

Cover Sistemi Uses AWR Software to Design a UWB Receiver From Concept to Final Production in a Single Pass

AWR Success Story

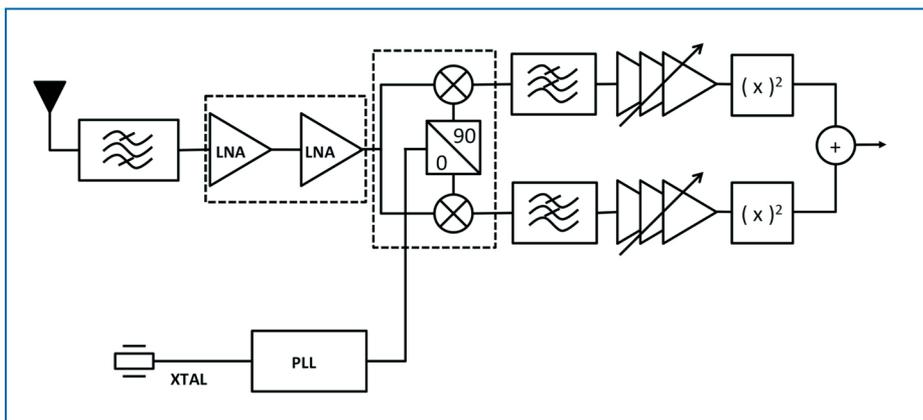
COMPANY PROFILE

Cover Sistemi develops advanced applications in electronics, RF, radar, optoelectronics, and 2D/3D vision systems. The development team offers professional consulting from basic research up through product engineering for patents and scientific publications.

THE DESIGN CHALLENGE

Cover Sistemi was awarded a project for the design of a complete RF ultra-wide band (UWB) receiver. Specifications were for a complete design starting from the antenna through to the entire RF/baseband analog chain down to the AD converter. It also included logic circuits for the receiver digital management. The project objective was to create a cost-effective receiver to be built using common off-the-shelf components on a six-layer printed circuit board (PCB) with a small 6cm x 6cm footprint.

Strict sensitivity specification poses a major challenge for UWB receiver design, as very low-noise figure is required. The target sensitivity of this UWB receiver was -92dBm with pulses occupying greater than 1GHz bandwidth.



Block diagram of direct conversion UWB receiver.

THE SOLUTION

Cover Sistemi designed the receiver from concept to final production with AWR software, using Microwave Office® for the circuit design and AXIEM® for the electromagnetic (EM) simulation. The scope of work included all design phases, from high-level simulation to circuit-level design and final verification of pre-layout and post-layout.

The UWB receiver included components such as antennas, filters, low-noise amplifiers, and mixers, all of which were built on a six-layer PCB. All component design elements were first optimized for peak performance and then the entire design was validated with full-chain simulation using AWR's APLAC® multi-rate harmonic balance simulator (MRHB™). The UWB signal had a very large set of harmonics, which required a powerful HB simulation engine. Thanks to AWR's APLAC MRHB, the Cover Sistemi design team was able to validate the complete design using standard PC workstations.



Application:

UWB Receiver

AWR Software:

Microwave Office®

AXIEM®



"AWR was the backbone of our productivity. We were extremely satisfied with the quality of the models, fast simulation engines, and accurate simulation results. It is a complete tool that enables us to succeed from scratch to production designs and provides us with a superior platform for designing RF/microwave products."

Alessio Cacciatori
R&D - RF&MW Engineer
Cover Sistemi Srl
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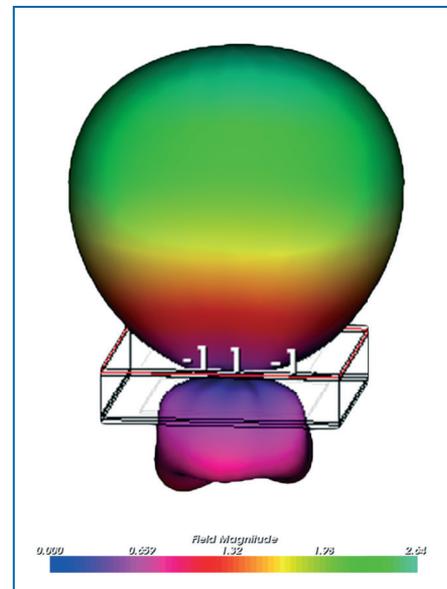
First the design was simulated to ensure it matched the requirements. Next it was verified by design rule check (DRC) to check the design against the PCB supplier's rules, and by layout versus schematic (LVS) to ensure proper connectivity of each layer, vias, and device connections. Gerber and drill echelon files were sent to the PCB supplier for production.

At the final stage, Cover Sistemi used AWR scripting language to create a pick-and-place bill-of-materials (BOM) file for the assembly. This was critical as the design included over 500 components that could not be placed manually. The BOM file included all necessary information such as component IDs, coordinates, mounting layers, rotation, etc.

WHY AWR?

AWR offered a complete package of technologies to enable Cover Sistemi to complete its end-to-end design with first-pass success. The system and RF measurements obtained were very close to AWR predicted simulation results. This, of course, is the added value of any EDA solution. The design team was also very pleased with the competitive pricing for the software's extensive technical capabilities.

Cover Sistemi further noted that the AWR scripting editor was very easy and straightforward and there was no need for extensive knowledge of Visual Basic programming language. The software also offered a very nice visual representation of layouts and graphs. Finally, the team was pleased with AWR's extensive online help and documentation.



AXIEM radiation pattern of the antenna.

Programming of the pick-and-place script using the AWR scripting language editor.