

Worldwide Semiconductor

■ ■ ■ ■ Market Forecast

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May 2006, Taipei

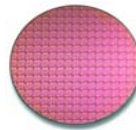
Worldwide Semiconductor Market Forecast



2005 Vendor Marketshare



Semiconductor Market Forecast



Semiconductor Applications Forecast



Summary

2005 Vendor Market Share: Top 15 Total Semiconductor Vendors

Rank '04	Rank '05	Vendor	2004 (\$M)	2005 (\$M)	Growth	2005 Share
1	1	Intel	30,730	34,590	12.6%	14.7%
2	2	Samsung Electronics	16,276	18,347	12.7%	7.8%
3	3	Texas Instruments	9,170	10,119	10.3%	4.3%
7	4	Toshiba	8,538	8,984	5.2%	3.8%
6	5	STMicroelectronics	8,691	8,821	1.5%	3.8%
4	6	Renesas Technology	9,001	8,291	-7.9%	3.5%
5	7	Infineon Technologies	8,945	8,205	-8.3%	3.5%
9	8	Philips Electronics	5,689	5,959	4.7%	2.5%
12	9	Hynix Semiconductor	4,648	5,723	23.1%	2.4%
8	10	NEC Electronics	6,438	5,657	-12.1%	2.4%
10	11	Freescale	5,519	5,599	1.4%	2.4%
13	12	Micron Technology	4,557	4,620	1.4%	2.0%
16	13	Sony	3,731	4,304	15.4%	1.8%
11	14	AMD	2,658	3,936	48.1%	1.7%
15	15	Matsushita	3,845	3,779	-1.7%	1.6%
		Others	93,581	97,701	4.4%	41.6%
		Total Market	222,017	234,635	5.7%	100.0%

Source: Gartner Dataquest (March 2006)

Semiconductor Industry Worldwide Annual Market Share -- Database [G00120719]

AMD's 2004 memory revenues have been included in the Spansion numbers for comparison purposes.

2005 Vendor Market Share: Micron's Relative Industry Performance Index

Micron Technology saw its total revenue increase by 1.4 percent, below the market average. So on the face of it, Micron's performance was substandard compared with the industry as a whole. However, if you take the device revenue for Micron in 2004 (DRAM, SRAM, NOR and so on) and increase it by the overall industry growth rate for 2005, you will come up with a theoretical revenue of \$4,408 million, or a 3.3 percent decline. This theoretical revenue and growth rate takes no account of companies winning or losing share, or even entering or leaving markets (see Table below for calculations).

In the case of Micron, it saw strong revenue growth in NAND flash and CMOS image sensors as it gained share; while in terms of DRAM, Micron's revenue decline was below the industry average. Overall, though, Micron performed better than would have otherwise been expected, with a relative industry performance (RIP) index of 4.7 percent — the difference between actual growth and calculated growth.

Device	MU's Actual Revenue 2004 (\$M)	MU's Actual Revenue 2005 (\$M)	MU's Actual Growth 2004-2005	Market Growth 2004-2005	Calculated Revenue 2005	Difference Actual vs. Calculated
DRAM	4,167	3,867	-7.2%	-4.2%	3,991	-3.0%
SRAM	16	21	31.3%	-15.7%	13	47.0%
NOR Flash	178	86	-51.7%	-15.4%	151	-36.2%
NAND Flash	4	199	4875.0%	70.6%	7	4804.4%
CMOS Image Sensor	192	447	132.8%	28.2%	246	104.6%
Total Semiconductor	4,557	4,620	1.4%	-3.3%	4,408	4.7%

Source: Gartner Dataquest (March 2006)

"Market Share: Semiconductor Revenue, Worldwide, 2005" [G00139260]

AMD's 2004 memory revenues have been included in the Spansion numbers for comparison purposes.

2005 Vendor Market Share: Relative Industry Performance Ranking

RIP Rank	Market Share Rank	Vendor	Revenue 2005 (\$M)	Actual Growth 2004-2005	Calc. Growth 2004-2005	Difference Act. vs. Calc.
1	14	Advanced Micro Devices	3,936	48.1%	15.6%	32.5%
2	9	Hynix Semiconductor	5,723	23.1%	-1.2%	24.3%
3	23	NVIDIA	2,203	21.4%	11.0%	10.4%
4	13	Sony	4,304	15.4%	5.2%	10.1%
5	20	Broadcom	2,671	11.2%	4.6%	6.7%
6	19	IBM Microelectronics	2,855	17.7%	11.9%	5.8%
7	12	Micron Technology	4,620	1.4%	-3.3%	4.7%
8	3	Texas Instruments	10,119	10.3%	6.2%	4.1%
9	25	Spansion	2,003	-14.5%	-15.5%	1.0%
10	17	QUALCOMM	3,457	7.7%	6.9%	0.8%
11	11	Freescale Semiconductor	5,599	1.4%	0.9%	0.5%
12	5	STMicroelectronics	8,821	1.5%	1.0%	0.5%
13	1	Intel	34,590	12.6%	12.8%	-0.3%
14	18	Rohm	2,919	0.5%	1.1%	-0.6%
15	2	Samsung Electronics	18,347	12.7%	13.6%	-0.9%
16	15	Matsushita	3,779	-1.7%	1.7%	-3.4%
17	21	Fujitsu	2,587	-0.5%	3.0%	-3.6%
18	8	Philips Electronics	5,646	-0.8%	3.6%	-4.3%
19	7	Infineon Technologies	8,205	-8.3%	-0.2%	-8.1%
20	6	Renesas Technology	8,291	-7.9%	1.1%	-9.0%
21	24	Sanyo Electric	2,052	-5.0%	4.2%	-9.1%
22	4	Toshiba	8,984	5.2%	16.1%	-10.9%
23	22	Analog Devices	2,434	-6.7%	4.2%	-11.0%
24	10	NEC Electronics	5,657	-12.1%	1.1%	-13.3%
25	16	Sharp	3,569	-8.7%	6.0%	-14.7%

Source: Gartner Dataquest (March 2006)

"Market Share: Semiconductor Revenue, Worldwide, 2005" [G00139260]

2005 Vendor Market Share: American Companies Dominate, AP Are Gaining

Vendor HQ	2004	2005	Growth	Share 2004	Share 2005
Total Market	222,017	234,635	5.7%	100.0%	100.0%
Americas' Companies	104,991	113,713	8.3%	47.3%	48.5%
Japanese Companies	54,715	53,947	-1.4%	24.6%	23.0%
EMEA Companies	27,967	28,451	1.7%	12.6%	12.1%
Asia/Pacific Companies	34344	38524	12.2%	15.5%	16.4%
S. Korean Companies	21,988	25,173	14.5%	9.9%	10.7%
Taiwanese Companies	11,576	12,133	4.8%	5.2%	5.2%
Chinese Companies	780	1,218	56.2%	0.35%	0.52%

Source: Gartner Dataquest (March 2006)
Semiconductor Industry Worldwide Annual Market Share -- Database [G00120719]

