



Q2 2022 Investor Conference

August 10th, 2022



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.



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.



Contents

- 1 Review of Operations
- 2 Future Outlook
- 3 Why is Random Number Generation Important in Gaming?
- 4 Q&A
- 5 Appendix

A hand is shown in the upper right corner, dropping a coin into a stack of several other coins. To the left of this stack, a small green plant with three leaves is growing out of a smaller stack of coins. The background is a warm, golden-yellow color, suggesting a bright light source. The entire image is framed by a white, brush-stroke-like border that curves across the top and right sides.

Review of Operations

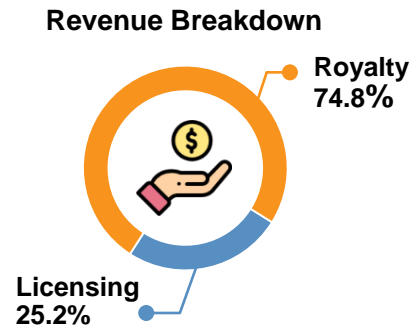
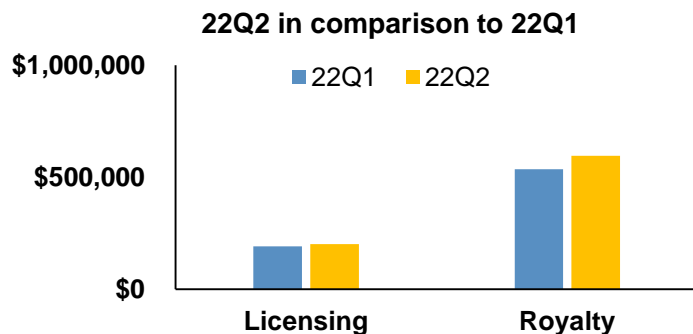
Q2 2022 Financial Results

(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

Revenue in Different Stream



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%

Revenue by Technology

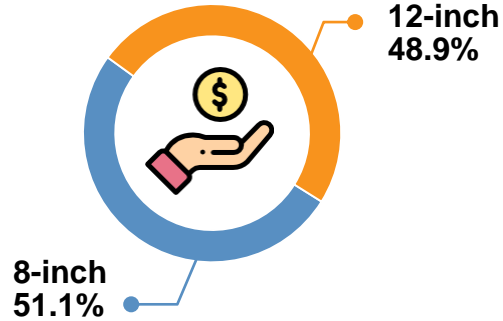
- PUF-based security revenue increased 576.4% sequentially 2,163% year-over-year and accounted for 6% of total revenue in Q2 as adopted by DPU, CPU, AI SoC, FPGA, Security MCU and Setup Box.

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%

Royalty Revenue by Wafer Size

Q2 Royalty Breakdown



- 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%

A hand is shown dropping a coin into a stack of coins. A small green plant with three leaves is growing out of the stack. The background is a warm, golden-yellow color. The image is framed by a white, brush-stroke-like border on the right side.

