

EVK1070B Demonstration Kit

User Guide





1.1 Introduction

The EVK1070B Demonstration Kit is designed for the evaluation and development of applications using the AT42QT1070 (QT1070) sensor controller. See [Section 1.2](#) for the contents of the kit. Each EVK1070B evaluation board has a serial (USB) interface allowing connection to a computer for control and data viewing via QT1070 demonstration computer software.

The board operates in comms mode and can have 1 – 7 keys, one of which can be used as a guard key. Refer to the AT42QT1070 datasheet for detailed information about the chip features.

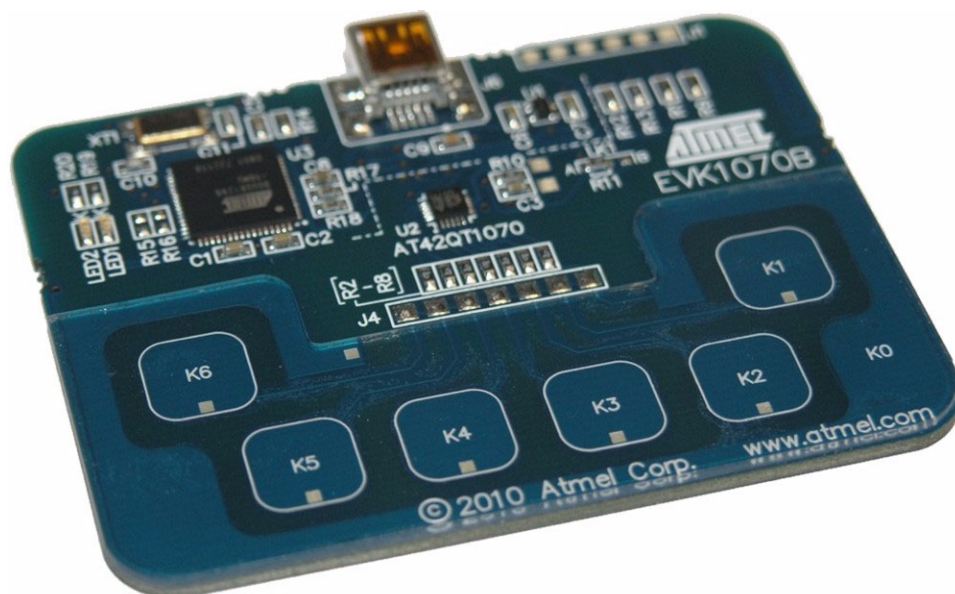
1.2 Contents of Kit

The kit comprises:

- 1x EVK1070B Evaluation Board (see [Figure 1-1](#))
- 1 x USB Cable
- 1 x EVK1070B Quickstart Guide

It is recommended that new users work through the Quickstart Guide to familiarise themselves with the kit and software before reading this User Guide.

