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ANCHOR REPORT

Global foundries: Sharing is not easy

Share gains critical in 2014, as Semi likely to slow on high-end SP saturation

November 7, 2013

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We take a deep dive into smartphone Semi and believe 2014 will likely be a lukewarm year for the industry, given our view that the smartphone demand mix — which has driven most Semi value growth over the past three years — is worsening, and die size expansion is likely peaking at 28nm.

That said, we expect TSMC to outperform the industry in 2014-15, as share gains (Apple) could help counter the headwinds. The debate concerning the superiority of x86 or ARM is not only about the change of transistor cost but also the entire ecosystem, we think. However, a push to include x86 chips in mobile would benefit Intel more than expanding its ARM foundry business, considering its high foundry costs, in our view. We reiterate our Buy on TSMC and Reduce on Intel. We also reiterate our Buy on Samsung, which will likely take some Apple orders back in 2015. We keep UMC at Neutral, since it has missed the 28nm window of opportunity.

Key analysis in this Anchor Report includes:

- Our proprietary bottom-up smartphone AP/BB wafer demand / value model by price segment in 2011-2015F
- A thorough study of the superiority debate concerning Intel (x86) and ARM from the viewpoints of semiconductor cost and ecosystem
- Foundry competition: quantitative methodologies to prove the difficulties at tier-two foundries, and Intel's foundry cost problems.

Global foundries

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Sharing is not easy

Share gains critical in 2014F, as Semi industry likely to slow on high-end SP saturation

High-end smartphone saturation to impact foundry volumes; share gains (Apple) critical to offset the impact

Our analysis indicates that high-end smartphone saturation from 2H13F and peaking smartphone die-sizes could pressure foundry economics. While keeping our forecasts and ratings unchanged, we have done deeper analysis on these issues using our proprietary bottom-up wafer demand model. Despite these headwinds, we like TSMC on share gains at Apple (which should account for 7% and 12% of TSMC's sales in 2014F and 2015F, respectively), which should allow the company to deliver above-industry revenue growth in 2014-15F.

Intel (x86) to gain traction in tablets next year, but impact on TSMC seems minimal

We believe Intel's 22nm Bay Trail could gain traction in tablets next year. With full scaling benefits, Intel has an edge on 22nm, which could help in narrowing the gap in power efficiency and transistor cost vs ARM SoCs at 20/16nm at TSMC. That said, tablet OS and market share dynamics imply minimal impact on TSMC. Moreover, ecosystem strength for ARM SoCs and Intel's lack of LTE integration likely prevent x86 from gaining traction in smartphones over the next two years.

Despite scaling issues at 16/20nm, TSMC remains well-positioned; Tier-2 competitors suffer from low yields; Samsung's business model conflict limits share gains; impact from Intel foundry seems limited

We believe Tier-2 foundries' share gains at 28nm will be limited to PolySiON node due to their lack of TSMC-like offerings on HKMG. Even at 28nm PolySiON, low yields are an issue for Tier-2 foundries. Samsung is facing the dilemma of being either an IDM or a foundry. Intel, while having a substantial edge in manufacturing, is likely constrained by limited non-competing customers and higher wafer costs.

Stock calls: Buy TSMC and SEC, Reduce Intel and Neutral on UMC

Share gains should help TSMC drive above industry growth in 2014-15F despite headwinds. We also like Samsung – it will likely regain some Apple orders in 2015F. Reduce maintained on Intel on increasing challenges to its core PC business (60+% of sales); Neutral reiterated on UMC since it has lost the 28nm window of opportunity, in our view. Last, following our proprietary die size analysis, we conclude that MediaTek has upside in GPM or market share (or both), which we address in a separate note today. (*MediaTek - A deeper dive in die cost supports our Buy*)

Fig. 1: Stocks for action

Company	Ticker	Rating	TP	Price	Up/Down side (%)
TSMC	2330 TT	Buy	TWD123	TWD106.5	15%
Intel	INTC US	Reduce	USD18	USD24.45	-25%
Samsung	005930 KS	Buy	KRW1,900,000	KRW1,485,000	28%
UMC	2303 TT	Neutral	TWD13.2	TWD12.45	7%

Source: Bloomberg, Nomura research. Note: Share prices are as of 5 Nov 2013 close.

Anchor themes

We expect Semi wafer demand to slow down in 2014, since the mix of smartphones – which has been the biggest growth driver for Semi value over the past 3 years – is worsening and die size expansion of smartphone chips is likely peaking at 28nm. Thus, share gains for foundries become critical in the new stage.

Nomura vs consensus

Our smartphone AP/BB wafer demand/model is proprietary and unique in the market.

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See Appendix A-1 for analyst certification, important disclosures and the status of non-US analysts.

Contents

A close look at smartphone Semi in 2014-15

We have gone through detailed **proprietary bottom-up smartphone AP/BB wafer demand analysis** in this report, in order **to identify potential outperformers in the Asia Semi market for 2014 when the smartphone sector** – which has been the most important factor driving Semi value growth over the past three years (eg, according to Gartner, 52% of incremental Semi value growth over 2011-13 was solely driven by handsets, even considering the fall in feature phone demand) – **is seeing saturation in the high-end segment**; **meanwhile technology upgrades could also see a slowdown**.

In the foundry space, saturation of high end smartphones is likely to provide a double blow to the entire foundry sector – 1) the (blended) die size expansion trend might be peaking at 28nm since the feature enhancement of smartphone chips would likely not be greater than the force of area shrinkage into 20nm and 16nm, based on our estimates; and 2) the strong volume ramping of low-end smartphones is unlikely to help reverse the trend, due to the significant (and growing) die size difference with high end chips (which impacts wafer consumption). Overall, **we expect smartphone AP/BB Semi wafer value to grow less than smartphone volume in 2014-15F, reversing from higher growth in 2011-13.**

Accordingly, TSMC's share gain at Apple AP orders over the next two years is likely to become critical, in our view, since Apple's high-end AP orders are strong enough to help TSMC break out of the headwind of the Semi value slowdown driven by high-end smartphone saturation and enable it to continue to be an outperformer in the Semi space until 2015, in our view. As for **Apple's order allocation**, we believe TSMC will grab all 2014 (A8) new projects, while Samsung and TSMC will share 2015 (A9) projects. It would seem that Intel has not been included in the foundry vendor list for Apple's iPhone/iPad AP over the next two years. We believe Intel's earlier opportunity for being included as an Apple foundry would be for AP for wearable devices or TVs.

The debate between Intel and ARM on the superiority of x86 vs. ARM was a hot topic this year, after Intel migrated to 22nm and launched Bay Trail for tablets. We think 22nm Silvermont-based Bay Trail chips will make Intel more competitive in power and performance with equivalent ARM SoCs. In addition, aided by the full extension of Moore's Law in 22nm node, **we believe Intel can narrow the gap in terms of cost per transistor with ARM foundries (eg, TSMC) in 20/16nm**. What is interesting about Bay Trail is that Intel is offering a high performance processor at competitive price points (USD10-40). In our view, Intel needed to enhance the value proposition to effectively compete with ARM-based tablets, which are proving to be better in power and performance than the prior-generation Atom chips. While Intel is also focusing on Android tablets, we think Windows 8.1-based tablets continue to be a differentiated play for Intel. We expect Bay Trail's devices to enter the market starting in 4Q13. While we think Intel could gain traction in tablets next year, we think success in smartphones could be another two years away. This is due to a stronger ARM SoC ecosystem and Intel's lack of integrated LTE modems. We think Intel's traction in tablets alone will have minimal impact on TSMC as more than 60-70% of tablet volume is driven by Apple and Samsung, which mainly use their own processors.

Our quantitative analysis also proves that TSMC has a superior cost structure vs its competitors largely due to better yields. **In our opinion**, **Tier-2 foundries may gain shares at 28nm PolySiON node but can hardly do so after 28nm HKMG due to the difficulties of offering T-like (ie, similar to TSMC) process. Even at 28nm PolySiON, yield rate is an issue dragging their (tier-2 foundries) competitiveness**. Our analysis also suggests that **TSMC's wafer costs seem much lower than those of Intel's. However, we acknowledge that this may not factor the likely superior performance of Intel's 22/14nm 3D transistor over TSMC's**. In addition, TSMC's lower wafer cost may not factor in that some customers may benefit from Intel's higher transistor density (Altera). **We believe Intel is also constrained by its mission of not enabling any of its competitors**, eg, Qualcomm, Nvidia, and Broadcom. Regarding Samsung foundry, we think it has an edge in offering superior logic IC and memory integration but **Samsung's conflict of interest** as it relates to Samsung's ambition of becoming a supplier of virtually all key semi components in mobile devices with most of their potential customers appears to be an issue.

Following the detailed die size analysis across different nodes in the first section, we found that MediaTek has an improving cost structure vs. Qualcomm in 3G smartphone chipsets. Our MediaTek report published today (*MediaTek - A deeper dive in die cost supports our Buy*) indicates that **the gap in cost structure has widened further in favour of MediaTek from the transition from 65nm to 28nm**. With an improving cost structure, we expect MediaTek to either expand gross margin or market share (or both) over the next 3-6 months.

Key discussions

In this report, we address some important topics in the smartphone semi space with potential impact to Asia Semi companies in 2014-15, including:

- How saturation of the high-end smartphone segment would impact foundry wafer demand in 2014-15F (ie, the analysis of die size trend by node by segment).
- How much wafer value contribution Apple could bring to the foundries.
- The amount of wafer value future contribution the booming China local/white box smartphone demand could bring to the foundries.
- If TSMC was unsuccessful in getting Apple AP orders…
- Evaluating how serious the threat from Intel’s x86 chips to ARM SOC/foundry would be.
- Foundry competition: Why we think Tier-2 foundries could only make noises, rather than real threats to TSMC.
- Foundry competition: Two quantitative ways to prove the disadvantage of Intel wafer costs vs. TSMC.
- Intel: Surmising what would be in its best interest: either promoting x86 chip or being an ARM foundry.

Actions

We believe 2014 will be a lukewarm year for the Asia Semi sector in general, given that smartphones - the biggest Semi value growth driver over the past three years – are likely to see demand slowing and mix worsening. However, with high Semi-value Apple’s order contribution, TSMC appears set to outperform its Semi peers over 2014-2015F.

TSMC is our top pick in the Greater China Semi space for 2014F. Globally, we also like Samsung on its solid smartphone business and attractive valuation while its system LSI (including foundry) business should see OPM recovery in 2015F with a return of Apple orders.

On the other hand, we maintain our Reduce on Intel due to the increasing challenges to its core PC business (60+% of sales). We maintain UMC at Neutral despite its low valuation at 0.8x P/B (2014F BVPS of TWD17). UMC’s window of being a 28nm second source foundry seems closed for some big smartphone chip vendors after GlobalFoundries became the second source for QCOM, MediaTek, etc. We expect its 28nm sales contribution to be limited in the foreseeable future.

Following the die size analysis, we are increasingly positive on MediaTek, since it has widened its cost advantage against QCOM through the node migration from 65nm to 40 40/45nm and 28nm. We reiterate our Buy on Mediatek in a separate note published today.

Fig. 2: Peer valuation comparisons

Ticker	Company	Rating	Mkt cap US$mn	Price (LCY$)	EPS (LCY$/shr) 2013E	2014E	P/E (x) 2013E	2014E	P/B (x) 2013E	2014E	ROE (%) 2013E	2014E	Dividend yield (%) 2013E	2014E
Foundry														
2303 TT	UMC	Neutral	5,500	12.4	1.0	0.6	12.0	20.0	0.7	0.7	6.1	3.5	4.2	4.2
2330 TT	TSMC	Buy	93,940	106.5	7.2	8.1	14.9	13.1	3.3	3.0	23.7	23.7	2.8	2.8
5347 TT	Vanguard	NR	1,745	31.7	2.7	2.9	11.8	10.8	2.1	2.0	19.3	19.0	3.8	3.8
Average							**12.9**	**14.6**	**2.0**	**1.9**	**16.4**	**15.4**	**3.6**	**3.6**
OSAT														
2311 TT	ASE	Buy	6,363	28.3	1.9	2.3	14.8	12.4	1.5	1.4	11.3	11.5	2.2	2.6
2325 TT	SPIL	Neutral	3,617	34.1	1.6	2.5	20.8	13.8	1.8	1.7	8.5	12.5	4.3	6.5
6147 TT	Chipbond	Buy	1,215	60.0	4.8	5.8	12.5	10.3	1.8	1.6	15.7	18.2	5.7	5.8
6239TT	Powertech	NR	1,215	45.0	3.1	3.1	14.6	14.6	0.9	0.9	6.6	7.7	5.1	5.1
STAT SP	STATS ChipPAC	NR	595	0.3	na	na	na	na	na	na	na	na	na	na
AMKR US	Amkor	NR	1,242	5.7	0.5	0.7	12.4	8.5	1.1	0.9	13.2	15.2	0.0	0.0
Average							**15.0**	**11.9**	**1.4**	**1.3**	**11.1**	**13.0**	**3.5**	**4.0**
Asia fabless														
2454 TT	Mediatek	Buy	16,098	430.0	20.0	25.5	20.0	16.9	3.0	2.8	13.3	15.7	3.5	4.4
3034 TT	Novatek	Reduce	2,332	115.0	8.4	9.3	8.4	12.3	2.8	2.5	19.0	20.3	5.5	6.1
6286 TT	Richtek	Reduce	656	129.0	9.7	10.2	9.7	12.7	2.9	2.6	20.6	20.8	5.5	5.6
SPRD US	Spreadtrum	Neutral	1,640	30.6	1.8	2.3	1.8	13.2	3.5	2.8	20.4	21.1	na	na
8299 TT	Phison	Neutral	1,231	204.0	17.6	18.5	17.6	11.0	2.6	2.3	20.7	20.4	4.4	4.4
HIMX US	Himax	Neutral	1,725	10.1	0.4	0.7	0.4	15.3	4.2	3.6	15.2	23.8	2.5	4.6
3697 TT	Mstar	NR	5,922	329.0	9.9	13.0	33.2	25.4	5.0	4.7	17.1	18.4	2.0	2.0
2379 TT	Realtek	NR	1,201	70.4	5.6	5.2	12.5	13.6	1.8	1.8	15.2	13.4	4.6	4.6
Average							**12.9**	**15.1**	**3.2**	**2.9**	**17.7**	**19.3**	**4.0**	**4.5**
Global peers														
IDM														
ADI US	Anaglog Devices Inc.	Neutral	15,469	49.8	2.1	2.5	23.8	19.6	3.3	3.1	14.8	17.2		
INTC US	Intel	Reduce	119,453	24.0	1.9	1.9	12.7	13.3	2.2	2.0	17.9	16.2		
LLTC US	Linear	Neutral	9,547	40.9	1.9	2.2	22.0	18.8	8.3	7.2	41.9	41.4		
MXIM US	Maxim	Neutral	8,248	29.2	1.5	1.9	19.0	15.0	3.4	3.2	20.9	24.9		
TXN US	Texas Instruments	Neutral	45,862	41.9	1.9	2.1	21.9	19.5	4.2	4.2	19.5	22.3		
SNDK US	Sandisk	Neutral	15,582	69.0	4.4	5.2	15.6	13.2	2.4	2.1	15.2	16.1		
IDM Average							**19.2**	**16.6**	**4.0**	**3.6**	**21.7**	**23.0**		
Fabless														
AMD US	Advanced Micro Devices	Neutral	2,410	3.3	(0.2)	0.1	(19.2)	37.4	5.1	4.1	(24.2)	12.4		
AVGO US	Avago	Buy	11,152	45.0	2.1	2.6	21.2	17.5	4.0	3.4	22.8	22.3		
BRCM US	Broadcom	Buy	15,032	26.5	0.6	1.3	41.0	20.9	2.0	1.7	15.0	13.2		
MRVL US	Marvell	Neutral	6,415	13.0	0.5	0.6	25.5	22.5	1.5	1.4	9.1	9.3		
NVDA US	Nvidia	Buy	8,563	14.8	0.7	0.8	20.9	19.1	2.0	1.9	9.6	10.2		
QCOM US	Qualcomm	Buy	118,373	69.0	4.0	4.4	17.2	15.6	3.1	2.8	19.8	19.0		
LSI US	LSI Logic	NR	4,519	8.3	0.2	0.3	40.1	29.0	4.0	3.3	31.0	32.4		
XLNX US	Xilinx	Neutral	12,079	45.0	2.2	2.4	20.5	18.4	4.0	3.4	20.7	20.1		
ALTR US	Altera	Reduce	10,588	33.0	1.4	1.6	24.3	20.6	2.9	2.7	12.9	13.2		
Fabless average							**20.9**	**22.6**	**3.2**	**2.7**	**13.0**	**17.4**		

Source: Bloomberg consensus estimates for not rated stocks, Nomura estimates. Note: Prices are as of 05 Nov 2013.

High-end smartphone saturation a likely headwind for foundry demand

We have done bottom-up research on how high-end smartphone saturation is likely to affect foundry wafer demand into 2014F and 2015F. We believe this saturation will prove to be a double blow for foundry wafer demand.

1) High-end smartphone die sizes have expanded in the last two node upgrades (ie, from 65 to 45nm and from 45 to 28nm), despite about 50% area shrinkage at each migration. However, we estimate that the (blended) die size might have peaked in 28nm and will start to decline with the transition to 20nm/16nm, which means the function/performance increase will not be significant enough to overcome area shrinkage (due to saturation of smartphone spec upgrades) – which is the very first structural reason why foundry wafer demand should slow, in our view;

2) Low-end smartphones are likely to be the growth driver for smartphone volume demand. However, wafer demand contribution to foundries from low-end smartphones is smaller than market expectations, given that: 1) a low-end smartphone naturally has a smaller die size given weaker features, eg, we estimate that low-end smartphone die sizes are about one-third as big as high-end smartphone die sizes in 2012 (vs a high-end QCOM MSM8960 chip with a low-end chip MSM 7x27A/7x25A chip); and 2) low-end smartphone die size shrinkage has been accelerating in 2013, with MediaTek and SPRD intensifying the competition in this segment. For example, on our estimates, blended low-end smartphone die size should shrink by c.40% in 2013F vs 2012, after MediaTek enters mass production of its low-cost dual-core AP MT6572 and SPRD's continuous push of a single-core AP into 2014F.

3) Thus, the smartphone AP SOC wafer value should grow less than smartphone volumes in 2014-15, reversing the trend of outgrowth in 2011-13.

Smartphones have been driving the Semi industry over the past three years…

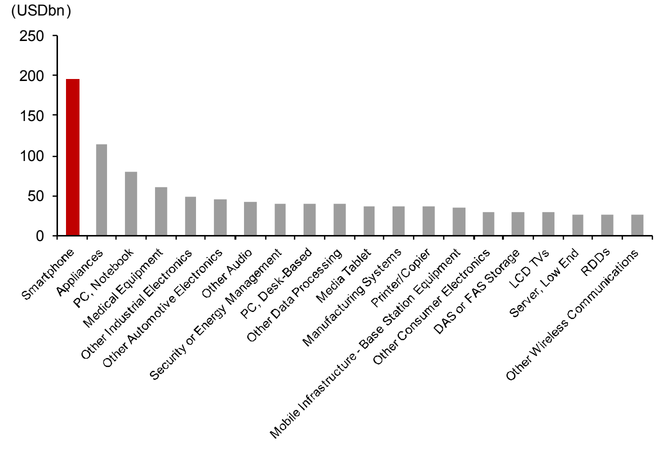
Smartphones have been the major Semi value growth driver in the past three years. According to Gartner data, the top 10 applications by incremental Semi value in 2013 over 2011 by application include smartphones, wireless communications, ultra mobile PCs, media tablets, etc, while the major applications which are eroding Semi value in the same period are notebook PCs, feature phones, etc (see Figs 3-4). Handsets are the single most important application behind Semi value growth – Gartner data show that handset applications alone contributed 52% of incremental Semi value growth in 2011-13 (Figs 5-6).

If we take out smartphones as the contributor and remove feature phones as the destroyer to Semi value (since growth of smartphones is at the expense of feature phones), the Semi value CAGR in 2011-13 would be only 1%, instead of the 3% CAGR that we now expect.

From foundry companies' disclosed information, we can also see the same trend. Foundry sales from communication applications have grown to 55% in 2Q13, from 44% in 1Q10 (Figure 7).

Fig. 3: Top 20 applications by Semi consumption – 2013

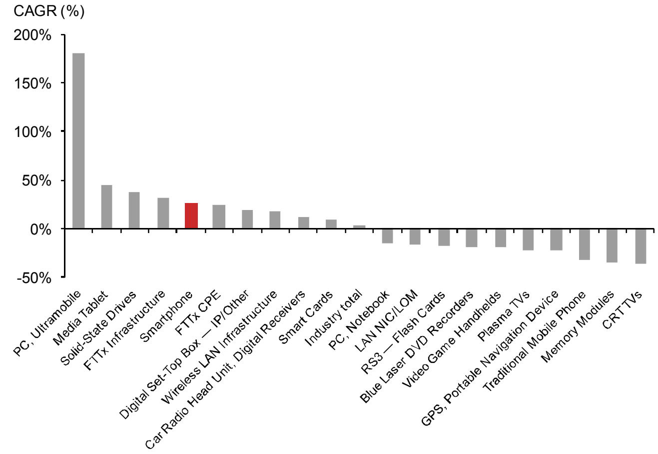
Smartphones: the biggest application



Source: Gartner

Fig. 4: Top 10 and bottom 10 applications by Semi value CAGR, 2011-13

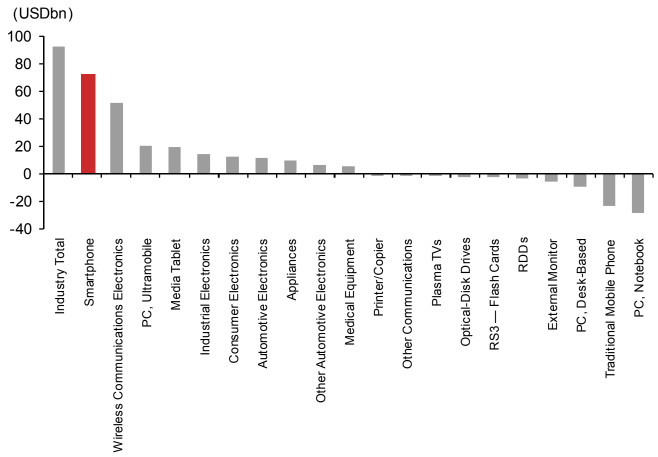
Smartphones: the fifth biggest application



Source: Gartner

Fig. 5: Top 10 and bottom 10 applications by Semi incremental value over 2011-13

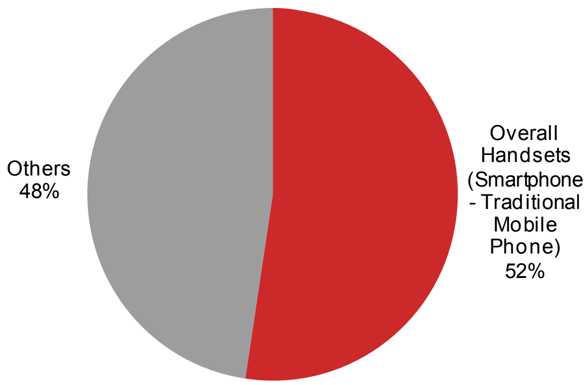
Smartphone: the biggest application



Source: Gartner

Fig. 6: handset contribution to incremental Semi value growth in 2011-13

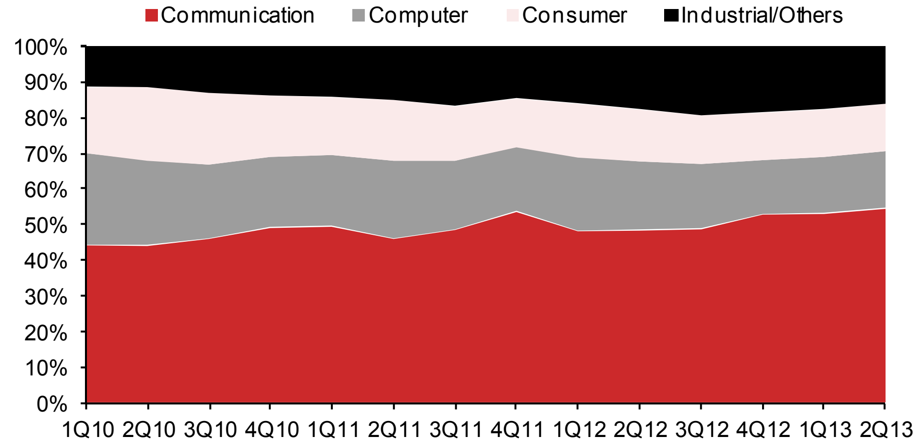
Handset application alone has contributed to 52% of incremental Semi value growth over 2011-13



Source: Gartner

Fig. 7: Foundry sales by application since 1Q10

Communication has been the growth driver for foundry sales



Source: Company data

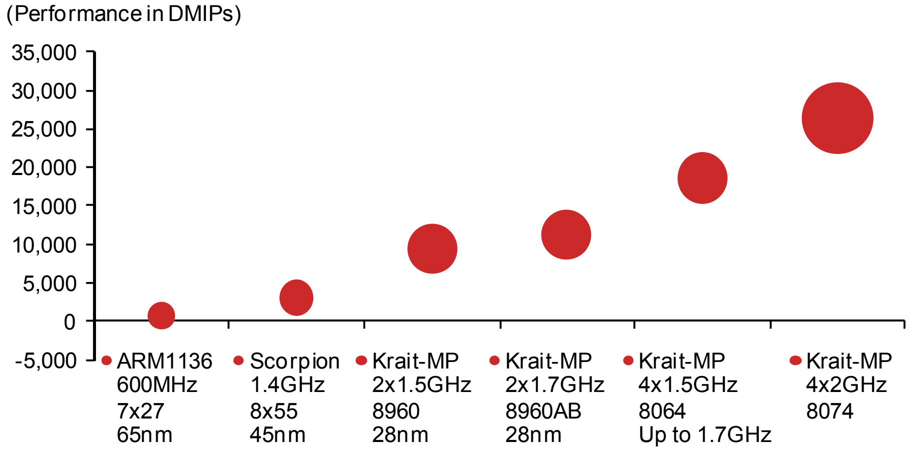
…on not only volume growth, but also spec upgrades (leading to growing die sizes)

Smartphones' volume growth and much higher Semi value vs feature phones are not industry secrets. However, the most interesting point that is probably less discussed by the Street is that the die sizes of smartphone chips have also continued to expand over the past three years, even at the transition to 45nm from 65nm and to 28nm from 45nm, which signals significant feature expansion of high-end smartphone chips (the feature expansion is big enough to overcome the die area shrinkage, which is as much as about 50% in every node transition). For example:

- QCOM's 7x27 65nm ARM11 600MHz chip (the mainstream smartphone chip back to 2010), saw a die size of about 70mm, based on our estimates.
- Even with the node migrating from 65nm to 45nm in 2010, the die size of QCOM's 8x55/7x30 (the mainstream smartphone chip in 2011) 45nm 1GHz chip was bigger, at about 80mm, based on our estimates.
- From 2012, QCOM began shipping 28nm smartphone chips in volume. The first 28nm smartphone chip by QCOM was the 8960 28nm 1.5GHz dual core. By our estimates, the die size had grown to about 90mm.
- In 2013, we continue to see the die size of high-end smartphone chips change in one direction — becoming bigger, particularly when there is no node migration taking place this year. For example, the 8974, QCOM's first 28nm HKMG chip, is about 110-120mm, on our estimates.

