DIGITIMES Research: FPD Report – 4Q 2007

Taiwan large-size LCD panels

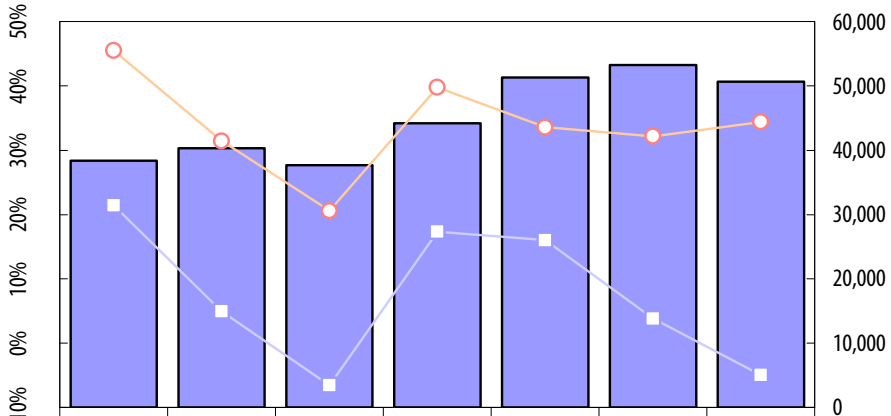
Original Chinese: Tony Huang, DIGITIMES Research, January 2008
English edition: Rodney Chan, DIGITIMES, March 2008

NOTE: Unless otherwise indicated, figures and tables refer to output from Taiwan makers.

Introduction

In the fourth quarter of 2007, Taiwan's large-size panel shipments to the monitor segment were slower than expected amid seasonality. But shipments to the TV and notebook segments continued to be rather strong, providing large-size panel shipments slight overall growth. Of the Taiwan makers, AU Optronics (AUO) and Chi Mei Optoelectronics (CMO) had higher proportions of shipments to the TV segment than their fellow competitors. AUO had quarterly growth of 4.3% while CMO reported 11.8% sequential growth. CMO was the major contributor to growth for Taiwan-based players in the fourth quarter. Chunghwa Picture Tubes (CPT), HannStar Display, and Innolux Display all saw their fourth-quarter large-size shipments drop.

Chart 1: Large-size TFT LCD shipments, 3Q06-1Q08 (k units)



	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)	1Q08(f)
Shipments	38,402	40,309	37,676	44,212	51,298	53,272	50,640
Q/Q	21.4%	5.0%	-6.5%	17.3%	16.0%	3.8%	-4.9%
Y/Y	45.5%	31.4%	20.6%	39.8%	33.6%	32.2%	34.4%

Source: Digitimes Research, January 2008

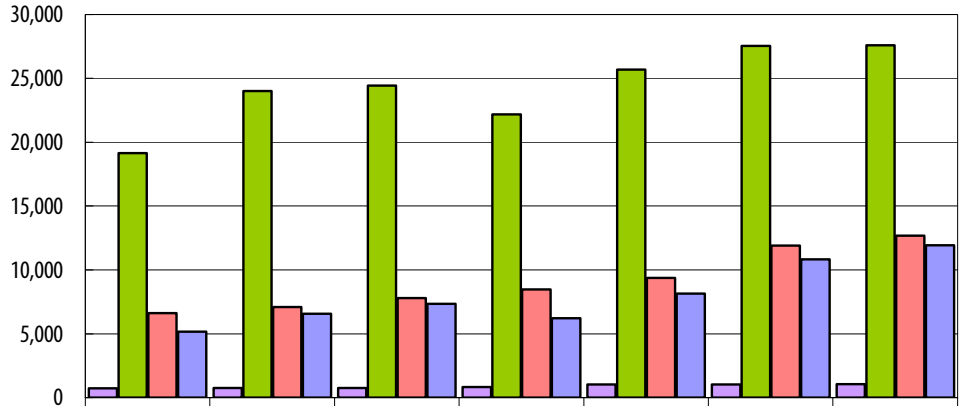
Review and forecast

Product breakdown by application

TV and notebook applications continued growing strongly while monitor panel shipments were flat in the fourth quarter of 2007. TV panel shipments were driven by new capacity from AUO and CMO. CMO enjoyed the strongest growth in terms of TV panels during the period while AUO led in other applications. Monitor applications remained the top segment although its share continued to decline.

