

C-017. DC-DC Step-Up Down Converter $V_o=400V$, $I_o=40A$

ROHM Solution Simulator Schematic Information



2023. Feb
64UG132E Rev.004

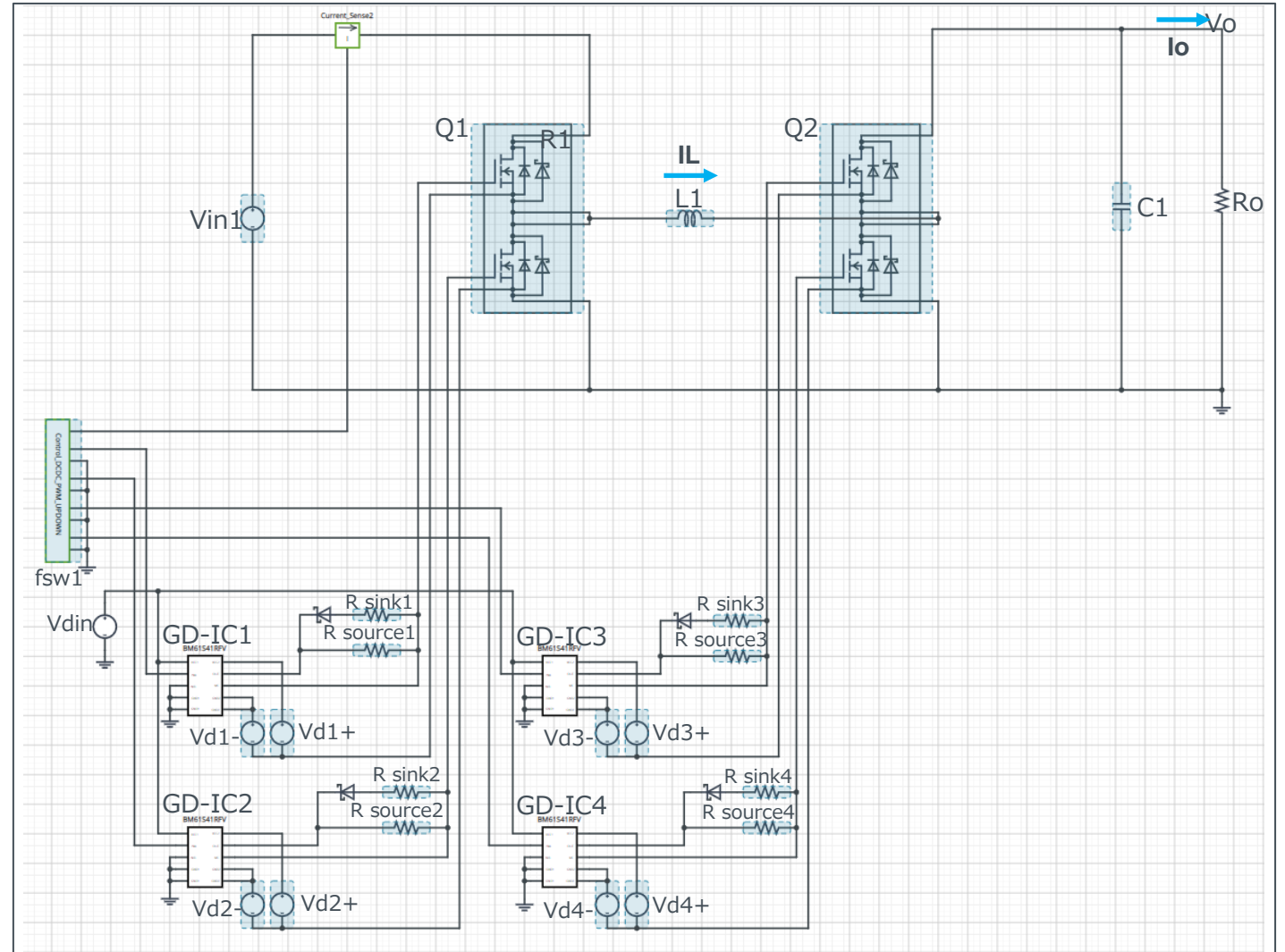
Simulation Parameters

Component name	Component	Default	Simulation Setting Range
Vin1	Input voltage	200Vdc	10 – 800V
Vo	Output voltage	400Vdc	
Io	Output current	40Adc	
fsw1	Switching frequency	50kHz	10k – 300kHz
Tj	Temperature	100°C	
Vd1-4+	Gate Drive voltage H	18V	10 – 20V
Vd1-4-	Gate Drive voltage L	-4V	-4 – 0V
Vdin	Signal voltage level	5V	

