PCB Design for Image Processing Module

Scope: End to End PCB Design

Application: ADAS

An automotive camera processor module, a specialized circuit board, is utilized by vehicles to interpret information captured by their cameras. This module integrates image sensors, processors, and algorithms, enhancing image quality and enabling the identification and recognition of objects. Through the analysis of camera data, it plays a crucial role in enhancing safety and enabling the implementation of advanced driver assistance systems as well as autonomous driving features.

Challenges

The challenge of designing a complete PCB layout, encompassing schematic verification to manufacturing outputs generation, has been assigned to us by the client within a short timeline.
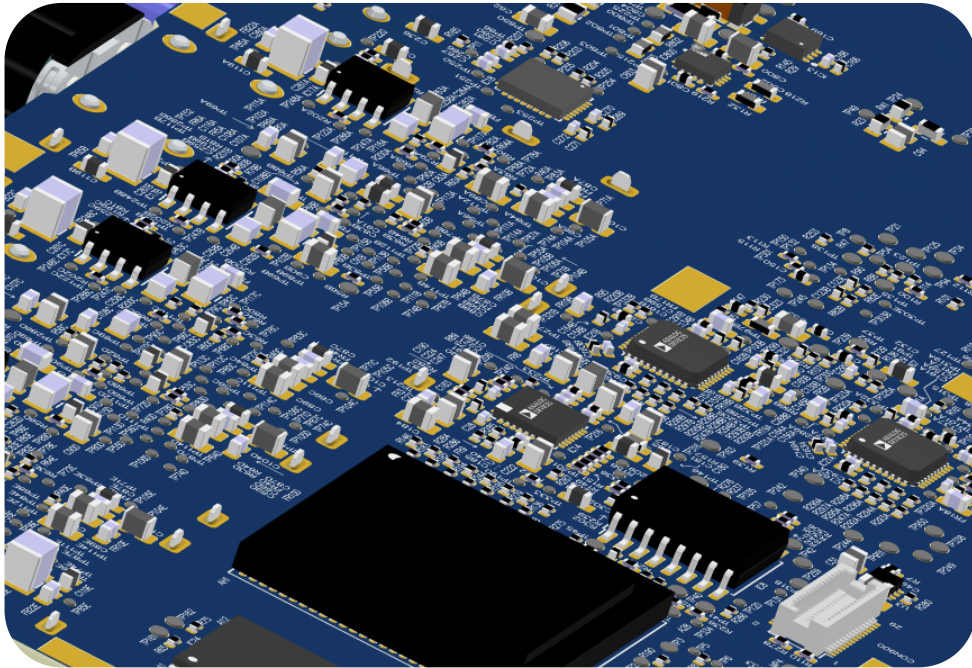

Challenges:

- Building a library for project-specific components not currently in the library database.

- Checking and updating the library to meet standards, especially if there is any non standard components.

- Design For Manufacturing Considerations

- EMI/EMC Compliance considerations

- Power Distribution

- Density of Board

- Many high-speed signal groups are present in this project.

