

**THESIS TITLE** PRESSURE CONTROLLED OSCILLATOR CIRCUIT BASED  
ON MOIS TRANSISTOR

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### **Abstract**

The operation of the MOIS transistor can be viewed as the voltage control current source, similar to that of the conventional MOS transistors. The MOIS transistor has lower electron and hole mobility. Therefore the applications of the MOIS transistor are not so good in the current mode circuit. The oscillator circuit is one of the application that MOIS operates in the voltage mode. When the air pressure is applied to the transistor on the silicon substrate, the transconductance of the transistor is changed and the frequency of the circuit is changed more than the oscillator circuit which is used MOS transistors. This is because the mobility is changed according to the presence of gold atom in device substrate. This structure of transistors is suitable to be made as a pressure control oscillator.

In this thesis, MOIS transistor Ring Oscillators are investigated. The circuits consist of odd stages of the inverter chain. The designed MOIS devices are fabricated on the Si substrate, n (100) oriented with the thickness of 400  $\mu\text{m}$ . The wafer resistivity is 8-12 ohm-cm. This wafer are etched using EPD anisotropic etchant to form thin square diaphragm on the backside of the transistor with the thickness of 20  $\mu\text{m}$ . It is found that The change of output frequency of the circuit depends on the change of transconductance of the transistors as the air pressure is applied to diaphragm. Different device types, PMOIS and NMOIS, are studied and compared. And from the experimental it is found that the change of frequency are depended on the direction of drain current via edge of diaphragm. And the highest sensitivity can be produced from 3-stage ring

oscillator with NMOIS in the diaphragm that determined the current flow paralleled with the diaphragm edge.