

C-005. DC-DC Boost Synchro Converter 2-Phase

$V_o=500V$, $I_o=10A$

ROHM Solution Simulator Schematic Information



2023. Feb
64UG122E Rev.004

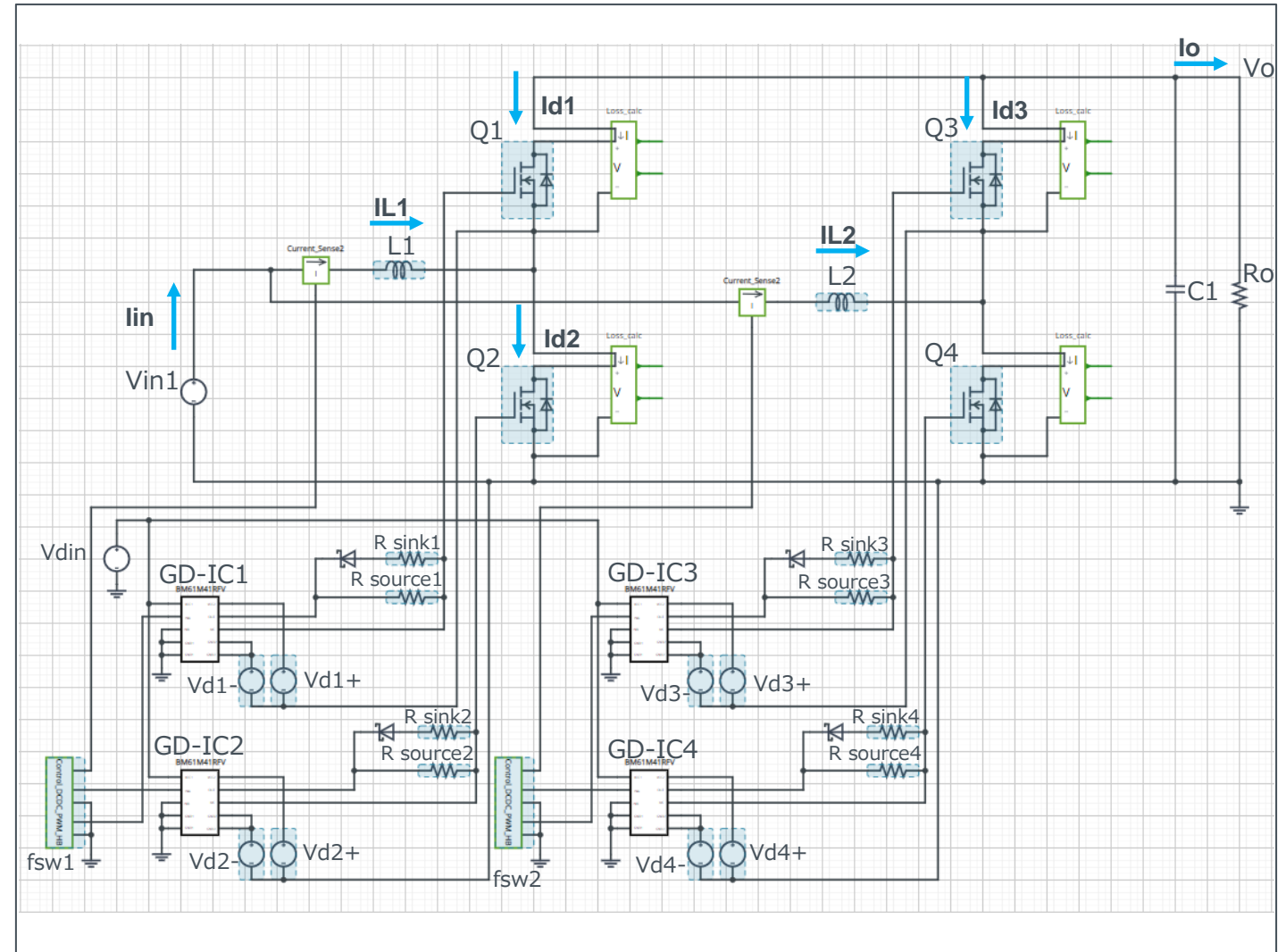
Simulation Parameters

Component name	Component	Default	Simulation Setting Range
Vin1	Input voltage	250Vdc	
Vo	Output voltage	500Vdc	
Io	Output current	10Adc	
fsw1,2	Switching frequency	50kHz	10k – 300kHz
Tj	Temperature	100°C	
Vd1-4+	Gate Drive voltage H	15V	10 – 20V
Vd1-4-	Gate Drive voltage L	-4V	-4 – 0V
Vdin	Signal voltage level	5V	

