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eGalax_eMPIA Technology Inc.

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# eGalaxTouchManager+ Advanced

# User Guide

# For EETI Orion Family

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## Revision History

| Document ID | Date | Revision Description |
|---|---|---|
| EUG-038-190517-1 | 2019/05/17 | First release. |
| EUG-038-191209-1 | 2019/12/09 | Update to kernel v4.08. |
| EUG-038-201223-1 | 2020/12/23 | Update to kernel v4.10. |
| EUG-038-210312-1 | 2021/03/12 | Document format correction. |
| | | |

**Table of Contents**

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# 1. Introduction

In **eGalaxTouchManager+,** EETI Orion IC family's powerful features and TM+'s comprehensive framework are both introduced. This user guide will give in-depth instruction to configure all the parameter settings provided in TM+, enabling user to utilize the full potential of Orion IC and tackle technical issues in the field.

We *strongly recommend* that user have extensive experience and solid fundamental knowledge of touch screen technology before using TM+ Advanced. Any inappropriate configuration will cause the touch system fail to work. EETI also provides numerous informative documents, such as working principal and installation guide. To require these documents, please contact sales@eeti.com.

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# 2. Preparation

## 2.1. Working Principle

### 2.1.A. Finger Touch

For a PCAP touch panel, transparent conductors (,such as ITO, Meta Mesh, silver nano-wire, etc.,) are always patterned into spatially separated electrodes on a film or glass, and arranged as a diamond or Matrix array to intentionally create a mutual capacitance at each row and column.
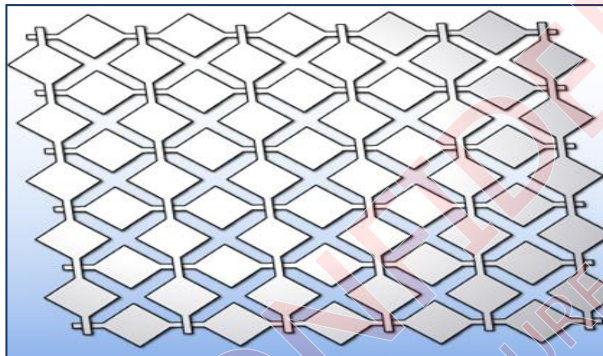


The projection of the finger location onto X and Y axis is called **Touch Profile** Rx(PR) and Tx(PT), respectively.
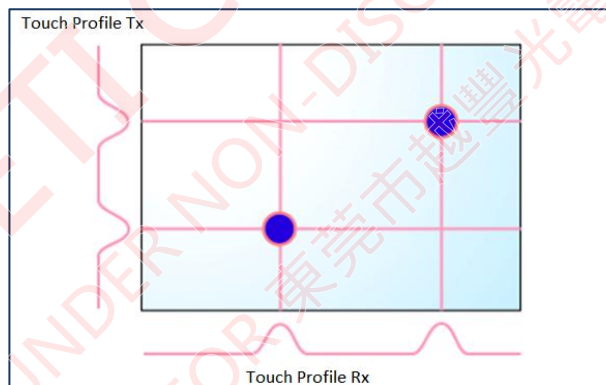


Mutual capacitance (Cm) formed at each intersection is composed of $C_f$ and $C_o.$

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$$C_m = C_f + C_0$$
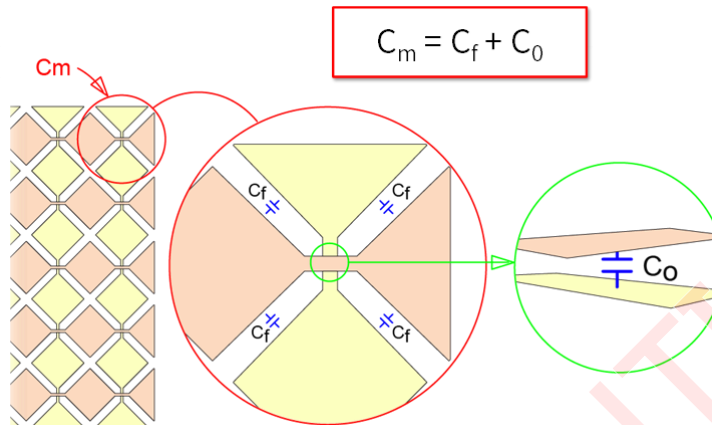


$C_f$ = fringe capacitance, which can be changed by a finger touch($\Delta C_f$).

$C_o$ = overlap capacitance, which can NOT be changed by a finger touch.

Signal driven from Tx electrodes will be coupled to Rx electrodes. The signal value we measured is called Raw Signal.
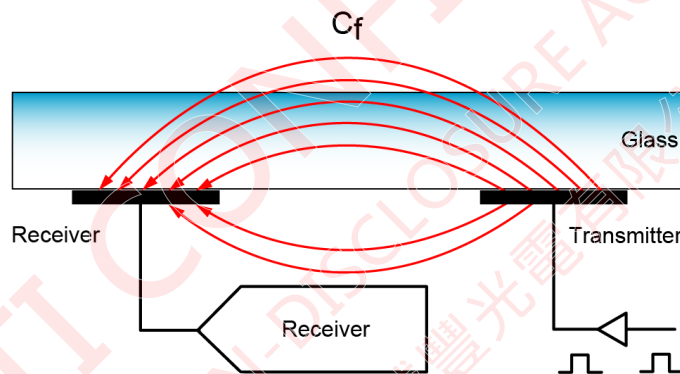


Raw Signal measured on each node of the electrode arrays can compose a capacitance image. When there is no finger touch, the Raw Signal derived is called baseline. When a finger touches the TP surface, it changes the original mutual capacitance value ($\Delta C_f$).
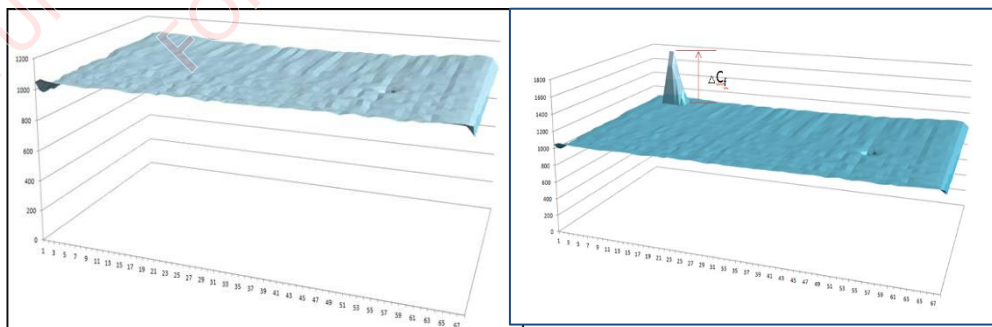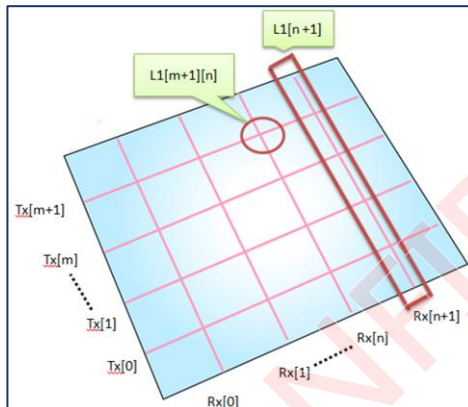


Calculating the change from baseline to the current Raw Signal, we can derive L1 signal, which represents the touch signal.

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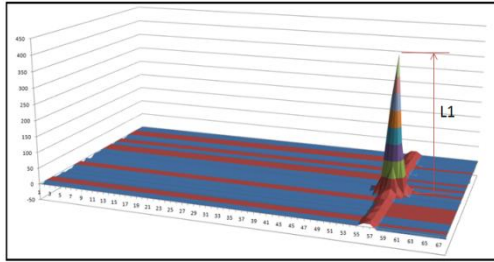
L1[n+1]= the L1 signal on Rx[n+1] channel.
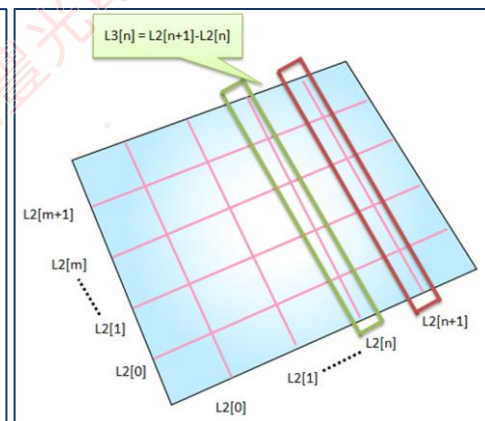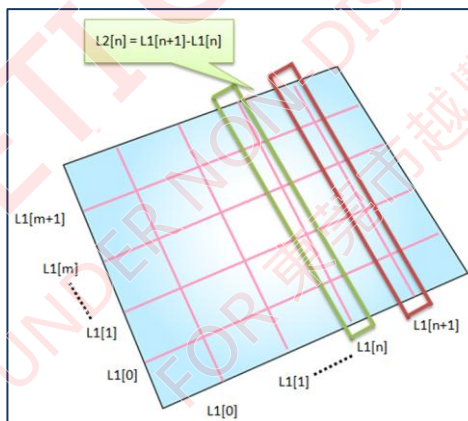
L1[m+1][n]= the L1 signal at the intersection of Tx[m+1] channel and Rx[n] channel.



L2 Signal refers to the L1 signal change along Rx channels.

L2 Signal can also represent a type of touch signal: L2[n]=L1[n+1]-L1[n].

L3 Signal refers to the L2 signal change along Rx channels: L3[n]=L2[n+1]-L2[n].



Touch% = $\Delta C_f / C_f$, which represents the ratio of the signal changed by a finger touch to the signal received from the Rx electrode without a touch. This value is subject to the touch screen design and the system mechanism.

Signal driven from Tx electrodes will be coupled to Rx electrodes and then enter the IC circuit. The controller chip has similar analog processing circuit to general measuring instruments, such as multi-meter and scope.

An attenuator unit is used for signal matching to obtain a suitable signal input to the

front-end amplifier.

A signal conditioner is used to manipulate the signal amplitude to suitable level for the ADC converter that follows.
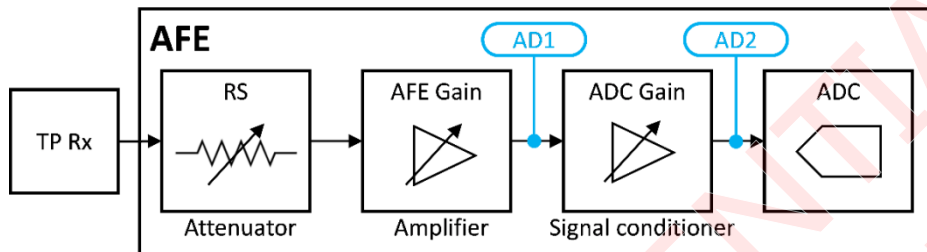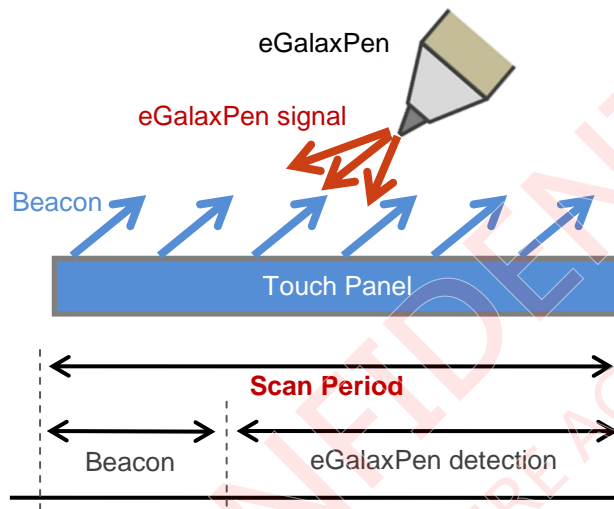


**Glossary**

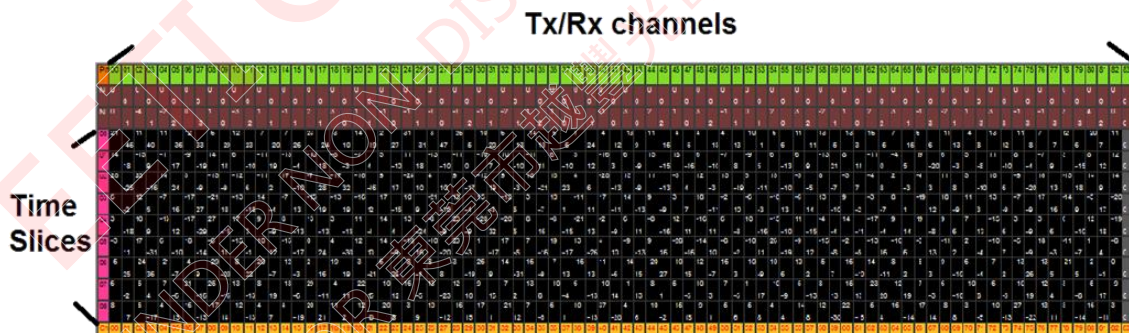| Terms | Definition |
|-------|-----------|
| **RS** | Attenuator level for signal matching and regulating. Decreasing this parameter can increase the SNR. |
| **AFE Gain** | Gain value of the front-end signal amplifier. Decreasing this parameter can amplify AD1 signal.<br>※Please check ADC1% to avoid signal saturation. |
| **ADC Gain** | Gain value of the signal conditioner. Increasing this parameter can amplify AD2 signal.<br>※Please check ADC2% to avoid signal saturation. |
| **AD1** | Front-end signal amplifier output. It shall remain in a certain range to avoid signal saturation or low SNR. |
| **AD2** | Signal conditioner output. It shall be well controlled to avoid signal saturation. |
| **ADC1 %** | The saturation index for AD1 signal in percentage. |
| **ADC2 %** | The saturation index for AD2 signal in percentage. |
| **Delay** | The delay time for signal measuring. When signal is not uniform along the Tx direction caused by high RC constant, increasing or decreasing this parameter may help. |
| **MeasureCount** | Signal measuring counts (also the cycles of signal wave driven by transmitter.). Increasing this parameter can increase the signal strength but decrease the reporting rate. |
| **Scaling** | For signal normalization. +1 to divide the value by 2; -1 to multiply the value by 2.<br>※This parameter is used to adjust the signal "value" only. It will NOT affect the Electrical characteristics. |
| **Raw** | The primal and unprocessed data measured from the receiver. |
| **L1** | The raw touch signal, which is derived from the change of baseline (Raw). |
| **L2** | The change in L1 value. |
| **L3** | The change in L2 value. |

| | |
|---|---|
| **DrivingAmp** | The signal amplitude level. The higher the number, the greater the amplitude. Default: 12(Max) |

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## 2.1.B. **eGalaxPen**

eGalaxPen is an active stylus that provides pressure sensing, tilting sensing, and functional buttons for users to experience a natural writing use. To communicate with eGalaxPen, EETI controller sends beacon signal to trigger eGalaxPen and then receives the signal driven by eGalaxPen in a specific period of time.



The period of eGalaxPen detection is divided into slices. The signal received can be presented on the time slices and compose an image called Pen Data, as shown below.
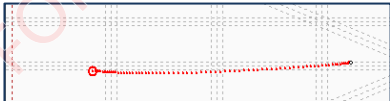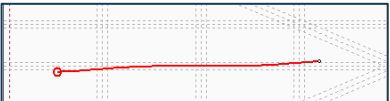


**Glossary**
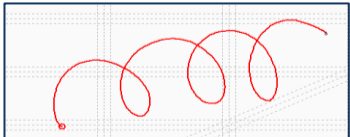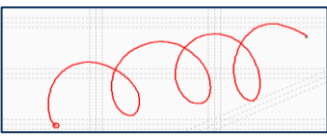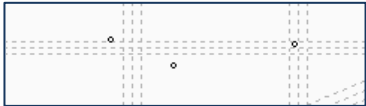
| Terms | Definition |
|---|---|
| Beacon | Signal driven from touch panel to trigger eGalaxPen. |
| Button state | Normal: A normal drawing state without any button clicked.<br>Eraser: Earaser function. By default the lower button.<br>Barrel: Right click function. By default the upper button. |
| Hover | The status when eGalaxPen is hovering around the touch screen. |
| Tip | The status when eGalaxPen contacts the touch screen. |

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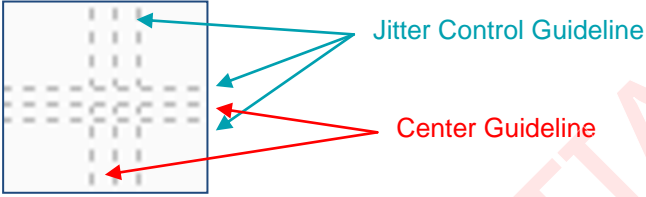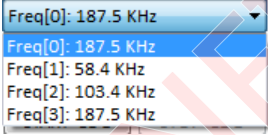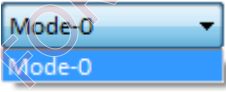
## 2.2.  **Introduction to eGalaxTuner**

eGalaxTuner, an embedded software in TM+, allows user to validate touch performance; check firmware status and touch information; view capacitance image of finger touch and eGalaxPen signal data; and collect informative debug messages.

### 2.2.A.  **Draw Test**
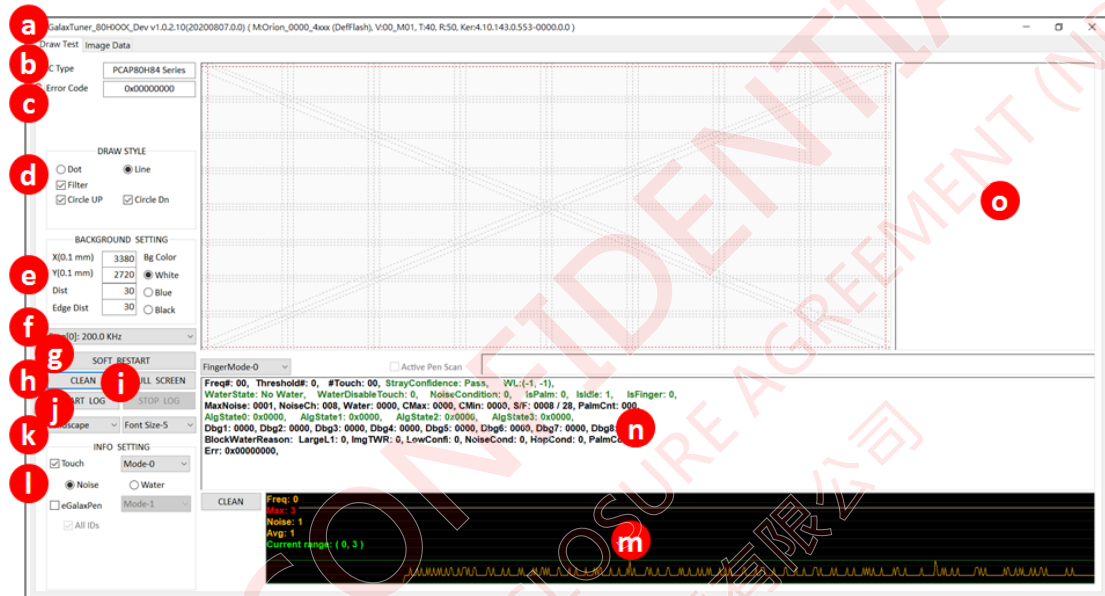


| Index | Description | | |
|-------|-------------|---|---|
| a. Title bar | Indicates the application version, FW model name, firmware version, kernel version and number of Tx and Rx channels. | | |
| b. IC Type | Indicates the type of touch IC. | | |
| c. Error | Indicates the error codes | | |
| d. Draw style | Dot  | Line  | |
| | Filter – checked  | Filter – unchecked  | |
| | Circle Up  | Circle Down  | |

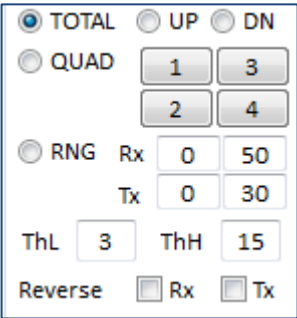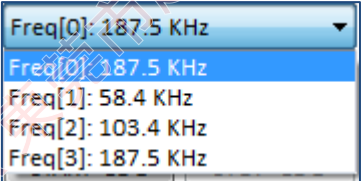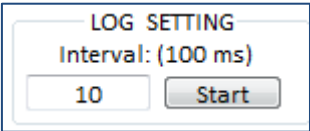| e. Background setting | X/Y (0.1mm): Active Area dimension.<br><br>Dist (0.1mm): Configure the distance between center guideline and jitter control guidelines.<br><br><br><br>Edge Dist (0.1mm): Configure distance of guideline, shown in red dots, from the edge.<br><br>Bg Color: Change the color of Draw Test background to White/Blue/Black. |
|---|---|
| f. Frequencies | To switch to other working frequencies.<br><br> |
| g. SOFT RESTART | Soft reset the controller touch function. |
| h. CLEAN | To clear the draw test window. |
| i. FULL SCREEN | To enter full screen mode. |
| j. START LOG | To record the touch coordinates and touch information. (**Info Setting\Touch** box should be checked to log detailed information). |
| k. Font size | To select font size. |
| l. Info Setting Touch APen | Enable finger touch/eGalaxPen information in Firmware Status Window.<br><br>(Information mode can be switched through the drop-down list.)<br><br><br><br>Noise: Display noise data in Noise/Water Information window.<br><br>Water: Display water data in Noise/Water Information window.<br><br>CLEAN: Clear Noise/Water Information window. |

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| | |
|---|---|
| m. Noise/Water Information window | **Noise:**<br>• Freq: The current working frequency.<br>• Max: The maximum static noise value detected.<br>• Noise: The real-time static noise value detected.<br>• Avg: The average static noise value detected.<br>• Current: Indicate the noise value detected within the period.<br>**Water:**<br>• Water-History Max: The maximum water quantity value detected.<br>• Water-Val: The real-time water quantity value detected.<br>• Water-Current: Indicate the range of water quantity value detected within the period.<br>• Ratio The ratio of CMax to Cmin. |
| n. Firmware Status window | • The current working frequency index.<br>• Threshold#: The current touch sensitivity setting index.<br>• #Touch: The number of valid touches detected.<br>• StrayConfidence: The status of baseline. If the system is deviated from its original normal condition, **StrayConfidence** shows **Low**.<br>• WaterState: Indicate if the controller enters "water **Level 1: Wet Touch**". This section displays No Water, Single- Touch, Dual-Touch, and Multi-Touch.<br>• WaterDisableTouch: Indicate if the controller enters "water **Level 2: Disable Touch**".<br>• NoiseCondition: Indicate if the controller enters "noise **Level 1: Noisy Touch**".<br>• IsPalm: Indicate if a palm is detected.<br>• IsIdle: Indicate if the controller is in idle state.<br>• MaxNoise: The maximum value of static noise detection.<br>• NoiseCh: Indicate the Rx channel of the maximum noise.<br>• Water: The real-time water quantity value detected.<br>• CMax: The maximum L1 value detected.<br>• Cmin: The minimum L1 value detected.<br>• S/F: Indicate the drawing speed and Anti-Aliasing level applied.<br>• PalmCnt: The number of suspicious palm sections. |

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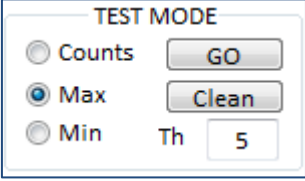
| o. Touch Information Window | Indicate the touch ID, reporting rate, X/Y-coordinate, contact signal, and contact size of each valid touch. |
|---|---|
| | 00:110Hz 11103, 08971, 03317, 00012<br>01:110Hz 10675, 04893, 03735, 00010<br>02:110Hz 08842, 02937, 03005, 00013<br><br>**ID: Reporting rate, (X, Y, Contact Signal, Contact Size)** |

## 2.2.B.  **Image Data**



| Index | Description |
|---|---|
| a. Font size | To select font size. |
| b. SPEED SETTING | Adjust the refreshing rate of Image Data window. (1 is the highest.) |
| c. IMAGE MODE SETTING: | Use the drop-down list to select the data type.<br><br>IMAGE MODE SETTING<br>Raw ▼<br>Raw<br>L1<br>L2<br>L3<br>Touch %<br>Uniformity<br>Unifor Cook<br>ADC1 %<br>ADC2 % |

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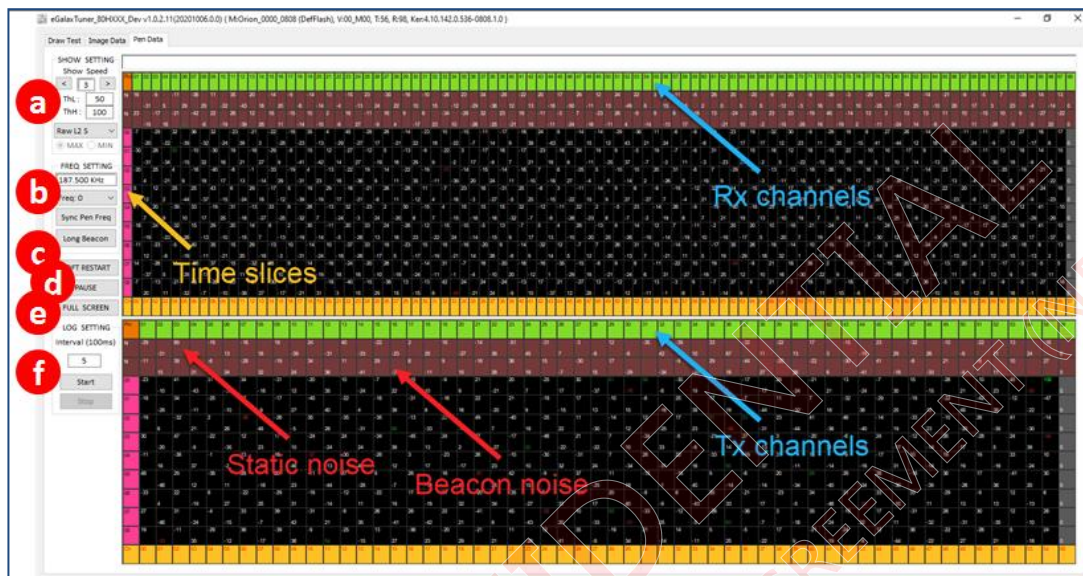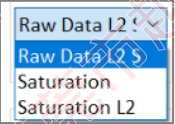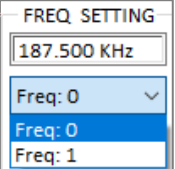| | |
|---|---|
| d. Image Range | Change the range of Image Data to be displayed.<br><br>○ TOTAL ○ UP ○ DN<br>○ QUAD [ 1 ] [ 3 ]<br>[ 2 ] [ 4 ]<br>○ RNG Rx [ 0 ] [ 50 ]<br>Tx [ 0 ] [ 30 ]<br>ThL [ 3 ] ThH [ 15 ]<br>Reverse ☐ Rx ☐ Tx<br><br>• TOTAL: Display the entire Image Data.<br>• UP: Display the top half of Image Data.<br>• DN: Display the bottom half of Image Data.<br>• QUAD: Display a quadrant of Image Data.<br>• RNG: Display the custom range of Image Data.<br>• ThL: If its absolute value is greater than ThL, it will be displayed in dark green/red color. (for visibility purpose only)<br>• ThH: If its absolute value is greater than ThH, it will be displayed in bright green/red color. ( for visibility purpose only)<br>※ Value less than ThL will be displayed in grey color.<br>• Reverse Rx/Tx: Reverse the Tx/Rx channel orders in Image Data. |
| e. Frequencies | To switch to other working frequencies<br><br>Freq[0]: 187.5 KHz ▼<br>Freq[0]: 187.5 KHz<br>Freq[1]: 58.4 KHz<br>Freq[2]: 103.4 KHz<br>Freq[3]: 187.5 KHz |
| f. SOFT RESTART | Soft reset the controller touch function. |
| g. PAUSE | Pause the refresh of Image Data window. |
| h. FULL SCREEN | Enter full-screen mode in Image Data window. |
| i. LOG SETTING | Adjust the logging interval and record the selected type of Image Data. (Unit: 100ms)<br><br>LOG SETTING<br>Interval: (100 ms)<br>[ 10 ] [ Start ] |

| j. TEST MODE | TEST MODE |
|---|---|
| | Counts GO / Max Clean / Min Th 5 |
| | • Counts: Count the value that is greater than Th. |
| | • Max: Display the maximum value in each node in Image Data. |
| | • Min: Display the maximum value in each node in Image Data. |
| | • GO: Start the TEST MODE. |
| | • Clean: Clear Image Data window in test mode. |
| k. Auxiliary functions | Cal target: Display the Tx Cal targets. Show Value: Display the digits in Image Data window. Color Scale: Colorize the node according to its value. Showcell: Display the average finger signal. |
| l. Raw Data Information | Indicates the maximum, minimum, average value of raw data, the ratio of Max to min value, and the number of system offset data usages. |
| m. Image Window | Displays the data of selected type in c. IMAGE MODE SETTING on each node. |
| n. Right/Bottom Yellow Index | Number the Tx and Rx channels from 0. |
| o. Left/Top Pink Index | Indicates the IC pin number of each channel. These numbers are used to set I/O channels manually. |

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### 2.2.C. **Pen Data**



| Index | Description |
|---|---|
| a. SHOW SETTING | • Show Speed: Adjust the refreshing rate of Pen Data window. (1 is the highest.)<br>• ThL : Display the digit in DARK green and red color if the value is less and greater than this threshold, respectively.<br>• ThH : Display the digit in LIGHT green and red color if the value is less and greater than this threshold, respectively.<br>• Data: Use the drop-down list to select the data type.<br><br>Raw Data L2 5<br>Raw Data L2 5<br>Saturation<br>Saturation L2 |
| b. FREQ SETTING | Use the drop-down list to switch to other working frequencies.<br><br>FREQ SETTING<br>187.500 KHz<br>Freq: 0<br>Freq: 0<br>Freq: 1 |
| c. SOFT RESTART | Soft reset the controller touch function. |
| d. PAUSE | Pause the refresh of Image Data window. |
| e. FULL SCREEN | Enter full-screen mode in Image Data window. |
| f. LOG SETTING | Adjust the logging interval and record the selected type of Image Data by clicking START.<br>(Unit: 100ms) |

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# 3.    **Advanced Parameter Settings**

The first section of **eGalaxTouchManager+ (TM+)** guides through the signal learning process and parameter settings for general applications. For such applications as marine display, military notebook, and medical tablets, stricter water resistance standards, higher noise immunity requirements, and enriched eGalaxPen features can be achieved in **TM+ Advanced**. When TM+ Advanced is executed, all the functions provided by the touch controller and firmware will be listed in tree view in the left panel. User can select any of the function nodes of the tree view in the left panel, of which the setting pages will be displayed at the right panel. Each function node has one or several setting pages.

