

# TEST REPORT

Report number : Z101C-15142

Issue date : December 29, 2015

The device, as described herewith, was tested pursuant to applicable test procedure and complies with the requirements of;

## FCC Part15 Subpart C

The test results are traceable to the international or national standards.

Applicant : KYOCERA Corporation

Equipment under test (EUT) : Mobile Phone

Model number : KA73

FCC ID : JOYKA73

Date of test : November 12, 13, 17, 19, December 16, 2015

Test place : TÜV SÜD Zacta Ltd. Yonezawa Testing Center  
4149-7 Hachimanpara 5-chome  
Yonezawa-shi Yamagata 992-1128 Japan  
Phone: +81-238-28-2880 Fax: +81-238-28-2888

Test results : Complied

The results in this report are applicable only to the equipment tested.

This report shall not be re-produced except in full without the written approval of TÜV SÜD Zacta Ltd.

This test report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Tested by : Taiki Watanabe  
Taiki Watanabe

Tested by : Hikaru Shibata  
Hikaru Shibata

Authorized by : Hiroaki Suzuki  
Hiroaki Suzuki  
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|                                                    |           |
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## 1. Summary of Test

### 1.1 Purpose of test

It is the original test in order to verify conformance to FCC Part 15 Subpart C.

### 1.2 Standards

CFR47 FCC Part 15 Subpart C

#### 1.2.1 Test Methods

ANSI C63.10-2009, KDB558074 D01 DTS Meas Guidance v03r03

#### 1.2.2 Deviation from standards

None

### 1.3 List of applied test to the EUT

| Test items<br>Section         | Test items                                     | Condition             | Result |
|-------------------------------|------------------------------------------------|-----------------------|--------|
| 15.247(a)(2)                  | 6dB Bandwidth                                  | Conducted             | PASS   |
| 15.247(b)(3)                  | Maximum Peak Output Power                      | Conducted             | PASS   |
| 15.247(d)                     | Band Edge Compliance of RF Conducted Emissions | Conducted             | PASS   |
| 15.247(d)<br>15.205<br>15.209 | Spurious Emissions                             | Conducted<br>Radiated | PASS   |
| 15.247(d)<br>15.205<br>15.209 | Restricted Bands of Operation                  | Radiated              | PASS   |
| 15.247(e)                     | Transmitter Power Spectral Density             | Conducted             | PASS   |
| 15.207                        | AC Power Line Conducted Emissions              | Conducted             | PASS   |

#### 1.3.1 Test set up

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### 1.4 Modification to the EUT by laboratory

None

## ***2. Equipment Under Test***

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### **2.1 General Description of equipment**

EUT is the Mobile Phone.

### **2.2 EUT information**

|                                 |   |                                                                                                                                                   |
|---------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant                       | : | KYOCERA Corporation<br>Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa,<br>Japan<br>Phone: +81-45-943-6253 Fax: +81-45-943-6314 |
| Equipment under test            | : | Mobile Phone                                                                                                                                      |
| Trade name                      | : | Kyocera                                                                                                                                           |
| Model number                    | : | KA73                                                                                                                                              |
| Serial number                   | : | N/A                                                                                                                                               |
| EUT condition                   | : | Pre-Production                                                                                                                                    |
| Power ratings                   | : | Battery: DC 3.8V                                                                                                                                  |
| Size                            | : | (W) 51.3 × (D) 113.8 × (H) 18.2 mm                                                                                                                |
| Environment                     | : | Indoor and Outdoor use                                                                                                                            |
| Terminal limitation             | : | -20°C to 60°C                                                                                                                                     |
| RF Specification<br>Protocol    | : | Bluetooth 4.1 + EDR                                                                                                                               |
| Frequency range                 | : | 2402MHz-2480MHz                                                                                                                                   |
| Number of RF<br>Channels        | : | 40 Channels                                                                                                                                       |
| Modulation method/<br>Data rate | : | GFSK (1Mbps)                                                                                                                                      |
| Channel separation              | : | 2MHz                                                                                                                                              |
| Output power                    | : | 1.585mW                                                                                                                                           |
| Antenna type                    | : | Internal antenna                                                                                                                                  |
| Antenna gain                    | : | 2.8dBi                                                                                                                                            |

### 2.3 Variation of the family model(s)

Not applicable

### 2.4 Operating channels and frequencies

| Channel | Frequency [MHz] | Channel | Frequency [MHz] |
|---------|-----------------|---------|-----------------|
| 0       | 2402            | 20      | 2442            |
| 1       | 2404            | 21      | 2444            |
| 2       | 2406            | 22      | 2446            |
| 3       | 2408            | 23      | 2448            |
| 4       | 2410            | 24      | 2450            |
| 5       | 2412            | 25      | 2452            |
| 6       | 2414            | 26      | 2454            |
| 7       | 2416            | 27      | 2456            |
| 8       | 2418            | 28      | 2458            |
| 9       | 2420            | 29      | 2460            |
| 10      | 2422            | 30      | 2462            |
| 11      | 2424            | 31      | 2464            |
| 12      | 2426            | 32      | 2466            |
| 13      | 2428            | 33      | 2468            |
| 14      | 2430            | 34      | 2470            |
| 15      | 2432            | 35      | 2472            |
| 16      | 2434            | 36      | 2474            |
| 17      | 2436            | 37      | 2476            |
| 18      | 2438            | 38      | 2478            |
| 19      | 2440            | 39      | 2480            |

### 2.5 Operating mode

The EUT had been tested under operating condition.

There are three channels have been tested as following:

| Tested Channel | Frequency [MHz] |
|----------------|-----------------|
| Low            | 2402            |
| Middle         | 2440            |
| High           | 2480            |

The pre-test has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

| Tested Channel    | Modulation Type | Data Rate |
|-------------------|-----------------|-----------|
| Low, Middle, High | GFSK            | 1Mbps     |

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.

The worst emission was found in X axis and the worst case recorded.

## 2.6 Operating flow

### [Tx mode]

- i) Test program setup to the DM tool
- ii) Select a Test mode  
Operating frequency: Channel Low: 2402MHz, Channel Middle: 2440MHz, Channel High: 2480MHz
- iii) Start test mode

### [Rx mode]

- i) Test program setup to the DM tool
- ii) Select a Test mode  
Operating frequency: Channel Low: 2402MHz, Channel Middle: 2440MHz, Channel High: 2480MHz
- iii) Start test mode

### 3. Configuration of equipment

#### 3.1 Equipment(s) used

| No. | Equipment    | Company | Model No. | Serial No. | FCC ID / DoC | Comment |
|-----|--------------|---------|-----------|------------|--------------|---------|
| 1   | Mobile Phone | KYOCERA | KA73      | N/A        | JOYKA73      | EUT     |
| 2   | AC Adapter   | au      | N/A       | N/A        | N/A          | *       |

\*: AC power line Conducted Emission Test.

#### 3.2 Cable(s) used

| No. | Cable                           | Length[m] | Shield | Connector | Comment |
|-----|---------------------------------|-----------|--------|-----------|---------|
| a   | Micro USB cable(for AC Adapter) | 1.0       | Yes    | Metal     | *       |

\*: AC power line Conducted Emission Test.

#### 3.3 System configuration



Note1: Numbers assigned to equipment or cables on this diagram correspond to the list in "3.1 Equipment(s) used" and "3.2 Cable(s) used".

## 4. 6dB Bandwidth

### 4.1 Measurement procedure

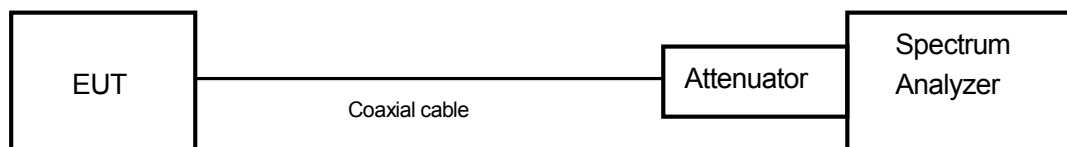
[FCC 15.247(a)(2), KDB558074 D01 v0303, Section 8.2]

The bandwidth at 6dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- a) RBW = 100kHz.
- b) VBW  $\geq 3 \times$  RBW.
- c) Sweep time = auto-couple.
- d) Detector = peak.
- e) Trace mode = max hold.

- Test configuration



### 4.2 Limit

The minimum permissible 6dB bandwidth is 500kHz.

### 4.3 Measurement result

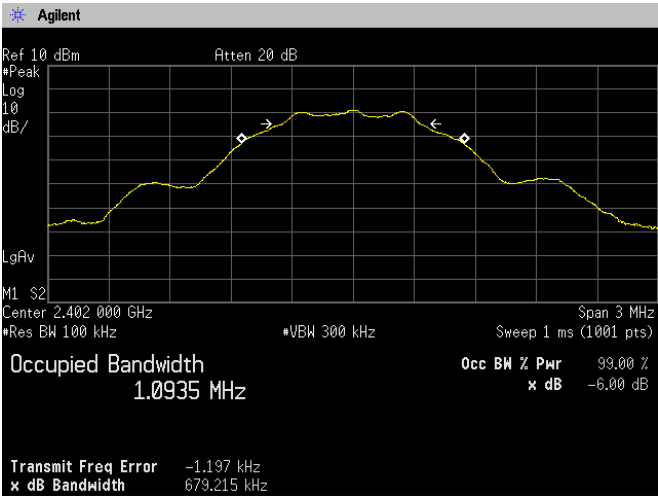
Date : November 12, 2015  
 Temperature : 23.6 [°C]  
 Humidity : 46.2 [%]  
 Test place : Shielded room No.4

Test engineer : Hikaru Shibata

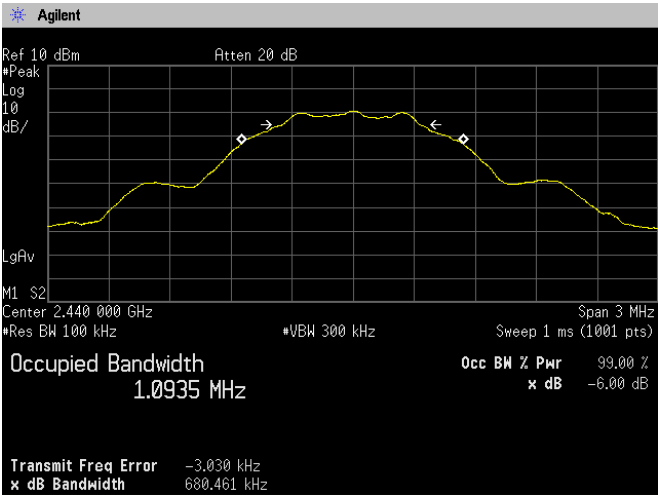
| Channel | Frequency [MHz] | 6dB bandwidth [MHz] |
|---------|-----------------|---------------------|
| Low     | 2402            | 0.679               |
| Middle  | 2440            | 0.680               |
| High    | 2480            | 0.681               |

