AXIOM Board

signal integrity, setup a cluster and power management

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AXIOM Ecosystem

H2020 allowed SECO to invest in the **Programmable hybrid ARM/FPGA SoCs** area bringing **new solutions** to the embedded market through relationships with both **industrial and academic partners**

INDUSTRIAL PARTNERS

SECO

herta security

VIMAR energia positiva

EVIDENCE EMBEDDING TECHNOLOGY

ACADEMIC PARTNERS

BSC Barcelona Supercomputing Center Centro Nacional de Supercomputación

UNIVERSITATIS SEMPER MCCXXXX

UPC

FORTH Institute of Computer Science

AXIOM Board

Hardware and Software Stack Solution

Hybrid SoC

ARM based

Compatibility with Arduino

Cost-effective networing infrastructure

Open source OS

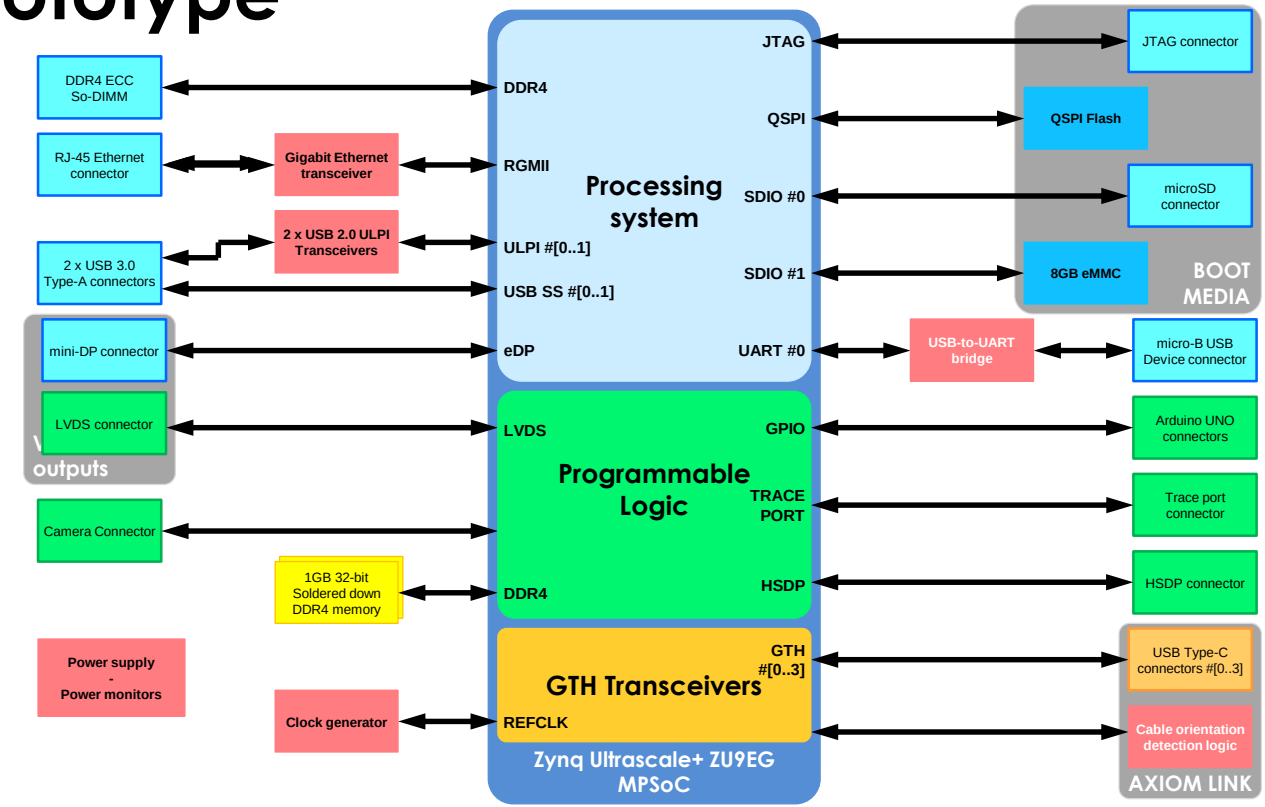
OmpSs framework

Clustering capabilities

Hardware

Software

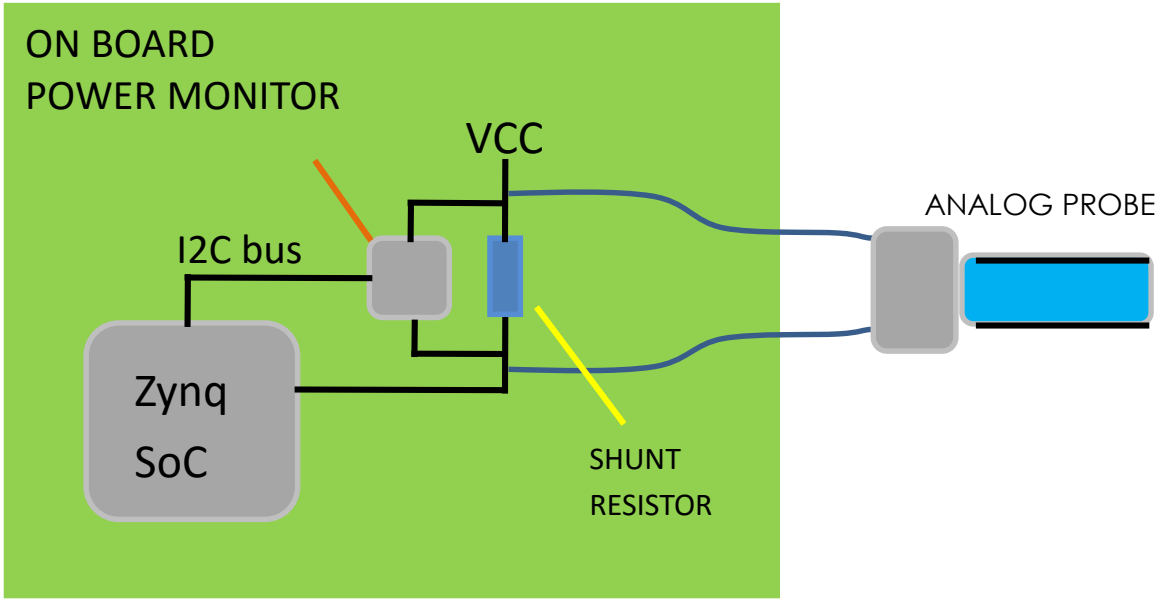
Hardware Prototype



Power Monitoring and Profiling

Dedicated On-Board Hardware:
Power measurements on 8 supply rails (70% of maximum total estimated power)

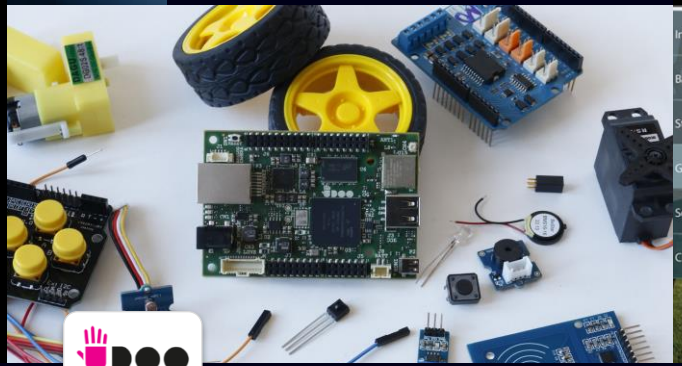
Specific Development Tools Cross Triggering Capabilities During Debug and Trace:
Dedicated test points for analog probe connections and 'Breakpoint' on given power consumption levels



- APPLICATIONS CAN TRACK POWER CONSUMTPION AGAINST RUNNING TASKS
- USERS MAY TEST CODING STYLES AGAINST POWER CONSUMPTION

SMART HEALTH

SMART HOME



DO- IT-YOURSELF

SMART CAR

SMART ENERGY

SMART SURVEILLANCE

First Outcome for SECO

Industrial solution SM-B71

SMARC Rel. 2.0 with the **Xilinx® Zynq® Ultrascale+™** MPSoC

SM-B71

Wide scalability from cost effective Dual-Core to high performance Quad-Core ARM® Cortex®-A53 MPSoCs with GPU/VCU

