# FCC/IC TEST REPORT

| | |
|---|---|
| **Job No.** | **: GPWE2105000091EH** |
| **Applicant Name** | **: FCC: LG Electronics USA** |
| | **IC: LG Electronics Inc.** |
| **Equipment Under Test (EUT) :** | |
| | **Product Name : Bluetooth Module** |
| | **Model Name : LCB-003** |
| **FCC Authorization Type** | **: Certification** |
| **FCC ID** | **: BEJ-LCB003** |
| **IC Certification** | **: 2703N-LCB003** |
| **Applied Standards** | **: FCC Part 15 Subpart B, Class B** |
| | **ANSI C63.4a:2017** |
| | **ICES-003 Issue 7:2020** |
| **Date of Receipt** | **: May 18, 2021** |
| **Date of Test** | **: May 26, 2021 ~ May 31, 2021** |
| **Date of Issue** | **: June 14, 2021** |
| **Test Results** | **: Complied** |

| | | |
|---|---|---|
| **Tested by** | : | **Lucas Ku** |
| **Reviewed by** | : | **Julia Choi** |

**This test report does not assure KOLAS accreditation.**
1) The results of this test report are effective only to the items tested.
2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

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# Revision History

| Revision | Report number | Description |
|---|---|---|
| 0 | F690501-RF-EMH001381 | Initial |
| 1 | F690501-RF-EMH001381_1 | Change 1.1 Client Information |
| 2 | F690501-RF-EMH001381_2 | Add FCC ID and IC Certification Information |

# 1. General Information

## 1.1 Client Information

| | |
|---|---|
| FCC Applicant | LG Electronics USA |
| FCC Applicant Address | 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, United States, 07632 |
| IC Applicant | LG Electronics Inc. |
| IC Applicant Address | 170, Seongsanpaechong-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea (Republic Of), 51533 |
| Manufacturer 1 | LG Electronics Inc. |
| Manufacturer 1 Address | 84, Wanam-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, 51554, Republic of Korea |
| Manufacturer 2 | OHSUNG ELECTRONICS CO.LTD. |
| Manufacturer 2 Address | 335-4, Sanho-daero, Gumi-si, Gyeongsangbuk-do, Republic of Korea, 39269 |
| Manufacturer 3 | OHSUNG ELECTRONICS(SUZHOU) CO., LTD. |
| Manufacturer 3 Address | NO.188 TUNPU SOUTH ROAD,TUNCUN,TONGLI,WUJIANG, JIANGSU PROVINCE,CHINA |

## 1.2 Test Laboratory

| | |
|---|---|
| Name and Address | SGS Korea Co., Ltd. |
| - Giheung 1 Laboratory | 35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea |
| - Giheung 2 Laboratory | 23, Giheungdanji-ro 24beon-gil, Giheung-gu,Yongin-si, Gyeonggi-do, Republic of Korea |
| FCC Registration No. | KR0150 |
| IC Registration No. | 7837B |
| Phone | + 82 31 548 0710 |
| Fax | + 82 31 548 0719 |
| e-mail | julia.choi@sgs.com |

## 1.3 General Information of E.U.T.

| Classification | Specification |
|---|---|
| Product Name | Bluetooth Module |
| Model Name | LCB-003 |
| Serial No. | None |
| EMI Classification | Class B |
| Test Power | DC 3.3V, DC 5.0V |
| Rated Power | DC 3.3 V, DC 5.0V |
| RF operating freq. range | (2 402 -2 480) ㎒ |
| Tx Power | 4 ㏈ m |
| Antenna | PCB Pattern Antenna |
| Port | DC IN(3.3 V), Audio |
| Function | Bluetooth Speaker Module |

## 1.4 Operating Modes and Conditions

| Operating mode | Operating Condition |
|---|---|
| 1) Bluetooth Communication | The EUT is tested on Bluetooth communication with mobile phone |

