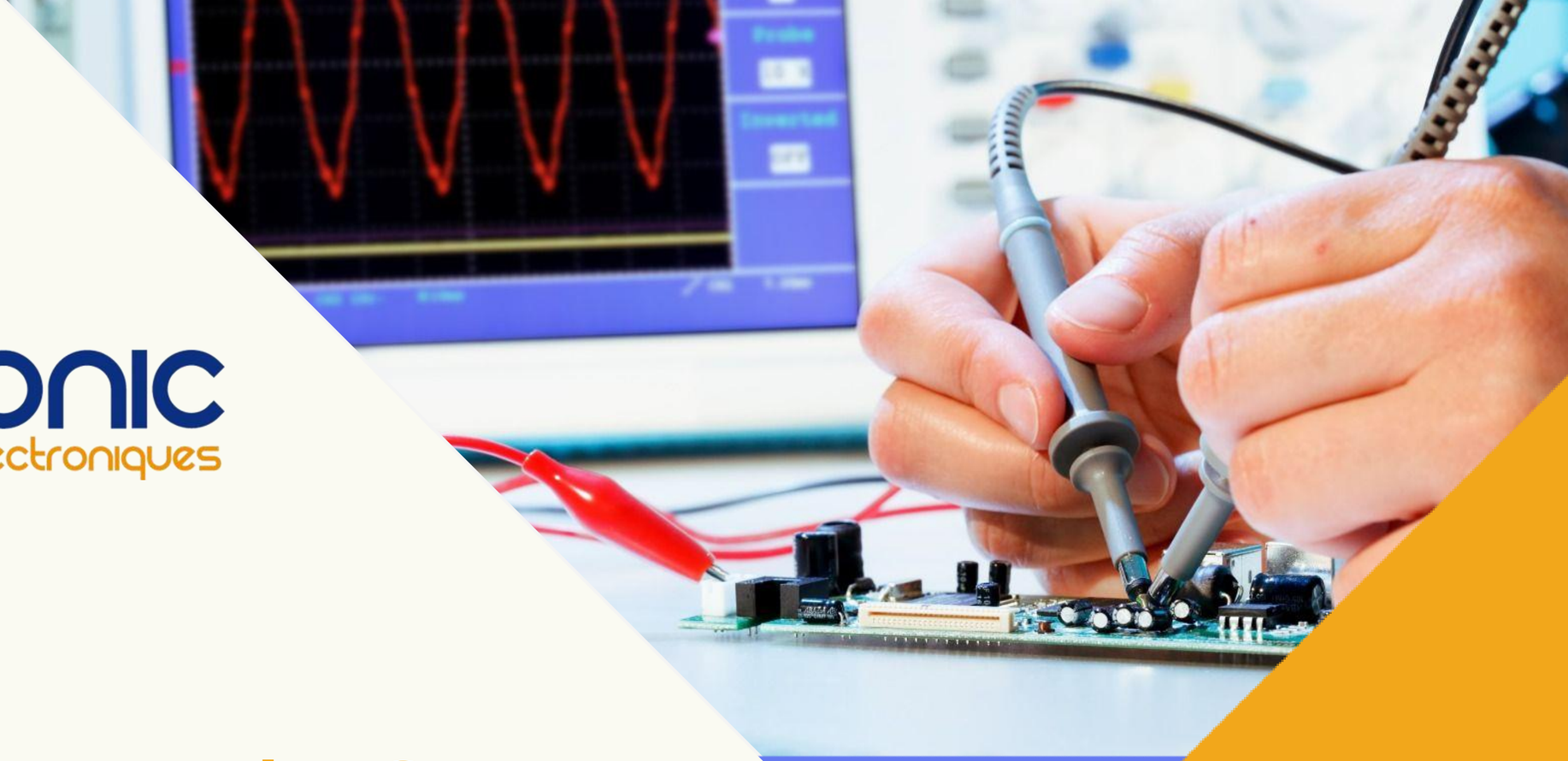
alltronic
solutions electroniques



Soutenance de Stage

BTS Systèmes Numériques option Électronique et Communication

Chloé Josse

Lycée technologique
Jeanne d'Arc Vitré

Institution Sainte Jeanne d'Arc Vitré

Sommaire

Présentation de l'entreprise

ALLTRONIC

22 avril 1992

contact.client@alltonic.fr

11 rue de la Croix Rouge,
35770 Vern sur Seiche

www.alltronic.fr

Capital : 30 490€

9 personnes

ISO 9001 Version 2008
ISO 9001 Version 2015

ALLTRONIC propose des services de maintenance électronique, de métrologie et de vérification, sur place ou en laboratoire

Sujet de stage

Fournir les ateliers d'un générateur de tensions triphasé :

- transportable, se connectant sur une source de tension monophasé
- pour but de contrôler les testeurs de rotation de phase (voir les analyseurs de tension triphasé)
- paramétrable et simple d'utilisation.

Condition :

- kit de développement Arduino UNO
- composants usuels simples
- documentation libres (sources internet)

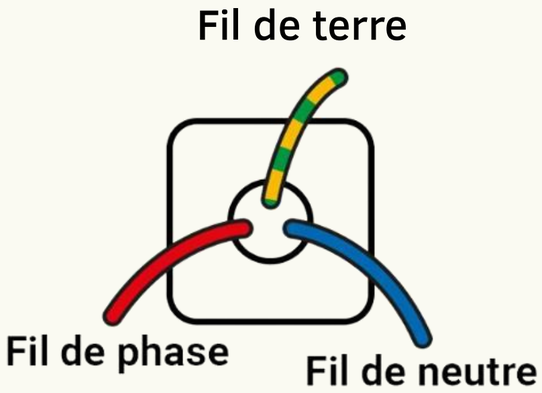
Mise en situation et support :

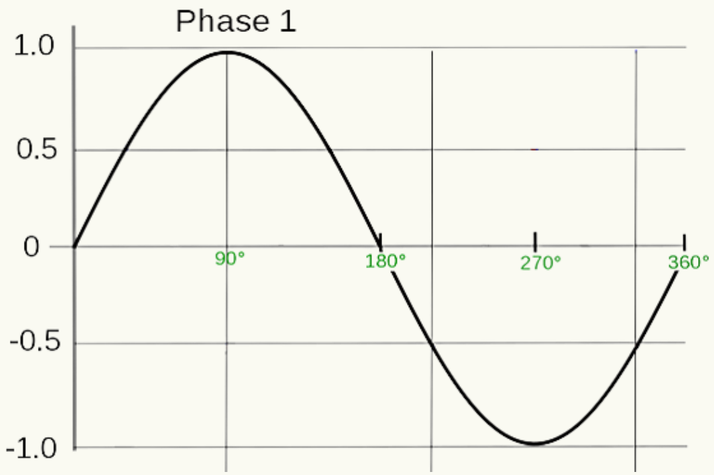
- poste informatique
- poste équipé d'outils d'électronicien
- Le maître de stage a déjà répertorié de la documentation technique libre quant à une piste possible de réalisation

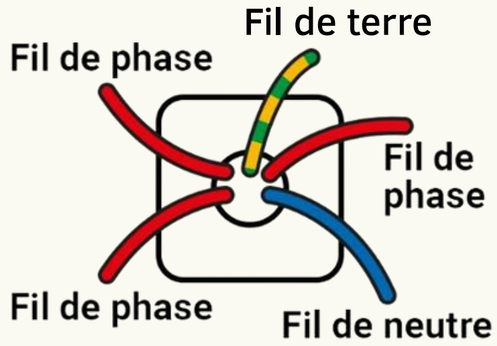
Validation :

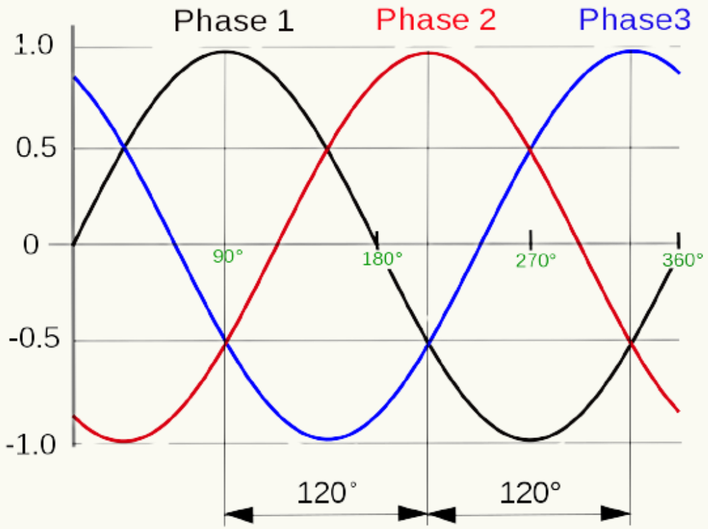
L'outil sera validé par les techniciens de maintenances pour la partie production et par les métrologues pour la partie fonctionnelle.