In the first quarter, all three major applications are expected to see negative shipment growth because of seasonality. The TV segment will drop the most because consumer electronics generally feel more strongly the first-quarter seasonal downturn than IT products.

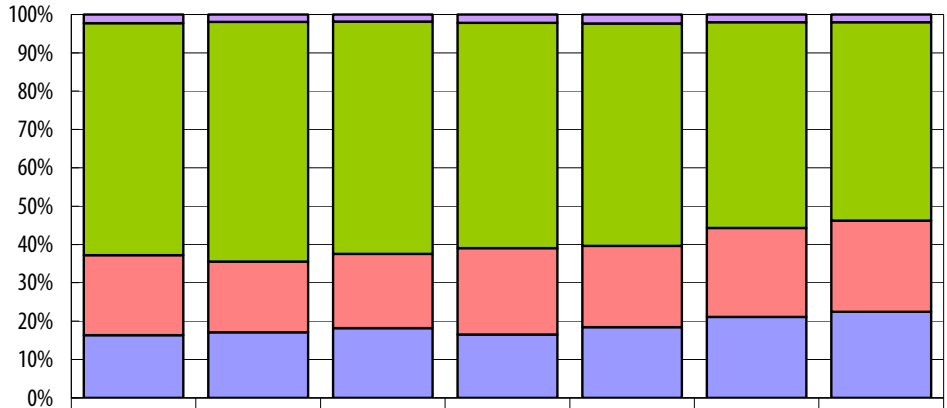
Chart 2: Shipments by application, 2Q06-4Q07 (k units)



	2Q06	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)
TV	5,152	6,552	7,330	6,220	8,135	10,824	11,933
Notebook	6,612	7,088	7,797	8,470	9,373	11,901	12,679
Monitor	19,152	24,019	24,435	22,166	25,687	27,547	27,595
Other	713	743	747	820	1,017	1,026	1,065

Source: Digitimes Research, January 2008

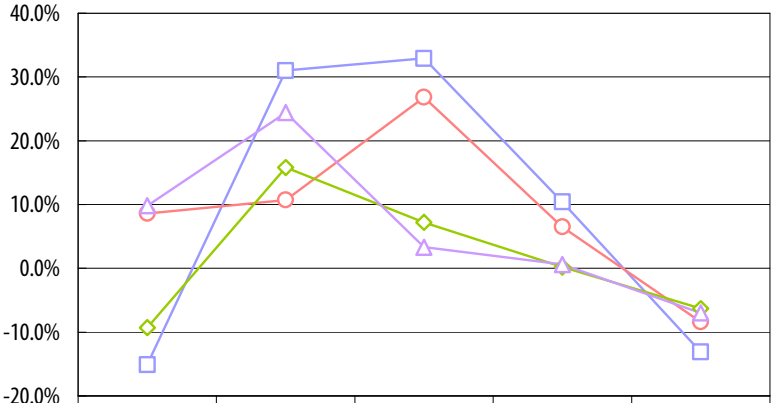
Chart 3: Shipment proportion by application, 2Q06-1Q08



	2Q06	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)
Other	2.3%	1.9%	1.9%	2.2%	2.3%	2.0%	2.0%
Monitor	60.6%	62.5%	60.6%	58.8%	58.1%	53.7%	51.8%
Notebook	20.9%	18.5%	19.3%	22.5%	21.2%	23.2%	23.8%
TV	16.3%	17.1%	18.2%	16.5%	18.4%	21.1%	22.4%