Figure 1-1. EVK1070B Evaluation Board

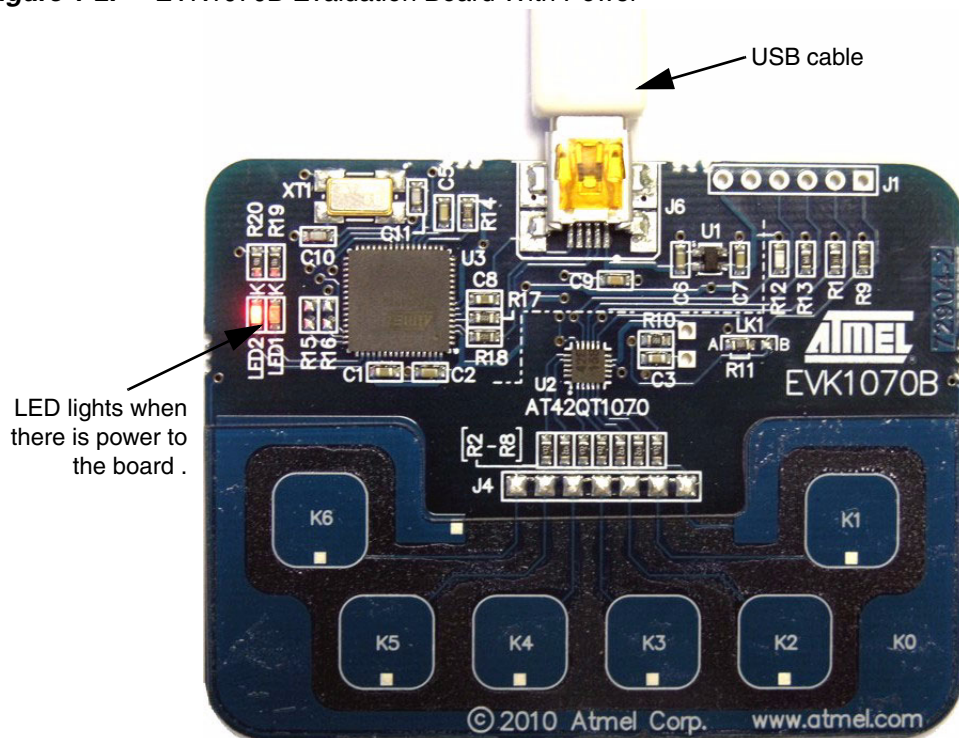


1.3 Preparing the Kit for Use

To prepare the EVK1070B Demonstration Kit for use with the software:

1. Download the latest EVK1070B software from the Atmel website (www.atmel.com/touch/AT42QT1070) and store on your computer.
2. Using the USB cable, connect the EVK1070B evaluation board to the computer. The LED on the EVK1070B lights and remains lit indicating that there is power to the board (see [Figure 1-2](#)).

Figure 1-2. EVK1070B Evaluation Board With Power



1.4 Restoring Default Settings

If the device configuration is changed and you want to restore the original settings there is a Reset Defaults function (see [Section 2.7.4 on page 2-8](#)).

1.5 Calibration

The Calibrate function can be accessed from two places:

- From the **EVK1070B Demonstration Software window** (see [Figure 2-1 on page 2-1](#))
- From the **EVK1070B dialog box** (see [Figure 2-6 on page 2-5](#))

See [Section 2.7.2 on page 2-8](#) for details.

1.6 Reset

The Reset function can be accessed from two places:

- From the **EVK1070B Demonstration Software window** (see [Figure 2-1 on page 2-1](#))
- From the **EVK1070B dialog box** (see [Figure 2-6 on page 2-5](#))

See [Section 2.7.3 on page 2-8](#) for details.





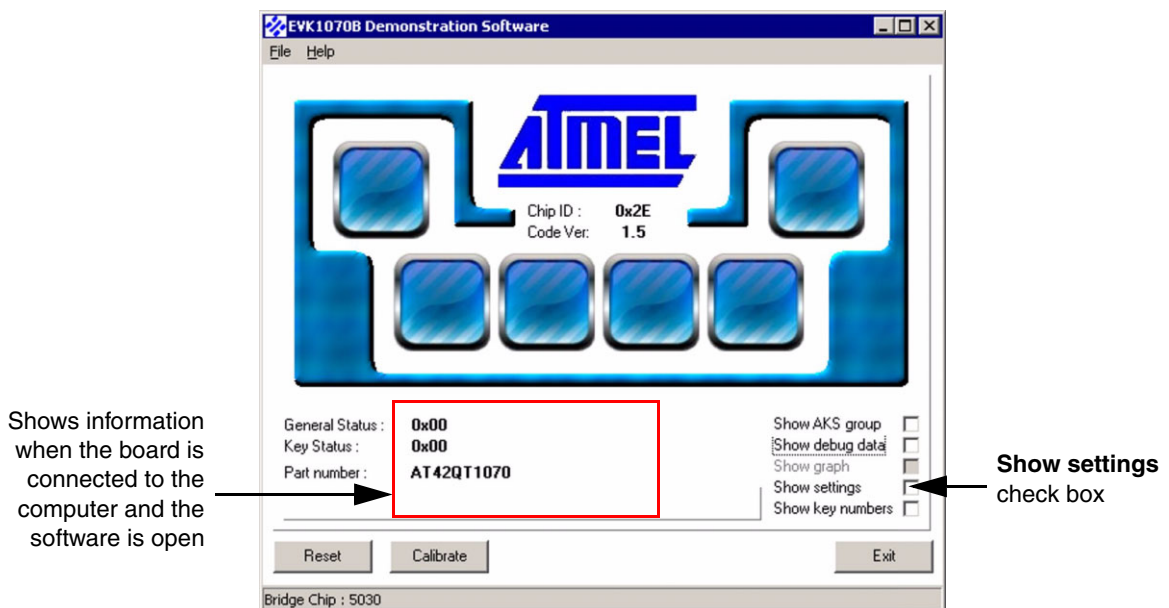
Configuring and Using the EVK1070B

2.1 Configuring the EVK1070B

To configure the EVK1070B for use, proceed as follows:

1. Prepare the kit for use (see [Section 1.3 on page 1-2](#)).
2. Open the software by navigating to the directory in which you stored it and double click the .exe file. The **EVK1070B Demonstration Software window** opens and general information about the EVK1070B is shown (see [Figure 2-1](#)).

Figure 2-1. EVK1070B Demonstration Software Window

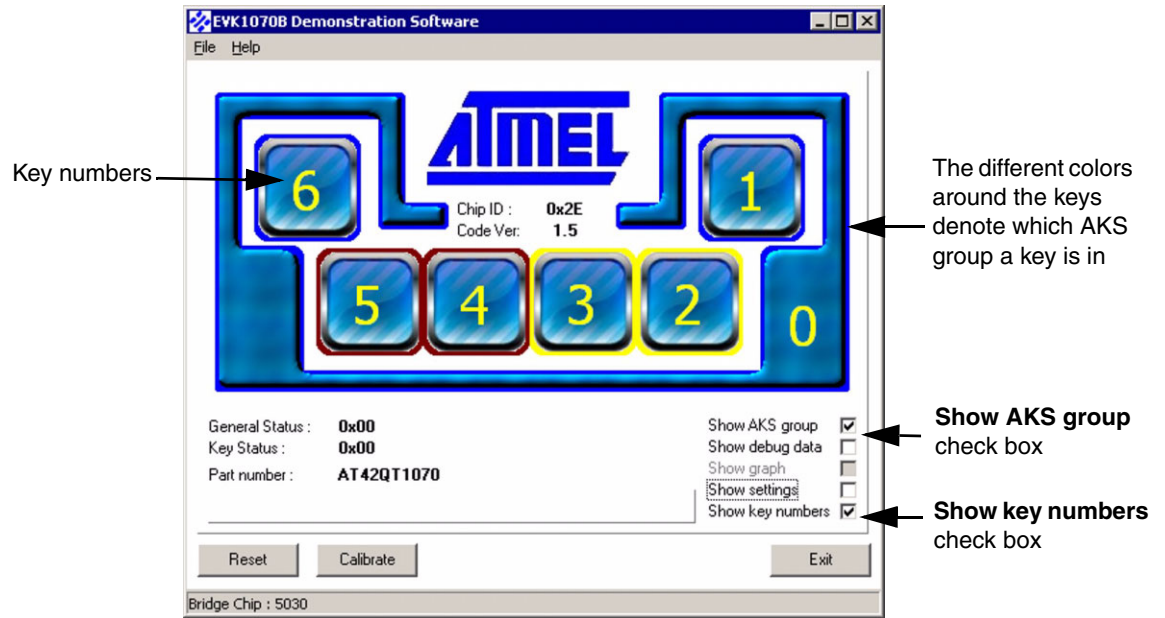


2.2 Viewing AKS Groups

To see which keys are in which Adjacent Key Suppression[®] (AKS[®]) group select the **Show AKS Group** check box. There can be up to three AKS groups. Different groups have different colors around the edge of the keys associated with them (see [Figure 2-2 on page 2-2](#)).

To change an AKS setting see [Section 2.6.5 on page 2-6](#).

Figure 2-2. AKS Groups and Key Numbers



2.3 Showing the Key Numbers

To show the key numbers (see [Figure 2-2](#)) select the **Show key number** check box. The key numbers correspond to the key numbers on the EVK1070B evaluation board.

