B-013. DC-AC 3-level ANPC Inverter Pout=10kW

ROHM Solution Simulator Schematic Information

2026 Aug.
69UG024E Rev.001

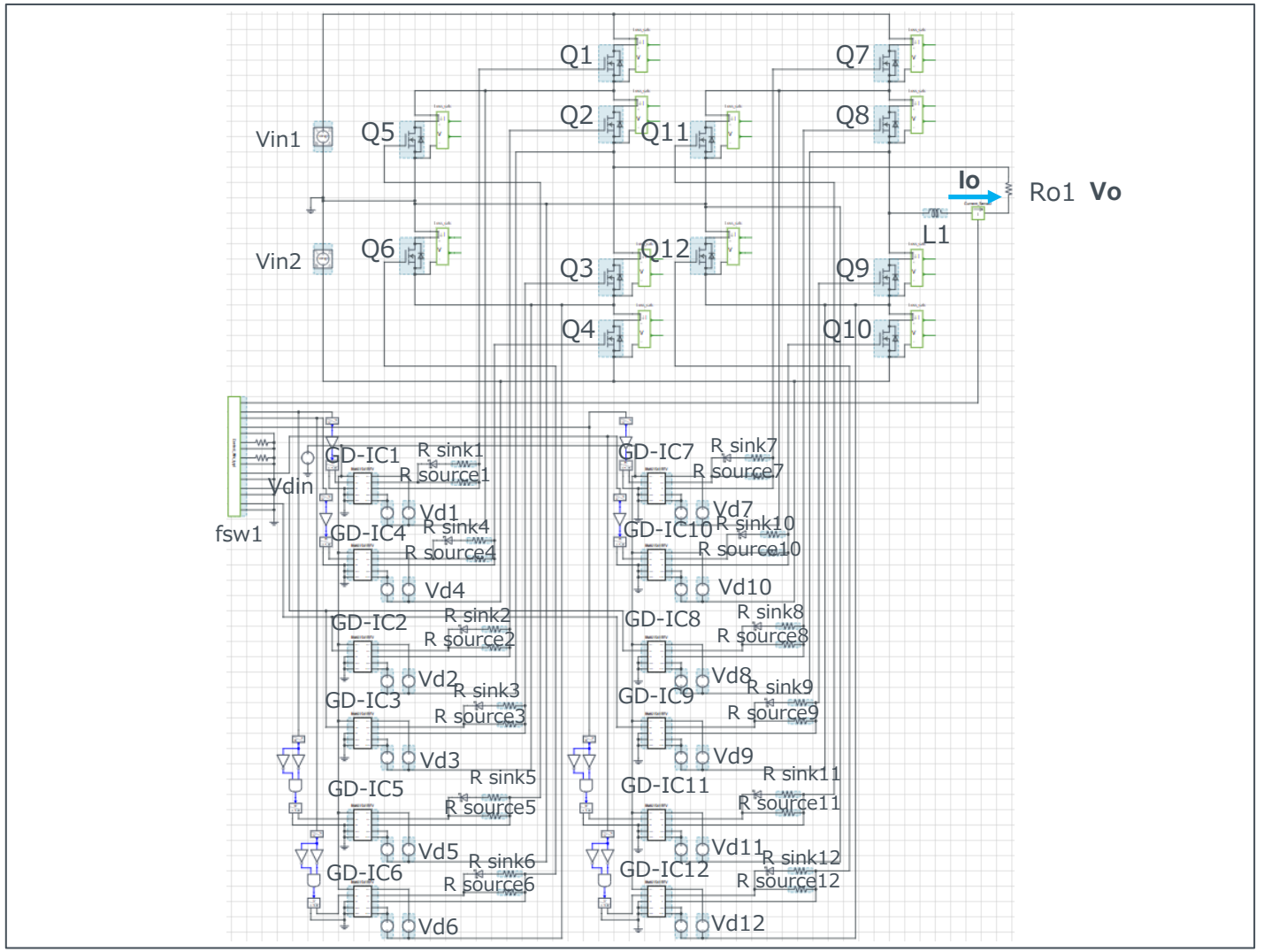
Simulation Parameters

Component name	Component	Default	Simulation Setting Range
Vin1,2	Input voltage	240Vdc	
Vo	Output voltage	200Vac	
Io	Output current	50Aac	
fsw1	Switching frequency	10kHz	10k – 300kHz
Tj	Temperature	100°C	
Vd1-12	Gate Drive voltage H	18V	10 – 20V
Vdin	Signal voltage level	5V	

