eMemory

A Leading Logic NVM Company

May, 2015

IPR Notice

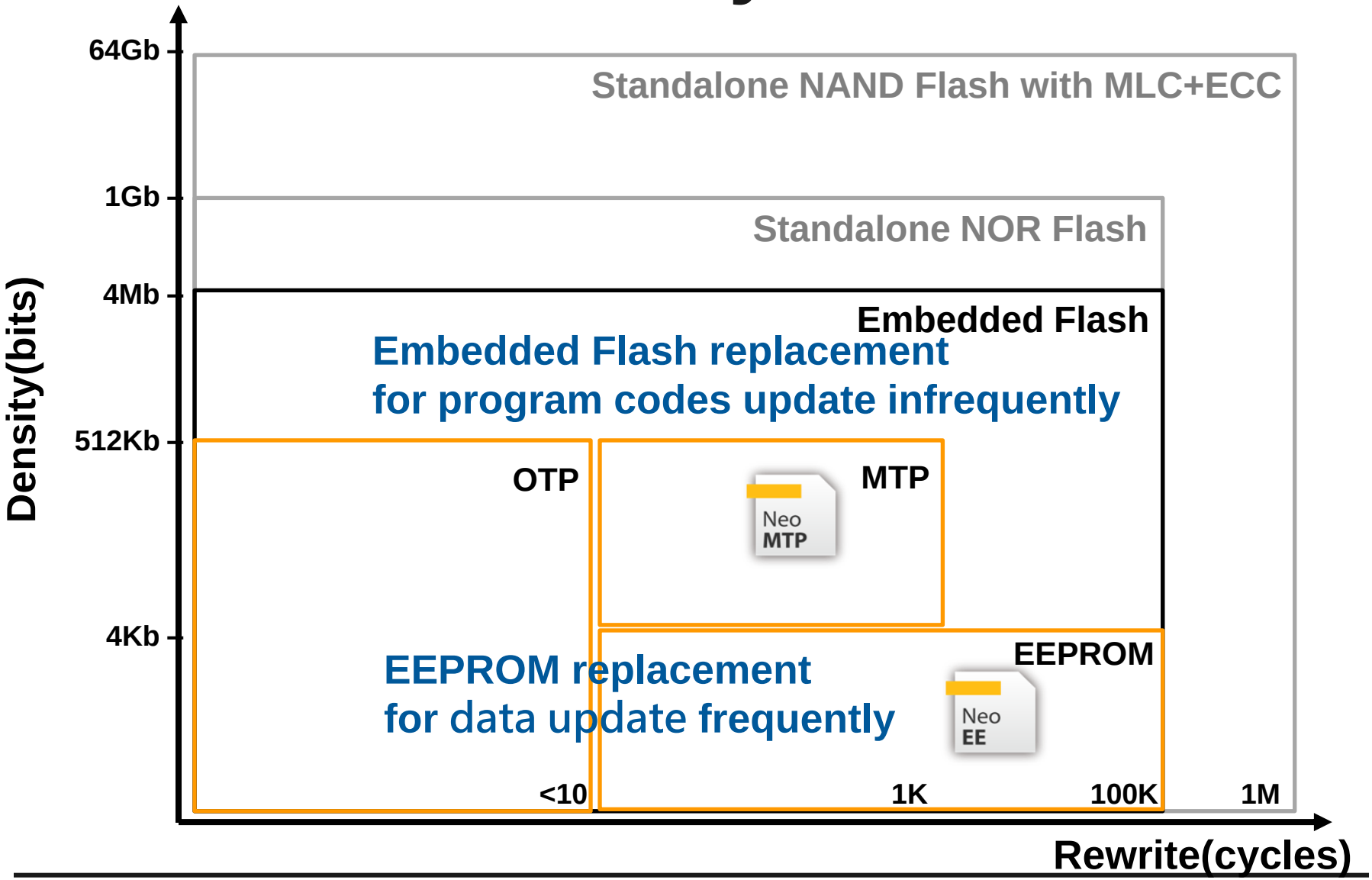
Cautionary Statement

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 and 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.

Outline

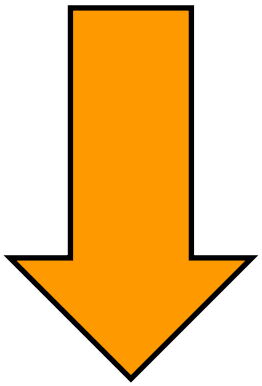
- **Business Model**
- **Review of Operations**
- **Growth Opportunity and Future Outlook**
- **Q & A**

Nonvolatile Memory Classifications



What's Logic Non-Volatile Memory (NVM)

Embedded NVM = LOGIC + 10 Masks



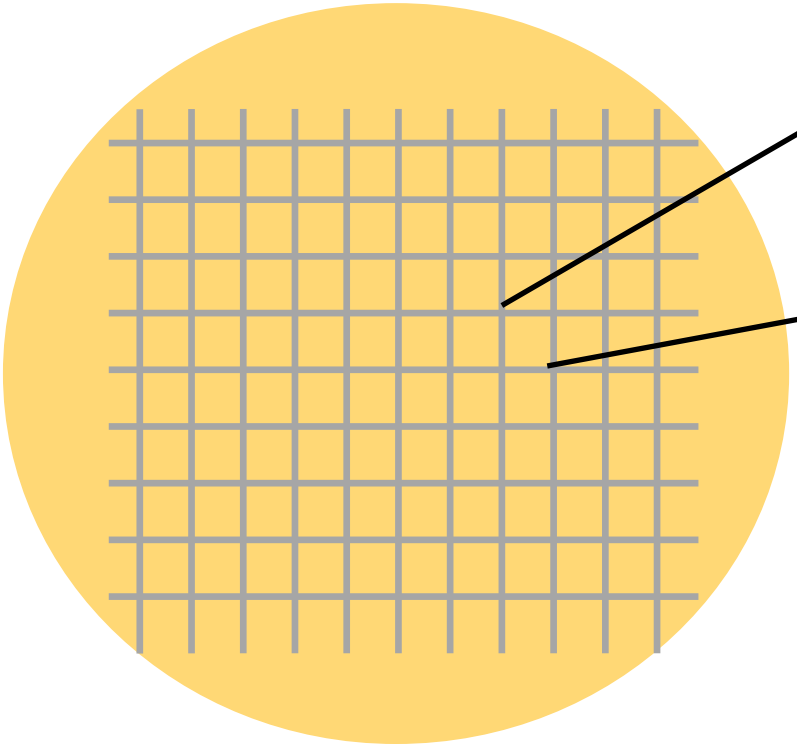
30% more
cost reduction

Embedded LOGIC NVM = LOGIC

Embedded NVM Technologies

	ROM	eFuse (OTP)	Antifuse (OTP)	CMOS Floating Gate (OTP)	CMOS Floating Gate (MTP)	Embedded Flash
Cell Structure	Transistor	Poly Fuse	Antifuse	Floating Gate	Floating Gate	Floating Gate
Standard CMOS Compatible	Yes	Yes	Yes	Yes	Yes	No
Bitcell Area	< 1	50	1	2	4	1
Endurance	No	No	< 10	< 10	10K-100K	100-1000K
Density	4Kb-1Mb	256bit-4Kb	16bit-1Mb	16Kb-1Mb	1Kb-2M	64Kb-4Mb
Security	Low	Low	High	High	High	High
Additional Steps	None	None	None	None	None	+10 Mask

Considerations for IP Adoption



Customer Product

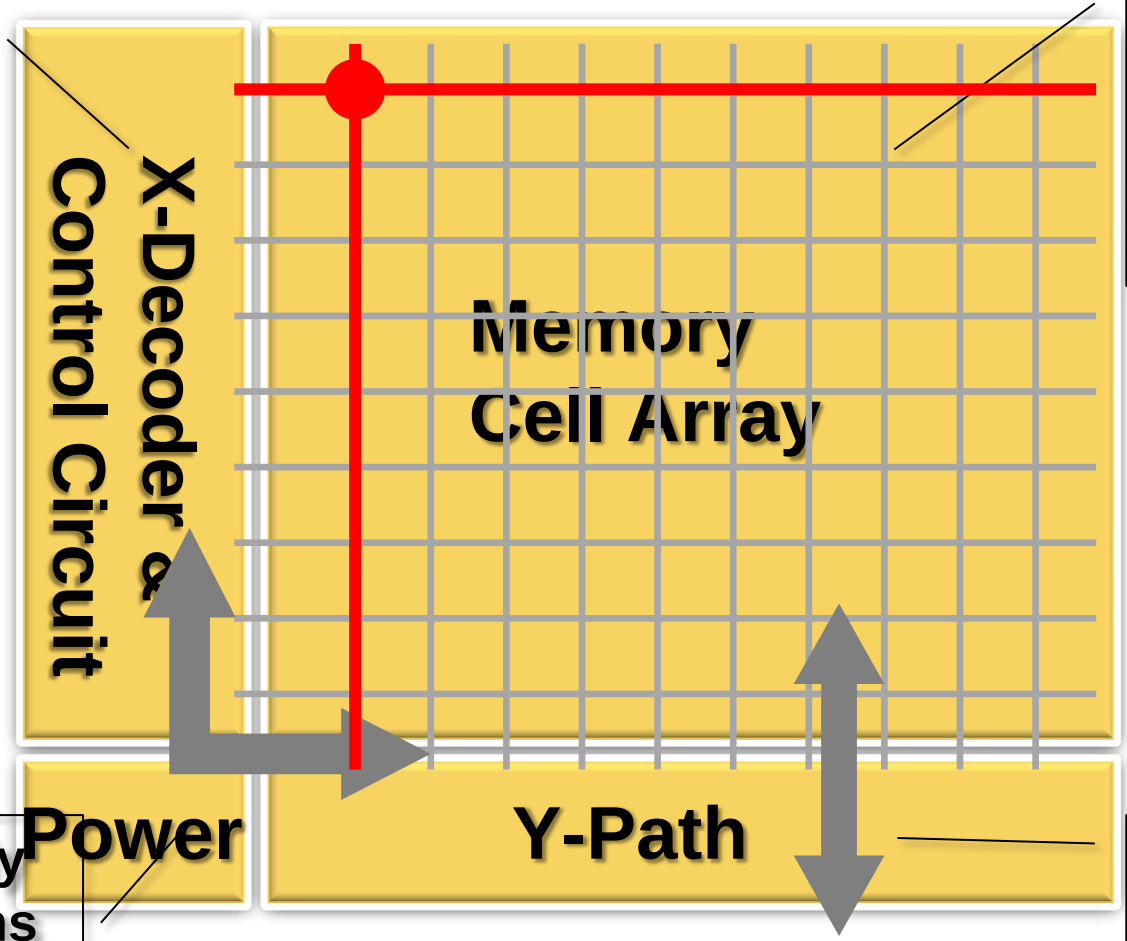
IP

Generally,
IP size is less than 10% of product size

Customers Request

1. **100% IP Reliability**
2. **No Mask Adder**
3. **Low testing Cost**
4. **On call Service**
5. **Acceptable IP Size**