Devices

Component Name	Component	Default	Simulation Setting Range
Q1-4	SJ-MOSFET	Selectable	
GD-IC1-4	Gate Driver	BM61M41RFV-C	
R sink1-4	Resistor for sink	ESR18 2Ω	0.1 -
R source1-4	Resistor for source	ESR18 5Ω	0.1 -
L1,2	Inductor	500μH	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.

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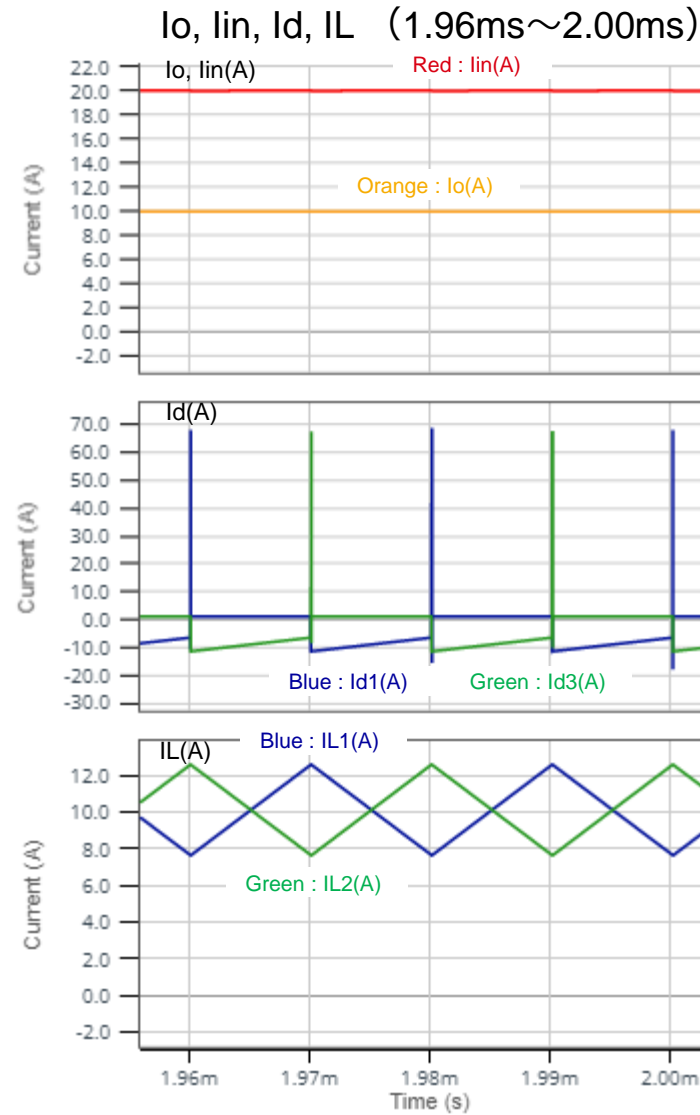
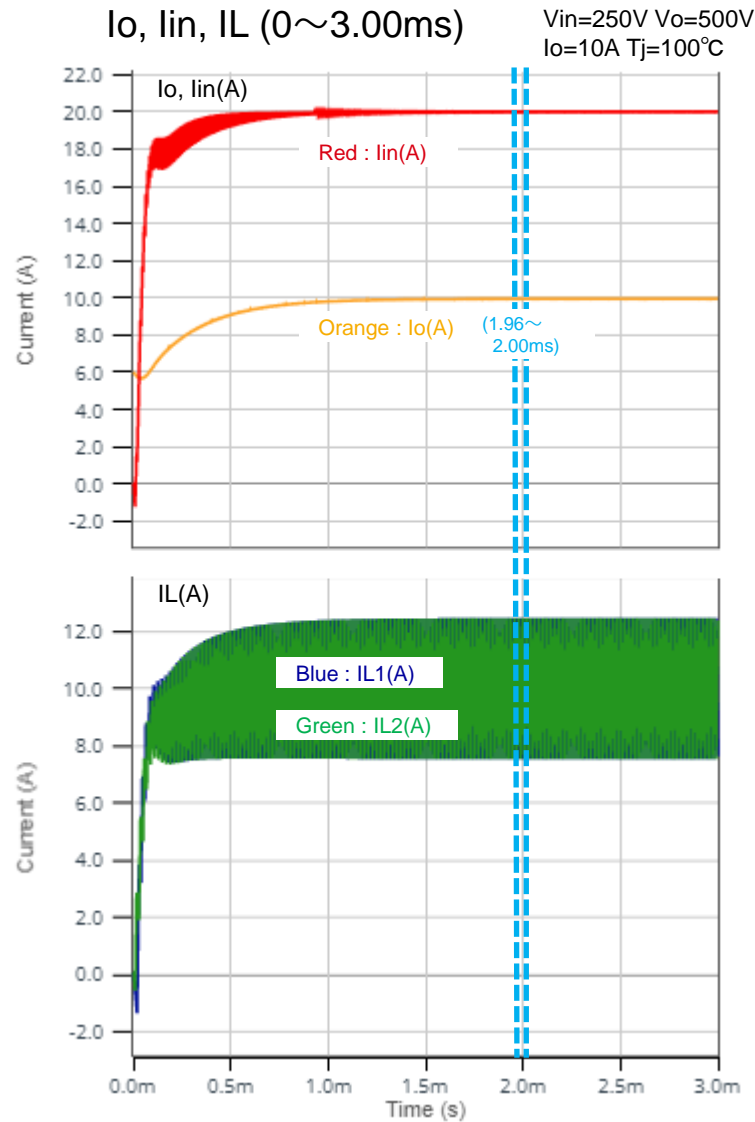
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Selectable Devices

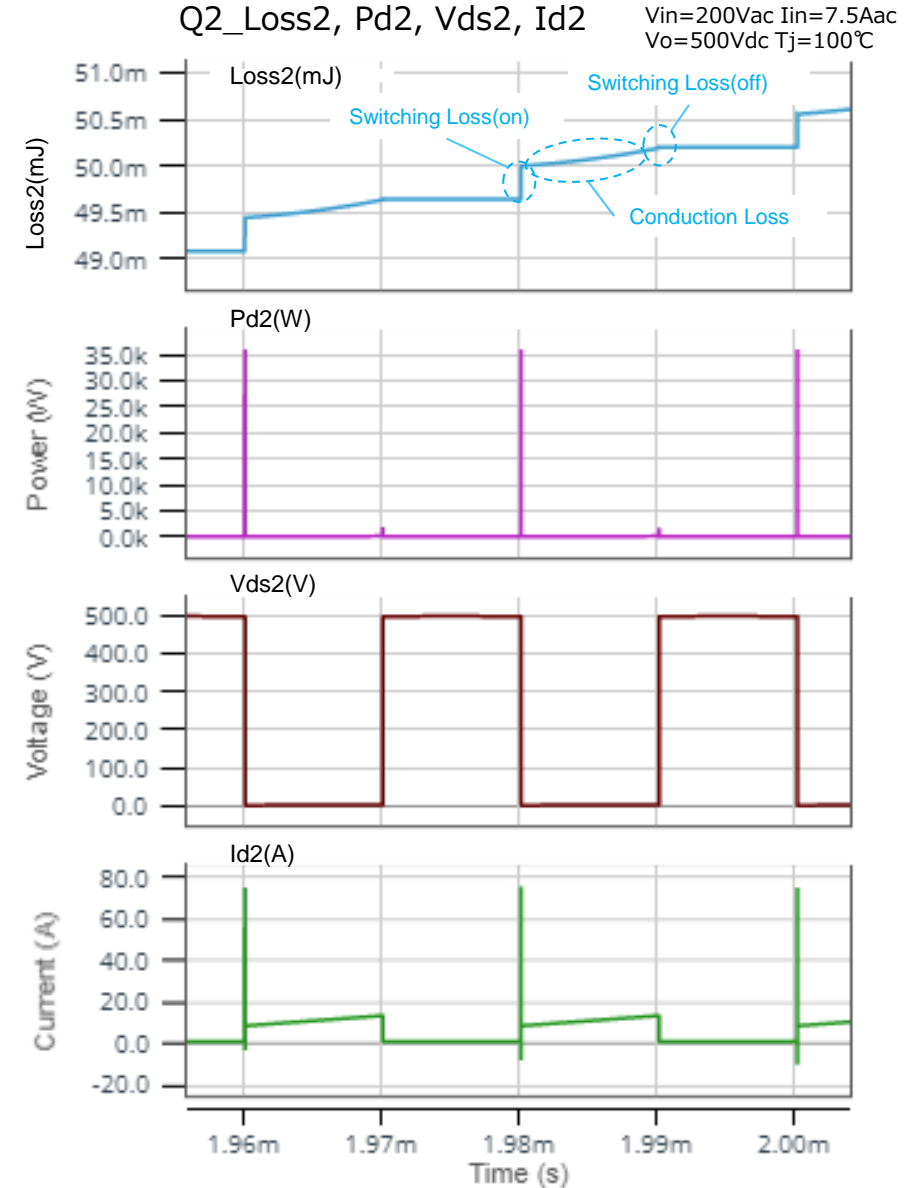
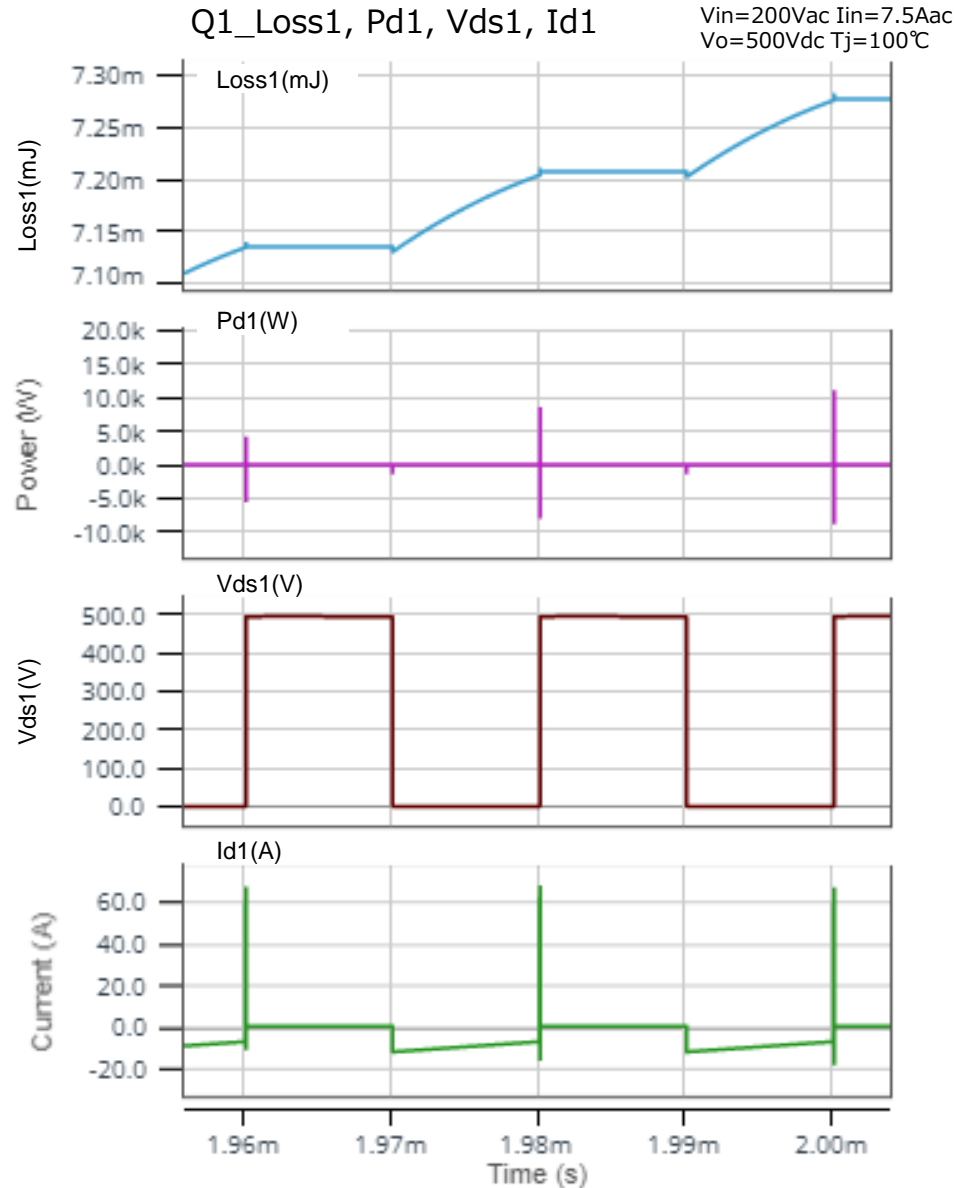
Component name	Component	Product No.	feature
Q1 – Q4	SJ-MOSFET	R6004JNX	600V, 4A
		R6006JNX	600V, 6A
		R6009JNX	600V, 9A
		R6018JNX	600V, 18A
		R6020JNX	600V, 20A
		R6025JNX	600V, 25A
		R6030JNZ4 (*)	600V, 30A
		R6050JNZ4	600V, 50A

