(C-011-D) DC-DC Forward Converter (Discrete)

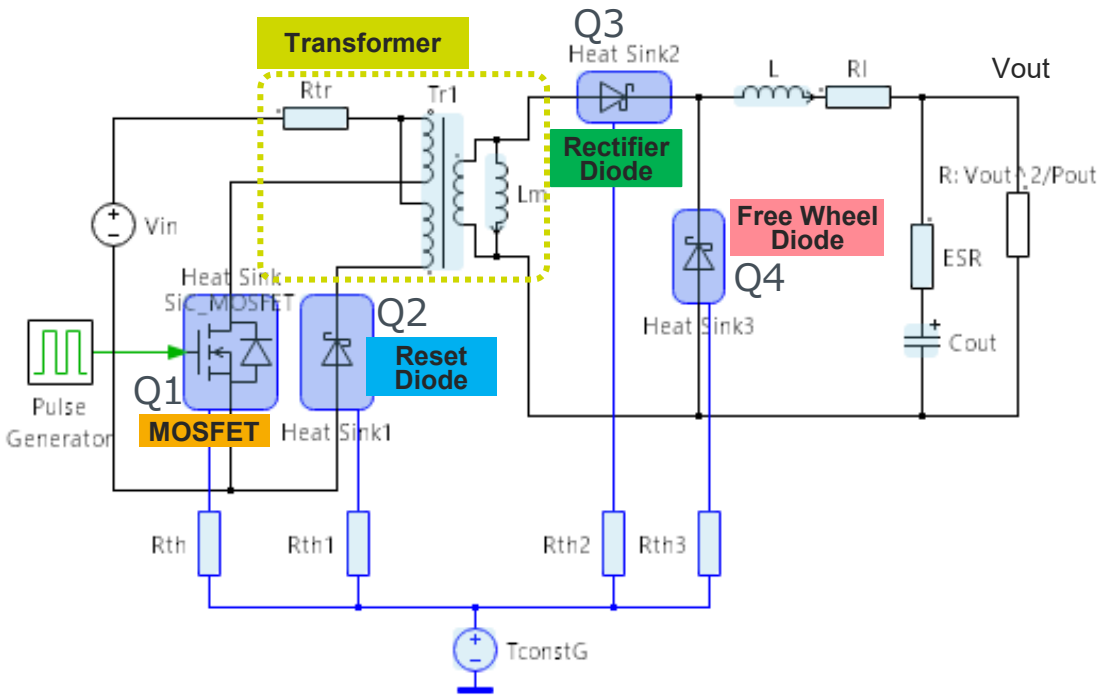
Simulation Parameters (Dialog)

	Name	Content	unit	Default Value	Variable Range
	Cout	Output Capacitor	F	500u	1u ～ 10m
	ESR	ESR of Cout	Ω	3m	1u ～ 100
	L	Inductive Load	H	300u	1u ～ 10m
	Rl	Choke Resistance	Ω	100m	1m ～ 100
Transformer	Lm	Magnetizing Inductance	H	2m	1u ～ 10m
Transformer	Np	Number of Primary windings	turns	3	1~100
Transformer	Ns	Number of Secondary windings	turns	1	1~100
Transformer	Rtr	Parasitic Resistance	Ω	100m	1m ～ 10
MOS FET	Thcap_mos	Thermal Capacitance	J/K	0.1	1m ～ 100
MOS FET	Rth_mos	Thermal Resistance	K/W	0.5	1m ～ 100
Reset Diode	Thcap_rst	Thermal Capacitance	J/K	0.1	1m ～ 100
Reset Diode	Rth_rst	Thermal Resistance	K/W	0.5	1m ～ 100
Rectifier Diode	Thcap_rec	Thermal Capacitance	J/K	0.1	1m ～ 100
Rectifier Diode	Rth_rec	Thermal Resistance	K/W	0.5	1m ～ 100
FW Diode	Thcap_fw	Thermal Capacitance	J/K	0.1	1m ～ 100
FW Diode	Rth_fw	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	0.4	100u ～ 0.5
fs	Switching Frequency	kHz	100	10 ～ 1000
Vin	Input Voltage	V	300	100~ 1000
Vout	Output Voltage	V	48	5 ~ 1000
Pout	Output Power	W	500	10~100k
Rg_on	Gate Resistance (Source)	Ω	4.7	0.1 ～ 100
Rg_off	Gate Resistance (Sink)	Ω	4.7	0.1 ～ 100
T_init	Initial Junction Temperature	℃	25	-40 ～ 175

Simulation Circuit



※Transformer has two primary windings, and the both have the same number of turns.

