

A Study on Cryocooler for Space Applications

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There is presently an urgent need in space cryogenics for the development of highly efficient and reliable, and light weight cooling systems as well as the development of high performance heat pipes and radiation heat rejection systems. There are three basic options for achieving cryogenic temperatures in space: radiative cooling, cryogen cooling, and mechanical cooling. Both the radiative and cryogen options can fail to meet the highly-demanding requirements for future space missions in terms of temperature, long life and low mass. The mechanical coolers can overcome several of these major problems, thereby providing much greater flexibility in overall spacecraft configuration compared with current cryogenic cooling designs. This paper describes infrared sensors and cooling system requirements, and representative space missions and cryocooler systems.