Fig. 8: Performance and die size of QCOM flagship chips since 2010

Die size expanded at 45nm and 28nm transition despite about 50% area shrinkage at each transition



Note: the size of circles denotes the relative die size of each chip

Source: Nomura estimates

Our global smartphone AP/BB wafer value bottom-up model

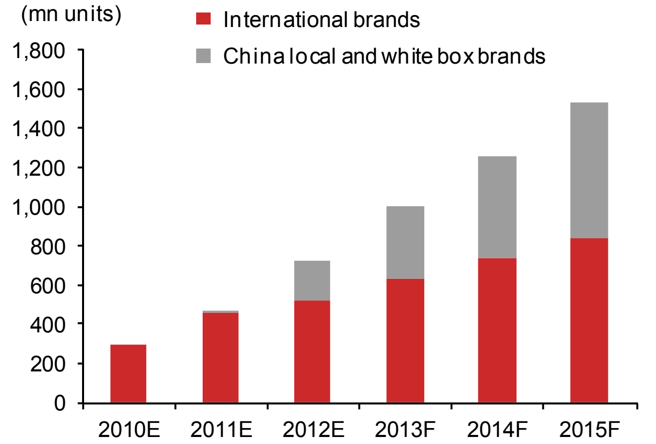
In our opinion, it is worth digging deeper into the analysis of smartphone Semi value changes, as this has been the driver for the industry. It seems the driver itself is seeing saturation in volume growth and segment mix. In this report, we particularly focus on AP and BB (baseband, or modem), as we believe they contribute the most smartphone to semi value.

Assumptions

- We include China white box handset makers' shipments (which are not included in statistics by third-party research) in our bottom-up model. For example, we estimate about 1bn smartphone shipments in 2013F, of which 365mn are shipped by China brands and white box handset makers (which translates to about 440mn units of chip demand, assuming a 15-20% inventory gap). Note that our 2013 device demand forecast of 1bn units is close to TSMC's guidance at its 2Q13 analysts' meeting of 996mn units (Figs 9-10).

Fig. 9: Global smartphone volume demand by China and international brands, 2011-15

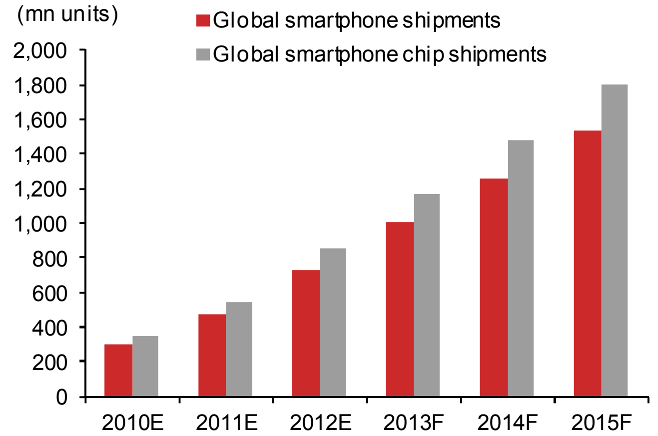
China brands are likely to outgrow international brands in volume shipments



Source: Nomura estimates

Fig. 10: Global smartphone volume demand and chip demand, 2011-15

Chip demand is 15-20% higher than device demand

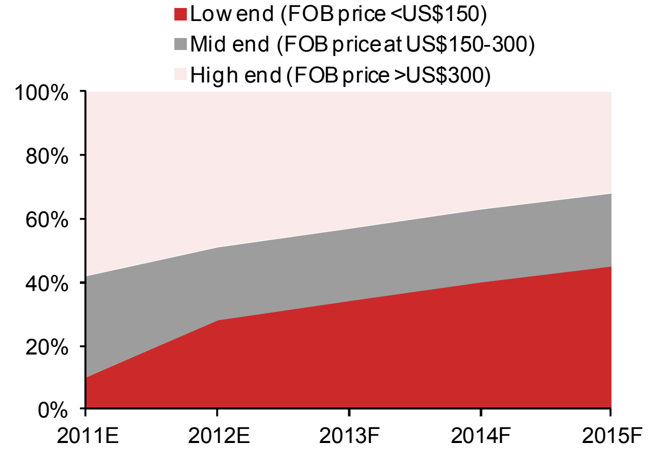


Source: Nomura estimates

- We categorize the smartphone AP market into three segments – high end (with handset FOB cost >US$300), mid-end (with handset FOB cost at US$150-300), and low end (with handset FOB cost at <US$150). For example, in the high-end segment for 2013, we include all Apple models, all Samsung models using in-house Exynos APs, nVidia Tegra3, and QCOM chips including MSM8974 (flagship model in 2H13), APQ8064 (flagship model in 4Q12-1H13) and MSM8960 (flagship model in 2012). In 1H13, the position of MSM8960 was replaced by APQ8064 and sold at the price point one or two notches below the flagship model. However, we think the FOB costs are still above US$300 in 2013. Our mix estimate for 2013 is 43%/23%/34% for high/mid/low end – which matches TSMC's guidance in its 2Q13 analysts' meeting (Figs 11-12).

Fig. 11: Smartphone demand mix change, 2011-15

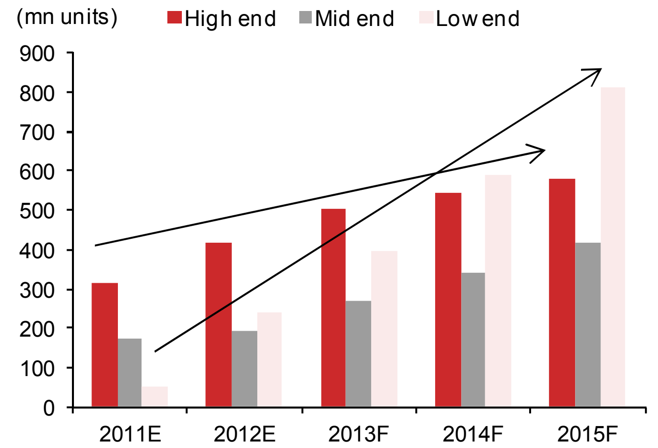
Low-end segment is outpacing



Source: Nomura estimates

Fig. 12: Smartphone demand volume by segment, 2011-15

Low-end volume likely to surpass high end from 2014F onward



Source: Nomura estimates

Fig. 13: Category of high-, mid- and low-end smartphone chips, 2013 examples

High end	Mid end	low end
Apple A7	QCOM 8930	QCOM 8x25
Apple A6	QCOM 8x25Q	QCOM 7x2xA
Apple A5	MTK 6592	QCOM 8x26
QCOM 8974	MTK 6589	QCOM 8x1x
QCOM 8064	…etc	MTK 6589
QCOM 8960		MTK 6588
nVidia Tegra 4		MTK 6582
nVidia Tegra 3		MTK 6572
Samsung Exynos Octa core		SPRD Shark
Samsung Exynos quad core		SPRD Tiger
...etc		SPRD 8810
		etc

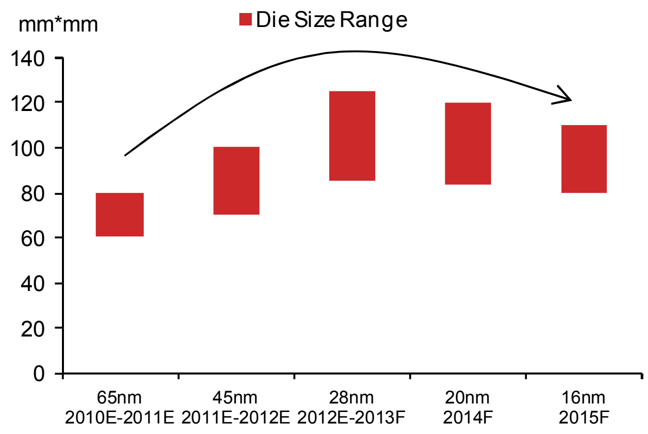
Source: Nomura estimates

- Following our market survey, for 2013, we assume good die numbers (after considering yield rate issues) for smartphone chips in high-, mid- and low-end segments to be 400-600, 1,000 and 1,800-2,000 units per wafer, respectively. While it's often difficult to be precise on the number, since chip die sizes, even in the same segment, could vary significantly by vendor, while the share of each chip vendor also varies quickly, we think it is still worth trying to estimate since we can still tell some trends from such analysis. For example, we believe high-end smartphone chip die sizes in general are within 85-125mm in 2013, including Apple's A6, A6X, A7, Samsung's Exynos quad core and Octa core APs, QCOM's MSM8974, APQ8064 and MSM8960, etc.
- The die size of 85-125mm translates to 400-500 good dies per 12" wafer, considering a 75-85% yield rate, by our calculations.
- In the transition from 65nm to 45nm and from 45nm to 28nm, we are seeing a general trend to die size expansion, despite area shrinkage of c.50%. In the transition to 20nm/16nm, we would expect high-end smartphone chip vendors to face the dilemma: should they add more high-end features (which will make die sizes bigger even with area shrinkage) to make more powerful chips despite high-end smartphone demand seeming to look saturated now and with many high-end features becoming unnecessary (eg, 4k2k display on a mobile phone?). Or, if they should start considering cost more (which means adding high-end features only "moderately", so that die size would not grow further).

- While at this stage, we are seeing chip vendors with both mindsets in designing their next-gen chips, we tend to think the "over-spec" flagship chip to have weaker-than-expected sales, so that overall 20/16nm high-end smartphone chip average die size would likely fall from 2014F (which means the current 85-125mm die size is already the peak for high-end smartphones), in our view. We expect high-end smartphone die size to shrink by 5-10% pa in 2013-15F in our model, which justifies our view of the saturation of high-end smartphone technology upgrades (Fig 14).

Fig. 14: Die size trends of high-end smartphone chips, 2010-15F

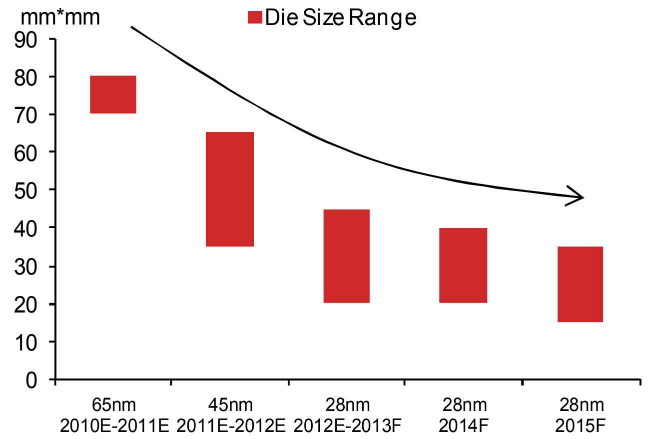
High-end SP blended die size expansion is likely peaking in 28nm



Source: Nomura estimates

Fig. 15: Die size trends of low end smartphone chips, 2010-15F

Low end SP blended die size is likely to continue to shrink

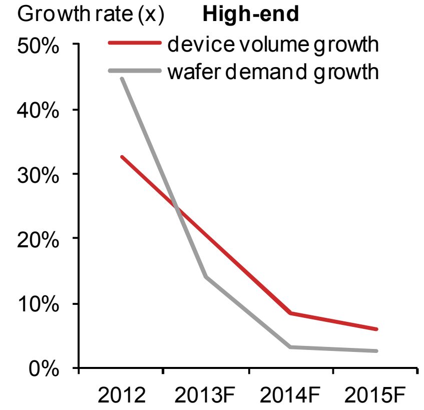


Source: Nomura estimates

- In the low-end smartphone chip segment, where we believe competition is the most severe, we have seen the opposite. Due to the severe competition among QCOM, MediaTek, SPRD etc, die sizes of low-end smartphone chips have shrunk meaningfully with the node migration. For example, both QCOM's 7227 (65nm, 600MHz single-core AP) and MediaTek's 6573 (65nm, 650MHz single0core AP) had die sizes of 70-80mm2, on our estimates.
- After low-end chips migrated to 40/45nm, the die size of QCOM's S200-level chips (ie, the lowest-end segment defined by QCOM) and MediaTek's 6575/6577 were shrunk by 30-60% (vs 65nm chips), by our estimates.
- Die size shrinkage is continuing into the 28nm node for the low-end smartphone segment. We estimate the die size of QCOM's S200-level quad core chips using 28nm and MediaTek's quad core 28nm chips are 40-70% smaller than their 65nm single core chips.
- MediaTek's cost optimization in the transition to 28nm and 40/45nm from 65nm has been much better than QCOM's, which also explains why MediaTek could gain share from QCOM significantly over the past two years with GPM growth despite QCOM sharply cutting its chip prices. (For more details please see our MediaTek report published today "*MediaTek - A deeper dive in die cost supports our Buy*").
- SPRD hasn't experienced a node migration for smartphone chips thus far. It only has two smartphone chips in volume, including a single-core 8810/6820 and dual-core 8825/6825, both of which are using 40nm. One reason for it to remain at 40nm longer than the others, in addition to a longer technology learning curve, is the cost subsidies from China's government by using SMIC's 40nm process.
- Low-end smartphone volumes took off in 2012 (mainly using 65nm and 45nm) and accelerated in 2013 (mainly using 45nm and 28nm). With node transition, we estimate the average low-end smartphone chip die size will shrink by ~40% y-y in 2013, which should see demand for 12" wafers for low-end smartphones grow by 20% y-y only, despite us estimating that low-end smartphone volumes will grow by 67% y-y in the same period (Fig 18).

Fig. 16: High-end smartphone demand growth vs wafer demand growth, 2012-15F

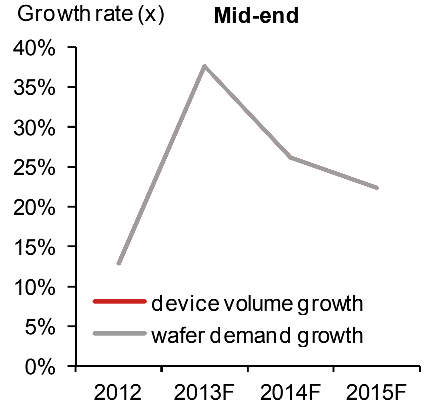
Wafer demand should grow less than device demand from 2013 onward



Source: Nomura estimates

Fig. 17: Mid-range smartphone demand growth vs wafer demand growth, 2012-15F

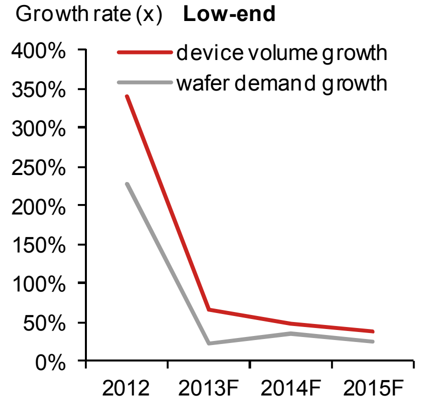
Assuming wafer demand and device demand growth are in line



Source: Nomura estimates

Fig. 18: Low-end smartphone demand growth vs wafer demand growth, 2012-15F

Wafer demand has been consistently weaker than device demand on die shrinkage

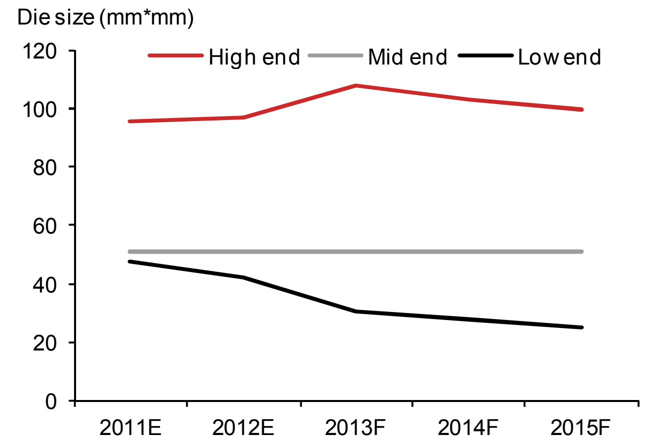


Source: Nomura estimates

- Looking forward, unlike high-end smartphone chips, which we estimate should migrate to 20nm in 2014 and 16nm in 2015 (to pursue performance), we expect mainstream low-end smartphone chips to remain at 28nm before 2015, given our view that 28nm can offer the best C/P value for low-end smartphone chips in these two years.
- With likely no meaningful node migration by 2015F, we expect die shrinkage to slow to 10% y-y p.a. in 2014F and 2015F. Though we expect competition to drive pressure for die shrinkage, feature additions (ie, spec upgrades) for this segment will likely also add to die size, which together leads to our forecasts (see Figure 15).
- As for mid-end smartphone chips, we simply assume die size to be in the middle of high-end and low-end chips and assume its die size to remain unchanged through our forecast period (Figs 19-20).

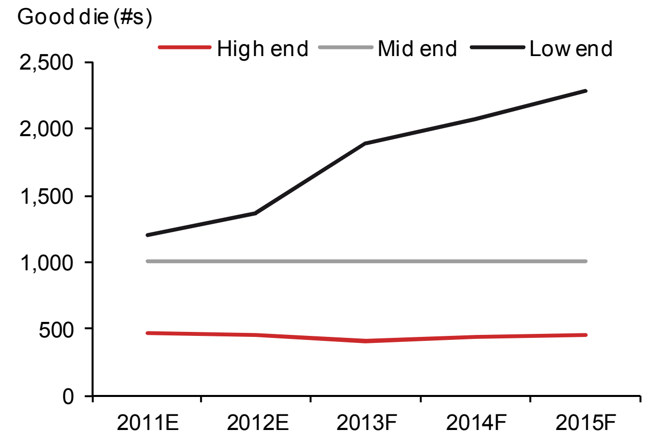
Fig. 19:(Blended) die size trend by price segment, 2011-15F

High-end AP/BB die size likely peaking at 28nm; low-end AP/BB die size continuous to shrink



Source: Nomura estimates

Fig. 20: The number of good dies per wafer by price segment, 2011-15F



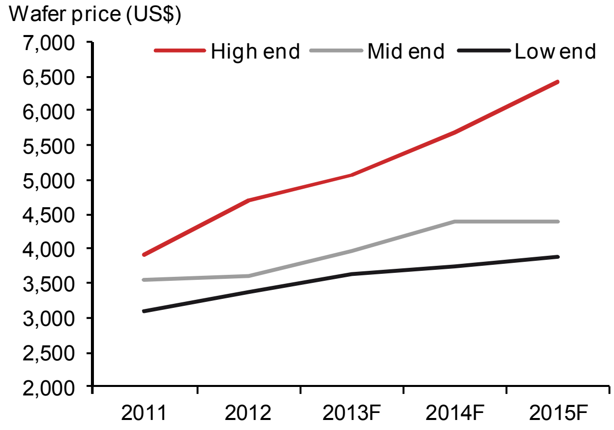
Source: Nomura estimates

- As for wafer pricing, we expect high-end smartphone chip wafer prices to sequentially rise from 2011 to 2015 due to the consistent pursuit of best performance using leading technology nodes. Wafer price increased significantly in 2012 due to the high-end smartphone chip transition to 28nm from 40nm. We expect the next big jump to take place in 2014F with migration into 20nm from 28nm, led by Apple iPhone chips.
- Low-end smartphone chip wafer pricing should also see an upward trend, albeit much more moderate than for high-end smartphone chips. In 2013, we estimate still 80% of

low-end chips will be produced at 40nm (ie, from SPRD, Leadcore, BRCM, etc), with only 20% at 28nm. In 2014, we expect a significant wave of transition into 28nm from 40nm, thanks to second tier chip vendors' move to 28nm PolySiON technology, which will likely see blended wafer pricing of low-end chips rise in 2014 (Figs 21-22).

Fig. 21: Smartphone chip wafer pricing trends by price segment, 2011-15F

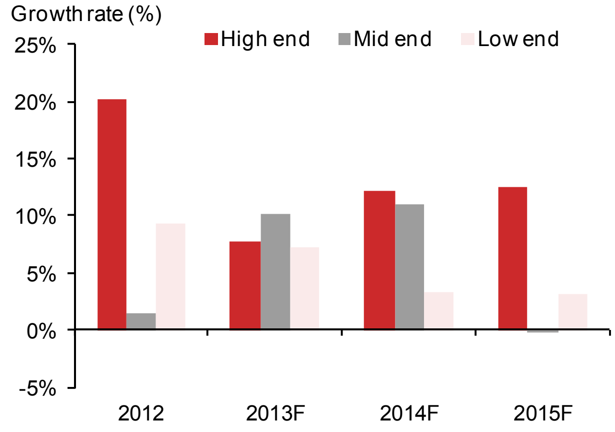
Node migration to push ASP upward



Source: Nomura estimates

Fig. 22: Smartphone chip wafer price changes by price segment, 2011-15F

High end AP/BB wafer prices to grow more on pursuit of performance



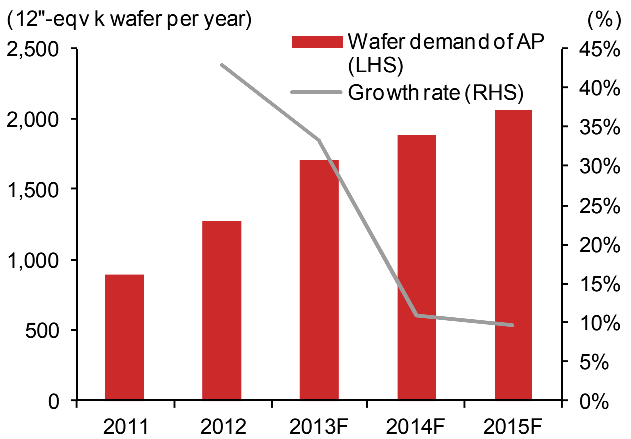
Source: Nomura estimates

Conclusion 1: AP/BB wafer value should grow less than device volume in 2014-15F, reversing from outgrowth in 2011-13

- In terms of wafer consumption, while low-end smartphone volume growth is significant, it may not be enough to offset high-end smartphone demand saturation. By our estimates, the die size difference between high- and low-end smartphones is not only big but also growing. For example, in 2011-12, the die size difference was only about 2-3x, but we expect this to expand to 4-5x in 2014-15F, which means it would take 4-5x more incremental volume growth of low-end smartphones to offset one incremental volume decline of high-end smartphones, in order to keep smartphone chip wafer demand unchanged.
- Thus, wafer demand from smartphone chips is slowing faster than smartphone volume demand from 2013 (when the low-end smartphone segment starts to outgrow the overall sector). Despite smartphone volume demand growth of 37%, 26% and 19% in 2013/14/15F, wafer demand is only likely to grow by 33%, 11% and 10%, respectively, by our estimates (Figs 23-24).

Fig. 23: Smartphone AP wafer demand and growth, 2011-15F

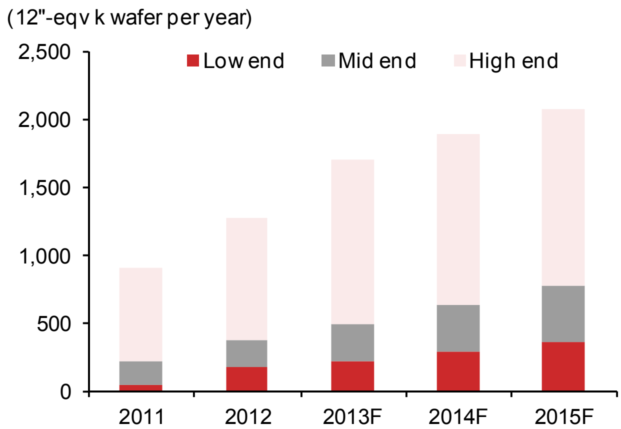
Wafer demand to slow in 2014-15F



Source: Nomura estimates

Fig. 24: Smartphone AP wafer demand by price segment, 2011-15F

High-end AP to consume the majority of wafer demand

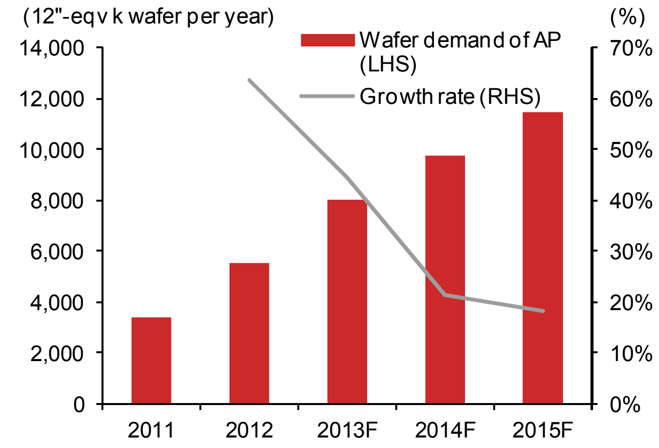


Source: Nomura estimates

- **Wafer value consumption by high-end and low-end smartphones is even wider**, considering high end chips' pursuit of stronger performance and low-end chips' pursuit of cost optimization (Figs 25-26).