Source: Digitimes Research, January 2008

Chart 4: Shipment growth by application, 1Q07-1Q08



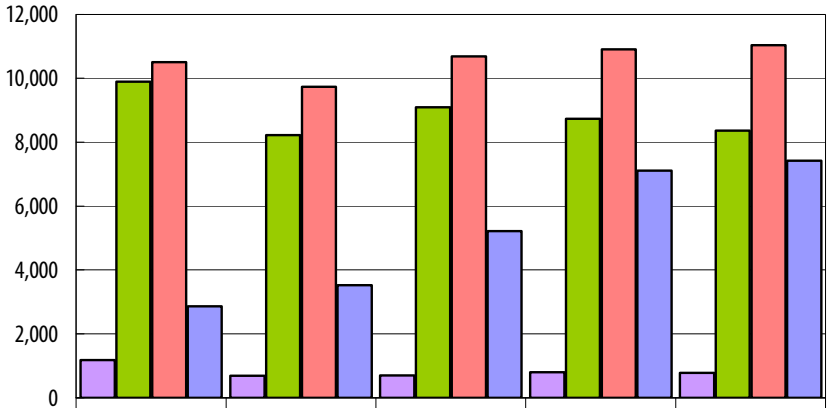
	1Q07	2Q07	3Q07	4Q07(e)	1Q08(f)
TV	-15.1%	31.0%	32.9%	10.4%	-13.1%
Notebook	8.6%	10.7%	26.8%	6.5%	-8.4%
Monitor	-9.3%	15.8%	7.2%	0.2%	-6.3%
Other	9.8%	24.4%	3.3%	0.6%	-7.0%

Source: Digitimes Research, January 2008

Application by size: Monitor

Benefiting from their largest capacity for 5G and 6G LCD production in the world, Taiwan panel players saw the proportion of their 19-inch and 20-inch-and-larger monitor panels continue to increase in the fourth quarter. Most of CMO's output was for the 19-inch widescreen and 22-inch widescreen segments while CPT and AUO also produced large volumes for the 20-inch widescreen to 22-inch widescreen segments. Shipments in the 20-inch-and-larger segment went up 4%, making that segment the only one that showed significant growth in the quarter.

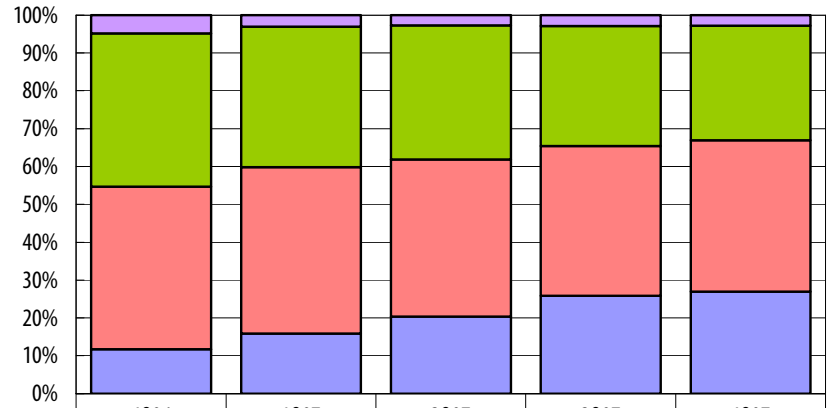
Chart 5: Monitor panel shipments by size, 4Q06-4Q07 (k units)



	4Q06	1Q07	2Q07	3Q07	4Q07(e)
>=20"	2,859	3,524	5,214	7,107	7,423
19"	10,507	9,731	10,686	10,909	11,038
17"	9,896	8,224	9,093	8,732	8,361
15"	1,173	687	694	799	773

