Investor Conference

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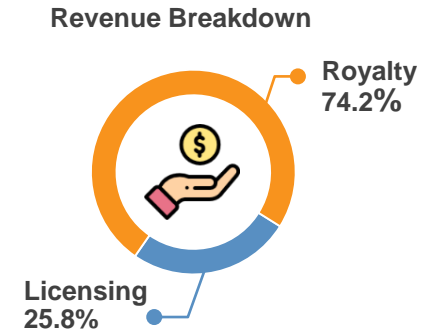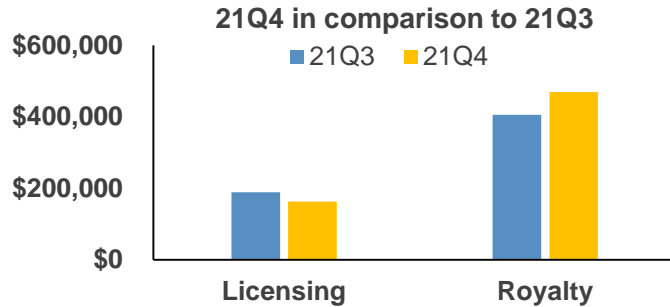ememory

Review of Operations

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Q4 2021 Financial Results

(thousands of NT dollars)

	Q4 2021 (Unaudited)	Q3 2021	Change (QoQ)	Q4 2020	Change (YoY)	FY 2021 (Unaudited)	FY 2020	Change (YoY)
Revenue	631,398	594,277	6.2%	496,682	27.1%	2,363,824	1,776,653	33.0%
Gross Margin	100%	100%	-	100%	-	100%	100%	-
Operating Expenses	299,677	277,611	7.9%	261,327	14.7%	1,095,012	954,067	14.8%
Operating Income	331,721	316,666	4.8%	235,355	40.9%	1,268,812	822,586	54.2%
Operating Margin	52.5%	53.3%	-0.8ppt	47.4%	5.1ppts	53.7%	46.3%	7.4ppts
*Net Income	287,263	277,181	3.6%	193,343	48.6%	1,101,157	707,999	55.5%
Net Margin	45.2%	46.3%	-1.1ppts	38.7%	6.5ppts	46.3%	39.8%	6.5ppts
EPS (NT$)	3.86	3.72	3.8%	2.60	48.5%	14.78	9.52	55.3%
ROE	51.4%	53.2%	-1.8ppts	41.8%	9.6ppts	49.3%	38.3%	11.0ppts

*Net income attributable to the Shareholders of the Company

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Revenue in Different Stream

21Q4 in comparison to 21Q3

Revenue Breakdown

Royalty 74.2%

Licensing 25.8%

Revenue

NT$ Thousands	Q4 2021	Q3 2021	Change (QoQ)	Q4 2020	Change (YoY)	FY 2021	FY 2020	Change (YoY)
Licensing	162,632	188,667	-13.8%	154,472	5.3%	702,851	490,105	43.4%
Royalty	468,766	405,610	15.6%	342,210	37.0%	1,660,973	1,286,548	29.1%
Total	631,398	594,277	6.2%	496,682	27.1%	2,363,824	1,776,653	33.0%

US$ Thousands	Q4 2021	Q3 2021	Change (QoQ)	Q4 2020	Change (YoY)	FY 2021	FY 2020	Change (YoY)
Licensing	5,855	6,778	-13.6%	5,350	9.4%	25,092	16,610	51.1%
Royalty	16,788	14,584	15.1%	11,859	41.6%	59,173	43,586	35.8%
Total	22,643	21,362	6.0%	17,209	31.6%	84,265	60,196	40.0%

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Revenue by Technology

✓ The royalty revenue of NeoFuse up 27.3% QoQ and up 89.6% YoY due to increasing production from new and existing products from OLED, DDI, ISP, DTV, DRAM and others.

✓ PUF-based IP licensing in 2021 increased 140.9% YoY due to strong demand for PUF-based solution.

