(B-012-DOT) DC-AC 3-phase 3-Level NPC-Type-I Inverter (DOT247)

Simulation Parameters (Dialog)

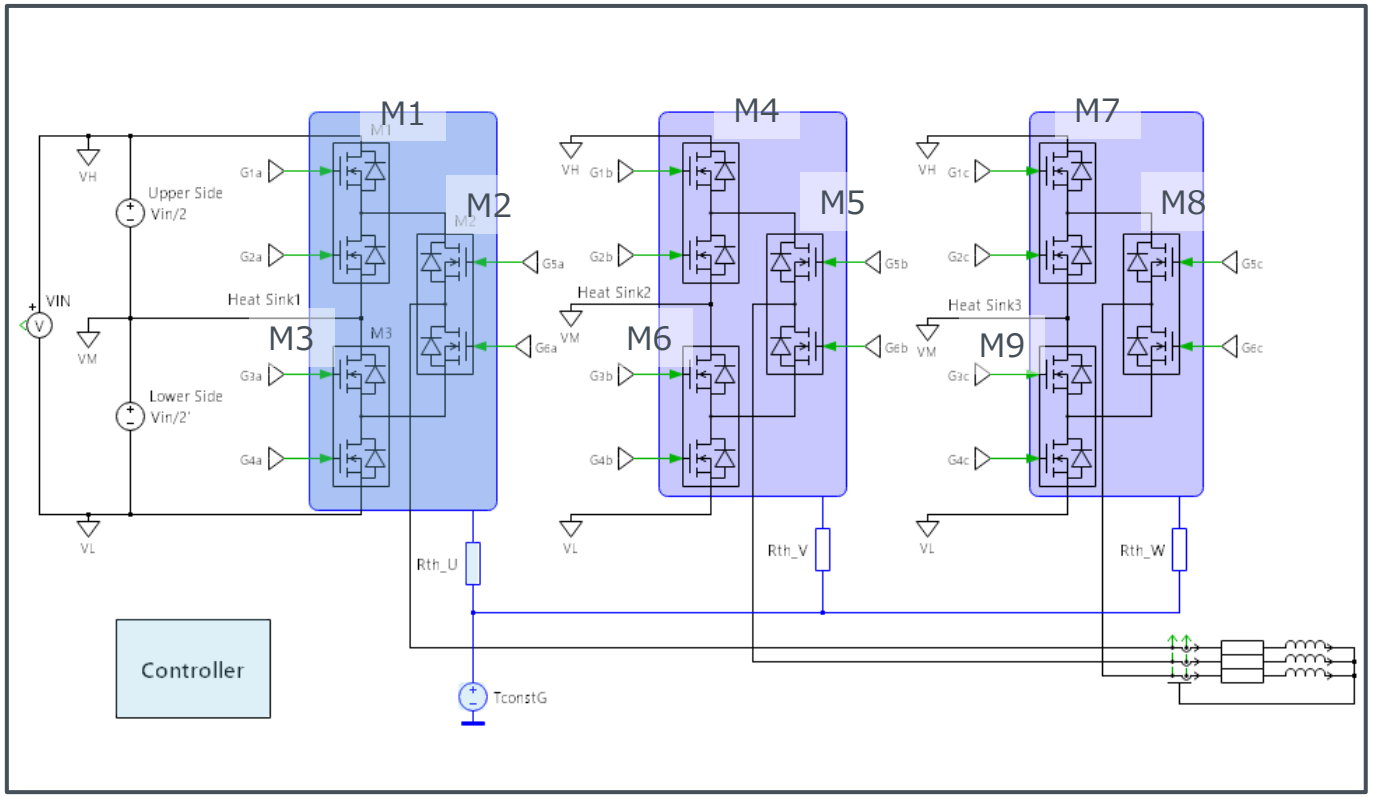
	Name	Content	unit	Default Value	Variable Range
Controller	fs	Switching Frequency	kHz	10	1 ~ 1000
	DT	Deadtime	ns	1000	100 ~100k
	M	Modulation Factor	-	0.8	1m~1
	Thcap	Thermal Capacitance ※	J/K	0.1	1m ～ 100
	Rth	Thermal Resistance ※	K/W	0.5	1m ～ 100
	TGND	Thermal GND Temperature	℃	25	-40 ～ 175