MONOPHASÉ - TRIPHASÉ

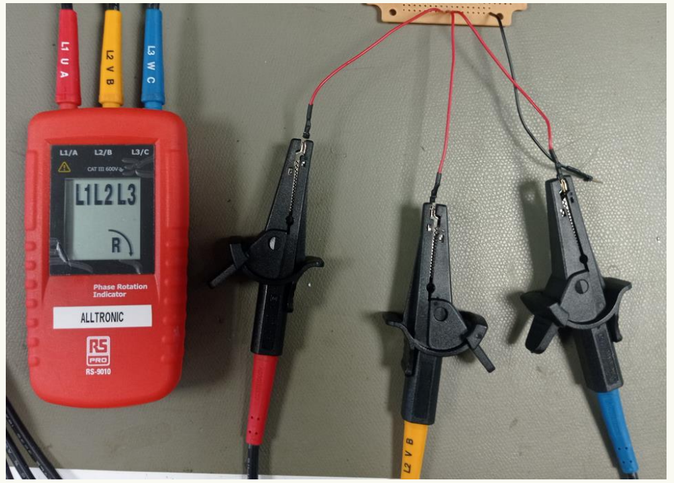


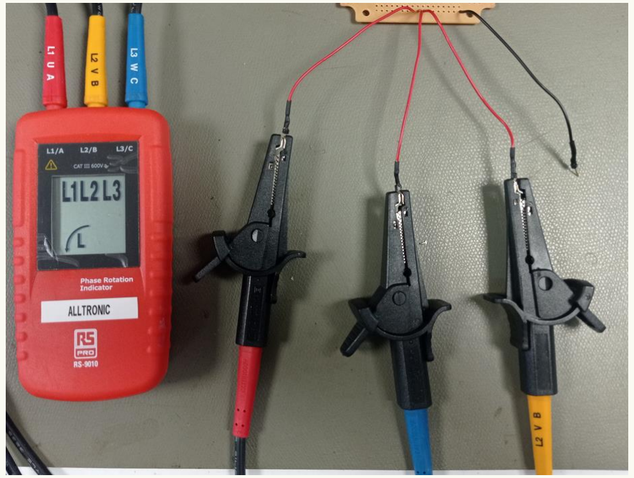






TESTEUR DE ROTATION DE PHASE





RS PRO RS9010
Tension nominale : 40 à 690V

Réalisation du sujet

01

Génération des trois signaux

Définition des broches de sortie

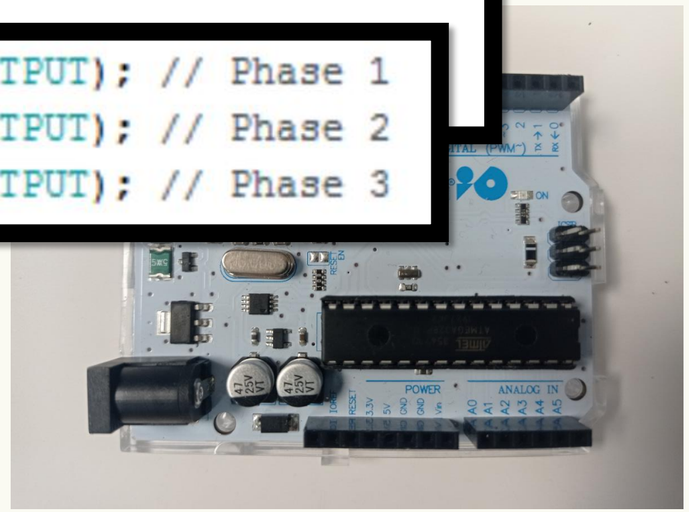
Définie les broches choisie comme des broches output

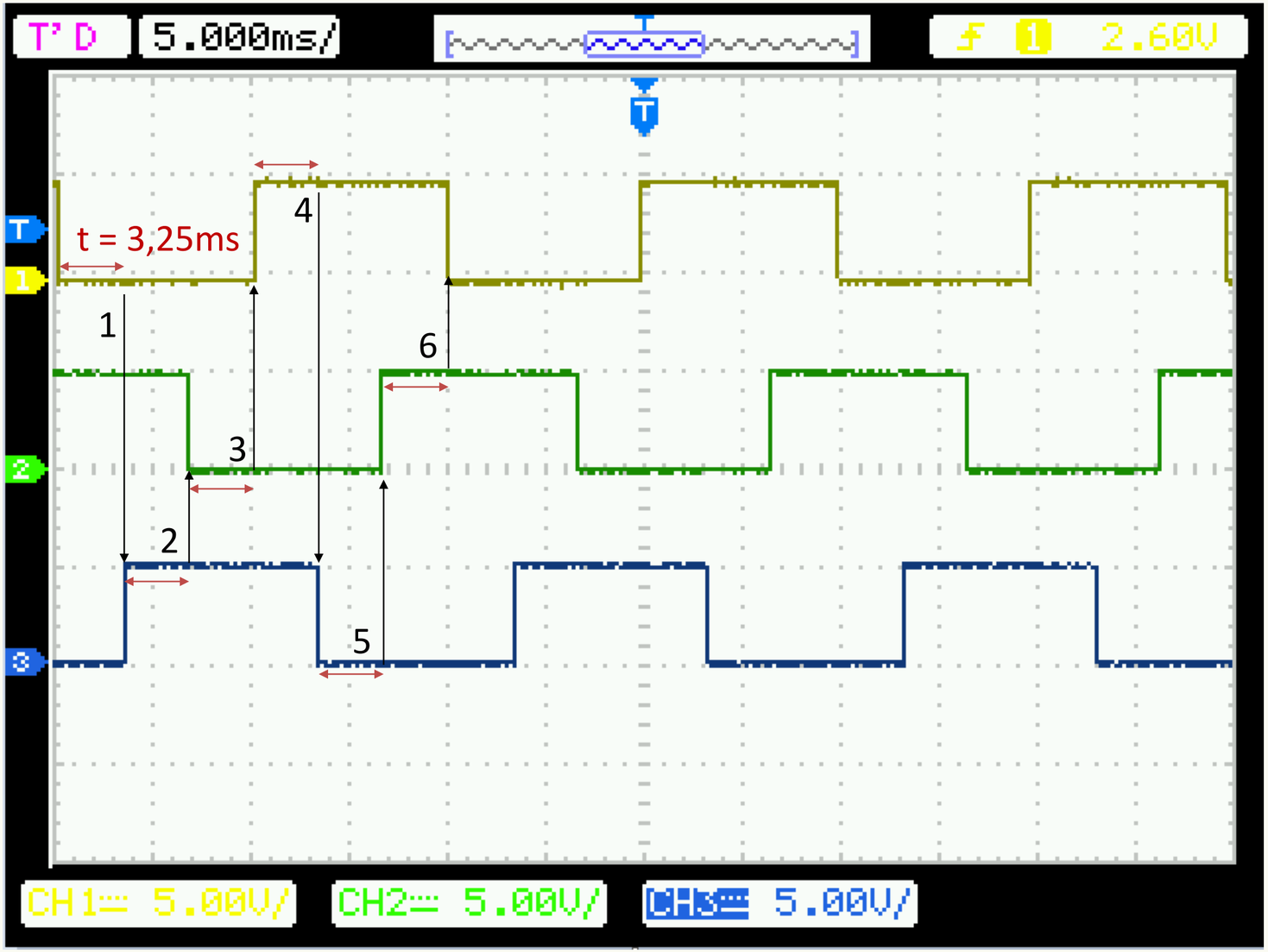
Temps entre chaque déclanchement

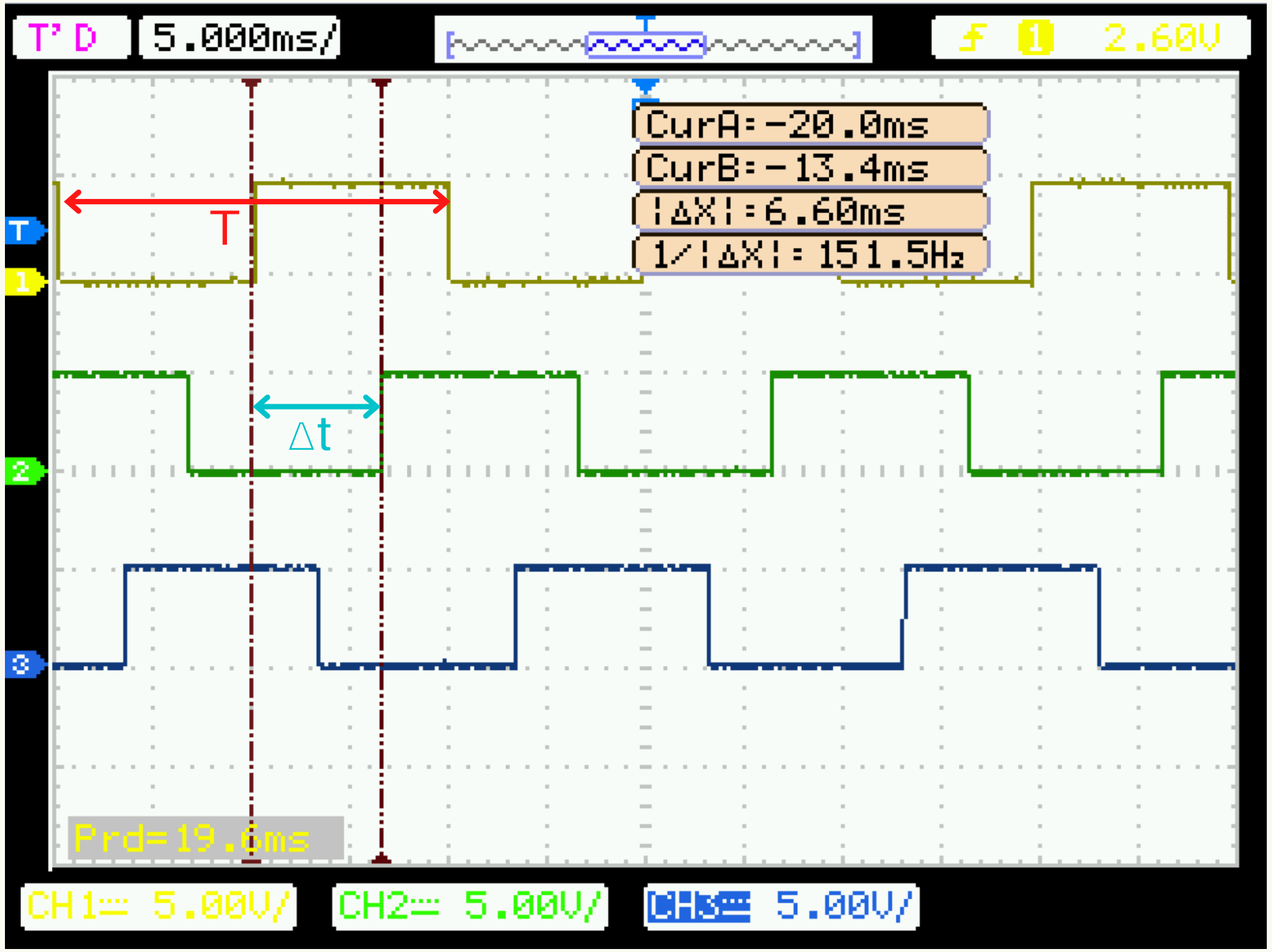
Création des trois signaux

```
// --------- <Electronics-project-hub>com -------- //
const int output_1 = 9;
const int output_2 = 10;
const int output_3 = 11;
int t = 0;
void setup()
{
  pinMode(output_1, OUTPUT); // Phase 1
  pinMode(output_2, OUTPUT); // Phase 2
  pinMode(output_3, OUTPUT); // Phase 3
}
void loop()
{
  t = 3250;
  delayMicroseconds(t);
  digitalWrite(output_1, LOW);
  delayMicroseconds(t);
  digitalWrite(output_3, HIGH);
  delayMicroseconds(t);
  digitalWrite(output_2, LOW);

  delayMicroseconds(t);
  digitalWrite(output_1, HIGH);
  delayMicroseconds(t);
  digitalWrite(output_3, LOW);
  delayMicroseconds(t);
  digitalWrite(output_2, HIGH);
}
// --------- <Electronics-project-hub>com -------- //
```




