

Global Semiconductors

Nov'23 SIA: Semis grow both sequentially and YoY on strong pricing trends

Industry Overview

November semi & core semis sales up +11% YoY

November semis sales finished **up 11.4% YoY**, making it the third consecutive month of positive semis growth since June of CY22. Core-semis (ex-memory) sales were **up 11.3% YoY**, showing positive YoY growth in core-semis for the fourth consecutive month. Key takeaways from the November data on a one-month basis: **1) Semis/core-semis were positive/slightly down sequentially**, at **+3.3%/-0.2% MoM**, yet finished 32bps/30bps above seasonal, **2) MoM core-semis performance was driven by Logic/MPUs**, the strongest core segments each growing 1.7% MoM, offset by Analog and MCUs, the weakest core segments down -5.4%/-3.0% MoM, **3) Memory sales grew in November**, up 21.4% MoM, with DRAM +28.4% MoM and NAND +15.1% MoM, **4) All regions except Europe grew MoM**, with Europe down -4.6% MoM, and Americas strongest (+9.3% MoM) followed by China +2.9% MoM, **5) Semis/Core-semis sales still down YTD, -10.6%/-3.9% YTD**, with MPUs weakest core segment (-14.9% YTD) and STD Cells, PLDs strongest (+19.0% YTD), while memory down -34.8% YTD, **6) Semis/Core-semis units down -18.0%/-17.3% YTD**, a sign that pricing resilience continues to buoy sales for the industry. Overall, consumer-exposed markets remain weakest, with shakiness having spread also to auto/industrial markets. Inventory corrections continued to be worked down in November, yet appear to be largely normalizing presently. Going into CY24E we remain optimistic on l-t market trends driving secular growth, namely AI, vehicle electrification, factory automation, cloud infrastructure, and chip complexity/design.

3mma semis/core semis YoY sales turn positive

On a 3mma basis: 1) November semi sales grew +2.9% MoM, down slightly from +3.9% MoM growth in Oct, yet boosted by MPUs (+4.6% MoM), 2) Core-semis sales (ex-memory) grew +2.1% MoM (vs +3.6% MoM in Oct), while semis/core-semis units fell -2.5% MoM, 3) 3mma semis/core semis sales of +5.5%/+7.0% YoY turned positive, 4) 3mma semis/core-semi ASPs remained positive MoM (+5.5%/+4.7%), driven by strong Analog ASPs (up +3.4% MoM) and Logic (up 3.2% MoM).

November MPUs strongest, MCUs weakest (3mma)

On a 3mma basis: MPU sales finished up 4.6% MoM in November (375bps above seasonal), while MCUs were down -4.6% MoM, (-536bps seasonally) on weak units (-783bps seasonally). On the memory side, DRAM/NAND sales finished up +12.4%/5.8% MoM, (1373bps/666bps above seasonal).

China strongest seasonally, Europe weakest (3mma)

On a 3mma basis: China region was strongest seasonally (625bps vs seasonally) growing 4.4% MoM, while Europe (325bps below seasonal) and Japan (147bps below seasonal) were the weakest seasonally, falling -2.0%/-0.7% MoM. Americas were 219bps above seasonality, with +3.9% MoM growth.

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Refer to important disclosures on page 14 to 16.

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Equity
Global
Semiconductors

Vivek Arya
Research Analyst
BofAS
vivek.arya@bofa.com

Simon Woo, CFA >>
Research Analyst
Merrill Lynch (Seoul)
simon.woo@bofa.com

Didier Scemama >>
Research Analyst
MLI (UK)
didier.scemama@bofa.com

Blake Friedman
Research Analyst
BofAS
blake.friedman@bofa.com

Duksan Jang
Research Analyst
BofAS
duksan.jang@bofa.com

Lauren Guy
Research Analyst
BofAS
lauren.guy2@bofa.com

Exhibit 1: 3mma revenue data

Semis sales down -10.6% YTD

3mma revs	MoM	YoY	YTD
Semiconductors	2.9%	5.5%	-10.6%
Discretes	-3.2%	0.3%	4.0%
Analog	0.7%	-7.5%	-8.9%
Microprocessors	4.6%	11.5%	-14.9%
Microcontrollers	-4.6%	6.3%	13.3%
Std Cells, PLDs	-4.0%	-1.5%	19.0%
Logic	3.0%	13.6%	-0.7%
Memory	9.1%	7.9%	-34.8%
DRAM	12.4%	9.4%	-40.1%
NAND	5.8%	8.5%	-28.1%
Total IC's	3.6%	7.2%	-12.5%
IC's ex-memory	2.1%	7.0%	-3.9%

Source: SIA, BofA Global Research

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See page 13 for abbreviations

November SIA review

Seasonality

- **3mma.** Total semiconductor sales were up 2.9% MoM, roughly 265bps above seasonal trends, with unit weakness weighing on growth (212bps below seasonal).

Exhibit 2: November revenues, units, ASP vs seasonality

Total semiconductor sales were up 2.9% MoM, 265bps above seasonal trends.

	Seasonal delta			Seasonal			Nov-23		
	Units	ASPs	Revenue	Units	ASPs	Revenue	Units	ASPs	Revenue
Semiconductors	-212	490	265	-0.3%	0.6%	0.3%	-2.5%	5.5%	2.9%
Discretes	-225	-79	-303	-0.6%	0.5%	-0.2%	-2.9%	-0.3%	-3.2%
Analog	-249	287	29	-0.2%	0.5%	0.4%	-2.6%	3.4%	0.7%
Microprocessors	329	42	375	1.2%	-0.3%	0.8%	4.5%	0.1%	4.6%
Microcontrollers	-783	259	-536	0.7%	0.2%	0.8%	-7.1%	2.8%	-4.6%
Std Cells, PLDs	-677	178	-497	1.6%	-0.5%	1.0%	-5.2%	1.3%	-4.0%
Logic	-40	201	161	0.2%	1.2%	1.4%	-0.2%	3.2%	3.0%
Memory	352	662	1032	-0.8%	-0.5%	-1.3%	2.7%	6.1%	9.1%
DRAM	833	510	1373	-0.6%	-0.7%	-1.3%	7.7%	4.4%	12.4%
NAND	39	617	666	-0.4%	-0.4%	-0.9%	0.0%	5.8%	5.8%
Total IC's	-171	512	332	-0.1%	0.4%	0.3%	-1.8%	5.5%	3.6%
IC's ex-memory	-255	377	110	0.0%	0.9%	1.0%	-2.5%	4.7%	2.1%

Source: SIA, BofA Global Research

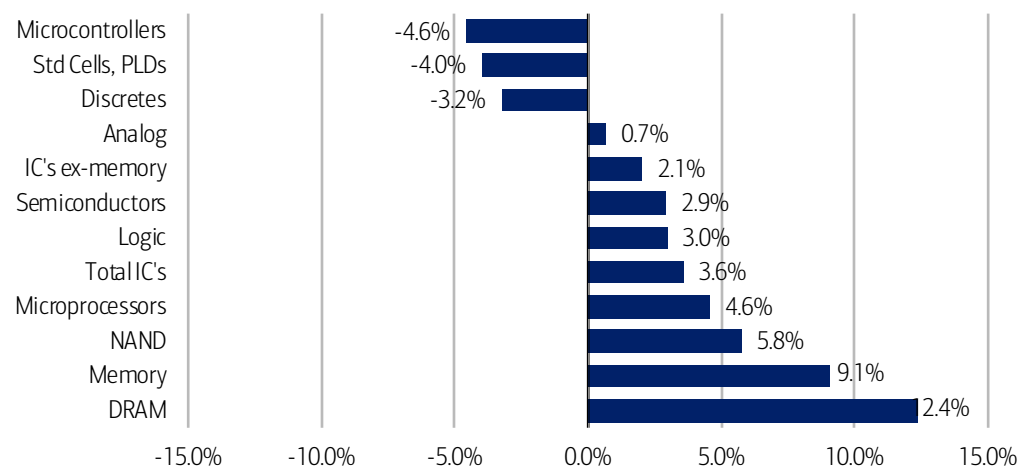
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Industry revenue trends

- **3mma.** DRAM revenue grew the most MoM (up 12.4%) while MCUs sales declined the most (down 4.6% MoM).