Dedicated Real-Time ARM® Cortex®-R5 processors

Extreme flexibility: up to 256k FPGA logic cells

LVDS and DP video interfaces up to 4K resolution High-speed interfaces

EMC evaluation and Signal Integrity

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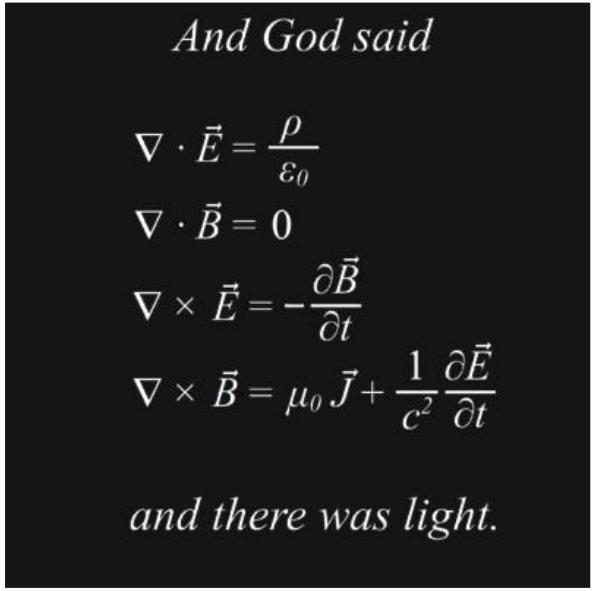
EMC evaluation & Signal Integrity

Product Research and Development



What SECO EMC division for measurements and certifications does:

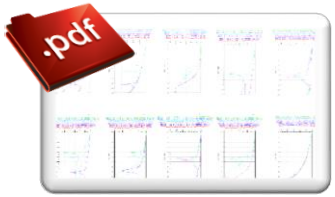
- Design of **HS digital lines**
- **Post layout** symulations
- **Signal integrity** measurements
- Pre-conformity **EMI/EMS** measurements

KEYSIGHT TECHNOLOGIES

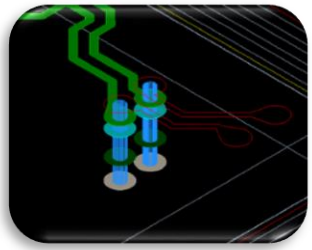
Keysight CERTIFIED EXPERT EDA SOFTWARE

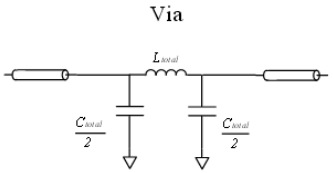
Pre-layout

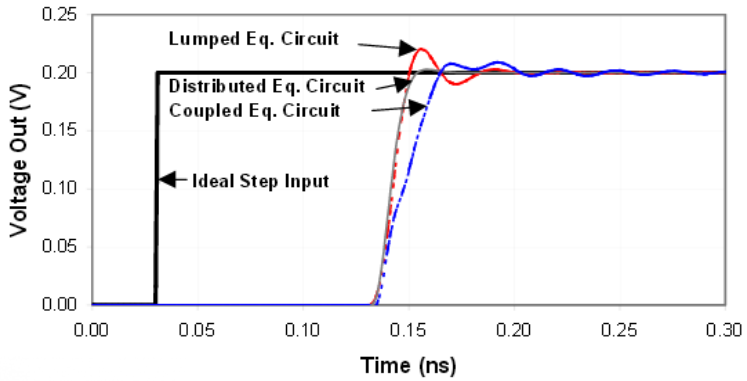
To verify the improvement

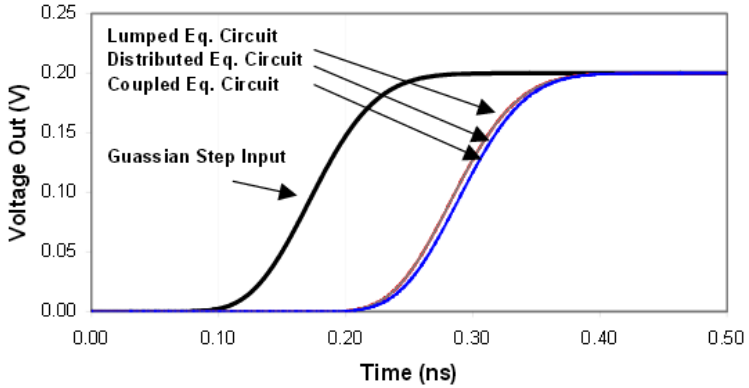


[Pre Layout Vias tecnology]





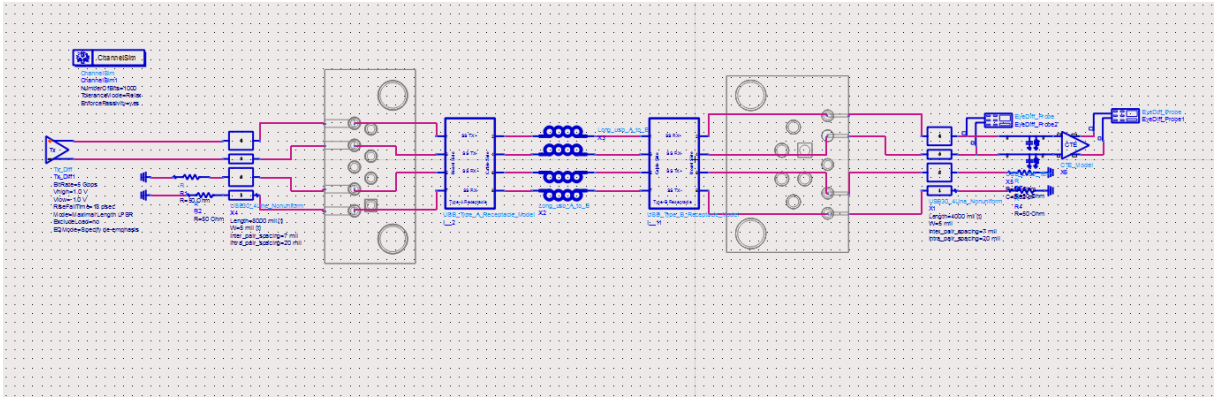




Pre-layout

USB 3.0

At the pre-layout stage we can **define the budget** we need to garant a correct routing of the board.

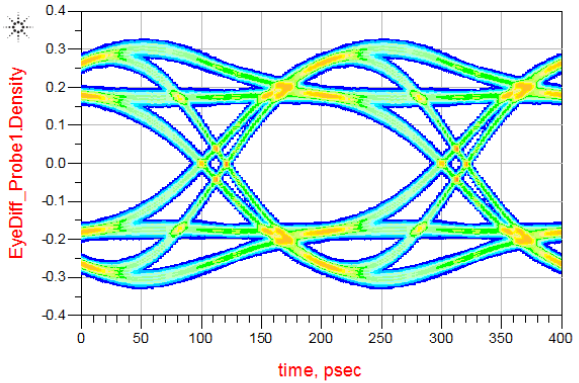


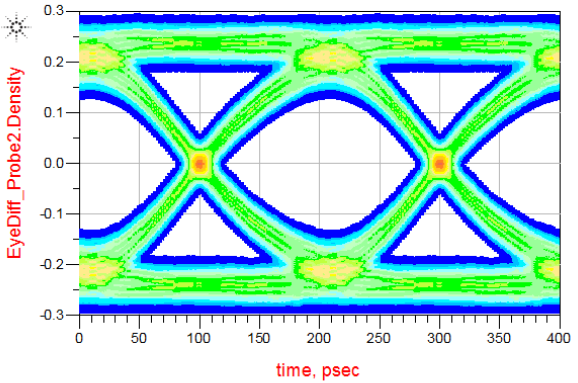
At the pre-layout stage we can evaluate the **surface roughness, xtalk etc.** effects yet.

Pre-layout

USB 3.0

At pre-layout stage we can also define the **equalization's parameters** we need to garant that the involved bus does work correctly.



