BLE HID Keyboard

1.0

Features

- BLE HID over GATT Profile in HID Device role operation
- Simulates keyboard pressing
- Simulates battery charging
- DeepSleep mode demonstration
- LED status indication

General Description

This project demonstrates keyboard pressing in the boot and protocol mode. The example also demonstrates handling a suspend event from the central device and entering the low power mode when suspended.

Development Kit Configuration

The device has the following configuration:

- A mechanical button (port 2 pin 7) is used to wake up the device, start re-advertising.
- The red LED (port 2 pin 6) is used to indicate a BLE disconnection state.
- The green LED (port 3 pin 6) is used to indicate an advertising state.
- The blue LED (port 3 pin 7) is used to indicate a Caps Lock state.

Project Configuration

The example project consists of the following components: BLE, UART, digital output pin, digital input pin. ADC is not used by default. Battery voltage measurement could be enabled in bas.h header file. The UART is used for transmitting debug information. The output pins are used to reflect the line signal output on the LED. The input pin is configured to the resistive pull up mode and used as a Caps Lock on/off button. The top design schematic is shown in **Figure 1**.

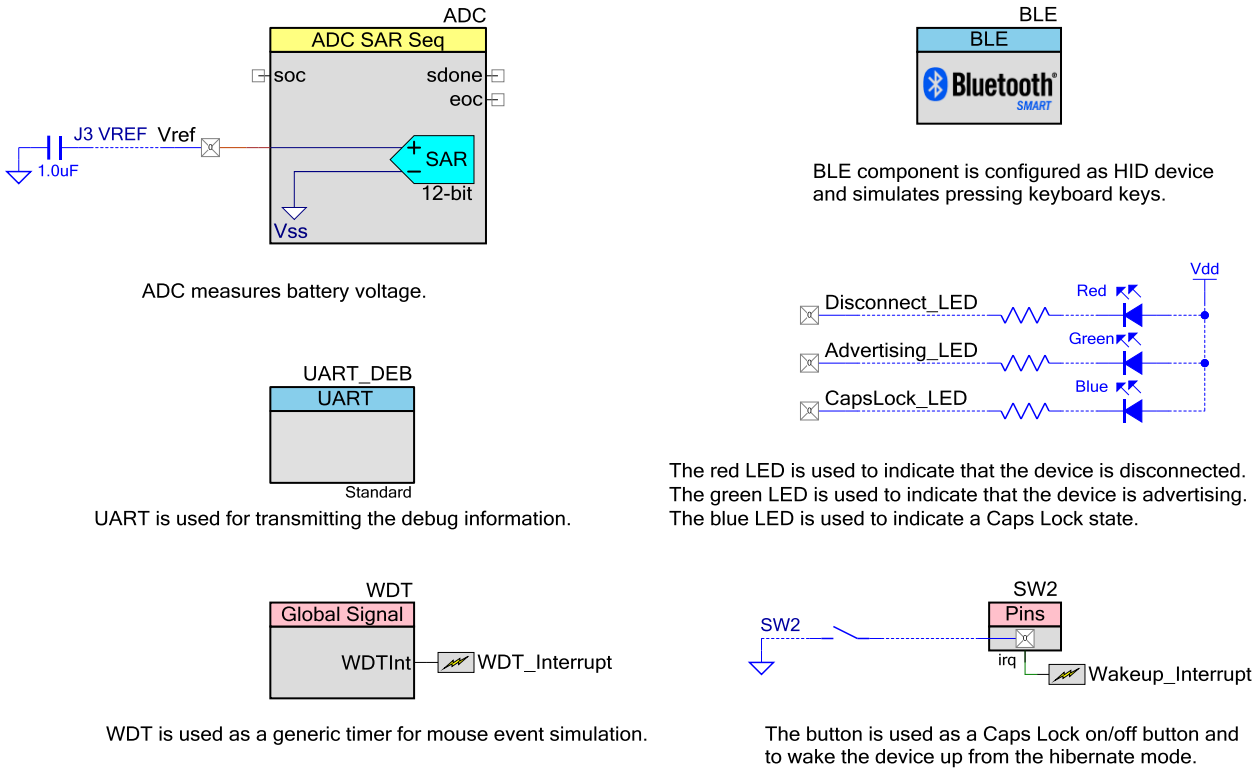

Figure 1. Top design schematic

The BLE component is configured as HID over GATT Profile in the HID Device role (GATT Server). The HID Device has one instance of the HID Service, Battery Service, Device Information Service, and Scan Parameters Service.

