

# Integrated Circuit Economics

**2010 Edition**

Written by Scotten W. Jones

**IC***KNOWLEDGE LLC*

<b>1</b>	<b>Welcome and License</b>	<b>1</b>
1.1	License	1
1.2	About IC Knowledge LLC	2
1.3	IC Knowledge LLC products	2
1.4	Disclaimer	3
1.5	Report outline	3
1.6	What this report is not	3
1.7	A word about technology focus	3
1.8	Acknowledgements	3
<b>2</b>	<b>IC Market Status and Trends</b>	<b>5</b>
2.1	Worldwide semiconductor revenue trend	5
2.2	Detailed 2010 IC forecast	6
2.3	The status of the recovery	8
2.4	The semiconductor market relationship to electronic systems and GDP	8
2.5	Semiconductor revenue by region	12
2.6	Semiconductor revenue by end use	14
2.7	Semiconductor revenue by product	14
2.8	Top 10 semiconductor companies	15
2.9	Further reading	16
2.10	References	16
<b>3</b>	<b>Capital and Materials Spending</b>	<b>17</b>
3.1	Capital spending analysis	17
3.2	Semiconductor materials market	24
3.3	References	30
<b>4</b>	<b>Economics Trends</b>	<b>31</b>
4.1	Introduction	31
4.2	Product pricing trends	31
4.3	Product cost trend	32
4.4	Fabrication facility cost trends	33
4.5	Effect of utilization on profitability	35
4.6	Profit and loss trends	36
4.7	Leasing trends	37
4.8	R&D spending	37
4.9	Fabs - build or buy and where to build	39
4.10	Memory trends	39
4.11	References	40
<b>5</b>	<b>300mm and 450mm</b>	<b>41</b>
5.1	Introduction	41
5.2	300mm status	41
5.3	300mm fab costs	41
5.4	300mm ramp versus 200mm ramp	44
5.5	Revenue required to support a 300mm fab	44

5.6	300mm cost savings	45
5.7	300mm strategies and impact for leading semiconductor companies	46
5.8	300mm analog fabs	48
5.9	450mm	48
5.10	Further information	51
5.11	References	52
<b>6</b>	<b>Foundries</b>	<b>53</b>
6.1	Introduction	53
6.2	The genesis of the pure play foundry	53
6.3	The growth years	54
6.4	The foundry model	55
6.5	Utilization effects on the foundry model	56
6.6	Foundry yields	59
6.7	Technology transitions	60
6.8	Average Selling Prices	61
6.9	Shake-up in the foundry landscape	62
6.10	What do these trends mean for the future of foundries?	62
6.11	References	63
<b>7</b>	<b>Design</b>	<b>64</b>
7.1	Introduction	64
7.2	Design productivity	64
7.3	Factors influencing design productivity	66
7.4	Design costs	66
7.5	Mask costs	68
7.6	Design issues at 90nm and 65nm	69
7.7	Design issues at 32nm and 28nm	71
7.8	Conclusion	71
7.9	References	71
<b>8</b>	<b>Integrated Circuit Manufacturing Overview</b>	<b>73</b>
8.1	Silicon wafer manufacturing	73
8.2	Wafer fabrication	75
8.3	Cleanroom technology	85
8.4	Electrical tests	89
8.5	Packaging	92
8.6	References	95
<b>9</b>	<b>Wafer Fabrication Costs</b>	<b>96</b>
9.1	Accounting categories and cost map	96
9.2	Material costs	97
9.3	Direct labor costs	101
9.4	Capital costs	102
9.5	Indirect labor costs	117
9.6	Toolset repair costs	119

9.7	Monitor wafer costs	119
9.8	Facilities costs	119
9.9	Consumable items costs	128
9.10	Unyielded wafer cost trends	137
9.11	Wafer yields	137
9.12	Yielded Wafer costs	139
9.13	Additional resources	139
9.14	References	140
<b>10</b>	<b>Test and Packaging Costs</b>	<b>142</b>
10.1	Test costs	142
10.2	Packaging	147
10.3	Additional resources	152
10.4	References	152
<b>11</b>	<b>Die Yield and Product Costs</b>	<b>154</b>
11.1	Gross die per wafer	154
11.2	Defect density concept	155
11.3	Yield models	155
11.4	Defect density trends	156
11.5	Recommended defect densities	157
11.6	Yield Trends	159
11.7	Product cost examples	159
11.8	Additional resources	159
11.9	References	159
<b>12</b>	<b>Cycle Time and Utilization</b>	<b>161</b>
12.1	Definitions	161
12.2	OEE is wrong	161
12.3	Managing cycle time	167
12.4	Cost of ownership	172
12.5	Equipment uptime	172
12.6	How the factory effects cost	176
12.7	Throughput benchmarks	177
12.8	References	178
<b>13</b>	<b>Technology Trends</b>	<b>179</b>
13.1	Transistors per IC	179
13.2	Die size	180
13.3	Photolithography trends	180
13.4	MOSFET scaling	190
13.5	Strain engineering	191
13.6	Gate oxide scaling and high-k gate oxides	192
13.7	SOI	195
13.8	Interconnect	196
13.9	DRAM technology	198

