IQS333EV02 Evaluation Kit User Guide

IQ Switch® - ProxSense® Series

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1 Introduction

This user guide describes the operation of the IQS333EV02 Evaluation Kit. The EV-Kit consists of 3 parts, the connection board, the wheel board and the cross board. The quick start guide is also included. To visualise raw data from the EV-Kit, the connection board can be interfaced to any personal computer with USB support, and IQS333 software Graphical User Interface (GUI). The purpose of the IQS333EV02 EV-Kit is to help application and development engineers in evaluating the IQS333's 9 channel projected- and 7 channel self-capacitive proximity and touch sensors. A picture of the evaluation kit is shown below.

Figure 1.1 Connection board (left), wheel module board (middle) and cross module board (right)

This user guide will help a user to fully use and understand the technology in this evaluation kit. The connection board will be described, followed by the wheel module board and the cross module board. This will be shown in conjunction with an IQS333 GUI (Graphical User Interface) to simplify explanations.

2 Connection Board and IQS333 IC

The IQS333 IC (Integrated Circuit) is located on the connection board. The IQS333 can be used in self-capacitive mode with up to 7 channels or in projected capacitive mode with up to 9 channels. In self-capacitive mode it can be used as 7 buttons or 1 slider with 4 buttons or 2 sliders with 1 button. In projected capacitive mode it can be used as 9 buttons or 1 slider with 6 buttons or 2 sliders with 3 buttons.

The IQS333 has a configurable PWM controller which is used to drive LEDs and can be used as a general output pin. Figure 2.1 and Figure 2.2 shows the working of the PWM controller. Figure 2.1 shows the switched on LEDs on the connection board. This is achieved by running the IQS333 GUI through following the next steps.

- Run IQS333 Application
- Read and Close the Hints & Tips menu
- Click the Start button
- Click the Wheels/Slider bar to get to the Compensation/Multiplier/Thresholds bar.

- Set the Mode to "Const" (Constant) and "CMP" (Compare) value to 31.
- Click the Send button.

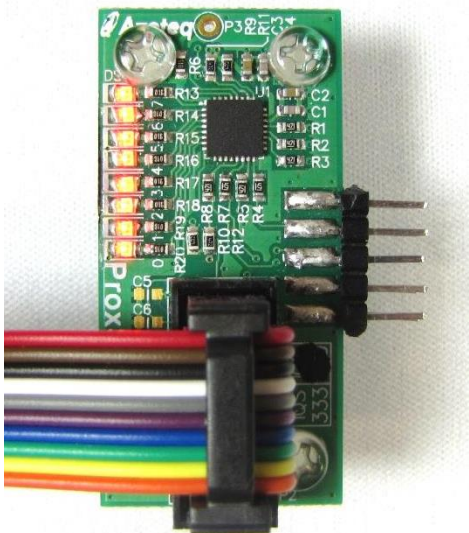The LEDs on the connection board should turn on as shown below.