Fig. 25: Smartphone AP wafer value and growth, 2011-15F

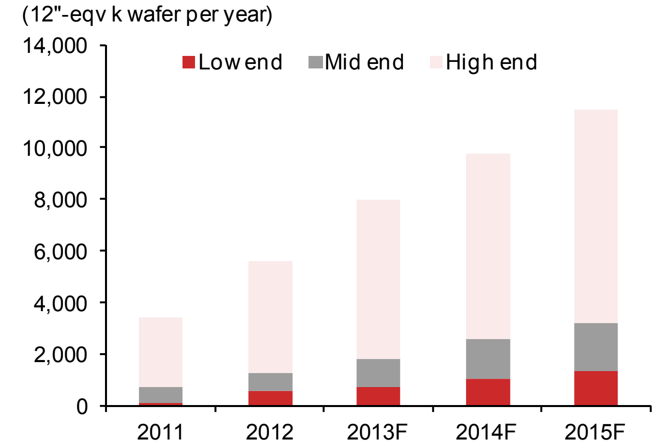
Wafer value to slow in 2014-15F



Source: Nomura estimates

Fig. 26: Smartphone AP wafer value by price segment, 2011-15F

High-end AP to consume majority of wafer value

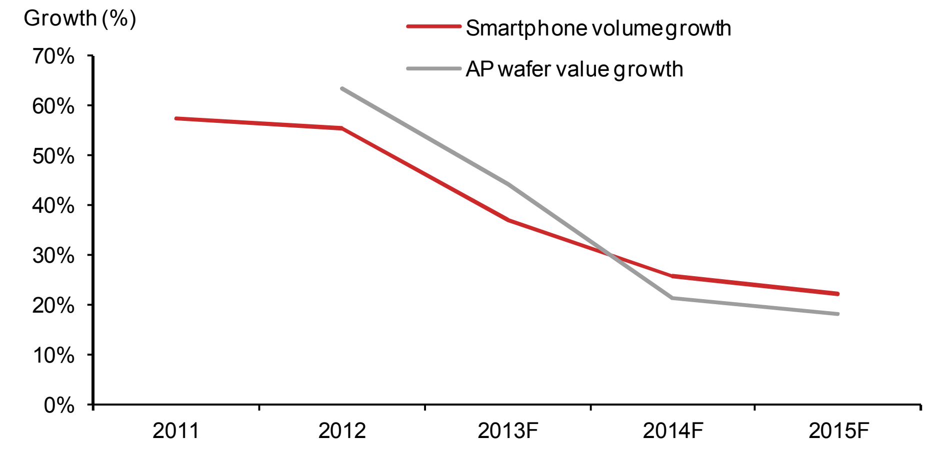


Source: Nomura estimates

- **AP Semi wafer value likely to grow less than smartphone device volume in 2014-15F, reversing from outgrowth in 2011-13**. We expect AP wafer value to grow by 64% and 44% respectively, in 2012 and 2013, outpacing smartphone volume growth of 55% and 37% in the same period, thanks to high-end smartphone die size expansion. However, AP Semi wafer value is likely to grow less than device volume from 2013F onwards on the peaking of high-can end AP die size and demand mix shifting to low-end AP (Fig 27).

Fig. 27: Growth comparison – smartphone volume vs. AP/BB wafer value

AP/BB wafer value to grow less than smartphone volume in 2014-15, reversing from higher growth in 2011-13



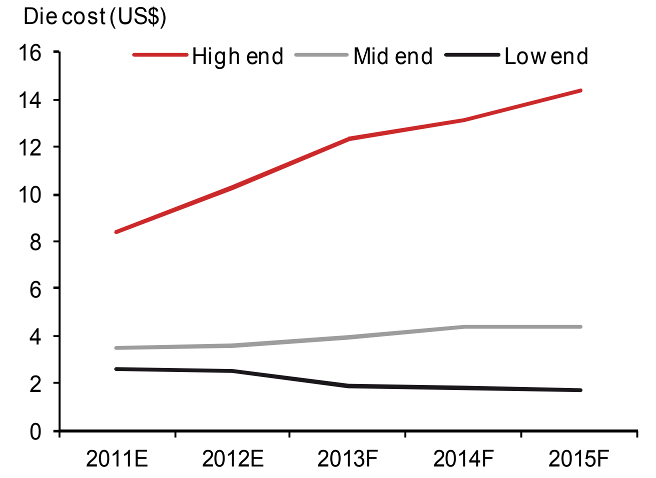
Source: Nomura estimates

Conclusion 2: Die cost of low- and high-end AP is diverging

- **We estimate die costs of high- and low-end smartphone chips at about US$12.3 and US$1.9 respectively in 2013, but will be about US$14.3 and US$1.7 in 2015.** Of note, high-end smartphone chips include both stand-alone AP (eg, QCOM's APQ064, nVidia's Tegra, Apple's Ax, Samsung's Exynos, etc) and BB and AP SOC, while most mid- and low-end smartphone chips are BB and AP SOC.

Fig. 28: Smartphone AP die cost by price segment, 2011-15F

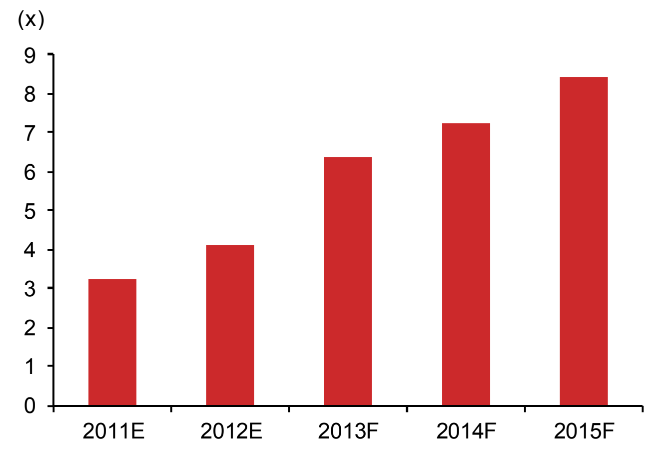
High-end AP die cost is sequentially growing



Source: Nomura estimates

Fig. 29: Die cost gap between high- and low-end smartphone, 2011-15F

The gap between high- and low-end die costs is widening



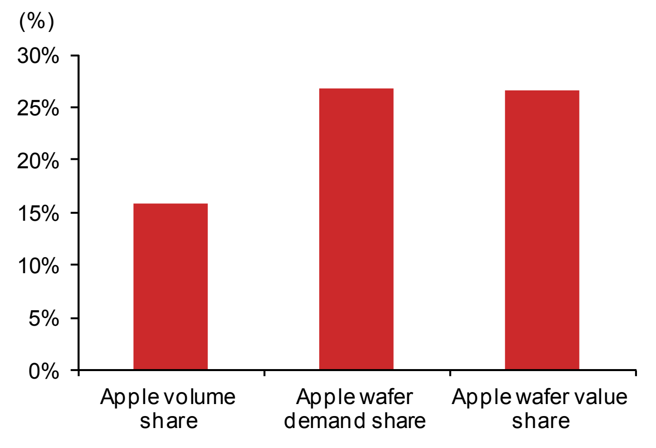
Source: Nomura estimates

Conclusion 3: Apple is very important as a foundry client

- By our estimate, in 2013, Apple should account for 16% of global smartphone demand, but its share at AP wafer volume demand and AP wafer value would be as high as 27% on its big die size. Apple's importance as a foundry client would likely be rising further into 2015 with Apple's full-scale migration to the most advanced nodes (ie, 20nm in 2014 and 16nm in 2015) (Fig 30).
- Apple's rising importance as a foundry client can be seen from die cost change. With migration to 20nm and 16nm earlier than its peers, we expect iPhone's die costs to rise to US$13.3 and US$14.6 in 2014-15, respectively, from US$11.6 in 2013 (Fig 31) .
- Why is Apple so important as a foundry client? 1) **iPhone AP carries one of the biggest die size among peers**, since it is one of the most high end chips in the market; 2) **Apple's model transition is full scale** (so volume impact is significant) given that it only has one flagship model a year; 3) **The yield rate of producing Apple's new AP could be lower than producing other high end chips**, given the likely longer learning curve since Apple is now becoming the very first wave user of new nodes (vs. the other first wave users, e.g. QCOM and nVidia, and second wave users, e.g. MediaTek). Thus, even with the same die size, we believe Apple could possibly consume more wafers than other chip vendors.

Fig. 30: Apple iPhone volume share, wafer demand share and wafer value share, 2013F

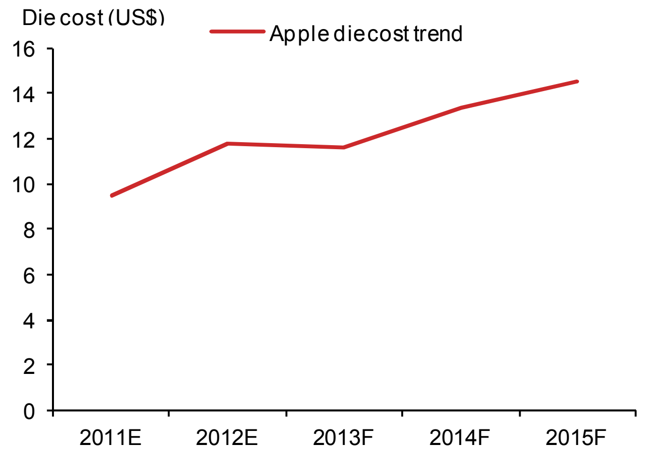
Apple AP's wafer value share is double its iPhone unit share



Source: Nomura estimates

Fig. 31: Apple iPhone die cost trends, 2011-2015F

IPhone die cost on the rise in 2014-15



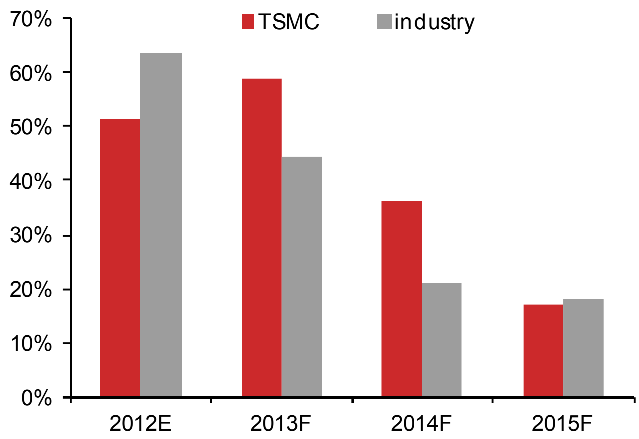
Source: Nomura estimates

Conclusion 4: Without Apple iPhone AP, TSMC is likely to grow less than the smartphone AP wafer industry

- Following conclusion 3, we believe it is unlikely that TSMC can continue its smartphone chip wafer volume growth by much in 2013-2015 without Apple orders due to market share loss to other foundries in the mid-end and particularly the low end segment (at the node of 28nm PolySiON).
- However, with Apple AP orders coming through from 2014F, we expect TSMC to outgrow the industry meaningfully. With Apple iPhone orders, we expect TSMC to grow its smartphone AP wafer value by 36% and 17% in 2014-15F, respectively, vs. industry-wise AP wafer value growth of 21% and 18%. However, without Apple, TSMC's growth will likely slow to 14% and 0% respectively (Figs 32-33).
- With Apple, we estimate that TSMC's sales from smartphone AP would be US$6bn and US$7bn in 2014-15F, but would be only US$5bn in each year without Apple, by our estimates (Fig 34).

Fig. 32: Comparison of growth – TSMC's smartphone AP wafer value (with Apple) vs. industry, 2013-15F

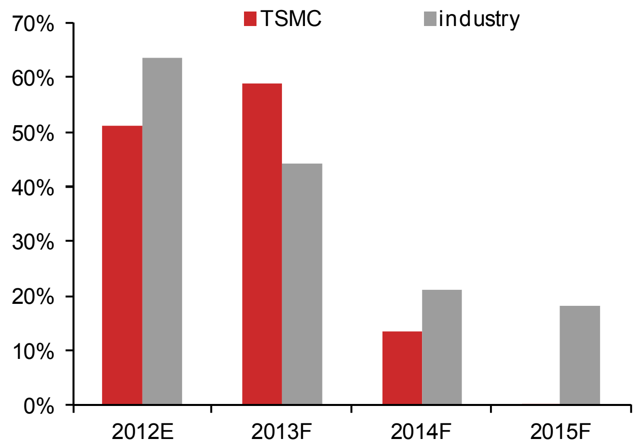
With Apple iPhone AP, TSMC is likely to outpace the smartphone AP wafer industry



Source: Nomura estimates

Fig. 33: Comparison of growth – TSMC's smartphone AP wafer value (without Apple) vs. industry, 2013-15F

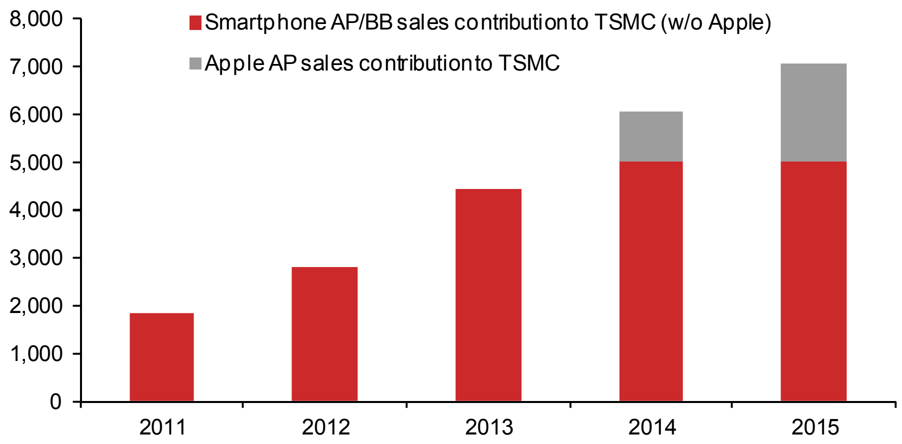
Without Apple iPhone AP, TSMC is likely to grow less than the smartphone AP wafer industry



Source: Nomura estimates

Fig. 34: Apple's iPhone AP sales contribution to TSMC

Without Apple, TSMC sales from smartphone AP/BB are unlikely to grow much in 2014-15F



Source: Nomura estimates

LTE modem Semi value – a side dish compared to AP/BB Semi

4G LTE is gaining popularity and may accelerate after China grants 4G licenses in end-2013 or early 2014. Thus, investors are interested in understanding how LTE could help foundry wafer demand. We conclude that LTE modem wafer demand is small vs. AP wafer demand but TSMC is likely to gain share from 2014F after the rapid deterioration in market share in 2012 and thus far in 2013.

Assumptions

- The LTE or 3G modem demand is partnering with stand-alone AP in smartphone space. Since AP and modem SOC is a trend, we can expect the portion of standalone AP (and the partnered independent 3G/4G modem) to fall every year in the future (Fig 36).
- We have seen significant LTE modem die size shrinkage (of about 50%) in the transition to 28nm (eg, QCOM's 9615M) from 40nm in 2013. We assume die size shrinkage to continue in 28nm HKMG and 20nm (Fig 35).

Fig. 35: Example of LTE modem technology transition – QCOM roadmap

LTE modem to migrate to 20nm in 2014F

	9x15M	9x25	9x35
Node	28nm PolysiON	28nm HKMG	20nm
Time of mass production		3Q13	3Q14
Package size	10x10	9x9	9.8x8.6
LTE spec	Rel 9 LTE TDD/FDD Cat3: (100/50 Mbps) Rel 8 DCHSPA+ (42/5.76 Mbps)	Rel 9 LTE Cat4: (150 Mbps) Rel 10 LTE-FDD CA	Rel 10 LTE-FDD/TDD 40mHz CA LTE Cat 7 D/U: 300/100 Mbps

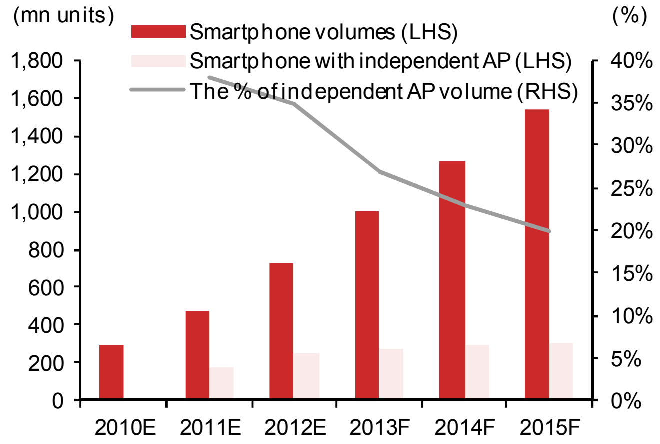
Source: Qualcomm, Nomura estimates

Conclusions

- We estimated independent smartphone modem wafer demand to be 200-250 thousand 12" wafers per year in 2013 with c.US$1-1.1bn sales, which is c.12% of smartphone AP/BB wafer value. Of which, 90% value is from LTE and only about 10% is from 3G (Fig 37).
- With gradually declining penetration of independent modems in the smartphone market, we expect wafer value of independent modems to grow to US$1.1-1.2bn only in 2015F, which would be only 10% of smartphone AP/BB wafer value in 2015.

Fig. 36: Smartphone with independent modem, volume and share, 2011-15F

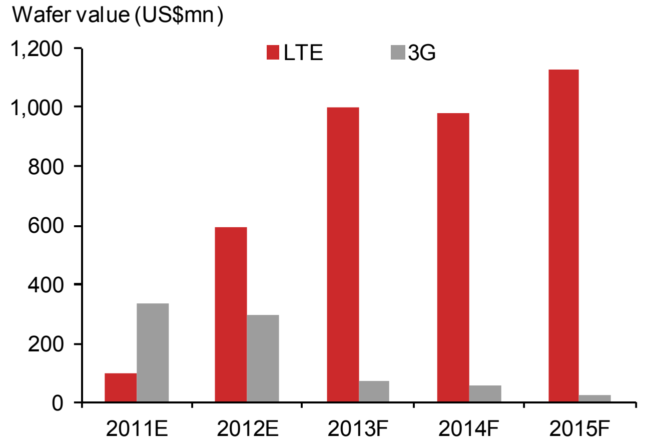
The percentage of smartphones with independent modem is coming down



Source: Nomura estimates

Fig. 37: Smartphone independent modem wafer value, LTE vs. 3G, 2011-15F

LTE is a clear trend

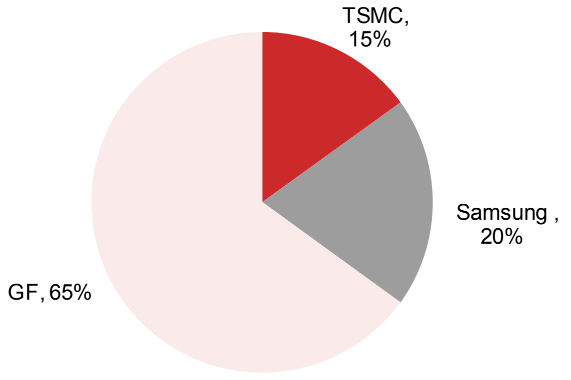


Source: Nomura estimates

- TSMC has been losing share in this market rapidly in 2013, by our industry survey, due mainly to QCOM's order shifting to Samsung and particularly Global Foundries. We estimate that TSMC may only have c.15% share in this segment in 2013, down sharply from 50% in 2012. Global Foundries, in our opinion, is the biggest share gainer in LTE modem foundry market over these three years with market share of 60-70% in 2013, by our estimate (Fig 38).
- However, we expect the market share to be more balanced in the next two years with the node migration to 28nm HKMG and 20nm, given that both TSMC and Samsung are more ready than Global Foundries in the new nodes (Fig 39).

Fig. 38: LTE modem foundry market share – 2013

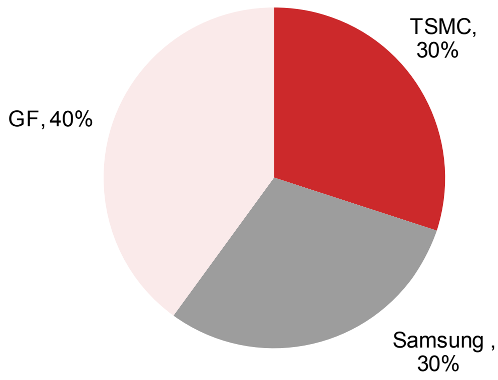
GF is the biggest LTE modem foundry in 2013



Source: Nomura estimates

Fig. 39: : LTE modem foundry market share – 2015

We expect TSMC and Samsung to gain share from GF through 2015

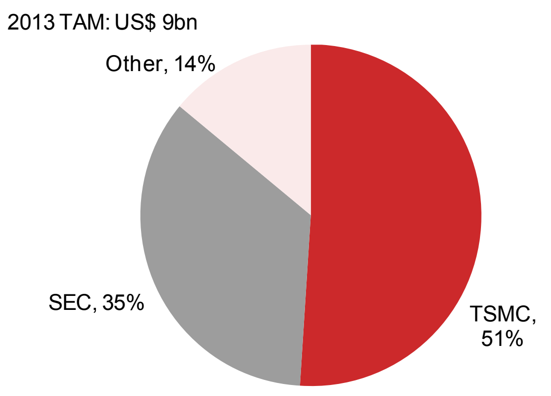


Source: Nomura estimates

We estimate that 40-50% of communication sales of TSMC are from smartphone AP/BB

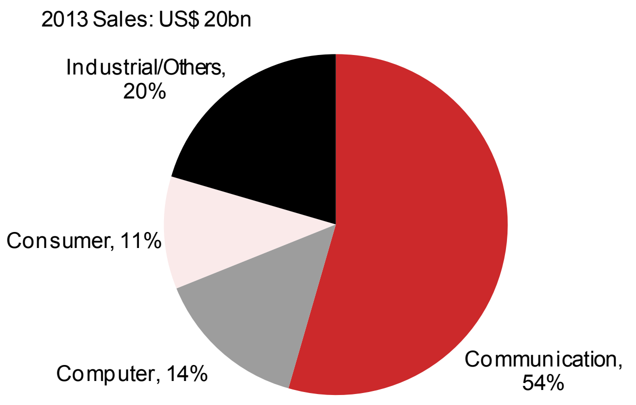
- Combing the numbers of independent modem and smartphone AP/BB, we estimate global smartphone AP/BB wafer volume demand at c.2mn units of 12" wafers (equivalent to about 4.5mn units of 8" wafers) in 2013. The value is as high as US$9bn per year in 2013, which is the smartphone AP Semi wafer TAM (excluding tablets) for foundry companies (Fig 40).
- For comparison, TSMC 8"-equivalent wafer volume shipments in 2013 is c.16mn units while its sales in 2013 should be about US$20bn. Considering that TSMC takes about 50+% share in smartphone AP/BB wafer value and TSMC has 50-55% sales contribution from communication applications, we estimate smartphone AP/BB alone contributes 40-50% of communication application sales, or 20-25% of TSMC's total sales. Smartphone AP/BB is likely the single product with the biggest sales contribution to TSMC, in our view (Fig 41).

Fig. 40: Foundry market share in terms of smartphone AP/BB wafer value, 2013F



Source: Nomura estimates

Fig. 41: TSMC's sales mix by application, 2013F



Source: Nomura estimates

Apple to become TSMC's second-largest customer by 2015F

As for Apple's iPhone/iPad order allocation, we believe TSMC will grab all 2014F (A8) new projects while Samsung and TSMC will likely share 2015F (A9) projects. It seems that Intel is not included on the foundry vendor list for Apple's iPhone/iPad AP over the next two years. We believe Intel's earlier chance in being Apple foundry would be for AP for wearable devices or TVs. We expect 7% and 12% sales contribution to TSMC from Apple iPhone/iPad AP in 2014 and 2015, respectively.

TSMC the sole supplier for Apple 2014 iPhone/iPad (A8) APs; Samsung to share orders in 2015 (A9); Intel is not in sight yet

We conducted a detailed analysis to gauge Apple AP foundry market shares and its sales contribution to existing supplier, Samsung S-LSI, and new-comer, TSMC, in Figures 42-44.

Assumptions:

- We assume that wafer suppliers would prepare 15% additional volumes as back-up inventory vs. iPhone/iPad device volume.
- We have a strong assumption that the die size of A8 (20nm) and A9 (16nm) will start decreasing from A7 (28nm HKMG), echoing our thesis in the prior section that industry-wise high end smartphone chip die sizes will start to come down from 20nm considering that smartphone spec upgrades are seeing saturation.
- We assume it will take 5-6 quarters before the yield rate grows to the 80-85% maximum level.

Conclusion:

- We expect Apple iPhone and iPad AP together to consume US$4bn and US$5.1bn of wafer value in 2014 and 2015, respectively, up sharply from US$3bn in 2013, with transition to 20nm and 16nm.
- With our assumption that TSMC will get 100% of Apple's 2014F new projects (at 20nm) while TSMC and Samsung will share Apple's 2015F projects (at 16/14nm), we expect TSMC to take 39% and 66% wafer value share at Apple in 2014F and 2015F, respectively.

We expect Apple iPhone/iPad to contribute US$1.5bn sales and US$3.4bn sales to TSMC in 2014 and 2015, respectively, accounting for 7% and 12% of TSMC's sales.