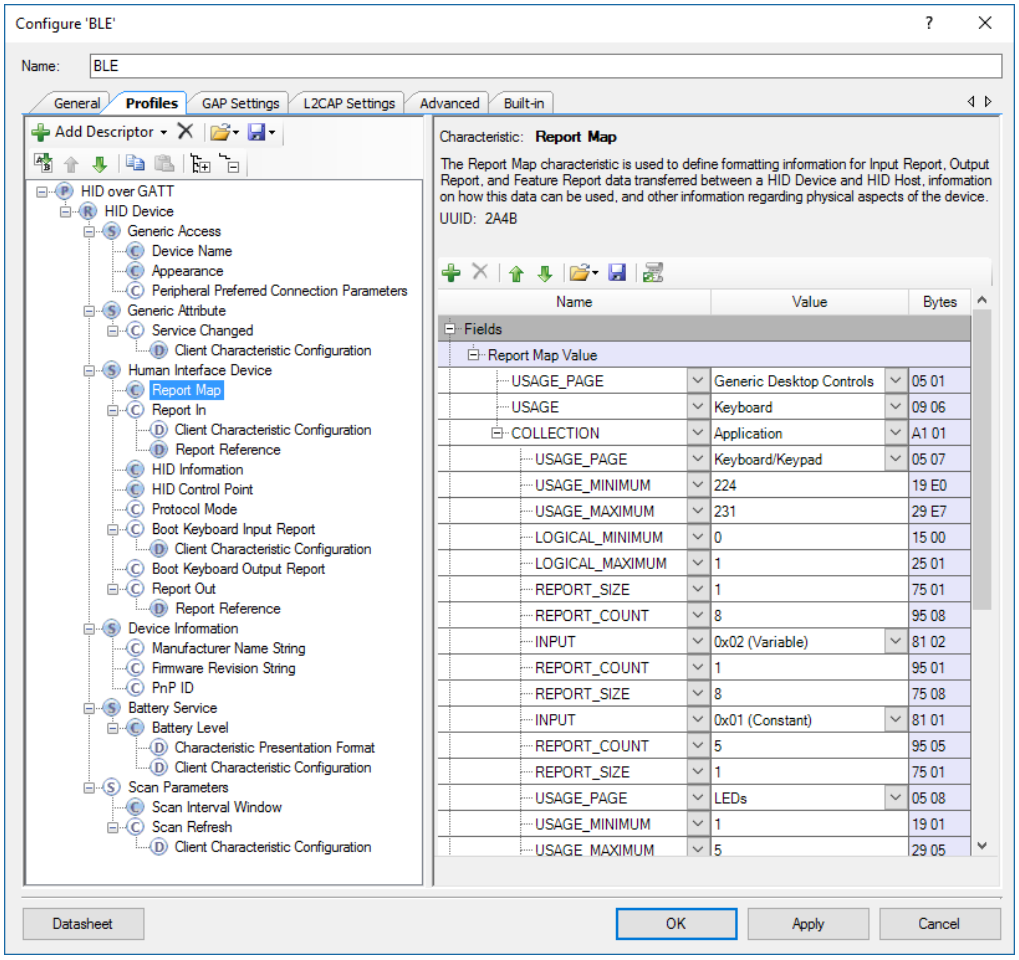

Figure 2. GATT settings

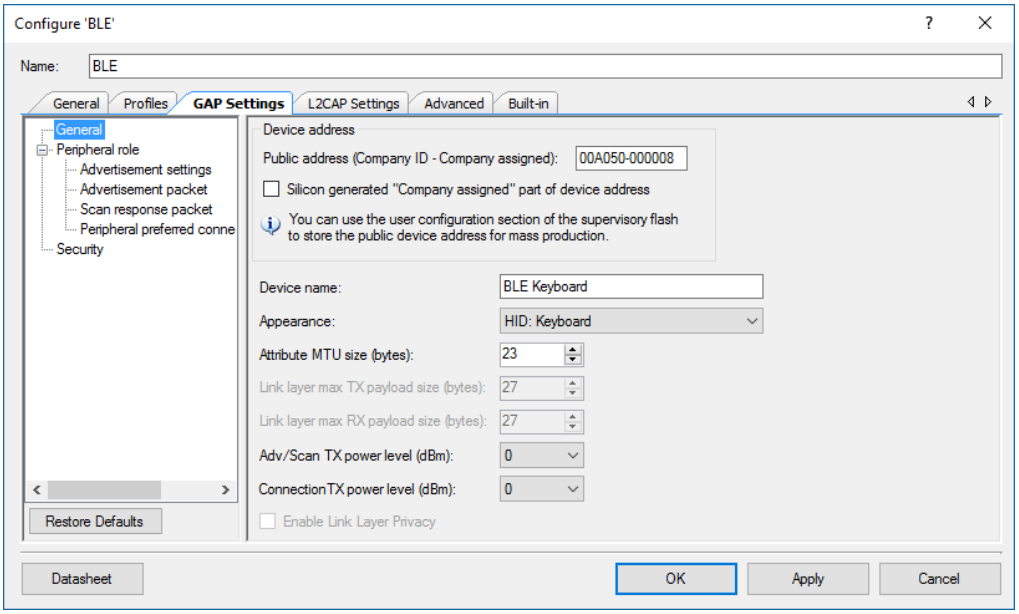

Figure 3. GAP settings

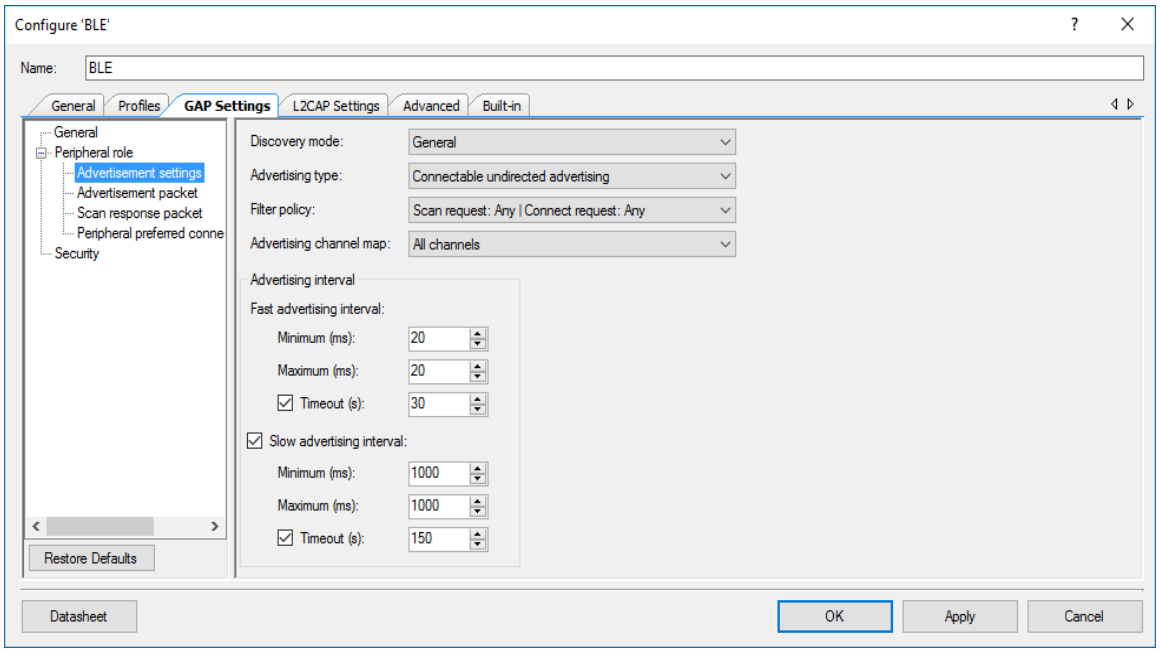

Figure 4. GAP settings -> Advertisement settings

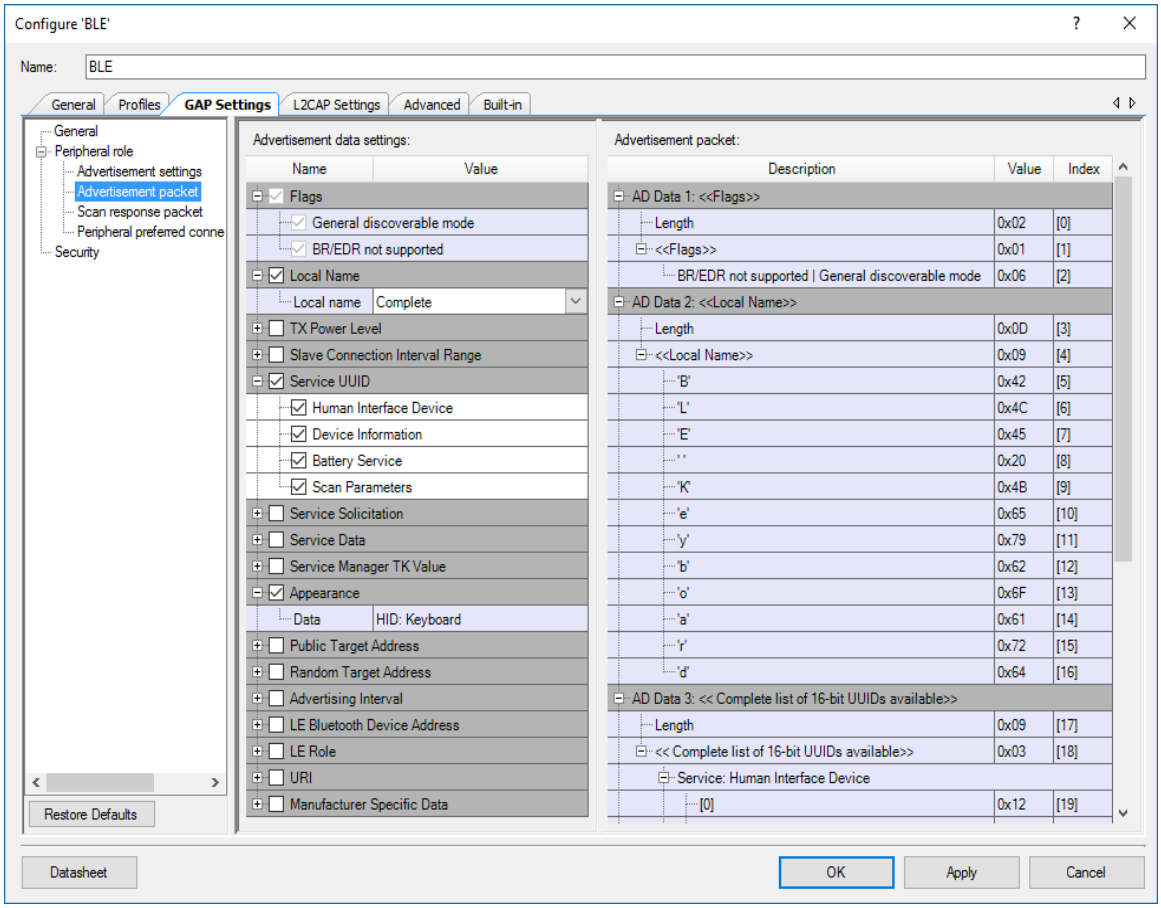

Figure 5. GAP settings -> Advertisement packet

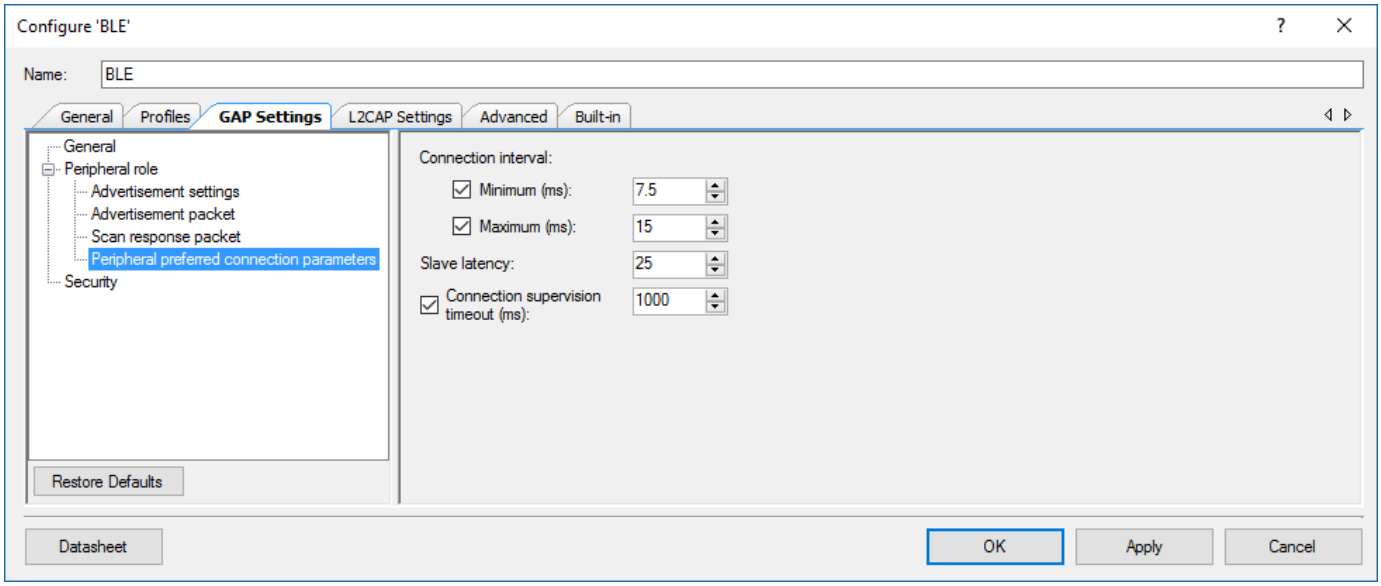

Figure 6. GAP settings -> Peripheral preferred connection parameters

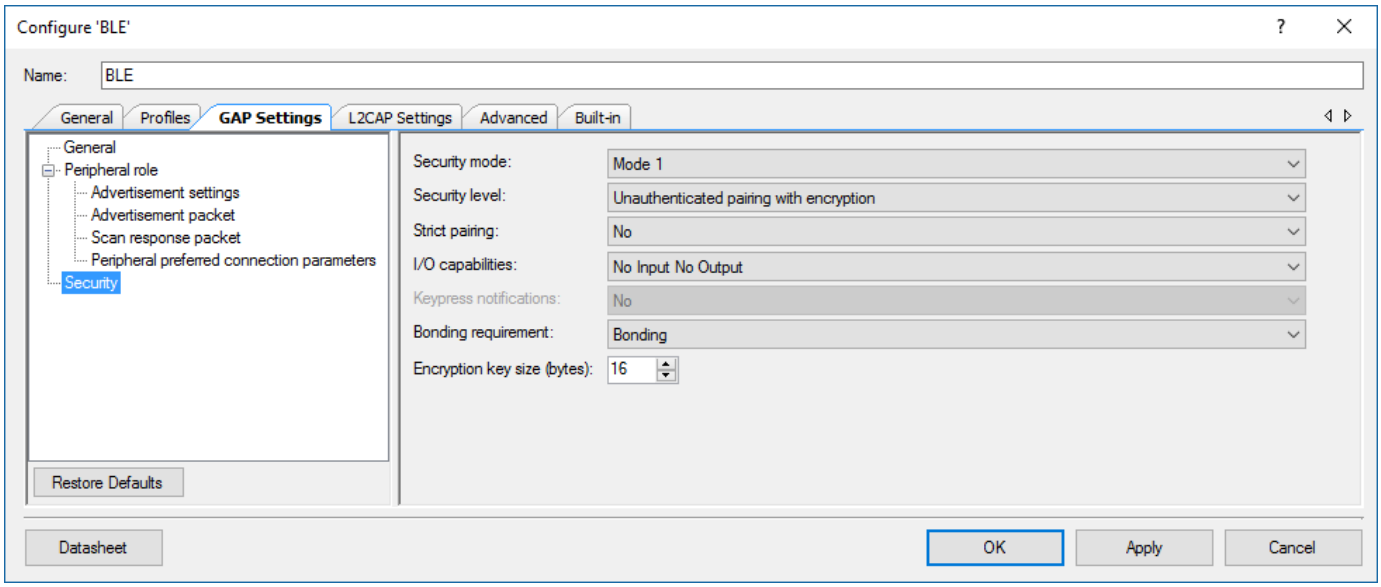

Figure 7. Security settings