Devices

Component Name	Component	Default	Simulation Setting Range
Q1,2	SiC Power Module	Selectable	
GD-IC1	Gate Driver	BM61S41RFV-C	
R sink1	Resistor for sink	ESR18 1Ω	0.1 -
R source1	Resistor for source	ESR18 2Ω	0.1 -
L1	Inductor	100μH	10μH - 2mH
C1	Capacitor	20μF	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.

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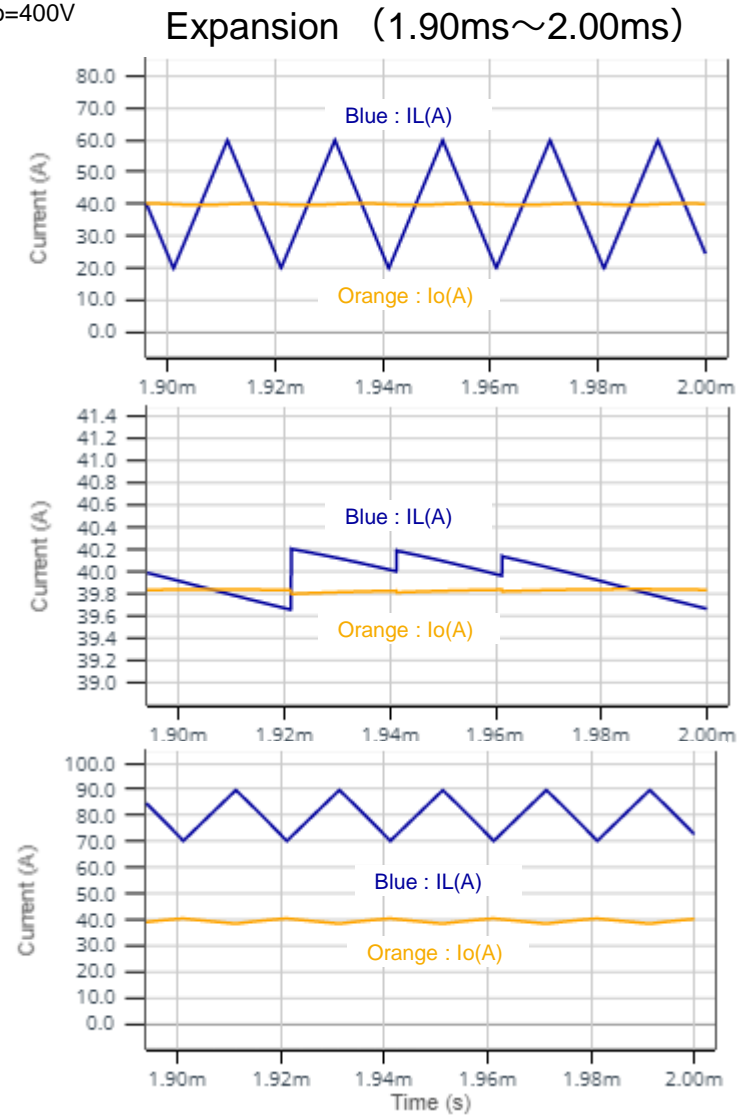
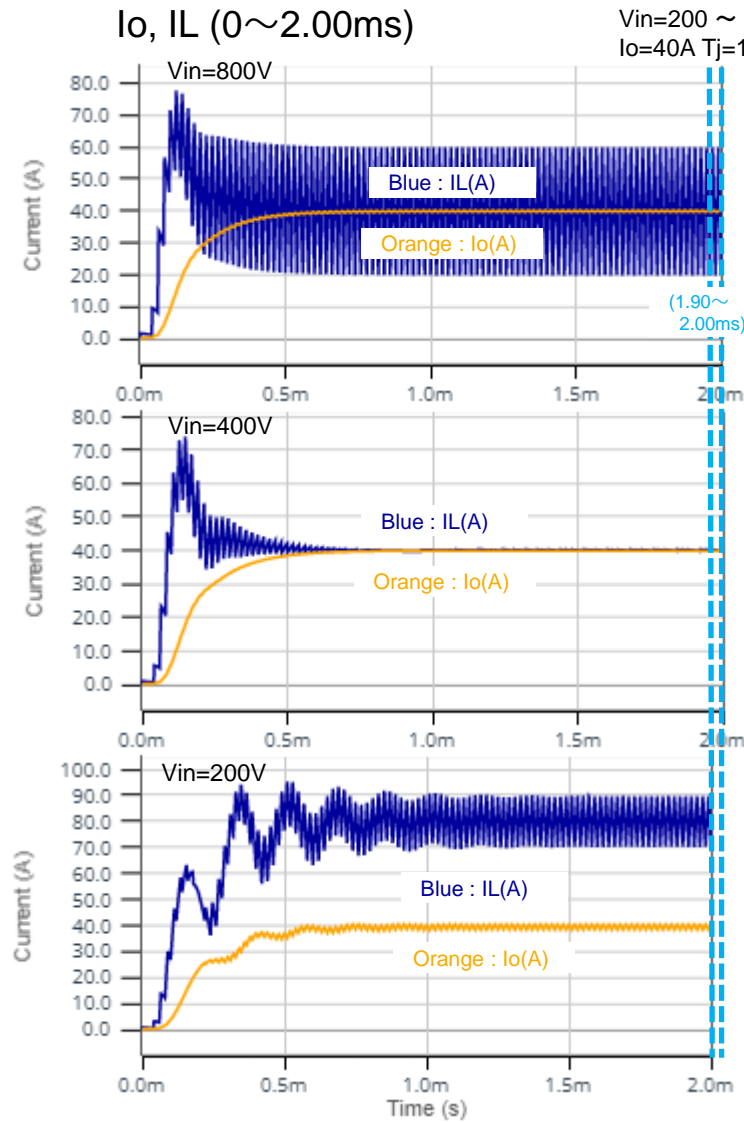


