

Touch Screens

Staying on Point in 2011 and Beyond

Michael Woolstrum, CEO

We Will Cover

Company Overview

- Company Snapshot

Touch Market Review

- Argument for Touch
- Touch in the Marketplace
- Touch Market Analysis

Touch Technologies & Products

- Surface Capacitive
- Resistive
- Projected Capacitive
- Display Enhancements



Company Overview

Company Snapshot

Who We Are

- 1200+ Employees Globally
- 7 World-Wide Manufacturing Facilities
- 5 Million Touch Screens per Year and Growing

What We Do

- Touch Screen Manufacturing
- Electronic Display Enhancements
- Custom Display Solutions for Any Application

Markets We Serve

- Military
- Medical
- Aerospace
- Retail
- Industrial



Touch Market Review

The Argument for Touch

Demand Is Increasing

- Consumers expect touch on every communication device

Touch Screens Help Lower Costs

- Self-service units reduce labor costs
- Low maintenance and easy to replace
- Allows for easy customization and upgrades
- Reduce waste and consume little energy

Promotes Ease of Use

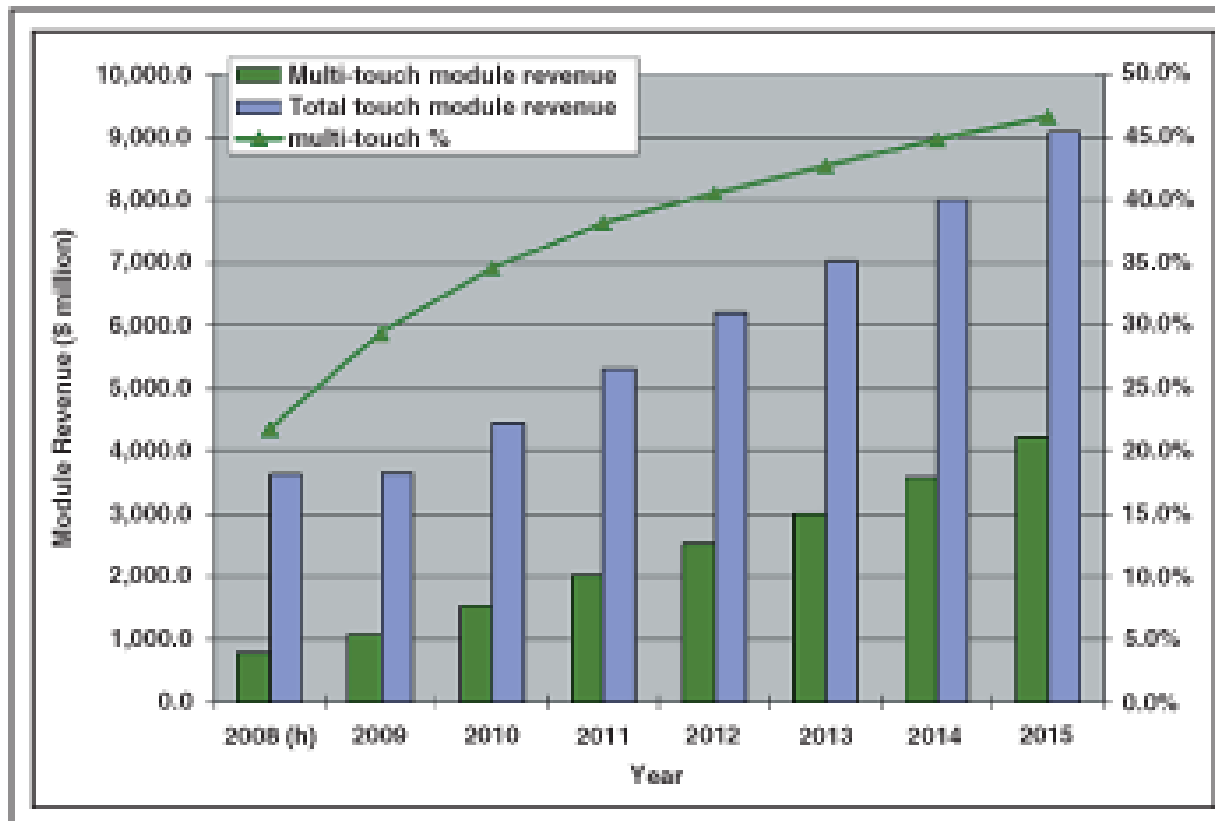
- Intuitive to use
- No peripherals required



Touch in the Marketplace

Touch Shipments and Revenue Forecast

- Shipments of touch screen modules (sensor + controller) expected to grow at compound annual growth rate (CAGR) of 17% to 1.4 billion units by 2015.
- Touch module revenue expected to grow at 14% CAGR to \$9 billion by 2015.



