Kinetis KwikStik Demo Software

Lab Guide

Rev. 0.3

1 Purpose

This lab document describes how to compile, program and run the Kinetis KwikStik demonstration software. The demonstration software includes projects for IAR Embedded Workbench for ARM version 6.10.5 and version 6.20.3, and CodeWarrior for Microcontrollers version 10.1.

For information on the KwikStik hardware and software please refer to the KwikStik Quick Start Guide and the KwikStik User's Manual.

2 Demonstration Software Revisions

There have been several revisions of the KwikStik Demonstration software. The current release is version 1.4. The changes are detailed below.

Version 1.2 – Original release; pre-flashed on Version 3 and Version 4 KwikStiks
Version 1.3 – Updated underlying software as follows:

- Updated to use Freescale MQX 3.7
- Updated to use TSS 2.5
- Added IAR 6.10.5 Project
- Added IAR 6.20.3 Project
- Added CodeWarrior 10.1 Project

Version 1.4 – Replaced USB Joystick demo with USB Mouse demo

3 Before You Start

The demonstration software is an application for the Freescale MQX RTOS. **MQX 3.7 and the latest patches for the KwikStik must be installed before** the KwikStik demonstration software can be added and built.

If you already have Freescale MQX 3.7 and the latest patches, please move to the next section. Otherwise:

1. Download and install Freescale MQX RTOS 3.7.
2. Download and install Freescale MQX RTOS 3.7 Patch for Kinetis KwikStik

If you don't already have the IAR or CodeWarrior tools installed, you should do so before you process further. You can install evaluation versions of the tools from the links below.

- IAR Embedded Workbench for ARM
- CodeWarrior for Microcontrollers

4 Installing the Demonstration Software

The demonstration software is deployed as a zip file containing this Lab Guide and an executable containing the demonstration software source code. The executable will install the demonstration

software to the default MQX installation path of *C:\Program Files\Freescale\Freescale MQX 3.7\demo* in a folder named *KwikStik_Demo*.

The *KwikStik_Demo* folder must be located inside the MQX *demo* folder for the paths to be found properly during the compile and link stage. You will need to change the install path of the KwikStik Demonstration Software to the *Freescale MQX 3.7\demo* during the installation procedure if you installation path for MQX doesn't match the default.

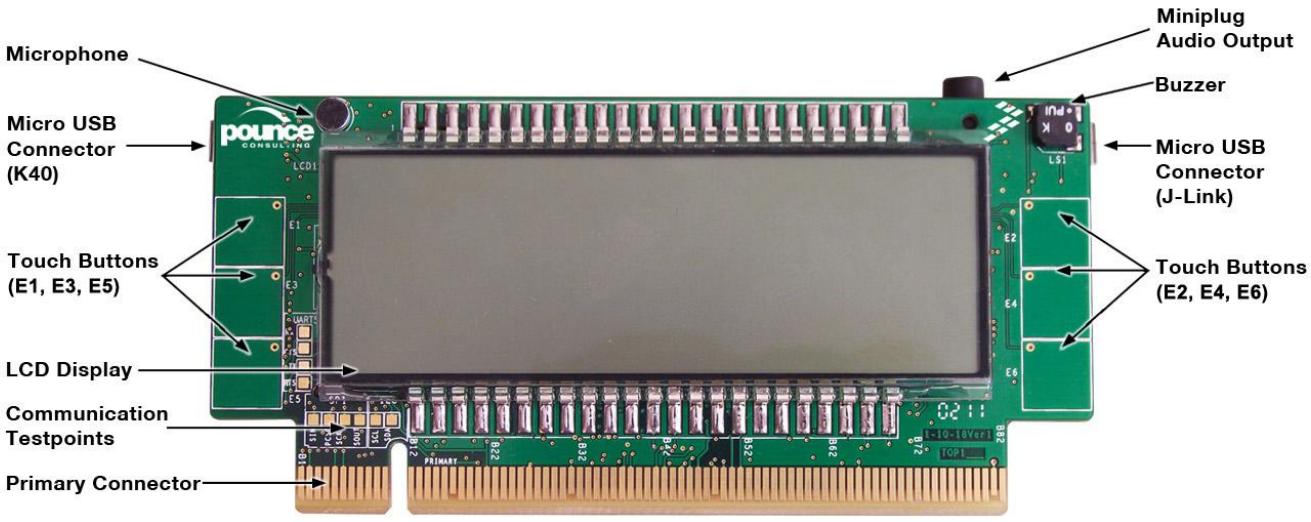
Note: If you have installed a previous version of the Kinetis Demonstration Software, ***you may wish to save off any changes*** you've made to the existing *Kinetis_Demo* folder. Otherwise, any ***files you modified will be overwritten.***

