

# Development of Second Order High Frequency Filter for Partial Discharge Measurement

## Abstract

Partial Discharge (PD) can occur on any high-voltage equipment. This study is particularly concerned with the PD that occurs on underground cables. Researchers frequently struggle to isolate interference noise from the PD signal when doing PD measurements. Therefore, to reduce the interference noise during PD measurements, Sallen-Key High Pass Filter (HPF) with a 500 kHz, or a little bit higher cut-off frequency are designed. This filter is designed with a designated cut-off frequency value because the frequency range of the PD signal is between 1 MHz to 1 GHz. Based on the results of experimental testing for actual filters, the designed filter is a HPF with a cut-off frequency of 500 kHz. When the generator function's input frequency values are set between 500 kHz and 2.4 MHz, the signal will pass the filter and provide output values for both frequencies and amplitude. However, at frequencies lower than 500 kHz, the signal is beginning to be filtered and the output signal's amplitude is getting close to zero. Based on the PD testing results, there is interference on the PD signal shown on the oscilloscope when a 1kV supply is applied to an underground cable without using a filter. But, when the proposed filter is used in PD testing, the ripple voltage is reduced from 123 mV to 67 mV. This proves that when the designed HPF is used in PD testing, it can reduce interference noise on the PD signal.

## Keywords

Cut-off Frequency; High Pass Filter (HPF); Interference Noise; Partial Discharge (PD); Sallen-Key