

(C-010-D) DC-DC Flyback Converter (Discrete)

Simulation Parameters

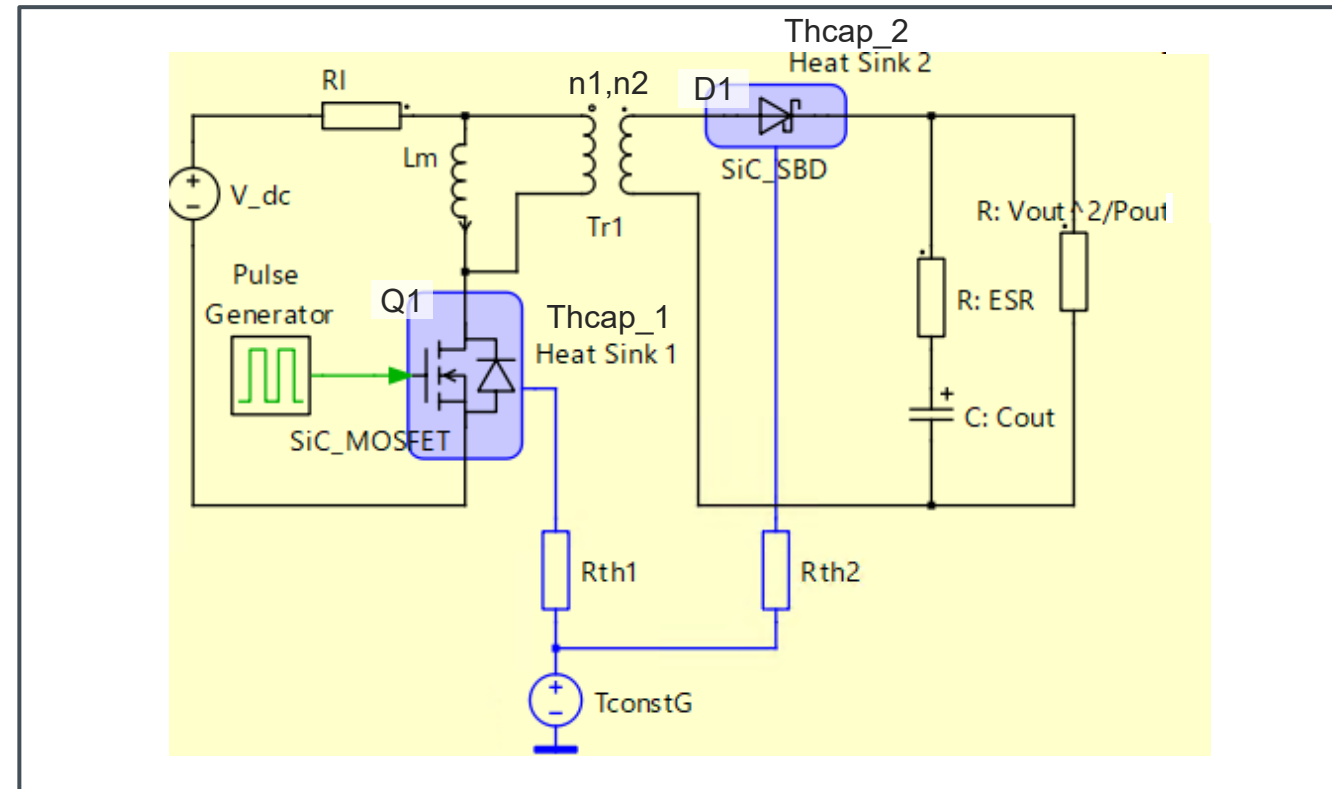
Name	Content	unit	Default Value
Lm	Magnetizing Inductance	H	3m
RI	Parasitic Resistance	Ω	5m
Cout	Output Capacitor	F	500u
ESR	Equivalent Series Resistance	V	0.01
n1	Primary coil	turns	15
n2 *	Secondary coil	turns	-2
Rc	Parasitic Resistance	Ω	10m
Rth1,2	Thermal Resistance	K/W	0.3
Thcap_1,2	Thermal Capacitance	J/K	1m
TGND	Thermal GND Temperature	$^{\circ}\text{C}$	25

* For the secondary coil parameters, negative values must be entered.

