



Water Tolerant Touch Surface Development Kit

Water Tolerant Touch Surface Development Kit User's Guide

Preface



Important: Notice to customers:

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our website (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXA”, where “XXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

Introduction

The Water Tolerant Touch Surface Development Kit showcases Microchip’s robust 2D Touch Surface solution. The kit shows the water tolerance performance of capacitive touch using the PTC’s Driven Shield+ feature. The kit has two self-capacitance touch buttons, 5x6 2D Touch Surface Sensor and driven shield. It also has 14 LEDs to indicate touch position and board information.

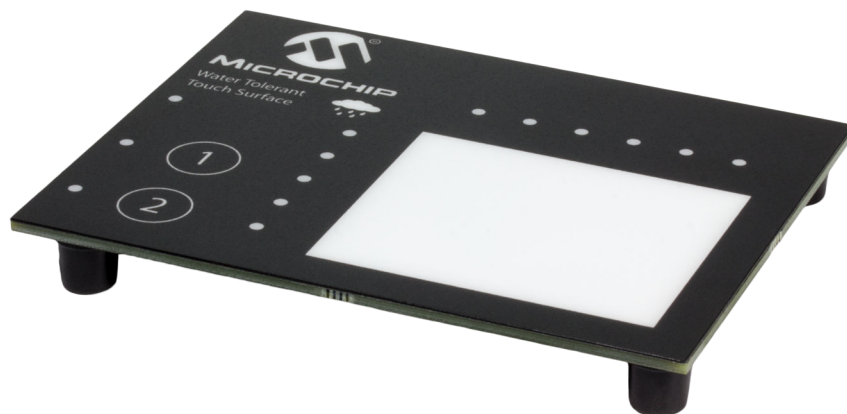


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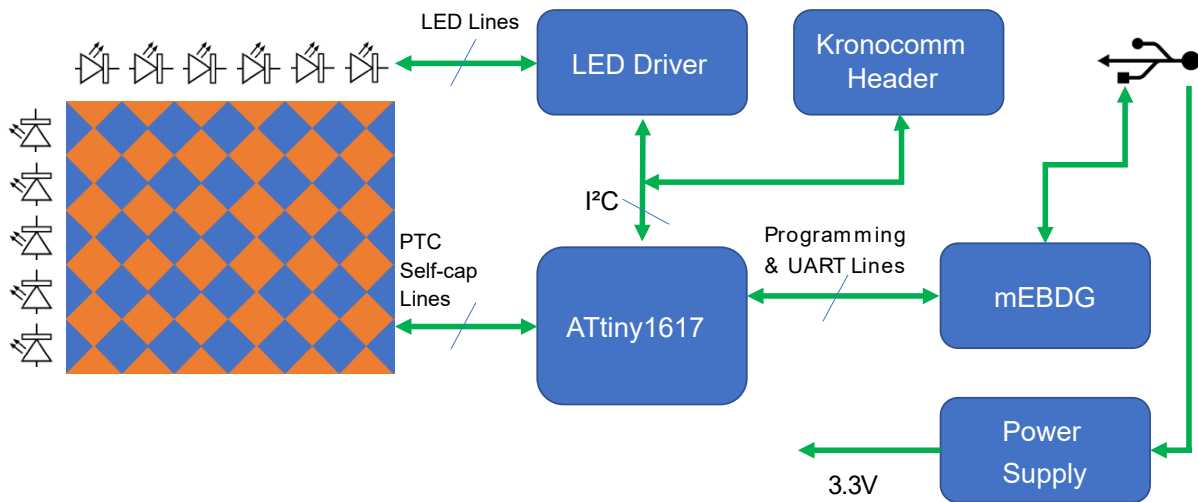
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1. Introduction

