IS31SE5117/IS32SE5117 EVB User Manual

Revision: A

Publication: Sep, 2020

Table of Contents

1. HARDWARE ENVIRONMENT 4
1.1 Appearance of Evaluation Board (EVB) 4
1.2 Connection Block Diagram 5
1.3 Schematic of Evaluation Board 6
1.4 ORDERING INFORMATION 7
2. SOFTWARE SUPPORT 8
2.1 Software Requirements 8
2.2 Run GUI Program 8
3. GUI INTERFACE 10
3.1 Connect Status 10
3.2 Export/Import 11
3.3 Write Parameters to Flash 11
4. IO CONFIG 13
4.1 IO Config Setting 13
5. KEY VARIATION 14
5.1 Operating Mode Switching 14
5.2 Gain Setting 14
5.3 Threshold of Key 14
5.4 Value of KEY 15
5.5 Key and interrupt enable 15
5.6 Key Calibration 16
5.7 Noise Display and Threshold Setting 16
5.8 KEY Value Display 17
6. SETTING-1 18
6.1 MAX_DURATION_TIME_SET： Maximum Pressing Duration Time Setting 18
6.2 AUTO_CLEAR_INT_SET： Auto-Clean Interrupt 19
6.3 SPREAD_SPECTRUM_SET： Spread Spectrum Setting 20
6.4 MULTI-KEY_SET： Multi-Key Setting 21
6.5 INT_REPEAT_SET： Interrupt Repeat Setting 21
6.6 SAMPLE_AVERAGE_SET： Sampling Frequency and Average Number Setting 22
6.7 AUTO_SLEEP_SET： Auto SLEEP Mode Setting 23
6.8 CALIB_SET： Calibration Setting 23
6.9 SCAN_SETTING： Scan And Frequency Setting 24
7. SETTING-2 25
8. SETTING-TK3 26
9. GRAPH 27

10. Sliders 28
10.1 Slider Type 28
10.2 Slider Key Calibration (Not yet to finish) 28
11. Output Setting 30
12. I2C Communication 31
12.1 I2C Communication Example1 (Touch Key) 31
13. Debug Customer Target Board Based On GUI 33
13.1 Connection Block Diagram 33
13.2 Customer Target Board Configuration by GUI 33
14. REVISION HISTORY 34

Table of Figures

Figure 1: Photo of IS31SE5117 Evaluation Board 4
Figure 2: Photo of Slider Board and Wheel Board 5
Figure 3: IS31SE5117 Evaluation Board connection block diagram 5
Figure 4: Schematic of IS31SE5117 Evaluation Board 6
Figure 5: Schematic of Slider Board 6
Figure 6: Schematic of Wheel Board 7
Figure 7: Photo of EzISP Board 8
Figure 8: Connection of IS31SE5117 evaluation board and EzISP board 9
Figure 9: GUI connect status shows disconnect 10
Figure 10: GUI connect status shows connect 10
Figure 11: GUI export/import options 11
Figure 12: GUI write parameters to Flash options 12
Figure 13: GUI preset IO configuration 13
Figure 14: Key Variation page of GUI 14
Figure 15: Threshold setting 14
Figure 16: Set the threshold of KEY0 15
Figure 17: The VALUE of the KEY 15
Figure 18: Set EN of KEY0 to disable 16
Figure 19: KEY's INT and INT_EN 16
Figure 20: The calibration of the KEY 16
Figure 21: The noise lights of the KEY 16
Figure 22: The value of the KEY 17
Figure 23: Setting page of GUI 18
Figure 24: MAX_DURATION_TIME_SET option 18
Figure 25: AUTO_CLEAR_INT_SET option 19
Figure 26: INTB action when AUTO_CLEAR_INT_ENABLE is disabled 19
Figure 27: INTB action when AUTO_CLEAR_INT_ENABLE is enabled 20
Figure 28: INTB action when AUTO_CLEAR_INT_ENABLE is enabled 20
Figure 29: MULTI-KEY_SET option 21
Figure 30: INT_REPEAT_SET option 21
Figure 31: INTB behavior when setting the INT_REPEAT_SET parameter 22
Figure 32: SAMPLE_AVERAGE_SET option 22
Figure 33: AUTO_SLEEP_SET option 23
Figure 34: CALIB_SET option 23
Figure 35: AUTO_SLEEP_SET option 24
Figure 36: SCAN_SETTING option 24
Figure 37: SCANNING_FREQUENCY_SET option 24
Figure 38: SETTIN-2 parameters 25
Figure 39: SETTING parameters 26
Figure 40: Display the current value of KEY on the GRAPH page 27
Figure 41: Slider page of GUI 28
Figure 42: Slider Bar (Open-end) and Slide Wheel (Close-end) 28
Figure 43 Slide key calibration 29
Figure 44: Output Setting 30
Figure 45: I2C Communication page of GUI 31
Figure 46: Block diagram of EzISP Board connected to the custom target board 33
Figure 47: Pin configuration on EzISP board 33

