Programmable Gain Instrumentation Amplifiers

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28 September 2022

***Abstract*— Instrumentation is the extension ofthe difference amplifier. Amplifies the difference between the voltages existing at its two input terminals. Instrumentation amplifier is a differential voltage-gain device. The main purpose of an instrumentation amplifier is to amplify small signals that may be riding on large common-mode voltages. Commonly used in environments with high common-mode noise, such as in data acquisition systems. Data Amplifier.**

Keywords—Instrumentation amplifier, ADC, OP AMP, Mixed Signal, Multiplexer

1. Reference Circuit Details

Instrumentation Amplifier can amplify the difference between the voltages existing at its two input terminals. Instrumentation Intensifier is a differential voltage-gain gadget. The principal motivation behind an instrumentation enhancer is to intensify little signalsthat might be riding on enormous well known mode voltages. programmable gain instrumentationamplifiers (PGIAs) are a good solution for the front end to accommodate the sensitivities of the various sensor interfaces, while optimizing SNR. Integrated PGIAs are available to achieve good dc and ac specifications. the circuit runs on a 5 V supply and was evaluated with different common-mode voltages, differential input voltages, and gains. In the best condition where the reference and the inputs are held at mid-supply, the circuit draws only 4.8 µA of current.Some increase in current is expected at varying differential inputs due to the current that flows through the gain resistors, given by $|V_{OUT} - V_{REF}|/(2\ M\Omega||1\ M\Omega)$. Figure 10 below shows the current drawn at different gains. Data is taken with respect to the output to account for the gains. By following the right design recommendations, the optimal design can be achieved even with a discrete approach, and the various implementations can be assessed to determine the best configuration in a specific application.

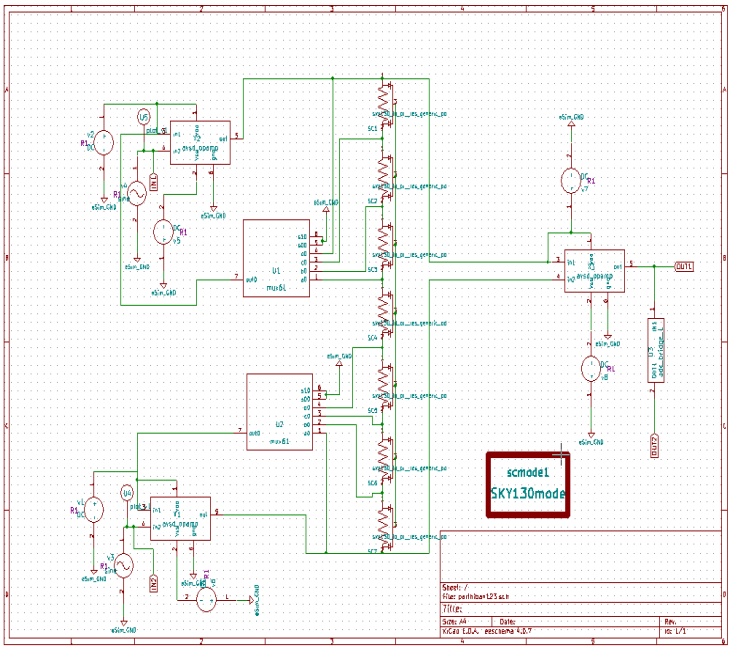

Fig1 : Programmable Gain Instrumentation Amplifiers

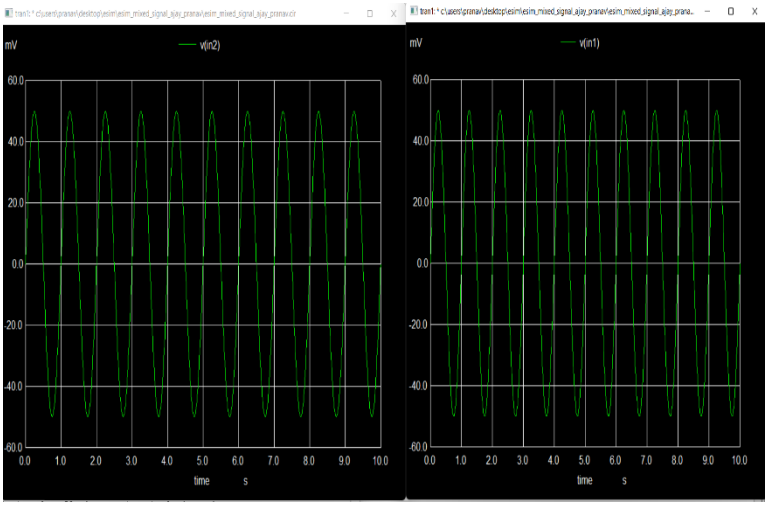

Fig2 : Reference circuit waveform

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