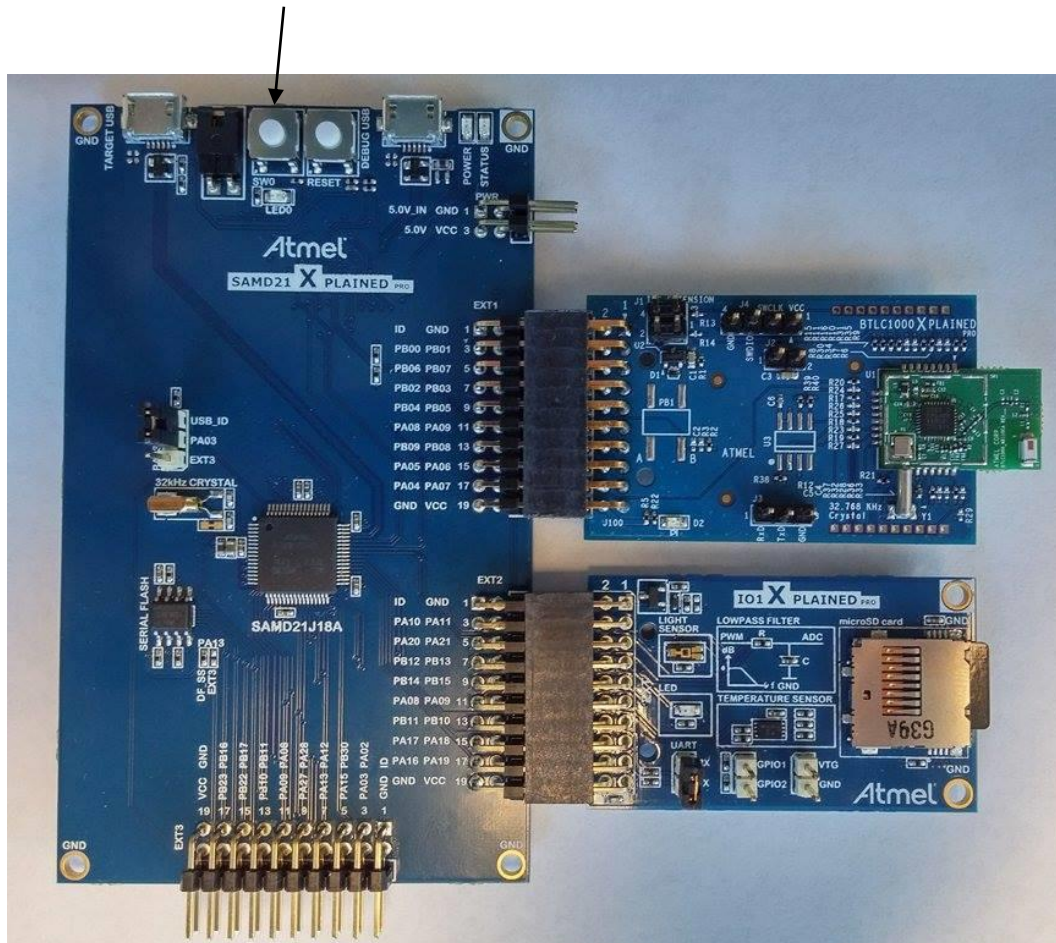
Figure 9 iOS App Health Thermometer Initial Screen

9. The temperature value, RSSI and the device name are displayed on the Mobile App. Console log will be as shown below.

### Figure 10 iOS App Health Thermometer Connected Screen

### Figure 11 Console log for connected state

10. To change the body measurement location, press the user button on the SAMD21. The new value should be updated in the application.