Simulation Parameters (Table)

Name	Content	unit	Default Value	Variable Range
Test_time	Test time in simulation	s	0.5	100μ ～ 0.5
Vin	Input Voltage	V	600	10~1200
Iout(peak)	Output Current (peak)	A	30	1~1000
fr	Output Frequency	Hz	50	50 ～ 1M
PF	Power Factor	-	0.9	0.5～1
Rg_on_HB	Gate Resistance (Source) ※	Ω	10	0.1 ～ 100
Rg_off_HB	Gate Resistance (Sink) ※	Ω	10	0.1 ～ 100
T_init	Initial Junction Temperature	℃	25	-40 ～ 175

※This setting is common to the U-V-W phases.

Simulation Circuit



Default Devices

Name	Device Type	Part No.	Specification
M1～M9	SiC Module (MOSFET)	SCZ4008DTA	750V/ 134A/ 8mΩ/ DOT247(Half Bridge)

Simulation Screen Overview

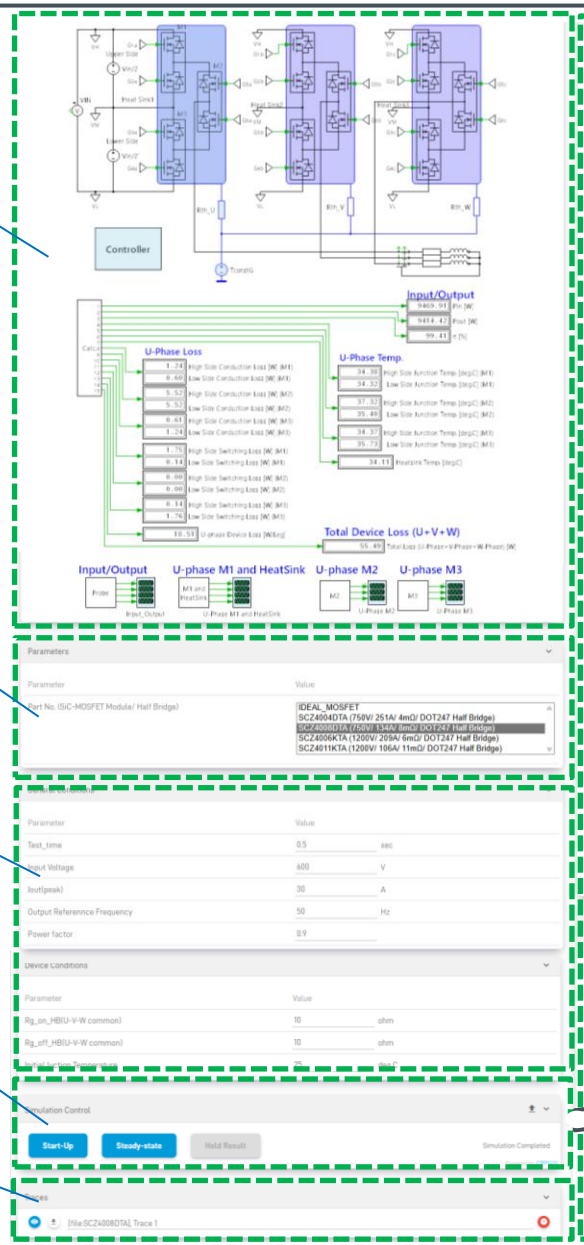
Schematic window
- Dialog parameters setting
- Results display