Future Outlook

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

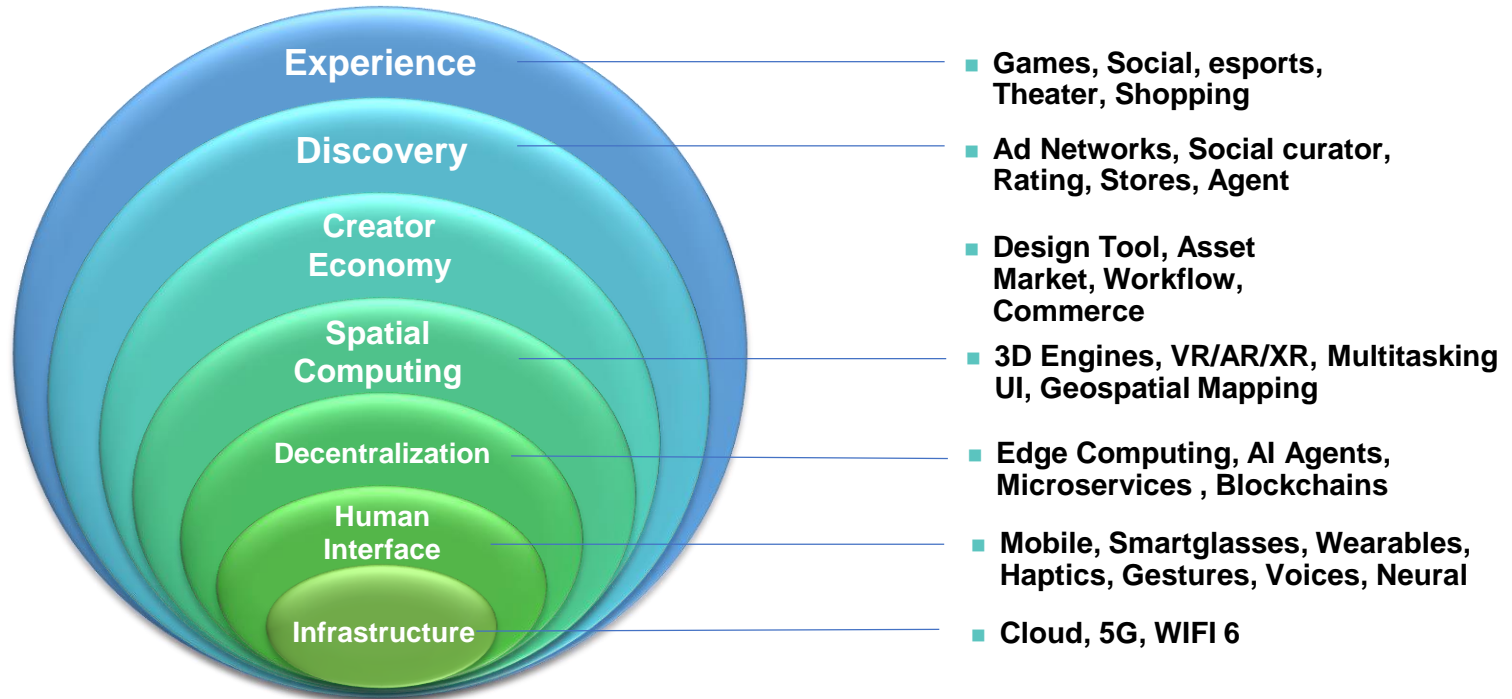




Why is Random Number Generation Important in Gaming?

Seven Layers of Metaverse: Gaming

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





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.

