

Global Semiconductors

Jan'24 SIA: Recovery continues with Jan sales up mid-teens YoY

Industry Overview

January semi & core semis sales up 9% YoY, fall MoM

January semis sales finished **up 15.5% YoY**, marking the fifth consecutive month of YoY growth. Core-semis (ex-memory) sales were **up 8.5% YoY**, showing positive YoY growth in core-semis for the sixth consecutive month. Key takeaways from the January data on a one-month basis: **1) Semis/core-semis declined sequentially**, at **-16.5%/-10.6% MoM**, 51bps/35bps below seasonal trends, **2) MoM core-semis performance was weakened by Discretes/MCUs**, falling -22%/-18% MoM, with Analog sales the strongest on a relative basis, falling 6% MoM, **3) Memory sales fell in January**, down 32.2% MoM, with DRAM -46.2% MoM and NAND -6.8% MoM, **4) All regions fell MoM**, with China down the most (-20.5% MoM, likely on holiday effects), followed by America (-19.5% MoM) and Europe (-13.0% MoM), **5) Pricing sustains growth**, with core semis ASP growth of +29.2% YoY offsetting units declines of -14.2% YoY. Overall, sequential weakness likely a large function of holiday slowdown in Chinese market (largest geography), as well as continued weakness across the industry. While we continue to anticipate a second-half recovery, customer inventory digestion persists across end markets, most pronounced now in auto/industrial markets who were later to enter the downcycle. More consumer-exposed markets appear to be in the process of normalization, with stabilization likely reaching the majority of the industry later this year. 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 remain positive

On a 3mma basis: 1) January semi sales fell -2.1% MoM, down from +1.5% MoM growth in Dec, weakened by MCUs (-5.0% MoM); 2) Core-semis sales (ex-memory) fell -3.5% MoM (vs +0.3% MoM in Dec), while semis/core-semis units fell -0.1%/-0.7% MoM, 3) 3mma semis/core semis sales of +15.4%/+10.8% YoY remain positive, 4) 3mma semis/core-semi ASPs fell MoM (-2.0%/-2.8%), on weak Std Cells, PLDs pricing (-4.3% MoM), offset by stronger MPUs (+1.8% MoM).

January memory segment strongest seasonally (3mma)

On a 3mma basis: MPU sales finished down 4.4% MoM in January (137bps below seasonal), while MCUs were down -5.0% MoM, (-522bps seasonally) on weak ASPs (-403bps seasonally). On the memory side, DRAM/NAND sales finished up +1.5%/6.3% MoM, (496bps/908bps above seasonal).

Americas strongest seasonally, Europe weakest (3mma)

On a 3mma basis: Americas region was strongest seasonally (372bps vs seasonally) falling -1.5% MoM, while Europe (406bps below seasonal) and Japan (166bps below seasonal) were the weakest seasonally, falling -2.8%/-3.9% MoM. China was 115bps above seasonal, falling -2.5% MoM in January.

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Exhibit 1: 3mma revenue data

Semis sales down -10.6% YTD

3mma revs	MoM	YoY	YTD
Semiconductors	-2.1%	15.4%	15.5%
Discretes	-2.1%	-2.1%	-9.3%
Analog	-2.7%	-4.3%	-1.8%
Microprocessors	-4.4%	26.8%	33.1%
Microcontrollers	-5.0%	-9.7%	-22.0%
Std Cells, PLDs	-3.8%	-10.0%	-20.0%
Logic	-3.4%	18.2%	13.9%
Memory	3.1%	54.2%	88.8%
DRAM	1.5%	55.5%	66.2%
NAND	6.3%	61.4%	147.4%
Total IC's	-1.9%	19.4%	20.7%
IC's ex-memory	-3.5%	10.8%	8.5%

Source: SIA, BofA Global Research
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See page 13 for abbreviations

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January SIA review

Seasonality

- **3mma.** Total semiconductor sales were down 2.1% MoM, roughly 9bps above seasonal trends, with ASP weakness weighing on growth (75bps below seasonal).

Exhibit 2: January revenues, units, ASP vs seasonality

Total semiconductor sales were down 2.1% MoM, 9bps above seasonal trends.

	Seasonal delta			Seasonal			Jan-24		
	Units	ASPs	Revenue	Units	ASPs	Revenue	Units	ASPs	Revenue
Semiconductors	84	-75	9	-1.0%	-1.2%	-2.2%	-0.1%	-2.0%	-2.1%
Discretes	156	-410	-251	-0.4%	0.9%	0.5%	1.1%	-3.2%	-2.1%
Analog	59	-215	-155	-1.4%	0.2%	-1.2%	-0.8%	-2.0%	-2.7%
Microprocessors	-271	139	-137	-3.4%	0.4%	-3.0%	-6.1%	1.8%	-4.4%
Microcontrollers	-65	-472	-522	-0.9%	1.2%	0.2%	-1.5%	-3.6%	-5.0%
Std Cells, PLDs	28	-403	-329	0.3%	-0.3%	-0.5%	0.5%	-4.3%	-3.8%
Logic	108	-210	-97	-1.4%	-1.0%	-2.4%	-0.3%	-3.1%	-3.4%
Memory	46	615	642	-3.0%	-0.3%	-3.3%	-2.6%	5.8%	3.1%
DRAM	27	485	496	-2.8%	-0.7%	-3.5%	-2.5%	4.1%	1.5%
NAND	248	662	908	-3.1%	0.4%	-2.7%	-0.6%	7.0%	6.3%
Total IC's	55	-7	47	-1.6%	-0.8%	-2.3%	-1.0%	-0.9%	-1.9%
IC's ex-memory	59	-212	-150	-1.3%	-0.6%	-2.0%	-0.7%	-2.8%	-3.5%

Source: SIA, BofA Global Research

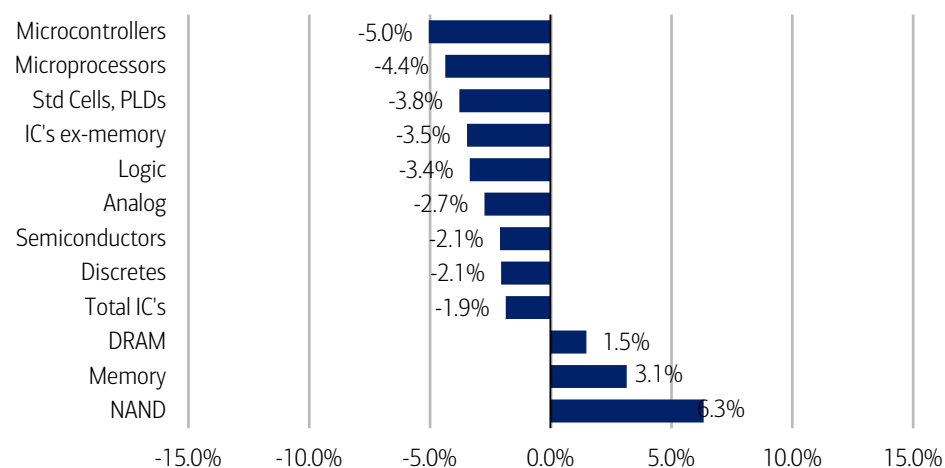
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Industry revenue trends

- **3mma.** NAND revenue grew the most MoM (up 6.3%) while MCUs sales declined the most (down 5.0% MoM).