Figure 2.1 Connection board with PWM LEDs switched on

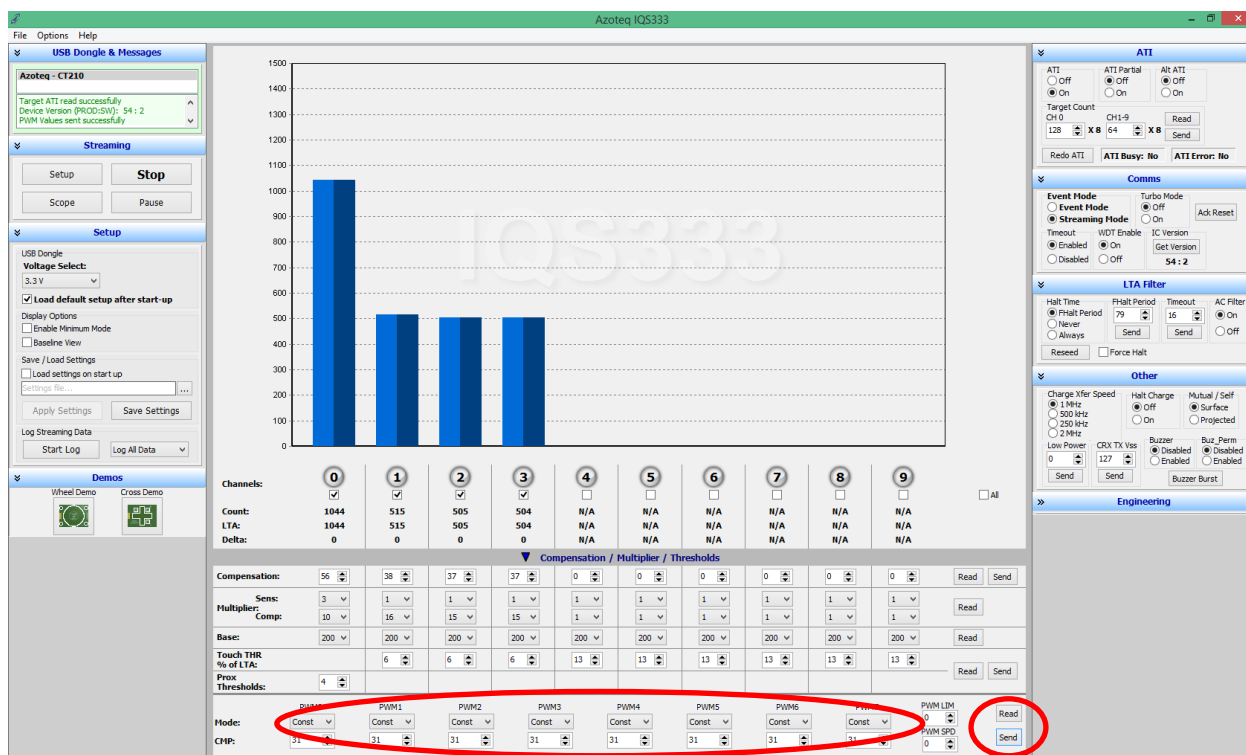The GUI should look similar to the screenshot below with the relevant settings highlighted.

Figure 2.2 Switch PWM LEDs on with IQS333 GUI

The connection board has 2 10-way headers, 1 box header for communicating with a microcontroller, such as a