#### 4.4 Trace data

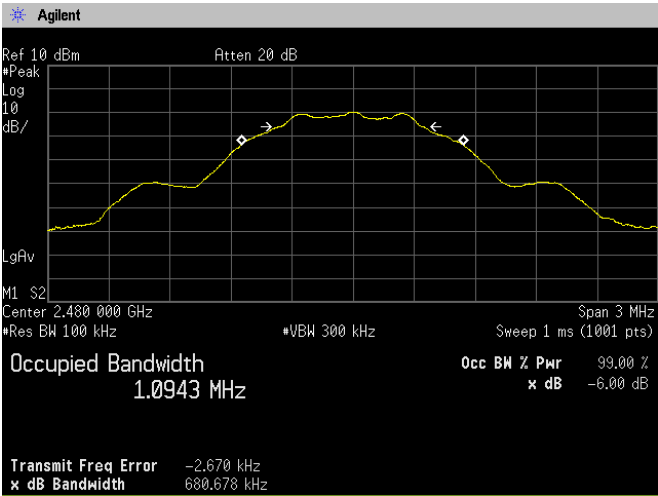
##### Channel Low



##### Channel Middle



##### Channel High



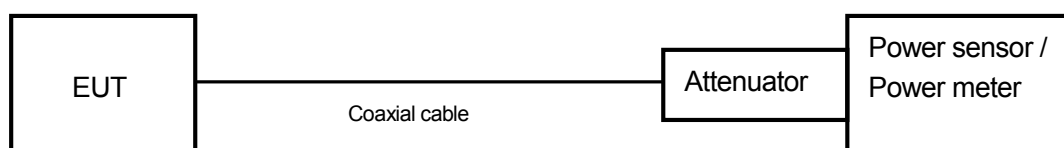
## 5. Maximum Peak Output Power

### 5.1 Measurement procedure

[FCC 15.247(b)(3), KDB558074 D01 v03r03, Section 9.1.2]

The peak power is measured with a power sensor connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

- Test configuration



### 5.2 Limit

1W (1000mW) or less

### 5.3 Measurement result

Date : November 13, 2015  
 Temperature : 23.6 [°C]  
 Humidity : 47.4 [%]  
 Test place : Shielded room No.4

Test engineer : Hikaru Shibata

### Battery Full

| Channel | Center Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Peak Output Power (mW) | Limit (mW) | Result |
|---------|------------------------|---------------|-------------|-------------|------------------------|------------|--------|
| Low     | 2402.00                | -8.51         | 10.51       | 2.00        | 1.585                  | ≤1000      | PASS   |
| Middle  | 2441.00                | -8.91         | 10.51       | 1.60        | 1.445                  | ≤1000      | PASS   |
| High    | 2480.00                | -9.34         | 10.51       | 1.17        | 1.309                  | ≤1000      | PASS   |

Calculation;

Reading (dBm) + Factor (dB) = Level (dBm)

$10\log P = \text{Level (dBm)}$

$P = 10^{(\text{Maximum Peak Output Power} / 10)} \text{ (mW)}$

## 6. Band Edge Compliance of RF Conducted Emissions

### 6.1 Measurement procedure

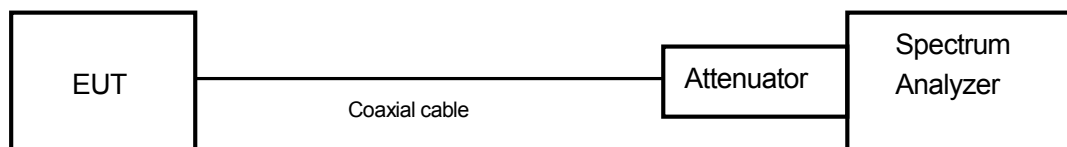
[FCC 15.247(d), KDB558074 D01 v03r03, Section 11.0]

The Band Edge is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- a) Span = Arbitrary setting. (Setting suitable for measurement.)
- b) RBW  $\geq$  1% of the span
- c) VBW  $\geq$  RBW
- d) Sweep time = auto-couple.
- e) Detector = peak.
- f) Trace mode = max hold.

- Test configuration



### 6.2 Limit

In any 100kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

### 6.3 Measurement result

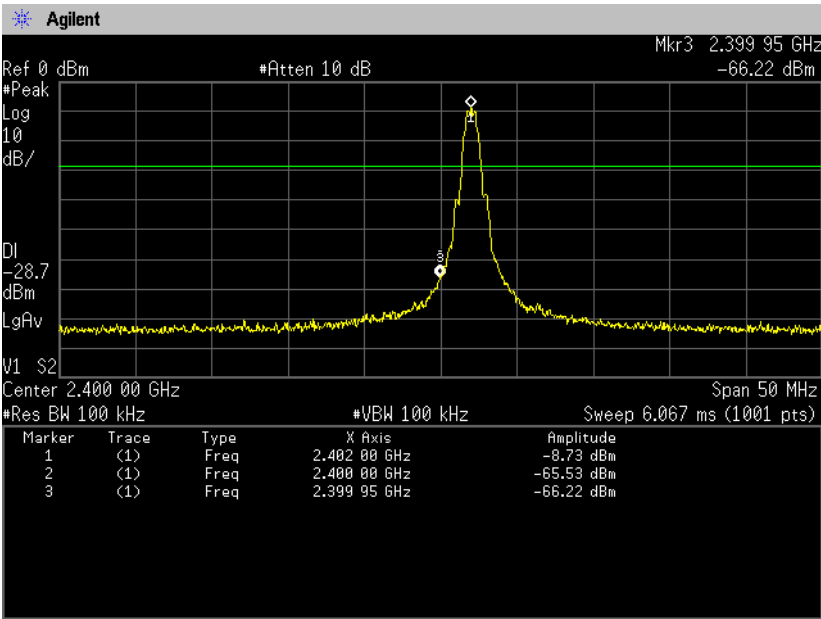
Date : November 12, 2015  
 Temperature : 23.6 [°C]  
 Humidity : 46.2 [%]  
 Test place : Shielded room No.4

Test engineer :  
 Hikaru Shibata

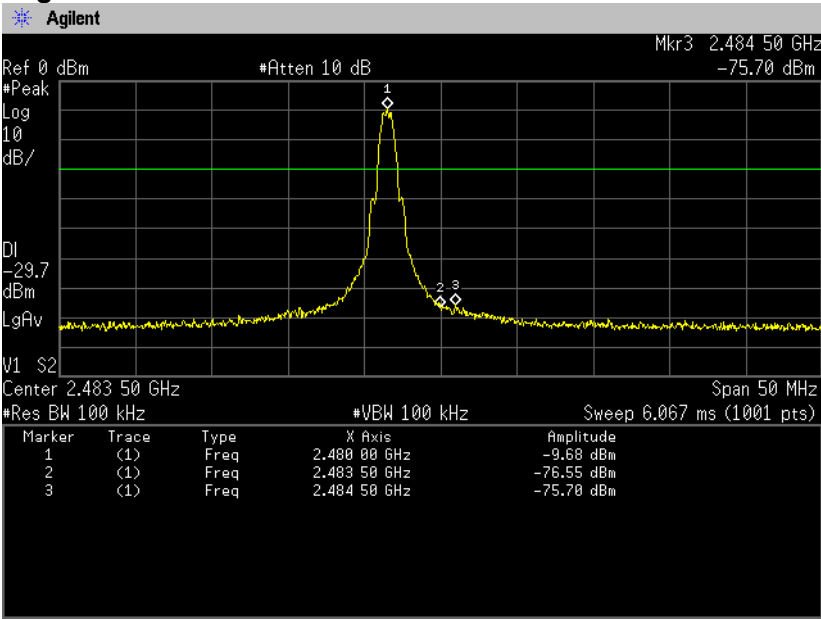
| Channel | Frequency (MHz) | RF Power Level (dBm) | Band-edge Frequency (MHz) | Band-edge Level (dBm) | Difference Level (dBm) | Limit (dBm)                         | Result |
|---------|-----------------|----------------------|---------------------------|-----------------------|------------------------|-------------------------------------|--------|
| Low     | 2402.00         | -8.73                | 2400.00                   | -65.53                | 56.80                  | At least 20dB below from peak of RF | PASS   |
| High    | 2480.00         | -9.68                | 2484.50                   | -75.70                | 66.02                  | At least 20dB below from peak of RF | PASS   |

6.4 Trace data

Channel Low



Channel High



## 7. Spurious emissions - Conducted -

### 7.1 Measurement procedure

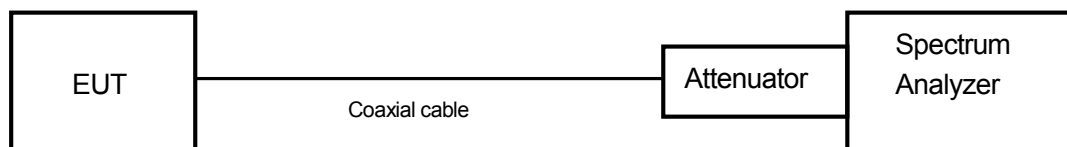
[FCC 15.247(d), KDB558074 D01 v03r03, Section 11.0]

The spurious emissions (Conducted) are measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- a) Span = wide enough to fully capture the emission being measured.
- b) RBW = 100 kHz.
- c) VBW  $\geq$  RBW.
- d) Sweep time = auto-couple.
- e) Detector = peak.
- f) Trace mode = max hold.

