TSHARC™ Win CE Drivers Manual
Windows® CE version 6.0
RS-232, USB & PS/2
Rev 1.18a

Document Revision and Copyright
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3. Introduction

Before you Begin

- ***Platform Builder 6.0*** **must already be installed and configured on your Windows development system.**
- **Please be sure no instances of *Platform Builder 6.0* are currently running.**
- **Navigate your system to find the TSHARCCE60V118a.MSI executable file.**

Supported Features

3, 4, 7, and 20 Point Calibration
Right-Click Emulation
Hardware Beep Support
Configurable Data Stream Rate

Supported Processors

Hampshire has recompiled the source code for the TSHARC WinCE driver to support the following processors.
ARMV4I
MIPSII
MIPSII_FP
MIPSIV
MIPSIV_FP
SH4
X86

RS-232 Specific Information

Port Assignment
The driver loads based on the "Port" value entry within the "TSHARCS.reg" file. This value corresponds with the available port.

- "Port"=dword: 1" assigns the port to the first available port defined in the "platform.reg" file.
- "Port" ="dword: 2" assigns the port to the second available port defined in the "platform.reg" file.

Baud Rate Configurations
If using a TSHARC® controller using other than a 9600 baud rate, the baud rate may be changed via the "Baud" registry entry. This may also be found in the "TSHARCS.REG" file.

TSHARC controllers are 9600 Baud by default.

PS/2 Specific Information

The 8042 input driver must be included in the OS Design in order for the TSHARC PS/2 driver to function on CE device.

USB Specific Information

The USB host controller and the UHCI component must be installed in order for USB to function. These components are added automatically after adding the "USB TSHARC Touch Screen Driver" component to the OS Design.

4. Running the TSHARC Microsoft Installer File

Welcome Screen

Figure 1: TSHARC CE 6.0.msi Welcome

Running the Microsoft Installer application will begin with a Welcome screen. This screen shows you what version of the driver you are installing, and for what CE platform version.

Platform builder must be installed before running the .MSI file. If you realize that Platform Builder is not present on your system, please select 'Cancel' to abort the installation process.

License Agreement

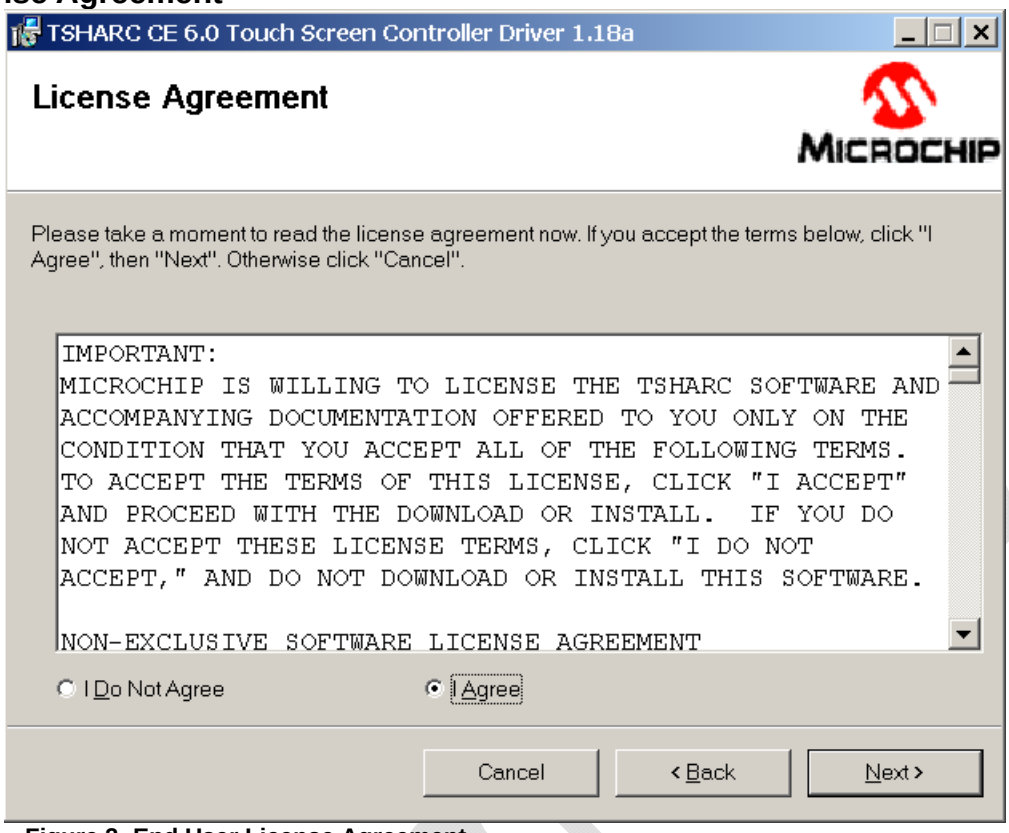

Figure 2: End User License Agreement

The End User License Agreement must be read and agreed-to before proceeding with the installation.

If you do not agree with the EULA statement, please select ‘Cancel’, and exit the installation application.

TSHARC drivers are available at no charge to TSHARC touch screen controller board or chip customers only. Any unlawful use of TSHARC drivers is in strict violation of the United States and international copyright laws. Please contact Microchip Technology Inc. if you have any questions regarding the license agreement.

Using a TSHARC Driver with any third party touch screen controller is strictly prohibited unless authorized in writing by Microchip Technology Inc.

