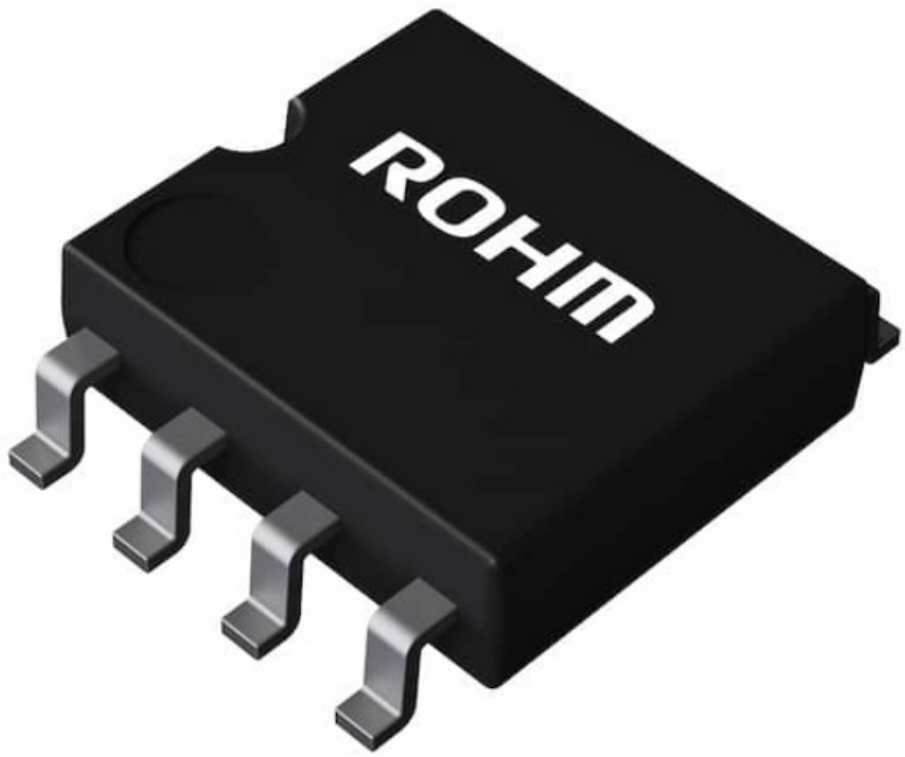
ROHM LMR1001YF-C Voltage Rail-to-Rail Input and Output CMOS Amplifier



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Important Information

This circuit simulates the transient response to sine wave input with voltage follower configured Op-Amps. You can observe the output voltage and how faithfully the sine wave input voltage is reproduced. 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]