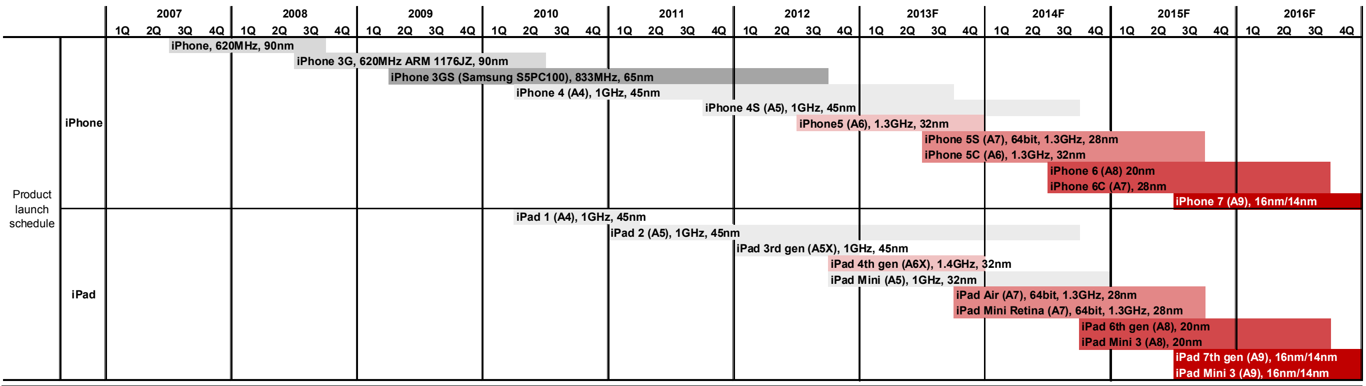
Fig. 42: Apple AP spec

A7 would be shared by iPhone 5S, iPad Air and iPad mini Retina

Name	A4	A5		A5X	A6	A6X	A7
Image							
Semiconductor technology	45nm	45nm	32nm HKMG	45nm	32nm HKMG	32nm HKMG	28nm HKMG
Die size (mm2)	53.3 (7.3x7.3)	122.6 (12.15x10.09	71.1 (8.19x8.68)	165.1 (12.9x12.8)	96.7 (9.7x9.97)	123 (10.4x11.9)	102
CPU	Cortex-A8 core 800 MHz to 1 GHz	Cortex-A9 800 MHz to 1 GHz		Cortex-A9 1 GHz (dual Arm-core processors and a quad-core PowerVR GPU)	Cortex-A15 1.3 GHz (custom layout CPU; GPU core x 3 , 5.4mm2 each)	Cortex-A15 1.4 GHz (custom layout CPU; GPU core x 4, 8.7mm2 each)	Cortex-A15 1.4 GHz (custom layout CPU; GPU core x 4, 8.7mm2 each)
Package	Package on Package (PoP)						
Memory technology	32-bit Dual-channel 200 MHz LPDDR (3.2 GB/sec)	32-bit Dual-channel 400 MHz LPDDR2 (6.4 GB/sec)	32-bit Dual-channel 400 MHz LPDDR2 (6.4 GB/sec)	32-bit Quad-channel 400 MHz LPDDR2 (12.8 GB/sec)	32-bit Dual-channel 1066 MHz LPDDR2 (more than 12.8 GB/sec)	32-bit Quad-channel LPDDR2	64-bit Quad-channel LPDDR2
End devices	iPad, iPhone 4, iPod Touch (4th gen.) and Apple TV (2nd gen.)	iPad 2 and iPhone 4S	Apple TV (3rd gen.), iPad 2, iPod Touch (5th gen.) and iPad mini	iPad (3rd gen.)	iPhone 5	iPad (4th gen)	iPhone 5S, iPad Air and iPad mini Retina
Launch date	March 2010	March 2011	March 2012	March 2012	September 2012	October 2012	September 2013

Source: Company data, Nomura research

Fig. 43: Apple product launch schedule



Source: Company data, Nomura estimates

Fig. 44: iPhone and iPad 2011-2015F sales contribution to Samsung S-LSI and TSMC

iPhone and iPad APs to contribute to 7%/12% of TSMC 2014F/2015F sales

iPhone	2011	2012	2013F	2014F	2015F	Note	iPad	2011	2012	2013F	2014F	2015F
iPhone volume (mn)	84	139	160	178	196		iPad volume (mn)	40	65	67	92	109
iPhone volume with inventory (mn)	96	160	184	205	225	Additional 15%	iPad volume with inventory (mn)	46	75	77	106	125
Blended die size (mm2)	88	105	103	99	89		Blended Die size (mm2)	117	127	96	94	94
Blended gross die per wafer	631	539	553	579	657	300mm wafer	Blended gross die per wafer	479	433	598	589	613
Blended yield rate	67%	69%	73%	73%	71%		Blended yield rate	67%	73%	80%	84%	75%
Blended net die per wafer	421	373	405	422	466		Blended net die per wafer	322	316	476	494	458
Blended die cost (USD)	9.5	11.8	11.6	13.4	14.6	wafer price/net die	Weighted die cost	13.7	14.6	11.8	12.1	14.3
Wafer demand (12" k wafer)	229	428	454	485	484	Volume/net die per	Wafer demand (12" k wafer)	156	254	179	228	275
Blended wafer price (USD)	4,000	4,408	4,696	5,632	6,787		Weighted wafer price	4,000	4,313	5,076	5,634	6,529
Total wafer value (USDmn)	916	1,889	2,131	2,734	3,284		Total wafer value (USDmn)	624	1,095	908	1,283	1,792
iPhone shares between Samsung S-LSI and TSMC	**2011**	**2012**	**2013F**	**2014F**	**2015F**		**iPad shares between Samsung S-LSI and**	**2011**	**2012**	**2013F**	**2014F**	**2015F**
By device	96	160	184	205	225		**By device**	46	75	77	106	125
Samsung S-LSI	100%	100%	100%	75%	40%		Samsung S-LSI	100%	100%	100%	54%	30%
TSMC	0%	0%	0%	25%	60%		TSMC	0%	0%	0%	46%	70%
By wafer volume	229	428	454	485	484		**By wafer volume**	156	254	179	228	275
Samsung S-LSI	100%	100%	100%	73%	41%		Samsung S-LSI	100%	100%	100%	58%	30%
TSMC	0%	0%	0%	27%	59%		TSMC	0%	0%	0%	42%	70%
By wafer value	916	1,889	2,131	2,734	3,284		**By wafer value**	624	1,095	908	1,283	1,792
Samsung S-LSI	100%	100%	100%	63%	38%		Samsung S-LSI	100%	100%	100%	56%	27%
TSMC	0%	0%	0%	37%	62%		TSMC	0%	0%	0%	44%	73%

iPhone and iPad shares between Samsung S-LSI	2011	2012	2013F	2014F	2015F
By device (mn)	142	235	261	311	351
Samsung S-LSI	100%	100%	100%	**65%**	**26%**
TSMC	0%	0%	0%	**35%**	**74%**
By wafer volume (12" k wafer)	385	682	633	713	758
Samsung S-LSI	100%	100%	100%	**68%**	**37%**
TSMC	0%	0%	0%	**32%**	**63%**
By wafer value (USDmn)	1,540	2,983	3,039	4,018	5,077
Samsung S-LSI	100%	100%	100%	**61%**	**34%**
TSMC	0%	0%	0%	**39%**	**66%**
Apple sales to Samsung (US$)	1,540	2,983	3,039	2,454	1,717
Apple sales to TSMC (US$)				1,563	3,360
TSMC corporate sales (USDmn)	14,543	17,116	20,127	23,681	27,122
Apple contribution %	0%	0%	0%	**7%**	**12%**

Source: Company data, Nomura estimates

x86 threat to ARM? Issue not only about node migration, but entire ecosystem

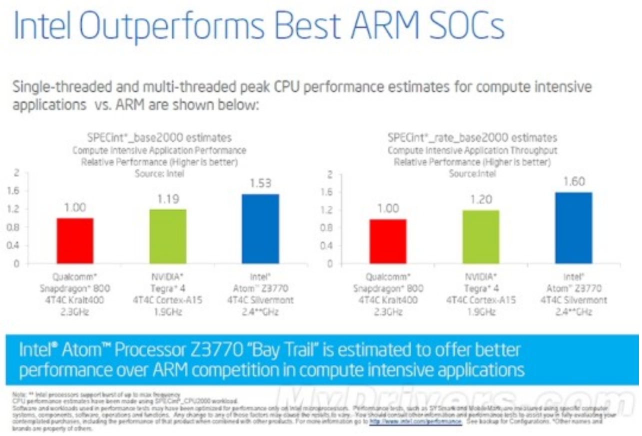
Intel's threat to TSMC comes in two ways: 1) Intel x86 CPU's progress in the mobile device market; and 2) Intel's possibility to do ARM foundry (eg, obtain Apple orders). We discuss the first topic here and conclude Intel "technologically" has indeed caught up quickly in the tablet CPU market with the ARM camp though it has an ecosystem problem (as discussed below) but Intel's success in smartphone CPU remains distant by 2015F.

The big industry debate this year – x86 vs. ARM: which one is superior?

The big industry debate between Intel and ARM this year is whether Intel has caught up with ARM in terms of performance and power consumption in mobile devices after the launch of 22nm Bay Trail (using Silvermont core).

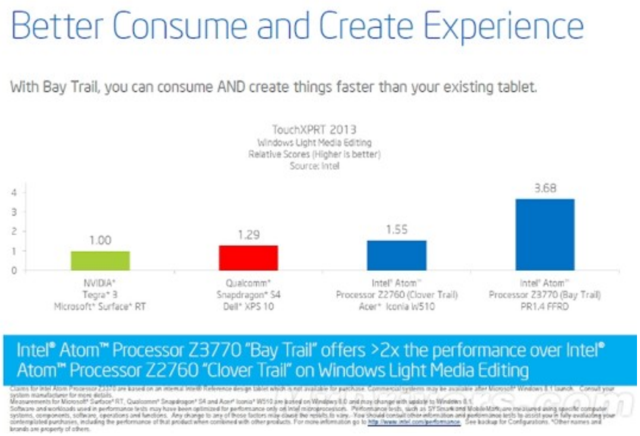
"*We're breaking the myth that ARM can do things that Intel cannot*," "*Cortex-A15 is not even close to Silvermont. They are higher power and much behind us on performance which means they are on the wrong scale.*" As stated by Dadi Perlmutter, executive VP, general manager of the Intel Architecture Group, and Intel's chief product officer, during the Silvermont event in June 2013 (Figs 45-46).

Fig. 45: Intel - Intel Outperforms Best ARM SOCs
Intel's perspective



Source: Intel

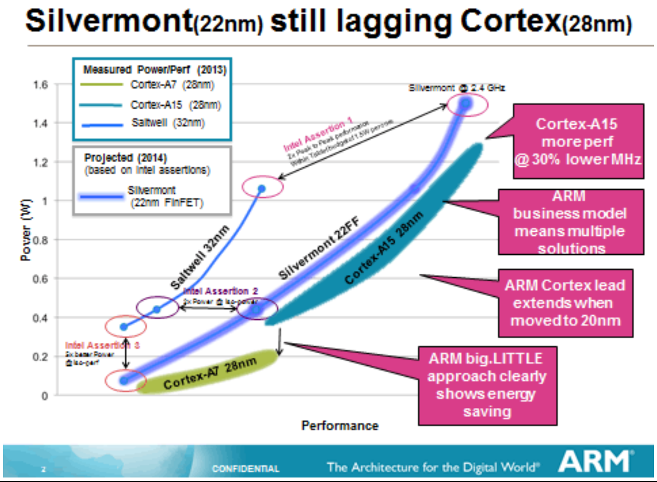
Fig. 46: Intel - Better Consume and Create Experience
Intel's perspective



Source Intel

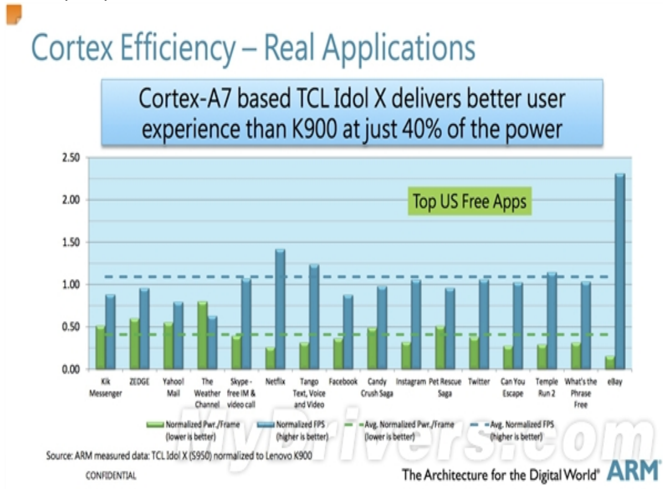
ARM responded immediately in June 2013 Taiwan Computex. "*Our analysis shows that we're more than a generation ahead. We've maintained our leadership in this place*," "*ARM's processors today—including the high-end Cortex A15 and low-end A7 chips—will beat Intel's chips based on the Silvermont*", "*The A15 and A7 on 28-nanometer is outstripping Silvermont on 22-nanometer FinFET*," said Noel Hurley, VP of marketing and strategy at ARM's processor division, at the news conference, June 2013 (Fig 47-48).

Fig. 47: ARM – Silvermont (22nm) still lagging Cortex (28nm)
ARM's perspective



Source: ARM

Fig. 48: ARM – Cortex Efficiency in Real Applications
ARM's perspective



Source: ARM

Our view: Intel's manufacturing advantage favors x86 over 20/16nm ARM SOC on Intel's full extension of Moore's Law…

Morris Chang, chairman of TSMC, confirmed at its 1Q13 earnings call that the cost per transistor in the transition to 20nm from 28nm will not fall as much as the transition to 28nm from 40nm (ie, slowdown of Moore's Law) ("From 28nm to 20nm, cost per transistor decrease will be smaller than those from 40nm to 28nm. But 20nm provides better performance and power consumption to offset this smaller cost reduction, making 20nm still an attractive node to customers" as per Morris Chang). As well, we expect limited area shrinkage in the transition to 16nm FINFET from 20nm for TSMC though performance and power consumption will likely be improved ("16nmFF is expected to deliver about 25% speed gain given the same standby power over the 20nm SoC. It's expected to give 25-30% power reduction at the same speed and the same standby power. And for mobile products, it's expected to give 15% to 20% speed gain at the same total power" as stated by Morris Chang).

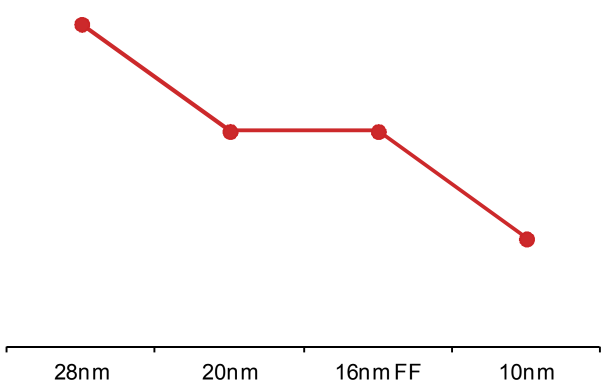
On the other hand, Intel reiterated its view at 2013 Intel Developer Forum (IDF) that Moore's Law would continue to work into the 10nm from its sight. Combining the view from both companies (which we believe are both true statements, from our market surveys), we can conclude that Intel's cost per transistor will improve more than TSMC's at 22nm/20nm and 14nm/16nm.

In the past, Intel's cost per transistor has been consistently higher than TSMC's due to Intel's heavy depreciation (ie, Intel has 2-4 years depreciation for its equipment vs TSMC which has 6 years depreciation – due to TSMC's extension of mature node life cycle for second wave or third wave customers which Intel doesn't have). However, the cost gap (per transistor) will be narrowed in 22nm/20nm and narrowed further in 14nm/16nm (but Intel's cost would still be higher), from our customer survey (Figs 49-50).

Thus, we believe that "technologically" Intel at 22nm/14nm nodes will improve more than what TSMC can improve at 20nm/16nm nodes in terms of transistor cost gap. Intel is making other changes as well. The 22nm Bay Trail chipset represents Intel's revamped Atom product line with major architectural changes which include out-of-order execution engines, four cores up from one or two cores in the prior chip, and significantly improved graphics engine. Bay Trail chips have substantially improved CPU (higher by 3x) and GPU (higher by 5-6x) performance over Atom chips. In addition to these changes, Intel for the first time is pushing the Bay Trail chips to the leading edge of manufacturing process technology (22nm). What is also interesting about Bay Trail is that Intel is offering a high performance processor at competitive price points ($10-40). Intel needed to enhance the value proposition to effectively compete with ARM-based tablets, which are proving to be better in power and performance than the prior-generation Atom chips.

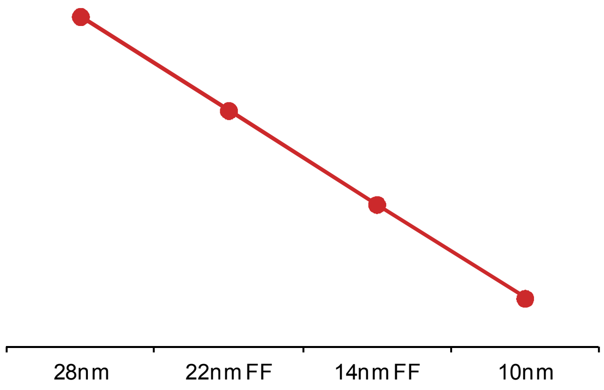
While Intel is also focusing on Android tablets, we think Windows 8.1-based tablets continue to be a differentiated play for Intel. We expect Bay Trail devices to enter into the market starting in 4Q13F. Intel also has a multi-mode LTE data-only modem that is available for commercial shipments. We think Bay Trail chipsets and LTE modems could gain some traction in the tablets space. We note that Samsung Tab 3 10.1 is using Intel's data-only LTE modem. That said, we think Intel's traction in smartphones could take longer. The reasons for that are Intel's lack of integrated LTE modem (both data and voice) and the fact that x86 is not native to Android. While the latter issue may not be a constraint with big vendors, we think Intel would have to hand-hold among the smaller vendors, white box players would have to optimize Android apps on its x86 platform to win their business. As such, we don't see Intel gaining a meaningful share in smartphones in the near term.

Fig. 49: Cost per transistor – TSMC's progress
TSMC's cost per transistor decrease will likely pause at 20/16nm



Source: Nomura estimates

Fig. 50: Cost per transistor – Intel's progress
Intel's cost per transistor decrease should continue in 22nm and 14nm



Source: Nomura estimates

From our interviews with Intel's PC, tablet and smartphone customers, below we uncovered additional issues that may continue to prohibit Intel's success in the mobile market:

First, x86 system BOM cost is higher vs. ARM-based systems
Our research suggests that the cost of peripheral chips recommended by Intel is higher, making the BOM cost of Intel solution's unattractive vs ARM solutions. MediaTek is the opposite example which has enabled many low cost peripheral chips on its vendor list – which is one part of its well-known "turnkey service" – which makes the BOM cost of MediaTek solutions lower than others.

Intel's solution: Intel is aware of this issue and is planning to resolve it with the launch of Bay Trail's cost-down version in 2014 - Bay Trail CR (cost reduction) – for tablet application. Comparing with Bay Trail, Bay Trail CR BOM saves costs from smaller memory size (ie, cut to 1GB DDR3 from 2GB, with savings of US$5), the change of PCB board (ie, from HDI to Type-3 6 layer PCB board, with savings of US$3), integration of PMIC (from the currently recommended vendor Rohm, with savings of US$4), the integration of more passive components, etc (Fig 51).

With such efforts, Intel targets to reduce the BOM cost of x86 chip tablets to about US$100 and US$65-70 for US$149 and US$99 retail price tablets, respectively, by the middle of 2014 (Fig 50). However, whether Intel's plan is too idealistic is worth watching closely in our opinion.

Fig. 51: Bay Trail vs. Bay Trail CR

Bay Trail CR is a cost-reduction version of Bay Trail

	Category	Bay Trail - T	Bay Trail - CR
CPU / GPU	Cores, Frequency	Silvermont 4C/4T HFM - 1.8GHz, Turbo - 2.4GHz	Silvermont 4C/4T HFM - 1.3GHz, Turbo - 1.8GHz
	L2 Cache	1M shared per 2 cores	=baseline
	Graphics	Gen7 LP - 700+ MHz	Gen7 LP - 600 MHz
Package & PCB	Package	17x17 & 25x27 BGA	17x17mm BGA
	Ball Pitch	0.4mm (17x17)	0.65mm
	PCBA Board Layers	HDI 2-4-2+	Type-3 6L
	Component count	1168 (FFRD8)	485 (1x32 SKU)
Tablet FF	Tablet Z-height	< 8.5mm	=baseline
	Min Tablet FF	TBD	7" ~190mmx120mm
	Battery Life	Active: 12hrs - 15hrs Fuel Gauge Accuracy: +/- 2% Standby: 20 days	~10 hour (18Whr) Accuracy: +/-2% (Xpower) =baseline
Pwr	PMIC	Rohm BDD2610GW/HDI	TI/ Xpower Type-3 PMIC
	Fuel Gauge, Battery Charger	Discrete	Intergrated into PMIC
RDF	Low cost WiFi, GPS	TBD	Yes
	Low cost Display , Touch, et	TBD	Yes
SW/FW	OS Support	Android & Windows	Android foucused (Windows boot only)
	SPI NOR Size	8MB	2MB

Source: Intel

Fig. 52: The "ideal" BOM cost of Bay Trail CR (cost reduction) in 2014 back-to-school season

BTS'14 BAYT-CR	$149 retail price tablet BOM cost target		$99 retail price tablet BOM cost target	
Board	6-layer LDI 50-60cm^2	$2	6-layer LDI 40-50cm^2	$2
Power/Audio	New int. PMIC w/disc.audio	$1.5	New int. PMIC w/disc.audio	$1.5
Misc EEBOM	SPINOR, USB Phy, EEBOM	$6.5	SPINOR, USB Phy, EEBOM	$4.5
LCD/Touch	cheap 7" 8x12 MIPI w/touch	$40	cheap 7" 8x480 LVDS w/touch	$25
Storage & Mem	8GB eMMC, 1GB DDR3LRS	$10	4GB eMMC, 1GB DDR3LRS	$8
Comms	WiFi/BR 1x1 BGN, no GPS	$1.5	WiFi/BR 1x1 BGN, no GPS	$1.5
Cameras	2MP rear, 0.9MP front	$6	no rear camera, 0.9MP front	$2
Battery	12Whr	$8	8Whr	$6
Sensors	cheap accel / comp/ gyro	$1	cheap accel / comp/ gyro	$1
Enclosure & MBOM	cheap 7" plastic w/IO's	$5	cheap 7" plastic w/IO's	$4
Silicon	BYT-CR SOC (SKU TBD)	$20	BYT-CR SOC (SKU TBD)	$15
HW BOM (no OS)		$102		$69
Target		$99		$66

Source: Intel, Nomura estimates

Second, long design in cycle (for low-tier customers)

Our research highlights another issue that customers face with x86 chipsets. Most OEM customers indicated that it takes a longer design cycle time with x86 chips vs. ARM chips. By our estimate, it takes big customers (with Intel's full support) at least 6 months to enable Intel's AP chips (from design in to mass production) and an extra three months if customers also need to enable LTE modem from Intel. The bigger problem is that, if customers intend to enable peripheral chips which are not on Intel's vendor list, it takes much longer. However, it will take even longer if small customers intend to use Intel's chips, without Intel's full support. This is a problem particularly when low price mobile device makers (mainly in China) are used to the turnkey solutions with fast time to market.

Intel's solution: Intel is trying to provide reference designs and turnkey solutions similar to MediaTek and Qualcomm.

Third, slow refresh cadence and poor segment coverage

From Intel's roadmap (Fig 54), we can see that Intel is launching one chipset per year for each segment. We think this does not align with the needs of most OEMs which create multiple chipsets optimized for various handset/tablet segments. We think if Intel intends to take shares in the already-competitive smartphone chip market where some ARM chip vendors are launching their new chips in two or three quarters' time, Intel may need to shorten its product refresh cadence.

For example, MediaTek has entered mass production of MT6575 single core AP in 1Q12. Two quarters later, it mass produced MT6577 dual core AP in 3Q12. Another two quarters later, it mass produced MT6589 quad core chip in 1Q13. This fast product (upgrade) launch, despite shortening life-cycle profits, has helped MediaTek to gain share significantly in the competitive market.

Separately, we found that Intel has relatively limited product segmentation. Given that Intel only has one chip to launch per year, the way it has used to make product segmentation is to offer chips in different CPU speeds and GPU specs (by downgrading some specs while all chips are based on the same die). However, it does not make segmentation by display resolution, memory density, camera pixel, etc, which makes it impossible for Intel to expand to low price mass volume market.

Intel's solution: We expect Intel to shorten product refresh cadence from its tablets application first. For example, Bay Trail stated that it will have windows OS version in mass production in 4Q13, Android version in mass production in 1Q14 and low cost Android version (Bay Trail CR) in 2Q14. Soon, by 4Q14F likely, Intel will launch 14nm Cherry Trail. However, in its smartphone segment, it seems that Intel's product refresh cadence will not be shortened until end-2014 when Intel's smartphone AP and modem SOC enters mass production (Fig 53).

With the shortening product refresh cadence, Intel could also make segmentation.

Fig. 53: Bay Trail roadmap by price segment over the next year

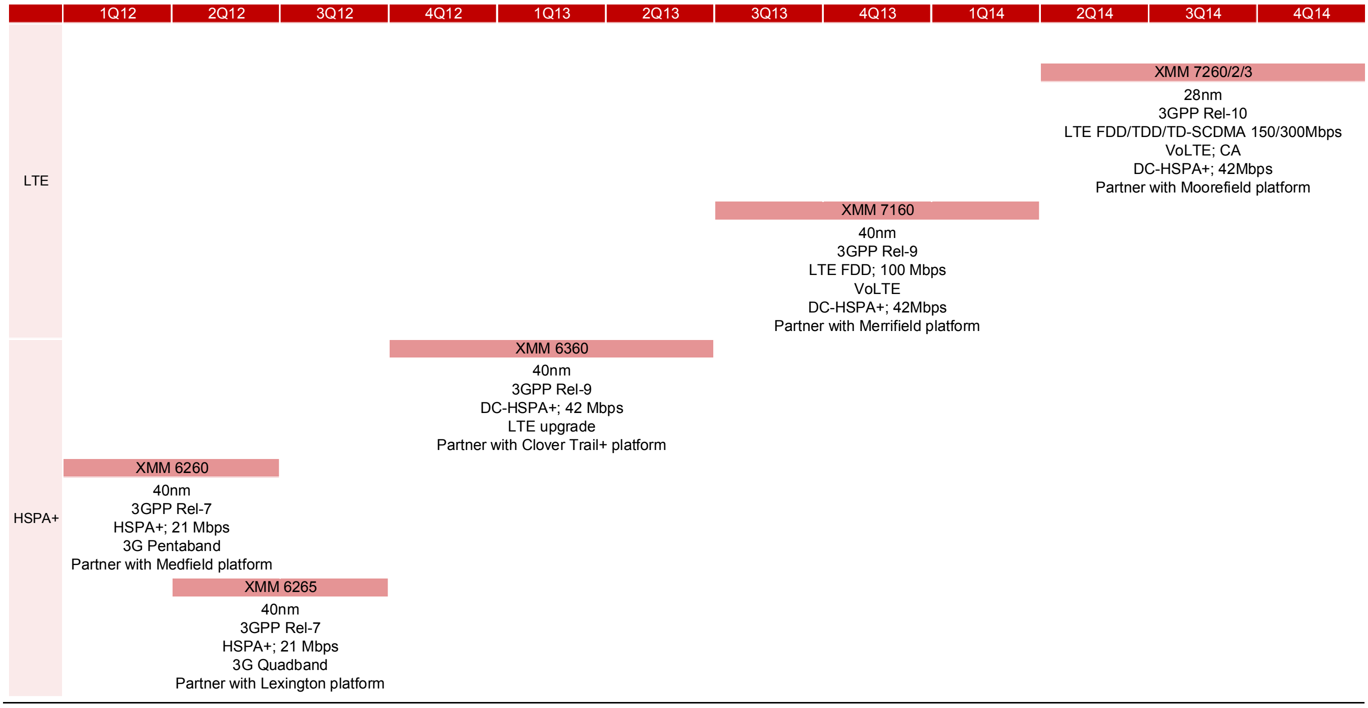
Price	Platform Attributes		Intel Platform Guidance		
			2H13	1H14	back to school 2014
>$249	Display Size: 10" Quad Core 19x12 IPS or higher 2GB RAM	16-32GB storage WIFI/3G&4G Options*	Bay Trail T	Bay Trail T	Bay Trail T
$199-249	Display Size: 8-10" Quad Core Up to 19x12 IPS 1-2GB RAM	16-32GB storage WIFI/3G&4G Options*	Bay Trail T	Bay Trail T	Bay Trail T
$149-199	Display Size: 7-8" Dual & Quad Core 8x12 IPS 1GB RAM	8-16GB storage WIFI/3G Options*	Clover Trail +	Bay Trail T Opt.0	Bay Trail CR opt.2
$99-149	Display Size: 7" Dual & Quad Core 6x10 or lower	512MB-1GB RAM 8GB storage WIFI only	Clover Trail +	Clover Trail +	Bay Trail CR opt.2

Source: Intel

Fourth, lack of LTE integration to limit smartphone penetration

It is our understanding that Intel has lost a few smartphone design wins as it didn't have the LTE modem (Motorola, Lenovo). We don't see this issue going away in the near term. We expect Intel to announce its data and voice enabled LTE model later this year, but we think a fully tested integrated solution may not be ready for the next 18-24 months. Intel's voice and data LTE chip XMM7260 (LTE-advanced) is scheduled to enter mass production in 2H14. In the low price mass market, Intel will not have integrated LTE modem and AP SOC until the end of 2014F, at earliest, in our view (Fig 54).

