Radiated Emission
Automobile Imager Module

Scope : Radiated Emission (EMI)

Application : Advanced Driver Assistance System (ADAS)

Radiated emissions in automotive imager modules are a critical concern, especially with the increasing complexity of electronic systems in vehicles. To ensure compliance with industry standards like CISPR 25, engineers employ various EMI mitigation techniques. These include filtering, spread spectrum, and E-field shielding to reduce interference and protect the functionality of sensitive components such as cameras and sensors. Understanding and controlling radiated emissions is essential for the reliability and safety of the system.

Radiated Emission - Challenges

The client requested to perform Radiated Emission analysis (Simulation in Tool) of the layout to ensure it passes CISPR 25. The following outlines the challenges associated with Signal Integrity Analysis.

Challenges

- **Obtaining IBIS Models for Components:** Acquiring detailed IBIS (I/O Buffer Information Specification) models to understand the electrical behavior of each component.
- **Simulation Setup at the Tool:** Configuring simulation software to model and analyze the component's performance under various conditions.
- **Layout Rework Based on Commands:** Adjusting the PCB layout as instructed to correct design issues or optimize performance.

Radiated Emission Analysis - SoW

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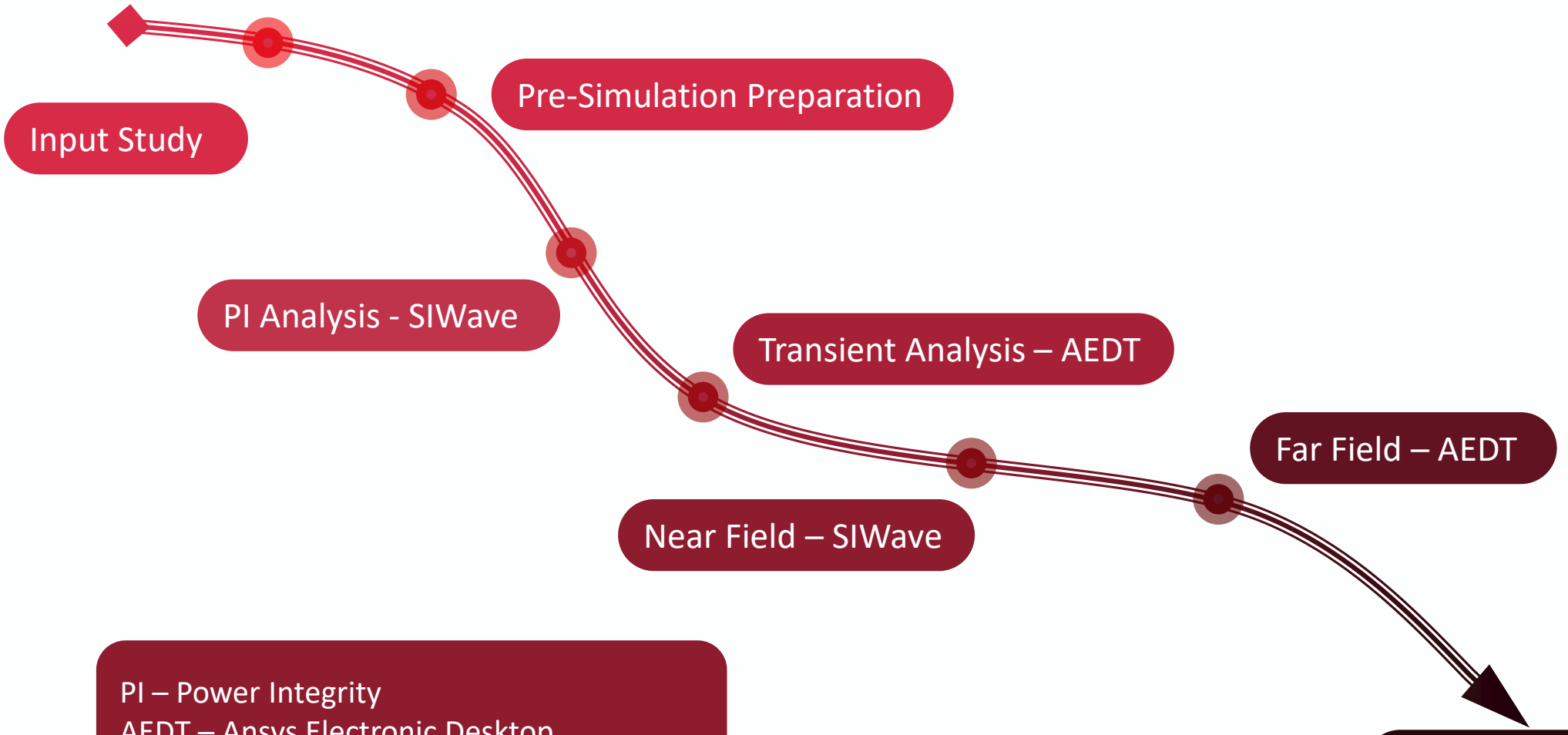
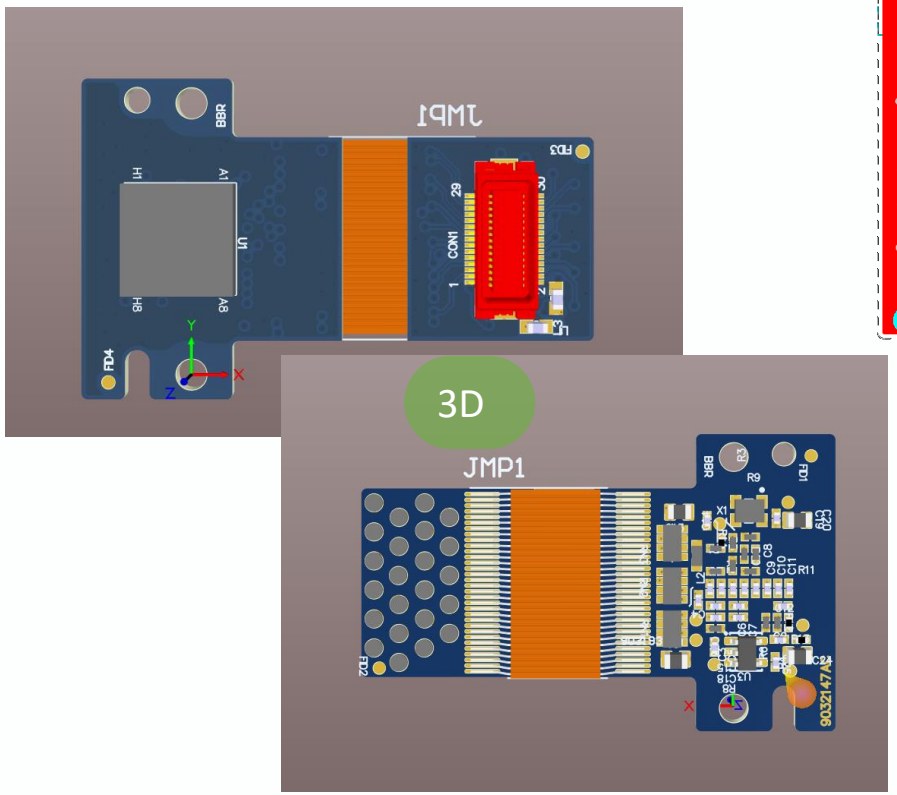
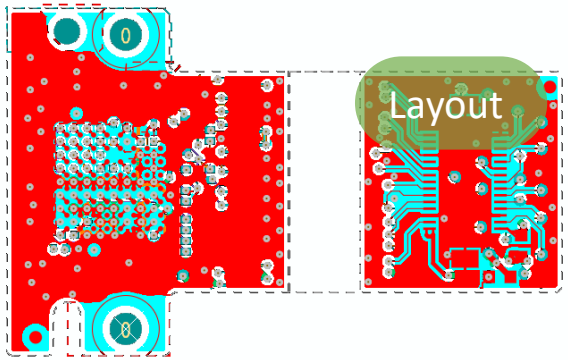


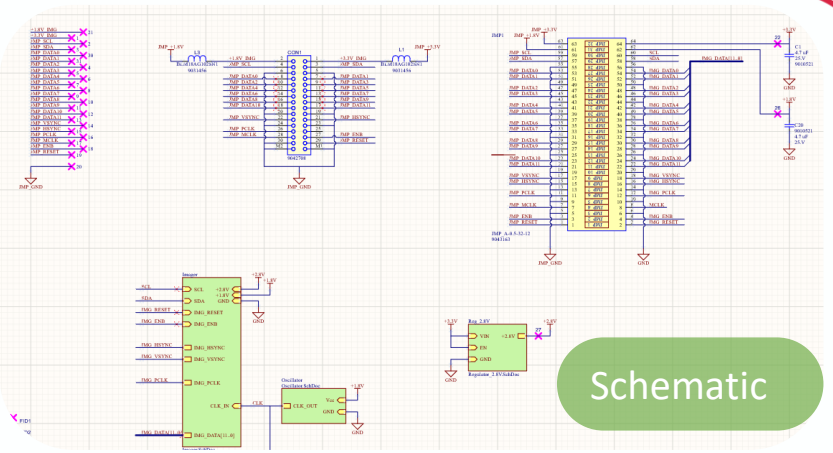
PI – Power Integrity
AEDT – Ansys Electronic Desktop

Input Study

The power circuits schematic and layout in the project are studied thoroughly to check whether the board has followed the recommendation of CISPR 25.







