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# Touch MCU Workshop v3.5 User's Guide

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# Table of Contents

<b>1 Development Platform Introduction and S/W Installation .....</b>	<b>3</b>
Characteristics .....	3
System requirements .....	3
System Configuration .....	3
S/W Installation .....	4
<b>2 Touch MCU Workshop S/W Functions and Operation .....</b>	<b>10</b>
S/W Development Flow .....	10
Quick Start .....	10
Create a new project .....	10
Add keys and components .....	11
Key or component property setting .....	12
Change the key or component pin setup .....	13
S/W Functional Description .....	14
Toolbox Window .....	15
Project Window .....	15
Global Option Window .....	16
Properties Window .....	17
<b>3 Touch MCU Tuning S/W Functions and Operation .....</b>	<b>18</b>
Quick Start .....	18
Touch MCU Tuning .....	18
S/W Functional Description .....	19
Touch Key Signal Observation Area .....	20
Tuning Window .....	21
Global Option Window .....	22
Scope Window .....	22
Menu Functional Description .....	22
<b>4 Component Generation .....</b>	<b>23</b>
Component Library System File Maker .....	23
Maker instructions .....	24
Component programming .....	28
<b>5 Appendix A .....</b>	<b>29</b>

# 1 Development Platform Introduction and S/W Installation

The HOLTEK Touch MCU Workshop V3.5 is a third generation platform, using an intuitive drag and drop methodology for touch switch project implementation. It fully integrates the touch software library, compiler function, key signal monitor and parameter adjustments functions.

## Characteristics

- Supports BS82xxx, BS83xxx, BS84xxx Flash series MCUs
- Provides friendly and intuitive operation interface
- Easy key sensitivity and parameter adjustment
- Integrated compiler
- Integrated touch control and peripheral library
- Advanced users defined component libraries

## System requirements

- PC with USB interface
- Operation system: Microsoft Windows® XP or above

## System Configuration

Touch MCU Workshop V3.5 Configuration



Touch MCU Tuning V1.5 Configuration

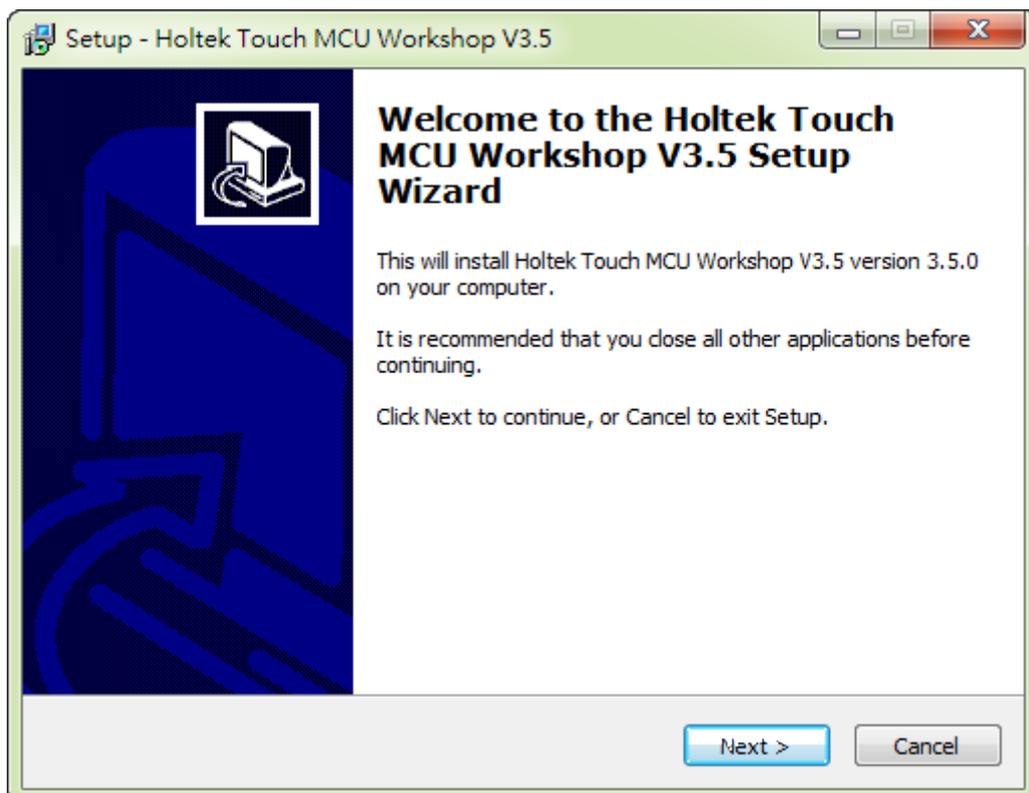


- S/W Components
  - Holtek Touch MCU Workshop: Used for MCU key setup, touch parameter setup, program generator and compiler functions. Operates together with the e-link hardware. Version 3.5 and later supports a download function
  - Holtek Touch MCU Tuning: Used with the BS-eBridge hardware for touch key signal monitoring, key sensitivity adjustment and touch parameter adjustment
- H/W Components
  - e-Link: Used for ICP programming
  - BS-eBridge: Used for data transmission
  - Target board: Used for functional verification

## S/W Installation

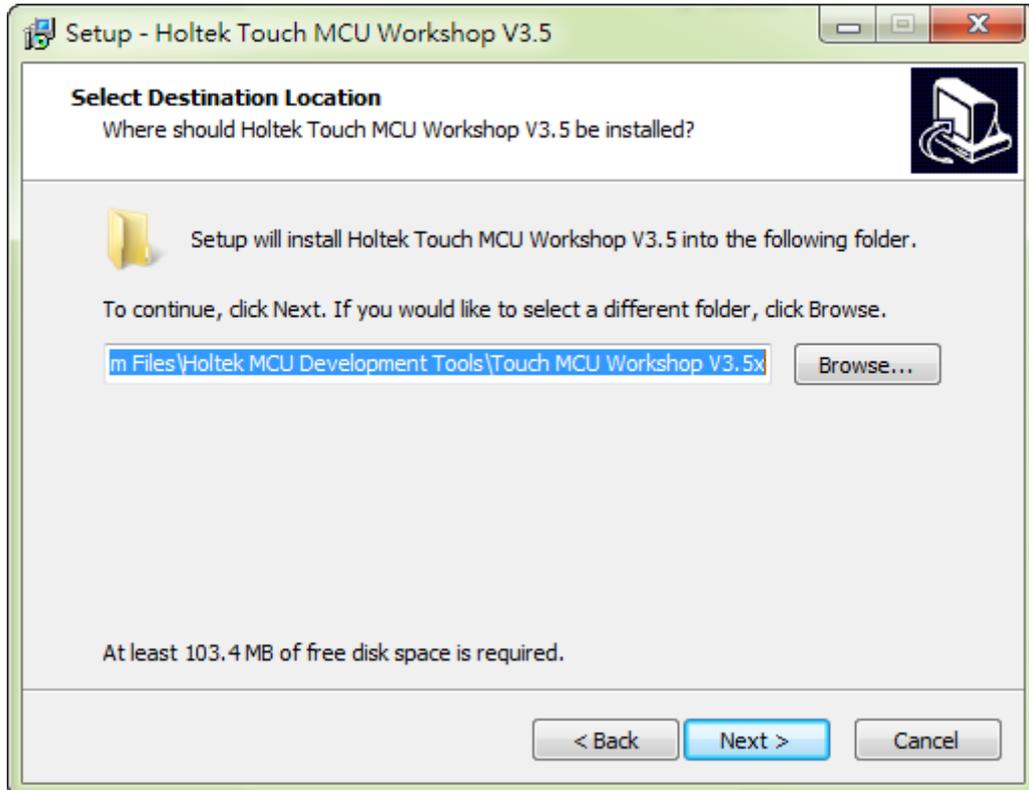
- **Step 1**

When starting the software installation, the following welcome dialogue will be displayed after which 'Next' should be selected to proceed with the installation.



