DASHBOARD SOFTWARE

AN-SW-001

PRODUCT FAMILY DESCRIPTION

This document describes features that are found in the Baanto™ ShadowSense™ family of open frame products. The Dashboard Software supports all Baanto SKUs, regardless of size.

COMPUTER REQUIREMENTS

The Baanto Dashboard software has the following requirements for the PC:

- OS: Windows 7®, Windows 8®, Windows 10®
- Plug-ins: Requires Microsoft .NET 4.5 Framework® (download from Microsoft, and included as an executable file in the \Redist directory)
- Plug-ins: Requires Visual Studio 10® x64\x86 (download from Microsoft, and included in ZIP file in the \Redist directory)
- HD Space: 15MB Minimum
- Processor: Celeron® class or better
- RAM: 500MB or above

INSTALLATION INSTRUCTIONS

The Baanto Dashboard can be installed on platforms running Microsoft Windows 7\8\10 OS. The Baanto Dashboard application also requires: Microsoft .Net 4.5 Framework and the Microsoft Visual C++ Service Pack.

The various Microsoft add-ons can be installed by downloading them from Microsoft directly, however for the sake of convenience, these add-ons are also included with the Dashboard zip file, and are located in the \Redist folder.

Installation Procedure is as follows:

- Install .NET Framework if needed. Either via download, or \Redist\dotNetFx45_Full_x86_x64.exe file
- Install Visual C++ 2010 if needed. Either via download or \Redist\vcredist_x86.exe
- Install 64 bit version \Redist\vcredist_x64.exe if your OS is 64 bit
- Run Dashboard.exe file to start the program

Note:
Dashboard is not supported on Windows XP®

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1.0 INTRODUCTION

The Baanto ShadowSense family of touchscreens offers a variety of features and advantages for application developers and hardware integrators.

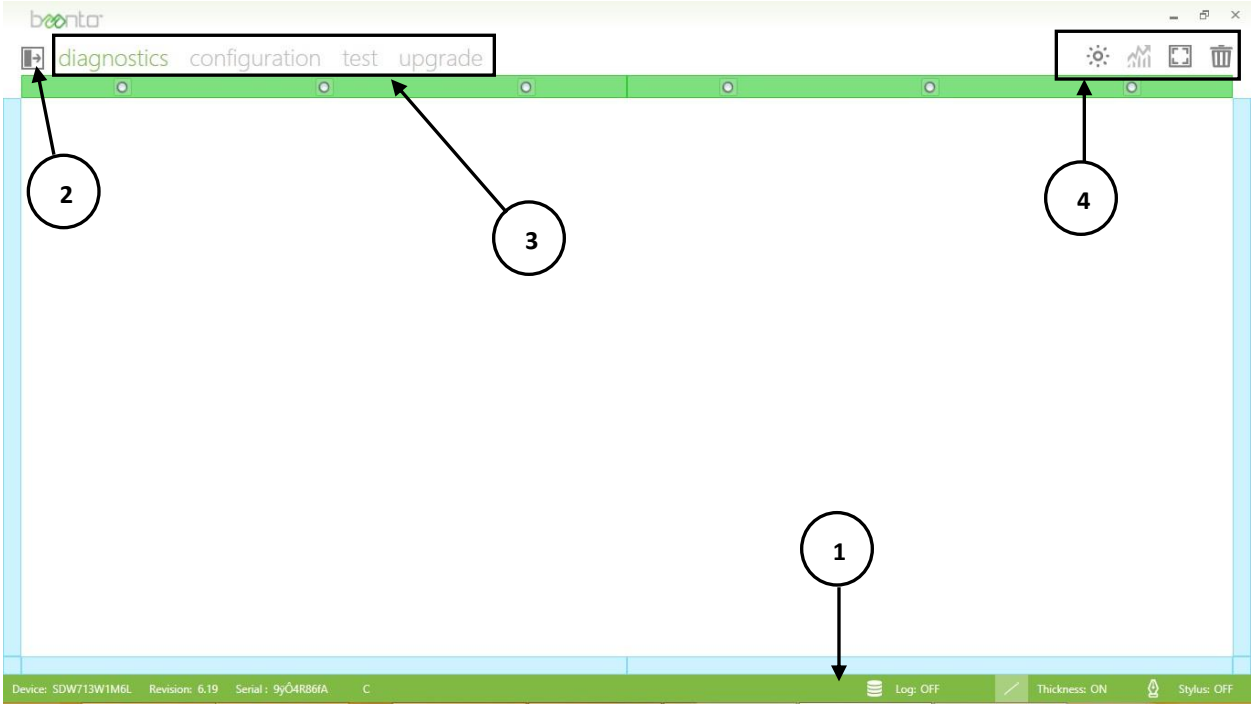
1. Diagnostics Capabilities – Baanto touchscreens can report all signal level information between LEDs and Shadow Sensors such that various failure modes can be detected and diagnosed easily.
2. Configuration Capabilities – Baanto touchscreens offer a variety of configurable parameters that allow performance customization based on application use models. For example, the touchscreen can be as sensitive as to detect a tap of a credit card or thin stylus or be configured to reject contaminants such as water, dust and even viscous and opaque fluids such as coffee, blood and many other fluids.
3. Test Capabilities – Dashboard can perform automatic functional tests to determine if there are any problems with the touchscreen.
4. Firmware Upgrade – Allows the user to upgrade the firmware of the touchscreen.

2.0 GENERAL STRUCTURE

The Baanto Dashboard software consists of main screen that has four top level elements

1. Status Bar –Displays firmware revision number, power state and other information related to the operation of the touchscreen.
2. Main Menu–Allows the user to access other functions.
3. Tabs –Allows the user to switch between different functions.
4. Function buttons –Allows the user to perform common tasks.

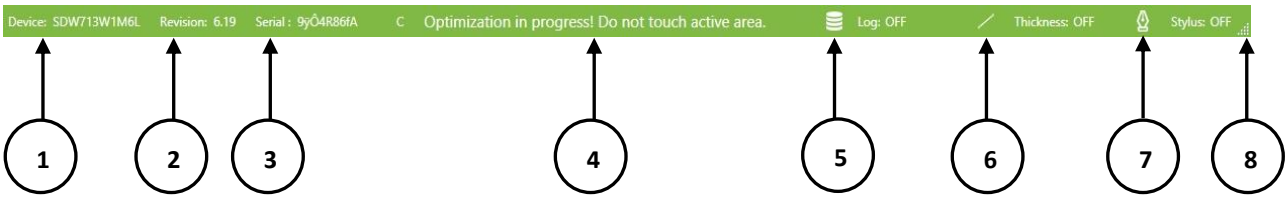
The main screen is shown below



2.1 STATUS BAR

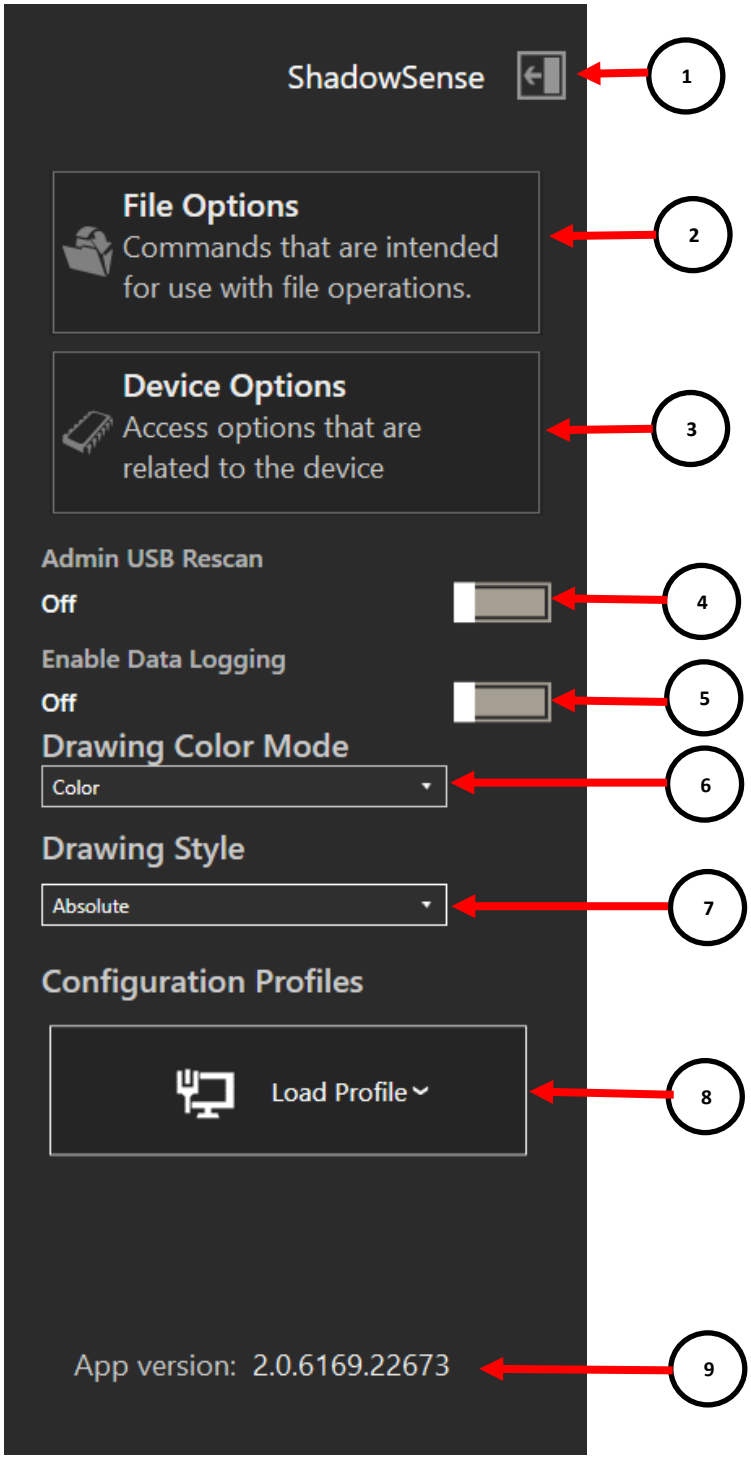
The status bar is located on the bottom side of the Dashboard application and provides a very quick overview of the touchscreen that is connected to the host PC. Status Bar includes the following items from left to right

1. DEVICE FIELD:
    - Displays the model number of the ShadowSense touchscreen. When the touchscreen is not connected “Device Not Detected” message is shown here.
2. REVISION NUMBER:
    - Displays the version of the firmware loaded on the master control board of the touchscreen.
3. SERIAL NUMBER:
    - Displays the Serial Number of the current touch frame connected to the PC.
4. ADVISORY MESSAGE:
    - The state of the touchscreen is shown in this section. When the message “Optimization in Progress!” is displayed, do not touch the active area of the screen. When the optimization process has been completed and the screen is ready for use the message will be cleared.
5. LOG DATA:
    - The circular disks icon is a button that starts\stops the logging function. All USB traffic is logged into a TXT file, located in the \Logs subdirectory of the Dashboard software.
6. THICKNESS STATUS:
    - Displays if touch thickness is being registered on the drawing canvas. Display of touch thickness can be toggled via the clicking on this icon or via the keyboard shortcut ‘Ctrl+T’ combination. If thickness display is enabled ON will be displayed here.
7. STYLUS STATUS:
    - Displays if stylus mode is active on the drawing canvas. Display of stylus mode can be toggled via clicking on this icon or via the keyboard shortcut ‘Ctrl+P’ combination. When the stylus mode is activated the drawing canvas will distinguish touches from finger, stylus and eraser separately as:
        - Finger touch events are shown as ghost streaks
        - Stylus/Pen events are shown as a solid line
        - Eraser events are shown as white streaks that can be used to clear the drawings done by the stylus
8. RESIZE HANDLE:
    - Allows the user to adjust the Dashboard application window size. Click and hold the corner edge to adjust the window size.



2.2 MAIN MENU

The main menu is accessible from any of the views by clicking the left arrow beside the Diagnostics tab. Some of the features that are available in this view are highlighted in the diagram below



1. ACCESS BUTTON:
    - Opens and close the Main Menu that opens up on screen and collapses from the left side in Dashboard.
2. FILE OPTIONS:
    - EXPORT LED VIEW: Saves all LED visibility data to an XML file for further analysis.
    - IMPORT LED VIEW: Allows the user to open an existing XML LED visibility data file so that it can be reviewed in graphical chart form. This feature can be used even if the touch screen is not connected to the computer.
    - IMPORT CSV FILE: Baanto internal use only.
    - LOAD CONFIGURATION FILE: Allows the user to select and open an external XML file from which all the settings in the configuration view can be loaded.
    - SAVE CONFIGURATION FILE: Saves the current settings in the configuration view to an external XML file.
3. DEVICE OPTIONS:
    - LOAD CONFIGURATION FROM HARDWARE: Downloads the configuration parameters from EEPROM.
    - SAVE CONFIGURATION TO HARDWARE: Saves the user configuration parameters to EEPROM.
    - DEFAULT CONFIGURATION: Resets the configuration parameters back to the factory defaults.
    - OPTIMIZE LEDS: This triggers a re-calibration process of the touchscreen.
    - REFRESH LED DATA: Downloads the latest LED visibility data. Usually the LED data is only downloaded once on touchscreen boot up.
    - READ LED DATA FROM HARDWARE: Baanto internal use
    - WRITE LED DATA TO HARDWARE: Baanto internal use
    - RESCAN SHADOWSENSE USB DEVICES: Re-enumerates the USB entries in the Device Manager for a particular USB port on the PC. Selection is used when a Shadow Sense device's USB pipe has been modified and is no longer detected by Windows or Dashboard. Refer to section 8 for more details.
    - LOG DATA: All USB traffic is logged into a TXT file, located in the \Logs subdirectory of the Dashboard software.
4. ADMIN USB RESCAN: When enabled this will do a deep removal and rescan of the touch device from the device manager. User has to enable this setting and select RESCAN SHADOWSENSE USB DEVICE from DEVICE OPTIONS to initiate the deep rescan. By default this setting is enabled.
5. ENABLE DATA LOGGING: Same as the Log Data under Device Options, this is just a short-cut.
6. DRAWING COLOR MODE: By default each touch is represented by the color BLACK. The user can choose COLOR from the drop down menu and this will register each touch with a different color within the diagnostic and the full screen view.
7. DRAWING STYLE:
    - ABSOLUTE: Drawing on screen will be squished into the canvas and touch position will not match the drawn position in the canvas.
    - WINDOWED: The drawing canvas will show the position of the touch point correctly. Drawing inside the canvas will be displayed.
8. CONFIGURATION PROFILES: allows the user to set the device with a pre-defined configuration profile from the drop down menu. The user can switch a profile anytime as long as the device is active. The profile is stored in the device memory, so it only requires a single update.
    - DEFAULT: resets the device into the default values (manufacturer settings)
    - WHITEBOARD: this profile configures the device to operate as an interactive white board
    - DIGITALSIGNAGE: this profile configures the device to operate as an interactive digital signage
9. APP VERSION: Dashboard software application revision number.

2.3 VIEWS TABS

The Baanto Dashboard software offers four different top level views that group the different functionalities together for easy access:

1. Diagnostics View – Displays LED and sensor visibility information
2. Configuration View – Allows the user to configure the touchscreen based on use model
3. Test View – Performs functional tests to confirm normal operation of the touchscreen.
4. Upgrade View – Allows the user to upgrade the firmware of the touchscreen.

2.4 FUNCTION BUTTONS

The Function Buttons allow the user to perform commonly used functions. These include:

OPTIMIZE LEDS: This button triggers a re-calibration process of the touchscreen. During this process, the touchscreen analyzes signals from every LED to every shadow sensor and optimizes performance.

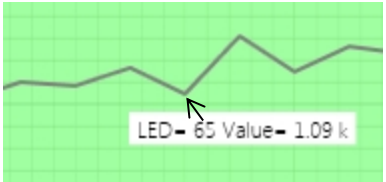
LED VIEW: This button displays LED visibility data in a new window. To activate and use this button the user has to select one of the radio buttons corresponding to the Shadow Sensors (See Section 3 below). The data can be used to analyze various failure modes and diagnose problems.

2.4.1 LED DATA VIEW

The LED Data View dialog box represents the health of the system. The performance and the health of the touchscreen are directly related to the strength and the efficiency of each LED\Shadow Sensor pair. If a Shadow Sensor or LED were compromised, then the performance of the system can suffer. Here is a brief description of the various elements found in this screen:

1. SHADOW SENSORS:
    - Select the shadow sensor using the radio button and the LED data and graph for the particular sensor will be populated. Refer to section 3 for more details about this bar.
2. LED DATA VIEW:
    - This area displays the actual numerical data between the LED and the Shadow Sensor. It represents the strength of the signal between the pair.
3. LED CHART:
    - This is a graphical chart that plots the same data for further analysis.

4. SPECIFIC DATA:
    - The dark line represents the data related to the specific touchscreen being evaluated. Move the cursor to a specific point on the graph and an onscreen popup will display the actual reading as shown below.



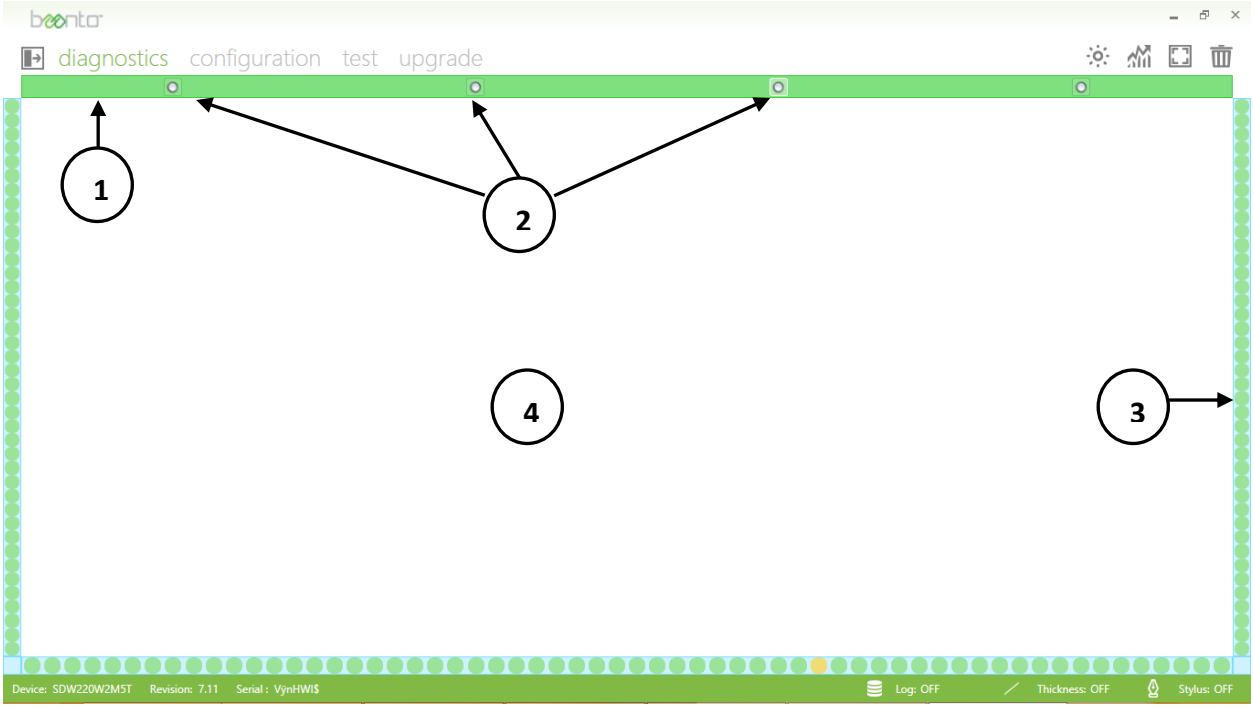
5. GENERAL TREND:
    - The light green area represents the nominal variance, or trend based on many different touchscreens that Baanto has previously tested. Moving the mouse just above or below the actual reading within the green zone will display a popup that shows the maximum and minimum test limits.
6. ZOOM BAR:
    - Sections of the graph can be zoomed in using the Horizontal and Vertical zoom bars.
7. ZOOM OUT:
    - This button resets the graphs zoom bars so that the entire graph is viewable on the screen.