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

NAND was the strongest performer on a 3mma basis

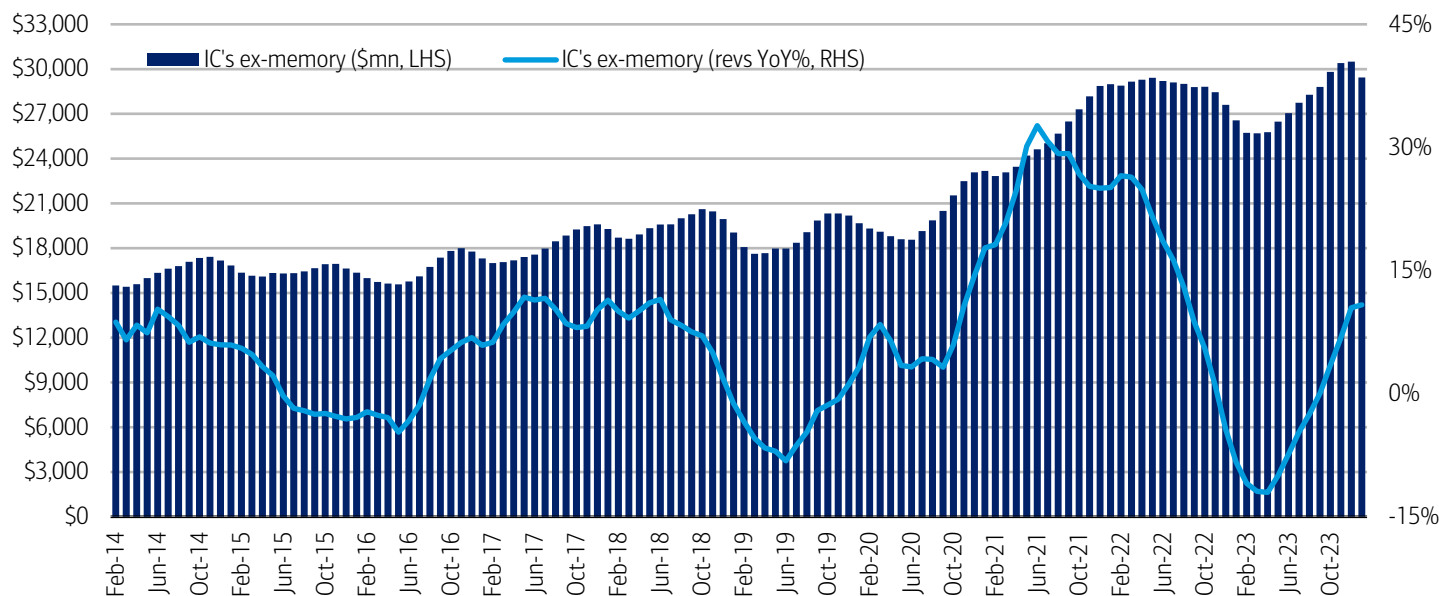


Source: SIA, BofA Global Research

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

IC ex-memory sales were up 10.8% YoY (3mma)



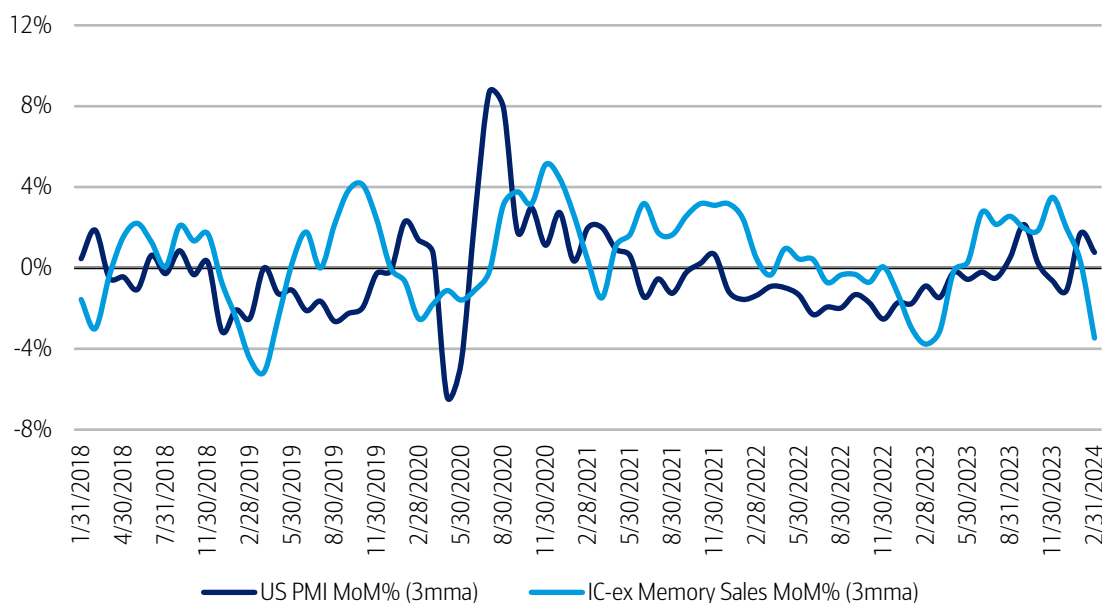
Source: SIA, BofA Global Research

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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 15.4%/10.8% YoY on a 3mma basis

3mma Revs (\$mn)	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
Semiconductors	\$41,290	\$39,660	\$39,832	\$40,098	\$41,182	\$42,233	\$43,224	\$44,041	\$44,886	\$46,590	\$47,918	\$48,659	\$47,634
Discretes	\$2,812	\$2,874	\$2,973	\$3,018	\$2,999	\$2,994	\$2,997	\$3,009	\$3,043	\$2,970	\$2,870	\$2,811	\$2,753
Analog	\$6,992	\$6,808	\$6,753	\$6,769	\$6,754	\$6,600	\$6,660	\$6,735	\$6,817	\$6,890	\$6,937	\$6,880	\$6,691
Microprocessors	\$3,468	\$3,153	\$3,031	\$3,067	\$3,236	\$3,417	\$3,661	\$3,817	\$4,115	\$4,359	\$4,558	\$4,597	\$4,397
Microcontrollers	\$2,245	\$2,298	\$2,355	\$2,358	\$2,331	\$2,378	\$2,364	\$2,444	\$2,419	\$2,368	\$2,233	\$2,135	\$2,027
Std Cells, PLDs	\$2,137	\$2,184	\$2,240	\$2,258	\$2,322	\$2,385	\$2,350	\$2,296	\$2,223	\$2,169	\$2,084	\$2,000	\$1,924
Logic	\$13,603	\$13,220	\$13,295	\$13,316	\$13,889	\$14,370	\$14,751	\$14,999	\$15,189	\$15,950	\$16,427	\$16,643	\$16,085
Memory	\$6,549	\$5,792	\$5,869	\$6,138	\$6,655	\$7,281	\$7,529	\$7,608	\$7,830	\$8,339	\$9,093	\$9,790	\$10,098
DRAM	\$3,780	\$3,374	\$3,337	\$3,327	\$3,476	\$3,764	\$3,938	\$3,957	\$4,420	\$4,746	\$5,335	\$5,794	\$5,880
NAND	\$2,402	\$2,072	\$2,176	\$2,455	\$2,825	\$3,173	\$3,252	\$3,291	\$3,037	\$3,216	\$3,401	\$3,647	\$3,878
Total IC's	\$33,115	\$31,526	\$31,562	\$31,908	\$33,133	\$34,329	\$35,268	\$35,892	\$36,640	\$38,155	\$39,499	\$40,288	\$39,537
IC's ex-memory	\$26,566	\$25,734	\$25,693	\$25,769	\$26,479	\$27,049	\$27,739	\$28,284	\$28,811	\$29,816	\$30,405	\$30,498	\$29,440
3mma MoM%													
Semiconductors	-5.0%	-3.9%	0.4%	0.7%	2.7%	2.6%	2.3%	1.9%	1.9%	3.8%	2.9%	1.5%	-2.1%
Discretes	-1.2%	2.2%	3.4%	1.5%	-0.6%	-0.2%	0.1%	0.4%	1.1%	-2.4%	-3.4%	-2.0%	-2.1%
Analog	-4.8%	-2.6%	-0.8%	0.2%	-0.2%	-2.3%	0.9%	1.1%	1.2%	1.1%	0.7%	-0.8%	-2.7%
Microprocessors	-9.8%	-9.1%	-3.9%	1.2%	5.5%	5.6%	7.1%	4.3%	7.8%	5.9%	4.6%	0.9%	-4.4%
Microcontrollers	3.5%	2.4%	2.5%	0.1%	-1.1%	2.0%	-0.6%	3.4%	-1.0%	-2.1%	-5.7%	-4.4%	-5.0%
Std Cells, PLDs	1.7%	2.2%	2.5%	0.8%	2.9%	2.7%	-1.5%	-2.3%	-3.2%	-2.4%	-4.0%	-4.0%	-3.8%
Logic	-2.7%	-2.8%	0.6%	0.2%	4.3%	3.5%	2.7%	1.7%	1.3%	5.0%	3.0%	1.3%	-3.4%
Memory	-12.1%	-11.6%	1.3%	4.6%	8.4%	9.4%	3.4%	1.0%	2.9%	6.5%	9.0%	7.7%	3.1%
DRAM	-10.9%	-10.8%	-1.1%	-0.3%	4.5%	8.3%	4.6%	0.5%	11.7%	7.4%	12.4%	8.6%	1.5%
NAND	-14.5%	-13.8%	5.1%	12.8%	15.1%	12.3%	2.5%	1.2%	-7.7%	5.9%	5.8%	7.3%	6.3%
Total IC's	-5.5%	-4.8%	0.1%	1.1%	3.8%	3.6%	2.7%	1.8%	2.1%	4.1%	3.5%	2.0%	-1.9%
IC's ex-memory	-3.8%	-3.1%	-0.2%	0.3%	2.8%	2.2%	2.6%	2.0%	1.9%	3.5%	2.0%	0.3%	-3.5%
3mma YoY%													
Semiconductors	-18.6%	-20.7%	-21.3%	-21.3%	-20.3%	-15.8%	-11.8%	-6.8%	-4.5%	-0.6%	5.4%	11.9%	15.4%
Discretes	3.3%	6.9%	8.9%	15.1%	11.7%	7.5%	0.2%	-1.5%	2.2%	1.6%	0.0%	-1.2%	-2.1%
Analog	1.2%	-2.1%	-5.3%	-6.0%	-7.7%	-11.5%	-12.9%	-13.5%	-11.9%	-10.6%	-7.5%	-6.3%	-4.3%
Microprocessors	-32.7%	-37.6%	-39.0%	-35.2%	-27.2%	-17.2%	-11.0%	-6.4%	1.1%	6.5%	11.5%	19.5%	26.8%
Microcontrollers	18.6%	18.9%	17.9%	17.3%	15.4%	13.4%	12.1%	14.0%	16.3%	11.7%	3.8%	-1.6%	-9.7%
Std Cells, PLDs	36.0%	38.6%	40.7%	36.3%	30.3%	29.9%	23.5%	17.3%	8.5%	3.6%	-1.5%	-4.8%	-10.0%
Logic	-8.0%	-10.1%	-10.2%	-11.7%	-9.6%	-5.8%	-1.4%	1.9%	3.7%	9.0%	13.7%	19.1%	18.2%
Memory	-51.4%	-56.1%	-56.3%	-55.4%	-53.2%	-43.5%	-34.8%	-21.2%	-17.6%	-10.2%	7.9%	31.4%	54.2%
DRAM	-52.3%	-56.9%	-58.7%	-59.9%	-59.8%	-51.1%	-43.8%	-32.1%	-25.0%	-14.9%	9.4%	36.5%	55.5%
NAND	-53.2%	-58.0%	-55.7%	-51.3%	-45.1%	-33.7%	-21.2%	-3.1%	-4.6%	-2.0%	8.5%	29.8%	61.4%
Total IC's	-22.0%	-25.1%	-25.9%	-25.9%	-24.1%	-18.4%	-13.2%	-7.2%	-4.3%	0.1%	7.1%	14.9%	19.4%
IC's ex-memory	-8.4%	-10.9%	-11.9%	-12.0%	-10.0%	-7.4%	-4.7%	-2.5%	0.0%	3.5%	6.9%	10.5%	10.8%