Worldwide Semiconductor Market Forecast



2005 Vendor Marketshare



Semiconductor Market Forecast



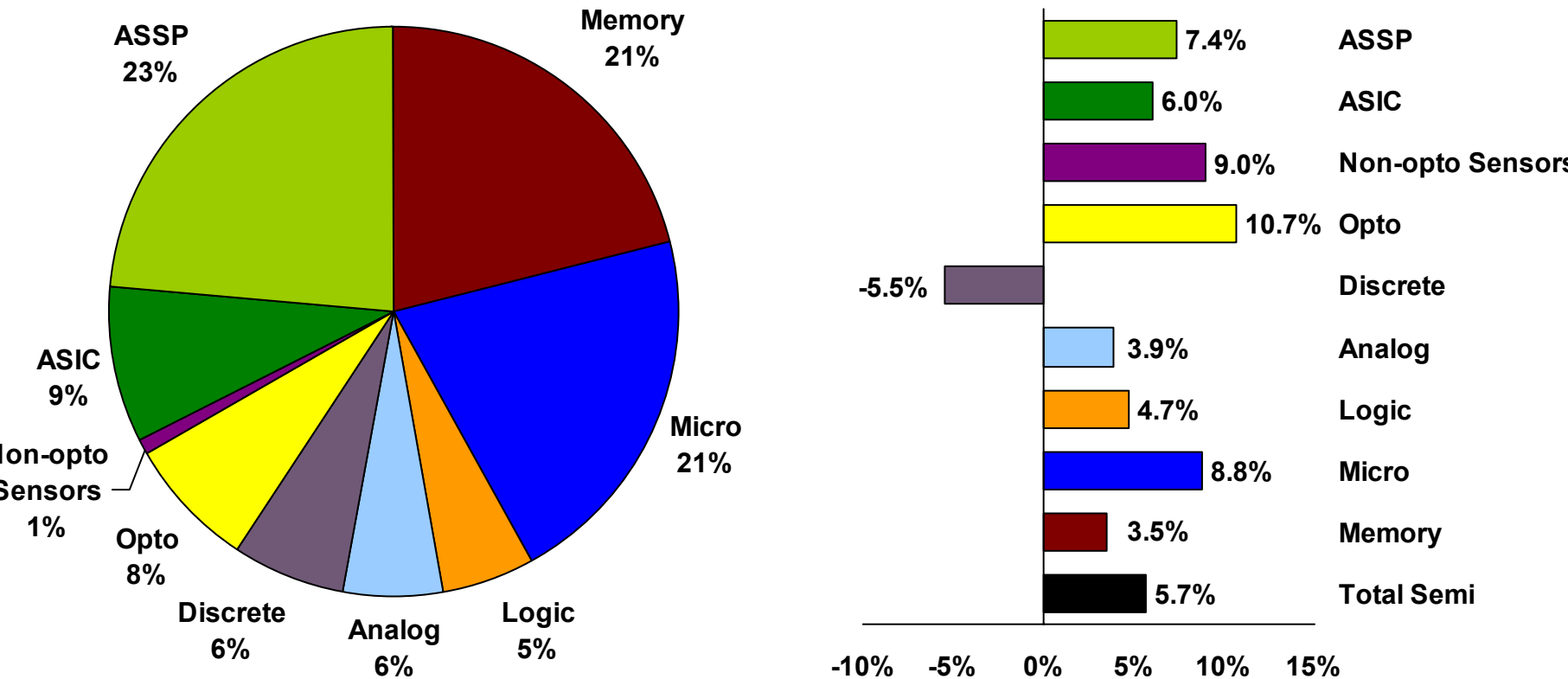
Semiconductor Applications Forecast



Summary

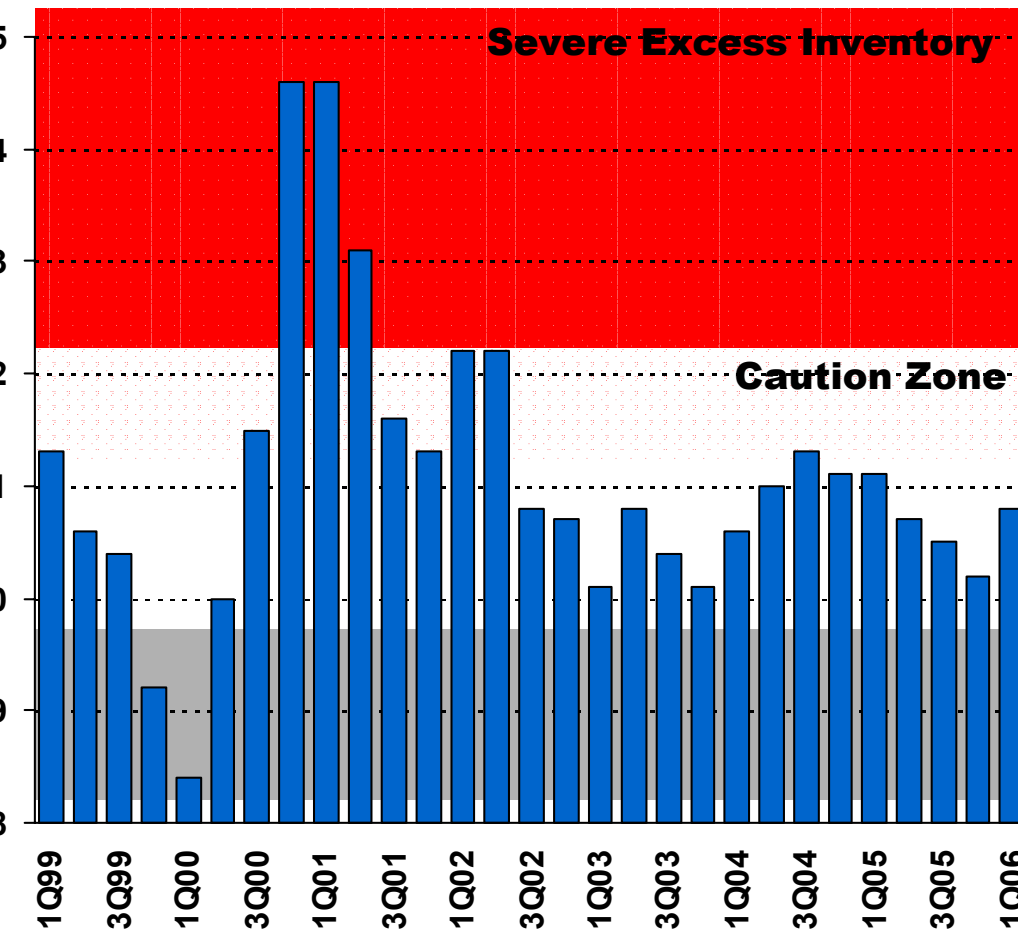
Semiconductor Market Forecast: 2005 Market Size & Growth by Device

2005 Revenues \$234.6 billion, 5.7% Growth
Market Percentage by Device and Growth



Source: Gartner Dataquest, May 2006
Semiconductor Forecast Worldwide--Forecast Database [SEQS-WW-DB-DATA]

