



SHADOWSENSE  
DASHBOARD USER  
GUIDE

AN-SW-003

## DOCUMENT REVISION HISTORY

Revision	Date	Author	Comments
1.0	NOV\20\2014	Ellen Cheng	Created the document
2.0	APR\27\2015	Rafay Rashid	Dependency on .net 4.5 Framework added. New feature Touch Regions Mask Updated pictures, added explanation of LINE and PEN canvas controls.
2.1	JUL\31\2015	Rafay Rashid	Document number fixed AN-SW-003 Added Eraser size calibrate button under eraser settings

## PRODUCT FAMILY DESCRIPTION

This document describes features that are found in the ShadowSense™ family of open frame and large format products. The Dashboard Software supports all ShadowSense™ touch displays, regardless of size.

## COMPUTER REQUIREMENTS

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

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

### Note:

Windows XP® does not support .NET Framework 4.5, please download .NET Framework 4.0 from Microsoft website.

## INSTALLATION INSTRUCTIONS

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

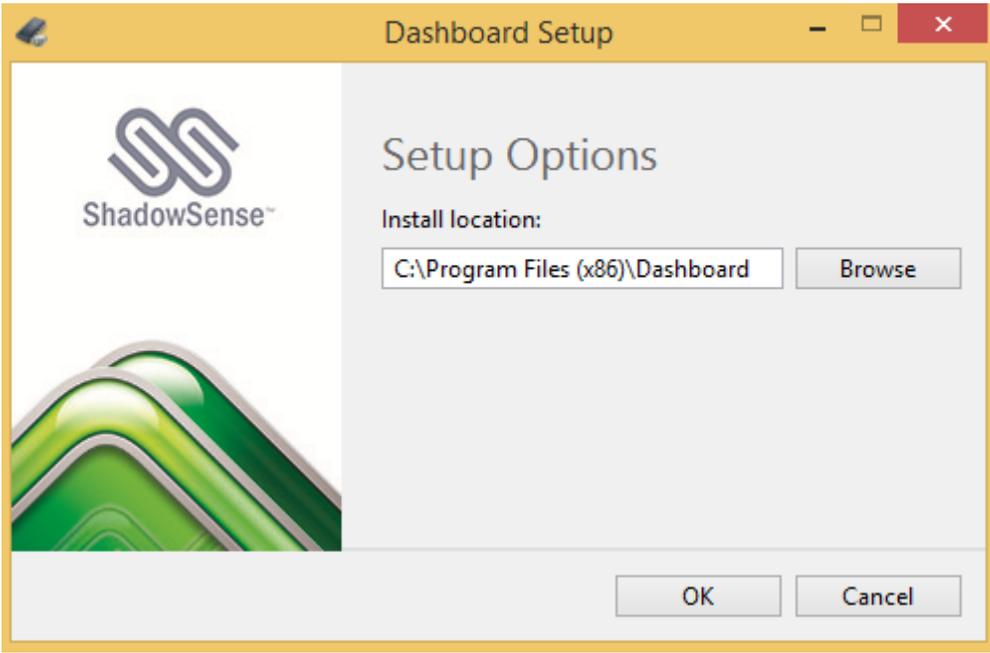
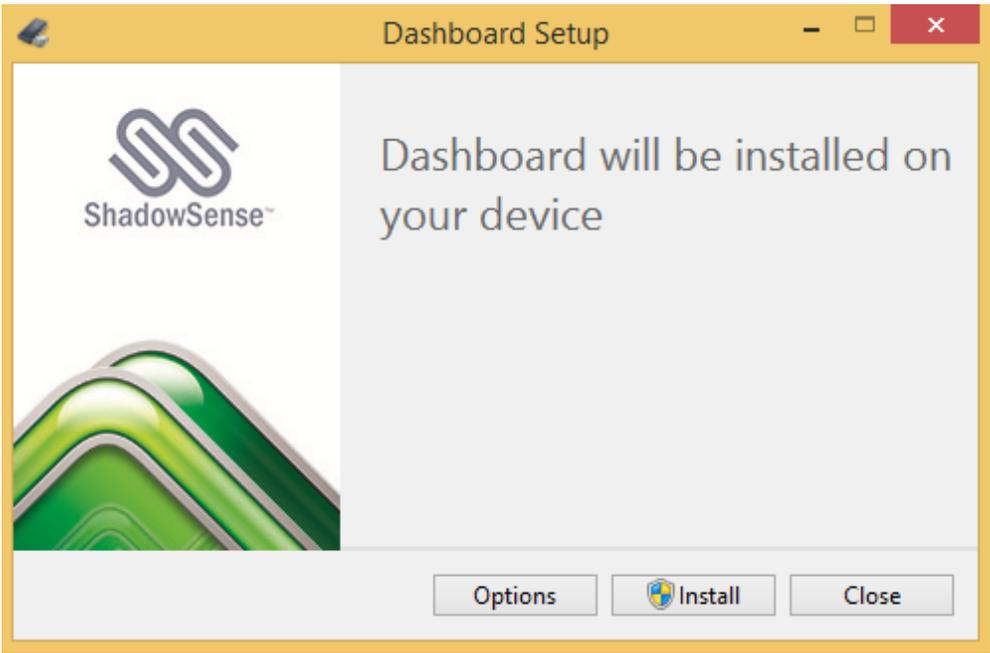
The various Microsoft add-ons can be installed by downloading them from Microsoft directly; the required add-ons are also included in the Dashboard zip file and are located in the \Redist folder.

