

Quick start

LM8300/8500 Evaluation Content

- 1 x LM8300/8500 evaluation board
- 1 x RS232 cable
- 1 x 9V battery
- 1 x Touch panel
- 1 x Stylus
- 1 x Software CD
- 1 x Quick start manual

Hardware Connection

- 1) Connect the enclosed touch panel to the J20 on the evaluation board
- 2) Connect the enclosed RS232 cable to J2 on the evaluation board
- 3) Connect the evaluation board to the serial port on the PC
- 4) Connect the enclosed 9V battery to J3 on the board

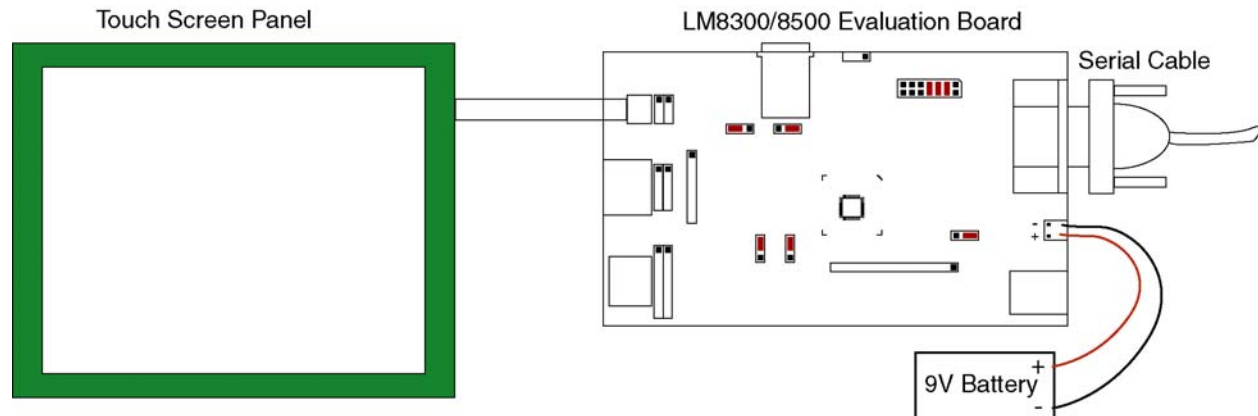
Software Installation for the Touch-Base UPDD Touch Screen Driver

- 1) Insert the software CD
- 2) Navigate to x:\UPDD, where x is the CDROM drive letter
- 3) Run UPDD.EXE
- 4) Follow the instructions on the screen
- 5) Reboot

OR

Software Installation for the NSC Touch Screen Driver

- 1) Insert the software CD
- 2) Navigate to x:\NSC_TSC, where x is the CDROM drive letter
- 3) Run HIMALAYA.EXE
- 4) Reboot



National TS Driver

The National TS Driver supports Win2K/XP only. This driver does not support Win95/98/ME. There are no plans to include support for Win95/8/ME.

Installation Win2K

The TS driver is located in the folder **x:\NSC_TSC**, where **x** is the CDROM drive letter. To invoke the installation routine, run **Himalaya.exe**.

During installation, the warning shown in Fig. 1 will pop-up.

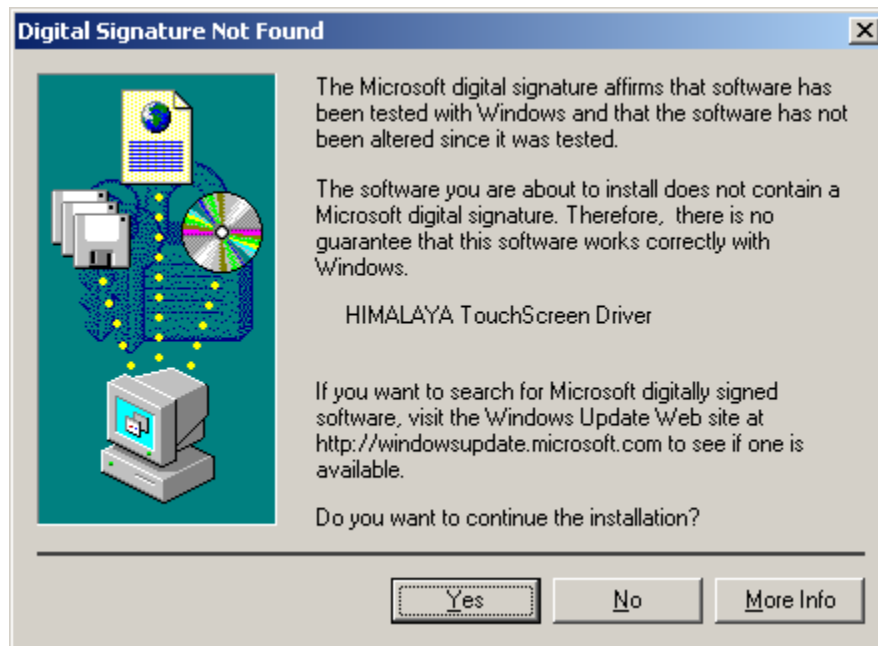


Fig. 1

Click on **Yes** to install the driver. The installation is complete when the command prompt window closes.

Reboot the computer.

Note – Make sure the evaluation board is powered and connected to the PC.

Installation WinXP

The TS driver is located in the folder **x:\NSC_TSC**, where **x** is the CDROM drive letter. To invoke the installation routine, run **Himalaya.exe**.

During installation, the warning shown in Fig. 2 will pop-up.

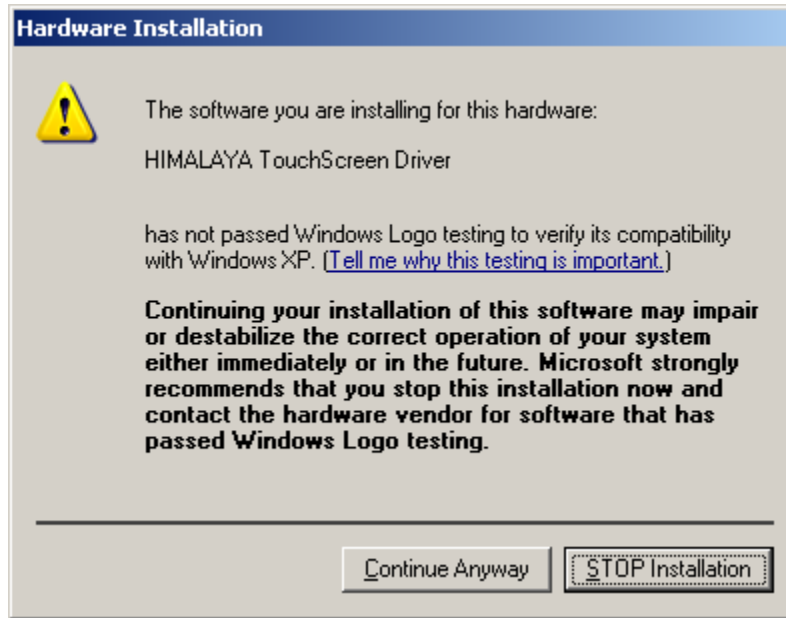


Fig. 2

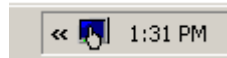
Click on **Continue Anyway** to install the driver. The installation is complete when the command prompt window closes.

Reboot the computer.

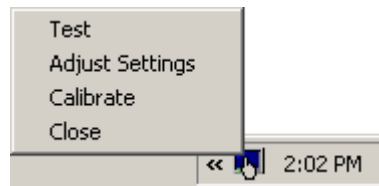
Note – Make sure the evaluation board is powered and connected to the PC.

National TS Driver Software

Open up Windows Explorer and navigate to **c:\touchscreen** and locate **Himalaya.exe**. Launch the program by double clicking on **Himalaya.exe**. When running, an icon will appear in the Windows[™] tray area.



