

# LTspice Model

## Synchronous Buck Regulator

### Texas Instruments Inc.

## LM20242

### Model Information

**Model** A macro model  
**Call Name** MDC\_LM20242\_LT  
**Pin Assign** 1:SS/TRK 2:FB 3:PGOOD 4:COMP 5,6,15,16:VIN 7,8,13,14:SW 9,10,11:GND 12:AGND 17:BOOT 18:VCC 19:EN 20:RT 21:Exposed pad  
**File List** Model Library MDC\_LM20242\_LT03.lib  
 Model Report MDC\_LM20242\_LT.pdf(this file)  
**Verified Simulator Version** LTspice XVII

### Note

### References

The information which was used for modeling is as follow:

[Data Sheet]

- Date/Version 29-May-2013
- Product name LM20242
- Company name Texas Instruments Inc.

[Characteristics listed]

- Characteristics VFB,RHSW-DS(ON),RLSW-DS(ON)  
VUVLO  
DMAX,ILIM,VEN

### Simulation Condition

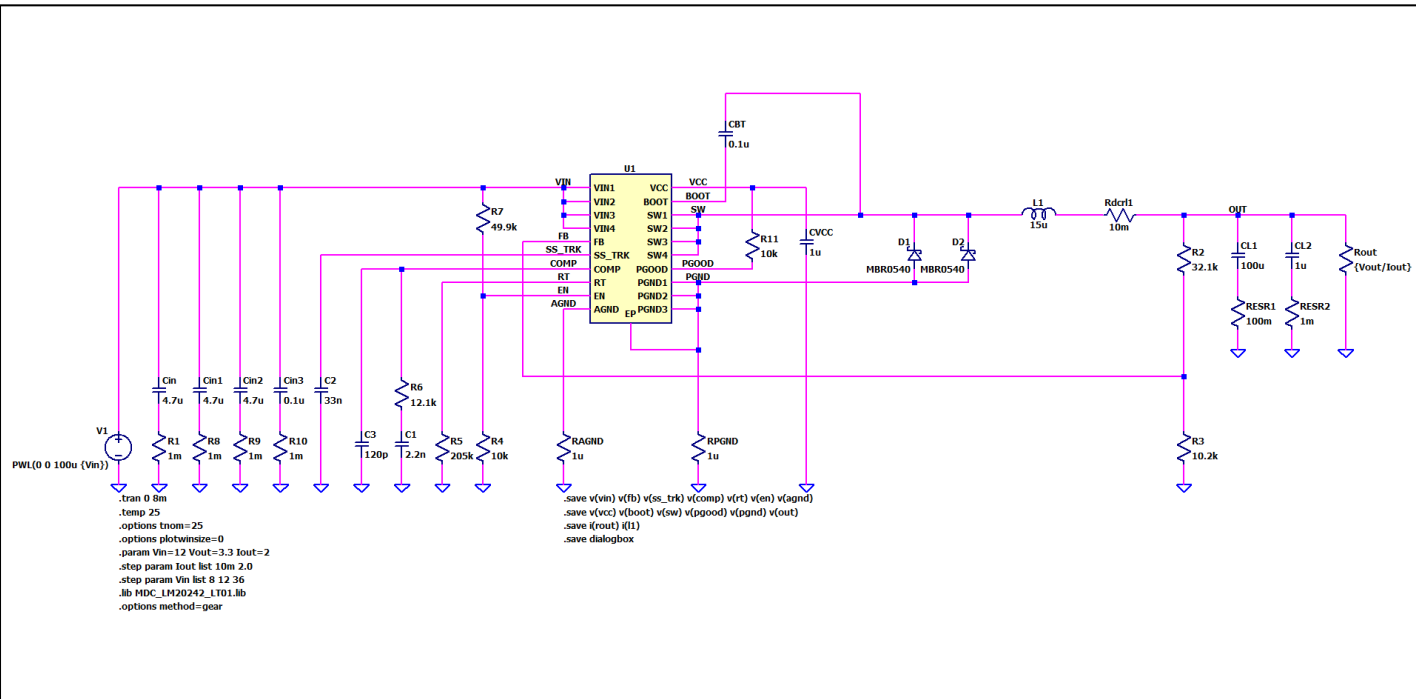
This table shows the range of evaluated simulation range that was not occurs any convergence problems in this area.