Exhibit 3: November (3mma) MoM% revenue growth by product

DRAM was the strongest performer on a 3mma basis

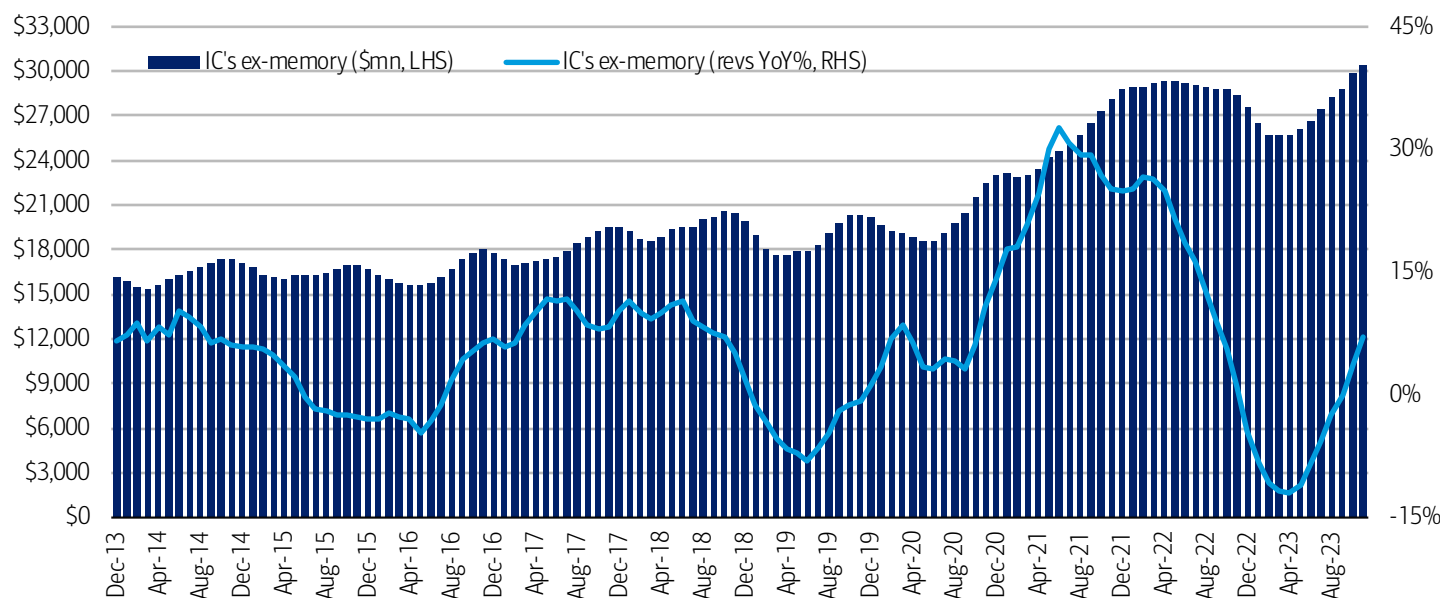


Source: SIA, BofA Global Research

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Exhibit 4: ICs ex-memory single-month revenue trends over the past 10 years

IC ex-memory sales were up 7.0% YoY (3mma)



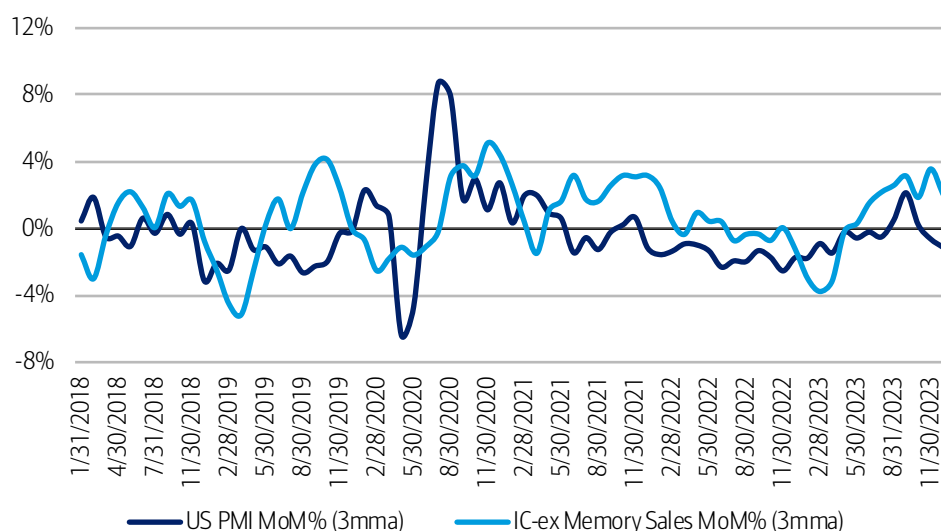
Source: SIA, BofA Global Research

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- The US ISM index has been a consistent indicator of global IC demand momentum. Since mid-2015, turns in the US PMI index have preceded accelerations/decelerations in IC ex-memory MoM growth by two to three months.

Exhibit 5: US ISM's PMI index MoM% vs. IC ex-memory sales MoM% (3mma)

Typically, turns in the US PMI index have preceded accelerations/decelerations in IC ex-memory MoM growth by 2-3 months



Source: BofA Global Research, ISM

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Exhibit 6: 3mma revenue summary (LTM)

Semis/core semis sales grew 5.5%/7.0% YoY on a 3mma basis

3mma Revs (\$mn)	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23
Semiconductors	\$45,483	\$43,472	\$41,288	\$39,658	\$39,829	\$40,098	\$40,808	\$41,859	\$42,850	\$44,041	\$44,886	\$46,617	\$47,984
Discretes	\$2,869	\$2,846	\$2,808	\$2,871	\$2,970	\$3,018	\$2,999	\$2,994	\$2,997	\$3,009	\$3,043	\$2,974	\$2,878
Analog	\$7,498	\$7,342	\$6,994	\$6,810	\$6,755	\$6,769	\$6,754	\$6,600	\$6,660	\$6,735	\$6,817	\$6,890	\$6,936
Microprocessors	\$4,087	\$3,847	\$3,468	\$3,153	\$3,031	\$3,067	\$3,129	\$3,310	\$3,554	\$3,817	\$4,115	\$4,359	\$4,558
Microcontrollers	\$2,151	\$2,168	\$2,243	\$2,296	\$2,353	\$2,358	\$2,331	\$2,378	\$2,364	\$2,444	\$2,419	\$2,395	\$2,286
Std Cells, PLDs	\$2,115	\$2,100	\$2,136	\$2,183	\$2,239	\$2,258	\$2,322	\$2,385	\$2,350	\$2,296	\$2,223	\$2,169	\$2,084
Logic	\$14,452	\$13,976	\$13,604	\$13,220	\$13,296	\$13,316	\$13,677	\$14,158	\$14,539	\$14,999	\$15,189	\$15,947	\$16,422
Memory	\$8,429	\$7,448	\$6,549	\$5,792	\$5,869	\$6,138	\$6,610	\$7,236	\$7,485	\$7,608	\$7,830	\$8,339	\$9,095
DRAM	\$4,875	\$4,243	\$3,780	\$3,374	\$3,337	\$3,327	\$3,476	\$3,764	\$3,938	\$3,957	\$4,420	\$4,746	\$5,335
NAND	\$3,134	\$2,809	\$2,402	\$2,072	\$2,176	\$2,455	\$2,781	\$3,129	\$3,207	\$3,291	\$3,037	\$3,216	\$3,401
Total IC's	\$36,884	\$35,055	\$33,116	\$31,527	\$31,563	\$31,908	\$32,770	\$33,966	\$34,905	\$35,892	\$36,640	\$38,179	\$39,547
IC's ex-memory	\$28,456	\$27,607	\$26,567	\$25,734	\$25,694	\$25,769	\$26,159	\$26,730	\$27,420	\$28,284	\$28,811	\$29,839	\$30,452
3mma MoM%													
Semiconductors	-2.9%	-4.4%	-5.0%	-3.9%	0.4%	0.7%	1.8%	2.6%	2.4%	2.8%	1.9%	3.9%	2.9%
Discretes	-1.9%	-0.8%	-1.3%	2.2%	3.5%	1.6%	-0.6%	-0.2%	0.1%	0.4%	1.1%	-2.3%	-3.2%
Analog	-2.7%	-2.1%	-4.7%	-2.6%	-0.8%	0.2%	-0.2%	-2.3%	0.9%	1.1%	1.2%	1.1%	0.7%
Microprocessors	-0.1%	-5.9%	-9.8%	-9.1%	-3.9%	1.2%	2.0%	5.8%	7.4%	7.4%	7.8%	5.9%	4.6%
Microcontrollers	1.4%	0.8%	3.4%	2.4%	2.5%	0.2%	-1.1%	2.0%	-0.6%	3.4%	-1.0%	-1.0%	-4.6%
Std Cells, PLDs	1.0%	-0.7%	1.7%	2.2%	2.5%	0.9%	2.9%	2.7%	-1.5%	-2.3%	-3.2%	-2.4%	-4.0%
Logic	-1.2%	-3.3%	-2.7%	-2.8%	0.6%	0.2%	2.7%	3.5%	2.7%	3.2%	1.3%	5.0%	3.0%
Memory	-9.3%	-11.6%	-12.1%	-11.6%	1.3%	4.6%	7.7%	9.5%	3.4%	1.6%	2.9%	6.5%	9.1%
DRAM	-12.6%	-13.0%	-10.9%	-10.8%	-1.1%	-0.3%	4.5%	8.3%	4.6%	0.5%	11.7%	7.4%	12.4%
NAND	-4.5%	-10.4%	-14.5%	-13.8%	5.1%	12.8%	13.3%	12.5%	2.5%	2.6%	-7.7%	5.9%	5.8%
Total IC's	-3.2%	-5.0%	-5.5%	-4.8%	0.1%	1.1%	2.7%	3.6%	2.8%	2.8%	2.1%	4.2%	3.6%
IC's ex-memory	-1.2%	-3.0%	-3.8%	-3.1%	-0.2%	0.3%	1.5%	2.2%	2.6%	3.2%	1.9%	3.6%	2.1%
3mma YoY%													
Semiconductors	-9.2%	-14.5%	-18.6%	-20.7%	-21.3%	-21.3%	-21.0%	-16.6%	-12.6%	-6.8%	-4.5%	-0.5%	5.5%
Discretes	8.6%	7.5%	3.1%	6.7%	8.7%	15.1%	11.7%	7.5%	0.2%	-1.5%	2.2%	1.7%	0.3%
Analog	12.9%	7.5%	1.2%	-2.1%	-5.2%	-6.0%	-7.7%	-11.5%	-12.9%	-13.5%	-11.9%	-10.6%	-7.5%
Microprocessors	-21.1%	-27.0%	-32.7%	-37.6%	-39.0%	-35.2%	-29.6%	-19.8%	-13.6%	-6.4%	1.1%	6.5%	11.5%
Microcontrollers	19.1%	17.6%	18.5%	18.8%	17.8%	17.3%	15.4%	13.4%	12.1%	14.0%	16.3%	12.9%	6.3%
Std Cells, PLDs	38.8%	34.2%	35.9%	38.5%	40.6%	36.3%	30.3%	29.9%	23.5%	17.3%	8.5%	3.6%	-1.5%
Logic	0.9%	-4.8%	-8.0%	-10.0%	-10.2%	-11.7%	-11.0%	-7.2%	-2.8%	1.9%	3.7%	9.0%	13.6%
Memory	-38.5%	-45.8%	-51.4%	-56.1%	-56.3%	-55.4%	-53.5%	-43.9%	-35.2%	-21.2%	-17.6%	-10.2%	7.9%
DRAM	-40.6%	-48.2%	-52.3%	-56.9%	-58.7%	-59.9%	-59.8%	-51.1%	-43.8%	-32.1%	-25.0%	-14.9%	9.4%
NAND	-37.6%	-45.0%	-53.2%	-58.0%	-55.7%	-51.3%	-46.0%	-34.7%	-22.3%	-3.1%	-4.6%	-2.0%	8.5%
Total IC's	-11.9%	-17.7%	-22.0%	-25.1%	-25.9%	-25.9%	-24.9%	-19.3%	-14.1%	-7.2%	-4.3%	0.2%	7.2%
IC's ex-memory	1.0%	-4.4%	-8.4%	-10.9%	-11.9%	-12.0%	-11.1%	-8.5%	-5.8%	-2.5%	0.0%	3.6%	7.0%