Name	Content	unit	Default Value
Test_time	Test time in simulation	s	0.3
fs	Switching Frequency	kHz	100
Vin	Input Voltage	V	400
Vout	Output Voltage	V	12
Pout	Output Power	W	100
Rg_on	Gate Resistance (Source)	Ω	6.8
Rg_off	Gate Resistance (Sink)	Ω	6.8
T_init	Initial Junction Temperature	$^{\circ}\text{C}$	25

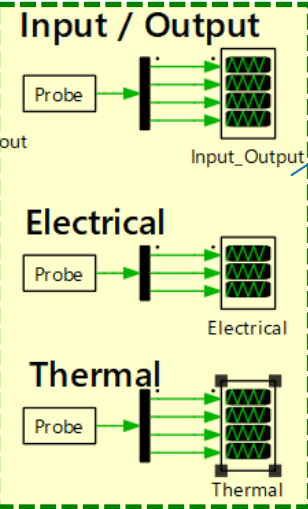
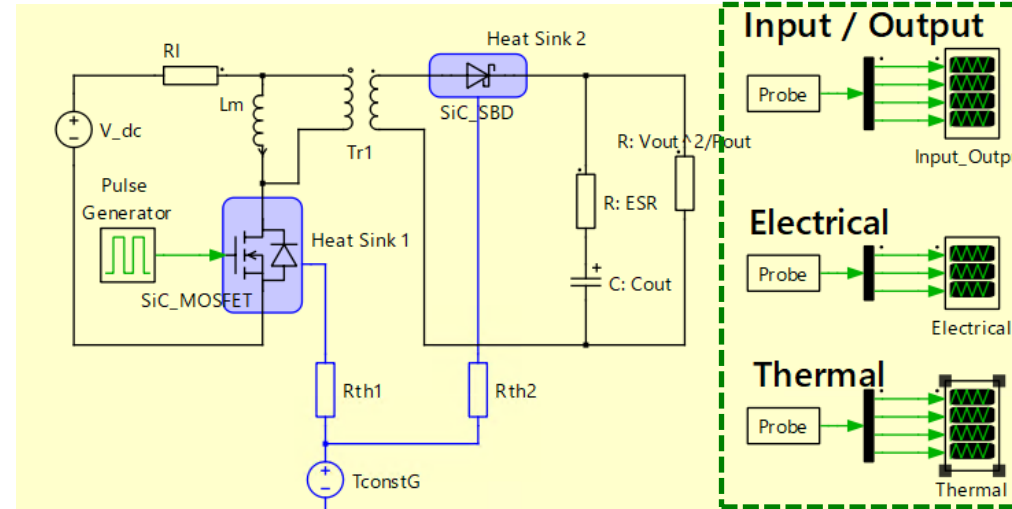
Simulation Circuit

2026 May
68UG133E Rev.002



Power Deices

Name	Device Type	Part No.	Specification
Q1	SiC MOSFET	SCT4065DR	750V/ 25A/ 65m Ω / TO-247-4L
D1	SiC Schottky Barrier Diode	SCS320AG	650V/ 20A/ TO-220ACGE



