

# Preliminary Analysis of the Possibility of Building of a Terahertz Spacecraft Communication Line

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**Abstract.** The variants of the inter-satellite link in the terahertz frequency range (0.3–3 THz) are considered. This is performed by selecting the basic design of the system and calculating the communication range relative to it and depending on the components used (signal detectors, signal sources), as well as changes in the antenna design. A terahertz transmitter antenna is a horn or parabolic antenna with a circular aperture, a receiving antenna is an array of circular horn antennas. The size of the antennas is chosen from the condition that the width of the radiation pattern is not less than the accuracy of the satellite antenna guidance system. The polarization of the transmitter and receiver are considered practically consistent. The maximum sensitivity of the receiver and the range of the terahertz connection are determined by the condition that the directed signal exceeds the thermal noise power in the working reception band by 3 dB. The calculation shows the possibility of space communications over distances of 10 000 km and about 80 000 km using terahertz components, which will become available in the near future.

**Keywords:** terahertz range, space communications, receiver, transmitter, antenna, orientation