(A-011-D) DC-AC Totem-Pole PFC Diode Rectification (Discrete)

ROHM PLECS Simulator
Circuit Information

2026 March
68UG103E Rev.001

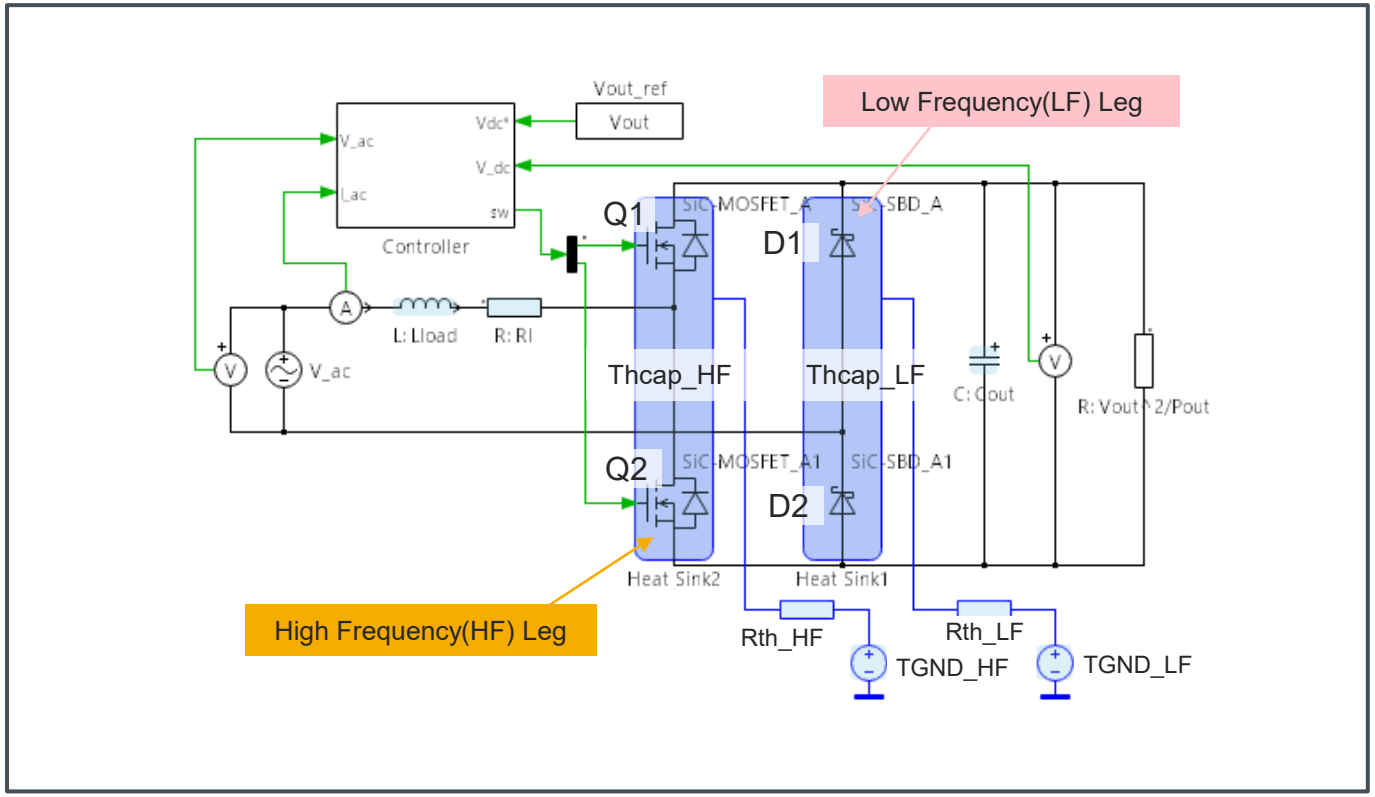
Simulation Parameters (Dialog)

