LTspice Model
High Speed Current Sensor IC
Melexis
MLX91216LDC-ACV-001-RE

Model Information

Model	A macro model
Call Name	MDC_MLX91216LDC-ACV-001-RE_LT
Pin Assign	1:VDEC 2:AGND 3:TEST 4:VDD 5:OUT 6:Tesla
File List	Model Library MDC_MLX91216LDC-ACV-001-RE_LT01.lib
	Model Report MDC_MLX91216LDC-ACV-001-RE_LT.pdf(this file)

Verified Simulator Version   LTspice version XVII

References

The information which was used for modeling is as follow:

[Data Sheet]
- ●Date/Version   Rev.002 / 02-Apr-2020
- ●Product name   MLX91216
- ●Company name   Melexis

[Characteristics listed]
- ●Characteristics   Current to Tesla
  - Supply Current
  - Output Impedance
  - Under-voltage detection
  - Clamped Output Level
  - Power on Delay
  - Step Response Time

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

① You need to create the library file shown in Figure 1.
　 Also, each parameter must be defined in PARAMETERS.

　　　.subckt MDC_MLX91216LDC-ACV-001-RE_LT VDEC NC AGND TEST VDD OUT NC NC IP IN

　　　X_MLX91216LDC-ACV-001-RE_U1　　　VDEC AGND TEST VDD OUT TESLA MLX91216LDC
　　　vmeas ip in 0
　　　b1 current 0 v=i(vmeas)

　　　e_c2t tesla 0 current 0 table=
　　　+ (
　　　+ (-30,-1)
　　　+ (-30m,-1m),　　　　　　　　　　　　②
　　　+ (0,0)
　　　+ (30m,1m),
　　　+ (30,1)
　　　+)
　　　.ENDS MDC_MLX91216LDC-ACV-001-RE_LT

　　　.PARAM
　　　+ Sensitivity=30
　　　+ CLAMP_LEVEL=0　　　①
　　　+ DIAG_LEVEL=0
　　　+ LOW_POWER_MODE=0
　　　+ NOISE_FILTER=0

Figure 1.

② Converts current into magnetism.
　 The format of the expression is shown below.

　Ex)
　e_c2t tesla 0 current 0 table=
　+ (Current 1, Magnetic flux density 1)
　+ (Current 2, Magnetic flux density 2)
　+ (Current 3, Magnetic flux density 3)
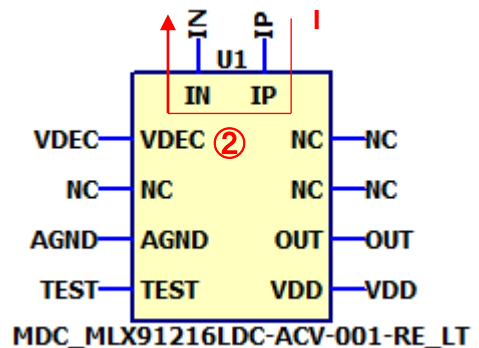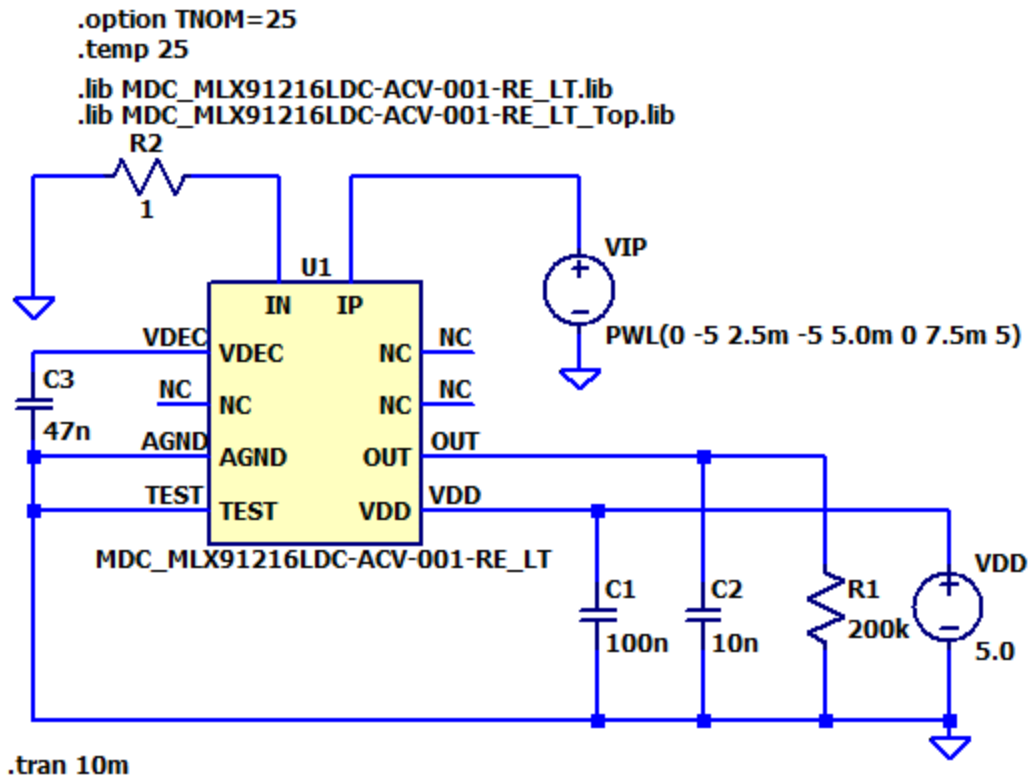　+ (Current 4, Magnetic flux density 4)
　+ 　　　…)

Figure 2.

Each values are described as a pair of current and magnetic flux density.
Except for the specified value, linear interpolation is performed.
For out of range, the minimum or maximum value of the specified value is output.

3

Model Functions Table

Functions	Implemented
Current to Tesla	○
Supply Current	○
Output Impedance	○
Under-voltage detection	○
Clamped Output Level	○
Power on Delay	○
Step Response Time	○

Current to Tesla Testbench

Referred to Data Sheet

```
.option TNOM=25
.temp 25
.lib MDC_MLX91216LDC-ACV-001-RE_LT.lib
.lib MDC_MLX91216LDC-ACV-001-RE_LT_Top.lib
```

R2
1

U1

IN   IP

VDEC VDEC   NC NC
C3   NC   NC NC
47n   AGND AGND OUT OUT
      TEST TEST VDD VDD

MDC_MLX91216LDC-ACV-001-RE_LT

VIP

PWL(0 -5 2.5m -5 5.0m 0 7.5m 5)

C1   C2   R1   VDD
100n 10n   200k 5.0

.tran 10m

Simulation results are following.
Explanatory notes   — : simulated

Current to Tesla

● TABLE

e_c2t tesla 0 current 0 table=
+ (
+ (-30,-1)
+ (-30m,-1m),
+ (0,0)
+ (30m,1m),
+ (30,1)
+)