Devices

Component Name	Component	Default	Simulation Setting Range
Q1-12	SiC MOSFET IGBT	Selectable	
GD-IC1-12	Gate Driver	BM61S41RFV-C	
R sink1-12	Resistor for sink	ESR18 1Ω	0.1 -
R source1-12	Resistor for source	ESR18 2Ω	0.1 -
L1	Inductor	500μH	10μH - 2mH
Ro1	Output Resistor	{Vo/Io}	

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

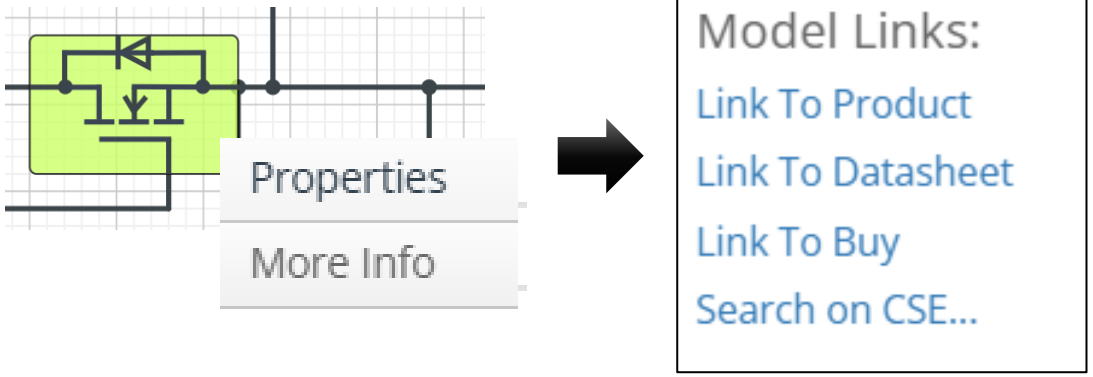
Component name	Component
Q1-12	SiC MOSFET

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.

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



Product Lineup: SiC MOSFETs

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

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Selectable Devices

Component name	Component	Product
Q1-12	IGBT	RGW series

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

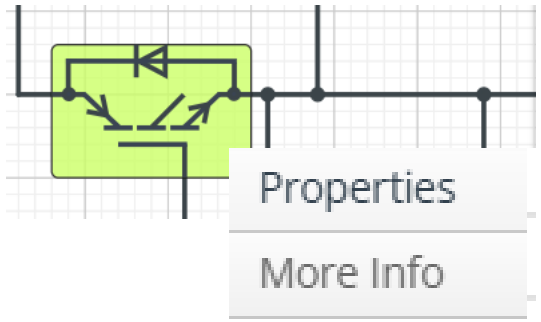
Rated voltage V_{CES}
60: 600 V
65: 650 V
X2: 1200 V
X8: 1800 V

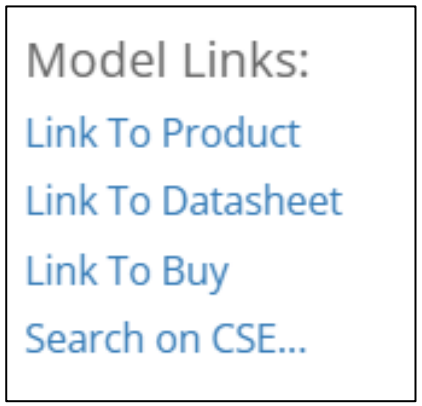
Built-in diode configuration
None: Without diode
C: SiC Schottky barrier diode
D: Fast recovery diode
E: Larger size Fast recovery diode
R: Body diode with reverse conducting (RC) structure

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

➧ Product Lineup: Field Stop Trench IGBT

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





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

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Selectable Devices

Component name	Component	Product No.	feature
GD-IC1-12	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

