

# LTspice Model

## LDO Regulators with Watch Dog and Timer

### Voltage Detector

### ROHM

### BD4271HFP

#### Model Information

**Model** A macro model  
**Call Name** MDC\_BD4271HFP\_LT  
**Pin Assign** 1:VCC 2:CTL 3:RO 4:GND 5:CT 6:CLK 7:VO FIN:GND  
**File List** Model Library MDC\_BD4271HFP\_LT.lib  
 Model Report MDC\_BD4271HFP\_LT.pdf(this file)

**Verified Simulator Version** LTspice

#### Note

#### References

The information which was used for modeling is as follow:

[Data Sheet]

- Date/Version
- Product name BD4271HFP
- Company name ROHM

[Characteristics listed]

- Characteristics
  - Output Voltage vs Input Voltage
  - Line regulation
  - Load regulation
  - When supply voltage VCC is ON ⇔ OFF
  - When output control voltage VCTL is ON ⇔ OFF
  - When WDT threshold Voltage VCLK is ON ⇔ OFF
  - Overcurrent Protection Characteristics

#### Simulation Condition

This table shows the range of evaluated simulation range that was not occurs any convergence problems in this area.

Item	Condition	Unit
Temperature	25	deg C

○ : Implemented  
 × : Not Implemented  
 — : Not applicable

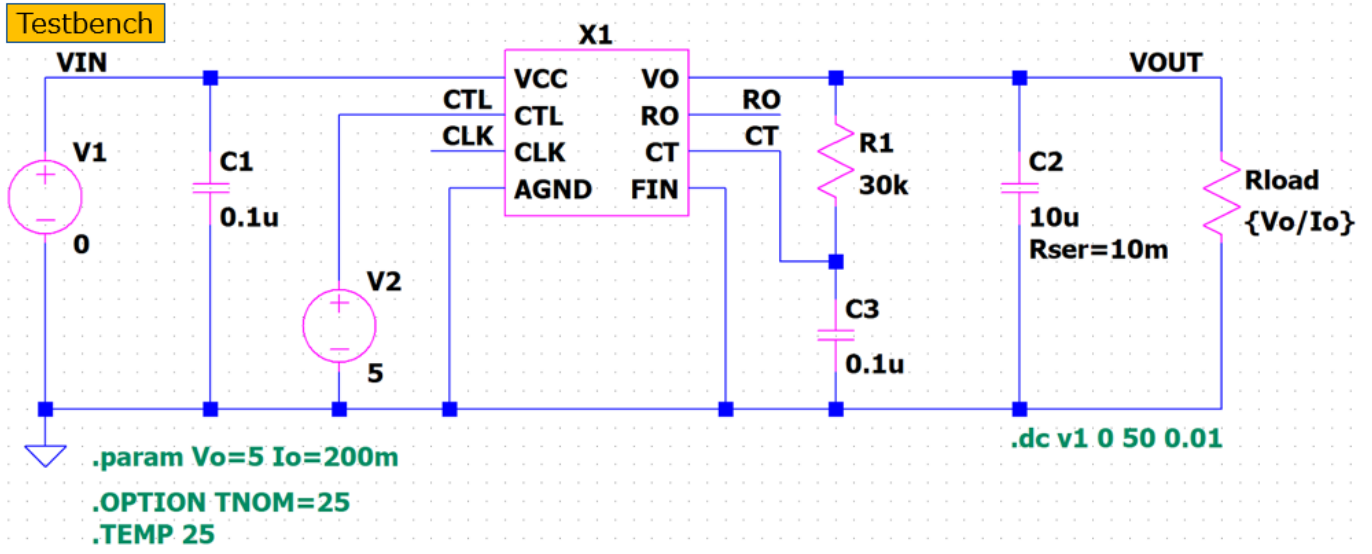
**Model Functions Table**

		RANK=2
Functions	RANK	Implemented
Output Voltage vs Input Voltage	1	○
Line regulation	1	○
Load regulation	1	○
Enable Operation	1	○
Dropout Voltage	1	○
Overcurrent Protection Characteristics	1	○
WDT Reset Operation	2	○

Output Voltage vs Input Voltage (Input=0V~45V Output=5.0V IO<sub>UT</sub>=200mA)

Simulation results are following.