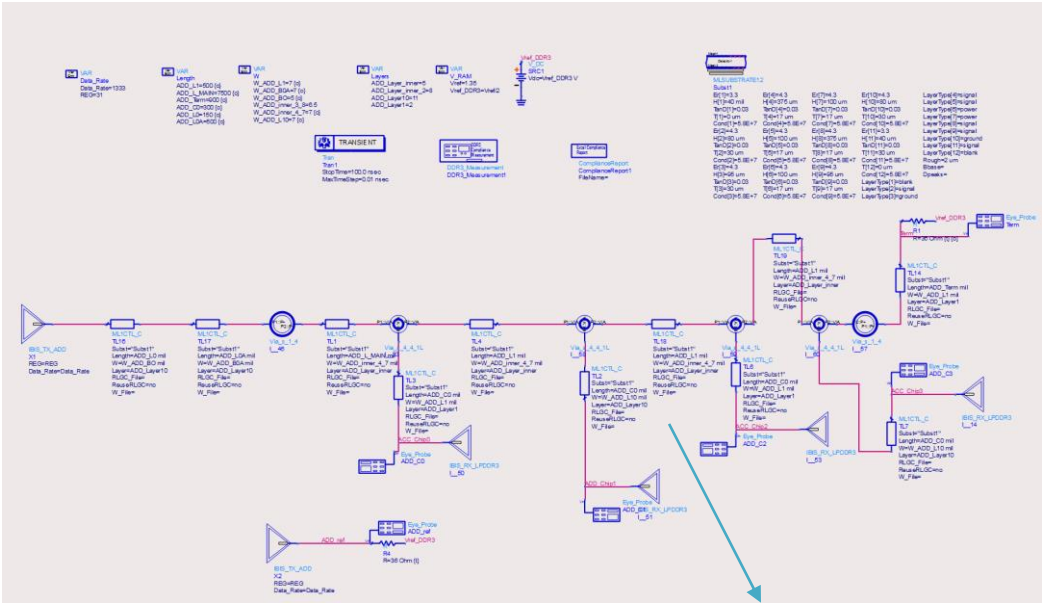


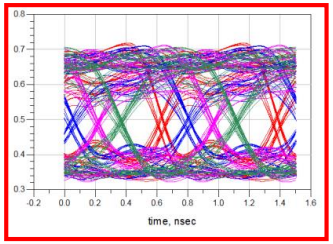
Pre-Layout Analysis

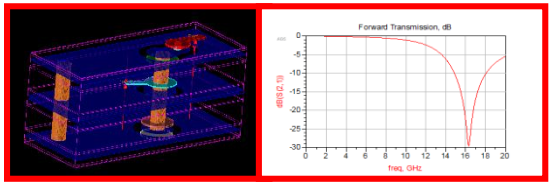
Simulation Bus DDR4

It can be useful to **define general rules** valid for all the data or addresses of a DDR, helping the CAD projectist to route a board that already has predefined distances and matchings.

To make the pre-layout stage closer to a real situation, VIASes can be extracted with ADS or EMPro.







VIA simulato con Momentum

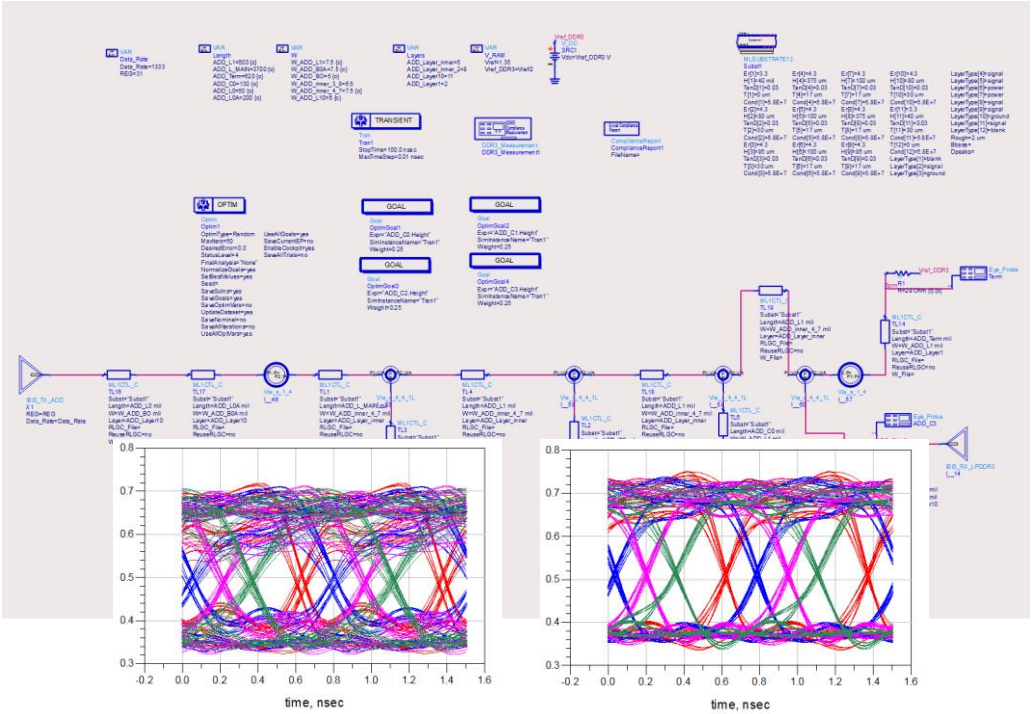
Pre-Layout Optimization

Simulation Bus DDR4

ADS is a powerful optimization instrument to improve our transmission line.

We used **eye width** and **skew interchip** as optimization parameters to stay in the standards managed by the processor controller to have a fly-by topology.

Those parameters would change for a T topology where the main problems are reflections not the xtalk.



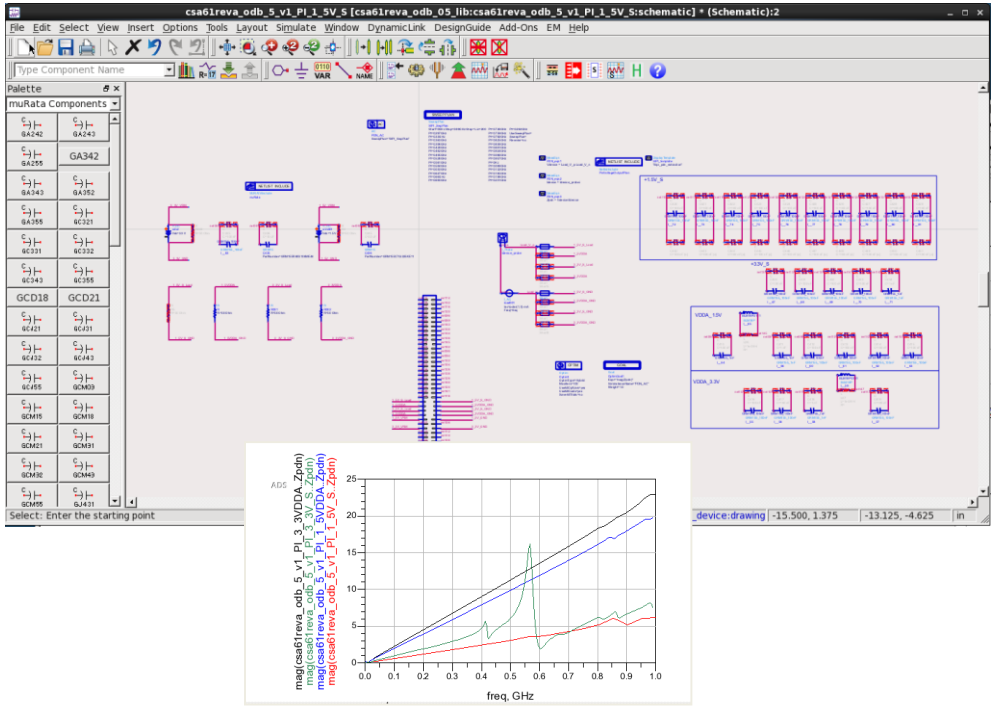
DDR before and after the optimization with ADS

Power Integrity Analysis

PDN extracted with **EM simulation**

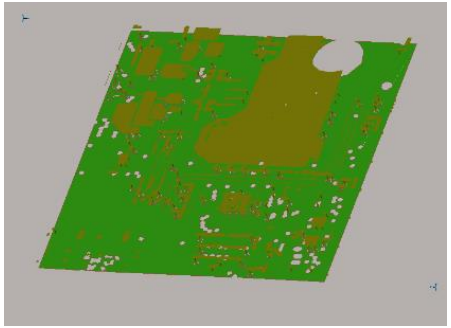
Impedance saw from the CPU with an **AC simulation**

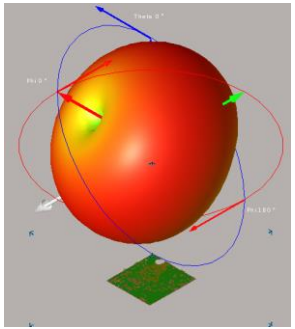
Decoupling capacitors and EMI suppressor include real elements: only with symulations we can comprehend the real impedance profile.

