

# TEST REPORT

Report number : Z101C-15148

Issue date : January 8, 2016

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

## FCC Part 24 Subpart E

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 : October 30, November 12, December 15, 17, 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

Kazunori Saito

Kazunori Saito

Hikaru Shibata

Hikaru Shibata

Tadahiro Seino

Tadahiro Seino

Taiki Watanabe

Taiki Watanabe

Authorized by

A. Suzuki

Hiroaki Suzuki

Manager of EMC Technical Department



## ***Table of contents***

---

|                                                                      | <b>Page</b> |
|----------------------------------------------------------------------|-------------|
| <b>1. Summary of Test .....</b>                                      | <b>4</b>    |
| 1.1 Purpose of test .....                                            | 4           |
| 1.2 Standards .....                                                  | 4           |
| 1.3 List of applied test to the EUT .....                            | 4           |
| 1.4 Modification to the EUT by laboratory .....                      | 4           |
| <b>2. Equipment Under Test .....</b>                                 | <b>5</b>    |
| 2.1 General Description of equipment .....                           | 5           |
| 2.2 EUT information .....                                            | 5           |
| 2.3 Variation of the family model(s) .....                           | 6           |
| 2.4 Description of Test mode .....                                   | 6           |
| <b>3. Configuration of equipment .....</b>                           | <b>7</b>    |
| 3.1 Equipment(s) used .....                                          | 7           |
| 3.2 System configuration .....                                       | 7           |
| <b>4. Conducted Output Power .....</b>                               | <b>8</b>    |
| 4.1 Measurement procedure .....                                      | 8           |
| 4.2 Measurement result .....                                         | 8           |
| <b>5. Equivalent Isotropic Radiated Power .....</b>                  | <b>9</b>    |
| 5.1 Measurement procedure .....                                      | 9           |
| 5.2 Calculation method .....                                         | 10          |
| 5.3 Limit .....                                                      | 10          |
| 5.4 Test data .....                                                  | 11          |
| <b>6. Peak to Average Ratio .....</b>                                | <b>12</b>   |
| 6.1 Measurement procedure .....                                      | 12          |
| 6.2 Limit .....                                                      | 12          |
| 6.3 Measurement result .....                                         | 12          |
| 6.4 Trace data .....                                                 | 13          |
| <b>7. Occupied Bandwidth .....</b>                                   | <b>14</b>   |
| 7.1 Measurement procedure .....                                      | 14          |
| 7.2 Limit .....                                                      | 14          |
| 7.3 Measurement result .....                                         | 14          |
| 7.4 Trace data .....                                                 | 15          |
| <b>8. Band Edge Spurious and Harmonic at Antenna Terminals .....</b> | <b>16</b>   |
| 8.1 Measurement procedure .....                                      | 16          |
| 8.2 Limit .....                                                      | 16          |
| 8.3 Measurement result .....                                         | 16          |
| 8.4 Trace data .....                                                 | 17          |
| <b>9. Radiated Emissions and Harmonic Emissions .....</b>            | <b>21</b>   |
| 9.1 Measurement procedure .....                                      | 21          |
| 9.2 Calculation method .....                                         | 22          |
| 9.3 Limit .....                                                      | 22          |
| 9.4 Test data .....                                                  | 23          |
| <b>10. Frequency Stability .....</b>                                 | <b>24</b>   |
| 10.1 Measurement procedure .....                                     | 24          |



Zacta

|                                                    |           |
|----------------------------------------------------|-----------|
| <b>10.2 Limit.....</b>                             | <b>24</b> |
| <b>10.3 Measurement result.....</b>                | <b>25</b> |
| <b>11. <i>Uncertainty of measurement</i> .....</b> | <b>26</b> |
| <b>12. <i>Laboratory description</i> .....</b>     | <b>27</b> |
| <b>Appendix A. <i>Test equipment</i> .....</b>     | <b>28</b> |

## 1. Summary of Test

### 1.1 Purpose of test

It is the original test in order to verify conformance to FCC Part 24 Subpart E.