Select Installation Folder

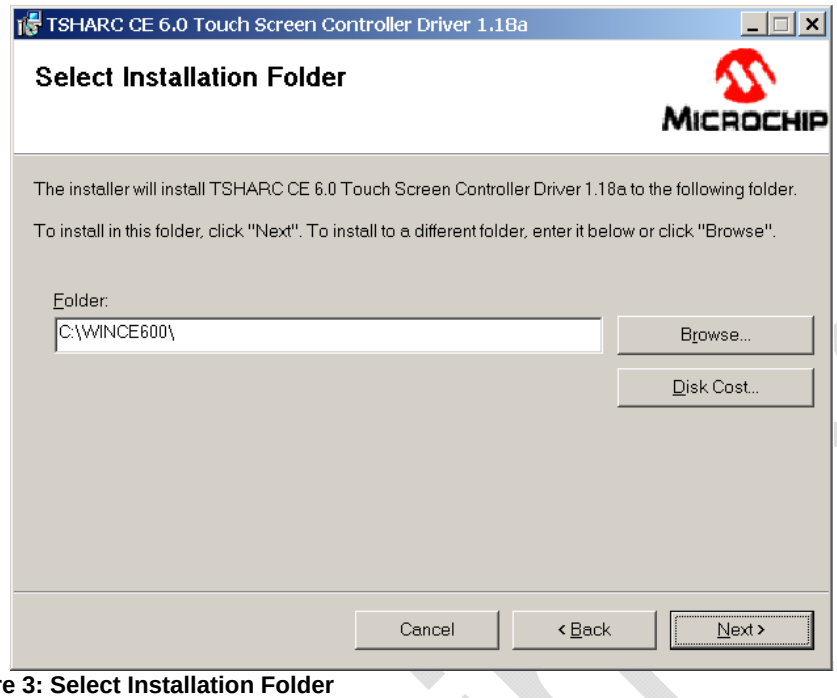

Figure 3: Select Installation Folder

Enter the root directory of your Windows CE installation and then click on the “Next” button. For most configurations, the default path is appropriate.
Select “Next” to proceed with installation.

Browsing Folder Location

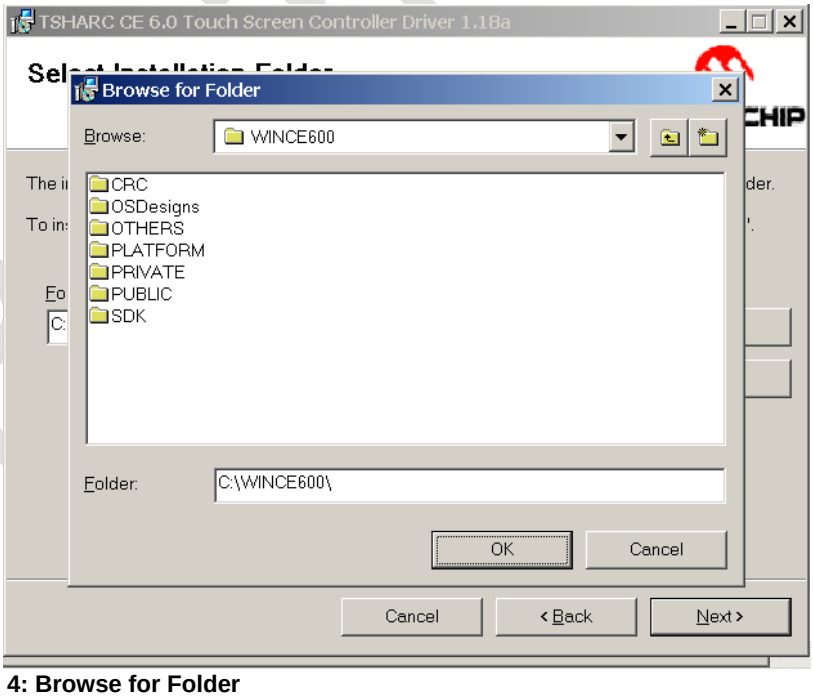

Figure 4: Browse for Folder

The TSHARCCE60V118a.msi copies files to the development system.
To select a different file path, please browse to the desired location.
Select “OK” to exit.

Verifying Disk Space

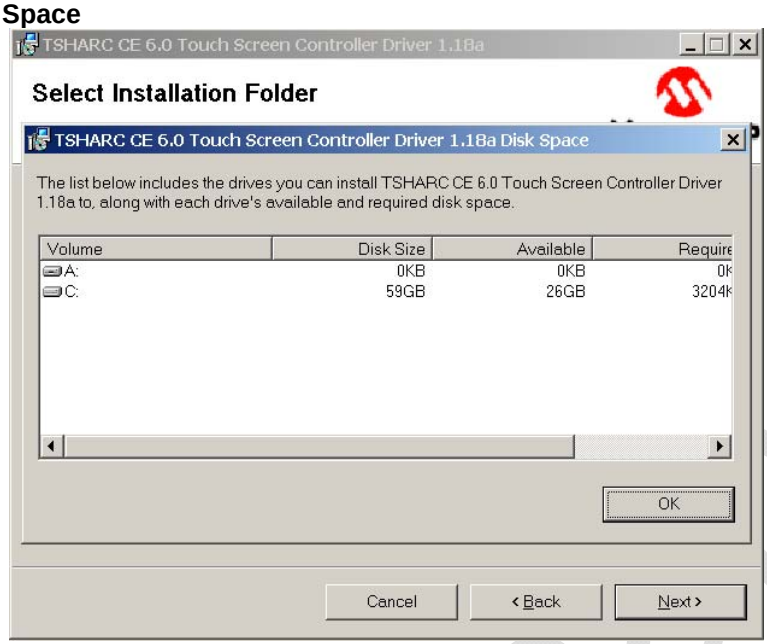

Figure 5: Disk Cost View

The Disk Cost View shows the amount of space available on each hard drive included on the development system.

Click on the “OK” button to exit.