FULL SCREEN TOGGLE: The drawing canvas can be maximized to cover the full screen area of the monitor by clicking on this icon. The 'ESC' key on the keyboard can also be used, as a shortcut, to toggle display from normal view to full view. When the display is not in Full Screen mode, there will be an offset between the display of a touch point and the physical location of the touch point on the screen. This is because the drawing canvas always scales to represent the entire screen, no matter how small the canvas is. So, if the drawing canvas is maximized to the full screen, the display and the touch will map onto one and other. Please note, the Windows task bar located on the bottom of the screen must also be set to 'Auto-Hide' such that the drawing canvas can be maximized properly.

TRASH CAN: Clears the drawing canvas. The 'Ctrl+BACKSPACE' key combination can also be used, as a shortcut, to clear the drawing canvas.

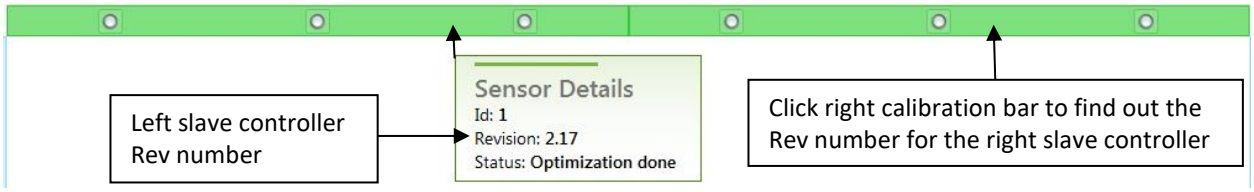
3.0 DIAGNOSTICS VIEW

The ShadowSense families of products are usually designed with a number of shadow sensors located along the top of the touchscreen. A variety of LEDs are placed along the remaining 3 edges and the shadow sensors are able to detect the angle of the shadow cast by a finger, or any other object, which is placed on the touchscreen. The Diagnostic View allows the user to view, debug and diagnose any potential problems with the Baanto ShadowSense touchscreen. The various elements of this view are described below.



Some of the features that are available in this view are highlighted in the diagram above and described below:

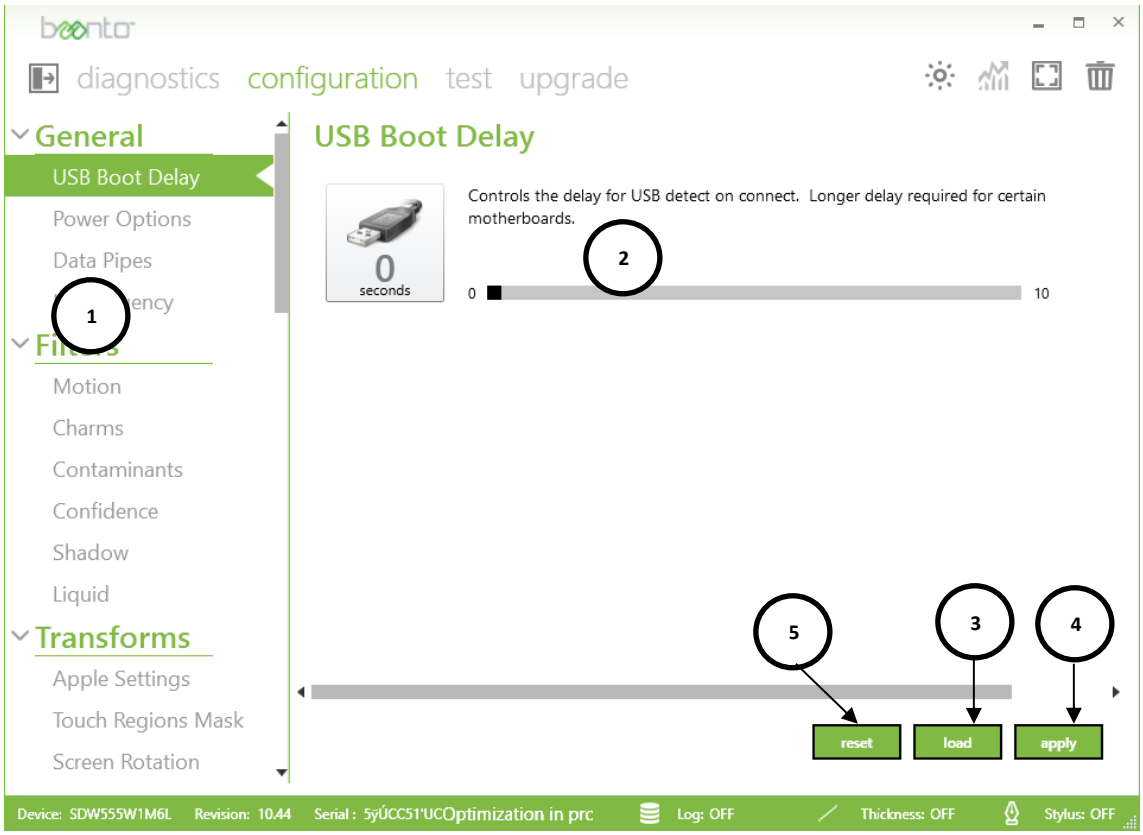
1. CALIBRATION BAR:
    - The calibration state of the touchscreen is shown in this bar. The touchscreen goes through a calibration process at boot up and at various times during operation when it detects that calibration has changed due to environmental conditions. There are four states of calibration that the touchscreen undergoes which are described below:
        - UNCONFIGURED – device has not started calibration
        - OPTIMIZATION STARTED – device is undergoing calibration, for optimal calibration it should not be touched or handled while in this state.
        - OPTIMIZATION POST DELAY – device has complete calibration and is waiting for post processing to be completed.
        - OPTIMIZATION DONE – device has successfully completed calibration and is ready for normal operation.
    - Certain Large Format Baanto touchscreens use multiple slave controllers. Each slave controls and manages a group of shadow sensors, and is shown as a specific 'bar' with a number of shadow sensors. In the example below, a touchscreen with two slave controllers is shown. The firmware revision of the two slave sensors can be found out by clicking the two rectangular calibration bars as shown below. Both of the slave controllers should have the same firmware revision numbers.



2. SHADOW SENSORS:
    - The shadow sensors are represented by the green circles located in the Calibration Bar. The user can obtain specific information relating to each of the shadow sensors by clicking or selecting the individual sensor. When a sensor is selected, it is highlighted as shown above and the LED data relating to this sensor will be shown in the LED Data Bars.
3. LED DATA BARS:
    - The touchscreen is surrounded by LEDs, and the bars around the edge of the window represent these LEDs.
    - GREEN LED: LED is within operating specifications.
    - YELLOW LED: LED is outside of normal operating parameters with respect to the sensor that is highlighted. In this situation, please forward the data saved by the Export LED Button to Baanto for further analysis.
    - BLUE LED: LED is not visible to the sensor and is intentionally ignored.
4. DRAWING CANVAS:
    - This area displays all touch events. By default each touch is represented by the color black. The user can choose to represent each touch using a different color by changing the Drawing Color Mode option from the main menu. The width of the touch is represented by the width of the stroke, if thickness is enabled.

4.0 CONFIGURATION VIEW

The Configuration View allows the user to customize the performance of the touchscreen based on application needs and use models.



Some of the features that are available in this view are highlighted in the diagram above and described below:

1. PARAMETER GROUP SELECTION BAR:
    - This menu bar allows the user to select the specific group of parameters to be modified. All of the modifiable parameters are classified under four headings listed below:
    - **GENERAL:** Parameters relating to USB delay detection, power modes and how the touchscreen is detected by the OS can be modified from here.
        - USB Boot Delay
        - Power Options
        - Data Pipes
        - IR Frequency
    - **FILTERS:** Change parameters relating to how data is filtered by the touchscreen before it is sent via USB.
        - Motion
        - Charms
        - Contaminants
        - Confidence
        - Shadow
        - Liquid
    - **TRANSFORMS:** Transformations can to be applied to touch data such as screen rotation, screen alignment and offset adjustments.
        - Apple Settings

        - Touch Regions Mask
        - Screen Rotation
        - Transformations
    - **MOUSE:** Adjust parameters when the touchscreen is configured or detected as a mouse by the host OS.
        - Mouse Options
    - **TOUCH:** Adjust parameters related to touch input.
        - Touch Rejection
        - Deadband
        - Hover
        - New Touch Delay
    - **AUXILIARY PORTS:** Configure auxiliary serial ports that are provided on ShadowSense Pro SKU
        - Port 1
        - Port 2
    - **STYLUS:** Configure parameters that control how the touchscreen distinguishes a Stylus/Pen and Eraser based on the size of the objects.
        - Settings
        - Shadow
        - Palm Rejection
2. SPECIFIC PARAMETER VIEW:
    - This area of the window lists the specific parameters in the selected group, and allows the user to make modifications to the values.
3. LOAD BUTTON:
    - This button reads the configuration parameters that are stored in the EEPROM of the touchscreen.
4. APPLY BUTTON:
    - This button flashes the configuration parameters being displayed to the EEPROM of the touchscreen.
5. RESET BUTTON:
    - This button resets the configuration parameters back to default, factory state. Note, TRANSFORMATION settings such as Orientation, Screen Mask or Transformation are not reset.

The various parameters are described in detail below.

4.1 GENERAL PARAMETERS

This group contains general touchscreen parameters related to USB, power etc.

USB BOOT DELAY PARAMETER

USB BOOT DELAY: This parameter controls the amount of time the touchscreen waits for USB enumeration to occur when plugged in or when the touchscreen is rebooted. The longer the delay, the longer it will take for the host CPU to perform enumeration. A longer delay might be required by certain motherboards or when connecting to certain USB 3.0 ports. If the touchscreen is not being reliably enumerated and detected by the OS, increase this value.

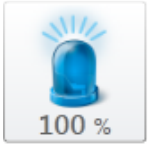
POWER OPTION PARAMETERS (FIRMWARE 4.11 AND ABOVE)

These parameters control the conditions by which the touchscreen goes into low power and sleep states. The specific power draw and performance metrics can also be adjusted by the user to achieve the required current draw in the various power modes. Three different power modes are currently supported:

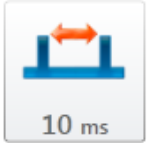
- ACTIVE POWER MODE: Full power, high performance, multi-touch state.

- IDLE POWER MODE: Low power, single touch state. As soon as touch is detected, touchscreen reverts back to Active Power state automatically.
- SLEEP POWER MODE: Very low power, no touch state. The touchscreen is in deep sleep, and does not detect any touch event. This state is triggered by USB going into SUSPEND or SLEEP, and can also be triggered by the application using a special USB command. The screen will revert back to Active Power Mode when USB exits SUSPEND or SLEEP state. In addition, the application can also use a special USB command to wake up the screen at will.

ACTIVE POWER MODE SETTINGS



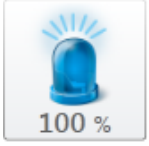
LED BRIGHTNESS: This parameter controls the brightness, and resulting current required, of the LEDs located in the perimeter of the screen. Lowering the value results in a dimmer LED and lowers the operating current of the system while in Active Mode. By lowering the brightness the signal to noise ratio is also effectively lowered and will result in more noise in the system. Hence, if high ambient light rejection is required or if the screen is operated in an environment where it is susceptible to dirt, debris and other contaminants a high LED brightness value will be required.



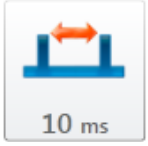
FRAME TIME: This parameter controls the period at which the touchscreen is scanned for touch events while in Active Power Mode. The lower the frame time, the faster the screen is being scanned resulting in a higher current draw, but the latency of the system is also minimized. Higher values will result in slower scans, which decrease the current draw at a cost of higher latency.

IDLE POWER MODE SETTINGS

TIME TO IDLE: Idle Power Mode is triggered when the touchscreen detects that there has not been a valid touch event for a certain period of time. This parameter controls how long the touchscreen waits before switching from Active Power Mode to Idle Power Mode. When configured to NEVER, Idle Power Mode is disabled and the screen only operates in Active Power Mode.



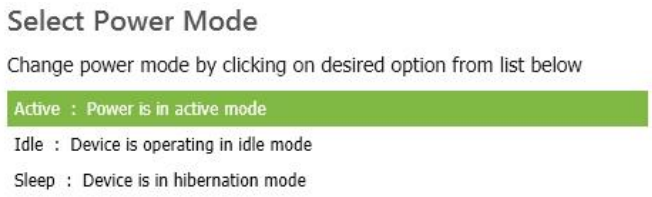
LED BRIGHTNESS: Similar to the LED Brightness parameter described above. This parameter controls the brightness, and current, of the LED while the screen is in Idle Power Mode. This allows the user to optimize power draw in Idle Power Mode effectively.



FRAME TIME: Similar to the Frame Time parameter described above. This parameter controls the period of scan while the screen is in Idle Power Mode.

POWER MODE SELECTION

This selection menu allows the user to instantaneously switch to any power mode. Once calibration has been completed the user can verify the power state from the status bar.



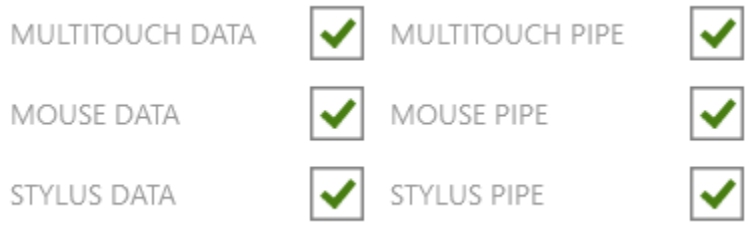
DATA PIPES PARAMETERS (FIRMWARE 6.00 AND ABOVE)

By default the Baanto touchscreens send data using three different USB HID data pipes: standard single touch mouse, multi touch digitizer and a custom data pipe. The touchscreen also follows the HID multi touch digitizer configuration standard such that when a multi-touch OS is detected (Windows 7\8, Linux – with the correct kernel etc.) the screen defaults to multi-touch operation. Otherwise it will only send single touch mouse data.

It is sometimes necessary to force the touchscreen to disable these data pipes. A typical example is for backwards compatibility, such as an application developed with the intent of using mouse clicks but being executed on a computer running Windows 8. In this case, the touchscreen's default behavior needs to change as it needs to send mouse data only and the multi touch data pipe must be disabled. In addition, when using older OS such as Windows CE or a custom embedded operating system that does not understand multi touch HID data, these pipes might have to be removed for the screen to operate properly or the OS might stall the USB pipe and the touchscreen might not operate correctly.

The USB Data Pipe Parameters allow the user to configure what pipes are used by the screen to communicate to the OS. There are three different pipes that can be controlled Stylus, Mouse and Multitouch.

By unchecking the PIPE flag, the user is able to completely remove the pipe from the USB descriptor and the OS will not even enumerate the pipe. By unchecking the DATA flag, the data stream can be disabled without removing the pipe from the USB descriptor.



When the USB descriptor for the touchscreen is modified, the device might have to be re-installed for proper operation. The procedure for this is different based on the specific OS, but a standard procedure is listed in Section 8.0.

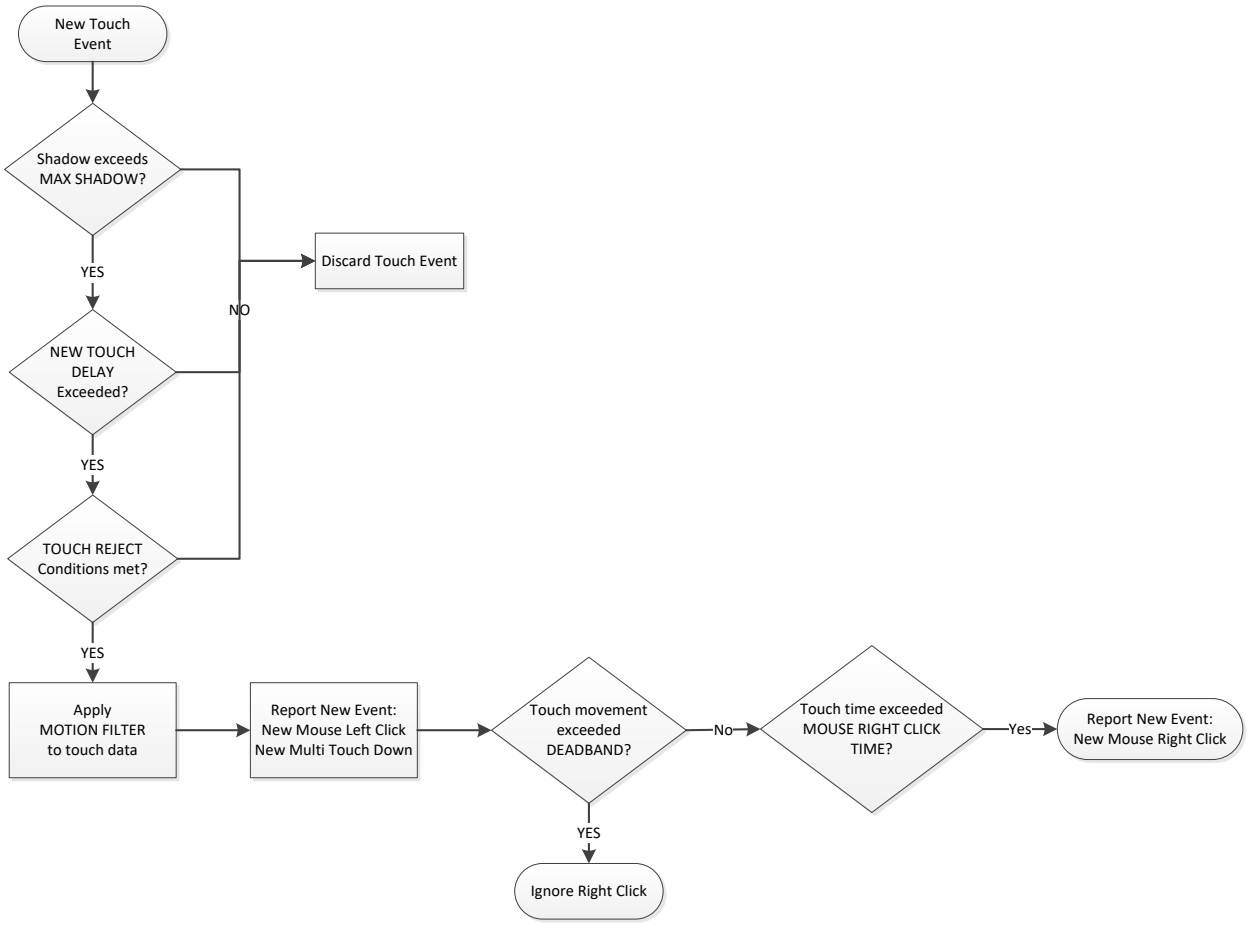
IR FREQUENCY MODIFIER PARAMETER (FIRMWARE 10.01 AND ABOVE)

FREQUENCY MODIFIER: This parameter adds a special modifier to the touch frame LED strobe frequency. Adjust this slider to reduce the interference between an IR remote and the touch frame.