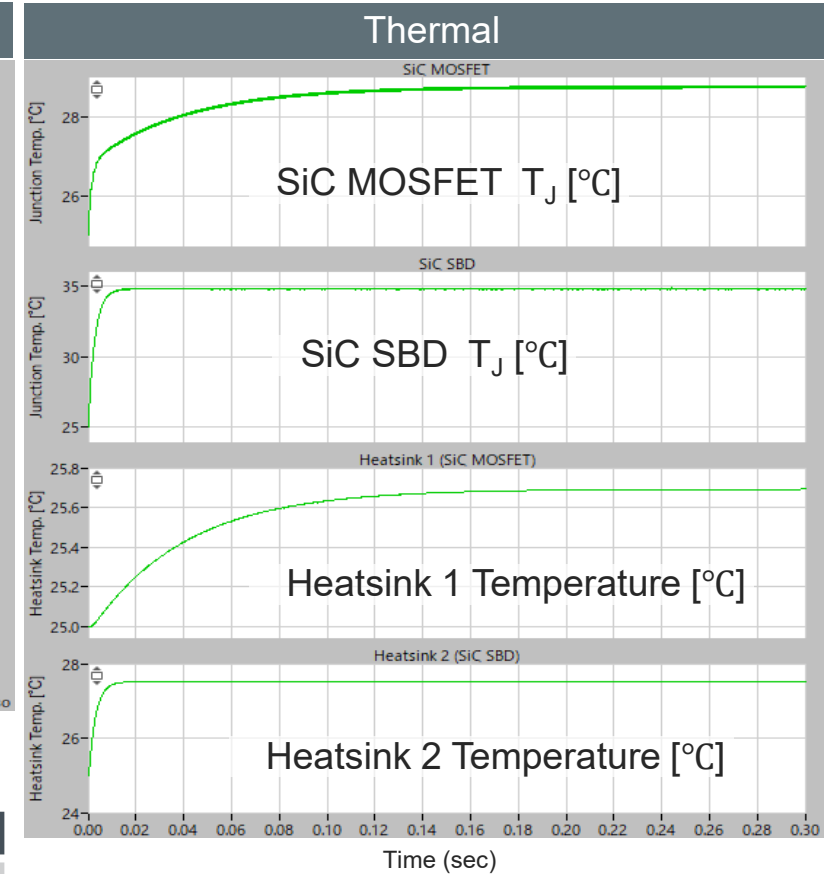
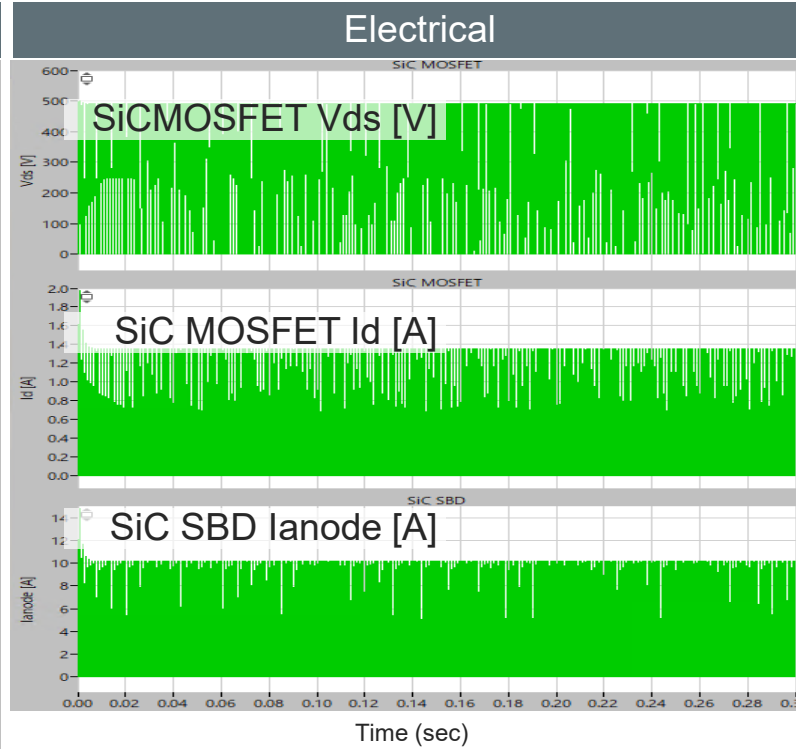
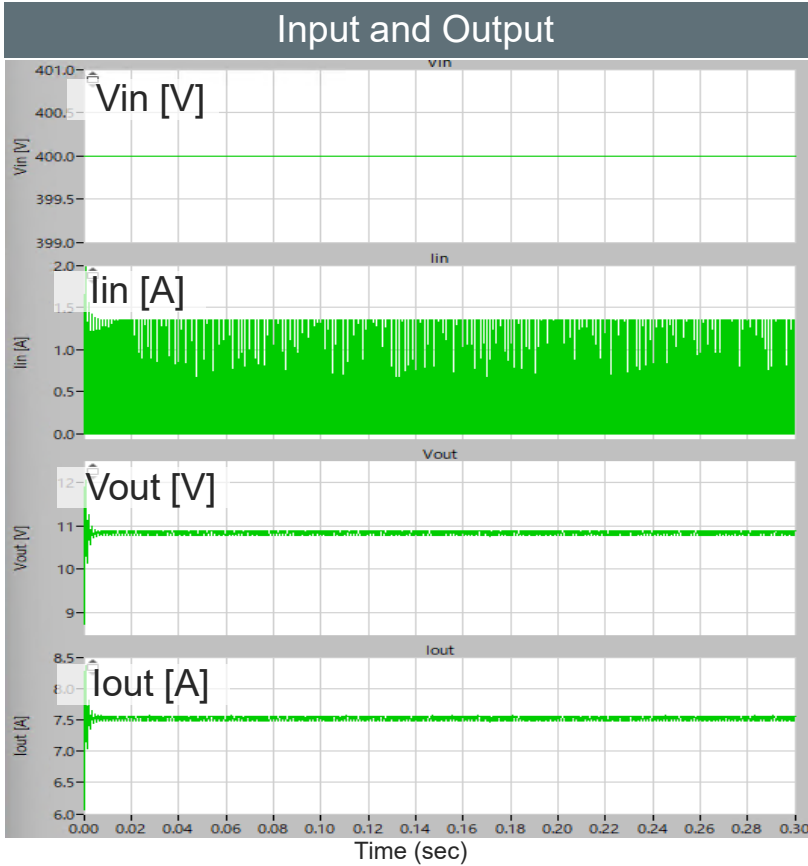
Results display