Default Devices

Name	Device Type	Part No.	Specification
Q1	SiC MOSFET	SCT4065DR	750V/25A/65mΩ/TO-247-4L
Q2～4	SiC Schottky Barrier Diode	SCS320AG	650V/20A/TO-220ACGE

Simulation Screen Overview

Schematic window
- Dialog parameters setting
- Results display

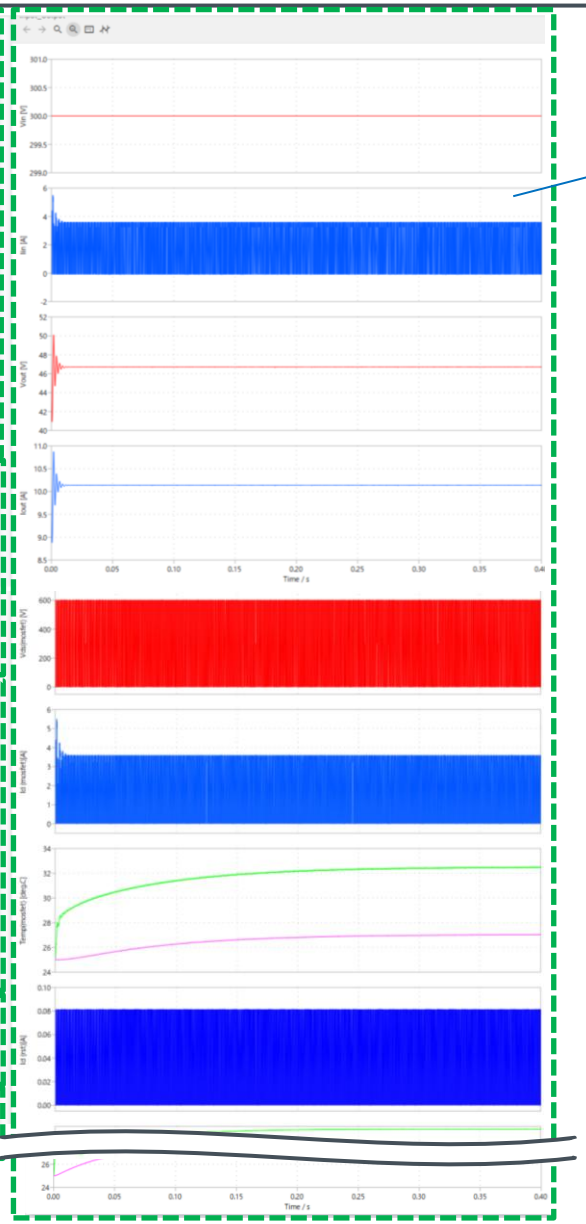
Device selection

Table parameters setting

Simulation control

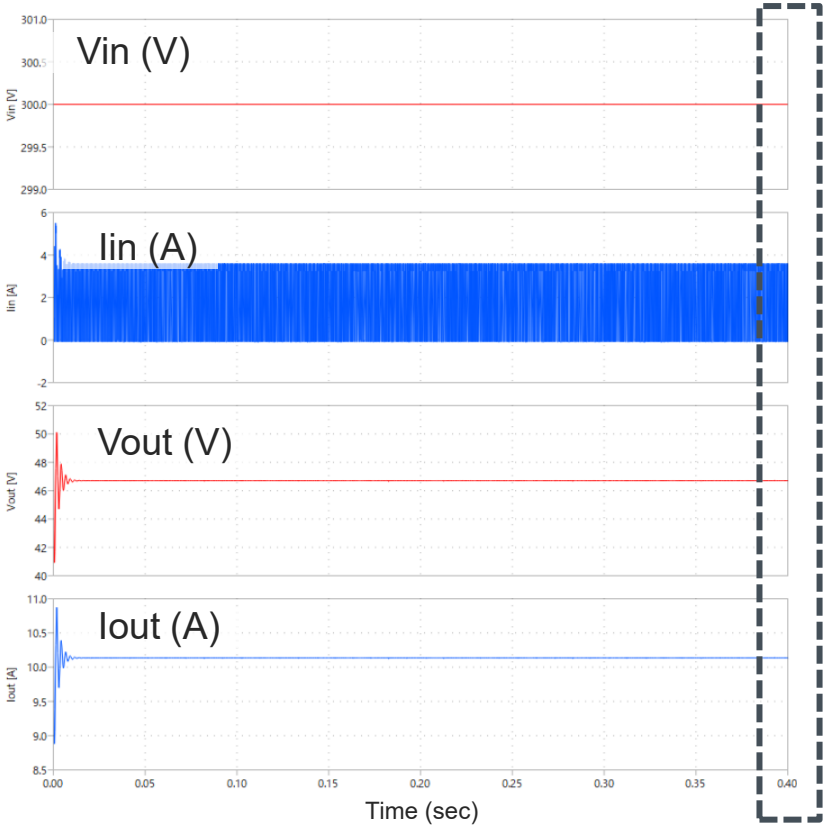
Trace selection

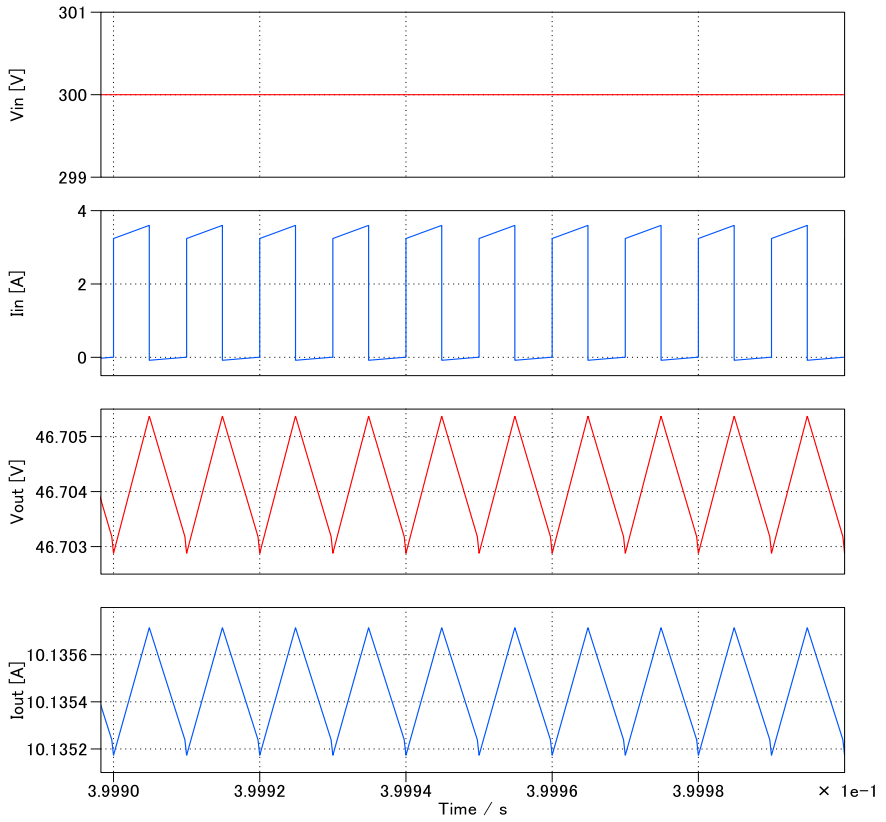