Source: Digitimes Research, January 2008

Chart 6: Monitor panel shipment proportion by size, 4Q06-4Q07



	4Q06	1Q07	2Q07	3Q07	4Q07
15"	4.8%	3.1%	2.7%	2.9%	2.80%
17"	40.5%	37.1%	35.4%	31.7%	30.30%
19"	43.0%	43.9%	41.6%	39.6%	40%
>=20"	11.70%	15.90%	20.30%	25.80%	26.90%

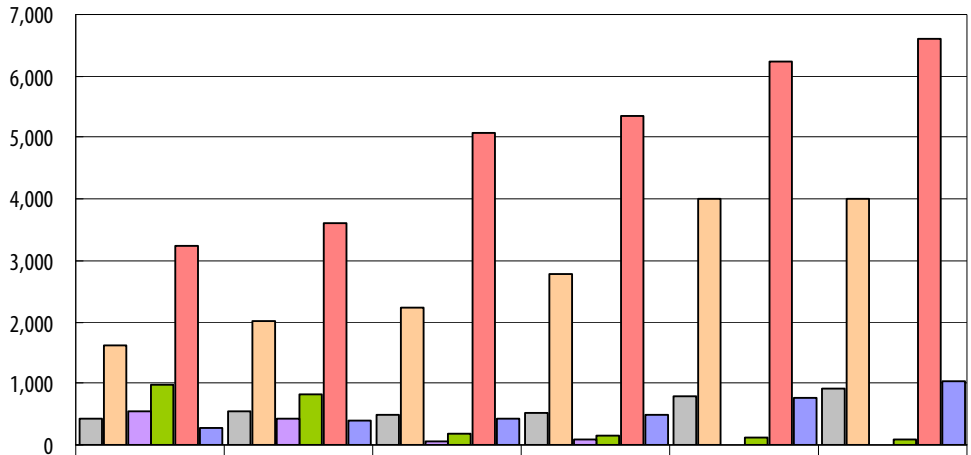
Source: Digitimes Research, January 2008

Application by size: Notebook

While prices for 14.1-inch widescreen and 15.4-inch widescreen notebook panels were almost the same, retail prices for 15.4-inch notebooks were higher than 14.1-inch ones. But the gap between the retail prices of the two segments was narrow enough to prompt consumers to opt for the bigger models that offer better multimedia experiences. Therefore system makers would be happy to roll out more 15.4-inch widescreen notebooks than 14.1-inch ones, and therefore the proportion of 14.1-inch widescreen panel shipments dropped in the fourth quarter.

The 16-inch and larger segment continued showing strong growth in the fourth quarter, with shipments up 37% sequentially. Shipments in the 13-inch and smaller segment were up 14% in the fourth quarter.

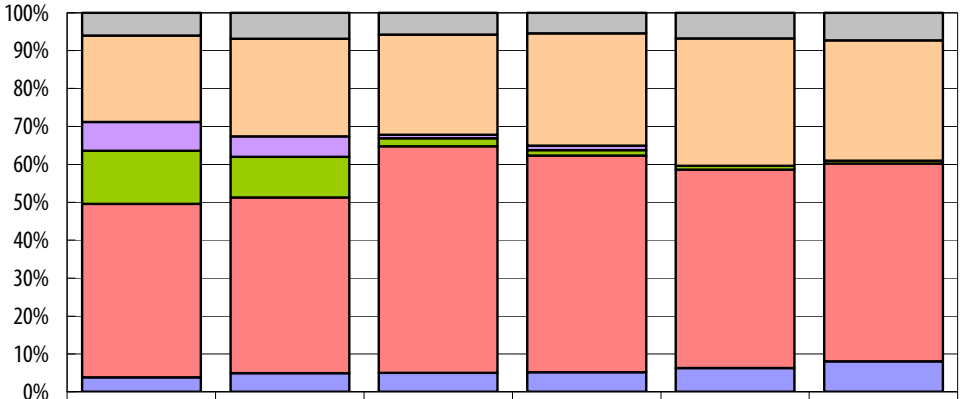
Chart 7: Notebook panel shipments by size, 3Q06-4Q07 (k units)



