# Al for Everyone, Everywhere

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# The Future of Al Computing

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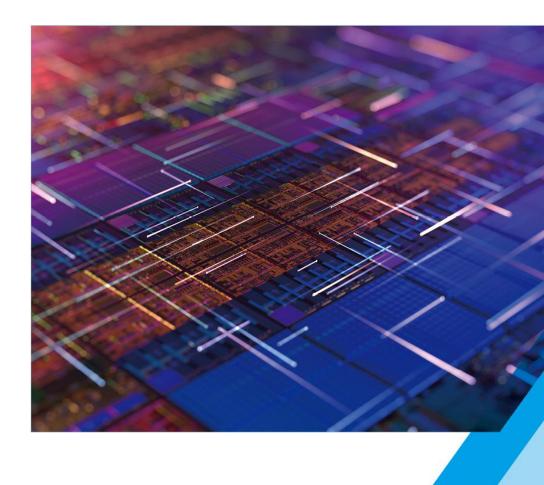
#### Openedges Technology at a Glance





## Prologue

OPENEDGES Technology's Business Areas

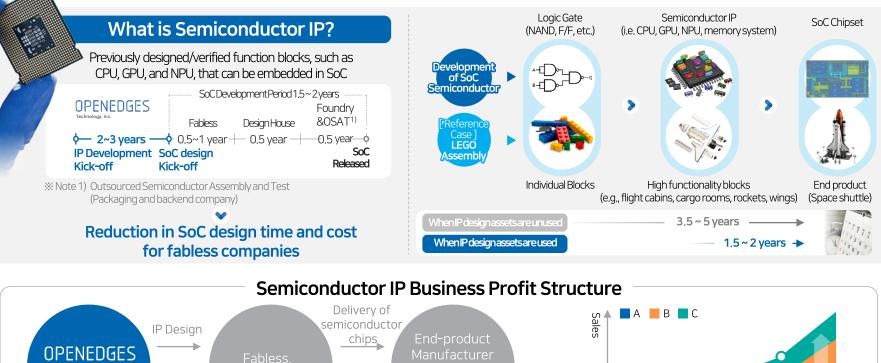


Prologue



#### OPENEDGES Technology's Business Areas ①

Semiconductor IP is a ready-made solution requiring high-level technologies that enable faster development of SoC (System on Chip) such as AI semiconductors, reduce costs, and mitigate the risk of failure risks in development that can cost \$100 million

