



CC-218 MCU BOARD

Design

2023/09/03

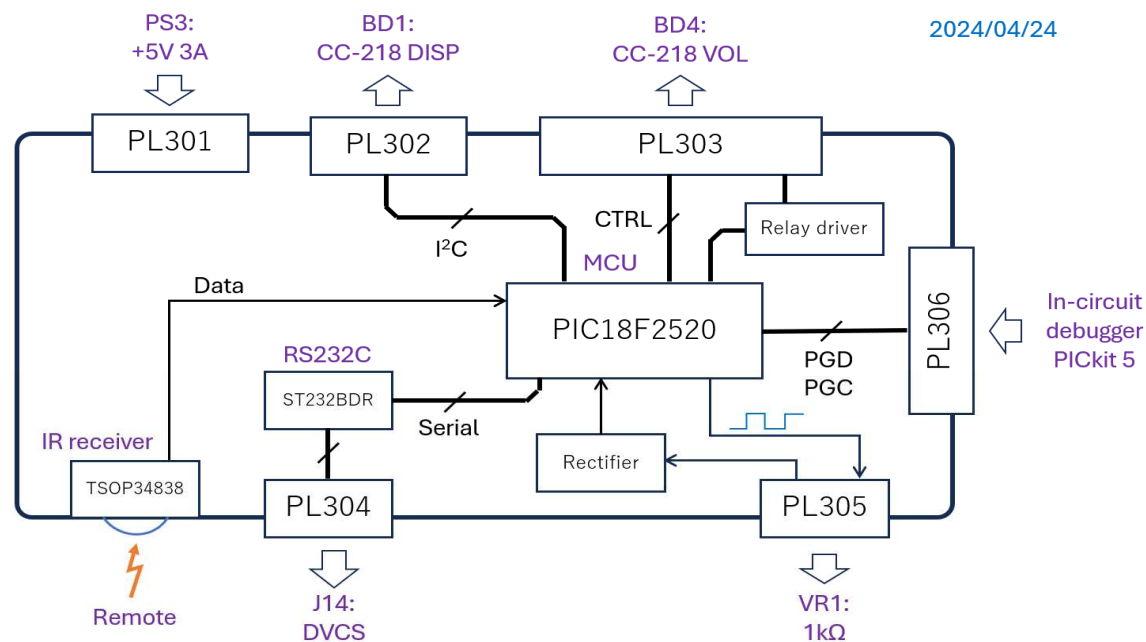
2024/04/24

Circuit Design

Contents

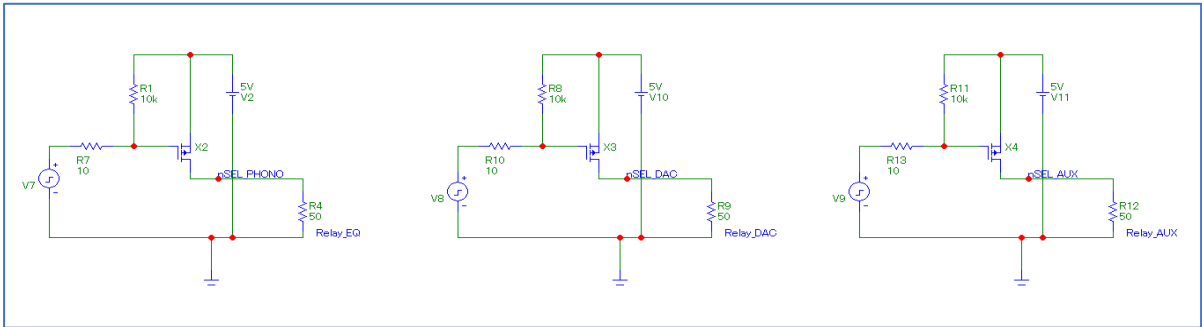
[Block Diagram](#)[Simulation of SEL relay driver](#)[Simulation of VR Interface](#)[Schematic](#)

Block Diagram



Simulation of SEL relay driver

* Schematics



* Settings of oscillators

PHONO

Pulse Source

Name: MODEL Value: SQUARE_PHONO

Display: ☐ Pin Markers ☐ Pin Names ☐ Pin Numbers ☒ Current ☒ Power ☒ Condition

Shape: Border D Fill D

PART=V7
MODEL=SQUARE_PHONO
SMOKE=
COST=
POWER=
SHAPEGROUP=Default
PACKAGE=

Voltage vs. Time

IMPULSE
PULSE
SAWTOOTH
SQUARE
SQUARE_AUX
SQUARE_DAC
SQUARE_PHONO
TRIANGLE

OK Cancel Font... Add Delete Browse...
New Find... Plot... Syntax... IBIS... Help...

Enabled: TRUE Columns: 3

☒ Help Bar [File Link](#)

☐ Show Data on Exit

Source: Local page 'Models'

P1: 0 P2: 0.0001m P3: 499.9999m
P4: 500.0001m P5: 1500m VONE: 4.6
VZERO: 0.4

T=1.5sec
Duty ratio: 33%

DAC

Pulse Source

Name: MODEL Value: SQUARE_DAC

Display: ☐ Pin Markers ☐ Pin Names ☐ Pin Numbers ☒ Current ☒ Power ☒ Condition

Shape: Border D Fill D

PART=V8
MODEL=SQUARE_DAC
SMOKE=
COST=
POWER=
SHAPEGROUP=Default
PACKAGE=

Voltage vs. Time

IMPULSE
PULSE
SAWTOOTH
SQUARE
SQUARE_AUX
SQUARE_DAC
SQUARE_PHONO
TRIANGLE

OK Cancel Font... Add Delete Browse...
New Find... Plot... Syntax... IBIS... Help...

