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A Leading Logic NVM Company

March, 2015

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Outline

- **Business Model**

- **Review of Operations for 4Q14**

- **Growth Opportunity and Future Outlook**

- **Q & A**

What's Logic Non-Volatile Memory (NVM)

Embedded NVM = LOGIC + 10 Masks
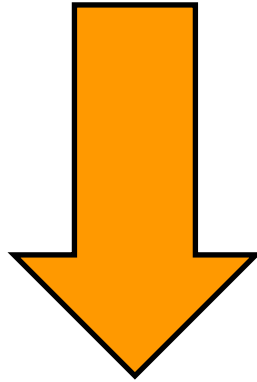
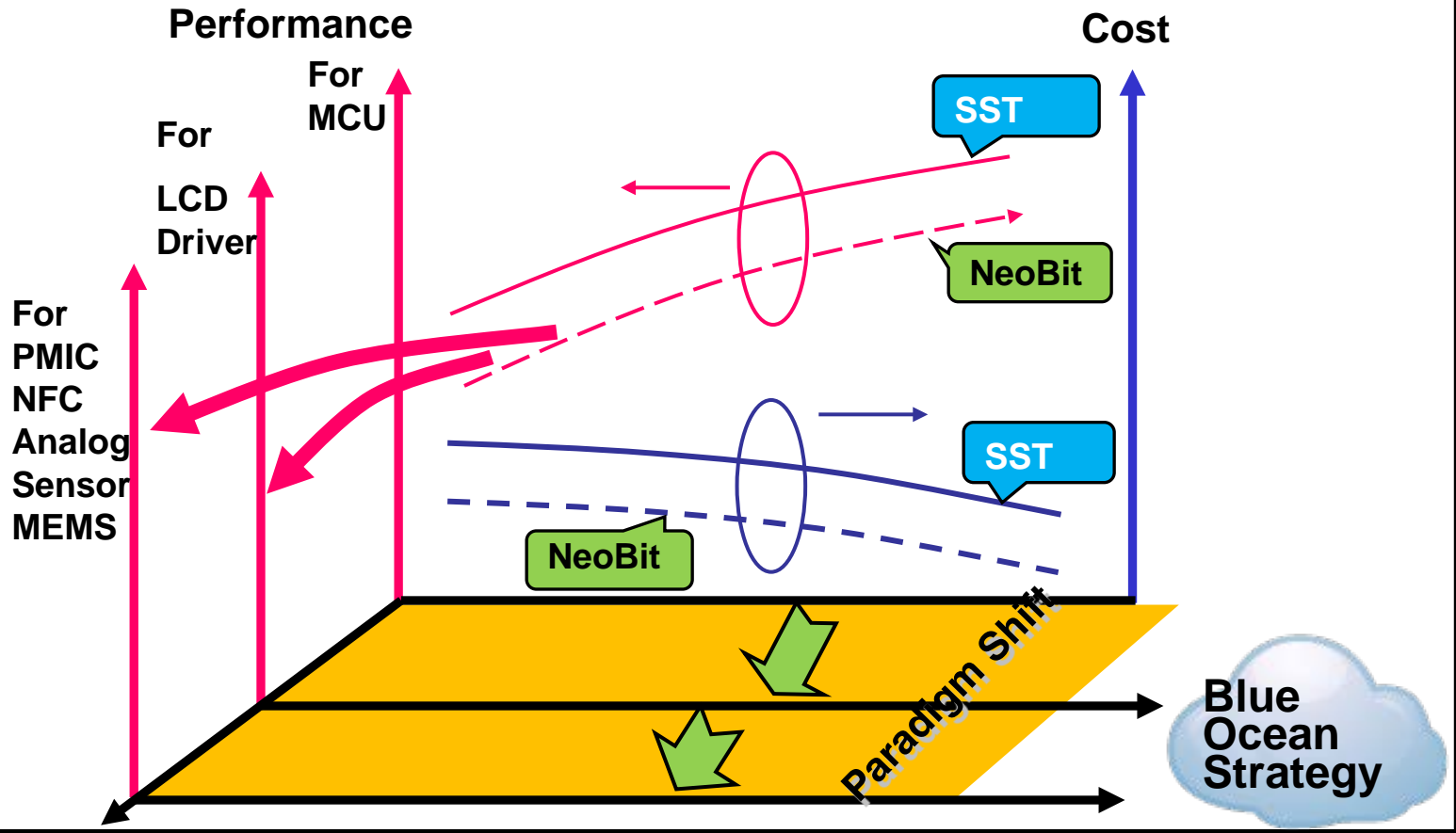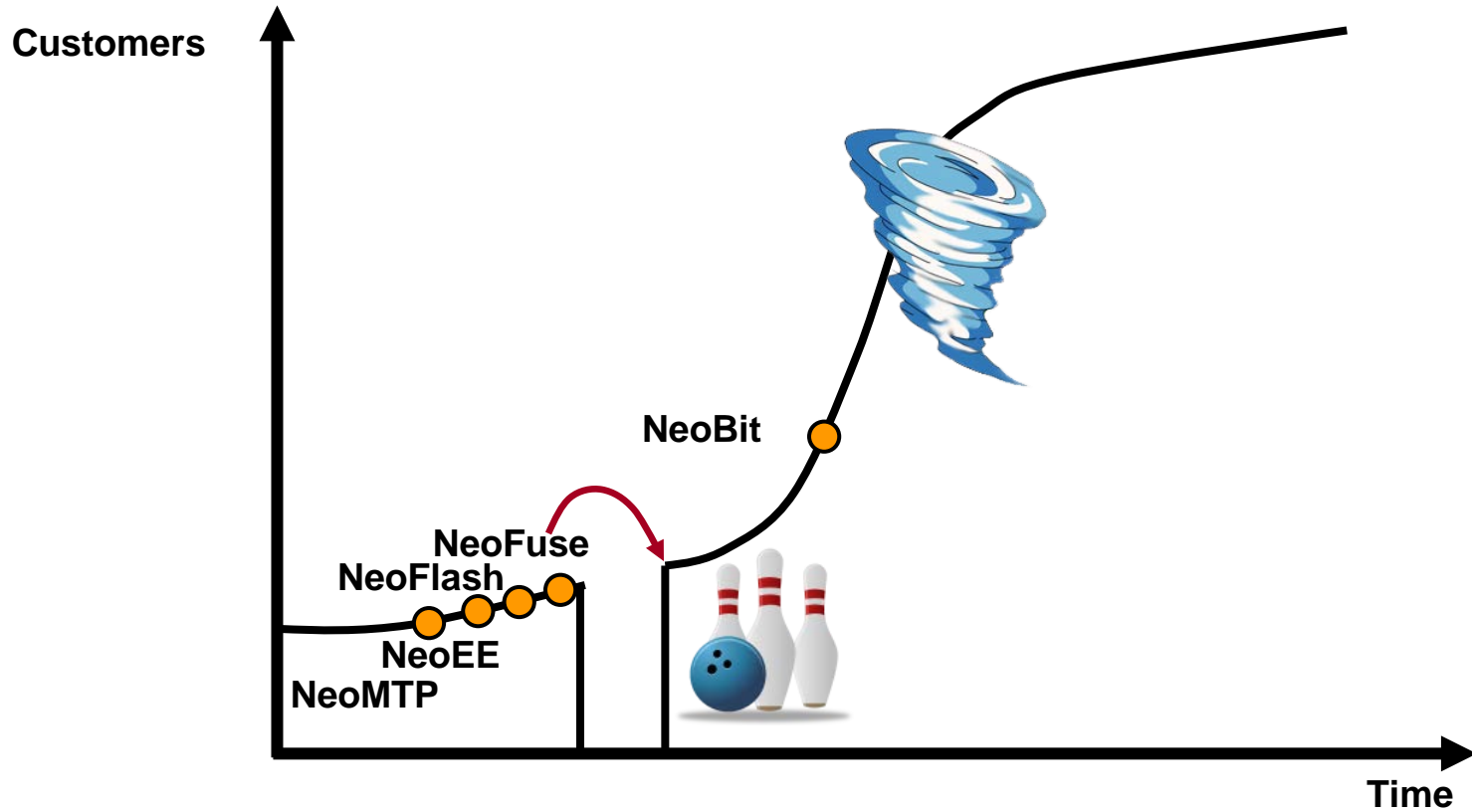*30% more
cost reduction*

Embedded LOGIC NVM = LOGIC

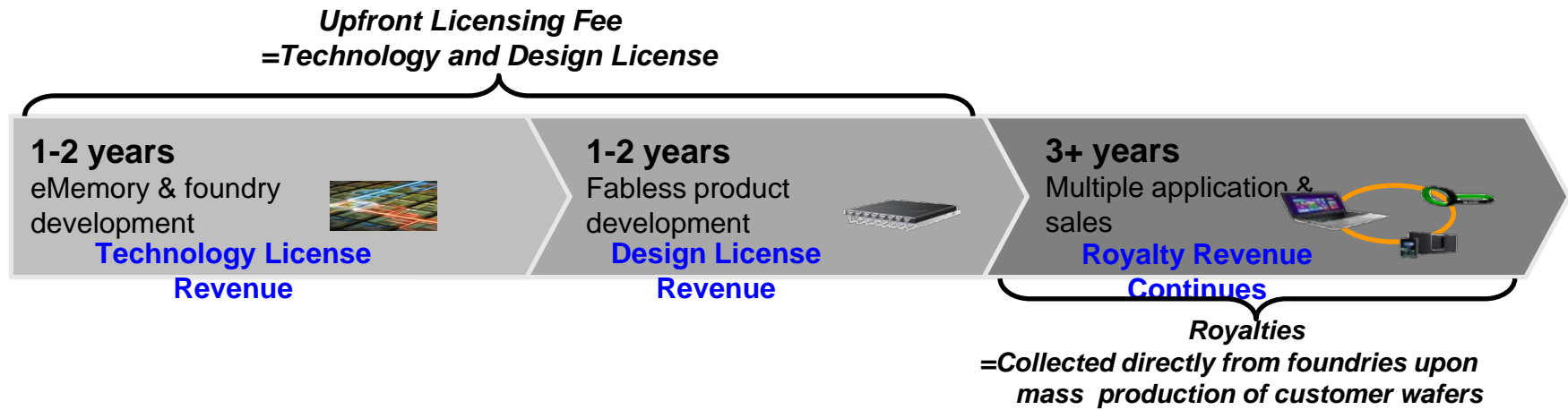# What We Have Done

Innovation, Innovation, and Innovation！

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Crossing the Chasm

Customers

NeoBit

NeoFuse
NeoFlash
NeoEE
NeoMTP

Time

Business Model

- **Founded in 2000. First customer engaged in 2002. Achieved profitability in 2005 and IPO in 2011. The largest logic non-volatile memory IP company, 216 employees (149 R&D).**