To access the functions, right click on the Himalaya icon.



Adjust Settings Dialog Box

The Adjust Settings will launch the settings dialog box. The calibrate option will execute the calibration procedure for the 5 point calibration. To exit the program, select close.

Communication Settings – The default setting for the TS driver is to communicate to the evaluation board through COM1. If the setting of the COM port is changed, the PC must be rebooted for the change to take effect.

Communication Mode – The default setting is stream mode. In this mode, the driver will interpret all touches on the touch panel. The other modes are touchdown and liftoff. In the touchdown mode, the driver will only receive data from the TSC when a touchdown is detected on the panel. In the liftoff mode, the driver will only receive data from the TSC when a liftoff is detected on the panel.

Samples per Coordinate – The default setting is 8 samples per coordinate. The other available settings are 2, 4, 16, and 32 samples per coordinate. Keep in mind that higher settings might cause the mouse pointer to trail the actual position of the touch.

Focus Value – The default setting is 4.

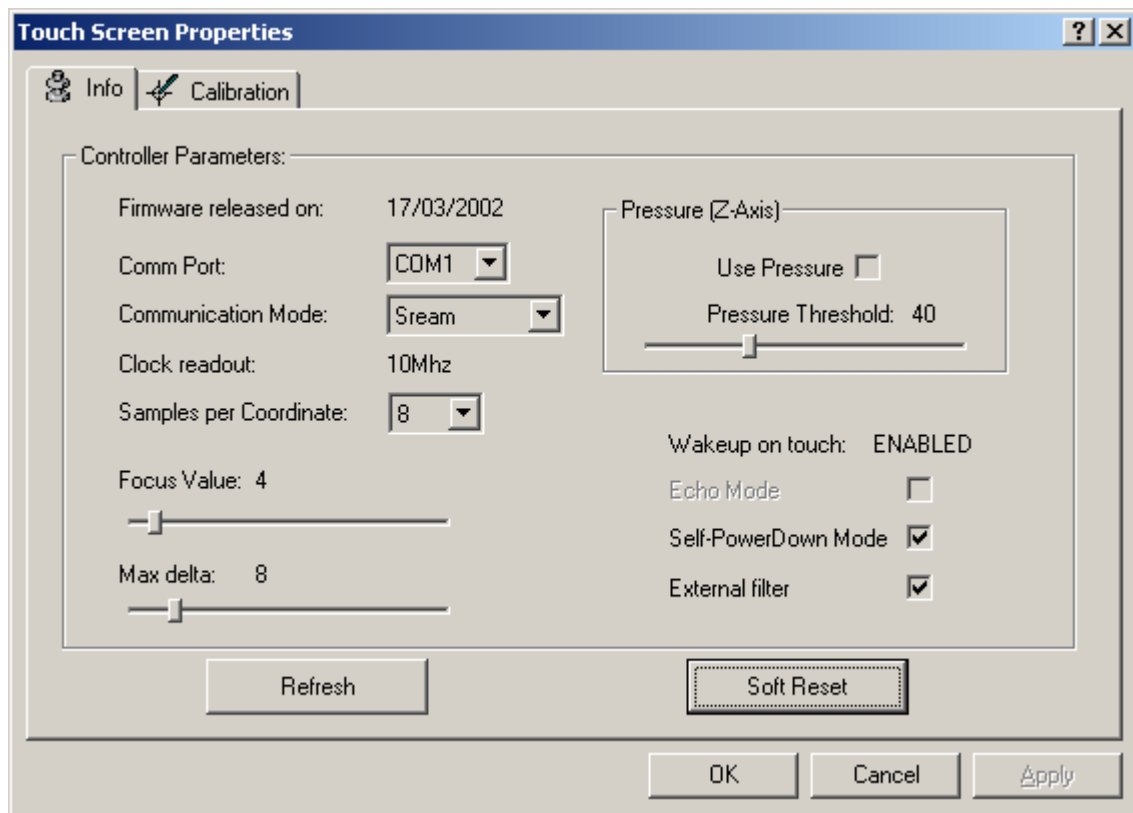
Max Delta – The default setting is 8.

Pressure (Z-Axis) Pressure Threshold – The default setting is 40. The pressure threshold is used by the controller to determine how hard a touch must be on the panel before it is considered valid. Be warned though, too high of a pressure threshold value might cause the corners of the touch panel to not be registered by the TSC.

Pressure (Z-Axis) Use Pressure – When enabled, the TSC will send the pressure measurement in addition to the X-Y coordinates. With the pressure measurement enabled, more data bytes are sent from the TSC to the driver; thus the coordinate pairs per second (CPPS) will be lower.

Self-Power Down Mode – The self-power down mode is enabled by default. The option is used to conserve power. If disabled, the TSC will always be on and will consume more power.

External Filter – The external filter is enabled by default. When enabled, the touch panel data is first sent through the external filter before an A/D conversion is done. This option should be used in noisy environments.

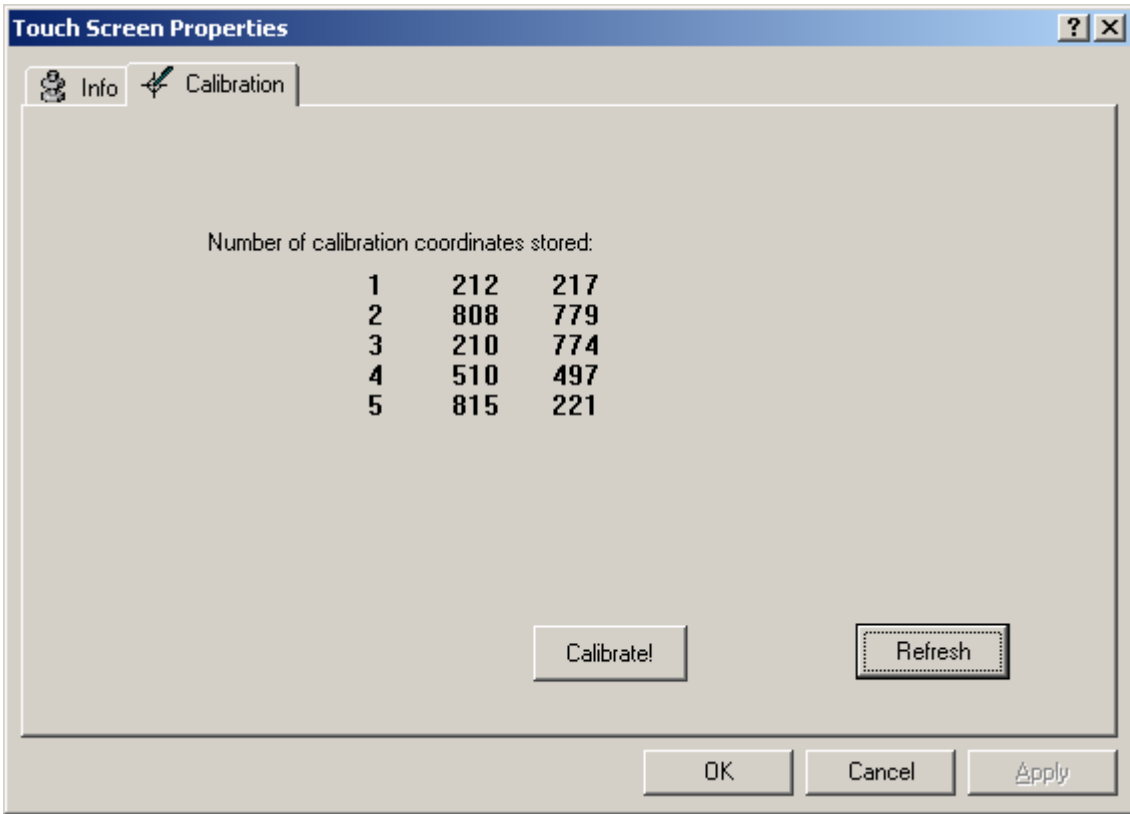


Calibration Tab

The driver supports five point calibration only. When a calibration is done, the driver will show the raw A/D value of the calibration points that are stored in the TSC.