Enabled: TRUE Columns: 3

☒ Help Bar [File Link](#)

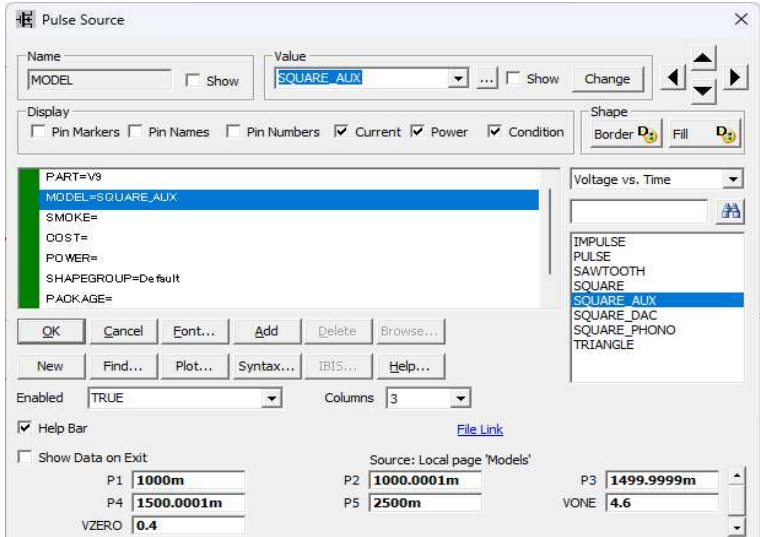
☐ Show Data on Exit

Source: Local page 'Models'

P1: 500m P2: 500.0001m P3: 999.9999m
P4: 1000.0001m P5: 2000m VONE: 4.6
VZERO: 0.4

