



Q2 2024 Investor Conference

Aug 7th, 2024

Embedded Wisely, Embedded Widely

ememory



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PUF-based TRNG
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Review of Operations



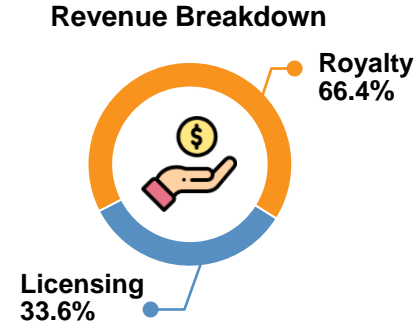
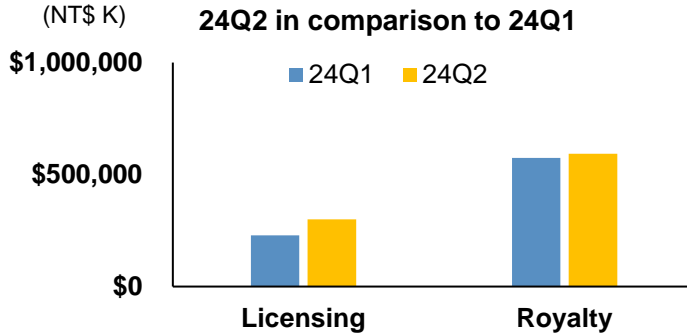
Q2 2024 Financial Results

(thousands of NT dollars)

	Q2 2024	Q1 2024	Change (QoQ)	Q2 2023	Change (YoY)	H1 2024	H1 2023	Change (YoY)
Revenue	893,010	802,764	11.2%	696,625	28.2%	1,695,774	1,364,376	24.3%
Gross Margin	100%	100%	-	100%	-	100%	100%	-
Operating Expenses	397,829	382,143	4.1%	327,865	21.3%	779,972	628,522	24.1%
Operating Income	495,181	420,621	17.7%	368,760	34.3%	915,802	735,854	24.5%
Operating Margin	55.5%	52.4%	3.1ppts	52.9%	2.6ppts	54.0%	53.9%	0.1ppt
*Net Income	475,096	430,577	10.3%	351,697	35.1%	905,673	664,787	36.2%
Net Margin	53.0%	52.7%	0.3ppt	50.2%	2.8ppts	52.8%	48.2%	4.6ppts
EPS (NT\$)	6.36	5.77	10.2%	4.71	35.0%	12.13	8.91	36.1%
ROE	67.3%	53.2%	14.1 ppts	53.5%	13.8 ppts	64.1%	50.5%	13.6ppts

*Net income attributable to Shareholders of the Company

Revenue across Different Streams



Revenue

NT\$ Thousands	Q2 2024	Q1 2024	Change (QoQ)	Q2 2023	Change (YoY)	H1 2024	H1 2023	Change (YoY)
Licensing	299,711	228,329	31.3%	249,711	20.0%	528,040	392,760	34.4%
Royalty	593,299	574,435	3.3%	446,914	32.8%	1,167,734	971,616	20.2%
Total	893,010	802,764	11.2%	696,625	28.2%	1,695,774	1,364,376	24.3%

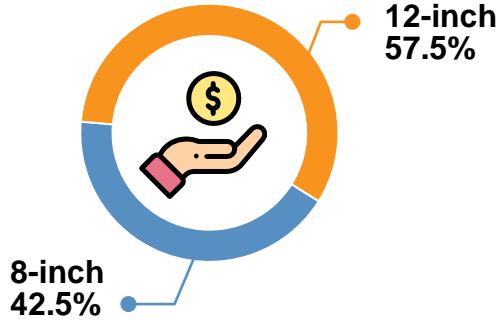
Revenue by Technology

Technology	Q2 2024								
	Total Revenue			Licensing Revenue			Royalty Revenue		
	% of Q2 Revenue	Change (QoQ)	Change (YoY)	% of Q2 Licensing	Change (QoQ)	Change (YoY)	% of Q2 Royalty	Change (QoQ)	Change (YoY)
NeoBit	25.9%	22.1%	20.1%	24.6%	54.0%	30.2%	26.7%	11.3%	15.9%
NeoFuse	58.1%	-3.5%	25.1%	33.3%	-16.7%	-11.9%	70.6%	0.2%	39.0%
PUF-Based	4.2%	105.1%	34.0%	12.5%	105.2%	36.0%	0.0%	-	-
MTP	11.8%	84.9%	72.3%	29.6%	110.0%	69.9%	2.7%	11.6%	86.8%

