A-002. Boost PFC Vin=200V, Iin=2.5A, CCM

ROHM Solution Simulator Schematic Information

2025. Nov.
64UG061E Rev.006

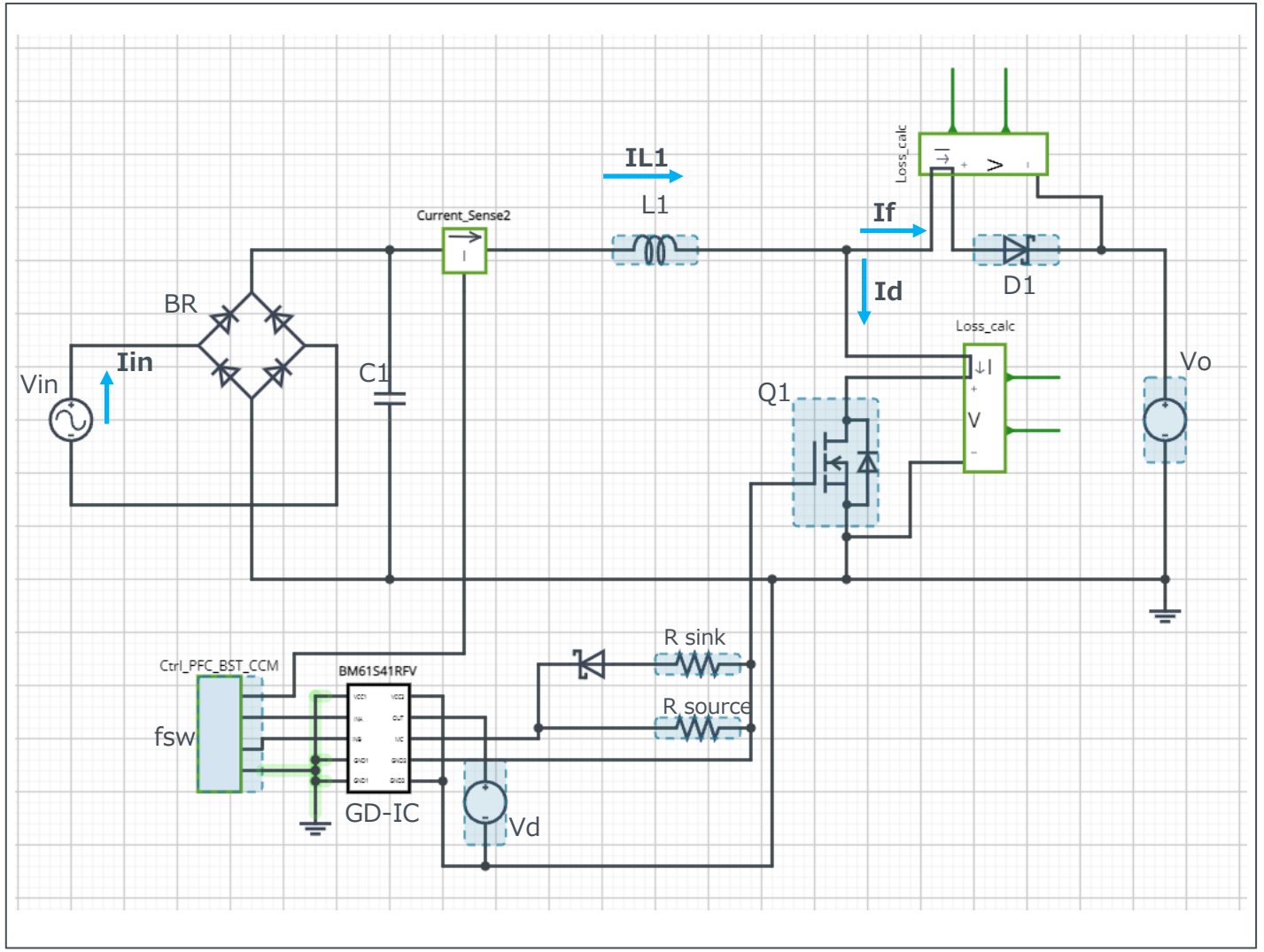
Simulation Parameters

Component name	Component	Default	Simulation Setting Range
Vin	Input voltage	200Vac 50Hz	
Iin	Input current	2.5Aac	
Vo	Output voltage	400Vdc	300 – 500Vdc
fsw	Switching frequency	100kHz	10k – 300k
Tj	Temperature	100°C	
Vd	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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A-002. Boost PFC Vin=200V, Iin=2.5A, CCM

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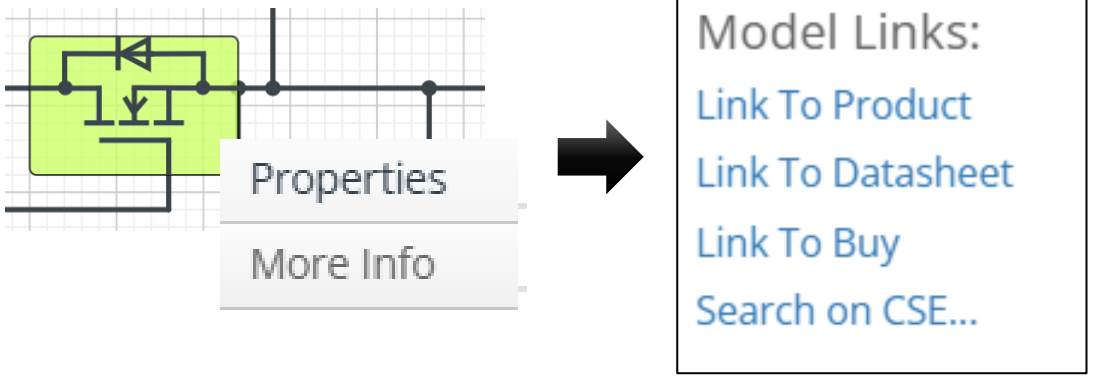
Selectable Devices

Component name	Component
Q1	SiC MOSFET

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



SiC MOSFET part number information

S C T 4 0 3 6 K R

- **Part No.**
- **Product category 1**
  - SC: SiC discrete device
- **Product category 2**
  - T: MOSFET
- **Product generations**
  - 2: 2nd Generation
  - 3: 3rd Generation
  - 4: 4th Generation
- **ON-resistance (Typ.)**
  - 013: 13 mΩ
  - 017: 17 mΩ
  - 018: 18 mΩ
  - 022: 22 mΩ
  - 026: 26 mΩ
  - 030: 30 mΩ
  - 036: 36 mΩ
  - 040: 40 mΩ
  - 045: 45 mΩ
  - 060: 60 mΩ
  - 062: 62 mΩ
  - 080: 80 mΩ
  - 105: 105 mΩ
  - 120: 120 mΩ
  - 160: 160 mΩ
  - 280: 280 mΩ
  - H12: 1150 mΩ
- **Rated voltage**
  - A: 650 V
  - D: 750 V
  - K: 1200 V
  - N: 1700 V
- **Package**
  - E: TO-247 (TO-247N) Other than 3rd generation
  - L: TO-247 (TO-247N) 3rd generation only
  - R: TO-247-4L
  - W7: TO-263-7L
  - WA: TO-263-7LA
  - Z: TO-3PFM
  - * JEDEC code. Parentheses indicate ROHM packages.