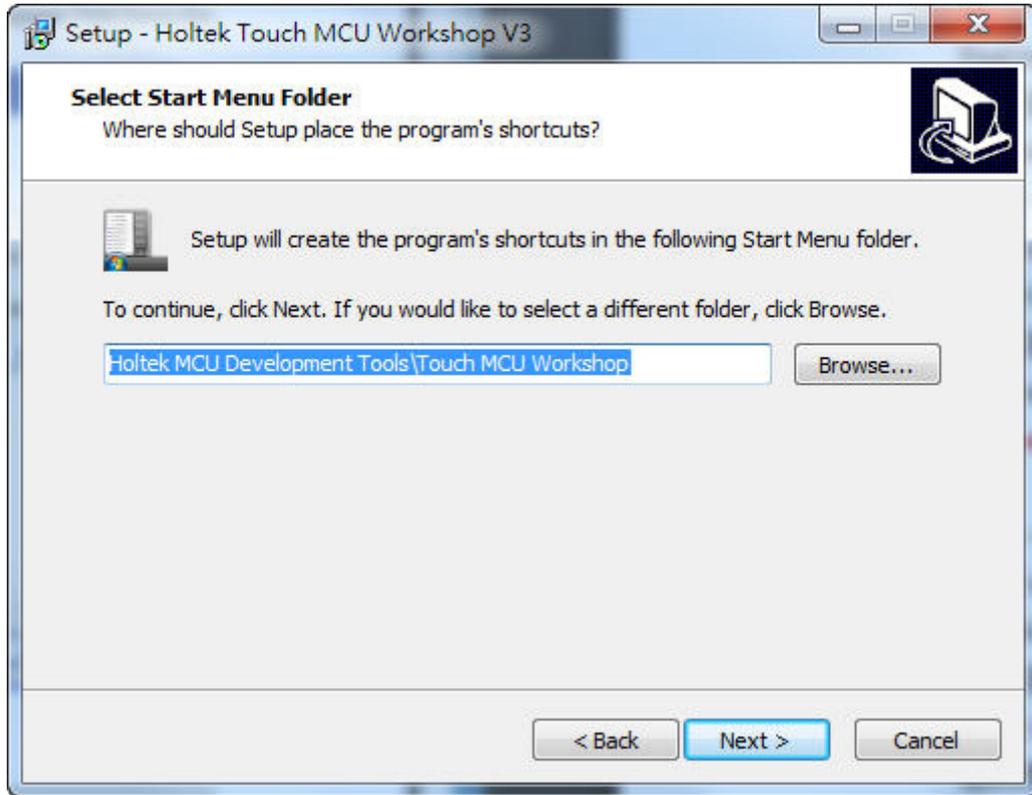
- **Step 2**

Setup the installation folder, the default folder is “C:\Program Files\Holtek MCU Development Tools\Touch MCU Workshop”, and click “Next” to continue the installation.



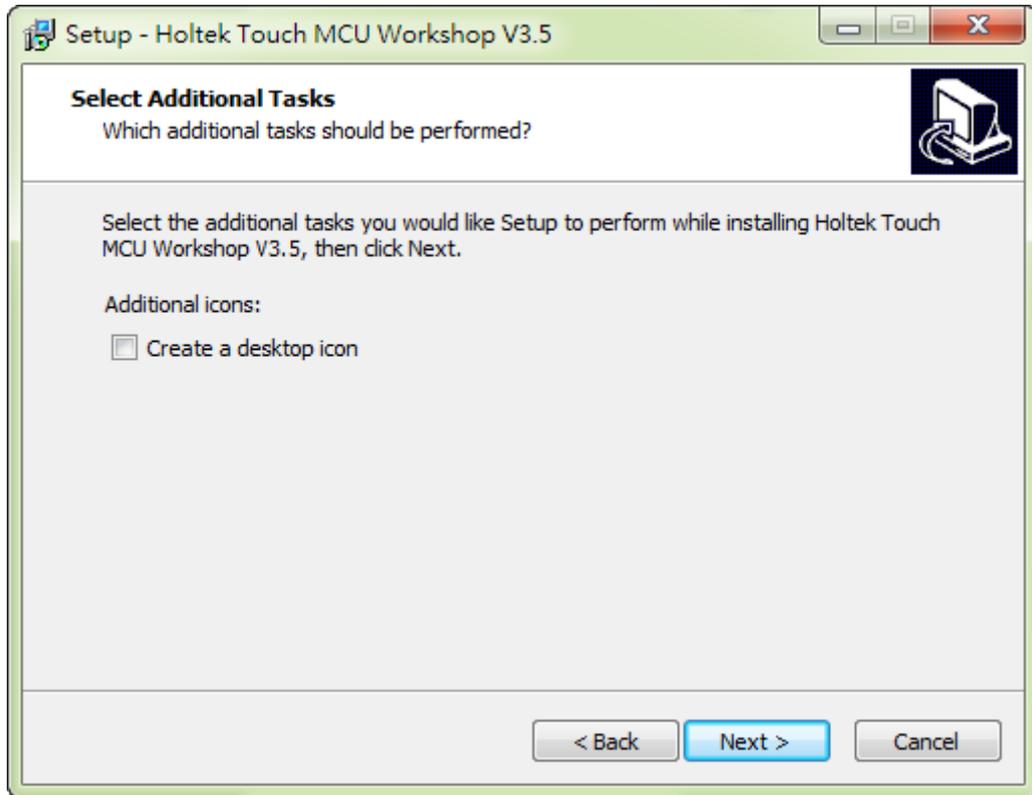
- **Step 3**

Setup the start menu folder, the default folder is “Holtek MCU Development Tools\Holtek Touch MCU Workshop”, and click “Next” to continue the installation.



