

# A-004. Boost PFC $V_{in}=200V$ , $I_{in}=2.5A$ , DCM

ROHM Solution Simulator Schematic Information



2025. Nov.  
64UG062E Rev.006

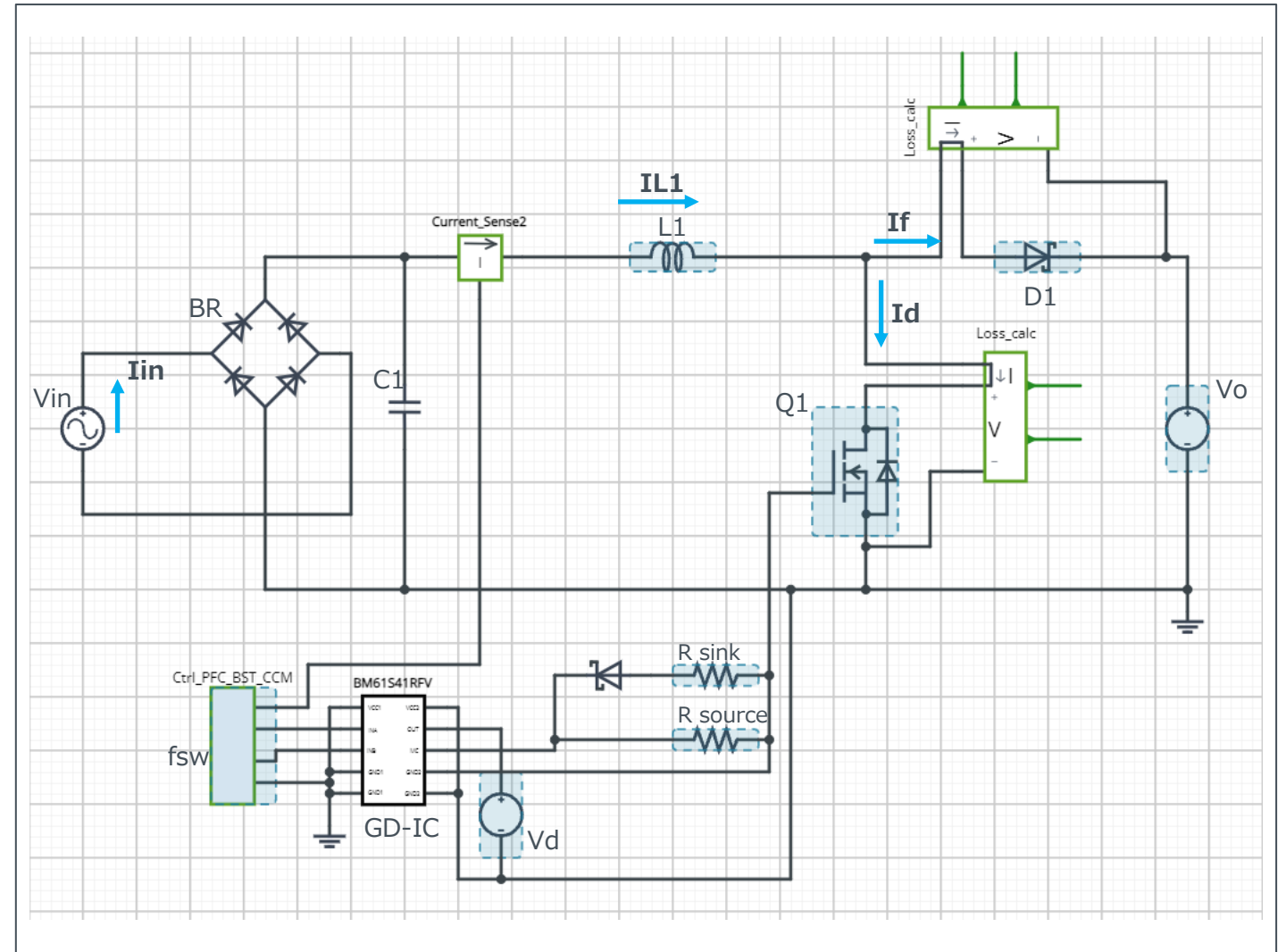
## Simulation Parameters

Component name	Component	Default	Simulation Setting Range
$V_{in}$	Input voltage	200Vac 50Hz	
$I_{in}$	Input current	2.5Aac	
$V_o$	Output voltage	500Vdc	300 – 500Vdc
fsw	Switching frequency	100kHz	10k – 300k
$T_j$	Temperature	100°C	
$V_d$	Gate Drive voltage	18V	10 – 20V

## Devices

Component name	Component	Default	Simulation Setting Range
Q1	SiC MOSFET SJ MOSFET IGBT	Selectable	
D1	SiC SBD	Selectable	
GD-IC	Gate Driver	Selectable	
R sink	Resistor for sink	ESR18 2Ω	0.1 -
R source	Resistor for source	ESR18 5Ω	0.1 -
L1	Inductor	150μH	10μH - 1mH
C1	Capacitor	200nF	
BR	Bridge Diode	600V 10A ideal diode	

## Simulation Circuit



Note: The Loss\_calc component is a utility module to support power loss calculation and does not affect the simulation results of circuit operation or performance.