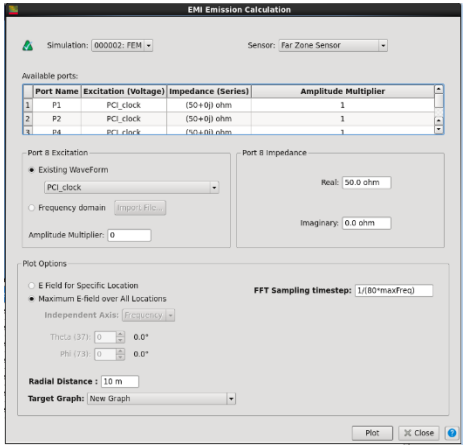


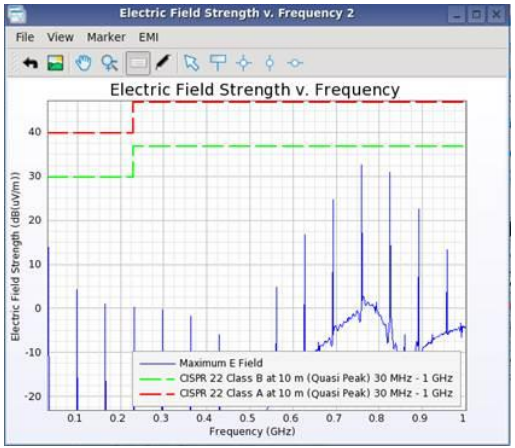
PCB EMI compliance analysis

RFEM 3D EM Simulation in EMPro with EMI Emission Calculation



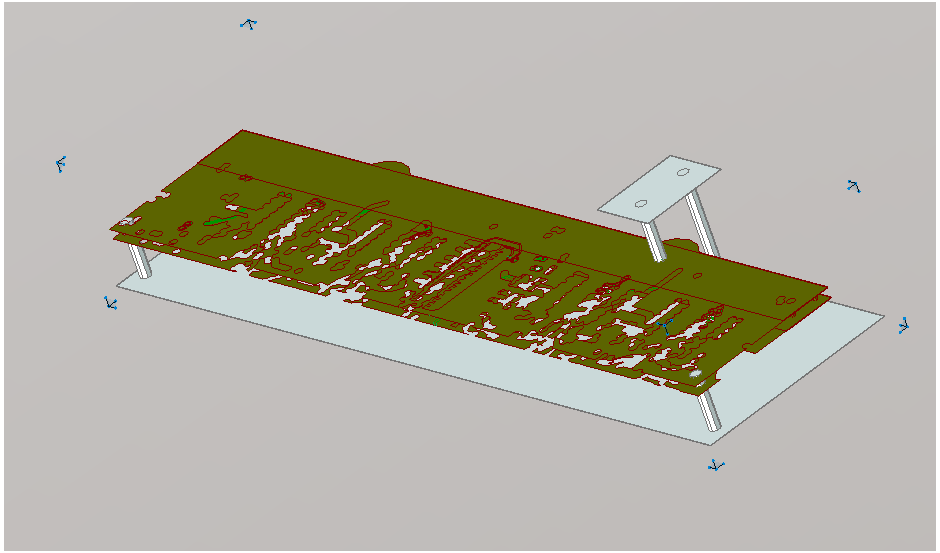


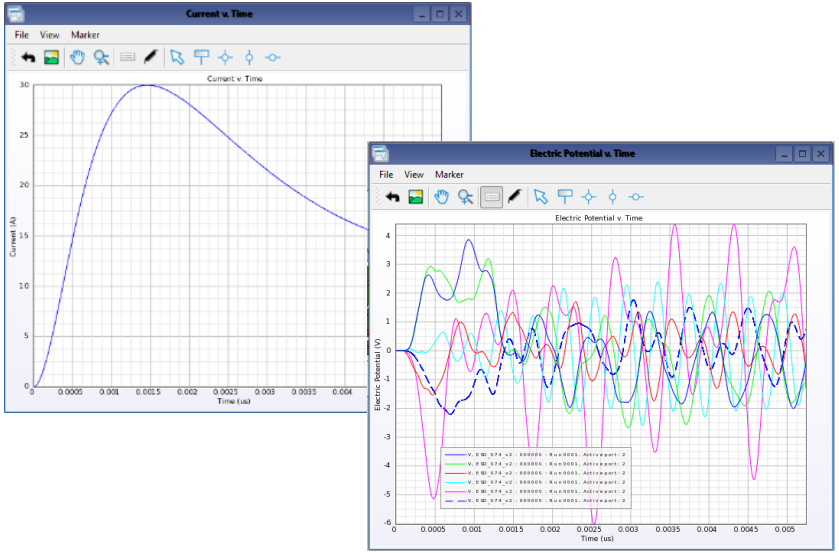




ESD Analysis

FTDT 3D EM Simulation with EMPro

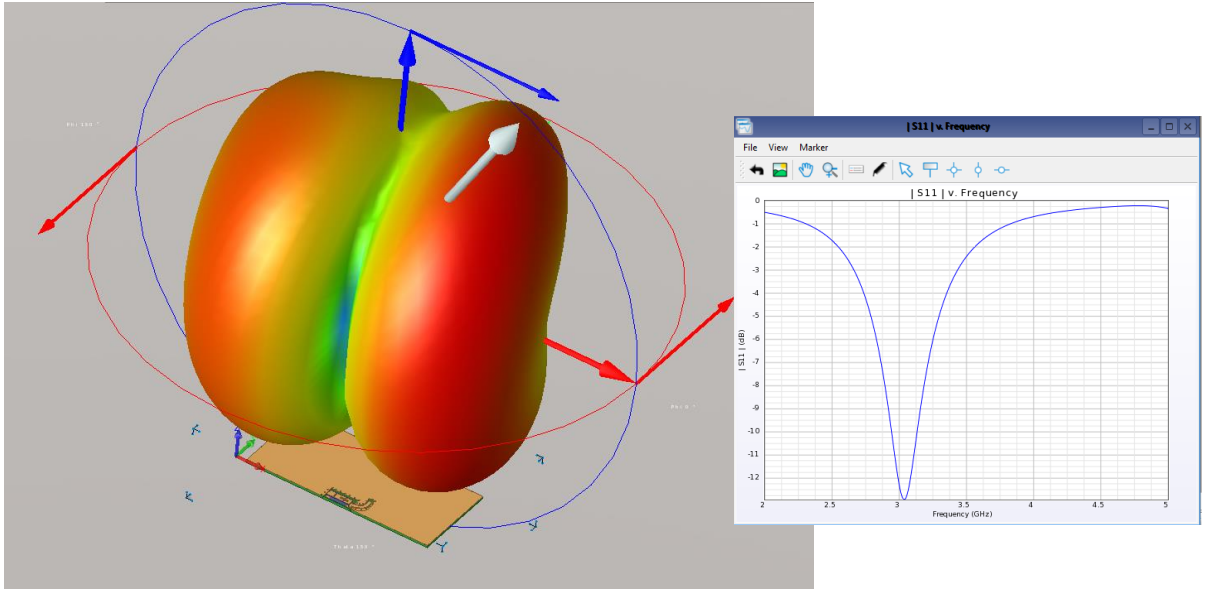




WiFi antenna on PCB

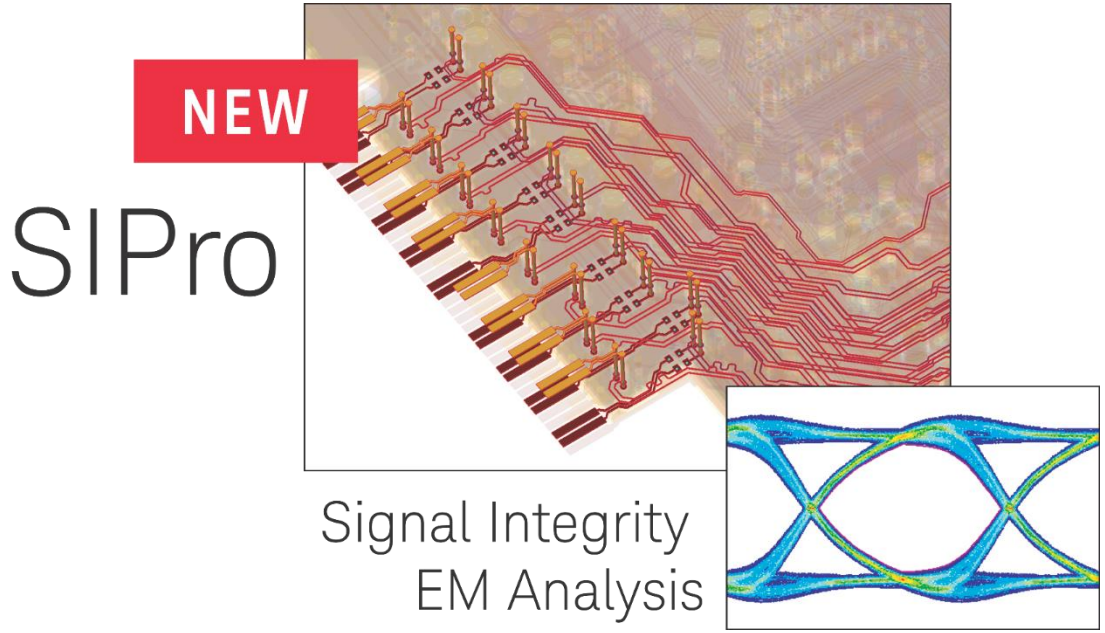
Analisi FEM with EMPro

Antenna matching network designed extracting S parameters with EMPro and optimization of the fine tuning elements with ADS optimization