Device selection

Table parameters setting

Simulation control

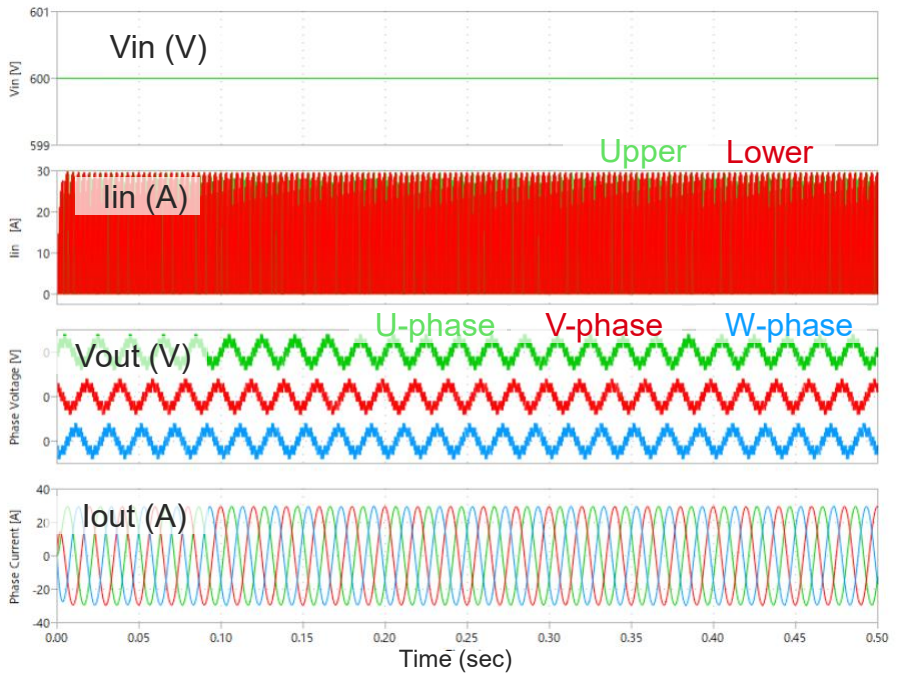
Trace selection



Waveforms

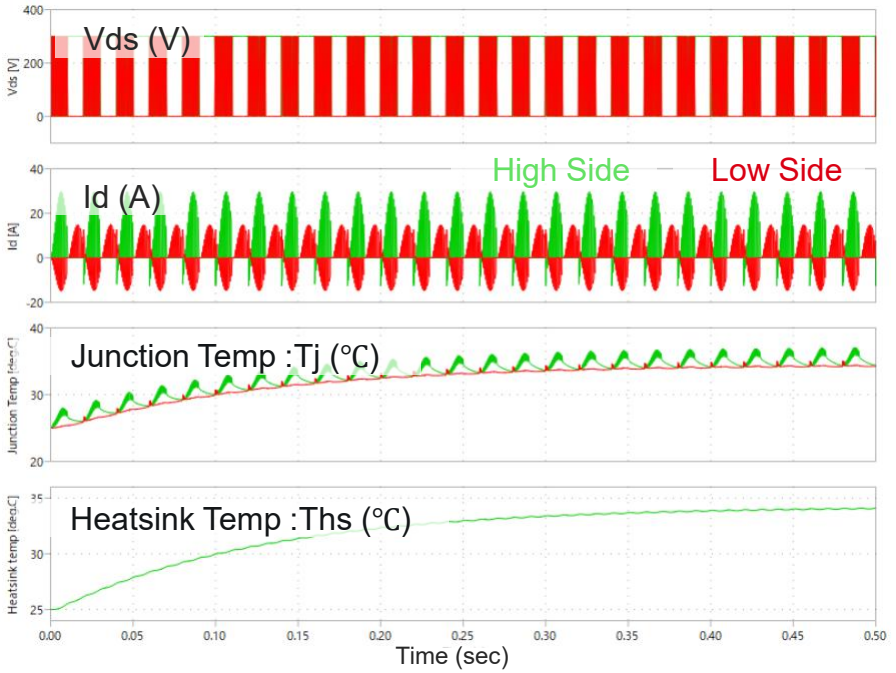
Simulation Results 1

Input and Output



Contents	Results
Input Power : Pin	9.470 (kW)
Output Power: Pout	9.414 (kW)
Efficiency: η	99.41 (%)