Project Description

The project demonstrates the core functionality of the BLE component configured as a HID Device.
Right after the device is started, it performs the BLE component initialization as well as initialization of the UART components. Four callback functions are required in this project for BLE operation. One callback function (AppCallBack()) is required to receive generic events from BLE Stack and the others (HidsCallBack(), BasCallBack(), ScpsCallBack()) are required for receiving events from the services. The component has also buried a call to CyBle_GappStartAdvertisement() on an execution of which the device will start advertising with the advertisement packet shown in **Figure 5**. As the BLE component is configured in the General Discovery mode, it will stop advertising after an advertisement period expires. On advertisement timeout, the system enters into the hibernate mode. Press the mechanical button on CY8CKIT-042 BLE (SW2) to wake up the system and start re-advertising. BLE subsystem and CPU enters into low power Deep-Sleep mode between connection and advertising intervals. BLE subsystem automatically wakes up to maintain connection and advertising data transfer.

To indicate that the device advertises, the green LED is blinking. The red LED will be lighted on after disconnection to indicate that no Client is connected to the device. When Client is connected successfully both red and blue LEDs will turn off. The blue Led will indicate a Caps Lock state sent from the Host through an output keyboard report characteristic.

You can connect HID Device to Windows 8. Windows 7 and older OS don’t have HOGP drivers. Make sure that a PC with Windows 8 has Bluetooth 4.0 installed. To connect to HID Device, click on “Add a device” in the Devices and Printers window of the Control panel. Select the “BLE Keyboard” device and click the Next button. Setup will automatically install the necessary files in the system and start receiving simulated keys “abcdef…”