- Test configuration



### 7.2 Limit

In any 100kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

### 7.3 Measurement result

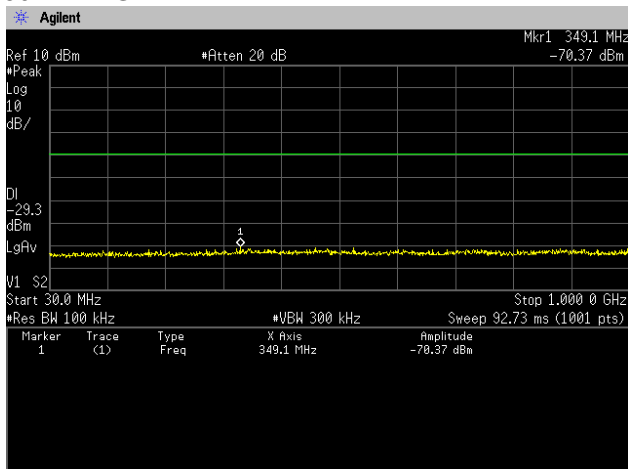
Date : November 12, 2015  
 Temperature : 23.6 [°C]  
 Humidity : 46.2 [%]  
 Test place : Shielded room No.4

Test engineer : Hikaru Shibata

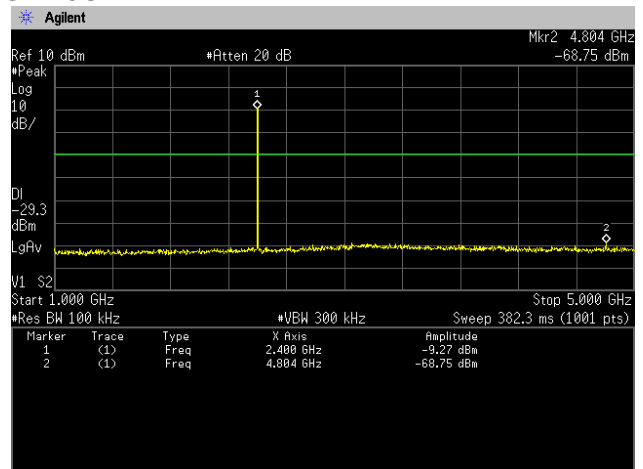
| Channel | Frequency [MHz] | Limit [dB]                          | Results Chart      | Result |
|---------|-----------------|-------------------------------------|--------------------|--------|
| Low     | 2402            | At least 20dB below from peak of RF | See the trace Data | PASS   |
| Middle  | 2440            | At least 20dB below from peak of RF | See the trace Data | PASS   |
| High    | 2480            | At least 20dB below from peak of RF | See the trace Data | PASS   |

