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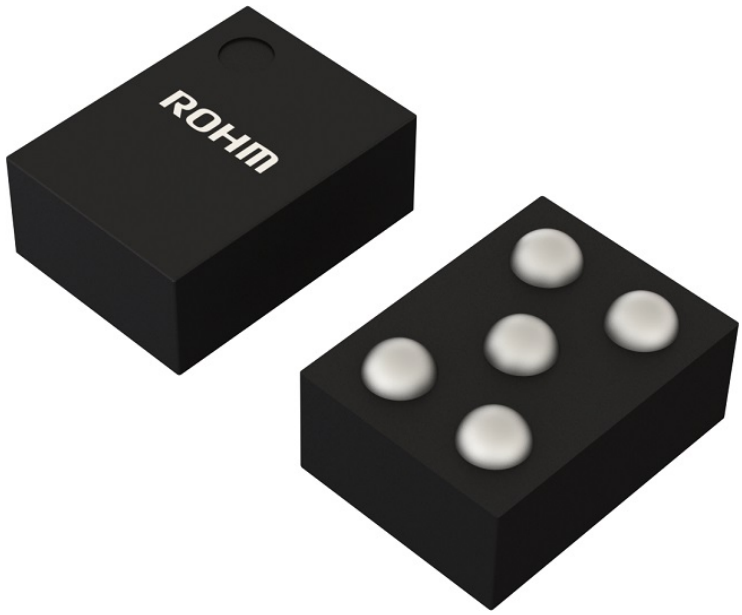
ROHM TLR377GYZ High Precision Rail-to-Rail Input and Output CMOS Amplifier



Product Specifications

- **Product Name:** ROHM Solution Simulator
- **Type:** Ultra Small Package & High Precision Rail-to-Rail Input/Output CMOS Operational Amplifier

Product Usage Instructions

Simulation Schematic

This product simulates the frequency response with an Op-Amp as a voltage follower. You can observe the AC gain and phase of the ratio of output to input voltage when the input source voltage AC frequency is changed.

How to Simulate

The simulation settings, such as parameter sweep or convergence options, are configurable from the ‘Simulation Settings’ as shown in Figure 2. Table 1 shows the default setup of the simulation.

Simulation Conditions

Table 2 lists the simulation condition parameters, including instance name, type, parameters, default values, variable range, and units.

Op-Amp Model

Table 3 shows the model pin function implemented for the Op-Amp simulation. The Op-Amp model is a behavioral model for its input/output characteristics.

Peripheral Components

Bill of Materials

Table 4 shows the list of components used in the simulation schematic, including resistors and capacitors with their default values and variable ranges.

Capacitor Equivalent Circuits

The product includes a property editor and an equivalent circuit for capacitors. The default value of ESR is 2mΩ.

INTRODUCTION

- This circuit simulates the frequency response with an Op-Amp as a voltage follower. You can observe the AC gain and phase of the ratio of output to input voltage when the input source voltage AC frequency is changed. You can customize the parameters of the components shown in blue, such as VSOURCE, or peripheral components, and simulate the voltage follower with the desired operating condition.
- You can simulate the circuit in the published application note: Operational amplifier, Comparator (Tutorial). [JP] [EN] [CN] [KR]

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:** These model characteristics are specifically at Ta=25°C. Thus, the simulation result with temperature variances may significantly differ from the result with the one done at the actual application board (actual measurement).
- **Caution 3:** Please refer to the Application Note of Op-Amps for details of the technical information.
- **Caution 4:** 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.