Tesla = I_{IP}/Sensitivity

Clamp_hi

Clamp_lo

V_{OUT}=Tesla*Sensitivity
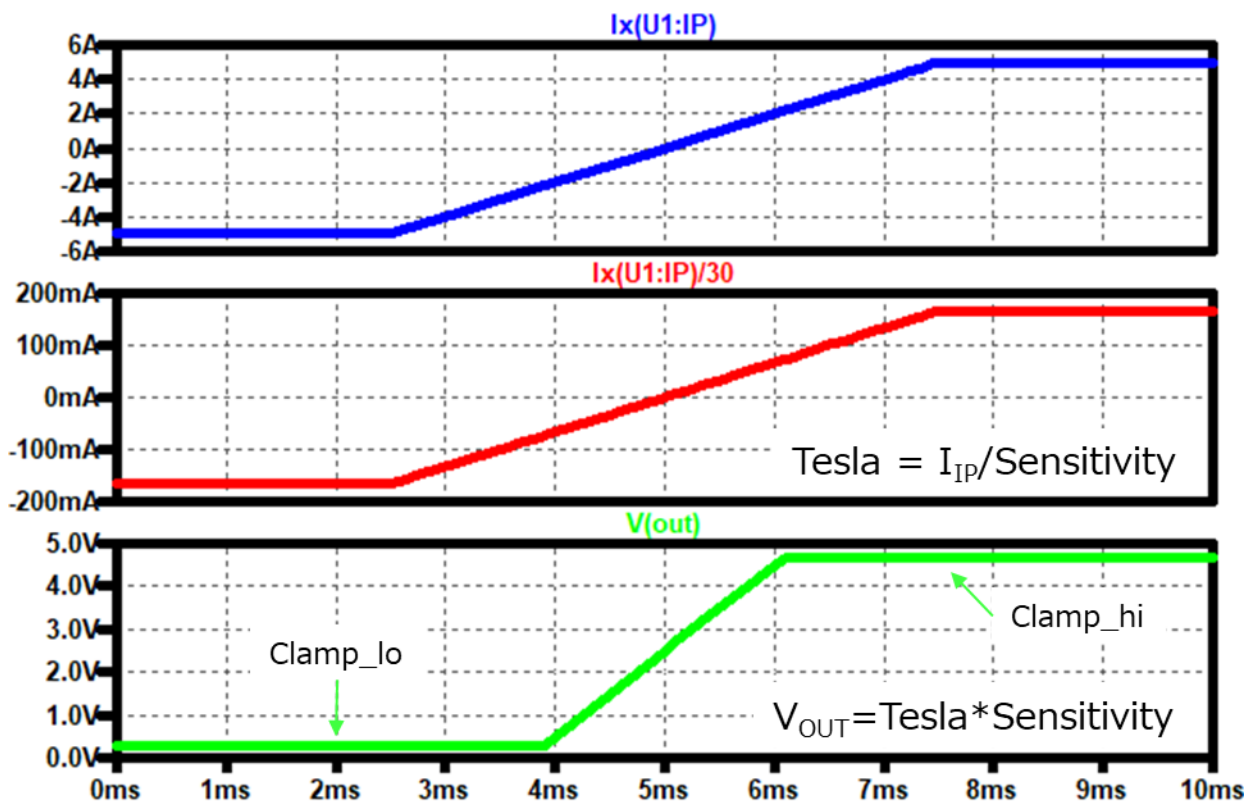
Supply Current Testbench

Referred to Data Sheet

.option TNOM=25
.temp 25
.lib MDC_MLX91216LDC-ACV-001-RE_LT.lib
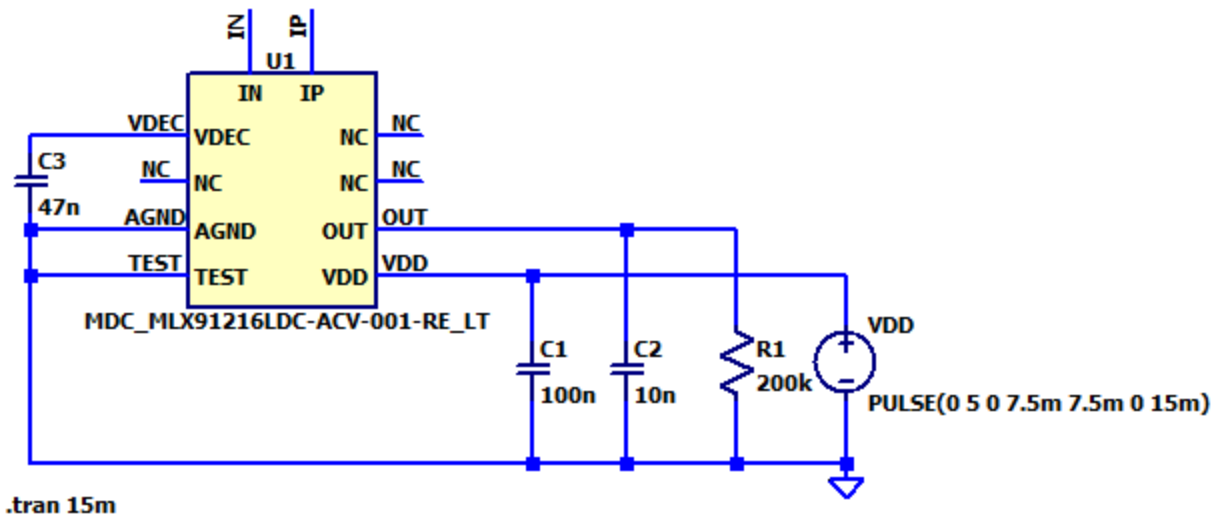.lib MDC_MLX91216LDC-ACV-001-RE_LT_Top.lib

.tran 1m
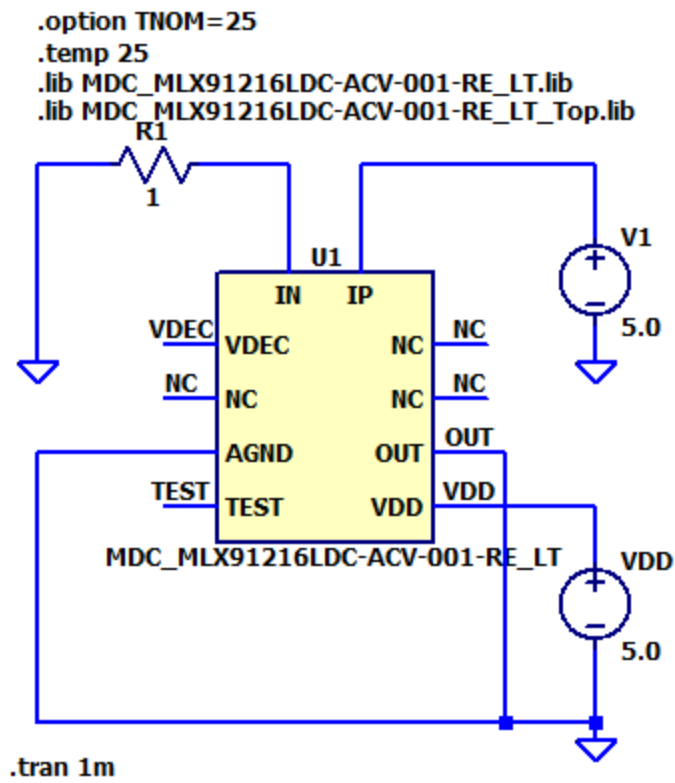
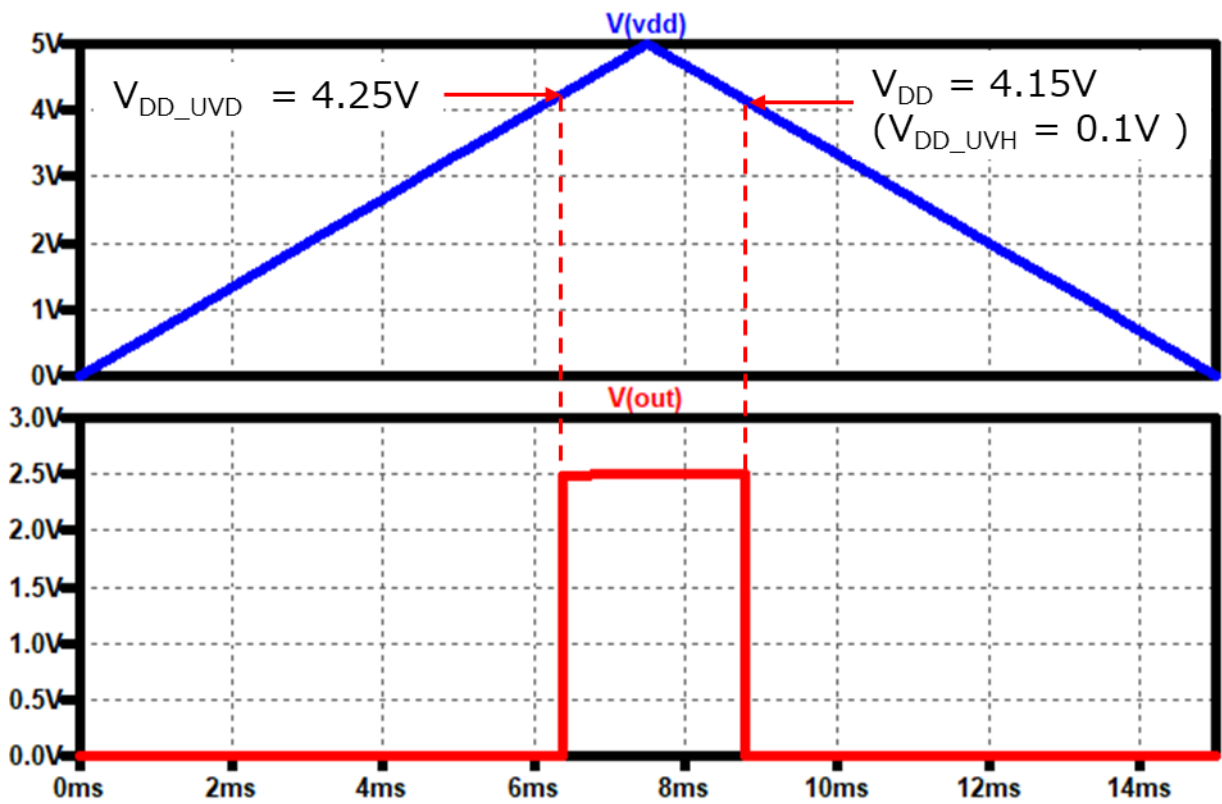Simulation results are following.
Explanatory notes　　— : simulated