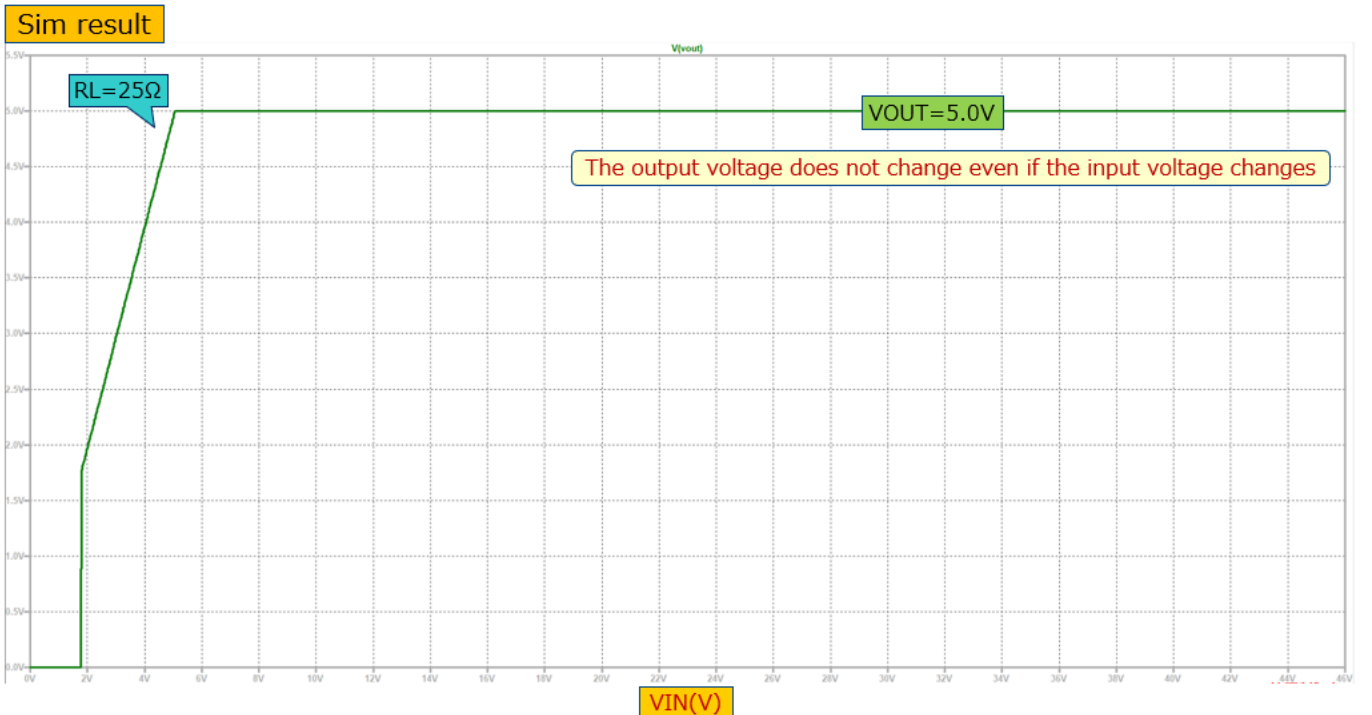
Explanatory notes — : simulated



Output Voltage vs Input Voltage (Input=0V~45V Output=5.0V IO<sub>UT</sub>=200mA)

Simulation results are following.

Explanatory notes — : simulated



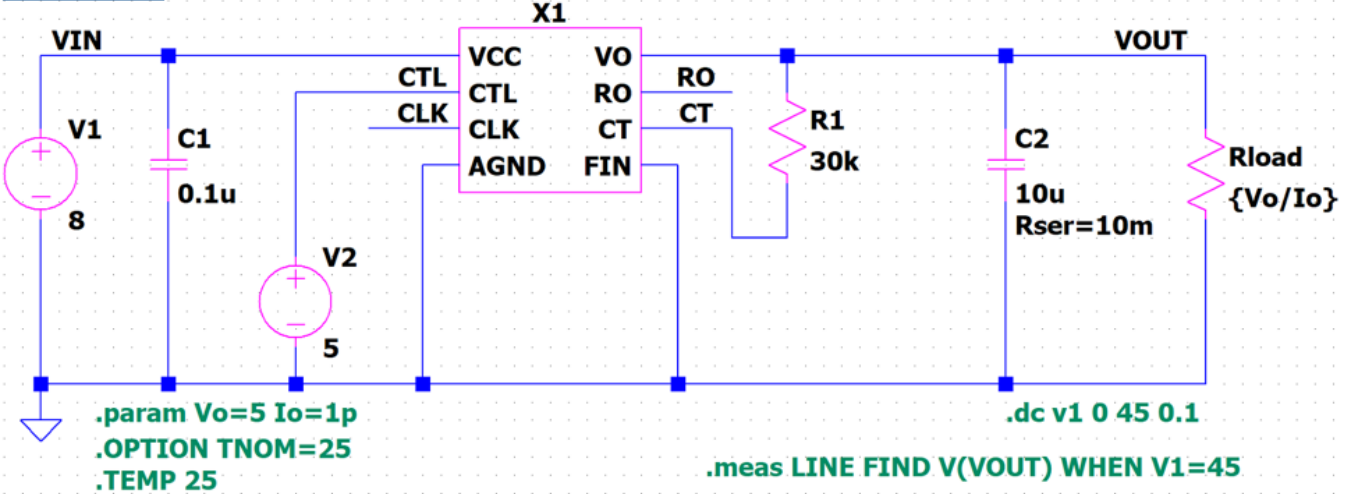
Line regulation (Input=8V~16V Output=5.0V IOU=0A)

Simulation results are following.

Explanatory notes — : simulated

Testbench

ラインレギュレーション	Reg.I	-30	-	30	mV	8 V ≤ V <sub>CC</sub> ≤ 16 V
-------------	-------	-----	---	----	----	------------------------------

