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Development of High Performance Pulse Power Generator using FPGA and Arduino

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Pulse power generators have been used in various fields such as environment, biology, agriculture and so on. Therefore, many researchers demand functions such as high power, short pulse, safety, miniaturization, low cost and ease of use. Our research aim to develop a high performance pulse power generator. The generator has ease of use and miniaturization. It is able to output various trigger signals by PC. Even if without PC, it can output trigger signals of about 10 patterns. The generator consists of a capacitor discharge circuit, a controller and a high voltage DC power supply. IGBTs (Model number: IXGX32N170H1 of IXYS) are used for the switching element of the capacitor discharge circuit. The controller consists of a Field Programmable Gate Array (FPGA) and an Arduino. The FPGA (Model number: Spartan-3AN of Xilinx) is used for the control the trigger signal of IGBTs, and the Arduino is used for the communication with a PC and display on a monitor. As results, the maximum output voltage was about 1.7 kV without pulse transformer. In addition, the maximum output voltage with pulse transformer was about 10 kV. The ease of use will be important for industry applications of the pulse power field.

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