T' D
5.000ms/
2.60V
t = 3,25ms
1
2
3
4
5
6
CH1 5.00V/
CH2 5.00V/
5.00V/



$$\varphi = 2\pi \times f \times \Delta t$$

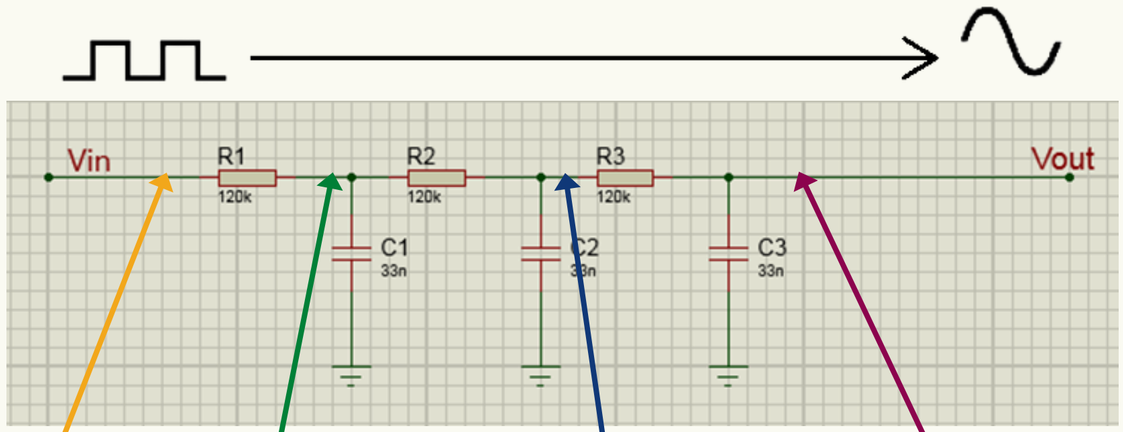
On a T = 20ms et Δt = 6.60ms

$$\varphi = 2\pi \times 49.5 \times 6.8 \times 10^{-3}$$

($f = \frac{1}{T}$ donc $f = \frac{1}{20.2 \times 10^{-3}} = 49.5\text{Hz}$)

