ROHM Solution Simulator

905 nm Pulsed Laser Diode

RLD90QZWx series / Resonant wave B-01

This circuit simulate the resonant wave B-01 Time-Domain response of RLD90QZWx series. You can observe the resonant wave of not only the current but also the optical output waveform. You can customize the parameters of the components shown in blue, such as VIN, or peripheral components, and simulate the resonant wave B-01 Time-Domain with desired operating condition.

General Cautions

Caution 1: The values from the simulation results are not guaranteed. Please use these results as a guide for your design.
Caution 2: Please refer to the Application note of Laser Diode for details of the technical information.
Caution 3: The characteristics may change depending on the actual board design and ROHM strongly recommend to double check those characteristics with actual board where the chips will be mounted on.

1 Simulation Schematic

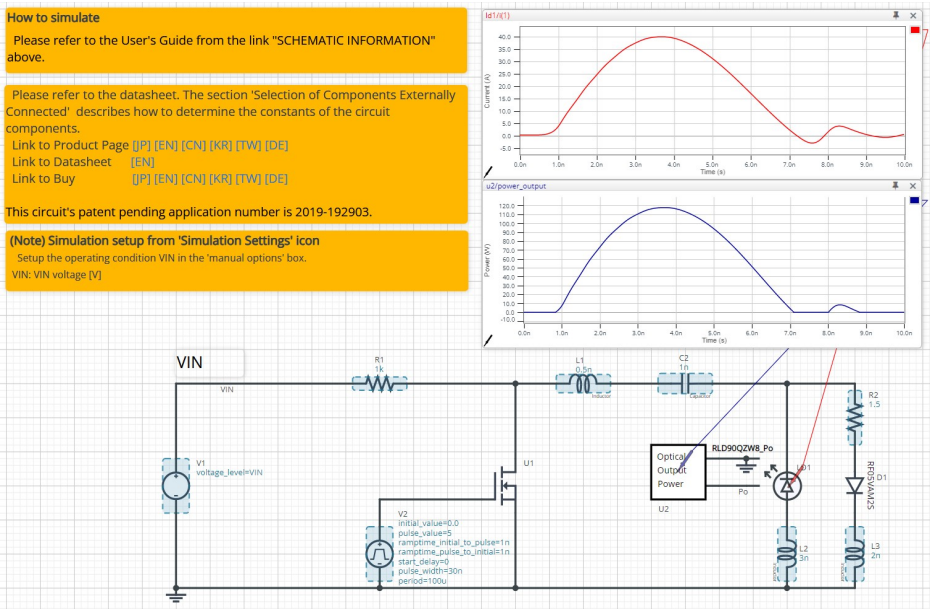

Figure 1. Simulation Schematic

2 How to simulate

The simulation settings, such as simulation time or convergence options, are configurable from the 'Simulation Settings' shown in Figure 2, and Table 1 shows the default setup of the simulation.

In case of simulation convergence issue, you can change advanced options to solve. Default statement in 'Manual Options' is a sets the transient analysis and parameter. You can modify it.

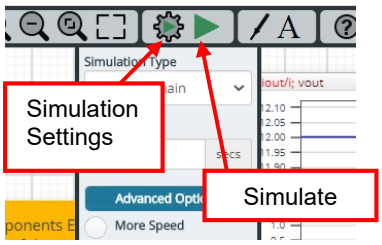

Figure 2. Simulation Settings and execution

Table 1. Simulation settings default setup

Parameters	Default	Note
Simulation Type	Time-Domain	Do not change Simulation Type
End Time	10 ns	-
Advanced options	Balanced	-
	Time Resolution Enhancement Convergence Assist	-
Manual Options	".tran 0 10ns 0ns .param VIN 90"	Default VIN for RLD90QZW3 is 60 V. RLD90QZW5 and RLD90QZW6 (30 V). RLD90QZW8 (90 V).

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3 Simulation Conditions

Table 2. List of the simulation condition parameters

Instance Name	Type	Parameters	Default Value	Variable Range		Units
				Min	Max	
V1	Voltage Source	Voltage_level	VIN	1	190	V
		AC_magnitude	0.0	fixed		V
		AC_phase	0.0	fixed		ns
V2	Voltage Source	Initial_value	0	-5	3	V
		Pulse_value	5	4	6	V
		ramptime_initial_to_pulse	1n	1n	1µ	s
		ramptime_pulse_to_initial	1n	1n	1µ	s
		Start_delay	0	0	100	s
		Pulse_width	30n	1n	1	s
		Period	100µ	10n	1	s

3.1 V2 parameter setup

Figure 3 shows how the V2 parameters correspond to the VIN stimulus waveform.

Figure 3. V2 parameters and its waveform

4 RLD90QZW8_Po model

Table 3 shows the model pin function implemented. Note that RLD90QZWx series_Po is the behavior model for its optical output power response operation, and no protection circuits or the functions not related to the purpose are not implemented.

Table 3. RLD90QZWx series_Po model pins used for the simulation

Pins	Description
1	A / Anode
2	C / Cathode
OPT	Optical output power in V [volts]
GND	Ground

4.1 Optical Output Power

RLD90QZWx series_Po model outputs optical output power in V [volts] unit. Optical Output Power insert model multiplies the output result by 1A and convert it to W [watts]. To monitor the optical output power in W [watts], select probe item 'power_output' from property of Optical Output Power insert model.

