Vincotech ISE

Various power modules are available for every field of application. Different topologies, technologies and diverse housings can fit to one application with their particular pros and cons. Vincotech gives customers the opportunity to preselect power modules with the help of the simulation environment Vincotech ISE. This offline tool is available as a free download on Vincotech's homepage.

Meanwhile the new Vincotech ISE is released; the upgraded version of the already known simulation environment for Vincotech's standard power modules. It is a set of integrated simulation tools designed to help you to select power modules for various applications. All power loss and temperature calculations are based on real measurements, taken of each module. A continuous updating process guarantees a latest set of power modules.

The updated Vincotech ISE features the first version's tools *flow*SOL, *flow*SIM and *flow*SEL. Calculations from *flow*MIS and our new thermal simulation tool *flow*THERM can be provided on special request. These software components are here to support your efforts to develop power electronic applications and find the power module best suited for the task at hand.

The simulation environment starts with a complete overview of all available power modules divided by several application fields. In this table the modules are sorted by topology and housing; from the smallest *flow*0B housing to the next bigger *flow*0 until *flow*2 derivates to the high power *flow*SCREW solutions and the four MiniSKiiP sizes. This makes it easy to find the right product family for your application. Besides a new search function eases the start of your simulation in case of an already selected module by entering the product name.

A click on one of the simulation buttons directly leads to the application related simulation tool, after the desired product family is selected. The right choice for solar applications is *flow*SOL, *flow*SIM should be used for industrial drives purposes.

1 *flowSOL / flowSIM* features

The simulation tool *flow*SOL contains all relevant modules for solar applications. It is tailored to this application field with its parameter setup and the different function blocks like Input Booster, H-Bridge, HF-Rectifier (both for transformer based solar-inverters) and inverter.

The *flow*SIM tool calculates Vincotech's power modules for industrial drive applications. Its user interface looks much like that of the *flow*SOL tool but containing different function blocks for drives power module solutions: Rectifier, PFC shunt, PFC, Brake, Inverter Shunt, Inverter.

Both user interfaces provide several entry masks where you can adjust all the key parameters. Basically the main windows consist of two panels. The top panel contains all modules' parameters and the simulation section; the bottom panel shows graphs with information on voltage, current, temperature and losses.

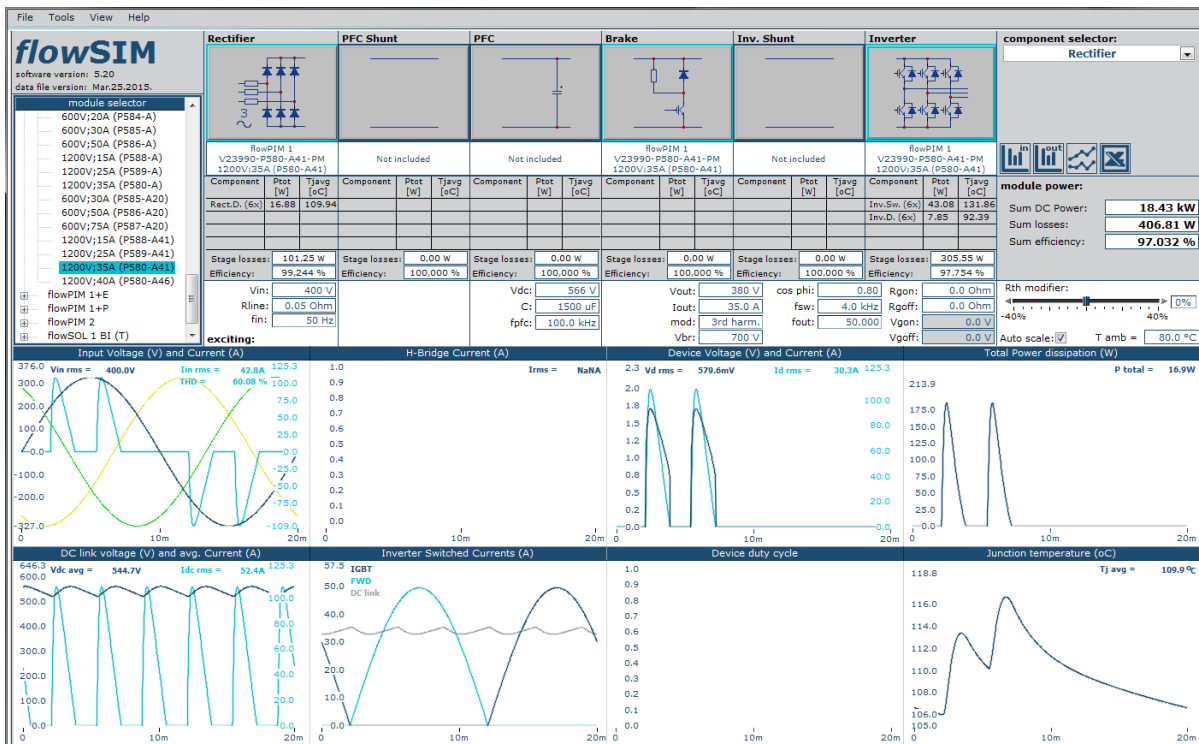Figure 2: *flow*SOL - simulation tool for solar applications