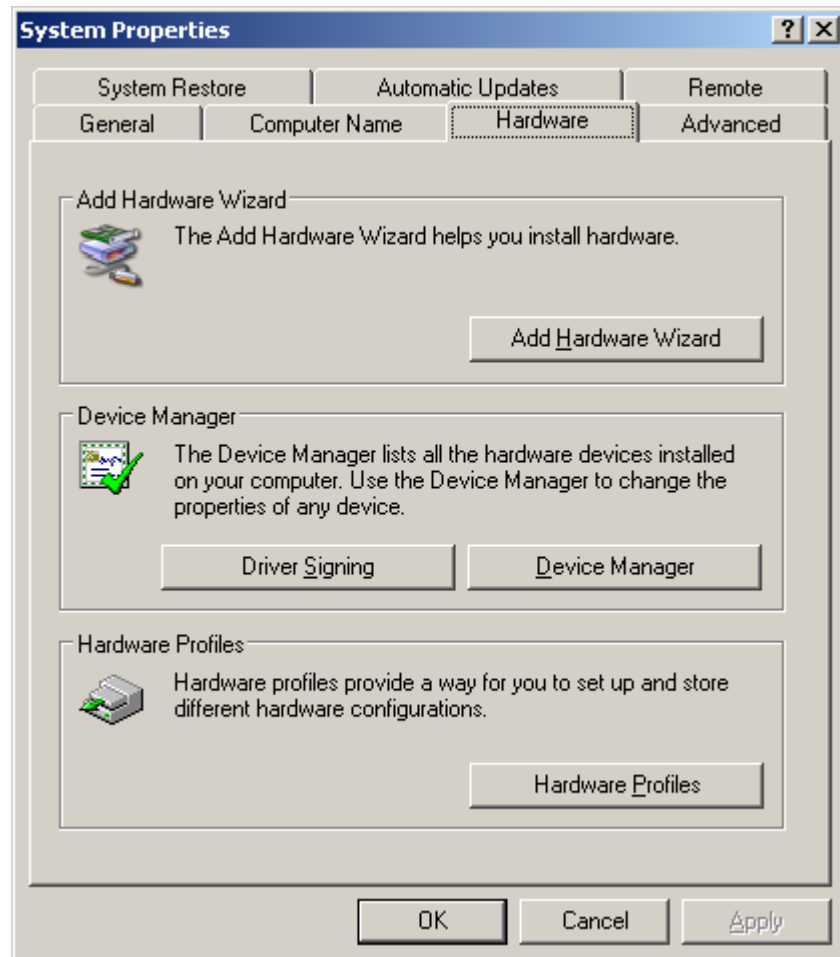
The Refresh button will cause the driver to retrieve the stored calibration data on the TSC to refresh the display.

The Calibrate button will cause the driver to use the stored calibration data on the TSC to align the mouse pointer with the touch on the panel.

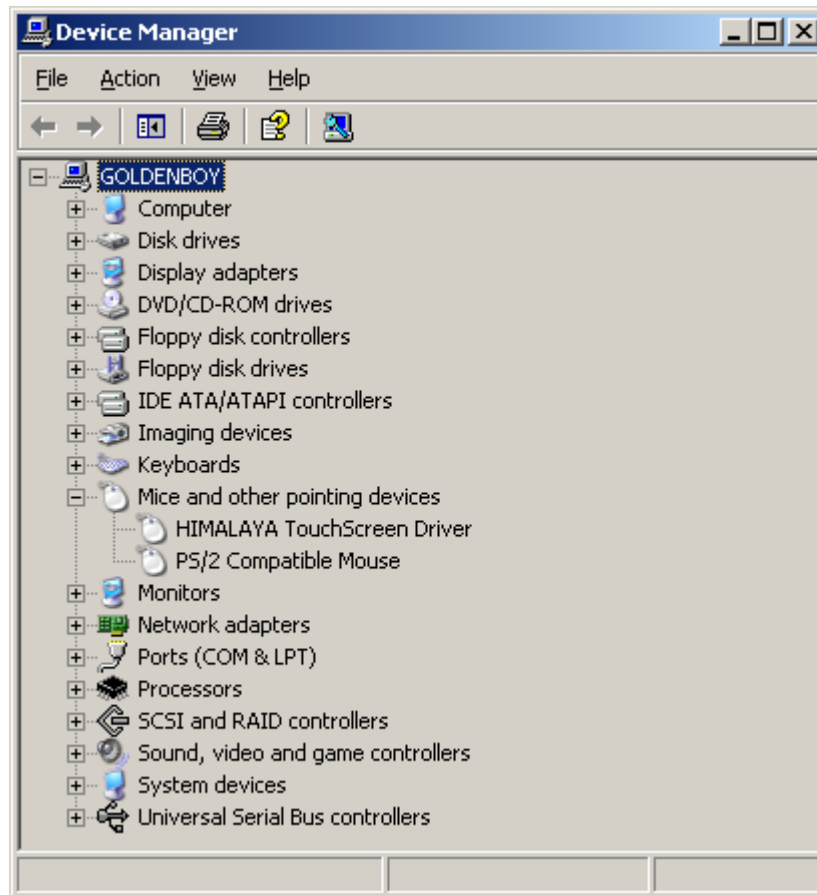


Uninstalling the Driver

On the Windows desktop, right click on **My Computer** and select **Properties**. Select the **Hardware** tab and click on the **Device Manager** button.



In the **Device Manager** dialog box, expand the **Mouse and other pointing devices** tree. Select the **Himalaya Touchscreen Driver** icon and press **Delete**. Reboot the computer for the changes to take effect.

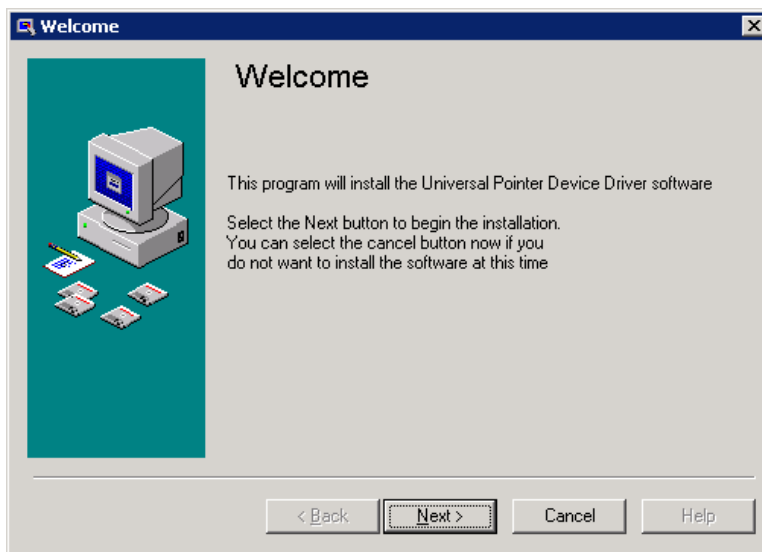


Universal Pointer Device Driver – Demoware TS driver

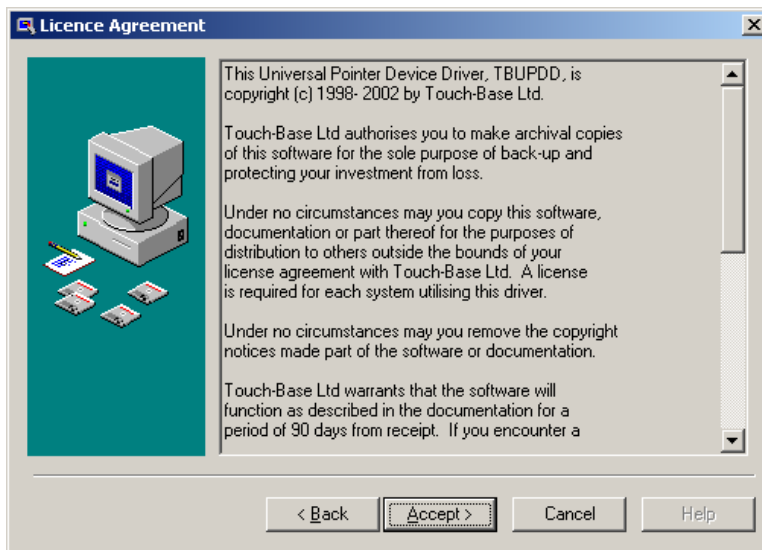
The enclosed software is an evaluation touch screen driver for the PC. It is designed to run on Win95/98/ME/2000/XP. This driver is not a crippleware, all functionalities are present. The only limitation is the driver is limited to one hundred touches for each calibration. When the one hundred touch limitation is reached, a calibration needs to be perform.