Technology	Q4 2021								
	Total Revenue			Licensing Revenue			Royalty Revenue		
	% of Q4 Revenue	Change (QoQ)	Change (YoY)	% of Q4 Licensing	Change (QoQ)	Change (YoY)	% of Q4 Royalty	Change (QoQ)	Change (YoY)
NeoBit	35.2%	-3.6%	0.0%	14.5%	-39.7%	-11.2%	42.4%	3.7%	1.5%
NeoFuse	57.1%	22.0%	46.6%	63.4%	10.4%	-6.3%	54.8%	27.3%	89.6%
PUF-Based	3.0%	585.6%	647.7%	11.6%	580.4%	639.6%	0.1%	2,188.9%	100.0%
MTP	4.7%	-54.5%	13.9%	10.5%	-68.2%	11.3%	2.7%	6.3%	17.6%

Technology	FY 2021					
	Total Revenue		Licensing Revenue		Royalty Revenue	
	% of FY 2021 Revenue	Change (YoY)	% of FY 2021 Licensing	Change (YoY)	% of FY 2021 Royalty	Change (YoY)
NeoBit	38.8%	1.5%	19.9%	45.9%	46.7%	-3.8%
NeoFuse	51.9%	58.4%	55.4%	15.6%	50.4%	91.6%
PUF-Based	1.2%	142.7%	4.2%	140.9%	0.0%	100.0%
MTP	8.1%	119.2%	20.5%	220.8%	2.9%	12.1%

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Royalty Revenue by Wafer Size

Q4 Royalty Breakdown

12-inch
49.7%
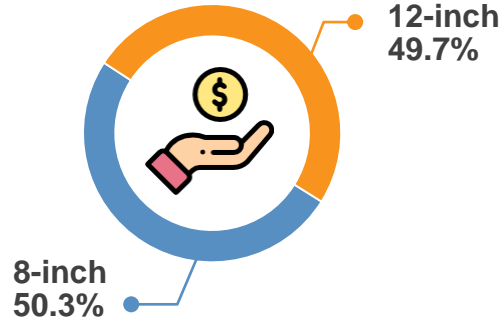
8-inch
50.3%

✓ 8-inch wafers contributed 50.3% of royalty, up 11.2% sequentially and 13% YoY due to more production from PMIC, DDI, Fingerprint and Sensors.

✓ 12-inch wafers contributed 49.7% of royalty, up 20.3% QoQ and 74.4% YoY due to continuous production from WiFi 6/6E, OLED, ISP, DTV, DRAM and more.

Wafer Size	Q4 2021			FY 2021	
	% of Q4	Change (QoQ)	Change (YoY)	% of FY 2021	Change (YoY)
8-Inch	50.3%	11.2%	13.0%	52.5%	8.9%
12-Inch	49.7%	20.3%	74.4%	47.5%	62.4%

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Future
Outlook

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eMemory Embedded Everywhere

✓ eMemory's IP seeks to penetrate across all the applications

Core Tech

Security

✓ **Product Applications:**

eMemory's IPs are already applied into different applications, which includes PMIC, LCD Driver, Sensors, RFID, OLED Driver, Connectivity IC, DTV, STB, SSD Controller, Bluetooth, TDDI, MCU, Finger-print Sensor, Smart Meters, Surveillance, ISP, CIS, DRAM, Embedded Flash, IoT, AI and FPGA.

✓ **Future Target:**

AP, GPU, CPU, DPU, and Autonomous Driving

✓ **Product Application with PUF-based Security IP:**

PUF-based security IPs are being applied in AI, IoT, AIoT, GPS, PMIC and MCU.

✓ **PUF-based Security Solutions:**

Automotive, Communication, Networking and Vertical Market.

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Our Perspectives

Licensing & Royalty

✓ **Licensing:**

- Licensing revenue will grow due to the continued strong demand for our IPs, especially NeoFuse and PUF-related solutions.

✓ **Royalty:**

- 8-inch royalties will continue to grow due to the demand and content increase for PMIC, MCU, Fingerprint, and Sensor-related in 5G, Automotive, and IoT-related applications.

- 12-inch royalties will have strong growth as customers are ramping up production for TDDI, OLED, ISP, DTV, STB, WiFi 6/6E, Bluetooth, Ethernet, Switch, TWS, DRAM and others.

- Royalties for 12/16nm and 7nm FinFET have also started to contribute in the fourth quarter and is expected to be the next growth driver after 28nm.