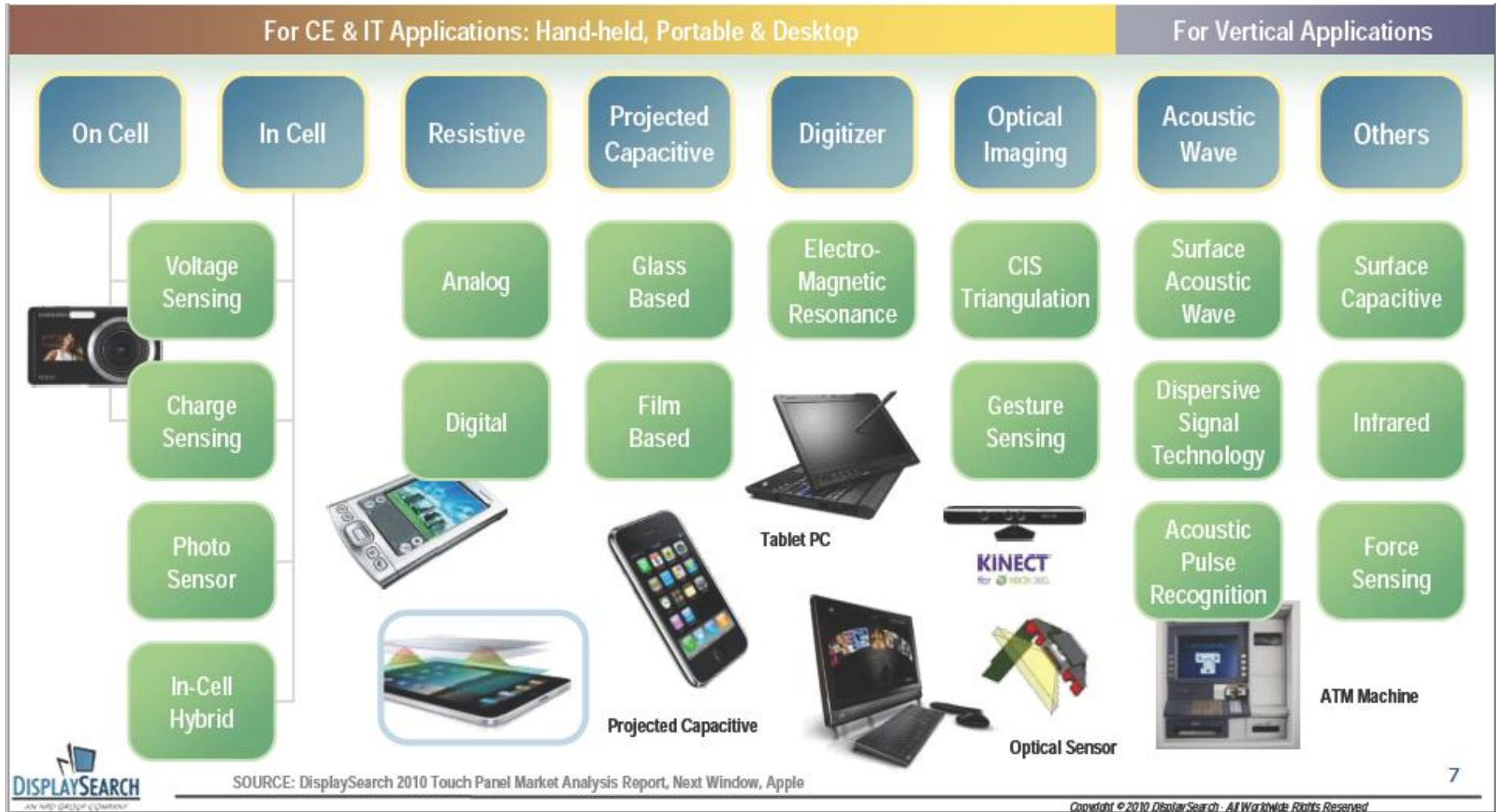
Touch in the Marketplace

Touch Technologies

- There are many competing touch technologies with no perfect solution.
- Few of today's touch technologies are used in high-volume applications.
- Resistive will retain 86% share of shipments through 2015.
- Projected capacitive will account for 50%+ of touch screen revenue through 2015.
- The iPhone optics have set a standard that must be met.
- Average touch panel selling price will increase 8% between 2007 and 2015; Increases in panel sizes and functionality mix will offset price declines for older panels.



Touch in the Marketplace



Touch Market Analysis

Applications

- Vertical applications have high margins; consumer electronics and IT are driving volume, cost and capacity.
- Growth in large format touch (>32") will be slow.
- Touch penetration in mobile phones is more than 30% and growing.
- Mobile phones will account for 34% and 21% of touch panel shipments and revenues respectively, through 2015.
- Both pen and finger input are gaining momentum, especially for consumer products.
- Displays for e-books and other portable units must be sunlight readable.



Touch Market Analysis

Complexity

- New technologies can create new applications.
- Application demands will sustain several technologies.
- Multi-touch software is in high demand due to multi-touch growth.