Waveforms



Simulation Results

Input and Output

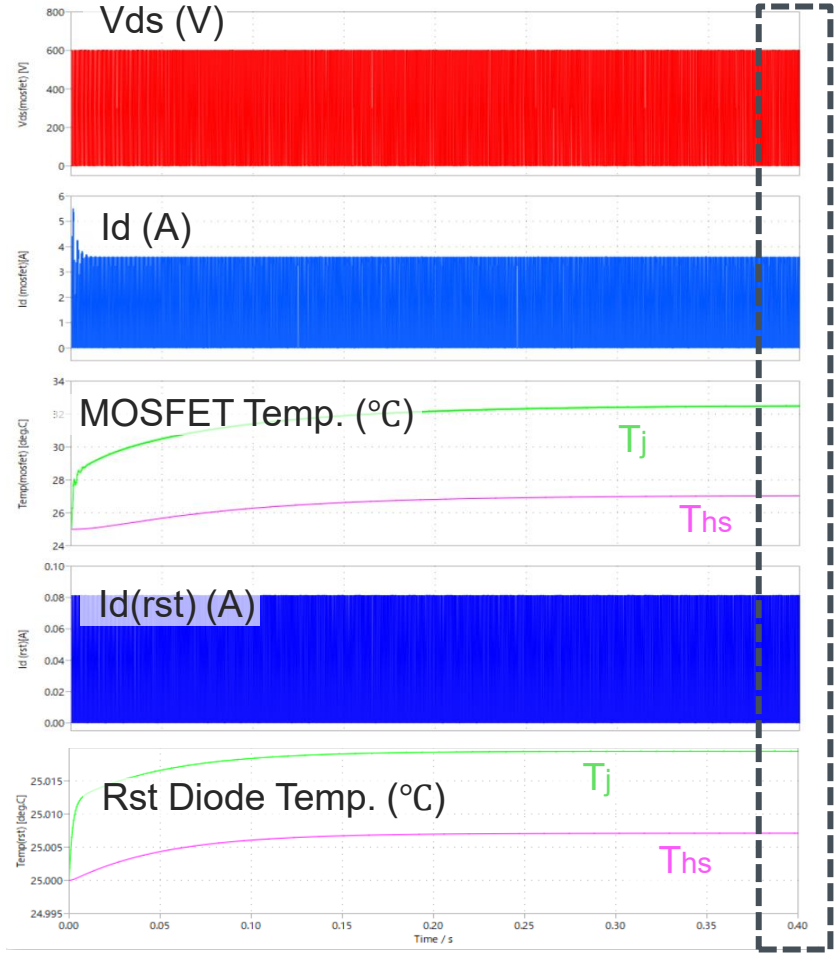


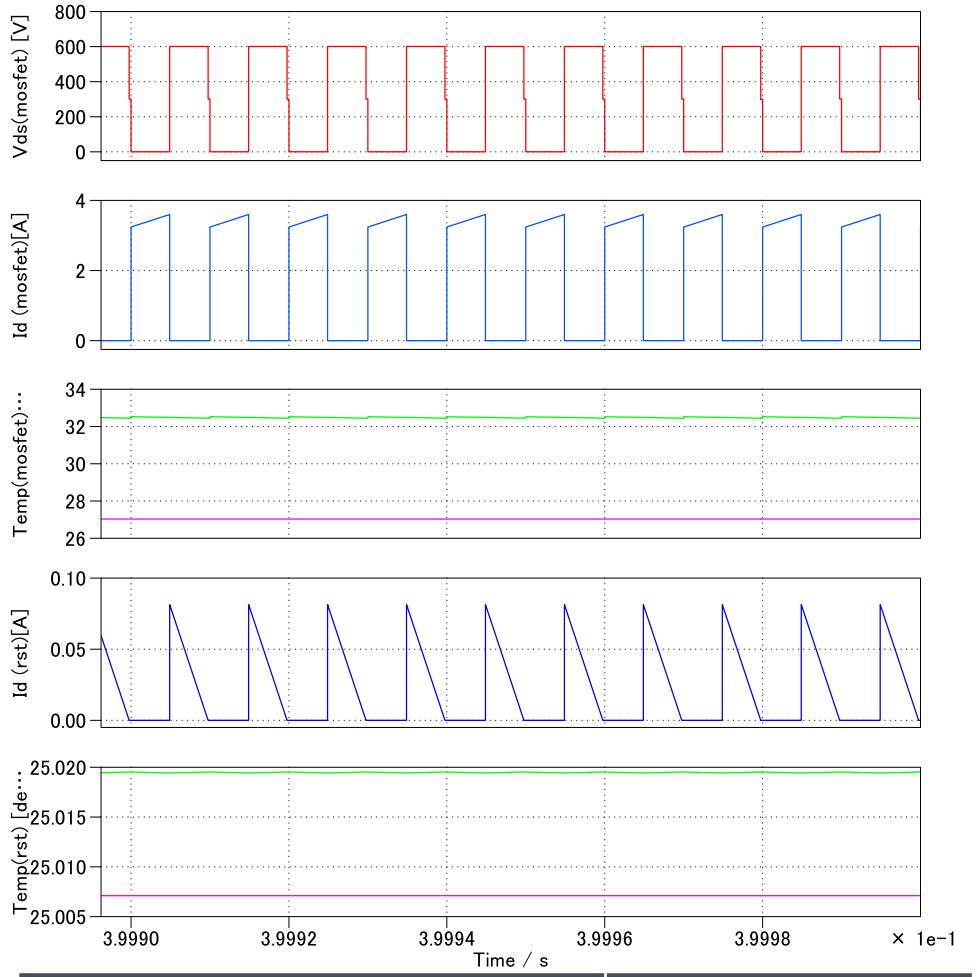


Contents	Results
Input Power : Pin	499.8(W)
Output Power: Pout	473.4 (W)
Efficiency: η	94.72 (%)