Source: BofA Global Research, SIA

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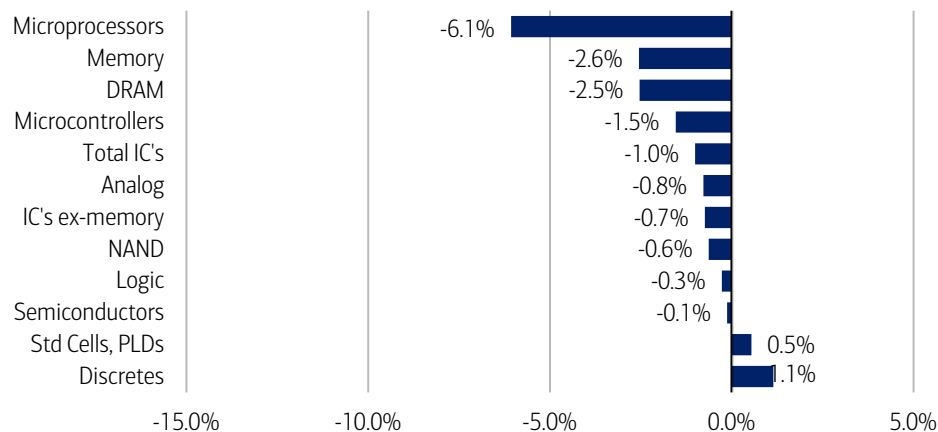


Industry unit trends

- **3mma.** MPUs saw the weakest MoM unit trends (-6.1% MoM), while Discrete units were up the most (+1.1% MoM).

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

MPUs saw the weakest unit growth on a 3mma basis

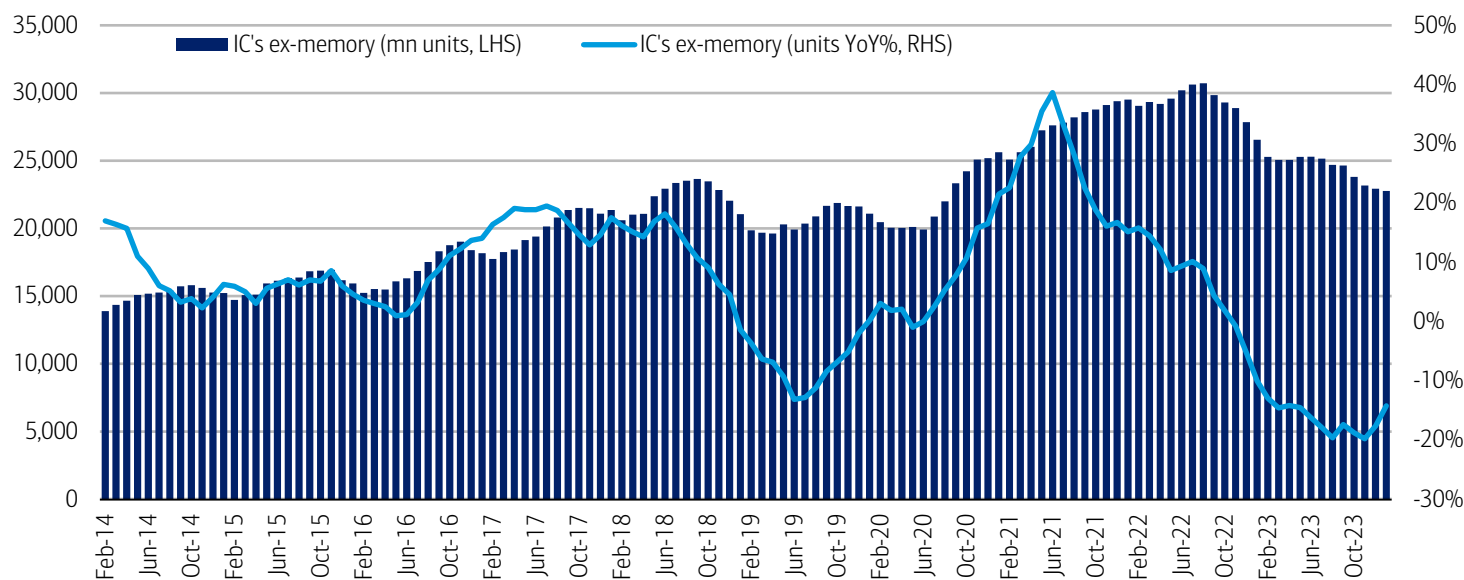


Source: SIA, BofA Global Research

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

IC ex-memory unit growth down 14.2% YoY



Source: SIA, BofA Global Research

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Exhibit 9: 3mma unit summary (LTM)