Confirm Installation

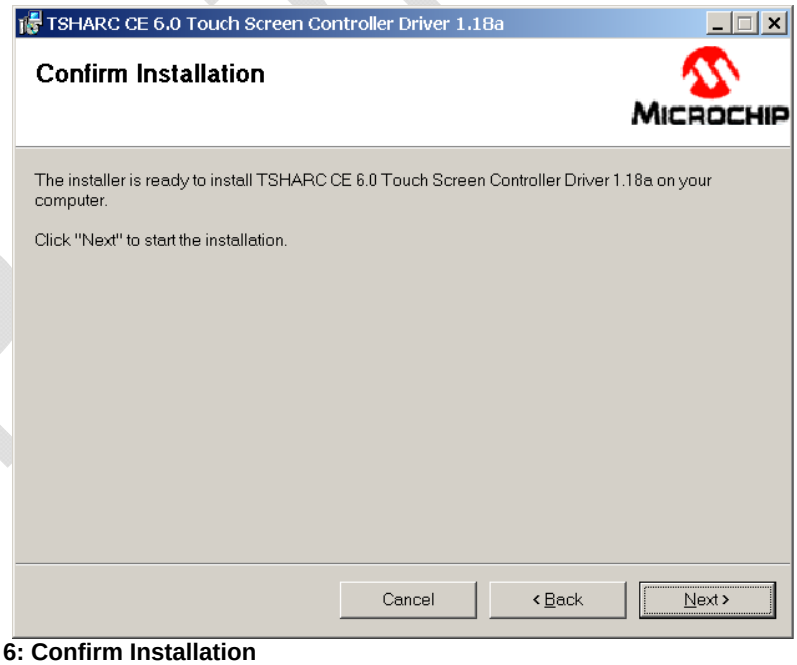

Figure 6: Confirm Installation

The “Confirm Installation” screen is the last opportunity to abort the installation of the driver on the development system.

Select “Next” to continue with the installation.

Install Status Screen

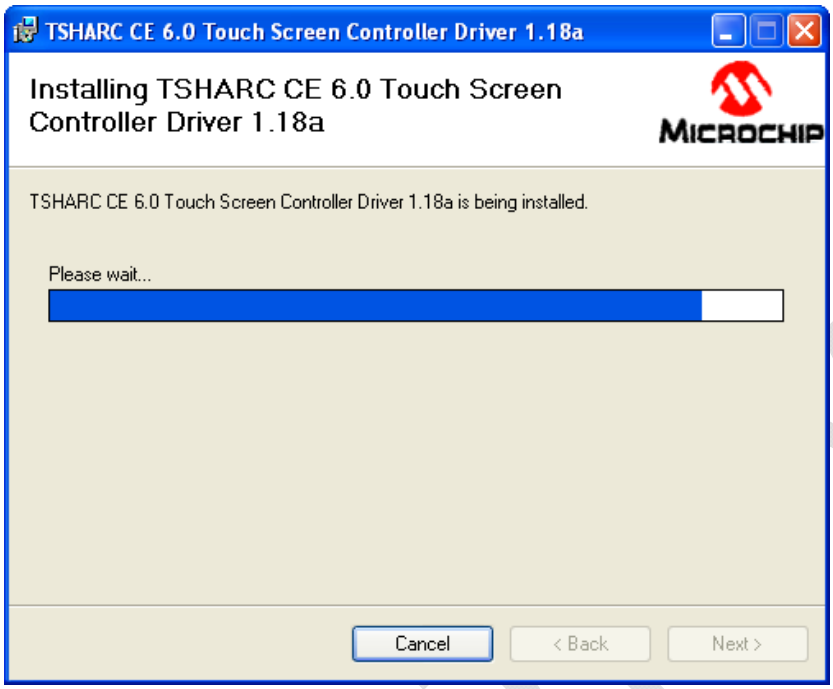

Figure 7: Install Status Screen

Once installation is complete, please select “Next”.

Driver Updates Report

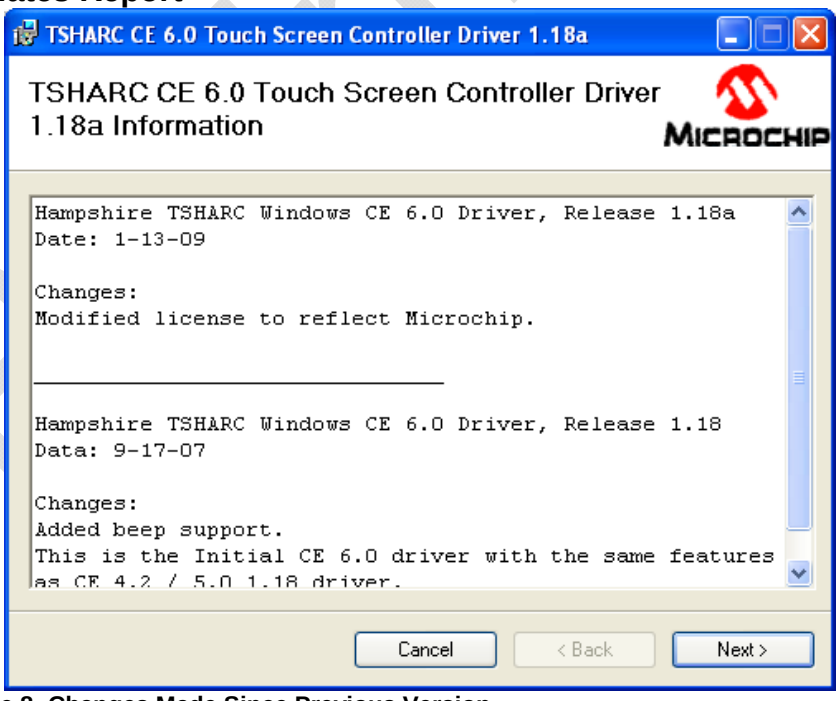

Figure 8: Changes Made Since Previous Version

A document on changes made to the driver will appear.

Select “Next” to proceed.