Simulation Waveform

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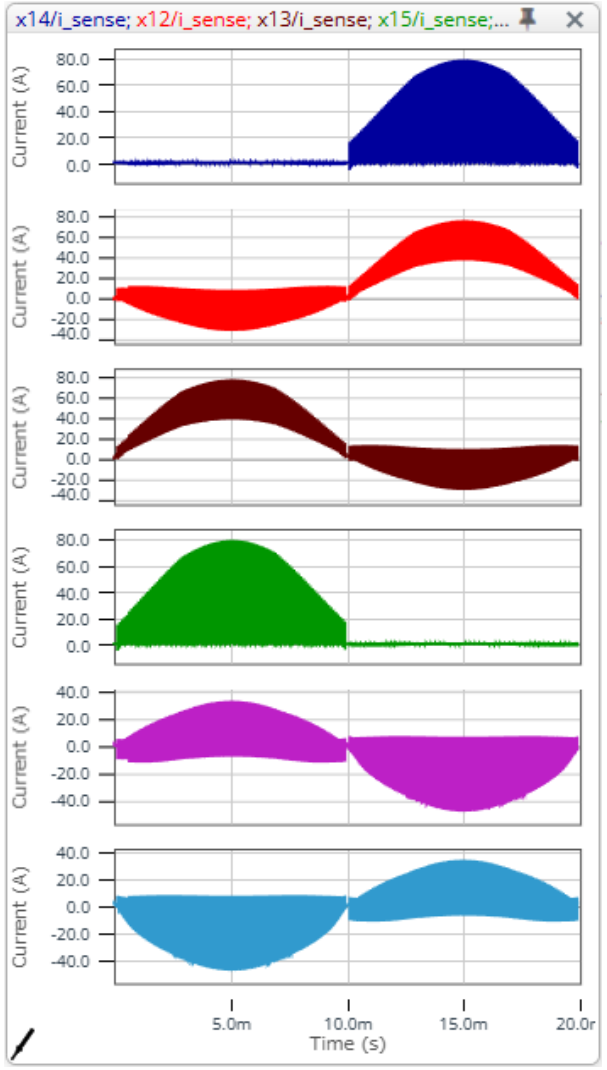
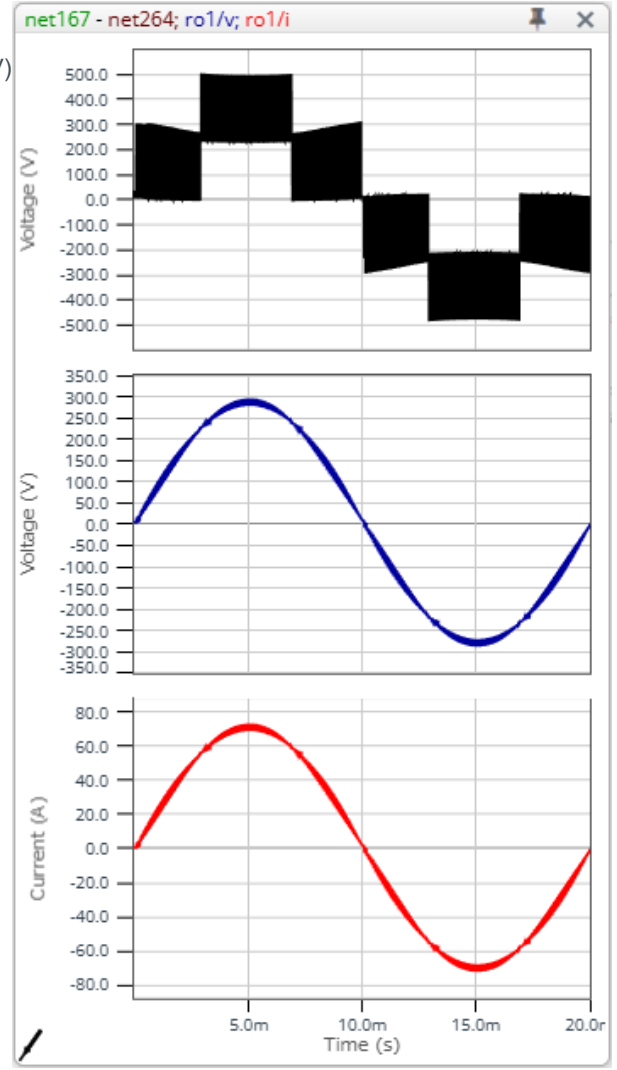
Q1-12 : SiC MOSFET
SCT4045DE
GD-IC1-12 :
BM61S41RFV-C

Id Q1-Q6 (0～20ms)



Vline / Vo, Io (0～20ms)



