

Elma Overcome Telecom Thermal Design Challenge with FloTHERM

MECHANICAL ANALYSIS
Electronics Thermal

Elma Electronic used FloTHERM to optimize the design of a new Advanced Telecommunications Computing Architecture (ATCA) platform that is designed to dissipate up to 300 watts in each of its 14 slots. Elma thermal engineers used FloTHERM's capability to automatically run a series of flow simulations while varying various dimensions and other parameters to achieve design goals such as maximizing airflow over the boards. "The optimization of the chassis via thermal simulation studies made it possible to beat competitors to market with a highly innovative product," said Ram Rajan, Thermal Engineer for Elma Electronic.

Design Challenge

Recently, Elma made the decision to develop a 13U ATCA platform that dissipates 4200 watts in the 14 main slots plus another 1120 watts in a rear transition module (RTM). The boards themselves are 8U tall leaving only 5U for cooling including the fans and intake and exhaust plenums.

"This is one of the most challenging thermal design problems that we have faced," Rajan said. "At Elma we are strong believers in thermal simulation and use it frequently to design the spacing for air intake and exhaust, types of fans and blowers, the plenum space above or below the fans, the placement of air filters and the use of baffles to optimize chassis thermal management."

Solution and Benefit

Elma utilized FloTHERM's automatic optimization module to explore the entire design space. The FloTHERM optimization module automatically generates a series of models with design parameters varying over a design space defined by the user and runs these models while monitoring product performance to identify the optimal design.

"I started with the fan to air filter and air filter to boards dimensions because they determine the airflow spread between the different boards," Rajan said. "After I optimized them, I used the FloTHERM Command Center to optimize the intake plenum to exhaust plenum ratio which dictates the total airflow through the system."

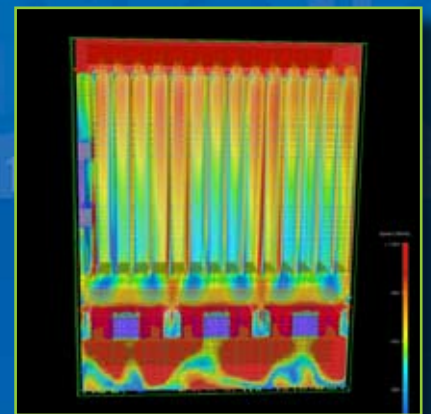
Rajan specified a goal of reducing the chassis static pressure while maintaining airflow level and distribution over the boards at acceptable levels. He specified 10 runs and the FloTHERM Command Center then created a designed experiment that uses these runs to efficiently explore the design space.

"With a couple of designed experiments run overnight, I was able to optimize every key dimension in the chassis and meet the performance requirements for the box with a minimum of time and effort," Rajan said. The system uses 3 individually removable fan trays with two 120 mm 48V fans in each tray. The result is that Elma S ATCA Carrier-Grade 13U system offers unmatched thermal performance by delivering 40 CFM per slot in the front card cage to cool well over 200 watts per slot and 6 to 10 CFM over the RTMs. "The optimization of the chassis via thermal simulation studies made it possible to beat competitors to market with a highly innovative product,"

Customer Testimonial

"We evaluated both of the leading thermal simulation software packages and use FloTHERM because it is more user friendly, provides superior reporting tools, and our customers have greater confidence in its accuracy."

Ram Rajan, Thermal Engineer
Elma Electronics



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