CT210, and a straight DIL header for connecting to the sense electrodes. The pin outs for the headers are numbered in Figure 2.3 and each pins description is given in Table 1. This is given as users may wish to connect their own sensing electrodes to the IQS333.
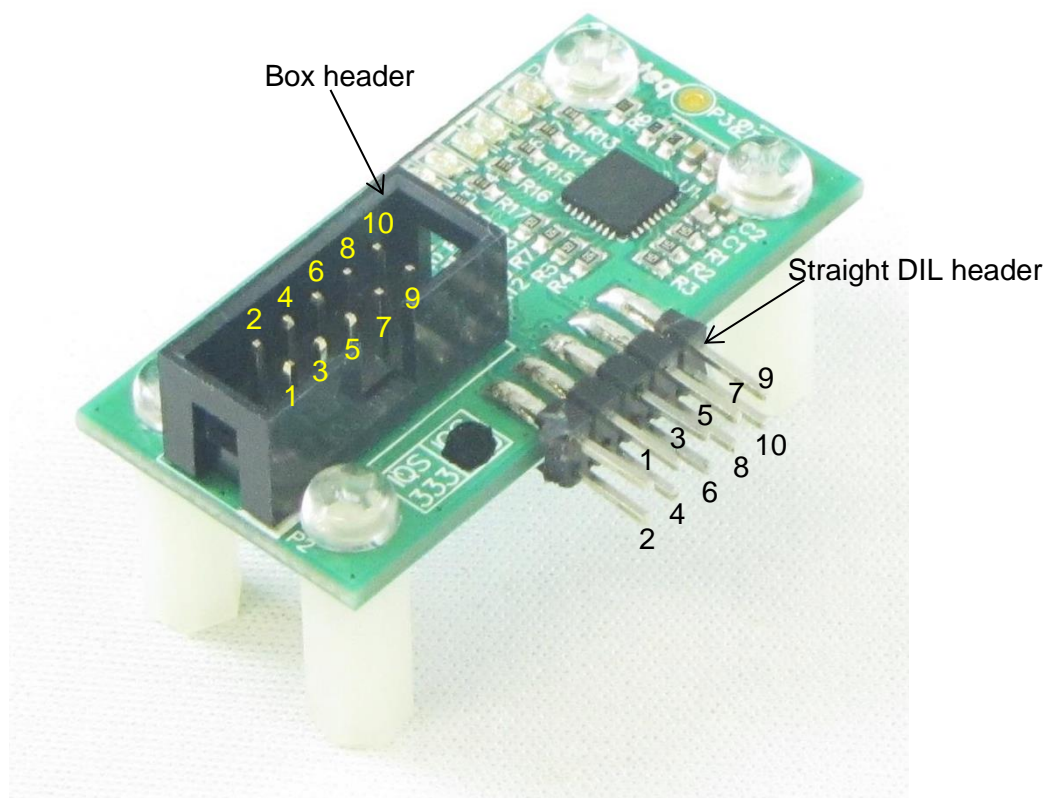
Figure 2.3 Connection board pin outs

