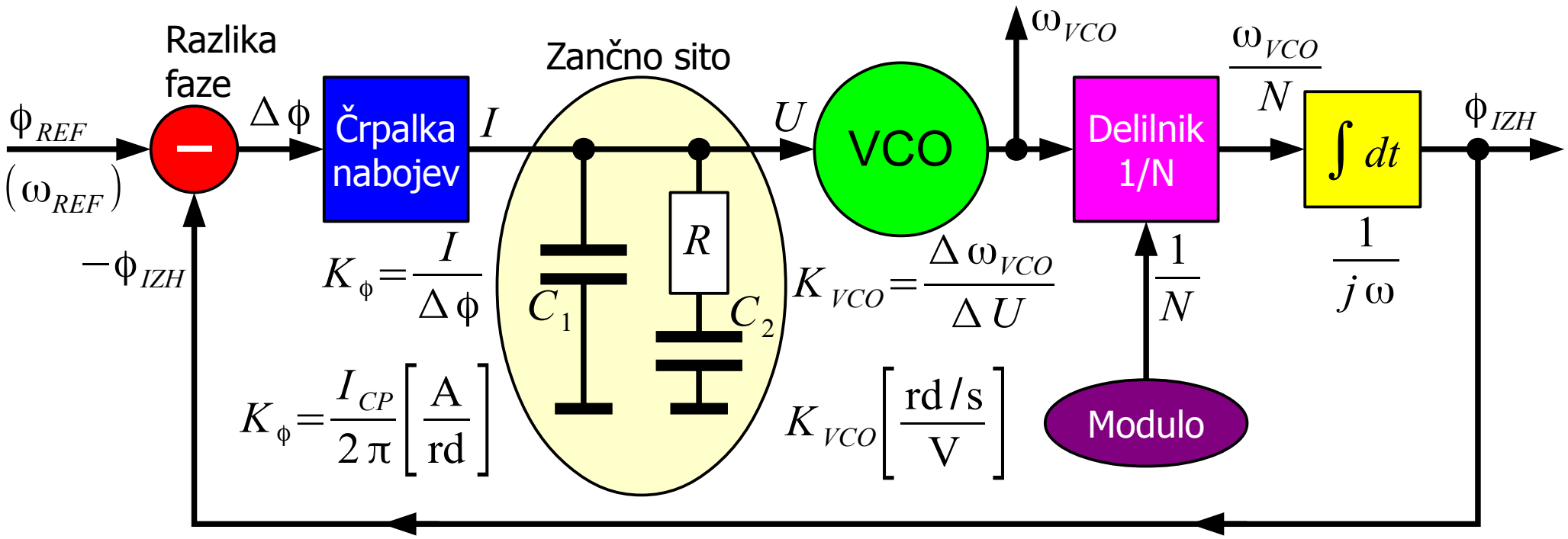


$$H(\omega) = \frac{\phi_{IZH}}{\Delta\phi} = K_\phi \cdot \frac{1}{j\omega C_1 + \frac{1}{R + \frac{1}{j\omega C_2}}} \cdot K_{VCO} \cdot \frac{1}{N} \cdot \frac{1}{j\omega}$$

Harmonska motnja:

$$\phi_{REF} = A \cdot e^{j\omega t},\ \omega \ll \omega_{REF} \approx \frac{\omega_{VCO}}{N}$$

