Light-Activated Surge Protection Thyristor for Distribution System Reliability

Contract #: 500-98-038
Contractor: OptiSwitch Technology, Inc.
Subcontractors: SRI International: Telecom Data. : Silicon Power Corporation
Contract Amount: $494,239
Match Amount: $93,292
Contractor Project Manager: David Giorgi (858) 452-8787
Commission Contract Manager: Jon Edwards (916) 654-4851
Status: Completed

Project Description:
The purpose of this project was to determine whether it is technically and economically feasible to replace electronically activated surge protection thyristors currently installed on high-power transmission and distribution systems with the improved custom light activated surge protection thyristors. Specifically, this Contractor designed, fabricated, and laboratory tested the LASPT to determine if it has superior technical performance characteristics to that of a conventional thyristor.

This project supports the PIER Program objective of:

- Improving the reliability/quality of California's electricity system by lowering the state's vulnerability to catastrophic outages by preventing cascading power failures due to rapid surges. This project also supports the PIER Program's strategic energy research objective under the revolutionary science attribute of designing and manufacturing a unique optical coupling to complete the development of the custom LASPT.

Proposed Outcomes:

1. Design, fabrication, and laboratory testing of a light activated surge protection thyristor.
2. Exhibit a surge response rate of 10 k (kilo) amps per microsecond (10 kA/µs).
3. Exhibit a peak current rate of 15 k (kilo) amps (15kA).
4. Exhibit minimum blocking voltage capability of 2700 volts (V).

Actual Outcomes:

1. The project exceeded the contract performance requirements at three testing levels:
   - The first requirement exceeded the "Blocking Voltage parameter by 63%. The contract requirement was 2,700 volts, and the measured result was 4,400 volts.
   - The second requirement exceeded the Peak Current parameter by 213%. The contract requirement was 15,000 amperes, and the measured was 47,000 amperes.
   - The third requirement exceeded the Rate of Rise of Current parameter by 420%. The contract requirement was 10,000 amperes/microsecond, whereas the measured was 52,000 amperes/microsecond.
2. The final objective was to determine the production unit price for the LASPT device. The cost was $1,200 per device for several hundred units and $700 for high volume production.

Project Status:
This PIER contract is complete. LASPT is seeking commercial partners. For the final report, please right click on www.energy.ca.gov/pier/final_project_reports/600-01-001.html