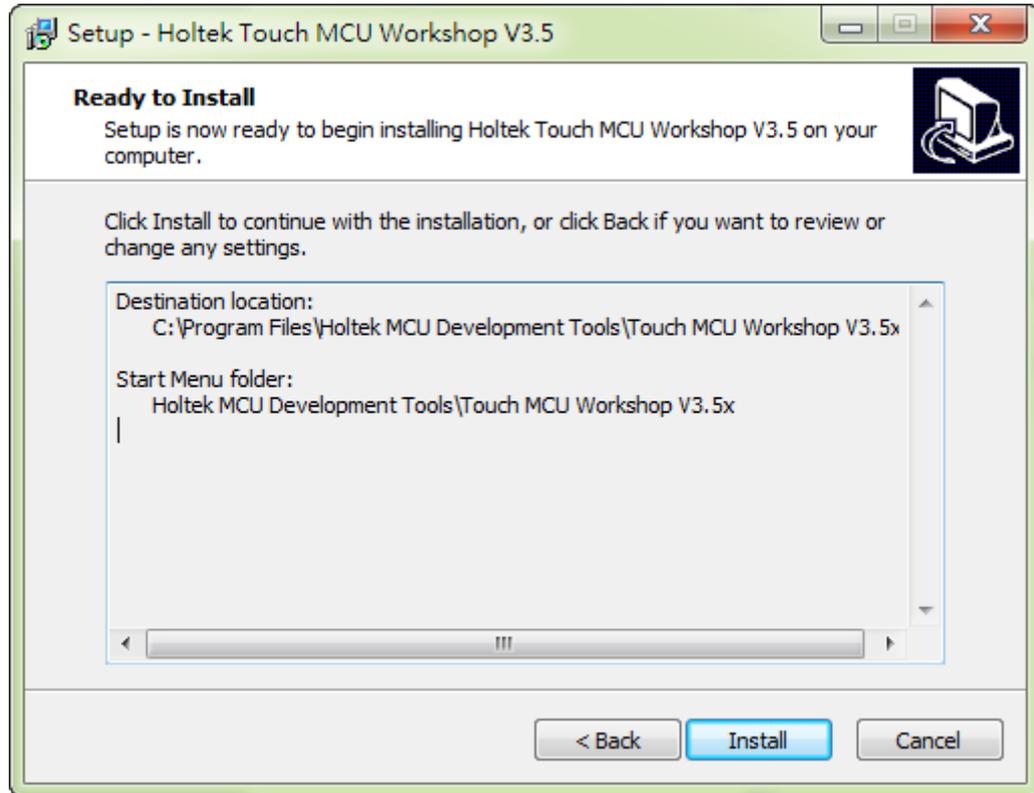
- **Step 4**

To add a desktop shortcut, check “Create a desktop icon”.



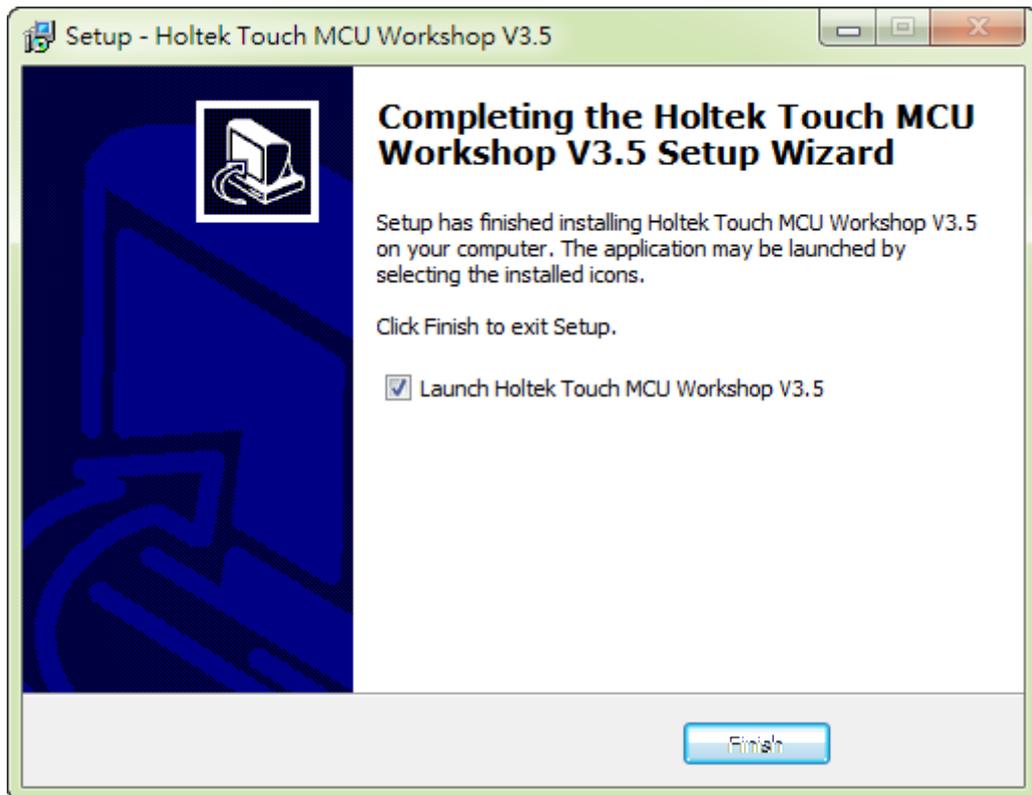
- **Step 5**

Confirm the settings, click “Back” to return to the the previous steps to modify if necessary, or click “Install” to complete the installation.



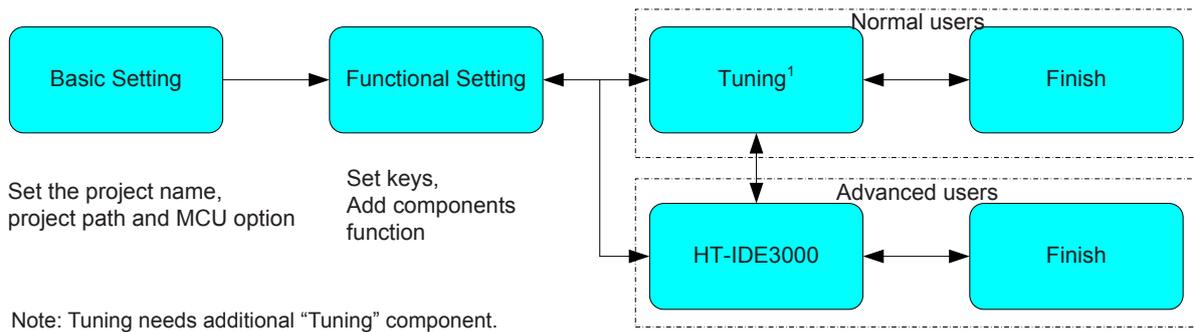
- **Step 6**

The completion dialogue will be shown after the installation is completed. If the “Launch Holtek Touch MCU Workshop” box is checked, the S/W will be executed after the ‘Finish’ button is clicked.



