$3.28 \times 0.21 = 688.8mV$

PWM → 3.3V → 21% $3.3 \times 0.21 = 0.693 V = 693mV$

rms value from Oscillsope

690 mV

→ ~~filtered 688.7mV~~

voltage follower 688.59 mV

ADS1115   2.25 ~ 2.44 = + 2.3mV

→ 687.75 ~ 687.56 mV

→ 684 mV ~ 683.81 mV.

~~4.7mV~~ ~ ~~4.1mV~~

4.5 ~ 4.7 mV = + 4.6mV

685.3mV ~ 685.5mV

3.2mV ~ 3mV. = 3.1mV

AD623 Instrumentation Amplifier

AD623. $RG = 100k/(G-1)$

$$\frac{RG}{G-1} = 100k$$

$$G-1 = \frac{RG}{100k}$$

m µ n p.

$$G = \frac{RG}{100k} + 1 = 20$$

$$\frac{RG}{100k} = 19$$

$$RG = 19 \times 100k$$

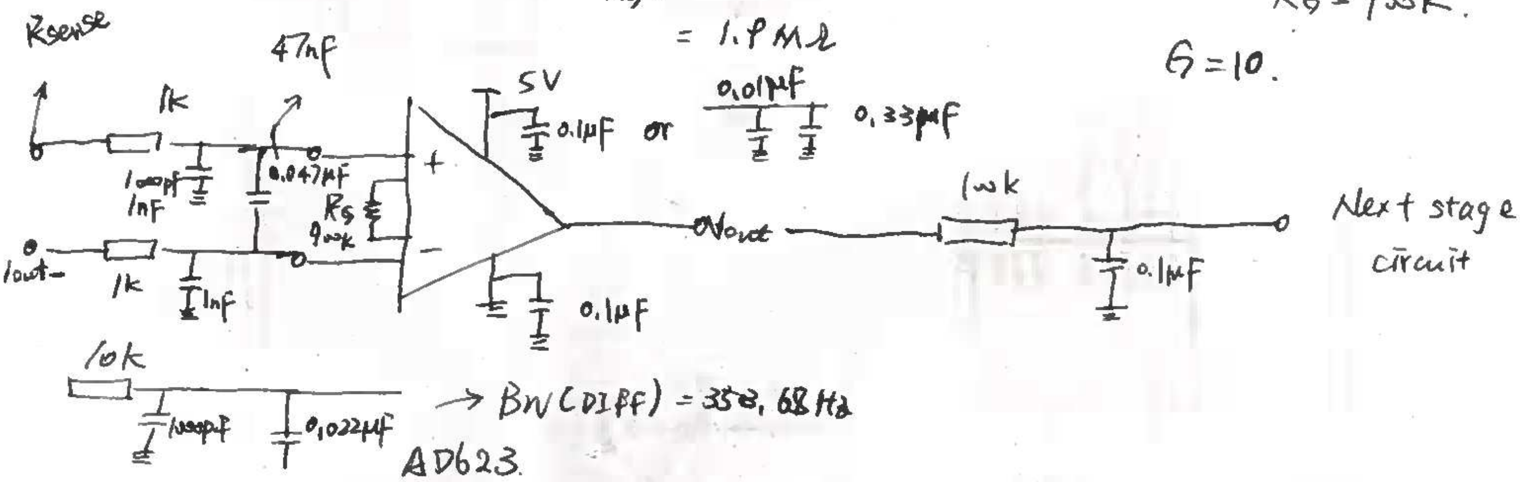
$$= 1.9M\Omega$$

$$G = \frac{RG}{100k} + 1 = 10$$

$$\frac{RG}{100k} = 9$$

$RG = 900k$.

$G = 10$.



→ BW(DIFF) = 358.68 Hz

AD623.

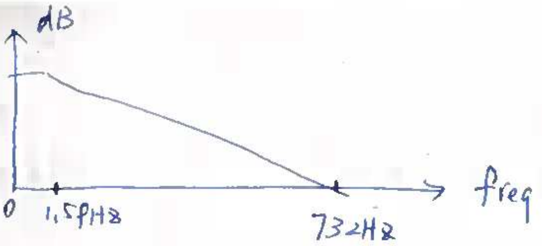
four stage → usually support max current supply 4A max

1A per branch (max) → 0.5V

$$BW(DIFF) = \frac{1}{2\pi R(2C_2 + C_1)} = \frac{1}{2\pi \times 1k \times (2 \times 0.047\mu F + 1nf)}$$

$$= \frac{1}{2\pi \times 10^3 \times (2 \times 47 \times 10^{-9} + 1 \times 10^{-9})} = 1675 Hz.$$

Attenuation $\longrightarrow$



In order to make DC pass filter $\longrightarrow$ 732 Hz max power at.