## 7.4 Trace data

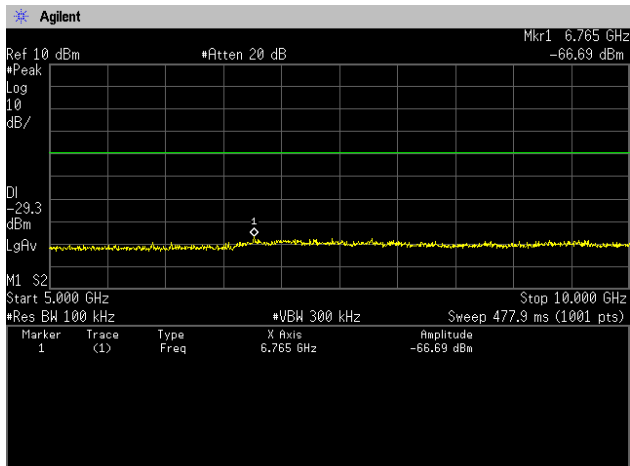
### Channel Low 30MHz-1GHz



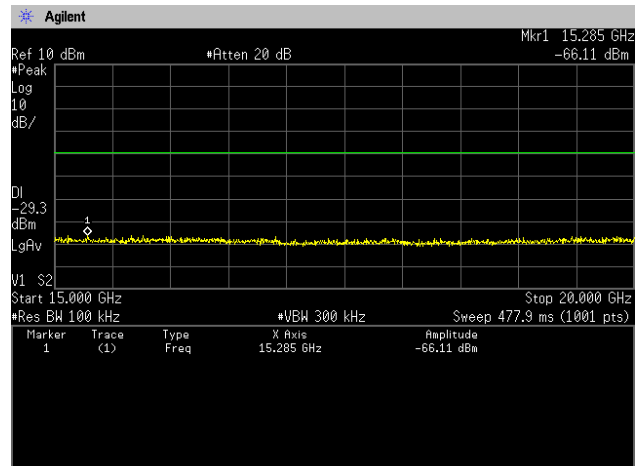
### 1GHz-5GHz



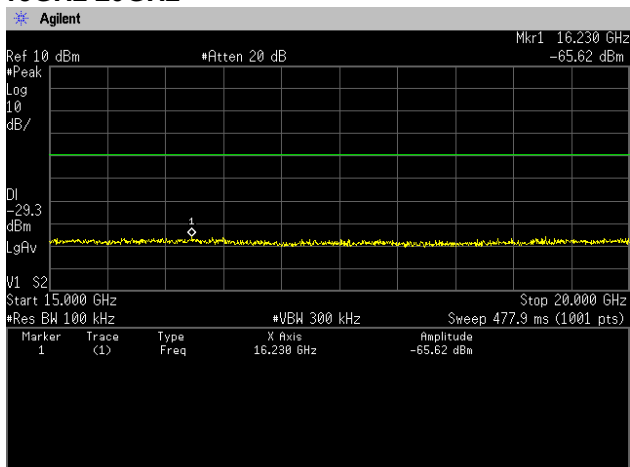
### 5GHz-10GHz



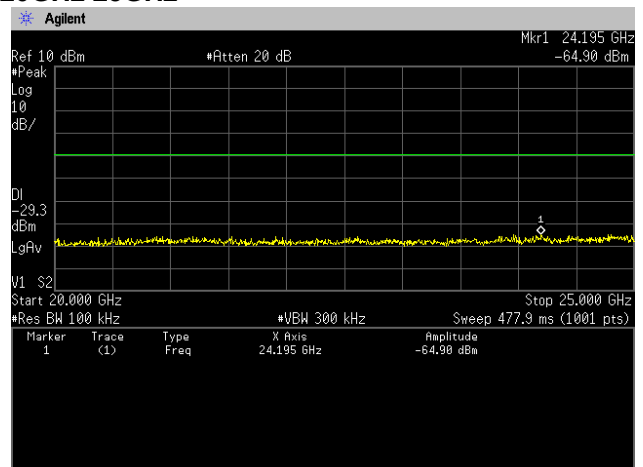
### 10GHz-15GHz



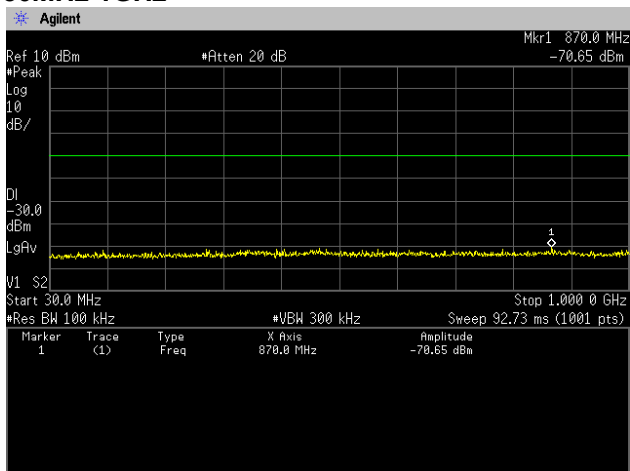
### 15GHz-20GHz



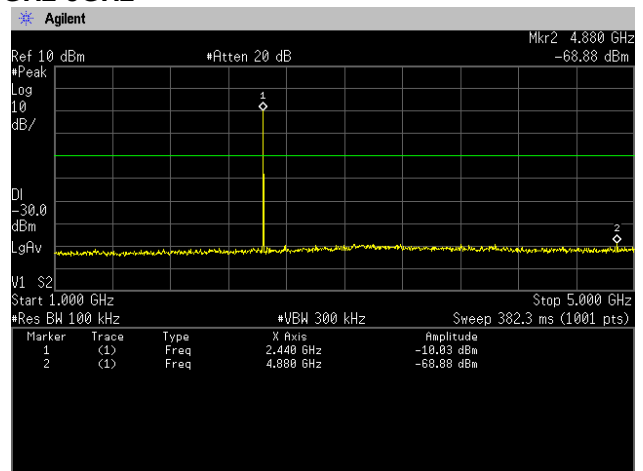
### 20GHz-25GHz



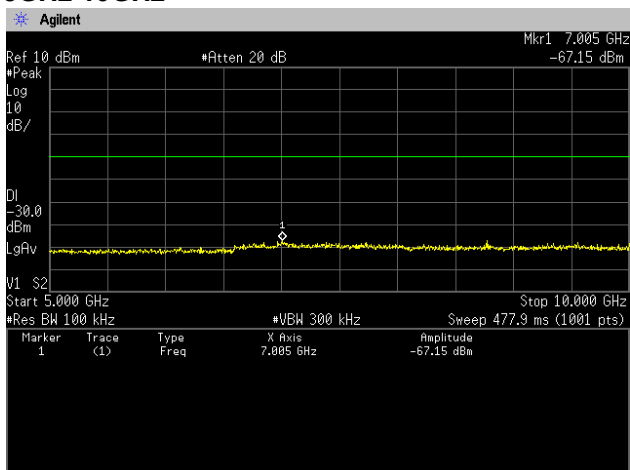
### Channel Middle 30MHz-1GHz



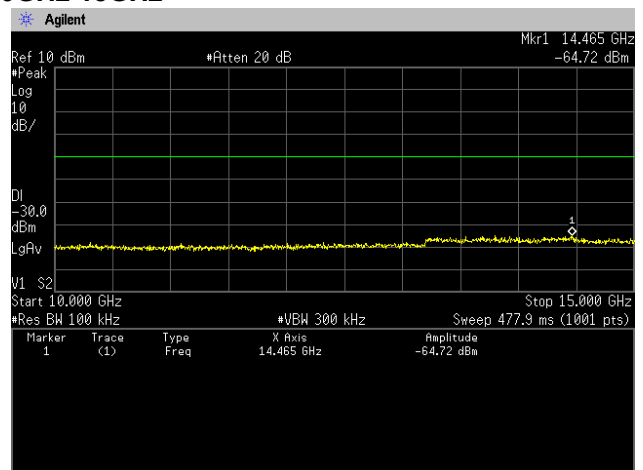
### 1GHz-5GHz



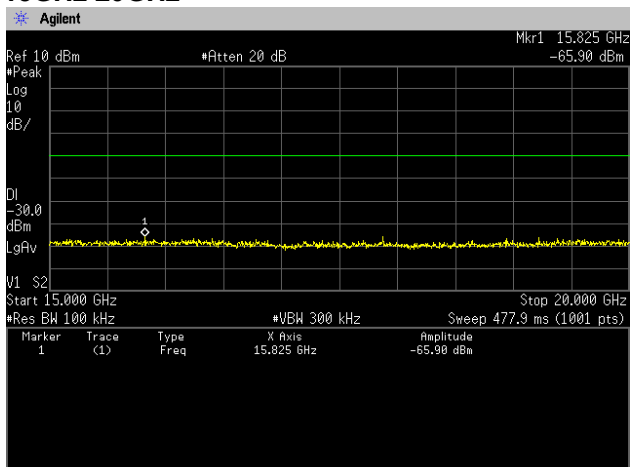
### 5GHz-10GHz



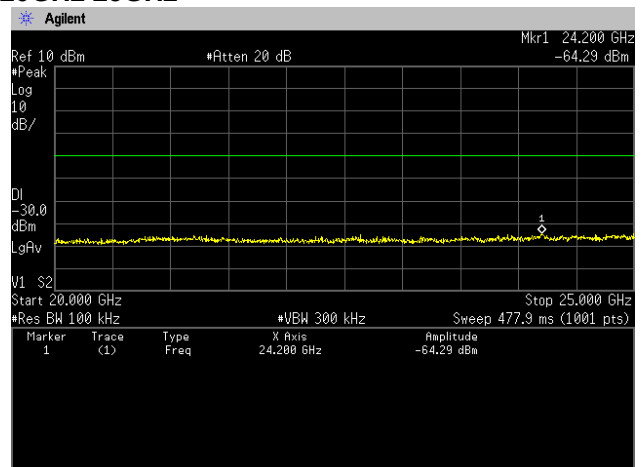
### 10GHz-15GHz



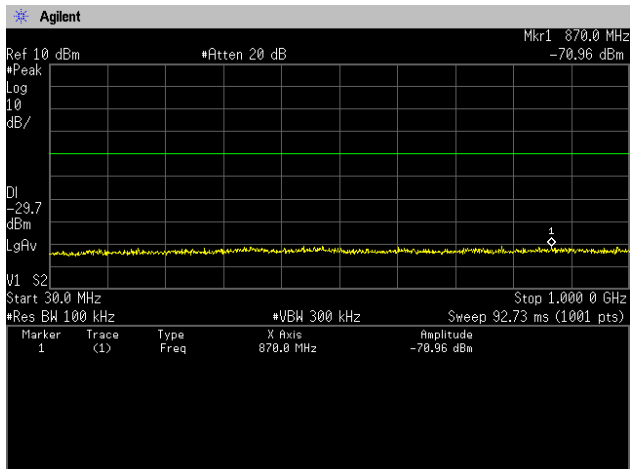
### 15GHz-20GHz



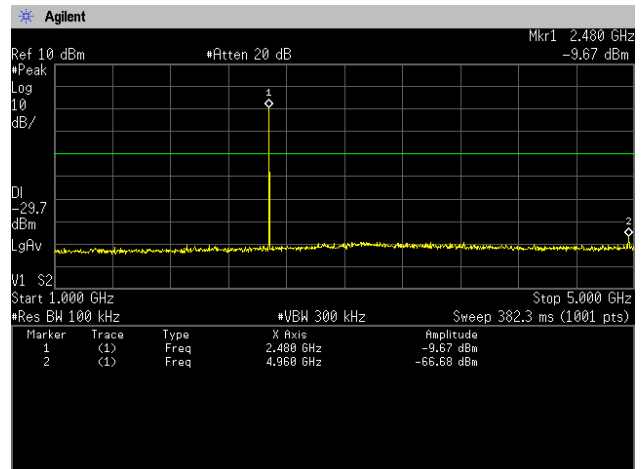
### 20GHz-25GHz



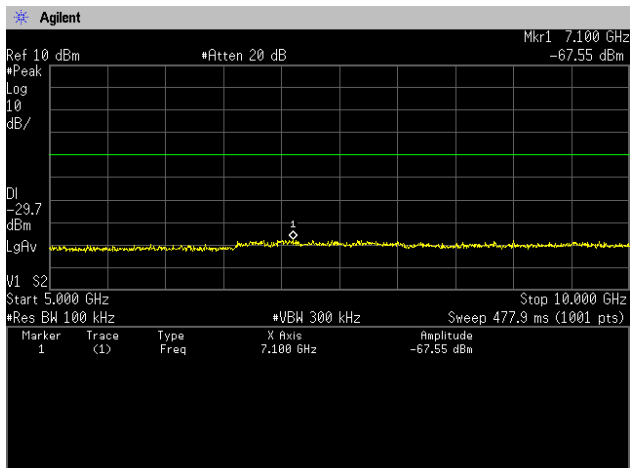
### Channel High 30MHz-1GHz



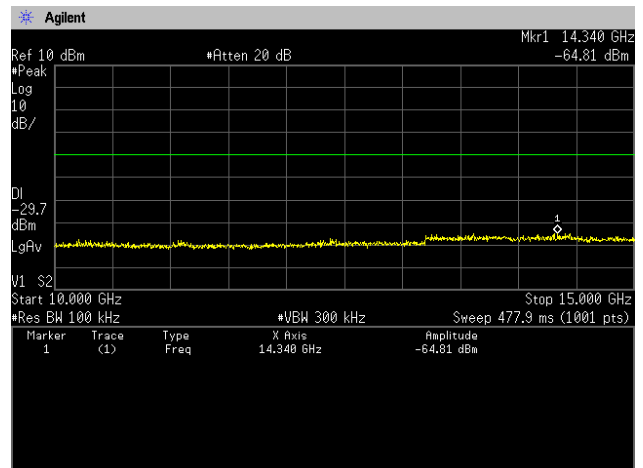
### 1GHz-5GHz



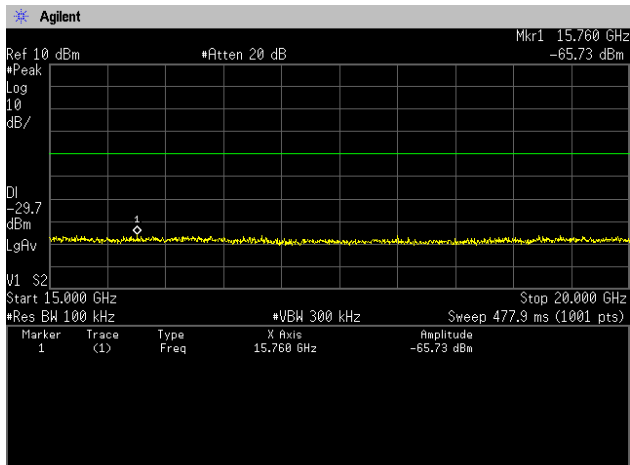
### 5GHz-10GHz



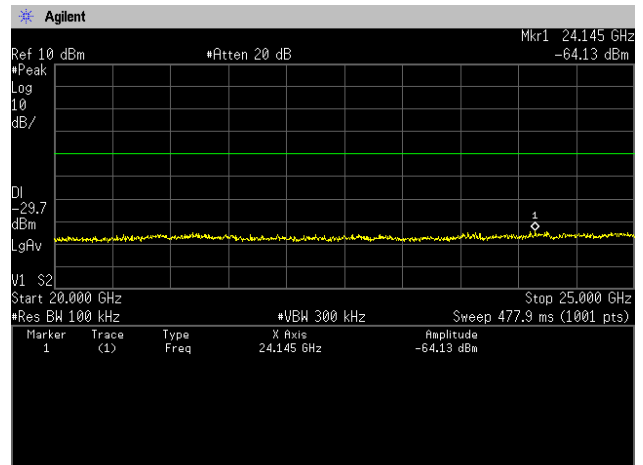
### 10GHz-15GHz



### 15GHz-20GHz



### 20GHz-25GHz



## 8. Spurious Emissions - Radiated -

### 8.1 Measurement procedure

[FCC 247(d), 15.205, 15.209, KDB 558074 D01 v03r03, Section 12.0]

Test was applied by following conditions.

|                           |                                                   |
|---------------------------|---------------------------------------------------|
| Test method               | : ANSI C63.10                                     |
| Frequency range           | : 9kHz to 25GHz                                   |
| Test place                | : 3m Semi-anechoic chamber                        |
| EUT was placed on         | : FRP table / (W)2.0m × (D)1.0m × (H)0.8m         |
| Antenna distance          | : 3m                                              |
| Test receiver setting     | Below 1GHz                                        |
| - Detector                | : Average (9kHz-90kHz, 110kHz-490kHz), Quasi-peak |
| - Bandwidth               | : 200Hz, 120kHz                                   |
| Spectrum analyzer setting | Above 1GHz                                        |
| - Peak                    | : RBW=1MHz, VBW=3MHz, Span=0Hz, Sweep=auto        |
| - Average                 | : RBW=1MHz, VBW=3kHz, Span=0Hz, Sweep=auto        |
|                           | Display mode=Linear                               |

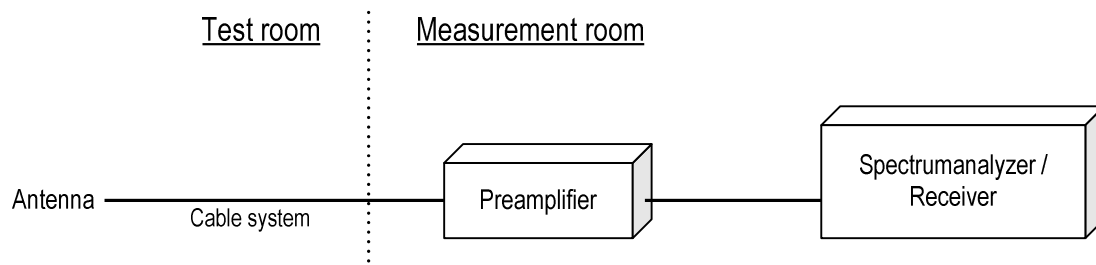
#### Average Measurement Setting [VBW]

| Mode             | Duty Cycle (%) | T <sub>on</sub> (us) | T <sub>off</sub> (us) | 1/T <sub>on</sub> (kHz) | Determined VBW Setting |
|------------------|----------------|----------------------|-----------------------|-------------------------|------------------------|
| Bluetooth 4.1 LE | 62.4           | 390                  | 235                   | 2.6                     | 3kHz                   |

Radiated emission measurements are performed at 3m distance with the broadband antenna (Loop antenna, Biconical antenna, Log periodic antenna, Double ridged guide antenna and Broad-band horn Antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission. As for the Loop antenna, it is positioned with its plane vertical, and the center of the Loop antenna is 1m above the ground plane.