Semis/core semis unit sales finished -5.2%/-14.2% YoY on a 3mma basis

3mma Units (mn)	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
Semiconductors	78,495	74,454	74,399	75,271	76,388	76,996	77,678	78,302	79,024	77,463	75,517	74,476	74,379
Discretes	33,088	31,929	32,668	33,162	33,564	34,217	34,800	35,649	36,326	35,605	34,564	33,658	34,043
Analog	17,808	17,202	17,238	17,242	17,433	17,563	17,571	17,113	17,017	16,229	15,800	15,698	15,575
Microprocessors	32	29	27	27	27	27	28	30	33	36	38	38	35
Microcontrollers	2,336	2,174	2,186	2,287	2,361	2,355	2,330	2,375	2,391	2,291	2,097	2,005	1,974
Std Cells, PLDs	354	313	275	263	276	279	279	281	286	276	262	245	247
Logic	6,337	5,845	5,568	5,470	5,429	5,311	5,183	5,134	5,168	5,214	5,204	5,166	5,152
Memory	3,087	2,907	3,153	3,330	3,527	3,666	3,712	3,716	3,753	3,852	3,956	3,990	3,888
DRAM	1,406	1,339	1,423	1,465	1,531	1,600	1,590	1,529	1,634	1,696	1,826	1,804	1,759
NAND	733	663	813	924	1,059	1,130	1,152	1,163	1,086	1,135	1,134	1,153	1,146
Total IC's	29,636	28,193	28,210	28,393	28,814	28,961	28,864	28,407	28,399	27,655	27,128	26,928	26,656
IC's ex-memory	26,548	25,286	25,057	25,063	25,287	25,295	25,153	24,691	24,647	23,803	23,172	22,938	22,768
MoM%													
Semiconductors	-6.6%	-5.1%	-0.1%	1.2%	1.5%	0.8%	0.9%	0.8%	0.9%	-2.0%	-2.5%	-1.4%	-0.1%
Discretes	-6.6%	-3.5%	2.3%	1.5%	1.2%	1.9%	1.7%	2.4%	1.9%	-2.0%	-2.9%	-2.6%	1.1%
Analog	-4.4%	-3.4%	0.2%	0.0%	1.1%	0.7%	0.0%	-2.6%	-0.6%	-4.6%	-2.6%	-0.6%	-0.8%
Microprocessors	-11.6%	-9.9%	-7.2%	0.0%	-0.5%	0.3%	4.1%	7.7%	10.4%	8.1%	4.5%	-0.2%	-6.1%
Microcontrollers	-6.3%	-6.9%	0.6%	4.6%	3.3%	-0.2%	-1.1%	1.9%	0.7%	-4.2%	-8.5%	-4.4%	-1.5%
Std Cells, PLDs	-2.2%	-11.7%	-12.2%	-4.0%	4.6%	1.2%	-0.1%	0.9%	1.7%	-3.5%	-5.2%	-6.2%	0.5%
Logic	-4.8%	-7.8%	-4.7%	-1.8%	-0.7%	-2.2%	-2.4%	-0.9%	0.7%	0.9%	-0.2%	-0.7%	-0.3%
Memory	-9.2%	-5.9%	8.5%	5.6%	5.9%	4.0%	1.3%	0.1%	1.0%	2.6%	2.7%	0.9%	-2.6%
DRAM	-6.6%	-4.8%	6.3%	3.0%	4.5%	4.5%	-0.6%	-3.8%	6.9%	3.8%	7.7%	-1.2%	-2.5%
NAND	-15.6%	-9.5%	22.7%	13.6%	14.7%	6.7%	1.9%	0.9%	-6.6%	4.5%	0.0%	1.7%	-0.6%
Total IC's	-5.2%	-4.9%	0.1%	0.6%	1.5%	0.5%	-0.3%	-1.6%	0.0%	-2.6%	-1.9%	-0.7%	-1.0%
IC's ex-memory	-4.7%	-4.8%	-0.9%	0.0%	0.9%	0.0%	-0.6%	-1.8%	-0.2%	-3.4%	-2.6%	-1.0%	-0.7%
YoY%													
Semiconductors	-18.2%	-20.3%	-21.0%	-18.8%	-18.6%	-18.8%	-19.5%	-18.3%	-14.4%	-14.0%	-14.0%	-11.4%	-5.2%
Discretes	-21.8%	-22.0%	-20.6%	-16.3%	-16.7%	-17.3%	-19.0%	-16.5%	-10.1%	-8.7%	-8.1%	-5.0%	2.9%
Analog	-6.5%	-8.0%	-8.8%	-8.3%	-9.5%	-11.1%	-13.5%	-16.4%	-14.7%	-17.1%	-17.9%	-15.7%	-12.5%
Microprocessors	-27.6%	-31.8%	-34.2%	-31.4%	-27.4%	-22.3%	-18.8%	-12.3%	-4.0%	-1.5%	0.2%	2.9%	9.3%
Microcontrollers	-6.3%	-9.1%	-7.8%	-0.1%	4.4%	4.4%	2.8%	3.1%	4.5%	-4.6%	-16.5%	-19.6%	-15.5%
Std Cells, PLDs	9.0%	2.2%	-1.1%	-4.0%	-5.3%	-3.5%	-5.1%	-7.0%	-12.6%	-18.4%	-25.2%	-32.2%	-30.3%
Logic	-19.7%	-25.9%	-30.3%	-31.8%	-32.1%	-34.6%	-35.0%	-34.7%	-31.4%	-28.1%	-26.3%	-22.4%	-18.7%
Memory	-22.5%	-25.6%	-20.7%	-17.2%	-13.9%	-4.6%	4.4%	13.9%	13.4%	10.1%	13.8%	17.3%	25.9%
DRAM	-18.9%	-21.8%	-19.5%	-19.6%	-18.5%	-10.0%	-1.6%	4.5%	9.3%	8.7%	21.6%	19.8%	25.0%
NAND	-32.6%	-37.0%	-23.9%	-14.2%	-1.0%	17.8%	37.3%	59.9%	41.5%	28.9%	24.1%	32.9%	56.4%
Total IC's	-11.5%	-14.5%	-15.3%	-14.5%	-14.5%	-14.9%	-15.6%	-16.4%	-14.3%	-15.7%	-16.2%	-13.8%	-10.1%
IC's ex-memory	-10.0%	-13.0%	-14.6%	-14.2%	-14.5%	-16.2%	-17.9%	-19.6%	-17.4%	-18.8%	-19.8%	-17.6%	-14.2%

Source: SIA, BofA Global Research

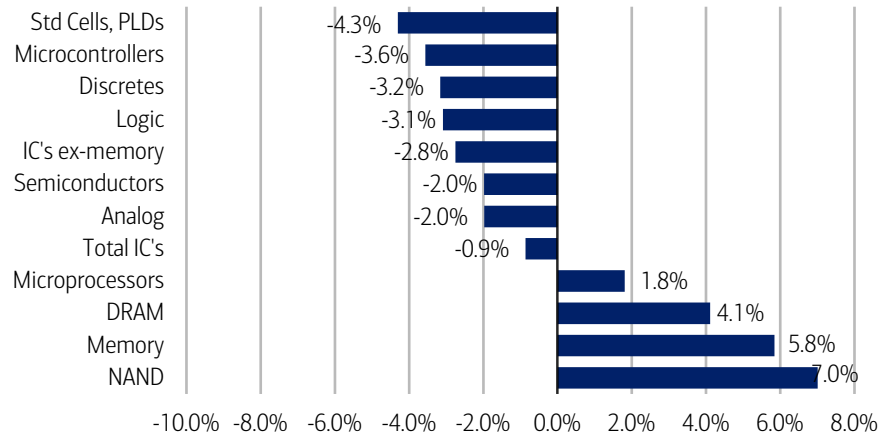
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Industry ASP trends

- **3mma.** NAND ASPs grew the most (+7.0% MoM) while Std Cells, PLDs ASPs saw the greatest declines (-4.3% MoM)

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

NAND saw the strongest industry ASP trends

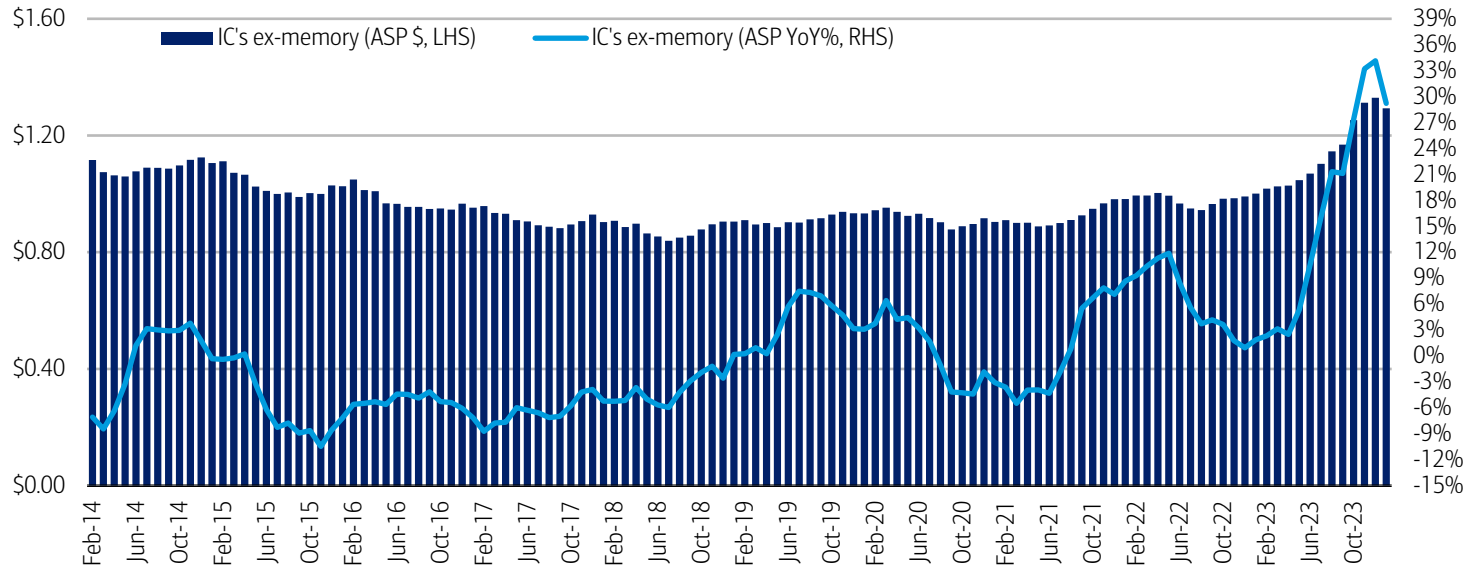


Source: SIA, BofA Global Research

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

IC ex-memory ASPs now up 29.2% YoY



Source: SIA, BofA Global Research

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Exhibit 12: 3mma ASP summary (LTM)