1. HARDWARE ENVIRONMENT

1.1 Appearance of Evaluation Board (EVB)

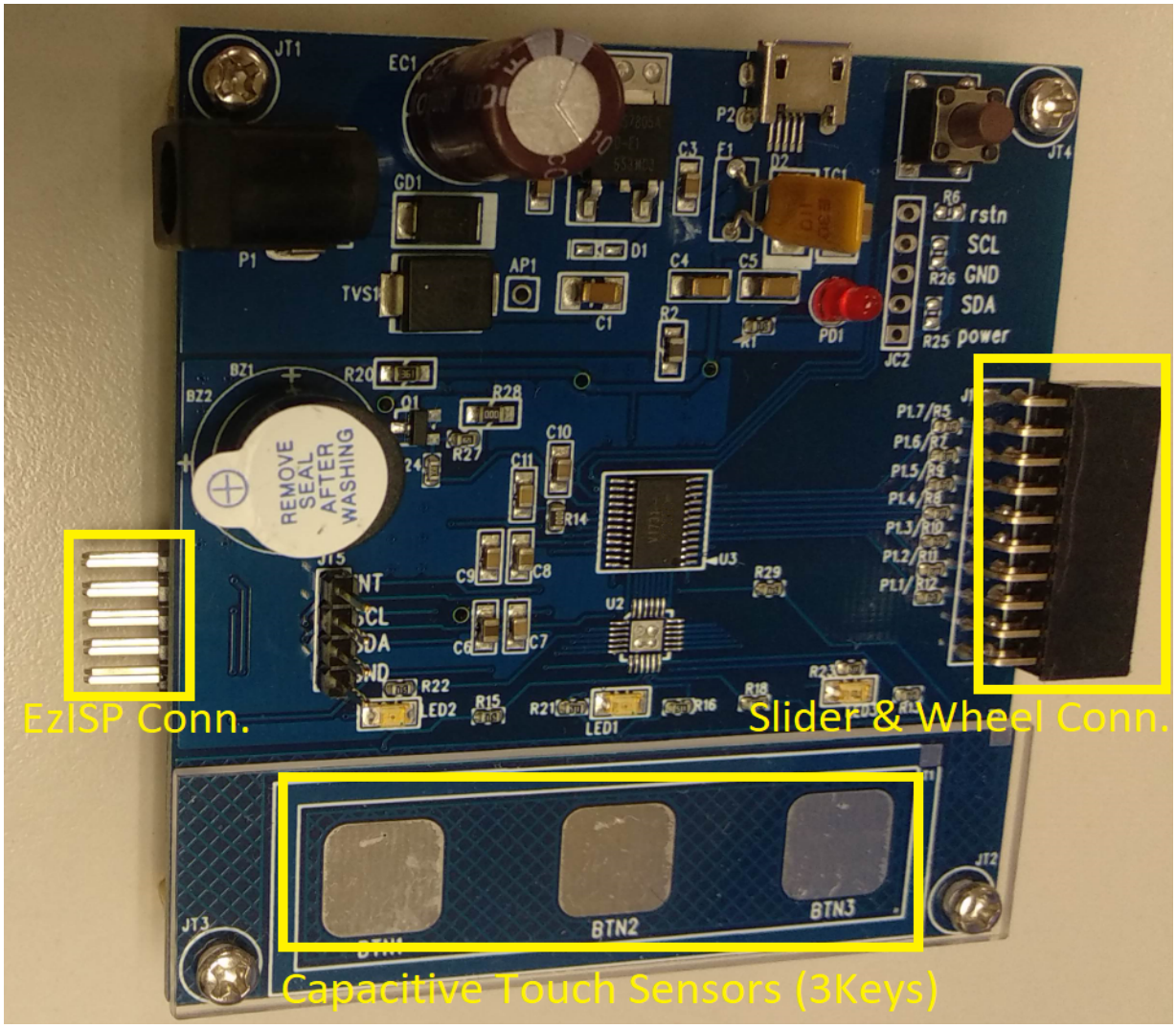

Figure 1: Photo of IS31SE5117 Evaluation Board

Figure 2: Photo of Slider Board and Wheel Board

1.2 Connection Block Diagram

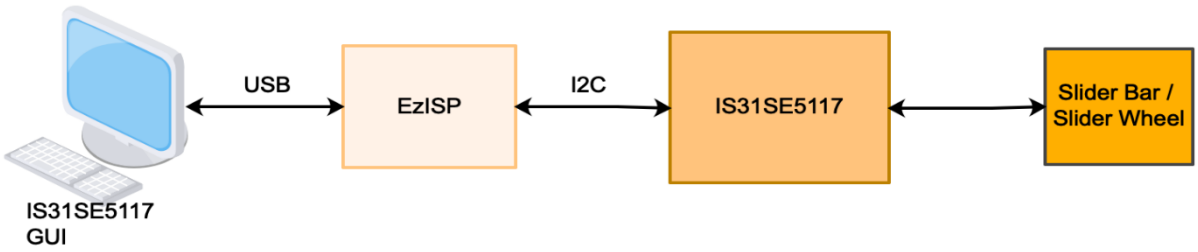

Figure 3: IS31SE5117 Evaluation Board connection block diagram

1.3 Schematic of Evaluation Board

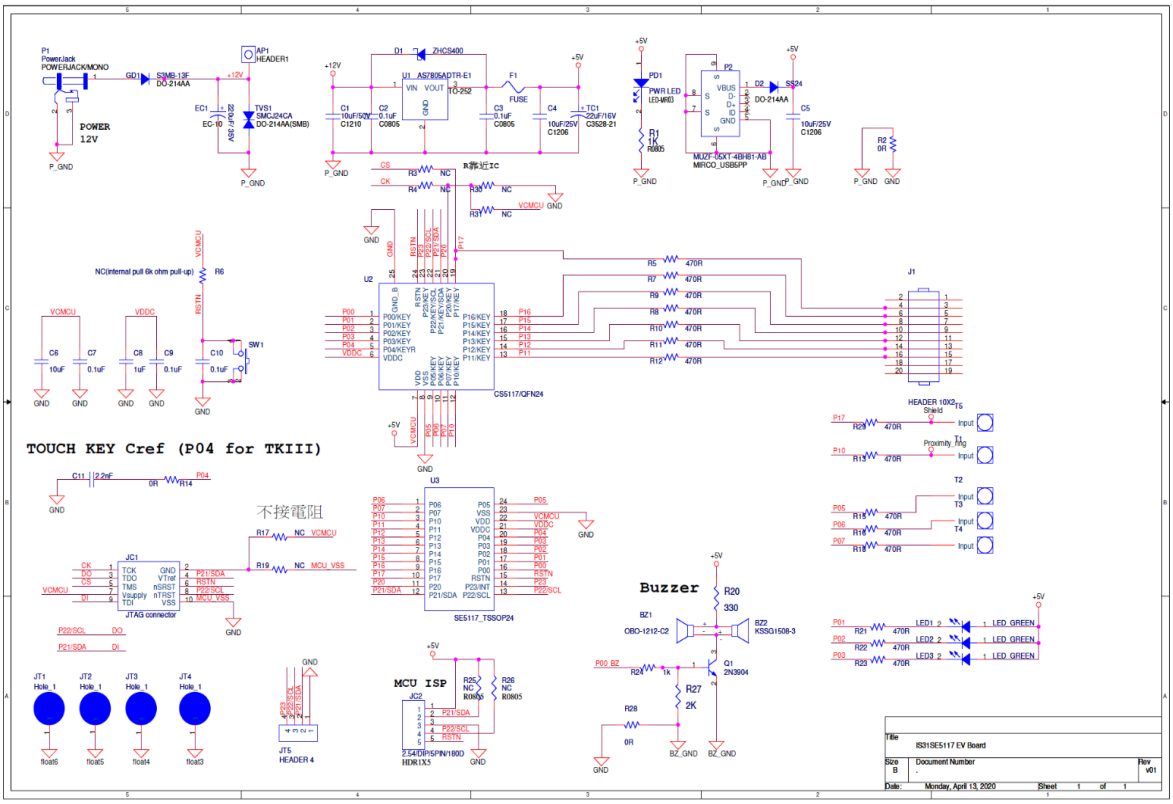

Figure 4: Schematic of IS31SE5117 Evaluation Board

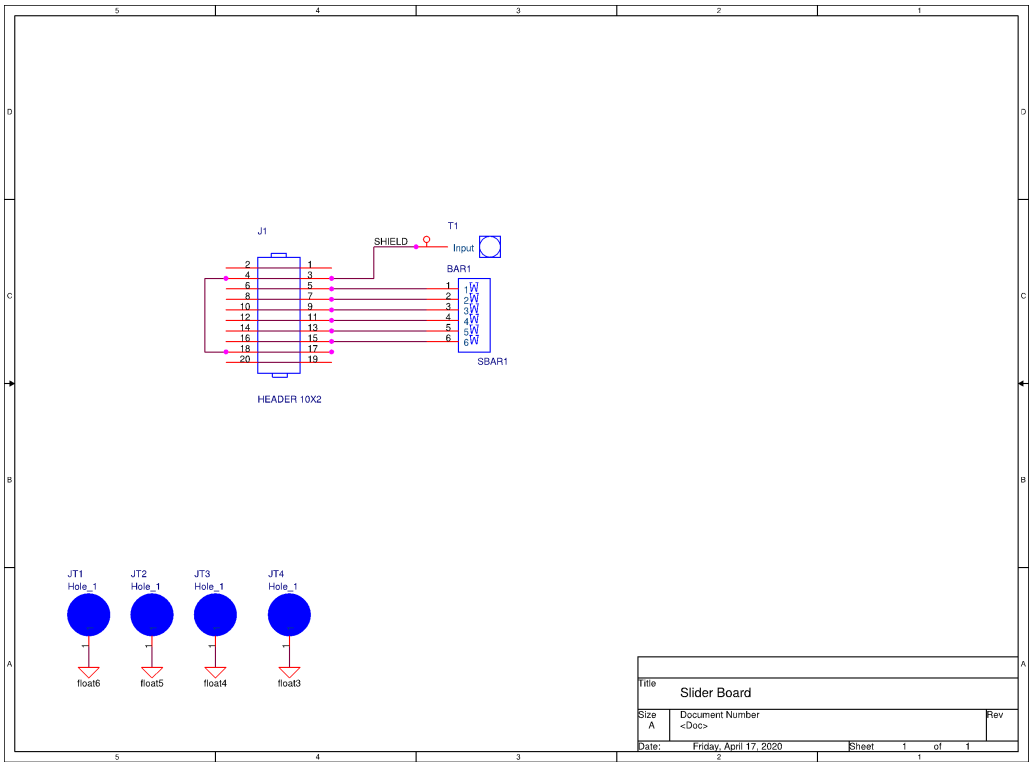

Figure 5: Schematic of Slider Board

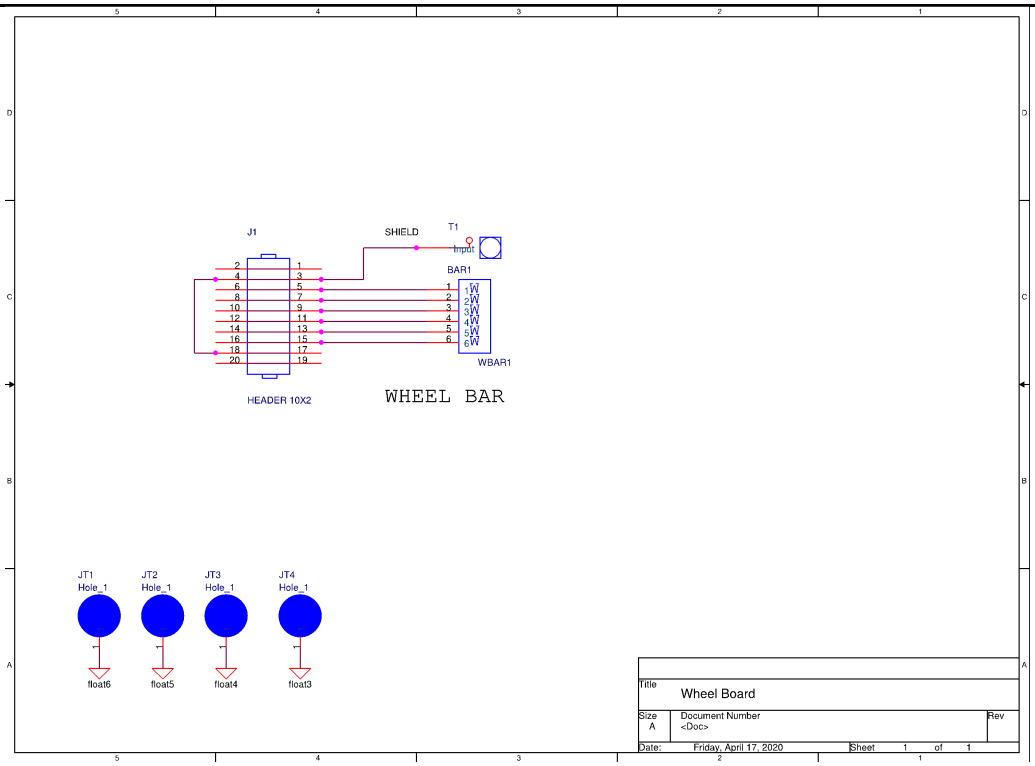

Figure 6: Schematic of Wheel Board

1.4 ORDERING INFORMATION

Part No.	Temperature Range	Package
IS31SE5117-QFLS3-EBGUI	-40°C ~ +105°C	QFN-24, Lead-free

Table 1: Ordering Information

For pricing, delivery, and ordering information, please contact LUMISSIL's marketing and sales team at http://www.lumissil.com/company/office-locations or (408) 969-6600.

2. SOFTWARE SUPPORT

2.1 Software Requirements

Before using the GUI, the PC first needs to install the EzISP USB driver and related files (for example: Microsoft Framework and C++ library).

Figure 7: Photo of EzISP Board

Note: If there is no ".NET Framework" or the version lower than revision 4.0 on Windows system, ".NET Framework" should be downloaded as below link and install it.

https://www.microsoft.com/en-us/download/confirmation.aspx?id=24872

2.2 Run GUI Program

GUI operation process is as follows:

I2C Slave Address* / AD Pin Select	Write Command	Read Command
AD = floating	0x78	0x79
AD = GND	0x7A	0x7B
AD = VDD	0x7C	0x7D

Table 2: AD pin selection and I2C slave address definition

* I2C Slave Address: 7-bit Address + 1 bit(R/W)

(1) Connect USB cable between the connector of the EzISP Board and the USB port of your PC.

(2) Use a 10-pin 2x5 Socket-Socket 2.54 mm IDC cable from the connector on the EzISP Board to the connector on the IS31SE5117 Evaluation Board.

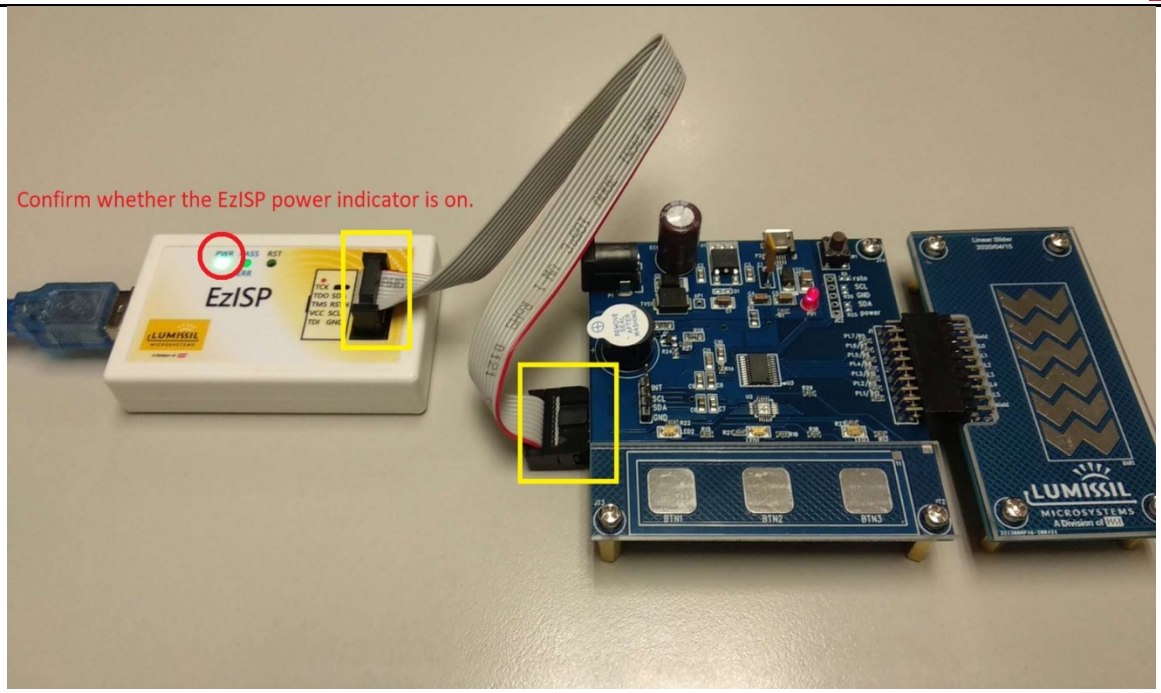

Figure 8: Connection of IS31SE5117 evaluation board and EzISP board

(1) Execute GUI program (file name: TouchKeyGUI_5117_rls.exe).

3. GUI INTERFACE

3.1 Connect Status

When connecting USB to IS31SE5117 EVB, first, you need to select the correct AD value. If the selected AD value is correct, the Connect Status will be displayed as "Connect" (with a green box), and the following settings can be selected. Otherwise, the Connect Status will be displayed as "Disconnect" (with a red box) and cannot select any of the following settings.

