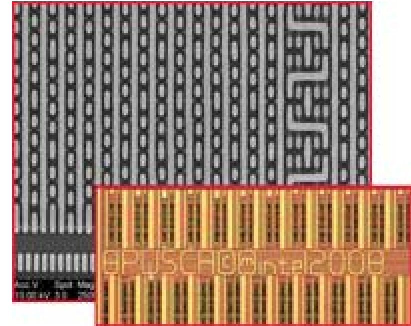
Complete Structural Analysis: Intel Westmere/Clarkdale i5 660 32 nm Microprocessor

Structural Analysis Report	SAR-0910-801
Transistor Characterization Report	TCR-0910-801
Package Analysis Report	PKG-0910-801

About this Device



Intel is the first to ship a 32 nm process technology product. As predicted, this generation matches Intel's pattern of launching a new process technology every two years, and represents the culmination of a US$7 billion investment.

While Westmere/Clarkdale is described as a shrink of the previous generation Nehalem architecture, Chipworks' analysis shows some fairly dramatic differences between the two generations.

Given that Intel has already followed a path of its own at 45 nm, it will be interesting to see where the process has changed for the smaller geometries. By tracking multiple generations, leading semiconductor companies reduce the risk as they move to high-k gate technology.

Intel promotes the fact that its gate pitch is 30% smaller and transistor drive current is 20% higher than its 45 nm technology. It further claims that these performance parameters are also superior to competitors' 28 nm design specifications (they are not yet in commercial production). To achieve these results, Intel has incorporated second generation high-k metal gates, second generation low-k dielectric in the interconnect stack, a different NMOS strain technology, and a move to immersion lithography that other manufacturers had to use in their 45 nm designs.

About these Reports

The **Structural Analysis Report** provides comprehensive analysis of the process technology, materials, and design rules using a combination of SEM and TEM analysis techniques. Please download the preliminary table of contents.

The **Transistor Characterization Report** provides an analysis obtained through AFM microprobing of several NMOS and PMOS transistors on the 32 nm device. Analysis measures transfer characteristics (transconductance), body effect, output characteristics, and punchthrough. Please download a preliminary table of contents.

The **Package Analysis Report** provides a cross-sectional analysis of the packaging technology via SEM and materials analyses. Please download the preliminary table of contents.

Reports are shipping this month (October 2009). Clients ordering these reports will immediately get access to preliminary images and analysis via a secure web folder.

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