



The Future of Touch Technology

Geoff Walker
NextWindow
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Agenda



- Introduction
- Touch in mobile devices 2" – 17"
- Touch in stationary enterprise applications 10" – 30"
- Touch in stationary consumer applications 15" – 30"
- Touch in large-format >30"
- Conclusions



About NextWindow



□ NextWindow

- ◆ Develops & manufactures optical touchscreens
- ◆ Currently focused on two touch-screen markets
 - ✓ Windows-7 consumer monitors and all-in-one computers
 - ✓ Large-format display applications such as interactive digital signage
- ◆ Global presence
 - ✓ New Zealand (HQ), Singapore (Ops), USA, Taiwan, Korea, Japan
 - ✓ Manufacturing in China, Thailand and Malaysia
 - ✓ 120 employees, 55 in engineering
- ◆ Brief history
 - ✓ 2000: Founded by CTO and private investors
 - ✓ 2003: First product to market (optical touch for large displays)
 - ✓ 2005: Entered USA market
 - ✓ 2006: First major volume contract signed (HP TouchSmart AiO)
 - ✓ 2008: Entered Taiwan market with ODM focus
 - ✓ 2009: Engaged with many PC OEMs & ODMs on Win-7 products
 - ✓ 2010: Acquired by SMART Technologies

Is Touch Really Just About Mobile Phones?



Is this all there is?

Is touch really all about **200M** mobile phones and everything else is more or less irrelevant?

No! Touch Is Spreading Everywhere



□ Touch was everywhere at the 2010 CES show (USA)

- ◆ There seemed to be a built-in assumption that all consumer devices should be touch-enabled



Mobile Devices 2” – 17”



□ Touch technology choices for mobile

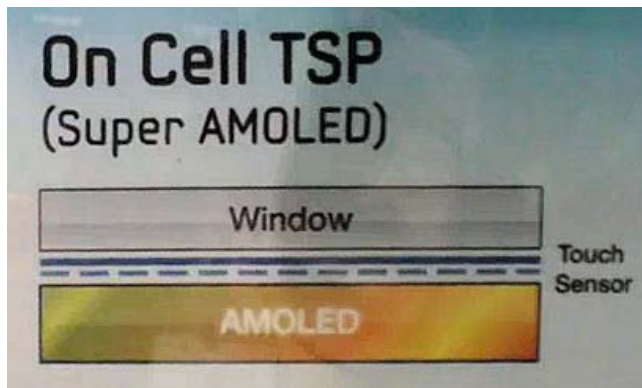
- ◆ Analog resistive
- ◆ Projected capacitive (p-cap)
- ◆ Analog multi-touch resistive (maybe)

□ NextWindow believes that P-cap is going to win the race

- ◆ DisplaySearch (market research firm) is forecasting that p-cap revenue will exceed analog resistive revenue this year
 - ✓ DisplaySearch says p-cap revenue in 2009 was \$1.3B
- ◆ Most mobile device makers are experimenting with p-cap
 - ✓ Apple iPad continues the trend started with the iPhone

Even AM-OLED Phones Are Going to P-Cap!

- ❑ **Samsung S8500 Wave mobile phone with Super OLED uses on-cell p-cap touch (Feb. 2010)**
 - ◆ 3.3-inch 800x480 (283 ppi) AMOLED
 - ◆ “Super OLED” is Samsung’s strange branding for on-cell touch



Source: Samsung booth graphic at Mobile World Congress 2010



Source: Samsung

Why P-Cap?



❑ **Multi-touch**

- ◆ Apple made it a requirement

❑ **Durability**

- ◆ Glass top surface

❑ **Optical performance**

- ◆ Only 3% light loss

❑ **Light touch**

- ◆ Zero pressure

❑ **Flush top surface**

- ◆ Zero bezel

❑ **Stylus**

- ◆ Cypress has announced 1 mm stylus for p-cap!