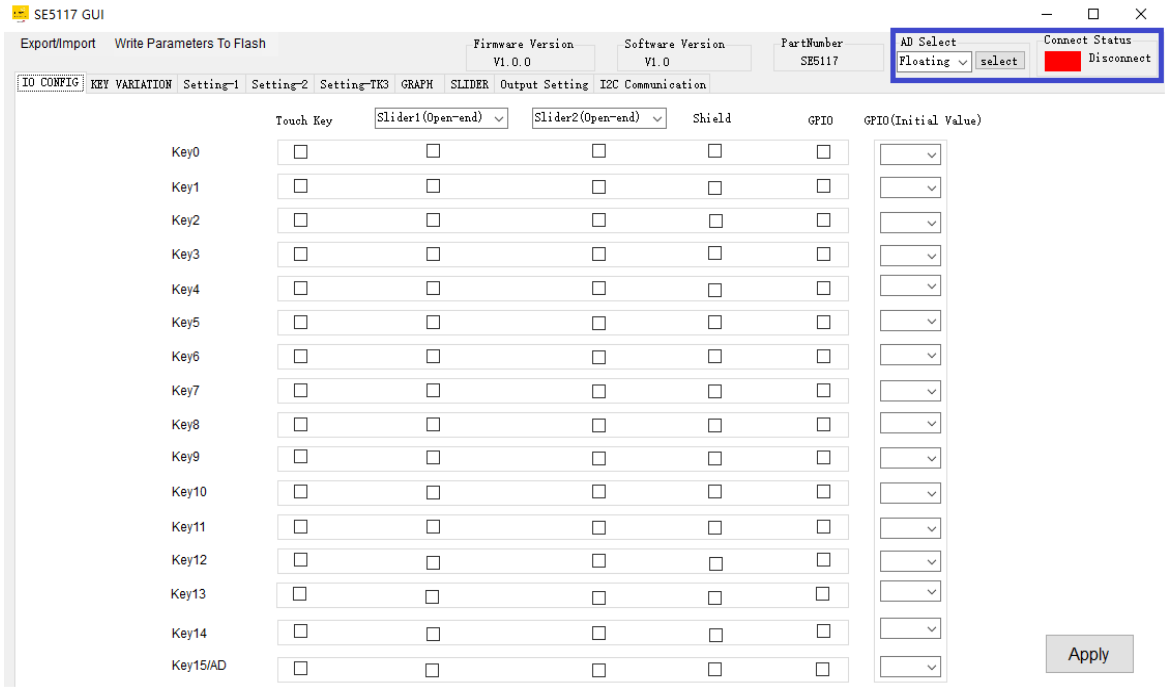

Figure 9: GUI connect status shows disconnect

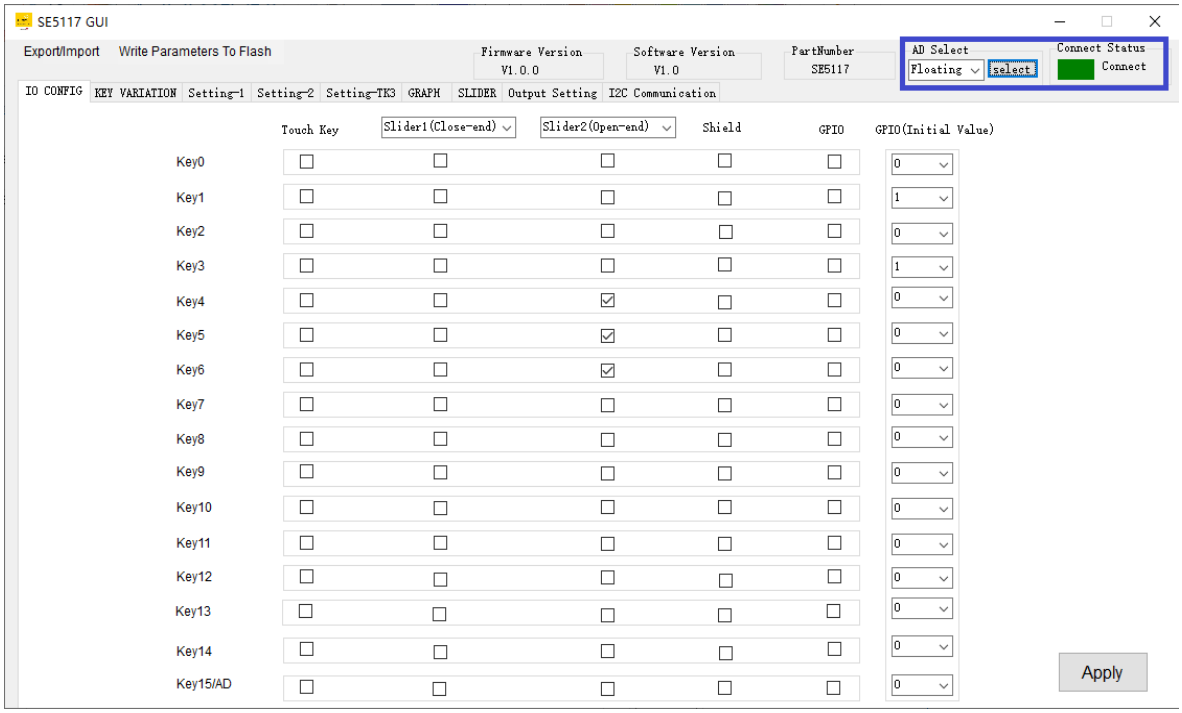

Figure 10: GUI connect status shows connect

3.2 Export/Import

As shown in **Error! Reference source not found.** below, "Export Register List" is used to export the register list of IS31SE5117. By exporting the register list, we can save the parameters set by the GUI to the computer. "Import Register List" is used to import the register list of IS31SE5117. By importing the register list, we can load the parameter file of the previous GUI settings into the computer.

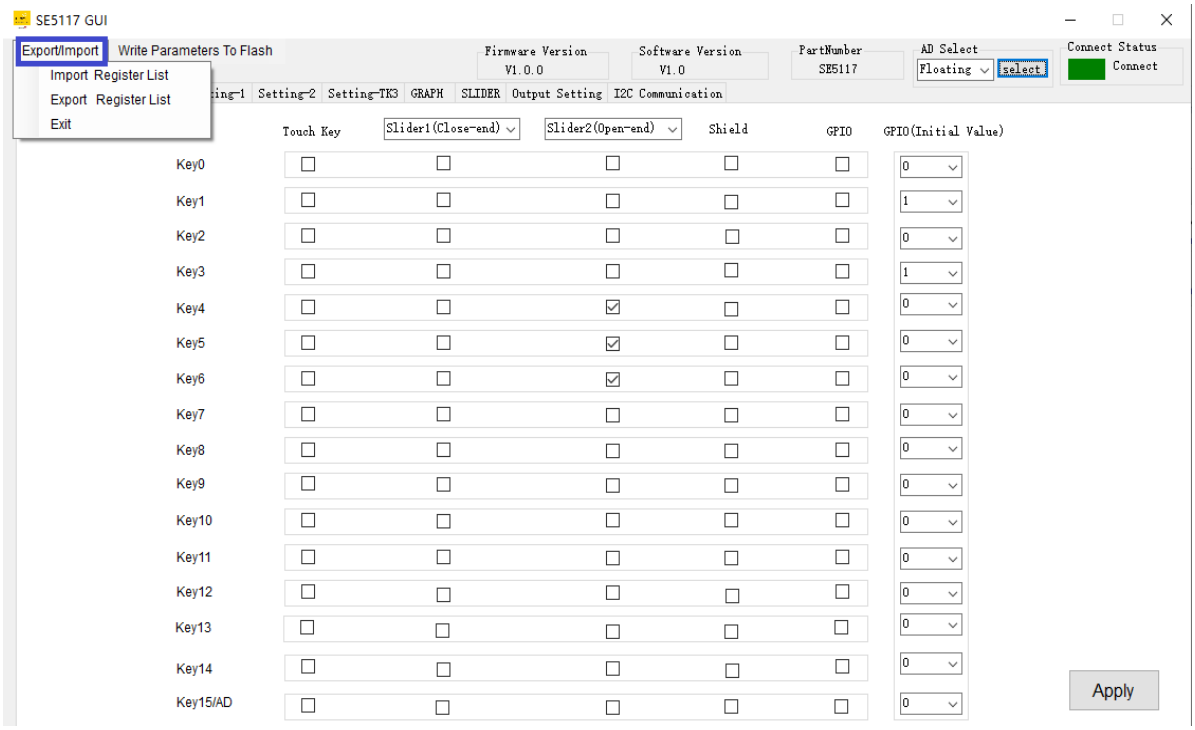

Figure 11: GUI export/import options

3.3 Write Parameters to Flash

As shown in **Error! Reference source not found.**Figure 15 below, the user can write the parameters set by the GUI into the flash memory of the IS31SE5117 chip. After clicking the "Write Parameters to Flash Memory" on the Menu Bar, the operation of writing parameters to Flash memory can be completed in about 4 seconds.

The embedded Flash Memory has the capability to hold saved data even if the power is turned off. When the chip is turned on again, the parameters previously written to the flash memory will become the default values.

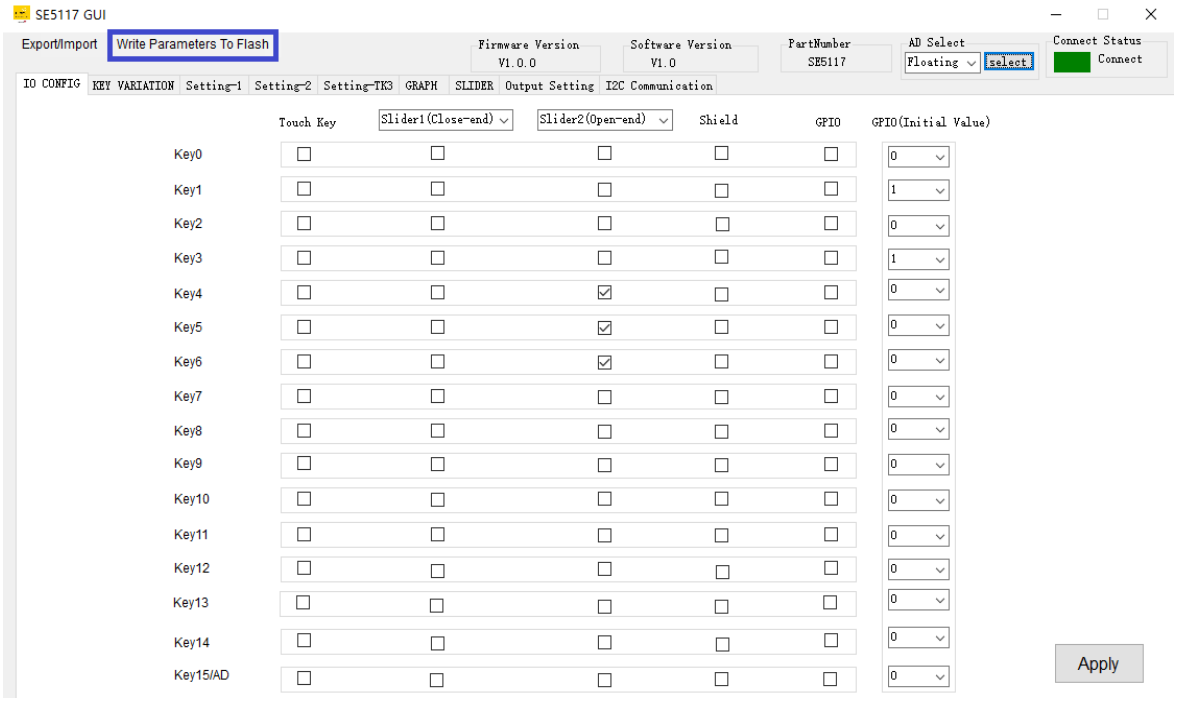

Figure 12: GUI write parameters to Flash options

4. IO CONFIG

4.1 IO Config Setting

When the correct AD value is selected and the Connect Status shows "Connect", it means the EVB has been successfully connected. As shown in the green box in Figure 13, the GUI will identify and display the correct firmware version, software version and chip part number.

As shown in the blue box in Figure 13, KEY0~KEY15 can be set as one of touch keys, Slider1, Slider2, Shield and GPIO functions. The functions that can be set for each IO pin are mutually exclusive. AD pin can be set as KEY15.

If the IO pin is selected as a touch key, it can be used as a button. IO pin can be set to GPIO (high) or GPIO (low). GPIO (high) here means that the IO pin is set to output high level, and GPIO (low) means that the IO pin is set to output low level.

Slider can choose Slider Bar (Open-end) or Slider Wheel (Close-end). Slider needs at least 6 IO pins. Users can define IO pins according to the required functions.

Users should click Apply button located at bottom right corner to submit setting.