Manual 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\vc\_redist\_x86.exe
- Install 64 bit version \Redist\vc\_redist\_x64.exe if your OS
- Run Dashboard.exe file to start the program

Auto Installation Procedure is as follows:

- Click on Dashboard.exe file and select the install location
- Click "OK" for install



## 1.0 INTRODUCTION

### ShadowSense

ShadowSense™ touch technology is an innovative and patented position sensing technology. ShadowSense designs use high performance sensors operating in the analog domain to provide unprecedented performance, stability, and accuracy.

The best analogy for ShadowSense technology lies in the 6,000 year old sundial. The shadow cast by a sundial instantly and accurately corresponds to the position of a light source without the use of lenses, with an infinite depth of field and without the need for exposure control. ShadowSense technology exploits the same characteristics for touch applications, resulting in one of the highest performance, most robust position sensing solutions available.

### Dashboard

ShadowSense algorithms offer a variety of parameters that can be used to customize the touch screen's performance. The Dashboard software tool provides customers with the ability to easily modify the behavior of the touchscreen based on various use cases. It allows the user to adjust the performance and touch characteristics of the touchscreen such as to provide spurious touch and palm rejection, debris and static object recognition, rain and fluid cancellation and to enable/disable various features.

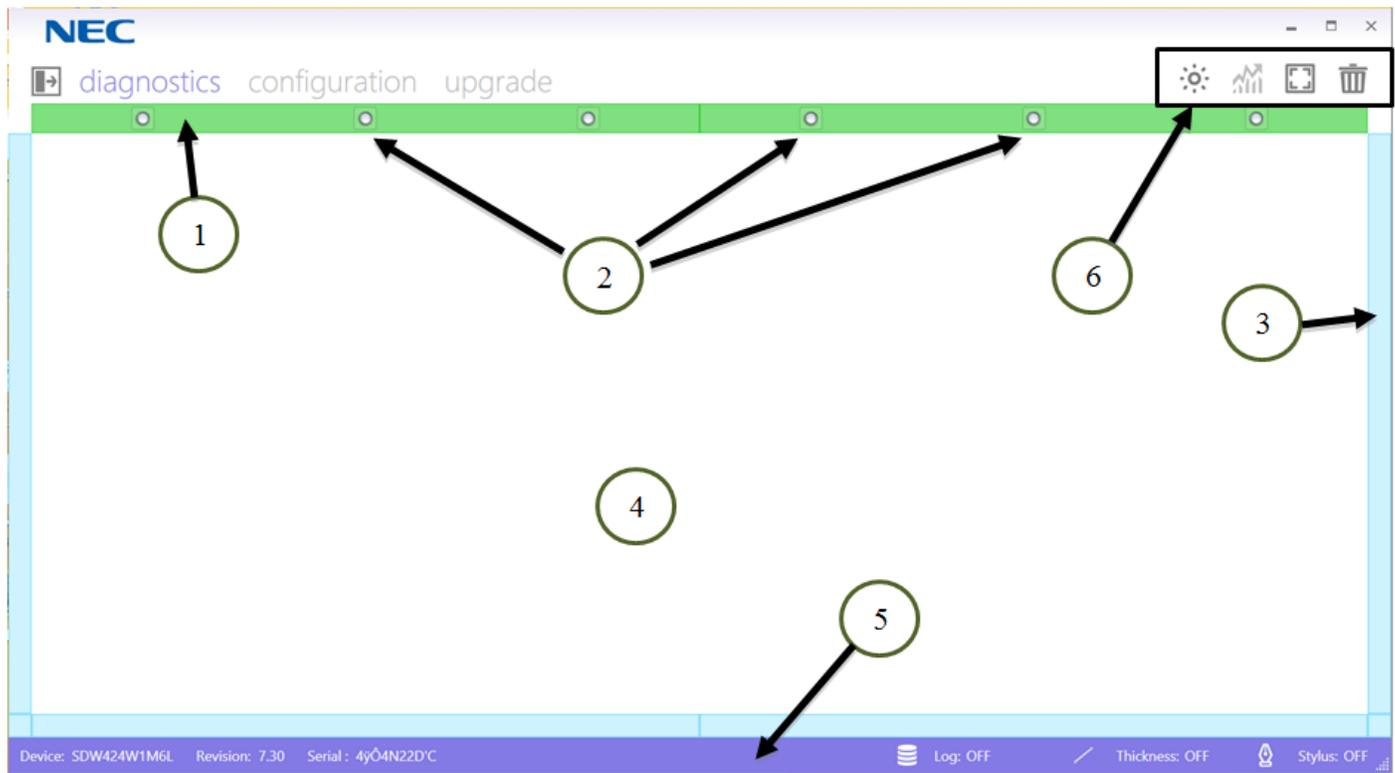


The Dashboard software utility offers three different top level views:

- Diagnostic View – Displays LED and sensor information
- Configuration View – Allows the user to configure the various touch screen parameters
- Upgrade View – Allows the user to upgrade the firmware of the touch screen

## 2.0 DIAGNOSTICS VIEW

The ShadowSense technology utilizes a number of unique shadow sensors located along the top of the touchscreen. LEDs are placed along the remaining 3 edges and these LEDs are used to cast light across the surface of the glass. When a finger or other object, touches the screen, the shadow sensors are able to detect the angle of the shadow cast by that object. 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.