PCB Layout Design - SoW
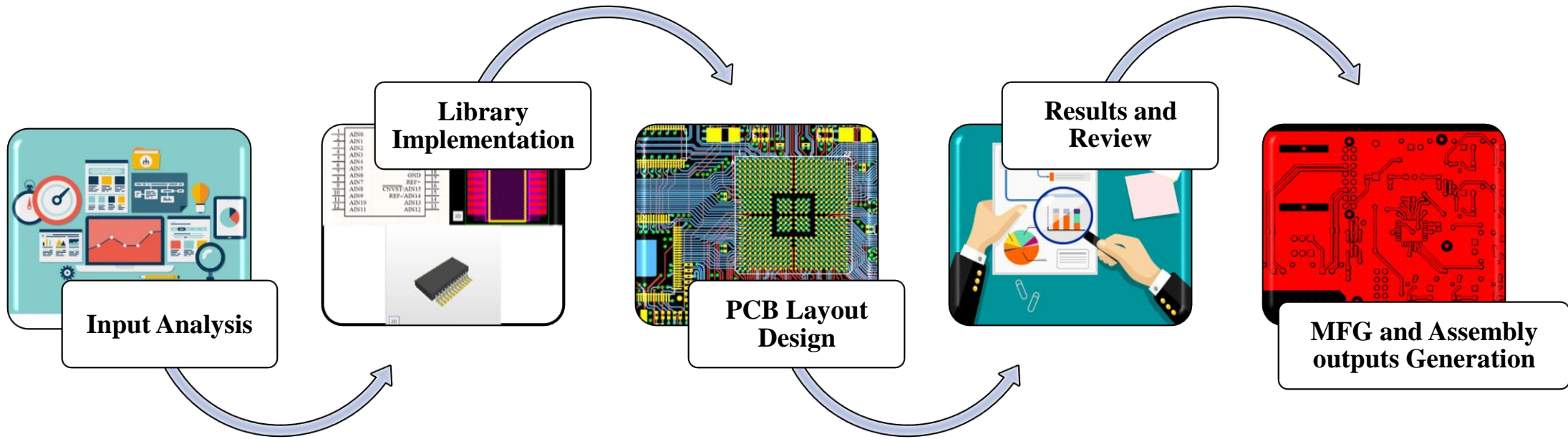
Input Analysis

PCB Project contains,

- Total components → 1659
- Layer count → 10
- Total connection → 3511
- Dimension → 165mm X 80mm
- Pin count → 4440
- No. of powers → 10
- No. of High speed signal Groups → 10
- Devices → CAN transceiver, Microcontroller(SPC560), MPSoC (XAZU3EG), Video Encoder, Video Decoder, DDR4, Serializer, DeSerializer, Coax connector, SEPIC, Buck Converter and LDOs.

