INDUSTRY REPORT

Taiwan

凱基亞洲 KGI ASIA

Memory sector

Samsung carries out epic production cut

Overweight • Maintained

Key message

Samsung (KR) stepped up its production cut of NAND flash to 50% in September, and we believe this will accelerate destocking, driving upticks in contract prices of NAND flash wafer and SSD. We believe NAND flash module makers will enjoy inventory valuation gains as prices rebound, especially those with higher inventories, like Phison and ADATA.

Event

Samsung (KR) stepped up its production cut of NAND flash to 50% in September, and we believe this will accelerate destocking, driving upticks in contract prices of NAND flash wafer and SSD.

Impact

Samsung launches epic production cut in bid to digest inventory. Samsung expanded its production cut of NAND flash to 50% in September from 15% in 2Q23 and 30% in 3Q23, with an aim to reduce in-house inventories to 10-15 weeks by end-4Q23F. We expect other producers to do the same by stepping up production cuts to 30% by 4Q23 from 15-30% in 2Q23 and 25-30% in 3Q23 amid (1) continued cash outflows by leading producers in sub 176-layer nodes; (2) further deterioration of server SSD demand, which we think will extend to 2024F, as demand for general server has been cannibalized by AI servers since August 2023; (3) the fact that Samsung's NAND flash inventories remain high at 27-28 weeks in 3Q23 versus peers' 23-27 weeks as the firm waited until 2Q23 to begin reducing production; and (4) it is generally believed that current declines in memory prices won't reverse before manufacturers' inventories fall below 10 weeks. For reference, DRAM producers also aim to lower their inventories to 8-9 weeks by the end of 4Q23F, which we believe is achievable.

Price rebound in the offing. Major module makers like Phison Electronics (8299 TT, NT$441.5, NR) have been purchasing NAND flash since 1H23, driving in-house inventory above 20 weeks. Following Samsung's announcement to expand the production cut of NAND flash to 30% in late August, module makers including ADATA Technology (3260 TT, NT$88.6, NR) have engaged in restocking with the aim to replenish inventories from 10 weeks in 2Q23 to 12-22 weeks by 4Q23F. This has pushed up the contract prices of NAND flash wafers by 10%. In the meantime, restocking by major downstream consumers, such as PCOEM, has been rather muted. With Samsung aiming to further step up production cut to 50%, we believe major downstream consumers will turn more aggressive in rebuilding inventories, consequently dragging down manufacturers' inventories to 10-15 weeks in 4Q23F and 7-9 weeks in 1Q24F (the effects of further production cuts in 4Q23F will be reflected on 1Q24F inventories), and we expect the prices of NAND flash wafers and mainstream SSD will pick up from 4Q23F.

Stocks for Action

We believe NAND flash module makers will enjoy inventory valuation gains as prices rebound, especially those with higher inventories, like Phison and ADATA.

Risks

Slower-than-expected production node migration; weakening market demand.

Stock valuations

Ticker	Company	Revenue contribution of related products(%)	Market cap (US$mn)	Price (NT$)	Rating	Target price (NT$)	Upside/ downside(%)	EPS(NT$) 2022	2023F	2024F
8299 TT	Phison	SSD module(79)	2,779	441.5	NR	N.A.	N.A.	27.71	12.09	26.53
3260 TT	ADATA	SSD module(42)	748	88.6	NR	N.A.	N.A.	3.19	3.73	6.63

Source: Bloomberg; KGI Research

Figure 1: Overview of NAND flash supply and demand, and pricing outlook

%	2023 1Q	2Q	3Q	4Q	2024 1Q	2Q	3Q	4Q	2022	2023	2024
NAND Flash											
Bit supply growth									30	1	3
Wafer output QoQ/YoY growth									5	(16)	(3)
Wafer output growth (kwpm)	(66)	(101)	(215)	(85)	15	60	146	106	81	(268)	(37)
Bit demand growth									19	11	13
Sufficiency rate	120	112	90	84	90	88	91	94	110	100	91
256Gb TLC wafer contract price QoQ growth	(8)	(10)	5	10	10	20	10	5			

Source: TrendForce; KGI Research

Structural supply constraints to persist

We revise down 2023-24F global NAND flash bit supply growth to 1% and 3%, to reflect:

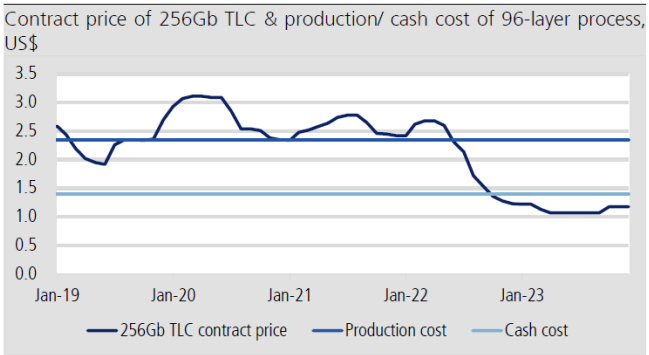
(1) More aggressive production cuts by producers since 2Q23. We believe Samsung's epic production cut (to 50%) came as the firm pushed forward the output cuts in 1Q-3Q24F to 2023 so that inventories may fall below 10 weeks early in 1Q24F, prompting prices to rebound. That is to say, Samsung's production cut will diminish in scale from 1Q24F;

(2) We estimate memory makers' 2023F capex on NAND flash business will fall 44% YoY on average in 2023F (from down 18% to down 76%), followed by just 19% YoY growth on average (from down 5% to up 35% YoY) in 2024F. Process migration to 232-layer process node have been largely suspended. As for newly added capacities, the wafer input at Samsung's new P3L plant, which came on stream in 2023, will remain low at 10k pieces per month in 2024F;

(3) In light of US tech sanctions against China, which ban investment in over 128-layer technology in the country, Samsung has halted production process upgrades at its Xi-an fab (currently at 128-layer), while SK Hynix (KR) also called off tech upgrades at Dalian (Solidigm) fab (currently at 144/ 192-layer floating gate) and announced that it would terminate the R&D of all floating gate processes. What this means is that even if geopolitical risks subside in the future, the Dalian fab will only be able to upgrade replacement gate processes; and

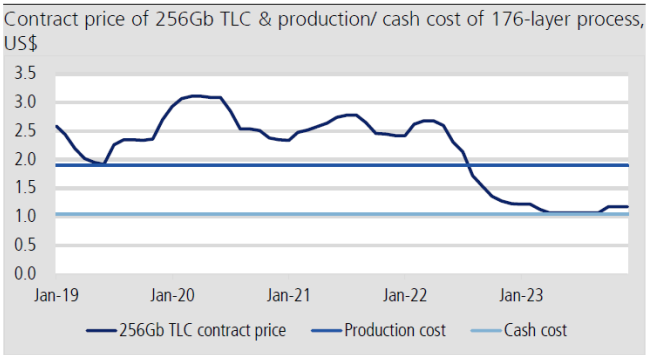
(4) Kioxia (JP) continues the consolidation with Western Digital (WDC, US), with the former raising additional capital to boost its joint venture holding to 60% in 2023 from 50% in 2022. Kioxia also intends to introduce another Japanese investment partner to take hold of a 20% stake in the joint venture so that it may control the joint venture's production capacity and product strategies. After the consolidation, the number of major market players will drop from five to four.

Figure 2: Prices of 96-layer NAND flash retreated to production cost level in 3Q22, and dipped further to cash cost level in 4Q22



Source: TrendForce; KGI Research
Production cost = cash cost + depreciation
Cash cost = variable cost + operating expenses
Operating cost = variable cost + depreciation

Figure 3: Prices of 176-layer NAND flash retreated to production cost level in 3Q22, and dipped further to cash cost level in 2Q23



Source: TrendForce; KGI Research

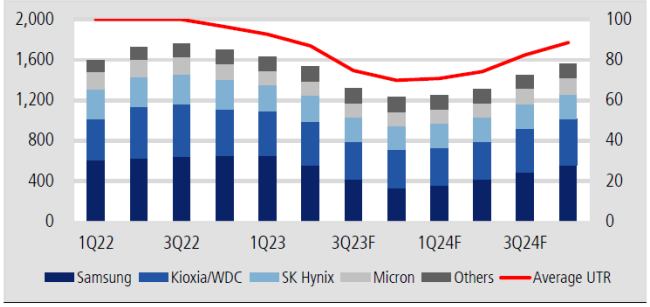
Figure 4: Inventories of NAND flash producers and downstream consumers