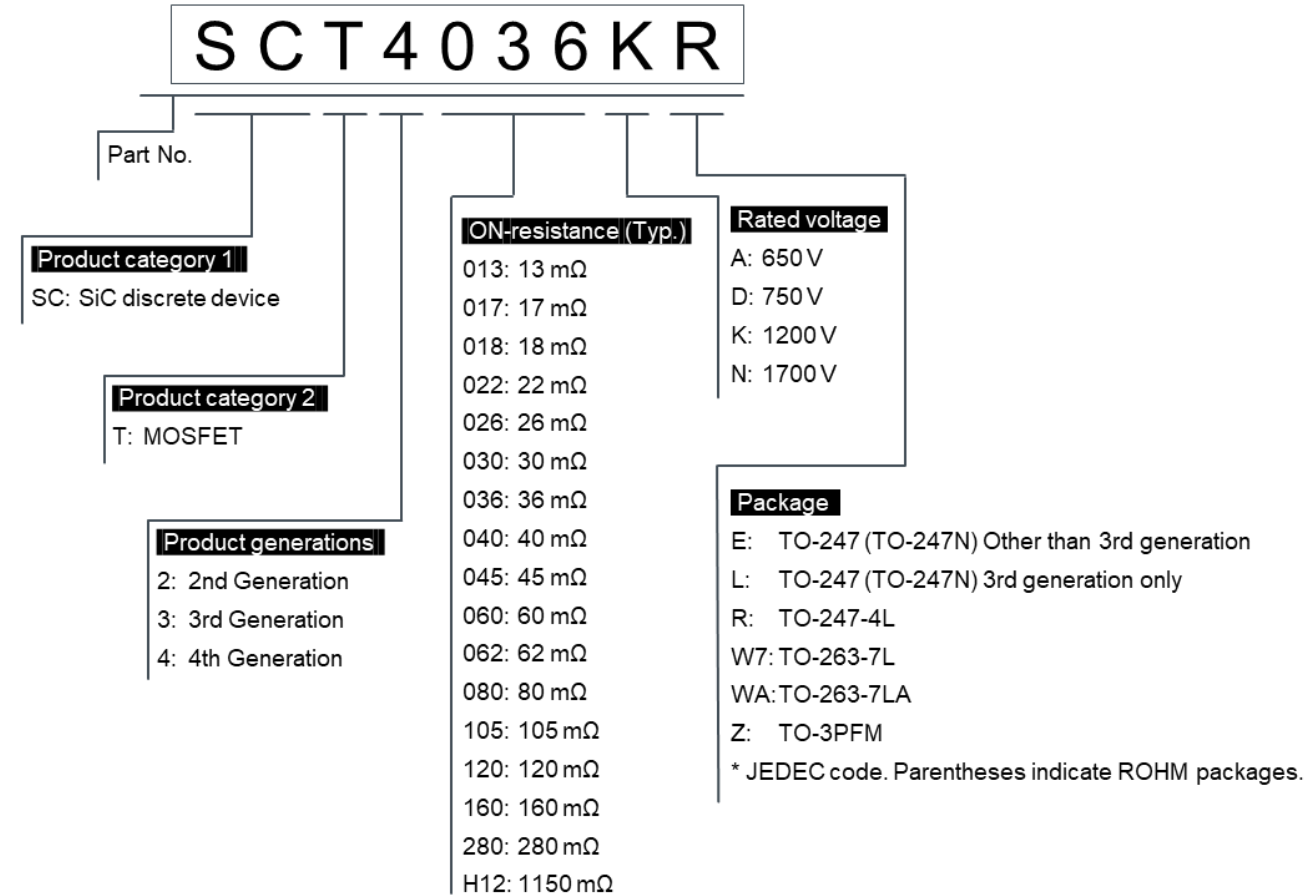
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## Selectable Devices

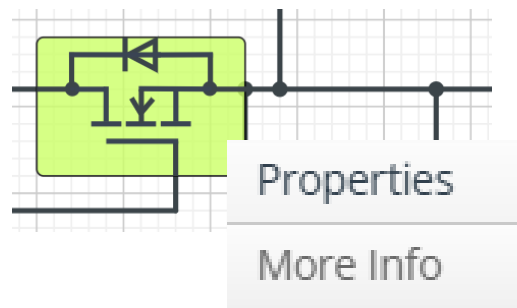
Component name	Component
Q1	SiC MOSFET

## SiC MOSFET part number information

**SCT4036KR**



For more information, go to “**More Info**” and click on “**Link to Datasheet**”.



**Model Links:**

- [Link To Product](#)
- [Link To Datasheet](#)
- [Link To Buy](#)
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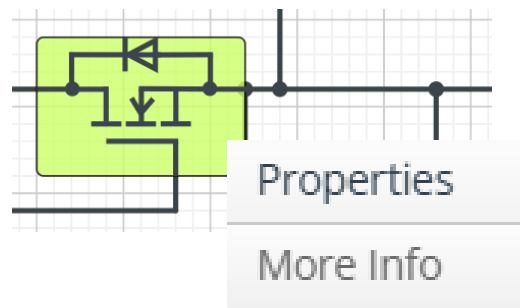
Product Lineup: [SiC MOSFETs](#)

# A-004. Boost PFC $V_{in}=200V$ , $I_{in}=2.5A$ , DCM

## Selectable Devices

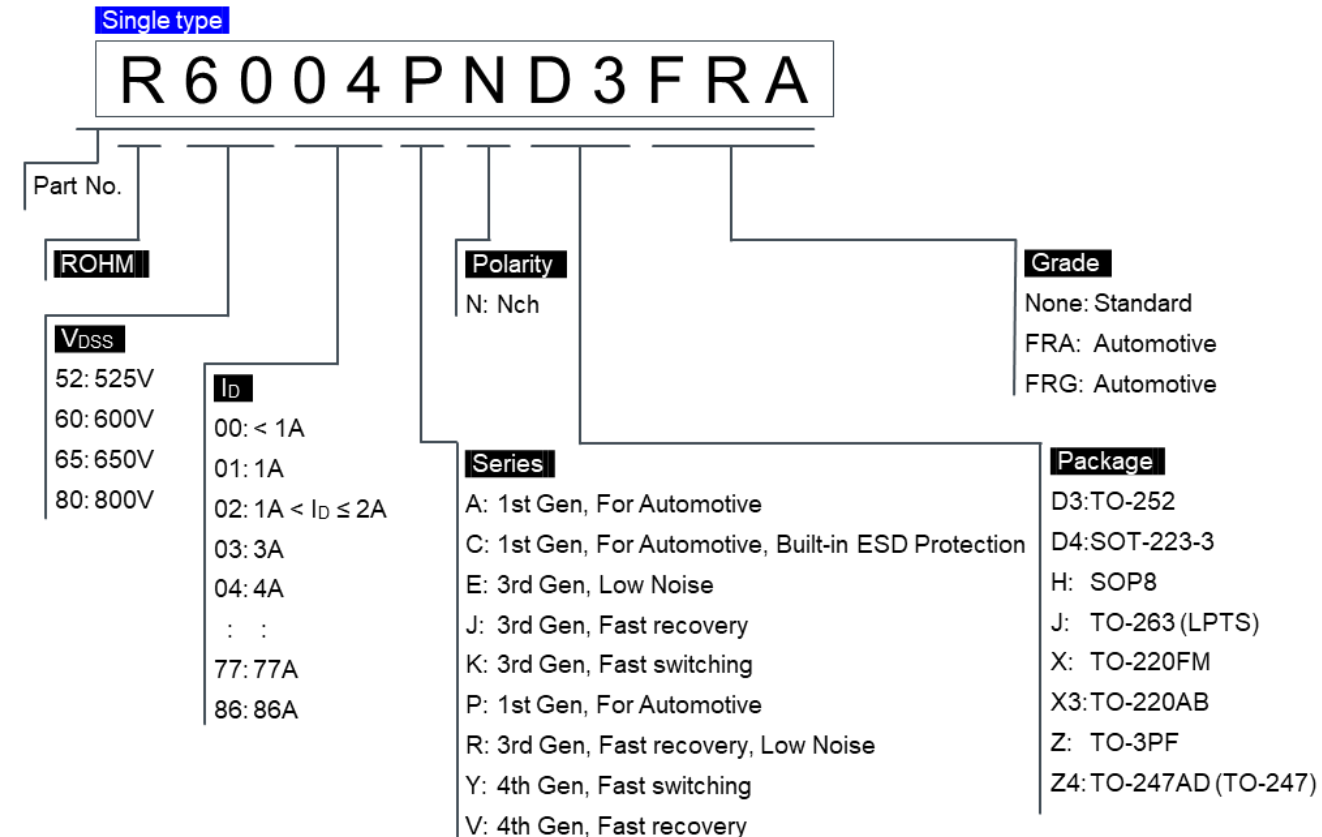
Component name	Component	Product
Q1	SJ MOSFET	RxxxxKN series RxxxxYN series