D'où $\varphi = \frac{2\pi}{3} = 120°$

De carré à sinusoïde

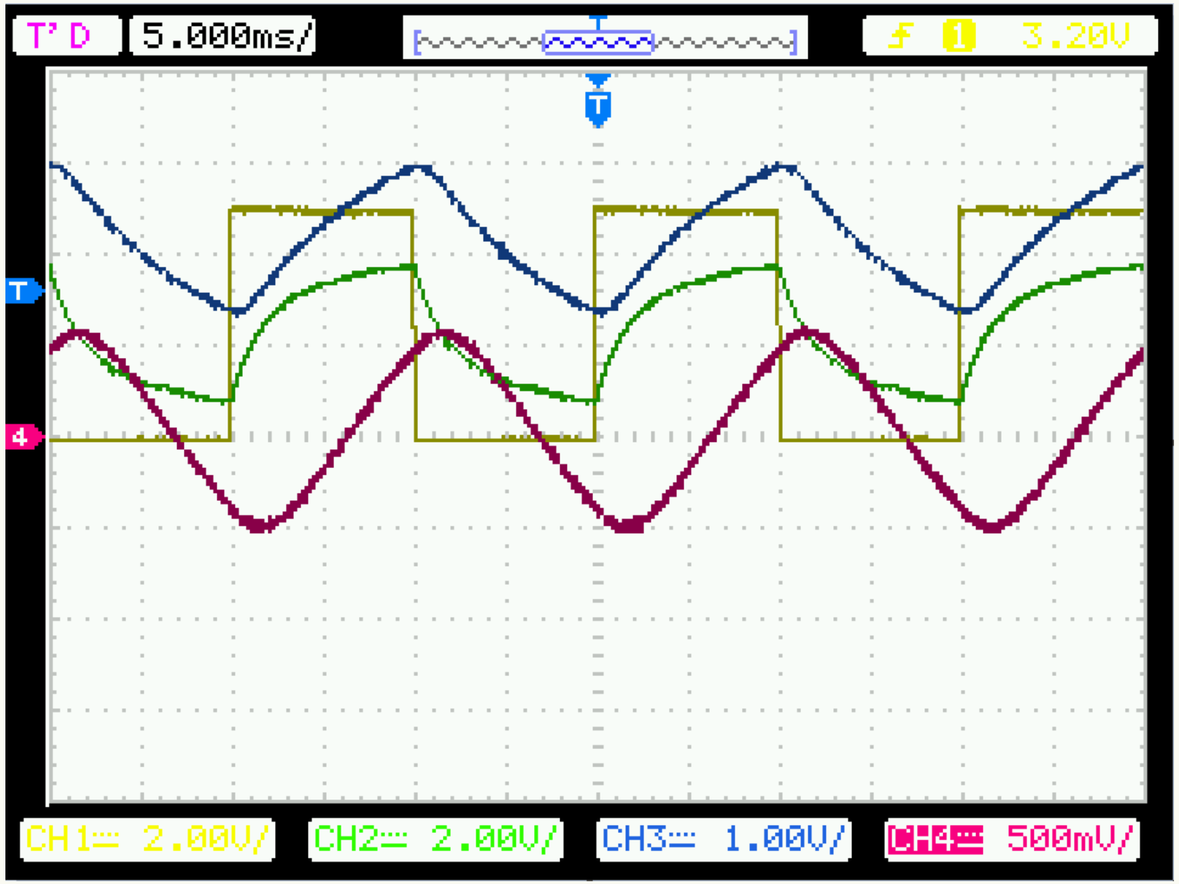


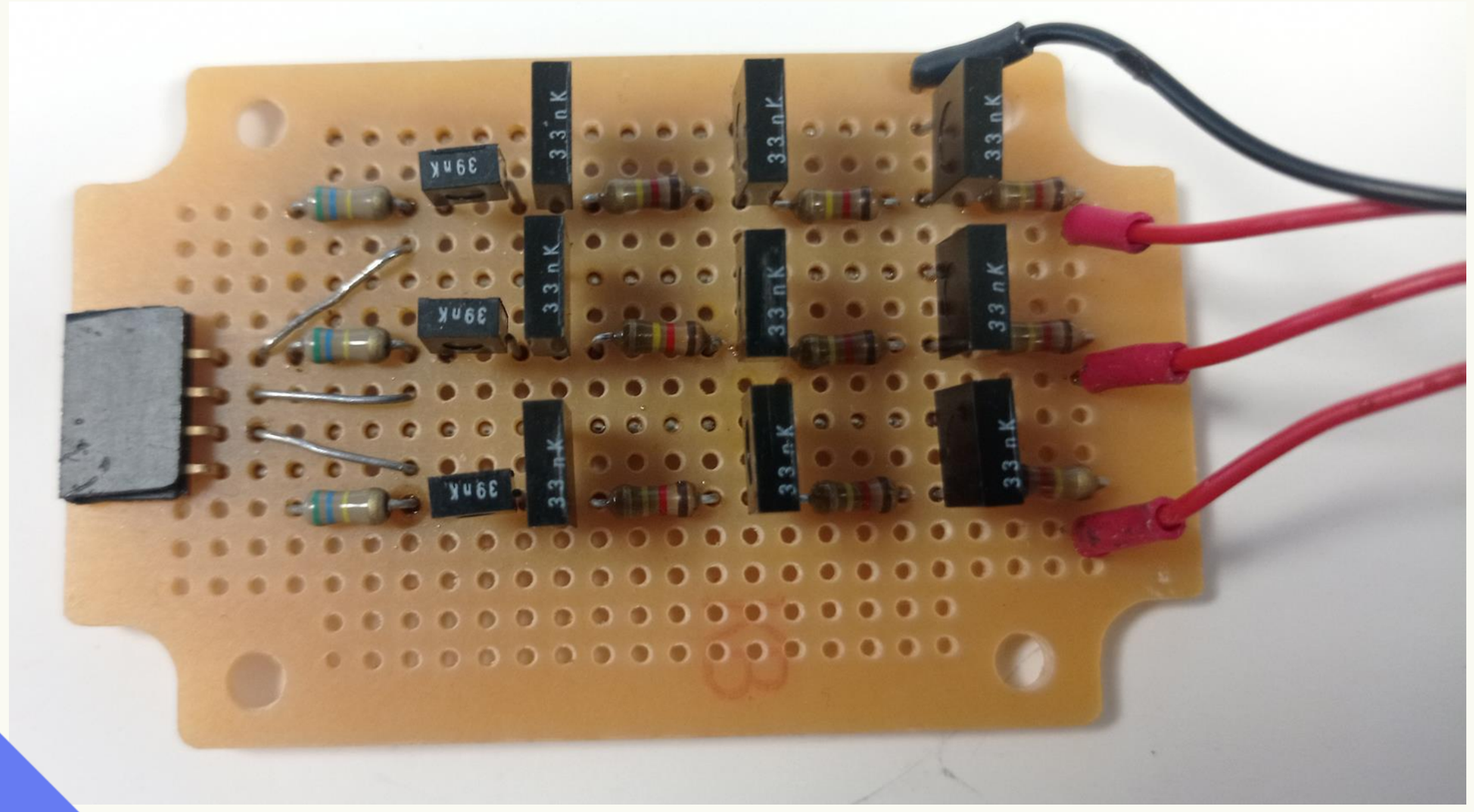
Signal 1 :
Sortie d'Arduino

Signal 2 :
Sortie 1er filtre RC

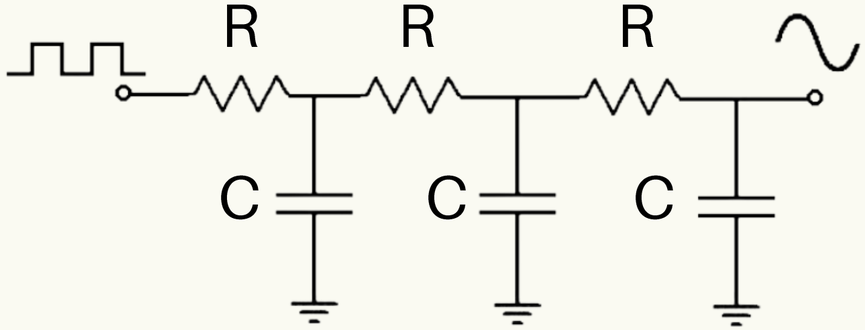
Signal 3 :
Sortie 2eme filtre RC

Signal 4 :
Sortie 3eme filtre RC



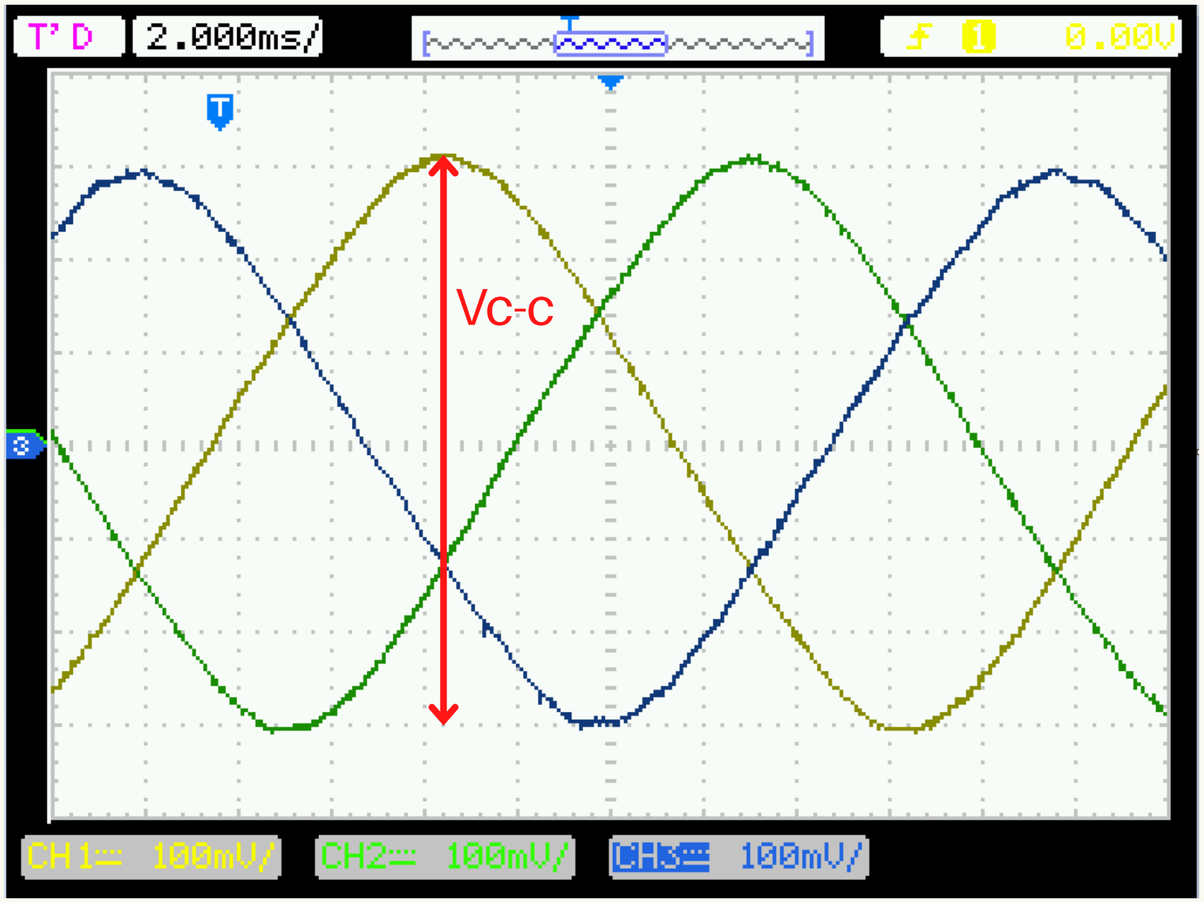


R = 120kΩ
C = 33nF



+ ajout d'un condensateur de filtrage pour enlever la composante continue

Amplifier la tension



On a Vc-c = 600mV, d'où Ueff = 210mV

(Uc-c = 2Umax = 2.√2 Ueff)

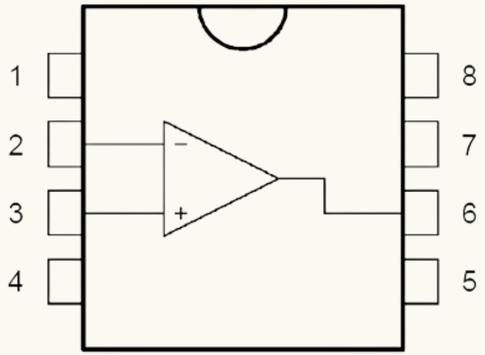
Transformateur :