Source: Microsoft.com/surface

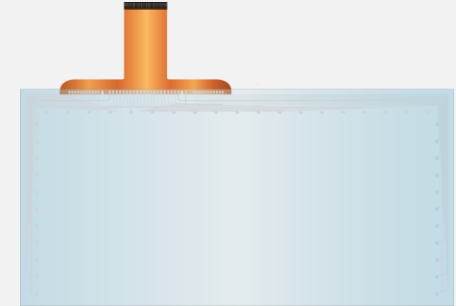


Touch Technologies & Products

Products and Services Overview



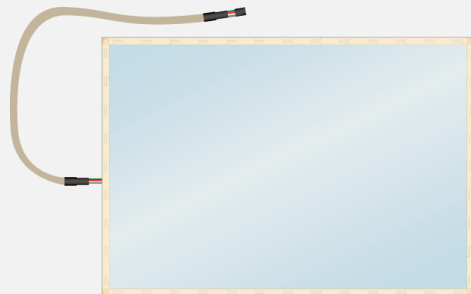
Analog Resistive



Projected Capacitive

Custom Solutions

Touch Screens
Controllers, Firmware
Display Enhancements
Value-Added Solutions



Surface Capacitive



Display Enhancements



Surface Capacitive Technology

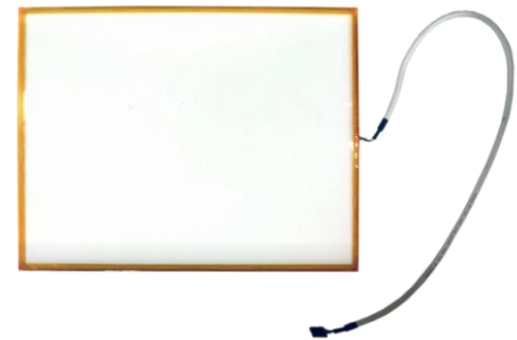
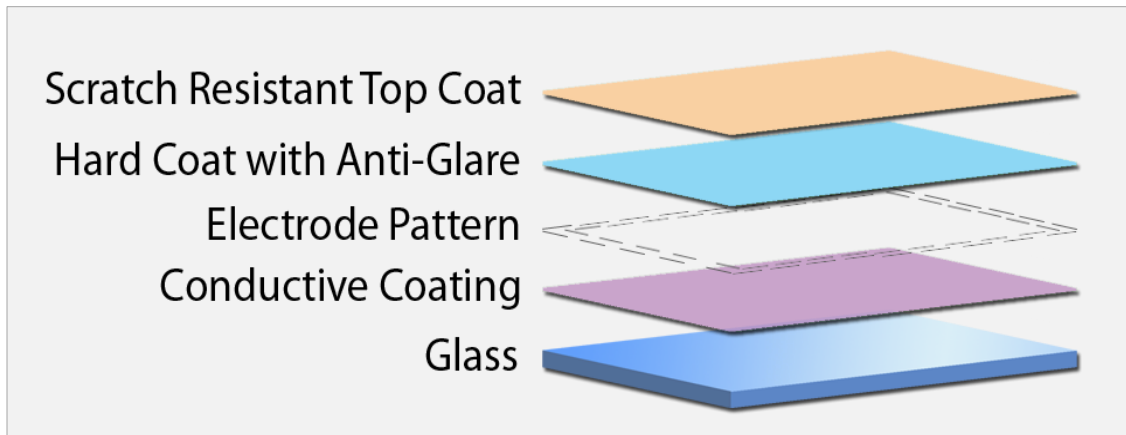
How Does It Work?

Capacitive technology works by sensing the electrical current from a person's finger, which interrupts the screen's electrostatic field, resulting in a touch.

Features & Characteristics

- Construction: Glass-Based (Typically)
- Available Curved or Flat

Typical Surface Capacitive Construction



Controllers

- Board & Chipset Solutions Available



Surface Capacitive Technology

Benefits to Using Surface Capacitive

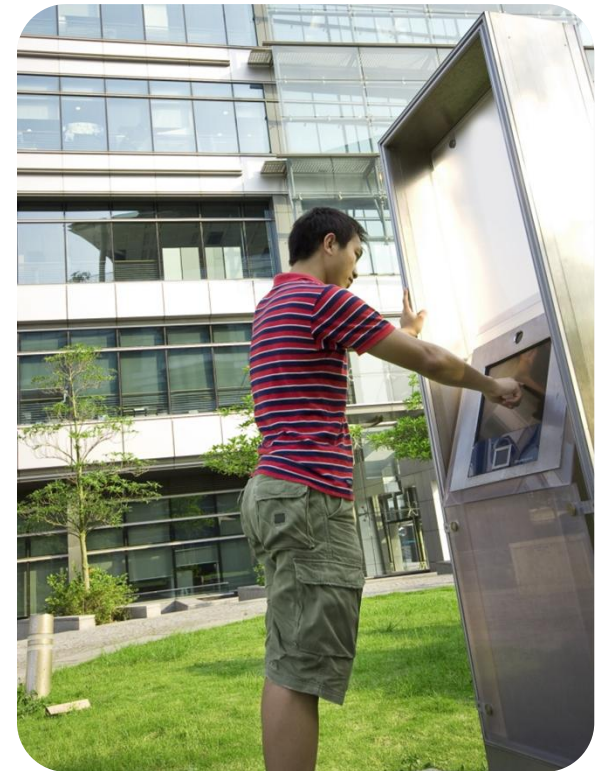
- Ideal for Public Access; High-Use Applications
- High Impact, Vandal and Scratch Resistant Glass
- High Display Image Transmission; No Air Gaps
- Unaffected by Moisture, Rain or Temperature