Supply Current
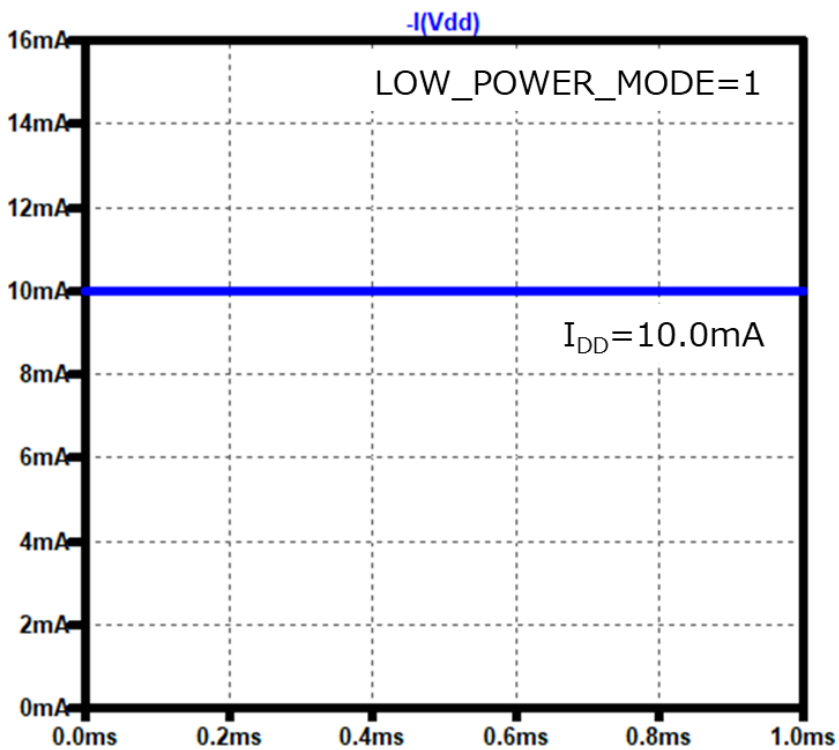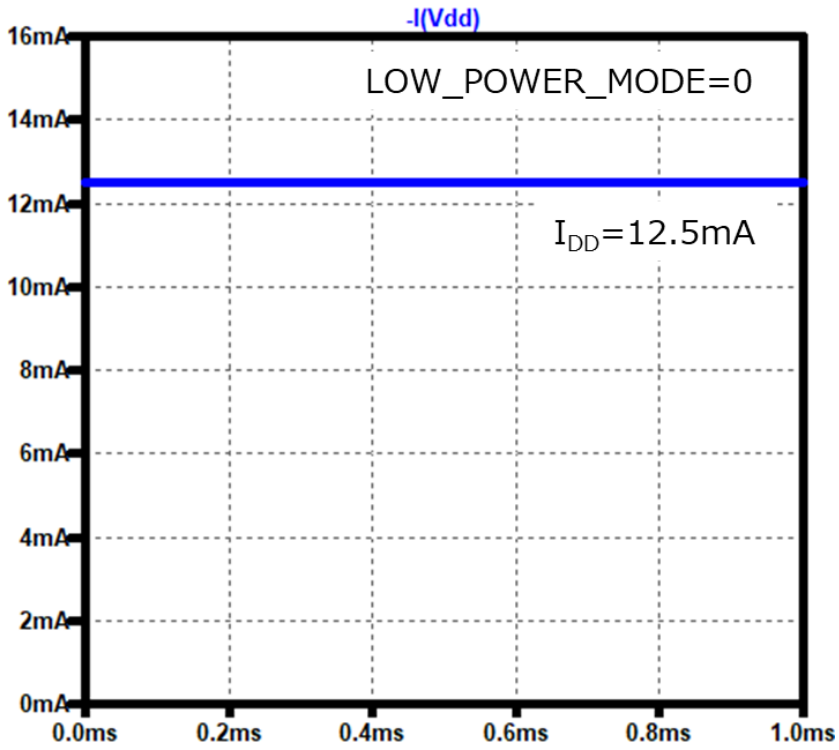
Output Impedance Testbench

Referred to Data Sheet

```
.option TNOM=25
.temp 25

.lib MDC_MLX91216LDC-ACV-001-RE_LT.lib
.lib MDC_MLX91216LDC-ACV-001-RE_LT_Top.lib
```
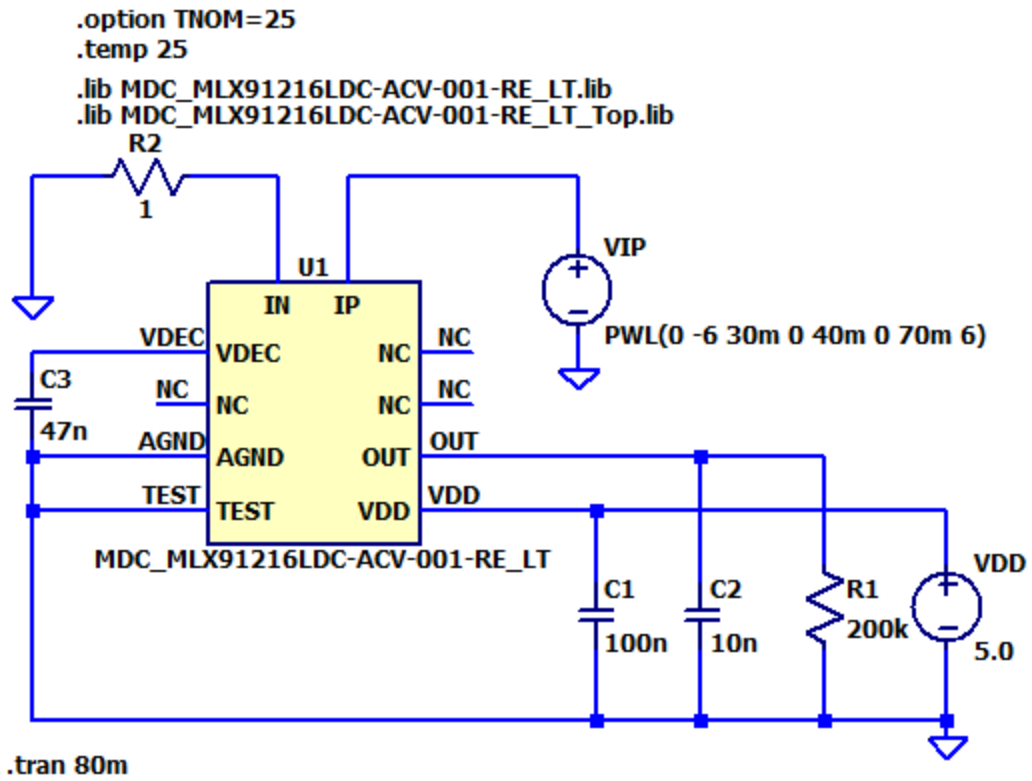

