

LTspice Model

DCDC converter

TEXAS INSTRUMENTS

TPS54302DDCR

Model Information

Model	A macro model
Call Name	MDC_TPS54302DDCR_LT
Pin Assign	1:GND 2:SW 3:VIN 4:FB 5:EN 6:BOOT
File List	Model Library MDC_TPS54302DDCR_LT01.lib Model Report MDC_TPS54302DDCR_LT.pdf(this file)

Verified Simulator Version LTspice

Note

References

The information which was used for modeling is as follow:

[Data Sheet]	
●Date/Version	APRIL 2021
●Product name	TPS54302DDCR
●Company name	TEXAS INSTRUMENTS

[Characteristics listed]	
●Characteristics	Peak current-mode control(Input=28V Output=1.8V IOU=2.1A) Eco-mode pulse skip(Input=24V Output=5.0V IOU=2.1A⇒10mA⇒2.1A) Overcurrent Protection(Input=12V Output=5.0V IOU=2.1A⇒5.0A⇒2.1A)

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

Model Functions Table

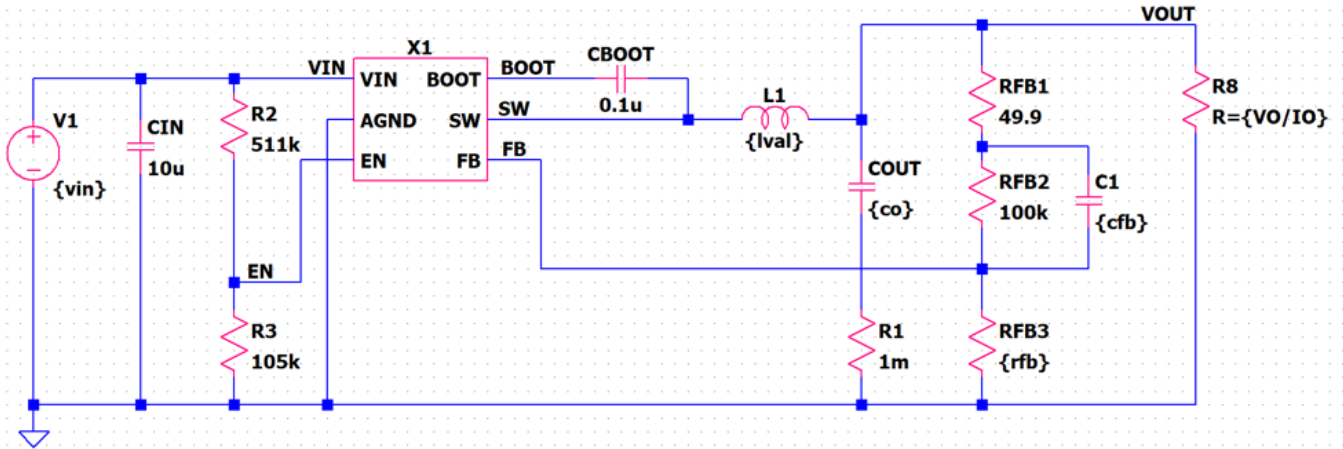
Functions	Implemented
4.5-V to 28-V wide input voltage range	○
Internal 5-ms soft start	○
Fixed 400-kHz switching frequency	○
Advanced Eco-mode pulse skip	○
Peak current-mode control	○
Overcurrent protection for both MOSFETs with hiccup mode protection	○
Overvoltage protection	○

Peak current-mode control(Input=28V Output=1.8V IO_{UT}=2.1A)

Simulation results are following.

Explanatory notes — : simulated

Testbench



```
.tran 0 6m 0 100n startup
.OPTION TNOM=25
.OPTION TEMP=25
.option plotwinsize=0
.meas TRAN VOUT_A AVG V(VOUT) FROM 5.5m TO 6m
.param VO=5 IO=2.1
.param co=44u lval=10u rfb=13.3k cfb=75p vin=28
.step param vin list 8 12 18 24 28
```

表 8-2. Recommended Component Values

V _{out} (V)	L (μH)	C _{out} (μF)	R ₂ (kΩ)	R ₃ (kΩ)	C ₈ (pF)
1.8	4.7	66	100	49.9	33
2.5	5.6	66	100	31.6	47
3.3	6.8	44	100	22.1	47
5	10	44	100	13.3	75
12	15	44	100	5.23	100