Source: BofA Global Research, SIA

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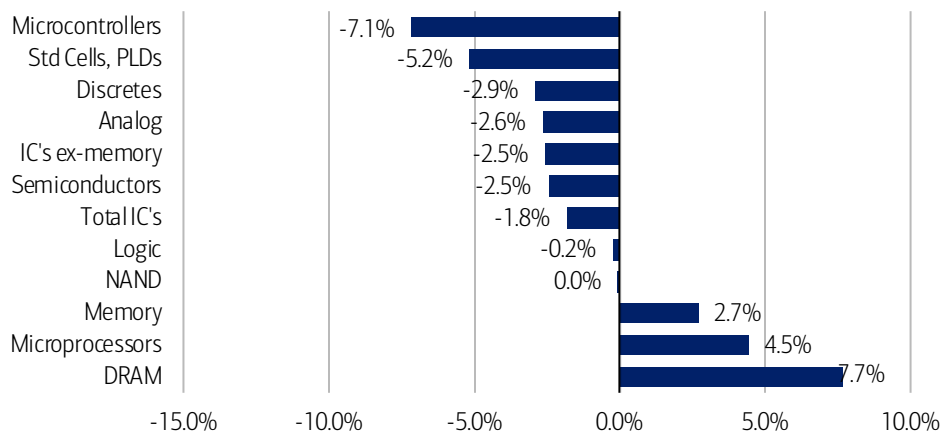


Industry unit trends

- **3mma.** MCUs saw the weakest MoM unit trends (-7.1% MoM), while DRAM units were up the most (+7.7% MoM).

Exhibit 7: November (3mma) MoM% unit growth by product

MCUs saw the weakest unit growth on a 3mma basis

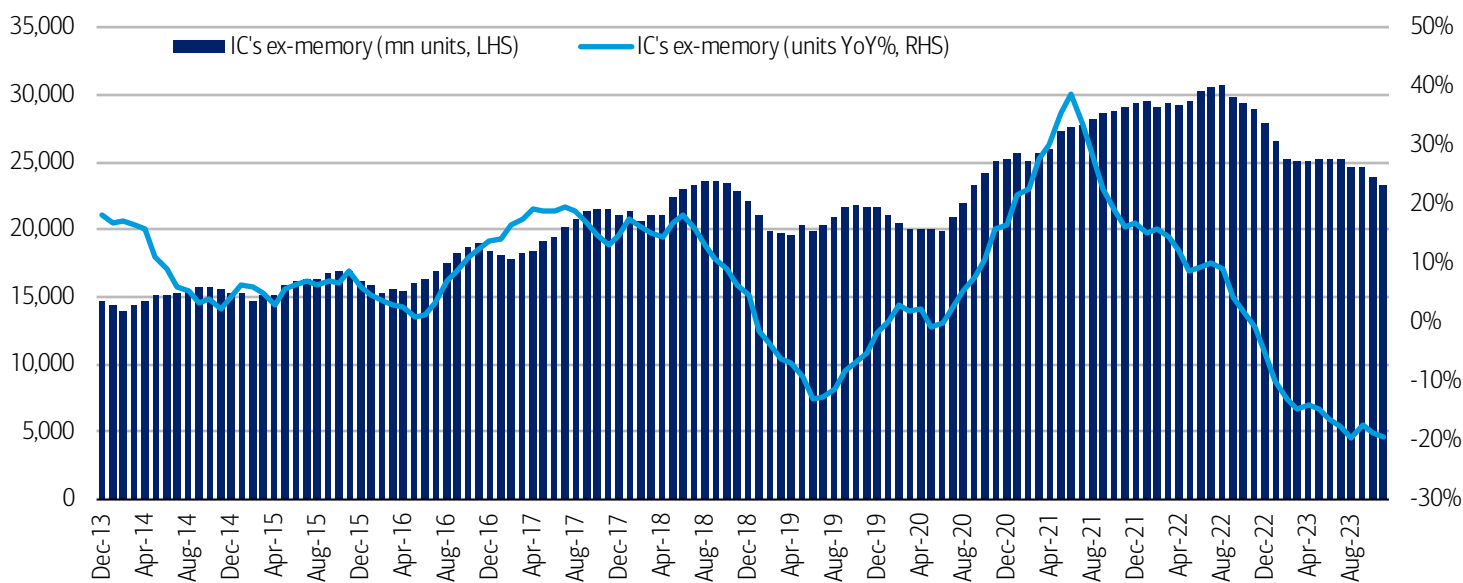


Source: SIA, BofA Global Research

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Exhibit 8: IC ex-memory unit trends over the last 10 years (3mma)

IC ex-memory unit growth down 19.6% YoY



Source: SIA, BofA Global Research

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Exhibit 9: 3mma unit summary (LTM)

