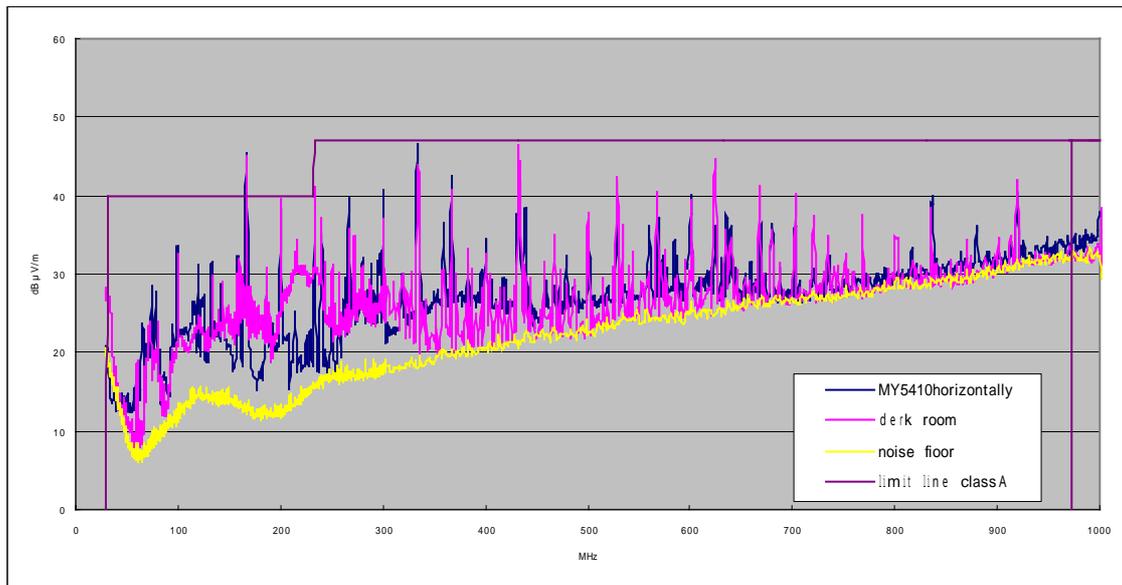


## Date comparison between MR2300/MY5410 system and a formal EMI site

### 1. Summary

- MR2300/MY5410 system was developed for a precompliance EMI test. This system enables the harmonics measurement, which is difficult before, of the switching regulator in 40 to 100MHz band.
- The data by this system is compared with the data of 3m method by the formal 10m chamber.
- The difference of site attenuation should be originally less than 2dB. But there is actually possibility of 6dB attenuation difference between sites because the measurement data changes by some conditions such as temperature. And even if there are a lot of NG points of PK values, the test passes if QP values are less than the limit line.
- When a chamber manufacturer and a measurement system manufacturer construct a chamber, they do the matching with compensation data based on a formal site to be compatible. However, it is also reported that the difference of the measurement value of maximum 20dB is caused by the difference of the wiring of the power cable. Actually, the 10dB difference might be caused by the difference of wiring on or under the table.
- The radio wave absorbers put on the five faces excepting the floor in the usual 3m chamber. Therefore, the radio wave is reflected on the floor. As a result, it is necessary to put the DUT 80cm apart from the floor. There is a formal site putting the radio wave absorbers on six faces.

Fig 1 . Spectrum comparison between 10m chamber and MR2300/MY5410 with electric turntable



### 2. Measurement

A note PC is used as a DUT(Device under Test) in this paper. Fig 1 shows the spectrum data in which each rotation angle of the electric turntable of 10m chamber and MR2300/MY5410.

#### -1. Measurement in 10m chamber

This chamber is equipped with the ferrite of 3m in length and 2m in width between the antenna and the turntable. The EMI receiver with -155dBm average noise floor is used to measure and made by Rohde & Schwarz. The DUT is put on the turntable,

and the antenna is rotated within 360 degrees and moved from 1m to 4m upward and downward. The maximum peak power is detected spending about 20 minutes. The measurement data is calculated in consideration of factors such as a preamplifier gain and a cable attenuation. Fig2 shows inside in chamber.

