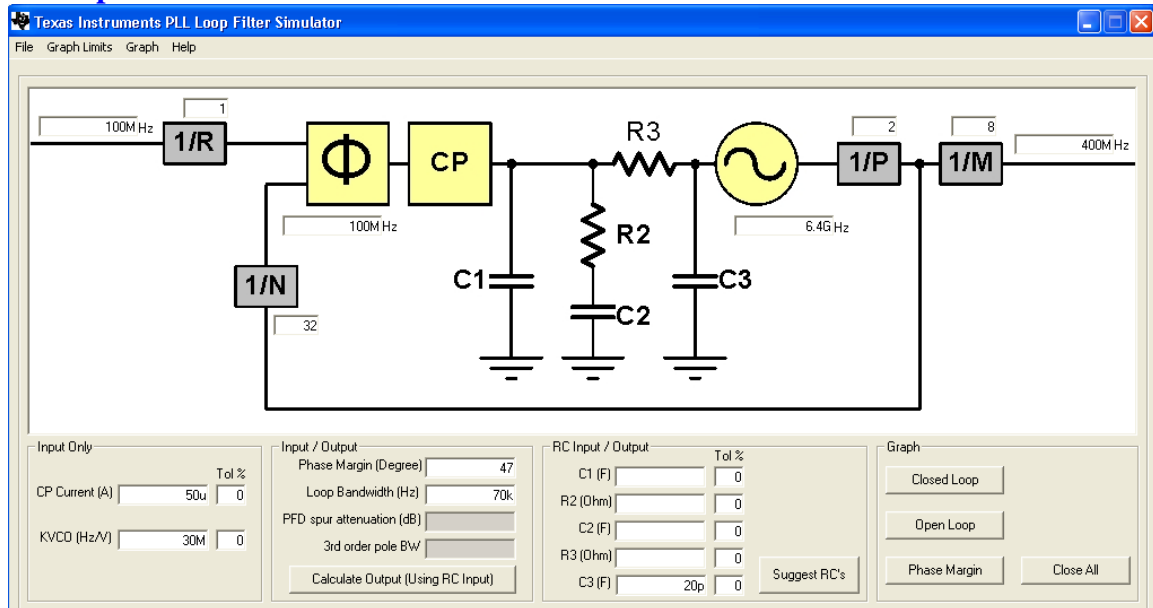


# Texas Instruments PLL Loop Filter Simulator

## - HELP FILE -

This tool can assist designing a 3<sup>rd</sup> order Low-Pass filter to optimize the PLL loop bandwidth of PLLs, such as the CDCM52002 loop one and loop two. The tool is commonly used in the following order:

### Startup Screen:



Next the user should input target values in the following order (**Step 1 to 6**):

**Step 1.** Input a target frequency into one of the 4 fields.

**Step 2.** configure all divider appropriately

**Step 3.** Input target charge pump (Parameter usually found in the DataSheet)

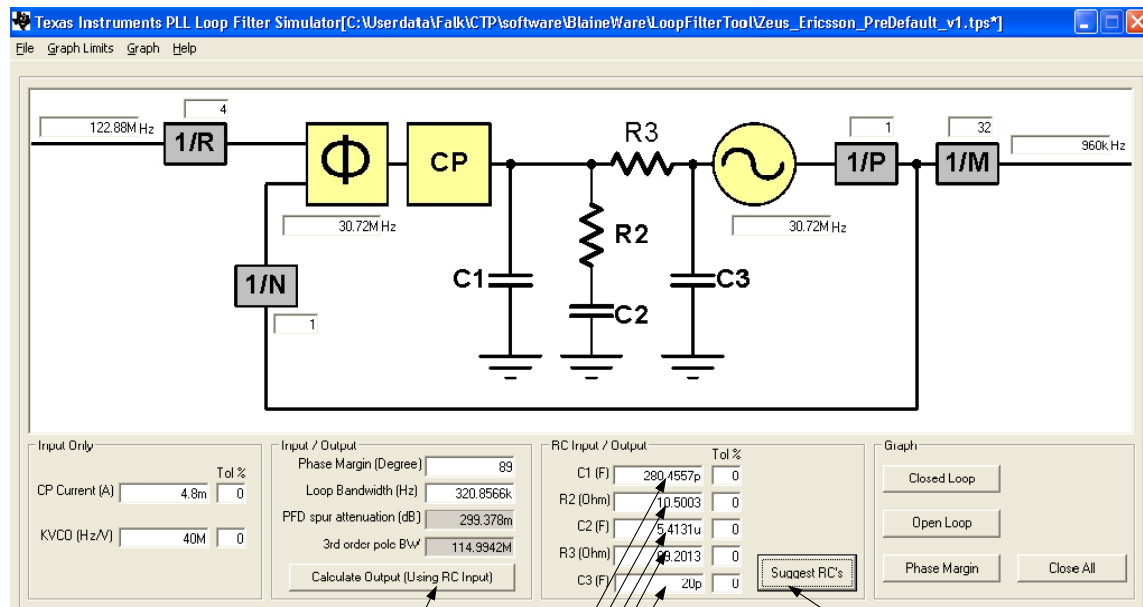
**Step 4.** Input KVCO (Parameter often found in the DataSheet, if not contact product team; use 40MHz/V for CDCM52005 PLL2, look up VCXO spec for loop 1)