Every 9 counts of this parameter add 1us to the IR strobe wavelength

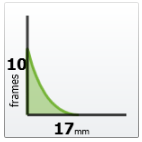
4.2 FILTER PARAMETERS

Baanto touchscreens implement a comprehensive filter pipeline in processing and evaluating a touch event. Dashboard allows the user to fine tune and control the exact condition under which a touch and\or mouse event is reported back to the OS. Here is a brief description of this pipeline:

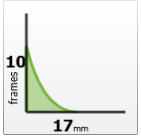


MOTION FILTER PARAMETERS

The touchscreen implements a two dimensional digital filter, which dynamically changes the filter size based on speed of user motion, and is used to filter the touch data before being reported via the USB. The filter is capable of smoothing out anomalies, glitches, and various sources of noise in the system. In general, the larger the values of the filter, the smoother the touch data will be with a corresponding increase in latency.

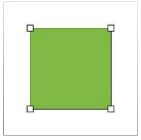


FILTER SIZE: This parameter controls the latency of the filter by adjusting how many frames of data are sampled and filtered together. The lower the value, the smaller the applied filter will be, resulting in a very sensitive touchscreen. A low value will allow a sensitivity of sub-pixel resolution so even small motions would be reported. This can result in jitter when the user is expected to hold their finger still for a certain period of time to activate a command (right click by holding down for 1 second, as an example). By increasing this value, small user motions would be filtered out resulting in a loss of resolution but greater stability.



FILTER DEPTH: This parameter controls the fall-off and sensitivity of the filter to high speed motions. The intent of this filter is to provide a stable touch response with very low noise when a finger is not moving, and also provide low latency when the user is moving quickly. The larger the value, the slower the fall-off and the filter is therefore active at higher motion speed. The lower the value, the faster the fall-off and high speed motions will be subject to lower latencies.

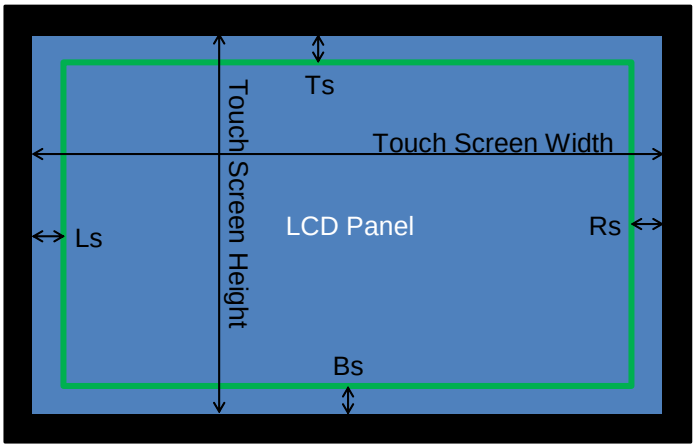
CHARMS PARAMETERS (FIRMWARE 9.00 AND ABOVE)



CHARMS: This parameter allows the user to configure the active touchscreen area around the perimeter so as to assist with edge gestures offered in Windows 8 and 10 from the left, right, top and bottom side. In a situation where the touchscreen inside dimensions are an exact match to the active monitor screen dimentions it might be harder to do the edge swipes offered in Windows. In such cases the parameters for charms can be adjusted to assist with the following actions

1) Edge swipe from the right to bring the charms menu (Action Centre) out
2) Edge swipe from the left to view all your open apps
3) Swipe in from the bottom edge to display the taskbar if autohide taskbar is active

The parameters can be adjusted either by typing in the values in the text boxes or by dragging the edges of the square using a mouse or touchscreen



The charms parameters can be calculated using a ruler or any measurement device. Simply assign border parameters Ts, Rs, Bs, Ls where assistance is needed, measure the width and height of the touchscreen area (from inside corner to corner, where the protective glass meets the plastic bezel) and calculate the ratio as a percentage.

The following example illustrates the principle described above. The diagram to the left shows the active area of an LCD panel (blue), the charm active border area (green) and the actual touch frame (black). First, measure all of the borders: Ts, Bs, Rs, and Ls as accurately as possible.

Next, calculate the values as follows:
Top Charm = (Ts/Touch Screen Height) * 100
Bottom Charm = (Bs/Touch Screen Height) * 100
Left Charm = (Ls/Touch Screen Width) * 100
Right Charm = (Rs/Touch Screen Width) * 100

Once set if the swipe gesture is initiated from outside the green border assistance will be provided. Typical values to use are 1% to 2%.

CONTAMINANT PARAMETERS

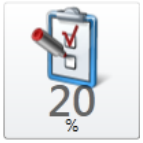
In order to determine that a shadow is present, it is important to note that a shadow is a relative decrease of light from the ambient level. Hence, an accurate knowledge of the ambient light level is required to be able to calculate shadow areas. The ambient light level itself can change due to temperature changes, LED variations, environmental contaminants, dust build-up etc. A dynamic auto-compensation algorithm has therefore been implemented into the touchscreen that allows for these environmental changes. This algorithm implements a type of low-pass filter that constantly adjusts the definition of the background light levels.

CONTAMINANT REJECTION PERIOD: This parameter controls the actual sampling period for the rejection algorithm. A large sampling period slows down the filter, resulting in a slower response to environmental effects such as rain and fluids. But, a large sampling period will result in higher accuracy of touch as well. A small sampling period speeds up the filter's ability to react to contaminants but reduces the accuracy of the system. The table below describes some sample values, the associated time to reject 50% of the signal detected and use cases.

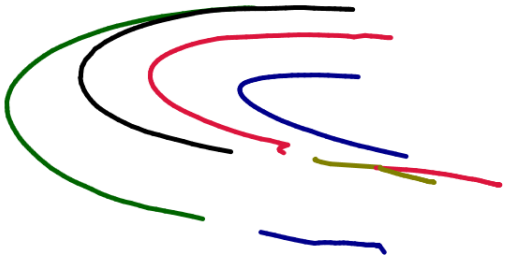
Value	Compensation Time	Result
2	18 sec	Very fast rejection to environmental conditions such as water, ice, etc. Ideal for public and outdoor kiosks.
50	450 sec	Provides an ideal trade-off between medium speed compensation and resulting inaccuracies.
200	1800 sec	Very slow rejection. Required in situations where touch event persists for long period of time.

RECOVERY SPEED: This parameter controls the speed at which the contaminant filter recovers when a touch or object has been removed from the screen. The Contaminant Rejection Period controls the introduction of the touch, whereas this parameter controls the recovery from touch. A high value results in a very fast recovery, whereas a low value results in a recovery speed that is comparable to the Contaminant Rejection Period.

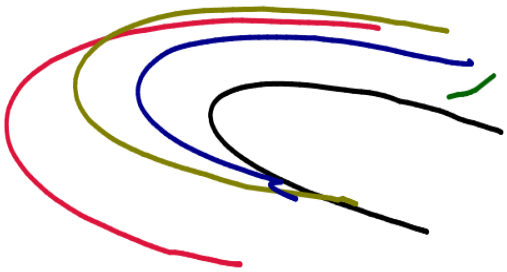
CONFIDENCE PARAMETERS (FIRMWARE 5.00 AND ABOVE)



CONFIDENCE: The Baanto ShadowSense algorithm is capable of generating a confidence factor based on a variety of parameters such as occlusion, signal to noise ratio and clear visibility of a touch object from multiple shadow sensors. This confidence measurement can be used to prune out ghost touches if required. If the confidence level is set high, the probability of a ghost touch is minimized greatly, but breaks can appear as only touch data that has the highest confidence will be reported. Conversely, if the confidence level is set to be low, there is a greater probability of ghost data but breaks will be minimized even during times of low visibility or high occlusion.



The touch data displayed on the left is a good representation of high confidence. It can be seen that 3 of the 4 lines have a break in the middle due to lack of confidence.

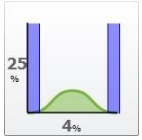


The touch data displayed on the left is a good representation of low confidence. One can note that there are no breaks but there is a stray ghost 'streak' at the beginning of the curve.

SHADOW PARAMETERS

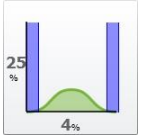
The Baanto technology works by detecting the shape, angle and size of the shadow that is cast by the touch object when it touches the screen. By analyzing this data from the perspective of each shadow sensor, the polygon shape, centroid location and other information can be determined. These parameters control the shadow detection algorithm. The shape of a shadow can be generalized as a Gaussian curve with a peak and a smooth roll-off, or decay, as it approaches zero shadow level. The peak defines how 'dark' the shadow is and is directly proportional to the transparency of the object touching the screen and the penetration of the touch object into the optical touch plane. In addition, as two fingers move closer together, their shadows merge and create a shadow that is a superposition of each individual point.

SEPARATION THRESHOLD: This parameter controls the inter-finger separation, which results in two separate touch points. The smaller the separation threshold, the closer the user's fingers can be and still be resolved as two separate touch points. The larger this number, the farther apart they have to be. In situations where the touchscreen is exposed to debris, water, high ambient light levels and other environmental conditions the 'noise' in the system can be misinterpreted as multiple merged shadows instead of one, resulting in an additional touch points being reported erroneously. If an application requires a high confidence level when working with multi-touch data or if a minimum touch distance is required between any two touch points, this parameter should be increased.



MAXIMUM SHADOW: This parameter can be used to adjust the hover distance above the protective glass or reject environmental contaminants based on their opacity. If a translucent or semi-transparent object was placed on the screen the shadow would not be very 'dark' or saturated as a certain percentage of light would still pass through. Whereas a very 'dark' shadow would be created if an opaque object such as a metal stylus was touching the screen. The lower the number, the more sensitive the touchscreen will be and will allow a minimal shadow of 20% density to create a touch (a very transparent object). Whereas higher numbers decrease the sensitivity and the touchscreen will only allow opaque objects to generate touch. Here are some sample values for various use conditions:

Value	Result
20%	Very sensitive: water, plastic credit cards, pens, and translucent paint brushes will activate touch.
40%	Reject minor environmental factors such as small drops of water, dust build-up, and transparent objects such as plastic pens.
80%	Reject major environmental factors such as splashing and running water, dark liquids, coffee, balsamic vinegar etc.
95%	Very insensitive: only very opaque objects such as fingers, metal stylus and other solid objects.



MINIMUM SHADOW: This parameter defines the edges of the shadow and controls the point at which the shadow ends and becomes background ambient light. The background levels can be noisy due to environmental factors such as water droplets, dust and high ambient light. In this situation, noise can be introduced into the calculation of the touch point as well. The lower this value, the more accurate the system will be as a large percentage of the energy of the shadow was used for calculation. The higher this value, the stability of the touch point will be increased in a noisy environment at the loss of resolution and accuracy of the touch data. Here are some sample values for various use conditions:

Value	Result
2%	Highly accurate, but small drops of water can result in noisy data.
5%	Impervious to small drops of water and contaminants.
10%	Insensitive to large drops of splashing water and other dark liquids such as coffee etc.

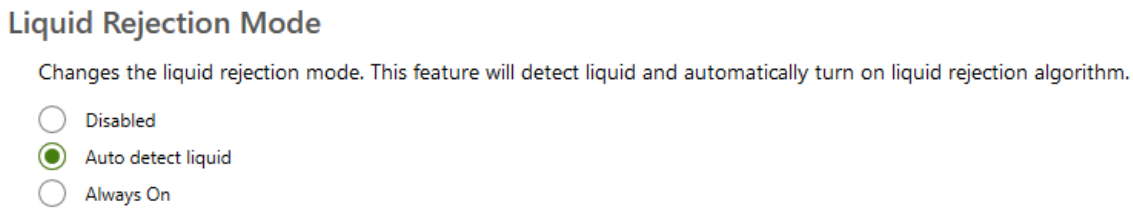
LIQUID PARAMETERS

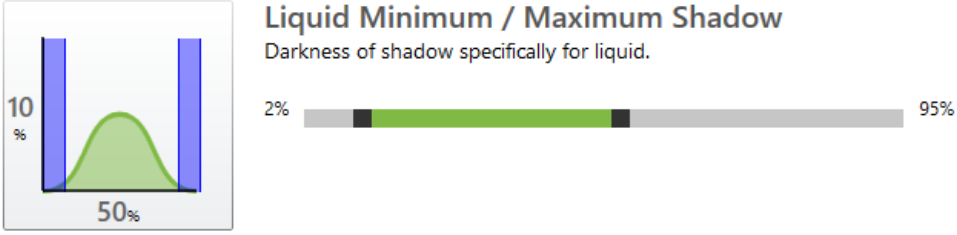
As the ShadowSense technology is capable of detecting the transparency of the touch, it is able to differentiate between a solid object like a user's finger versus a drop of water or liquid. This is particularly useful in signage applications where liquid, rain and other contaminants have to be rejected while allowing for seamless touch operation.

The Liquid Rejection Algorithm is capable of detecting rain and automatically configure the screen to reject the rain and switch back to normal operation when rain finishes. There are three modes for the algorithm:

- DISABLED – Algorithm never turns on.
- AUTO DETECT LIQUID – Automatically detects liquid based on a set of conditions and turns on the high noise liquid rejection algorithm.
- ALWAYS ON – Permanently keeps the high noise liquid rejection algorithm on. If the algorithm is left on during normal operation, it can severely impact the multi touch performance of the screen when rain is not present.

If the user selects AUTO DETECT option, additional parameters can be configured. The liquid detection algorithm works by trying to understand when the touch screen is subjected to water and other liquid contaminants. In general, rain or water tend to splash and cover a large area of the screen in a short period of time, versus a user's finger which is a localized touch that does not cover a large percentage of the screen. In addition, liquid is more transparent versus a finger or stylus and this information can be also used to detect the presence of a rain situation.





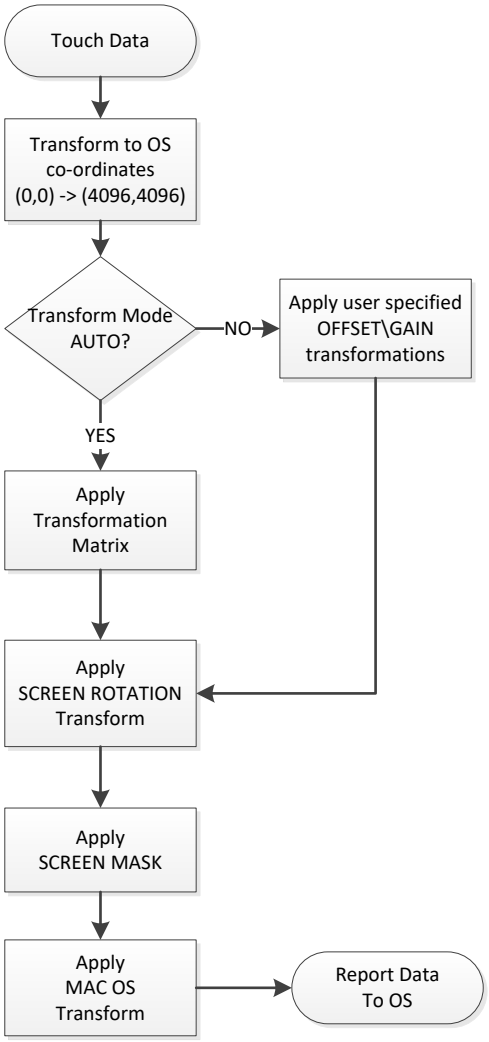
SENSITIVITY

Determines the amount of water that has to accumulate before the algorithm turns on. So a 50% setting will require at least 50% of the screen area to be covered in water before the algorithm triggers and rejects the liquid.

LIQUID SHADOW

This allows the user to configure the transparency of the liquid being rejected. The higher the value, the darker the liquid that will be rejected (coffee, wine, coke etc.).

4.3 TRANSFORM PARAMETERS



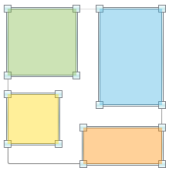
Once a touch event has been generated, the touchscreen transforms the data using a transform pipeline. These parameters allow the user to transform the touch data so that translation, rotations and offset corrections can be performed. All these transformation allow the user to accurately position the active touchscreen area onto the LCD screen regardless of the OS used on the host computer, misalignments between the display and touch frame may help in reducing parallax effects in some use cases. A brief description of this pipeline is given to the left.

APPLE SETTINGS

When the Shadow Sense screens are used with certain versions of Mac OS® system there can be an offset between the touch location and where the mouse cursor is reported. This offset is due to a difference in the co-ordinate system between the Mac and Windows. This offset can be eliminated and corrected by enabling the Apple Setting control. Enable this control whenever the touchscreen is to be used with Mac OSX 10.9 or lower versions of Mac OS.

Note: This parameter must be turned off if the touch frame is to be used with Mac OSX 10.10 or higher

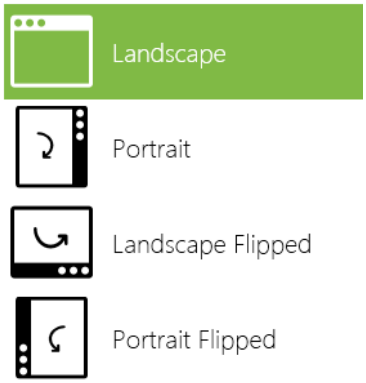
TOUCH REGIONS MASK PARAMETERS (FIRMWARE 7.30 AND ABOVE)



This settings allows the user to define up to four different zones where the touch is active. Each individual zone can be turned on and off. Similar to the screen mask parameters each zone is defined by a Top, Bottom, Left and Right Mask that can be calculated as described in the Screen Mask section. The touch screen will not report touch data in any spot that is outside of these zones. Touch will be active in the area where two or more regions are being overlapped.

