TITLE : Efficient High-Side N-Channel MOSFET Driver Circuit

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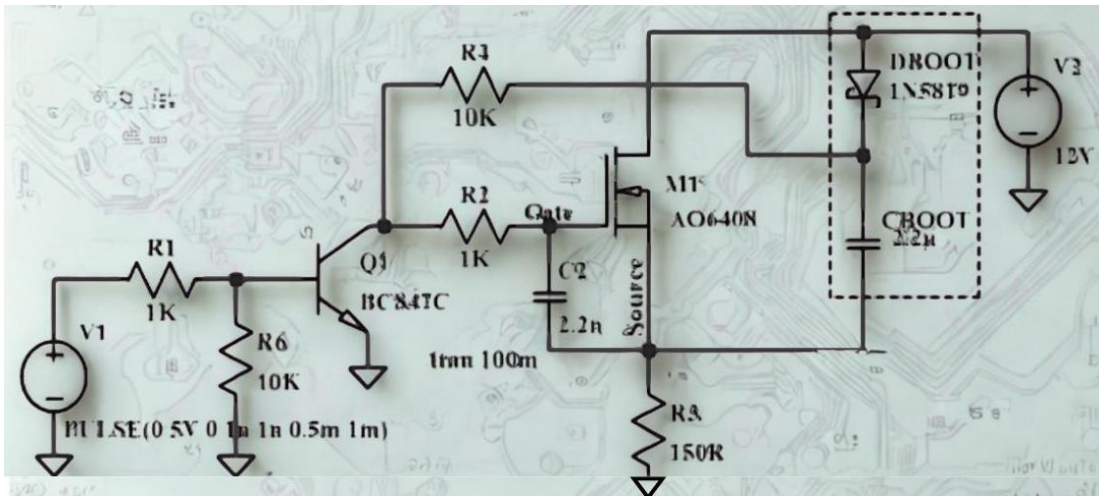
PROBLEM STATEMENT :

Driving a high-side N-channel MOSFET is challenging because the gate voltage must be higher than the source voltage, which is close to the supply voltage. The bootstrap circuit solves this by using a capacitor and diode to provide the necessary higher gate voltage during switching. This enables efficient high-side MOSFET switching with pulse control, making it suitable for various power electronic applications.

ABSTRACT :

This project demonstrates a high-side N-channel MOSFET driver using a bootstrap circuit to provide the necessary gate voltage higher than the source voltage. The bootstrap capacitor and diode enable efficient gate driving by storing and supplying charge during switching. This technique allows reliable and efficient high-side switching in power electronics, suitable for applications requiring pulsed control of high-voltage loads.

PROPOSED CIRCUIT :



Efficient High-Side N-Channel MOSFET Driver Circuit

REFERENCES :

1. Texas Instruments. Bootstrap circuitry selection for half bridge configurations (SLUA887). Texas Instruments.

2. Abd El-Halim, H., Soliman, E. S., & Refky, A. (2022). Performance of MOSFET driven via a bootstrap capacitor for dynamic load continuity enhancement. Journal of Engineering, 2022.