IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 2 (2B)

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THE HIGH EFFICIENT UHF BAND RELAY COMMUNICATION SYSTEM FOR MOON EXPLORATION

Abstract

Moon is the important milestone in the deep space exploration. Due to the long distance between the earth and moon, in order to maximize the communication efficiency between the lunar rover and the earth, the inter vehicle relay communication technology between the lunar rover and the lunar orbiter is particularly important. Aiming at the difficulties of low signal-to-noise ratio, rapid change of signal parameters, high requirements for full autonomy and extremely strict weight and power constrains of inter device communication in large elliptical orbit, this paper proposes the high efficient UHF band relay communication system, whose key techniques includes ultra-high sensitivity and dynamic adaptive signal demodulation, high precise Doppler measurement, the CCSDS Proximity-1 multiple dimensional integration and the highly integration RX/TX isolation engineering design of transceiver product. Based on the conception product, the presented communication system has achieved the acquisition sensitivity better than -141dBm, demodulation sensitivity (1kbps) better than -134dBm, frequency dynamic range better than 56kHz, Doppler measurement precision better than 10mHz and RX/TX isolation greater than 180dB, which could provide the Chinese CE-7 lunar mission with the fully autonomous high reliability and high throughput communication service.