	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)
>=16"	271	384	424	487	750	1,027
15"W	3,244	3,618	5,065	5,352	6,224	6,606
15"	989	837	178	141	119	101
14"	540	421	76	103	0	0
14"W	1,616	2,004	2,236	2,784	3,999	4,019
<=13"	427	538	491	506	809	926

Source: Digitimes Research, January 2008

Chart 8: Notebook panel shipment proportion by size, 3Q06-4Q07



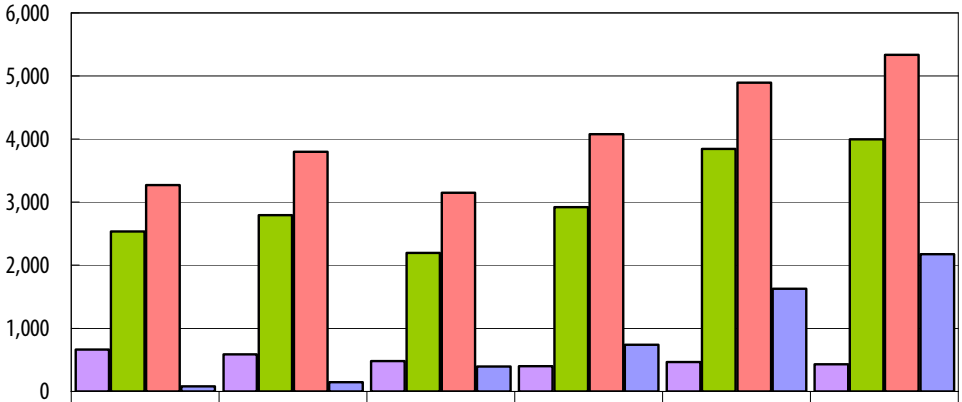
	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)
<=13"	6.0%	6.9%	5.8%	5.4%	6.8%	7.30%
14"W	22.8%	25.7%	26.4%	29.7%	33.6%	32%
14"	7.6%	5.4%	0.9%	1.1%	0.0%	0.00%
15"	14.0%	10.7%	2.1%	1.5%	1.0%	0.80%
15"W	45.8%	46.4%	59.8%	57.1%	52.3%	52.10%
>=16"	3.8%	4.9%	5.0%	5.2%	6.3%	8.10%

Source: Digitimes Research, January 2008

Application by size: TV

For shipments of TV applications in the fourth quarter, the 32-inch segment remained the mainstream, but the sequential growth of 9% in shipments to the 30-39 inch class lagged overall growth of 10.4%. Of all makers, AUO saw the higher sequential growth in TV panel shipments, at 19.8%. Increased capacity from AUO's and CMO's 7.5G lines in the fourth quarter helped push 40-inch-and-larger shipments up 34% sequentially.

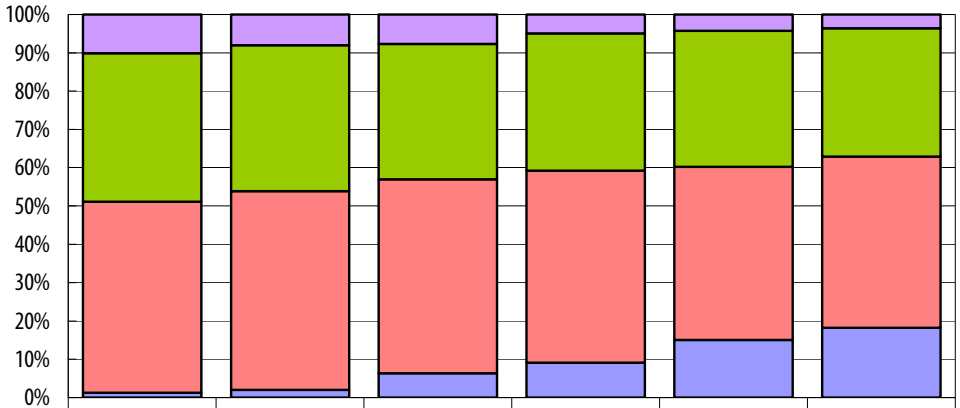
Chart 9: TV panel shipments by size, 3Q06-4Q07 (k units)



