

Student Contest 2020

Sponsored by the German Chapter of the IEEE EMC Society

Solution Sheet 2020

Sponsored by the German Chapter of the IEEE EMC Society

Start date: 15.06.2020

End date: 31.12.2020

Eligible participants:

Students of Electrical Engineering and Information Technology or similar subjects with Bachelor degree or below

Contact:

Send the completed solution sheet via email to: Prof. Dr.-Ing. Matthias Hampe, m.hampe@ostfalia.de

**Choose your decoupling capacitor:
Which values of C and R minimize
the noise current $i_N(t)$?**

Sink

Noise current $i_N(t)$ through internal resistance $R_i = 50 \Omega$, directly connected with both copper layers at $(x_N, y_N) = (160 \text{ mm}, 120 \text{ mm})$

Printed Circuit Board

Length 200 mm, width 150 mm, height 1.5 mm, substrate FR-4 with $\epsilon_r = 4.3$, $\tan(\delta) = 0.025$, both sides full copper layer

Source

Ideal current source with current $i_0(t) = 1 \text{ mA} \cdot \sin(2\pi \cdot 355 \text{ MHz} \cdot t) + 1 \text{ mA} \cdot \sin(2\pi \cdot 472 \text{ MHz} \cdot t)$, directly connected with both copper layers at $(x_0, y_0) = (3 \text{ mm}, 3 \text{ mm})$

Decoupling Capacitor

Series equivalent circuit with

$$1 \text{ pF} \leq C \leq 1 \text{ }\mu\text{F},$$

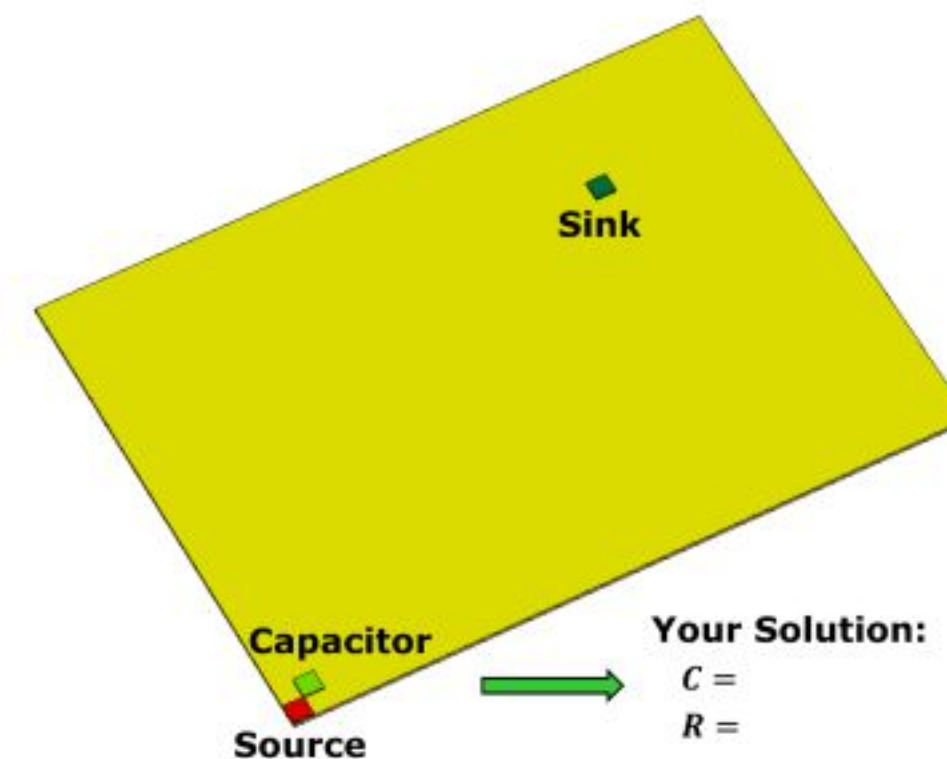
$$10 \text{ m}\Omega \leq R \leq 10 \Omega,$$

$$L = 4 \text{ nH},$$

directly connected with both copper layers at $(x_D, y_D) = (9 \text{ mm}, 9 \text{ mm})$

Participants, up to 3 students:

Email address of contact person:



Your Solution:

$C =$
 $R =$

How was the solution determined and why is the selected capacitor so effective?