**Step 5.** Input desired Phase Margin (PM). This parameter impacts PLL stability, lock time, PLL jitter peaking, and spur gain. If in doubt, select a phase margin of 60 degree. Recommended input range 46° to 89°.

**Step 6.** Input desired Loop BW. The PLL acts as a LP filter to the input clock reference, and tracks input PN up to the LBW. A higher LBW is desired when the PN of the input clock is lower than the VCO noise. A lower LBW should be chosen otherwise, and especially when the input clock noise is uncertain (e.g. jitter cleaner application).

**Step 6.** Input C3 target value. If in doubt, leave this value at 20pF. Sometimes the 3<sup>rd</sup> pole is part of the PLL and only allows a small number of fixed values. Check in the D/S. CDCM52005 example:

Then the tool can be used to generate a filter configuration (**Step 7**). Also, the filter can be fine-tuned by adjusting the capacitor and resistor values (**Step 8**):

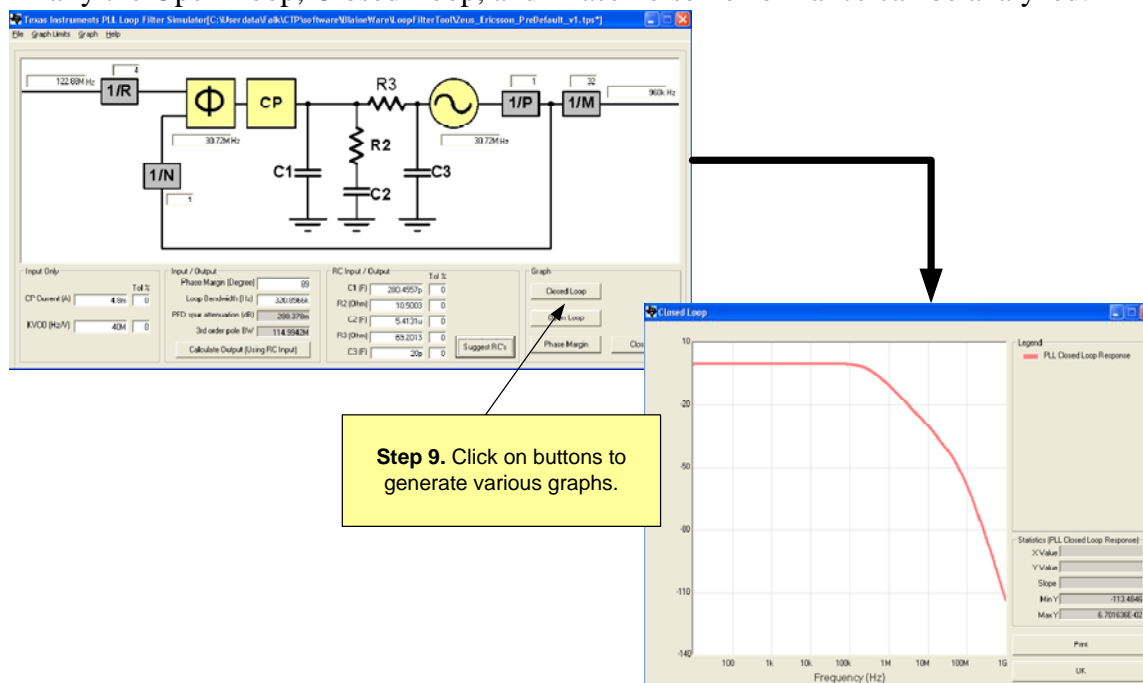


**Step 8-B.** Re-calculate the loop BW and phase margin based on the adjusted R's and C's by clicking this button.

**Step 8-A.** Fine-tune R1, R2, C1, C2, and C3.

**Step 7.** Click on button to generate an RC recommendation.

Finally the Open Loop, Closed Loop, and Phase noise Performance can be analyzed:



The graph itself also allows to marking a data point of the selected function:

