

# TEST REPORT

## 1. Applicant

Name : SEGI LIMITED  
Address : Chenjiapucun, Liaobu Town, Dongguan City,  
Guangdong Province, P.R.China(523-408)

## 2. Products

Name : Security/Remote Control transceiver(Car Alarm System)  
Model/Type : 2W8000FMR  
Manufacturer : SEGI LIMITED

## 3. Test Standard

: FCC CFR 47 Part 15, Subpart C section 15.231(a) &  
IC RSS 210 Annex I-2007

## 4. Test Method

: ANSI C63.4-2003, RSS-GEN-2007

## 5. Test Result

: Positive

## 6. Date of Application

: June 01, 2007

## 7. Date of Issue

: July 05, 2007

Tested by



Sung-Kyu Cho

Telecommunication Team  
Engineer

Approved by



Seok-Jin Kim

Telecommunication Team  
Manager

*The test results contained apply only to the test sample(s) supplied by the applicant, and this test report shall not be reproduced in full or in part without approval of the KTL in advance.*

## Korea Testing Laboratory

## TABLE OF CONTENTS

|                                    |    |
|------------------------------------|----|
| I. GENERAL INFORMATION.....        | 3  |
| 1. Applicant(client)               |    |
| 2. Equipment(EUT)                  |    |
| 3. Testing Laboratory              |    |
| II. SUMMARY OF TEST RESULTS.....   | 4  |
| III. TEST RESULT.....              | 5  |
| 3.1 Transmitter Radiated Emissions |    |
| 3.2 Bandwidth of Momentary Signals |    |
| 3.3 Receiver Radiated Emissions    |    |
| IV. TEST EQUIPMENTS.....           | 15 |

## I . GENERAL INFORMATIONS

### 1.1 Applicant (Client)

|                |  |
|----------------|--|
| Name           | SEGI LIMITED   |
| Address        | Chenjiapucun, Liaobu Town, Dongguan City, Guangdong Province, P.R.China(523-408) |
| Contact Person | Byung joon - Ko  |
| Telephone No.  | +86-769-8322-4133(175)   |
| Facsimile No.  | +86-769-8322-4130  |
| E-mail address | byungjoon@magicar.com  |

### 1.2 Equipment (EUT)

|                      |  |
|----------------------|--|
| Type of equipment    | Security/Remote Control transceiver(Two-way Car Alarm System)                    |
| Model Name           | 2W8000FMR  |
| FCC ID               | VA5JR2W8000R   |
| IC ID                | 7087A-2W8000R  |
| Operating Frequency  | 433.92 MHz   |
| Type of Signal       | Pulse Code Signal  |
| Power Source         | DC 1.5V (Battery)  |
| Manufacturer Name    | SEGI LIMITED   |
| Manufacturer Address | Chenjiapucun, Liaobu Town, Dongguan City, Guangdong Province, P.R.China(523-408) |

### 1.3 Testing Laboratory

|                  |   |
|------------------|---|
| Testing Place    | Korea Testing Labortory (KTL)<br>222-13 Guro-dong, Guro-Gu, Seoul 152-848 Korea |
| Test Engineer    | Sungkyu Cho   |
| Telephone number | +82 2 860 1463  |
| Facsimile number | +82 2 860 1468  |
| E-mail address   | skcho@ktl.re.kr   |
| Other Comments   |   |

## II. SUMMARY OF TEST RESULTS

The 2W8000FMR has been found to conform as detailed below.

| FCC       | IC      | Test Requirements   | Result |
|-----------|---------|---|--------|
| 15.231(a) | A1.1.1  | Provisions of FCC 15.231 & IC RSS210 A1.1                           | Pass   |
| 15.231(b) | A1.1.2  | Transmitter Radiated Emissions – Fundamental, Harmonic and Spurious | Pass   |
| 15.231(c) | A1.1.3  | 20 dB & 99% Bandwidth   | Pass   |
| 15.109(a) | Table 2 | Receiver Radiated Emissions   | Pass   |

### III. TEST RESULTS

#### 3.1. Transmitter Spurious Emissions (FCC Part 15.231(a) & RSS-210 A1.1.2)

##### 3.1.1 Test procedure

###### 3.1.1.1 Preliminary Testing for Reference

Preliminary testing was performed in a KTL absorber-lined room to determine the emission characteristics of the EUT. The EUT was placed on the wooden table which has dimensions of 0.8 meters in height, 1 meter in length and 1.5 meters in width. Receiving antenna (Biconi-Log antenna : 30 to 1000 MHz or Horn Antenna : 1 to 18 GHz) was placed at the distance of 1 meter from the EUT.

