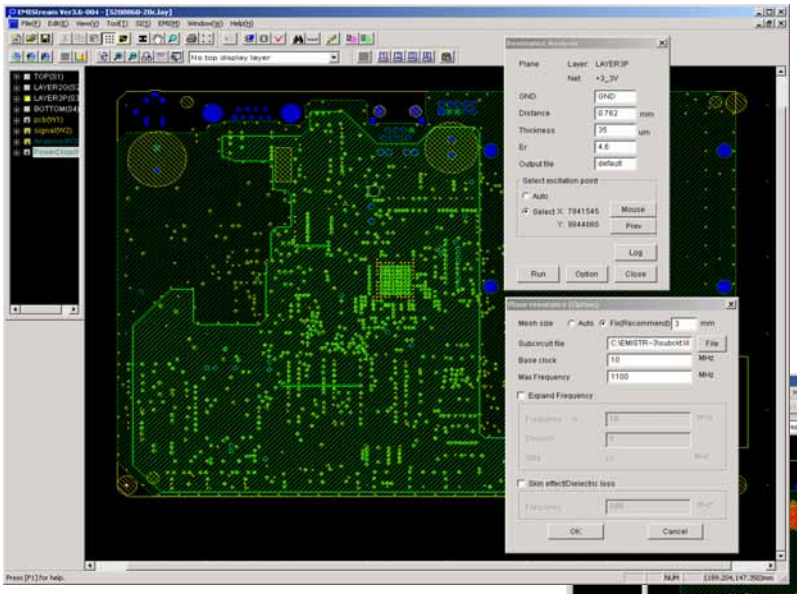
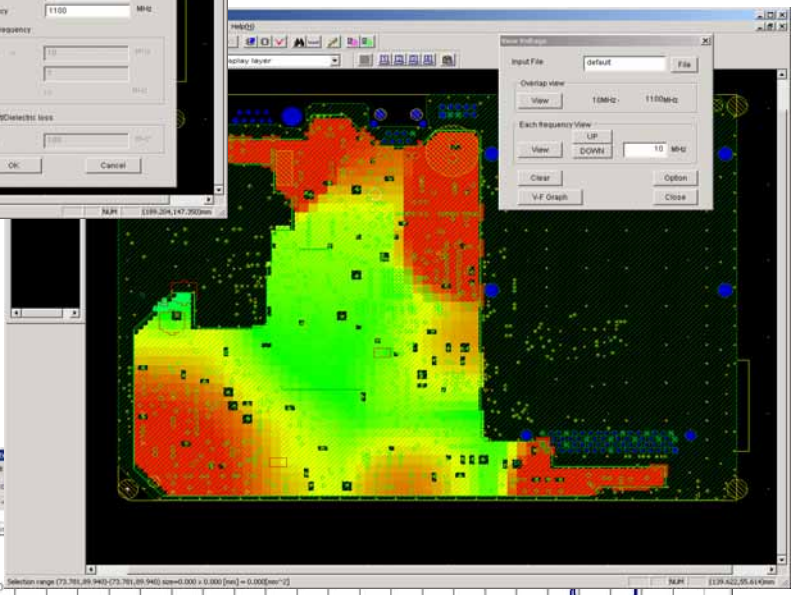
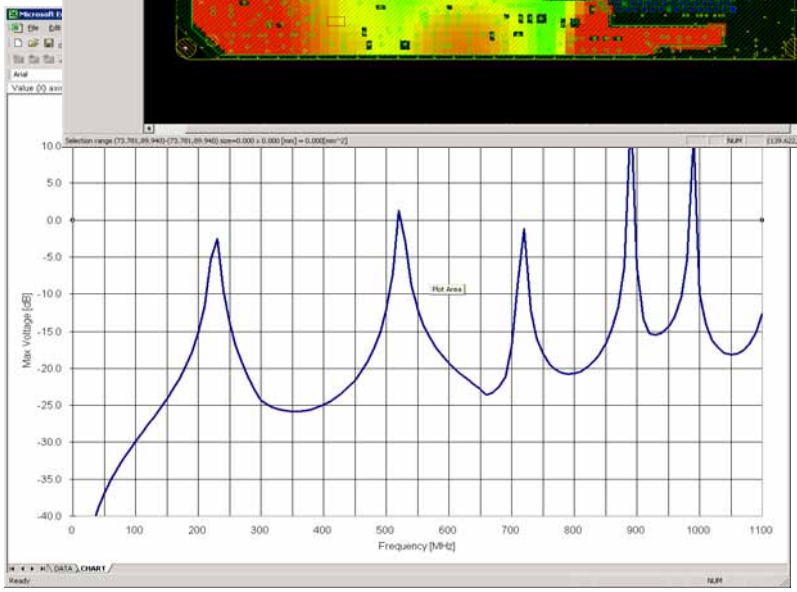
Power Plane Resonance Analysis



- **Spice Based**
- **Base Capacitor Library Provided**
- **3rd Order Capacitor Models Required**



- **Odd Shaped Planes**
- **Color Distribution Plot**



- **Excel Interface**
- **Parallel Resonance**
- **Freq Distribution Plot**

Product Concept

Engineers need to be able to easily determine the resonance profile of the power distribution subsystem without resorting to complex and time consuming electromagnetic equations. To this aim, EMIStream makes this possible through the application of research in using 2D Spice simulation capabilities to obtain first order effects of pcb construction and capacitor placement on plane resonance. This technique allows for rapid analysis and display of potential resonance points in the plane construction.

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Power Plane Resonance Analysis

Product Features

Resonance areas are created due to the physical association of the layer spacing, component placement and via placement. By adjusting the stackup for the minimal distance between the planes, and the best position of the power system capacitors EMIStream Helps reduce noise that leads to higher voltage droop, ground bounce and EMI emissions.

By using 2D Spice analysis techniques, 1st Order resonance effects can be observed through the use of gradient color mapping. The resonance profile is also viewable as an Excel spreadsheet.

Stackup Analysis

The PCB Stackup can be analyzed to see how the dielectric thickness and dielectric constant affects the resonance profile between the selected planes.

This analysis can be used to determine if buried capacitance will provide any benefit. Also, various materials can be easily and quickly evaluated.

Capacitor Placement

Capacitors that are placed to support the power distribution system can be evaluated for effectiveness. The resulting graphs and color maps show where and what frequencies may cause potential resonance.

Capacitor Movement

If the results show that there is an area of the PCB where resonance needs addressing, then the engineer can move the current capacitors to new locations and if necessary change their value by pointing to a different model.

Once the engineer is satisfied with the location, the host cad system can have the new location back-annotated.

Insufficient or Excessive Quantity

Because EMIStream allows the capacitors to be moved, the engineer is free to evaluate 'what if' scenarios. Capacitors that are moved outside the board boundary are effectively removed. If the engineer thinks that he may need more capacitors, they can simply copy an existing one and edit the model.

This flexibility allows for determining the optimum quantity and values of capacitors. This can translate into reduced part count and cost.

Benefits

Resonance analysis of the cavity structures using spice techniques provides an indication of the frequencies that will cause the plane structure to resonate. Once the resonate frequencies are known, then the capacitor values and their perspective quantities can be more effectively determined and placed based on the design operating frequencies.

CAD Interfaces

Cadence Allegro
Mentor BoardStation
Mentor Expedition
Pads PowerPCB
Zuken

System Requirements

Minimum

OS:	Windows 2000 / XP
CPU:	Pentium III 500 MHz
RAM:	64 MB
Disk:	20 MB

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