How to change the devices

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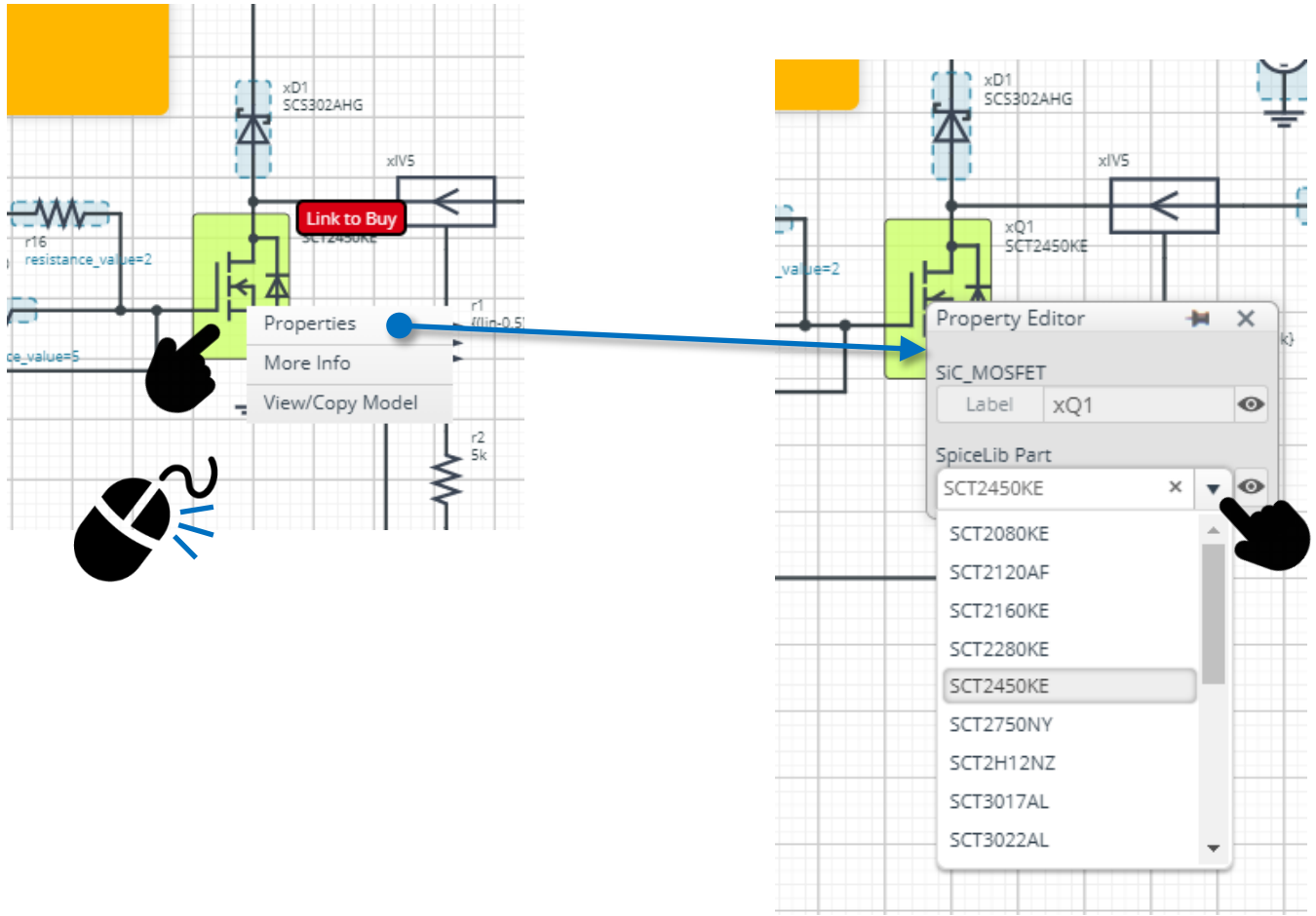
Right-click on the device ⇨ Select Properties ⇨ Pull down “SpiceLib Part” ⇨ Select the product



Loss Calculation Model

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

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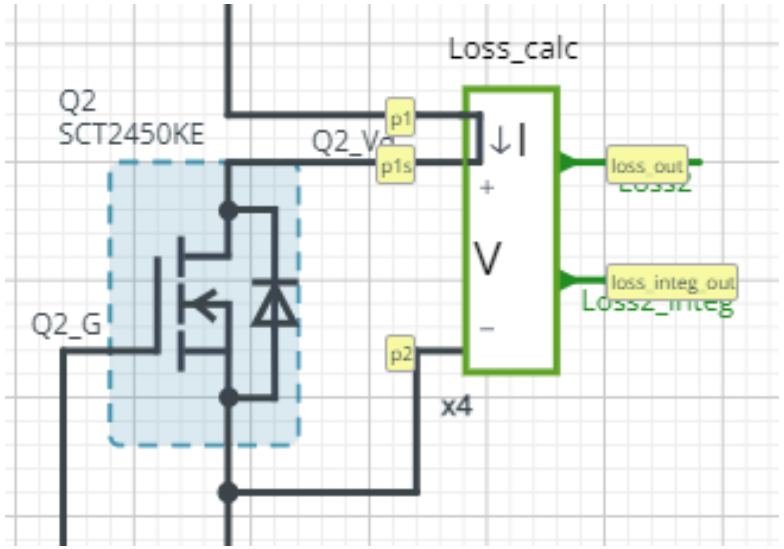
Loss calculation model ‘Loss_calc’



