Q2 2022 Investor Conference

August 10th, 2022

Embedded Wisely, Embedded Widely

ememory

IPR Notice

All rights, titles and interests contained in this information, texts, images, figures, tables or other files herein, including, but not limited to, its ownership and the intellectual property rights, are reserved to eMemory. This information may contain privileged and confidential information. Some contents in this information can be found in Logic Non-Volatile Memory (The NVM solutions from eMemory), published in 2014. Any and all information provided herein shall not be disclosed, copied, distributed, reproduced or used in whole or in part without prior written permission of eMemory Technology Inc.

eMemory, NeoBit, NeoFuse, NeoEE, NeoMTP, NeoROM, EcoBit and NeoPUF are all trademarks and/or service marks of eMemory in Taiwan and/or in other countries.

ememory

Cautionary Statement

This presentation contains forward-looking statements, which are subject to risk factors associated with semiconductor and intellectual property business. It is believed that the expectations reflected in these statements are reasonable. But they may be affected by a variety of variables, many of which are beyond our control. These variables could cause actual results or trends to differ materially which include, but are not limited to: wafer price fluctuation, actual demand, rapid technology change, delays or failures of customers' tape-outs into wafer production, our ability to negotiate, monitor and enforce agreements for the determination and payment of royalties, any bug or fault in our technology which leads to significant damage to our technology and reputation, actual or potential litigation, semiconductor industry cycle and general economic conditions. Except as required by law, eMemory undertakes no obligation to update or revise any forward-looking statements, whether as a result of new information, future events, or otherwise.

ememory

Contents

Embedded Wisely, Embedded Widely

ememory

Review of Operations

ememory

Q2 2022 **Financial Results**

(thousands of NT dollars)

	Q2 2022	Q1 2022	Change (QoQ)	Q2 2021	Change (YoY)	H1 2022	H1 2021	Change (YoY)
Revenue	796,292	727,107	9.5%	541,415	47.1%	1,523,399	1,138,149	33.8%
Gross Margin	100%	100%	-	100%	-	100%	100%	-
Operating Expenses	336,197	313,846	7.1%	258,701	30.0%	650,043	517,724	25.6%
Operating Income	460,095	413,261	11.3%	282,714	62.7%	873,356	620,425	40.8%
Operating Margin	57.8%	56.8%	1.0ppt	52.2%	5.6ppts	57.3%	54.5%	2.8ppts
***Net Income**	408,924	366,019	11.7%	243,731	67.8%	774,943	536,713	44.4%
Net Margin	51.5%	49.8%	1.7ppts	44.7%	6.8ppts	50.7%	46.9%	3.8ppts
EPS (NT$)	5.48	4.91	11.6%	3.27	67.6%	10.39	7.20	44.3%
ROE	69.5%	55.0%	14.5ppts	50.2%	19.3ppts	65.9%	55.3%	10.6ppts

*Net income attributable to Shareholders of the Company

ememory

Revenue in **Different Stream**

22Q2 in comparison to 22Q1

Revenue Breakdown

Royalty
74.8%
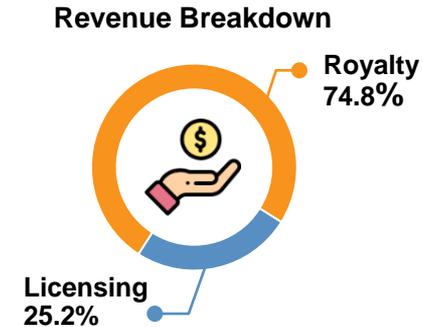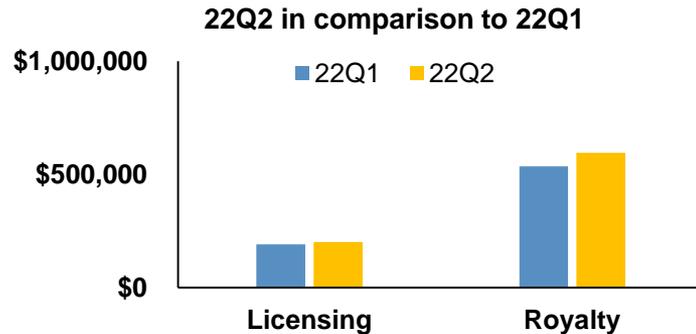
Licensing
25.2%

Revenue

NT$ Thousands	Q2 2022	Q1 2022	Change (QoQ)	Q2 2021	Change (YoY)	H1 2022	H1 2021	Change (YoY)
Licensing	200,729	191,608	4.8%	174,559	15.0%	392,337	351,552	11.6%
Royalty	595,563	535,499	11.2%	366,856	62.3%	1,131,062	786,597	43.8%
Total	796,292	727,107	9.5%	541,415	47.1%	1,523,399	1,138,149	33.8%

US$ Thousands	Q2 2022	Q1 2022	Change (QoQ)	Q2 2021	Change (YoY)	H1 2022	H1 2021	Change (YoY)
Licensing	6,878	6,875	0.0%	6,218	10.6%	13,753	12,459	10.4%
Royalty	20,425	19,384	5.4%	13,013	57.0%	39,809	27,801	43.2%
Total	27,303	26,259	4.0%	19,231	42.0%	53,562	40,260	33.0%

ememory

Revenue by **Technology**

- PUF-based security revenue increased 576.4% sequentially 2,163% year-over-year and accounted for 6% of total revenue in Q2 as adopted by DPU, CPU, AI SoC, FPGA, Security MCU and Setup Box.

