

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

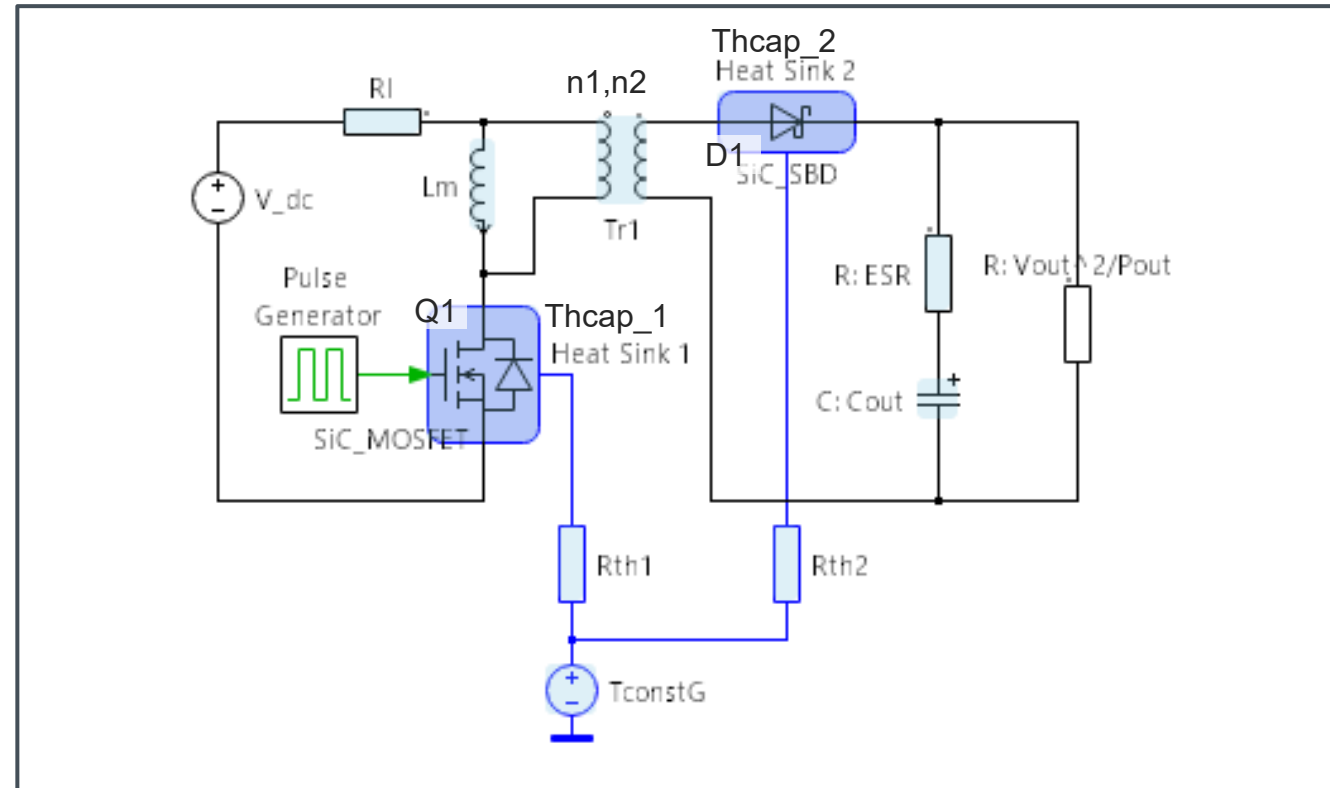
Simulation Parameters

Name	Content	unit	Default Value	Variable Range
Lm	Magnetizing Inductance	H	3m	1n ~ 1
Rl	Parasitic Resistance	Ω	5m	1u ~ 100m
Cout	Output Capacitor	F	500u	1n ~ 1
ESR	Equivalent Series Resistance	V	0.01	1u ~ 100m
n1	Primary coil	turns	15	1~100
n2 *	Secondary coil	turns	-2	-100~-1
Rc	Parasitic Resistance	Ω	10m	1u ~ 100m
Rth1,2	Thermal Resistance	K/W	0.3	1m ~ 100
Thcap_1,2	Thermal Capacitance	J/K	1m	1m ~ 100
TGND	Thermal GND Temperature	$^{\circ}\text{C}$	25	-40 ~ 175