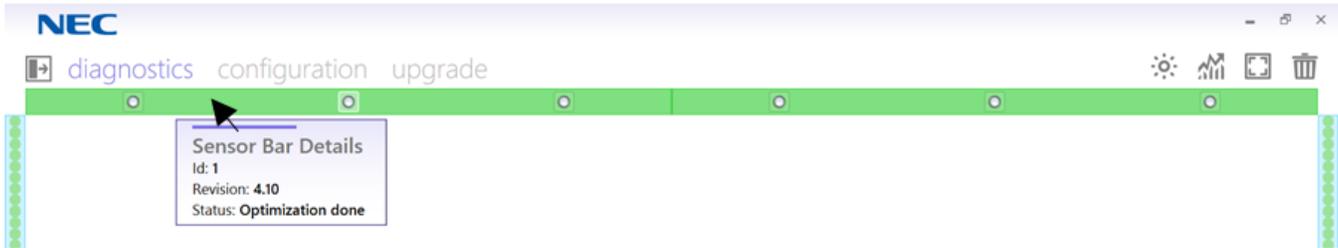


Some of the features available in this view are highlighted in the diagram above and described below:

### 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 if it detects that calibration has changed due to environmental conditions. There are four states of calibration that the touchscreen undergoes, which are described below:
  - NO COMMUNICATION (RED) – Cannot communicate with the sensor bar
  - UNCONFIGURED (GREY) – Device has not started calibration
  - OPTIMIZATION STARTED (YELLOW) – Device is undergoing calibration. For optimal calibration it should not be touched or handled while in this state.
  - OPTIMIZATION POST DELAY (LIGHT GREEN) – device has completed calibration and is waiting for post processing to be completed.
  - OPTIMIZATION DONE (GREEN) – device has successfully completed calibration and is ready for normal operation.

- Certain Large Format Baanto touchscreens use multiple slave controllers. Each slave controller 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 controllers can be found 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 white circles located in the Calibration Bar. The user can obtain specific information relating to each of the shadow sensors by 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 save the data using the Export LED Button, and forward it 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. If thickness is enabled, the width of the touch is represented by the width of the stroke. It should be noted that the drawing canvas represents the entire LCD screen, regardless of how small the actual window is made to be. In order to match the touch data with the LCD image, hit 'ESC' key or click the Full Screen Icon such that the drawing canvas will maximize to fill the LCD image.

## 4. STATUS BAR:



The status bar 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

- **DEVICE FIELD:** Displays the model number of the ShadowSense touchscreen.

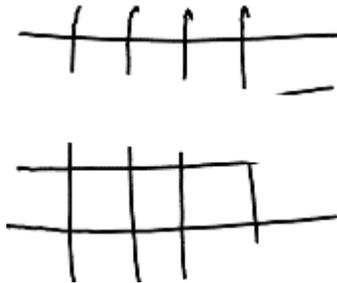
- REVISION NUMBER: Displays the version of the firmware loaded on the master control board of the touchscreen.
- SERIAL NUMBER: Displays the Serial Number of the current touch frame connected to the PC.
- ADVISORY MESSAGE: The state of the touchscreen is shown in this section. When the message “Optimization 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.
- LOG DATA: The circular disks icon is a button that starts\stops the logging function.
- THICKNESS STATUS: Displays if touch thickness is being registered on the drawing canvas. Display of touch thickness can be toggled by clicking on the LINE icon or via the keyboard shortcut ‘Ctrl+T’ combination. If thickness display is enabled ON will be displayed here.
- STYLUS STATUS: Displays if stylus mode is active on the drawing canvas. Display of stylus mode can be toggled by clicking on the PEN icon or via the keyboard shortcut ‘Ctrl+P’ combination. When the stylus mode is activated the drawing canvas will display touches from finger, stylus and eraser separately as:
  - Finger touch events are shown as ghost streaks

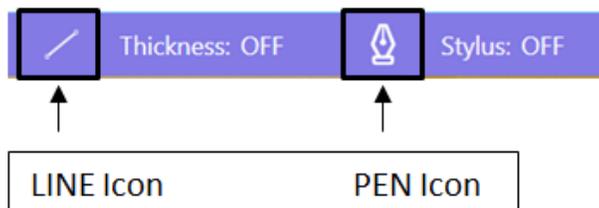


- Stylus/Pen events are shown as a solid line of fixed width



- Eraser events are shown as white streaks that can be used to clear the drawings done by the stylus





### Note:

The LINE and PEN icon **do not** activate or deactivate Thickness and Stylus/Eraser modes.

Touch thickness is at all times being reported to the OS via the usb packets. What the LINE button does is it allows one to visualize the thickness on the Dashboard drawing canvas.

Similarly the Stylus/Eraser mode are activated from Enable Features under the configuration view. The PEN Icon here when turned on will draw solid lines in the drawing canvas when pen is detected. For fingers it will draw streaks and the eraser will be able to erase drawing created by the stylus.

## 6. FUNCTION BUTTONS:

- These buttons allow the user to perform commonly required tasks.



