Synthese de fréquence

1. Caractérisation du VCO

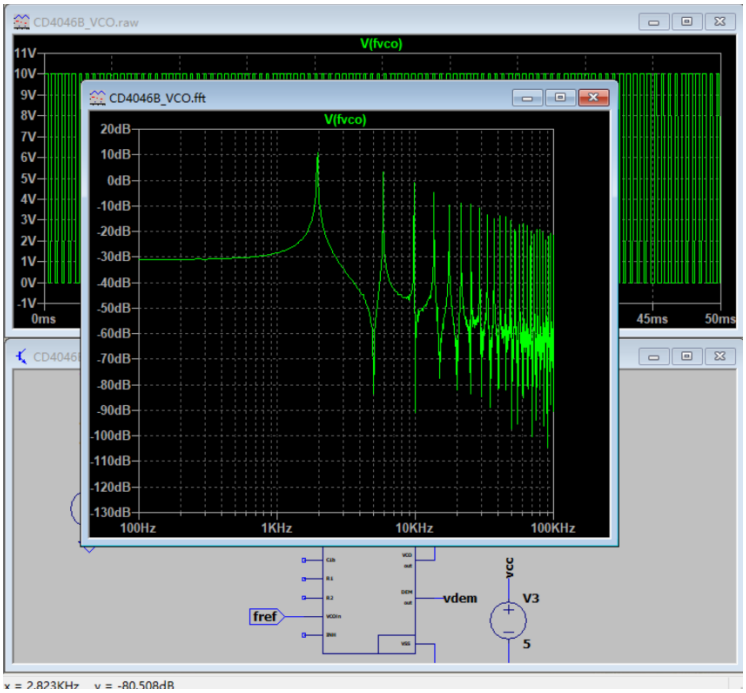
1. Si $C_1 = 1nF$, $R_1 = 10k\,\Omega$ et $R_2 = \infty$, je trouve que $f_0 \approx 7.8 \times 10^4 Hz$

   Alors $f_{max} = 2 \times f_0 = 1.56 \times 10^5 Hz$, $f_{min} = 0Hz$

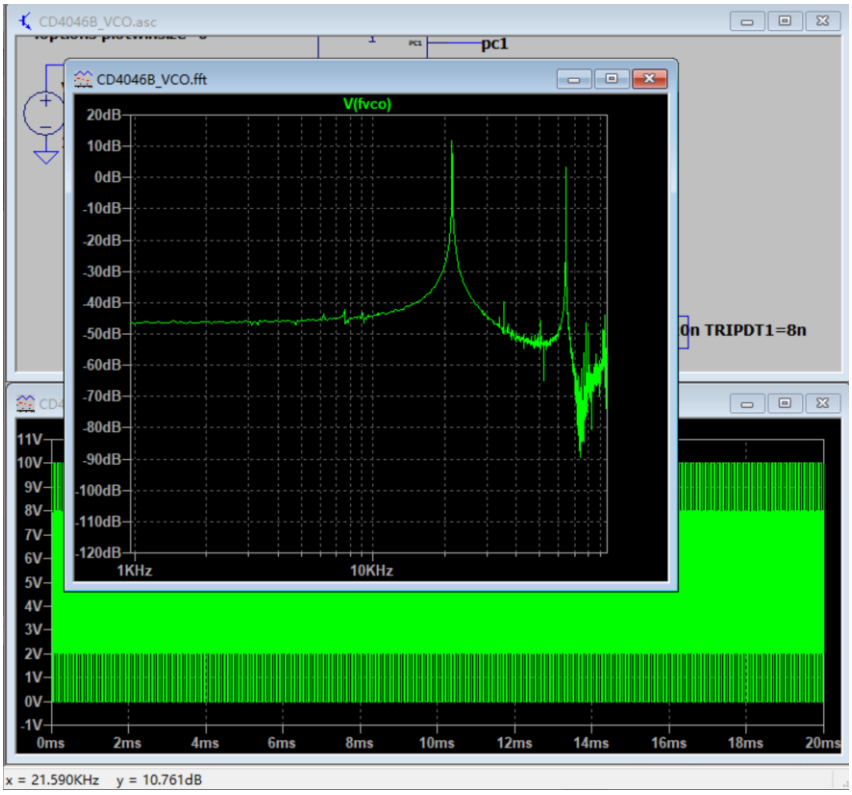
   La plage de fonctionnement du VCO est $\mathbf{0 \sim 1.56 \times 10^5 Hz}$

2.