An attempt was made to maximize the emission level with the various configurations of the EUT while rotating the table and varying antenna height.

Emissions level from the EUT with various configurations were examined on a Spectrum Analyzer connected with an RF amplifier and graphed by a plotter.

###### 3.1.1.2 Final Radiated Emission Test at an Absorber-Lined Room

The final measurement of radiated field strength was carried out in a KTL Absorber-Lined Room that was listed up at FCC according to the "Radiated Emissions Testing" procedure specified by ANSI C63.4.

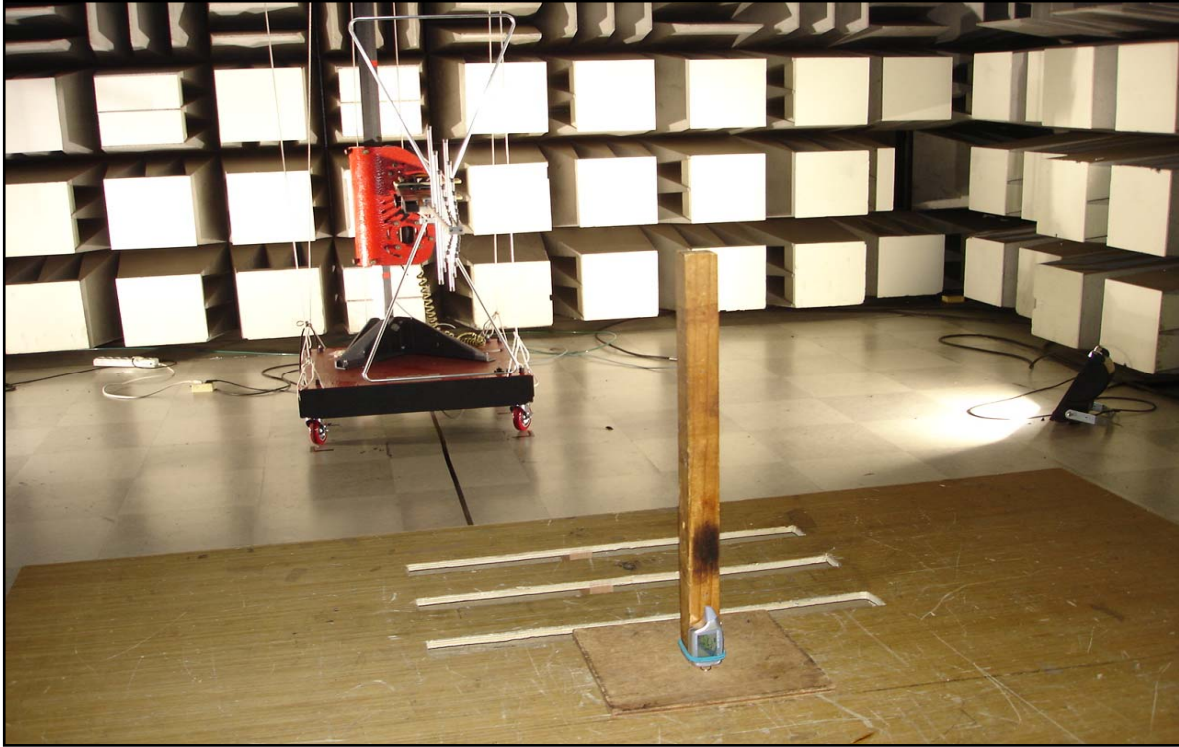
Based on the test results in preliminary test, measurement was made in same test set up and configuration which produced maximum emission level. Receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver. Receiving antenna polarization was changed vertical and horizontal. The worst value was recorded.

Turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane to read maximum emission level.

If necessary, the radiated emission measurements could be performed at a closer distance than specified distance to ensure higher accuracy and their results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per Section 15.31(f).