Ničla: $\tau_2 = R C_2$

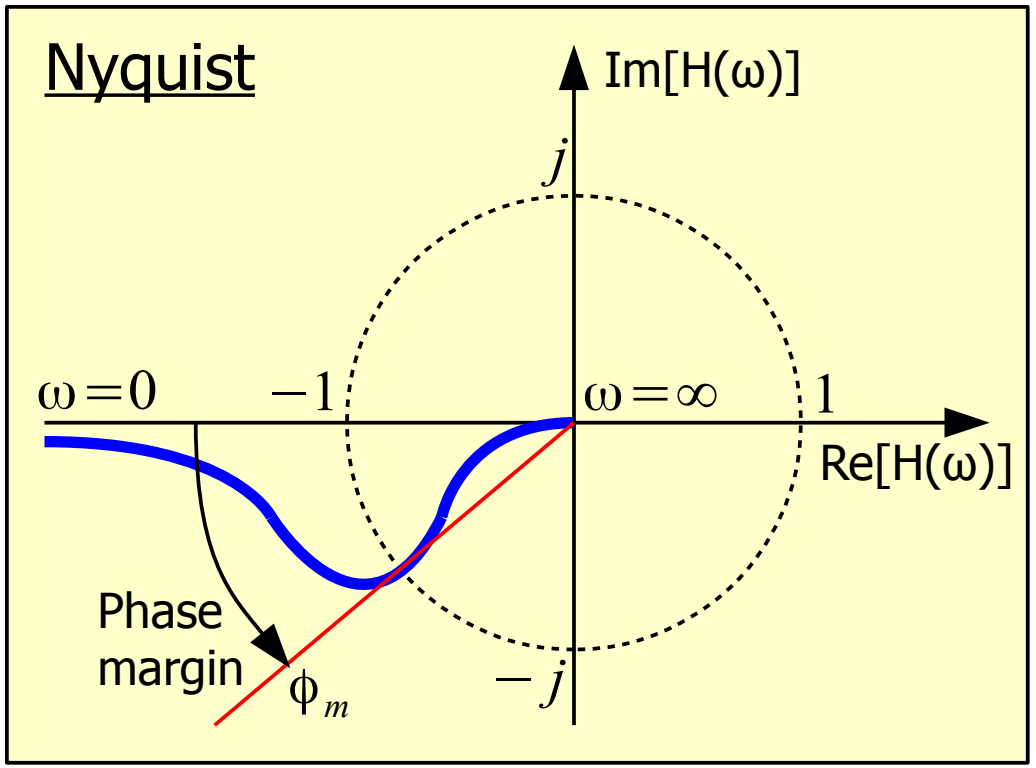
$$H(\omega) = \frac{-K_\phi K_{VCO}}{\omega^2 N (C_1 + C_2)} \cdot \frac{1 + j\omega\tau_2}{1 + j\omega\tau_1}$$

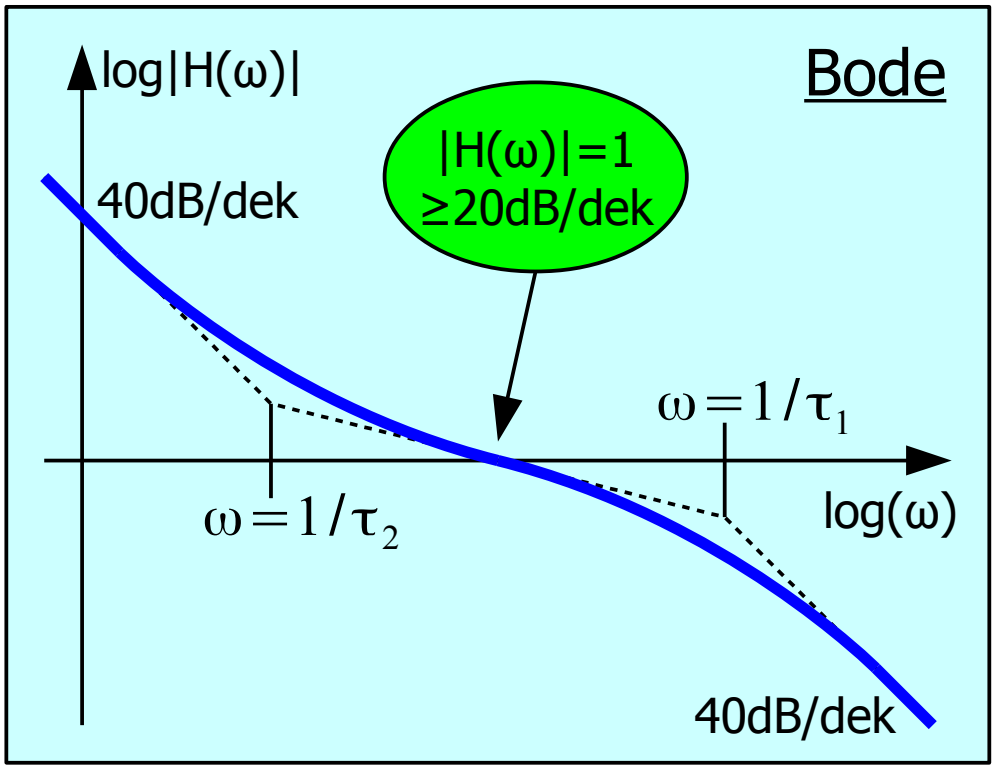
$$\Delta\phi = \frac{\phi_{REF}}{1 + H(\omega)}$$