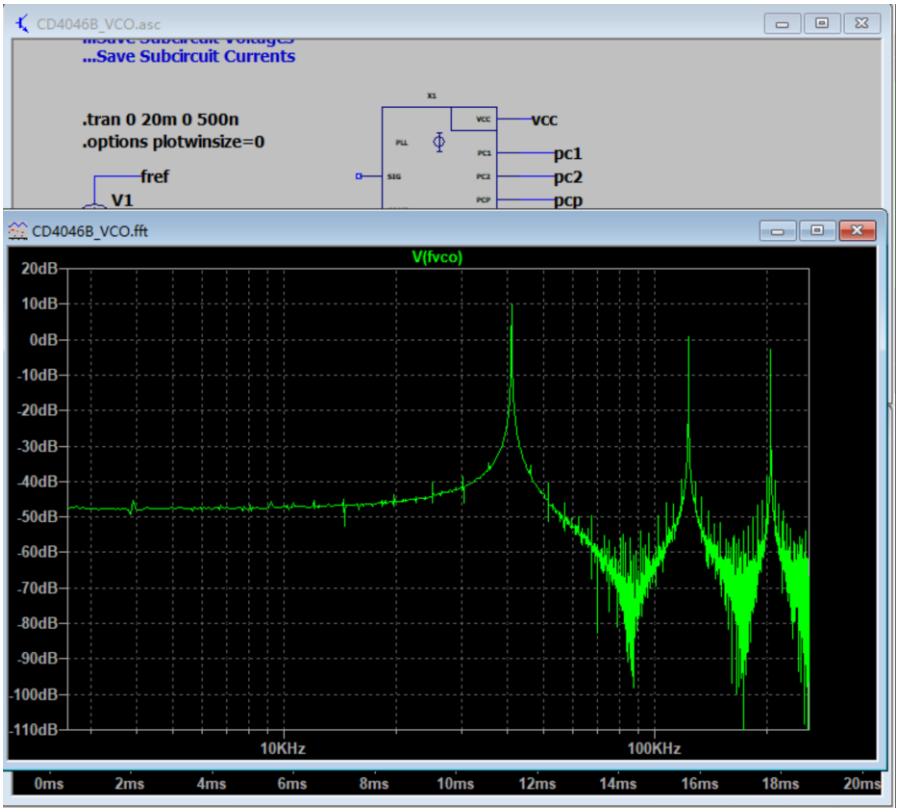
$V_1 = 1V$, $f_{harmonique} = 1.965kHz$



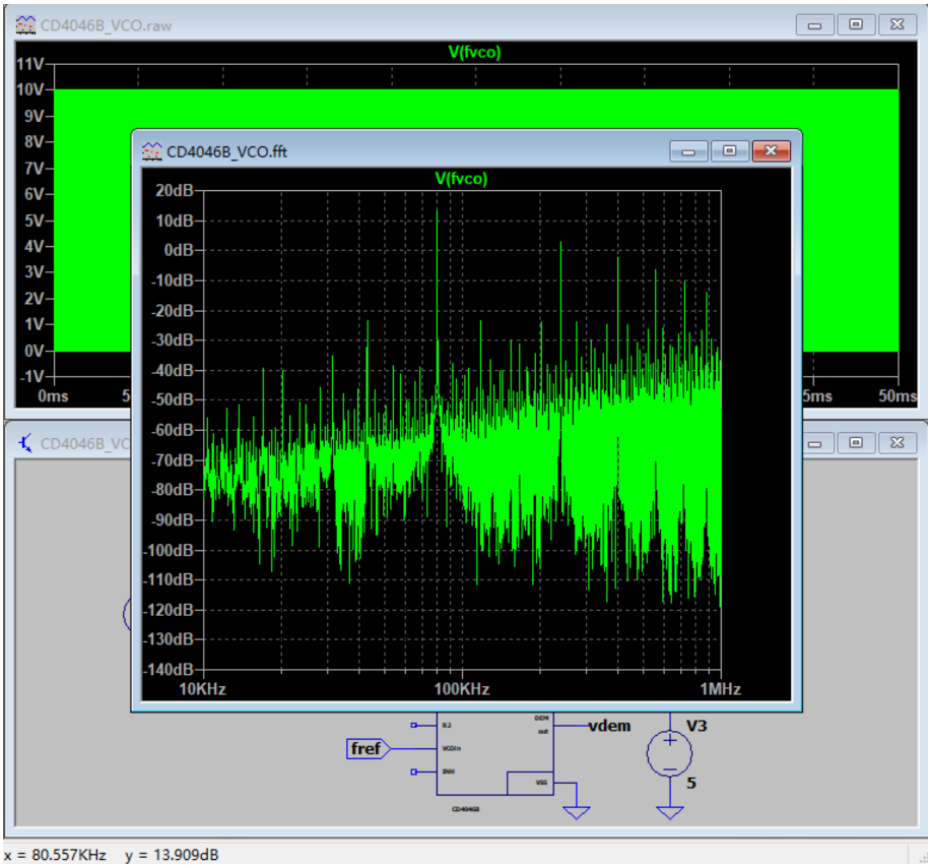
$V_1 = 2V, f_{harmonique} = 21.3kHz$



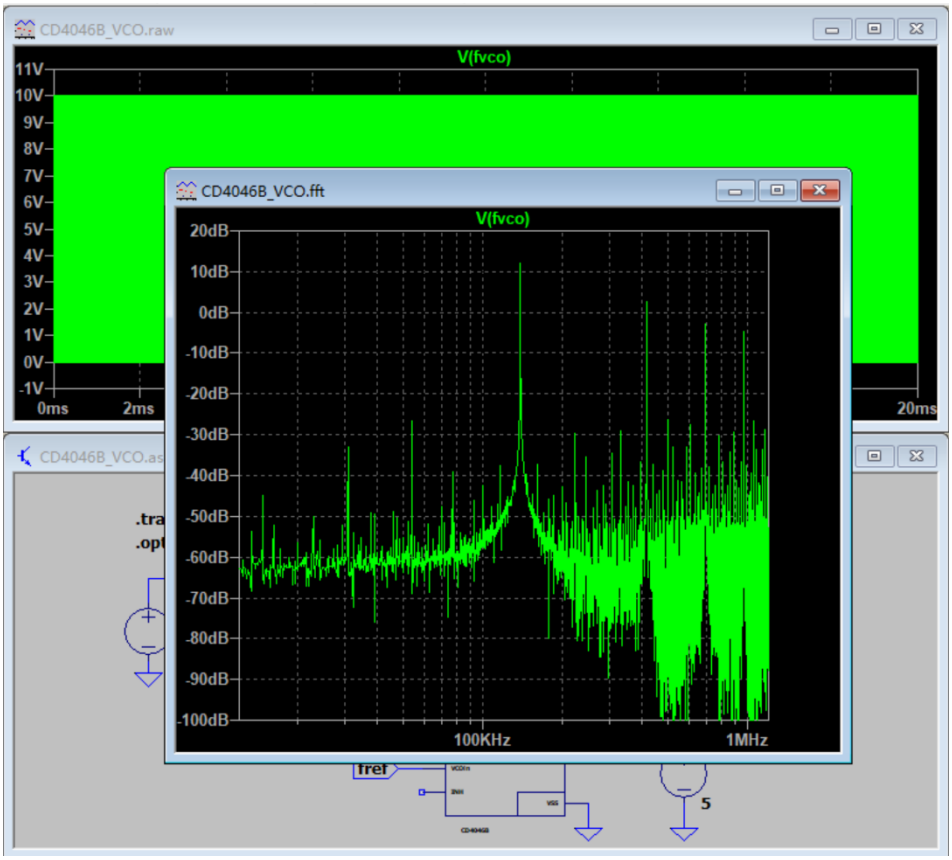
