ROHM Solution Simulator

Hands-on User’s Manual

Rev.2

February, 2020
ROHM Solution Simulator Hands-on

Choose Simulation Circuit

Execute Simulation

Customize Simulation

Export Schematics

Order Samples
1. Link from ROHM Web Top Page

‘Design Support Tools’
> ‘ROHM Solution Simulator’
2. From ‘Technical Support’ pull-down

‘Technical Support’
> ‘Design Support’
> ‘Simulation/Calculation Tools’
> ‘ROHM Solution Simulator’
Where will you find ROHM Solution Simulator 3/3

3. From Product Pages

N-channel Silicon Carbide Power MOSFET - SCT3080KL

SCT3080KL is an SiC (Silicon Carbide) trench MOSFET. Features include high voltage resistance, low ON resistance, and fast switching speed.

Link to the corresponding simulation schematics under TOOLS Tab
Simulation schematics are categorized and you can choose one from the menu of a variety of circuit topology.

As an example, “Buck Converter Vo=250V Io=20A” from DC-DC Converter is chosen.
Login to My ROHM Account to initiate ROHM Solution Simulator
ROHM Solution Simulator Hands-on

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Execute Simulation

• Learn ROHM Solution Simulator through the cases

• Open Schematics on the simulator
• User interface and basic operations
• Simulation setup and simulate
• Simulation result and waveforms
  • How to use the Wavebox
  • How to use the Waveform Viewer
Open Schematics on the simulator 1/2

The schematic image shows up when login to My ROHM Account

Click the icon in yellow to initiate the simulator

Starting Simulator
Open Schematics on the simulator 2/2

ROHM Solution Simulator User Interface

Refer to the link for the description of schematic and simulation setup

Schematic Field

Schematic Toolbar

Wavebox

Waveform Viewer Icon
Schematic Toolbar icon and functions

- **Undo**
- **Redo**
- **Zoom In**
- **Zoom Out**
- **Zoom to Fit**
- **Enter Fullscreen Mode**
- **Design Settings**
- **Help**
User interface and basic operation (2/4)

**Zoom in/out**
- Click Zoom in or out.

- Mouse wheel or touch pad work

<table>
<thead>
<tr>
<th></th>
<th>Zoom In</th>
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<tr>
<td>Mouse wheel</td>
<td>Up</td>
<td>Down</td>
</tr>
<tr>
<td>2finger swipe on touch pad</td>
<td>Down</td>
<td>Up</td>
</tr>
</tbody>
</table>

**Zoom to Fit**
- Click Zoom to Fit.

Fit entire schematics and Waveboxes to screen
User interface and basic operation (3/4)

Drag schematics
Click on the schematic field
Drag the cursor to move the schematic drawings. The mouse cursor will change while dragging the schematic.

Full screen mode
- Go full screen
- Leave full screen
- Move mouse to top, and this icon shows up. Click it to leave full screen.
- ESC Key does the same
Design Settings

- Change visibility of schematic label

Show All Labels

Show Chosen Labels

Hide all labels
Simulation setup and execution (1/3)

Click Run to simulate

DC-DC Converter / Buck
Buck Converter V_o=250V I_o=20A

Components highlighted in blue have parameters the user can change. The simulation can then be re-run to show the corresponding performance change.
Run / Terminate simulation

- Bar graph indicates progress
- Waveform will be refreshed when simulation done

Restrictions
- Fixed schematics, no connection change or adding component
- Able to change designated component constant, or to swap power device
- Maximum simulation time 60 minutes
Simulation setup and execution (3/3)

Simulation setup

Note:
Simulation setup is predefined in the schematics.

Simulation Type (do not change)
- Time-Domain (transient analysis)
- Frequency-Domain (frequency analysis)

End Time: Simulation time

Advanced Options:
Accuracy and speed trade-off option

Manual Options:
Condition descriptions

Simulation Status:
Simulation logs
You can display waveforms of designated connection nodes or components using viewer tools.