Item	Condition			Unit
	Min	Typ	Max	
Vin	4.5	12.0	36.0	V
Temperature		25.0		deg C

**Model Functions Table**

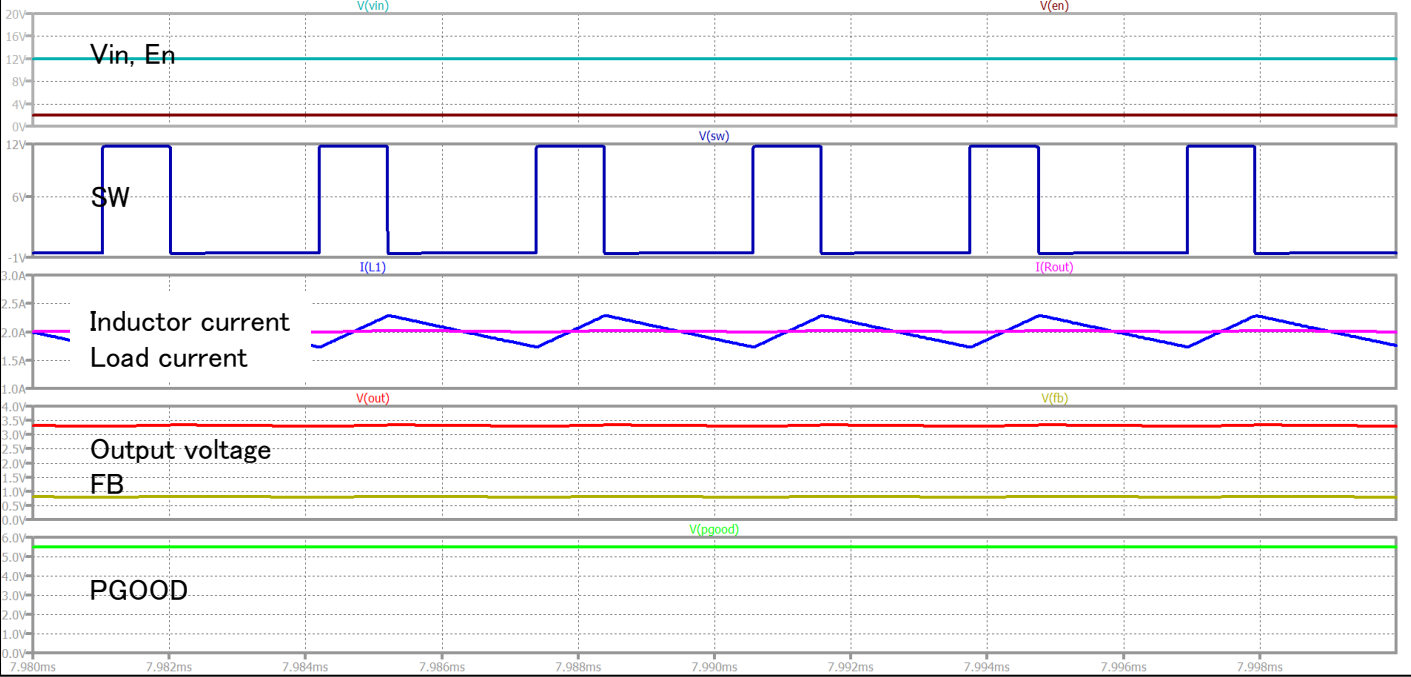
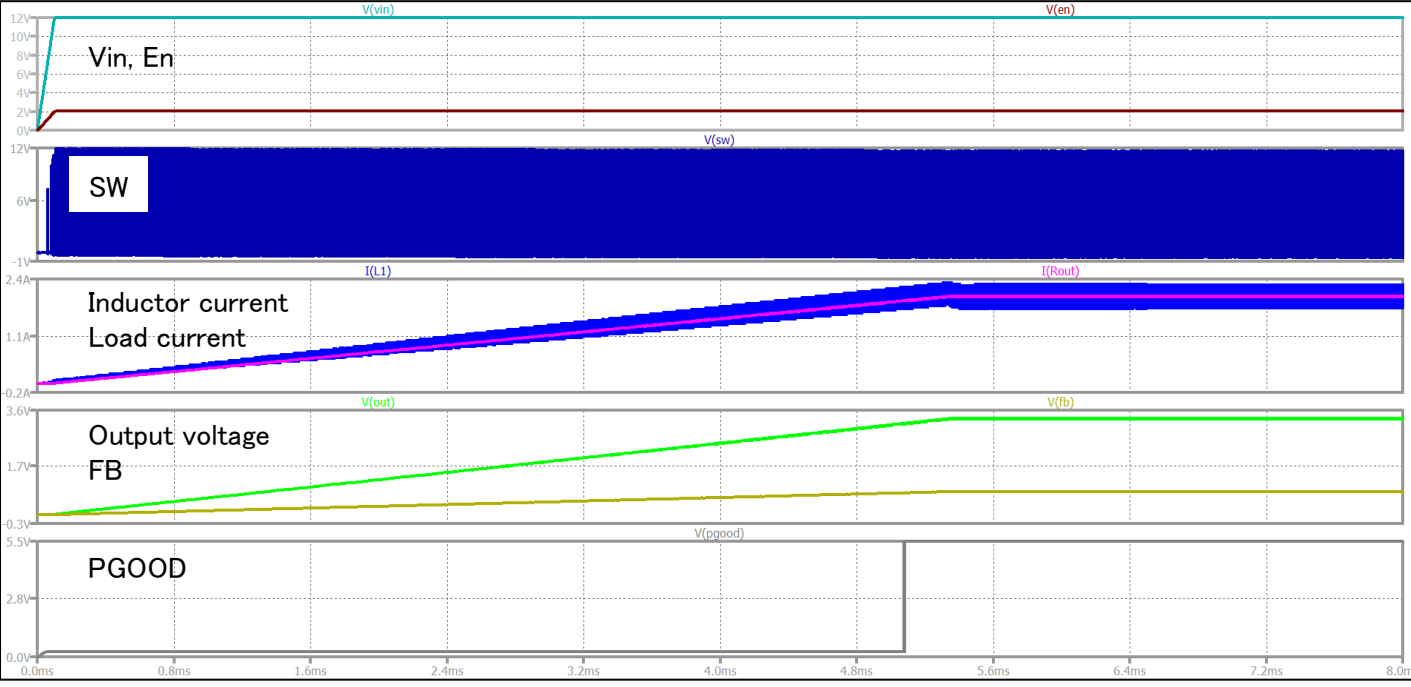
Functions	Implemented
Current Mode Control, Selectable Compensation	○
Resistor Programmed, 1MHz Capable Oscillator	○
Synchronous Rectifier with Diode Emulation	○
Adjustable Output Voltage Down to 0.8V	○
Programmable Soft-Start With External Capacitor	○
Precision Enable Pin with Hysteresis	○
OVP, UVLO Inputs and PGOOD Output	○
Internally Protected with Peak Current Limit	○
Non-Linear Current Mode Slope Compensation	○