$V_1 = 3V, f_{harmonique} = 41.3kHz$



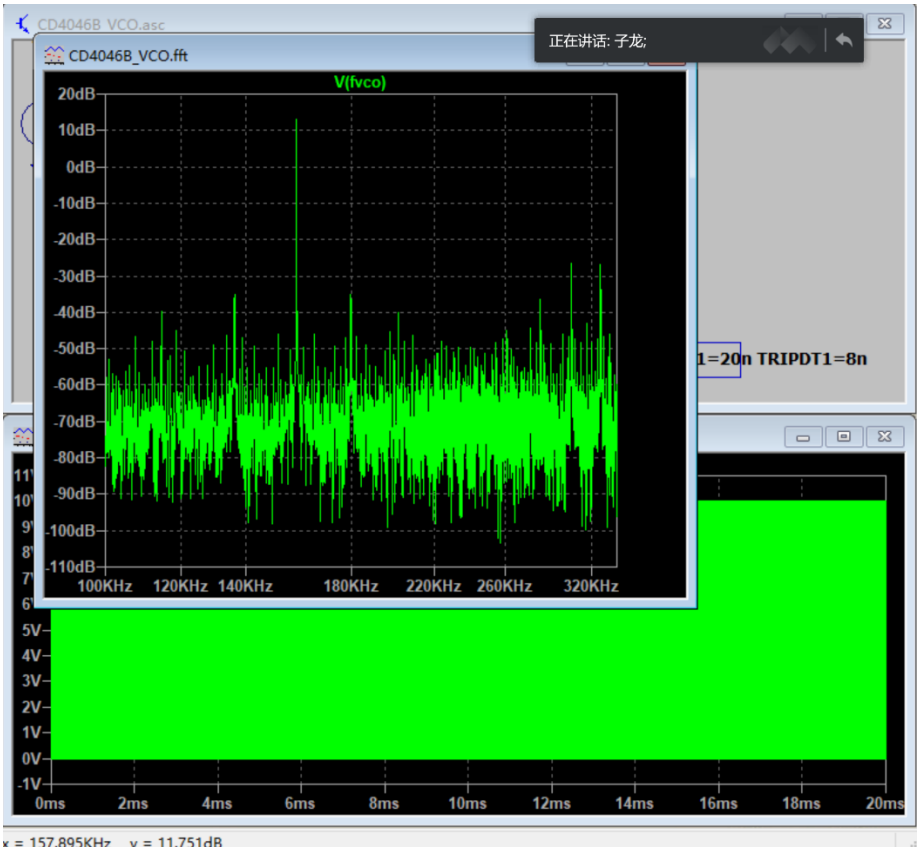
$V_1 = 5V$, $f_{harmonique} \approx 80kHz$



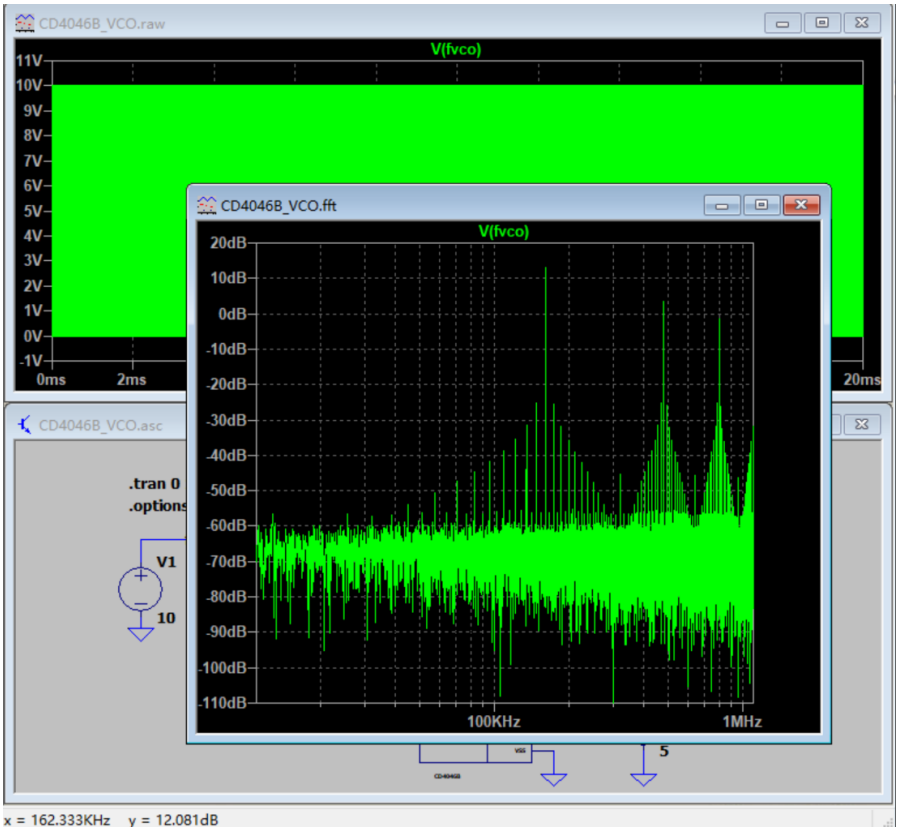
$V_1 = 8V,\ f_{harmonique} \approx 138kHz$



