

Touch Panel Installation



Four-wire Resistive Touch Panel Operation Principle

A resistive touch panel consists of a glass layer and a (transparent) flexible plastic membrane. Both the glass and the membrane are covered with transparent resistive coating. The space between the glass and the membrane is filled with a net of micro-separators that are equally spread throughout the whole active surface to prevent undesired contact between the conductive surfaces. Some touch panels have a second flexible membrane which is used as a base instead of a glass layer. Such panels have the advantage of lesser thickness, which is important for installation. For example, the touch panel's thickness with a glass base ranges from 1.2mm to 2.1mm, while the thickness of a flexible touch panel ranges from 0.4mm to 0.7mm.

When you press on the touch panel, the membrane comes into contact with the base. This results in a resistance change. The analog-to-digital converter measures and transforms this resistance change into touch coordinates (X and Y). Generally, the algorithm is as follows:

1. +5V input is fed to the upper electrode (**Uy4 Fig. 1**). The lower electrode (**Uy3 Fig. 1**) is grounded. Then voltage is measured on the left and right electrodes (**Ux1, Ux2 Fig. 1**). This voltage corresponds to the Y-coordinate on the screen.
2. In the same way, the left and right electrodes (**Ux1, Ux2 Fig. 1**) are connected to +5V and GND, and the X-coordinate is obtained from the upper and lower electrode's voltage. (**Uy4, Uy3 Fig. 1**)

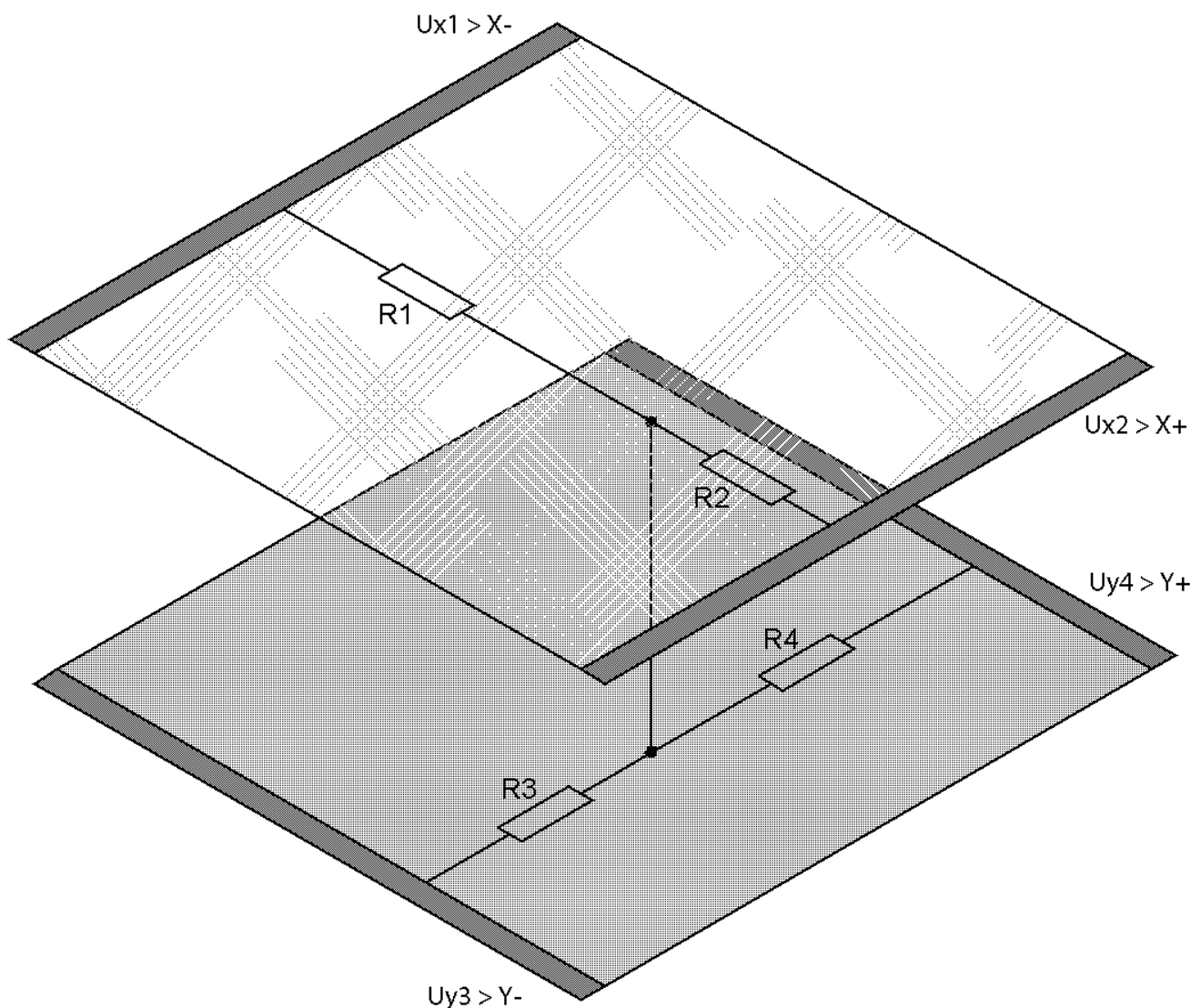


Figure 1

Four-Wire Resistive Touch Panel Structure

Figure 2 illustrates the structure of four-wire resistance touch panel. A 6.5" touch panel is shown on **Fig. 2**. The different areas of the touch panel are color-coded for your convenience (only at this illustration).