	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)
>=40"	79	147	392	740	1,624	2,172
30"-39"	3,269	3,797	3,147	4,076	4,892	5,334
20"-29"	2,536	2,793	2,196	2,920	3,842	3,998
10"-19"	662	586	479	399	465	430

Source: Digitimes Research, January 2008

Chart 10: TV panel shipment proportion by size, 3Q06-4Q07



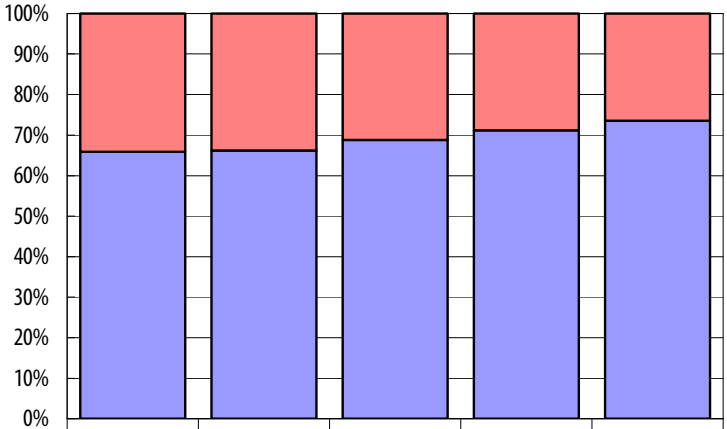
	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)
10"-19"	10.1%	8.0%	7.7%	4.9%	4.3%	3.6%
20"-29"	38.7%	38.1%	35.3%	35.9%	35.5%	33.5%
30"-39"	49.9%	51.8%	50.6%	50.1%	45.2%	44.7%
>=40"	1.2%	2.0%	6.3%	9.1%	15.0%	18.2%

Source: Digitimes Research, January 2008

Top makers: AUO and CMO

Since new capacity was mostly coming from AUO and CMO, the share of the Top-2 panel makers continued to rise steadily in the fourth quarter. CMO's large-size shipments rose 11.8% sequentially in the fourth quarter, while AUO's grew 4.3%, against global average growth of 3.9% for the large-size segment.

Chart 11: Shipment proportion by maker tier, 4Q06-4Q07



	4Q06	1Q07	2Q07	3Q07	4Q07
Others	34.1%	33.8%	31.2%	28.8%	26.5%
Top-2 (AUO & CMO)	65.9%	66.2%	68.8%	71.2%	73.5%

Source: Digitimes Research, January 2008

Industry watch

Taiwan's large-size panel shipments saw its lowest growth in 2007 since 2002 as a result of a relatively late ramp-up of makers' 7G production compared to their Korean competitors. Taiwan's share of the global large-size panel market also dropped. Although AUO and CMO were outpacing their Korean competitors, the fact that the other three Taiwan-based large-size panel suppliers had no new capacity undermined Taiwan's overall shipment growth.

In 2007, monitor panels remained the top segment but its share dropped to 55.2% of all large-size panel shipments, compared to 60.6% in 2006. The shares of both TV and notebook applications grew, the former benefiting from the growing popularity of LCD TVs, and the latter from the trend of notebooks replacing desktops. Both AUO and CPT were actively pushing for notebook panels. In contrast, CMO, whose 5G and 5.5G lines were best cut into widescreen monitor panels, was less active than AUO or CPT in pushing notebook panels until the fourth quarter.