* Default device

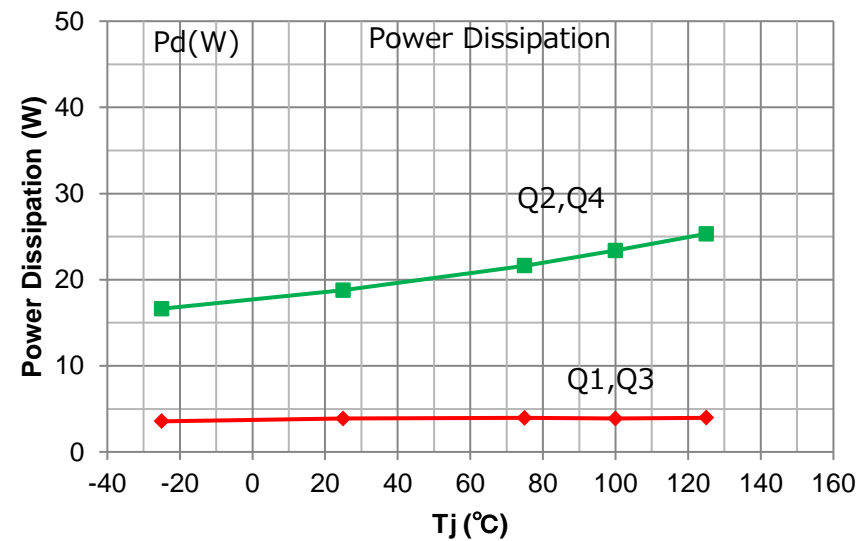
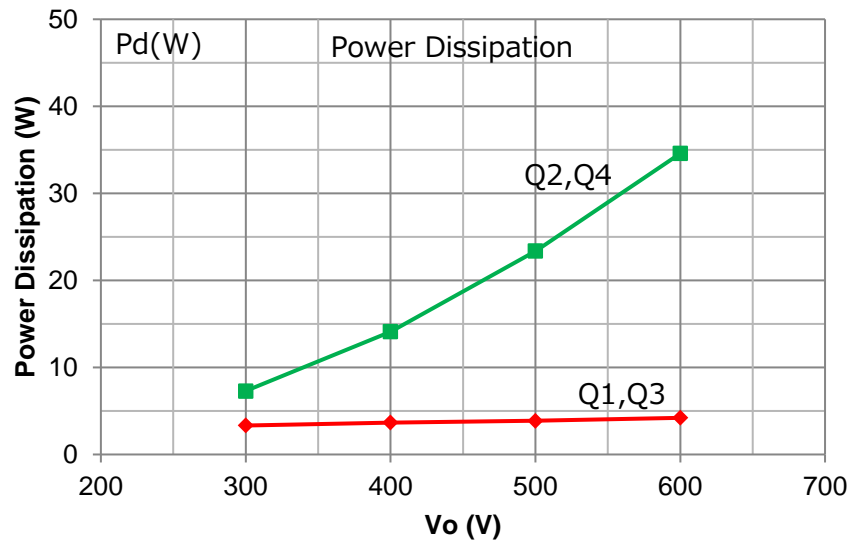
