SAE SON

Conception et réalisation d’un amplificateur de classe D

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Intervenants :
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M Laurent
M Vermalean
M Salvat

Sommaire

- Introduction
- Organisation
- Etude de la chaine de traitement
- Réalisations
- Design
- Conclusion

Objectifs

- Avoir un signal entre 0V et 5V à la sortie du conditionnement
- Faire un CAN et une PWM en VHDL
- Faire un affichage dynamique du son
- Amplifier la PWM
- Amortir les surtensions et filtres les hautes fréquences
- Avoir une qualité de son la plus qualitative possible

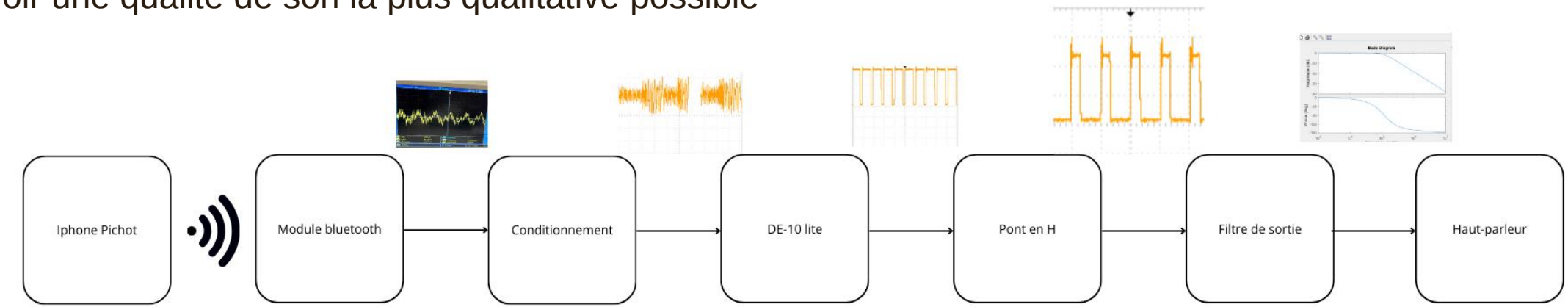


Diagramme de Gantt

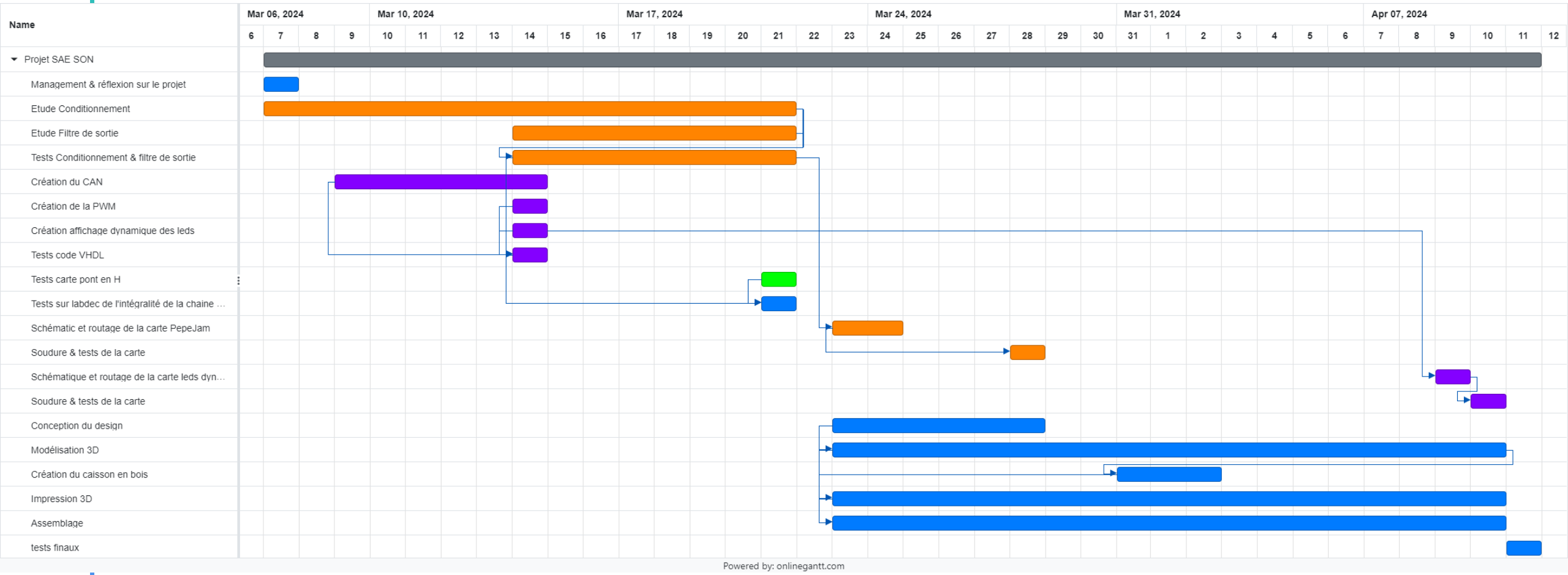
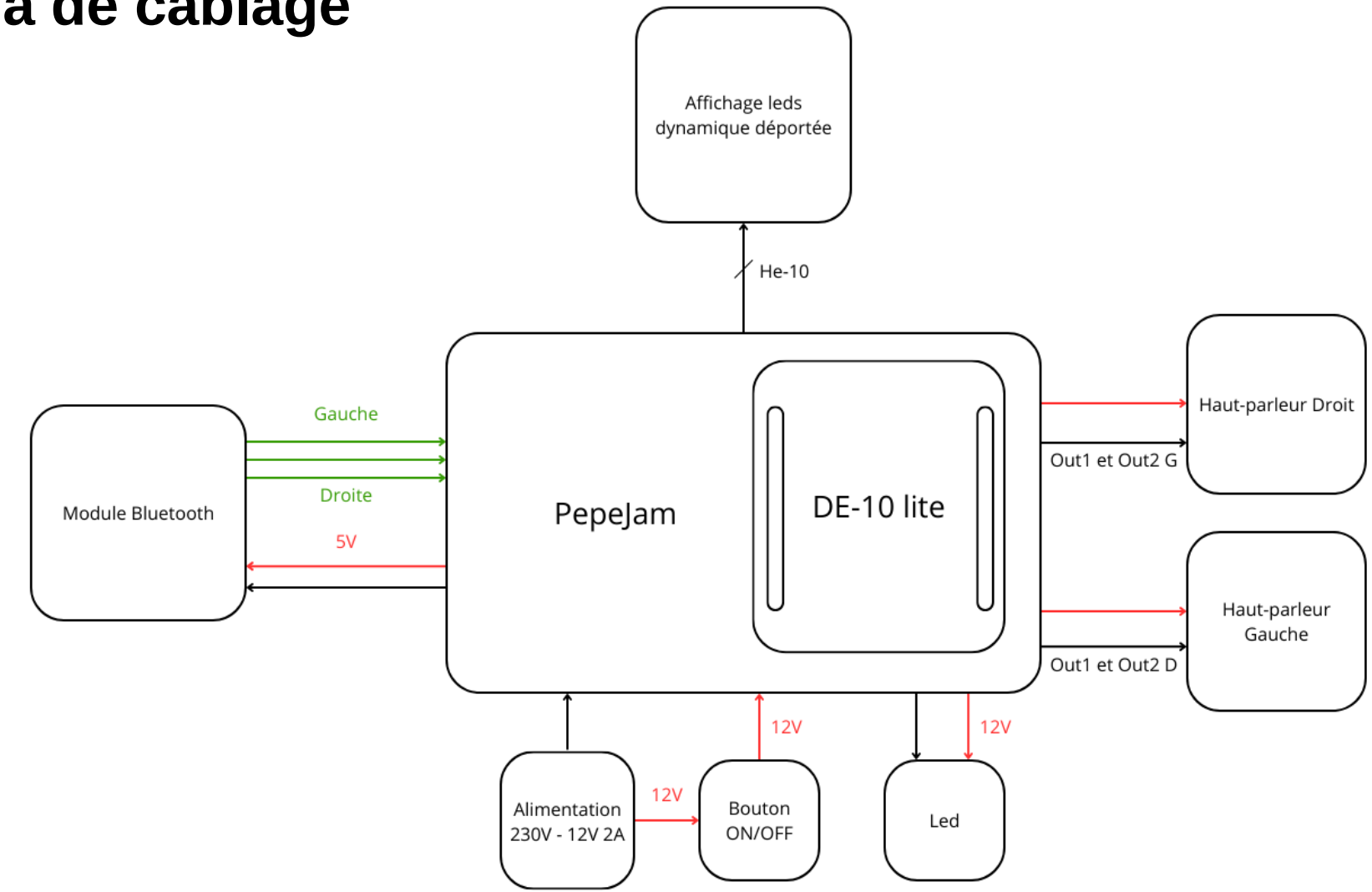
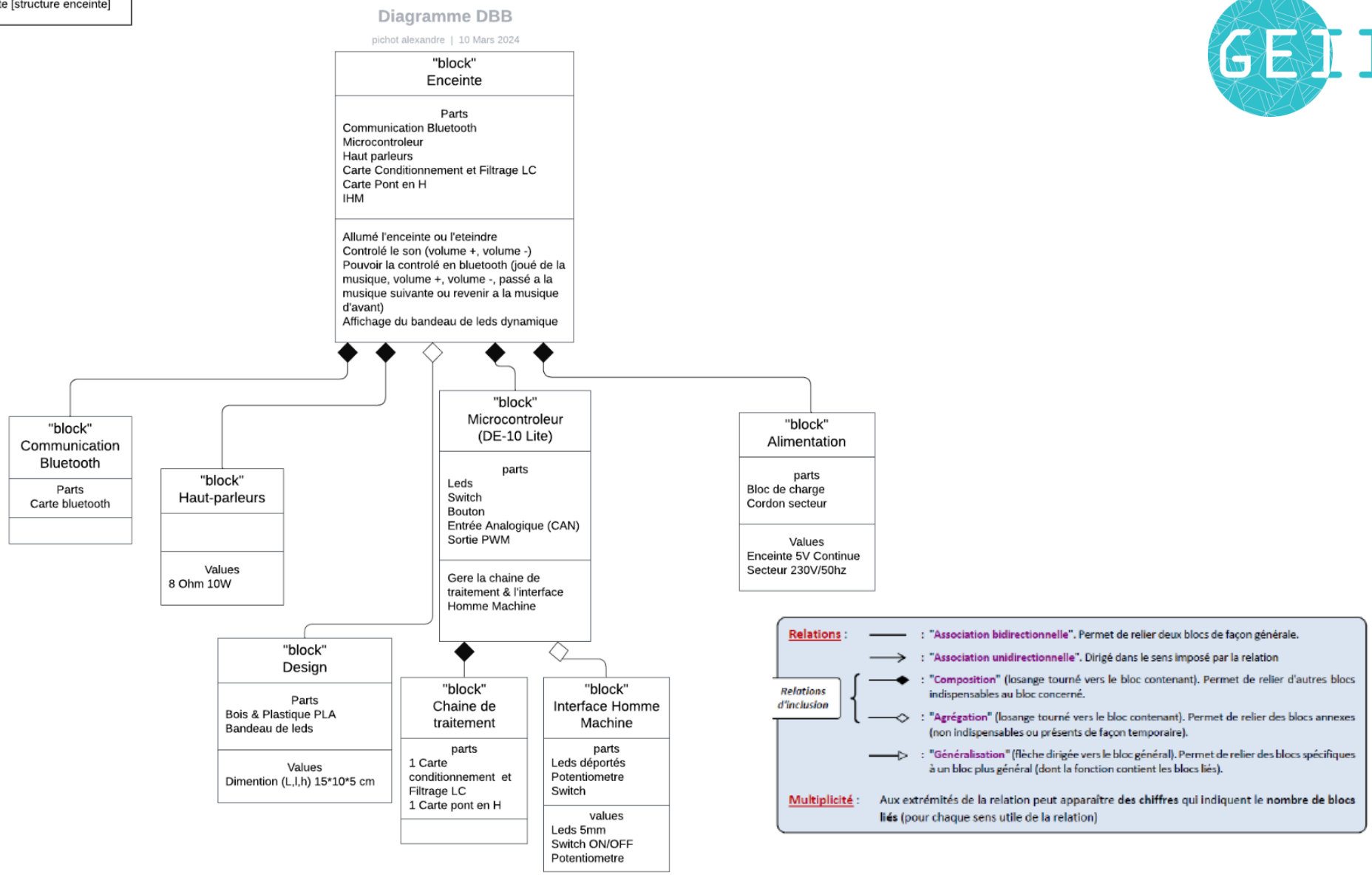