### 1.2 Standards

CFR47 FCC Part 24 Subpart E

#### 1.2.1 Test Methods

KDB 971168 D01 Power Meas License Digital Systems v02r02  
ANSI/TIA/EIA-603-D-2010

#### 1.2.2 Deviation from standards

None

### 1.3 List of applied test to the EUT

| Test items<br>Section | Test items                                                      | Condition | Result |
|-----------------------|-----------------------------------------------------------------|-----------|--------|
| 2.1046                | Conducted Output Power                                          | Conducted | PASS   |
| 24.232(c)             | Effective Radiated Power<br>Equivalent Isotropic Radiated Power | Radiated  | PASS   |
| 24.232(d)             | Peak to Average Ratio                                           | Conducted | PASS   |
| 24.238(a)<br>2.1049   | Occupied Bandwidth                                              | Conducted | PASS   |
| 24.238(a)<br>2.1051   | Band Edge Spurious and Harmonic at<br>Antenna Terminal          | Conducted | PASS   |
| 24.238(a)<br>2.1053   | Radiated emissions and<br>Harmonic Emissions                    | Radiated  | PASS   |
| 24.235<br>2.1055      | Frequency Stability                                             | Conducted | PASS   |

#### 1.3.1 Test set up

Table-Top

### 1.4 Modification to the EUT by laboratory

None

## 2. Equipment Under Test

---

### 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>Frequency of<br>Operation | : | Up Link<br>GSM1900: 1850.2-1909.8MHz<br><br>Down Link<br>GSM1900: 1930.2-1989.8MHz                                                                |
| Modulation type                               | : | GSM1900: GMSK                                                                                                                                     |
| Emission designator                           | : | GSM1900: 248KGXW                                                                                                                                  |
| Output power                                  | : | GSM1900: 0.995W (29.98dBm)                                                                                                                        |
| Antenna type                                  | : | Internal antenna                                                                                                                                  |
| Antenna gain                                  | : | GSM1900: -0.5dBi                                                                                                                                  |

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

Not applicable

### 2.4 Description of Test mode

The EUT had been tested under operating condition.  
There are three channels have been tested as following:

| Band    | Channel | Frequency |
|---------|---------|-----------|
| GSM1900 | 512     | 1850.2MHz |
|         | 661     | 1880.0MHz |
|         | 810     | 1909.8MHz |

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 Z axis and the worst case recorded.



Zacta

### 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     |

#### 3.2 System configuration

1. Mobile Phone  
(EUT)

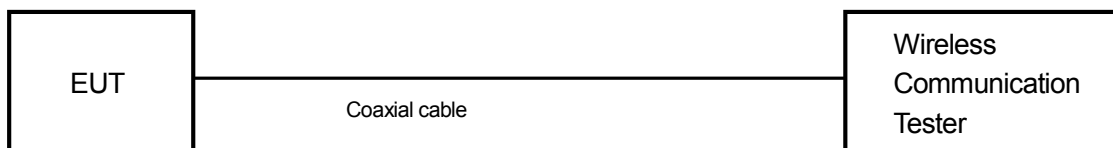
Note1: Numbers assigned to equipment or cables on this diagram correspond to the list in "3.1 Equipment(s) used".

## 4. Conducted Output Power

### 4.1 Measurement procedure [FCC 2.1046]

The conducted output power was measured with a wireless communication tester connected to the antenna terminal. The wireless communication tester parameters were set to produce the maximum power from the EUT.

