

Advanced Ka-Band Deep Space Transponder Breadboard - Design and analysis

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ABSTRACT

This article summarizes the design concepts applied in the development of a advanced Ka-band (34.4 GHz/32 GHz) Transponder breadboard for the next generation of space communications systems applications. The selected architecture upgrades the X-band (7.2 GHz/8.4 GHz) Deep Space Transponder (DST) to provide Ka-band-up/Ka and X-band down capability. In addition it can also be configured to provide X-band-up/Ka and X-band down. The Ka-band transponder breadboard incorporates several state-of-the-art components including sampling mixers, sampling phase detectors, Ka-band dielectric resonator oscillator, and microwave monolithic integrated circuits (MMIC). The MMICs that are being tested in the breadboard include upconverters, down converters, automatic gain control circuits, mixers, phase modulators, and amplifiers. The analytical and measured results will be presented.

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