Schéma de câblage



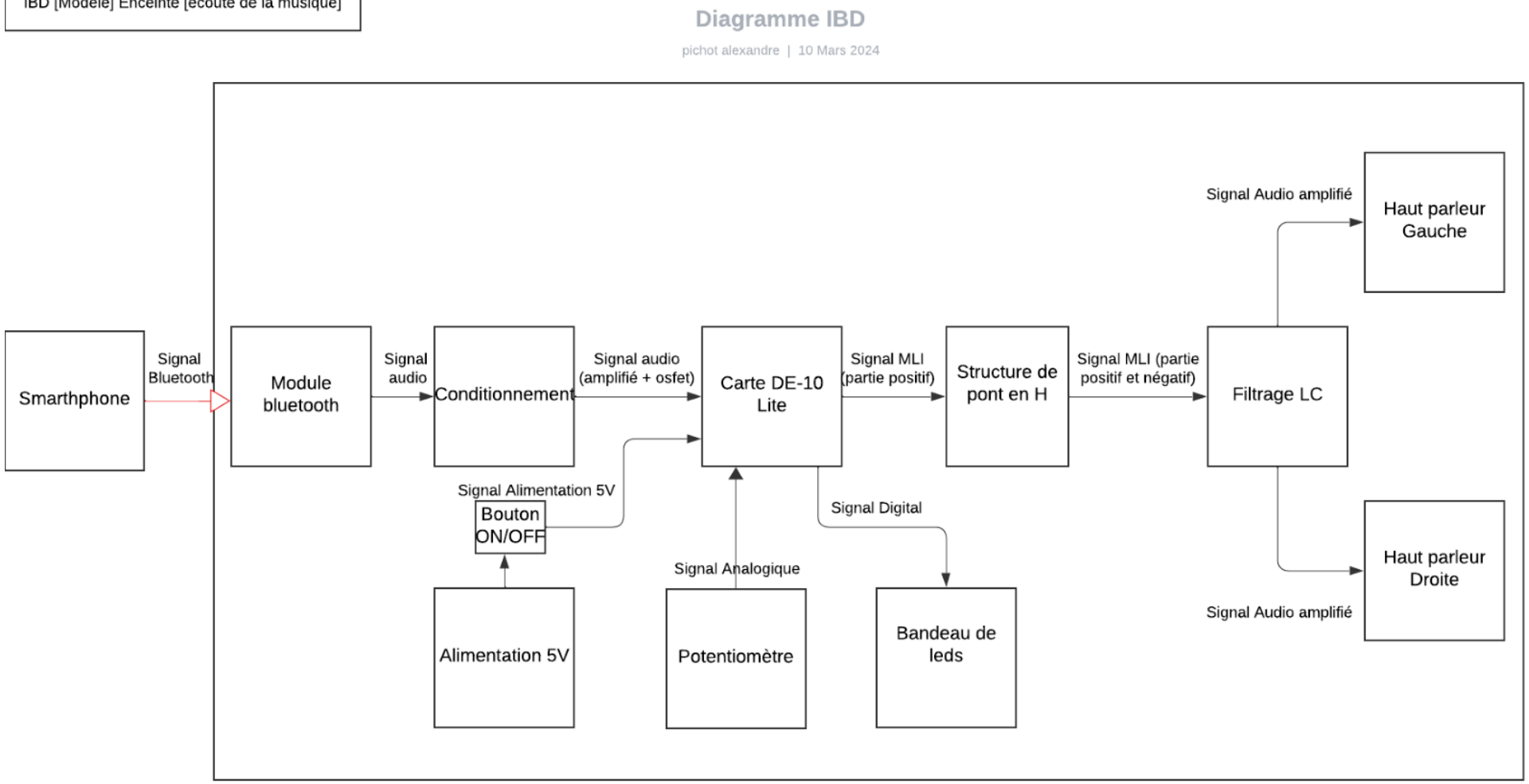
DBB

BDD [Modèle] Enceinte [structure enceinte]

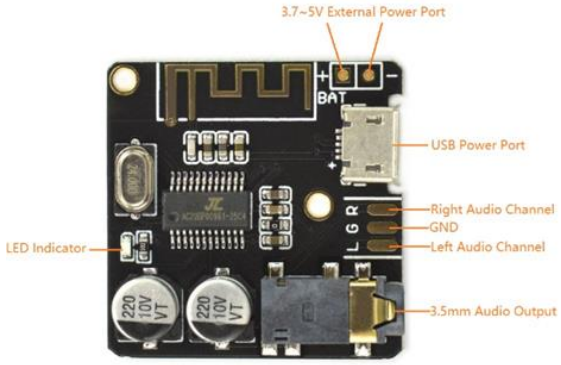


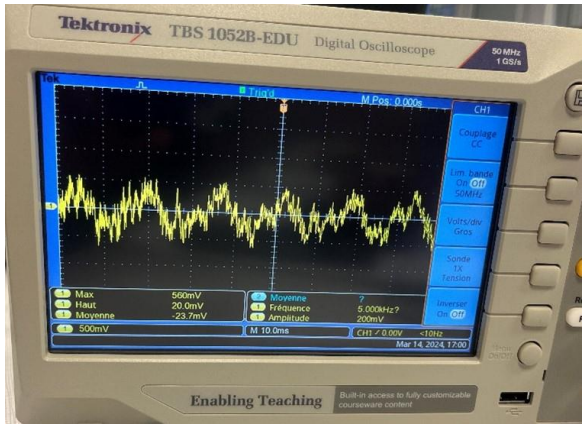
IBD

IBD [Modèle] Enceinte [écouté de la musique]

