

(B-004-DOT) DC-AC single-phase 2-Level Full-Bridge Inverter (DOT247)

Simulation Parameters (Dialog)

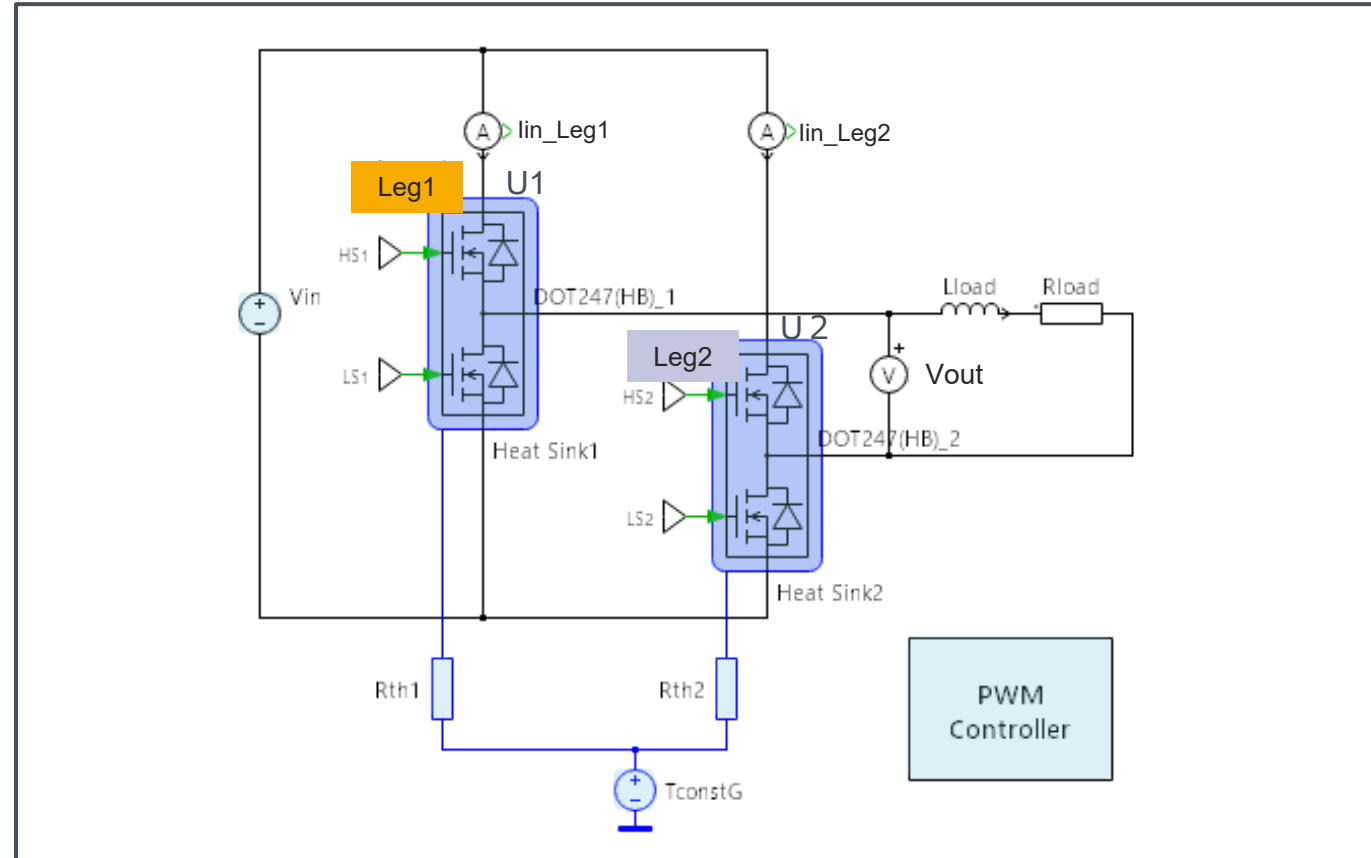
| Name | Content | unit | Default Value | Variable Range |
|---------|-------------------------|------|---------------|----------------|
| Vin | Input Voltage | V | 400 | 100 ~ 1000 |
| fs | Carrier Frequency | Hz | 20k | 1~1000 |
| M | Modulation Index | - | 0.8 | 0.5~1 |
| DT | Dead Time | ns | 800 | 100~10k |
| 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 |
| Iopeak | 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 | 15 | 0.1 ~ 100 |
| Rg_off | Gate Resistance (Sink) ※ | Ω | 15 | 0.1 ~ 100 |
| T_init | Initial Junction Temperature | °C | 25 | -40 ~ 175 |

