LTspice Model
DC-DC LED Driver
ON Semiconductor
NCV78702DE0R2G

Model Information

Model A macro model
Call Name MDC_ NCV78702DE0R2G _LT
Pin Assign 1:AGND 2:VDD 3:VDRIVE 4:VBB 5:VGATE1 6:VGATE2 7:GNDP 8:IBSTSENSE1+ 9:IBSTSENSE1- 10:IBSTSENSE2+
11:IBSTSENSE2- 12:FSO/ENABLE2 13:SCLK/TST2 14:CSB/SCS 15:SDI 16:SDO 17:BSTSYNC/TST 18:ENABLE1 19:VBOOSTDIV 20:COMP
21:FSO_ENABLE_SEL 22:VDRIVE_SETPOINT 23:VDRIVE_UV_THR 24:VDD_ENA 25:BST_OVSD_THR 26:BOOST_OV_REACT 27:BOOST_VSETPOINT 28:BOOST_OTA_GAIN 29:BOOST_SLPCTRL 30:BOOST_VLIMTH1
31:BOOST_VLIMTH2 32:BOOST_SKCL 33:P_DISTRIBUTION1 34:P_DISTRIBUTION2
35:VBST_VGATE_THR 36:VBOOST_TOFF_SET 37:VBOOST_TON_SET 38:BOOST_SRCINV
39:BOOST1_EN 40:BOOST2_EN
41:FSO_BST_FREQ

File List

Model Library	MDC_NCV78702DE0R2G_LT01.lib
Model Report	MDC_NCV78702DE0R2G_LT.pdf (this file)

Verified Simulator Version LTspice XVII

Note

1. Strong Recommend
   ・Default Integration Method：Gear
   ・Trtol：5
2. Additional pin names and SPI parameter names are shown in Table 1.

References

The information which was used for modeling is as follow:

[Data Sheet]

- ●Date/Version March, 2023 − Rev. 4
- ●Product name NCV78702DE0R2G
- ●Company name ON Semiconductor

[Characteristics listed]

- ●Characteristics VBOOST
  VDRIVE UVLO

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

Note

Table 1:Add Pin Name and SPI Parameter Name

No	Add Pin Name	SPI Parameter	Value
21	FSO_ENABLE_SEL	FSO_ENABLE_SEL	0,1
22	VDRIVE_SETPOINT	VDRIVE_VSETPOINT	0 - 15
23	VDRIVE_UV_THR	VDRIVE_UV_THR	0 - 7
24	VDD_ENA	VDD_ENA	0,1
25	BST_OVSD_THR	BOOST_OVERVOLTSD_THR	22 - 127
26	BOOST_OV_REACT	BOOST_OV_REACT	0 - 3
27	BOOST_VSETPOINT	BOOST_VSETPOINT	22 - 125
28	BOOST_OTA_GAIN	BOOST_OTA_GAIN	0 - 3
29	BOOST_SLPCTRL	BOOST_SLPCTRL	0 - 7
30	BOOST_VLIMTH1	BOOST_VLIMTH1	0 - 3
31	BOOST_VLIMTH2	BOOST_VLIMTH2	0 - 3
32	BOOST_SKCL	BOOST_SKCL	0 - 3
33	P_DISTRIBUTION1	P_DISTRIBUTION1	-16 - 15
34	P_DISTRIBUTION2	P_DISTRIBUTION2	-16 - 15
35	VBST_VGATE_THR	VBOOST_VGATE_THR	0,1
36	VBOOST_TOFF_SET	VBOOST_TOFF_SET	0 - 7
37	VBOOST_TON_SET	VBOOST_TON_SET	0 - 7
38	BOOST_SRCINV	BOOST_SRCINV	0,1
39	BOOST1_EN	BOOST1_EN	0,1
40	BOOST2_EN	BOOST2_EN	0,1
41	FSO_BST_FREQ	FSO_BST_FREQ	0 - 7