Simulation Schematic

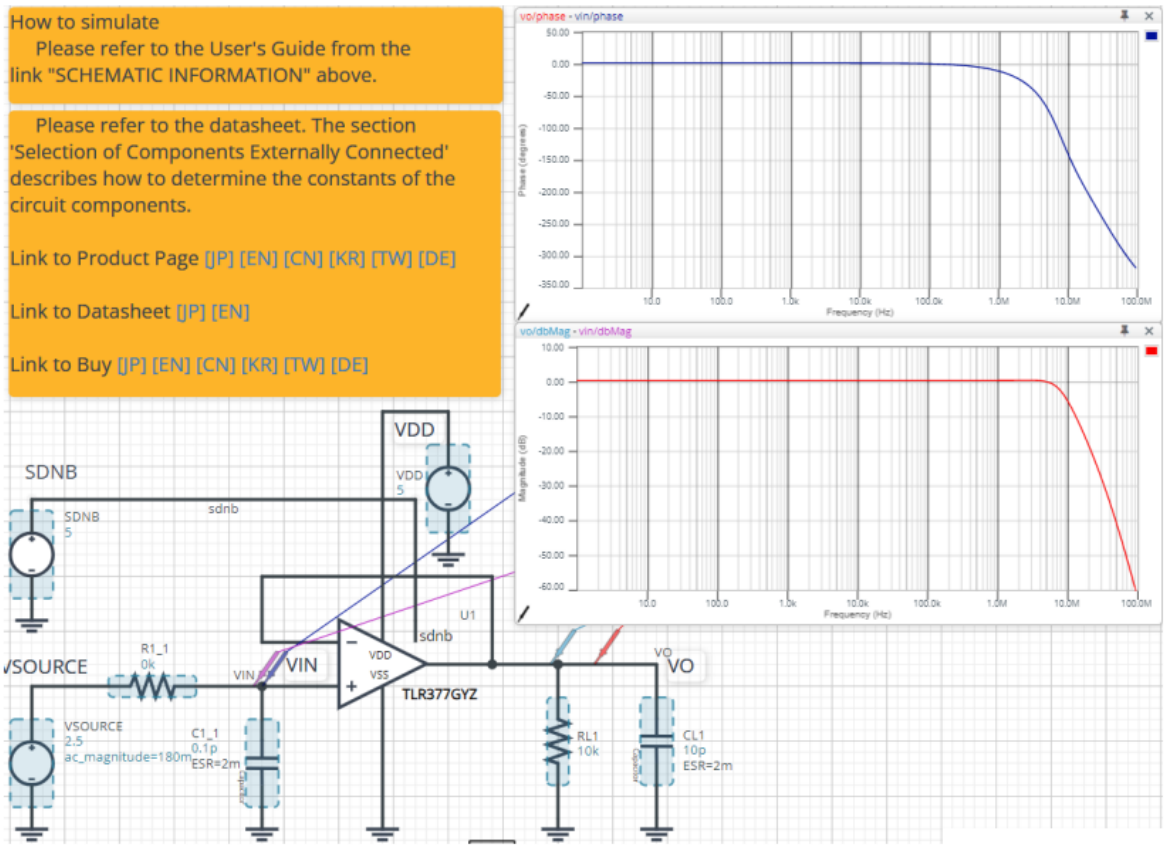


Figure 1. Simulation Schematic

How to simulate

- The simulation settings, such as parameter sweep 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. The temperature is set to 27 °C in the default statement in ‘Manual Options’. You can modify it.

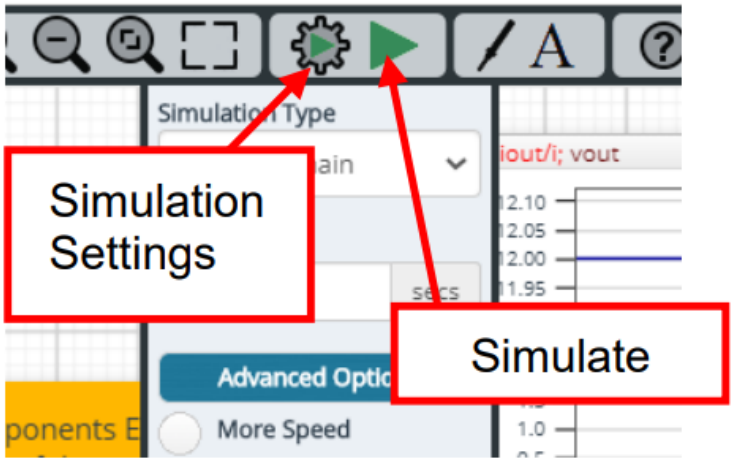


Figure 2. Simulation Settings and execution

Parameters	Default	Note
Simulation Type	Frequency-Domain	Do not change Simulation Type
Start Frequency	0 Hz	Simulate the frequency response for the frequency range from 0 Hz to 100 MHz.
End Frequency	100Meg Hz	
Advanced options	Balanced	–
	Convergence Assist	–
Manual Options	.temp 27	–

Simulation Conditions

Instance Name	Type	Parameters	Default Value	Variable Range		Units
				Min	Max	
VSOURCE	Voltage Source	Voltage_level	2.5	0	5.5	V
		AC_magnitude	180	free		mV
		AC_phase	0.0	fixed		°
VDD	Voltage Source For Op-Amp	Voltage_level	5	1.8*(Note1)*	5.5*(Note1)*	V
		AC_magnitude	0.0	fixed		V
		AC_phase	0.0	fixed		°
SDNB	Voltage Source For Shutdown Setting	Voltage_level	5	VSS	VDD	V
		AC_magnitude	0.0	fixed		V
		AC_phase	0.0	fixed		°

Op-Amp model

Table 3 shows the model pin function implemented. Note that the Op-Amp model is the behavioral model for its input/output characteristics, and neither protection circuits nor functions unrelated to the purpose are implemented.

Pin Name	Description
+IN	Non-inverting input
-IN	Inverting input
VDD	Positive power supply
VSS	Negative power supply / Ground
OUT	Output
SDNB	Shutdown setting

Peripheral Components

Bill of Materials

Table 4 shows the list of components used in the simulation schematic. Each of the capacitors has the parameters of equivalent circuit shown below. The default values of equivalent components are set to zero except for the ESR of C. You can modify the values of each component.