Pol: $\tau_1 = R \cdot \frac{C_1 C_2}{C_1 + C_2}$

$$\phi_{IZH} = \phi_{REF} \cdot \frac{H(\omega)}{1 + H(\omega)}$$

Enačba fazno-sklenjene zanke





$$\phi_m = \arctan \frac{\omega(\tau_2 - \tau_1)}{1 + \omega^2 \tau_1 \tau_2}$$

$$\frac{d\phi_m}{d\omega} = 0 \rightarrow \omega_m = \frac{1}{\sqrt{\tau_1 \tau_2}}$$

$$\tau_2 = m\tau_1 \rightarrow \phi_m = \arctan \frac{m-1}{2\sqrt{m}}$$

Izberemo m in B_{ZANKE}

$$\omega_m \approx 2\pi B_{ZANKE}$$

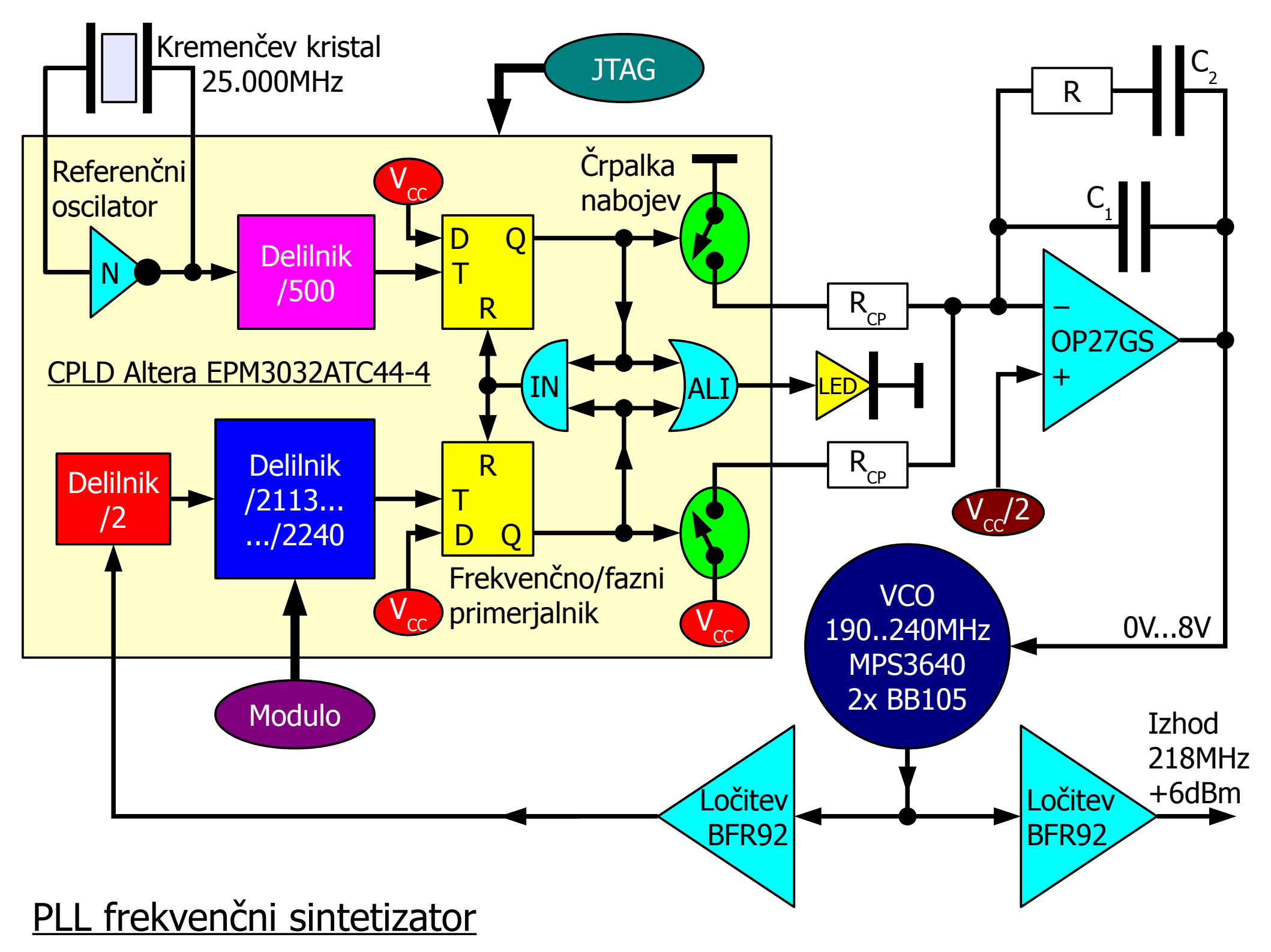
$$C_1 = \frac{K_\phi K_{VCO}}{\omega_m^2 N \sqrt{m}}$$

