C-003. DC-DC Boost Converter 2-Phase Vo=800V, Io=40A

ROHM Solution Simulator Schematic Information

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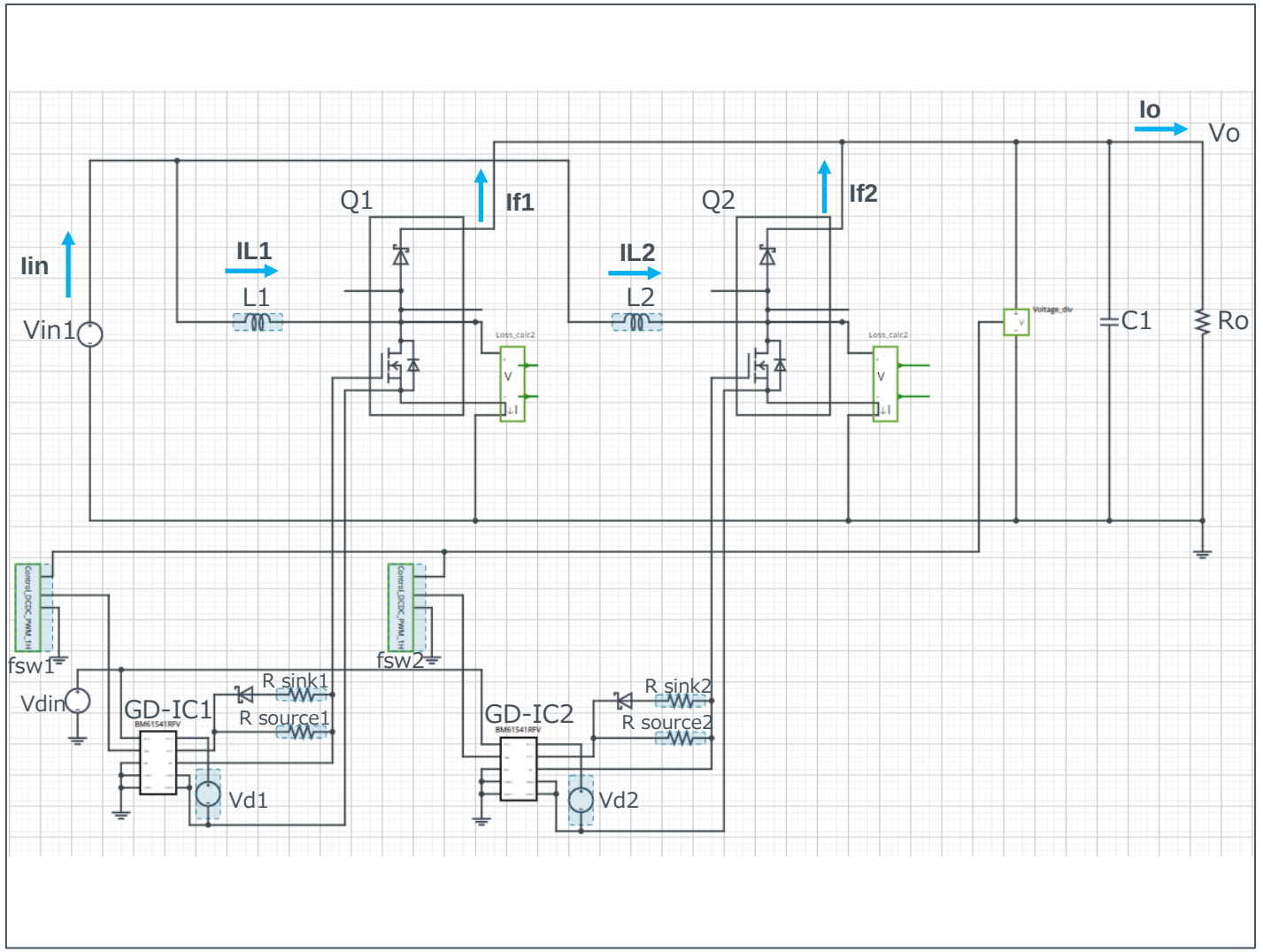
Simulation Parameters