### 1.5 Peripheral Equipments

| Description | Model | Serial No. | Manufacturer |
|---|---|---|---|
| Mobile Phone | SM-N916S | - | Samsung Electronics |
| DC POWER SUPPLY1 | IT6720 | - | ITECH |
| DC POWER SUPPLY2 | IT6720 | - | ITECH |

### 1.6 Cable List

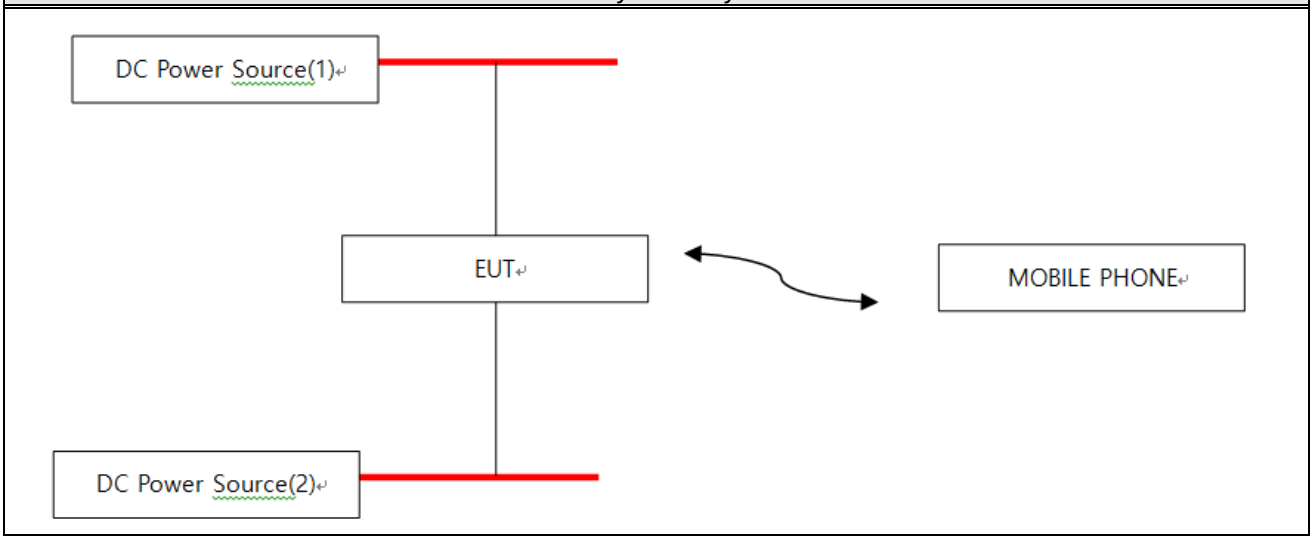
| Start | | END | | Cable Spec. | | Used core |
|---|---|---|---|---|---|---|
| Name | I/O Port | Name | I/O Port | Length (m) | Shield | |
| EUT | DC IN | DC POWER SOURCE(1) | DC OUT | 1.2 | Unshield | No |
| | Audio | DC POWER SOURCE(2) | DC OUT | 1.2 | Unshield | No |
| | - | MOBILE PHONE | - | - | - | - |

### 1.7 System Configurations

| Description | Model | Serial No. | Manufacturer | Note |
|---|---|---|---|---|
| - | - | - | - | - |

### 1.8 Test System Layout

Test System Layout




### 1.9 Modifications

- There was no modified item during the test.

### 1.10 Applicable Standards for Testing

| Standards | Status | Deviation |
|---|---|---|
| FCC Part 15 : Subpart B<br>ICES-003 Issue 7:2020 | Applicable | No Deviation |

### 1.11 Summary of Test Results

| Test Item | Standards | Results |
|---|---|---|
| Conducted Emission | FCC Part 15 Subpart B Section 15.107<br>ICES-003 Issue 7:2020 | N/A |
| Radiated Emission | FCC Part 15 Subpart B Section 15.109<br>ICES-003 Issue 7:2020 | Complied |

Note : Test methods of all test items are performed according to the basic standards in this table.