	Name	Content	unit	Default Value	Variable Range
	L	Inductive Load	H	680u	1n ～ 1
	Rl	Parasitic Resistance	Ω	1m	1u ～ 100m
	C	Output Capacitor Initial Voltage	F V	470u 500	1n ～ 1 0 ～ 1200
High-Freq. Leg	Thcap_HF	Thermal Capacitance	J/K	0.2	1m ～ 100
High-Freq. Leg	Rth_HF	Thermal Resistance	K/W	2	1m ～ 100
High-Freq. Leg	TGND_HF	Thermal GND Temperature	℃	25	-40 ～ 175
Low-Freq. Leg	Thcap_LF	Thermal Capacitance	J/K	0.2	1m ～ 100
Low-Freq. Leg	Rth_LF	Thermal Resistance	K/W	2	1m ～ 100
Low-Freq. Leg	TGND_LF	Thermal GND Temperature	℃	25	-40 ～ 175

Simulation Parameters (Table)

Name	Content	unit	Default Value	Variable Range
Test_time	Test time in simulation	s	0.5	100u ～ 0.5
fs	Switching Frequency	Hz	60k	10k ～ 100k
V_ac(rms)	Input Voltage Grid Frequency	V Hz	220 50	100 ～ 500 50 or 60
Vout (dc)	Output Voltage	V	500	300 ～ 1200
Pout	Output Power	W	2500	100 ～ 30000
Rg_on	Gate Resistance (Source)	Ω	4.7	0.1 ～ 100
Rg_off	Gate Resistance (Sink)	Ω	2.2	0.1 ～ 100
T_init	Initial Junction Temperature	℃	25	-40 ～ 175

Simulation Circuit



Default Devices

Name	Device Type	Part No.	Specification
Q1,2	SiC MOSFET	SCT4065DR	750V/ 25A/ 65mΩ/ TO-247-4L
D1,2	SiC Schottky Barrier Diode	SCS320AG	650V/ 20A/ TO-220ACGE

Simulation Screen Overview

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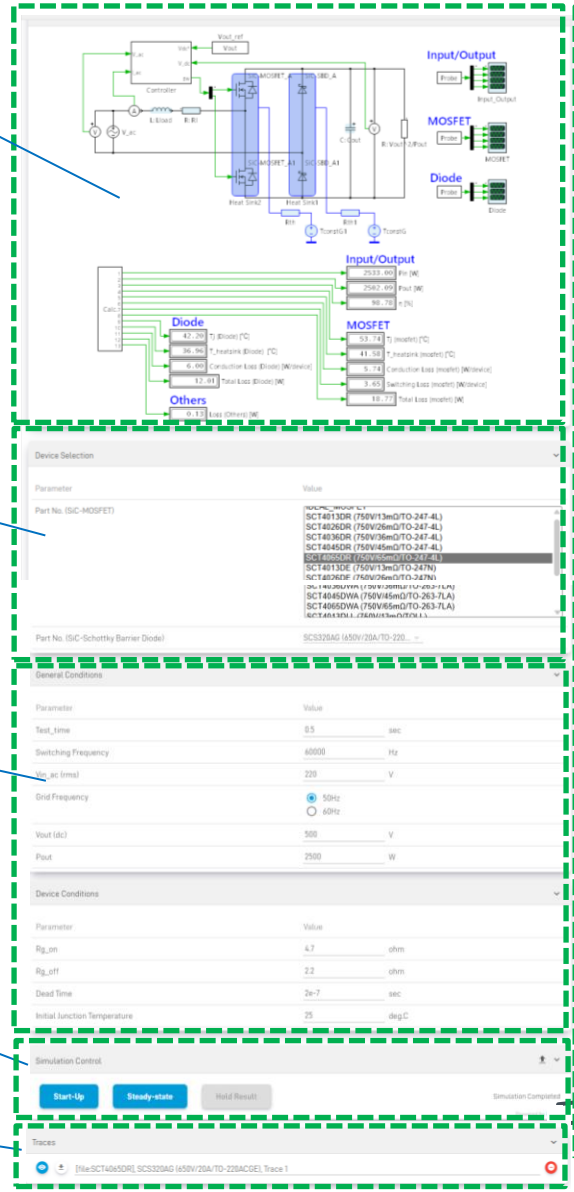
Schematic window
- Dialog parameters setting
- Results display

