

Semiconductor GaAs nonlinear transducer of electric signals

Technology for production of the new semiconductor instrument – nonlinear electric signals transformer intended for operating with frequencies up to 10 GHz.

Operation of the instrument is based on the internal effect by Hall. The present effect is based on the internal effect by Hall. The present effect is in appearance of a nonlinear potential difference in a cross-section of a semiconductor between its center and its border when passing of electric current and in absence of external magnetic field. Polarity of the nonlinear potential difference doesn't depend on a direction of electric current but it is determined only by a charge carrier type in the semiconductor.

Theoretically the instrument has an ideal quadratic characteristic because of it is made of homogeneous semiconductor without «p-n» transition.

The instrument is fulfilled on GaAs transducer with «n» type conductivity, the instrument is supplied with two inlets and two outlets.

The present work is carried to test samples: basic crystals GaAs are made with metallized small areas in the borders and the center. Sizes of the crystals are 0,5 x 0,5 x 0,01 mm. Models of the instruments are made in the body. The instrument is provided with two inlets and two outlets. Inlet resistance and outlet one is 24 and 30 Ohms correspondingly; a maximum value of inlet current is 100 mAmps; operating frequency is up to 10 GHz; temperature range is - 70 +150°C.

Main technical advantages of the new instrument compared to known semiconductor high frequency blending and quadratic diodes and super high frequency ones are confined in provision of more ideal quadratic transmissive characteristic in wide dynamic and frequency ranges, absence of a reactive component of input resistance, provided by conventional barrier capacity in known diodes.

The offered instrument can be comparatively simply integrated into the microcircuit structure produced by GaAs technology.

The offered semiconductor instrument can be used for measurements of capacity and conversion of frequency of high frequency signals and super high frequency ones in various assemblies of radio-and electronic devices, e.g., in converters, contactors, detectors.

The instrument can be made as a separate element or it can be included into the composition of an integrated circuit.