# Optimized Low-Pass Filter Architecture with Fast Settling Response

Problem Statement :

When measuring or tracking some slowly varying quantity in a noisy environment, one usually applies a lowpass filter to suppress the noise, thereby achieving a steady, more accurate reading. Despite their ease of design, conventional single-pole RC low-pass filters have slow settling times because of the filter capacitor's charging and discharging limitations. In applications like instrumentation, communication systems, and high-speed data converters that demand quick reaction times and accurate signal acquisition, this delay impairs system performance. A low-pass filter topology that provides a notable enhancement in transient response while preserving the intended frequency-selective behaviour is thus required. The suggested fast-settling low-pass filter overcomes this restriction by employing diodes (D1 and D2), which facilitate faster charging and discharging of the filter capacitor whenever a significant voltage difference exists between the input and output nodes.
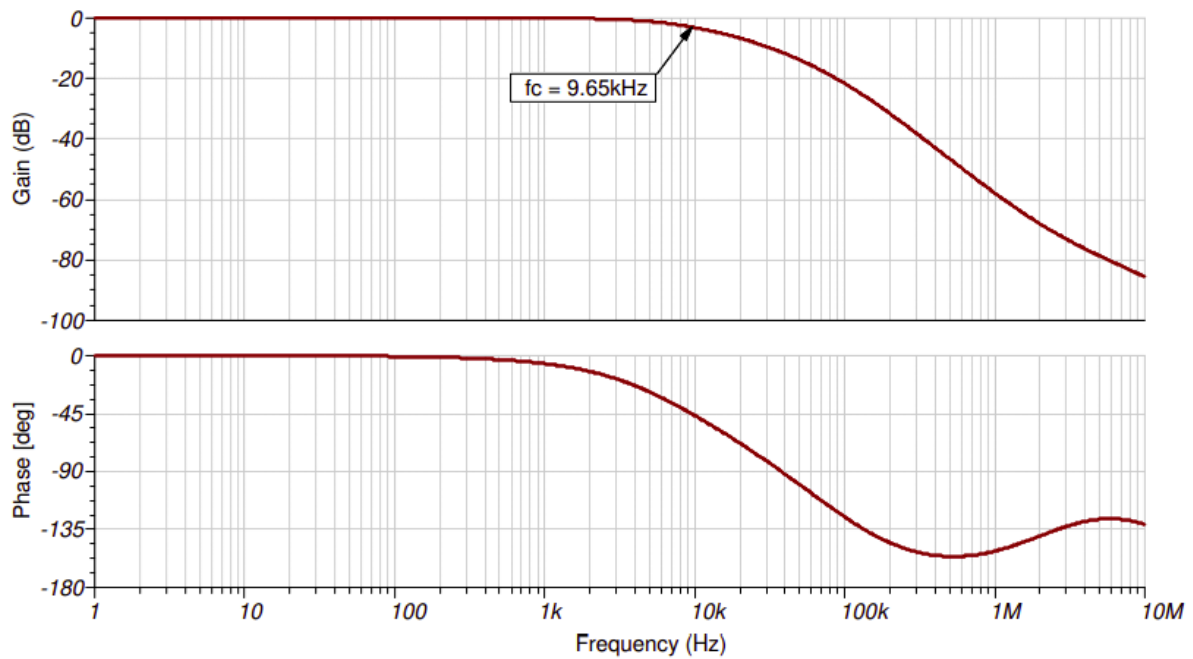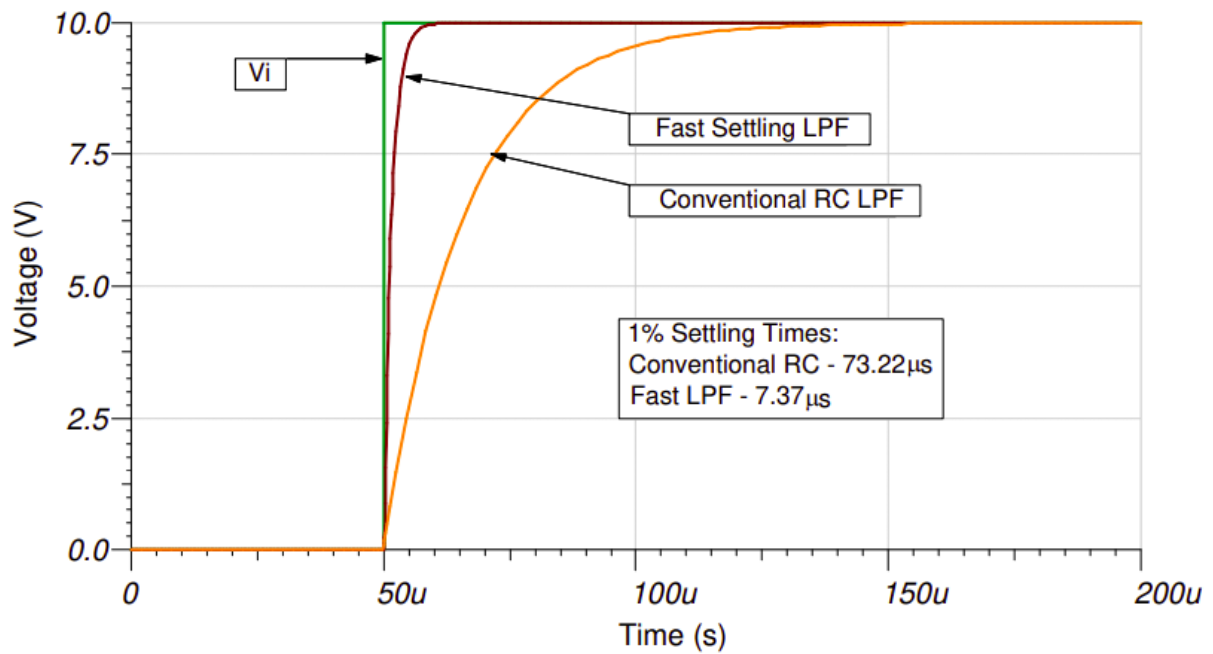
Solution :