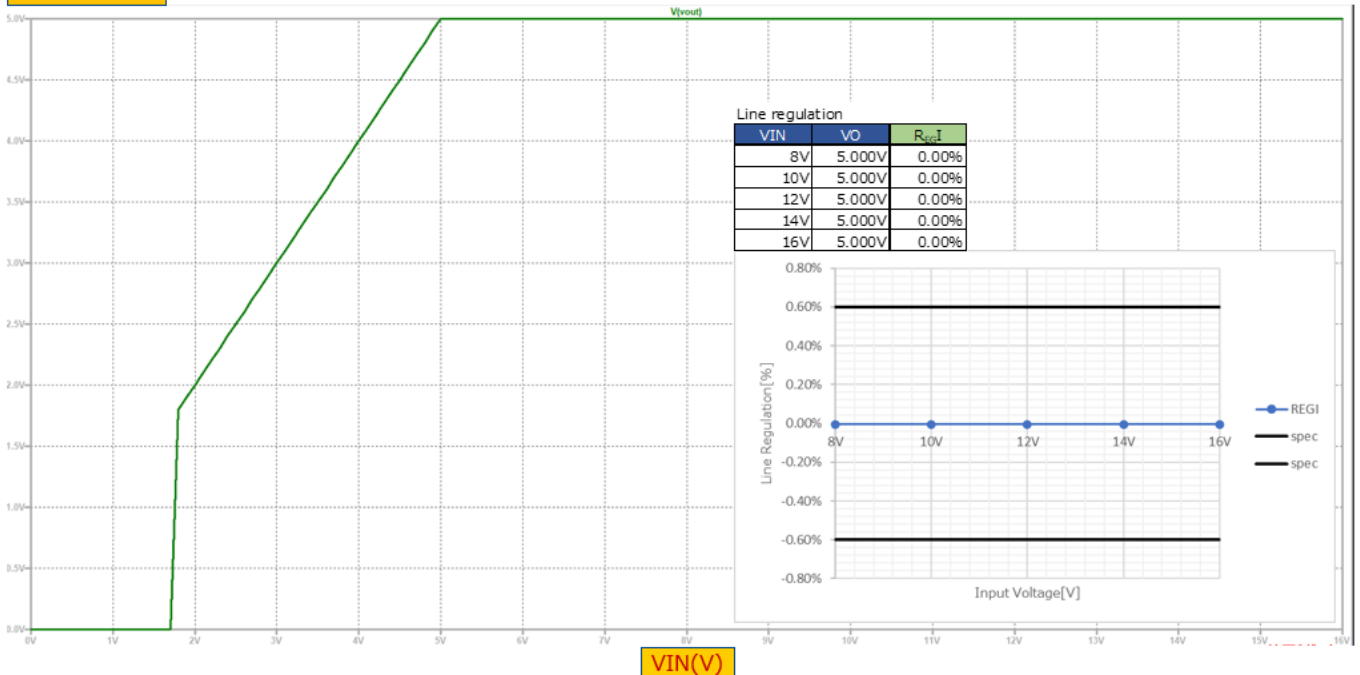


Line regulation (Input=8V~16V Output=5.0V IOU=0A)

Simulation results are following.

Explanatory notes — : simulated

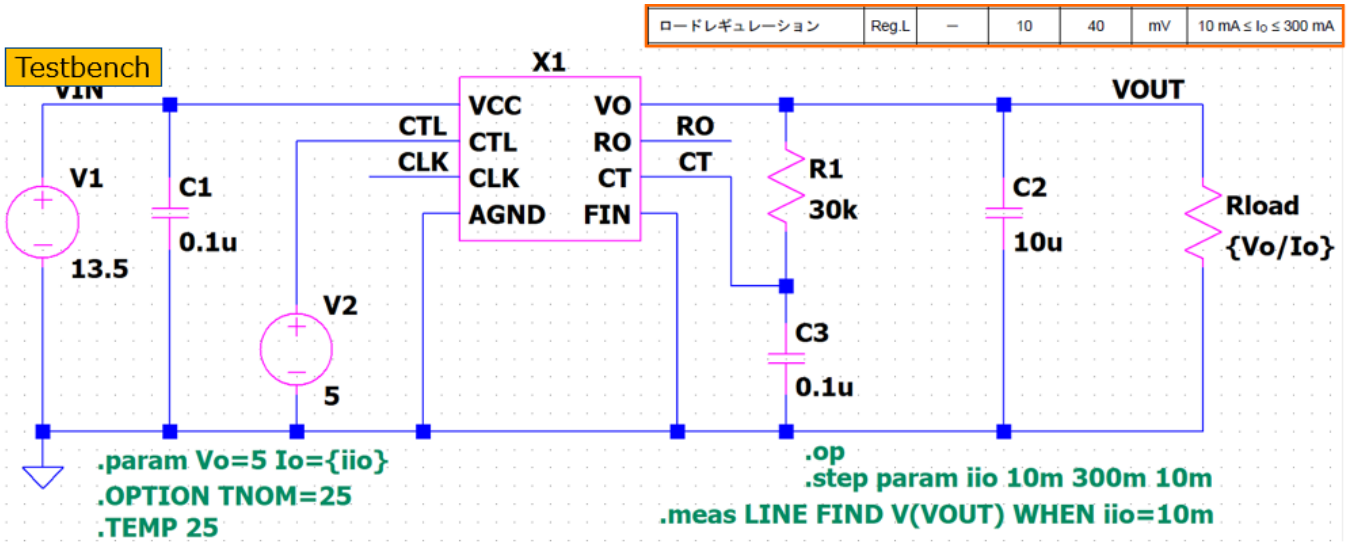
Sim result



Load regulation (Input=13.5V Output=5.0V IOU=10mA~300mA)

Simulation results are following.