Semiconductor Market Forecast: DQ Semiconductor Inventory Index

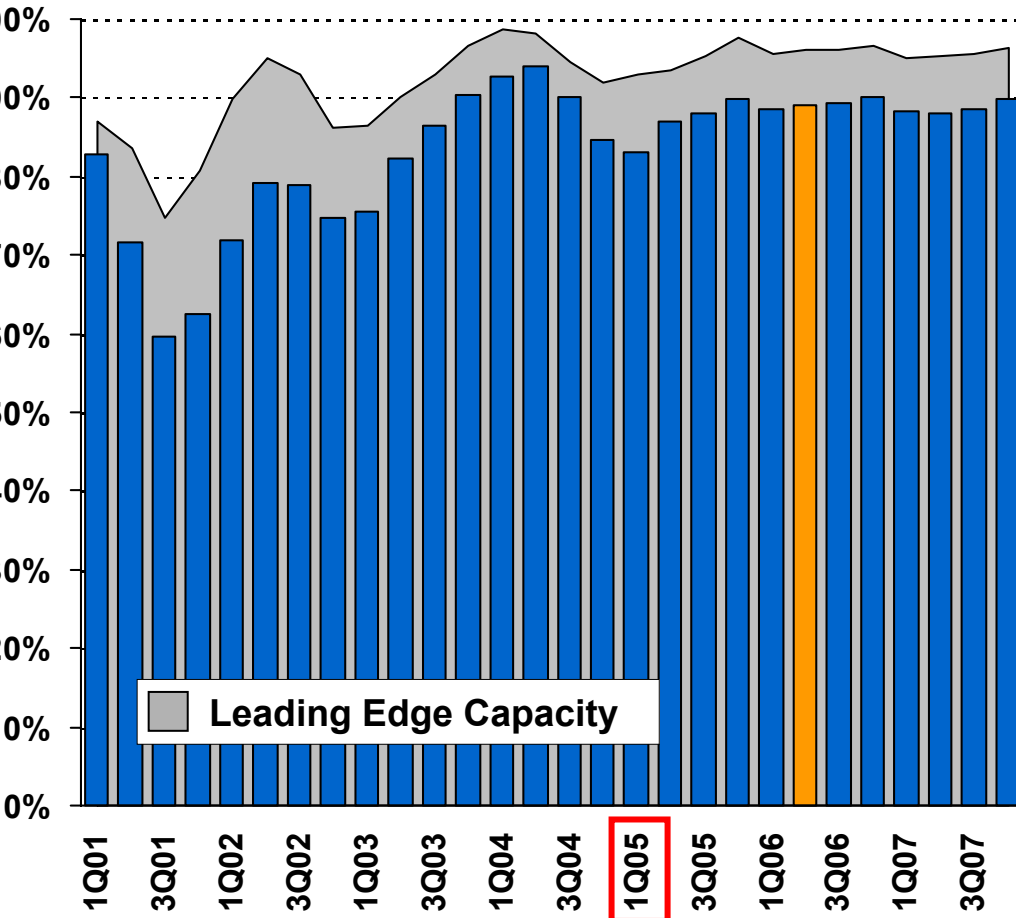


- Index increased in 1Q06 to 1.08
- Expect seasonal moves within the ideal range during 2006
- 1Q06 should see a slight increase
- **Caution:** low inventory levels may lead to increased production to build inventories in anticipation of demand. If demand does not materialize as anticipated, inventories could rise like in 2004
- **Less than 0.95** — moderate to severe inventory shortages
- **0.95 to 1.10** — normal inventory levels
- **1.10 to less than 1.20** — caution zone with moderately inflated inventory levels
- **Greater than 1.20** — severe excess inventory

Source: Gartner Dataquest, May 2006
Semiconductor Inventory Outlook: 2Q06 Update [G00138053]

Semiconductor Market Forecast: Wafer Fab Capacity Utilization Rates

Ratio of Silicon Consumed
to Fab Capacity



- Leading edge capacity remains in adequate, but not excessive supply
- Fabs are managing capacity carefully
- New capacity additions anticipate seasonal production patterns
- Aggressive capacity additions in memory may cause softness in 2007 rates
- Capital Spending Outlook
 - 2004 63.5% revenue growth
 - 2005 -2.0%
 - 2006 8.8%
 - 2007 1.2%
- Leading Edge Capacity: defined as the two most advanced nodes in volume production, so today it's 130 and 90nm, by the end of 2006 will be 90 and 65nm

Semiconductor Market Forecast: \$300 Billion Dollar Industry

Millions of Dollars	2004	2005	2006	2007	2008	2009	2010	CAGR 2005-2010
Memory	48.1 43.5%	49.8 3.5%	57.4 15.5%	61.3 6.7%	72.2 17.8%	63.8 -11.7%	66.5 4.3%	6.0%
Microcomponent	44.5 13.4%	48.4 8.8%	52.2 7.8%	56.1 7.6%	62.4 11.1%	65.9 5.5%	70.7 7.4%	7.9%
Logic IC	11.9 29.8%	12.5 4.7%	13.3 6.6%	14.7 10.6%	16.8 14.1%	17.6 4.7%	19.0 8.1%	8.8%
ASSP	51.4 20.8%	55.2 7.4%	61.2 10.9%	68.1 11.3%	78.4 15.2%	83.3 6.2%	94.4 13.3%	11.3%
ASIC	19.9 13.9%	21.1 6.0%	23.3 10.3%	25.6 9.8%	28.2 10.2%	28.8 2.4%	31.4 9.0%	8.3%
Analog IC	12.8 19.1%	13.4 3.9%	14.8 10.7%	16.4 10.8%	18.6 13.5%	17.6 -5.1%	19.6 11.0%	7.9%
Discrete	15.8 17.6%	15.0 -5.5%	15.8 5.6%	16.9 6.6%	18.1 7.2%	18.3 1.5%	19.5 6.5%	5.5%
Optical	16.0 47.4%	17.7 10.7%	19.6 10.9%	21.4 9.2%	25.1 17.3%	26.5 5.7%	28.4 7.2%	10.0%
Sensors	1.6 29.2%	1.7 9.0%	1.9 8.2%	2.1 13.3%	2.4 11.2%	2.5 7.9%	2.7 7.6%	9.6%
Total Market	222.0 24.6%	234.6 5.7%	259.5 10.6%	282.6 8.9%	322.1 14.0%	324.4 0.7%	352.3 8.6%	8.5%

Asia Pacific	107.0	117.1	134.7	149.6	175.3	181.6	201.5	11.5%
AP Growth	27.2%	9.4%	15.1%	11.0%	17.2%	3.6%	11.0%	
% Worldwide TAM	48.2%	49.9%	51.9%	53.0%	54.4%	56.0%	57.2%	

Source: Gartner Dataquest, May 2006

Semiconductor Forecast Worldwide--Forecast Database [SEQS-WW-DB-DATA]

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Gartner

Semiconductor Market Forecast: Top Applications in 2005 and 2010

Semiconductor Revenues (Billions of Dollars)

Applications	2005 Revenue	2005 Share	Applications	2010 Revenue	2010 Share	2005-2010 CAGR
PCs	45.7	19.5%	PCs	72.9	20.7%	9.8%
Digital Cellular	36.1	15.4%	Digital Cellular	67.6	19.2%	13.3%
Servers	8.8	3.7%	RS3	10.7	3.0%	4.5%
RS3	8.6	3.7%	Digital Media Players	10.6	3.0%	18.4%
Disk Drive	7.5	3.2%	Servers	10.6	3.0%	3.8%
Video Game Machines	5.0	2.1%	Disk Drive	10.6	3.0%	7.0%
Other Automotive	4.9	2.1%	Digital TVs	10.2	2.9%	17.6%
Digital TVs	4.6	1.9%	Other Automotive	7.4	2.1%	8.7%
Digital Media Players	4.5	1.9%	Video Game Machines	5.8	1.6%	3.1%
Digital Still Camera	3.7	1.6%	Monitor, Flat Panel	5.0	1.4%	9.1%
Others	105.3	44.9%	Others	141.0	40.0%	6.0%
Total	\$234.6	100.0%	Total	\$352.3	100.0%	8.5%

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RS3: Removable solid-state storage

- **Top 4 applications account for 48 percent of Asia Pacific demand in 2005 and this will rise to 54 percent in 2010**

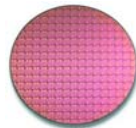
Worldwide Semiconductor Market Forecast



2005 Vendor Marketshare



Semiconductor Market Forecast



Semiconductor Applications Forecast



Summary

Semiconductor Applications Forecast: Personal Computer

Personal Computer

First Shipped: 1981

Penetration: 12.3% population (2005)