Component name	Component	Default	Simulation Setting Range
Vin1	Input voltage	250Vdc	
Vo	Output voltage	800Vdc	
Io	Output current	40Adc	
fsw1,2	Switching frequency	50kHz	10k – 300kHz
Tj	Temperature	100°C	
Vd1,2	Gate Drive voltage H	18V	10 – 20V
Vdin	Signal voltage level	5V	

Devices

Component Name	Component	Default	Simulation Setting Range
Q1,2	SiC Power Module	BSM120C12P2C201 (1200V, 134A, Chopper)	
GD-IC1,2	Gate Driver	BM61S41RFV-C	
R sink1,2	Resistor for sink	ESR18 1Ω	0.1 -
R source1,2	Resistor for source	ESR18 2Ω	0.1 -
L1,2	Inductor	20µH	10µH - 2mH
C1	Capacitor	10µF	1µF - 1mF
Ro	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.

Simulation Waveform

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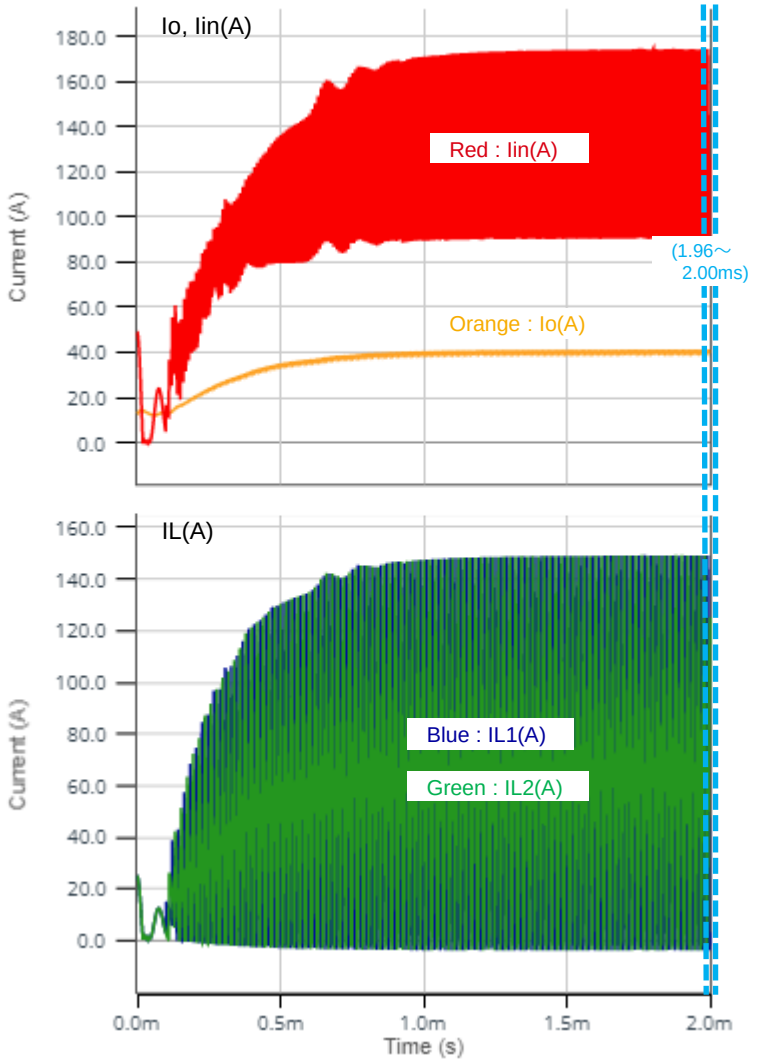
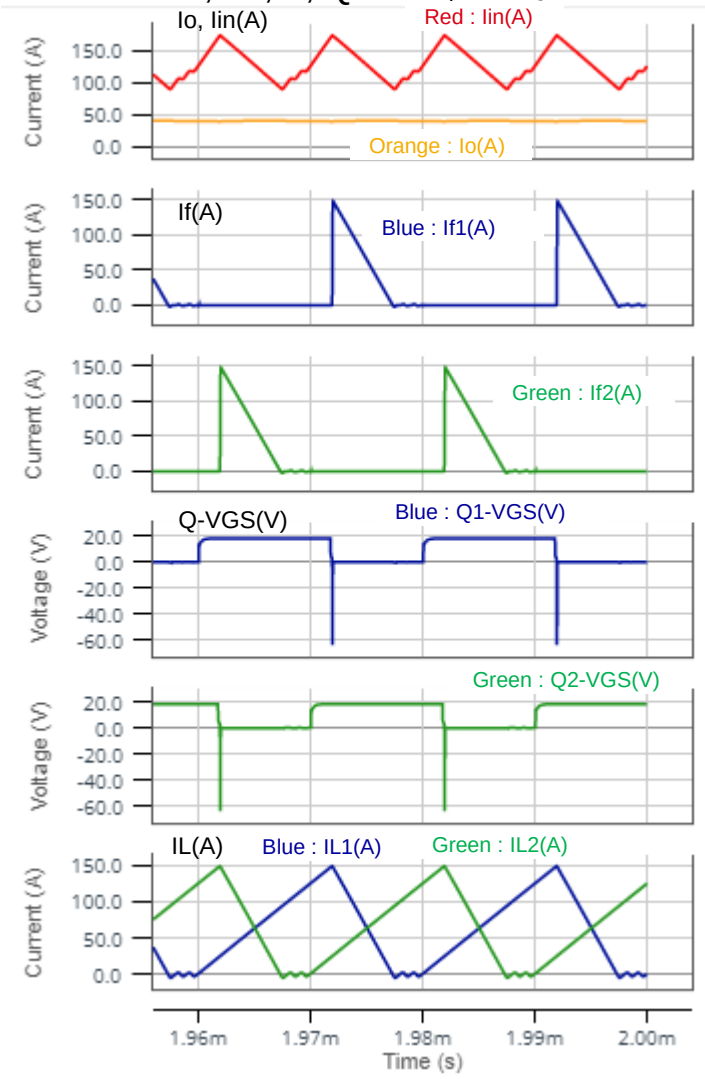
Io, Iin, IL (0～2.00ms)