BGA Pitch

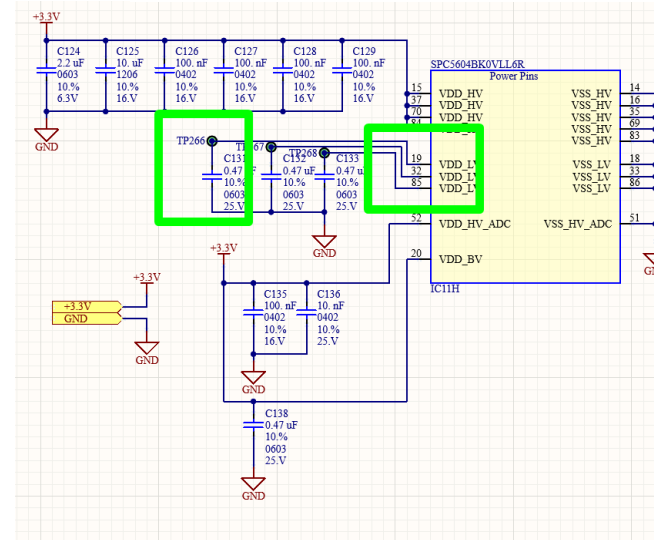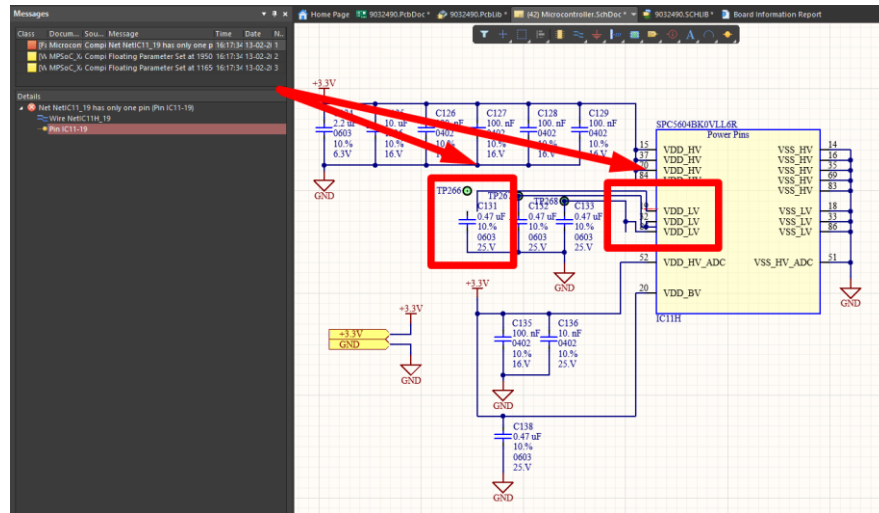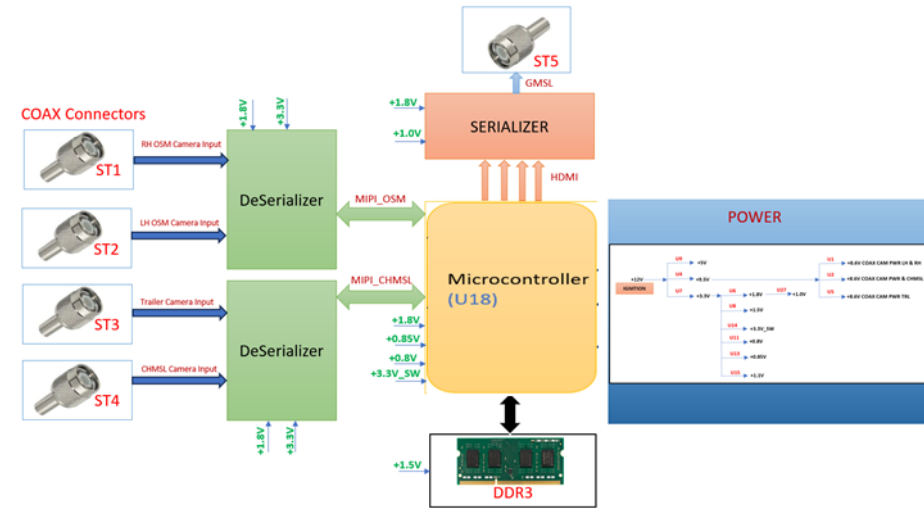- 