

Title	Measurement of movements of chest wall and abdomen
Sub Title	
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Publisher	慶応義塾大学藤原記念工学部
Publication year	1968
Jtitle	Proceedings of the Fujihara Memorial Faculty of Engineering Keio University (慶応義塾大学藤原記念工学部研究報告). Vol.21, No.86 (1968. ) ,p.168(40)- 168(40)
JaLC DOI	
Abstract	
Notes	Summaries of Doctor and Master Theses
Genre	Departmental Bulletin Paper
URL	<a href="https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001004-00210086-0055">https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001004-00210086-0055</a>

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## A Study on Avalanche Diodes

Keisuke MATSUMOTO (松 本 圭 祐)

The theoretical analysis of p-i-n junction with reverse biased concerning d.c. and a.c. characteristics has been studied. These solutions tell that input power has a limited value to operate continuous oscillation. And also small signal impedance has been got when avalanche is generated uniformly. Its real part is very small and negative reactance scarcely depends on bias current. Those results are proved with the experiment by measuring the impedance of the junction.

The oscillation spectra and characteristics are shown. The noise decreases when the cavity length or bias current is chosen at their optimum.

The oscillation locked by injected signal is different from the original ones. Near the center frequency, S/N is improved but in its side bands, the noise increases with injection locking. This phenomenon is explained as follows. A signal is modulated by a driving signal so that the side bands in the output spectra are increased near the locking. When the power of signals is bigger than 20 db, the pushing effect has been observed.

## Measurement of Movements of Chest Wall and Abdomen

Haruyuki MINAMITANI (南 谷 晴 之)

Although the pulmonary ventilation is done by the displacement of ribcage and of diaphragm, there are so many unsolved physiological problems on the contribution of these two elements.

The paper was performed to analyze the mechanisms of ventilation by establishing simple, reliable and quantitative methods of detecting ventilatory movement of these elements.

The detector is made of strain gauge pasted on a thin rubber band to put them on the chest and the abdominal wall. Using the dynamic strain meter, signal was taken out to display on a pen-writing recorder. Preliminary experiments revealed linear change of the strain gauge resistance in terms of the displacement of the rubber-band length and also revealed sufficient sensitivity to detect the displacement of the ventilatory changes in the chest and in the abdominal circumference.