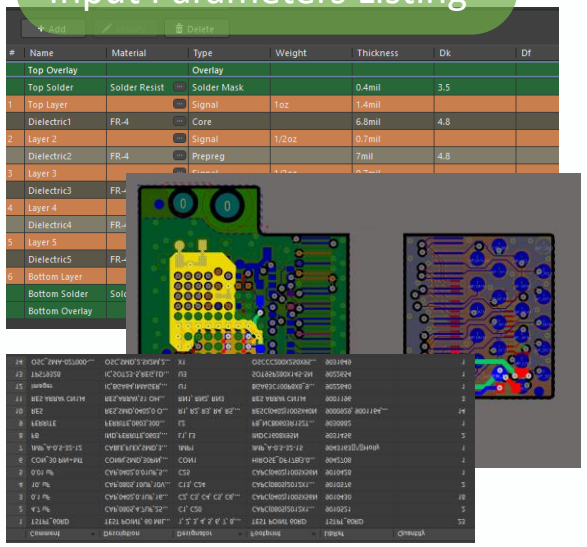
Powers Present:

- 3.3V – From Connector to LDO
- 2.8V – From LDO to Imager
- 1.8V – From Connector to Imager

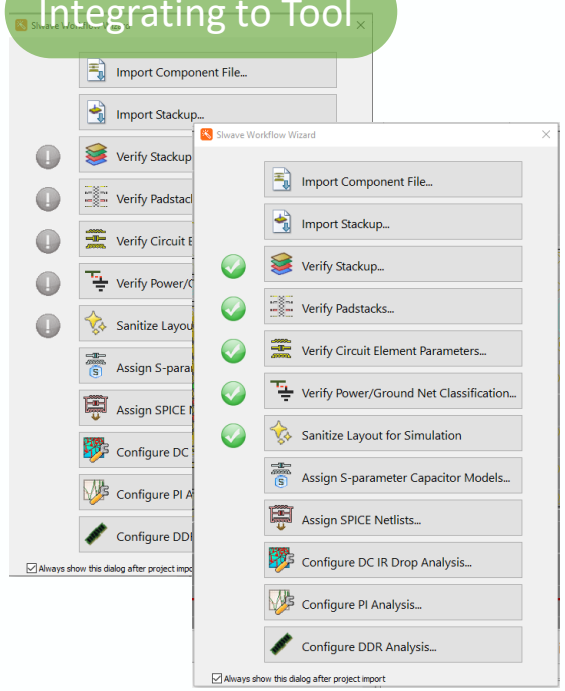
Pre-Simulation Preparation

The necessary inputs for simulating radiated emissions in Ansys were collected and imported into the simulation setup to ensure a realistic simulation.

