Thursday, June 08, 2017

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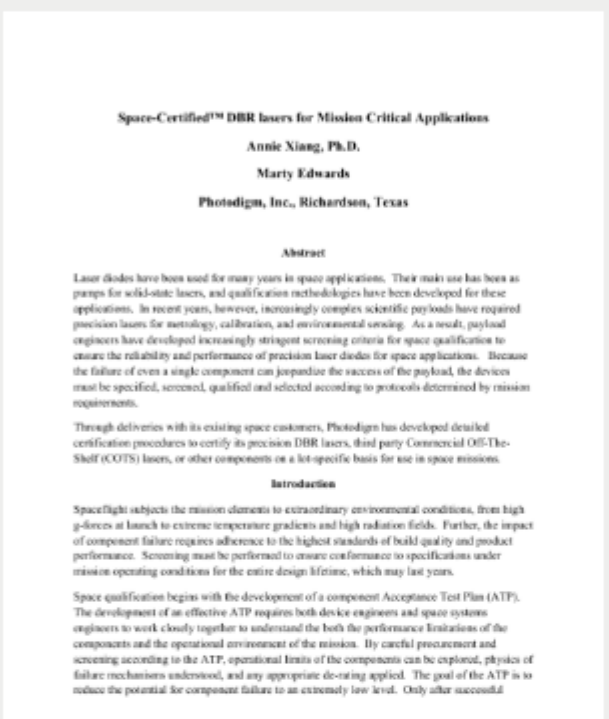

Space-Certified™ DBR lasers for Mission Critical Applications

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Abstract

Laser diodes have been used for many years in space applications. Their main use has been as pumps for solid-state lasers, and qualification methodologies have been developed for these applications. In recent years, however, increasingly complex scientific payloads have required precision lasers for metrology, calibration, and environmental sensing. As a result, payload engineers have developed increasingly stringent screening criteria for space qualification to ensure the reliability and performance of precision laser diodes for space applications. Because the failure of even a single component can jeopardize the success of the payload, the devices must be specified, screened, qualified and selected according to protocols determined by mission requirements.

Through deliveries with its existing space customers, Photodigm has developed detailed certification procedures to certify its precision DBR lasers, third party Commercial Off-The-Shelf (COTS) lasers, or other components on a lot-specific basis for use in space missions.

Introduction

Spaceflight subjects the mission elements to extraordinary environmental conditions, from high g-forces at launch to extreme temperature gradients and high radiation fields. Further, the impact of component failure requires adherence to the highest standards of build quality and product performance. Screening must be performed to ensure conformance to specifications under mission operating conditions for the entire design lifetime, which may last years.

Space qualification begins with the development of a component Acceptance Test Plan (ATP). The development of an effective ATP requires both device engineers and space systems engineers to work closely together to understand the both the performance limitations of the components and the operational environment of the mission. By careful procurement and screening according to the ATP, operational limits of the components can be explored, physics of failure mechanisms understood, and any appropriate de-rating applied. The goal of the ATP is to reduce the potential for component failure to an extremely low level. Only after successful

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