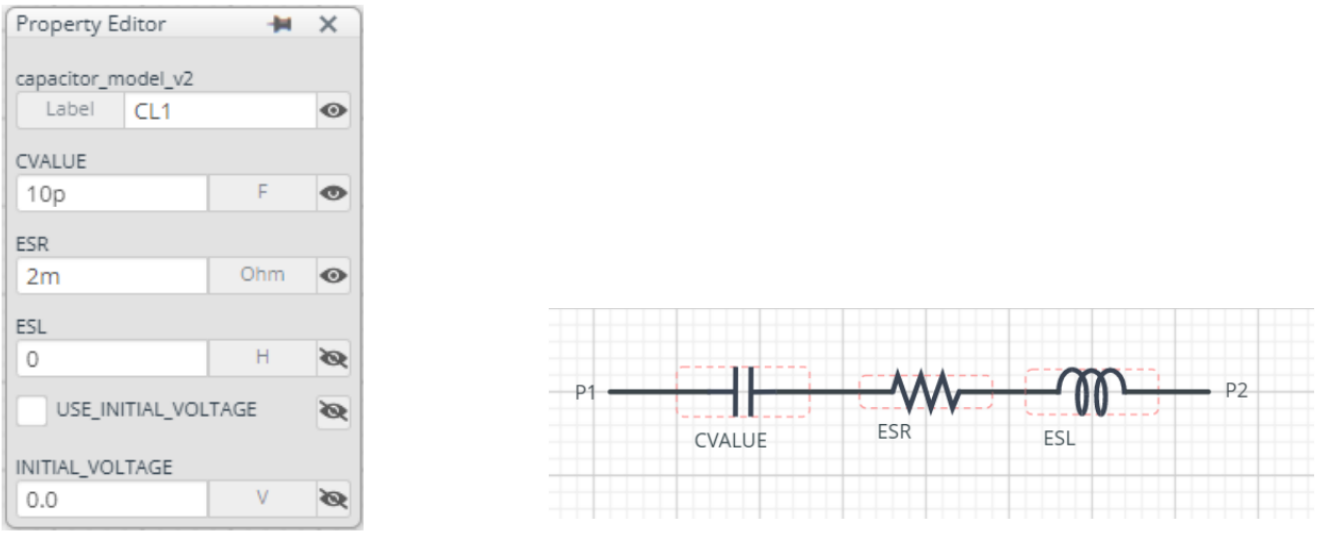
Type	Instance Name	Default Value	Variable Range		Units
			Min	Max	
Resistor	R1_1	0	0	10	kΩ
	RL1	10k	1k	1M, NC	Ω
Capacitor	C1_1	0.1	0.1	22	pF

	CL1	10	free, NC	pF

Capacitor Equivalent Circuits

The default value of ESR is 2 mΩ.

(Note 2) 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 the adequate value of parameters.



(a) Property editor (b) Equivalent circuit

Figure 3. Capacitor property editor and equivalent circuit

Recommended Products

Op-Amp

TLR377GYZ: Ultra Small Package & High Precision Rail-to-Rail Input/Output CMOS Operational Amplifier. [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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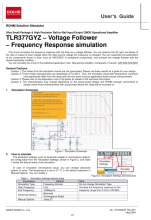
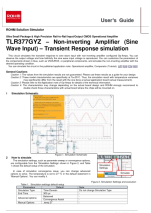
FAQ

- **Can I customize the parameters of the components in the simulation?**
  Yes, you can customize parameters such as VSOURCE and peripheral components to simulate the voltage follower with desired operating conditions.
- **What is the default simulation type and frequency range?**
  The default simulation type is Frequency-Domain, and the frequency range simulated is from 0 Hz to 100 MHz.

Documents / Resources

	ROHM TLR377GYZ High Precision Rail-to-Rail Input and Output CMOS Amplifier [pdf] User Guide TLR377GYZ, TLR377GYZ High Precision Rail-to-Rail Input and Output CMOS Amplifier, High Precision Rail-to-Rail Input and Output CMOS Amplifier, Rail-to-Rail Input and Output CMOS Amplifier, Input and Output CMOS Amplifier, CMOS Amplifier
	ROHM TLR377GYZ High Precision Rail-to-Rail Input and Output CMOS Amplifier [pdf] User Guide TLR377GYZ, TLR377GYZ High Precision Rail-to-Rail Input and Output CMOS Amplifier, High Precision Rail-to-Rail Input and Output CMOS Amplifier, Rail-to-Rail Input and Output CMOS Amplifier, Input and Output CMOS Amplifier, CMOS Amplifier

References

- User Manual

ROHM

CMOS Amplifier, High Precision Rail-to-Rail Input and Output CMOS Amplifier, Input and Output CMOS Amplifier, Rail-to-Rail Input and Output CMOS Amplifier, ROHM, TLR377GYZ, TLR377GYZ High Precision Rail-to-Rail Input and Output CMOS Amplifier

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