

C-013. DC-DC LLC Full-Bridge $V_o=400V$, $I_o=15A$

ROHM Solution Simulator Schematic Information



2022. Feb
64UG130E Rev.003

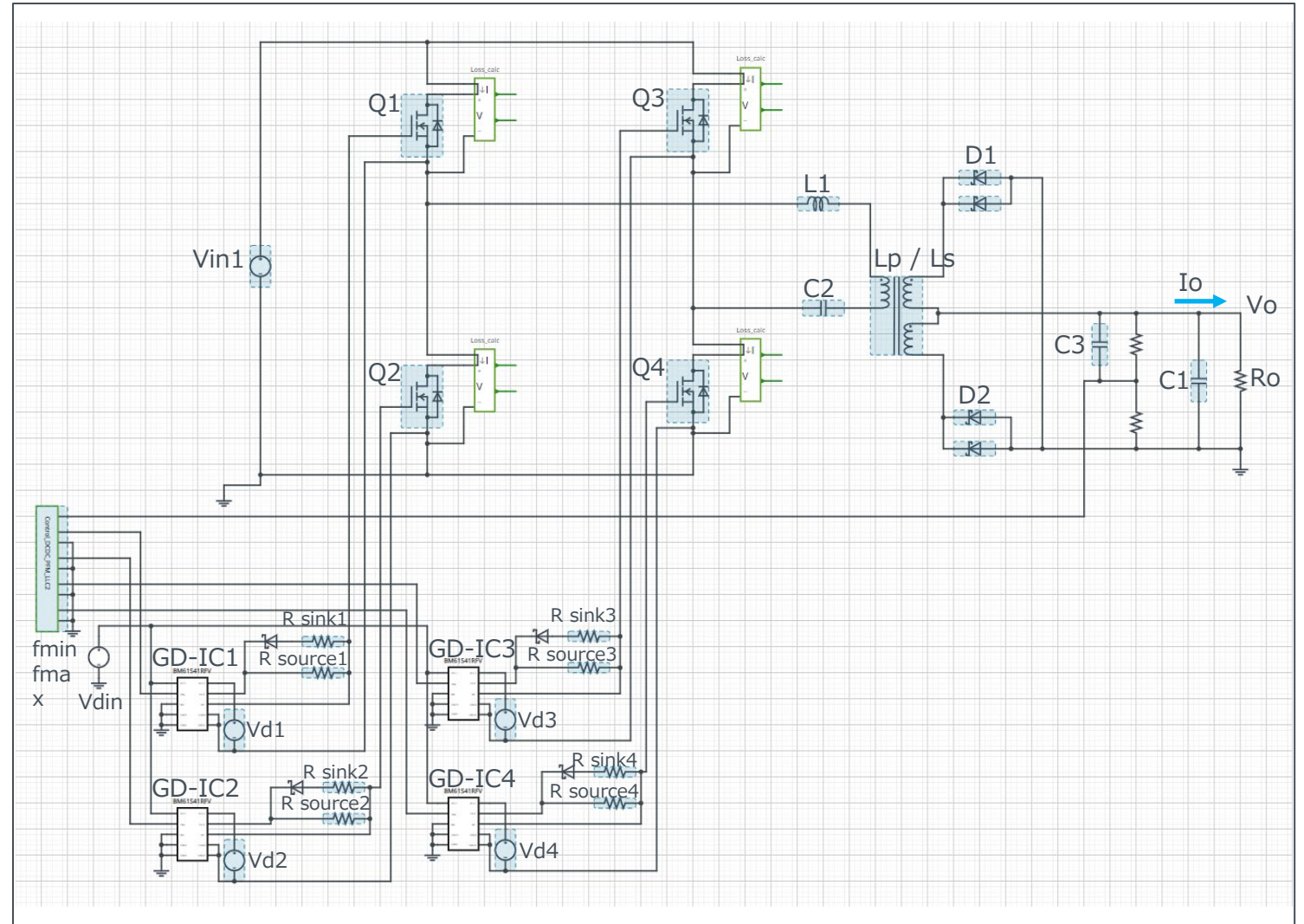
Simulation Parameters

Component name	Component	Default	Simulation Setting Range
Vin1	Input voltage	450Vdc	
Vo	Output voltage	400Vdc	
Io	Output current	15Adc	
fmin	Switching frequency	50kHz	10k – 300kHz
fmax	Switching frequency	300kHz	100k – 500kHz
Tj	Temperature	100°C	
Vd1-4	Gate Drive voltage H	18V	10 – 20V
Vdin	Signal voltage level	5V	
Lp / Ls	Transformer	300μ/300μ/300μH K=1.0	

