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Development status and constructional features in RF HPA for ALS-U project at LBNL

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The Advanced Light Source Upgrade (ALS-U) project at Lawrence Berkeley National Laboratory (LBNL) is a major upgrade of the ALS that involves the design and installation of a new Accumulator Ring and an upgraded Storage Ring. The RF High Power Amplifier (HPA) with 60 kW CW output power at 500 MHz is a complex and very costly piece of equipment that will provide high power RF to the accelerating cavities in Accumulator Ring. This paper presents the main technical specifications / requirements, features, development status and construction details of various subsystems of the HPA which is being built under contract by R&K Company and with engineers at LBNL providing technical oversight and inputs. The HPA detailed design and construction drawings / documents were completed by the vendor and the Final Design Review was successful. Presently, manufacturing of the HPA is in progress. The HPA is self-protecting and the main features consist of a distributed control system employing extensive monitoring of various signals; slow and fast interlock responses; finite state machine controls; and built-in fault tolerance to RF or DC power supply module failures. The theoretical high reliability (MTBF ~ 135000 hours) and high availability (~99.997%) requirements of the HPA requires redundancy in RF modules and DC PS modules for delivering a minimum 48 kW RF output under module fault conditions.

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Footnotes

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