Empowered by Innovation NEC

PIStream

POWER INTEGRITY DESIGN TOOL

With the development of new electronic products that demand increased power performance, current consumption increases while operational voltage for ICs decrease, resulting in power integrity issues.

PIStream is your solution.

PIStream will help meet your target impedance by adding/moving capacitors, changing capacitance values, plane shapes, and Power/GND plane distances. Graphic-based PIStream is easy to use and offers speedy analysis. Whether you are a designer with tight deadlines or have little power integrity knowledge, you can utilize PIStream to improve power integrity.

Input Impedance Analysis

You can repeat trial and error so that the input impedance falls below the target impedance. For example, Figure 1 is the analysis result of the target IC at an early component placement stage. The circled area frequency range exceeds the set target impedance. This means that within this frequency range when the IC is consuming current, bigger voltage fluctuation occurs. By adding 4 capacitors around the target IC (Figure 2), the input impedance fell below the target impedance as seen in Figure 3. Optimal capacitors were automatically placed around the IC pins using PIStream's Auto Capacitor Placement feature.

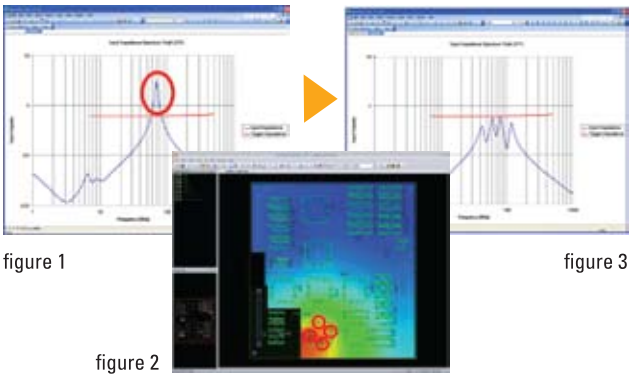


figure 1 figure 3

figure 2

Transfer Impedance Analysis

PIStream will calculate power bus noise propagation generated from the IC as transfer impedance. Figure 4 is a result of transfer impedance in color gradation. Red means there is more transfer impedance. It shows that when the aggressor IC (Figure 4, in the lower left) consumes current power bus noise increases. By adding capacitors in the lower left hand corner (Figure 5, circled area) you can eliminate the red area. Transfer impedance has decreased and power bus noise propagation was reduced.

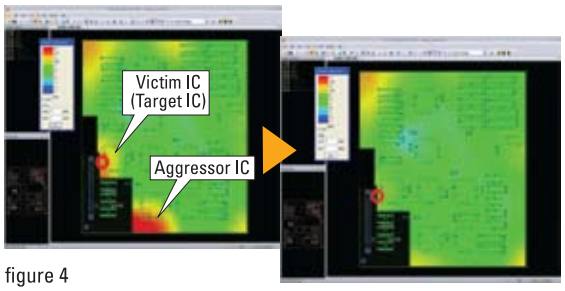


figure 4 figure 5

IR Drop Analysis (DC Analysis)

PIStream calculates IR drop. Color gradation displays where voltage drop has occurred. Figure 6 illustrates the result of IR Drop analysis which shows large voltage drop at the ICs. As shown in Figure 7, IR drop can be reduced by changing the connection of the power plane (red circles) from the bottom of the IC to a location closer to the voltage regulator which is the upper left hand corner of the IC.

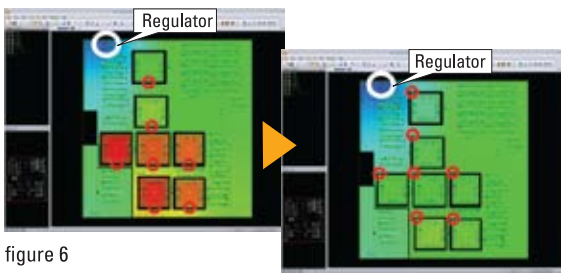
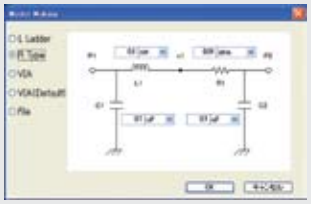
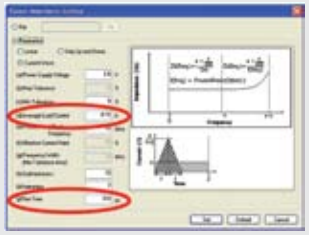


figure 6 figure 7



IC Model Generation GUI

You can now take capacitance and inductance of the chip and package into account by using the GUI. These values affect mid-frequency resonance which is an important aspect for power integrity. By utilizing this function you can get a more accurate result in order to optimize capacitor placement, values, and numbers.



Target Impedance GUI Setting

You can select Linear, Step Up and Down or Transient Current Waveform for target impedance. Transient Current Waveform option allows you to take into account the rise time of the IC current which helps generate a more precise target impedance.

PCB Layout CAD Interfaces

Cadence Design Systems: Allegro, OrCAD Layout
Mentor Graphics: Board Station, Expedition PCB, PADS Layout
Altium: Altium Designer
Zuken: CR-5000 Board Designer

Operation Environment

OS	Windows XP Professional, Windows Vista, Window 7, Windows 8
CPU	Celeron® / Pentium4® 1GHz or faster
Memory	1 GB or more
Disk space	100 MB PIStream system + data file space (200 MB or more recommended)
Other	Microsoft Excel 2003, 2007, 2010

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