Semis/core semis unit sales finished -13.9%/-19.6% YoY on a 3mma basis

3mma Units (mn)	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23
Semiconductors	87,801	84,081	78,428	74,387	74,332	75,271	76,363	76,972	77,654	78,302	79,024	77,501	75,594
Discretes	37,626	35,438	33,020	31,861	32,600	33,162	33,564	34,217	34,800	35,649	36,326	35,615	34,583
Analog	19,248	18,626	17,810	17,204	17,240	17,242	17,433	17,563	17,571	17,113	17,017	16,228	15,799
Microprocessors	38	36	32	29	27	27	26	27	28	30	33	36	38
Microcontrollers	2,511	2,493	2,334	2,172	2,185	2,287	2,361	2,355	2,330	2,375	2,391	2,322	2,156
Std Cells, PLDs	350	362	354	312	274	263	276	279	279	281	286	276	262
Logic	7,058	6,659	6,342	5,851	5,574	5,470	5,427	5,308	5,181	5,134	5,168	5,210	5,199
Memory	3,475	3,401	3,087	2,907	3,153	3,330	3,514	3,654	3,700	3,716	3,753	3,854	3,960
DRAM	1,502	1,506	1,406	1,339	1,423	1,465	1,531	1,600	1,590	1,529	1,634	1,696	1,826
NAND	914	868	733	663	813	924	1,047	1,118	1,140	1,163	1,086	1,135	1,134
Total IC's	32,366	31,253	29,641	28,199	28,216	28,393	28,799	28,947	28,850	28,407	28,399	27,684	27,183
IC's ex-memory	28,891	27,852	26,554	25,292	25,063	25,063	25,285	25,293	25,150	24,691	24,647	23,830	23,223
MoM%													
Semiconductors	-2.6%	-4.2%	-6.7%	-5.2%	-0.1%	1.3%	1.5%	0.8%	0.9%	0.8%	0.9%	-1.9%	-2.5%
Discretes	-3.5%	-5.8%	-6.8%	-3.5%	2.3%	1.7%	1.2%	1.9%	1.7%	2.4%	1.9%	-2.0%	-2.9%
Analog	-1.7%	-3.2%	-4.4%	-3.4%	0.2%	0.0%	1.1%	0.7%	0.0%	-2.6%	-0.6%	-4.6%	-2.6%
Microprocessors	2.7%	-2.8%	-11.6%	-9.9%	-7.2%	0.0%	-1.8%	0.3%	4.1%	9.1%	10.4%	8.1%	4.5%
Microcontrollers	4.6%	-0.7%	-6.4%	-6.9%	0.6%	4.7%	3.3%	-0.2%	-1.1%	1.9%	0.7%	-2.9%	-7.1%
Std Cells, PLDs	3.5%	3.5%	-2.3%	-11.7%	-12.2%	-3.8%	4.6%	1.2%	-0.1%	0.9%	1.7%	-3.5%	-5.2%
Logic	-2.7%	-5.7%	-4.8%	-7.8%	-4.7%	-1.9%	-0.8%	-2.2%	-2.4%	-0.9%	0.7%	0.8%	-0.2%
Memory	-0.7%	-2.1%	-9.2%	-5.9%	8.5%	5.6%	5.5%	4.0%	1.3%	0.4%	1.0%	2.7%	2.7%
DRAM	-3.7%	0.2%	-6.6%	-4.8%	6.3%	3.0%	4.5%	4.5%	-0.6%	-3.8%	6.9%	3.8%	7.7%
NAND	3.8%	-5.0%	-15.6%	-9.5%	22.7%	13.6%	13.4%	6.8%	1.9%	2.0%	-6.6%	4.5%	0.0%
Total IC's	-1.3%	-3.4%	-5.2%	-4.9%	0.1%	0.6%	1.4%	0.5%	-0.3%	-1.5%	0.0%	-2.5%	-1.8%
IC's ex-memory	-1.4%	-3.6%	-4.7%	-4.8%	-0.9%	0.0%	0.9%	0.0%	-0.6%	-1.8%	-0.2%	-3.3%	-2.5%
YoY%													
Semiconductors	-10.5%	-12.6%	-18.3%	-20.4%	-21.1%	-18.8%	-18.6%	-18.8%	-19.5%	-18.3%	-14.4%	-14.0%	-13.9%
Discretes	-12.2%	-15.4%	-21.9%	-22.1%	-20.7%	-16.3%	-16.7%	-17.3%	-19.0%	-16.5%	-10.1%	-8.7%	-8.1%
Analog	2.7%	-1.7%	-6.5%	-8.0%	-8.8%	-8.3%	-9.5%	-11.1%	-13.5%	-16.4%	-14.7%	-17.1%	-17.9%
Microprocessors	-18.8%	-21.8%	-27.6%	-31.8%	-34.2%	-31.4%	-28.4%	-23.3%	-19.8%	-12.3%	-4.0%	-1.5%	0.2%
Microcontrollers	-1.8%	-1.8%	-6.3%	-9.2%	-7.8%	-0.1%	4.4%	4.4%	2.8%	3.1%	4.5%	-3.3%	-14.1%
Std Cells, PLDs	18.0%	10.5%	8.8%	2.0%	-1.3%	-4.0%	-5.3%	-3.5%	-5.1%	-7.0%	-12.6%	-18.4%	-25.2%
Logic	-8.7%	-15.0%	-19.6%	-25.8%	-30.3%	-31.8%	-32.1%	-34.6%	-35.1%	-34.7%	-31.4%	-28.2%	-26.3%
Memory	-15.0%	-16.1%	-22.5%	-25.6%	-20.7%	-17.2%	-14.2%	-4.9%	4.0%	13.9%	13.4%	10.2%	14.0%
DRAM	-15.0%	-15.0%	-18.9%	-21.8%	-19.5%	-19.6%	-18.5%	-10.0%	-1.6%	4.5%	9.3%	8.7%	21.6%
NAND	-16.1%	-20.2%	-32.6%	-37.0%	-23.9%	-14.2%	-2.1%	16.5%	35.9%	59.9%	41.5%	28.9%	24.1%
Total IC's	-2.5%	-6.6%	-11.5%	-14.4%	-15.3%	-14.5%	-14.5%	-15.0%	-15.6%	-16.4%	-14.3%	-15.6%	-16.0%
IC's ex-memory	-0.8%	-5.2%	-10.0%	-12.9%	-14.6%	-14.2%	-14.6%	-16.2%	-17.9%	-19.6%	-17.4%	-18.7%	-19.6%

Source: SIA, BofA Global Research

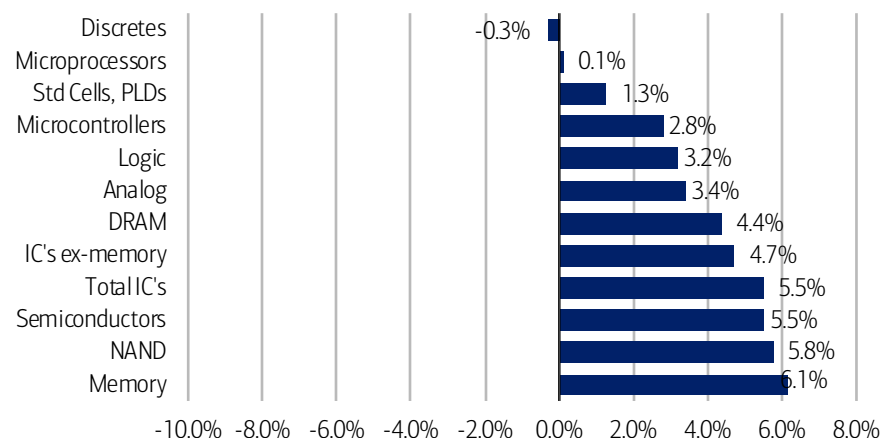
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Industry ASP trends

- **3mma.** Memory ASPs grew the most (+6.1% MoM) while Discrete ASPs saw the greatest declines (-0.3% MoM)

Exhibit 10: November (3mma) MoM% ASP growth by product type

Memory saw the strongest industry ASP trends

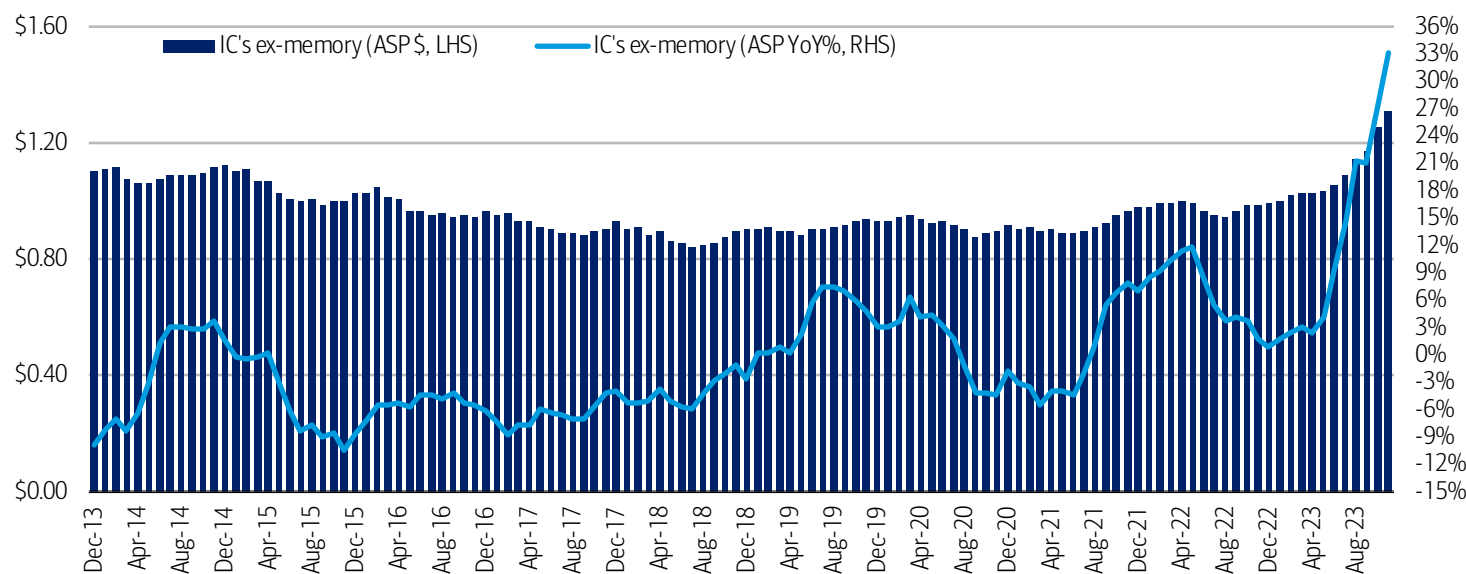


Source: SIA, BofA Global Research

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Exhibit 11: IC ex-memory ASP trends over the last 10 years (3mma)

IC ex-memory ASPs now up 33.1% YoY



Source: SIA, BofA Global Research

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Exhibit 12: 3mma ASP summary (LTM)