## 3.1. Touch Controller
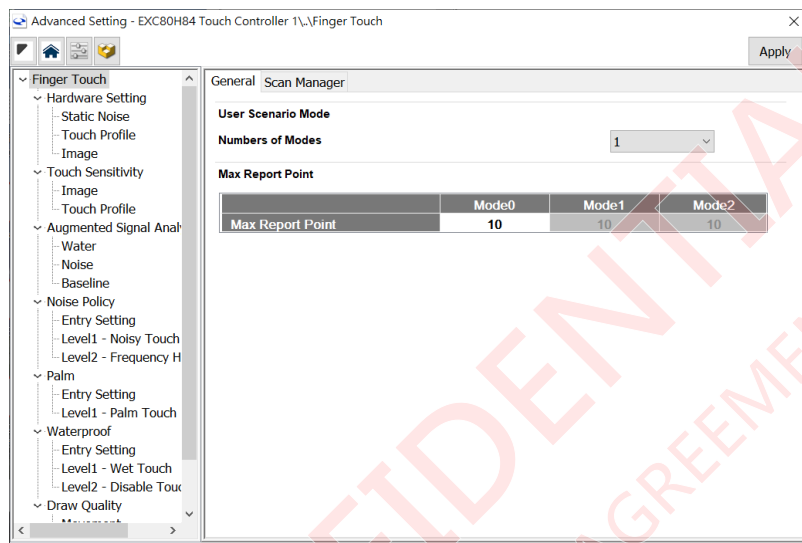
### 3.1.A. Touch Controller \ Power Setting
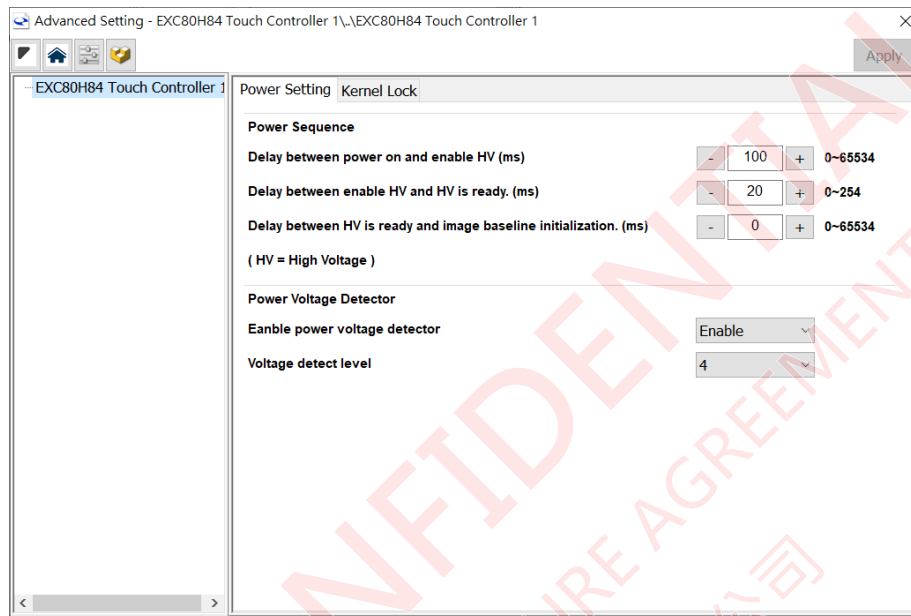


| Power Sequence | |
|---|---|
| Description |  |
| Delay between power on and enable HV. (ms) | The delay time for enabling the HV after the controller powers on. |
| Delay between enable HV and HV is ready. (ms) | The duration for HV to get ready after it is enabled. |
| Delay between HV is ready and image baseline initialization. (ms) | The delay time for getting the first baseline after the HV is ready. |
| Power Voltage Detector | |
| Enable Power Voltage Detector | To monitor the power supply voltage and reset the IC if the voltage drops below a certain level. |

| Voltage Detect Level | The voltage level for IC hardware reset. | | | |
|---|---|---|---|---|
| | Level | EXC80x84/60 | EXC80x46/32 | EXC86H |
| | 0 | 2.2V | 2.0V | 2.0V |
| | 1 | 2.3V | 2.2V | 2.1V |
| | 2 | 2.4V | 2.4V | 2.3V |
| | 3 | 2.5V | 2.5V | 2.5V |
| | 4 | 2.6V | 2.6V | 2.6V |
| | 5 | 2.7V | 2.8V | 2.7V |
| | 6 | 2.8V | 2.9V | 2.8V |
| | 7 | 2.9V | X | 2.9V |

## 3.2. Finger Touch

### 3.2.A. Finger Touch \ General



| Finger Touch General Setting | |
|---|---|
| **User Scenario Mode** | |
| Numbers of Modes | The number of working modes (up to 5 sets) for different uses or scenarios.<br>User can apply different settings to each mode in the following pages, such as sensitivity, water/noise/palm function, and draw quality settings, etc.<br>In the following pages, if settings can be configured differently in each working mode, they will be shown as below.<br><br>The modes in which functions are not enabled will be greyed out.<br><br>EX：Users can set up three different modes as,<br>　　Mode0: Finger mode.<br>　　Mode1: Water-resistance mode.<br>　　Mode2: Gloved hands mode. |
| Max Report Point | The number of the supported finger touches. |

### 3.2.B. Finger Touch \ Scan Manager
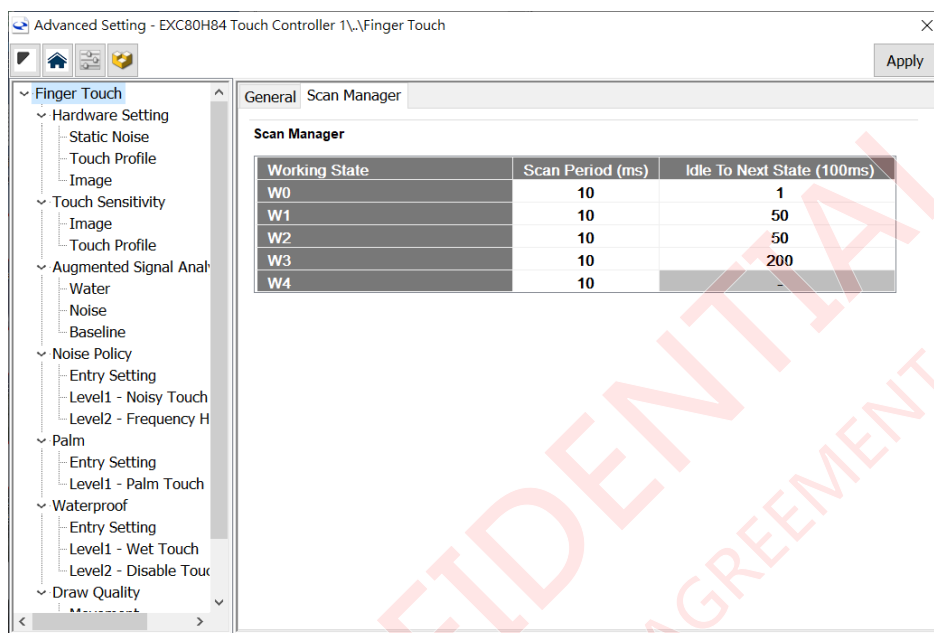


| Finger Touch Scan Manager | |
|---|---|
| **Scan and state control** | |
| Working State | From W0~W4. |
| Scan Period (ms) | Do scan measurement every Scan Period ms. |
| Idle to Next State(100ms) | The duration for staying in the **Working State**. (Unit: 100ms) |
| ※Description※ | Multi-Touch device is initially at W2 state, and it switches to W0 state when a finger touch is detected. If no finger touch is detected after **Idle to Next Step** period, the device will switch to the next state(W1), and so on. |

### 3.2.C. **Finger Touch \ Hardware Setting**

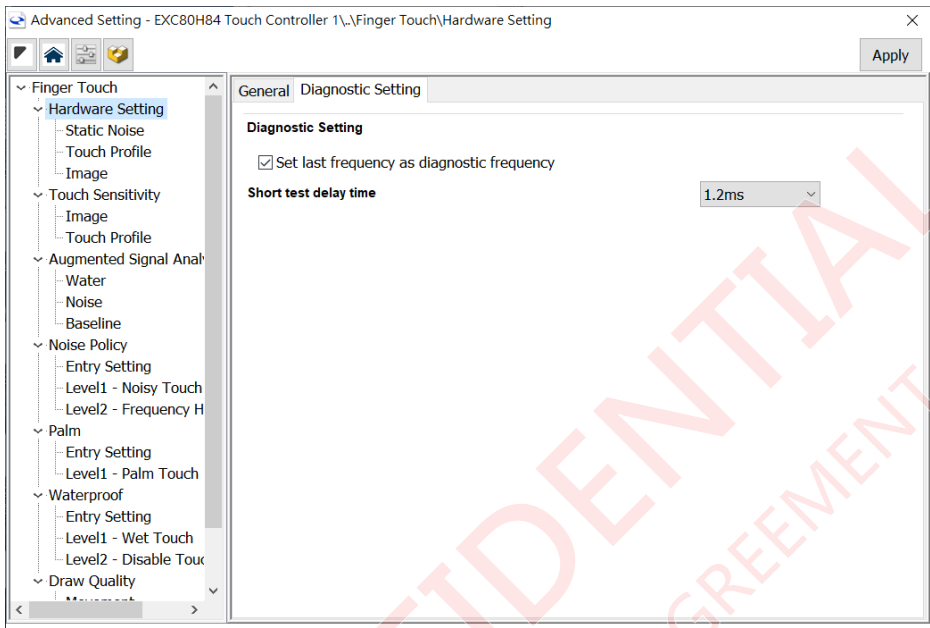In this section, user can configure RS, scaling, AFE and MeasureCount for each selected frequency to optimize and stabilize touch performance (Reference: Finger Touch). TM+ will find the best configuration for the touch panel automatically. Therefore, in most cases, user does not need to do so manually.

### i. **Hardware Settings \ General**
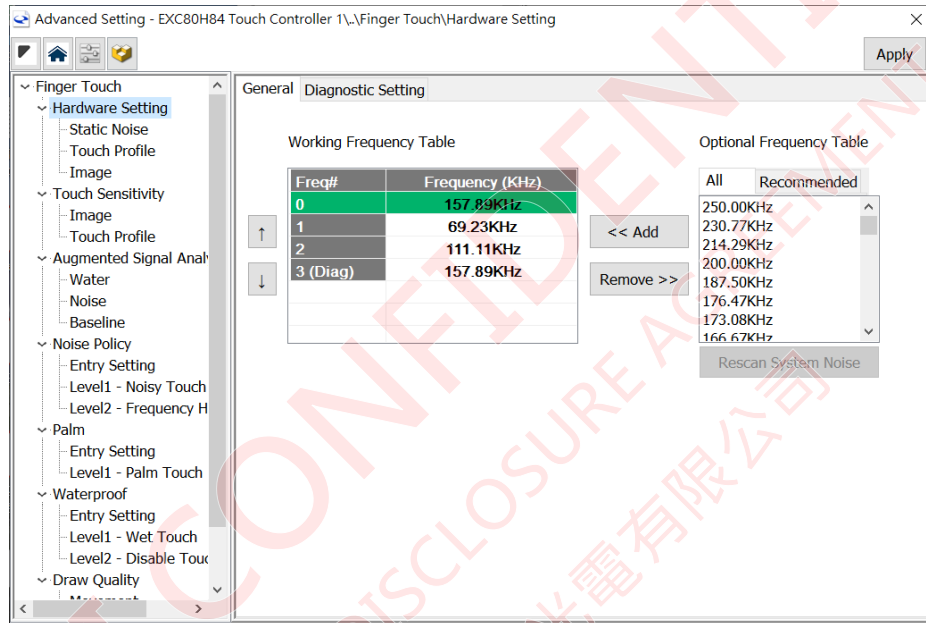


| Hardware General Setting | |
| --- | --- |
| Working Frequency Table | The current working frequencies in used. (The Max number of frequencies: 5)<br>The order of the frequencies can be arranged. These frequencies will be applied to function nodes below. |
| Optional Frequency Table | **All:** All available frequencies.<br>**Recommended:** Once signal learning is completed, eGalaxTouchManager+ will sort out the working frequencies that have less noise interference.<br>**Rescan System Noise:**<br>Use this function to get a new set of frequencies if there is noise interference. |

## ii. Hardware Settings \ Diagnostic Setting



| Hardware Diagnostic Setting | |
|---|---|
| Set last frequency as diagnostic frequency | The last frequency will be used for sensor test only. |
| Short test delay time | A touch panel with high RC constant may get a *Sensor Short Test* misjudgment. <br> Delay *Sensor Short Test* to measure the signal value when capacitance reaches its steady-state. (Unit: ms). <br> WHEN TO USE: When a touch panel has no short electrode but always fails *Sensor Short Test*, increase this parameter to see if the signal value can be measured correctly. |

### iii. **Hardware Setting \ Static Noise**

Static Noise refers to the signal that is scanned during the period apart from Image, Touch profile, and eGalaxPen. User can configure Scaling, RS, AFE Gain, and MeasureCount for each selected working frequency individually. (Reference: Finger Touch)
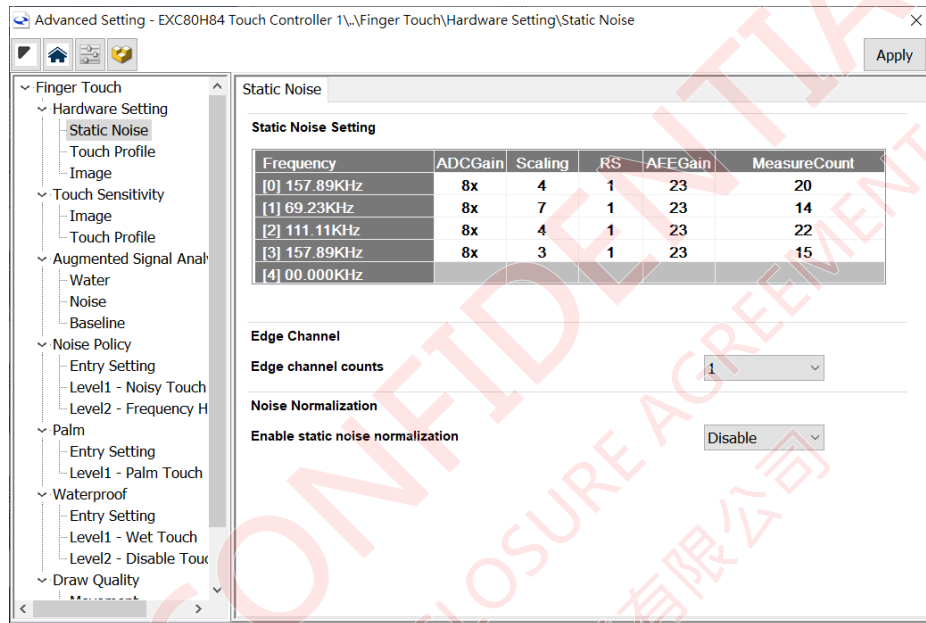


| Edge Channel | |
|---|---|
| Edge channel counts | Define the edged channels for Noise Policy \ Entry setting. |
| **Noise Normalization** | |
| Enable static noise normalization | Noise normalization aims to stabilize the static noise value. Enable this feature if the static noise value fluctuates unexpectedly. |

## iv. **Hardware Setting \ Touch Profile**

The projection of the finger location onto X and Y axis is called Touch Profile Rx(PR) and Tx(PT), respectively.

(Reference: Finger Touch)
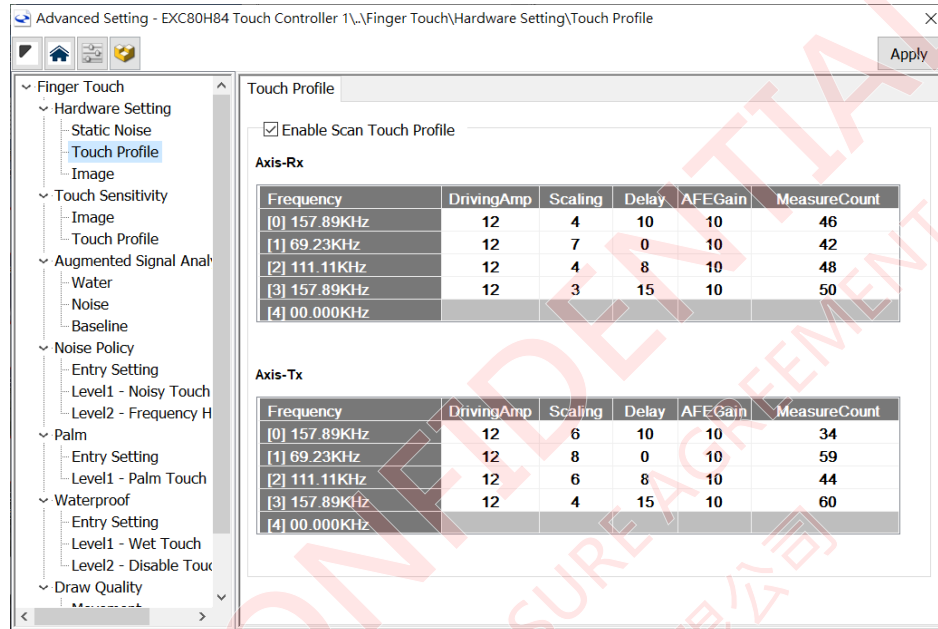


| Touch Profile Setting | |
|---|---|
| Enable Scan Touch Profile | After Scan Touch Profile is enabled, user can configure DrivingAmp, Scaling, Delay, AFEGain, and MeasureCount for both Axis-Rx and Axis-Tx. |

v. **Hardware Setting \ Image**

The mutual capacitances measured at each intersection of the Tx and Rx electrodes form the signal Image.

- Image \ Rx Setting

User can configure Rx settings of each working frequency.
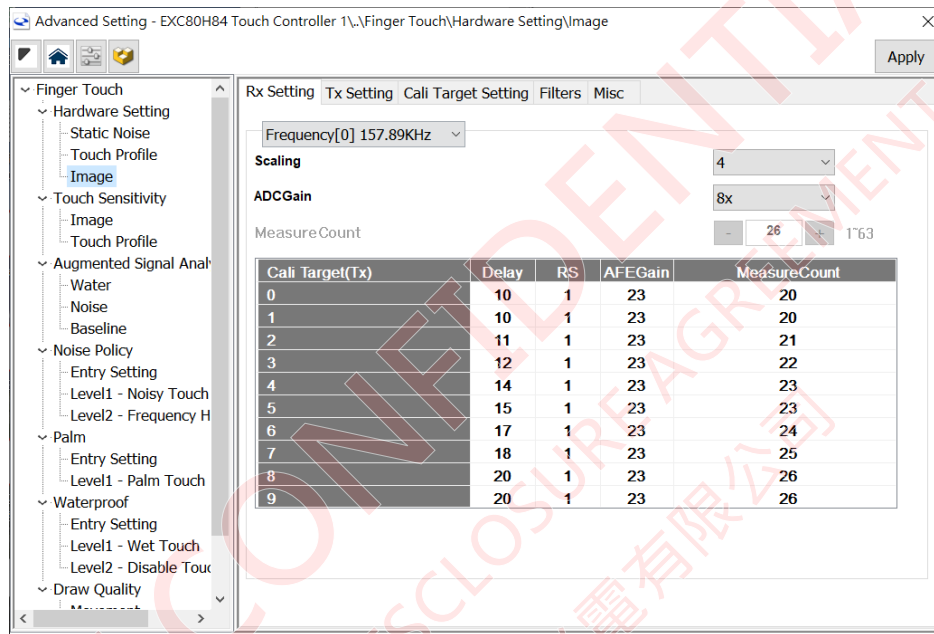


| Rx Setting | |
|---|---|
| Rx Setting | User can configure Scaling, ADCGain, MeasureCount, Delay, RS, and AFE Gain. |

- **Image \ Tx Setting**

  Users can configure the signal amplitude driven from Tx channels. The amplitude is set to the maximum by default, in order to maximize the signal to noise ratio. Decreasing the amplitude can lower EMI.
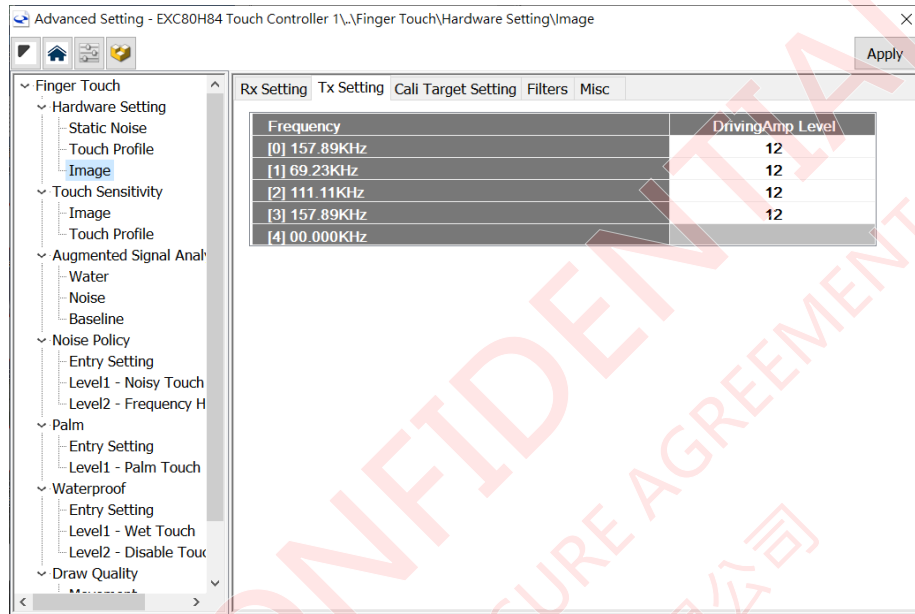


- **Image \ Cali Target Setting**

  EETI controller applies different ImageDelay, RS, AFEGain, MeasureCount values to each calibration target to minimize the signal difference across the touch sensor. The distribution of calibration target has been optimized during the signal learning process.
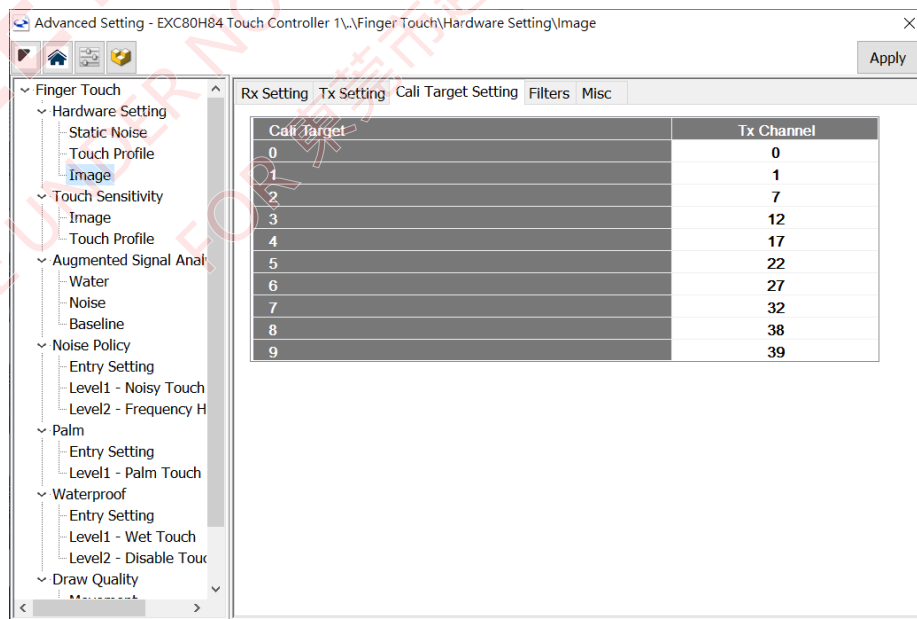
- Image \ Filters