U-Phase M1 and HeatSink

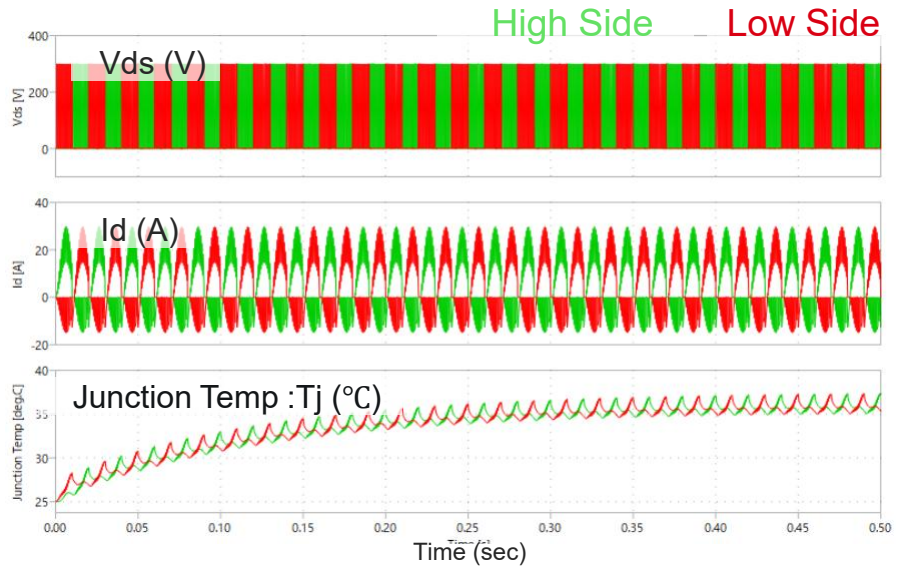


Contents	Results
Junction Temp: Tj (M1_HS)	34.38 (℃)
Junction Temp: Tj (M1_LS)	34.32 (℃)
Heatsink Temp: Ths	34.11 (℃)

Contents	Results
Conduction Loss: Pcond (M1_HS)	1.24 (W)
Switching Loss: Psw (M1_HS)	1.75 (W)
Conduction Loss: Pcond (M1_LS)	0.60 (W)
Switching Loss: Psw (M1_LS)	0.14 (W)

Simulation Results 3

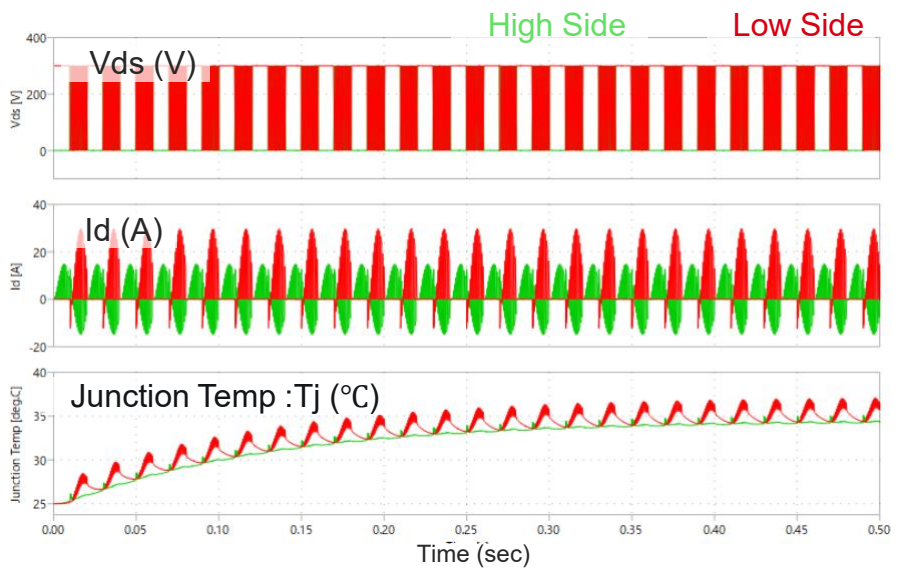
U-Phase M2



Contentsa	Results
Junction Temp: Tj (M2_HS)	37.32 (℃)
Junction Temp: Tj (M2_LS)	35.40 (℃)

Contents	Results
Conduction Loss: Pcond (M2_HS)	5.52 (W)
Switching Loss: Psw (M2_HS)	0.00 (W)
Conduction Loss: Pcond (M2_LS)	5.52 (W)
Switching Loss: Psw (M2_LS)	0.00 (W)