Semis/Core semis ASPs grew 22.5%/33.1% YoY on a 3mma basis

3mma ASPs (\$)	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23
Semiconductors	\$0.52	\$0.52	\$0.53	\$0.53	\$0.54	\$0.53	\$0.53	\$0.54	\$0.55	\$0.56	\$0.57	\$0.60	\$0.63
Discretes	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.09	\$0.09	\$0.09	\$0.09	\$0.08	\$0.08	\$0.08	\$0.08
Analog	\$0.39	\$0.39	\$0.39	\$0.40	\$0.39	\$0.39	\$0.39	\$0.38	\$0.38	\$0.39	\$0.40	\$0.42	\$0.44
Microprocessors	\$108.97	\$105.51	\$107.56	\$108.46	\$112.33	\$113.68	\$118.17	\$124.68	\$128.57	\$126.61	\$123.66	\$121.20	\$121.32
Microcontrollers	\$0.86	\$0.87	\$0.96	\$1.06	\$1.08	\$1.03	\$0.99	\$1.01	\$1.01	\$1.03	\$1.01	\$1.03	\$1.06
Std Cells, PLDs	\$6.05	\$5.80	\$6.04	\$6.99	\$8.17	\$8.57	\$8.43	\$8.55	\$8.43	\$8.16	\$7.77	\$7.86	\$7.96
Logic	\$2.05	\$2.10	\$2.14	\$2.26	\$2.39	\$2.43	\$2.52	\$2.67	\$2.81	\$2.92	\$2.94	\$3.06	\$3.16
Memory	\$2.43	\$2.19	\$2.12	\$1.99	\$1.86	\$1.84	\$1.88	\$1.98	\$2.02	\$2.05	\$2.09	\$2.16	\$2.30
DRAM	\$3.25	\$2.82	\$2.69	\$2.52	\$2.35	\$2.27	\$2.27	\$2.35	\$2.48	\$2.59	\$2.70	\$2.80	\$2.92
NAND	\$3.43	\$3.24	\$3.28	\$3.12	\$2.68	\$2.66	\$2.66	\$2.80	\$2.81	\$2.83	\$2.80	\$2.83	\$3.00
Total IC's	\$1.14	\$1.12	\$1.12	\$1.12	\$1.12	\$1.12	\$1.14	\$1.17	\$1.21	\$1.26	\$1.29	\$1.38	\$1.45
IC's ex-memory	\$0.98	\$0.99	\$1.00	\$1.02	\$1.03	\$1.03	\$1.03	\$1.06	\$1.09	\$1.15	\$1.17	\$1.25	\$1.31
MoM%													
Semiconductors	-0.4%	-0.2%	1.8%	1.3%	0.5%	-0.6%	0.3%	1.8%	1.5%	1.9%	1.0%	5.9%	5.5%
Discretes	1.7%	5.3%	5.9%	5.9%	1.1%	-0.1%	-1.8%	-2.1%	-1.6%	-2.0%	-0.8%	-0.3%	-0.3%
Analog	-1.0%	1.2%	-0.4%	0.8%	-1.0%	0.2%	-1.3%	-3.0%	0.9%	3.8%	1.8%	6.0%	3.4%
Microprocessors	-2.8%	-3.2%	1.9%	0.8%	3.6%	1.2%	3.9%	5.5%	3.1%	-1.5%	-2.3%	-2.0%	0.1%
Microcontrollers	-3.0%	1.5%	10.5%	10.0%	1.9%	-4.3%	-4.3%	2.3%	0.5%	1.4%	-1.7%	1.9%	2.8%
Std Cells, PLDs	-2.4%	-4.1%	4.1%	15.8%	16.8%	4.9%	-1.6%	1.5%	-1.4%	-3.2%	-4.8%	1.1%	1.3%
Logic	1.5%	2.5%	2.2%	5.3%	5.6%	2.1%	3.5%	5.8%	5.2%	4.1%	0.6%	4.1%	3.2%
Memory	-8.6%	-9.7%	-3.1%	-6.1%	-6.6%	-1.0%	2.0%	5.3%	2.2%	1.2%	1.9%	3.7%	6.1%
DRAM	-9.2%	-13.2%	-4.6%	-6.3%	-6.9%	-3.2%	0.0%	3.6%	5.3%	4.5%	4.5%	3.5%	4.4%
NAND	-8.0%	-5.6%	1.3%	-4.7%	-14.3%	-0.7%	-0.1%	5.4%	0.6%	0.6%	-1.2%	1.4%	5.8%
Total IC's	-1.9%	-1.6%	-0.4%	0.1%	0.1%	0.5%	1.3%	3.1%	3.1%	4.4%	2.1%	6.9%	5.5%
IC's ex-memory	0.2%	0.6%	0.9%	1.7%	0.8%	0.3%	0.6%	2.1%	3.2%	5.1%	2.0%	7.1%	4.7%
YoY%													
Semiconductors	1.5%	-2.2%	-0.4%	-0.5%	-0.2%	-3.1%	-2.9%	2.8%	8.6%	14.1%	11.6%	15.7%	22.5%
Discretes	23.7%	27.1%	32.1%	37.1%	37.2%	37.5%	34.1%	29.9%	23.6%	18.0%	13.7%	11.4%	9.2%
Analog	10.0%	9.3%	8.3%	6.4%	3.8%	2.5%	1.9%	-0.4%	0.6%	3.6%	3.2%	7.9%	12.7%
Microprocessors	-2.9%	-6.7%	-7.1%	-8.6%	-7.3%	-5.5%	-1.7%	4.5%	7.6%	6.7%	5.3%	8.1%	11.3%
Microcontrollers	21.3%	19.7%	26.5%	30.8%	27.8%	17.4%	10.5%	8.7%	9.1%	10.6%	11.3%	16.7%	23.7%
Std Cells, PLDs	17.6%	21.5%	24.9%	35.8%	42.5%	42.0%	37.6%	34.6%	30.1%	26.1%	24.1%	26.9%	31.6%
Logic	10.6%	11.9%	14.4%	21.3%	28.7%	29.5%	31.1%	41.9%	49.7%	56.0%	51.3%	51.8%	54.3%
Memory	-27.6%	-35.4%	-37.4%	-40.9%	-44.8%	-46.1%	-45.8%	-41.0%	-37.7%	-30.8%	-27.3%	-18.5%	-5.3%
DRAM	-30.1%	-39.1%	-41.2%	-44.9%	-48.7%	-50.1%	-50.7%	-45.7%	-42.9%	-35.0%	-31.4%	-21.7%	-10.0%
NAND	-25.7%	-31.1%	-30.5%	-33.3%	-41.8%	-43.3%	-44.8%	-43.9%	-42.8%	-39.4%	-32.6%	-24.0%	-12.6%
Total IC's	-9.6%	-12.0%	-11.9%	-12.4%	-12.5%	-13.3%	-12.1%	-5.1%	1.8%	11.1%	11.7%	18.7%	27.7%
IC's ex-memory	1.8%	0.9%	1.9%	2.3%	3.1%	2.5%	4.1%	9.3%	14.7%	21.3%	21.1%	27.3%	33.1%

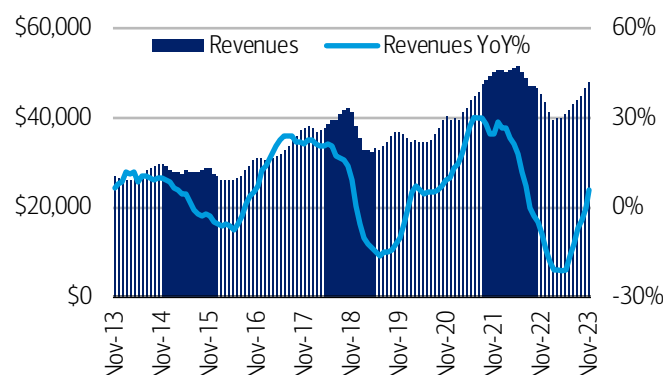
Source: BofA Global Research, SIA

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Appendix

Exhibit 13: Total semiconductor revenue trends (3mma)

Semis sales grew 5.5% YoY on a 3mma basis

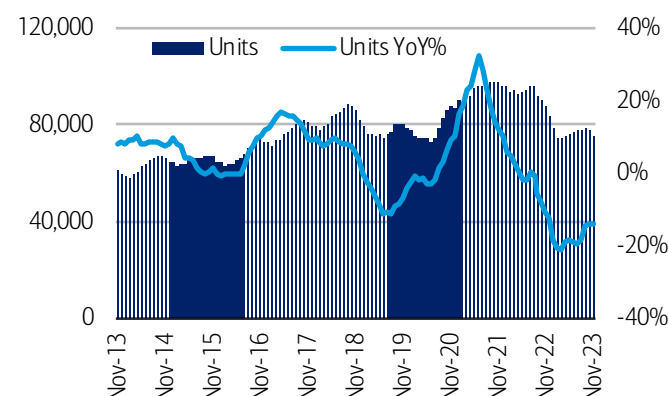


Source: SIA, BofA Global Research estimates

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Exhibit 14: Total semiconductor unit trends (3mma)

