README document for IQS5xx example code

Version 1.1

18 February 2016

1 Introduction

This document is a supplement to the provided example code and provides additional information regarding the hardware and software required.

The example code is intended for the Arduino UNO revision 3 PCB. The code is free software and a user can redistribute it or modify it under the terms of the latest GNU General Public License as published by the Free Software Foundation. The source code can easily be ported to a different platform if required, as it consists mostly of I^2C communication with the IQS5xx device.

The example project implements a master I^2C protocol and interacts with the IQS5xx device on this bus. The relevant data is read from the IQS5xx device and displays this on the serial monitor in the Arduino development environment when user interaction occurs.

The comments in the code are very thorough and serve as additional documentation.

Please visit www.Arduino.cc for information related to the Arduino.

2 Hardware connections

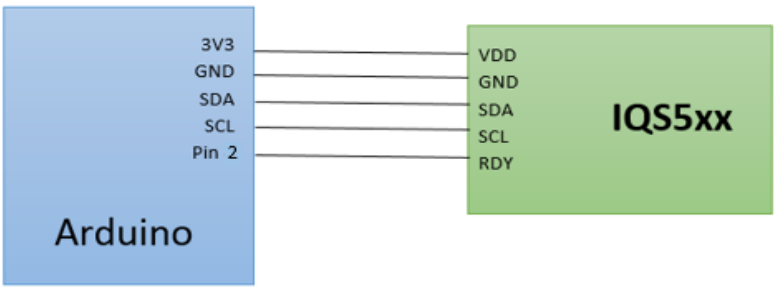


Figure 2.1 Connection diagram between Arduino and IQS5xx.

Pull-up resistors are required on the SCL and SDA lines (if not present on the IQS5xx application PCB). The recommended value for the pull-up resistors is 4.7kΩ. Digital I/O Pin 2 of the Arduino is used for the RDY input and is located under the DIGITAL (~PWM) group. If Pin 2 is not available, the user can use any other pin (to connect to RDY) on the Arduino board by changing the RDY_PIN definition under defs.h. Do not use the 5V rail to power the IQS5xx as the operational voltage range of the IQS5xx is from 1.65V to 3.6V.

3 Quick start guide

Follow the following steps to get started:

a) Connect the Arduino to the application PCB as described in Section 2

b) Connect the Arduino USB to a PC

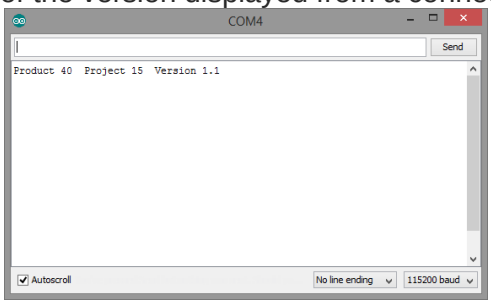
c) Open the example project in Arduino (by opening “IQS550_Example_Code.ino”)

d) Verify/Compile the project/sketch (click the icon or press CTRL-R), and confirm there are no errors

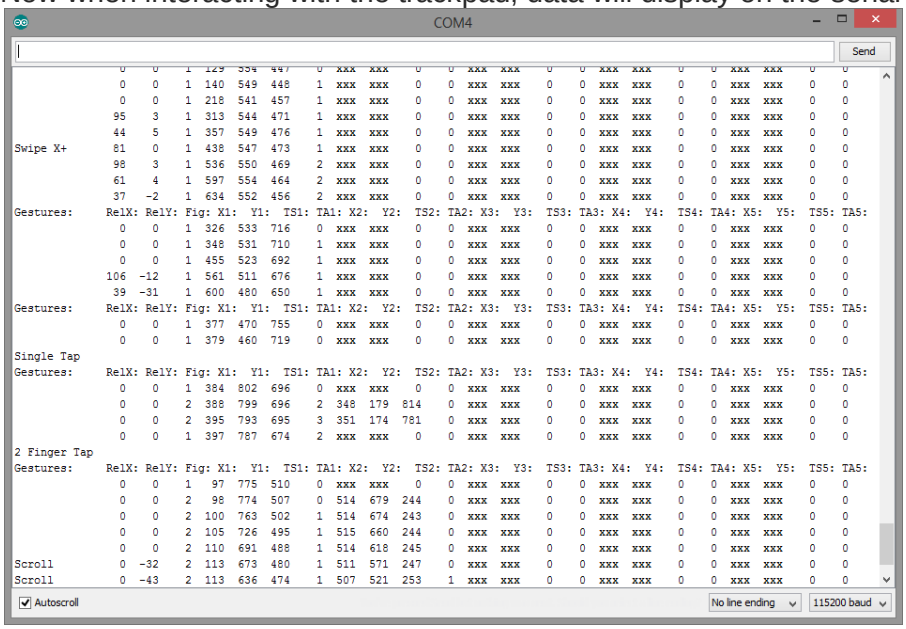
e) Upload to the device (click the icon or press CTRL-U)