U-Phase M3



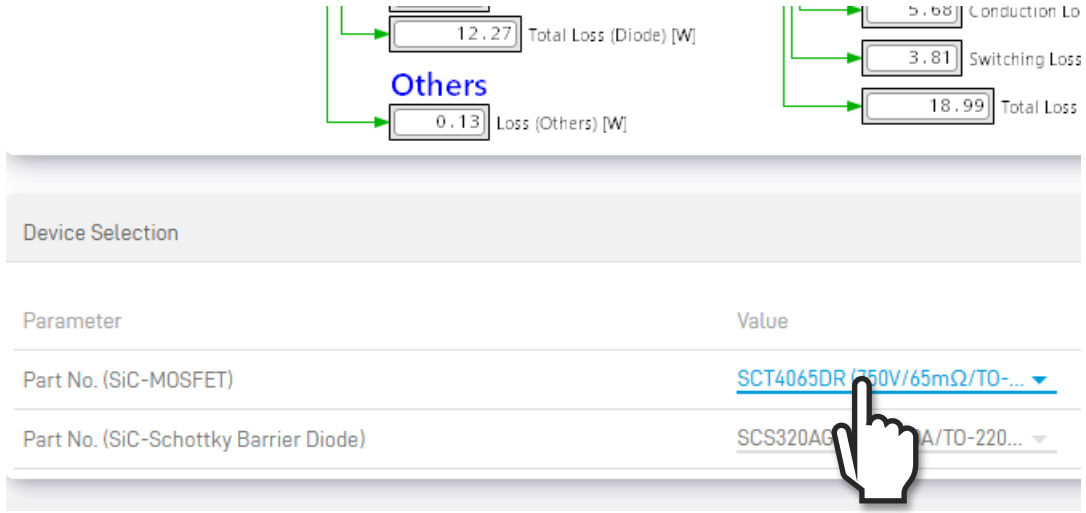
Contents	Results
Junction Temp: Tj (M3_HS)	34.37 (℃)
Junction Temp: Tj (M3_LS)	35.73 (℃)
Conduction Loss: Pcond (M3_HS)	0.61 (W)
Switching Loss: Psw (M3_HS)	0.14 (W)

Contents	Results
Conduction Loss: Pcond (M3_LS)	1.24 (W)
Switching Loss: Psw (M3_LS)	1.76 (W)
U-phase Device Loss (U+V+W)	18.51 (W/Leg)
Total Device Loss (U+V+W)	55.49(W)

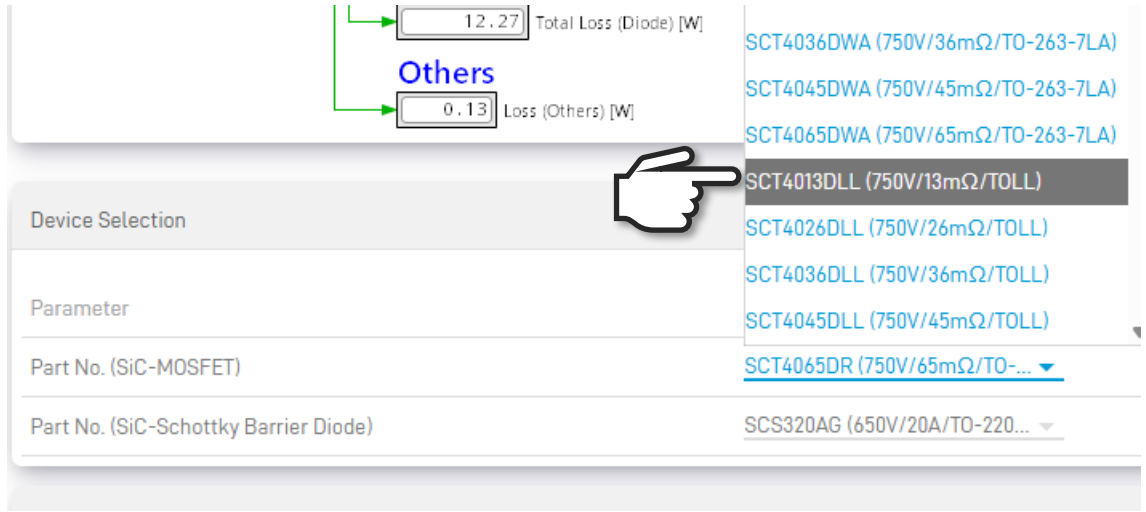
How to change the devices

The figure of "(A-011-D) DC-AC Totem-Pole PFC Diode Rectification (Discrete)" is used as an example in this page.

