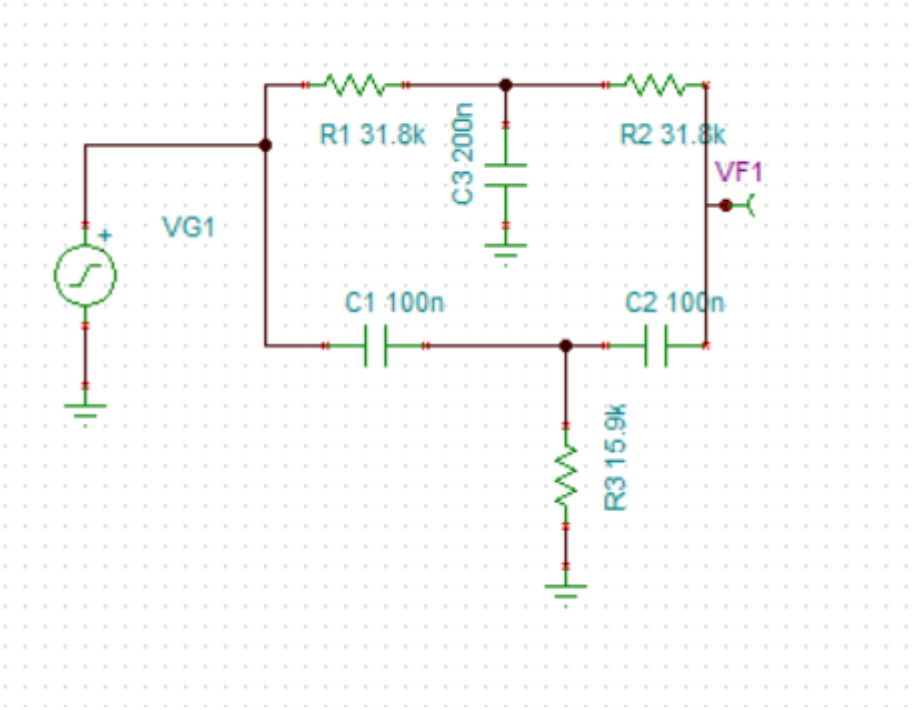
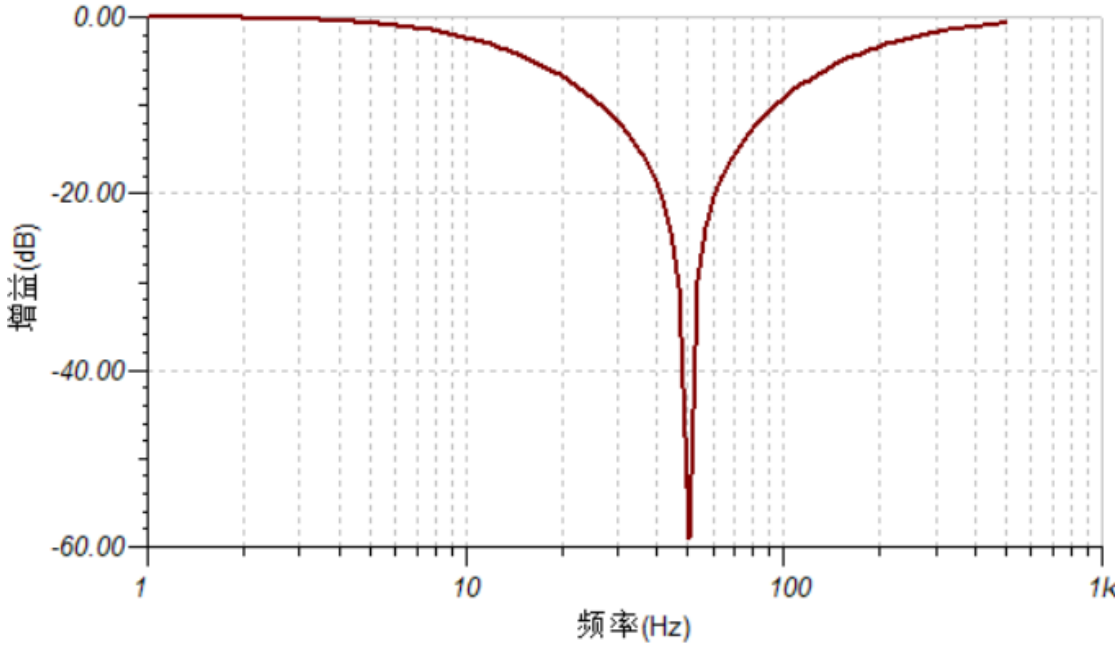
The Twin-T Notch Filter as the name suggests , is composed of two T-type networks, a high-pass part composed of resistors and capacitors, and a low-pass part composed of capacitors and resistors, formed in parallel.

The primary function is to generate a deep notch at a specific frequency, effectively eliminating interference signals of targeted frequencies, such as 50Hz power line interference.

Simulation from TINA





The resistor and capacitor for The Twin-T Notch Filter should follow these steps:

1) **Determine the frequence *f0***

   f0 =1/(2*Pi*R*C)

   *In this document, the target frequency is **50Hz.***

2) **Select standard capacitor values**

   Prioritize commonly available capacitor values for practicality.

   Example: If C=100 nF, substituting into the formula yields

   R≈31.8 kΩ.

3) **Match component ratios**

   The standard Twin-T structure requires the following ratios:

   a) Upper T-network: 2 resistors R and 1 capacitor 2C

      (E.G., 31.8kΩ+31.8kΩ+200nF)

b) Lower T-network: 2 capacitors C and 1 resistor R/2

(E.G., 100nF+100nF +15.9kΩ)

Ensure strict adherence to these ratios, as deviations will degrade notch depth and frequency response.

Strictly speaking, **this filter is a passive Twin-T filter**. Its key advantage is simplicity, but it suffers from a low Q factor (limited frequency selectivity)

If you need a high Q factor, consideration should be given to using an **active Twin-T notch filter**, which will be detailed in a separate document.

Additionally, when implementing a passive Twin-T notch filter in practical applications, it is critical to ensure impedance matching between the circuit and adjacent stages. If the load impedance is low (e.g., with ADCs, speaker, etc.), a buffer stage (such as a voltage follower) must be added to prevent loading effects from degrading the notch filter's performance. This buffered configuration essentially constitutes an active Twin-T notch filter.

*The **Q** factor (Quality factor) is defined as the ratio of the notch filter's center frequency **f0** to its stopband bandwidth **Δf**.*

a) *High Q value: Narrow stopband bandwidth, enabling the notch filter to suppress signals within an extremely narrow frequency range. This achieves precise elimination of single-frequence (e.g., 50Hz power line interference).*

b) *Low Q value: Wide stopband bandwidth, suppressing signals across a broader frequency range but with reduced rejection depth.*