Semis unit sales were down 13.9% YoY on a 3mma basis

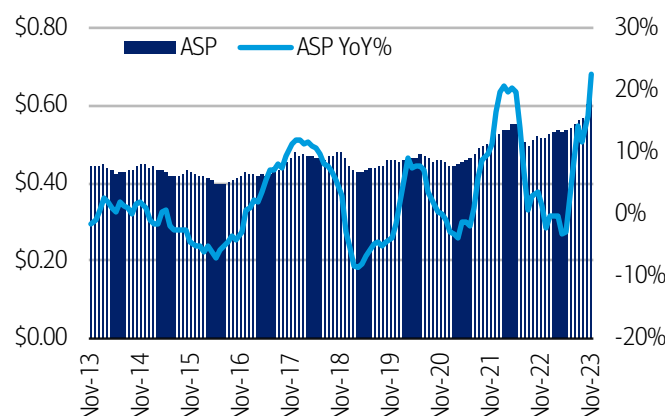


Source: SIA, BofA Global Research estimates

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Exhibit 15: Total semiconductor ASP trends (3mma)

Semis ASPs grew 22.5% YoY on a 3mma basis

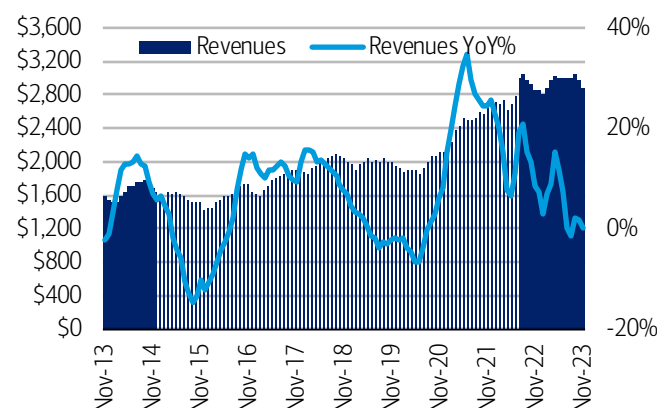


Source: SIA, BofA Global Research estimates

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Exhibit 16: Discretes revenue trends (3mma)

Discrete sales were up 0.3% YoY on a 3mma basis

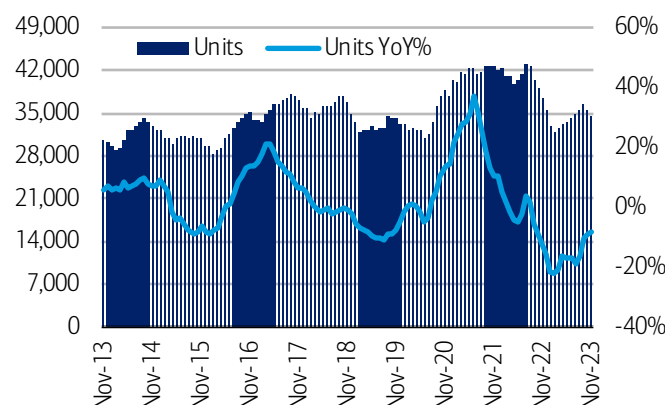


Source: SIA, BofA Global Research estimates

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Exhibit 17: Discretes unit trends (3mma)

Discrete unit sales fell 8.1% YoY on a 3mma basis

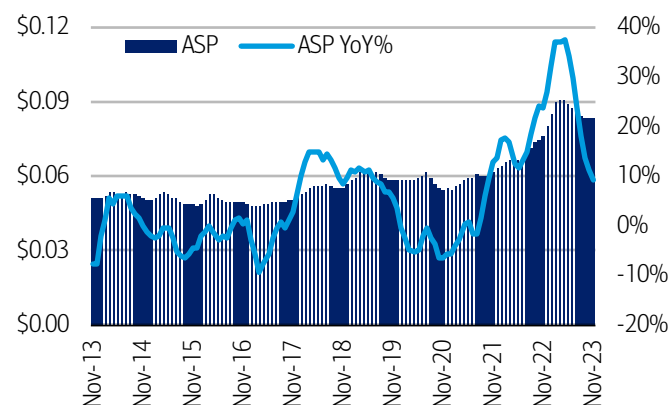


Source: SIA, BofA Global Research estimates

BofA GLOBAL RESEARCH

Exhibit 18: Discretes ASP trends (3mma)

Discrete ASPs grew 9.2% YoY on a 3mma basis

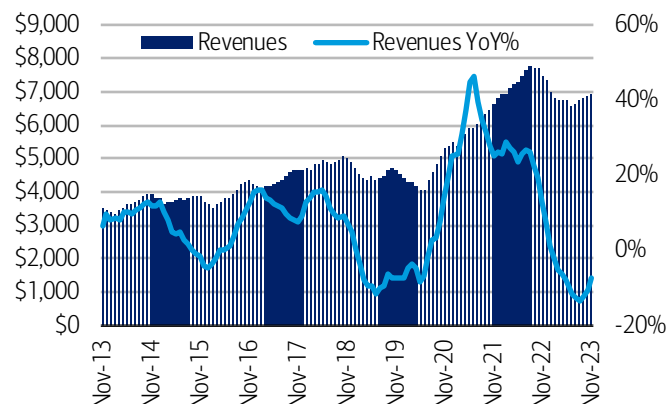


Source: SIA, BofA Global Research estimates

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Exhibit 19: Analog revenue trends (3mma)

Analog sales fell 7.5% YoY on a 3mma basis

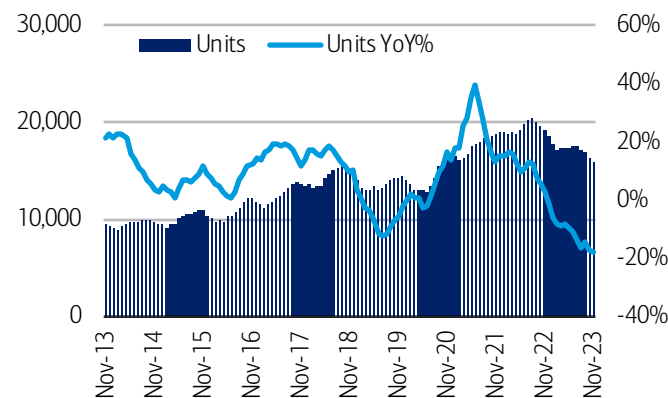


Source: SIA, BofA Global Research estimates

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Exhibit 20: Analog units trends (3mma)

Analog unit sales fell 17.9% YoY on a 3mma basis

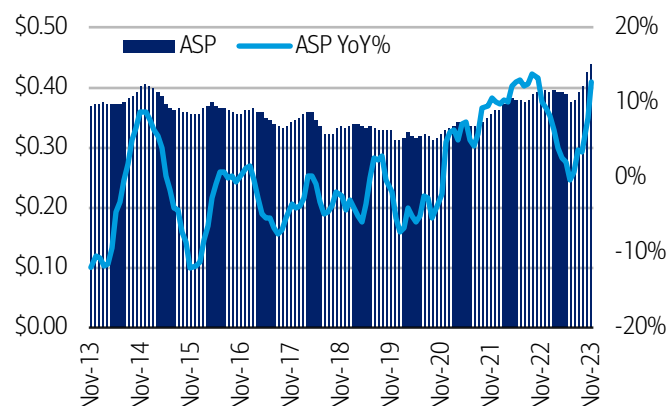


Source: SIA, BofA Global Research estimates

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Exhibit 21: Analog ASP trends (3mma)

Analog ASPs grew 12.7% YoY on a 3mma basis

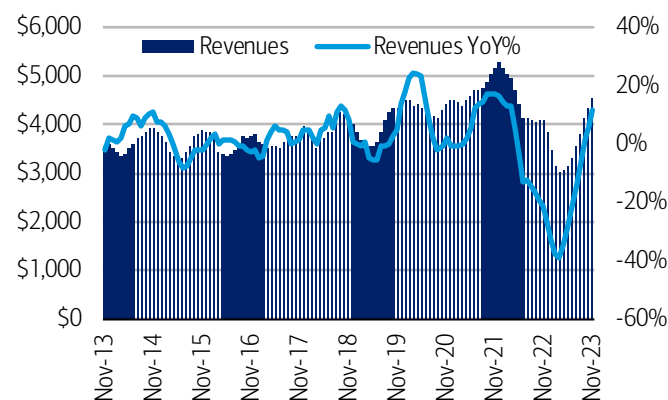


Source: SIA, BofA Global Research estimates

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Exhibit 22: Microprocessor revenue trends (3mma)

MPU sales were up 11.5% YoY on a 3mma basis

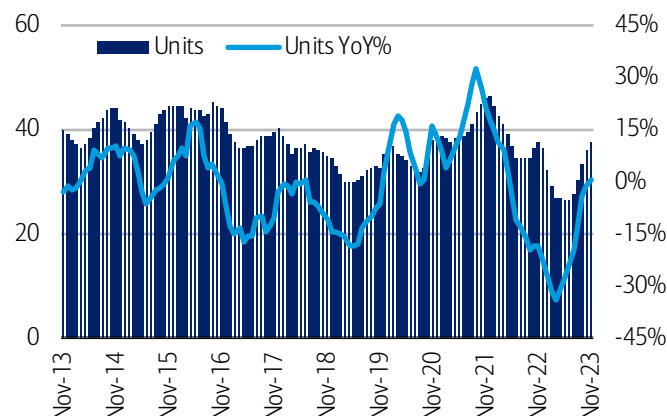


Source: SIA, BofA Global Research estimates

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Exhibit 23: Microprocessor units trends (3mma)