Shipments: 211.6m

Vendor Revenue: \$115.9 billion

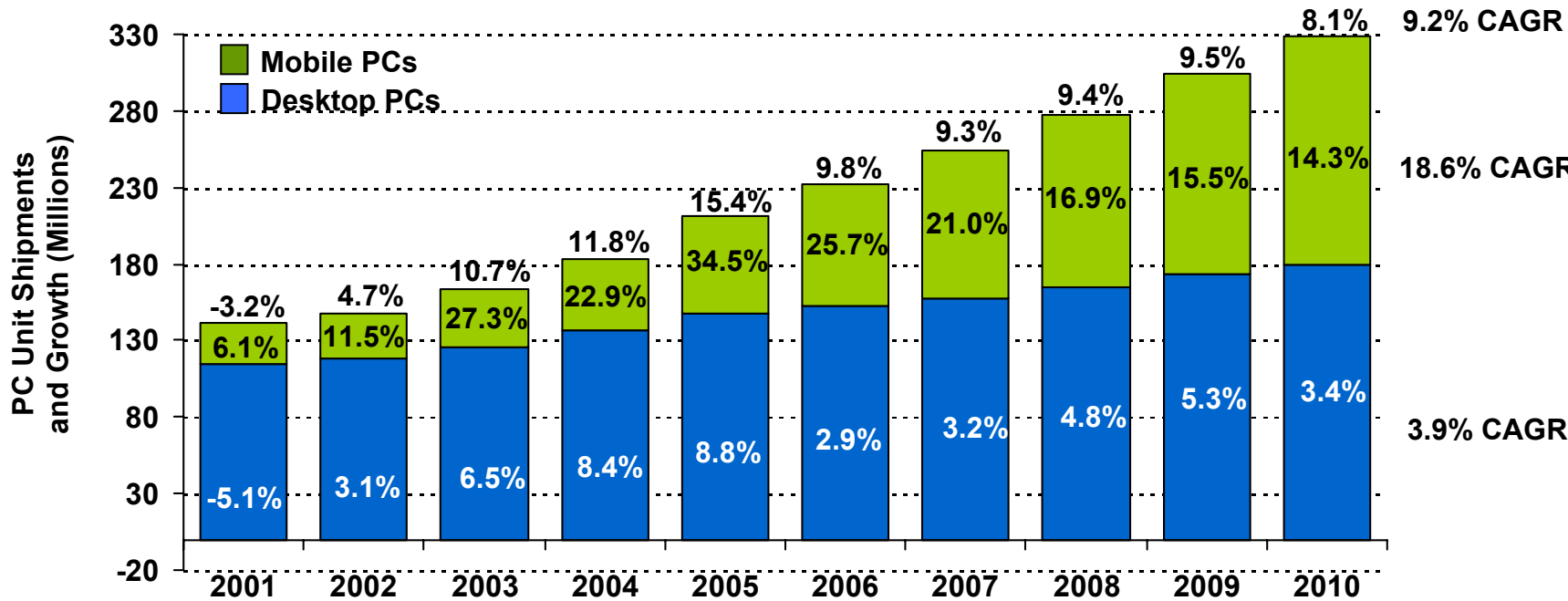
Semi. Revenue: \$45.7 billion

Semi. I/O Ratio: 39.4%



Semiconductor Applications Forecast: Personal Computer Market Forecast

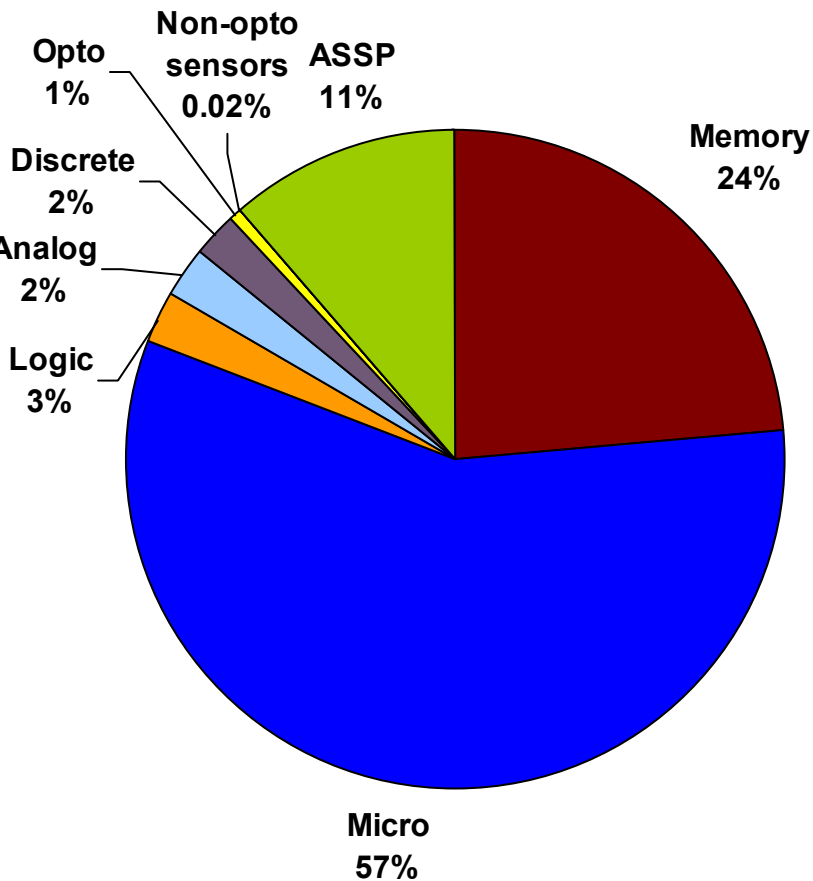
Semi TAM (\$bn)	31.4	31.4	35.3	42.0	45.7	50.1	56.0	64.9	65.8	72.9	CAGR 05-10	9.8%
% M/K	20.5%	20.2%	19.8%	18.9%	19.5%	19.3%	19.8%	20.2%	20.3%	20.7%		



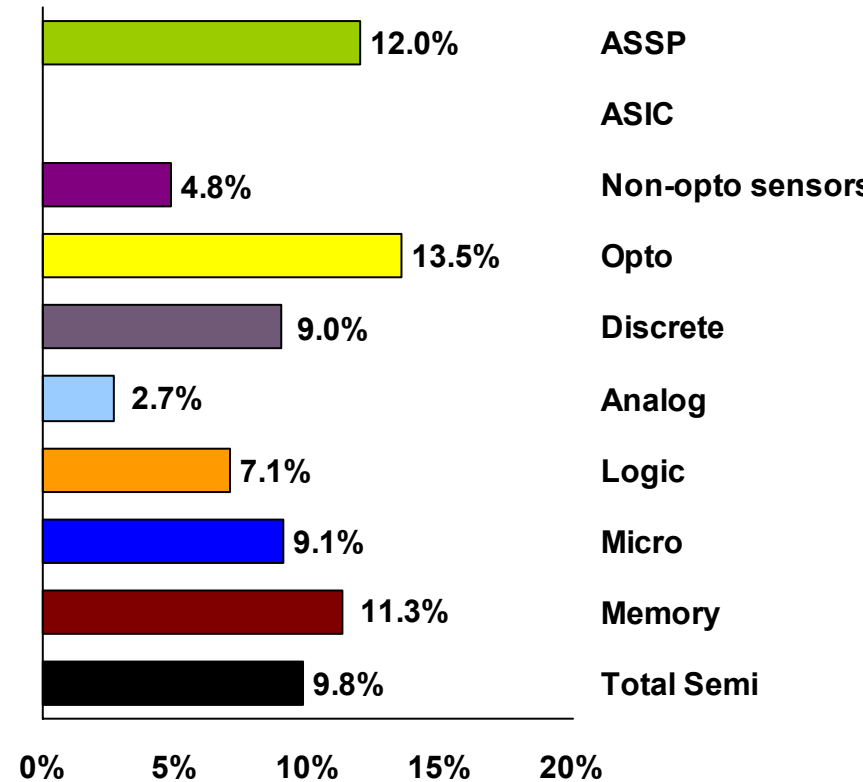
AP TAM (\$bn)	11.4	15.5	19.5	23.6	25.4	28.3	31.6	37.0	38.3	42.8	CAGR 05-10	11.1%
% WW PC TAM	36.3%	49.3%	55.4%	56.3%	55.5%	56.6%	56.5%	57.0%	58.2%	58.8%		
% AP Total TAM	21.8%	23.0%	23.2%	22.1%	21.7%	21.0%	21.1%	21.1%	21.1%	21.3%		

Semiconductor Applications Forecast: Personal Computer Device Market & CAGRs

2005 Revenues \$45.7 billion



2010 Revenues \$72.9 billion
2005-2010 CAGR



Semiconductor Applications Forecast: Digital Cellular Handset

Digital Cellular Handset

First Shipped: 1973

Penetration: 29.7% population (2005)