Disadvantages

- Limited to Finger Input
- Requires Periodic Recalibration
- Susceptible to Electromagnetic Interference

Applications

- Banking ATMs
- Self-Serve Kiosks
- Vending Machines
- Digital Slot Machines



Resistive Technology

How Does It Work?

With resistive technology, a touch occurs when a finger touches the surface and the top two conductive layers come in contact with each other and close the electrical circuit (this is called pressure sensing).

Traditional Resistive Products

- 4-Wire
- 5-Wire
- 8-Wire

Features & Characteristics

- Construction: Film on Glass
- Can be Designed 'Backwards Compatible'

Controllers

- Many Options on Market; I/C & Logic Built into Off-the-Shelf Micros & A/D Converters

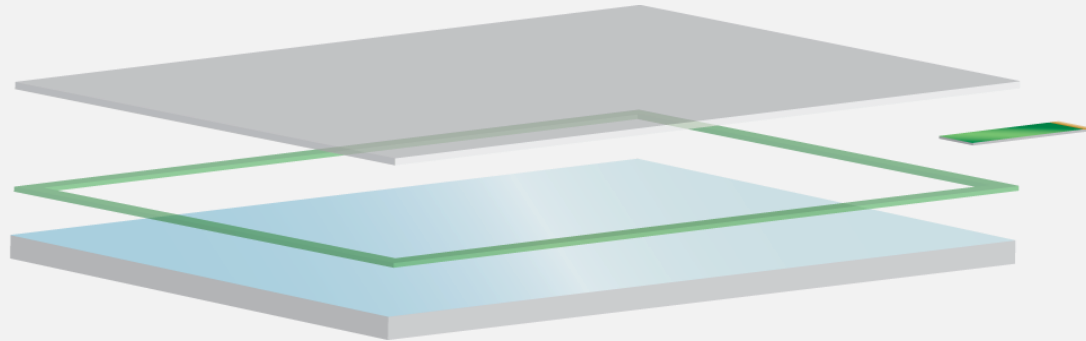


Resistive Technology

2 Common Resistive Configurations

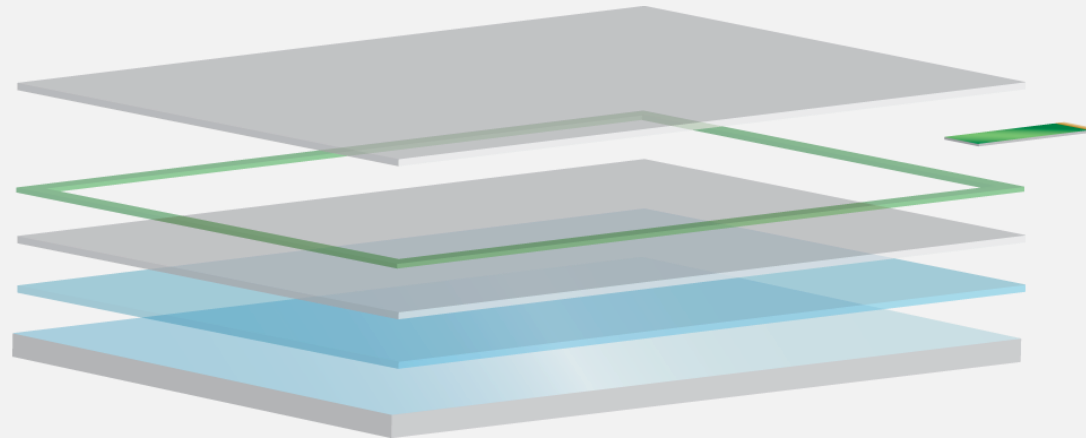
Film/Glass

Polyester Top Circuit
Tail
Inner Adhesive Gasket
Glass



Film/Film/Glass

Polyester Top Circuit
Tail
Inner Adhesive Gasket
Polyester Bottom Circuit
Optical Adhesive
Glass



Resistive Technology

Benefits to Using Resistive

- Low Cost Solution
- Low Power Consumption
- Not Affected by Dirt, Water, Light and Most EMI Noise
- Works with Finger, Glove and Any Pointing Device