Fig. 54: Intel's LTE roadmap



Intel's mobile device roadmap from 2H13 to 2015 – leading ARM in tablets but lagging ARM in smartphones

It is clear that Intel is the most advanced semiconductor company in the world in manufacturing process execution. It launched Bridge platform for PC/NB segment in 2013 using 22nm tri-gate (3D) process for the first time in the industry. We compare Intel x86's mobile device roadmap with ARM below.

2H13

Tablets: **Intel Bay Trail tops in performance on 22nm CPU (vs. 28nm of ARM camp)**

Intel officially announced Bay Trail (based on 22nm Silvermont quad core) for its tablet segment at Intel Development Forum (IDF) in Sep 2013 with mass availability starting in 4Q13. For comparison, ARM CPU using 20nm will not be shipping in volume till 2Q14 (e.g. Apple A8 from TSMC). We believe Bay Trail will dominate all Windows OS based tablets as WoA (Windows on ARM, which is using QCOM chips) is not gaining traction. In terms of performance, we think, Bay Trail tablet should be on par to slightly better in performance versus 20nm ARM SoCs in 2014.

Smartphones: Intel migrated to 32nm dual core (vs. 28nm quad core of ARM camp)

However, its smartphone chip progress is lagging behind the tablet chip roadmap. At the January 2013 CES, Intel announced Clover Trail+ (based on 32nm Saltwell core) smartphone AP (partnering with its own LTE modem acquired from Infineon) with design-wins including Lenovo (K900), ZTE (Geek), Samsung 10" tablet, etc. This was Intel's first dual core smartphone AP. For comparison, smartphones using 28nm ARM core chips entered mass production as early as in 4Q11.

2014

Tablets: Intel will likely migrate to 14nm by 4Q14, leading ARM suppliers by up to 2-3 quarters

We think Intel's tablet offerings will migrate to 14nm (Cherry Trail, Airmont core) with mass availability by 4Q14F, which would likely be 2-3 quarters earlier than ARM SoCs for tablets using a 16nm TSMC node. We think 16nm FF TSMC solutions will enter mass production by 2Q15.

Smartphones: Both Intel and ARM camp are likely to migrate to 22nm/20nm by mid-2014; Intel to launch AP and modem SOC

Currently, Intel is offering Merrifield (22nm Silvermont dual core) with its standalone LTE modem. However, given the long design in cycle of LTE modem, we do not expect customer mass production before 2Q14, which is near the time when smartphones using 20nm ARM chip will start entering mass production (eg, Apple iPhone6 to mass production no later than 3Q14, in our view)

In 2H14, we expect Intel to start offering its first quad core AP for smartphones (**Moorefield**), which would still use 22nm Silvermont core. Due to the long design in process of LTE modem, we do not expect smartphones using the chip to enter mass production before 2Q15

More important, we expect Intel to launch its first-ever modem and AP SOC chip for smartphone application by end-2014F. Intel will target the mass volume smartphone market with this SOC chip, in our view.

2015

We expect Intel's next-gen tablet chip to stay at 14nm and enter mass production by 4Q15F while smartphone chips will finally catch up with the tablet chip schedule by using 14nm toward the end of 2015. However, we do not expect smartphones using 14nm smartphone chips to enter mass production before 1Q16F. We also expect an integrated (on-die) application processor and LTE modem offering available from Intel at this time. For the ARM SoCs, we expect smartphones/tablets using 16nm FF TSMC ARM chips to enter mass production by the middle of 2015.

2016

In 2016, we expect Intel will enter volume production for 10nm process node, which would be fully one-year ahead of TSMC's plan to manufacture 10nm chips in 2017.

Our conclusions: Intel x86 chip cost disadvantage relative to TSMC will improve at 22nm/14nm nodes (2013-15) but the weak ecosystem could be a bigger problem

The debate between ARM and Intel has confused investors on which is superior. However, with our survey from both upstream semiconductor technology migration and downstream ecosystem comparison, we make the observations below:

Conclusion 1: Intel's manufacturing advantage will favour x86 over 20nm/16nm ARM SCOM in 2013-2015
As explained above, Intel's push of Moore's law will enhance its transistor cost competitiveness vs. ARM camp into 20nm and 14nm (while performance and power consumption will both enhance naturally with node migration).

Conclusion 2: Intel seems aware of its ecosystem weakness. Thus, execution across several tiers of OEMs would be the key to gain traction against ARM.

Conclusion 3: Intel's threat to ARM SOC is bigger in tablets than in smartphones in the near-term.
It is clear from the node migration roadmap comparison that Intel's competitiveness vs. the ARM camp in the tablet chip market is much stronger than in the smartphone chip

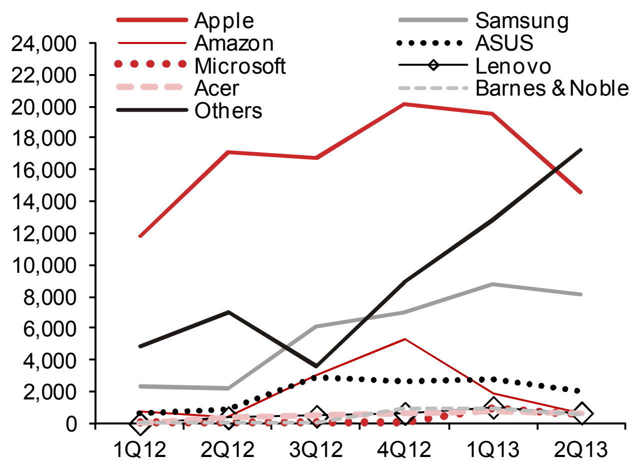
market. As well, Intel is also working harder than in the past to improve the tablet chip ecosystem now. Thus, we expect Intel's share at the tablet market to grow faster than in the smartphone market.

Conclusion 4: But, the "effective" tablet TAM for Intel is small
Intel is the single silicon for both Android and Windows OS. It has 100% share at Windows OS tablets – the problem is that the Windows OS tablet market is very niche. In the android market, Apple and Samsung remain as the two biggest players with a 50% global share in 2Q13 and they both have their own APs. Though there are many tablet brands in the low price segment ("others" in Figs 55 and 56), Intel x86 chips' higher BOM cost and long design in cycle are not attractive to those tablet makers.

Conclusion 5: Intel's x86 smartphone opportunity likely to take longer to materialize
Two reasons: First, node migration, which is Intel's strongest strength, for smartphone AP is slower than for tablet AP. Second, Intel does not have AP and modem SOC chips yet. From these perspectives, Intel's smartphone chips are unlikely to be competitive before 2015F, based on our estimates.

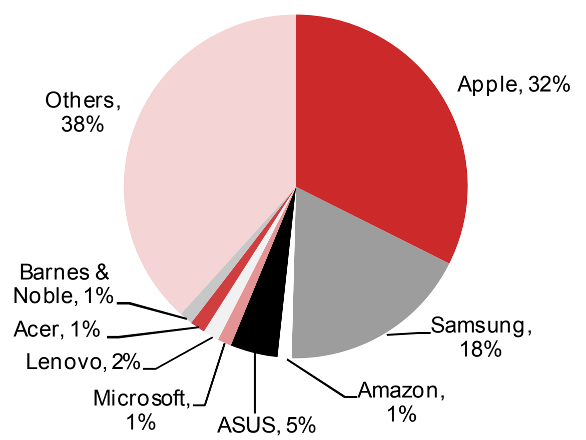
Conclusion 6: Impact to ARM foundry from Intel's x86 chip should be limited until 2015F
Intel may have potential in the long run (2-3 years later) in the mobile device market with the push of Moore's law and the enhancement of the ecosystem weakness, in our view. However, its impact to ARM foundry, eg, TSMC, would likely be limited by the next two years, in our view.

Fig. 55: Tablet market share trends



Source: IDC

Fig. 56: Tablet market share breakdown by vendor, 2Q13



Source: IDC

Fig. 57: Intel's tablet and smartphone chip roadmap, 2011-15

Core	2011 Bonnell (45nm)	1H12 Saltwell (32nm)	2H12 Saltwell (32nm)	1H13 Saltwell (32nm)	2H13 Silvemont (22nm 3D)	1H14 Silvemont (22nm 3D)	2H14 Airmont (14nm 3D)	1H15 Airmont (14nm 3D)	2H15 ? (14nm 3D)
Tablet	**Oak Trail** Atom Z6xx **45nm Bonnell core** *Announced in Sep 2010 IDF *MP in 4Q10 *Design win: TESO T10	**Medfield** Atom Z24xx **32nm Saltwell core** *Announced in May 2012 Computex *MP in 3Q12	**Clover Trail** Atom Z27xx **32nm Saltwell core** *Intel's 1st dual core in tablet *Announced in Sep 2012 IDF *MP in 4Q12 *Design win: Acer Iconia W510		**Bay Trail** Atom Z23xx **22nm Silvemont core** *Intel's 1st quad core in tablet *Announced in Sep 2013 IDF *MP in 4Q13 Design win: ASUS Transformer Book T100 Acer Iconia W3-810 / W4-820 Dell Venue Lenovo Miix 2 / Miix 8 Toshiba Encore etc…	**Bay Trail-CR** *Bay Trail cost reduction	**Cherry Trail** **14nm Airmont core** *MP in 4Q14 **Cherry Trail-CR** *Cherry Trail cost reduction		**?** **14nm** *MP in 4Q15
Smartphone	**Moorestown** Atom Z6xx **45nm Bonnell core** *Announced in Sep 2010 IDF *MP in ? *Design win: LG TW990	**Medfield** Atom Z24xx **32nm Saltwell core** *Announced in May 2012 Computex *MP in 3Q12 *Design win: Lenovo K800 ZTE Grand X IN Motorola RAZR i Xolo X900 ASUS Fonepad		**Clover Trail+** Atom Z25xx **32nm Saltwell core** *Intel's 1st dual core in SP *start partnering with LTE modem *Announced in Jan 2013 CES *LTE: XMM6360 HSPA+ *MP in 2Q13 *Design win: Lenovo K900 ZTE Geek Samsung 10" tablet **Lexington** Atom Z24xx **32nm Saltwell core** *Medfield downgrade *Announced in Jan 2013 CES *MP in 1Q13 *Design win: Acer Liquid C1		**Merrifield** **22nm Silvemont core** *Still dual core *MP in 2Q14 *Partner with LTE modem *LTE: XMM7160 LTE Cat.3	**28nm SOC** *Intel's 1st gen AP+modem SOC chip *To address mass volume market *MP by 4Q14	**Moorefield** **22nm Silvermont** *Intel's 1st quad core in SP *MP in 2Q15 *Partner with LTE modem *LTE: XMM726x LTE Cat4/6	**?** **14nm** *Mid-2015 launch *MP by 1Q16? **14nm SOC** *Intel's 2nd gen AP+modem SOC chip *To address mass volume market *MP by 4Q15

Source: Company data, Nomura estimates

Competition among foundries and IDMs

Traditional foundry competitors such as UMC or Global Foundries are now regarded by the market as a second-tier group but they still create noise and also gain orders from market leader TSMC from time to time. However, we think it would be harder for them to have T-like (i.e. TSMC-like) process from 28nm HKMG node onward, making their share gains difficult going forward.

The first-tier group includes TSMC, Intel and Samsung. We believe the foundry business is a dilemma for Intel due to its low margin profile in the foundry business. On one hand, we do not expect Intel to gain Apple iPhone/iPad orders by 2015. On the other hand, we expect Samsung to make a comeback as an Apple foundry vendor (in addition to TSMC) in 2015F. The conflict of interest with its customers remains the biggest issue for Samsung foundry, in our view.

Second -tier foundries, e.g. Global Foundries and UMC: yield rate is everything for them

While Global Foundries and UMC are now regarded as second tier foundries by the market given their limited resources for advanced node investments, they are still trying to catch up in 28nm and they either took some shares from TSMC (or created some noise). However, we believe the impact to TSMC would be small given that the damage is likely only limited to the PolySiON process (when customers are still able to find a second source with T-like process), given that the T-like process is becoming more difficult for other foundries to copy from 28nm HKMG process onward, in our view.

Separately, whether they (Global Foundries and UMC) can really gain the 28nm PolySiON orders as early as they wish is unwarranted, in our view, and subject to the improvement speed of their yield rate. If their 28nm yield rate improves too slowly (does not improve fast enough relative to what they expected), they would lose more money by working on more production, and customers would shift orders back to TSMC since they couldn’t satisfy their customers’ demands.

Simulation: Second-tier foundries’ profitability and what the cost incentive is for customers to switch orders
We have a simulation in Fig 58 for second-tier foundries’ 28nm profits and customers’ die costs under a different yield rate assumption.

- TSMC stated at its 4Q12 earnings call that its 28nm (PolySiON) GPM will improve to slightly higher than the corporate average level (of 45.6%) from 1Q13 and remain at this level through 2013. On our estimates, its 28nm wafer price was at c.US$5500 with yield rate of at least 85% in 1Q13. If TSMC was making 47% (ie, slightly higher than the corporate average of 45.6%) GPM, its COGS would be US$2915 in 1Q13.
- We assume that second-tier foundries need to have their wafer price 10% lower than TSMC’s but their COGS is 10% higher than TSMC’s (on higher costs of purchasing equipment). In addition, we assume their 2013F OPEX-to-sales to be 13% (within the Taiwan foundry industry range of 10-15%). If so, they could make 35% GPM and 20% OPM, respectively, if their yield rates were on par with TSMC’s.
- On our estimates, second-tier foundries need to have at least about 63% yield rate in such a case to ensure they have positive OPM.
- However, from a customer’s perspective, if the wafer price is only 10% lower, the yield rate needs to be at least 77% to ensure that customers have die cost savings, which also means these second-tier foundries’ 28nm yield rate gap with TSMC needs to be at least within 10% (or more precisely, 8%, in this case) in order to be competitive, in our opinion.

Fig. 58: Simulation - The "critical yield rate" (ie, a yield rate above which customers have incentive to use, by our definition) and break-even yield rate of second-tier foundries

The comparison base: TSMC 28nm GPM was near 47% when yield rate was at 85% in 1Q13				
TSMC			**Die cost for customers**	
Wafer price (US$)	5500		Die size	76mm2 (using MSM8930 as an example)
GPM	*47%*		Gross die	850
GP (US$)	2585		Good die	722.5
COGS (US$)	2915		Die cost (US$)	7.6
Simulation: If 2nd tier foundry wafer price is 10% lower than TSMC				
	When yield rate is 85%, wafer px is 10% lower, GPM/OPM would be 35%/22%			
Wafer price (US$)	4950	10% discount to TSMC wafer price	Gross die	850
COGS (US$)	3,207	Assuming 10% higher COGS on higher equipment and material costs	Good die	722.5
GP (US$)	1,744		Die cost (US$)	6.9
GPM	*35%*		Cost saving	10%
OPEX	13%	Assuming OPEX-to-sales% to be similar to TSMC and UMC at 10-15%		
OPM	*22%*			
	Critial yield rate: 77% (to make their wafer solution attractive)			
Wafer price - adjusted (US$)	4,455	Adjusted wafer price assuming die buy at 77% yield rate (=4950*77/85))	Gross die	850
COGS (US$)	3,207	Assuming 10% higher COGS on higher equipment and material costs	Good die	650
GP (US$)	1,249		Die cost (US$)	7.6
GPM	*28%*		Cost down	0%
OPEX	13%	Assuming OPEX-to-sales% to be similar to TSMC and UMC at 10-15%		
OPM	*15%*			
-> Implication: With 10% lower wafer price, fabless customers have incentives to use 2nd tier foundries when their yield rate exceeds 77%				
	Breakeven yield rate: 63% (OPM breakeven)			
Wafer price - adjusted (US$)	3,669	Adjusted wafer price assuming die buy at 63% yield rate (=4950*63/85))	Gross die	850
COGS (US$)	3,207	Assuming 10% higher COGS on higher equipment and material costs	Good die	536
GP (US$)	462		Die cost (US$)	9.2
GPM	*13%*		Cost up	21%
OPEX	13%	Assuming OPEX-to-sales% to be similar to TSMC and UMC at 10-15%		
OPM	*0%*			
-> Implication: With 10% lower wafer price, 2nd tier foundries will not make money at yield rate below 63%				
Simulation: If 2nd tier foundry wafer price is 15% lower than TSMC				
	When yield rate is 85%, wafer px is 15% lower, GPM/OPM would be 31%/18%			
Wafer price (US$)	4675	15% discount to TSMC wafer price	Gross die	850
COGS (US$)	3,207	Assuming 10% higher COGS on higher equipment and material costs	Good die	722.5
GP (US$)	1,469		Die cost (US$)	6.5
GPM	*31%*		Cost saving	15%
OPEX	13%	Assuming OPEX-to-sales% to be similar to TSMC and UMC at 10-15%		
OPM	*18%*			
GF/UMC	**Critial yield rate: 72% (to make their wafer solution attractive)**			
Wafer price - adjusted (US$)	3,960	Adjusted wafer price assuming die buy at 72% yield rate (=4675*72/85))	Gross die	850
COGS (US$)	3,207	Assuming 10% higher COGS on higher equipment and material costs	Good die	612
GP (US$)	754		Die cost (US$)	7.6
GPM	*19%*		Cost down	0%
OPEX	13%	Assuming OPEX-to-sales% to be similar to TSMC and UMC at 10-15%		
OPM	*6%*			
-> Implication: 2nd tier foundries need to sacrifice OPM to be attractive, if yield rate is low				
-> E.g. With 15% lower wafer price, customers have incentives to use 2nd tier foundries when yield rate exceeds 72% comparing with the critical point of 77% yield rate when wafer price of 2nd tier foundries are only 10% lower				
GF/UMC	**Breakeven yield rate: 67% (OPM breakeven)**			
Wafer price - adjusted (US$)	3,685	Adjusted wafer price assuming die buy at 67% yield rate (=4675*67/85))	Gross die	850
COGS (US$)	3,207	Assuming 10% higher COGS on higher equipment and material costs	Good die	570
GP (US$)	479		Die cost (US$)	8.2
GPM	*13%*		Cost up	8%
OPEX	13%	Assuming OPEX-to-sales% to be similar to TSMC and UMC at 10-15%		
OPM	*0%*			
-> Implication: With 15% lower wafer price, 2nd tier foundries will not make money at yield rate below 67%				

Source: Nomura estimates

Conclusion: a race with time and yield rate

- **It takes longer for second-tier foundries to catch up to an acceptable level on yield rate with TSMC in 28nm nodes vs. before.** For example, in 1Q13, we estimated that Global Foundries and Samsung only had about 60% yield rate for 28nm PolySiON chips, which means they were still losing money.
- **If 28nm PolySiON wafer price offered by second tier foundries is only 10% below TSMC's wafer price, customers wouldn't have incentives to place orders to second tier foundries unless they could guarantee a certain level of yield**. For example, in the case above, we believe 75-80% yield rate is the minimum level for second-tier foundries to make their solutions attractive vs. TSMC.
- **QCOM has recently opened many 28nm PolySiON projects at Global Foundries, since Global Foundries has finally improved its yield rate** of LTE modem chip to 75-80% at end-3Q13 (from below 50% a year ago). However, given that the new projects are mostly AP and modem integrated (ie, more complicated than simply LTE modem), it is worth monitoring and seeing if Global Foundries can catch up to the yield rate of these new projects to at least the 75% level in a decent amount of time. Otherwise, orders will be shifted back to TSMC.

- **Time is another variable, in addition to yield rate, for second-tier foundries' profits**. **The later they ramp up 28nm yield rate, the worse wafer price (and return) they can likely make**. Thus, we continue to be bearish on UMC, which hasn't yet entered mass production for its 28nm wafer (and the engineering chip yield rate is at the 60% level now). Even in the good scenario where it could ramp up volumes in 1H14, the wafer price might be another 10% lower than it is currently, which would make it more difficult for UMC to post a profit at 28nm (despite rising volumes).
- **Yield rate is everything**. Before the second tier foundries (Global Foundries and UMC) ramp up yield rate to an acceptable level, any order gain would likely be at the cost of financial losses.
- **Why is TSMC a (distant) leader?** It takes Global Foundries five full quarters to reach a 75-80% yield rate as it is now where it is currently, but it only takes TSMC half the time (ie, two to three quarters), on our estimates.

Intel: foundry business is a dilemma

Though Intel has claimed its direction as being a "specialized foundry", our analysis below shows that Intel should focus on pushing the progress of its x86 chip in mobile devices (taking share from ARM), rather than being an ARM foundry, since the margin profile would be extremely different for Intel. For Intel, the foundry business is a dilemma between sales and margin, in our view.

Intel's foundry business is now moving to "walk" from the "crawl" stage (from Brian M. Krzanich, the CEO) the former CEO, Paul S. Otellini, said.

The industry has started discussing Intel's possibility in the foundry business after the PC sector began seeing a structural decline. According to Brian M. Krzanich, who as of May 2013, became Intel's CEO, the company is moving to the "walk" stage from the "crawl" stage as some smaller scale customers have signed on for orders but revenue and earnings are still a ways out. We summarise below some key comments with regard to foundry strategy from Intel's key management over the past year.

- **Foundry strategy**: At the 2Q13 analysts' meeting, when being asked about the difference in his foundry strategy vs. that of the prior CEO's, the new CEO Mr. Krzanich stated the following: "*When you sign up a foundry customer, it's 18 to 24 months, sometimes even longer, 30 months before that foundry customer is able to start producing product, especially when they move from one foundry to another as they go through their design cycle and their product qualification. So you should think that even the customers that we've already signed up that you've heard about in the press, those revenues and that impact on Intel's bottom line is still a ways out. We are moving from I'd say that crawl space to at least the walk space*."

- **Intel's capabilities and gaps of doing foundry**: At Jeffries' TMT conference on May 7, 2013, William M. Holt, Intel's Executive VP, said "*Probably the most important is you had to put in a service-minded organization. We've had to do a lot of learning, we've had to bring in a lot of people, to establish what looks like an operation intended on servicing foundry customers. Support organization is quite substantial and does have to operate with a much different mindset than when dealing with an internal partner*."

- **Long term vision**: At the 1Q13 analysts' meeting, Paul S. Otellini, Intel's former CEO said "*We're in the mode of collecting serious customers. It will not have a significant revenue impact to the company for two to three years. The business model that we have for the foundry assumes value-based pricing. People that are attracted to us are those who see the advantages of our technology as it manifests itself in their products and gives them an advantage in the marketplace*."

- **Being a specialized foundry**. At the 4Q12 analysts' meeting, Paul S. Otellini, Intel's former CEO said "We are very interested in being a selective foundry manufacturer for certain customers. We don't see ourselves as a general purpose foundry. We would not take business that would enable a competitor. We would certainly consider business that would enable and strengthen relationships with strategic partners. The kinds of things that we've announced so far have been in the programmable logic area, which is an area that Intel is not in today, so that makes perfect sense. And those kinds of companies need leading edge technology."

- **Expectation of margin (seems high):** In the 4Q12 analysts' meeting, Stacy J. Smith, Intel's CFO said "our expectations around return. We want to get paid in terms of margin, and we want to get a return on our invested capital that's commensurate with our technology leadership."

- **To get Apple or Samsung orders?** At the CSFB tech conference on 27 Nov 2012, Stacy J. Smith, Intel's CFO, answered a question from John W. Pitzer "Is there an opportunity for Intel at the high-end of the smartphone market with those two customers?" He replied "The short answer is yes. We absolutely believe that we have an opportunity to win Apple and/or Samsung. If you're delivering the best performance, you win the designs and you win your fair share of the market. So our goal is just stay ahead of the industry in terms of our transistor performance"

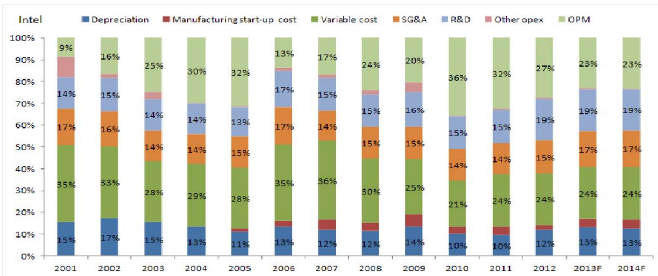
Intel's foundry wafer cost Simulation 1: from the perspective of depreciation cost difference

In the section of Intel x86 chip progress at mobile device, we conclude that "technologically" Intel will indeed have better progress than TSMC in shrinking transistor cost in 22nm and 14nm (vs. TSMC's 20nm and 16nm, respectively). However, we think these would not be enough for Intel being competitive in foundry business. Intel stated in its annual report that the depreciation timeframe for its equipment is 2-4 years, which is much shorter than TSMC's general depreciation timeframe of 5 years, given our view that TSMC has the 2nd and 3rd wave of customers to extend the life cycle of each node (while Intel doesn't have).

Below we compare wafer cost from TSMC and Intel at 28nm and 32nm, respectively, by using some simplified assumptions.

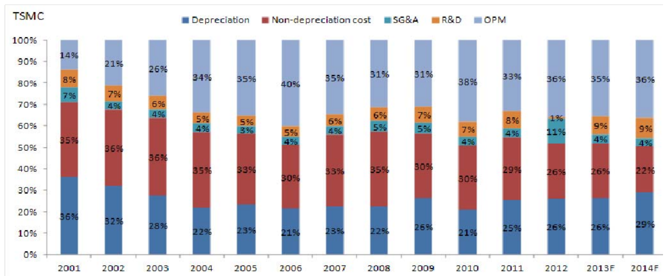
- We continue to use TSMC's 28nm wafer price, GPM and COGS assumptions in 1Q13 (from Fig 58) as the base to extend our comparison with Intel's wafer cost.
- We assume TSMC is using 5 years to depreciate its equipments while Intel is using 3 years (within the 2-4 years range), which means Intel's depreciation cost per unit is about 1.6-1.7x that of TSMC's. We assume 1.5x in the calculation below to factor in Intel's possibly stronger bargaining power from bigger scale.
- We assume the non-depreciation cost (mostly variable costs) per unit are similar for TSMC and Intel.
- We assume depreciation cost and other variable costs are respectively 50% at TSMC's COGS (which is the case for 2013), while on the other hand Intel's variable costs account for 60-65% (as well as depreciation cost ~30% and manufacturing start-up cost ~10%) of Intel's COGS in these 4 years (2011-2014F) (Figs 59-60).
- Though 32nm and 28nm are (slightly) different nodes and the equipments that TSMC and Intel have bought would not be exactly the same, we assume limited impact from the difference as we are trying to simplify the simulation given the condition of limited detailed information disclosure from both companies.