The EUT is Placed on a turntable, which is 0.8m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

#### - Test configuration



## 8.2 Calculation method

[9kHz to 150kHz]

Emission level = Reading + (Ant. factor + Cable system loss )

Margin = Limit – Emission level

[150kHz to 25GHz]

Emission level = Reading + (Ant. factor + Cable system loss – Amp. Gain)

Margin = Limit – Emission level

## 8.3 Limit

| Frequency<br>[MHz] | Field strength  |               | Distance<br>[m] |
|--------------------|-----------------|---------------|-----------------|
|                    | [uV/m]          | [dBuV/m]      |                 |
| 0.009-0.490        | 2400 / F [kHz]  | 20logE [uV/m] | 300             |
| 0.490-1.705        | 24000 / F [kHz] | 20logE [uV/m] | 30              |
| 1.705-30           | 30              | 29.5          | 30              |
| 30-88              | 100             | 40.0          | 3               |
| 88-216             | 150             | 43.5          | 3               |
| 216-960            | 200             | 46.0          | 3               |
| Above 960          | 500             | 54.0          | 3               |

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level [dBuV/m] = 20log Emission [uV/m]
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition modulation.

## 8.4 Test data

Date : December 16, 2015  
 Temperature : 23.3 [°C]  
 Humidity : 21.5 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer : Hikaru Shibata

### Channel Low

| No. | Frequency (P) | Reading<br>PK | Reading<br>CAV | c. f      | Result<br>PK | Result<br>CAV | Limit<br>PK | Limit<br>AV | Margin<br>PK | Margin<br>CAV | Height | Angle |     |
|-----|---------------|---------------|----------------|-----------|--------------|---------------|-------------|-------------|--------------|---------------|--------|-------|-----|
|     | [MHz]         | [dB(μV)]      | [dB(μV)]       | [dB(1/m)] | [dB(μV/m)]   | [dB(μV/m)]    | [dB(μV/m)]  | [dB(μV/m)]  | [dB]         | [dB]          | [cm]   | [°]   |     |
| 1   | 4804.000      | H             | 48.8           | 36.2      | 8.3          | 57.1          | 44.5        | 74.0        | 54.0         | 16.9          | 9.5    | 100.0 | 0.0 |
| 2   | 4804.000      | V             | 48.5           | 36.4      | 8.3          | 56.8          | 44.7        | 74.0        | 54.0         | 17.2          | 9.3    | 100.0 | 0.0 |

### Channel Middle

| No. | Frequency (P) | Reading<br>PK | Reading<br>CAV | c. f      | Result<br>PK | Result<br>CAV | Limit<br>PK | Limit<br>AV | Margin<br>PK | Margin<br>CAV | Height | Angle |     |
|-----|---------------|---------------|----------------|-----------|--------------|---------------|-------------|-------------|--------------|---------------|--------|-------|-----|
|     | [MHz]         | [dB(μV)]      | [dB(μV)]       | [dB(1/m)] | [dB(μV/m)]   | [dB(μV/m)]    | [dB(μV/m)]  | [dB(μV/m)]  | [dB]         | [dB]          | [cm]   | [°]   |     |
| 1   | 4880.000      | H             | 48.9           | 36.3      | 8.7          | 57.6          | 45.0        | 74.0        | 54.0         | 16.4          | 9.0    | 100.0 | 0.0 |
| 2   | 4880.000      | V             | 48.5           | 36.5      | 8.7          | 57.2          | 45.2        | 74.0        | 54.0         | 16.8          | 8.8    | 100.0 | 0.0 |

### Channel High

| No. | Frequency (P) | Reading<br>PK | Reading<br>CAV | c. f      | Result<br>PK | Result<br>CAV | Limit<br>PK | Limit<br>AV | Margin<br>PK | Margin<br>CAV | Height | Angle |
|-----|---------------|---------------|----------------|-----------|--------------|---------------|-------------|-------------|--------------|---------------|--------|-------|
|     | [MHz]         | [dB(μV)]      | [dB(μV)]       | [dB(1/m)] | [dB(μV/m)]   | [dB(μV/m)]    | [dB(μV/m)]  | [dB(μV/m)]  | [dB]         | [dB]          | [cm]   | [°]   |
| 1   | 4960.000      | H             | 47.9           | 35.9      | 8.8          | 56.7          | 44.7        | 74.0        | 17.3         | 9.3           | 100.0  | 0.0   |
| 2   | 4960.000      | V             | 47.3           | 36.1      | 8.8          | 56.1          | 44.9        | 74.0        | 17.9         | 9.1           | 100.0  | 0.0   |

#### Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.
3. No emission was detected in the receive mode.

## 9. Restricted Band of Operation

### 9.1 Measurement procedure

[FCC 247(d), 15.205, 15.209, KDB 558074 D01 v03r03, Section 12.0]

Test was applied by following conditions.

Test method : ANSI C63.10  
 Test place : 3m Semi-anechoic chamber  
 EUT was placed on : FRP table / (W)2.0m × (D)1.0m × (H)0.8m  
 Antenna distance : 3m

Spectrum analyzer setting  
 - Peak : RBW=1MHz, VBW=3MHz, Span=Arbitrary setting, Sweep=auto  
 - Average : RBW=1MHz, VBW=3kHz, Span=Arbitrary setting, Sweep=auto  
 Display mode=Linear

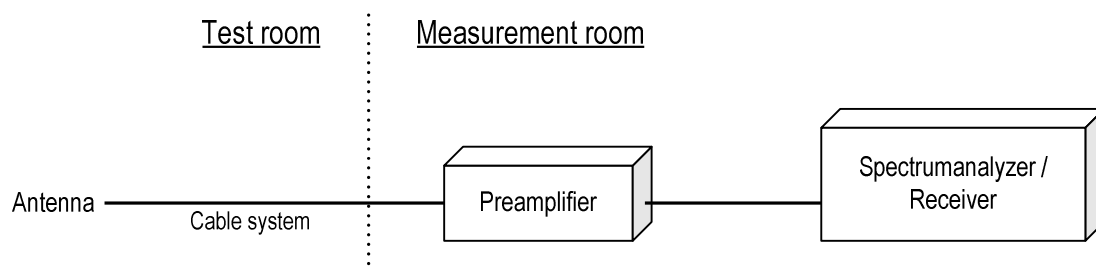
#### Average Measurement Setting [VBW]

| Mode             | Duty Cycle (%) | T <sub>on</sub> (us) | T <sub>off</sub> (us) | 1/T <sub>on</sub> (kHz) | Determined VBW Setting |
|------------------|----------------|----------------------|-----------------------|-------------------------|------------------------|
| Bluetooth 4.1 LE | 62.4           | 390                  | 235                   | 2.6                     | 3kHz                   |

Radiated emission measurements are performed at 3m distance with the broadband antenna (Double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission.

The EUT is Placed on a turntable, which is 0.8m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

#### - Test configuration



### 9.2 Limit

Emission at the boundary of the restricted band provided by 15.205 shall be lower than 15.209 limit.

### 9.3 Measurement Result

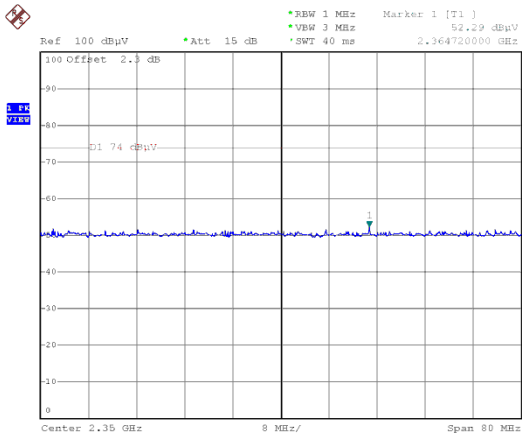
| Channel | Frequency [MHz] | Results Chart      | Result |
|---------|-----------------|--------------------|--------|
| Low     | 2402            | See the Trace Data | Pass   |
| High    | 2480            | See the Trace Data | Pass   |

### 9.4 Test data

Date : November 17, 2015  
Temperature : 23.4 [°C]  
Humidity : 42.4 [%]  
Test place : 3m Semi-anechoic chamber