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

Name	Content	unit	Default Value	Variable Range
Test_time	Test time in simulation	s	0.3	100u ~ 0.5
fs	Switching Frequency	kHz	100	10k ~ 100k
Vin	Input Voltage	V	400	1 ~ 1000
Vout	Output Voltage	V	12	10 ~ 1200
Pout	Output Power	W	100	1~10k
Rg_on	Gate Resistance (Source)	Ω	4.7	0 ~ 100
Rg_off	Gate Resistance (Sink)	Ω	2	0 ~ 100
T_init	Initial Junction Temperature	$^{\circ}\text{C}$	25	-40 ~ 175

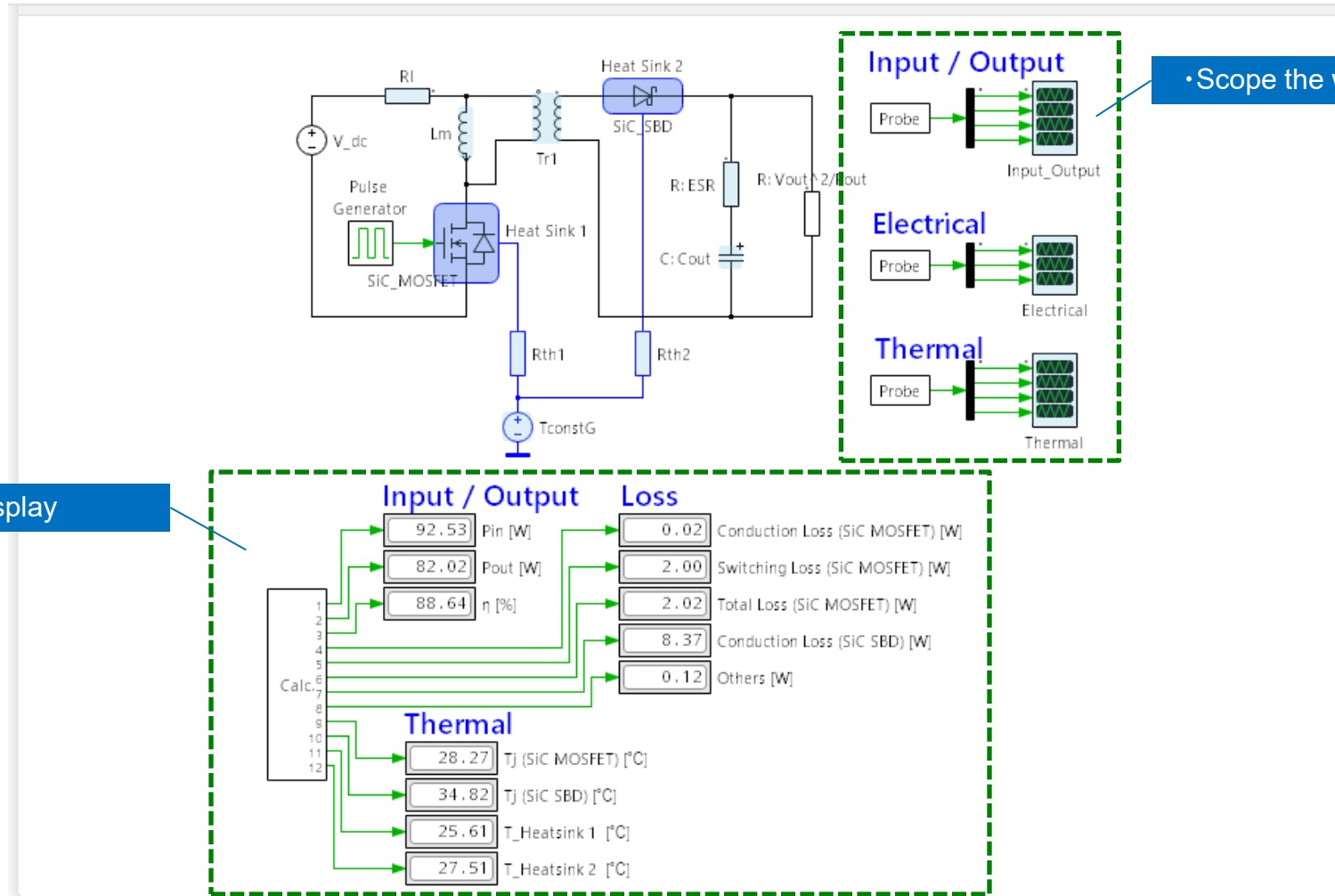
Simulation Circuit



Default 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

Schematic window

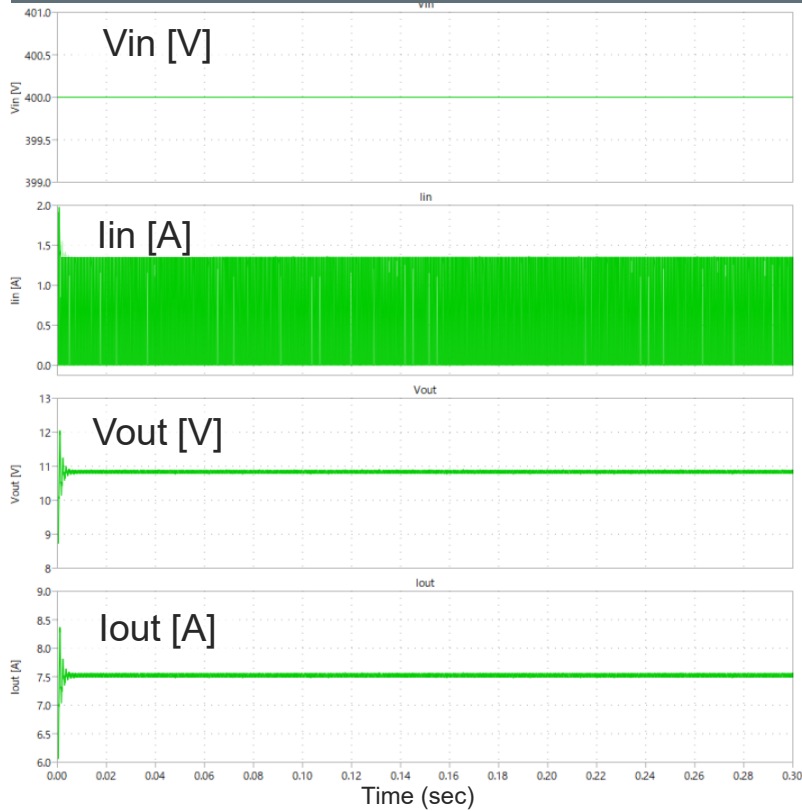


• Results display

• Scope the waveform

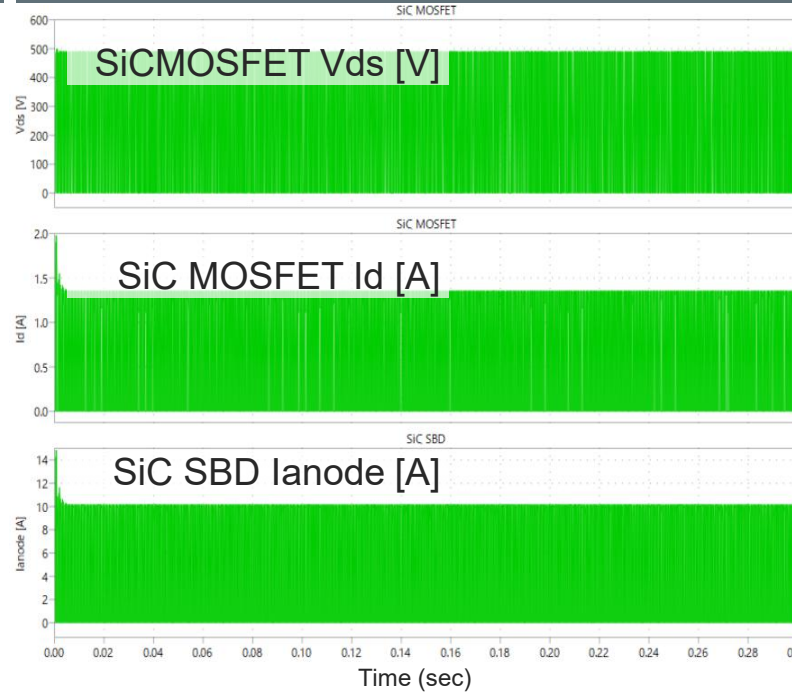
Simulation Results

Input and Output



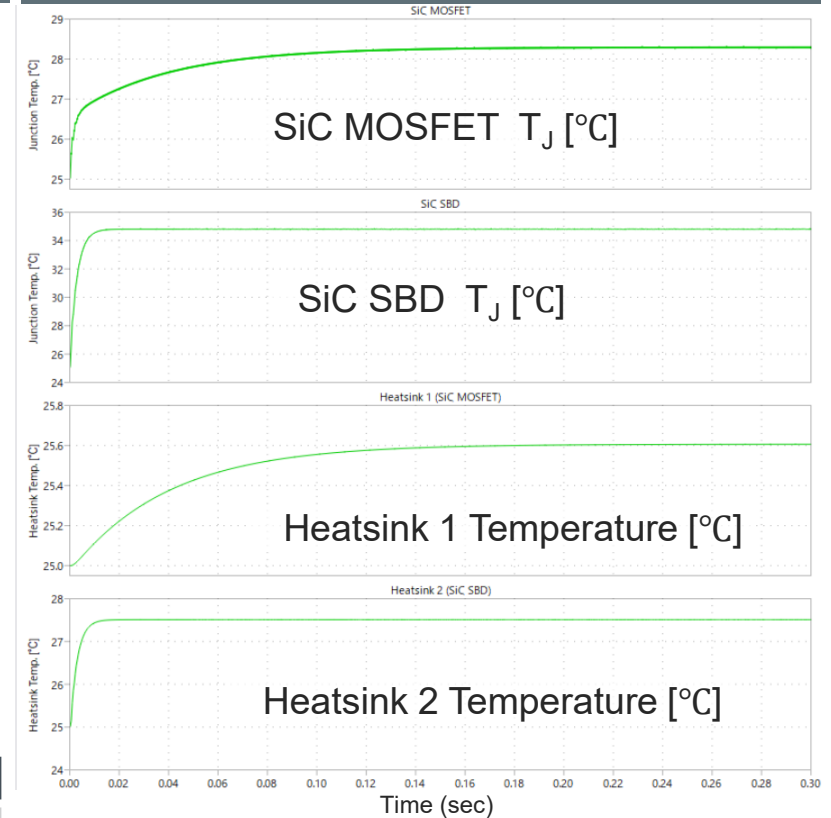
Contents	Results
Input Power : Pin	92.53 W
Output Power: Pout	82.02 W
Efficiency: η	88.64 %

Electrical



Contents	Results
Conduction Loss (SiC MOSFET)	0.02 W
Switching Loss (SiC MOSFET)	2.00 W
Total Loss (SiC MOSFET)	2.02 W
Conduction Loss (SiC SBD)	8.37 W
Loss (Others)	0.12 W

Thermal



Contents	Results
T _j (SiC MOSFET)	28.27 °C
T _j (SiC SBD)	34.82 °C
T_Heatsink 1	25.61 °C
T_Heatsink 2	27.51 °C