Fig. 59: Intel's cost breakdown



Source: Company data, Nomura estimates

Fig. 60: TSMC's cost breakdown



Source: Company data, Nomura estimates

With the assumptions above, we can conclude that Intel's 32nm wafer cost is likely 88% higher than TSMC's 28nm wafer cost (US$5466 vs. US$2915) (Fig 61).

Fig. 61: Intel's foundry wafer cost simulation – the perspective from depreciation cost difference

The comparison base: TSMC 28nm GPM was near 47% when yield rate was at 85% in 1Q13	
TSMC	
Wafer price (US$)	5,500
GPM	*47%*
GP (US$)	2,585
COGS/wafer cost (US$)	$\boxed{2,915}$

Simulation 1: Intel 32nm foundry wafer cost

Assumption1: Intel depreciation cost per unit is 1.5x higher than TSMC's while variable cost per unit is similar
2: TSMC COGS mix: 50% depreciation cost and 50% other variable costs (which is 2013 case)
3: Intel COGS mix: 30% depreciation cost, 10% manufacturing start up costs, and 60% other variable costs (consistent in 2012-14)

COGS/wafer cost (US$)	$\boxed{5,466}$

GPM requirement A	*60%*	Wafer price A	13,664
B	*40%*	B	9,109
C	*20%*	C	6,832
D	0%	D	5,466

-> Implication: Intel's 32nm wafer cost is 88% higher than TSMC's 28nm wafer cost
-> Implication: Intel's GPM would be zero if its 32nm wafer price intends to be on par with TSMC's 28nm price

Source: Nomura estimates

Intel's foundry wafer cost simulation 2: a bottom up approach
In Figure 60, we use another different approach to analyze Intel's 32nm wafer cost.

Our US Semi team estimates Clover Trail (32nm) die size is about 96mm2, which means 650-670 gross die, by our estimates. We believe yield rate is mature at 80-85% for die at such size, so good dies per wafer is likely 520-570.

Clover Trail ASP is ranging from US$20-40, according to our US Semi team. If we assume US$30 ASP, the chip value which can be generated by selling these Clover Trail chips would be US$15.6-17.1k.

Our US Semi team estimates that Clover Trail GPM is at low 50% (vs. the corporate average of 60%), which means COGS of these chips is at US$7000-8500

Assuming that wafer cost accounts for 75-80% of COGS (the rest 20-25% goes to the back end), we estimate that the 32nm Clover Trail wafer cost is at US$5250-6800, which seems to support our simulation result above of US$5466 and even imply that our wafer cost estimation of Intel's wafer cost could have upside (i.e. US$5466 is near the low bound of US$5250-6800).

Fig. 62: Intel's foundry wafer cost simulation – a bottom up approach

Simulation 2: Intel 32nm foundry wafer cost		
Intel Clover Trail		
Die size (mm2)	96	
Gross die	650-670	
Yield rate	80-85%	
Good die	520-570	
ASP (US$)	30	-> ranging at US$20-40 depending on chip config (dual/quad core and CPU speed)
Wafer value (US$)	15600-17100	
GPM	50-55%	-> slightly lower than Intel's corporate average of 60%
COGS (US$)	7000-8500	
Wafer cost % of COGS	75-80%	-> assuming the rest 20-25% goes to back end
Wafer cost (US$)	5250-6800	

-> Implication: The result from simulation 1 could be conservative and underestimating Intel's wafer cost

Source: Nomura estimates

Conclusions: Intel's foundry opportunity is for very high value-added chips only

- **Intel's 32nm wafer cost (i.e. US$5466 – using simulation 1, or US$5250-6800 – using simulation 2) is likely higher than TSMC's 28nm wafer price (i.e. US$5500) with the assumptions above.** Though we estimate the cost gap will narrow into 22nm (vs. 20nm of TSMC) and 14nm (vs. 16nm of TSMC) due to Intel's push further of Moore's law (details in the section of "**x86 threat to ARM? The problem is not only about node migration, but more about the entire ecosystem**"), the cost gap seems too significant to be covered in just two nodes.
- **It is a dilemma for Intel to do foundry business – it can help fulfil the vacant fab utilization rate (on falling PC volumes) but will dilute margin meaningfully.** Given that Intel OPEX-to-sales ratio is as high as 35%, Intel's 32nm wafer price needs to be 35% higher than TSMC's 28nm wafer price if Intel intends to keep break-even at operating level for any foundry orders, in this case.
- **Customers' benefit of using Intel's fab as foundry source would be left to be using the advanced nodes where Intel has global leading position**, if the cost gap of the same generation nodes (eg, 32nm vs. 28nm) is so significant,
- However, if Intel uses the advanced node to produce some competing chips, e.g. Apple iPhone/iPad chip (which compete with Intel's x86 chip in mobile devices), it seems conflicting with its own benefits, in our view.
- Two options for Intel in gaining exposure in mobile space: 1) promoting x86 chip in mobile device; 2) manufacturing ARM chip for Apple. The second seems to be a more reasonable choice for Intel as it benefits Intel the most (ie, higher profitability and no business conflict).
- **The challenge (to our assumptions):** There could be a lot of challenges since our assumptions are very simplified, but one key challenge is "what if Intel's depreciation method changes?" According to Romit Shah and Sanjay Chaurasia, our US Semi analysts, this could happen at 14nm "*14nm could be a long lasting node for Intel. Although Intel has capability to 10nm, but would it necessarily do it at the same cadence as it has in the prior years is not clear. Given depressed PC sales, there is really no reason why Intel should rush to 10nm and spend another 10-12B. I don't see a real benefit. That could be the reason, I think, Intel is using 14nm as the foundry node for external customers and not 22nm. I think 14nm is going to last for a longer time.*"

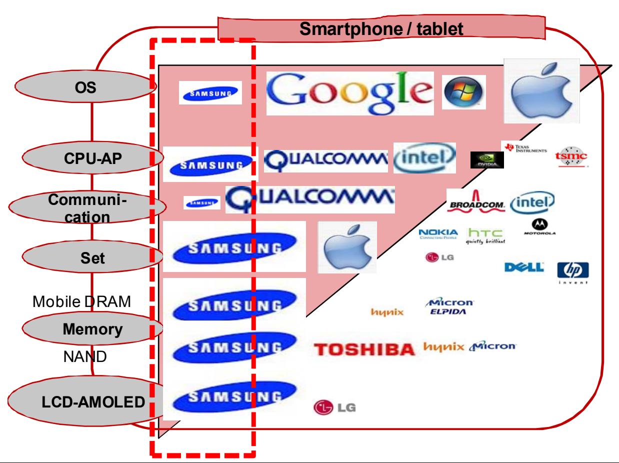
Samsung: Foundry or IDM?

For Samsung, our Samsung analyst CW Chung thinks the system-LSI business means more than just a growth driver of its semiconductor division, as it is closely linked to the company's efforts to differentiate from the future competitiveness of Samsung's set business (contributing c.70% of its operating profit). Samsung's S-LSI division is currently facing multiple predicaments as opposed to its initial expectations. Please refer to *Samsung Electronics (005930 KS, Buy) - Strong mobile earnings dispels market concerns*.

First, we believe that Apple, which employs c.40% of Samsung's 12-inch facilities, is expected to transfer its foundry business to other competitors starting from 2014F. As a result, we expect the utilisation rate of Samsung's facilities geared towards Apple to decline gradually from 1H14F. Samsung and TSMC are likely to become the ultimate dual vendors for Apple, in our view.

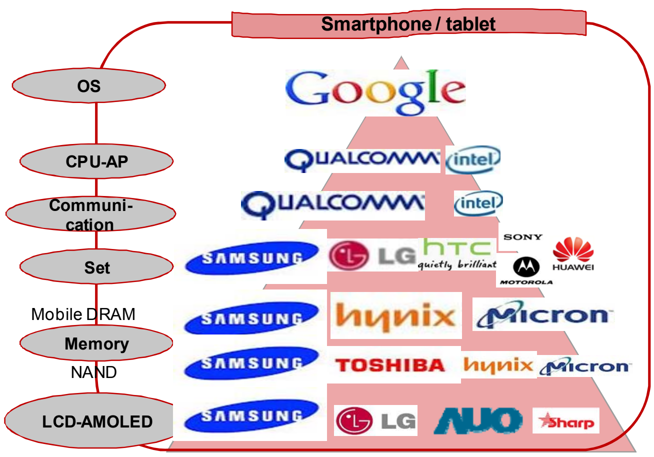
Second, Samsung's AP business is facing difficulties due to roadblocks in the development of baseband technology. While Samsung's AP and third-party baseband solutions have been employed for high-end smartphones in the past, chipset maker Qualcomm has been expanding its market dominance through periods of LTE. Samsung is yet to penetrate into mid- and low-end markets where third-party products are employed, and has not yet secured a solution to resolve issues in the near-term (implying, in our view, higher likelihood of Samsung pursuing its M&A efforts continuously). In the event Samsung cannot come up with a solution, we expect the company to convert its business into an AP/baseband foundry on the footing of its captive set business while forgoing the AP/baseband IDM business. In such a case, it may not be a major negative sign for Samsung's memory business that has been losing growth momentum amid a lower utilisation rate. However, we believe it should negatively impact Samsung, as a whole, in the long term as we expect the commoditisation trend of smartphones to accelerate going forward.

Fig. 63: Samsung's dream vertical integration structure



Source: Nomura research

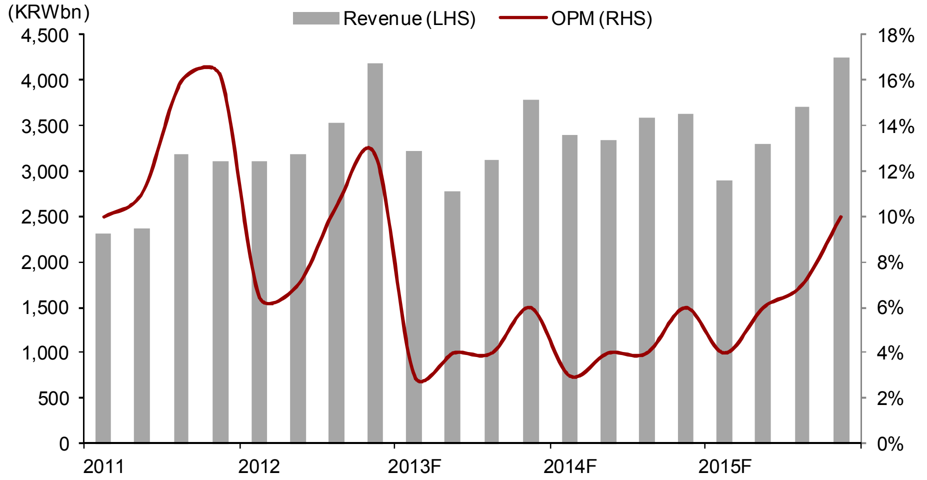
Fig. 64: Commoditised supply chain (similar to PC supply chain)



Source: Nomura research

Fig. 65: Samsung's S-LSI revenue and OPM

OPM to recover in 2015F on the return of Apple orders



Source: Company data, Nomura estimates

Although we think Samsung needs to expedite its foundry business to raise utilisation rates of its idle facilities (caused by the above factors), we expect it to experience difficulties as we estimate it would require roughly 2-3 years considering the nature of the business, with conflicts of interest likely to arise with Samsung's IDM business. Thus, we estimate that it would take a significant amount of time to improve profitability as Samsung's competitiveness is weaker than first-tier foundry competitors in terms of economies of scale. We expect Samsung will likely prefer mass production of small-variety products (rather than low-volume production of multi-variety products), eg, mobile products, consumer electronics, automobile, supported by its robust capital strength and extra capacity.

Competitiveness in processing technology can be very critical to success in the system-LSI business, in our view. Unlike the above three factors, we do not see any meaningful disadvantages for Samsung in processing technology for logic memory, thanks to its unique competitiveness in the memory market. Though Samsung may not be superior to its competitors in 20nm process technology, we expect the company to narrow the gap between itself and first-tier companies starting from 14nm technology. We expect Samsung to pursue expansion of its 14nm production line while targeting mass production from early-2015. While Samsung is likely to convert from "gate first" technology to "gate last" technology starting from the 20nm space, it has been progressing well with preparation for next-generation technology such as high-K, Fin-Fet, in our view. We believe Samsung has a unique edge to create operating synergies between system-LSI and other segments using its memory technology. Going forward, we believe Samsung will likely be well-positioned as we expect DRAM, NAND, and logic memory to be further integrated in the form of TSV packages for mobile devices.

Fig. 66: Comparison – Samsung vs. TSMC

	Unit	CY10	CY11	CY12	CY13F	CY14F
Revenue	USDmn					
Samsung (S-LSI)		6,116	9,956	13,059	11,770	12,671
TSMC		13,306	14,540	17,072	20,127	23,681
Operating profit	USDmn					
Samsung (S-LSI)		329	1,367	1,238	513	417
TSMC		5,048	4,820	6,096	7,114	8,313
OP Margin						
Samsung (S-LSI)		5%	14%	9%	4%	3%
TSMC		38%	33%	36%	35%	35%
Capex & EBITDA	USDmn					
Samsung (Whole company)						
EBITDA		24,889	27,098	41,735	52,621	59,797
Capex		18,768	19,692	20,759	22,669	26,955
Capex (S-LSI only)		*2,169*	*4,540*	*6,909*	*4,695*	*5,660*
EBITDA - Capex		**6,121**	**7,406**	**20,976**	**29,952**	**32,842**
TSMC						
EBITDA		7,833	8,487	10,562	12,365	15,221
Capex		5,929	7,286	8,322	9,797	10,000
EBITDA - Capex		**1,904**	**1,201**	**2,241**	**2,568**	**5,221**
Capa. by wafer size						
Samsung (S-LSI)	Intra-yr avrg.					
8"	kpm	200	200	200	200	200
12"	kpm	42	67	115	139	132
Total	**12"eq., kpm**	**131**	**156**	**204**	**228**	**221**
TSMC						
8"	kpm	450	469	498	504	534
12"	kpm	206	272	328	385	467
Total	**12"eq., kpm**	**406**	**480**	**549**	**609**	**704**
Technology mix						
Samsung (S-LSI)	Intra-yr avrg.					
Below 28/32nm	12", kpm		1	52	75	89
40nm ~ 45nm	12", kpm	42	66	42	47	33
Above 60nm	8", kpm	200	200	200	200	200
Total	**12" eq., kpm**	**131**	**156**	**204**	**228**	**221**
TSMC	Intra-yr avrg.					
Below 28/32nm	12", kpm	-	5	45	110	170
40nm ~ 45nm	12", kpm	50	98	121	130	145
Above 60nm	8", kpm	802	849	863	830	895
Total	**12" eq., kpm**	**406**	**480**	**549**	**609**	**713**
Company market cap.	USDmn					
Samsung Elec.		121,258	141,512	209,328	200,376	
in Wtn		140	156	224	213	
FX		1,153	1,101	1,071	1,065	
TSMC		55,929	66,892	75,163	87,605	
Company OP.	USDmn					
Samsung Elec.		15,005	14,756	27,149	36,818	40,562
TSMC		5,048	4,820	6,096	7,114	8,313
ROE						
Samsung Elec.		20%	15%	22%	24%	21%
TSMC		30%	22%	24%	24%	25%
P/B	x					
Samsung Elec.		2.5	2.2	1.9	1.5	1.2
TSMC		3.2	3.1	3.5	3.3	3.0
P/E	x					
Samsung Elec.		13.7	16.3	9.4	7.1	6.4
TSMC		11.4	14.6	15.1	15.2	12.7

Source: Company data, Nomura estimates

Taiwan Semiconductor Manufacturing Corp. 2330.TW 2330 TT

FOUNDRY

NOMURA
EQUITY RESEARCH

November 7, 2013

Rating Remains	**Buy**
Target price Remains	TWD 123.0
Closing price November 5, 2013	TWD 106.5
Potential upside	+15.5%

Apple orders are coming at the right time

TSMC to outperform in 2014-15 continuously, as share gains counter industry headwinds

Action: Maintain Buy and TP of TWD123 on new Apple orders and intact long-term competitiveness

Structurally, we believe TSMC is able to offset smartphones saturation by not only attracting but also retaining first-tier customers placing flag-ship chip orders, while further strengthening LT competitiveness by replicating 28nm leadership into 20nm/16nmFF. Thus, we reaffirm our Buy rating and TP of TWD123, on 3.4x FY14 BVPS of TWD36, and reaffirm our view that the share price has started to reflect the 2Q14 up-cycle and recommend investors to accumulate the stock in 4Q13.

Catalysts: Apple AP orders to drive TSMC's sales to outgrow the smartphones AP foundry industry

While low-end smartphones volume growth would be inadequate to offset high-end smartphones demand saturation, we think AP/BB wafer value will grow slower than device volumes in FY14F-15F. However, with TSMC ramping-up Apple 20nm AP orders since 1Q14, we estimate Apple would be the second-largest customer by FY15F, accounting for 7%/12% of TSMC's FY14F/15F sales. With Apple AP consuming bigger die-size and lower yield, we expect TSMC's smartphone AP wafer value to grow by 36%/17% in FY14F/15F vs. industrial AP wafer value growth of 21%/18%.

Catalysts: Long-term competitiveness into 20nm/16nm Fin-FET

We are positive on TSMC's LT competitiveness because: 1) of its intact technology leadership into 20nm/16nmFF (virtually one node) while sales contribution and yield/GM improvement is faster than 28nm, 2) it has maintained advanced node market share with sufficient capex/R&D; and 3) we estimate sustainable double-digit y-y sales growth to drive over 10% y-y growth in profit-before-tax in FY14-15F amid smooth CEO transition.

31 Dec	FY12	FY13F		FY14F		FY15F	
Currency (TWD)	Actual	Old	New	Old	New	Old	New
Revenue (mn)	506,249	597,684	597,684	698,031	698,591	803,504	800,091
Reported net profit (mn)	166,159	185,783	185,783	210,604	210,771	239,363	239,812
Normalised net profit (mn)	166,159	185,783	185,783	210,604	210,771	239,363	239,812
FD normalised EPS	6.41	7.17	7.17	8.12	8.13	9.24	9.25
FD norm. EPS growth (%)	23.8	11.8	11.8	13.4	13.4	13.7	13.8
FD normalised P/E (x)	16.6	N/A	14.9	N/A	13.1	N/A	11.5
EV/EBITDA (x)	8.7	N/A	7.5	N/A	6.2	N/A	5.3
Price/book (x)	3.8	N/A	3.3	N/A	3.0	N/A	2.7
Dividend yield (%)	2.8	N/A	2.8	N/A	2.8	N/A	2.8
ROE (%)	24.6	23.7	23.7	23.7	23.7	24.4	24.5
Net debt/equity (%)	net cash	3.3	3.3	4.8	5.2	net cash	1.1

Source: Company data, Nomura estimates

Key company data: *See page 2 for company data and detailed price/index chart.*

Anchor themes

TSMC has outperformed the overall foundry sector and its growth is outpacing global fabless and IDM sectors. We think the theme of long-term market share gains will continue to evolve for TSMC.

Nomura vs consensus

Our FY14F earnings are 1.1% higher than consensus, reflecting our positive stance on TSMC's growth prospects for FY14F.

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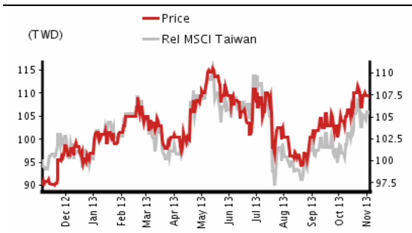
Key data on Taiwan Semiconductor Manufacturing Corp.

Income statement (TWDmn)

Year-end 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
Revenue	**427,081**	**506,249**	**597,684**	**698,591**	**800,091**
Cost of goods sold	-233,012	-262,654	-312,777	-365,808	-420,081
Gross profit	**194,069**	**243,595**	**284,907**	**332,783**	**380,009**
SG&A	-42,855	-50,576	-60,220	-72,105	-81,609
Employee share expense	-9,657	-11,962	-13,445	-15,451	-20,042
Operating profit	**141,557**	**181,057**	**211,242**	**245,227**	**278,358**
EBITDA	**249,239**	**312,406**	**367,187**	**449,026**	**517,683**
Depreciation	-107,682	-131,349	-155,945	-203,799	-239,325
Amortisation	0	0	0	0	0
EBIT	141,557	181,057	211,242	245,227	278,358
Net interest expense	853	625	-1,249	-1,989	-1,935
Associates & JCEs	898	2,029	3,218	1,496	1,496
Other income	1,840	-2,156	375	-3,996	-3,996
Earnings before tax	**145,148**	**181,554**	**213,586**	**240,738**	**273,923**
Income tax	-10,694	-15,590	-27,940	-30,073	-34,219
Net profit after tax	**134,453**	**165,964**	**185,646**	**210,664**	**239,704**
Minority interests	-252	195	137	106	108
Other items	0	0	0	0	0
Preferred dividends	0	0	0	0	0
Normalised NPAT	**134,201**	**166,159**	**185,783**	**210,771**	**239,812**
Extraordinary items	0	0	0	0	0
Reported NPAT	**134,201**	**166,159**	**185,783**	**210,771**	**239,812**
Dividends	-77,743	-77,751	-77,751	-77,751	-77,743
Transfer to reserves	**56,458**	**88,408**	**108,032**	**133,020**	**162,069**
Valuation and ratio analysis					
Reported P/E (x)	20.6	16.6	14.9	13.1	11.5
Normalised P/E (x)	20.6	16.6	14.9	13.1	11.5
FD normalised P/E (x)	20.6	16.6	14.9	13.1	11.5
FD normalised P/E at price target (x)	17.2	13.9	12.4	10.9	9.6
Dividend yield (%)	2.8	2.8	2.8	2.8	2.8
Price/cashflow (x)	10.3	9.4	8.3	6.6	5.8
Price/book (x)	4.4	3.8	3.3	3.0	2.7
EV/EBITDA (x)	10.7	8.7	7.5	6.2	5.3
EV/EBIT (x)	18.7	14.9	13.0	11.4	9.9
Gross margin (%)	45.4	48.1	47.7	47.6	47.5
EBITDA margin (%)	58.4	61.7	61.4	64.3	64.7
EBIT margin (%)	33.1	35.8	35.3	35.1	34.8
Net margin (%)	31.4	32.8	31.1	30.2	30.0
Effective tax rate (%)	7.4	8.6	13.1	12.5	12.5
Dividend payout (%)	57.9	46.8	41.9	36.9	32.4
Capex to sales (%)	50.1	48.6	48.7	42.2	36.9
Capex to depreciation (x)	2.0	1.9	1.9	1.4	1.2
ROE (%)	22.3	24.6	23.7	23.7	24.5
ROA (pretax %)	23.7	25.4	23.6	23.1	23.9
Growth (%)					
Revenue	1.8	18.5	18.1	16.9	14.5
EBITDA	0.9	25.3	17.5	22.3	15.3
EBIT	-11.1	27.9	16.7	16.1	13.5
Normalised EPS	-17.0	23.8	11.8	13.4	13.8
Normalised FDEPS	-17.3	23.8	11.8	13.4	13.8
Per share					
Reported EPS (TWD)	5.18	6.41	7.17	8.13	9.25
Norm EPS (TWD)	5.18	6.41	7.17	8.13	9.25
Fully diluted norm EPS (TWD)	5.18	6.41	7.17	8.13	9.25
Book value per share (TWD)	24.29	27.90	32.64	35.86	39.80
DPS (TWD)	3.00	3.00	3.00	3.00	3.00

Source: Company data, Nomura estimates

Relative performance chart (one year)



Source: ThomsonReuters, Nomura research

(%)	1M	3M	12M
Absolute (TWD)	2.4	6.0	17.9
Absolute (USD)	2.3	7.9	17.3
Relative to MSCI Taiwan	2.1	3.1	3.4
Market cap (USDmn)	93,940.2		
Estimated free float (%)	87.3		
52-week range (TWD)	116.5/88.8		
3-mth avg daily turnover (USDmn)	108.49		
Major shareholders (%)			
National Development Fund Executive Yuan	6.4		

Source: Thomson Reuters, Nomura research

Notes

We estimate sales growth of 18% in 2013F and 17% in 2014F

Cashflow (TWDmn)

Year-end 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
EBITDA	249,239	312,406	367,187	449,026	517,683
Change in working capital	-1,905	-3,171	20,491	-2,606	964
Other operating cashflow	19,433	-15,451	-55,799	-28,961	-42,444
Cashflow from operations	**266,767**	**293,785**	**331,878**	**417,460**	**476,203**
Capital expenditure	-213,963	-246,137	-290,933	-295,000	-295,000
Free cashflow	**52,805**	**47,647**	**40,946**	**122,460**	**181,203**
Reduction in investments	5,317	-31,328	-23,779	-1,496	-1,496
Net acquisitions	0	0	0	0	0
Reduction in other LT assets	9,369	-7,626	-15,453	-4,132	-4,852
Addition in other LT liabilities					0
Adjustments					
Cashflow after investing acts	**67,491**	**8,694**	**1,714**	**116,832**	**174,855**
Cash dividends	-77,743	-77,743	-77,751	-77,751	-77,751
Equity issue	0	0	0	0	0
Debt issue	9,435	63,571	136,021	4,954	2,961
Convertible debt issue	0	0	0	0	0
Others	-3,598	5,417	22,974	-59,859	-59,892
Cashflow from financial acts	**-71,906**	**-8,756**	**81,245**	**-132,655**	**-134,681**
Net cashflow	**-4,415**	**-62**	**82,959**	**-15,823**	**40,174**
Beginning cash	147,887	143,472	143,411	226,369	210,546
Ending cash	143,472	143,411	226,369	210,546	250,720
Ending net debt	-89,125	-25,493	27,570	48,347	11,135

Source: Company data, Nomura estimates

Notes

We forecast an 18% increase in capex for 2013F and a 1.4% increase for 2014F

Balance sheet (TWDmn)

As at 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
Cash & equivalents	143,472	143,411	226,369	210,546	250,720
Marketable securities	7,150	7,507	39,948	37,155	44,245
Accounts receivable	40,948	52,093	56,981	79,394	86,885
Inventories	24,841	37,830	33,259	41,647	45,577
Other current assets	8,850	11,447	3,114	3,900	4,268
Total current assets	**225,260**	**252,289**	**359,671**	**372,642**	**431,694**
LT investments	34,459	65,786	89,565	91,061	92,556
Fixed assets	490,375	617,529	762,725	855,249	912,477
Goodwill	0	0	0	0	0
Other intangible assets	0	0	0	0	0
Other LT assets	24,171	19,430	22,439	22,439	22,439
Total assets	**774,265**	**955,035**	**1,234,400**	**1,341,391**	**1,459,166**
Short-term debt	33,889	35,757	43,523	48,477	51,438
Accounts payable	11,859	15,239	17,155	20,409	21,111
Other current liabilities	71,259	91,440	101,998	127,726	139,778
Total current liabilities	**117,007**	**142,436**	**162,677**	**196,612**	**212,327**
Long-term debt	20,458	82,161	210,416	210,416	210,416
Convertible debt	0	0	0	0	0
Other LT liabilities	4,756	4,683	14,665	4,700	4,700
Total liabilities	**142,221**	**229,281**	**387,758**	**411,728**	**427,443**
Minority interest	2,450	2,556	298	298	298
Preferred stock	0	0	0	0	0
Common stock	259,162	259,244	259,284	259,284	259,284
Retained earnings	219,791	294,781	384,006	467,026	569,088
Proposed dividends	0	0	0	0	0
Other equity and reserves	150,640	169,172	203,054	203,054	203,054
Total shareholders' equity	**629,594**	**723,198**	**846,344**	**929,364**	**1,031,426**
Total equity & liabilities	**774,265**	**955,035**	**1,234,400**	**1,341,391**	**1,459,166**
Liquidity (x)					
Current ratio	1.93	1.77	2.21	1.90	2.03
Interest cover	na	na	169.1	123.3	143.8
Leverage					
Net debt/EBITDA (x)	net cash	net cash	0.08	0.11	0.02
Net debt/equity (%)	net cash	net cash	3.3	5.2	1.1
Activity (days)					
Days receivable	36.0	33.6	33.3	35.6	37.9
Days inventory	41.8	43.7	41.5	37.4	37.9
Days payable	19.5	18.9	18.9	18.7	18.0
Cash cycle	58.3	58.4	55.9	54.3	57.8

Source: Company data, Nomura estimates

Notes

Solid financial position

Earnings estimate revisions

Owing to Apple's 20nm orders with larger die-size and a lower yield-rate, implying more sales contribution, we revise our FY14F sales/earnings estimates slightly by 0.1%/0.1%, respectively.