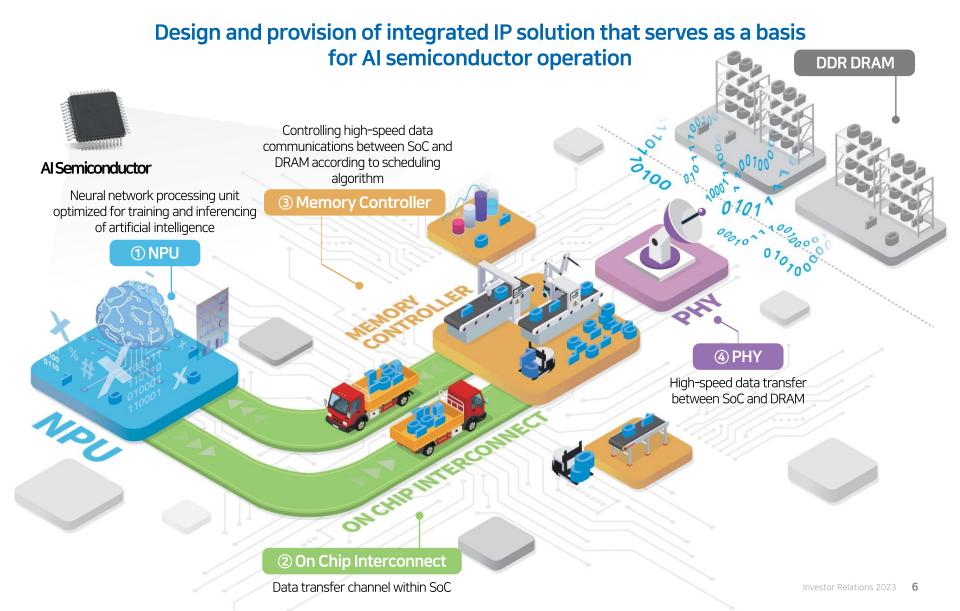






#### OPENEDGES Technology's Business Areas 2

Prologue

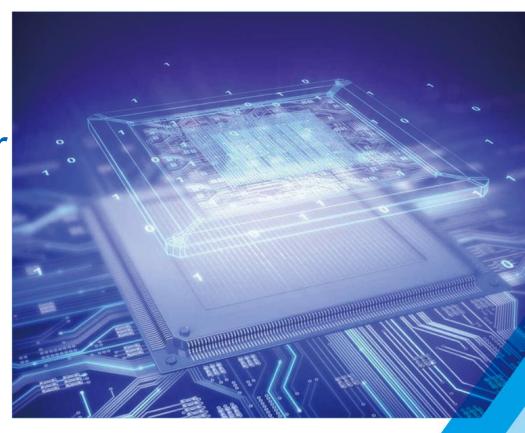




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## 01 Structural Development of System Semiconductor Market

01. Growth of AI Semiconductor & IP Market02. Roles of Semiconductor IP Design Company

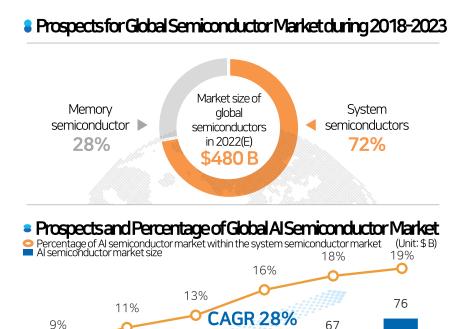


Chapter 01, Structural Development of System Semiconductor Market



#### 01 | Growth of Global System Semiconductor Market

#### Contrary to memory semiconductors, system semiconductors are continuing their steady growth



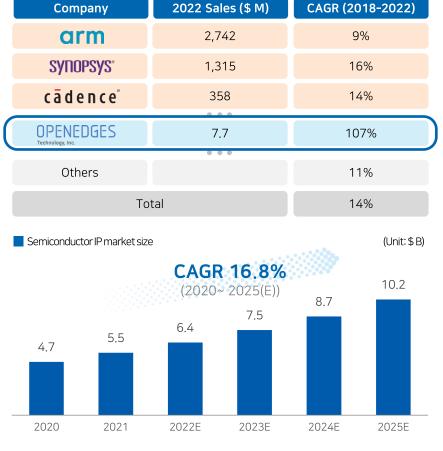
(2020~ 2025(E))

44

55

2023(E)

2024(E)



Global Semiconductor IP market forecast

2021 \* Source: Al Semiconductor (Gartner, May 2022)

35

O

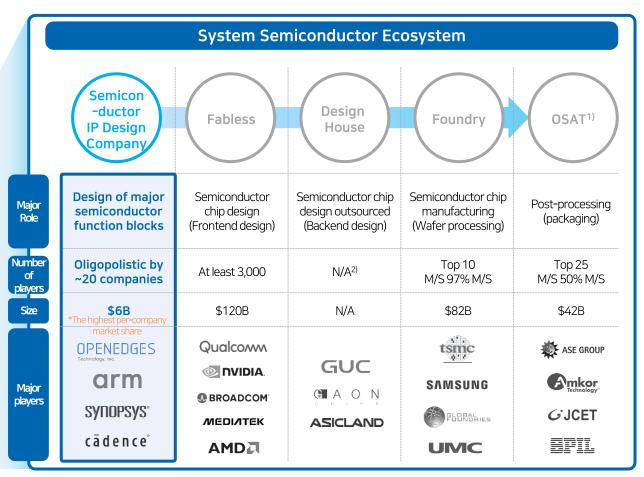
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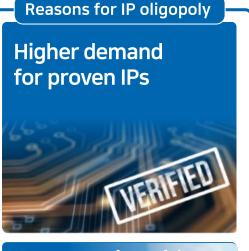
2020



#### 03 | Roles of Semiconductor IP Design Companies

#### Semiconductor IP companies aim to develop and supply function blocks as needed by Fabless and Design House in a proactive manner.





IP companies with proven IPs are in high demand due to the rising entry barriers

Requires highly proficient technical personnel Requires R&D investments for at least 3 years

% Note 1) (Outsourced) Semiconductor Assembly and Test: Semiconductor package assembly and test company that is responsible for performing post-processing after wafer process Note 2) Design House market does not have a reliable market size data as it is in its initial formation stage.