Installation

To install the driver run **Updd.exe** from the CDROM (**x:\UPDD\Updd.exe**), where **x:** is the CDROM drive letter.



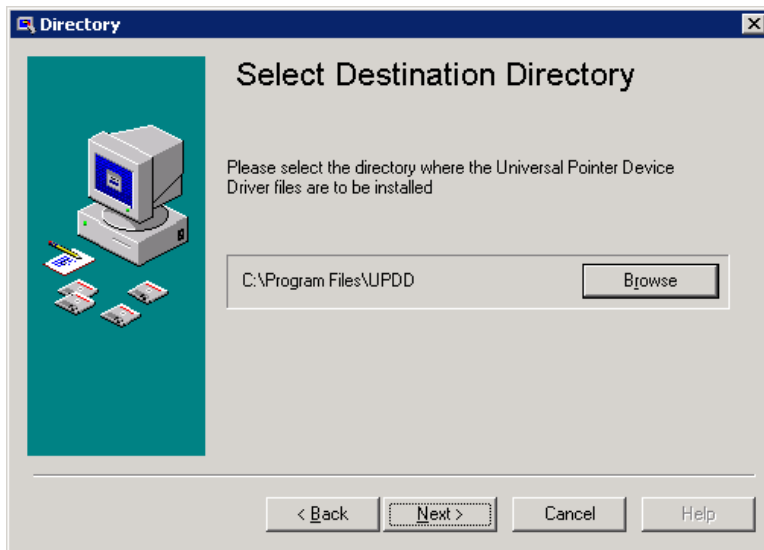
Click **Next** to begin installation



Click **Accept** to accept the license agreement or **Cancel** to stop the installation.



Click **Next** to accept the default folder name.



Click **Next** to accept the default installation folder.



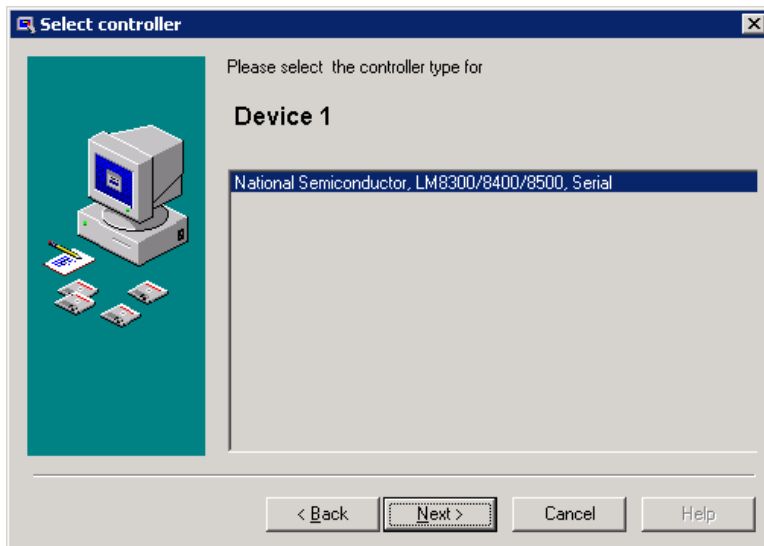
Click **Next** to install system tray icons.



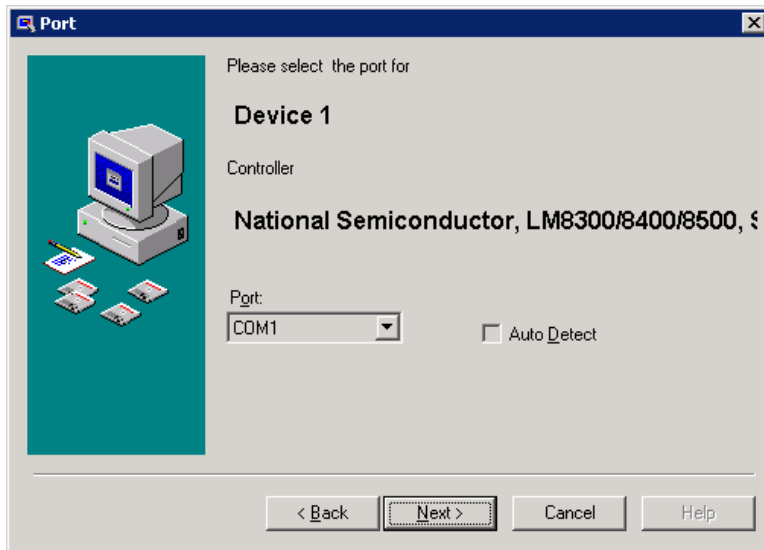
Click **Next** to accept the default number of devices



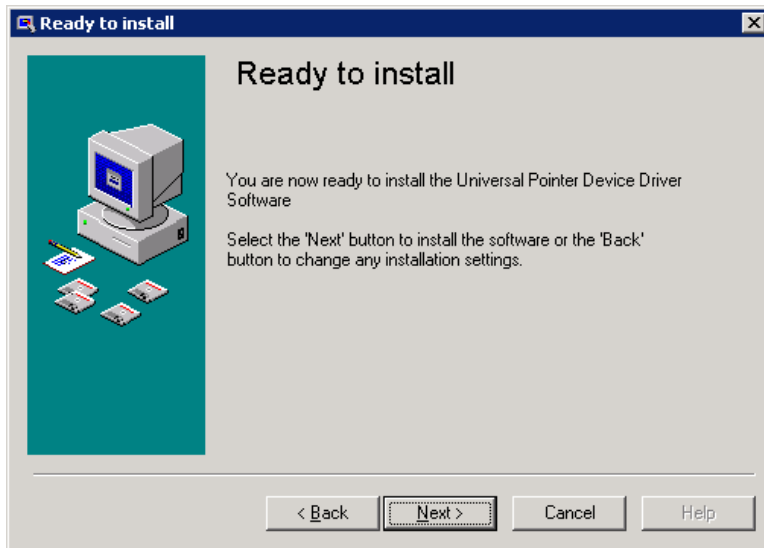
Click **Next** to accept the default size of the TS panel and device name.



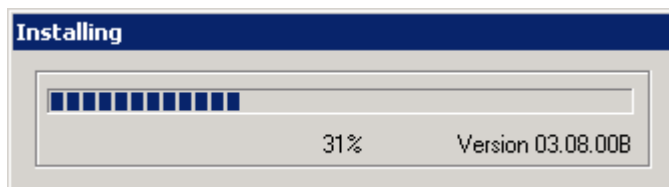
Click **Next** to verify the correct TSC driver to use.



