ECE 444 – Design Project
Temperature and Voltage Stabilized Voltage Source

April 11, 2023

Introduction. Design a band-gap reference circuit, using the 350nm CMOS process, to generate a supply voltage of 1.2 V. This supply voltage should be independent of temperature, over the temperature range between -20° and 100°C, and independent of the external supply voltage, as the external supply voltage is varied between 3.0 and 3.5 V. The operational amplifier used in the band-gap reference circuit should be biased using a boot-strapped bias circuit.

Specifications.

1. External Supply voltage: 3.0 – 3.5 V (single rail)
2. Temperature: -20° to 100°C
3. Output voltage of band-gap reference circuit: 1.2 V independent of the temperature and the external supply voltage

Report. Characterize the band-gap reference circuit. The operational amplifier should be simulated to ensure stability of the amplifier. Plot the output voltage of the band-gap reference circuit as a function of temperature as the temperature is varied from -20° to 100° C when the external supply voltage is 3.3 V. Plot the output voltage as a function of supply voltage as the supply voltage is varied from 3.0 to 3.5 V at a temperature of 30°C. For a well designed band-gap reference circuit, the output voltage should be independent of the temperature and the external supply voltage. The final project report describing the two designs are due on 27 April 2023.