○ : Implemented
× : Not Implemented
— : Not applicable

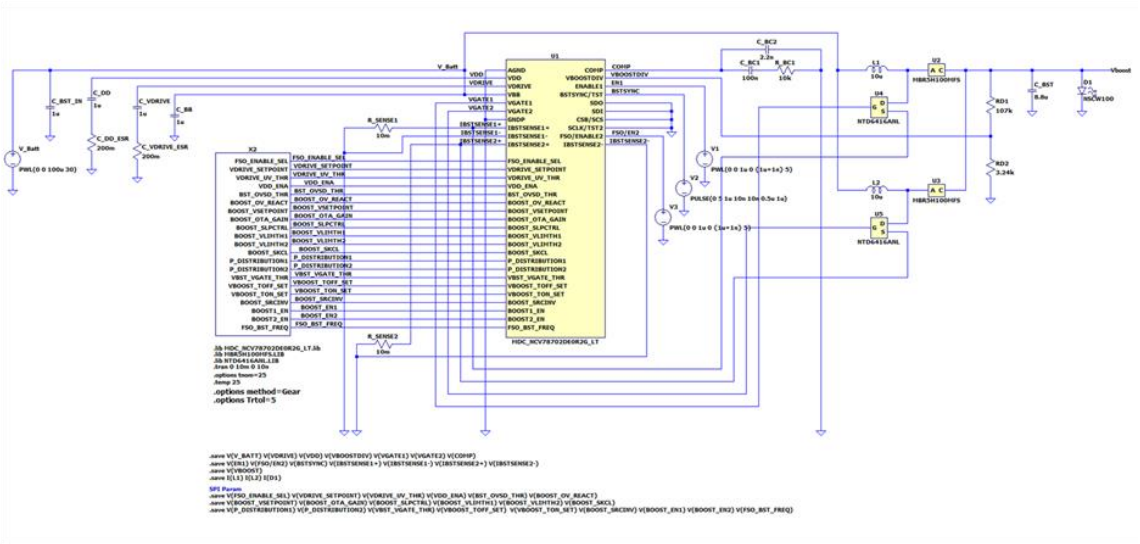
Model Functions Table

	RANK=1	
Functions	**RANK**	**Implemented**
Control Method(PWM,PFM)	1	○
Enable Function	1	○
Soft Start	1	–
Line Regulation	1	–
Load Regulation	1	–
Synchronous External Oscillation	1	–
UVLO	1	○
Line Transient	2	–
Load Transient	2	–
Light Load Current Mode	2	–
Spread Spectrum	2	–
Over Current Protection	2	–
Over Voltage Protection	2	–
Forard/Flyback Other Device in Circuit	3	–
Brown IN/OUT Function	—	–
ZT Pin OVP Function	—	–