- **Since its IPO, the company initiated no new fund raising or bank debt, and has distributed in excess of 100% of earnings in cash dividends.**

- **Growth Indices: 1) No. of on-going technology platforms**
  2) No. of design licenses
  3) Royalty

Upfront Licensing Fee
=Technology and Design License

1-2 years	1-2 years	3+ years
eMemory & foundry development	Fabless product development	Multiple application & sales
Technology License Revenue	**Design License Revenue**	**Royalty Revenue Continues**

Royalties
=Collected directly from foundries upon
mass production of customer wafers

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Worldwide Customers

Foundry

IDM

	Taiwan	China	Korea	Japan	North America	Europe	Others
Foundry	5	6	3	2	1	0	1
IDM	0	0	0	8	2	1	0
Fabless	226	331	49	31	168	80	31

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Patent Portfolio

	3Q14	4Q14	Diff.
Pending	160	166	+6
Issued	255	269	+14
Total	415	435	+20
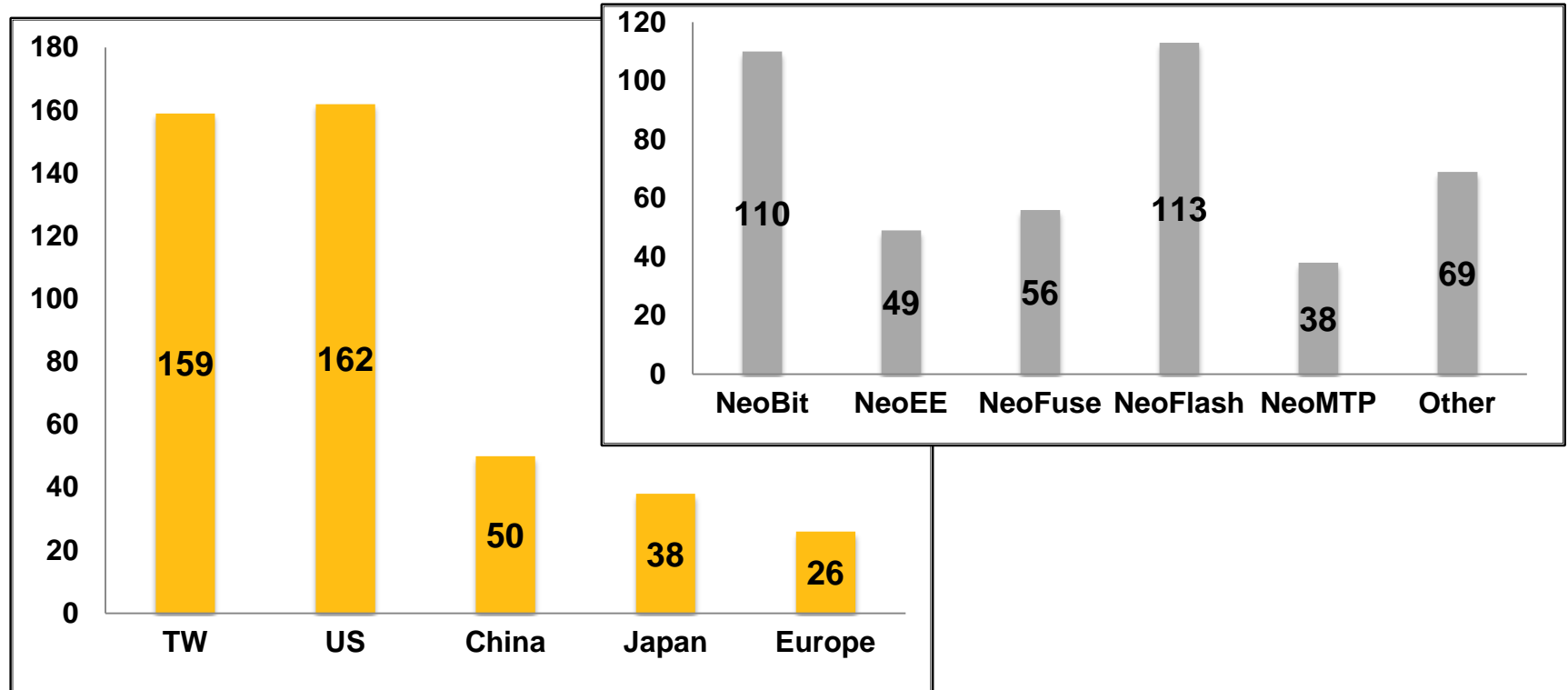
Quarterly Revenue Pattern

- **The quarterly royalty from most of foundries are collected at first month of each quarter and from some other foundries are collected at second month, and none at third month.**

Unit：NTD Thousands
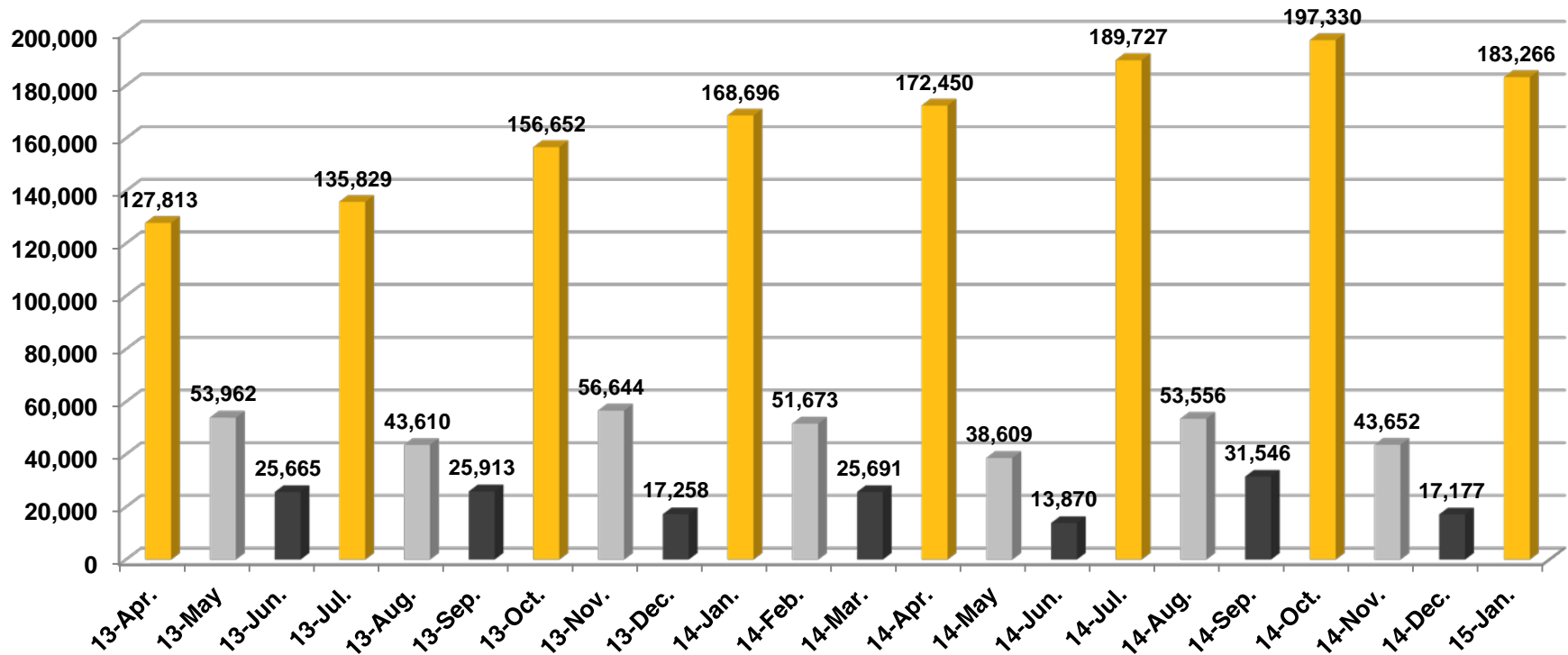
Month	Revenue
13-Apr.	127,813
13-May	53,962
13-Jun.	25,665
13-Jul.	135,829
13-Aug.	43,610
13-Sep.	25,913
13-Oct.	156,652
13-Nov.	56,644
13-Dec.	17,258
14-Jan.	168,696
14-Feb.	51,673
14-Mar.	25,691
14-Apr.	172,450
14-May	38,609
14-Jun.	13,870
14-Jul.	189,727
14-Aug.	53,556
14-Sep.	31,546
14-Oct.	197,330
14-Nov.	43,652
14-Dec.	17,177
15-Jan.	183,266

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4Q Revenue Breakdown

Unit: NTD thousands

	4Q14	3Q14	% change	4Q13	% change	2014	2013	% change
Licensing	51,849	61,981	-16.35%	56,933	-8.93%	246,073	245,688	0.16%
Royalty	206,310	212,848	-3.07%	173,621	18.83%	757,904	562,570	34.72%
Total	258,159	274,829	-6.07%	230,554	11.97%	1,003,977	808,258	24.21%

Unit: Number of contracts

		4Q14	3Q14	2014	2013
Technology Licenses		3	6	21	19
Design Licenses	**NRE**	15	22	82	51
	Usage	99	88	363	342

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Financial Income Statement

(Unit: NTD thousands)	4Q14	4Q13	% change	2014	2013	% change
Revenue	258,159	230,554	12.0%	1,003,977	808,258	24.2%
Gross Margin	100%	100%	-	100%	100%	-
Operating Expenses	148,501	124,761	19.0%	540,321	468,574	15.3%
Operating Margin	42.5%	45.9%	-3.4ppts	46.2%	42.0%	+4.2ppts
Net Income	100,896	91,268	10.5%	418,569	290,640	44.0%
Net Margin	39.1%	39.6%	-0.5ppts	41.7%	36.0%	+5.7ppts
EPS (Unit: NTD)	1.33	1.21	9.9%	5.52	3.87	42.6%
ROE	23.4%	22.9%	+0.5ppts	24.3%	18.2%	+6.1ppts

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Technology License Statistics

Unit: Number of contract

Year	2012	2013	2014
License number	12	19	21

Note: The 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.