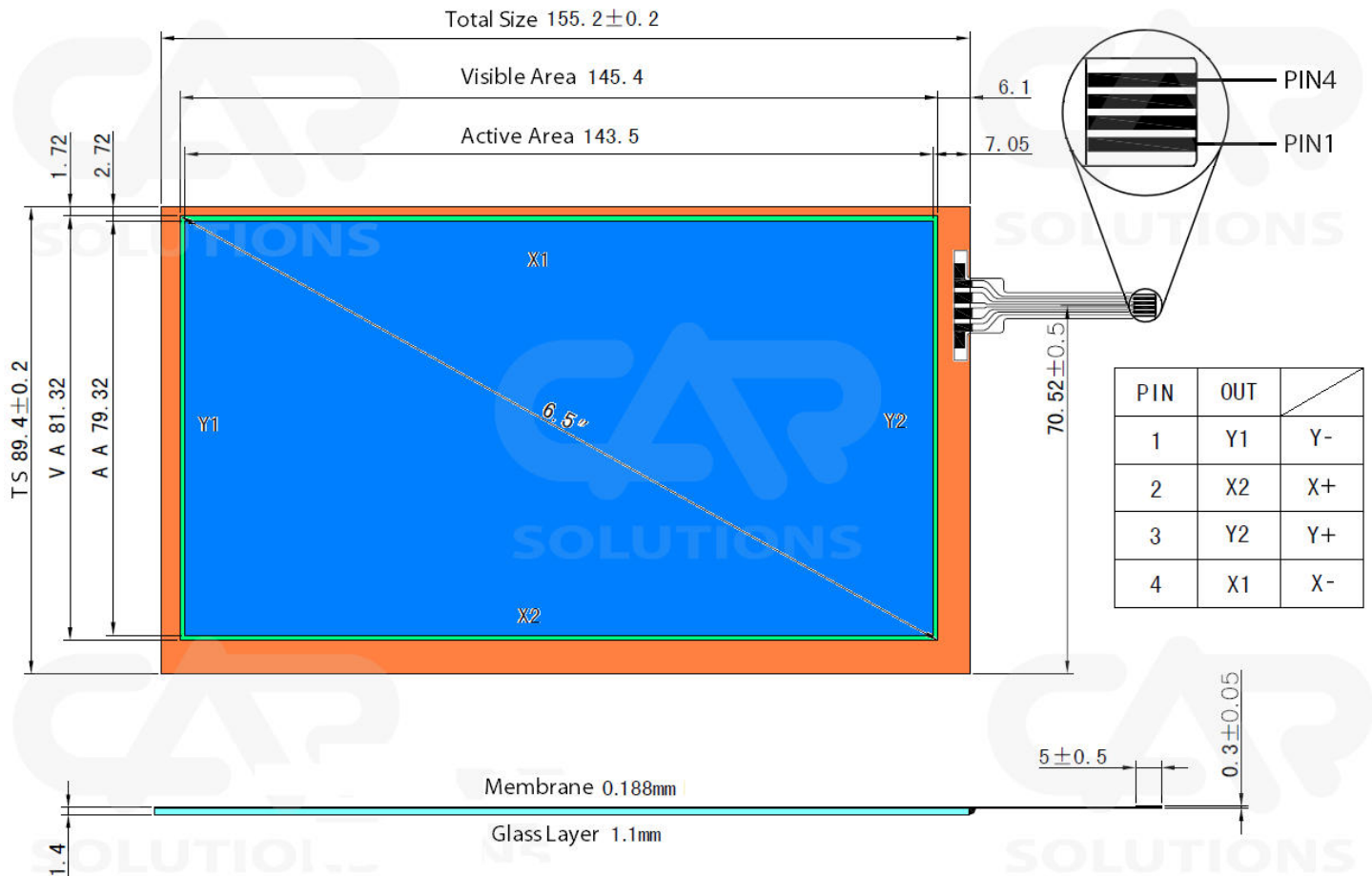


Figure 2

Inactive area is colored in orange. It contains conductive traces that are connected to the resistance surface from four different sides. The sides are marked as **X+**, **X-**, **Y+**, **Y-** (similarly to a coordinate system). The **inactive area** should not be visible, as it is covered by the plastic frame that encompasses the display.

! Do not press the **inactive surface** too hard to avoid damaging the conductive traces and the glass base!

Visible inactive area is colored in green. It is a transitory area for ease of installation. It can be covered by the plastic frame or be visible.

Active area is colored in blue. This surface reacts to touch and records its coordinates.

! **Attention!** Make sure that **the plastic frame** does not press against the **active surface** of the touch panel. If it does, it will not respond to any touches because it will always read the coordinates where the plastic frame touches the panel.

USB Touch Controller Structure

The USB touch controller converts analog signals from the resistance touch panel into a control protocol for the navigation block (or PC). This protocol emulates the use of a mouse:

- Tapping twice emulates a double left-click of a mouse;
- Pressing and holding for 2-3 sec. emulates a right-click of a mouse (which calls up a context menu in certain applications)

A USB touch controller illustration is shown below (Fig. 3). The pin-layout of CON2 socket is shown on the left of the image.

⚠ Attention! The CON2 socket pin layout must match the touch panel's flat cable pin layout! If they do not match, reconnect correctly the wires of the adaptor cable (Fig. 4) to connect CON2 with the touch panel.