Application Circuit (VBatt = 30V, VDRIVE = 5V, VBOOST = 64.8V) Testbench

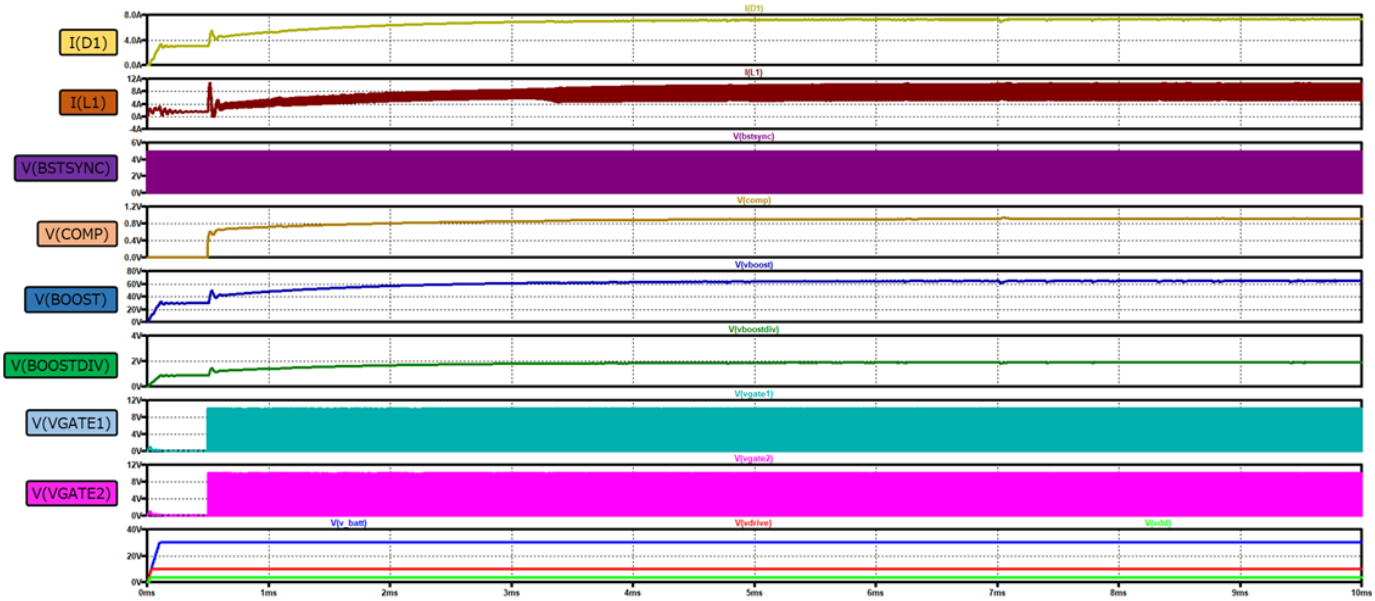
Referred to Data Sheet

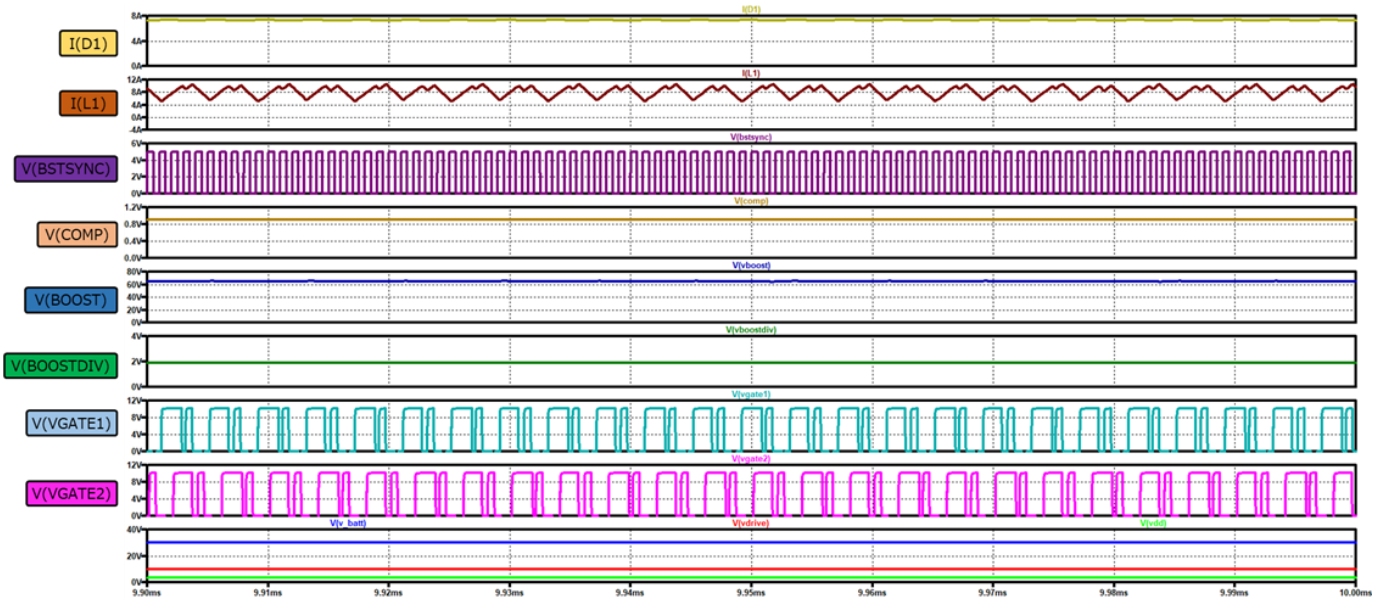
SPI Param	Value
FSO_ENABLE_SEL	1
VDRIVE_SETPOINT	15
VDRIVE_UV_THR	0
VDD_ENA	0
BST_OVSD_THR	127
BOOST_OV_REACT	3
BOOST_VSETPOINT	125
BOOST_OTA_GAIN	3
BOOST_SLPCTRL	1
BOOST_VLIMTH1	3
BOOST_VLIMTH2	3
BOOST_SKCL	0
P_DISTRIBUTION1	-16
P_DISTRIBUTION2	-16
VBST_VGATE_THR	1
VBOOST_TOFF_SET	1
VBOOST_TON_SET	7
BOOST_SRCINV	0
BOOST1_EN	0,1
BOOST2_EN	0,1
FSO_BST_FREQ	0



Simulation results are following.
Explanatory notes　　— : simulated

Application Circuit (VBatt = 30V, VDRIVE = 5V, VBOOST = 64.8V)