Circuit Diagram :
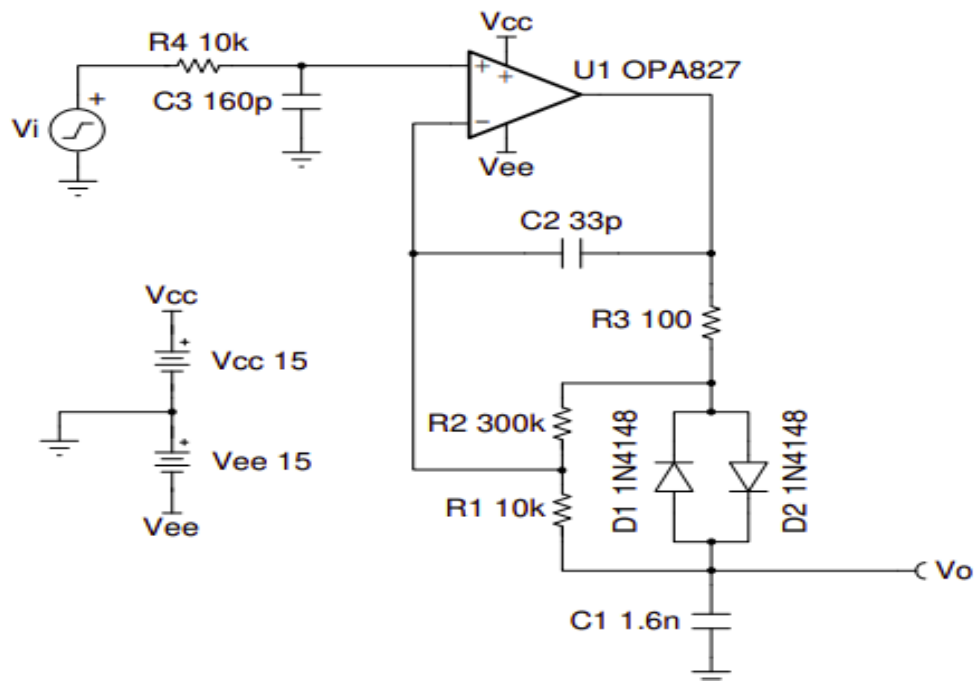
Simulations :

AC Simulation Results

Transient Simulation Results

Cutoff frequency , f=10k Hz

References :

1. FAST SETTLING LOW-PASS FILTER By Rod Burt and R. Mark Stitt (602) 746-7445
2. [Fast-settling low-pass filter circuit (Rev. A)](#)