

(B-009-D) DC-AC 3-phase 2-Level Motor Driver (Discrete)

Simulation Parameters (Dialog)

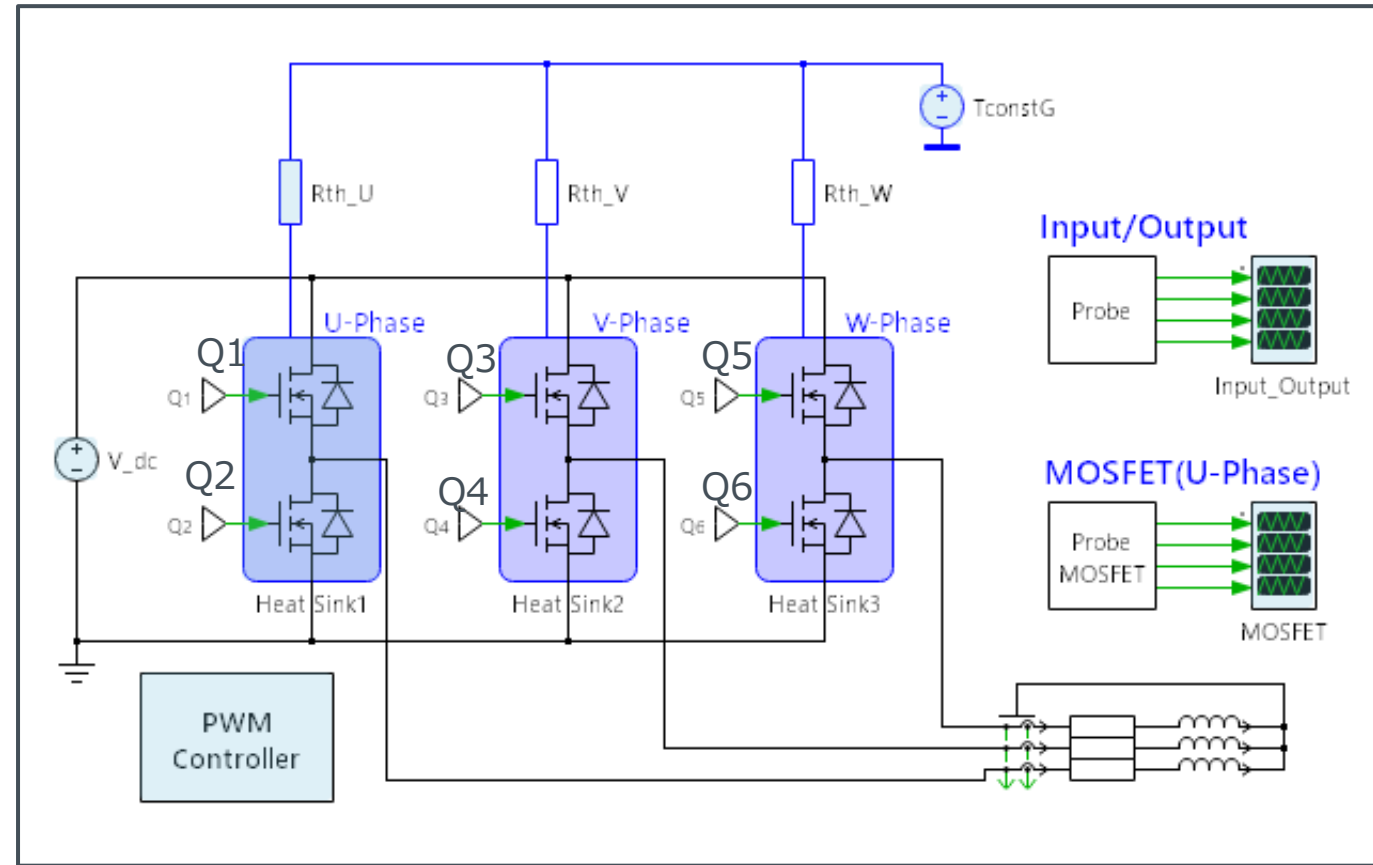
Name	Content	unit	Default Value	Variable Range
Controller	fs	Switching Frequency	kHz	1~ 1000
	DT	Dead time	ns	100 ~100000
	M	Modulation Factor	-	0.5~1
V_dc	Input Voltage	V	600	100~1200
Thcap	Thermal Capacitance ※	J/K	0.1	1m ~ 100
Rth	Thermal Resistance ※	K/W	0.5	1m ~ 100
TGND	Thermal GND Temperature	°C	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
Iout(peak)	Output Current (peak)	A	15	1~1000
fr	Output Frequency	Hz	50	50 ~ 1M
PF	Power Factor	-	0.9	0.5~1
Rg_on※	Gate Resistance (Source) ※	Ω	6.8	0.1 ~ 100
Rg_off※	Gate Resistance (Sink) ※	Ω	6.8	0.1 ~ 100
T_init	Initial Junction Temperature	°C	25	-40 ~ 175

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

Simulation Circuit



Power Device

Name	Device Type	Part No.	Specification
Q1~Q6	SiC MOSFET	SCT4065DR	750V/65mΩ/TO-247-4L

Schematic window

- Dialog parameters setting
- Results display

Clicking blue-colored symbols will allow you to change the parameters.