Shipments: 811.9m

Vendor Revenue: \$140.1 billion

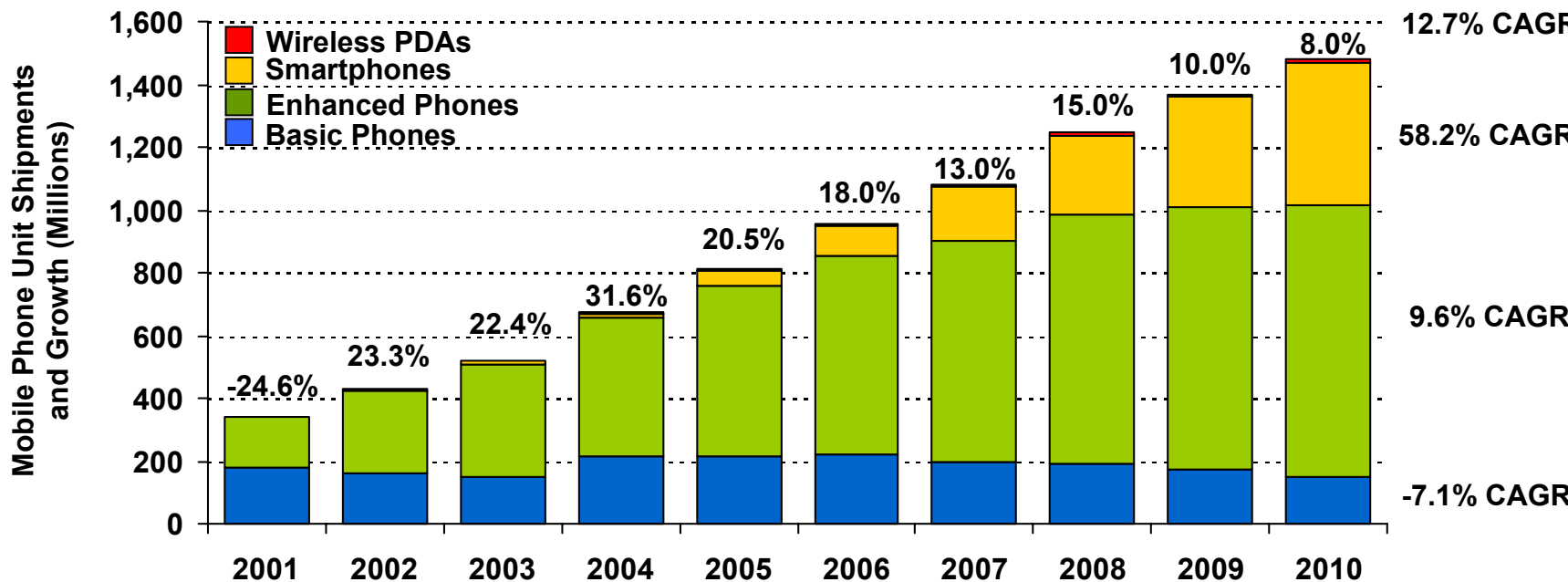
Semi. Revenue: \$36.1 billion

Semi. I/O Ratio: 25.8%



Semiconductor Applications Forecast: Digital Cellular Handset Market Forecast

Semi TAM (\$bn)	14.9	17.4	23.3	34.6	36.1	39.4	45.0	54.4	58.6	67.6	CAGR 05-10	13.3%
% M/K	9.7%	11.2%	13.1%	15.6%	15.4%	15.2%	15.9%	16.9%	18.1%	19.2%		



AP TAM (\$bn)	4.8	9.5	14.6	19.4	20.5	23.8	28.1	35.9	40.7	48.0	CAGR 05-10	18.5%
% WW MP TAM	32.5%	54.8%	62.7%	56.1%	56.8%	60.4%	62.5%	66.1%	69.4%	71.0%		
% AP Total TAM	9.3%	14.2%	17.4%	18.1%	17.5%	17.7%	18.8%	20.5%	22.4%	23.8%		

Source: Gartner Dataquest, May 2006
 Semiconductor Forecast Worldwide--Forecast Database [SEQS-WW-DB-DATA]

Semiconductor Applications Forecast: Digital Cellular Handset Memory Architecture Battle

Execute in Place (XiP)

- Typically uses NOR
- Code is executed directly out of NOR so it requires no code shadowing for execution
- NOR can store boot code, as well as code for applications

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- XiP is seen as the higher cost option, but NOR vendors have responded by lowering prices
 - XiP will remain the most popular memory architecture during the forecast period

Store & Download (SnD)

- Typically uses NAND
- Uses shadowing architecture
 - Stored code brought from NAND to volatile memory (PSRAM/DRAM) then executed
- NAND also used for data storage
- OneNAND and Mobile Disk on Chip in this category

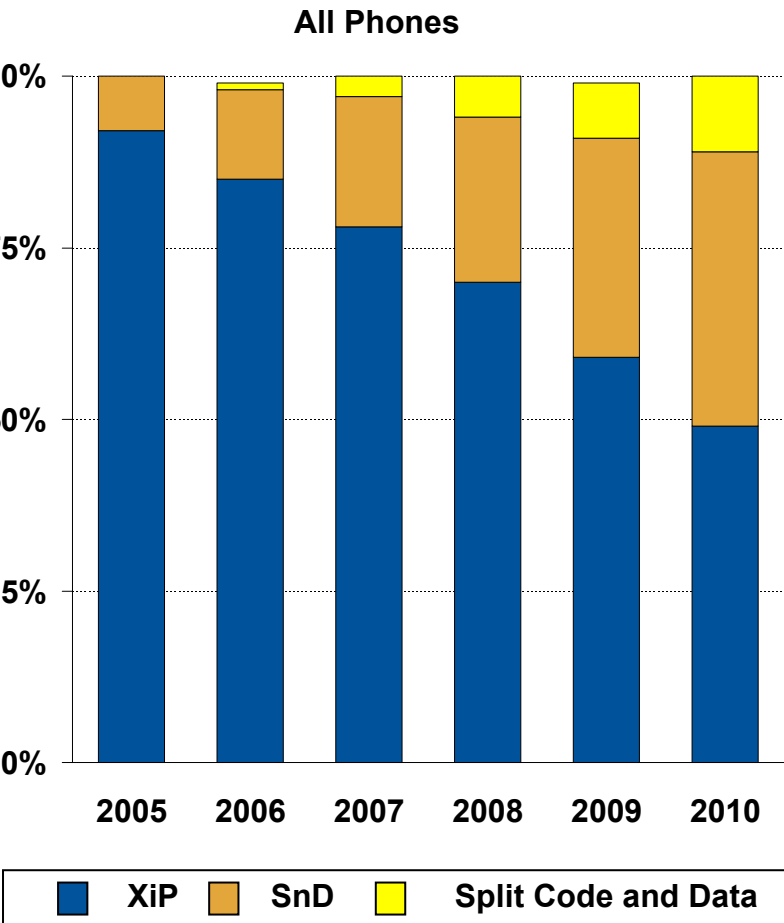
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- SnD is seen as the lower cost option-favorable cost per bit of NAND v NOR
 - SnD will be preferred for high-end handsets, where data storage is important

Split Code & Data

- Hybrid architecture with elements of both XiP & SnD
 - Boot code and lower level OS executed with NOR
 - NAND used for higher level OS and application code storage and execution

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- Expected to be used in handsets with separate application and baseband processor silicon
 - Split code and data architecture will emerge toward the end of the forecast period, but its future is uncertain

Semiconductor Applications Forecast: Digital Cellular Handset Memory Architecture Battle

