Modulation Signal Board

• Mates on Mojo v3 (stacked headers)
• 4-pin (male) header connections
• Layout in Altium starter package on course website

Deliverables Next Wed.

• Login info to account with PCB layout that has passed Sierra Circuits’ AFV with
  – 6 mil spacing  – 2 boards
  – 15 mil holes  – Up to 6 layers
  – 4-day turn
• Excel spreadsheet of all parts, showing $150 requirements met
• Actionable ordering links/quotes for all parts
Output Characteristic

Transfer Function in Standard Form

\[ H(s) = \frac{R_C}{R_C + sL + \frac{1}{sC}} = \frac{R_sC}{\omega_sC + sL + \frac{1}{sC}} + 1 = \frac{s}{\omega_sC} + \frac{s}{\omega_sC} + 1 \]

\[ R_0 = \sqrt{\frac{L}{C}} \]

\[ \omega_0 = \frac{1}{\sqrt{LC}} \]

\[ Q_e = \frac{R_0}{R_C} \]

\[ Q_e\omega_0 = \frac{1}{R_C} + \frac{1}{\omega_0} = \frac{1}{\omega_0} \]

\[ F = \frac{F}{F_0} = \frac{\omega}{\omega_0} \]

\[ H(s) = \frac{\omega_sC}{\omega_sC + sL + \frac{1}{sC}} \]

\[ \left(1 - F^2\right) \frac{F}{\omega_0} + \frac{F^2}{Q_e^2} = \frac{\omega_sC}{\omega_sC + sL + \frac{1}{sC}} \]

\[ \left(1 - F^2\right) + \frac{F^2}{Q_e^2} \]
Series Resonant Tank

$E_{in} = E_{in}$  \( R_e \to \text{Short} \)

$E_{in} = E_{in}$  \( R_e \to \text{Open} \)

As \( R_e \) goes from zero to \( \infty \),

\( Z_l \) increases

\( \to \) Good!

\( \to \) Conduction losses decrease at low \( P \).
Subharmonic Modes - High Q

Subharmonic Modes – Low Q

Control by
switching frequency modulation

Voltage-controlled oscillator