

Simulation of Power Electronics at System Level

PLECS® is a circuit simulator that makes the modeling and simulation of complex electrical systems simple. Supporting a top-down approach, it lets you start with ideal component models in order to focus on system behavior. Low-level device details can be added later to account for parasitic effects.



With the intuitive, easy-to-use schematic editor, new models are set up quickly. Thanks to a proprietary handling of switching events, simulations of power electronic circuits are fast and robust. Seamless integration with Simulink further extends the possibilities of system-

oriented simulations. Whether you are simulating a simple power electronic converter or a complex electrical drive, PLECS is a powerful tool that will help you quickly obtain the results that you need.

Fast and efficient

PLECS uses ideal component models where possible to simplify switching transitions and to allow for larger simulation time steps. At the circuit and system levels, this results in a fast and efficient simulation because only those details that affect the circuit response are modeled.

Simple to use

Just place a PLECS circuit onto your Simulink worksheet as you would with a normal subsystem block. Begin drag-

At a glance:

Electrical system modeling

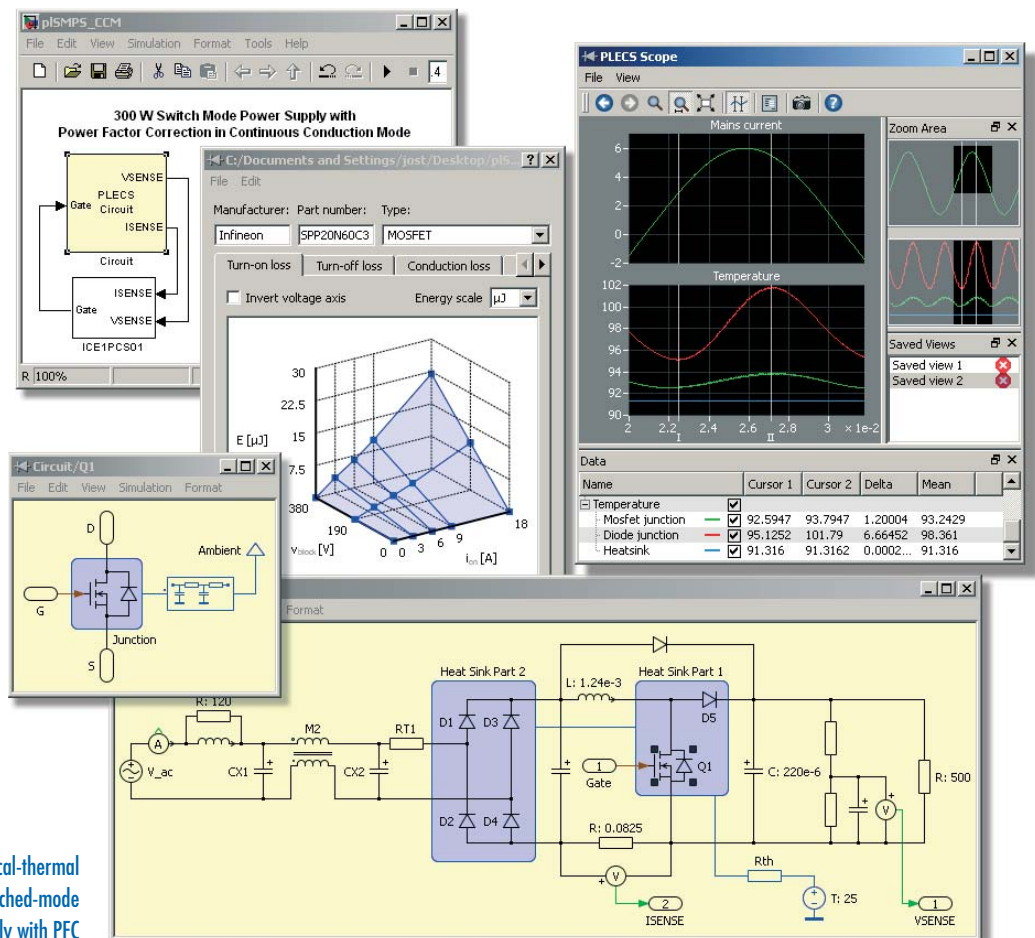
Use the PLECS schematic editor to create electrical circuits that slot into the Simulink environment as a subsystem.