Product Lineup: SiC MOSFETs

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Note) We have not been able to confirm operation with all combinations. Please read the disclaimer carefully.

A-002. Boost PFC Vin=200V, Iin=2.5A, CCM

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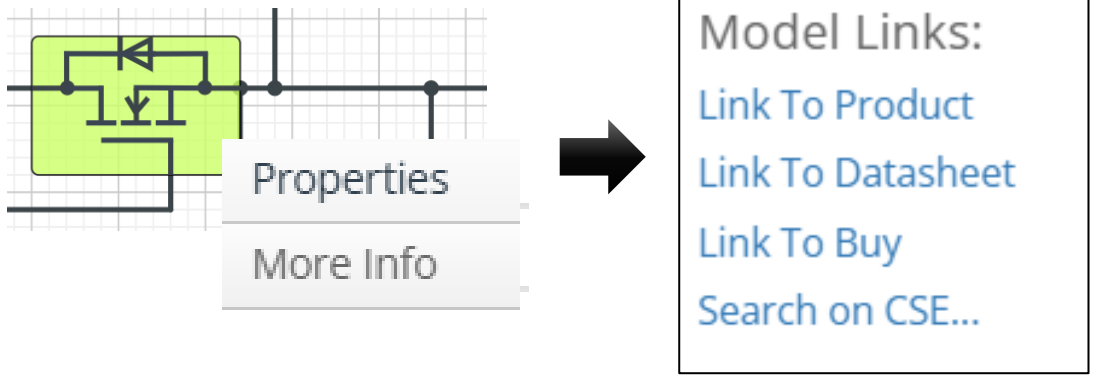
Selectable Devices

Component name	Component	Product
Q1	SJ MOSFET	RxxxxKN series RxxxxYN series

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



SJ MOSFET part number information

Single type

R 6 0 0 4 P N D 3 F R A

- Part No.
- ROHM
- V_{DSS}
  - 52: 525V
  - 60: 600V
  - 65: 650V
  - 80: 800V
- I_D
  - 00: < 1A
  - 01: 1A
  - 02: 1A < I_D ≤ 2A
  - 03: 3A
  - 04: 4A
  - : :
  - 77: 77A
  - 86: 86A
- Polarity
  - N: Nch
- Series
  - A: 1st Gen, For Automotive
  - C: 1st Gen, For Automotive, Built-in ESD Protection
  - E: 3rd Gen, Low Noise
  - J: 3rd Gen, Fast recovery
  - K: 3rd Gen, Fast switching
  - P: 1st Gen, For Automotive
  - R: 3rd Gen, Fast recovery, Low Noise
  - Y: 4th Gen, Fast switching
  - V: 4th Gen, Fast recovery
- Package
  - D3: TO-252
  - D4: SOT-223-3
  - H: SOP8
  - J: TO-263 (LPTS)
  - X: TO-220FM
  - X3: TO-220AB
  - Z: TO-3PF
  - Z4: TO-247AD (TO-247)
- Grade
  - None: Standard
  - FRA: Automotive
  - FRG: Automotive

➧ Product Lineup: Super Junction MOSFETs

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Note) We have not been able to confirm operation with all combinations. Please read the disclaimer carefully.

A-002. Boost PFC Vin=200V, Iin=2.5A, CCM

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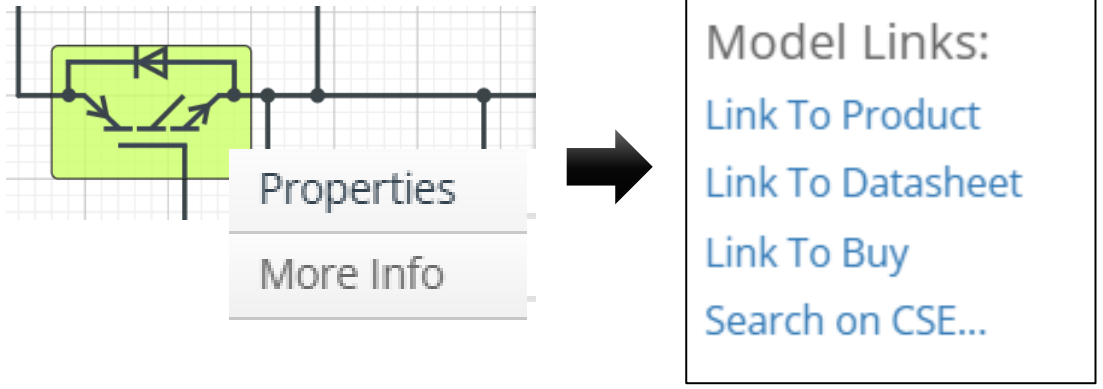
Selectable Devices

Component name	Component	Product
Q1	IGBT	RGW series

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



IGBT part number information

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

Part No.

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 10μs
T: For inverter, Short circuit capability guaranteed 5μs
TV: For converter / inverter, High speed switching, Short circuit capability guaranteed 2μs
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°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

Rated voltage V_{CES}
60: 600 V
65: 650 V
X2: 1200 V
X8: 1800 V

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

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

➧ Product Lineup: Field Stop Trench IGBT

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Note) We have not been able to confirm operation with all combinations. Please read the disclaimer carefully.

