

eMemory

Investor Presentation

eMemory Technology Inc.

January 2018

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eMemory – the Embedded IP Expert

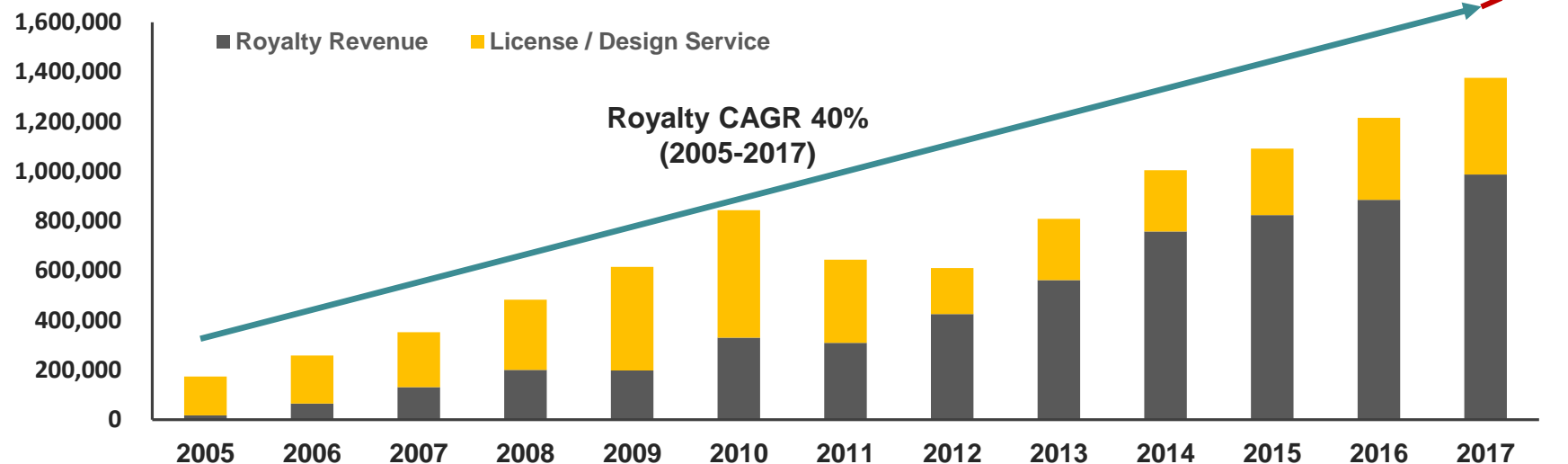
- **Key Summary**
- **Value Creations**
- **Financials**

Company Overview

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

(Unit: NT\$ 1,000)

Revenue Trend



Key Facts

- Headquartered in Hsinchu (Taiwan), founded in 2000, IPO in 2011
- 100% gross margins, 48.6% OP margins
- Ranking no. 7 semiconductor IP vendor
- Over 18.5 mlns of wafers shipped.
- Over 510 patents Issued, another 240 pending
- 238 employees (70% R&D personnel)
- Largest embedded NVM IP vendor
- TSMC Best IP Partner Award since 2010

Worldwide Customers

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

Global Customers

	Foundry	IDM	Fabless
Taiwan	5	0	261
China	8	0	513
North America	1	2	242
Europe	2	1	111
Korea	3	0	71
Japan	4	8	52
Others	1	0	53



Foundry

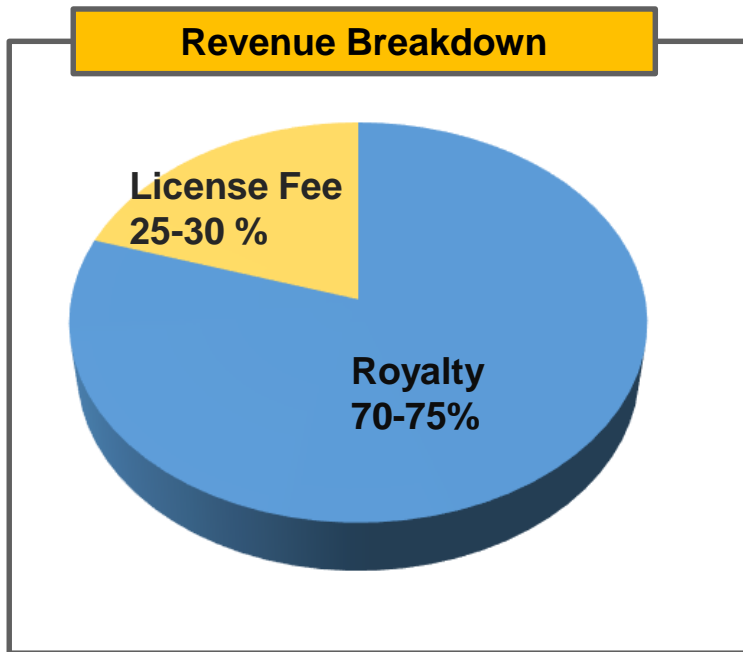
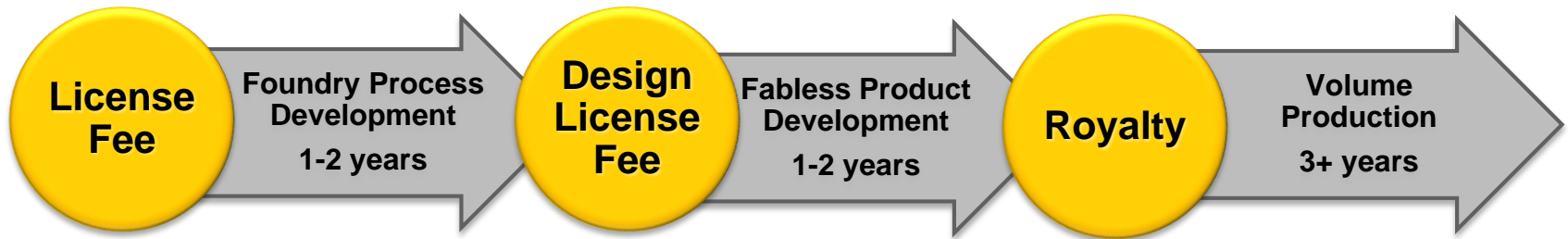


