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(19) **United States**(12) **Patent Application Publication****LEE et al.**(10) **Pub. No.: US 2024/0223191 A1**(43) **Pub. Date:****Jul. 4, 2024**(54) **NEGATIVE LEVEL SHIFTER AND DISPLAY DEVICE INCLUDING THE SAME**(52) **U.S. Cl.**CPC ... **H03K 19/018521** (2013.01); **G09G 3/3225** (2013.01); **G09G 2310/0289** (2013.01)(71) Applicant: **Magnachip Semiconductor, Ltd.**,
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ABSTRACT

A negative level shifter that connects a source terminal and a body region of an element included in a shielding circuit so that the element operates within a medium voltage operating region. The negative level shifter of the present disclosure connects the source terminal and the body region of the shielding circuit so that the voltage between the drain terminal of the shielding circuit and the body region required for negative level shifting is operated in the medium voltage operating region. In addition, the negative level shifter may be able to use a medium voltage transistor rather than a high voltage transistor element provided in the input circuit so that the design area will be reduced compared to the conventional art. Also, the present disclosure suggests a display device with a negative level shifter.