Vin=250V Vo=800V
Io=40A Tj=100℃



Io, Iin, If, Q-VGS, IL （1.96ms～2.00ms）



Efficiency, Power Dissipation 1

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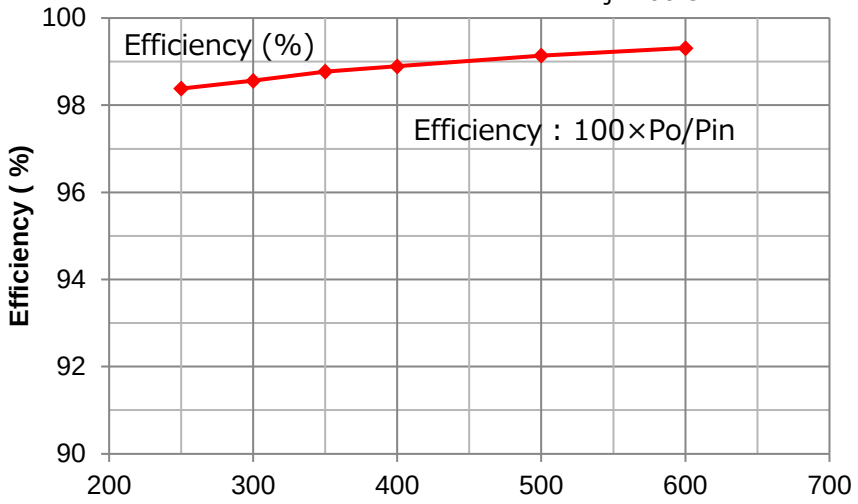
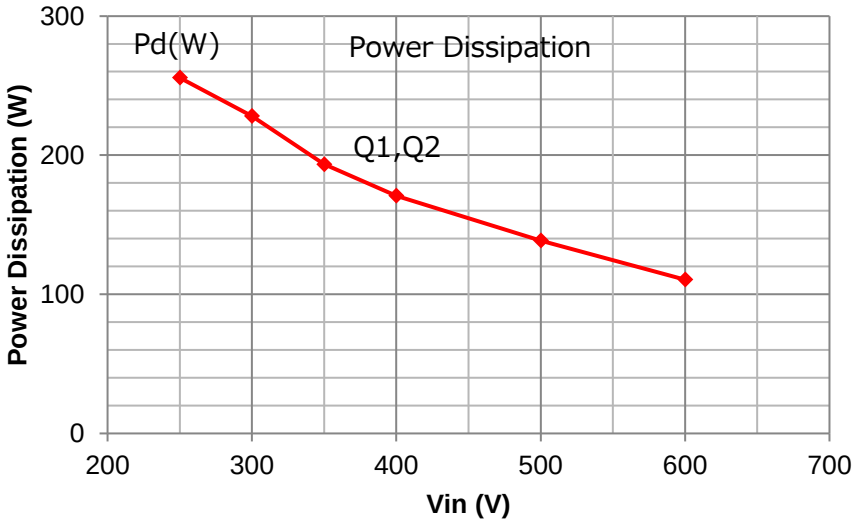
Vin：250V～600V