$$C_2 = (m-1) C_1$$

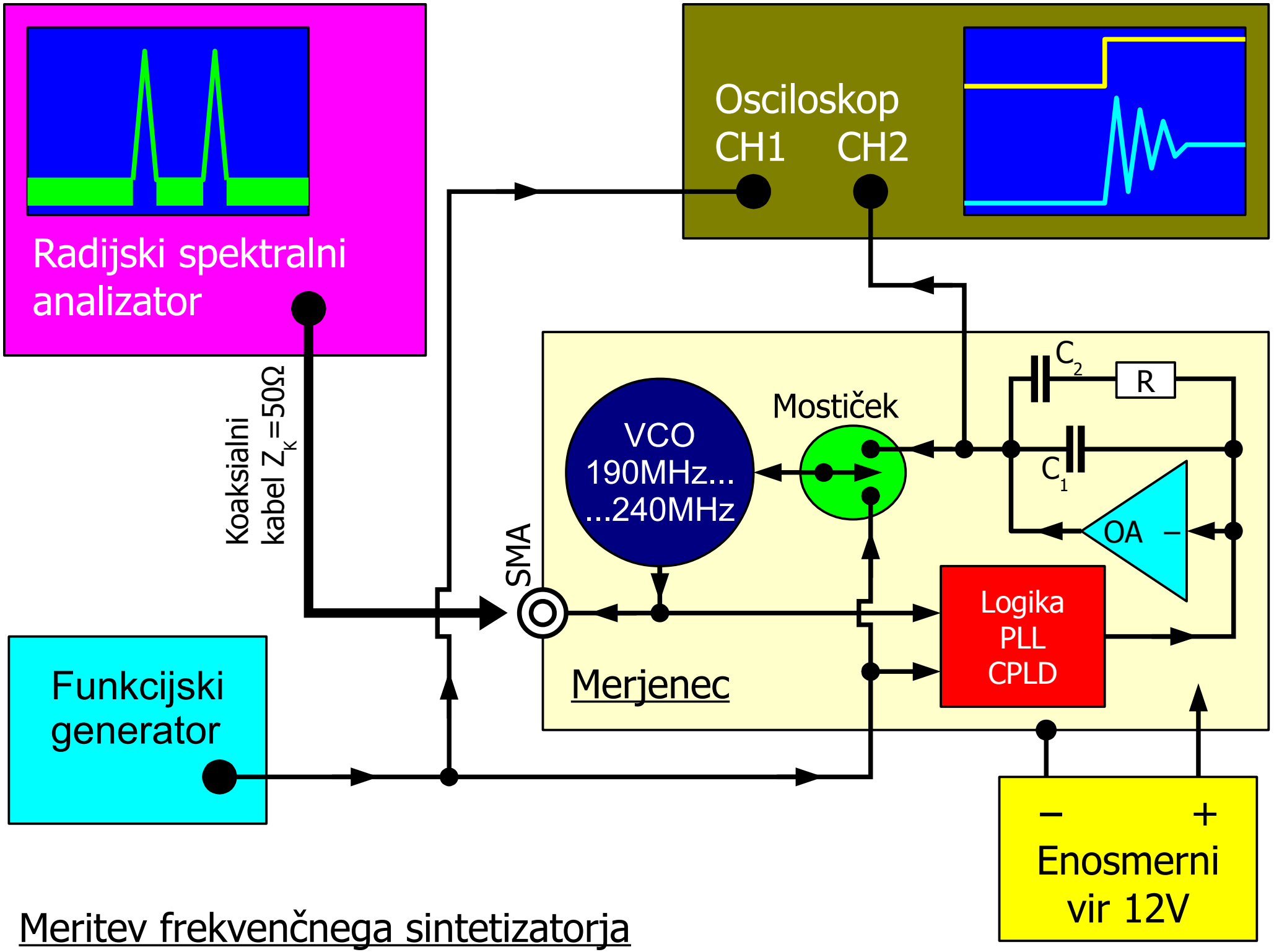
$$R = \frac{\sqrt{m}}{\omega_m C_2}$$

$$1 = |H(\omega_m)| = \frac{K_\phi K_{VCO}}{\omega_m^2 N m C_1} \cdot \sqrt{\frac{1+m}{1+\frac{1}{m}}} = \frac{K_\phi K_{VCO}}{\omega_m^2 N C_1 \sqrt{m}} \rightarrow \omega_m = \sqrt{\frac{K_\phi K_{VCO}}{N C_1 \sqrt{m}}}$$