Input / Output		Loss	
1	92.82 Pin [W]	0.02	Conduction Loss (SiC MOSFET) [W]
2	82.02 Pout [W]	2.29	Switching Loss (SiC MOSFET) [W]
3	88.37 η [%]	2.31	Total Loss (SiC MOSFET) [W]
4		8.37	Conduction Loss (SiC SBD) [W]
5		0.12	Others [W]
6			
7			
8			
9			
10			
11	28.73 Tj (SiC MOSFET) [°C]		
12	34.82 Tj (SiC SBD) [°C]		
	25.69 T_Heatsink 1 [°C]		
	27.51 T_Heatsink 2 [°C]		

Simulation Results

Simulation Mode: Start-UP

2026 May
68UG133E Rev.002



Contents	Results
Input Power : Pin	92.82 W
Output Power: Pout	82.02 W
Efficiency: η	88.37 %

Contents	Results
Conduction Loss (SiC MOSFET)	0.02 W
Switching Loss (SiC MOSFET)	2.29 W
Total Loss (SiC MOSFET)	2.31 W
Conduction Loss (SiC SBD)	8.37 W
Loss (Others)	0.12 W

Contents	Results
T _j (SiC MOSFET)	28.73 °C
T _j (SiC SBD)	34.82 °C
T_Heatsink 1	25.69 °C
T_Heatsink 2	27.51 °C

To run this PLECS Reference Circuit, you must have the "PLECS" simulation software installed on your computer.

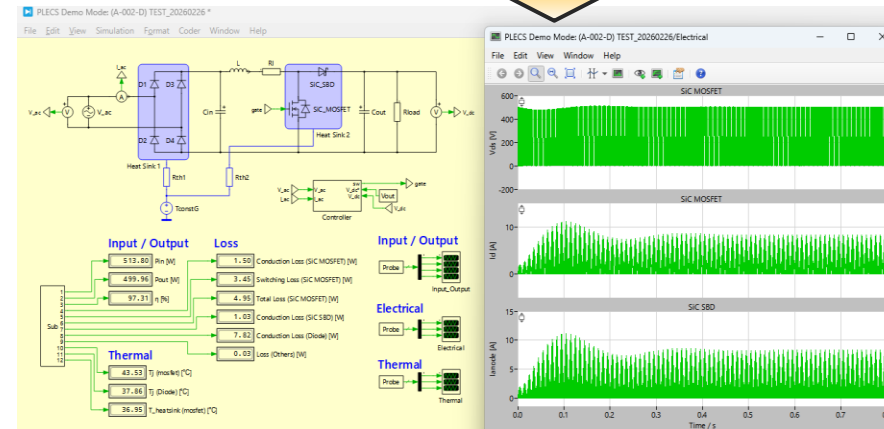
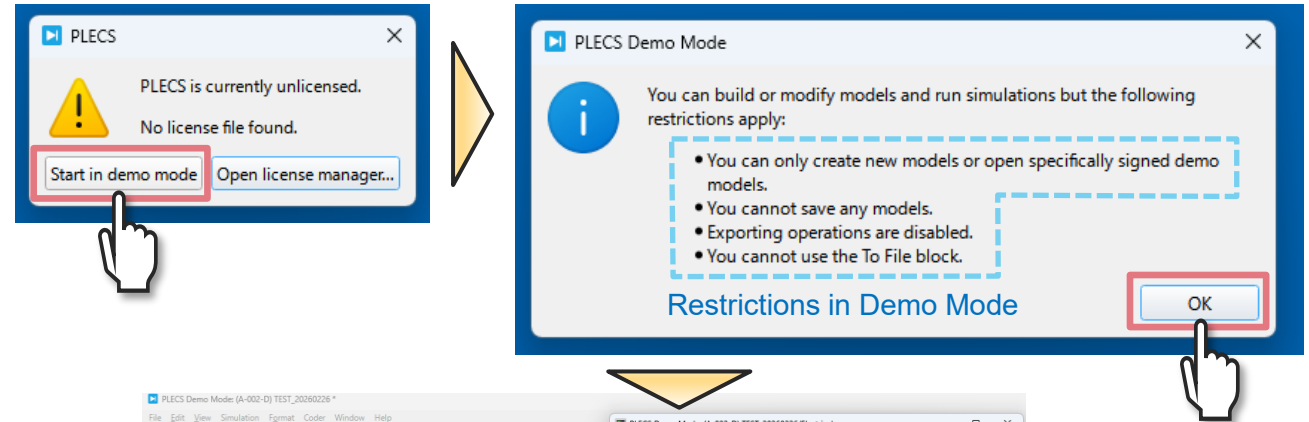
1. Obtaining the Software