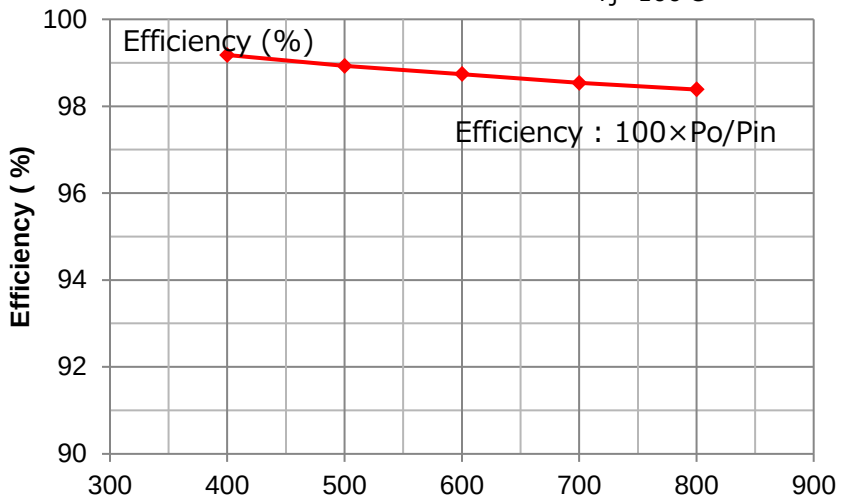
Vo=800V Io=40A
Tj=100℃

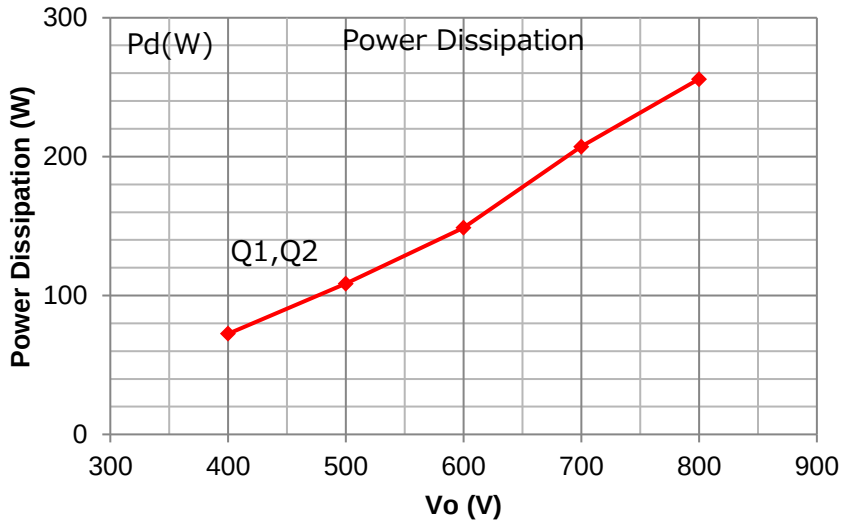




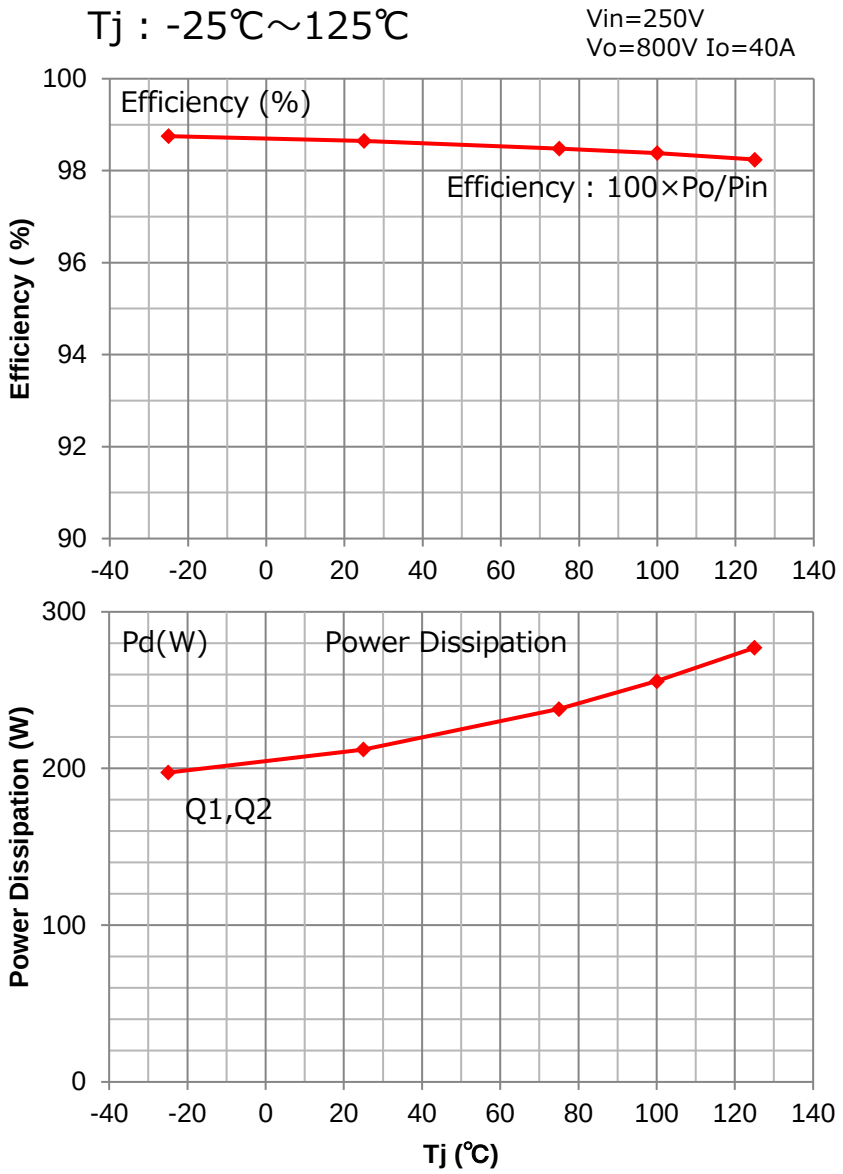
Vo：400V～800V

Vin=250V Io=40A
Tj=100℃





Efficiency, Power Dissipation 2