# EMISSION

## 2.1 Test Results

| Test Items | Standards | Test Results |
|---|---|---|
| Conducted Emission | FCC Part 15 Subpart B Section 15.107<br>ICES-003 Issue 7:2020 | N/A |
| Radiated Emission | FCC Part 15 Subpart B Section 15.109<br>ICES-003 Issue 7:2020 | Complied |

## 2.2 Test Method and Limits

### 2.2.1 Test Method

| Test Items | Measuring Frequency Range | RBW | Measuring Distance |
|---|---|---|---|
| Conducted Emission | 0.15 MHz ~ 30 MHz | 9 kHz | - |
| Radiated Emission | 30 MHz ~ 1 GHz | 120 kHz | 10 m & 3 m |
| | Above 1 GHz | 1 MHz | 3 m |

Note : 10 m method of radiated emission measurement is only applied to Class A equipment over the frequency range of 30 MHz ~ 1 GHz. Except this, 3 m method is applied to Class B equipment over the frequency range of 30 MHz ~ 1 GHz and Class A and Class B equipment above 1 GHz.

### 2.2.2 Test Limits

**-Conducted Emission Limits**

| Frequency Range | Limits(dBμV) | | Class |
|---|---|---|---|
| | Quasi-peak | Average | |
| 0.15 MHz ~ 0.5 MHz | 79 | 66 | Class A |
| 0.5 MHz ~ 30 MHz | 73 | 60 | |
| 0.15 MHz ~ 0.5 MHz | 66 to 56 | 56 to 46 | Class B |
| 0.5 MHz ~ 5 MHz | 56 | 46 | |
| 5 MHz ~ 30 MHz | 60 | 50 | |

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

**-Radiated Emission Limits below 1 GHz**

[ FCC Part 15 Subpart B ]

| Frequency Range | Limits(dBμV/m) | Class |
|---|---|---|
| | Quasi-peak | |
| 30 MHz ~ 88 MHz | 39.0 | Class A (10 m method) |
| 88 MHz ~ 216 MHz | 43.5 | |
| 216 MHz ~ 960 MHz | 46.4 | |
| 960 MHz ~ 1 GHz | 49.5 | |
| 30 MHz ~ 88 MHz | 40.0 | Class B (3 m method) |
| 88 MHz ~ 216 MHz | 43.5 | |
| 216 MHz ~ 960 MHz | 46.0 | |
| 960 MHz ~ 1 GHz | 54.0 | |

[ ICES-003 Issue 7 : 2020 ]

| Frequency Range | Limits(dBμV/m) | Class |
|---|---|---|
| | Quasi-peak | |
| 30 MHz ~ 88 MHz | 40.0 | Class A (10 m method) |
| 88 MHz ~ 216 MHz | 43.5 | |
| 216 MHz ~ 230 MHz | 46.4 | |
| 230 MHz ~ 960 MHz | 47.0 | |
| 960 MHz ~ 1 GHz | 49.5 | |
| 30 MHz ~ 88 MHz | 50.0 | Class A (3 m method) |
| 88 MHz ~ 216 MHz | 54.0 | |
| 216 MHz ~ 230 MHz | 56.9 | |
| 230 MHz ~ 960 MHz | 57.0 | |
| 960 MHz ~ 1 GHz | 60.0 | |
| 30 MHz ~ 88 MHz | 30.0 | Class B (10 m method) |
| 88 MHz ~ 216 MHz | 33.1 | |
| 216 MHz ~ 230 MHz | 35.6 | |
| 230 MHz ~ 960 MHz | 37.0 | |
| 960 MHz ~ 1 GHz | 43.5 | |
| 30 MHz ~ 88 MHz | 40.0 | Class B (3 m method) |
| 88 MHz ~ 216 MHz | 43.5 | |
| 216 MHz ~ 230 MHz | 46.0 | |
| 230 MHz ~ 960 MHz | 47.0 | |
| 960 MHz ~ 1 GHz | 54.0 | |

**-Radiated Emission Limits above 1 GHz (3 m method)**

[ FCC Part 15 Subpart B ]

| Frequency Range | Limits(dBμV/m) | | Class |
|---|---|---|---|
| | Average | Peak | |
| Above 1 GHz | 59.5 | 79.5 | Class A |
| Above 1 GHz | 54.0 | 74.0 | Class B |

Note : The limits of class A equipment is extrapolated using an extrapolation factor of 20 dB/decade because it was measured at 3 m distance not 10 m distance.

