ROHM Solution Simulator

500mA 3.3V Output LDO Regulator
BD433M5FP2-C – Line Response simulation

This circuit simulates the line response of BD433M5FP2-C. You can observe the fluctuation of the output voltage when the line voltage is abruptly changed. You can customize the parameters of the components shown in blue, such as VCC, or peripheral components, and simulate the line response with the 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: 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 datasheet and application notes of LDO Regulators 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.

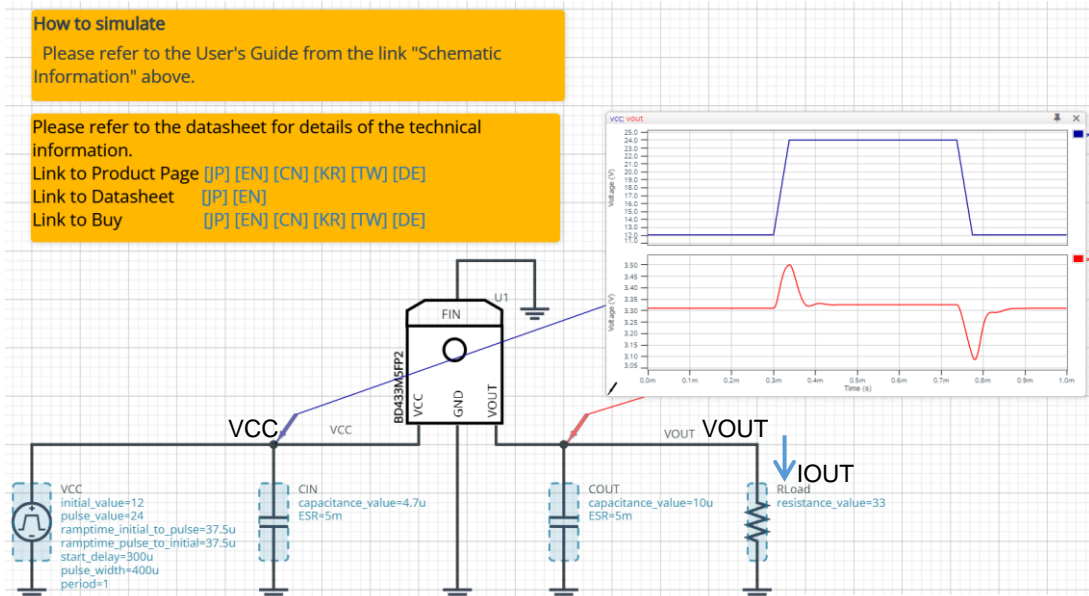## 1   Simulation Schematic

Figure 1. Simulation Schematic

2   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. Nothing is stated in the default statement in 'Manual Options'. You can modify it.
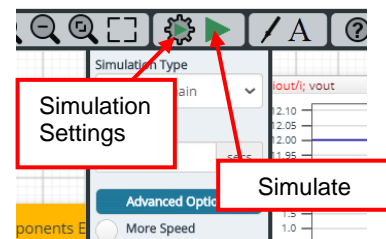

Figure 2. Simulation Settings and execution

Table 1. Simulation settings default setup

Parameters	Default	Note
Simulation Type	Time-Domain	Do not change Simulation Type
End Time	1ms	-
Advanced options	Balanced	-
	Convergence Assist	-
Manual Options	-	-

3   Simulation Conditions

Table 2. List of the simulation condition parameters

Instance Name	Type	Parameters	Default Value	Variable Range		Units
				Min	Max	
VCC	Voltage Source	Initial_value	12	4	42	V
		Pulse_value	24	4	42	V
		Ramptime_initial_to_pulse	37.5	free[(Note1)]		µs
		Ramptime_pulse_to_initial	37.5	free[(Note1)]		µs
		Start_delay	300	free[(Note1)]		µs
		Pulse_width	400	free[(Note1)]		µs
		Period	1	free[(Note1)]		s
Rload	Resistor	Resistance_value	33	6.6	100M	Ω

(Note 1) Set it to the guaranteed operating range of the LDO Regulators.