Testbench for step-down converted function ( $V_{in}=12[V]$ ,  $V_{out}=3.3[V]$ ,  $I_{out}=2.0/0.01[A]$ ,  $F_{sw}=315[kHz]$ )  
 Referred to Data Sheet



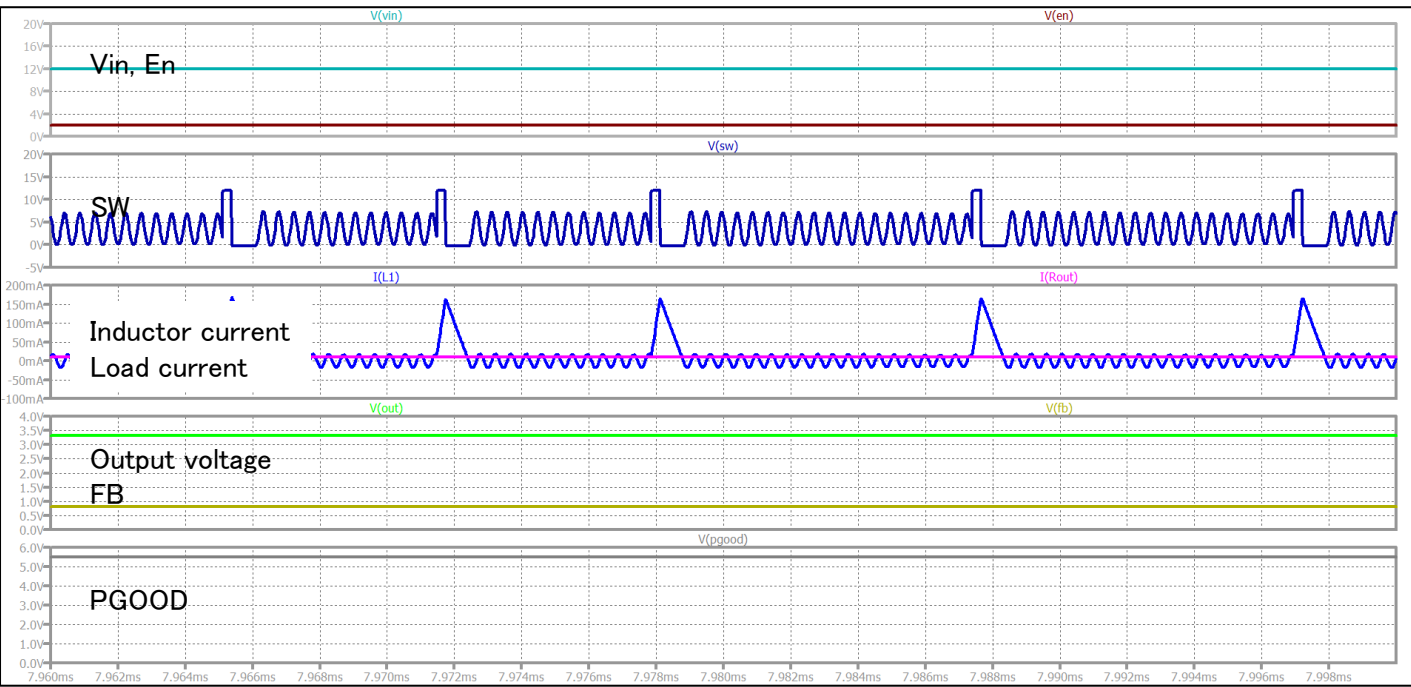
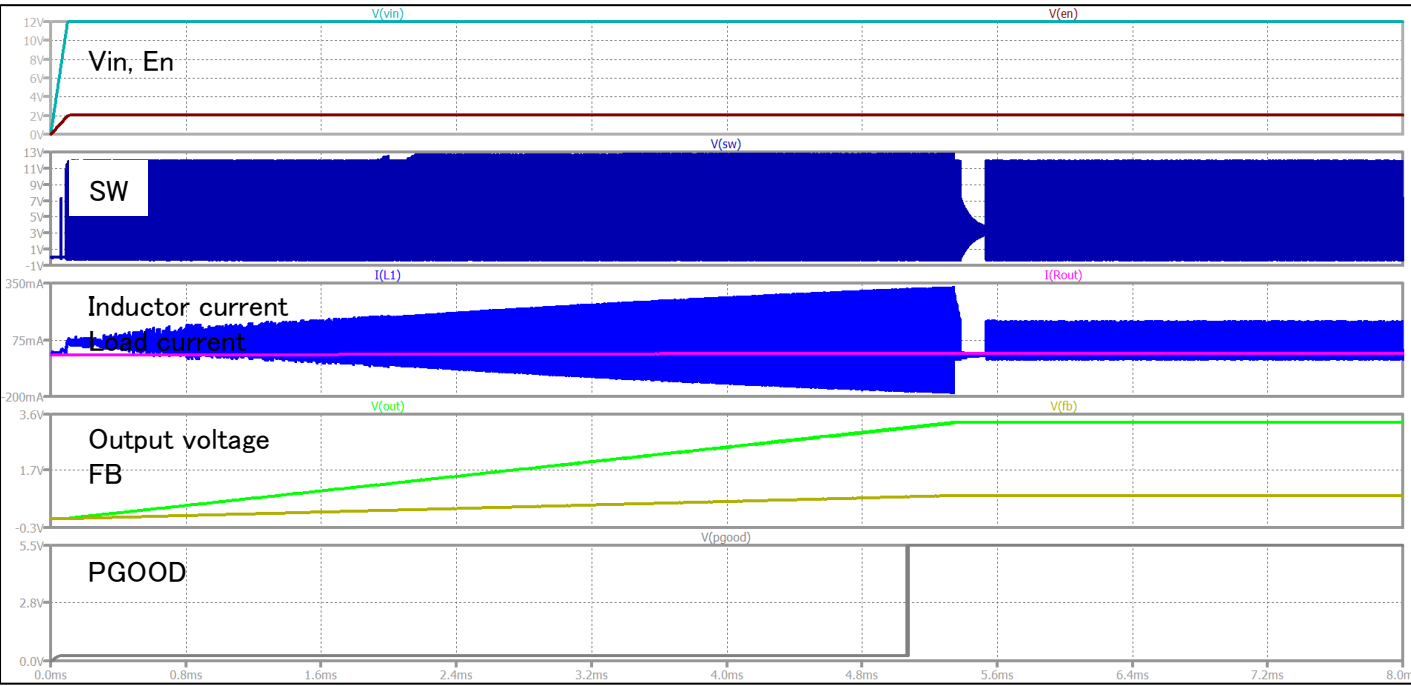
Simulation results are following.  
 Explanatory notes — : simulated