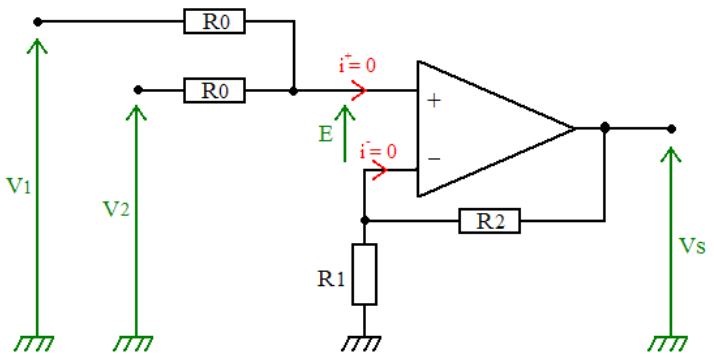


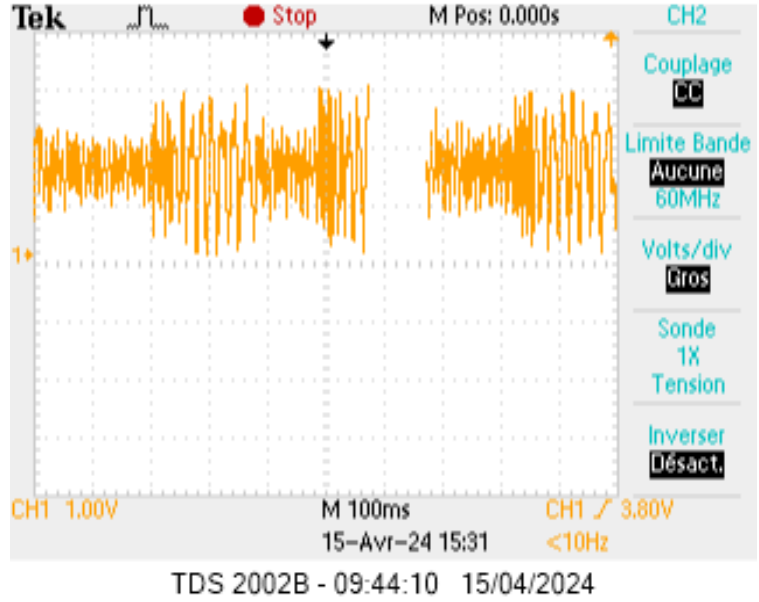
Conditionnement





- Module Bluetooth
- De-10 lite entrée analogique
- Sommateur non inverseur
- LM358
- Offset + Gain





VHDL

- Etude du manuel de la DE-10 lite
- Block CAN
- Création MLI
- Affichage leds dynamique

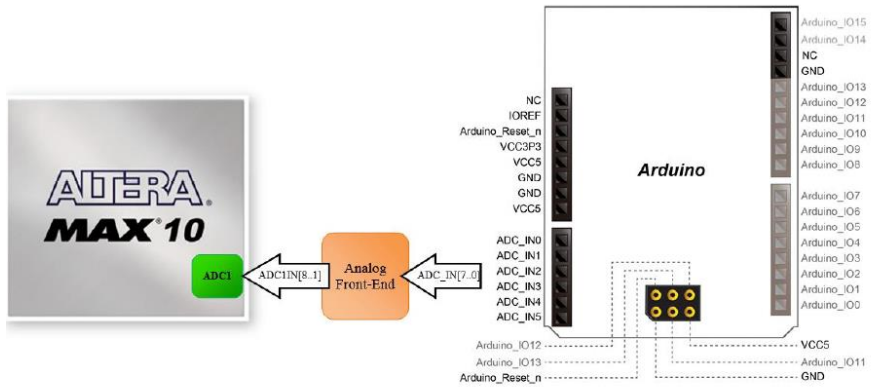
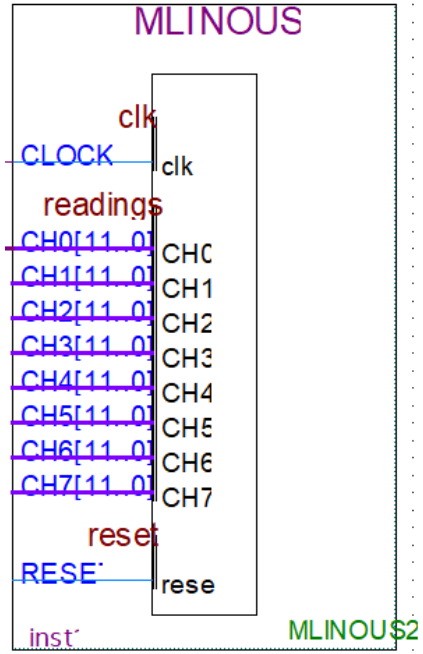
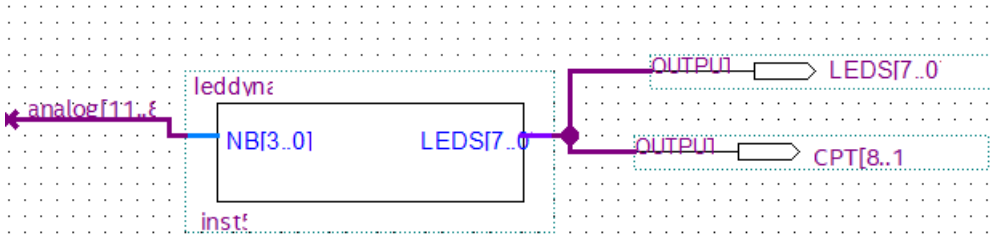
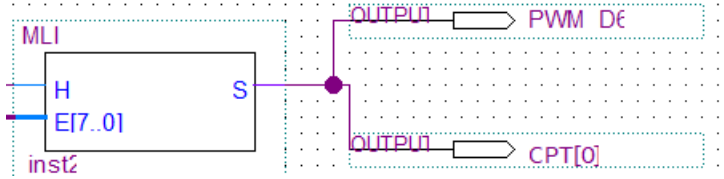