Fast and robust simulation

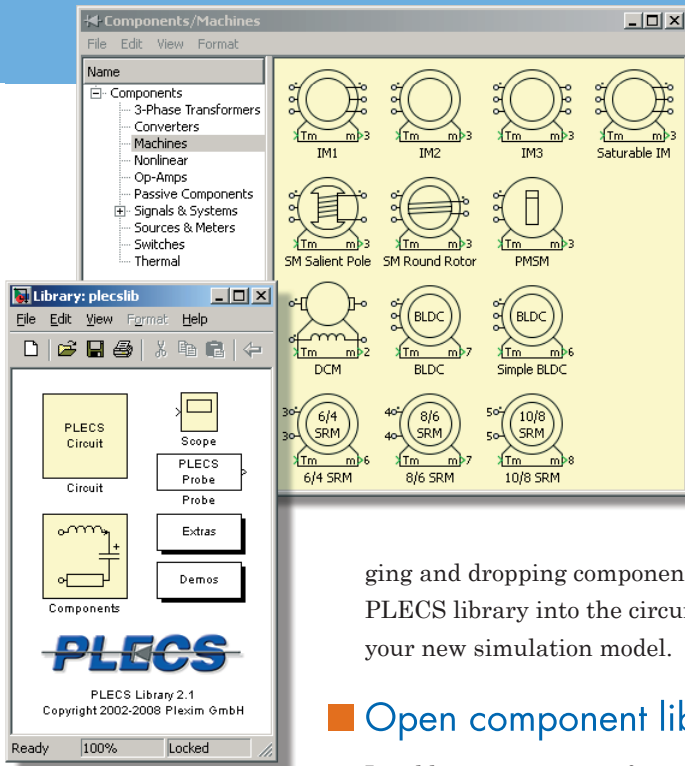
Power semiconductors modeled as ideal switches speed up the simulation of large converter systems.

Analysis tools

The new analysis tools help you to determine the periodic operating point and the transfer function of your converter.



Combined electrical-thermal model of a switched-mode power supply with PFC



PLECS library

Industries:

Aerospace

Actuation systems, aircraft power supply ...

Automotive

X-by-wire, starter-generator, hybrid electric vehicle ...

Drives & Automation

Variable speed drives, motion control, robotics ...

Electronics

Batteries, mains adapters, lighting, audio amplifiers ...

Transportation

Railway interties, traction units, auxiliary systems ...

Industrial Equipment

Inductive heating, wind and solar power, active filters ...

ging and dropping components from the PLECS library into the circuit to create your new simulation model.

Open component library

In addition to a range of standard components, the PLECS library comes with specialized elements for power electronics. Ideal and non-ideal semiconductor switches are included as well as customizable converter, machine and transformer models.

Thermal modeling

PLECS supports the modeling of thermal structures and the calculation of switching and conduction losses. Simulation speed is not adversely affected during loss calculations since ideal switching is maintained. Device losses are calculated after each switching occurrence by referring to lookup tables that are created using an integrated visual editor.

Analysis tools

Steady-state analysis

PLECS offers a steady-state analysis tool that rapidly iterates to the periodic operating point of a switching power system. Particularly useful for electro-thermal systems, this tool calculates final device temperatures without wasting hours of simulation time.

AC analysis

The AC sweep tool allows control systems engineers to obtain important small signal transfer functions such as the loop gain of a system. The transfer functions are obtained by measuring the system response to perturbations over a frequency range.

PLECS Scope

With advanced zooming and panning features, the new PLECS scope is a convenient tool for viewing your results. The scope has cursors for reading data values and measuring time differences, and can perform simple analyses such as obtaining the RMS value of a signal. Printing and saving your results is made easy with the customizable export feature.

Integration with Simulink®

A PLECS circuit is modeled directly within Simulink and appears as a unique subsystem with control inputs and measurement outputs. Rather than relying on co-simulation, the Simulink engine itself solves the circuit equations alongside the external control system. PLECS offers full compatibility with simulation settings, supporting both variable and fixed-step solvers.

System requirements

PLECS is available for Windows, Mac OS X and Linux. MATLAB and Simulink are required for using PLECS.

Try it

Find out why industry-leading companies have adopted PLECS. To obtain your free trial license for the latest version of PLECS, visit www.plexim.com.