For more information, go to “**More Info**” and click on “**Link to Datasheet**”.



Model Links:  
[Link To Product](#)  
[Link To Datasheet](#)  
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## SJ MOSFET part number information



Product Lineup: [Super Junction MOSFETs](#)

# A-004. Boost PFC $V_{in}=200V$ , $I_{in}=2.5A$ , DCM

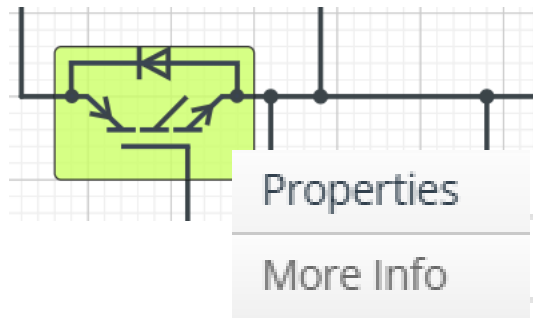
IGBT part number information

**R G S 6 0 T S 6 5 D H R**

Selectable Devices

Component name	Component	Product
Q1	IGBT	RGW series

For more information, go to “More Info” and click on “Link to Datasheet”.



Model Links:  
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**Product category**

RG: IGBT

**Product series**

- C: For voltage resonant, Reverse Conducting IGBT (RC-IGBT)
- CL: Low  $V_{CE(sat)}$
- S: For Automotive Inverter, Short circuit capability guaranteed 8 to 10 $\mu$ s
- T: For inverter, Short circuit capability guaranteed 5 $\mu$ s
- TV: For converter / inverter, High speed switching, Short circuit capability guaranteed 2 $\mu$ s
- TH: For converter, High speed switching
- W: For converter, Ultra high-speed switching
- WS: For converter, Ultra high-speed switching, Popular edition

**Rated collector current  $I_C(T_C=100^\circ C)$**

- 8: 4 A
- 16: 8 A
- 20: 10 A
- 30: 15 A
- 40: 20 A
- 50: 25 A
- 60: 30 A
- 80: 40 A
- 00: 50 A
- X2: 60 A
- X5: 75 A
- X6: 80 A

\* See datasheet for current values that may differ in some cases.

**Package**

- BM: TO-252, TO-252GE
- NS: TO-263S, TO-262
- NL: TO-263L
- TM: TO-220NFM
- TS: TO-247N, TO-247GE
- TK: TO-3PFM

**Grade**

- G: Standard
- GV: Standard
- HR: Automotive (AEC-Q101)
- HRB: Automotive (AEC-Q101)

**Built-in diode configuration**

- None: Without diode
- C: SiC Schottky barrier diode
- D: Fast recovery diode
- E: Larger size Fast recovery diode
- R: Body diode with reverse conducting (RC) structure

**Rated voltage  $V_{CES}$**

- 60: 600 V
- 65: 650 V
- X2: 1200 V
- X8: 1800 V

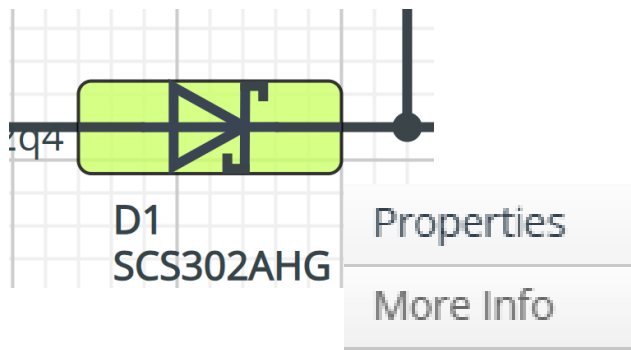
Product Lineup: [Field Stop Trench IGBT](#)

# A-004. Boost PFC $V_{in}=200V$ , $I_{in}=2.5A$ , DCM

## Selectable Devices

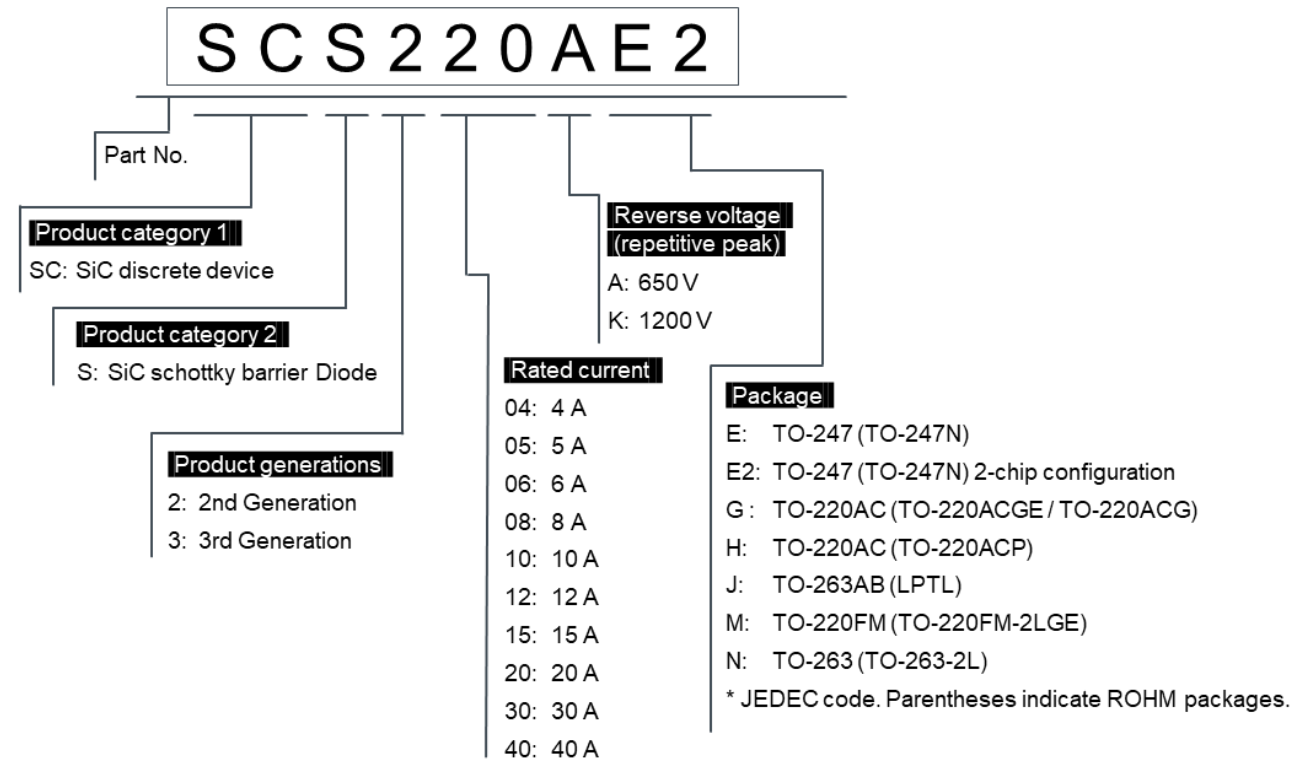
Component name	Component
D1	SiC Schottky Barrier Diode