Device selection

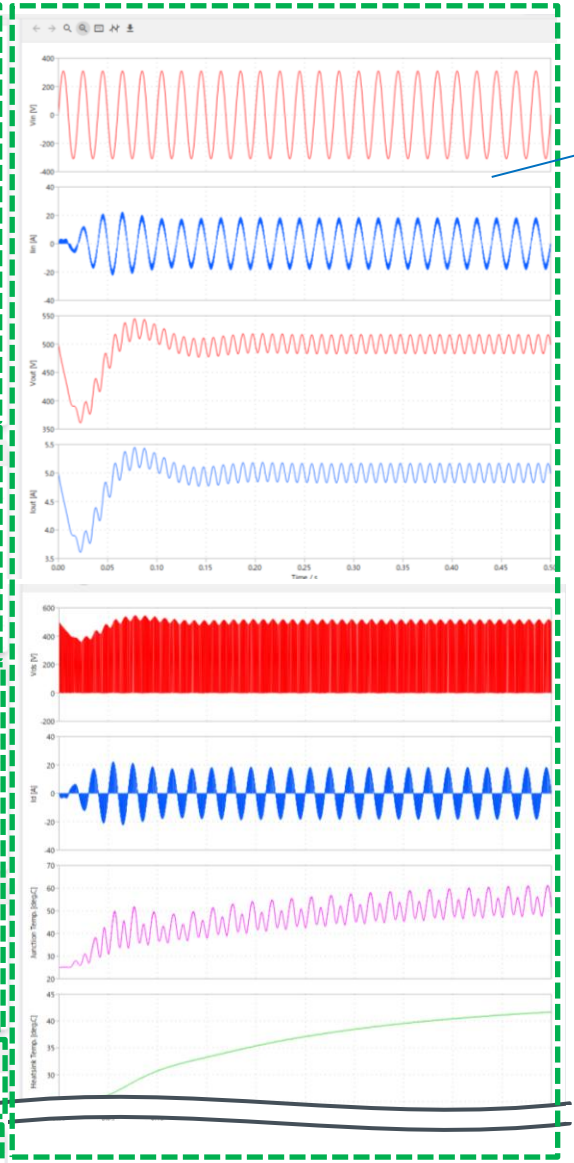
Table parameters setting

Simulation control

Trace selection



Waveforms



Simulation Results

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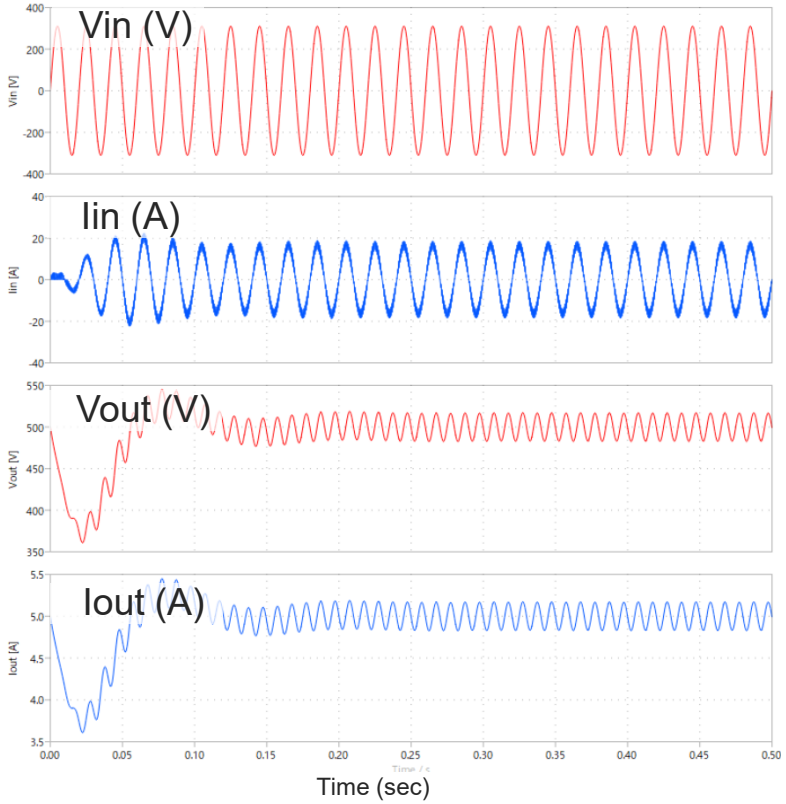
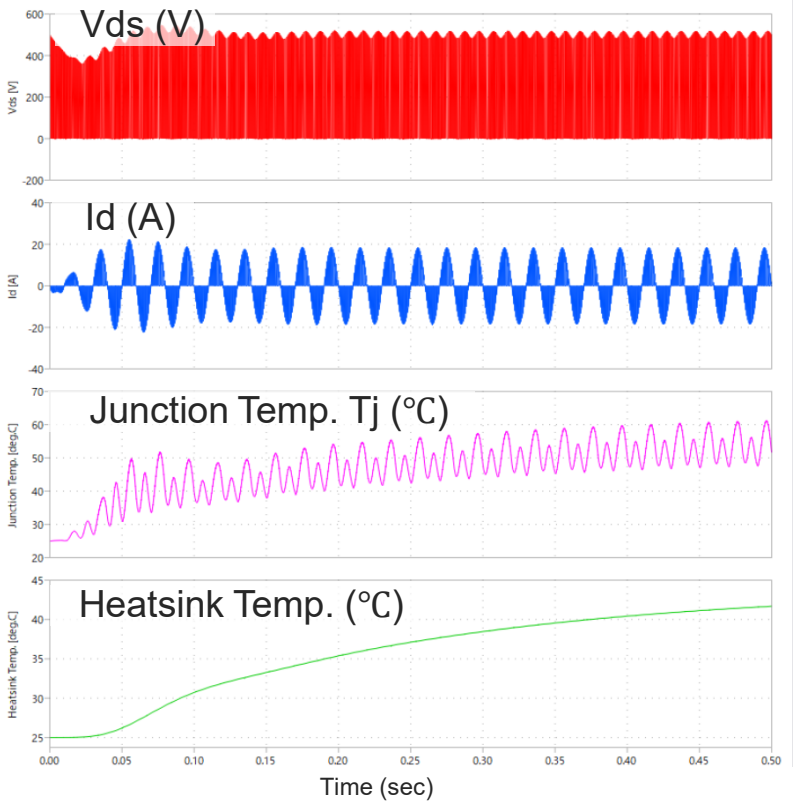
Input and Output