■ **Accumulated process platform number in previous year**
■ **Process platform number in the corresponding year**

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Accumulated (previous year)	5	20	42	61	85	113	141	181	201	213	234
Corresponding year	15	22	19	24	28	28	40	20	12	21	29

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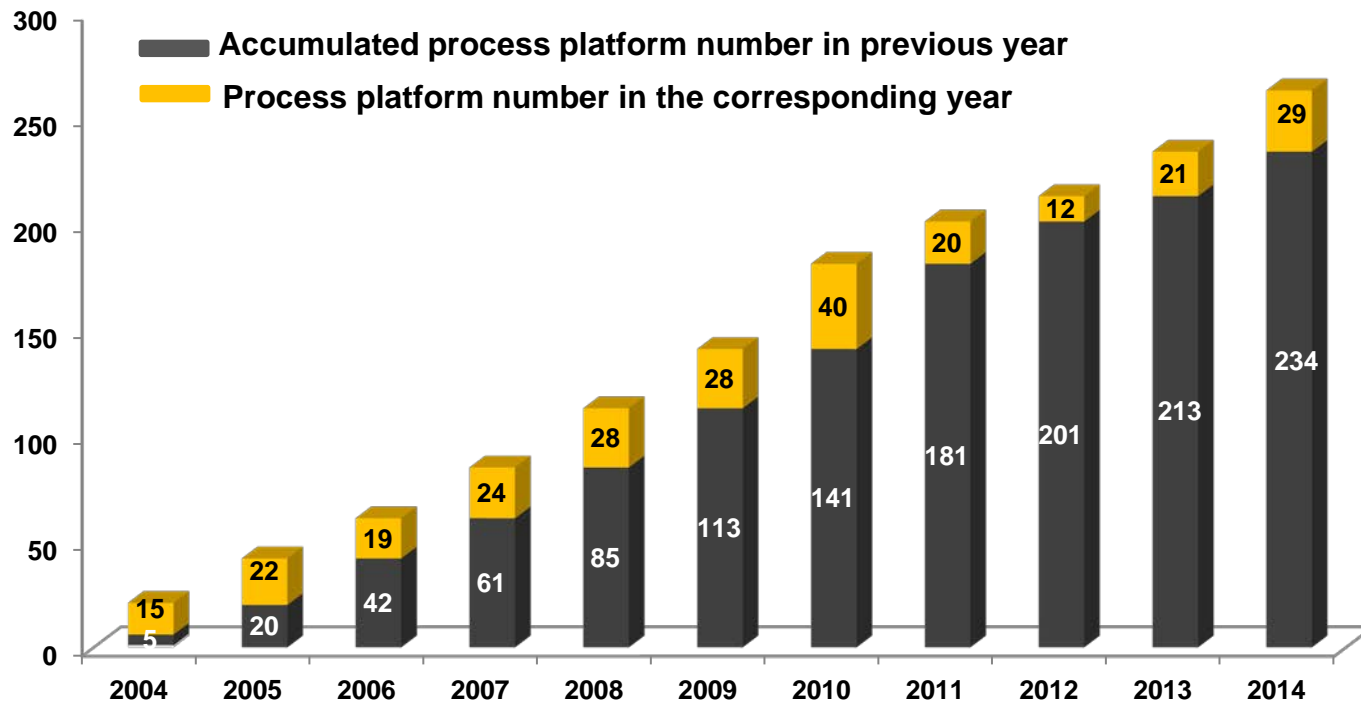
Current Technology Development Platforms

- **Total (As of Jan.) : 81***

- **27 for NeoBit, 29 for NeoFuse, 2 for NeoFlash, 15 for NeoEE, and 8 for NeoMTP.**

	16nm	28nm	40nm	55/65nm	80/90nm	0.11~0.13um	0.15~0.18um	>0.25 um	Total
NeoBit	-	-	-	1	-	9	15	2	27
NeoFuse	1	7	4	9	1	5	2	-	29
NeoFlash	-	-	-	1	-	1	-	-	2
NeoEE	-	-	2	-	1	4	7	1	15
NeoMTP	-	-	-	1	2	2	3	-	8

Note*: 2 platforms qualified in Jan.

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Current Technology Development Platforms

12" Fabs	Production	Development	NVM Type	Process Type
16nm	0	1	OTP	FF+
28nm	2	7	OTP	LP/HPM, HLP/HPM, LPS
40nm	1	6	OTP, MTP	HV-DDI, LP
55/65nm	7	12	OTP, MTP, Flash	LP, HV-DDI, HV-OLED, DRAM, CIS
80/90nm	5	4	OTP, MTP	HV-DDI, HV-OLED, LP
0.13/0.11um	4	5	OTP, Flash	HV-DDI, BCD, Generic
0.18um	1	0	OTP	BCD

8" Fabs	Development	NVM Type	Process Type
0.13/0.11um	16	OTP, MTP, Flash	HV-DDI, BCD, LP, RF, CIS, LL
0.18/0.16/0.152um	27	OTP, MTP	Generic, LP, LL, MR, HV, Green, BCD
0.25um	2	OTP, MTP	BCD
0.35um	1	OTP	UHV

*As of Jan. 31, 2015

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Quarterly Design Licensing (New Tape Out)

- Total 445 NTO as of 4Q 2014 (393@2013, 303@2012, 258@2011)

	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		2010				2011				2012				2013				2014		
TOTAL	62	85	77	72	54	52	67	85	69	83	73	78	80	83	106	124	123	98	110	114
USAGE	53	70	68	53	50	45	59	67	62	68	63	68	73	69	88	112	90	86	88	99
NRE	9	15	9	19	4	7	8	18	7	15	10	10	7	14	18	12	33	12	22	15
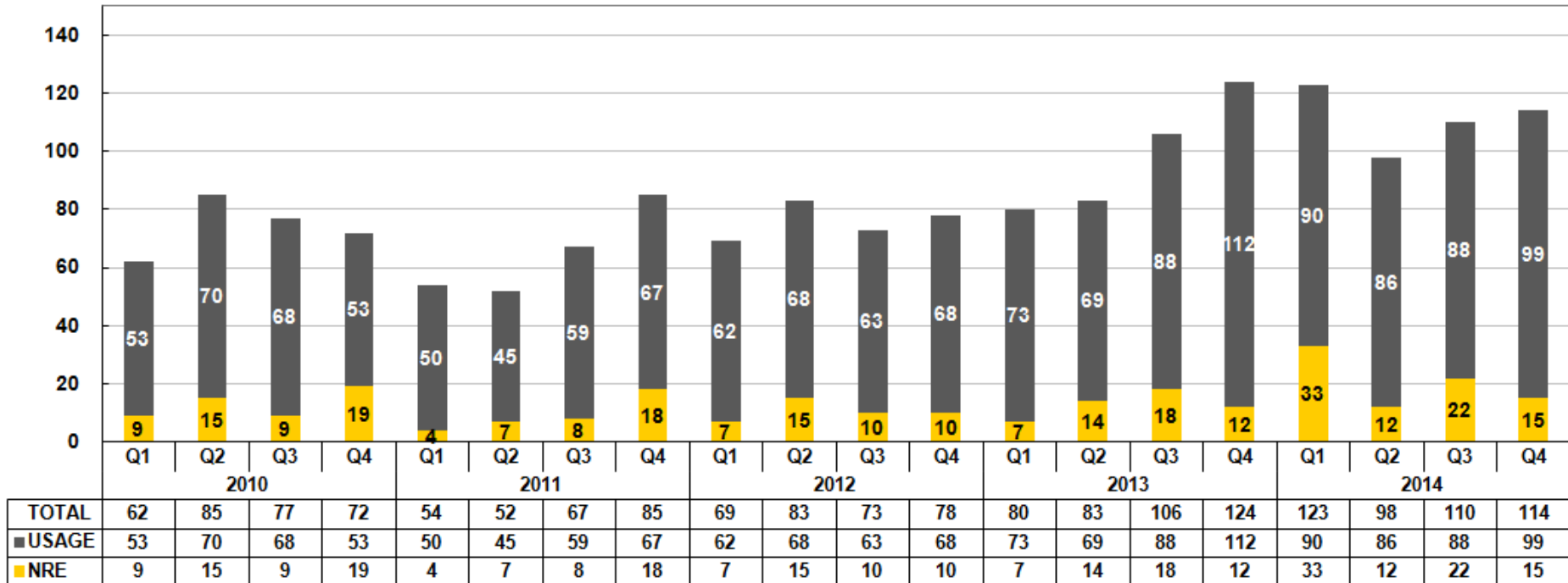
Usage：Usage of pre-qualified and verified IP (charged by per product tape out or annual package), the cycle time from design implementation to royalty payments for mass production is faster, typically less than one year.