**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.



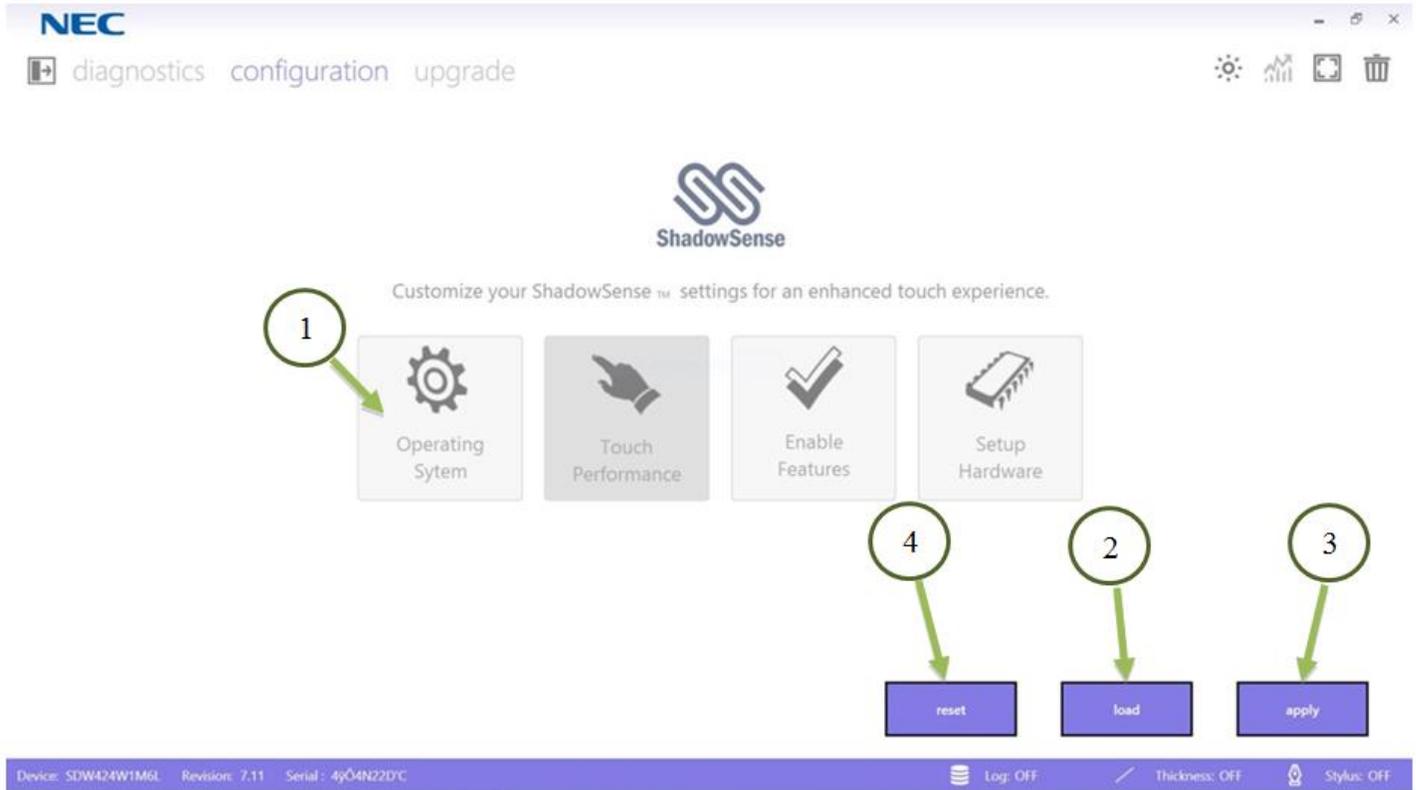
**FULL SCREEN TOGGLE:** The drawing canvas can be maximized to cover the full screen area of the monitor by clicking on this icon. The 'ESC' key on the keyboard can also be used, as a shortcut, to toggle display from normal view to full view. When the display is not in Full Screen mode, there will be 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 CONFIGURATION VIEW

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



### 1. CUSTOMIZATION BAR:

- OPERATING SYSTEM
  - Groups various parameters related to the operating system:
    - Apple Settings
    - Screen Rotation
- TOUCH PERFORMANCE
  - These parameters allow the user to configure the performance of the touch screen:
    - New Touch Delay
    - Motion
    - Deadband
    - Shadow
- ENABLE FEATURES
  - A user can enable/disable various features such as:
    - Multi Touch
    - Touch Rejection
    - Stylus & Eraser Options
    - Mouse Options

- **SETUP HARDWARE**
  - Changes parameters that control the touch screen hardware
    - USB Boot Delay
    - Calibrate
    - Touch Regions Mask

**2. LOAD BUTTON:**

- This button reads the configuration parameters that are stored in the EEPROM of the touchscreen.

**3. APPLY BUTTON:**

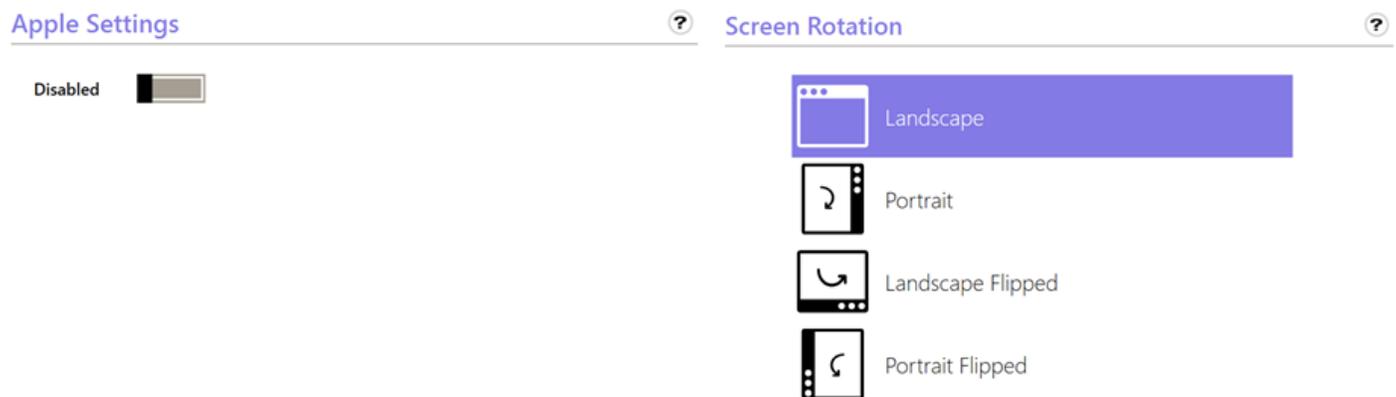
- This button flashes the configuration parameters being displayed to the EEPROM of the touchscreen.