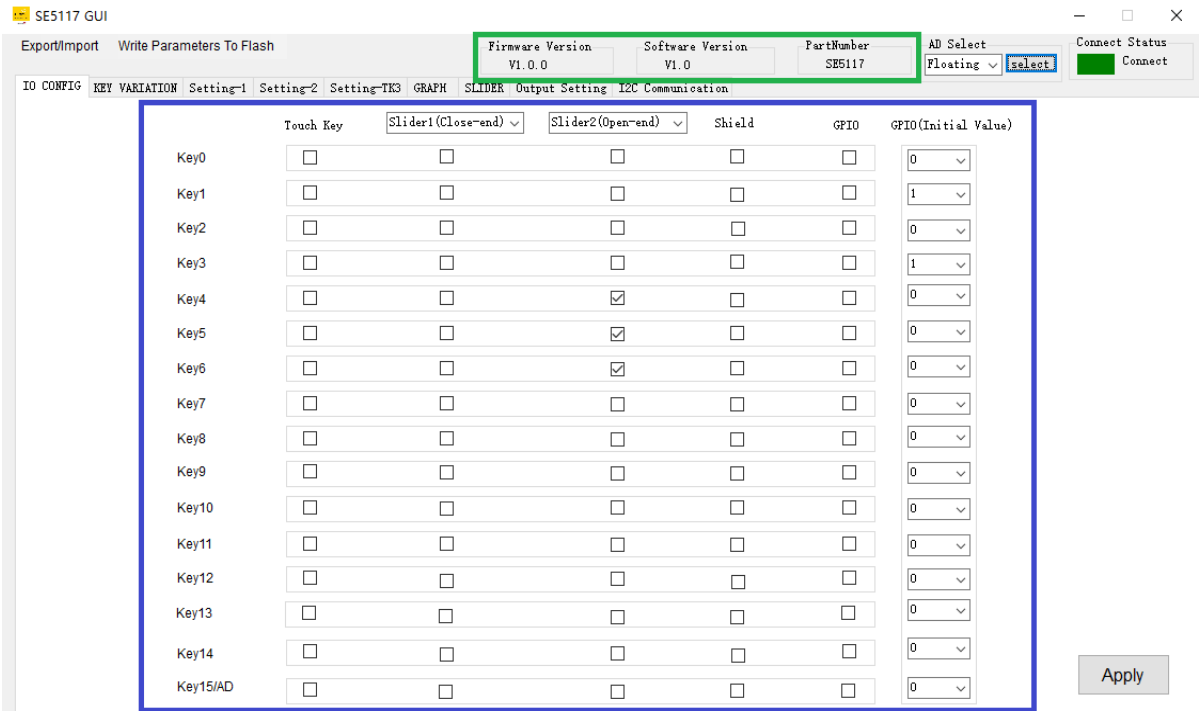

Figure 13: GUI preset IO configuration

5. KEY VARIATION

5.1 Operating Mode Switching

As shown by the red box in Figure 14, IS31SE5117 EVB is in normal mode, and the corresponding indicator light will turn green. After pressing the "Sleep" button, IS31SE5117 EVB will enter sleep mode, and the corresponding indicator light will turn red. At this time, IS31SE5117 can only be woken up by the key that has been previously set as a touch key and the wake-up function is enabled to return to Normal Mode.

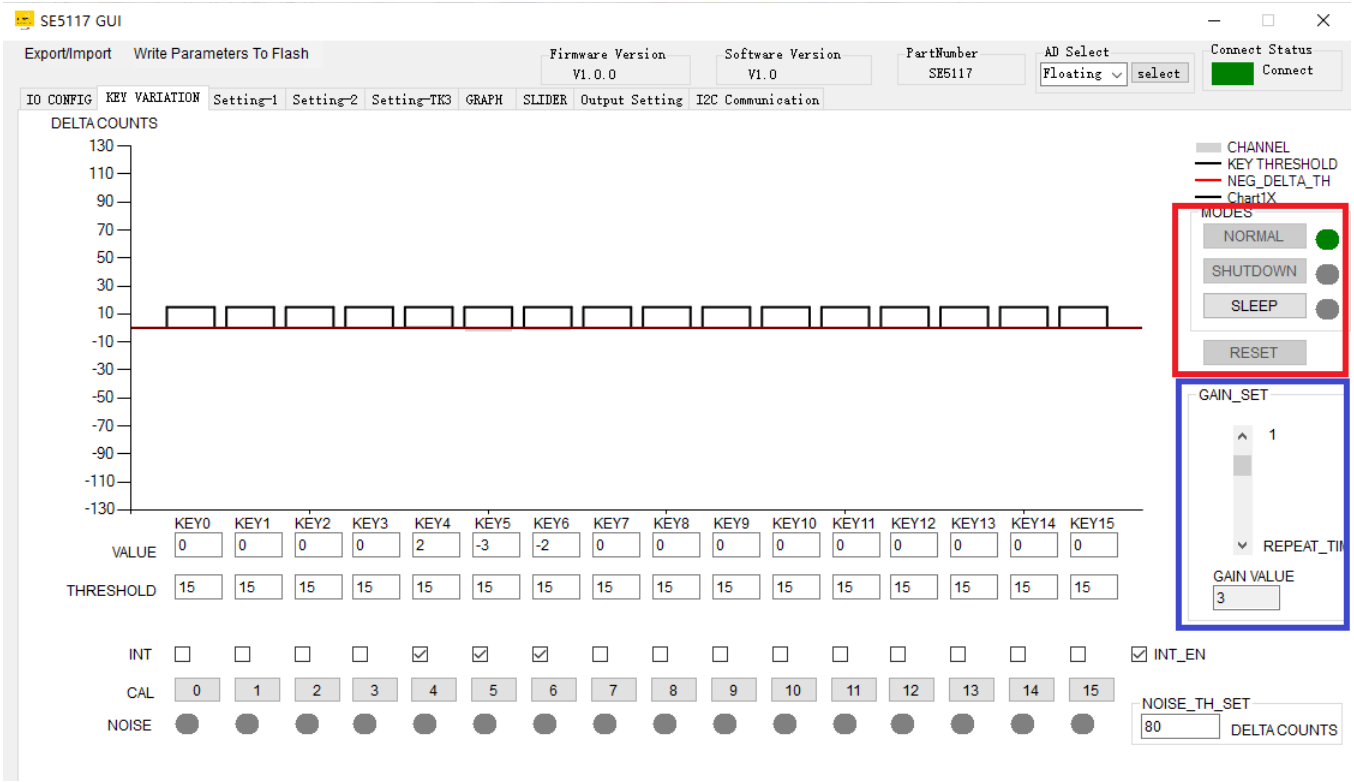

Figure 14: Key Variation page of GUI

Note: If the user sets a specific key to GPIO (high) or GPIO (low), when IS31SE5117 EVB enters sleep mode, this key will continue to maintain its previous state.

5.2 Gain Setting

The button GAIN_SET in the blue box in Figure 14 above is used to set gain for the touch keys. The gain could be set in 1~16 levels by pulling the scroll bar and the current gain value will be shown in bottom.

Setting gain will affect the sensitivity of all the touch keys. If gain value is set too large, high sensitivity of keys may cause a false trigger. Therefore, the touch key gain setting should be adjusted according to the actual touch button size and working environment.

5.3 Threshold of Key

As shown in Figure 15 below,

Figure 15: Threshold setting

THRESHOLD is used to set the threshold of keys (KEY0-KEY15). The maximum value is 127. GUI will keep 127 if input value is over 127. Input data in the corresponding box and press Enter or Tab key, or move the cursor to another location will set up the threshold.

Put mouse on corresponding box, for example in KEY0, will show a table in the red box as shown in Figure 19.

The whole interface has prompted box for each programmable parameter.

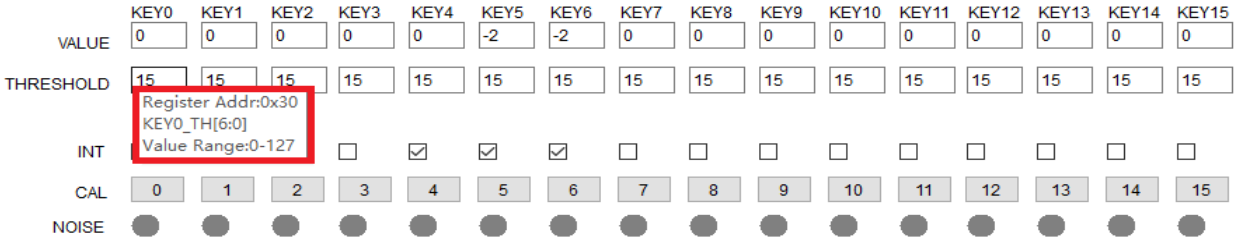

Figure 16: Set the threshold of KEY0

The address of KEY0 THRESHOLD Register is 0x30.

KEY0_TH[6:0] are the setting bits of KEY0 THRESHOLD Register (0x30).

Threshold range is from 0 to 127.

Key will be triggered when the environmental capacitance of touch key is over key threshold.

5.4 Value of KEY

As shown in Figure 20 below,

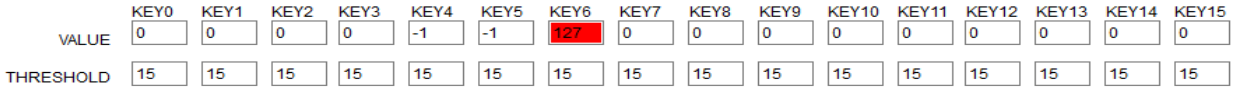

Figure 17: The VALUE of the KEY

VALUE is the current touch key value. It shows environmental capacitance if there is no object close to touch key. The corresponding value will be display in the box when pressing KEYs (KEY0~KEY15) on EVB. The box turns red if value is over key threshold and it means this key is triggered.

5.5 Key and interrupt enable

Figure 18 below is an example. If you want to disable KEY0, you cannot select the check box in the KEY0 column of the IO CONFIG page. Key enable setting could shut down any touch key. If disable the KEY0 and KEY1~KEY15 is enabled, there is no changing by touching KEY0.

Note: If KEY is set to GPIO (High) or GPIO (low) on the IO CONFIG page, the key enable setting corresponding to KEY will also be disabled.

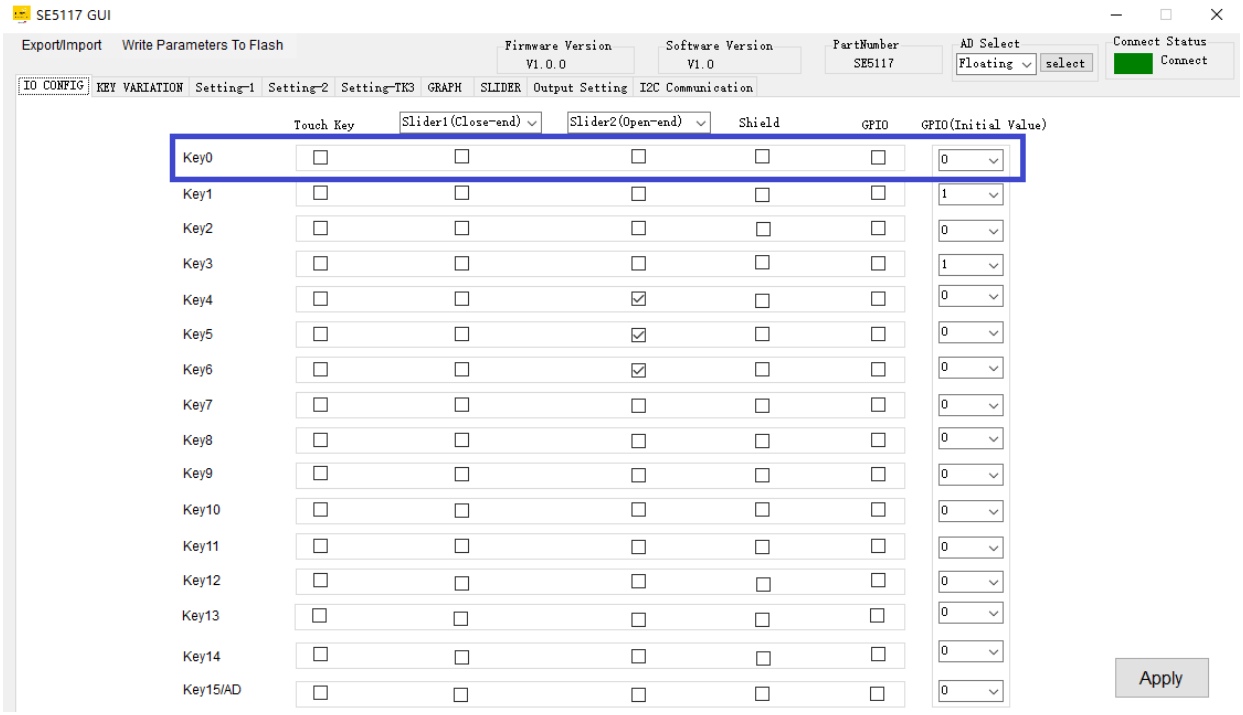

Figure 18: Set EN of KEY0 to disable

Interrupt enabled setting, as shown in Figure 19 below,

Figure 19: KEY's INT and INT_EN

Checking in the box is the action of enable interrupt function, no checking means disable. INT_EN should be set to enable first when configure key interrupt for KEY0~KEY15. INT_EN is the global interrupt setting. If it is disabled, all keys interrupt will be turned off even though key is pressed.