A-002. Boost PFC Vin=200V, Iin=2.5A, CCM

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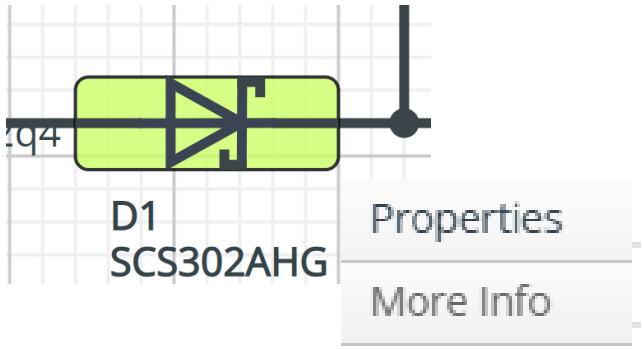
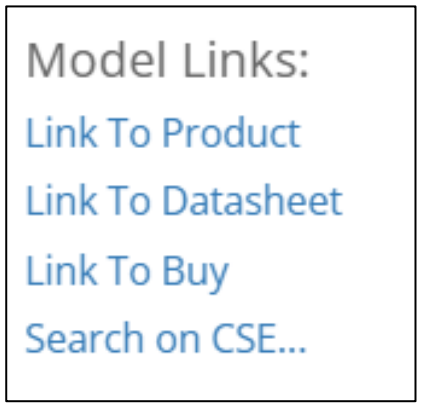
Selectable Devices

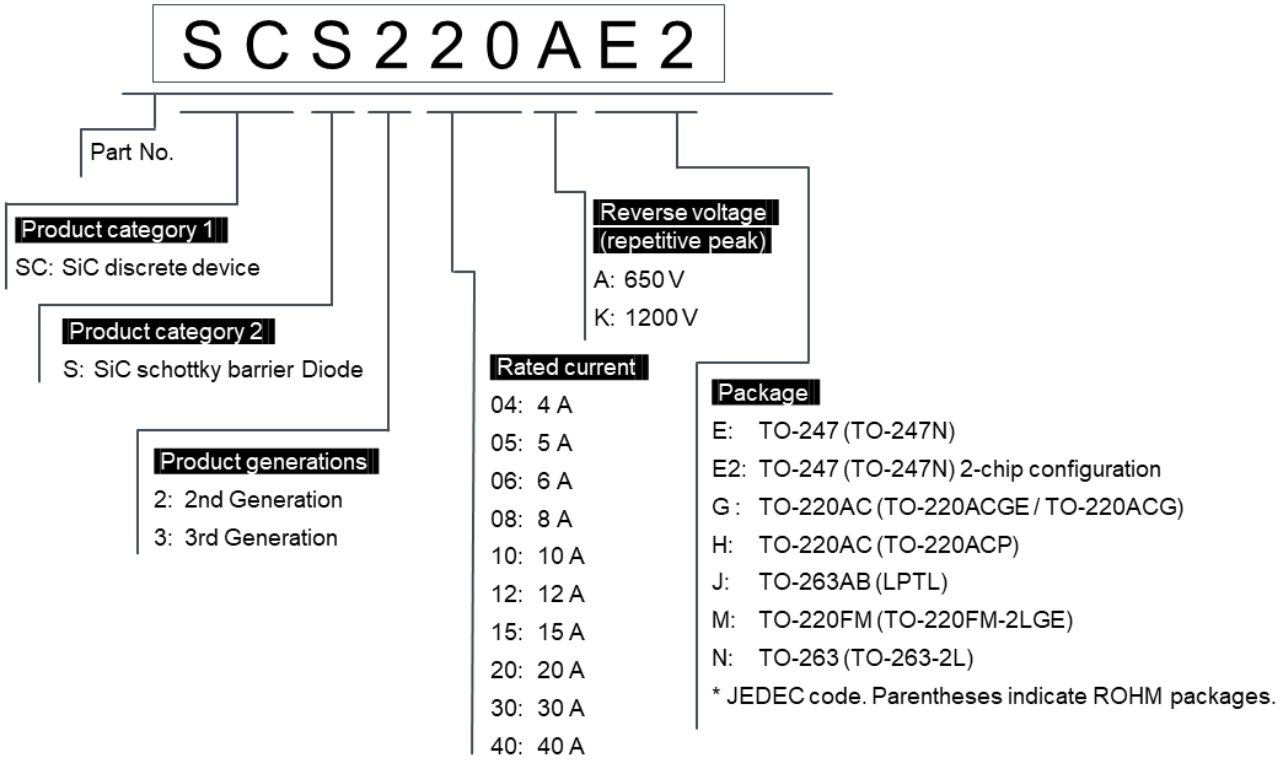
Component name	Component
D1	SiC Schottky Barrier Diode

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





SiC Schottky Barrier Diode part number information



➧ Product Lineup: SiC Schottky Barrier Diodes

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A-002. Boost PFC Vin=200V, Iin=2.5A, CCM

2025. Nov.
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Selectable Devices

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

* Default device

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Simulation Waveform1

2025. Nov.
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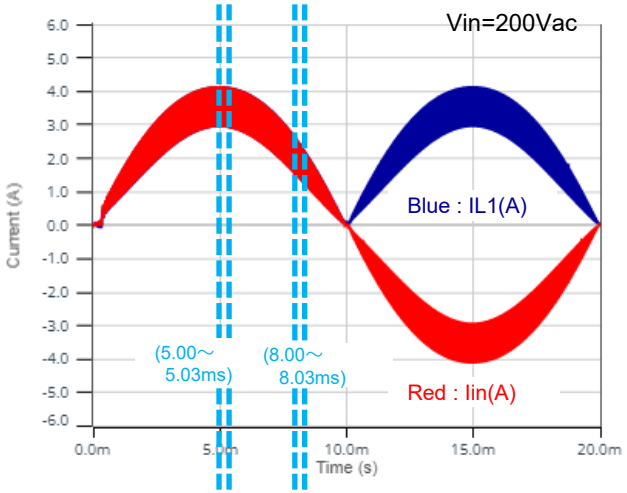
Q1 : SiC MOSFET
SCT2450KE
D1 : SiC SBD
SCS302AHG

IL1, Iin

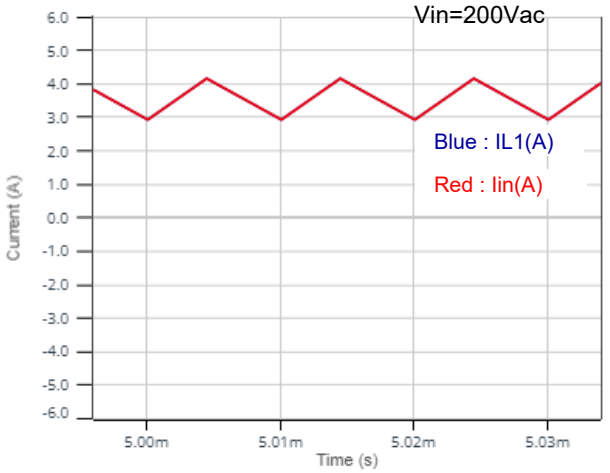
Pin=500W Vo=500Vdc
Tj=100°C

Vin=200Vac



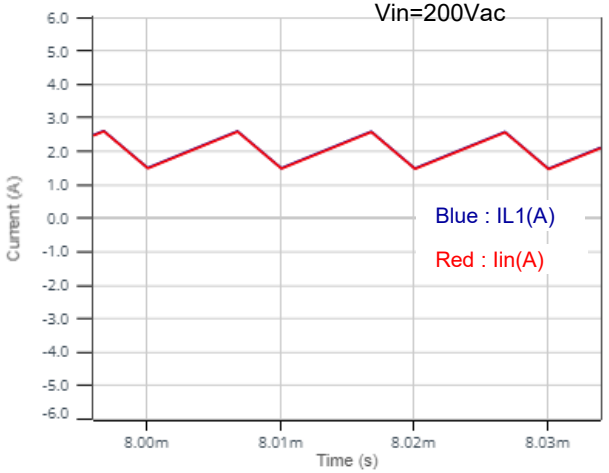
Expansion (5.00～5.03ms)