Devices

Component Name	Component	Default	Simulation Setting Range
Q1-4	SiC MOSFET	Selectable	
D1,2_1,2	SiC SBD	Selectable	
GD-IC1-4	Gate Driver	BM61S41RFV-C	
R sink1-4	Resistor for sink	2Ω	0.1 -
R source1-4	Resistor for source	5Ω	0.1 -
L1	Inductor	30μH	10μH - 2mH
C1	Capacitor	10μF	1μF - 10mF
C2	Capacitor	110nF	1nF - 100μF
C3	Capacitor	10pF	1pF - 1nF
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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Selectable Devices

Component name	Component	Product No.	feature
Q1	SiC MOSFET	SCT2080KE	1200V, 80mΩ, 40A
		SCT2120AF	650V, 120mΩ, 29A
		SCT2160KE	1200V, 160mΩ, 22A
		SCT2280KE	1200V, 280mΩ, 14A
		SCT2450KE	1200V, 450mΩ, 10A
		SCT2750NY	1700V, 750mΩ, 6A
		SCT2H12NZ	1700V, 1150mΩ, 3.7A
		SCT3017AL	650V, 17mΩ, 118A
		SCT3022AL	650V, 22mΩ, 93A
		SCT3022KL	1200V, 22mΩ, 95A
		SCT3030AL	650V, 30mΩ, 70A
		SCT3030KL	1200V, 30mΩ, 72A
		SCT3040KL	1200V, 40mΩ, 55A
		SCT3060AL (*)	650V, 60mΩ, 39A
		SCT3080AL	650V, 80mΩ, 30A
		SCT3080KL	1200V, 80mΩ, 31A
		SCT3105KL	1200V, 105mΩ, 24A
		SCT3120AL	650V, 120mΩ, 21A
		SCT3160KL	1200V, 160mΩ, 17A

* Default device

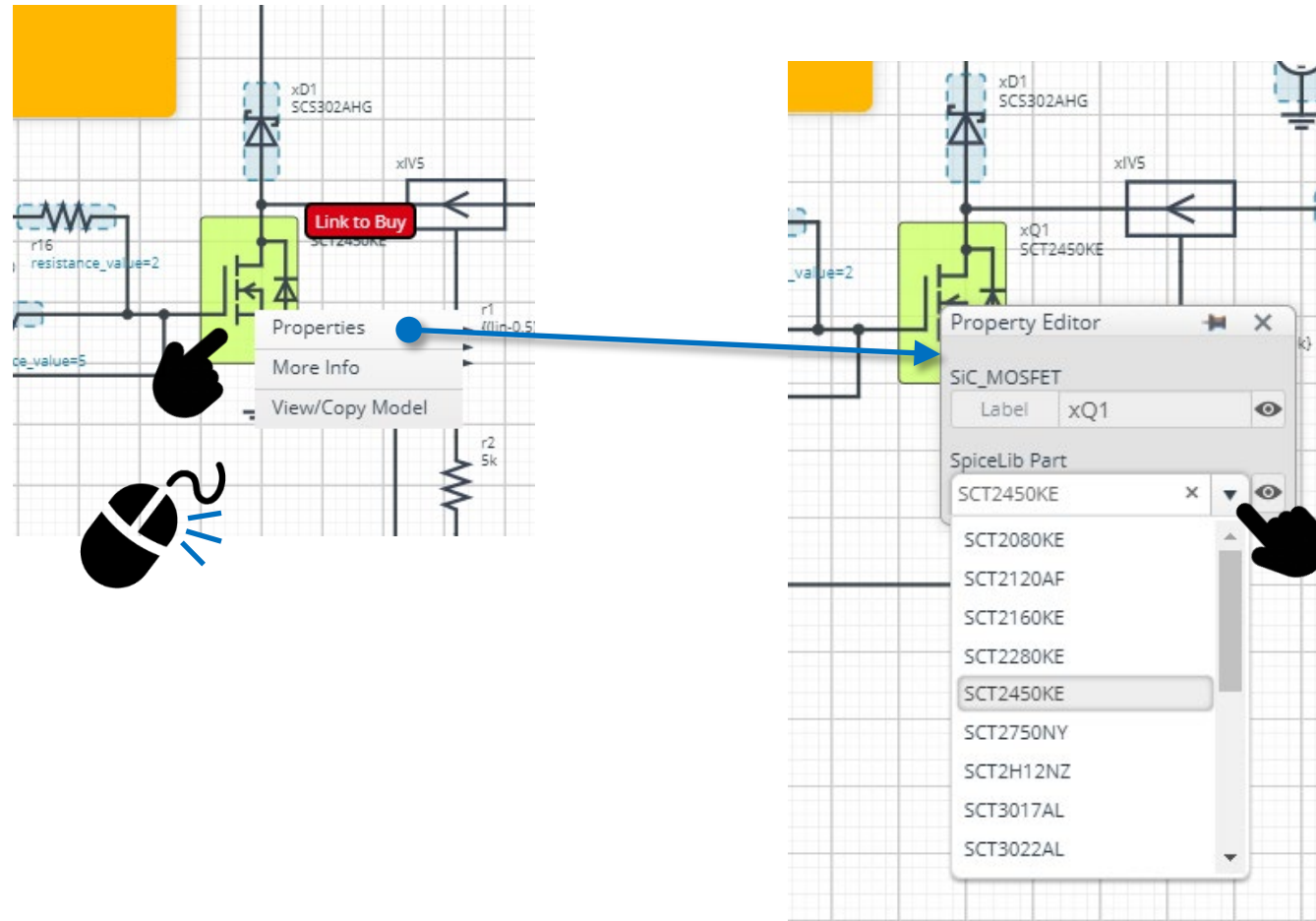
Selectable Devices

Component name	Component	Product No.	feature
D1, D2	SiC SBD	SCS205KG	1200V, 5A
		SCS206AG	650V, 6A
		SCS208AG	650V, 8A
		SCS210AG	650V, 10A
		SCS210KG	1200V, 10A
		SCS212AG	650V, 12A
		SCS215AG	650V, 15A
		SCS215KG	1200V, 15A
		SCS220AG	650V, 20A
		SCS220KG	1200V, 20A
		SCS302AHG	650V, 2A, High surge resistance
		SCS304AHG	650V, 4A, High surge resistance
		SCS306AHG	650V, 6A, High surge resistance
		SCS308AHG	650V, 8A, High surge resistance
		SCS310AHG	650V, 10A, High surge resistance
		SCS312AHG	650V, 12A, High surge resistance
		SCS315AHG	650V, 15A, High surge resistance
		SCS320AHG (*)	650V, 20A, High surge resistance

* Default device

How to change the devices

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

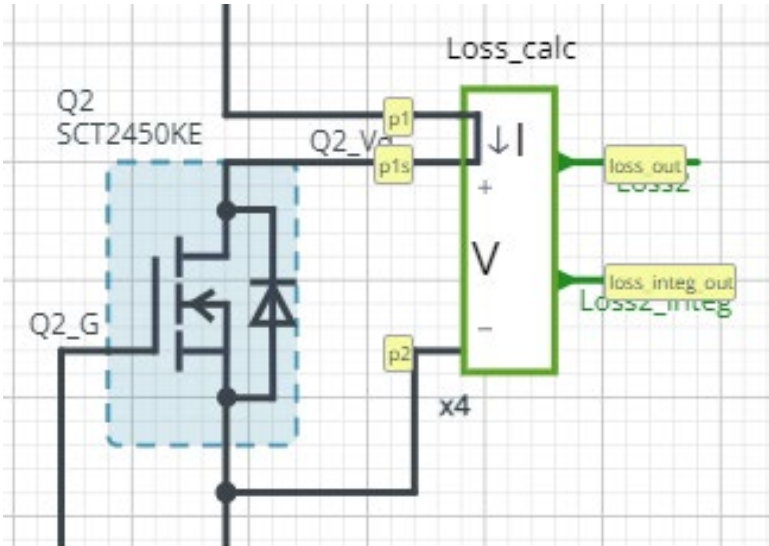


Loss Calculation Model

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

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Loss calculation model 'Loss_calc'