Note: If KEY is set to GPIO (High) or GPIO (low) on the IO CONFIG page, the INT_EN corresponding to KEY will also be disabled.

5.6 Key Calibration

As shown in Figure 20 below,

Figure 20: The calibration of the KEY

“0” in a box means KEY0 and “10” means KEY10. System will force calibrating the corresponding KEY by pressing button. Please make sure there in no action on keys during calibration, or it will cause errors.

5.7 Noise Display and Threshold Setting

As shown in Figure 21 below,

Figure 21: The noise lights of the KEY

There are 16 noise lights for KEY0~KEY15. Light will be red when the corresponding KEY has noise or it will be

gray.

NOISE_TH_SET bit is noise threshold set from 0~127. Input data in the corresponding box and press Enter or Tab key, or move the cursor to another location will set up the threshold.

When the VALUE of the sample changes more than NOISE_TH_SET, but not exceeds the key threshold setting, the touch key will be considered to be an ambient noise disturbance. And corresponding noise display will turn red.

5.8 KEY Value Display

The key value will be shown in the red block as Figure 22.

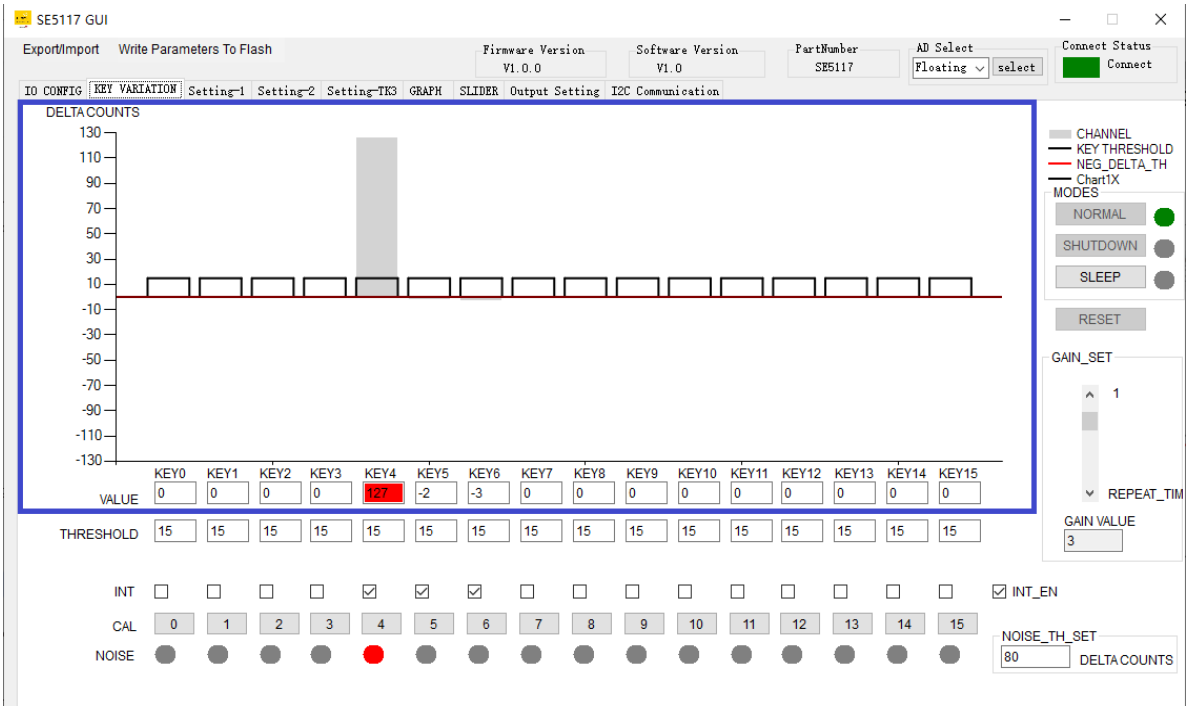

Figure 22: The value of the KEY

As shown in the blue box above, black line is key threshold value, gray line is key value and red line is negative threshold value.

Key value will update the current capacitance of key. The value of KEY2 is 127 and threshold is 30. The value is over threshold, so KEY4 value display red meaning pressed.

6. SETTING-1

As shown in Figure 23 below, the touch key related parameters are set as follows.

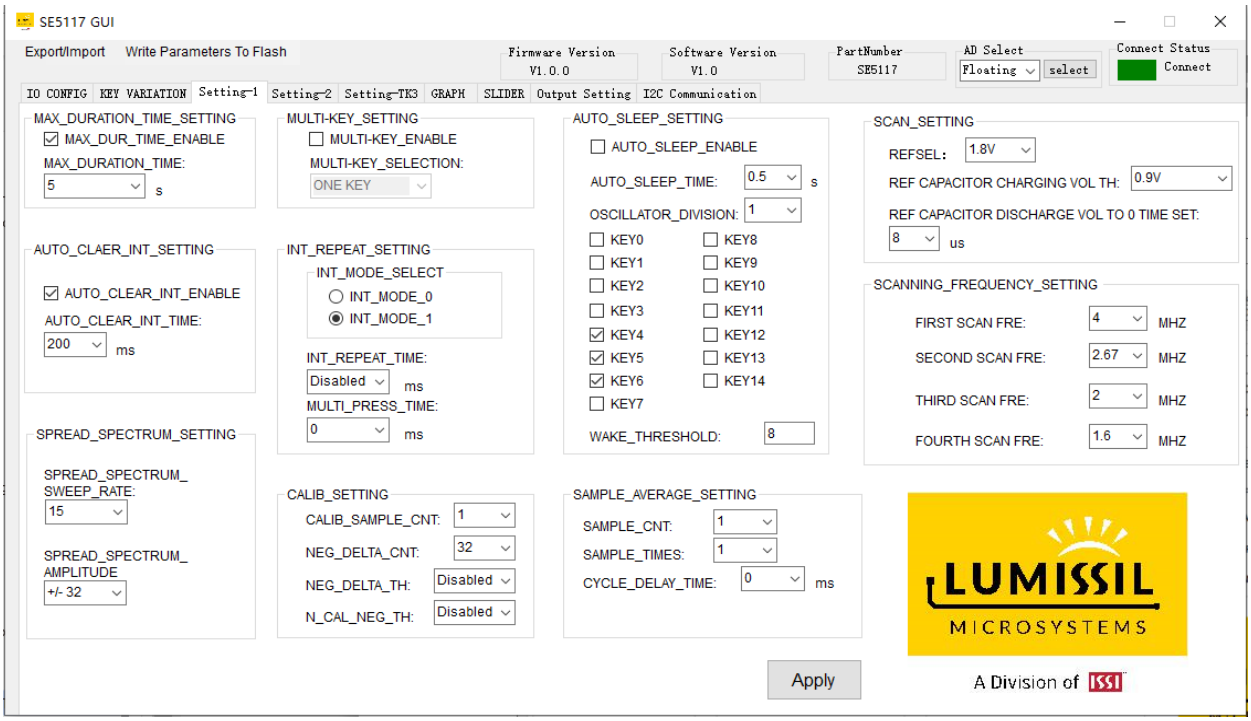

Figure 23: Setting page of GUI

6.1 MAX_DURATION_TIME_SET：Maximum Pressing Duration Time Setting

As shown in Figure 24 below,

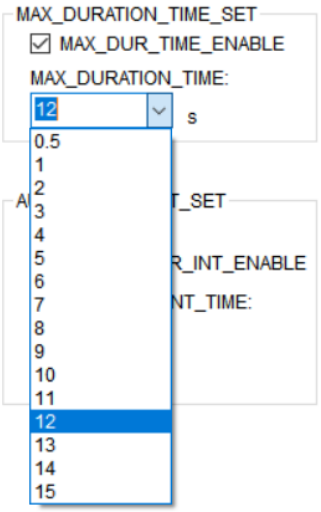

Figure 24: MAX_DURATION_TIME_SET option

MAX_DUR_ENABLE is the maximum pressing duration time function enable. Checking is enable, no checking is disable.

MAX_DURATION_TIME is the maximum pressing duration time setting. Unit is second. When pressing time is over MAX_DUR_TIME, system will force calibrating the pressed key.

This function is mainly used to prevent a touch key from the environment factor. For example, the water drop is on the touch button, which causes the touch button keep pressing status and cannot be used again.

If the maximum pressing time is set, when the touch button is pressed over programmed time, it will be force

calibration. Then the touch button can be used after being affected by the water drop.

6.2 AUTO_CLEAR_INT_SET：Auto-Clean Interrupt

As shown in Figure 25 below,

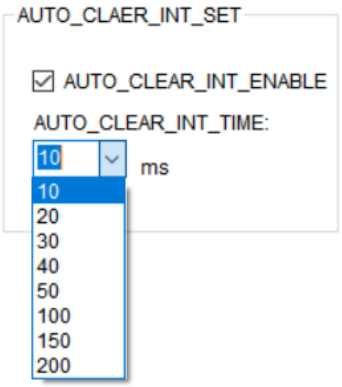

Figure 25: AUTO_CLEAR_INT_SET option

AUTO_CLEAR_INT_ENABLE is auto-clean interrupt function. Checking is enable.

AUTO_CLEAR_INT_TIME is auto-clean interrupt time to choose. Unit is milisecond.

When AUTO_CLEAR_INT_ENABLE is disabled, only reading 02h and 03h registers will releae the INTB pin, otherwise it will keep low.

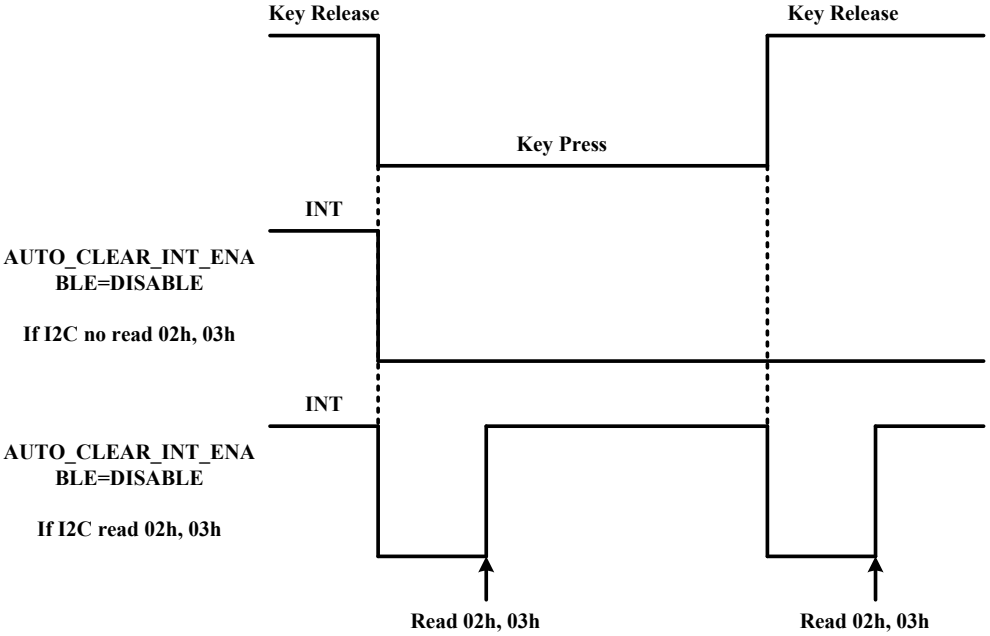

Figure 26: INTB action when AUTO_CLEAR_INT_ENABLE is disabled

When AUTO_CLEAR_INT_ENABLE is enabled, INTB pin will be released by reading 02h (Key Status Register1) and 03h (Key Status Register2) registers. If 02h and 03h registers are not be read within programmed time AUTO_CLEAR_INT_TIME (10ms~200ms), then IS31SE5117 will release INTB pin after AUTO_CLEAR_INT_TIME time expired.

