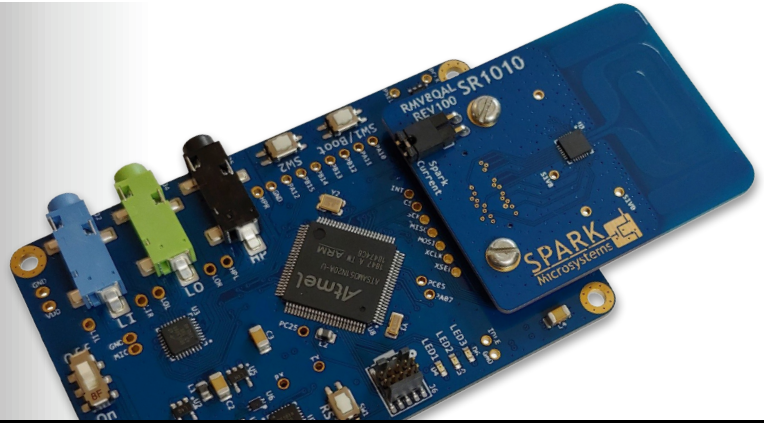




ANSYS® + SPARK Microsystems

“Obtained through the ANSYS Startup Program, ANSYS HFSS is a crucial tool in our ultra-wideband (UWB) hardware development process. The simulation drives the cost-effective design of our highly sophisticated antennas and passive components, customizing them to range, bandwidth, radiation pattern, and efficiency performance requirements. ANSYS HFSS is also instrumental for performing in-depth analyses of our hardware’s radiated power output. This helps our talented engineering team comply with strict FCC and ETSI standards for UWB emission bands.”

Mohammad H. Rahmani

RF and Antenna Designer

SPARK Microsystems Innovates Highly Advanced Ultra-Wideband Radio with ANSYS Simulation

Introduction

Manufacturing an ultra-wideband (UWB) radio system is challenging due to highly complex design specifications. UWB engineers must ensure the radios satisfy range, bandwidth, radiation pattern, and efficiency performance requirements. Developing the antenna and passive components can be an expensive process, requiring physical prototyping and fabrication trials to meet strict governmental standards. SPARK Microsystems' use of electromagnetic simulation effectively overcomes these demanding hurdles.

Challenges

High-frequency, full-wave electromagnetic simulations are paramount for cost-effectively designing the optimum antennas, transmission lines, filters and passive circuitry for UWB systems. Simulations are invaluable for helping our engineers analyze the performance of each passive component and the radiated power of the entire system. Simulation is the only way for accurately predicting radiation patterns, impedance matching bandwidth, realized gain, efficiency, and insertion loss to ensure our product meets specifications.

Technology Used

ANSYS HFSS

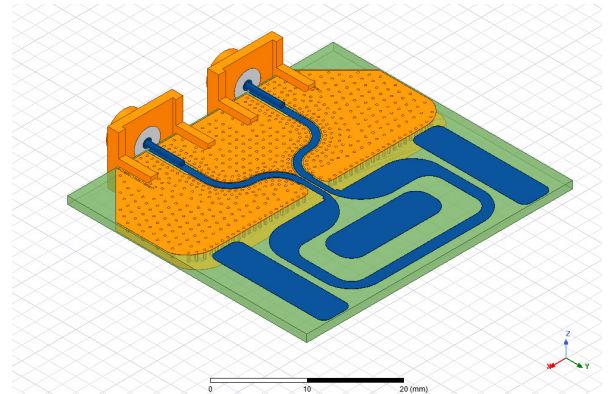
Engineering Solution

Our engineers depended on ANSYS software to complete essential tasks:

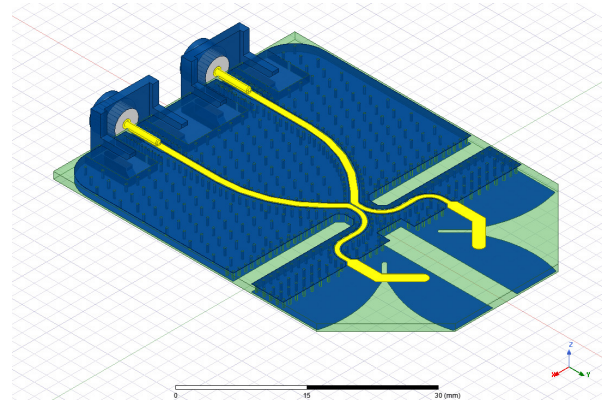
- Conducted radio antenna simulations to model required antenna performance characteristics, speeding the overall antenna design process
- Ran full-wave simulations, analyzing the performance of passive components and the whole system to help design various complex components
- Performed HFSS modal-driven simulation to analyze differential antenna systems, enabling optimization of the antennas for specific requirements
- Executed far field simulations to:
 - Examine the whole system's radiated power to minimize the out-of-band electromagnetic emissions and comply with the regulations
 - Accurately predict radiation pattern, impedance matching bandwidth, realized gain, efficiency, and insertion loss, leading to a faster and more accurate prototyping

Benefits

- Analyzing innovative designs prior to fabrication with HFSS reduces prototyping costs by 75%.
- HFSS helps reduce antenna dimensions by nearly 50%.
- HFSS simulations drive the implementation, test, and verification of new ideas 50% faster than before. This has led to a 50% increase in productivity and product output.
- HFSS full-wave simulations deliver more than 95% accuracy.



Differential loop antenna with enhanced gain performance.



Antenna diversity realized by a pair of open slot antennas.

Company Description

SPARK Microsystems develops the Spark SR1000 Radio, a proprietary, ultra-low power, ultra-short latency radio system that achieves 35X higher energy efficiency and 60X lower latency than Bluetooth Low Energy (BLE). A leading fabless semiconductor company, SPARK Microsystems specializes in developing wireless transceivers that deliver a much longer battery life and instantaneous, high-fidelity short-range communications for Internet of Things devices.

Highly efficient, agile and robust, the Spark SR1000 Radio supports numerous markets including automotive, smart home, medical, wearables and wireless devices. Its cutting-edge technology enables countless applications ranging from streaming video to high-end audio distribution to hearing aids.

SPARK Microsystems was recently named the winner of the Nokia Open Innovation Challenge 2018 and will collaborate with Nokia and Nokia Bell Labs to deploy the Spark SR1000 Radio.