In 2008, the global markets for TV and notebook applications are expected to grow 30.5% and 26.6% respectively, higher than the average growth for large-size panels. Monitor applications' growth will remain under 10%. Shipments to the large public display market will still be fewer than 5 million units annually through 2010, and until then large public displays will not have much influence in changing the topography of the large-size panel market.

A major force driving the LCD TV market is the fast decline in prices to acceptable levels. The mainstream TV sizes are also moving to the 40-46 segment from the present 32-37-inch segment, gradually squeezing the markets for the PDP and RP TVs.

Other driving forces are the migration to digital broadcasting, and the upcoming Beijing Olympics. Moreover, the acceptability of 26- and 32-inch LCD TVs are growing in emerging markets, as their prices are edging close to the mainstream CRT TV range of 20-29 inches. LCD is now the dominant technology in the 10-46-inch TV market.

Limited increases in supply

In 2008, global LCD panel capacity in terms of area is expected to grow 24.4%, a bit short of the demand, which will grow 28% in terms of panel area. In the second quarter of 2008, tight supply will start to appear in some segments, and in the third quarter, there will be a repeat of the shortages as seen in the third quarter of 2007. But the situation will be slightly better this year because growth in the LCD TV and monitor markets will be slightly lower in the second half of 2008 compared to the same period of last year.

Taiwan's makers are lagging the global average in terms of LCD panel capacity expansion. In 2008 there will be limited increase in new large-size panel capacity from Taiwan makers. Worse still, AUO, CMO, CPT, HannStar, and Innolux are shifting their 4-5G lines to processing medium-size panels, which in turn will undermine the growth of Taiwan's large-size panel shipments.

AUO

AUO was the worldwide top supplier of large-size panels in the second half of 2007, but it will have limited increases in its capacity in 2008: there will be a slight capacity rise at its 7.5G line in the first half of the year, and some new capacity at both its 6G and 7.5G lines in the second half.

AUO's major expansion will come only in the second half of 2009. It is constructing a second 7.5G plant (L7B), which will also house a 8.5G line. Equipment will be moved in at the 7.5G/8.5G hybrid plant in the second half of 2008. The 7.5G and 8.5G capacity at the new plant will be 60,000 and 40,000 glass substrates per month. As its new plants will not start volume production until next year, AUO's large-size capacity is expected to increase only 18.4% in 2008, lower than the global average of 24.5%.

Table 1: AUO capacity (k substrates)

Fab (generation)	Substrate size (mmxmm)	Jun 2007	Dec 2007	Jun 2008	Dec 2008
L3A (3.5G)	610×720	40			
L3B (3.5G)	610×720	20 (LTPS)			
L3C (3.5G)	600×720	60			
L3D (3.5G)	620×750	25	25	30	30
L4A (4G)	680×880	60			
L5A (5G)	1,100×1,250	50			
L5B (5G)	1,100×1,300	70			
L5C (5G0	1,100×1,300	120			
L5D (5G)	1,100×1,300	70			
L6A (6G)	1,500×1,850	120			
L6B (6G)	1,500×1,800	70	90	105	120
L7A (7.5G)	1,950×2,250	40	60	75	75

Source: AUO, compiled by Digitimes Research, January 2008

CMO

In the second half of 2007, CMO's large-size panel shipment growth beat Samsung LPL, and AUO for two quarters in a row.

CMO will be most active among Taiwan makers to expand its capacity in 2008, with the company estimating that its unit shipments for the large-size segment will increase 32%. Its capacity for large-size panels (5G and above production) is expected to increase more than 46% in terms of area, a growth faster than all other competitors. It will increase its 7.5G capacity to 100,000 substrates monthly by the end of 2008 from 50,000 substrates at the end of 2007. It is also building a 6G plant, with volume production scheduled for the second quarter, and capacity to be ramped up to 50,000 substrates monthly by the end of the year.