5 Using IAR Embedded Workbench

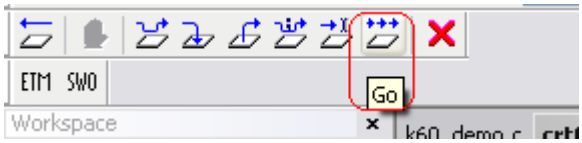
This section covers how to build the software and program it to the Kinetis K40 flash using IAR Embedded Workbench for ARM.

1) Open the appropriate IAR workspace file either
   Freescale MQX 3.7\demo\Kwikstik_Demo\iar\Kwikstik_Demo_6_10.eww
   or
   Freescale MQX 3.7\demo\Kwikstik_Demo\iar\Kwikstik_Demo_6_20.eww
   depending on the version of IAR you are using.
2) Click on the Make button  to build the code.
3) Plug a USB cable from your PC to the J-Link micro USB connector on the KwikStik.

   Note: there are two micro USB connectors on the KwikStik. In order to connect to the board using the IAR tools you have to use the ***J-Link connector on the right side of the board.***



4) After compilation completes, download the code to the board and start the debugger by pressing the "Download and Debug" button 
5) The code will download Flash, and the debugger screen will come up and pause at the first instruction. Hit the "Go" button to start running.



6) Follow the instruction in section 7, "Running the Demos".

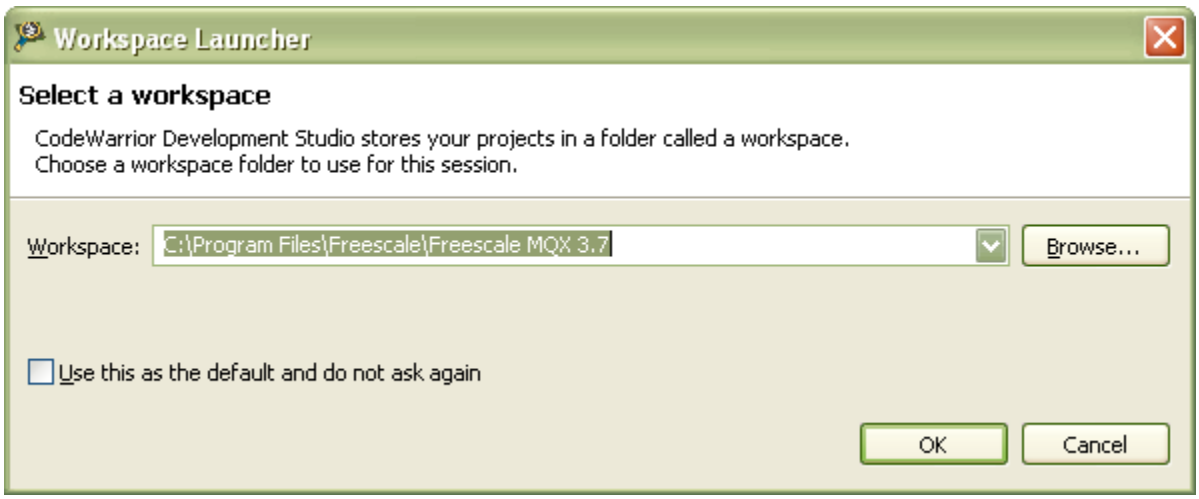
6 Compiling the Code Using CodeWarrior 10.1

This section covers how to build the software and program it to the Kinetis K40 flash using CodeWarrior for Microcontrollers.

1) If you haven't already, you should make sure you have downloaded and installed the latest CodeWarrior patches. Follow the patch installation instructions which can be found here.