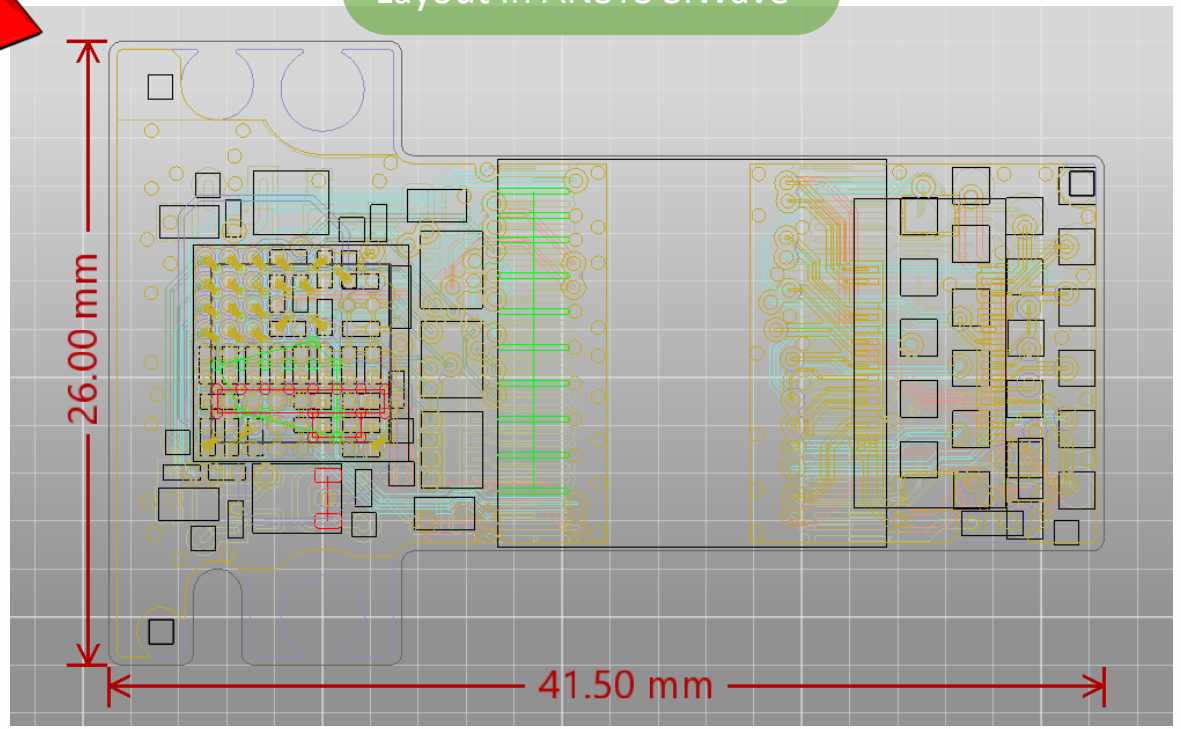
Input Parameters Listing



Integrating to Tool



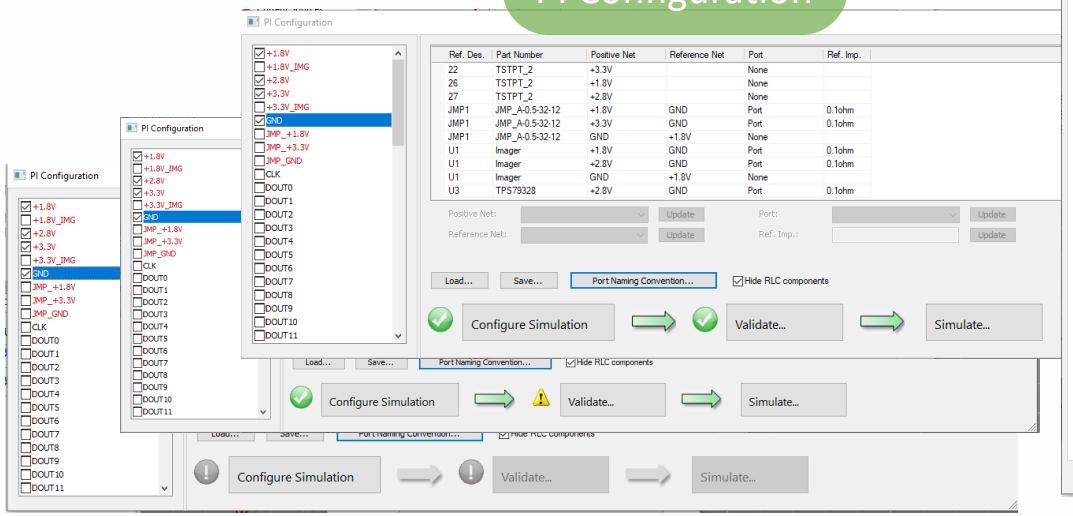
Layout in ANSYS SIWave



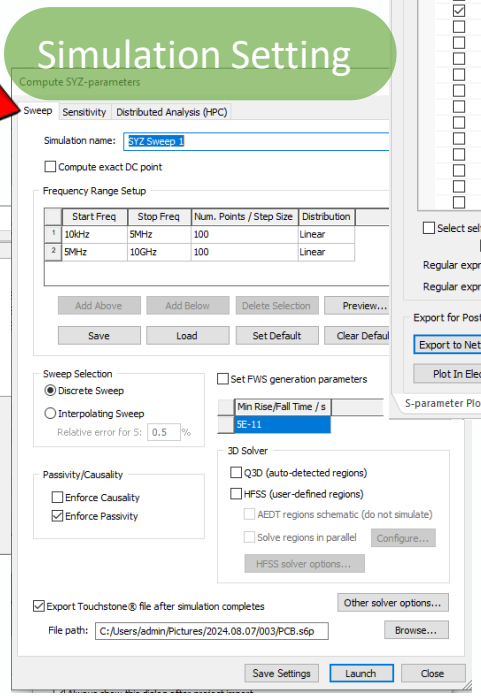
PI Analysis - SIWave

For power nets (1.8V, 2.8V, 3.3V), the S-parameter is calculated based on the PI simulation over the range of frequency from 10kHz to 10GHz. As per CISPR 25, the frequency for radiated emission will be 30MHz to 5GHz.