# Al joi Everyone, Everywhen

# 02

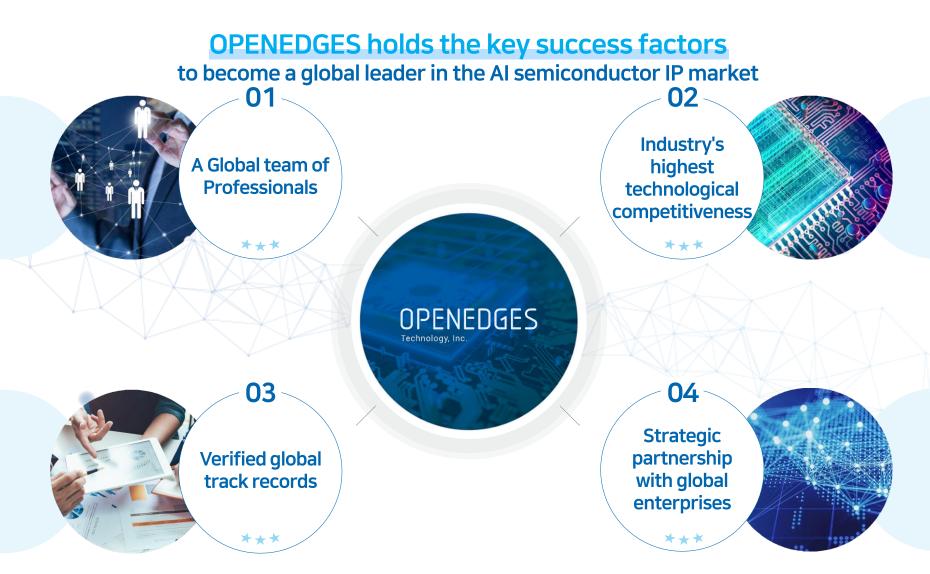
## OPENEDGES Technology, as Korea's most renowned Al semiconductor IP design company

- 01. The Overview of OPENEDGES's Core Competitiveness
- 02. A Global Team of Professionals
- 03. Industry's Highest Technological Competitiveness
- 04. Verified Global Track Records
- 05. Business Partnership with Global Enterprises



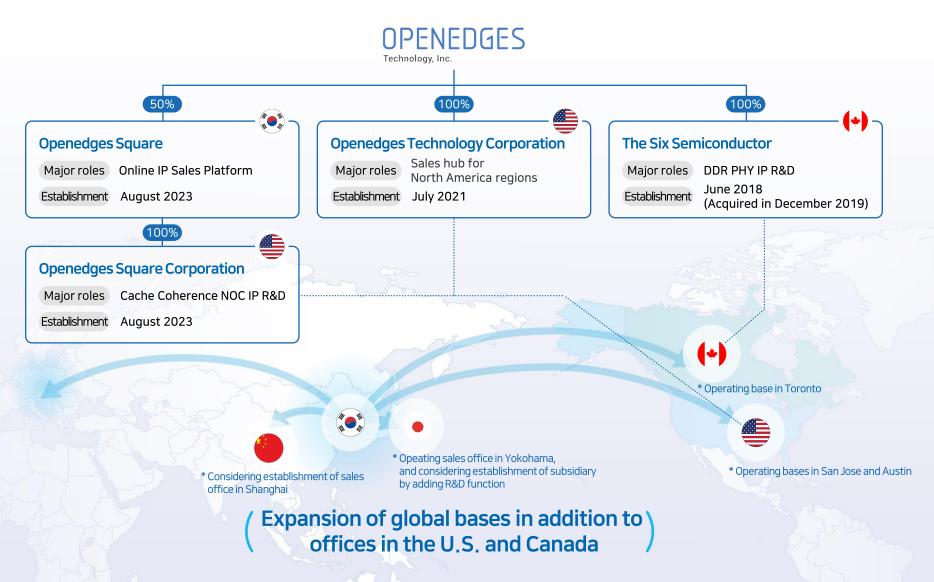


01 | The Overview of OPENEDGES' Core Competitiveness





#### 02 | A Global Team of Professionals – Global Presence





#### 02 | A Global Team of Professionals

# Leadership of industry-leading experts with over 20 years of experience from Samsung Electronics/SK Hynix, and more.



: As of the end of Sep. 2023



03 | Industry's Highest Technological Competitiveness ①

Al semiconductors are characterized as 'Data Intensive Computing' → Most optimize NPU and memory systems in edge Al with limited resources OPENEDGES is the only global leading Al semiconductor IP platform provider