Vin=200Vac

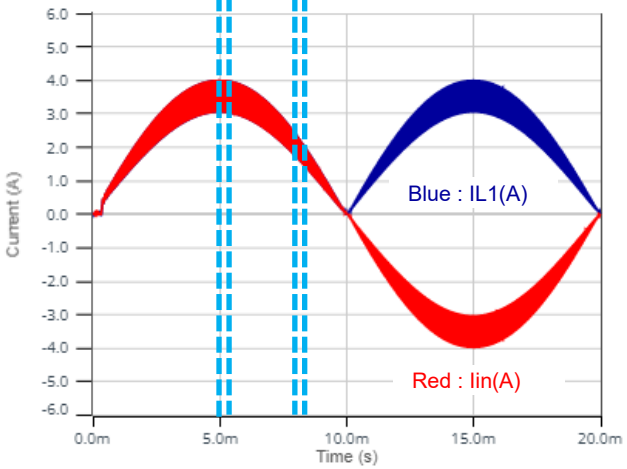


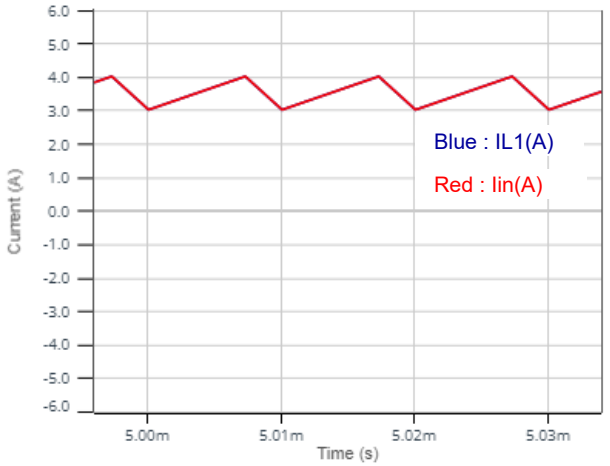
Expansion (8.00～8.03ms)