f) Open the serial monitor (go to Tools->Serial Monitor).
It might be necessary to change the port setup to the correct port (go to Tools->Port: “xxx”). In addition, the line ending and baud rate must be configured, see picture in *g* below for details.

g) If the previous steps are successful, then the serial monitor should display the version information of the IQS5xx-B000 firmware from the connected device. Here is an example of the version displayed from a connected IQS550 PCB:



h) Now when interacting with the trackpad, data will display on the serial monitor as follows:



4 Device initialization

One of the most attractive features of the IQS5xx B000 firmware is reduced initialization time. There is no need to load configuration settings at power-up because the IQS5xx can be programmed using the bootloader with pre-configured settings. The B000 GUI is a multipurpose tool and can be used to identify appropriate settings, create a custom HEX file and program the IQS5xx using the custom HEX file.

The use of a custom HEX file simplifies the master controller firmware because no device setup is required at run-time. An additional advantage is that the device is ready to operate faster after power-up, without any intervention.

Please refer to AZD087 for more information about device setup and initialization using the IQS5xx PC GUI software.

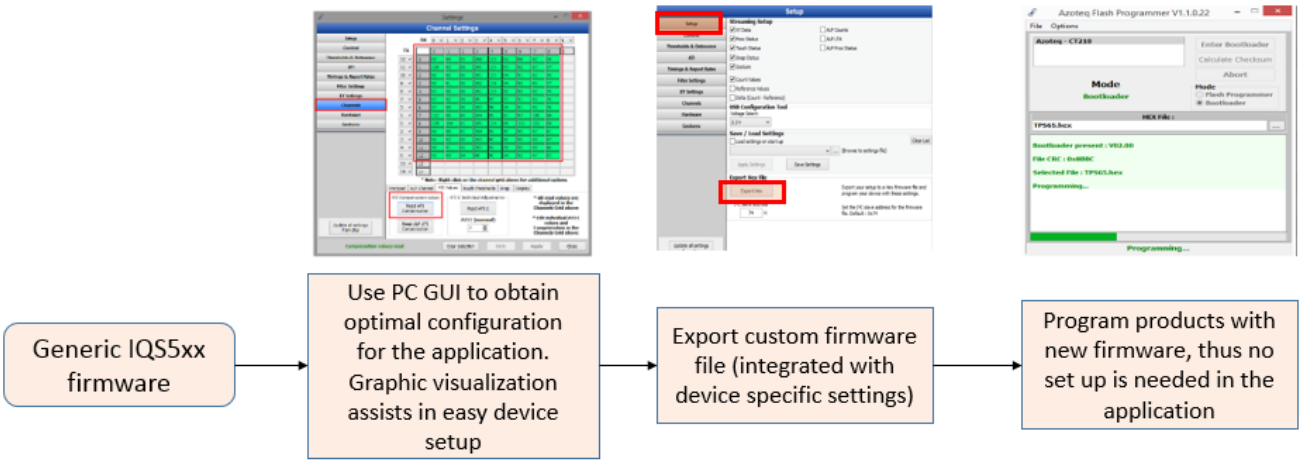


Figure 4.1 Device initialization

5 Isolation shield PCB

5.1 Battery applications and ground isolation

The sensitivity of a capacitive sensor is intrinsically related to the ground reference of the sensor. A capacitive sensor where the mains electricity provides the ground reference is more sensitive than a sensor where a battery provides the ground reference.