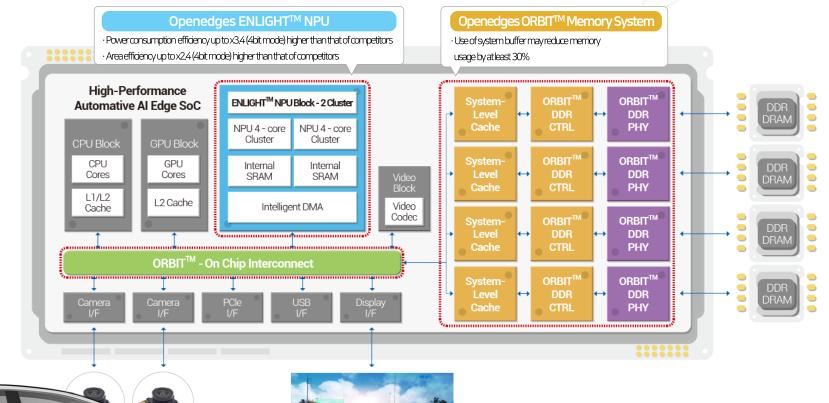
The gap between the required data processing volume Al Platform IP for Edge Computing and the capacity provided by DRAMs has increased due to OPENEDGES is globally the only company that is capable of supplying NPU IP (the the development of AI accelerator technologies core of AI semiconductors) and memory system IP (functions as the 'Back Bone' for all semiconductors) at the same time. (Data Volume) Al accelerator: 90,000x/20 years (3.1x/2 years) DRAM capacity: 30x/20 years (1.4x/2 years) 1.000.000 Veri)Silicon Radeon 100.000 C Imagination Gap between -chip-uo Memory Interface 10,000 Al accelerator capacity and **DRAM** capacity 1.000 cādence 100 HBM2 arm Itanium 2 **SYNOPSYS**<sup>®</sup> ARTERIS GDDR5 10 **Rambus** GDDR3 R10000 **Bare spot of** Al semiconductor 0.1 OPFNFDGFS IP market filled by Technology, Inc **OPENEDGES** 0 M 1999 2002 2005 2011 2017 2020 1996 2006 2014

X Source: AI And Memory Wall By Riselab

03 | Industry's Highest Technological Competitiveness 2

#### A leading AI semiconductor IP platform provider, OPENEDGES provides higher efficiencies in power, size, and memory compared to its competitors

[Examples showing OPENEDGES' integrated IP solutions applied to the AI semiconductor for autonomous driving vehicles]



Investor Relations 2023 15



#### 03 | Industry's Highest Technological Competitiveness ③

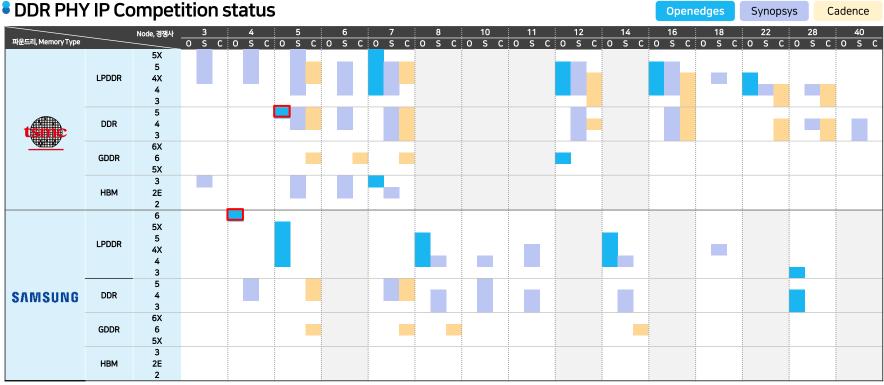
#### Leading the market through the development of cutting-edge technology