[ ICES-003 Issue 7 : 2020 ]

| Frequency Range | Limits(dBμV/m) | | Class |
|---|---|---|---|
| | Average | Peak | |
| Above 1 GHz | 60.0 | 80.0 | Class A |
| Above 1 GHz | 54.0 | 74.0 | Class B |

## 2.3 Radiated Emission

The initial preliminary exploratory scans were performed over the measuring frequency range (30 ㎒ to 1 ㎓) using a max hold mode incorporating a Peak detector by using the EMI measuring software. The final test data was measured using a Quasi-Peak detector below 1 ㎓, Peak and CISPR-Average detector above 1 ㎓. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

Note. Measuring software
-Giheung 1Lab. : EMC32(V9.26.01) from R&S
-Giheung 2Lab. : EMC32(V10.40.10) from R&S

### 2.3.1 Test Equipments

| Equipment | Model | Manufacturer | Serial No | Cal Due. Date |
|---|---|---|---|---|
| EMI TEST RECEIVER | ESU40 | R&S | 100075 | 2021.08.18 |
| Hybrid ANTENNA | VULB 9163 | SCHWARZBECK | 9163-390 | 2022.02.15 |
| Double Ridged Horn Antenna | HF907 | R&S | 102578 | 2022.04.15 |
| AMPLIFIER | 8447D | HP | 2727A05297 | 2021.07.10 |
| Microwave Preamplifier | PAM-118A | Com-Power | 551074 | 2021.10.13 |

### 2.3.2 Test Site

3m SEMI-ANECHOIC CHAMBER in Giheung 2 Laboratory

### 2.3.3 Environment Conditions

**① Below 1 ㎓**

| | |
|---|---|
| Temperature | (Minimum 19.0, Maximum 20.0)℃ |
| Humidity | (Minimum 43.0, Maximum 44.0)％R.H.. |
| Atmospheric Pressure | (Minimum 100.2, Maximum 100.2)㎪ |
| Test Date | May 26, 2021 |