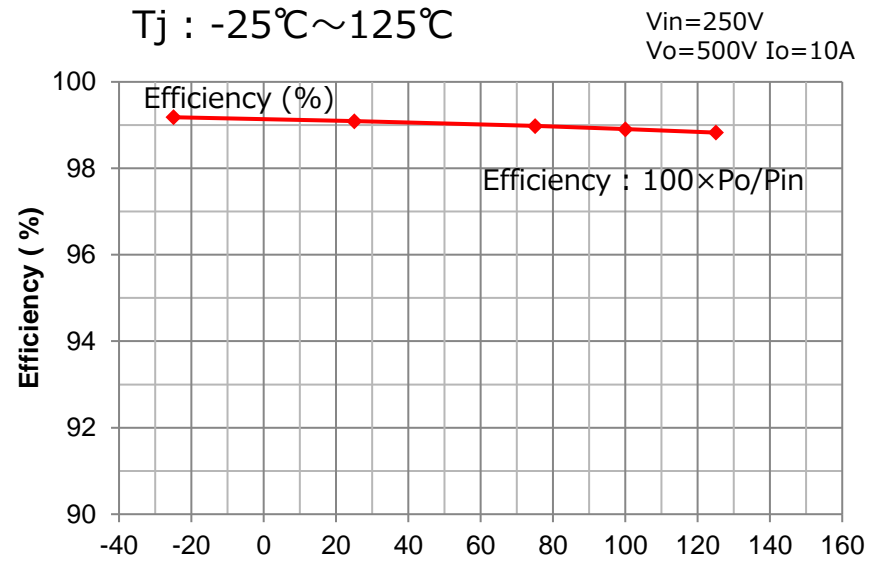
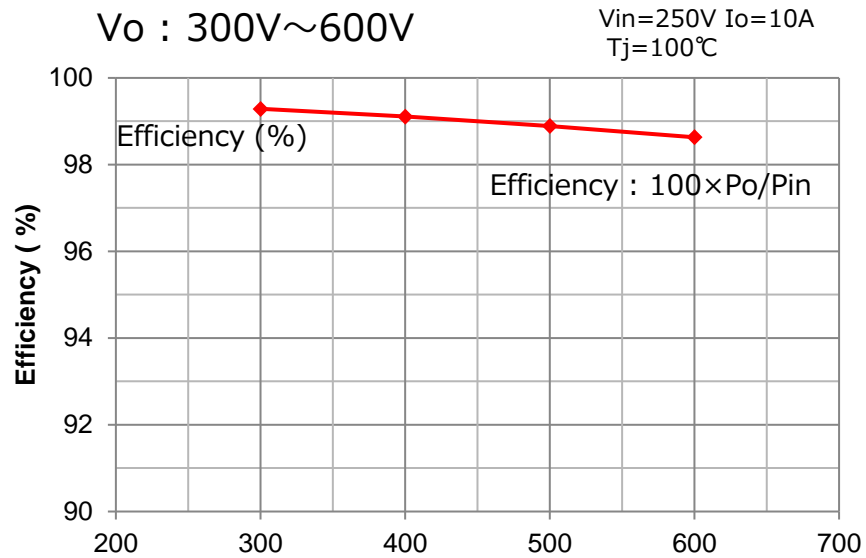
Simulation Waveform 1