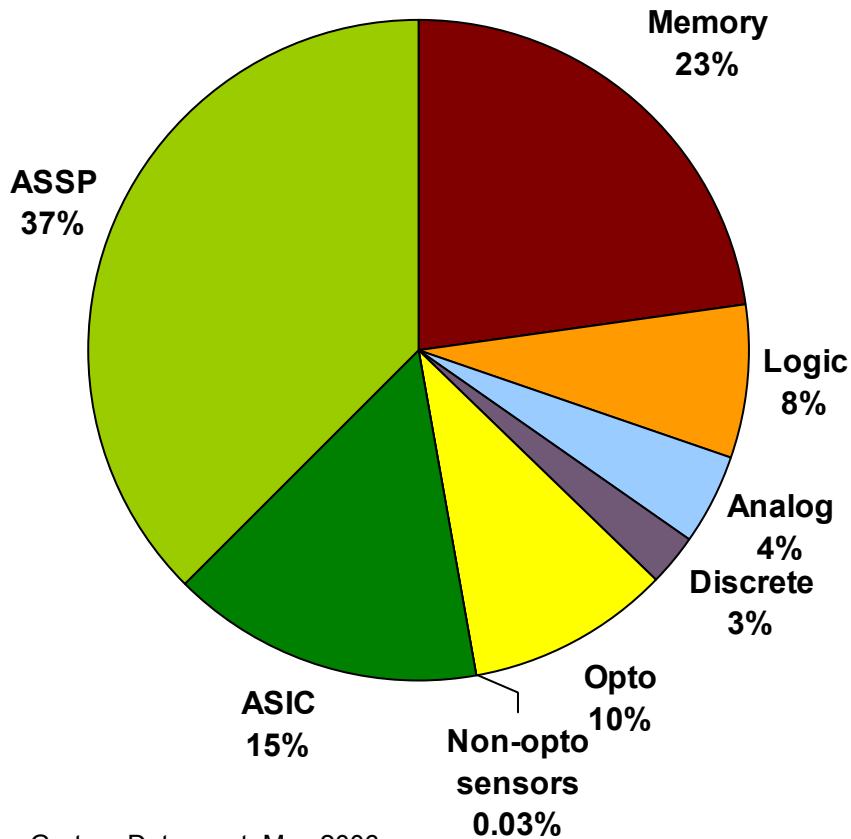


XiP declines from 91% in 2005 to 49% in 2010
SnD increases from 8% in 2005 to 40% in 2010
Split code and data reaches 11% by 2010

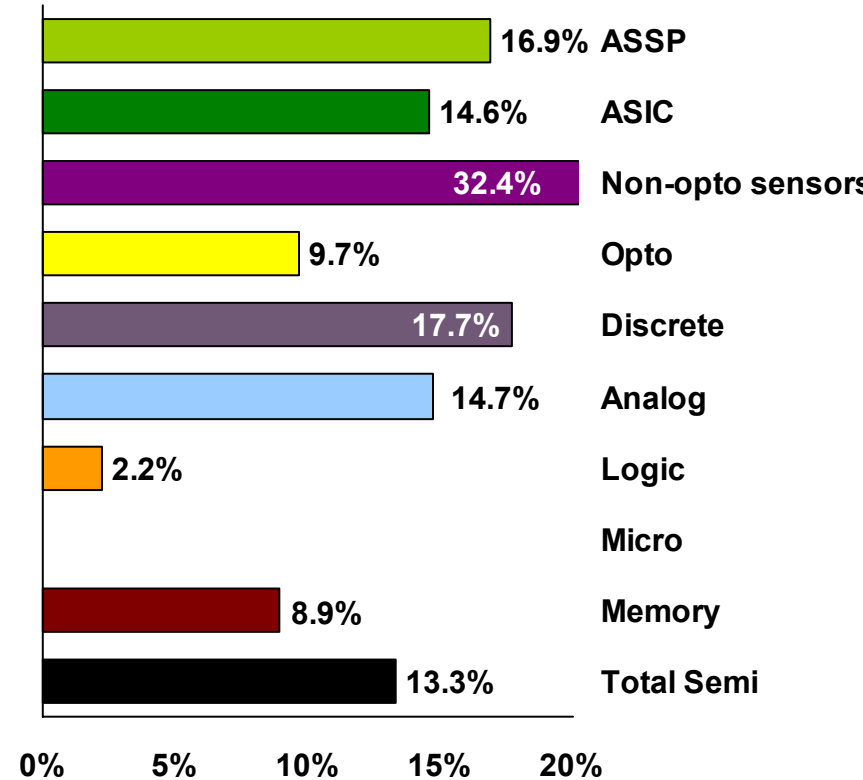
- There are no simple conclusions to this debate but...
- What was originally a cost debate is now a question of performance and system complexity:
 - NOR does not offer sufficient technical advantage over NAND to compensate for higher price, so NOR vendors have dropped pricing to compete
- Handset Manufacturers will segment the market
 - Handset manufacturers will design in both XiP and SnD interfaces in the short term, depending on handset type
 - Handset manufacturers will now consider which is the best technical solution for the particular product as well as ease of implementation
- Re-evaluation of NOR vendor strategy...What is the Impact?
 - NOR vendors are leveraging their cost structure and dropping NOR pricing to compete with the low cost per bit of NAND
 - NOR market overall is declining in revenue terms

Semiconductor Applications Forecast: Digital Cellular Handset Device Market & CAGRs

2005 Revenues \$36.1 billion



2010 Revenues \$67.6 billion
2005-2010 CAGR



Semiconductor Applications Forecast: Removable Solid State Storage

Removable Solid State Storage

First Shipped: 1998 (USB drive)

Penetration: 20.9% of PCs (USB/2005)

Shipments: 460.2m

Vendor Revenue: \$9.8 billion

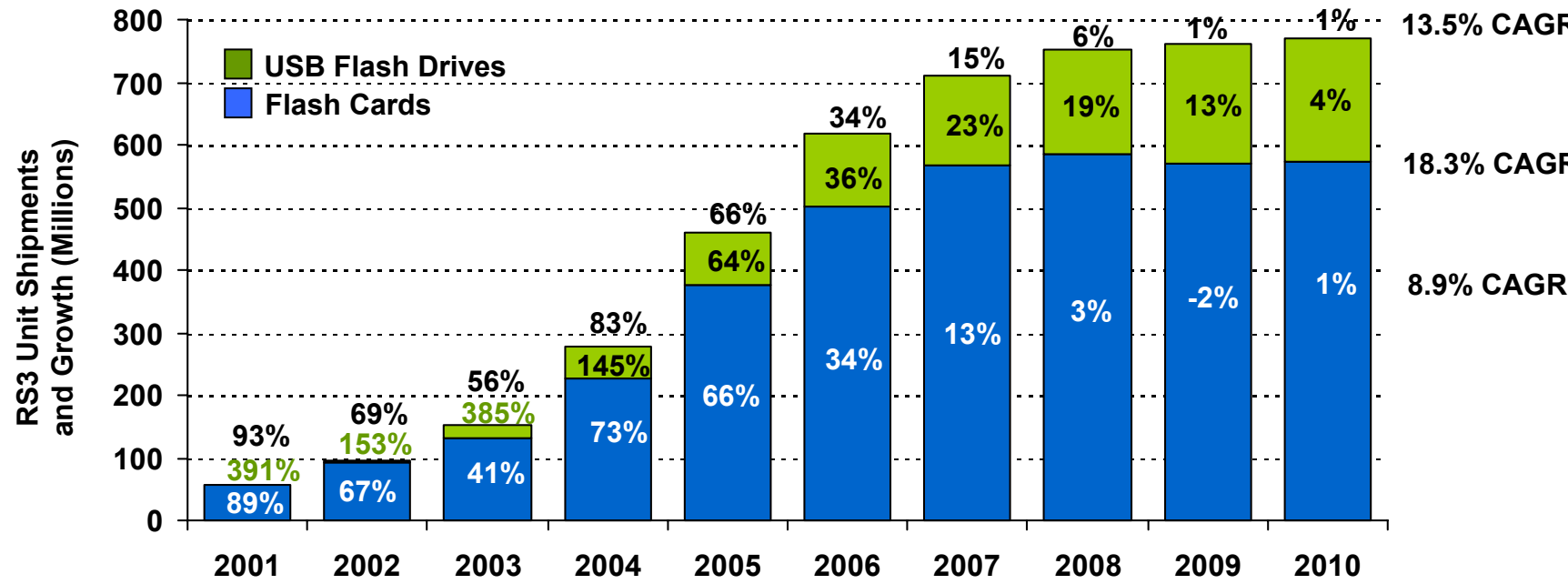
Semi. Revenue: \$8.6 billion

Semi. I/O Ratio: 88.0%



Semiconductor Applications Forecast: Removable Solid State Storage Market Forecast

