

(B-004-D) DC-AC single-phase 2-Level Full-Bridge Inverter (Discrete)

Simulation Parameters (Dialog)

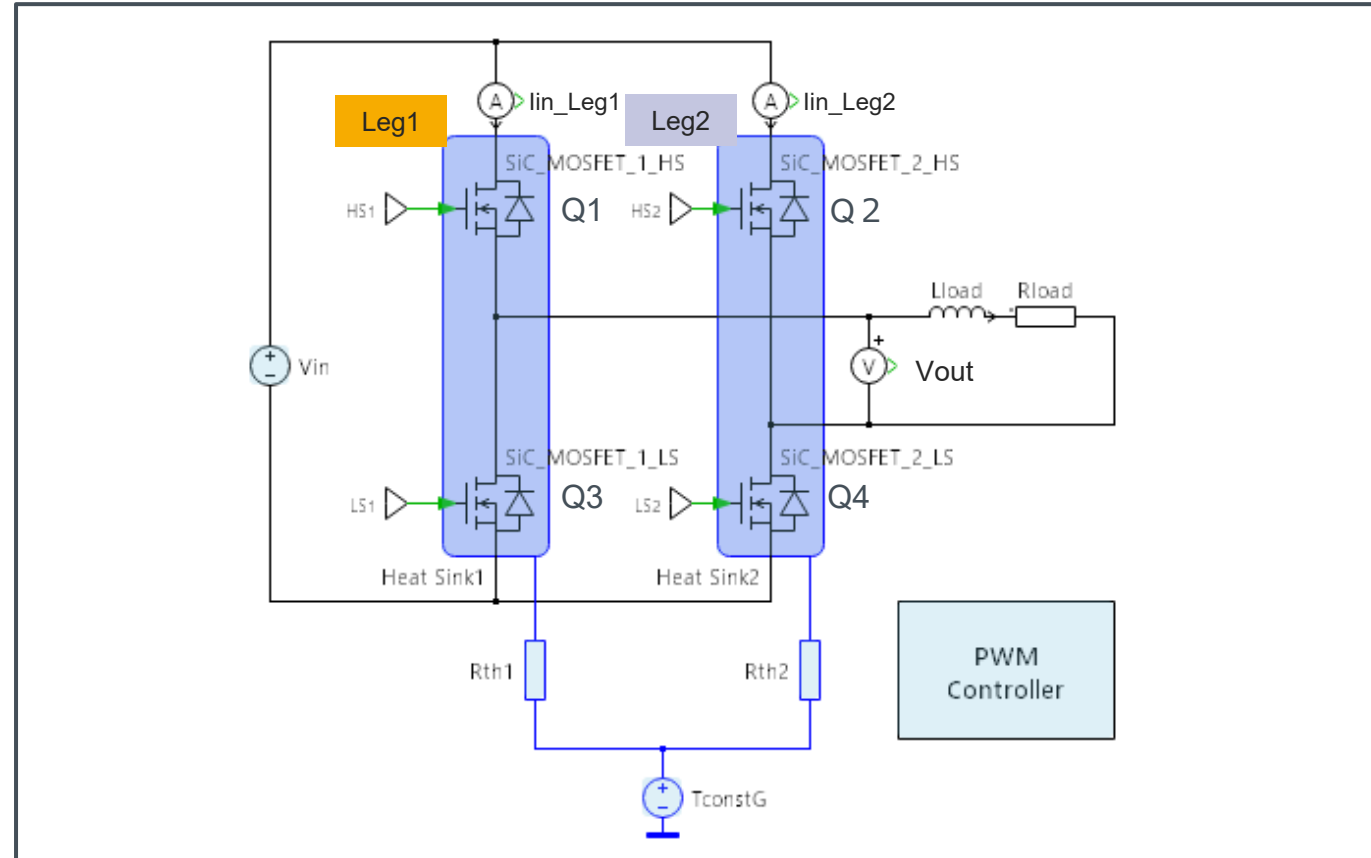
Name	Content	unit	Default Value	Variable Range
Vin	Input Voltage	V	400	100 ~ 1000
fs	Switching Frequency	kHz	20	1~1000
M	Modulation Index	-	0.8	0.5~1
DT	Dead Time	ns	800	100~10000
Thcap_1	Thermal Capacitance	J/K	0.1	1m ~ 100
Rth_1	Thermal Resistance	K/W	0.5	1m ~ 100
Thcap_2	Thermal Capacitance	J/K	0.1	1m ~ 100
Rth_2	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	100u ~ 0.5
lopeak	Output Current (peak)	A	15	1 ~ 100
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

※ Same value at Leg 1 and 2.