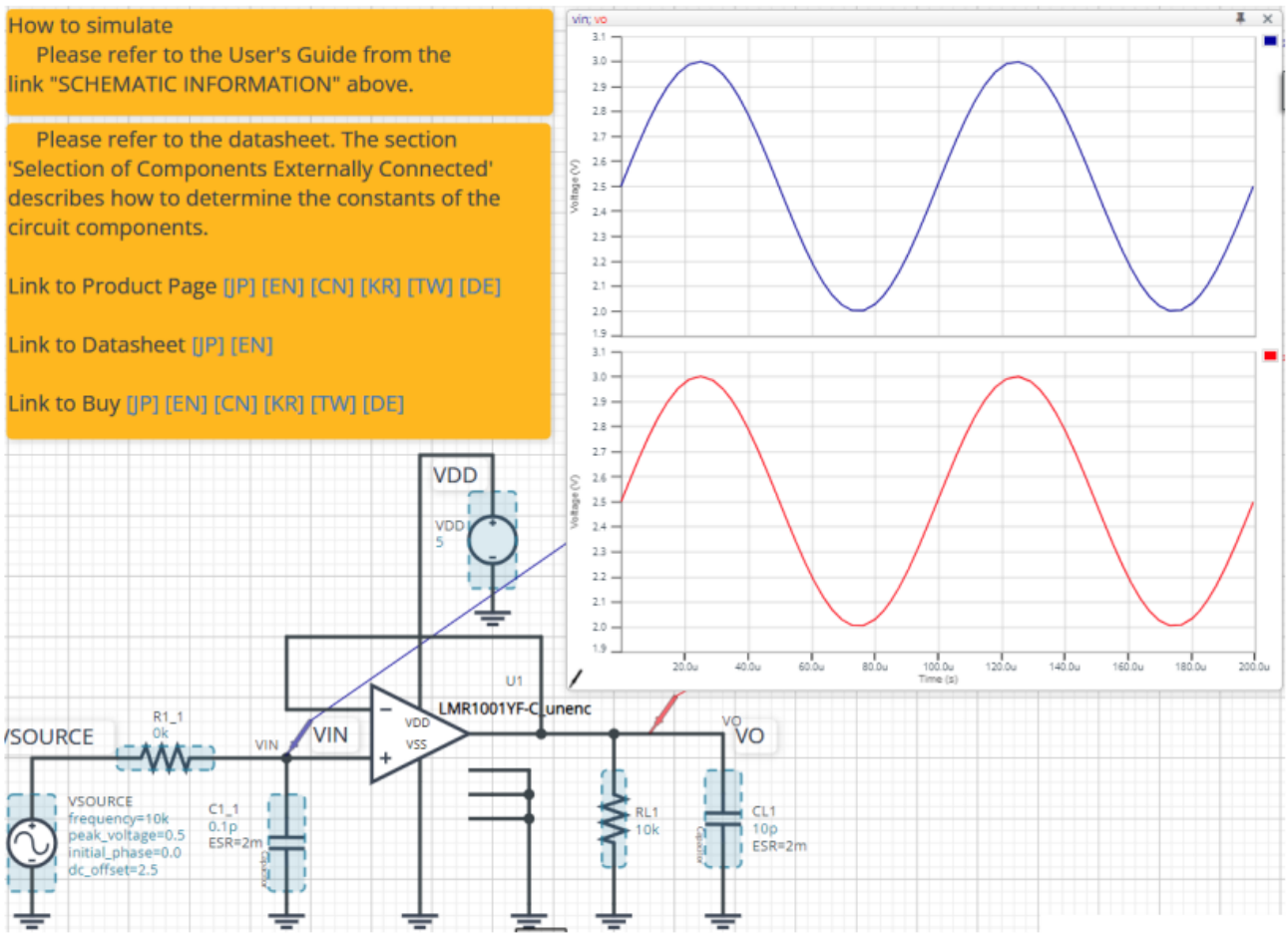
General Cautions

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 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.

Figure 2. Simulation Settings and execution

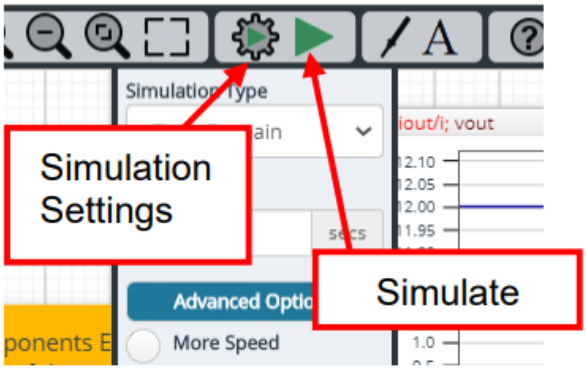


Table 1. Simulation settings default setup

Parameters	**Default**	**Note**
Simulation Type	Time-Domain	Do not change Simulation Type
End Time	200 us	–
Advanced options	Balanced	–
	Convergence Assist	–
Manual Options	.temp 27	–

Simulation Conditions

Table 2. List of the simulation condition parameters

Instance Name	**Type**	**Parameters**	**Default Value**	**Variable Range**		**Units**
				Min	**Max**	
VSOURCE	Voltage Source	Frequency	10k	10	10M	Hz
		Peak_ voltage	0.5	0	5.5	V
		Initial_ phase	0	free		°

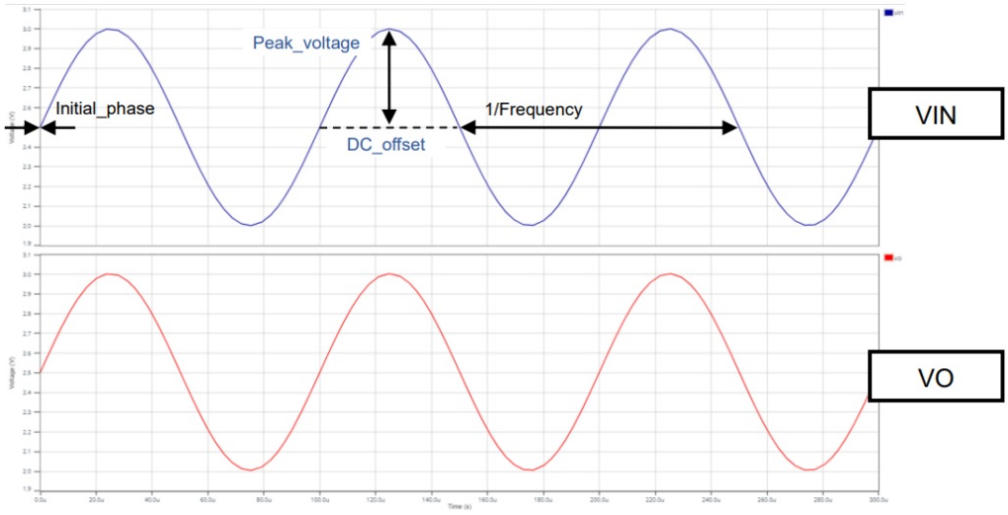
		DC_ offset	2.5	0	5.5	V
		DF	0.0	fixed		1/s
		AC_ magnitude	0.0	fixed		V
		AC_ phase	0.0	fixed		°
VDD	Voltage Source For Op-Amp	Voltage_ level	5	2.7(Note 1)	V	V
		AC_ magnitude	0.0	fixed		V
		AC_ phase	0.0	fixed		°

(Note 1) Set it to the guaranteed operating range of the Op-Amps.