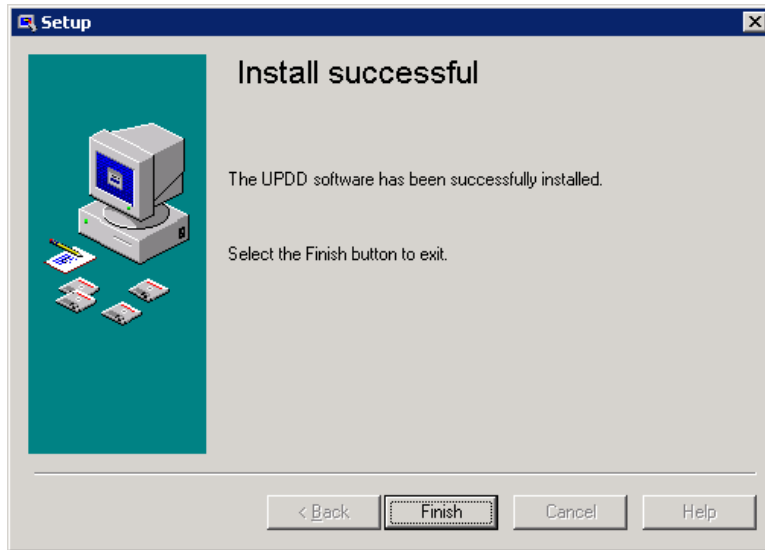
Select the COM port the LM8300/8500 evaluation board is connected to and click **Next**.



Click **Next** to begin installation of the driver.



The status bar will show the progress of the installation.

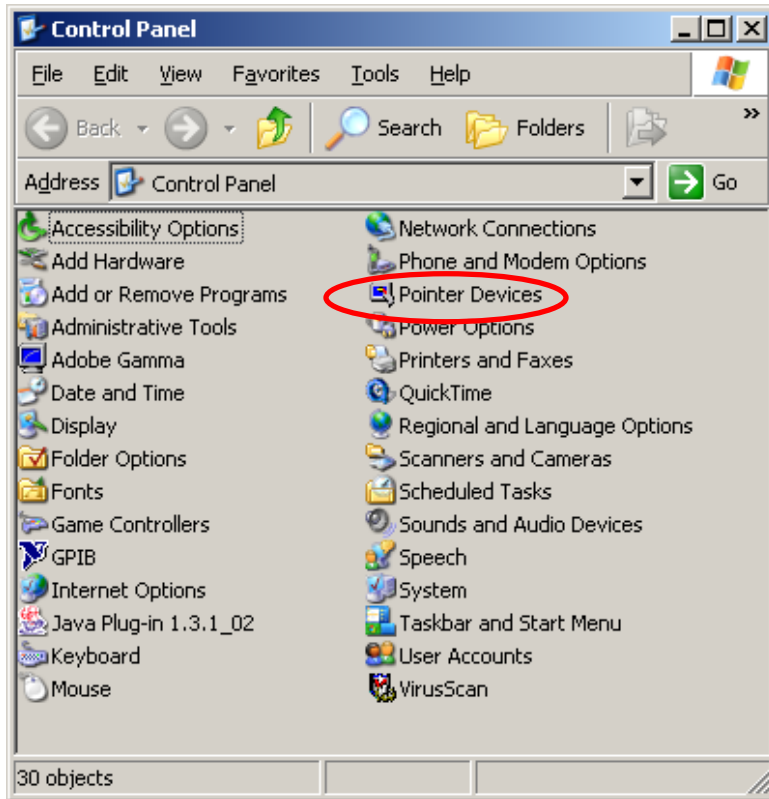


Click **Next** to finish the installation.

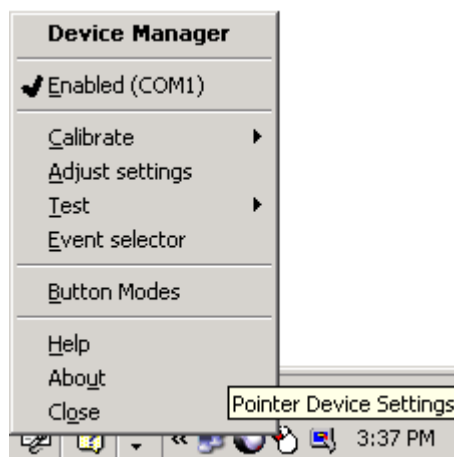
If the LM8300/8500 evaluation board is not powered and connected to PC during installation of the UPDD driver, the PC must be rebooted for the installation to take effect.

Universal Pointer Device Driver Options.

The **UPDD Device Properties** panel can be accessed in the **Control Panel** in Windows™ or from the UPDD icon located in the windows tray. To access the **Control Panel**, select **Start|Settings|Control Panel**. Double click on **Pointer Devices** to launch **UPDD Device Properties** panel.

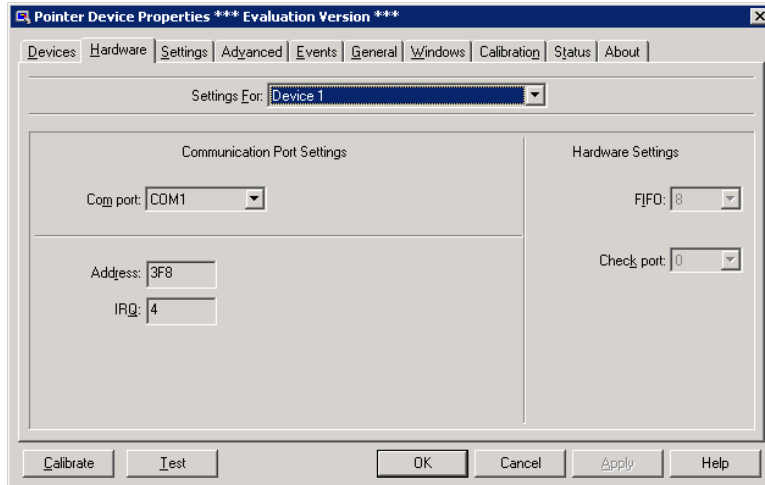


Accessing the UPDD Device Properties panel from the Control Panel




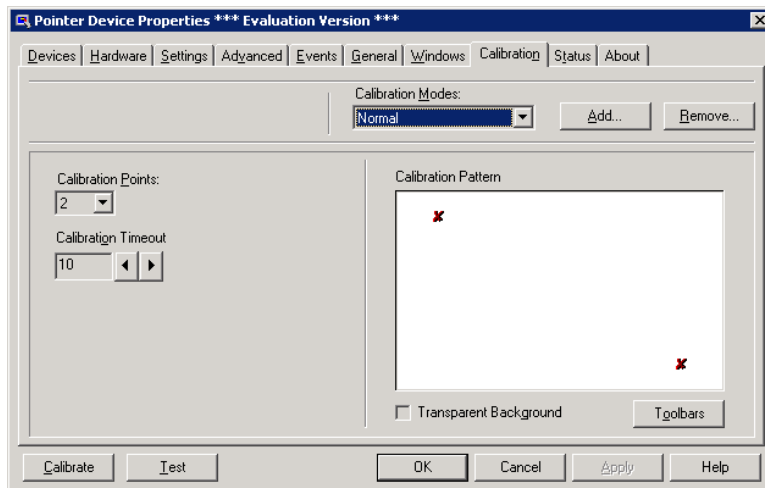
Accessing the UPDD Device Properties panel from the Windows tray

Pointer Device Properties Calibration Tab



Hardware Tab – This allows the changing of the COM port the LM8300/8500 evaluation board is connected to

The Hardware tab allows the modification of the existing serial port. Unless the touch screen controller is not responding, none of the settings should be changed. The IRQ and Address resources are determined from the Windows Setup. It is possible to enable and disable the COM port by right clicking on the Pointer Device Properties Icon () located in the Windows Tray and selecting **Enable COMx**, where x is the COM number. When enabled, there will be a check mark next to the text **Enable COMx**. When disabled, there will be a X mark next to **Enable COMx**.