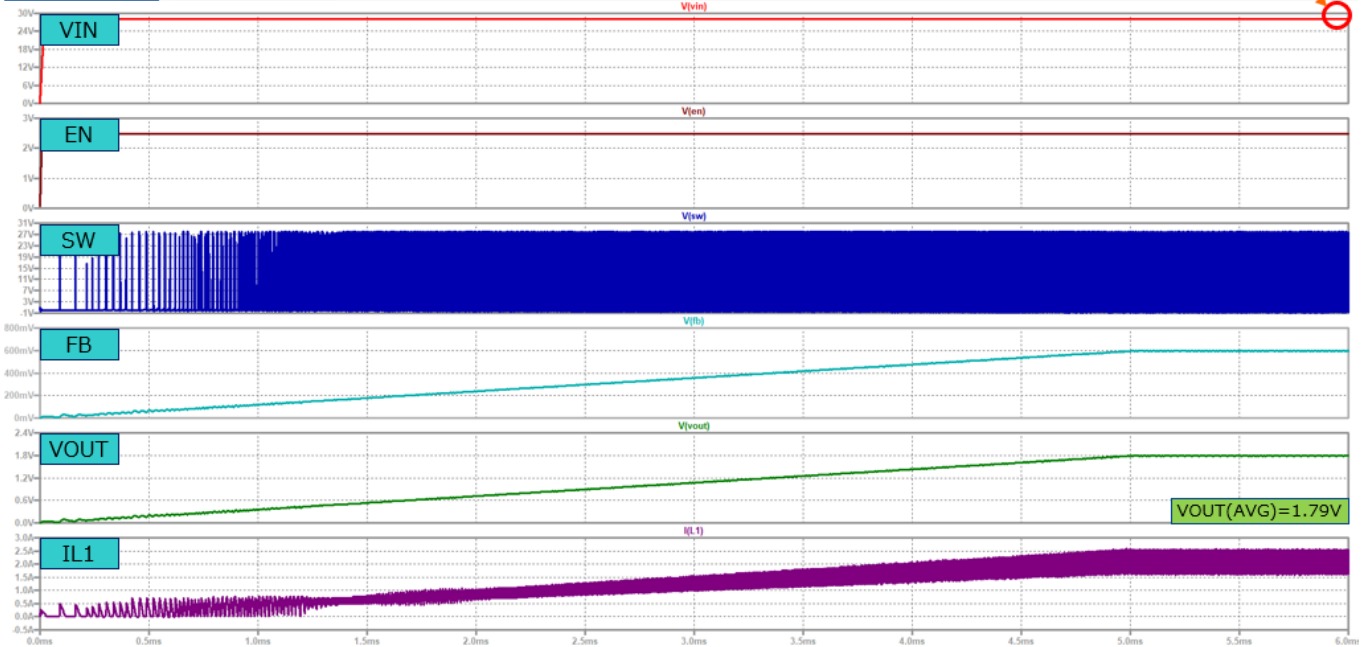
Peak current-mode control(Input=28V Output=1.8V IOUT=2.1A)

Simulation results are following.