Technology	H1 2024					
	Total Revenue		Licensing Revenue		Royalty Revenue	
	% of H1 Revenue	Change (YoY)	% of H1 Licensing	Change (YoY)	% of H1 Royalty	Change (YoY)
NeoBit	24.9%	10.7%	23.0%	43.4%	25.7%	1.4%
NeoFuse	62.3%	25.6%	41.7%	19.3%	71.7%	27.3%
PUF-Based	3.3%	24.7%	10.5%	26.3%	0.0%	-
MTP	9.5%	66.4%	24.8%	64.3%	2.6%	75.7%

Royalty Revenue by Wafer Size

Q2 Royalty Breakdown



- 8-inch wafers contributed 42.5% of royalty, up 2.6% sequentially and 26.7% yearly.
- 12-inch wafers contributed 57.5% of royalty, up 3.8% QoQ and up 37.6% YoY.

Wafer Size	Q2 2024			H1 2024	
	% of Q2	Change (QoQ)	Change (YoY)	% of H1	Change (YoY)
8-Inch	42.5%	2.6%	26.7%	42.6%	11.8%
12-Inch	57.5%	3.8%	37.6%	57.4%	27.3%

Future Outlook



Future Outlook

Licensing & Royalty:

■ Licensing:

- Licensing revenue will continue its growth momentum due to strong demands from both foundries and chip companies.

■ Royalties:

- We expect royalty sequential growth in H2 due to new products ramping up.

Future Outlook

New IP Technology & Business Development:

■ New IP Technologies:

- NeoFuse is developing in FinFET HV process to meet customers' next generation OLED DDI plans.
- RRAM is expanding into more processes with increased customers' demand.
- NeoFlash continues progressing in specialty processes replacing embedded flash and external NOR flash.
- Developing 2nm technologies with leading foundries.

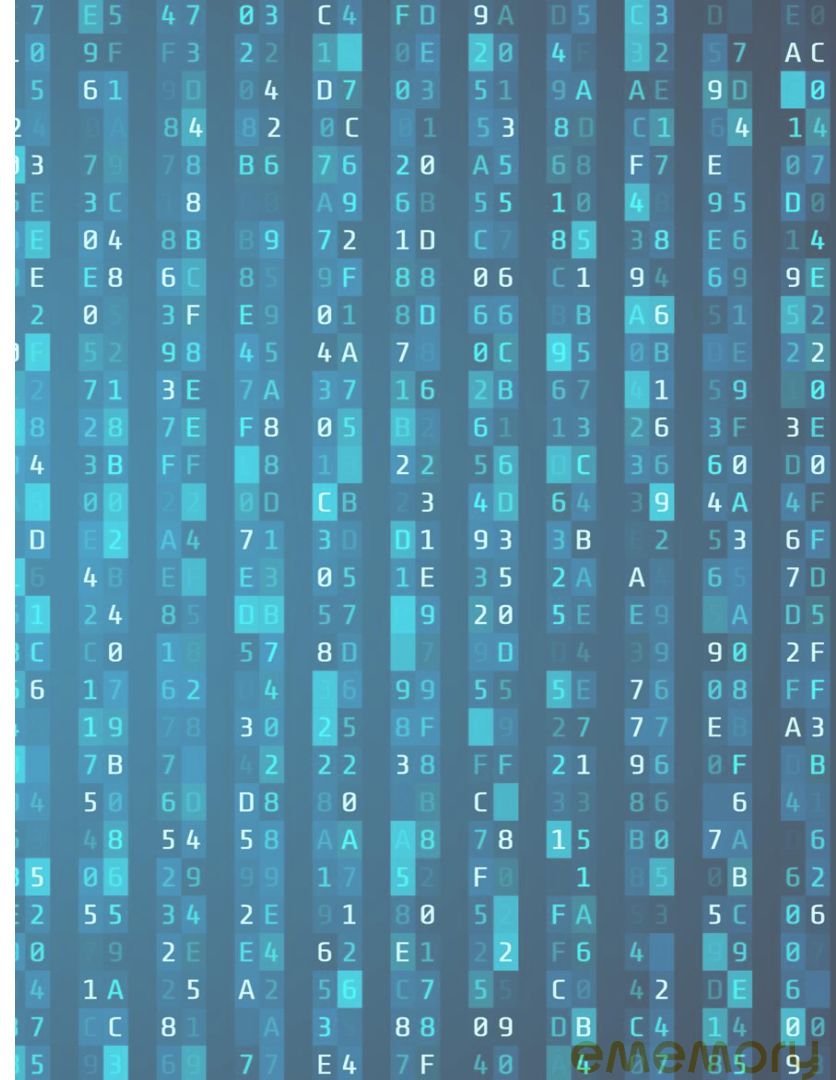
■ Business Development Platform:

- CPU architecture for security IP will start to contribute to revenue.
- Successfully integrated NeoFuse for SRAM repair with EDA company.

A Must in Security:

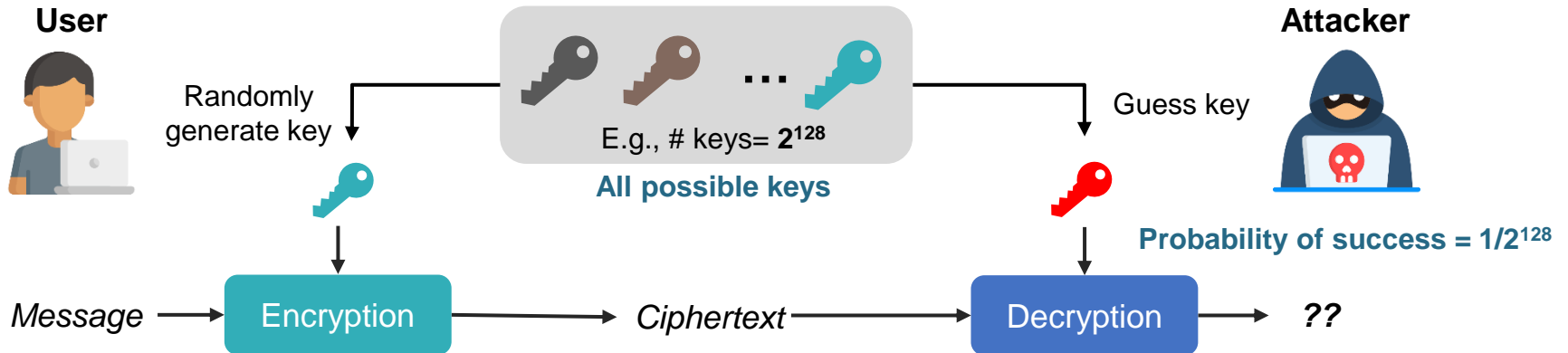
100X Faster

PUF-based TRNG



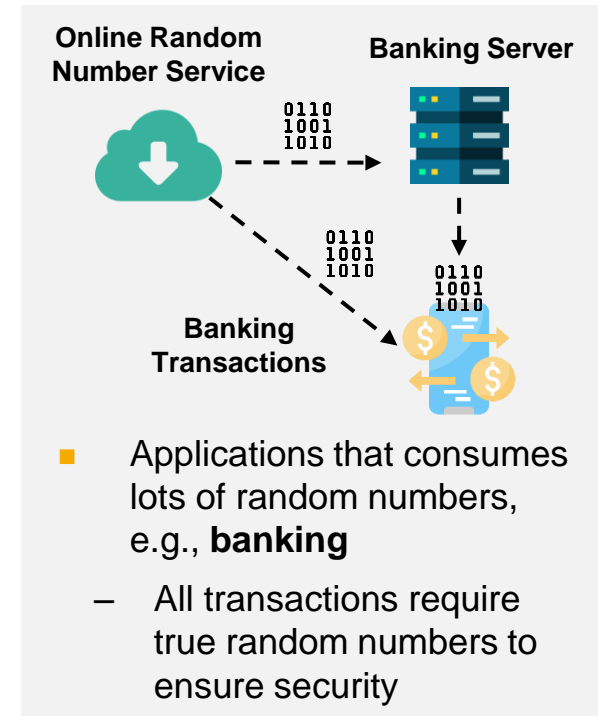
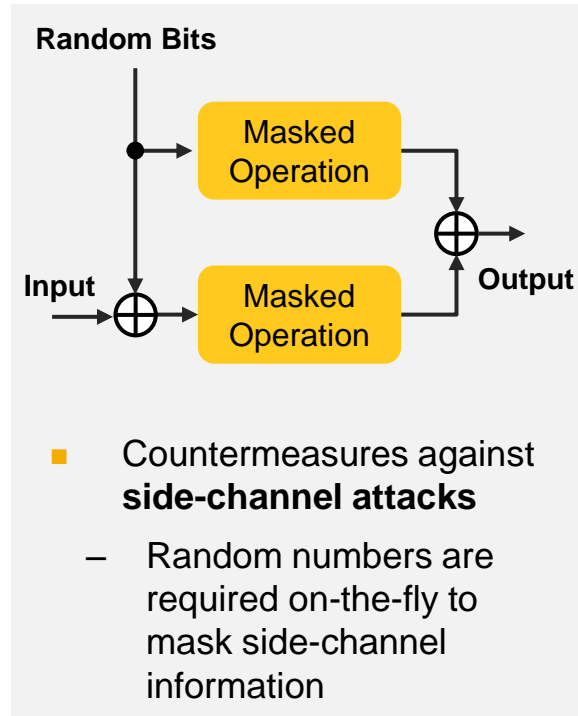
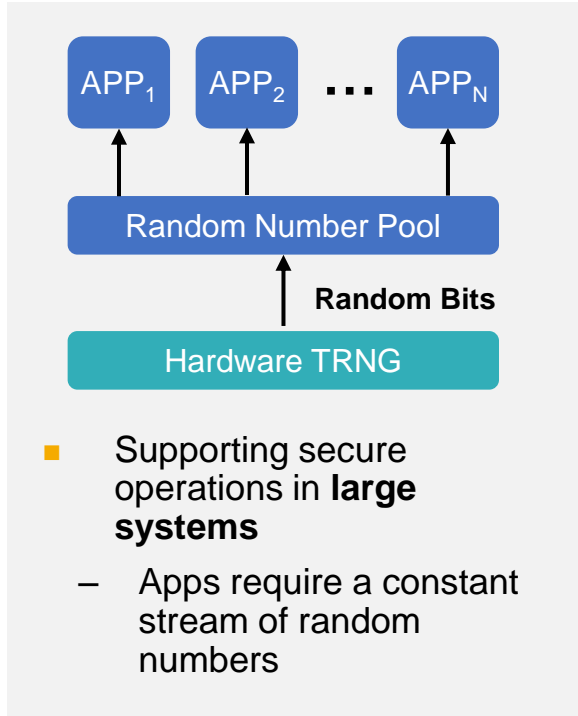
True Randomness Makes Guessing Impossible

- **How to break a secure system?**
 - Cryptanalysis: find weakness in cryptographic algorithms
 - Implementation attacks: find secret keys used in the system
- **A well-designed secure system is resistant to cryptanalysis and attacks**
 - The only option for an attacker is to guess the secret keys
- **Truly random** secrets cannot be guessed (with minimum success probability)
- To achieve this, we need **True Random Number Generators (TRNGs)**



High-speed TRNG: Why Throughput Matters?

- High-throughput TRNG can generate large amounts of random numbers in a short period of time.



PUFtrng: 100 Times Faster than Conventional TRNG

- PUF-based conditioning algorithm provides high-throughput and high entropy quality

Similar to...