Inside Nonvolatile Memory IP



Program, Erase and Read operation control

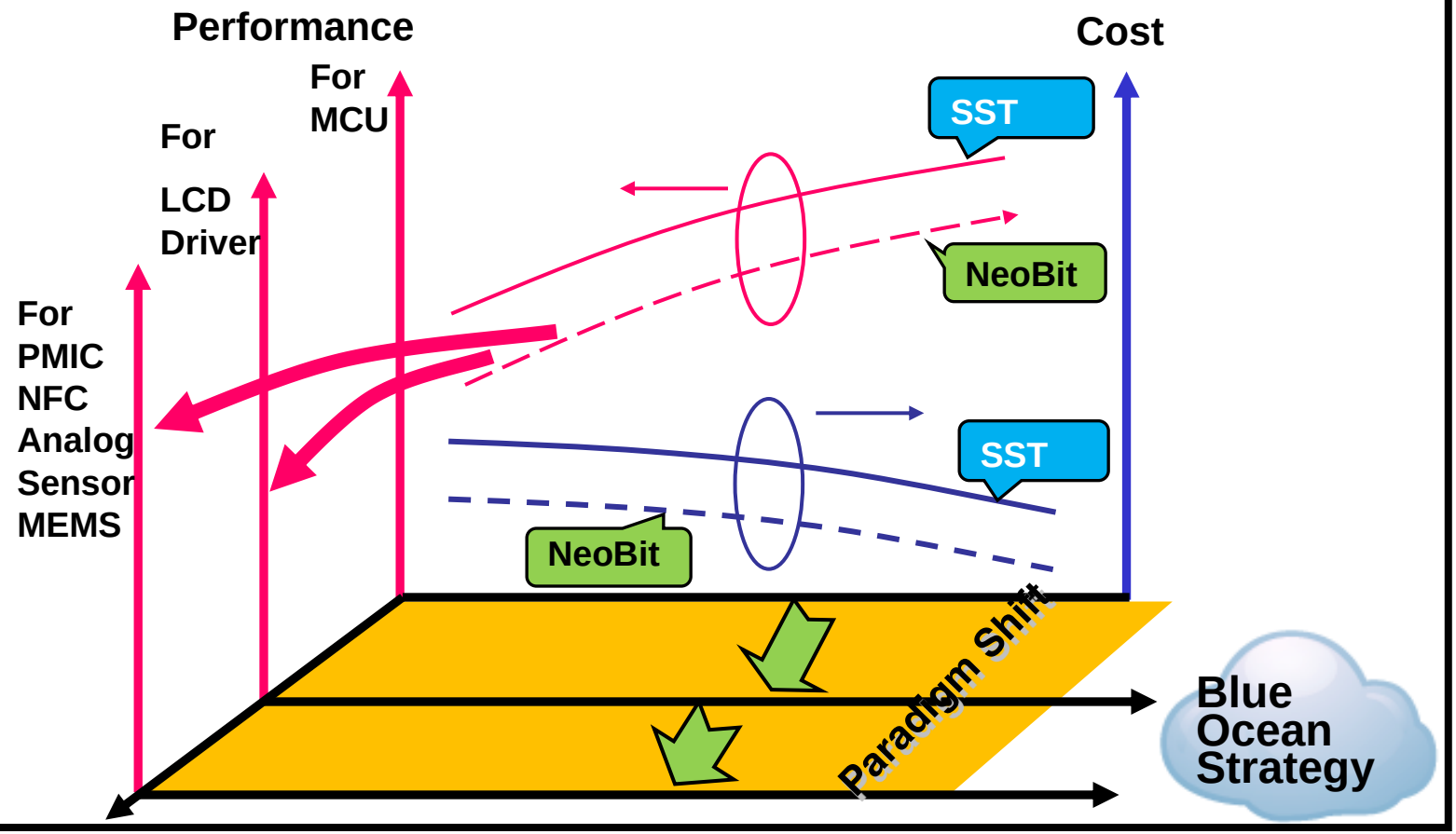
Where data is stored. Each cross point has a memory cell.

Power supply for operations

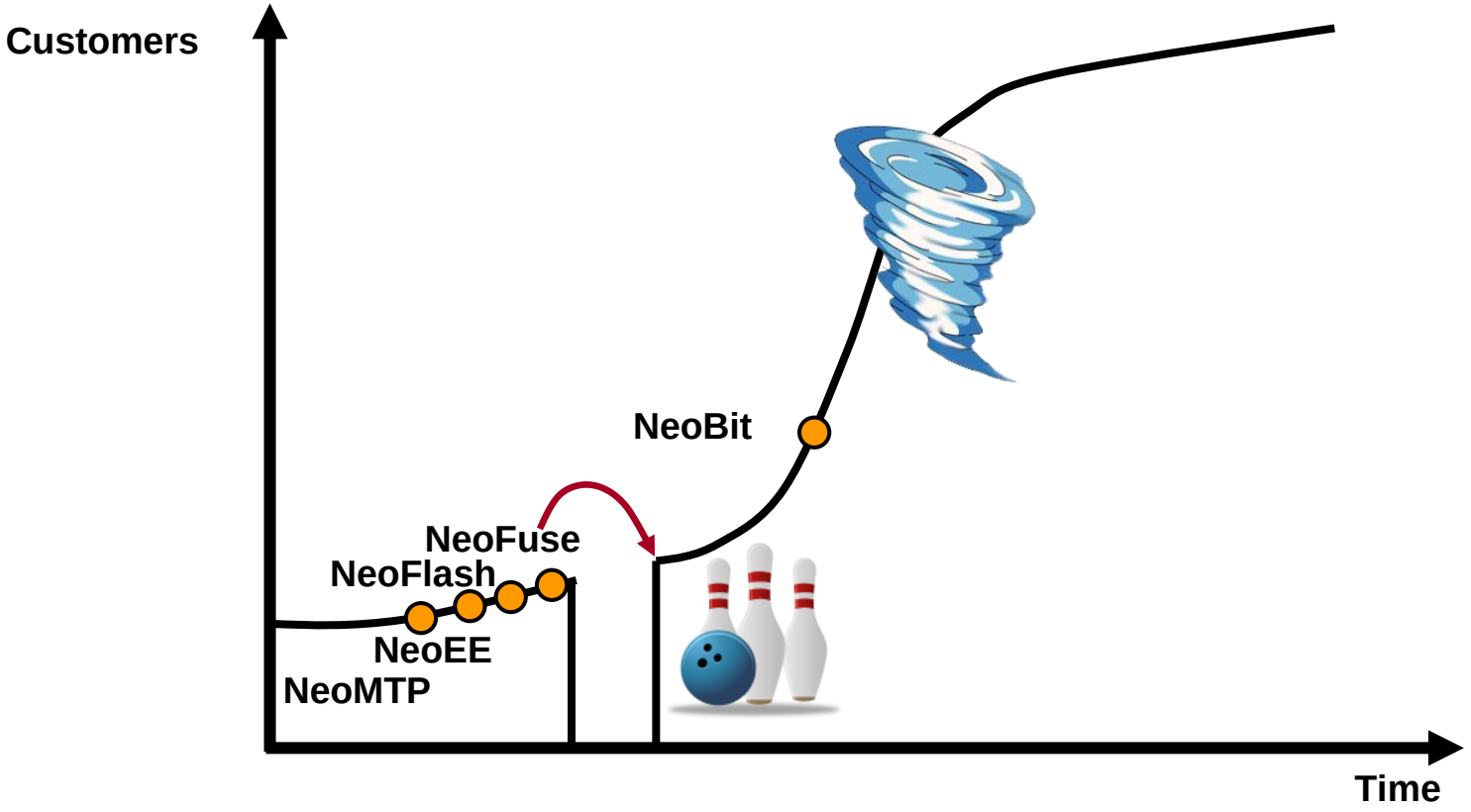
Data input & output

What We Have Done

- *Innovation, Innovation, and Innovation !*

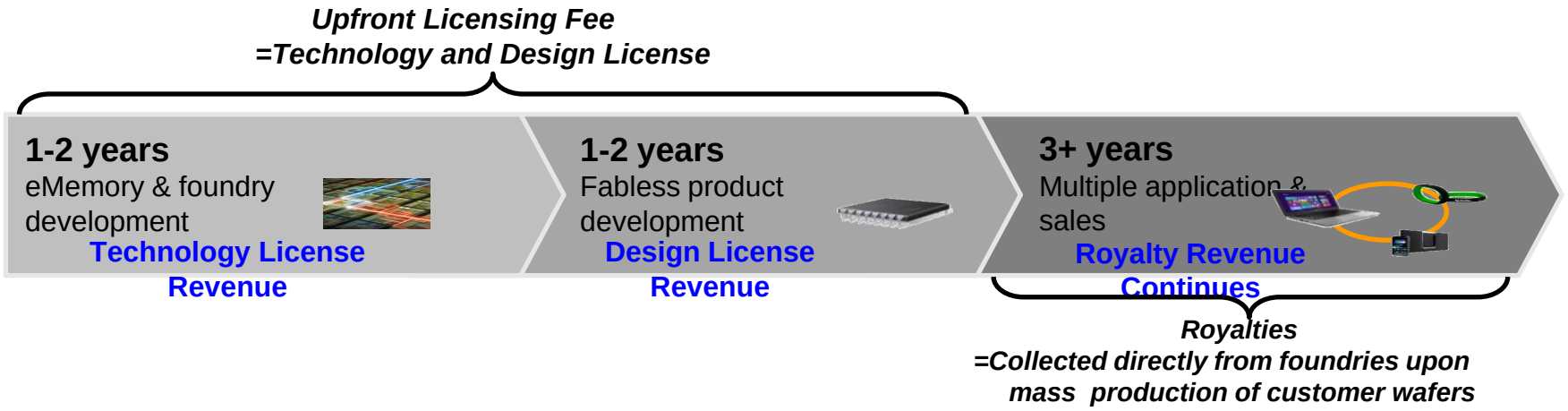


Crossing the Chasm



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, 210 employees (142 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