Table 1 Connection board pin out description

Header 1 Box header		Header 2 Straight DIL header	
Pin number – Description		Pin number – Description	
1 – Ground	2 – No connect	1 – CTRX0/RX0	2 – CTRX4/TX1
3 – VDDHI	4 – No connect	3 – CTRX1/RX1	4 – CTRX5/TX2
5 – No connect	6 – No connect	5 – CTRX2/RX2	6 – CTRX6
7 – I^{2}C Data	8 – No connect	7 – CTRX3/TX0	8 – No connect
9 – I^{2}C Clock	10 – Ready	9 – No connect	10 – Ground

3 Wheel Board

The IQS333EV02 Kit comes with 2 module boards: the wheel and the cross module boards. First we look at the working of the wheel board. Always remember to click the **Stop** button before removing or connecting a module board. When the wanted board is connected click the **Start** button to continue evaluating. This Stop and Start is needed for the software to ensure that no errors occur.

To evaluate the wheel module board, connect the wheel module board to the connection board as shown in the figure below.
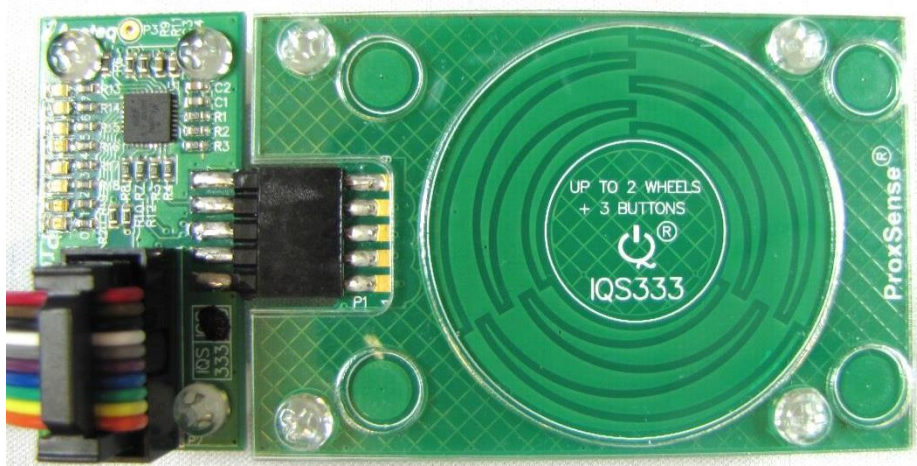
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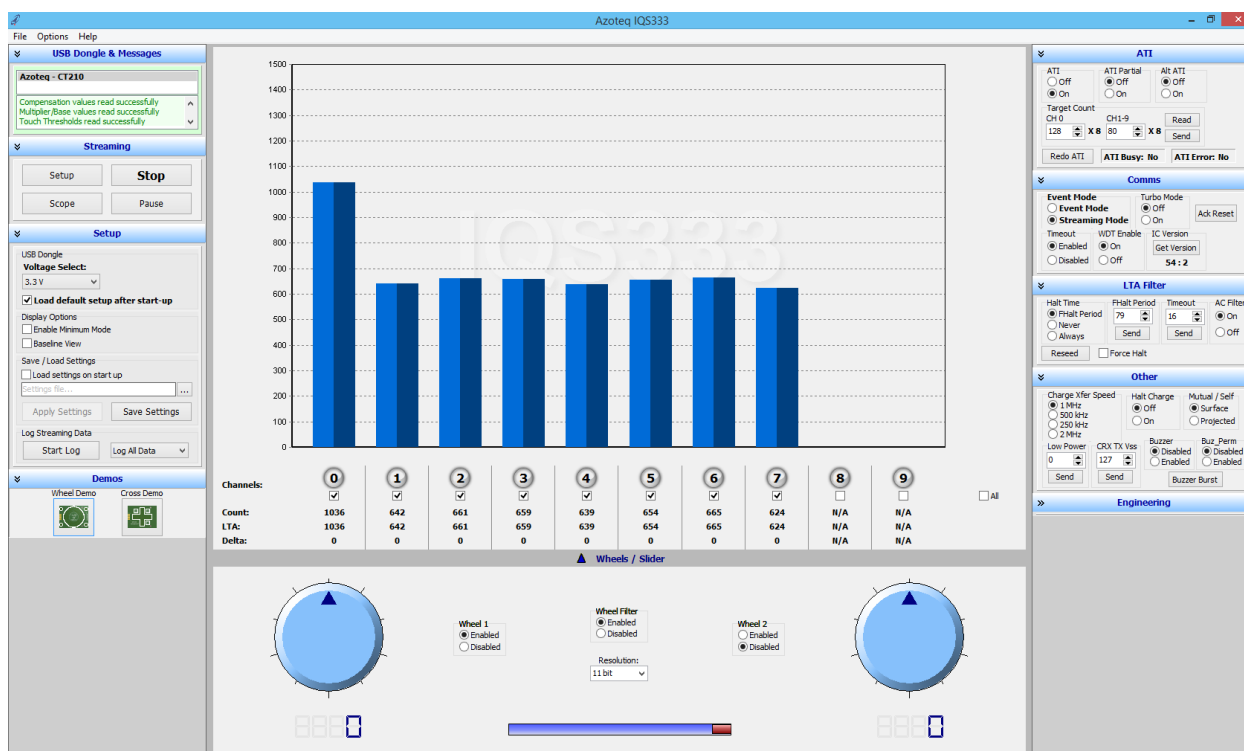**Figure 3.1 Wheel board plugged into connection board**

Figure 3.2 IQS333 GUI setup for wheel board

This is achieved through the following steps:
- Click the Stop button.
- Connect the wheel board to the connection board.
- Click the Start button.
- Click the Wheel Demo icon under the Demos tab.

The GUI is now setup as shown in Figure 3.2 above. Evaluate the board by sliding a finger on the big wheel in the centre of the board in a circular motion. This will correspond to Wheel 1 on the left side of the GUI and Channels 1 to 3. Channel 0 is a distributed proximity channel and activates when a finger comes close to a Channel. Channels 4 to 7 represent the four touch buttons at each corner of the Wheel board. After we are done evaluating the Wheel module board, we move on to the Cross module board.