**4. RESET BUTTON:**

- This button resets the configuration parameters back to default, factory state for this frame and firmware.

**3.1 OPERATING SYSTEM MENU**

**3.1 OPERATING SYSTEM MENU**



**3.1.1 APPLE SETTINGS**

Certain MAC operating systems use a different co-ordinate system versus Windows and Linux systems. This creates a problem with touch registration whereby the user’s finger and the operating system pointer do not line up. If this problem is encountered, MAC mode can be enabled. This forces the touch screen to convert the touch data into the MAC co-ordinate system versus Linux or Windows.

**3.1.2 SCREEN ROTATION**

When the LCD image is set to Portrait versus Landscape, Windows automatically rotates the touch screen data to match the LCD orientation. Unfortunately, not every OS performs this task. Linux and MAC do not rotate the touch screen data to match the LCD orientation. In these situations the user might have to command the

touch screen to rotate the data in order to match up with the LCD. The available options are: Landscape, Portrait, Landscape Flipped and Portrait Flipped.

## 3.2 TOUCH PERFORMANCE

### New Touch Delay



### Motion



### Deadband



### Shadow



### 3.2.1 NEW TOUCH DELAY

The New Touch Delay parameter allows the user to control the latency between a new touch event and when the touchscreen reports the data. In other words, it introduces a delay whenever a new touch is detected. As the ShadowSense technology is capable of detecting even the fastest motions, accidental touches could be reported. Setting up the “New Touch Delay” parameter can avoid unintended touches. For example, in a ticketing kiosk it might be useful to only report touches that the user intended and not the accidental brushing of the screen by the cuff of a jacket. Increasing this parameter creates a longer delay and forces the user to touch the screen for a longer period of time before a touch is reported.

### 3.2.2 MOTION

The Motion parameters smooth the touch data by applying two different averaging filters. Filter Size controls the latency of the touch by adjusting how many frames of data are sampled and filtered together in any given period of time. Filter Depth controls the fall-off and sensitivity of the filter to high speed motions. In general, the larger the values of the filter, the smoother the touch data will be with a corresponding increase in latency. For example, increasing the two parameters will create a smoother line for artists who intend to draw on the screen with a brush. However, the latency will be increased slightly due to the act of filtering.

### 3.2.3 DEADBAND

The Deadband parameter helps users correctly identify left and right click selections. Because the ShadowSense technology is capable of detecting touch with an incredibly high resolution, even small jitters of

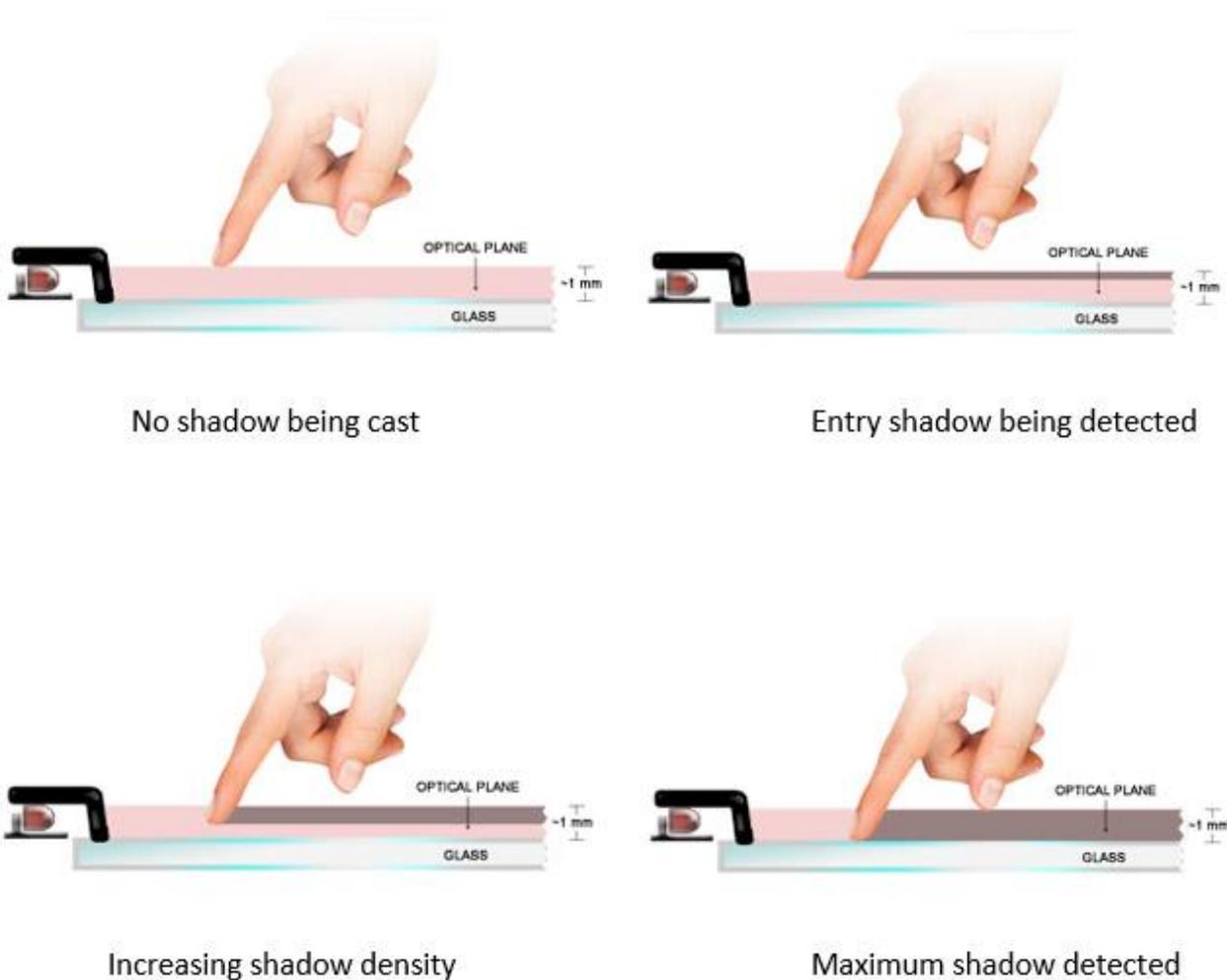
the user's fingers can be detected. This can make it difficult to process clicks, especially when trying to hold a finger still to generate a right click. Small movements of the finger will register as a mouse move in Windows, causing the intended right-click to be converted to a drag. This parameter sets a radius in millimeters around the first detected touch position, within which other motion will be filtered allowing for easier right-click.