The War Is Over In Mobile



ALFRED EISENSTADT
"I Kissed Her" at Times Square, New York City, 1945

The LIFE Picture Collection

**P-Cap
Has
Won!**

Question #1



Do you agree that
p-cap is the future
of mobile touch?



What About Stationary Devices?



❑ For stationary devices 10” – 30” in enterprise applications

◆ NextWindow believes that multiple touch technologies will continue to dominate for a combination of application, technical and business reasons

- ✓ Kiosks = SAW or surface capacitive
- ✓ Casino gambling = Surface capacitive
- ✓ Point of sales (POS) = 5-wire resistive or infrared
- ✓ Industrial control = 5-wire resistive
- ✓ Outdoor device control = projected capacitive
- ✓ Etc.

(There is no perfect touch technology!)



Consumer Applications 15” – 30”



- ❑ **NextWindow believes that optical touch will remain dominant in stationary consumer applications 15” – 30”**
 - ◆ What, you didn't know that optical is already dominant?
 - ✓ It's in 95% of consumer All-in-One (AiO) touch computers and touch monitors, and those are the only products that are touch-enabled for stationary consumer applications >15”

Examples



HP



Medion



NEC



Sony



Dell



Lenovo



13 Touch Technologies



- 1 – Analog Resistive
- 2 – Analog Multi-Touch Resistive (AMR)
- 3 – Surface Acoustic Wave (SAW)
- 4 – Traditional Infrared (IR)
- 5 – Waveguide Infrared (from RPO)
- 6 – Surface Capacitive
- 7 – Projected Capacitive (P-Cap, including on-cell)
- 8 – Optical
- 9 – Acoustic Pulse Recognition (APR from Elo)
- 10 – Dispersive Signal Touch (DST from 3M)
- 11 – Embedded (in-cell optical/voltage/charge-sensing)
- 12 – Vision-Based (like Microsoft Surface)
- 13 – Force Sensing (no current supplier)

Touch Technology Requirements for Windows-7 AiOs & Monitors...1



❑ Multi-touch (Windows-7 logo)

- ◆ Analog Resistive, Surface Capacitive, Acoustic Pulse Recognition (APR from Elo), Dispersive Signal Technology (DST from 3M) & Force-Sensing
 - ✓ **Disqualified:** No multi-touch

❑ Size range 15” – 30”

- ◆ Waveguide IR (from RPO)
 - ✓ **Disqualified:** Too small
- ◆ DST
 - ✓ **Disqualified:** Too big

❑ Touch-and-hold

- ◆ APR & DST
 - ✓ **Disqualified:** No touch-and-hold

Touch Technology Requirements for Windows-7 AiOs & Monitors...2



❑ Low profile

◆ Vision-Based

✓ **Disqualified:** Too thick (projection only)

❑ Shipping in high volume (> 500K)

◆ Waveguide Infrared, Force-Sensing

✓ **Disqualified:** Not in volume production

◆ Embedded touch

✓ **Disqualified:** Embedded in >15" AiOs & monitors is unlikely to be shipping in high volume even 3 years from now



What's Left?



- Optical**
- Projected Capacitive (P-Cap, including on-cell)**
- Analog Multi-Touch Resistive (AMR)**
- Surface Acoustic Wave (SAW)**
- Traditional Infrared (IR)**



Why Optical?



❑ **Lowest cost multi-touch**

- ◆ Multi-touch is a definite requirement

❑ **Most scalable**

- ◆ Increase size just by increasing retro-reflector length

❑ **Touch with any object**

- ◆ Unlike p-cap's finger-only touch
- ◆ Object size recognition

❑ **High durability**

- ◆ Plain glass touch surface

❑ **High optical performance**

- ◆ No coatings to wear out or scratch

❑ **And more...**

Desktop Touch Technology Comparison



Characteristic	Optical	P-Cap	SAW	AMR	IR
Size range 17" – 25"	H	M	H	M	H
→ Touch with any object	H	L	L	M	H
Light touch	H	H	L	M	H
Multi-touch	M	H	M	H	M
→ Object size recognition	H	H	L	M	L
Fast response and drag	H	H	H	H	M
Low profile (flush surface)	M	H	M	H	L
→ High durability	H	H	H	L	H
→ High optical performance	H	M	H	L	H
Narrow border width	H	H	L	M	L
Insensitive to EMI & RFI	H	L	H	H	H
Easy integration	H	M	M	H	H
→ Low cost	H	L	M	H	L
Shipping in high volume	H	L	M	L	H
Simple sensor manufacturing	H	L	M	L	M
High MTBF	H	H	M	H	L
Multiple sources	H	H	L	M	H

