Memory Market Trends
An Overview

Presenter:

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Memory Market – Overview

2022 memory market - breakdown by technology

$144B

$58.7B 40.8%
$79.7B 55.4%
$3.2B 2.2%
$0.67B 0.5%
$0.6B 0.4%
$1.0B 0.7%

DRAM
NAND
(NV)SRAM / FRAM
EEPROM and Other
Emerging NVM

NAND and DRAM market evolution

Source: “Status of the Memory Industry 2023” report by Yole Intelligence

*Note: Stand-alone memory revenues include chips and wafers, as well as memory modules and solid-state drives sold by IDM memory companies.
NAND Memory Market – Overview

2022 NAND market shares by revenue

- Samsung: 34%
- Micron: 12%
- SK hynix: 13%
- Western Digital: 13%
- KIOXIA: 18%
- YMC: 6%
- SOLIDIGM: 4%
- winbond: 0.3%
- Yate: 0.3%
- NAND market in 2022 ~$58.7B (-12% Y/Y)

Total NAND market in 2022 ~$58.7B (-12% Y/Y)

Note: stand-alone memory revenues include chips and wafers, as well as memory modules and solid-state drives sold by IDM memory companies.
**2022 DRAM market shares by revenue**

- **SAMSUNG**: 42%
- **Micron**: 28%
- **SK hynix**: 25%
- **Powerchip**: 0.7%
- **Nanya**: 0.9%
- **Other**: 1.1%

Total DRAM market in 2022 ~$79.7B (-15% Y/Y)

**Note**: Stand-alone memory revenues include chips and wafers, as well as memory modules and solid-state drives sold by IDM memory companies.

**DRAM market revenue**

- **Revenue ($B)**
- **Annual Growth (%)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue ($B)</th>
<th>Annual Growth (%)</th>
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<tbody>
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<td>2024</td>
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**DRAM average selling price**

- **ASP ($/Gb)**
- **Annual Growth (%)**

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2018-2028 Memory Wafer Demand
Breakdown by end market

NAND and DRAM Wafer Demand
in Million 12" Wafers per Year

Wafer Demand Growth Rates

PC/Client
CAGR\textsubscript{22-28}: -6%

Data Center
CAGR\textsubscript{22-28}: 9%

Mobile
CAGR\textsubscript{22-28}: -7%

Consumer
CAGR\textsubscript{22-28}: -8%

Automotive
CAGR\textsubscript{23-28}: 17%

Other
CAGR\textsubscript{22-28}: -2%

Source: DRAM and NAND market monitors (Q2-2023) by Yole Intelligence
2022-2028 Memory Market Evolution
Breakdown by technology

**2022**
- DRAM: $1B
- NAND: $80B
- NOR: $59B
- (NV)SRAM / FRAM: $0.7B
- Emerging NVM: $0.6B

**2028**
- DRAM: $1B
- NAND: $256B
- NOR: $157B
- (NV)SRAM / FRAM: $0.3B
- Emerging NVM: $0.7B
- EEPROM and other: $4.1B

CAGR:\n- 2022-2028 ~10%
- 2022-2028 ~12%
- 2022-2028 ~8%
- 2022-2028 ~5%

Source: “Status of the Memory Industry 2023” report by Yole Intelligence
# Acknowledgements – Yole’s Memory Team

<table>
<thead>
<tr>
<th>Walt Coon</th>
<th>Mike Howard</th>
<th>Simone Bertolazzi, PhD</th>
<th>Thibault Grossi</th>
<th>Diego Alfaro, PhD</th>
<th>Belinda Dube</th>
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<tr>
<td><strong>VP of NAND and Memory Research</strong></td>
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<td><strong>Principal Technology and Market Analyst - Memory</strong></td>
<td><strong>Senior Technology and Market Analyst - Memory</strong></td>
<td><strong>Technology and Market Analyst - Memory</strong></td>
<td><strong>Senior Technology and Cost Analyst – Memory &amp; Integrated Circuits</strong></td>
</tr>
<tr>
<td>Experience 15+ years in memory</td>
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<td>Experience 15 years in emerging semiconductor devices</td>
<td>Experience 15+ in electronic procurement (semiconductor, PCBA and software)</td>
<td>Experience 5+ years in emerging semiconductor devices</td>
<td>Experience 5+ years in memory and integrated circuits</td>
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<td>At Yole NAND</td>
<td>At Yole DRAM</td>
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<td>At Yole SystemPlus Memory</td>
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<td>Education MBA</td>
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<td>Education M.Sc. in Electronic and Computing science</td>
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<tr>
<td>Bachelor of Science in Chemical Engineering</td>
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<td>Bachelor of Arts in Finance</td>
<td>M.Sc. in Micro &amp; Nanotechnology</td>
<td>M.Sc. in Engineering Physics</td>
<td>M.Sc. in Nanoelectronics and Nanotechnology</td>
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**Experience** 15+ years in memory

**Education**
- MBA
- Bachelor of Science in Chemical Engineering
- Bachelor of Arts in Finance
Yole Group Memory Products

Non-exhaustive list

- NAND Market Monitor
- Status of the Memory Industry 2023
- Solid-State Drives 2023
- Memory Packaging 2023
- DRAM Market Monitor
- Emerging Non-Volatile Memory 2023
- DRAM Modules 2023
- Memory for Automotive 2022

- YMTC 232-layer 3D NAND Memory
- 16Gb DDR5 DRAM Memory from Micron
- Everspin Technologies Latest STT-MRAM in 28nm
- LPDDR5 Memory Comparison 2022
Thank you for your attention

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Yole Group is recruiting for its sales teams in the US, a Sales Manager position is open in Denver area, join us: https://careers.yolegroup.com