Figure 3-20 Connections between the Arduino Analog input and MAX 10 FPGA

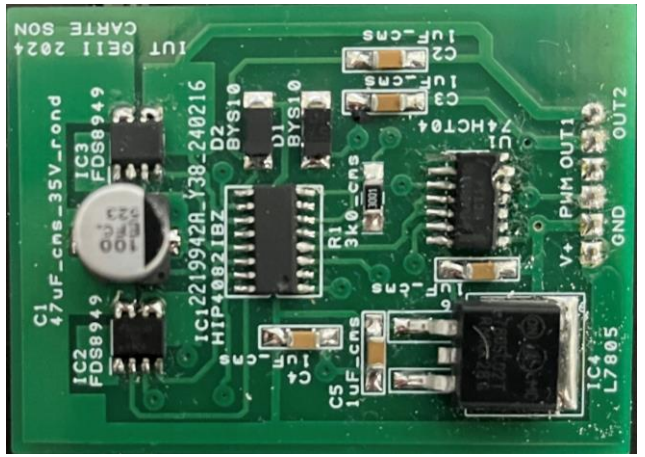




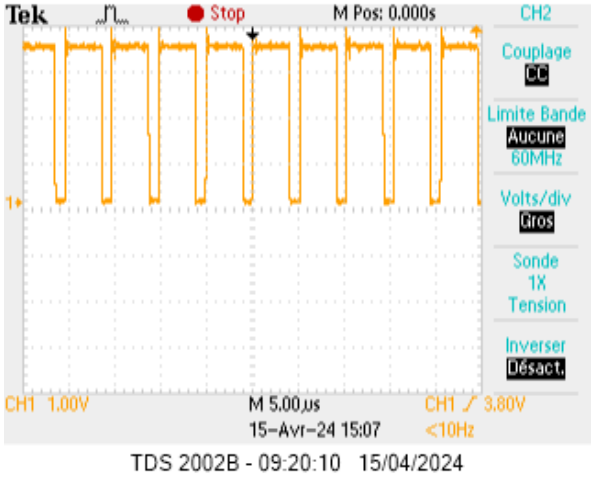


Carte pont en H

- Aides
- Problème
- Signaux de sortie



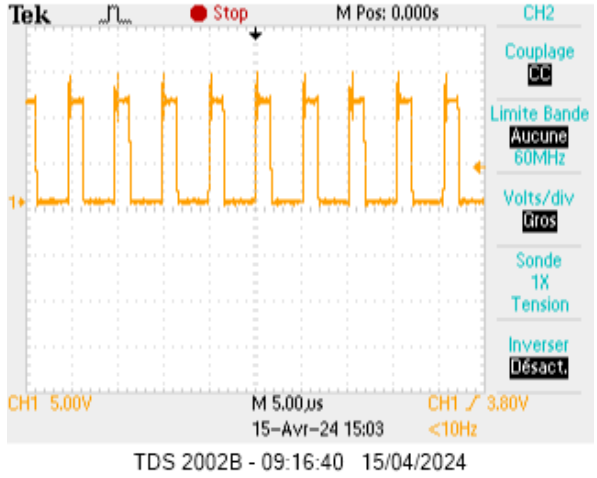
Amplitude : 3.8V



TDS 2002B - 09:20:10 15/04/2024

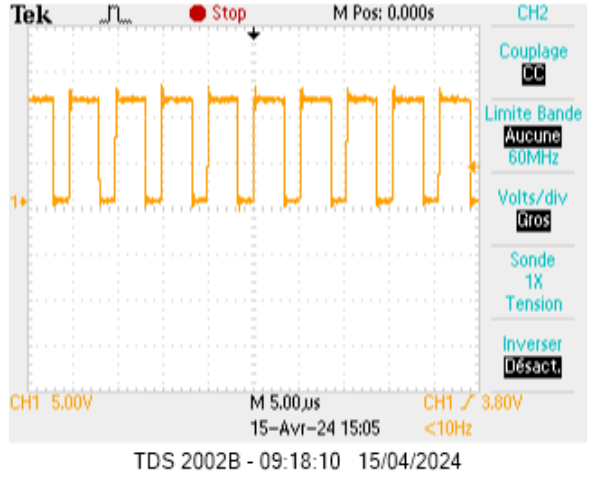
PWM

Amplitude : 12.5V



TDS 2002B - 09:16:40 15/04/2024