For more information, go to “**More Info**” and click on “**Link to Datasheet**”.



Model Links:  
[Link To Product](#)  
[Link To Datasheet](#)  
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## SiC Schottky Barrier Diode part number information



Product Lineup: [SiC Schottky Barrier Diodes](#)

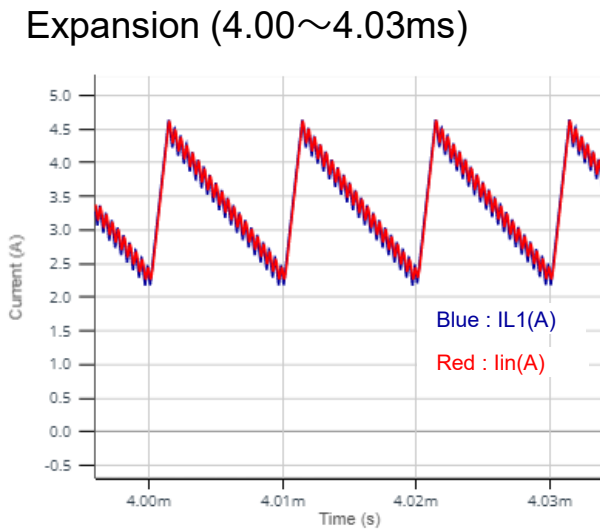
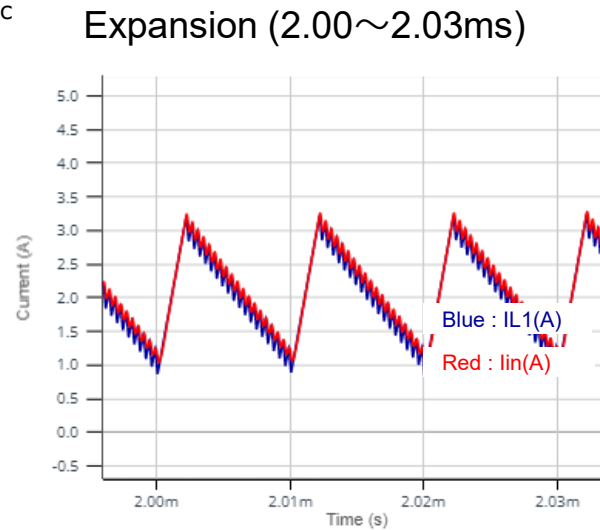
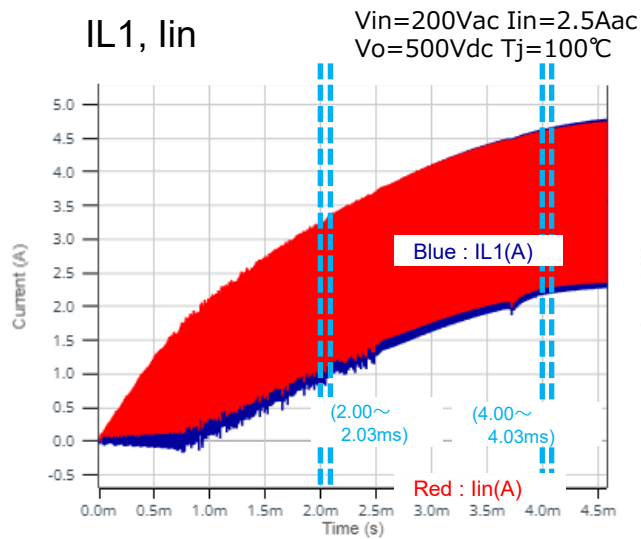
# A-004. Boost PFC Vin=200V, Iin=2.5A, DCM



## Selectable Devices

Component name	Component	Product No.	feature
GD-IC	Gate Driver	BM61S41RFV-C (*)	<b>for SiC MOSFET</b> Isolation Voltage : 3750 Vrms I/O Delay Time (max) : 65ns Miller Clamp : Built-in UVLO : 14.5V
		BM61M41RFV-C	<b>for SJ-MOS / IGBT</b> Isolation Voltage : 3750 Vrms I/O Delay Time (max) : 65ns Miller Clamp : Built-in UVLO : 7.4V