How to change the devices

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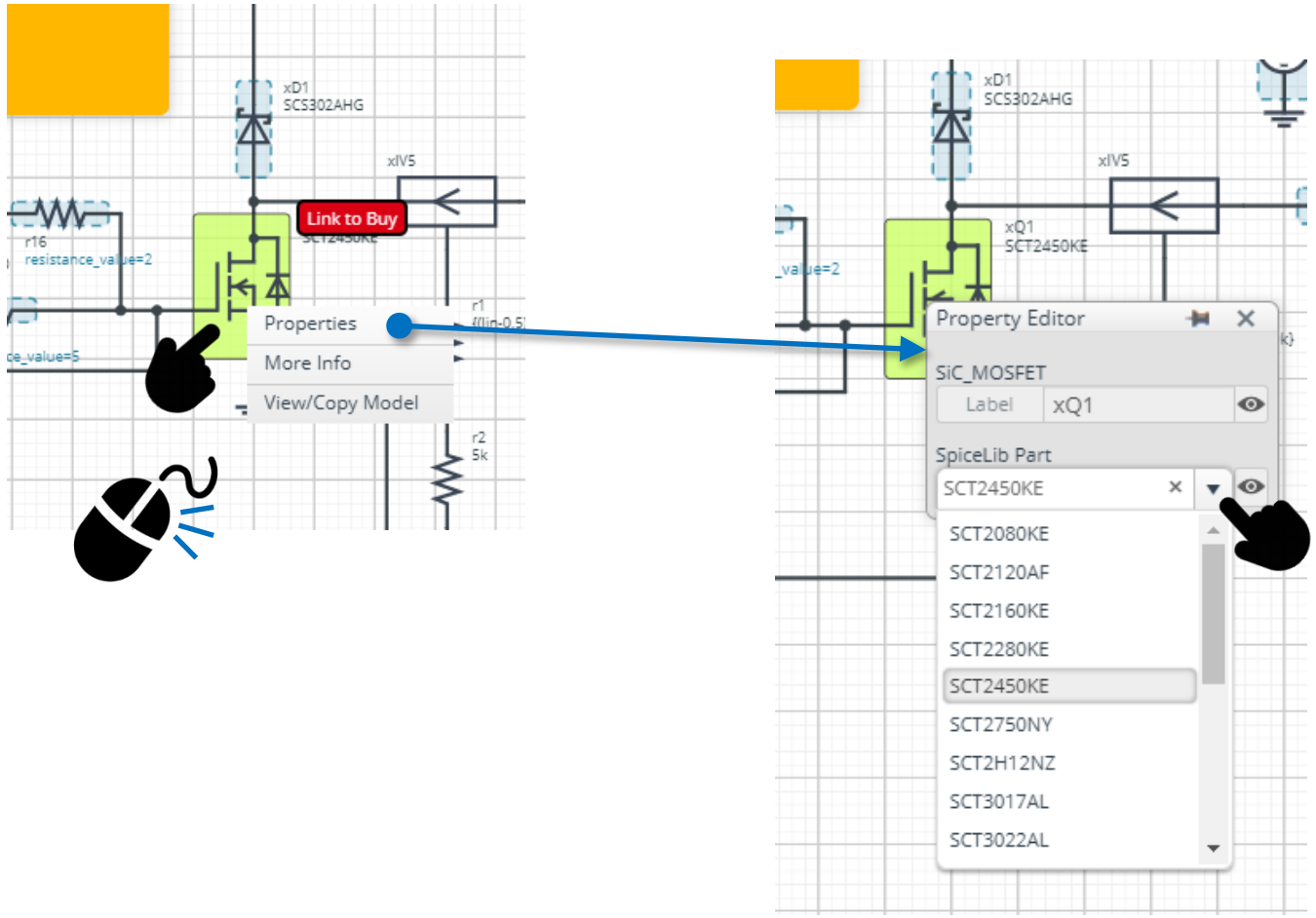
Right-click on the device ⇨ Select Properties ⇨ Pull down “SpiceLib Part” ⇨ Select the product