Trackpads are widely used in battery-powered applications like remote controls. The ground-dependent sensitivity issue mentioned earlier makes it difficult for designers to perform an accurate evaluation of the trackpad performance during the initial phases of a project. In order to shorten the development time, Azoteq recommends the use of optical ground isolation to simulate the effects of a battery. For this purpose, Azoteq offers an isolation shield PCB that uses the Arduino Uno Revision 3 pinout. The shield enables designers to power trackpads/IQS-controllers through an external power source while connected to an Arduino board. The isolation board can also be connected to Azoteq's CT210 USB dongle.

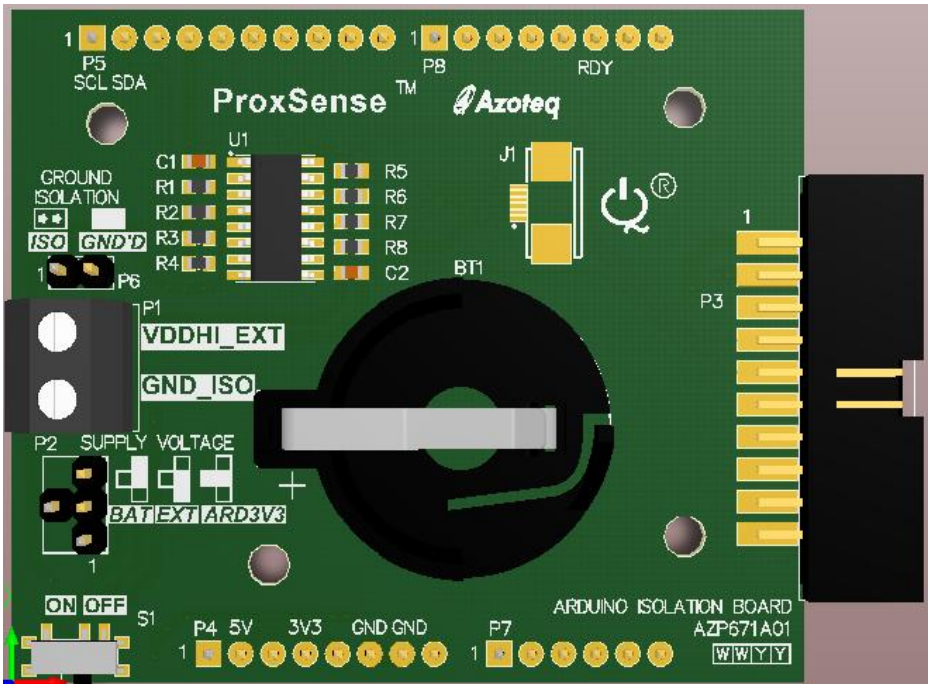


Figure 5.1 3D view of isolation shield PCB

5.2 Isolation board hardware configurations

The isolation PCB enables a designer to connect a master device to a slave device while keeping the devices electrically isolated. The following subsections provide a description of the various supported master devices, slave devices and power sources.

5.2.1 Slave device options:

All compatible IQS I^2C devices are supported. The IQS device must use either connector P3 or connector J1 on the isolation board.

5.2.2 Master device options:

The isolation board is pin-compatible with the Arduino Uno Revision 3 PCB. If any other master device is used, the following electrical connections are compulsory:

Table 5.1 Master connections to isolation PCB

Electrical connection on master	Isolation board connection	
	Connector	**Pin**
GND	P4 P5 P3	6,7 4 1
3V3	P4 P3	4 1
SDA	P5 P3	2 7
SCL	P5 P3	1 9
RDY	P8 P3	6 10

5.2.3 Power source options:

Table 5.2 Power connections

Power Source	Isolation board setup
External (isolated)	Connect the trackpad or IQS board to P3 or J1. Set jumper P2 to EXT. Connect external power to P1 (1.65V – 3.6V). Leave P6 open. Set switch S1 to ON position.
Coin cell (isolated)	Connect the trackpad or IQS board to P3 or J1. Set jumper P2 to BAT. Place a coin cell battery in BT1 (1.65V – 3.6V). Leave P6 open. Set switch S1 to ON position.
Mains (not isolated)	Connect the trackpad or IQS board to P3 or J1. Set jumper P2 to ARD3V3. Set jumper P6. Set switch S1 to ON position.

6 Contact Information

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