Simulation Waveform2

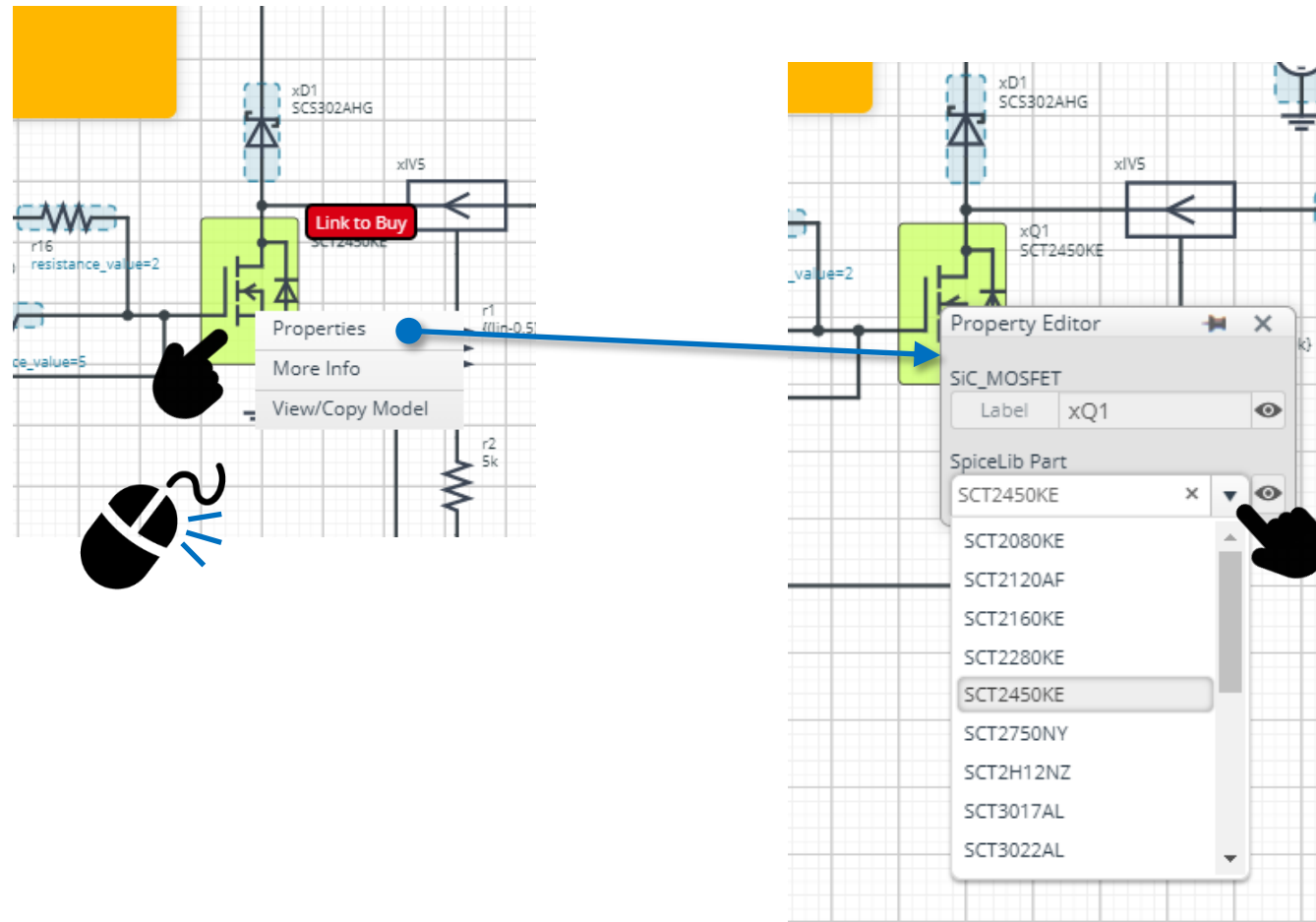


Efficiency, Power Dissipation



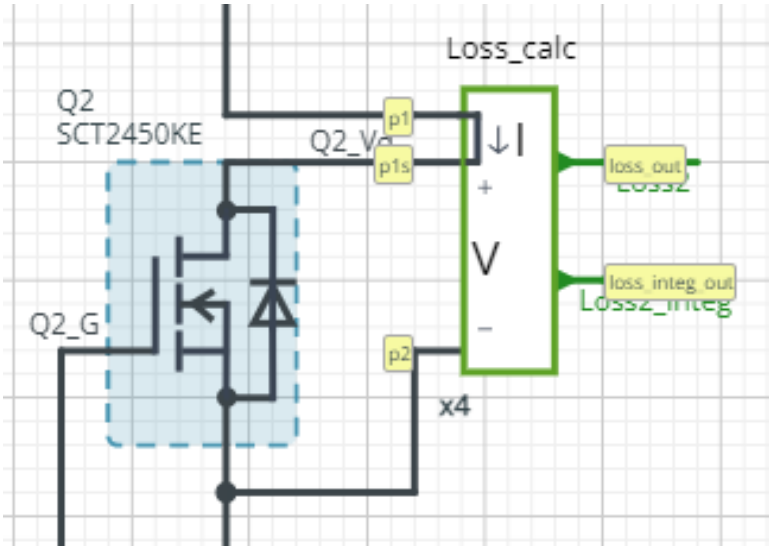
How to change the devices

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.

