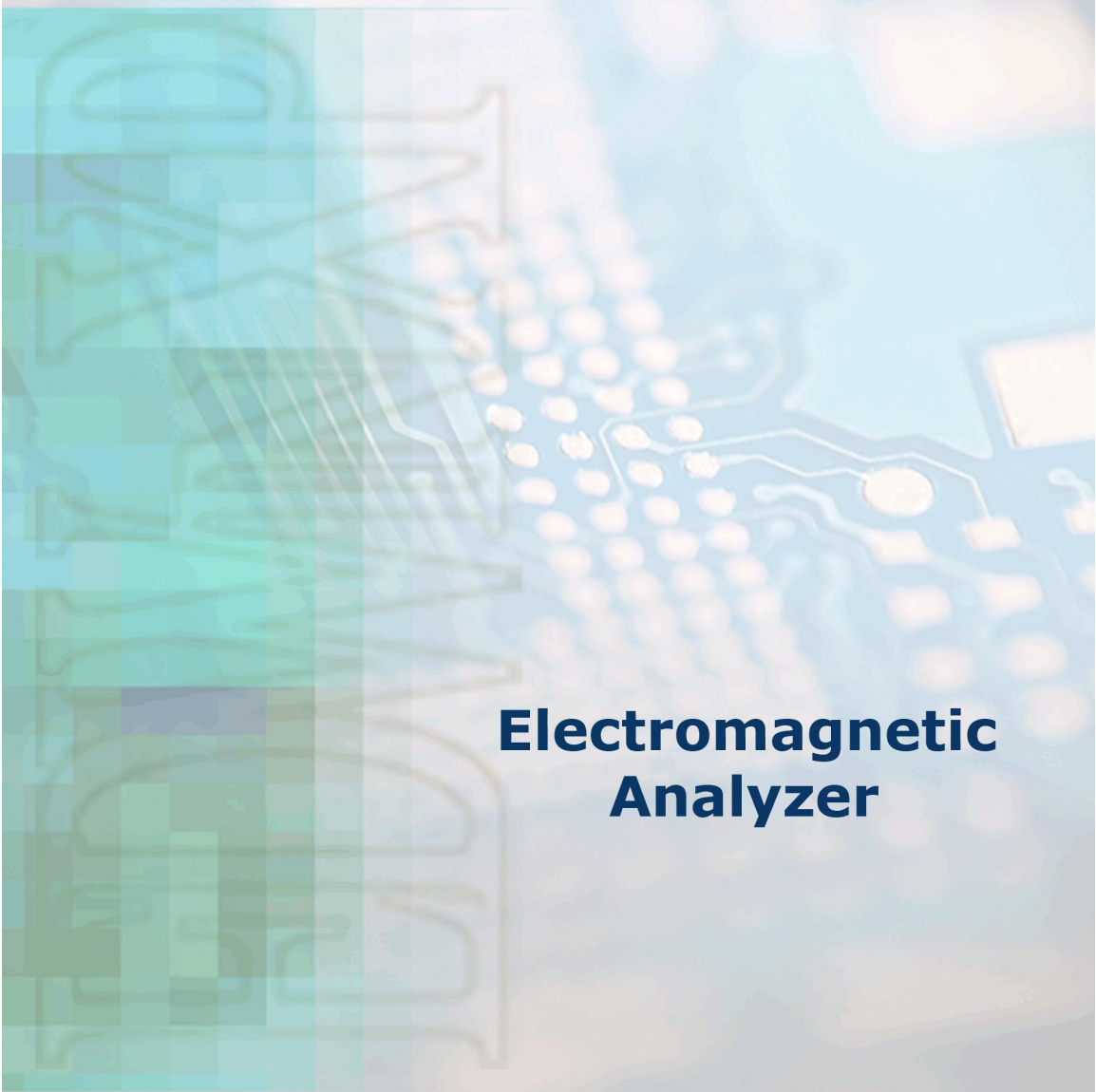


Electronic Design for Windows
EDWINXP



Electromagnetic Analyzer

VISIONICS

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Electromagnetic Analyzer

Electromagnetic Analyzer is used to predict the intensity of electromagnetic field generated by the working circuit on the PCB. An electromagnetic field develops when voltage passes through the traces on board. Once the routing of traces is complete, electromagnetic analysis may be performed on the board. The Electromagnetic Analyzer measures the distribution of the Electric Field Intensity on a finished PCB. The isolines show the distribution of the field intensity on the board. Under the electromagnetic analyzer you can perform Signal Integrity Analysis and Field Analysis.