Simulation Circuit



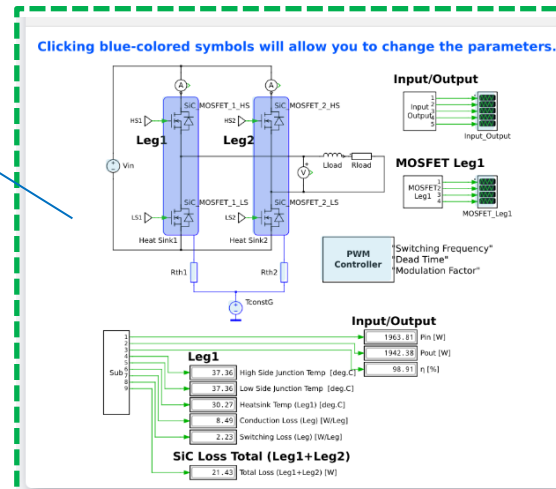
Power Device

Name	Device Type	Part No.	Specification
Q1~Q4	SiC-MOSFET	SCT4065DR	750V/25A/65mΩ/TO-247-4L

Simulation Screen Overview

Schematic window

- Dialog parameters setting
- Results display



Simulation control

Simulation Control

Start-Up Steady-state Hold Result Simulation Completed

Powered by PLECS