Installation Complete

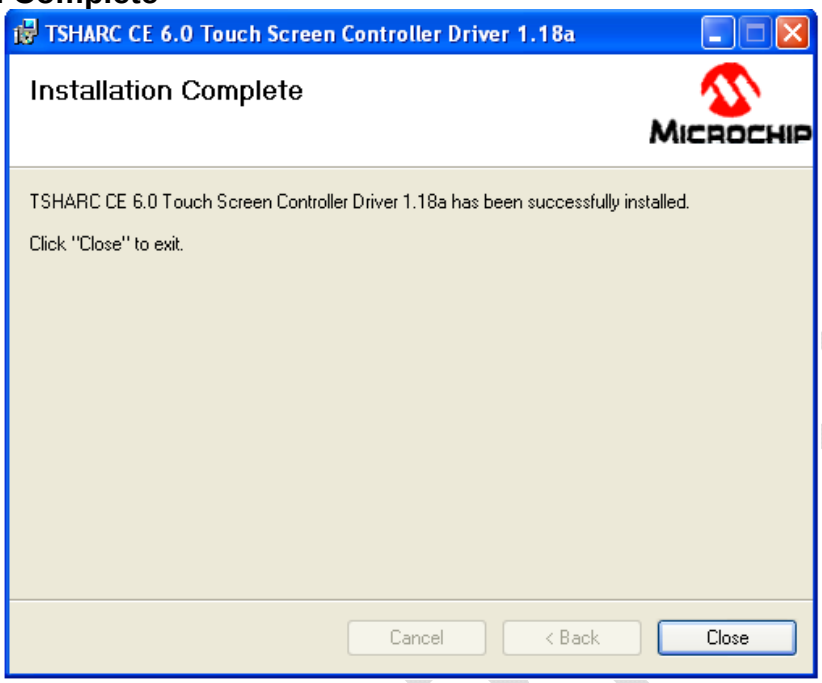

Figure 9: Installation Complete

The installation of the TSHARC® driver is now complete.

Driver File Locations

Upon successful installation of the TSHARC driver, the TSHARC Driver files will now be copied according to the following:

- The Serial files are copied to "<WINCEROOT>\PUBLIC\COMMON\OAK\DRIVERS\TSHARC\TSHARCS"
- The PS/2 files are copied to "<WINCEROOT>\PUBLIC\COMMON\OAK\DRIVERS\TSHARC\TSHARCP"
- The USB files are copied to "<WINCEROOT>\PUBLIC\COMMON\OAK\DRIVERS\TSHARC\TSHARCU"

The TSHARC driver components are now added to the Windows CE catalog.

5. Adding a TSHARC Driver Component to an OS

Adding the TSHARC driver component to your OS design is an integral step in the Image Building Process. Often this step is over-looked or performed incorrectly.

The TSHARC driver was designed to make this process simple to execute.

These steps show how to add the TSHARC controller's component to your image design.

Launch "Visual Studio 2005"

Figure 10: Opening a New Project within Visual Studio

Platform Builder is accessed via Visual Studio 2005.

The Platform Wizard is a Windows CE tool used to create a Windows CE Operating System. It allows for the selective inclusion of many different peripheral devices and other system dependencies.

Other options may be desirable for the particular image build. This document only shows how to add the TSHARC driver component.

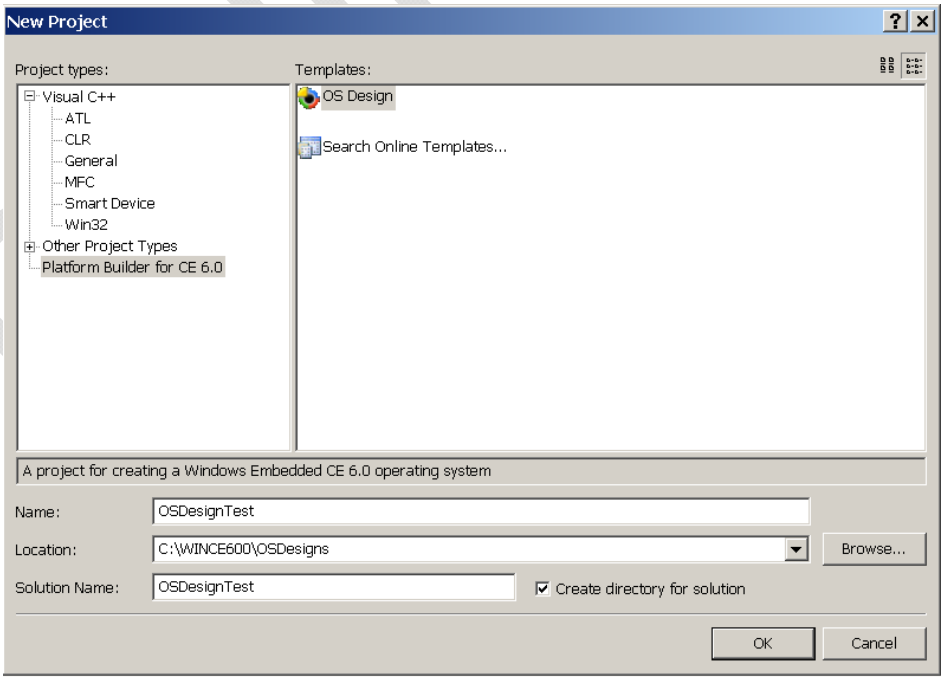

Figure 11: Build New Project

CE 6.0 OS Design Wizard

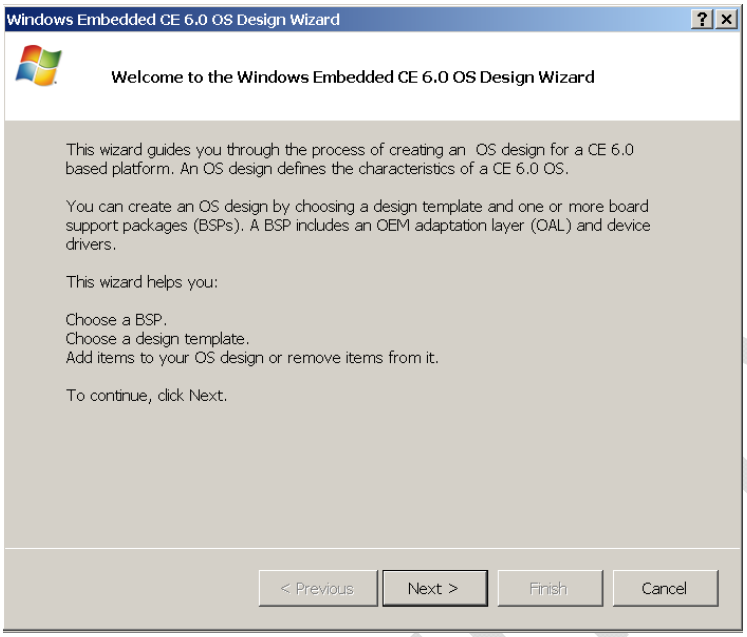

Figure 12: Welcome to the CE 6.0 OS Design Wizard

In this design wizard, you will choose a BSP, choose a design template, and customize your OS design.