MPU units grew 0.2% YoY on a 3mma basis

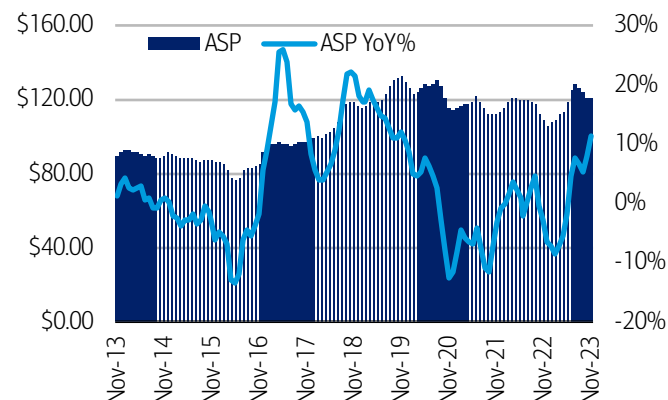


Source: SIA, BofA Global Research estimates

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Exhibit 24: Microprocessor ASP trends (3mma)

MPU ASPs grew 11.3% YoY on a 3mma basis

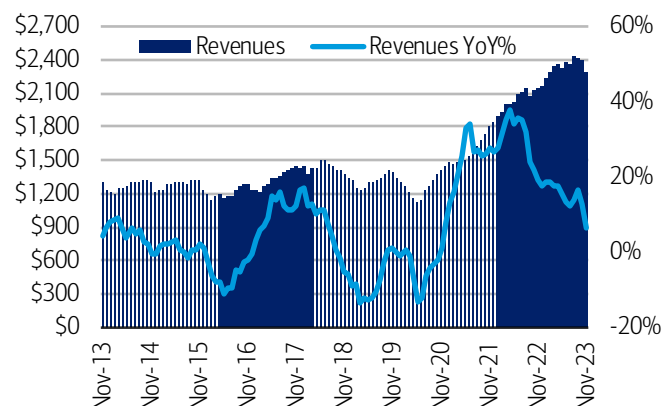


Source: SIA, BofA Global Research estimates

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Exhibit 25: Microcontroller revenue trends (3mma)

MCU sales grew 6.3% YoY on a 3mma basis

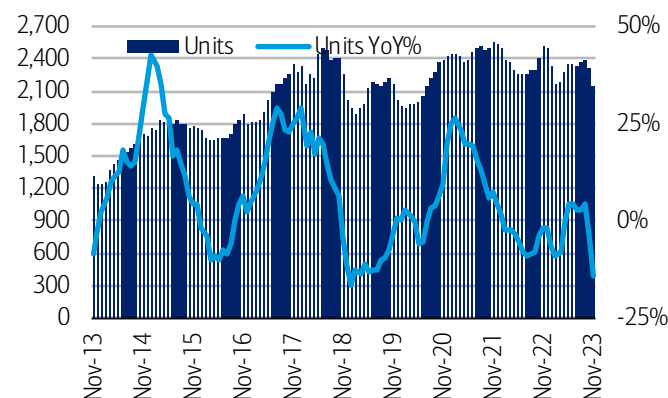


Source: SIA, BofA Global Research estimates

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Exhibit 26: Microcontroller unit trends (3mma)

MCU unit sales fell 14.1% YoY on a 3mma basis

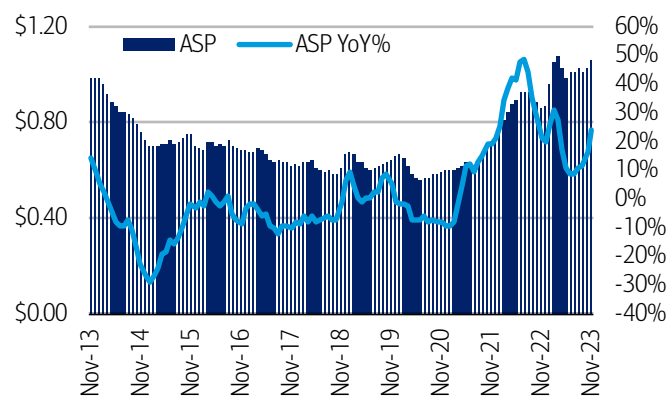


Source: SIA, BofA Global Research estimates

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Exhibit 27: Microcontroller ASP trends (3mma)

MCU ASPs grew 23.7% YoY on a 3mma basis

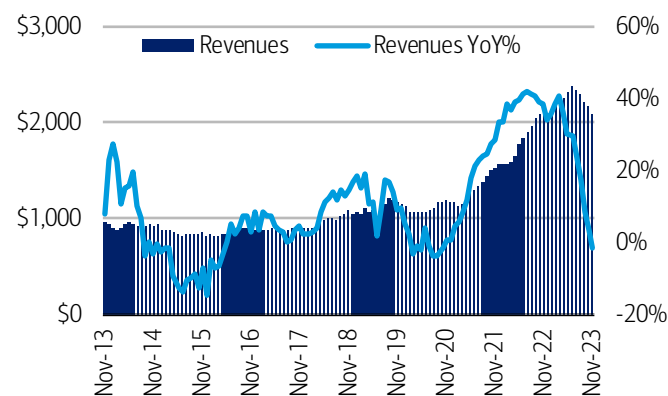


Source: SIA, BofA Global Research estimates

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Exhibit 28: PLD revenue trends (3mma)

PLD sales fell 1.5% YoY on a 3mma basis

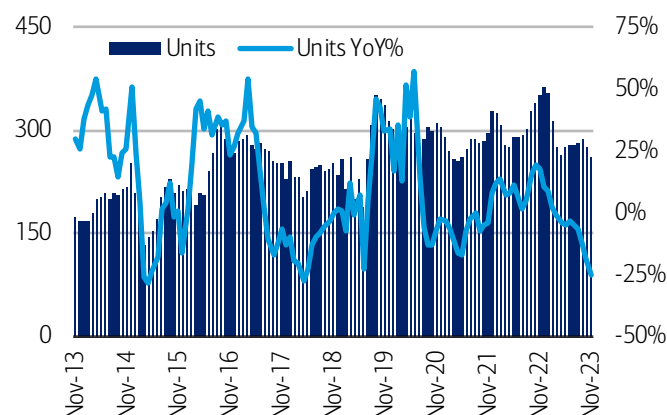


Source: SIA, BofA Global Research estimates

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Exhibit 29: PLD unit trends (3mma)

PLD unit sales were down 25.2% YoY on a 3mma basis

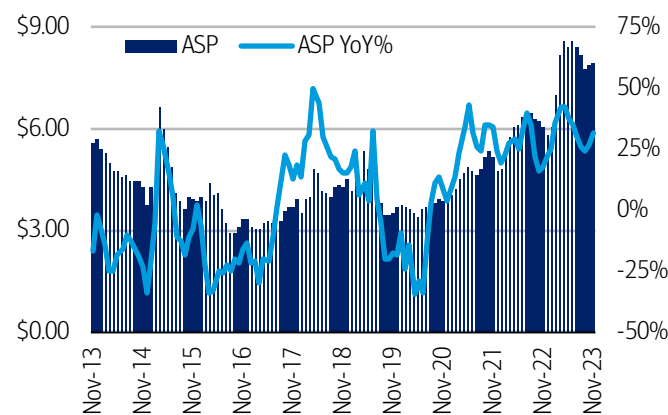


Source: SIA, BofA Global Research estimates

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Exhibit 30: PLD ASP trends (3mma)

PLD ASPs grew 31.6% YoY on a 3mma basis

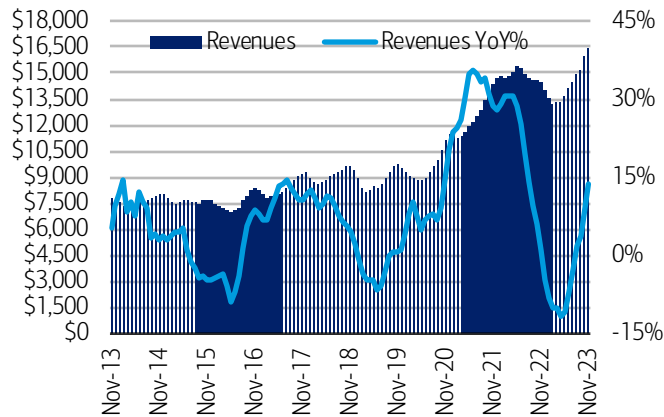


Source: SIA, BofA Global Research estimates

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Exhibit 31: Logic revenue trends (3mma)

Logic sales grew 13.6% YoY on a 3mma basis

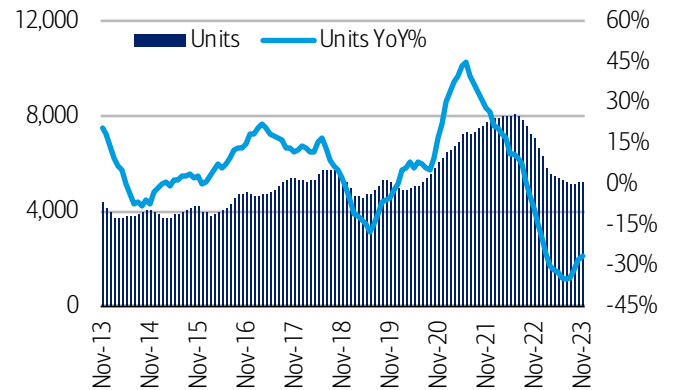


Source: SIA, BofA Global Research estimates

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Exhibit 32: Logic unit trends (3mma)