2.4 Showing Debug Data and Graph

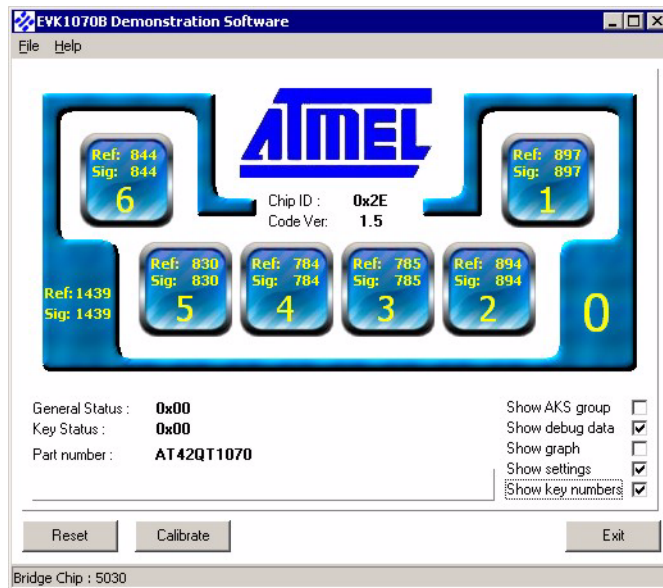
To show the debug data select the **Show debug data** check box. The EVK1070B Debug window (see [Figure 2-3 on page 2-3](#)) opens, showing the signal and reference data for all the keys. To stop the window updating click **Pause**. To restart the data update click **Play**.

Figure 2-3. EVK1070B Debug Window

Time	Status	Keys	Sig 0	Ref 0	Sig 1	Ref 1	Sig 2	Ref 2	Sig 3	Ref 3	Sig 4	Ref 4	Sig 5	Ref 5	Sig 6	Ref 6
18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	844	844
18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	844	844
18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	844	844
18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	844	844
18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
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18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
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18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
18:37:10	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	844	844
18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	844	844
18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	844	844
18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	844	844
18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
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18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844
18:37:09	0x00	0x00	1440	1440	896	896	894	894	785	785	785	785	831	831	845	844

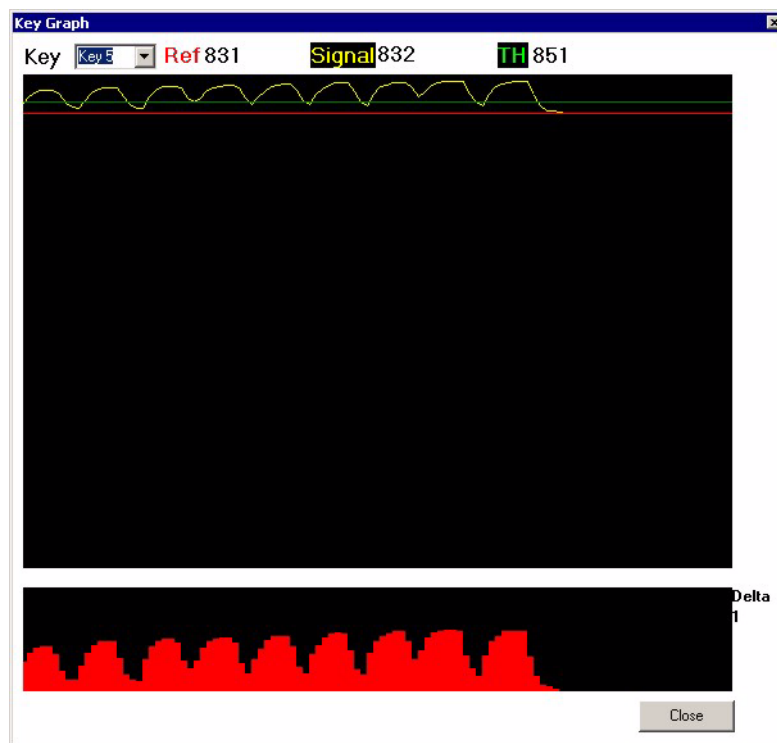
At the same time the **EVK1070B Demonstration Software window** shows the signal and reference values for each key (see [Figure 2-4](#)).

Figure 2-4. EVK1070B Demonstration Software Window Showing Signal and Reference Data



To see a graph of the signal, reference and threshold levels for individual keys, select the **Show graph** check box. The **Key Graph window** opens (see [Figure 2-5 on page 2-4](#)), showing the signal and reference data for all of the keys individually.