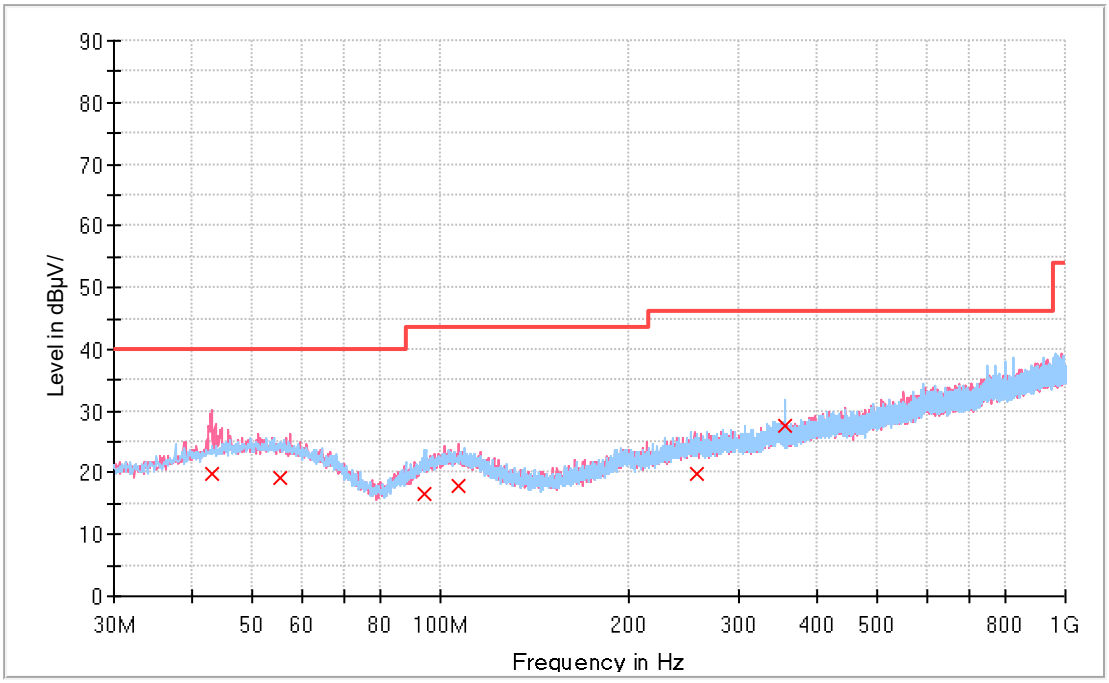
**② Above 1 ㎓**

| | |
|---|---|
| Temperature | (Minimum 20.8, Maximum 20.9)℃ |
| Humidity | (Minimum 37.0, Maximum 38.0)％R.H.. |
| Atmospheric Pressure | (Minimum 99.7, Maximum 99.7)㎪ |
| Test Date | May 31, 2021 |

### 2.3.4 Test Results

#### ① Below 1 ㎓ (3 m method)

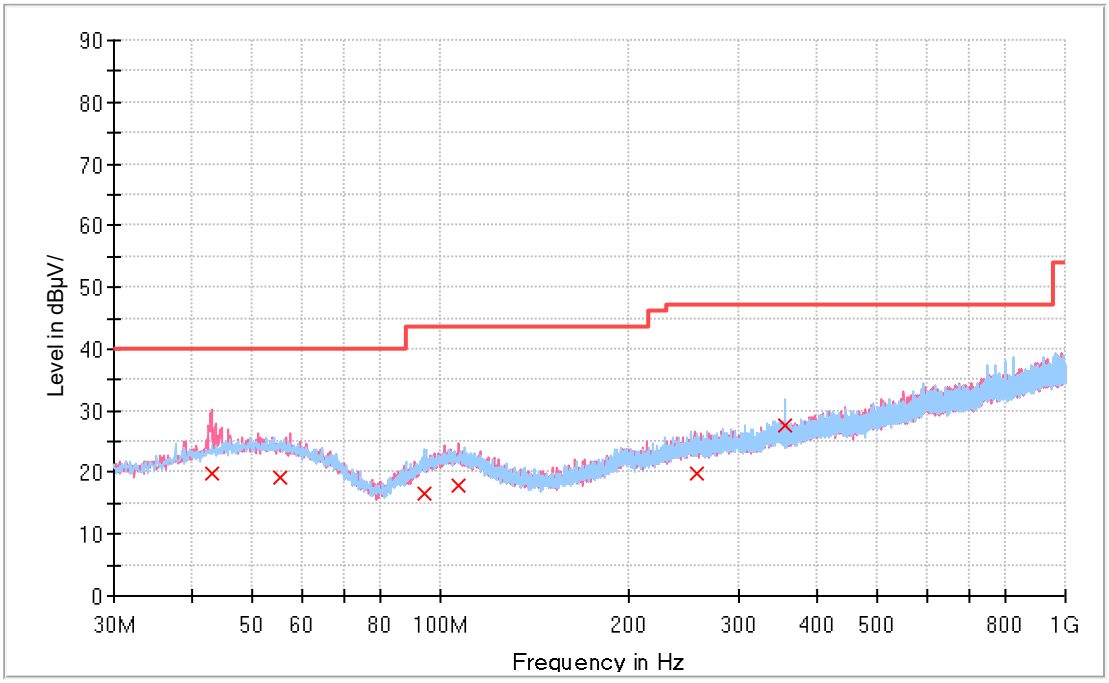
[ FCC Part 15 Subpart B ]