The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

### 3.1.2. Photograph for the test configuration



### 3.1.3 Limit

| Fundamental Frequency (MHz) | Field Strength of Fundamental (microvolts/meter) | Field Strength of Spurious Emission (microvolts/meter) |
|-----------------------------|--|--|
| 40.66-40.70                 | 1,000  | 100  |
| 70-130                      | 500  | 50   |
| 130-174                     | 500 to 1,500**                                   | 50 to 150**  |
| 174-260                     | 1,500  | 150  |
| 260-470                     | 1,500 to 5,000**                                 | 150 to 500**   |
| Above 470                   | 5,000  | 500  |

\*\* linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows : for the band 130-174 MHz, Uv/m at 3 meters = 22.72727(F)-2454.545; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) – 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

Example) 433.92 MHz Field Strength of Fundamental (microvolts/meter)  
 $41.6667 * 433.92 - 7083.3333 = 10996.68116 \text{ uV/m} = 80.8 \text{ dBuV/m}$

### 3.1.3. Sample Calculation

The emission level measured in decibels above one microvolt (dB  $\mu V$ ) was converted into microvolt per meter ( $\mu V/m$ ) as shown in following sample calculation.

For example :

|                                    |   |
|------------------------------------|---|
| Measured Value at <u>433.9 MHz</u> | 84.4 dB $\mu V$                             |
| + Antenna Factor & Cable Loss      | 18.6 dB/m                                   |
| - Pre-amplifier                    | 32.7 dB                                     |
| - Distance Correction Factor *     | 0.0 dB                                      |
| -----                              |   |
| = Radiated Emission                | 70.3 dB $\mu V/m$<br>( = 3273.4 $\mu V/m$ ) |

**3.1.4. Measurement Data**

- Resolution Bandwidth :   x   CISPR Quasi-Peak (6 dB Bandwidth : 120 kHz)  
    Peak (3 dB Bandwidth : 100 kHz)
- Measurement Distance : 3 Meter
- Measurement Frequency : 30 MHz ~ 1000 MHz

| Frequency (MHz) | * D.M. | * A.P. | Measured Value (dB $\mu$ V) | * A.F. + C.L (dB/m) | * A.G. (dB) | * D.C.F. (dB) | Emission Level |              | Limit (dB $\mu$ V/m) | ** Margin (dB) |
|-----------------|--------|--------|-----------------------------|---------------------|-------------|---------------|----------------|--------------|----------------------|----------------|
|                 |        |        |                             |                     |             |               | (dB $\mu$ V/m) | ( $\mu$ V/m) |                      |                |
| 433.9           | Q      | V      | 84.4                        | 18.6                | -32.7       | 0.0           | 70.3           | 3273.4       | 80.8                 | -10.5          |
| 482.1           | Q      | V      | 59.6                        | 19.8                | -32.7       | 0.0           | 46.7           | 216.3        | 60.8                 | -14.1          |
| 867.8           | Q      | V      | 43.1                        | 26.5                | -32.1       | 0.0           | 37.5           | 75.0         | 60.8                 | -23.3          |
|                 |        |        |                             |                     |             |               |                |              |                      |                |
|                 |        |        |                             |                     |             |               |                |              |                      |                |
|                 |        |        |                             |                     |             |               |                |              |                      |                |
|                 |        |        |                             |                     |             |               |                |              |                      |                |
|                 |        |        |                             |                     |             |               |                |              |                      |                |
|                 |        |        |                             |                     |             |               |                |              |                      |                |
|                 |        |        |                             |                     |             |               |                |              |                      |                |
|                 |        |        |                             |                     |             |               |                |              |                      |                |
|                 |        |        |                             |                     |             |               |                |              |                      |                |

Note

The observed EMI receiver(ESVS30) noise floor level was 2.0 dB $\mu$ V. And all other emissions not reported on data were more than 25 dB below the permitted level.

\* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average)  
 A.P. : Antenna Polarization (H : Horizontal, V : Vertical)  
 A.F. : Antenna Factor  
 C.L. : Cable Loss  
 A.G. : Amplifier Gain  
 D.C.F. : Distance Correction Factor  
 < : Less than

\*\* Margin (dB) = Emission Level (dB) - Limit (dB)



Note ;

- (1) Fundamental emissions from the intentional radiators were not located within any of frequency bands described in section 15.205(a) listed below ;

| MHz               | MHz                 | MHz           | GHz         |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110       | 16.42-16.423        | 399.9-410     | 4.5-5.25    |
| 0.495-0.505       | 16.69475-16.69525   | 608-614       | 5.35-5.46   |
| 2.1735-2.1905     | 16.80425-16.80475   | 960-1240      | 7.25-7.75   |
| 4.125-4.128       | 25.5-25.67          | 1300-1427     | 8.025-8.5   |
| 4.17725-4.1775    | 37.5-38.25          | 1435-1626.5   | 9.0-9.2     |
| 4.20725-4.20775   | 73-74.6             | 1645.5-1646.5 | 9.3-9.5     |
| 6.215-6.218       | 74.8-75.2           | 1660-1710     | 10.6-12.7   |
| 6.26775-6.26825   | 108-121.94          | 1718.8-1722.2 | 13.25-13.4  |
| 6.31175-6.31225   | 123-138             | 2200-2300     | 14.47-14.5  |
| 8.291-8.294       | 149.9-150.05        | 2310-2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4   |
| 8.37625-8.38675   | 156.7-156.9         | 2655-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267     | 23.6-24.0   |
| 12.29-12.293      | 167.72-173.2        | 3332-3339     | 31.2-31.8   |
| 12.51975-12.52025 | 240-285             | 3345.8-3358   | 36.43-36.5  |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     |             |
| 13.36-13.41       |                     |               |             |

The field strength of emissions appearing within above frequency bands did not exceed the limits shown in section 15.209. At frequency equal to or less than 1000MHz, compliance with the limits section 15.209 was demonstrated using measurement employing a CISPR quasi-peak detector. Above 1000MHz, demonstrated based on the average value of the measured emissions.

- (2) If the intentional radiator was operated under the radiated emission limits of the general requirements of section 15.209, it's fundamental emissions were not located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-860MHz.
- (3) The level of any unwanted emissions from an intentional radiator did not exceed the level of the fundamental emission.
- (4) Radiated and spurious emissions were checked from 30MHz to 3GHz. And all other emissions not reported on data were more than 20 dB below the permitted level.

