EMI/EMC Simulation: third party service

Analysis before prototyping

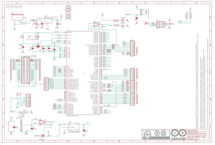
Silvano Chialina

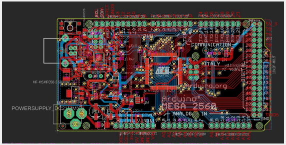
EXONX SRL
Via Jacopo Linussio 1, 33020 Amaro (UD) - Italy

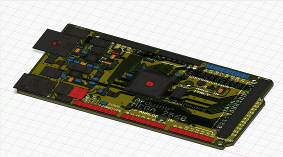
22th 03 2023

Simulation setup

The CAD project composed of Schematic, PCB and CAM files is imported into the simulator. The preferred format are: IPC 2581, ODB++, Metor, GDSI, Ansys, Gerber

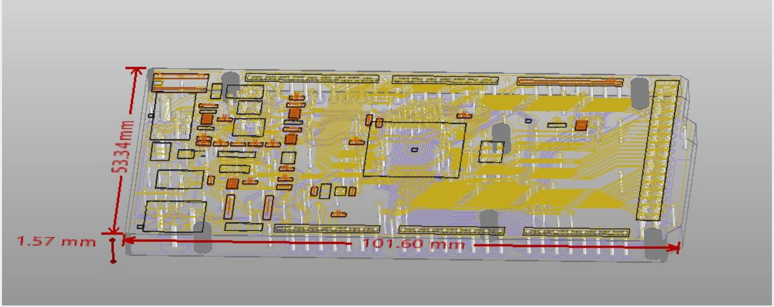






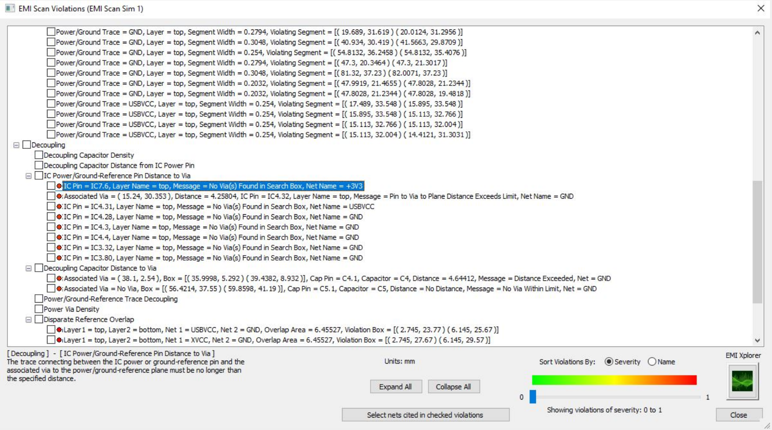
Project import

At the end of the process the project is incorporated in 3D into the simulator with all the relevant characteristics of the PCB and the components

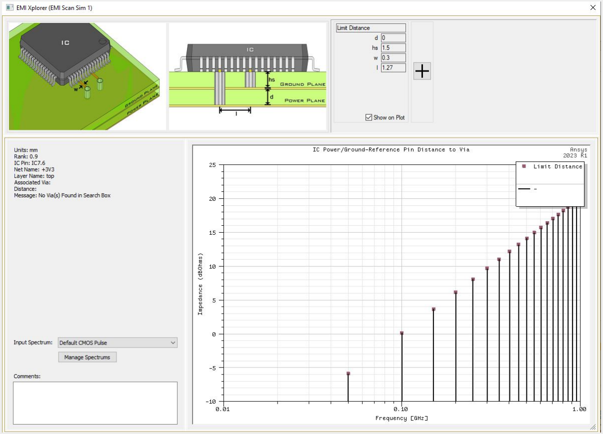


EMI ANALYSIS

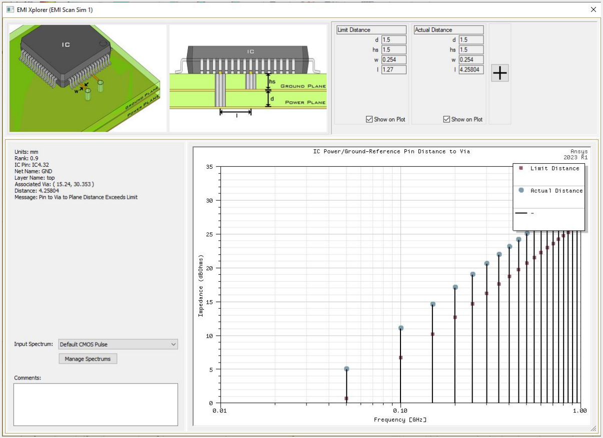
The project is analyzed by verifying if the design rules are respected



