Belarusian State University
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Research of parameters and fabrication of integrated digital magnetic threshold sensors

Type of collaboration

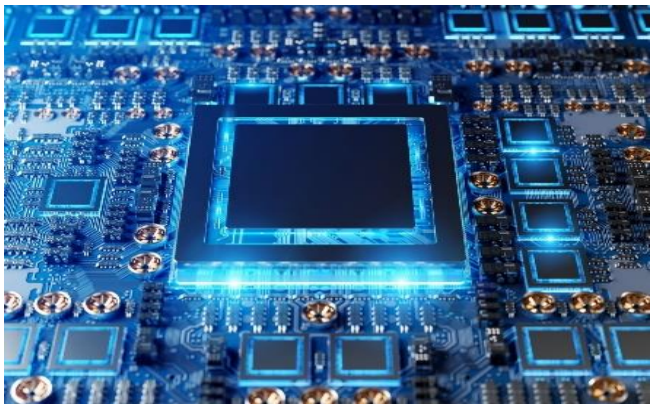
technical cooperation

Key words

sensor, nanotechnology, threshold microelectronics, magnetic

State of IPR

Secret knowhow



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Collaboration

- Research of parameters of the sensor and development in the field of integrated digital magnetic threshold sensors controlled by an electric field.
- Conducting joint research of the magnetic field influence on the switching characteristics of the sensors.
- Conducting a series of tests of sensors and further technology development, based on the test results.

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Project description

The principle of operation of digital magnetic threshold sensors is based on the excitation of electrons located on traps in a potential well by a magnetic field. Filling electron traps in a thin dielectric layer leads to a decrease in the electrical resistance of such a layer. In turn, when the magnetic field of the threshold value is applied, the electrons acquire enough energy to leave the electron traps. As a result, the electrical resistance of such a dielectric layer increases dramatically.

The University conducted research on the influence of a magnetic field with a strength of 0.5-3 Tesla on the switching characteristics of experimental sensors.

Performance characteristics of magnetic sensors:

- information reading voltage, V, - 0.5
- the ratio of sensor resistances in the high-resistance and low-resistance state – 200
- resistance in the high-resistance state, kOm-100-400

The main advantages of magnetic sensors are extremely low energy consumption, high speed of reading information. The components of the magnetic sensor use a metal-nanoscale metal oxide-metal multilayer structure and are characterized by the capability to scale, long data retention time, and can meet the criteria of high integration density.

The developed non-contacting magnetic sensors can be used in various positioning systems: for positioning the piston in pneumatic cylinders, determining the position of the cartridge in machine tools, determining the speed and angular position.

Advantages of the development

The main advantages of the developed magnetic sensors are non-volatility and long duration of information storage, low reading currents, the possibility of using integrated technologies for their manufacture, and high integration density.