Electromagnetic Analysis (and Simulation) occupies a general area of Science and Engineering that come under the category of Field Analysis. Specific instances of problem areas are Electromagnetic Fields, Pressure Fields, Temperature Fields, Stress Fields, Velocity Fields etc.

An exhaustive body of scientific work exists that deals with field simulation. While traditional methods of mathematical analysis and description of fields efficiently and elegantly uses straightforward Vector Calculus (both Integral and Differential), such methods do not lend themselves to Digital Computer based analysis. This means that we need some method / technique that enables us to model fields described using Vector Calculus on a Digital Computer. In resolving this problem an entire body of Computational Mathematics has developed. These include Numerical methods such as Finite Difference methods, Finite Element methods, Method of Moments, Boundary Element methods etc. Each of these methods has their own strengths and weaknesses. Each one of them is particularly adapted to certain kinds of problems.

Electromagnetic Analysis and Simulation software are often classified on the basis of the computational technique they employ. For example, the Electromagnetic Analyzer (EMA) is a Finite Difference Time Domain based Electromagnetic Field Solver and Simulator.




The general procedure used by any Field Solver (Simulator) is as follows:

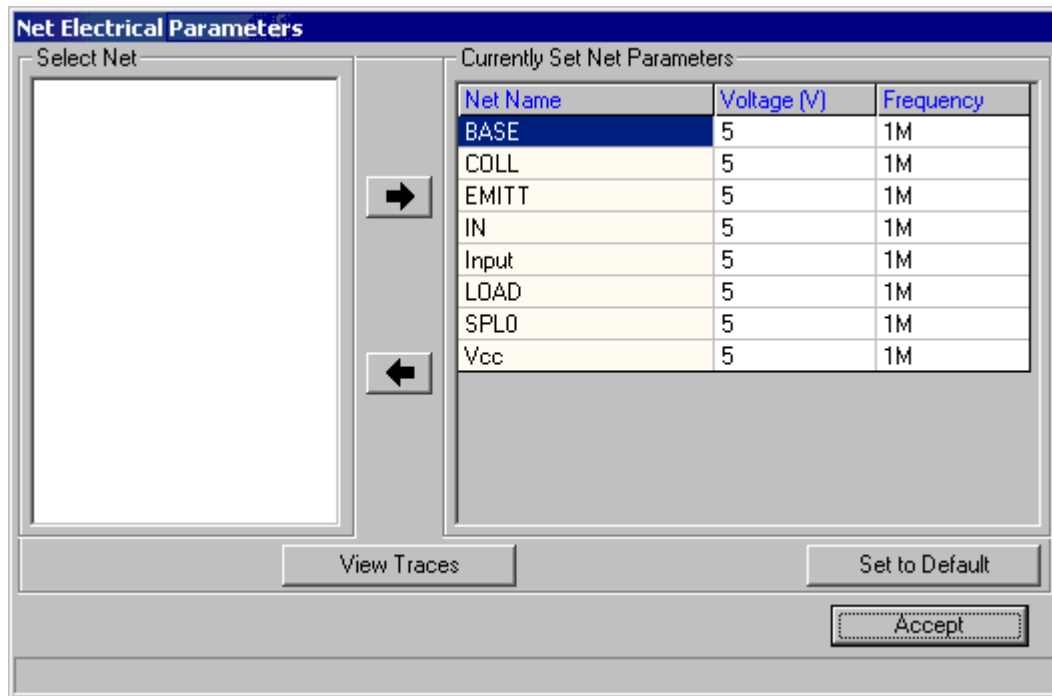
- **Pre-processing:** In this step, the field in the problem area is prepared into a form that can be handled by a Digital computer. This includes modifying the characteristic equations describing the field, setting up


the initial parameters and boundary conditions, specifying the values of the constants used, specifying the solution space, setting Analysis Breakpoints etc.