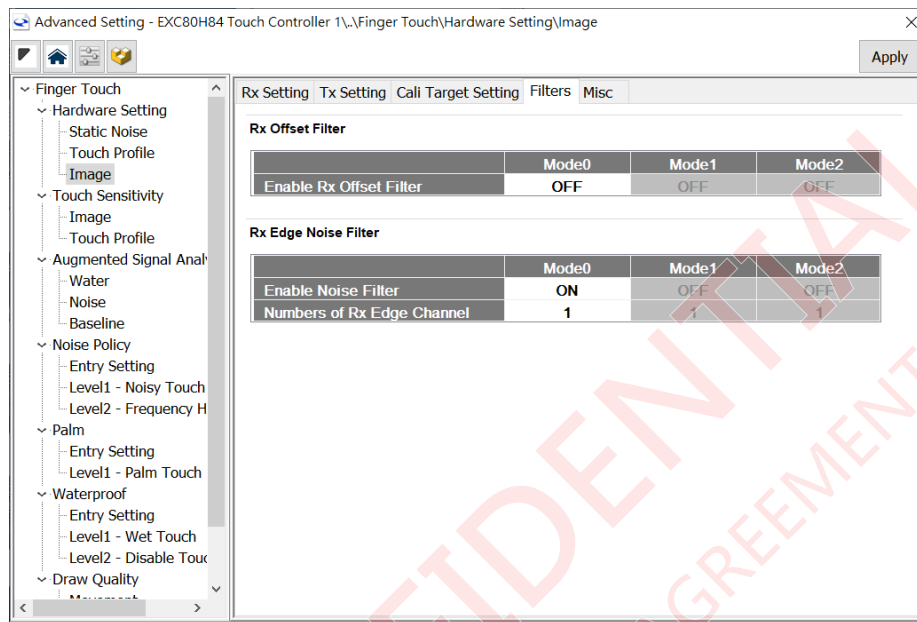| Rx Offset Filter | |
|---|---|
| Enable Rx Offset Filter | Filter the signal offset on the same Rx channel. |
| **Rx Edge Noise Filter** | |
| Enable Noise Filter | Enhance the noise immunity on edge channels, which are sometimes more susceptible to noises than other channels. |
| Numbers of Rx Edge Channel | Users can set how many edge channels to be applied this filter.<br>※Enabling this feature may decrease the reporting rate. |

- Image \ Misc.



| Image Misc Setting | |
|---|---|
| L1 Policy | The calculation type of L1 signal. |
| **Image Speed Up** | |
| Enable Image Speed Up | When this feature is enabled, Touch Profile will be referenced for Image Data processing, in order to speed up the scanning rate. WHEN TO USE: When the scanning time is affected by excessive Tx channels, this function can be enabled to increase the reporting rate as a countermeasure. ※The drawback is that user might experience line drop during fast drawing test. |

### 3.2.D. Finger Touch \ Touch Sensitivity
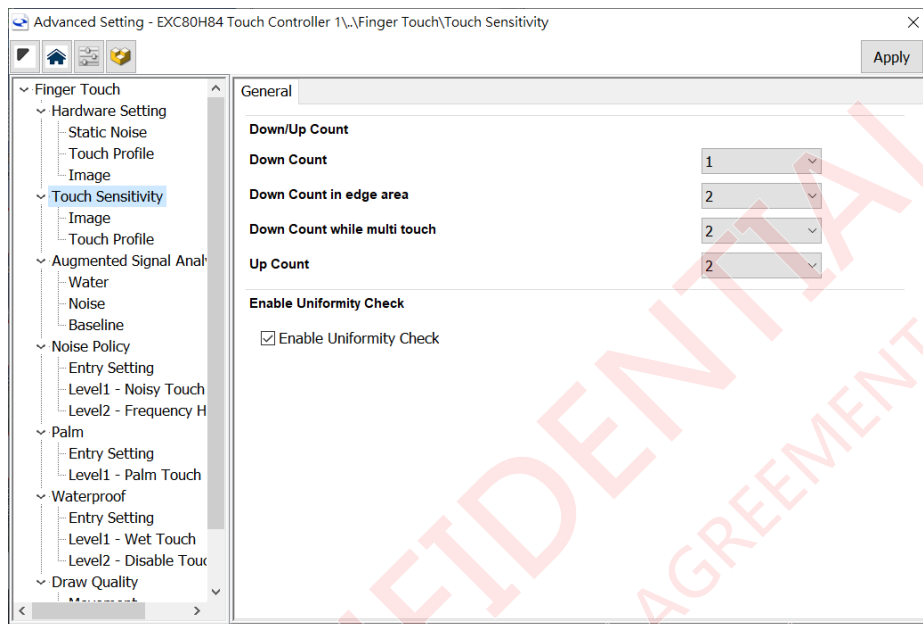
| Touch Sensitivity General Setting | |
|---|---|
| Down Count | The number of frames a touch needs to be detected before it is reported to the host system.<br>WHEN TO USE: Decrease this parameter to reduce the first-down latency; increase this parameter to avoid false touch by undesired spike noise. |
| Down Count in edge area | When finger is touching near the edges, the number of frames a touch needs to be detected before reported to the host. |
| Down Count while multi touch | The number of frames the 2$^{nd}$ (, and each of the following,) touch needs to be detected before reported to the host system. |
| Up Count | The number of frames without touch that needs to be detected before an UP event is reported to the host system.<br>WHEN TO USE: Increase this parameter if lines drop or break too often; decrease this parameter if touch points are formed into lines during quick tapping. |
| Enable Uniformity Check | Enable system calibration table, which is used for baseline check and baseline recovery. |

i. **Touch Sensitivity \ Image**

- Image \ Sensitivity

   ***Sensitivity*** is a set of thresholds for reporting a valid finger touch. Every signal should pass its corresponding threshold.
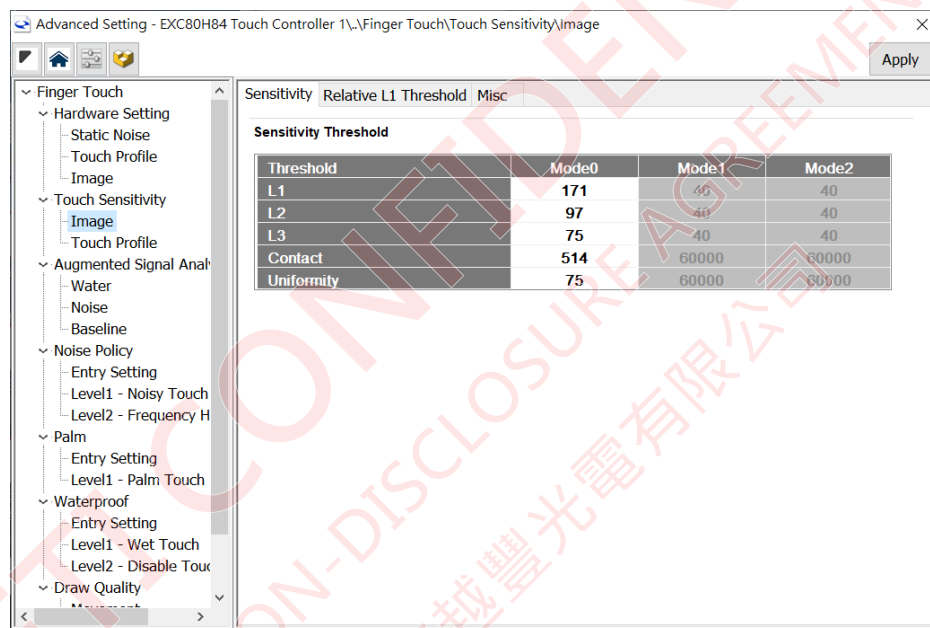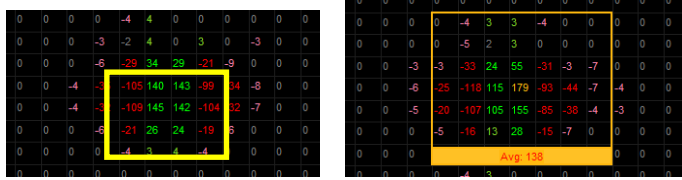




| Image Sensitivity Setting | |
|---|---|
| Description | Use eGalaxTuner to find the average value of Image signal. Move finger slightly until the four central numbers remain close to one another, and then calculate the average value. Or, user can enable ShowCell from the auxiliary function bar and get the average value.  |
| L1 | The typical L1 threshold is 50% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |
| L2 | The typical L2 threshold is 50% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |

| L3 | The typical L3 threshold is 50% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |
|---|---|
| Contact | Refer to eGalaxTuner\Draw Test\ Touch Information Window. Place one finger on the screen with a regular contact pressure. The typical contact threshold is 50% of the contact value. User can adjust this threshold for touch sensitivity optimization. |
| Uniformity | The typical threshold is recommended to be set 50% of the Avg value. |

- Image \ Relative L1 Threshold



| Relative L1 Threshold | |
|---|---|
| Enable Relative L1 Threshold | A new threshold relative to the signal of finger input may be applied, in order to increase the touch performance stability. |
| L1 Ratio(1/32) | The factor used to calculate Relative L1 Threshold. (i.e. $CMax \times \frac{L1\ Ratio}{32}$) Whichever the L1 threshold or relative L1 threshold is higher will be applied. WHEN TO USE: Stabilize the touch performance of high sensitivity settings. ※If the touch screen does NOT have uniform signal strength across the surface due to its RC characteristic, line drop may occur at the area with weaker signal. |

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- Image \ Misc.
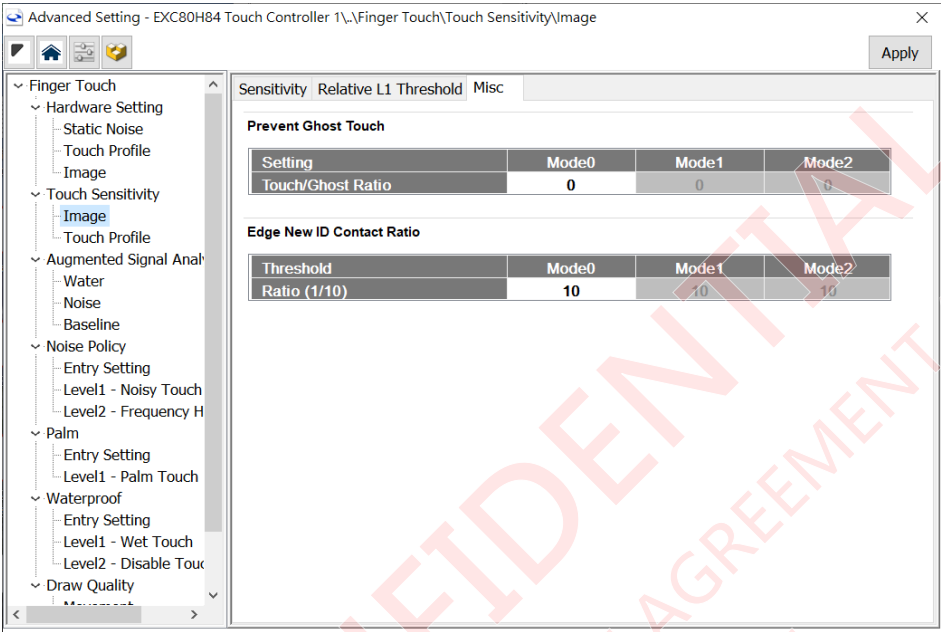


| Prevent Ghost Touch | |
|---|---|
| Touch/Ghost Ratio | Any contact with its $\left|\frac{+L1}{-L1}\right|$ less than Touch/Ghost Ratio will be discarded. |
| Edge New ID Contact Ratio | |
| Ratio (1/10) | The relative Contact signal threshold for a new touch input. |

## ii. **Touch Sensitivity \ Touch Profile**

- Touch Profile \ Touch Profile

    In this page user can configure PT and PR threshold for each user scenario mode.

    This section is only valid when Scan Touch Profile is enabled.

    ※When reading PT/PR signal, please slightly move the finger position until two central numbers remain similar and then calculate the average value(Avg).
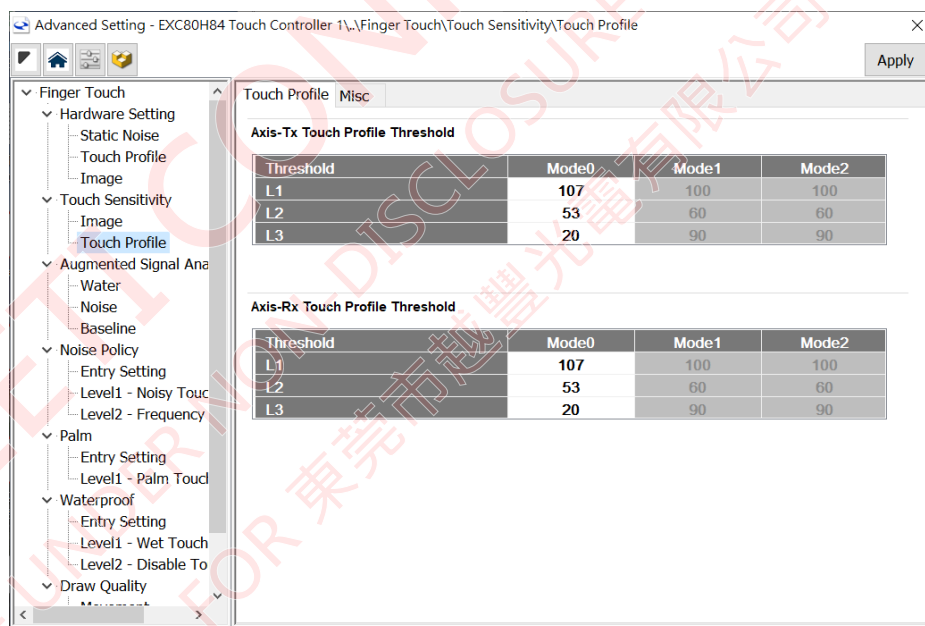




| Tx/Rx Touch Profile Threshold | |
|---|---|
| L1 | The typical L1 threshold is 50% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |
| L2 | The typical L2 threshold is 50% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |
| L3 | The typical L3 threshold is 50% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |

- Touch Profile \ Misc.

    In this page, user can change the **Finger Touch** report point policy from image data to touch profile data.
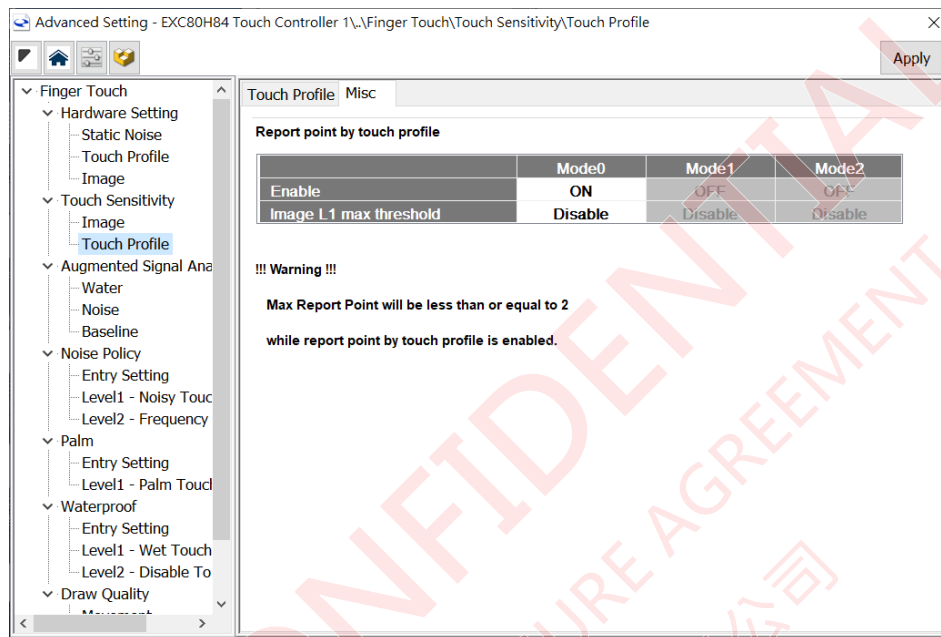


| Report point by touch profile | |
|---|---|
| Enable | Enable "report point by touch profile" policy. |
| Image L1 max threshold | Any finger touches with L1 signal greater than this threshold will be discarded. |

### 3.2.E. Finger Touch \ Augmented Signal Analyzer (ASA)

Augmented Signal Analyzer (ASA) is a new powerful feature of the Orion family touch controllers (beta bersion). By analyzing the unique pattern formed by signal and noise, ASA can accurately differentiate those signal changes caused by electrical noise from the environment, water on the touchscreen surface, or undesired electrical characteristic changes due to human operation or sensor deviation. ASA eliminates the need of manually tuning for noise immunity and water resistance; it simplifies the whole firmware tuning process.

Note: ASA function is a brand-new function from EETI Orion touch solution. When you enable ASA function, some previous functions may have conflict with ASA. In this case, the conflict functions need to be disabled to get a stable result.

- ASA \ General
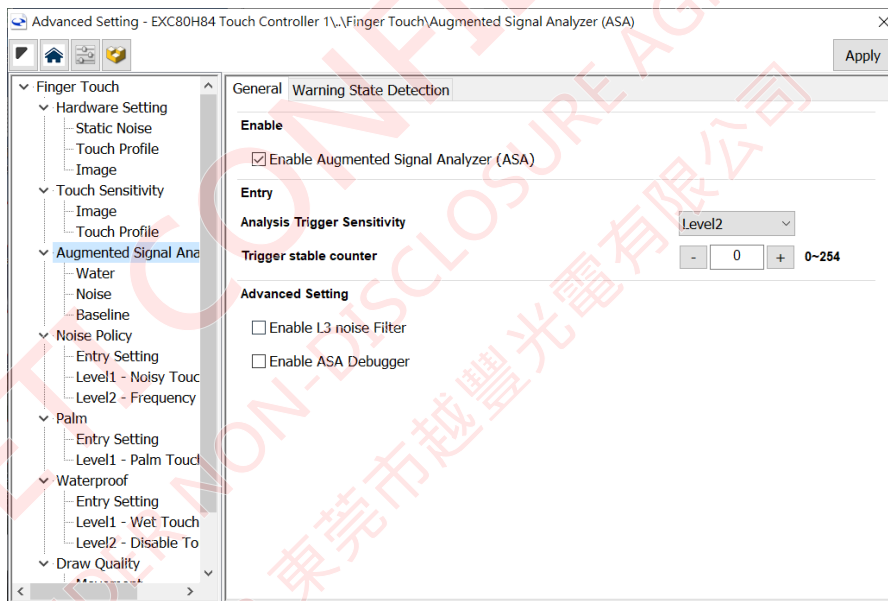


| Augmented Signal Analyzer (ASA) General Setting | |
|---|---|
| Enable ASA | Enable/ Disable Augmented Signal Analyzer function. |
| **Entry** | |
| Analysis Trigger Sensitivity | The sensitivity to trigger Augmented Signal Analyzer. Level 1 refers to the lowest sensitivity. |
| Trigger stable counter | The de-bounce to trigger Augmented Signal Analyzer. (Unit: Frame) |
| **Advanced Settings** | |
| Enable L3 noise Filter | Enable this feature to get better SNR on L3 signal, but finger separation will become worse. |

| Enable ASA Debugger | Enable ASA debug function. The debug messages for issue analysis will be shown in the Firmware Status window. |
|---|---|

- ASA \ Warning State Detection

    When suspicious water, noise, or abnormal basedline is detected, the controller will enter warning state and increase Down Count, in order to stabilize the touch performance.
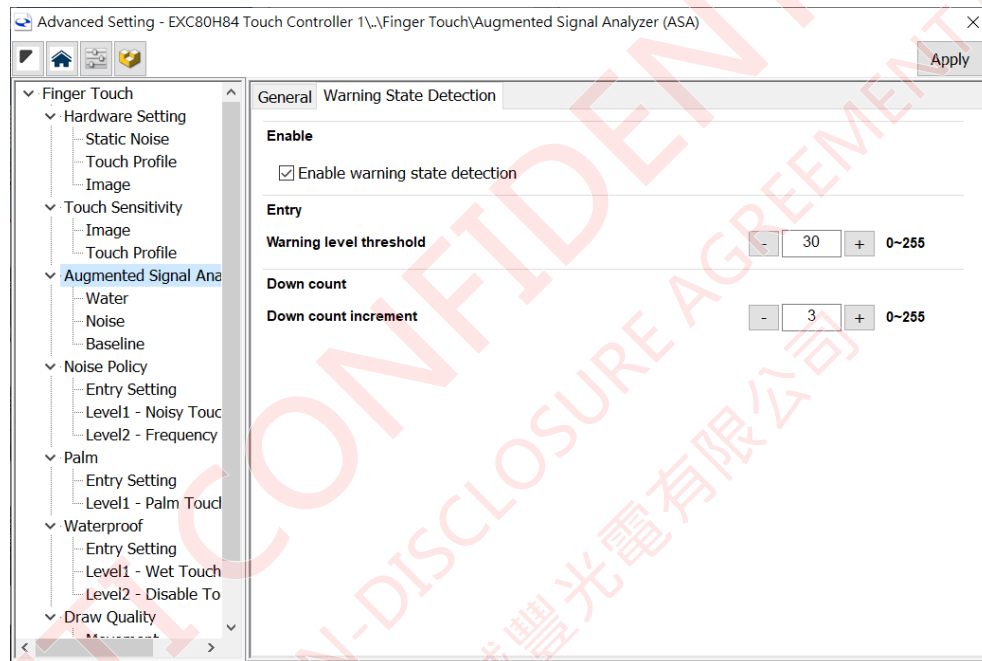


| Enable | |
|---|---|
| Enable warning state detection | Enable ASA warning state detection. |
| **Entry** | |
| Warning level threshold | The sensitivity level for entering ASA warning state. ※This value is suggested to remain as default. |
| **Down count** | |
| Down count increment | The extra Down Count added when the controller is in ASA warning state. |

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## i. **ASA \ Water**

When signal pattern resembles water, the controller will trigger water rejection mode to stabilize the touch performance.
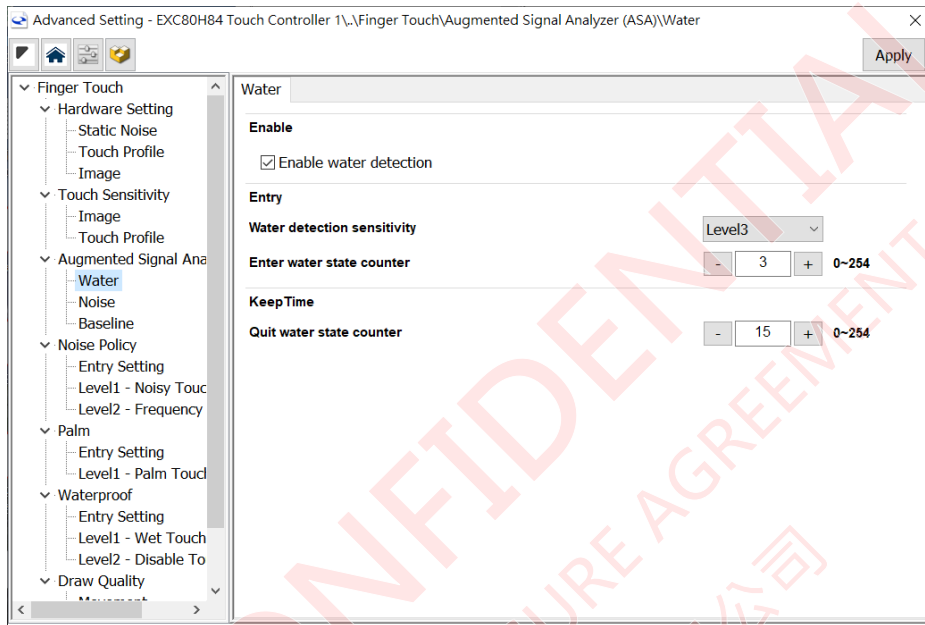


| ASA Water Setting | |
|---|---|
| Enable water detection | Enable ASA water detection function.<br>*Palm rejection needs to be enabled. |
| **Entry** | |
| Water detection sensitivity | The sensitivity level of water detection.<br>*Level1 refers to the lowest sensitivity. |
| Enter water state counter | The signal detection counter to verify a stable water signal.<br>(Unit: Frame) |
| **Keep Time** | |
| Quit water state counter | The counter for keeping a stable water status.<br>(Unit: Frame) |

## ii. ASA \ Noise

When signal pattern resembles electrical nosie, the controller will trigger anti-noise mode to stabilize the touch performance. If the anti-noise mode cannot mitigate the noise impact, the controller will do frequency hopping to avoid the noise interference.
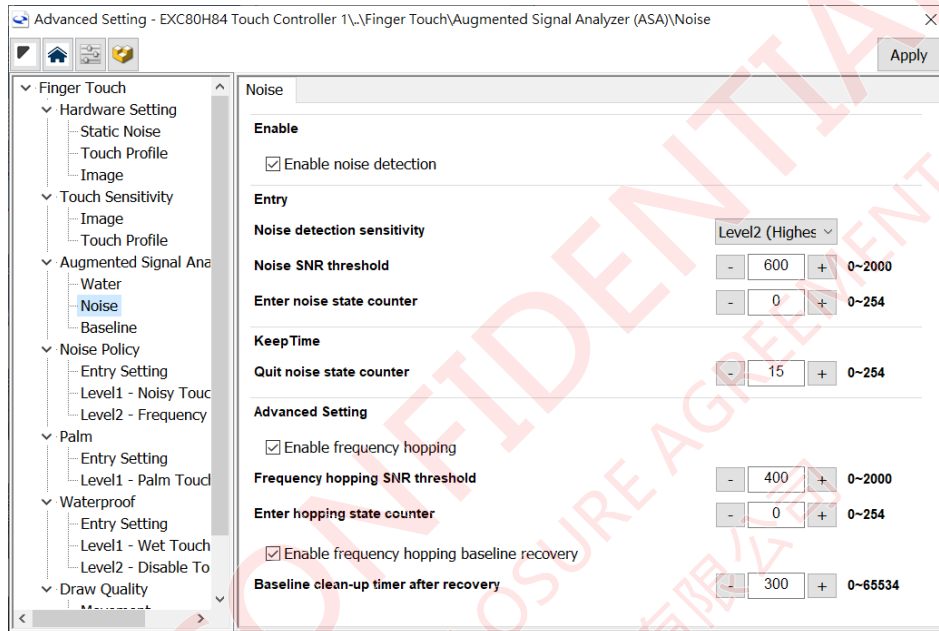


| ASA Noise Setting | |
|---|---|
| Enable noise detection | Enable ASA noise detection function. |
| Note | ※ ASA-Noise conflicts with Image Check Noise. Please disable Image Check Noise when enabling ASA-Noise detection. |
| **Entry Setting** | |
| Noise detection sensitivity | The sensitivity level of noise detection.<br>*Level1 refers to the lowest sensitivity. |
| Noise SNR threshold | The SNR threshold (Unit: 1%) for entering anti-noise state. |
| Enter noise state counter | The noise detection counter to enter anti-noise state. (Unit: Frame) |
| **Keep Time** | |
| Quit noise state counter | The counter for keeping at noise state. (Unit: Frame) |
| **Advanced Setting** | |
| Enable frequency hopping | Enable ASA frequency hopping function. |
| Frequency hopping SNR threshold | The SNR threshold (Unit: 1%) of frequency hopping. |

| Enter hopping state counter | The noise detection counter to trigger frequency hopping. (Unit: Frame) |
|---|---|
| Enable baseline recovery | Enable the baseline restore function after frequency hopping. ※Please turn off Uniformity Check if enabling this feature. |
| Baseline clean-up timer after recovery | Reset the baseline after all signal and FW status are removed. (Unit: Frame) |