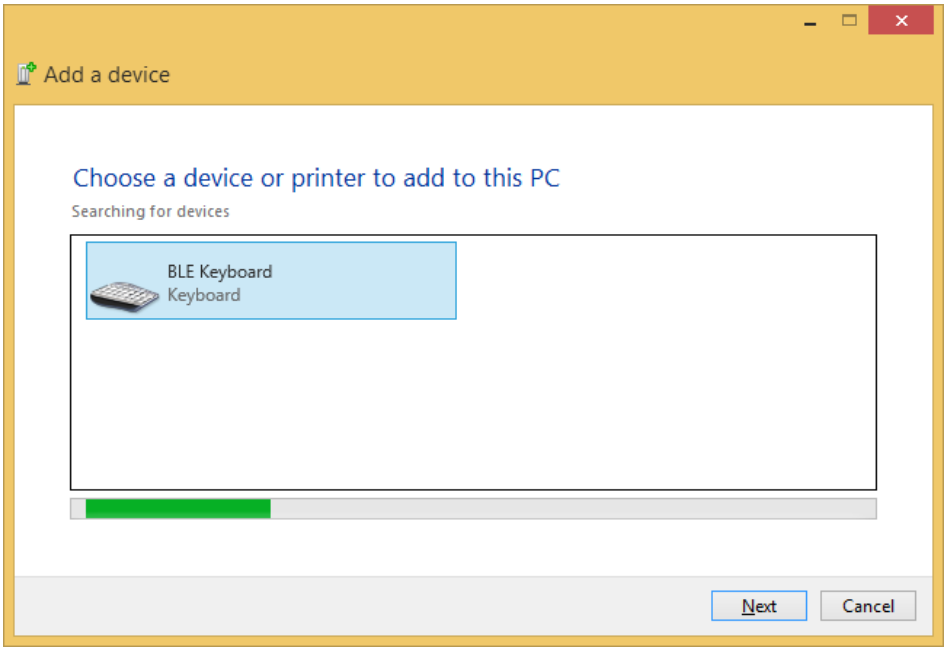

Figure 8. Pairing with Windows 8 PC

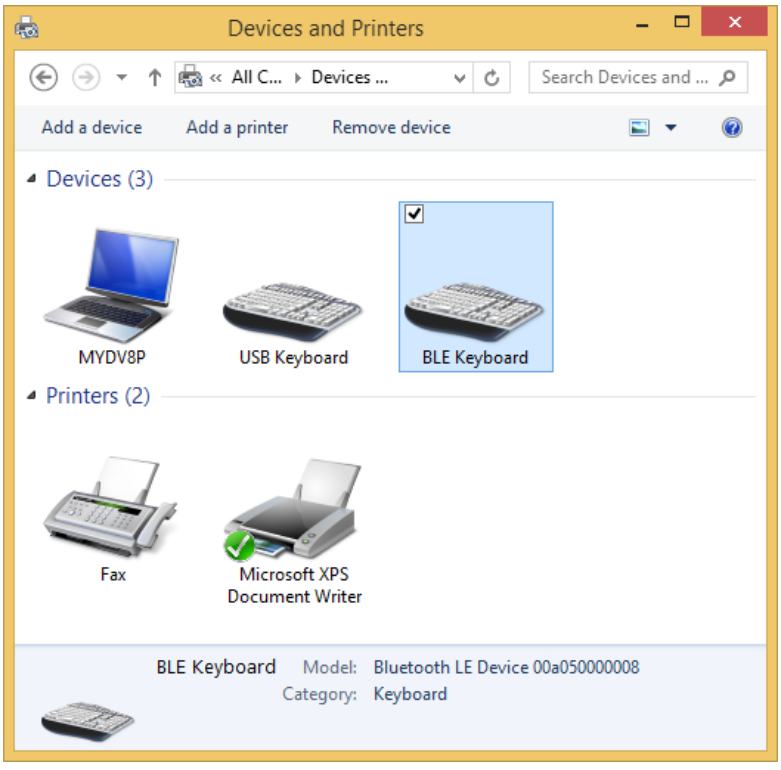

Figure 9. BLE Keyboard is recognized as HID device

Also, you can connect HID Device to Android or iOS device with Bluetooth 4.0 support. To do this, go to phone's Bluetooth settings and pair it with CY8CKIT-042 BLE device (it should be recognized as BLE Keyboard).