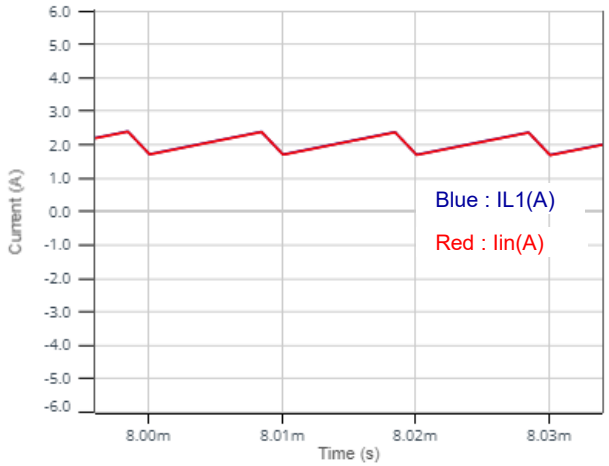
Vin=200Vac



Vin=100Vac







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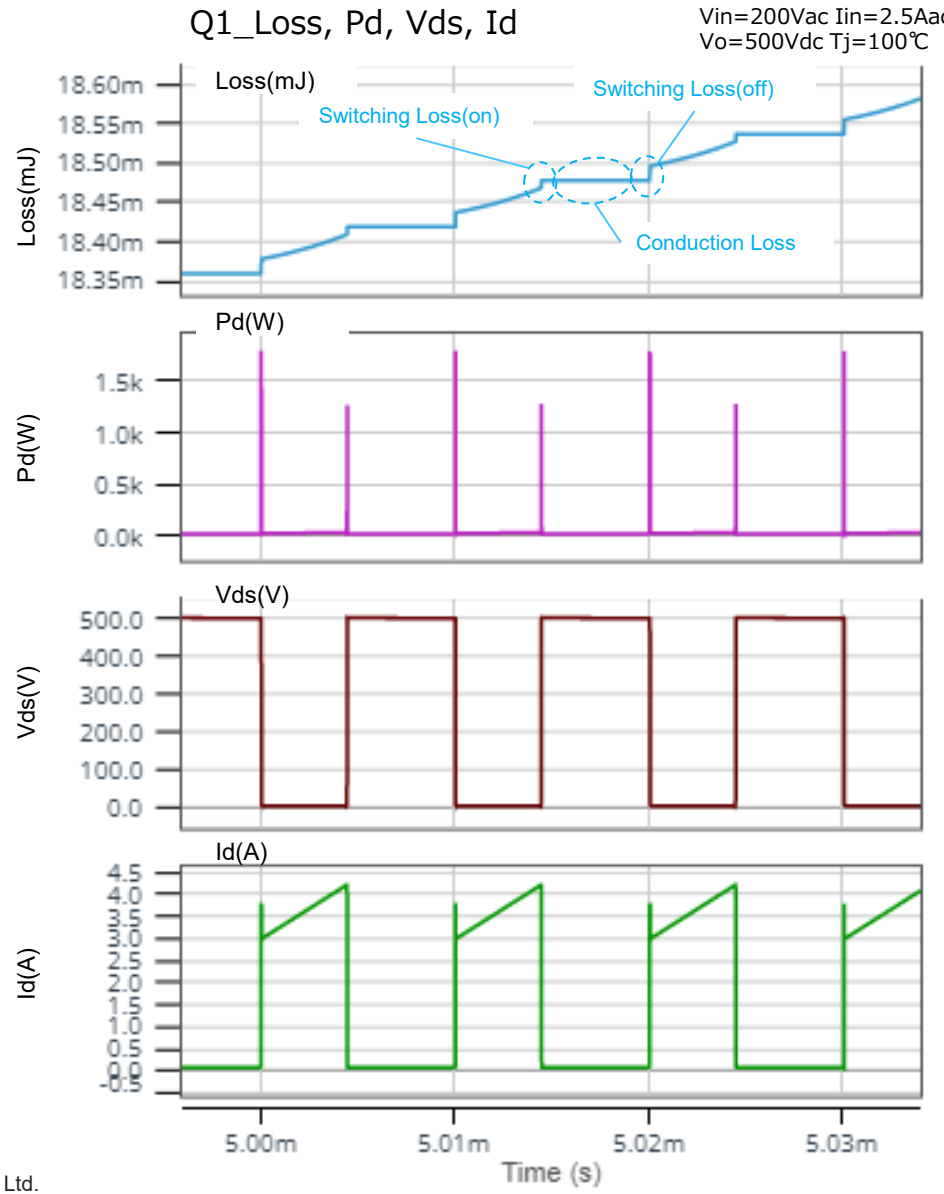
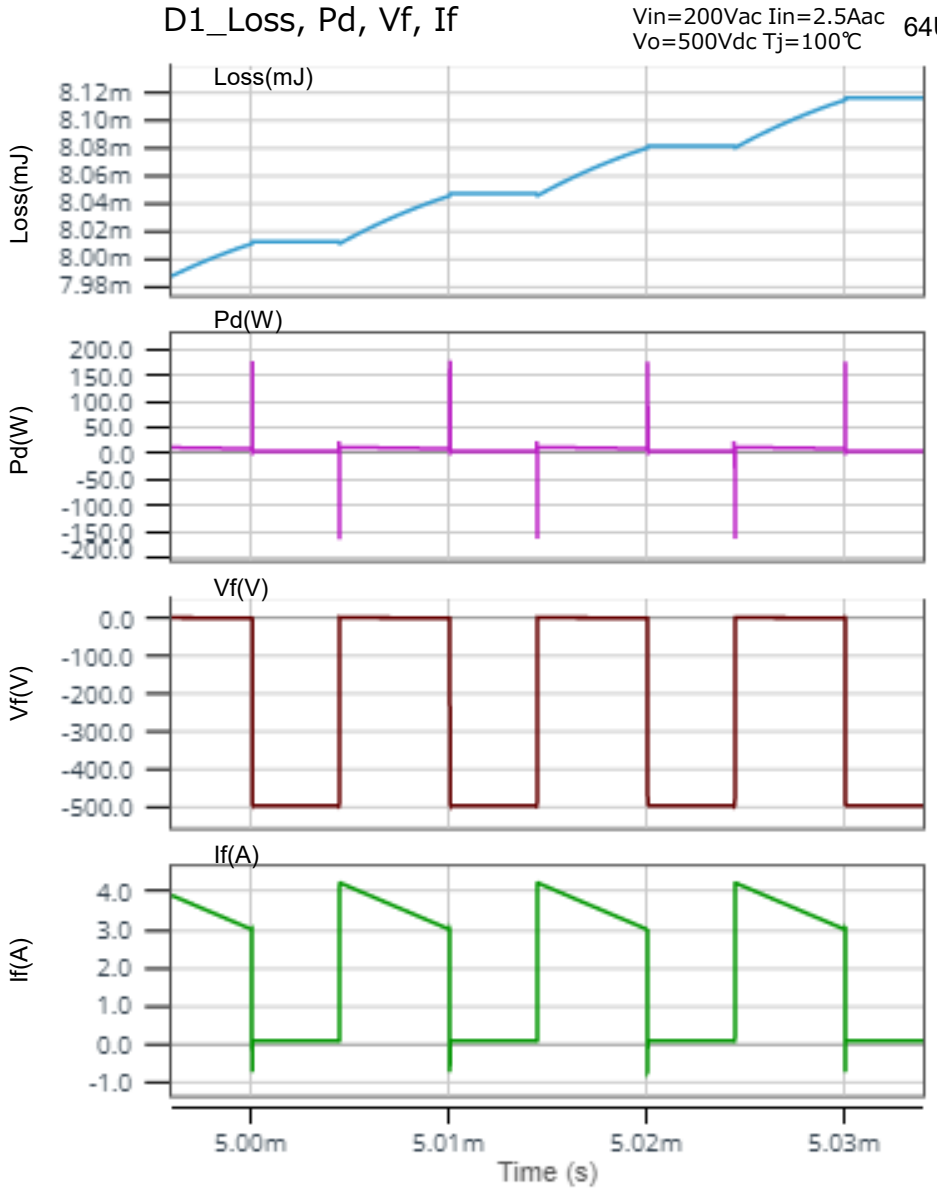
Simulation Waveform2

2025. Nov.
64UG061E Rev.006

Q1 : SiC MOSFET
SCT2450KE
D1 : SiC SBD
SCS302AHG





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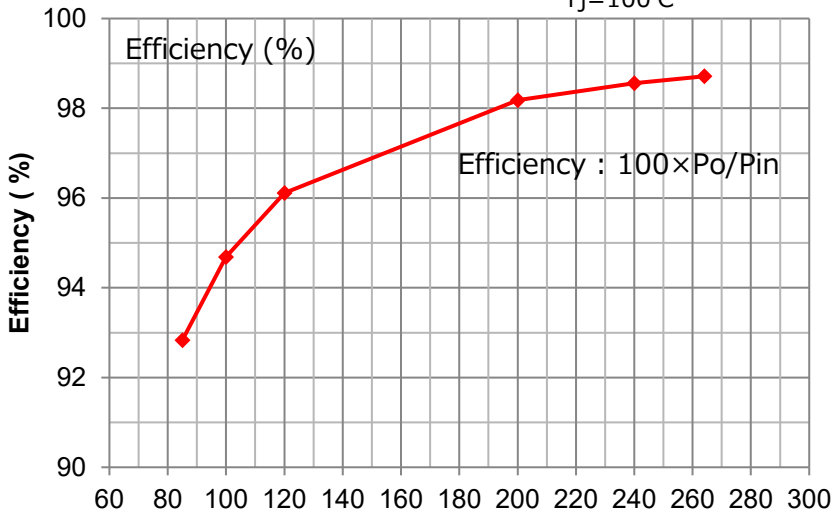
Efficiency, Power Dissipation 1