Figure 3: *flow*SIM - simulation tool for industrial drives applications

The simulation starts with preset parameters as the basis, just after a module is selected. A change in the parameter setup, e.g. switching frequency or input voltage, is directly adapted to the output graphs. So, the effect on the modules' behavior of every little parameter change can be studied.

A click on one of the three simulation buttons opens additional windows containing more details about losses, R_{th}, temperature, etc. These windows show exact information about single components of the module. Therefore the desired semiconductor has to be chosen in the component selector above, e.g. Buck Switch, Boost Diode. This allows you to explore the whole module step by step to get a detailed idea of the module's behavior.

If the desired power module is selected, *flow*SOL and *flow*SIM give the opportunity to combine this module with another one. For example, if an inverter module is selected, in *flow*SOL a right click on the "Input Booster" box allows you to choose a booster module to get both simulated at once. In *flow*SIM, for instance, an inverter can be combined with a rectifier or PFC equally and so on.

2 *flow*SEL features

The power module selector *flow*SEL is the well known tool which helps especially industrial drives customers to select the most suitable power module for each application. The clear user interface is divided into three parts; an interactive schematic to enter all relevant application

parameters, a table containing all suitable power module families and three graphs with most important information on output currents, power losses and junction temperatures.
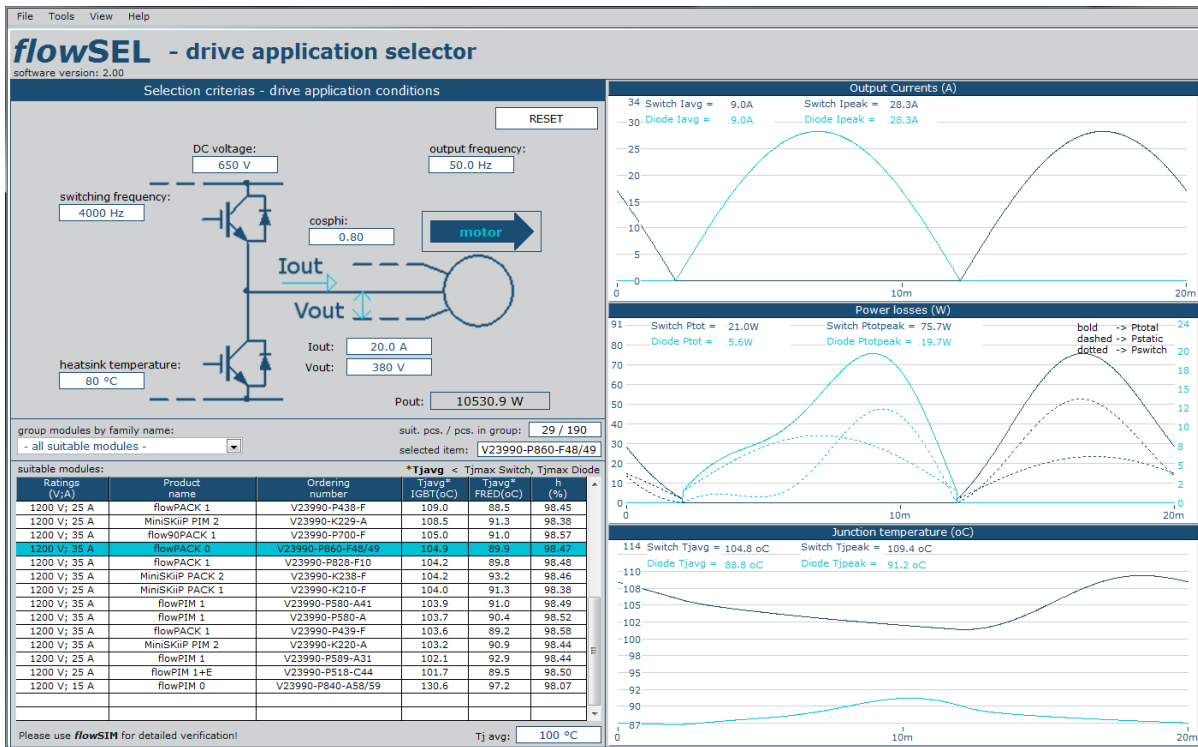

Figure 4: *flow*SEL - power module selector for industrial drives applications

The user friendly interactive half-bridge schematic helps you to adjust all related electrical parameters. Additionally the number of matched power modules changes by setting the allowed average junction temperature or just by a pre-selection of the desired product family. A button above the grid symbol gives the opportunity to change between motor and generator mode; change of the power flow direction. Every input reduces the number of selectable power modules step by step until the desired power module remains.
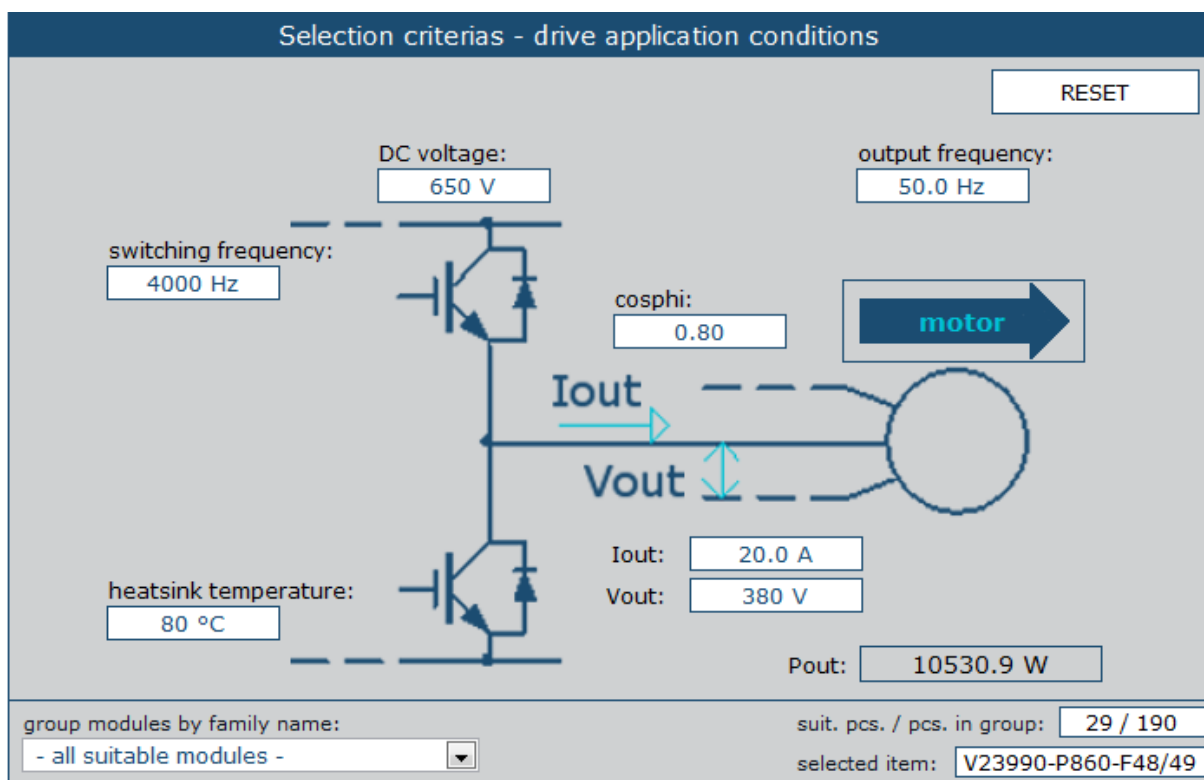
Figure 5: *flow*SEL - interactive input screen