**Step-down converted function (Vin=12[V], Vout=3.3[V], Iout=2.0[A], Fsw=315[kHz])**

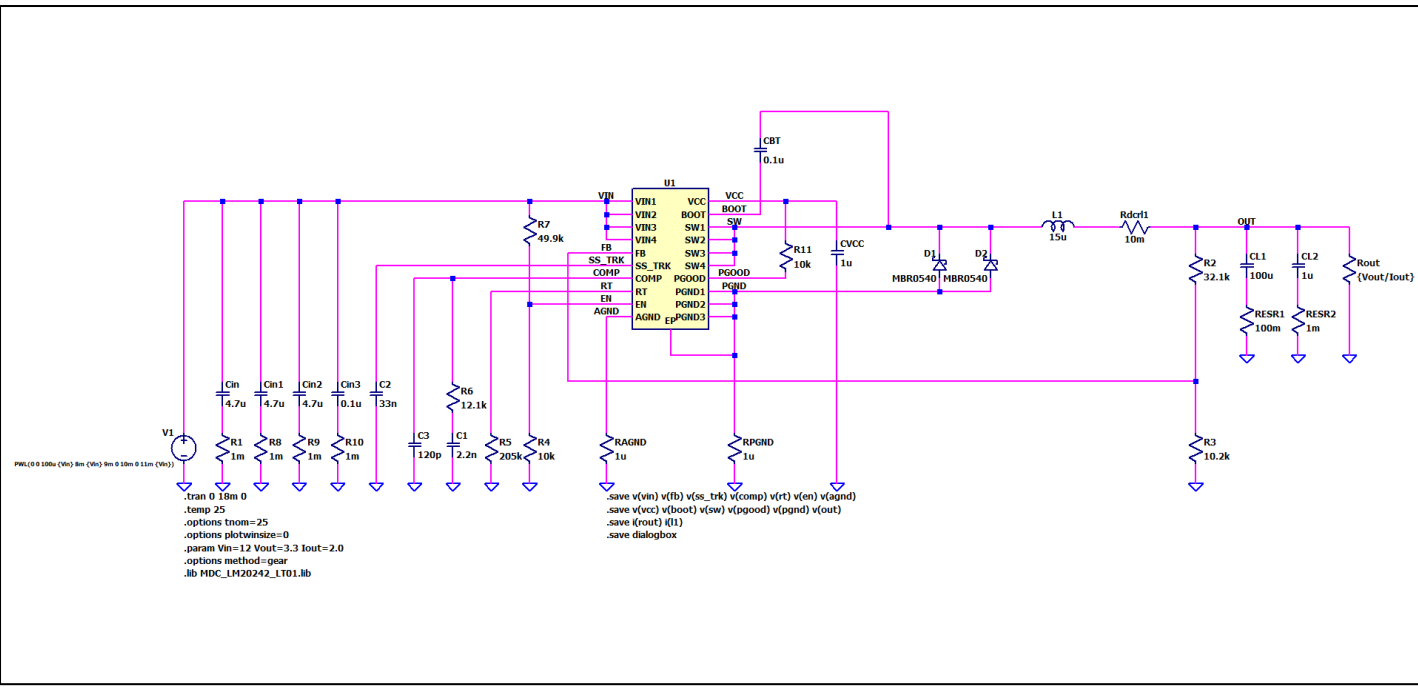


Simulation results are following.  
 Explanatory notes — : simulated

**Step-down converted function (Vin=12[V], Vout=3.3[V], Iout=10.0[mA], Fsw=315[kHz])**

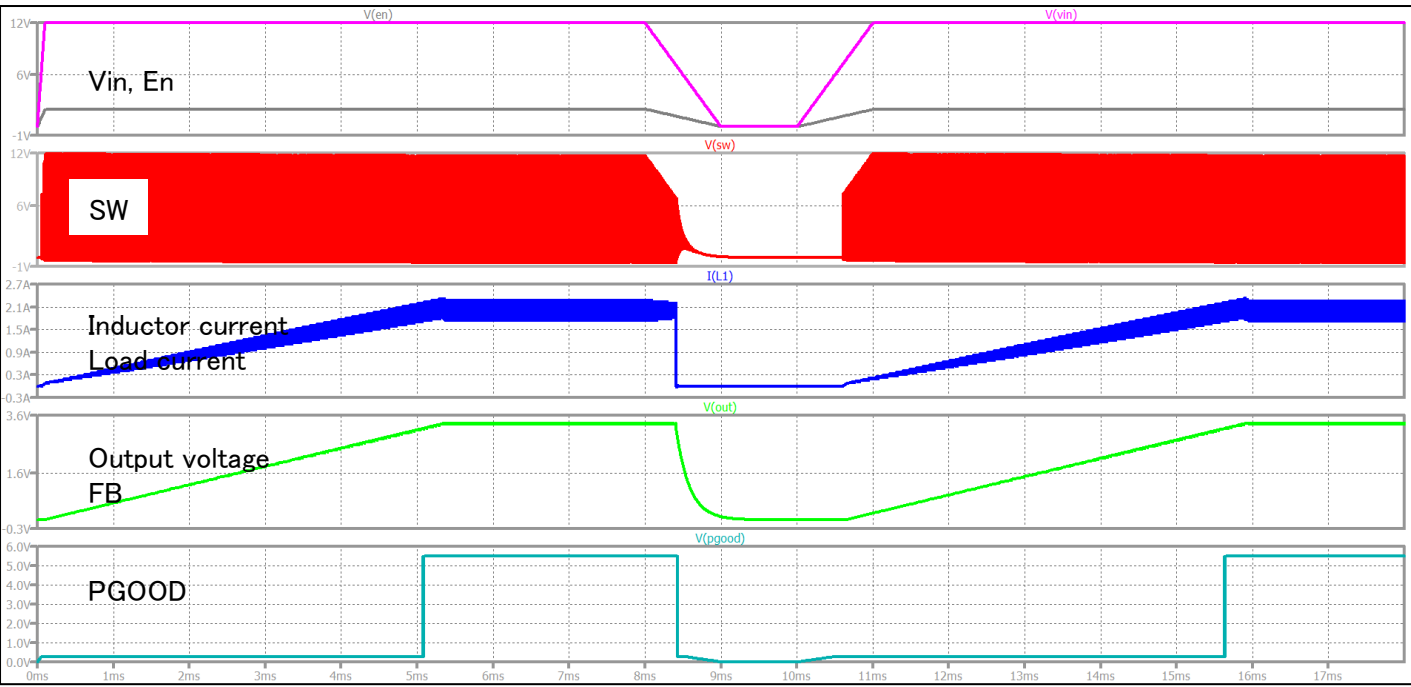


Testbench for UVLO function ( $V_{in}=12 \rightarrow 0 \rightarrow 12[V]$ ,  $V_{out}=3.3[V]$ ,  $I_{out}=2.0[A]$ ,  $F_{sw}=315[kHz]$ )  
 Referred to Data Sheet

