Fujitsu Resistive Touch Panels

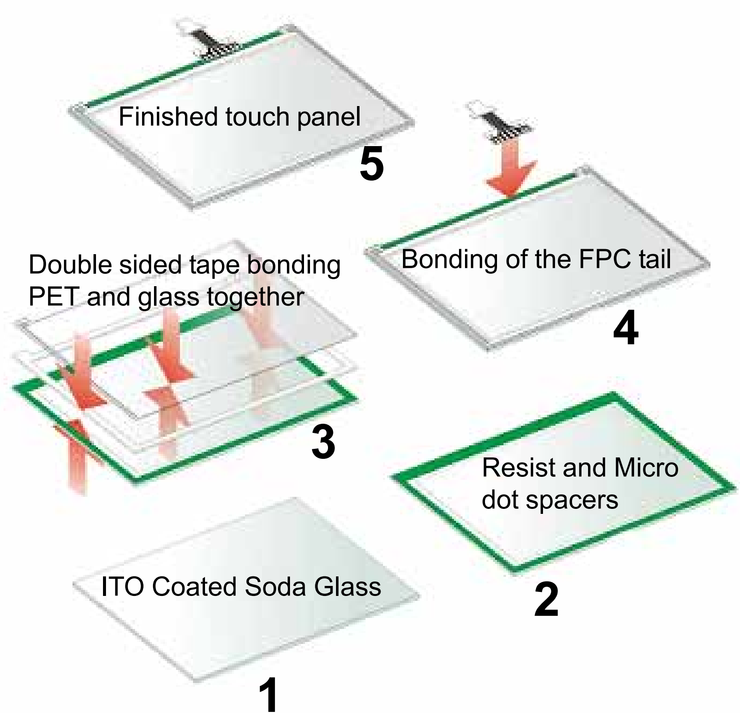
The Technology – 4-Wire Panels - How They Work

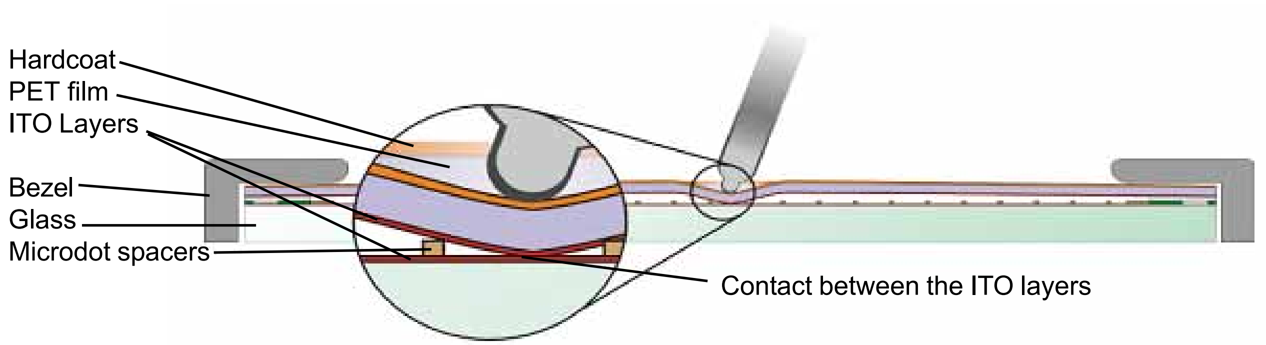
■ Construction Details

A resistive touch panel is made by sandwiching together ITO (Indium Tin Oxide) coated glass and PET (Poly Ethylene Terephthalate). The process is illustrated by pictures 1 through 5, opposite. The glass is for mechanical stability and the PET provides the flexible medium through which the two parts connect.

Microdot spacers separate the layers to avoid accidental input. The microdot spacers are printed onto the glass by a proprietary process, which allows precise control over dot size, height and density. Dot density determines the operation method from low-density finger to higher density pen-operation panels.

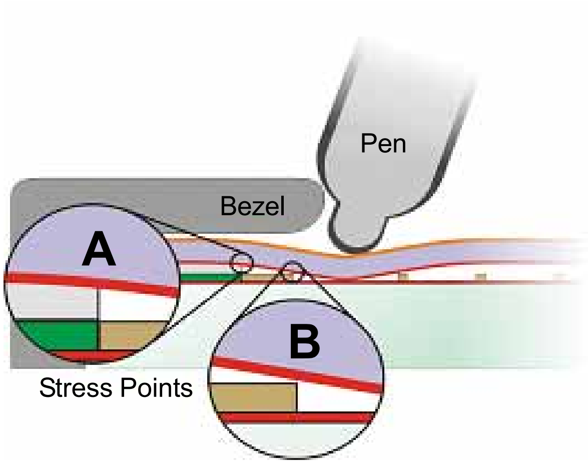
A slight positive air pressure in between the layers and a sealed construction prevents dirt and dust from entering the panel. Basic operation is shown in the exaggerated cross section below.