$V_1 = 9V, f_{harmonique} = 157kHz$



$V_1 = 10V, f_{harmonique} = 160kHz$

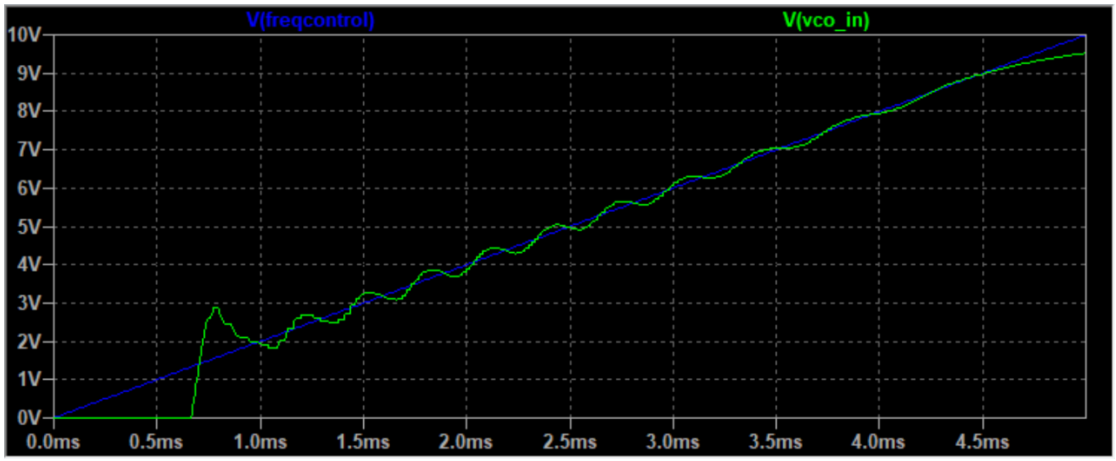


J'ai constaté une linéarité entre la tension d'entrée et la fréquence de sortie. Notamment entre 1V ~ 9V

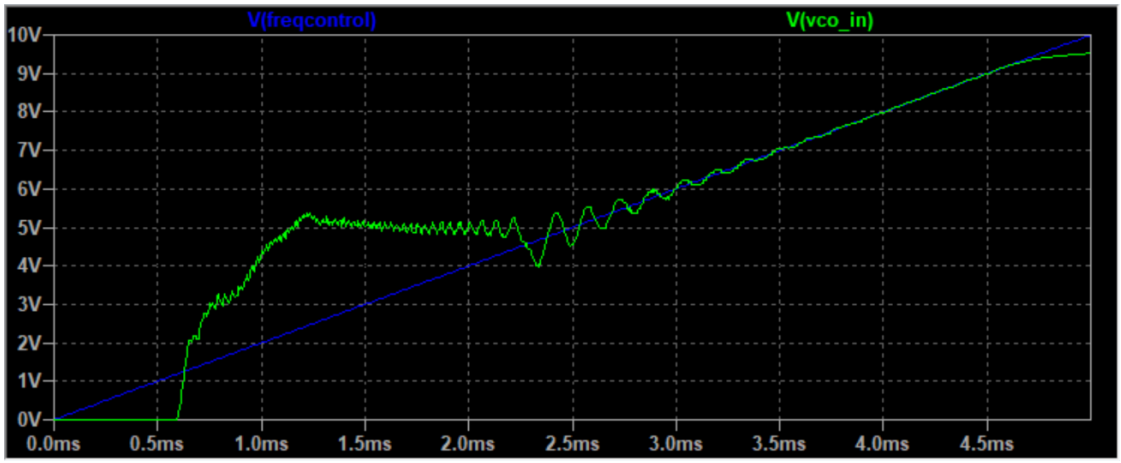
$f_{harmonique} = 2kHz\ si\ V \leq 1V$
$f_{haomonique} = 20k \times (V\text{-}1)$ si $V \in (1V, 9V)$
$f_{harmonique} = 160kHz\ si\ V \geq 9V$

