Measurement of Transient Magnetic Field Using Microstrip Transmission Line

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Abstract

A measurement method of transient magnetic field due to gap discharge using the microstrip transmission line is considered in time domain. The magnetic field sensor is consisted of a strip transmission line on basal plate, a SMA type receptacle connector and a terminating resistance. In experiment, the distributed constant experimental system is used to take a pure step current at the gap discharge. It was confirmed that the measured waveform using this sensor shows an ideal response of the step current. This method enables to measure the high speed transients of magnetic field as the EMI (Electromagnetic-Interference) source.

Introduction

It is well known that the sudden transients are generated at the make and break of electrical contacts and surrounding electrical devices are affected [1, 2]. Switching noise has been studied extensively, but in almost all reports, phenomena at the electric contacts have been investigated from the viewpoint of the contact reliability and the contact materials [3-6]. We consider the transient magnetic field from viewpoint of EMC (Electromagnetic-Compatibility) source at the making of electrical contacts. However, as the current transients are very rapid, it is difficult to find the factors of the transient magnetic filed using a pickup coil in lumped constant system [7, 8].

Therefore, the magnetic field sensor using microstrip transmission line is consisted to measure the transient magnetic field. The magnetic filed sensor is useful in finding the factors of the transients in time domain. In this paper, the measured transients of magnetic field using this magnetic field sensor are presented.

Characteristics of the Magnetic Field Sensor Using Microstrip Transmission Line

Fig. 1 shows a construction of the magnetic field sensor using micro strip line. The sensor consists of the strip transmission line on basal plate, a SMA type receptacle connector and

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