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

SHOP

FEATURED

CRESTS

BUNDLES

COSMETICS

CURRENCY

MATERIALS

+800% EXTRA VALUE

BEGINNER'S PACK

60

Max Available: 1/1

£0.89

ETERNAL ORBS +5% £8.99

ETERNAL ORBS +10% £21.99

ETERNAL ORBS +15% £44.99

600 +30

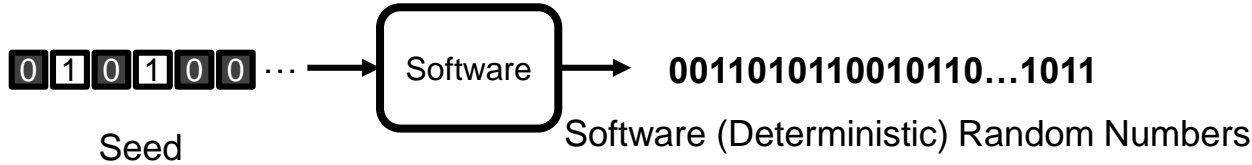
1,500 +150

3,000 +450

Software vs. Hardware Random Numbers

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

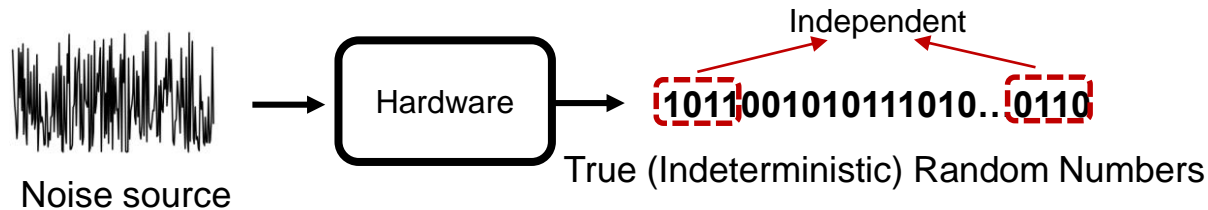
Generating deterministic numbers that shows random behaviors



Examples:



Generating random numbers based on physical processes



Software RNG is Often Criticized in Games

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

The screenshot shows the top navigation bar of the GameRant website with categories like GAME NEWS, GR ORIGINALS, GAME GUIDES, MOVIES & TV, ANIME, GAME REVIEWS, and MORE. Below the navigation is a breadcrumb trail: Home > Gaming News > Diablo Immortal Streamer's Spending Passes \$20,000 Without Legendary Gem. The main headline reads "Diablo Immortal Streamer's Spending Passes \$20,000 Without Legendary Gem". A sub-headline states: "Diablo Immortal streamer Quin69 has now spent more than NZ\$20,000 on Blizzard's Free-to-Play game without getting a single 5/5-Star Legendary Gem." The article is attributed to Thomas Bowen and published on June 15, 2022. Social media sharing icons for Facebook, Twitter, YouTube, and Email are visible at the bottom right of the article snippet.

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

The screenshot shows the top navigation bar of a news website with categories like Home, War in Ukraine, Coronavirus, Climate, Video, World, Asia, UK, Business, Tech, and Science. Below the navigation is a breadcrumb trail: Home > Tech. The main headline reads "Video game loot boxes declared illegal under Belgium gambling laws". A sub-headline states: "China ready towards Taiwan". The article is dated 26 April 2018. An advertisement for Adobe Creative Cloud is visible above the article. Social media sharing icons for Facebook, Twitter, YouTube, and Email are visible at the bottom right of the article snippet.