0.8mm X 0.8 mm - MPSoC
- 0.8mm X 0.65 mm - DDR4
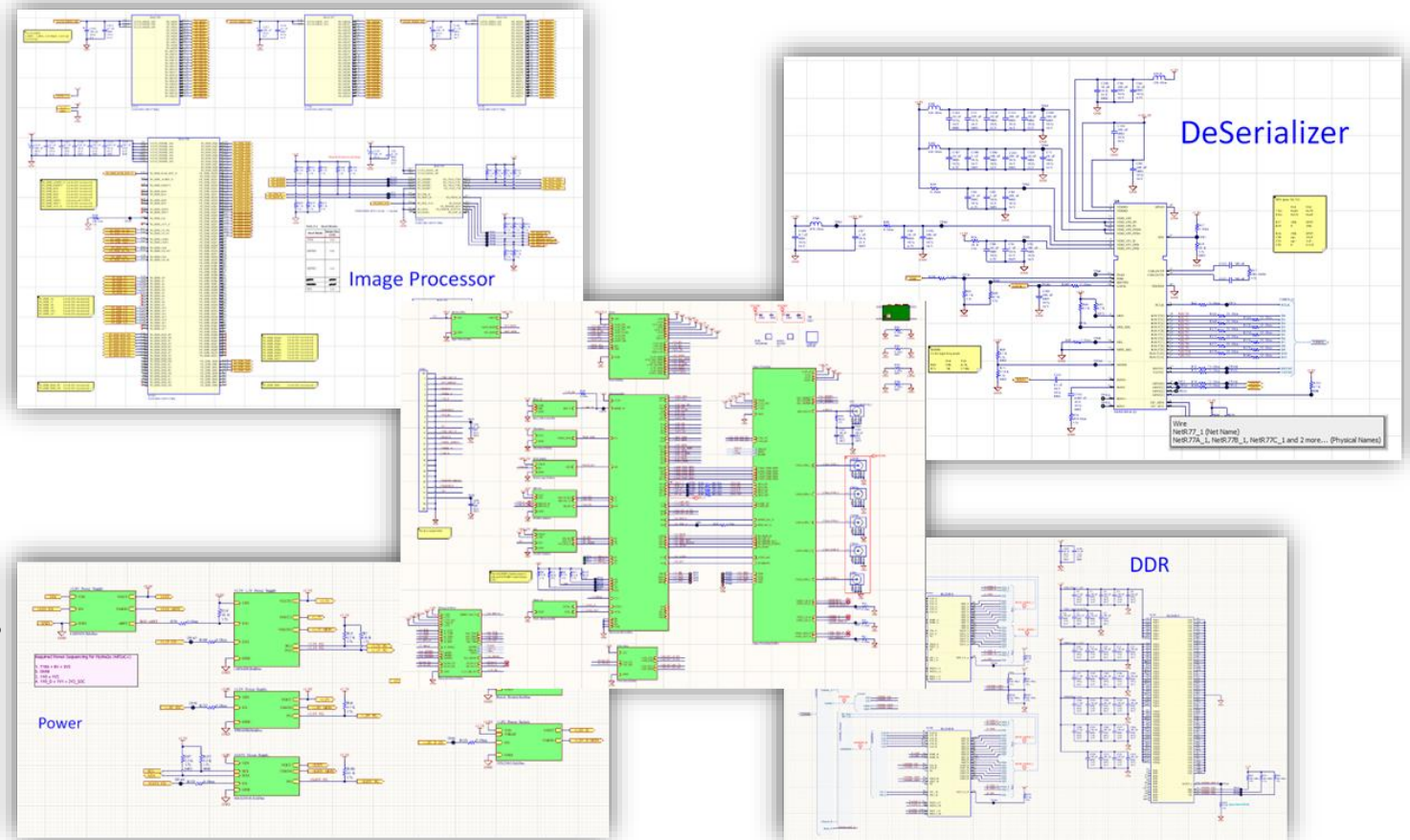
Library Implementation