Device Selection



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

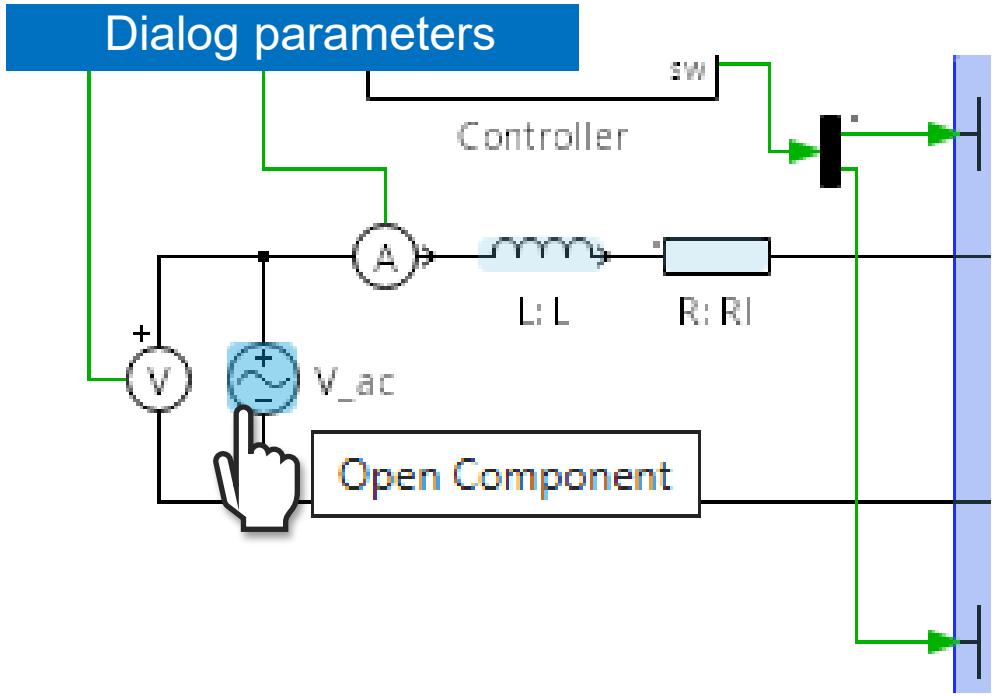


Available device lists are appeared like the above, and you can select a favorite device from these.

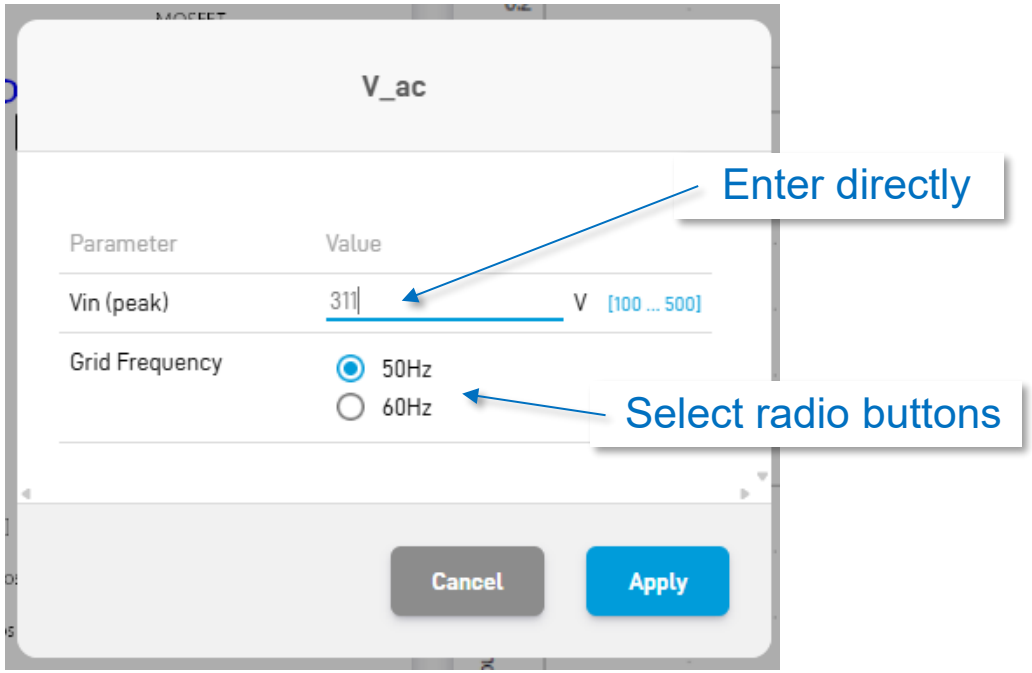
How to change Dialog parameters

The figure of “(A-011-D) DC-AC Totem-Pole PFC Diode Rectification (Discrete)” is used as an example in this page.