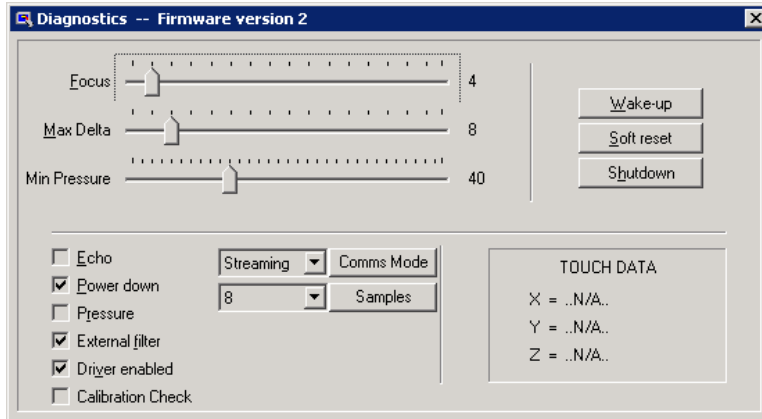


Calibration Tab – This allows the changing of the number of calibration points.

The **Calibration** tab sets up the number of calibration points. The default number of calibration points is 2. The currently supported calibration point settings are 2, 5, and 13. To change the calibration point, select either 2, 5, or 13 and press **Apply**. To calibrate the touch screen controller, click on **Calibrate** and follow the instructions displayed on the screen.

The Diagnostics program

To access the Diagnostics program to change various setting on the touch screen controller, click on **Start|Programs|UPDD|Diagnostics**



Diagnostics Tab – This allows the changing of the various options on the LM8300/8500

Comms Mode – The default setting is stream mode. In this mode, the driver will interpret all touches on the touch panel. The other modes are touchdown and liftoff. In the touchdown mode, the driver will only receive data from the TSC when a touchdown is detected on the panel. In the liftoff mode, the driver will only receive data from the TSC when a liftoff is detected on the panel. It is necessary to first select the desired communication mode then press the **Comms Mode** button for the changes to be sent to the device.

Samples per Coordinate – The default setting is 8 samples per coordinate. The other available settings are 1, 2, 4, 16, and 32 samples per coordinate. Keep in mind that higher settings might cause the mouse pointer to trail the actual position of the touch. It is necessary to first select the desired number of samples then press the **Samples** button for the changes to be sent to the device

Focus Value – The default setting is 4. For more information on what the **Focus Value** does, please refer to the datasheet.

Max Delta – The default setting is 8. For more information on what the **Max Delta** does, please refer to the datasheet.

Min Pressure – The default setting is 40. The **Min Pressure** is used by the device to determine how hard a touch must be on the detected on the panel to be considered a valid touch. Please note, too high of a **Min Pressure** value might cause touches on the corner of the touch panel to be not considered valid by the device.

Pressure – When enabled, the TSC will send the pressure measurement in addition to the X-Y coordinates. With the pressure measurement enabled, more data bytes are sent from the TSC to the driver; thus the coordinate pairs per second (CPPS) will be lower.

Power Down – The self-power down mode is enabled by default. The option is used to conserve power. If disabled, the TSC will always be on and will consume more power.

External Filter – The external filter is enabled by default. When enabled, the touch panel data is first sent through the external filter before an A/D conversion is done. This option should be used in noisy environments.

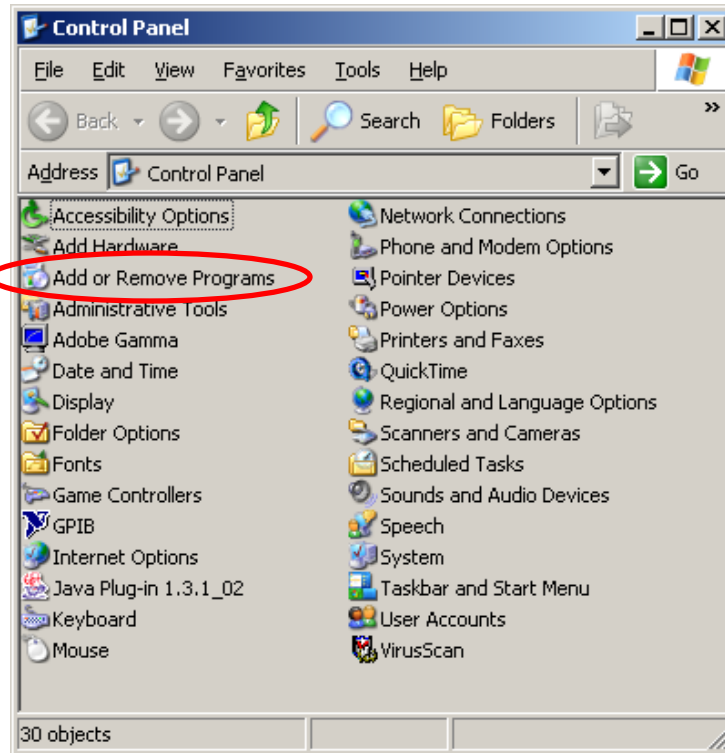
Echo – The **Echo** mode is disabled by default. The **Echo** mode should only be used in a debugging environment.

Driver Enabled – This will send a command to the device to power down. Please note, if the **Power Down** option is disabled and the **Driver Enabled** is disabled, only enabling the **Driver Enabled** option will cause the device to resume operation.

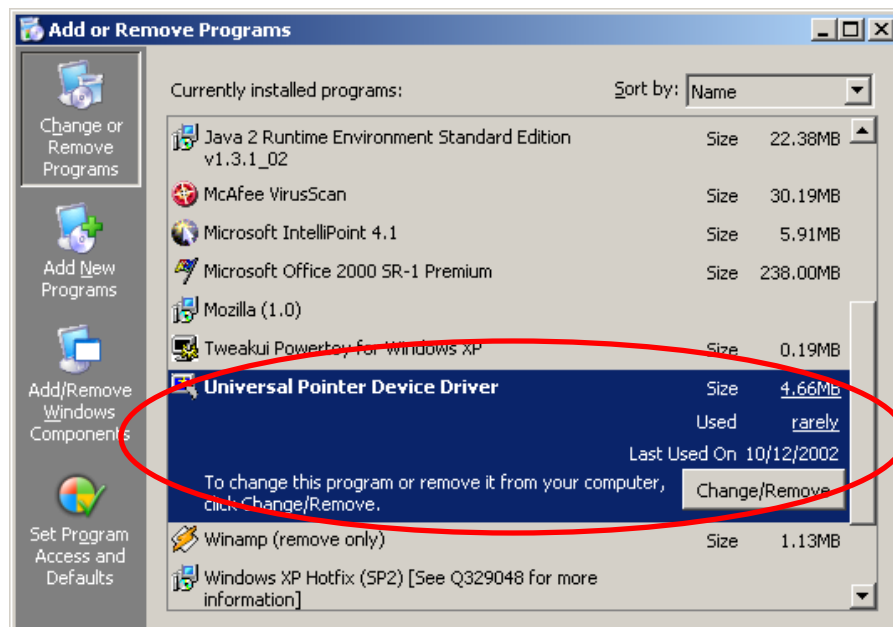
Calibration Check – The calibration check is disabled by default. When enabled, all calibration data are checked internally by the device for valid calibration data.

Uninstalling the Universal Pointer Device Driver – Demoware TS driver

To uninstall the Universal Pointer Device Driver, select **Start|Settings|Control Panel**. In the **Control Panel** window, double click on **Add or Remove Programs**.



In the **Add or Remove Programs** window, select the **Change or Remove Programs**. Find the entry for **Universal Pointer Device Driver** and select it. Once selected, click **Change/Remove**.



Jumper settings

The board was designed to work with a voltage of 7-16V DC (J3). This voltage will be dropped down to 5V for the LM8500 and 3V for the LM8300/8400 using the onboard regulator chip. For proper operation, a jumper block must be placed on J7 pin 1 and 2. Current measurement can be performed by removing the jumper block and inserting an ammeter between J7-1 and J7-2.