Disadvantages

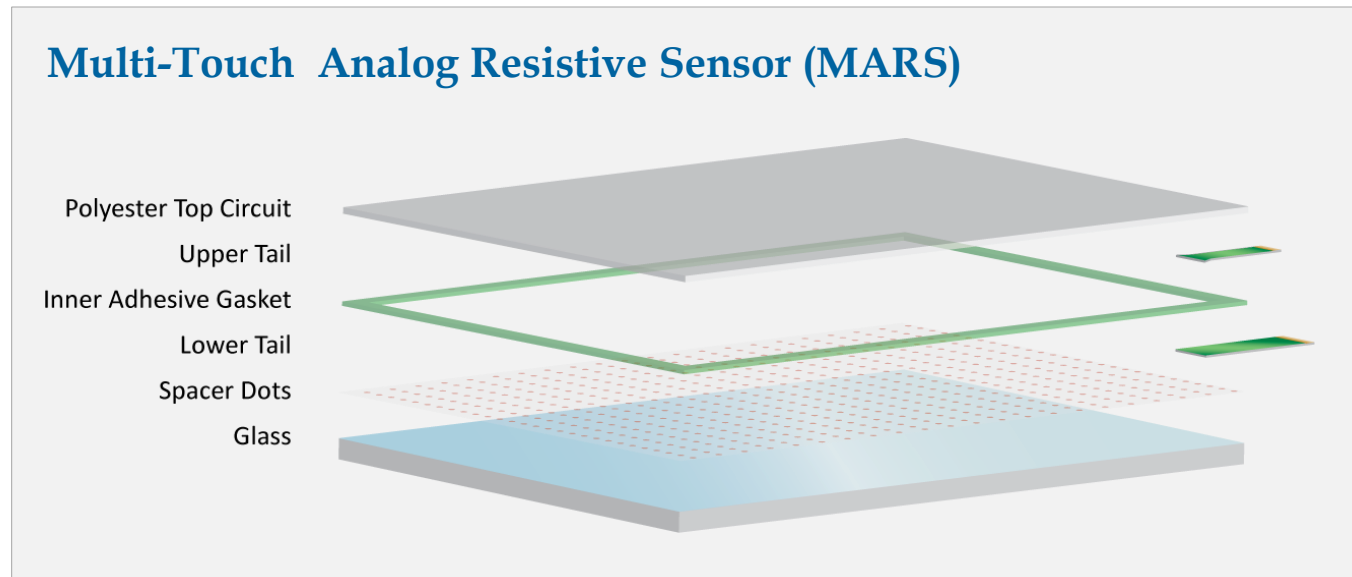
- Plastic “Face” is Not as Durable as Other Technologies
- Lower Transmittance and Overall Optical Quality
- Requires Periodic Recalibration

Applications

- Medical Instruments
- Industrial Automation
- Handheld Military Systems
- Signature Capture Devices

Multi-Touch Resistive Technology

Multi-Touch Analog Resistive (MARS) is most recent addition to resistive technology.



Like traditional resistive technology, MARS is pressure sensing; however the coordinates are scanned like projected capacitive.

Features & Characteristics

- Construction: Film on Glass
- Multi-Touch Capable
- Flexible Design Capabilities

Controllers

- Board & Chipset Solutions Available



Multi-Touch Resistive Technology

Benefits to Using Multi-Touch Resistive

- Low Power Consumption
- Not Affected by Dirt, Water, Light & Most EMI Noise
- Works with Finger, Glove & Any Pointing Device
- Drift Free Coordinates with No Recalibration



Disadvantages

- Plastic “Face” is Not as Durable as Other Technologies
- Lower Transmittance and Overall Optical Quality

Applications

- Cockpit Displays
- Medical Instruments
- Signature Capture Devices
- Military Navigation Systems



Projected Capacitive Technology

The advent of the iPhone has ushered in a seismic change in the touch screen business by popularizing projected capacitive touch technology.

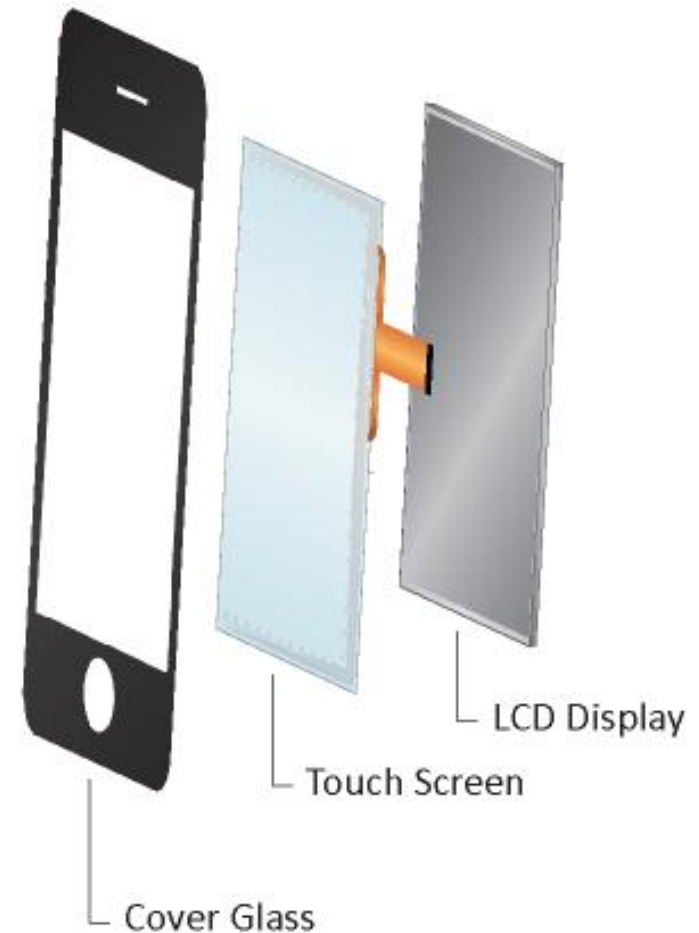
Projected capacitive incorporates the best of competing technologies.