NRE: NRE covers the customization of IP that must undergo new verification or qualification. It typically requires 1 to 1.5 years before resulting in royalty revenue.

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Accumulated Licenses Drive Future Royalties

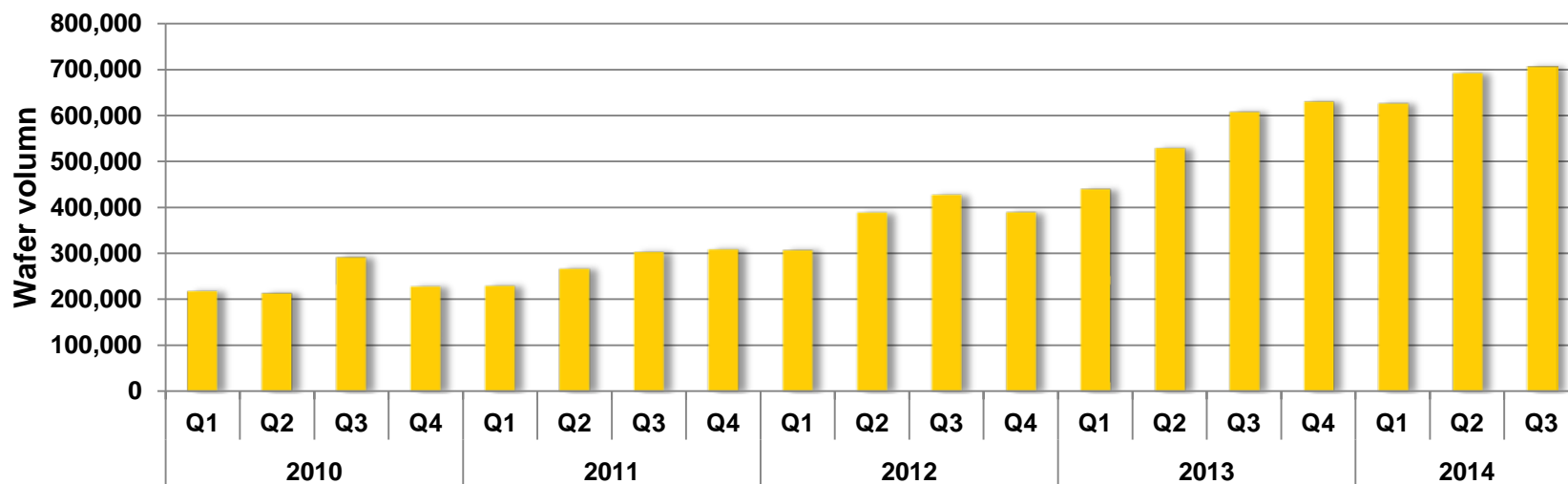Accumulated design licenses **> 2,755**
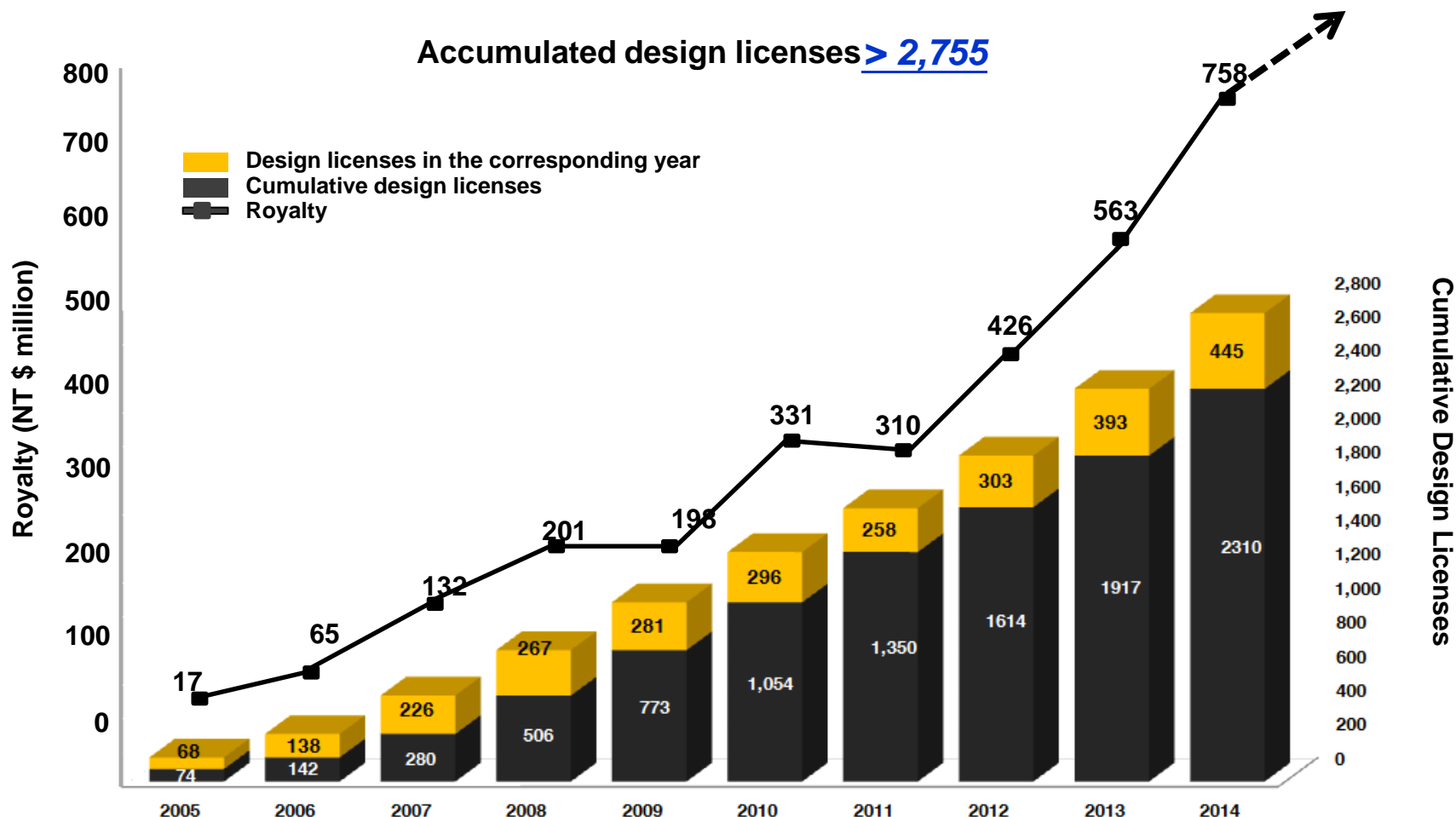
note 1: Due to the 2009 recession, royalty income was down annually 1.5%.
note 2: Pre-payment of royalty fees by a single customer contributed to 2010 annual growth of 67%,
        causing a drop of 6.3% in the following year, 2011.
note 3: CAGR for 2009-2013 was 30%.

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Wafer Production Volume

embedded eMemory IP in T Company ($revenue); * % of Process node in T company total revenue in 4Q14

	Process node	*% of T	4Q14	3Q14	2014	2013
8"	0.5+	1%	0%	0%	0%	0%
	0.25/0.35	4%	30%	33.5%	30.5%	27.3%
	0.15/0.18	12%	8%	13%	11.9%	10.7%
	0.11/0.13	2%	28.9%	21%	20.8%	19.1%
12"	90nm	6%	18.2%	16.4%	16.3%	4.8%
	65nm	11%	0.1%	0%	0%	0%
	40/45nm	13%	0%	0%	0%	0%
	28nm	30%	0%	0%	0%	0%
	20nm	21%	0%	0%	0%	0%
8"		19%	14.2%	17%	15.6%	14.2%
12"		81%	1.4%	1.6%	1.4%	0.69%
Total		100%	4.3%	5.1%	4.5%	4.1%

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Applications by Technology

	12"					8"		
16/20nm	28nm	40nm	55/65nm	80/90nm	110/130nm	160/180nm	250nm	350nm

NeoBit

NeoFuse

AP

NeoFlash

Bluetooth

NeoEE

NeoMTP

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eMemory's NVM Technologies

- **Logic NVM portfolio offers one-stop-shop solution.**
  - › Compatible to any process
  - › Robust structure
  - › Low process cost
  - › Competitive macro sizes
  - › Easy integration
  - › Easy porting

eMemory's NVM Technology	OTP		MTP		
	NeoBit	**NeoFuse**	**NeoFlash**	**NeoEE**	**NeoMTP**
Product Type	OTP	OTP	Flash	EEPROM	MTP
Endurance (Cycles)	10	10	1K~10K	10K~100K	1K~10K
Additional Mask Steps	0	0	2-3	0	0
Technology	Floating gate	Anti-Fuse	SONOS	Floating gate	Floating gate
Scalability	Simple	Simple	Simple	Simple	Simple
Memory Density	HD < 512Kb GHD < 16Mb	< 4Mb	< 2Mb	< 4Kb	< 512Kb

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Opportunity at all Price Points

eMemory Inside today

Royalty

Opportunity

| $400-700 | $750-1,000 | $1,000-4,000 | $4,000-8,000 |
| (0.5um-0.25um) | (0.18um-0.11um) | (90nm-55nm) | (40nm-16nm) |