1.1 Features and Overview

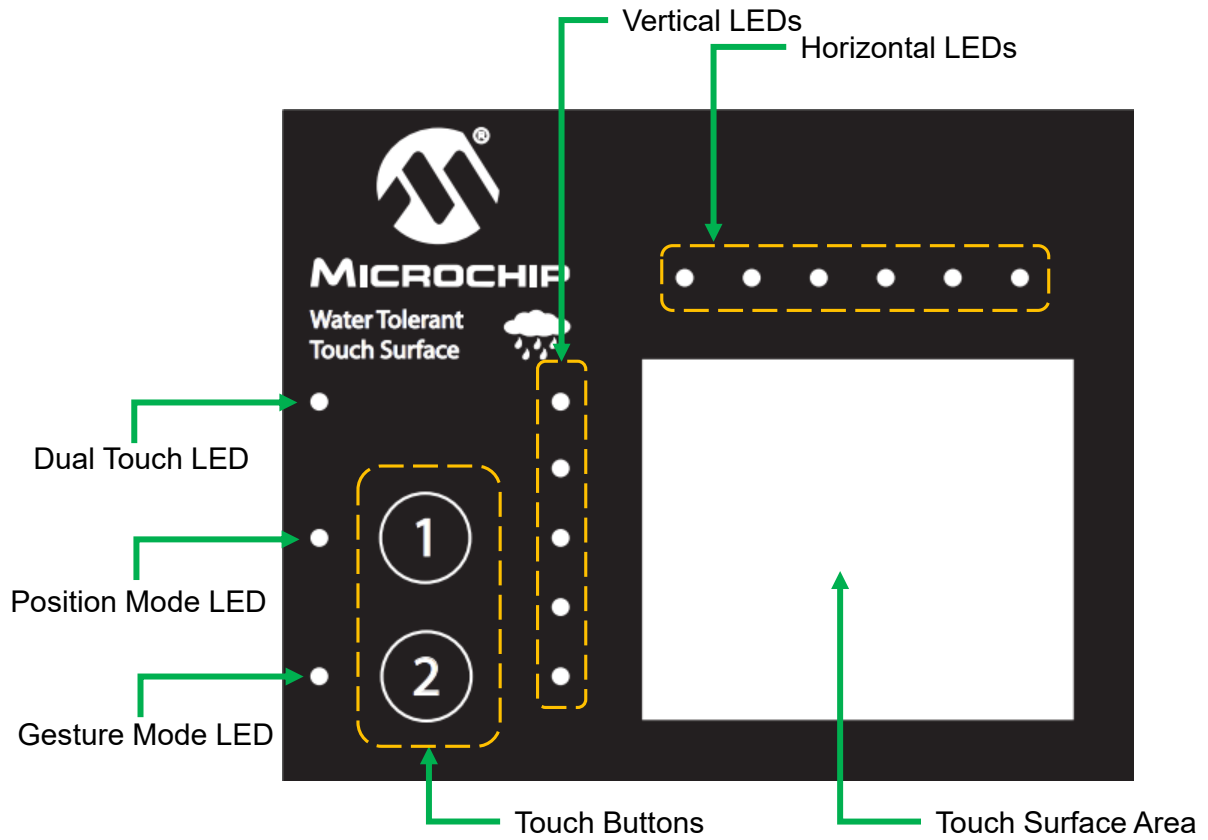
- Surface Sensor: 5x6 Surface Diamond Pattern with Dedicated Driven Shield
- Two Self-Capacitance Touch Buttons
- Microcontroller: ATtiny1617 8-bit AVR Microcontroller - 20 MHz, 16 Kbytes Flash, 2 Kbytes RAM, 128 bytes of EEPROM
- Debugging and Programming: mEBDG with CDC UART
- LEDs: LEDs to Indicate Position and Mode
- LED Driver: MCP23017