구분	IP	Description	개발현황	Remark
Al Platform IP Solution for Edge Computing	ENLIGHT™ (Neural Processing Unit)	ENLIGHT™-L(1st gen. a.k.a v1.0)	Now	Lightweight IoT applications (Keyword recognition, security camera application)
		ENLIGHT™-R(2nd gen. a.k.a v2.0)	Now	Intermediate IoT applications (ADAS)
		ENLIGHT™-P(3rd gen. a.k.a v3.0)	In the process ('24 1H release)	Automotive high-performance applications (Level 3 or higher self-driving vehicle application)
		ENLIGHT™-X(4th gen. a.k.a v4.0)	In the future	Automotive high-performance applications (Level 4 or higher self-driving vehicle application)
		DDR4/3, LPDDR4X/4/3	Now	Current Mainstream Technology
		LPDDR5X/5/4X/4	Now	Next-generation Mainstream Technology
	OMC™	НВМЗ	Now	Server and ultra-high-performance products
	(DDR Memory	DDR5	Now	Next-generation Mainstream Technology
	Controller)	GDDR6	Now	High-performance AI product
		GDDR7	In the future	High-performance AI product
		LPDDR6	In the future('24)	Next-generation Mainstream Technology
	OPHY™ (DDR PHY)	LPDDR4X/4	Now	TSMC 22nm Nodes
		LPDDR5/4X/4	Now	TSMC 16nm Nodes
Total Memory		LPDDR4X/4, LPDDR5/4X/4	Now	TSMC 12nm Nodes
System		GDDR6	Now	TSMC 12nm Nodes
Solution IP		LPDDR5X/5/4X/4	Now	TSMC 6/7nm Nodes
(ORBIT <sup>™</sup> )		НВМЗ	Now	TSMC 6/7nm Nodes
		DDR5	In the future ('24)	TSMC 5nm Nodes
		LPDDR6	In the future	-
		LPDDR3, DDR4/3	Now	Samsung 28nm Nodes
		LPDDR4X/4, LPDDR5/4X/4	Now	Samsung 14nm Nodes
		LPDDR5/4X/4	Now	Samsung 8nm Nodes
		LPDDR5X/5/4X/4	Now	Samsung 5nm Nodes
		LPDDR6	In the future ('24)	Samsung 4nm(or less) Nodes
		GDDR7	In the future	-
	OIC™ (On-Chip-Interconnect)	OICTM	Now	Non-Cache-Coherent NoC
		OIC <sup>TM</sup> -AI	In the process	Cache-Coherent NoC



#### 03 | Industry's Highest Technological Competitiveness ④

#### Concentrate on areas that major global competitors cannot cover & expand M/S



IP to be developed

✓ Synopsys and Cadence are focusing on TSMC 5nm and below leading-edge processes

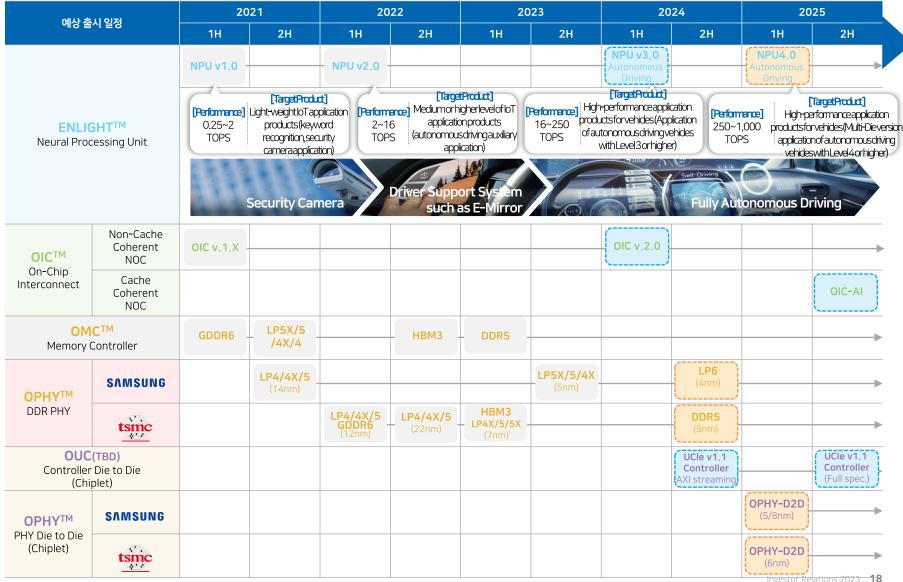
M/S expansion strategy

- $\checkmark$  OE is the only one who provides LPDDR5X/5 PHY IP for supporting the SSF 5nm process
- ✓ OE is expanding its PHY IP Line up from Legacy to 5nm in TSMC & SSF process
- $\checkmark\,$  OE's PHY IP requires area less than 50% compared to competitors by proving through the test chips