### iii. ASA \ Baseline \ Baseline

By analyzing the siganl pattern, ASA can determine if the current baseline is invalid and calibrate the baseline to restore the touch function.
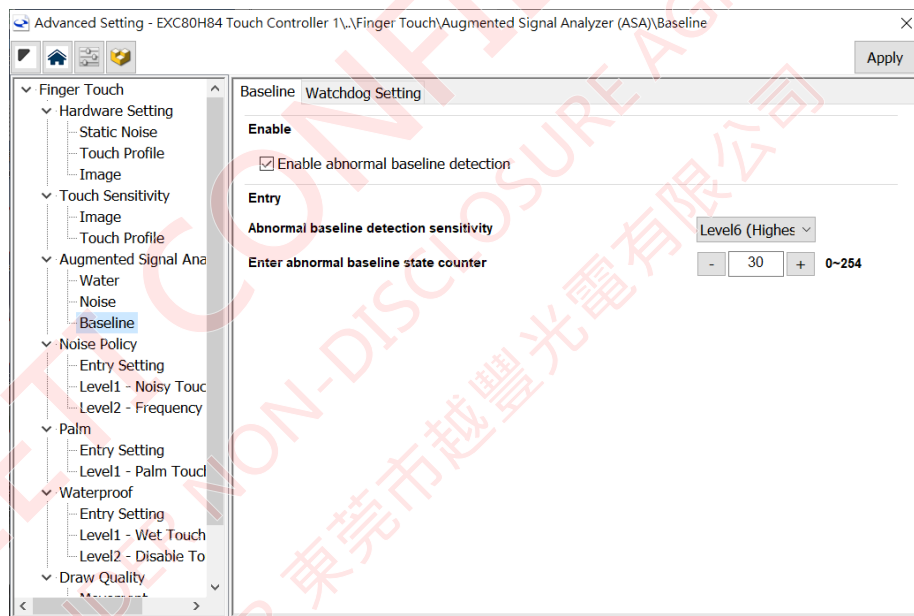


| ASA Baseline Setting | |
|---|---|
| Enable abnormal baseline detection | Enable ASA abnormal baseline detection function. |
| Abnormal baseline detection sensitivity | The sensitivity level of abnormal baseline detection. |
| Enter abnormal baseline state counter | The signal detection counter to verify a stable abnormal baseline state. (Unit: Frame) |

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- ASA \ Baseline \ Watchdog Setting

ASA-Watchdog monitors the abnormal states caused by the irrecoverable abnormal baseline. When these abnoraml states remain and meet the certain conditions, the controller will force retrieve the baseline.
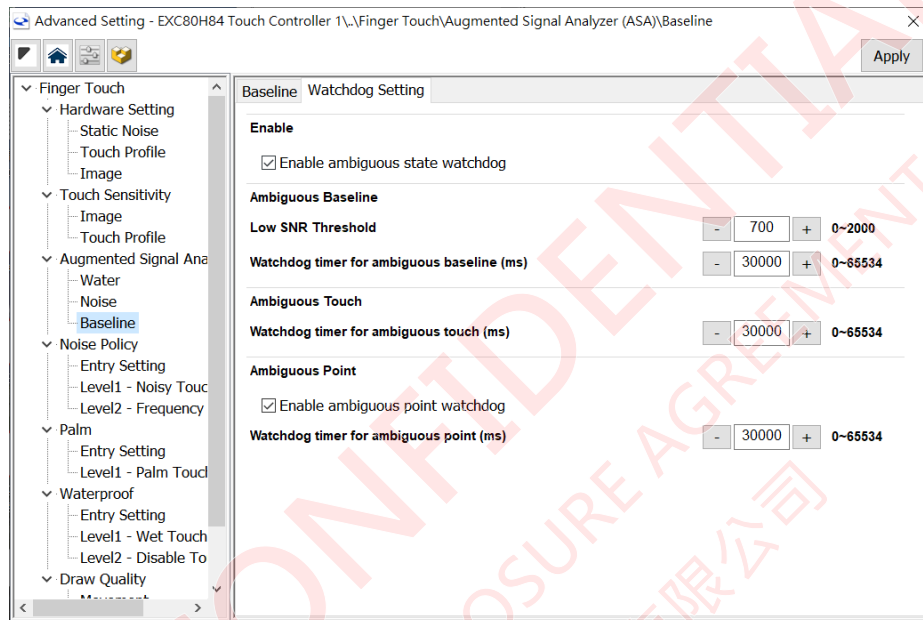


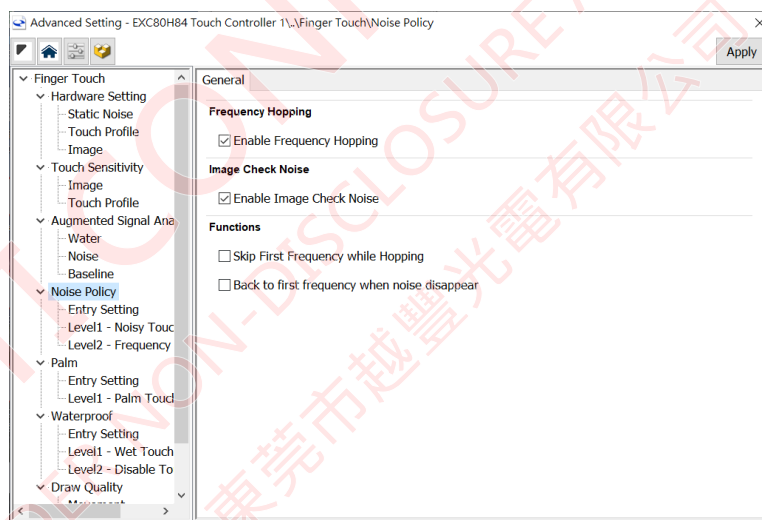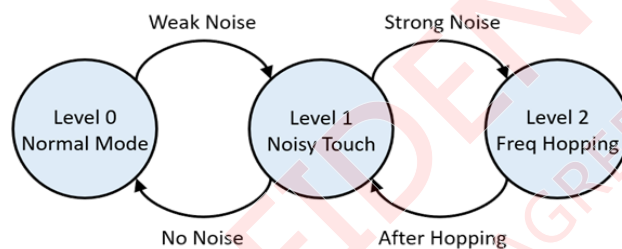| ASA Watchdog Setting | |
|---|---|
| Enable ambiguous state watchdog | Enable ASA ambiguous state watchdog function. |
| **Ambiguous Baseline** | |
| Low SNR Threshold | The SNR threshold (Unit: 1%) of ambiguous condition. |
| Watchdog timer for ambiguous baseline | The timeout value to reset baseline in ambiguous baseline condition. |
| **Ambiguous Touch** | |
| Watchdog timer for ambiguous touch | The timeout value to reset baseline in ambiguous touch condition-- a touch signal is detected by the controller but is not strong enough to report a valid touch. |
| **Ambiguous Point** | |
| Enable ambiguous point watchdog | Enable ambiguous point watchdog function. Ambiguous point -- A point that is not moving and is continuously reported. |
| Watchdog timer for ambiguous point (ms) | The timeout value to reset baseline in ambiguous point condition. |

### 3.2.F. **Finger Touch \ Noisy Policy**

EETI touch controller can automatically detect signal noises in the environment, and then trigger different levels of noise protection to mitigate the interference.

**Level0 - Normal mode**: The touch controller stays in this state regularly.

**Level1 - Noisy Touch**: If signal noises get stronger (Meet entry settings →L1), the touch controller enters Level1 - Noisy Touch. Sensitivity and other miscellaneous settings will be adjusted to stabilize the touch performance.
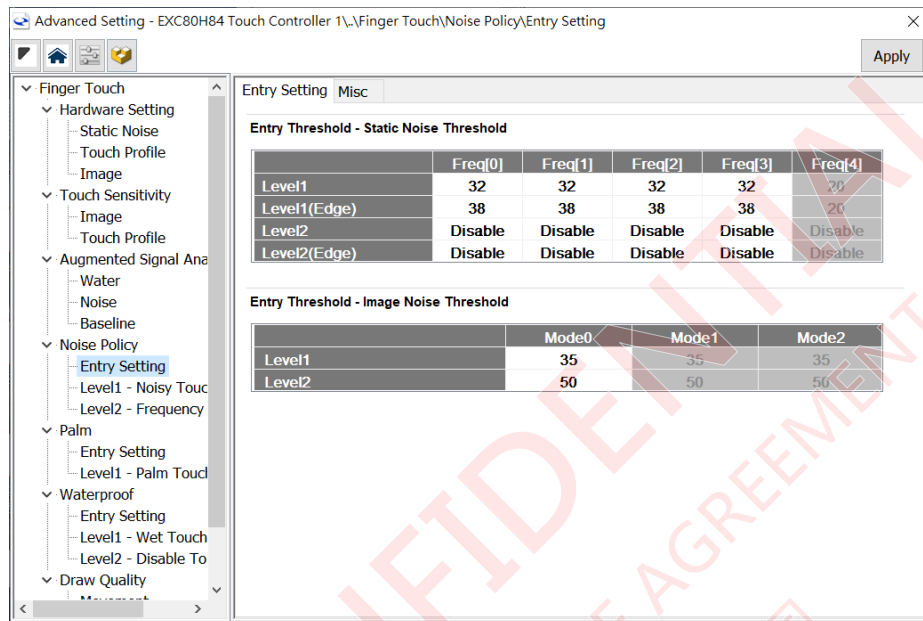
**Level2 - Frequency Hopping:** If signal noises get too strong (Meet entry settings →L2), the touch controller will do frequency hopping to avoid noise interference.





| Noise Policy General | |
|---|---|
| Frequency Hopping | Enable Noisy Touch and Frequency Hopping feature. |
| Image Check Noise | When Image Check Noise is enabled, Static Noise becomes pre-check information for image SNR analysis. |
| Functions | **Skip First Frequency while Hopping:** When doing frequency hopping, controller will skip the first working frequency. **Back to first frequency when noise disappear:** The controller will hop back to the first working frequency when all the noises disappeared and the controller remains idle for 20 seconds. |

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i. **Noise Policy \ Entry Setting**

- Entry Setting \ Entry Setting



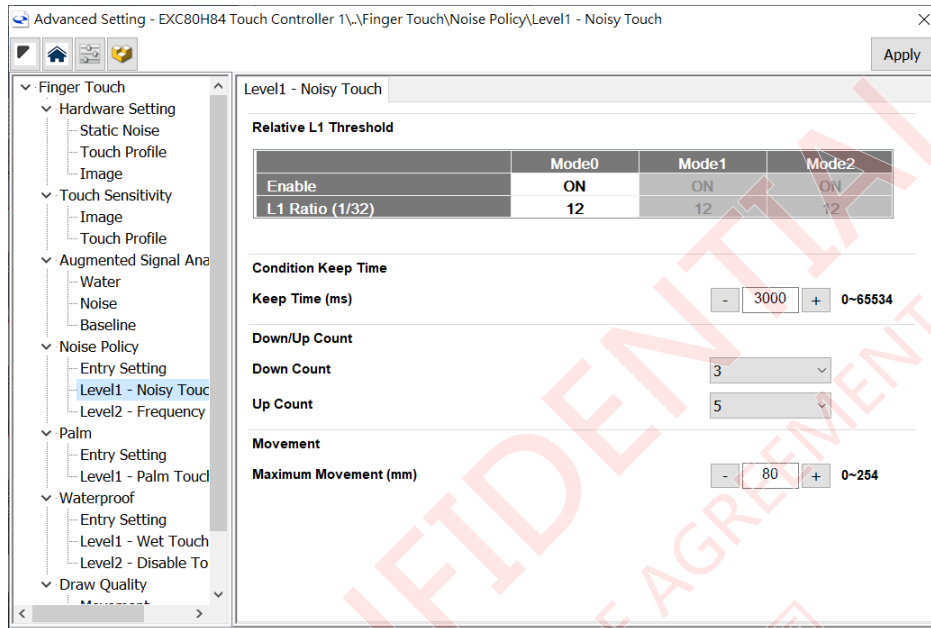| Noise Policy Entry Setting | |
|---|---|
| **Entry Threshold - Static Noise Threshold** | |
| Level1<br>Level1(Edge) | When Static Noise is greater than Level1 threshold, the controller enters Level 1 state. |
| Level2<br>Level2(Edge) | When Static Noise is greater than Level2 threshold, the controller enters Level 2 state. |
| **Entry Threshold – Image Noise Threshold (Unit: %)**<br>※The following thresholds will only be valid when Image Check Noise is enabled. | |
| Description | **ImageNoise**, which refers to the noise to signal ratio of Image data, can be read in Firmware Status window shown below. |
| Level1 | When **ImageNoise** is greater than Level1 threshold, the controller enters Level 1 state. |
| Level2 | When **ImageNoise** is greater than Level2 threshold, the controller enters Level 2 state. |

• Entry Setting \ Misc.
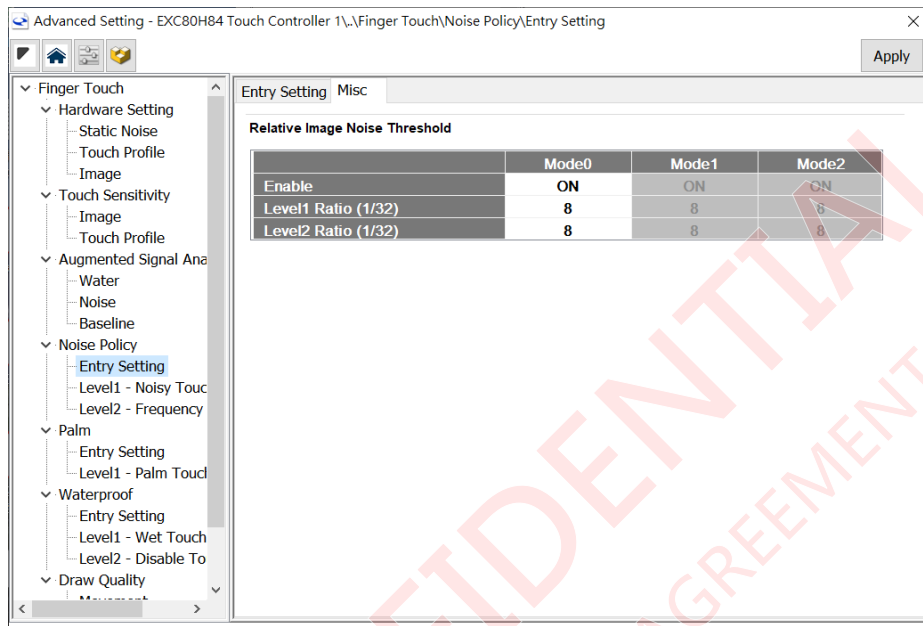


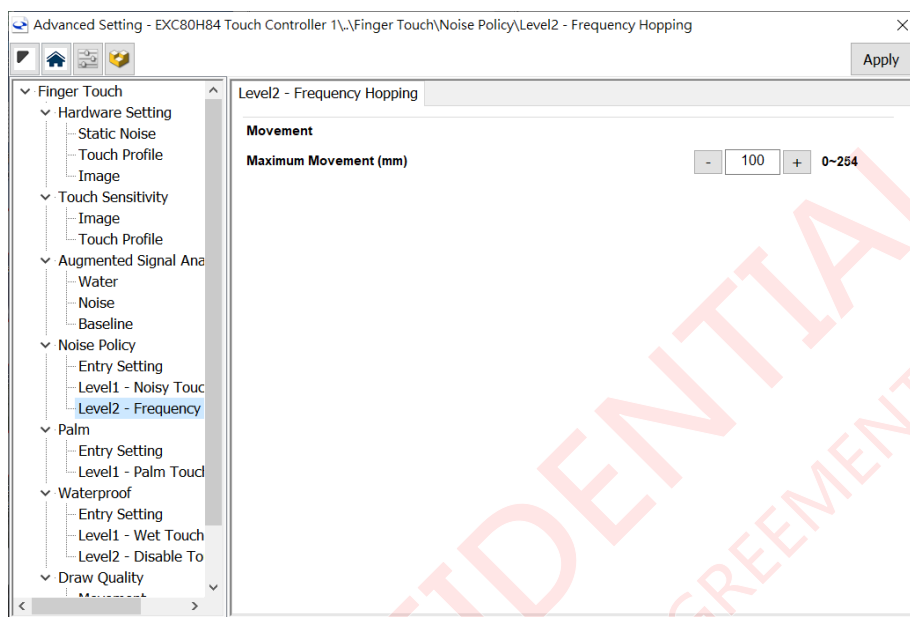| Noise Policy Misc | |
|---|---|
| **Relative Image Noise Threshold** | |
| Description | ※Enable this feature to calibrate Image Noise measurement when having high sensitivity settings.<br>※The higher the ratio is, the smaller the Image Noise is. |
| Level1 Ratio (1/32) | The factor used to calculate relative ImageNoise for entering Level1 state. |
| Level2 Ratio (1/32) | The factor used to calculate relative ImageNoise for entering Level2 state. |

## ii.　Noise Policy \ Level 1- Noisy Touch

The touch behavior after entering level 1.



| Noise Policy Level 1 Setting | |
|---|---|
| **Relative L1 Threshold** | |
| Enable | Enable Relative L1 threshold feature at Level 1: Noisy Touch. |
| L1 Ratio (1/32) | The factor used to calculate the relative L1 threshold.(i.e. $$CMax \times \frac{L1\ Ratio}{32})$$ |
| **Condition Keep Time** | |
| Keep Time (ms) | Duration of Level1. If neither noise nor finger is detected after this amount of time, FW enters normal mode. |
| **Down/Up Count** | |
| Down count | Down count settings at Level 1: Noisy Touch. |
| Up count | Up count settings at Level 1: Noisy Touch. |
| **Movement** | |
| Maximum Movement (0.1mm) | The maximum distance between any two points to connect together at Level 1: Noisy Touch. *Any two points closer to each other than this distance will be connected into a line. |

### iii.　**Noise Policy \ Level2 – Frequency Hopping**



| Noise Policy Level 2 Setting | |
|---|---|
| Maximum Movement (mm) | The maximum distance between any two touch points to connect together at the frequency hopping moment. |

### 3.2.G. **Finger Touch \ Palm**

EETI controller can automatically detect a palm contact and reject it.

**Normal mode**: The touch controller stays in this state regularly.

**Level1 - Palm Touch**: If the touch controller detects a palm contact (Meet entry settings →L1), the touch controller enters Level1 - Palm Touch. The palm contact and signal within its affected range will be rejected.
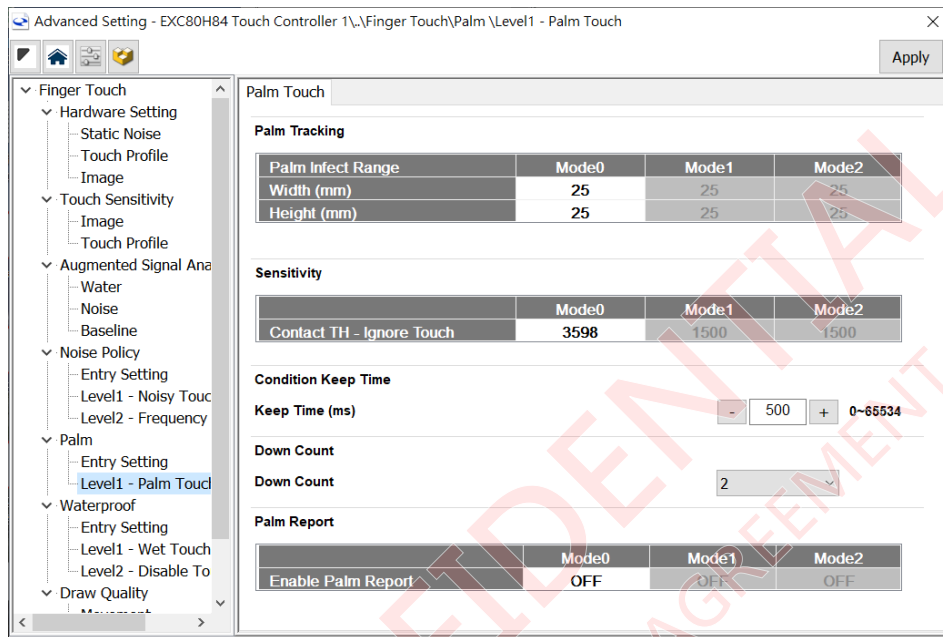
Palm or eGalaxPen  is detected

Level 0
Normal Mode

Level 1
Palm Touch

Palm or eGalaxPen is removed
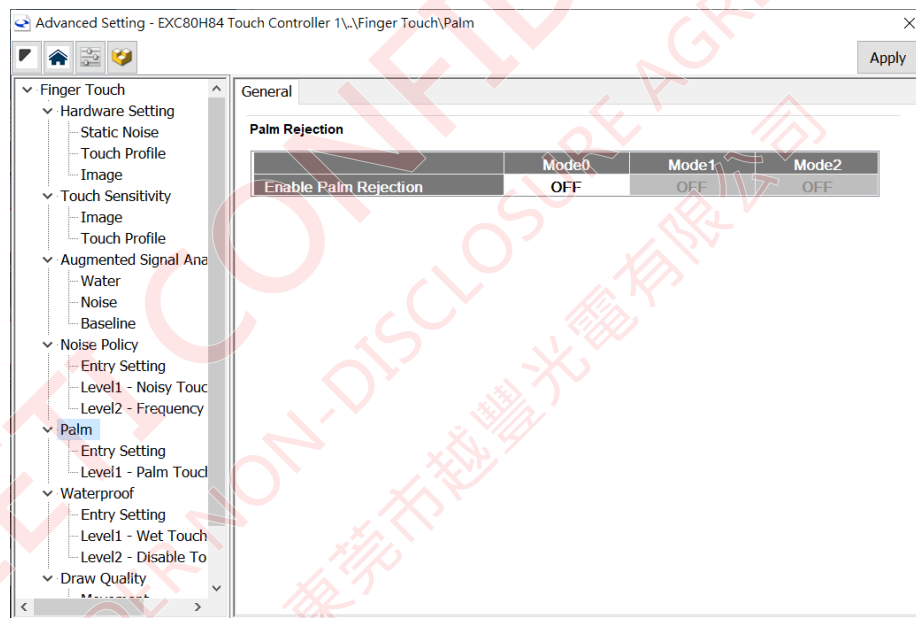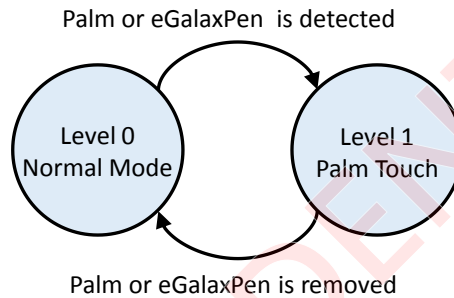
| Palm General Setting | |
|---|---|
| Enable Palm Rejection | Enable/Disable palm rejection function. |

## i.    Palm \ Entry Setting
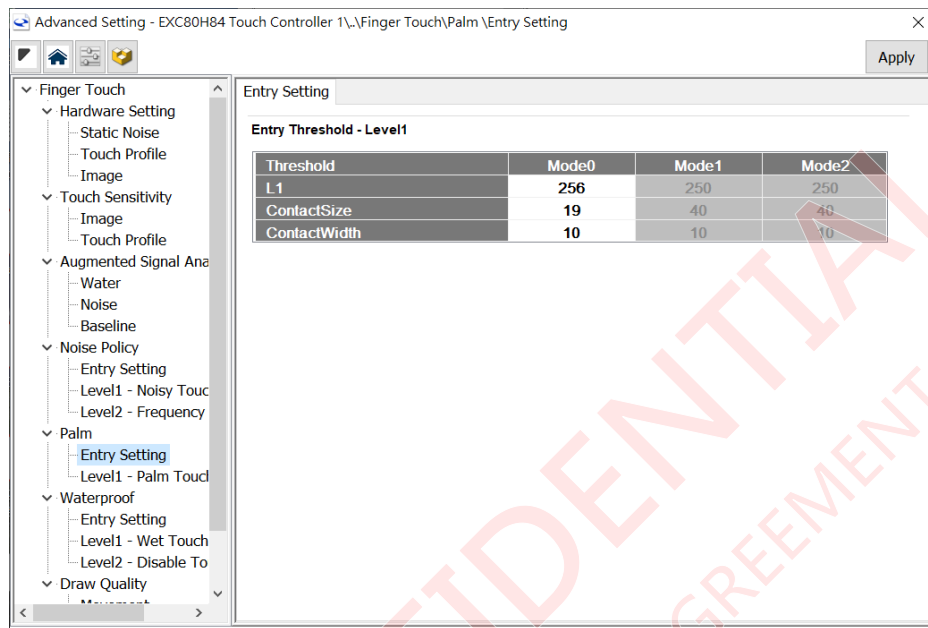


| Palm Entry Setting | |
|---|---|
| L1 | Any node that has L1 signal greater than this threshold will be regarded as a "palm" node. This threshold is usually set 1.2* Sensitivity-L1 threshold. |
| Note | The controller will enter Level1: Palm Touch when any of the condition below is met. |
| ContactSize | When the touch size is larger than this threshold, the controller enters Level1: Palm Touch. |
| ContactWidth | When a contact's width is larger than this threshold, the controller enters Level1: Palm Touch. |

### ii. Palm \ Level1 - Palm Touch



| Palm Level 1 – Palm Touch Setting | |
|---|---|
| **Palm Tracking** | |
| Palm Infect Range Width(mm)/Height(mm) | The infected range to block contacts near a palm. Any finger touch within this extended range will be disabled. |
| **Sensitivity** | |
| Contact TH – Ignore Touch | Ignore any finger touch with Contact signal greater than this threshold at Level: Palm Touch. |
| **Condition Keep Time** | |
| Keep Time (ms) | Duration of staying at Level1: Palm Touch. (Unit: ms) |
| **Down Count** | |
| Down Count | Down Count for exiting Level1: Palm Touch. (Unit: frame) |
| **Palm Report** | |
| Enable Palm Report | Report a palm event and coordinates to the host system. This feature is usually used for some application such as palm painting, palm rejection, eraser, large buttons, etc. |

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### 3.2.H. **Finger Touch \ Waterproof**

EETI touch controller can automatically detect the quantity of water(WQ) on the touch screen surface and trigger different levels of water protection to mitigate the interference.

