

## **Master 2020**

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### **Development of an Active Source to Validate Transimpedance Amplifiers Used in LIDAR Systems.**

#### ***ABSTRACT - Masterthesis***

This work describes the design and implementation of voltage to current converter circuit, used to stimulate transimpedance amplifiers for ADAS LiDAR applications. This comes as a solution for implementing an active driver circuit to emulate better the behavior of avalanche photodiodes (APD) in the laboratory validation and system tests. Firstly, Howland current source is evaluated along with Tietze and current mirror current sources. The comparison criteria here are high output impedance and better bandwidth. Howland circuit proved to provide best results. Secondly, a large part of the analysis involves studying Howland circuit behavior to choose the right opamp and the circuit configuration. Circuit simulations are carried out using LTSpice and TINA-TI tools. Hardware implementation of the circuit is done with three different opamps for better comparison. PCB is designed using the Altium designer EDA tool. Finally, functional measurements are performed with hardware in laboratory to verify system performance. The designed circuit has a bandwidth of 100MHz and is capable of handling load in the range of  $20\Omega$  to  $200\Omega$  as per requirements.

A variable dynamic load range of  $2\mu\text{A}$  to  $2\text{mA}$  is also achieved.