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Our Perspectives
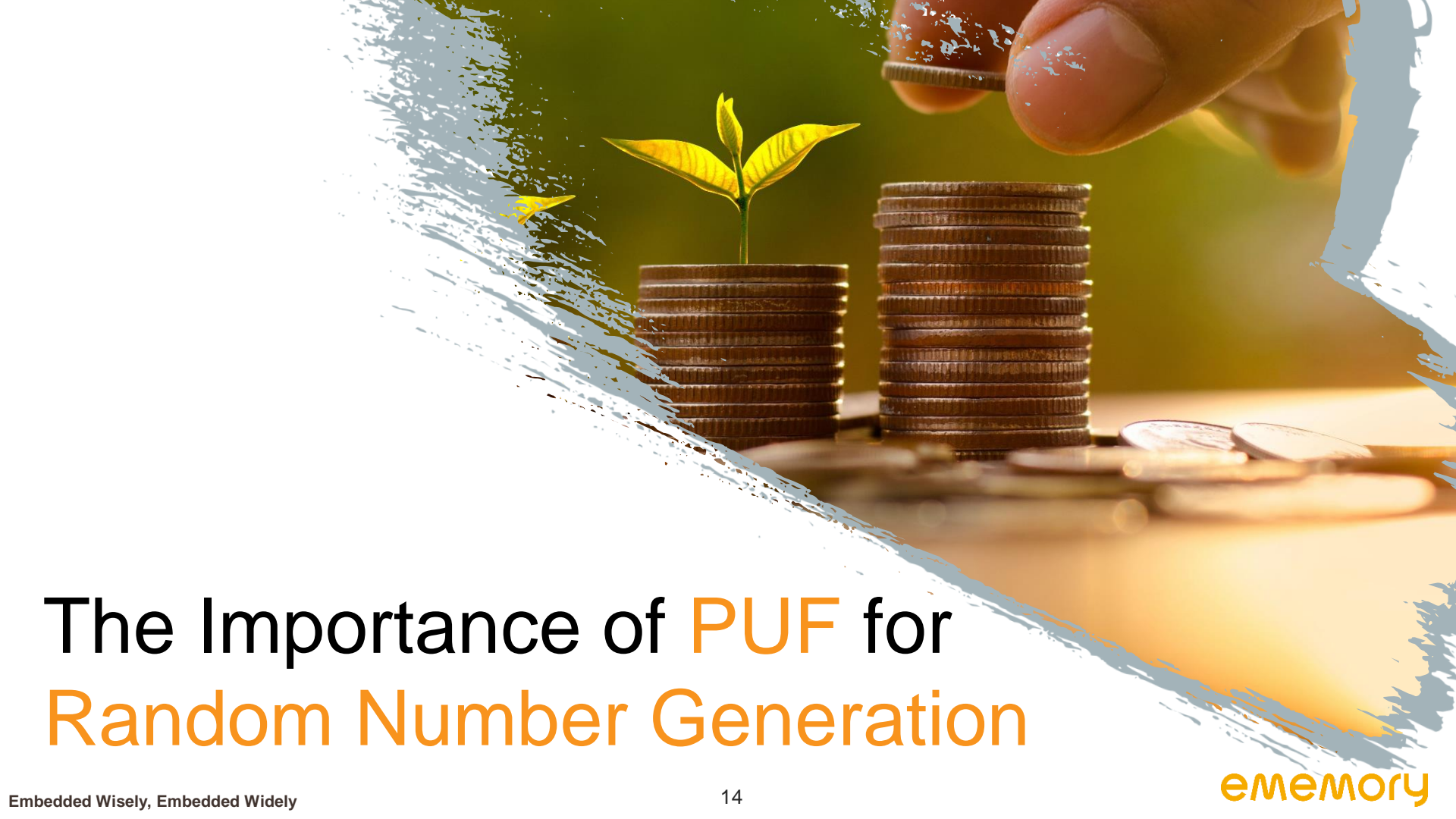
✓ **New Business Development:**

- The focus of our new application development is in the field of security. NeoFuse is replacing secret key storage for eFuse, and applications are migrating to more advanced processes, and was also adopted by automotive applications in 6/7nm.

- Business activities for PUF-based security solutions are continuing to progress in IoT, Industrial IoT, AI, Blockchain, FPGA, Data Processor Unit (DPU), Mobile Storage (UFS) and Automotive applications.