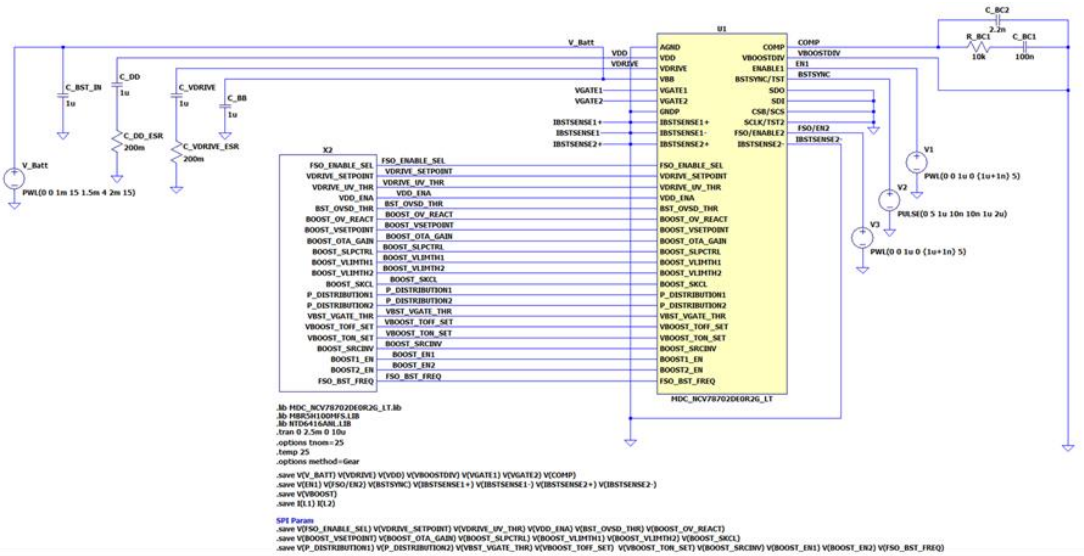




VDRIVE UVLO Testbench

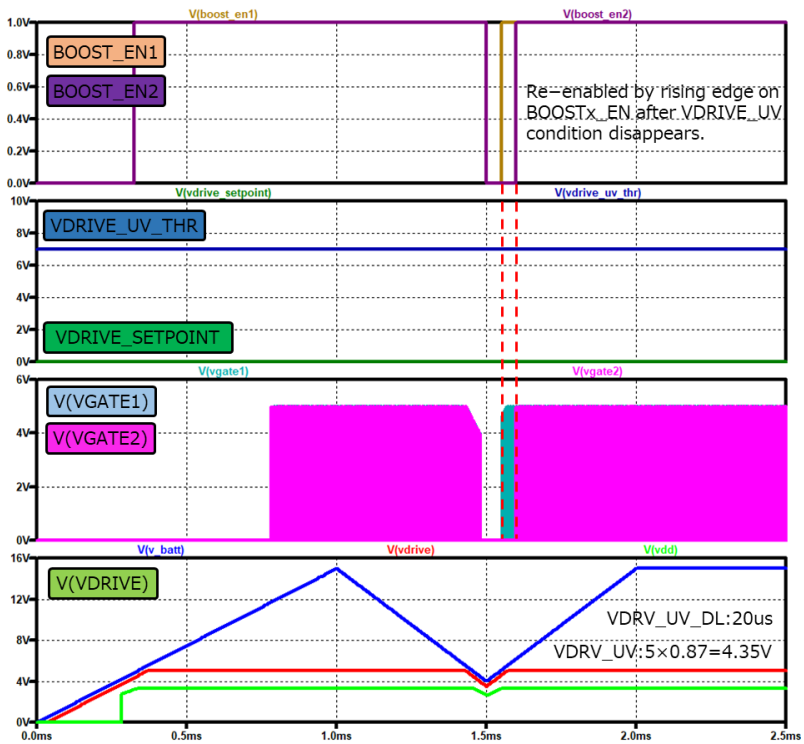
Referred to Data Sheet

SPI Param	Value
FSO_ENABLE_SEL	1
VDRIVE_SETPOINT	0
VDRIVE_UV_THR	7
VDD_ENA	0
BST_OVSD_THR	127
BOOST_OV_REACT	3
BOOST_VSETPOINT	125
BOOST_OTA_GAIN	1
BOOST_SLPCTRL	1
BOOST_VLIMTH1	0
BOOST_VLIMTH2	0
BOOST_SKCL	1
P_DISTRIBUTION1	15
P_DISTRIBUTION2	15
VBST_VGATE_THR	1
VBOOST_TOFF_SET	1
VBOOST_TON_SET	1
BOOST_SRCINV	0
BOOST1_EN	0,1
BOOST2_EN	0,1
FSO_BST_FREQ	0



Simulation results are following.
Explanatory notes — : simulated

VDRIVE UVLO



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