# A microelectromechanical systems-based vertical magnetometer-accelerometer with the modulated frequency difference in one microstructure

Cho J.-M., Kim K.S., An S., Yeo C.H., Shin K., Ju B.K., Lee S.-Y., Kim S.-W.

ASIC Design Lab., Department of Electronics Engineering, University of Korea, Seoul 136 701, South Korea; Navigation MEMS, R and D Center, Samsung Electromechanics Co., Suwon 442-743, South Korea; Display and Nano Devices Laboratory, College of Engineering, Korea University, Seoul 136-713, South Korea

Abstract: This paper presents a vertical magnetometer-accelerometer capable of detecting simultaneously both the acceleration and the geomagnetic field. The conceived sensor detects the magnetic field by the Lorentz force and differentiates the magnetic field and the acceleration by the modulated frequency difference. The process uses a silicon-on-glass (SOG) wafer and the goldsilicon eutectic bonding for the wafer-level hermetic packaging. When the 10 mA current flows through the conductor, the measured resistances are an average of 10Ω, so in total, 1 mW is consumed in the current driving element. When 35 μT and lg is applied to the sensor at the same time, the fusion sensor has a sensitivity of 73 mV/g in acceleration sensing mode, and a sensitivity of approximately 1.63mV/μT in magnetic field sensing mode. This newly developed sensor can be used in portable navigators that need a small size, low cost and low power electronic compass. 

Author Keywords: Bulk-micromachining; Eutectic bonding; Lorentz force; Magnetometer-accelerometer; MEMS; Silicon-on-glass wafer

Year: 2008
Source title: Japanese Journal of Applied Physics
Volume: 47
Issue: 7 PART 1
Page : 5432-5437
Cited by: 1
Link: Scorpus Link
Document Type: Article
Source: Scopus

Authors with affiliations:

1. Cho, J.-M., ASIC Design Lab., Department of Electronics Engineering, University of Korea, Seoul 136 701, South Korea
2. Kim, K.S., Navigation MEMS, R and D Center, Samsung Electromechanics Co., Suwon 442-743, South Korea
3. An, S., Navigation MEMS, R and D Center, Samsung Electromechanics Co., Suwon 442-743, South Korea
4. Yeo, C.H., Display and Nano Devices Laboratory, College of Engineering, Korea University, Seoul 136-713, South Korea
5. Shin, K., Display and Nano Devices Laboratory, College of Engineering, Korea University, Seoul 136-713, South Korea
6. Ju, B.K., Display and Nano Devices Laboratory, College of Engineering, Korea University, Seoul 136-713, South Korea

7. Lee, S.-Y., ASIC Design Lab., Department of Electronics Engineering, University of Korea, Seoul 136 701, South Korea
8. Kim, S.-W., ASIC Design Lab., Department of Electronics Engineering, University of Korea, Seoul 136 701, South Korea