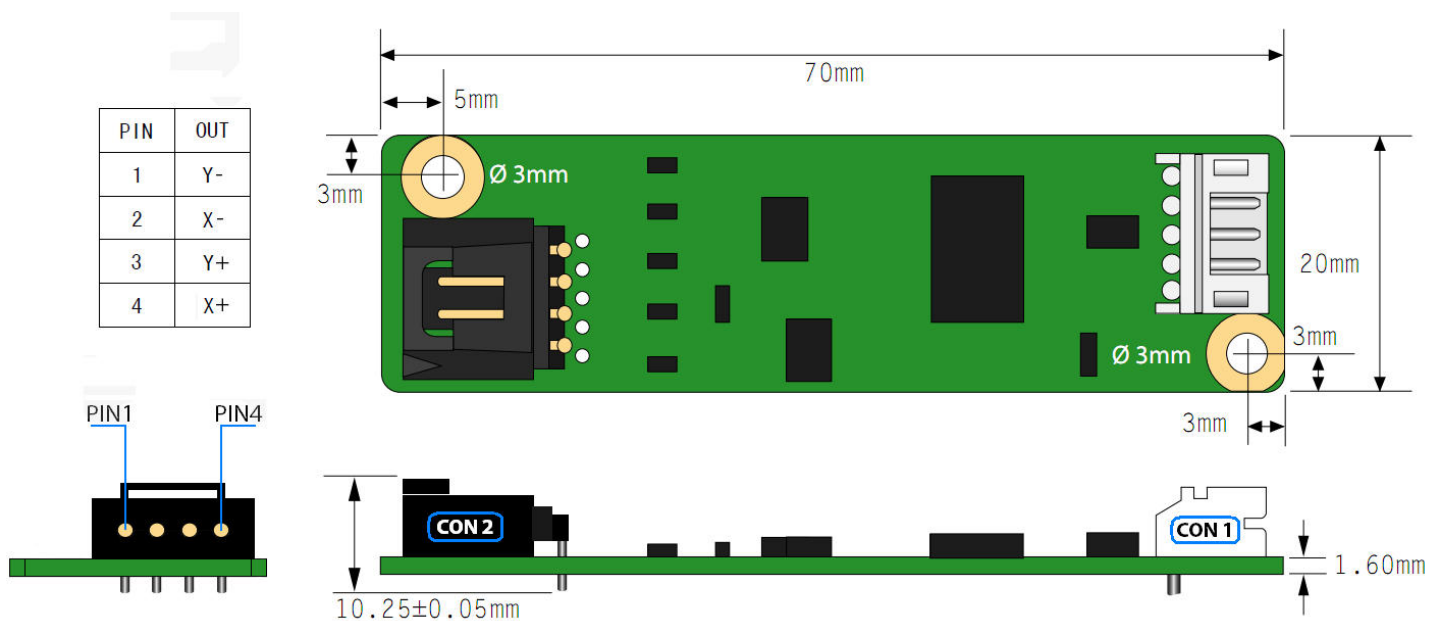


Figure 3

The USB touch controller is shipped with a USB cable (Fig. 5) and an adaptor cable, which connects the resistance touch panel to CON2 (Fig. 4).

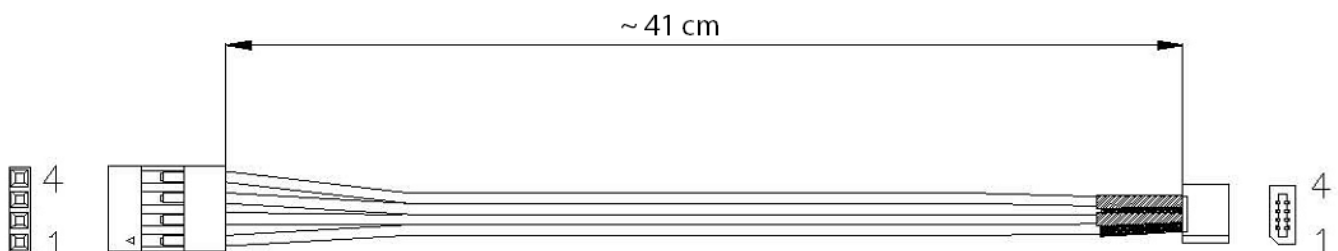


Figure 4

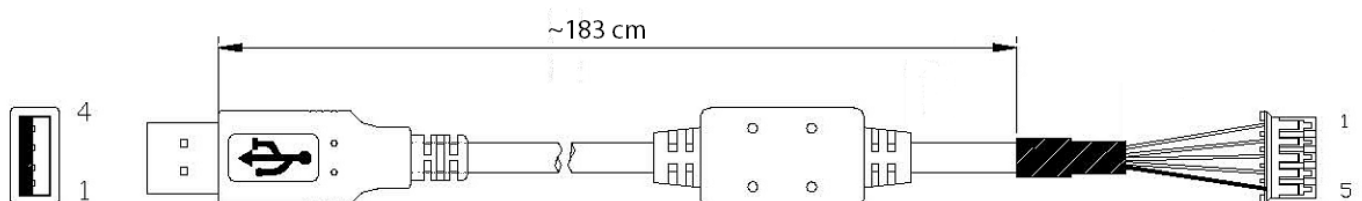


Figure 5

Example: Touch Panel Installation for Audi Q7

1. Measure the visible display surface width and height using a ruler or calipers. The visible display surface – is the portion of display surface, which is not obstructed by the plastic frame (**Fig. 6**).

