New a-IGZO TFT Gate Driver Circuit with AC-Driven Pull-Down Circuit

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Abstract

This work presents a gate driver circuit using indium-gallium-zinc oxide (a-IGZO) thin-film transistors (TFTs). The proposed circuit suppresses the threshold voltage shifts and completely turns off the a-IGZO TFTs having negative threshold voltage. Simulation results reveal the proposed gate driver circuit can stably operate with a-IGZO TFT having negative threshold voltage.

Circuit Structure & Timing Diagram

![Circuit Structure & Timing Diagram](image1)

Proposed a-IGZO TFT gate driver circuit (a) schematic diagram and (b) timing diagram.

Circuit Simulations

![Circuit Simulations](image2)

Simulation results of output signals with a-IGZO TFTs having various V_{TH}.

Conclusion

This letter presents a new a-IGZO TFT gate driver circuit with AC-driven pull-down structure. Three low-level-voltages and clock signals with lower low-level-voltage are used to turn off the a-IGZO TFT completely and prevent the constant gate-bias of a-IGZO TFTs. The HSPICE results demonstrate the circuit can be generate stable output signal even if the V_{TH} of a-IGZO TFTs are shifted to 5 V or -5 V. Thus, the proposed circuit is suitable for applying to a-IGZO TFT gate driver.