#### 03 | Industry's Highest Technological Competitiveness (5)



#### Maximize first-mover advantage of AI semiconductor integrated IP solutions



R&D started in 2023 O R&D to be launched from 2024



#### 04 | Verified Global Track Records

# Expanding global track record as value recognized as the essential solution in various industries

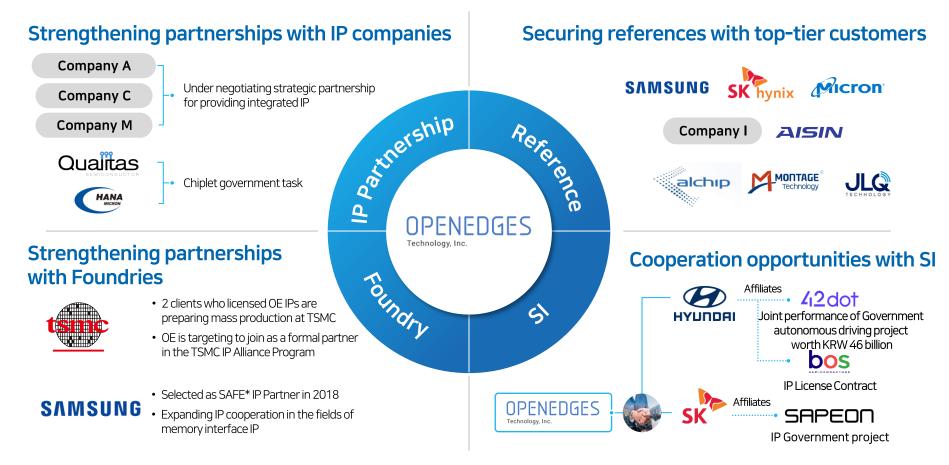


\* Including contracts announced on Nov. 7



05 | Business Partnership with Global Enterprises

#### Securing stable IP demands + Proactive response to advanced technologies and market trends





# 03

#### **3Q23 Business Performance**

01. Sales02. Operating Profit(Loss)03. Contract Status

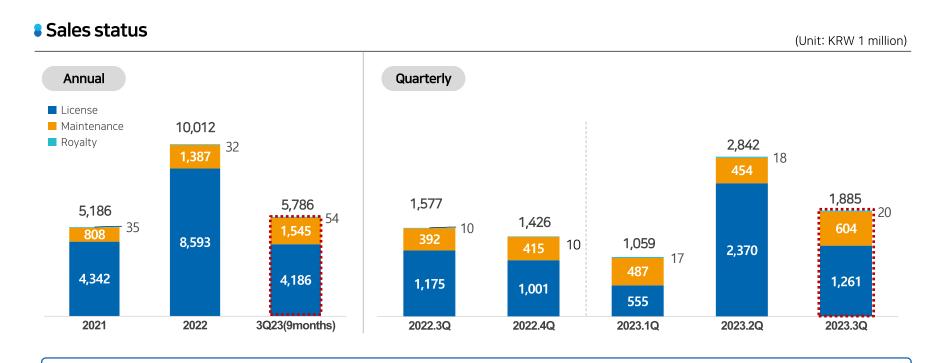






#### 01 | Sales Revenue

#### Stagnant revenue due to delay in contract confirmations compared to the plan. But, continued sales growth is expected as orders have been actively secured since the 2H23



Sales Analysis

- License : slightly decreased in the 3Q 2023 due to contract delays, but is expected to be normalized from the 4Q 2023
- ✓ **Maintenance:** Sales are being generated from a total 16 projects
- ✓ Royalty: Approx. 1% of total sales, but expected to be increased with customers' mass production cases

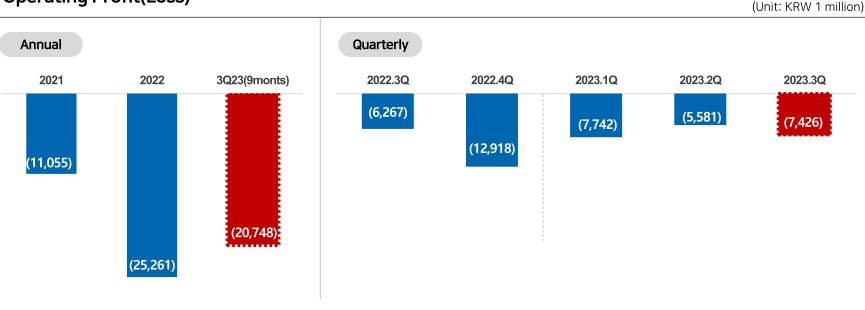
Chapter 03, '3Q23 Business Performance



#### 01 | Operating Profit(Loss)

#### Continued investment on R&D to develop next-generation NPU and IPs for advanced nodes, which are expected to significantly contribute to future sales growth