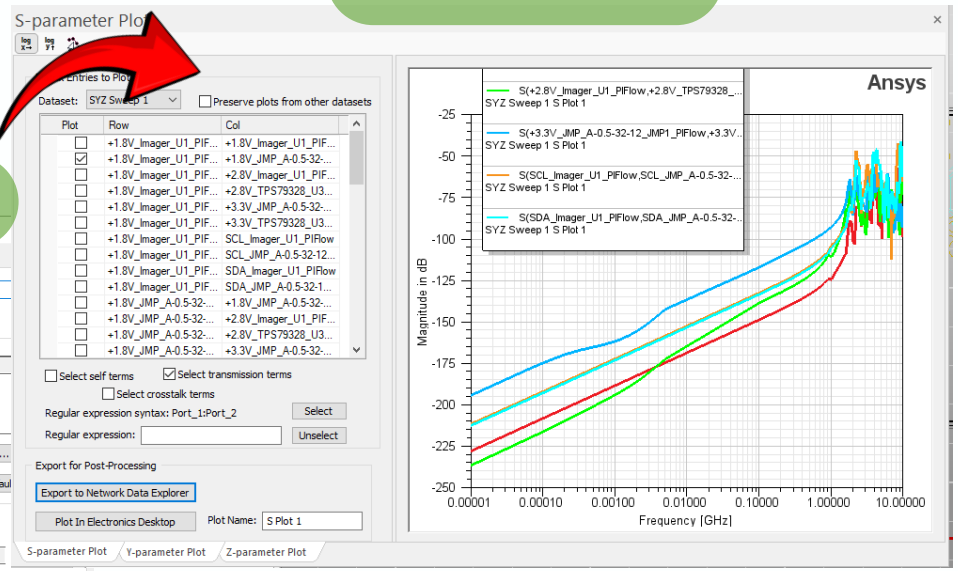
PI Configuration



Simulation Setting



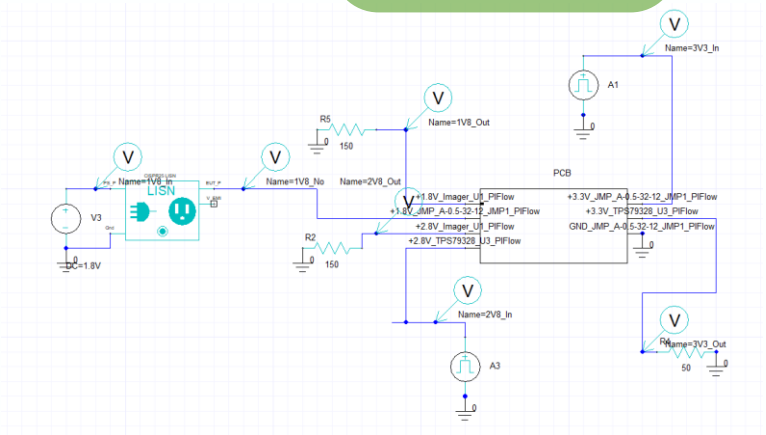
S-Parameter Result



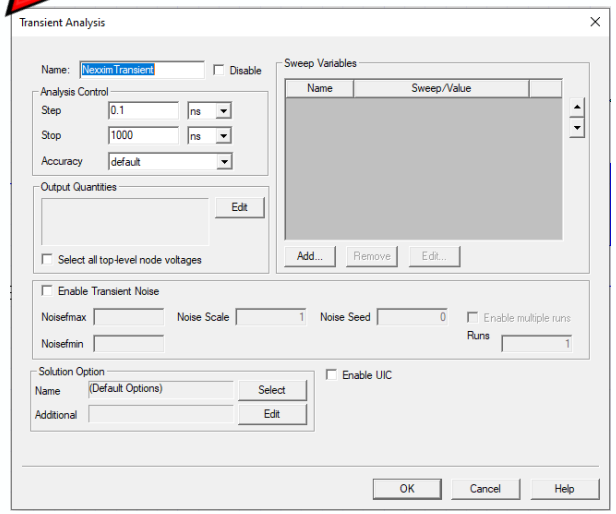
Transient Analysis – AEDT

The S-parameter simulation result from SIWave is used to create circuit for transient analysis. The schematic is created using the power inputs and load properties as per imager datasheet.