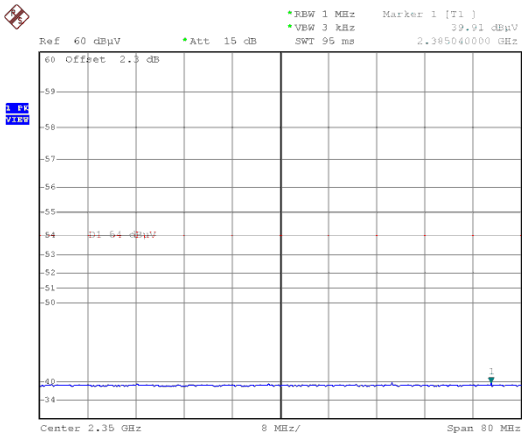
Test engineer : Taiki Watanabe

Channel Low  
Horizontal  
Peak



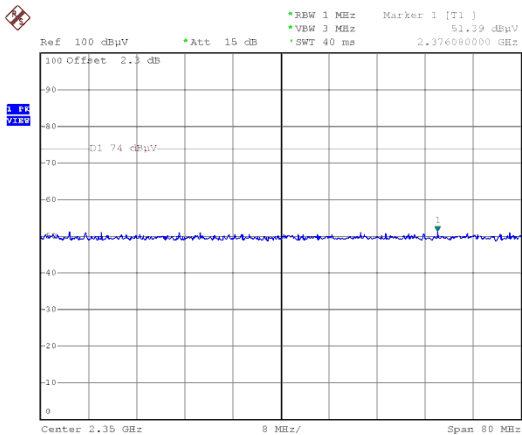
Date: 17.DEC.2015 21:01:32

Average



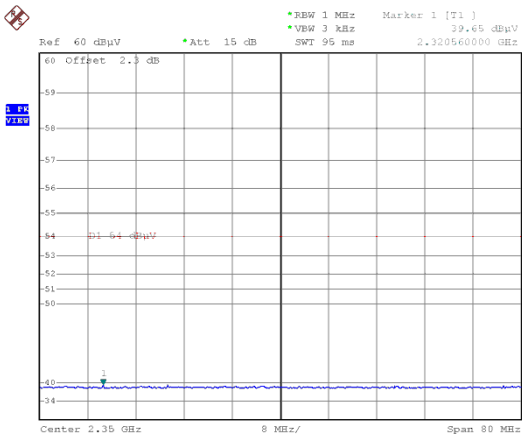
Date: 17.DEC.2015 21:00:32

Vertical  
Peak



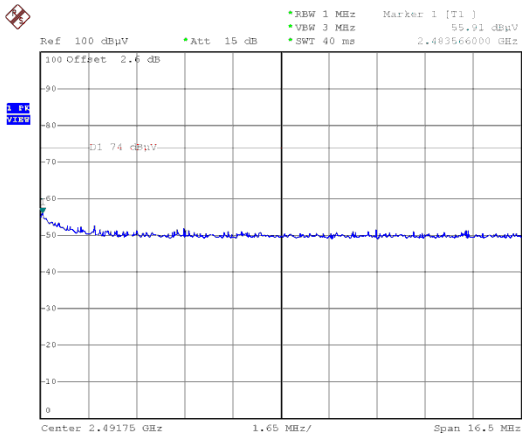
Date: 17.DEC.2015 21:07:10

Average



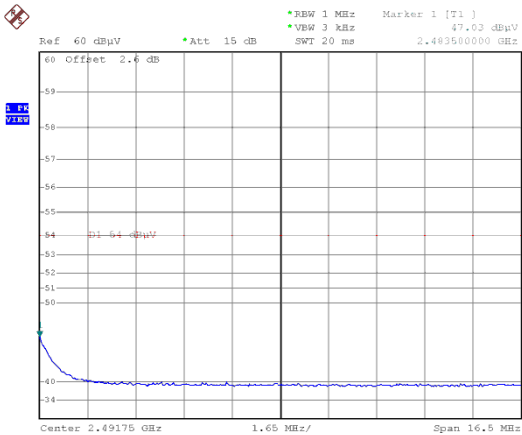
Date: 17.DEC.2015 21:06:34

Channel High  
Horizontal  
Peak



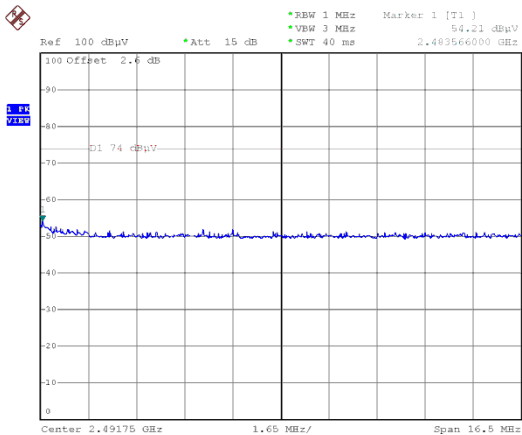
Date: 17.DEC.2015 21:26:36

Average



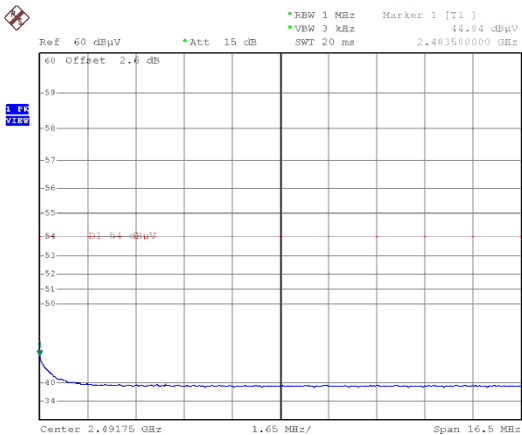
Date: 17.DEC.2015 21:27:17

Vertical  
Peak



Date: 17.DEC.2015 21:23:47

Average



Date: 17.DEC.2015 21:24:56

## 10. Transmitter Power Spectral Density

### 10.1 Measurement procedure

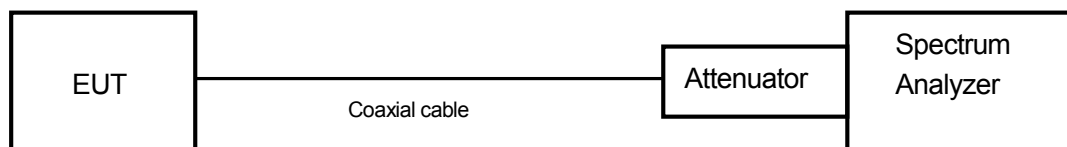
[FCC 15.247(e), KDB558074 D01 v03r03, Section 10.2]

The peak power is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- a) Span = 1.5 times the 6 dB bandwidth.
- b) RBW = 3kHz - 100kHz.
- c) VBW  $\geq 3 \times$  RBW.
- d) Sweep time = auto-couple.
- e) Detector = peak.
- f) Trace mode = max hold.

- Test configuration



### 10.2 Limit

The peak power spectral density shall not be greater than 8dBm in any 3kHz band.

### 10.3 Measurement result

Date : November 13, 2015  
 Temperature : 23.6 [°C]  
 Humidity : 47.4 [%]  
 Test place : Shielded room No.4

Test engineer : Hikaru Shibata

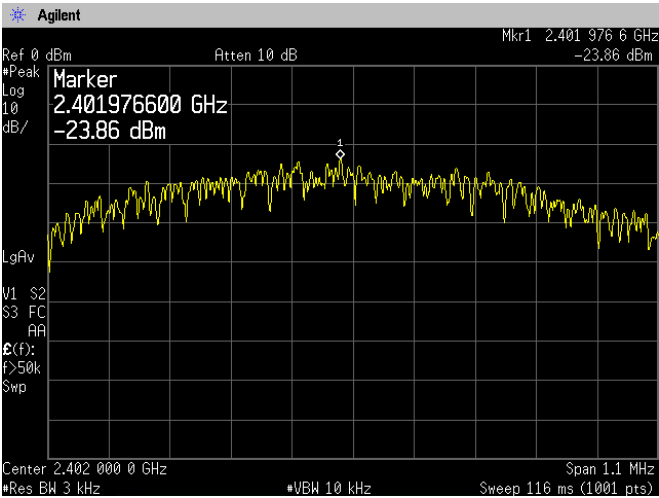
| Channel | Center Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dBm) | Result |
|---------|------------------------|---------------|-------------|-------------|-------------|--------------|--------|
| Low     | 2412.00                | -23.86        | 10.53       | -13.33      | 8.00        | 21.33        | PASS   |
| Middle  | 2440.00                | -24.28        | 10.53       | -13.75      | 8.00        | 21.75        | PASS   |
| High    | 2480.00                | -24.70        | 10.53       | -14.17      | 8.00        | 22.17        | PASS   |

Calculation;

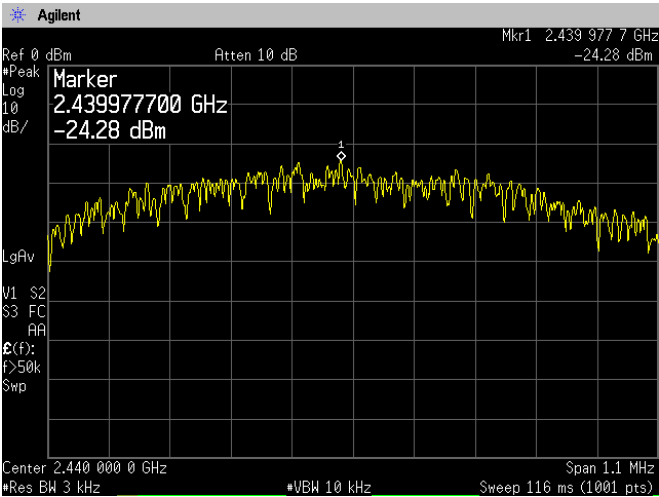
Transmitter Power Spectral Density Level (Margin) = Limit – (Reading + Factor)

10.4 Trace data

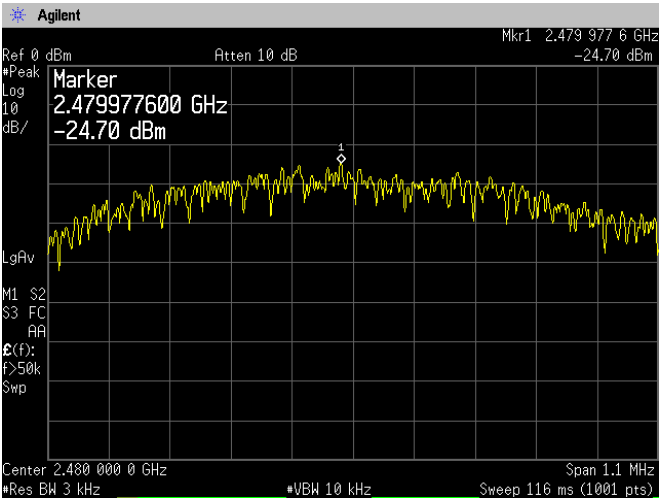
Channel Low



Channel Middle



Channel High



## 11. AC Power Line Conducted Emissions

### 11.1 Measurement procedure [FCC 15.207]

Test was applied by following conditions.

