Projected Capacitive Touch Panel Presentation

---Application for Industrial, Automotive & Home Appliance

December 2013
Agenda

- **Projected Capacitive Touch Technology Introduction**
  - Basic Introduction
  - Principle of P-Cap (Self & Mutual Capacitance)
  - Orient Display P-Cap Sensor Structure

- **Orient Display P-Cap Touch Panel’s Development Situation**
  - Development History / Industrial Chain Layout / CTP Patent Layout
  - Main Application of Orient Display Touch Module
  - Orient Display Touch Solution Roadmap
  - Orient Display Technology Roadmap
Basic Introduction...

- Common Touch Panel Category

  - Resistive TP
  - Infrared TP
  - Capacitive TP
    - Surface capacitive TP
    - Projected capacitive TP
      - Self P-Cap
      - Mutual P-Cap
    - Other Technologies
Basic Introduction...

- Touch-Panel Market 2007-2017 by Technology (Units)

Source: DisplaySearch Touch-Panel Market Analysis Reports
**Main Feature**

- **Projected Capacitive Touch Module:**
  - High light transmittance
  - Durable and scratch-resistant
  - Zero operating force
  - Support true multi-touch and gesture recognition
  - High accuracy, linearity and sensitivity
  - Excellent Signal-to-noise (SNR)
  - Faster refresh rate
  - No calibration is required
  - High reliability under harsh environment

**New feature:**
Support for **gloves, stylus** and **hover** touch.
Self-Capacitance Principle

- Multiple separate touch pads in a single layer.
- Each pad is scanned individually.
- Rows and columns of electrodes in two layers.
- Each electrode is scanned in sequence.

The capacitance readings are taken for each sensor electrode individually.
The change in capacitance at the point of intersection between X and Y would be detected.
Self-Capacitance Vs. Mutual-Capacitance

**Self-Capacitance:**
- ✔ Simpler
- ✔ Low cost
- • Limited to 1 or 2 touches with ghosting
- • Lower immunity to noise

**Mutual-Capacitance:**
- • More complex
- • Higher cost
- ✔ Support unambiguous touches (Up to 16)
- ✔ Higher Immunity to noise
P-Cap Sensor Structure

G+G SITO Stackup

Recommended Application:
- Industrial Instrument
- Automotive
- Tablet
G+G DITO Stackup

APPLE INC Patented Structure
Patent No: ZL200810125849.6 & US7920129
P-Cap Sensor Structure

**OGS (One Glass Solution) Stackup**

- **Recommended Application:**
  - Smart Phone
  - Ultrabook
  - Tablet

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**Diagram:**
- FPC
- OGS sensor
- Optical Protect Film
P-Cap Sensor Structure...4

Polarizer + Sensor Glass Stackup

Recommended Application:
- Automotive
- Industrial Instrument
- Home Appliance
P-Cap Sensor Structure…5

Single Layer Stackup For Touch Key Solution

Recommended Application:
- Home Appliance
- Security Equipment
CTP+TFT Air Bond Vs. Full Lamination

**Air Bond**
- Touch Display Integration
- Easy to Assemble
- Slight Reflection

**Full Lamination**
- Touch Display Integration
- High Contrast Ratio
- Thinner & Lighter
- Difficult To Assemble
- High Cost
- IPS-LCD Recommended
P-Cap Touch Panel’s Development Situation
Orient Display CTP’s History

- **Oct. 2007**  Project to carry out research of multi-touch capacitive touch panel technology.
- **Jan. 2008**  Successfully invented the sealed double substrate capacitive touch panel module sample.
- **Mar. 2010**  CTP Project put into quantity production and application;
  Successfully developed the mono On-Cell Touch sample.
- **May 2010**  Successfully developed the OGS sample.
- **July 2011**  The Sensor line put into production and formed a complete set of Cover Lens, Sensor and lamination assembly.
- **Sept. 2011**  The touch module with high-resolution TFT-LCD put into high-volume production.
- **2012**  Developed new CTP Production line, grew to China’s No.1 CTP manufacturer.
- **2014**  Expanded CTP Production with additional new line
We integrate CTP sensor, Cover lens, CTP module, LCD/LCM, Lamination Unit

In-house designed & manufactured —— One Shop Solution
Advanced Equipments & Facilities

- Vacuum Coater Line
- Exposure
- SMT
- Vacuum Evaporation Line
- Coating
- Advanced Test Instrument
- Precision Machining
- ACF Automatic Attached Line
Our Suppliers

Close relationship with our CTP material suppliers

ATMEL  CYPRESS  ELAN  FocalTech  GOODiX  CORNING  AGC  LG Hausys  HYDIS  BOE  3M  

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Main Applications Of Orient Display Touch Module

- Ultrabook
- Industrial/Automotive/Home Appliance
- CTP/LCD Inside
- Smart Phone/Tablet
# Automotive Touch Applications Of P-Cap

## Applications Environment:
- Direct Sunlight Dashboard applications
- Interference Sources
  - (e.g. Power System, LCD Noise, RF Noise, ESD etc.)
- Long-term Vibration
- Wide Operating Temperature Range (-30°C~+85°C)
- Other Harsh Working Conditions

## Product Applications:
Center Stack, GPS Navigator, Backseat Entertainment etc.

## Assembly Method:

1. **Flush Design**

2. **Built-in Design**
Thank you for your attention!