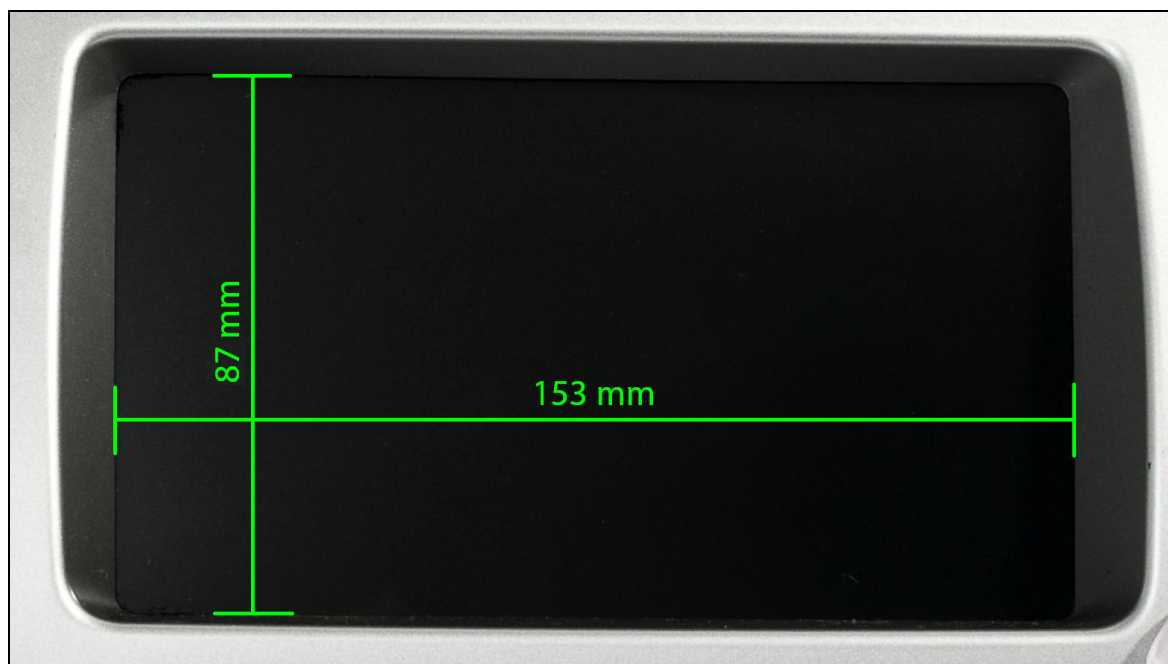


Figure 6

2. Choose a touch screen of an appropriate size, based on your measurements. Make sure that the panel's **active surface** does not exceed the **visible surface**, or the plastic frame will press at its edges when installed, which will be interpreted as a finger (or stylus) touch and the panel will not respond to other touches. In this example we have chosen a 7" touch panel.
3. Remove the original dashboard with a mounted display (**Fig. 7**).

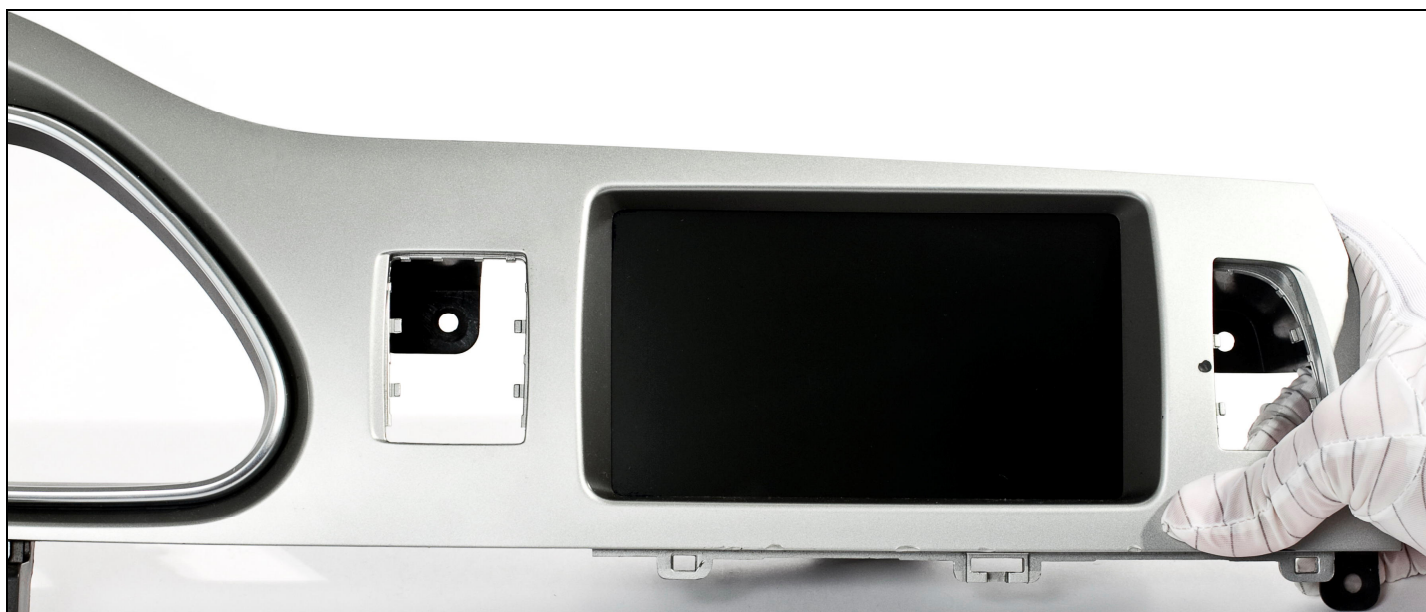


Figure 7

4. Detach the display from the dashboard (**Fig. 8**).



Figure 8

5. Perform a visual inspection and determine the possibility to attach the touch pad to the display or the plastic frame. In this example we chose to attach the touch pad to the plastic frame using a double-sided foam tape (**Fig. 9**). Degrease the surface before using the tape.