Explanatory notes — : simulated

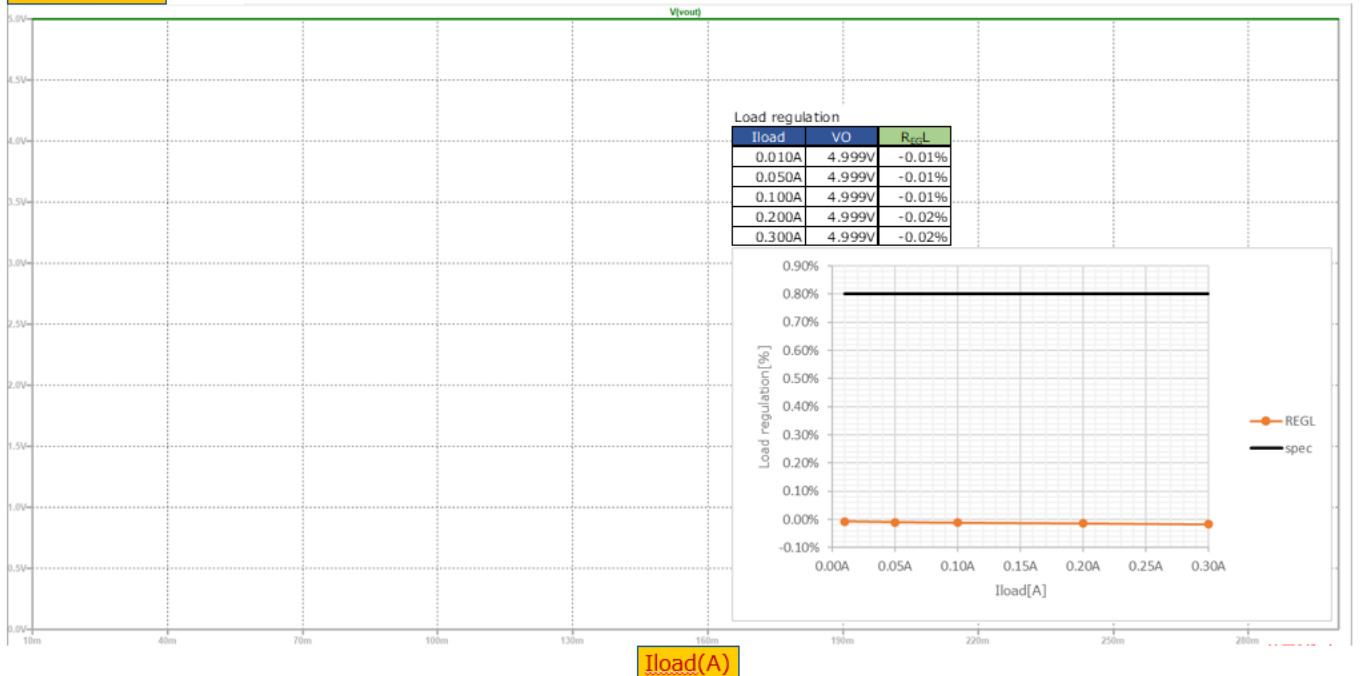


Load regulation (Input=13.5V Output=5.0V IOU=10mA~300mA)

Simulation results are following.

Explanatory notes — : simulated

Sim result

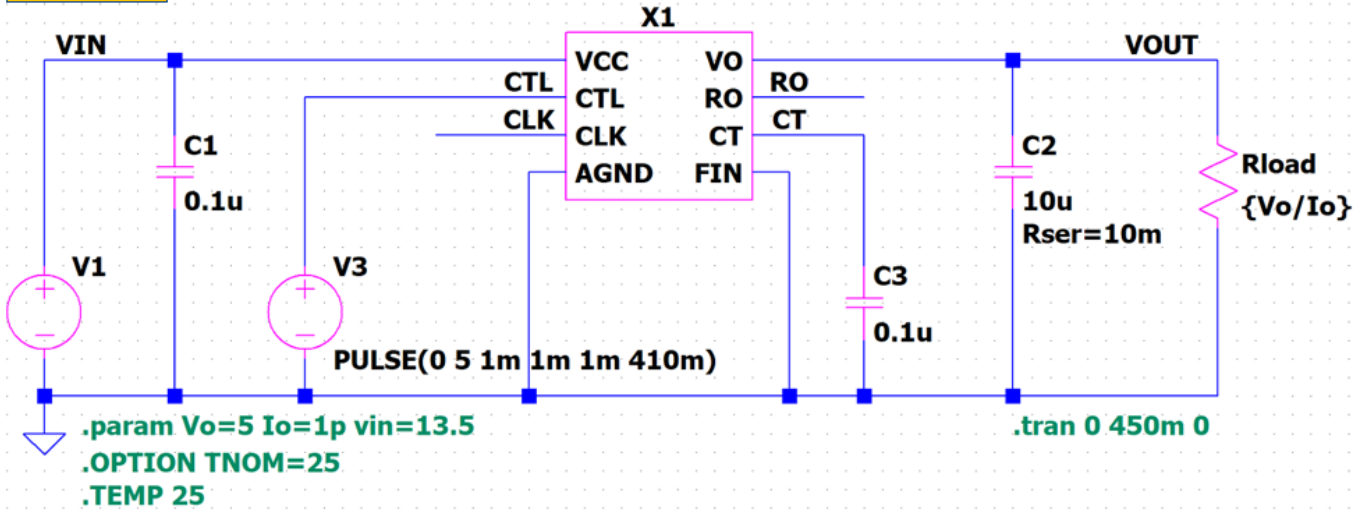


When supply voltage VCC is ON  $\leftrightarrow$  OFF (Input=13.5V Output=5.0V IO<sub>UT</sub>=1pA)

Simulation results are following.