Worldwide Customers

	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

Foundry

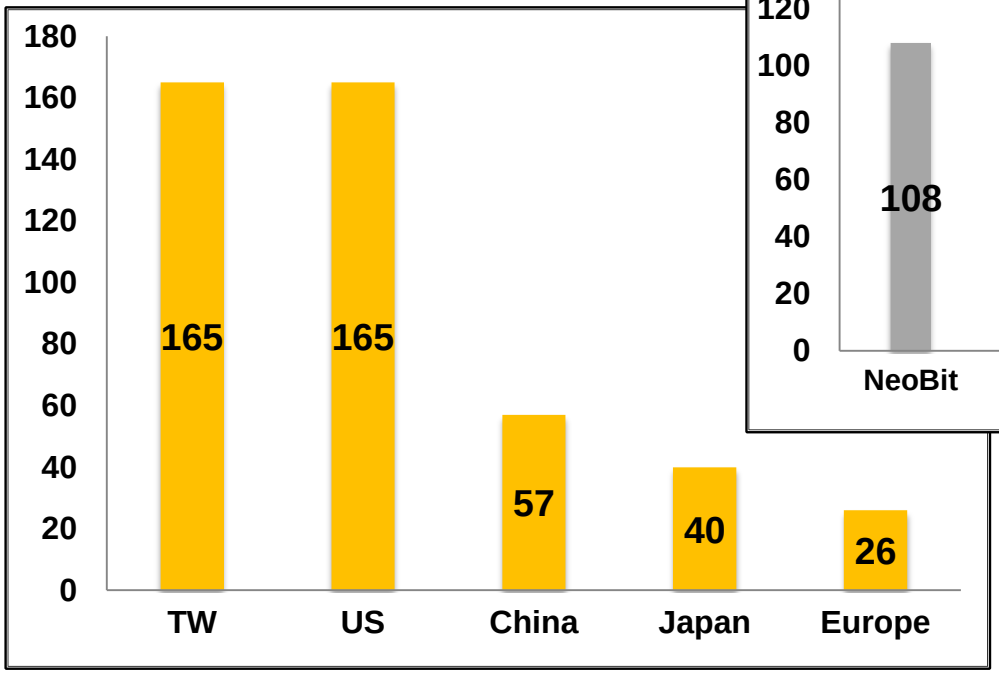
tsmc, UMC, VIS, SILTERRA, GRACE SEMICONDUCTOR MANUFACTURING CORPORATION, GLOBALFOUNDRIES, MagnaChip, Maxchip 鉅晶電子, ROHM SEMICONDUCTOR, SK hynix, Dongbu HiTek, HEJIAN, FUJITSU, Powerchip力晶科技, SMIC, CSMC A LEADING ANALOG FOUNDRY, HLMC, asmc Advanced Semiconductor Manufacturing Corporation Limited

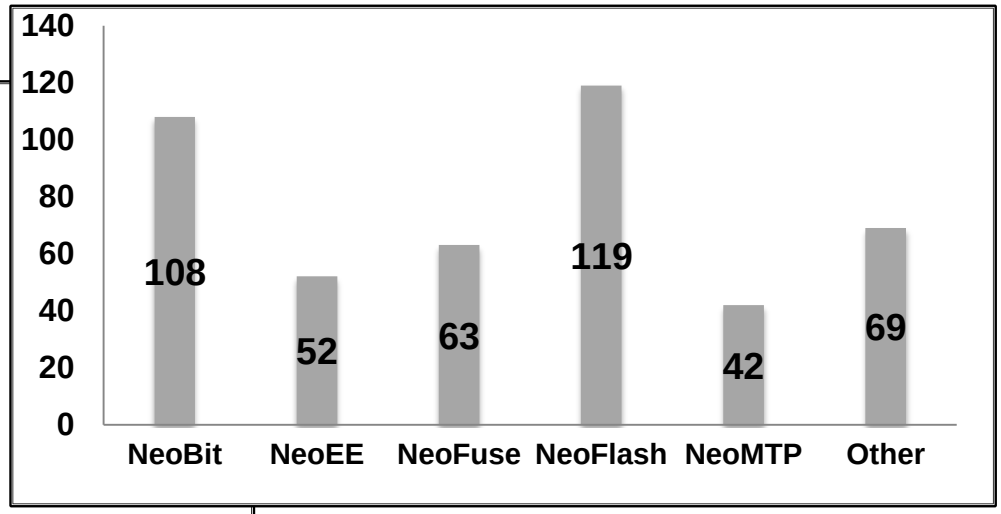
IDM

FUJITSU, OKI, MITSUMI, MITSUBISHI ELECTRIC Changes for the Better, JRC, MAXIM, RICOH, RENESAS, SII, TOSHIBA, ON Semiconductor, NXP

Patent Portfolio

	4Q14	1Q15	Diff.
Pending	166	175	+9
Issued	269	278	+9
Total	435	453	+18

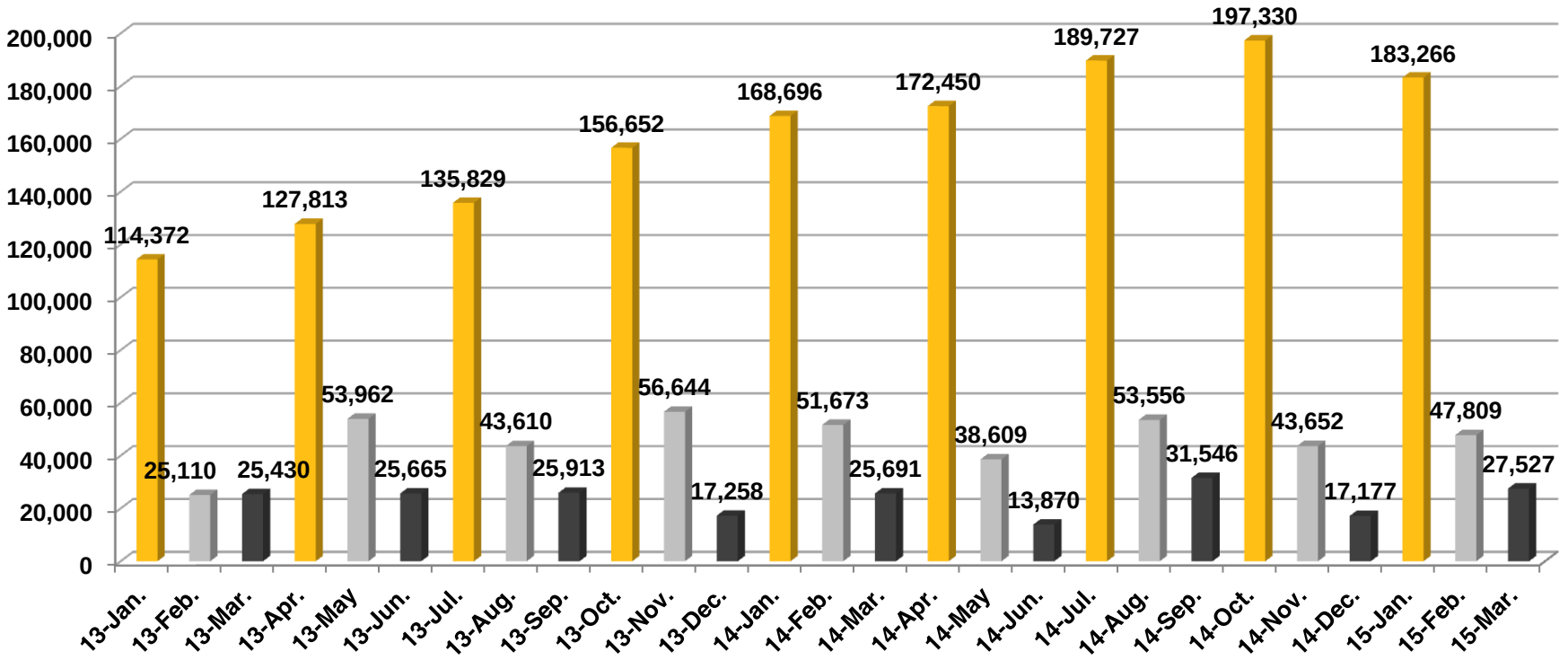




Quarterly Revenue Pattern

- 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



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1Q Revenue Breakdown

Unit: NTD thousands

	1Q15	4Q14	% change	1Q14	% change	2014	2013	% change
Licensing	64,056	51,849	23.54%	75,045	-14.64%	246,073	245,688	0.16%
Royalty	194,546	206,310	-5.70%	171,015	13.76%	757,904	562,570	34.72%
Total	258,602	258,159	0.17%	246,060	5.10%	1,003,977	808,258	24.21%

Unit: Number of contracts

		1Q15	4Q14	2014	2013
Technology Licenses		5	3	21	19
Design Licenses	NRE	21	15	82	51
	Usage	82	99	363	342