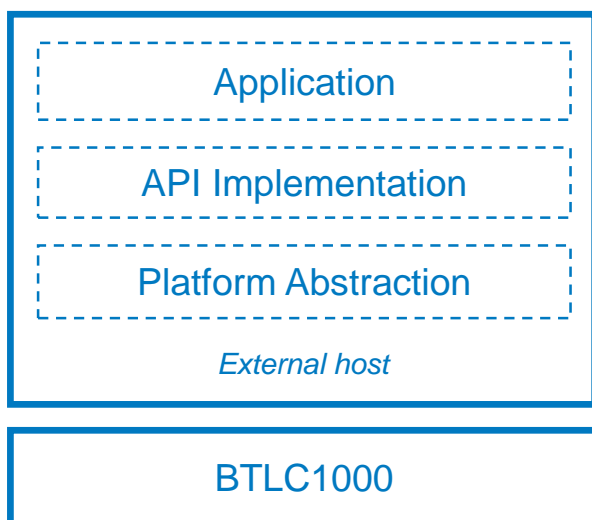


11. Pull the slider to disconnect the device with mobile application.



## 13 Software Architecture

The following diagram illustrates the various layers in the BLE subsystem for the BTLC1000 configuration. The External host can be SAMD21 or SAMG55. The application in this example is Health Thermometer Sensor.

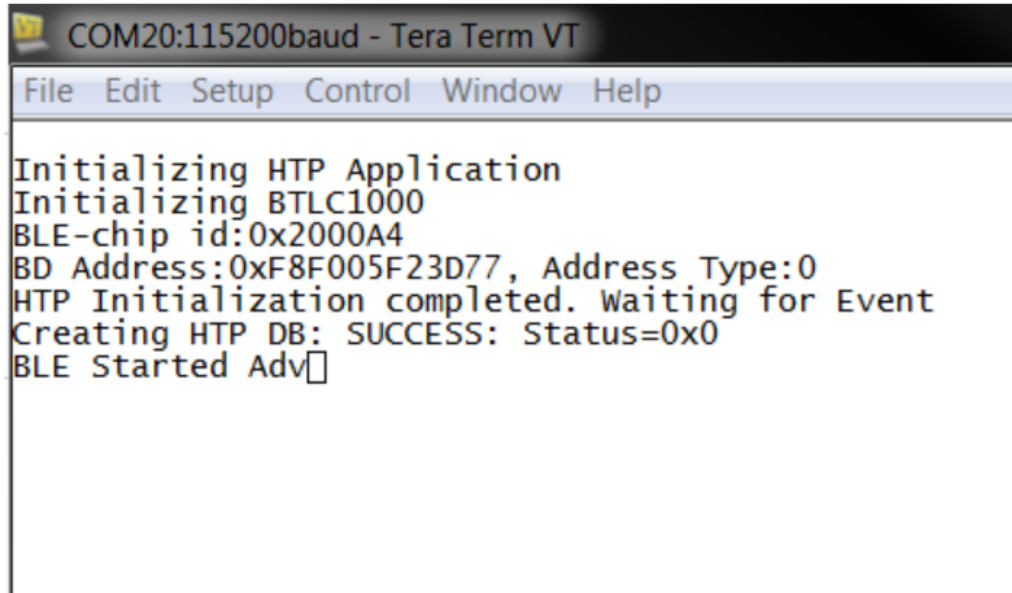


## 14 Console Logging

For the purpose of debugging, a logging interface had been implemented in the Health Thermometer Application.

The logging interface utilizes the same EDBG port that connects to SAMD21 or SAMG55. A serial port monitor application (for example teraterm) shall be opened and attached to the EDBG COM port .