2. Mesure des plages de capture et de verrouillage
   3

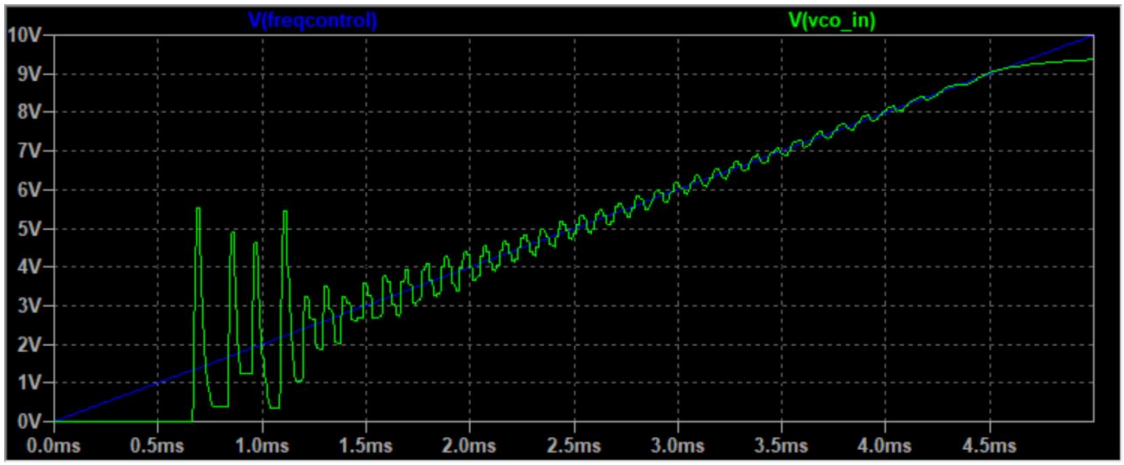
(1) : $C_2 = 100nF, Comparateur = PC2$



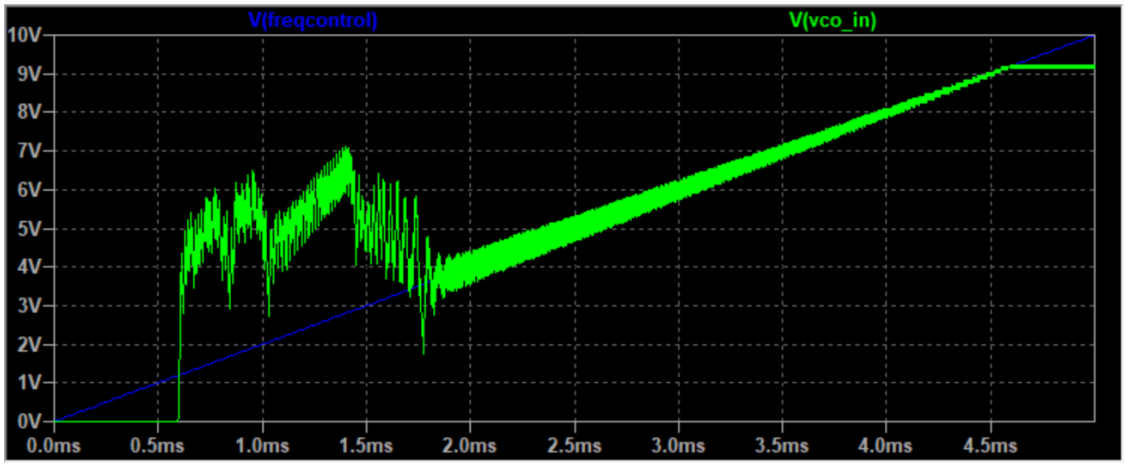
(2): $C_2 = 100nF, Comparateur = PC1$



(3) : $C_2 = 10nF, Comparateur = PC2$

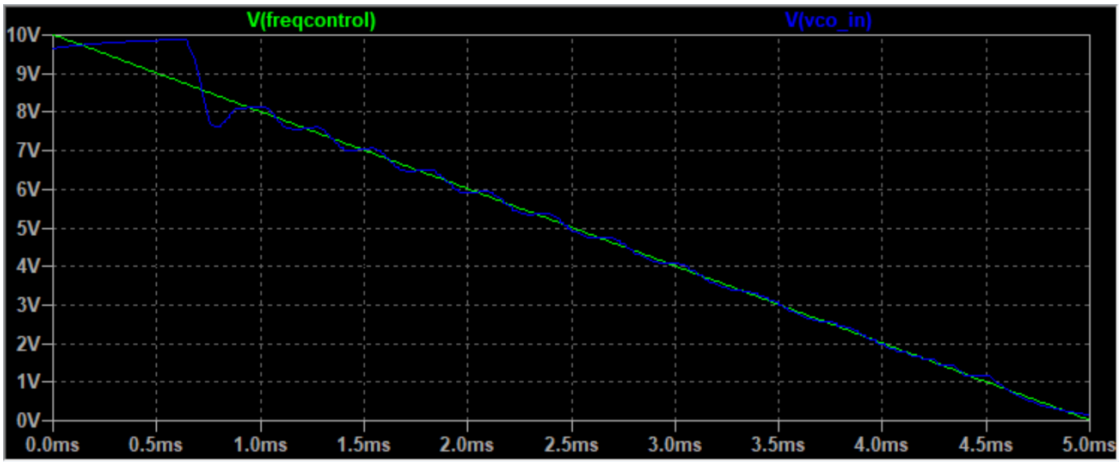


(4) : $C_2 = 10nF, Comparateur = PC1$