### 3.2 Bandwidth of Momentary Signals (FCC Part 15.231(c) & RSS-210 A.1.1.3)

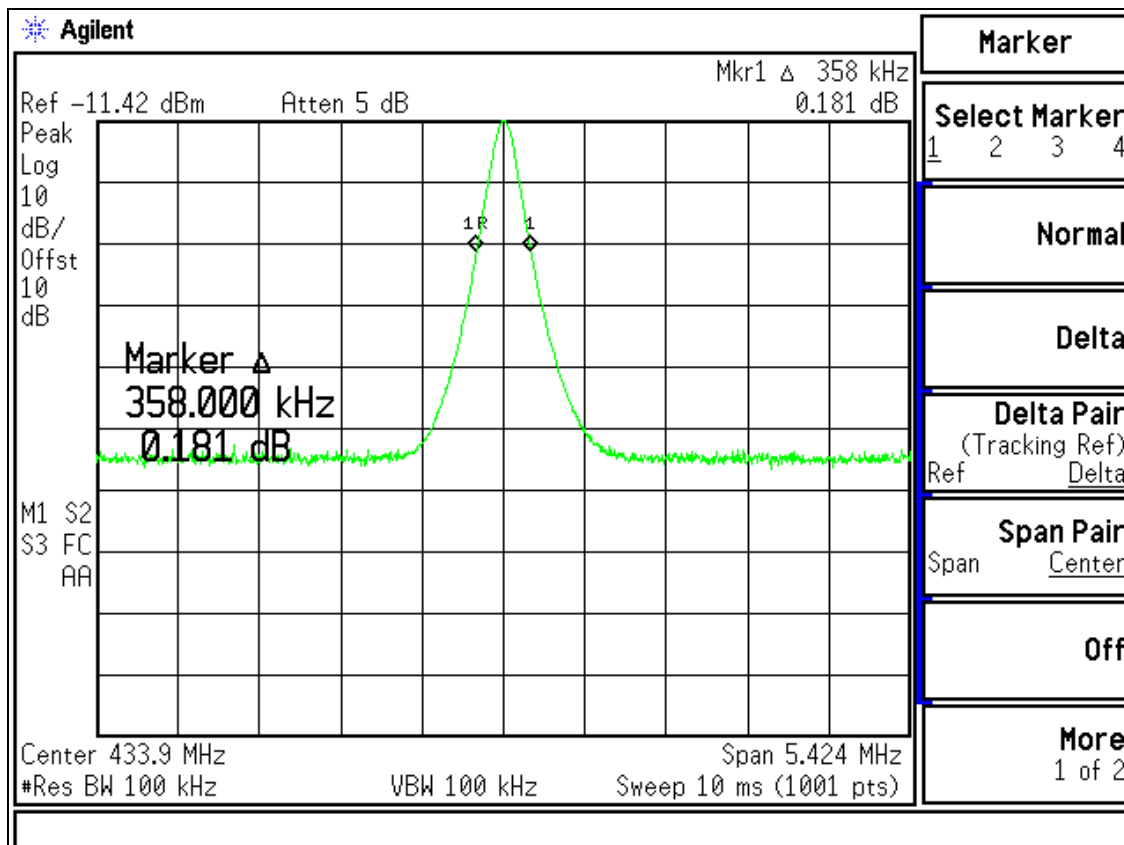
#### 3.2.1 Limit

The 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70~900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.

#### 3.2.2 Test result (FCC Part 15.231(c))

| Frequency (MHz) | Result (kHz) | Limit (MHz) | Verdict |
|-----------------|--------------|-------------|---------|
| 433.92          | 358.0        | 1.0848      | Pass    |

1. Carrier Frequency = 433.92 MHz
2. The bandwidth of emission shall be no wider than 0.25 % of center frequency.
3. Limit : less than 1.0848 MHz (433.92 x 0.025)