IDM



Business Model

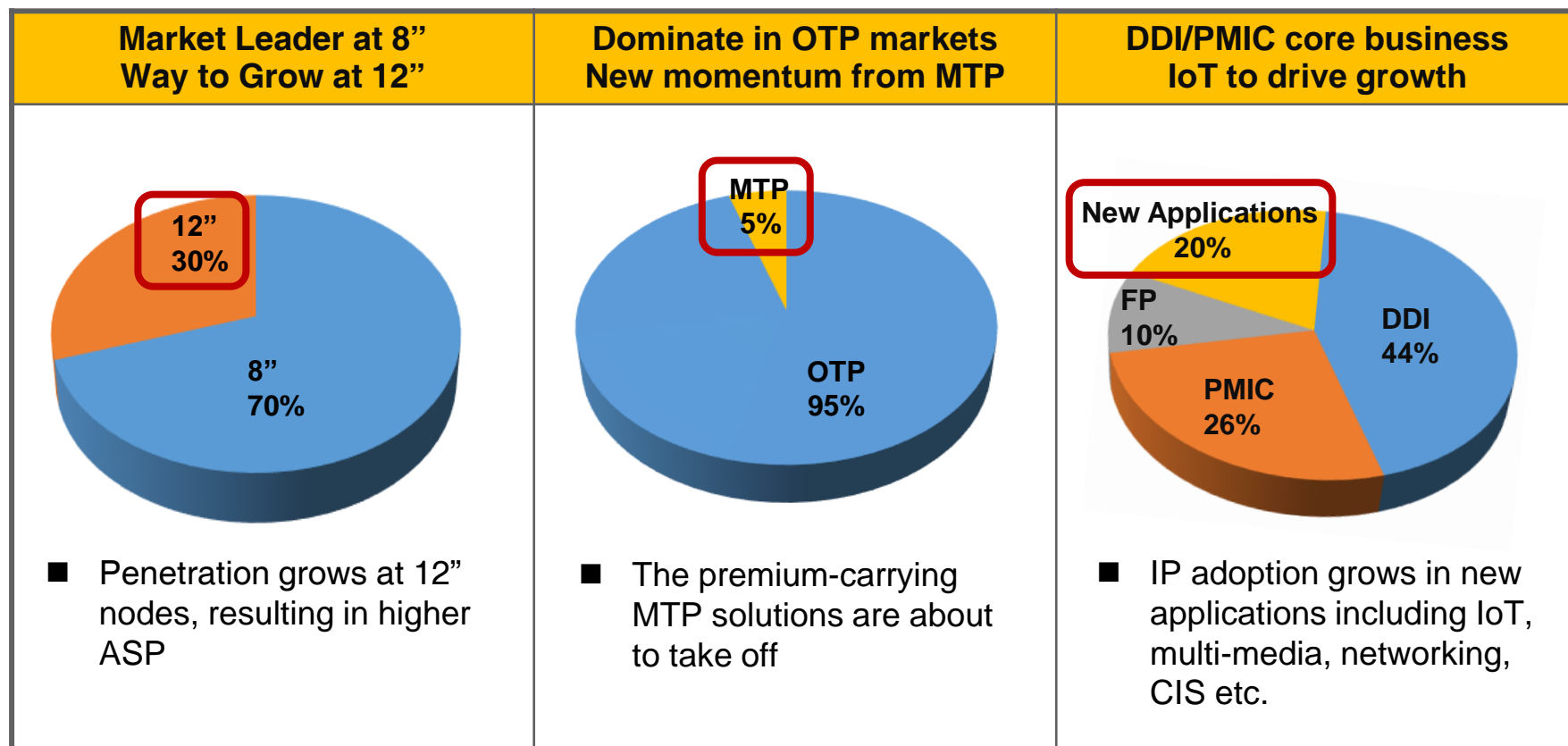
Recurring royalty is the backbone of our business



- 70-75% of revenue is from royalty based on wafer productions
- Royalty rates are based on IP type and wafer
- Royalty revenue is a key growth driver:
 - More adoption = more volume shipment
 - More advanced node wafers = Higher ASP per wafer