SCREEN ROTATION PARAMETERS

Often times the touchscreen is mounted in Portrait mode rather than the default Landscape mode where the sensor bar is located on the top. These parameters rotate the touch data so that it corresponds to the correct screen mounting orientation. This parameter rotates the Mouse data as well as the Multi Touch data stream.



Landscape: By default the frame is mounted such that sensor bar is on top

Portrait: Frame is rotated by 90 degrees clockwise

Landscape Flipped: Frame is mounted upside down or rotated 180 degrees counter clockwise

Portrait Flipped: Frame is rotated by 90 degrees counter clockwise

In a Windows OS® the touch data is rotated automatically, whenever the display is rotated, and there is no need to adjust the screen rotation parameters in dashboard. For other operating systems that do not support touch rotation such as Mac OS® and Linux® screen rotation parameters have to be adjusted under dashboard.

TRANSFORMATIONS PARAMETERS

Allows the user to align the touchscreen with respect to the LCD or projected image. Auto alignment will align a variety of effects such as gain, offset, rotation, skew. Manual mode will allow the user to precisely control offset and gain of touch data. This feature can also be used instead of the OS based touch windows calibration offered in Windows 7 & 8.

TRANSFORM MODE: Allows the user to toggle between AUTO and MANUAL transform modes.

AUTO TRANFORM: Dashboard will provide the user with four circles to touch. Once the user touches these four areas, the software will calculate a transformation matrix to compensate for any distortion discovered by the system. This is ideal to compensate for a variety of distortions such as: Rotation, Gain, Offset, Barrel, Trapezoidal and PinCushion effects as well as compensating for parallax effects. This feature is ideal when the touchscreen is being used with a front projection system or if the touch frame is offset with respect to the underlying image for whatever reason.

Note: For auto transformation to work correctly it is recommended that Windows be configured to Landscape view. Perform the auto calibration and then adjust the screen rotation as needed.

MANUAL TRANSFORM: Allows the user to simply specify an OFFSET and GAIN to the touch data. Ideal in situations where the user is trying to 'stretch' the touch data just a little bit to allow for easier access to button in the corners or compensate for simple distortions.

4.4 MOUSE PARAMETERS

In applications where the touchscreen is being used to simulate mouse input, these parameters allow the user to define and adjust how left and right click are detected and reported.

MOUSE OPTIONS PARAMETERS

RIGHT CLICK OPTIONS: The touchscreen processes a right click event if the user holds a finger on the screen for a period of time without moving it. This parameter allows the user to configure the duration of time that a touch must be held to trigger a right click.

LEFT CLICK OPTIONS: This parameter allows the user to specify how the left click is processed.

- NO LEFT CLICK: Disables left clicks. Mouse pointer will be tracked, but clicks will not be generated.
- NORMAL CLICK AND DRAG: Left Click Down is generated when the user touches the screen, and a Click Up event is generated with the user lifting the finger off the screen. Click is held down during the entire duration of touch.
- CLICK ON NEW TOUCH, NO DRAG: Left Click Down and Left Click Up are generated back to back when a new touch event is detected. Click is not held down as the user moves the finger.
- CLICK ON TOUCH RELEASE, NO DRAG: Left Click Down and Left Click Up are generated back to back when a touch is removed. Click is not held down as the user moves the finger.

MOVE OPTIONS: In a multi touch situation, allows the user to configure what touch to report as a mouse event. Select the checkbox and the mouse pointer will follow the newest touch event. Otherwise the mouse pointer will continue to follow the previous touch event. For example, a user may want to track the first touch event if there is a chance of an accidental touch disrupting the action. On the other hand, for situation where ignoring a static object on a touchscreen (gum, debris, etc.) is desirable, reporting the newest touch event would be selected.

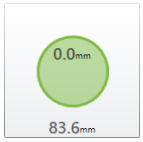
4.5 TOUCH PARAMETERS

In applications where the touchscreen is being used for touch input, these common parameters allow the user finer control over the touch event triggered by fingers

TOUCH REJECTION PARAMETERS (FIRMWARE 4.11 AND ABOVE)

These parameters control the conditions under which the touchscreen is able to automatically reject various touch events. Baanto ShadowSense technology reports both the X-Y location and calculated area of the touch object contacting the screen. Hence it is possible to reject specific touches based on the surface area of the contact. This is useful in situations where palm rejection, environmental debris rejection, and in any application where a high confidence level that only a specific class of touch object was used to activate the screen is required.

TOUCH REJECT ENABLE: This parameter can enable and disable the touch rejection algorithm in the firmware of the touchscreen. All touches regardless of contact area are reported when this is disabled. When enabled, the parameters below are used to determine when a touch is reported to the OS.



MINIMUM AND MAXIMUM AREA: There are two slide bars for this control. The one on the top controls the minimum contact area required before a touch is activated. The touch area is calculated based on the entered diameter in millimeters. The Dashboard software error checks to ensure that Minimum Area is smaller than Maximum Area entered.

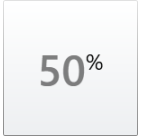
The slide bar on the bottom controls the maximum contact area required before a touch is rejected. The touch area is calculated based on the entered diameter in millimeters. The software error checks to ensure that Maximum Area is larger than Minimum Area. If a value of Zero is selected for this parameter, the touchscreen will reject all touch inputs.

Using the Minimum and Maximum parameters described above, an application can configure the system to reject extraneous inputs from palms, shirt sleeves, dirt, debris, and insects very accurately. The user should ensure that the gap between Minimum Area and Maximum Area is calculated to meet their application requirements. Minimizing this gap will result in loss of touch as there can be a wide variance to an object, such as a human finger compared between a child and an adult, as it touches across the screen surface.

DEADBAND PARAMETERS (FIRMWARE 6.00 AND ABOVE)

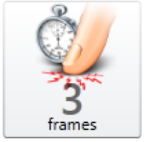
DEADBAND: This parameter controls the radius in millimeters around the first detected touch position, where motion will be filtered. This parameter helps the user when performing a click by eliminating small finger motions due to jitter. Higher values can filter out larger fingertip jitters.

HOVER PARAMETERS (FIRMWARE 11.00 AND ABOVE)



HOVER: This parameter control the maximum shadow depth percentage threshold at which the hover will be activated. Hover allows users to highlight an icon without selecting it, similar to moving the mouse on an icon. Hover percentage works in conjunction with the Max shadow parameter, if the max shadow is set to 40% and hover is 50% then when the shadow depth is within 40% to 50% the hover will be activated.

NEW TOUCH DELAY PARAMETERS



NEW TOUCH DELAY: This parameter controls the delay, or latency, between a new touch event and when the touchscreen reports the data. The lower the touch delay, the faster the screen reports new touch events. The higher the touch delay, the longer the screen waits to confirm that the new touch event is valid and doesn't disappear. This parameter is useful when trying to eliminate glitches or erroneous touches caused by environmental contamination such as splashing rain etc. This parameter is also useful when the application requires a certainty that a touch event was intended by the user, such as a financial application. Here are some sample values for various use conditions:

Value	Result
0	Can detect a credit card tapping or bouncing off the screen
3	Can detect a finger tapping or bouncing off the screen
5	Requires the user to intentionally press down
10+	Requires a touch with a noticeable delay

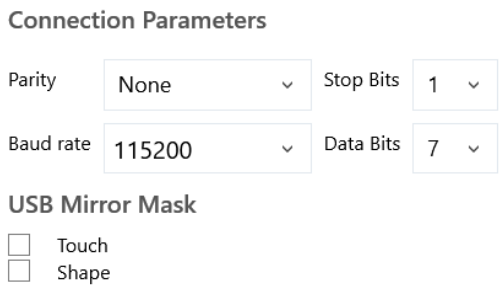
4.6 AUXILIARY PORTS PARAMETERS

ShadowSense Pro SKUs have two auxiliary ports that can be configured as serial or GPIO (General Purpose Input Output pins) and this section allows the users to configure these two ports. COM Port 1 offers a RS-232 UART serial port for data communication between the touch frame and the PC. COM Port 2 maps two GPIO pins on the microcontroller and these pins can be configured to send TTL level serial data or used as a GPIO pins. On Large Format SKU these parameters cannot be adjusted and are disabled.

PORT 1 FUNCTIONS

DISABLED: Disable the RS-232 Transceiver chip on COM Port 1

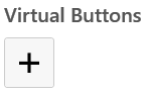
USB MIRROR: In certain applications the only way to communicate touch data to the PC is via serial port. This function is used to send touch data to the PC via the serial port. Touch packet are sent as 64 bytes of serial data.



CONNECTION PARAMETERS: Allows the user to configure the Serial port communication parameters.

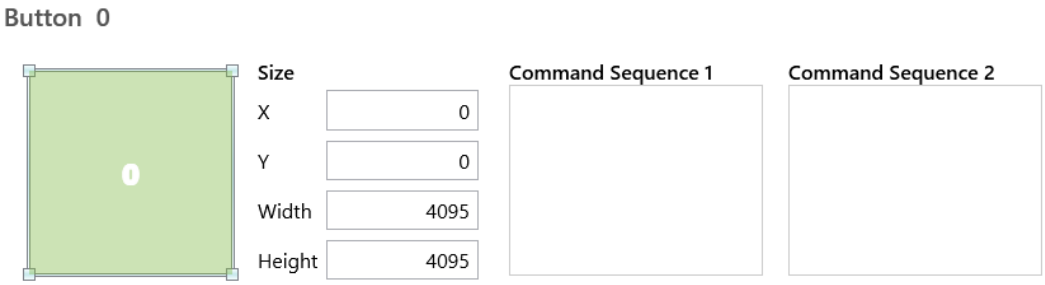
USB MIRROR MASK: To receive Touch and Shape data on the serial port both the Touch and Shape check boxes need to be ticked. If both Touch and Shape text boxes are not checked no serial data will be sent.

VIRTUAL BUTTONS: Many Audio Video devices such as monitors and projectors offer control functionality via the RS-232 Serial Port. These devices offer Control Codes that can be used to turn the device on/off or to switch the video inputs. Virtual Button feature allows the user to define up to 4 virtual button that send specific control HEX command sequences to an external peripheral device connected to the touch screen.



Use the + button to add button to added virtual buttons on the screen.

BUTTON PARAMETERS: Virtual Buttons are just rectangles defined on the screen. X, Y coordinate point to the location of the top left corner of the rectangle and the other parameters correspond to the Width & Height of the rectangle.



COMMAND SEQUENCE 1 & 2: Are text fields that hold the Hex control code. Each field can hold up to 25 bytes of Hex data. Only valid Hex byte are allowed in the two text fields. When the button is triggered the touch frame sends out the Command Sequence 1 followed by the Command Sequence 2.

PORT 2 FUNCTIONS

Port 2 offers the same functions as Port 1 only difference is that the two pins corresponding to Port 2 are GPIO pins from the microcontroller that can be configured for UART or GPIO functionality. Only TTL (0 to 5V) level voltages are supported on Port 2. For OEM customers that would like to integrate the touch data with internal FPGA or Microprocessors Port 2 offers seamless connection for touch data.

Do not connect Port 2 pins to an RS-232 level (+/-5V) signal as this will damage the microcontroller!!

DISABLED: Disable the two GPIO pins on the Microprocessor

USB MIRROR: Configures one of the GPIO pin as a TX (Transmitter) and the other GPIO pin as a RX (Receiver). Similar to Port 1 but the serial data sent out on Port 2 will be TTL level output only.

VIRTUAL BUTTONS: Similar to Port 1 offers the ability to send Hex command sequences when the user touches the virtual button. The serial data send out will be in TTL level voltage.

GPIO BUTTONS: Configures the two GPIO pins as Output pins that can be driven High (3.3 V) or Low (0 V). User can create two virtual buttons. Activating the virtual button toggles the output pin from High to Low or from Low to High. Default state for the pin is Low.

Use the save com button to active the configured ports and save the settings to the touch frame. Use the load com settings button to find out what the com port settings are set to on a particular touch frame.

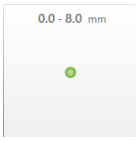
Note:
It is important to realize that one cannot use the same function on Port 1 and Port 2 simultaneously. So if port 1 is being used to mirror usb data then this feature will not be supported on port 2. Virtual and GPIO buttons on port 2 are essentially the same function. So if GPIO Buttons or Virtual Buttons are used on Port 2 then the Virtual Buttons on Port 1 will not be available.

4.6 STYLUS PARAMETERS

Firmware version 7.XX introduces support for pen and eraser detection. This allows the touch screen to automatically identify the touching object as the user's fingers versus pen or eraser and allows for annotation within Microsoft Products such as OneNote® and PowerPoint®. The following parameters allow the user to configure the size of a pen and eraser object.

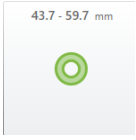
STYLUS AND ERASER PARAMETERS

STYLUS ENABLE: Allow the user to Enable or Disable Pen detection



STYLUS AREA: Use the sliders to adjust the minimum and maximum contact diameter in mm which will be used to detect PEN touch event. If the touch contact diameter is within the range specified it will be treated as a PEN input.

ERASER ENABLE: Allow the user to Enable or Disable Eraser detection



ERASER AREA: Use the sliders to adjust the minimum and maximum contact diameter in mm which will be used to activate erase mode. If the touch contact diameter is within the range specified then it will be treated as a virtual eraser.

All objects that are not within the Stylus or Eraser area range are treated as a touch point.

There is no need to use a special stylus with the touch screen as any stylus can be configured based on its size to be recognized as a stylus or an eraser. Some recommendations are provided below.

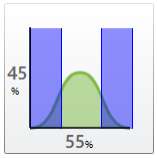
1. Any stylus can be used as long as they have a rounded tip of diameter greater than or equal to 5mm. Best diameter to use is between 5 mm to 10 mm.
2. To differentiate between fingers and stylus it is recommended to choose a stylus that has a diameter less than the diameter of the little finger.
3. Set the minimum stylus diameter to 0 mm. Measure the diameter of the stylus to be used in mm set this as the maximum contact diameter.
4. Ideally the eraser should be much larger than the size of a clenched fist such that it cannot be accidentally be confused with the user's palm or fist. This will allow the touch screen to differentiate between finger touch and the eraser and provide better palm rejection. Measure the diameter of the Eraser, set the maximum and minimum contact diameter using the formulas below.

Minimum Eraser Contact Diameter = Measured Diameter * 73%
Maximum Eraser Contact Diameter = Measured Diameter + 1 mm

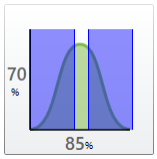
CALIBRATE: Calibrates the eraser size based on input from the touch surface device

The eraser calibration is an interactive process that once started requires the user the move the eraser in the designated screen area for a few seconds. When completed, the user is notified with a complete message on the screen and the calibration results are displayed (eraser minimum and maximum size in mm). In order to use the calibration values the user must click apply to send eraser size parameters to the device.

STYLUS AND ERASER SHADOW PARAMETERS



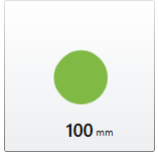
STYLUS MINIMUM/MAXIMUM SHADOW: This parameter can be used to adjust the stylus hover distance above the protective glass. The maximum shadow value is used to activate the stylus touch and the minimum value is used to de-activate the stylus touch. Generally, the lower the numbers, the more sensitive the touchscreen will be.



ERASER MINIMUM/MAXIMUM SHADOW: This parameter can be used to adjust the eraser hover distance above the protective glass. The maximum shadow value is used to activate the eraser touch and the minimum value is used to de-activate the eraser touch. Generally, the lower the numbers, the more sensitive the touchscreen will be.

STYLUS UP THRESHOLD: This parameter control the threshold point at which the stylus is considered to be lifted off the glass surface. When the user decides to lift the pen up from the glass surface the shadow casted by the pen tip is reduced when the shadow depth is down to 25% it is considered the pen has been lifted off the glass. The pen is no longer tracked and a new pen touch down is initiated when the pen enters the IR field of view again.

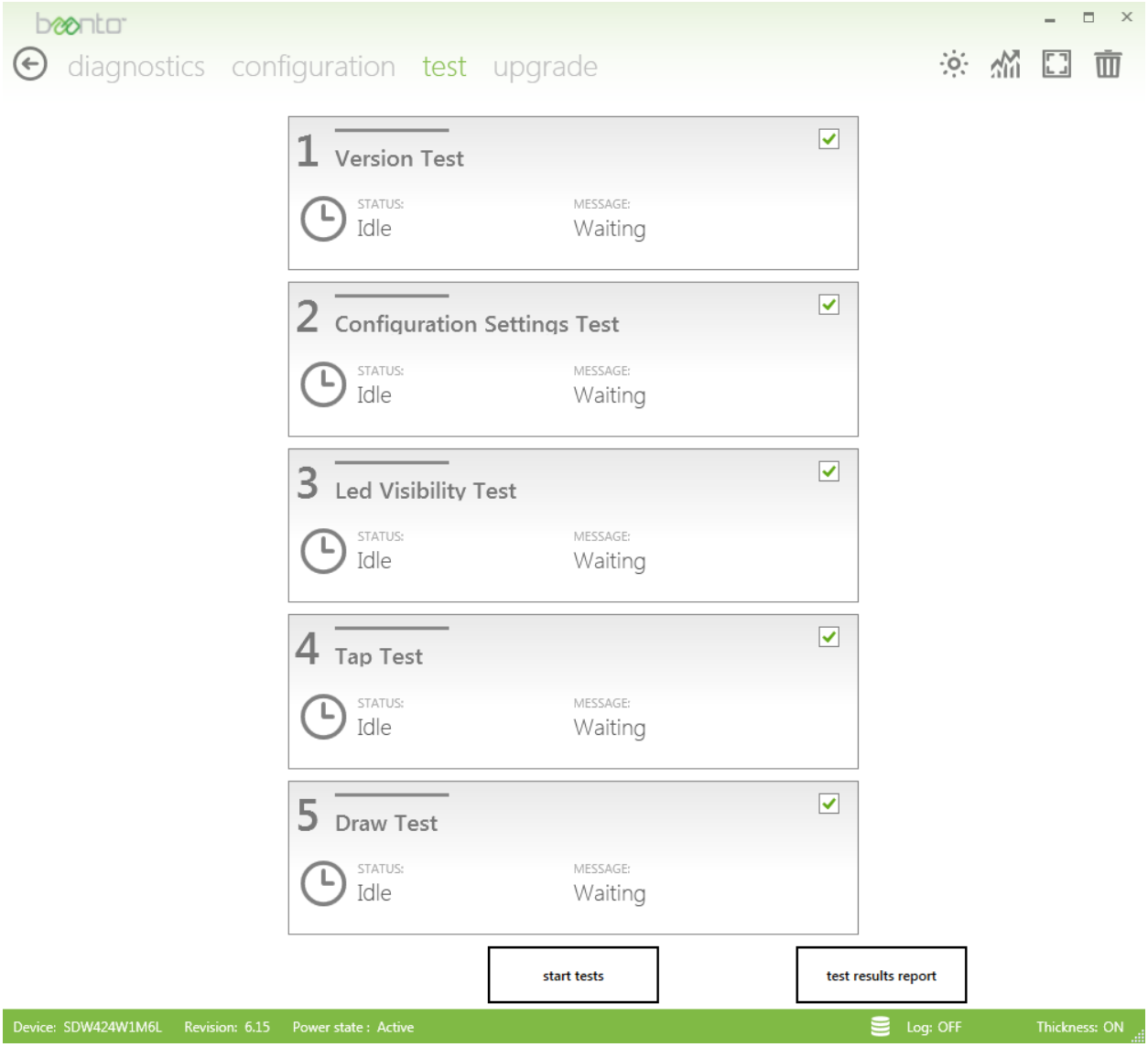
PALM REJECTION PARAMETERS



PALM REJECTION: This parameter defines a radius (in mm) around a stylus where all other touches are rejected. This feature is only available in the custom HID pipe. HID Stylus (Windows pipe) operates as before and only sends out information on a single stylus and palm rejection area is set to be the entire screen.