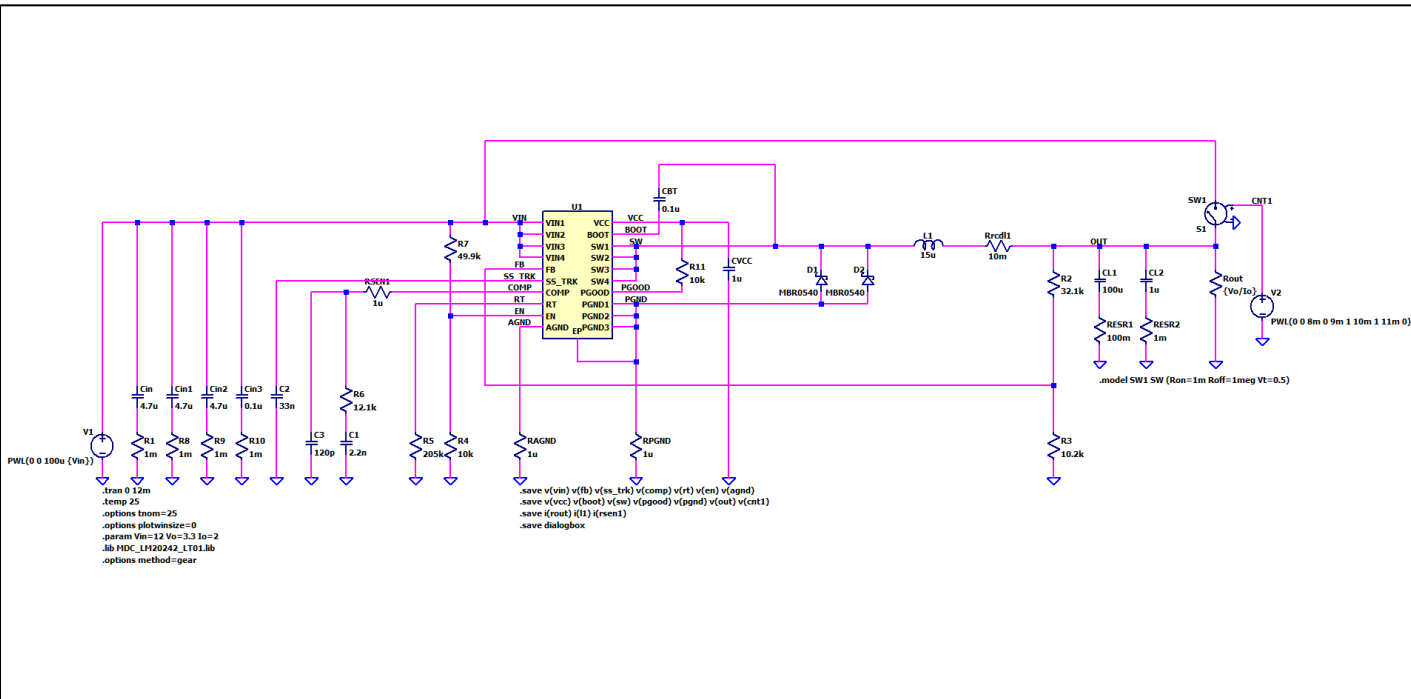


Simulation results are following.  
Explanatory notes — : simulated

**UVLO function (Vin=12->0->12[V], Vout=3.3[V], Iout=2.0[A], Fsw=315[kHz])**



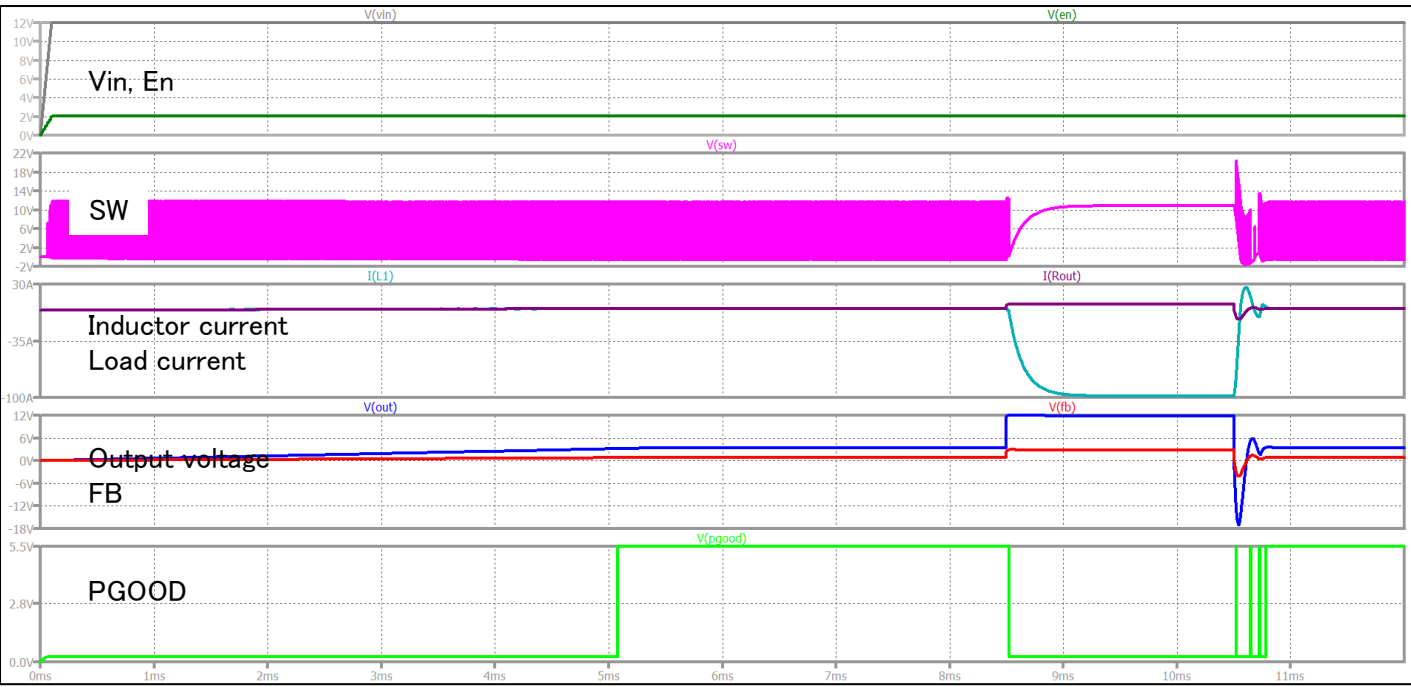
Testbench for OVP function (Vin=12[V], Vout=3.3[V]->VIN short->3.3[V], Iout=2.0[A], Fsw=315[kHz])  
 Referred to Data Sheet