The controller is set to low power standby enabled by default. A jumper block must be placed on J12 in the J12-2 and J12-3 on the evaluation board for proper operation.

The controller has the external filter options enabled by default. The board has two kinds of filter: active and passive. The active filter is based on an op-amp design and the passive filter is a simple low pass RC filter. To set the board with active filter enabled, a jumper block must be placed on J5-2 and J5-3; and between J4-2 and J4-3. To set the board with passive filter enabled, a jumper block must be placed on J5-1 and J5-2; and between J4-1 and J4-2.

The touch screen panel that is enclosed with the board is design to plug into J20. If other connectors are required, then additional connectors can be placed on J18, J19, and J8.

Three jumpers blocks must be placed on J1, position J1-3, J1-4, position J1-5, J1-6, and position J1-7, J1-8.

The default jumper setting is shown in figure 1.

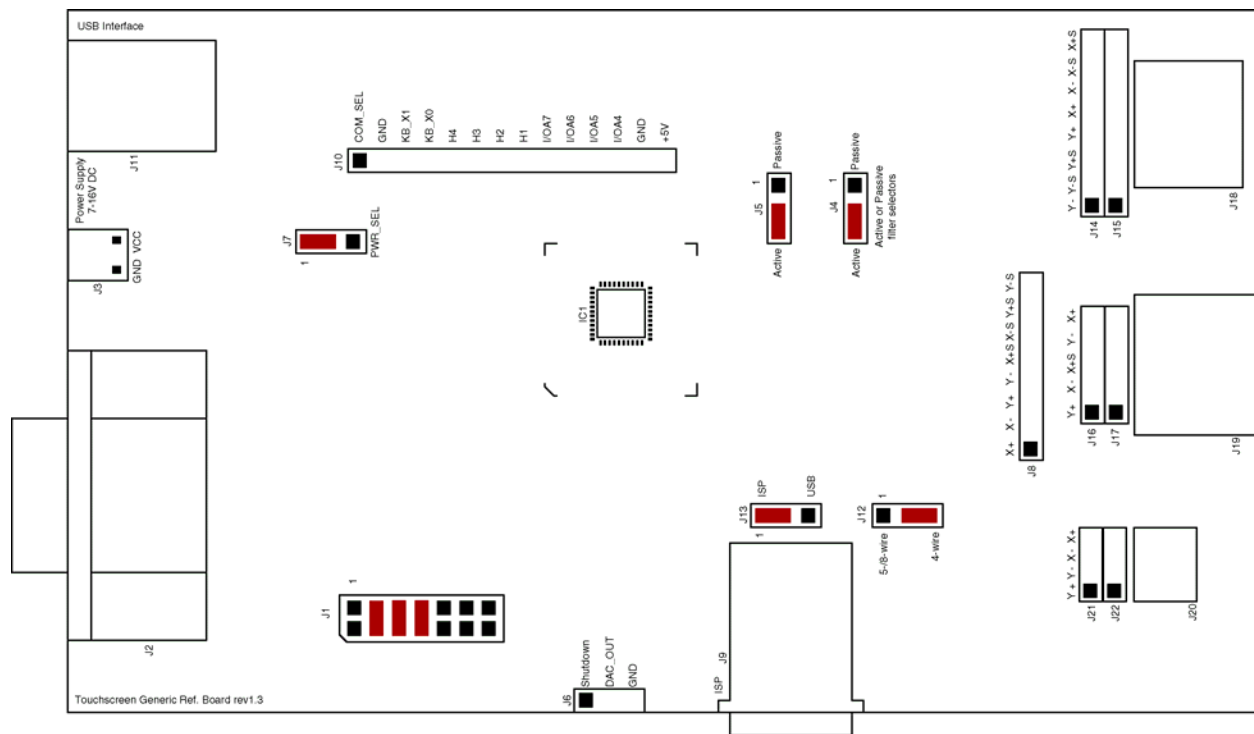


Fig. 1

Physical connection

The evaluation kit comes with a 4-wire resistive touch screen panel. The panel connects to the 4-wire resistive touch screen connector label J20 on the evaluation board. Please note the wire connecting the panel to the board should have the white side up. Figure 2 shows the actual connection.

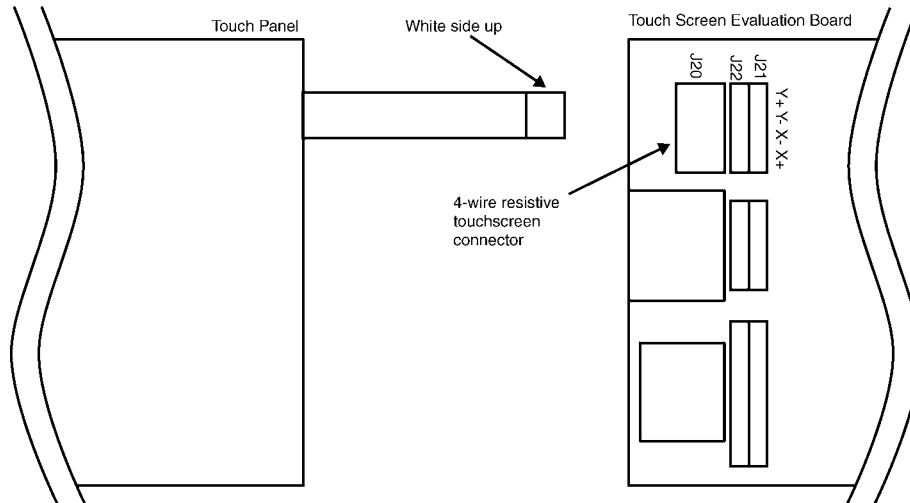


Fig. 2

The wire signal for the touch panel is shown in figure 3.

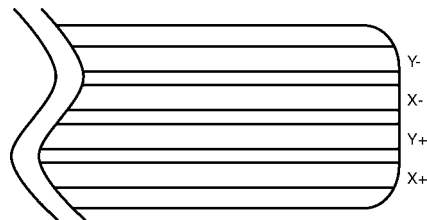


Fig. 3

Touch Screen Connection

The device was designed to drive a 4 wire resistive touchscreen directly without the need of external components. Care should be exercised when the touchscreen is used in a noisy environment. Noise can be picked up from sources such as back-light for a LCD display or from external EMI/RFI sources. The simplest method is to connect a capacitor from the touchscreen lines to ground, as shown in fig. 1.

As an ESD precaution, each touch screen line is also connected to a pair of clamping diodes. These diode pairs ensure that the voltage level going into the device is no greater than analog V_{CC} (AVCC) and no less than analog ground (AGND).

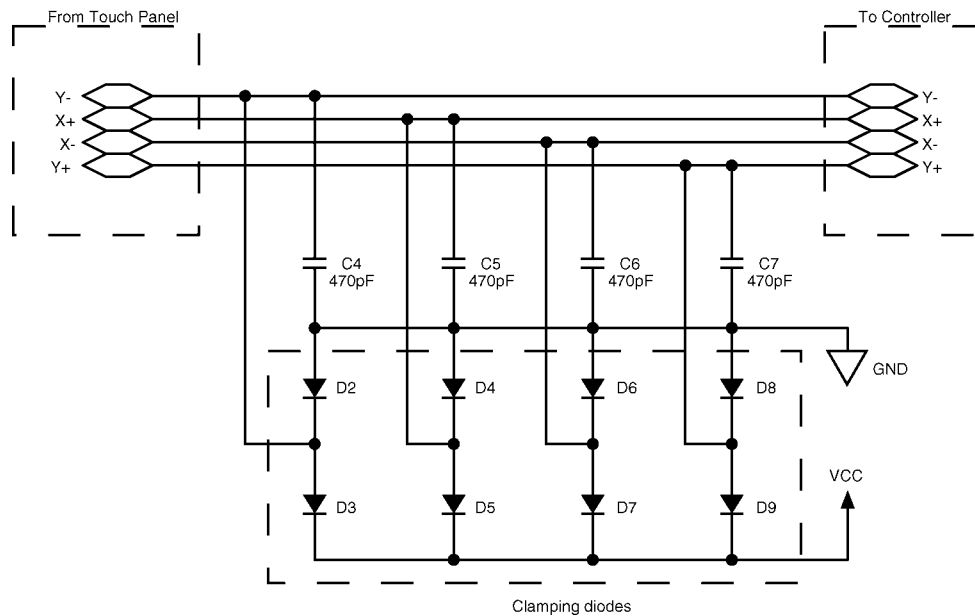


Fig. 1

External filtering

With the use of the diode clamp and the bypass capacitor, the amount of noise being filtered is already very good. To further eliminate noise, it is possible to connect a filter stage before the A/D conversion is done on the touchscreen. The filter can either be a passive or active filter. The passive filter has the advantage of being lower in component count while the active filter has the advantage of being closer to the ideal “brick wall” for frequency filtering.