If you figured out the most suitable module with the help of *flow*SEL, maybe more detailed information is needed in regard of the module's behavior to decide if the selected module is the right choice. Then the simulation tool for industrial drives applications flowSIM should be used to execute a detailed simulation.

3   Vincotech ISE advanced tools

The two following simulation tools *flow*MIS and the new *flow*THERM are not part of the standard setup of Vincotech ISE, calculations results are available on request only.

3.1   *flow*MIS features

*flow*MIS is the tool of choice for simulating an industrial drive application's power and temperature characteristics based on a known mission profile.

With this tool you have the opportunity to take a look at the modules behavior under a given mission profile of your application.
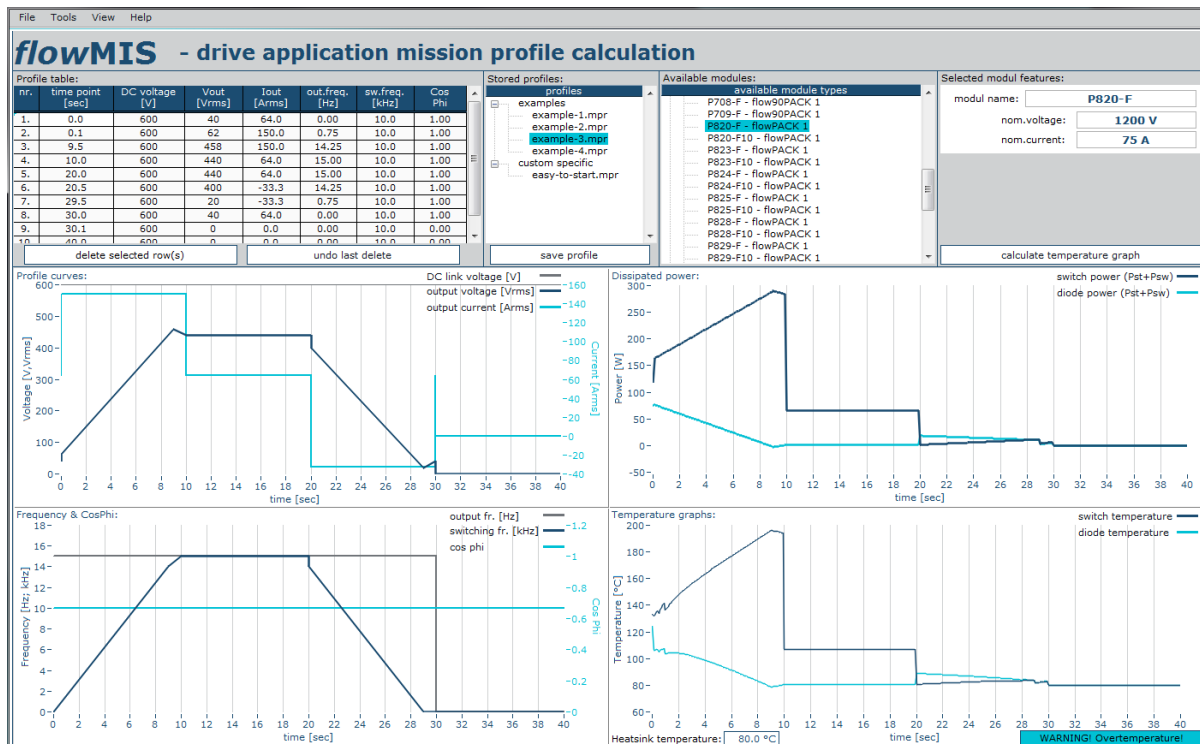
Figure 6: *flow*MIS - mission profile simulation tool for industrial drives applications