Keysight ADS 2017

Signal and Power Integrity Solutions

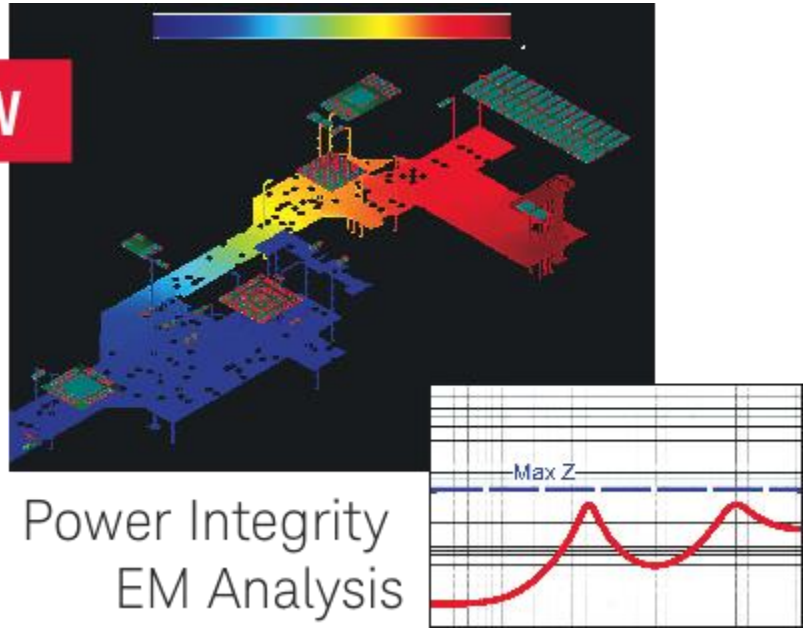


Keysight ADS 2017

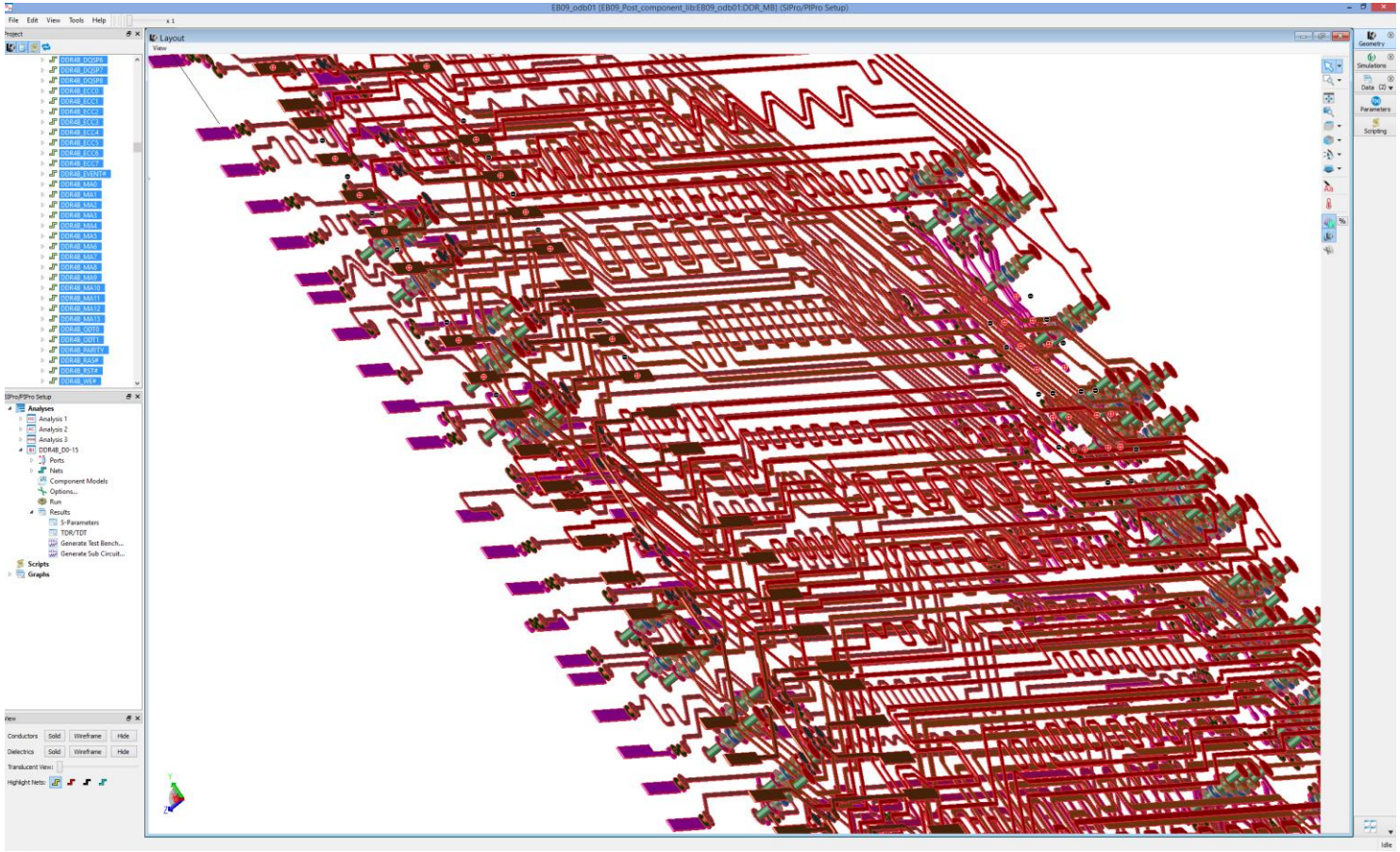
Signal and Power Integrity Solutions

NEW

PIPro



Power Integrity
EM Analysis



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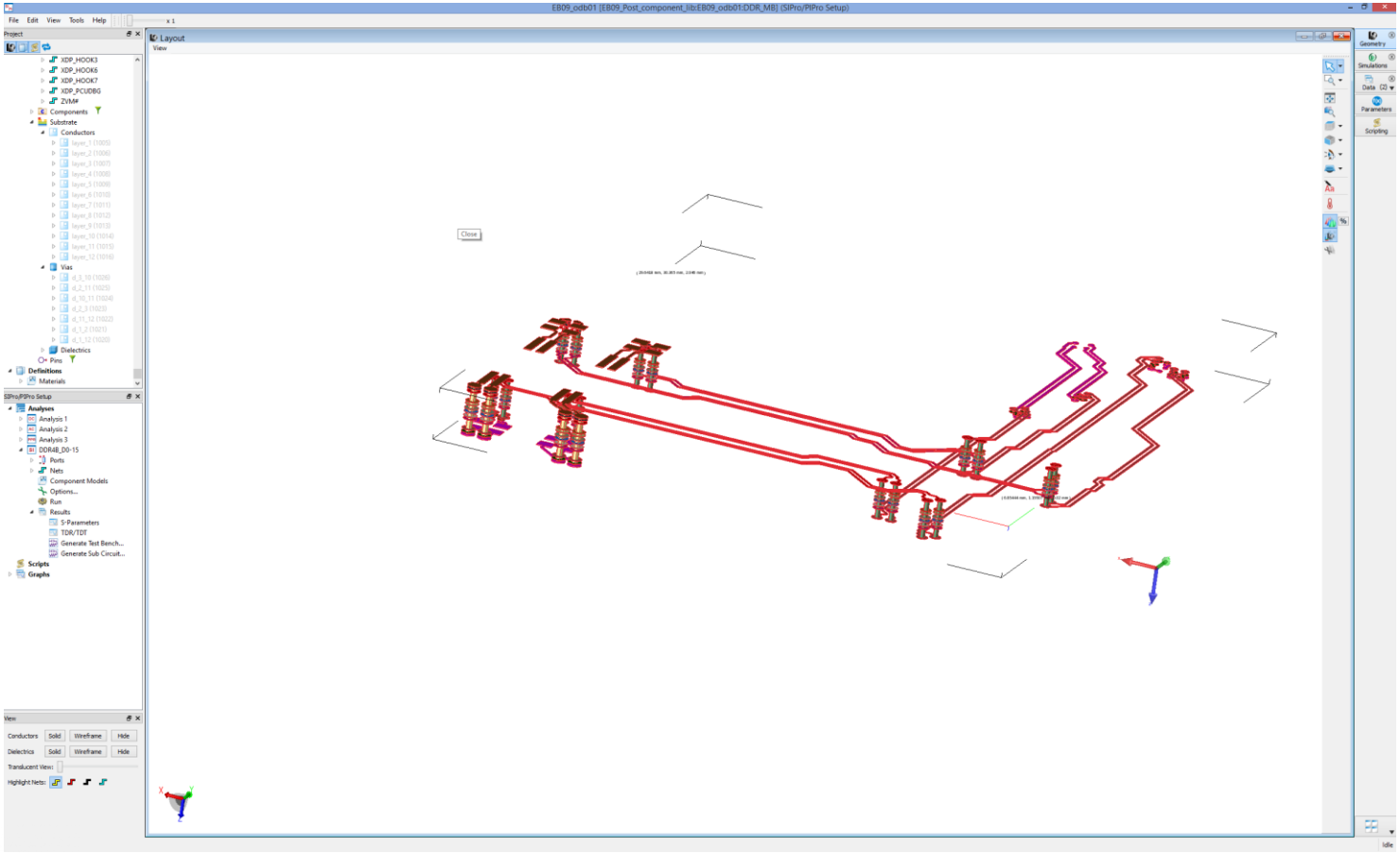