.tran 1m
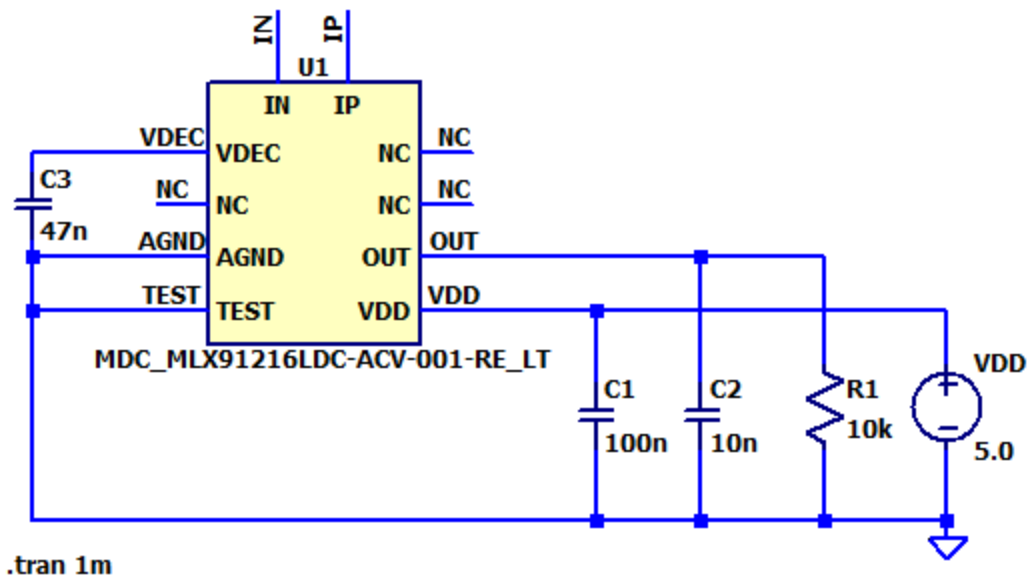
Simulation results are following.
Explanatory notes — : simulated

Output Impedance
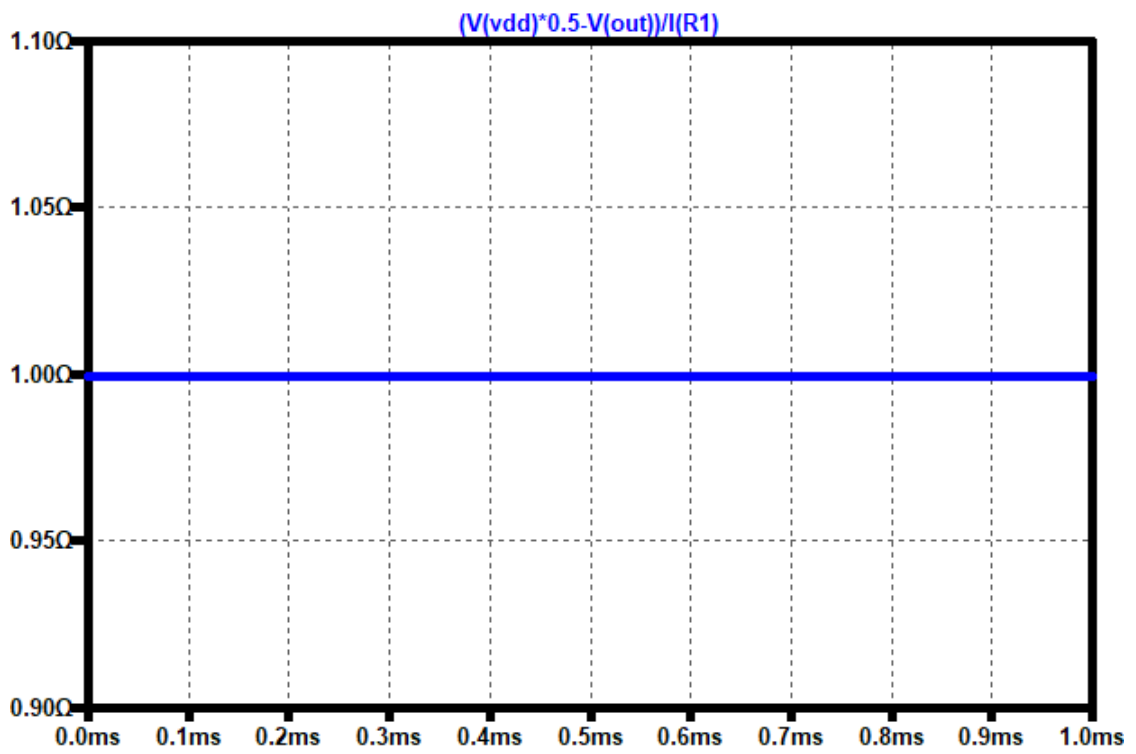
Under-voltage detection Testbench

Referred to Data Sheet

.option TNOM=25
.temp 25
.lib MDC_MLX91216LDC-ACV-001-RE_LT.lib
.lib MDC_MLX91216LDC-ACV-001-RE_LT_Top.lib

.tran 15m

Simulation results are following.
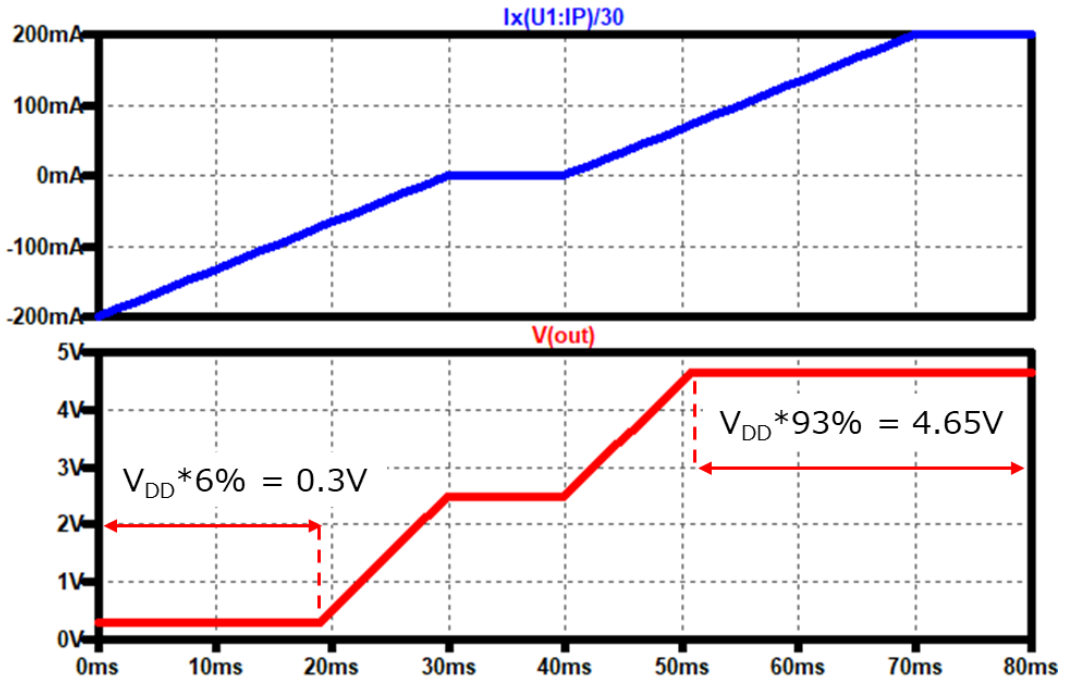Explanatory notes   — : simulated

