

PSU Heat Management

A Configurator Concept

Graduate



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Introduction: Effective heat management is vital for the performance and longevity of power supply units (PSUs). Selecting the optimal combination of a PSU and a cooling unit, however, can be a complex and time-consuming task.

Elma Electronic plans to address this challenge by releasing a configurator to facilitate model validation between PSUs and cooling components, ensuring adequate heat compensation. With decades of industry experience, the company is committed to providing an innovative and reliable solution.

Approach: The conception process followed a step-by-step guide for developing a configurator. Initially, the current circumstances were analyzed, and a workshop with Elma Electronic employees was conducted to gain a clear understanding of the configurator's requirements. Based on these insights, several rough concept variants were created and presented to Elma Electronic.

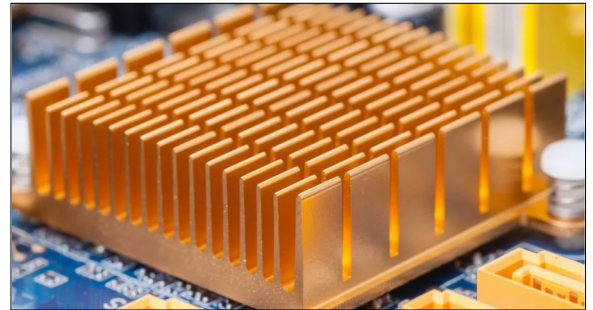
A more detailed concept was then developed based on the feedback received. Additionally, a simple mockup was created to demonstrate the basic functions of the concept.

The conclusion discusses the final concept, experiences with the mockup, and potential future project extensions.

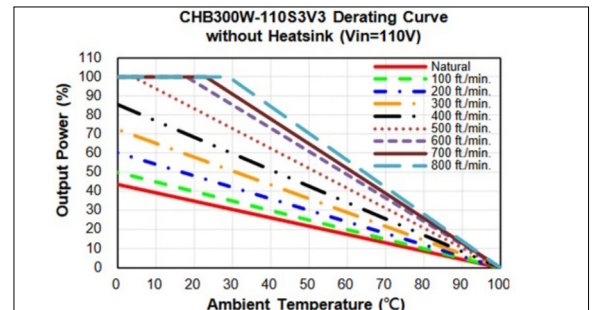
Result: The final concept is a bare-bones configurator that calculates the heat compensation between a specific PSU and cooling unit. It also evaluates the maximally allowable ambient temperature and the minimally required specifications for the cooling unit. Users manually enter values from the datasheets of their selected components, allowing the configurator to operate without a database. This approach gives users the flexibility to choose components beyond a predefined selection and enables Elma Electronic to

gain experience with a simple preliminary version of the configurator, while more complexity can be added at a later stage.

Heatsinks are commonly used cooling units that come in various shapes, sizes, and materials.
3ERP, 2021



The derating curve illustrates how the PSU's output power decreases as the ambient temperature increases.
Cincon, 2024



The configurator checks the validity of the PSU and cooling unit combination and calculates their operational limits.
Own presentation

Cooling Power	Compensation	Recommendation	Temperature
Fan 119.35 Watt	VALID	Airflow min. 3.51 m ³ /h	Ambient max. 86 °C
Heatsink 7.63 Watt	INSUFFICIENT	Thermal Resistance max. 0.84 °C/W	Ambient max. 34 °C
Cooling Plate / Case Wall 18.98 Watt	LIMITED		Ambient max. 67 °C
PSU Internal Convection <missing input>			Ambient max. - °C

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