Explanatory notes — : simulated

Testbench



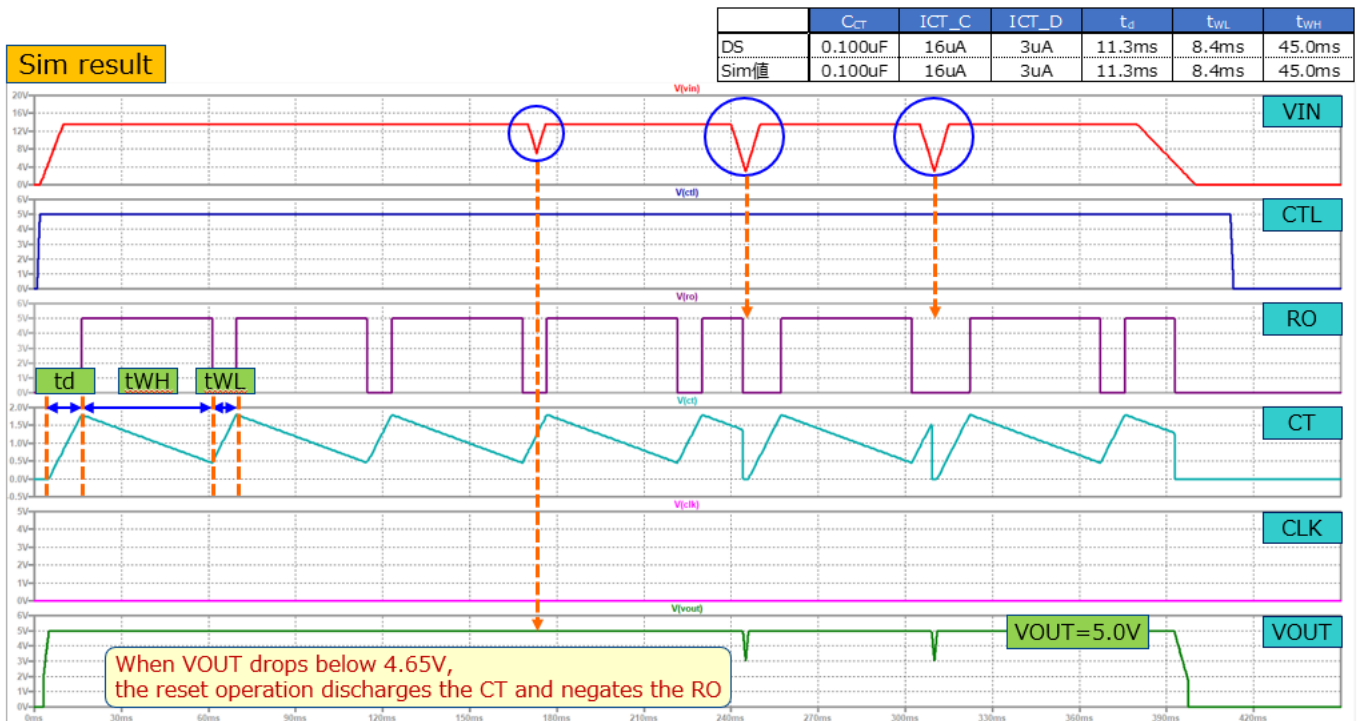
PWL(0 0 2m 0 10m {vin} 170m {vin} 173m 7 176m {vin} 240m {vin} 245m 3 250m {vin} 305m {vin} 310m 3 315m {vin} 380m {vin} 400m 0)

When supply voltage VCC is ON  $\leftrightarrow$  OFF (Input=13.5V Output=5.0V IO<sub>UT</sub>=1pA)

Simulation results are following.