- 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》。

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

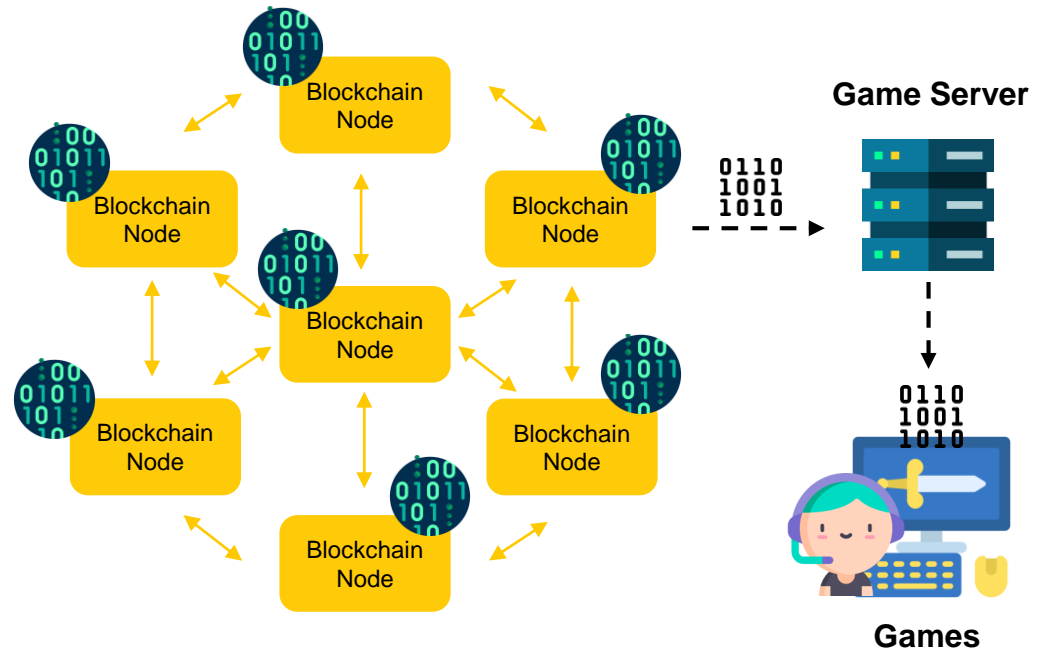
How PUFtrng Improves Gaming

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





Q&A

Q&A: Revenue and Tape-out by Technology

Year	NTO		Revenue (USD)		
	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**



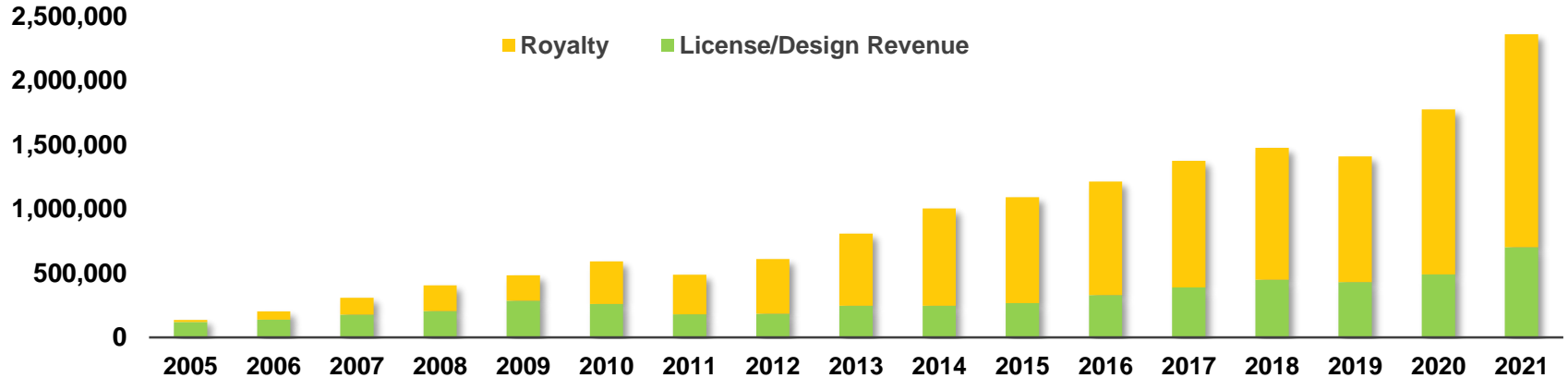
Appendix

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 44M wafers
shipped.

**1000+
Patents Issued**

194 pending patents. 314
employees with 69% R&D
personnel.