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Selectable Devices

Component name	Component	Product No.	feature
Q1	SiC Power Module	BSM080D12P2C008 (*)	800V, 120A
		BSM120D12P2C005	1200V, 120A

* Default device

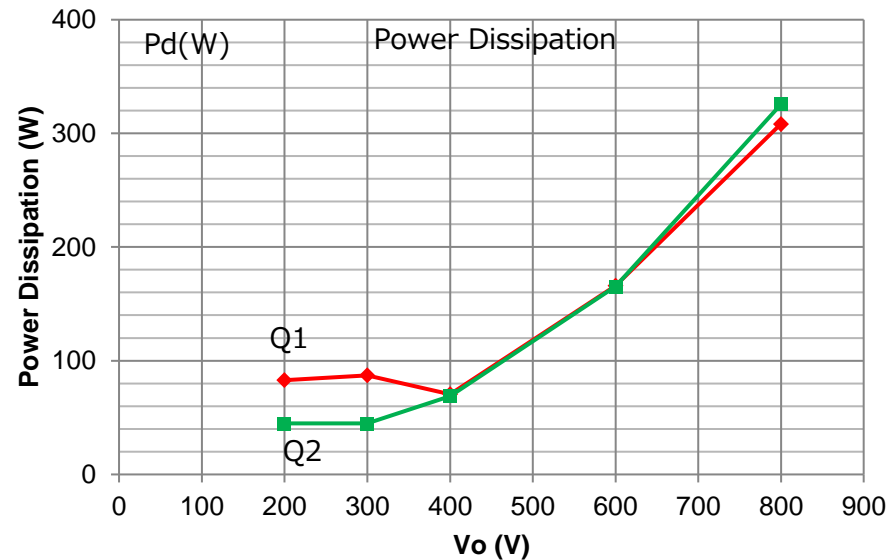
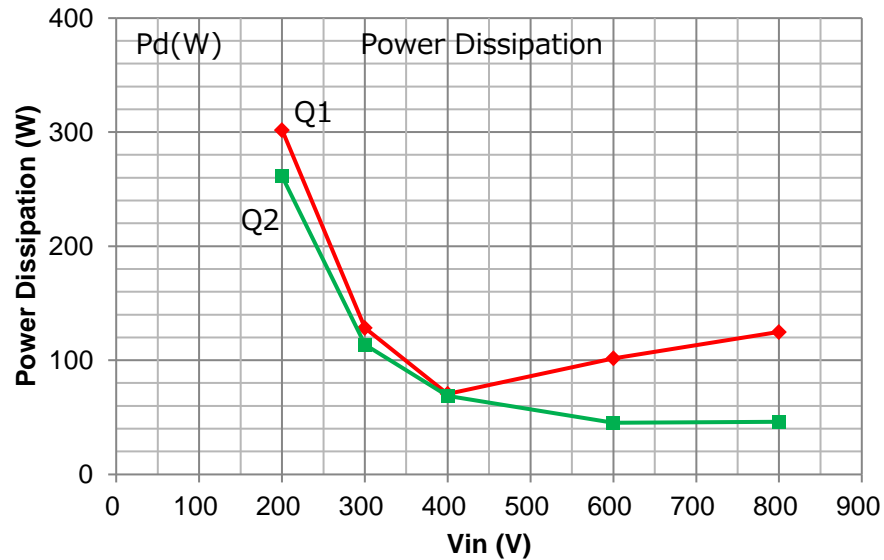
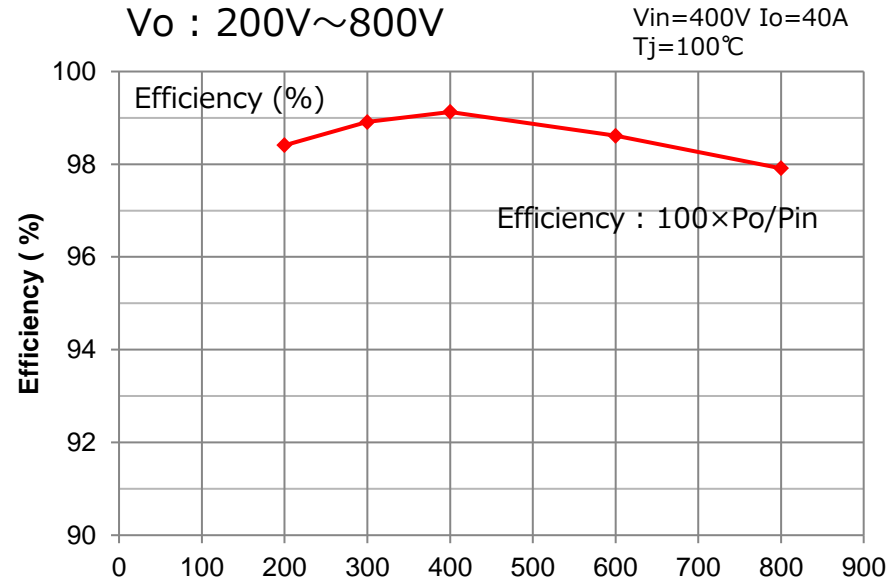
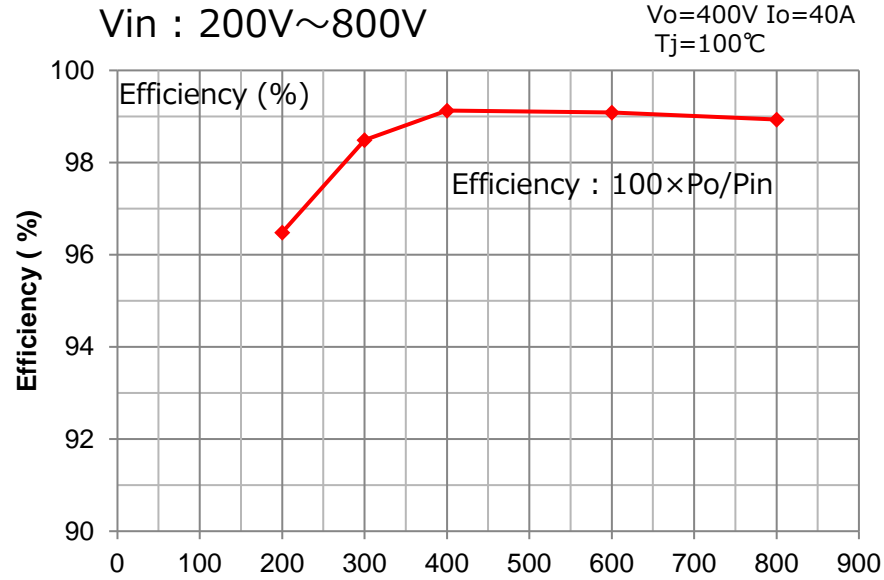


