

D-008. High Frequency Arc Start (Welding) $V_{in}=800V$, $V_o=-10kV$

ROHM Solution Simulator Schematic Information



2026. May.
69UG016E Rev.001

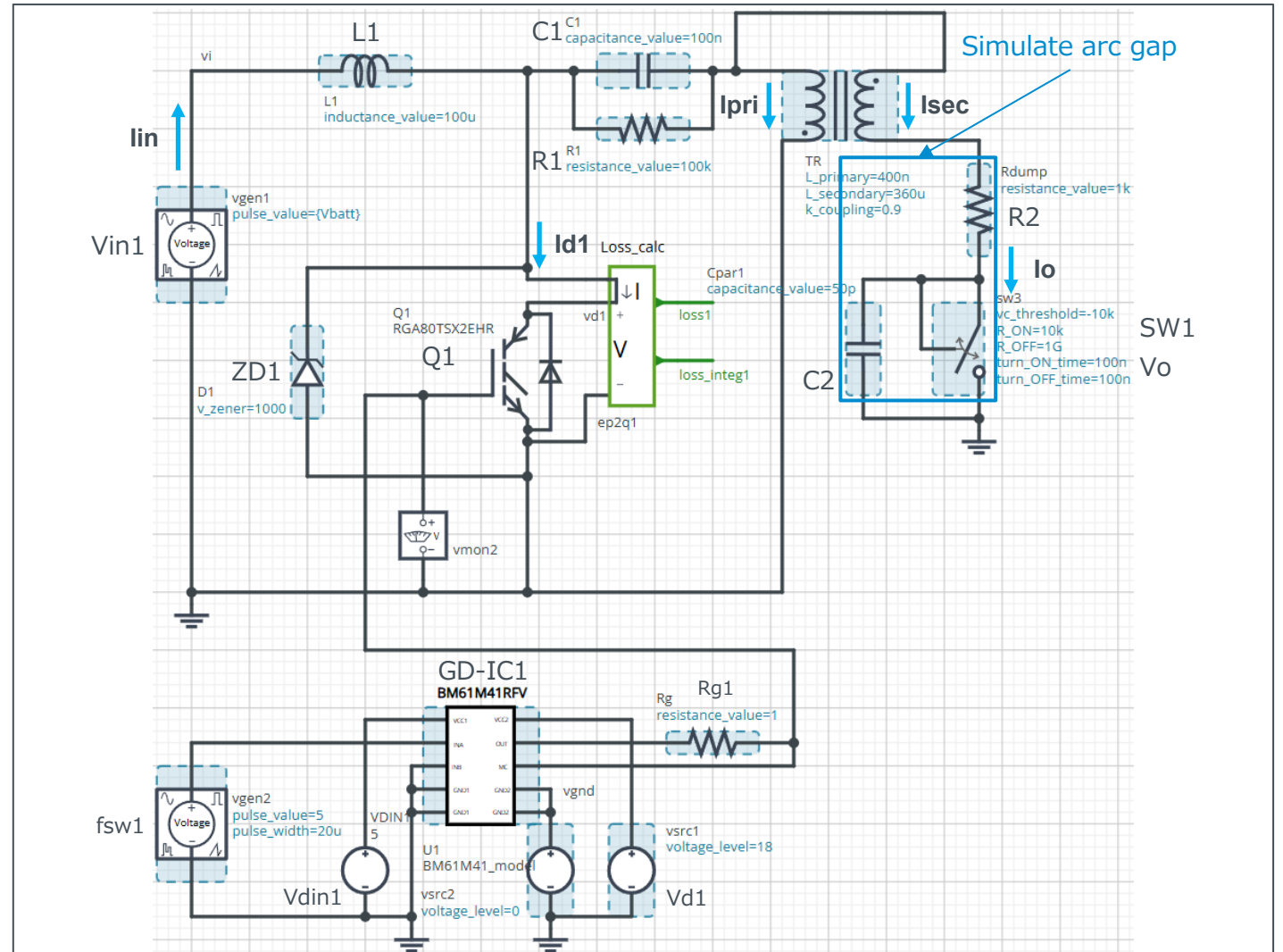
Simulation Parameters

Component name	Component	Default	Simulation Setting Range
Vin1	Input voltage	800V	
fsw1	Switching frequency	200Hz	
	Pulse ON time	20 μ s	
Tj	Temperature	25 $^{\circ}$ C	
Vd1	Gate drive voltage H	18V	10 – 20V
Vdin1	Signal voltage level	5V	
Lp / Ls	Transformer	400nH / 360 μ H K=0.90	