week	Healthy level	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23F	4Q23F	1Q24F	2Q24F
Hyperscaler	7-8	Destock 8-9	Destock 7-8	Destock 9-10	Destock 8-9	Destock 11-13	Destock 10-11	Destock 9-10	Restock	Restock	Restock
Smartphone	5-6	Destock 9-11	Destock 10-12	Destock 9-10	Destock 8-9	Destock 7-8	Destock 6-7	Destock 6-9	Restock 8-11	Restock	Restock
PC OEM	5-6	De > restock 6-8	Re > destock 10-12	Destock 9-10	Destock 8-9	Destock 8	Destock 7-8	Destock 8-10	Restock 9-11	Restock	Restock
Module house	5-6	De > restock 9-11	Re > destock 12-14	Destock 10-11	Destock 10-11	Destock 9-10	Destock 9-10	Restock 8-22	Restock 12-22	Restock	Restock
NAND Flash maker	4-5	6-10	9-14	12-16	14-16	13-18	16-20	21-26	10-15	7-9	Less

Source: TrendForce; KGI Research

Figure 5: NAND flash producers launched production cuts in 4Q22 and since have gradually reduced quarterly output

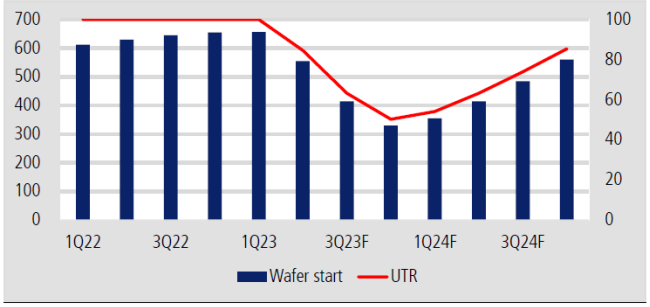
Wafer start volume of NAND flash producers, '000 pieces/month (LHS); average capacity utilization rate, percent (RHS)



Source: TrendForce; KGI Research

Figure 6: Samsung waited until 2Q23 to begin NAND flash production cuts

Samsung NAND flash wafer start volume, '000 pieces/month (LHS); capacity utilization, percent (RHS)



Source: TrendForce; KGI Research

Figure 7: Overview of NAND flash producers' 2019-24 annual production capacity outlook

(k piece/month)	2019	2020	2021	2022	2023F	2024F
Capacity	**1,364**	**1,484**	**1,616**	**1,696**	**1,429**	**1,392**
Samsung	465	490	574	636	489	454
Kioxia/WDC	404	494	496	474	408	413
SK Hynix	221	198	195	293	252	243
Micron	154	165	170	169	135	145
Intel	85	85	89	0	0	0
YMTC	13	26	66	98	120	110
Powerchip	3	4	3	5	4	4
Winbond	5	7	6	7	8	8
Macronix	10	10	11	13	12	13
SMIC	5	5	5	4	3	3
YoY growth		**120**	**132**	**81**	**(268)**	**(37)**
Samsung		25	84	62	(147)	(35)
Kioxia/WDC		91	2	(23)	(66)	5
SK Hynix		(24)	(3)	98	(42)	(9)
Micron		11	5	(2)	(34)	10
Intel		0	4	(89)	0	0
YMTC		14	40	31	23	(10)
Powerchip		1	(1)	2	(1)	1
Winbond		2	(1)	1	1	1
Macronix		1	1	2	(1)	1
SMIC		0	0	(1)	(1)	0

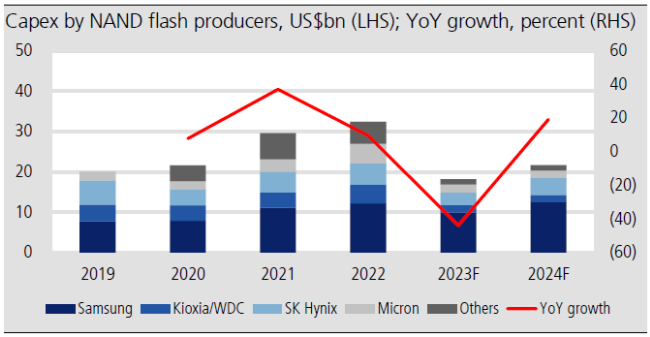
Source: TrendForce; KGI Research

Figure 8: Overview of NAND flash producers' quarterly production capacity outlook between 1Q22-4Q24F