Explanatory notes — : simulated

Sim result

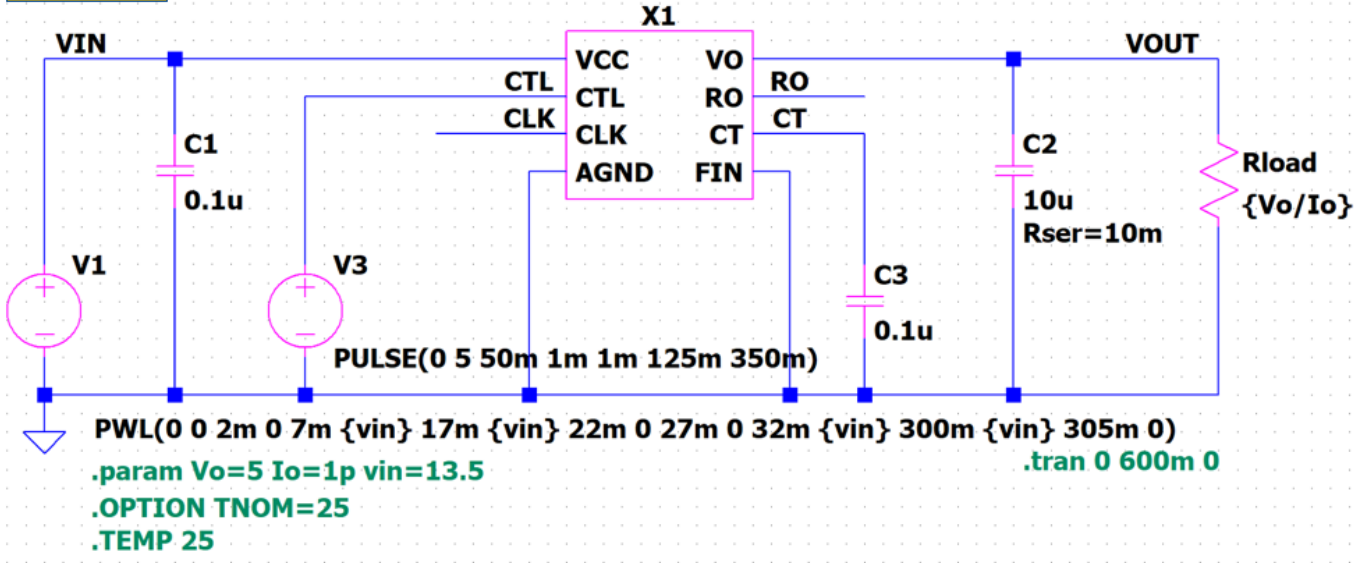


When output control voltage VCTL is ON  $\leftrightarrow$  OFF (Input=13.5V Output=5.0V IO<sub>UT</sub>=1pA)

Simulation results are following.

Explanatory notes — : simulated

Testbench



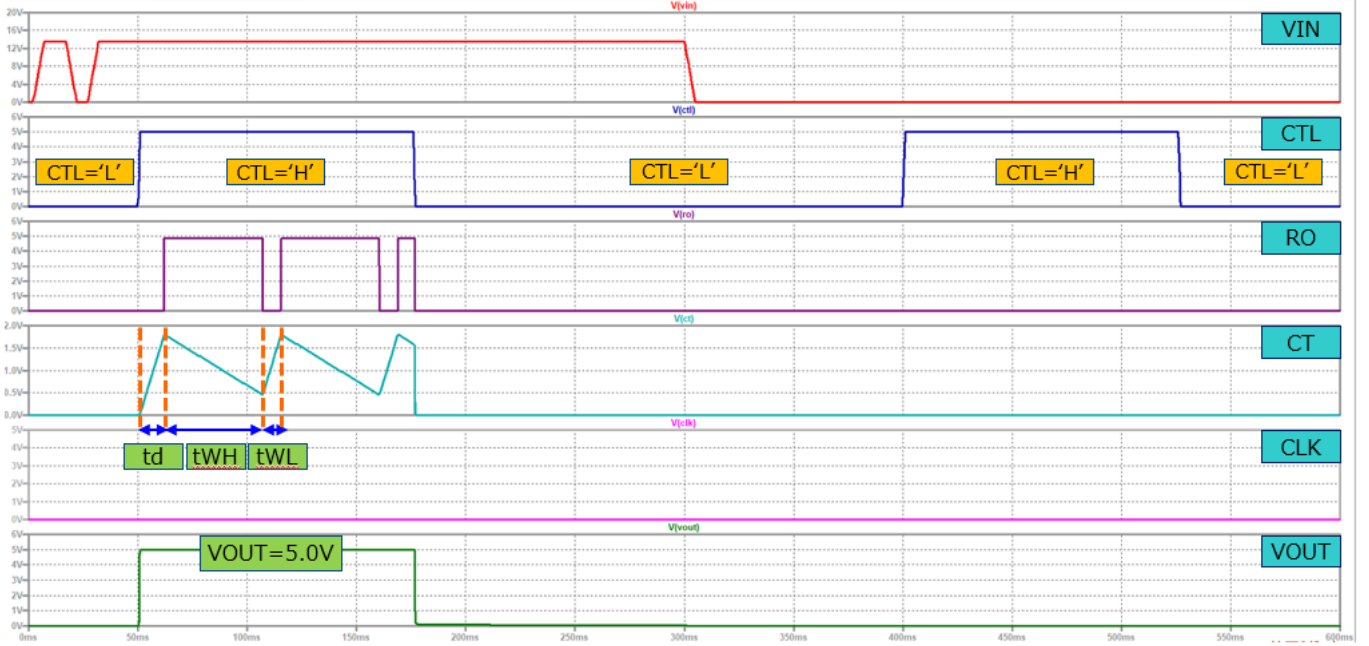
When output control voltage VCTL is ON  $\leftrightarrow$  OFF (Input=13.5V Output=5.0V IO<sub>UT</sub>=1pA)

Simulation results are following.

Explanatory notes — : simulated

Sim result

	C <sub>CT</sub>	ICT_C	ICT_D	t <sub>d</sub>	t <sub>WL</sub>	t <sub>WH</sub>
DS	0.100uF	16uA	3uA	11.3ms	8.4ms	45.0ms
Sim値	0.100uF	16uA	3uA	11.3ms	8.4ms	45.0ms