Semi TAM (\$bn)	1.2	2.0	3.6	5.9	8.6	10.3	10.0	11.4	10.9	10.7	CAGR 05-10	4.5%
% M/K	0.8%	1.3%	2.0%	2.6%	3.7%	4.0%	3.5%	3.5%	3.4%	3.0%		

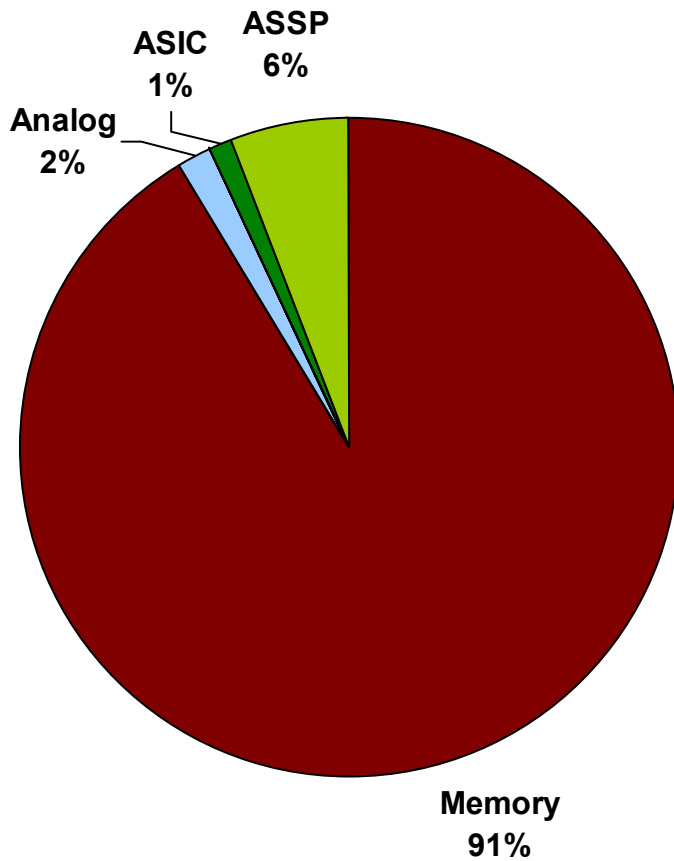


AP TAM (\$bn)	0.8	1.4	2.5	4.1	6.1	7.4	7.4	8.7	8.4	8.5	CAGR 05-10	6.8%
% WW RS3 TAM	70.0%	70.0%	70.0%	70.0%	70.7%	72.0%	74.0%	76.0%	77.0%	79.0%		
% AP Total TAM	1.6%	2.1%	3.0%	3.8%	5.2%	5.5%	4.9%	4.9%	4.6%	4.2%		

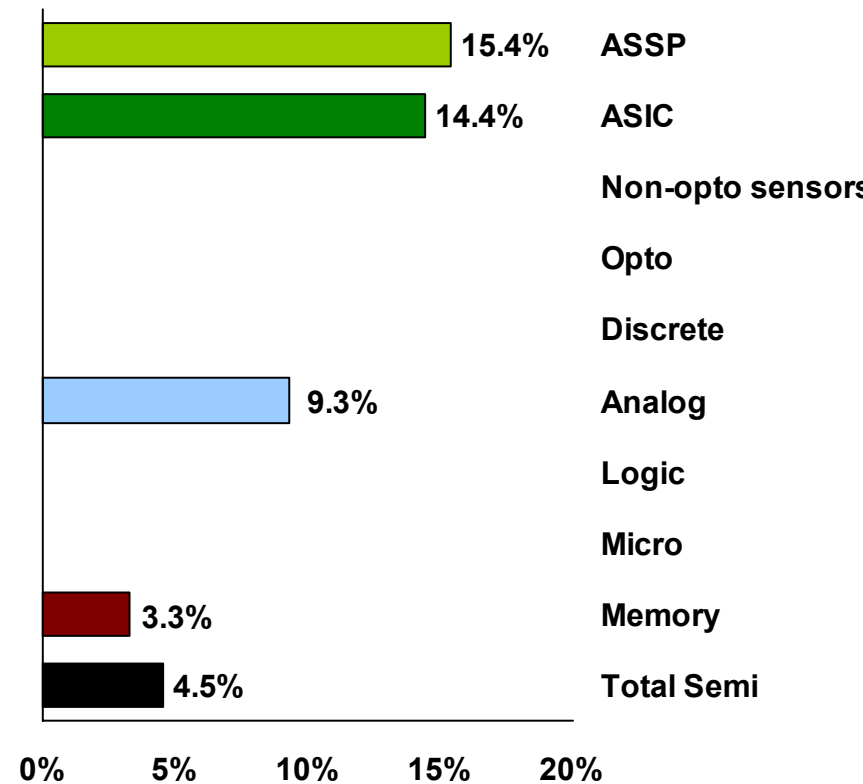
Source: Gartner Dataquest, May 2006
Semiconductor Forecast Worldwide--Forecast Database [SEQS-WW-DB-DATA]

Semiconductor Applications Forecast: RS3 Device Market & CAGRs

2005 Revenues \$8.6 billion



2010 Revenues \$10.7 billion
2005-2010 CAGR



Semiconductor Applications Forecast: Digital Media Players

Digital Media Players

First Shipped: 1998

Penetration: 2.5% population (2005)