**Normal mode**: The touch controller stays in this state regularly.

**Level1 - Wet Touch**: If the touch screen is slightly wet (Meet entry settings →L1), the touch controller enters Level1 - Wet Touch. Sensitivity and other miscellaneous settings will be adjusted to stabilize the touch performance.

**Level2 – Disable Touch:** If the touch screen is wet or covered by too much water (Meet entry settings →L2), the touch controller will disable the touch function temporarily to stabilize the touch performance, until water is removed.
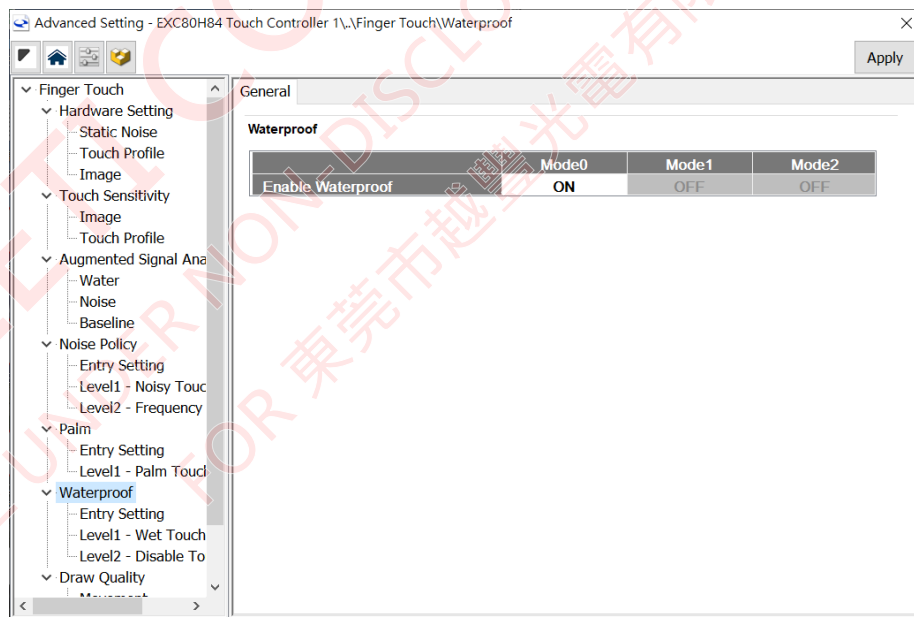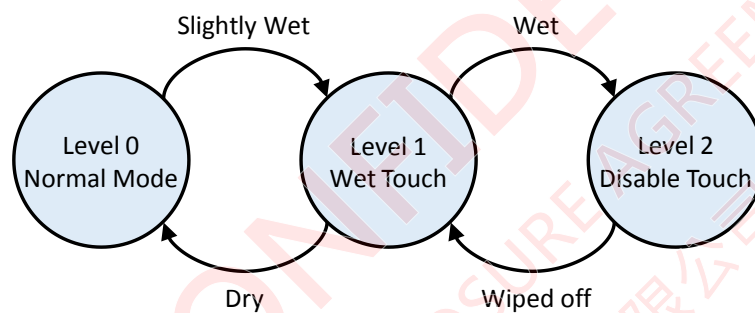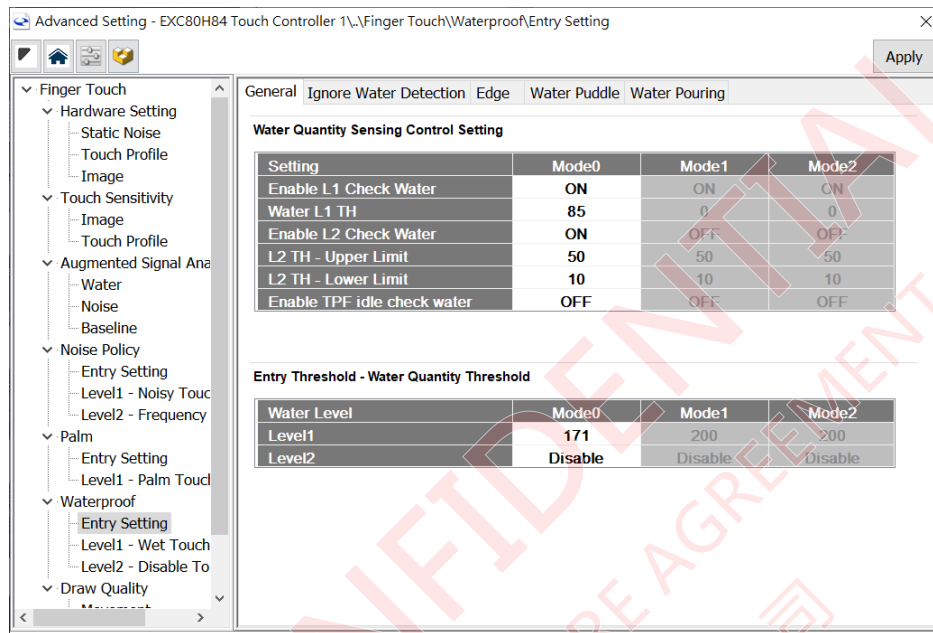




| Waterproof General Setting | |
|---|---|
| Enable | Enable/Disable waterproof feature. |

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- Waterproof \ Prevent Ghost Touch
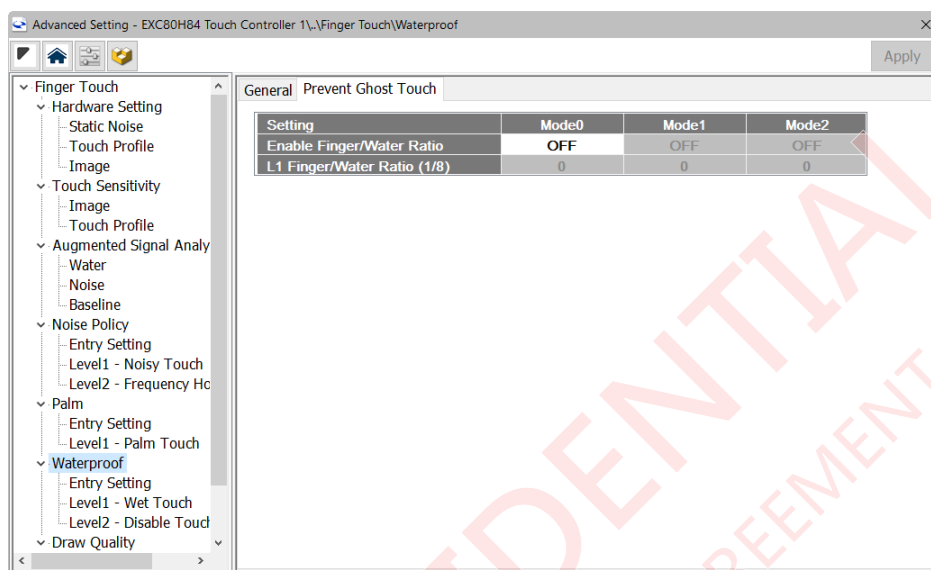


| Waterproof Prevent Ghost Setting | |
|---|---|
| Enable Finger/Water Ratio | Enable/Disable Finger/Water Ratio to prevent ghost touch from water interference.<br>Finger/Water Ratio means the ratio of (L1 local maximum) / (L1 local minimum). |
| L1 Finger/Water Ratio(1/8) | The Finger/Water Ratio Threshold. If a contact's Finger/Water Ratio is smaller than this threshold, it will be rejected. |

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i. **Waterproof \ Entry Setting**

- Entry Setting \ General



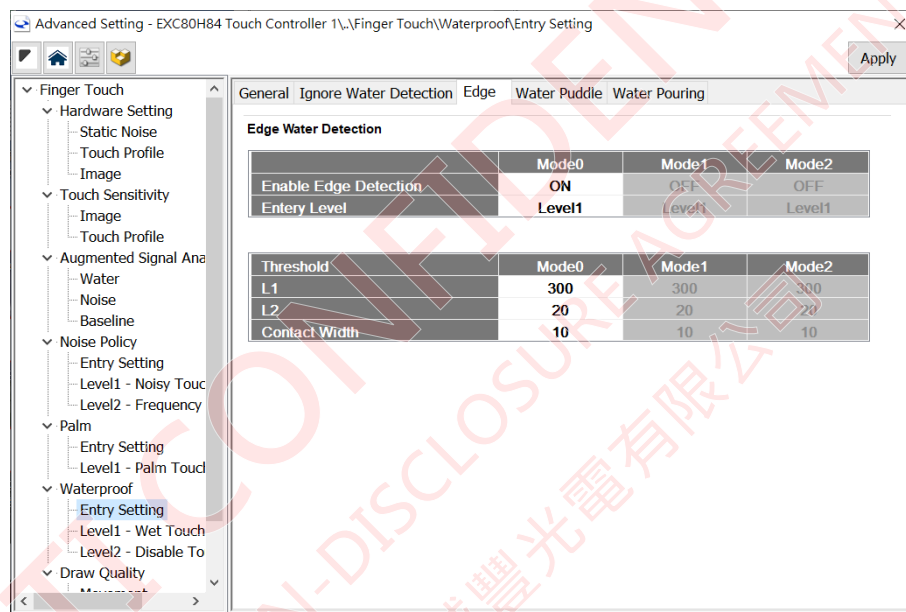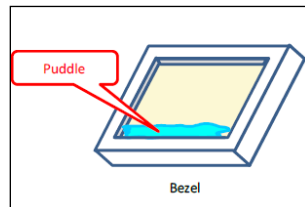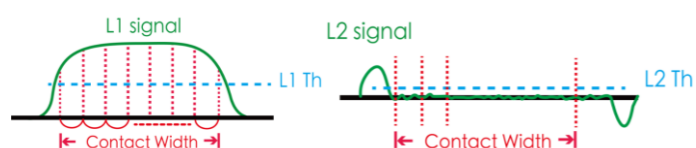| Waterproof Entry Setting | |
|---|---|
| **Water Quantity Sensing Control Setting** | |
| Enable L1 Check Water | Set L1 to be one of the WQ sources. |
| Water L1 TH | The negative L1 signal will be counted into WQ when its absolute value is greater than Water L1 TH. |
| Enable L2 Check Water | Set L2 to be one of the WQ sources. |
| L2 TH – Upper Limit<br>L2 TH – Lower Limit | The absolute L2 value within [Lower, Upper] range will be counted in to WQ.<br>※Please note that the WQ derived from L1 and L2 are NOT accumulated. Only the highest WQ will be shown in eGalaxTuner. |
| Enable TPF idle check water | Increase the water detection sensitivity. |
| **Entry Threshold – Water Quantity TH　(WQ can be read in Firmware Status window)** | |
| Level1 | If WQ is greater than Level1 threshold, the controller enters Level1: Wet Touch. |
| Level2 | If WQ is greater than Level2 threshold, the controller enters Level2: Disable Touch. |

- Entry Setting \ Ignore water detection
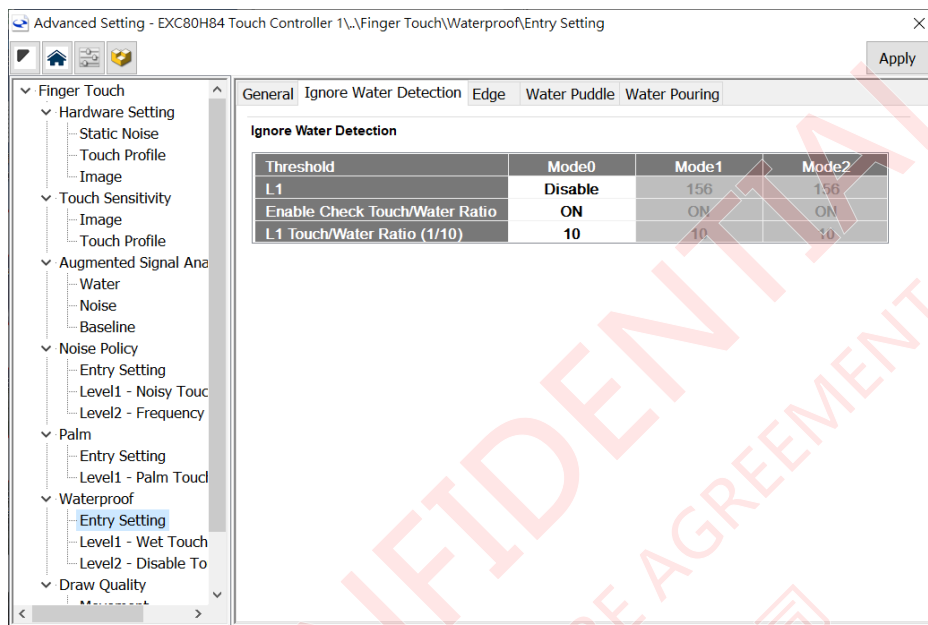


| Ignore Water Detection | |
|---|---|
| L1 | WQ will not be counted if the maximum value of L1 signal is greater than this threshold.<br>Set the value 65534 to disable this function. |
| Enable Check Touch/Water Ratio | ON/OFF |
| L1 Touch/Water Ratio (1/10) | If $\frac{CMax}{Cmin}$ is greater than $\frac{L1\ Touch/Water\ Ratio}{10}$, the controller will NEVER enter Waterproof Leve1/2 even the entry thresholds below are met. |

- Entry Setting \ Edge

When water is trapped on the touchscreen bezel, its siganl may resemble the finger signal. **Edge Water Detection** can analyze the sgianl pattern on the edge channels and trigger water protection if needed.





| Waterproof Edge Entry Setting | |
| --- | --- |
| **Edge Water Detection** | |
| Enable Edge Detection | Enable water signal analysis on edge. |
| Entry Level | Level1: Enter Wet touch when **Edge Water** is detected. Level2: Enter Disable touch when **Edge Water** is detected. |
| **Threshold** | |
| L1 | Any contact wider than Contact Width threshold, with its L1 signal <u>greater</u> than L1 threshold and L2 signal <u>less</u> than L2 threshold, will be regarded as **Edge Water.** |
| L2 | |
| Contact Width | ※Only analyze the image data on the boundary(Tx0/TxN).  |

- Entry Setting \ Water Puddle
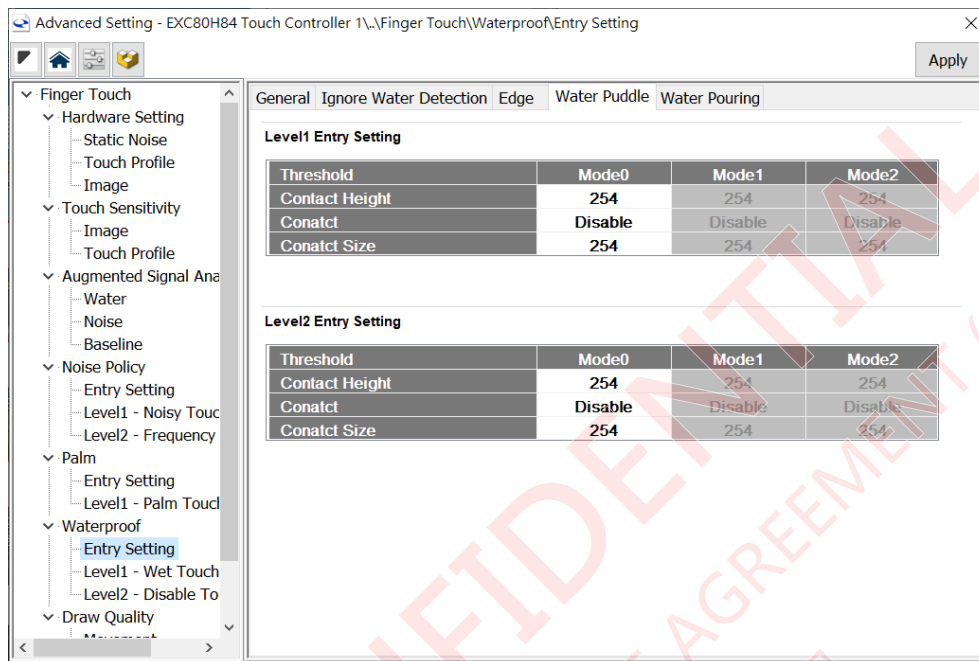


| Waterproof Puddle Entry Setting | |
|---|---|
| **Level1 Entry Setting** | |
| Contact Height | Enter Level1 - Wet Touch when a contact's height is greater than the threshold. |
| Contact | Enter Level1 - Wet Touch when a contact's signal is greater than the threshold. |
| Contact Size | Enter Level1 - Wet Touch when a contact's size is larger than the threshold. |
| **Level2 Entry Setting** | |
| Contact Height | Enter Level2 - Disable Touch when a contact's height is greater than the threshold. |
| Contact | Enter Level2 - Disable Touch when a contact's signal is greater than the threshold. |
| Contact Size | Enter Level2 - Disable Touch when a contact's size is larger than the threshold. |

- Entry Setting \ Water Pouring
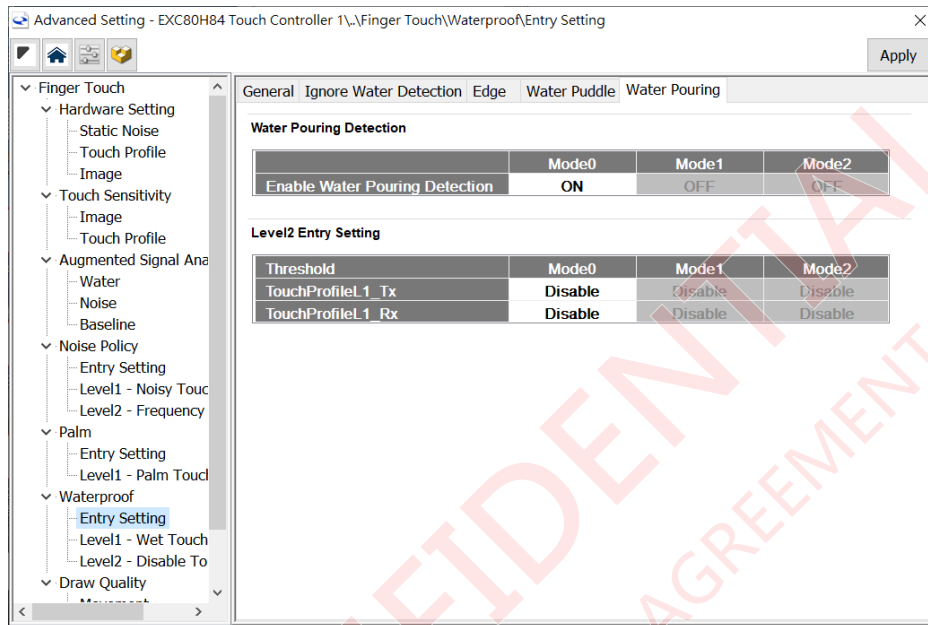


| Waterproof Pouring Entry Setting | |
|---|---|
| **Water Pouring Detection** | |
| Enable Water Pouring Detection | Enable Water Pouring signal analysis function. |
| **Level2 Entry Setting** | |
| TouchProfileL1_Tx | Enter Level2 - Disable Touch when the L1 signal on Touch Profile Tx is greater than the threshold. |
| TouchProfileL1_Rx | Enter Level2 - Disable Touch when the L1 signal on Touch Profile Rx is greater than the threshold. |

## ii. **Waterproof \ Level1 - Wet Touch**

- Level1 - Wet Touch \ General

  **Sensitivity in Wet Touch** refers to a sensitivity setting set for Wet Touch state. This setting shall have higher value than the normal sensitivity setting in order to stabilize the touch experience in wet use.
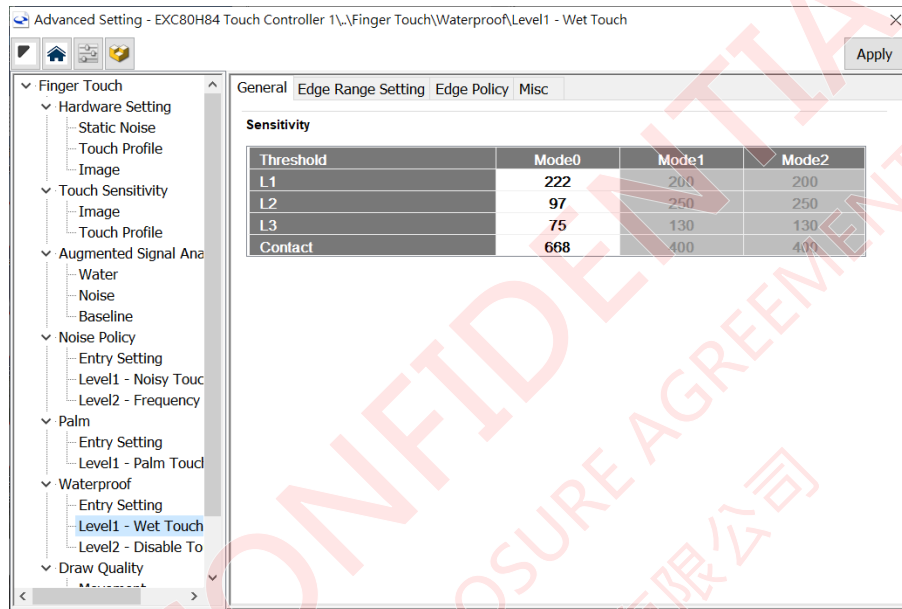


| Sensitivity Setting | |
|---|---|
| L1 | The typical L1 threshold is 80% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |
| L2 | The typical L2 threshold is 80% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |
| L3 | The typical L3 threshold is 80% of the Avg value. User can adjust this threshold for touch sensitivity optimization. |
| Contact | Refer to eGalaxTuner\Draw Test\ Touch Information Window. Place one finger on the screen with a regular contact pressure. The typical contact threshold is 80% of the contact value. User can adjust this threshold for touch sensitivity optimization. |

- Level1 - Wet Touch \ Edge Range Setting
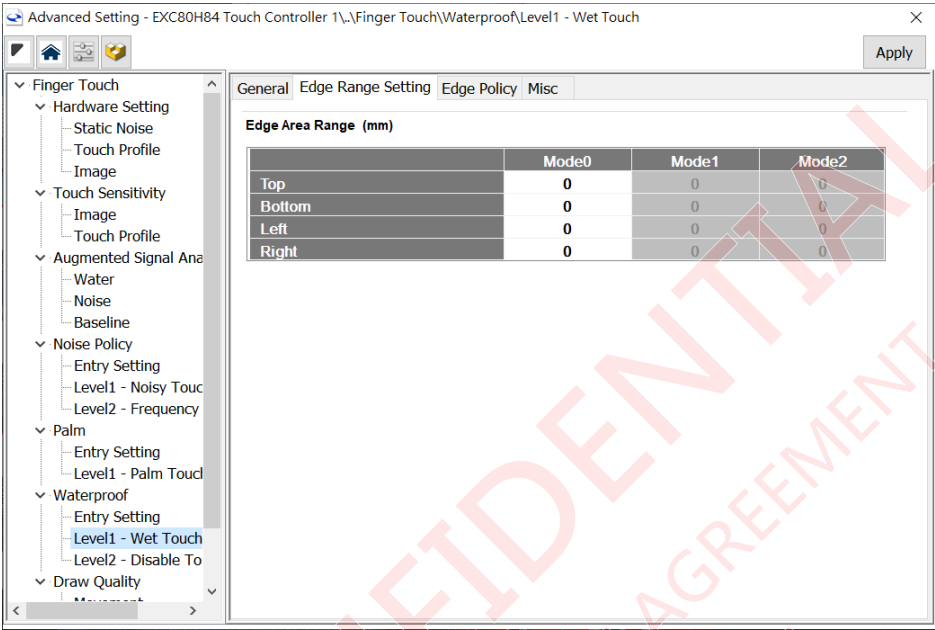


| Edge Area Range | |
|---|---|
| Top/Bottom/Left/ Right | These parameters define the width of each edge. Areas extended from boundaries by the distance set in the parameters will be defined as edge areas.(Unit: mm) |

- Level1 - Wet Touch \ Edge Policy
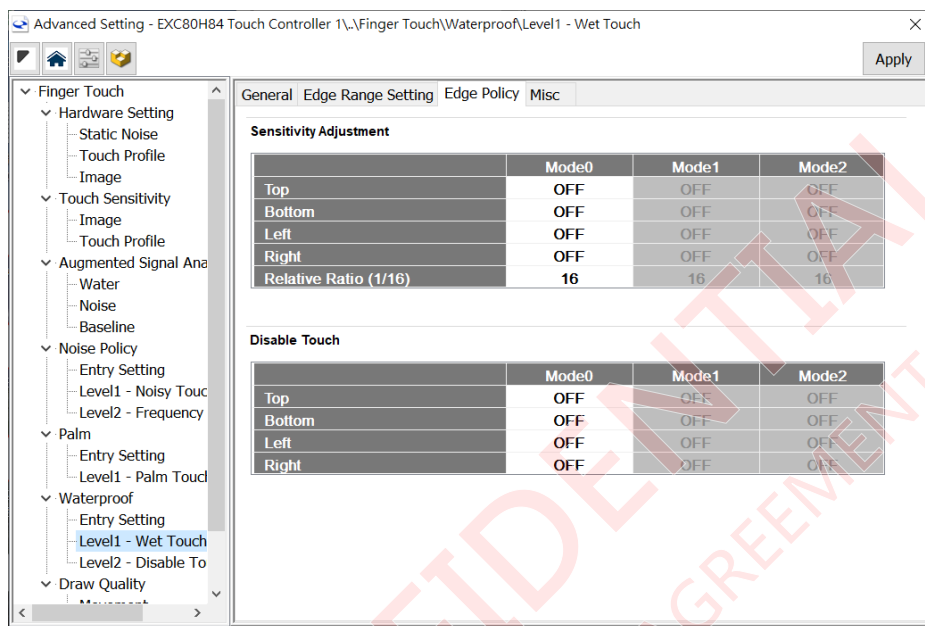


| Edge Policy | |
|---|---|
| Sensitivity Adjustment | Enable this feature to increase the threshold at specific edge areas by **Ratio (1/16)**. |
| Disable Touch | Enabling this feature to disable the finger touch function at specific edge areas. |