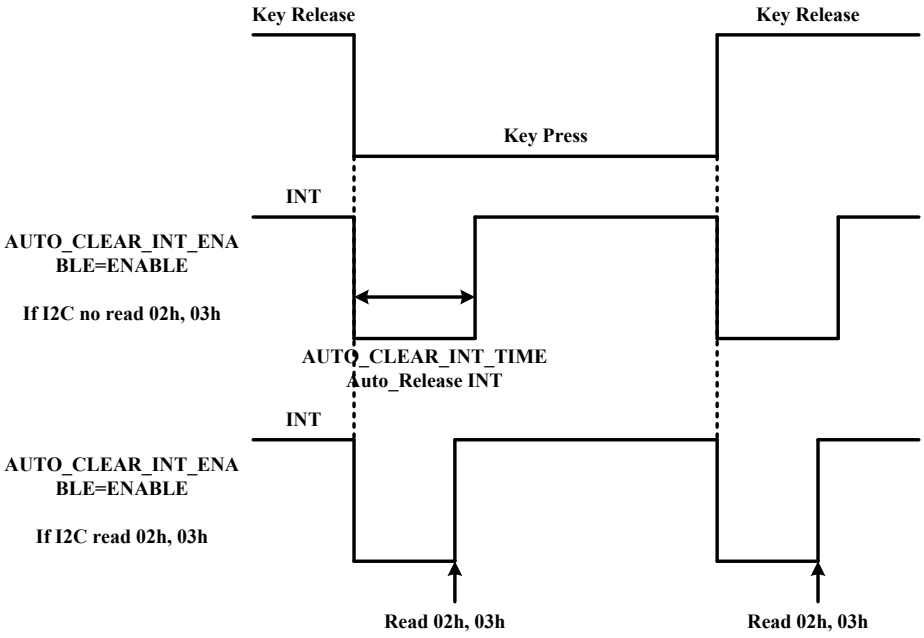

Figure 27: INTB action when AUTO_CLEAR_INT_ENABLE is enabled

6.3 SPREAD_SPECTRUM_SET：Spread Spectrum Setting

As shown in Figure 28 below,

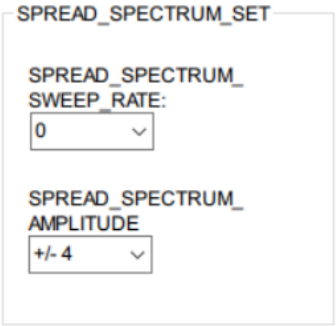

Figure 28: INTB action when AUTO_CLEAR_INT_ENABLE is enabled

SPREAD_SPECTRUM_SWEEP_RATE is defines the spread spectrum sweep rate. If SPREAD_SPECTRUM_SWEEP_RATE = 0, then the spread spectrum is disabled.

SPREAD_SPECTRUM_AMPLITUDE is defines the amplitude of spread spectrum frequency change.

The setting of spread sweep frequency and the spread amplitude should be carefully selected to reduce the effect of EMI.

6.4 MULTI-KEY_SET：Multi-Key Setting

As shown in Figure 29 below,

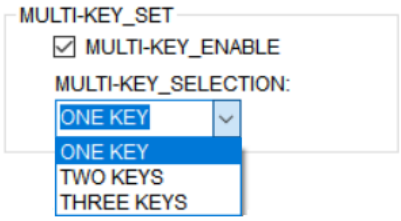

Figure 29: MULTI-KEY_SET option

MULTI-KEY_ENABLE is enabled multi-key function. Checking is enable. When MULTI-KEY_ENABLE is not checking, all keys are available.

MULTI-KEY_SELECTION can be set to ONE KEY, TWO KEYS or THREE KEYS by clicking the arrow in box. In some applications, such as a password lock, the number of keys pressed need to limit at the same time. The MULTI-KEY_SELECTION should be set to ONE KEY to prevent error on password lock.

6.5 INT_REPEAT_SET：Interrupt Repeat Setting

As shown in Figure 30 below,

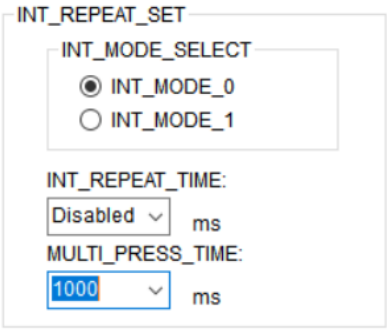

Figure 30: INT_REPEAT_SET option

INT_MODE_SELECT is INT_MODE mode setting. System generates one interrupt only by pressing or releasing keys when pick INT_MODE_0. System generates interrupt repeatly by pressing keys when pick INT_MODE_1 and releaseing key will trigger once interrupt.

INT_REPEAT_TIME is used to set interrupt auto-repeat time. Click arrow in bow to choose different time and unit is milisecond.

MULTI_PRESS_TIME is used to set the time between first and second interrupt. Click arrow to choose different time and unit is milisecond.

If there is a key keeping pressing, second interrupt will be generate untill MULTI_PRESS_TIME after first interrupt and waiting for INT_REPEAT_TIME to trigger third interrupt and going on interrrupt.

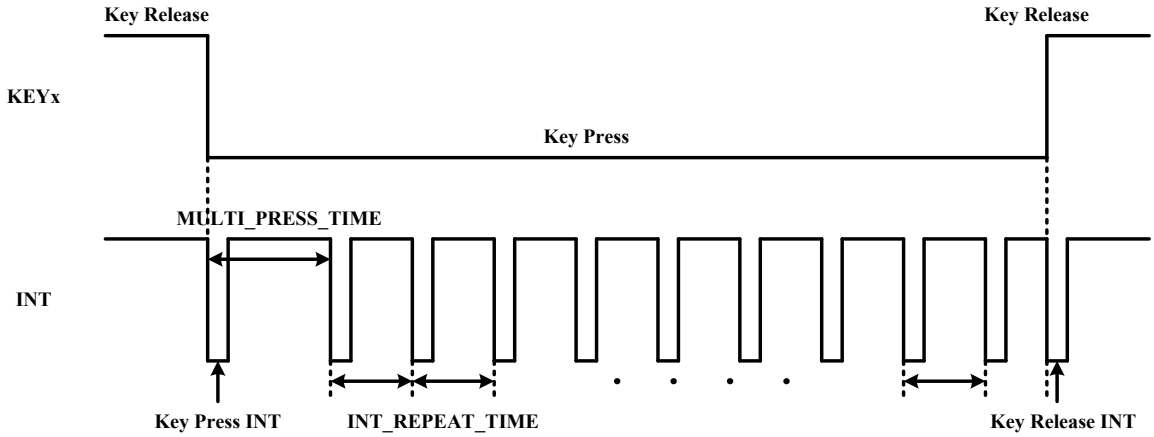

Figure 31: INTB behavior when setting the INT_REPEAT_SET parameter

6.6 SAMPLE_AVERAGE_SET：Sampling Frequency and Average Number Setting

As shown in Figure 32 below,

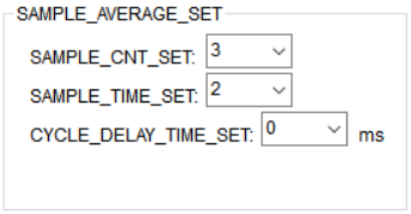

Figure 32: SAMPLE_AVERAGE_SET option

SAMPLE_CNT_SET is to set each button sampling number, the average value of multiple samples is taken as the final key value to improve the scanning stability.

SAMPLE_TIME_SET is single sampling time for SAMPLE_CNT_SET, then sampling time for each key is: SAMPLE_TIME_SET*SAMPLE_CNT_SET.

The larger value of SAMPLE_CNT_SET and SAMPLE_TIME_SET, the better the reliability of the key. However at the same time the sampling speed of the button will be slower. Please set these values according to the actual application.

CYCLE_DELAY_TIME_SET is a cycle delay time after all keys scanned.

6.7 AUTO_SLEEP_SET：Auto SLEEP Mode Setting

As shown in Figure 33 below,

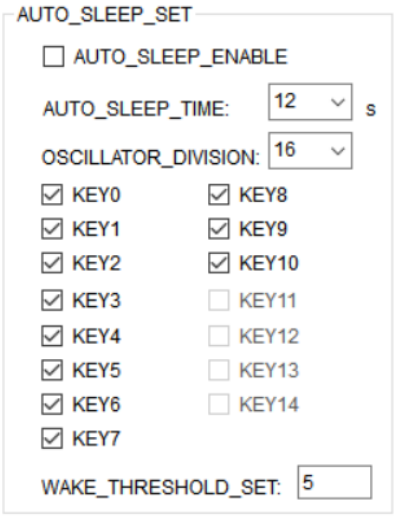

Figure 33: AUTO_SLEEP_SET option

IS31SE5117 integrates AUTO_SLEEP function and the entering time could be configured. System will enter into SLEEP Mode when no action in touch key. It will be waked up by any key action. In some applications that require low power consumption, it can be set to SLEEP mode automatically.

KEY0~KEY10 is enabled to exit SLEEP Mode (Click SLEEP button in Figure 17 to enter into SLEEP Mode in GUI interface). Enable the corresponding key and system will be waked up as key value arrives the wake up threshold (WAKE_THRESHOLD)

WAKE_THRESHOLD_SET is used to set the key threshold for waking up from SLEEP Mode. Input data in box and press Enter or Tab key, or move the cursor to another location will set up the threshold.

6.8 CALIB_SET：Calibration Setting

As shown in Figure 34 below,

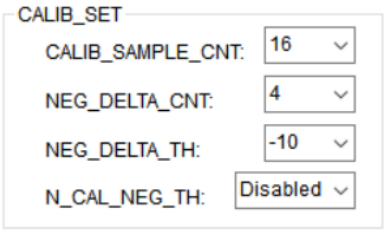

Figure 34: CALIB_SET option

CALIB_SAMPLE_CNT sets times for auto-calibrate cycle. The influence of parasitic capacitance shift on touch key will be reduced by calibrating.

When the variety of continuous sampling is negative and over the negative threshold (NEG_DELTA_TH), the corresponding key will be forced calibrating.

NEG_DELTA_TH is used to set negative threshold.

N_CAL_NEG_TH is the negative threshold for forced calibration.

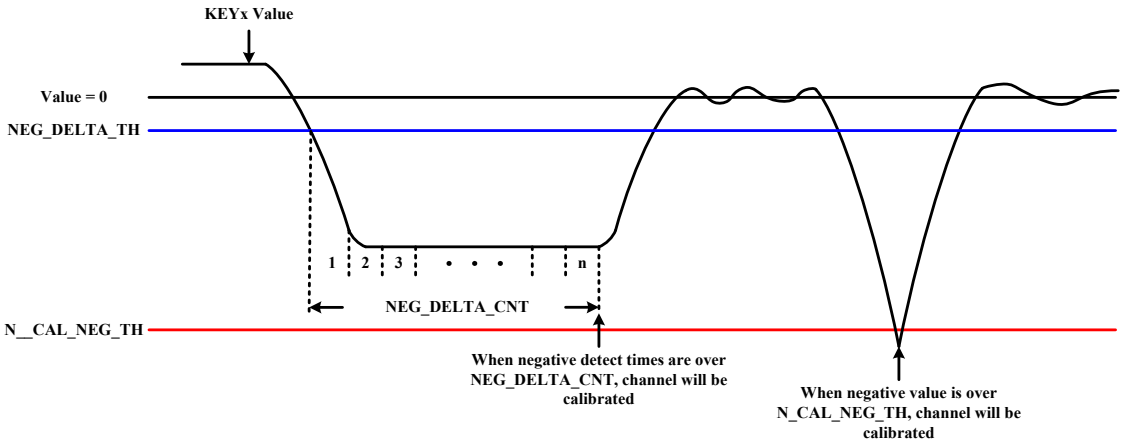

Figure 35: AUTO_SLEEP_SET option

6.9 SCAN_SETTING：Scan And Frequency Setting

Scanning function is set as shown in Figure 36,

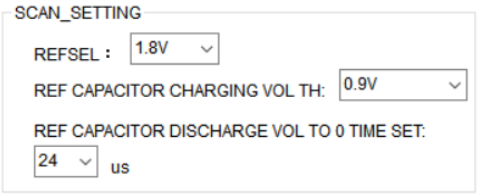

Figure 36: SCAN_SETTING option

REFSEL is VREF selection (Use 1.8V or VDDH as a reference).