- 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 mouse’s left button.



- 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.

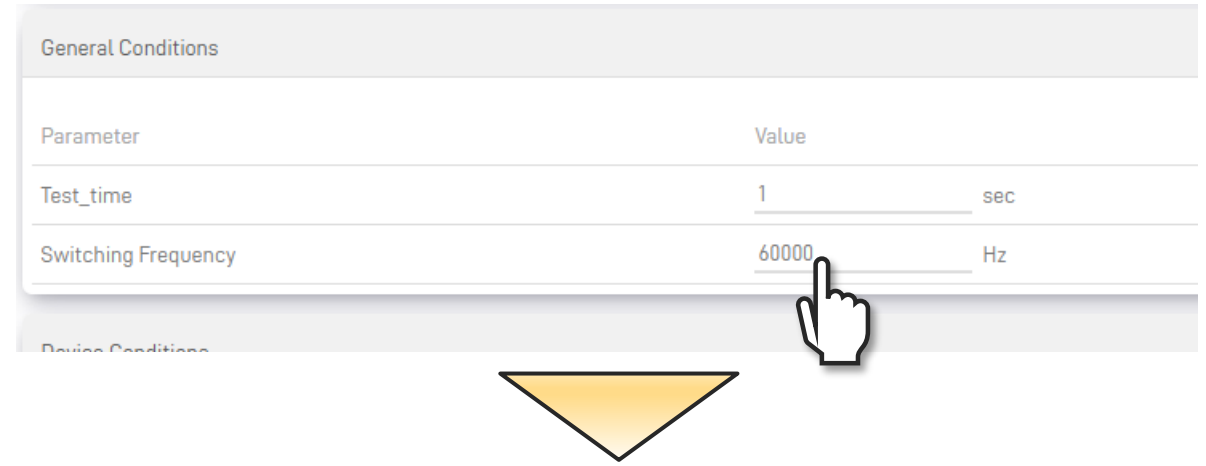


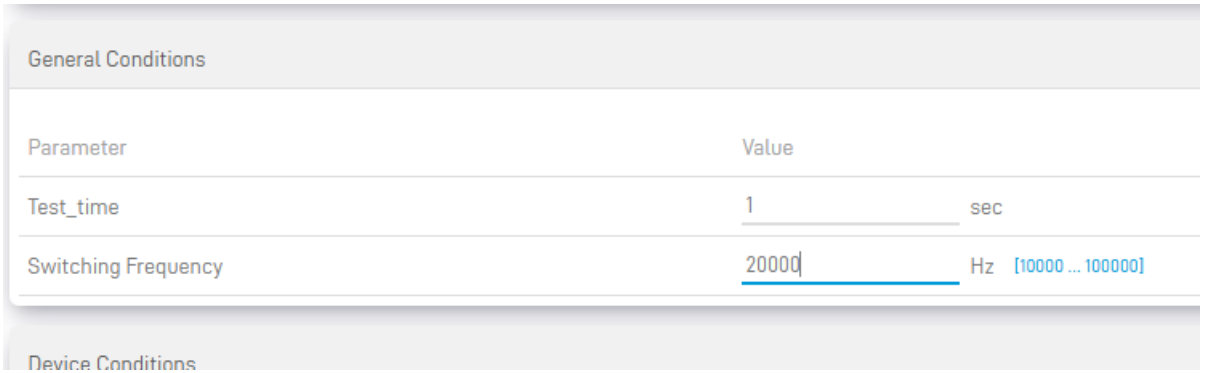
*Note: Parameters can be entered directly are limited by Min. and Max. values to avoid unexpected system errors.
(e.g. “Vin(peak)” is limited between 100 and 500V in the above.)

How to change Table parameters

The figure of “(A-011-D) DC-AC Totem-Pole PFC Diode Rectification (Discrete)” is used as an example in this page.

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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