



Flip Chip Markets and Infrastructure Developments

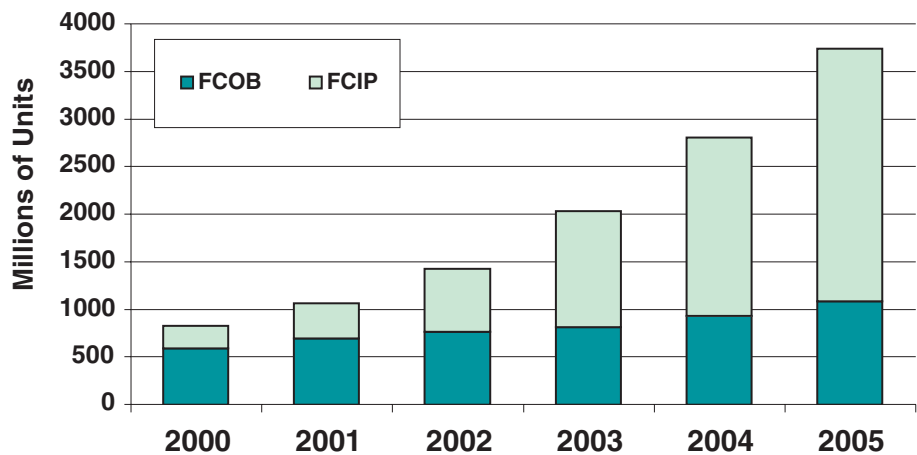
Flip chip has expanded in two major areas—one driven by the high performance needs of the microprocessor, ASIC, and high-end DSP devices, the other driven by form factor where die sizes are small and packaging cost must be as minimal as the package itself. What's new in flip chip technology is its expansion into the interconnect realm previously dominated by wire bond. It is the potential expansion of flip chip into the mid-range pin counts that represents a shift in the adoption of the technology, improvements in the industry infrastructure, and a maturing of the industry—reflected in cost reductions. Another new development is the introduction of wafer level packages (WLPs).

Major improvements over the last four years have removed or reduced many barriers to the expansion of flip chip. For many companies the key to the expanded use of flip chip has been the availability of low-cost wafer bumping. Prices from service providers have declined and the number of wafer bumping foundries has increased from just a few to more than a dozen. Bumped die can be fabricated using a number of methods and materials, including gold, gold stud bump, electroless nickel/gold, and solder. In keeping with the environmentally friendly marketing movement, many merchant bumping operations have introduced or have R&D activities for lead-free bumping methods, and some products using lead-free bumps have been introduced. The report looks at the growth in flip chip not only in the number of die, but also the number of wafers.

The report examines bumping capacity and projects supply and demand in number of wafers. Both gold and solder bumping are examined. The report carefully separates the supply and demand for bumped wafer level packages from other solder bump applications in number of wafers and number of devices.

More than 20 companies offer flip chip bonders—each suited for a particular application. Bump inspection systems from at least eight companies are available. New underfill materials with shorter cure times and improved properties have been introduced and developments such as no-flow and reworkable materials

Solder Bumped FCIP and FCOB Growth



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are promising. Microvia technology in organic substrates has been developed for high density routing, and many companies worldwide are in volume production. An increasing number of contract assembly operations are offering assembly services for flip chip bumped die.

The report details flip chip market by application, including chip on glass and chip on flex for displays using gold bumps, stud bump bonded die in packages and on flex circuit, and solder bumped ICs packaged as flip chip in package (FCIP) and flip chip on board (FCOB).

The anticipated growth in the flip chip market is finally becoming a reality as a result of performance and form factor drivers coupled with infrastructure developments. Despite the slow growth in the electronics sector for 2001, the future for flip chip is bright. Many development programs, while experiencing slight delays, remain focused on future volume applications. An increasing number of devices of all types will be bumped.

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