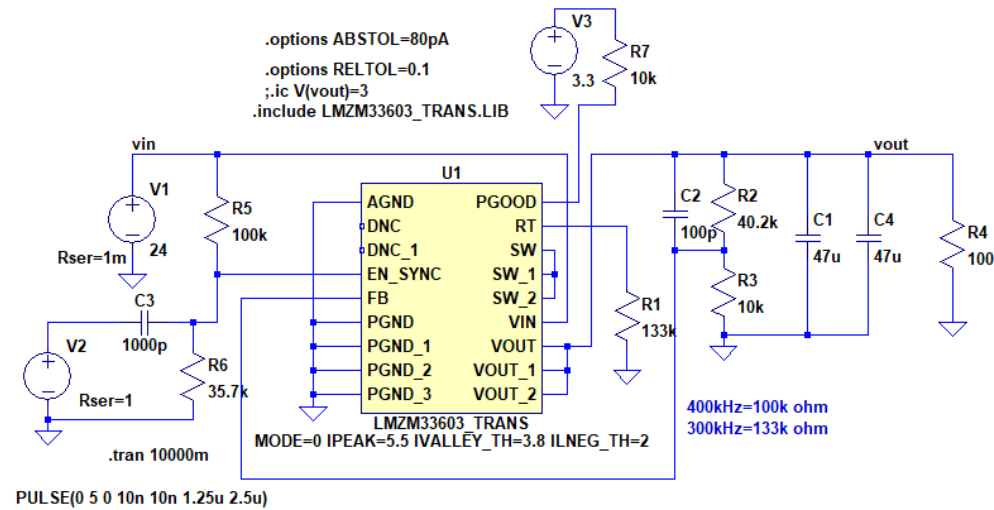# Simulation using LTSPICE

※default setting

LMZM33603 Unencrypted Non-inverting and Inverting PSpice Transient Model	PSpice Model	ZIP	24 Oct 2017

Vin=24V
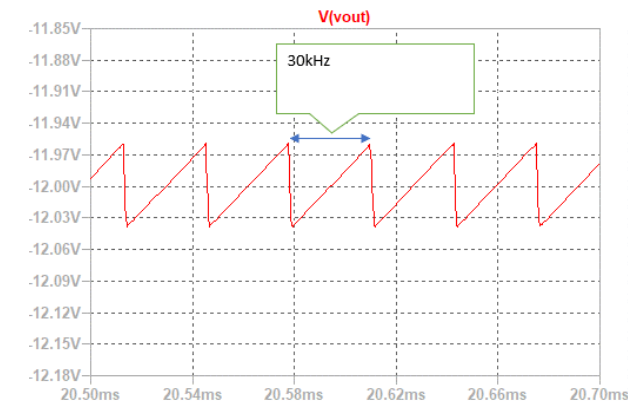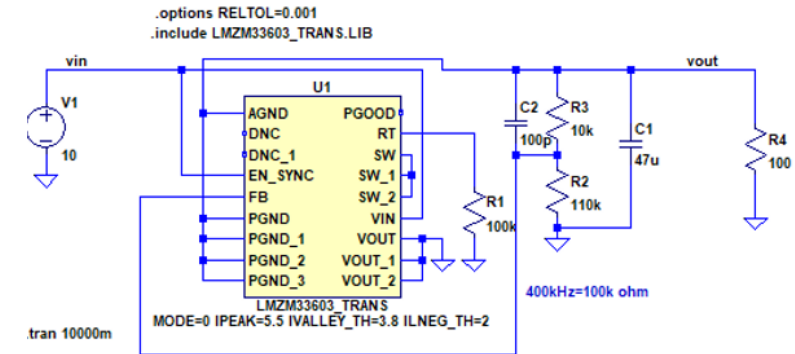Vout=5V
Fsw=400kHz(High=5V, Low=0V)

.options ABSTOL=80pA
.options RELTOL=0.1
;.ic V(vout)=3
.include LMZM33603_TRANS.LIB

V3
3.3
R7
10k

vin

V1
24
Rser=1m

R5
100k

C3
1000p

V2
Rser=1

R6
35.7k

U1
AGND   PGOOD
DNC   RT
DNC_1   SW
EN_SYNC   SW_1
FB   SW_2
PGND   VIN
PGND_1   VOUT
PGND_2   VOUT_1
PGND_3   VOUT_2
LMZM33603_TRANS
MODE=0 IPEAK=5.5 IVALLEY_TH=3.8 ILNEG_TH=2

C2
100p

R2
40.2k

R3
10k

R1
133k

C1
47u

C4
47u

R4
100

vout

400kHz=100k ohm
300kHz=133k ohm

.tran 10000m

PULSE(0 5 0 10n 10n 1.25u 2.5u)

①

Could not synchronize externally.
Please tell me how to check external
synchronization operation using Spice model.

When not using external synchronization (negative output ver)

.options RELTOL=0.001
.include LMZM33603_TRANS.LIB

vin   vout

V1
10

U1
AGND   PGOOD
DNC   RT
DNC_1   SW
EN_SYNC   SW_1
FB   SW_2
PGND   VIN
PGND_1   VOUT
PGND_2   VOUT_1
PGND_3   VOUT_2
LMZM33603_TRANS
MODE=0 IPEAK=5.5 IVALLEY_TH=3.8 ILNEG_TH=2

C2
100p

R3
10k

R2
110k

R1
100k

C1
47u

R4
100

400kHz=100k ohm

.tran 10000m

V(vout)

-11.85V	
-11.88V	30kHz
-11.91V	
-11.94V	
-11.97V	
-12.00V	
-12.03V	
-12.06V	
-12.09V	
-12.12V	
-12.15V	
-12.18V	

20.50ms   20.54ms   20.58ms   20.62ms   20.66ms   20.70ms

②

Entered PFM mode. Please tell me how to avoid this.
Is it correct with the understanding that the frequency can be
fixed even under light load conditions by performing external
synchronous operation?