Under-voltage detection

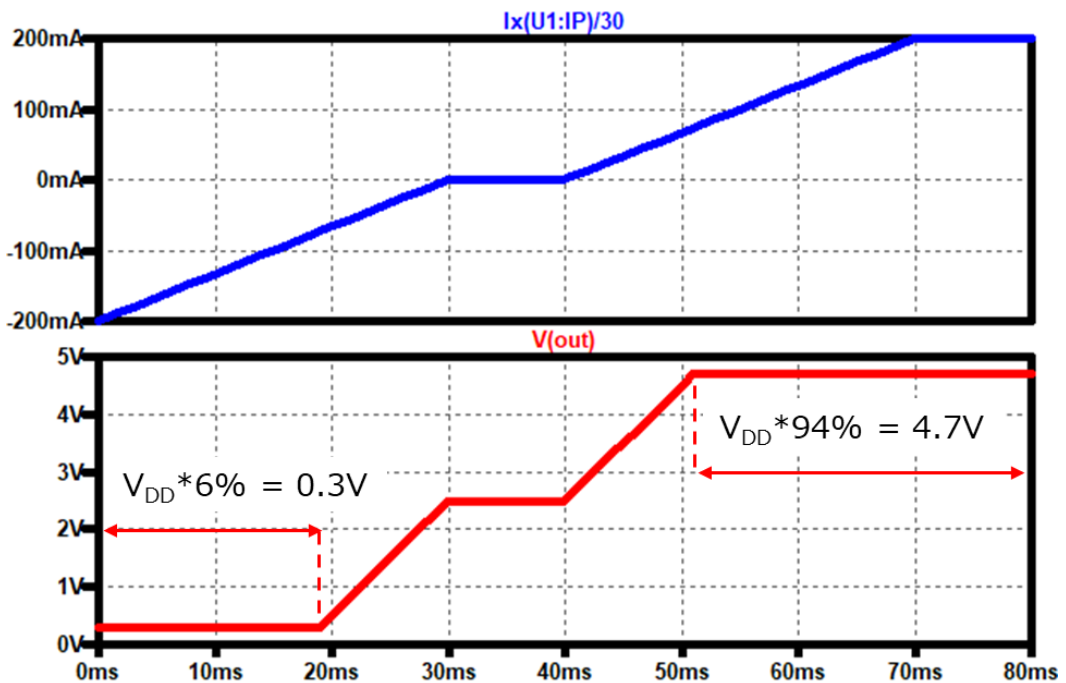**Clamped Output Level Testbench**

Referred to Data Sheet

```
.option TNOM=25
.temp 25
.lib MDC_MLX91216LDC-ACV-001-RE_LT.lib
.lib MDC_MLX91216LDC-ACV-001-RE_LT_Top.lib
```


PWL(0 -6 30m 0 40m 0 70m 6)