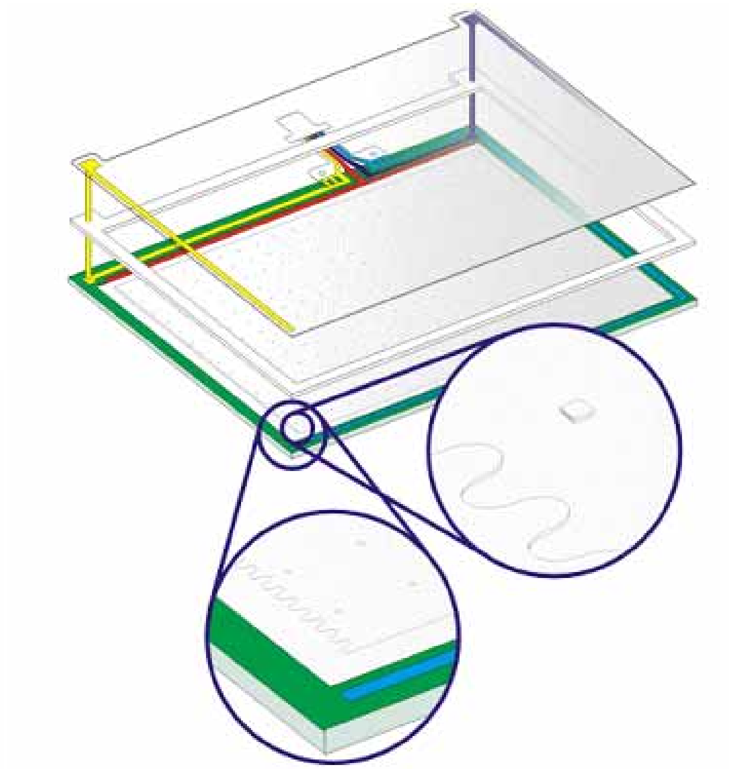




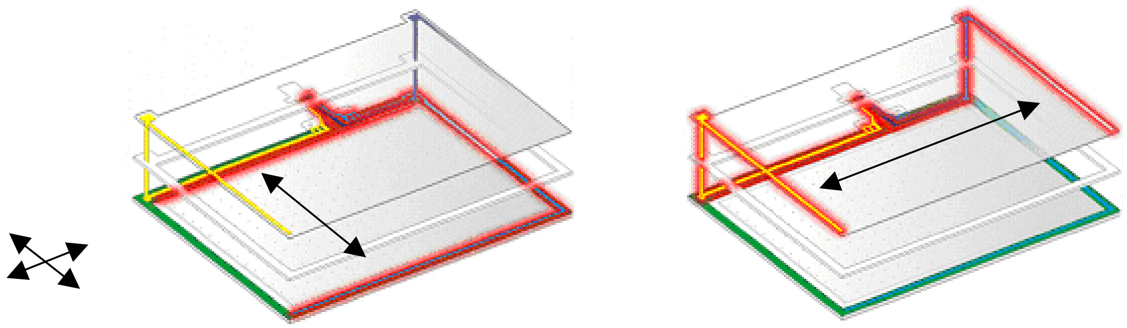
At the same time as the microdot spacers are created, an edge-life enhancement pattern is placed along the sides. This allows the panel to withstand more edge slide operations as the PET layer is cushioned when under stress from operation by a pen.

Point **(B)** prevents the angle of the film at point **(A)** from being too sharp against the sealing tape. Flexing of this point weakens the PET ITO and causes premature reliability issues on alternative lower quality designs.





■ How 4-wire panels work – in simple terms



Y measurements – Glass-based ITO circuit

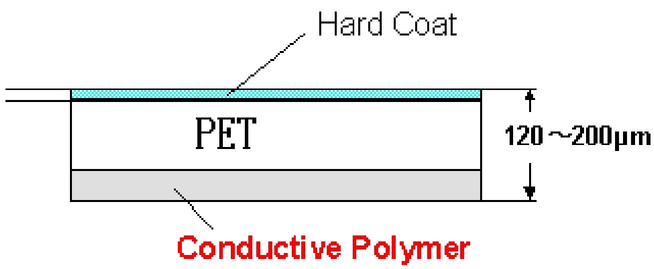
X measurements – PET-based ITO circuit

The above diagrams show how one ITO plane on the glass can be used to measure the voltage and find the point of touch in one direction. The ITO plane on the PET is used to measure the voltage and find the point of touch in a perpendicular direction. The Serial or USB decoder chip will then tell the system where the panel has been touched by measuring the voltages in each plane.

Fujitsu Components uses the best materials possible for optimal panel quality, but, regardless of this, the PET will eventually weaken over time and ITO degradation will occur, changing the resistance slightly. To counteract both these issues, Fujitsu developed the 7-wire panel, which provides 10x the reliability of the 4-wire while retaining all the design features of the 4-wire mentioned here.

Recently, Fujitsu announced that in 2006 it plans to begin producing touch panels using a pliable, transparent conductive polymer as the transparent electrode in place of the Indium Tin Oxide (ITO).

Transparent Film with Conductive Polymer



Able to withstand 200,000 pen inputs with no significant degradation or resistance changes, the new touch panels are more durable than those using ITO film. They are also less costly and more ecologically friendly to produce than ITO-film touch panels. Applications include cell phones, PDAs, tablet PCs, and other pen-based devices where longer life and higher reliability are required.

To produce the conductive polymer touch panels in sizes ranging from 2.9 to 17 inches, Fujitsu is developing a film coating process that is cost efficient and ecologically friendly. Using a roll coater, the liquid conductive polymer is combined with a water-based solvent and is applied to the PET film with very uniform thickness. This coating process eliminates the need for sputtered film and reduces production costs in high volume compared to ITO-film touch panels.

The new touch panels have similar conductivity and transparency properties as ITO-film touch panels. Using a patented, molecular-orientation technology, Fujitsu is able to produce the conductive polymer material with 93 percent transparency over the 400-700 nanometer spectrum.

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