Final Result

| Frequency (㎒) | QuasiPeak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (㎳) | Bandwidth (㎑) | Height (㎝) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 42.998 | 19.78 | 40.00 | 20.22 | 15 000.0 | 120.000 | 132.0 | V | 69.0 | -2.5 |
| 55.317 | 19.33 | 40.00 | 20.67 | 15 000.0 | 120.000 | 358.0 | H | 340.0 | -2.0 |
| 94.214 | 16.68 | 43.50 | 26.82 | 15 000.0 | 120.000 | 220.0 | H | 272.0 | -4.5 |
| 106.630 | 17.90 | 43.50 | 25.60 | 15 000.0 | 120.000 | 330.0 | V | 165.0 | -3.3 |
| 257.562 | 19.88 | 46.00 | 26.12 | 15 000.0 | 120.000 | 400.0 | H | 44.0 | -1.2 |
| 356.308 | 27.52 | 46.00 | 18.48 | 15 000.0 | 120.000 | 110.0 | H | 358.0 | 0.4 |

[ ICES-003 Issue 7 : 2020 ]




Final Result

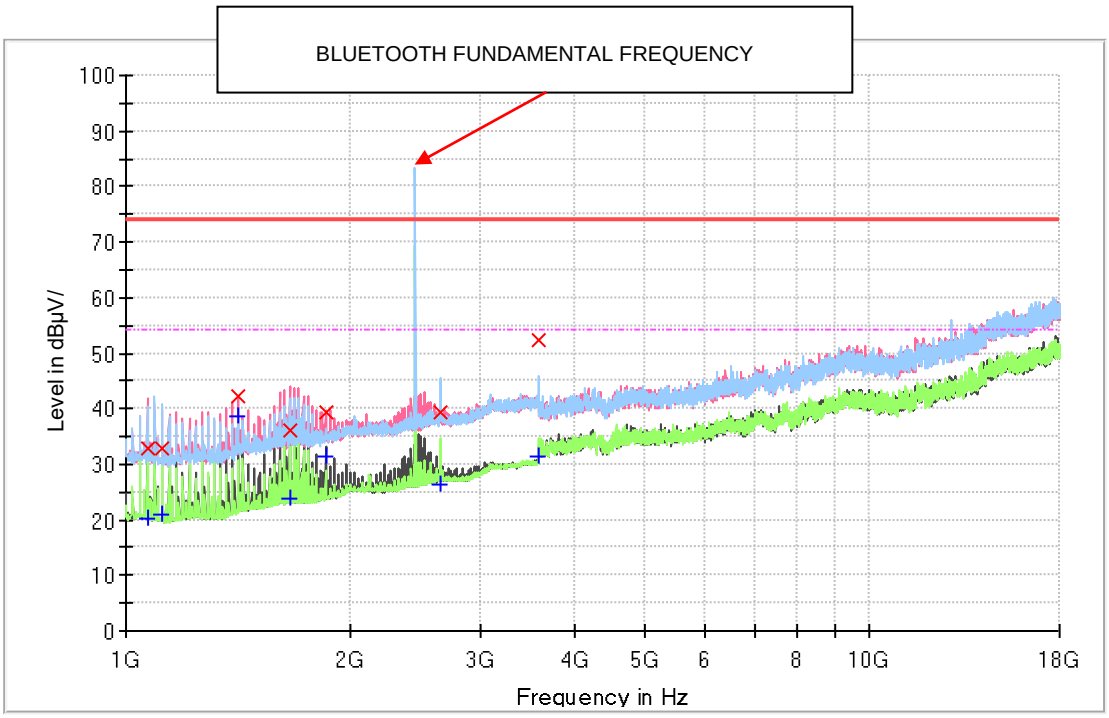
| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 42.998 | 19.78 | 40.00 | 20.22 | 15 000.0 | 120.000 | 132.0 | V | 69.0 | -2.5 |
| 55.317 | 19.33 | 40.00 | 20.67 | 15 000.0 | 120.000 | 358.0 | H | 340.0 | -2.0 |
| 94.214 | 16.68 | 43.50 | 26.82 | 15 000.0 | 120.000 | 220.0 | H | 272.0 | -4.5 |
| 106.630 | 17.90 | 43.50 | 25.60 | 15 000.0 | 120.000 | 330.0 | V | 165.0 | -3.3 |
| 257.562 | 19.88 | 47.00 | 27.12 | 15 000.0 | 120.000 | 400.0 | H | 44.0 | -1.2 |
| 356.308 | 27.52 | 47.00 | 19.48 | 15 000.0 | 120.000 | 110.0 | H | 358.0 | 0.4 |