※ Same value at Leg 1 and 2.

Simulation Circuit



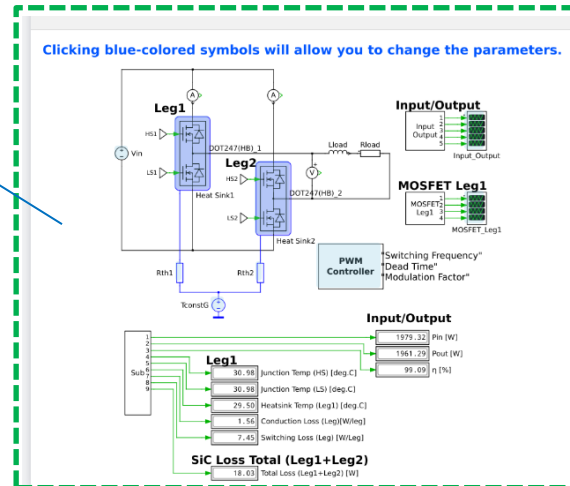
Power Device

| Name | Device Type | Part No. | Specification |
|------|------------------|------------|--------------------------------------|
| U1,2 | SiC Power Module | SCZ4008DTA | 750V/ 134A/ 8mΩ/ DOT247(Half-bridge) |

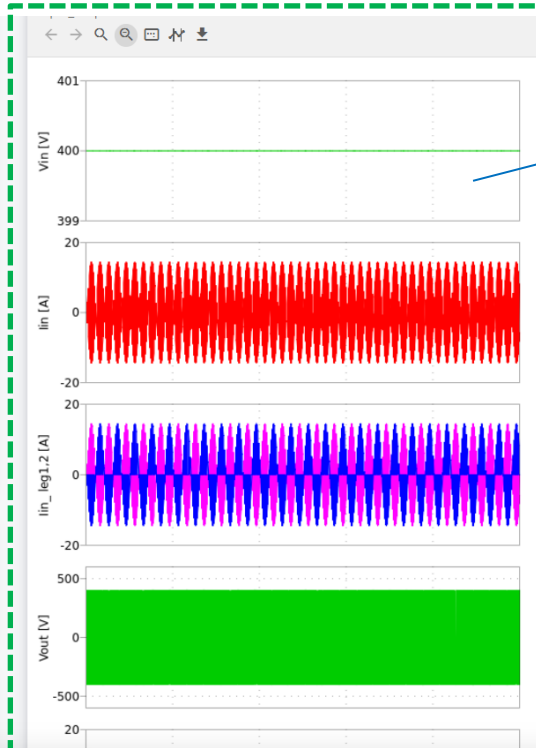
Simulation Screen Overview

Schematic window

- Dialog parameters setting
- Results display



Waveforms



Simulation control

Simulation Control

Start-Up Steady-state Hold Result Simulation Completed

Powered by PLECS

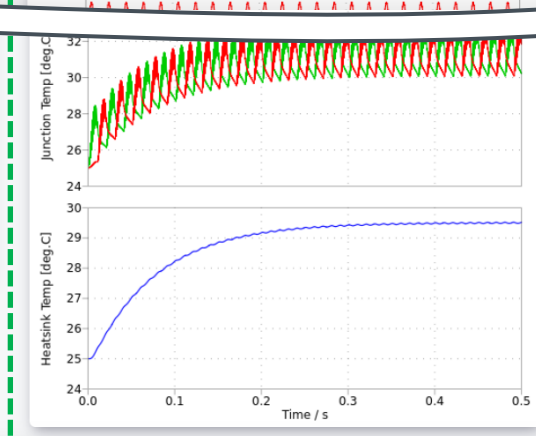
Trace selection

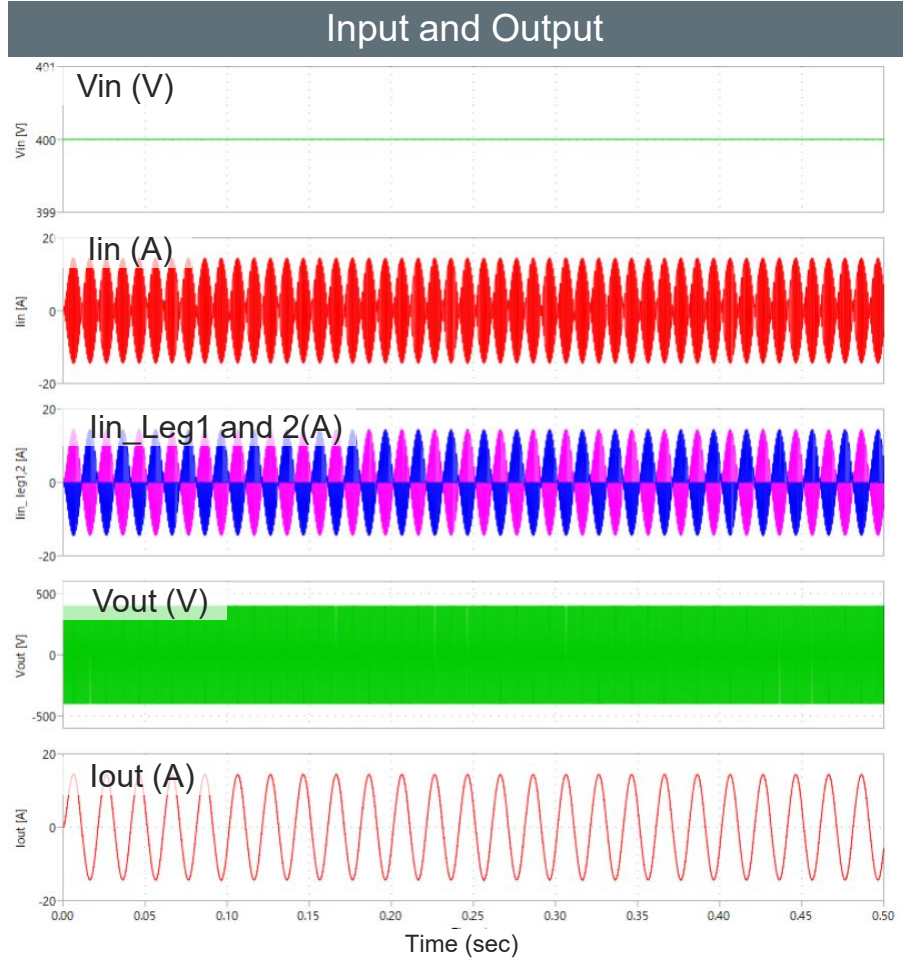
Traces

[file:SCZ4008DTA], Trace 1

Table parameters setting

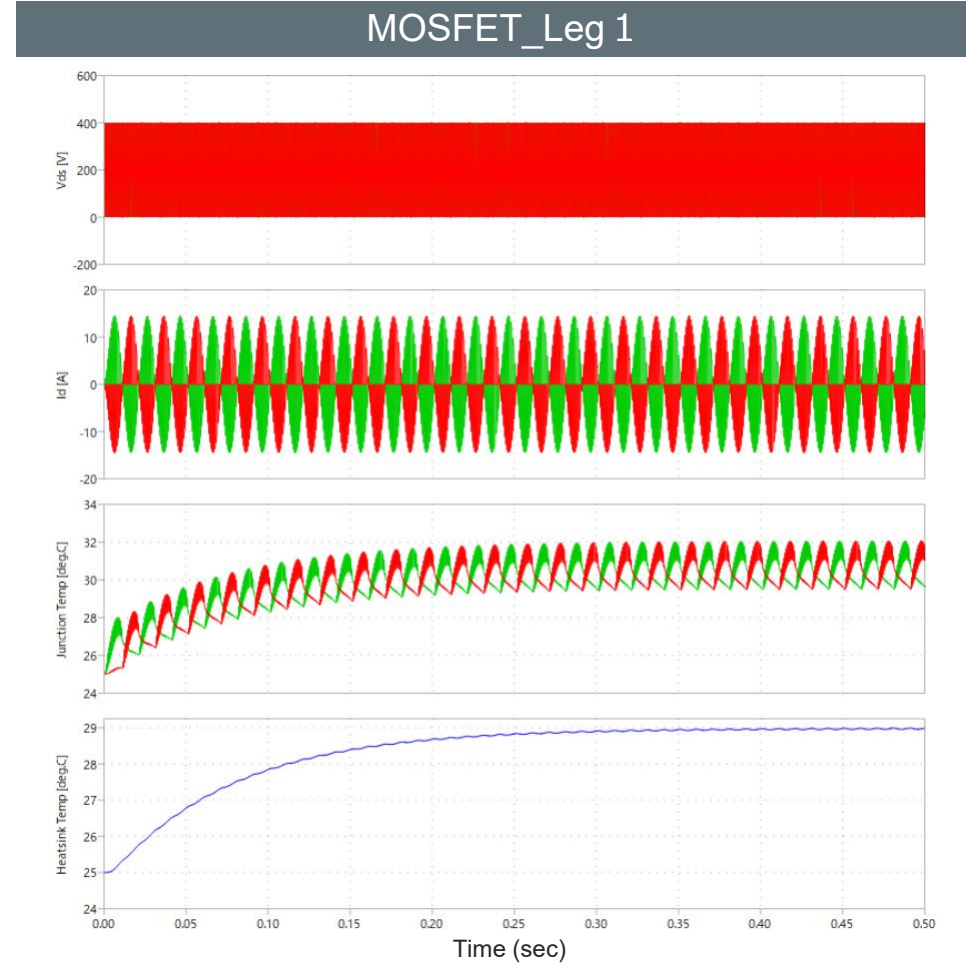
| Parameter | Value | Unit |