Financial Income Statement

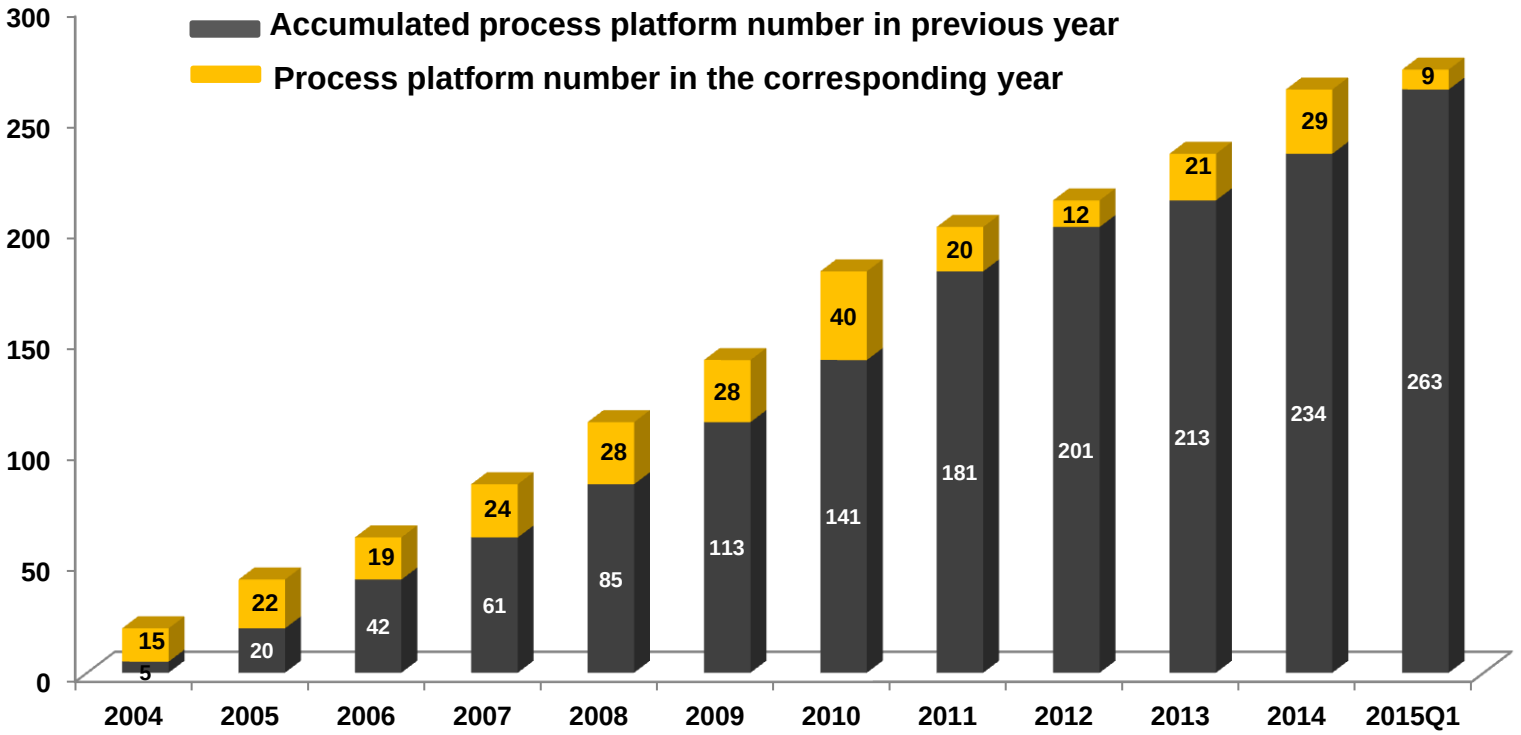
(Unit: NTD thousands)	1Q15	4Q14	% change	1Q14	% change
Revenue	258,602	258,159	0.2%	246,060	5.1%
Gross Margin	100%	100%	-	100%	-
Operating Expenses	128,976	148,501	-13.1%	126,719	1.8%
Operating Margin	50.1%	42.5%	+7.6ppts	48.5%	+1.6ppts
Net Income	114,423	100,896	13.4%	110,936	3.1%
Net Margin	44.2%	39.1%	+5.1ppts	45.1%	-0.9ppts
EPS (Unit: NTD)	1.51	1.33	13.5%	1.46	3.4%
ROE	24.8%	23.4%	+1.4ppts	25.8%	-1.0ppts

Technology License

Unit: Number of contract

Year	2012	2013	2014	20151Q
License number	12	19	21	5

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.



Current Technology Development Platforms

- Total (As of Mar.) : 74*
- 22 for NeoBit, 26 for NeoFuse, 1 for NeoFlash, 17 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	-	8	12	2	22
NeoFuse	1	7	4	8	1	3	2	-	26
NeoFlash	-	-	-	1	-	-	-	-	1
NeoEE	-	-	2	-	1	4	9	1	17
NeoMTP	-	-	-	1	2	2	3	-	8

Note*: 9 platforms qualified in 1Q; 5 platforms kicked off in 1Q.

Current Technology Development Platforms

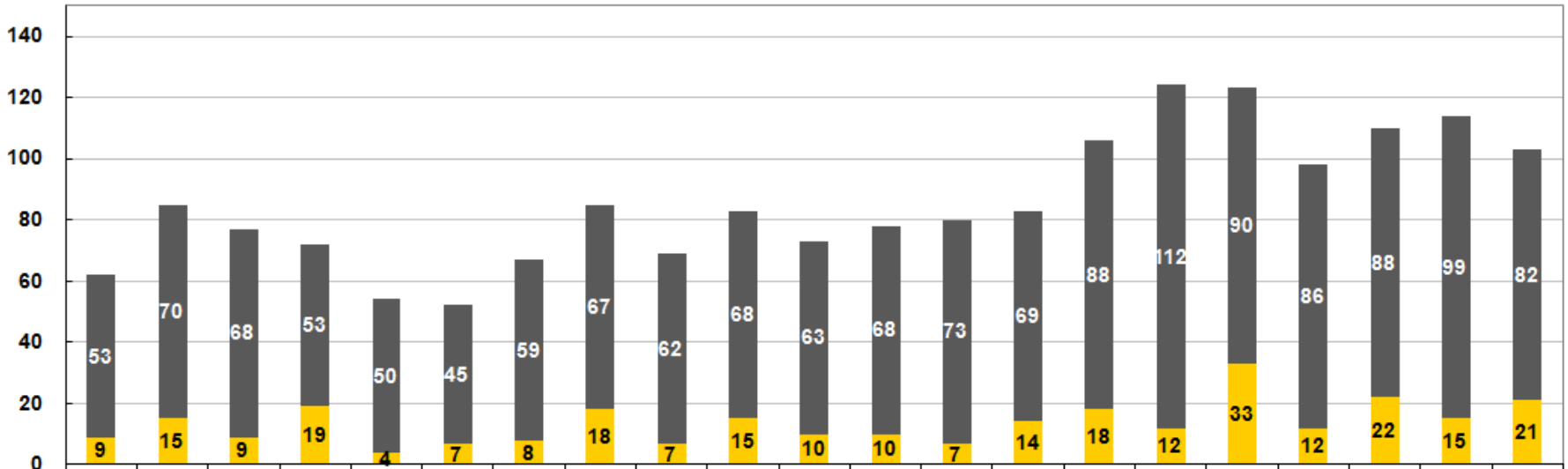
12" Fabs	Production	Development	NVM Type	Process Type
16nm	0	1	OTP	FF+
28nm	2	7	OTP	LP/HPM, HLP/HPM, LPS
40nm	1	6	OTP, MTP	HV-DDI, LP
55/65nm	9	10	OTP, MTP, Flash	LP, HV-DDI, HV-OLED, DRAM, CIS
80/90nm	5	4	OTP, MTP	HV-DDI, HV-OLED, LP
0.13/0.11um	4	5	OTP, Flash	HV-DDI, BCD, Generic
0.18um	1	0	OTP	BCD

8" Fabs	Development	NVM Type	Process Type
0.13/0.11um	12	OTP, MTP, Flash	HV-DDI, BCD, LP, RF, CIS, LL
0.18/0.16/0.152um	26	OTP, MTP	Generic, LP, LL, MR, HV, Green, BCD
0.25um	2	OTP, MTP	BCD
0.35um	1	OTP	UHV

*As of Mar. 31, 2015

Quarterly Design Licensing (New Tape Out)

- Total 103 NTO as of 1Q 2015 (445@2014 393@2013, 303@2012, 258@2011)