Trace selection

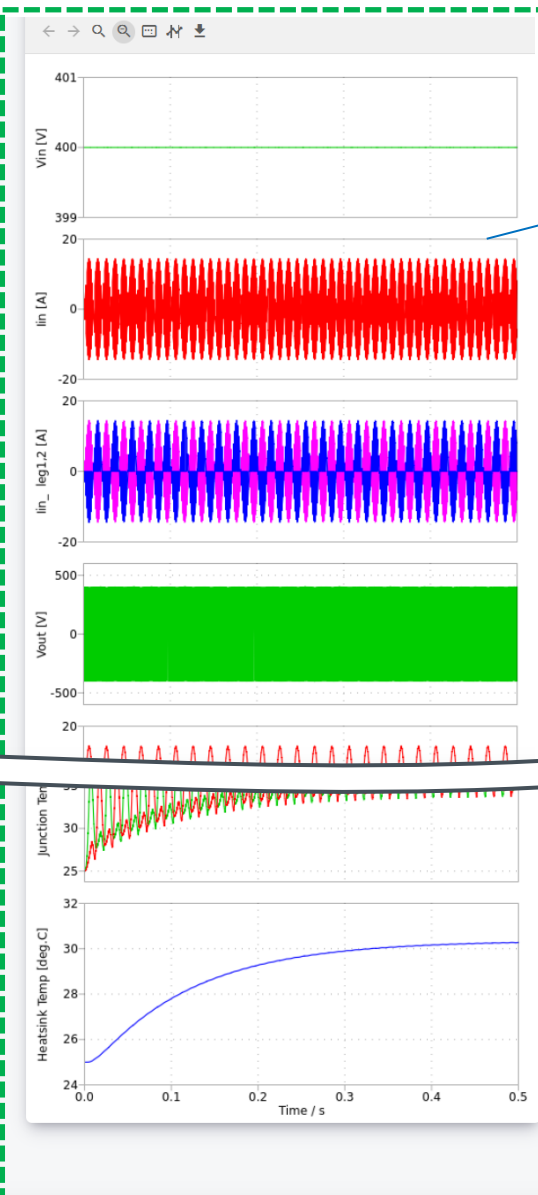
Traces

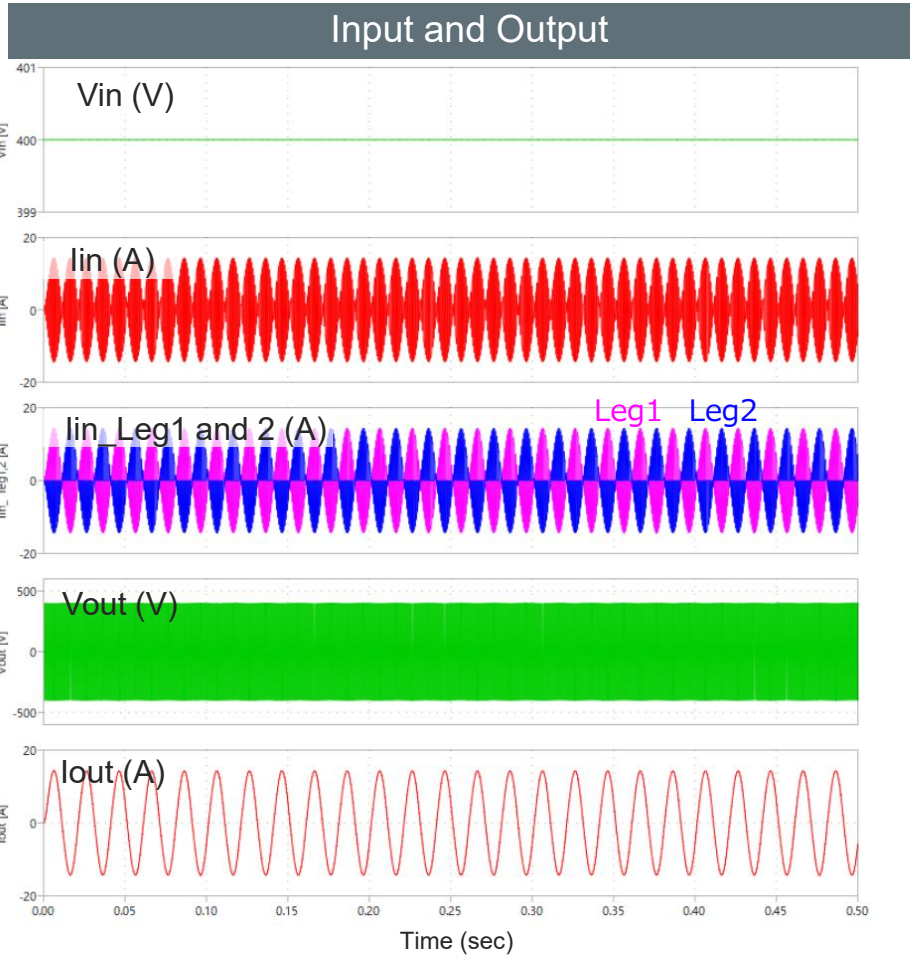
[file:SCT4065DRI], Trace 1

Table parameters setting

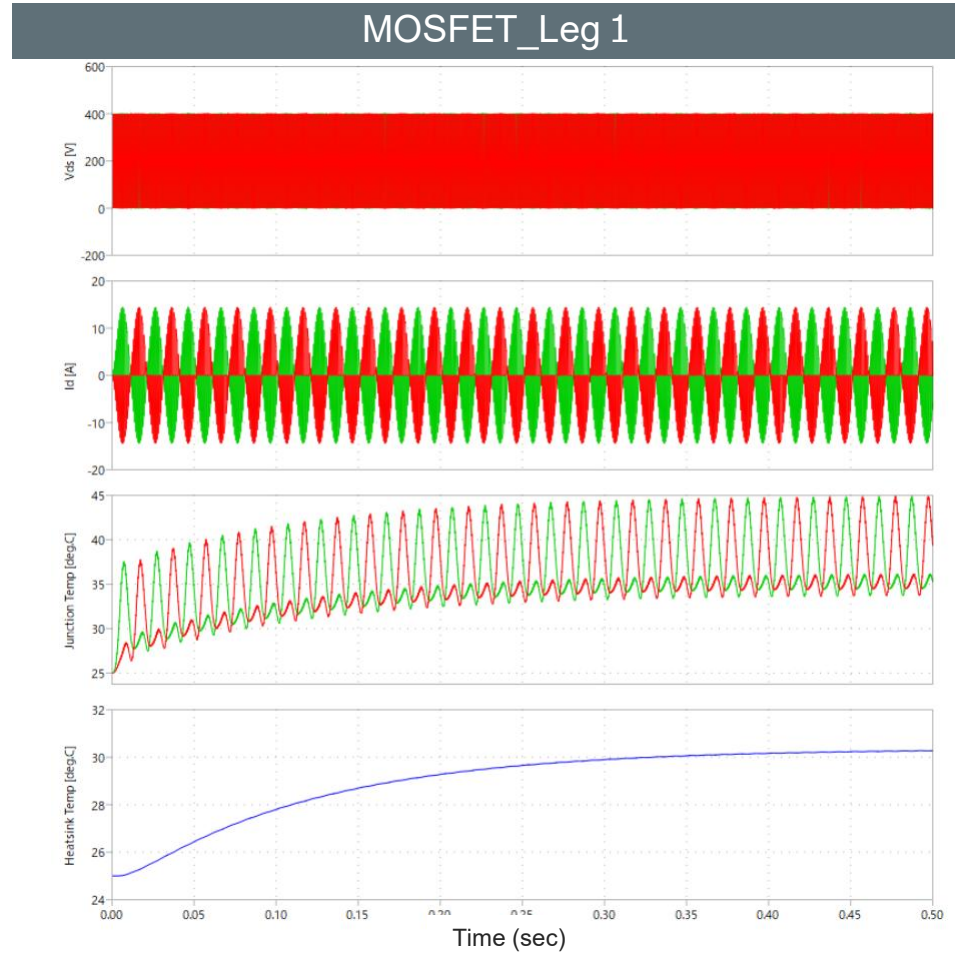
Output Frequency	50	Hz
Power factor	0.9	
Device Conditions		
Parameter	Value	
Rg_on (Leg1, 2 Common)	6.8	ohm
Rg_off (Leg1, 2 Common)	6.8	ohm
Initial Junction Temperature	25	deg.C

