



## **Flashlight Demo for iCE40 Ultra™ Wearable Development Platform User Guide**

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UG100 Version 1.0, September 2015

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## Demo Setup

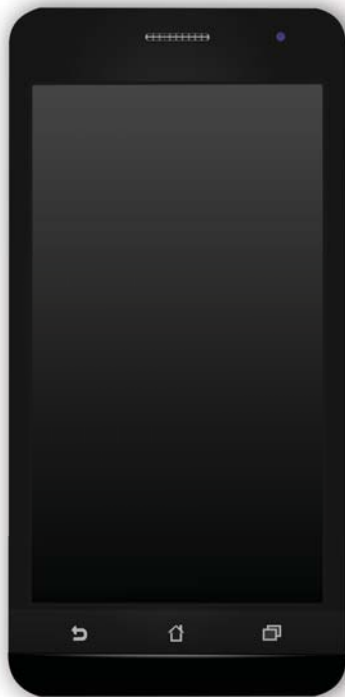
### Hardware Requirements

- iCE40 Ultra™ Wearable Development Platform
- Android smart phone with Android 4.3 or 4.4  
*Note: Current design may not function correctly on Android 5.0.*
- Windows PC or Linux machine for downloading the bit stream
- USB cable for programming the device

### Software Requirements

- Lattice Diamond® Programmer software 3.3 or higher
- Android apk file *FlashlightDemo.apk*
- MachXO2™ device bitstream file *p2dsi.jed*
- iCE40 Ultra device bitstream file *flshlgt\_uart\_top.bin*

**Figure 1. Demo Setup**



Smartphone with  
Android 4.3 or higher



iCE40 Ultra Wearable  
Development Platform

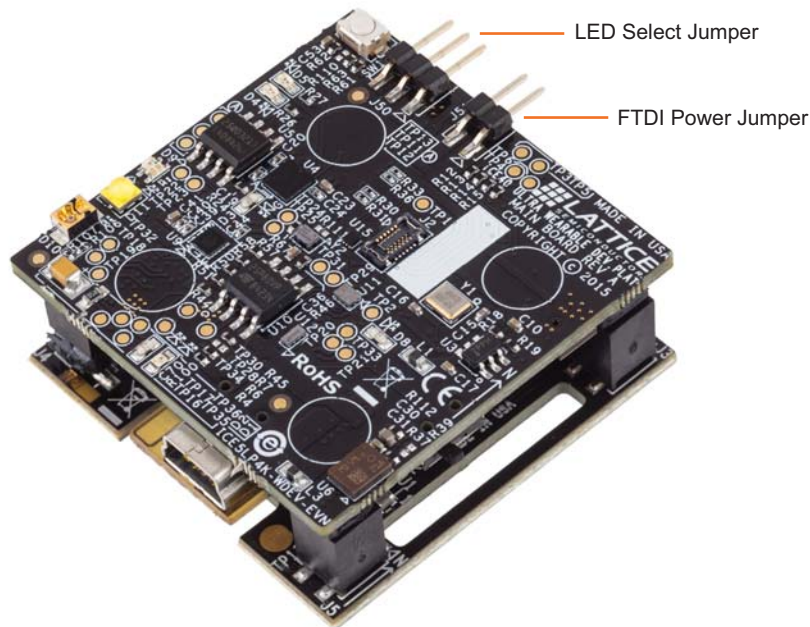
## Jumper Settings for iCE40 Ultra Wearable Development Platform

In this demo, there are two jumpers that need to be set.

- Connect the USB2JTAG Power Jumper (J51) for FTDI device.
- Connect jumper J50 pin2 and pin3 to enable High-Brightness LED.

For more information about the board, see EB100, [iCE40 Ultra Wearable Development Platform User Guide](#).

**Figure 2. Jumper Settings**



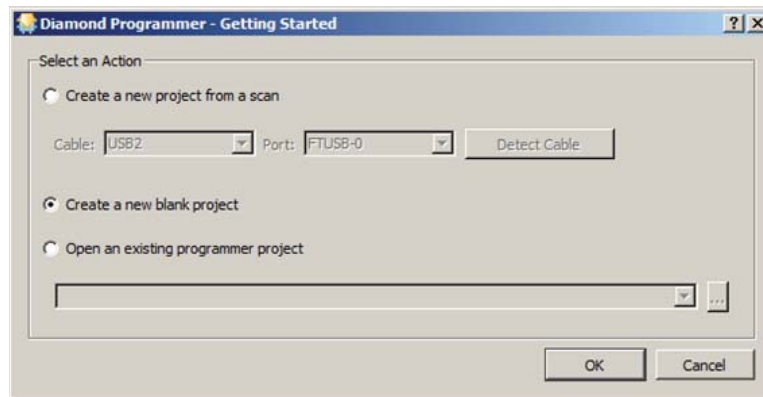
## Downloading Bitstreams to iCE40 Ultra Wearable Development Platform

In this demo, there are two devices that need to be programmed: the iCE40 Ultra and the MachXO2 which provides clock signal to the iCE40 Ultra device.

