

Can a miniature capacitance diaphragm gauge be used for absolute vacuum measurement?

The maximum sensitivity of the gauge is 10.96 fF/Pa, meanwhile, good repeatability, hysteresis and long-term stability are also exhibited. Miniaturization of sensors using micromachining technology is full of potential and challenges. A miniature capacitance diaphragm gauge for absolute vacuum measurement is developed in this work.

How accurate is a capacitance diaphragm gauge?

Only for the vacuum range itself, we are dealing with roughly 16 orders of magnitude of the defined four regions of vacuum measurement, from atmospheric to extremely high vacuum levels. The capacitance diaphragm gauge (CDG) has been one of the most accurate gauges or transfer standards for use in the low pressure to medium vacuum regions [1,2,3].

What is a capacitance diaphragm gauge (CDG)?

The capacitance diaphragm gauge (CDG) is one of the most accurate transfer standards for use in atmospheric to medium vacuum regions. Currently, it is practical to cover a wide range of measurements with the least amount of equipment possible.

How does a diaphragm change capacitance?

The diaphragm will deform in response to applied pressure load and change the gap between the fixed electrode, therefore, the capacitance will change, and the change of capacitance can be measured by the external circuit. Fig. 1. Structure sketch of MEMS CDG.

What is a MEMS capacitance diaphragm gauge?

A MEMS capacitance diaphragm gauge is developed for measuring absolute vacuum pressure in the range of 0.1 Pa to atmospheric pressure. A novel glass-silicon-glass structure is proposed to simplify the fabrication processes and improve the vacuum sealing performance.

How do you calculate a diaphragm's capacitance?

In this formula, the origin of the coordinate system is the center of the diaphragm,  $p$  is the pressure applied to the diaphragm, and  $D$  is the bending rigidity of the diaphragm (3)  $D = E h^3 / 12(1 - \nu^2)$  where,  $E$  is Young's modulus,  $\nu$  is Poisson's ratio. Once the deflection of the diaphragm is obtained, changes of capacitance can be calculated.

voltage regulation (if they were adequately designed), reduction of losses and reduction or postponement of investments in transmission. The main disadvantage of SCB is that its ...

For a capacitor, one of the limits is keeping the voltage low enough that the capacitor dielectric stays intact. As you increase the terminal voltage, the electric stress increases across the ...

be increased by applying a higher bias voltage or reducing the diaphragm stiffness. ... brane of 1 mm in diameter and low bias voltage of 1 V. ... voltage when one of its charged capacitor plate ...

Capacitive transducers are favored for their low temperature drift, flat frequency response and ...

In this paper, we present a new design of diaphragm that supported by frog arms for MEMS capacitive microphone structure. The proposed diaphragm reduces the air ...

Carbon mics work as capsules with carbon granules pressed between two metal plates (diaphragm and backplate). A voltage across the plates causes a current through the granules. As the diaphragm moves, it alters the ...

DC BIAS Voltage Dependence of Ferroelectric Class 2 MLCC Multilayer Ceramic Capacitors. ... low frequencies are known to introduce harmonic distortion in the ...

The invention relates to the technical field of new materials of aluminum electrolytic capacitor diaphragms, and discloses a low-voltage low-internal-resistance electrolytic capacitor...

A closed-form model to evaluate the pull-in voltage associated with a clamped square diaphragm and a circular diaphragm subject to electrostatic forces due to a bias voltage is developed. The ...

novel diaphragm design is proposed that offers increased mechanical sensitivity of a capacitive microphone by reducing its diaphragm stiffness. A lumped element model of the spring ...

A capacitor consists of two conducting surfaces separated by a small gap. They are used to store separated electric charges and are common circuit components. ... A high pressure ...

The design of a microelectromechanical systems (MEMS) ultra-wideband (UWB) RMS power sensor is presented. The sensor incorporates a microfabricated Fe-Co-B core ...

A rugged, high precision capacitance diaphragm low pressure gauge for cryogenic use

The diaphragm is a 1.4  $\mu\text{m}$ , aluminized Mylar foil for low-voltage capacitors with a spacing of ...

Enlarge: Capacitors, fixed, low voltage: MKP, metallized polypropylene film: LVAC power capacitors - oil - INDOOR, IP00: 1000: 3-phase D: 3 x 20.3  $\mu\text{F}$ , 1-phase: 165.7  $\mu\text{F}$

The low-temperature oxidation method was used to remove BSG effectively, and the rapid thermal annealing method was adopted to reduce the internal stress of diaphragm. ...

A rugged, high precision capacitance diaphragm low pressure gauge for ...

Capacitive transducers are favored for their low temperature drift, flat frequency response and low noise level. The development of high-performance diaphragm structures is of critical ...

This paper introduces a MEMS capacitance diaphragm gauge with a square pressure-sensing diaphragm for 1-1000 Pa measurement. The edge effect is analyzed using ...

The diaphragm is a 1.4  $\mu\text{m}$ , aluminized Mylar foil for low-voltage capacitors with a spacing of 200  $\mu\text{m}$  approx.. Its capacitance is about 40 pF. A first set of measurements was made with an ...

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