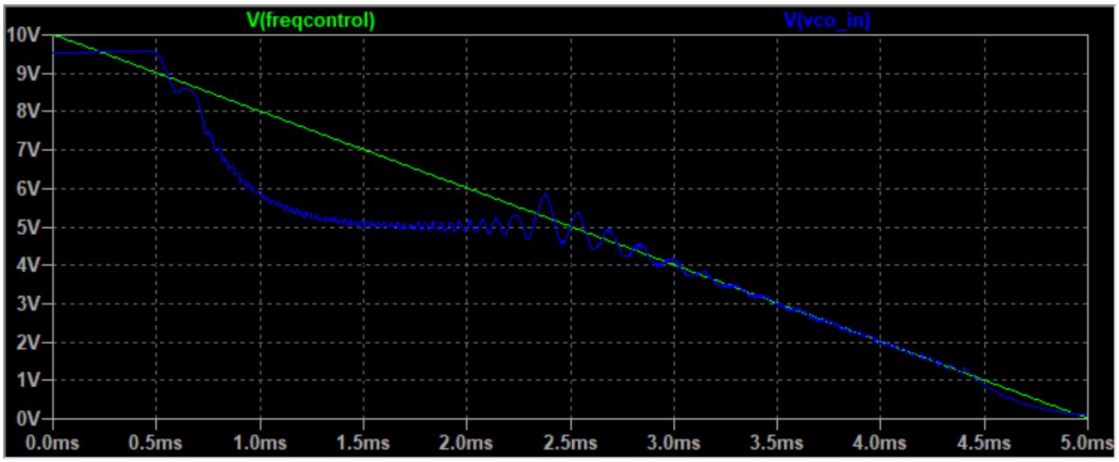


4

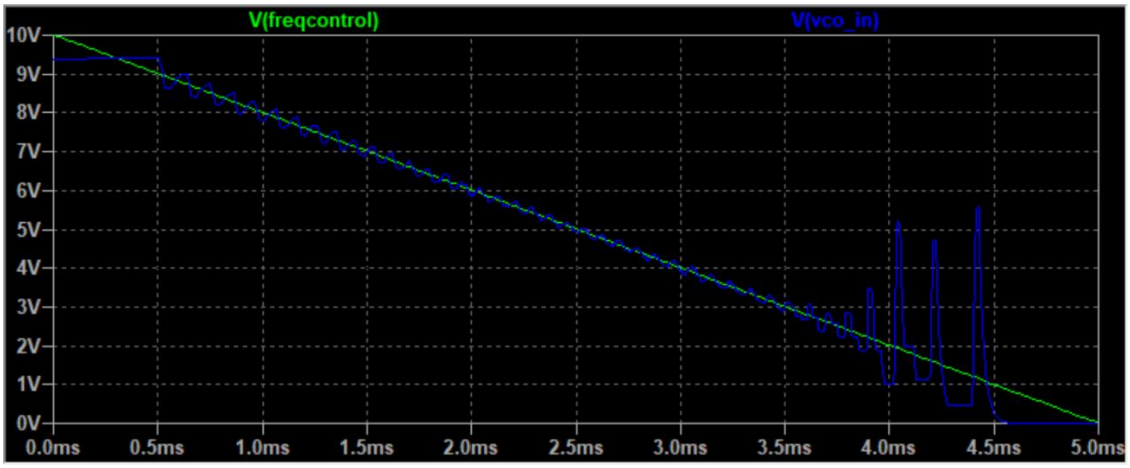
(1) : $C_2 = 100nF, Comparateur = PC2$



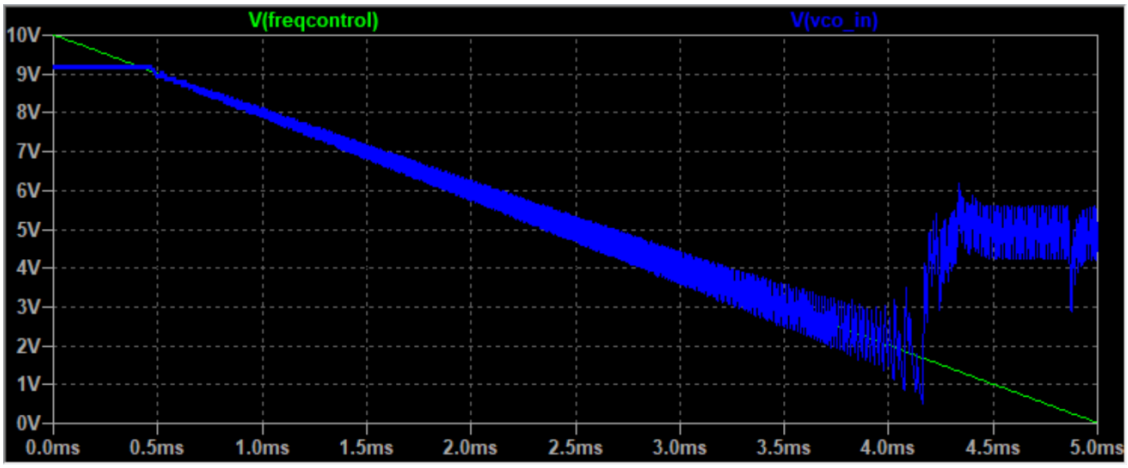
(2) $C_2 = 100nF, Comparateur = PC1$



(3) $C_2 = 10nF, Comparateur = PC2$

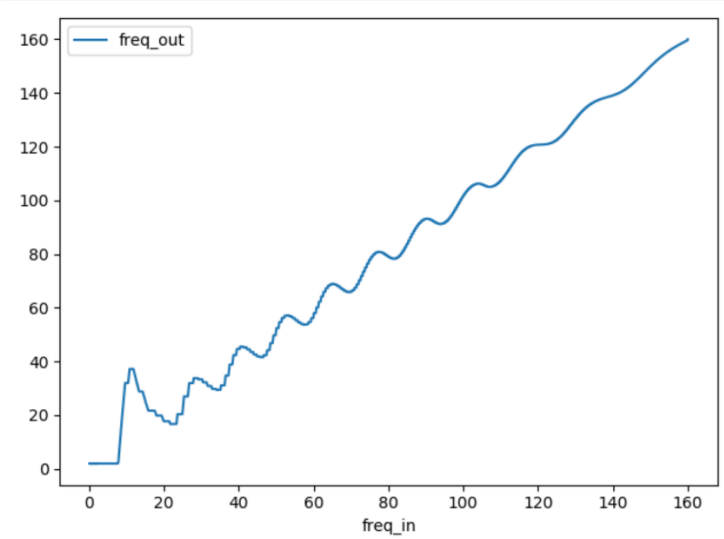


(4) $C_2 = 10nF, Comparateur = PC1$



5.