Devices

Component Name	Component	Default	Simulation Setting Range
Q1	IGBT	Selectable	
GD-IC1	Gate Driver	Selectable	
Rg1	Gate resistor	1 Ω	0 – 100 Ω
ZD1	Zener diode	1000V	
L1	Inductor	100 μ H	
R1	Resistor	100k Ω	
C1	Capacitor	100nH	
SW1	Arc switch	-20kV	
R2	Dumping resistor	1k Ω	
C2	Parasitic capacitor	50pF	

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
Q1	IGBT	RGA 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 10 μ s
- T: For inverter, Short circuit capability guaranteed 5 μ s
- TV: For converter / inverter, High speed switching, Short circuit capability guaranteed 2 μ s
- 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 $I_C(T_C=100^\circ C)$

- 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

Grade

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

Built-in diode configuration

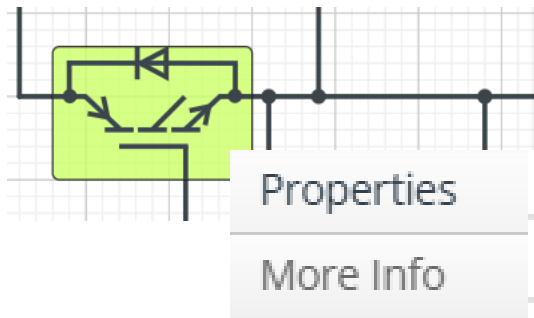
- None: Without diode
- C: SiC Schottky barrier diode
- D: Fast recovery diode
- E: Larger size Fast recovery diode
- R: Body diode with reverse conducting (RC) structure

Rated voltage V_{CES}

- 60: 600 V
- 65: 650 V
- X2: 1200 V
- X8: 1800 V

Product Lineup: [Field Stop Trench IGBT](#)

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



Model Links:
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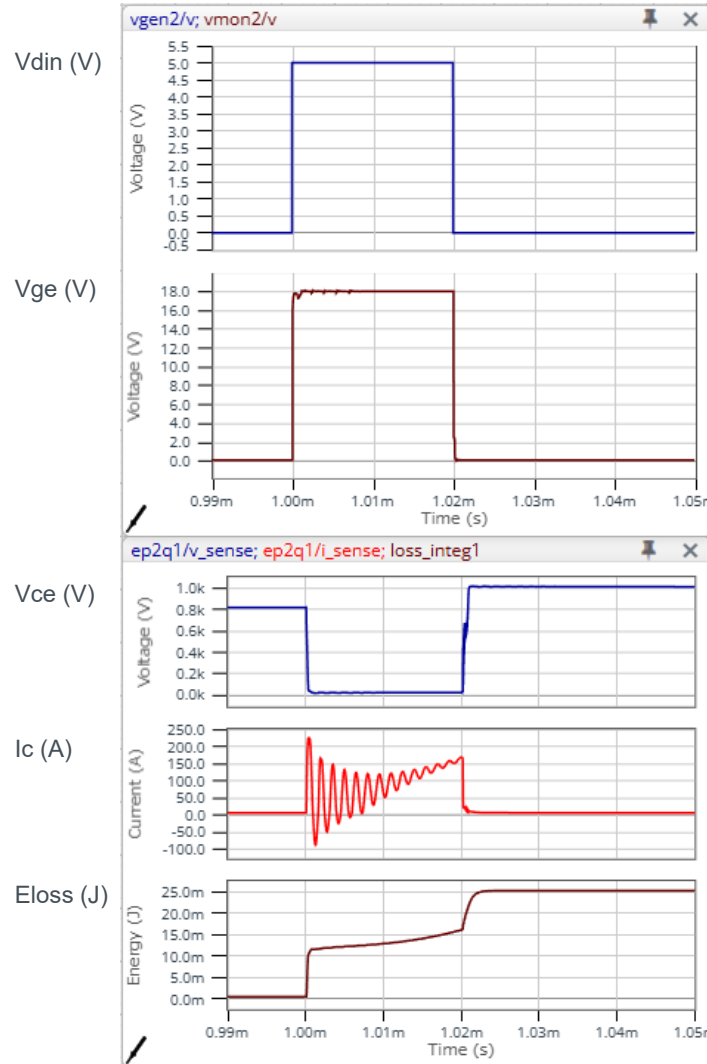
Selectable Devices