To program the devices:

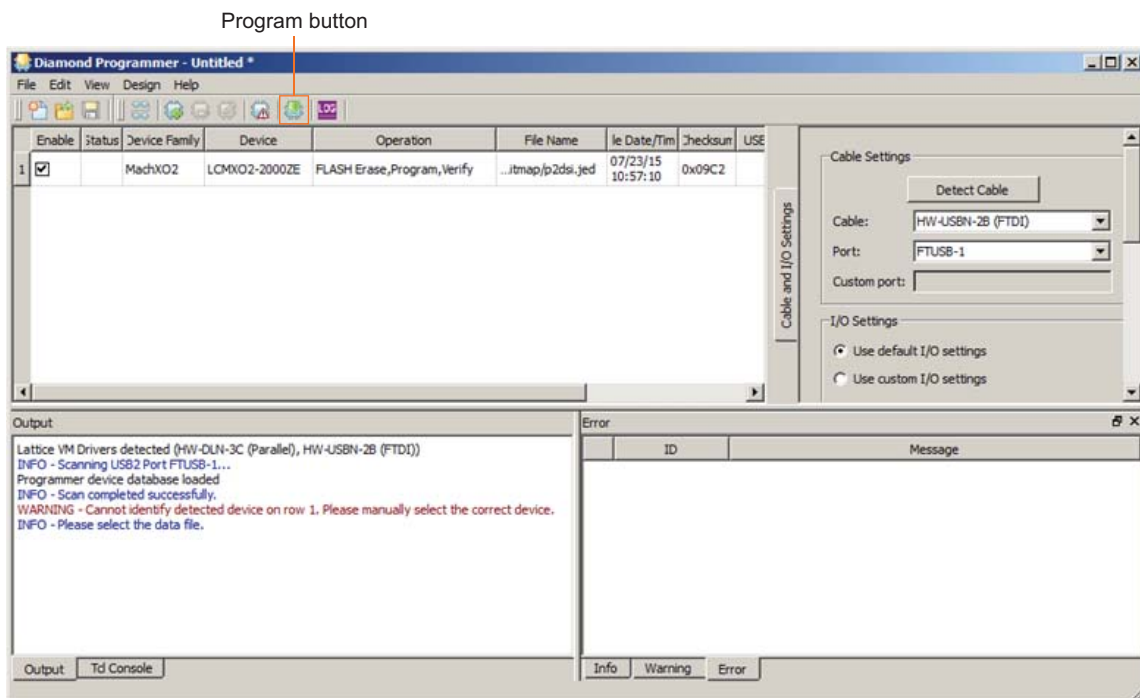
1. Make sure that the FTDI Power Jumper is connected.
2. Connect the wearable board to the PC through the USB mini socket (see EB100, [iCE40 Ultra Wearable Development Platform User Guide](#)).
3. Power on the board using the Power Switch (see EB100, [iCE40 Ultra Wearable Development Platform User Guide](#)).
4. Start Diamond Programmer.
5. In the Getting Started dialog box, select **Create a new blank project** and click **OK**. This opens the main interface of Diamond Programmer.