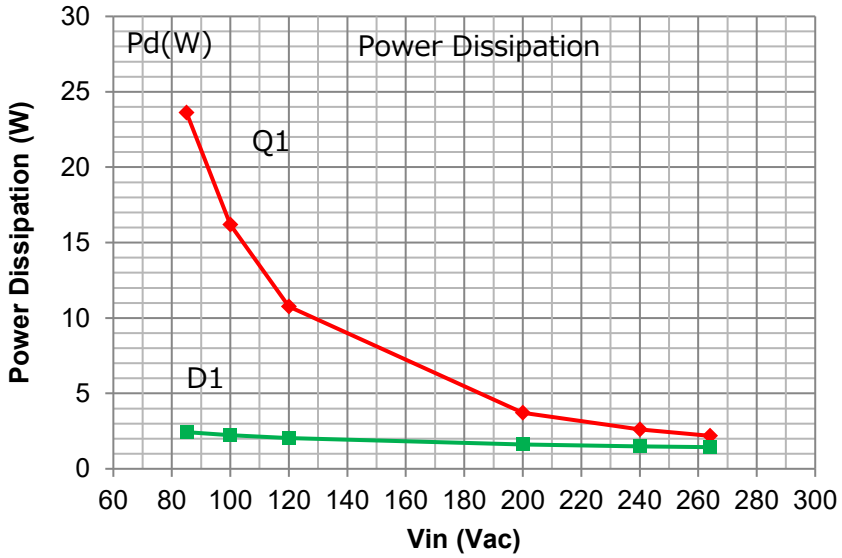
2025. Nov.
64UG061E Rev.006

Q1 : SiC MOSFET
SCT2450KE
D1 : SiC SBD
SCS302AHG

Vin : 85Vac～264Vac

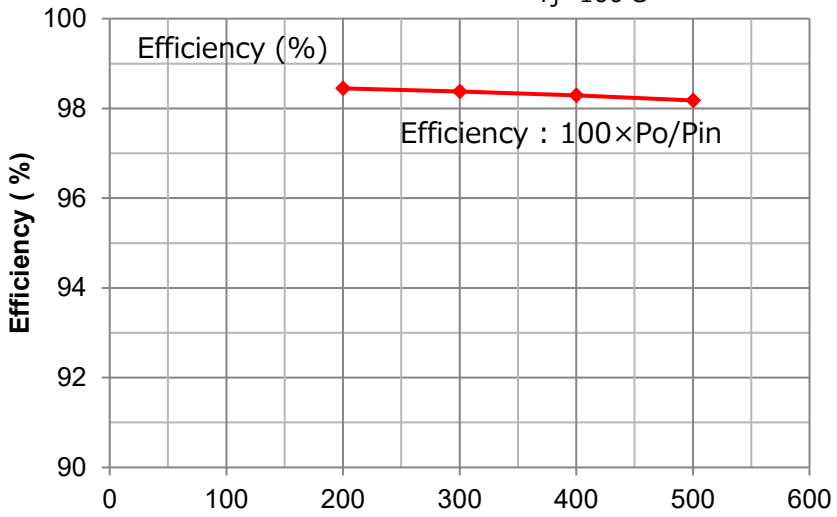
Pin=500W Vo=500Vdc
Tj=100℃

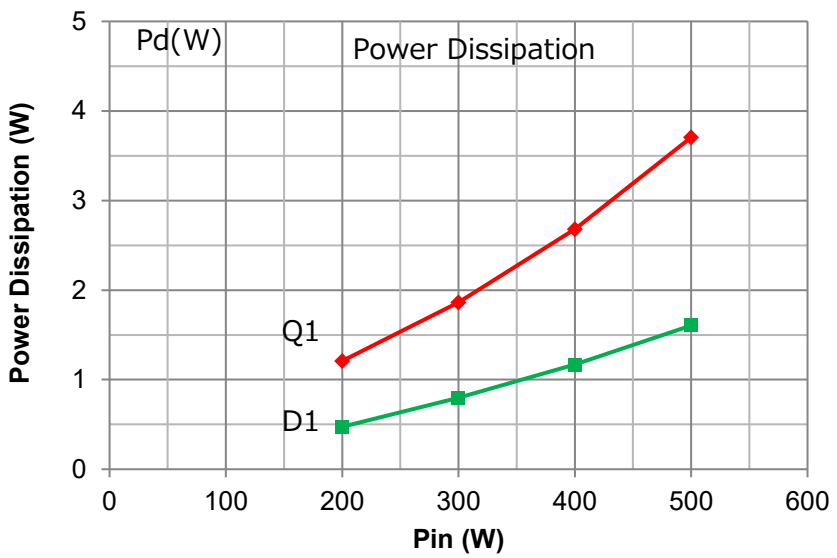




Pin : 200W～500W

Vin=200Vac Vo=500Vdc
Tj=100℃





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Efficiency, Power Dissipation 2

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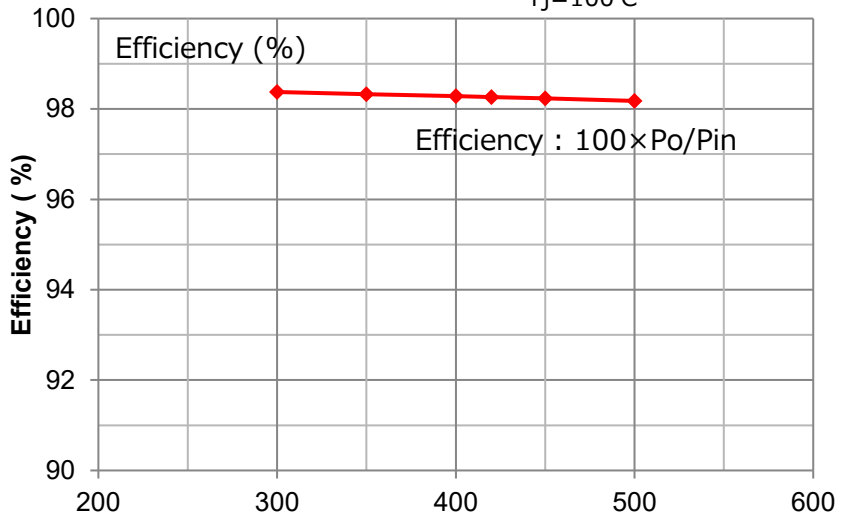
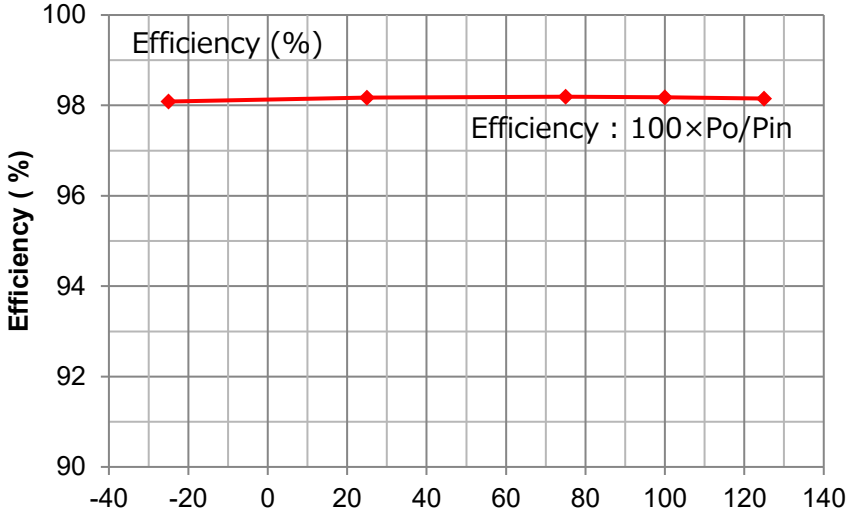
64UG061E Rev.006