Loss calculation model 'Loss_calc'



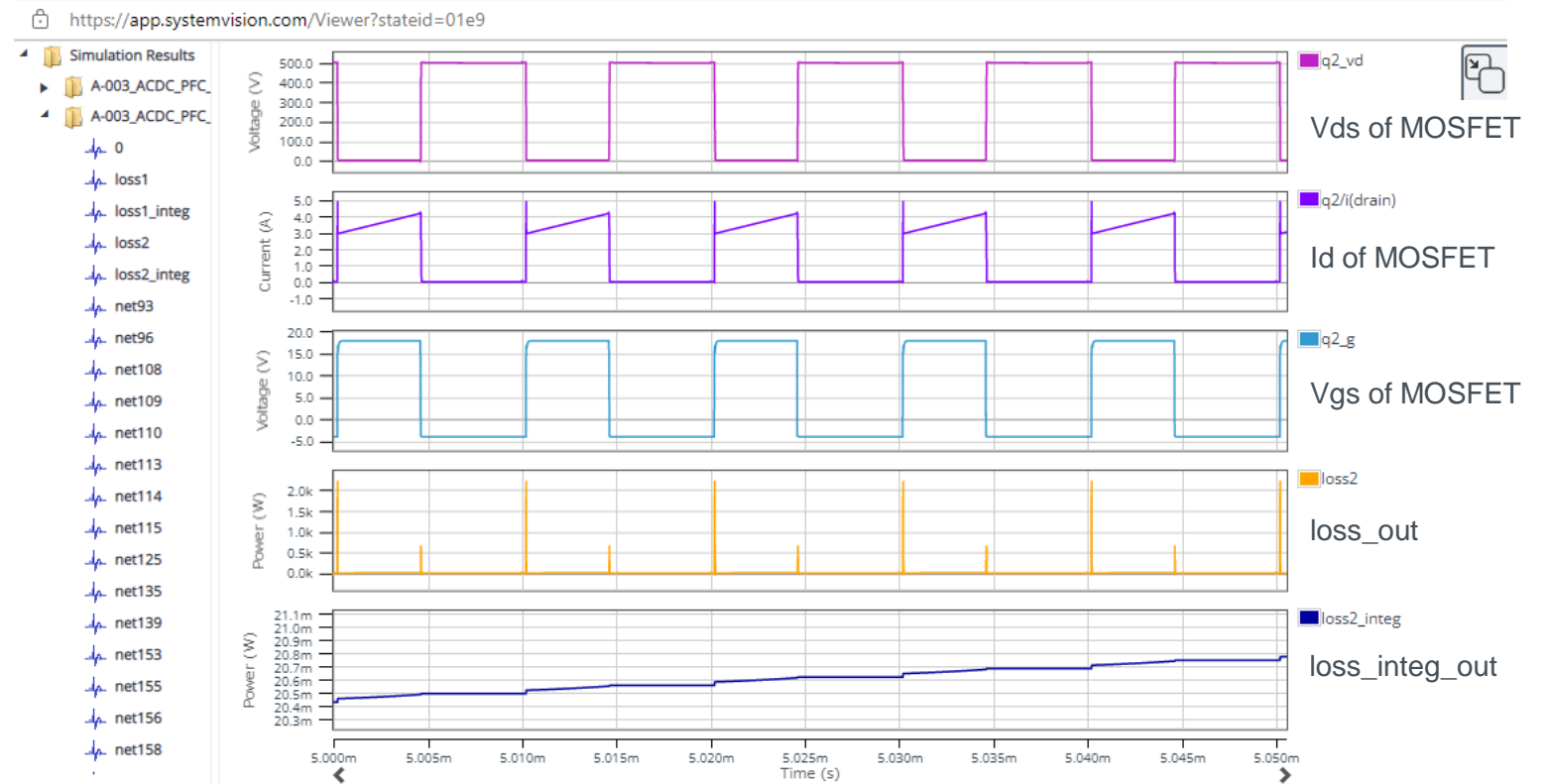
$$loss_out(t) = I(t) \times V(t)$$

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

I : Current through p1 to p1s

V : Voltage between p1s and p2

Waveform example



Notes

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