

# Transverse Electromagnetic Microactuators Using Electroplated Planar Coil Driven by Symmetric Twin Magnets

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In this paper, we present an electromagnetic microactuator that uses an electroplated copper coil on a p<sup>+</sup>-silicon diaphragm with symmetric twin magnets. The microactuator generates a vertical motion of the diaphragm using the radial components of the magnetic field on the coil plane. To guide and concentrate the magnetic field in the radial direction, we propose a new microactuator structure with symmetric twin magnets. The microactuator shows values of resonant frequency and quality factor in the ranges of  $10.51 \pm 0.22$  kHz and  $46.6 \pm 3.3$ , respectively. The twin magnet microactuator generates the maximum peak-to-peak amplitude of  $4.4 \mu\text{m}$  for an AC rms current of 26.8 mA, showing 2.4 times larger amplitude than the single magnet microactuator.

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