# 2 Touch MCU Workshop S/W Functions and Operation

## S/W Development Flow



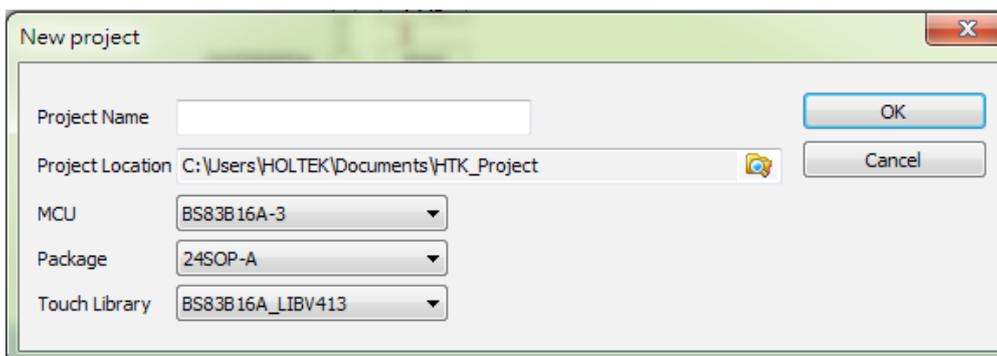
## Quick Start

### Create a new project

1. In the Toolbar, click on the "new".



2. Appear under the dialog box.



3. Perform the following steps to create a new project

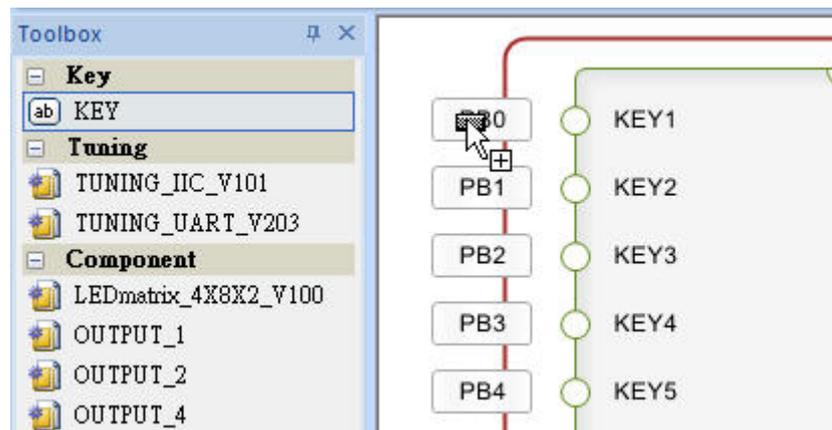
- In the “Project Name” location in the project window, enter a project name.
- In the “Project Location” set the project path, the default path is the same as that of the HT-IDE3000. After the project has been created, it will generate a new subdirectory with the same project name in the directory to store any related files.
- Choose the MCU that is to be used in the project.
- Choose the touch library version.

## Add keys and components

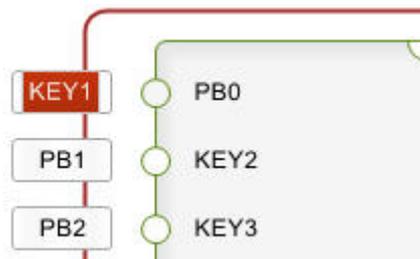
### 1. Add a key

#### Method 1

Drag a “KEY” from the toolbox to the IC pin position labeled KEY, as shown below:

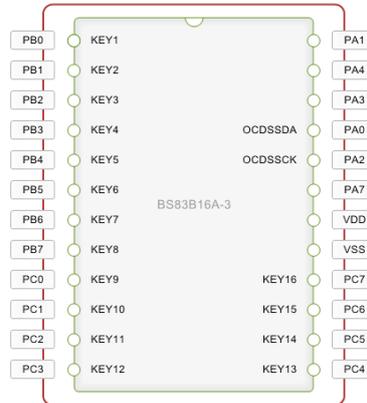


Release the left mouse button and it will change to the condition shown below where the original PB0 name changes to the key function.



### Method 2

Drag a “KEY” from the toolbox into the IC block shown by the dotted box. The touch keys will be automatically arranged in a KEY1, KEY2 ...etc order.

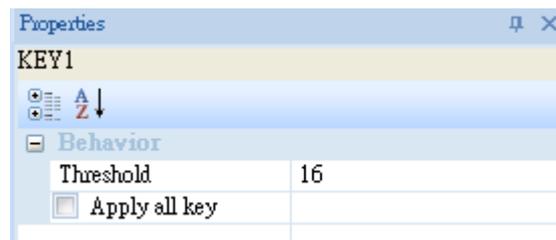


### 2. Add a component

Drag a component from the toolbox into the IC block, shown by the blue box in the diagram to complete the settings.

### Key or component property setting

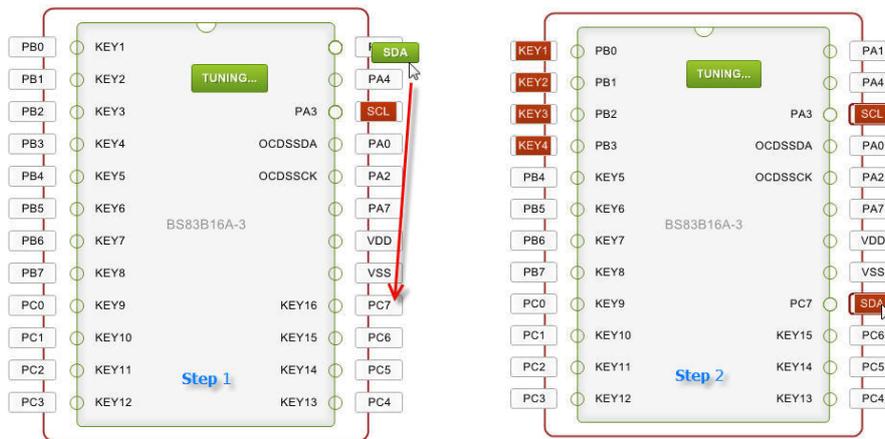
When dragging a key or a component from the toolbox, its property settings will be displayed in the properties window. The following figure shows the key threshold value setting. If the properties window is blank, this means that the key has not had any properties setup.



### Change the key or component pin setup

The already setup pins, shown in red, can be directly dragged to other I/O pins which have a KEYx label. When dragged the pin colour will change to green. If the colour turns red, then the pin setup is complete. If the colour of the dragged pin does not change to red, then this means that the pin could not be changed.

For example, to change the SDA pin in the Scope component to PC7, just drag the SDA directly to PC7 pin until the colour turns red.



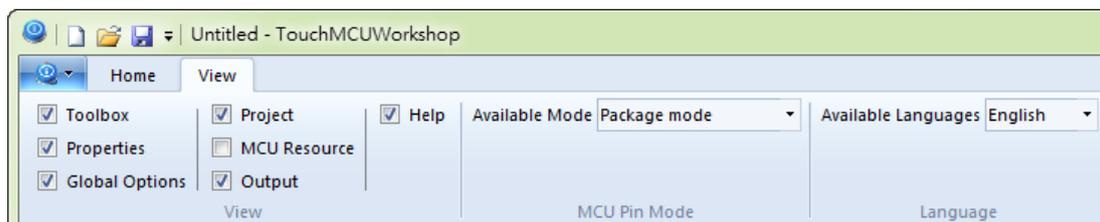
## S/W Functional Description

### Home Menu Functions



- New: Create a new project
- Open: Open an already saved project file
- Save: Save the current edited project
- Build: Build project
  - Download: If checked, the program will be downloaded to the board after successful compilation. The board must not be connected to an external power supply or batteries when downloading.
  - Power: The ICP programming voltage can be either 5V or 3V.
- HT-IDE3000: Advanced users can use the HT-IDE3000 to continue to develop the project. After executing the HT-IDE3000, the Touch MCU Workshop will be switched off automatically. If the user's computer is not installed with the HT-IDE3000, then it will be in a gray state.
- Tuning: This is used to fine tune the Touch Keys to obtain the optimal sensitivity and touch parameter adjustments. If TUNING components are not chosen, such as TUNING\_IIC and TUNING\_UART, this column will be in a gray state.
- Register e-Link: Note that the e-Link must be registered before use. If registered, it will be in a gray state.
- Upgrade the e-Link F / W: This will upgrade the e-Link firmware.