1.2 Functional Block Diagram



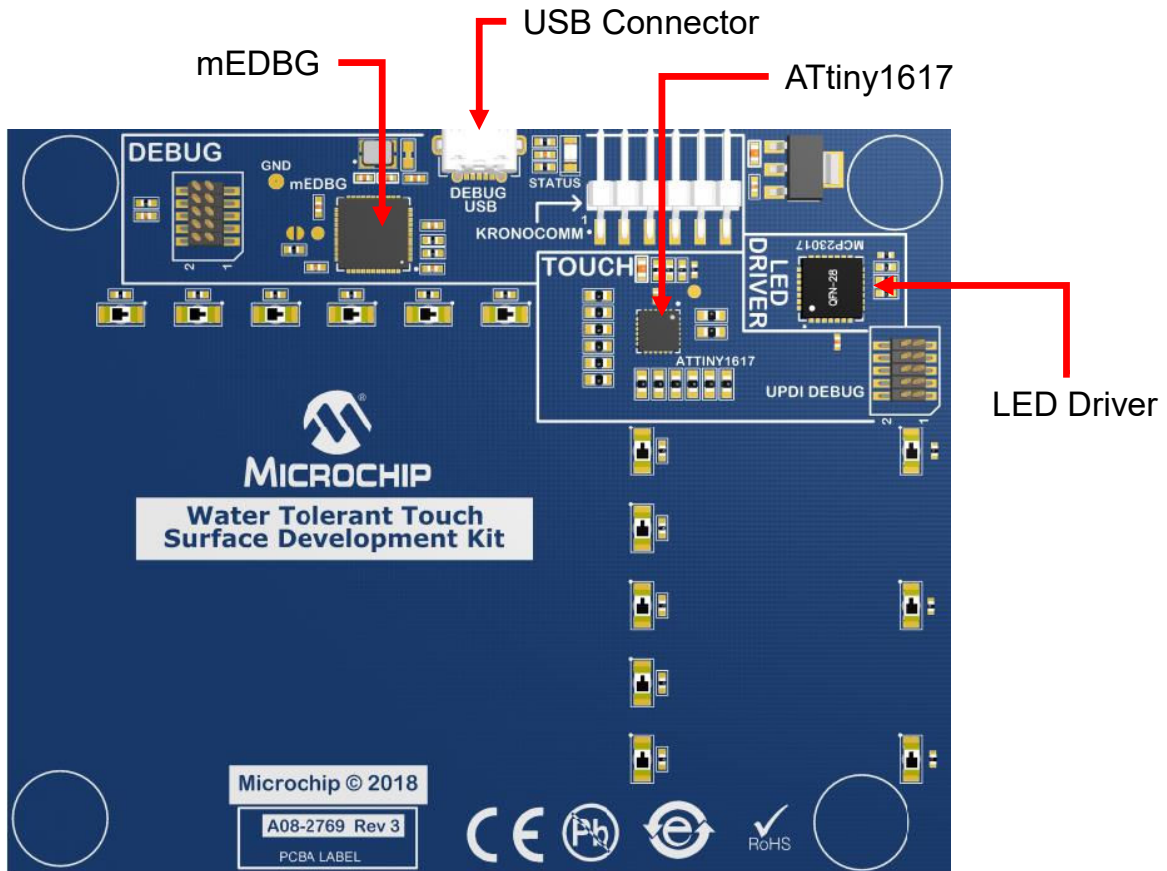
2. Getting Started

2.1 Quick Start



Water Tolerant Touch Surface Develo...

