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SAMSUNG MEMORY BUSINESS REVIEW

#1 in Memory Worldwide Since 1993, Well Balanced DRAM/NAND Portfolio

2022 Market Share

- DRAM: 43%
- NAND: 35%

Source: IDC, Mar. '23

Revenue: $55B

Market Share: 39%
MEMORY BIZ. PARADIGM SHIFT LED BY SAMSUNG

Samsung is Powering the Technologies that bring Innovation to Lifestyle

Big Fluctuations

1st Jump

2nd Jump

3rd Quantum Jump

Memory Revenue

1990

2000

2010

2020

iPod

iPhone

App Store

Galaxy S

China S/Phone

Android Market

Data Center

Autonomous

AI

iPhone

App Store

Galaxy S

China S/Phone

Android Market

Data Center

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Beyond The Boundary

HUMAN

Samsung Memory

AI
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SPREAD-OUT OF PUBLIC CLOUD

Explosive Growth of Data

THE FLOOD OF DATA

1st WAVE
Cloud Service Providers
2016

2nd WAVE
.Com & Forbes Top100
2020

3rd WAVE
5G
Telcos

4th WAVE
AI
Automotive
2023
SMART CITY & AUTONOMOUS CAR FUELED BY 5G NETWORK

Huge Amounts of Data Generated by Hyper-connected Devices
MARKET OPPORTUNITY IN BIG DATA ANALYTICS
Demand Increase for High Density & Performance Memory to Enhance Computing Power
CONTINUOUS GROWTH OF MEMORY DEMAND
Memory Growth led by Server & Mobile devices based on Big Data Ecosystem

Automotive
Server
Cons. & Gfx
Mobile
PC

Public Cloud Service
In-Memory DB
AI
Edge Computing
Big Data Analytics / ML
Smart Home
IoT

Dual Camera
Network Equipment
AR & VR
On-Device AI

2017
2023
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SAMSUNG STRATEGY

Break-through Technology
---
TECH LEADERSHIP

Enhanced Solutions
---
S/W & CONTROLLERS

Advanced Manufacturing
---
EFFICIENCY & FLEXIBILITY
CONTINUOUS TECHNOLOGY SCALING
Thru Technology Evolution

Cost/Gb

35nm 28nm 25nm 20nm 1xnm 1ynn 1zm 1anm 1bnm ...

BEYOND < 10nm

Source: Samsung
PUSHING THE LIMITS OF V-NAND
Thru Innovative Layer Stacking Technology

NAND

Cost/Gb

Planer 21nm 19nm 16nm 14nm 14nm 14nm V32 V48 V64 V9x V12x V17x V23x ... BEYOND 200 LAYERS

FUTURE V-NAND TECHNOLOGY

Vertical Stack-up
Multi-Stacking
Lateral Shrink
Cell Over Peri

QLC

* QLC: Quad-Level Cell

Source: Samsung
UNIQUE CAPABILITIES FOR DIFFERENTIATED SOLUTIONS
Integrating Key Components to Deliver Value-added Solutions

ADVANCED PROCESS TECHNOLOGY
Wafer / Chip
- Smaller
- Higher Density
- Less Power Consumption
- Faster

ADVANCED PACKAGING TECHNOLOGY
Stacking / TSV
- Thinner
- Smaller
- No Performance Loss

VERTICAL INTEGRATION
Software & Logic (Controller)
- Customized
- Expandable
- Smarter
- Secure
SAMSUNG SOLUTIONS FOR THE 5G ERA
Enhanced Processing for Massive Data with Lower Latency & Less Power Consumption

FASTER DATA RATES WITH LOW POWER

3DS RDIMM, Z-SSD
- Low Latency *
- High Capacity
- Stable QoS

LPDDR5/5X
- Higher Speed
- Lower Power Consumption
- Smaller Package

* Latency: Time Delay between input and output in a system
SAMSUNG SOLUTIONS FOR ARTIFICIAL INTELLIGENCE
Superlative Performance and High Reliability Using Less Energy

ENHANCED PERFORMANCE
FOR DATA-INTENSIVE TASKS

24GB HBM3 *
Fastest Performance
Energy Efficiency

32TB SAS SSD, 16TB NVMe SSD
Largest Density
Higher Reliability
Unparalleled Performance

* HBM: High Bandwidth Memory
SAMSUNG SOLUTIONS FOR AUTOMOTIVE INDUSTRY

Advanced Total Memory Solution for Autonomous Driving Technology

Dedicated Support for automotive
- Full Memory Line-ups
- Quality & Longevity
- Full In-house Solution

Automotive Storage
- High Density
- High Performance
- High Reliability

Automotive DRAM
- High Bandwidth
- Lower Power Consumption
- Higher Reliability
EVOLUTION TO SMARTER FACTORY
Customer Value Improvement through High Productivity and Enhanced SCM

SCM
- Inventory Management
- Demand Fulfillment

Productivity
- Automated Operation
- Seamless Quality Control
- Intelligent Planning
- Early Yield Improvement
- Efficient Logistics
- Lead Time Reduction
- Order Pick Time: 00:05:15

* SCM: Supply Chain Management
QUALITY BY DESIGN
Meet the Industry Standard and Expectation of AI & Automotive Customers

PREDICTIVE

PREDICTIVE

PREVENTIVE

PREVENTIVE

ENHANCED QUALITY REQUIREMENT

1993
ISO9001

Quality Management System

2001
TL9000

2002
QS9000

ICT/Auto Quality Requirement

2018–Now
IATF16949

Automotive Supplemental Requirement

COLLABORATIVE

COLLABORATIVE
Placing Memory at the Forefront of Future Innovation and Creative IT Life

Technology
Leading Technological Breakthroughs

Customers
Supporting Customers’ Future Innovation

Employees
Fostering Employees’ Creativity

Society
Enriching a New Way of Digital Life

http://www.samsung.com/semiconductor