FFT : fft(A)

Power spectrum : $\dfrac{fft(A) * fft^*(A)}{N}$ $\Rightarrow$ (Amplitude $)^2$

freq spectrum · fft(A)

V^2 P

DC $\rightarrow$ power − electrical power

Decibels

$$A_{dB} = 10 \log \left(\frac{P_{out}}{P_{in}} \right) dB$$

$$= 20 \log \left(\frac{V_{out}}{V_{in}} \right) dB$$

$$= 20 \log \left[\frac{1}{\sqrt{\left(R^2 + \frac{1}{4\pi^2 f^2 C^2}\right)} \times 2\pi f C} \right] dB$$

$$= 10 \log \left[\frac{1}{\left(R^2 + \frac{1}{4\pi^2 f^2 C^2}\right) \times 4\pi^2 f^2 C^2} \right] dB$$

$$= -10 \log \times \left[\frac{R^2}{4\pi^2 f^2 C^2} + 1 \right] dB$$

$$\frac{V_{out}}{V_{in}} = \frac{Z_C}{R + Z_C} = \frac{\frac{1}{j2\pi f C}}{R + \frac{1}{j2\pi f C}} = \frac{1}{R \cdot j2\pi f C + 1}$$

$$= \frac{1}{\sqrt{(j2\pi f R C)^2 + 1^2}}$$

$$A_{dB} = 20 \log \left(\frac{1}{\sqrt{j2\pi f R C + 1}} \right) dB$$

$$= 10 \log \left[\frac{1}{(1 + j2\pi f R C)^2} \right] dB$$

$$= -10 \log \times [1 + j2\pi f R C]^2 \, dB$$

$A_{dB} = -3 \, dB$ $\quad \dfrac{P_{out}}{P_{in}} = 0{,}5$

$$\frac{V_{out}}{V_{in}} = \frac{\sqrt{2}}{2}$$

$$j2\pi f R C + 1 = \sqrt{2}$$

$$(j2\pi f R C + 1)^2 = 2$$

$$- 4\pi^2 f^2 R^2 C^2 + 1 + 2j 2\pi f R C$$

$$\frac{X_c}{\sqrt{X_c^2+R^2}} = \frac{\frac{1}{2\pi f c}}{\sqrt{R^2+\frac{1}{4\pi^2 f^2 c^2}}} = \frac{1}{\sqrt{R^2+\frac{1}{4\pi^2 f^2 c^2}} \times 2\pi f c}$$

$$= \frac{1}{\sqrt{R^2\cdot 4\pi^2 f^2 c^2 + 1}} = \frac{V_{out}}{V_{in}} = \frac{1}{\sqrt{2}}$$

$$R^2 \times 4\pi^2 f^2 c^2 + 1 = 2$$

$$R^2 \times 4\pi^2 f^2 c^2 = 1$$

$$f^2 = \frac{1}{R^2 \cdot 4\pi^2 \times c^2} \qquad f = \frac{1}{2\pi R C}$$

$$A_{dB} = 20\log\left(\frac{V_{out}}{V_{in}}\right) dB$$

$$= 20\log\left(\frac{1}{\sqrt{R^2 \times 4\pi^2 f^2 c^2 + 1}}\right) dB$$

$$= -10\log\left(R^2 \times 4\pi^2 f^2 c^2 + 1\right) dB$$

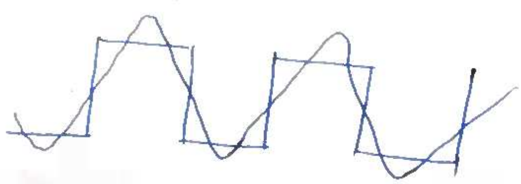
$$= -10\log\left(4\pi^2 f^2 \underline{R^2 c^2} + 1\right) dB \rightarrow \text{attenuation } \cancel{\text{fo}} \text{ over all freq}$$

$$f_{cut\text{-}off} = \cancel{2\pi f} = \frac{1}{2\pi R C}$$

$$f^2_{cut\text{-}off} = \frac{1}{4\pi^2 R^2 C^2}$$

$$4\pi^2 R^2 C^2 = \frac{1}{f^2_{cutoff}}$$

$$A_{dB} = -10\log\left(\frac{1}{f^2_{cut\text{-}off}} \times f^2_{test} + 1\right) dB$$



$$= -10\log\left(\frac{f^2}{(1{,}5 f)^2} + 1\right) dB$$

for duty < 60%

duty > 60%