Getting Started



2.2 Surface Sensor Design

Figure 2-1. Surface Sensor

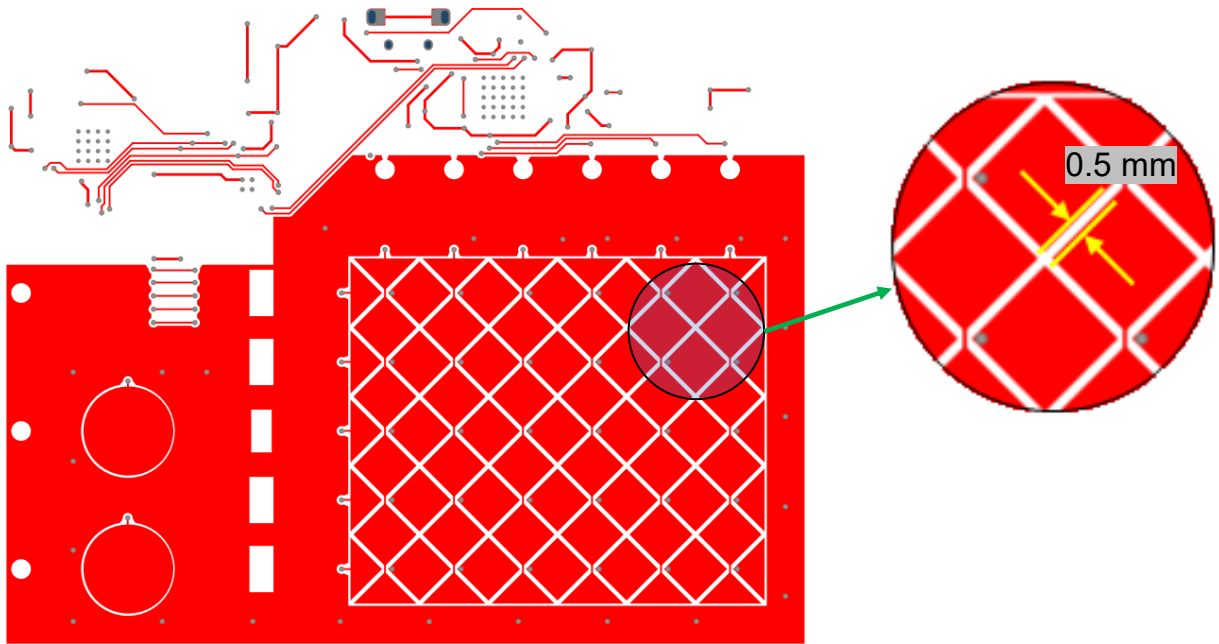
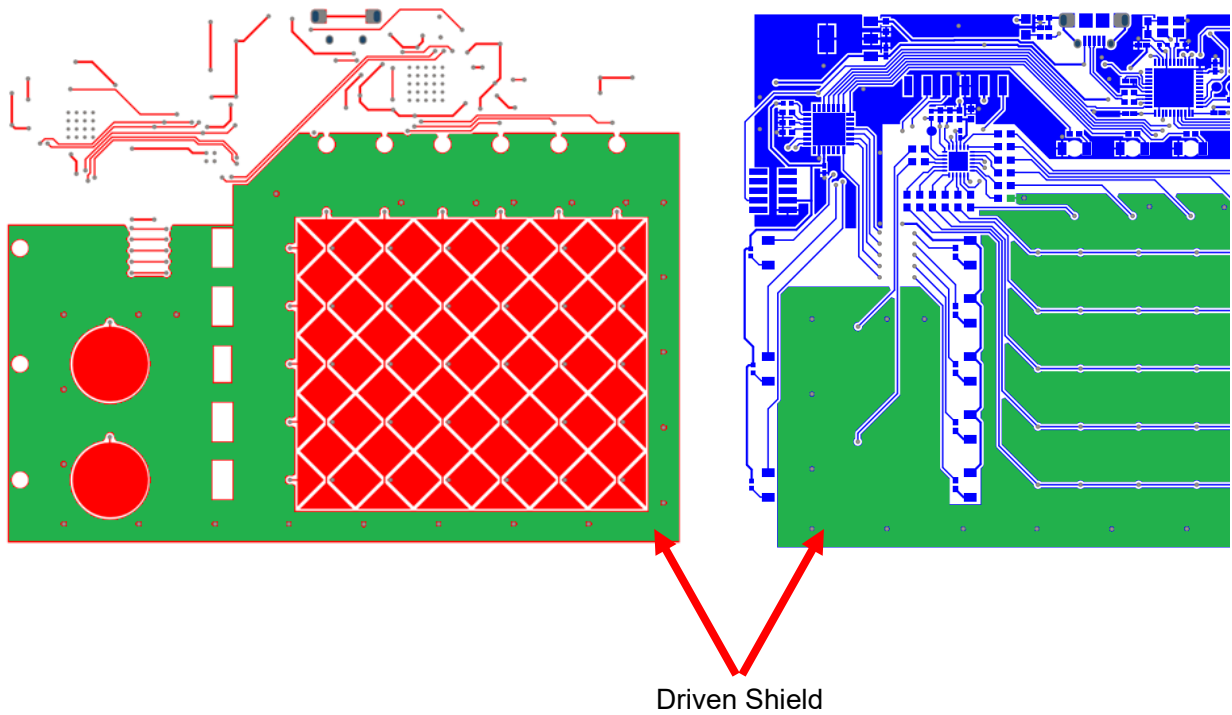


Figure 2-2. Driven Shield



2.3 Touch Buttons

Button 1:

When touched, the kit's mode is changed to Finger Position mode.