MDC_MLX91216LDC-ACV-001-RE_LT

.tran 80m

Simulation results are following.
Explanatory notes — : simulated

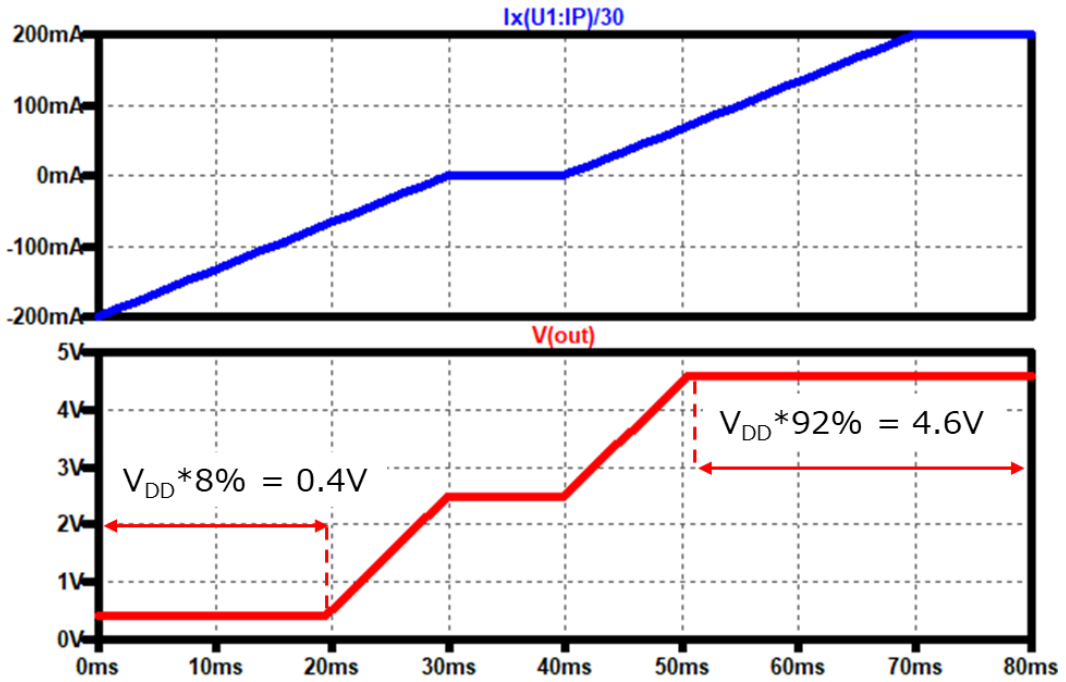**Clamped Output Level**

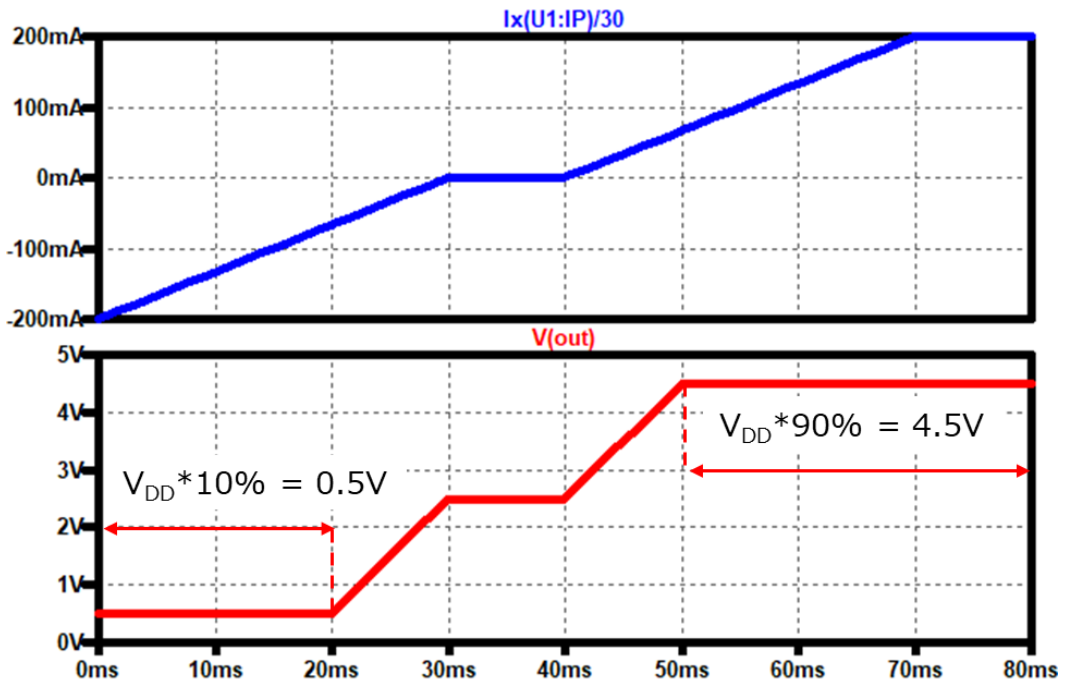●**CLAMP_LEVEL = 0**

●**CLAMP_LEVEL = 1**

Simulation results are following.
Explanatory notes 　　 — : simulated

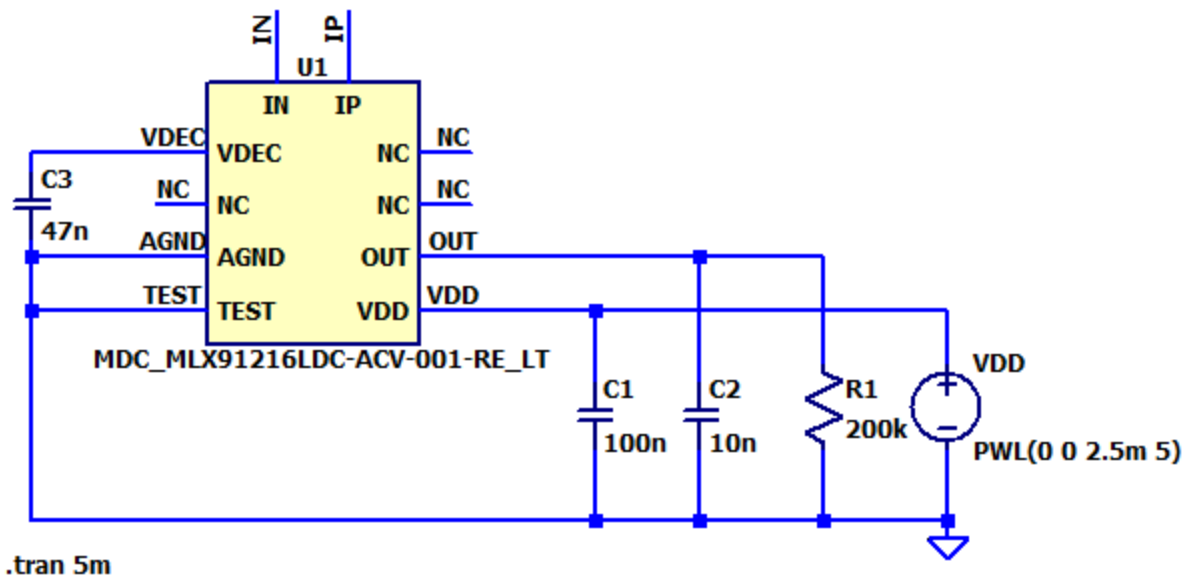**Clamped Output Level**

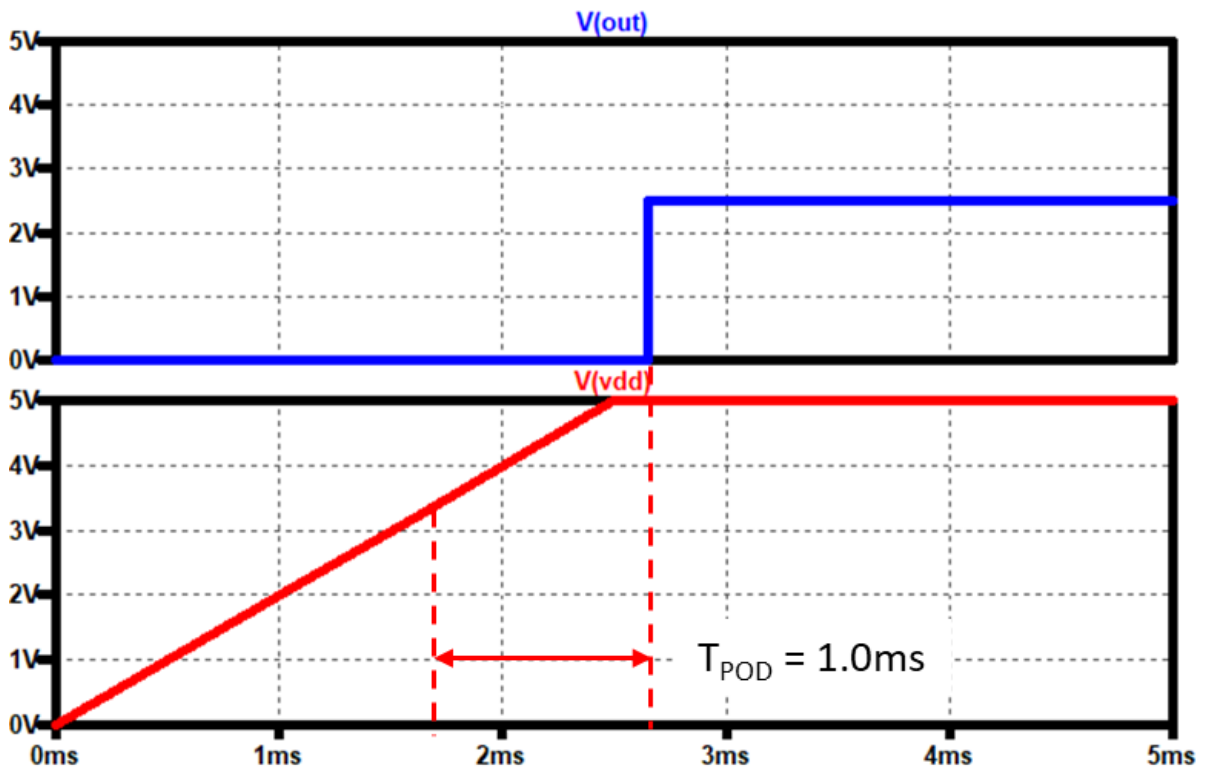●**CLAMP_LEVEL = 2**

●**CLAMP_LEVEL = 3**

Power on Delay Testbench

Referred to Data Sheet

```
.option TNOM=25
.temp 25
.lib MDC_MLX91216LDC-ACV-001-RE_LT.lib
.lib MDC_MLX91216LDC-ACV-001-RE_LT_Top.lib
```


.tran 5m

Simulation results are following.
Explanatory notes — : simulated

Power on Delay

$T_{POD} = 1.0ms$

Step Response TimeTestbench

Referred to Data Sheet

```
.option TNOM=25
.temp 25
.lib MDC_MLX91216LDC-ACV-001-RE_LT.lib
.lib MDC_MLX91216LDC-ACV-001-RE_LT_Top.lib
```
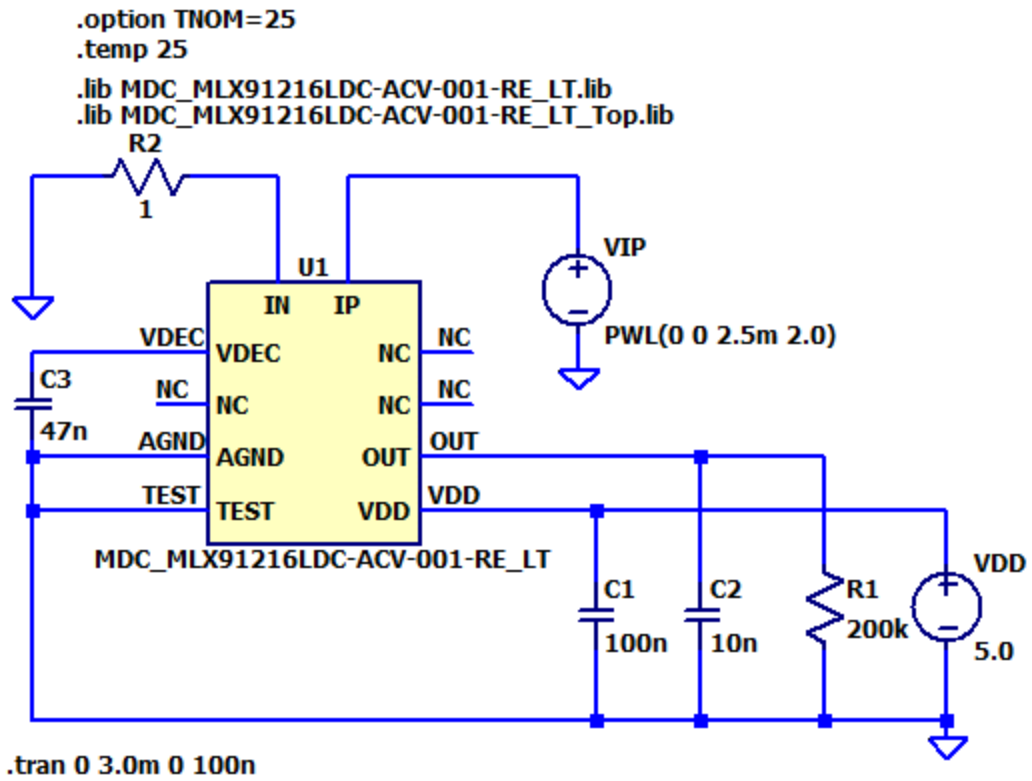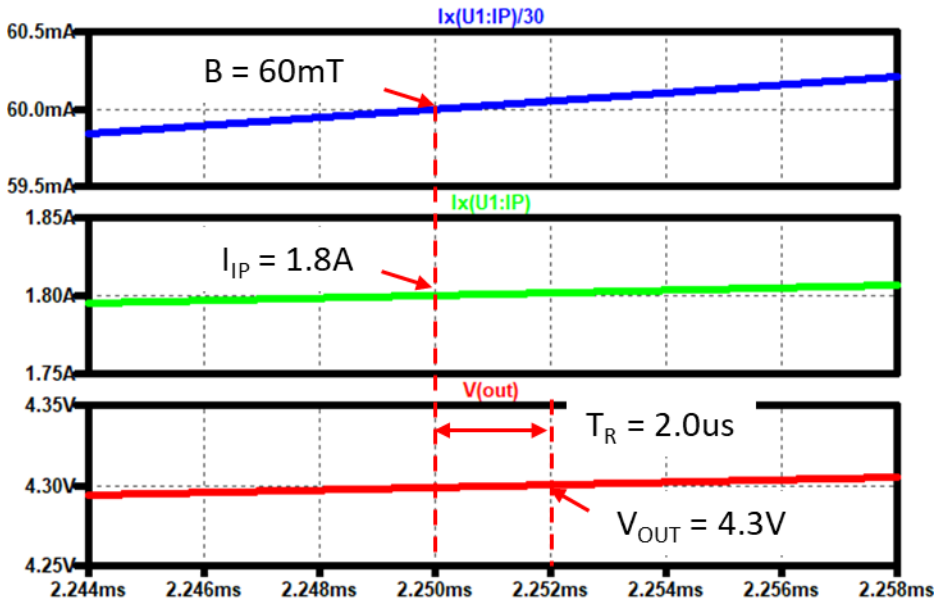
R2
1