REF CAPACITOR CHARGING VOL TH is set the reference capacitor charging voltage.

Improve Vth will increase detecting time and sensitivity, but might interfere SNR.

REF CAPACITOR DISCHARGE VOL TO 0 TIME SET is set the reset time for reference capacitor discharging.

The reference capacitor should be reset before each detecting period and increase discharging time by actual application.

Scanning frequency is set as shown in Figure 37,

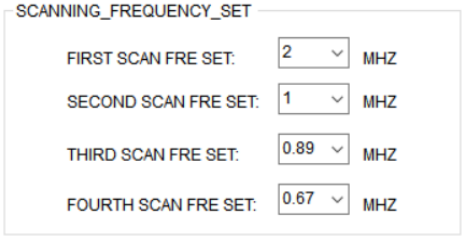

Figure 37: SCANNING_FREQUENCY_SET option

FIRST SCAN FRE SET is the first scanning frequency setting;

SECOND SCAN FRE SET is the second scanning frequency setting;

THIRD SCAN FRE SET is the third scanning frequency setting;

FOURTH SCAN FRE SET is the fourth scanning frequency setting.

A higher scanning frequency will decrease detecting time and not sensitive for alternating supply ripple, precondition is the sensing pad charged enough to VREF or the sensitive will get worse.

These four scanning frequencies are plus total to evaluate the effect.

7. SETTING-2

Seven parameters for filter algorithm and one parameter for sleep wake up period are setting as shown in Figure 38.

In the SETTIN-2 window, all the SETTING parameters must adjust to evaluation board of IS31SE5117. The customer didn't be encouraged to adjust these parameters in the SETTIN-2 window. There is another APP Note to illustrate SETTING-2 window.

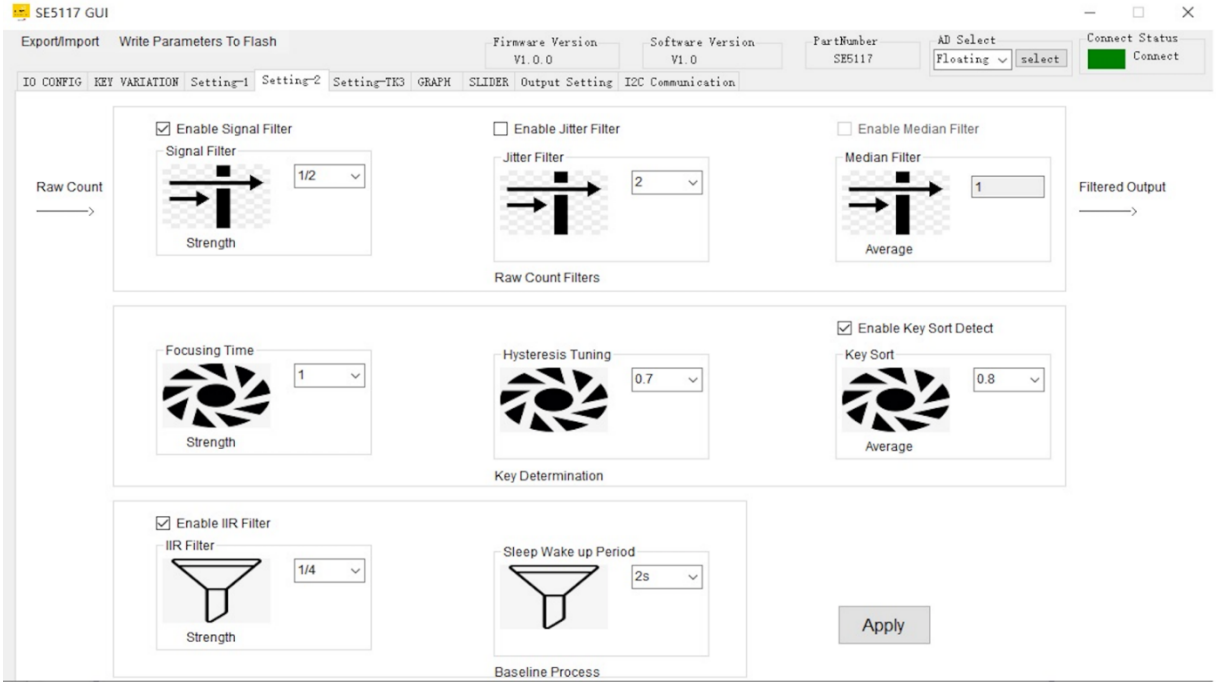

Figure 38: SETTIN-2 parameters

8. SETTING-TK3

TK3 stands for Touch Key technology III. It is a name for one of Touch Key technologies in Lumissil. TK3 uses dual-slople technology to design charge charging among an internal charge capacitor, an external reference capacitor and the Touch Key capacitor. Several parameters for the TK3 should be set. There is another APP Note to illustrate SETTING-TK3 window.

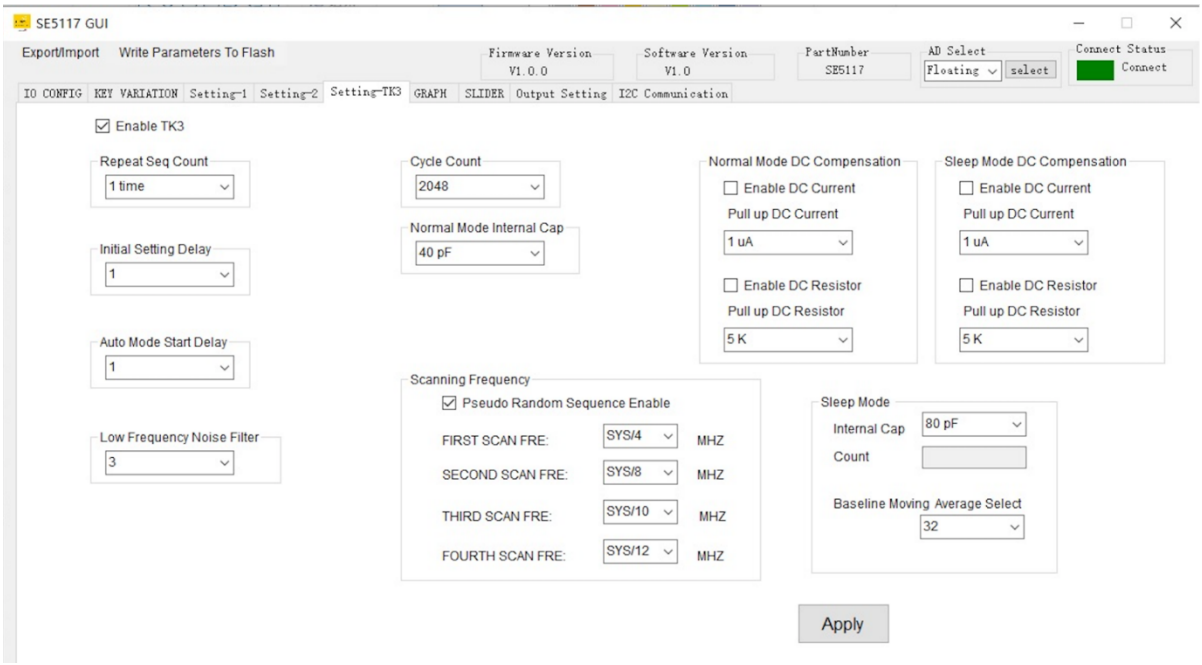

Figure 39: SETTING parameters

9. GRAPH

GRAPH is KEY value curves to show the current value of KEY0~KEY15 (Currently IS31SE5117 EVB only supports KEY0~KEY10). As shown in Figure 40, history value of KEYs will be checked by pulling the scroll bar. Users can uncheck the "KEY ENABLE" box in the lower right corner to filter out unwanted key values.

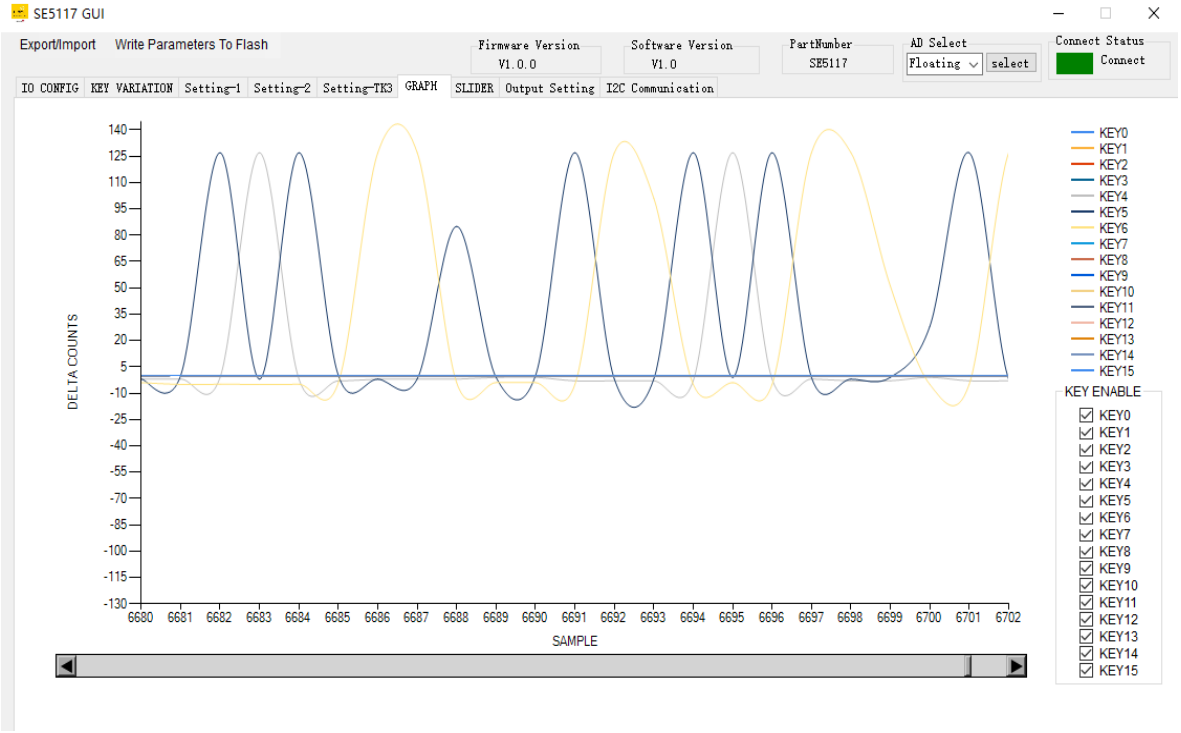

Figure 40: Display the current value of KEY on the GRAPH page

10. Sliders

As shown in the blue box in Figure 41, black line is key threshold value, gray line is key value.

When the selected key is combined to the slider (Set the slider type through the IO CONFIG page in Figure 13). The keys used as a slider will be updated as the finger moves. On the right-hand side of Figure 41,slider's information will be updated immediately while sliding.

Sliding keys can also change the order. As shown in the red box below, the key sequence is Key5 to Key10. Users can change the order of slider keys as needed.

Note: The number of Sliding keys must be 6 keys to be combined.