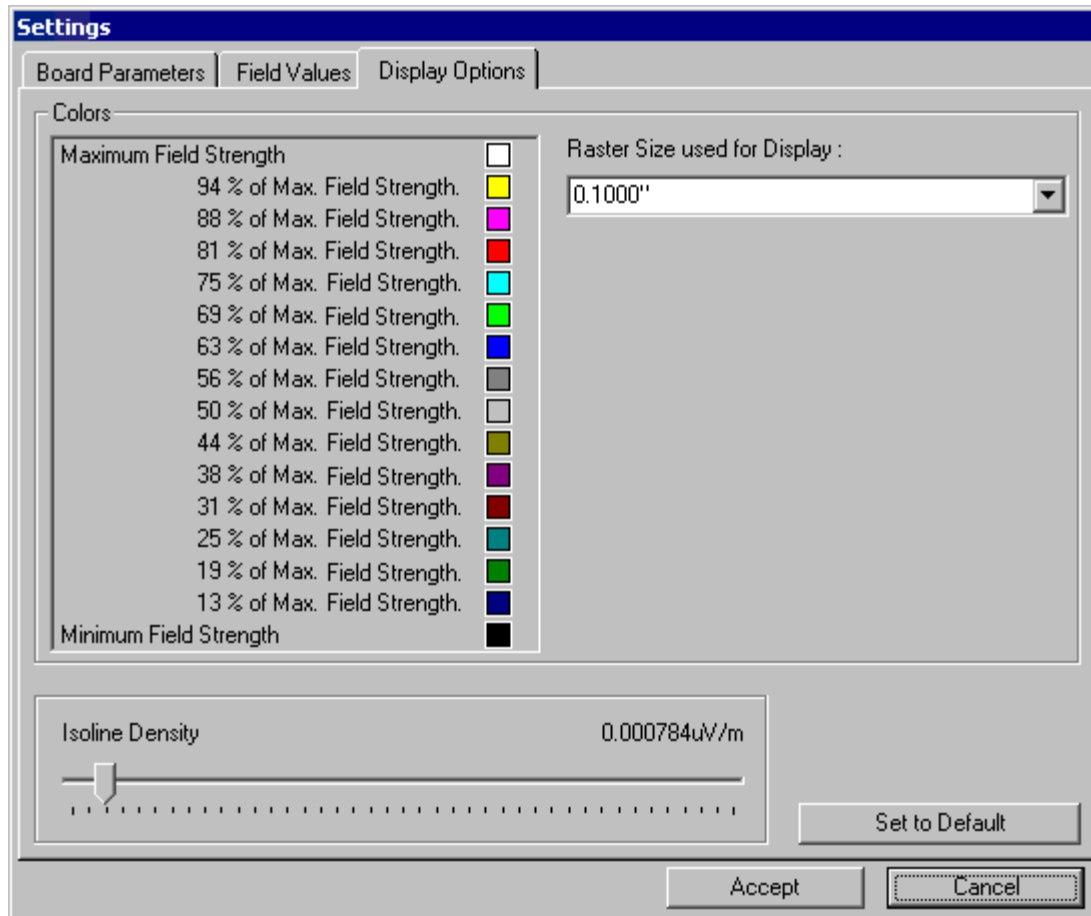
- **Analyze:** This step consists of the actual Analysis based on the Physical Law applicable, using numerical computing techniques. The results are basically the values the field at definite points in the solution space. The results are stored in some basic format, which can be manipulated in the next step. With some techniques this step might even generate a further set of matrix equations that must be solved in the next step.
- **Post-processing:** Finally, the results obtained in the previous step (or the matrix equations generated) are processed so as to present a meaningful set of results to the Designer / Engineer. Most commercial programs provide the facility to view the results in more than one way. Often, there are also options to export the results to other Software. The popular formats for presentation of the results include Isolines (isotherms, isobars etc.), Color Maps of the Fields, 3D Contour Maps of the Fields and Animation Displays of the field patterns. The choice of which scheme to use basically depends on the requirements of the Designer / Engineer and the particular problem at hand.