U1

VIP

PWL(0 0 2.5m 2.0)

IN	IP
VDEC	NC
NC	NC
AGND	OUT
TEST	VDD

VDEC

C3
47n

NC

AGND

TEST

NC

NC

OUT

VDD

MDC_MLX91216LDC-ACV-001-RE_LT

C1
100n

C2
10n

R1
200k
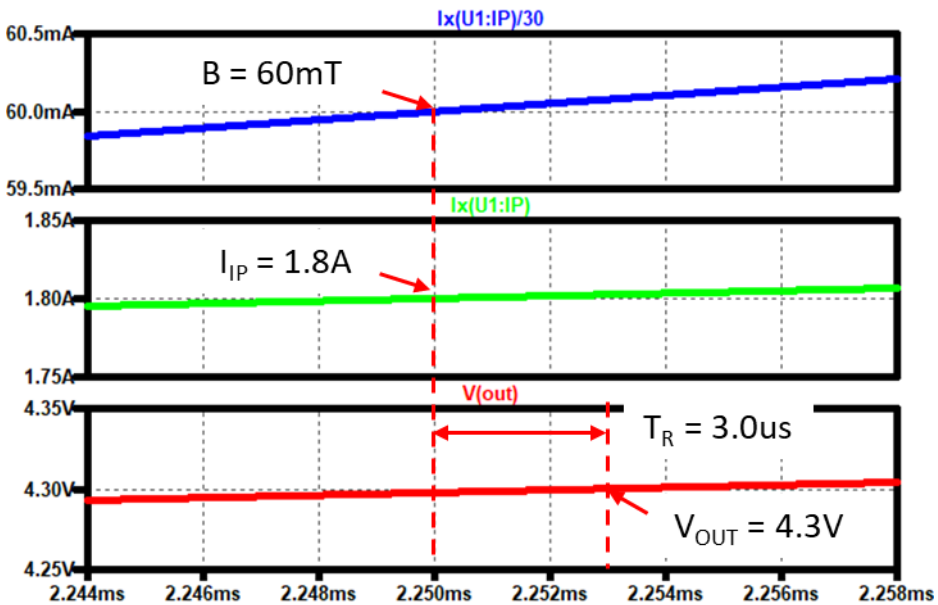
VDD

5.0

.tran 0 3.0m 0 100n

Simulation results are following.
Explanatory notes　　— : simulated

Step Response Time

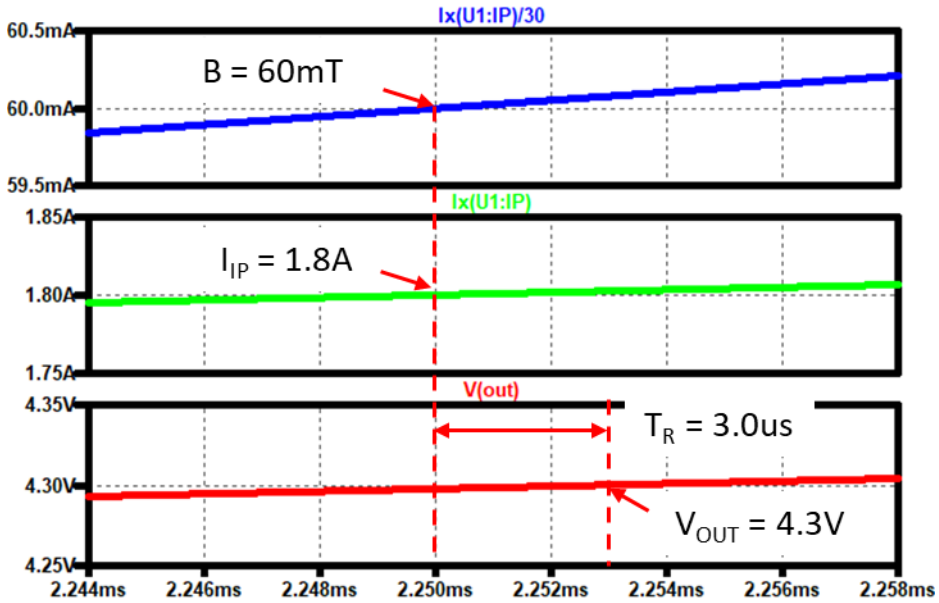●**Sensitivity = 30, NOISE_FILTER = 0, POWER_MODE = 0**

●**Sensitivity = 30, NOISE_FILTER = 0, POWER_MODE = 1**

Simulation results are following.
Explanatory notes — : simulated

Step Response Time

●**Sensitivity = 30, NOISE_FILTER = 1, POWER_MODE = 0**

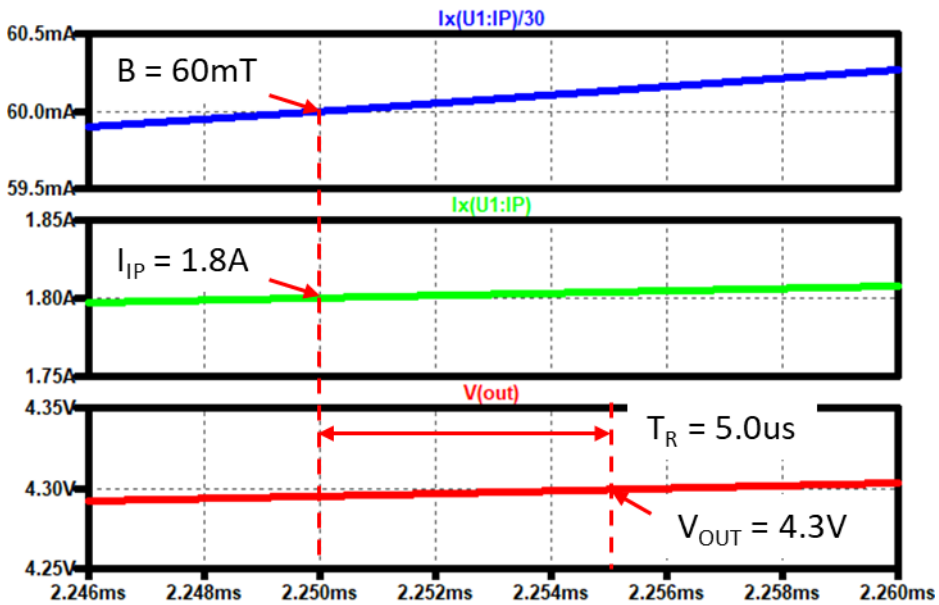●**Sensitivity = 30, NOISE_FILTER = 1, POWER_MODE = 1**