Average Selling Price of Wafer
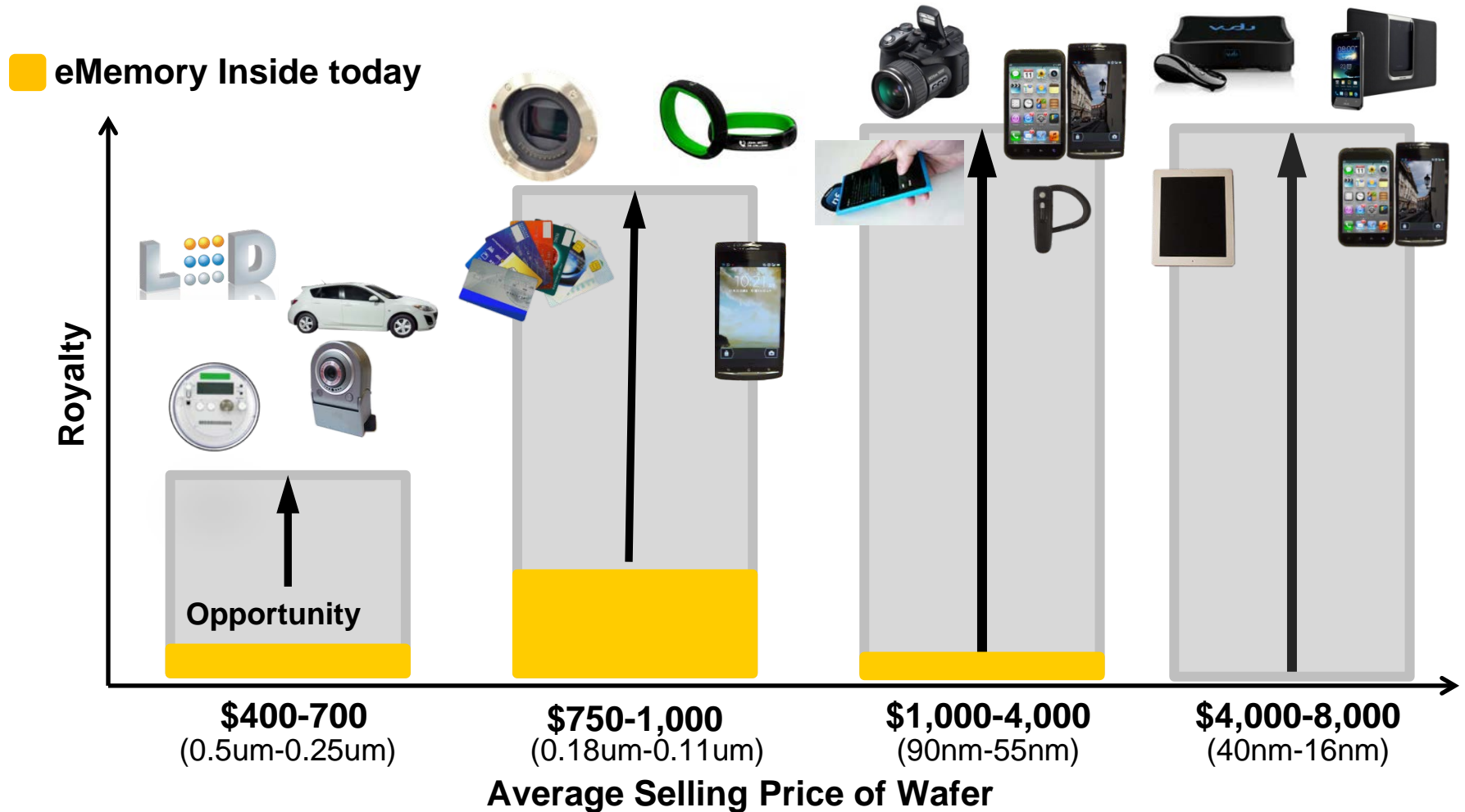
Note: 2.2 million 8" equivalent wafers with eMemory IP were shipped in 2013. (~5% of WW foundry shipment)

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eMemory IP in Smart Phone

Capacitive Touch Panel Controller

Neo Flash

Neo MTP

PMIC/PMU

Neo Fuse

Neo EE

Neo Bit

-Ambient Sensor
- Proximity sensor

Neo Bit

- Accel.-sensor
- Mag.-sensor
- Gyro-sensor

Neo Bit

NFC

-Base Band

Neo Fuse

Neo EE

-Application Processor

Battery

LCD Driver

Connector

Camera Module

Fuel Gauge

Neo Flash

Neo Fuse

Neo MTP

Neo Bit

Neo Bit

Neo EE

Neo Fuse

Neo MTP
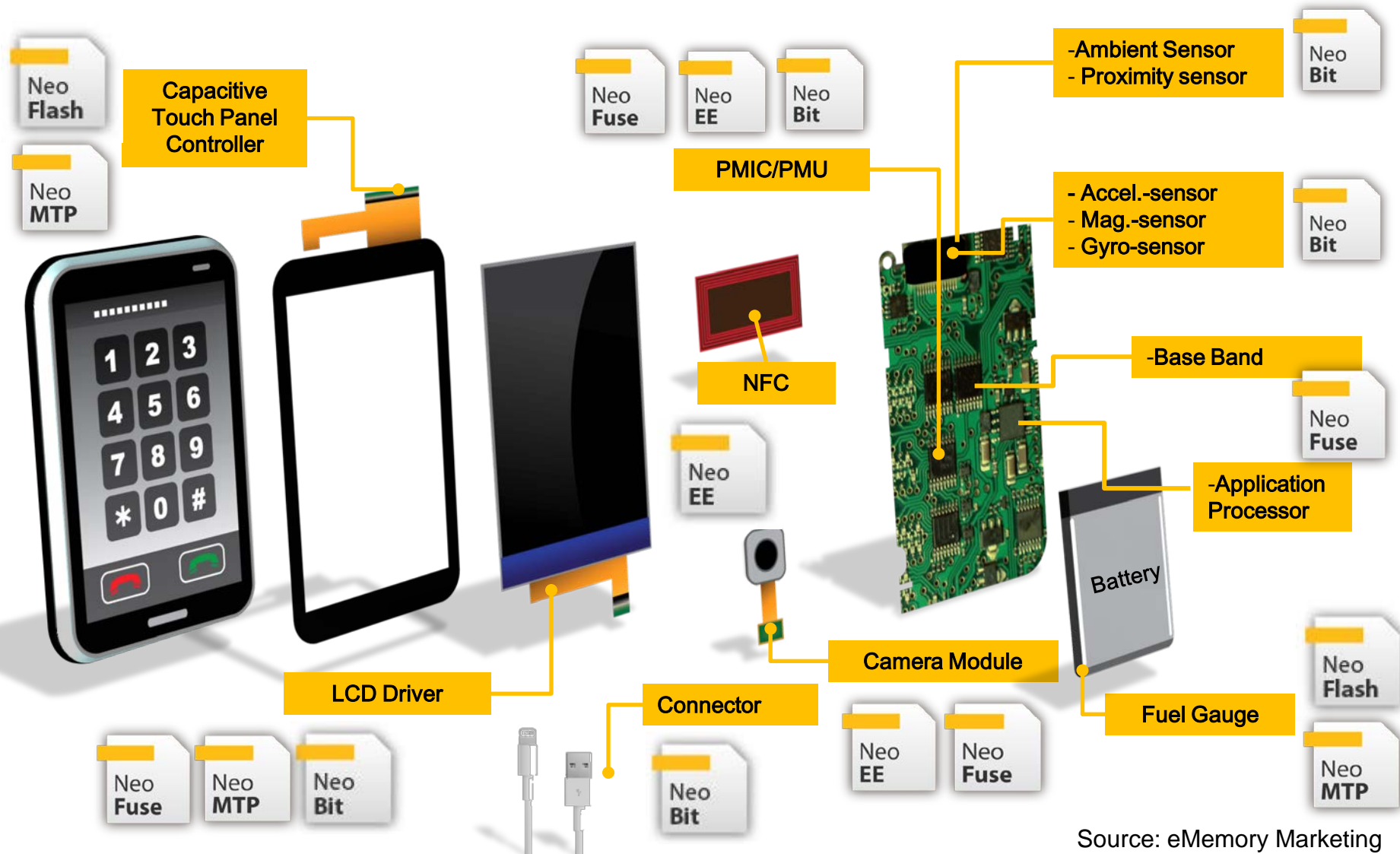
Source: eMemory Marketing

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3Q14 Wafer Demand by IC Type

IC Type	Equ. to 8-inch wafer (K)
AP	4964
PMU	4756
CIS sensor	4226
Fingerprint	4000
Smart card controller	3000
Base Band	2935
LCD driver (with TCON)	2013
Gauge IC	627
Touch panel controller (C)	556
Connectivity	395
STB controller	335
TV controller	327
Wifi controller	245
LED driver	243
DC-DC/AC-DC	176
Accelerator sensor controller	124
Light snesor	121
Bluetooth controller	121
Gyroscope sensor controller	104
TAG IC	76
DVD controller	67
MCU (8bits, LV/3.3V)	56
MCU (8bits, LV/3.3V)	56
P-Gamma	52
MCU (8bits, pure 5V)	51
NB CAM controller	42
Pressure sensor controller	20
Touch pad controller	18
PC CAM controller	15
Touch panel controller (R)	5
TCON (w/o driver)	4

2014.8.29 updated

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Advanced LCD Driver ICs

Process Technology : 0.11um HV/80nm HV/55nm HV

I/F
(LVDS, MIPI,…)