- Display waveforms
- Waveform analysis
- Export waveforms (csv files)
How to display waveforms

- Probe signals of the nodes or components on the schematics
- Use Wavebox and Waveform Viewer to display waveforms

**Wavebox**
- Shows waveform where the probe icon is placed

**Waveform Viewer**
- Multiple waveforms in a window
- Waveform analyzers
- Compare waveforms
- Generate a link to Waveform Viewer
You can display waveforms of designated connection nodes or components using viewer tools.

- Display waveforms
- Waveform analysis
- Export waveforms (csv files)
(Case #1) Indicate the waveform of Inductor u1 current i(p1)

- Place Wavebox at u1
- Indicate current i(p1)

i(terminal) represent the current through the terminal
How to use Wavebox (2/10)

How to place / delete Wavebox?

Click waveform probe icon, drag cursor to a wire or over a component, and click

Click x mark to delete Wavebox

<Tips>
- Replace probe then Wavebox renews waveforms at the location
- Free to move Wavebox in the schematic field

<Tips>
- Grab the corner of Wavebox to change its size
How to use Wavebox (3/10)

How to show a waveform in Wavebox

**Probe on a wire > voltage**

**Probe on a component > chose a signal from the pull-down**
Zoom in / Zoom out waveforms

Zoom In: Drag mouse in desired area

Zoom Out: Right click > ‘View All’
(Case #2) Display the waveform of xSCT3080KL1 $V_{GS}$
How to use Wavebox (6/10)

Differential probe with Wavebox

Probe xQ1 gate to open Wavebox

Right click on the graph area > ‘Display’ > ‘net13-net75’

Drag & drop the probe icon at left bottom of window to the xQ1 source
How to use Wavebox (7/10)

Display two waveforms in a Wavebox

Display > Dual Trace

Display > Overlaid
How to use Wavebox (8/10)

**Add Cursor**: Right click on Waveform > Add Cursor

**Move Cursor**: Put mouse over the cursor, drag it to move

Or

Right click on the cursor > Set X Value > input value
Delete Cursor: Right Click on Cursor > Delete
How to use Wavebox (10/10)

Download waveform in CSV file format

Right Click on a Wavebox > Download Waveforms
You can display waveforms of designated connection nodes or components using viewer tools.

- Display waveforms
- Waveform analysis
- Export waveforms (csv files)
How to use Waveform Viewer (1/11)

Basic operations

Display Waveform Viewer

Display in a separate window

Hide Waveform Viewer

Merge viewer to the original window

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How to use Waveform Viewer (2/11)

Waveform Viewer Window

**Simulation Results**
List of wires and components in the Schematics

Previous simulation data

**Waveform Analyzer**
Time-Domain Operations
- Frequency
- DutyCycle
- Falltime
- Period
- PulseWidth
- Risetime
- SettleTime
- SlewRate
- Slope
- Undershoot

**Level - Time - Calc - Trans - Trig**
(Case #3) Display the inductor u1 current $i(p1)$, xQ1 source voltage net75 and output voltage net68 waveforms respectively in the Waveform Viewer.

- Display Waveform Viewer
- Choose the signals from Simulation Results, and display waveforms in the Waveform Viewer
1. Drag ‘net75’ signal from Simulation Result and drop it on the graph area to display the waveform.

2. The waveform will be displayed.
3. Add net68 waveform. Drop the signal outside of a graph area to separate waveforms (shown below), or drop it on the designated graph area to overlay waveforms.