#### Operating Profit(Loss)



✓ Quarterly costs are being controlled at the 8.5-9 billion(KRW) range

Operating Profit Anlaysis

- ✓ Most of the costs are R&D expenses related to developing NPU v3, LPDDR5X/DDR5 PHY IP, OIC v2, etc.
- Openedges Square, a subsidiary, is being consolidated as of the end of the 3Q, but will be excluded from operating expenses due to equity method treatment from 4Q
   \* Received KRW 18 billion cash contribution(50% stake) from two VCs in November 2023



#### 03 | Contract Status

# Sales growth slowed in the first half due to the delays in signing license contracts, but expected to grow from the 4Q based on gradually improved market situation

#### Financial and contract status (Unit: KRW 1 million) Quarter 구분 23.3Q QoQ(%) 22.3Q YoY(%) 23.20 -33.7% 19.5% Sales 1.885 2.842 1,577 **Operating Profit** (7, 426)(5,581)N/A (6, 267)N/A (Loss) Net Income (7, 310)(5, 557)N/A (6, 178)N/A (Loss)

Contract status					
(Unit: case/\$M)	License Contract ('22.1~4Q)	License Contract ('22.4~'23.3Q)	License Contract ('231.~3Q)		
Numbers	13	14	11		
Sum of money	\$7.5M	\$16.8M	\$15.0M		

\* Including License contract announced on Nov. 7, 2023

#### Performance Analysis and outlook

#### 3Q.2023

#### Revenue generated from some contracts of 1H23

- Some IPs has been delivered and recognized as sales in 3Q
  → Many delayed contracts in 1H23 caused sales delay by ~2 quarters
- Most of the cost is for R&D while controlling within certain range
  - $\rightarrow$  R&D costs are expected to remain around 9 bil. KRW level for the time being, and a turnaround will be possible if sales cover R&D costs

#### 4Q.2023

#### Trying to achieve quarterly BEP based on secured orders

- Many IP releases are expected in 4Q and sales recognition will be made accordingly
- Actively negotiating with customers targeting signing within 1H24
  - → Customer inquiries are continued for the recently developed IP products (SF5nm, TSMC 6/7nm, etc.)
  - $\rightarrow$  R&D for NPU v3, TSMC DDR5 PHY IP, TSMC IP alliance, etc. are also being progressed smoothly