- Level1 - Wet Touch \ Misc.
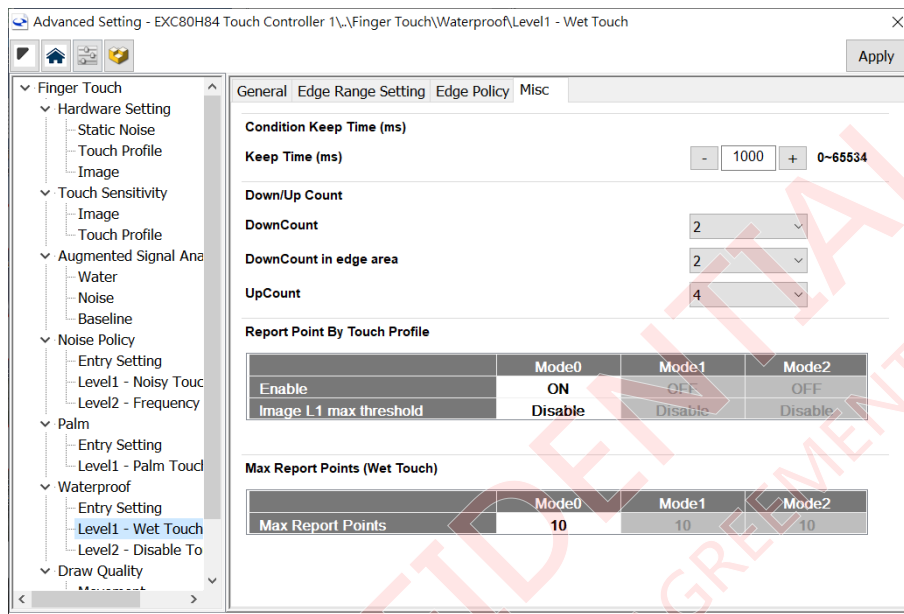


| Waterproof Level1 – Wet Touch Misc Setting | |
|---|---|
| **Condition Keep Time (ms)** | |
| Keep Time (ms) | The duration staying in Wet Touch state when there is no water. |
| **Down/Up Count** | |
| DownCount | Down count settings at Level 1: Wet Touch. |
| DownCount in edge | Down count settings in edge areas at Level 1: Wet Touch. |
| UpCount | Up count settings at Level 1: Wet Touch. |
| **Report Point By Touch Profile** | |
| Enable | Refer to touch profile data to improve touch position accuracy. When this feature is enabled, the max report point in Level1-Wet Touch will be limited to 2. |
| Image L1max threshold | Any finger touches with L1 signal greater than this threshold will be discarded. |
| **Max Report Points (Wet Touch)** | |
| Max Report Points | The maximum number of supported touches in Wet Touch state. |

### iii. **Waterproof \ Level2 - Disable Touch**
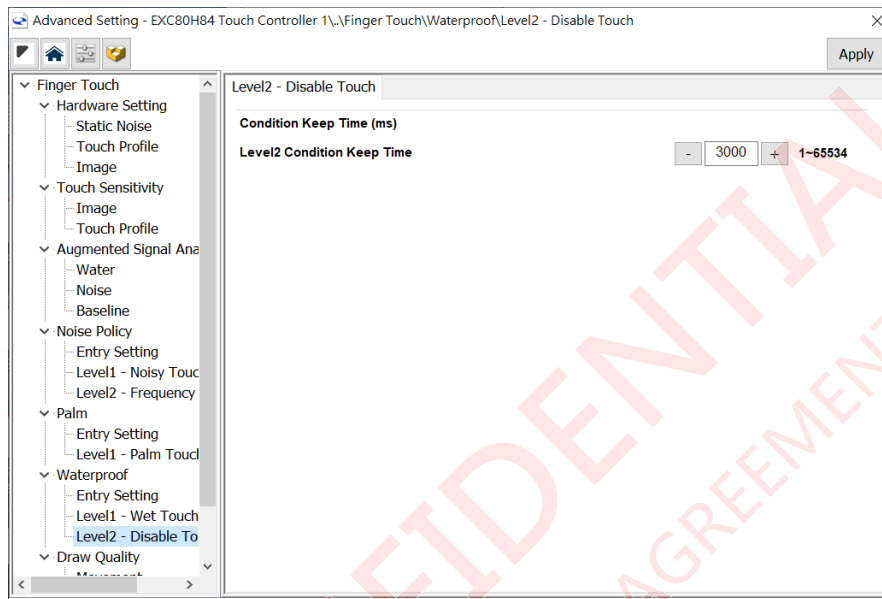


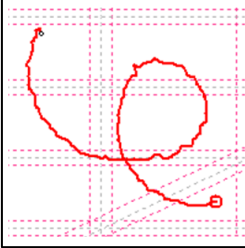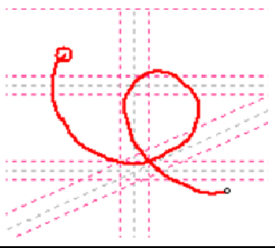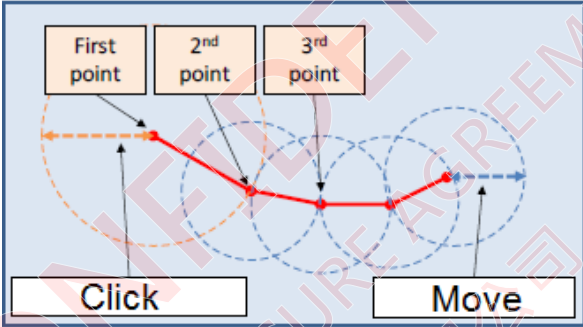| Waterproof Level2 - Disable Touch Setting | |
|---|---|
| Level2 Condition Keep Time | The duration staying in Disable Touch state when WQ< Level2 threshold. |

### 3.2.I. Finger Touch \ Draw Quality

Draw Quality allows user to configure the settings related to user experience, such as anti-aliasing level, finger separation, and edge compensation, etc.

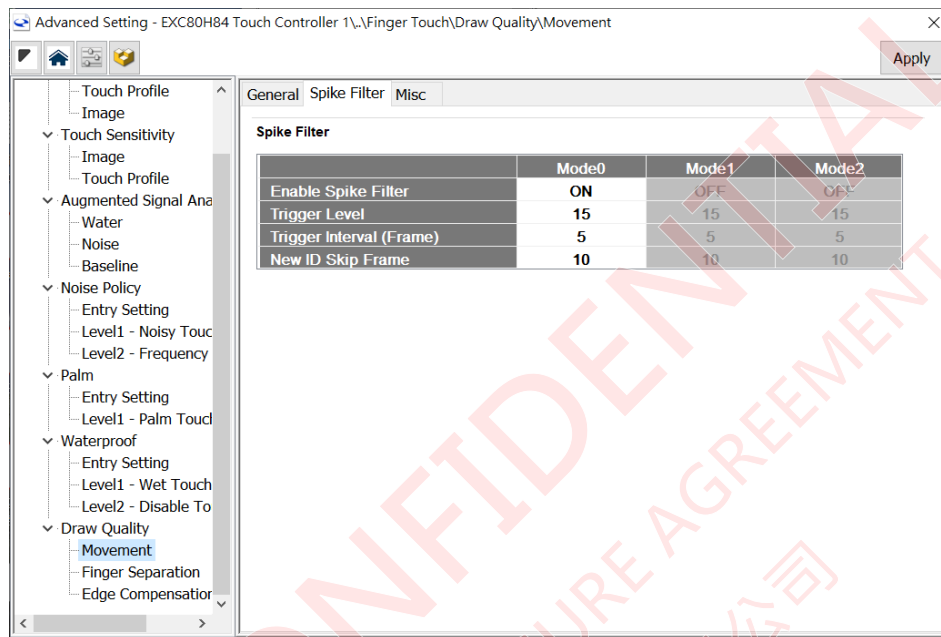#### i. Draw Quality \ Movement

- Movement \ General
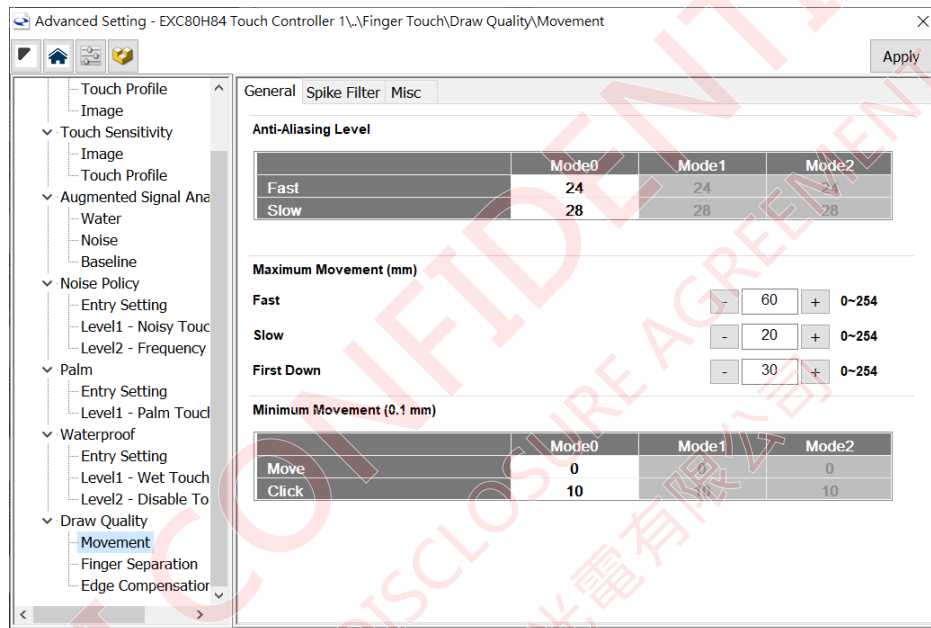


| Anti-Aliasing Level | |
|---|---|
| Description | Drawing line will be smoother when the higher Anti-Aliasing level is applied, but latency may increase. The Anti-Aliasing Level will be dynamically adjusted according to the drawing speed.  |
| Fast | The Anti-Aliasing Level applied when drawing fast. |
| Slow | The Anti-Aliasing Level applied when drawing slowly. |

| Maximum Movement (mm) | |
|---|---|
| Description | Maximum movement refers to the maximum distance between any two touch points to connect. |
| Fast | The Maximum Movement settings applied when drawing fast. |
| Slow | The Maximum Movement settings applied when drawing slowly. |
| First Down | The Maximum Movement settings applied at the beginning of the movement. |
| **Minimum Movement (0.1mm)** | |
| Description | Minimum movement refers to the minimum distance a touch point needs to move over to report a new different coordinate.  |
| Move | Minimum movement for a touch point that has once moved. (Unit: 0.1 mm) |
| Click | Minimum movements for a first-down touch point. (Unit: 0.1 mm) ※This parameter can be increased if user find difficulty to register a "long press" due to jitters. |

- Movement \ Spike Filter

  Spike Filter aims to discard the touch points that are caused by radom noise interfernece, such as EFT, conducted noise, radiated noise, etc.
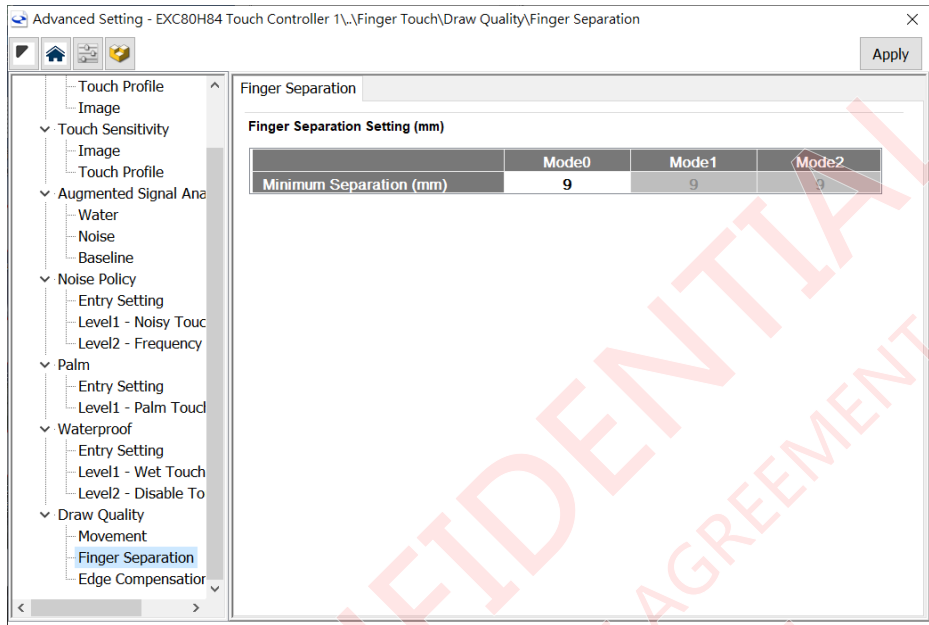


| Spike Filter | | | |
|---|---|---|---|
| | Mode0 | Mode1 | Mode2 |
| Enable Spike Filter | ON | OFF | OFF |
| Trigger Level | 15 | 15 | 15 |
| Trigger Interval (Frame) | 5 | 5 | 5 |
| New ID Skip Frame | 10 | 10 | 10 |

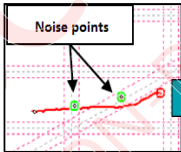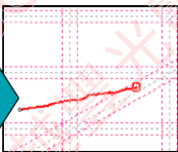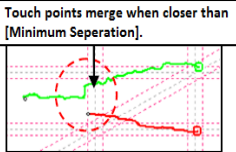| Spike Filter | |
|---|---|
| Enable Spike Filter | Enable Spike Filter feature. |
| Trigger Level | Spike Filter determine the noise spike based on the moving speed. This trigger level refers to the speed ratio of the new reporting touch to the remaining touch movement. |
| Trigger Interval (Frame) | Spike Filter will not be triggered within this interval. |
| New ID Skip Frame | The Down Count for reporting a new touch point after a noise spike is filtered. |

- Movement \ Misc
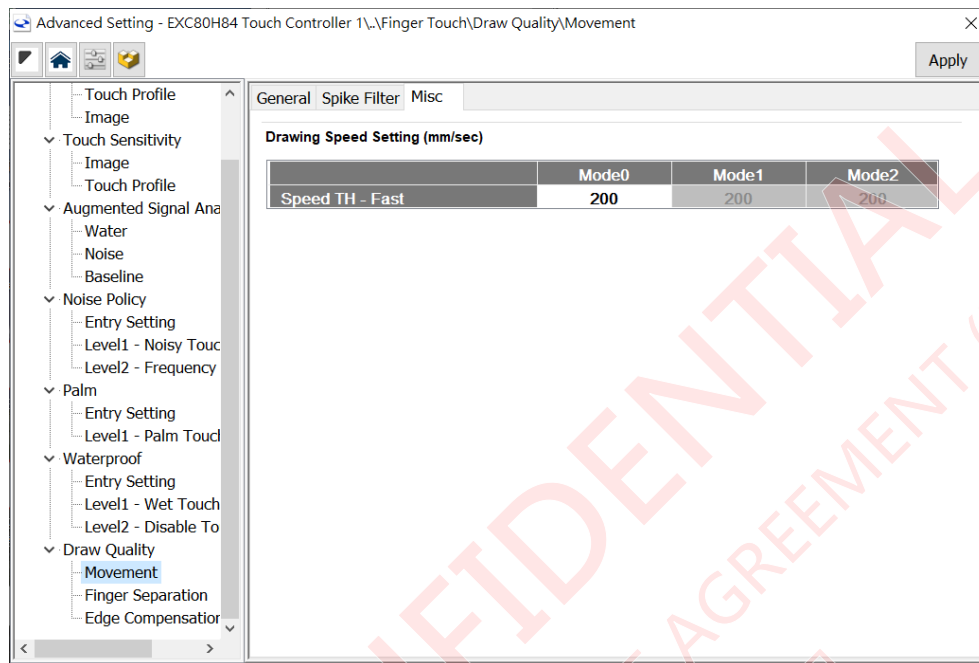


| Drawing Speed Setting (mm/sec) | |
|---|---|
| Speed TH - Fast | Anti-Aliasing Level-Fast will be applied when drawing speed is faster than this threshold. (Unit: mm/sec) |

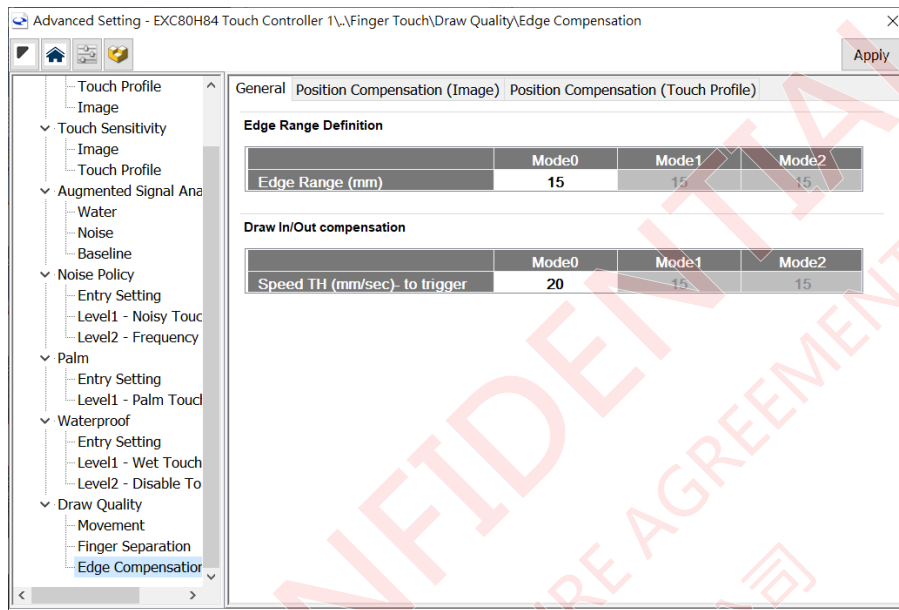ii.   **Draw Quality \ Finger Separation**



| Draw Quality Finger Separation Setting | |
| --- | --- |
| Minimum Separation (mm): | Any two points closer than this distance will be merged into one point.<br>※This parameter can be used to eliminate undesired noise points.<br> |

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### iii. **Draw Quality \ Edge Compensation**

- Edge Compensation \ General



| General | |
|---|---|
| **Edge Range Definition** | |
| Edge Range (mm) | Define the edge area for Draw In/Out compensation. |
| **Draw In/Out compensation** | |
| Speed TH (mm/sec)- to trigger | If a touch point is moving faster than this threshold in edge areas, Draw In/Out compensation will be triggered to improve draw in and draw out performance. |

- Edge Compensation \ Position Compensation (Image)
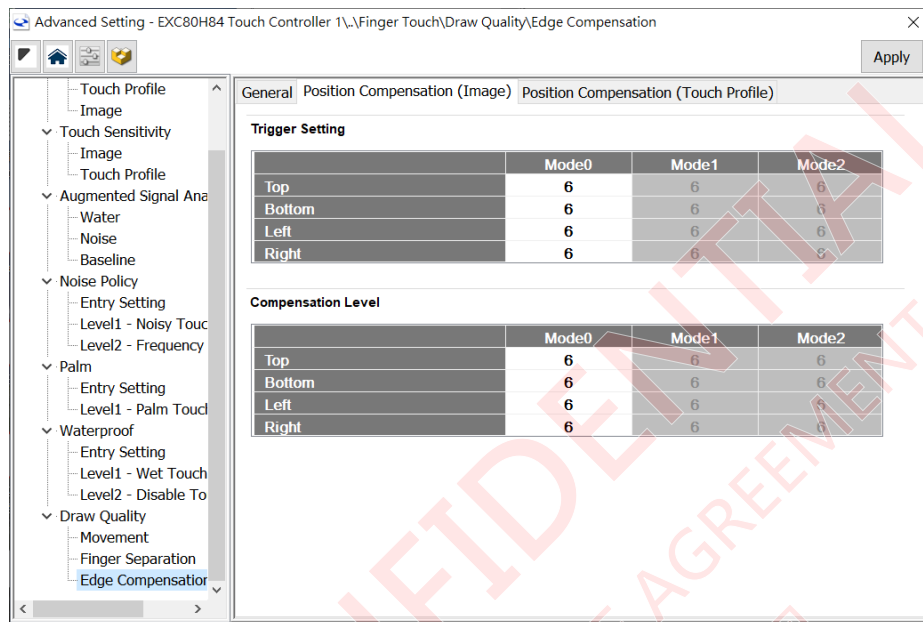


| Position Compensation (Image) | |
|---|---|
| Description |  |
| Trigger Setting | The position compensation area. Increase this parameter to shrink the compensation area; decrease this parameter to enlarge the compensation area. |
| Compensation Level | Increase the compensation level can make the touch boundary close to the edge, decrease it can make the touch boundary away from the edge. |

- Edge Compensation \ Position Compensation (Touch Profile)

  The compensation settings used when Report point by Touch Profile or Report Point by Touch Profile(Waterproof) is on.
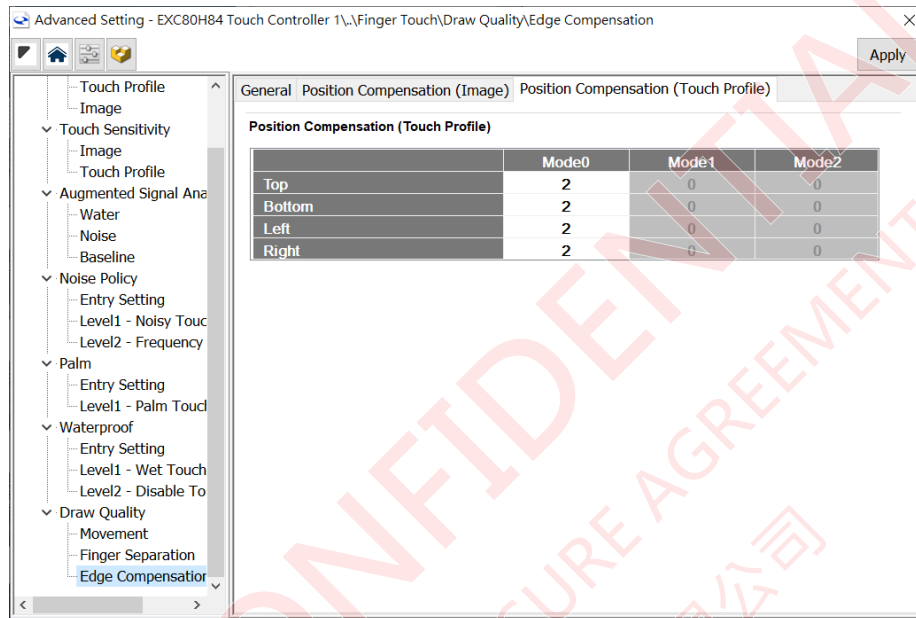


| Position Compensation (Touch Profile) | |
|---|---|
| Description | When algorithm takes touch profile data to make position, algorithm will reference Touch Profile compensation level to adjust the edge accuracy. |
| Position Compensation Level | Increase the compensation level can make the touch boundary close to the edge, decrease it can make the touch boundary away from the edge. |

# 4. eGalaxPen Advanced Settings

In environments such as hospital, heavy machinery factory, radio filled automobile, abrupt or constant noise might inject and affect pen performance and stability. TM+ Advanced opens hardware settings and frequencies settings, empowering user to maintain the optimized pen performance in noisy environment. Through TM+ Advanced, user also can configure pen's pressure, button, tilt and hovering features to enrich writing experience.
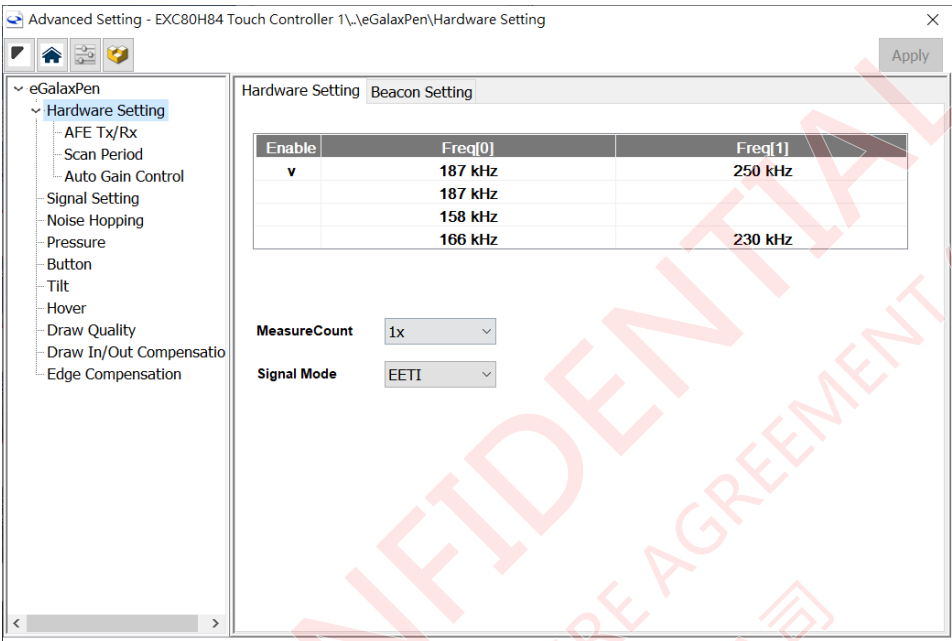
## 4.1. eGalaxPen
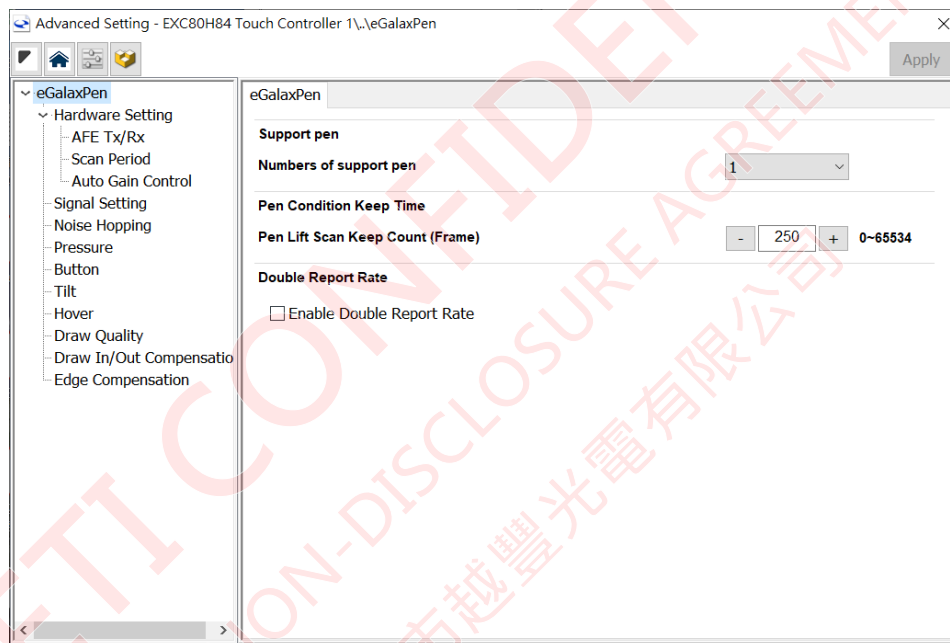