Steps for Electromagnetic Analysis

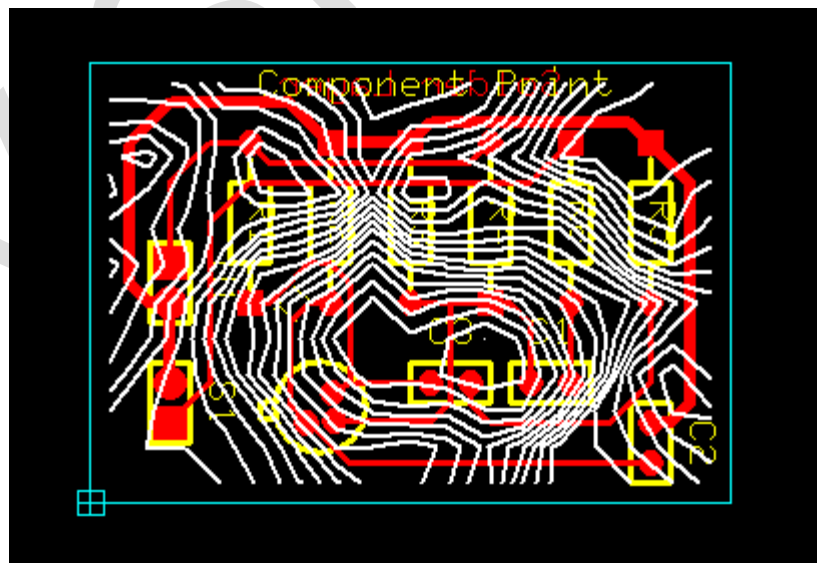
1. Right click on the **PCB Layout** in the Project Explorer. Select **Board Analyzer** in the list.
2. Select **Electromagnetic Analyzer** tab, Right click and select the tool  **Electrical Parameters**.
3. The board parameters are set to the default values by clicking the **Set to default** button.
4. If you select the **Set to default** button, the default parameter gets loaded into the text boxes. To move Net from Select Net to Currently Set Net parameters use  key and to move backward use  key.
5. View the electrical parameters of the trace from point to point using the **View Traces** button after selecting the particular Net Name



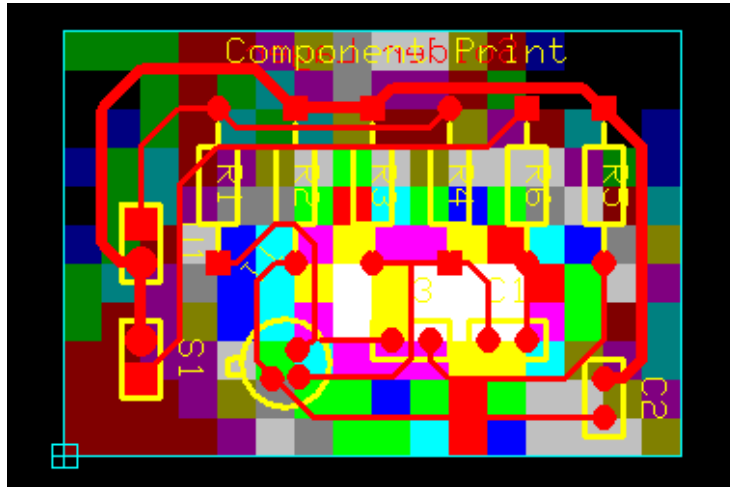
6. From **Analysis**, choose **Settings** to open the settings window and click the **Display Parameters** tab. Click on **Set to default** button .
7. From the **Analysis** menu select **Settings** click and select the tool  **Board Parameters** Click on **Set to default** button




8. After adding these nets you may execute the analysis directly. For this right click and select the tool **Execute Analysis**. The result is displayed in the form of isolines.



9. Color mapping on the board and may be viewed by switching on the option Colored board under **View → Analysis Results → Colored Board**. The analysis result is obtained. The Maximum and minimum field intensity locations can be observed.



10. Labels may be placed to display the field intensity at various points on the board. For this select the tool  **Set/ Delete Isolines** and click on the board at required locations. Label gets tag to the cursor. Now drag the mouse to place the label at proper place.