Loss Calculation Model

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

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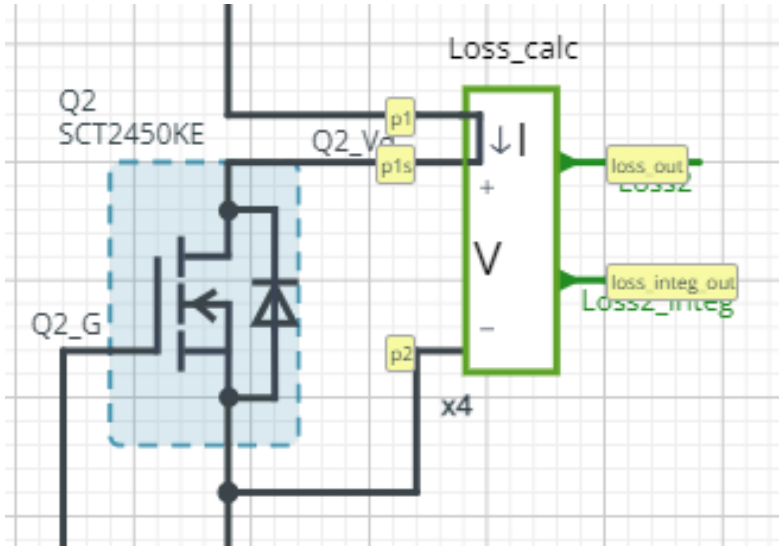
Loss calculation model ‘Loss_calc’