### 3.2.4 SHADOW

The proprietary shadow sensors detect not just the angle of the shadow, but also the transparency of the shadow. They are capable of detecting how dark a shadow is, which in turn provides additional information about the transparency or hover of a touching object.

#### Controlling Hover

It is possible to determine the distance of the touching object above the glass and control the hover distance at which touch is activated.



As an example, consider the progression as a finger enters the touch plane of a ShadowSense touchscreen. From a fully illuminated state when the finger is above the optical plane, the shadow continues to represent a

larger percentage of the sensor reading until the finger is totally touching the surface of the glass, at which time the finger blocks all the light and casts a very dark shadow onto the sensor. Increasing the Shadow parameter will configure the touch screen to only process touches that cast a darker shadow, hence reduce hover. However this also will force the touch screen to reject touches caused by a semi-transparent fingernail or the edge of a credit card, for example.

### Controlling Transparent Touches

The Shadow parameter can also allow the user to reject touch based on the transparency of an object. This might be useful in situation where the user’s finger must generate touch, but not a drop of water, rain or any other transparent fluids. This can be critical in applications such as signage, ticketing, kiosks and medical devices where the screens maybe subject to liquids and must be able to differentiate between liquids and the user’s fingers.

A user’s finger will cast a much darker shadow compared to a drop of water. Hence increasing the shadow parameter will configure the touch screen to only process touches that cast a dark shadow and reject objects such as water and other fluids.

## 3.3 ENABLE FEATURES

### Multi Touch

Enabled

### Touch Reject

Enabled

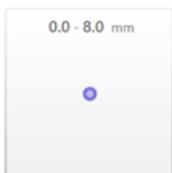


Minimum  
0.0  25.0

Maximum  
0.0  115.0 Fullscreen

### Stylus

Enabled

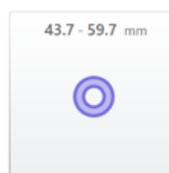


Minimum  
0.0  25.0

Maximum  
0.0  25.0

### Eraser

Enabled



Minimum  
0.0  115.0

Maximum  
0.0  115.0

## Right click options



## Left click options

Changes how left click is generated.

- No left click
- Normal click and drag
- Clicks on new touch, with no drag
- Click on touch release, with no drag

## Move options

- Always track newest touch

### 3.3.1 MULTI TOUCH

This parameter allows the user to enable/disable the multi touch functionality of the screen. When enabled the screen will be detected by the OS as a fully compliant multi-touch digitizer. When disabled the screen will be detected as a simple single touch or mouse device.

This feature is important when backwards compatibility with an existing operating system or application framework is required. A typical example could be when using OS such as Windows CE, custom embedded operating systems or digital signage players that only understand mouse input. This feature will allow the user to force the touch screen to act like a mouse.

### 3.3.2 TOUCH REJECTION

The Touch Rejection parameter can be used in situations where the touchscreen is required to reject touch events based on the size of the touch. It is useful in situations where palm rejection or environmental debris rejection is required, or in any application where a high level of confidence is required that only a specific class of touch object was used to activate the screen. For example, the touch size can be adjusted so that touches from small children will be ignored for security reasons in shopping malls installations. Or in a digital signage installation it might be beneficial to ignore touch events due to a user leaning on the screen or a table application where the cup or a cell phone placed on the screen should be ignored.

The minimum and maximum sliders define the size of the object that is allowed to generate a touch event.

### 3.3.3 STYLUS & ERASER

Using the size and shape detection capability of the ShadowSense technology, it is possible to configure the touch screen to automatically detect a specific size of object such as a stylus or eraser. This allows the touch screen to report three different types of events: touch, eraser and stylus. This functionality can be used in

conjunction with an OS like Windows 8 that supports pen and eraser messages without the need for any drivers.

The user can enable/disable the stylus. If enabled, the user can then configure the minimum and maximum size of the stylus. Under this scenario, if the touch screen detects a touch event that matches the set size, it automatically reports a stylus event.

The user can also enable/disable the eraser. If enabled, the user can then configure the minimum and maximum size of the eraser. Under this scenario, if the touch screen detects a touch event that matches the set size, it automatically reports an eraser event.

The calibrate button allows the user to automatically set the size of the Eraser. During the sampling time use the eraser on the screen and the program will automatically measure the size of the eraser. When the completed message appear remove the eraser and let the program calculate the min and max size numbers for the eraser. Screen shot of the Eraser calibration window is shown on the next page.