Technology	Q2 2022								
	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	35.5%	16.3%	27.1%	22.0%	26.4%	-11.4%	40.0%	14.6%	38.2%
NeoFuse	54.0%	-0.1%	51.2%	46.9%	-24.2%	-8.0%	56.4%	9.7%	84.5%
PUF-Based	6.0%	543.3%	2,196.0%	23.4%	576.4%	2,163.0%	0.1%	47.6%	100.0%
MTP	4.5%	-22.0%	11.0%	7.7%	-39.3%	-23.7%	3.5%	-1.1%	67.7%

Technology	H1 2022					
	Total Revenue		Licensing Revenue		Royalty Revenue	
	% of H1 Revenue	Change (YoY)	% of H1 Licensing	Change (YoY)	% of H1 Royalty	Change (YoY)
NeoBit	34.5%	13.5%	20.2%	2.6%	39.5%	15.7%
NeoFuse	56.5%	50.7%	55.7%	13.1%	56.7%	69.8%
PUF-Based	3.6%	625.0%	13.7%	609.9%	0.1%	100.0%
MTP	5.4%	-14.5%	10.4%	-44.6%	3.7%	82.1%

ememory

Royalty Revenue by **Wafer Size**

Q2 Royalty Breakdown

12-inch
48.9%
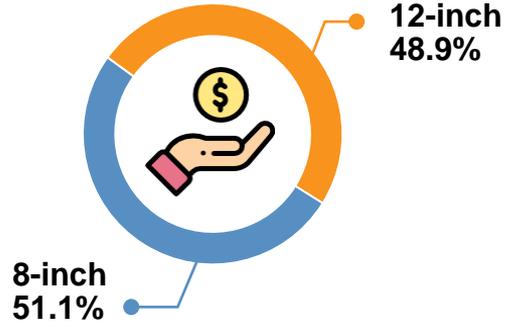
8-inch
51.1%

- 8-inch wafers contributed 51.1% of royalty, up 12.1% sequentially and 56.3% YoY due to growth in wafer shipment and ASP from the increasing penetration rate of various applications.

- 12-inch wafers contributed 48.9% of royalty, up 10.3% QoQ and 69.1% YoY due to increasing penetration rate for 28nm and below.

Wafer Size	Q2 2022			H1 2022	
	% of Q2	Change (QoQ)	Change (YoY)	% of H1	Change (YoY)
8-Inch	51.1%	12.1%	56.3%	50.9%	35.5%
12-Inch	48.9%	10.3%	69.1%	49.1%	53.5%

ememory

Future Outlook

ememory

Our **Perspectives**

- **Licensing & Royalty:**
  - Strong demand for NeoFuse and PUF-based security solutions will drive licensing to grow.
  - 8-in and 12-in royalties will continue its growth momentum from the increasing penetration rate in various applications.
  - New tape-outs from 6/7nm will also drive ASP and royalty growth further.

- **New Business Development:**
  - PUFrt and PUFcc are continuously adopted in IoT, industrial IoT, FPGA, DPU, CPU, Setup Box, UFS and Automotive.
  - Arm collaboration is going successfully, we anticipate more joint-marketing activities.

