



Extreme Touch

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Extreme Touch is Touch International's newest touch technology that can transform any transparent surface into a functioning touch screen, giving the designer the flexibility to choose any first surface material, including a window store front, table top, or bullet proof glass.

Theory of Operations

Extreme Touch works by sensing an electrical phenomenon called capacitance. Whenever two electrically conductive objects come near to each other without touching, their electric fields interact to form capacitance. The human finger is also an electrical conductor. When you place your finger on Extreme Touch's surface, a tiny capacitance is introduced between your finger and the transparency grid.

While there are a number of methods to measure capacitance, the one used in this technology is combination switching capacitor with delta-sigma modulator. The Capacitive Sensing using a Sigma-Delta Modulator provides capacitance sensing using the switched capacitor technique with a sigma-delta modulator to convert the sensing switched capacitor current to digital code.

The sensor array consists of combinations of independent sensors, sliding sensors, and touch pads implemented as a pair of orthogonal sliders. A separate shield electrode can be used for shielding the sensor array to reduce stray capacitance, providing more reliable operation in the presence of a water film or droplets.

Engineering Information

The Extreme Touch sensor consists of physical, electrical, and software components:

Physical - The physical sensor itself, typically two ITO films (X, Y) are attached to the back side of an overlay. The glass-glass ITO technology is under development.

Electrical - A method to convert the sensor capacitance to digital format. The conversion system consists of a sensing switched capacitor, a sigma-delta modulator, and a counter-based digital filter to convert the modulator output bit stream to a readable digital format.

Software - Detection and compensation software algorithms convert the count value into a sensor detection decision. In the case of sliding sensors or X-Y touch-pads, a calculation finds a position with greater resolution than the physical pitch of the sensors.

The Drivers

Extreme Touch can work with any mouse driver, but it performs the best with Touch International's driver. Then the touch screen reports not only the mouse-like motion of a finger, but also the absolute position of the finger on the touch screen surface as well as the amount of finger pressure. This driver uses the information to enhance the user interface in a variety of ways. Touch International has developed drivers for operating systems like Windows, Windows CE, Linux and others. Also, an API is available that allows the adaptation of our Extreme Touch into products such as cell phones, autos, medical devices, set top boxes, control panels, security systems, and remote controls.

How Extreme Touch differs from 5-wire Resistive Technology

The most common alternative to an Extreme Touch implementation is resistive technology. In a typical resistive touch screen, two layers of ITO-coated PET are separated by an air gap. When the screen is pressed, the top layer bends to make contact with the bottom layer. The point of contact can be calculated by placing a voltage gradient across the top ITO layer, and then measuring the voltage on the bottom layer.

Extreme Touch is optically simpler than the resistive touch panel. Touch International uses refractive index-matched adhesives; the lack of an air gap and spacer dots provide for fewer internal reflections. Absorption of light is also minimized because very thin ITO is used. In contrast, the physical stack-up of a resistive panel requires the use of an air gap, and steps must be taken to minimize the loss of light as it passes through layers with differing refractive indices.

The Advantages of Extreme Touch

There are some fundamental technical advantages to an Extreme Touch solution; it is completely solid state, with no moving parts and it has the durability of its rigid components, thus making it an extremely rugged solution. In contrast, resistive screens are physical switches that must flex and rub throughout their useful lifetime. Since Extreme Touch is simply a grid of transparent thin films, it can be made extremely thin, lightweight, flexible, or even transparent. Extreme Touch eliminates drift issues, while having extremely high resolution (depending on the surface materials used). Extreme Touch will operate with or without a pen option, due to its thinness, which also includes a contouring flexibility that is not found in any other touch screen. Because capacitance can be sensed through most materials, Extreme Touch designers can use almost any type of surface material. Capacitive sensing operates even when the sensor is placed underneath a durable surface, such as a polycarbonate or acrylic. In this situation, Extreme Touch has the environmental durability of its rigid overlay that allows Extreme Touch to function in environments where other technologies fail. Finally, the lack of critical spacing allows Extreme Touch to be molded onto curved surfaces. Because of these differences, Touch International's Extreme Touch technology allows designers to add inexpensive and simple touch sensing in applications that other technologies cannot approach.

Benefits

- **Wear Resistant** –The conductive coating is adhered to the second surface, therefore it is not subject to direct contact. Excellent moisture immunity and environmentally protected design.
- **Bacteria Resistant** – Resistant to bacteria such as E-coli and Staphylococcus aureu (Optional), tested for resistance to methyl alcohol, ethyl alcohol, toluene, acetone, benzene, etc.
- **Scratch Resistant** – Glass up to 9H, plastic up to 4h, depending on customer specifications.
- **Chemically Resistant** – Industrial corrosives, acidic beverages, and household cleaners.
- **Adheres to Curved or Contoured Surfaces.**
- **Outdoor Environment** – Shield electrode support for reliable operation in the presence of water film or droplets.
- **High Immunity to AC Mains Noise, EMC Noise, and Power Supply Voltage Changes.**

Specifications

Provided sizes	Up to 15” diagonal (available June 2007)
Material	Pure glass, Anti-glare and anti-reflective glass overlay.
Light Transmission	Up to 90%, 85% typical.
Input Method	Finger operational.
Voltage	12V DC
Communication	RS232C, USB
Thickness	Up to 5mm.
Supported Operating Systems	MS-DOS, Windows 95/98/2000, CE/ME/2000NT, OS/2, XP, Linux
Touch Durability Electrically	Infinity
Touch Durability Cosmetically	Infinity