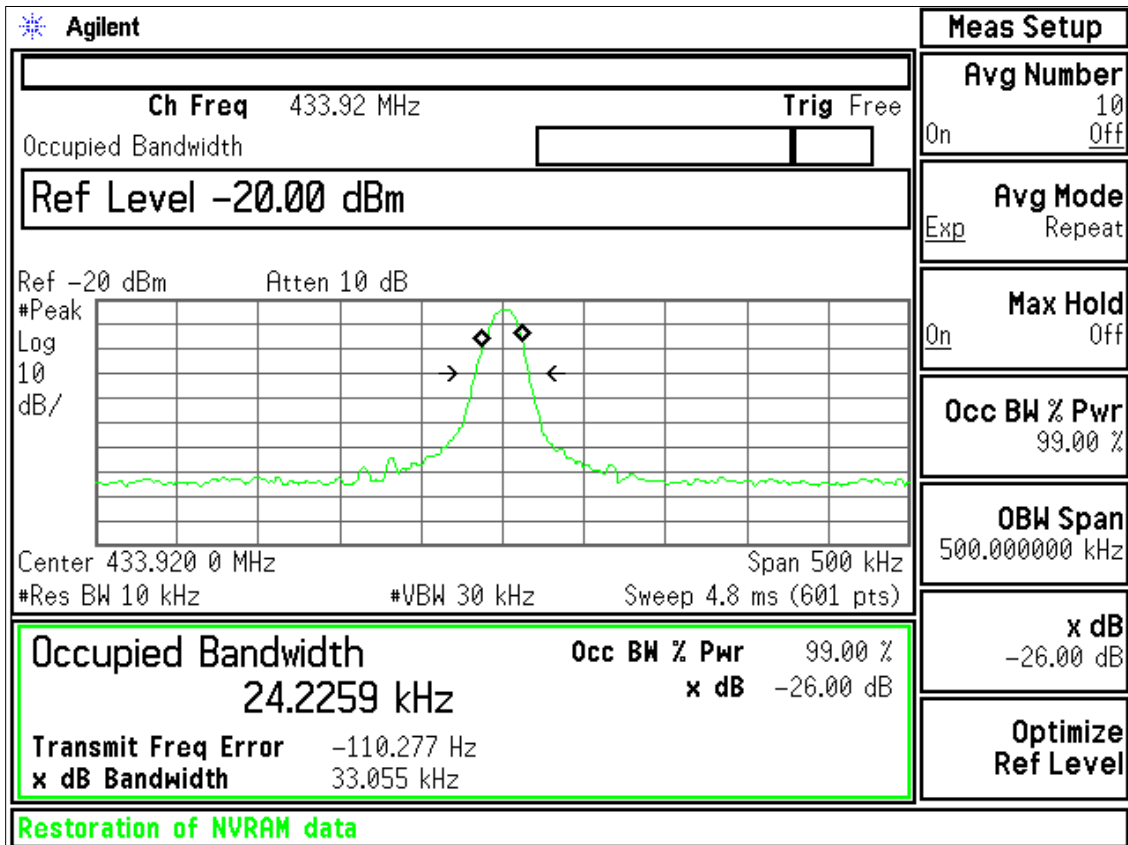


– 20 dB Occupied Bandwidth –

**3.2.3 Test result (RSS-210 A1.1.3)**

| Frequency (MHz) | Result (kHz) | Limit (MHz) | Verdict |
|-----------------|--------------|-------------|---------|
| 433.92          | 24.22        | 1.0848      | Pass    |

- 3. Carrier Frequency = 433.92 MHz
- 4. The bandwidth of emission shall be no wider than 0.25 % of center frequency.
- 3. Limit : less than 1.0848 MHz (433.92 x 0.025)



- 99% Occupied Bandwidth -

### 3.3 Receiver Spurious Emissions (FCC Part15.109 & RSS-210 Table 2)

#### 3.3.1 Test Procedure

##### 3.2.1.1 Preliminary Testing for Reference

Preliminary testing was performed in a KTL absorber-lined room to determine the emission characteristics of the EUT. The EUT was placed on the wooden table which has dimensions of 0.8 meters in height, 1 meter in length and 1.5 meters in width. Receiving antenna (Biconi-Log antenna : 30 to 1000 MHz or Horn Antenna : 1 to 18 GHz) was placed at the distance of 1 meter from the EUT.

An attempt was made to maximize the emission level with the various configurations of the EUT. Emission levels from the EUT with various configurations were examined on a spectrum analyzer connected with a RF amplifier and graphed by a plotter.

##### 3.2.1.2 Final Radiated Emission Test at an Absorber-Lined Room

The final measurement of radiated field strength was carried out in a KTL Absorber-Lined Room that was listed up at FCC according to the "Radiated Emissions Testing" procedure specified by ANSI C63.4.

Based on the test results in preliminary test, measurement was made in same test set up and configuration which produced maximum emission level. Receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver.

Turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane to read maximum emission level. Receiving antenna polarization was changed vertical and horizontal. The worst value was recorded.

If necessary, the radiated emission measurements could be performed at a closer distance than specified distance to ensure higher accuracy and their results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per Section 15.31(f).

The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

### 3.3.3. Sample Calculation

The emission level measured in decibels above one microvolt ( $\text{dB } \mu\text{V}$ ) was converted into microvolt per meter ( $\mu\text{V/m}$ ) as shown in following sample calculation.

For example :

|                                    |  |
|------------------------------------|--|
| Measured Value at <u>412.5 MHz</u> | 33.3 dB $\mu\text{V}$                                |
| + Antenna Factor & Cable loss      | 18.0 dB  |
| - Preamplifier                     | 32.8 dB  |
| - Distance Correction Factor *     | 0.0 dB   |
| -----                              |  |
| = Radiated Emission                | 18.5 dB $\mu\text{V/m}$<br>( = 8.4 $\mu\text{V/m}$ ) |

\* Extrapolated from the measured distance to the specified distance by an inverse linear distance extrapolation.

**3.3.4. Test Results**

- Resolution Bandwidth :   x   CISPR Quasi-Peak (6 dB Bandwidth : 120 kHz)  
                                      Peak (3 dB Bandwidth : 100 kHz)
- Measurement Distance : 3 Meter
- Measurement Frequency: 30 MHz ~ 3 GHz

| Frequency (MHz) | * D.M. | * A.P. | Measured Value (dB $\mu$ V) | * A.F. + C.L. (dB/m) | * A.G. (dB) | * D.C.F. (dB) | Emission Level |              | Limit (dB $\mu$ V/m) | ** Margin (dB) |
|-----------------|--------|--------|-----------------------------|----------------------|-------------|---------------|----------------|--------------|----------------------|----------------|
|                 |        |        |                             |                      |             |               | (dB $\mu$ V/m) | ( $\mu$ V/m) |                      |                |
| 412.5           | Q      | V      | 33.3                        | 18.0                 | -32.8       | 0.0           | 18.5           | 8.4          | 46.0                 | -27.5          |
| 835.0           | Q      | V      | 32.6                        | 26.0                 | -32.1       | 0.0           | 26.5           | 21.1         | 46.0                 | -19.5          |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |
|                 |        |        |                             |                      |             |               |                |              |                      |                |