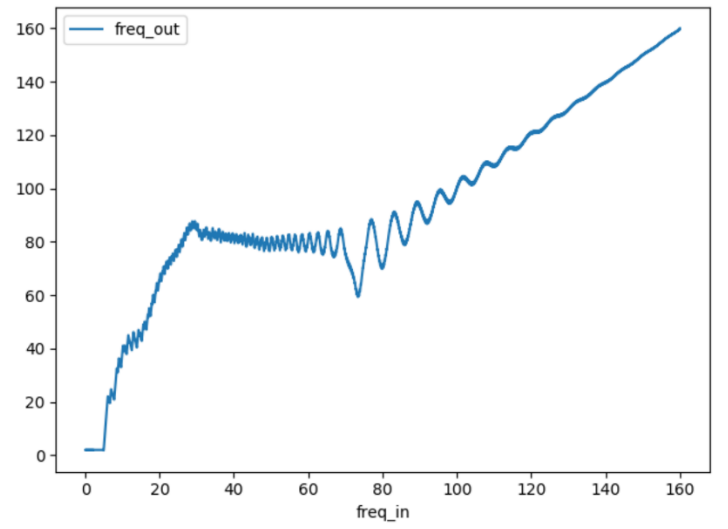
(1) : $C_2 = 100nF, Comparateur = PC2$



Plage de verrouillage = 160kHz

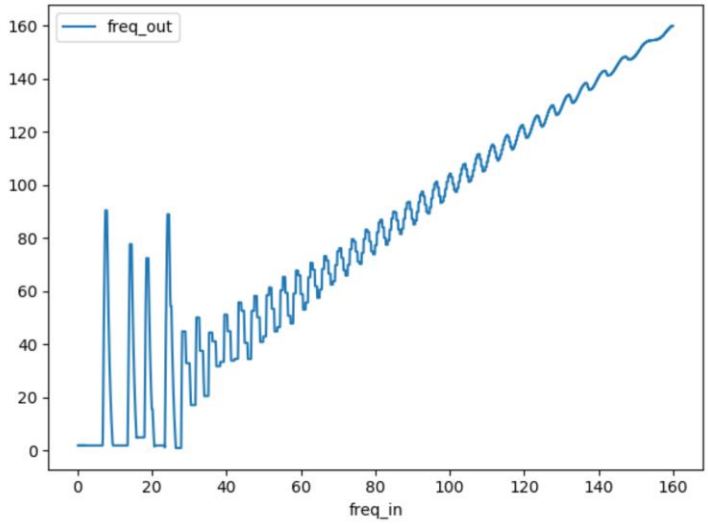
Plage de capture = 150kHz

(2) : $C_2 = 100nF, Comparateur = PC1$



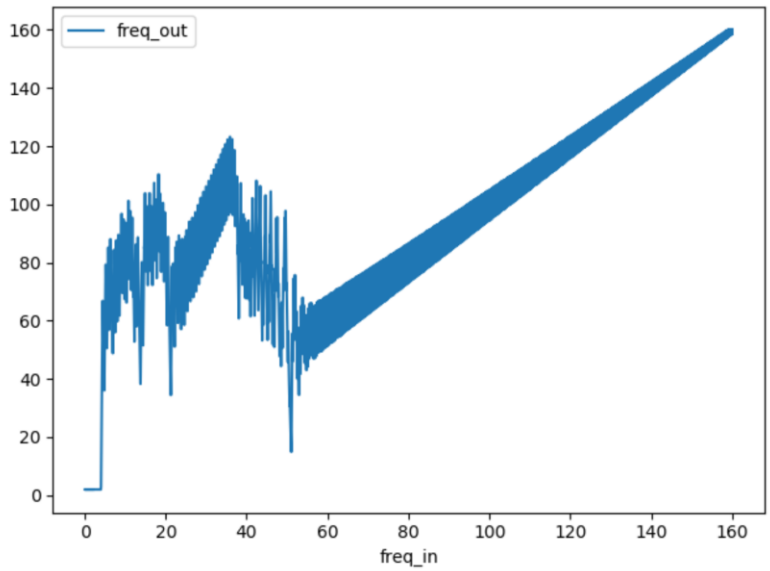
Plage de verrouillage = 155kHz
Plage de capture = 155kHz

(3) : $C_2 = 10nF, Comparateur = PC2$



Plage de verrouillage = 155kHz
Plage de capture = 155kHz

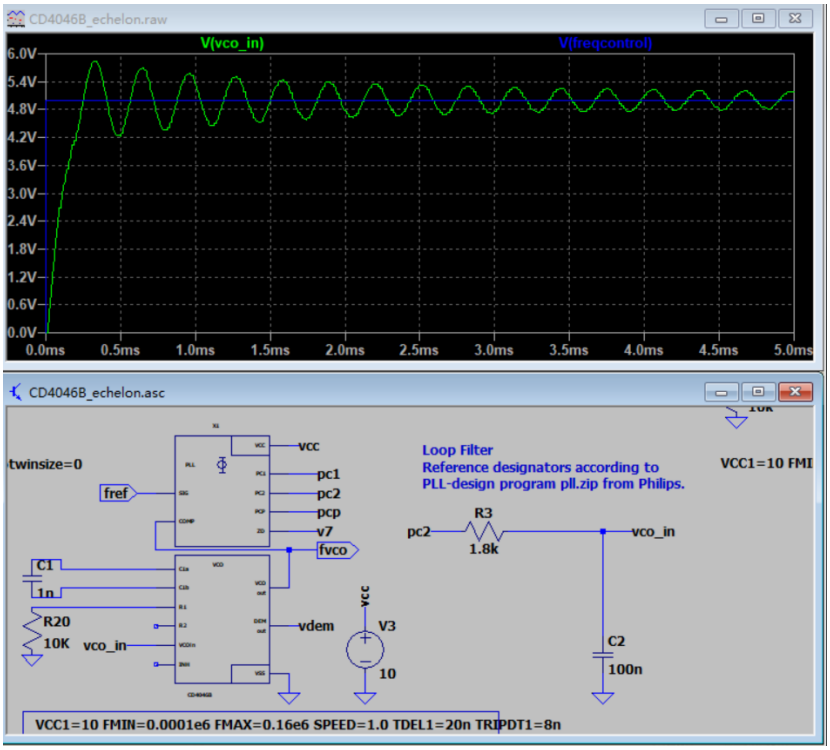
(4) : $C_2 = 10nF, Comparateur = PC1$



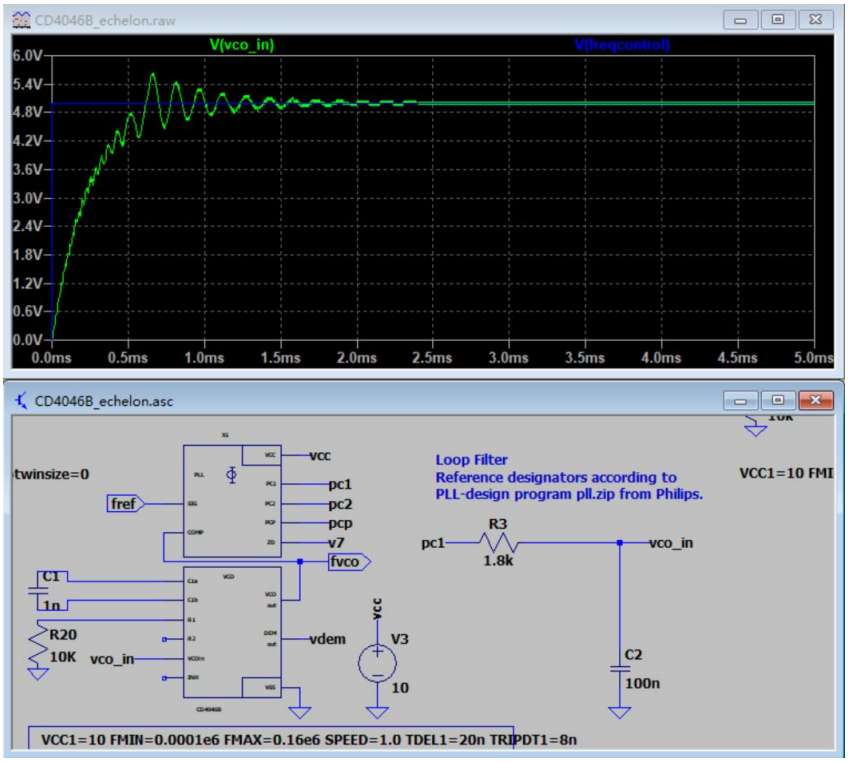
Plage de verrouillage = 155kHz
Plage de capture = 155kHz