Just send the name of the desired module including information regarding the mission profile to the regional Vincotech representative. The following parameters are needed: time step in seconds, DC voltage, output voltage and current, output frequency, switching frequency and cos phi. You should provide as many increments of time steps as you can to get the most accurate result.

Basically four graphs are the outcomes of the *flow*MIS tool.The two helpful graphs on the left display the entered mission profile. The graphs on the right show as a result the dissipated power and the temperature of the devices in the module.

3.2 *flow*THERM features

The powerful new simulation tool *flow*THERM was introduced with the previous Vincotech ISE version. As its name suggests, this tool allows you to take a look inside to analyze the module's thermal behavior. *flow*THERM is based on a constantly growing power module database defined by real measurements in Vincotech labs.
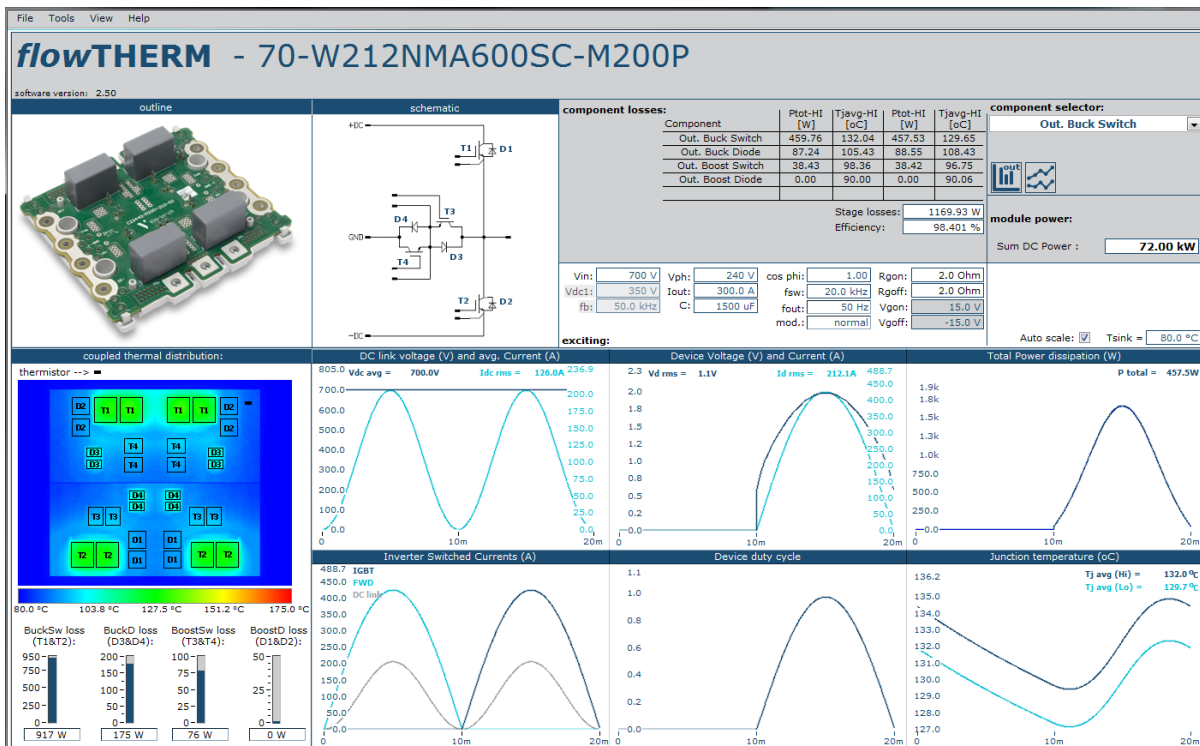
Figure 7: *flow*THERM - thermal simulation tool