   The latest patches can be found on the CodeWarrior Development Studio for Microcontrollers download page. At the time of this writing, the two patches available are:
   a. MCU v10.1 Compiler Update
   b. MCU v10.1 Kernel Awareness Update

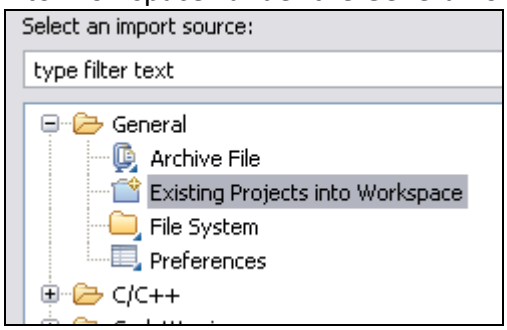
2) Open "CW for MCU v10.1" from the Start menu.
3) Depending on your preference settings in CodeWarrior, a dialog box may pop us asking you to select a workspace. Set the workspace to the MQX installation directory, which by default is: *C:\Program Files\Freescale\Freescale MQX 3.7*



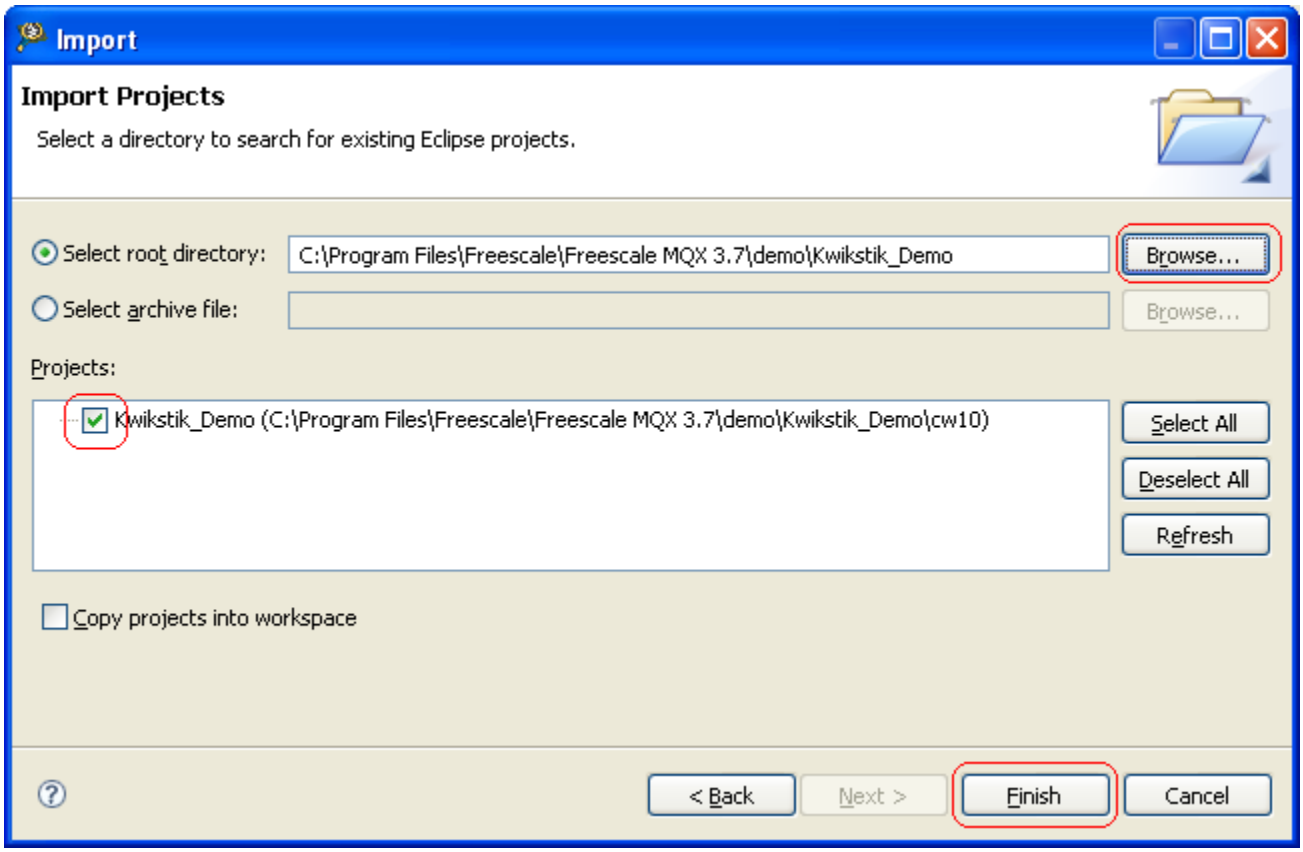
   Unless you have active projects already, CodeWarrior will open to the Welcome screen. Select "Go to Workbench".

