

# task\_pdkggyexxy1ktu3\_with\_calculation

## Student Group

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complex impedance, exam ee1 WS2022

### Exercise E1 Impedances at different Frequencies

**(written test, approx. 18 % of a 60-minute written test, WS2022)**

Each of the series resistor values  $R_1$  through  $R_5$  shall be a 1% tolerance component of 33  $\Omega$  to 3.0 k $\Omega$ , with  $B = 200$  to 450 nHz,  $H_z$  high-gate test current  $I_{GT} = 50$  to 300 nA,  $A$  through  $A_3$ .  
 A resistor  $R_{R1}$  shall have the same absolute value of the impedance as a capacitor  $C_1 = 40$  nF at  $f_1 = 4$  MHz.

### Solution

**Solution**

$$R_1 = 1.00 \sim \Omega$$
$$\text{solution} \begin{aligned} R_2 &= 10.0 \sim \Omega \end{aligned}$$

A series circuit means that the current is constant on every component.

The equivalent impedance for  $R$  and  $L$  combined is given by  $\begin{aligned} & \end{aligned}$

Parallel circuit means that the voltage is the same on \$R\_1\$, \$R\_2\$, and \$R\_3\$.

[illegible]
$$V_{\text{G}} = 56 \text{ V} \quad \text{lever} \{2 \pi \cdot \text{cm} \cdot 4\} \quad 3 \text{ cm} \quad \text{MHz} \cdot \text{cm} \cdot 4 \text{ G} \quad 3 \text{ cm} \quad \text{nF} \quad \text{clear} \quad \text{end} \quad \text{align}^*$$

\$\underline{B\_1B\_2}\$ is perpendicular to \$\underline{B\_1B\_3}\$ (It has to, since \$B\_1B\_3\$

[illegible]
$$\sqrt{\text{sum}(\text{find}(\{x\}_{L2}, \{x\}_{L1} \setminus \text{set}(\{u\}_{\text{over}}\})), \text{weight})^2 \equiv \{R_2\}^2 + \{x_{L2}\}^2$$

where  $I_{\text{total}}$  is the resulting current of the parallel circuit is given as:

$$\underline{I}_3 = \underline{I}_{3R} + \underline{I}_{3C} \quad \text{||}$$
$$\frac{\text{This can be rephrased as } \text{get\_Rise}(\text{begin}[\text{R}][i]2^*) \text{ underinsert}[\_k\text{FC}][i]2 \text{ over}[\_k\text{FC}][i]2}{\text{This can be rephrased as } \text{get\_Rise}(\text{begin}[\text{R}][i]2^*) \text{ underinsert}[\_k\text{FC}][i]2 \text{ over}[\_k\text{FC}][i]2}$$

$I_{D1} \approx I_{D2} = \frac{V_{DD} - V_{th}}{R_D} \approx \frac{10V - 1.5V}{10k\Omega} = 0.85mA$

$$\right)^2 - (2\pi \cdot 450 \sim \text{kHz} \cdot 4.7 \sim \text{\mu H})^2 \} \quad \end{align*}$$

Back to the first formula: 
$$R_3 \cdot \{I\}_{3R} = \{X\}_{3\dot{C}} \cdot \{I\}_{3\dot{C}}$$

$$\{I\}_{3C} \parallel R_3 \&= \{X\}_{3C} \cdot \frac{\{I\}_{3C}}{\{I\}_{3R}} \parallel \&=$$
$$\frac{1}{2\pi i} \oint_{\Gamma} f(z) dz \cdot C^3 \cdot \sqrt{|I|} \cdot |3|^{n^2} \cdot$$
$$\frac{|I| \cdot |3R|^2}{|I| \cdot |3R|} \quad \text{\texttt{\textbackslash\textbackslash \end{align*}}}$$

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