While global large-size LCD panel shipments are estimated to increase 19% in 2008, CMO's shipments to the segment will grow 32%.

Table 2: CMO capacity (k substrates)

Fab	Substrate size (mmxmm)	Jun 2007	Dec 2007	Jun 2008	Dec 2008
3.5G	620x720	55			
4G	680x880	88			
5G-1	1,100x1,300	145			
5G-2	1,100x1,300	120	180	180	180
5.5G	1,300x1,500	150	170	170	170
7.5G	1,950x2,250	20	50	75	100
6G	1,500x1,850	0	0	20	50

Source: CMO, compiled by Digitimes Research, January 2008

CPT

CPT's capacity increase will be small compared to its fellow competitors. The only major increase will be seen at its 6G line, whose capacity will rise to 120,000 glass substrates monthly by the end of 2008 from 90,000 substrates at the end of last year. It is increasing the 6G capacity mainly to make up for the gap created by its shifting of its 4.5G line to process the more profitable medium-size panels. The 6G capacity needs to be increased to cater to monitor segment. CPT at present gives top priority to profitability. Its income-before-tax from the TFT LCD panel business for the fourth quarter of 2008 hit a company record at NT$7 billion, chiefly because the margins from its medium-size and PC-use panels were over 25%.

CPT's 6G line will stay focused on the monitor market, with the company having singed supply contract with Innolux Display for monitor panels. While Innolux and HannStar have allocated part of their 5G lines to process medium-size panels, the large-size panel shipments from these makers are expected to drop in 2008. For CPT, its large-size panel shipments will still grow 5.4% because of the increased 6G capacity.

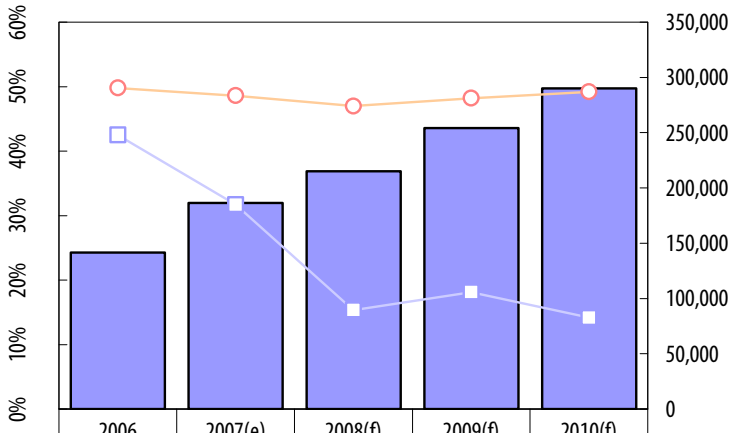
Korean and Japanese makers

Korean and Japanese makers will focus on increasing their TV panel capacity. Sharp is increasing its 8G capacity to 90,000 substrates monthly from 60,000. Sharp and Sony have also announced a plan to jointly build a 10G line. Samsung will add an 8.5G line to its production facilities, while LG Display is increasing its 6G capacity. Samsung aims to increase its large-size panel shipments 26% in 2008.

Outlook till 2010

As Taiwan-based panel makers are not expanding capacity as quickly as their competitors this year, Taiwan's global share will decrease to 47% in 2008. In 2009, with AUO and CMO expected to ramp capacity at their 6G lines, Taiwan's share is expected to rebound. Innolux is also expected to enter volume production at its 6G line in the second quarter of 2009.

Chart 12: Taiwan large-size panel shipments and share of global market, 2006-2010



	2006	2007(e)	2008(f)	2009(f)	2010(f)
Shipments	141,579	186,458	215,110	254,100	290,200
Y/Y growth	42.5%	31.7%	15.4%	18.1%	14.2%
Global share	49.8%	48.6%	47.0%	48.2%	49.20%

Source: Digitimes Research, January 2008