Table 2. Results from realistic simulation of your own *AM Frequency Tunable Matching Network.*

Figure of Merit	Realistic Simulation
C_0 {pF}	9.5pF
L {mH}	0.675mH
$f_{0,min}$ {kHz}	720.8
$T[f_{0,min}]$ {V/V}	0.1148
$Q[f_{0,min}]$	35,161
$f_{0,max}$ {kHz}	1421.15
$T[f_{0,max}]$ {V/V}	0.4420
$Q[f_{0,max}]$	70.704

.675m 9.5p

.1148/2 = .0574

Δf = 730.5 − 710 = 20.5 $\frac{720.8}{20.5}$ = 35.161

.4420/2 = .2210

Δf = 1431.5 − 1411.4 = 20.1 $\frac{1421.15}{20.1}$ = 70.704

Task 3: Understanding the Engineering Trade-Offs (5 Points)

Discuss your observations regarding any correlations or engineering trade-offs that exist between the parameters BW, $T[f_0]$, and $Q[f_0]$. Why do you think that these correlations or tradeoffs exist?

Task 4: Submitting Your Project

Email a PDF copy of your Task 1 table and .ASC file, your Task 2 table and .ASC file, and your Task 3 discussion to the teaching assistant Michael Gasper (mrg41@zips.uakron.edu), and submit a printout of this single file to Dr. Toonen's mailbox (located in ASEC 156) no later than the specified deadline. This project is intended to be completed by individual students. Projects files submitted on behalf of *teams* will not be accepted.

Task 3 Discussion:

Observing the quality factor, it seems like it decreases with an increase in BW AKA a decrease in C_0. $T[f_0]$ gets to be more extreme differences if you increase the BW as well. In task 1 with the BW = 250 kHz, ΔT between peaks was 0.144. with the BW = 700 kHz, ΔT between peaks is a whopping 0.3202! The quality factor values are also much lower for the second diode with the larger BW (35 + 70) compared to the first with the smaller BW (57 + 72). As the BW increases, Q and T both decrease, and vice-versa. The circuit designer needs to make a choice between covering a wider range or having a higher quality factor. These tradeoffs exist because if they didn't, you could just make the bandwidth as high as you want and keep a great Quality Factor and low ΔT.