Growth Engines

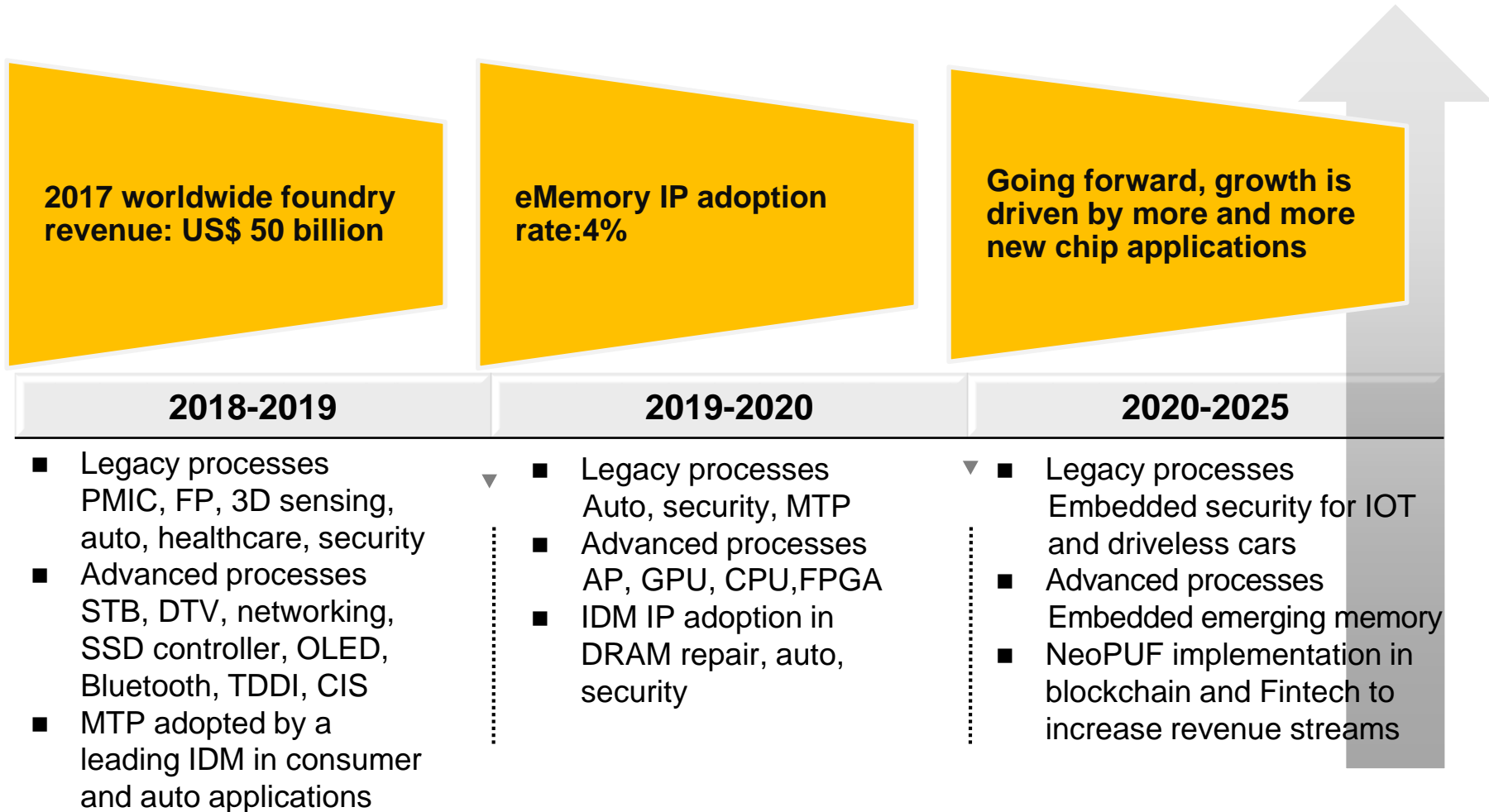
What supports our current growth, What drives our **Future Growth**