TCON

Neo Bit

DDI

Display Power

LED Backlighting

Gate Driver

LCD Display

VCOM Buffer

Neo Bit

Source Driver
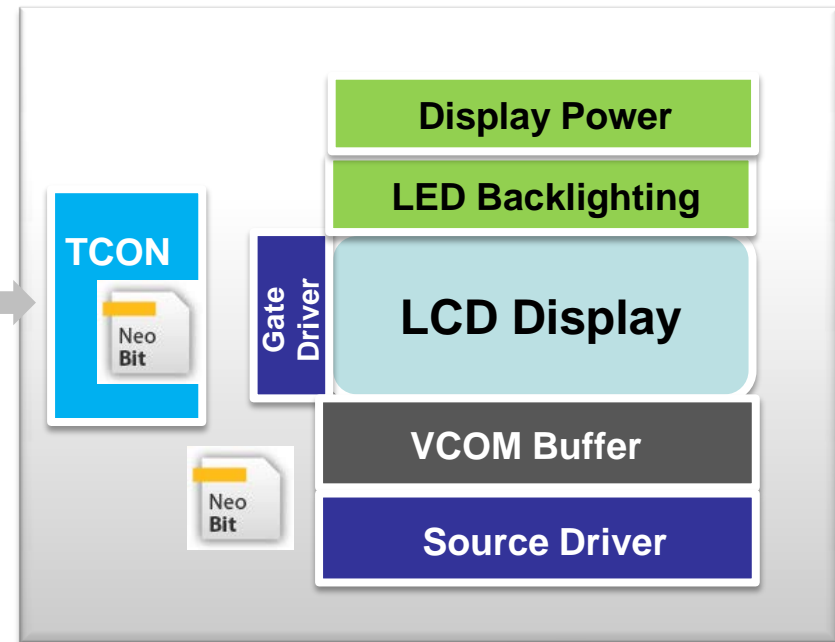
Density	Endurance	NVM Type	Purpose	NVM Usage		
2K8~4K8	1	OTP	Trimming	1. Accuracy enhancement 2. Mismatch cancellation		
			Code Storage	1. Gamma Correction Table 2. Timing Control Pattern 3. Color Engine Enhancement		

Power Management ICs for Baseband and Application Processor

Process Technology : Advanced 0.25um BCD/ 0.18um BCD/ 0.13um BCD
Mature 0.18um/0.16um/0.152um Logic
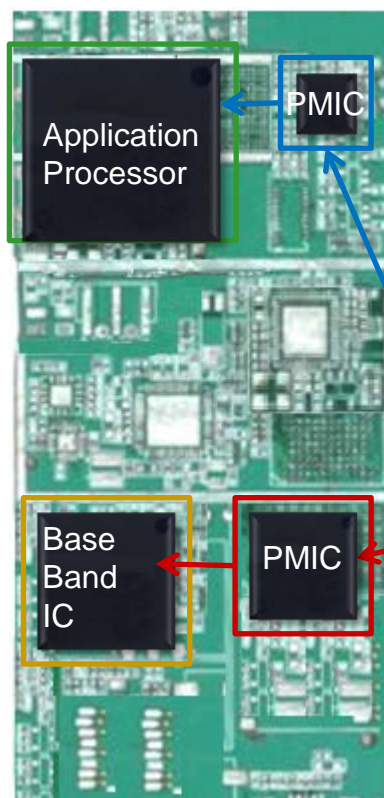
Density	NVM Type	Purpose	NVM Usage
2Kb~4Kb	OTP	Trimming	DC/DC, Bandgap
		Parameter Setting	Design flexibility & Performance optimization
		Code Storage	Start-up behavior & smart power saving algorithm

Application Processor

PMIC

Base Band IC

PMIC

PMIC Neo Bit

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Touch Panel Controller ICs

Process Technology : 0.16um HV/0.11um G
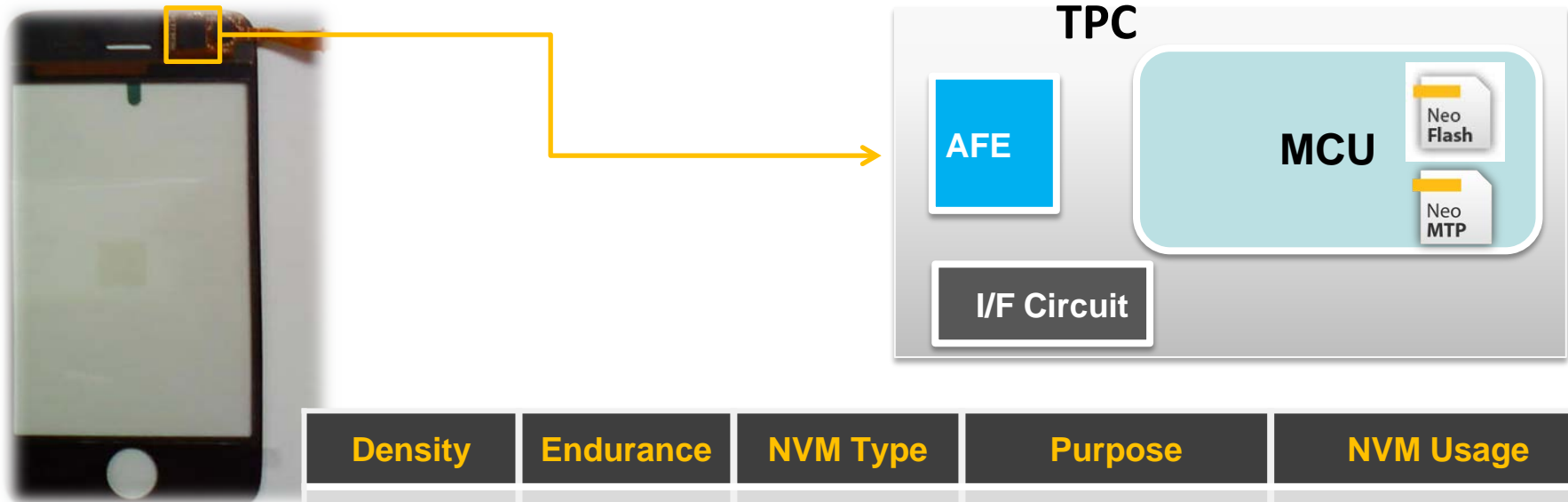
Density	Endurance	NVM Type	Purpose	NVM Usage
16K8~32K8	<1000	MTP	Code Storage	F/W code
			Parameter setting	Customized model and performance optimization

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In-Cell Touch Panel Controllers ICs

Process Technology : 0.11um HV/80nm HV/55nm HV

TDDI IC

Touch AFE

MCU — Neo MTP

Display Driver — Neo Bit
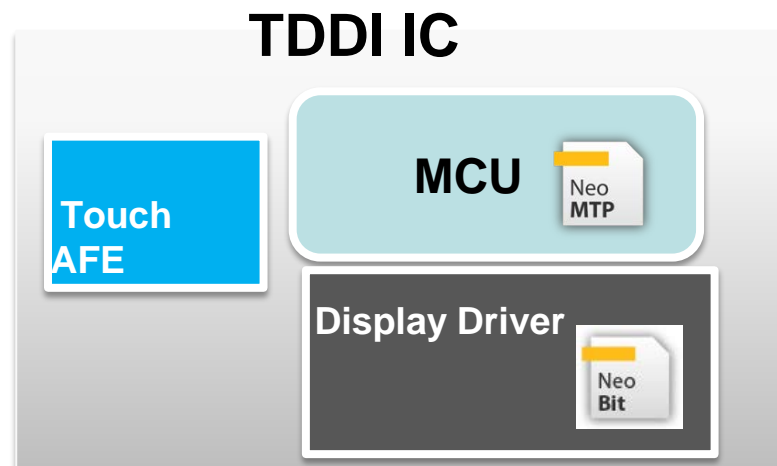
Density	Endurance	NVM Type	Purpose	NVM Usage
2K8~4K8	1	OTP	Trimming	Accuracy
			Code Storage	Gamma Table
16K8~32K8	<1000	MTP	Code Storage	Touch F/W Code
			Parameter setting	Performance Optimization

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CMOS Image Sensor

Process Technology : 0.11um CIS/90nm CIS/65nm CIS

CIS SoC

Column S/H

Row Select

Image Array

AFE

Image Sensor Processor

Neo Fuse
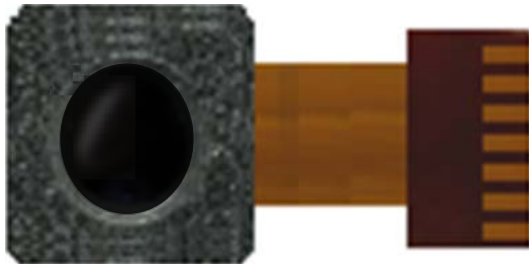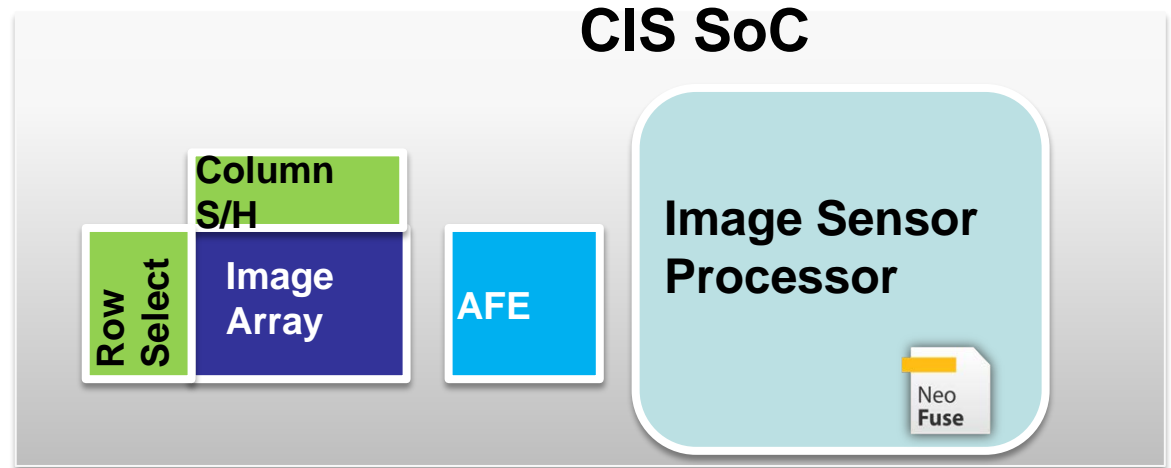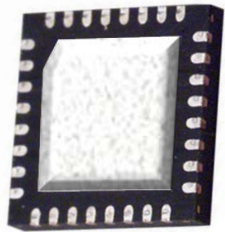
Density	Endurance	NVM Type	Purpose	NVM Usage
2Kb~4Kb	1	OTP	Identification Setting	Product Code
			Parameter Setting	Start-up Initial Setting
32K8	1	OTP/ROM	Code Storage	Boot Load