Fig. 67: Earnings estimate revisions

	Revised				Prior				Change %			
(TWDmn)	**4Q13F**	**1Q14F**	**2013F**	**2014F**	**4Q13F**	**1Q14F**	**2013F**	**2014F**	**4Q13F**	**1Q14F**	**2013F**	**2014F**
Capacity (k)	4,372	4,476	16,705	19,272	4,372	4,438	9,954	11,247	0.0%	0.8%	67.8%	71.4%
Utilization	84%	83%	92%	88%	84%	82%	77%	105%	0.0%	1.0%	14.6%	-17.0%
Shipment (k)	3,675	3,711	15,308	17,046	3,675	3,638	7,738	11,860	0.0%	2.0%	97.8%	43.7%
ASP (US$)	1,340	1,367	1,315	1,389	1,340	1,367	1,163	1,122	0.0%	0.0%	13.1%	23.8%
Sales	**146,466**	**149,696**	**597,684**	**698,591**	**146,466**	**149,554**	**597,684**	**698,031**	**0.0%**	**0.1%**	**0.0%**	**0.1%**
Gross profit	68,824	67,784	284,907	332,783	**68,824**	**66,765**	284,907	332,326	0.0%	1.5%	0.0%	0.1%
Gross margin	*47.0%*	*45.3%*	*47.7%*	*47.6%*	*47.0%*	*44.6%*	*47.7%*	*47.6%*	*0bps*	*64bps*	*0bps*	*3bps*
Operating profit	49,588	49,121	211,242	245,227	49,588	48,176	211,242	245,031	0.0%	2.0%	0.0%	0.1%
Operating margin	*33.9%*	*32.8%*	*35.3%*	*35.1%*	*33.9%*	*32.2%*	*35.3%*	*35.1%*	*0bps*	*60bps*	*0bps*	*0bps*
Net income	42,467	41,950	185,783	210,771	42,467	41,123	185,783	210,604	0.0%	2.0%	0.0%	0.1%
EPS(TWD)	**1.64**	**1.62**	**7.17**	**8.13**	**1.64**	**1.59**	**7.17**	**8.12**	**0.0%**	**2.0%**	**0.0%**	**0.1%**

Source: Company data, Nomura estimates

Fig. 68: TSMC's P&L

(TWDmn)	1Q13	2Q13	3Q13	4Q13F	1Q14F	2Q14F	3Q14F	4Q14F	2012	2013F	2014F	2015F
Net Sales	132,755	155,886	162,577	146,466	149,696	175,384	190,101	183,409	506,249	597,684	698,591	800,091
Gross profit	60,770	76,422	78,891	68,824	67,784	83,984	93,205	87,809	243,595	284,907	332,783	380,009
Operating income	44,428	57,629	59,618	49,588	49,121	62,013	69,261	64,833	181,057	211,242	245,227	278,358
Pretax income	45,748	60,017	59,349	48,493	47,911	60,930	68,290	63,607	181,554	213,586	240,738	273,923
Net income	39,577	51,808	51,952	42,467	41,950	53,346	59,786	55,689	166,159	185,783	210,771	239,812
Profitability												
Gross Margin	45.8%	49.0%	48.5%	47.0%	45.3%	47.9%	49.0%	47.9%	48.1%	47.7%	47.6%	47.5%
Operating Margin	33.5%	37.0%	36.7%	33.9%	32.8%	35.4%	36.4%	35.3%	35.8%	35.3%	35.1%	34.8%
Pretax Margin	34.5%	38.5%	36.5%	33.1%	32.0%	34.7%	35.9%	34.7%	35.9%	35.7%	34.5%	34.2%
Net Margin	29.8%	33.2%	32.0%	29.0%	28.0%	30.4%	31.4%	30.4%	32.8%	31.1%	30.2%	30.0%
EPS	1.53	2.00	2.00	1.64	1.62	2.06	2.31	2.15	6.41	7.17	8.13	9.25
Growth												
Net Sales	1.1%	17.4%	4.3%	-9.9%	2.2%	17.2%	8.4%	-3.5%	18.5%	18.1%	16.9%	14.5%
Gross profit	-1.9%	25.8%	3.2%	-12.8%	-1.5%	23.9%	11.0%	-5.8%	25.5%	17.0%	16.8%	14.2%
Op income	-3.9%	29.7%	3.5%	-16.8%	-0.9%	26.2%	11.7%	-6.4%	27.9%	16.7%	16.1%	13.5%
Pretax income	-1.0%	31.2%	-1.1%	-18.3%	-1.2%	27.2%	12.1%	-6.9%	25.1%	17.6%	12.7%	13.8%
Net income	-4.7%	30.9%	0.3%	-18.3%	-1.2%	27.2%	12.1%	-6.9%	23.8%	11.8%	13.4%	13.8%

Source: Company data, Nomura estimates

Valuation methodology and risks

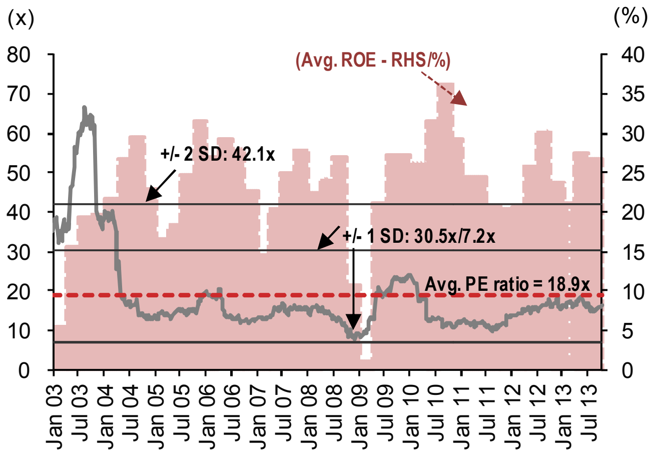
We reiterate our Buy rating and TP of TWD123, based on 3.4x the average FY14F BVPS of TWD36. Our Buy rating reflects: 1) our positive stance and higher-than-consensus earnings growth forecasts of 1.1% for FY14F; and 2) the company's leading position in the foundry industry. TSMC is currently trading at 3.0x FY14F BVPS of TWD36 and our TP represents 15.5% price upside from here.

TSMC remains our top pick among our foundry coverage given: 1) our higher-than-consensus earnings forecasts for 2013-14F; 2) our view that top foundry companies could retain their monopoly on 28nm HKMG (high-K metal gate) process during FY13-14F; and 3) our view that TSMC should be able to maintain its leading position heading into the 20nm/16nmFF geometry migration since 2014F.

Risks to our views

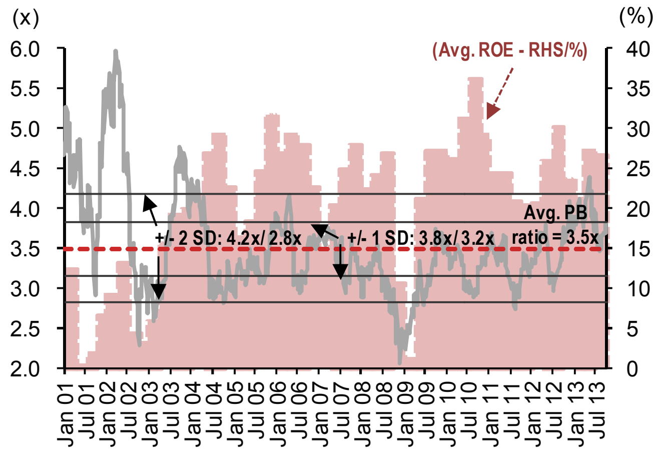
Downside risk may come from a worse-than-expected end-demand slowdown heading into 4Q13 and onwards.

Fig. 69: P/E vs. ROE



Source: TEJ

Fig. 70: P/B vs. ROE



Source: TEJ

Intel Corporation INTC.O INTC US

AMERICAS SEMICONDUCTORS

NOMURA
EQUITY RESEARCH

Manufacturing Edge has Limited Impact on P/L

Apple likely set with TSMC / Samsung through 2017

November 7, 2013

Relative Rating Remains	**Reduce**
Target price Remains	USD 18.00
Closing price November 5, 2013	USD 24.03
Potential upside	-25.1%

Intel has a significant lead in manufacturing

Intel started mass production of 22nm 3D transistors in 2011, much ahead of any other foundry. In contrast, TSMC is expected to go into production with its first FinFET 16nm process in mid-2015. Intel's manufacturing lead is not limited to 3-4 years in duration, but also in transistor scaling. We believe TSMC's 16nm FF process will not benefit from addition scaling over its 20nm planar process. Considering this, we think Intel is in a unique position in terms of furthering its foundry ambitions and closing the gap with ARM SoCs in power efficiency.

However, we see limited foundry engagements over next few years

We think foundry upside is limited as Intel stays committed to not enabling any of its competitors, which rules out Qualcomm, MediaTek, Broadcom, Nvidia, and Marvell. Apple is a potential customer with $0.20-0.30 in earnings power. That said, Apple seems to be set with its roadmap at TSMC and Samsung through 2016-2017.

Gains in mobile likely limited to tablets in the near term

We think Intel should have a more meaningful presence in tablets next year with the 22nm Bay Trail chips. But we think the earnings impact is likely negligible. In an extreme scenario, if Intel captured a 50% share of the non-Apple tablet market (70-75m units @ $18 ASP), the EPS impact would be less than $0.05. Currently, Intel's tablet and smartphones lag the leading node by 1-2 years. We think it would take Intel about two years to move its smartphone roadmap to the leading node. Even then, we think success in smartphones would require more than the leading process. We think an on-die integrated LTE modem would be critical to gain share in smartphones, which we see around two years away from mass availability.

Maintain Reduce with $18 PT

We maintain our Reduce rating on Intel shares with an $18 price target based on 10x CY14E EPS. Intel currently trades at 13x CY14 consensus estimates. Over the last three years the stock has traded at an average multiple of 10x, a high of 13x and a low of 8x.

Year end:Dec	2012A	2013E		2014E	
(in $mn)	Actual	Old	New	Old	New
Sales	53,341	-	52,574	-	53,242
Nomura EPS	$2.13	-	$1.89	-	$1.80
Cons EPS	-		$1.89		$1.92
Difference	-		($0.00)		($0.11)
P/E	11.3x		12.7x		13.3x

Source: Company data, Nomura estimates

Key company data: *See page 2 for company data, and detailed price/index chart.*

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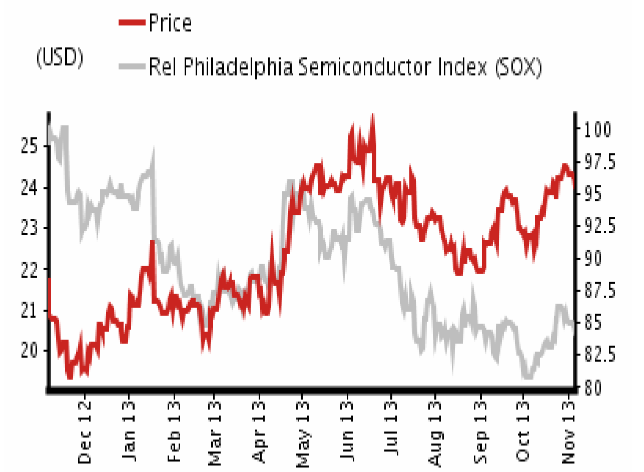
Key data on Intel Corporation

Rating

Stock	Reduce
Sector	Neutral

Relative performance chart



Source: Thomson Reuters, Nomura research

Performance

(%)	1M	3M	12M
Absolute	5.3	4.8	10.0
Relative to Philadelphia Semiconductor Index (SOX)	4.3	0.5	-22.9

Market data

Current stock price (USD)	24.03
Market cap (USD - mn)	119,453.1
52-week low (USD)	19.23
52-week high (USD)	25.98
Shares outstanding (mn)	4,971.00

Source: Thomson Reuters, Nomura research

Income Statement (in $mn)	2012	2013E	2014E
Revenue	53,341	52,574	53,242
Gross income	33,151	31,307	31,764
Gross margin	62.1%	59.5%	59.7%
Operaing expenses	18,513	19,078	19,500
Operating income	14,638	12,229	12,264
Other inc/(exp)	235	318	(40)
Pretax income	14,873	12,547	12,224
Income tax	3,868	2,937	3,056
Net income	11,005	9,610	9,168
EPS (GAAP)	**$2.13**	**$1.89**	**$1.80**
Diluted shares	5,161	5,096	5,082

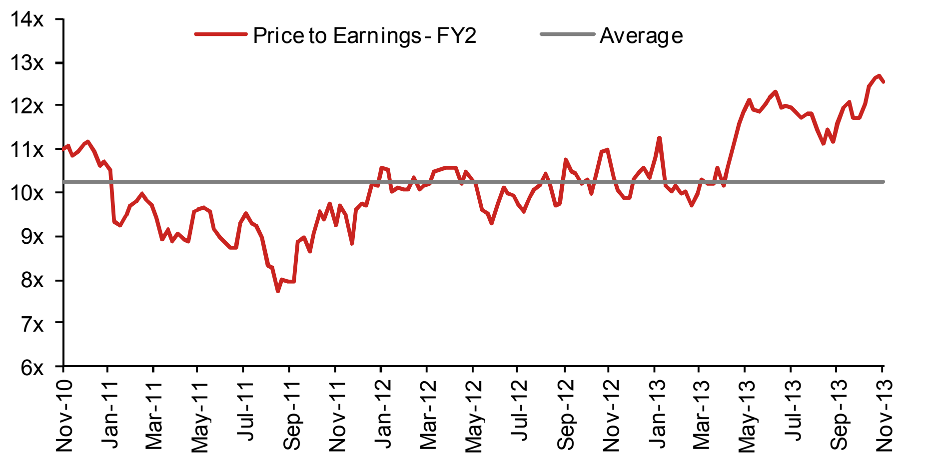
Balance Sheet	2012	2013E	2014E
Cash & equivalents	18,162	19,341	19,595
Accounts receivable	3,833	3,779	3,796
Inventories	4,734	4,778	4,800
Other current assets	4,629	3,952	3,952
Total current assets	31,358	31,850	32,143
PP&E	27,983	31,482	35,782
LT Investments	493	1,583	1,583
Equity investments	4,424	6,514	6,514
Other non-current assets	20,093	20,466	19,298
Total non-current assets	52,993	60,045	63,177
Total assets	**84,351**	**91,895**	**95,320**
Total current liabilities	12,898	14,037	14,051
LT debt	13,136	13,157	13,157
Other non-current liabilities	7,114	8,067	8,067
Total liabilities	33,148	35,261	35,275
Shareholders' equity	51,203	56,634	60,045
Total liabilties & equity	**84,351**	**91,895**	**95,320**

Cash Flow	2012	2013E	2014E
Cash from operations	18,884	22,109	18,650
Cash from investing	(14,060)	(17,192)	(11,000)
Cash from financing	(1,408)	(6,097)	(7,395)
Depreciation	6,357	6,853	6,700
Capital expenditures	(11,027)	(10,629)	(11,000)

Valuation Ratios	2012	2013E	2014E
Return on equity	21%	17%	15%
Debt to equity	65%	62%	59%
Debt to assets	39%	38%	37%
Book value per share	$9.92	$11.11	$11.82
Cash per share	$1.83	$2.49	$2.55

Source: Company data, Nomura estimates

Fig. 71: Intel's 3-yr PE (FY2) valuation trend



Source: FactSet, Nomura research

Fig. 72: Income statement summary, 2012-2014E

	2012				2013E				2014E				2012	2013E	2014E
($ in millions)	**Mar-12**	**Jun-12**	**Sep-12**	**Dec-12**	**Mar-13**	**Jun-13**	**Sep-13**	**Dec-13E**	**Mar-14E**	**Jun-14E**	**Sep-14E**	**Dec-14E**	**Dec-12**	**Dec-13**	**Dec-14**
INCOME STATEMENT															
Total Revenue	12,906	13,501	13,457	13,477	12,580	12,811	13,483	13,700	12,819	13,043	13,618	13,762	53,341	52,574	53,242
QoQ	-7.1%	4.6%	-0.3%	0.1%	-6.7%	1.8%	5.2%	1.6%	-6.4%	1.7%	4.4%	1.1%			
YoY	0.5%	3.6%	-5.5%	-3.0%	-2.5%	-5.1%	0.2%	1.7%	1.9%	1.8%	1.0%	0.5%	-1.2%	-1.4%	1.3%
COGS	4,641	4,947	4,942	5,660	5,514	5,341	5,069	5,343	5,384	5,347	5,379	5,367	20,190	21,267	21,478
Gross Income	8,265	8,554	8,515	7,817	7,066	7,470	8,414	8,357	7,435	7,695	8,239	8,395	33,151	31,307	31,764
R&D	2,401	2,513	2,605	2,629	2,527	2,516	2,742	2,750	2,780	2,790	2,830	2,850	10,148	10,535	11,250
SG&A	1,973	2,131	1,995	1,958	1,947	2,165	1,970	1,950	1,970	2,000	1,995	2,005	8,057	8,032	7,970
Amort. of Intangibles, IPR&D	81	78	74	75	73	70	74	70	70	70	70	70	308	287	280
Total operating expenses	4,455	4,722	4,674	4,662	4,547	4,751	4,910	4,870	4,820	4,860	4,895	4,925	18,513	19,078	19,500
Operating Income	3,810	3,832	3,841	3,155	2,519	2,719	3,504	3,487	2,615	2,835	3,344	3,470	14,638	12,229	12,264
Net interest expense/(income)	(23)	(55)	(27)	11	50	37	32	25	35	35	35	35	(94)	144	140
Loss/(Gain) on equity investments	19	(47)	(53)	(60)	26	(11)	(452)	(25)	(25)	(25)	(25)	(25)	(141)	(462)	(100)
Pretax Income	3,814	3,934	3,921	3,204	2,443	2,693	3,924	3,487	2,605	2,825	3,334	3,460	14,873	12,547	12,224
Provision for income tax	1,076	1,107	949	736	398	693	974	872	651	706	833	865	3,868	2,937	3,056
Net income	2,738	2,827	2,972	2,468	2,045	2,000	2,950	2,615	1,954	2,119	2,500	2,595	11,005	9,610	9,168
Net income (non-GAAP)	2,883	2,973	3,115	2,609	2,202	2,139	3,043	2,708	2,047	2,212	2,593	2,688	11,580	10,092	9,540
EPS (GAAP)	**$0.53**	**$0.54**	**$0.58**	**$0.48**	**$0.40**	**$0.39**	**$0.58**	**$0.51**	**$0.38**	**$0.42**	**$0.49**	**$0.51**	**$2.13**	**$1.89**	**$1.80**
EPS (non-GAAP)	$0.56	$0.57	$0.60	$0.51	$0.43	$0.42	$0.60	$0.53	$0.40	$0.43	$0.51	$0.53	$2.24	$1.98	$1.88
Shares outstanding - basic	4,999	5,022	4,996	4,968	4,948	4,978	4,981	4,981	4,981	4,981	4,981	4,981	4,996	4,972	4,981
Shares outstanding - fully diluted	5,192	5,199	5,153	5,095	5,080	5,106	5,100	5,095	5,090	5,085	5,080	5,075	5,161	5,096	5,082
Percent of Sales															
Gross Margin	64.0%	63.4%	63.3%	58.0%	56.2%	58.3%	62.4%	61.0%	58.0%	59.0%	60.5%	61.0%	62.1%	59.5%	59.7%
R&D	18.6%	18.6%	19.4%	19.5%	20.1%	19.6%	20.3%	20.1%	21.7%	21.4%	20.8%	20.7%	19.0%	20.0%	21.1%
SG&A	15.3%	15.8%	14.8%	14.5%	15.5%	16.9%	14.6%	14.2%	15.4%	15.3%	14.7%	14.6%	15.1%	15.3%	15.0%
Operating Margin	29.5%	28.4%	28.5%	23.4%	20.0%	21.2%	26.0%	25.5%	20.4%	21.7%	24.6%	25.2%	27.4%	23.3%	23.0%
Pretax Margin	29.6%	29.1%	29.1%	23.8%	19.4%	21.0%	29.1%	25.5%	20.3%	21.7%	24.5%	25.1%	27.9%	23.9%	23.0%
Tax Rate	28.2%	28.1%	24.2%	23.0%	16.3%	25.7%	24.8%	25.0%	25.0%	25.0%	25.0%	25.0%	26.0%	23.4%	25.0%
Net Margin	21.2%	20.9%	22.1%	18.3%	16.3%	15.6%	21.9%	19.1%	15.2%	16.2%	18.4%	18.9%	20.6%	18.3%	17.2%

Source: Company data, Nomura estimates

Samsung Electronics 005930.KS 005930 KS

TECHNOLOGY

NOMURA
EQUITY RESEARCH

Strong mobile earnings dispels market concerns

Memory likely to fuel major earnings momentum into 2014F

November 7, 2013

Rating Remains	**Buy**
Target price Remains	KRW 1,900,000
Closing price November 5, 2013	KRW 1,485,000
Potential upside	+27.9%

3Q13 OP of KRW10.16tn (+6.6% q-q)

Samsung Electronics recorded 3Q13 OP of KRW10.16tn (+6.6% q-q). Despite weaker earnings of its display and consumer electronics businesses, Samsung's OP surpassed the KRW10tn level for the first time thanks to better-than-expected earnings of IT & mobile communications division and a recovery of its memory division. Samsung's system-LSI division continued to show its weak operating performance in 3Q13. We believe the 3Q13 earnings reinforce our view that Samsung's smartphones business should be quite resilient despite market concerns.

We anticipate further resilient earnings growth for 4Q13F and 2014F

We estimate Samsung's OP to grow further to KRW10.74tn (+5.8% q-q) in 4Q13F on the back of our expected robust profit growth of its DRAM division and a recovery of system-LSI. We expect the operating performance of its IM and consumer electronics divisions to remain flat q-q, whereas the display division's OP is likely to fall. We anticipate a short-term recovery of system-LSI earnings in 4Q13F thanks to favourable seasonality impact and the launch of new products by customers.

We forecast Samsung's 2014F OP at KRW43.00tn (+10% y-y). We expect its memory and OLED divisions should act as major growth drivers in 2014F, while the OP of its IM division is likely to be stalled.

Reaffirm Buy

We maintain our Buy rating and TP of KRW1,900,000. We think Samsung's 12M forward P/E of 6.3x reflects what we view as the market's excessive concerns about its smartphones business. However, as we expect a resilient smartphones business for Samsung (as opposed to market concerns) and a stronger recovery of the memory business, we believe the relief rally should continue.

31 Dec	FY12	FY13F		FY14F		FY15F	
Currency (KRW)	Actual	Old	New	Old	New	Old	New
Revenue (bn)	201,104	230,701	231,300	246,867	239,978	255,880	255,052
Reported net profit (bn)	23,185	31,101	31,140	35,693	34,651	35,803	37,002
Normalised net profit (bn)	23,185	31,101	31,140	35,693	34,651	35,803	37,002
FD normalised EPS	136,278.16	182,803.93	183,033.25	209,795.32	203,668.57	210,440.71	217,486.72
FD norm. EPS gr. (%)	73.6	34.1	34.3	14.8	11.3	0.3	6.8
FD norm. P/E (x)	10.6	N/A	7.9	N/A	7.1	N/A	6.7
EV/EBITDA (x)	4.7	N/A	3.5	N/A	2.8	N/A	2.3
Price/book (x)	1.9	N/A	1.5	N/A	1.2	N/A	1.0
Dividend yield (%)	0.6	N/A	0.7	N/A	0.8	N/A	0.8
ROE (%)	21.6	23.4	23.6	21.6	21.2	18.0	18.8
Net debt/equity (%)	net cash	net cash	net cash	net cash	net cash	net cash	net cash

Source: Company data, Nomura estimates

Key company data: *See page 2 for company data and detailed price/index chart.*

Anchor themes

Despite commoditization of the smartphone market, we expect a soft-landing of profitability. We believe Samsung can continue to generate above-mid-teens ROEs.

Nomura vs consensus

We are more optimistic than the Street about the smartphone margin outlook as we expect a soft-landing scenario.

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See Appendix A-1 for analyst certification, important disclosures and the status of non-US analysts.