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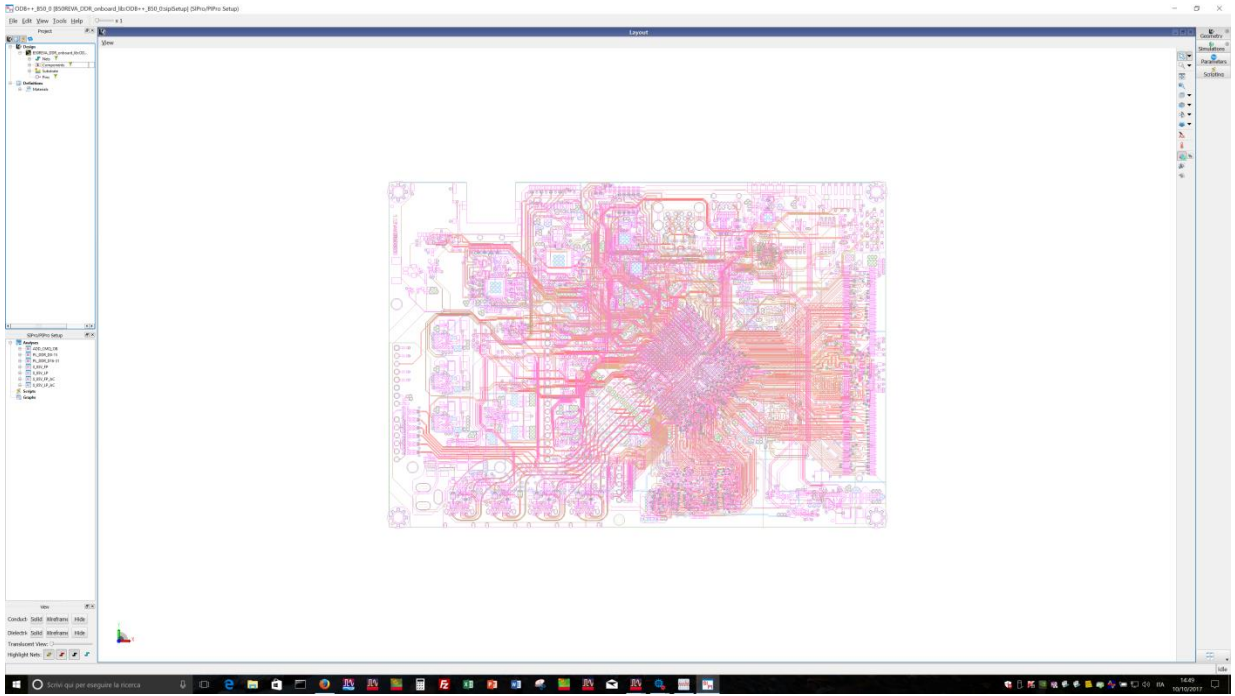
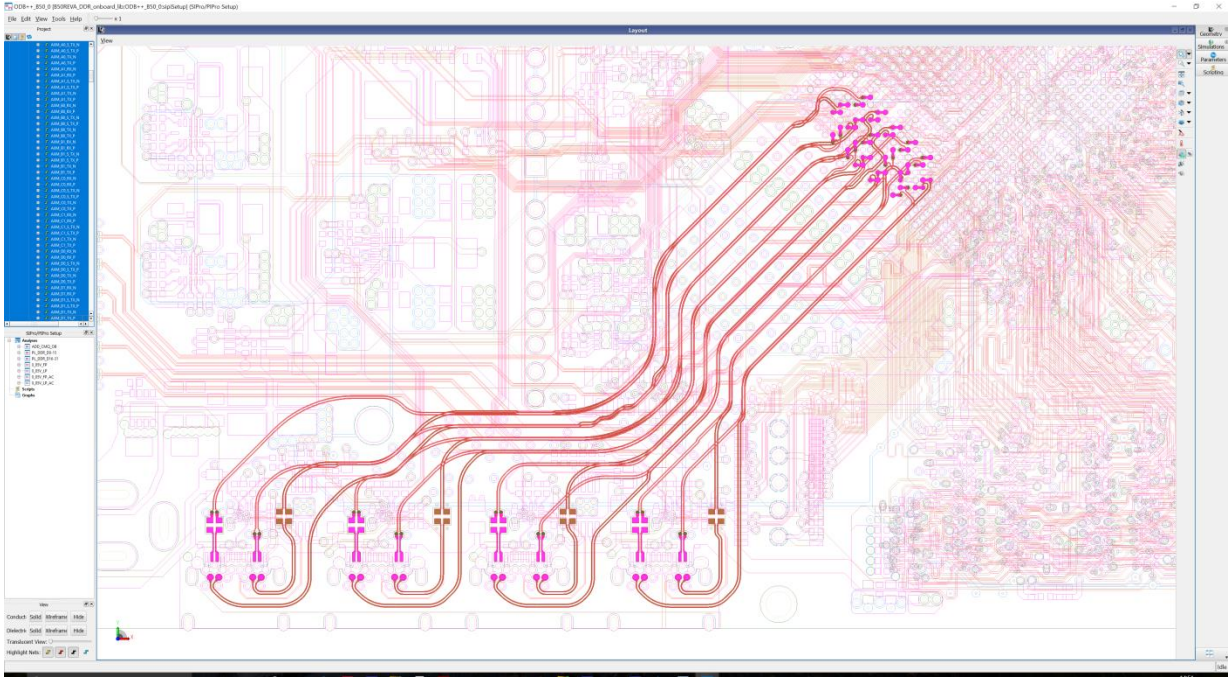
AXIOM Board