If you do not have PLECS installed, please download the installer from the official website and complete the setup process.

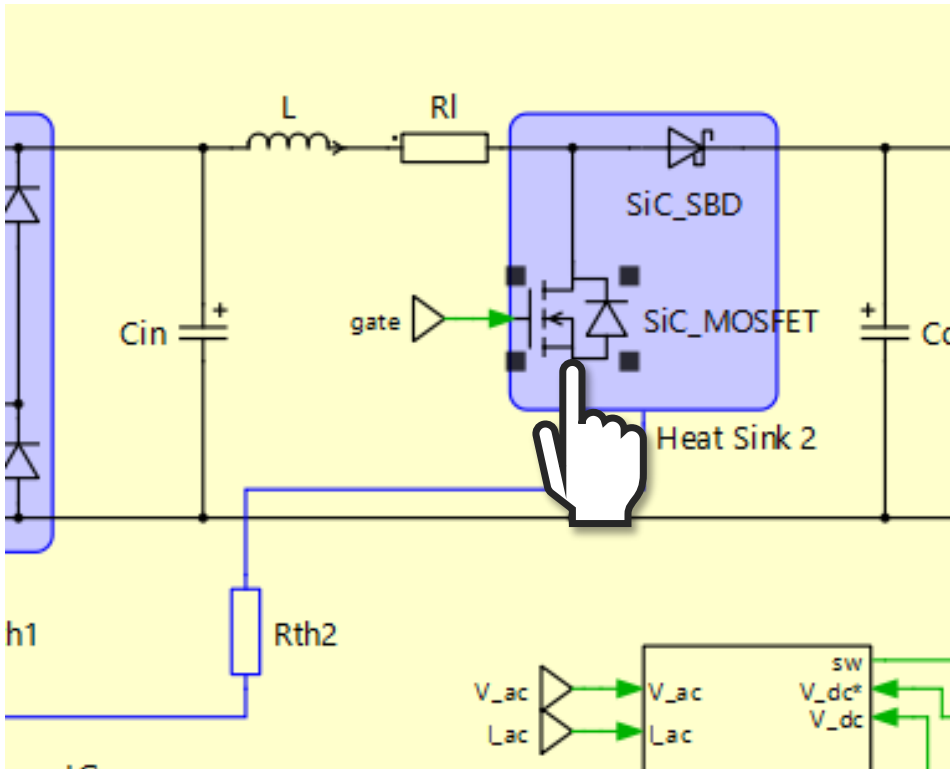
<https://www.plexim.com/download>

2. Licensing (Using Demo Mode)

This reference circuit can be executed and viewed in "Demo Mode" even if you do not possess a paid license.