Efficiency, Power Dissipation 1

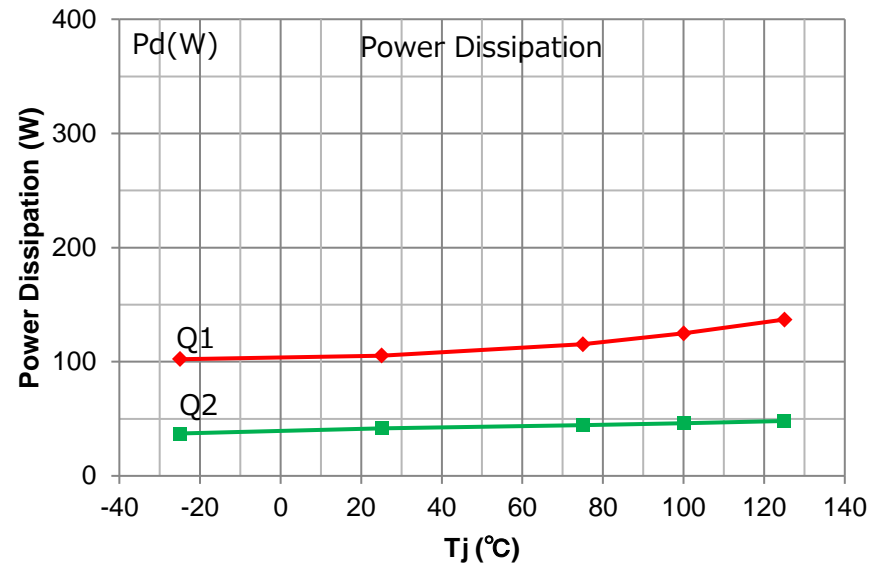
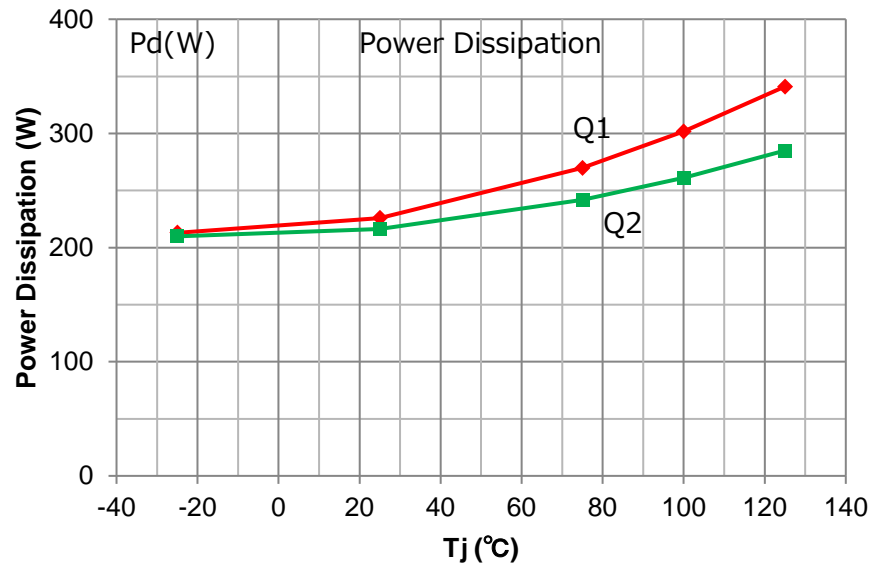
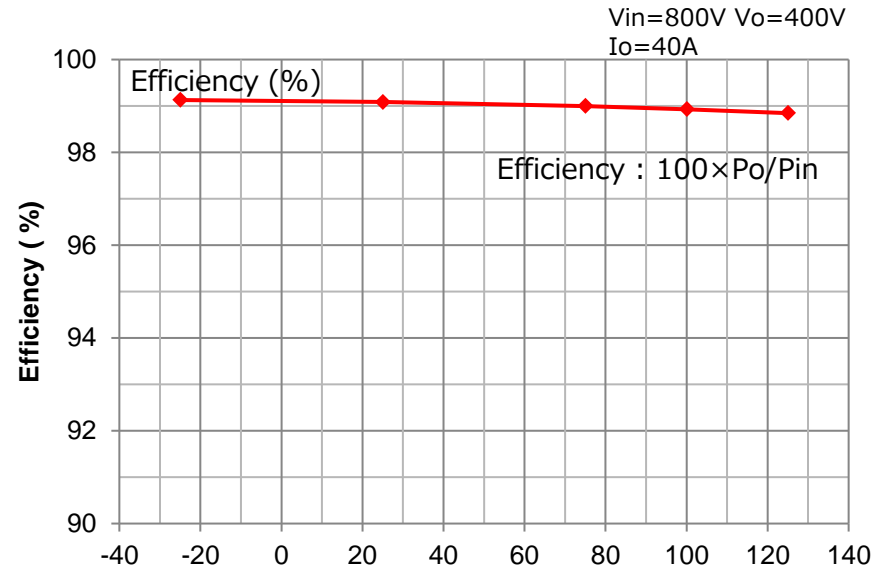
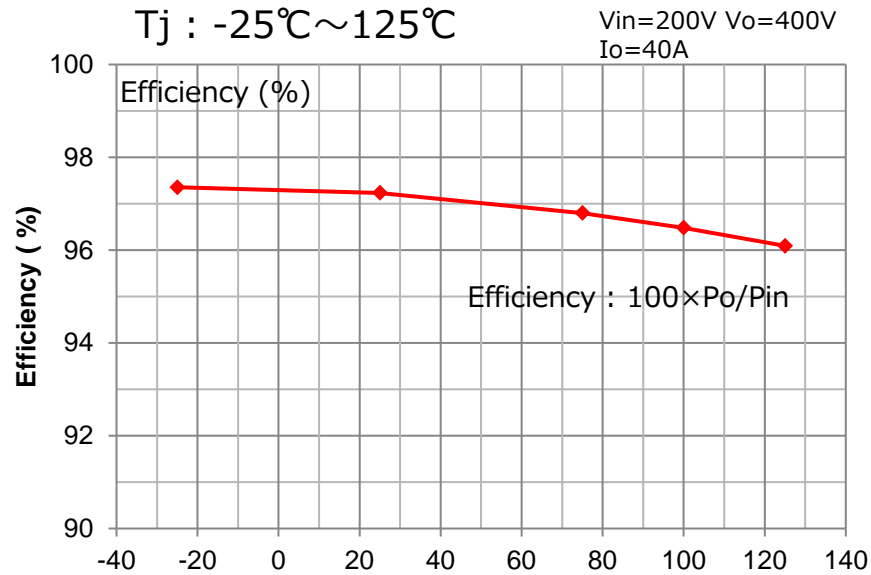