Semis/Core semis ASPs grew 21.7%/29.2% YoY on a 3mma basis

3mma ASPs (\$)	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
Semiconductors	\$0.53	\$0.53	\$0.54	\$0.53	\$0.54	\$0.55	\$0.56	\$0.56	\$0.57	\$0.60	\$0.63	\$0.65	\$0.64
Discretes	\$0.08	\$0.09	\$0.09	\$0.09	\$0.09	\$0.09	\$0.09	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08
Analog	\$0.39	\$0.40	\$0.39	\$0.39	\$0.39	\$0.38	\$0.38	\$0.39	\$0.40	\$0.42	\$0.44	\$0.44	\$0.43
Microprocessors	\$107.56	\$108.46	\$112.33	\$113.68	\$120.61	\$127.03	\$130.78	\$126.61	\$123.66	\$121.20	\$121.32	\$122.57	\$124.79
Microcontrollers	\$0.96	\$1.06	\$1.08	\$1.03	\$0.99	\$1.01	\$1.01	\$1.03	\$1.01	\$1.03	\$1.06	\$1.06	\$1.03
Std Cells, PLDs	\$6.03	\$6.98	\$8.16	\$8.57	\$8.43	\$8.55	\$8.43	\$8.16	\$7.77	\$7.86	\$7.96	\$8.15	\$7.80
Logic	\$2.15	\$2.26	\$2.39	\$2.43	\$2.56	\$2.71	\$2.85	\$2.92	\$2.94	\$3.06	\$3.16	\$3.22	\$3.12
Memory	\$2.12	\$1.99	\$1.86	\$1.84	\$1.89	\$1.99	\$2.03	\$2.05	\$2.09	\$2.16	\$2.30	\$2.45	\$2.60
DRAM	\$2.69	\$2.52	\$2.35	\$2.27	\$2.27	\$2.35	\$2.48	\$2.59	\$2.70	\$2.80	\$2.92	\$3.21	\$3.34
NAND	\$3.28	\$3.12	\$2.68	\$2.66	\$2.67	\$2.81	\$2.82	\$2.83	\$2.80	\$2.83	\$3.00	\$3.16	\$3.38
Total IC's	\$1.12	\$1.12	\$1.12	\$1.12	\$1.15	\$1.19	\$1.22	\$1.26	\$1.29	\$1.38	\$1.46	\$1.50	\$1.48
IC's ex-memory	\$1.00	\$1.02	\$1.03	\$1.03	\$1.05	\$1.07	\$1.10	\$1.15	\$1.17	\$1.25	\$1.31	\$1.33	\$1.29
MoM%													
Semiconductors	1.7%	1.3%	0.5%	-0.5%	1.2%	1.7%	1.4%	1.1%	1.0%	5.9%	5.5%	3.0%	-2.0%
Discretes	5.8%	5.9%	1.1%	0.0%	-1.8%	-2.1%	-1.6%	-2.0%	-0.8%	-0.4%	-0.4%	0.6%	-3.2%
Analog	-0.4%	0.8%	-1.0%	0.2%	-1.3%	-3.0%	0.9%	3.8%	1.8%	6.0%	3.4%	-0.2%	-2.0%
Microprocessors	1.9%	0.8%	3.6%	1.2%	6.1%	5.3%	3.0%	-3.2%	-2.3%	-2.0%	0.1%	1.0%	1.8%
Microcontrollers	10.5%	10.0%	1.9%	-4.3%	-4.3%	2.3%	0.5%	1.4%	-1.7%	2.2%	3.0%	0.0%	-3.6%
Std Cells, PLDs	4.0%	15.8%	16.8%	5.0%	-1.6%	1.5%	-1.4%	-3.2%	-4.8%	1.1%	1.3%	2.3%	-4.3%
Logic	2.3%	5.4%	5.6%	2.0%	5.1%	5.8%	5.2%	2.7%	0.6%	4.1%	3.2%	2.1%	-3.1%
Memory	-3.1%	-6.1%	-6.6%	-1.0%	2.4%	5.2%	2.1%	0.9%	1.9%	3.8%	6.2%	6.7%	5.8%
DRAM	-4.6%	-6.3%	-6.9%	-3.2%	0.0%	3.6%	5.3%	4.5%	4.5%	3.5%	4.4%	9.9%	4.1%
NAND	1.3%	-4.7%	-14.3%	-0.7%	0.4%	5.3%	0.5%	0.3%	-1.2%	1.4%	5.8%	5.5%	7.0%
Total IC's	-0.4%	0.1%	0.1%	0.4%	2.3%	3.1%	3.1%	3.4%	2.1%	6.9%	5.5%	2.8%	-0.9%
IC's ex-memory	1.0%	1.7%	0.8%	0.3%	1.8%	2.1%	3.1%	3.9%	2.0%	7.2%	4.8%	1.3%	-2.8%
YoY%													
Semiconductors	-0.5%	-0.5%	-0.3%	-3.1%	-2.1%	3.7%	9.5%	14.1%	11.6%	15.7%	22.5%	26.4%	21.7%
Discretes	32.0%	36.9%	37.1%	37.5%	34.1%	29.9%	23.6%	18.0%	13.7%	11.3%	8.9%	4.0%	-4.8%
Analog	8.2%	6.4%	3.8%	2.5%	1.9%	-0.4%	0.6%	3.6%	3.2%	7.9%	12.7%	11.2%	9.4%
Microprocessors	-7.1%	-8.6%	-7.3%	-5.5%	0.4%	6.5%	9.5%	6.7%	5.3%	8.1%	11.3%	16.2%	16.0%
Microcontrollers	26.5%	30.8%	27.8%	17.4%	10.5%	8.7%	9.1%	10.6%	11.3%	17.0%	24.2%	22.4%	6.8%
Std Cells, PLDs	24.8%	35.6%	42.3%	42.0%	37.6%	34.6%	30.1%	26.1%	24.1%	26.9%	31.6%	40.4%	29.2%
Logic	14.5%	21.4%	28.9%	29.5%	33.1%	43.9%	51.8%	56.0%	51.3%	51.7%	54.2%	53.5%	45.4%
Memory	-37.4%	-40.9%	-44.8%	-46.1%	-45.6%	-40.8%	-37.5%	-30.8%	-27.3%	-18.5%	-5.2%	12.0%	22.4%
DRAM	-41.2%	-44.9%	-48.7%	-50.1%	-50.7%	-45.7%	-42.9%	-35.0%	-31.4%	-21.7%	-10.0%	14.0%	24.4%
NAND	-30.5%	-33.3%	-41.8%	-43.3%	-44.6%	-43.7%	-42.6%	-39.4%	-32.6%	-24.0%	-12.6%	-2.3%	3.2%
Total IC's	-11.9%	-12.4%	-12.5%	-13.3%	-11.2%	-4.1%	2.8%	11.1%	11.7%	18.8%	27.8%	33.4%	32.7%
IC's ex-memory	1.9%	2.3%	3.1%	2.5%	5.3%	10.6%	16.1%	21.3%	21.1%	27.4%	33.2%	34.1%	29.2%

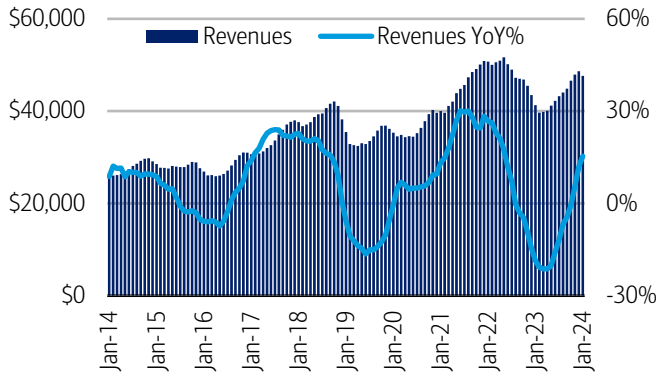
Source: BofA Global Research, SIA

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Appendix

Exhibit 13: Total semiconductor revenue trends (3mma)

Semis sales grew 15.4% YoY on a 3mma basis

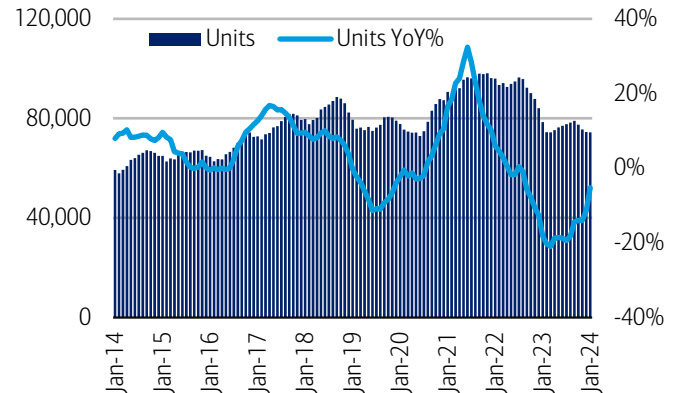


Source: SIA, BofA Global Research estimates

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Exhibit 14: Total semiconductor unit trends (3mma)