\* Default device



Q1 : SiC MOSFET  
SCT2450KE  
D1 : SiC SBD  
SCS302AHG

# Simulation Waveform2



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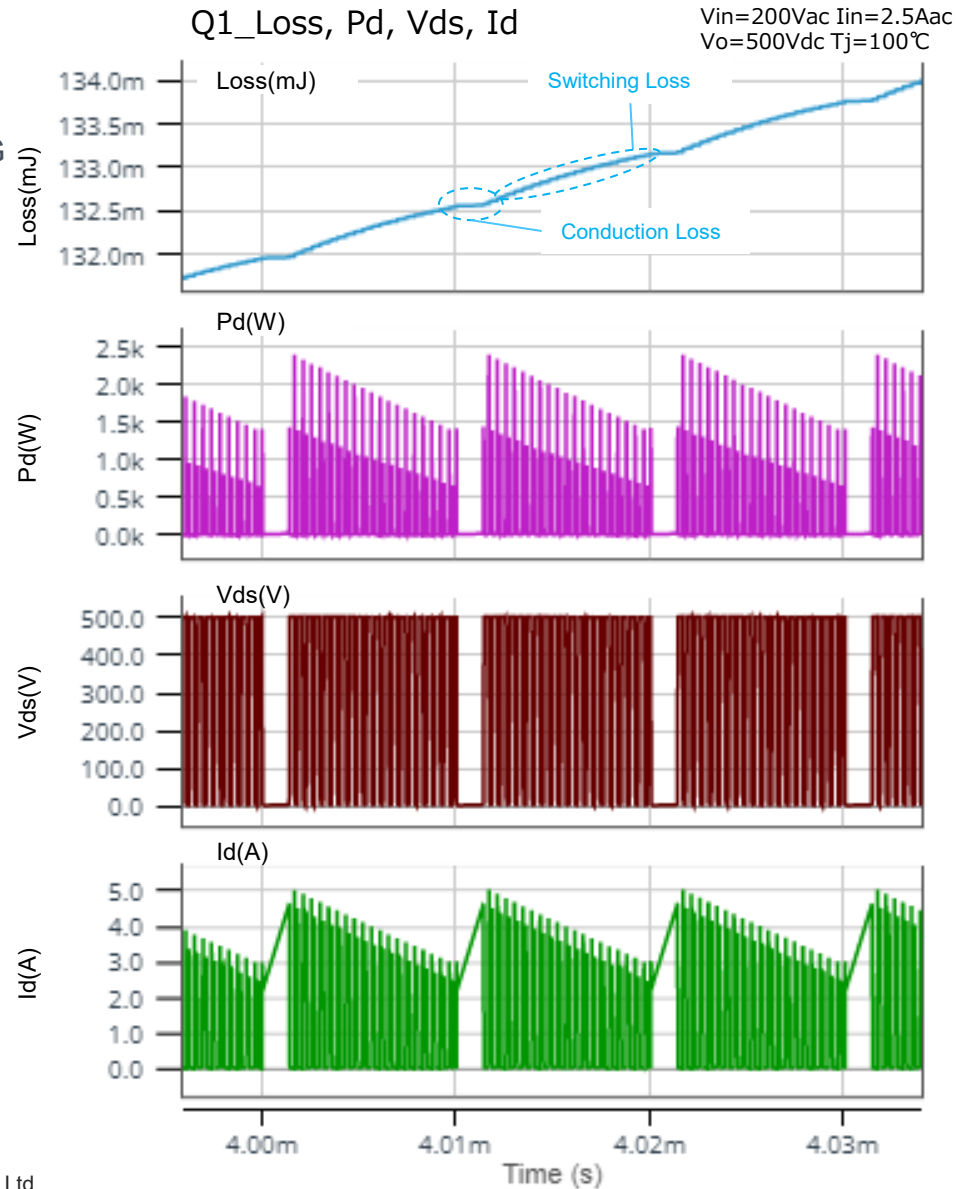
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Q1 : SiC MOSFET