- PUFrt was selected by Arm for the secure sub-system of the Armv9 confidential computing architecture. This is significant breakthrough for our IP to be adopted by leading processor application markets.

✓ **New IP Technology Development:**

- Integrated NeoFuse and NeoPUF IP with high security function, was verified and designed in TSMC's N5 process, supporting high-end to mid-end Mobile, Consumer, AI, Networking, 5G Infrastructure, GPU, DPU and High-performance Computing.

- ReRAM IP has been qualified on the UMC 40nm process, and tape-out has begun for the 22nm process. ReRAM will extend to advanced process nodes and specialty processes such as BCD and high voltage.

- Continue to develop new security functional IPs, including PUF-based Security Co-Processors and PUF-based Security Elements.

- Develop NeoFlash in BCD as well as 28nm and below processes to solve the technology problem of traditional embedded Flash.
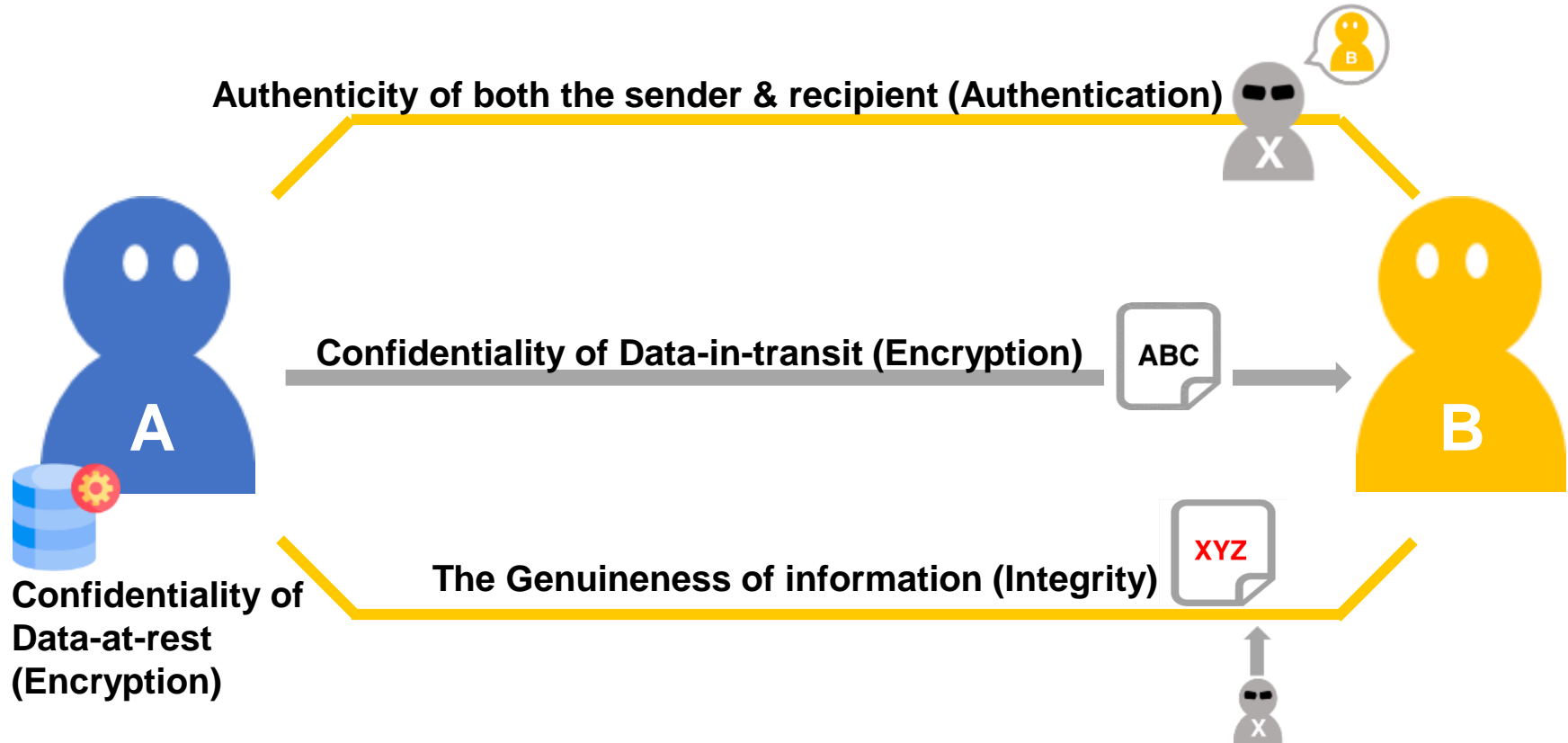
New Business & IP Technology Development