Fig 2. (1) ~ (3) Inside in chamber

(1). Electric turntable



(2). EMI receiver



(3). Antenna

## -2. Measurement by MR2300 and MY5410

The inside dimensions of MY5410 is 2140(W) × 1450(H) × 1390(D). The antenna is moved from 20 to 80 cm upward and downward, and the polarization is only vertical one. The DUT is put on the electric turntable in MY5410 and measured by rotation angle of 0,145 and 180 degrees, The electric turntable allows the rotation of 360 degrees.

Max HOLD is executed 32 times at each angle in the condition of 30 seconds sweep time and the total measurement time is 5 minutes. The spectrum analyzer used MSA338E with a preamplifier and 115dBm noise floor.

### 3. Consideration of measurement result

Table 1. Date comparison between 10m chamber and MR2300/MY5410 with electric turntable

| 10m chamber         |                   |                   |                |                |     | MR2300/MY5410 with electric turntable |                   |                   |                |                |     |
|---------------------|-------------------|-------------------|----------------|----------------|-----|---------------------------------------|-------------------|-------------------|----------------|----------------|-----|
| 3 meters test range |                   |                   |                |                |     | Date converted into 3 m               |                   |                   |                |                |     |
| Frequency<br>[MHz]  | PK<br>[dB(μ V/m)] | QP<br>[dB(μ V/m)] | Height<br>[cm] | Angle<br>[ ° ] | Pol | Frequency<br>[MHz]                    | PK<br>[dB(μ V/m)] | QP<br>[dB(μ V/m)] | Height<br>[cm] | Angle<br>[ ° ] | Pol |
| 79.94               | 47.5              | 28.4              | 100            | 158            | V   | 74                                    | 30                | 28.4              | 60             | 145            | V   |
| 167.1               | 60.9              | 45.2              | 163            | 46             | H   | 167                                   | 45.2              | 45.2              | 80             | 0              | V   |
| 334.1               | 53.2              | 43.4              | 100            | 2              | V   | 334                                   | 45.6              | 46.4              | 40             | 0              | V   |
| 432.1               | 49                | 41.5              | 100            | 76             | H   | 432                                   | 40                | 40                | 20             | 180            | V   |
| 528.2               | 45.3              | 39.6              | 100            | 116            | V   | 528                                   | 40.8              | 41.6              | 40             | 0              | V   |
| 601.4               | 40.9              | 36.7              | 235            | 204            | V   | 601                                   | 37.6              | 40                | 40             | 0              | V   |
| 835.2               | 39.8              | 39.3              | 124            | 343            | V   | 836                                   | 39.6              | 39.2              | 20             | 180            | V   |
| 918.7               | 43.3              | 44.9              | 110            | 21             | H   | 919                                   | 40.4              | 41.2              | 40             | 0              | V   |

Each radiated emission noise of a note PC by 10m chamber and MR2300/MY5410 system is shown in Table 1.

The measured frequency almost corresponds by two systems. And also the difference of the electric field strength by QP detection is within 4dB. It is our target that the difference from a formal site should be within about 5dB and all of data are satisfied with this target value.

The 74 to 80MHz noise which seems to be from a switching regulator has a certain band and is also measured low by 10dB with MY5310 system. However, the data by MY5410 system are almost same as the data by a formal site as shown in Table 1.

As a result, the MY5410 system enables the measurement up to low frequency compared with the MY5310 system.

The ferrite tile installed in MY5310/MY5410 has such good absorption efficiency as 30dB @150 to 450MHz, 40dB @280MHz and 20dB @30 to 1000MHz. From these results, the MR2300/MY5410 system is very effective in the EMI precompliance test and noise measures in the laboratory.