

Fujitsu Microelectronics Limited  
e-Shuttle, Inc.  
D2S, Inc.

## Fujitsu Microelectronics, e-Shuttle and D2S to Develop Maskless ICs

*- Industry leaders introduce design for e-beam technology to deliver significant cost and time reductions for producing prototypes, derivatives and high-value ICs -*

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**Tokyo, October 9, 2008 and San Jose, Calif., October 8, 2008** - Fujitsu Microelectronics Limited ("FML"), e-Shuttle Inc. ("e-Shuttle") - a joint venture established by FML and Advantest Corporation ("Advantest") - and D2S, an emerging design and software company, today announced an agreement under which FML and e-Shuttle will adopt D2S' advanced design for e-beam (DFEB)\* technology - starting with a 65-nm Low Power (LP) library - to result in the creation of test silicon to refine and validate DFEB technology for the 65-nm, 40-nm and below nodes. e-Shuttle will produce test chips using D2S' advanced DFEB design and software capabilities, and FML's standard cell libraries. These test chips will be manufactured using Advantest's F3000 e-beam direct-write (EBDW) lithography equipment, which is already in operation at e-Shuttle. As a result of this partnership, FML will be able to manufacture ICs faster and more cost-effectively than is possible with conventional e-beam direct lithography technologies.

The rising cost trends of advanced ICs show no signs of slowing unless a new manufacturing approach is adopted. Especially with mask budgets doubling at every node, the application range and market for low-volume ASICs (custom ICs) continue to shrink, with future profitability of many applications anticipated to be threatened. Without the need to rely on a lithography breakthrough, D2S' advanced DFEB technology maximizes and enhances the existing e-beam technology of the F3000 from Advantest. By efficiently employing the EBDW approach, DFEB technology eliminates the cost of masks and can speed time to market by shortening the design-to-lithography process flow. In addition to the obvious advantages this will deliver to systems companies seeking early prototypes for testing, this type of DFEB technology can dramatically impact specific application fields, such as computing, as well as a host of low- to mid-volume semiconductor companies producing test chips, engineering samples and design derivatives.

"We are uniquely positioned with e-Shuttle as the leader in manufacturing chips using the DFEB approach," said Yoji Hino, corporate executive vice president of Fujitsu Microelectronics Limited. "We expect to see the benefits of this collaboration, in terms of reduced costs and time savings, starting in 2009. This design-to-manufacturing collaboration will facilitate a unique capability for virtually maskless ICs that will increase design starts. Enabling the long tail of ASIC designs, particularly for derivative designs, is beneficial for the semiconductor industry overall."

"e-Shuttle has been in operation since November 2006 with the mission to bring EBDW capabilities to low-volume production applications. This collaboration further increases the throughput of our production line," said Haruo Tsuchikawa, CEO and president of e-Shuttle, Inc. "We view this type of collaboration between design software, design, manufacturing, and equipment makers to be essential for maximizing the capabilities of today's fabrication technologies."

"The increasing cost of semiconductor masks is making low-volume production of custom ICs economically unfeasible yet, in aggregate, this segment can represent as much volume as the high-volume segment," said Aki Fujimura, founder and CEO of D2S. "This long tail of the custom IC business can be enabled through a virtually maskless DFEB technology. By not requiring the development of any revolutionary new hardware technologies, this design and software approach represents a low-risk, low-cost path to a new production paradigm."

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### Press Contacts

Fujitsu Semiconductor Limited  
Inquiries : <https://www-s.fujitsu.com/jp/group/fsl/en/release/inquiry.html>

"The F3000 in production use at e-Shuttle will benefit from the innovative DFEB technology from D2S," said Toshio Maruyama, president and CEO of Advantest Corporation. "Advantest is improving the throughput of the e-beam direct write solution, and the DFEB technology will further increase the throughput of our systems."

## Glossary

**\*Direct for e-beam (DFEB) technology:** A design and software approach to enhance the throughput of e-beam (EB) lithographic exposure. DFEB uses character projection (CP) technology combined with design and software techniques to reduce a design's required shot count, resulting in increased CP e-beam direct write throughput.

## For more information

Fujitsu Microelectronics Limited: <http://jp.fujitsu.com/group/fsl/en/e-Shuttle>

D2S: <http://www.design2silicon.com/>

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## About Fujitsu Microelectronics (FML)

Fujitsu Microelectronics Limited (FML) is a large-scale integrated circuit (LSI) manufacturer that provides highly reliable, optimal solutions to meet the varying needs of its customers, through LSI offerings including ASIC/COT, ASSP and power management ICs, and flash microcontrollers. Along with building on its wide-range expertise focusing on imaging, wireless, and security LSI applications, FML also pursues initiatives for power efficiency and undertakes environmentally-conscious countermeasures. Headquartered in Tokyo, FML was established as a subsidiary of Fujitsu Limited on March 21, 2008. Through its global sales and development network with sites in Japan and other regions in Asia, Europe, and the U.S., FML offers LSI solutions to the global marketplace. For more information: <http://jp.fujitsu.com/group/fml/en/>

## About e-Shuttle

Headquartered in Kawasaki, Japan, e-Shuttle, Inc., was founded by Fujitsu Microelectronics Limited and Advantest Corporation on November 1, 2006, to develop EBDW technologies for 90-, 65- and 45-nanometer process technologies, and to establish and offer semiconductor prototyping services, SiExpress™. (See the press release dated October 30, 2006.) For more information, visit [http://www.e-shuttle.co.jp/index\\_e.html](http://www.e-shuttle.co.jp/index_e.html).

## About D2S

D2S is empowering an era of new business opportunities for electronic products by making low-volume silicon production cost effective at the 65 nanometer node and below. D2S' advanced design-for-e-beam (DFEB) design and software capabilities maximize existing e-beam technology to virtually eliminate the costs of masks and speed time to market by shortening the design-to-lithography process flow. Headquartered in San Jose, Calif., the company was founded in 2007. For more information, see <http://www.direct2silicon.com/>.

## About Advantest

Advantest Corporation is the world's leading automatic test equipment supplier to the semiconductor industry, and also produces electronic and optoelectronic instruments and nanotechnology systems, including electron-beam lithography systems. A global company, Advantest has long offered total ATE solutions, and serves every segment of the semiconductor test industry: test, material handling, mechanical and electrical interfaces, and software. Its logic, memory, mixed-signal and RF testers and device handlers are integrated into the most advanced semiconductor production lines in the world. Founded in Tokyo in 1954, Advantest established its first subsidiary in 1982, in the USA, and now has 40 subsidiaries worldwide. It is also affiliated with e-Shuttle, Inc. More information is available at <http://www.advantest.co.jp/en-index.shtml>.

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