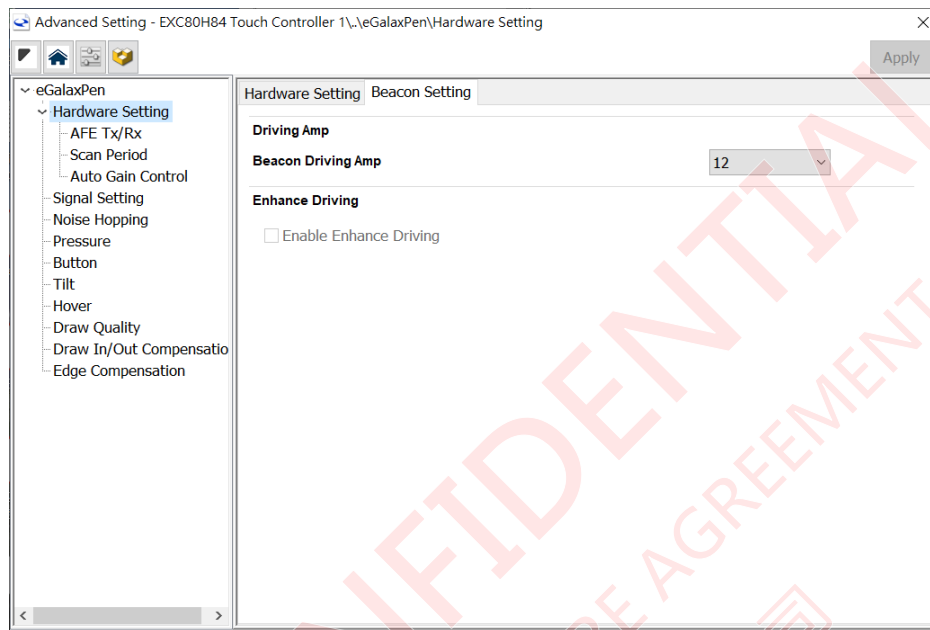| eGalaxPen Setting | |
|---|---|
| **Support Pen** | |
| Numbers of support pen | The number of the supported eGalaxPen inputs. |
| **Pen Condition Keep Time** | |
| Pen Lift Scan Keep Count (Frame) | The duration staying in pen state after eGalaxPen is not detected. |
| **Double Report Rate** | |
| Enable Double Report Rate | Enable this feature to increase the reporting rates of eGalaxPen. |

### 4.1.A. **eGalaxPen \ Hardware Setting**

- Hardware Setting \ Hardware Setting



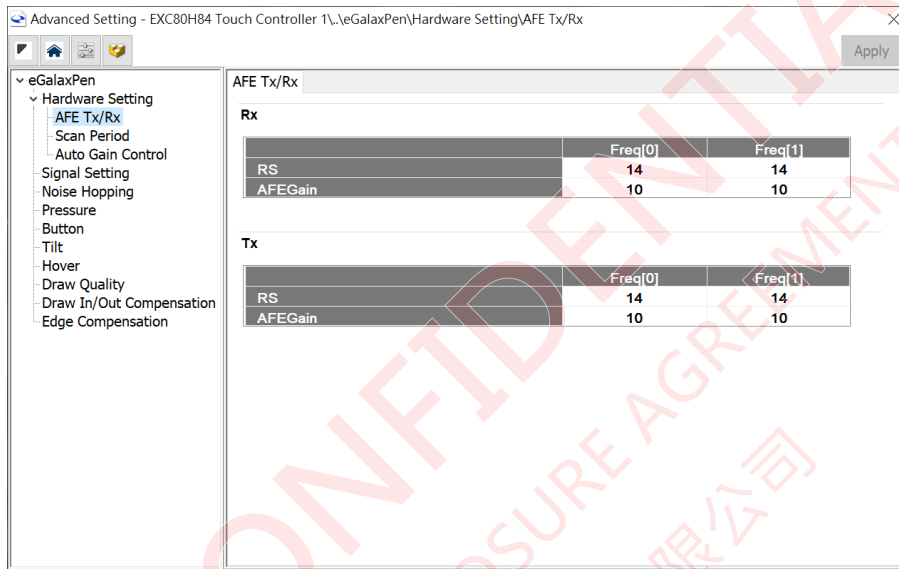| Frequency Table | |
|---|---|
| Frequency Table | Select the corresponding frequency pair according to the eGalaxPen in use. |
| MeasureCount | eGalaxPen signal measuring counts. |
| Signal Mode | Select the eGalaxPen signal type in use. |

- Hardware Setting \ Beacon Setting



| eGalaxPen Beacon Setting | |
|---|---|
| Beacon Driving Amp | The amplitude level of the beacon signal. |
| Enhance Driving | Drive the beacon signal from both Tx and Rx channels. |

## i. Hardware Settings \ AFE Tx/Rx

When detecting eGalaxPen, both Rx and Tx of touch sensor are served as receivers to receive the signal driven by eGalaxPen. The following hardware settings are to control the analog circuit processing. i.e. the attenuators and amplifiers.

Advanced Setting - EXC80H84 Touch Controller 1\..\eGalaxPen\Hardware Setting\AFE Tx/Rx

Apply

eGalaxPen
  Hardware Setting
    AFE Tx/Rx
    Scan Period
    Auto Gain Control
  Signal Setting
  Noise Hopping
  Pressure
  Button
  Tilt
  Hover
  Draw Quality
  Draw In/Out Compensation
  Edge Compensation

AFE Tx/Rx

**Rx**

|  | Freq[0] | Freq[1] |
|---|---|---|
| RS | 14 | 14 |
| AFEGain | 10 | 10 |

**Tx**

|  | Freq[0] | Freq[1] |
|---|---|---|
| RS | 14 | 14 |
| AFEGain | 10 | 10 |

## ii. **Hardware Settings \ Scan Period**

Scan Period refers to the duration for the controller to scan each eGalaxPen siganl. When eGalaxPens are in use, each eGalaxPen's signal should fall on the proper time range. User can use Delay Counts and Scan Counts to determine the starting point and the duration for signal scanning.
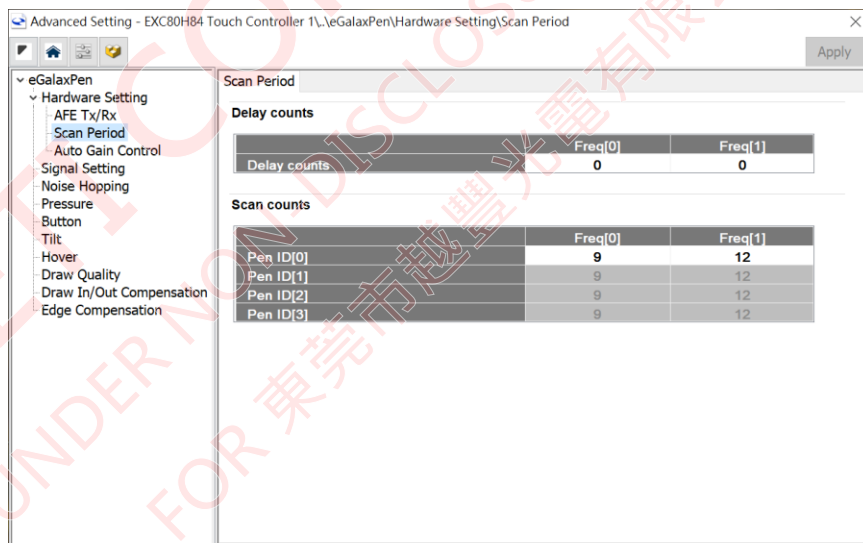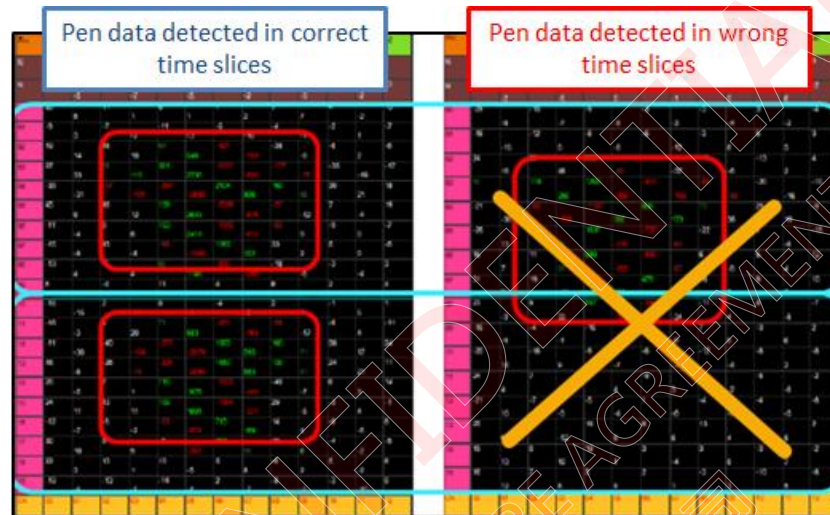




| Scan Period | |
|---|---|
| Delay counts | Delay counts can control the timing for the controller to start scanning eGalaxPen signal. |
| Scan counts | Define the number of the time slices for signal scanning of each eGalaxPen. |

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### iii. **Hardware Settings \ Auto Gain Control**

**Auto Gain Control** empower EETI controller to automatically apply different gain values according to the signal strength received from eGalaxPen. Users can set up to eight levels for Auto Gain Control.

Before an eGalaxPen is detected, the controller applies the maximum gain level; After the eGalaxPen is detected, the touch controller will apply the proper gain level to regulate the signal in certain range.
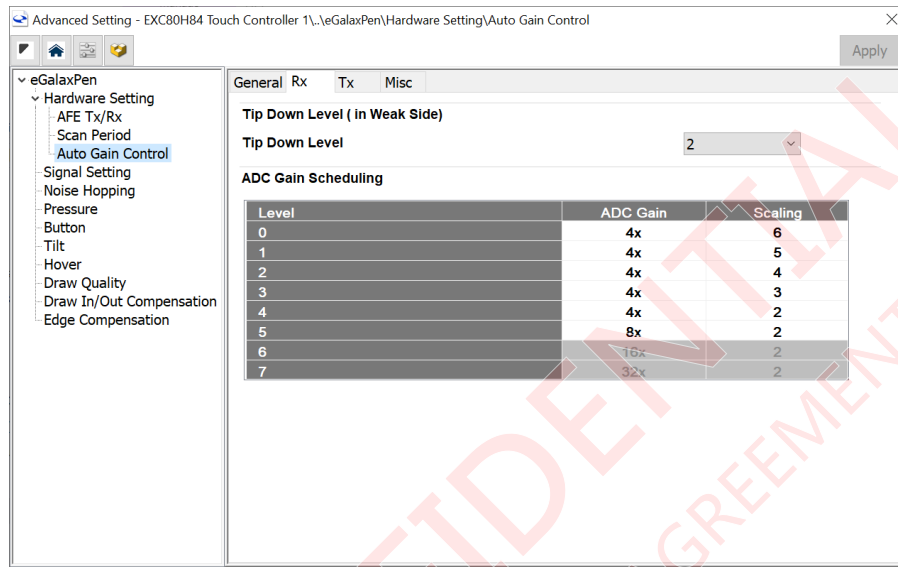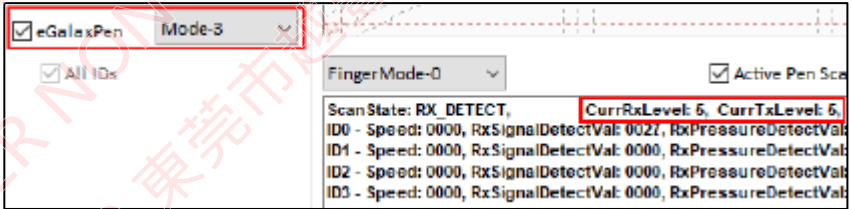
- Auto Gain Control \ General



| Auto Gain Control General Settings | |
|---|---|
| Enable | Enable Auto Gain Control function. |
| Numbers of Gain Level | User can set up to 8 levels for Auto Gain Control. |

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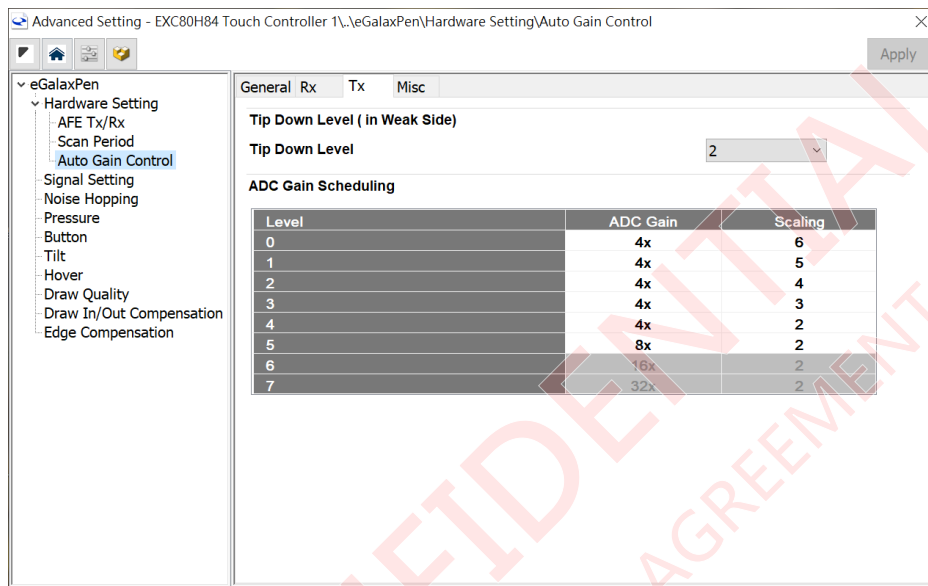
- Auto Gain Control \ Rx

   The table below shows the gain levels and the gain value for each gain level.
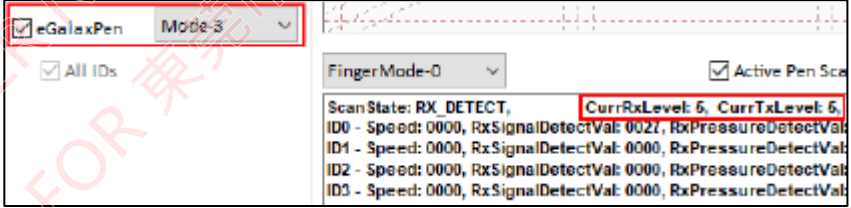


| Auto Gain Control Rx Settings | |
|---|---|
| Tip Down Level | When eGalaxPen contacts the touch screen (tip state), this level will be applied immediately. <br> ※ To set Tip Down Level, please run eGalaxTuner, select eGalaxPen Mode-3, and refer to the CurrRxLevel in Firmware Status Window while holding an eGalaxPen onto the weak side (signal) of the touch panel. <br>  |
| ADC Gain Setting | Level 0/1/2/3/4/5/6/7 <br> The gain value for each level is defined by ADC Gain and Scaling. <br> ※The gain ratio of each two successive levels must be 2. |

- Auto Gain Control \ Tx
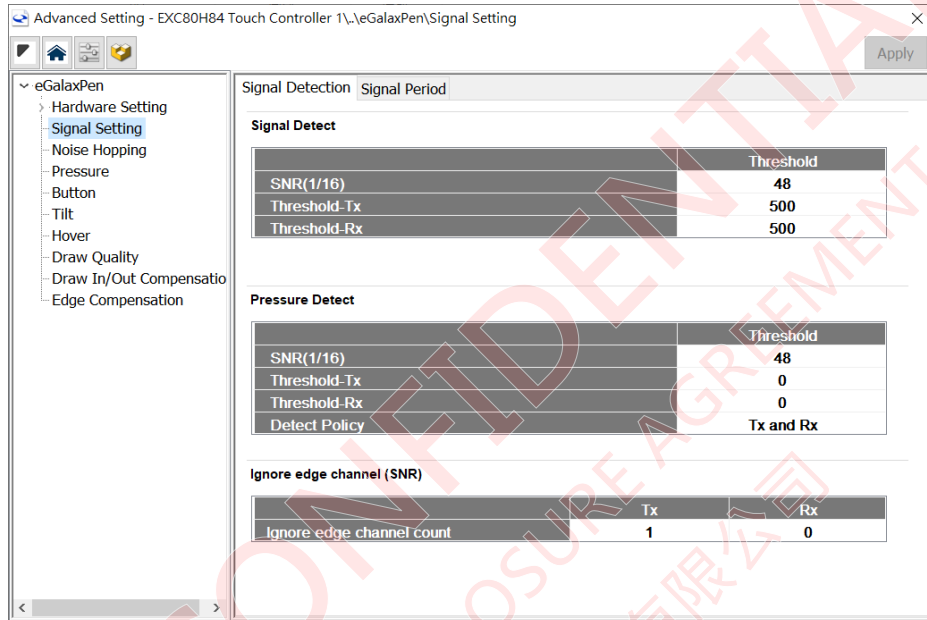
   The same as Rx level Scheduling.



| Auto Gain Control Tx Setting | |
|---|---|
| Tip Down Level | When eGalaxPen contacts the touch screen (tip state), this level will be applied immediately.<br>※ To set Tip Down Level, please run eGalaxTuner, select eGalaxPen Mode-3, and refer to the CurrTxLevel in Firmware Status Window while holding an eGalaxPen onto the weak side (signal) of the touch panel.<br><br> |
| ADC Gain Scheduling | Level 0/1/2/3/4/5/6/7<br>The gain value for each level is defined by ADC Gain and Scaling.<br>※The gain ratio of each two successive levels must be 2. |

### 4.1.B. **eGalaxPen \ Signal Setting**

In signal setting page, user can configure the time slice range for eGalaxPen signal detection and the threshld for eGlaxPen In Range detection and pressure detection.

- Signal Setting \ Signal Detection



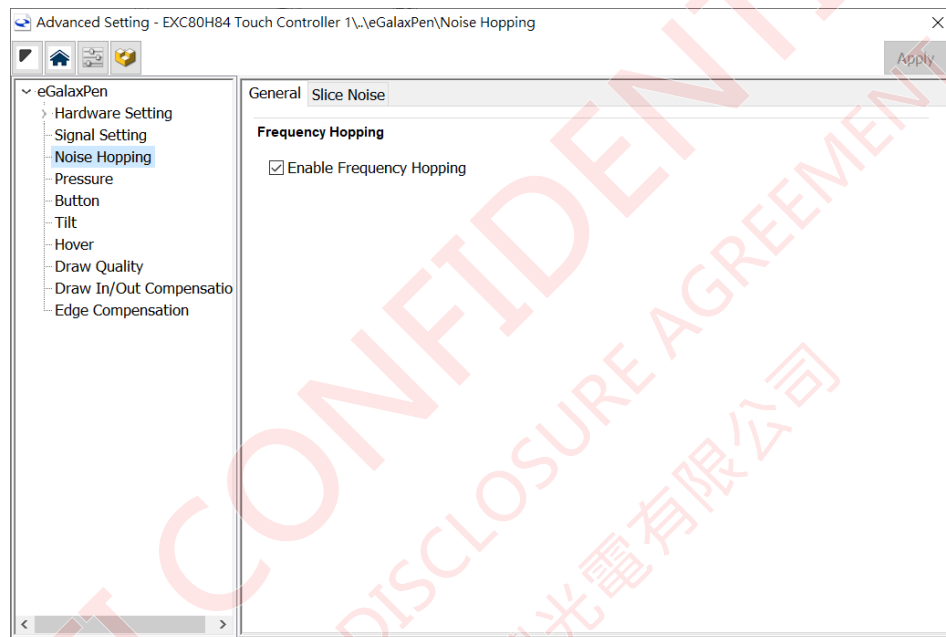| Signal Detect | |
|---|---|
| SNR (1/16) | If the SNR is less than this threshold, the suspicious eGalaxPen signal will be discarded. |
| Threshold-Tx/Rx | The threshold for eGalaxPen InRange detection. |
| **Pressure Detect** | |
| SNR (1/16) | If the SNR is less than this threshold, the suspicious eGalaxPen pressure value will be discarded. |
| Threshold-Tx/Rx | The threshold for eGalaxPen pressure detection. |
| Detect Policy | Select Tx or Rx signal to be the eGalaxPen pressure source. |
| **Ignore edge channel (SNR)** | |
| Ignore edge channel count | For some touch panels, channels on edges may be more susceptible to electrical noise, possibly affecting the reliability for the controller to detect eGalaxPen signal. Enable this feature to ignore the edge channels if needed. ※ Please note that only one of Tx and Rx can be enabled at a time. |

- Signal Setting \ Signal Period
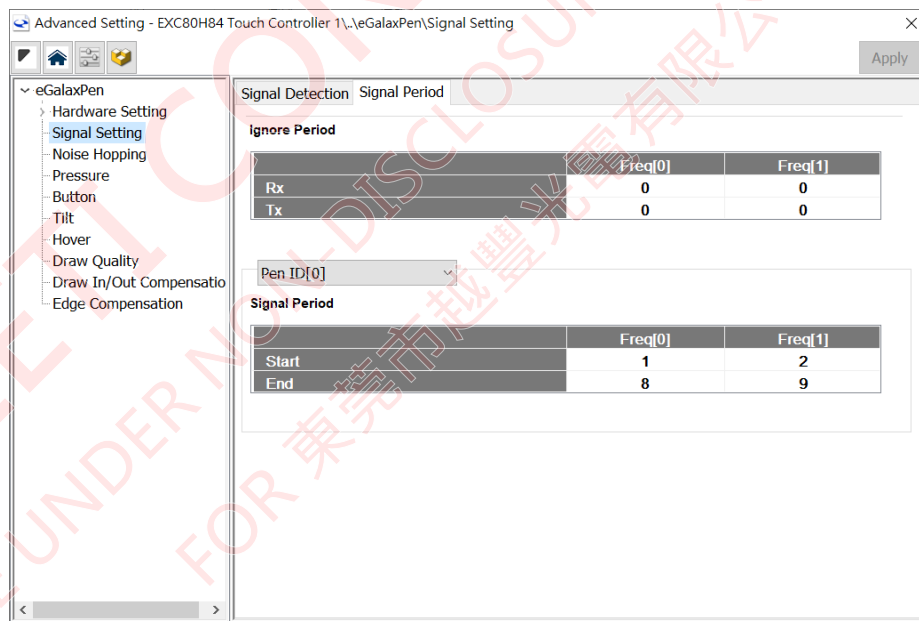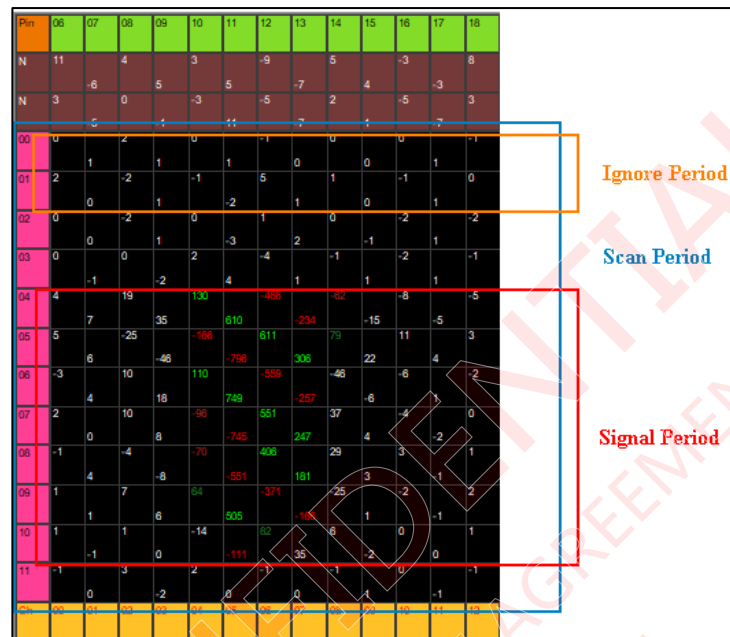




| Ignore Period | |
|---|---|
| Rx/Tx | Ignore the signal detected in this range. |
| **Signal Period** | |
| Start / End | Signal scanned within this time slice range is regarded as eGalaxPen signal |

## 4.1.C.　**eGalaxPen \ Noise Hopping**

eGalaxPen itself can detect the noises from environment and do frequency hopping. Features in the following Noise related pages are to allow the touch screen to detect noises and force eGalaxPen to do frequency hopping.
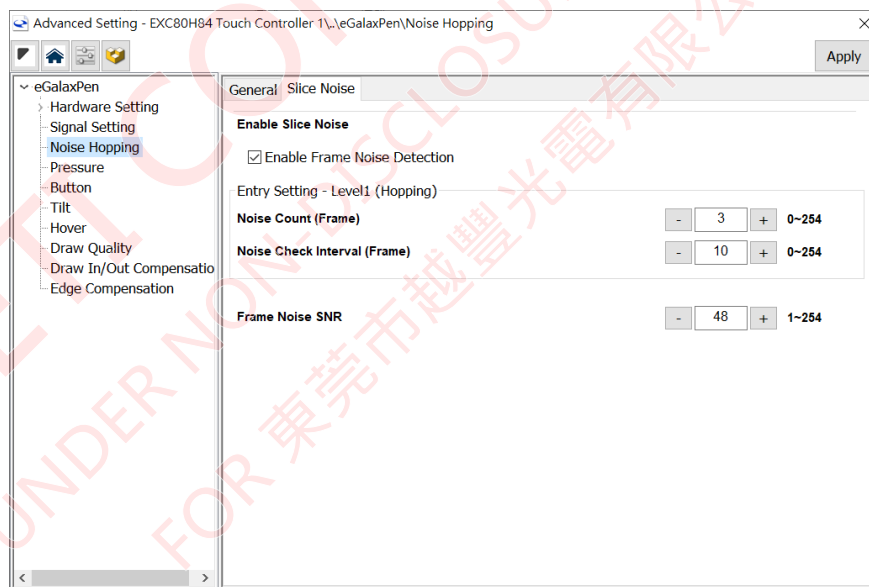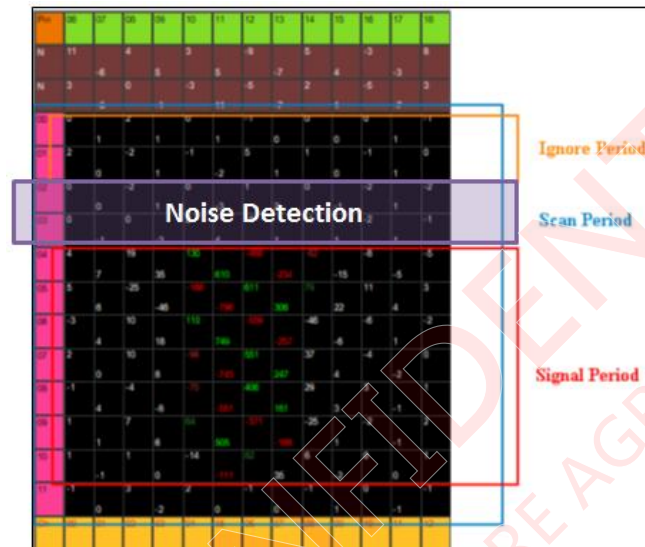
- Noise Hopping \ General



| Enable | Enable Frequency Hopping function. |
|---|---|

- Signal Noise \ Frame Noise

  EETI controller can detect noises during the eGalaxPen detection session. Please complete Signal Setting first in advance. Signal scanned apart form the Ignore Period and Signal Period is reagarded as Frame Noise.