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The Importance of PUF for Random Number Generation

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Revisiting the Goals of Security

Authenticity of both the sender & recipient (Authentication)

Confidentiality of Data-in-transit (Encryption)

ABC

A

B

Confidentiality of Data-at-rest (Encryption)
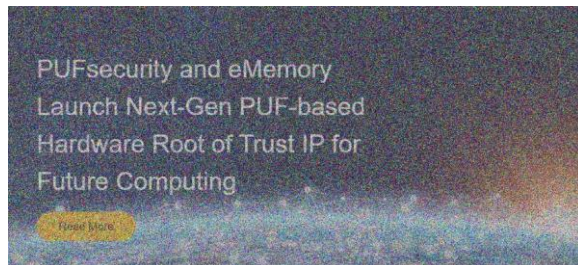
The Genuineness of information (Integrity)

XYZ

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Randomness is Pivotal in Security

- Introducing unpredictability significantly improves security

Ex: Encrypting a message using random numbers of different quality
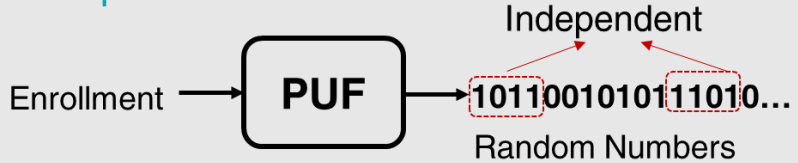

Original

Poorly Random
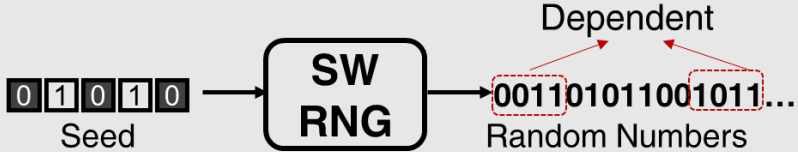
Highly Random

"The strength of a security mechanism is directly proportional to the randomness of the number it uses"

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# Methods of Generating Random Numbers

| Software RNG	Hardware RNG
Generated from Computer Programs e.g. rand() commands	Extracted from physical sources e.g., intrinsic difference in materials
Pseudorandom	Truly Random
Requires initial seed	No seed is needed
Periodic up to a certain length	Not repeatable
Deterministic, thus reproducible	Non-reproducible

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On-Chip Randomness from PUF

NeoPUF Bit-Cell

NeoPUF Enable

50% → "1" Cell
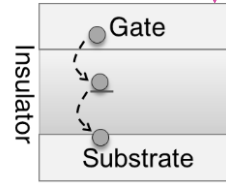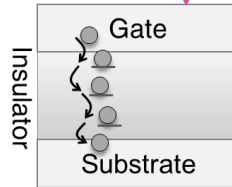
50% → "0" Cell
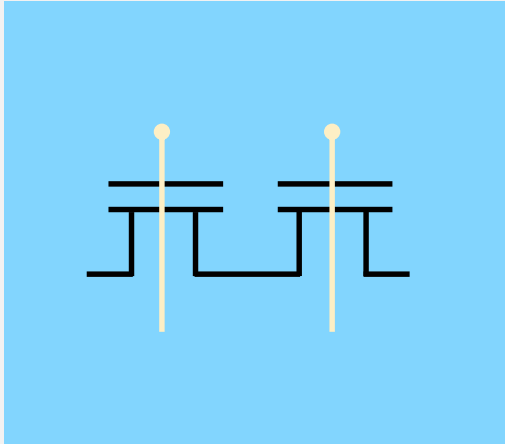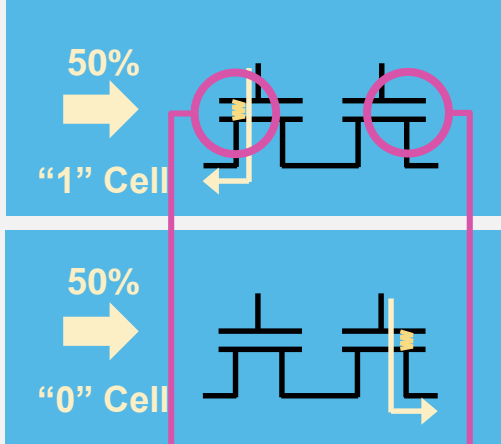
NeoPUF Array
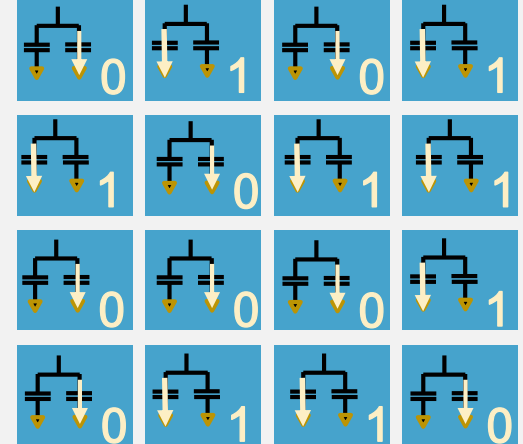
Easy to Tunnel