3. Réponse de la PLL a un échelon

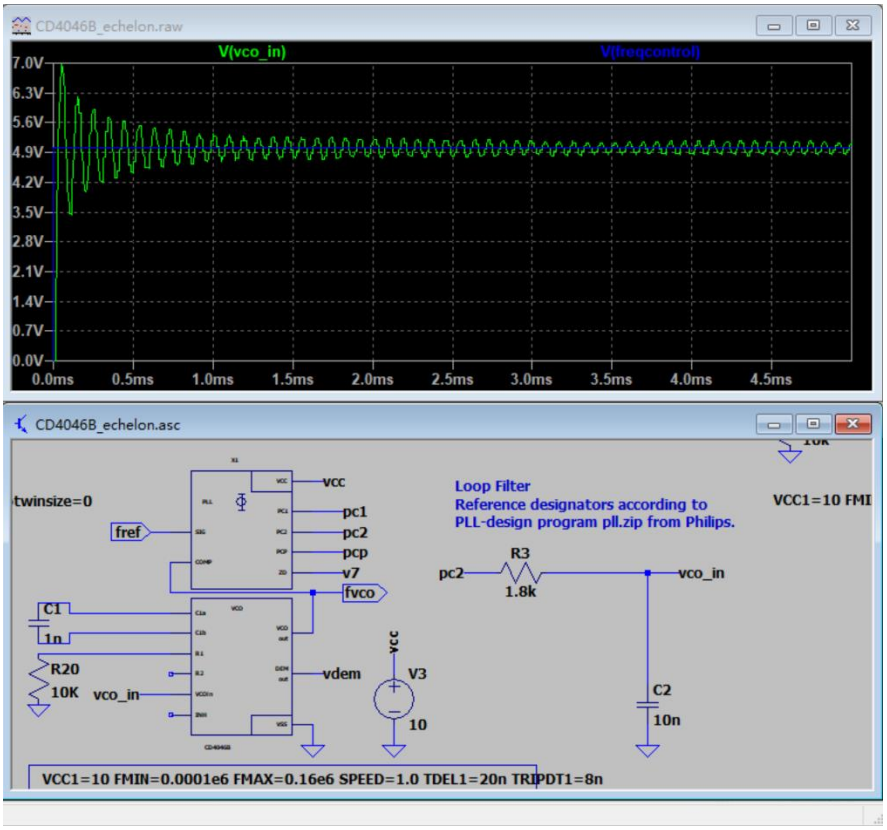
(1) : $C_2 = 100nF, Comparateur = PC2$



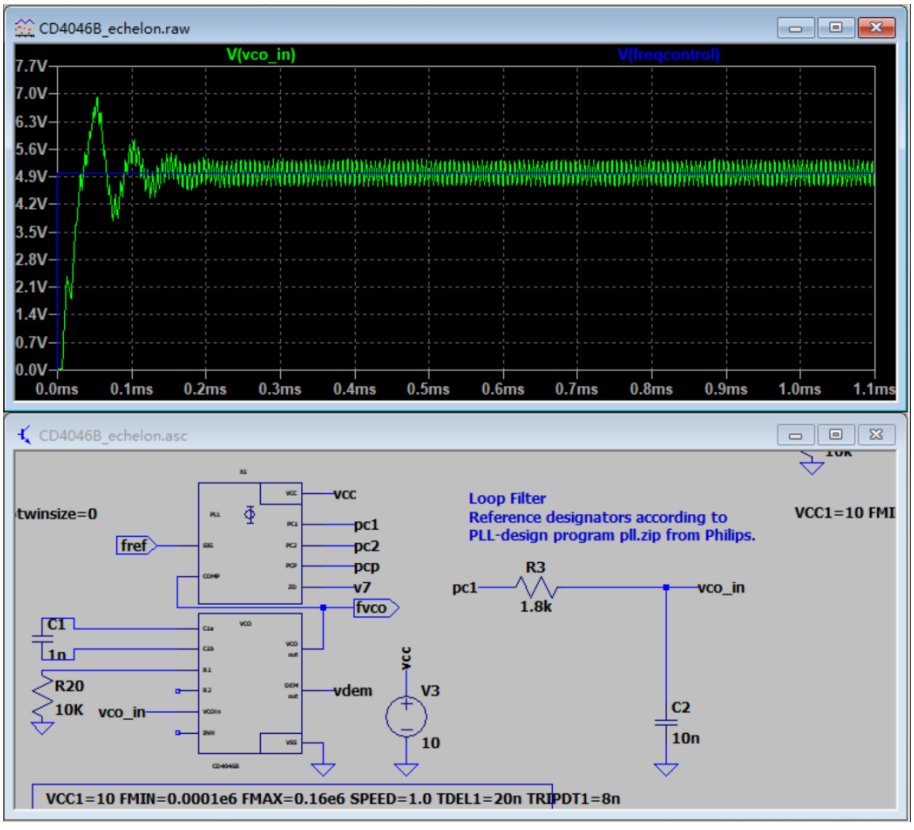
(2) : $C_2 = 100nF, Comparateur = PC1$



(3) : $C_2 = 10nF, Comparateur = PC2$



(4) : $C_2 = 10nF, Comparateur = PC1$



2.

(1) : $C_2 = 100nF, Comparateur = PC2$

$$t_{90\%} = 0.25ms$$

(2): $C_2 = 100nF, Comparateur = PC1$

$$t_{90\%} = 0.5ms$$

(3): $C_2 = 10nF, Comparateur = PC2$

$$t_{90\%} = 0.03ms$$

(4) : $C_2 = 10nF, Comparateur = PC1$

$$t_{90\%} = 0.03ms$$

3.

Le temps est plus court si on prend une capacité plus petite.