Figure 2-5. Key Graph Window



2.5 Logging Data

The data logging procedures are as follows:

- Set the location where you want to keep the .csv log file:
 - Click ... (at the end of the file name box).
 - Navigate to the directory where you want to store the .csv file. A Save As dialog box opens.
 - Enter the file name and click **Save**.
- To log the data from the **EVK1070B Debug window** click **Log**. The data starts being recorded into a log file (.csv).
- To stop recording the data click **Stop**.
- To view the data navigate to the directory where the .csv file is stored and open the file. The file opens in Excel and shows all captured data.

2.6 Changing the Settings

2.6.1 Overview

The settings are changed from the **EVK1070B Settings dialog box** (see [Figure 2-6](#)).

From the **EVK1070B Demonstration Software window** (see [Figure 2-1 on page 2-1](#)) select the **Show settings** check box. This action opens the **EVK1070B Settings dialog box** which shows the various options whose settings can be changed. These are:

- Threshold Level – **Threshold**
- Averaging Factor – **Averaging Factor**
- Detect Integrator – **Detect Integrator**
- AKS Group – **AKS Grp**
- Low Power Mode – **LPM**
- Guard Channel – **Guard**
- Max On Duration – **Max On**

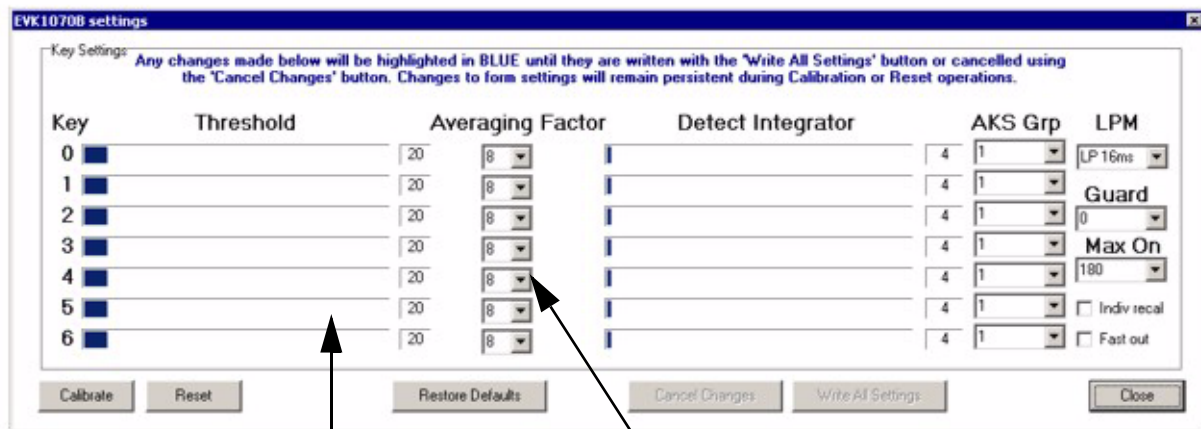
Some values are changed by dragging a bar or clicking in the oblong box. Other values are selected from menus.

You can cancel changes by clicking **Cancel Changes** (see [Section 2.7.5 on page 2-8](#)).

Note: This cancels all the changes, not just the last one you made.

To make all the changes active click **Write All Settings** (see [Section 2.7.6 on page 2-8](#)), to put the values into RAM.

Figure 2-6. EVK1070B Settings Dialog Box



Click in the box or drag the blue bar to the required position

Click the downward arrow and select a value from the options

2.6.2 Threshold Level

The device detects a touch when the signal has crossed a threshold level and remained there for a specified number of counts. This can be altered on a key-by-key basis.

The threshold level range of values is between 0 – 255. They can be set individually for each key. You should select a minimum of 8 – 10 counts. Typical values are 15 – 25.

Note: Do not use a setting of 0 as this causes a key to go into detection when its signal is equal to its reference.

Default: 20

2.6.3 Averaging Factor

The Averaging Factor (AVE) is the number of pulses which are added together and averaged to get the final signal value for that channel. For example, if AVE = 8 then 8 ADC samples are taken and added together. The result is then divided by the original number of pulses (8). This gives the average value.

Using the AVE provides a better signal-to-noise ratio but requires longer acquire times. Values for AVE are restricted internally to 1, 2, 4, 8, 16 or 32.