As of Q317

Growth Prospects

Our near-term, medium-term and long-term growth engines

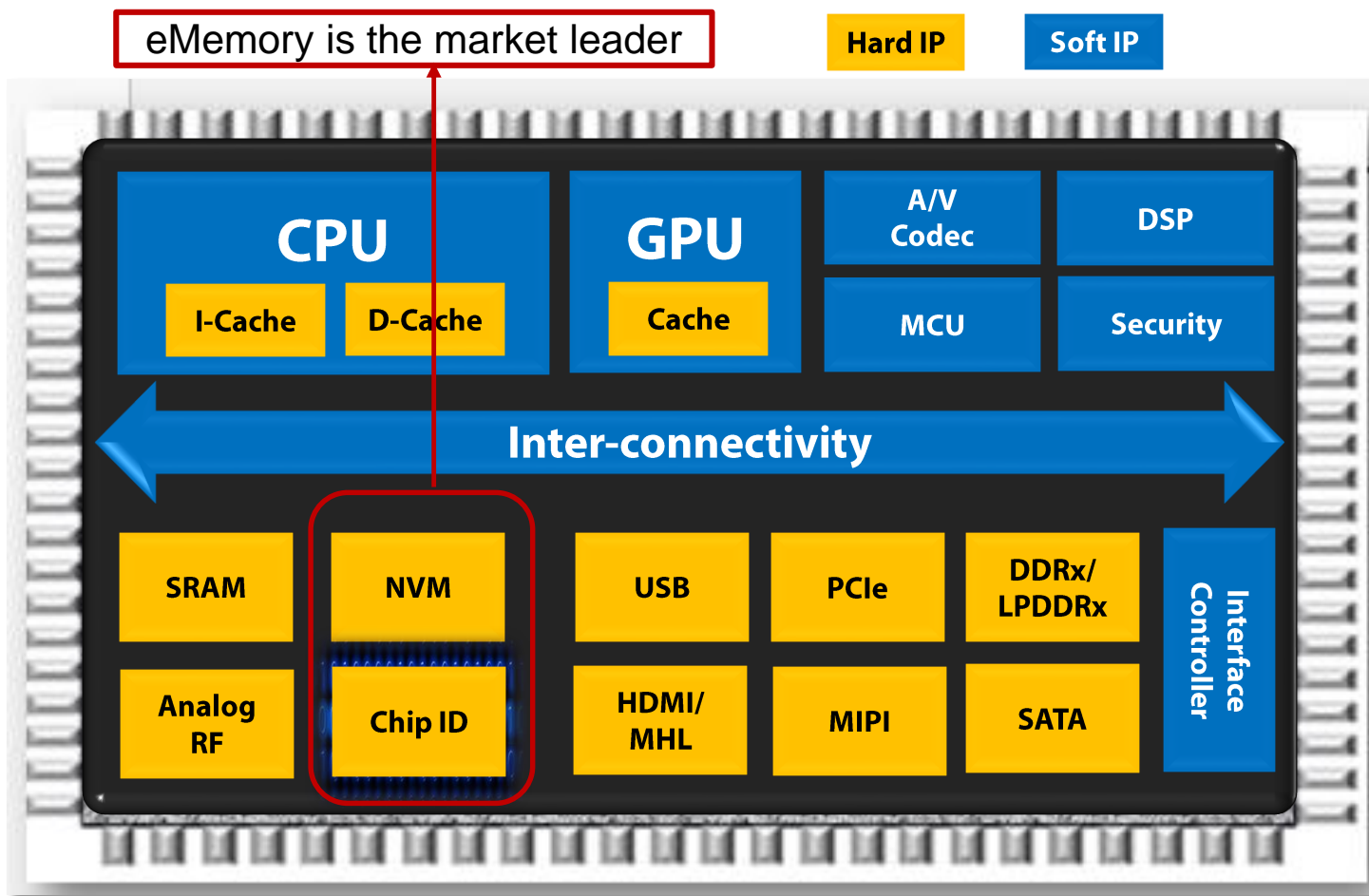


eMemory – the Embedded IP Expert

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Leading Silicon IP Provider

eMemory's embedded Non-Volatile Memory and Chip ID are foundation IP of SoC

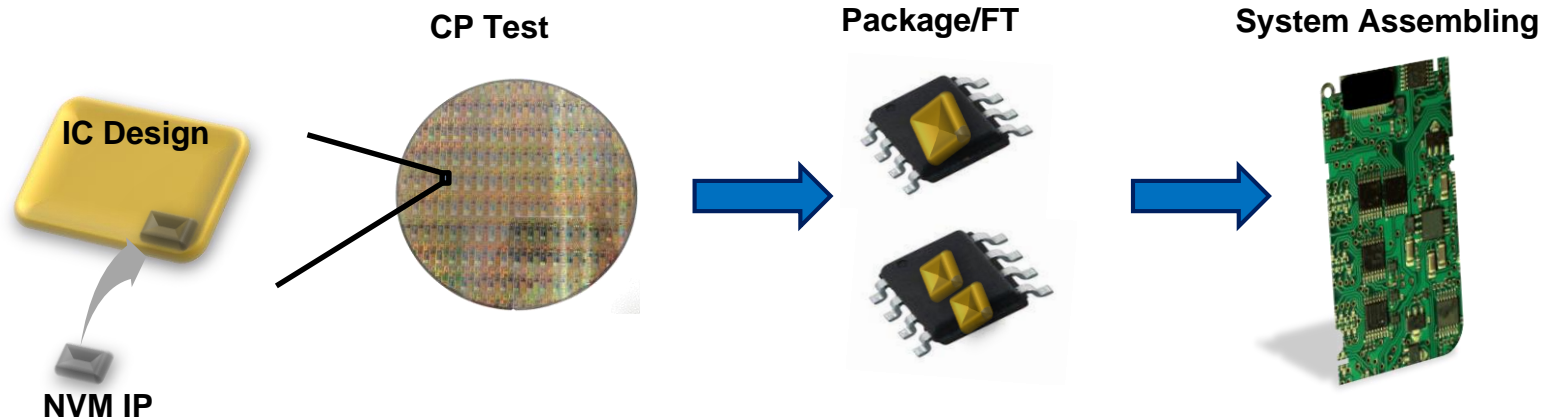


Embedded NVM Usage

eMemory's embedded NVM creates value for customers

Cost Reduction

Programmable, Configurable



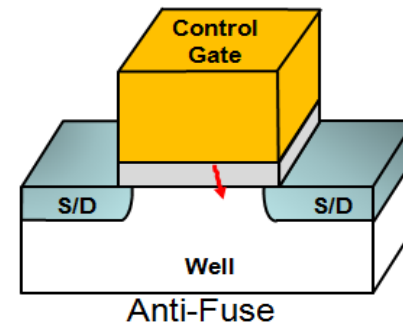
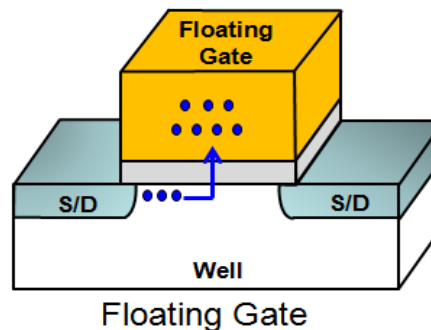
Security

