

# Method of measuring conducted disturbance using both capacitive voltage probe and current probe

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# Method of measuring conducted disturbance using both capacitive voltage probe and current probe

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### 1. Introduction

In CISPR 22[1], conducted disturbances at the telecommunication ports of information technology equipment (ITE) are generally measured using an impedance stabilization network (ISN). When a suitable ISN is not available, CISPR 22 specifies an alternative method to measure both the voltage and current of the disturbance. However, a voltage probe appropriate for this method has not been reported, and the correlation between this method and the one using an ISN is not clear in CISPR 22.

### 2. Configuration

We developed a capacitive voltage probe with an electrostatic shield which can measure the common-mode voltage for any kind of cable[2]. The configuration of the capacitive voltage probe is shown in Fig. 1. It consists of two coaxial electrodes, a cable fixture, and a high-input-impedance amplifier operated by a battery. The outer electrode is used as an electrostatic shield. When a voltage appears between the cable and ground, an induced voltage occurs between its inner electrode and electrostatic shield. The induced voltage depends on the kind of cable, so the input-output factor of the probe is needed for every cable. Fig. 2 shows an example of the input-output factor relating to a twisted pair cable.

### 3. Performance

We measured the common-mode voltage of a telecommunication equipment using the capacitive voltage probe and an ISN with the setup according to CISPR22. The set-up used to measure the voltage is shown in Fig. 3. Measurement results are shown in Fig. 4. The common-mode voltage measured by the capacitive voltage probe is nearly equal to that measured by the ISN, within 3 dB.

In the future, it will be necessary to investigate about the averaged deviation of measured voltage level using the capacitive voltage probe and an ISN.

### Reference

- [1] CIPR Pub. 22, 1997.
- [2] R. Kobayashi, N. Kuwabara, and M. Hattori, "A method for determining the transmission direction of common-mode electromagnetic noise by measuring its energy flow", 12th International Zurich Symp. 38G5, Feb. 1997.

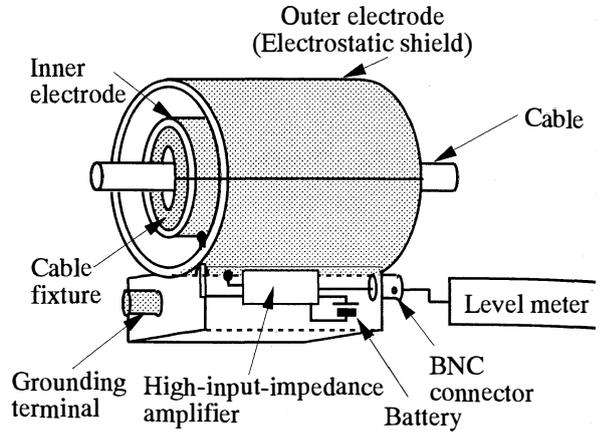


Fig. 1 Capacitive voltage probe.

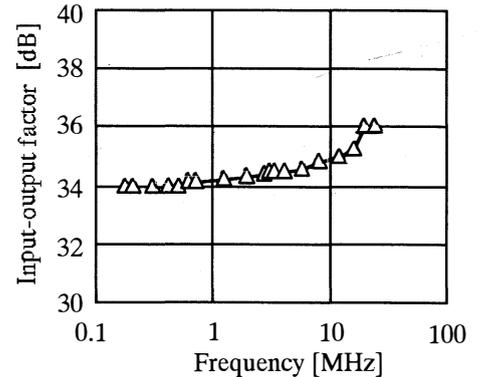


Fig. 2 Input-output factor

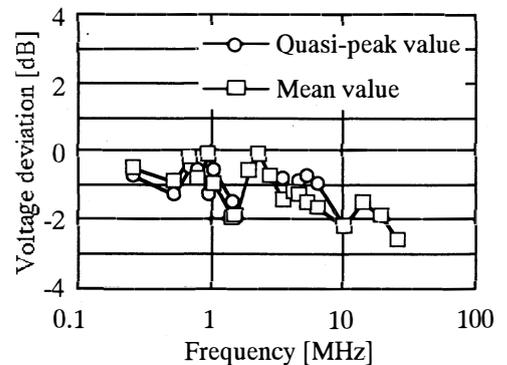


Fig. 4 Deviation between levels measured using ISN and the capacitive probe.

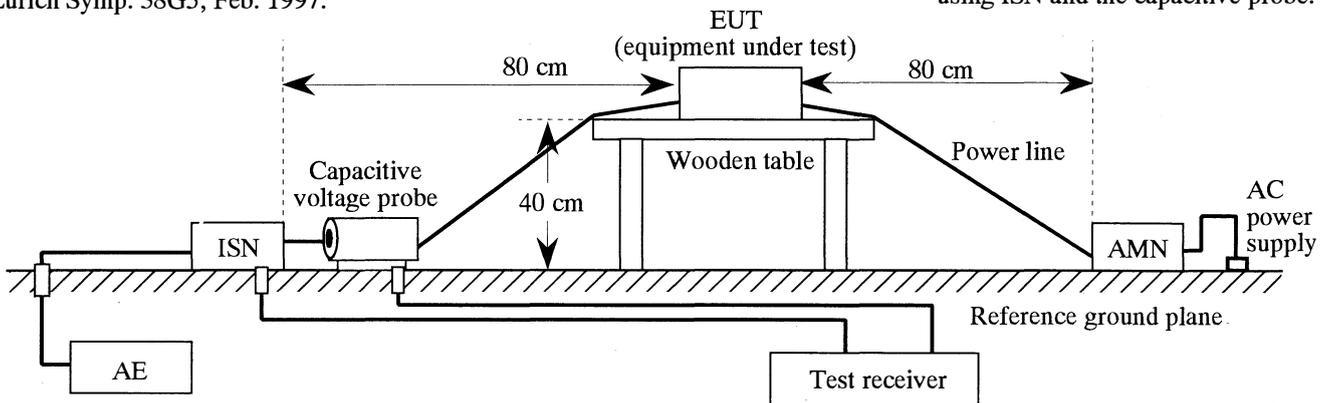


Fig. 3 Measurement setup of capacitive disturbance.