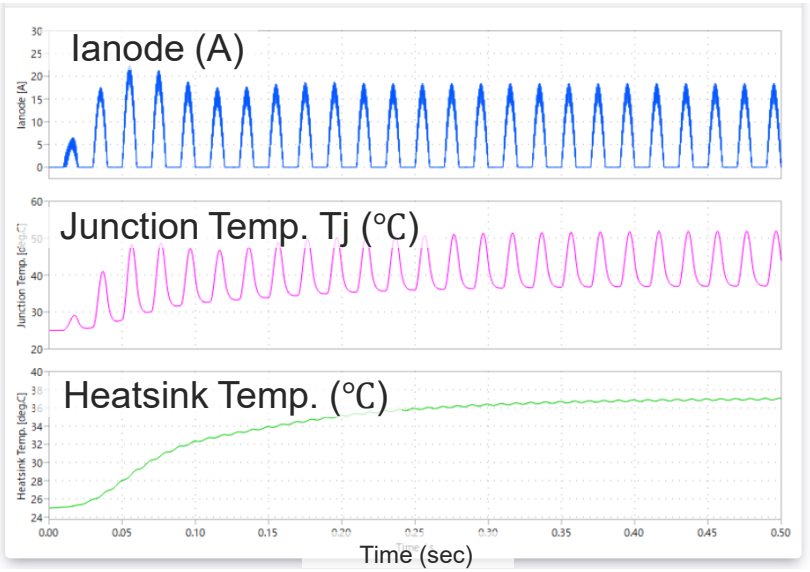
Contents	Results
Input Power : Pin	2533.00 (W)
Output Power: Pout	2502.09 (W)
Efficiency: η	98.78 (%)

MOSFET (HF leg)



Contents	Results
Junction Temp. Tj(mos)	53.74 (℃)
Heatsink Temp. T_hs(mos)	41.58 (℃)
Conduction Loss: Pcond(mos)	5.74 (W/device)
Switching Loss: Psw(mos)	3.65 (W/device)
Total Loss: Ptot(mos)	18.77 (W)

Diode (LF leg)



Contents	Results
Junction Temp. Tj(diode)	42.20 (℃)
Heatsink Temp. T_hs(diode)	36.96 (℃)
Conduction Loss: Pcond(diode)	6.00 (W/device)
Total Loss: Ptot(diode)	12.01 (W)