**Figure 3. Getting Started Dialog Box**



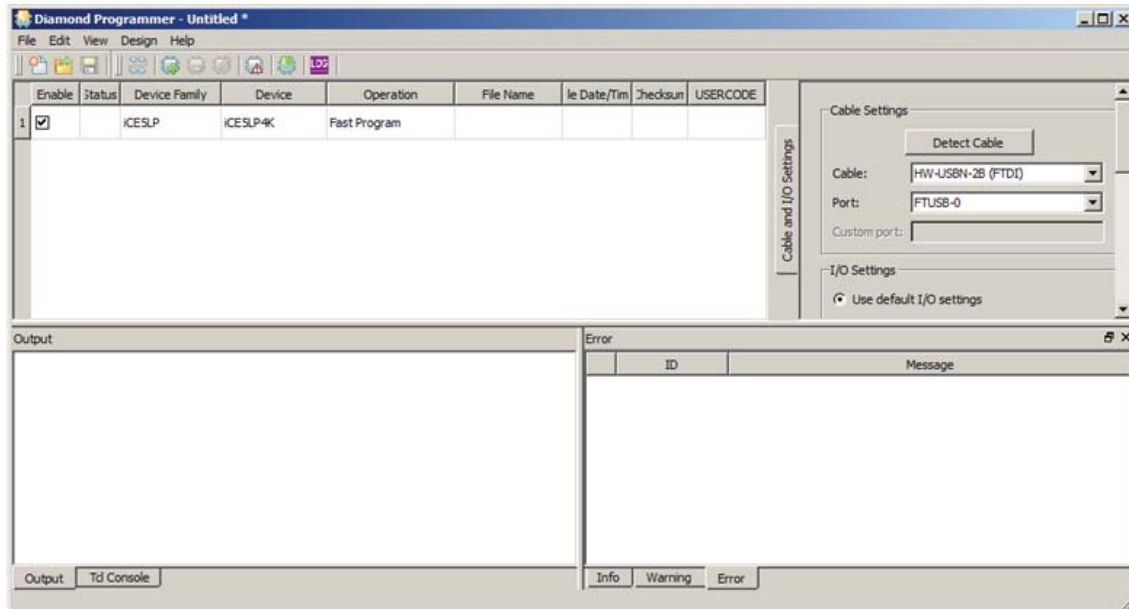
6. In the main interface, select the following options as shown in Figure 4.
  - Device Family: **MachXO2**
  - Device: **LCMXO2-2000ZE**
  - Cable: **HW-USBN-2B (FTDI)**
  - Port: **FTUSB-1**
  - File Name: **/Flashlight/bitmap/p2dsi.jed**
7. Click the **Program** button to flash MachXO2 and check Status.

**Figure 4. Program Button**



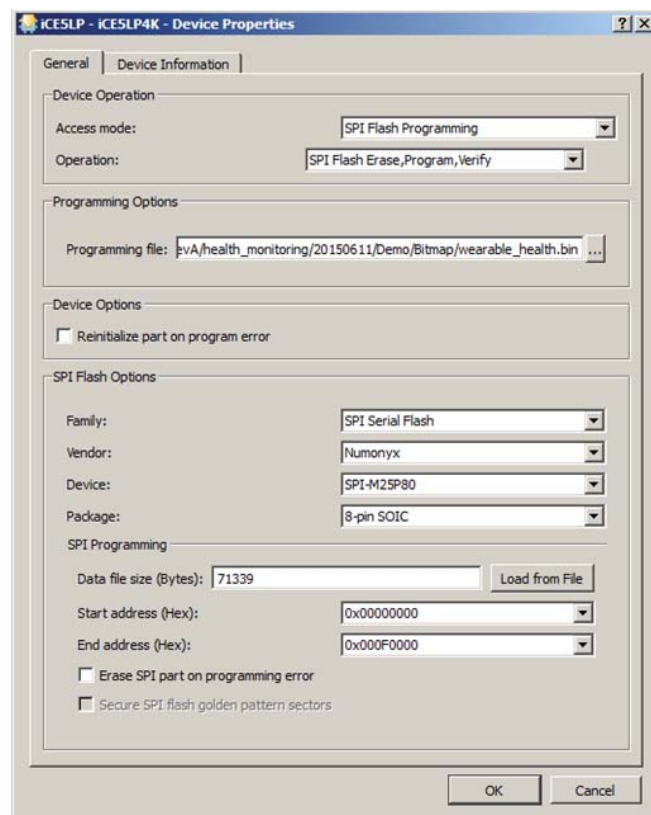
8. After programming MachXO2, select the following options as shown in Figure 5:
  - Device Family: **iCE5LP**
  - Device: **iCE5LP4K**
  - Cable: **HW-USBN-2B (FTDI)**
  - Port: **FTUSB-0**.

**Figure 5. Programming the iCE40 Ultra Device**



9. Double-click on a blank area in Operation to open the Device Properties dialog box.

**Figure 6. Device Properties**



10. Configure the settings as shown in Figure 6.

11. Select the program file **/Flashlight/bitmap/flshlgt\_uart\_top.bin**. Then click **OK**.
12. Click the **Program** button to flash the iCE40 device and check Status.

## Installing FlashlightDemo.apk to Android Phone

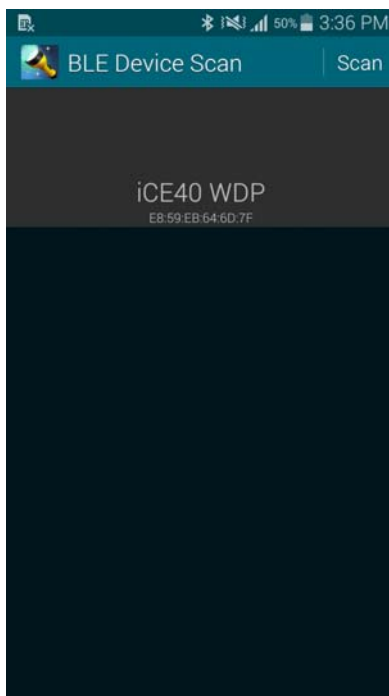
To install FlashlightDemo.apk to Android:

1. In the Android phone, go to **Settings > Security > Unknown sources** to allow the installation of the APK directly to the Android phone.
2. Connect the Android phone with the PC and make sure the driver is ok.
3. Go to File Manager and click the FlashlightDemo.apk to install the application.
4. Deselect the **Unknown sources** option.