Secure Data Storage

eFuse Key: Data is easily observed



Invisible Hardware Key : Data is hard to be detected



Embedded NVM Usage

Security

Secure Data Storage

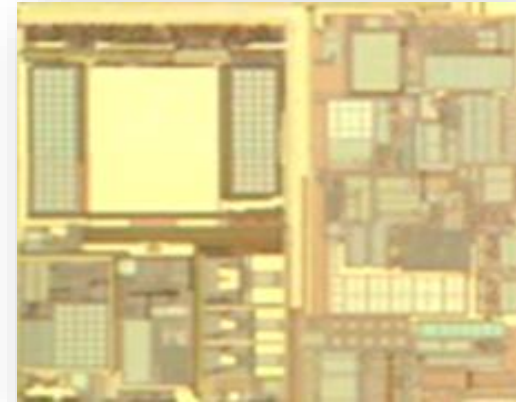
Authorized Product



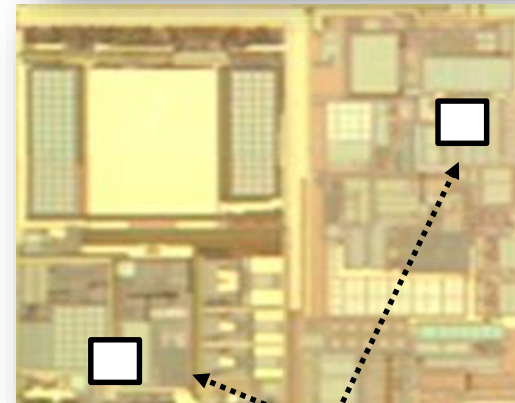
Without protection



Fake Product



With protection

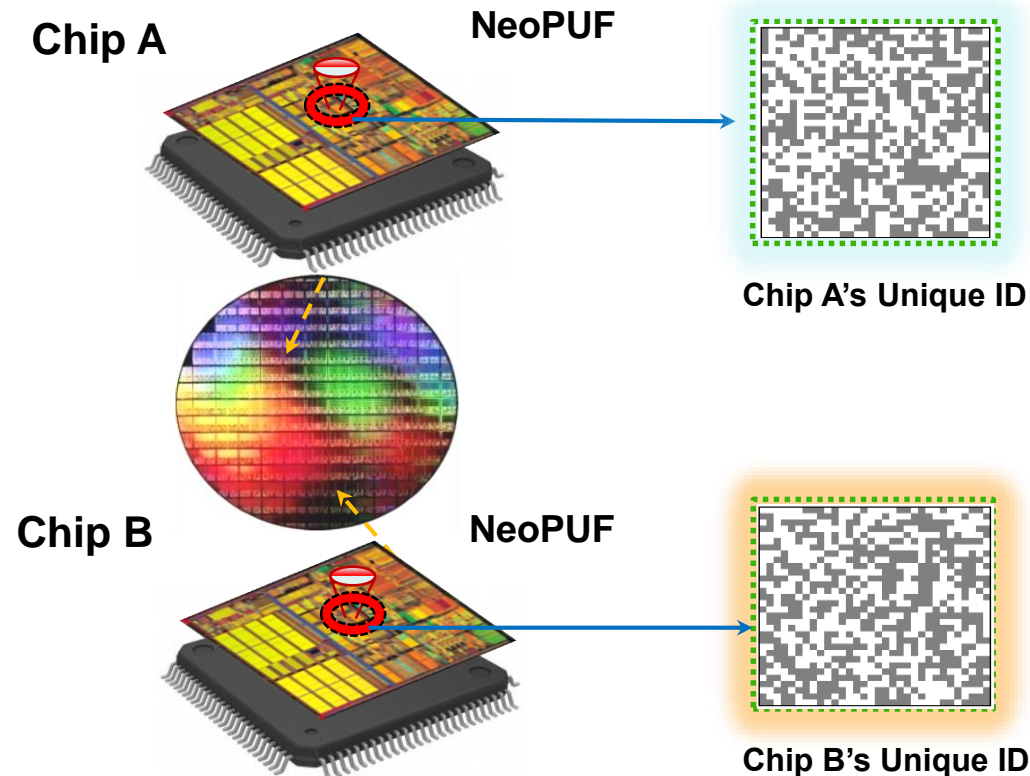


Security IP/Code by Authorized Use

Can NOT Work w/o Security IP/Code

Technology that Defines the Future

eMemory's Chip ID is the security element in every emerging big trends



Ideal for Crypto Applications

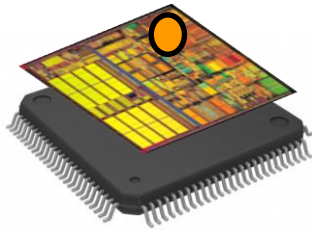
Physically Unclonable Function

- **Deep-rooted Root of Trust**
Based on uncontrollable silicon manufacturing variations
- **Unclonable & Unpredictable**
Manufacturing variations cannot be controlled or replicated
- **Chip-Unique**
Every Chip bears its unique
 - ✓ Chip ID
 - ✓ Entropy source

Secure HW& SW from Chip-level

eMemory's chip ID provides the fundamental security for every single chip

Silicon PUF



Unclonable Entropy Source



Deploy Security From NeoPUF Entropy

- Chip inherent physical characters digitalized and used as **Entropy Source**
- Every chip can generate its own **Unique ID** and **Crypto Keys**
- **Personalization of keys** serves as a damage control
- Security Applications include **chip ID, authentication, data encryption, SW code encryption, secure firmware update** etc.

Global Security Market Forecast

eMemory's NeoPUF is set to capitalize on the promising new markets



IoT/IoT



Fintech



Connected Car

By 2027 global IoT security market is forecast

US\$48 billion in revenue*

CAGR of 14.9% (2017-2027)



Data Center



Chip Vendor/OEM IP Protection

'Internet of Things (IoT) Security Product Market: Global Industry Analysis 2012-2016 and Opportunity Assessment 2017-2027', Future Market Insight

eMemory – the Embedded IP Expert

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Financial Income Statement

Amount in Thousands of NT Dollars, except margins/EPS/ROE

	Q3 2017	Q2 2017	Q3 2016	change (QoQ)	change (YoY)
Revenue	384,423	332,220	309,367	15.7%	24.3%
Gross Margin	100%	100%	100%	-	-
Operating Expenses	205,291	188,562	173,605	8.9%	18.3%
Operating Margin	46.6%	43.2%	43.9%	3.4ppts	2.7ppts
Net Income	194,062	135,610	130,299	43.1%	48.9%
Net Margin	50.5%	40.8%	42.1%	9.7ppts	8.4ppts
EPS	2.56	1.79	1.72	43.0%	48.8%
ROE	40.2%	29.6%	28.9%	10.6ppts	11.3ppts

Q4 Revenue Breakdown

Revenue (thousands of NT dollars)

K NTD	Q4 2017	Q3 2017	QoQ	Q4 2016	YoY	2017	2016	YoY
Licensing	78,811	101,087	-22.04%	79,684	-1.10%	388,184	330,087	17.60%
Royalty	243,055	283,336	-14.22%	226,543	7.29%	987,574	885,372	11.54%
Total	321,866	384,423	-16.27%	306,227	5.11%	1,375,758	1,215,459	13.19%