- The library files (symbol and footprint libraries, including 3D models) are to be verified based on standards, and libraries will be created if not presented in the database.

- 147 symbol and 250 Footprint libraries verified.

- 22 symbol and 31 Footprint libraries are modified as per standards.

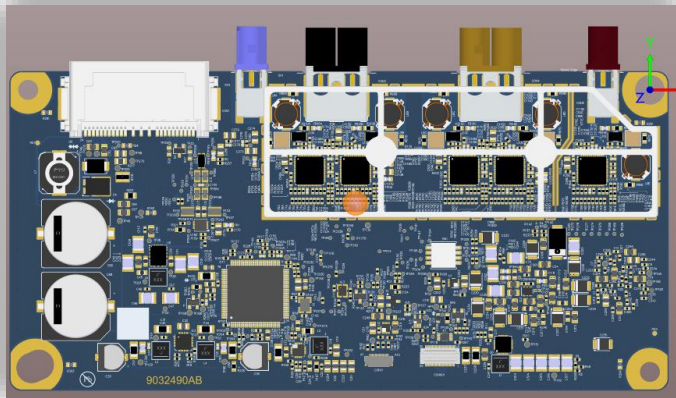- 20 unique Symbols and 35 unique Footprints have been created.
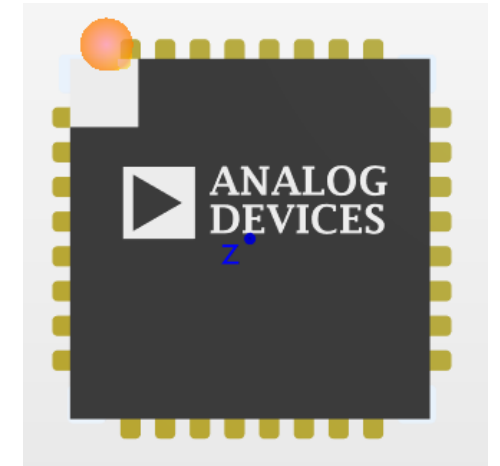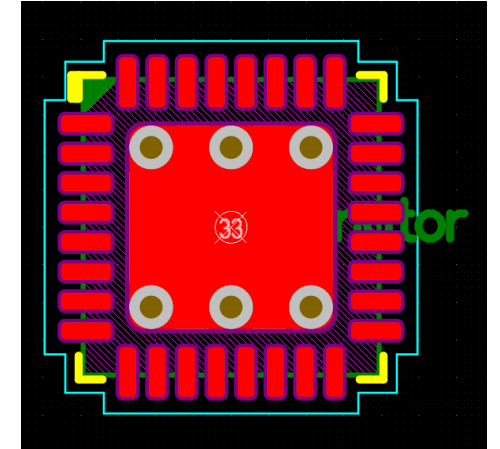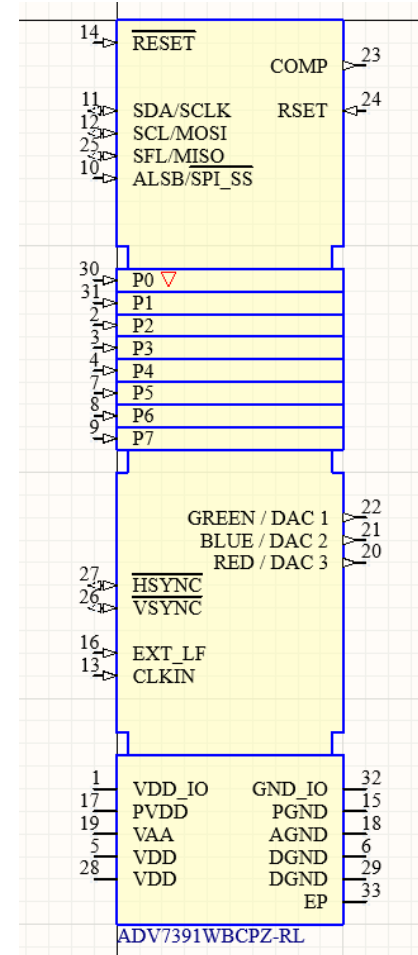
Schematic verification