Board Support Package Selection

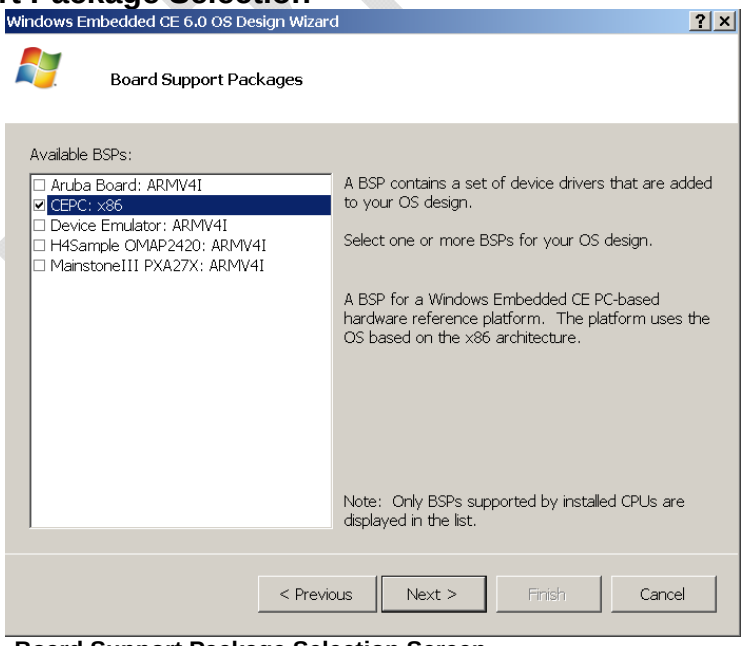

Figure 13: Board Support Package Selection Screen

Many different board support packages are available with the TSHARC driver. While many CE systems seen are X86, please make sure the correct BSP for the image build is selected.

Failure to include the correct BSP may result in a non-functioning image build.

Design Templates

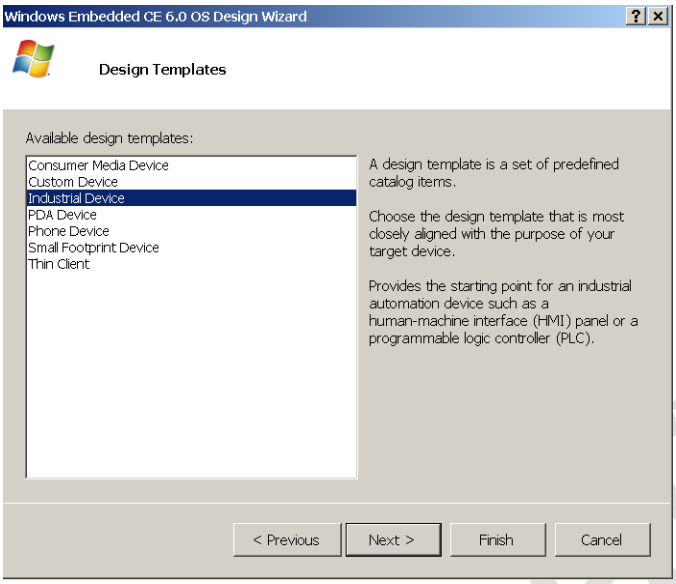

Figure 14: Platform Configuration Selection

Design templates are ready-configured system builds made available by Platform Builder. These different configurations try to include the necessary dependencies and components for your particular application.

The TSHARC driver has been verified using the “Industrial Controller” Design Template. Other design templates may work, but the Industrial Controller configuration is strongly recommended.

Application and Media Selection

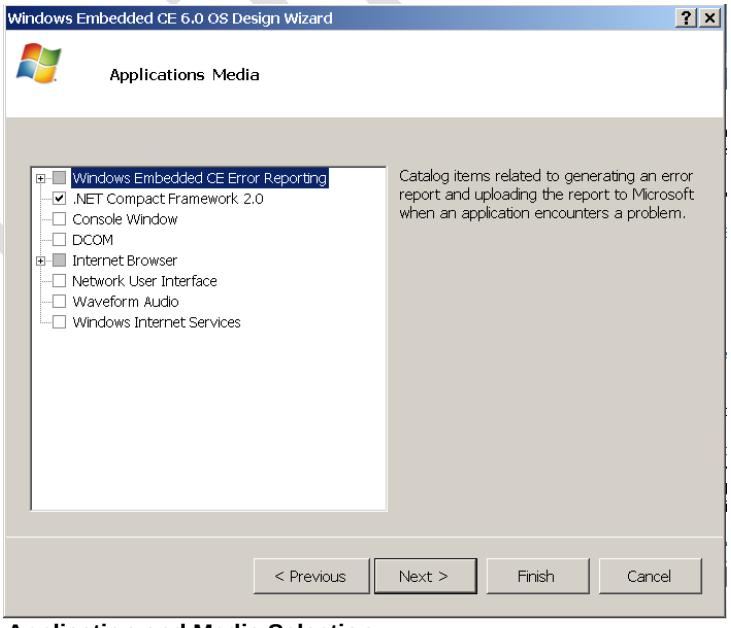

Figure 15: Application and Media Selection

This screen allows for the addition of applications and media support to the OS build. This is completely optional and dependent only on the individual project’s requirements. TSHARC controllers do not require the addition of peripheral applications or media packages, unless system beep is required. If beep is required, then Waveform Audio Support much be added.