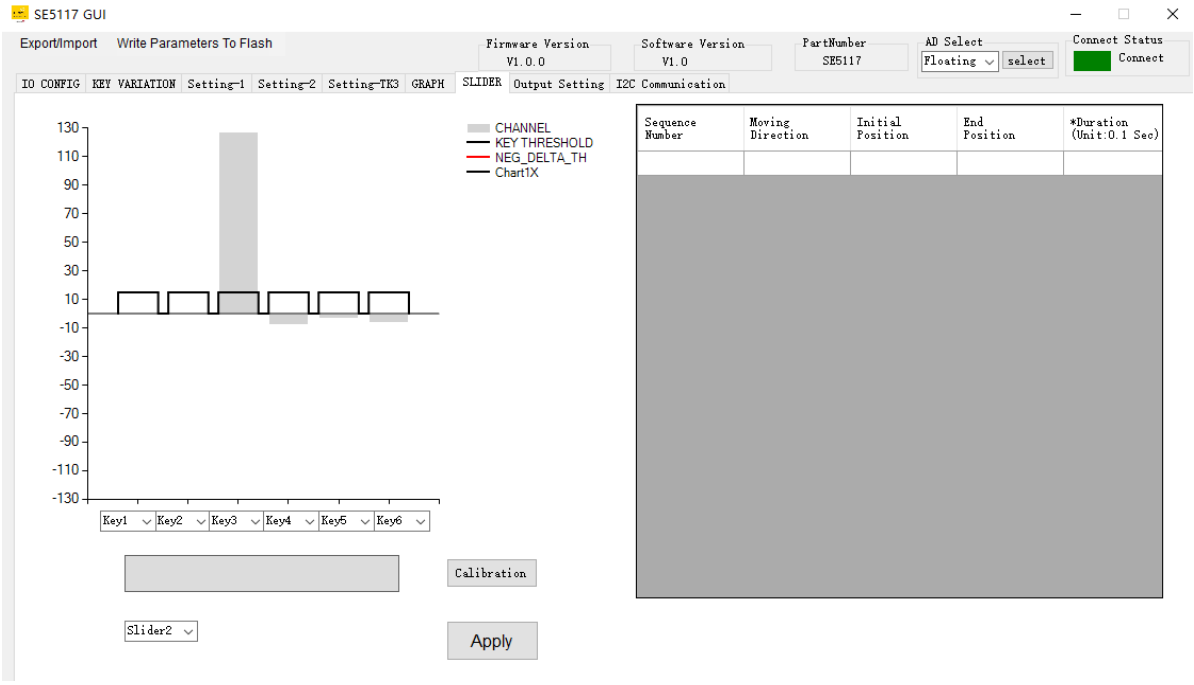

Figure 41: Slider page of GUI

10.1 Slider Type

As shown in Figure 42 below, Users can set the following slider types (Set the slider type through the IO CONFIG page in Figure 13).

Slider Bar (Open-end): Used in Slider Board (As shown on the left side of **Error! Reference source not found.**).

Slider Wheel (Close-end): Used in Wheel Board (As shown on the right side of **Error! Reference source not found.**).

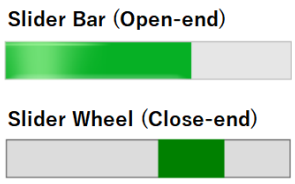

Figure 42: Slider Bar (Open-end) and Slide Wheel (Close-end)

10.2 Slider Key Calibration (Not yet to finish)

When the user develops the slider PCB (Slider Bar or Slider Wheel), the calibration button can be used to calibrate the moving distance of the slider. When the calibration button is pressed, as shown in the blue box in Figure 43, the red blocks will be displayed in order. The user must move the slider with a finger at a constant speed until the red blocks are displayed to the end.

Note: If no touch is detected within 3 seconds after pressing the calibration button, the calibration process will end.

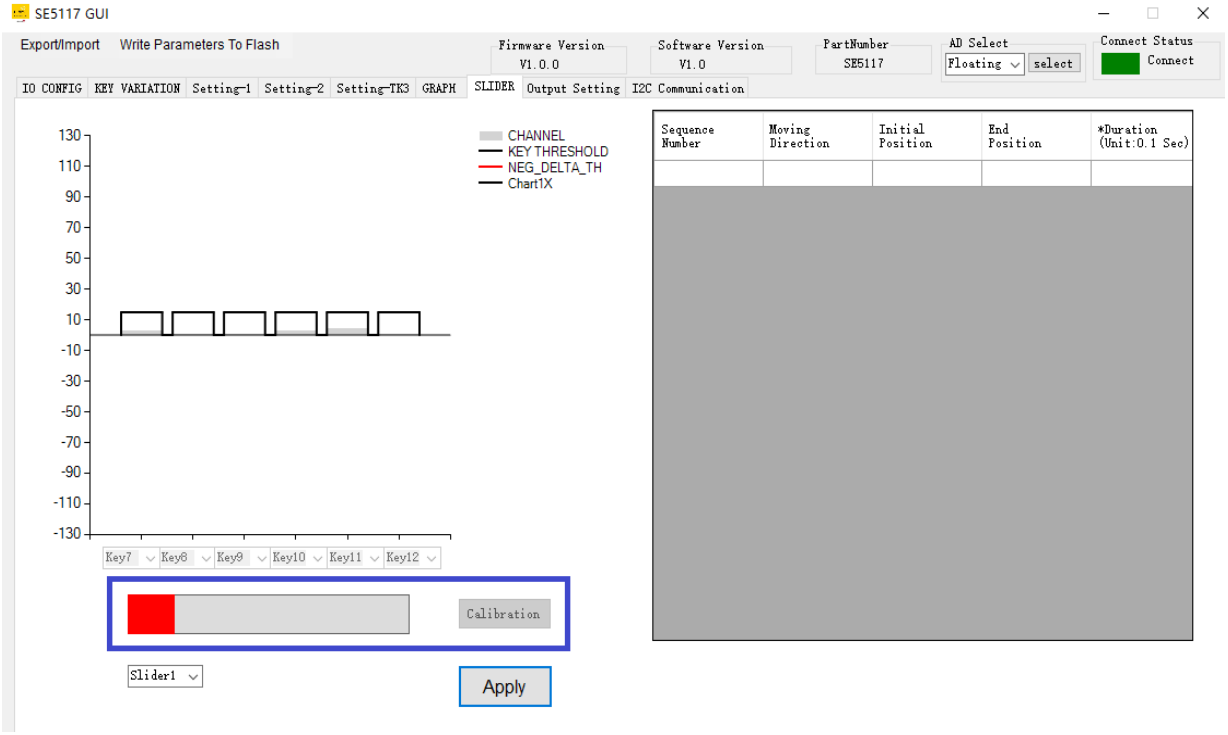

Figure 43 Slide key calibration

11. Output Setting

As shown in Figure 44, the customers can organize their own rules according to the hardware layout status. The format of rules are as follows:

(1) Select the input Touch Keys.

(2) Select the output GPIOs.

(3) Select the reaction of the output GPIO to the related input Touch Keys. There are two reactions are as follows: i. toggle and ii. inverted.

(4) Click the ADD button to add the rule in Rule Content.

(5) Click the Apply button to complete the output setting.

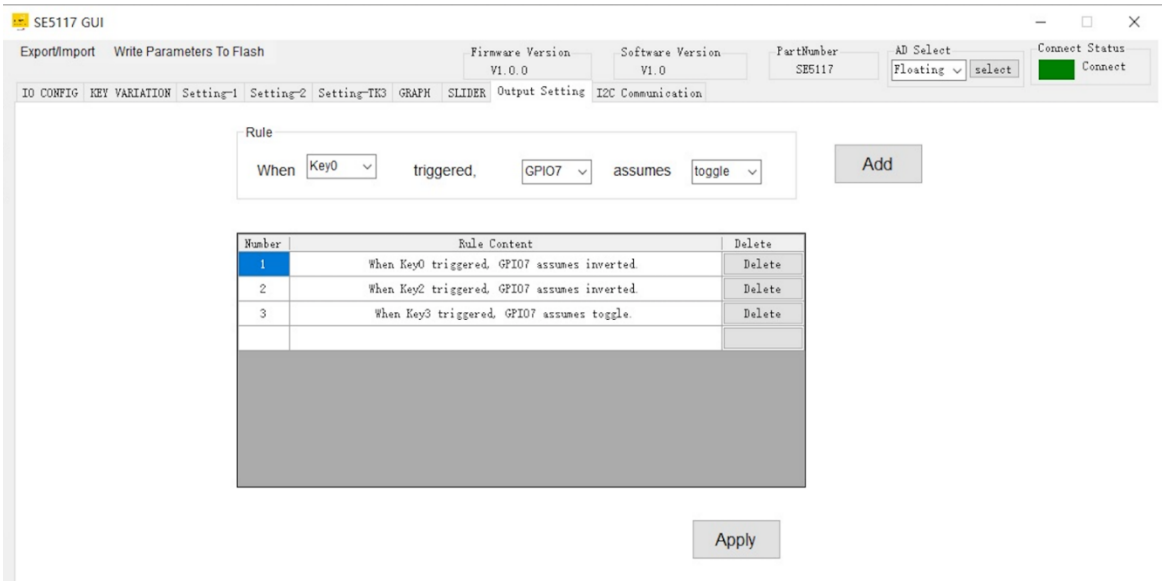

Figure 44: Output Setting

12. I2C Communication

As shown in the blue box in Figure 45, the user can issue I2C commands to the EVB here. On the right, you can choose to load, store, send and clear actions. I2C command set can be composed of several bytes. These bytes can be separated by space or comma. I2C command set can be terminated by a line wrap.

As shown in the red box, you can choose to save or clear the data log on the right after the result of the I2C command is issued. The green box indicates the delay time setting between each command and command, the delay setting range is 10ms~1000ms.

Note: Please select the correct I2C address according to the setting of the AD pin switch on the EVB (Please refer to Table 2).

Figure 45: I2C Communication page of GUI

12.1 I2C Communication Example1 (Touch Key)

Command list:

Command	Description
78 06 0A 3C	Write data 0x0A to register no. 06
	Write data 0x3C to register no. 07
78 06	Write register no. as 06
79	Read data from register no. 06
78 07	Write register no. as 07
79	Read data from register no. 07

Log list:

Time	Direction	Command/Data	Description
22:16:45:170	>>	78 06 0A 3C	Write data 0x0A to register no. 06
			Write data 0x3C to register no. 07
22:16:45:197	>>	78 06	Write register no. as 06
22:16:45:218	<<	0A	Read data from register address 06
22:16:45:238	>>	78 07	Write register no. as 07

22:16:45:238	<<	3C	Read data from register address 07

Note: All the expressed number will be treated as hex, i.e. 16 is 22 in decimal
Note: only one bye data can be read

13. Debug Customer Target Board Based On GUI

13.1 Connection Block Diagram

As shown in Figure 46 below, the EzISP board can be connected to the customer target board to configure touch keys or LED parameters through the GUI interface.

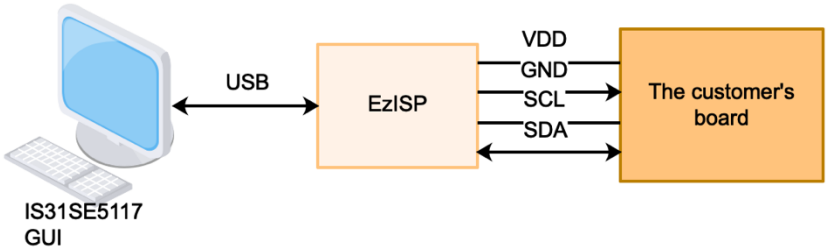

Figure 46: Block diagram of EzISP Board connected to the custom target board

As shown in Figure 47 below, the EzISP Board only needs 4 pins to connect to the custom target board, which are VDD, GND, SCL, and SDA.

Figure 47: Pin configuration on EzISP board

13.2 Customer Target Board Configuration by GUI

First, you can use the GUI interface to connect to the customer's target board to adjust the parameters of the touch keys and set the LED pattern without having to develop code in the customer's MCU at the beginning. This can shorten development time.