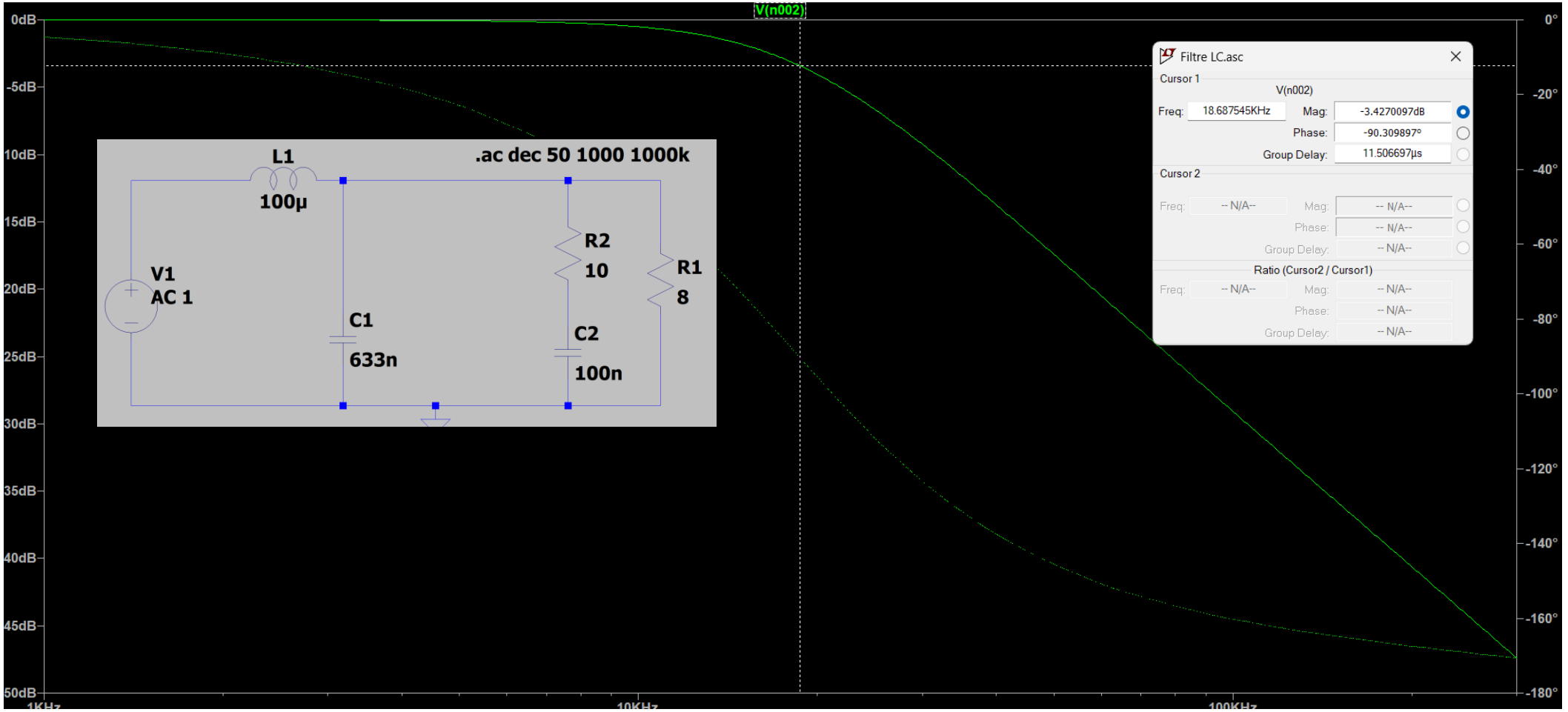
OUT1



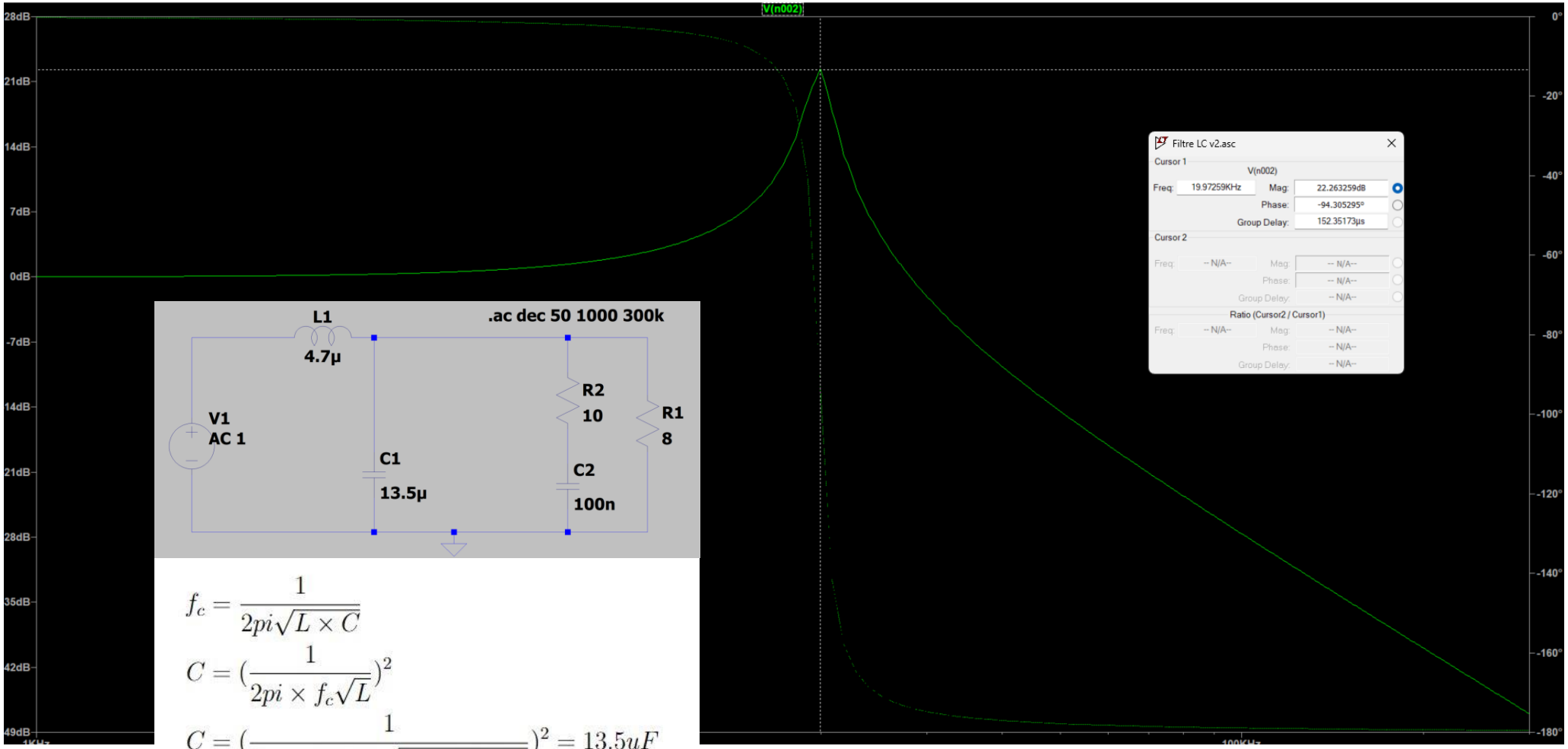
TDS 2002B - 09:18:10 15/04/2024

OUT2

Filtre de sortie



Filtre de sortie

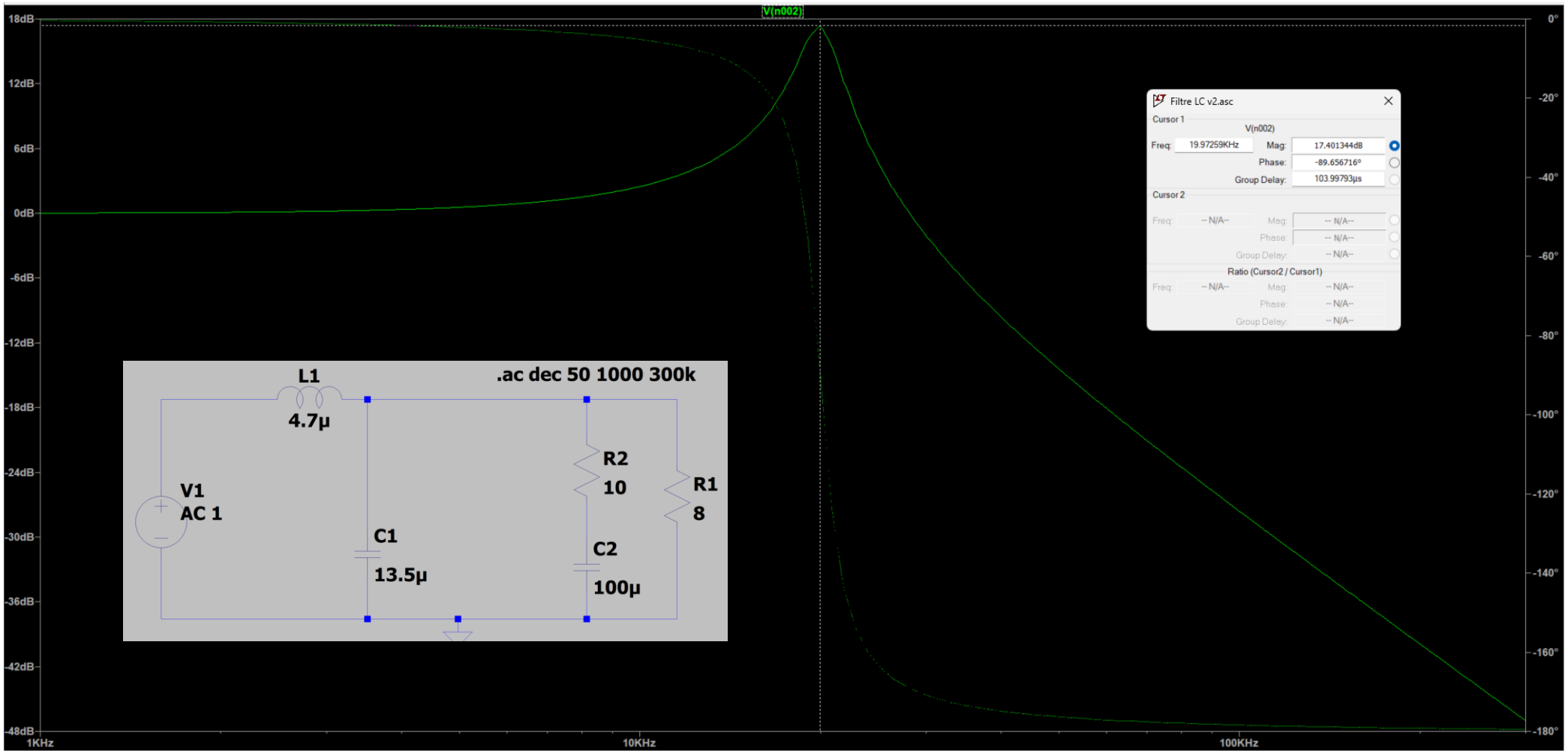


$$f_c = \frac{1}{2pi\sqrt{L \times C}}$$

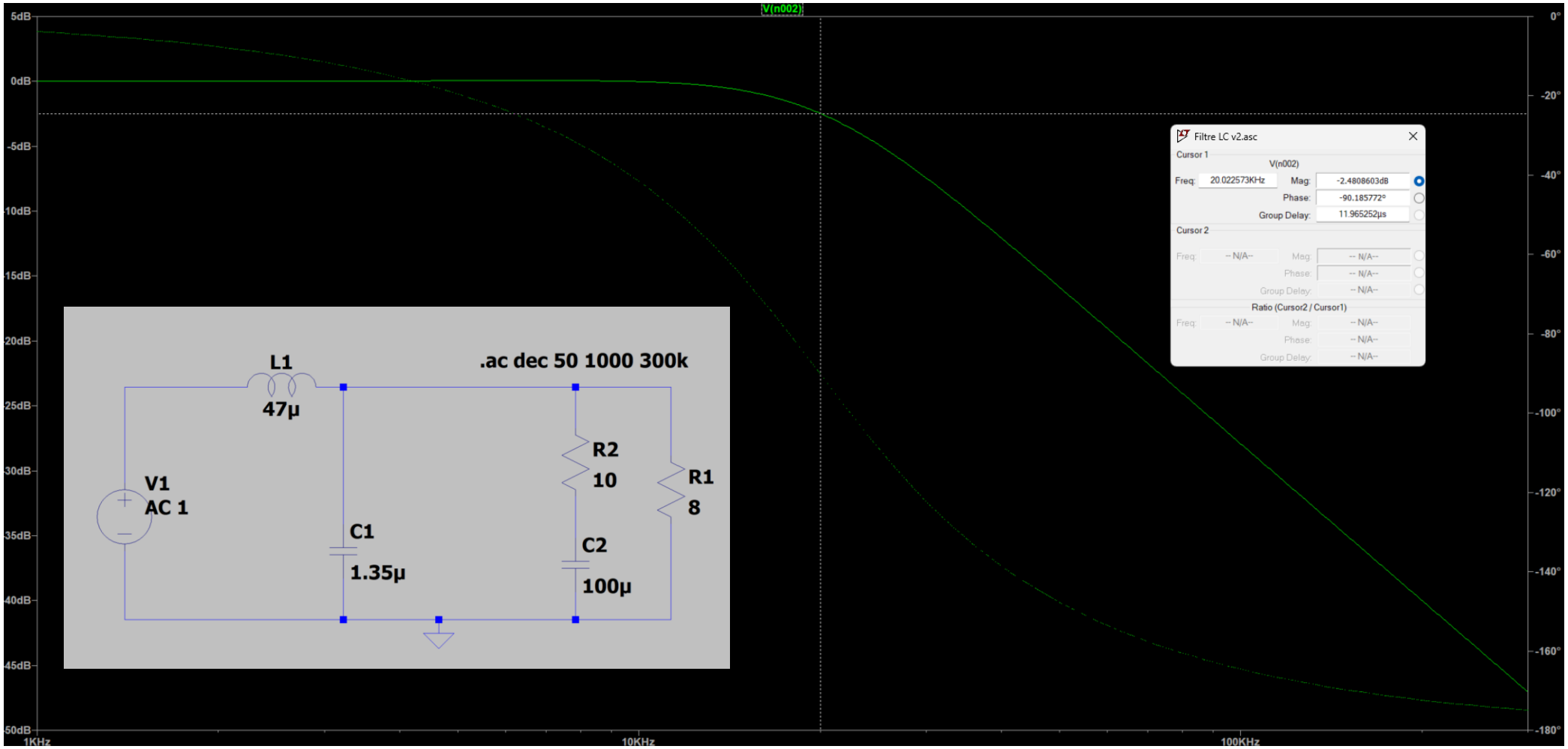
$$C = \left(\frac{1}{2pi \times f_c\sqrt{L}}\right)^2$$

$$C = \left(\frac{1}{2pi \times 20000\sqrt{4.7 \times (10^{-6})}}\right)^2 = 13.5uF$$