Networking and Communications

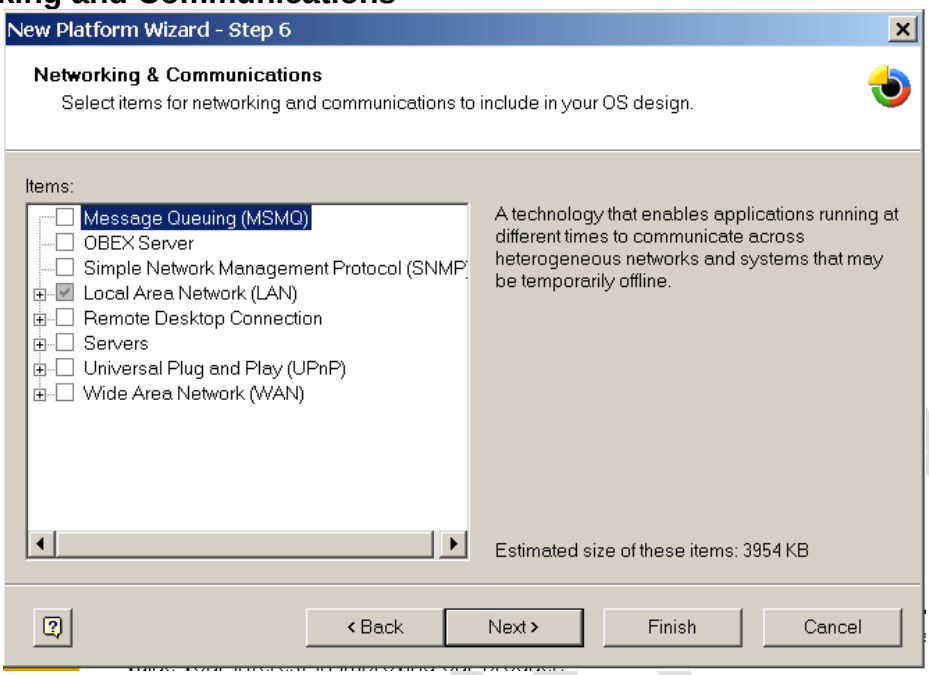

Figure 16: Networking and Communications

If any additional support for networking or communications are required, please select them here.

Select “Next” to continue.

Completing Platform Builder Wizard

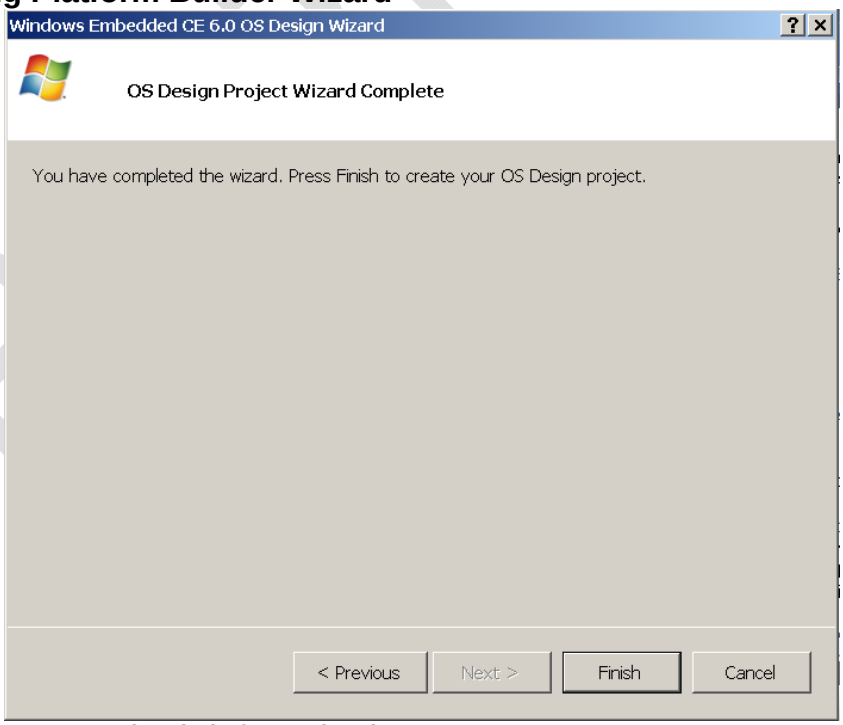

Figure 17: Completed Platform Wizard

Please select “Finish” to complete the Wizard.

Adding the TSHARC Catalog

Adding the TSHARC Device Driver as a catalog item is essential for correct driver implementation.

The TSHARC Driver Catalog can be found under **Third Party, Device Drivers, Touch.**

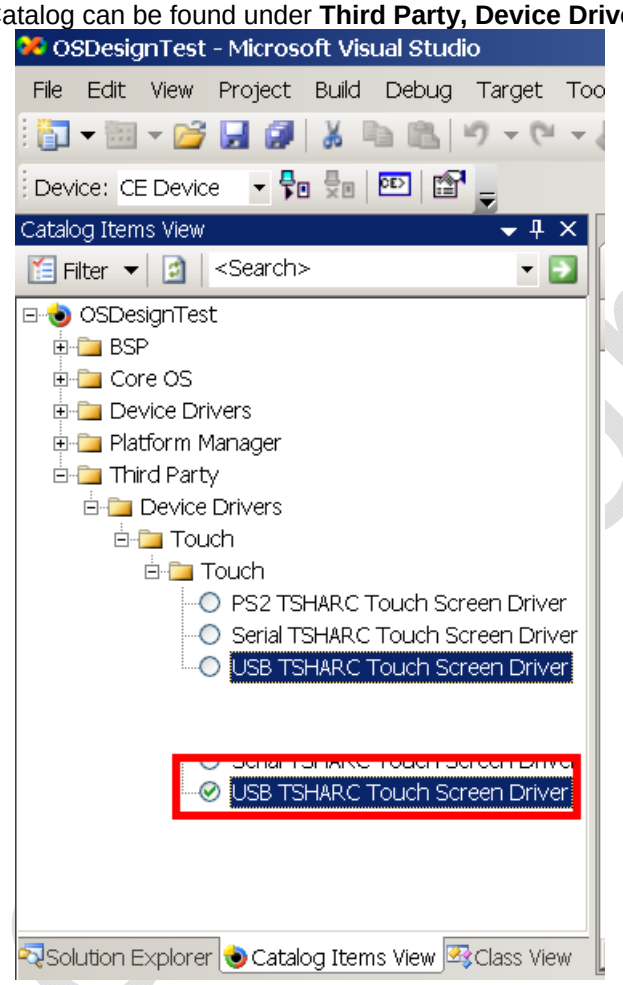

Figure 18: Adding TSHARC Component

Please select the appropriate component to add to the OS build.