The user interface is broadly similar to flowSOL and flowSIM but with some crucial differences. On the first sight you have the opportunity to see the temperature distribution within the desired module through a thermal picture. Here a thermal picture of the DCB containing the positions of the mounted components is displayed. A move with the curser over the components or DCB areas allows you to see the expected temperature at this special point to gain knowledge about junction temperatures and thermal coupling in different operation modes.
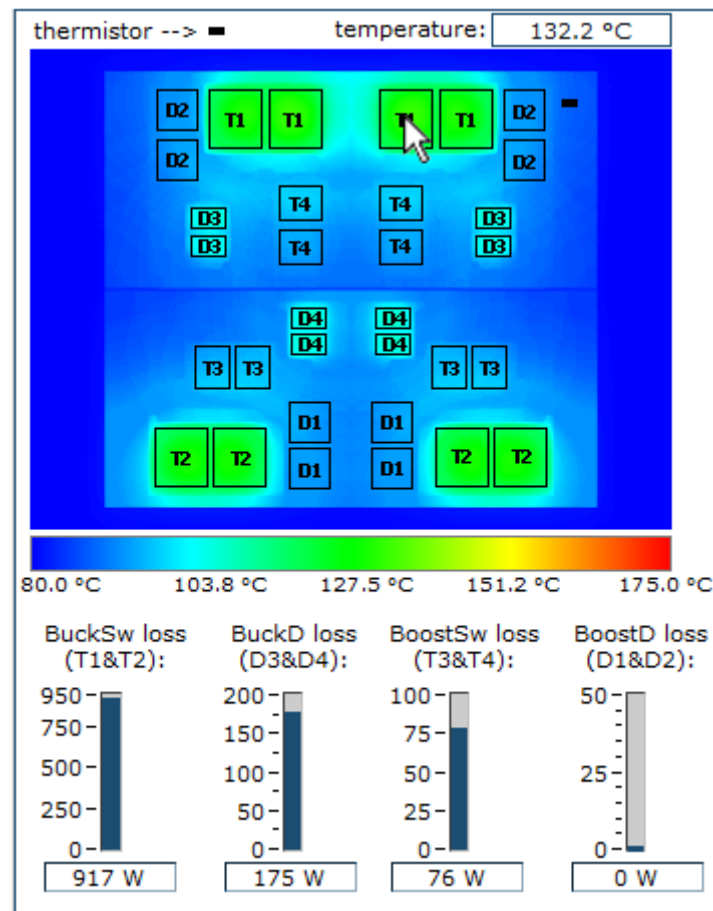
Figure 8: *flow*THERM - thermal view of the simulated power module

Analogous to *flow*MIS, please contact your regional Vincotech representative to receive thermal calculations based on your application parameters.

4 Conclusion

Vincotech ISE is a powerful, cost saving tool to speed up your development. It helps to find the most suitable power module for your application in a fast and comfortable way and enables you to earn a deep knowledge of these power electronics devices even before you start your first prototype measurements. A continuous update process guarantees a state of the art database including all latest product families of Vincotech power modules. Real measurements as a foundation of this database make Vincotech ISE a reliable and accurate tool for your development.