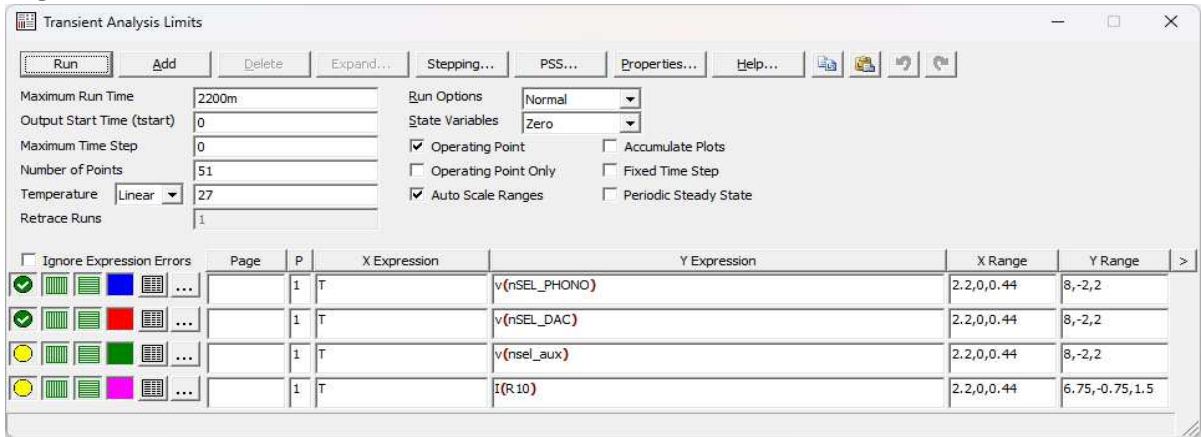
T=1.5sec
Duty ratio: 33%
Delay: 0.5sec

AUX



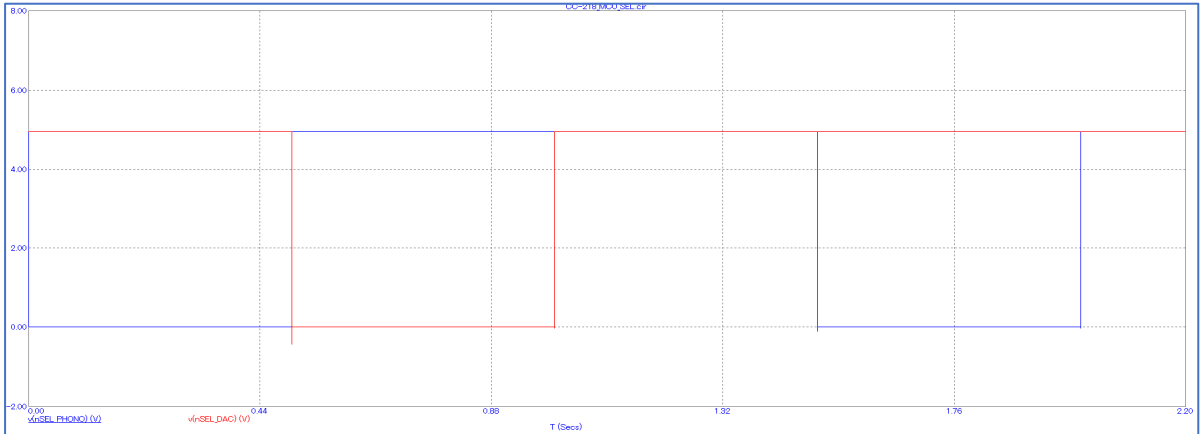
T=1.5sec
Duty ratio: 33%
Delay: 1sec

* Settings of simulation



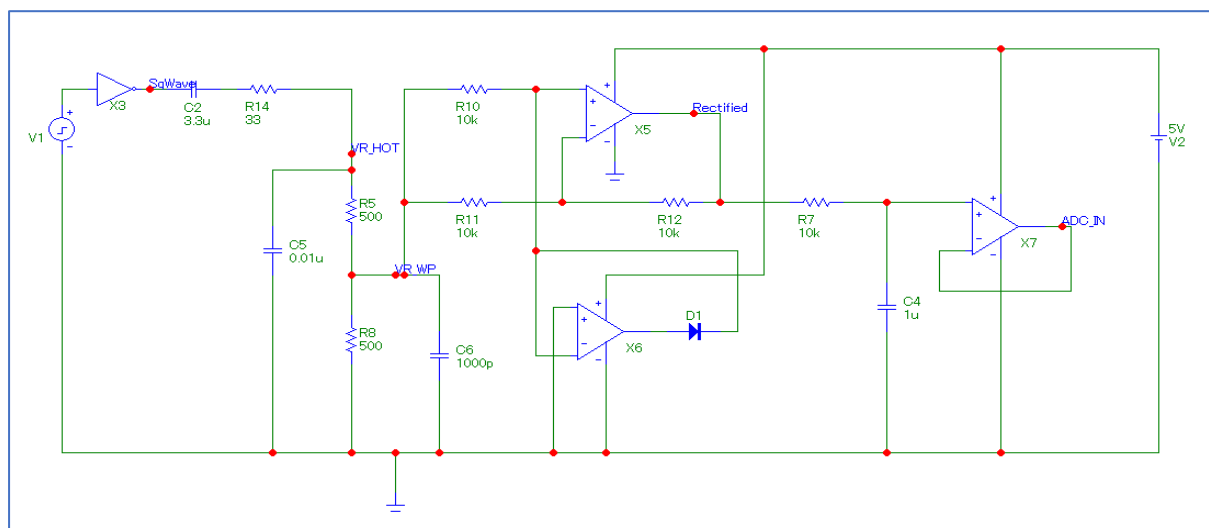
* Transition

nSEL_EQ and nSEL_DAC