Simulation results are following.
Explanatory notes 　　— : simulated

Step Response Time

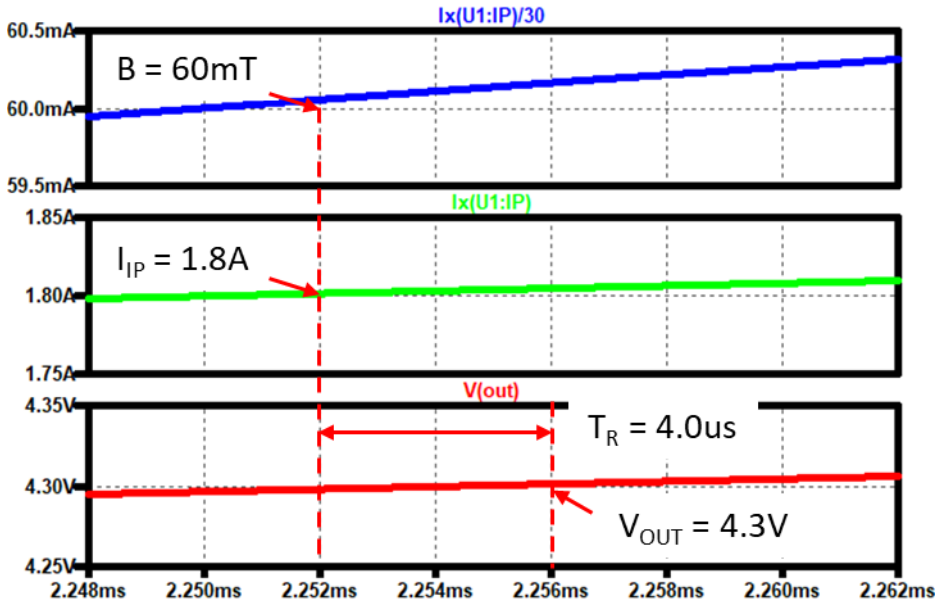●**Sensitivity = 30, NOISE_FILTER = 2, POWER_MODE = 0**

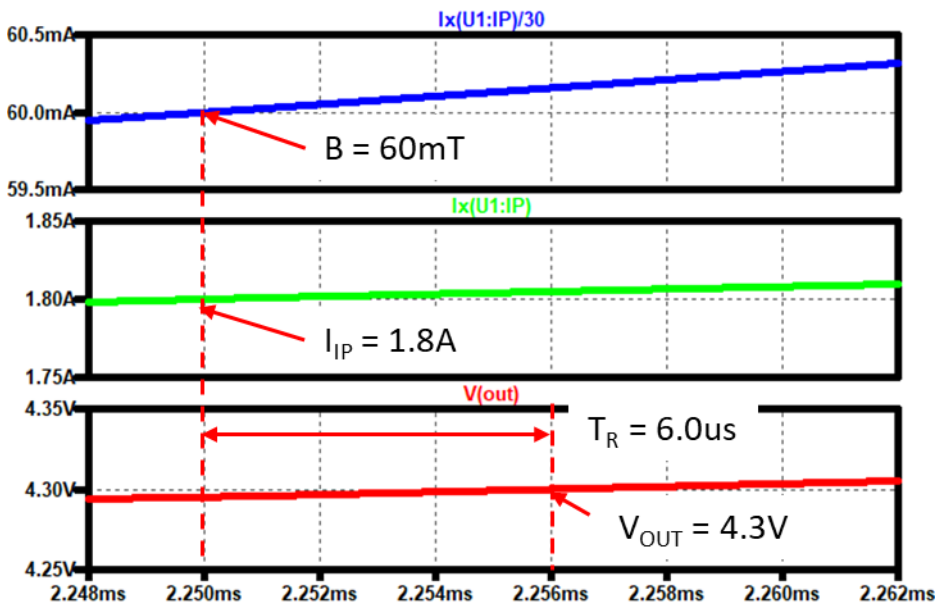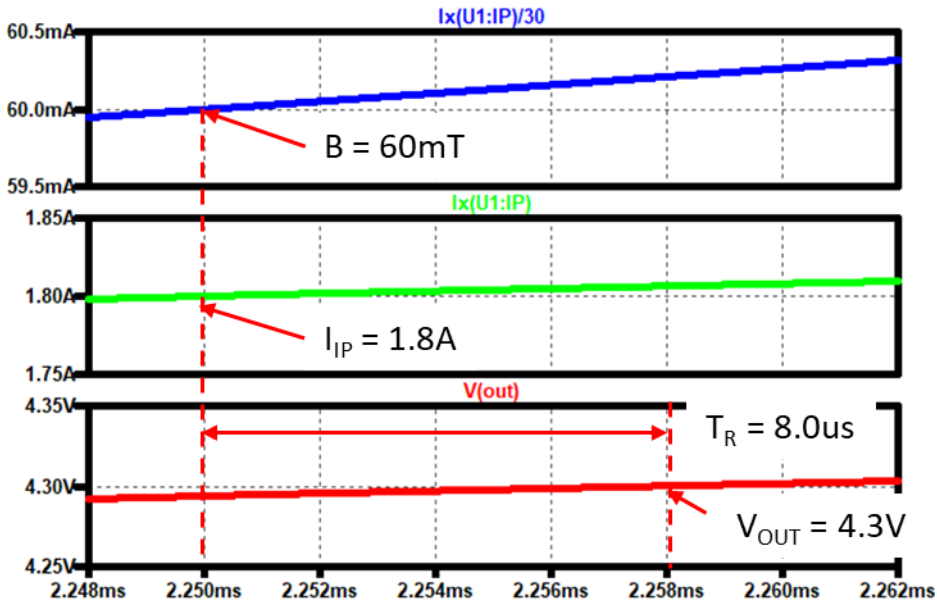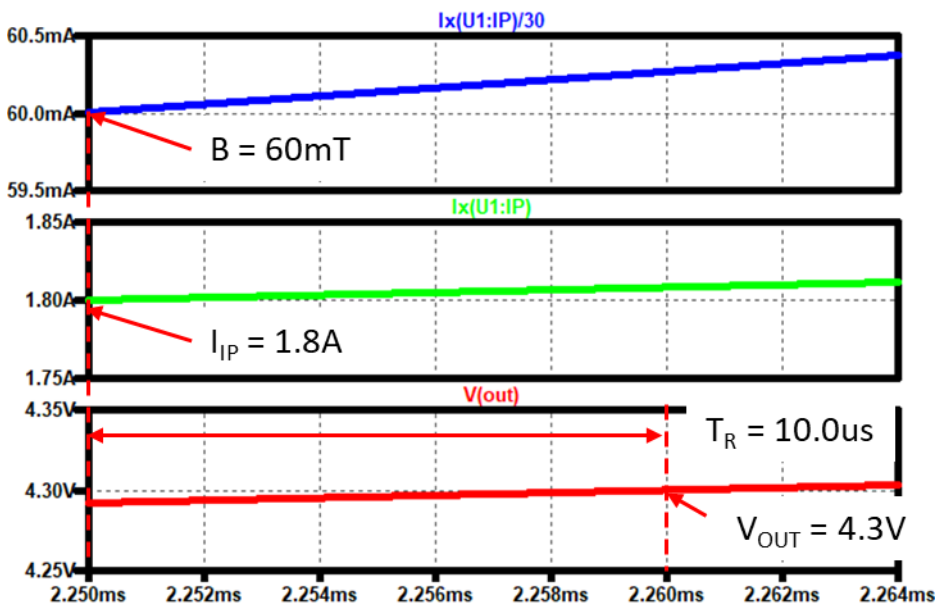●**Sensitivity = 30, NOISE_FILTER = 2, POWER_MODE = 1**

Simulation results are following.
Explanatory notes　　— : simulated

Step Response Time

●**Sensitivity = 30, NOISE_FILTER = 3, POWER_MODE = 0**

●**Sensitivity = 30, NOISE_FILTER = 3, POWER_MODE = 1**

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

Modeling Design Technology

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

Jan 29,2021
Rev 2.0