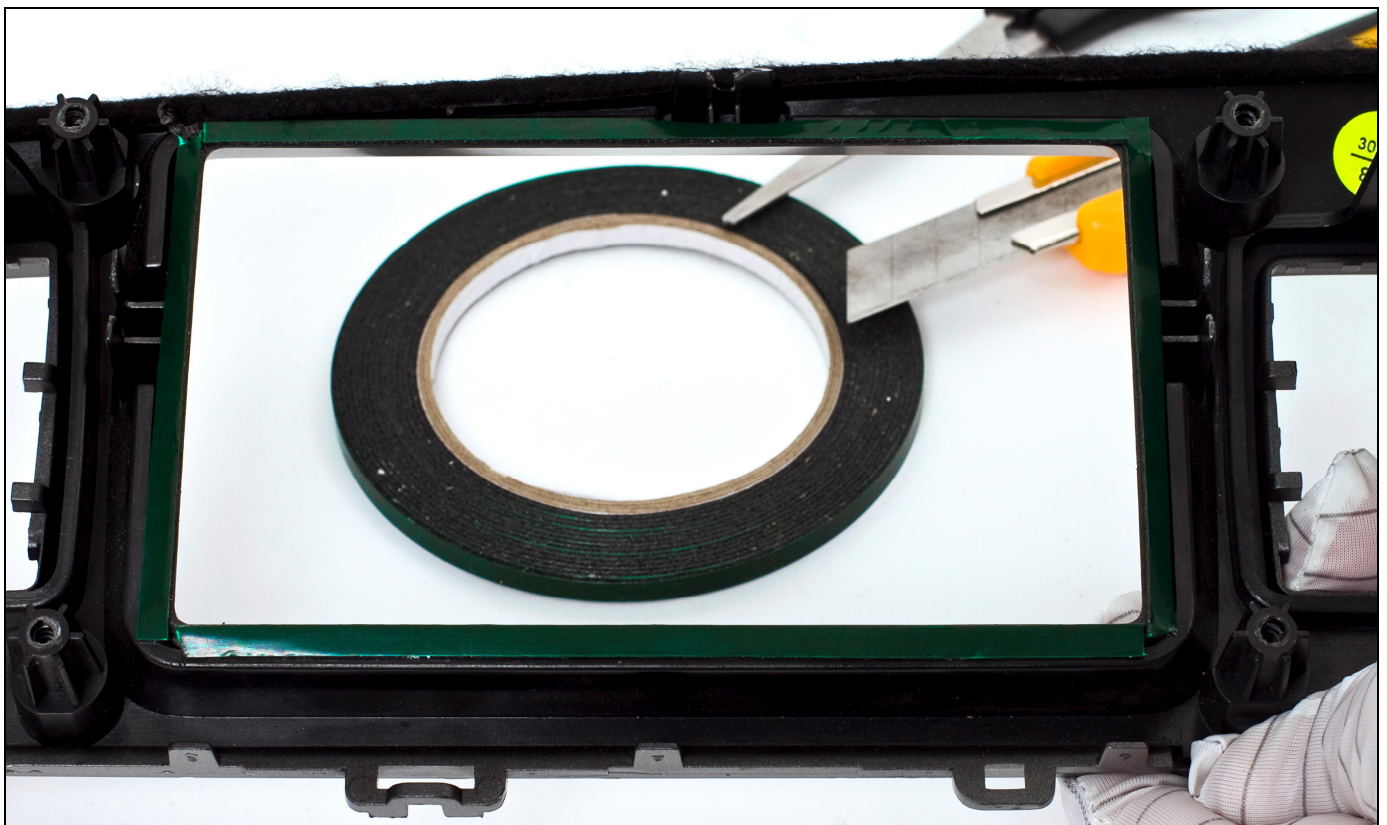


Figure 9

6. Cover the metal frame on the front side of the display with a cloth tape (**Fig. 10, 11**). This operation is necessary to prevent dust and other tiny particles from reaching the space between the touch panel and the screen, and also to avoid damaging the glass base of the touch screen in the assembling process.



Figure 10



Figure 11

7. Remove the protective film from the touch panel (do it carefully and don't leave your fingerprints on the glass surface that will be facing the display) and place the panel on the foam tape (Fig. 12, 13). The touch screen can be installed with any orientation (i.e. with the flat cable on top or at the bottom) because the calibration process will sort this out.

⚠ Make sure that the glass base of the touch panel is facing the display and the active membrane is facing the plastic frame.

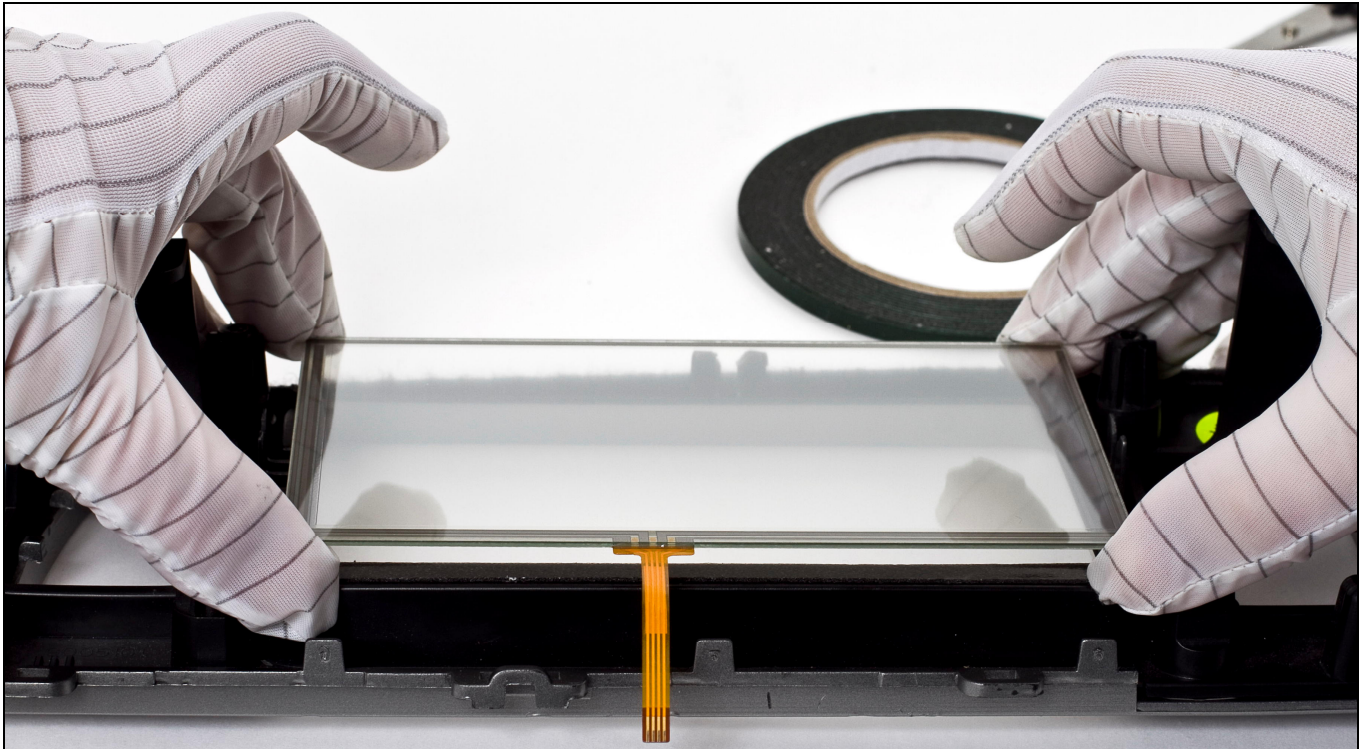


Figure 12



Figure 13

8. Carefully wipe the display surface, remove fingerprints and dust. Use special spray and (or) a cloth designed for cleaning monitors.