4 Cross Board

The next board to evaluate is the Cross module board. Remember to click the Stop button, replace the Wheel board with the Cross board and then click the Start button to avoid unwanted errors. The connection board with the cross board plugged in is shown below.
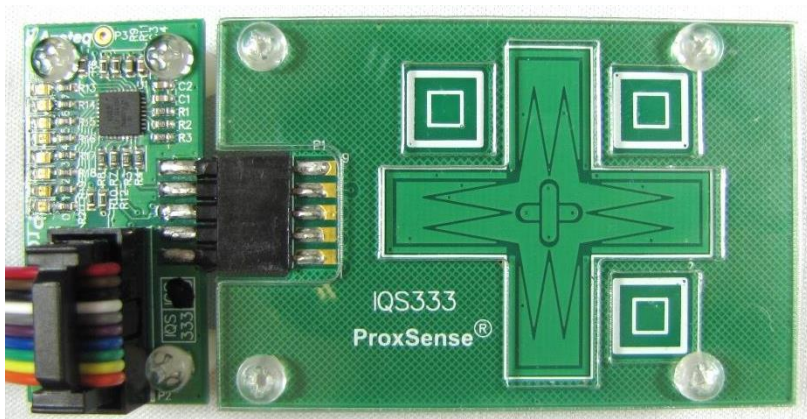
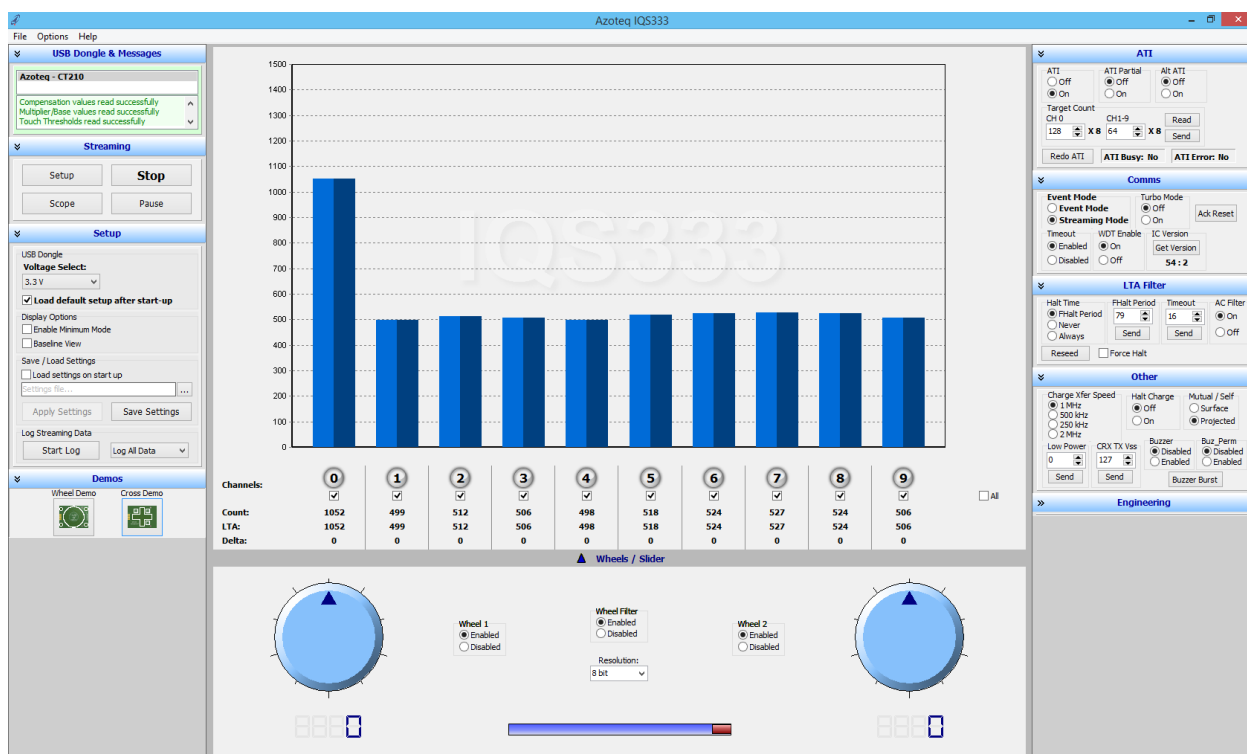**Figure 4.1 Cross board plugged into connection board**

Figure 4.2 IQS333 GUI setup for cross board

Get the Cross board setup by following the next couple of steps:
- Click the Stop button.
- Remove the Wheel board from the connection board.
- Connect the Cross board to the connection board.
- Click the Start button.
- Click the Cross Demo icon under the Demos tab.

The GUI resembles that of Figure 4.2 above. Evaluate the Cross board by sliding a finger over the vertical and horizontal parts of the cross. The vertical slider (vertical bar of the cross) relates to Wheel 1 on the left of the GUI and correlates to Channel 1 to 3. Note that in the middle of the cross, Channels 2 and 5 will be activated as this is where the two sliders cross. The horizontal slider (horizontal bar of the cross) relates to Wheel 2 on the right of the GUI and correlates to Channel 4 to 6, additionally it also relates to the slider at the bottom of the GUI. The 3 square

buttons relate to Channels 7 to 9 in the GUI. Evaluate this module board fully to see all the capabilities that this board provide.