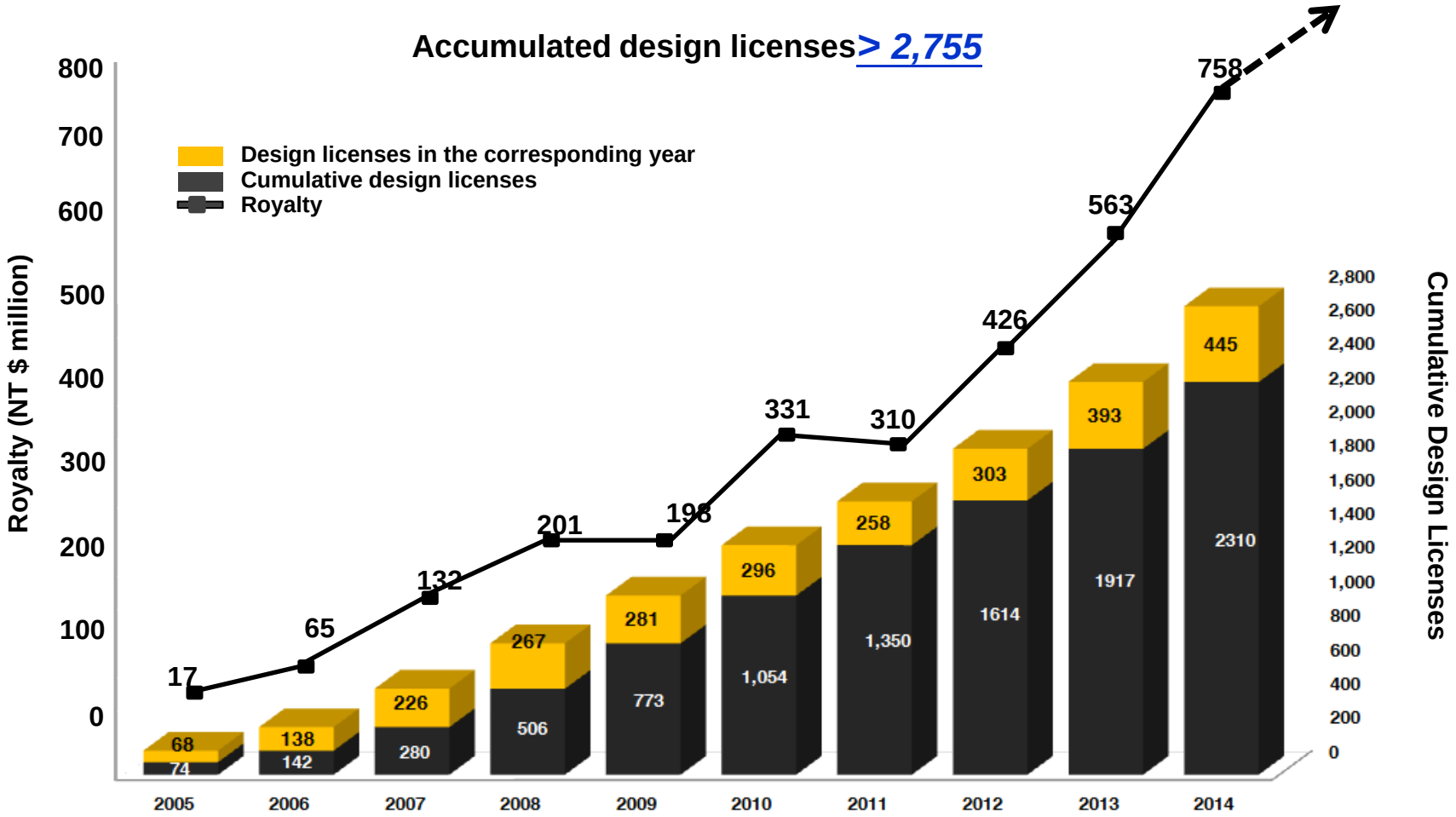


	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
	2010				2011				2012				2013				2014				2015
TOTAL	62	85	77	72	54	52	67	85	69	83	73	78	80	83	106	124	123	98	110	114	103
USAGE	53	70	68	53	50	45	59	67	62	68	63	68	73	69	88	112	90	86	88	99	82
NRE	9	15	9	19	4	7	8	18	7	15	10	10	7	14	18	12	33	12	22	15	21

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.

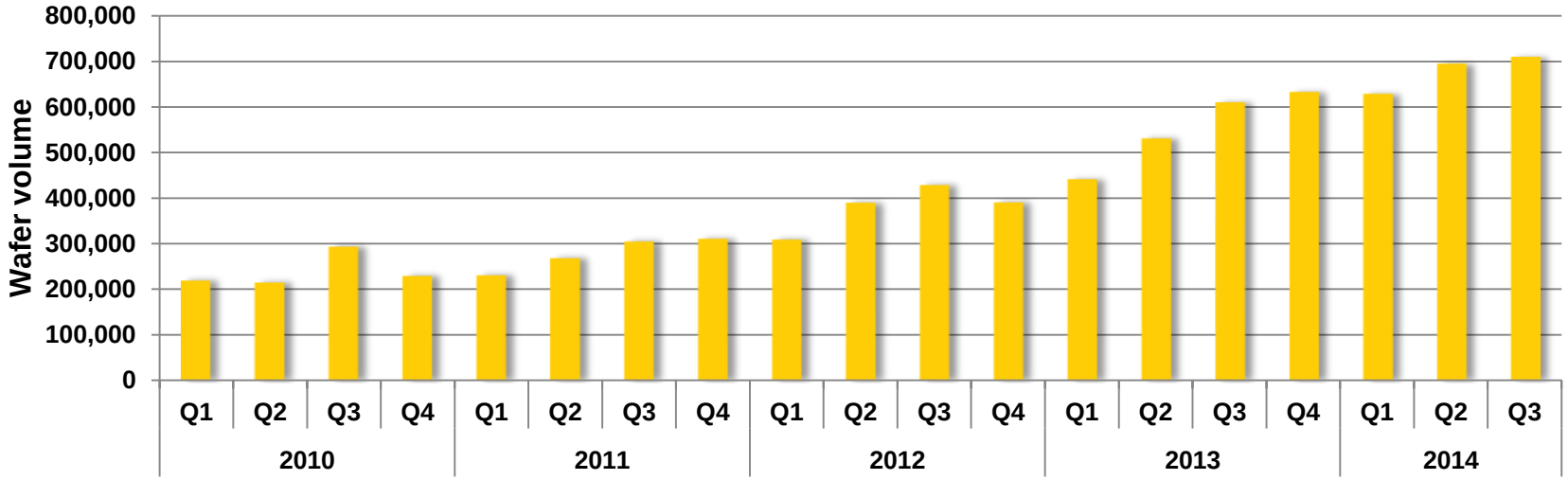
NRE: NRE covers the customization of IP that must undergo new verification or qualification. It typically requires 1 to 1.5 years before resulting in royalty revenue.

Accumulated Licenses Drive Future Royalties



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%.

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

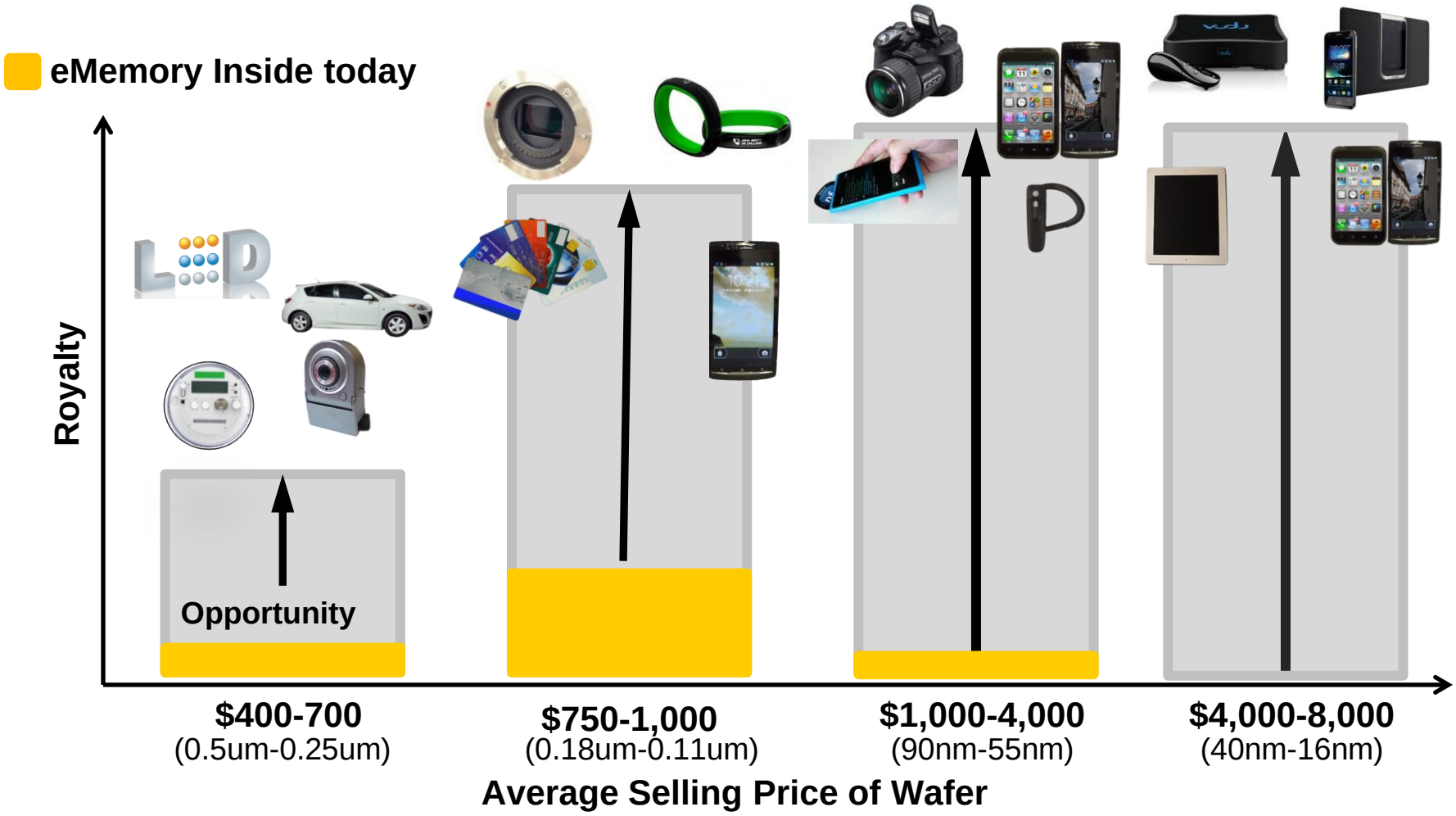
12"						8"		
16/20nm	28nm	40nm	55/65nm	80/90nm	110/130nm	160/180nm	250nm	350nm