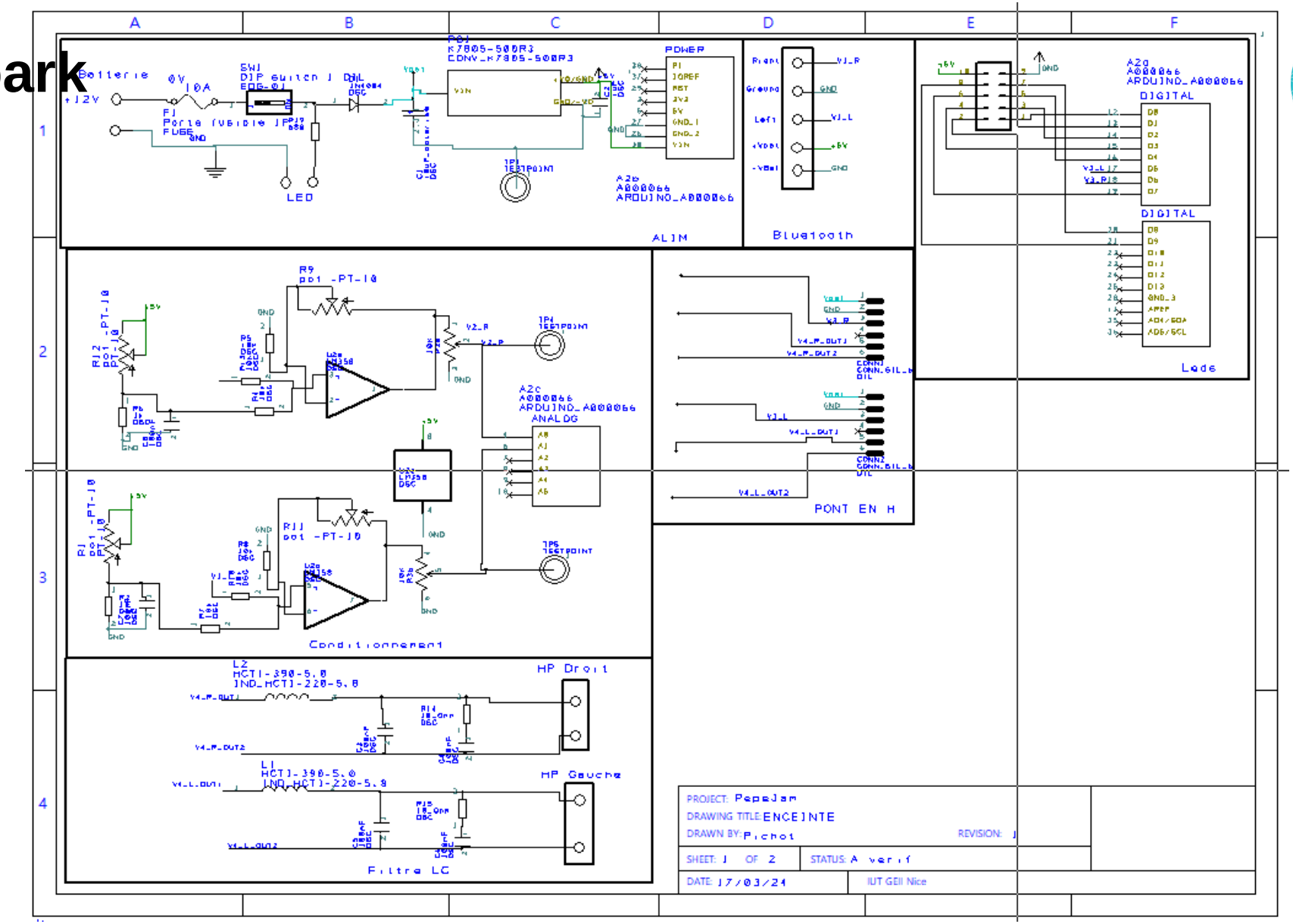
Filtre de sortie



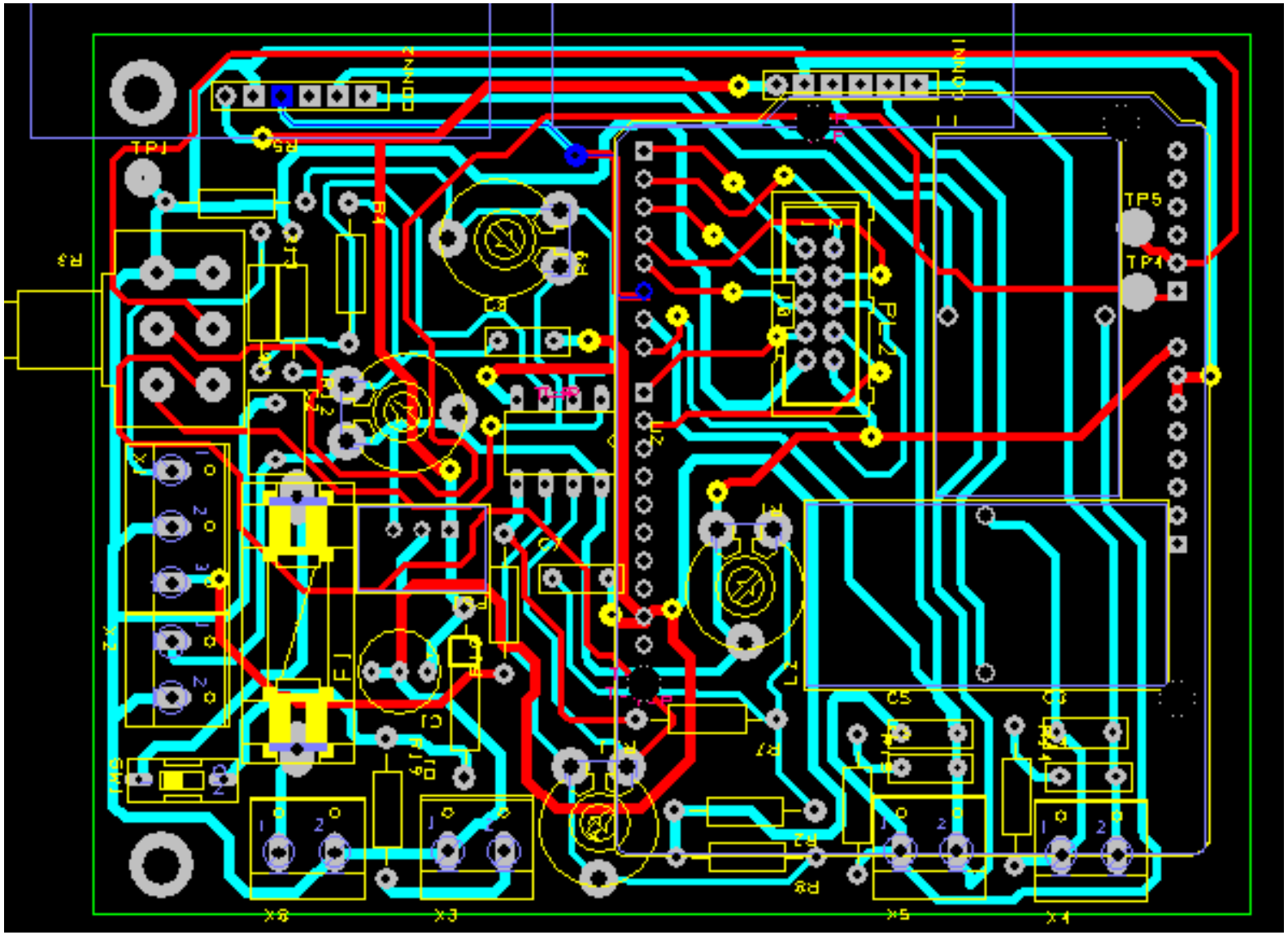
Filtre de sortie



Design Spark



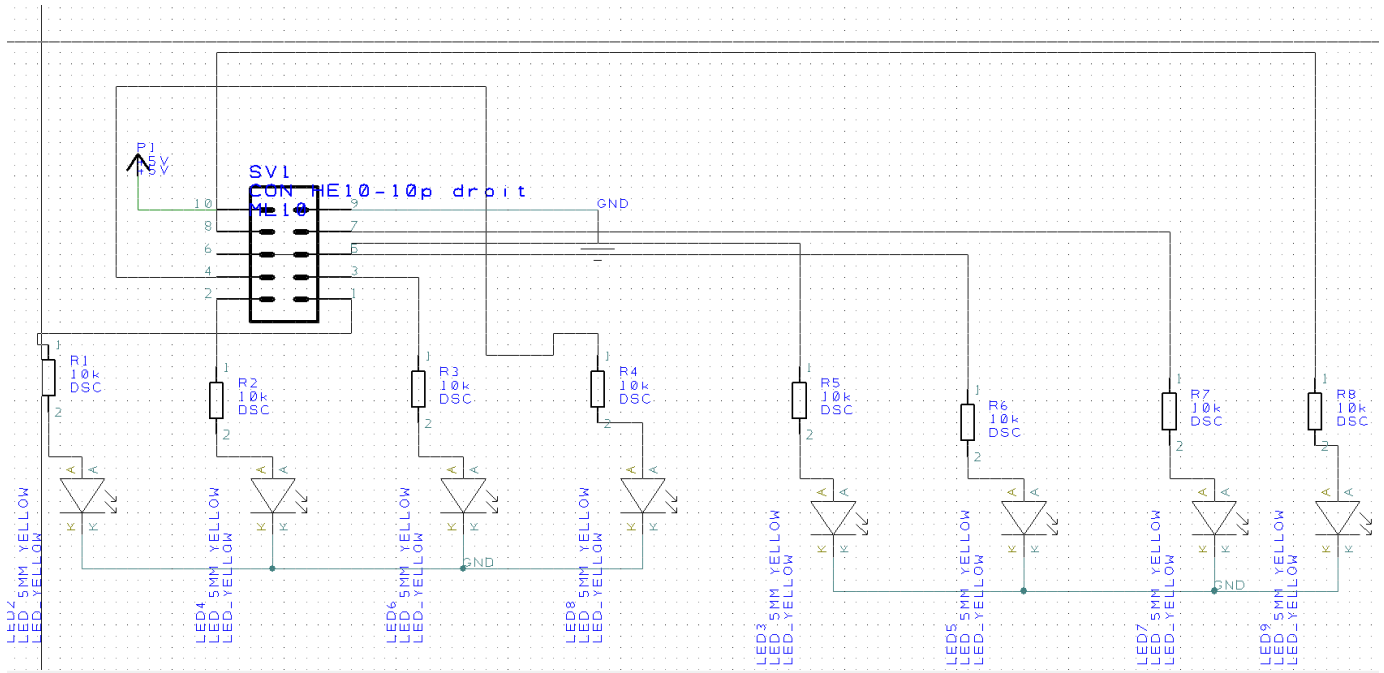
Design Spark

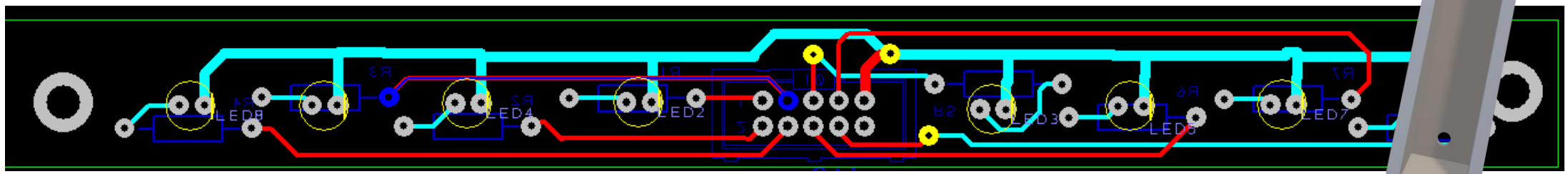


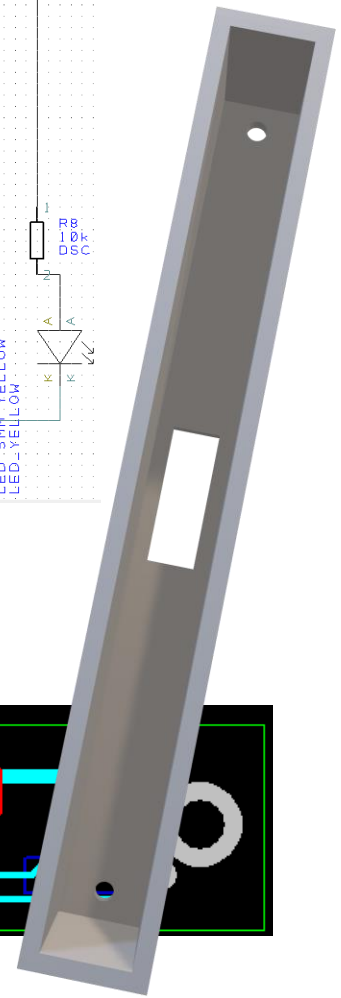