Conventional TRNG



Dynamic Entropy
(ROSC)



Post-processing



Conventional
TRNG

Slower



Classic Cars

PUFtrng



Static Entropy
PUF
(Chip Fingerprint)



Entropy Refine Engine



PUFtrng

100x Faster



New Energy Cars

PUFtrng: 100 Times Faster than Conventional TRNG

- PUF-based conditioning algorithm provides high-throughput and high-quality entropy

Similar to...

Conventional TRNG

Figure 1:

Dynamic Entropy

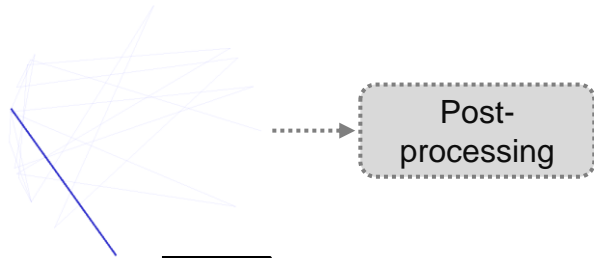


Figure 2:

Conventional TRNG
→ Low throughput random bits
→ Slower



Classic Cars

PUFtrng

Figure 3:

Static Entropy
→ **PUF**
(chip fingerprint)

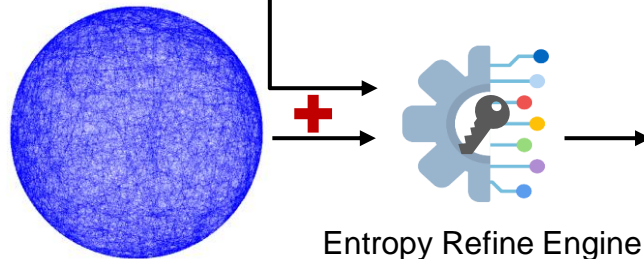
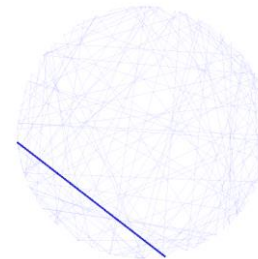


Figure 4:

PUFtrng
→ High throughput random bits
→ **100x Faster**



New Energy Cars

Q&A



Appendix

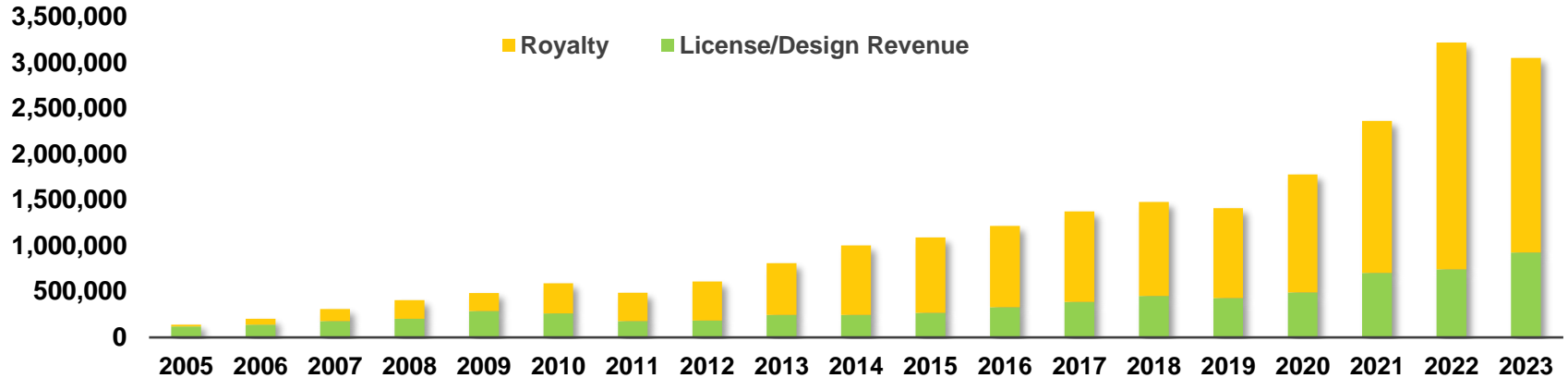


Company Overview

- eMemory is the global leader of embedded non-volatile memory IP

Revenue Trend

(Unit: NT\$ 1,000)



**Founded
In 2000**

Based in Hsinchu, Taiwan.
IPO in 2011. Over 60M wafers
shipped.

**1200+
Patents Issued**

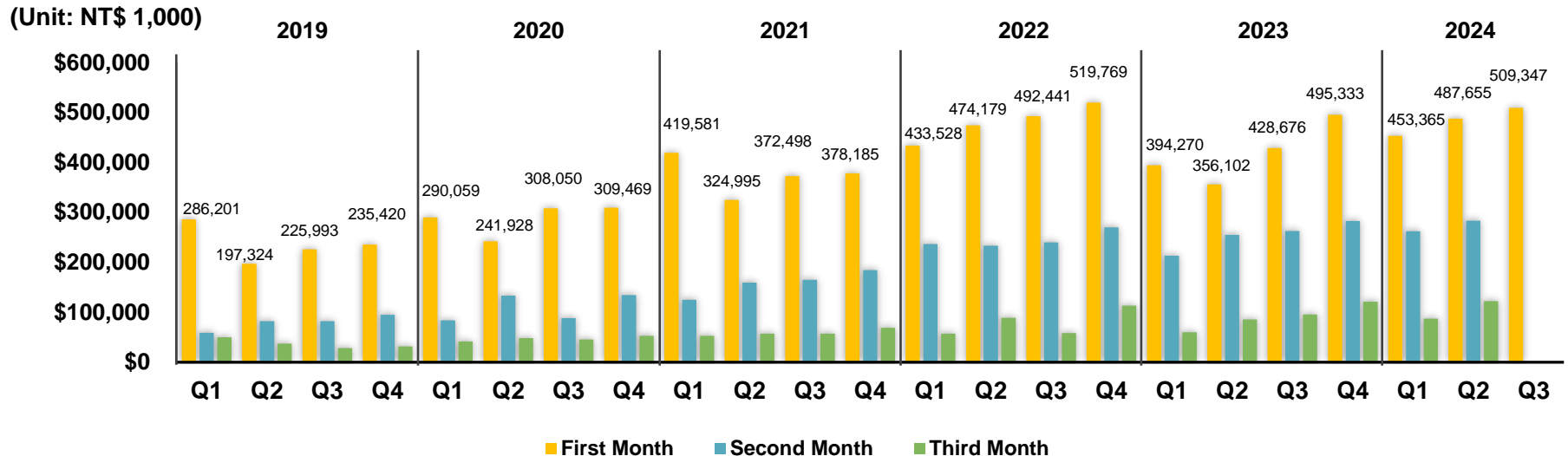
193 pending patents. 357
employees with 68% R&D
personnel.

**Best IP Partner
With TSMC**

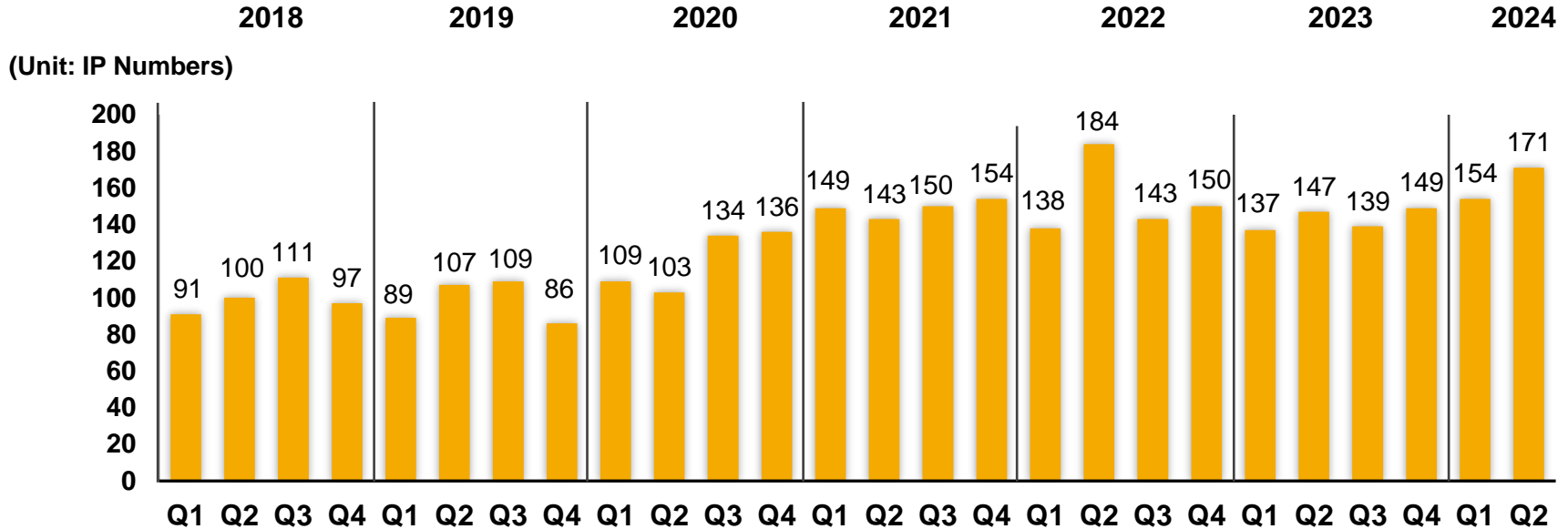
TSMC Best IP Partner Award
since 2010.

Quarterly Revenue Pattern

- 1st month: Receive **License Fees** of the month and **Royalty** from most foundries on previous quarter's wafer shipments.
- 2nd month: Receive **License Fees** of the month and **Royalty** from other foundries.
- 3rd month: **License Fees** Only.



Quarterly Number of New Tape-outs



Worldwide Customers

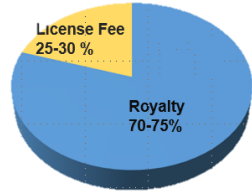
- Our IP solutions are adopted by leading foundries, IDMs and fables worldwide

Country	Foundry	IDM	Fabless
Taiwan	4	1	318
China	11	0	1185
Korea	4	0	98
Japan	1	9	81
North America	2	2	365
Europe	2	2	224
Others	1	0	110



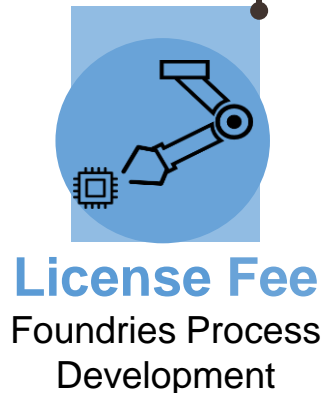
Business Model

- Recurring royalty is the backbone of our business



- 70-75% revenue are from royalty based on wafer production
- More adoption = more volume shipment
- More advanced node wafers = higher ASP per wafer

Revenue Breakdown



1-4 years



1-4 years

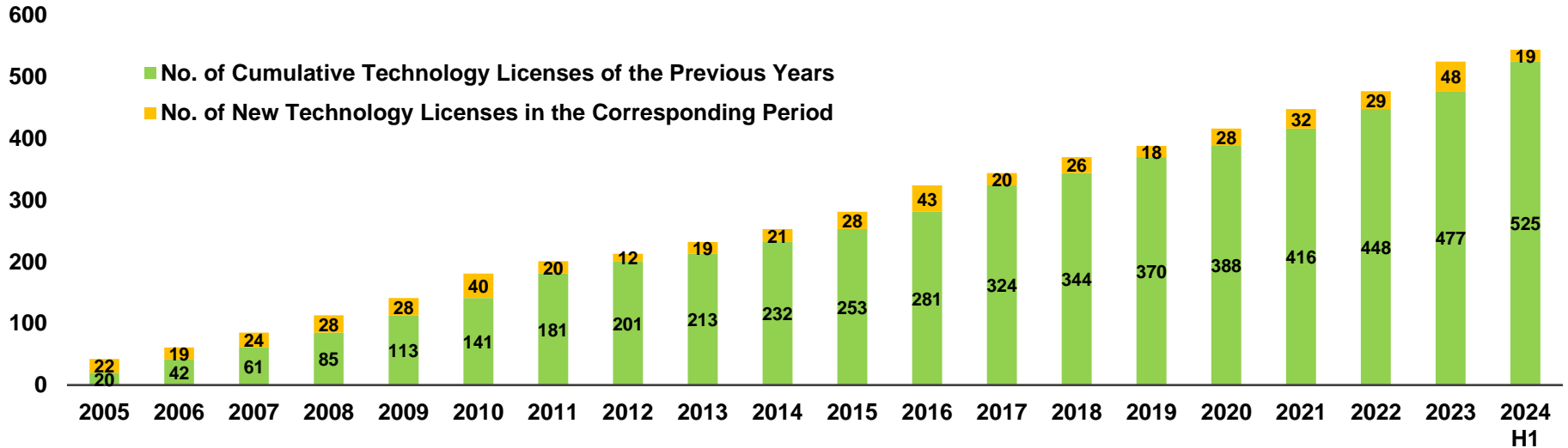


Technology Licenses

Number of Licenses

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024 H1
License	43	20	26	18	28	32	29	48	19

Note: Terms (including number of process platforms and licensing fees) for each technology license are set contractually. Payments are made according to set milestones, and there are no particular seasonal factors involved.



New Technology Under Development

- New technologies are being developed for 153 platforms by Q2 2024.
- 10 licensing contracts were signed.

Technology	3nm	4/5nm	6/7nm	12/16nm	22/28nm	40nm	55/65nm	80/90nm	0.11~ 0.13um	0.15~ 0.18um	>0.25um
NeoBit	-	-	-	-	-	-	2	2	10	14	1
NeoFuse	3	-	1	7	16	6	11	8	5	3	-
PUF-Based	1	-	-	1	1	2	1	-	-	-	-
MTP	-	-	-	-	1	-	7	12	16	22	-

Note: As of June 30th, 2024

Technology Development

- Developments by process nodes

12" Fabs	Production	Development	IP Type	Process Type
3nm	0	4	OTP, PUF	FF, FFP
4/5nm	6	0	OTP, PUF	FF, FF-Auto
6/7nm	4	1	OTP, PUF	FF, FF+
12/16nm	9	8	OTP, PUF	FF, FF+, FFC, FFC+, LPP, DRAM, HV
22/28nm	54	18	OTP, PUF, MTP	LP/ULP/ULL, HPC/HPC+, HV-OLED, DRAM, SOI, ReRAM, MRAM, E-Flash, BCD, WoW
40nm	25	8	OTP, PUF, MTP	LP/ULP, E-Flash, HV-DDI/OLED, ReRAM, BCD+
55/65nm	55	21	OTP, PUF, MTP	LP/ULP, E-Flash, HV-DDI/OLED, DRAM, CIS, BCD, PM
80/90nm	28	19	OTP, MTP	HV-DDI/OLED, LP, Generic, BCD, CIS
0.11/0.13um	21	7	OTP, MTP	HV-DDI, BCD, Generic
0.15/0.18um	11	17	OTP, MTP	BCD, Generic
Total	213	103		

8" Fabs	Production	Development	IP Type	Process Type
80/90nm	9	3	OTP	HV-DDI, LL, BCD
0.11/0.13um	83	24	OTP, MTP	HV/HV-MR, BCD, LP/LL, CIS, Green, Flash, SOI, Generic
0.152/0.16/0.18um	243	22	OTP, MTP	HV/HV-MR, BCD, LP/LL, CIS, Green, Generic
0.25um	42	1	OTP	BCD
0.3/0.35um	53	0	OTP, MTP	UHV, BCD
0.4/0.5um	11	0	OTP	UHV, BCD
Total	441	50		

Note: As of June 30th, 2024

THANKS

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For more information, please visit:

eMemory Website: <https://www.ememory.com.tw/>

PUFsecurity Website: <https://www.pufsecurity.com/>