5.0 TEST VIEW

This Diagnostics View allows the user to perform a full functional and diagnostic test on the touchscreen assembly.



The Diagnostic Tester performs 5 individual tests:

1. VERSION TEST: Confirms the production firmware version that has been flashed into the Microcontroller of the touchscreen.
2. CONFIGURATION SETTINGS TEST: Confirm that the correct Configuration Parameters are flashed into the MCU.
3. LED VISIBILITY TEST: Confirm that all LEDs are within operating parameters to all shadow sensors (every LED is green in Diagnostic View).
4. TAP TEST: User needs to tap on the circles on the screen, in order, with no glitches reported anywhere else on the screen.
5. DRAW TEST: User needs to trace a line in the bounding box given, from start to end, with no break, and without deviating from the bounded area.

Select the check box besides the specific tests that need to be carried out and press the start button. Once the tests are complete the results can be displayed in a report format as shown below.

Status: Idle
Message: Waiting

2 Configuration

Status: Idle
Message: Waiting

3 Visibility

Status: Failed
Message: Warning: 24 Leds

Leds Shadow Sensors

Led Id	0	1	2	3	4	5
Led 0	--	NV	OK	OK	OK	NV
Led 1	--	NV	OK	OK	OK	OK
Led 2	--	NV	OK	OK	OK	OK
Led 3	--	NV	OK	OK	OK	OK
Led 4	--	NV	OK	OK	OK	OK
Led 143	OK	OK	OK	OK	OK	NV
Led 144	OK	OK	OK	OK	OK	NV
Led 145	OK	OK	OK	OK	-67%	NV
Led 146	OK	OK	OK	-55%	-94%	-98%
Led 147	OK	OK	-69%	-90%	-94%	-98%
Led 148	OK	-60%	-79%	-86%	-86%	-93%
Led 149	NV	-88%	-92%	-88%	-82%	-52%
Led 150	NV	-92%	-93%	-88%	-80%	OK
Led 151	NV	-90%	-90%	-84%	-71%	OK
Led 152	NV	-86%	-87%	-78%	OK	OK
Led 153	NV	-87%	-87%	-64%	OK	OK

print

Any specific LEDs that fail the test, their visibility and brightness values are displayed in the report format. Hard copy of the above report can be generated using the Print button.

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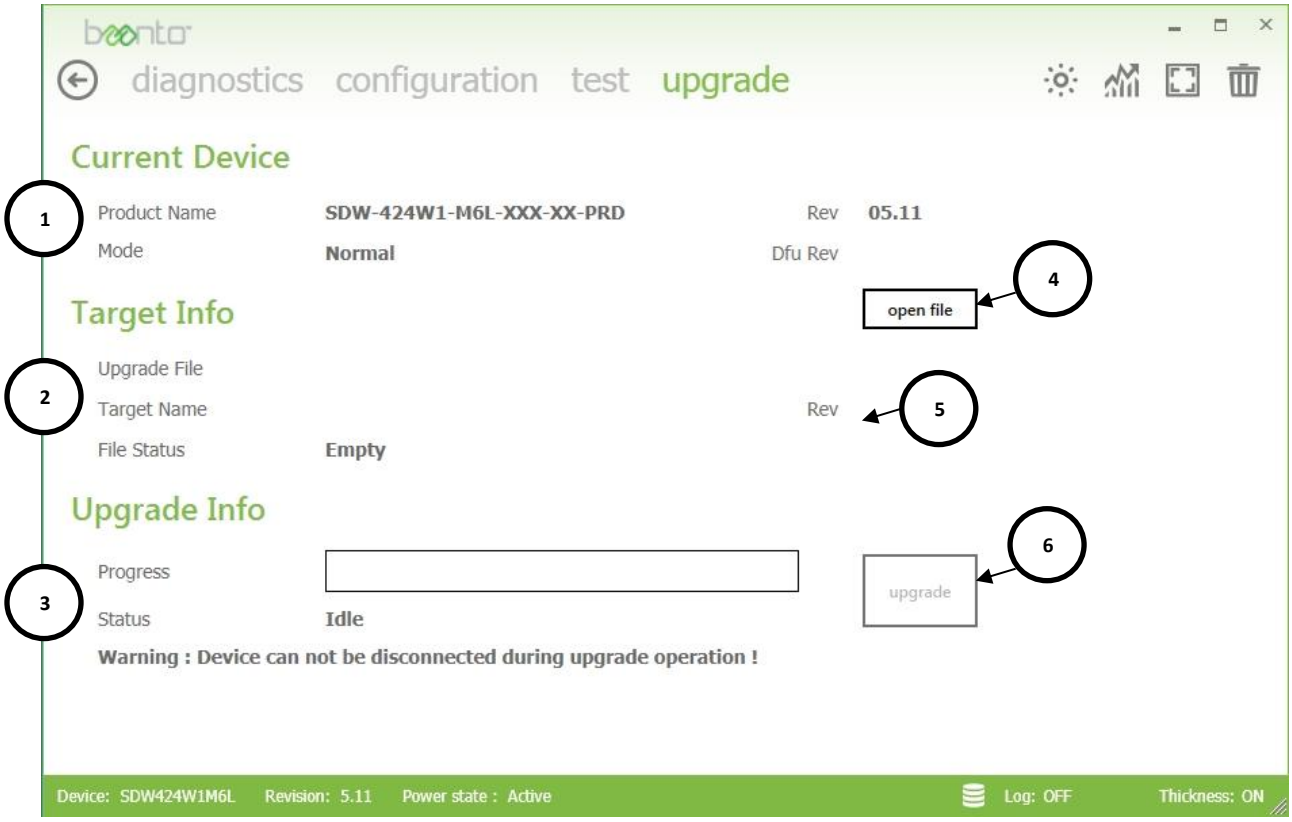
6.0 UPGRADE VIEW

The Upgrade View allows the user to change the firmware of the touchscreen. On occasion, Baanto will provide the user with a specific file that can be used to perform dynamic, in the field upgrade or downgrade. The touchscreen only supports a special firmware file that is custom and proprietary to Baanto. Performing an upgrade with any other file can permanently damage the touchscreen and should be avoided.

Baanto upgrade files have a specific naming convention that is required for a successful upgrade. All firmware files have the following format:

Firmware-SDW-170S1-M5T-XXX-XX-PRD-Ver-0523-RETAIL.EDFU

The filename contains the product SKU, version number and a specific EDFU extension. Only these files will be recognized as valid upgrade files by the system.



Some of the features that are available in this view are highlighted in the diagram above and described below:

1. CURRENT DEVICE INFORMATION:
    - Displays SKU, Revision Number and other information about the device plugged in.
2. TARGET INFORMATION:
    - Displays SKU, Revision Number and other information about the upgrade file that was selected by the user.
3. UPGRADE INFO:
    - Show the current status and progress of the upgrade process.
4. OPEN FILE BUTTON:

- Allows the user to select the Firmware Upgrade File

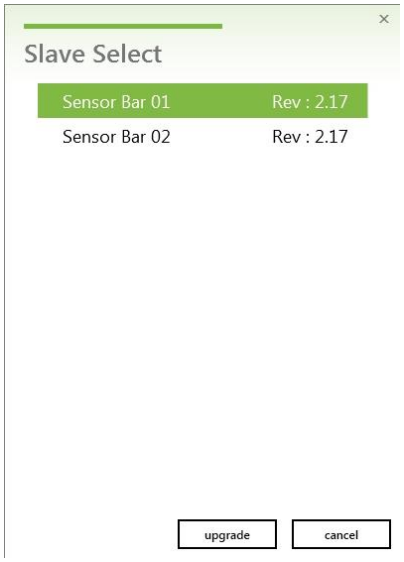
5. FILE ERROR:
    - Displays any errors encountered. It should be noted that the “Product Name” and “Target Name” strings must match for upgrade to occur. If the user connects a 190S1-M5T touchscreen, they can only flash firmware that is another revision of 190S1-M5T. They CANNOT change firmware from 170S1-M5T to 190S1-M5T as each control board may be different in production.
6. UPGRADE BUTTON:
    - Once the correct target file has been selected and no errors have been encountered, this button initiates a device upgrade command.
    - It should be noted that the user should never disconnect USB or POWER from the touchscreen during a device upgrade as it can cause the touchscreen to fail in a manner that cannot be rectified in the field.

Certain Baanto touchscreens have multiple microcontrollers referred to as slave controllers and a single master controller. To upgrade these screens the user has to upgrade both the master and the slave controller firmware separately. There are two ways to upgrade these multiple microcontroller touch frames: Manual and batch mode. Manual mode requires the user to upgrade each individual microcontroller separately, whereas the Batch mode allows the user to upgrade all of them at once, automatically and without user intervention.

MANUAL MODE

Manual mode requires the user to select a file with .EDFU extension. In a multi microprocessor situation, two separate files will be given that represent the firmware for slave and master controller. The steps below outline the manual procedure for firmware upgrading.

1. Find out the Device number of the screen being used. Click the Open File Button and load the correct master file (example **Firmware-SDW-424W1-M6L-XXX-XX-PRD-Ver-527-RETAIL.edfu**). Then click the upgrade button.
2. Select the upgrade button again and select the slave firmware file (example **Firmware-SDW-424W1-M6L-XXX-XX-PRD-SLAVE-Ver-221.edfu**). Then click the upgrade button this time a Slave select screen will show up as shown below.



3. Select Sensor Bar 01 and click upgrade button.

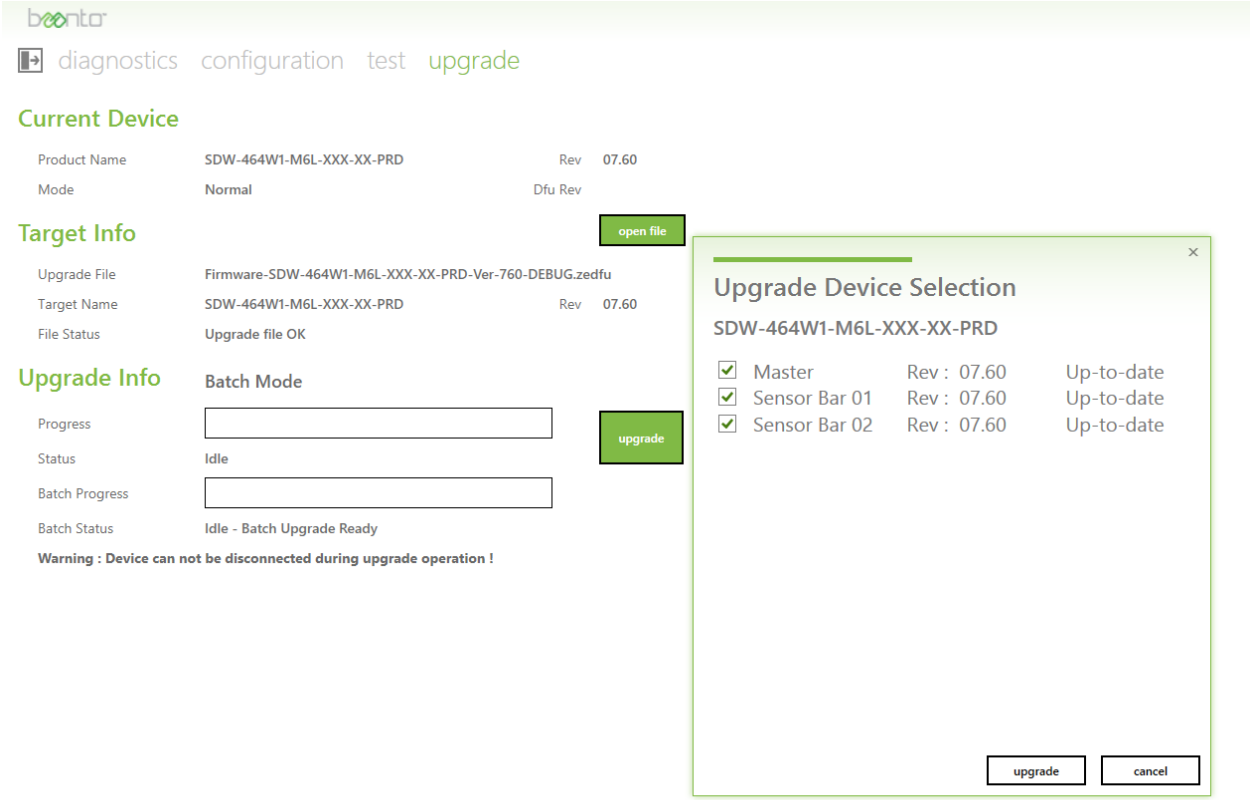
4. Perform step 2 again and this time select Sensor Bar 02 and click upgrade button, repeat until all sensor bars are completed.

Verify the upgraded master firmware revision number from the status menu and the slave revision numbers from the left and right calibration bars.

BATCH MODE

Batch mode requires the user to select a file with .ZEDFU extension. The steps below outline the batch firmware upgrade procedure.

1. Find out the Device number of the screen being used. Click the Open File button and load the correct ZEDFU file (example **Firmware-SDW-464W1-M6L-XXX-XX-PRD-Ver-810-Retail.zedfu**). Then click the upgrade button.
2. Select all the microcontrollers that you would like to upgrade (default will upgrade all), and click upgrade.



PLEASE NOTE: Performing a firmware upgrade requires the installation of a device driver, please refer to section 7.0 for more detailed instructions on this process.

7.0 DFU DRIVER INSTALLATION

The DFU (Dynamic Firmware Upgrade) is a method by which the firmware of the touch controller can be updated in the field without the need to take the touchscreen apart. The touchscreen enters a special DFU mode, whereby the new firmware is flashed using special USB packets.

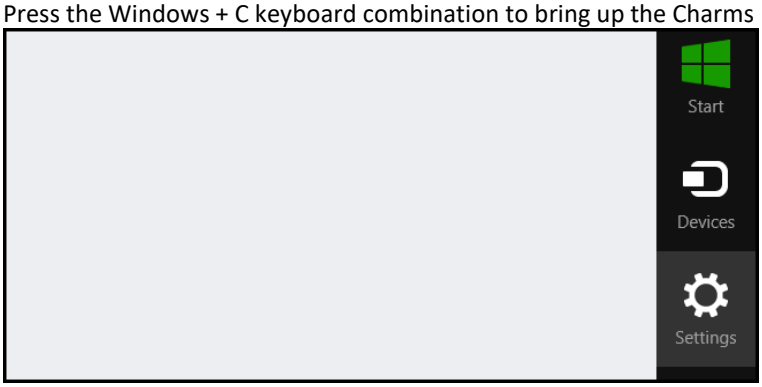
Our touchscreen requires the use of a special driver in order for the installation to occur. The driver is able to communicate to the BOOT LOADER that resides in a special location of the controller's memory and erases the old firmware and programs the new file. The driver is compatible in all Microsoft products such as XP, Windows 7/8 and Windows 10. The following section details the instructions for installing this device driver.

It should be noted that on any given computer, the driver will only have to be installed the first time an upgrade is performed. Once installed there is no need to ever update or re-install the driver.

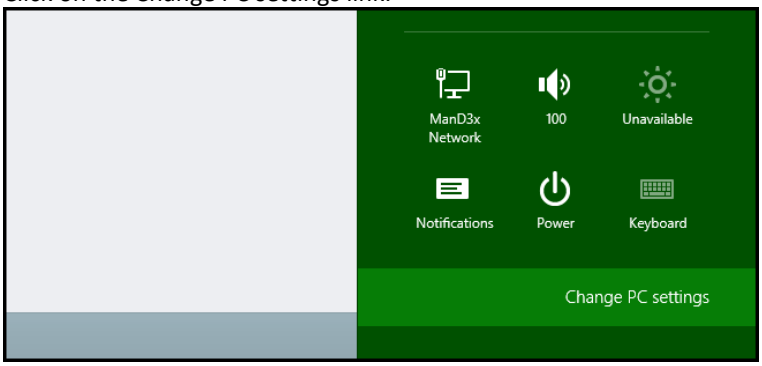
7.1 WINDOWS 8.0 – DISABLING DRIVER SIGNATURE ENFORCEMENT

The STM32 DFU drivers provided in the Dashboard\Drivers\ directory are unsigned drivers and Windows 8.0® prevents users from installing these drivers. The following steps should be followed to disable driver signature enforcement on a Windows 8.0® machine before installing the DFU Driver.

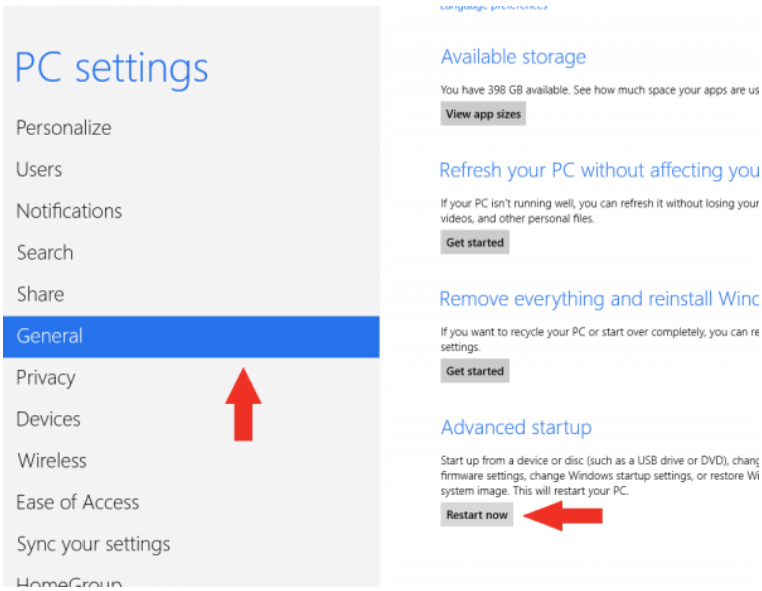
Press the Windows + C keyboard combination to bring up the Charms Bar, and then click on the Settings Charm.