Design Spark

LED Color	Typical Vf Range
Red	1.8 to 2.1
Amber	2 to 2.2
Orange	1.9 to 2.2
Yellow	1.9 to 2.2
Green	2 to 3.1
Blue	3 to 3.7
White	3 to 3.4

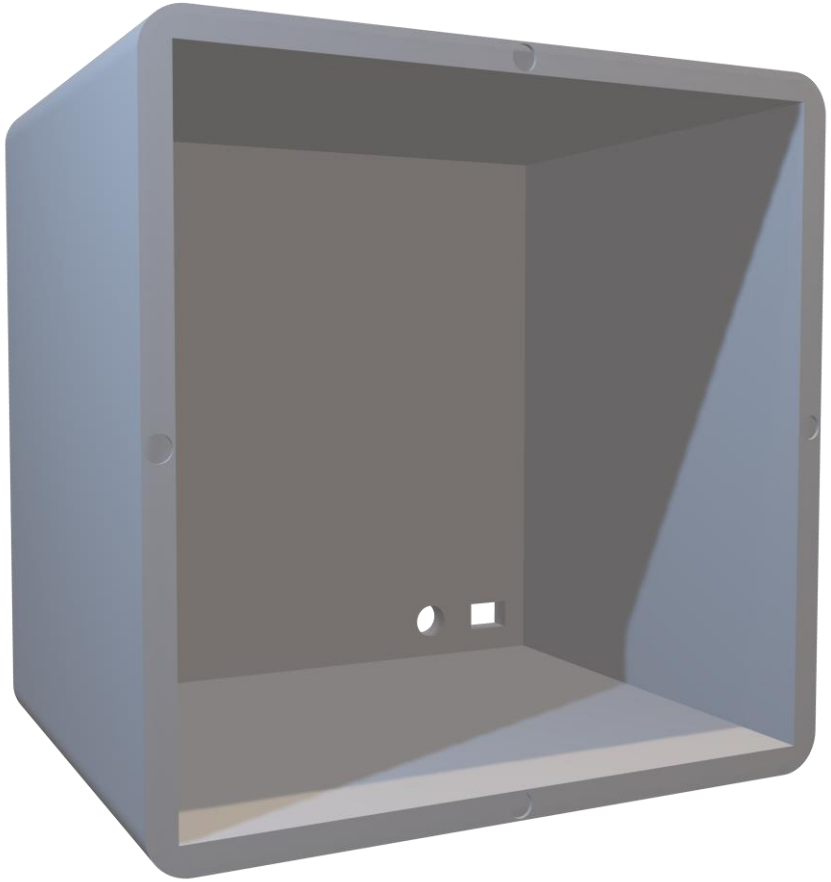
$$R = \frac{3{,}3V - 3V}{20 * 10^{-3}} = 15\ ohms$$