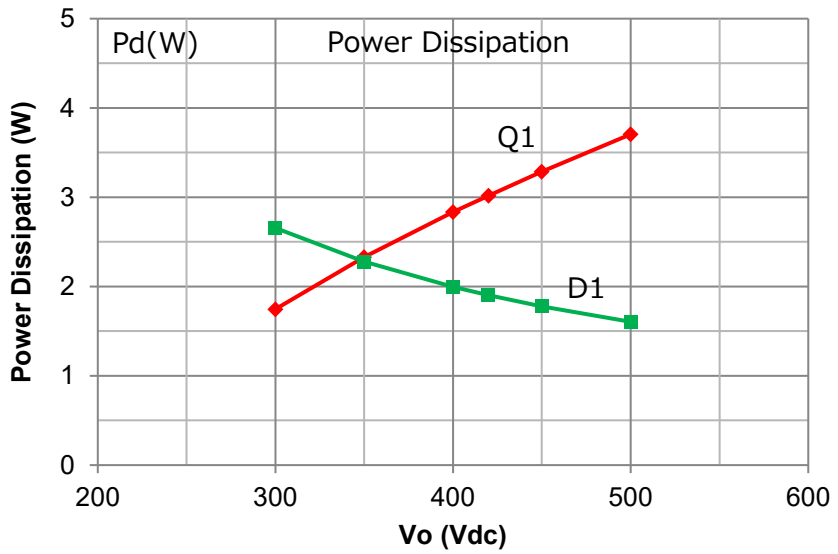
Q1 : SiC MOSFET
SCT2450KE
D1 : SiC SBD
SCS302AHG

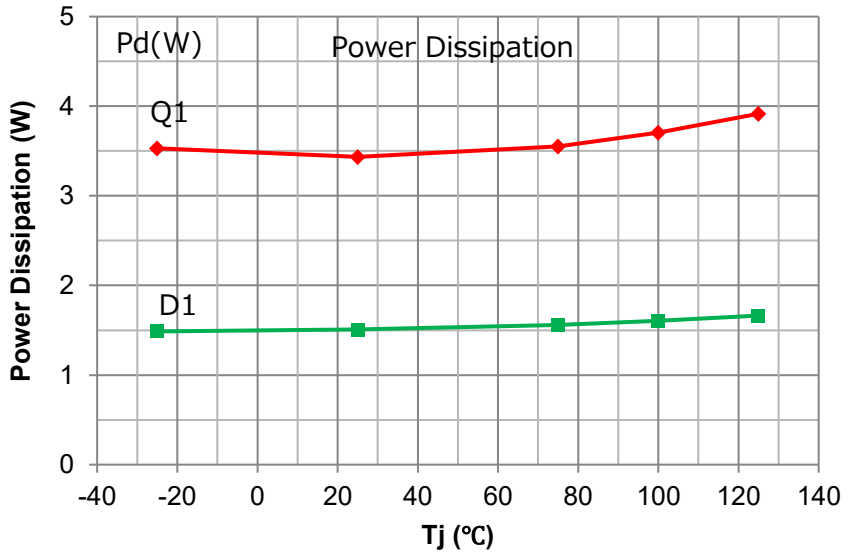
Vo：300Vdc～500Vdc　Vin=200Vac Iin=2.5Aac Tj=100℃



Tj：-25℃～125℃　Vin=200Vac Iin=2.5Aac Vo=500Vdc







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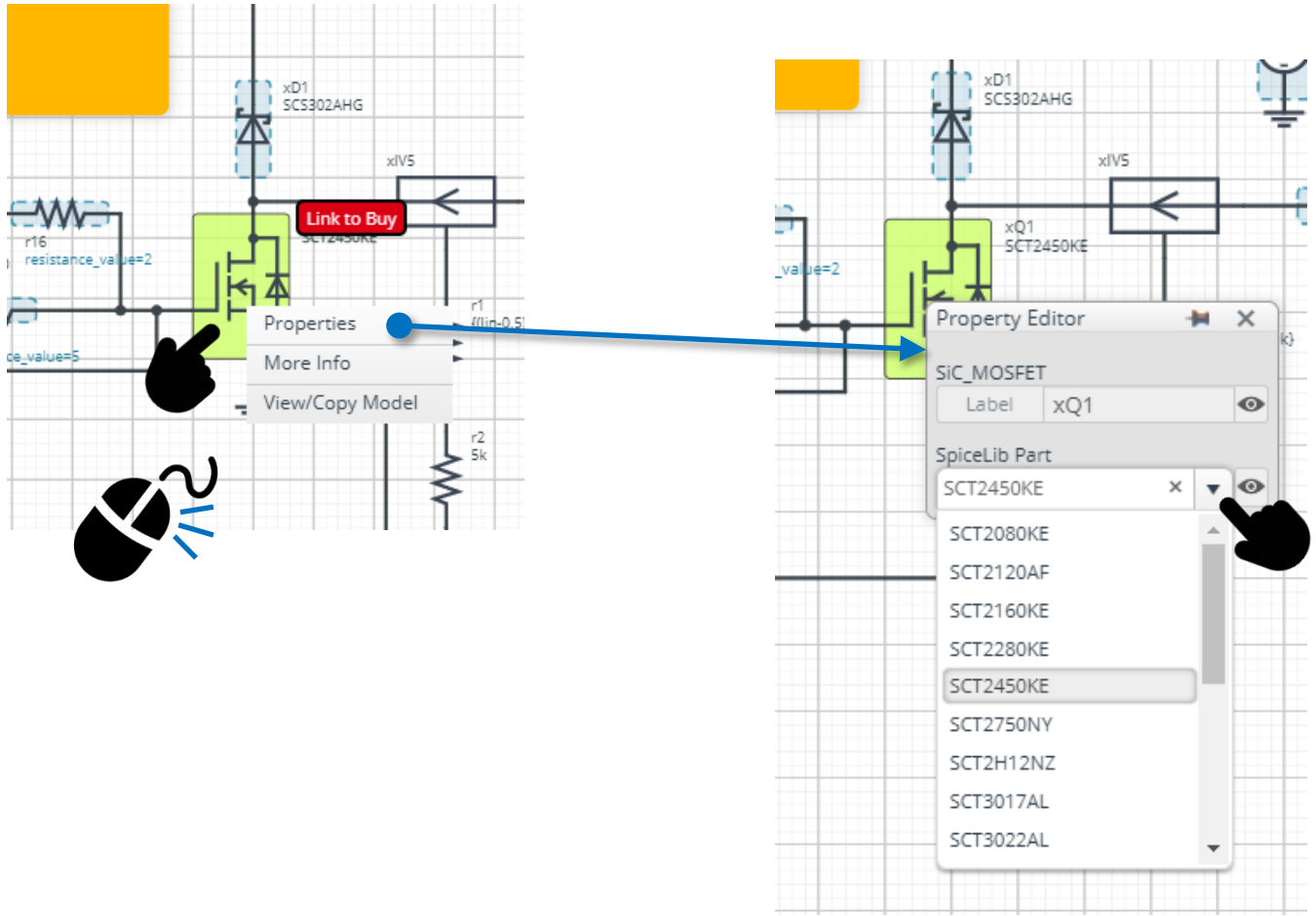
How to change the devices