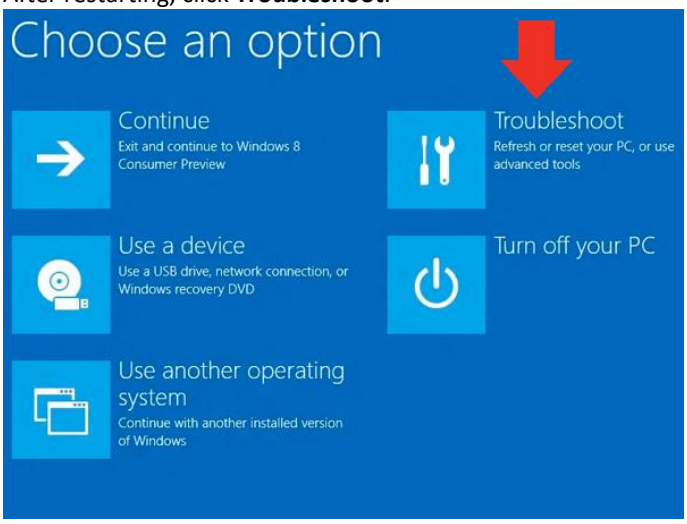
Click on the Change PC settings link.



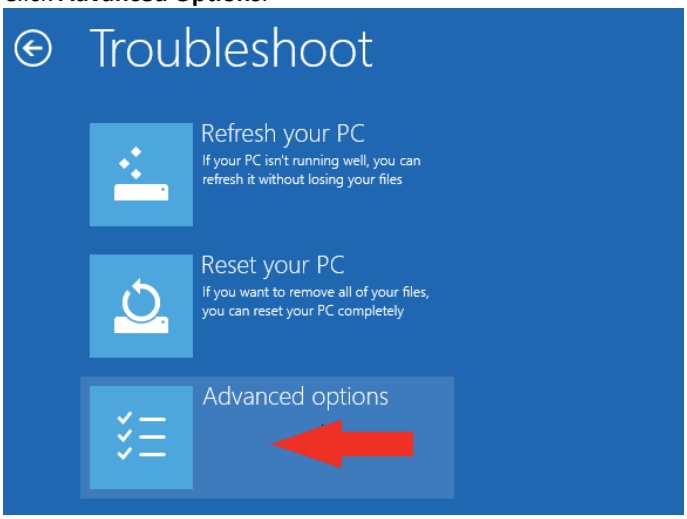
Select **General** Settings than under *Advanced Startup*, click **Restart Now**.



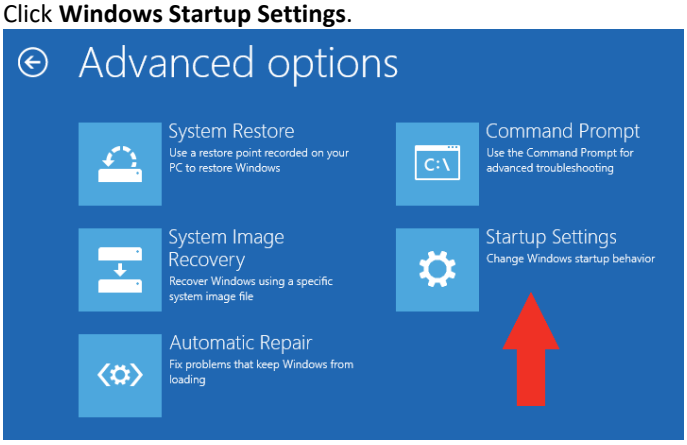
After restarting, click **Troubleshoot**.



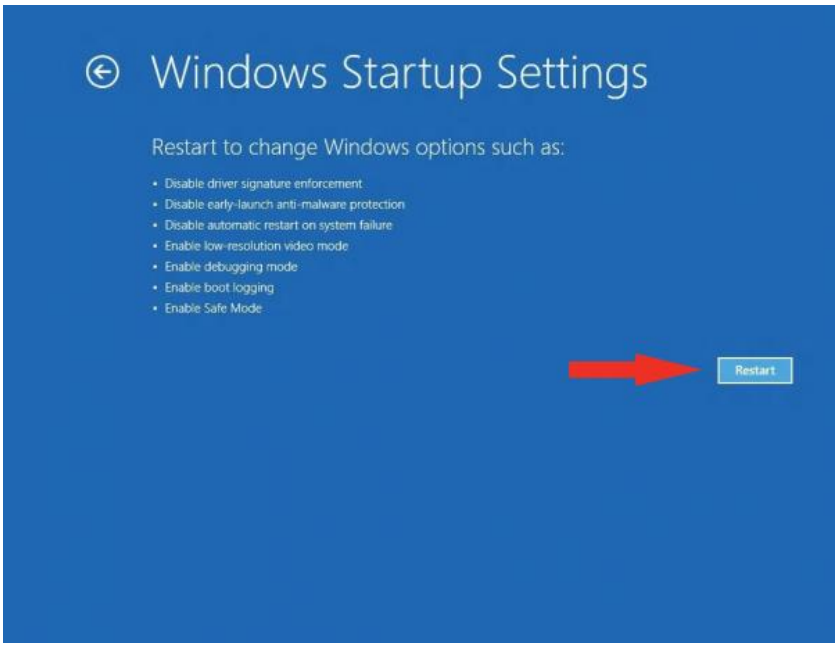
Click **Advanced Options**.



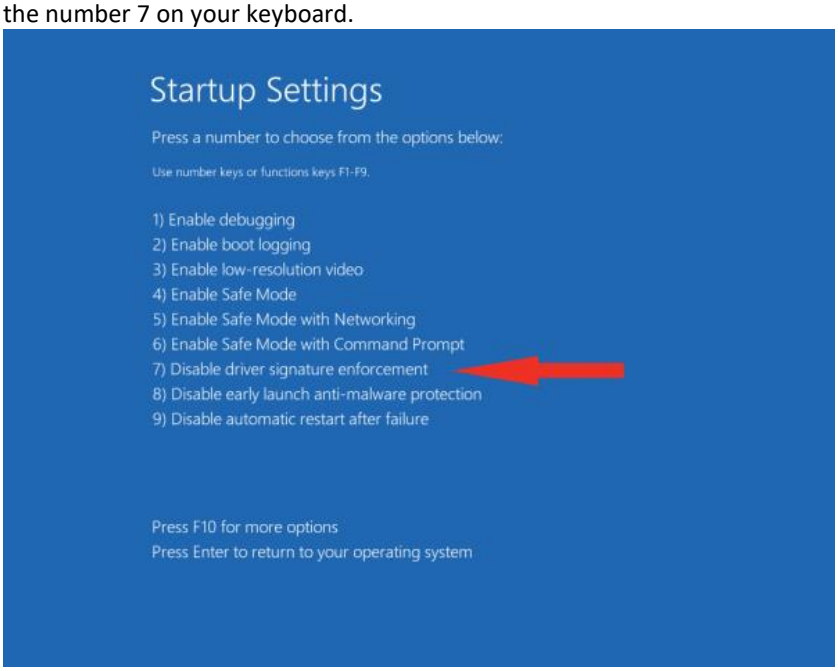
Click **Windows Startup Settings**.



Click **Restart**.



After restarting your computer a second time, choose **Disable driver signature enforcement** from the list by typing the number 7 on your keyboard.

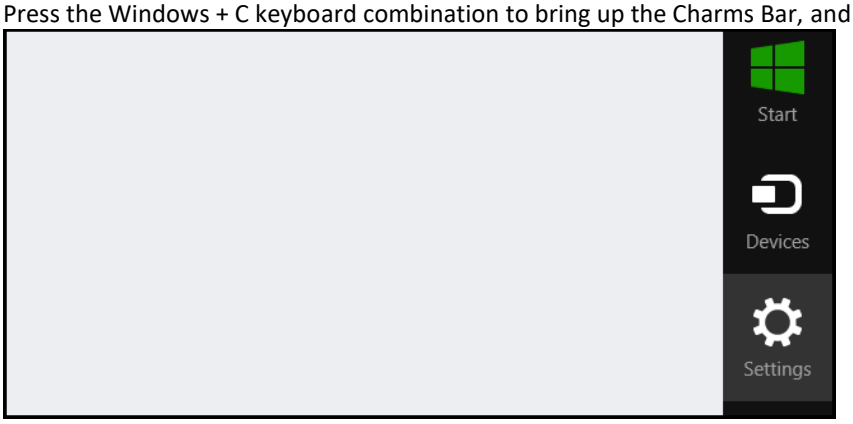


Your computer will restart automatically.

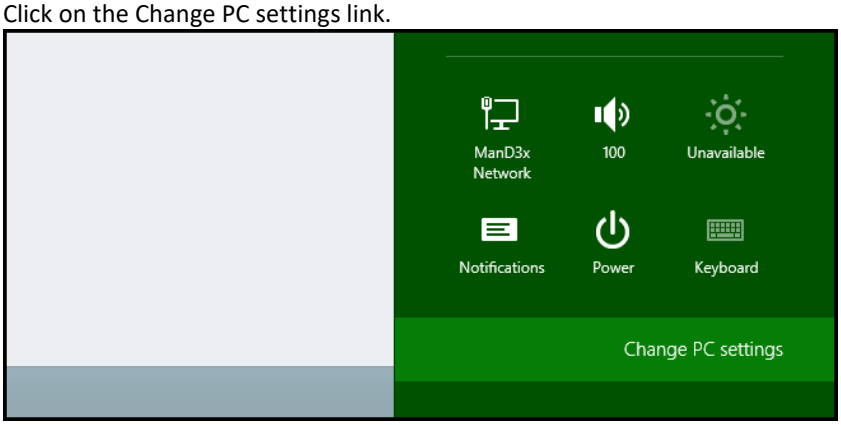
7.2 WINDOWS 8.1 – DISABLING DRIVER SIGNATURE ENFORCEMENT

The STM32 DFU drivers provided in the Dashboard\Drivers\ directory are unsigned drivers and Windows 8.1® prevents users from installing these drivers. The following steps should be followed to disable driver signature enforcement on a Windows 8.1® machine before installing the DFU Driver.

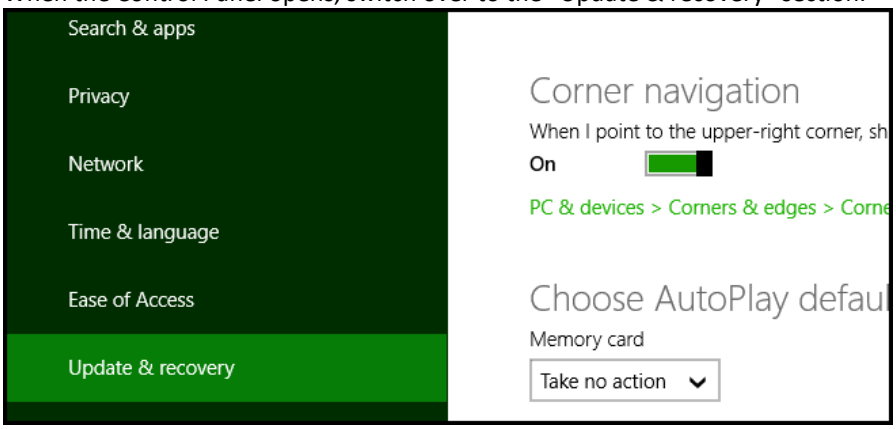
Press the Windows + C keyboard combination to bring up the Charms Bar, and then click on the Settings Charm.



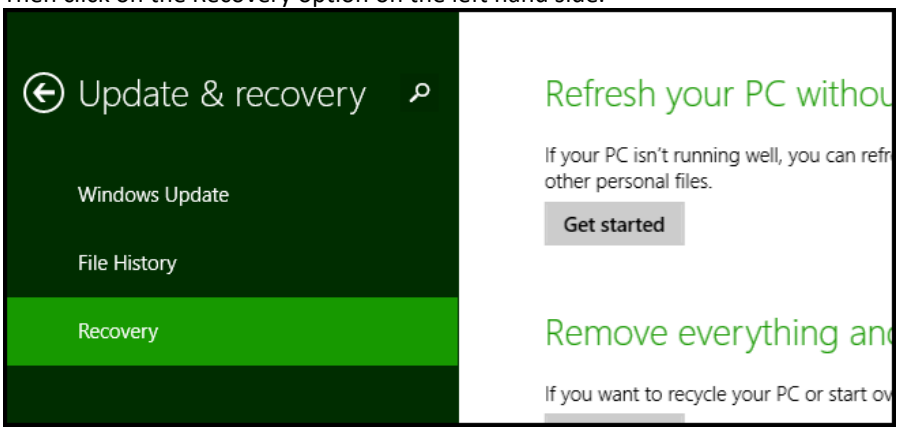
Click on the Change PC settings link.



When the Control Panel opens, switch over to the “Update & recovery” section.

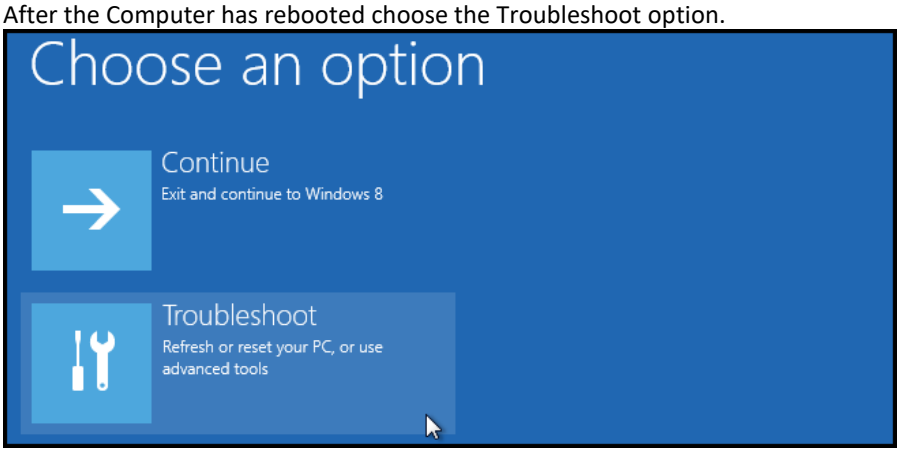


Then click on the Recovery option on the left hand side.

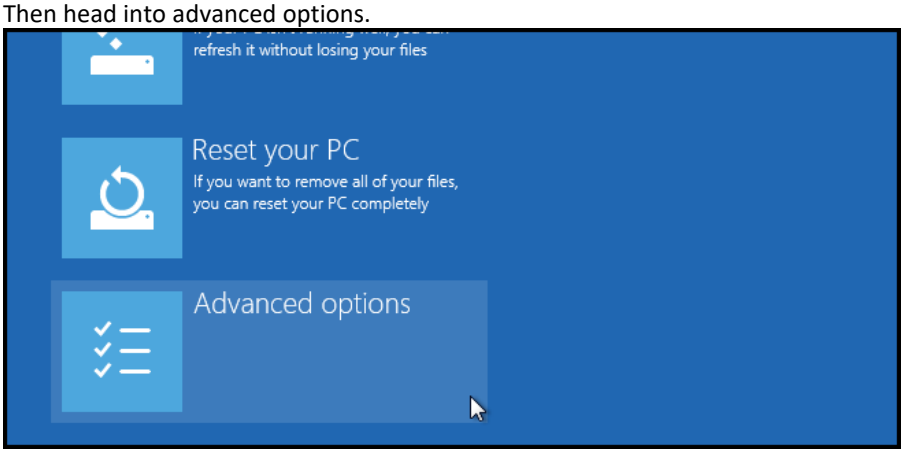


Once selected, notice the advanced startup section appear on the right hand side. Click on the “Restart now” button.

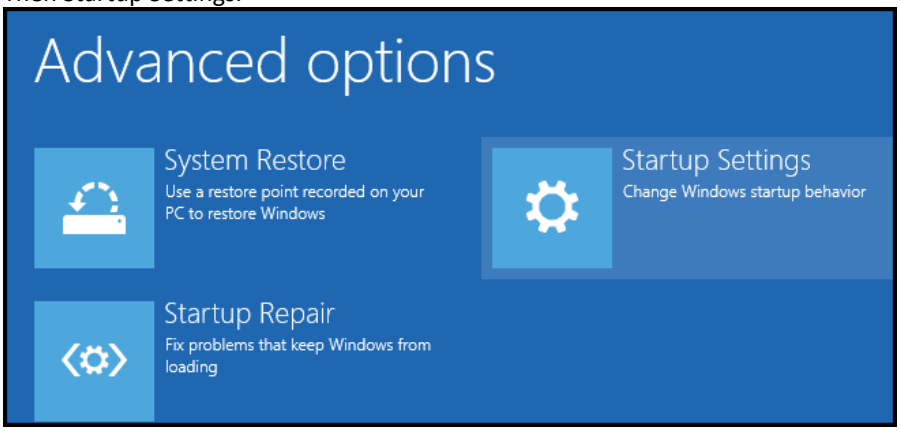
After the Computer has rebooted choose the Troubleshoot option.



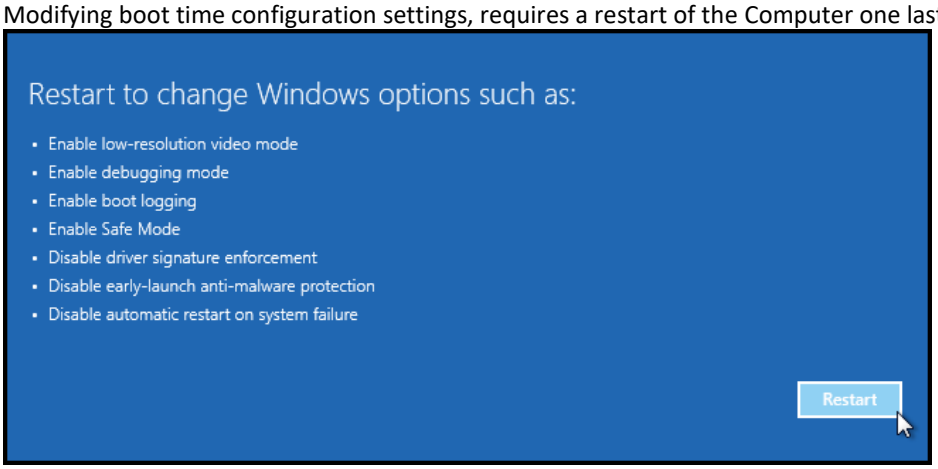
Then head into advanced options.