On the right and bottom of the GUI there are multiple settings that can be changed. For a first time user we suggest to leave these settings and first evaluate the boards with the loaded settings. After evaluation the user can make adjustments to these settings for application specific options. This will help the user in achieving more/less sensitive buttons and various other settings.

5 Reference Designs

For further technical detail the datasheet should be consulted and can be found at the Azoteq website. Some reference designs from the datasheet are shown below.
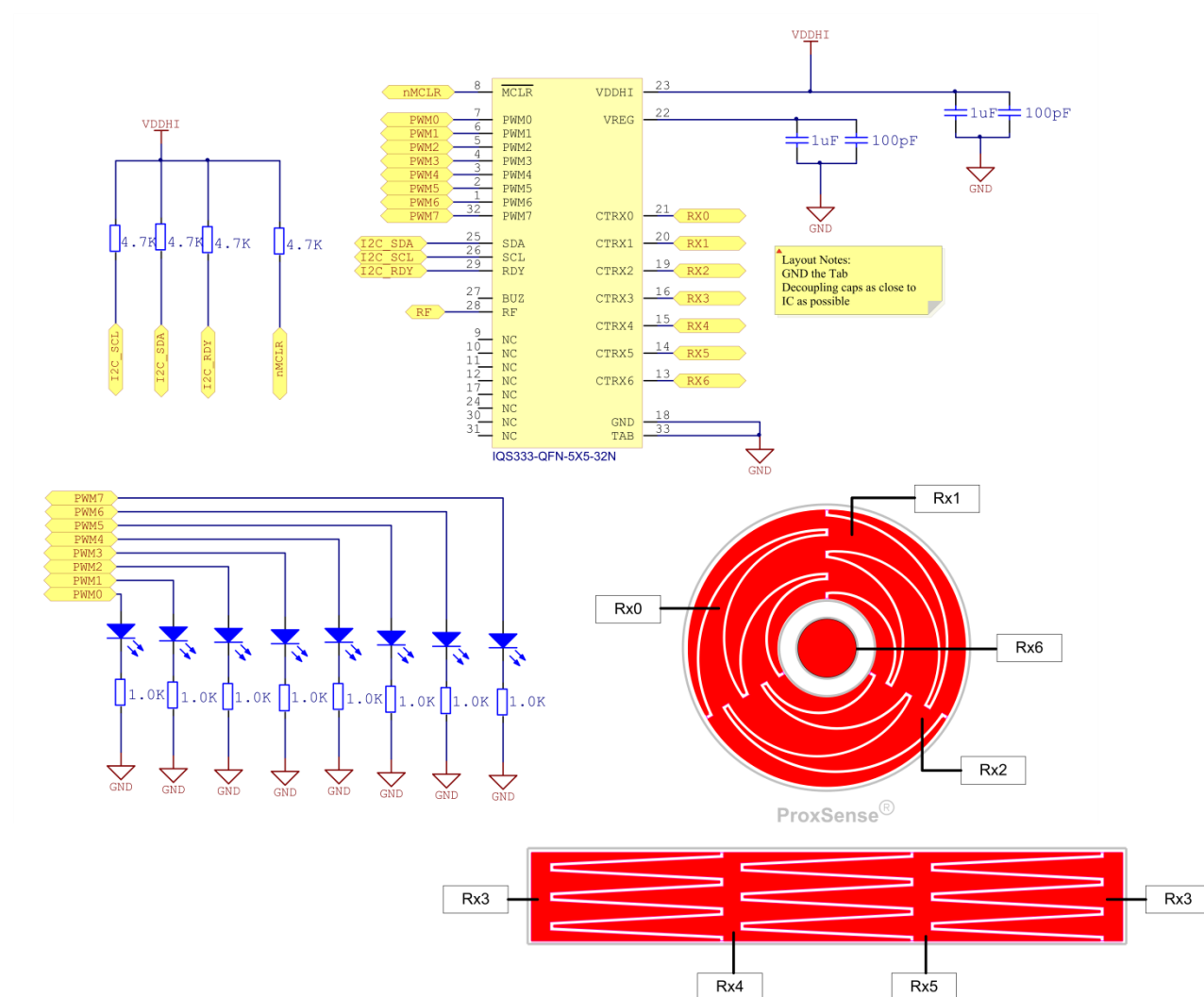
Figure 5.1 IQS333 Self Capacitive Reference Design
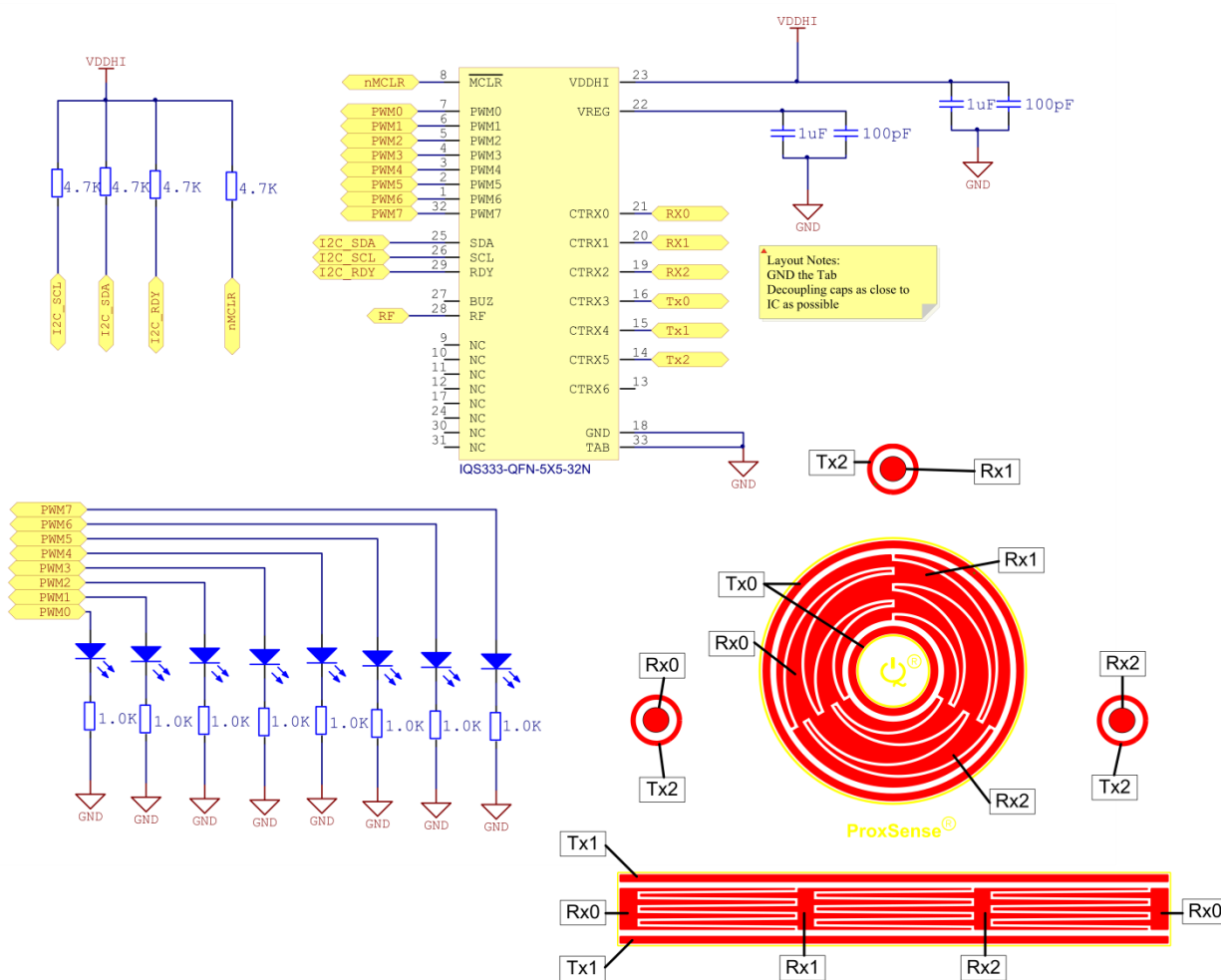
Figure 5.2 IQS333 Projected Capacitive Reference Design

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