Component name	Component	Product No.	feature
GD-IC1	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

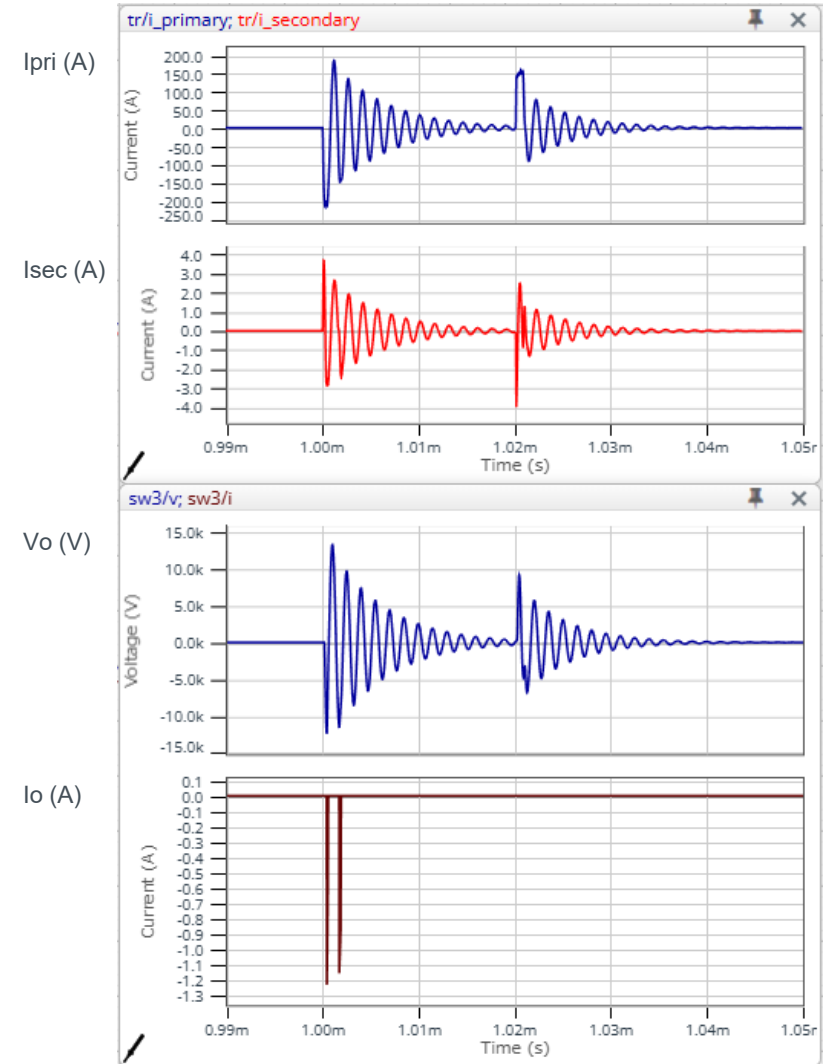
* Default device

Q1 : IGBT
RGA80TSX2EHR

Vdin, Vge / Vce, Ic, Eloss (0.99~1.05ms)