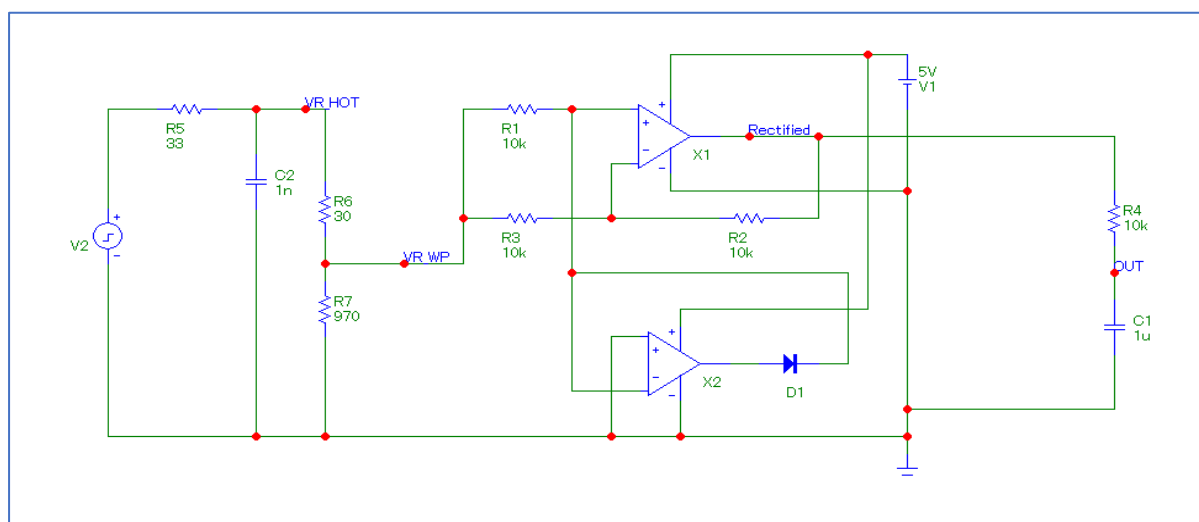
Simulation of VR Interface

* Schematics for simulation



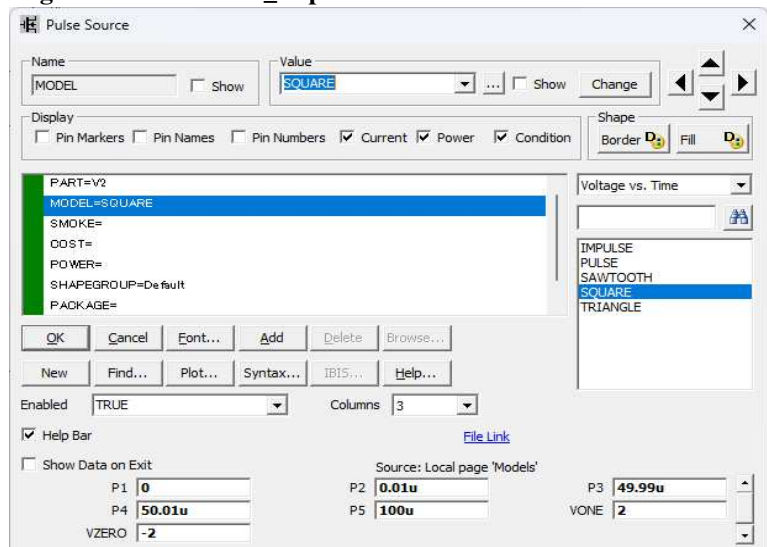
This circuit is unable to simulate when the value of R5 is smaller than 500ohm.

The schem below works, which employs a simplified AC generator.