2025. Nov.
64UG061E Rev.006

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



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Loss Calculation Model

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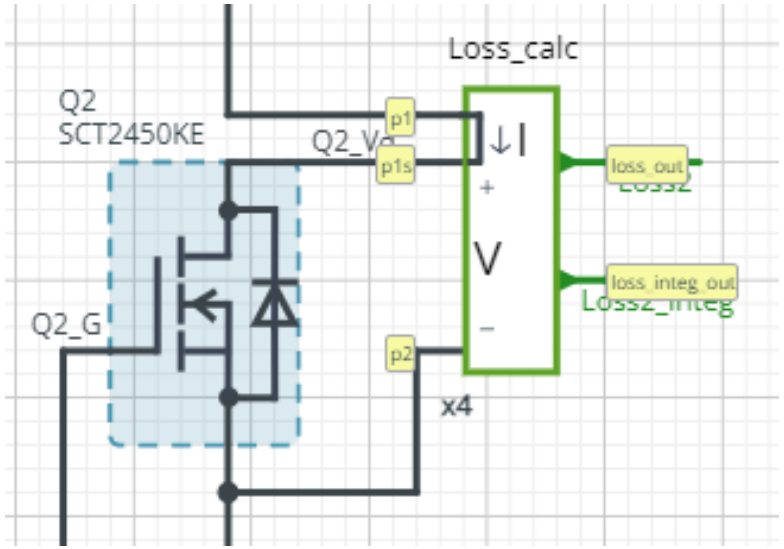
Loss Calculation Model outputs the instantaneous value of power loss and its integration.

Loss calculation model 'Loss_calc'



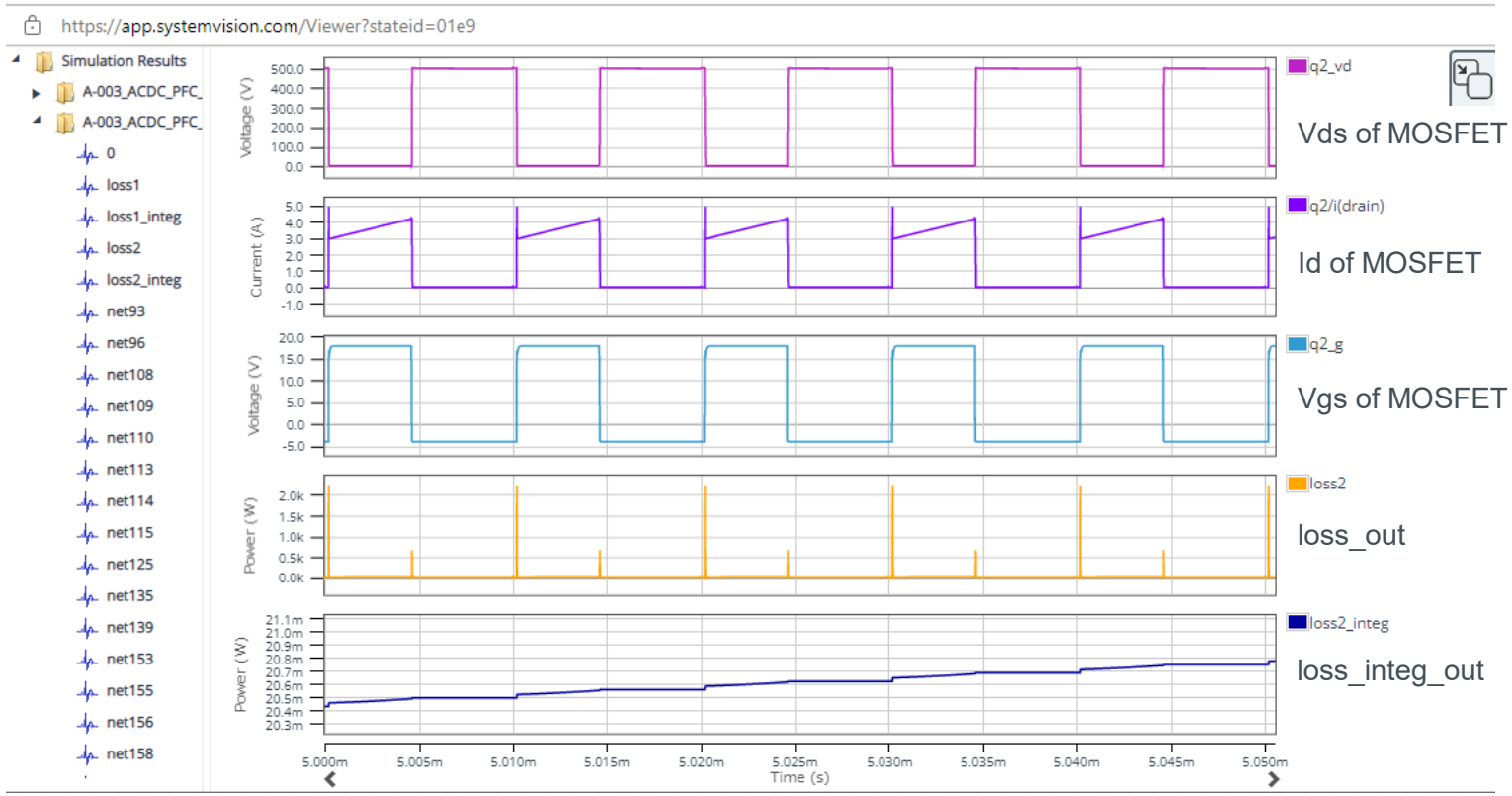
$$loss_out(t) = I(t) \times V(t)$$

$$loss_integ_out = \int_0^t loss_out(t)dt$$

I : Current through p1 to p1s

V : Voltage between p1s and p2

Waveform example



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ROHM SEMICONDUCTOR

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