

Missing Octave Code. Will resubmit with code as soon as I can

ADC & DAC

ADC & DAC

2)

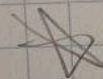
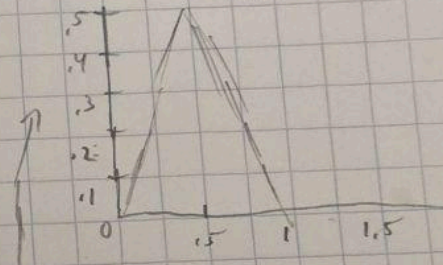
$$a) \frac{50 \text{ kHz}}{500 \text{ kHz}} = \frac{1}{10} = 50 \text{ kHz}$$

$$b) \frac{250 \text{ kHz}}{500 \text{ kHz}} = \frac{1}{2} = 250 \text{ kHz}$$

$$c) \frac{750 \text{ kHz}}{500 \text{ kHz}} = 1.5 = 250 \text{ kHz}$$

$$d) \frac{1000 \text{ kHz}}{500 \text{ kHz}} = 2 = 0 \text{ kHz}$$

Conversion
of analog
frequency converts
directly for
first half.
Past half
takes place
aliasing



not a value its a decimal
of the signal frequency

ADC & DAC

DAC Signal amplitude (V) = Digital amplitude $\times \Delta V$

a)

$$256 \cdot 0,0098 \text{ V} = 2,508 \text{ V}$$

$$\boxed{\text{signal amp} = 2,51 \text{ V}}$$

b)

$$[0,5]$$

$$\Delta V = \frac{5}{4095} = 0,00122$$

$$\Delta A = 2048 \cdot 0,00122 = \boxed{2,5 \text{ V}}$$

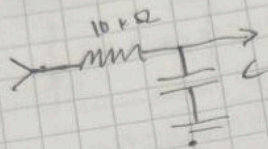
c) $\Delta V = \frac{0,25}{128} = 0,00195 \text{ V per count}$

$$\text{Max(V)} = 0,00195 \cdot 511$$

$$\boxed{\text{max V} = 0,991 \text{ V}}$$

ADC & DAC

3)



$$R(f) = \frac{1}{1 + j\omega T}$$

$$\omega = 2\pi f$$

$$T = RC$$

$$A = 3.3V$$

$$f = 25 MHz = 25 \cdot 10^7 Hz$$

$$R = 10 k\Omega = 10000 \Omega$$

$$C = ?$$

$$S_f = 0.33V \text{ (Filtered signal)}$$

$$|R(f)| = \frac{1}{\sqrt{1 + (\omega T)^2}}$$

$$\Rightarrow A(f) R(f) = S_f$$

$$3.3 |R(f)| = 0.33$$

$$\frac{3.3}{\sqrt{1 + (\omega T)^2}} = 0.33$$

$$\left(\frac{3.3}{\sqrt{1 + (2\pi f RC)^2}} \right)^2 = 0.33^2 = \frac{3.3^2}{1 + (2\pi f RC)^2} = 0.33^2$$

$$(3.3)^2 = (0.33)^2 + (0.33)^2 (2\pi f RC)^2$$

$$\frac{(3.3)^2 - (0.33)^2}{(0.33)^2 (2\pi f R)^2} = C^2$$

$$C = \sqrt{\frac{(3.3)^2 - (0.33)^2}{(0.33)^2 (2\pi (10000) (25 \cdot 10^7))^2}}$$

$$C = 6.33 \cdot 10^{-11} F$$

ADC & DAC

2)

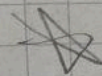
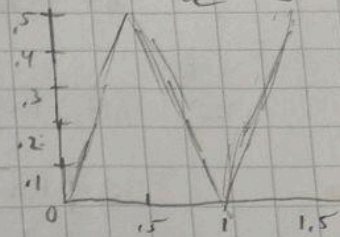
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