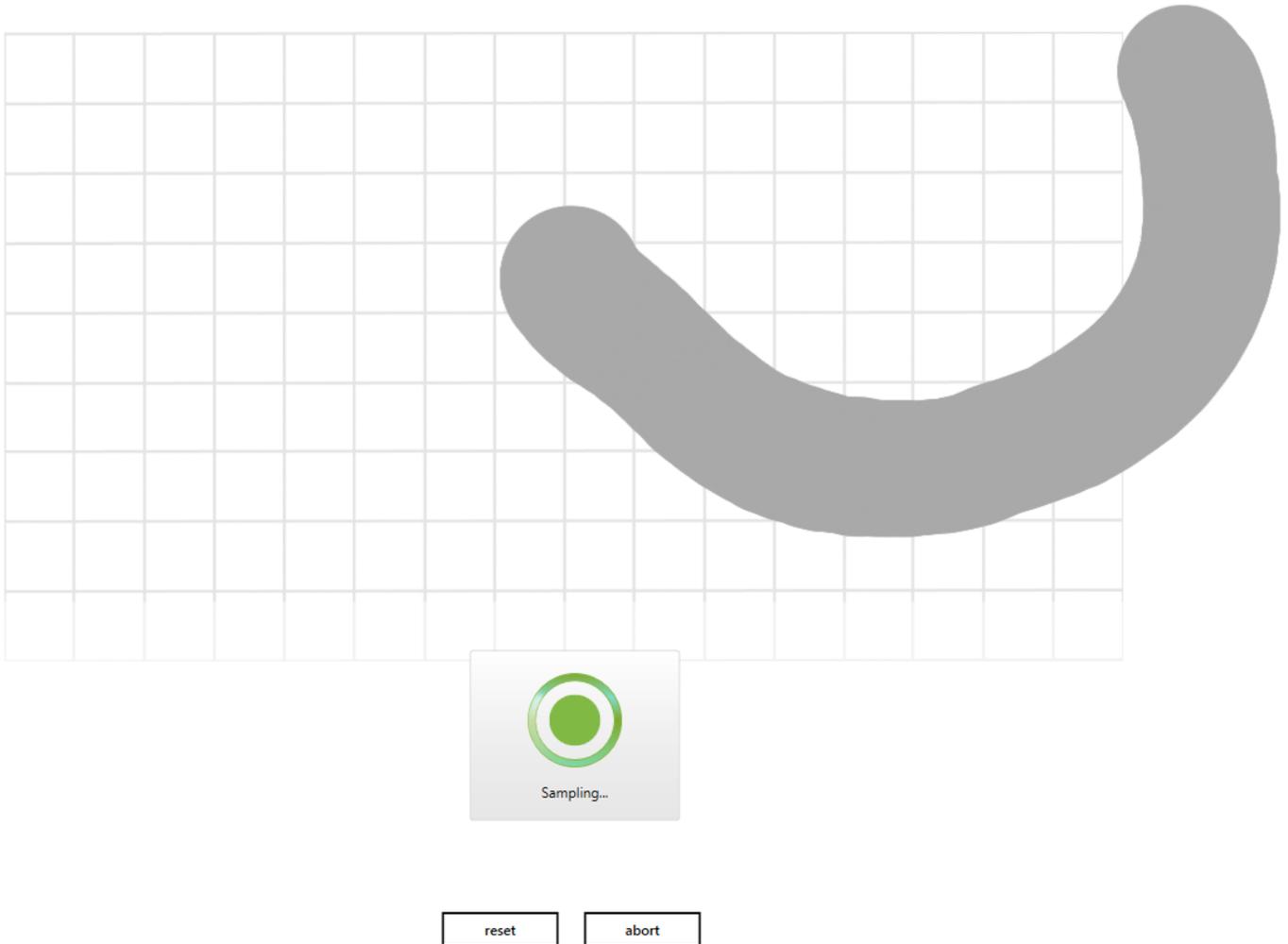
### Eraser Calibration

Time remaining

55

Eraser Size: 0.0 [mm] 0.0 [pixels]

Range Min/Max: 0.0 [mm] 0.0 [mm]



### 3.3.4 MOUSE

The mouse options allow the user to configure how the touch screen processes mouse events.

**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. The user can set the time period by changing the right click option parameter.

**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 Click: 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.

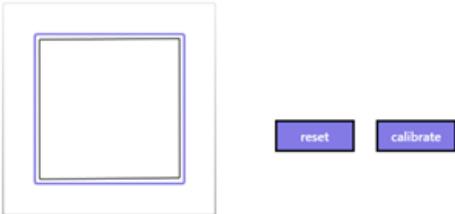
## 3.4 SETUP HARDWARE

### USB Boot Delay ?



0 seconds 10

### Calibrate ?



reset   calibrate

### Touch Regions Mask ?



reset

Zone 1  
Disabled

Zone 2  
Disabled

Zone 3  
Disabled

Zone 4  
Disabled

### 3.4.1 USB BOOT DELAY

The USB Boot Delay controls the time that the touchscreen waits for USB enumeration to occur when plugged in, or when the touchscreen is rebooted.

This parameter can be used in specific situations where it is desirable to have the touch screen boot up after the computer has booted up. For example the BIOS might not support a multi touch device on boot up, or in a situation where the boot up sequences of various USB devices needs to be staggered.