Features & Characteristics

- Construction: Glass, Film or Both
- Multi-Touch Capable
- Flexible Design Capabilities
- Often Has a Cover Glass Layer

Controllers

- Board & Chipset Solutions Available



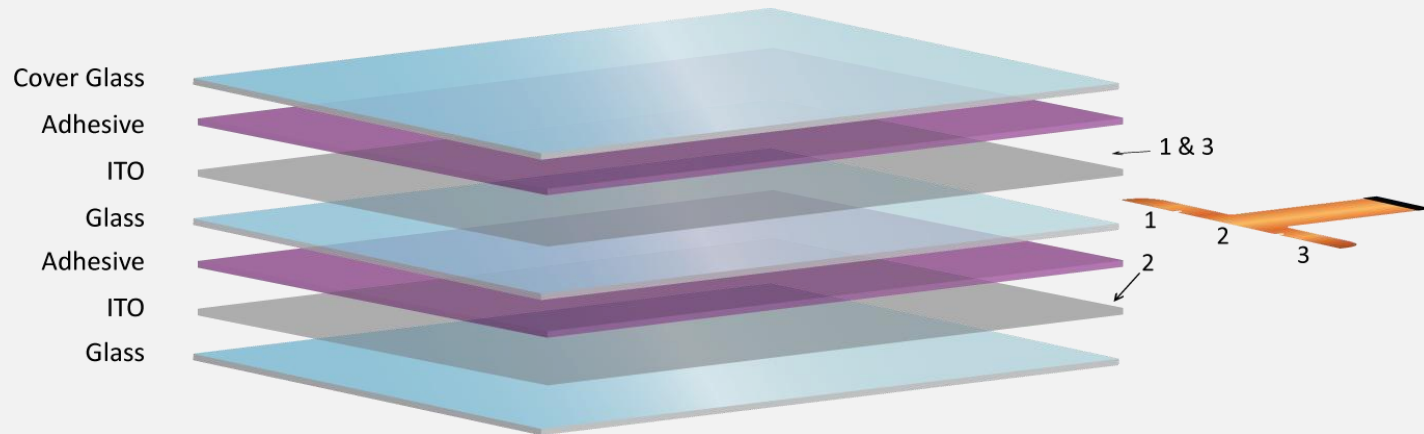
Apple iPhone Example



Projected Capacitive Technology

Our most recent addition to projected capacitive technology is Multi-Touch.

MULTI-Touch Projected Capacitive Sensor



Projected Capacitive Technology

Benefits to Using Projected Capacitive

Top four benefits

- Long Life
- Excellent Optical Properties
- Multi-Touch Capable
- Ease of Integration

Additional Benefits

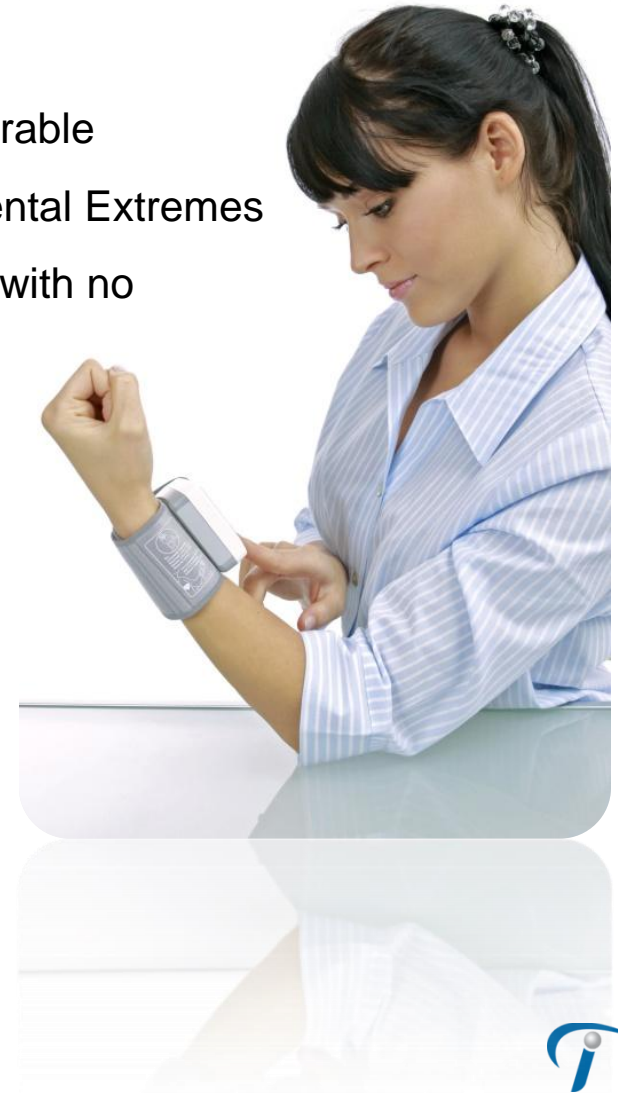
- Highly Reliable and Durable
- Operates in Environmental Extremes
- Drift Free Coordinates with no Recalibration