How to change the devices

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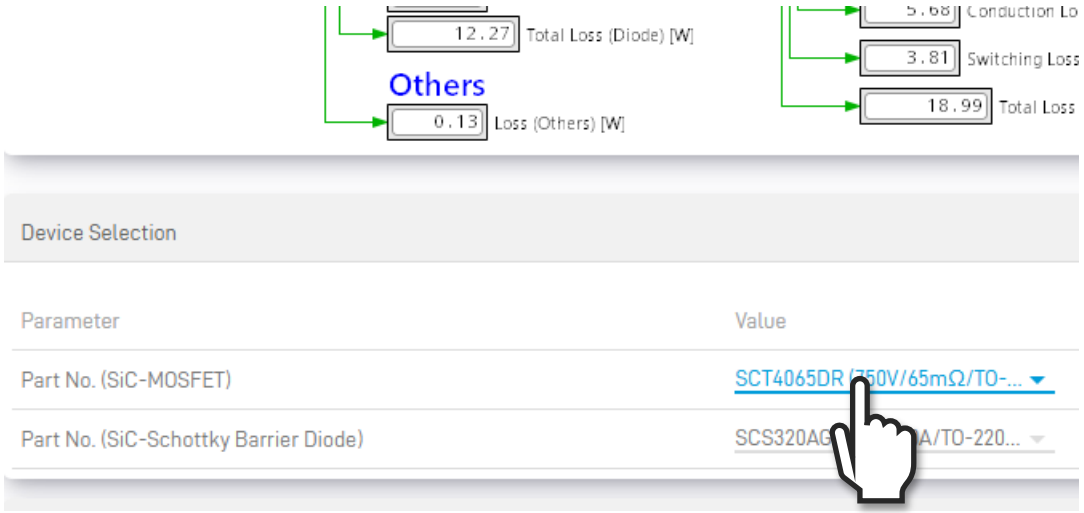
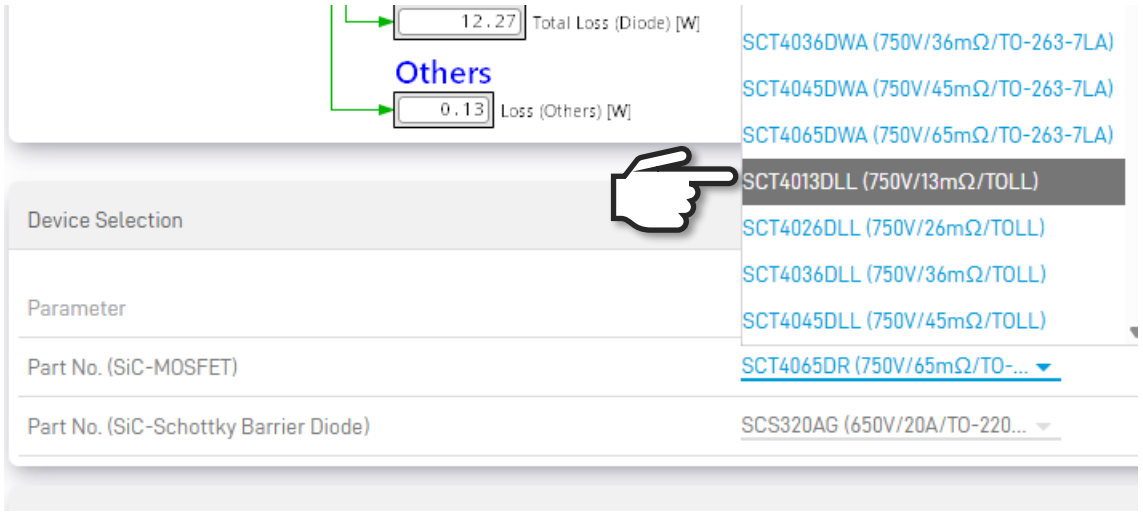
Device Selection



Over your mouse cursor to the device name that you want to change and click the left button of the mouse.



Available device lists are appeared like the above, and you can select a favorite device from these.