Imported in ADS



AXIOM Board

Imported in ADS



AXIOM Board

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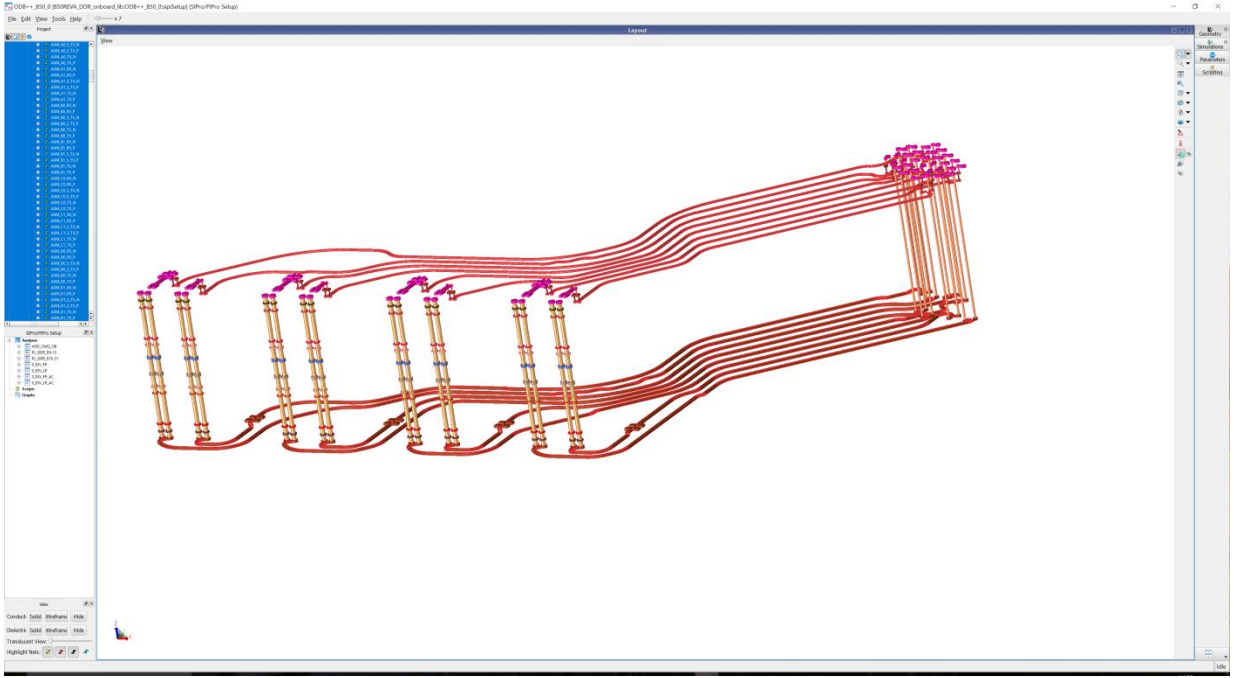
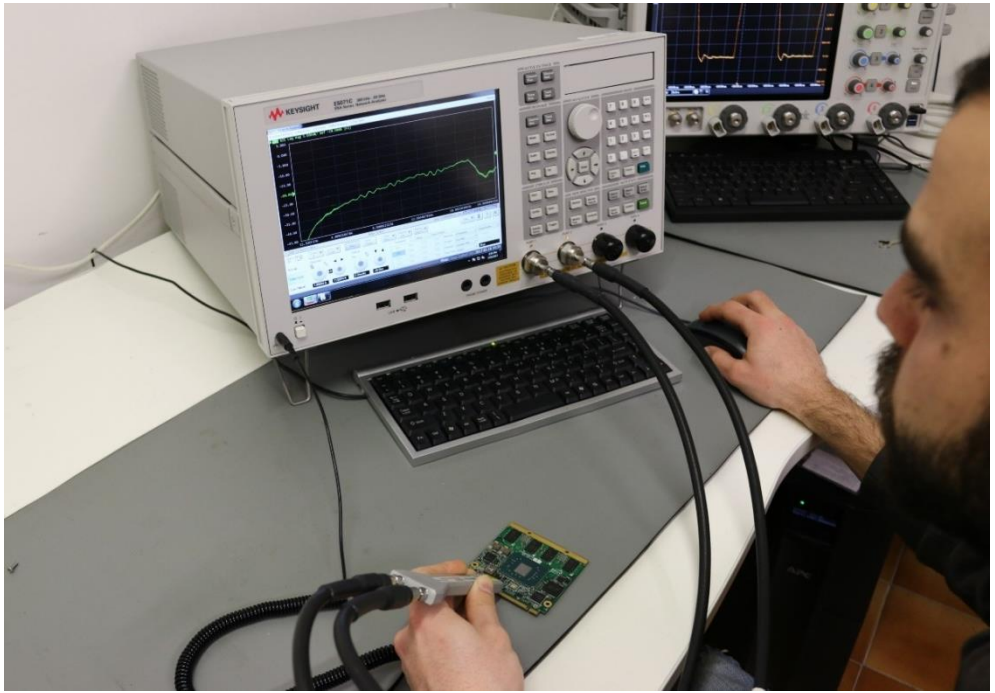