Explanatory notes — : simulated

Sim result

Shows an enlarged view

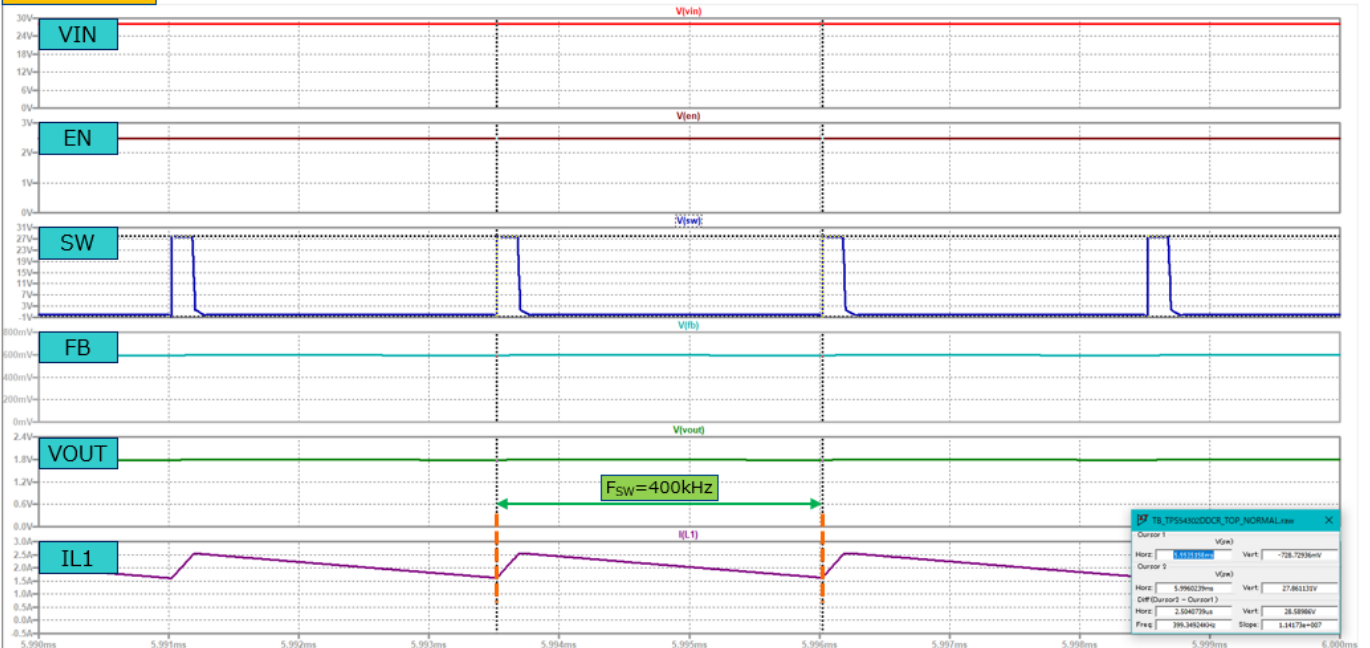


Peak current-mode control(Input=28V Output=1.8V IOUT=2.1A)

Simulation results are following.