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MEMS

180/160/15x nm HV/Logic for MEMS Controller

Yaw

Pitch

Roll

MEMS Chip

MEMS Element	AFE	Digital Motion Processing
Trimming Circuit **OTP**		**OTP**
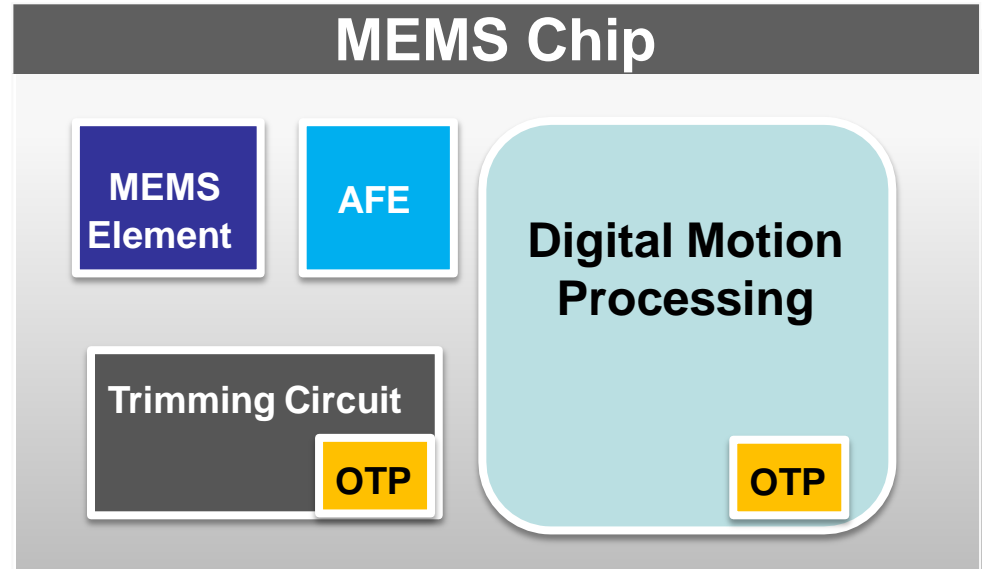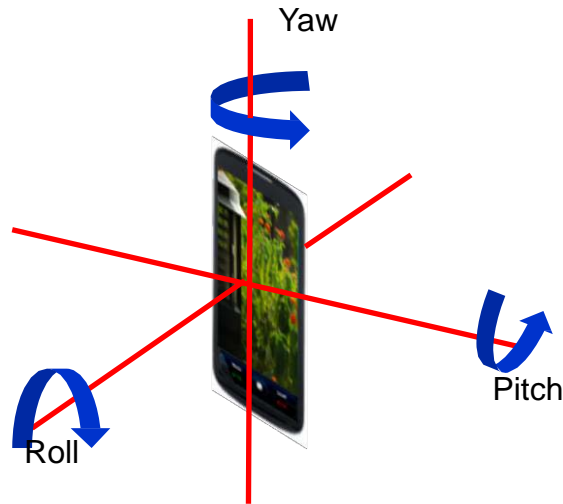
Density	NVM Type	Purpose	NVM Usage
2Kb~4Kb	OTP	Trimming	Factory trimming
		Parameter Setting	Signal filtering
		Code Storage	Geometric computation

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Security & Protection

Authorized Product   **Fake Product**

reverse copy **re-produce**

without protection
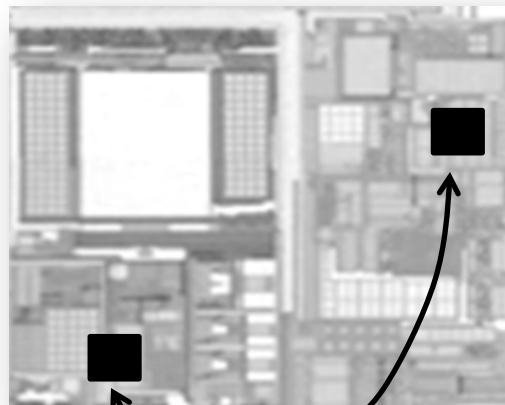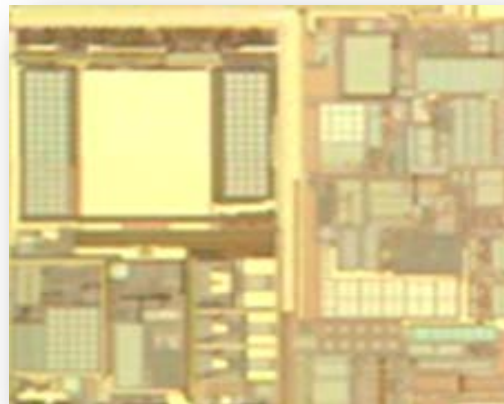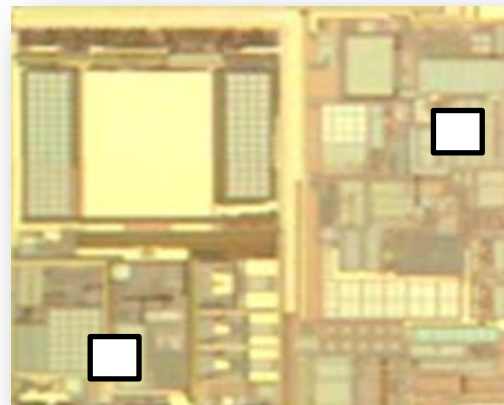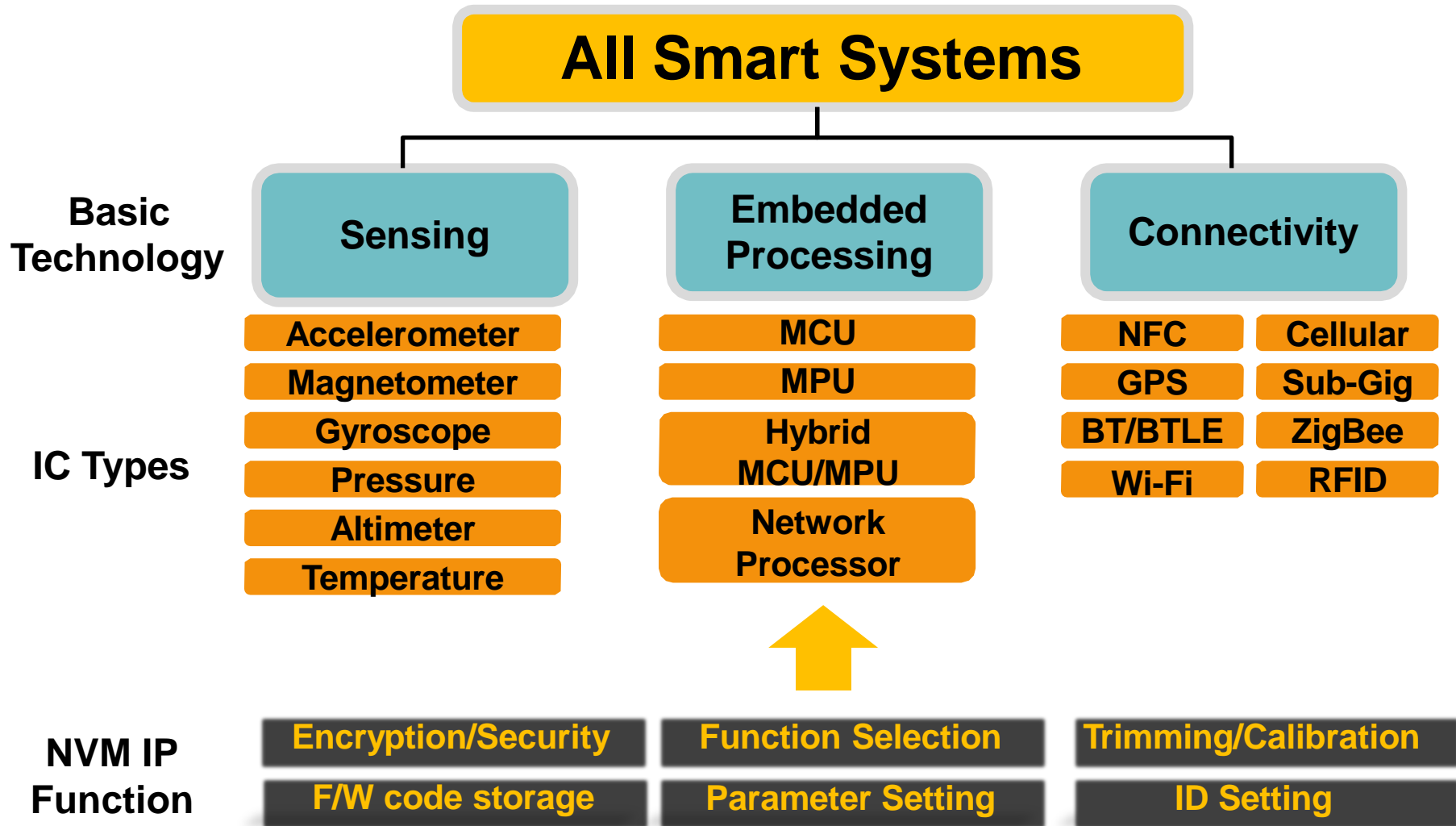

reverse copy **re-produce**

with protection

Security IP/Code by Authorized Use

Can NOT Work w/o Security IP/Code

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NVM IP Demand in IoT

All Smart Systems

Basic Technology

Sensing	Embedded Processing	Connectivity

IC Types

Sensing	Embedded Processing	Connectivity	
Accelerometer	MCU	NFC	Cellular
Magnetometer	MPU	GPS	Sub-Gig
Gyroscope	Hybrid MCU/MPU	BT/BTLE	ZigBee
Pressure		Wi-Fi	RFID
Altimeter	Network Processor		
Temperature			