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

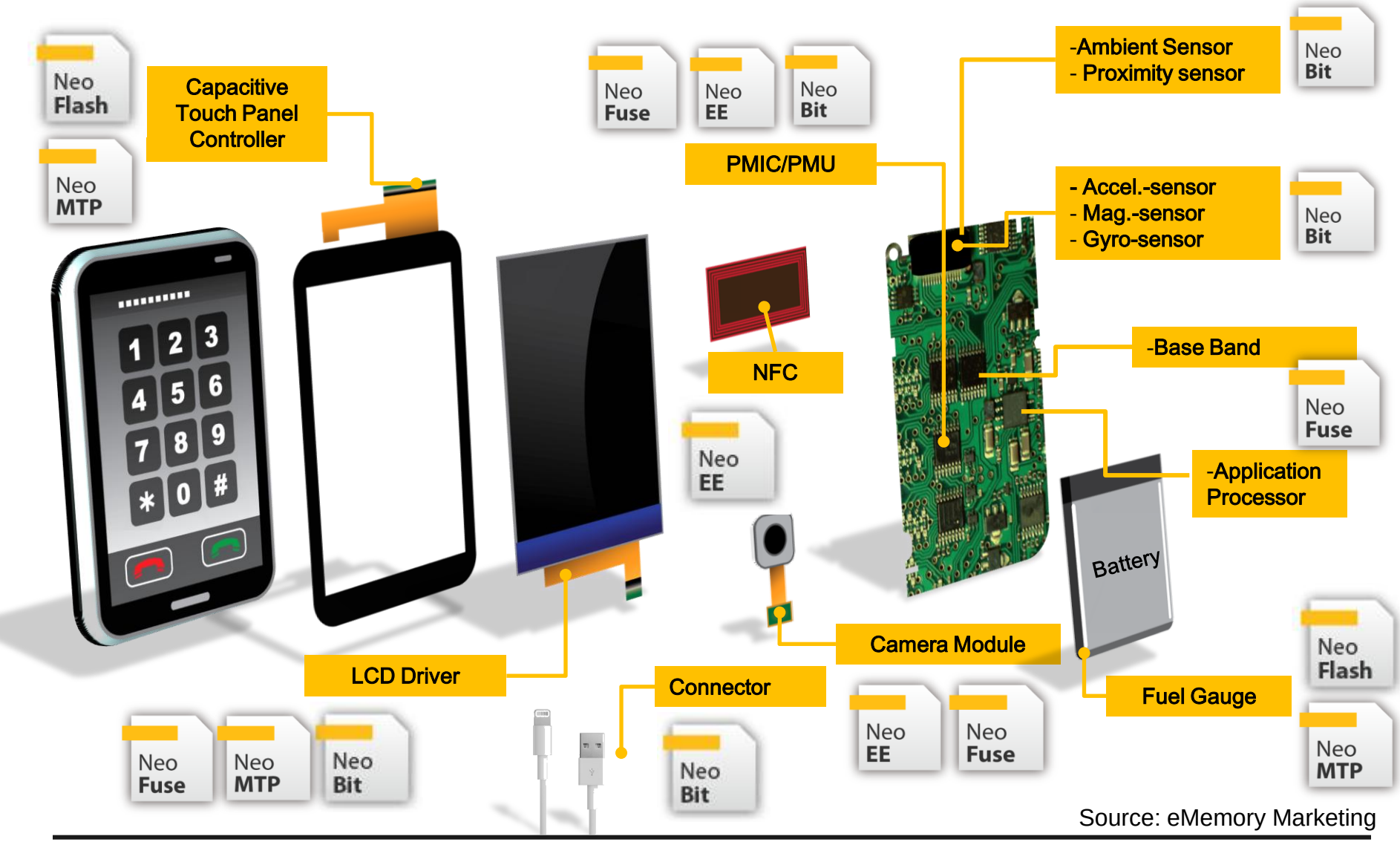
eMemory's NVM Technology	OTP		MTP		
	NeoBit	NeoFuse	NeoFlash	NeoEE	NeoMTP
Product Type	OTP	OTP	Flash	EEPROM	MTP
Endurance (Cycles)	10	10	1K~10K	10K~100K	1K~10K
Additional Mask Steps	0	0	2-3	0	0
Technology	Floating gate	Anti-Fuse	SONOS	Floating gate	Floating gate
Scalability	Simple	Simple	Simple	Simple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

Opportunity at all Price Points



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

eMemory IP in Smart Phone



Source: eMemory Marketing

3Q14 Wafer Demand by IC Type

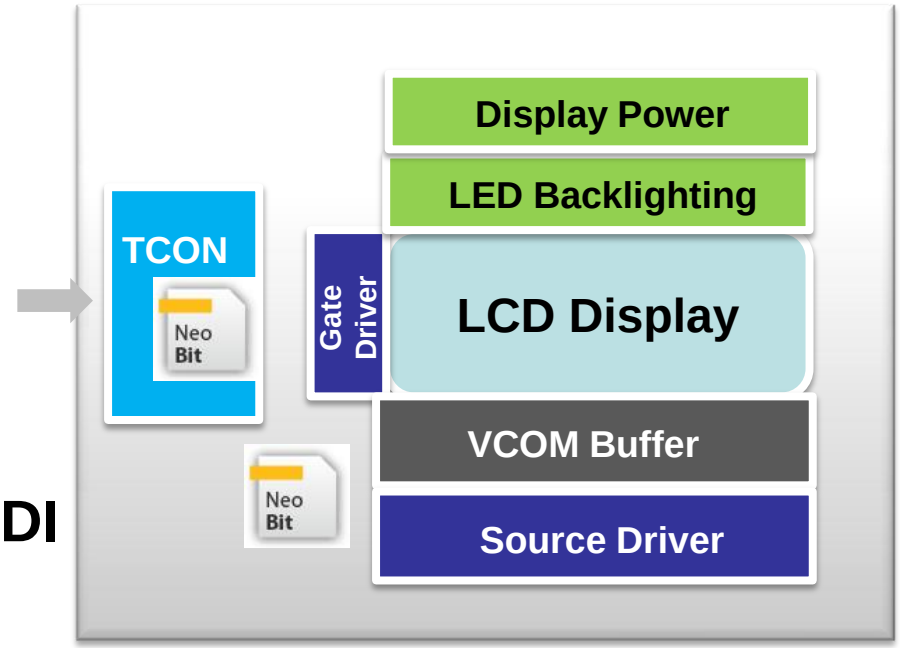
IC Type	Equ. to 8-inch wafer (K)
AP	4964
PMU	4756
CIS sensor	4226
Fingerprint	4000
Smart card controller	3000
Base Band	2935
LCD driver (with TCON)	2013
Gauge IC	627
Touch panel controller (C)	556
Connectivity	395
STB controller	335
TV controller	327
Wifi controller	245
LED driver	243
DC-DC/AC-DC	176
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

Advanced LCD Driver ICs

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

I/F
(LVDS, MIPI,…)

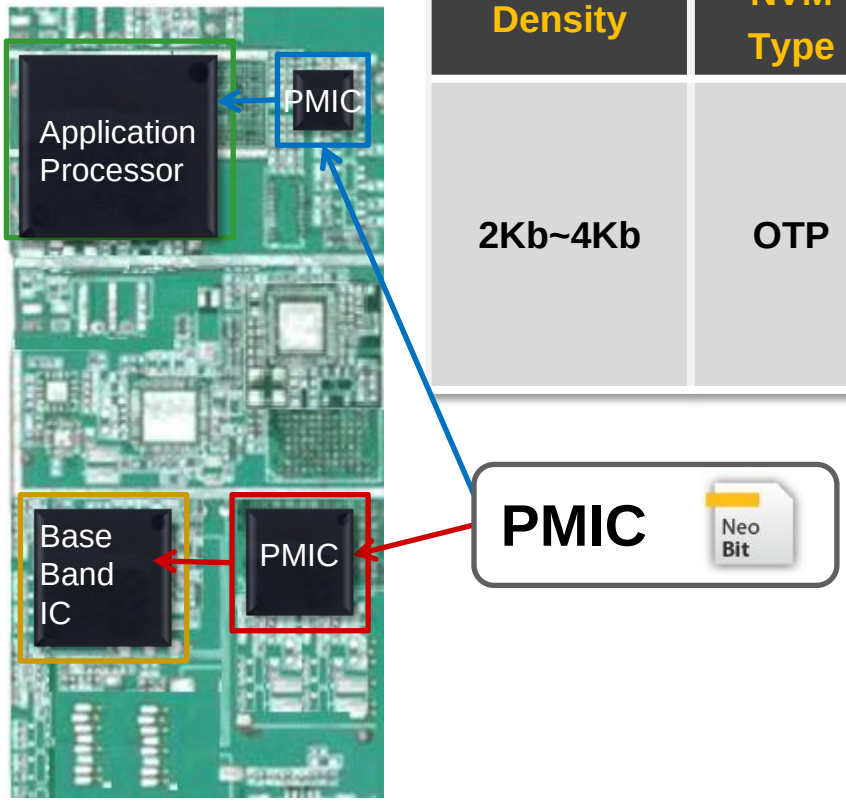


DDI

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

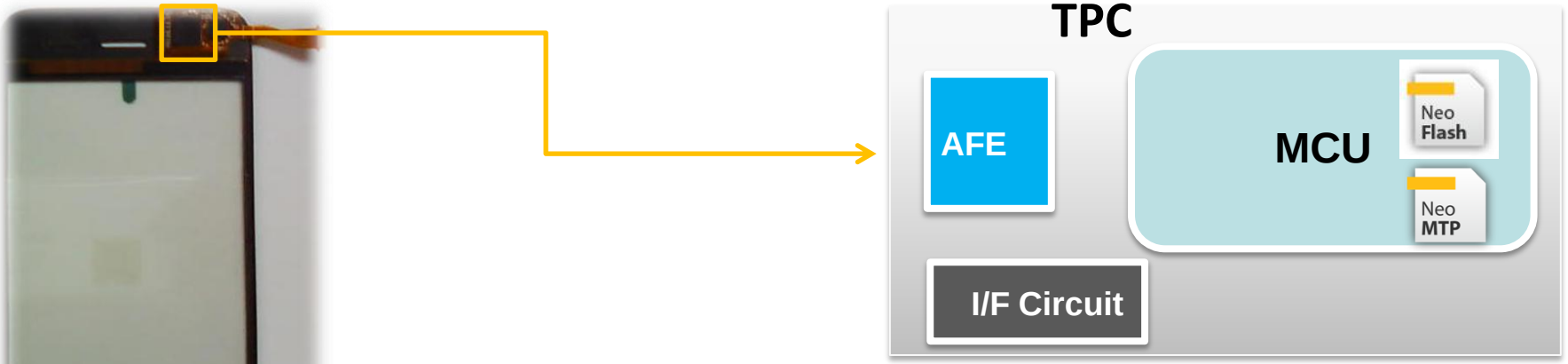
Process Technology : Advanced 0.25um BCD/ 0.18um BCD/ 0.13um BCD
Mature 0.18um/0.16um/0.152um Logic