SCT2450KE

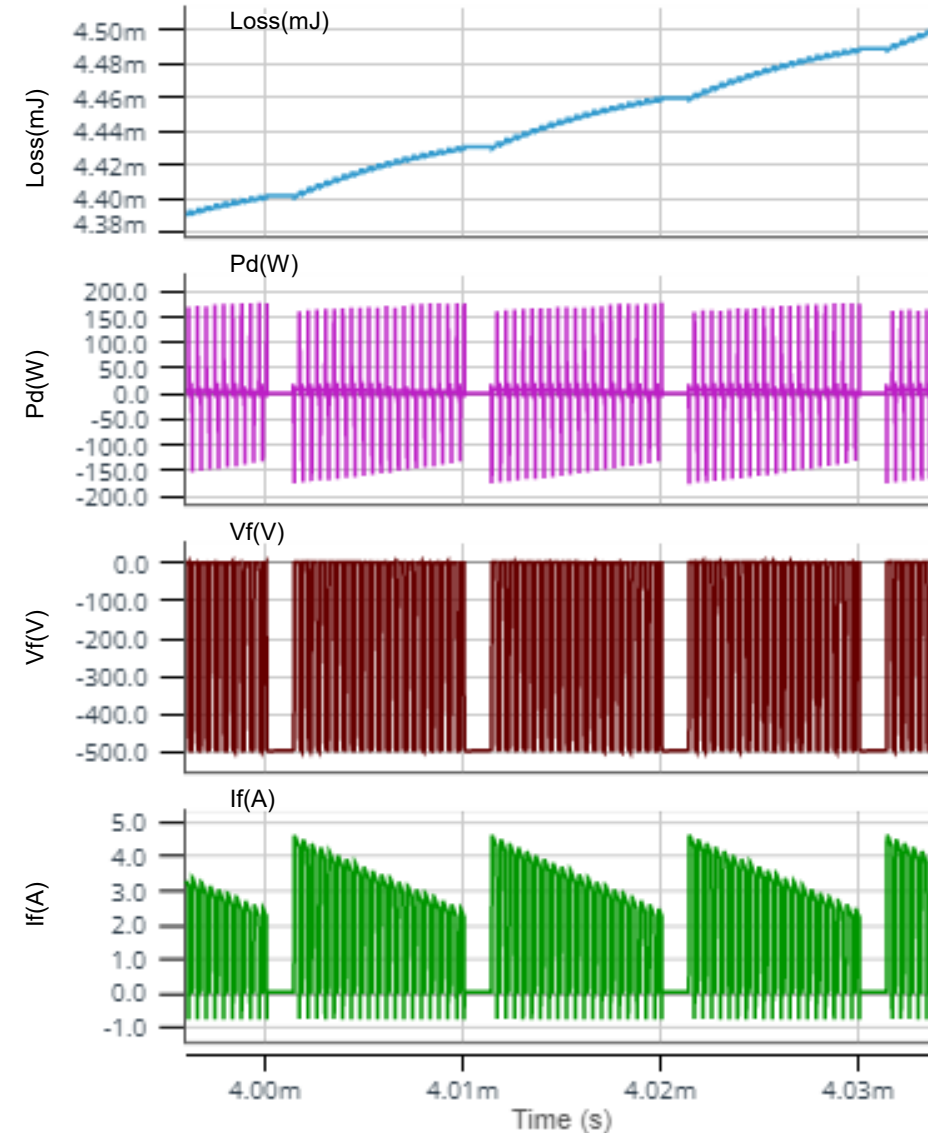
D1 : SiC SBD

SCS302AHG



D1\_Loss, Pd, Vf, If

Vin=200Vac Iin=2.5Aac  
Vo=500Vdc Tj=100°C



# Efficiency, Power Dissipation 1

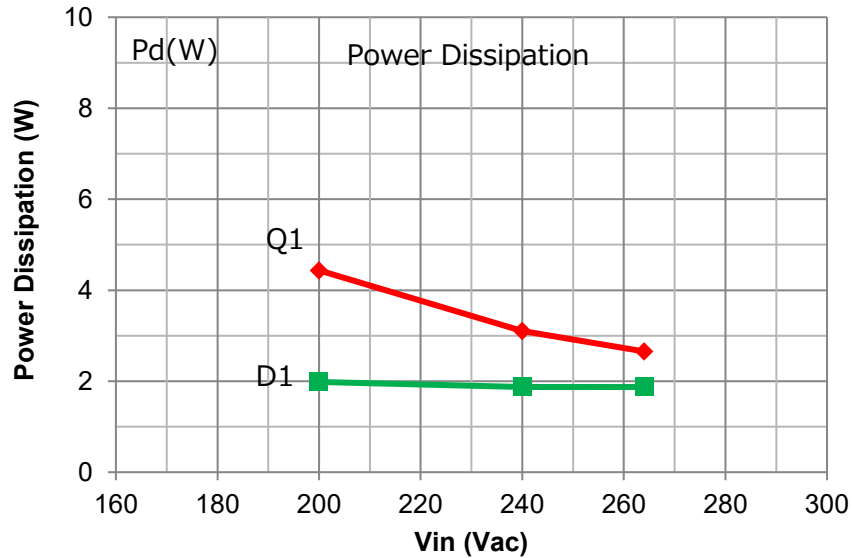
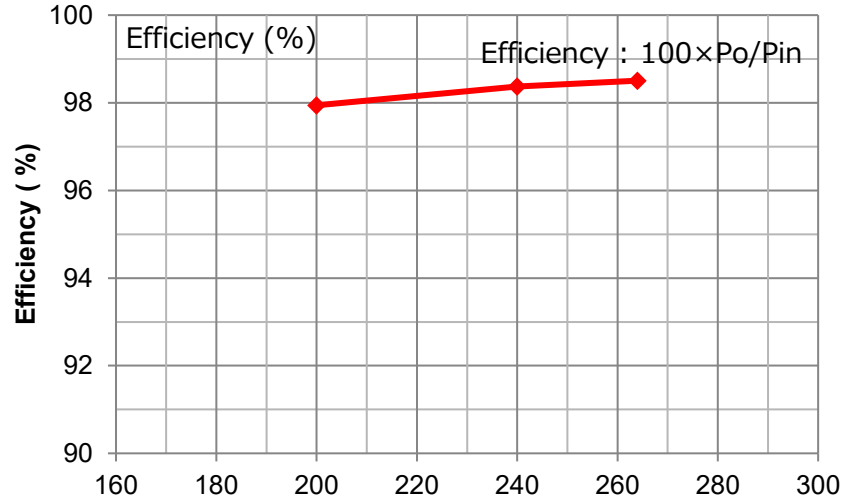


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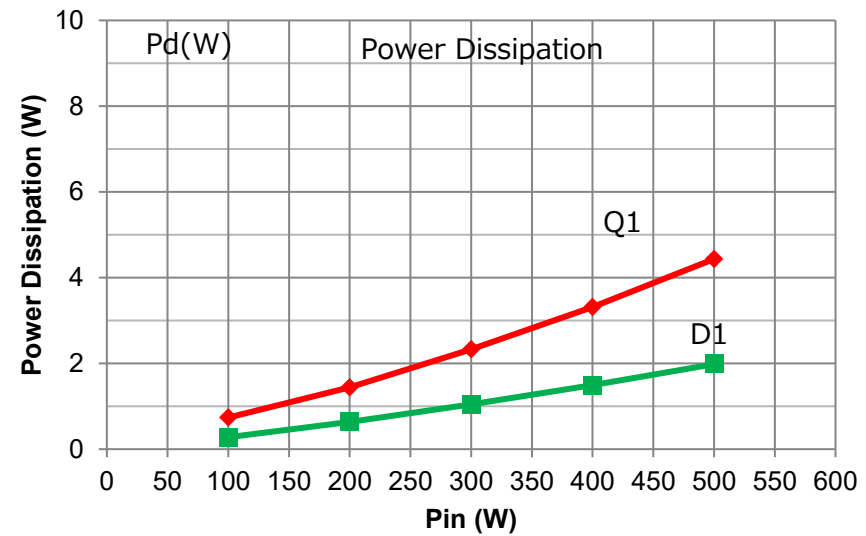
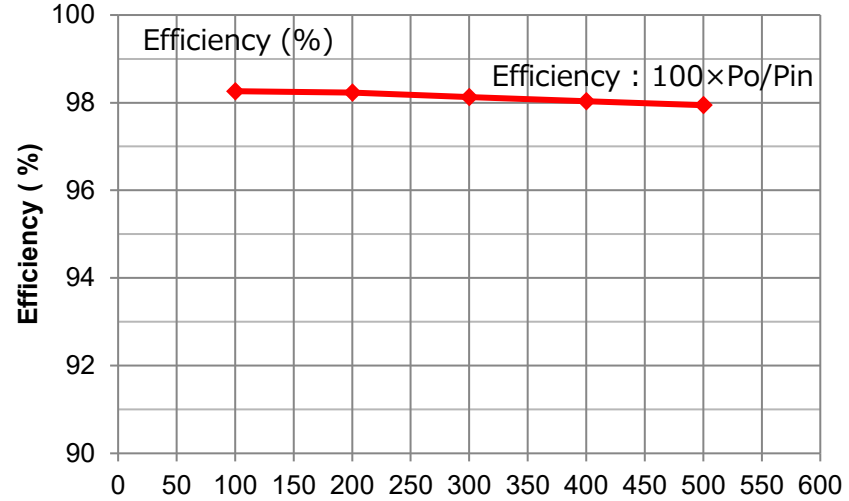
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Q1 : SiC MOSFET  
SCT2450KE  
D1 : SiC SBD  
SCS302AHG

