

ABSTRACT

Marcin Jakubaszek

Optimalizations of optoelectronic module for a laser warning system

The dissertation „*Optimalizations of optoelectronic module for a laser warning system*” concerns the construction of the main module in a laser warning system. This is important part, of the analytical process, which creates a detailed concept of the warning system.

The introduction is focused on general reasons, for initiating this work start. The way the lasers devices are used on a battlefield have also been discussed. Historical background of laser warning systems have been presented as well.

The second chapter contain the main targets of the dissertation. In this was detailed the milestones to achieved are shortly presented.

Third chapter deals with laser sources available on a battlefield. They are classified according to their purpose and the basic range of parameters. The chapter ends with a short summary, where the main characteristics of a laser beam parameter are considered.

Laser warning systems are described in the fourth chapter. The first part of this chapter provides definitions of basic parameters of such systems. The second part gives a review of systems which are offered by Polish and foreign manufactures. Basic parameters declared by the manufactures have been discussed. At the end of this chapter as last, summary is included.

The ideas of methods to determine incidence angle of light, which are available in literature are described at the fifth chapter. It provided a review of conceptions of constructions, detections modules architectures which are used to determine incidence angle of light. Focus was set on methods which have a high implementation potentials.

The sixth chapter is a main analytical chapter. At the first part mathematical is presented as well as the main optimization criteria. Next the impact of particular technical parameters on the performance is discussed. Analysis which has been done, shows the optimal photodiode diameter with respect to sensitivity maximization and overall compactness. In this chapter a dynamic range of detection module was also analyzed. In the summary all the components and parameters which were considered optimal are presented.

At the seventh chapter, results of real implementations are discussed. The module was built during the realisation of the project „Laserowe Systemy Broni Skierowanej Energii,

Laserowe Systemy Broni Nieśmiercionośnej- PSOB16-064/WAT” which was financed by NCBIR. Technical solutions of detection module was presented.

The experimental results are presented in eighth chapter. At first the testing methodology was presented. Next, the obtained results was presented. As in the previous chapters short summary is provided at the end.

At the last part of the dissertations the main conclusions are presented. The details of all analysis and experimental results are specified. At the end a future research directions.

In the attachments all essential are gathered outlined. Those of lasers, of warning systems, and also the results obtained in the on laboratory and terrain of the constructed laser warning system prototype.