Button 2:

When touched, the kit's mode is changed to Gesture Recognition mode.

2.4 LEDs

Dual touch LED

This LED glows when two fingers touch the touch surface area.

Position mode LED

This LED glows to indicate that the kit is currently in Position mode.

Gesture mode LED

This LED glows to indicate that the kit is currently in Gesture mode.

2.5 Documentation and Relevant Links

- **Xplained Products:** Xplained evaluation kits are a series of easy-to-use evaluation kits for Microchip microcontrollers and other Microchip products.
 - Xplained Nano – used for low pin count devices and provides a minimalistic solution with access to all I/O pins of the target microcontroller.
 - Xplained Mini – used for medium pin count devices and adds an Arduino Uno compatible header footprint and a prototyping area.
 - Xplained Pro – used for medium to high pin count devices that feature advanced debugging and standardized extensions for peripheral functions.

Note: All the above kits have on-board programmers/debuggers, which create a set of low-cost boards for evaluation and demonstration of features and capabilities of different Microchip products.

- **Atmel Start:** This tool will help you select and configure software components and tailor your embedded application in a usable and optimized manner.
- **Atmel Studio:** Free Atmel IDE for development of C/C++ and assembler code for Microchip microcontrollers.
- **Data Visualizer:** Data Visualizer is a program used for processing and visualizing data. Data Visualizer can receive data from various sources such as the Embedded Debugger Data Gateway Interface found on Xplained Pro boards and COM ports.
- **Design Documentation:** Package containing CAD source, schematics, BOM, assembly drawings, 3D plots, layer plots, etc.
- **Hardware User's Guide:** PDF version of this user's guide.
- **Water Tolerant Touch Surface Kit on Microchip Page:** Microchip website link.

3. User's Guide

3.1 Powering the Board

The kit takes power from the micro-USB cable. The kit can be powered by connecting the micro-USB cable to the USB connector on the board and to the computer.

3.2 Modes of Operation

The kit operates in two different modes.

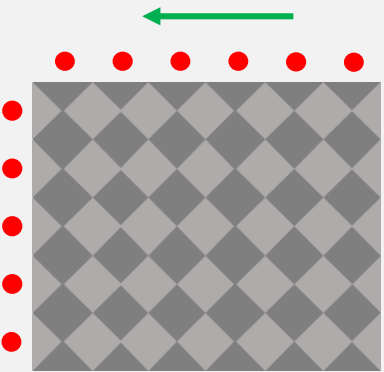
3.2.1 Position Mode

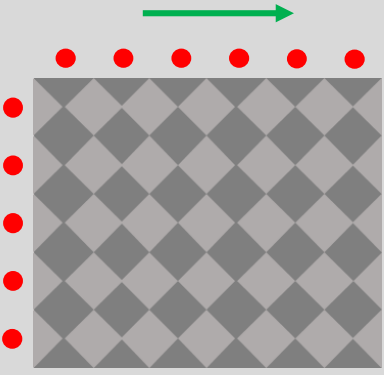
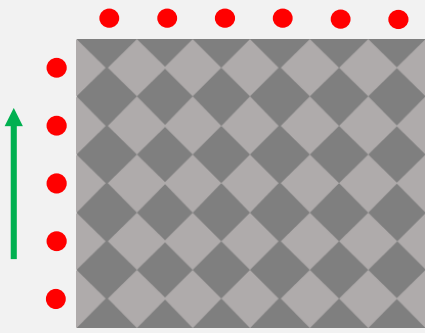
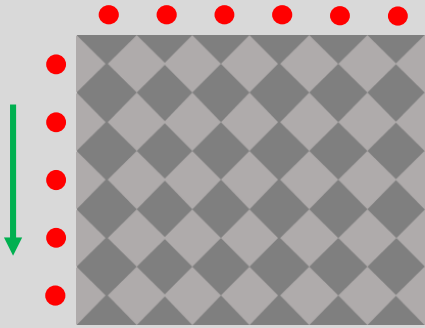
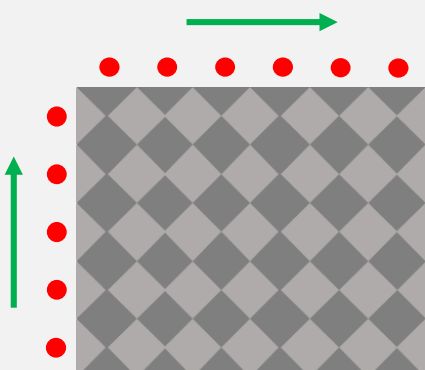
In this mode, the user touch position is decoded. Based on the position, the vertical and horizontal LEDs glow. After power-up, the kit works in this mode.