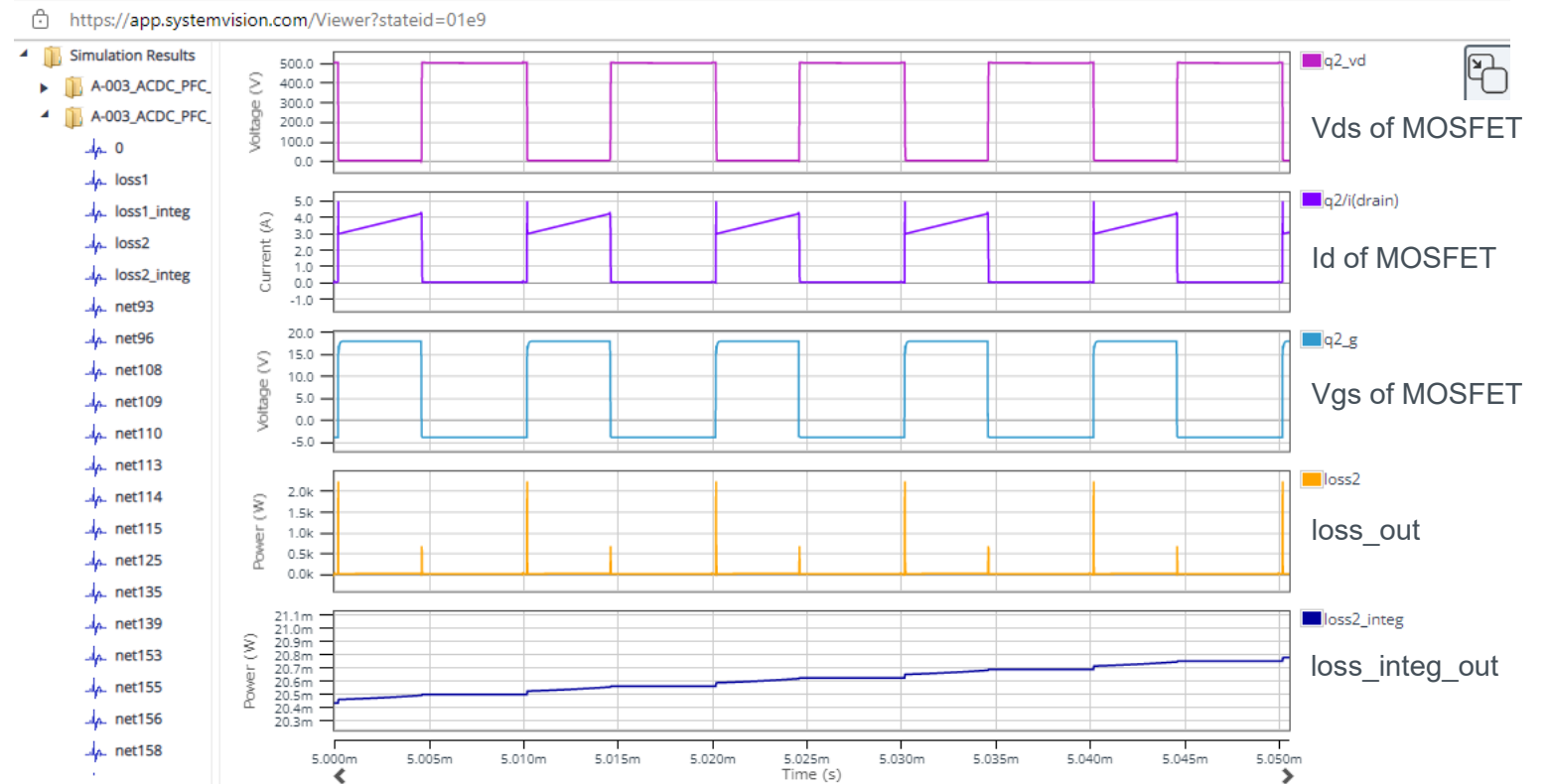
$$loss_out(t) = I(t) \times V(t)$$

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

I : Current through p1 to p1s

V : Voltage between p1s and p2

Waveform example



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