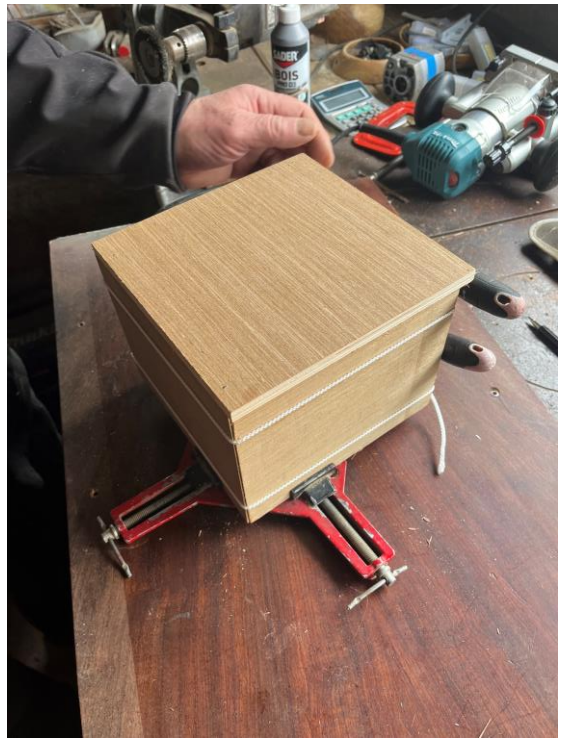




Caisson en bois



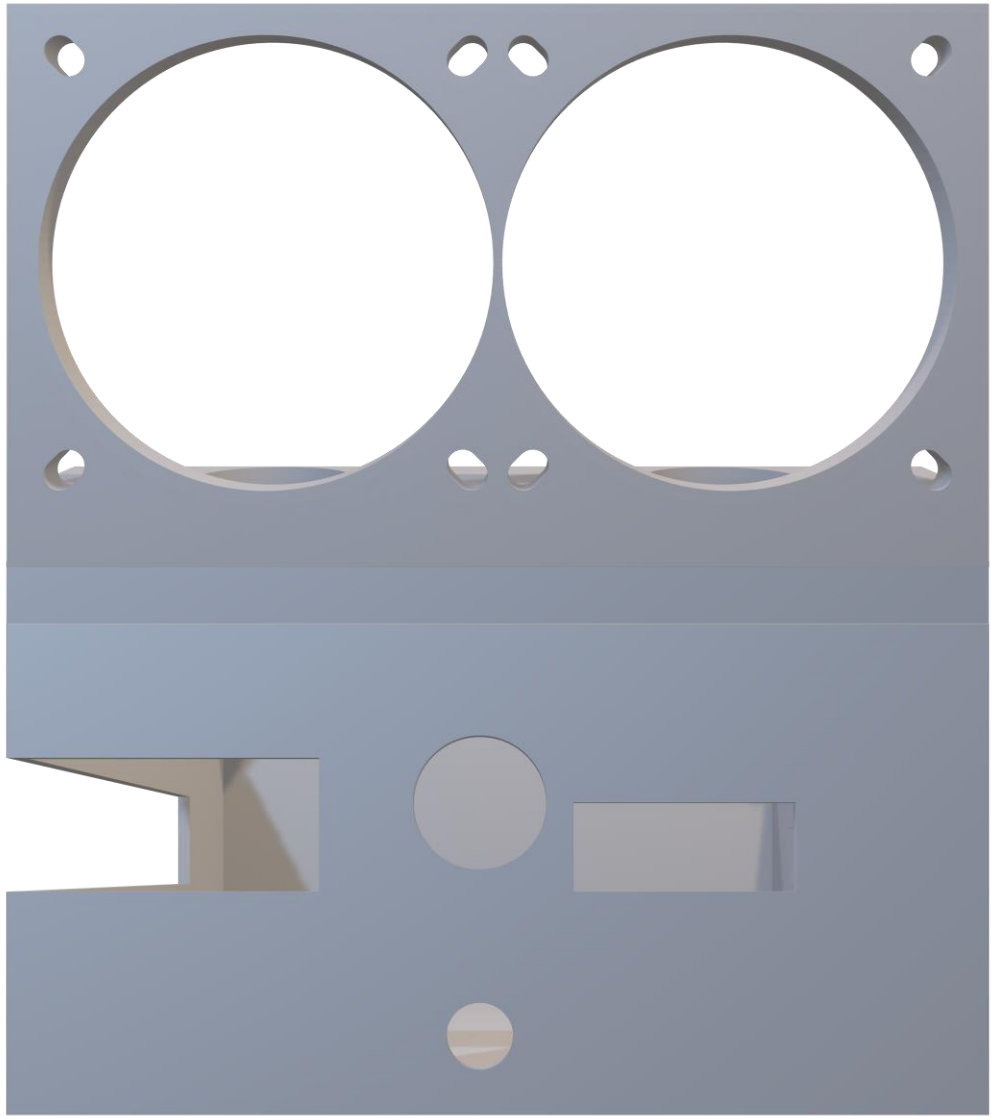
- Qualité du bois
- Bois dur contreplaqué
- Lasure couleur teck

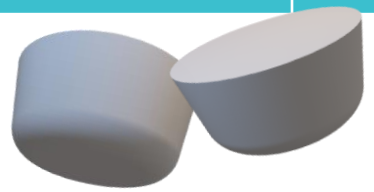


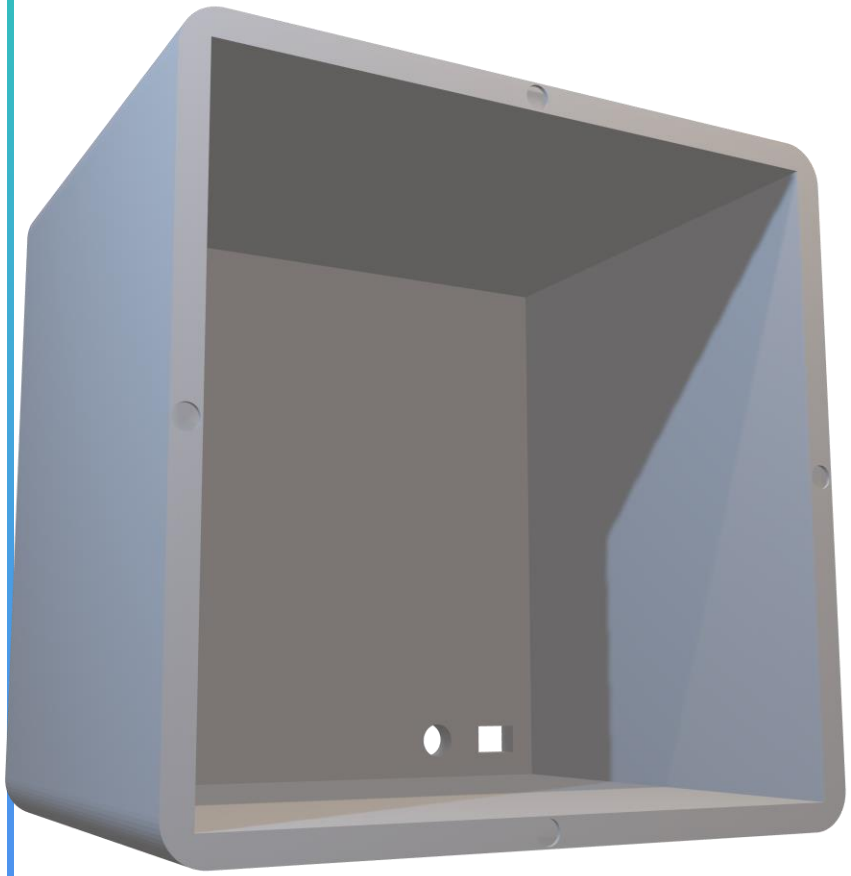
Impression 3d

- PLA Blanc
- Beaucoup d’impressions
- Impression avec le minimum de supports
- Insert laiton M3

Rendu assemblé

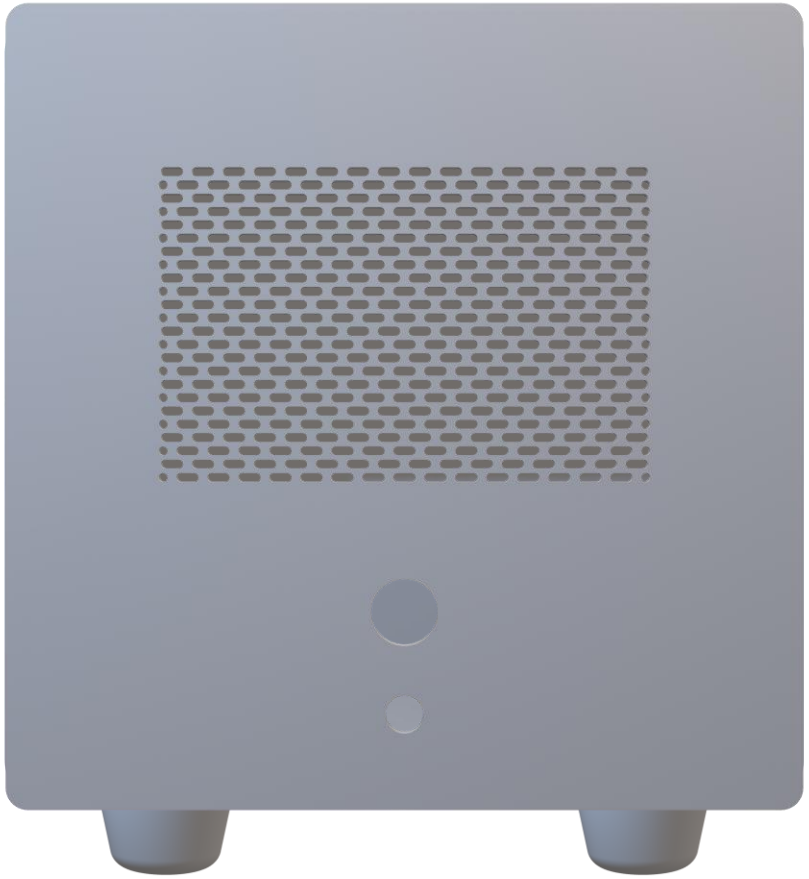






- Inspiration Marshall
- PLA Blanc
- 175*175*137
- Aimants
- Fixation colle
- Problème

Rendu final



Cahier des charges respecté

- ✓ Diagramme IBD et DBB
- ✓ Livrable
- ✓ Conditionnement
- ✓ PWM en sortie de la DE-10 lite
- ✓ Affichage led dynamique
- ✓ Pont en H
- ≃ Filtre de sortie
- ✓ Boitier enceinte
- ✓ Prix

	A	B
1		Prix
2	DE-10 lite	100,00 €
3	vis	0,30 €
4	Haut-parleurs	6,87 €
5	Cables	0,20 €
6	Composants	4,00 €
7	Colles	0,10 €
8	Aimants	0,05 €
9	Alimentation 12V 2A	3,00 €
10	Alimentation femelle	0,10 €
11	Cartes	1,00 €
12	Inter ON/OFF	0,10 €
13	Bois	5,00 €
14	0,5kg PLA	10,00 €
15		
16	Amplificateur classe	115,72 €
17	Boitié	15,00 €
18	Total	130,72 €

130,72€ < 150€

Questions