230V au primaire

6V au secondaire

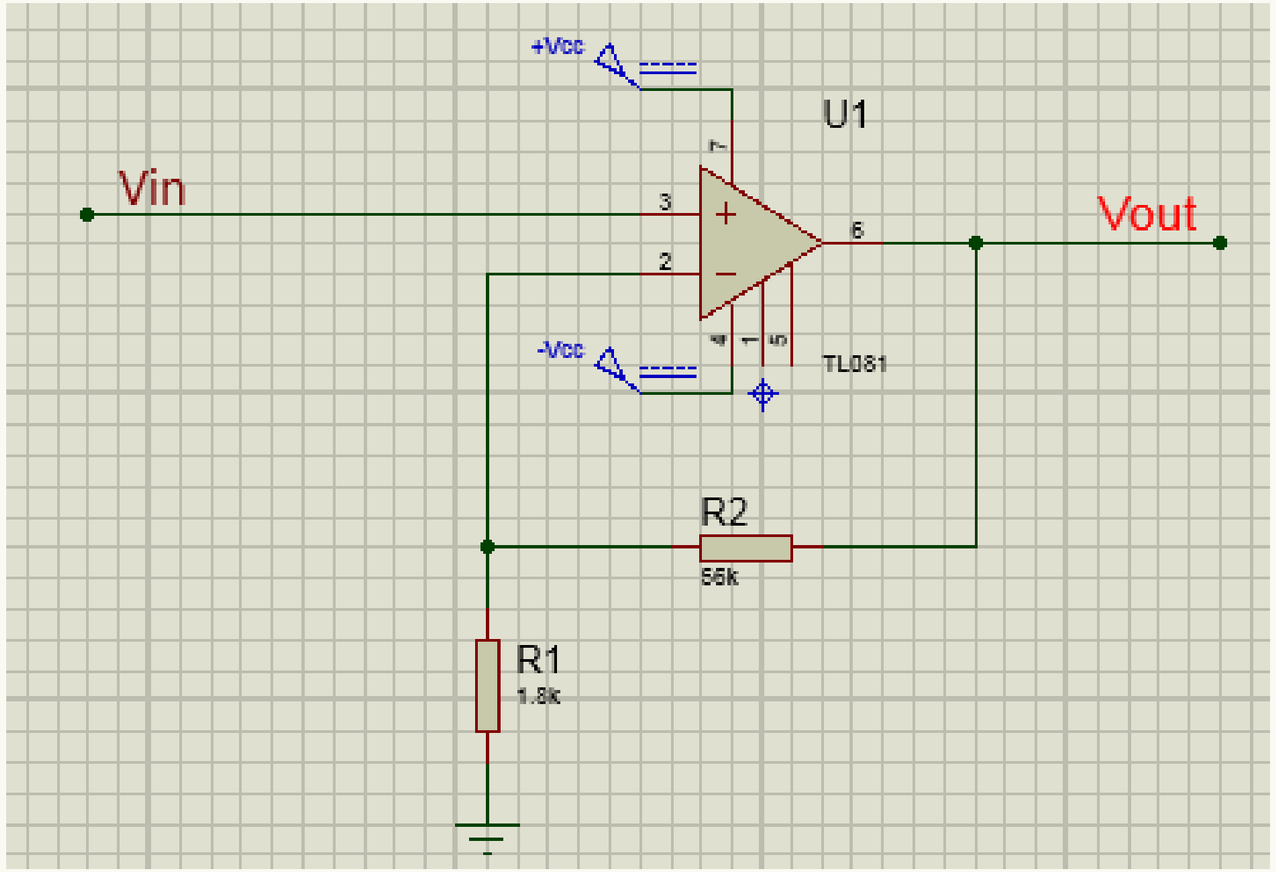
→Augmentation de la tension nécessaire

TL081 :



1 - Offset Null 1
2 - Inverting input
3 - Non-inverting input
4 - V_{CC}^-
5 - Offset Null 2
6 - Output
7 - V_{CC}^+
8 - N.C.

Montage amplificateur non inverseur



Montage linéaire :

$\varepsilon = V+ - V-$ $\varepsilon = 0$ $\rightarrow$ $V+ = V-$

Pont diviseur de tension :

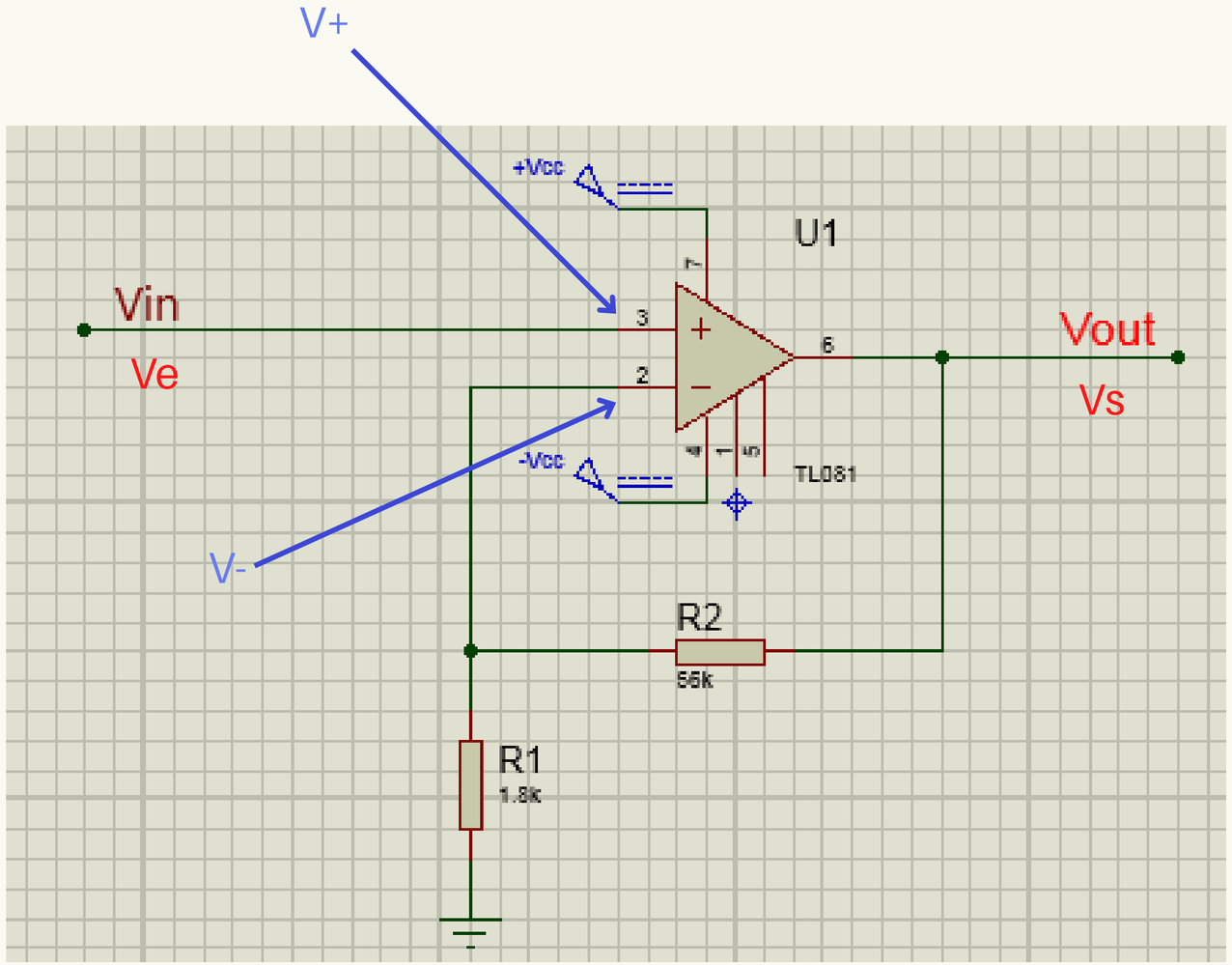
$$V- = Vs \times \frac{R_1}{R_1 + R_2}$$

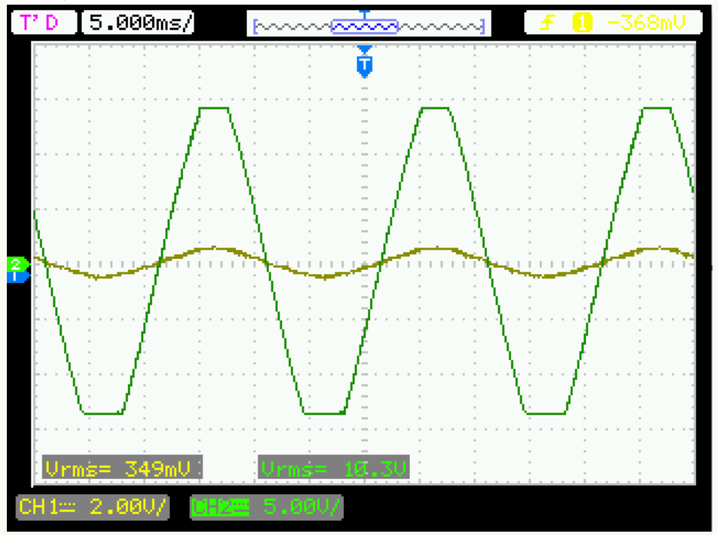
$$\rightarrow \quad Ve = Vs \times \frac{R_1}{R_1 + R_2}$$

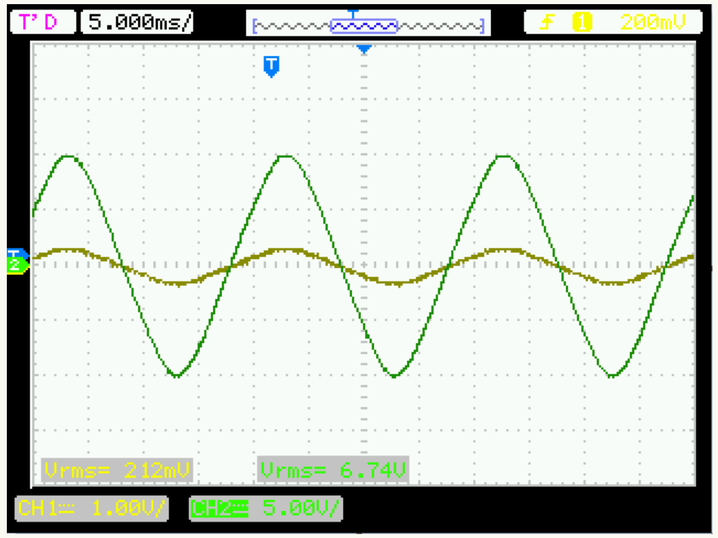
L'amplification, ou le gain, est : $G = \frac{Vs}{Ve}$.