Semis unit sales were down 5.2% YoY on a 3mma basis

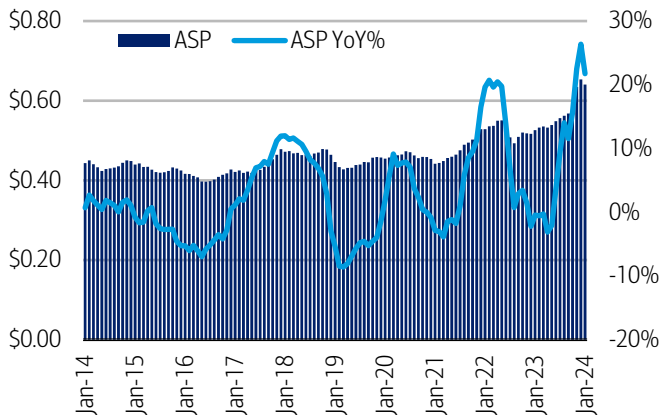


Source: SIA, BofA Global Research estimates

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Exhibit 15: Total semiconductor ASP trends (3mma)

Semis ASPs grew 21.7% YoY on a 3mma basis

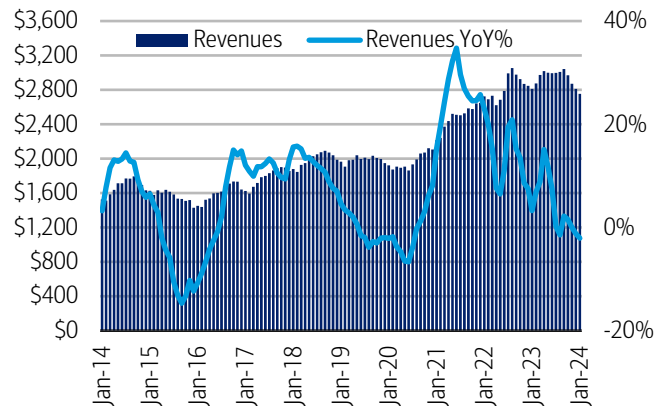


Source: SIA, BofA Global Research estimates

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Exhibit 16: Discretes revenue trends (3mma)

Discrete sales were down 2.1% YoY on a 3mma basis

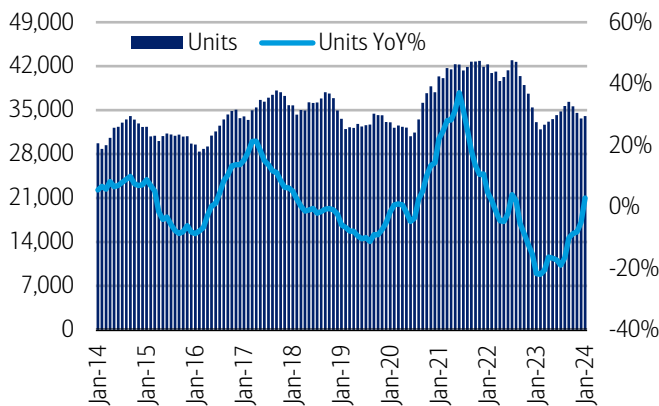


Source: SIA, BofA Global Research estimates

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Exhibit 17: Discretes unit trends (3mma)

Discrete unit sales grew 2.9% YoY on a 3mma basis

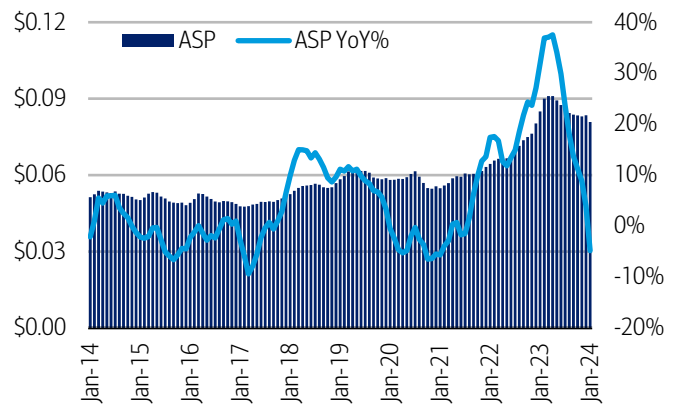


Source: SIA, BofA Global Research estimates

BofA GLOBAL RESEARCH

Exhibit 18: Discretes ASP trends (3mma)

Discrete ASPs fell 4.8% YoY on a 3mma basis

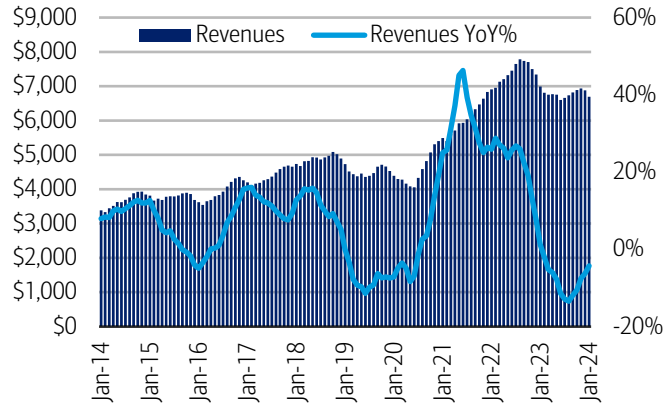


Source: SIA, BofA Global Research estimates

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Exhibit 19: Analog revenue trends (3mma)

Analog sales fell 4.3% YoY on a 3mma basis

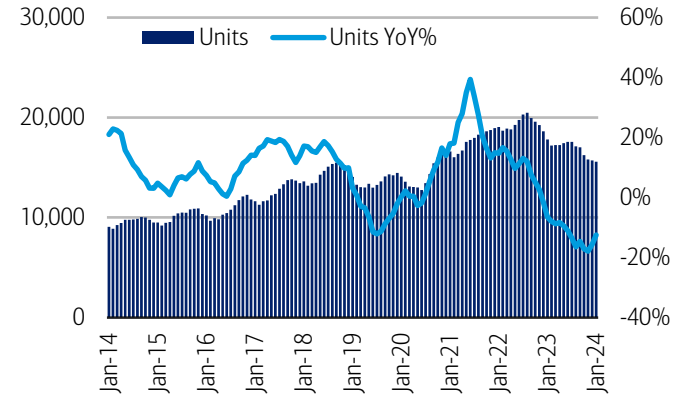


Source: SIA, BofA Global Research estimates

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Exhibit 20: Analog units trends (3mma)

Analog unit sales fell 12.5% YoY on a 3mma basis

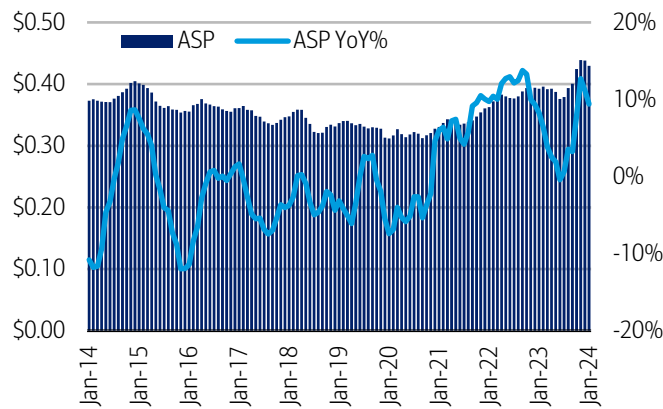


Source: SIA, BofA Global Research estimates

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Exhibit 21: Analog ASP trends (3mma)

Analog ASPs grew 9.4% YoY on a 3mma basis

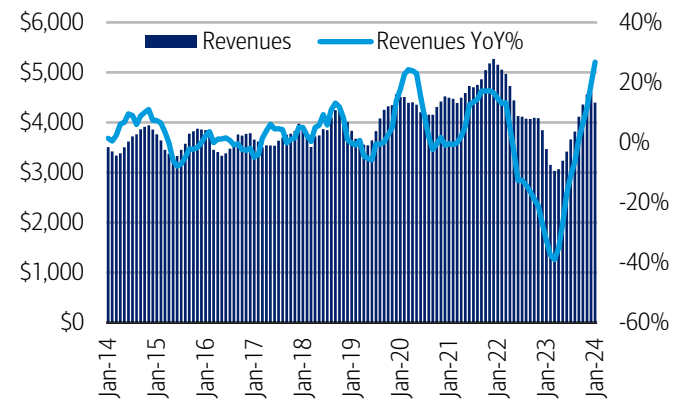


Source: SIA, BofA Global Research estimates

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Exhibit 22: Microprocessor revenue trends (3mma)