Explanatory notes — : simulated

Sim result

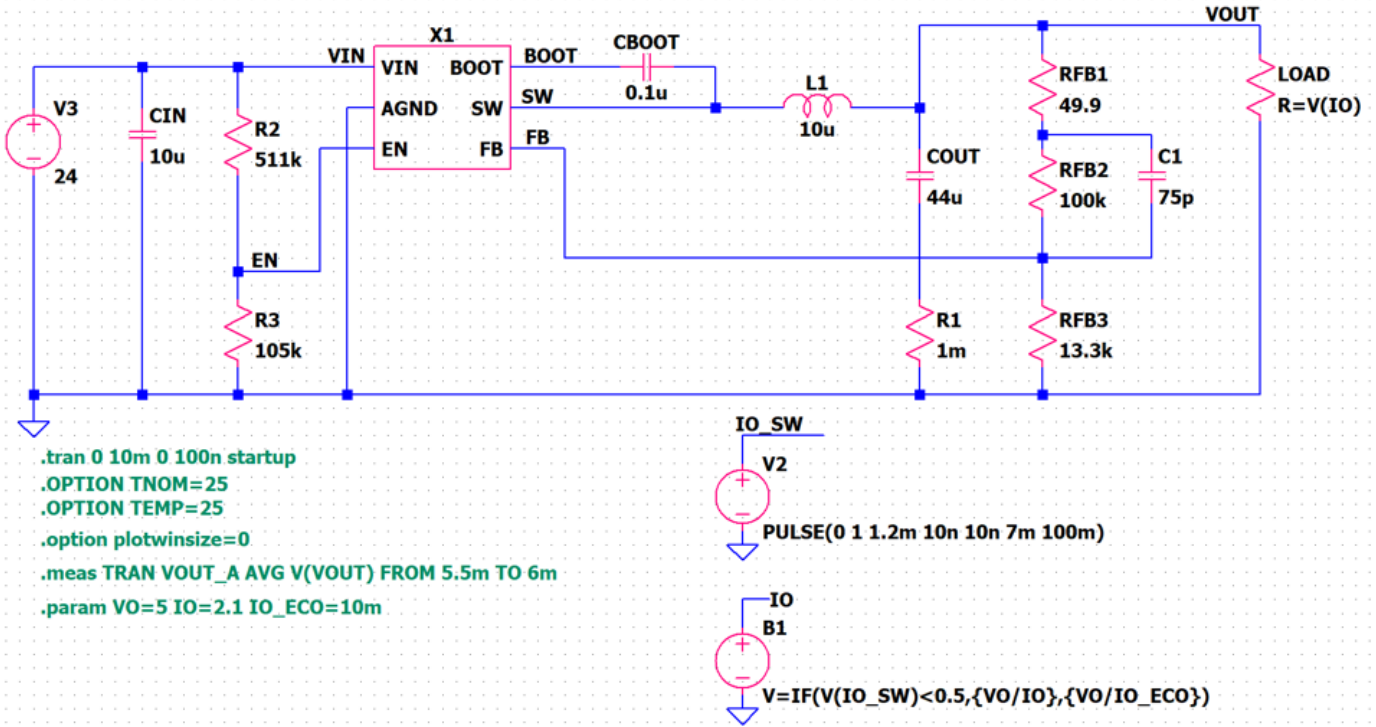


Eco-mode pulse skip (Input=24V Output=5.0V IO_{UT}=2.1A ⇒ 10mA ⇒ 2.1A)

Simulation results are following.

Explanatory notes — : simulated

Testbench

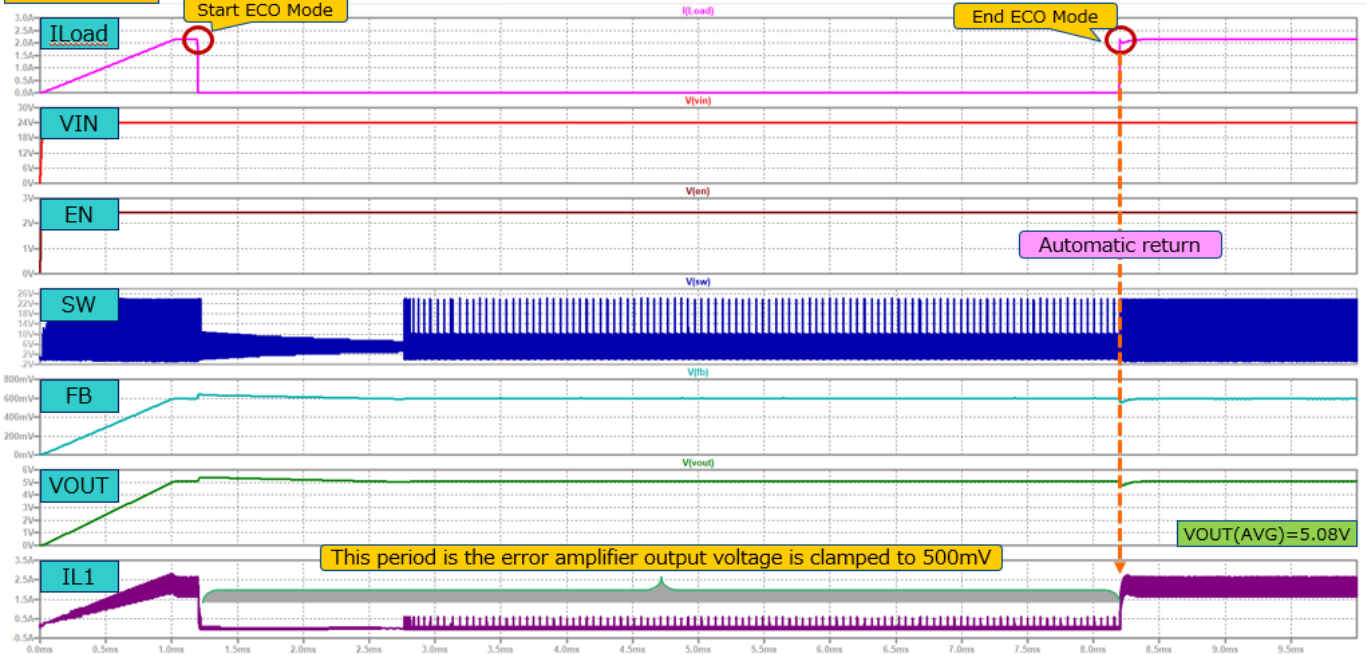


Eco-mode pulse skip (Input=24V Output=5.0V IO_{UT}=2.1A⇒10mA⇒2.1A)

Simulation results are following.