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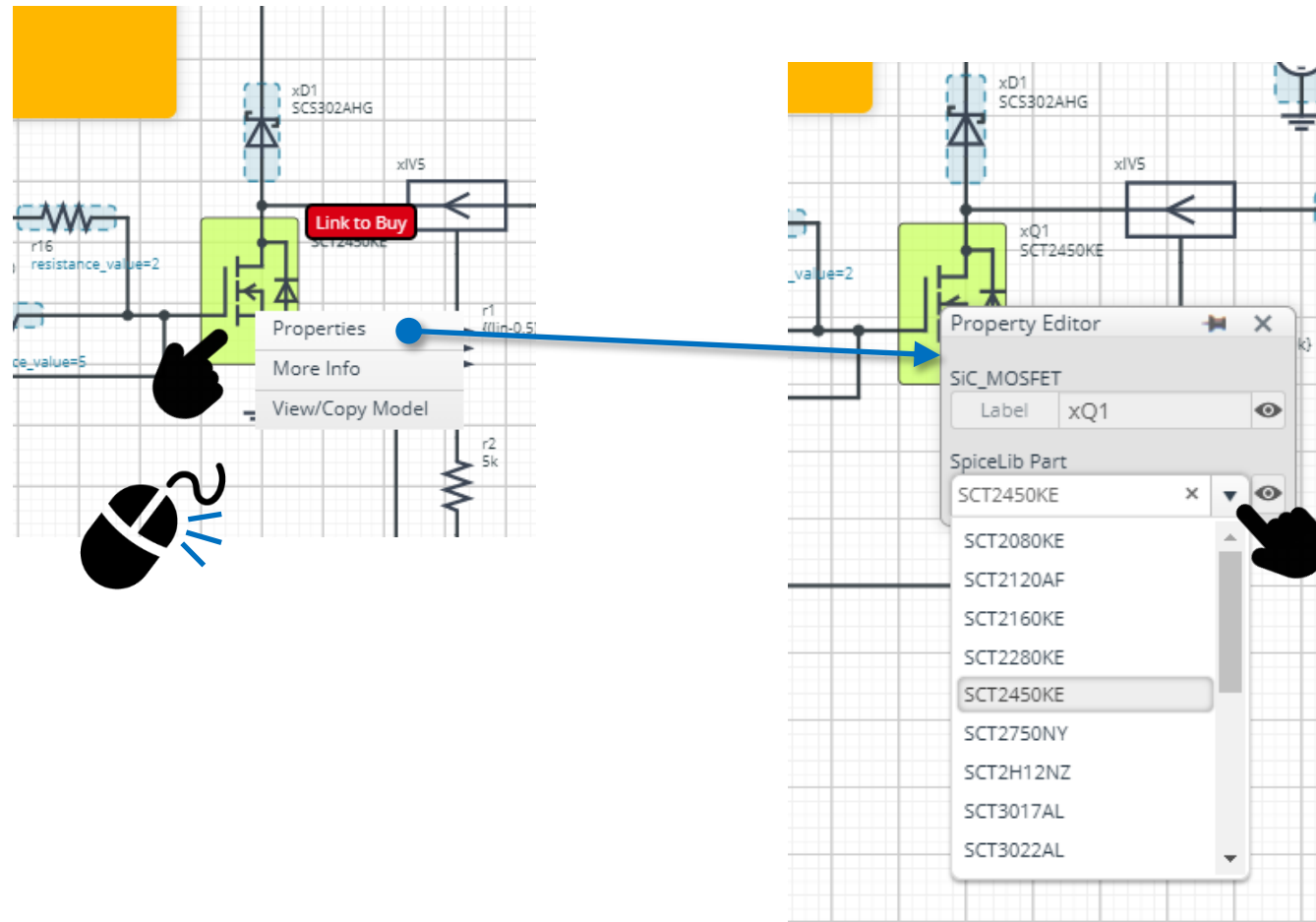


