

# Radio-frequency transmission of few-layer WSe<sub>2</sub> nanosheet Coplanar waveguide

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## Abstract

For a decade, many researches regarding graphene, which has metallic two-dimensional structure, have been explored. However, there are a lot of limits in the field of nanoscale electronics because of its zero bandgap. Transition Metal Dichalcogenides (TMDc) has been spotlighted as a next-generation nanomaterial due to its existence of bandgap and its good electrical and mechanical characteristics<sup>1</sup>. Even though TMDc materials shows various electronic properties<sup>2-3</sup>, there is no demonstration with high frequency transmission yet.

In this research, We confirmed WSe<sub>2</sub>, one of TMDc can be a good candidate for an radio-frequency interconnector. To fabricate the device, WSe<sub>2</sub> nanosheet was mechanically exfoliated on highly resistive Si/SiO<sub>2</sub> substrate. Also, gold pattern was deposited for using ground-signal-ground (GSG) probe method. We demonstrate high frequency characteristics of WSe<sub>2</sub> in range of 0.5–40 GHz. We measured Scattering parameters, and extracted equivalent properties including impedance, resistance to understand the transport conductivity of WSe<sub>2</sub>. The results of impedance and resistance within the frequency region through WSe<sub>2</sub> show negligible degradation. Those results show that WSe<sub>2</sub> has high potential for transmitting signals at gigahertz ranges although it has large bandgap.

## References

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## Figures