⚠ Attention! Never use liquids containing ammonium chloride or ammonia (window cleansers) to wipe the monitor. You may damage the antiglare coating on the monitor. An example is shown in Figure 14.



Figure 14

9. Mount the display in its original position (Fig. 15)

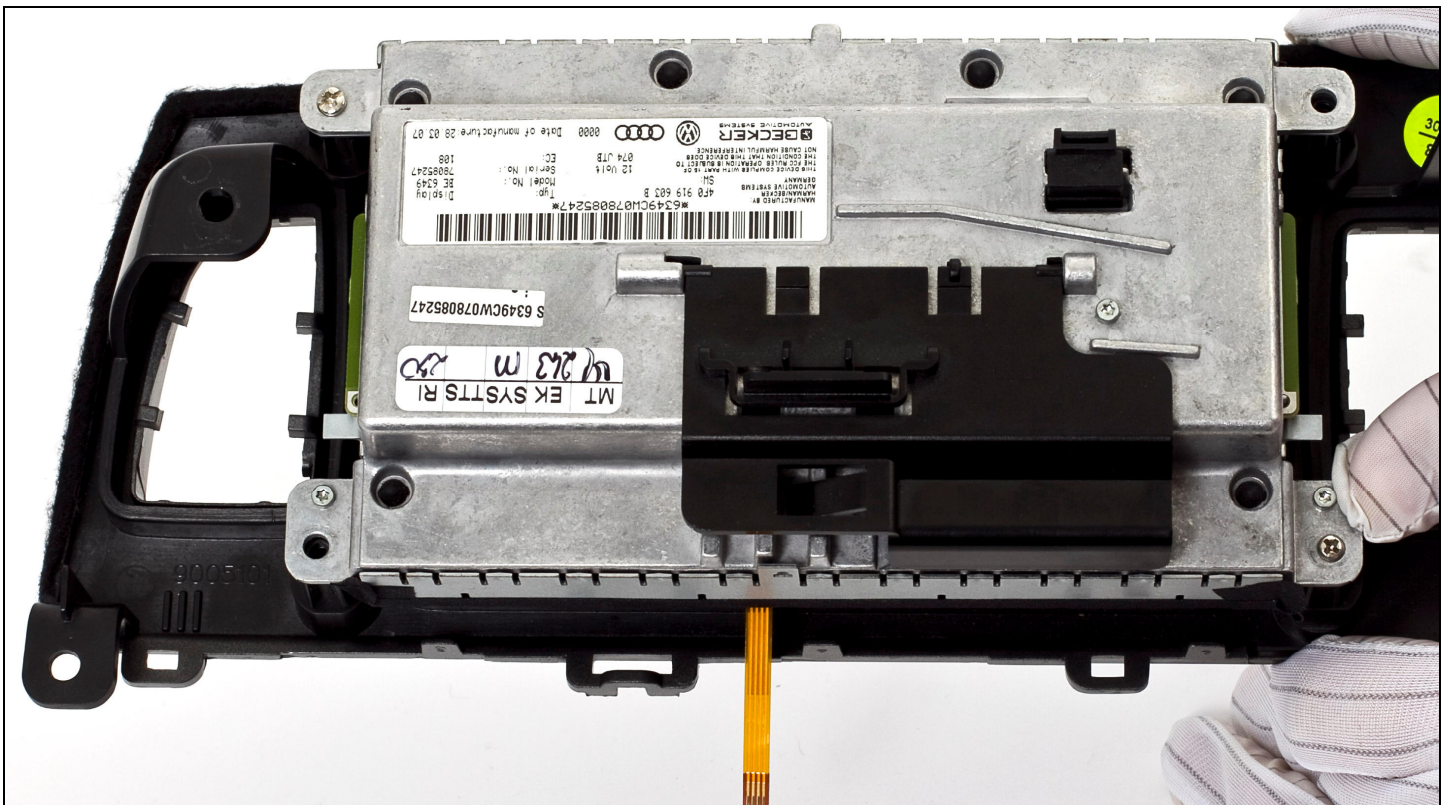


Figure 15

10. When mounting the display, place several washers in the gap (Fig. 16) that appeared between the display's metal frame and the fixation tabs of the plastic tab in order to avoid crushing or damaging the touch panel. When you finish mounting the display, fasten the touch panel ribbon-cable on the display case with a cloth tape (Fig. 17).