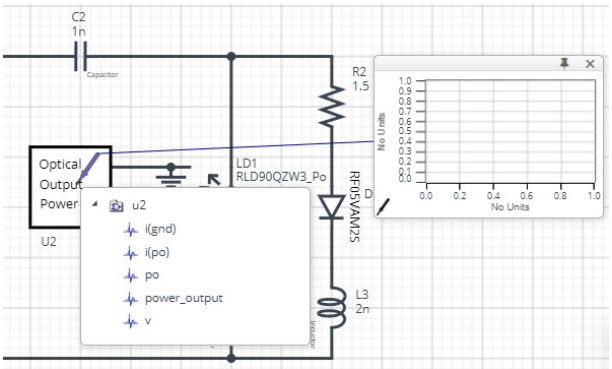


Figure 4. Probe Items of Optical Output Power insert model

5 Peripheral Components

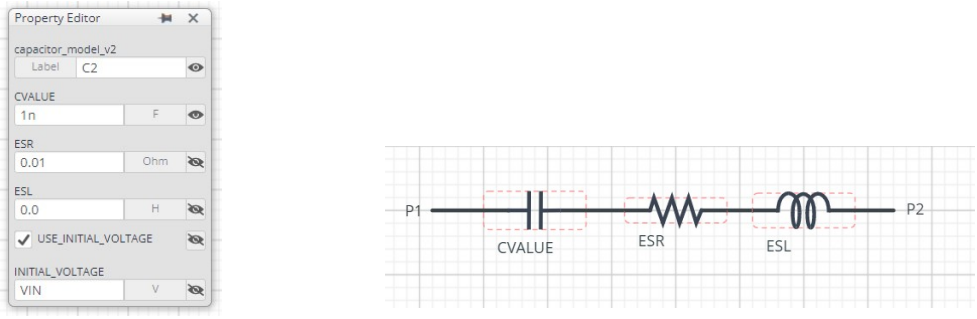
5.1 Bill of Material

Table 4 shows the list of components used in the simulation schematic. Each of the capacitor and inductor has the parameters of equivalent circuit shown below. The default value of equivalent components are set to zero except for the ESR of C, and parallel resistance of L. You can modify the values of each component.

Table 4. List of capacitors, inductors, and resistors used in the simulation circuit

Type	Instance Name	Default Value	Variable Range		Units
			Min	Max	
Capacitor	C2	1n	0.1n	10μ	F
Inductor	L1	0.5	0.1	100	nH
	L2	3	0.1	100	nH
	L3	2	0.1	100	nH
Resistor	R1	1k	0.1	10k	Ω
	R2	1.5	0.01	100	Ω

5.2 Capacitor Equivalent Circuits

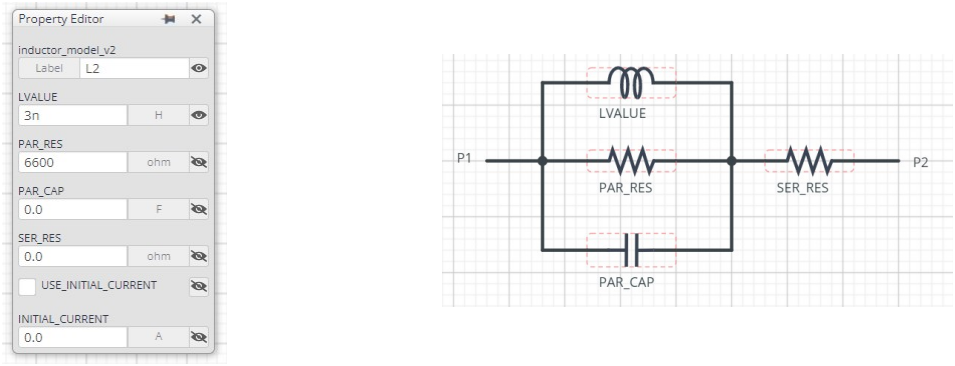


(a) Property editor (b) Equivalent circuit

Figure 5. Capacitor property editor and equivalent circuit

The default value of ESR is 0.01 Ω.

5.3 Inductor Equivalent Circuits



(a) Property editor (b) Equivalent circuit

Figure 6. Inductor property editor and equivalent circuit

The default value of PAR_RES is 6.6 kΩ.

(Note 1) These parameters can take any positive value or zero in simulation but it does not guarantee the operation of the IC in any condition. Refer to the datasheet to determine adequate value of parameters.

6 Link to the product information and tools

6.1 Laser Diode

RLD90QZW3 : 905 nm, 75 W, 225 μm Invisible Pulsed Laser Diode. [JP] [EN] [CN] [KR] [TW] [DE]
RLD90QZW5 : 905 nm, 25 W, 70 μm Invisible Pulsed Laser Diode. [JP] [EN] [CN] [KR] [TW] [DE]
RLD90QZW6 : 905 nm, 25 W, 50 μm Invisible Pulsed Laser Diode. [JP] [EN] [CN] [KR] [TW] [DE]
RLD90QZW8 : 905 nm, 120 W, 270 μm Invisible Pulsed Laser Diode. [JP] [EN] [CN] [KR] [TW] [DE]

Technical Articles and Tools can be found in the Design Resources on the product web page.

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