THE WORLDWIDE IC PACKAGING MARKET

2011 EDITION

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NOTES

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CHAPTER 1
INTRODUCTION

1.1 SCOPE

This report offers an in-depth look at the worldwide integrated circuit (IC) packaging market. Extensive interviewing yielded the information upon which to base forecasts of the following major package types:

- Dual in-line package (DIP)
- Small outline transistor (SOT)
- Small outline (SO)
- Thin small outline package (TSOP)
- Dual flat pack no lead (DFN)
- Chip carrier (CC)
- Quad flat pack (QFP)
- Quad flat pack no lead (QFN)
- Pin grid array (PGA)
- Ball grid array (BGA)
- Fine-pitched ball grid array (FBGA)
- Wafer-level package (WLP)

Forecasts include data on:

- Units assembled
- Average assembly price, broken down by price per I/O and average I/O count
- Packaging revenue

Additionally, unit forecasts for die mounted using direct chip attach (DCA) methods were developed. DCA methods include chip on board (COB), flip chip on board (FCOB), chip on glass (COG), flip chip on glass (FCOG), and

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tape automated bonding (TAB)/tape carrier package (TCP). No packaging prices or revenue were developed for DCA methods.

Both the total worldwide IC market and the contract IC package assembly market are explored. The contract market is a subset of the worldwide IC market. Forecasts are broken down by I/O-count range for the package types described previously for the world market.

The purpose of the report is to aid companies associated with the IC packaging market in forecasting demand for their own products. The IC packaging market is evolving to keep pace with other changing markets. IC packaging demand is affected by changes in the die contained in the packages, and by performance expectations of the final product purchased at the consumer level. Through extensive primary and secondary research, this report presents an objective look at the world of IC packaging.

1.2 ORGANIZATION

This report is organized into seven chapters and three appendices. Chapter 1, "Introduction," outlines the scope, organization, and methodology of the report. Chapter 2, "Executive Summary," is a worldwide forecast of the overall packaging market by package type. Units and revenue are presented for both the world market and the contract market.

Chapter 3 is an overview of the state of the semiconductor industry. Chapter 4 analyzes the total worldwide IC packaging market by units and packaging revenue. The analysis in this chapter is presented by IC device type, defining each device market by the percentage of each package type utilized, and by I/O range. Chapter 5 then rearranges the data for presentation by package family. Unit analysis is further broken down by I/O-count segments. Packaging revenue is generated by multiplying worldwide units with pricing information supplied by the contractor IC package assemblers.

Chapter 6 forecasts growth in the contract IC packaging market. Units and revenue are analyzed by package family. Forecasts are computed by

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compiling information obtained from each individual contract assembly company. Pricing information is provided by I/O count and price per I/O, and when multiplied by units, yields revenue. Contractor revenue from test, shipping, and so forth is not within the scope of this report.

The package family pricing provided in this report is a broad average across all situations within the package family: high and low volumes, wire bonding and flip chip interconnections, plastic and ceramic substrates, and so on. Pricing data per I/O is applied to the worldwide market in Chapter 4 to obtain revenue figures in that chapter.

Profiles of packaging contractors are given in Chapter 7. These profiles give a look at the companies that provide contract semiconductor assembly services, and their package offerings. When provided by the company, accompanying statistics appear with each package offering. The extent of each profile depends on the amount of information provided by that company.

Appendix A lists the packaging contractors' offerings by package family. Appendix B gives the website addresses for the profiled contractors. Appendix C is a small glossary of acronyms and terms used in the semiconductor packaging industry.

1.3 METHODOLOGY

In obtaining information for this report, both primary and secondary sources were utilized. Gathering information for Chapter 4 consisted of contacting a wide spectrum of semiconductor manufacturers and fabless companies. Each group was contacted to obtain specific information on a given segment of the industry. The information was gathered via e-mail and face-to-face interviews, and through secondary sources.

The base year (2010) IC units for each product segment in Chapter 4 have been formulated by New Venture Research, based upon data published by World Semiconductor Trade Statistics (WSTS), and are for the merchant IC

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industry as defined by WSTS. All forecasts were created by NVR using its proprietary methods.

The contractor IC package pricing developed for Chapter 6 was used to calculate the worldwide IC packaging "revenue" provided in Chapter 4. That is, the price per I/O for IC package assembly gathered from the contract market (Chapter 6) is applied to the worldwide IC packaging market in Chapter 4 to arrive at worldwide package revenue figures. Contractor pricing embodies all costs associated with package assembly, including materials, labor, equipment amortization, and overhead.

To gather information for Chapter 6, every contractor in the IC packaging marketplace was contacted and asked a standardized series of questions. The goal of the questions was to get a "fix" on the marketplace—where it is now and the direction it is heading. As with Chapter 4, the responses were obtained by e-mail. Chapter 6 forecast information then is built "from the bottom up," as information is added up company by company to reach the total market figures.

IC packaging contractors were queried on their total units and revenue, and the percentage of their units that each package family represented. For each package family, the contractors were asked to provide information on the number of units, average number of I/Os, and price per I/O. A model was then used to produce the results given in this chapter.

For both Chapters 4 and 6, the responses to these questions were used to reveal the path or direction NVR may reasonably predict that the industry will follow. The answers to these questions were considered anonymous, and are not printed as being associated with any specific company. Multiple companies were queried per segment, thus revealing "aggregate" trends in the market.

An array of secondary sources was also consulted. The Internet, technical magazines, newspapers, and proceedings from technical programs were utilized to gain information for the body of the report. The author also attended

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numerous trade functions and met informally with IC packaging industry participants to ascertain the direction of the industry.

IC package contractor profiles in Chapter 7 were updated with information from company websites and sent to the appropriate person within each company with a request for updated information, and changes were made if necessary. If no corrections or additions were made to the profile, all information was assumed to be correct and current, and published as such.

All prices and revenue given in the figures and tables within the market analysis chapters of this report are stated in current US dollars.

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