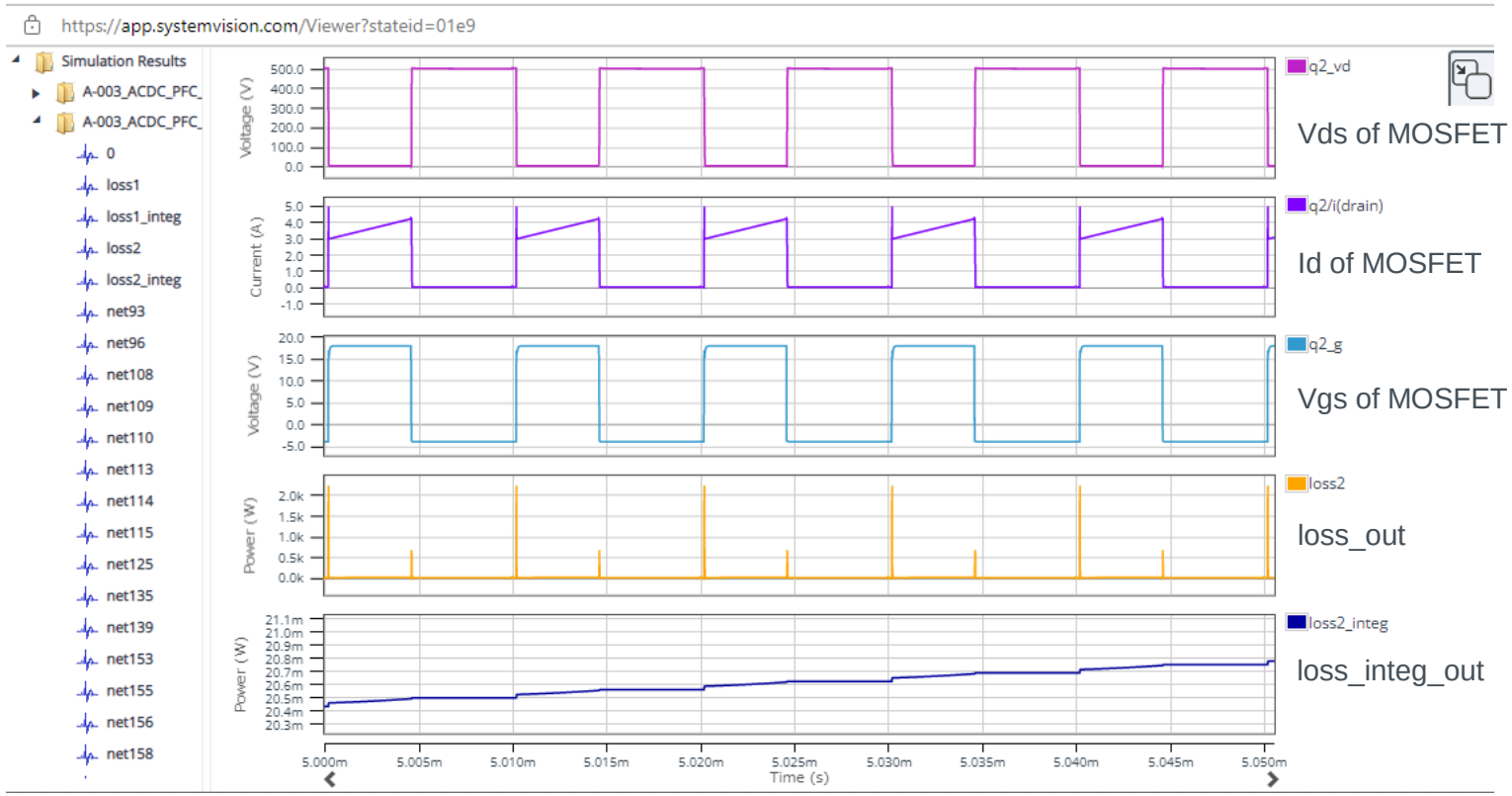
$$loss\_out(t) = I(t) \times V(t)$$

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

I : Current through p1 to p1s

V : Voltage between p1s and p2

Waveform example



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