Sputnik Product Development Specification

William Harrington, Jake Heath, Shan Quinney, Michael Mathis

ECE412 Capstone

January 9, 2016

Requirements

Must

- Environment
  - Have a radiation tolerant watchdog system
  - Be able to operate in an Industrial Operating Temperature Range (?40C to 80C)
  - Acceleration: must handle 15g in the "Z" axis
  - Vibration TBD
- Radio System
  - Operate in the 70 cm band (436 to 438 MHz)
  - Use IARU specified frequency for RF comms and make appropriate changes if necessary
  - Meet FCC Amateur Radio Licensing requirements (Title 47 CFR part 97)
  - Meet 400km ISS orbit link budget by a margin of 6 dB
- Energy storage
  - Use an energy storage system to power the energy when not in sunlight
  - Monitor the state of charge of the battery
    - Voltage
    - Current
    - Charge (Coulombs)

  - Charge the energy storage from energy harvesting system
- Energy harvesting
  - Handle 6 photovoltaic panel inputs
- Energy Switching/Control
  - Be able to seamlessly switch energy sources to the load
- System controller
  - Have an interface to the CubeSat payload
    - One or more standard logic level UARTs for communicating with payload
    - Power switches to turn payload on and off
  - Monitor energy storage and energy harvesting systems
- CubeSat requirements
  - Meets latest CubeSat specification
  - Fits in 1/4 1U CubeSat
  - Weighs less than 250 g

Should

- Use as many COTS (Commercial Off The Shelf) parts as possible
- Use Automotive Operating Temperature Range (-40C to 125C) or even military (-55C to 125C)
- Use a frequency ofr 436.5 MHz for RF communication

May