Simulation Results

Primary Side



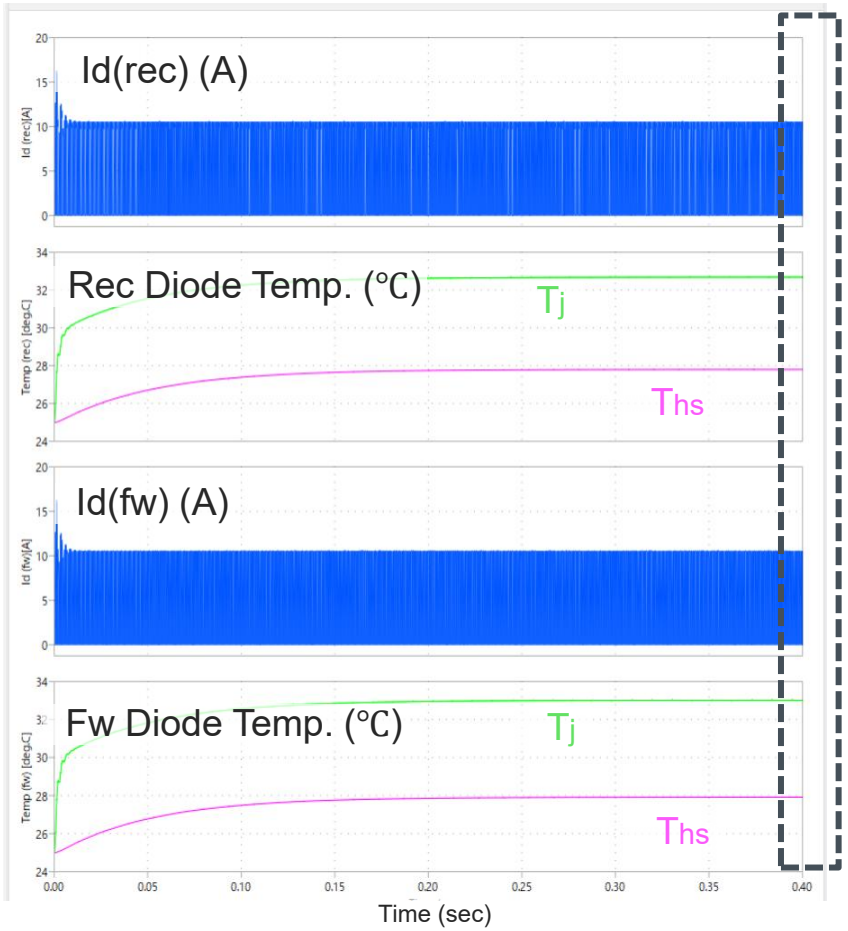


Contents	Results
Junction Temp: Tj (mosfet)	32.48 (℃)
Heatsink Temp: Ths (mosfet)	27.03 (℃)
Conduction Loss: Pcond (mosfet)	0.42 (W)
Switching Loss: Psw (mosfet)	3.70(W)

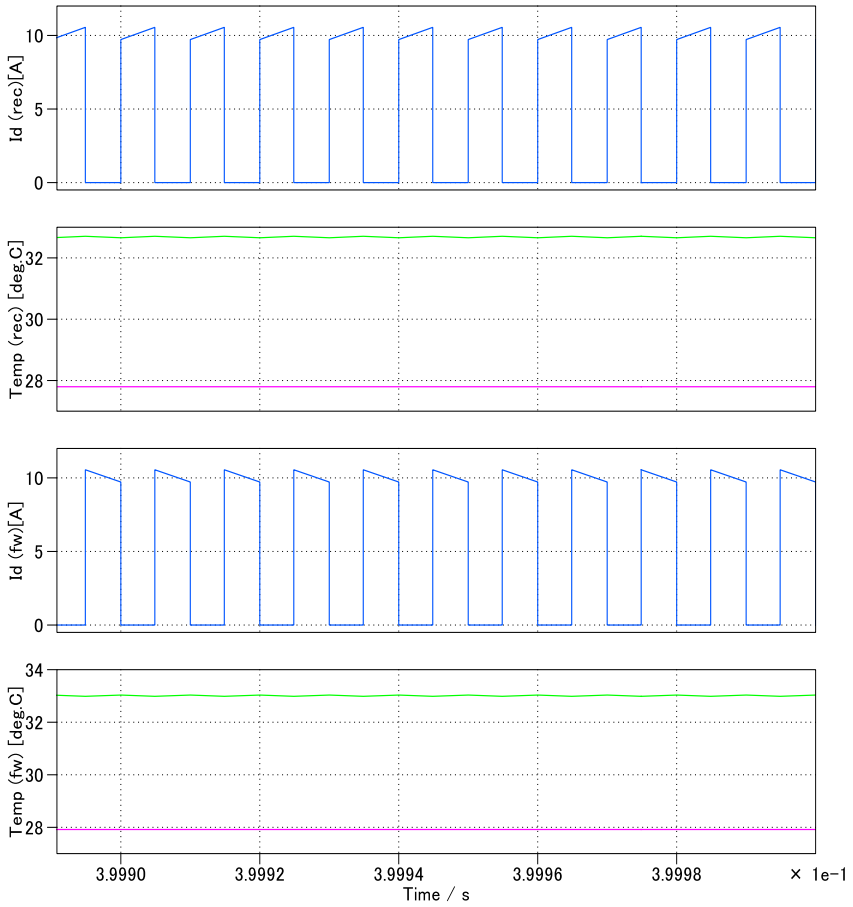
Contents	Results
Junction Temp : Tj (rst)	25.02(℃)
Heatsink Temp: Ths (rst)	25.01(℃)
RST Diode Loss: Pcond(rst)	0.01(W)