- **New IP Technology Development:**
  - 22nm ReRAM IP is adopted by wearable and IoT applications.
  - NeoFlash is licensed as Embedded Flash solutions in specialty processes for Smart Power and Smart MCU related applications.
  - PUF-based IPs have tape-out in N5 and developing in N4/N3.
  - Developed PUF-based Embedded Flash solutions for protecting digital assets.
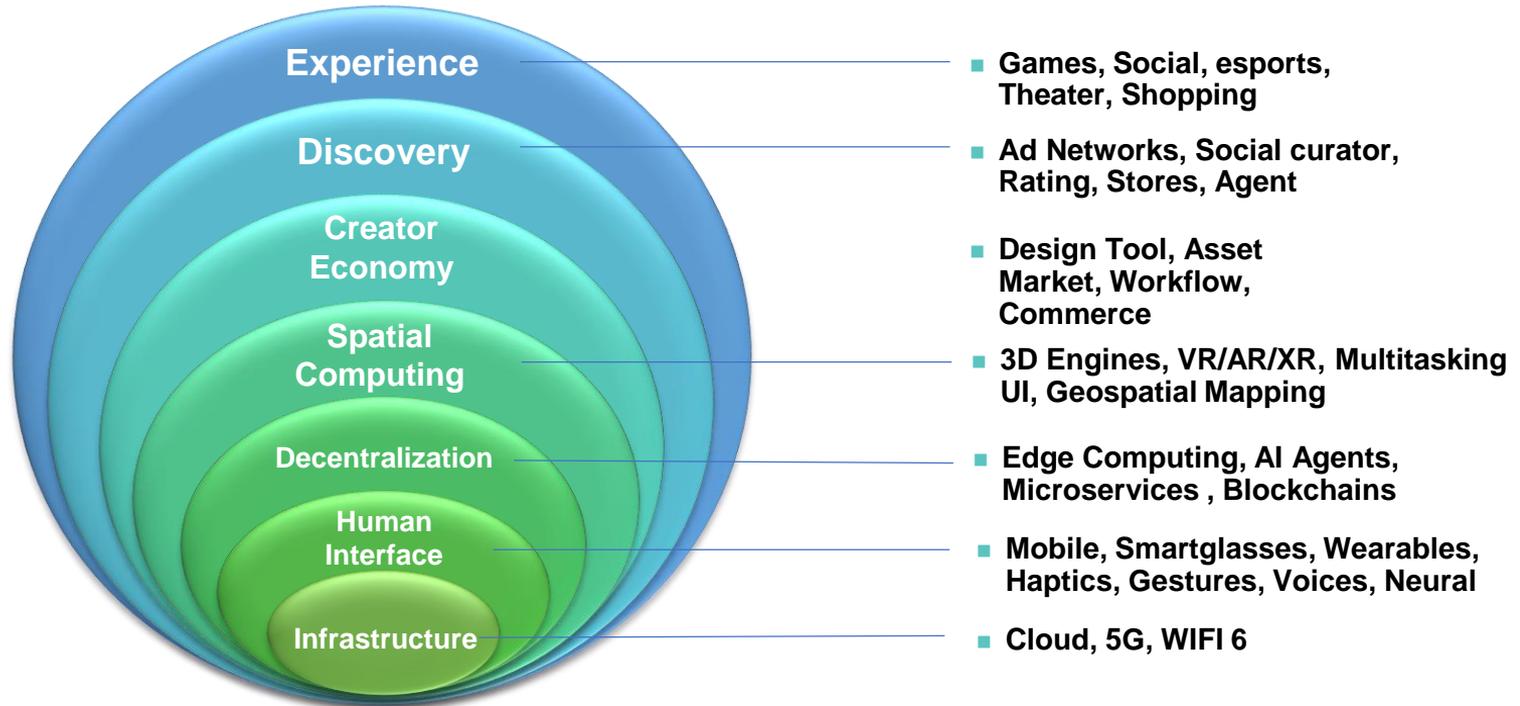
Future Outlook

ememory

Why is Random Number Generation Important in Gaming?

ememory

Seven Layers of Metaverse: **Gaming**

Metaverse has different levels. Today, we will be talking about the **experience** layer using **gaming** as an example.

Experience — ■ **Games, Social, esports, Theater, Shopping**

Discovery — ■ **Ad Networks, Social curator, Rating, Stores, Agent**

Creator Economy — ■ **Design Tool, Asset Market, Workflow, Commerce**

Spatial Computing — ■ **3D Engines, VR/AR/XR, Multitasking UI, Geospatial Mapping**

Decentralization — ■ **Edge Computing, AI Agents, Microservices , Blockchains**

Human Interface — ■ **Mobile, Smartglasses, Wearables, Haptics, Gestures, Voices, Neural**

Infrastructure — ■ **Cloud, 5G, WIFI 6**

ememory

Random Number Generation in **Gaming**

- **Random Number Generator (RNG)** are algorithms that create random values**.**

- They determine **random events**, such as the items you pick up, whether an attack lands, etc.

- In other words, they introduce an element of "**luck**" in gaming.

ememory

Example: RNG in Games

RPG games feature weapon "drops" and in-game purchases (*microtransactions*) for players to acquire the items they desire.

Dropped new item that can be looted

Voodoo Mask

Phantom Bow
Warlord Plate of Pain
91 Gold
195 Gold
Tome of Secrets   160 Gold
283 Gold   Balanced Slayer
Assailing Stonebow of Gore
15 Gold
Sovereign Helm
9 Gold

