



Electromagnetic Interference Impact of Wireless Power Transfer on Implantable Medical Device

Takashi Hikage ⁽¹⁾, and Toshio Nojima ⁽¹⁾

(1) Graduate School of Information Science and Technology, Hokkaido University,
Kita14, Nishi9, Kita-ku, Sapporo, Hokkaido, 060-0814 Japan
e-mail: hikage@wtmc.ist.hokudai.ac.jp

Electromagnetic fields from wireless technology devices raises concern that they may cause other electronic devices to malfunction. Accordingly, investigations of electromagnetic interference (EMI) have recently become more important. In particular, EMI effects on medical equipment, including active implantable medical devices (AIMD), such as implantable-cardiac pacemakers and -cardioverter-defibrillators (ICD) should be precisely investigated because these are used by widely scattered members of the general public. In particular, the EMI caused by mobile phone systems is being investigated on a massive scale [1], [2]. In order to reduce the EMI risk on AIMDs, some guidelines on EMI suppression define a minimum safe distance [3], [4].

Recently, wireless power transfer (WPT) technologies have been attracting attention [5]. The technologies are expected to achieve wireless charging and power supply functions not only for low-power applications but also high power applications such as home appliances, electric vehicles (EV), and other electric systems. Since these systems can generate reactive fields of high field strength, it is important to assess exposure level for human safety. Investigations of compliance with the basic restrictions defined in SAR, induced currents and electric fields have been conducted [6]. However, there is still concern that, when an implantable medical device patient is close to WPT system, the electromagnetic fields may be strong enough to impact pacemaker operation. The fields generated by WPT based on resonant coupling is complicated and varies with the coupling condition (e.g. frequency, air-gap). It is important to assess the pacemaker (including ICD) EMI risk for WPT by means of reliable measurement techniques.

This paper introduces in-vitro AIMD EMI test method for WPT system and the EMI characteristics based upon assessments of many types of WPT including Qi-compliant system, EV-WPT system [7]. These WPT system are tested to estimate the EMI experienced by various types of implantable-cardiac pacemakers and ICDs.

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