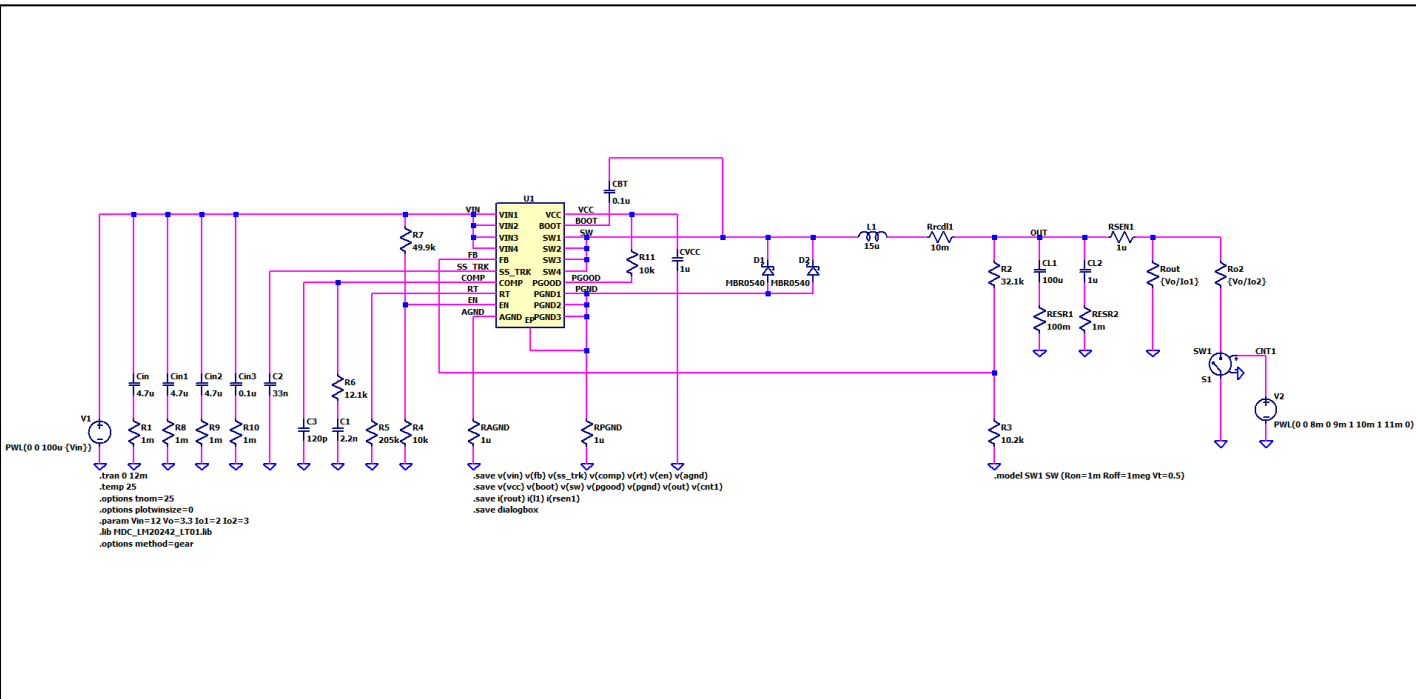


Simulation results are following.  
Explanatory notes — : simulated

**OVP function (Vin=12[V], Vout=3.3[V]->VIN short->3.3[V], Iout=2.0[A], Fsw=315[kHz])**

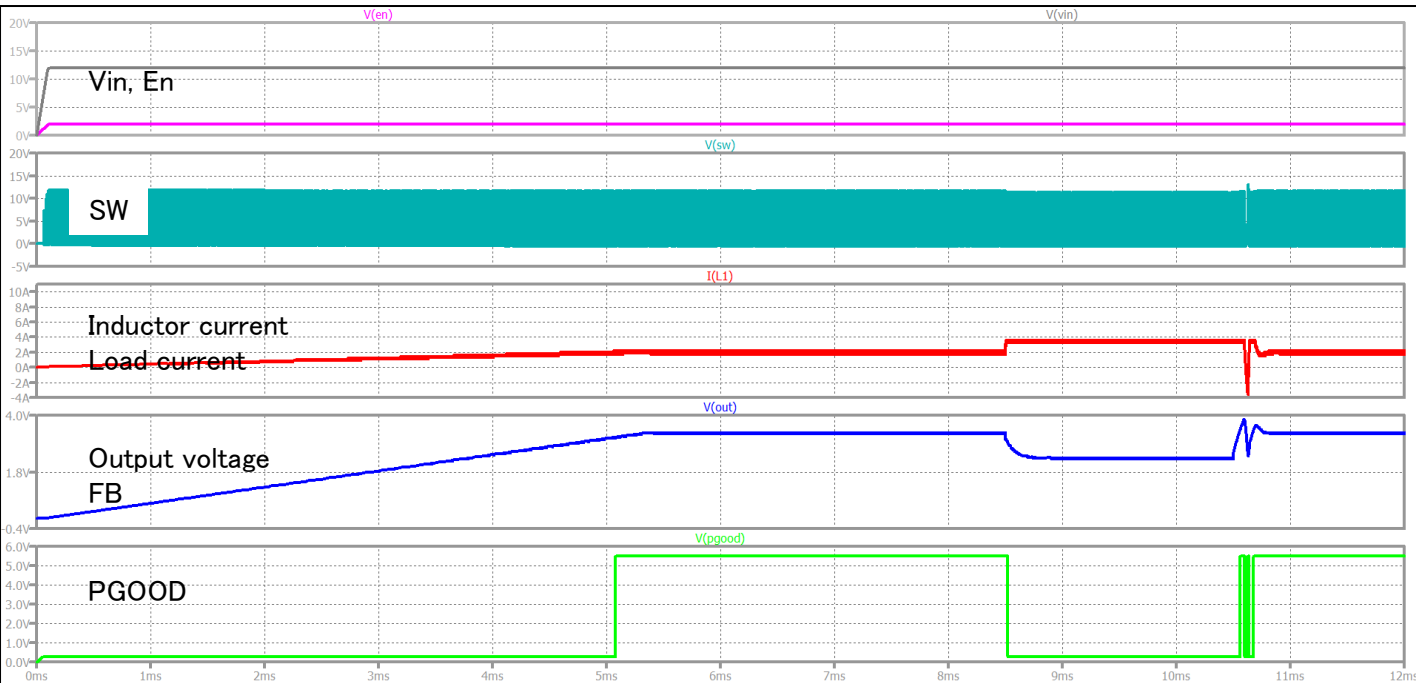


Testbench for OCP function (Vin=12[V], Vout=3.3[V]->GND short->3.3[V], Iout=2.0[A], Fsw=315[kHz])  
 Referred to Data Sheet



Simulation results are following.  
Explanatory notes — : simulated

OCP function (Vin=12[V], Vout=3.3[V]->GND short->3.3[V], Iout=2.0[A], Fsw=315[kHz])



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