### View Menu Functions



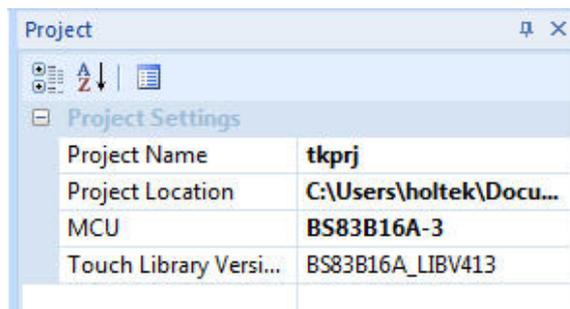
- View: check the Toolbox, Global Options, Project, MCU Resource, the Output, Help to display the corresponding window
- MCU pin Mode: change the picture to set interface
- Language: select the software display Language. There are traditional Chinese, simplified Chinese and English to choose from

## Toolbox Window

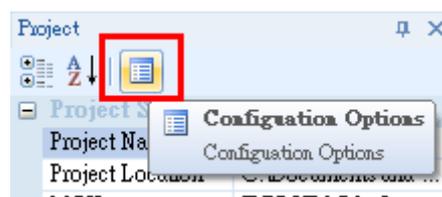
Here keys and components are provided for users to add functions.



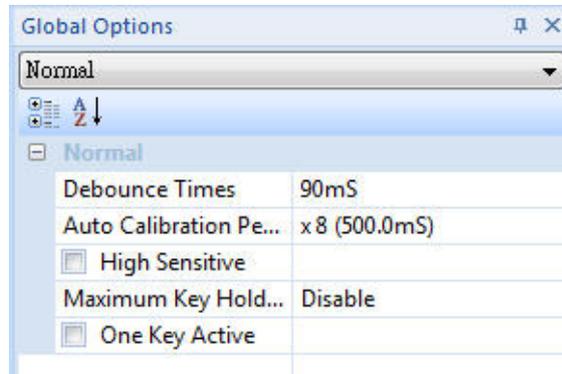
## Project Window



- Project Name: Enter the project name. Note that after a "Save" operation the project name can not be changed later.
- Project Location: Set the project path, the default path is the same as the HT-IDE3000.
- MCU: Choose the MCU that is to be used.
- Library Application: Choose the touch software library version.
- MCU Configuration Options: For normal users, the MCU options are not required to be setup so the default options can be used. Click the red framed block below to make changes if necessary.



## Global Option Window

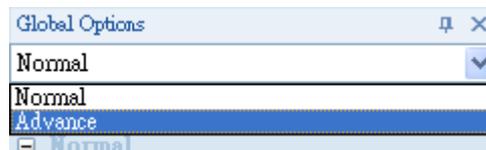


The global option window provides the touch key parameter for user setup. The available touch key parameters are shown in the accompanying table.

Name	Range
Debounce Times	50ms~190ms
Auto Calibration Period	62.5ms~937.5ms
High Sensitive	0=Normal Sensitive. 1=High Sensitive (check)
Maximum Key HoldTime	Disable. 4 sec~60 sec
One Key Active	0=Off; 1=On (check)
Fast Response <sup>1</sup>	0=Off; 1=On (check)
Auto Frequency Hopping <sup>1</sup>	0=Off; 1=On (check)
Power Save <sup>1</sup>	0=Off; 1=On (check)
Noise Protect <sup>1</sup>	0=Off; 1=On (check)
Moving Calibration <sup>1</sup>	0=Off; 1=On (check)

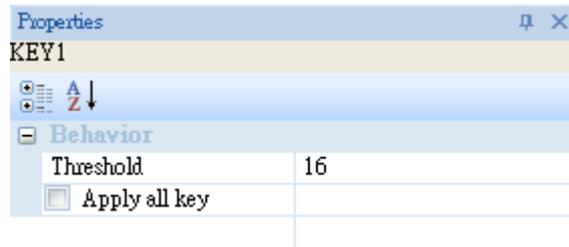
Note: 1. Here it is necessary to check Advance Mode.

2. Options will vary according to the library version.



## Properties Window

When dragging a component, its properties can be set in the properties window or by clicking on the added component to change its properties. If a component does not require additional settings, then the properties window will be blank. The key properties are setup as follows:



The Key trigger threshold value has a range of 8~255. Check “Apply all key” and adjust the threshold values of the other keys.

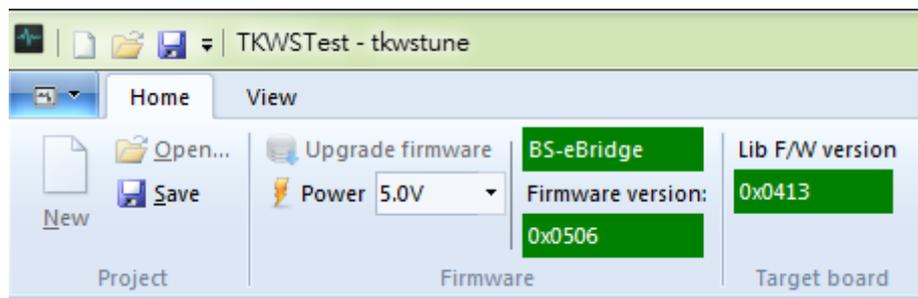
## 3 Touch MCU Tuning S/W Functions and Operation

The Touch MCU Tuning functions provide users with a software interface to observe the key signals as well as providing a platform for touch key sensitivity and parameter adjustment. The platform allows users to observe the results immediately after adjustment. In addition to being used via the Holtek Touch MCU Workshop, the tuning software can also be used independently.