Schematic window



Block Parameters: (A-002-D) AC-DC Boost PFC Diode Rectific... X

SiC-MOSFET (mask)

Model Generated by ROHM
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Date: 21-Jan.-2026

Parameters Assertions

SiC-MOSFET:
SiCMOS

Custom variables:
struct('Rg_on', 'Rg_on', 'Rg_off', 'Rg_off', 'sw', 'sw')

Gate resistance (on):
Rg_on

Gate resistance (off):
Rg_off

Initial temperature:
T_init

Initial Ron:
Ron_init

OK Cancel Apply Help

- From library...
- By reference
- Edit...
- Remove
- New thermal description...
- New thermal package description...

[SiC-MOSFET] TO-247-4L_750V_25A_65mΩ (SCT4065DR)
[SiC-MOSFET] TO-247-4L_750V_34A_45mΩ (SCT4045DR)
[SiC-MOSFET] TO-247-4L_750V_42A_36mΩ (SCT4036DR)
[SiC-MOSFET] TO-247-4L_750V_56A_26mΩ (SCT4026DR)
[SiC-MOSFET] TO-247N_1200V_19A_90mΩ (SCT4090KE)
[SiC-MOSFET] TO-247N_1200V_26A_62mΩ (SCT4062KE)
[SiC-MOSFET] TO-247N_1200V_32A_50mΩ (SCT4050KE)
[SiC-MOSFET] TO-247N_1200V_40A_36mΩ (SCT4036KE)
[SiC-MOSFET] TO-247N_1200V_81A_18mΩ (SCT4018KE)
[SiC-MOSFET] TO-247N_750V_105A_13mΩ (SCT4013DE)
[SiC-MOSFET] TO-247N_750V_25A_65mΩ (SCT4065DE)
[SiC-MOSFET] TO-247N_750V_34A_45mΩ (SCT4045DE)
[SiC-MOSFET] TO-247N_750V_42A_36mΩ (SCT4036DE)
[SiC-MOSFET] TO-247N_750V_56A_26mΩ (SCT4026DE)
[SiC-MOSFET] TO-263-7LA_1200V_17A_90mΩ (SCT4090KWA)
[SiC-MOSFET] TO-263-7LA_1200V_24A_62mΩ (SCT4062KWA)
[SiC-MOSFET] TO-263-7LA_1200V_29A_50mΩ (SCT4050KWA)
[SiC-MOSFET] TO-263-7LA_1200V_40A_36mΩ (SCT4036KWA)
[SiC-MOSFET] TO-263-7LA_1200V_75A_18mΩ (SCT4018KWA)
[SiC-MOSFET] TO-263-7LA_750V_22A_65mΩ (SCT4065DWA)
[SiC-MOSFET] TO-263-7LA_750V_31A_45mΩ (SCT4045DWA)
[SiC-MOSFET] TO-263-7LA_750V_38A_36mΩ (SCT4036DWA)
[SiC-MOSFET] TO-263-7LA_750V_51A_26mΩ (SCT4026DWA)
[SiC-MOSFET] TOLL_750V_120A_13mΩ (SCT4013DLL)
[SiC-MOSFET] TOLL_750V_26A_65mΩ (SCT4065DLL)
[SiC-MOSFET] TOLL_750V_37A_45mΩ (SCT4045DLL)