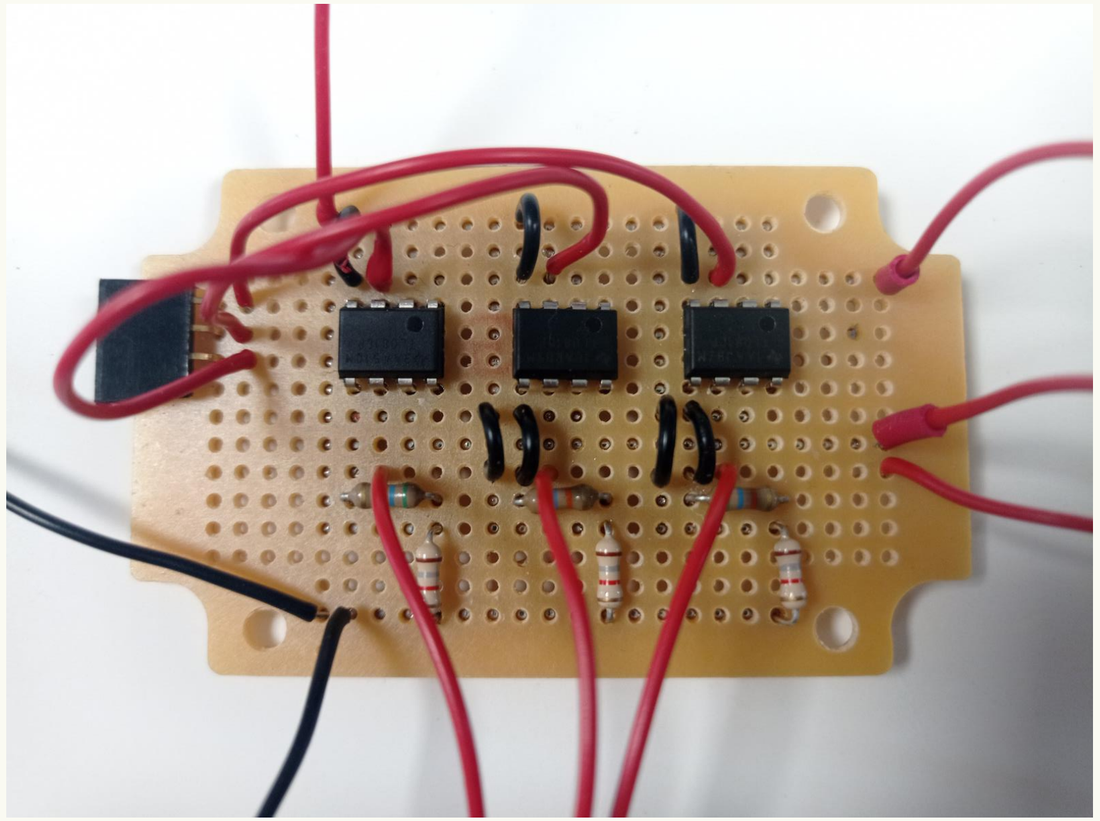
$$\frac{Ve}{Vs} = \frac{R_1}{R_1 + R_2} \quad \text{d'où} \quad \frac{Vs}{Ve} = \frac{R_1 + R_2}{R_1}$$

Donc $$G = \frac{Vs}{Ve} = 1 + \frac{R_2}{R_1}$$





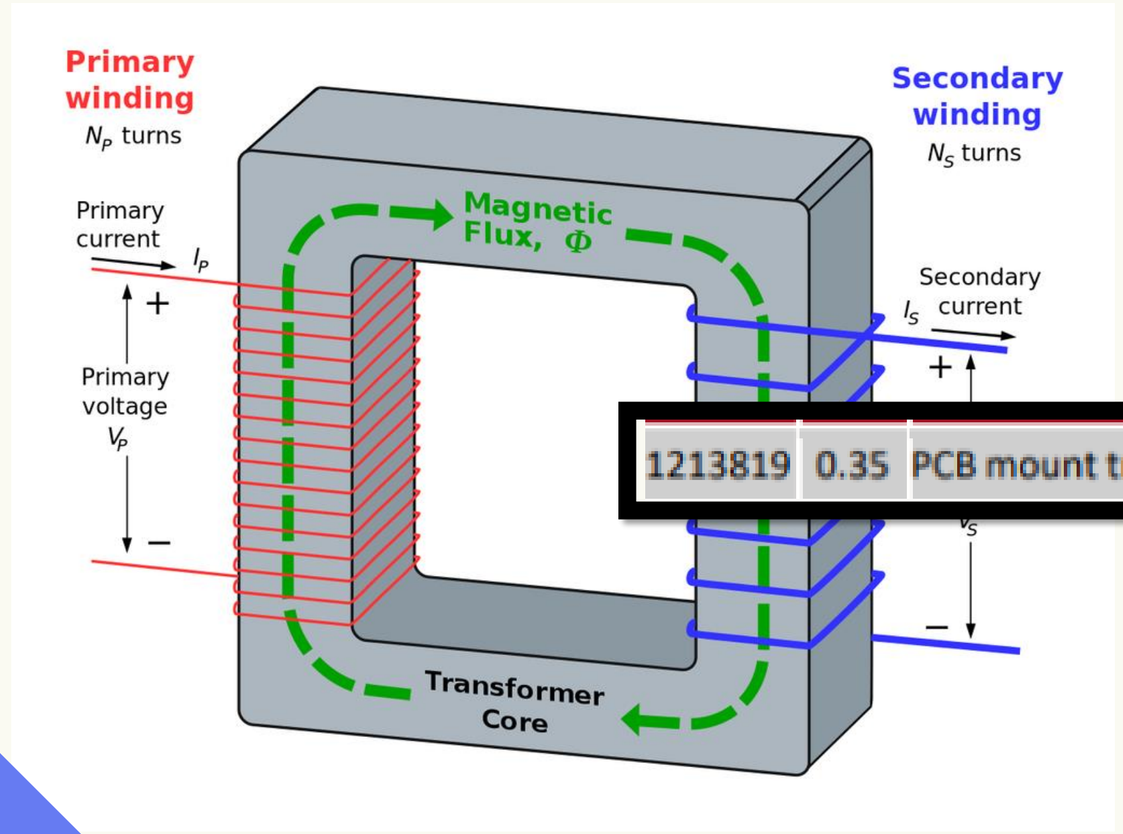




R2 = 56kohms

R1 = 1.8kohms

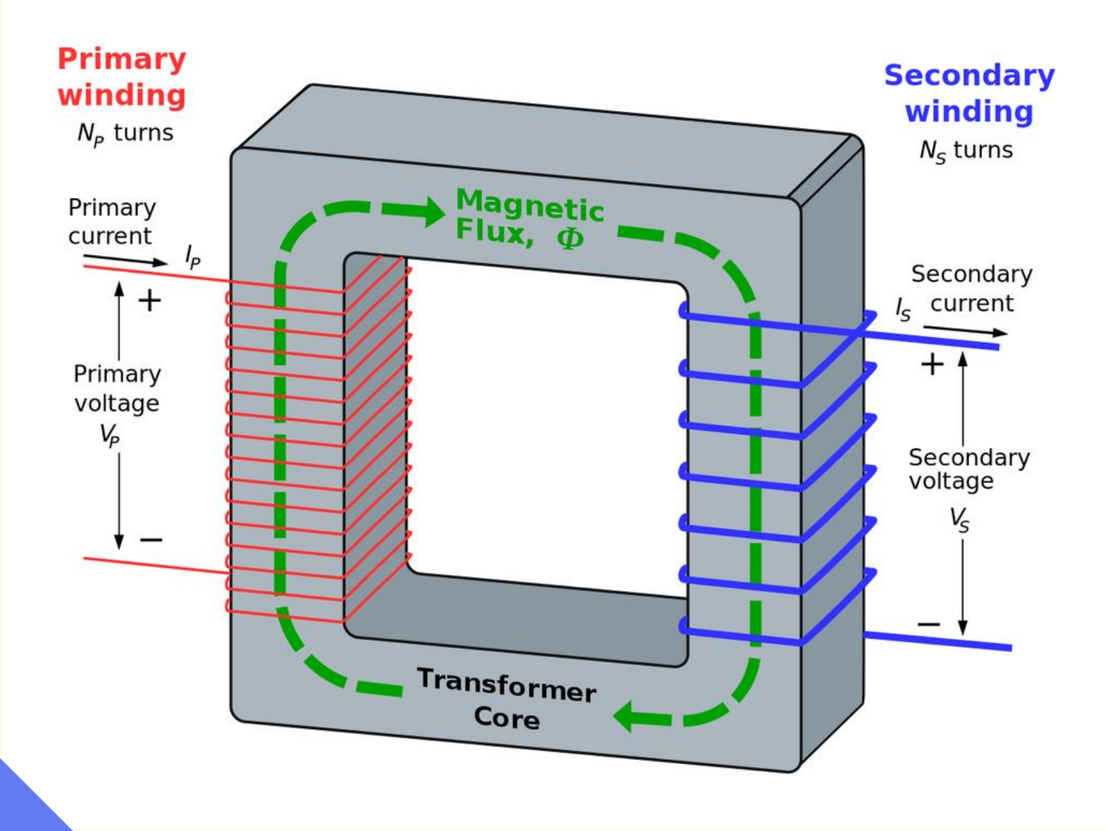
Transformateur



Transformateur pour circuit imprimé RS PRO, 1 sortie :
1 x 6V c.a. - 230V c.a.
0.35VA

RS Stock number	Power VA	Specification	Primary [V]	Secondary voltage [V]	Secondary current [mA]	No-load voltage ±10% [V]
1213819	0.35	PCB mount transformer 0.35VA 1x6 o/p	230	6	58.3	9.7
1213822	1.5 [1]	Transformer PCB 1.5VA 2x9V	230	2x9	83.3	2 x 12.5
1213823	1.5	Transformer PCB 1.5VA 2x9V	230	2x9	83.3	2 x 13.5
1213824	1.5	PCB mount transformer 1.5VA 1x12 o/p	230	12	125.0	17.0
1213825	1.5	Transformer PCB 1.5VA 2x12V	230	2x12	62.5	2 x 18.0
1213826	1.5	Transformer PCB 1.5VA 2x15V	230	2x15	50.0	2 x 22.0
1213827	2.3	Transformer PCB 2.3VA 2x6V	230	2x6	191.6	2 x 9.0
1213828	2.3	Transformer PCB 2.3VA 2x9V	230	2x9	127.7	2 x 13.5