Shipments: 134.6m

Vendor Revenue: \$14.0 billion

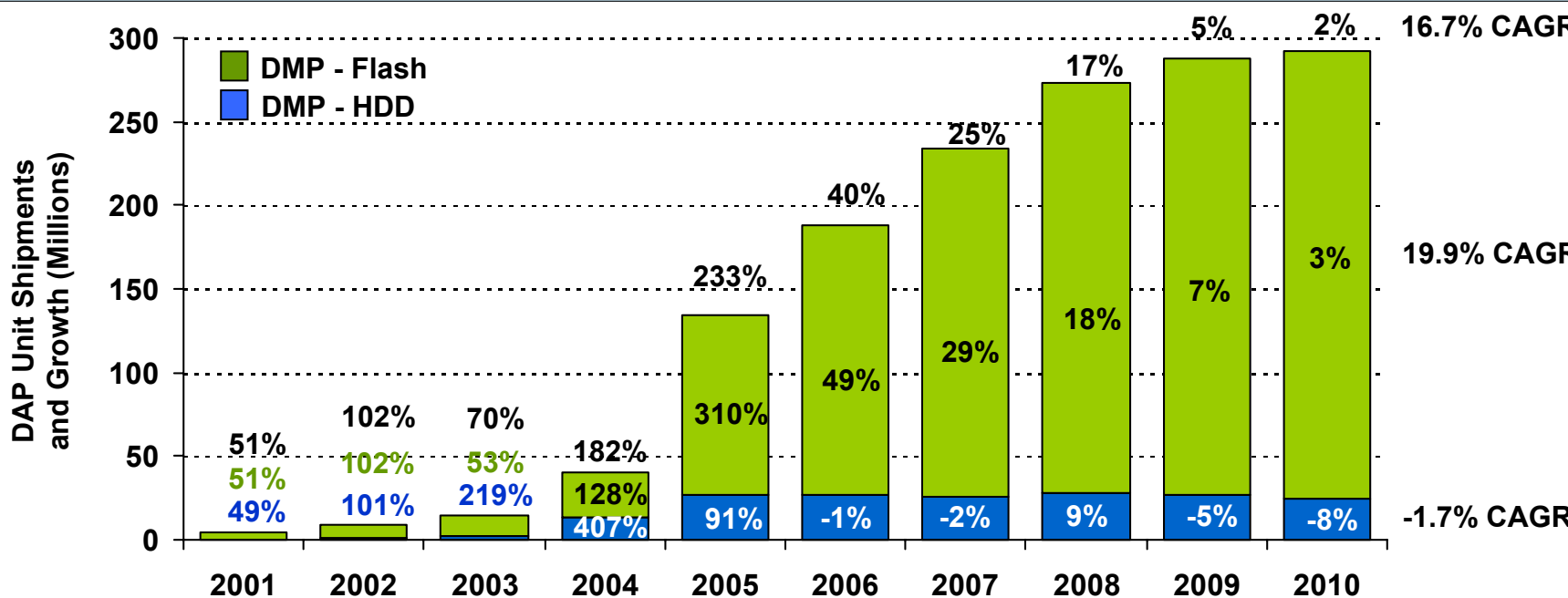
Semi. Revenue: \$4.5 billion

Semi. I/O Ratio: 32.4%



Semiconductor Applications Forecast: Digital Media Players Market Forecast

Semi TAM (\$bn)	0.2	0.3	0.6	2.0	4.5	6.7	7.7	9.9	9.7	10.6	CAGR 05-10	18.4%
% M/K	0.1%	0.2%	0.3%	0.9%	1.9%	2.6%	2.7%	3.1%	3.0%	3.0%		

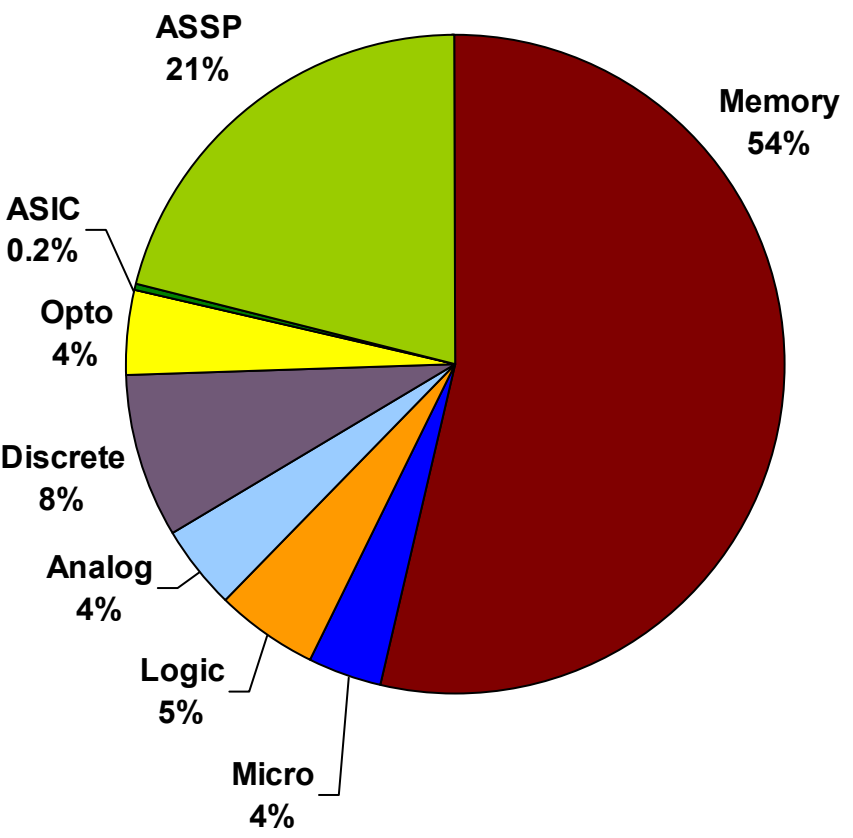


AP TAM (\$bn)	0.1	0.2	0.4	1.6	3.9	6.1	7.1	9.2	9.1	10.0	CAGR 05-10	20.7%
% WW DMP TAM	66.0%	67.0%	70.0%	80.4%	86.0%	91.1%	92.3%	93.5%	93.7%	94.7%		
% AP Total TAM	0.2%	0.3%	0.5%	1.5%	3.3%	4.6%	4.7%	5.3%	5.0%	5.0%		

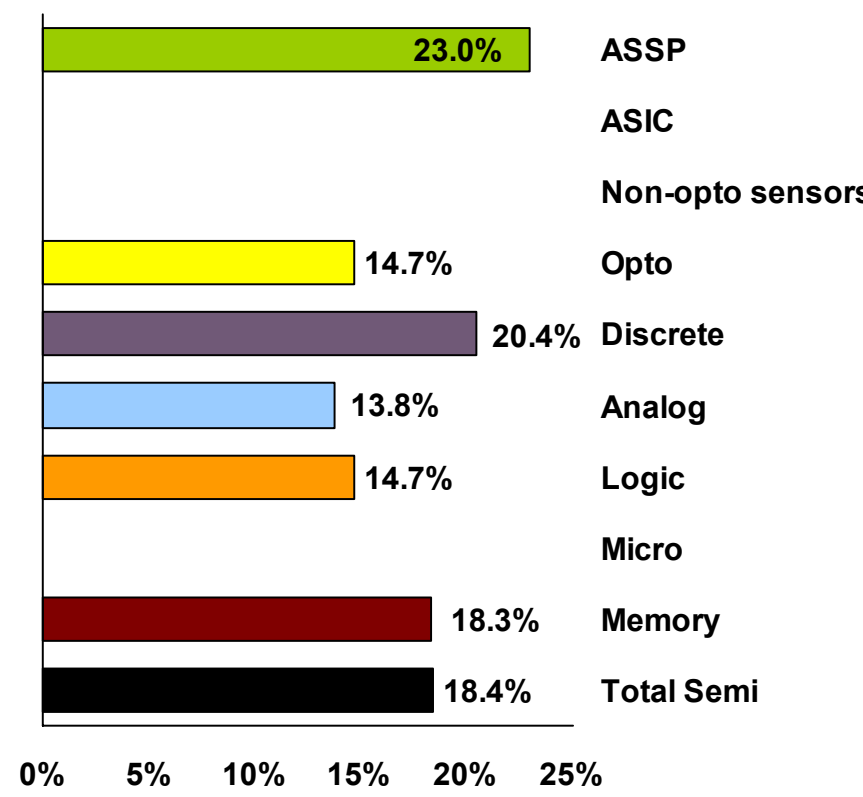
Source: Gartner Dataquest, May 2006
Semiconductor Forecast Worldwide--Forecast Database [SEQS-WW-DB-DATA]

Semiconductor Applications Forecast: Digital Media Players Device Market & CAGRs

2005 Revenues \$4.5 billion



2010 Revenues \$10.6 billion
2005-2010 CAGR



Source: Gartner Dataquest, May 2006
Semiconductor Forecast Worldwide--Forecast Database [SEQS-WW-DB-DATA]

Worldwide Semiconductor Market Forecast



2005 Vendor Marketshare



Semiconductor Market Forecast



Semiconductor Applications Forecast



Summary

Worldwide Semiconductor Market Forecast: Summary

2005 Vendor Marketshare

- Success can be traced to:
 - Participation in high-growth markets – Samsung and Hynix
 - Gaining share in existing markets – AMD and Nvidia
 - Being aligned to the right OEMs – Texas Instruments

Semiconductor Market Forecast

- DRAM market benefited from strength of the NAND flash market 2005
- Three years of sluggish revenue growth for the semiconductor industry, 2005-2007
- Commodity memory market continues to drive the cyclicity of the industry
- 2008 peak of current industry cycle with next down-cycle starting in 2009

Semiconductor Applications Forecast

- Major application markets - PC and mobile phone – are replacement markets
- Strong growth from new application, but no challenge to established markets
- Asia Pacific gaining share in established applications and key growth applications
- In 2005 Asia Pacific consumed 50% of all semiconductors, increasing to 57% and over \$200bn by 2010