

Development of the RF Equipment for the COMS(Communication, Ocean and Meteorological Satellite) Communications Payload

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통신해양기상위성 통신탑재체용 RF 부품개발

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Abstract

This paper describes the development of the RF equipment for the COMS(Communication, Ocean and Meteorological Satellite) communications payload. The COMS communications payload receives 30 GHz signals and down-converts to 3 GHz for beam switching and then up-converts to 20 GHz for transmitting to ground. Total twelve(12) types of equipment have been developed for the engineering verification. The RF active equipment is designed by using MMIC technology to reduce size and mass, and to secure high stable performances. Some of the RF passive equipment is designed by use of dual mode and thin wall waveguide technologies to reduce mass and size. The 4 x 4 microwave switch matrix and manifold type output multiplexer are newly designed for the dedicated purpose of beam switching application. The channel amplifier provides 32 dB commandable gain control range and 20 dB automatic level control range to use transponders at optimum operating condition. The test results of the equipment show good agreement with the simulation results and are compliant to the requirement of each equipment.

Key words: COMS, Satellite transponder, RF active equipment, Amplifier

1. Introduction

ETRI has successfully completed the development of the CBS(Communication and Broadcasting satellite) payload systems from 2000 to 2003. The core RF equipment also has been developed through the CBS project. The heritage from the CBS project allows ETRI to develop the new project, COMS Ka-band communications payload systems, which is planned to launch in 2008.

The mission of the COMS Ka-band communications payload is to verify the performances of the advanced communications technologies, and to provide experimental broadband multi-media communications services. The service coverage includes South Korea, North Korea, and Northeast of China via individual satellite beam. The coverage is switched by the onboard

MSM(Microwave Switch Matrix).

This paper presents the engineering verification of RF equipment for COMS communications payload system. The design target was determined by the heritage of former project(CBS) to meet the payload system specifications. The test results of all equipment show good agreement with the requirements.

LNA(Low Noise amplifier)

The LNA consists of two cascaded MMICs - a single ended type 30GHz MMIC LNA and a balanced type 30 GHz MMIC LNA. The noise figure of a single ended type LNA is 1.7 dB[1].

The measured gain and noise figure of the LNA are 32.5 dB and 2.0 dB at room temperature as shown in Figure 1.