Note: If you already have CodeWarrior open, you can change the workspace by going to **File->Switch Workspace**. This will restart CodeWarrior and open the new workspace location.

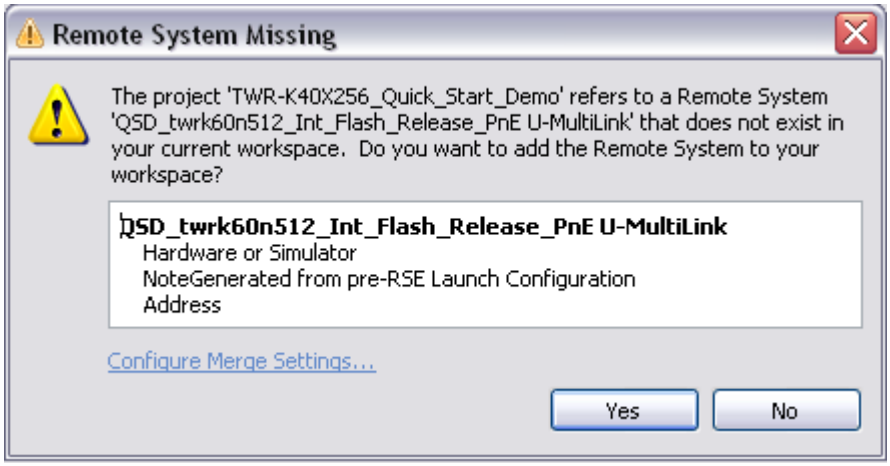
4) Click on **File->Import** in the menu bar. In the dialog box that comes up, select "Existing Projects into Workspace" under the General folder. Then click Next



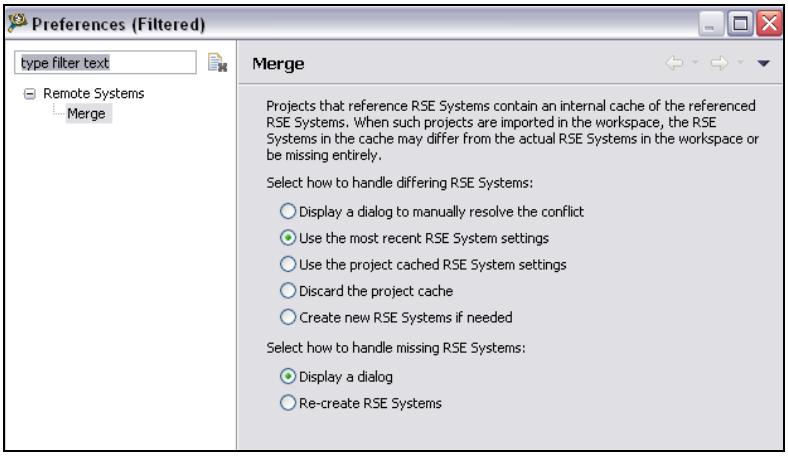
5) On the next screen, select the "Select root directory:" option, and click on Browse
6) Navigate to the *C:\Program Files\Freescale\Freescale MQX 3.7\demo\Kwikstik_Demo* directory and hit OK.
7) Make sure "Kwikstik_Demo" is checked and "Copy projects into workspace" is unchecked. Hit Finish. Read the instructions below for the error dialog box that will likely come up after hitting Finish.



8) At this point you may see an error message like the following image. If not, skip to step number 15).

