

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

Dr. Koichi Ijichi

Japan Space Systems, Japan, Ijichi-Koichi@jspacesystems.or.jp

Dr. Yukihiko Homma

Mitsubishi Electric Corporation, Japan, Homma.Yukihiko@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 CURRENT STATUS OF GROUND EXPERIMENT OF MICROWAVE WIRELESS POWER TRANSMISSION

Abstract

Japan Space Systems (J-spacesystems: Former USEF/Institute of Unmanned Space Flyer) 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). For the SSPS system, the lightest weight and highest performance transmission panel with accurate beam steering is required. J-spacesystems has started the ground WPT experiments project from 2009 under the contract of Ministry of Economy, Trade and Industry (METI) with Mitsubishi Electric Corporation and IHI Aerospace. In this project, we have several goals to realize. (1) Realization of high performance, light weight and high power phased array microwave power transmission system. Beam forming network, 76 High Power Amplifier (HPA) modules and 304 antenna modules are included in one sub-array panel with 60cm square size and 25mm thickness panel structure. GaN HEMT and Class F amplifiers are applied to HPA. We have achieved 37.3 g/w weight to power rate and output power is designed to achieve more than 400W by each panel. Four panels will be manufactured for the final system. (2) Realization of microwave energy receiving system, or Rectenna, with stable performance and suppression of harmonics. Avoidance of the failure of rectify diode is the key factor for realization of stable performance of Rectenna system. (3) Demonstration of its performance more than 50 meters distance between transmission system and receiving system. (4) The realization of beam steering system is responsible for Japan Aerospace Exploration Agency (JAXA), and we are working together for the

realization of total ground experiment system. We are in detail design phase. Manufacture, demonstration and evaluation phase will follow after current phase.