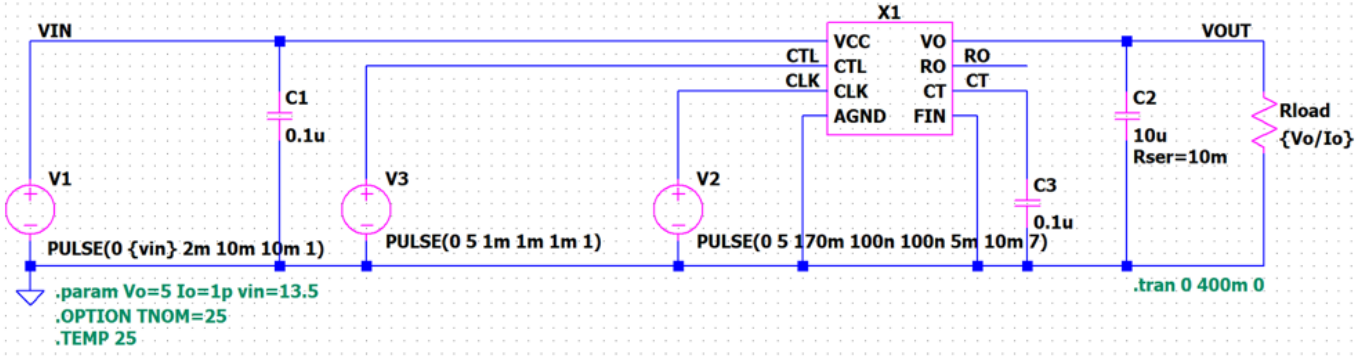


When WDT threshold Voltage VCLK is ON  $\Leftrightarrow$  OFF (Input=13.5V Output=5.0V IOU=1pA)

Simulation results are following.

Explanatory notes — : simulated

Testbench



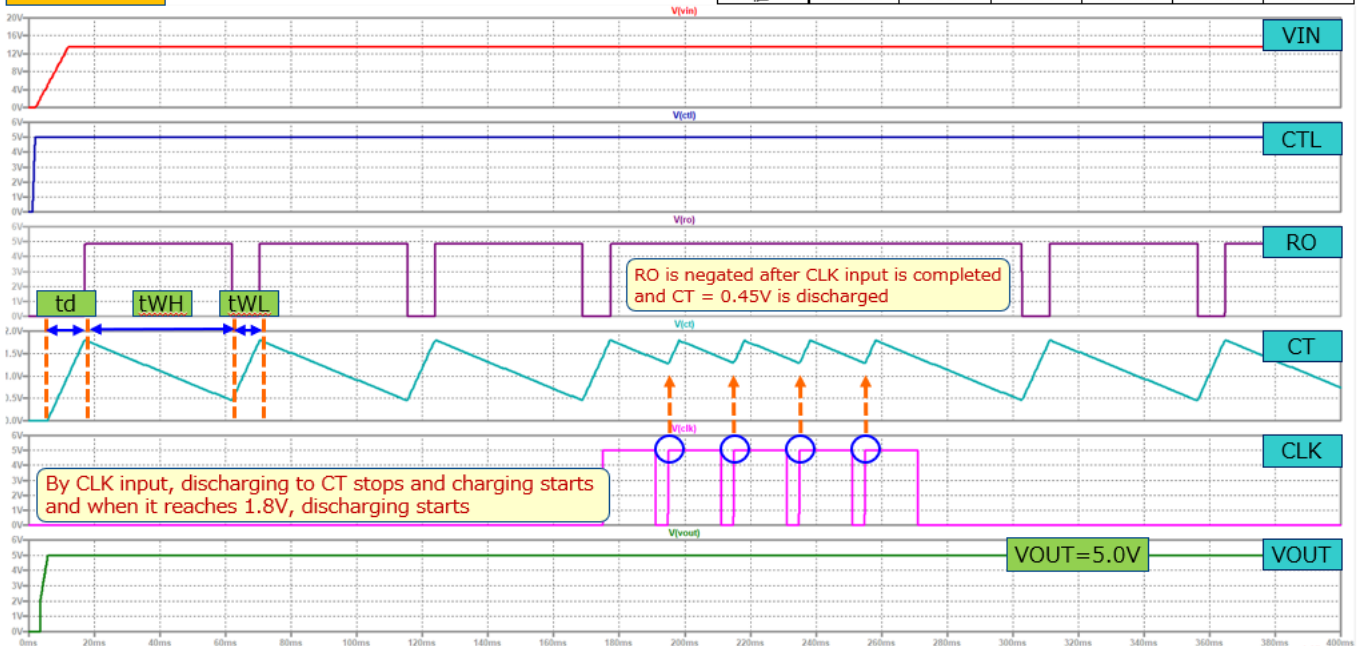
When WDT threshold Voltage VCLK is ON  $\Leftrightarrow$  OFF (Input=13.5V Output=5.0V IOU=1pA)

Simulation results are following.

Explanatory notes — : simulated

Sim result

	C <sub>T</sub>	I <sub>CT_C</sub>	I <sub>CT_D</sub>	t <sub>d</sub>	t <sub>WL</sub>	t <sub>WH</sub>
DS	0.100uF	16uA	3uA	11.3ms	8.4ms	45.0ms
Sim 値	0.100uF	16uA	3uA	11.3ms	8.4ms	45.0ms



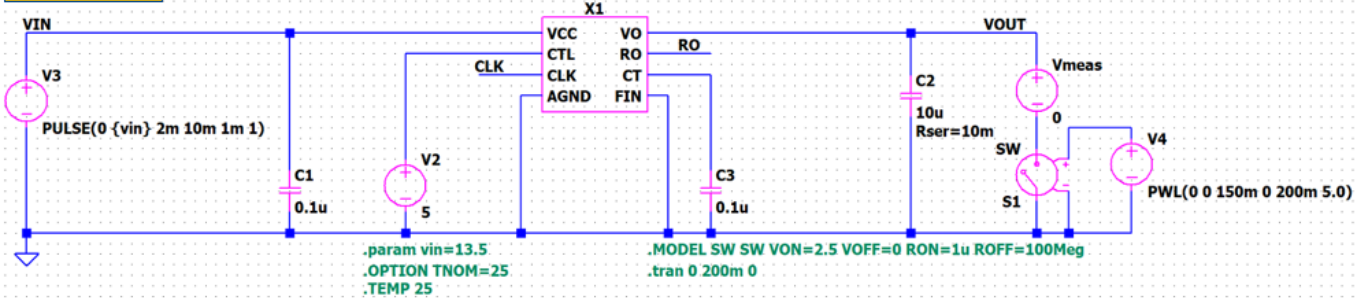


Overcurrent Protection Characteristics (Input=13.5V Output=5.0V⇒0V)

Simulation results are following.