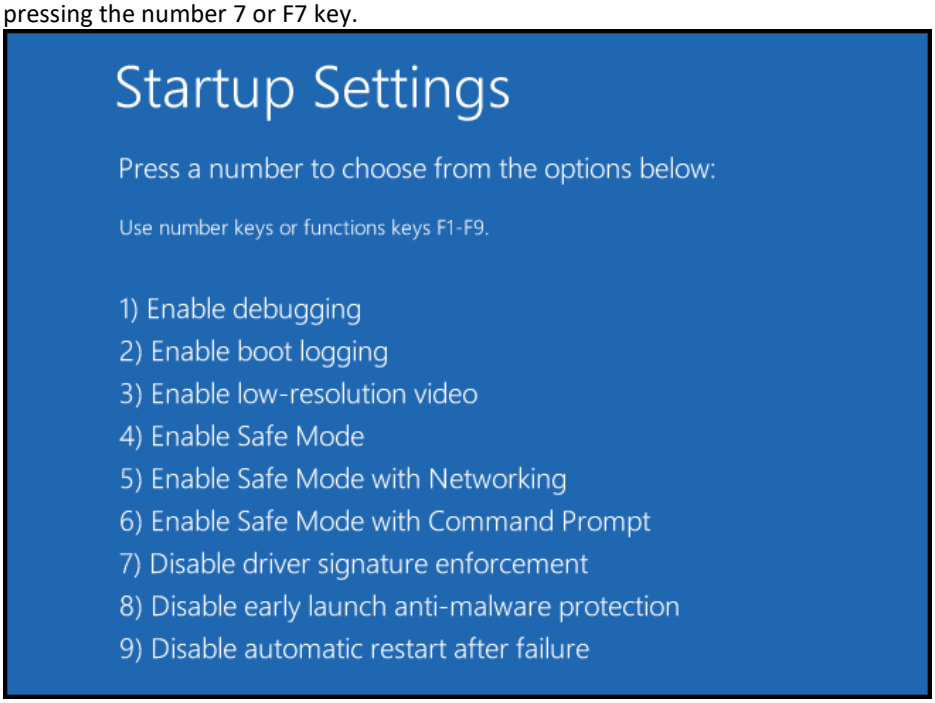
Then Startup Settings.



Modifying boot time configuration settings, requires a restart of the Computer one last time.



Finally, a list of Startup settings will appear on the screen. Choose “Disable driver signature enforcement” by pressing the number 7 or F7 key.

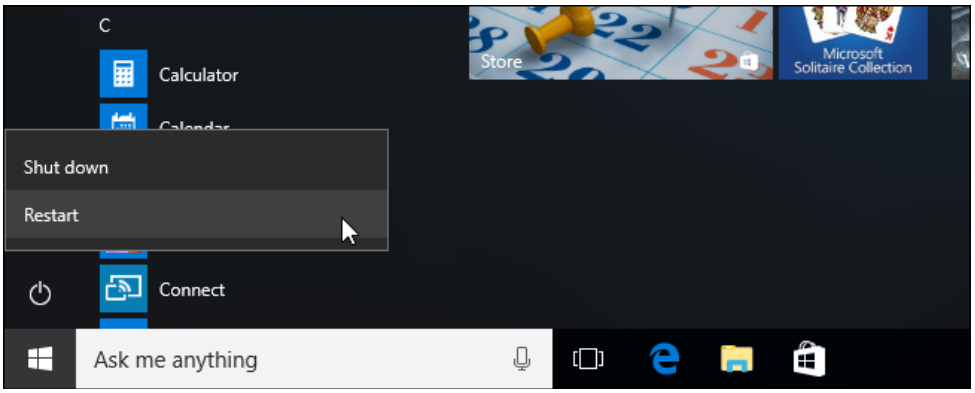


The PC will then reboot and allow the user to install unsigned drivers without any error message.

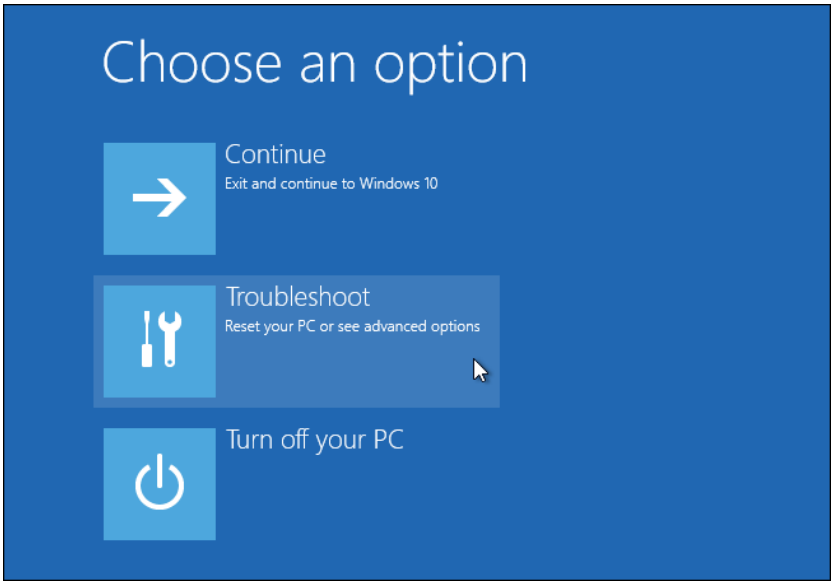
7.3 WINDOWS 10 – DISABLING DRIVER SIGNATURE ENFORCEMENT

The STM32 DFU drivers provided in the Dashboard\Drivers\ directory are unsigned drivers and Windows 10® prevents users from installing these drivers. The following steps should be followed to disable driver signature enforcement on a Windows 10® machine before installing the DFU Driver.

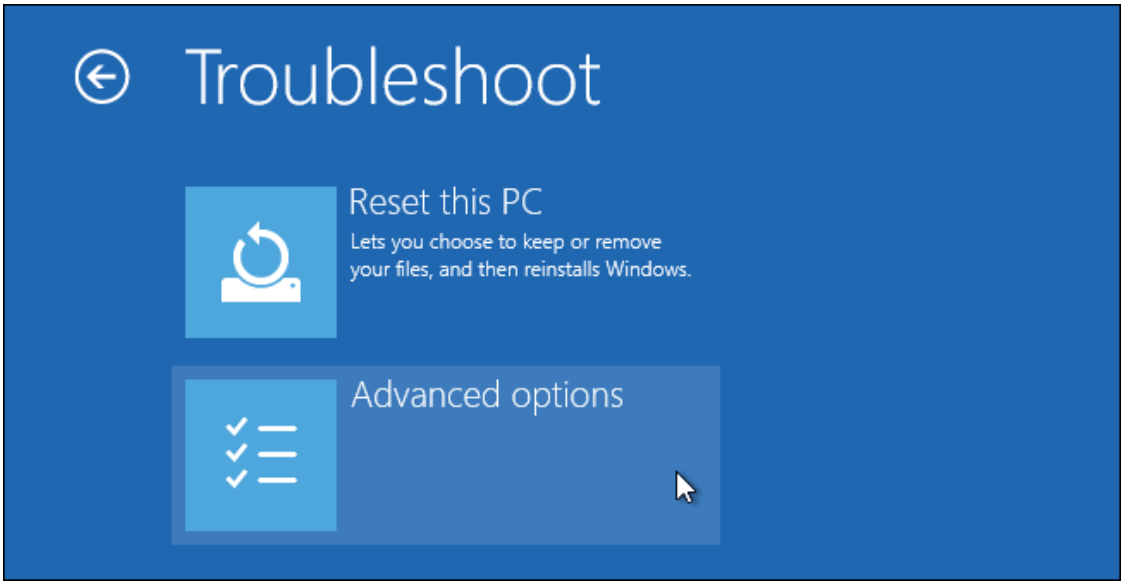
Hold down the shift key, press the start button then press the power button select restart



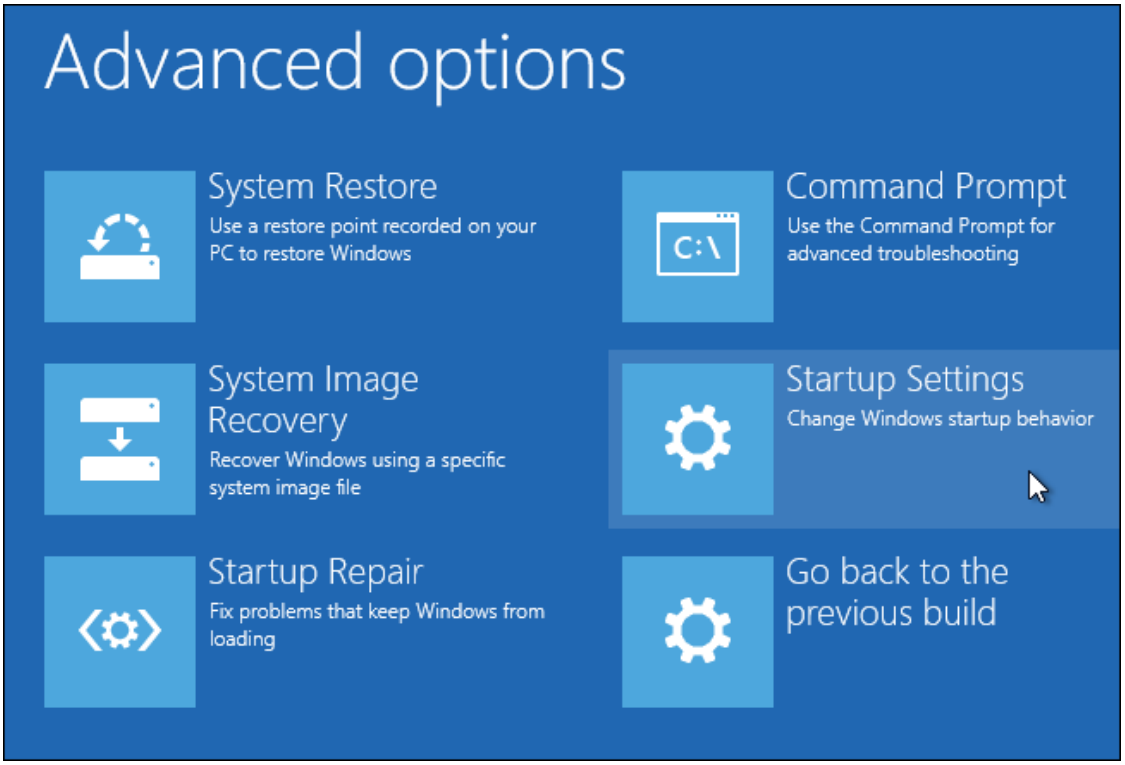
Your computer will restart. Select the "Troubleshoot" tile on the Choose an option screen that appears



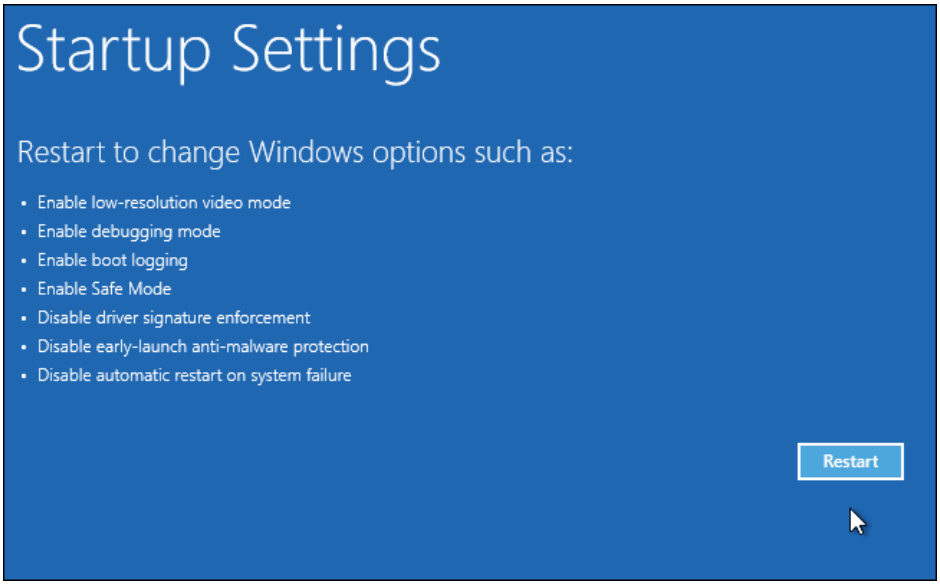
Select “Advanced options”.



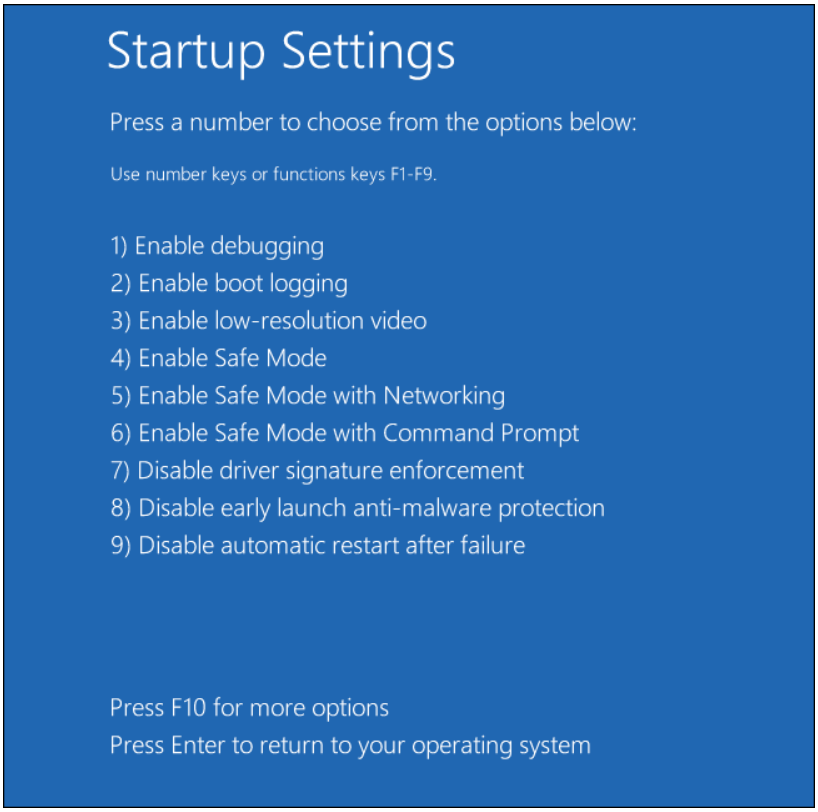
Click the “Startup Settings” tile.



Click the “Restart” button to restart your PC into the Startup Settings screen.



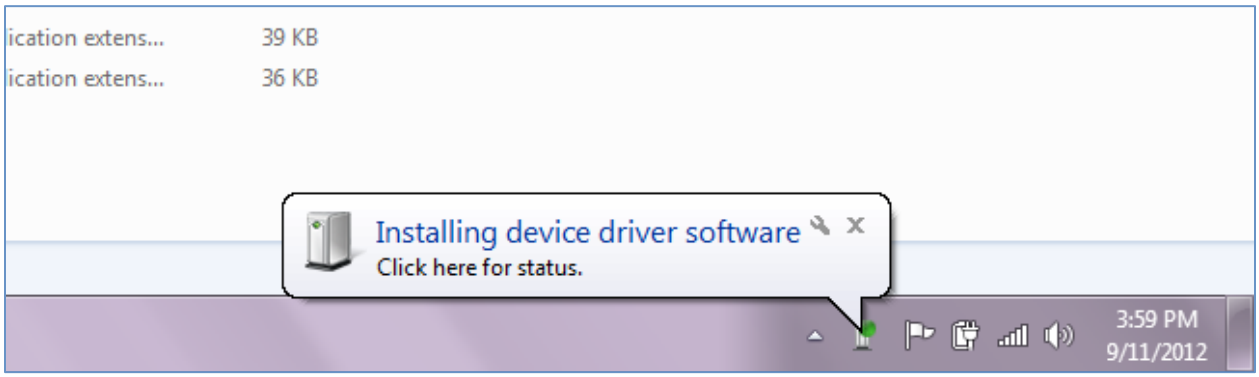
Type “7” or “F7” at the Startup Settings screen to activate the “Disable driver signature enforcement” option.



Your PC will boot with driver signature enforcement disabled and you’ll be able to install unsigned drivers

7.4 AUTOMATIC INSTALLATION

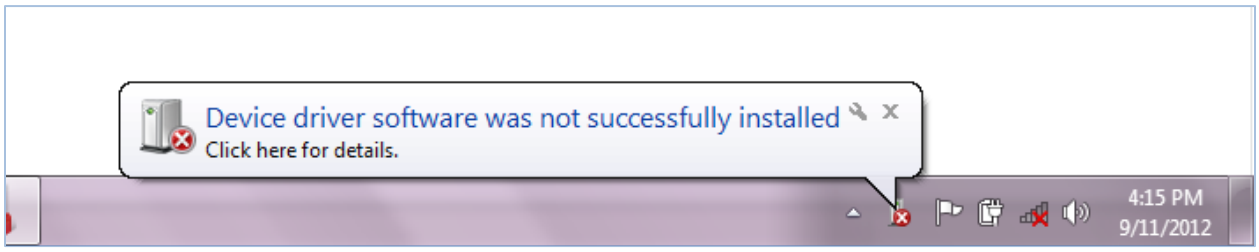
If the computer performing the upgrade process is connected to the Internet, Windows will automatically detect the boot loader, download the driver from Microsoft and install the device driver without the need for user intervention. Once the touchscreen (in DFU mode) is detected by the OS, the following message should be displayed in the Status Bar:



Once the device driver has been installed, the upgrade process will automatically continue.

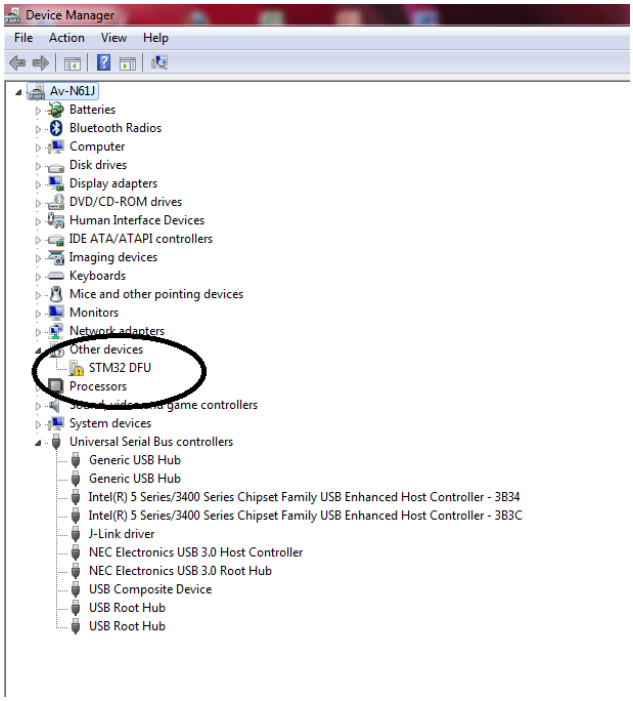
7.5 MANUAL INSTALLATION

If the computer does not have an Internet connection, or the driver fails to install for whatever reason, it can be installed manually.