Simulation Results

Secondary Side



Contents	Results
Junction Temp : T(rec)	32.68 (℃)
Heatsink Temp : Ths (rec)	27.80 (℃)
REC Diode Loss: Pcond(rec)	5.60 (W)

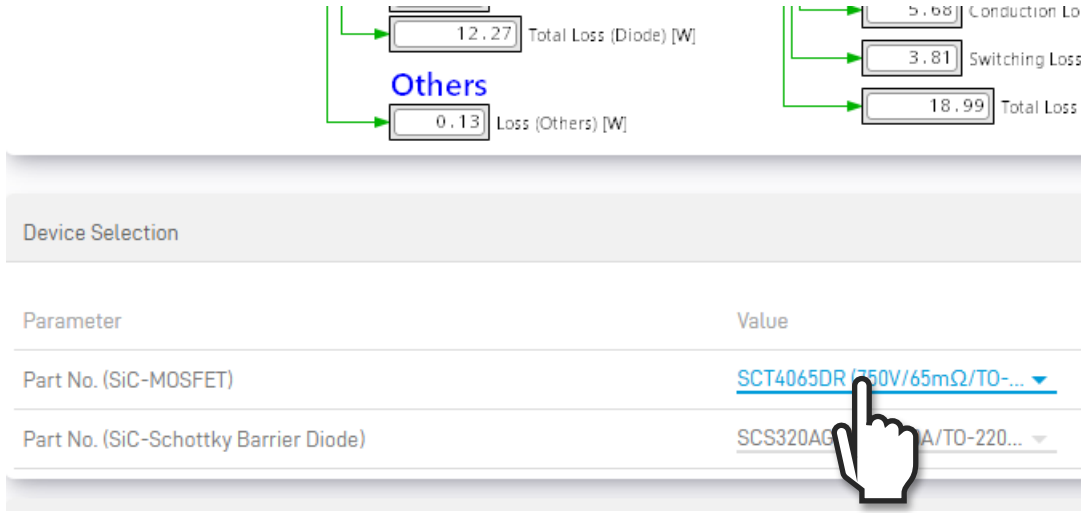


Contents	Results
Junction Temp : T(fw)	33.01(℃)
Heatsink Temp : Ths (fw)	27.92(℃)
FW Diode Loss: Pcond(fw)	5.84 (W)
Total Loss: Ptotal (mosfet+SBD)	15.56 (W)