Measurement Uncertainty : See Appendix A

Note : • POL H = Horizontal • POL V = Vertical
• Margin = Limit – Quasi Peak • Corr. = Antenna Factor + Cable loss – Amplifier Gain

Ex) In case
Freq ; 100 MHz, level ; 30 dB(µV/m), AF ; 10 dB/m, CL ; 4 dB, Amp ; 25 dB
Result = Level + AF + CL – Amp
= 30 + 10 + 4 - 25
= 19
Margin = Limit – Result
= 43.5 – 19
= 24.5

## ② Above 1 ㎓ (3 m method)




Final Result

| Frequency (㎒) | MaxPeak (dBμV/m) | CAverage (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (㎳) | Bandwidth (㎑) | Height (㎝) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 068.000 | 32.75 | --- | 74.00 | 41.25 | 15 000.0 | 1 000.000 | 100.0 | V | 0.0 | -13.7 |
| 1 068.000 | --- | 20.22 | 54.00 | 33.78 | 15 000.0 | 1 000.000 | 100.0 | V | 0.0 | -13.7 |
| 1 117.300 | --- | 21.04 | 54.00 | 32.96 | 15 000.0 | 1 000.000 | 100.0 | H | 188.0 | -14.1 |
| 1 117.300 | 32.72 | --- | 74.00 | 41.28 | 15 000.0 | 1 000.000 | 100.0 | H | 188.0 | -14.1 |
| 1 413.100 | --- | 38.75 | 54.00 | 15.25 | 15 000.0 | 1 000.000 | 100.0 | V | 169.0 | -12.9 |
| 1 413.100 | 42.29 | --- | 74.00 | 31.71 | 15 000.0 | 1 000.000 | 100.0 | V | 169.0 | -12.9 |
| 1 657.900 | 35.99 | --- | 74.00 | 38.01 | 15 000.0 | 1 000.000 | 100.0 | V | 64.0 | -11.3 |
| 1 657.900 | --- | 23.88 | 54.00 | 30.12 | 15 000.0 | 1 000.000 | 100.0 | V | 64.0 | -11.3 |
| 1 855.100 | 39.40 | --- | 74.00 | 34.60 | 15 000.0 | 1 000.000 | 100.0 | V | 135.0 | -10.7 |
| 1 855.100 | --- | 31.31 | 54.00 | 22.69 | 15 000.0 | 1 000.000 | 100.0 | V | 135.0 | -10.7 |
| 2 643.900 | 39.50 | --- | 74.00 | 34.50 | 15 000.0 | 1 000.000 | 200.0 | H | 142.0 | -7.8 |
| 2 643.900 | --- | 26.49 | 54.00 | 27.51 | 15 000.0 | 1 000.000 | 200.0 | H | 142.0 | -7.8 |
| 3 597.600 | --- | 31.26 | 54.00 | 22.74 | 15 000.0 | 1 000.000 | 100.0 | H | 21.0 | -4.8 |
| 3 597.600 | 52.22 | --- | 74.00 | 21.78 | 15 000.0 | 1 000.000 | 100.0 | H | 21.0 | -4.8 |