|------------------------------|-------|-------|
| Rg_on (Leg1, 2 Common) | 15 | ohm |
| Rg_off (Leg1, 2 Common) | 15 | ohm |
| Initial Junction Temperature | 25 | deg.C |





Leg1
Leg2

| Contents | Results |
|-------------------------|------------|
| Input Power : P_{in} | 1.979 (kW) |
| Output Power: P_{out} | 1.961 (kW) |
| Efficiency: η | 99.09 (%) |



High-Side
Low-Side

High-Side
Low-Side

| Contents | Results |
|-------------------------------------|--------------|
| Junction Temp: T_j (HS) | 30.98 (°C) |
| Heatsink Temp: T_{hs} | 30.98 (°C) |
| Conduction Loss: P_{cond} (Leg) | 1.56 (W/Leg) |
| Switching Loss: P_{sw} (Leg) | 7.45 (W/Leg) |
| Total Loss: P_{total} (Leg1+Leg2) | 18.03 (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.

SIC-MOSFET Block

Selected: 1/3 SCS320AG

| Select | Part Number | VDS [V] | Drain Current [A] | R _{DS(on)} [mΩ] (Typ.) | Package |
|-------------------------------------|-------------|---------|-------------------|---------------------------------|------------|
| <input type="checkbox"/> | SCT4090KWA | 200 | 17 | 90.0 | TO-263-7LA |
| <input type="checkbox"/> | SCT4090KR | 200 | 19 | 90.0 | TO-247-4L |
| <input type="checkbox"/> | SCT4090KE | 200 | 19 | 90.0 | TO-247N |
| <input type="checkbox"/> | SCT4065DWA | 750 | 22 | 65.0 | TO-263-7LA |
| <input checked="" type="checkbox"/> | SCT4065DR | 750 | 25 | 65.0 | TO-247-4L |
| <input type="checkbox"/> | SCT4065DLL | 750 | 26 | 65.0 | TOLL |
| <input type="checkbox"/> | SCT4065DE | 750 | 25 | 65.0 | TO-247N |
| <input type="checkbox"/> | SCT4065DK | 200 | 24 | 62.0 | TO-263-7LA |