U-Phase

Calc.	Value	Unit
High Side Junction Temp. [deg.C]	34.88	deg.C
Low Side Junction Temp. [deg.C]	38.83	deg.C
Heatsink Temp. [deg.C]	30.03	deg.C
Conduction Loss [W/device]	4.23	W
Switching Loss [W/device]	0.83	W
Uphase Device Loss [W/ang]	10.32	W
Total Device Loss (U+V+W)	20.34	W

Input/Output

Pin [W]	Port [W]	η [%]
4582.04	4578.88	99.25

Simulation Control

Start-Up Steady-state Hold Result Simulation Completed

Traces

[file:SCT4065DR], Trace 1

Power factor 0.9

Device Conditions

Parameter	Value	Unit
Rg_on (U-V-W phase Common)	6.8	ohm
Rg_off (U-V-W phase Common)	6.8	ohm
Initial Junction Temperature	25	deg.C

Waveforms

Vin [V]

lin [A]

Phase Voltage [V]

Phase Current [A]

Time [s]

Junction Temp [deg.C]

Heatsink Temp [deg.C]

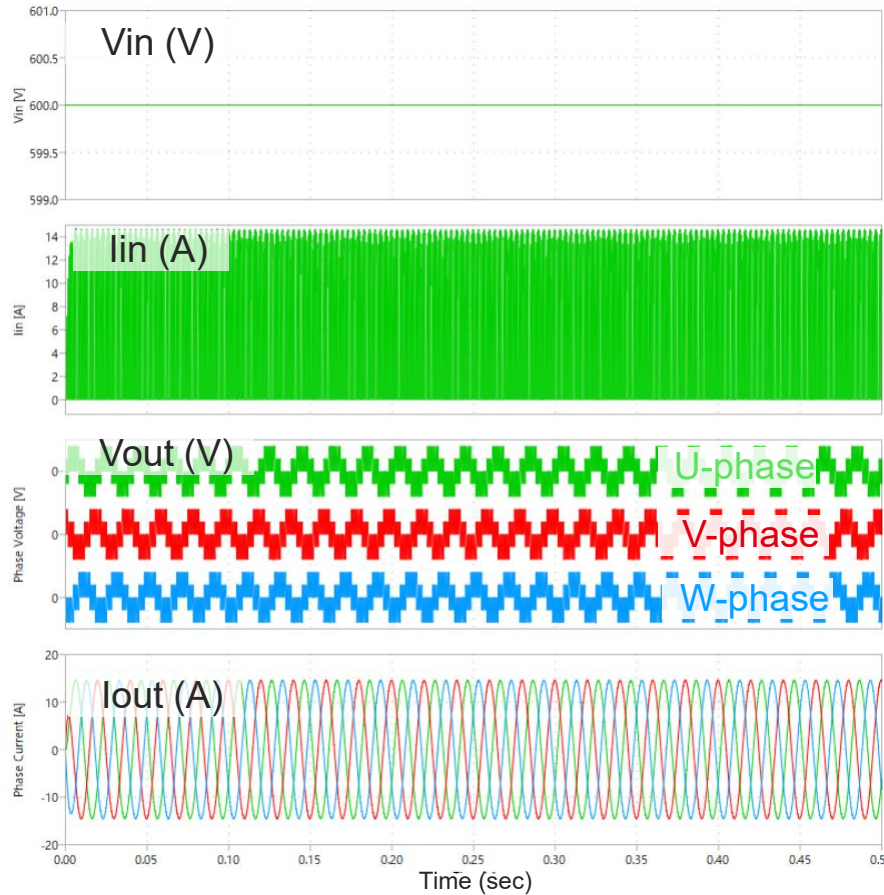
Time / s

Simulation control

Trace selection

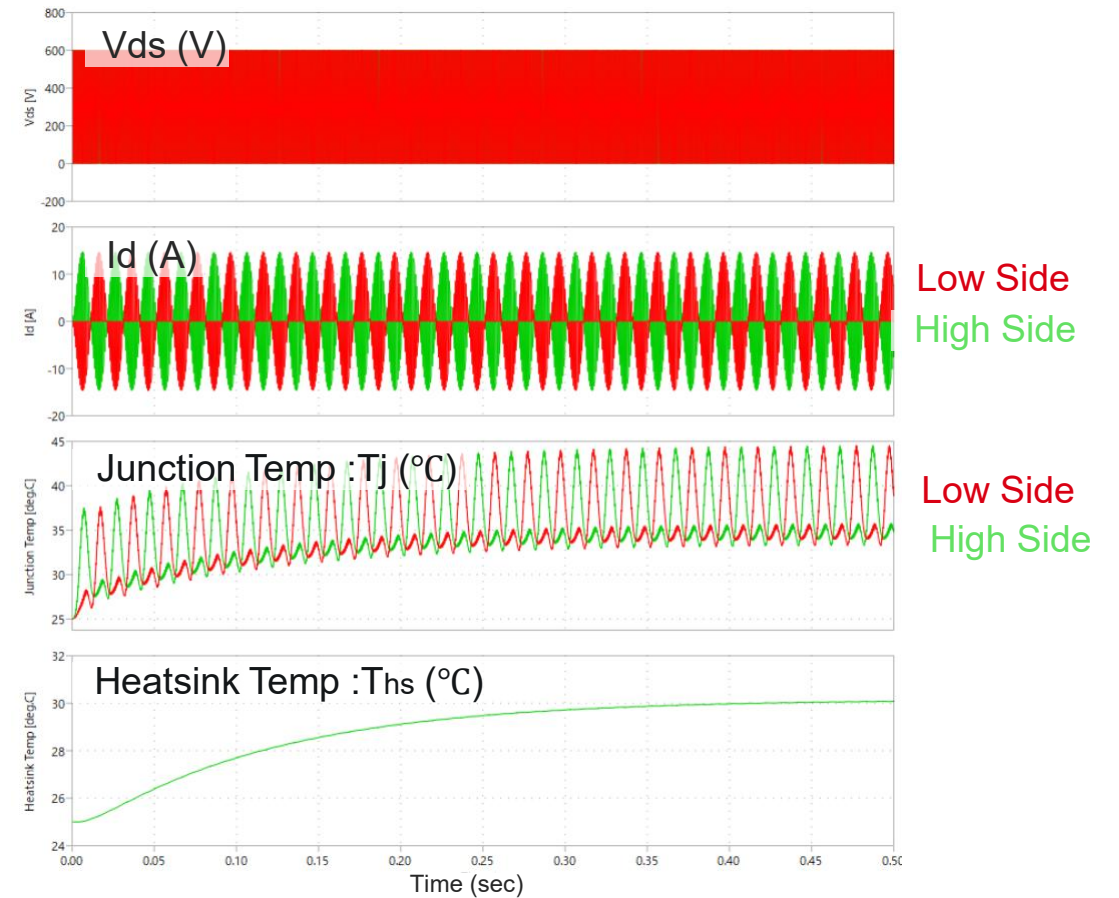
Table parameters setting

Input and Output



Contents	Results
Input Power : P_{in}	4.582 (kW)
Output Power: P_{out}	4.579 (kW)
Efficiency: η	99.26 (%)

U-Phase



Contents	Results	Contents	Results
U-phase Device Loss	10.32 (W/Leg)	Junction Temp: T_j (HS)	34.88 (°C)
Total Device Loss(U+V+W)	30.94 (°C)	Junction Temp: T_j (LS)	38.83 (°C)
		Heatsink Temp: T_{hs}	30.08 (°C)
		Conduction Loss: P_{cond} (HS)	4.31 (W/ device)
		Switching Loss: P_{sw} (HS)	0.85 (W/ device)

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.



You can select the simulation devices at "Step-2: Device Selection"

Step 2: Device Selection

Please check the checkboxes of the devices you want to simulate (Square checkboxes allow you to select up to three devices simultaneously.)

You can also select IDEAL devices (no-loss).

In addition, clicking PDF icon will allow you to view the datasheet of the certain device.

Selected device names are shown here.

