ELKA RF

No.
Date :

M. Hasyim Abdillah P.
1101191095
TT-43-61

2.a. Frekuensi 1 GHz :

$\Delta = S_{11} \cdot S_{22} - S_{12} \cdot S_{21}$

$= 0{,}85 \angle 172^\circ \cdot 0{,}87 \angle -172^\circ - 0{,}009 \angle -35^\circ \cdot 1{,}804 \angle 44^\circ$

$= 0{,}7395 \angle 0^\circ - 0{,}016 \angle 9^\circ$

$= 0{,}7237 - j0{,}0025$

$|\Delta| = 0{,}7237$

$k = \dfrac{1 - |S_{11}|^2 - |S_{22}|^2 + |\Delta|^2}{2 \cdot |S_{12} \cdot S_{21}|}$

$= \dfrac{1 - 0{,}85^2 - 0{,}87^2 + 0{,}7237^2}{2 \cdot 0{,}016}$

$= 1{,}30$

$K > 1 \quad ; \quad |\Delta| < 1$

∴ Transistor stabil tanpa syarat

Frekuensi 4 GHz :

$\Delta = S_{11} \cdot S_{22} - S_{12} \cdot S_{21}$

$= 0{,}95 \angle 172^\circ \cdot 0{,}78 \angle -172^\circ - 0{,}008 \angle -35^\circ \cdot 2{,}03 \angle 44^\circ$

$= 0{,}741 \angle 0^\circ - 0{,}016 \angle 9^\circ$

$= 0{,}7252 - j\,0{,}0025 \rightarrow \Delta = 0{,}7252 \angle 0{,}2^\circ = 0{,}7252 \angle 0^\circ$

$|\Delta| = 0{,}7252$

$k = \dfrac{1 - |S_{11}|^2 - |S_{22}|^2 + |\Delta|^2}{2 \cdot |S_{12} \cdot S_{21}|}$

$= \dfrac{1 - 0{,}95^2 - 0{,}78^2 + 0{,}7252^2}{2 \cdot 0{,}016}$

$= 0{,}469$

$k < 1 \quad ; \quad |\Delta| < 1$

∴ Transistor stabil bersyarat

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b. Frekuensi 4 GHz :

$$R_L = \left| \frac{S_{12} \cdot S_{21}}{|S_{22}|^2 - |\Delta|^2} \right| = \left| \frac{0{,}08 \angle -35^\circ \cdot 2{,}03 \angle 44^\circ}{0{,}70^2 - 0{,}7252^2} \right|$$

$$= \left| \frac{0{,}016 \angle 9^\circ}{0{,}08} \right|$$

$$R_L = 0{,}2$$

$$C_L = \frac{(S_{22} - \Delta \cdot S_{11}^*)^*}{|S_{22}|^2 - |\Delta|^2} = \frac{(0{,}70 \angle -172^\circ - 0{,}7252 \angle 0 : 0{,}95 \angle -172^\circ)^*}{0{,}70^2 - 0{,}7252^2}$$

$$= \frac{(0{,}70 \angle -172^\circ - 0{,}68 \angle -172^\circ)^*}{0{,}08}$$

$$= \frac{-0{,}09 - j\,0{,}013}{0{,}08}$$

$$= -1{,}125 - j\,0{,}1625$$

d. $$G_{T,Max} = \frac{|S_{21}|}{|S_{12}|} \left(k - \sqrt{k^2 - 1} \right)$$

$$= \frac{2{,}03}{0{,}08} \left(1{,}38 - \sqrt{1{,}38^2 - 1} \right)$$

$$= 108{,}85$$