Note

The observed EMI receiver(ESVS30) noise floor level was 2.0 dB $\mu$ V. And all other emissions not reported on data were more than 25 dB below the permitted level.

\* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average)  
 A.P. : Antenna Polarization (H : Horizontal, V : Vertical)  
 A.F. : Antenna Factor  
 C.L. : Cable Loss  
 A.G. : Amplifier Gain  
 D.C.F. : Distance Correction Factor  
 < : Less than

\*\* Margin (dB) = Emission Level (dB) - Limit (dB)

**VI. TEST EQUIPMENTS**

| No. | Equipment                                | Manufacturer | Model    | S/N        | Effective Cal.Duration  |
|-----|--|--------------|----------|------------|-------------------------|
| 1   | EMI Receiver<br>(20 MHz ~ 1 GHz)         | R&S          | ESVS30   | 830516002  | 03/15/2007 ~ 03/15/2008 |
| 2   | EMI Receiver<br>(9 kHz ~ 3 GHz)          | R&S          | ESCI     | 100076     | 03/28/2007 ~ 03/28/2008 |
| 3   | Spectrum Analyzer<br>(100 Hz ~ 26.5 GHz) | Agilent      | E4407B   | US41443316 | 12/01/2006 ~ 12/01/2007 |
| 4   | Spectrum Analyzer<br>(3 Hz ~ 50 GHz)     | Agilent      | E4448A   | MY43360322 | 02/26/2007 ~ 02/26/2008 |
| 5   | Test Receiver<br>(9 kHz ~ 30 MHz)        | R&S          | ESH3     | 860905001  | 06/18/2007 ~ 06/18/2008 |
| 6   | Pre-Amplifier<br>(100 kHz ~ 3 GHz)       | H.P.         | 8347A    | 2834A00543 | 05/19/2007 ~ 05/19/2008 |
| 7   | Pre-Amplifier<br>(1 GHz ~ 26.5 GHz)      | H.P.         | 8449B    | 3008A00302 | 06/14/2007 ~ 06/14/2008 |
| 8   | LISN(50 Ω , 50 μH)<br>(10 kHz ~ 100 MHz) | R&S          | ESH3-Z5  | 826789009  | 07/05/2007 ~ 07/05/2008 |
| 9   | Biconi-Log Ant.<br>(30 MHz ~ 1000 MHz)   | Schwarzbeck  | VULB9168 | 9168-168   | 08/16/2007 ~ 08/16/2008 |
| 10  | Horn Ant.<br>(1 GHz ~ 18 GHz)            | EMCO         | 3115     | --         | 05/09/2007 ~ 05/09/2008 |
| 11  | Active Loop Ant.<br>(9 kHz ~ 30 MHz)     | EMCO         | 6502     | 2532       | 06/08/2007 ~ 06/08/2008 |
| 12  | Shielded Room<br>(5.0 m x 4.5 m)         | SIN-MYUNG    | --       | --         | --                      |
| 13  | Signal Generator<br>(250 kHz ~ 20 GHz)   | Agilent      | E8257D   | MY44320379 | 01/02/2007 ~ 01/02/2008 |
| 14  | DC Power Supply                          | Agilent      | E4356A   | MY41000296 | 09/28/2006 ~ 09/28/2007 |
| 15  | Power Splitter                           | H.P.         | 11667A   | 21063      | 10/09/2006 ~ 10/09/2007 |
| 16  | Power Meter                              | Agilent      | E4417A   | GB4129075  | 09/17/2006 ~ 09/17/2007 |
| 17  | Attenuator                               | Weinschel    | 56-20    | N8257      | 01/13/2007 ~ 01/13/2008 |
| 18  | Oscillator                               | Kenwood      | AG-203D  | 10040568   | 10/23/2006 ~ 10/23/2007 |