Efficiency, Power Dissipation 2



How to change the devices

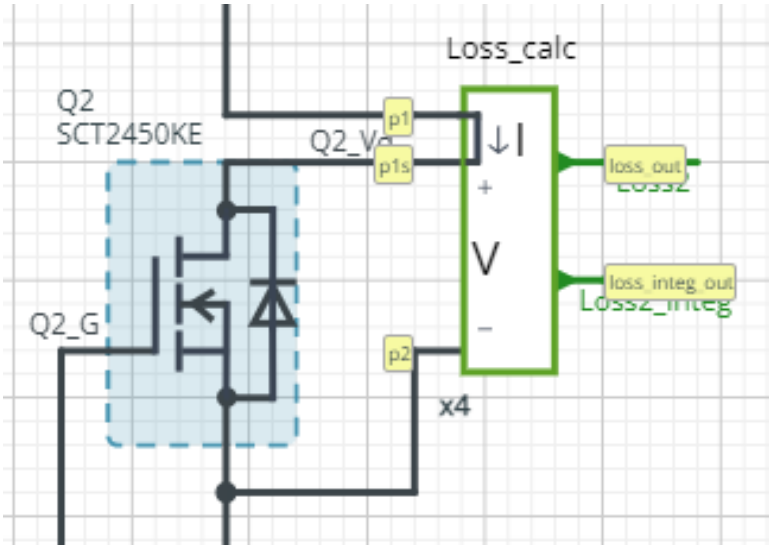
Right-click on the device → Select Properties → Pull down “SpiceLib Part” → Select the product