| Enable Frame Noise | |
|---|---|
| Enable | Enable/Disable Frame Noise Detection |
| Noise Count (Frame) Noise Count Interval (Frame) | When the valid noise counts excess Noise Count threshold within Noise Count Interval, frequency hopping occurs. |
| Frame Noise SNR (1/16) | A valid noise count refers to the signal to noise ratio less than this threshold. |

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### 4.1.D. eGalaxPen \ Pressure
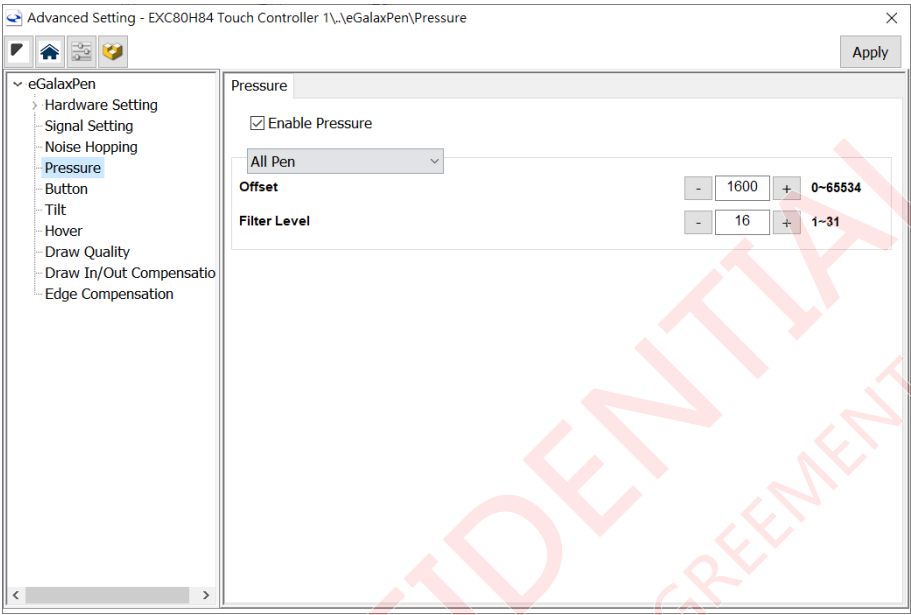


| eGalaxPen Pressure Setting | |
|---|---|
| Enable Pressure | Enable Pressure sensing feature. |
| Offset | The translation of pressure sensing line shown in the diagram below. Usually the pressure value is to be 800 when having $20g_f$ force on pen.<br><br> |
| Filter Level | Control the change rate of pressure value.<br><br> |

### 4.1.E. **eGalaxPen \ Button**

eGalaxPen has two buttons on the side. The button closer to pen tip is Eraser button by default, while the other is Barrel function.
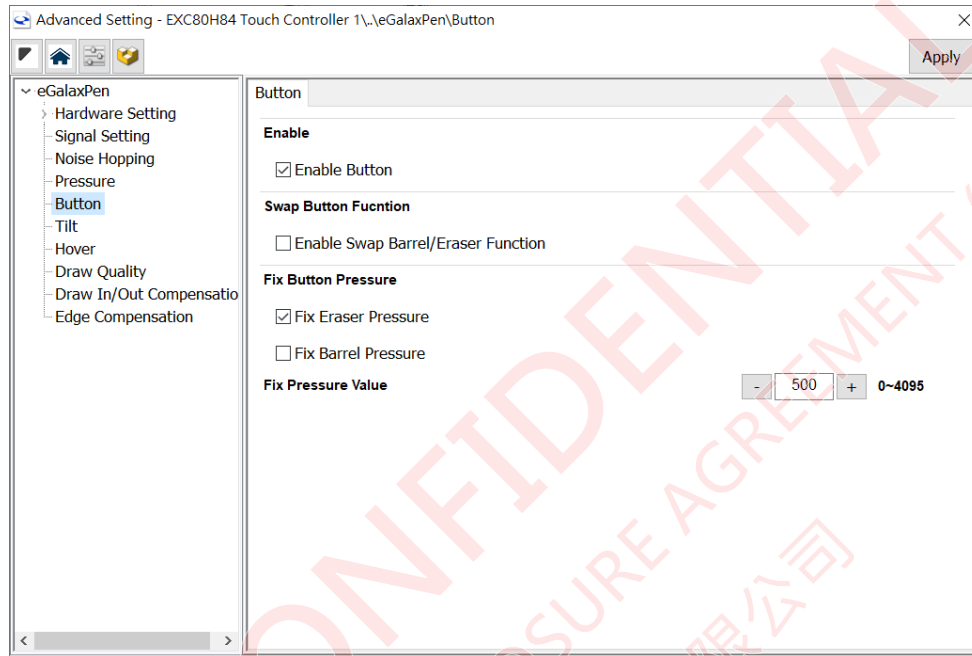


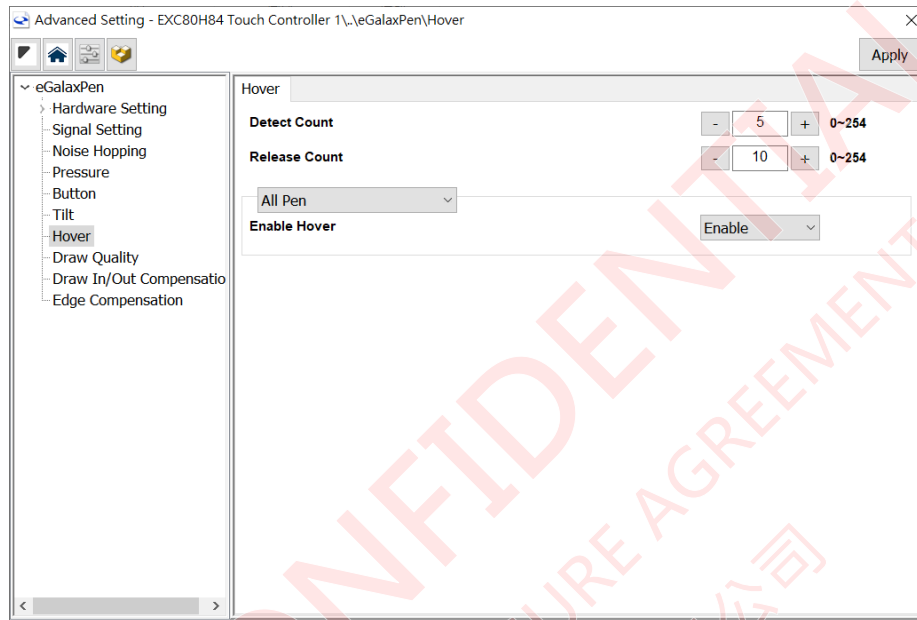| eGalaxPen Button Setting | |
|---|---|
| Enable | Enable button function. |
| Enable Swap Barrel/Eraser Function | Swap the functions on two buttons. |
| Fix Eraser Pressure | Lock the pressure value of Eraser button. |
| Fix Barrel Pressure | Lock the pressure value of Barrel button. |
| Fix Pressure Value | Lock the pressure at this value. |

### 4.1.F.　**eGalaxPen \ Tilt**

eGalaxPen supports tilt sensing feature. Holding the pen at different angle can be detected and used to simulate a more natural pencil sketching or brush experience.
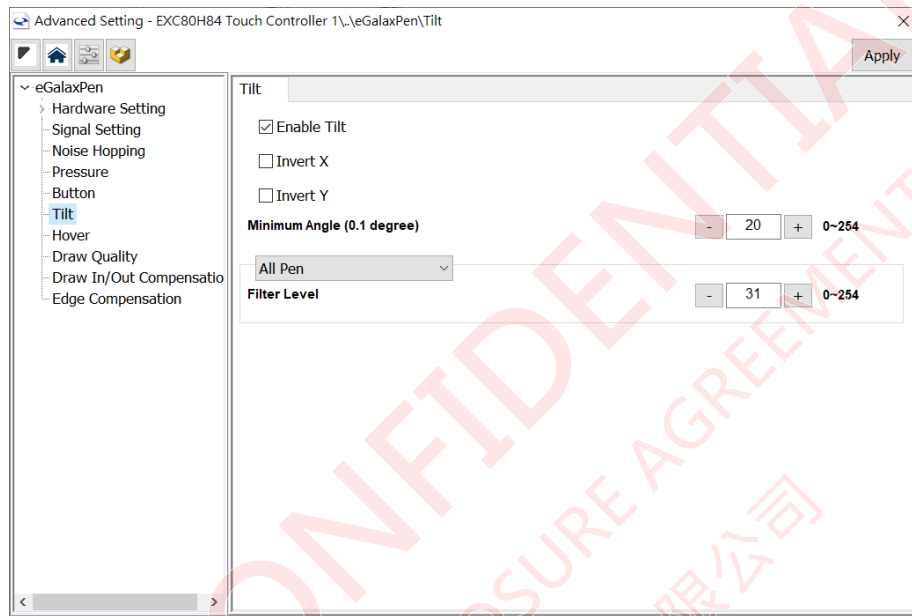


| eGalaxPen Tilt Setting | |
|---|---|
| Enable | Enable Tilt sensing function. |
| Invert X | Invert the X angle. |
| Invert Y | Invert the Y angle |
| Minimum Angle | Set the minimum tilting angle. (Unit: 0.1°) |
| Filter Level | Control the sensitivity of tilt sensing. |

### 4.1.G. **eGalaxPen \ Hover**

eGalaxPen support hovering feature, which is usually to simulate a "mouse over."



| eGalaxPen Hover Setting | |
| --- | --- |
| Detect Count | The detect count for entering the hover state when no button or Barrel button is pressed. |
| Release Count | The release count for leaving the hover state when no button or Barrel button is pressed. |
| Enable Hover | Enable Hover feature. |

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## 4.1.H.  **eGalaxPen \ Draw Quality**

- Draw Quality \ General
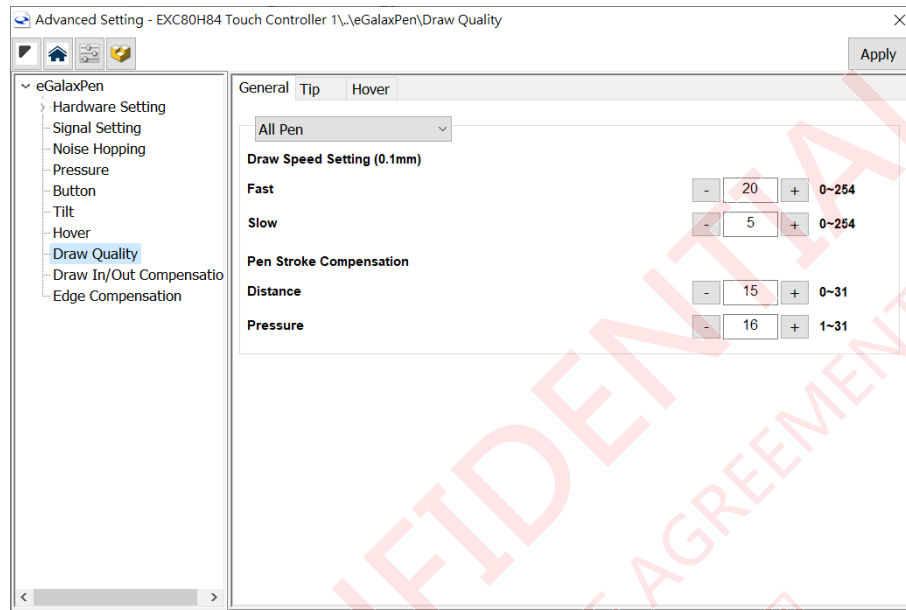


| Draw Speed Setting (0.1mm) | |
|---|---|
| Fast | Define Fast drawing speed |
| Slow | Define Slow drawing speed |
| **Pen Stroke Compensation** | |
| Distance | The distance of a pen stroke should last after eGalaxPen lifts off. Smaller number refers to longer distance. |
| Pressure | The sharpness of the pen stroke. Smaller number refers to a sharper pen stroke.  |

- Draw Quality \ Tip
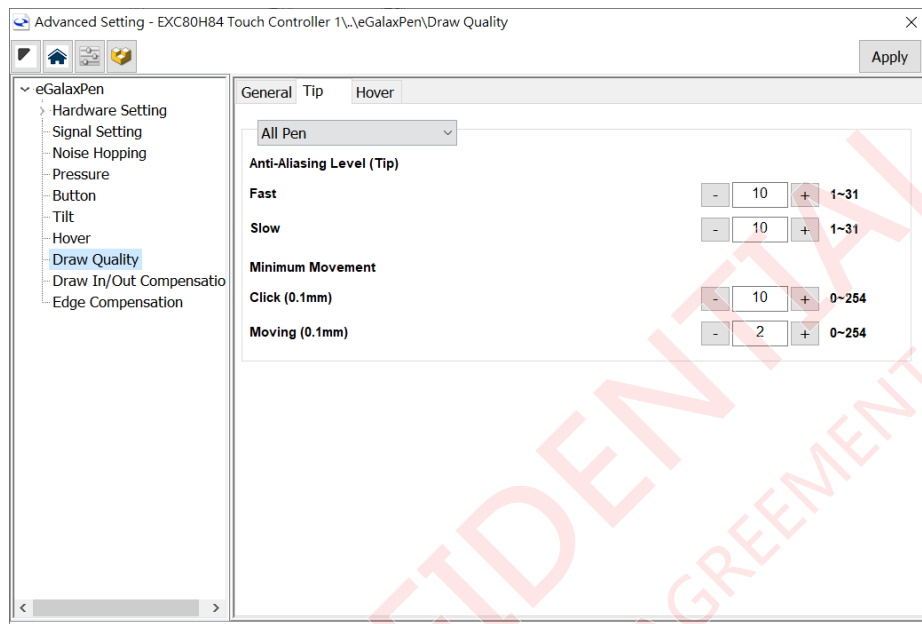


| Anti-Aliasing Level (Tip) | |
|---|---|
| Fast | Anti-aliasing level for fast eGalaxPen drawing. |
| Slow | Anti-aliasing level for slow eGalaxPen drawing. |
| **Minimum Movement** | |
| Click (0.1mm) | Minimum movements for a first-down eGalaxPen input. (Unit: 0.1 mm) |
| Moving | Minimum movement for an eGalaxPen input once moved. (Unit: 0.1 mm) |

- Draw Quality \ Hover
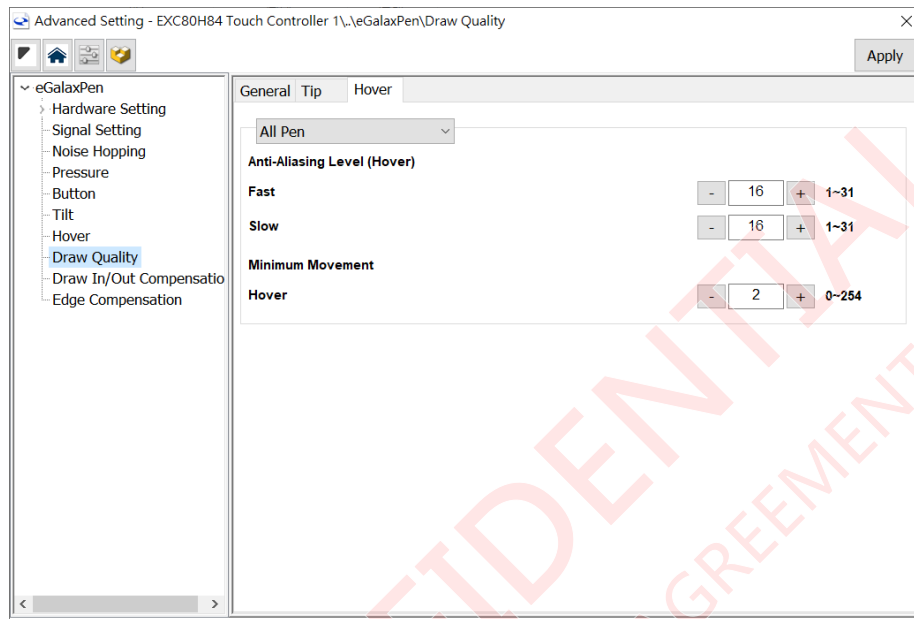


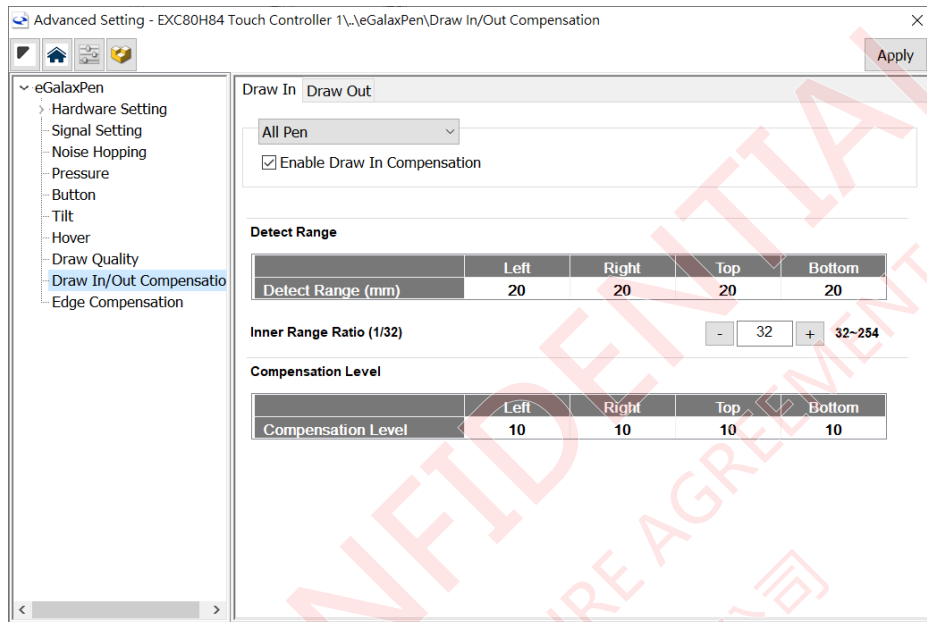| Anti-Aliasing Level (Hover) | |
|---|---|
| Fast | Anti-aliasing level for fast eGalaxPen hovering movement. |
| Slow | Anti-aliasing level for slow eGalaxPen hovering movement. |
| **Minimum Movement** | |
| Hover | Minimum movement setting in hovering state. |

### 4.1.l. **eGalaxPen \ Draw In/Out Compensation**

- Draw In

    EETI controller can optimize Draw In gesture by tracking the drawing behavior.



| Draw In Setting | |
|---|---|
| Enable | Enable Draw In Compensation feature. |
| Detect Range | Define the detect range for Draw In Compensation condition. The first detected point needs to fall in the Detect Range to trigger Draw In Compensation. |
| Inner Range Rate (1/32) | Two-factor authentication to increase the accuracy for triggering Draw In Compensation. The second and the successive points need to fall in the Inner Range to trigger Draw In Compensation. |
| Compensation Level | The level for Draw In compensation. Increase the levels to trigger Draw In compensation more easily. |

- Draw Out

  EETI controller can optimize Draw Out gesture by tracking the drawing behavior.
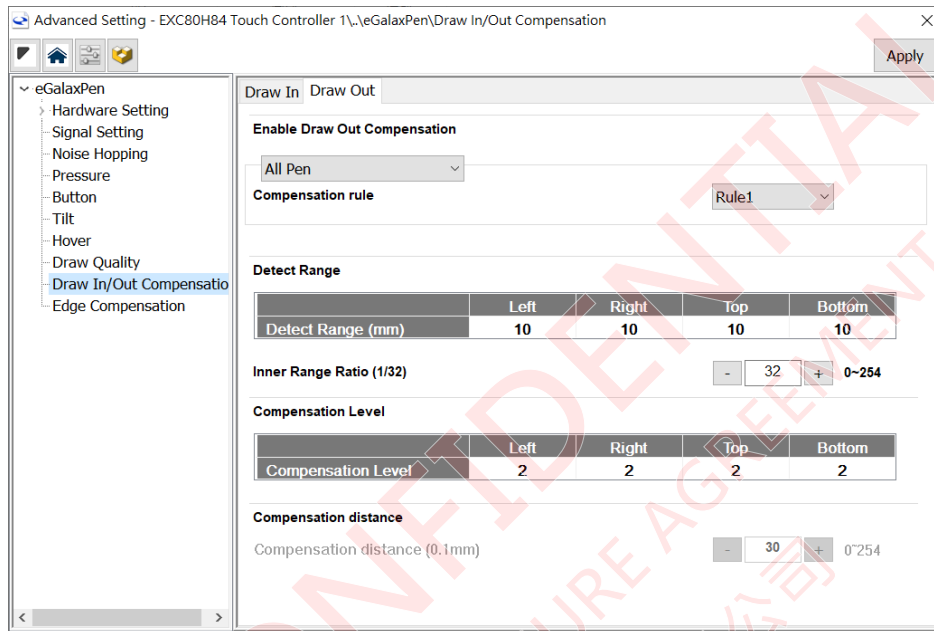


| Draw Out Setting | |
|---|---|
| Compensation rule | Rule1 – the same as Draw In compensation setting. Rule2 – Trigger draw out compensation based on Compensation Distance and Prevent Touch setting. |
| Compensation Distance | Trigger draw out compensation if the distance between two points near edges is farther than this threshold. |

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### 4.1.J. **eGalaxPen \ Edge Compensation**

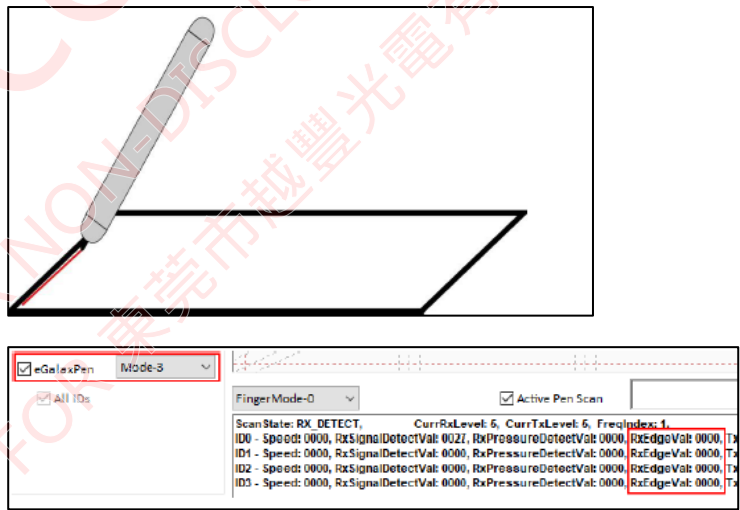- Edge Compensation \ Position
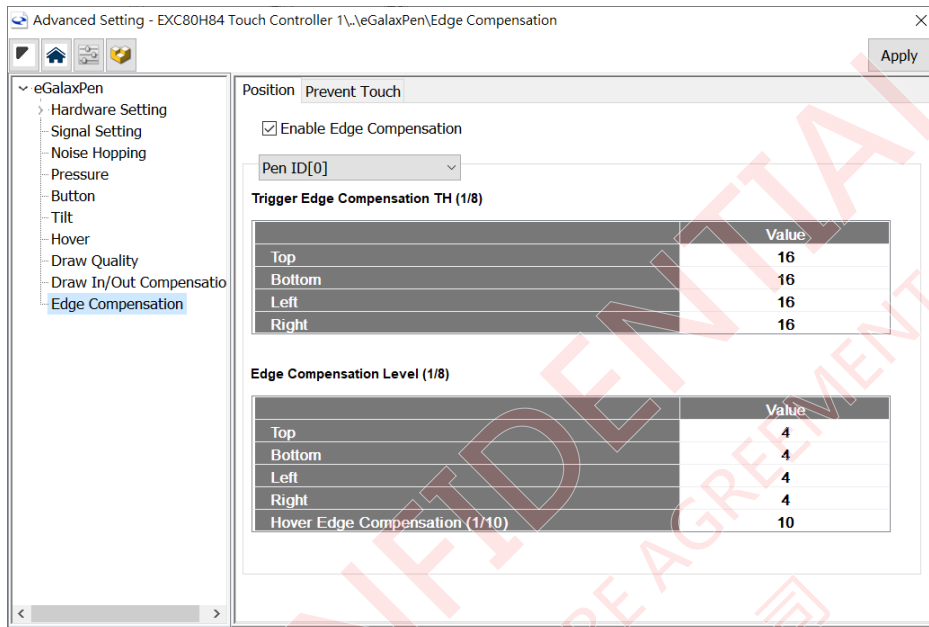


| Edge Compensation Position Setting | |
|---|---|
| Enable Edge Compensation | Enable Edge Compensation function. |
| Trigger Edge Compensation TH (1/8) | The position compensation area. Increase this parameter to shrink the compensation area; decrease this parameter to enlarge the compensation area. |
| Edge Compensation Level (1/8) | Increase the compensation level if a touch point cannot be detected near the edges. |
| Hover Compensation (1/10) | Compensation Factor: Position compensation level in hovering state is relative to normal state. By default, it is set to 10, meaning that hovering state applies the same setting as normal state does. |

- Edge Compensation \ Prevent Touch
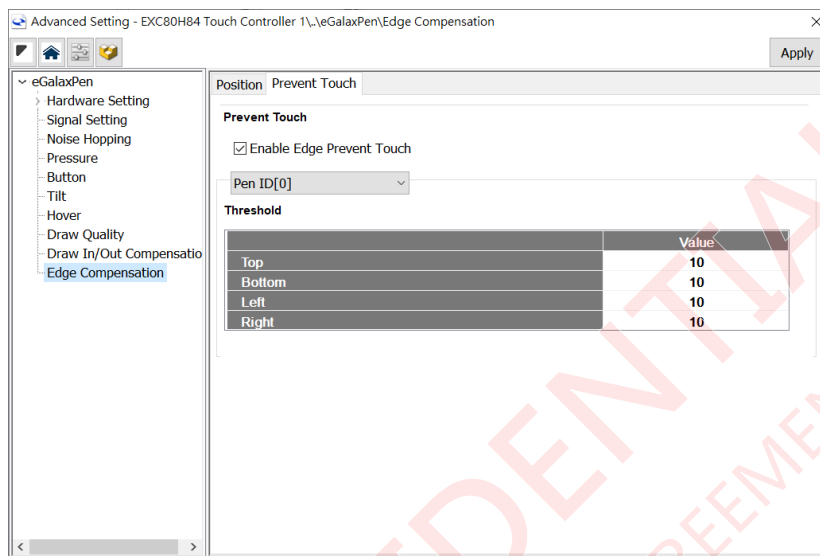


| Edge Compensation Prevent Touch Setting | |
|---|---|
| Enable | Enable Edge Prevent Touch to block any points from being reported in edge areas. Draw on the edges with eGalaxPen and observe the Tx/RxEdgeVal to set the threshold below.<br> |
| Threshold | If eGalaxPen signal is less than this threshold in edge areas, the points will be blocked. |

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