H = High (Best) **M** = Medium (OK) **L** = Low (Worst)

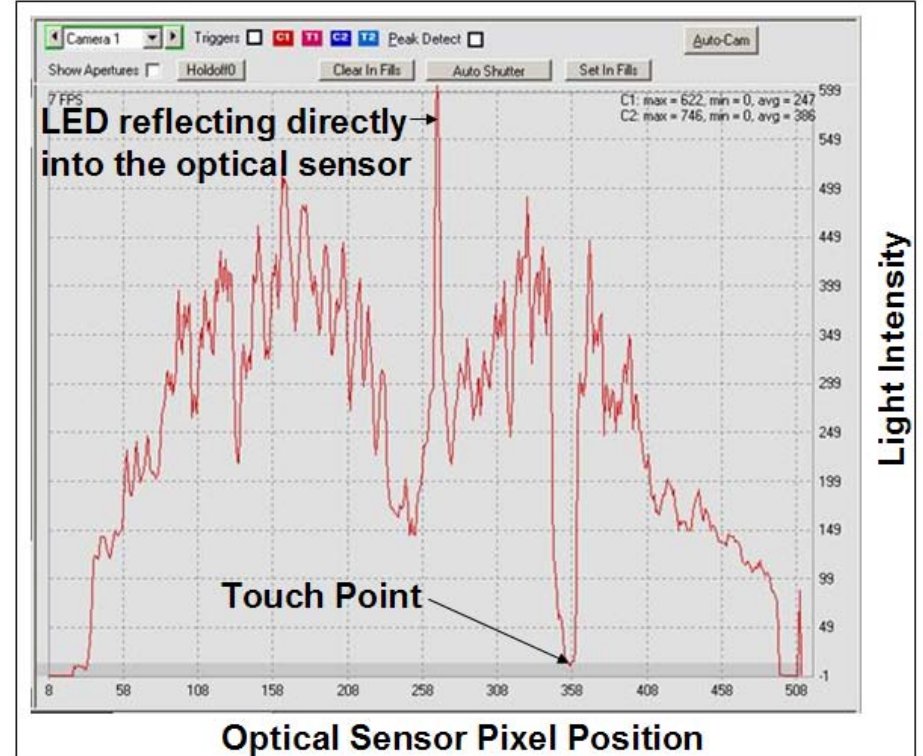
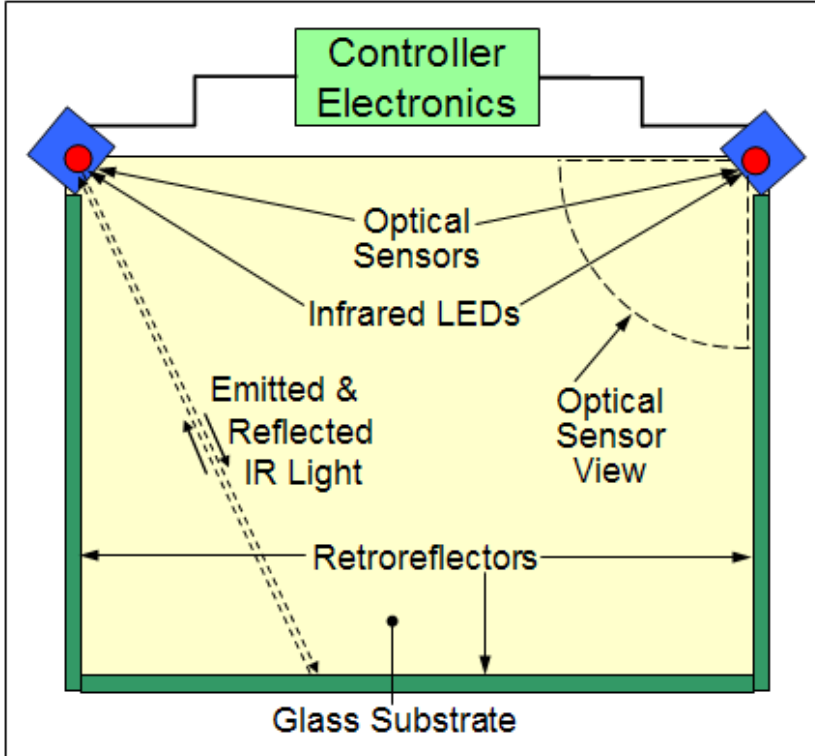
Question #2