Measurement Uncertainty : See Appendix A

Note :
- AF = Antenna Factor
- CL = Cable Loss
- AMP = Amplifier Gain
- POL H = Horizontal
- POL V = Vertical
- A = Angle
- H = Height
- Distance = Distance Correction Factor
- Margin = Limit – Result
- Result = Level + AF + CL – AMP + Distance

## Appendix A : Measurement Uncertainty

**- Giheung 1 Laboratory**

| Test Method | | Measurement Uncertainty | |
|---|---|---|---|
| Conducted Emission | | ENV216 | 3.70 dB (The confidential level is 95 %, *k*=2) |
| | | ESH2-Z5 | 3.58 dB (The confidential level is 95 %, *k*=2) |
| | | ESH3-Z6 | 3.54 dB (The confidential level is 95 %, *k*=2) |
| Conducted Emission - Signal | | ISN T800 | 5.12 dB (The confidential level is 95 %, *k*=2) |
| | | ISNT8-Cat6 | 5.14 dB (The confidential level is 95 %, *k*=2) |
| | | ISN S751 | 5.20 dB (The confidential level is 95 %, *k*=2) |
| Radiated Emission | 9 kHz ~30 MHz (3m chamber) | Horizontal | 3.64 dB (The confidential level is 95 %, *k*=2) |
| | | Vertical | 3.64 dB (The confidential level is 95 %, *k*=2) |
| | 30 MHz ~ 1 000 MHz (10m chamber) | Horizontal | 4.26 dB (The confidential level is 95 %, *k*=2) |
| | | Vertical | 4.39 dB (The confidential level is 95 %, *k*=2) |
| | 1 GHz ~ 18 GHz (3m chamber) | Horizontal | 3.59 dB (The confidential level is 95 %, *k*=2) |
| | | Vertical | 3.59 dB (The confidential level is 95 %, *k*=2) |
| Radiated Immunity Test | | 0.86 dB (The confidential level is 95 %, *k*=2) | |
| Conducted Immunity Test | | 2.23 dB (The confidential level is 95 %, *k*=2) | |
| Magnetic Field | | 5.78 dB (The confidential level is 95 %, *k*=2) | |

**- Giheung 2 Laboratory**

| Test Method | | Measurement Uncertainty | |
|---|---|---|---|
| Conducted Emission | | ENV216 | 3.54 dB (The confidential level is 95 %, *k*=2) |
| | | ESH2-Z5 | 3.53 dB (The confidential level is 95 %, *k*=2) |
| | | ESH3-Z6 | 3.49 dB (The confidential level is 95 %, *k*=2) |
| Conducted Emission - Signal | | ISN T800 | 5.03 dB (The confidential level is 95 %, *k*=2) |
| | | ISNT8-Cat6 | 5.15 dB (The confidential level is 95 %, *k*=2) |
| | | ISN S751 | 5.15 dB (The confidential level is 95 %, *k*=2) |
| Discontinuous | | 3.02 dB (The confidential level is 95 %, *k*=2) | |
| Disturbance Power | | 3.66 dB (The confidential level is 95 %, *k*=2) | |
| Radiated Emission | 9 kHz ~30 MHz (3m chamber) | Horizontal | 3.84 dB (The confidential level is 95 %, *k*=2) |
| | | Vertical | 3.84 dB (The confidential level is 95 %, *k*=2) |
| | 30 MHz ~ 1 000 MHz (10m chamber) | Horizontal | 5.18 dB (The confidential level is 95 %, *k*=2) |
| | | Vertical | 5.32 dB (The confidential level is 95 %, *k*=2) |
| | 1 GHz ~ 18 GHz (3m chamber) | Horizontal | 3.62 dB (The confidential level is 95 %, *k*=2) |
| | | Vertical | 3.67 dB (The confidential level is 95 %, *k*=2) |
| Radiated Immunity Test | | 1.47 dB (The confidential level is 95 %, *k*=2) | |
| Conducted Immunity Test | | 2.23 dB (The confidential level is 95 %, *k*=2) | |
| Magnetic Field | | 5.78 dB (The confidential level is 95 %, *k*=2) | |

**- End of Test Report -**