4. Add i(p1) of the Inductor u1, and display the waveforms as follows.
Zoom In / Zoom Out:
- Same as Wavebox’s operations
How to use Waveform Viewer (7/11)

Delete a waveform
Right click on a signal name to be deleted > ‘Delete Waveform’

Delete all waveforms
Right click > ‘Clear Window’
(Case #4) Measure toggle frequency of the net75 signal using Waveform Analyzer

- Open Waveform Viewer
- Display net75 signal waveform
- Initiate Waveform Analyzer
- Choose ‘Frequency’ from ‘Time’ tab
- Select net75 from the drop-box and measure the frequency
How to use Waveform Viewer (9/11)

Use Waveform Analyzer

- Initiate Waveform Analyzer

<<Variety of analysis/calculation menu>>

- Click x on top /right corner to end
How to use Waveform Viewer (10/11)

Measure signal frequency with Waveform Analyzer

1. Select function
   ‘Time’ tab > ‘Frequency’

2. Select a signal from pull-down

3. Apply
How to use Waveform Viewer (11/11)

Share the Waveform Viewer to others
1. Use the Waveform Viewer in a single window
2. Display URL: Click Share Viewer icon > Display the URL
3. Copy the URL and paste to another browser

- Anyone can see the waveform with the URL
ROHM Solution Simulator Hands-on

- Choose Simulation Circuit
- Execute Simulation
- Customize Simulation
- Export Schematics
- Order Samples
(Case #5) Change the PWM frequency and run simulation. Compare the simulation result before/after the change.

- Change PWM-1H switching frequency (FSW) from 50KHz to 25kHz
- Run simulation
- Compare the net75 frequency using the Waveform Analyzer
Customize Simulation (2/5)

Component shown in blue has variable parameters
You can run simulation with different circuit parameters

- You can change component properties
- You can swap power devices
How to change parameters: Property Editor

Open Property Editor:
- Double click a component, or
- Right click on a component > ‘Properties’

Change properties:
- Properties in white can be changed.
- Properties in gray cannot be changed.
Customize Simulation (4/5)

You will see instruction how to change properties when mouseover.
How to swap power devices:
• You will find alternative choices of transistors or diodes on the property editor if available, and can easily evaluate device characteristics with the same circuit topology.

Change properties:
Select one from pull-down
Compare Simulation Results before/after

1. Change parameters
2. Run Simulation
3. Open the Waveform Viewer
4. Display net75 waveform from 1\textsuperscript{st} run and 2\textsuperscript{nd} run of simulation
5. Measure frequencies with the waveform analyzer
ROHM Solution Simulator Hands-on

Choose Simulation Circuit

Execute Simulation

Customize Simulation

Export Schematics

Order Samples
Export Schematics to SystemVision® Cloud (1/2)

- You will need to change the schematic connections or parameters of a given simulation circuit on the website. To do so, you can export schematics to SystemVision®Cloud, and edit schematics as you like.

Click ‘Edit in systemVision.com’
To open SystemVision®Cloud

• For more details about SystemVision®Cloud, please visit https://www.systemvision.com.
If you have SystemVision® Cloud account, you will see the schematics in your SystemVision® cloud simulator. You can change schematic connection or device properties. You need to save the schematic to one of your workgroups with ‘SaveAs’ to run simulation.
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Order Samples (1/2)

How to order samples:
You will find links to the corresponding product page, datasheet and the sample order page in ‘More Info’

Right click > ‘More Info’
More Info window will show up

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Model Descriptions

Detailed Model Description:
* sct3080kl_Lt.lib converted from PSpice to AMS
* Version: AMS VX.2.5
* Date: October 09, 2019 at 04:23 PM
* SCT3080KL_LT
* SiC NMOSFET model
* 1200V 31A 80mOhm
* Model Generated by ROHM
* All Rights Reserved
* Commercial Use or Resale Restricted
* Date: 2018/07/04

Model Links:
- Link To Product
- Link To Datasheet
- Link To Buy

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Product Page
Product Datasheet
Sample Order Page
Order Samples (2/2)

Link to distributors:

- Please find your distributor from the Order Sample page.

Click 'Link to Buy'
<table>
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<tr>
<th>Rev.</th>
<th>Date</th>
<th>Changes</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>February 26th, 2020</td>
<td>New release</td>
<td></td>
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