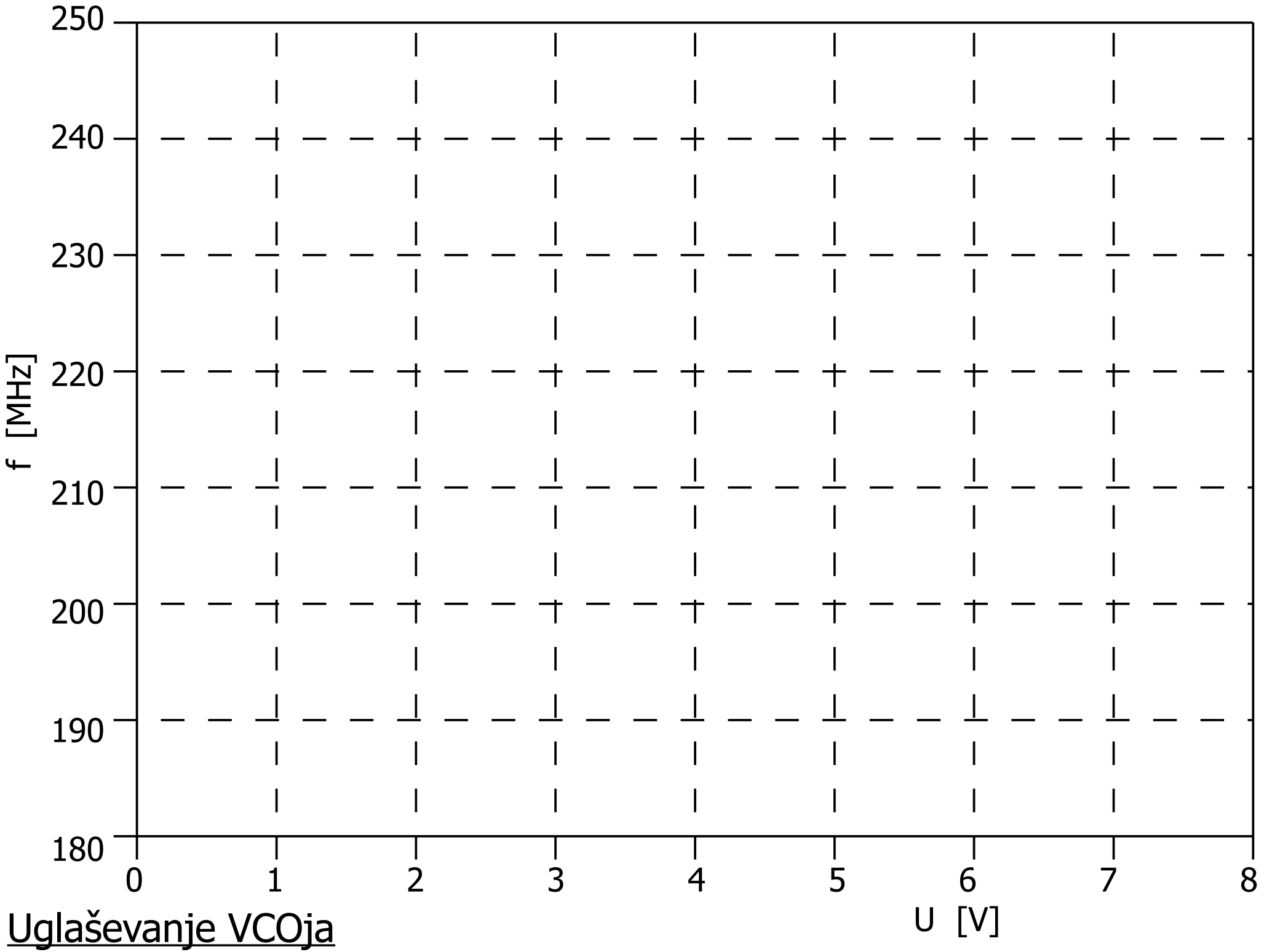
Izračun povratne vezave



PLL frekvenčni sintetizator



Meritev frekvenčnega sintetizatorja



Uglaševanje VCOja