# O3 Appendix

01. Shareholders02. Openedges Square03. Financial Statements Summary

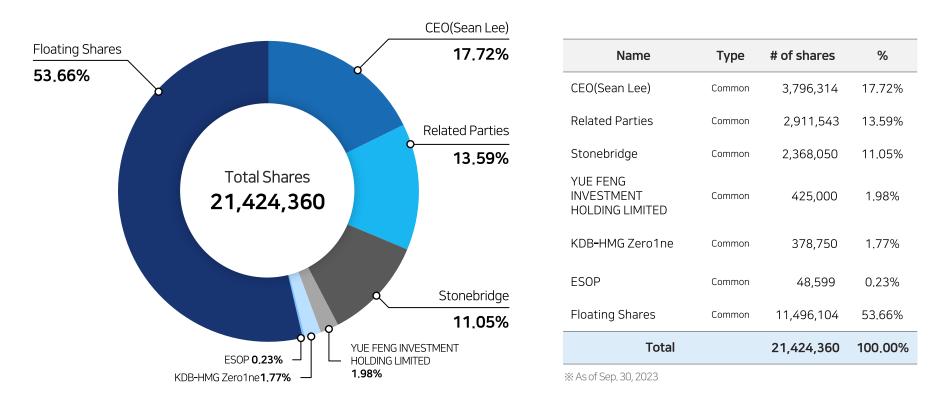




## 01 | Shareholders

# Sean Lee(including related parties) owns a stake of 31.31%, securing management rights through stable ownership.

Shareholders



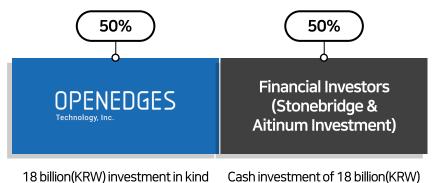




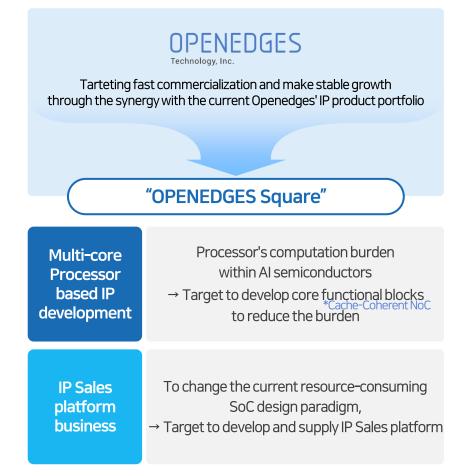
#### Company Profile

Name	OPENEDGES Square
CEO	Sean Lee
Establishment	August 2023
Capital	36 bil.(Openedges I8 bil. Investment in kind ) (2 financial investors: 18 bil. Investment in cash)
Employees	7 people (as of November 1, 2023)
Workplace	Headquarters: 10th floor, Hyeonjuk Building, 114 Yeoksam-ro, Gangnam-gu, Seoul
Key points	Openedges HQ holds a call option for 35% of the financial investor's shares.

#### Shareholders



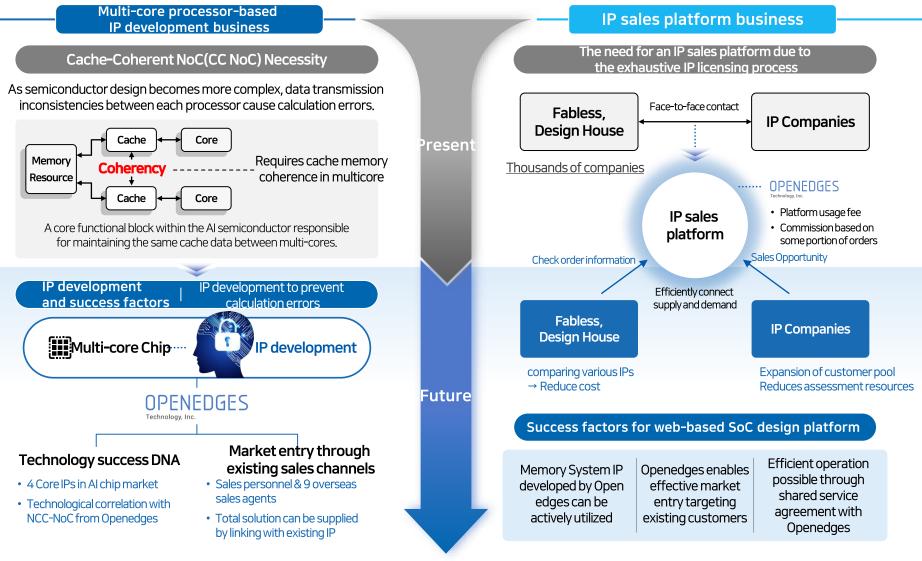
Business Status





Appendix

#### 02 | Openedges Square - Main business areas





# 03 | Financial Statements Summary

#### Summary of Financial Statements

	3Q23	2022	2021	2020
Current Assets	30,473	44,304	29,020	6,216
Non-current Assets	12,402	9,552	7,077	4,075
Total Assets	42,875	53,855	36,097	10,291
Current Liabilities	24,507	18,318	9,171	5,477
Non-current Liabilities	3,472	3,288	6,374	31,551
Total Liabilities	27,979	21,606	15,545	37,028
Capital	2,142	2,116	1,653	15
Capital Surplus	97,909	96,376	58,927	-
Other Capital	3,612	2,026	3,007	1,697
Retained earnings	-88,767	-68,269	-43,035	-28,449
Total Equity	14,896	32,249	20,553	-26,737

#### Summary of Income Statements (Unit: KRW 1 million)

		(Unit: KRW 1 millior		₹W 1 million)
	3Q23	2Q23	증감	증감(%)
Sales	1,885	2,842	-957	-33.7
Sales Management Expenses	9,311	8,422	889	10.6
Operating Profits	- 7,426	- 5,581	-1,845	N/A
Financial Profits	411	319	92	-23.2
Financial Costs	313	301	12	-9.3
Other Profits	12	10	2	-75.8
Other Costs	0	7	-7	-65.6
Net Profit before Corporate Tax Costs	-7.317	-5,559	-1,758	N/A
Corporate Tax Costs	-7	-2	-5	N/A
Current Net Income	- 7,310	- 5,557	-1,753	N/A
XX Decederation and the set for some				

\* Based on consolidated financial statements