Difficult to Tunnel

Random Numbers should be:

- Electronically measurable on chip
- Unpredictable and Unrepeatable

Quantum Tunneling NeoPUF

- Measurable tunneling current on chip
- Unique and Randomly distributed 0s & 1s

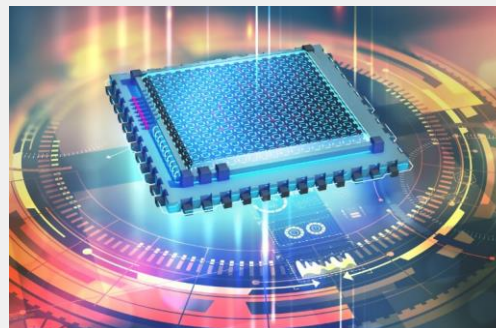*Embedded Wisely, Embedded Widely*

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Building upon PUF-based Security

PUFrt selected by ARM for v9 CCA security

- PUFrt fully integrates Key generation, Secure Storage and tRNG
- Such Hardware Root-of-Trust is indispensable for all markets spanning cloud to mobile and automotive to IoT.

eMemory partners with Intel Foundry Service

- eMemory's OTP, PUF and Security IPs will be available in Intel's leading-edge processes
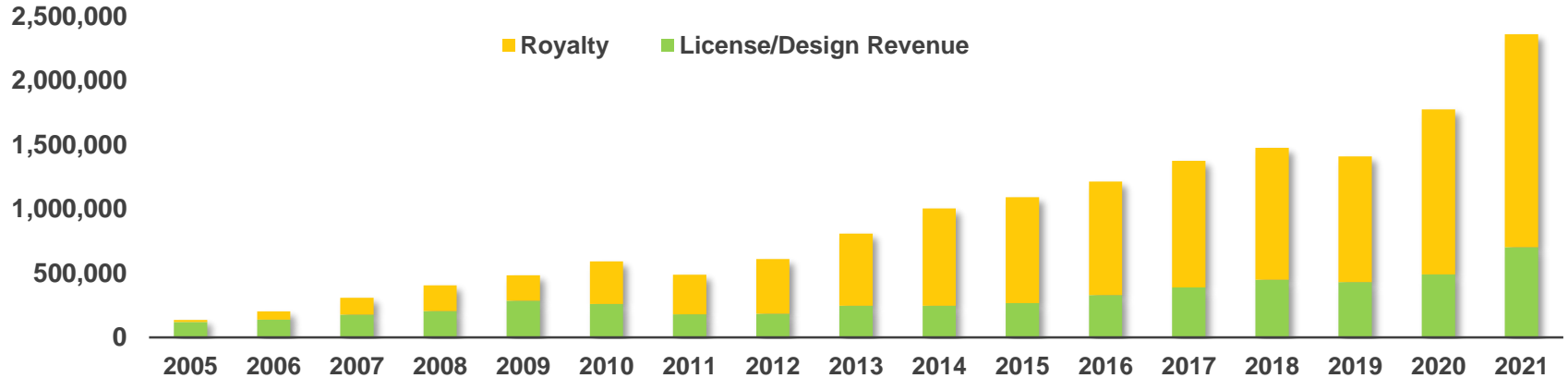- PUF-based security enables Zero Trust and enhances supply chain security

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Q&A

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Appendix

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Company Overview

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

Revenue Trend
(Unit: NT$ 1,000)

Revenue Trend chart showing Royalty and License/Design Revenue from 2005 to 2021, with values reaching approximately 2,400,000 in 2021.