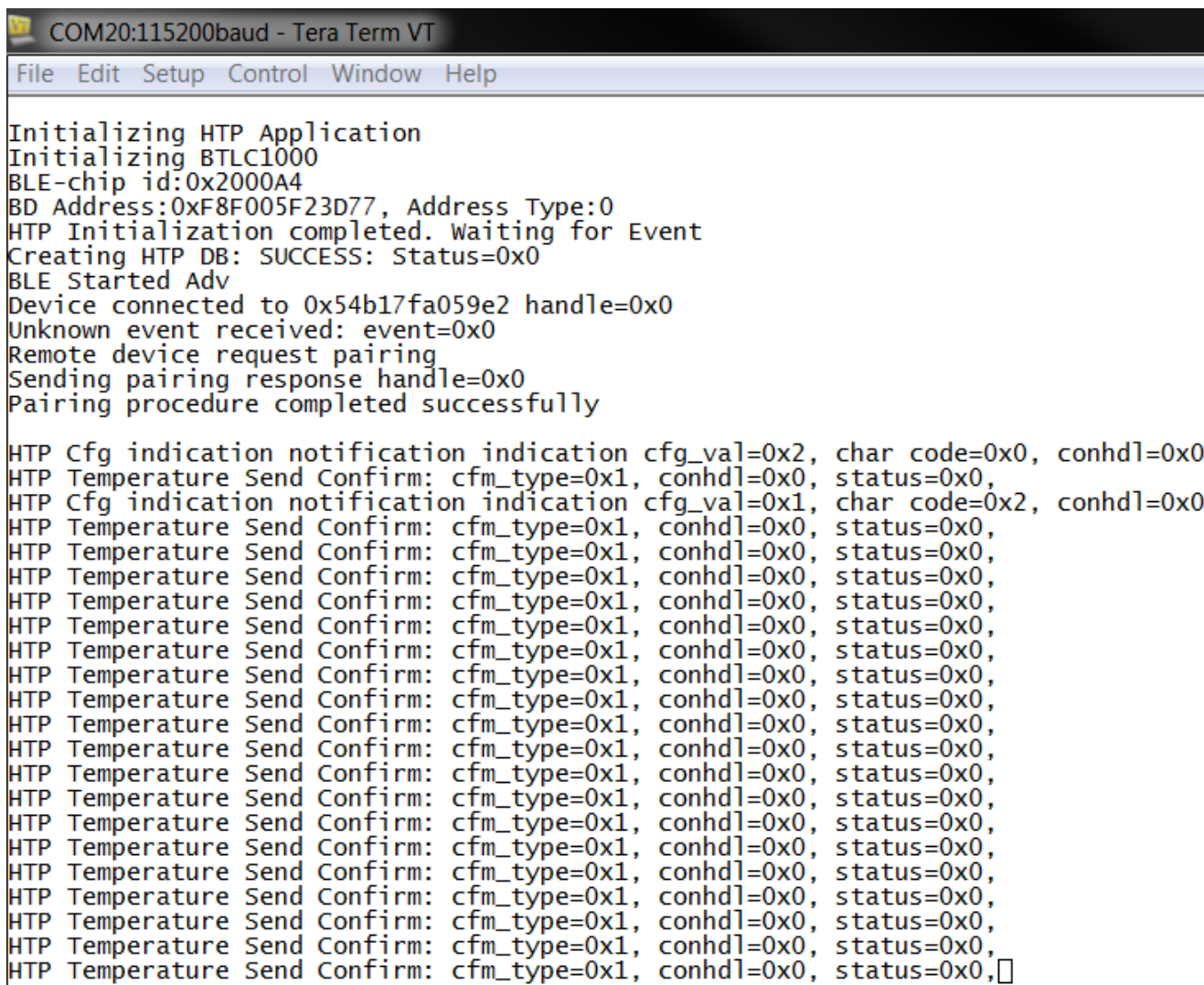
The below screenshot shows the information about BLE and HTP initialization and advertisement.



```
COM20:115200baud - Tera Term VT
File Edit Setup Control Window Help

Initializing HTP Application
Initializing BTLC1000
BLE-chip id:0x2000A4
BD Address:0xF8F005F23D77, Address Type:0
HTP Initialization completed. Waiting for Event
Creating HTP DB: SUCCESS: Status=0x0
BLE Started Adv□
```

The below screenshot shows the information about connection and temperature send confirmation.



## 15 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 (WEE), 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.

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## 16 Revision History

Doc Rev.	Date	Comments
1.0	03/31/2015	Initial document release.



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