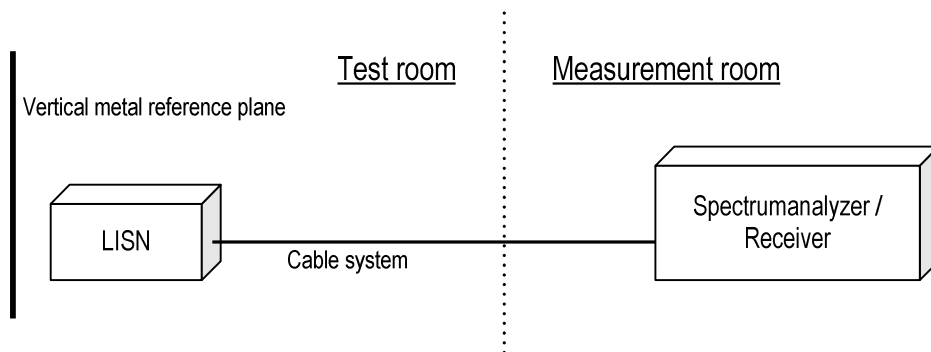
|                                |                                           |
|--------------------------------|-------------------------------------------|
| Test method                    | : ANSI C63.10                             |
| Frequency range                | : 0.15MHz to 30MHz                        |
| Test place                     | : 10m Semi-anechoic chamber               |
| EUT was placed on              | : FRP table / (W)2.0m × (D)1.0m × (H)0.8m |
| Vertical Metal Reference Plane | : (W)2.0m × (H)2.0m 0.4m away from EUT    |
| Test receiver setting          |                                           |
| - Detector                     | : Quasi-peak, Average                     |
| - Bandwidth                    | : 9kHz                                    |

EUT and peripherals are connected to 50Ω/50μH Line Impedance Stabilization Network (LISN) which are connected to reference ground plane, and are placed 80cm away from EUT. Excess of AC power cable is bundled in center.

LISN for peripheral is terminated in 50Ω.

EUT operating mode is selected to emit the maximum noise. Overall frequency range is investigated with spectrum analyzer using peak detector. Maximum emission configuration is determined by manipulating the EUT, peripherals, interconnecting cables. Then, emission measurements are performed with test receiver in above setting to each current-carrying conductor of the mains port. Sufficient time for EUT, peripherals and test equipment is provided in order for them to warm up to their normal operating condition. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits.

- Test configuration



### 11.2 Calculation method

Emission level = Reading + (LISN. factor + Cable system loss)

Margin = Limit – Emission level

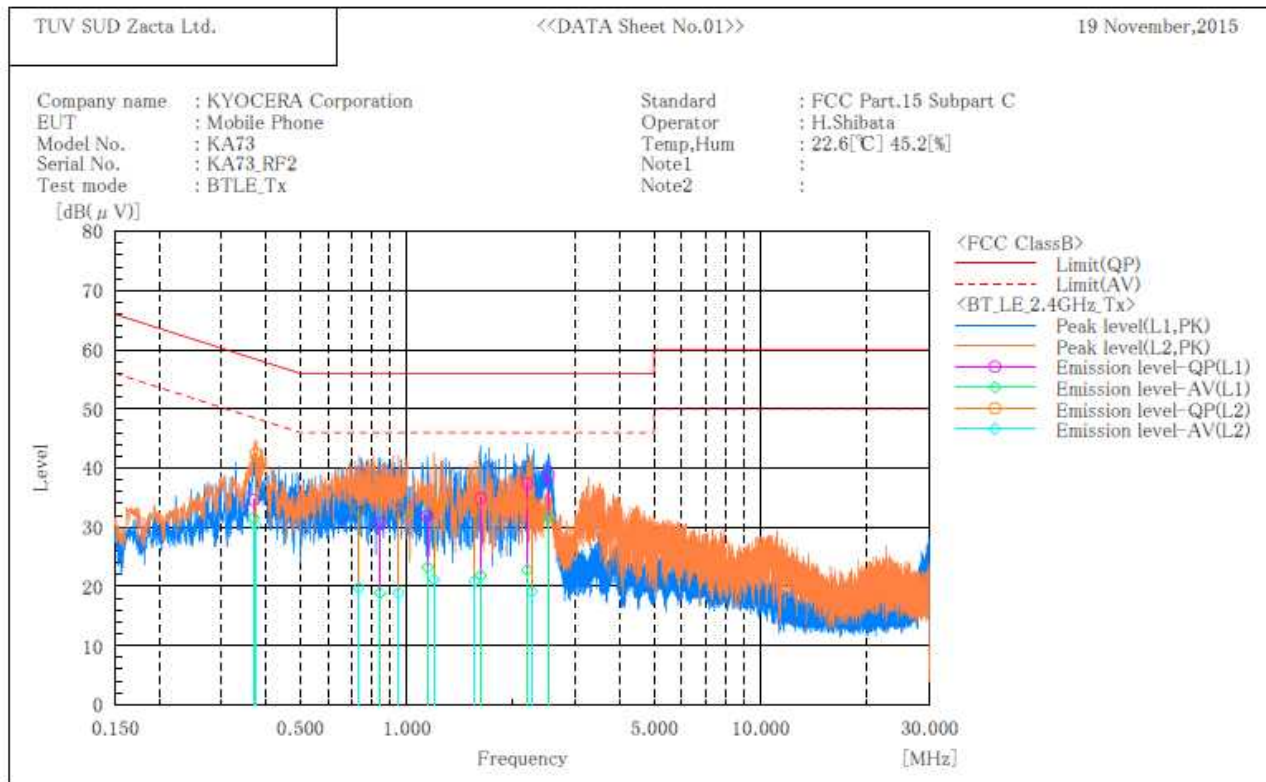
### 11.3 Limit

| Frequency<br>[MHz] | Limit     |           |
|--------------------|-----------|-----------|
|                    | QP [dBuV] | AV [dBuV] |
| 0.15-0.5           | 66-56*    | 56-46*    |
| 0.5-5              | 56        | 46        |
| 5-30               | 60        | 50        |

\*: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

## 11.4 Test data

\*\*\*\*\* CONDUCTED EMISSION at MAINS PORT \*\*\*\*\*  
[ 10m semi-anechoic chamber #1 ]



### Final Result

#### — L1 Phase —

| No. | Frequency<br>[MHz] | Reading<br>QP<br>[dB(μV)] | Reading<br>AV<br>[dB(μV)] | c. f<br>[dB] | Result<br>QP<br>[dB(μV)] | Result<br>AV<br>[dB(μV)] | Limit<br>QP<br>[dB(μV)] | Limit<br>AV<br>[dB(μV)] | Margin<br>QP<br>[dB] | Margin<br>AV<br>[dB] |
|-----|--------------------|---------------------------|---------------------------|--------------|--------------------------|--------------------------|-------------------------|-------------------------|----------------------|----------------------|
| 1   | 0.370              | 24.0                      | 21.0                      | 10.6         | 34.6                     | 31.6                     | 58.5                    | 48.5                    | 23.9                 | 16.9                 |
| 2   | 0.843              | 20.1                      | 8.3                       | 10.6         | 30.7                     | 18.9                     | 56.0                    | 46.0                    | 25.3                 | 27.1                 |
| 3   | 1.146              | 21.3                      | 12.6                      | 10.6         | 31.9                     | 23.2                     | 56.0                    | 46.0                    | 24.1                 | 22.8                 |
| 4   | 1.622              | 24.2                      | 11.1                      | 10.7         | 34.9                     | 21.8                     | 56.0                    | 46.0                    | 21.1                 | 24.2                 |
| 5   | 2.191              | 26.7                      | 12.1                      | 10.7         | 37.4                     | 22.8                     | 56.0                    | 46.0                    | 18.6                 | 23.2                 |
| 6   | 2.521              | 28.1                      | 21.0                      | 10.8         | 38.9                     | 31.8                     | 56.0                    | 46.0                    | 17.1                 | 14.2                 |

#### — L2 Phase —

| No. | Frequency<br>[MHz] | Reading<br>QP<br>[dB(μV)] | Reading<br>AV<br>[dB(μV)] | c. f<br>[dB] | Result<br>QP<br>[dB(μV)] | Result<br>AV<br>[dB(μV)] | Limit<br>QP<br>[dB(μV)] | Limit<br>AV<br>[dB(μV)] | Margin<br>QP<br>[dB] | Margin<br>AV<br>[dB] |
|-----|--------------------|---------------------------|---------------------------|--------------|--------------------------|--------------------------|-------------------------|-------------------------|----------------------|----------------------|
| 1   | 0.375              | 31.7                      | 19.6                      | 10.7         | 42.4                     | 30.3                     | 58.4                    | 48.4                    | 16.0                 | 18.1                 |
| 2   | 0.733              | 22.4                      | 9.1                       | 10.7         | 33.1                     | 19.8                     | 56.0                    | 46.0                    | 22.9                 | 26.2                 |
| 3   | 0.951              | 21.6                      | 8.2                       | 10.7         | 32.3                     | 18.9                     | 56.0                    | 46.0                    | 23.7                 | 27.1                 |
| 4   | 1.196              | 23.1                      | 10.5                      | 10.7         | 33.8                     | 21.2                     | 56.0                    | 46.0                    | 22.2                 | 24.8                 |
| 5   | 1.559              | 22.7                      | 10.1                      | 10.8         | 33.5                     | 20.9                     | 56.0                    | 46.0                    | 22.5                 | 25.1                 |
| 6   | 2.263              | 23.1                      | 8.2                       | 10.9         | 34.0                     | 19.1                     | 56.0                    | 46.0                    | 22.0                 | 26.9                 |

## ***12. Antenna requirement***

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According to FCC section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The antenna is a special antenna mounted inside of the EUT. Therefore, the EUT complies with the antenna requirement of FCC section 15.203.

### ***13. Uncertainty of measurement***

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Expanded uncertainties stated are calculated with a coverage Factor  $k=2$ .

