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标题: DEVELOPMENT OF A HIGH-POWER PULSED SUBTERAHERTZ GYROTRON FOR REMOTE DETECTION OF SOURCES OF IONIZING RADIATION
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来源出版物: RADIOPHYSICS AND QUANTUM ELECTRONICS 卷: 54 期: 8-9 页: 600-608 出版年: JAN 2012
在 Web of Science 中的被引频次: 0
被引频次合计: 0
引用的参考文献数: 25
摘要: We describe the main stages of the development of a gyrotron in the sub-terahertz band with a power of several hundreds of kilowatts, a duration of the output radiation pulses of about 10 mu s, and the generation frequency corresponding to an atmospheric transparency window. The gyrotron having a working frequency of 0.67 THz, a power of 200-300 kW, and the focal diameter of the output beam 1-2 mm can be used to detect sources of ionizing radiation from a distance of several tens of meters. The detection principle is based on the appearance of a microwave frequency discharge in the focal spot if the number of free electrons exceeds the natural background by 1-2 orders of magnitude. The electron-optical system of such a gyrotron has been calculated and optimized. The scenario of the gyrotron switch-on has been analyzed for the electron beam formed in such a system, and the possibility of stable single-mode generation on the TE31.8 mode is demonstrated. The results of analysis of thermal loads, which demonstrate their acceptable level in the cavity and the tube cavity for pulse durations of about 10 mu s are presented.
入藏号: WOS:000302290000010
语种: English
文献类型: Article
KeyWords Plus: NUMERICAL-SIMULATION; SYSTEMS
地址: [Glyavin, M. Yu.; Luchinin, A. G.; Manuilov, V. N.; Morozkin, M. V.; Bogdashov, A. A.; Gachev, I. G.; Sedov, A. S.] Russian Acad Sci, Inst Appl Phys, Nizhnii Novgorod, Russia
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出版商: SPRINGER
出版商地址: 233 SPRING ST, NEW YORK, NY 10013 USA
Web of Science 分类: Engineering, Electrical & Electronic; Physics, Applied
学科类别: Engineering; Physics
IDS 号: 918ZJ
ISSN: 0033-8443

29 字符的来源出版物名称缩写: RADIOPHYS QUANT EL+
ISO 来源出版物缩写: Radiophys. Quantum Electron.
来源出版物页码计数: 9