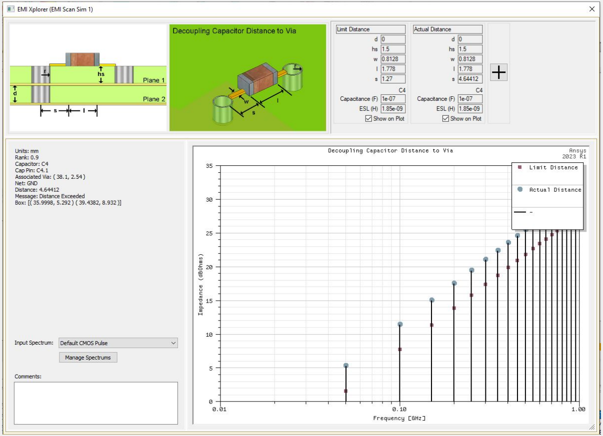
Details of rule violations are provided, for example:



Details of rule violations are provided, for example:

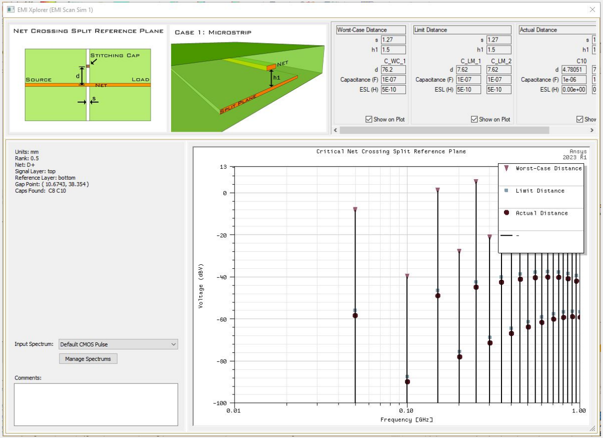


Details of rule violations are provided, for example:



Design roules check

Details of rule violations are provided, for example:



Design roules check

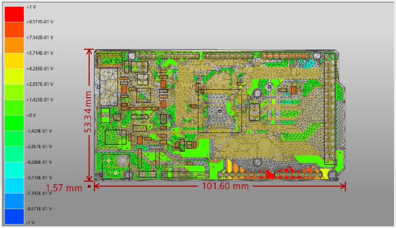
The report provided will contain the breakdown of individual violations with an indication of the location where it occurred. Based on this output it is possible to update the PCB in order to reduce the probability of having a critical behavior from an EMC point of view.

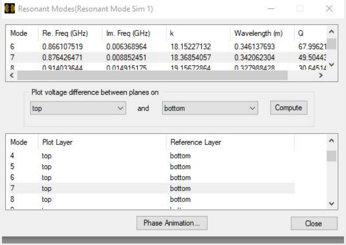
Resonances

Resonances

The resonance analysis allows to verify any areas of the PCB that could amplify the emissions and the effects of the RF immunity. Also this analysis can be done before the realization of the prototypes in order to limit the areas and/or the resonance effects.

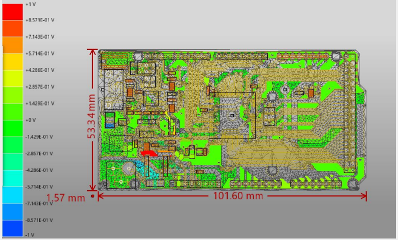
In this example we see une area closed to the connector

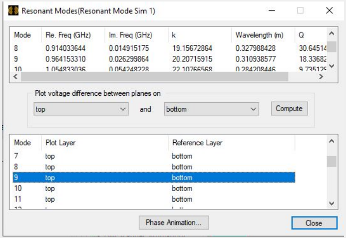




Resonances

In this example we see une area closed to one component



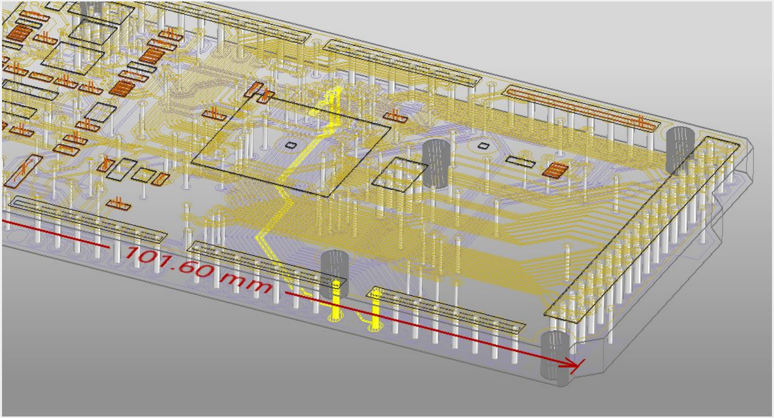


Interference analysis

Interference analysis

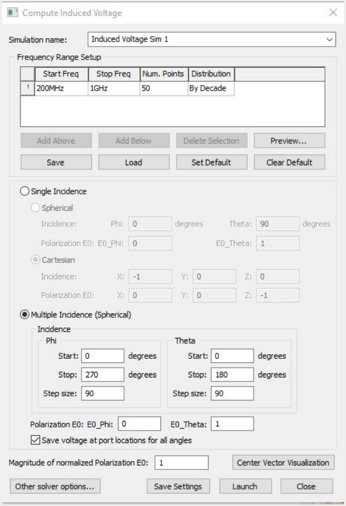
In critical areas it is possible to make an accurate analysis of the effect of immunity to electromagnetic fields. Interference testing is done for various field orientations and over a very wide frequency range..