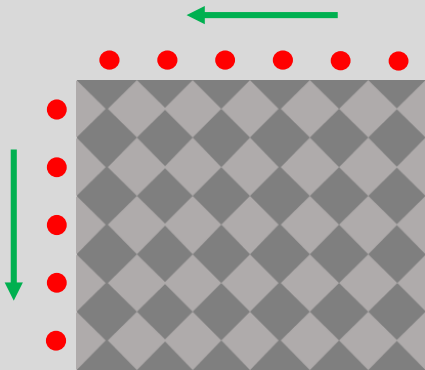
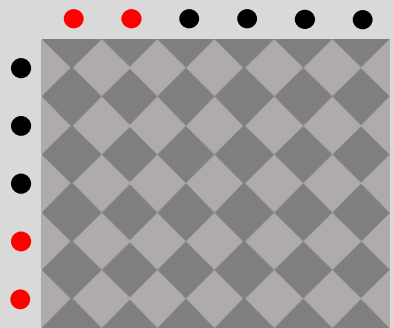
Note: In this kit, two-touch is supported only for gestures. No two-individual position can be decoded correctly due to self-capacitance sensor arrangement. If user tries to do two-touch, then the decoding stops and the two-touch LED glows.

3.2.2 Gesture Mode

In Gesture mode, depending on the gesture, the LEDs glow to indicate the gesture. The tap is indicated by a blink and swipes are indicated by LED chasing. The following table provides information on how LEDs glow when a gesture is performed.

Gesture	LED Chasing Direction
Tap	No chasing. All vertical and horizontal LEDs blink ONCE.
Double-Tap	No chasing. All vertical and horizontal LEDs blink TWICE.
Left Swipe	

Gesture	LED Chasing Direction
Right Swipe	
Up Swipe	
Down Swipe	
Clockwise Wheel Gesture	

Gesture	LED Chasing Direction
Counterclockwise Wheel Gesture	
Pinch-Zoom	<p>Zoom: The horizontal and vertical LEDs start to glow from one end.</p> <p>Pinch: The horizontal and vertical LEDs start to diminish from one end.</p> 

3.2.3 Connecting to GUI

Due to code memory limitation, the application can either use the LEDs to show touch performance or use datastreamer to stream data to the 2D Touch Surface Utility. By default, the project is compiled to display data in LEDs (datastreamer disabled). To connect to GUI, modify the following code in the `touch.h` file and program the `.hex` file.

Disable LED:

```
#define ENABLE_LED 0u
```

Enable Datastreamer:

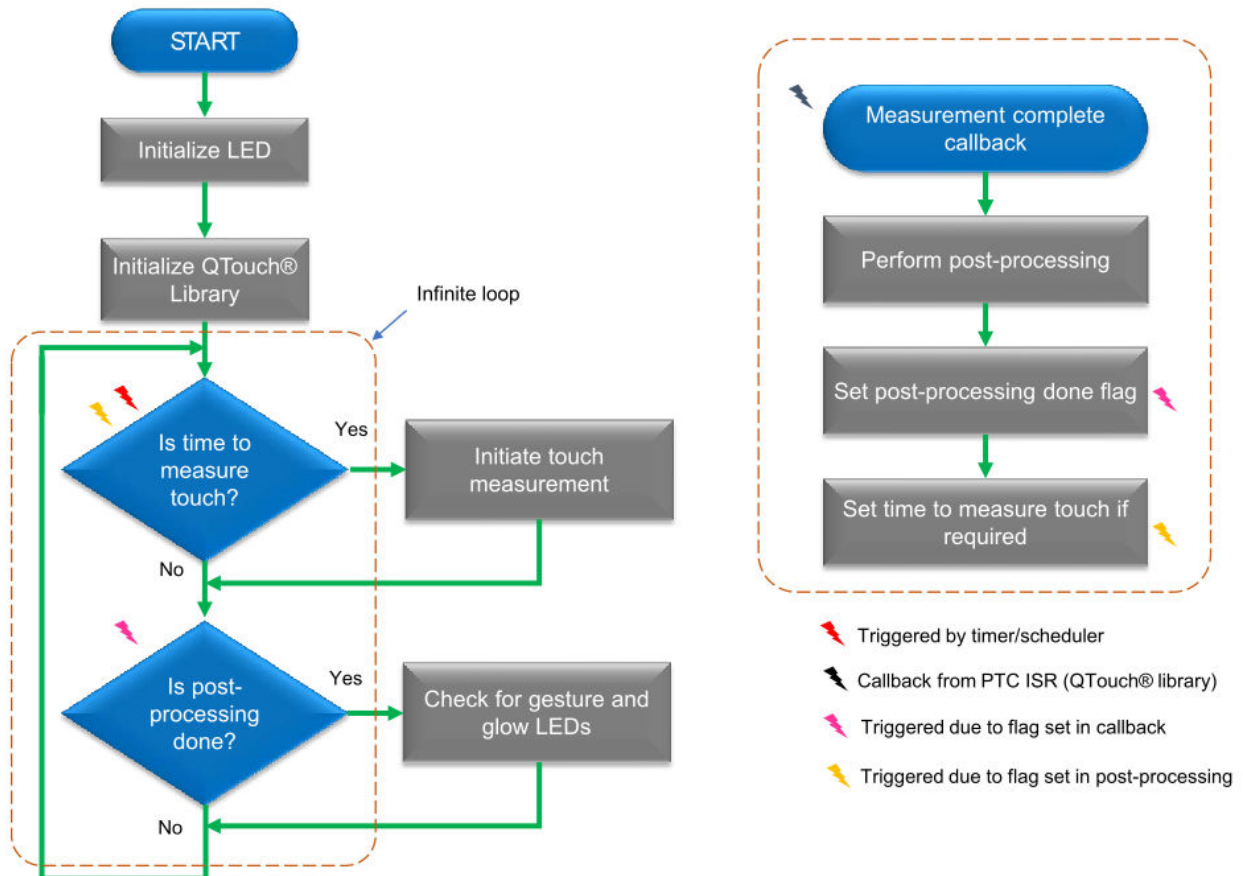
```
#define KRONOCOMM_UART 1u
#define KRONOCOMM_ENABLE 1u
#define KRONO_GESTURE_ENABLE 1u
```

Refer to the guide to connect the kit to the datastreamer.

Comport Settings: Baud rate is 38400, parity none, Stop bit 1 and flow control none.

3.3 Application Flow

The following diagram shows the application flow. Touch measurement is performed at regular intervals. At the end of each measurement, the surface and gesture data are taken from the library. Depending on the position or gesture information, the LEDs are updated.



4. Hardware Revision History and Known Issues

4.1 Identifying Product ID and Revision

The revision and product identifier of the Xplained Pro boards can be found in two ways: either through Atmel Studio or by looking at the sticker on the bottom side of the PCB.

When an Xplained Pro MCU board is connected to a computer with Atmel Studio running, an information window with the serial number is shown. The first six digits of the serial number contain the product identifier and revision. Information about connected Xplained Pro extension boards is also shown in the window.

The same information can be found on the sticker on the bottom side of the PCB. Most kits have stickers that have the identifier and revision printed in plain text as A09-nnnn/rr, where “nnnn” is the identifier and “rr” is the revision. Boards with limited space have a sticker with only a data matrix code, which contains a serial number string.

The serial number string has the following format:

```
"nnnnrrssssssss"
```

n = product identifier

r = revision

s = serial number

The product identifier for the Water Tolerant Touch Surface Kit is A09-3026.

4.2 Revision 5

Revision 5 of Water Tolerant Touch Surface Development Kit (A09-3026/05) is the initial released version. There are no known issues.

5. Document Revision History

Doc.Rev.	Date	Comments
A	06/2018	Initial document release.

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- Technical Support

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