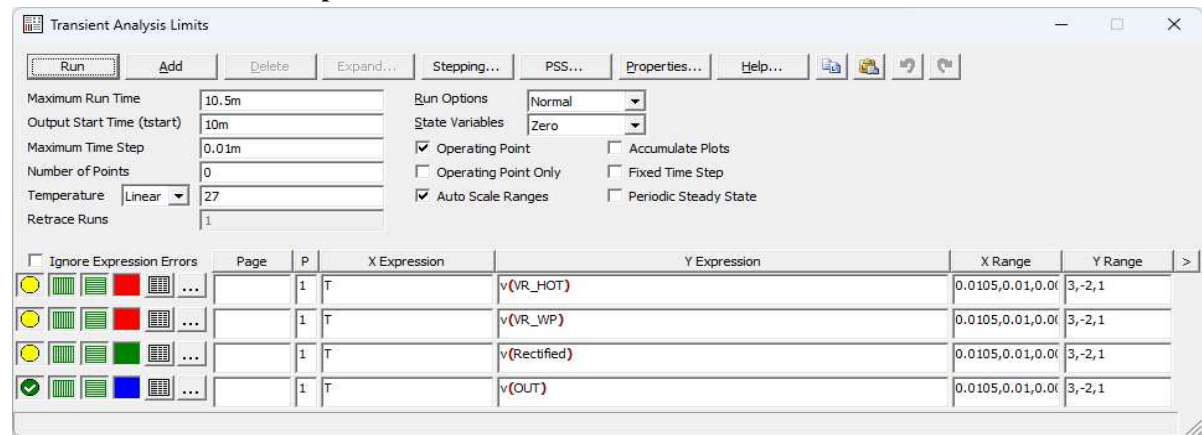
X1, X2: LMV358, D1: 1N4148. R6, R7 simulates VR1 (1kohm, B-curve)

* Settings of oscillator - VR_Exp



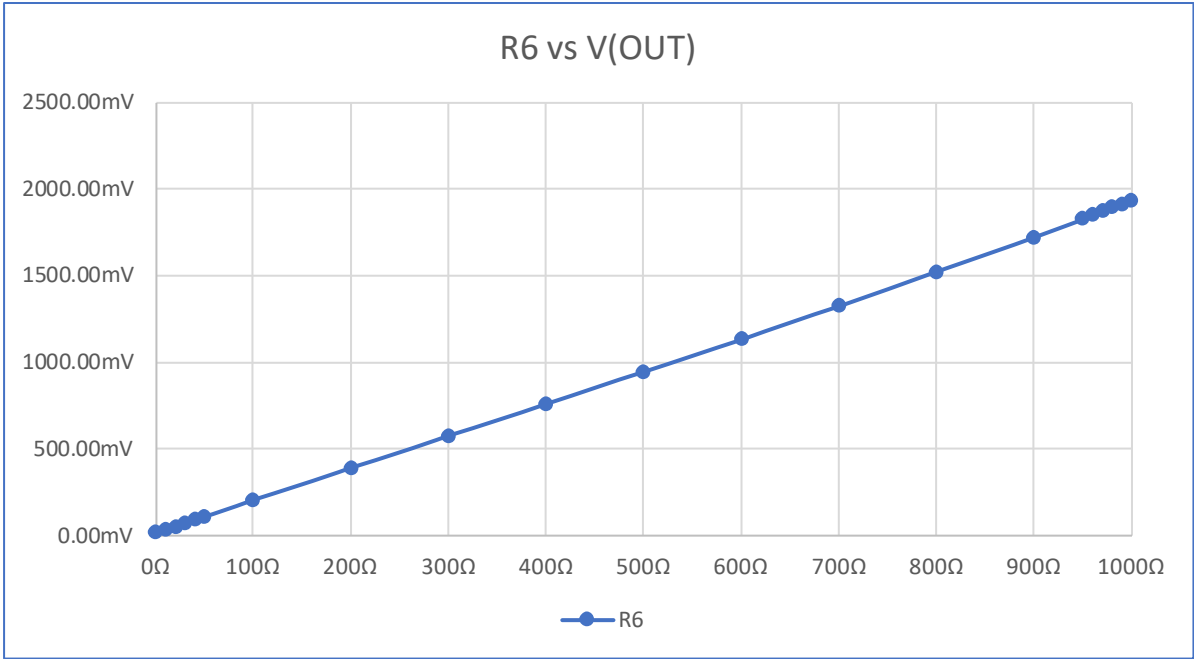
10kHz square wave
Duty ratio: 50%

* Simulation conditions - VR_Exp



* R6 vs V(OUT)

