

Design of two-phase lock-in amplifier

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Lock-in amplifiers are widely applied in optical measurements when desired signal buried in noise. In the same time commercial broadband lock-in amplifiers that can make such measurements are expensive. This article presents design of lock-in amplifier that can be used in one-phase, two-phase mode or as two parallel one-phase amplifiers. It is completely digitally-controlled and may be connected to personal computer through USB interface. The structure scheme and electrical circuits of the lock-in amplifier components were developed. Using the automatical design systems such as TINA and Eagle CAD the appliance was simulated and his main characteristics were calculated: maximum sensitivity – 2 μ V, minimum – 40 mV; operating frequency range of the input signal from 100 Hz to 130 kHz; accumulation time 0.1 ms, 1 ms, 10 ms, 100 ms, 1 s, 2.5 s, 5 s, 10 s; minimum signal-to-noise ratio is 62 dB, maximum – 75 dB; dynamic reserve not less than 97 dB.

Topics

Session C. Applied optics and engineering

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