

- Don't follow the difference between 3σ , $6\sigma/7\sigma$, $6\sigma/1\sigma$, $6\sigma/2\sigma$, and $6\sigma/3\sigma$ cell? Read on to learn this and much more
- What's hot and what's not? Find out about the technologies that are likely to shape your future investment decisions



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Important disclosures, including any required research certifications, are provided on the last three pages of this report.

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Please also see:

<p>Taiwan Touch Panel Sector: Cook's speech triggers more demand for touch panels 8 March 2012</p> <p style="font-size: small;">Chris Lin (886) 2 8758 6251 (chris.lin@daiwacm-cathay.com.tw)</p>	<p>Korea Touch Screen Sector: We foresee robust growth in addressable market 8 March 2012</p> <p style="font-size: small;">Jae H. Lee (82) 2 787 9173 (jlee@kr.daiwacm.com) Joshua Oh, CFA (82) 2 787 9176 (joshua.oh@kr.daiwacm.com)</p>

explain an industry from top to bottom, and the ongoing developments and drivers within it, in layman's terms.

In this report, we put you in the role of procurement executive at a hypothetical global smartphone manufacturer. Against the backdrop of constantly evolving technologies and emerging new solutions, you are tasked with determining the key criteria, balancing each technology's strengths and weaknesses, and choosing the right solution for the job.

Our decision to kick off the *Made Easy* series with touch panels follows on from our recent reports on the sector in both Korea ([In touch with new market opportunities](#), published on 7 February 2012) and Taiwan ([Threats become opportunities](#), published on 31 January 2012).

We believe the outlook for the touch-panel space remains bright. As we see it, the market is likely to continue to boom in 2012 as smartphone, tablet-PC, automobile, and notebook makers move to make their products more user-friendly by adopting touch-panel displays (TPD), allowing for touch-driven command inputs.

In Taiwan, our top pick is TPK (3673 TT, NT\$483, Buy [1]), which we expect to remain the major touch-panel/lamination supplier for Apple (AAPL US, US\$530.69, Outperform [2]). We forecast TPK's small-sized and mid-sized touch pane shipments for Apple to rise by 28% YoY and 36% YoY, respectively, for 2012. We have a six-month target price of NT\$630, based on a target PER of 9.5x applied to our fully diluted 2012 EPS forecast. Risks to our call would be slower-than-expected iPad 3 panel yield rate improvement, and pricing pressure from Wintek (2384 TT, NT\$25.35, Outperform [2]) and CMI (3481 TT, NT\$15.15, Hold [3]).

In Korea, our top pick is Ijin Display (020760 KS, W13,450, Buy [1]), as we expect the company to continue to gain share in Korea's touch-panel market and forecast robust revenue growth of 63% YoY for 2012. We have a six-month target price of W18,000, based on a mid-cycle PBR of 3.3x applied to our 2012 BVPS forecast. The risk to our call would be a slowdown in touch-screen orders from its main customer.

■ Touch Panel Sector: Daiwa key stock calls

Stock	Bloomberg code	Rating	Share price 7-Mar-11	Market cap (US\$bn)	Target price
TPK	3673 TT	Buy	NT\$483.0	3.85	NT\$630
Wintek	2384 TT	Outperform	NT\$25.35	1.42	NT\$29.10
Ijin Display	020760 KS	Buy	W13,450	0.32	W18,000
Melfas	096640 KS	Buy	W24,500	0.37	W32,000

Source: Daiwa

Note: (1) Our NT\$29.10 target price for Wintek is based on our 2012E BVPS of NT\$24.32 and a target PBR of 1.20x, in the middle of its past three-year range; the risk to our view would be a delay in the launch of Win 8. (2) Our W32,000 target price for Melfas is based on a target PBR of 3.2x (assuming a long-term ROE of 25%) on our 2012 BVPS forecast; the risk to our call would be a slowdown in touch-screen and touch sensor chip orders from its main customer.

We trust that you find this first *Made Easy* report a useful introduction to the touch-panel space, and look forward to receiving your feedback.