MPU sales were up 26.8% YoY on a 3mma basis

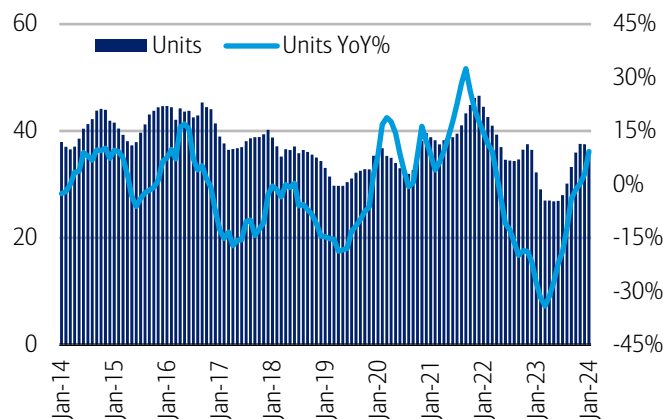


Source: SIA, BofA Global Research estimates

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Exhibit 23: Microprocessor units trends (3mma)

MPU units grew 9.3% YoY on a 3mma basis

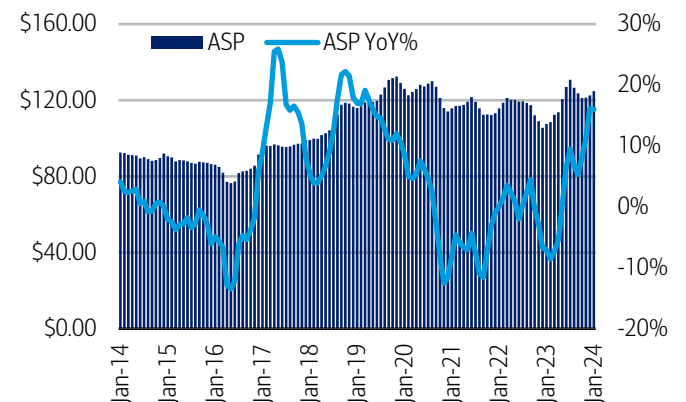


Source: SIA, BofA Global Research estimates

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Exhibit 24: Microprocessor ASP trends (3mma)

MPU ASPs grew 16.2% YoY on a 3mma basis

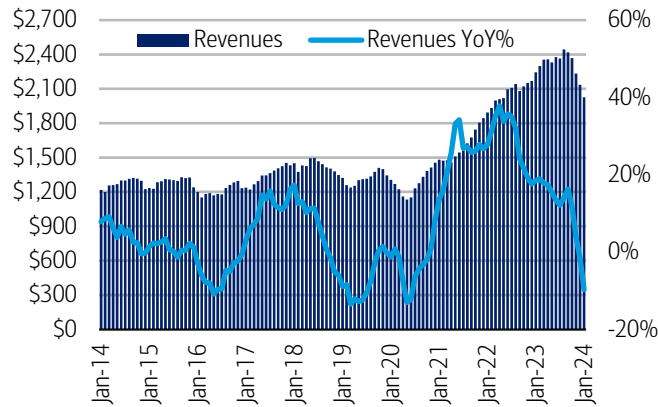


Source: SIA, BofA Global Research estimates

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Exhibit 25: Microcontroller revenue trends (3mma)

MCU sales fell 9.7% YoY on a 3mma basis

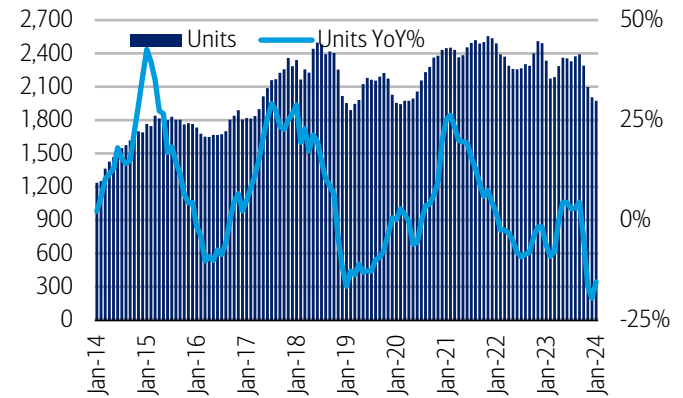


Source: SIA, BofA Global Research estimates

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Exhibit 26: Microcontroller unit trends (3mma)

MCU unit sales fell 15.5% YoY on a 3mma basis

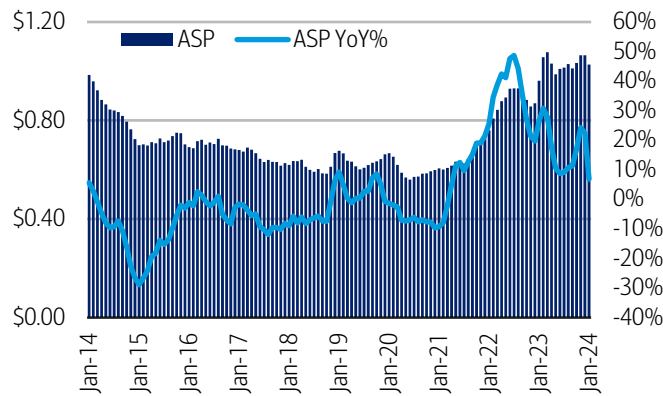


Source: SIA, BofA Global Research estimates

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Exhibit 27: Microcontroller ASP trends (3mma)

MCU ASPs grew 6.8% YoY on a 3mma basis

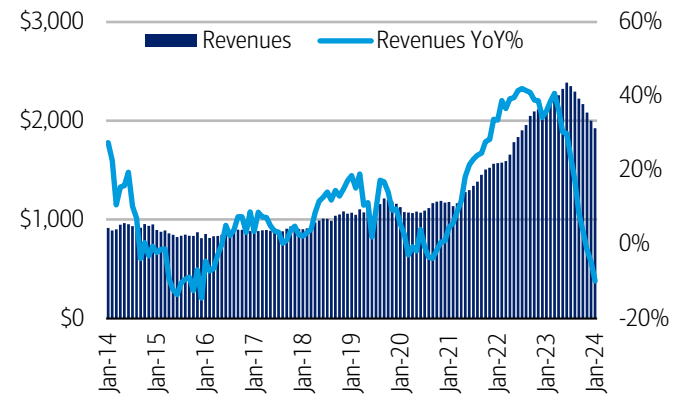


Source: SIA, BofA Global Research estimates

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Exhibit 28: PLD revenue trends (3mma)

PLD sales fell 10.0% YoY on a 3mma basis

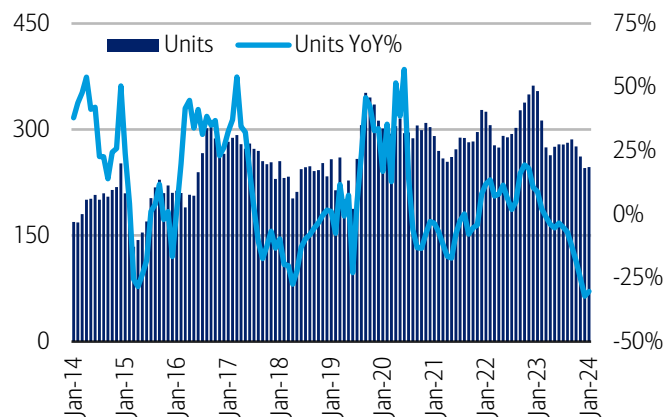


Source: SIA, BofA Global Research estimates

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Exhibit 29: PLD unit trends (3mma)

PLD unit sales were down 30.3% YoY on a 3mma basis

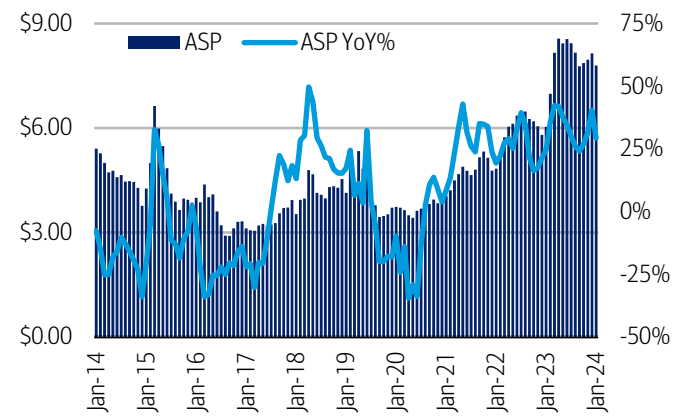


Source: SIA, BofA Global Research estimates

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Exhibit 30: PLD ASP trends (3mma)