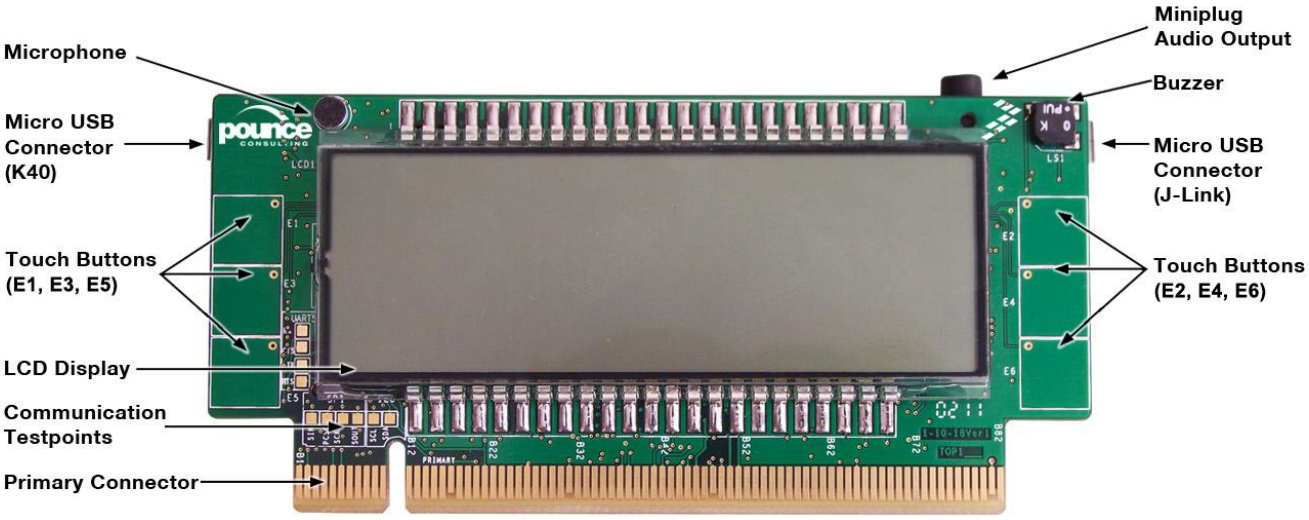


9) When importing a project, you will often see a “Remote Systems Changed” or “Remote System Missing” dialog box. This occurs when CodeWarrior detects a mismatch between the RSE (Remote System Explorer) settings in the project and the settings in the framework, or if the RSE system is missing in the project.
10) Click on “Configure Merge Settings” to avoid having the dialog box re-come up for this project.
11) On the screen that comes up, select the “Use the most recent RSE System settings” option, and click “Apply” and then “OK”