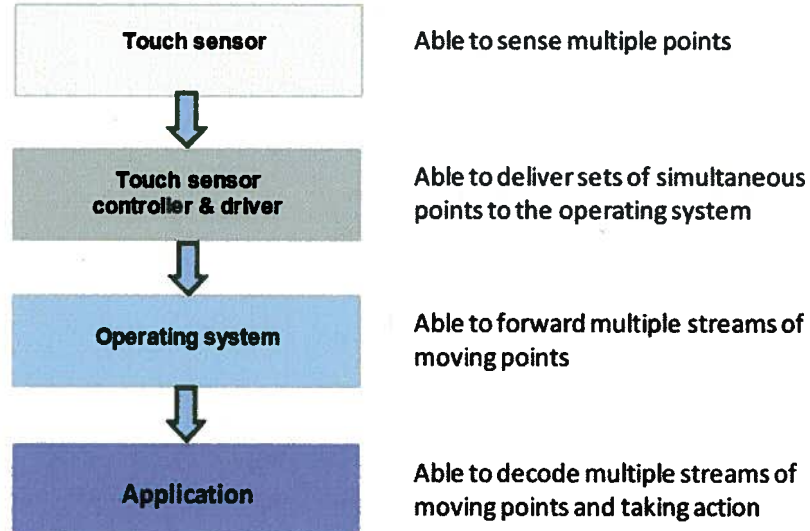
maker in Asia seeking to expand its presence in the global market. You know that the smartphone market is extremely competitive, with the high end dominated by Samsung Electronics (SEC) (005930 KS, W1,172,000, Outperform [2]) and Apple, while the mid-to low-end segment is increasingly crowded, and it is hard to distinguish one product from another.

You believe that Five Star Mobile can leverage its design team hired recently from a European automaker to differentiate the basic 'look' of the smartphone from its competitors. But you think that another important feature to consider is the 'feel' of the handset. Keen to adopt the best touch-panel technology for this new smartphone, you have contacted several touch-panel makers in the region (Taiwan and Korea).

So, what is a touch-panel display?

TPD comes in various forms, depending on the type of touch solution adopted, but simply, it provides not only visual output with information, but detects the presence and location of touch point(s) to input instructions with a finger(s) and/or a stylus. One advantage of a touch panel is that it removes the need for a physical button (keyboard) on an electronic device. This is because a 'soft' keyboard can be displayed on-screen and the user interface can be designed with much more user-friendly functions, such as zooming in and out of the content using two or more fingers.

Architecture of multi-touch technology



Source: IMS Research, Daiwa

the following table presents a bill-of-materials (BOM) cost analysis prepared by your procurement team. Since the mainstream touch solution is not yet built into the TFT-LCD display, an add-on component called a touch-panel module (TPM) is laminated on top of the TFT-LCD display. The cost of the TPM is about US\$10, or about 5% of the smartphone's total manufacturing cost.

■ BOM cost estimate for a smartphone

	Cost (US\$)	Proportion (%)
Processor	15.0	7.7
Memory		
NAND flash	20.0	10.3
mobile DRAM	8.0	4.1
Other chips	30.0	15.4
Display		
LCD	20.0	10.3
Touch-panel module	10.0	5.1
Camera modules	16.5	8.5
User interface & sensors	7.5	3.9
Power management	7.0	3.6
Battery	7.5	3.9
Mechanical components	35.0	18.0
Box contents	8.0	4.1
Total BOM	184.5	94.9
Manufacturing cost	10.0	5.1
Total manufacturing costs	194.5	100.0

Source: Daiwa

Choosing the right touch-panel module

You know you have to keep manufacturing costs below US\$200 per smartphone, and have met several major touch-panel companies in Taiwan and Korea with a view to determine the best touch-panel solution for your new smartphone. The TPM makers have told you that although there are many different types of touch panels available and new ones continue to emerge, there is no perfect solution – each touch technology has its own strengths and weaknesses.

The touch-panel makers have given you the following ideas.

There are various competing technologies. Resistive touch was once the most widely adopted technology until Apple introduced the iPhone, using projected capacitive (P-cap) touch, which has gone on to become today's mainstream solution. Other technologies include optical imaging, infrared, surface acoustic wave, and electromagnetic.

Resistive-type

The early generation of touch-panel technology was based on resistive technology. It is usually composed of two flexible sheets coated with indium-tin oxide (ITO), a transparent, conductive material, and separated by an air gap with spacers. When the human finger (or anything else, as the contact does not necessarily need to be conductive) presses the outer-layer film (with ITO on the x-axis voltage), it creates a depression leading to the film coming into contact with the inner-layer film (with ITO on the y-axis voltage), the two sheets are pressed together to create the X and Y coordinates, then processed by the controller IC to locate the touch point(s).

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