

## **Development of tools and methods to characterize low noise power supplies for the purpose of Astronomical instrumentation**

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Reducing power supply noise is one of the essential steps in order to implement precision and reliable instrumentation. However, commercial power supplies are usually insufficient for the purpose of astronomical instrumentation. They usually lack noise characterization over a range of frequencies and also over a range of applied load. In this regard, we have defined a method of estimating tolerable noise limits along with specific bandwidth and load limit requirements for various electronic components. We have developed tools such as DC constant current loads and active RC filters to test and measure the noise performance of off-the-shelf power supply modules. Finally, We have fabricated a range of old and modern voltage regulator architectures and compared their measured noise figures for the purpose of realizing a low noise ( $< 50$  microVolt RMS) power supply. We will discuss the various methods of noise measurement using a modern digital oscilloscope and various techniques to reduce power supply noise.