Do you agree that optical is the future of 15" – 30" stationary consumer touch?



How Optical Touch Works



What About Large-Format (>30")?



☐ >30 inches

- ◆ Analog Resistive, Analog Multi-Touch Resistive, Surface Capacitive, Waveguide IR (from RPO), Embedded

✓ **Disqualified:** Too small

☐ Low profile

- ◆ Vision-Based

✓ **Disqualified:** Too thick (projection only)

☐ Likely to be available in 3 years

- ◆ Force-Sensing

✓ **Disqualified:** No current supplier; three failures so far



What's Left?



- Optical**
- Traditional Infrared (IR)**
- Projected Capacitive (P-Cap, with wires on film)**
- Surface Acoustic Wave (SAW)**
- Acoustic Pulse Recognition (APR from Elo)**
- Dispersive Signal Technology (DST from 3M)**



Why Optical?



❑ Scalable to >100 inches

- ◆ No added components in larger sizes, unlike infrared

❑ Lowest cost

- ◆ Most economical large-format touch-screen solution

❑ Multiple suppliers

- ◆ Unlike single-source APR & DST

❑ High optical performance

- ◆ No visible wires like in projected capacitive film
- ◆ Uses common soda-lime glass, unlike SAW's boro-silicate

❑ Touch with any object

- ◆ Unlike soft touch-object required by SAW

❑ And more...



Large-Format Touch Technology Comparison



Characteristic	Optical	IR	P-Cap (Film)	SAW	APR	DST
→ Touch with any object	H	H	L	M	H	H
Touch with a small object	M	L	L	M	H	H
Light touch	H	H	H	L	M	H
No unintended touch	M	L	H	H	H	H
Multi-touch	M	M	M	L	L	L
Touch-and-hold	H	H	H	H	L	L
Object size recognition	H	L	M	L	L	L
Measures Z-axis	M	L	M	H	L	L
→ High optical performance	H	H	M	H	H	H
Flush surface (low profile)	M	L	H	M	H	H
Resistant to contaminants	M	M	H	L	H	H
Insensitive to EMI and RFI	H	H	L	H	H	H
Insensitive to ambient infrared	M	M	H	H	H	H
Works with plastic substrate	H	H	H	L	L	L
→ Low cost	H	L	L	M	M	L
→ Scalable	H	L	M	M	H	H
Simple sensor manufacturing	H	M	L	M	H	H
High MTBF	H	L	M	M	H	M
→ Multiple sources	H	H	H	H	L	L

Page 25 **H** = High (Best) **M** = Medium (OK) **L** = Low (Worst)