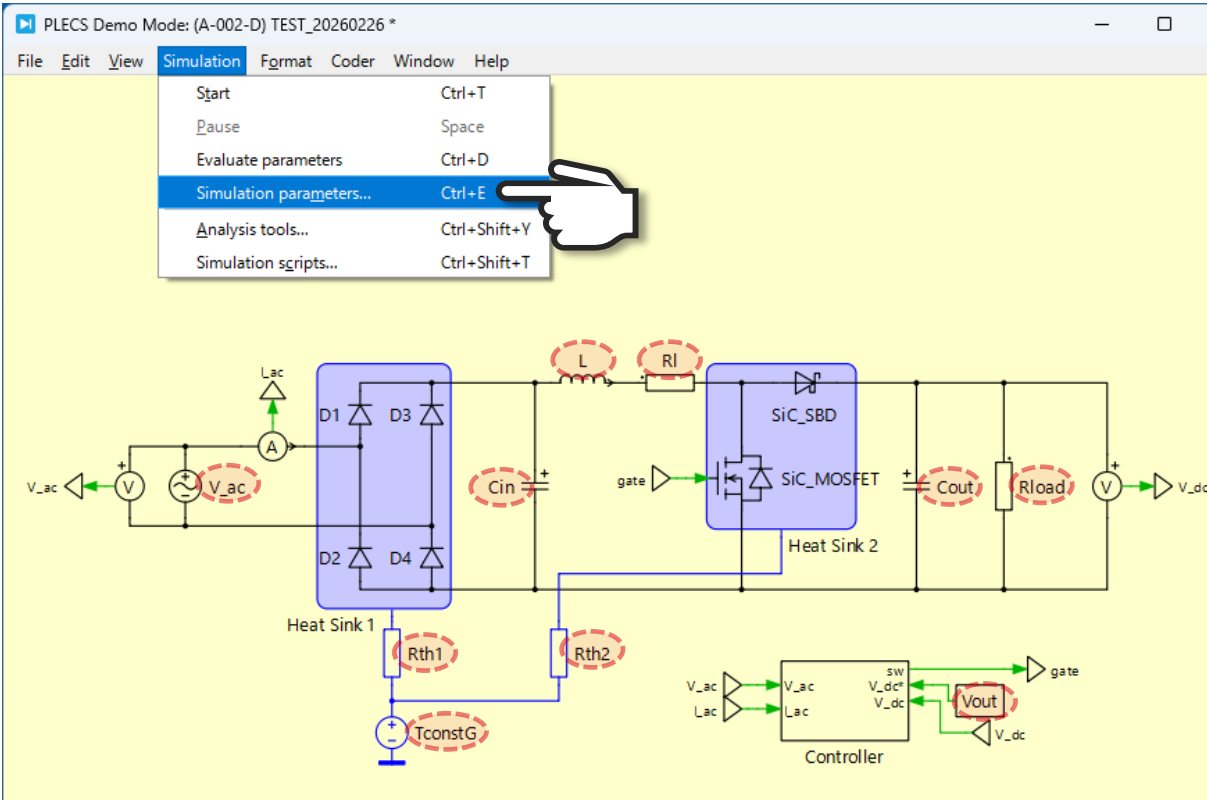
Hover your mouse cursor over the device symbol that you want to change and double-click the left button of the mouse.

Click "... " > "From library..." to view the list of available devices and you can select a favorite device from these.

If the model you need is not in the list, please refer to the application note "[How to Use PLECS Models](#)".

How to change the simulation parameters

Schematic window



```
1 % General|
2 Test time = 0.8; % End time of simulation [s]
3 SiCMOS = 'file:SC14065DR';
4 SiCSBD = 'file:SCS320AG';
5
6 % Grid
7 Vin = 100;
8 %Wac = Vin*sqrt(2); % Grid voltage [V]
9 Vout = 500
10 F = 50.0; % Grid frequency [Hz]
11
12 % Plant
13 fs_k = 50; % Switching frequency [kHz]
14 %fs = fs_k*1e3; % Switching frequency [Hz]
15
16 Rl = 0.001
17 Rload = 500; % Load resistance [ohms]
18 Rsense = 0.0025; % Sense resistance [ohms]
19 L = 1e-3; % Choke inductance [H]
20 Cin = 0.1e-6; % Input capacitor [C]
21 Cout = 1e-3; % Output capacitor [C]
22 C1 = 470e-9; % Reference capacitor [C]
23
24 %Wcout_init = Vout; %Initial Voltage of Output Capacitor [V]
25
26
27 R_Di = 0.02; % Diode On-resistance [ohm]
28 V_F_Di = 0.6; % Diode On-resistance [ohm]
29
30 % Thermal system
31 T_init = 25; % Initial Temperature of Heatsink [deg.C]
32 Thcap_1 = 0.001; % Thermal capacitance of Heatsink [J/K]
33 Thcap_2 = 0.001; % Thermal capacitance of Heatsink [J/K]
34 Rth_1 = 2.0; % Thermal Resistance [K/W]
35 Rth_2 = 2.0; % Thermal Resistance [K/W]
36 TGNd = 25; %Thermal GND Temperature [deg.C]
37
```

All simulation parameters are parameterized. To modify them, go to the menu, select “Simulation parameters...”, and edit the values within “Model initialization commands.”

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