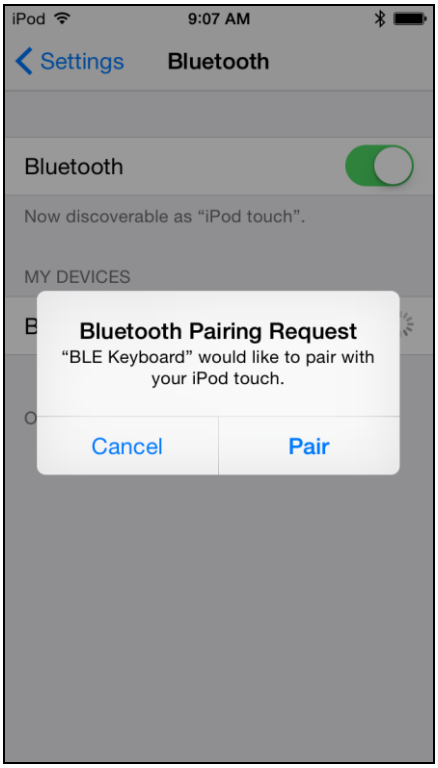

Figure 10. iOS Bluetooth pairing

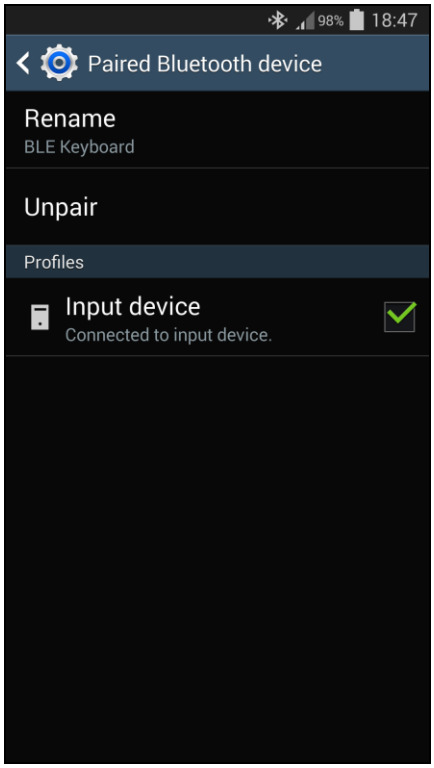

Figure 11. Android settings for paired Bluetooth device

Additionally, this project implements Battery Level Service. By default, the battery level is simulated and is changed from 2 to 20 percent. To enable battery level measurement, set BAS_MEASURE_ENABLE to 1, BAS_SIMULATE_ENABLE to 0 and connect J2 pin P3[0] to J3 pin VREF. For instructions on how to use this service, refer to BLE_Battery_Level example project datasheet.

Expected Results

After pairing with peer device (Windows 8 PC,.Android/iOS phone or tablet), focus input to some editable field (open text editor, take a note, etc). Simulated keys "abcdef…" will fill the document. When SW2 button is pressed, Caps Lock led on the keyboard will be turned on/off. Blue led on KIT will indicate Caps Lock state, received from HID client. Note that old Android OS doesn't send a Caps Lock state backward to device, that's why led will not be turned on/off.

Figure 12. HID Keyboard emulation on iOS device

Figure 13. HID keyboard emulation on Android device

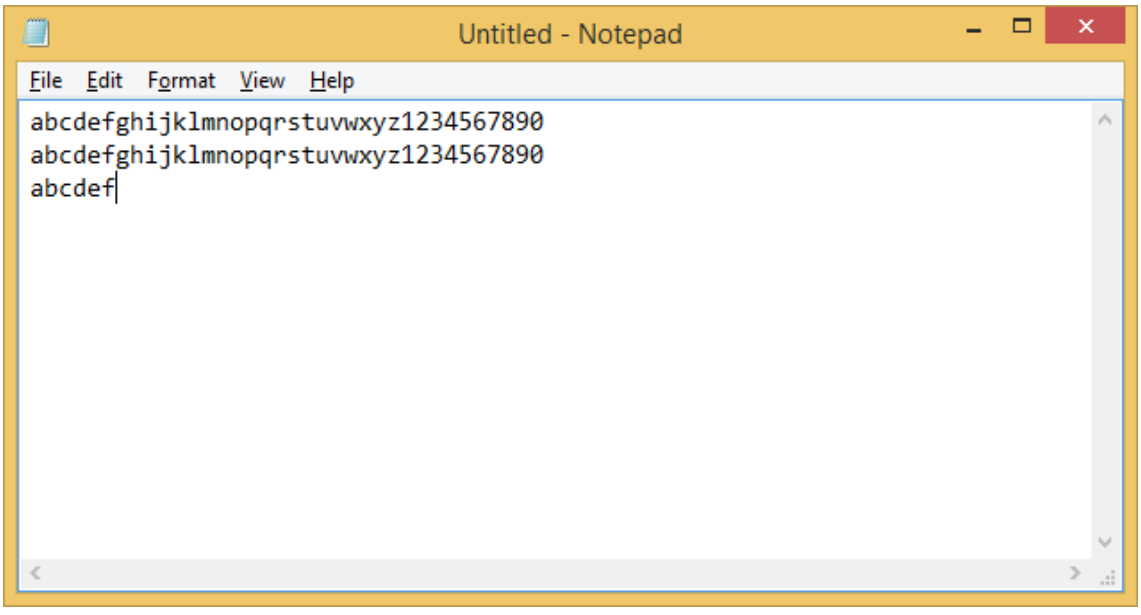

Figure 14. HID Keyboard emulation on Windows 8 PC