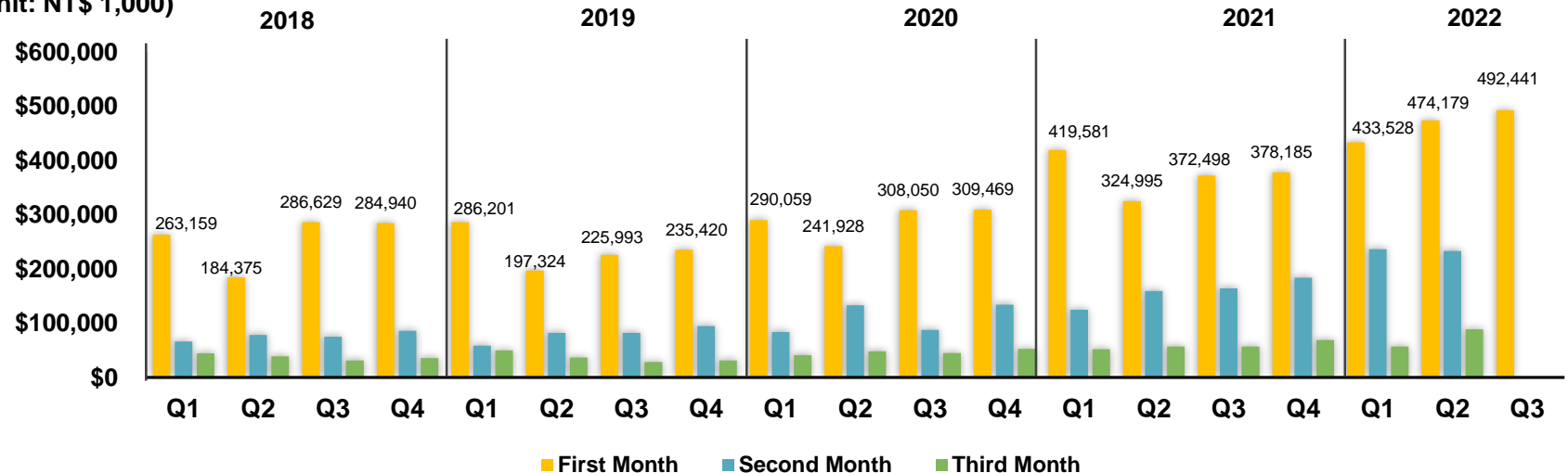
**Best IP Partner
With TSMC**

TSMC Best IP Partner Award
since 2010.

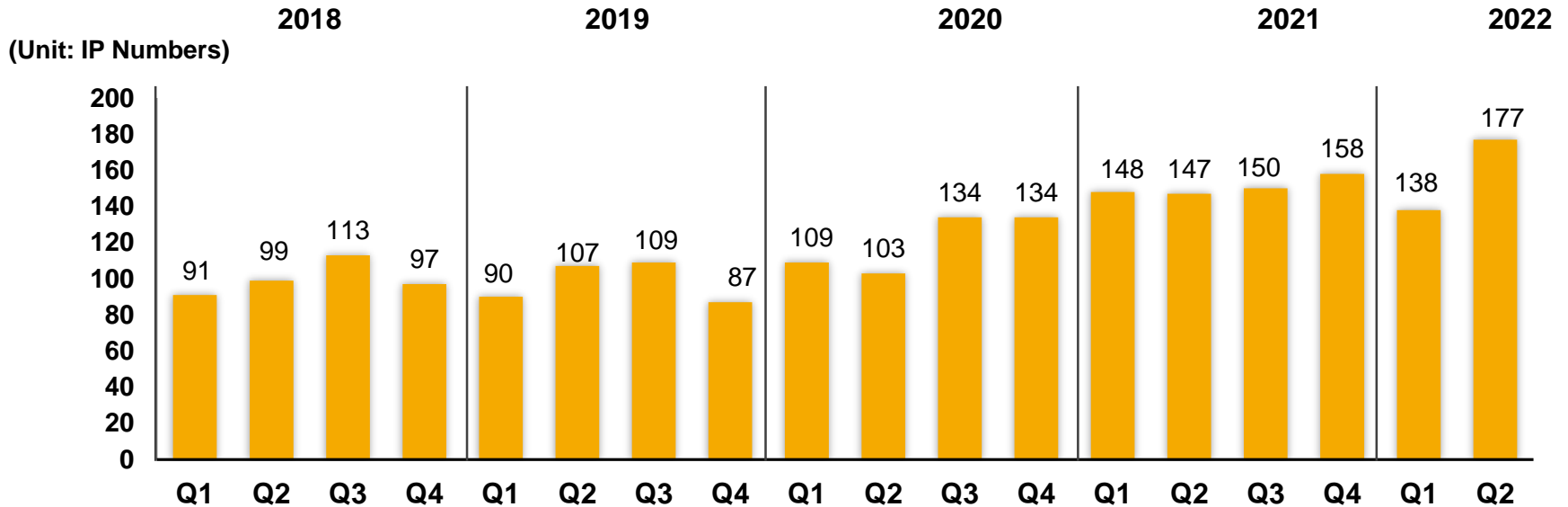
Quarterly Revenue Pattern

- 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)