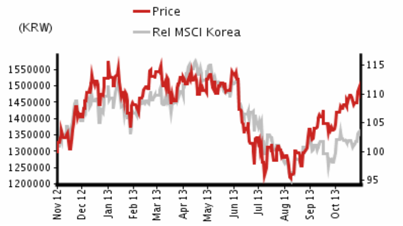
Key data on Samsung Electronics

Income statement (KRWbn)

Year-end 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
Revenue	**165,002**	**201,104**	**231,300**	**239,978**	**255,052**
Cost of goods sold	-112,145	-126,652	-136,640	-138,257	-146,652
Gross profit	**52,857**	**74,452**	**94,660**	**101,722**	**108,400**
SG&A	-37,402	-45,402	-55,448	-58,726	-63,219
Employee share expense	795	27	0	0	0
Operating profit	**16,250**	**29,077**	**39,211**	**42,996**	**45,181**
EBITDA	**29,842**	**44,699**	**56,041**	**63,384**	**66,944**
Depreciation	-12,934	-14,835	-15,890	-19,424	-20,775
Amortisation	-658	-787	-940	-964	-988
EBIT	16,250	29,077	39,211	42,996	45,181
Net interest expense	62	246	842	1,638	2,418
Associates & JCEs	1,399	987	698	420	430
Other income	-551	-395	-503	-98	-98
Earnings before tax	**17,159**	**29,915**	**40,248**	**44,956**	**47,931**
Income tax	-3,425	-6,070	-8,281	-9,441	-10,066
Net profit after tax	**13,734**	**23,845**	**31,967**	**35,515**	**37,866**
Minority interests	-375	-660	-827	-864	-864
Other items					
Preferred dividends					
Normalised NPAT	**13,359**	**23,185**	**31,140**	**34,651**	**37,002**
Extraordinary items					
Reported NPAT	**13,359**	**23,185**	**31,140**	**34,651**	**37,002**
Dividends	-827	-1,208	-1,592	-1,751	-1,758
Transfer to reserves	**12,532**	**21,977**	**29,548**	**32,900**	**35,244**
Valuation and ratio analysis					
Reported P/E (x)	16.3	9.4	7.1	6.4	6.0
Normalised P/E (x)	16.3	9.4	7.1	6.4	6.0
FD normalised P/E (x)	18.5	10.6	7.9	7.1	6.7
FD normalised P/E at price target (x)	24.2	13.9	10.4	9.3	8.7
Dividend yield (%)	0.4	0.6	0.7	0.8	0.8
Price/cashflow (x)	10.8	6.5	5.2	4.6	4.3
Price/book (x)	2.2	1.9	1.5	1.2	1.0
EV/EBITDA (x)	7.0	4.7	3.5	2.8	2.3
EV/EBIT (x)	12.4	7.1	5.0	4.2	3.4
Gross margin (%)	32.0	37.0	40.9	42.4	42.5
EBITDA margin (%)	18.1	22.2	24.2	26.4	26.2
EBIT margin (%)	9.8	14.5	17.0	17.9	17.7
Net margin (%)	8.1	11.5	13.5	14.4	14.5
Effective tax rate (%)	20.0	20.3	20.6	21.0	21.0
Dividend payout (%)	6.2	5.2	5.1	5.1	4.7
Capex to sales (%)	13.1	11.1	10.4	11.9	10.2
Capex to depreciation (x)	1.7	1.5	1.5	1.5	1.3
ROE (%)	14.6	21.6	23.6	21.2	18.8
ROA (pretax %)	13.3	19.9	22.7	21.9	21.3
Growth (%)					
Revenue	6.7	21.9	15.0	3.8	6.3
EBITDA	4.0	49.8	25.4	13.1	5.6
EBIT	-6.1	78.9	34.9	9.7	5.1
Normalised EPS	-15.7	72.8	33.7	10.8	6.4
Normalised FDEPS	-15.4	73.6	34.3	11.3	6.8
Per share					
Reported EPS (KRW)	88,919.06	153,640.31	205,480.43	227,722.43	242,232.17
Norm EPS (KRW)	88,919.06	153,640.31	205,480.43	227,722.43	242,232.17
Fully diluted norm EPS (KRW)	78,522.44	136,278.16	183,033.25	203,668.57	217,486.72
Book value per share (KRW)	649,623.76	775,935.79	968,238.43	1,180,542.3	1,406,703.7
DPS (KRW)	5,500.00	8,000.00	10,500.00	11,500.00	11,500.00

Source: Company data, Nomura estimates

Relative performance chart (one year)



Source: ThomsonReuters, Nomura research

(%)	1M	3M	12M
Absolute (KRW)	6.2	10.2	9.6
Absolute (USD)	7.9	15.9	13.5
Relative to MSCI Korea	3.5	0.7	1.7
Market cap (USDmn)	206,613.5		
Estimated free float (%)	82.0		
52-week range (KRW)	1584000/1209000		
3-mth avg daily turnover (USDmn)	296.03		
Major shareholders (%)			
Samsung Life Insurance	7.5		
Samsung Corp.	4.1		

Source: Thomson Reuters, Nomura research

Notes

We expect Samsung to continue to post record-high operating profits through 2014F

Cashflow (KRWbn)

Year-end 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
EBITDA	29,842	44,699	56,041	63,384	66,944
Change in working capital	-1,458	-1,654	1,557	-1,912	-1,312
Other operating cashflow	-5,466	-5,072	-9,926	-8,399	-7,807
Cashflow from operations	**22,918**	**37,973**	**47,673**	**53,074**	**57,825**
Capital expenditure	-21,685	-22,233	-24,142	-28,572	-26,072
Free cashflow	**1,232**	**15,740**	**23,531**	**24,502**	**31,753**
Reduction in investments	58	34	-1,087	-542	-585
Net acquisitions					
Reduction in other LT assets	974	-5,911	-5,795	0	0
Addition in other LT liabilities					
Adjustments	-459	-3,212	-2,367	-2,039	-2,478
Cashflow after investing acts	**1,805**	**6,651**	**14,283**	**21,921**	**28,690**
Cash dividends	-875	-1,265	-1,212	-1,592	-1,751
Equity issue	161	88	10	0	0
Debt issue	3,758	539	-3,640	-3,624	-2,435
Convertible debt issue					
Others	51	-1,227	238	60	60
Cashflow from financial acts	**3,095**	**-1,865**	**-4,603**	**-5,157**	**-4,126**
Net cashflow	**4,900**	**4,787**	**9,679**	**16,764**	**24,564**
Beginning cash	9,791	14,691	19,478	29,157	45,921
Ending cash	14,691	19,478	29,157	45,921	70,485
Ending net debt	-167	-4,685	-17,725	-38,113	-65,112

Source: Company data, Nomura estimates

Notes

The company has allocated a capex of c.KRW24tn and c.KRW28tn for 2013F and 2014F, respectively

Balance sheet (KRWbn)

As at 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
Cash & equivalents	14,691	19,478	29,157	45,921	70,485
Marketable securities	12,186	18,657	24,721	24,721	24,721
Accounts receivable	21,882	23,861	28,203	30,528	33,045
Inventories	15,717	17,747	20,749	22,819	25,095
Other current assets	7,026	7,526	7,818	9,140	8,371
Total current assets	**71,502**	**87,269**	**110,648**	**133,129**	**161,716**
LT investments	12,428	14,015	16,290	17,252	18,267
Fixed assets	62,044	68,485	77,826	86,973	92,271
Goodwill					
Other intangible assets	3,355	3,730	4,200	4,371	4,549
Other LT assets	6,302	7,573	9,461	11,500	13,978
Total assets	**155,631**	**181,072**	**218,425**	**253,225**	**290,780**
Short-term debt	9,684	9,443	8,699	6,015	4,197
Accounts payable	10,277	9,489	11,686	12,649	13,692
Other current liabilities	24,358	28,001	34,998	37,839	39,507
Total current liabilities	**44,319**	**46,933**	**55,383**	**56,503**	**57,396**
Long-term debt	4,840	5,351	2,733	1,793	1,177
Convertible debt					
Other LT liabilities	4,627	7,308	8,474	9,497	10,740
Total liabilities	**53,786**	**59,591**	**66,590**	**67,793**	**69,313**
Minority interest	4,246	4,386	5,102	5,798	6,589
Preferred stock	119	119	119	119	119
Common stock	778	778	778	778	778
Retained earnings	97,543	119,986	148,402	181,302	216,546
Proposed dividends					
Other equity and reserves	-840	-3,789	-2,566	-2,566	-2,566
Total shareholders' equity	**97,600**	**117,094**	**146,734**	**179,634**	**214,878**
Total equity & liabilities	**155,631**	**181,072**	**218,425**	**253,225**	**290,780**
Liquidity (x)					
Current ratio	1.61	1.86	2.00	2.36	2.82
Interest cover	na	na	na	na	na
Leverage					
Net debt/EBITDA (x)	net cash	net cash	net cash	net cash	net cash
Net debt/equity (%)	net cash	net cash	net cash	net cash	net cash
Activity (days)					
Days receivable	45.4	41.6	41.1	44.7	45.5
Days inventory	47.3	48.4	51.4	57.5	59.6
Days payable	31.6	28.6	28.3	32.1	32.8
Cash cycle	61.1	61.4	64.2	70.1	72.3

Source: Company data, Nomura estimates

Notes

As we estimate the company's cash and equivalents at above KRW70tn in 2014F, we see a higher likelihood of an increase in shareholder returns

United Microelectronics Corporation 2303.TW 2303 TT

FOUNDRY

NOMURA
EQUITY RESEARCH

Missed 28nm window of opportunity

Striving for 28nm progress but sales contribution may be delayed to 2014F

November 7, 2013

Rating Remains	**Neutral**
Target price Remains	TWD 13.2
Closing price November 5, 2013	TWD 12.4
Potential upside	+6.5%

Action/valuation: Maintain Neutral rating and TP of TWD13.2

As UMC's 28nm PoliSiON yield is improving, we think management's low-single-digit sales contribution target of 28nm remains at risk, though its 40nm and specialty technologies remain competitive. We maintain our Neutral and TP of TWD13.2, based on 0.8x FY14F BVPS of TWD17.

Catalysts: Widening gap with first tier competitors

Given its limited capex/R&D resources to sustain capital intensive advanced node investments, UMC is now regarded as a second tier foundry, behind Global Foundries, striving to catch up in the 28nm business. As copying T-like process is getting more difficult since the 28nm HKMG process, we believe the technology gap between UMC and other foundries may widen if UMC keeps falling behind in attracting sufficient 28nm customers to sustain the utilisation rate. With Global Foundries replacing UMC as the second source for 28nm PolySiON wafer, we think customers need strong incentives for evaluating UMC as the third source, given high R&D and mask costs. Thus, we reiterate our view that UMC's 28nm sales contribution may continue to be delayed to early 2014F despite its 28nm PolySiON yield rate improving to 70%+ recently.

Catalysts: Competitive legacy node solutions

Amid improving 28nm yield, UMC's legacy node and special technologies continue to support the company's resources for investing in advanced nodes. Accounting for 30% of UMC's sales, special technologies such as high-voltage DDI (40% sales of special technologies), PWM IC, touch controller and embedded flash etc. would still be competitive in cost/performance to attract customers, implying UMC may still allocate further capex into related legacy nodes during 2014F, in our view.

31 Dec	FY12	FY13F		FY14F		FY15F	
Currency (TWD)	Actual	Old	New	Old	New	Old	New
Revenue (mn)	105,998	122,240	122,240	128,400	128,400	137,706	137,706
Reported net profit (mn)	7,819	13,019	13,019	7,893	7,893	8,177	8,177
Normalised net profit (mn)	7,819	13,019	13,019	7,893	7,893	8,177	8,177
FD normalised EPS	61.62c	1.03	1.03	61.83c	61.83c	64.05c	64.05c
FD norm. EPS growth (%)	-27.0	66.5	66.5	-39.7	-39.7	3.6	3.6
FD normalised P/E (x)	20.0	N/A	12.0	N/A	20.0	N/A	19.3
EV/EBITDA (x)	4.2	N/A	4.9	N/A	4.6	N/A	4.2
Price/book (x)	0.8	N/A	0.7	N/A	0.7	N/A	0.7
Dividend yield (%)	na	N/A	4.2	N/A	4.2	N/A	4.2
ROE (%)	3.8	6.1	6.1	3.5	3.5	3.6	3.6
Net debt/equity (%)	2.6	22.6	22.6	25.8	25.8	24.7	24.7

Source: Company data, Nomura estimates

Key company data: *See page 2 for company data and detailed price/index chart.*

Anchor themes

While UMC is catching up in 28nm technology, the gap with TSMC remains at a one-year level for 40nm. We lower our FY14F earnings as we think a delay in the 28nm ramp-up schedule could cast uncertainty over UMC's long-term competitiveness for 14nm delivery.

Nomura vs consensus

Our FY13F/FY14F sales forecasts are -1%/-1% vs. consensus.

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See Appendix A-1 for analyst certification, important disclosures and the status of non-US analysts.

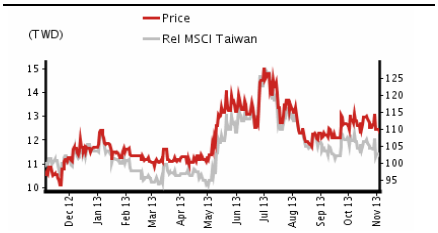
Key data on United Microelectronics Corporation

Income statement (TWDmn)

Year-end 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
Revenue	**105,880**	**105,998**	**122,240**	**128,400**	**137,706**
Cost of goods sold	-81,885	-83,474	-99,526	-103,676	-112,348
Gross profit	**23,995**	**22,524**	**22,715**	**24,724**	**25,358**
SG&A	-13,857	-13,423	-18,383	-17,208	-15,868
Employee share expense	0	0	-68	-376	-1,951
Operating profit	**10,138**	**9,101**	**4,263**	**7,140**	**7,539**
EBITDA	**40,647**	**42,447**	**42,572**	**47,830**	**53,004**
Depreciation	-30,087	-32,665	-37,610	-39,919	-44,603
Amortisation	-422	-681	-698	-771	-862
EBIT	10,138	9,101	4,263	7,140	7,539
Net interest expense	36	-104	-365	-454	-527
Associates & JCEs	-2,020	-2,850	439	-592	-742
Other income	3,212	3,743	10,693	3,338	3,580
Earnings before tax	**11,366**	**9,889**	**15,030**	**9,433**	**9,851**
Income tax	-756	-2,070	-2,011	-1,540	-1,675
Net profit after tax	**10,610**	**7,819**	**13,019**	**7,893**	**8,177**
Minority interests					
Other items	0	0	0	0	0
Preferred dividends	0	0	0	0	0
Normalised NPAT	**10,610**	**7,819**	**13,019**	**7,893**	**8,177**
Extraordinary items	0	0	0	0	0
Reported NPAT	**10,610**	**7,819**	**13,019**	**7,893**	**8,177**
Dividends	-6,316	0	-6,596	-3,907	-6,596
Transfer to reserves	**4,293**	**7,819**	**6,424**	**3,986**	**1,581**
Valuation and ratio analysis					
Reported P/E (x)	14.6	19.9	11.9	19.9	19.2
Normalised P/E (x)	14.6	19.9	11.9	19.9	19.2
FD normalised P/E (x)	14.6	20.0	12.0	20.0	19.3
FD normalised P/E at price target (x)	17.2	23.5	14.1	23.5	22.6
Dividend yield (%)	4.1	na	4.2	4.2	4.2
Price/cashflow (x)	4.0	4.2	2.6	3.5	2.8
Price/book (x)	0.8	0.8	0.7	0.7	0.7
EV/EBITDA (x)	4.0	4.2	4.9	4.6	4.2
EV/EBIT (x)	19.3	26.7	45.1	33.5	31.9
Gross margin (%)	22.7	21.2	18.6	19.3	18.4
EBITDA margin (%)	38.4	40.0	34.8	37.3	38.5
EBIT margin (%)	9.6	8.6	3.5	5.6	5.5
Net margin (%)	10.0	7.4	10.7	6.1	5.9
Effective tax rate (%)	6.7	20.9	13.4	16.3	17.0
Dividend payout (%)	59.5	0.0	50.7	49.5	80.7
Capex to sales (%)	43.8	47.9	36.4	32.3	30.1
Capex to depreciation (x)	1.5	1.6	1.2	1.0	0.9
ROE (%)	5.0	3.8	6.1	3.5	3.6
ROA (pretax %)	3.5	2.7	1.7	2.1	2.2
Growth (%)					
Revenue	-12.1	0.1	15.3	5.0	7.2
EBITDA	-23.0	4.4	0.3	12.4	10.8
EBIT	-55.2	-10.2	-53.2	67.5	5.6
Normalised EPS	-55.7	-26.8	67.3	-40.0	3.6
Normalised FDEPS	-55.8	-27.0	66.5	-39.7	3.6
Per share					
Reported EPS (TWD)	84.61c	61.94c	1.04	62.20c	64.43c
Norm EPS (TWD)	84.61c	61.94c	1.04	62.20c	64.43c
Fully diluted norm EPS (TWD)	84.45c	61.62c	1.03	61.83c	64.05c
Book value per share (TWD)	16.45	15.63	17.56	17.66	17.67
DPS (TWD)	0.50	0.00	0.52	0.52	0.52

Source: Company data, Nomura estimates

Relative performance chart (one year)



Source: ThomsonReuters, Nomura research

(%)	1M	3M	12M
Absolute (TWD)	-3.9	-7.5	17.1
Absolute (USD)	-4.0	-5.8	16.5
Relative to MSCI Taiwan	-4.2	-10.4	2.6
Market cap (USDmn)	5,499.9		
Estimated free float (%)	90.0		
52-week range (TWD)	15.4/10		
3-mth avg daily turnover (USDmn)	24.51		
Major shareholders (%)			
Hsun-Chieh Investment Co., Ltd.	3.4		

Source: Thomson Reuters, Nomura research

Notes

We estimate FY13F/14F sales growth of 15%/5%

Cashflow (TWDmn)

Year-end 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
EBITDA	40,647	42,447	42,572	47,830	53,004
Change in working capital	-5,034	-4,572	4,157	-3,253	2,068
Other operating cashflow	2,836	-448	13,061	649	647
Cashflow from operations	**38,449**	**37,428**	**59,790**	**45,226**	**55,720**
Capital expenditure	-46,400	-50,818	-44,471	-41,468	-41,468
Free cashflow	**-7,951**	**-13,391**	**15,318**	**3,758**	**14,252**
Reduction in investments	8,539	11,957	16,234	592	610
Net acquisitions	0	0	0	0	0
Reduction in other LT assets	2,649	4,043	-87,510	-5,390	-4,389
Addition in other LT liabilities		0	0	0	0
Adjustments					
Cashflow after investing acts	**3,237**	**2,609**	**-55,957**	**-1,041**	**10,474**
Cash dividends	-14,546	-6,316	0	-6,596	-3,907
Equity issue	0	1,260	2,598	0	0
Debt issue	16,746	11,408	23,049	4,861	-2,502
Convertible debt issue					
Others	-7,542	-8,033	8,360	40	-4,155
Cashflow from financial acts	**-5,342**	**-1,681**	**34,008**	**-1,695**	**-10,564**
Net cashflow	**-2,105**	**928**	**-21,949**	**-2,736**	**-90**
Beginning cash	32,935	30,829	31,757	9,808	7,072
Ending cash	30,829	31,757	9,808	7,072	6,983
Ending net debt	-5,199	5,281	50,280	57,877	55,465

Source: Company data, Nomura estimates

Notes

We estimate FY14F capex to decrease 7% y-y

Balance sheet (TWDmn)

As at 31 Dec	FY11	FY12	FY13F	FY14F	FY15F
Cash & equivalents	30,829	31,757	9,808	7,072	6,983
Marketable securities	5,821	4,987	682	786	776
Accounts receivable	12,502	14,110	14,374	15,831	15,255
Inventories	10,479	11,851	12,364	13,617	12,837
Other current assets	1,134	2,514	1,952	2,150	2,026
Total current assets	**60,765**	**65,220**	**39,180**	**39,456**	**37,877**
LT investments	59,876	47,919	31,685	31,093	30,483
Fixed assets	130,951	145,136	232,062	238,231	238,622
Goodwill	0	0	0	0	0
Other intangible assets					
Other LT assets	6,701	5,946	12,692	12,692	12,692
Total assets	**258,293**	**264,220**	**315,619**	**321,471**	**319,673**
Short-term debt	10,427	8,145	16,779	17,309	14,807
Accounts payable	3,997	4,982	8,826	9,085	8,433
Other current liabilities	17,324	16,128	16,655	16,051	17,292
Total current liabilities	**31,749**	**29,255**	**42,260**	**42,444**	**40,532**
Long-term debt	15,203	28,894	43,310	47,640	47,640
Convertible debt	0	0	0	0	0
Other LT liabilities	3,604	3,622	7,210	7,250	7,250
Total liabilities	**50,556**	**61,770**	**92,779**	**97,335**	**95,422**
Minority interest	0	0	0	0	0
Preferred stock	0	0	0	0	0
Common stock	130,843	129,518	126,905	126,905	126,905
Retained earnings	21,056	21,429	39,107	40,405	40,519
Proposed dividends	0	0	0	0	0
Other equity and reserves	55,837	51,503	56,827	56,827	56,827
Total shareholders' equity	**207,737**	**202,450**	**222,839**	**224,137**	**224,251**
Total equity & liabilities	**258,293**	**264,220**	**315,619**	**321,471**	**319,673**
Liquidity (x)					
Current ratio	1.91	2.23	0.93	0.93	0.93
Interest cover	na	87.5	11.7	15.7	14.3
Leverage					
Net debt/EBITDA (x)	net cash	0.12	1.18	1.21	1.05
Net debt/equity (%)	net cash	2.6	22.6	25.8	24.7
Activity (days)					
Days receivable	50.1	45.9	42.5	42.9	41.2
Days inventory	48.4	49.0	44.4	45.7	43.0
Days payable	21.8	19.7	25.3	31.5	28.5
Cash cycle	76.8	75.2	61.6	57.1	55.7

Source: Company data, Nomura estimates

Notes

We expect the company to raise long-term debt during FY13F-14F

Fig. 73: UMC's P&L

(TWDmn)	1Q13	2Q13	3Q13	4Q13F	1Q14F	2Q14F	3Q14F	4Q14F	2012	2013F	2014F	2015F
Net Sales	27,781	31,905	33,407	29,147	27,517	33,368	35,414	32,101	105,998	122,240	128,400	137,706
Gross profit	4,492	6,177	7,337	4,709	4,143	6,842	7,639	6,100	22,524	22,715	24,724	25,358
Op income	274	1,149	2,432	366	346	2,237	2,823	1,734	9,101	4,221	7,140	7,539
Pretax income	7,523	1,780	3,993	1,693	342	2,983	3,669	2,439	9,889	14,988	9,433	9,851
Net income	6,772	1,812	3,477	1,443	287	2,506	3,063	2,036	7,819	13,503	7,893	8,177
Profitability												
Gross Margin	16.2%	19.4%	22.0%	16.2%	15.1%	20.5%	21.6%	19.0%	21.2%	18.6%	19.3%	18.4%
Operating Margin	1.0%	3.6%	7.3%	1.3%	1.3%	6.7%	8.0%	5.4%	8.6%	3.5%	5.6%	5.5%
Pretax Margin	27.1%	5.6%	12.0%	5.8%	1.2%	8.9%	10.4%	7.6%	9.3%	12.3%	7.3%	7.2%
Net Margin	24.4%	5.7%	10.4%	4.9%	1.0%	7.5%	8.6%	6.3%	7.4%	11.0%	6.1%	5.9%
EPS	0.54	0.15	0.28	0.11	0.02	0.20	0.24	0.16	0.62	1.07	0.62	0.64
Growth												
Net Sales	6%	15%	5%	-13%	-6%	21%	6%	-9%	0%	15%	5%	7%
Gross profit	2%	38%	19%	-36%	-12%	65%	12%	-20%	-6%	1%	9%	3%
Op income	-72%	319%	112%	-85%	-6%	547%	26%	-39%	-10%	-54%	69%	6%
Pretax income	498%	-76%	124%	-58%	-80%	772%	23%	-34%	-13%	52%	-37%	4%
Net income	528%	-73%	92%	-59%	-80%	772%	22%	-34%	-26%	73%	-42%	4%

Source: Company data, Nomura estimates

Valuation methodology and risks

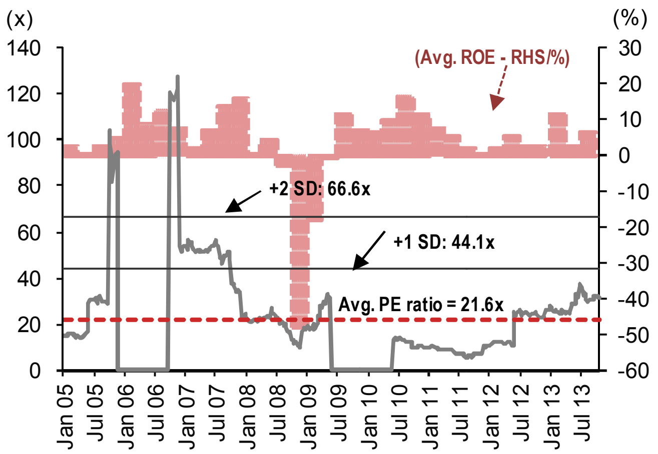
We reiterate our Neutral rating and TP of TWD13.2, based on 0.8x 2014F BVPS of TWD17 (rolled over from 2013F BVPS of TWD17). We maintain our Neutral rating for the following reasons: 1) 28nm sales contribution target of low-single digit sales by the end of 2013F remains at risk; and 2) 40nm and specialty technologies are still competitive.

Our TP valuation methodology is at the mid-point level of the peak/trough of 0.4-1.2x from 4Q08 to 1Q10. Our TP multiple remains discounted to the book, which reflects our view on: (1) a delay in 28nm ramp-up schedule; and (2) the uncertainty over UMC's long-term competitiveness for 14nm delivery.

Downside risks: (1) a delay in 28nm ramp-up schedule; and (2) uncertainty over UMC's long-term competitiveness for 14nm delivery.

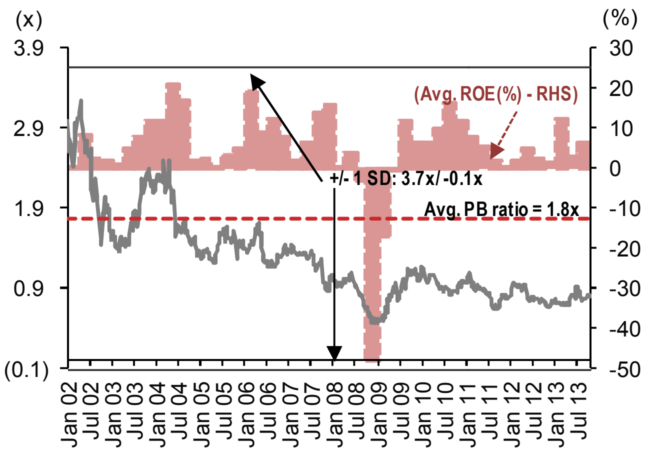
Upside risks: 1) the progress in 40/28/14nm exceeds our expectation; and 2) end-demand across communication/consumer/PC segments is stronger than expected.

Fig. 74: P/E vs. ROE



Source: TEJ

Fig. 75: P/B vs. ROE



Source: TEJ

Appendix A-1

Analyst Certification

Each research analyst identified herein certifies that all of the views expressed in this report by such analyst accurately reflect his or her personal views about the subject securities and issuers. In addition, each research analyst identified on the cover page hereof hereby certifies that no part of his or her compensation was, is, or will be, directly or indirectly related to the specific recommendations or views that he or she has expressed in this research report, nor is it tied to any specific investment banking transactions performed by Nomura Securities International, Inc., Nomura International plc or any other Nomura Group company.

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Online availability of research and conflict-of-interest disclosures

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STOCKS

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