## Frequency Synthesizer project

**145B  Lab 3**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency step size</td>
<td>20 KHz</td>
</tr>
<tr>
<td>Frequency range</td>
<td>134 to 137 MHz (VCO +/- 10MHz)</td>
</tr>
<tr>
<td>Varactor tuning voltage range</td>
<td>1 to 5 volts</td>
</tr>
<tr>
<td>Overshoot</td>
<td>&lt; 30%</td>
</tr>
<tr>
<td>Reference Spurs</td>
<td>Better than 40 dBC</td>
</tr>
<tr>
<td>Settling time</td>
<td>10 ms to 1%</td>
</tr>
<tr>
<td>Crystal reference frequency</td>
<td>10.00 MHz</td>
</tr>
</tbody>
</table>
## Frequency Synthesizer project

### 218B  Lab 3

<table>
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<th>Parameter</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>Frequency step size</td>
<td>20 KHz</td>
</tr>
<tr>
<td>Frequency range</td>
<td>From Lab 2 results</td>
</tr>
<tr>
<td>Varactor tuning voltage range</td>
<td>1 to 5 volts</td>
</tr>
<tr>
<td>Overshoot</td>
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Frequency Synthesizer

ADF4002

Crystal osc

5V

Ref In

Vp

Rset

-7 dBm to FS

AV_{DD}

RF_{inB}

RF_{inA}

LM6482

output

Scope probe

SA – 50Ω termination
Reference Oscillator

\[ C_L = \frac{C_1 C_2}{C_1 + C_2} + C_a + C_o + \frac{C_{in} C_{out}}{C_{in} + C_{out}} \]

<table>
<thead>
<tr>
<th>Crystal:</th>
<th>ECS – 100 – 18 - 4</th>
<th>10.000 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co</td>
<td>7 pF</td>
<td></td>
</tr>
<tr>
<td>CL</td>
<td>18 pF</td>
<td></td>
</tr>
<tr>
<td>Max series resistance</td>
<td>60 ohms</td>
<td></td>
</tr>
<tr>
<td>Max drive power</td>
<td>0.5 mW</td>
<td></td>
</tr>
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</table>
Frequency Synthesizer

ADF4002

Crystal osc

5V

Mux Out

Lock detect

Control interface

Ref In

VP

Rset

ADF4002

AVDD

RFinB

RFinA

-7 dBm to FS

Your VCO

LM6482

3.3V

E

SA – 50Ω termination

Scope probe

SA – 50Ω termination
Charge pump loop filter
Frequency Synthesizer

ADF4002

Crystal osc

5V

E

ADF4002

AV_{DD} RF_{inB} RF_{inA}

5V

E

-7 dBm to FS

LM6482

CP loop filter

Your VCO

Scope probe

SA – 50\Omega termination
Microcontroller board

Ribbon cable to FS board

Serial RS232

“Radio Dial”
Controller menu

---------MENU---------
c - Configuration Mode
t - Toggle Mode
r - Radio Mode
f - Fastlock Mode
d - Display Configuration
m - Display this Menu
---------
Output spectrum
Transient response