OBJECTIVES
The Imprisoned Angel
☐ Enter the Cursed Hold

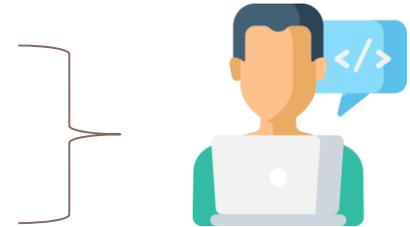Microtransaction in-game purchases

Software vs. Hardware Random Numbers

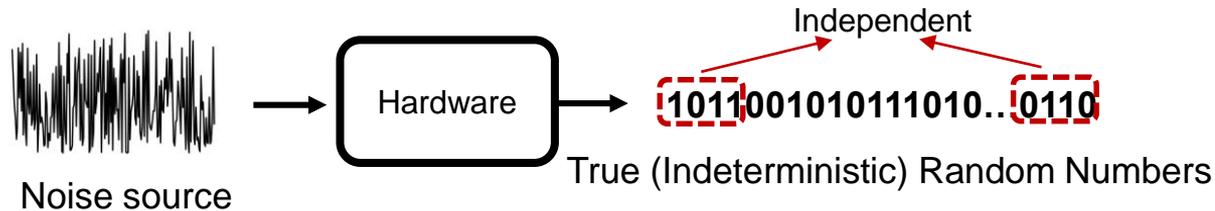- The difference between software-based and true-random hardware-based numbers lies in the **input**.

Generating deterministic numbers that shows random behaviors

Examples:

0 1 0 1 0 0 ⋯ → Software → **0011010110010110…1011**

Seed
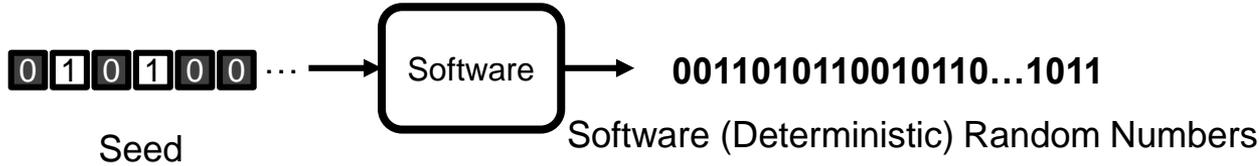
Software (Deterministic) Random Numbers

Generating random numbers based on physical processes

Independent

Noise source → Hardware → **1011**001010111010…**0110**

True (Indeterministic) Random Numbers

ememory

Software RNG is Often **Criticized in Games**

- In-game RNG are based on software and **lack true randomness**.

Trans: The Ministry of Economic Affairs will now <u>require</u> game companies to <u>disclose the odds of winning</u>. The incident was caused by game player, Ding Tehao, throwing 1.7 million NTD into buying "blind boxes" but could not obtain the treasure.

7月15日來自行政院消保會的一則公告，經濟部將研擬草案，要求遊戲業者必須揭露中獎機率，該修正案，也被稱為《轉蛋法》，到底轉蛋法是什麼？事件起因玩家丁特豪擲170萬元卻拿不到寶物，怒槓遊戲橘子；更意外揭開台灣手遊商機竟高達約800億元，全球擠進前五大的神秘面紗。

The business opportunity of Taiwan's mobile games is approx. 80 billion NTD

行政院消保會上週五（7/15）以「公布轉蛋中獎機率」為標題，宣布審議通過經濟部研擬草案，將要求遊戲業者揭露中獎機率。除明確定出揭露範疇外，更要求業者直接寫出中獎機率的百分比。另外，若遊戲業者沒有誠實公布機率，經勸不改，將處最重50萬元的罰鍰。這就是所謂的《轉蛋法》。

ememory

Who does this Affect?

- Multiple parties are affected by in-game RNG, not just players and providers, but also assets as well.

Players	Game Providers	Digital Assets
Credibility of the random numbers provided in games	**Verifiability** of random numbers	**Authenticity** in all in-game items
Assurance that time and effort spent in game is fair	**Quantifiability** of random numbers	**Traceability** of where assets originated from
Fairness in game results	**Transparency** in certain data and calculations	**Security** features to protect digital assets

ememory

How **PUFtrng** Improves Gaming

PUFtrng can generate random numbers in **blockchain**:

- **Decentralize** the process, ensuring transparency

- Provide the **volume** of random numbers needed during game play

- Allow third-parties to **verify** the numbers since it is an open network

PUFtrng can also provide **security** features:

- Create **secure private keys** to encrypt data and virtual assets

- **Store** secret keys in PUF-based OTP

Game Server

Games

ememory

Q&A

ememory
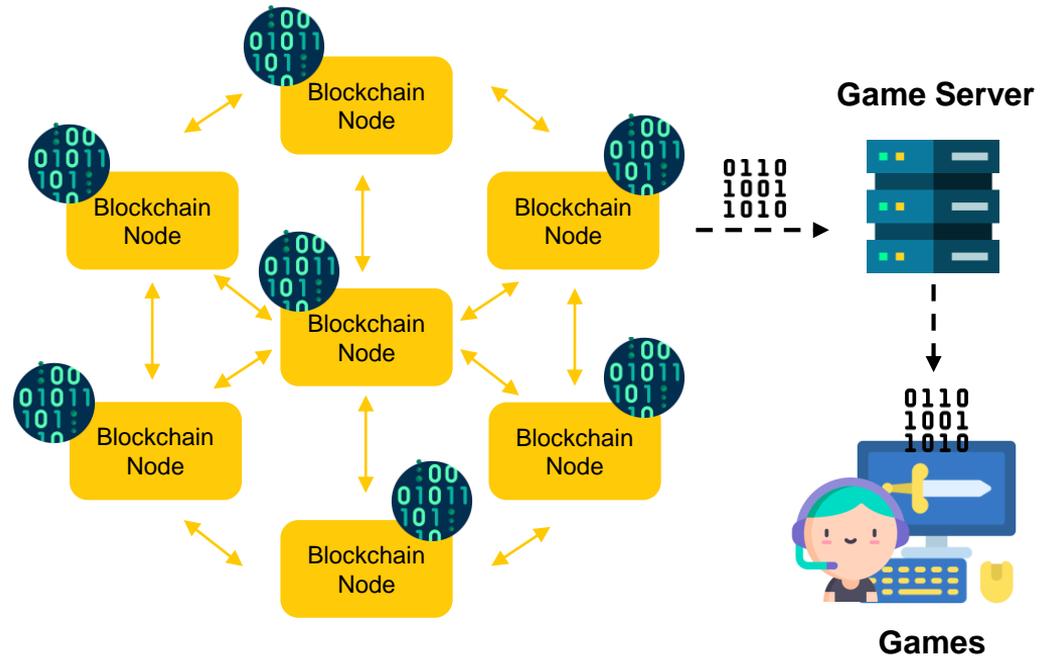
Q&A: Revenue and Tape-out by Technology

	NTO		Revenue (USD)		
Year	NeoBit	NeoFuse	NeoBit	NeoFuse	PUF-based
2003	28				
2004	39				
2005	69		$4,217,380		
2006	133		$6,202,270		
2007	220		$9,402,479		
2008	253		$12,896,211		
2009	268		$11,695,587		
2010	285		$15,873,331		
2011	254		$15,399,098		
2012	272		$19,620,768		
2013	370	1	$25,436,669	$382,084	
2014	371	3	$31,831,985	$328,787	
2015	314	11	$30,943,426	$1,080,373	
2016	273	31	$30,247,340	$3,636,142	
2017	256	61	$34,619,653	$5,238,351	
2018	256	87	$31,834,860	$10,773,223	$85,000
2019	228	111	$27,602,332	$14,466,279	$220,000
2020	249	185	$30,378,346	$26,437,660	$464,998
2021	258	266	$32,367,560	$44,011,223	$1,160,702
2022 H1	144	135	$18,099,790	$30,672,317	$2,064,415
Total	**4,540**	**891**	**$388,669,085**	**$137,026,439**	**$3,955,115**

*NTO stands for **New Tape-Out**

* Revenue includes both **licensing** and **royalty**

ememory

Appendix

ememory

Company Overview

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

Revenue Trend
(Unit: NT$ 1,000)

Chart legend: Royalty, License/Design Revenue. Years 2005–2021, values from 0 to 2,500,000.
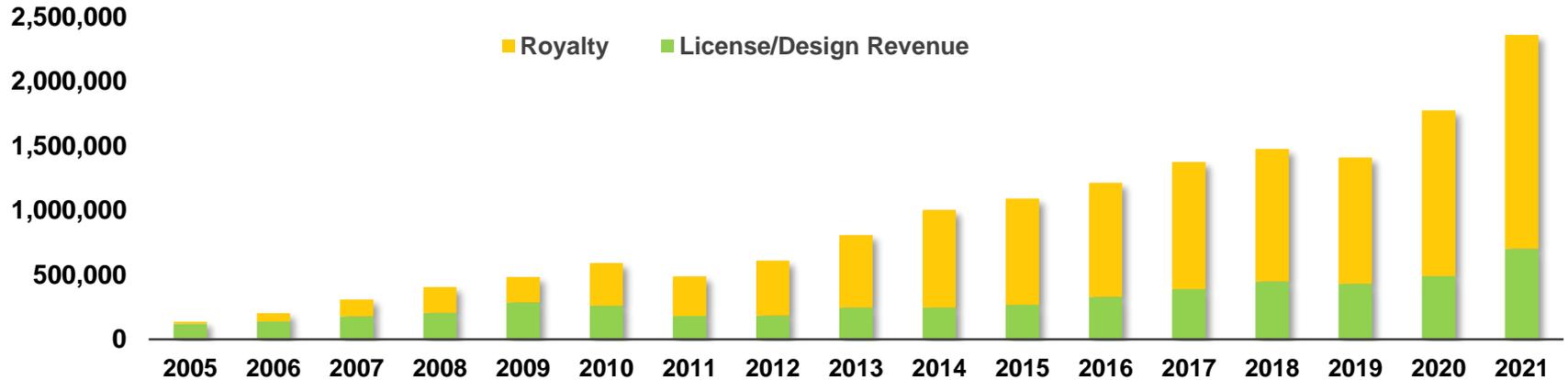
Founded
In 2000
Based in Hsinchu, Taiwan. IPO in 2011. Over 44M wafers shipped.

1000+
Patents Issued
194 pending patents. 314 employees with 69% R&D personnel.

Best IP Partner
With TSMC
TSMC Best IP Partner Award since 2010.

ememory

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.

(Unit: NT$ 1,000)

First Month   Second Month   Third Month

ememory
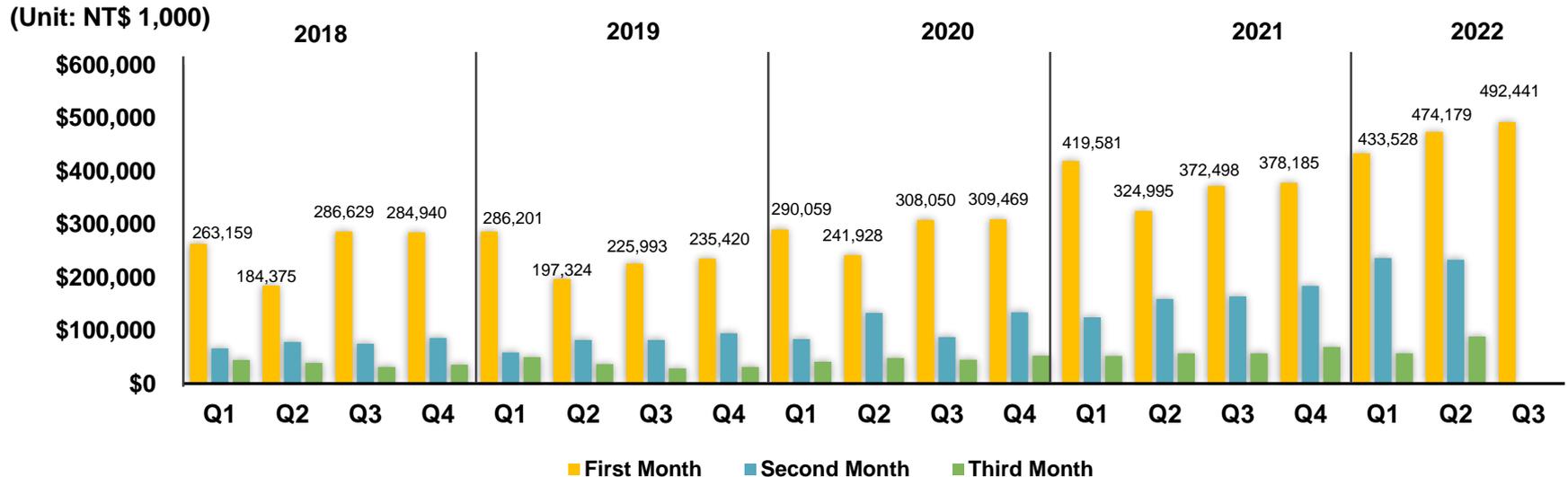
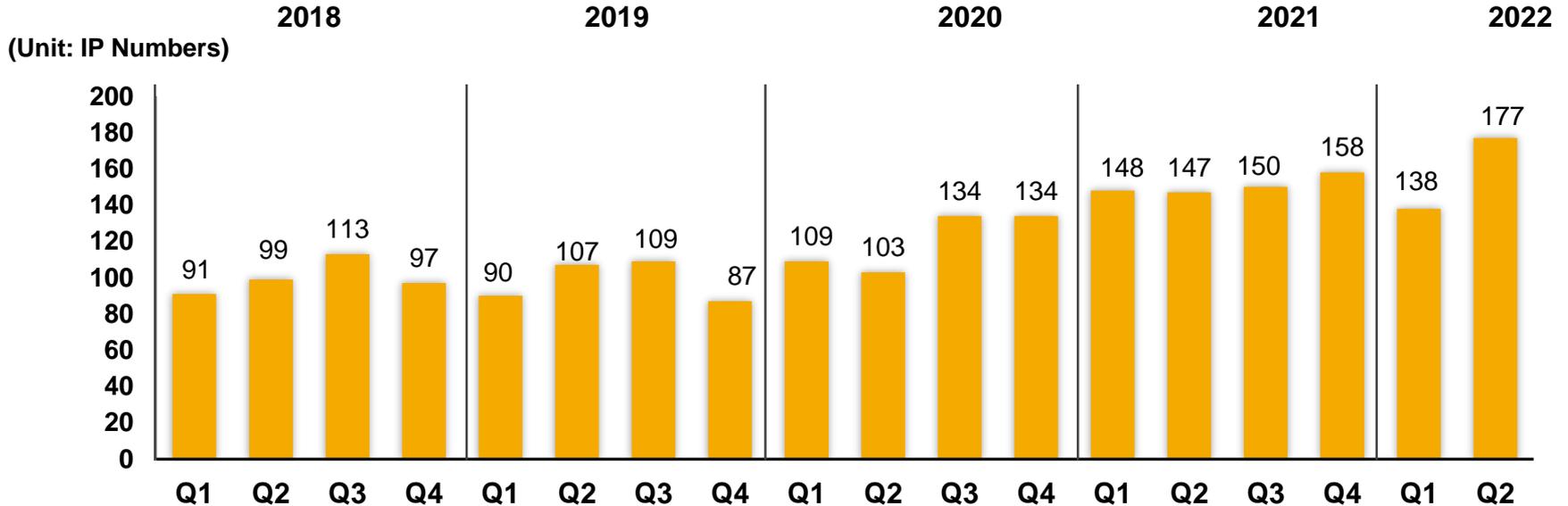# Quarterly Number of **New Tape-outs**

(Unit: IP Numbers)

	2018				2019				2020				2021				2022	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
	91	99	113	97	90	107	109	87	109	103	134	134	148	147	150	158	138	177

Worldwide Customers

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

Country	Foundry	IDM	Fabless
Taiwan	4	1	316
China	9	0	1030
Korea	4	0	94
Japan	4	7	75
North America	1	1	332
Europe	2	1	204
Others	1	0	115

ememory

Business Model

- Recurring royalty is the backbone of our business

Revenue Breakdown

Pie chart: License Fee 25-30 %, Royalty 70-75%

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

1-4 years

1-4 years

License Fee
Foundries Process Development

Design License Fee
Fabless Product Development
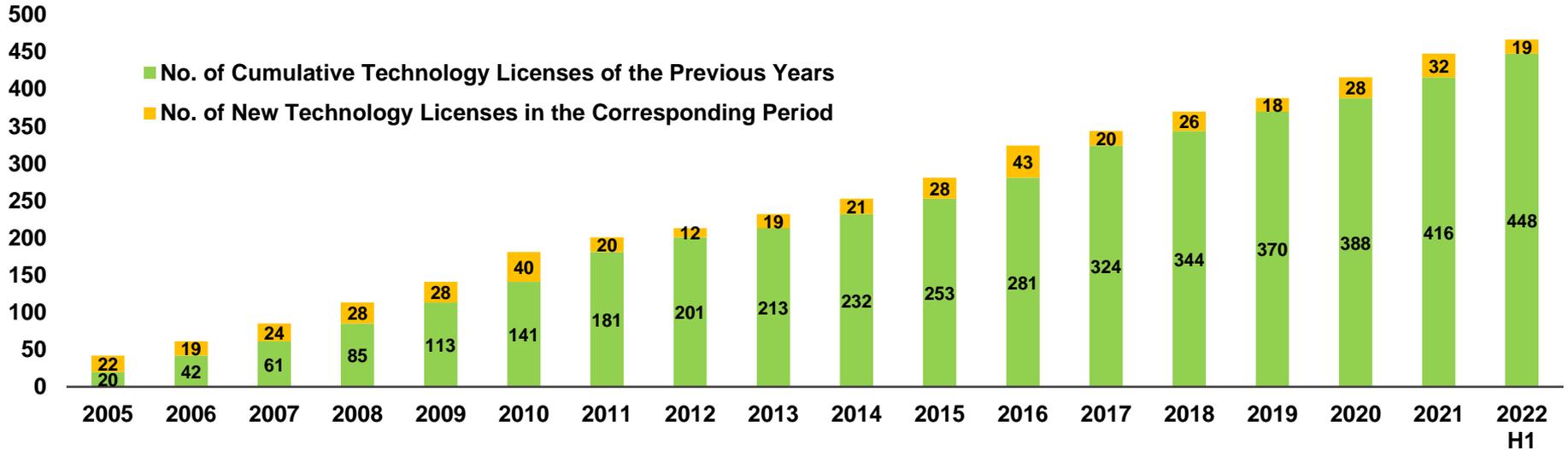
Royalty
Wafer Mass Production

ememory

Technology **Licenses**

Number of Licenses

Year	2016	2017	2018	2019	2020	2021	2022 H1
License	43	20	26	18	28	32	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.

■ No. of Cumulative Technology Licenses of the Previous Years
■ No. of New Technology Licenses in the Corresponding Period

Embedded Wisely, Embedded Widely

ememory

New Technology Under Development

- New technologies are being developed for 128 platforms by Q2 2022.
- 8 licensing contracts were signed.

| Technology	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	1	12	12	1
NeoFuse	2	1	6	8	5	15	8	2	3	-
PUF-Based	2	-	1	1	-	1	-	-	-	-
MTP	-	-	-	3	1	7	3	8	23	-

Note: As of June 30th, 2022

ememory

Technology Development

- Developments by process nodes

12" Fabs	Production	Development	IP Type	Process Type
4/5nm	0	4	OTP, PUF	FF
6/7nm	4	1	OTP, PUF	FF, FF+
12/16nm	6	7	OTP, PUF	FF, FF+, FFC, FFC+, LPP
22/28nm	43	12	OTP, PUF ,MTP	LP/ULP/ULL, HPC/HPC+, HV-OLED, DRAM,SOI, ReRAM, MRAM
40nm	21	6	OTP, PUF ,MTP	LP/ULP, E-Flash, HV-DDI/OLED, ReRAM
55/65nm	35	25	OTP, PUF, MTP	LP/ULP, E-Flash, HV-DDI/OLED, DRAM, CIS, BCD, PM
80/90nm	22	9	OTP, MTP	HV-DDI/OLED, LP, Generic, BCD, CIS
0.11/0.13um	20	2	OTP, MTP	HV-DDI, BCD, Generic
0.15/0.18um	1	12	OTP, MTP	BCD, Generic
Total	152	78		

8" Fabs	Production	Development	IP Type	Process Type
80/90nm	9	3	OTP	HV-DDI, LL, BCD
0.11/0.13um	75	20	OTP, MTP	HV/HV-MR, BCD, LP/LL, CIS, Green, Flash, SOI, Generic
0.152/0.16/0.18um	222	26	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	412	50		

Note: As of June 30th, 2022
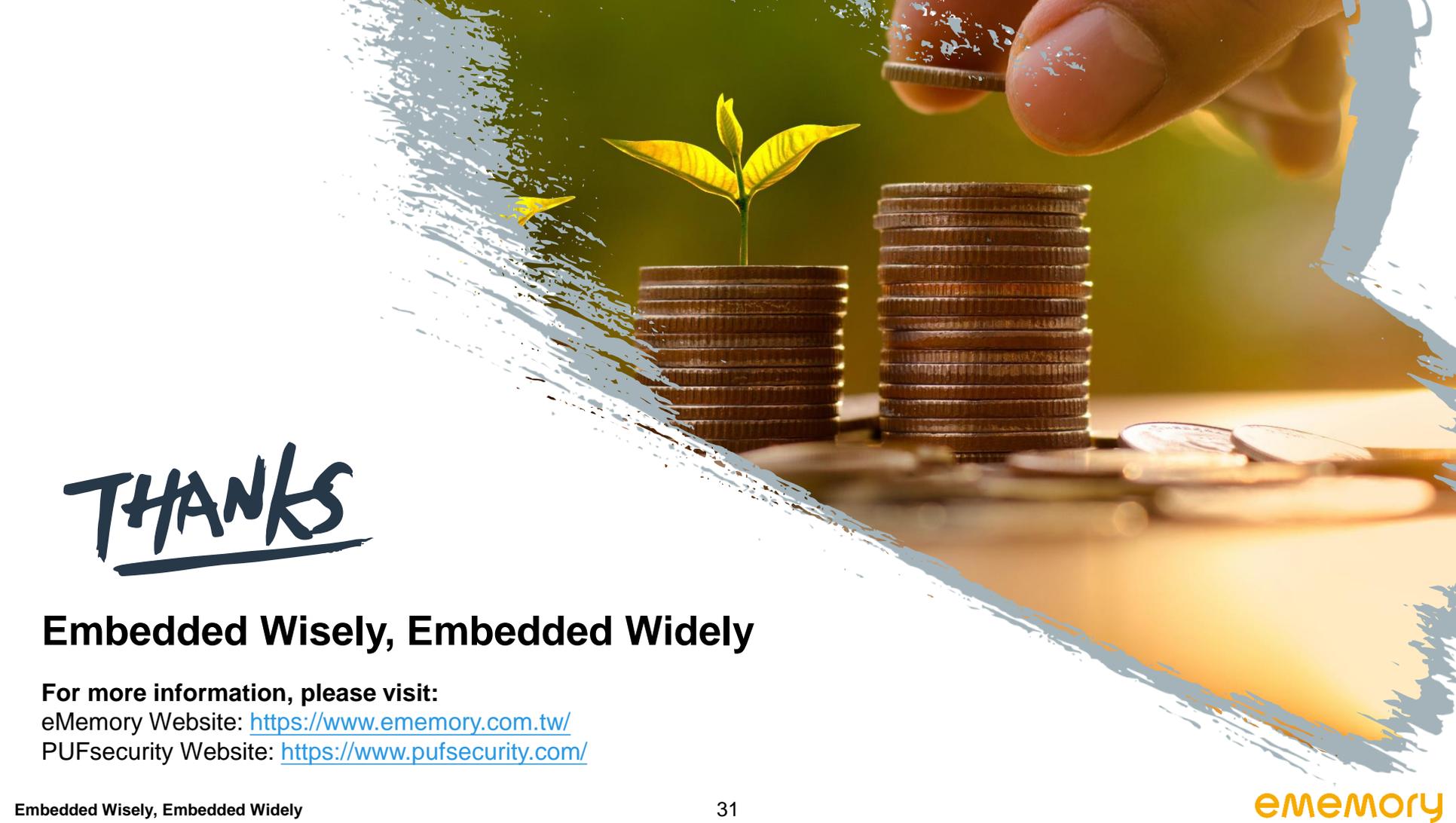
ememory

Embedded Wisely, Embedded Widely

For more information, please visit:
eMemory Website: https://www.ememory.com.tw/
PUFsecurity Website: https://www.pufsecurity.com/

ememory