NVM IP Function

Encryption/Security	Function Selection	Trimming/Calibration
F/W code storage	Parameter Setting	ID Setting

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Replacement of Embedded Flash for Competitiveness Improvement

MCU

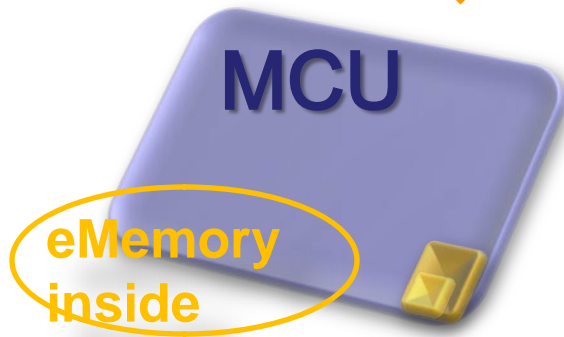**product design & manufacturing by embedded Flash**
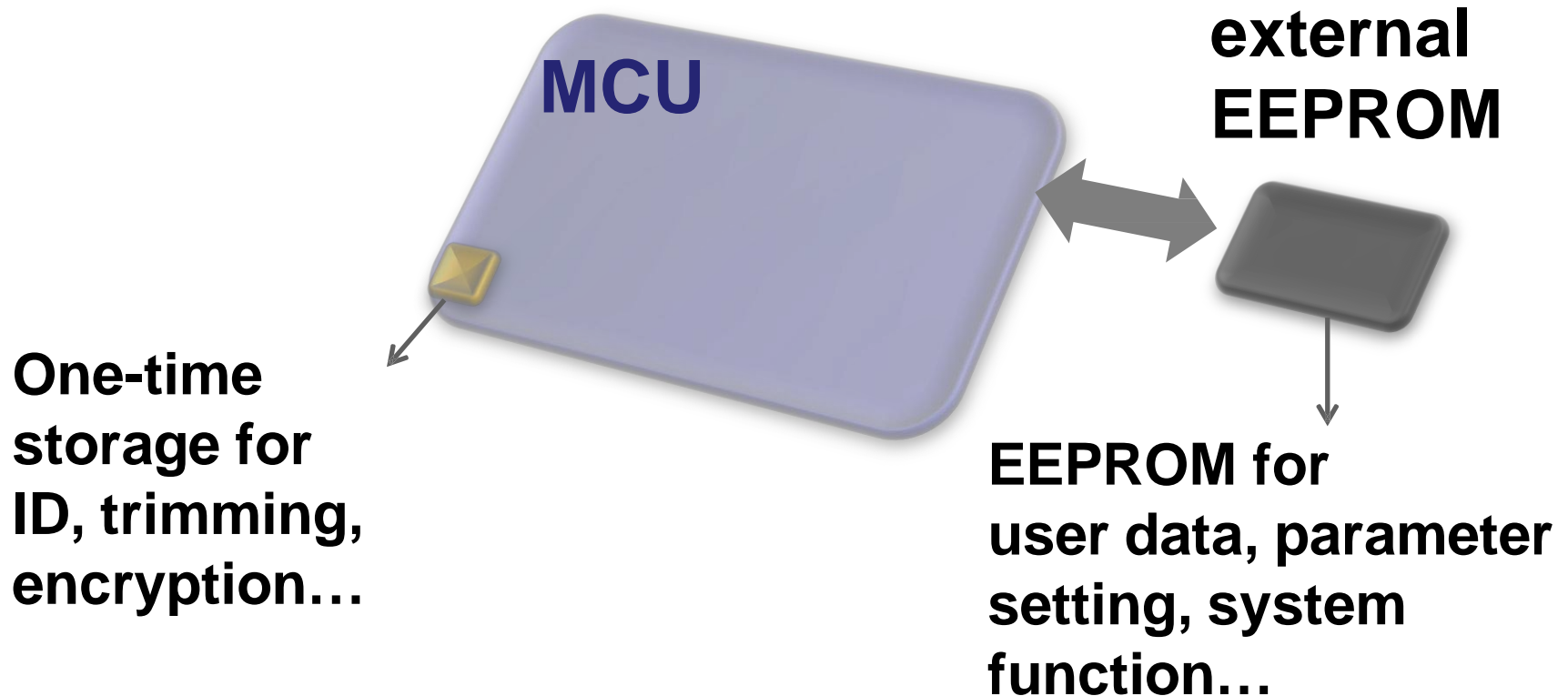**Logic Process + 10 Masks**
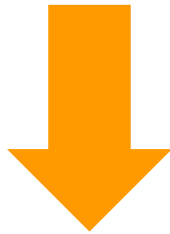
30% more cost reduction

wafer cost & testing time

MCU

eMemory inside

product design & manufacturing by Embedded Logic NVM (OTP/MTP) Logic Process

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MCU Applications with EEPROM

MCU

external EEPROM

One-time storage for ID, trimming, encryption…

EEPROM for user data, parameter setting, system function…

NeoBit + NeoEE

Hybrid NVM solution (NeoBit + NeoEE) with customized SPEC & optimized size

MCU

•One single IP by integration of NeoBit & NeoEE
•Help for system size reduction

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2015 Outlook

- **Applications in major smart phone customer continue their momentum and expand to wearable devices.**

- **PMICs in Chinese smart phone continue to increase production and expand to new power management applications , such as fast charger and wireless charger.**

- **TDDI and 55nm LCD Drivers start to ramp up.**

- **Applications in STB, Fingerprints, and CIS will ramp up in 2H of 2015.**

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Key Growth Drivers

Growth in value per mobile devices

- More chip applications per smartphone/tablet product.

Growth into more markets

- From consumer electronics and mobile devices to wearable devices.
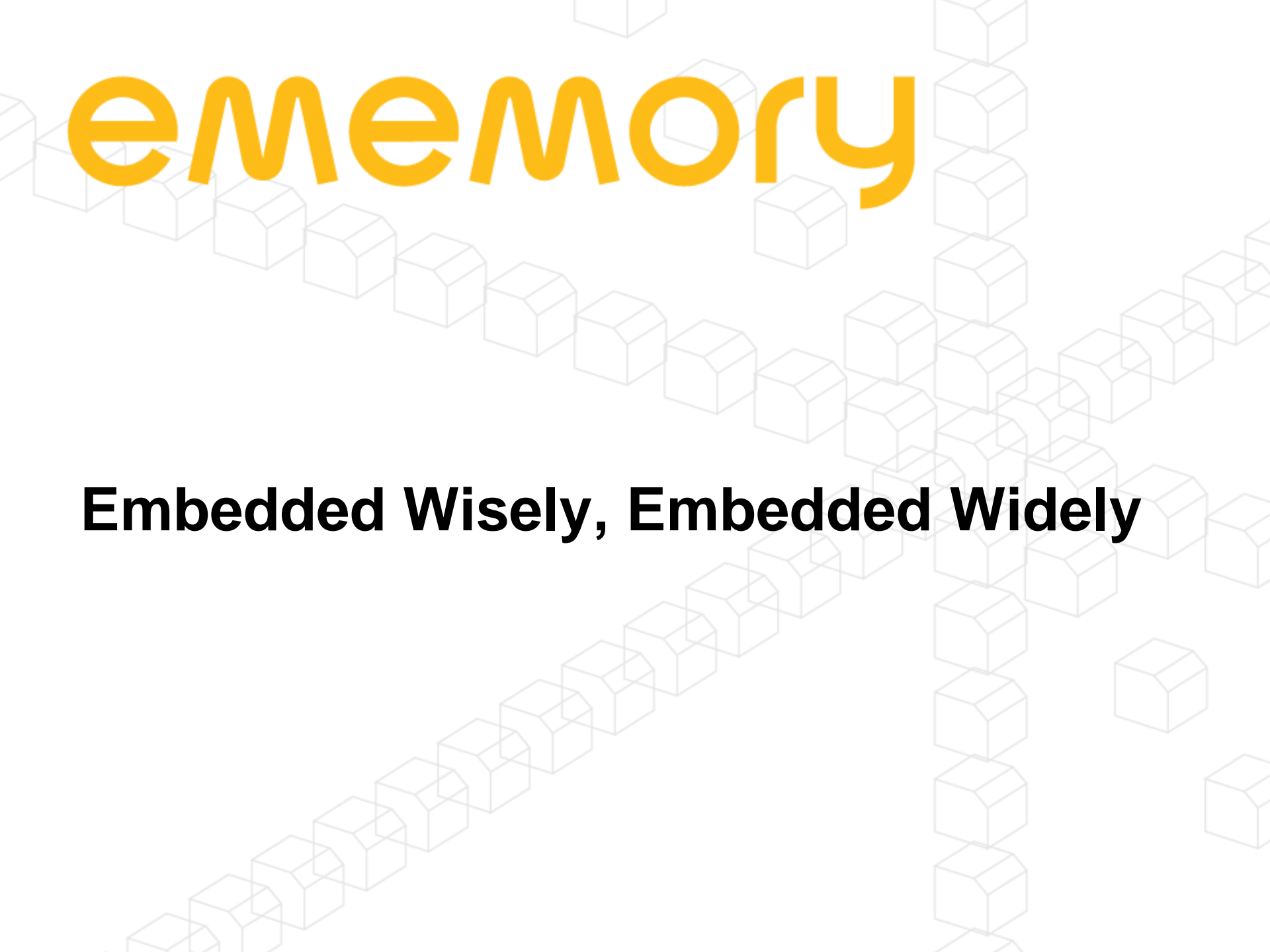- Adding new NVM product lines further enable more product applications.

Growth in more advanced technology

- Higher royalty per wafer is contributed from more advanced technology nodes.

IoT great era

- Embedded Logic NVM will be a must.

Q & A

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