## Connecting the iCE40 Ultra Wearable Board to the Android Phone

1. Power on the board using the Power Switch (see EB100, [iCE40 Ultra Wearable Development Platform User Guide](#)).
2. Enable Bluetooth on the Android phone.
3. Go to the Apps menu and click the **FlashlightDemo** icon to open the installed application.
4. Click the **Scan** button on the top right of the screen. An iCE40 Ultra BLE device is detected.

**Figure 7. BLE Device Scan**



5. Click **iCE40 WDP** to connect the wearable device and open the demo interface.

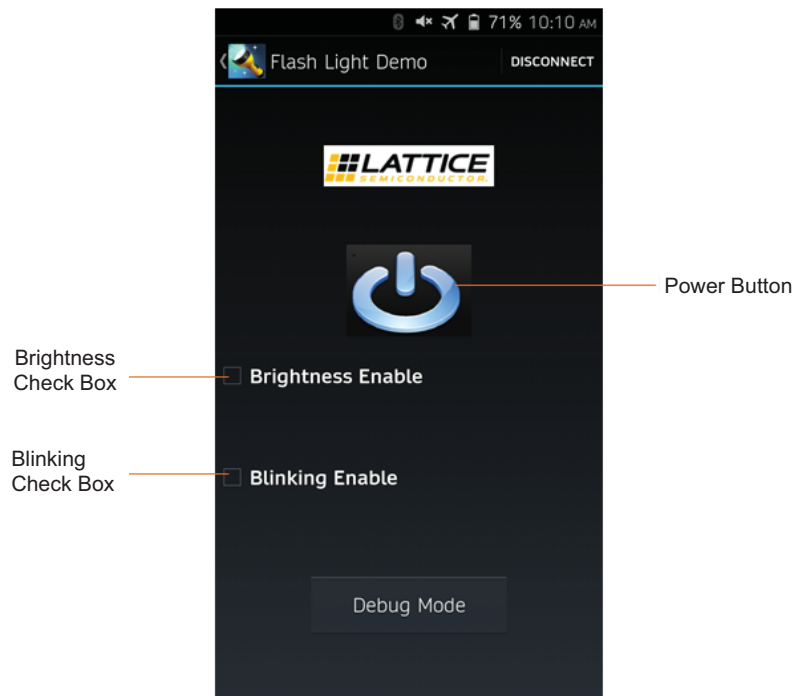
## Demo Procedure

Follow all the steps mentioned above so that the Wearable board and the phone are ready with necessary bitmap and application respectively. The demo application also should be connected to the board via BLE.

To run the demo:

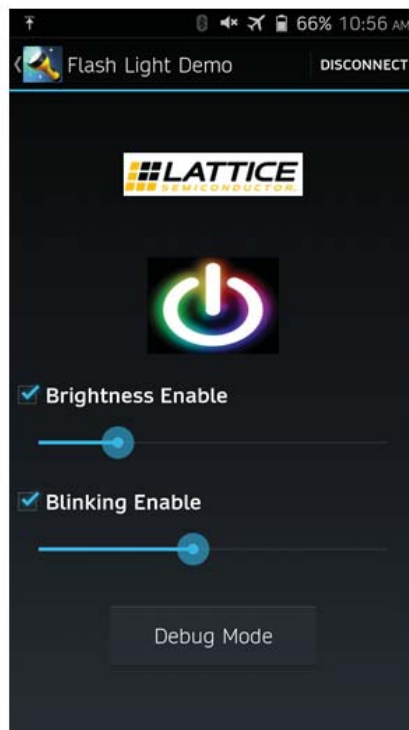
1. Click the **Power** button to power on the flashlight. The button switches to active state.
2. Select the **Brightness Enable** check box. Move the slider from left to right to adjust brightness.
3. Select the **Blinking Enable** check box. Move the slider from left to right to adjust blinking frequency.

**Figure 8. Active State**



4. Click the **Power** button again to power off the flashlight. The button switches to inactive state.

**Figure 9. Inactive State**



## Technical Support Assistance

Submit a technical support case through [www.latticesemi.com/techsupport](http://www.latticesemi.com/techsupport).

## Revision History

| Date           | Version | Change Summary   |
|----------------|---------|------------------|
| September 2015 | 1.0     | Initial release. |