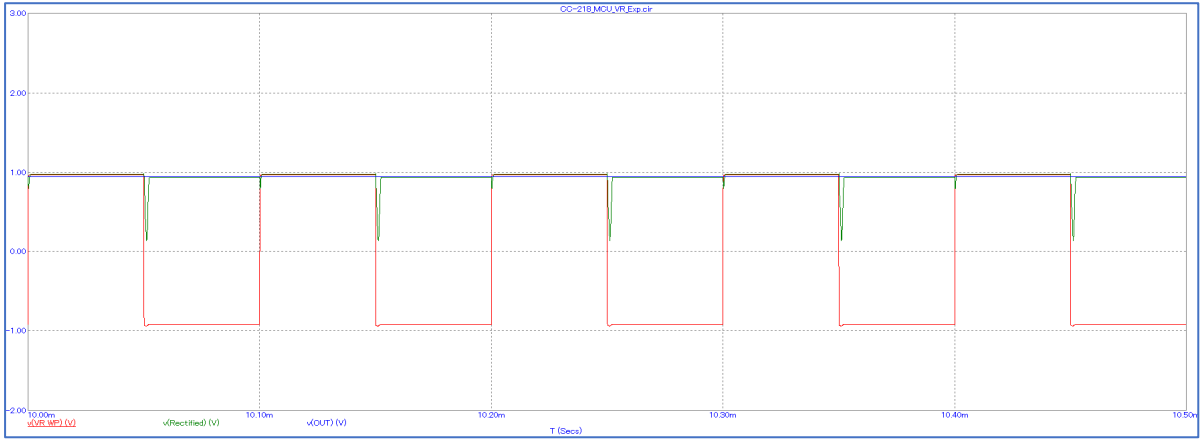
R6	R7	V(OUT)	Note
0Ω	1000Ω	22.65mV	
10Ω	990Ω	36.16mV	
20Ω	980Ω	55.28mV	
30Ω	970Ω	74.41mV	
40Ω	960Ω	93.51mV	
50Ω	950Ω	112.57mV	
100Ω	900Ω	206.55mV	
200Ω	800Ω	392.07mV	
300Ω	700Ω	576.28mV	
400Ω	600Ω	761.78mV	
500Ω	500Ω	947.98mV	
600Ω	400Ω	1136.00mV	
700Ω	300Ω	1328.00mV	
800Ω	200Ω	1524.00mV	
900Ω	100Ω	1723.00mV	
950Ω	50Ω	1828.00mV	
960Ω	40Ω	1850.00mV	
970Ω	30Ω	1872.00mV	
980Ω	20Ω	1894.00mV	
990Ω	10Ω	1915.00mV	
1000Ω	0Ω	1936.00mV	



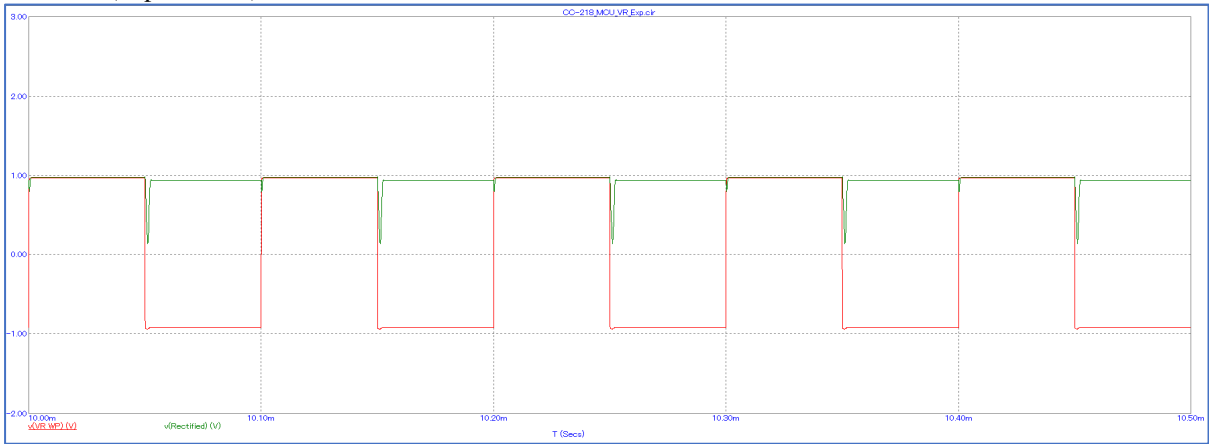
Linearity is OK!