Parameter	Value
V_{DSS}	750V
$R_{DS(on)}$ (Typ.)	65mΩ
I_D^{-1}	25A
P_D	88W

Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Easy to parallel
- 5) Simple to drive
- 6) Pb-free lead plating ; RoHS compliant

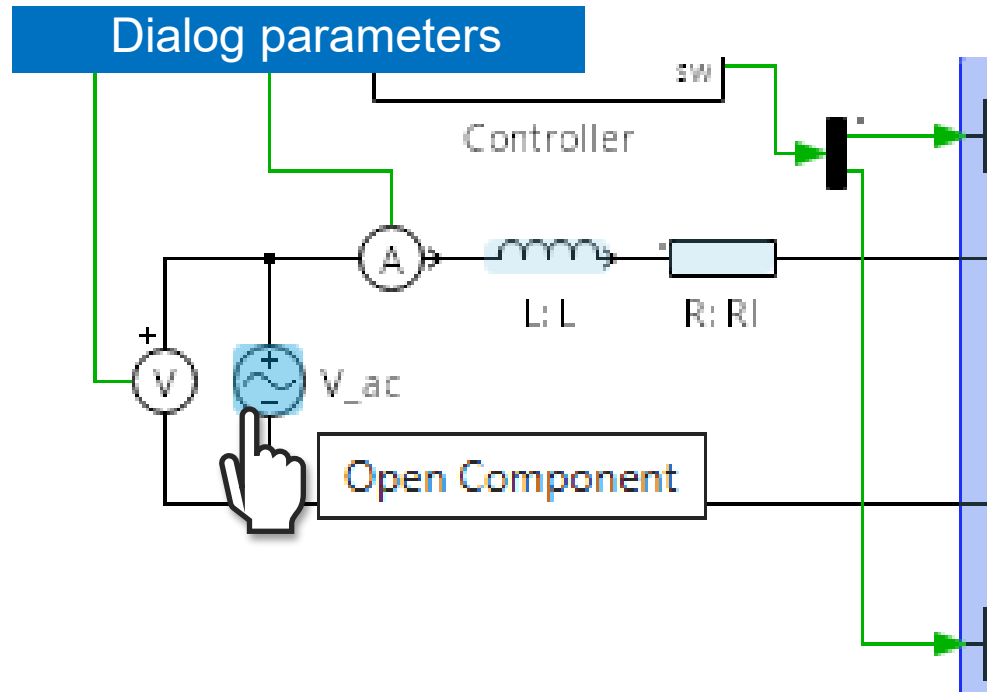
How to change Dialog parameters

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

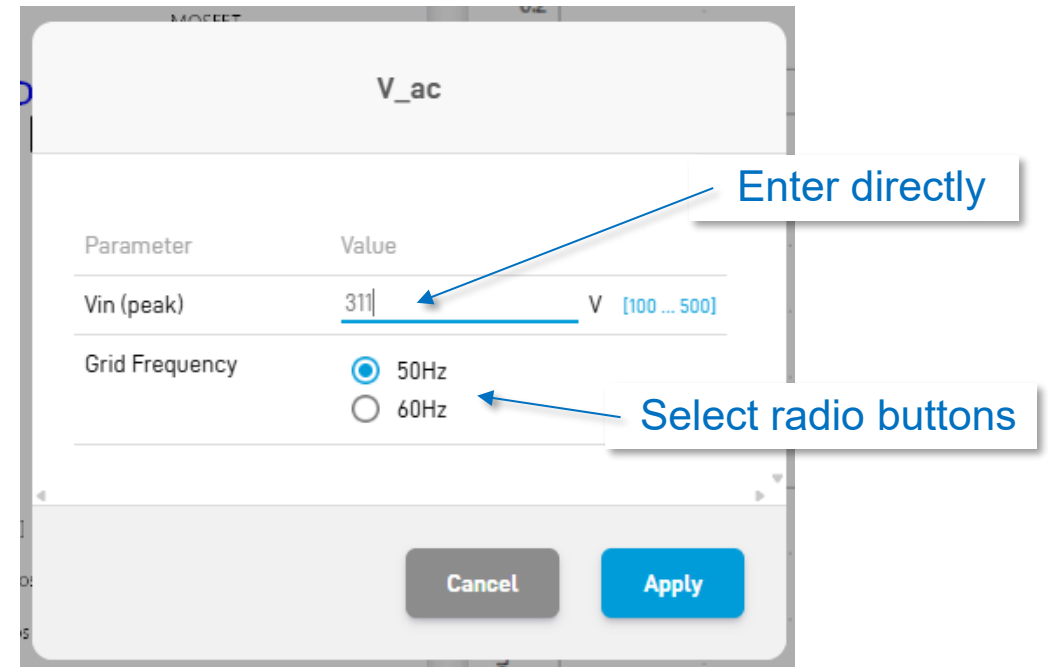
ROHM PLECS Simulator
Simulation Example



- 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.)

Table parameters

General Conditions

Parameter	Value
Test_time	1 sec
Switching Frequency	60000 Hz

Device Conditions

General Conditions

Parameter	Value
Test_time	1 sec
Switching Frequency	<u>20000</u> Hz [10000 ... 100000]

Device Conditions

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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