Founded
In 2000
Based in Hsinchu, Taiwan.
IPO in 2011. Over 41M wafers shipped.

1000
Patents Issued
213 pending patents. 297 employees with 68% R&D personnel.

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

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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

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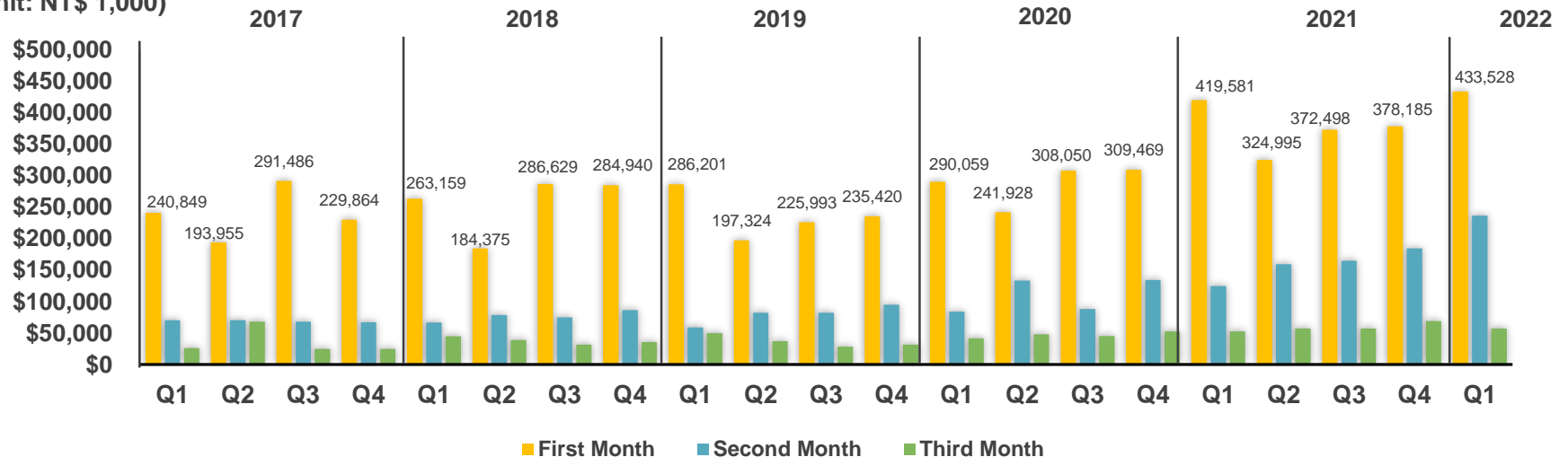
Worldwide Customers

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

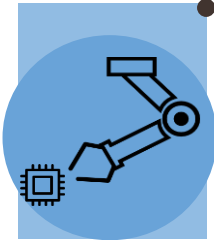| Country	Foundry	IDM	Fabless
Taiwan	4	1	324
China	9	0	979
Korea	4	0	94
Japan	4	7	75
North America	1	1	319
Europe	2	1	198
Others	1	0	83

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Business Model

✓ Recurring royalty is the backbone of our business
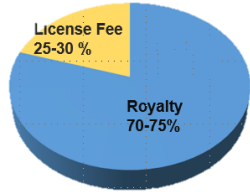
Revenue Breakdown