Vin : 200Vac~264Vac Pin=500W Vo=500Vdc  
Tj=100°C



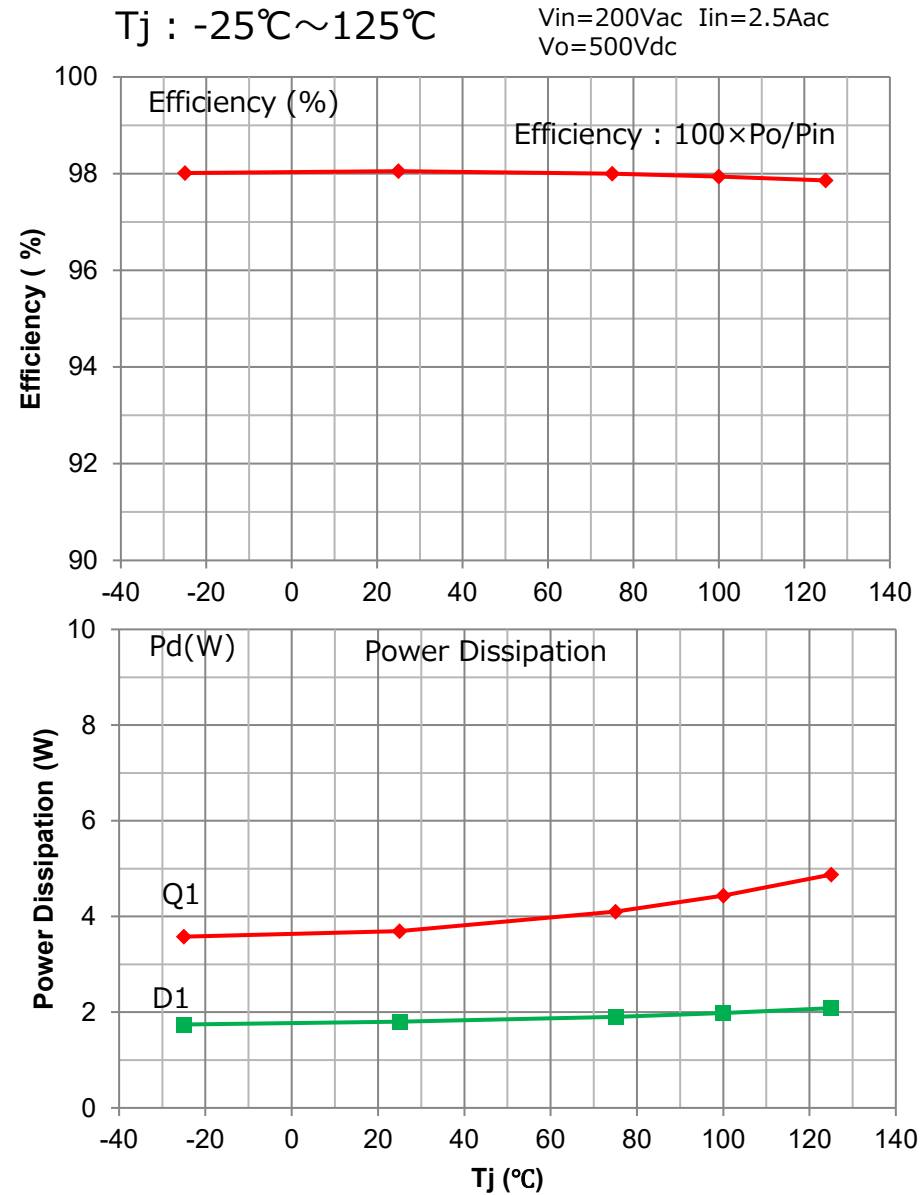
Pin : 100W~500W Vin=200Vac Vo=500Vdc  
Tj=100°C



