





Using semiconductors for devices which regulate heat flows in closed spaces of spacecrafts

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Challenges:

- Electronic devices must operate at a certain range of temperatures
- Heterogeneous heating of spacecraft



• Electronic degradation under influence of cosmic radiation





Objectives

• Create a system for regulating the thermal conditions of electronic devices



• Create a protection against cosmic radiation for our device





Main components of regulating system



T - temperature sensor; C - controller;
G - generator; H - heater; F - fridge.



Temperature sensor

• choose from temperature range of the devices



 resistant to space radiation (we plan to cover main elements with bismuth films and also use optocouplers to transfer information)



Heater and fridge

- Heaters and coolers are based on the Peltier effect
- The number of elements n-type and p-type semiconductors depends on the required voltage.





Thermoelectric generator

TEG working on the basis of the Seebeck effect is necessary for converting the heat received from the action of solar radiation and the operation of a nuclear reactor





Radioisotope thermoelectric generator

Uses an array of thermocouples to convert the heat released by the decay of a suitable radioactive material into electricity. This generator has no moving parts. (Cassini–Huygens, New Horizons)

GPHS-RTG







Partners



Large companies, such as SpaceX, NASA, EKA, NSAU, Pocкoсмoc, UNOOSA.







Thank you for attention!