Number of Licenses

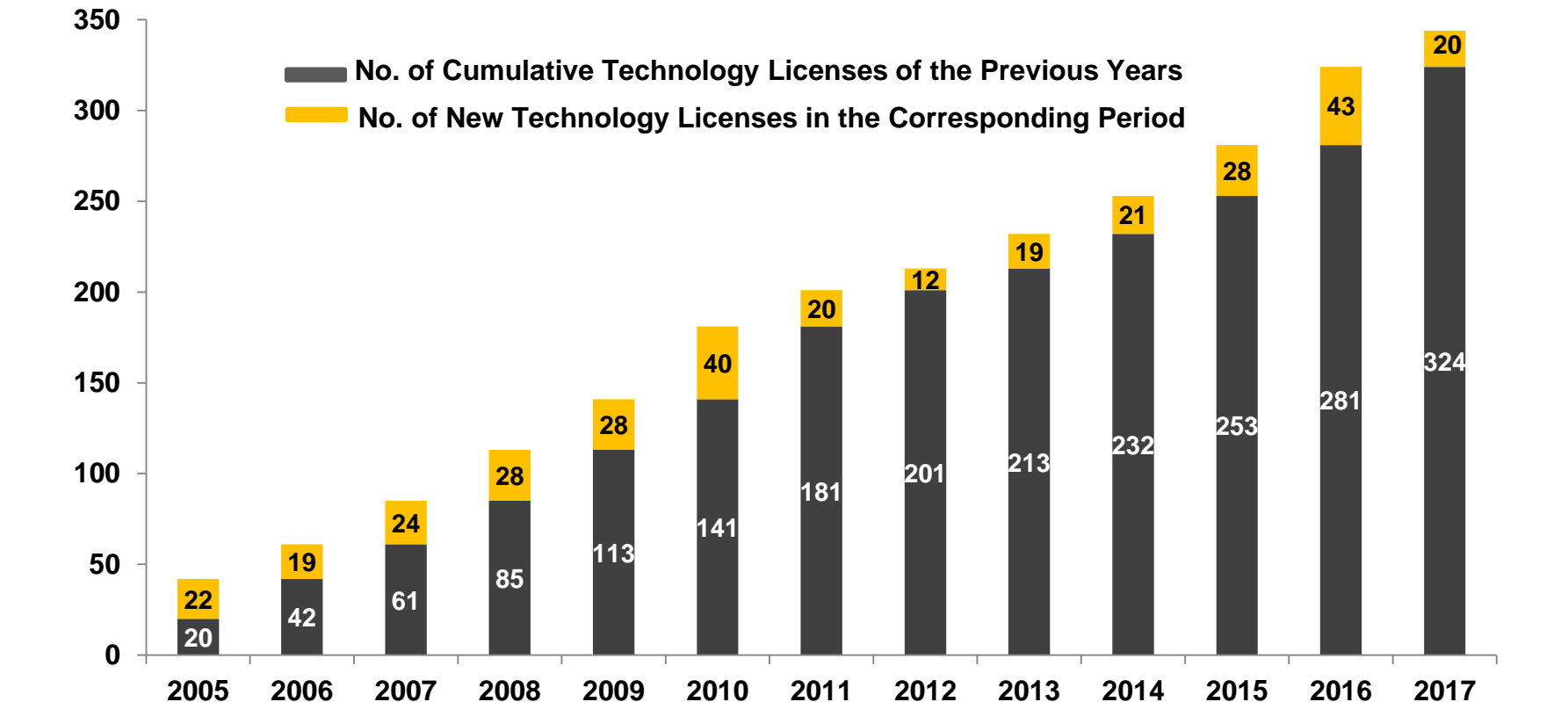
		Q4 2017	Q3 2017	2017	2016
Technology Licenses		3	4	20	43
Design Licenses	NRE	15	23	55	56
	Usage	78	87	325	311

Technology Licensing

Number of Licenses

Year	2014	2015	2016	2017
License	21	28	43	20

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 Technologies Under Development

- New technologies being developed for **106** platforms by Q4 17.
- **18** for NeoBit, **40** for NeoFuse, **3** for NeoPUF, **18** for NeoEE, and **27** for NeoMTP.

	7/10nm	12/14/16nm	28nm	40nm	55/65nm	80/90nm	0.11~ 0.13um	0.15~ 0.18um	>0.25 um
NeoBit	-	-	-	-	1	-	7	10	
NeoFuse	3	3	10	4	8	7	1	4	-
NeoPUF	-	-	1	-	2	-	-	-	-
NeoEE	-	-	-	-	-	-	2	16	-
NeoMTP	-	-	-	1	2	2	7	15	-

As of Dec. 31st, 2017

Technology Developments by Processes

12" Fabs	Production	Development	NVM Type	Process Type
7/10nm	0	3	OTP	FF
14/16nm	2	3	OTP	FF+
28nm	10	11	OTP	LP/HPM, HLP/HPM, LPS
40nm	10	5	OTP, MTP	HV-DDI, LP, eFlash
55/65nm	15	13	OTP, MTP	LP, HV-DDI, HV-OLED, DRAM, CIS, eFlash
80/90nm	7	6	OTP, MTP	HV-DDI, HV-OLED, LP, eFlash
0.13/0.11um	9	2	OTP	HV-DDI, BCD, Generic
0.18um	1	0	OTP	BCD
Total	54	43		

8" Fabs	Development	NVM Type	Process Type
90nm	3	OTP	HV-DDI, LL
0.13/0.11um	15	OTP, MTP	HV-DDI, BCD, LP, RF, CIS, LL, Green
0.18/0.16/0.152um	45	OTP, MTP	Generic, LP, LL, MR, HV, Green, BCD
0.25um	0	OTP, MTP	BCD
0.35um	0	OTP	UHV
Total	63		

Note: As of Dec. 31st, 2017

Application Markets

12"

8"

7nm	10nm	12/14/16nm	28nm	40nm	55/65nm	80/90nm	110/130nm	160/180nm	250nm	350nm
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NeoBit