Please note that these results are not taken into account when determining compliance or non-compliance with test result.

| Test item                           | Measurement uncertainty |
|-------------------------------------|-------------------------|
| Conducted emission at mains port    | $\pm 3.0\text{dB}$      |
| Radiated emission (9kHz – 30MHz)    | $\pm 4.4\text{dB}$      |
| Radiated emission (30MHz – 1000MHz) | $\pm 4.5\text{dB}$      |
| Radiated emission (1000MHz – 26GHz) | $\pm 3.9\text{dB}$      |

## 14. Laboratory description

### 1. Location:

TÜV SÜD Zacta Ltd. Yonezawa Testing Center  
4149-7 Hachimanpara 5-chome Yonezawa-shi Yamagata 992-1128 Japan  
Phone: +81-238-28-2880 Fax: +81-238-28-2888

### 2. Facility filing information:

1) NVLAP accreditation: NVLAP Lab. code: 200306-0

2) VLAC accreditation: Lab. code: VLAC-013

| Site name                      | Radiated emission | Conducted emission for mains port | Conducted emission for telecom port | Radiated emission (CMAD) | Expiry Date  |
|--------------------------------|-------------------|-----------------------------------|-------------------------------------|--------------------------|--------------|
| 3m Semi-anechoic chamber       | VLAC-013          | VLAC-013                          | VLAC-013                            | -                        | Jul. 3, 2017 |
| 10m Semi-anechoic chamber No.1 |                   |                                   |                                     | VLAC-013                 |              |
| 10m Semi-anechoic chamber No.2 |                   |                                   |                                     | VLAC-013                 |              |
| Shielded room No.1             | -                 | VLAC-013                          | -                                   | -                        |              |

3) FCC filing:

| Site name                      | Registration Number | Expiry Date   |
|--------------------------------|---------------------|---------------|
| Site 3                         | 91065               | Oct. 1, 2017  |
| 3m Semi-anechoic chamber       | 540072              | Feb. 20, 2017 |
| 10m Semi-anechoic chamber No.1 |                     |               |
| 10m Semi-anechoic chamber No.2 |                     |               |
| Shielded room No.1             |                     |               |

4) Industry Canada Oats site filing:

| Site name                      | Sites on file: Oats 3m/10m | Expiry Date   |
|--------------------------------|----------------------------|---------------|
| Site 3                         | 4224A-3                    | Dec. 3, 2017  |
| 3m Semi-anechoic chamber       | 4224A-4                    |               |
| 10m Semi-anechoic chamber No.1 | 4224A-5                    |               |
| 10m Semi-anechoic chamber No.2 | 4224A-6                    | Jan. 15, 2017 |

5) VCCI site filing:

| Site name                      | Radiated emission | Conducted emission for mains port | Conducted emission for telecom port | Expiry Date   |
|--------------------------------|-------------------|-----------------------------------|-------------------------------------|---------------|
| Site 3                         | R-138             | C-134                             | T-1222                              | Nov. 16, 2017 |
| 3m Semi-anechoic chamber       | A-0166            | A-0166                            | A-0166                              | Jul. 3, 2017  |
| 10m Semi-anechoic chamber No.1 |                   |                                   |                                     |               |
| 10m Semi-anechoic chamber No.2 |                   |                                   |                                     |               |
| Shielded room No.1             | -                 | A-0166                            |                                     |               |

6) TÜV SÜD PS authorization:

Authorized as an EMC test laboratory

7) TÜV Rheinland authorization:

Authorized as an EMC test laboratory

## Appendix A. Test equipment

### Antenna port conducted test

| Equipment         | Company              | Model No. | Serial No. | Cal. due      | Cal. date     |
|-------------------|----------------------|-----------|------------|---------------|---------------|
| Spectrum analyzer | Agilent Technologies | E4440A    | US44302655 | Jun. 30, 2016 | Jun. 11, 2015 |
| Microwave cable   | RS                   | YH_13S5   | N/A (S403) | May 31, 2016  | May 10, 2015  |
| Attenuator        | Weinschel            | 56-10     | J4180      | Oct. 31, 2016 | Oct. 30, 2015 |
| Power meter       | ROHDE&SCHWARZ        | NRP2      | 103269     | Jun. 30, 2016 | Jun. 25, 2015 |
| Power sensor      | ROHDE&SCHWARZ        | NRP-Z81   | 102467     | Jun. 30, 2016 | Jun. 25, 2015 |

### Radiated emission

| Equipment                   | Company              | Model No.         | Serial No.       | Cal. Due      | Cal. Date     |
|-----------------------------|----------------------|-------------------|------------------|---------------|---------------|
| EMI Receiver                | ROHDE&SCHWARZ        | ESCI              | 100764           | Aug. 31, 2016 | Aug. 21, 2015 |
| Preamplifier                | ANRITSU              | MH648A            | M96057           | Jun. 30, 2016 | Jun. 30, 2015 |
| Loop antenna                | ROHDE&SCHWARZ        | HFH2-Z2           | 892246/010       | Apr. 30, 2016 | Apr. 2, 2015  |
| Attenuator                  | TDC                  | TAT-43B-06        | N/A (S209)       | Apr. 30, 2016 | Apr. 16, 2015 |
| Biconical antenna           | Schwarzbeck          | VHA9103/BBA9106   | 2155             | Jun. 30, 2016 | Jun. 4, 2015  |
| Log periodic antenna        | Schwarzbeck          | UHALP9108A        | 0560             | Jun. 30, 2016 | Jun. 4, 2015  |
| Attenuator                  | TME                  | CFA-01NPJ-6       | N/A (S275)       | Jun. 30, 2016 | Jun. 23, 2015 |
| Attenuator                  | TME                  | CFA-01NPJ-3       | N/A (S272)       | Jun. 30, 2016 | Jun. 23, 2015 |
| Spectrum analyzer           | Agilent Technologies | E4440A            | US40420937       | Jul. 31, 2016 | Jul. 23, 2015 |
| Preamplifier                | Agilent Technologies | 8449B             | 3008A1008        | Dec. 31, 2015 | Dec. 5, 2014  |
| Double ridged guide antenna | EMCO                 | 3115              | 5205             | Feb. 29, 2016 | Feb. 16, 2015 |
| Attenuator                  | Agilent Technologies | 8491B             | MY39268633       | Feb. 29, 2016 | Feb. 1, 2015  |
| Broad-Band Horn Antenna     | Schwarzbeck          | BBHA9170          | BBHA9170189      | Jun. 30, 2016 | Jun. 16, 2015 |
| Preamplifier                | TSJ                  | MLA-100M18-B02-40 | 1929118          | May 31, 2016  | May 1, 2015   |
| Notch filter                | Micro-Tronics        | BRM50702          | 045              | Nov. 30, 2016 | Nov. 12, 2015 |
| Microwave cable             | SUHNER               | SUCOFLEX104/9m    | 346316/4         | Oct. 31, 2016 | Oct. 23, 2015 |
|                             |                      | SUCOFLEX104/1m    | 322084/4         | Oct. 31, 2016 | Oct. 23, 2015 |
|                             |                      | SUCOFLEX104/1.5m  | 317226/4         | Oct. 31, 2016 | Oct. 23, 2015 |
|                             |                      | SUCOFLEX104/7m    | 41625/6          | Oct. 31, 2016 | Oct. 23, 2015 |
| PC                          | DELL                 | DIMENSION E521    | 75465BX          | N/A           | N/A           |
| Software                    | TOYO Corporation     | EP5/RE-AJ         | 0611193/V5.3.61  | N/A           | N/A           |
| 3m Semi-anechoic chamber    | TOKIN                | N/A               | N/A (9002-NSA)   | Apr. 30, 2016 | Apr. 27, 2015 |
| 3m Semi-anechoic chamber    | TOKIN                | N/A               | N/A (9002-SVSWR) | Apr. 30, 2016 | Apr. 27, 2015 |

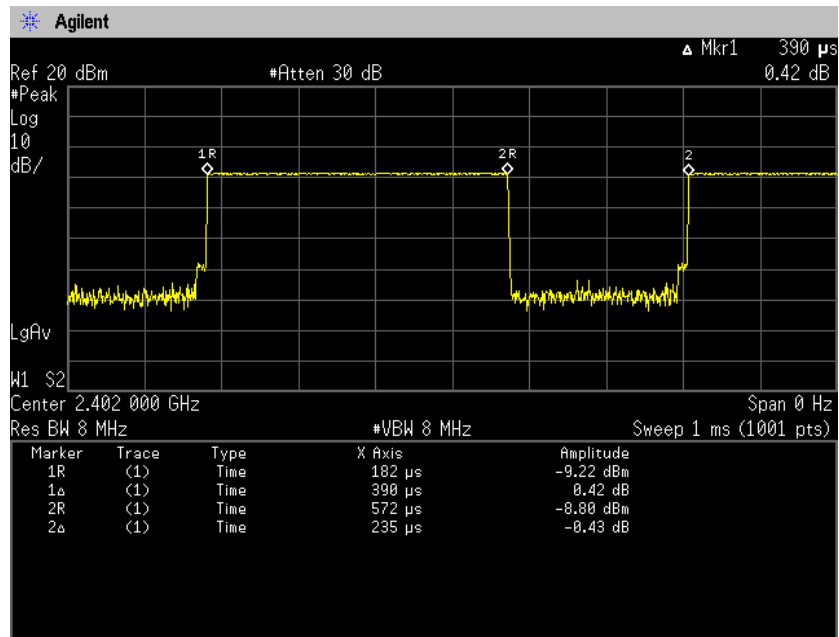
### Conducted emission at mains port

| Equipment                                    | Company                         | Model No.   | Serial No. | Cal. due      | Cal. date     |
|----------------------------------------------|---------------------------------|-------------|------------|---------------|---------------|
| EMI Receiver                                 | ROHDE&SCHWARZ                   | ESCI        | 100764     | Aug. 31, 2016 | Aug. 21, 2015 |
| Attenuator                                   | HUBER+SUHNER                    | 6810.01.A   | N/A (S411) | Feb. 29, 2016 | Feb. 5, 2015  |
| Line impedance stabilization network for EUT | Kyoritsu Electrical Works, Ltd. | KNW-407     | 8-663-4    | Mar. 31, 2016 | Mar. 5, 2015  |
| Coaxial cable                                | FUJIKURA                        | 5D-2W/4m    | N/A (S330) | Feb. 29, 2016 | Feb. 5, 2015  |
| Coaxial cable                                | FUJIKURA                        | 5D-2W/1m    | N/A (S193) | Feb. 29, 2016 | Feb. 5, 2015  |
| Coaxial cable                                | SUHNER                          | RG214/U/10m | N/A (S194) | Feb. 29, 2016 | Feb. 5, 2015  |
| PC                                           | DELL                            | DIMENSION   | 75465BX    | N/A           | N/A           |

\*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.

## Appendix B. Duty Cycle

### [Plot & Calculation]



$$\text{Duty Cycle} = T_{\text{on}} / (T_{\text{on}} + T_{\text{off}}) = 390[\mu\text{s}] / (390[\mu\text{s}] + 235[\mu\text{s}]) = 62.4[\%]$$