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

Touch Panel Controller ICs

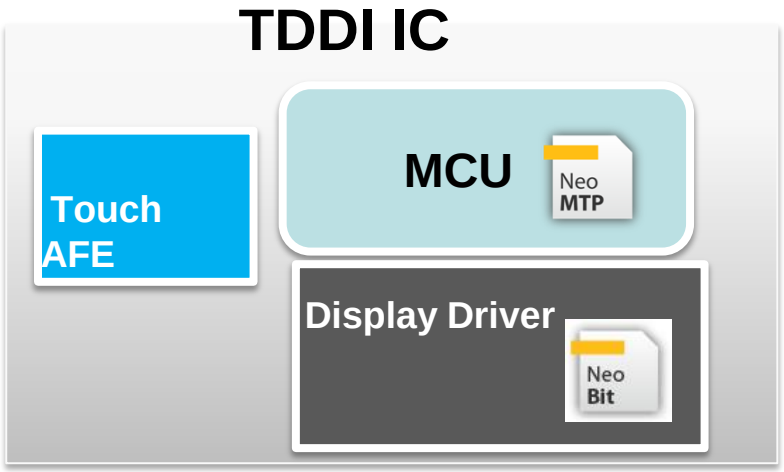
Process Technology : 0.16um HV/0.11um G



Density	Endurance	NVM Type	Purpose	NVM Usage
16K8~32K8	<1000	MTP	Code Storage	F/W code
			Parameter setting	Customized model and performance optimization

In-Cell Touch Panel Controllers ICs

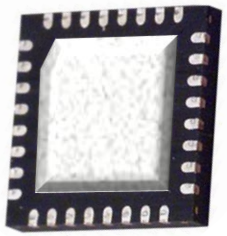
Process Technology : 0.11um HV/80nm HV/55nm HV

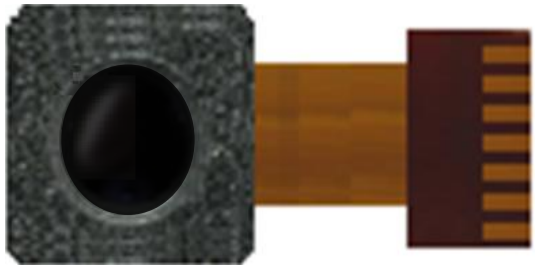


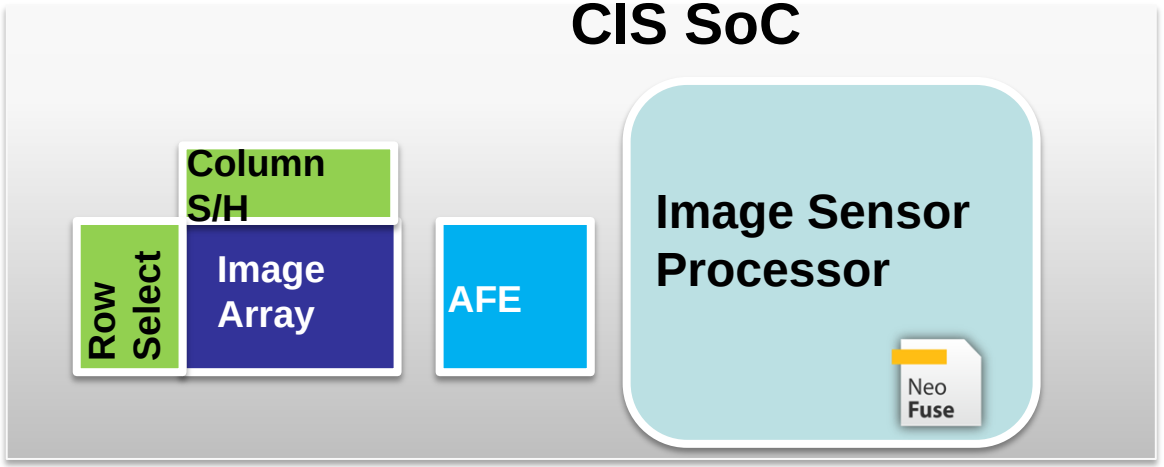
Density	Endurance	NVM Type	Purpose	NVM Usage
2K8~4K8	1	OTP	Trimming	Accuracy
			Code Storage	Gamma Table
16K8~32K8	<1000	MTP	Code Storage	Touch F/W Code
			Parameter setting	Performance Optimization

CMOS Image Sensor

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



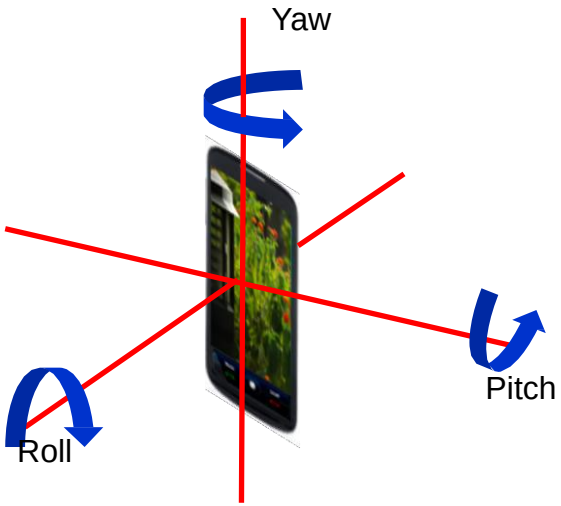


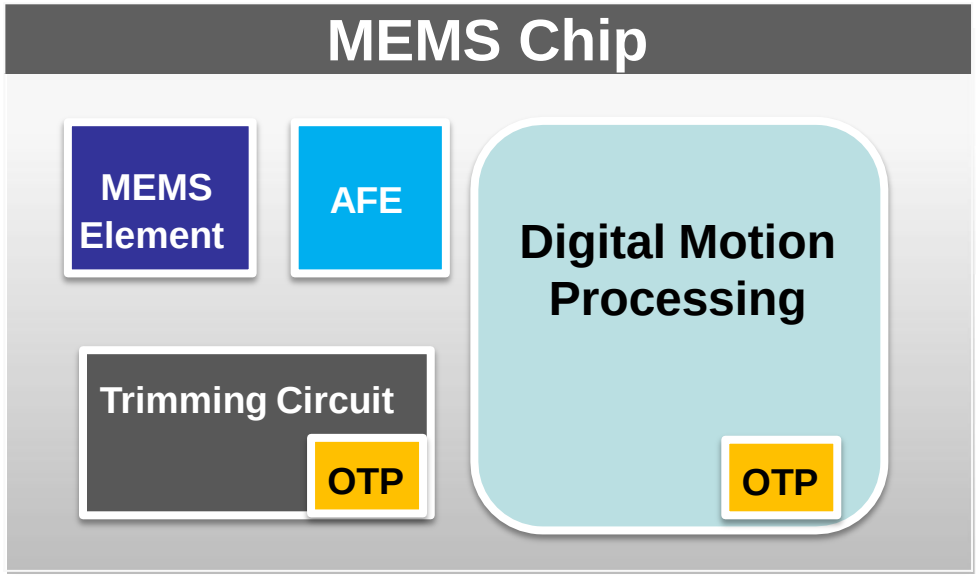


Density	Endurance	NVM Type	Purpose	NVM Usage
2Kb~4Kb	1	OTP	Identification Setting	Product Code
			Parameter Setting	Start-up Initial Setting
32K8	1	OTP/ROM	Code Storage	Boot Load

MEMS

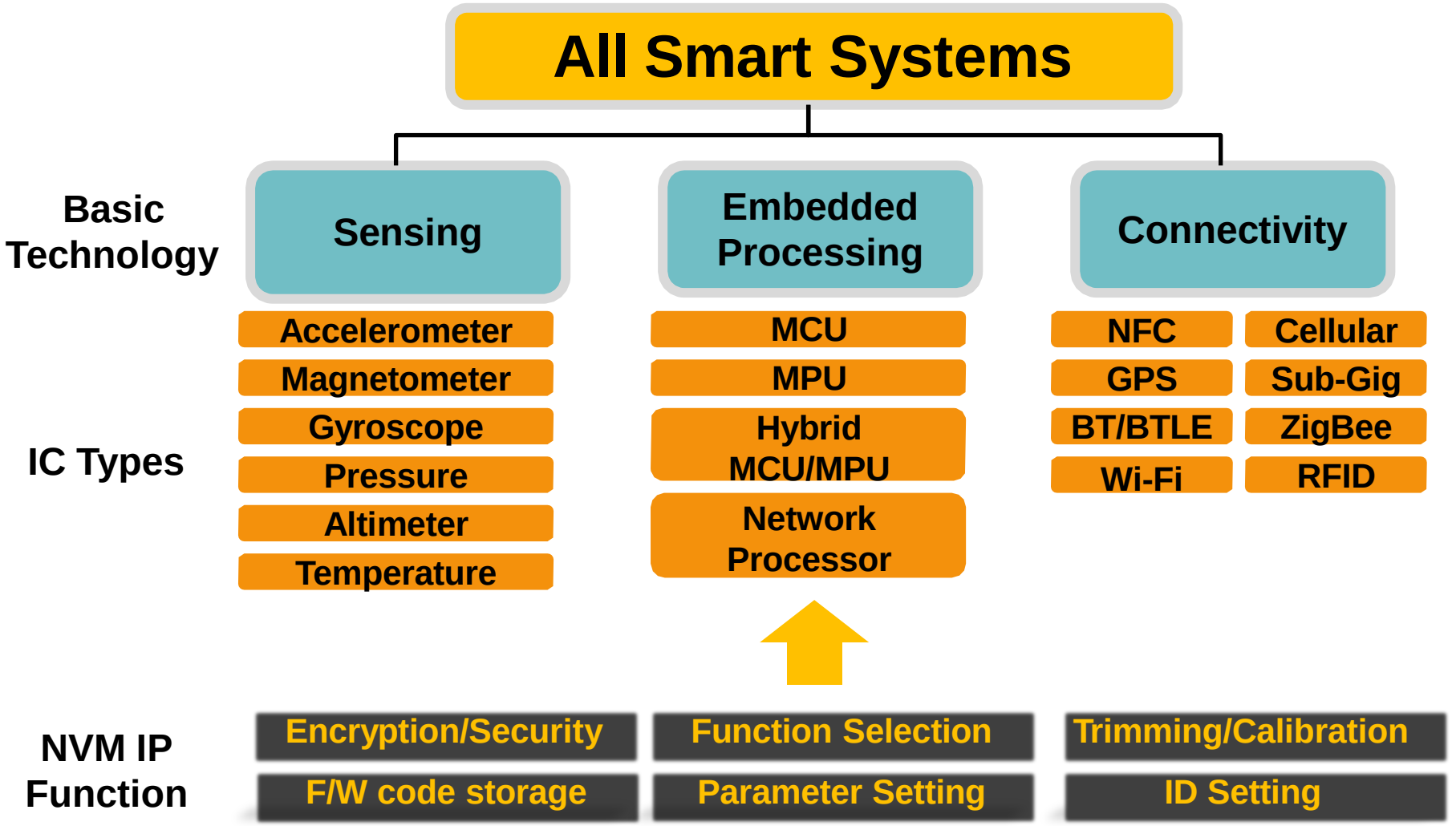
180/160/15x nm HV/Logic for MEMS Controller