* Waveforms

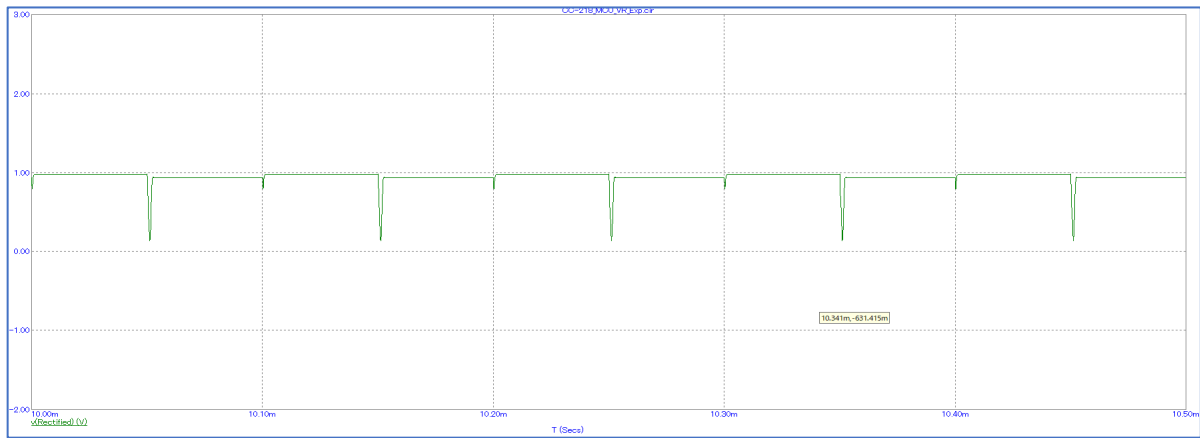
VR_WP (wiper of VR), Rectified, OUT

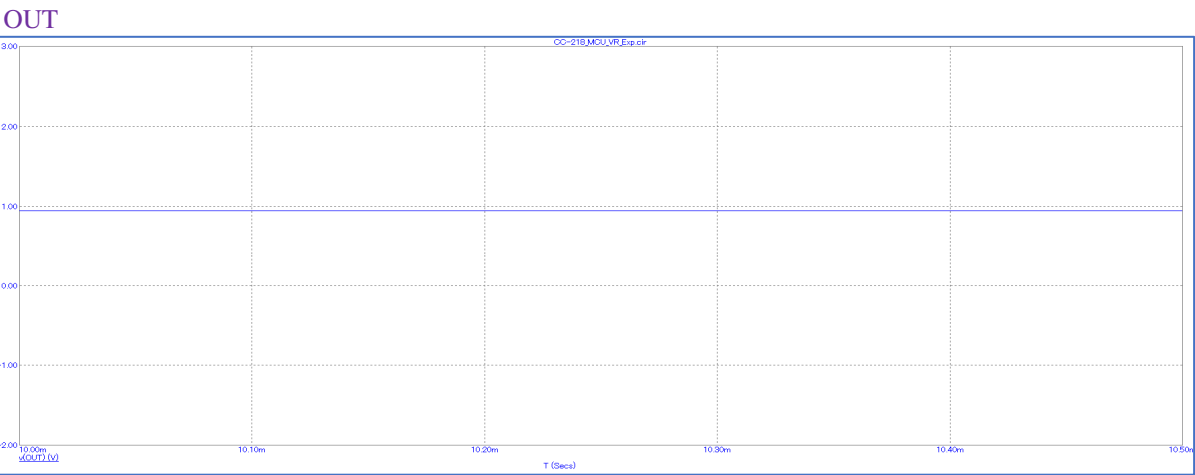


VR_WP (wiper of VR), Rectified

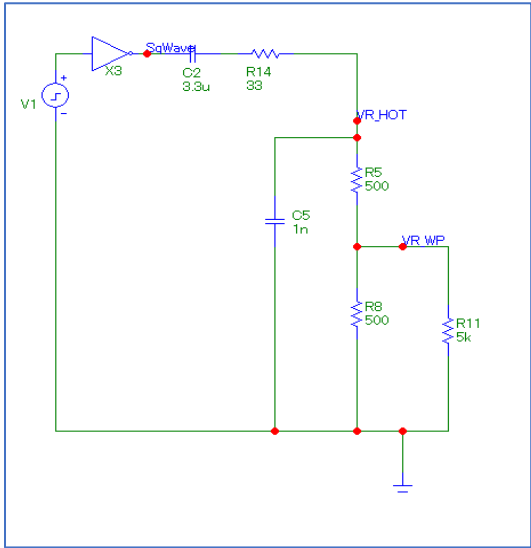


Rectified



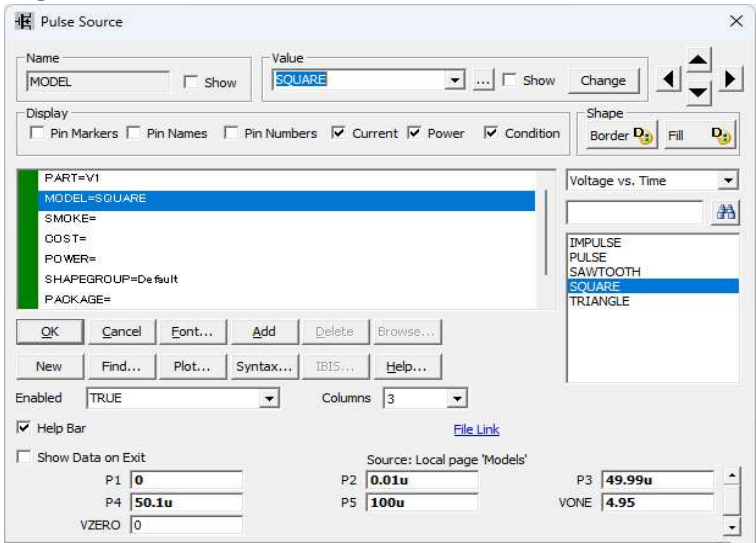


* Schematics for simulation - VR - Square wave generator



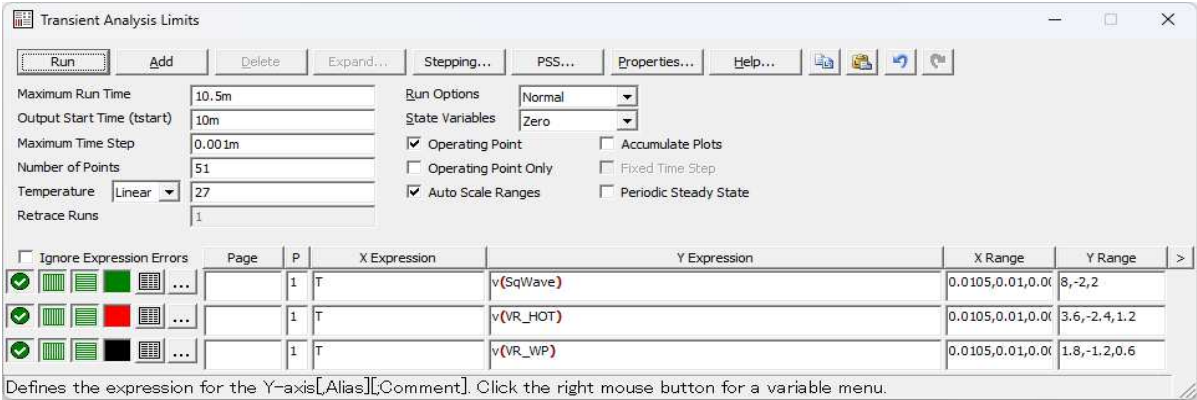
X3: 74HC04
R5 and R8 simulate VR.
HC04 simulates the output of MCU.

