

ECE 3065 Homework 7: Resonator Design

Solutions

- (a) **Open-Open:** A line of length of 5 cm will produce a $\frac{3}{2}\lambda$ -resonance for 2.4 GHz and a $\frac{5}{2}\lambda$ -resonance for 4.0 GHz.

(b) **Open-Short:** A line of length of 2.5 cm will produce a $\frac{3}{4}\lambda$ -resonance for 2.4 GHz and a $\frac{5}{4}\lambda$ -resonance for 4.0 GHz.

(c) **Ring:** A ring with circumference of 10 cm will produce a 3λ -resonance for 2.4 GHz and a 5λ -resonance for 4.0 GHz.

2. Transmission Line Resonator

- (a) $\alpha = 0.0287$ Nepers/m

(b) $D = 0.809$ cm

(c) $C = 6.06 \times 10^{-15}$ F

(d) -0.5% shorter

(e) $Q_L = 3364$; thus, bandwidth is 2.38 MHz.

(f) α approaches 0, Q approaches infinity; thus, bandwidth approaches zero.