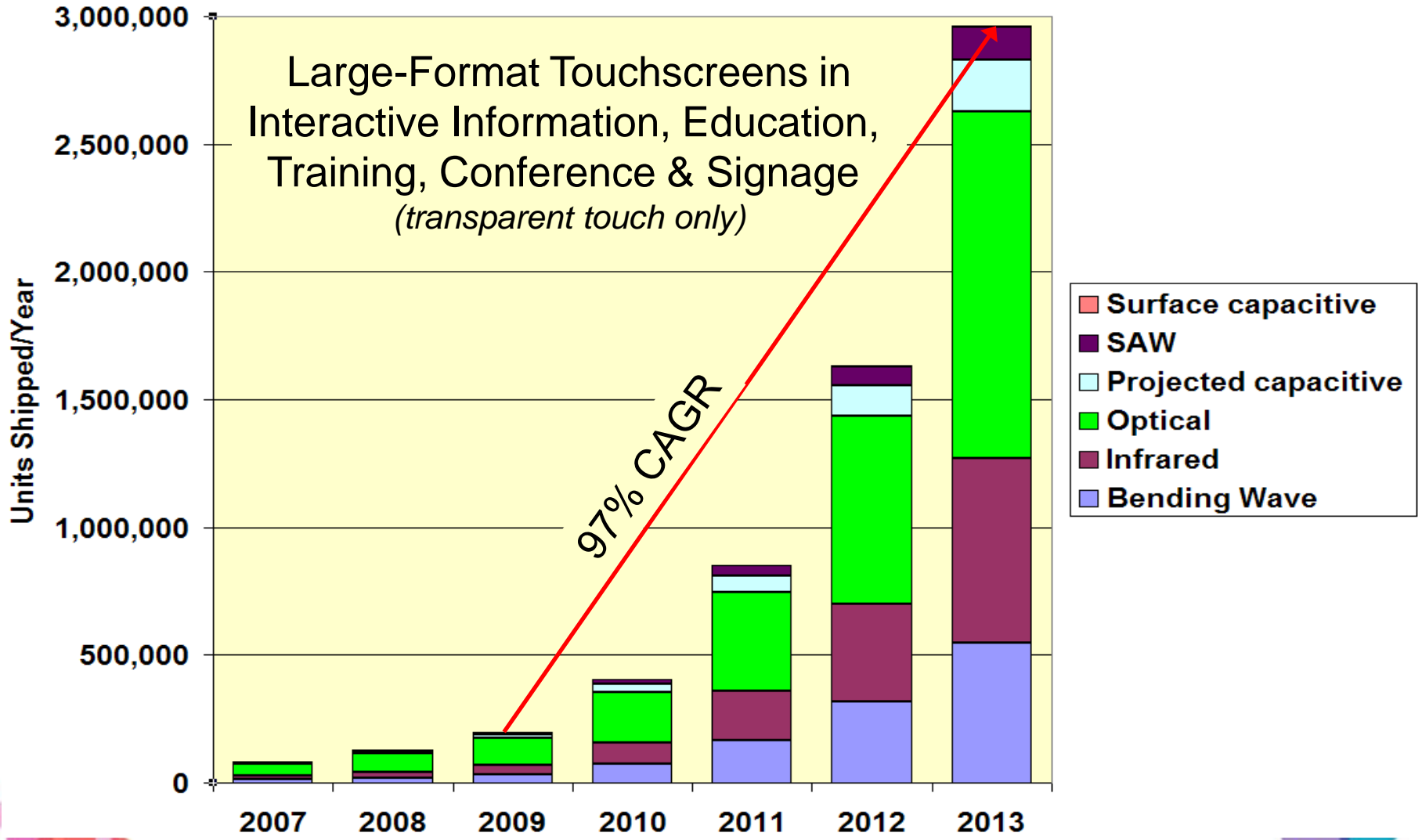
Question #3



Do you agree that
optical is the future
of large-format touch?



Large-Format Forecast



Conclusions



- ❑ **P-cap will dominate in mobile devices up to 17”**

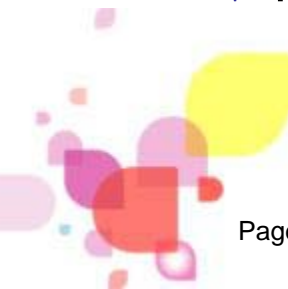
- ◆ It's already started

- ❑ **Optical will dominate in the stationary consumer 15” – 30” segment**

- ◆ Lowest cost multi-touch
- ◆ Most scalable
- ◆ Most full-featured technology

- ❑ **Optical will dominate in the large-format >30” segment**

- ◆ Lowest cost
- ◆ Most scalable



Suggestion #1



Come see the future
of touch at NextWindow
in Booth B019!