Here are highlighted two nets potentially at risk



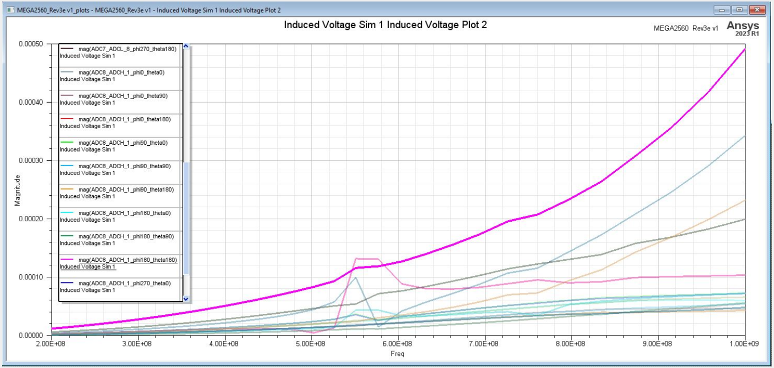
Interference analysis

Induced field

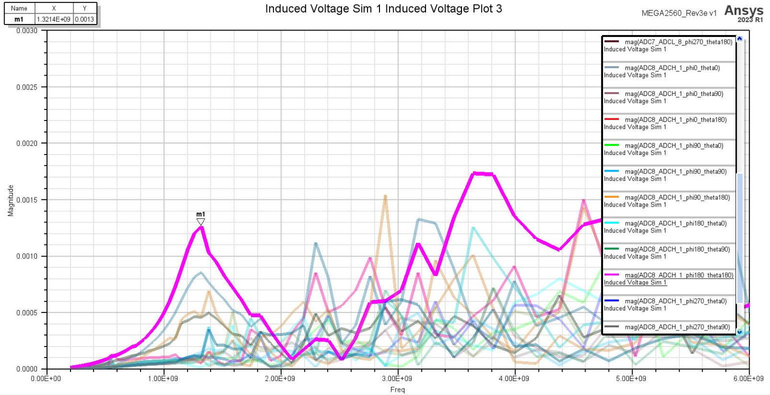


Interference analysis

Induced voltage



Induced voltage

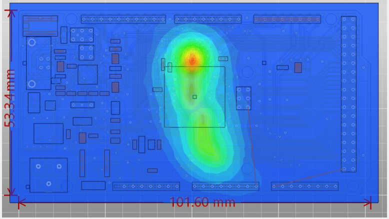


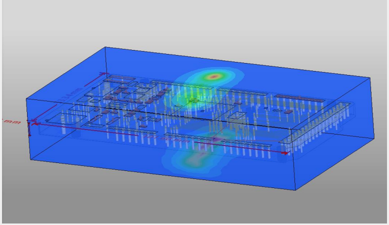
Radiated emission

Radiated emission

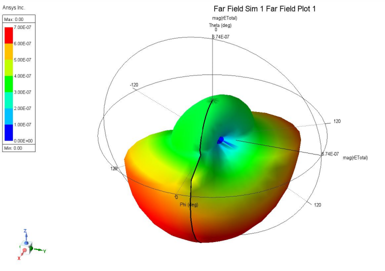
The near field and radiated field analysis is done by stressing the areas of the PCB that can radiate the most. Below are the results of the near-field simulations and the results of the radiated field.

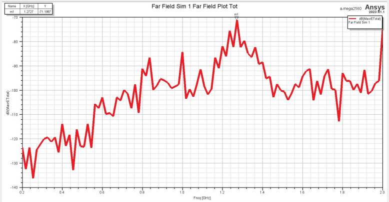
Near field calculated from 1 to 1.4GHz
This result is calculated at 1.3GHz. The emission is asymmetrical





It is possible to calculate the radiated field, in this case at 1m. You can see the representation in polar coordinates and the evaluation of the total field. The peak is at 1.27GHz, it corresponds to the peak of the voltage induced by the radiated field.





References

Susan C. Hagness Allen Taflone.
Computational Electrodynamics
The Finite-difference Time-Domine Methos. - Third Edition.
Artech House, 2005.

Notes