# Efficiency, Power Dissipation 2

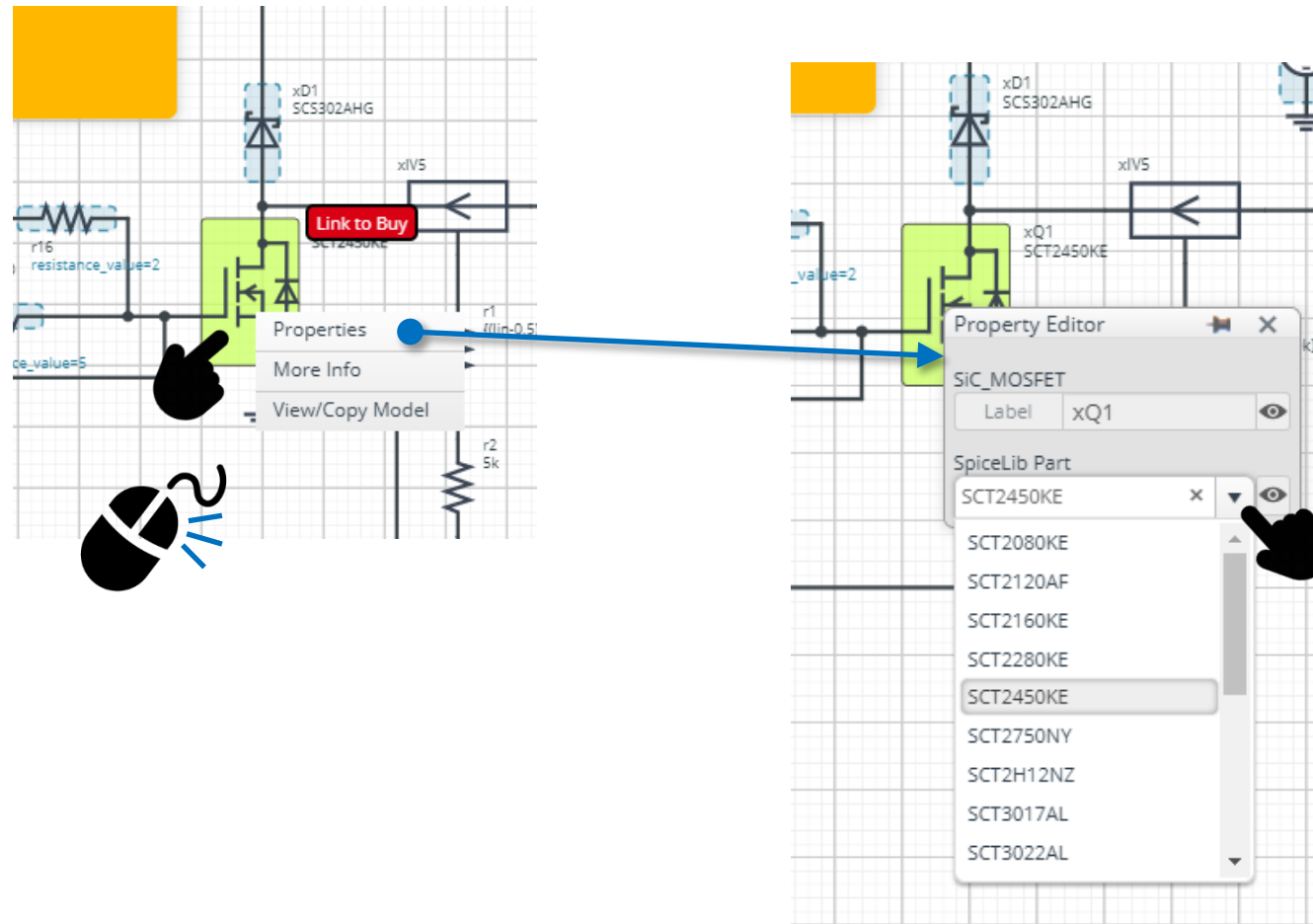


Q1 : SiC MOSFET  
SCT2450KE  
D1 : SiC SBD  
SCS302AHG



# How to change the devices

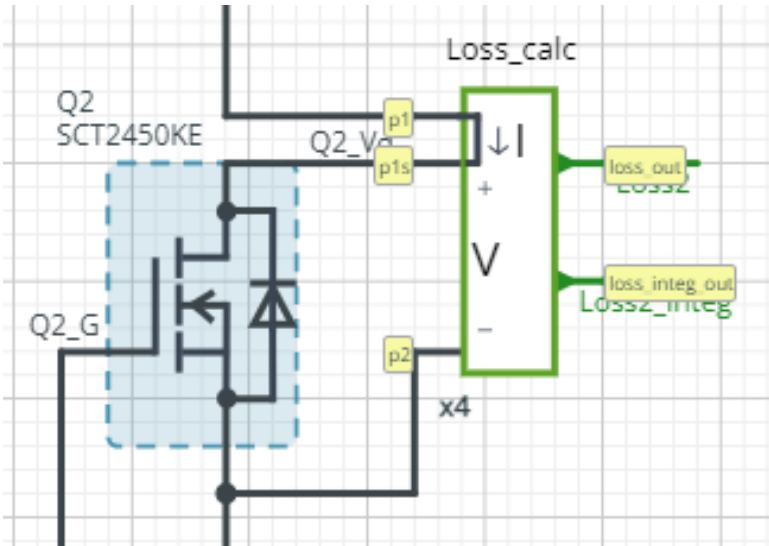
Right-click on the device → Select Properties → Pull down “SpiceLib Part” → Select the product



Loss Calculation Model outputs the instantaneous value of power loss and its integration.

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## Loss calculation model 'Loss\_calc'



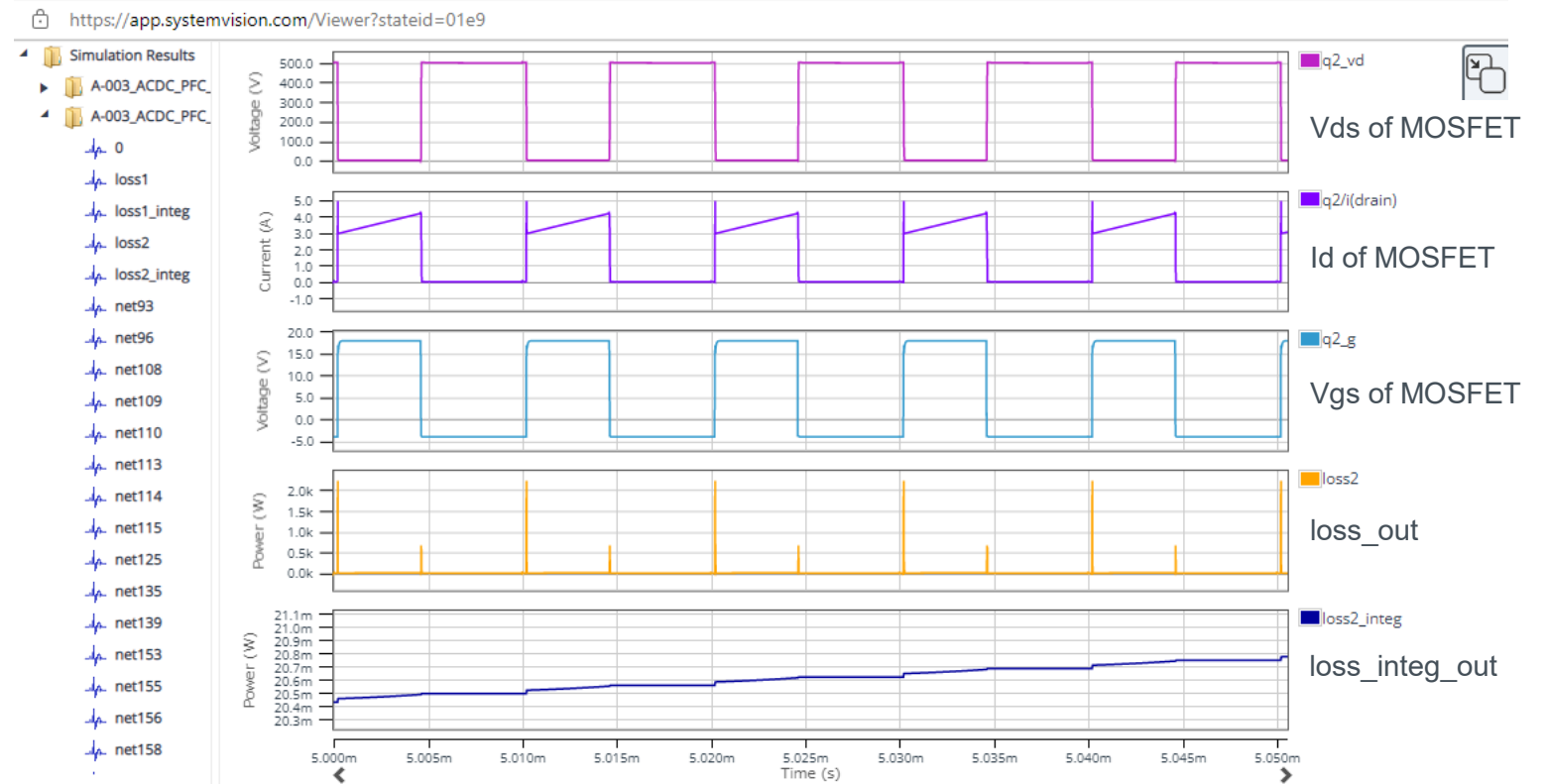
$$loss\_out(t) = I(t) \times V(t)$$

$$loss\_integ\_out = \int_0^t loss\_out(t) dt$$

I : Current through p1 to p1s

V : Voltage between p1s and p2

## Waveform example



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