

Zurich, December 31, 2008

**Letter of Reference**

Mr. Christian Senning was employed with Celestrius AG, Zurich, Switzerland, as a VLSI Engineer from November 12, 2007 to February 29, 2008. From March 1, 2008 to December 31, 2008 he worked as a PhD student at the Integrated Systems Laboratory of the ETH Zurich in a joint research project with Celestrius.


Celestrius is an ETH Zurich spin-off company that develops and markets semiconductor devices for high-performance wireless communications solutions.

At Celestrius, Mr. Senning was involved in the development of a MIMO-OFDM transceiver for the IEEE 802.11n wireless LAN standard. In this project, he designed VLSI architectures for different digital signal processing blocks and implemented these blocks as MATLAB golden model and in VHDL. He was also responsible for block-level verification of these blocks and performed top-level simulations of the complete transceiver. The completion of his tasks required excellent knowledge and experience in digital VLSI design. More specifically, Mr. Senning has worked on the following tasks:

- MATLAB and VHDL implementation and verification of a complex digital automatic gain controller
- VHDL implementation of a basic behavioral model of an RF interface
- MATLAB and VHDL implementations of various signal processing blocks in the transmitter of an IEEE 802.11n modem
- Extension and optimization of a systolic-array QR decomposition unit

Mr. Senning was very committed to his job and always highly motivated. In his work, he proved very good analytical skills paired with pragmatic judgement. We were impressed by his very good technical knowledge and his ability to apply this knowledge to the problems at hand. Mr. Senning always worked efficiently and independently and completed his tasks with great care and diligence. We were always fully satisfied by his performance. Furthermore, we particularly appreciated that he was very successful and effective in finding solutions in a team. His behavior toward managers and colleagues was always exemplary.

Mr. Senning's collaboration with Celestrius was terminated because Celestrius is ceasing its operations. We deeply regret that we have to end the collaboration and thank him for his consistently very good contributions. For his future, we wish him the very best and continued great success in his professional career.

Thomas Thaler  
Managing DirectorDr. Andreas Burg  
Director VLSI