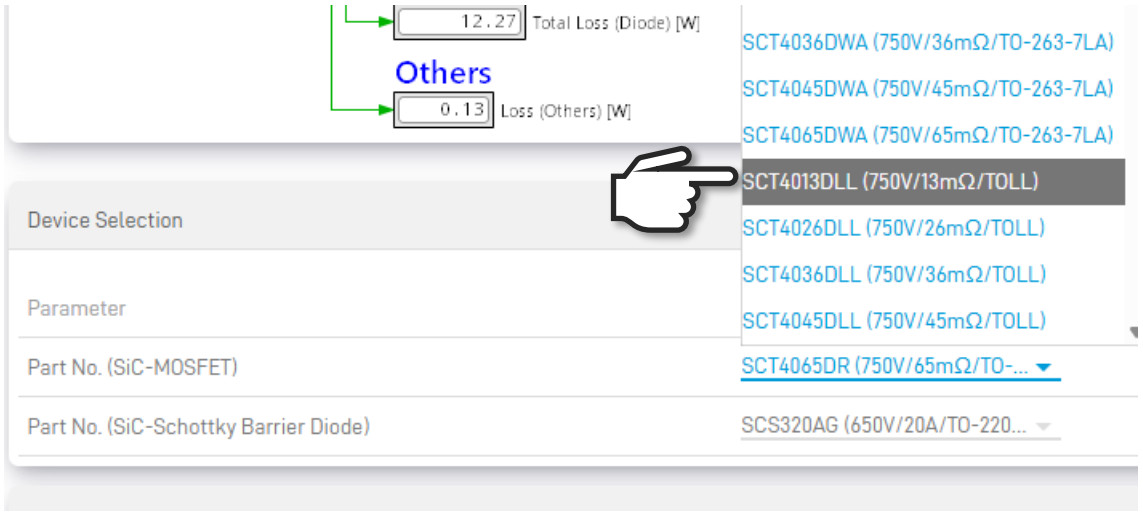
How to change the devices

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.

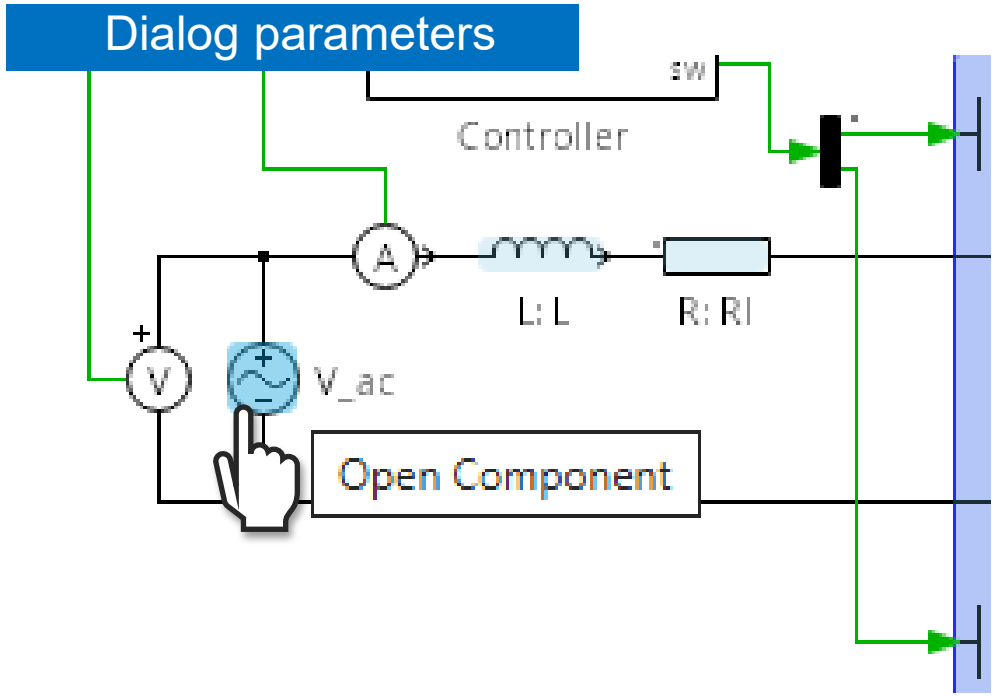


Available device lists are appeared like the above, and you can select a favorite device from these.

