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## Intel's Ivy Bridge Triple Threat

*Intel today released its first Ivy Bridge chips, starting with desktop processors and will soon also announce mobile chips. Intel is doing more than just releasing a new processor, which of course it is. It is also putting a stake in the ground around technology and performance that others will have a hard time catching. With this release, Intel has extended its lead in the semiconductor field by at least 2 years, and has accelerated its pace of innovation to stay well ahead of its primary competition.*

Ivy Bridge is more than just a new processor; it's also spotlight's Intel's competitive triple threat. With this release Intel is exhibiting leadership in three key technology and innovation areas that competitors will find hard to meet.

The first threat is Intel's process expertise. The new Ivy Bridge processors are built on the first volume 22nm CPU production line in the industry. Others have claimed to match Intel in this area. The largest manufacturer/foundry, TSMC, is processing 28 nm chips. But it has been having great difficulty in supplying its customers, and has admitted manufacturing issues, negatively affecting product launches and delivery for key customers like Qualcomm (who admitted such in their last quarterly report). And AMD, which divested itself of its own foundry to reduce expenses, has been using the offshoot, Global Foundries, for its own chips. However it has recently been looking for other suppliers given Global Foundries' difficulties in getting its fabs to produce the leading edge product volumes and quality AMD (and others) require.

While some have berated Intel for keeping its own fabs (at a huge capital cost) in an increasingly commoditized world, we believe the advantage of having its own integrated process capability has brought it significant market advantage. Without this capability, it is unlikely it would have been able to so quickly move to mass produce its Tri-Gate transistors using the High K metal gate technology it also pioneered. Tri-gate transistors offer significant performance and/or power improvements that allow Intel to tune the chips for specific market requirements (e.g., low power portable devices, high performance desktops/servers, or blended capability). While others claim to be able to duplicate the technology, we don't expect to see such capability in production volumes for at least 2 years, giving Intel a major competitive advantage. We believe being first to market with Tri-gate is the second big advantage that Intel is exhibiting with the Ivy Bridge launch.

The third area Intel has advanced with Ivy Bridge is in its graphics capability. Long a weak point for Intel, with its integrated graphics often being replaced by much higher performing discrete graphics chips from Nvidia or AMD, the Ivy Bridge graphics engine is a redesign that claims twice

the performance of its Sandy Bridge predecessor, which also substantially raised the bar for integrated graphics performance. We believe the new graphics capability inherent in Ivy Bridge will satisfy the demands of all but the most extreme users, and will significantly reduce the need for discrete graphics in >95% of systems sold. Integrated graphics has the ability to reduce cost, power and physical size of systems, especially important in the new age of Ultrabooks and other portable devices. This will accelerate the already declining sales volumes for discrete graphics chips and modules.

The substantial Intel capital spending has allowed it to significantly outpace other “fabless” semiconductor companies that require a commodity foundry supplier. Newer generation chips that continue to extend Moore’s Law are a cooperative effort between chip design and process/manufacturing acumen. Design engineers and process engineers must work closely to leverage each other if the pace of innovation is to continue. We believe that an integrated and intelligently engineered chip supply chain greatly advantages Intel against its fabless chip competitors, except perhaps in lower end commodity chips where price is more important than performance.

**Bottom Line:** Ivy Bridge demonstrates that Intel has effectively leveraged its capital investments, and we expect it to continue to stay ahead of the pack in this regard. Further, the waterfall effect will allow it to migrate much of this technology pioneered for its higher end processors down to the Atom processor family and give it a competitive edge there as well where performance, power and graphics are all becoming necessary for the vastly improved capabilities of portable smart devices.

*For more in-depth comments or analysis on this or other subjects, feel free to contact us.*

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