SIC-SBD Block

Selected: SCS320AG

| Select | Part Number | Reverse Voltage [V] | Continuous Forward Current [A] | Package |
|----------------------------------|-------------|---------------------|--------------------------------|------------|
| <input type="radio"/> | SCS320KN | 1000 | 20.0 | TO-263-2L |
| <input type="radio"/> | SCS320KG | 1000 | 20.0 | TO-220AC |
| <input type="radio"/> | SCS320AM | 600 | 20.0 | TO-220FM |
| <input type="radio"/> | SCS320AJ | 600 | 20.0 | LPTL |
| <input checked="" type="radio"/> | SCS320AG | 600 | 20.0 | TO-220ACGE |
| <input type="radio"/> | SCS315KN | 1000 | 15.0 | TO-263-2L |

Selected Products

- SIC-MOSFET SCS320AG
- SIC-SBD SCS320AG

Selected device names are shown here.

SCT4065DR
N-channel SiC power MOSFET

| Parameter | Value |
|------------------------------|-------|
| V _{DSS} | 750V |
| R _{DS(on)} (Typ.) | 65mΩ |
| I _D ⁻¹ | 25A |
| P _D | 88W |

Outline
TO-247-4L

Inner circuit

Please note Driver Source and Power Source are not exchangeable. Their exchange might lead to malfunction.

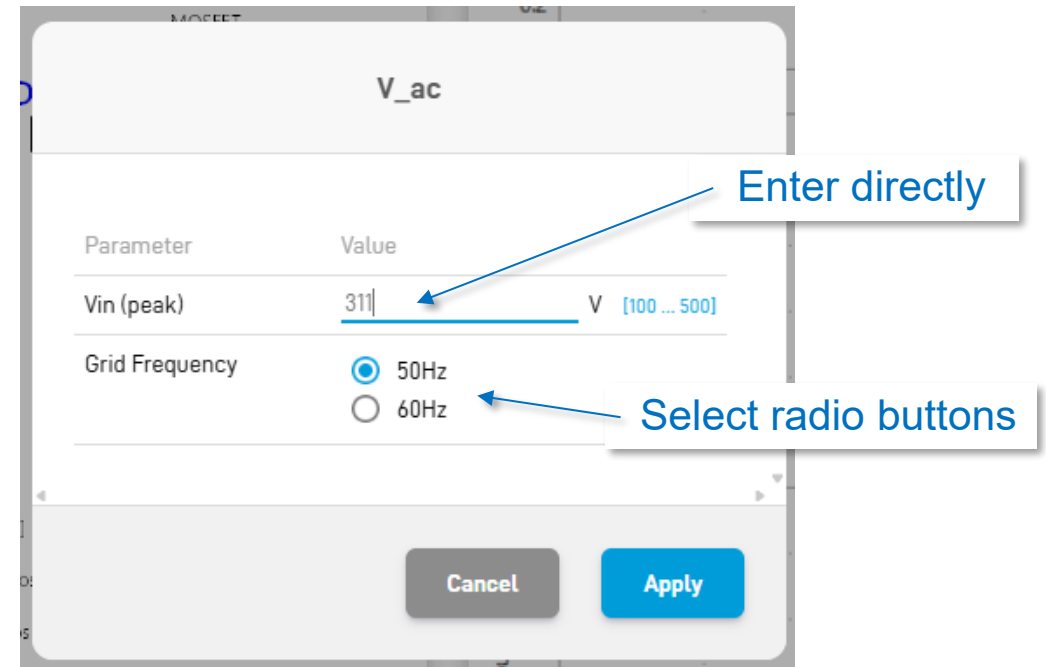
How to change Dialog parameters

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.

ROHM PLECS Simulator
Simulation Example



2026 May
68UG107E Rev.002

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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