How to change Dialog parameters

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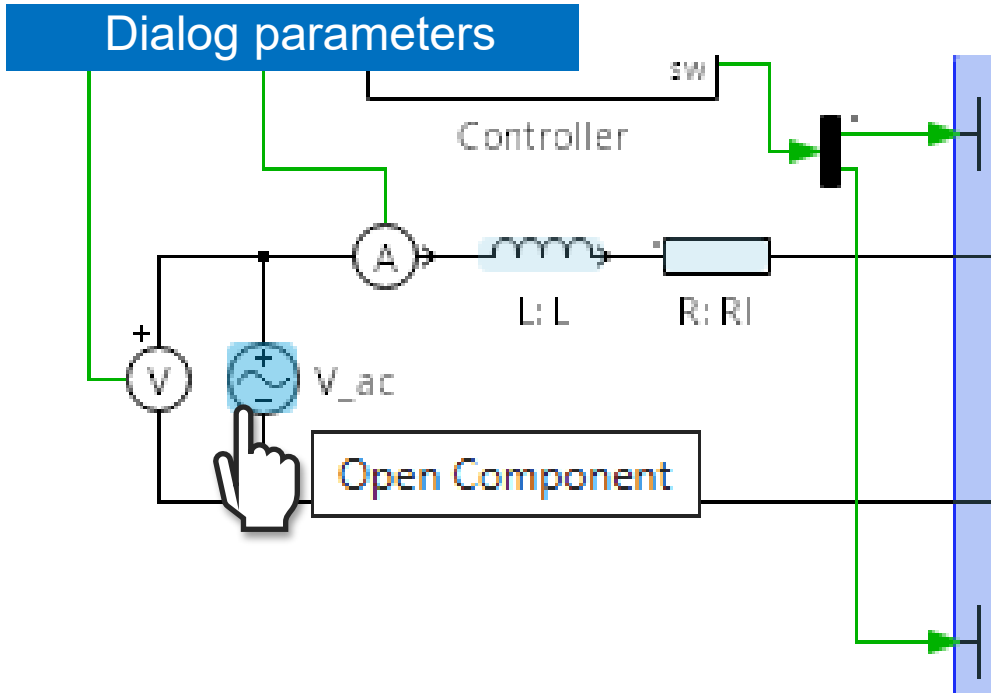
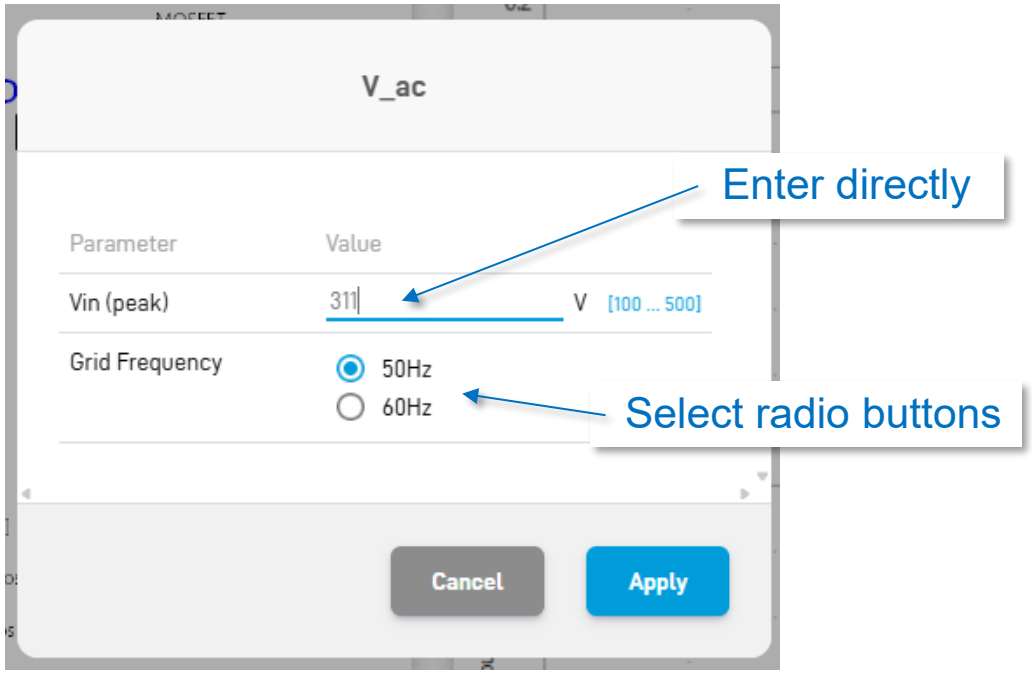
- Symbols whose parameters can be changed are colored light-blue in the circuit diagram.
- Over your mouse cursor to the symbol that you want to change the parameter and the symbol color is turned to blue (e.g. “V_ac” symbol in the below).
- Click the left button of the mouse.