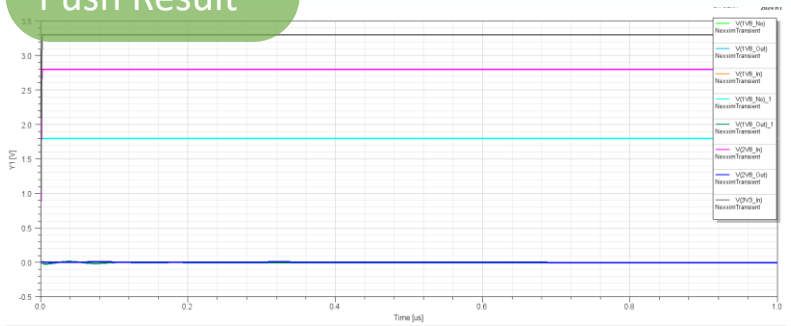
PI Configuration



Simulation Setting



Push Result



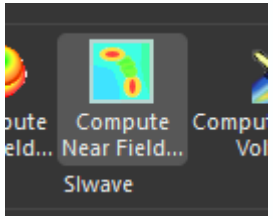
This result is again push back to the SIWave for near field analysis.

Near Field – SIWave

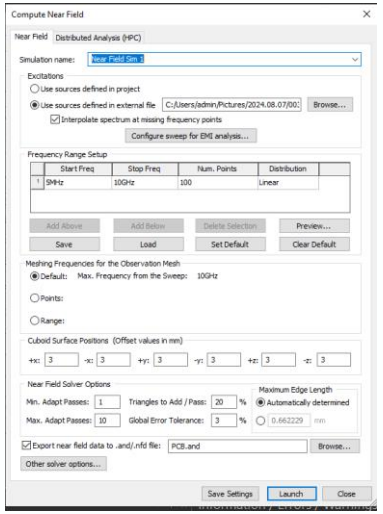
The power locations on the PCB is simulated to measure the electric and magnetic field strength radiated from the PCB.

Distance: 3mm in each Direction (X, Y, Z).