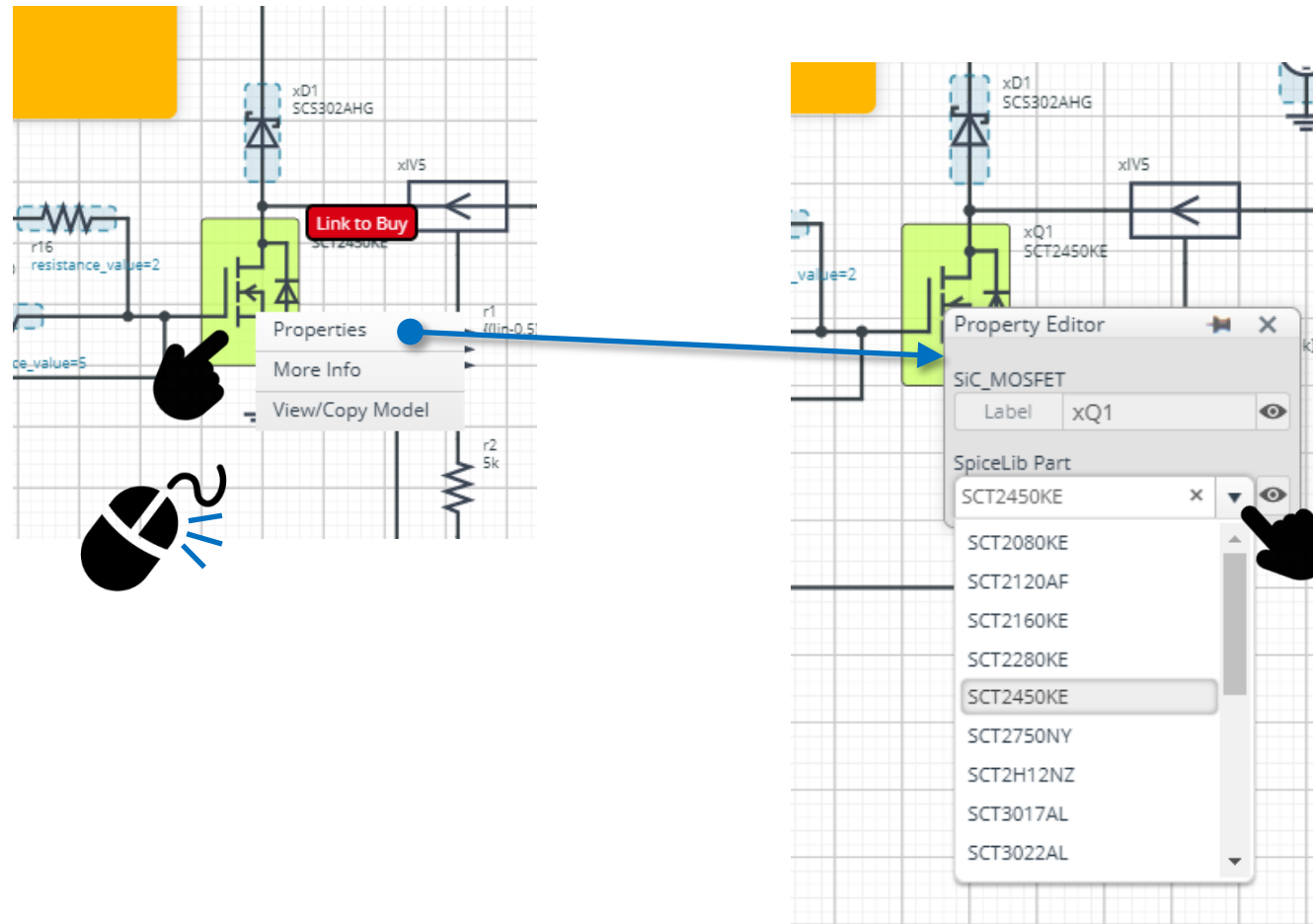


Ipri, Isec / Vo, Io (0.99~1.05ms)



How to change the devices

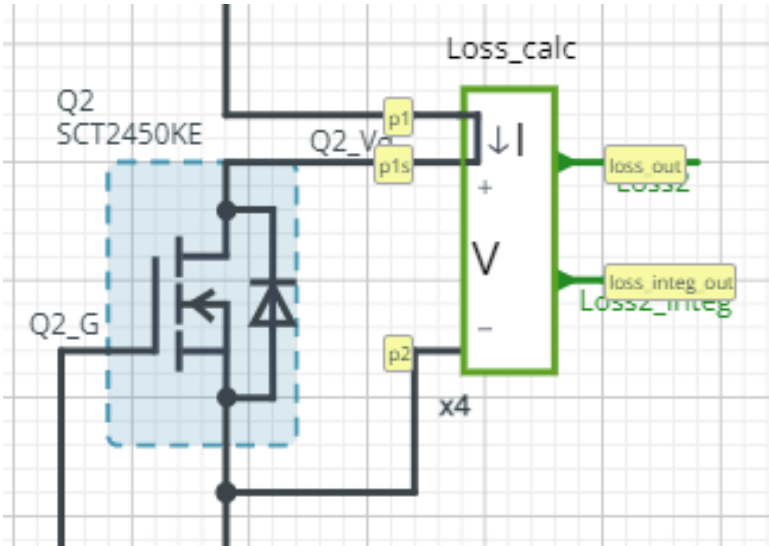
Right-click on the device → Select Properties → Pull down “SpiceLib Part” → Select the product



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

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Loss calculation model 'Loss_calc'



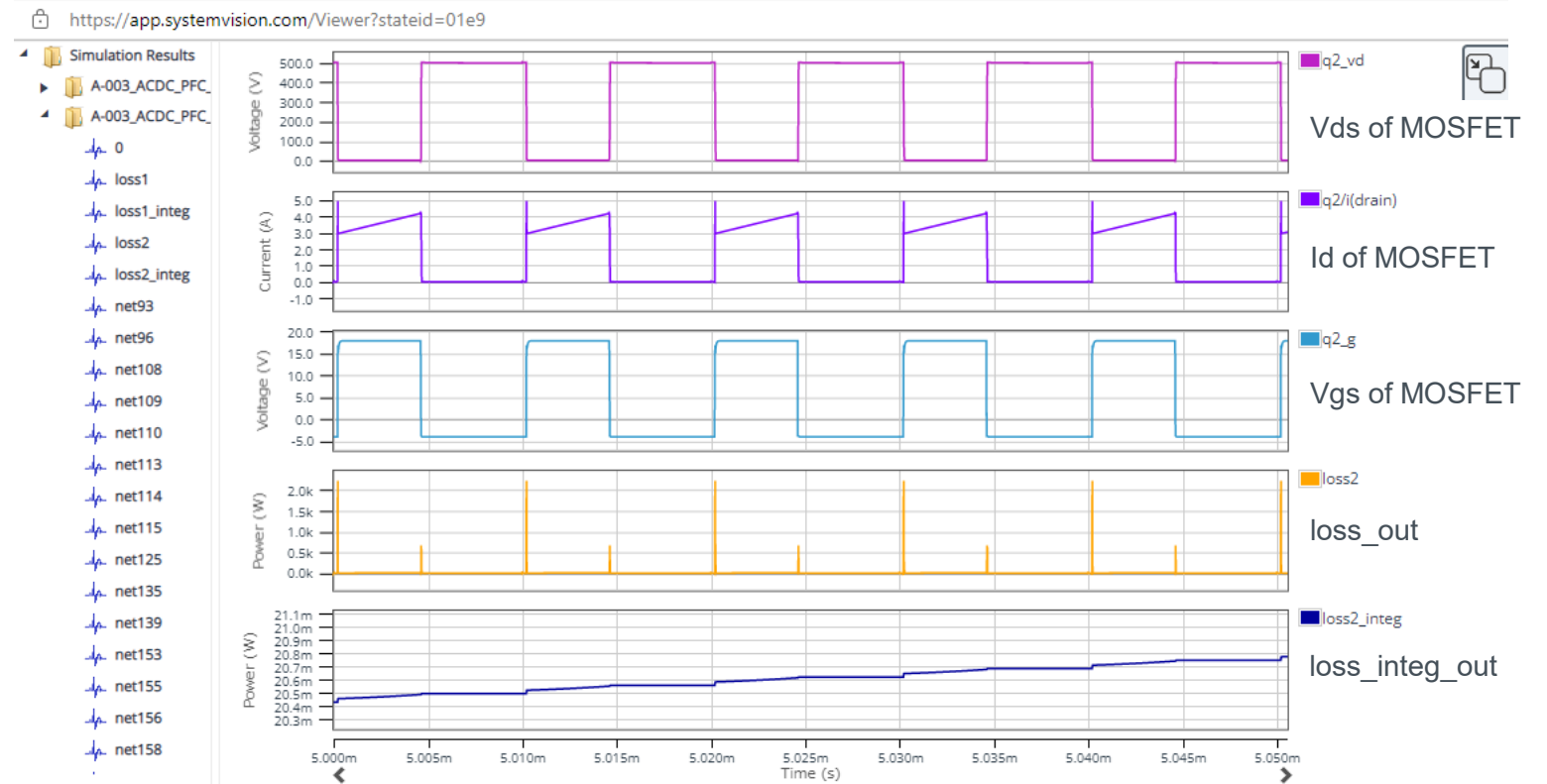
$$loss_out(t) = I(t) \times V(t)$$

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

I : Current through p1 to p1s

V : Voltage between p1s and p2

Waveform example



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