Thank You!



Geoff Walker
Marketing Evangelist & Industry Guru
NextWindow
7020 Koll Center Parkway, Suite 138
Pleasanton, CA 94566
1-925-272-4529
gwalker@nextwindow.com





Appendix

Products on display at Display Taiwan 2010

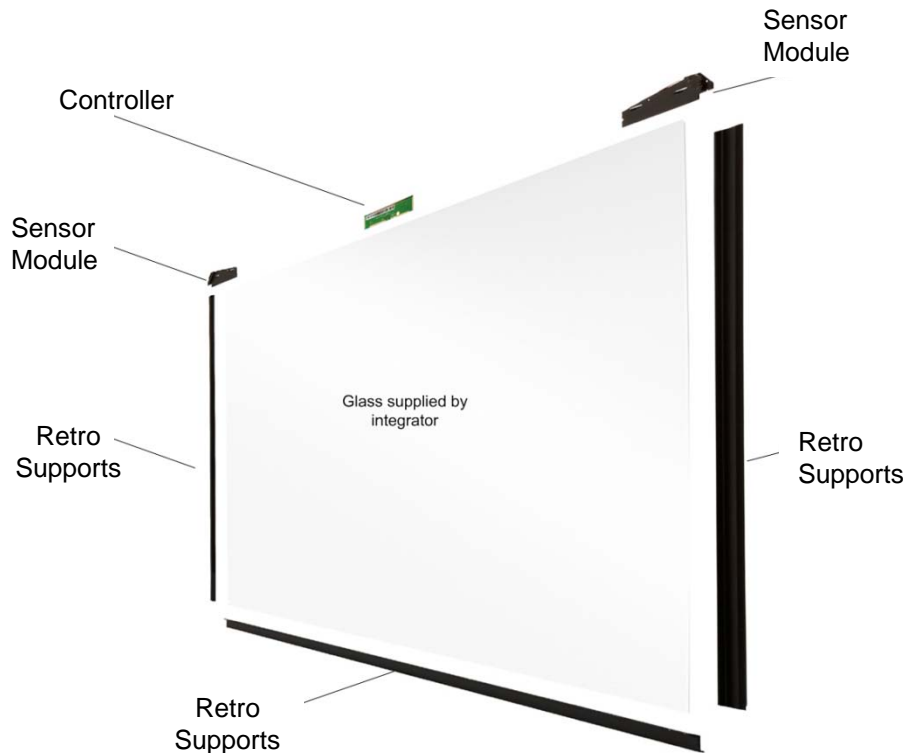


1900 OEM Touch-Screen



- ❑ High-volume OEM components
- ❑ Microsoft Windows-7 multi-touch logo
- ❑ Kit, on-glass or glassless
- ❑ 15" to 30"
- ❑ Highly durable
- ❑ Low cost
- ❑ Easy integration
- ❑ USB interface

2500 OEM Touch-Screen



- High-volume applications
- Standard sizes from 30" to 52"
- Low cost
- Microsoft Windows-7 multi-touch ready
- Low profile & narrow border
- Kit or on-glass
- USB powered (no external power supply)

2150 OEM Touch-Screen



- ❑ Standard sizes from 30" to 103"
- ❑ Passive illumination & reduced components yields higher MTBF
- ❑ Microsoft Windows-7 multi-touch ready
- ❑ Kit or on-glass
- ❑ USB powered (no external power supply)

2700 Touch-Screen Overlay



- ❑ Integrates over almost any large display
- ❑ Adds touch to any computer application
- ❑ Protective overlay guards against abuse
- ❑ Microsoft Windows-7 multi-touch ready
- ❑ Fully compatibility (no proprietary drivers)