The active filter shown in Fig. 2 is op-amp base low pass filter and the passive filter is a low pass RC filter. The corner frequency for both filters is 3 kHz. J4 and J5 are jumper blocks that are used to switch between the passive and active filter.

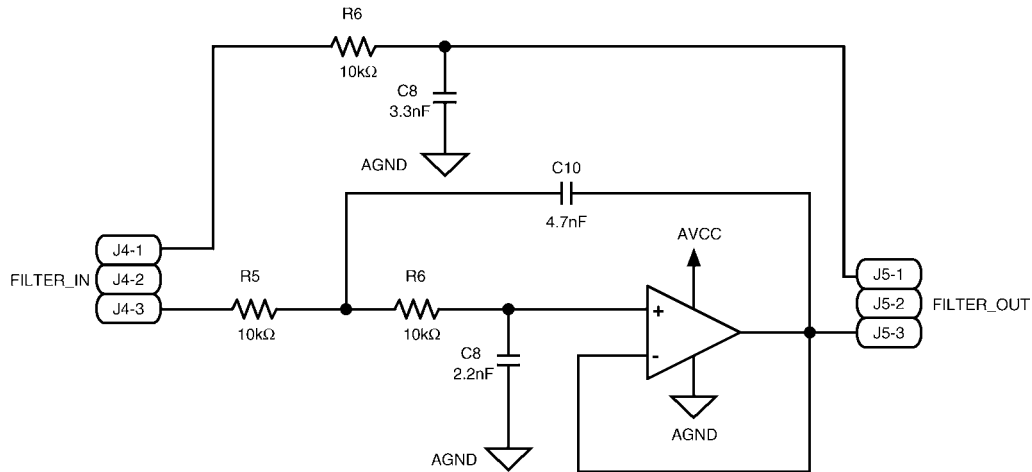


Fig. 2

Analog supply voltage

The analog ground and voltage is used to power the analog block in the device as well as providing the reference voltage for A/D. For the A/D to operate properly, AVCC must be equal to VCC.

If the analog power supply is to be derived from the VCC, then the analog power supply should have sufficient filtering available. The simplest filter method is to decouple the VCC before connecting to the AVCC pin. This can be accomplished by the use of a RC filter. Figure 3 shows a typical connection. If desired, ferrite beads can be used between the analog ground (AGND) and digital ground (GND) to control ground current. Another method is to provide an analog ground plane.

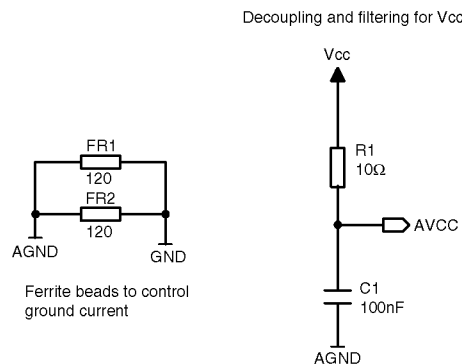


Fig. 3

RS232 Connector

The device uses the RS232 protocol to communicate with the touch screen (TS) driver. To minimize the cost of the board and to demonstrate the low cost components that can be used to drive the RS232 connection, three BJTs are used. Although it is possible to use a RS232 driver chip, the use of BJTs are lower in cost. Figure 4 shows the RS232 circuitry.

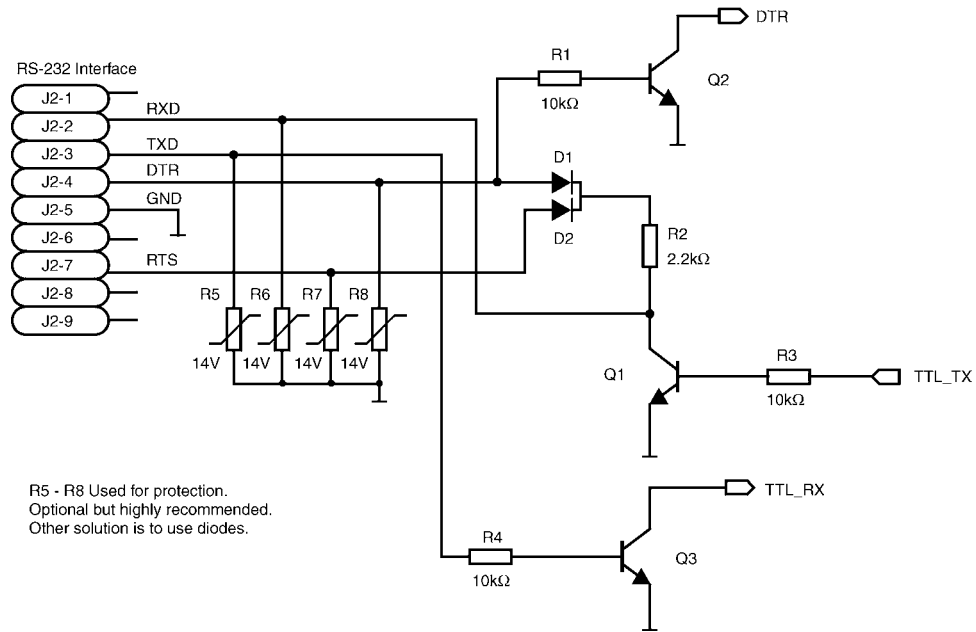


Fig. 4

Note – R5 – R8 on the board are optional. These resistors are used for ESD protection.

The device uses the DTR signal to determine when it is safe to transmit data to the TS driver. If the system on which the TS driver resides does not have the DTR signal or does not use the DTR signal, it is possible to connect the DTR signal on the device to ground. This will signal the device that the system is always ready to receive data from it.

Troubleshooting

The PC does not respond to any touch on the touch panel.	Make sure the touchscreen driver is installed.
	Make sure only one touchscreen driver is installed, either UPDD or the NS driver.
The touchscreen driver is installed, but the PC does not response to any touch on the touch panel.	Make sure the touch panel is connected to the LM8300/8500 evaluation board.
	Make sure the serial cable is connected between the PC and the LM8300/8500 evaluation board.
	If the 9V battery is low, then there is not sufficient voltage supplying the board. Replace with a new 9V battery. Another option is to power the board with a 9V regulated power supply
	Make sure a jumper block is placed on J7-1 and J7-1 on jumper J7
	The device has the external filter enabled by default. Make sure there is a jumper placed in the J4-1 and J5-1 for the active filter, and J4-2 and J5-2 for the passive filter.
The NS driver will not install on a Windows 95/98/ME machine	The NS driver is designed to work only in the Windows 2K/XP environment. Install the driver in a Windows 2K/XP machine.
The driver works, but if I don't touch the touch screen for an extended period of time and I touch it again, the PC does not response anymore.	The device has the low power stand by mode enabled by default. Make sure a jumper block is placed on J12-2 and J12-3 on jumper J12.

