

SPACE POWER SYMPOSIUM (C3)

Wireless Power Transmission Technologies, Experiments and Demonstrations (2)

Author: Mr. Shoichiro Mihara

Japan Space Systems, Japan, Mihara-Shoichiro@jspacesystems.or.jp

Mr. Takashi Saito

Japan Space Systems, Japan, saito-takashi@jspacesystems.or.jp

Mr. Masao Sato

Japan Space Systems, Japan, sato-masao@jspacesystems.or.jp

Mr. Shuji Nakamura

Japan Space Systems, Japan, Nakamura-shuji@jspacesystems.or.jp

Mr. Kenji Sasaki

Japan Space Systems, Japan, sasaki-kenji@jspacesystems.or.jp

Dr. Yukihiro Homma

Mitsubishi Electric Corporation, Japan, Homma.Yukihiro@df.mitsubishielectric.co.jp

Mr. Takuro Sasaki

Mitsubishi Electric Corporation, Japan, Sasaki.Takuro@dn.MitsubishiElectric.co.jp

Mr. Yuichiro Ozawa

IHI Aerospace Co, Ltd., Japan, yuichiro-ozawa@iac.ihl.co.jp

Mr. Naohiro Tanaka

IHI Aerospace Co, Ltd., Japan, n-tanaka@iac.ihl.co.jp

Mr. Teruo Fujiwara

IHI Aerospace Co, Ltd., Japan, qfuji@js5.so-net.ne.jp

THE RESULT OF GROUND EXPERIMENT OF MICROWAVE WIRELESS POWER TRANSMISSION

Abstract

Japan Space Systems (J-SPACESYSTEMS) has been studying wireless power transmission (WPT) from the beginning of 2000. In this study, we have focused on the microwave power transmission as a key technology for the realization of future Space Solar Power System (SSPS). In 2009, Japanese New Space basic plan was issued, that selected SSPS as one of the research and development program to be promoted. Though SSPS was selected as an important project, Large Space System is not declared yet. J-SPACESYSTEMS group has conducted the ground WPT experiments project which includes kW level electrical power, under the contract of Ministry of Economy, Trade and Industry (METI). For the SSPS system, the lightest weight and highest performance transmission panel with accurate beam steering is required. In this program, we have been seeking for the development and research of high effective and high performance technologies. We have developed thin phased array antenna by four subpanels. High power amplifiers with high efficient GaN HEMT and class-F circuits were applied to produce the microwave power. The received microwave at array of rectenna, antenna with rectifier, was converted to the electrical energy again with the distance of tens of meters. The rectenna uses existing Schottky Barrier Diode. A software retrodirective technology is applied to the microwave beam direction control, and the microwave is controlled in precisely and high accuracy to the direction of the pilot signal sent from the rectenna panel. Japan Aerospace Exploration Agency (JAXA) is responsible for the development of this precise beam direction control in this program. We know it is necessary to apply a further technology to divert it for the space experiment. However, this project is at an important position to proceed to the

next development step aiming to the SSPS achievement. The ground experiment has been carried out in the microwave test field in from February to March of 2015. The result of the development will be explained in this presentation.