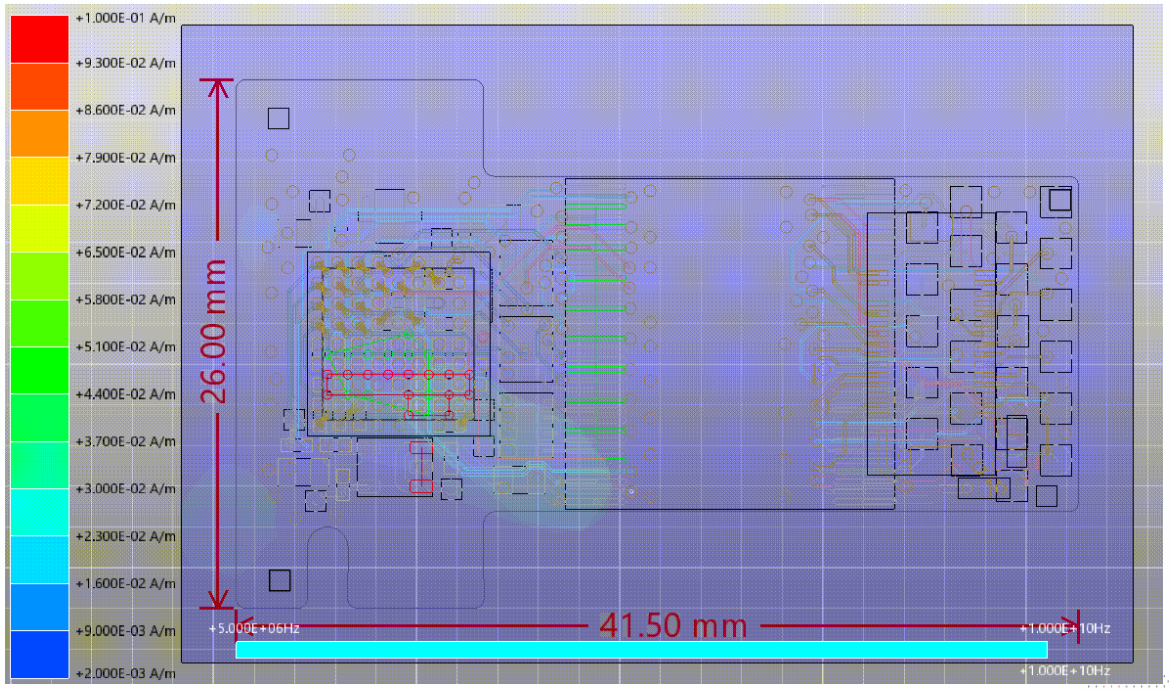
Near field



Simulation Setting



Near Field Result



Far Field – AEDT

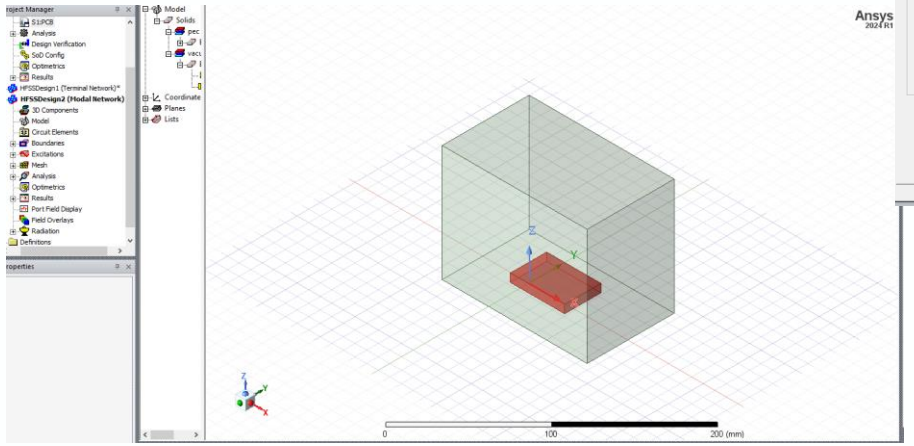
The far field simulation is done to ensure that the radiated emission is minimum.

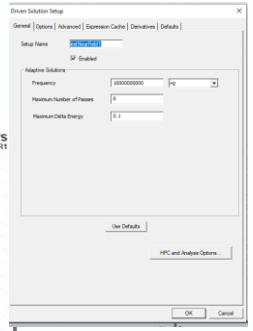
The radiation effect in spherical distance (radius) is plotted.