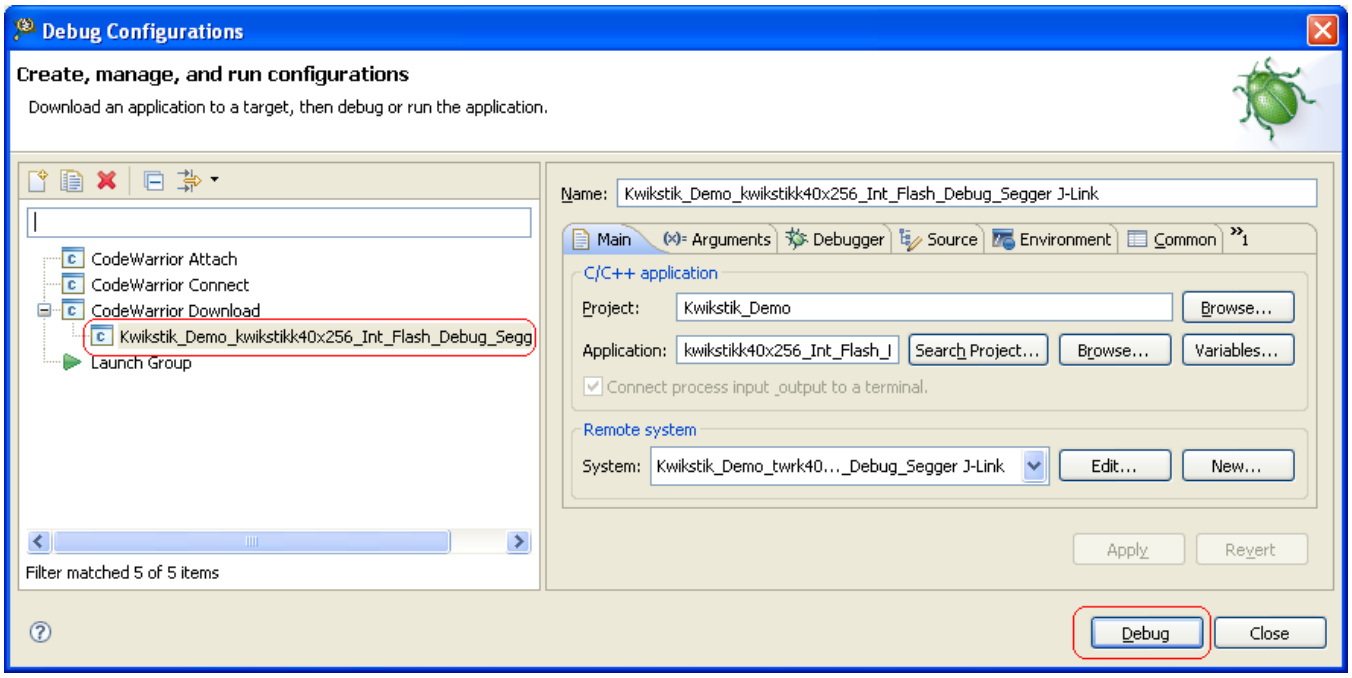


12) Then hit “Yes” to get rid of the error message. It is very important to not hit “No”
13) If you did hit “No”, you will need reset the RSE project settings. First close the project by right-clicking on it and selecting “Close Project”, and then open it up by right clicking on the project and selecting “Open Project”. The dialog box should come up again, and this time follow the steps listed above to solve this issue.
14) Repeat these steps for any other RSE message boxes that come up
15) Build the project by clicking on the Hammer icon in the toolbar 
16) Plug a USB cable from your PC to the J-Link micro USB connector on the KwikStik.

Note: There are two micro USB connectors on the KwikStik. In order to connect to the board using the IAR tools you have to use the ***J-Link connector on the right side of the board.***



17) Click **Run->Debug Configurations…** in the menu bar, and select the **KwikStik_Demo_kwikstikk40x256_Int_Flash_Debug_Segger_J-Link** configuration in the **CodeWarrior Download** section. Then hit the debug button in the bottom of the window



18) The code will then be flashed to the board and the debugger started. This may take a several moments.
19) Once the code is done flashing, the code will pause at the start of the MQX main() function.
20) Hit the run icon to continue the program execution. 

7 Running the Demos

The Kinetis Demonstration Software highlights some of the features of the K40X256 MCU and the KwikStik evaluation and development board. All of the applications run under the Freescale MQX™ RTOS.

When the board is plugged in and powered on, a menu will allow selection of one of the applications. Use the top left and right electrodes (E1, E2) to navigate through the available options. To select an application, use either one of the bottom electrodes (E5, E6).

