

MULTICHANNEL HIGH-VOLTAGE PULSED GENERATORS FOR ELECTRO-DISCHARGE TECHNOLOGIES

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We present here the design and test results of portable HV pulsed generators, designed for materials fragmentation, though some other technological applications are possible as well. The generator consists of a low-voltage block, high-voltage block and fragmentation chamber with 4 independent discharge channels. The low-voltage block of the generator, consisting of a primary capacitor bank (~330 μ F) and a thyristor switch, stores pulse energy and transfers it to the HV block. The primary capacitor bank stores energy of 660 J at the maximum charging voltage of 2 kV. The HV block includes an HV pulsed step-up transformer, HV capacitive storage (12.5 nF per discharge channel), and two electrode gas switches. Air at atmospheric pressure is used for insulation of the generator and as the work medium of the gas switch.

Experimental tests of the generator consisted of the crushing[A1] of 4-layer printed circuit boards. Tests have shown that this generator circuit allows the implementation of four discharge channels simultaneously in the fragmentation chamber. The following technical parameters of the generator were achieved: output voltage up to 100 kV, voltage rise time of ~60 ns, current amplitude of ~5 kA per channel.

Comparison of the results of crushing in a single-channel and multichannel mode demonstrates that a multichannel generator allows both a reduction of the specific energy consumption and an increase in the productivity of the crushing process in proportion to the number of channels, without increasing the stored energy of the generator.

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