✓ 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

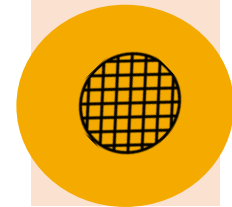1-4 years

License Fee
Foundries Process
Development

Design License Fee
Fabless Product
Development

Royalty
Wafer Mass Production

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Technology Licenses

Number of Licenses

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

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

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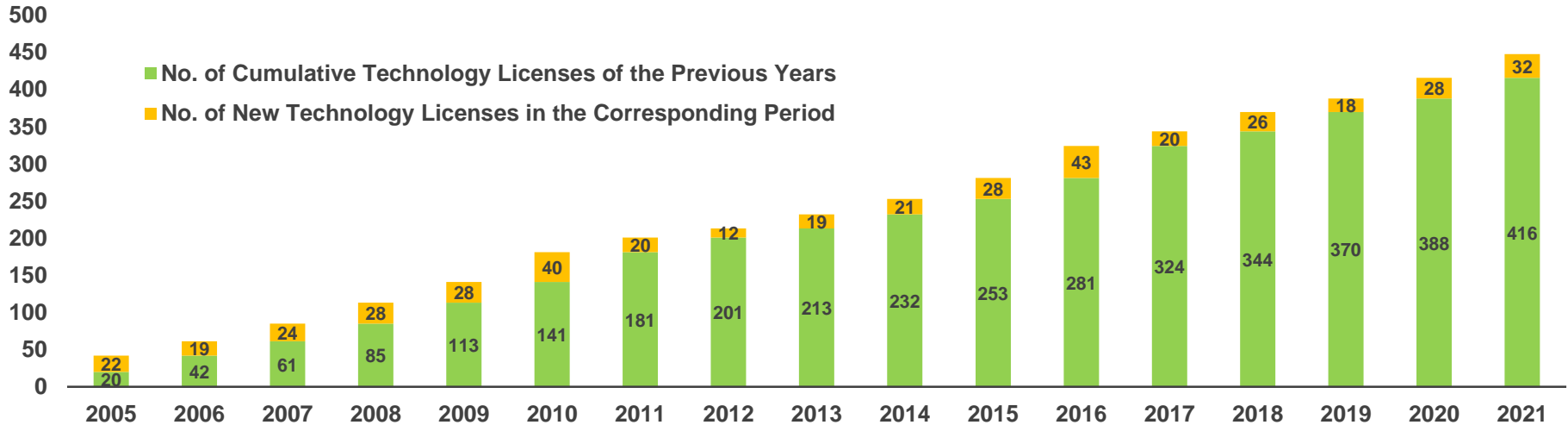
New Technology Under Development

✓ New technologies are being developed for 103 platforms by Q4 2021.

✓ 8 licensing contracts were signed.

Technology	5/6nm	7/10nm	12/16nm	22/28nm	40nm	55/65nm	80/90nm	0.11~ 0.13um	0.15~ 0.18um	>0.25um
NeoBit	-	-	-	-	-	1	1	9	11	1
NeoFuse	1	1	5	9	2	11	8	2	-	-
PUF-Based	1	-	-	-	-	1	-	-	-	-
MTP	-	-	-	2	-	6	3	8	20	-

Note: As of Dec 31st, 2021

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Technology Development

✓ Developments by process nodes

12" Fabs	Production	Development	IP Type	Process Type
5/6nm	2	2	OTP, PUF	FF
7/10nm	2	1	OTP, PUF	FF, FF+
12/16nm	6	5	OTP, PUF	FF, FF+, FFC. FFC+, LPP
28/22nm	40	11	OTP, PUF	LP/ULP/ULL, HPC/HPC+, HV-OLED, DRAM, SOI, ReRAM MRAM
40nm	20	2	OTP, PUF, MTP	LP/ULP, E-Flash, HV-DDI/OLED, ReRAM
55/65nm	32	19	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
0.13/0.11um	20	2	OTP, MTP	HV-DDI, BCD, Generic
0.18um	1	8	OTP, MTP	BCD, Generic
Total	145	59		

8" Fabs	Production	Development	IP Type	Process Type
80/90nm	9	3	OTP	HV-DDI, LL, BCD
0.13/0.11um	74	17	OTP, MTP, PUF	HV/HV-MR, BCD, LP/LL, CIS, Green, Flash, SOI, Generic
0.18/0.16/0.152um	219	23	OTP, MTP	HV/HV-MR, BCD, LP/LL, CIS, Green, Generic
0.25um	43	1	OTP, MTP	BCD
0.3/0.35um	52	0	OTP	UHV, BCD
0.4/0.5um	11	0	OTP	UHV, BCD
Total	408	44		

Note: As of Dec 31st, 2021

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