Disadvantages

- Higher Cost
- Does not Work with all Glove or Stylus Inputs
- Sizes Larger than 22" are Expensive to Build

Applications

- Medical Instruments
- Retail Signature Capture
- Industrial Instrument Panels
- Aerospace Entertainment System



Touch Screen Controllers

Touch International offers controller & chipset solutions for any project.

Resistive

- 4-Wire
- 5-Wire
- 8-Wire

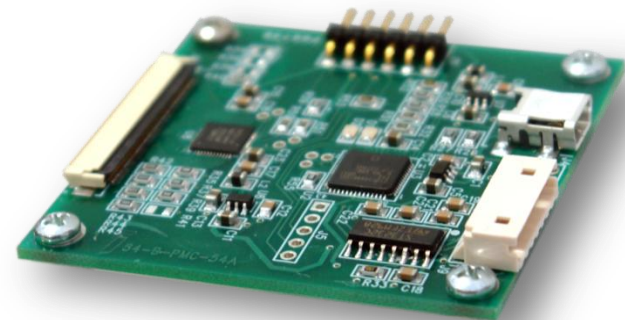
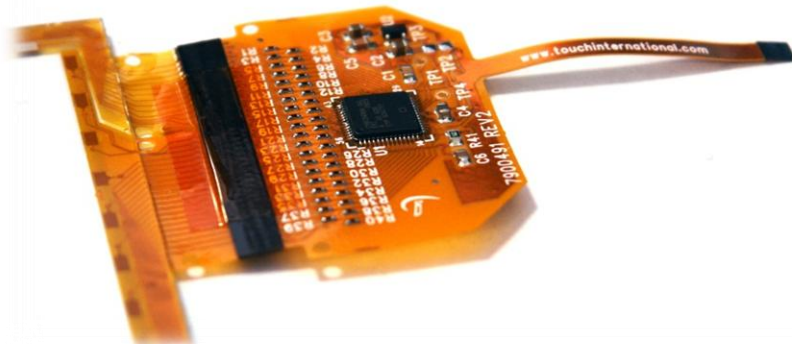
Projected Capacitive

- Self Capacitance (Ghosting)
- Mutual Capacitance (No Ghosting)

Surface Capacitive

Advantages of Chip-on-Flex vs. PCB

- Requires less space to integrate.
- Easy to Upgrade – To upgrade PCB controllers, the entire controller must be replaced. However, with chip on flex, only the chip needs replaced.



Display Enhancements

Display Enhancements

Touch Screen + Integrated Enhancements = Total Display Solution

Integrating Display Enhancements

- Conquers Environmental Challenges
- Improves Performance
- Extends Display Life