Explanatory notes — : simulated

Testbench

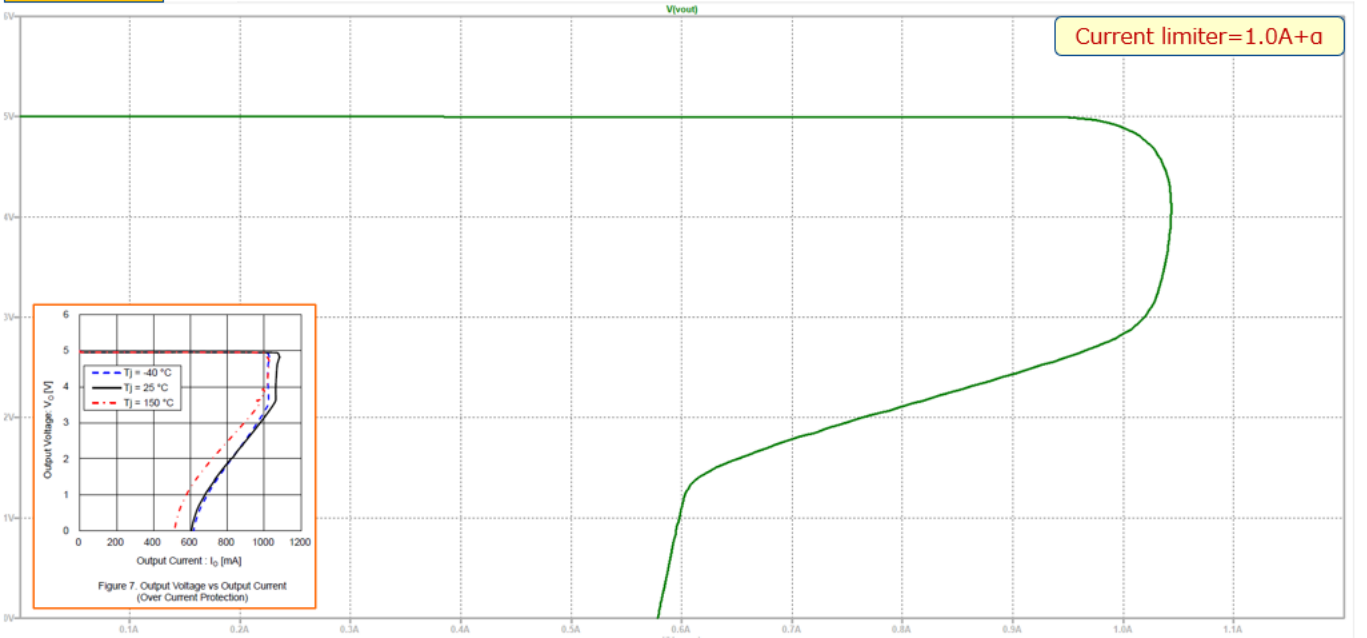


Overcurrent Protection Characteristics (Input=13.5V Output=5.0V⇒0V)

Simulation results are following.

Explanatory notes — : simulated

Sim result



## DISCLAIMER

1. This SPICE (Simulation Program with Integrated Circuit Emphasis) model and its content (the "Contents") are copyright of MoDeCH Inc. All rights reserved. Any redistribution or reproduction of any or all part of the Contents in any form is prohibited without express written permission made by MoDeCH Inc.
2. MoDeCH Inc. as licensor (the "Licensor") hereby grants to you, as licensee (the "Licensee"), a non-exclusive, non-transferable license to use the Contents as long as you abide by the terms and conditions of this DISCLAIMER.
3. The Licensee is not authorized to sell, loan, rent and redistribute or license the Contents in whole or in part, or in modified form, to anyone.
4. The Licensor shall in no way be liable to the Licensee or any third party for any loss or damage (including ,but not limited to, lost profits, or other incidental, consequential, or punitive damages), however caused (including through negligence) which may be directly or indirectly suffered from, arising out of, or in connection with, any use of the Contents .
5. Notwithstanding anything contained in this DISCLAIMER, in no event shall Licensor be liable for any claims, damages or loss which may arise from the modification, combination, operation or use of the Contents with the Licensee's computer programs.
6. The Licensor does not warrant that the Contents will function in any environment.
7. The Contents may be changed or updated without notice. MoDeCH Inc. may also make improvements and/or changes in the products, pricing and/or the programs related to the Contents at any time without notice.



MoDeCH Inc.

Head Office

Location: 5-15 Yokoyama-cho, Hachioji-Shi, Tokyo 192-0081, Japan

Tel:+81-42-656-3360

E-Mail: [model-on-support@modech.co.jp](mailto:model-on-support@modech.co.jp)

URL: <http://www.modech.com/en/>