**Contents**

13.10 Flash Technology  
13.11 References

201  
203

**Glossary**

**206**

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## **1.3. IC Knowledge LLC products**

- Integrated Circuit Cost and Price Model - a Microsoft Excel based cost model that uses dropdown menu selections to generate product costs and prices for most integrated circuit products.
- Discrete and Power Products Cost and Price Model - a Microsoft Excel based cost model that uses dropdown menu selections to generate product costs and prices for most discrete and power products.
- MEMS Cost Model - a Microsoft Excel based cost model that uses dropdown menu selections to generate product costs for most MEMS products.
- Integrated Circuit Economics - this report.
- Integrated Circuit Packaging - a report covering the packaging market, packaging technology, test, packaging technology trends, packaging foundry selection and pricing.
- Integrated Circuit Technology - a report covering the latest in IC technologies.
- 300mm Watch - a database of 300mm fabs and companion analysis.
- Cleanroom Reference Guide for Semiconductor and MEMS Applications - a concise reference guide containing all the information needed to design, build and operate a cleanroom.

- A Visual Guide to Semiconductor Process Equipment - a highly visual guide describing the theory, operation and usage of the major types of semiconductor process equipment.

### 1.4. Disclaimer

We believe the information presented in this publication to be accurate and representative of general integrated circuit industry practices. Much of the information in this report is compiled from technical journals and other secondary sources. IC Knowledge LLC does not warranty the accuracy of the information presented in this report in any way. It is up to the user to determine whether the information presented is applicable to the situation the user is interested in.

### 1.5. Report outline

This report is broken up into thirteen sections.

1. Welcome.
2. IC market status and trends - a general look at the IC market and market trends.
3. Capital and materials spending - an analysis of capital and materials spending and spending trends.
4. Economics trends - a high level analysis of IC economics.
5. 300mm and 450mm - a discussion of the impact of 300mm and 450mm wafer sizes on the industry.
6. Foundries - the impact and future of foundries.
7. Design - the impact of design complexity and cost.
8. Integrated circuit manufacturing overview - an overview of IC manufacturing and facility requirements.
9. Wafer fabrication costs - a detailed look at the costs of wafer fabrication.
10. Test and packaging costs - a detailed review of the costs to test and package integrated circuits.
11. Die yield and product costs - how to calculate die yield and die and product costs from the information presented in the previous two sections.
12. Cycle time and utilization - wafer fabrication facility utilization is one of the most important factors in determining costs, this section discusses factory management trade-offs.
13. Technology trends - trends in IC technology and a brief history of the IC.

### 1.6. What this report is not

This report is meant to give the reader an understanding of integrated circuit manufacturing costs and broad economic issues.

- We discuss general market trends, but this is not a market research firm and we are not in the business of forecasting the market. For market research and forecasts we recommend IC Insights at [www.icinsights.com](http://www.icinsights.com).
- This report is not intended to serve as a cookbook for calculating IC costs. To calculate costs for specific ICs, we recommend our IC Cost and Price Model.

### 1.7. A word about technology focus

For many years the overall driver of IC technology was DRAMs, then microprocessors displaced DRAMs in many areas and more recently NAND Flash has become a driver, although DRAMs still lead in areas such as high-k capacitor structures. For the purposes of technology analysis in this report, we discuss microprocessors, NAND Flash and DRAMs. Our microprocessor analysis is centered on Intel since they have the dominant market share in the microprocessor arena and our DRAM and Flash analysis is centered on Samsung, the market leader in those segments.

### 1.8. Acknowledgements

We would like to thank IC Insights for permission to reprint several tables from the 2010 edition of the McClean report. As we mentioned in the previous section we are not a market research firm - they are, and

## **Chapter 1 - Welcome and license**

a good one. We strongly recommend the McClean report to anyone interested in understanding the semiconductor market in greater detail than presented here. We would also like to thank Linx Consulting, another company we strongly recommend for providing data for the section on Semiconductor Materials.