Once selected, a green checkmark will appear, as shown in Fig. 18 in the red box.

Only one TSHARC interface component (Serial, PS2, USB) should be included in an OS design at any given time. The TSHARC driver supports a single controller configuration.

6. Configuring TSHARC Controller

Changing the Number of Calibration Points

Method 1:

- In "Platform Builder 6.0", click on the “Solution Explorer” tab
- Double click on the appropriate registry file <WINCEROOT>\PUBLIC\COMMON\OAK
    - If Serial
      \DRIVERS\TSHARC\TSHARCS\TSHARCS.reg
    - If PS/2
      \DRIVERS\TSHARC\TSHARCP\TSHARCP.reg
    - If USB
      \DRIVERS\TSHARC\TSHARCU\TSHARCU.reg
- Change the value of "CalType" appropriately
    - For 3-point calibration, set value to "dword:3"
    - For 4-point calibration, set value to "dword:4"
    - For 7-point calibration, set value to "dword:7"
    - For 20-point calibration, set value to "dword:14"
- Rebuild and recreate run-time image.

Method 2:

- Using a registry editor for the target device, change the “CalType” registry item located within the “HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\CalType” branch according to the following:
    - For 3-point calibration, set value to "dword:3"
    - For 4-point calibration, set value to "dword:4"
    - For 7-point calibration, set value to "dword:7"
    - For 20-point calibration, set value to "dword:14"
- Browse to the “Windows” directory using Windows Explorer and double-click the shortcut “TouchIOCTL”. This will cause current TSHARC driver to re-read and apply the new registry settings.

Calibrating the Controller

- Select the Start menu
- Under the “Programs” group select “TSHARC Calibration”
- Touch all targets with activator tip for at least a couple seconds each.

The points used for the calibration is determined by the “CalType” registry entry described in section “Changing the Calibration Type” below.

If no shortcut is present under “Programs” group, a shortcut to the calibration application may be found in under the “Windows” directory on the CE Device.

Windows CE Calibration Registry Entries

Calibration parameters are created by Hcecal after calibration and are stored in the registry under the following key:

[HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global]

Upon boot, if the registry entries are not located, the driver defaults to a default un-calibrated state.

Enabling Right-Click Emulation

Method 1

- In "Platform Builder 6.0", click on the “Solution Explorer” tab
  - If Serial, double-click "Subprojects->TSHARCS->Parameter files->TSHARCS.reg"
  - If PS/2, double-click "Subprojects->TSHARCP->Parameter files->TSHARCP.reg"
  - If USB, double-click "Subprojects->TSHARCU->Parameter files->TSHARCU.reg"
- Remove the semi-colons (uncomment) from the last four lines of the file.
- Rebuild and recreate run-time image.

Method 2

- Using a registry editor for the target device, change the “xEventArea”, “yEventArea” and “RightClickTime” registry items located within the “HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global” branch according to the description of what these values are responsible for in the next paragraph.
- Browse to the “Windows” directory using Windows Explorer and double-click the shortcut “TouchIOCTL”. This will cause current TSHARC driver to re-read and apply the new registry settings.

Configuring Right-Click Emulation

There are three entries that can be configured for right-click emulation found at [HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global]

- "xEventArea"
- "yEventArea"
- "RightClickTime"

The "RightClickTime" is the time elapsed (measured in clock ticks) on a touch that is within an area on the screen (the event area) before a right-click event is sent.

The "xEventArea" and "yEventArea" entries are horizontal and vertical components of the area that a touch remains in for a time specified by "RightClickTime" before a right-click event is sent. The Values for "xEventArea" and "yEventArea” entries can range from between 0x0000 and 0xFFFF.

The "xEventArea" and "yEventArea" are relative to the touch screen coordinates rather than the screen coordinates.

To determine the values for xEventArea and yEventArea, the following formula may be used:

xEventArea = 65535 * (desired_event_area_width / width_of_touchscreen)
yEventArea = 65535 * (desired_event_area_height / height_of_touchscreen)

These values must be entered in hexadecimal for the Registry entry.

Disabling Right-Click Emulation

To disable Right-Click emulation, “RightClickTime” should have of value or zero, or the registry entries “xEventArea”, “yEventArea”, and “RightClickTime” can be removed or kept absent from the registry.

Changing Calibration Timeout Values

There are two timeout values that are adjustable in the registry that correspond to the timeout value when first launching the calibration application (“CalTimeIn”) and the timeout value after touching all of the calibration points(“CalTimeOut”). If the countdown timer for “CalTimeIn” expires, the calibration application simply exits. If the counter for “CalTimeOut” expires then the calibration application reverts the calibration settings to the previous settings. The default value “CalTimeIn” is 15 seconds and the default value for “CalTimeOut” is 90 seconds.

Method 1:

- In "Platform Builder 6.0", click on the “Solution Explorer” tab
  - If Serial, double-click "Subprojects->TSHARCS->Parameter files->TSHARCS.reg"
  - If PS/2, double-click "Subprojects->TSHARCP->Parameter files->TSHARCP.reg"
  - If USB, double-click "Subprojects->TSHARCU->Parameter files->TSHARCU.reg"
- Add the following lines to the end of the file:

  [HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global]
  "CalTimeIn"=dword:F
  “CalTimeOut”=dword:5A
- Rebuild and recreate run-time image.

Method 2:

- Using a registry editor for the target device, change the “CalTimeIn”, “CalTimeOut” registry items located within the “HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global” branch according to timeout value(s) that are desired.
- Browse to the “Windows” directory using Windows Explorer and double-click the shortcut “TouchIOCTL”. This will cause current TSHARC driver to re-read and apply the new registry settings.

Configure Touch Beep

Method 1:

The following lines may be added to the "tsharcs.reg", "tsharcu.reg" or "tsharcp.reg" file.

[HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global]
"usewincebeep"=dword:1

The "Volume & Sounds" control panel applet uses the "PanelState" registry to store its settings.

If "usewincebeep"=1

This value is queried on touch-down and changes made in the control panel can be observed immediately.