- Preparing a power flow diagram and block diagram based on the schematics.

- Verifying (manually) the net connections and port connections to avoid any floating nets in the schematic.

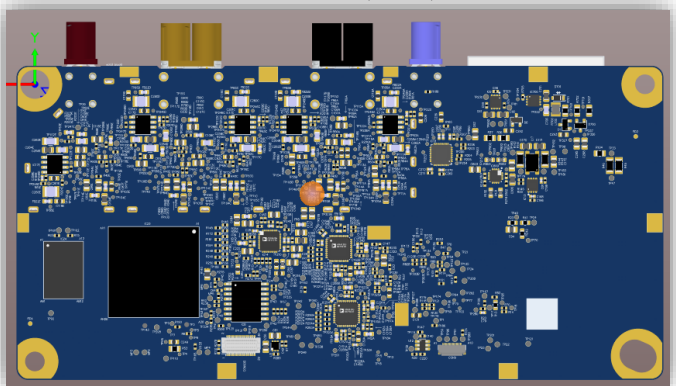- Conducted a verification through ERC (Electrical Rules Check)

PCB Layout Design

PCB Layout Design - Execution

Pre-Layout Process

Placement and Routing

High speed signals Length Matching

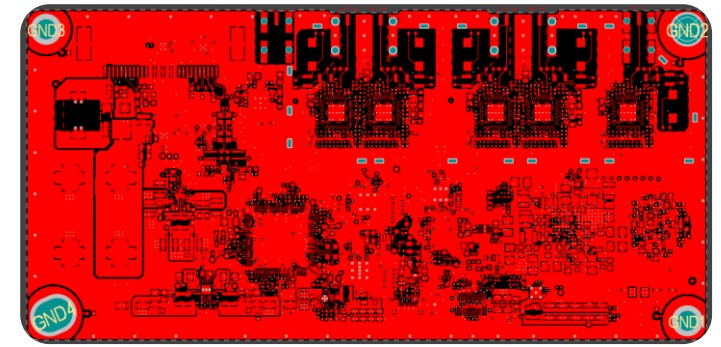**DRC, Cu Clean up**

Legend cleanup
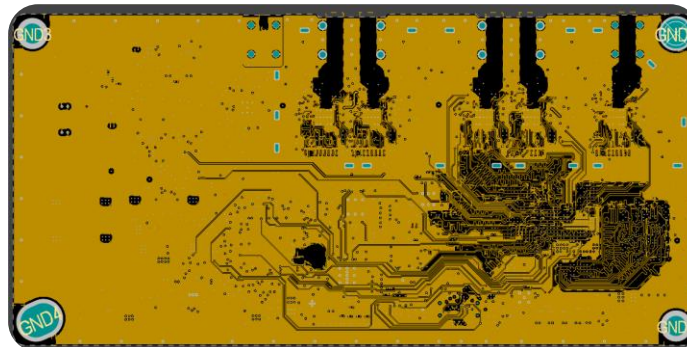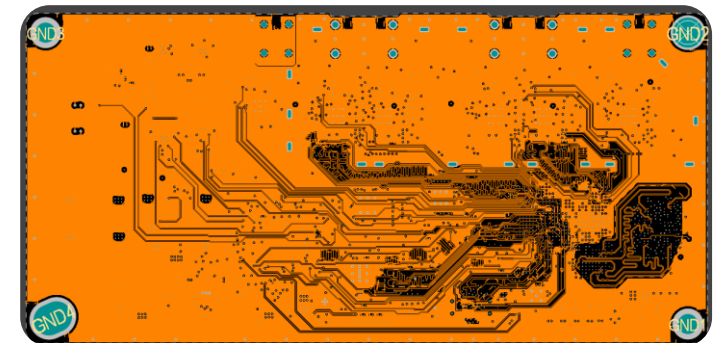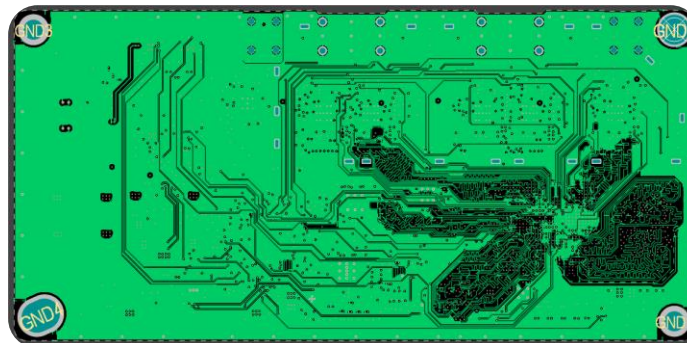
Results and Review

Top view (3D)

Rear view (3D)

- Layout design completed with considerations for power distribution, EMI/EMC, Design For Manufacturing (DFM).