Quarterly Number of New Tape-outs



Worldwide Customers

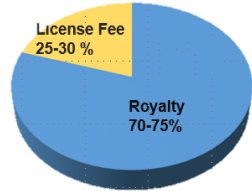
- Our IP solutions are adopted by leading foundries, IDMs and fables worldwide

Country	Foundry	IDM	Fabless
Taiwan	4	1	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



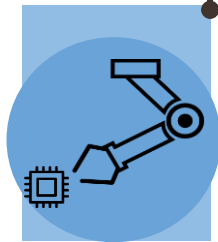
Business Model

- Recurring royalty is the backbone of our business



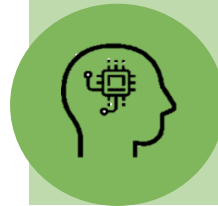
- 70-75% revenue are from royalty based on wafer production
- More adoption = more volume shipment
- More advanced node wafers = higher ASP per wafer

Revenue Breakdown



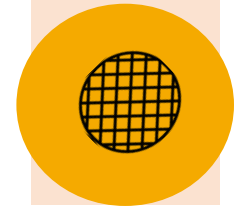
License Fee
Foundries Process
Development

1-4 years



Design License Fee
Fabless Product
Development

1-4 years



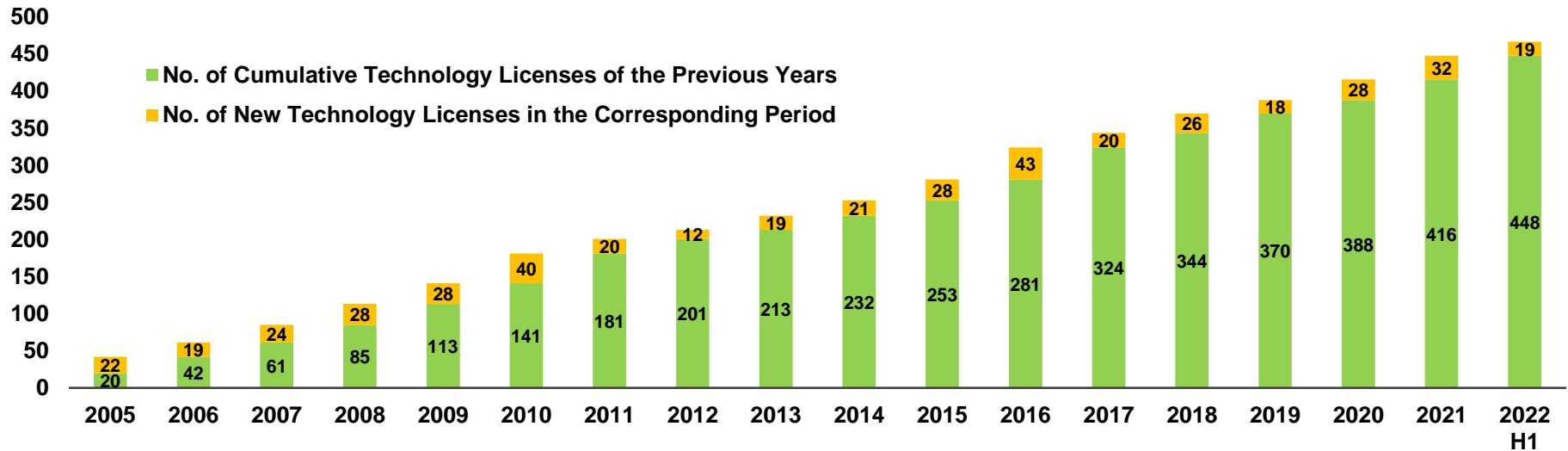
Royalty
Wafer Mass Production

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.



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

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

A hand is shown dropping a coin into a stack of coins. A small green plant with three leaves is growing out of the stack. The background is a warm, golden-brown color with a white brushstroke effect on the left side.

THANKS

Embedded Wisely, Embedded Widely

For more information, please visit:

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

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