Waveforms





Contents	Results
Input Power : Pin	1.964(kW)
Output Power: Pout	1.942 (kW)
Efficiency: η	98.91 (%)



High-Side
Low-Side

High-Side
Low-Side

Contents	Results
Junction Temp: Tj (HS)	37.36 (°C)
Heatsink Temp: Ths	30.27 (°C)
Conduction Loss: Pcond (Leg)	8.49 (W/Leg)
Switching Loss: Psw (Leg)	2.23 (W/Leg)
Total Loss: Ptotal (Leg1+Leg2)	21.43 (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.

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.

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

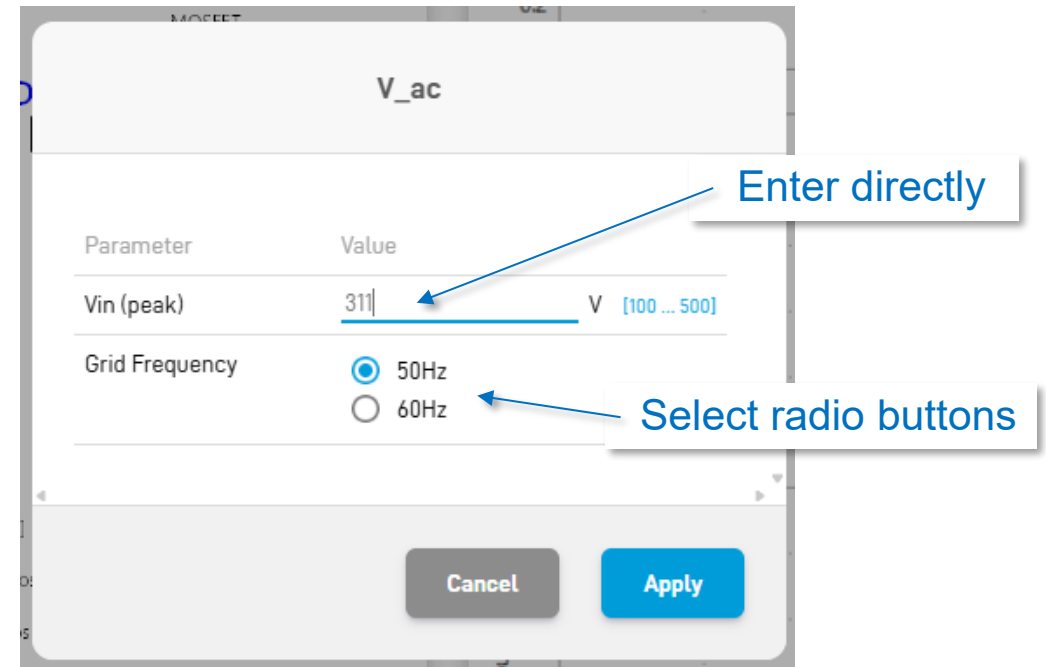


2026 May
68UG106E Rev.002

- 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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