Density	NVM Type	Purpose	NVM Usage
2Kb~4Kb	OTP	Trimming	Factory trimming
		Parameter Setting	Signal filtering
		Code Storage	Geometric computation

NVM IP Demand in IoT

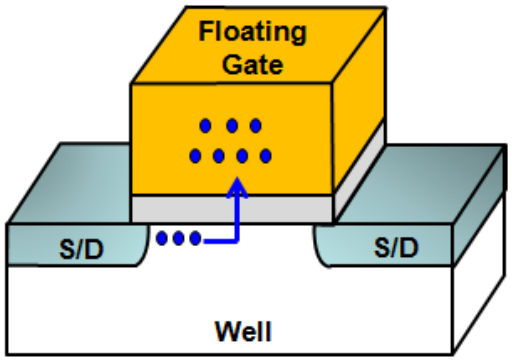


Invisibility for Security

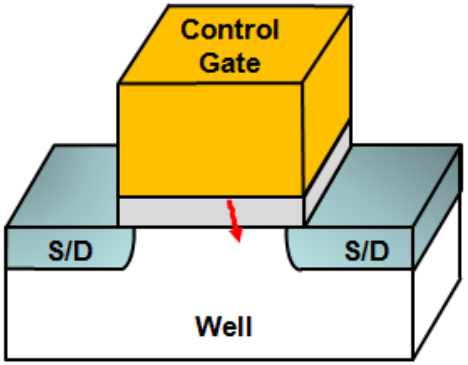
- Provide “Invisible Hardware Key” for invisible storage
- Prevent reverse-engineering to detect content of security key
- Protect firmware and hardware of ICs from pirating
- Extend & protect customer’s business

eFuse Key: Data is easily observed

Invisible Hardware Key : Data cannot be observed



Floating Gate



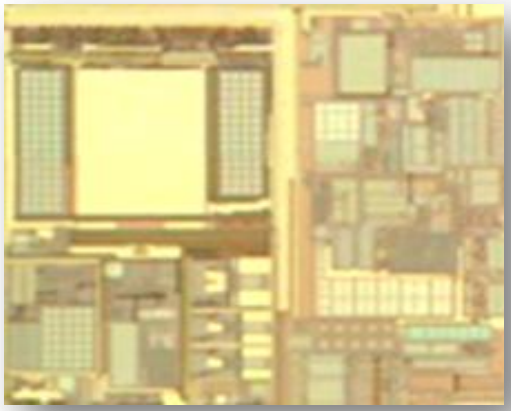
Anti-Fuse

Security & Protection

Authorized Product

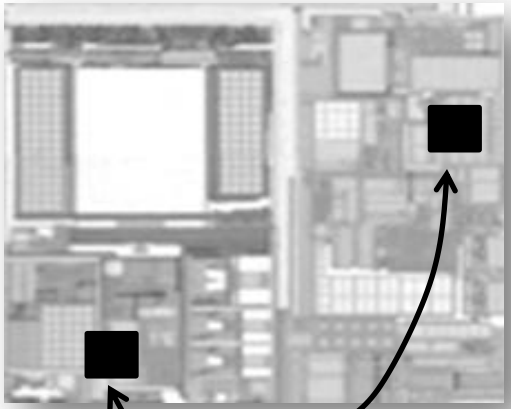
reverse copy

re-produce



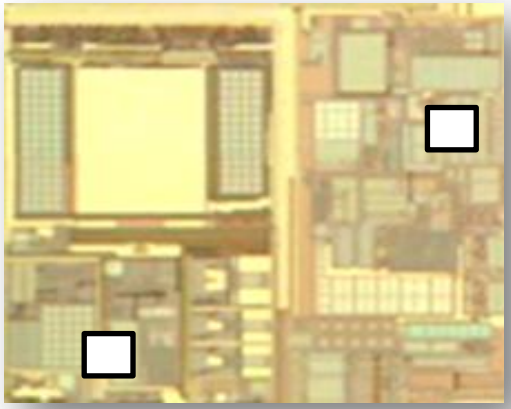
Fake Product

without protection



reverse copy

re-produce



with protection

Security IP/Code by Authorized Use

Can NOT Work w/o Security IP/Code

Security with eMemory IPs

Security for System Service

Cloud Processing

ID & Authentication
Data Integrity
Access Control

Hardware-Software/Firmware Lock

Hardware Key

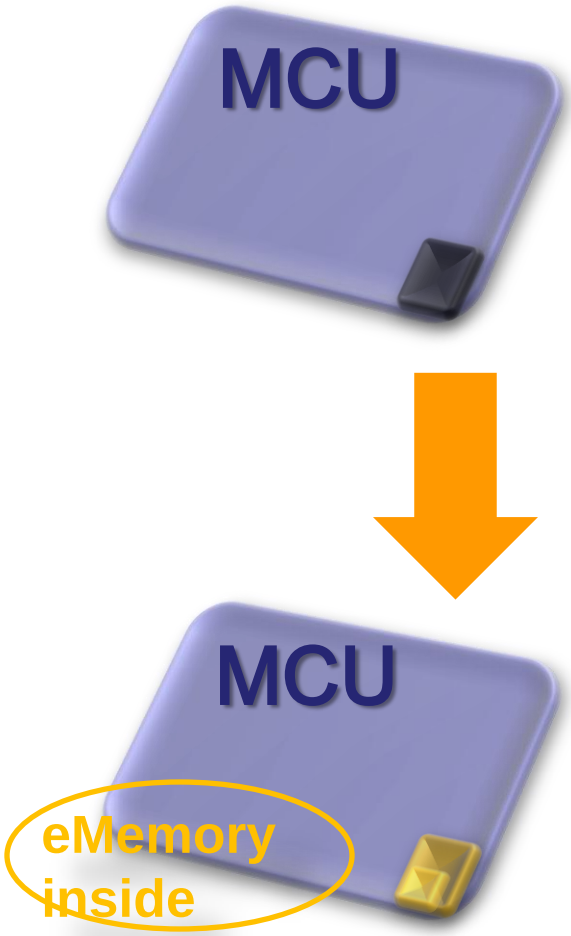
Security Lock

Firmware (OS) with security key

Hardware Protection
Invisible Key for Anti-Cloning

Security IP/Code by Authorized Use

Replacement of Embedded Flash for Competitiveness Improvement



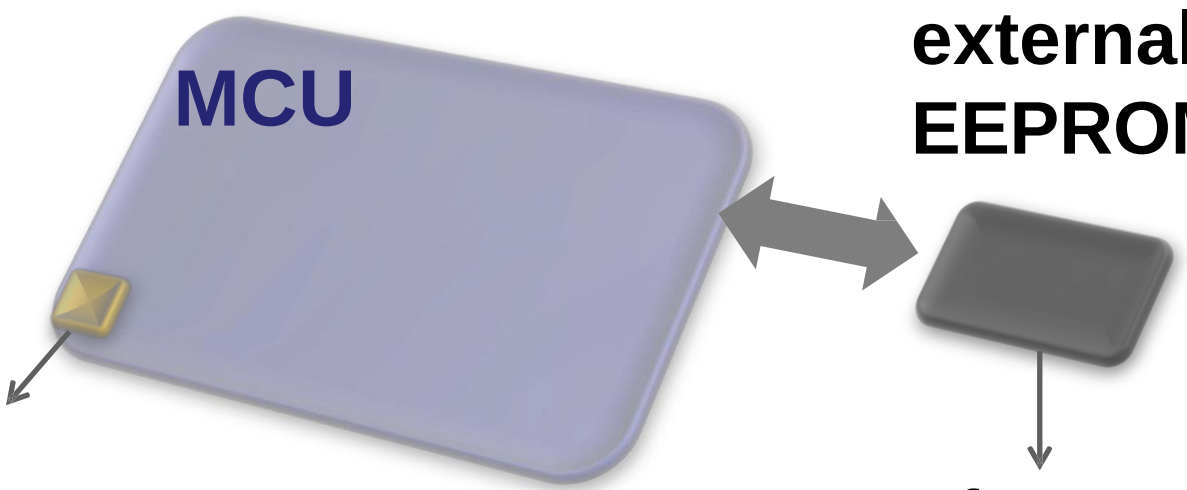
product design & manufacturing by embedded Flash Logic Process + 10 Masks

30% more cost reduction

wafer cost & testing time

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

MCU Applications with EEPROM

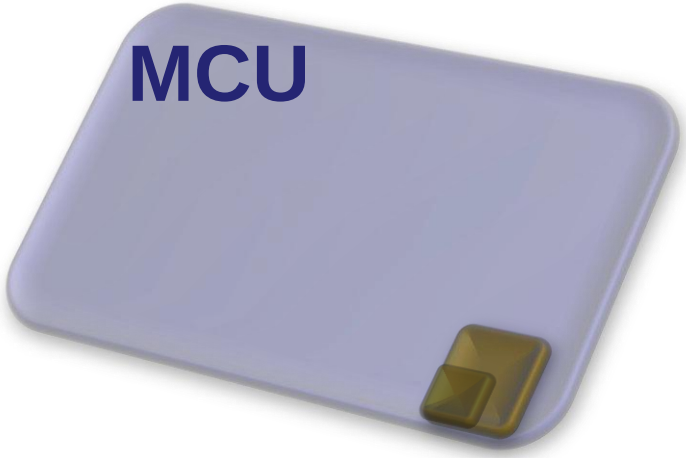


One-time storage for ID, trimming, encryption…

EEPROM for user data, parameter setting, system function…

NeoBit + NeoEE

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



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

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.**

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

ememory

Embedded Wisely, Embedded Widely