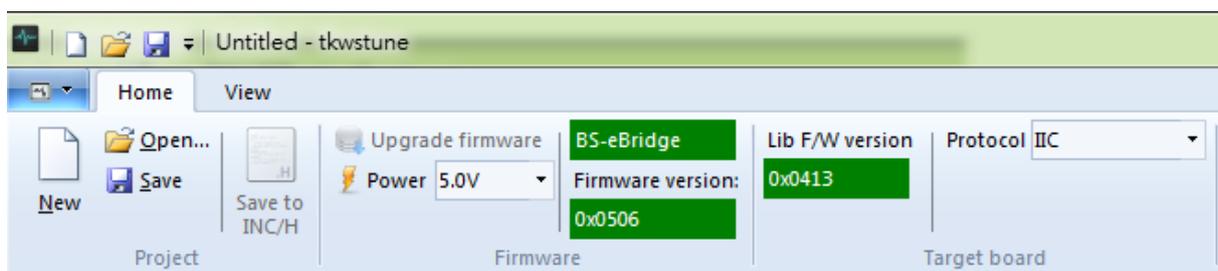
### Quick Start

#### Touch MCU Tuning

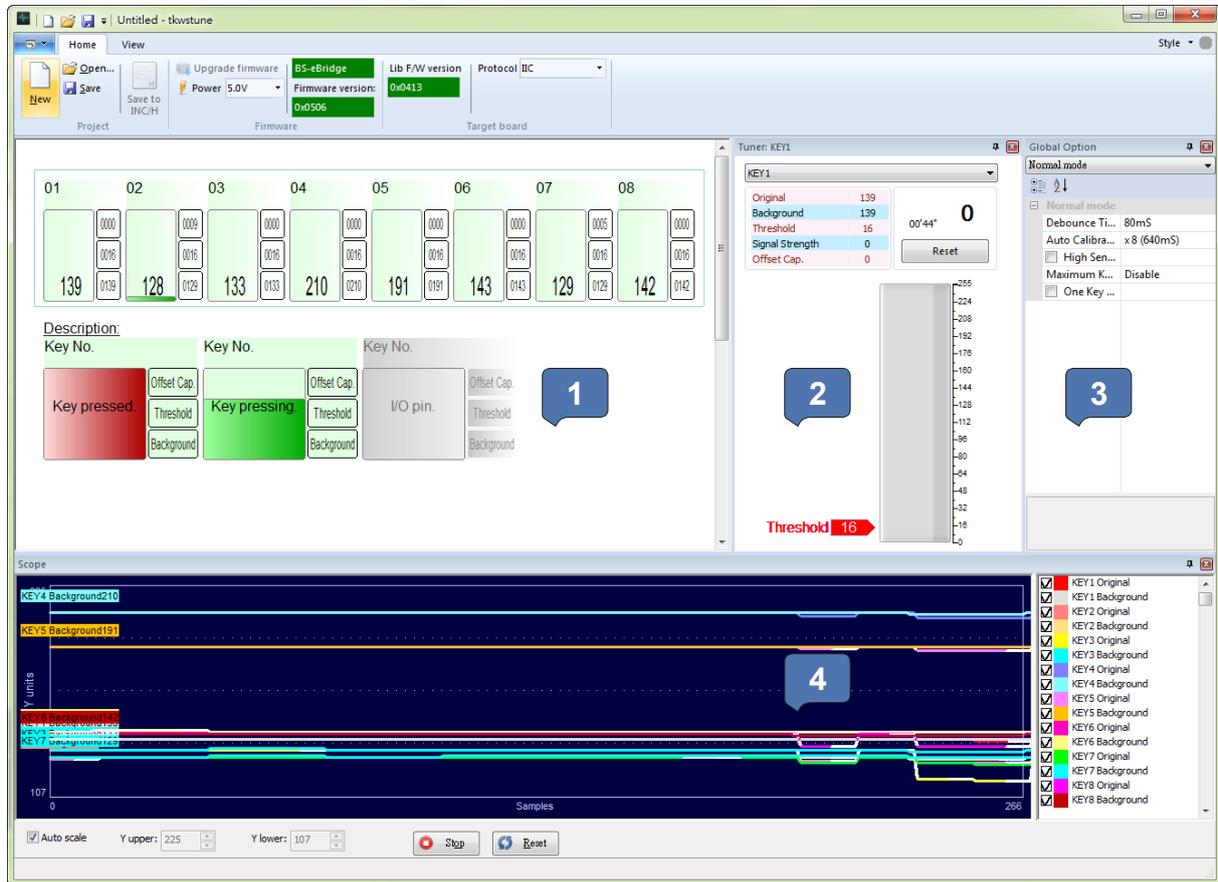
1. After running from within the Touch MCU Workshop the tuning software menu screen is shown as follows:



2. After executing the tuning software, the following screenshot will be displayed. It is necessary to select the target board and BS-eBridge transmission protocol first, which is set in the "Protocol" section of the software with a default protocol of IIC. After this the power supply for the target board can be setup.



## S/W Functional Description



1. Touch Key signal observation area
2. Tuning Window
3. Global Option Window
4. Scope Window

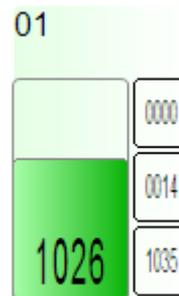
## Touch Key Signal Observation Area

From the touch key signal observation area, whether the pin is defined as a touch key or I/O pin, it can be observed within this area. If the pin is used as an I/O pin, then it will be grayed out as shown below. If the pin is used as a touch key then users can click on the key to observe it in more detail.

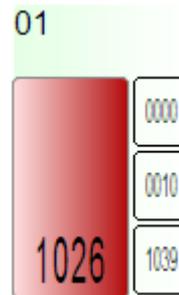


## Key State Display

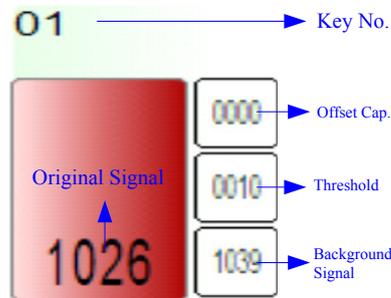
The actual detected difference is shown in the green block, the greater the difference is, the more the green area is.



When the key is pressed, it will be displayed in red, as shown in the diagram, here KEY1 is pressed and the key flag is setup in the program.



The displayed numbers in the key icon are described in the following diagram.



### Tuning Window

The Tuning Window can observe a single key signal value and adjust the key sensitivity.

The screenshot shows the 'Tuner' window interface. At the top, there is a dropdown menu labeled 'KEY1'. Below it is a table with the following data:

Original	1026
Background	1036
Threshold	16
Signal Strength	10
Offset Cap.	0

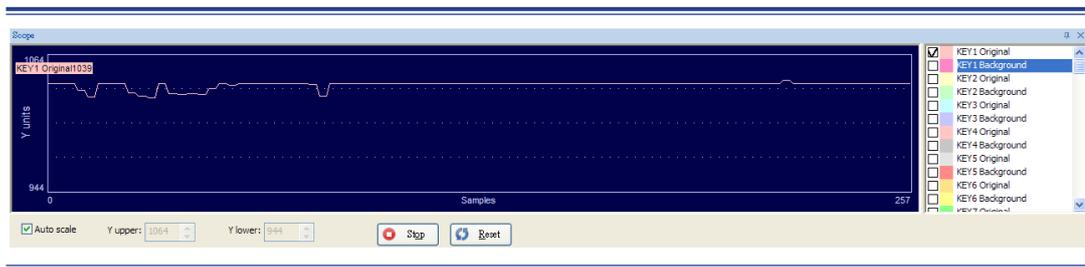
To the right of the table is a large display showing '42'06"' and a large number '11'. Below this is a 'Reset' button. A vertical bar on the right side of the window is used for adjusting sensitivity, with a scale from 0 to 255. A red arrow labeled 'Threshold' points to the value '16' on this scale. A label 'Adjust sensitivity of Key 8~255' points to the vertical bar. A label 'Single Strength' points to the value '128' on the scale.

## Global Option Window

The Global Option Window provides touch key parameters which the user can change. Users can observe the adjusted results immediately after the setup values are changed. Refer to Page 16, Global Option Window, for the touch key parameters.

