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OHSIMA et al.(10) **Pub. No.: US 2022/0352865 A1**(43) **Pub. Date: Nov. 3, 2022**(54) **SEMICONDUCTOR DEVICE**(71) Applicant: **Semiconductor Energy Laboratory Co., Ltd.**, Atsugi-shi, Kanagawa-ken (JP)(72) Inventors: **Kazuaki OHSIMA**, Atsugi (JP); **Hitoshi KUNITAKE**, Isehara (JP); **Yuto YAKUBO**, Atsugi (JP); **Takayuki IKEDA**, Atsugi (JP)(21) Appl. No.: **17/765,046**(22) PCT Filed: **Oct. 5, 2020**(86) PCT No.: **PCT/IB2020/059313**

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ABSTRACT

An amplifier is formed in a wiring layer. A semiconductor device includes a second layer over a first layer with a metal oxide therebetween. The first layer includes a first transistor including a first semiconductor layer containing silicon. The second layer includes an impedance matching circuit, and the impedance matching circuit includes a second transistor including a second semiconductor layer containing gallium. The first transistor forms first coupling capacitance between the first transistor and the metal oxide, and the impedance matching circuit forms second coupling capacitance between the impedance matching circuit and the metal oxide. The impedance matching circuit is electrically connected to the metal oxide through the second coupling capacitance. The metal oxide inhibits the influence of first radiation noise emitted from the impedance matching circuit on the operation of the first transistor.

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