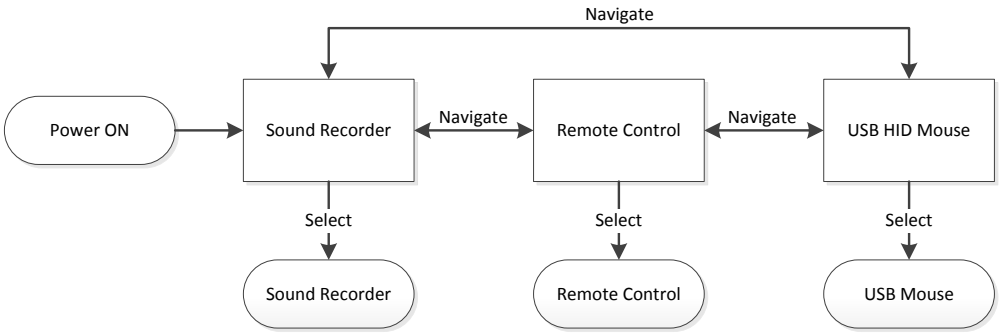


Figure 1. Main menu navigation flow diagram for demo applications

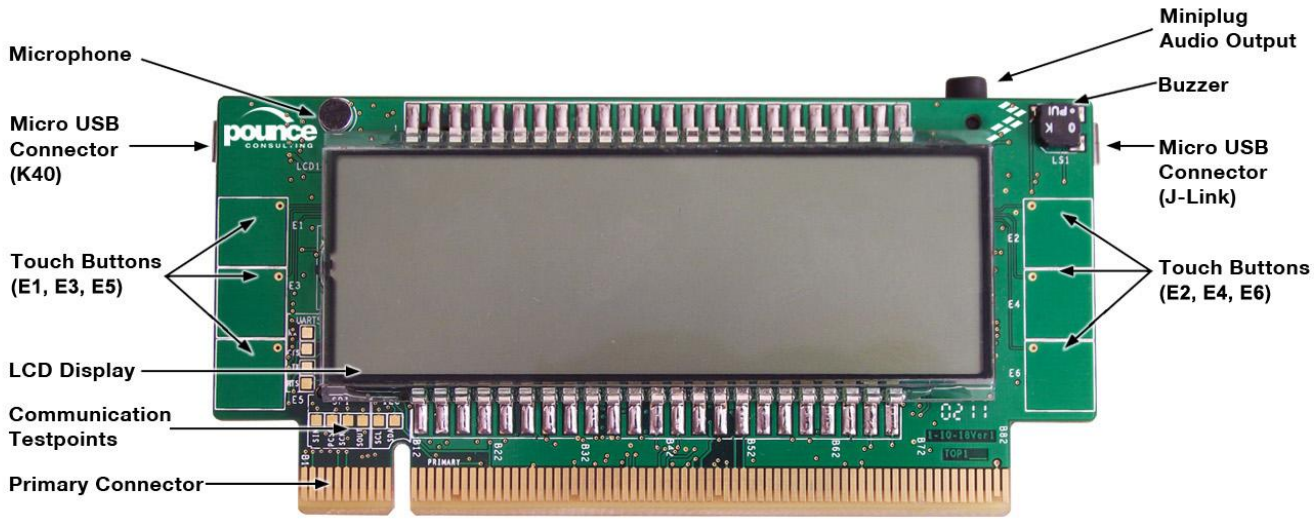


Figure 2. KwikStik Electrode Map

7.1 Sound Recorder

Raw sound data can be recorded from the microphone, stored in the K40 internal memory, and reproduced using the audio output mini-plug connector. A pair of headphones or external speakers connected to the audio output jack of the KwikStik is required for this demo application.

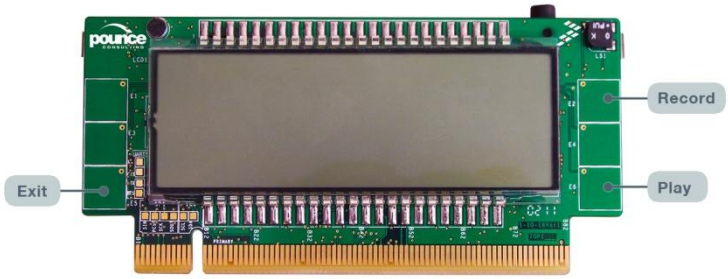


Figure 3. Sound recorder demo application electrode layout

7.2 Remote Control

The remote control application uses the infrared transmitter to send SIRC protocol commands that can control most Sony televisions. Commands for Power (E2), Channel Up (E4), and Channel Down (E6) are pre-stored and can be transmitted by pressing the corresponding electrode.

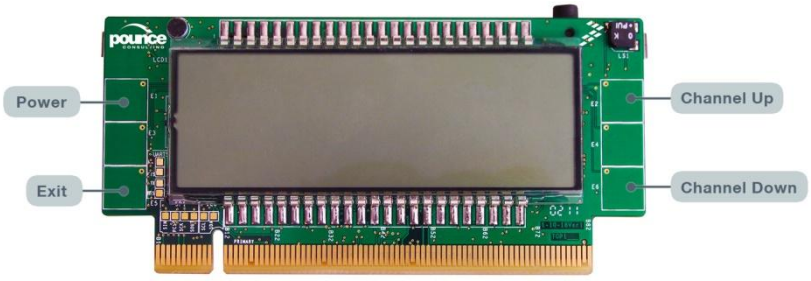


Figure 4. Remote Control demo application electrode layout

7.3 USB Mouse (HID)

The KwikStik can be used as a USB mouse device when running this application. When this application is selected the K40X256 will enumerate as an HID-compliant mouse on the PC. Use the touch-sensing electrodes to send button commands to the PC.

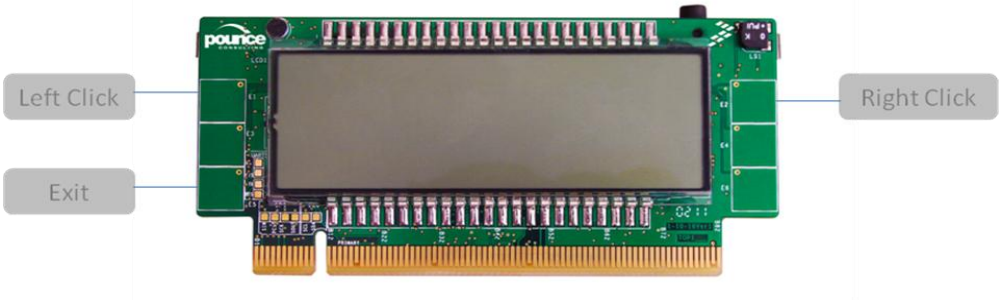


Figure 5. USB mouse demo application electrode layout