Explanatory notes — : simulated

Sim result

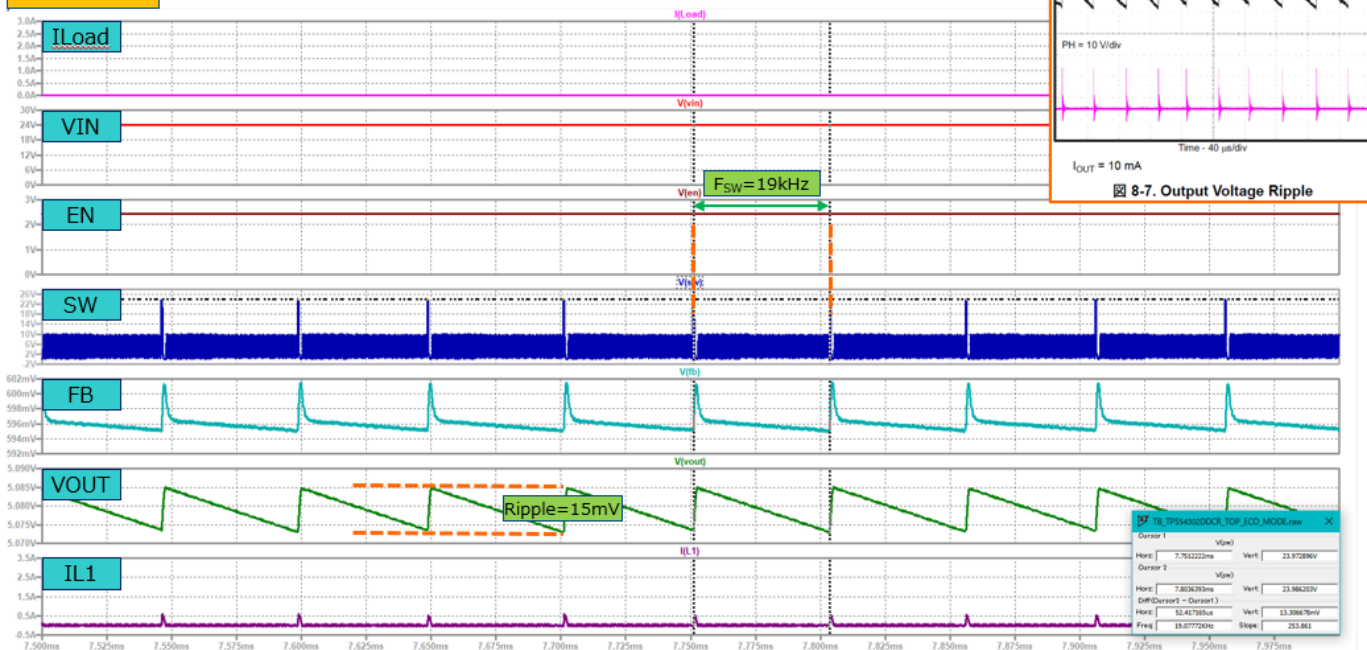


Eco-mode pulse skip (Input=24V Output=5.0V IO_{UT}=2.1A⇒10mA⇒2.1A)

Simulation results are following.