### 3.4.2 CALIBRATE

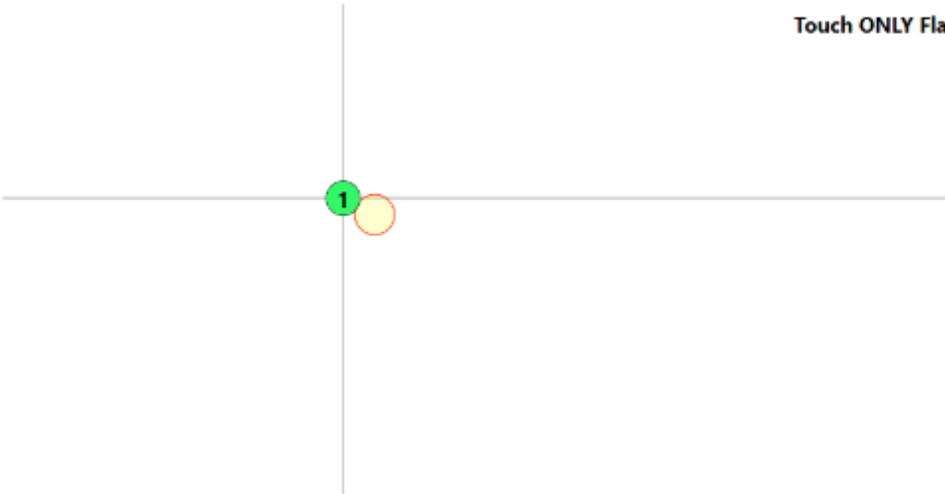
The calibration process allows the user to perfectly align the touch screen data to the LCD image. Due to manufacturing variations, the LCD image might not line up with the touch location exactly. In order to fix this problem the user has the ability to measure the error and calibrate the screen by tapping the center of the four purple circles within one minute.

It should be noted that the user must try to touch as close to the middle of the purple circle as physically possible. Every time the user touches a purple circle the dashboard draws a red circle representing the error between the LCD image and the touch location. Once the calibration process is completed the touch screen automatically compensates for the detected error and the LCD image will register very accurately with the touch location.

The calibration screen is shown below.



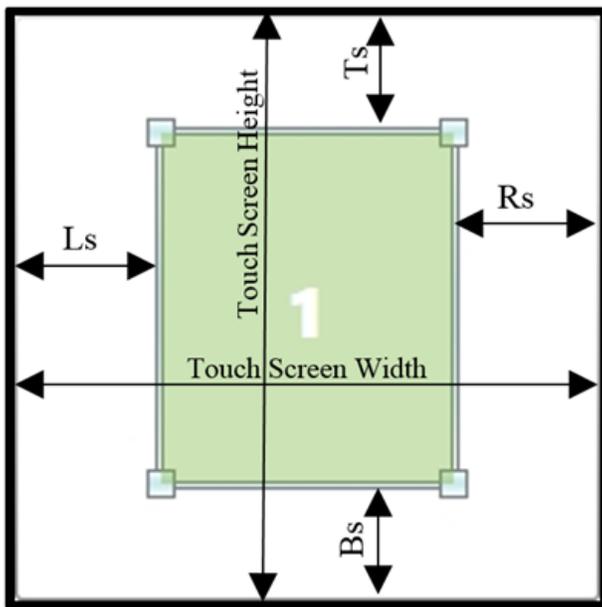
Once the circle has been touched a red circle is shown that signifies the error between the LCD image and the touch location.



### 3.4.3 TOUCH REGIONS MASK

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. 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.

The zone parameters can be calculated using a ruler or any measurement device. Simply measure the Top Side (Ts), Bottom Side (Bs), Right Side(Rs) and Left side (Ls) of where you want the zone to be in millimeters. Measure the inside width and height of the touchscreen in millimeters and calculate the mask parameter ratio as a percentage.



Calculate the mask values as follows:  
 Top Mask =  $(Ts / \text{Touch Screen Height}) * 100$   
 Bottom Mask =  $(Bs / \text{Touch Screen Height}) * 100$   
 Left Mask =  $(Ls / \text{Touch Screen Width}) * 100$   
 Right Mask =  $(Rs / \text{Touch Screen Width}) * 100$

#### Zone 1

Enabled



Top Mask	0.00	%
Bottom Mask	0.00	%
Left Mask	0.00	%
Right Mask	0.00	%

## 4.0 UPGRADE VIEW

The Upgrade View allows the user to change the firmware of the touchscreen. On occasion, NEC 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 a ShadowSense touchscreen. Performing an upgrade with any other file can permanently damage the touchscreen and should be avoided.

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

**Firmware-SDW-565W1-M6L-XXX-XX-PRD-Ver-0730-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.

The screenshot shows the NEC Upgrade View interface. At the top, there is a navigation bar with 'diagnostics', 'configuration', and 'upgrade' (highlighted). Below this is the 'Current Device' section, which displays the following information:

Product Name	SDW-424W1-M6L-XXX-XX-PRD	Rev	07.30
Mode	Normal	Dfu Rev	

Callout 1 points to the Product Name field. Callout 4 points to the Rev field. Callout 5 points to the Dfu Rev field. To the right of the Dfu Rev field is an 'open file' button, which is highlighted by callout 4.

Below the 'Current Device' section is the 'Target Info' section, which displays the following information:

Upgrade File	
Target Name	
File Status	Empty

Callout 2 points to the Upgrade File field. Callout 5 points to the Target Name field. To the right of the Target Name field is a 'Rev' field, which is highlighted by callout 5.

Below the 'Target Info' section is the 'Upgrade Info' section, which displays the following information:

Progress	<input type="text"/>
Status	Idle

Callout 3 points to the Progress field. Callout 6 points to the 'upgrade' button, which is highlighted by callout 6.

At the bottom of the 'Upgrade Info' section, there is a warning message: **Warning : Device can not be disconnected during upgrade operation !**

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 connected.

## **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. For example, if the user connects a 565W1-M6L touchscreen, they can only flash firmware that is another revision of 565W1-M6L. They CANNOT change firmware from 464W1-M6L to 565W1-M6L.

## **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 the touchscreen USB, or POWER cables, or physically touch the screen during a device upgrade.

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