* Setting of oscillator



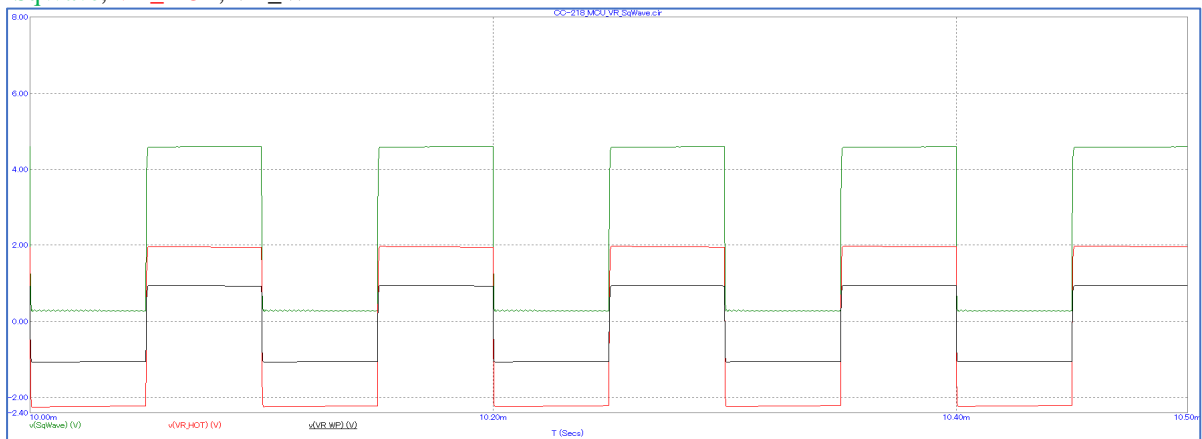
10kHz square wave

* Simulation conditions - VR - Square wave generator

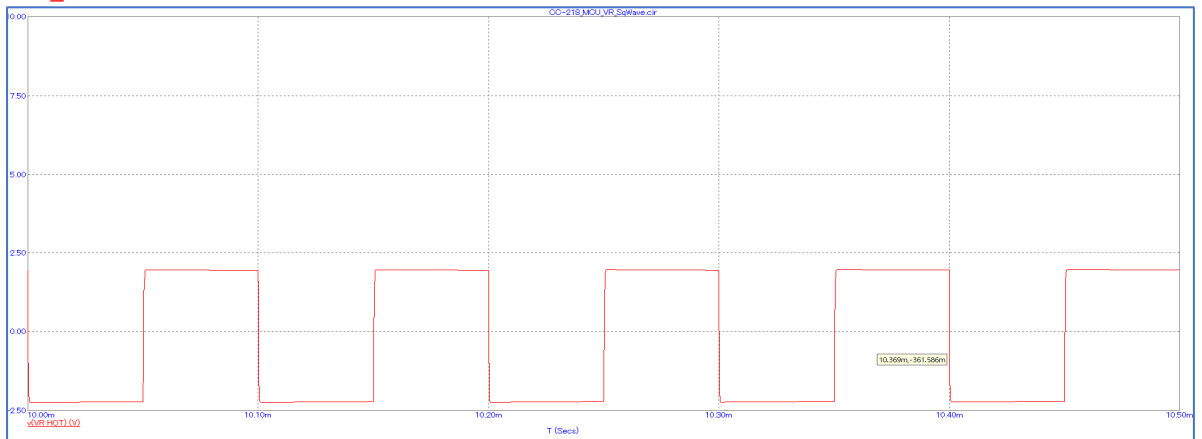


* Waveforms - VR - Square wave generator

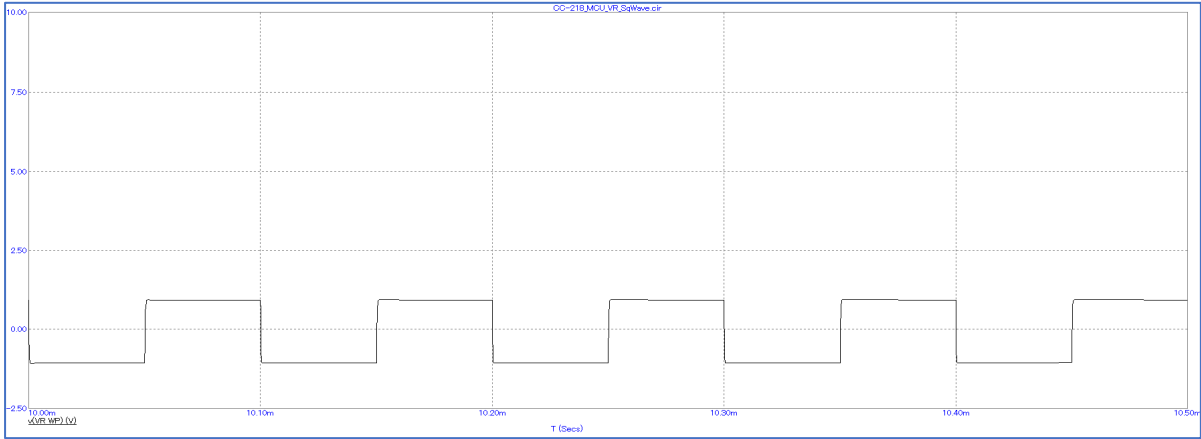
SqWave, VR_HOT, VR_WP



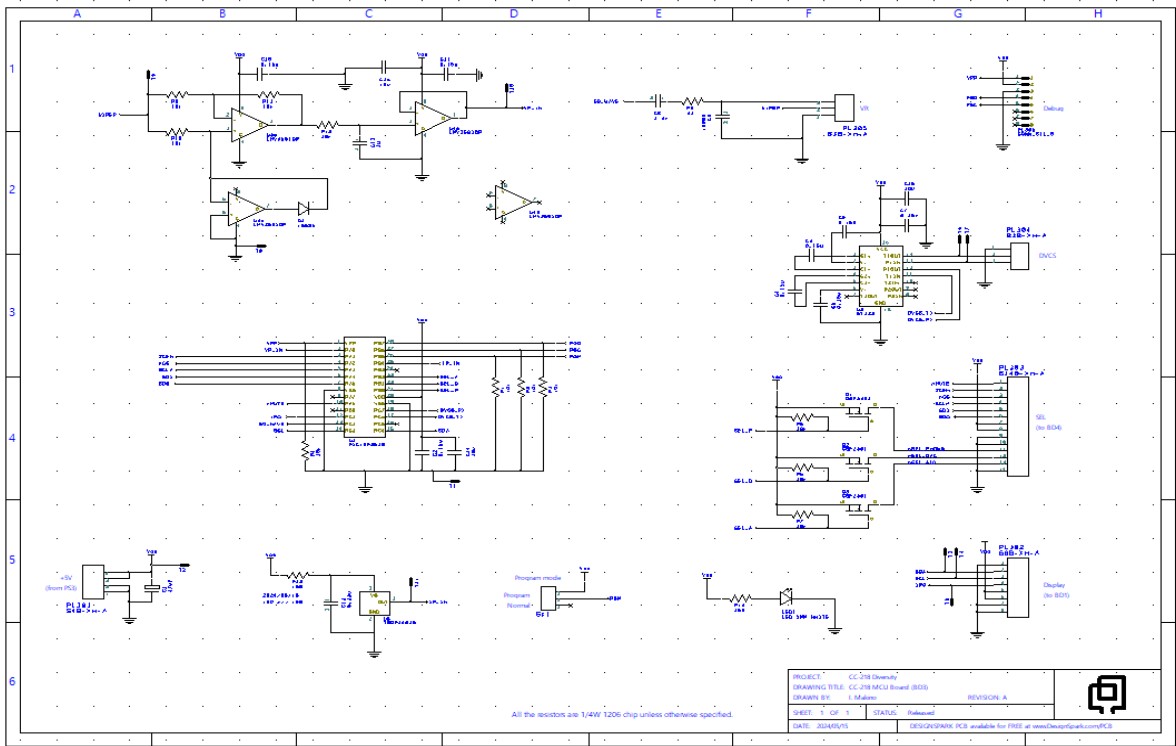
VR_HOT



VR_WP



Schematic



For more details, see the PDF:
CC-218_MCU_Schematic.pdf

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