Explanatory notes — : simulated

Sim result

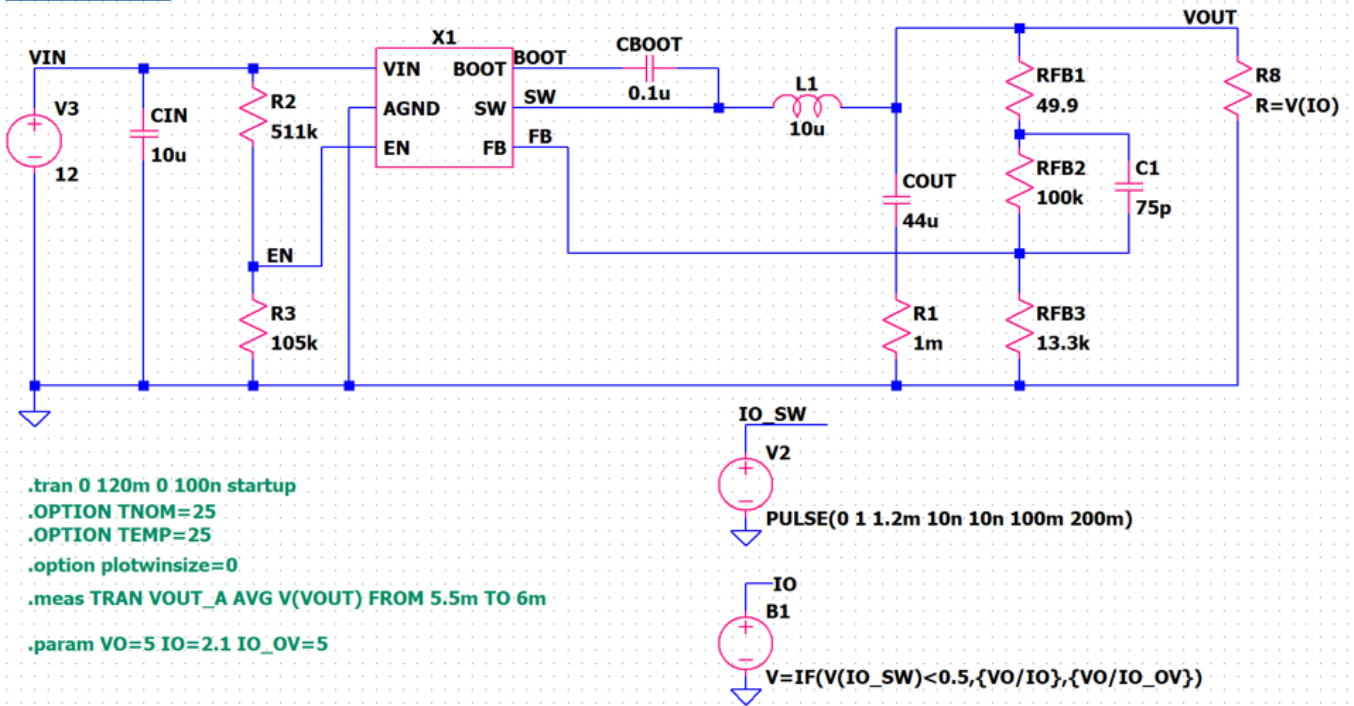


Overcurrent Protection(Input=12V Output=5.0V IO_{UT}=2.1A⇒5.0A⇒2.1A)

Simulation results are following.