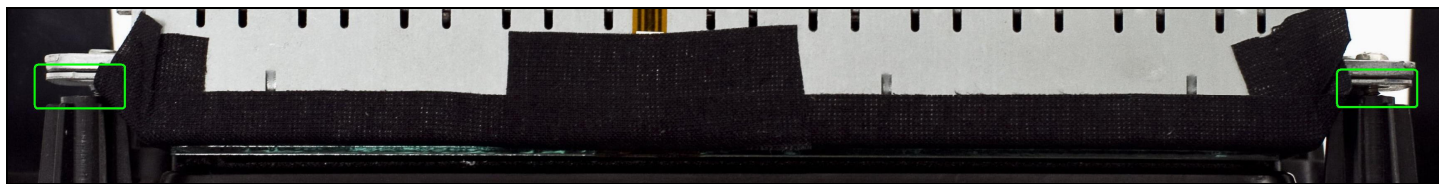


Figure 16

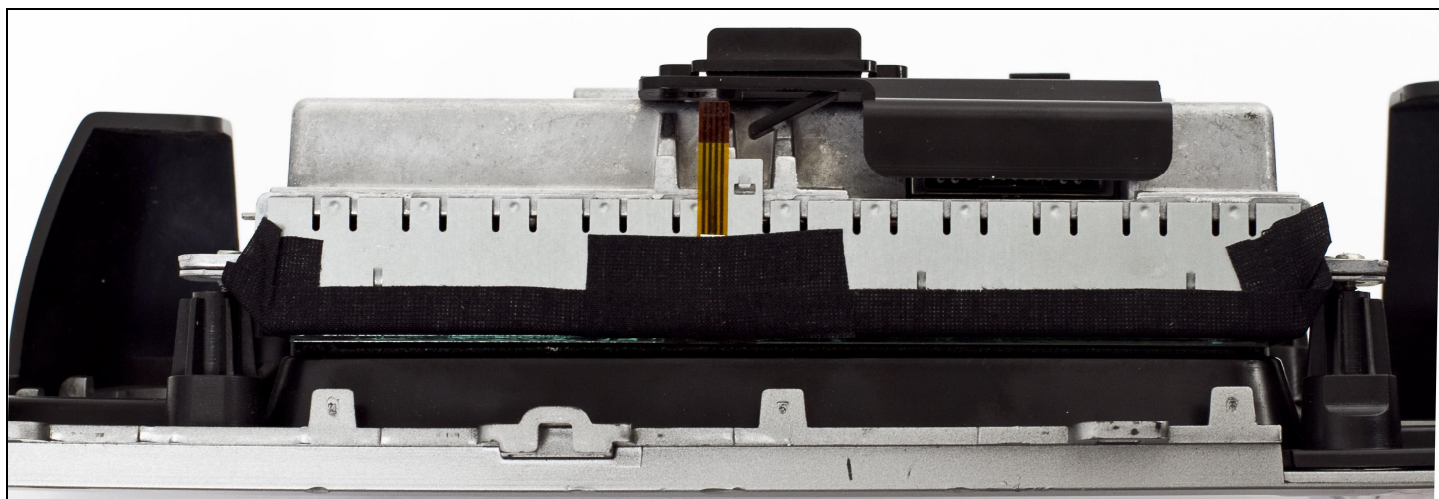


Figure 17

11. The end result should look like this: (Fig. 18)



Figure 18

12. The wire connection diagram for connecting a touch panel to the **CS9100** navigation block is shown below (**Fig. 19**).