- A new window like the below is opened.
- You can change the parameters by entering the value directly* or selecting radio buttons.
- Push “Apply” button after changing all parameters.



*Note: Parameters can be entered directly are limited by Min. and Max. values to avoid unexpected system errors.
(e.g. “Vin(peak)” is limited between 100 and 500V in the above.)

How to change Table parameters

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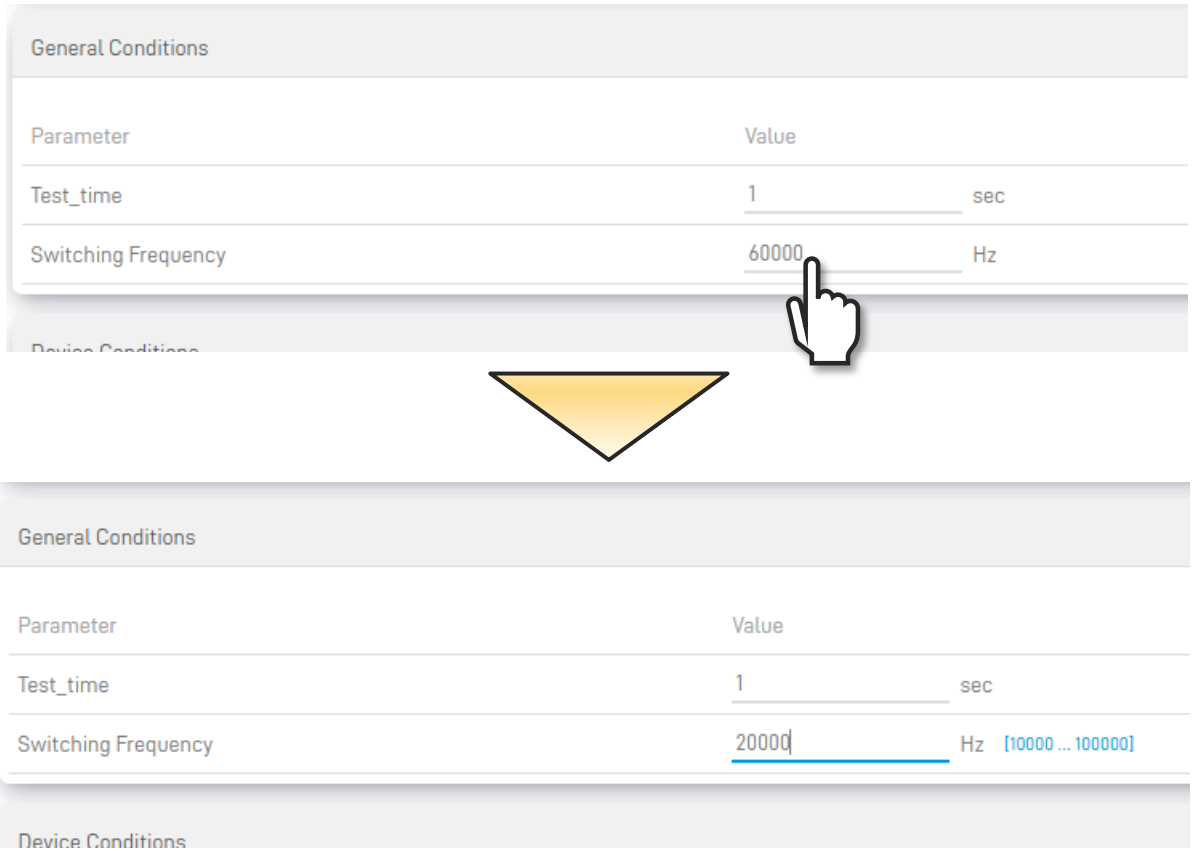
Table parameters



Choose the parameter that you want change on the parameter tables (e.g. ”60kHz” of Switching Frequency in the left figure.)

- A blue under-line and variable range of the parameter are appeared.
- Then, you can change the parameters by entering the value directly ” (e.g. “60kHz” was changed to “20kHz”).

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