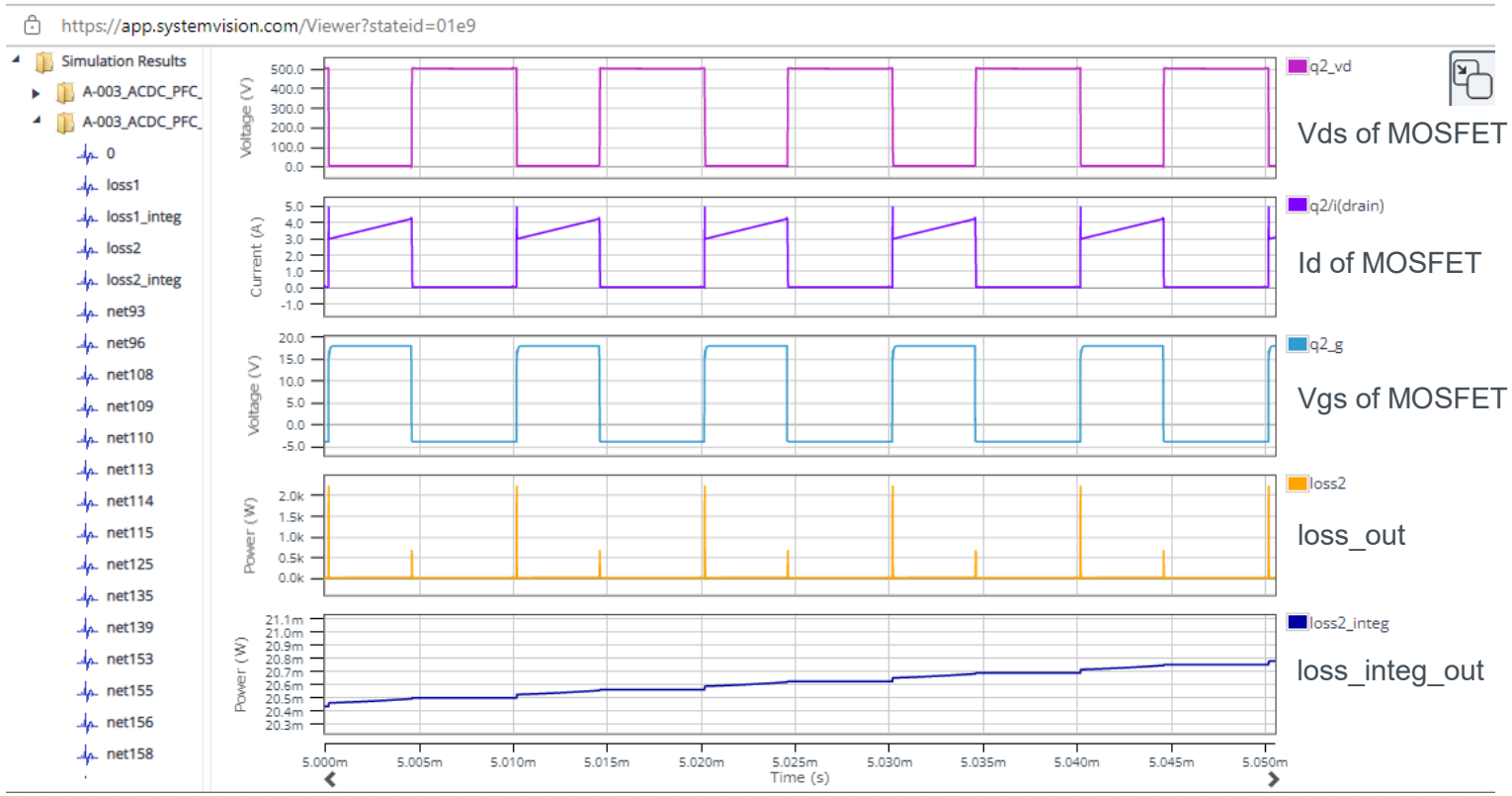
$$loss\_out(t) = I(t) \times V(t)$$

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

I : Current through p1 to p1s

V : Voltage between p1s and p2

Waveform example



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