	2022				2023				2024			
(k piece/month)	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Total wafer output	1,597	1,726	1,762	1,699	1,633	1,532	1,317	1,232	1,247	1,307	1,453	1,559
Samsung	612	630	645	655	656	555	415	330	355	415	485	560
Kioxia/WDC	404	510	520	460	435	435	380	380	380	380	435	455
SK Hynix	293	293	293	293	263	263	240	240	240	240	245	245
Micron	172	172	175	155	135	135	135	135	135	135	150	160
Intel	0	0	0	0	0	0	0	0	0	0	0	0
YMTC	90	95	100	105	120	120	120	120	110	110	110	110
Powerchip	4	4	5	5	3	3	4	4	4	4	4	4
Winbond	7	7	7	7	7	7	8	8	8	8	8	8
Macronix	11	11	13	15	11	11	12	12	12	12	13	14
SMIC	4	4	4	4	3	3	3	3	3	3	3	3
QoQ growth	(92)	129	36	(63)	(66)	(101)	(215)	(85)	15	60	146	106
Samsung	(3)	18	15	10	1	(101)	(140)	(85)	25	60	70	75
Kioxia/WDC	(101)	106	10	(60)	(25)	0	(55)	0	0	0	55	20
SK Hynix	98	0	0	0	(30)	0	(23)	0	0	0	5	0
Micron	2	0	3	(20)	(20)	0	0	0	0	0	15	10
Intel	(93)	0	0	0	0	0	0	0	0	0	0	0
YMTC	5	5	5	5	15	0	0	0	(10)	0	0	0
Powerchip	1	0	1	0	(2)	0	1	0	0	0	0	0
Winbond	0	0	0	0	0	0	1	0	0	0	0	0
Macronix	0	0	2	2	(4)	0	1	0	0	0	1	1
SMIC	(1)	0	0	0	(1)	0	0	0	0	0	0	0

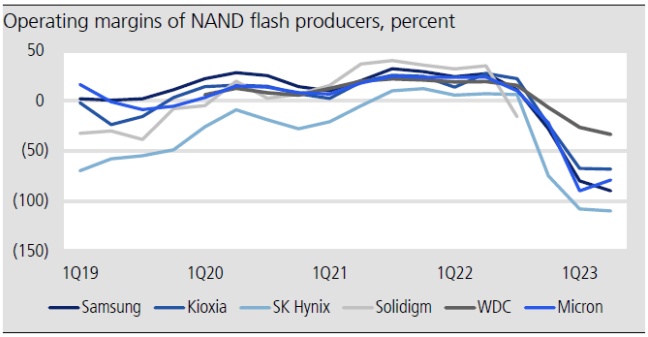
Source: TrendForce; KGI Research

Figure 9: NAND flash producers to reduce capex in 2023F, followed by moderate capex growth in 2024F



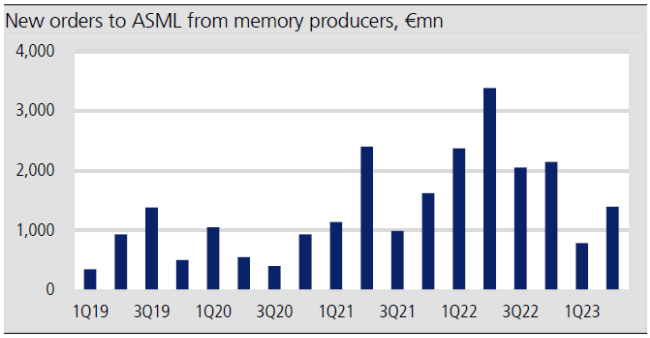
Source: TrendForce; KGI Research

Figure 10: Operations of NAND flash producers are already in the red, with some suffering cash outflows



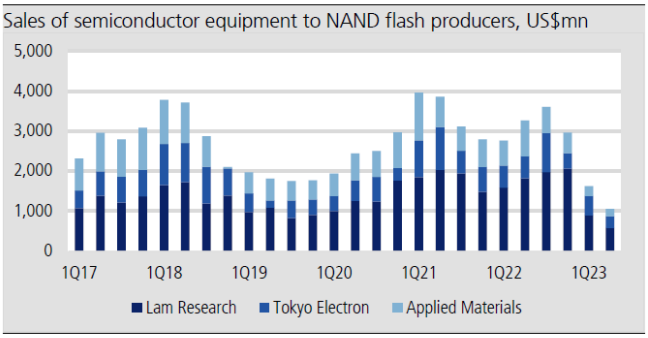
Source: TrendForce; KGI Research

Figure 11: ASML's orders from memory producers grew 77% QoQ in 2Q23, driven mainly by clients based in China



Source: Company data; KGI Research

Figure 12: Vendors of semiconductor equipment have seen sales from NAND flash clients reduce 35% QoQ in 2Q23 as a result of declining capex



Source: Company data; KGI Research

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