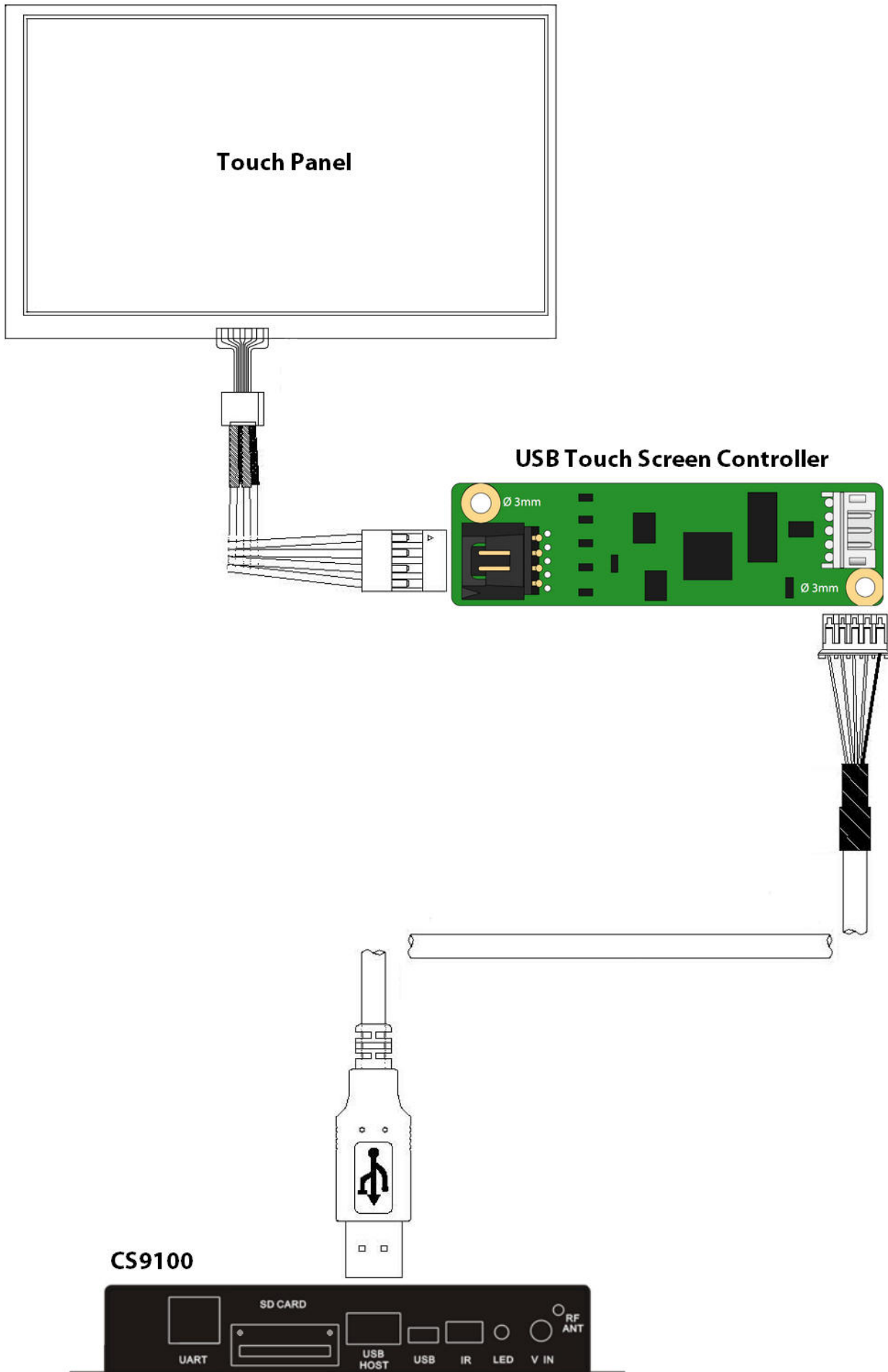


Figure 19

Touch Screen Calibration

You should calibrate the touch panel the first time you switch on the **CS9100** navigator or any other device, to which the touch panel is connected via the USB controller. To calibrate the touch screen for correct operation, do the following:

1. Use the remote control or mouse to enter **Settings** in the main menu (**Fig. 20**).
2. Click the **USB Touch** icon (**Fig. 21**).

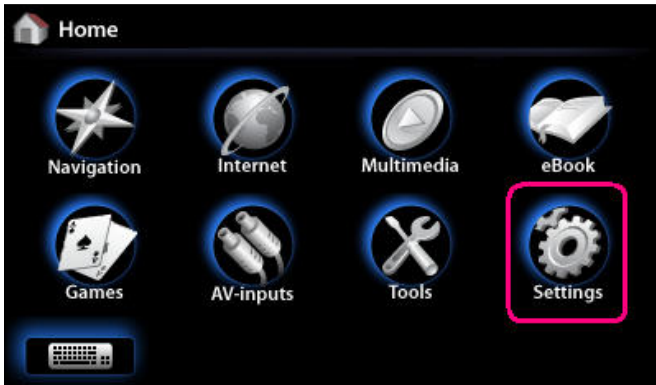


Figure 20



Figure 21

3. Make sure that **TUB1:** appears in the combo box (**Fig. 22**). If the combo box is empty (**Fig. 23**), check the connection between the USB controller and **CS9100**.

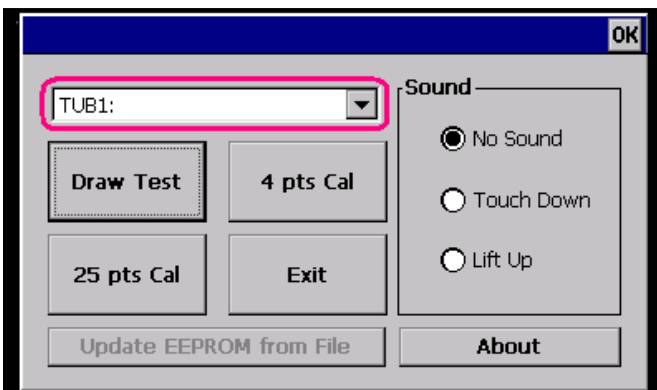


Figure 22

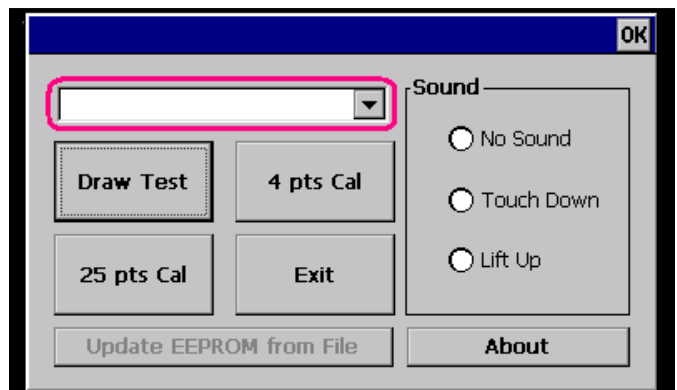


Figure 23

4. Choose calibration by **4 points** or **25 points** (**Fig. 25**).
5. A flashing **X** symbol will appear (**Fig. 25**). Press and hold the center of the symbol until a new one appears.

Note: We recommend you to calibrate the touch panel using a stylus or any other non-sharp object.

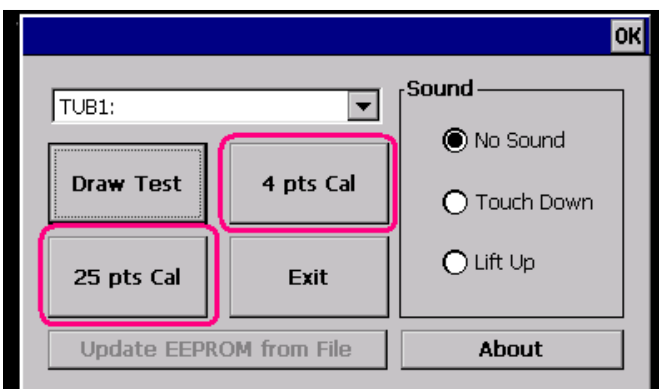


Figure 24

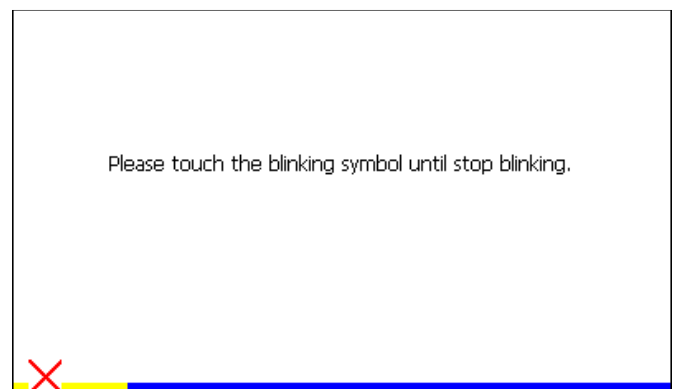


Figure 25