NeoFuse



NeoFlash



NeoEE

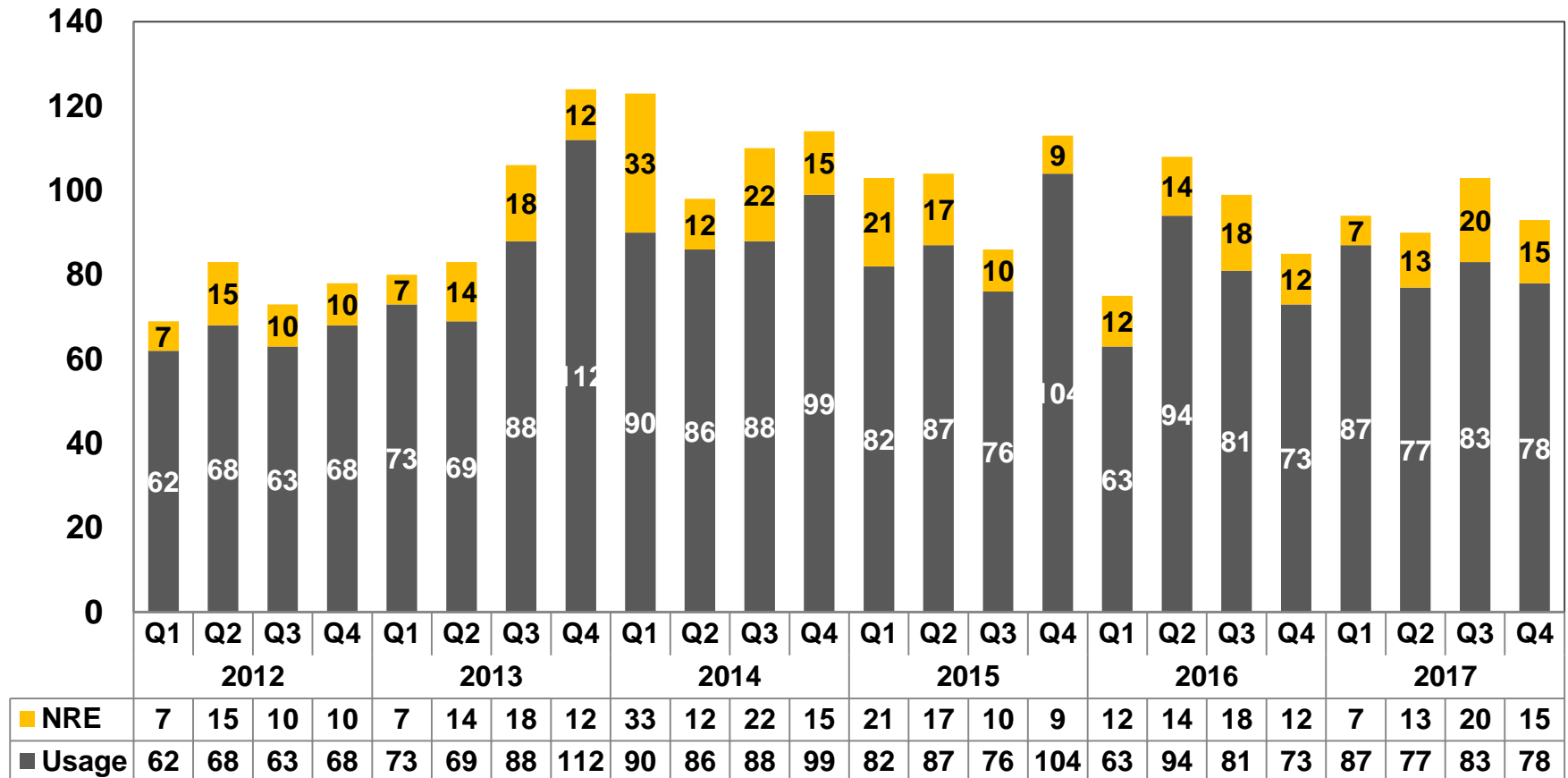


NeoMTP



Design Licensing (New Tape-Out)

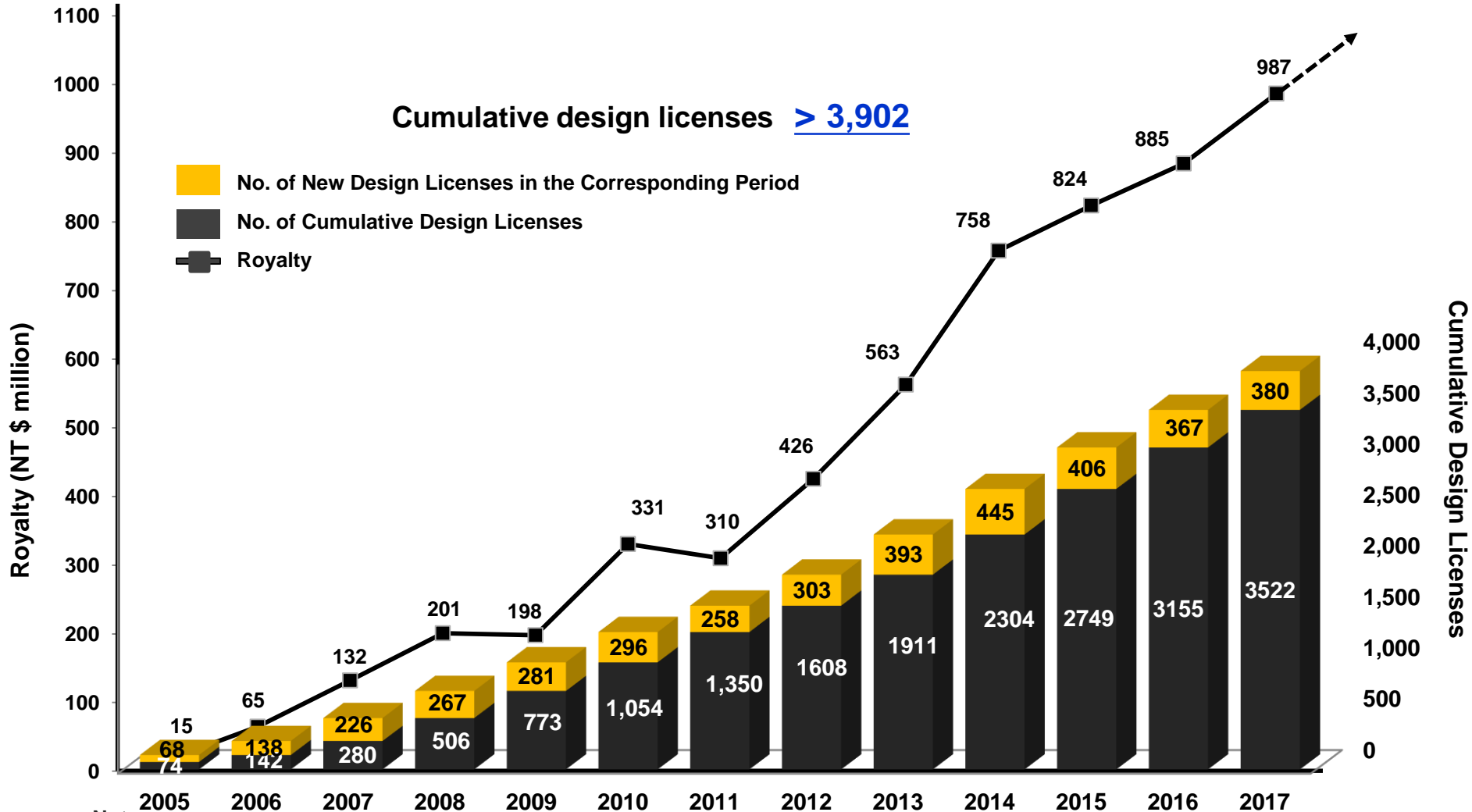
- A total **380** NTO in Q1-Q3 2017 (**367**@2016, **406**@2015, **445**@2014, **393**@2013)