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

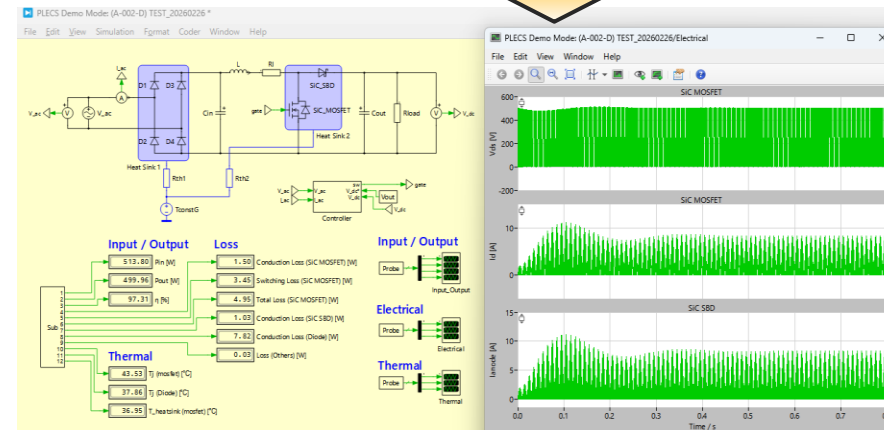
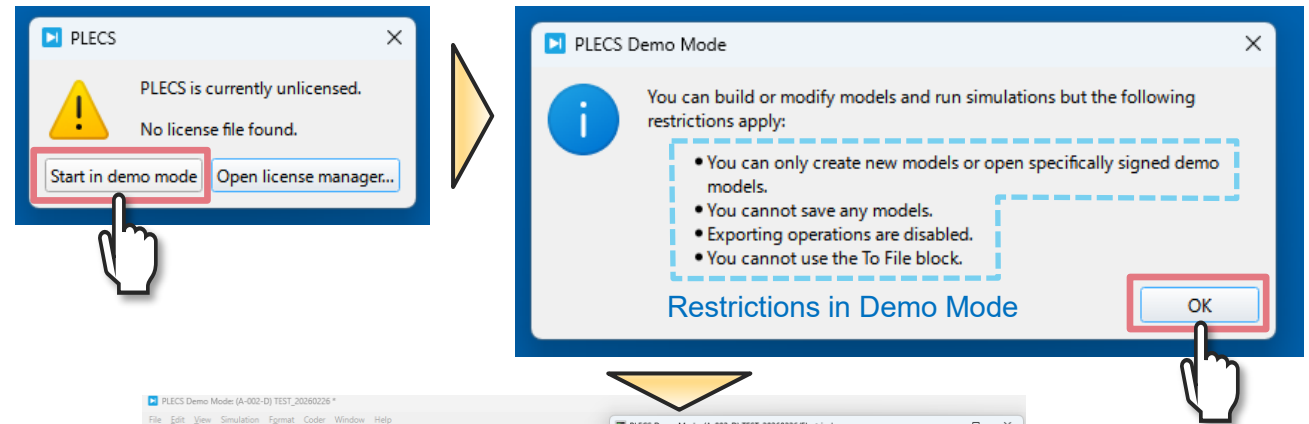
1. Obtaining the Software