Logic unit sales fell 26.3% YoY on a 3mma basis

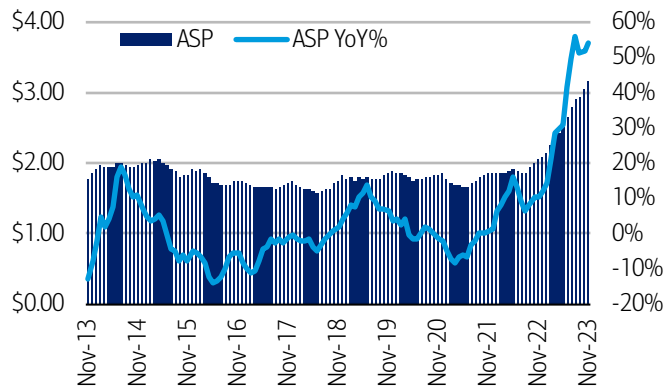


Source: SIA, BofA Global Research estimates

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Exhibit 33: Logic ASP trends (3mma)

Logic ASPs grew 54.3% YoY on a 3mma basis

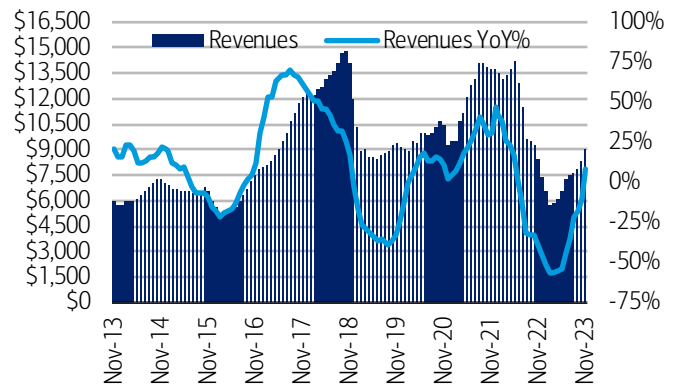


Source: SIA, BofA Global Research estimates

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Exhibit 34: Memory revenue trends (3mma)

Memory sales grew 7.9% YoY on a 3mma basis

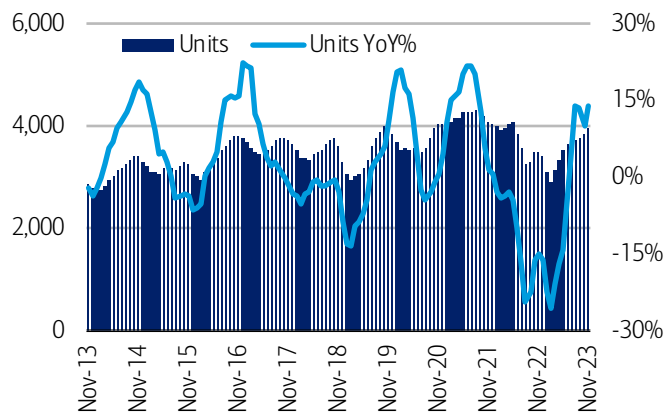


Source: SIA, BofA Global Research estimates

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Exhibit 35: Memory unit trends (3mma)

Memory unit sales grew 14.0% YoY on a 3mma basis

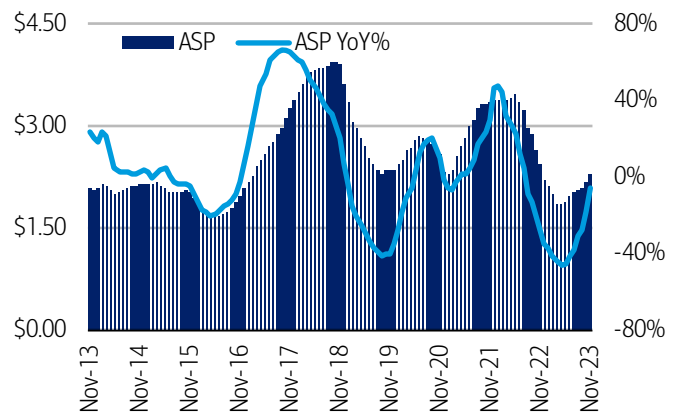


Source: SIA, BofA Global Research estimates

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Exhibit 36: Memory ASP trends (3mma)

Memory ASPs fell 5.3% YoY on a 3mma basis

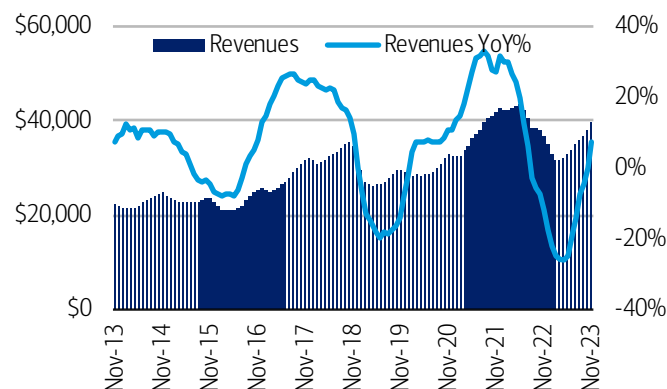


Source: SIA, BofA Global Research estimates

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Exhibit 37: Total IC revenue trends (3mma)

Total IC sales grew 7.2% YoY on a 3mma basis

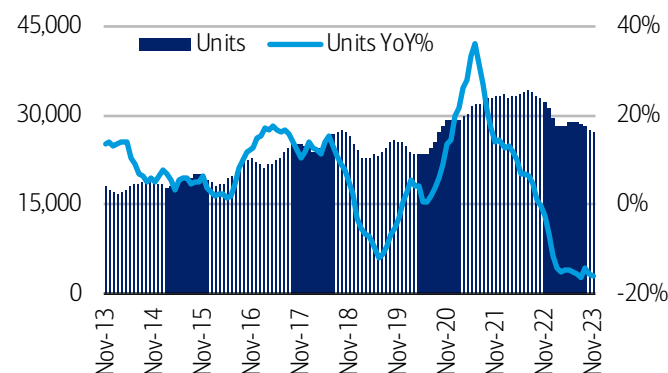


Source: SIA, BofA Global Research estimates

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Exhibit 38: Total IC unit trends (3mma)

Total IC unit sales fell 16.0% YoY on a 3mma basis

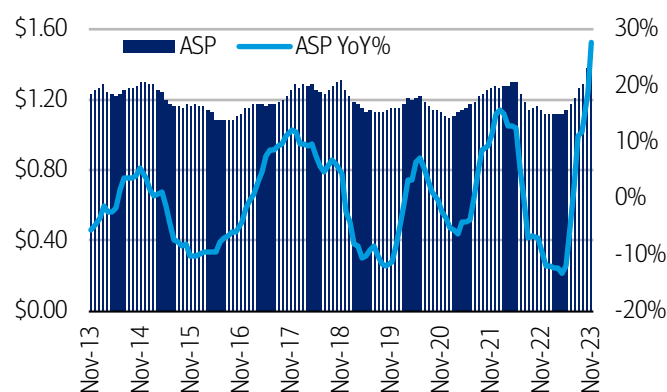


Source: SIA, BofA Global Research estimates

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Exhibit 39: Total IC ASP trends (3mma)

Total IC ASPs grew 27.7% YoY on a 3mma basis



Source: SIA, BofA Global Research estimates

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Glossary

DRAM: dynamic random-access memory

IC: integrated circuit

MCU: Microcontroller

MPU: Microprocessor

n-t: near term

l-t: long term

ASP: average selling price

PLD: Programmable Logic Device

mma: monthly moving average

NAND: "NOT AND" memory

Disclosures

Important Disclosures

FUNDAMENTAL EQUITY OPINION KEY: Opinions include a Volatility Risk Rating, an Investment Rating and an Income Rating. **VOLATILITY RISK RATINGS**, indicators of potential price fluctuation, are: A - Low, B - Medium and C - High. **INVESTMENT RATINGS** reflect the analyst's assessment of both a stock's absolute total return potential as well as its attractiveness for investment relative to other stocks within its Coverage Cluster (defined below). Our investment ratings are: 1 - Buy stocks are expected to have a total return of at least 10% and are the most attractive stocks in the coverage cluster; 2 - Neutral stocks are expected to remain flat or increase in value and are less attractive than Buy rated stocks and 3 - Underperform stocks are the least attractive stocks in a coverage cluster. An investment rating of 6 (No Rating) indicates that a stock is no longer trading on the basis of fundamentals. Analysts assign investment ratings considering, among other things, the 0-12 month total return expectation for a stock and the firm's guidelines for ratings dispersions (shown in the table below). The current price objective for a stock should be referenced to better understand the total return expectation at any given time. The price objective reflects the analyst's view of the potential price appreciation (depreciation).

Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster ^{R1}
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

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