## Scope Window

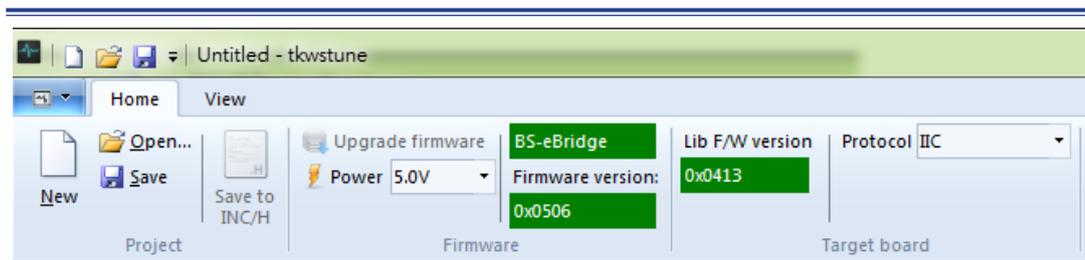
The Scope can display the key values. Users can check the list on right side of the Scope window to observe the corresponding selected key waveforms.



### Functional Description

- Automatic Scale: If checked, the software will automatically setup the Y-axis display range, otherwise the Y upper and lower limits will need to be setup manually.
- Start/Stop: Start or stop the Scope display.
- Reset: Clear the waveform and reset the pressed key count value and time in the tuning window.

## Menu Functional Description



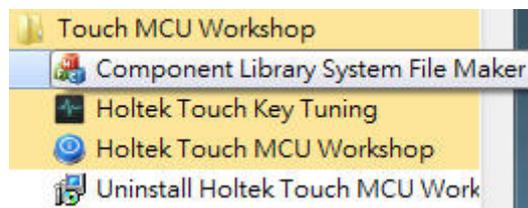
- New: Create a new Touch MCU Workshop project
- Open: Open a previously saved Touch MCU Workshop project file
- Save to INC/H: Touch Key setting output saved to TKS\_GLOBE\_VARIES.INC
- Upgrade firmware: Upgrade the BS-eBridge firmware.
- Power: Set the BS-eBridge to provide power to the target board. There are 5V, 3.3V or external power supply options.
- Protocol: Select the communication protocol between the target board and the BS-eBridge. There are two kinds of interface, IIC and UART. If the "TUNING\_IIC" in the Touch MCU Workshop is selected, then the IIC protocol will be used. If "TUNING\_UART" is selected, then the UART protocol will be used.

# 4 Component Generation

Touch MCU Workshop is an open platform, in which advanced users can create their own component library, which can be shared with other users.

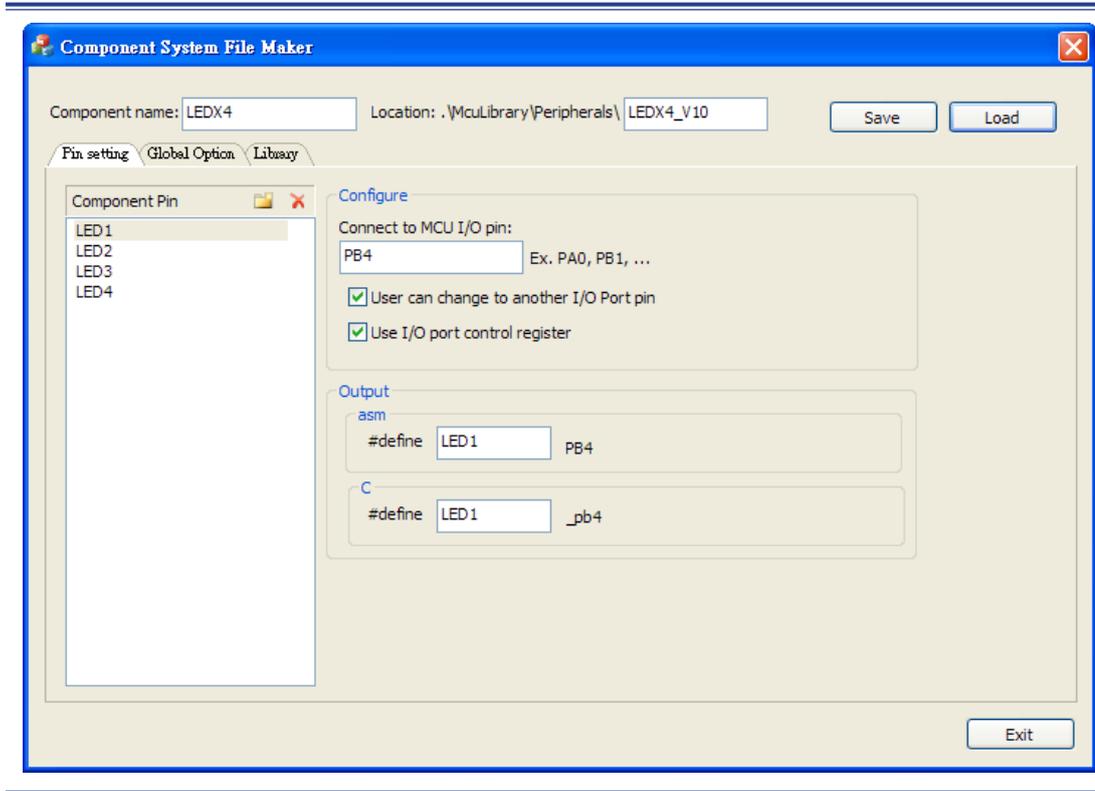
## Component Library System File Maker

Users can execute the "Component Library System File Maker" in the start menu to call up this creation function.