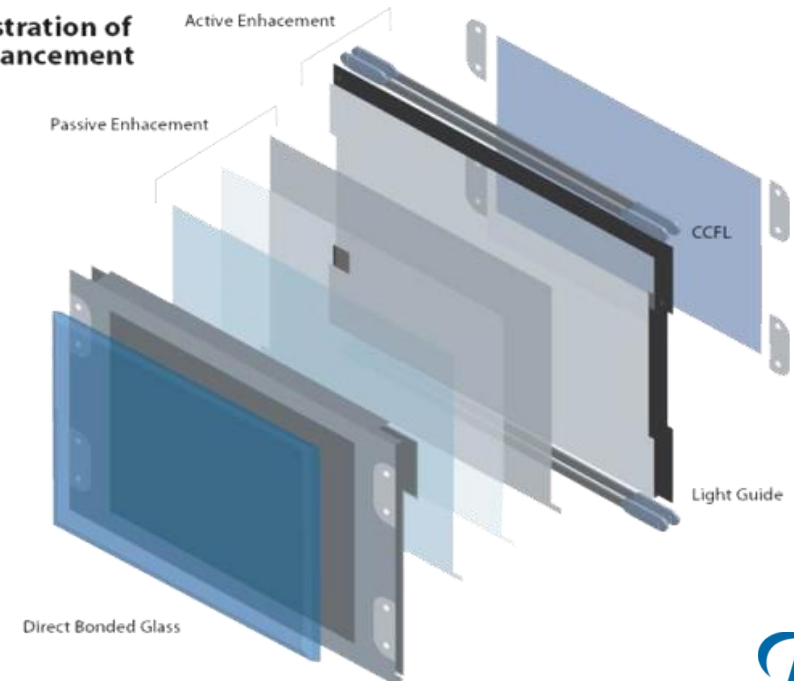
Specialized Applications

- Military
- Medical
- Aerospace

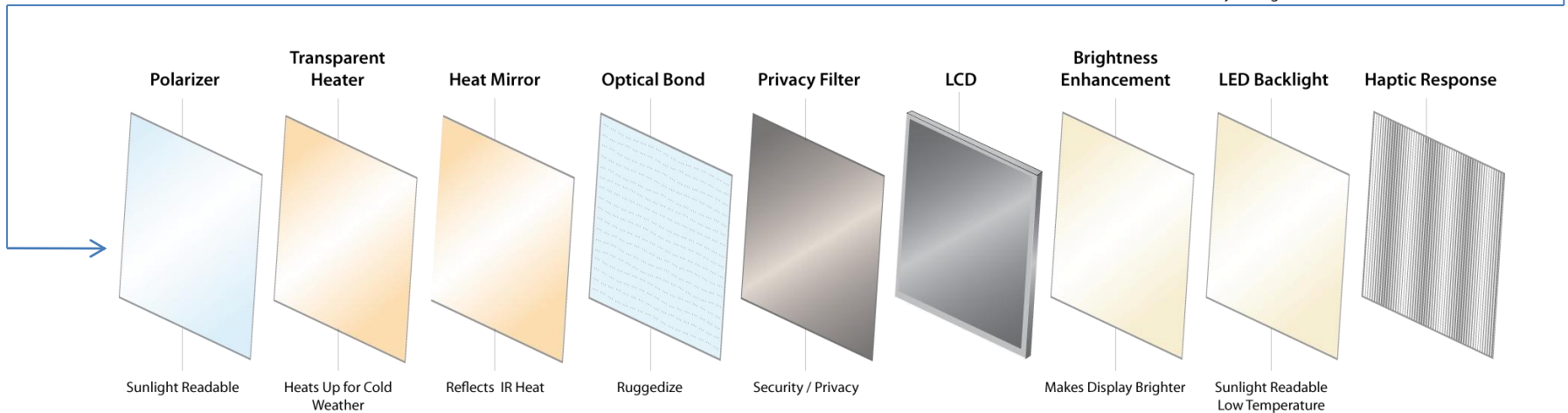
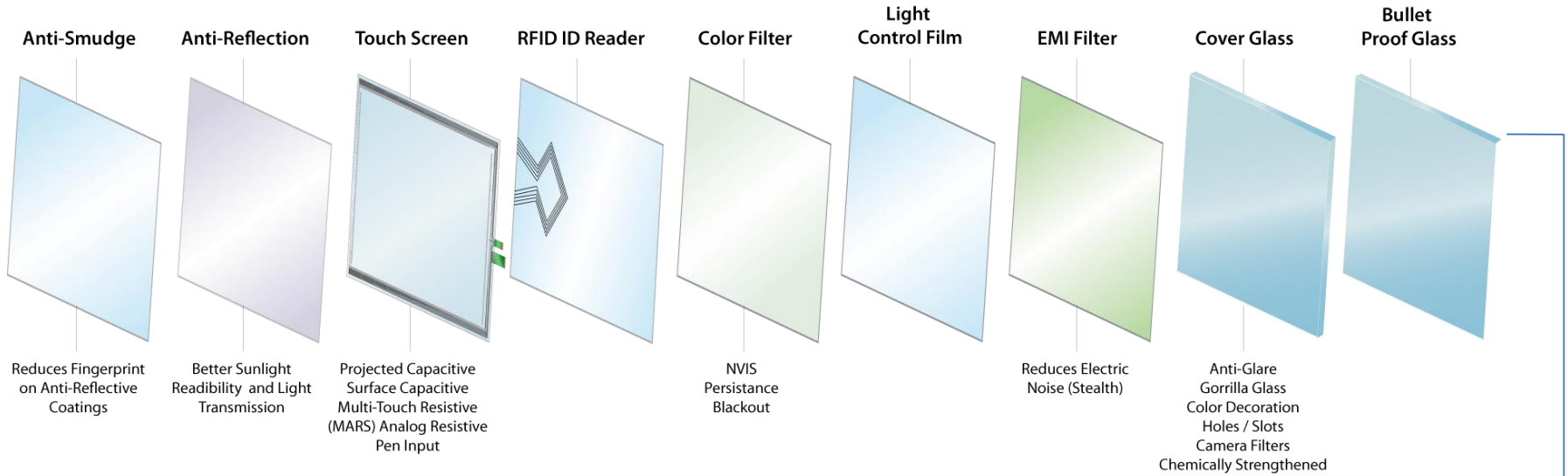
Enhancements Improve

- Optical Performance
- Mechanical Durability
- EMI/RFI Emissions
- Thermal Operating Ranges

Illustration of Enhancement



Display Enhancements



Q & A