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THE USE OF AN ELECTROMAGNETIC PULSE GENERATOR FOR THE STUDY OF FAST SWITCHING PROCESSES IN CADMIUM TELLURIDE LAYERS

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Recently, more and more attention has been paid to the electromagnetic stability of electronic equipment, which means the ability to maintain operating parameters during and after the action of electromagnetic pulses (EMI) of various origins [1,2]. Under the influence of EMI, overvoltage pulses are induced in circuit elements, and as the size of semiconductor device structures decreases, the level of energy sufficient to damage them decreases. Elements of protection of electronic equipment against impulse overvoltages are connected in parallel to the protected device and, upon reaching the threshold voltage, in a short time reduce the resistance to a value significantly lower than the input resistance of the equipment.

A generator based on a charge line made of a coaxial cable was developed in previous works [3,4] to conduct research on electronic equipment protection elements. However, for the charging line, the amplitude of the pulses is half the voltage of the cable. In this regard, the pulse generator was upgraded to ensure the generation of high-energy pulses based on industrial high-speed capacitors.

Using a battery of capacitors connected in parallel, you can gradually adjust the duration of the pulse, and by charging the capacitors to a voltage lower than the maximum, you can also vary the amplitude of the generated pulses. The joint use of energy storage devices based on the charge line and capacitors made it possible to implement a rectangular pulse to study the transient characteristics of switching and to investigate the limit characteristics of protection elements at high energy pulses.

To study the processes in the test samples, a research complex consisting of a nanosecond pulse generator, a Siglent SDS 1202X-E digital oscilloscope, and a laptop was assembled. The pulse arriving at the samples had the following parameters: the duration of the pulse was about 30 ns, which is due to the length of the charge line (5 m, about 5-6 ns/meter) and the pulse growth front was about 2.2-2.4 ns, which is enough for of research Volt-second characteristics of switching processes in test samples were based on experimental oscillograms. Experimental volt-second characteristics were transferred in the form of tables to a laptop connected to an oscilloscope, and then their analytical processing was carried out using Microsoft Excel.

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