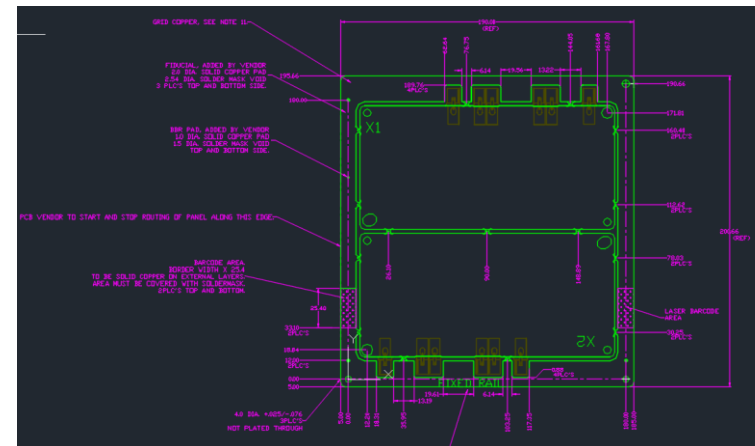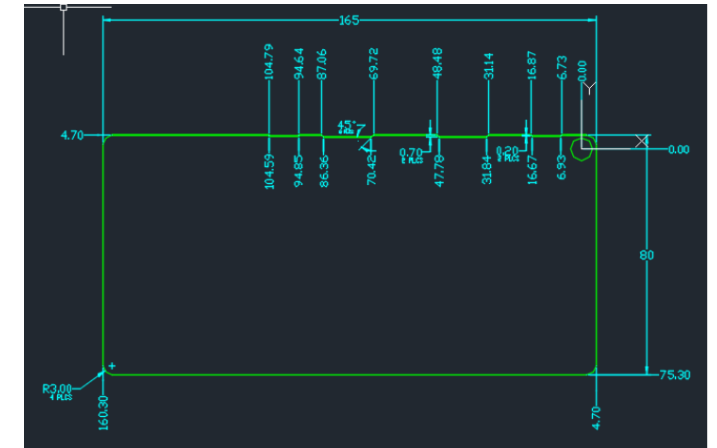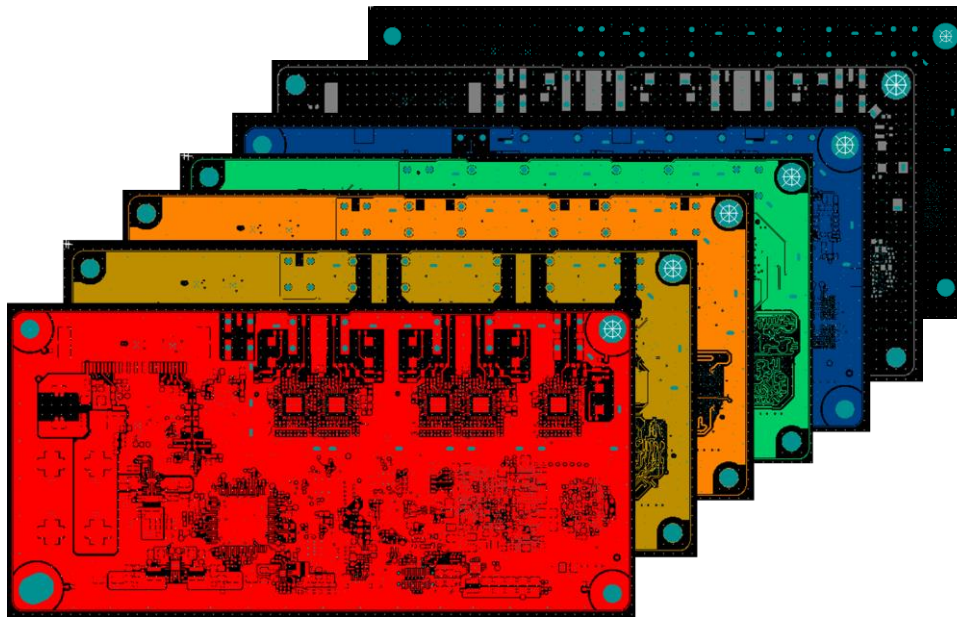- At every stage of the design process, Reviews and feedbacks from the client are verified thoroughly in the design.

MFG Outputs Generation

MFG Outputs

- Gerber Files
- NC Drill Files.
- ODB++ files
- Hyper Lynx File

- Fab and Array Drawing Files

Assembly Outputs Generation

- BOM (Bill Of Materials) and PNP (Pick and Place) file

- Assembly Drawings (PDF file)

- 3D STEP File

A Heartfelt Customer's Voice

Provided is an enthusiastic client testimonial, serving as a powerful testament to the remarkable effectiveness of PCB design.

"Working with the GigHz team on our PCB design was a game-changer. Their dedication to overcoming challenges, ensuring precision, and delivering a high-quality product within our time and budget constraints was impressive. The intricately crafted PCB not only met our technical requirements but also exceeded our expectations. Their passion, expertise, and unwavering commitment to excellence were palpable throughout the entire process.. We look forward to future collaborations with this outstanding team and highly recommend their services!"

Conclusion

- Designing the board posed challenges, especially in managing numerous connections within a limited space.

- Achieving the desired impedance profile for diverse signals demanded our dedicated focus on quality and precision.

- Drawing on our expertise in PCB design, we persevered, overcoming obstacles efficiently while ensuring high-quality standards.

- We proudly present a meticulously crafted PCB that meets technical challenges, adheres to timelines and budgets, and maintains stringent quality standards. This achievement has earned the approval of our esteemed customers, marking a significant milestone in our journey.