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

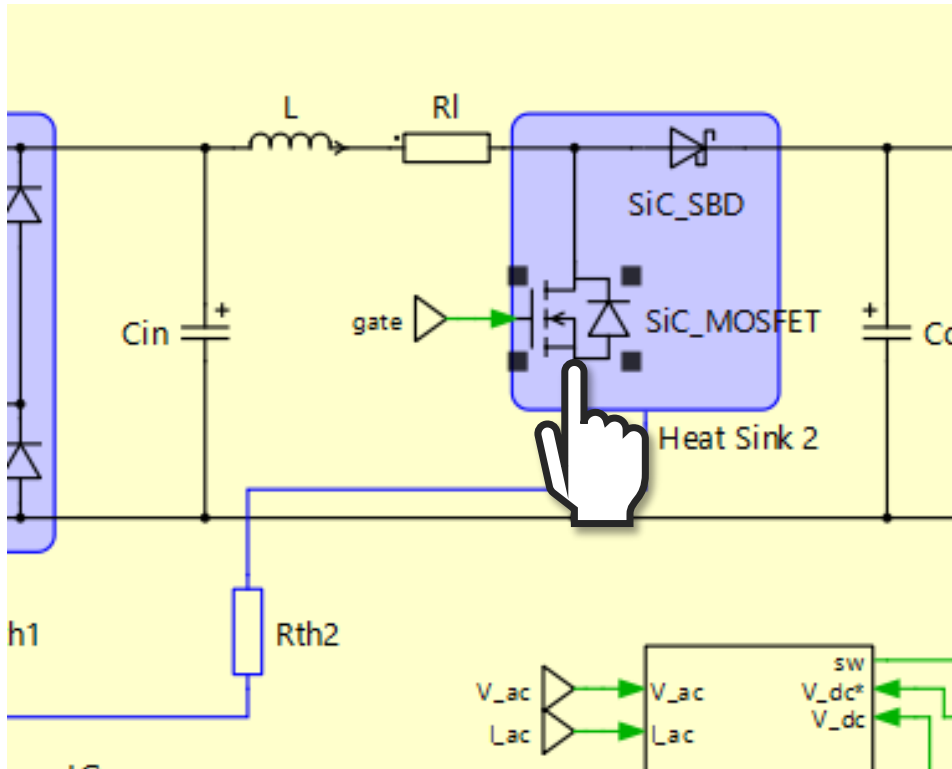
<https://www.plexim.com/download>

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)

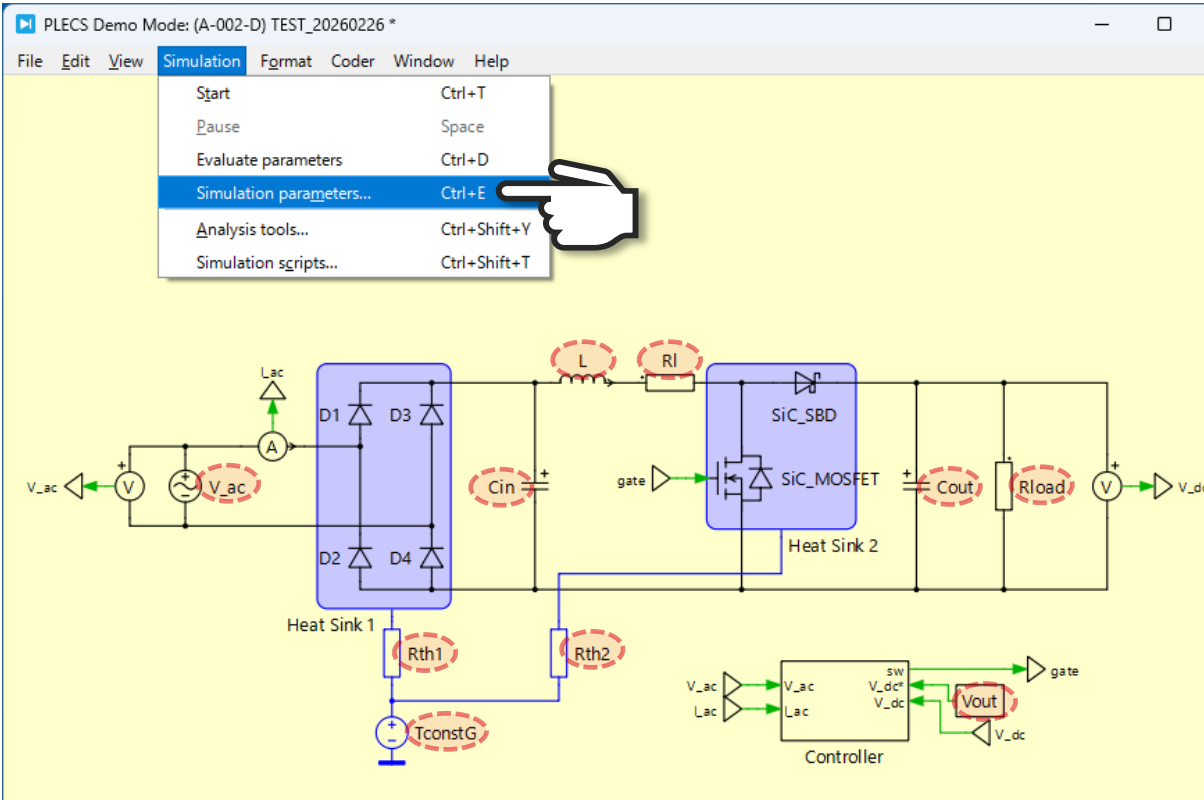
Hover your mouse cursor over the device symbol that you want to change and double-click the left button of the mouse.

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



Simulation Parameters: (A-002-D) TEST_20260226

Solver Options Diagnostics Initialization

System state

Initialize from: Block parameters
 Stored system state

Store current state...

Model initialization commands

```
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 T_GND = 25; %Thermal GND Temperature [deg.C]
37
```

OK Cancel Apply Help

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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