

## **Renesas Technology and Grandis to Collaborate on Development of 65 nm MRAM Employing Spin Torque Transfer**

**Silicon Valley and Tokyo, December 1, 2005**--Renesas Technology Corp. and Grandis, Inc. have agreed to collaborate on the development of 65 nm process MRAM (Magnetic Random Access Memory<sup>1</sup>) employing spin torque transfer writing technology.<sup>2</sup> Renesas Technology will start to ship microcomputers and SoC products incorporating 65 nm process STT-RAM<sup>TM</sup> in the near future.

“We are currently doing development work on MRAM technology employing high-speed and highly reliable conventional magnetic field data writing technology.<sup>3</sup> We intend to use this technology in products such as microcomputers and SoC devices with on-chip memory.” said Tadashi Nishimura, Deputy Executive General Manager of the Production and Technology Unit at Renesas Technology Corp. “Nevertheless, in view of factors such as the need to reduce writing instability and lower current requirements, we feel that spin torque transfer is a more appropriate technology for future MRAM produced using ultra-fine processes. Grandis has world-class spin torque transfer technology. We are confident that by fusing their technology with our production processes we will be able to develop a universal memory that combines high performance and excellent reliability.”

“Grandis has been a leader in spin torque transfer technology for many years. We’re pioneers because we were the first to incorporate spin torque transfer technology into the structure of memory cells used in MRAM.” said William Almon, President & CEO of Grandis, Inc. “By maximizing the efficiency of spin torque transfer we have brought it to a level where it can be incorporated into today’s LSI devices. We anticipate that collaborating with Renesas Technology in applying our technology to LSI devices will lead to an expansion in business opportunities for Grandis.”

### **Notes**

1. MRAM uses magnets as memory cells. It is a type of random access memory that stores data based on the magnetic orientation of the magnets. MRAM is non-volatile memory that enables data to be retained when power is cut off while also providing high-speed operation and unlimited rewriting capability. This ability to implement functions provided by various kinds of memory has led to high expectations of MRAM as next-generation memory. Most of the MRAM presently under development is based on conventional magnetic field data writing, which supports fast operation speeds. However, in future more ultra-fine processes, MRAM would require very large writing currents. This has caused attention to focus on spin torque transfer writing technology for MRAM using a 65 nm or finer process.
2. Spin torque transfer writing technology: A technology in which an electric current is polarized by aligning the spin direction of the electrons flowing through a TMR (tunneling magneto-resistance) element. Data writing is performed by using the spin-polarized current with the electrons having the same spin direction to change the magnetic orientation. Spin torque transfer RAM (STT-RAM<sup>TM</sup>) has the advantages of lower power-consumption and better scalability over conventional MRAM. Spin torque transfer technology has the potential to make possible MRAM devices combining low current requirements and reduced cost.
3. Conventional magnetic field data writing technology: A technology in which a current is passed through a wire near a TMR element. Data writing is performed by using the magnetic field generated by the wire to change the magnetic orientation.

### **About Renesas Technology Corp.**

Renesas Technology Corp. designs and manufactures highly integrated semiconductor system solutions for mobile, automotive and PC/AV markets. Established on April 1, 2003 as a joint venture between Hitachi, Ltd. (TSE : 6501, NYSE : HIT) and Mitsubishi Electric Corporation (TSE : 6503) and headquartered in Tokyo, Japan, Renesas Technology is one of the largest semiconductor companies in the world and the world’s leading microcontroller supplier globally. Besides microcontrollers, Renesas Technology offers flash memories, system-in-package and system-on-chip devices, Smart Card ICs, mixed-signal products, SRAMs and more. [www.renesas.com](http://www.renesas.com)

### **About Grandis, Inc.**

Grandis, Inc., a world leader in the development of Spin Torque Transfer based RAM technology (STT-RAM<sup>TM</sup>), was established in 2002 and is headquartered in Silicon Valley, California. The company currently holds 17 patents in the field and has 35 patents pending. Grandis has assembled a strong international technical team with extensive expertise in magnetic thin film and device technology. Investors include Applied Materials Ventures, Sevin Rosen Funds, Matrix Partners and Incubic. [www.grandisinc.com](http://www.grandisinc.com)

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