Valeur relevée en sortie de la plaquette AOP : I = 45mA



$$V_{pri} \times I_{pri} = V_{sec} \times I_{sec} \qquad VA = V_{pri} \times I_{pri}$$

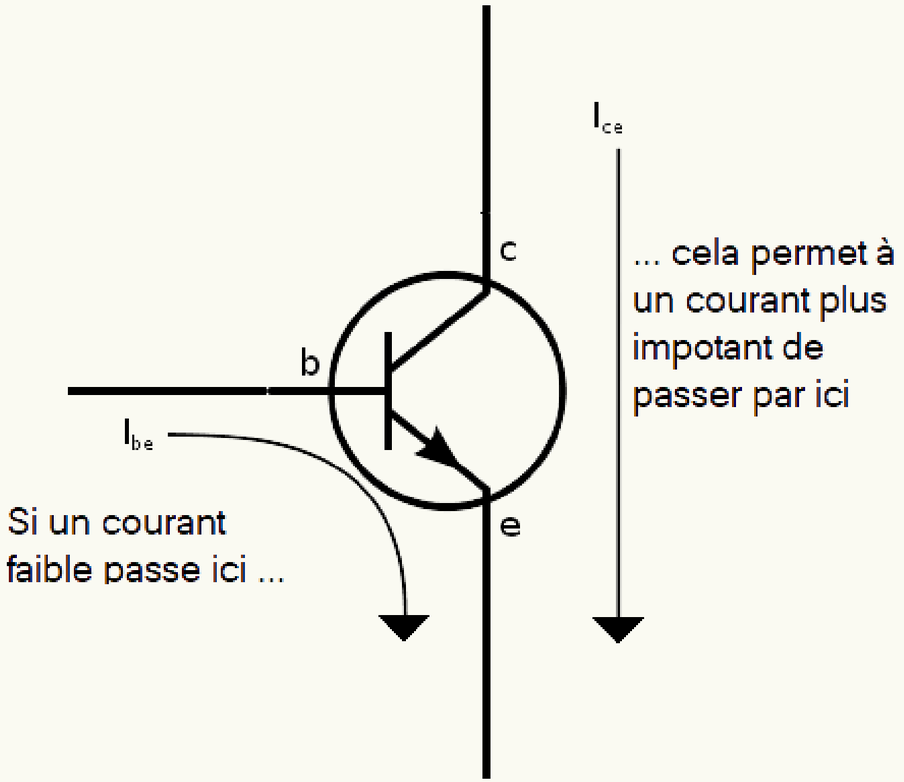
$$I_{pri} = \frac{VA}{V_{pri}} = \frac{0.35}{230} = 0.001\,521\ A$$

$$I_{sec} = \frac{V_{pri} \times I_{pri}}{V_{sec}}$$

$$= \frac{230 \times 0.001\,521}{6}$$

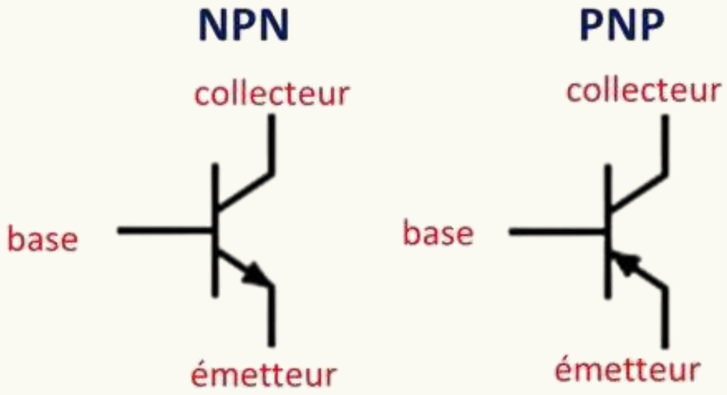
$$= 0.058\,3\ A\ (58.3mA)$$

Amplifier en intensité

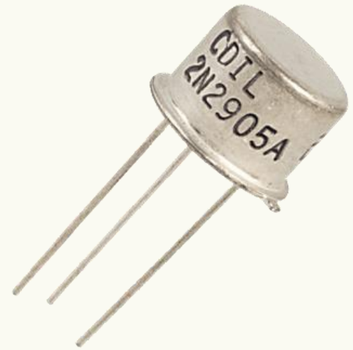


Transistor bipolaire :

BJT (Bipolar Junction Transistor)