The Averaging Factor can be set individually for each key. A typical value of 8 is recommended for good low frequency noise immunity.

Default: 8

2.6.4 Detect Integrator

The device features a fast detection integrator counter (DI filter), which acts to filter out noise at the small expense of a slower response time. The DI filter requires a programmable number of consecutive samples confirmed in detection before the key is declared to be touched. The minimum number for the DI filter is 2. Settings of 0 and 1 for the DI also default to 2.

The detection integrator values are between 0 – 255 and can be set individually for each key. A typical value is 4. A higher DI gives higher noise immunity but at the cost of increasing the response time. A large difference between keys gives different response times.

Default: 4

2.6.5 AKS Group

AKS is used to suppress the activation of two neighboring keys at the same time; only the key with the strongest signal level can activate. This solves the problem that occurs when a finger placed on a key also overlaps a neighboring key, potentially triggering it as well as the intended key.

There are three AKS groups; 1, 2 and 3. There is also an Off function whereby AKS is not used on that channel.

Any key can be in any AKS group, or none.

Default: 1

2.6.6 Low Power Mode

This 8-bit value determines the number of 8 ms intervals between key measurements. Longer intervals between measurements yield a lower power consumption but at the expense of a slower response to touch. The times are between 8 ms – 2.040 ms.

This is a global setting.

Default: 2 (16 ms between key acquisitions)



2.6.7 Guard Channel

A Guard Channel is used to help prevent false detection of keys. Normally guard channel keys should be more sensitive than the other keys (physically bigger). Because the guard channel key is physically bigger it becomes more susceptible to noise so it should have a higher Averaging Factor (see [Section 2.6.3 on page 2-6](#)) and a lower Threshold (see [Section 2.6.2 on page 2-6](#)) than the other keys.

If a guard channel is enabled and active, any other channel in the same AKS group will be forced out of its filtering-in stage if the guard channel begins to go into detect. Only one guard channel can be selected.

Note: The guard channel will not force a key which is already in a detect state out of detection.

Valid values are 0 – 6, (corresponding to key numbers) with any larger value disabling the guard key feature.

Default: Key 0

2.6.8 Max On Duration

If an object obstructs the sense pad the signal may rise enough to create a detection, preventing further operation. To prevent this, the sensor includes a timer which monitors detections. If a detection exceeds the timer setting then the sensor performs a key recalibration. This is known as the Max On Duration.

This can be changed by setting a value in the range 1 – 255 (160 ms – 40800 ms) in steps of 160 ms. A setting of 0 disables the Max On Duration recalibration.

This is a global setting.

Default: 180 (160 ms x 180 = 28.8s)

2.6.9 Individual Recalibration

This is user configurable. If a key is in detect for the Max On Duration time then only that key recalibrates if this setting is enabled. Otherwise, all keys are recalibrated.

2.6.10 Fast Out

The DI is used for filtering a key into, and out of, detect. The higher the DI setting then the longer the touch must be present for that key to go into detect. The same applies for removing a touch; the key remains in detect for the DI period until it has filtered out of detect.

If the **Fast out** check box is selected then the DI for filtering out of detect is fixed to a setting of 4. Hence, filtering out is much quicker if a high DI is required for filtering in. If the **Fast out** check box is clear the same DI is used for filtering in and out of detect.

2.7 Functions

2.7.1 Overview

The functions relate to the buttons on the **EVK1070B Settings dialog box**.

2.7.2 Calibrate

Click **Calibrate** to calibrate the EVK1070B.

2.7.3 Reset

Click **Reset** to reset the EVK1070B. It loads the default settings.

2.7.4 Restore Defaults

Click **Restore Defaults** to restore the default settings to the chip.

2.7.5 Cancel Changes

Click **Cancel Changes** to cancel any changes made *before* clicking **Write All Settings**. After this you will not be able to cancel the settings.

2.7.6 Write All Settings

Click **Write All Settings** to write the current settings to the chip. You need to do this before the changes are implemented.

2.7.7 Close

Click **Close** to exit the **EVK1070B Settings dialog box**.

Revision History

Revision No.	History
Revision A – November 2010	<ul style="list-style-type: none"><li>• Initial version of the user manual for firmware code revision 1.5 of the AT42QT1070.



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