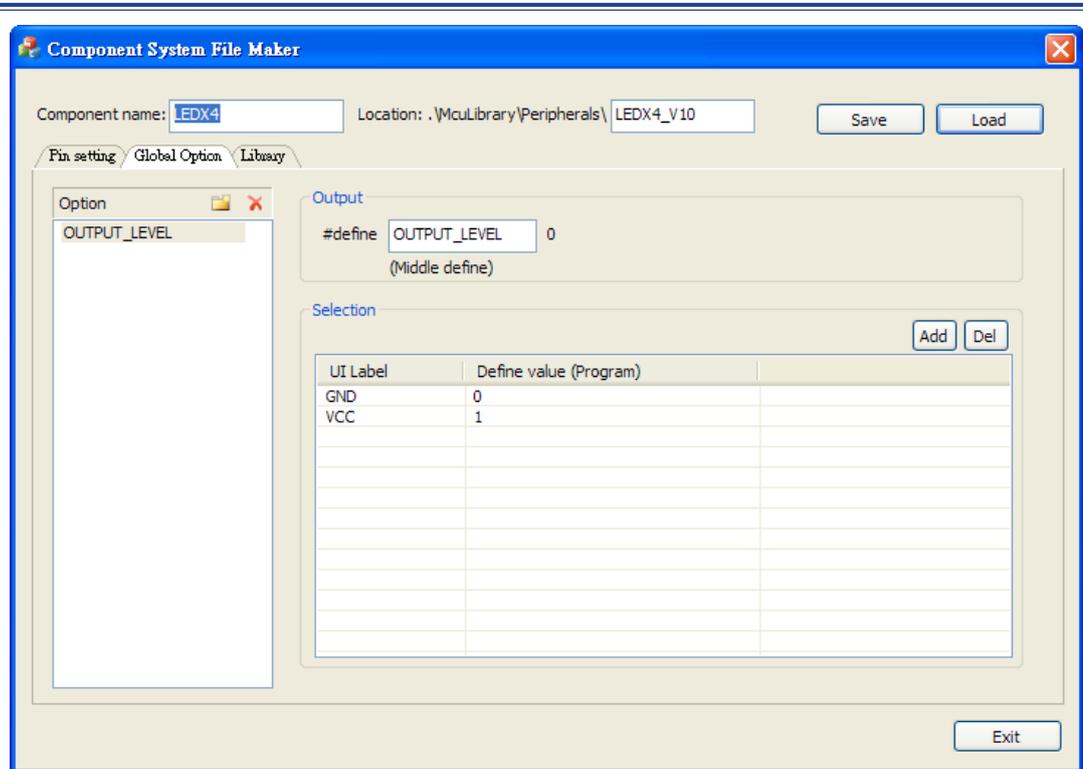
## Maker instructions

- Step 1 – Pin setting

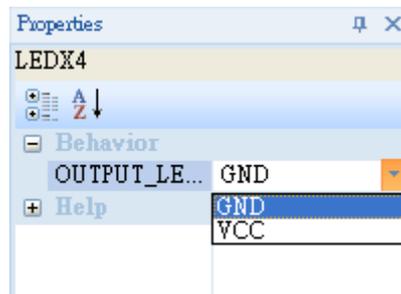


1. Specify the component name, and it will appear in the toolbox of the Touch MCU Workshop.
2. Specify the folder name for the component library path. The folder is required for proper placement of the component system files, the related program code files and the component help documents. Its root directory is the “McuLibrary\Peripherals” directory under the platform installation path. As an example, if the platform installation path is “C:\Program Files\Holtek MCU Development Tools\Touch MCU Workshop”, then the folder should be located in “C:\Program Files\Holtek MCU Development Tools\Touch MCU Workshop\McuLibrary\Peripherals”.
3. “Component pin setup” will setup the component pins combined with the MCU I/O pins. These settings also affect the software display. If the component does not have a corresponding pin, then it is not necessary to implement this setup.
4. After setting the “Component pin setting”, the right side can be clicked in sequence for the detailed settings.

- Step 2 – Global Option

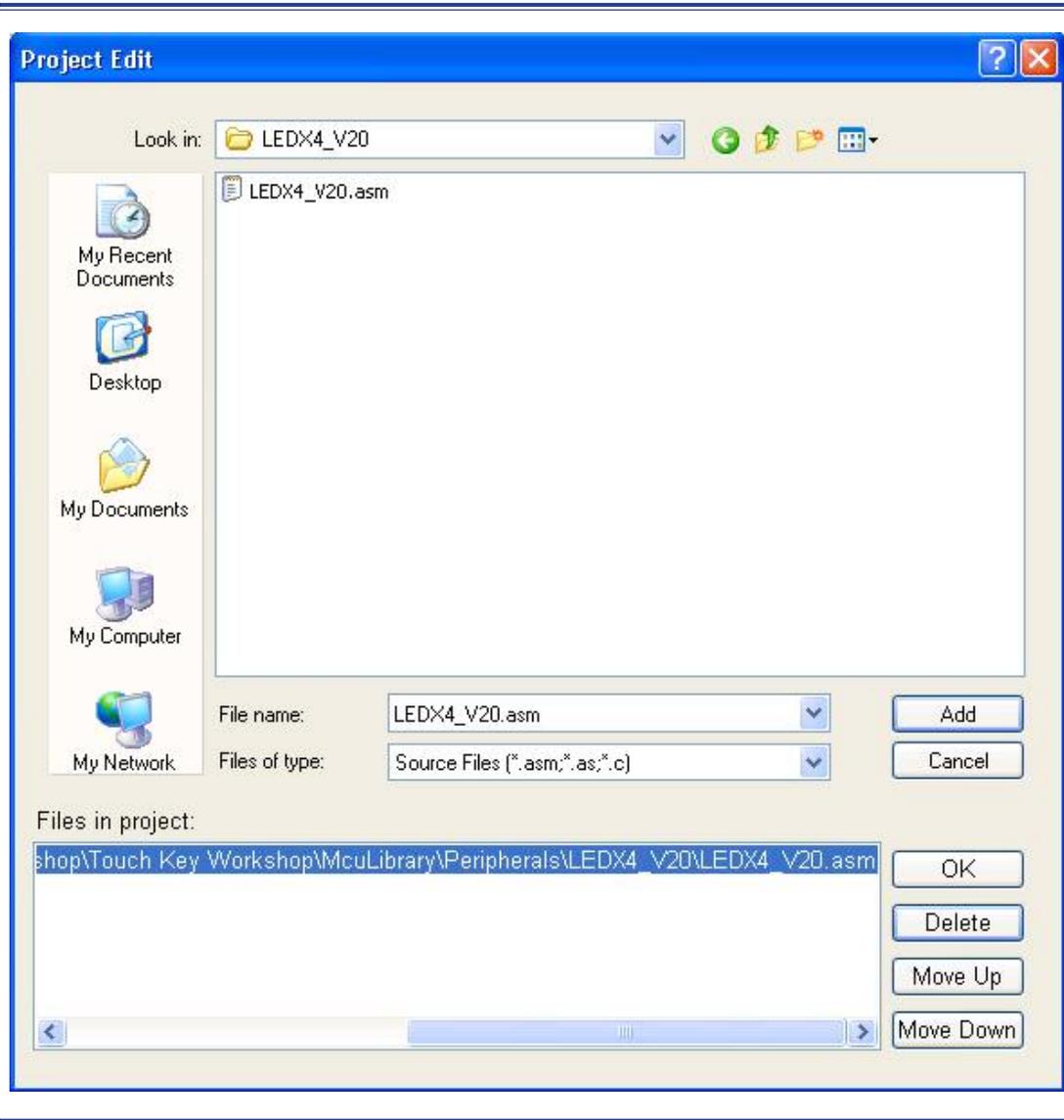


Component Generation



After setting, the software screen is shown in the accompanying diagram.





1. The MCU name which supports the component should be setup in the “Misc” area.
2. The component description files can be setup in the “Help Document” area. With regard to documents, it is recommended that PDF files are used and that they should be placed in the component library location.

## Component programming

- Program structure: users need to implement two subroutines named using the component names.
  - <component name>\_INITIAL: For the component initialization at power on.  
e.g. LEDX4\_V20\_INITIAL
  - <component name>: Component functional program entry  
e.g. LEDX4\_V20
- File naming rule: The files need to be named the same as the folder.
- File structure: It is necessary to provide at least three kinds of files with extension names as follows:
  - .C/.ASM: Place the main program for the component. If the development language is the C language, then the extension name is .C. If the development language is assembly language, then the extension name is .ASM.
  - .AEX: Use assembly language syntax to locate the label of the external output.  
e.g.

```
EXTERN _LEDX4_V20_INITIAL:NEAR
EXTERN _LEDX4_V20:NEAR
```
  - .CEX: Use C language syntax to locate the function name of the external output.  
e.g.

```
extern void LEDX4_V20_INITIAL();
extern void LEDX4_V20();
```

# 5 Appendix A

The BS-eBridge pin usage is as follows:

Pin	I <sup>2</sup> C
1	
2	SDA
3	
4	SCL
5	
6	
7	—
8	VDD
9	
10	GND

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