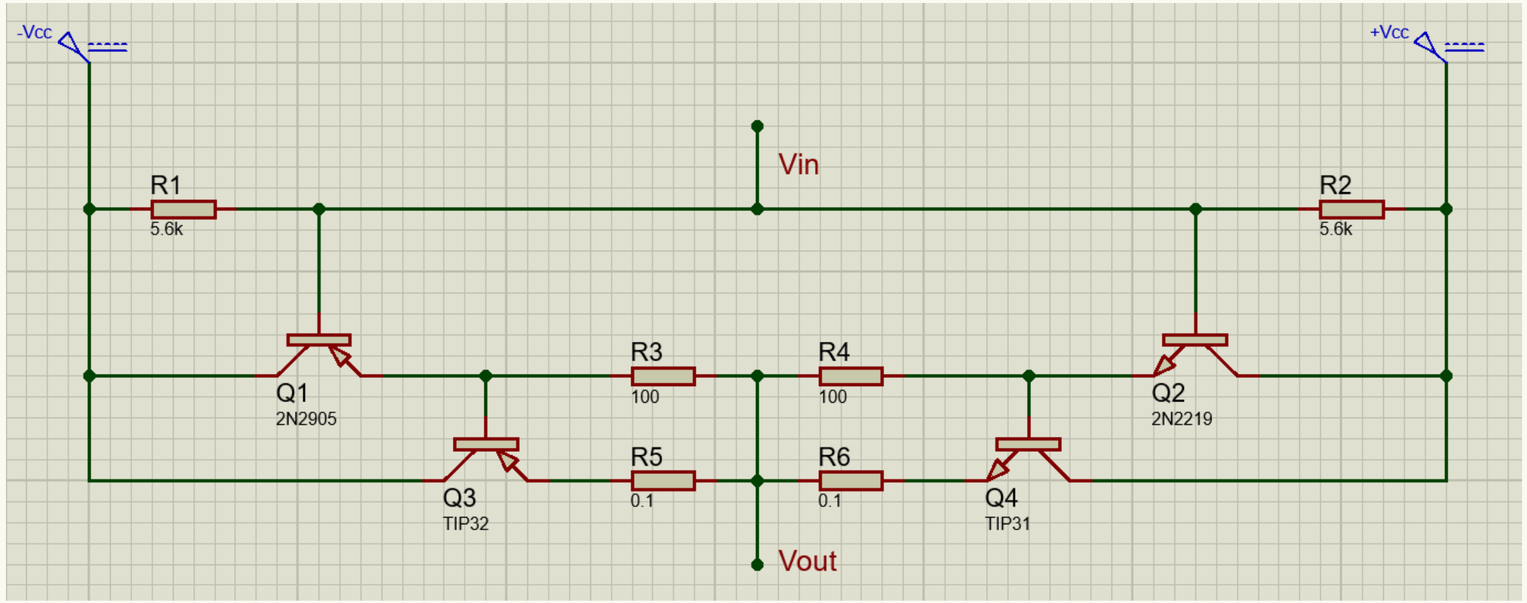


2N2905

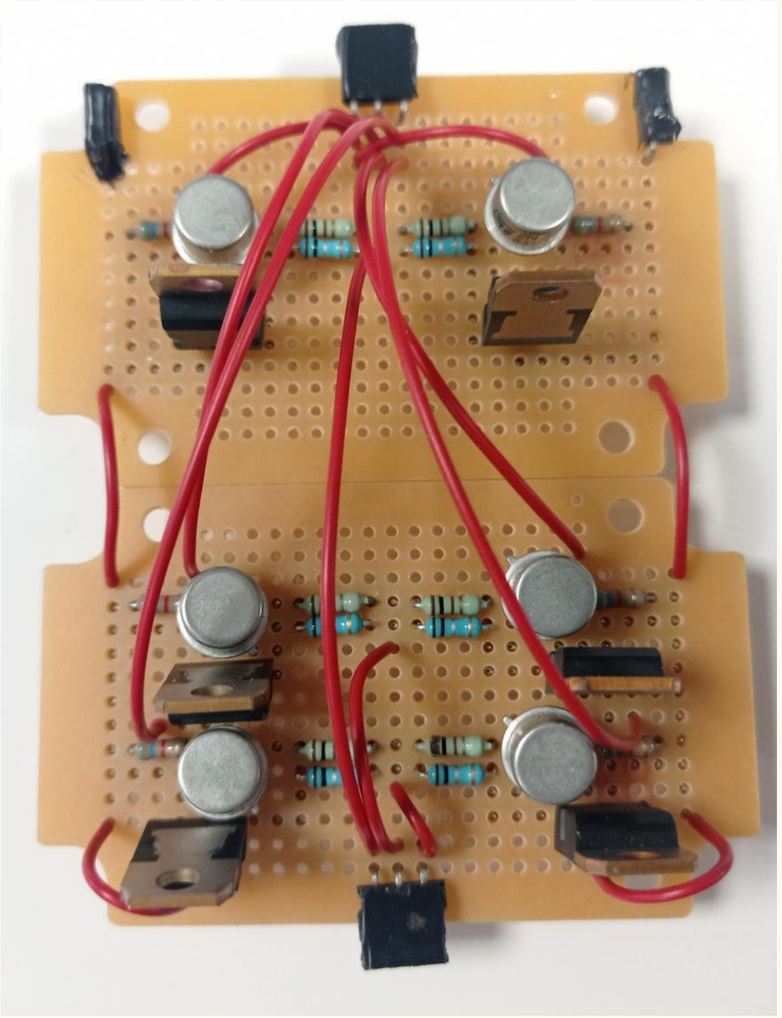


TIP31

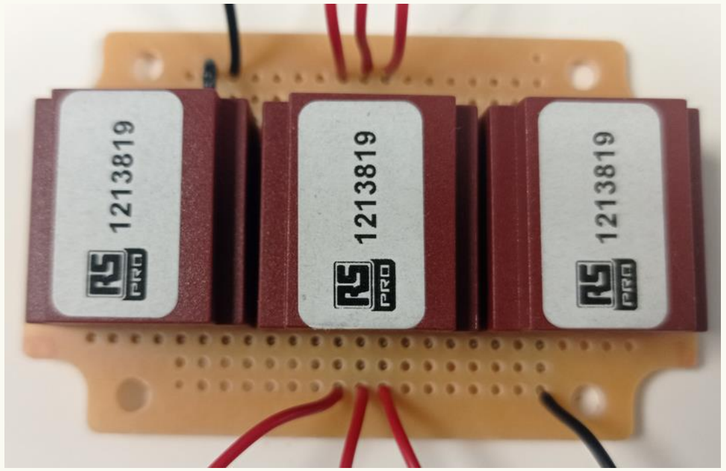
Amplifier en intensité

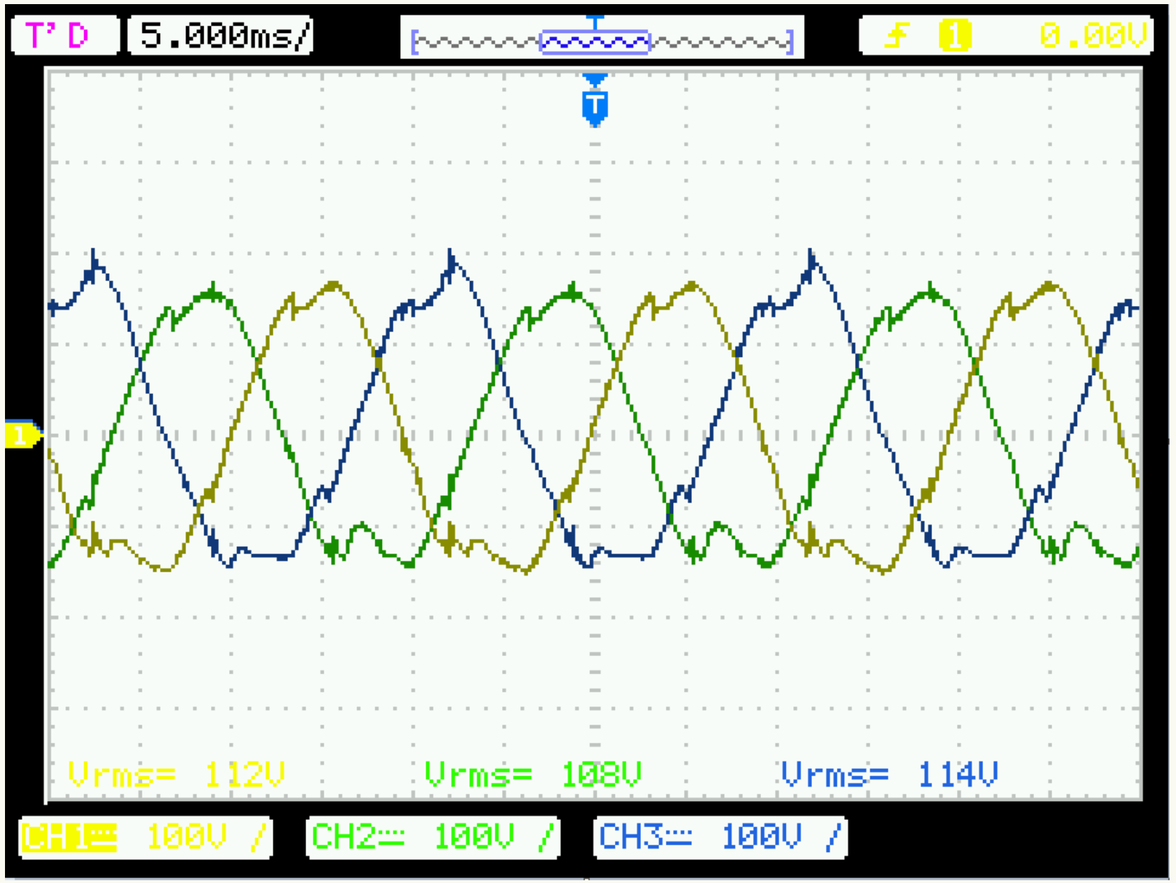


Iout = 500mA

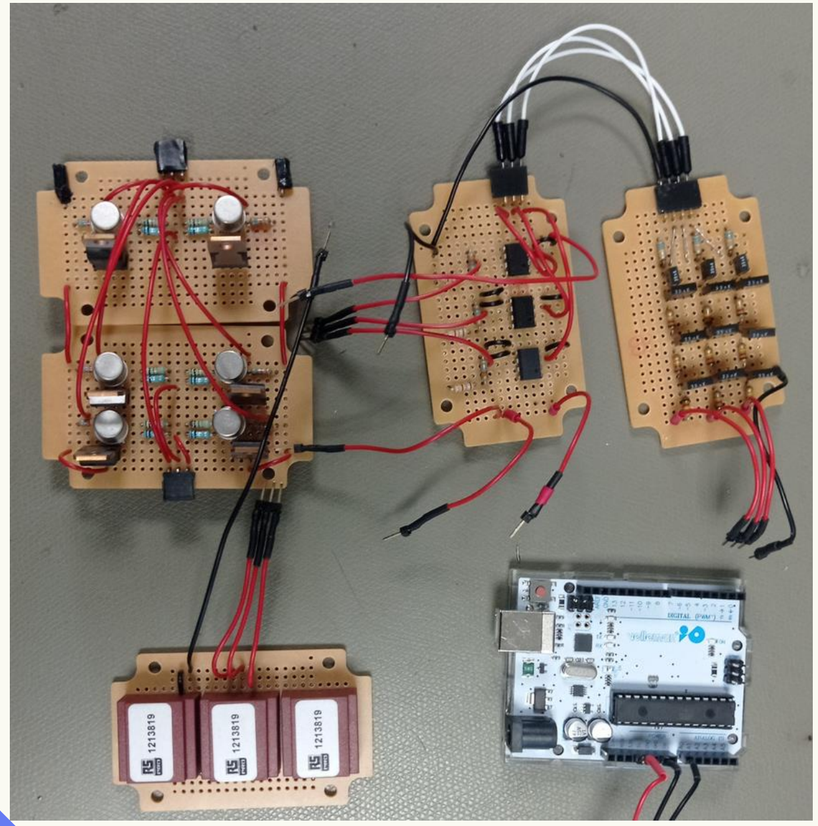


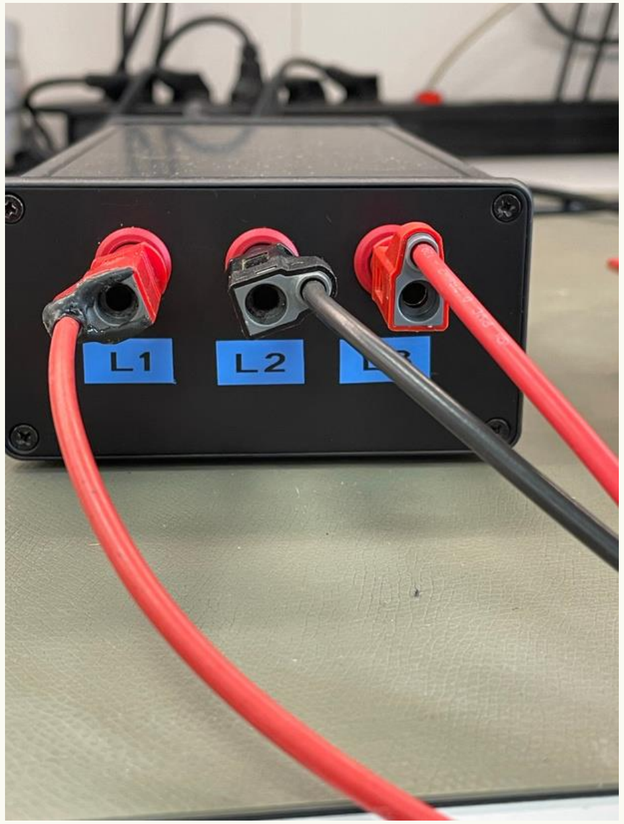
Transformateur





Fabrication du boîtier





Fabrication du boîtier

Conclusion

Merci de votre attention

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solutions electroniques

Institution Sainte Jeanne d'Arc Vitré