Circuit Simulation Project

Name of the Participant: RAJASRI KUTIKUPPALA

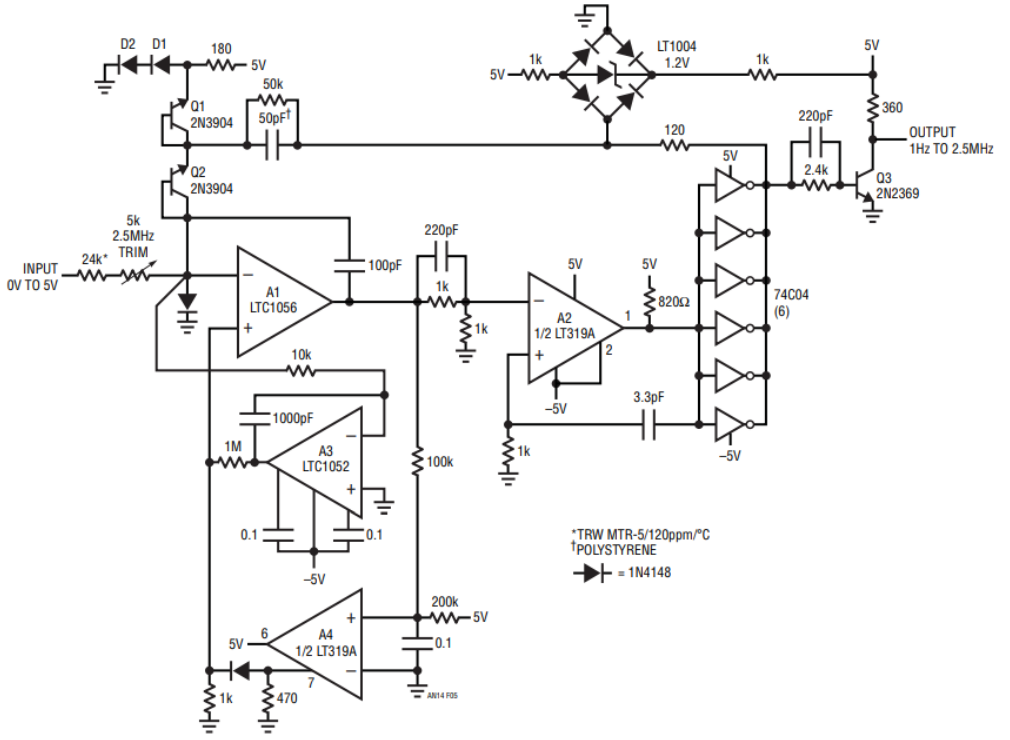
Title of the circuit: Fast Response **Voltage-to-Frequency** Converter.

Theory/Description:

A **Voltage-to-Frequency Converter** (VFC) is an analog circuit that produces a pulse train with frequency proportional to the applied input voltage. This technique is widely used in analog-to-digital conversion, data transmission, and sensor interfacing, because frequency signals are less susceptible to noise and distortion over long distances compared to direct voltage signals. By converting voltage into frequency, measurement systems can achieve higher accuracy, linearity, and stability.

The selected design is a fast-response charge-dispensing VFC capable of converting voltages in the range of 1 Hz to 2.5 MHz. It works by integrating the input voltage on a capacitor until a threshold is reached, then rapidly discharging the capacitor through a transistor and inverter stage, creating an output pulse. Each charge–discharge cycle corresponds to one output pulse, making the pulse frequency directly proportional to the input voltage. This approach ensures excellent linearity (≈0.05%), high speed (≈3 μs settling time), and temperature stability, making it suitable for precision applications such as instrumentation, frequency modulation, and sensor signal conditioning.

Circuit Diagram:



Source/Reference:

https://www.analog.com/media/en/technical-documentation/application-notes/an14f.pdf