VSOURCE parameter setup

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

Figure 3. VSOURCE parameters and its waveform



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.

Table 3. Op-Amp model pins used for the simulation

Pin Name	Description
+IN	Non-inverting input
-IN	Inverting input
VDD	Positive power supply
VSS	Negative power supply / Ground
OUT	Output
NC1	No connection inside
NC2	No connection inside
NC3	No connection inside

Peripheral Components

Bill of Material

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.

Table 4. List of capacitors used in the simulation circuit

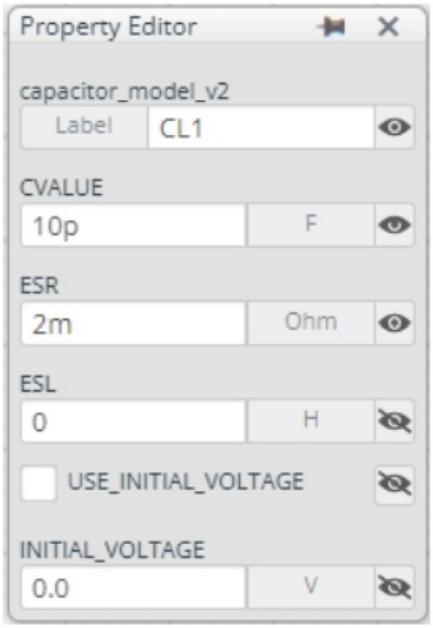
Type	Instance Name	Default Value	Variable Range		Units
			Min	Max	

Resistor	R1_1	0	10	10	kΩ
	RL1	10k	1k	1M, NC	Ω
Capacitor	C1_1	0.1	0.1	22	pF
	CL1	10	free, NC		pF

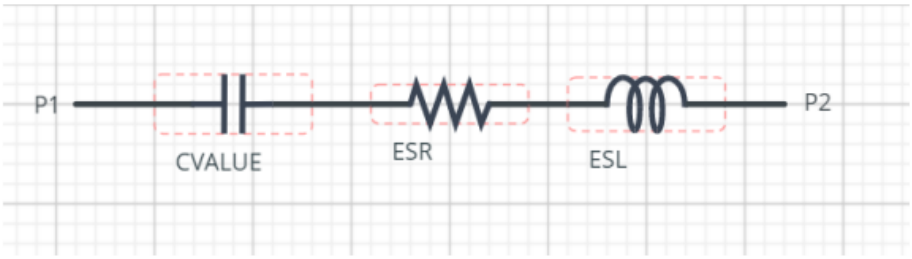
Capacitor Equivalent Circuits

Figure 4. Capacitor property editor and equivalent circuit

- (**a**) Property editor



- (**b**) Equivalent circuit



The default value of ESR is 2m Ω.

(**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 adequate value of parameters.

Recommended Products

Op-Amp

LMR1001YF-C : Automotive Zero Drift Low Offset Voltage Rail-to-Rail I/O CMOS Op-Amp. [JP] [EN] [CN] [KR] [TW] [DE] **LMR1001YG-C** : Automotive Zero Drift Low Offset Voltage Rail-to-Rail I/O CMOS Op-Amp. [JP] [EN] [CN] [KR] [TW] [DE] **LMR1002F-LB** : Automotive Zero Drift Low Offset Voltage Rail-to-Rail I/O CMOS Op-Amp. [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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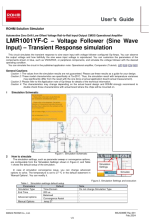	ROHM LMR1001YF-C Voltage Rail-to-Rail Input and Output CMOS Amplifier [pdf] User Guide LMR1001YF-C, LMR1001YF-C Voltage Rail-to-Rail Input and Output CMOS Amplifier, Voltage Rail-to-Rail Input and Output CMOS Amplifier, Rail-to-Rail Input and Output CMOS Amplifier, Input and Output CMOS Amplifier, CMOS Amplifier

References

- User Manual

ROHM

CMOS Amplifier, Input and Output CMOS Amplifier, LMR1001YF-C, LMR1001YF-C Voltage Rail-to-Rail Input and Output CMOS Amplifier, Rail-to-Rail Input and Output CMOS Amplifier, ROHM, Voltage Rail-to-Rail Input and Output CMOS Amplifier

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