Explanatory notes — : simulated

Testbench

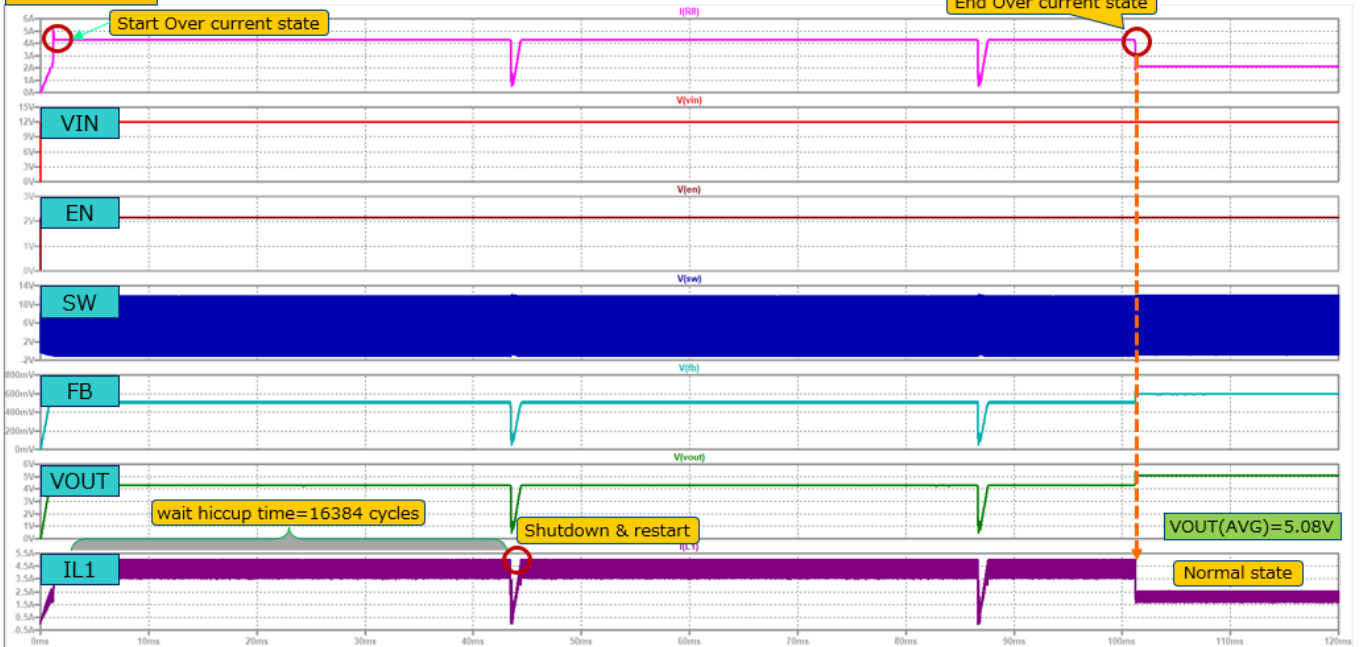


Overcurrent Protection(Input=12V Output=5.0V IOUT=2.1A⇒5.0A⇒2.1A)

Simulation results are following.

Explanatory notes — : simulated

Sim result

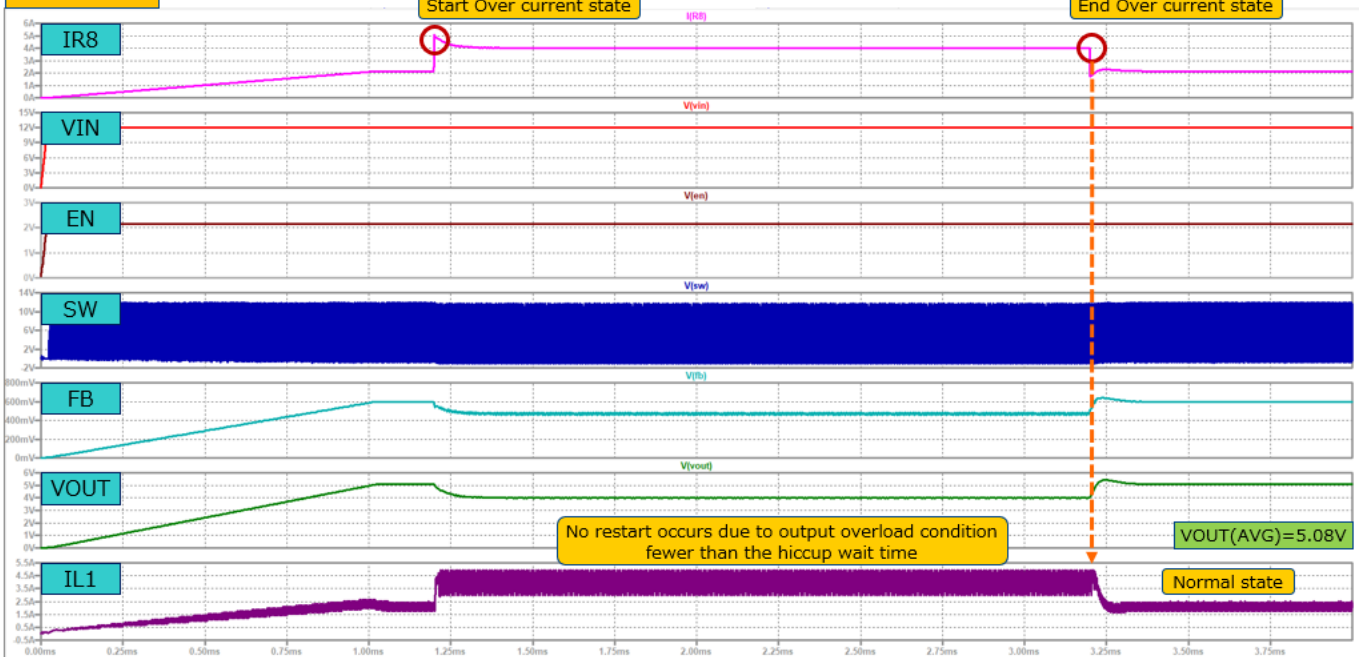


Overcurrent Protection(Input=12V Output=5.0V IOUT=2.1A⇒5.0A⇒2.1A)

Simulation results are following.

Explanatory notes — : simulated

Sim result



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