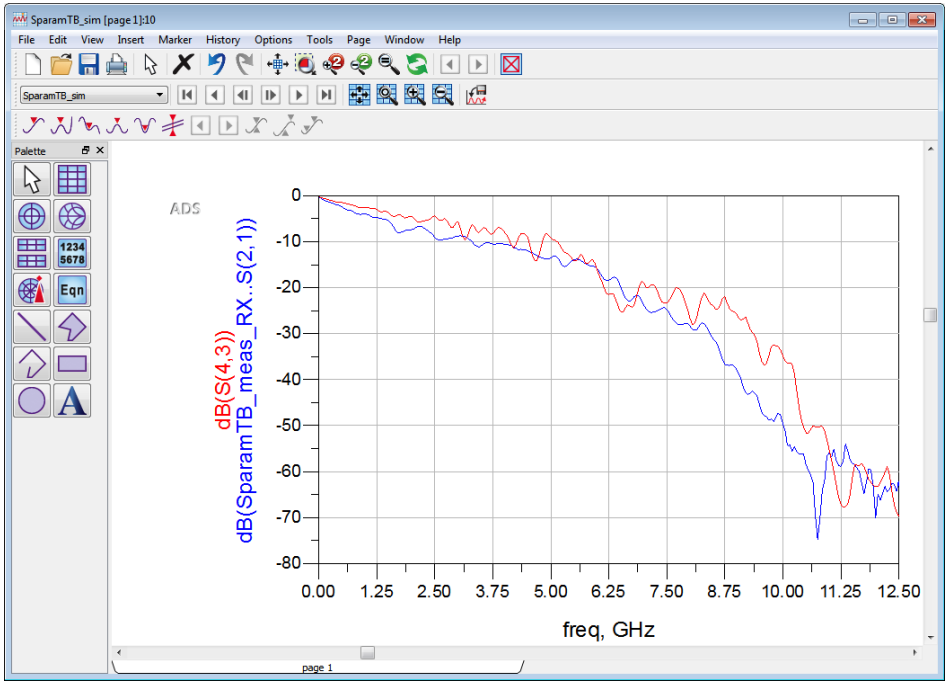
S-Parameter Measurement

With Keysight ENA



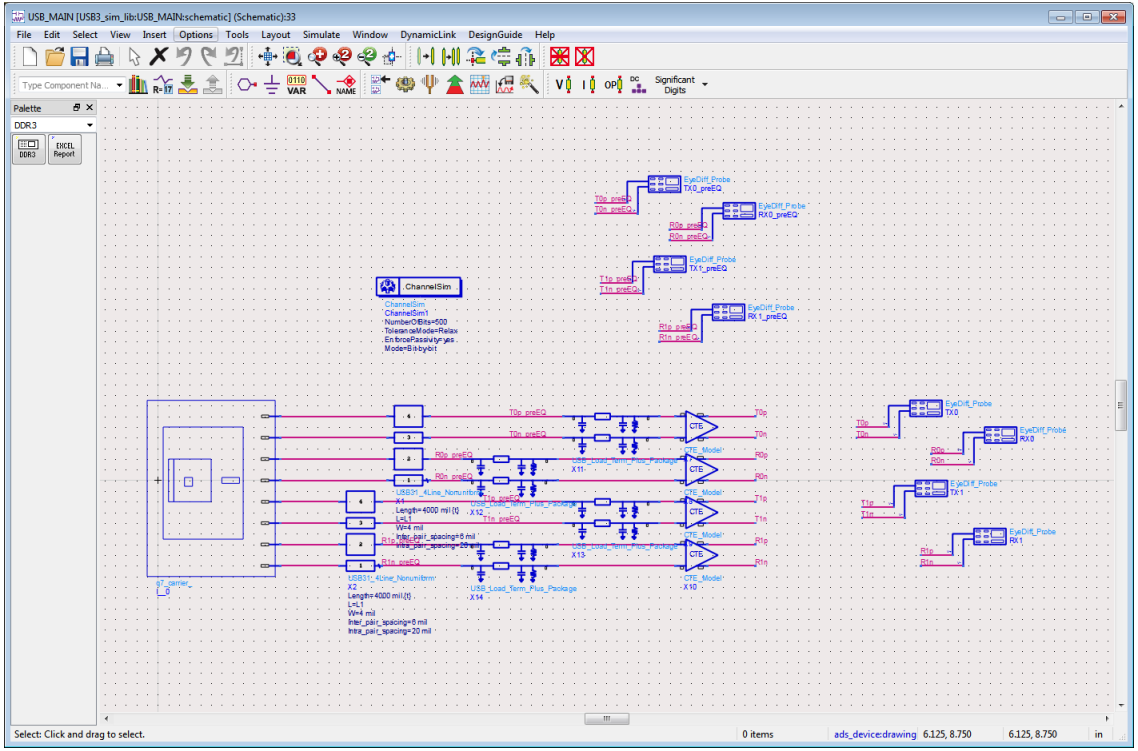
S-Parameters

Simulated vs Measured



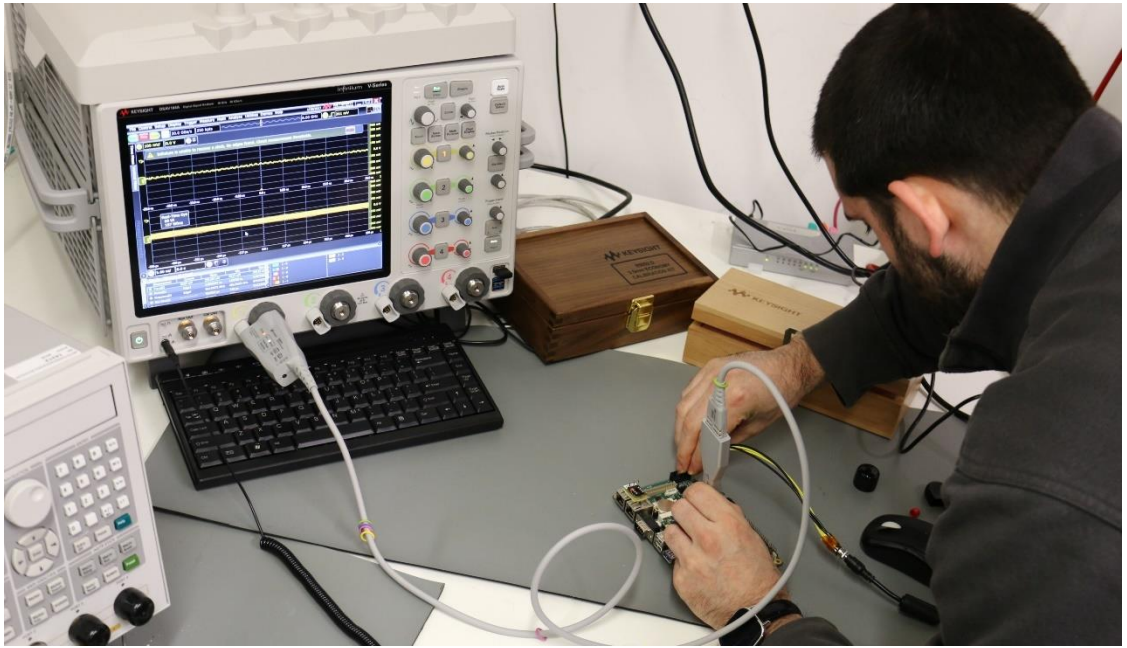
Eye Diagram Test Bench

In ADS



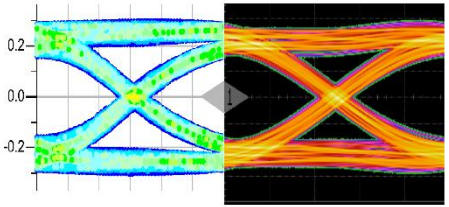
Eye Diagram Measurement

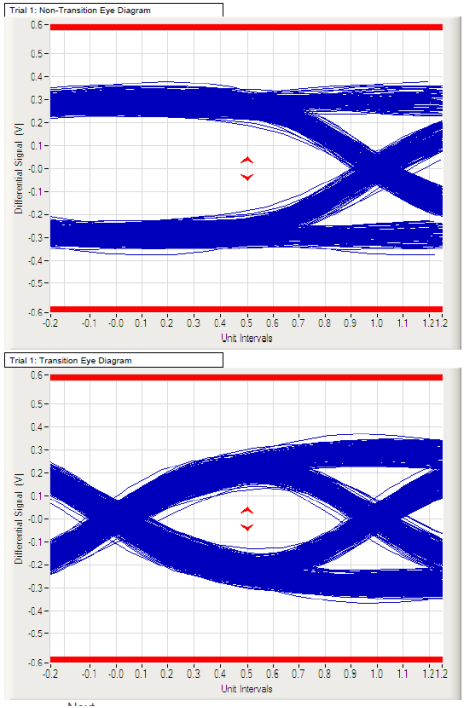
With Keysight V-Series Scope



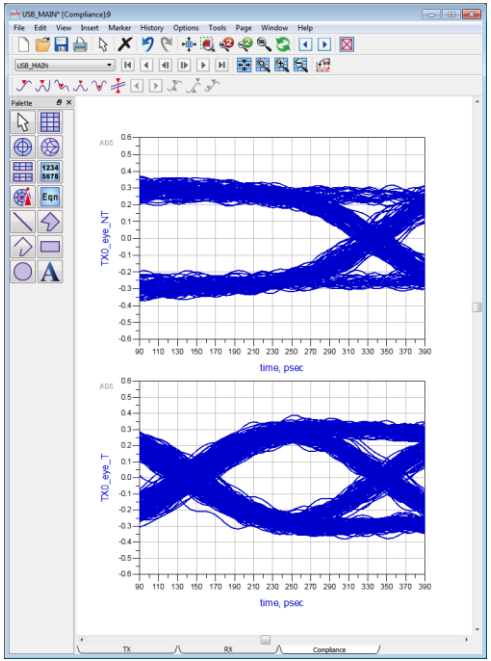
Eye Diagram

Simulated vs Measured



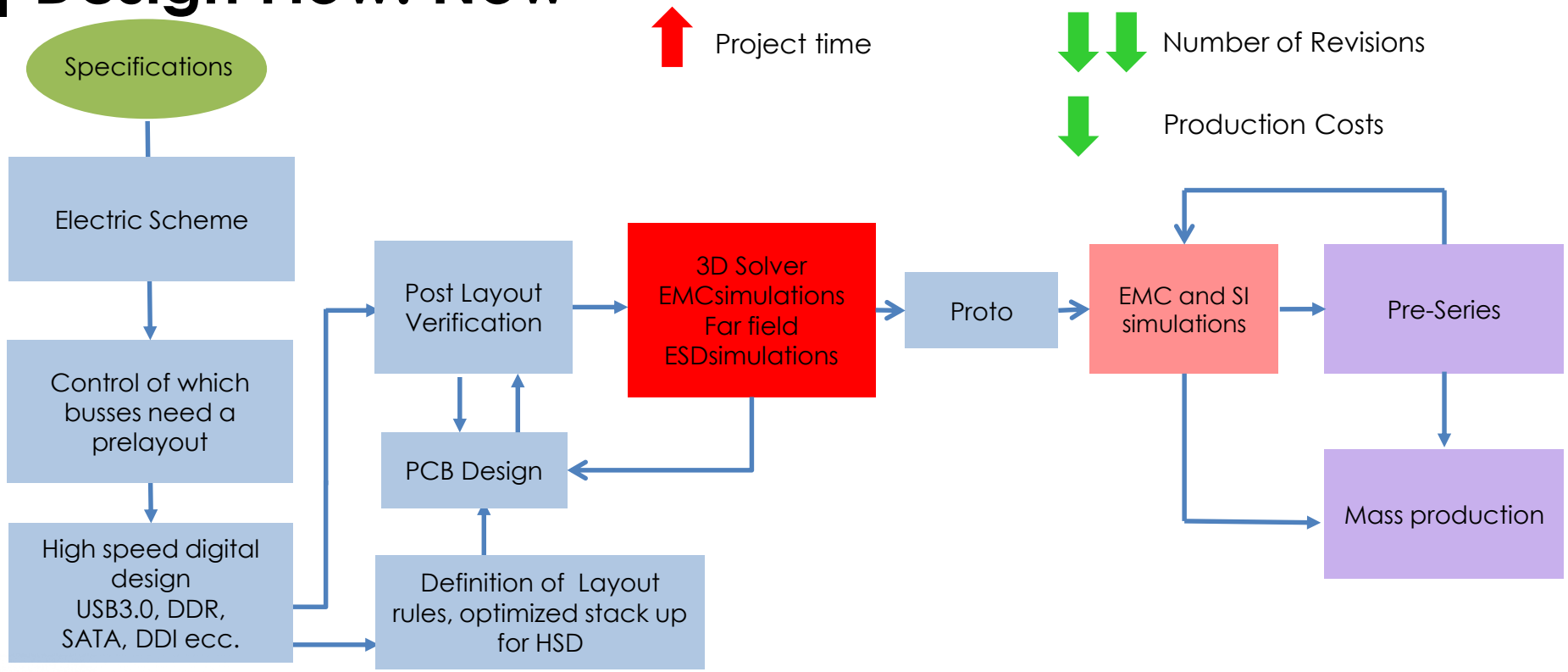


Measured



Simulated

Design Flow: Now



Thank You

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