Note*: As the applications of MCU at several foundries have gradually entered mass production, and the business model of the main foundry partner which provides green process has shifted to — eMemory licenses IP cell to the foundry for it to provide direct design service to customers - as the result, the new tape out number of MCU has been affected, but the royalty coming from IP cell usage continues to roll in.

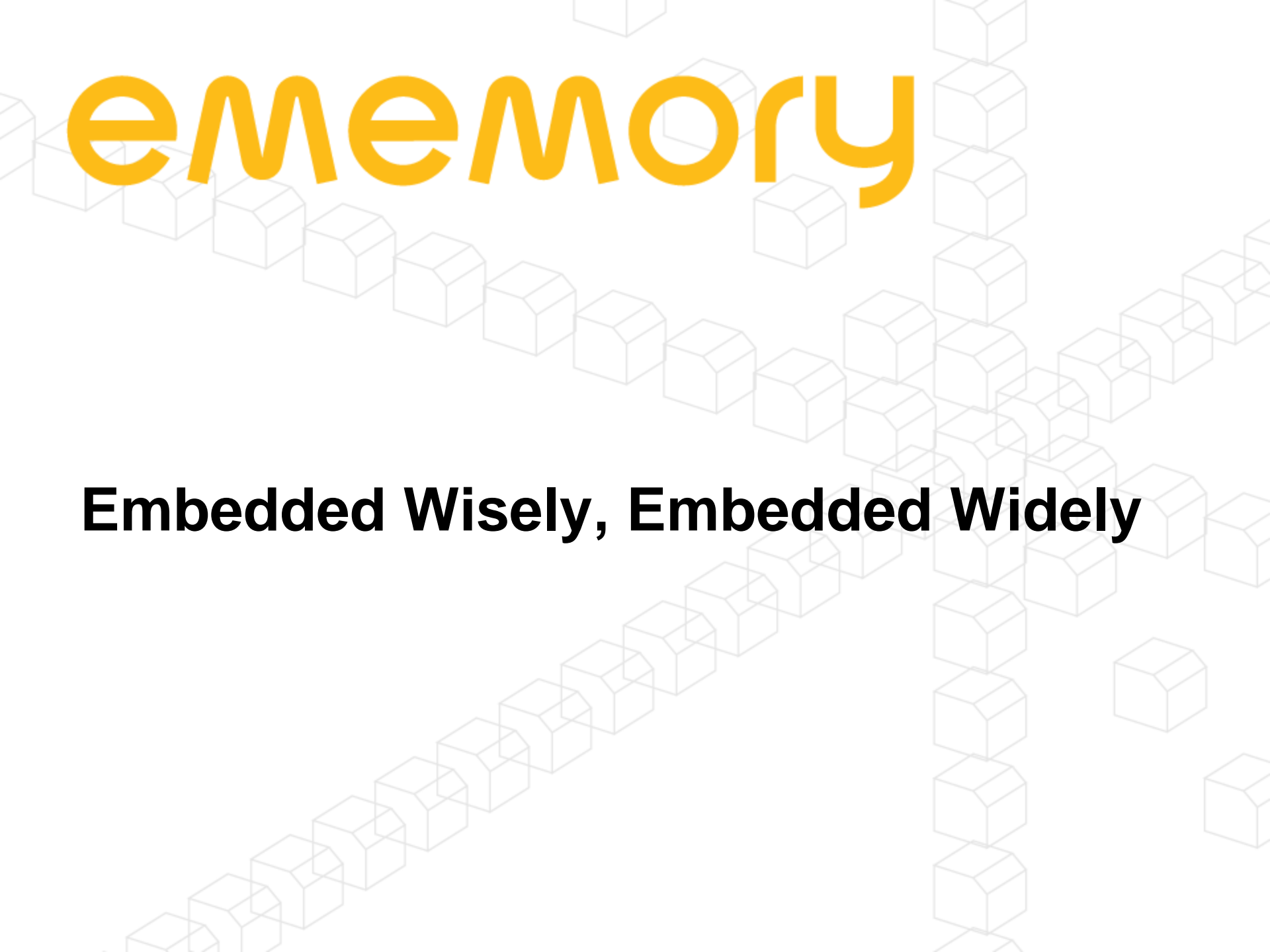
In summary, even the new tape out number of MCU is lower than before; the corresponding wafer output and royalty continue to grow.

Cumulative Licenses Drive Future Royalties



Note

- 1: Due to the 2009 recession, royalty income was down 1.5% from the previous year.
- 2: Prepaid royalty from a single customer contributed to 2010 annual growth of 67%, followed by a drop of 6.3% in 2011.
- 3: CAGR for 2009-2013 was 30%.



ememory

Embedded Wisely, Embedded Widely