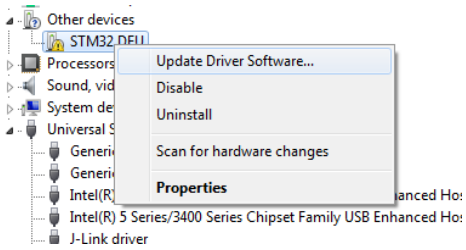


Under this scenario, the following steps must be followed:

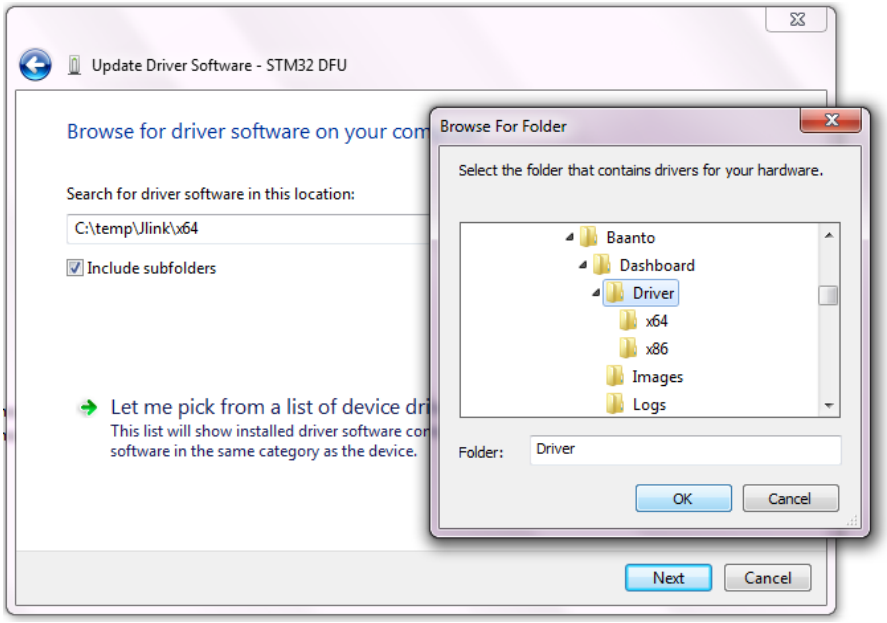
- Go into CONTROL PANEL -> DEVICE MANAGER
- You will see an OTHER DEVICE called “STM32 DFU DEVICE”



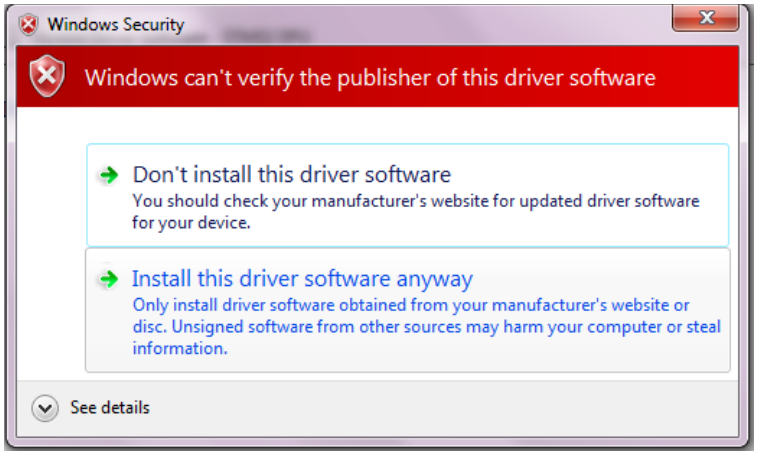
- RIGHT CLICK on this device and select UPDATE DRIVER SOFTWARE



- Select BROWSE MY COMPUTER FOR DRIVER SOFTWARE
- Click the BROWSE button and select the DRIVER sub-directory inside the Baanto Dashboard software directory



- If a Windows Security dialog box appears, select INSTALL THE DRIVER SOFTWARE ANYWAY option



This should complete the installation of the driver and the upgrade process will continue automatically if the Dashboard window is still open.

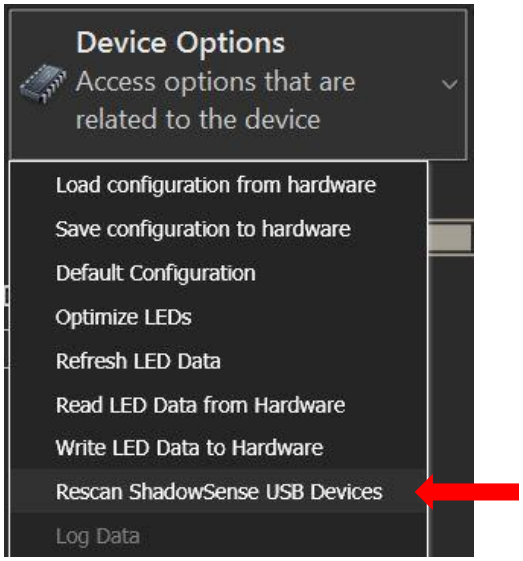
8.0 RE-INSTALLING THE DEVICE

Most operating systems 'remember' the exact configuration of a USB HID device. For example, when a new USB device is detected for the first time, Windows makes an entry in the Registry of the exact configuration and expected packet format for the device. In addition, it installs a driver to parse this data and provides an interface for the application framework to access this data.

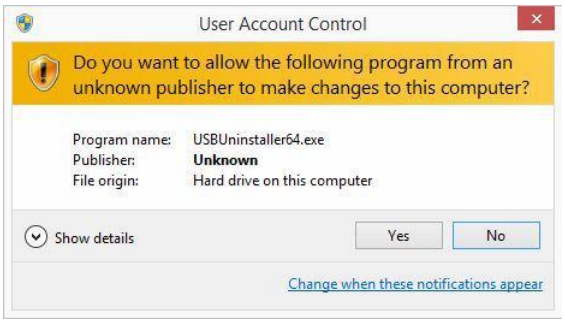
However, if the configuration of the device changes, then the Registry entry and the actual packet format will now differ and the operating system will stall the device and it cannot be used again. The Baanto touchscreens allows the user to dynamically change the configuration of the device by enabling and removing the USB pipes for certain types of compatibility. If the Multitouch or mouse pipe flags in Data Pipe parameters are modified there is a need to reinstall the device. There are two methods by which one can re-install the device.

8.1 AUTOMATIC PROCESS VIA DASHBOARD

The following procedure allows the user to re install the device on a windows machine using Dashboard.
Select the RESCAN SHADOWSENSE USB DEVICES from the Device Options in the Main Menu as shown below



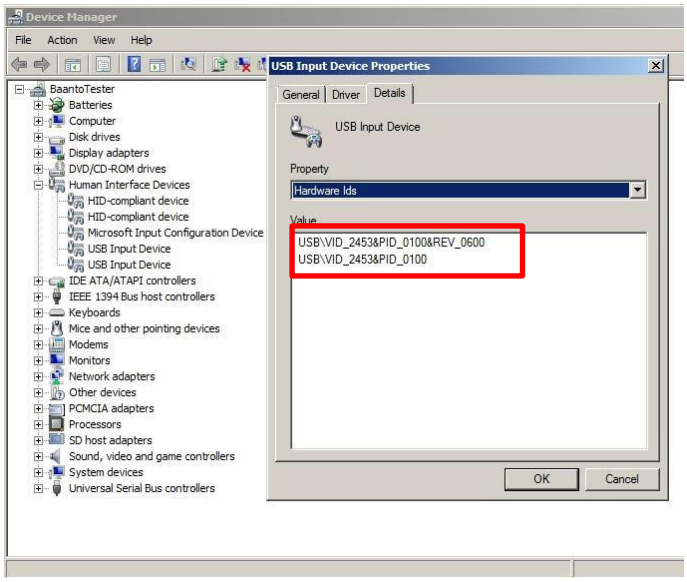
A user account control dialog box as shown below will show up select yes and the USB HID device will be uninstalled and then reinstalled automatically. Note the feature only works with users that have administrator privileges to the PC.



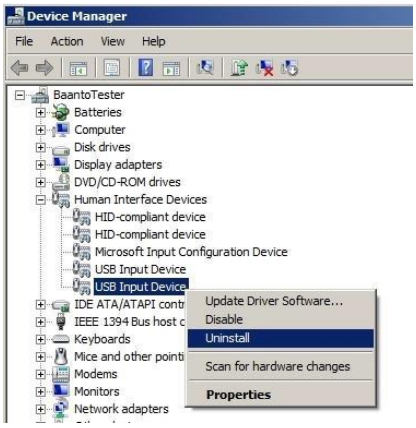
8.2 MANUAL PROCESS VIA CONTROL PANEL

This process is useful if Dashboard is not installed on a specific computer of if the user does not have Administrator privileges.

1) First find and open up the **Device Manager** on the host computer (this can usually be found via the Control Panel of the Windows version you are using).
2) Browse to the **Human Interface Devices** and select the properties of the **USB Input Device** entries. User has to go through each **USB Input Device** entry and perform steps 3 on each entry until the right VID and PID number is found as listed in step 4.
3) In the **USB Input Device Properties** sub window, go to the Details tab and for Property select the **Hardware Ids** from the drop down menu.
4) Verify the Hardware ID value and ensure VID_2453&PID_0100 entry is present as shown in the figure on the right.
   This VID\PID entry represents the Baanto touchscreen.



5) Next uninstall the **USB Input Device** entry, by right clicking on the entry and selecting 'UNINSTALL' as shown in the figure below.



6) Disconnect and then reconnect the USB cable to the host computer or select **Action->Scan for hardware changes** from the device manager menu.

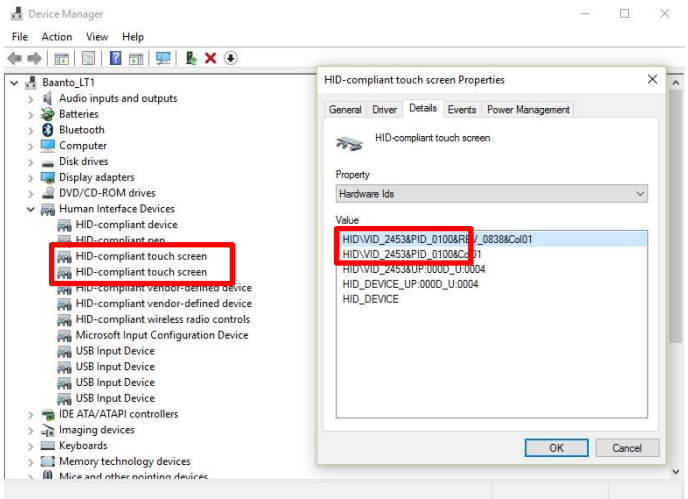
7) The touchscreen will now be detected and various devices will be re-enumerated.

9.0 WAKE FROM SLEEP

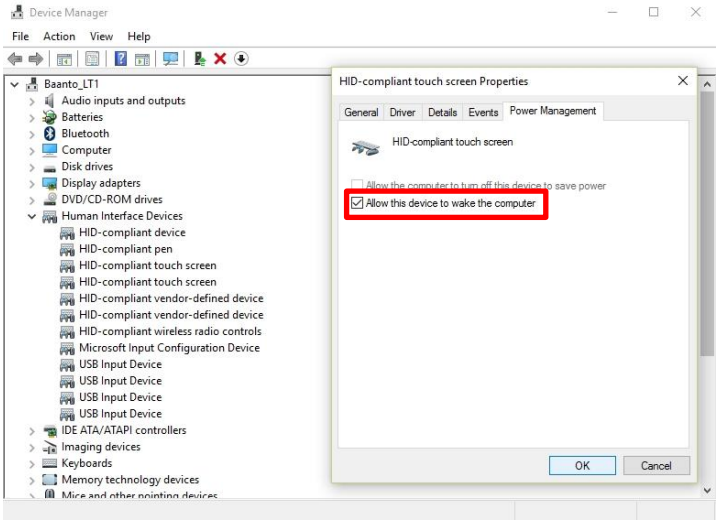
The touch screen has the ability to wake the PC up from sleep mode. This feature was added in firmware 9.00 so that touch monitors that rely on input from the touch screen can wake the PC up when it goes to sleep. Sleep mode is important for applications where power consumption is of concern for both the PC and the monitor.

The following procedure allows the user to turn on the wake from sleep feature via the device manager.

1) First find and open up the **Device Manager** on the host computer (this can usually be found via the Control Panel of the Windows version you are using).
2) Browse to the **Human Interface Devices** and locate the **HID-compliant touch screen** entries. If more than one touch screen is connected to the PC then the user has to go through each of the **HID-compliant touch screen** entries, find the entry with the right VID and PID number as listed in step 4.
3) Open the **HID-compliant touch screen** entry. In the **HID-compliant touch screen Properties** sub window, go to the Details tab and for Property select the **Hardware Ids** from the drop down menu.
4) Verify the Hardware ID value and ensure VID_2453&PID_0100 entry is present as shown in the figure on the right. This VID\PID entry represents the Baanto touchscreen.



5) If the VID\PID is not matching go to the next **HID-compliant touch screen** entry and redo steps 3 and 4.
6) Once the right entry is found select the Power Management tab and check the box that states "Allow this device to wake the computer" up as shown below.



7) Click the OK button.

Now go to sleep from the PC. Start -> Power -> Sleep and once in sleep mode touch the screen to wake the PC up.

APPENDIX A - REVISION HISTORY

The last entry in the main menu corresponds to the Software Revision number for the Dashboard.

Revision	Release Date	Comments
2.0.6766.29069	Jul, 2017	• Updated all configuration files in both MEDIA and CMEDIA folder for 11.00 release • Dashboard now supports Pro SKU SDW-656, 759, 874 & 989 • New features like Hover, Stylus Up Threshold and Auxiliary Port added
2.0.6400.26235	Jul, 2017	• DFU driver installation is done automatically with the executable installer package • Support for R10.01 firmware on Large Format, MultiSensor, SDW-150Z1 and Modular • Updated limit files for SDW-215 Rev 8_10 • Added the IR Frequency parameter under general settings
2.0.6218.18101	Jan, 2017	• Added admin USB Rescan, allows for deep USB scanning. This is enabled by default. • Drawing styles added to the main menu • Support for R9.50 firmware across all SKU • Dashboard Media and CMedia folder now includes previous firmware configuration and limit files • Directory RMedia added to the dashboard folder • Fixed Bug where Dashboard crashes on Windows Embedded 7 after firmware upgrade • Added instructions on how to disable driver signature enforcement in Windows 10
2.0.6078.27074	Aug, 2016	• Updated all configuration files in both MEDIA and CMEDIA folder for 9.00 release • New GUI for touch calibration • Introduction of Charms to assist with edge swipe gestures • Support for Modular SKU
2.0.5942.22157	Apr, 2016	• Updated IKIT configuration files in both MEDIA and CMEDIA folder • Increase the Motion filter to reduce distortion in corners for IKIT • Increase Tap & Draw test timeout to 120 sec • Firmware version check for IKIT R8.23 firmware
2.0.5861.19880	Jan, 2016	• Batch Upgrade allows user to upgrade both the master and slave controllers with a single ZEDFU file • Support for R8.10 firmware • Added Rain mode parameters in configuration view • LED Visibility Test in the report section now shows a visual representation of the failed LEDs and the percentages they are off by on the high and low limits
2.0.5688.24402	Jul, 2015	• Support for R7.50 firmware. • Shadow parameters added for Stylus and Eraser • Palm rejection added for Stylus in custom HID pipe only • Whiteboard, digital signage and default profile are added in dashboard
2.0.5592.28034	Apr, 2015	• Support for R7.30 firmware • Touch zones feature added • Stylus\eraser\touch rejection changed to diameter • Verify on configuration packet

		• Configuration files were added for SKU such as SDW 273, 329, 917 • Default Pen Size is 0 – 8 mm and Eraser size is 45-60 mm
2.0.5459.28934	Dec, 2014	• NEC and TSI Touch Dashboard skin installer package added. • Added parameters to configure STYLUS and ERASER in configuration. • Added stylus mode in status bar which allows for easy differentiation between a finger touch, Pen input and Eraser operation in the drawing canvas. • Changed keyboard shortcuts that toggle stylus mode, line thickness and clear the drawing surface.
2.0.5346.19684	Aug, 2014	• Added ability to load LED visualization data from file • Redesigned the LED graphing window. • Updated Led Data chart to support zooming. • Added report to the test view. • Added Language support for Windows OS running different languages such as French, Swedish, German etc.
2.0.5267.21961	Jun, 2014	• Support for SDW565\SDW656 for functional test • Support for R6.15 for all mid-size SKUs • Fixed various bugs and inconsistencies with the graphing control
2.0.5231.27098	Apr, 2014	• Added feature Rescan ShadowSense USB Devices which allows for automatic Re-enumeration of USB HID device
2.0.5143.27048	Jan, 2014	• Entire Dashboard look is upgraded • Support for R6.0 firmware across all products • Various new features
1.1.5023.26400	October, 2013	• Updated support for new SKUs like IWB family • Update LED View and functional test parameters for a variety of SKUs
1.1.4877.19054	May, 2013	• Support for Large format 42”\46” screens • New media folder support
1.1.4714.22463	Dec, 2012	• Support for R5.0 firmware release • New definitions for 15”, 21.5” screens • New engine for faster USB response
1.1.4637.21985	September, 2012	• Support for SDW-150S0, SDW-215W1 screens • New USB libraries to fix various problems related to detection, missing packets • Much more optimized draw canvas for slower computers
1.1.4563.25642	July, 2012	• Support for R5.00 firmware, confidence, screen mask • New Dashboard platform
1.0.4427.20552	Feb, 2012	• Full Modular IKIT support • Test setting for 22” updated based on field information
1.0.4399.26406	Jan, 2012	• Support for R4.12 firmware release • Updated to support modular touch frame • Bug fixes for WinXP related crashes
1.0.1.16682	Nov, 2011	• Support for Rev 4.11 firmware release • Touch Rejection, Power Options are configurable • Bug fix – LEDs\Sensors are not mirror imaged in Diagnostic View any more.
1.0.1.22724	Aug, 2011	• Initial production release • Support for Rev 4.00 firmware
1.0.1.32728	Jan, 2011	• Support for drawing canvas in Diagnostics View • Support for field firmware upgrades