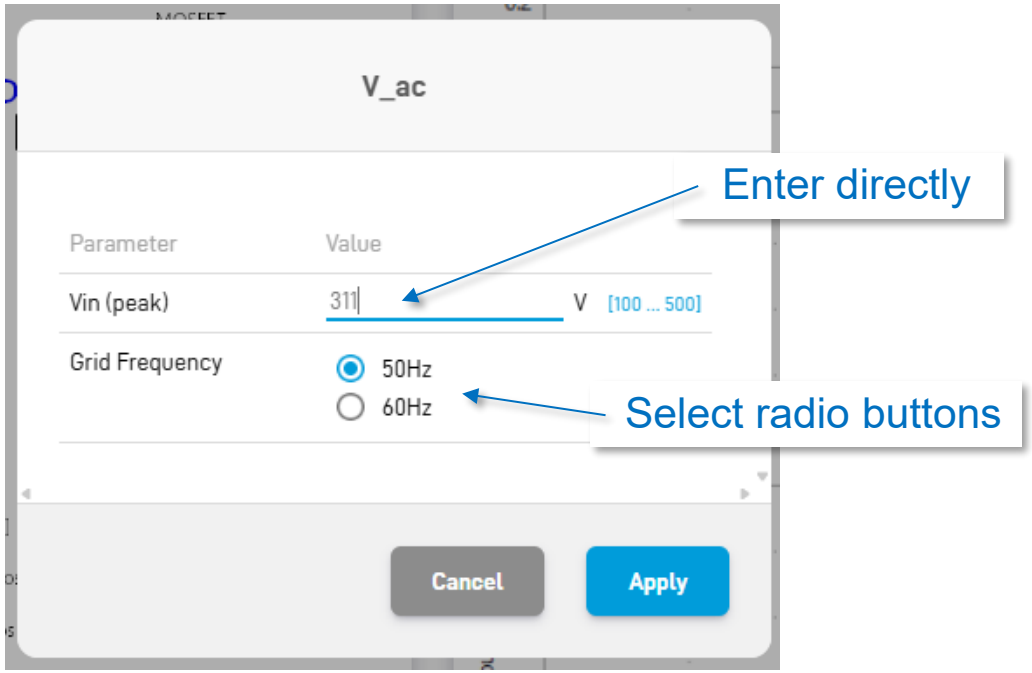
How to change Dialog parameters

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.

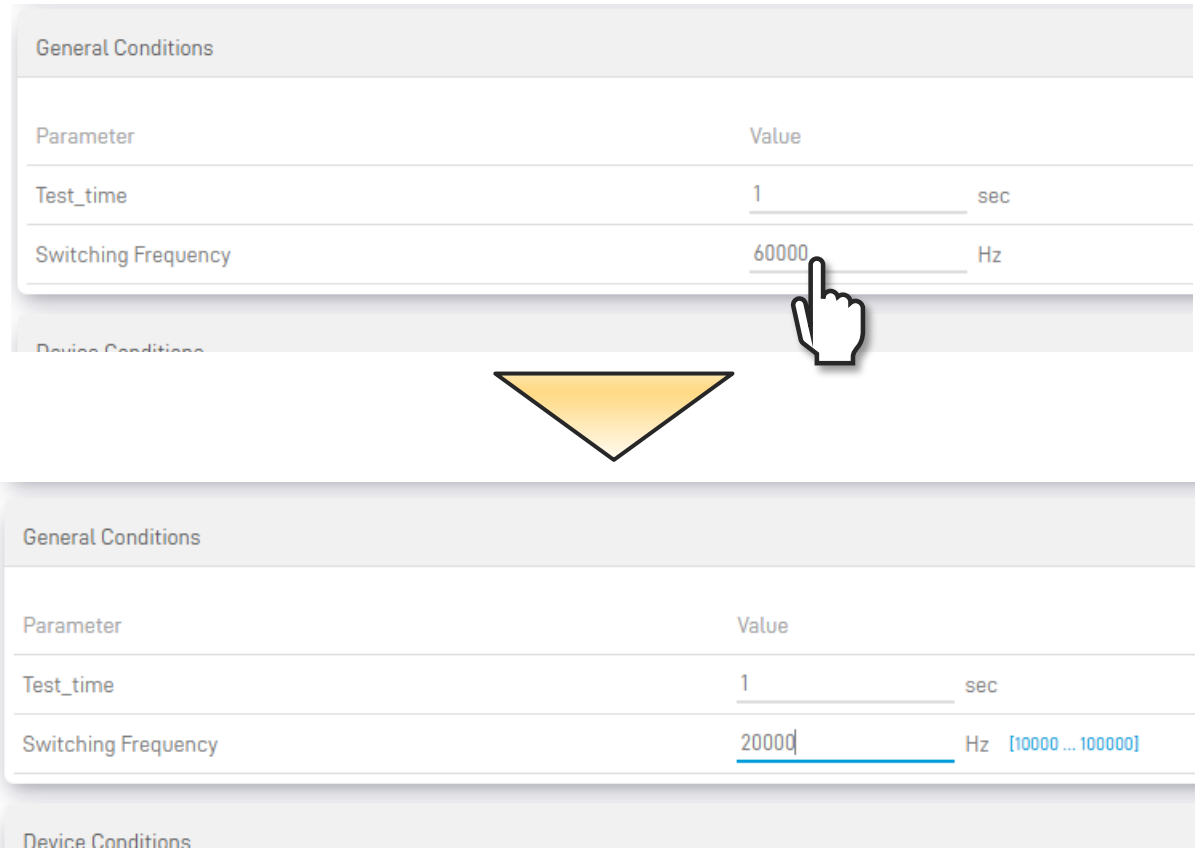


*Note: Parameters can be entered directly are limited by Min. and Max. values to avoid unexpected system errors.
(e.g. “Vin(peak)” is limited between 100 and 500V in the above.)

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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