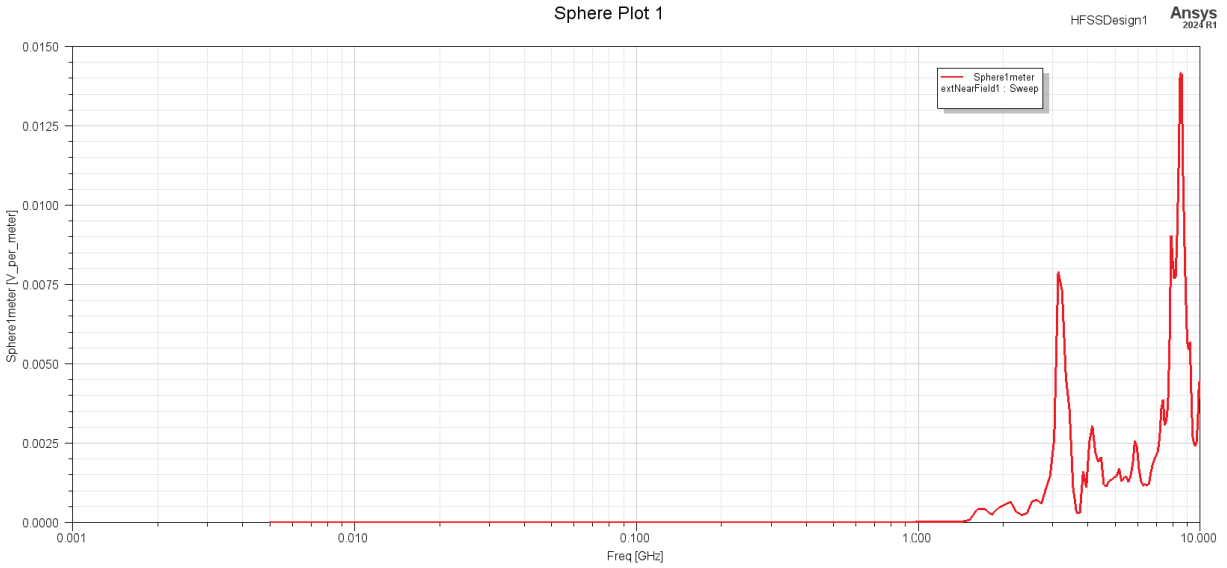
Far field Set-Up

Simulation Setting

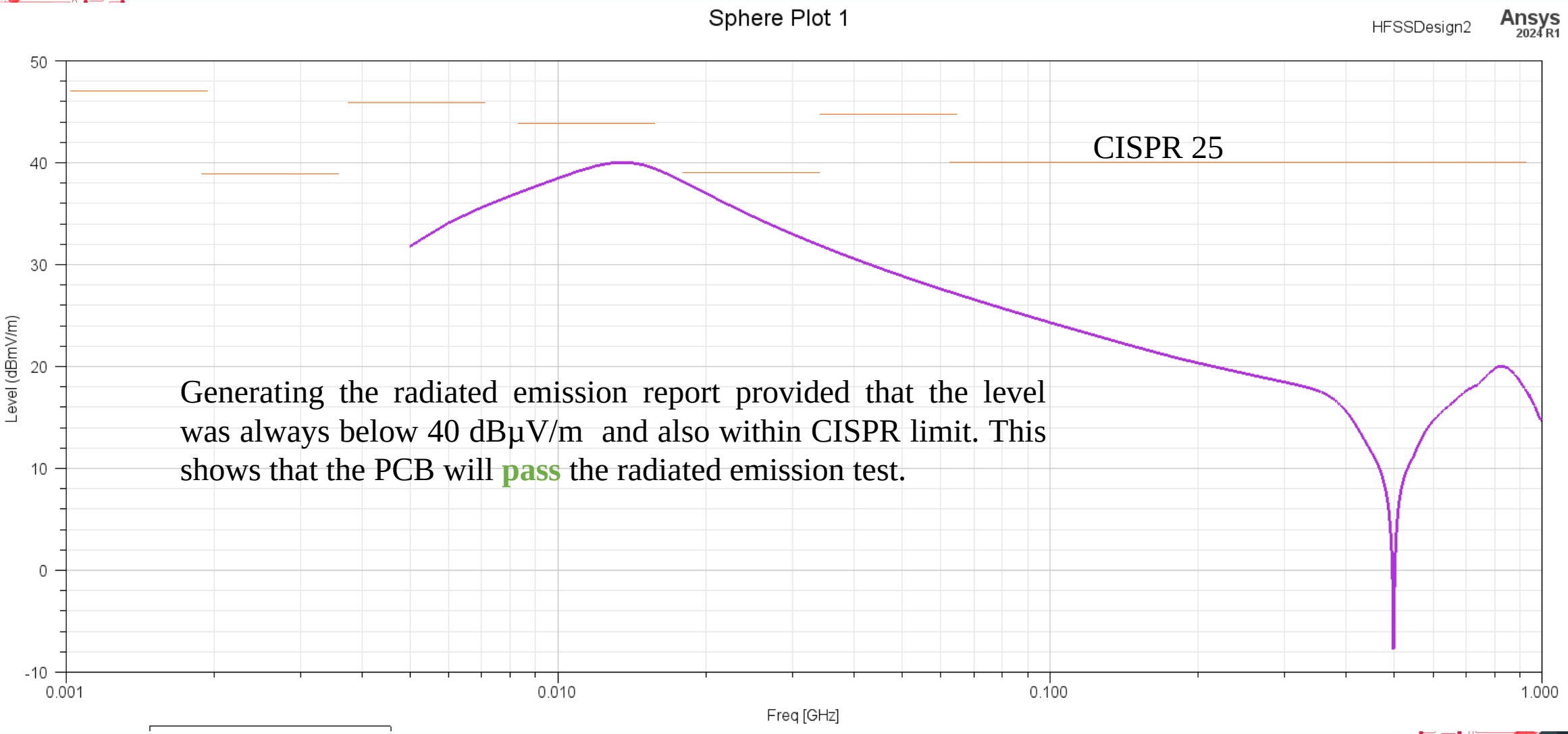
Far Field Result







Result – Radiated Emission



Generating the radiated emission report provided that the level was always below 40 dBµV/m and also within CISPR limit. This shows that the PCB will **pass** the radiated emission test.

Customer Testimonial

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Excited to present a testimonial from a content client, emphasizing the success and positive impact of our Radiated Emission Analysis.

We are thrilled with the results of our recent radiated emission simulation project. The team delivered exceptional performance, achieving accurate and reliable simulation results at a remarkably low cost. Despite the complexity of the task, they completed the project within a tight timeframe without compromising on quality. Their expertise and efficiency have significantly contributed to our product's compliance with regulatory standard (CISPR-25), all while staying well within budget. We highly recommend them for their dedication to excellence and cost-effective solutions.

Conclusion

Our commitment to excellence and technical expertise was evident in the successful delivery of tailored EMI/EMC handling solutions that met the CISPR 25 requirements.

We simulate the PCB with real time simulation to verify the circuit will pass the CISPR 25 Radiated emission test, that reduce the product testing cost.

Our commitment is focused to delivering top-tier Analysis services, showcasing our unparalleled skills and unwavering reliability in achieving outstanding results.