If the "usewincebeep"=2

This value is queried on touch up. Also, changes in the control panel applet will not be observed until the second touch.

The follow entry is needed to make the option to configure taps in the "Volume & Sounds" control panel applet visible:

[HKEY_LOCAL_MACHINE\ControlPanel]
"Screen"=dword:3

Method 2

The Beep can also be configured using the Windows CE "Volume & Sounds" control panel applet. To use this applet, set the "usewincebeep" entry to a DWORD value of one or two in the "HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global" registry branch.

Enable/Disable Touch Beep

Enable
To enable the beep add the registry value "beepEnabled" and set it to one.
Disable
To disable the beep, exclude the "beepEnabled" registry value or set to zero.
Loud Beep
To make the beep loud, add the registry value "beepIsLoud" and set it to one.
Soft Beep
To make the beep soft, exclude the "beepIsLoud" registry value or set to zero.

Changing the mouse event stream rate

When the mouse cursor moves and changes state as a result of a touch, the TSHARC CE driver sends a series of mouse events to the Windows CE event queue. If the mouse events are sent too fast, other CE applications and background process may take longer to process their own events while the touch screen is being touched. For this reason, a new feature has been added to the TSHARC Serial and USB drivers to allow adjustment of the speed at which the driver sends mouse events.

The default value is a minimum duration 16 clock ticks for every mouse packet (except for pen up and pen down packets which are always processed immediately).

For slower embedded devices, it may be desirable to increase this value to decrease to rate at which mouse packets are sent. For faster devices, it may be desirable to decrease this value to increase the rate at which mouse packets are sent.

Method 1:

- In "Platform Builder 6.0", click on the “Solution Explorer” tab
  - If Serial, double-click "Subprojects->TSHARCS->Parameter files->TSHARCS.reg"
  - If PS/2, double-click "Subprojects->TSHARCP->Parameter files->TSHARCP.reg"
  - If USB, double-click "Subprojects->TSHARCU->Parameter files->TSHARCU.reg"
- Add the following lines to the end of the file::

  [HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global]
  "mouseMoveThreshold"=dword:10

Method 2:

- Using a registry editor for the target device, add or change the “mouseMoveThreshold”, registry item located within the “HKEY_LOCAL_MACHINE\SOFTWARE\Hampshire\CurrentVersion\Global” branch to the desired minimum duration length to be applied for every mouse stream packet.
- Browse to the “Windows” directory using Windows Explorer and double-click the shortcut “TouchIOCTL”. This will cause current TSHARC driver to re-read and apply the new registry settings.

7. TSHARC Component Removal

Removing a TSHARC Driver Components from an OS Design

- Click on the "Solution Explorer" tab.
- Browse to "Subprojects".
- Right-click on the appropriate TSHARC component:
    - If Serial, right-click on "TSHARCS"
    - If PS/2, right-click on "TSHARCP"
    - If USB, right-click on "TSHARCU"
- Left-click "Remove".

Removing TSHARC Driver Components from the Catalog

- Open the Windows Control Panel.
- Double-click on Add/Remove Programs icon.
- Select the “TSHARC Touch Screen Controller Driver” item.
- Click on the "Remove" Button.

The TSHARC driver components are now removed from the Catalog.

To remove the TSHARC files as well, the directory "<WINCEROOT>\PUBLIC\COMMON\OAK\DRIVERS\TSHARC” now can safely be deleted.

8. Additional Set-Up Notes

Establish Communication with Target CE Device

To modify the registry, add a file, or to use any of Platform Builders tools on existing target CE system, the ActiveSync tool is very necessary for making changes on a target CE device.

To connect via ActiveSync, there are multiple communication mechanisms available to connect to the target device. Usually, the easiest way to communicate with the target device is to attach a NULL modem cable between the CE device and other computer that is used for debugging, download the latest ActiveSync application, and then in the windows directory of the CE device, there is usually the executable file "repllog". Double-click this application from Windows Explorer and the device will connect to the debugging computer.

For detailed instructions on different ways to communicate with a Windows CE, please see Microsoft’s documentation.

Aygshell Component - Effect on Right-Click Emulation

Windows CE has a shell extension called "aygshell" that is meant to be used with touch screen. If the touch screen is touched and held in the same region of the screen, black dots will appear and a right click will occur in the same area that is being touch. The issue with using this is component is that appears to be no way to disable this component once it has been included in the CE target image. Also, this component conflicts with the right-click feature of the driver. To remove this component, search for the "aygshell" component and remove this from the target image. A clean build should then be done to ensure it is properly removed.

If this component is component is included in the target image, it may be configured as follows:

- The "HKEY_LOCAL_MACHINE\System\GWE\Commctrl" registry subkey stores settings that affect common controls.
- UseLongDelayForGestures : DWORD
- There is no default setting. This value controls the recognition delay used by SHRecognizeGesture. If this value is set to 1, then the delay is 800 ms. Otherwise, the delay is 400 ms There is no way to disable this feature.

Saving registry settings to Persistent Storage

After calibrating the touch screen controller the calibration registry settings are automatically saved to the persistent storage if persistent storage is setup correctly on the CE device. However, if the TSHARC registry settings are edited using a registry editor or third-party application, the new registry settings may be saved using two methods.

Method 1:

Click “Start->Suspend” on the Windows CE target.

Method 2:

If changing the registry settings programmatically, call RegFlushKey() function in source code after making registry modifications.

Troubleshooting TSHARC CE Driver

In some cases there may be conflicting devices or an invalid configuration on a target CE system. In this case, it may be difficult to determine if the TSHARC driver is correctly being loaded.

To see if the TSHARC CE driver is being loaded and if there are any relevant messages being outputted due to an invalid configuration, it is often useful to see the kernel debug output from the target system.

Very often on Windows CE devices, there is a COM port available for kernel debugging. If there is such a COM port, attach a NULL modem cable between the CE device and other computer that is used for debugging. On the computer that is used for debugging, set the terminal application to 38400-N-8-1. If there is a successful communication with the device, first output from the boot loader will be seen followed by output from the CE operating system. There will be kernel debug messages from the TSHARC driver if the target system is correctly configured.

9. Notes

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