PLD ASPs grew 29.2 YoY on a 3mma basis

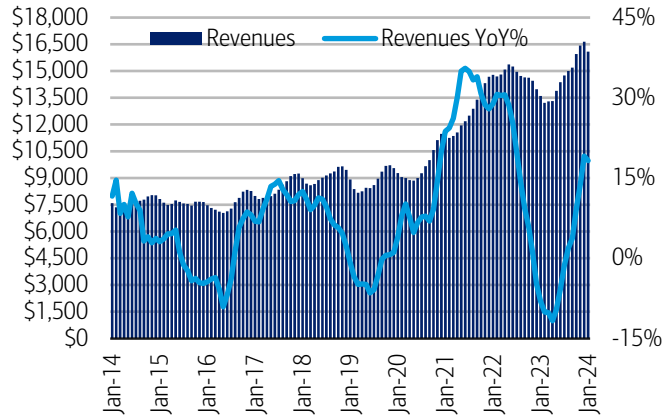


Source: SIA, BofA Global Research estimates

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Exhibit 31: Logic revenue trends (3mma)

Logic sales grew 18.2% YoY on a 3mma basis

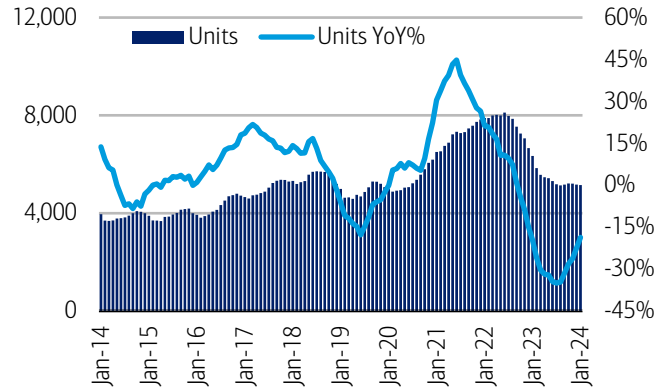


Source: SIA, BofA Global Research estimates

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Exhibit 32: Logic unit trends (3mma)

Logic unit sales fell 18.7% YoY on a 3mma basis

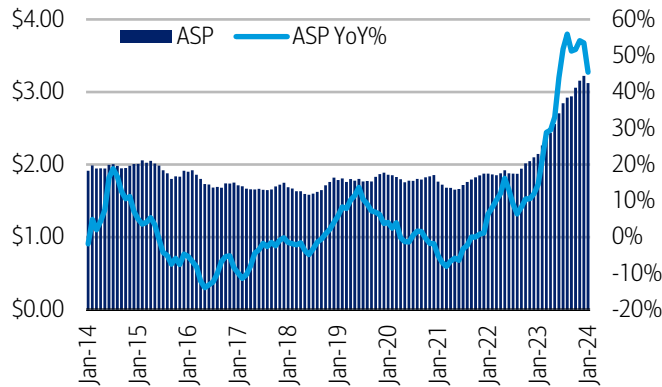


Source: SIA, BofA Global Research estimates

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Exhibit 33: Logic ASP trends (3mma)

Logic ASPs grew 45.4% YoY on a 3mma basis

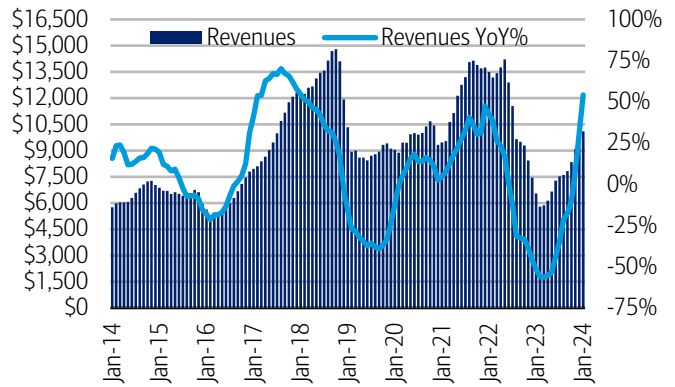


Source: SIA, BofA Global Research estimates

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Exhibit 34: Memory revenue trends (3mma)

Memory sales grew 54.2% YoY on a 3mma basis

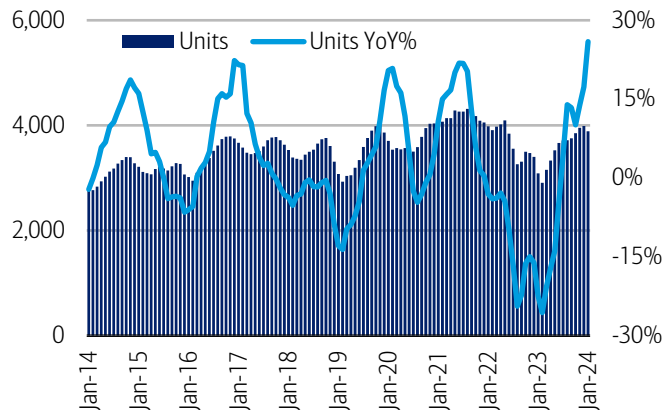


Source: SIA, BofA Global Research estimates

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Exhibit 35: Memory unit trends (3mma)

Memory unit sales grew 25.9% YoY on a 3mma basis

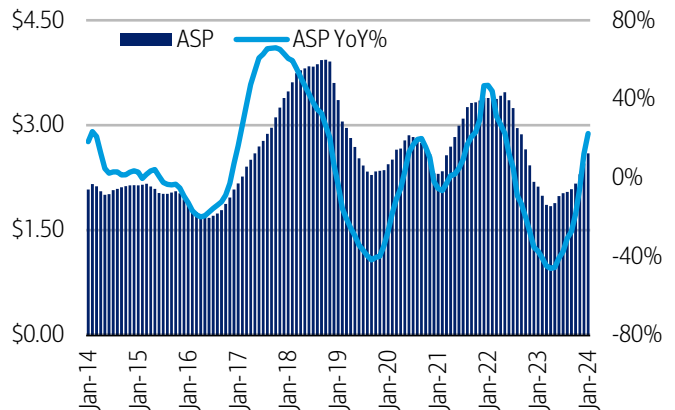


Source: SIA, BofA Global Research estimates

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Exhibit 36: Memory ASP trends (3mma)

Memory ASPs grew 22.4% YoY on a 3mma basis

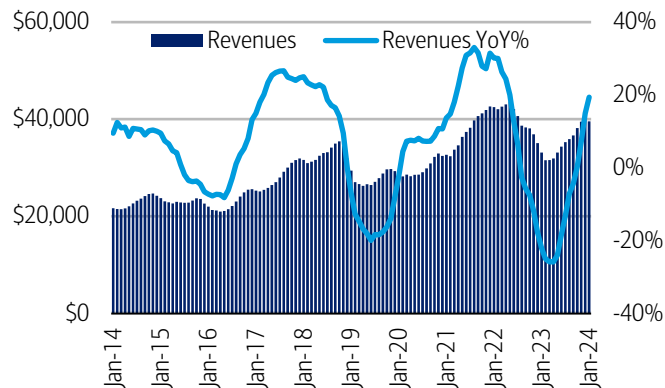


Source: SIA, BofA Global Research estimates

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Exhibit 37: Total IC revenue trends (3mma)

Total IC sales grew 19.4% YoY on a 3mma basis

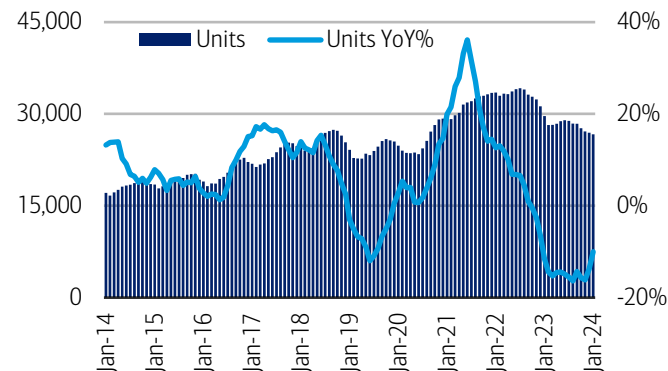


Source: SIA, BofA Global Research estimates

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Exhibit 38: Total IC unit trends (3mma)

Total IC unit sales fell 10.1% YoY on a 3mma basis

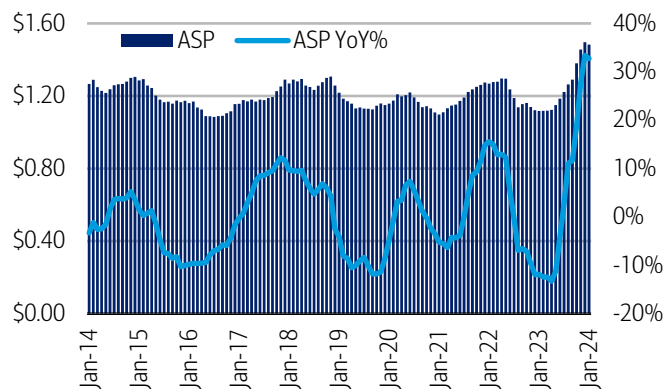


Source: SIA, BofA Global Research estimates

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Exhibit 39: Total IC ASP trends (3mma)

Total IC ASPs grew 32.7% 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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