3.1 VCC parameter setup

Figure 3 shows how the VCC parameters correspond to the VCC stimulus waveform.
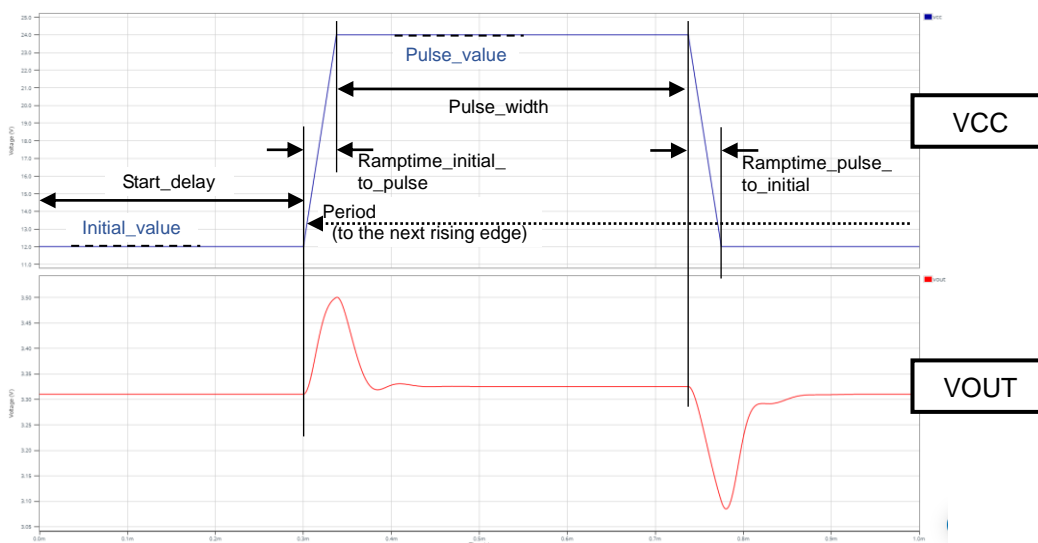

Figure 3. IOUT parameters and its waveform

4   BD433M5FP2 model

   Table 3 shows the model terminal function implemented. Note that BD433M5FP2 is the behavior model for its load/line response operation, and no protection circuits or the functions not related to the purpose are not implemented.

Table 3. BD433M5FP2 model terminals used for the simulation

Terminals	Description
VOUT	Output Pin
GND	Ground Pin
VCC	Supply Voltage Input Pin

(Note 2) This model is not compatible with the influence of ambient temperature.
(Note 3) Use the simulation results only as a design guide and the data reported herein is not a guaranteed value.

5   Peripheral Components

5.1   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 parameters' value of equivalent components are set to default except for the ESR of C. You can modify the values of each component.

Table 4. List of capacitors used in the simulation circuit

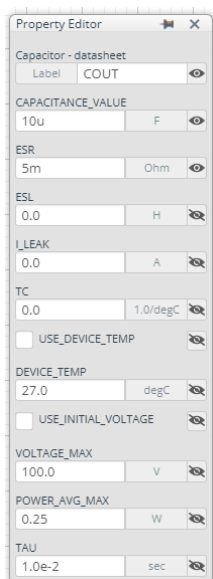| Type	Instance Name	Parameters	Default Value	Variable Range		Units
				Min	Max	
Capacitor	CIN	Capacitance_value	4.7	0.1	free	μF
		ESR	5m	1m	10	Ω
	COUT	Capacitance_value	10	10	free	μF
		ESR	5m	1m	10	Ω

5.2   Capacitor Parameters

Figure 4. Capacitor property editor

The default value of ESR is 5mΩ.

(Note 4) 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   Recommended Product

6.1   LDO Regulator
BD433M5FP2-C: 500mA 3.3V Output LDO Regulator. [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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