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

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Loss calculation model 'Loss_calc'



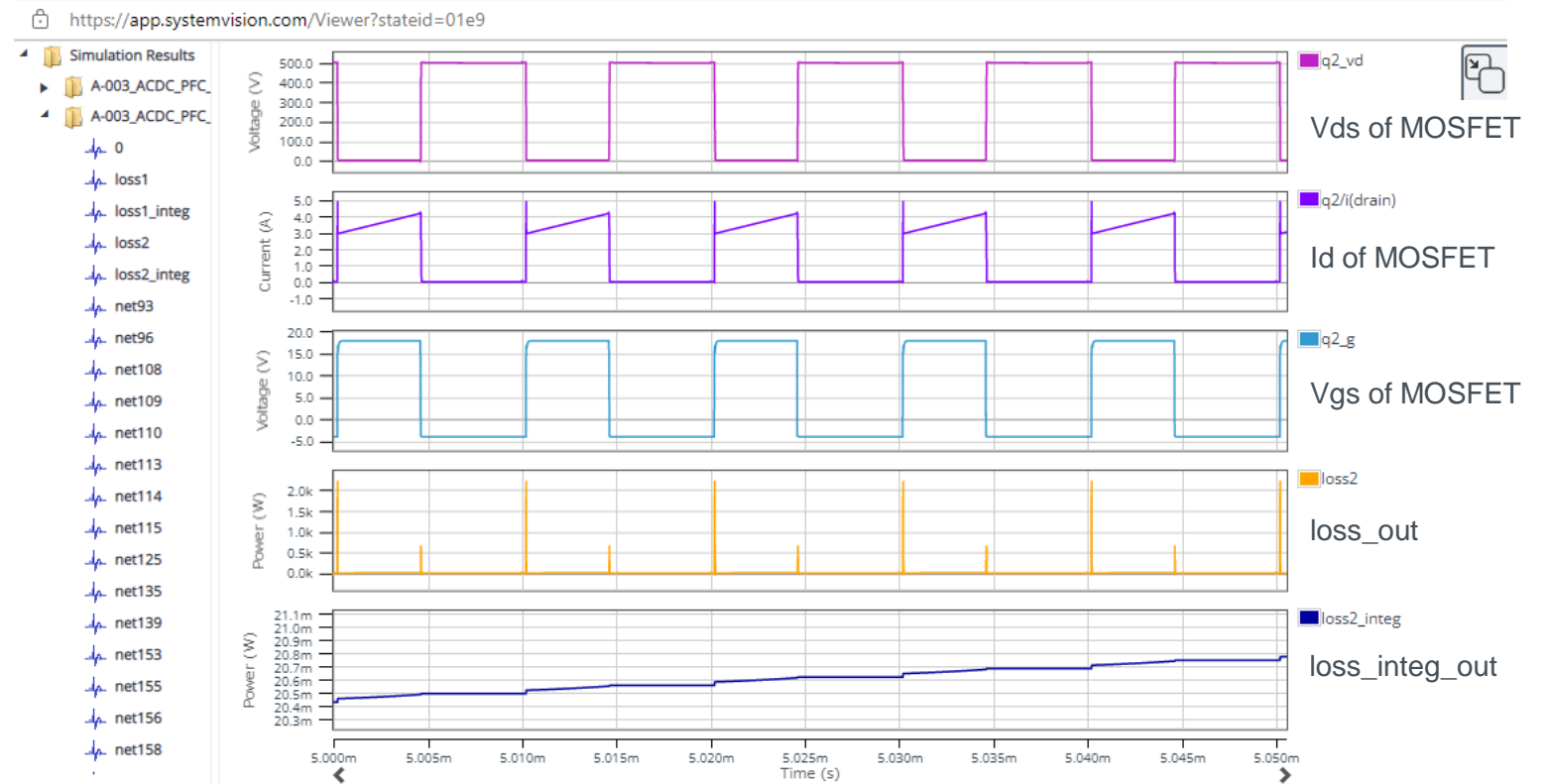
$$loss_out(t) = I(t) \times V(t)$$

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

I : Current through p1 to p1s

V : Voltage between p1s and p2

Waveform example



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