- Test configuration



### 4.2 Measurement result

Date : October 30, 2015

Temperature : 24.7 [°C]

Humidity : 37.6 [%]

Test place : Shielded room No.4

Test engineer :

Tadahiro Seino

| Band        | Channel | Frequency<br>[MHz] | Maximum Burst-Averaged Output Power [dBm] |                      |                      |                      |                      |
|-------------|---------|--------------------|-------------------------------------------|----------------------|----------------------|----------------------|----------------------|
|             |         |                    | Voice<br>GSM<br>CS 1slot                  | GPRS/EDGE(GMSK)Data  |                      |                      |                      |
|             |         |                    |                                           | GPRS<br>1 TX<br>Slot | GPRS<br>2 TX<br>Slot | GPRS<br>3 TX<br>Slot | GPRS<br>4 TX<br>Slot |
| PCS<br>1900 | 512     | 1850.2             | <u>29.98</u>                              | 29.97                | 28.49                | 26.56                | 25.42                |
|             | 661     | 1880.0             | 29.84                                     | 29.79                | 28.19                | 26.51                | 25.45                |
|             | 810     | 1909.8             | 29.73                                     | 29.60                | 28.02                | 26.26                | 25.24                |



## 5. Equivalent Isotropic Radiated Power

### 5.1 Measurement procedure [FCC 24.232(c)]

#### <Step 1>

The EUT and support equipment are placed on a 1 meter x 2 meter surface, 0.8 meter height FRP table. Radiated emission measurements are performed at 3 meter 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 1 to 4 meters and stopped at height producing the maximum emission. The bandwidth of the spectrum analyzer is set to 1MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission.

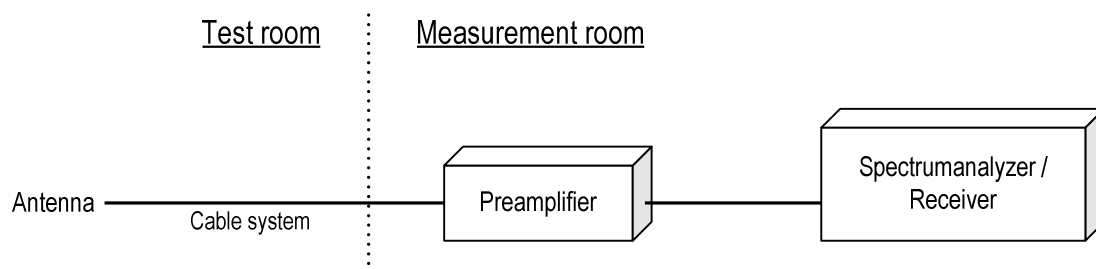
#### <Step 2>

The substitution antenna is replaced by the transmitter antenna (EUT). The frequency of the signal generator is adjusted to the measurement frequency. Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

The spectrum analyzer is set to;

- a) Span = 1.5 times the OBW
- b) RBW = 1-5% of the expected OBW, not to exceed 1MHz
- c) VBW  $\geq 3 \times$  RBW
- d) Number of sweep points  $\geq 2 \times$  span / RBW
- e) Sweep time = auto-couple
- f) Detector = RMS (power averaging)
- g) If the EUT can be configured to transmit continuously (i.e., burst duty cycle  $\geq 98\%$ ), then set the trigger to free run.
- h) If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle  $< 98\%$ ), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Ensure that the sweep time is less than or equal to the transmission burst duration.
- i) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

#### - Test configuration



## 5.2 Calculation method

Result (EIRP) = S.G Reading – Cable loss + Antenna Gain

Margin = Limit – Result (EIRP)

Example:

Limit @ 1880MHz : 33.0dBm

S.G Reading = 18.9dBm Cable loss = 1.1dB Ant. Gain = 8.3dBi

Result =  $18.9 - 1.1 + 8.3 = 26.1\text{dBm}$

Margin =  $33.0 - 26.1 = 6.9\text{dB}$

## 5.3 Limit

2 W (33dBm)

#### 5.4 Test data

Date : December 15, 2015  
 Temperature : 20.3 [°C]  
 Humidity : 40.0 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer :

Hikaru Shibata

Date : December 17, 2015  
 Temperature : 21.9 [°C]  
 Humidity : 29.1 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer :

Taiki Watanabe

#### [GSM1900]

| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBi] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| V   | 1850.2             | -21.9                | 23.6                 | 1.1                | 8.2               | 30.6            | 33.0           | 2.4            |
| V   | 1880.0             | -22.0                | 24.1                 | 1.1                | 8.3               | 31.2            | 33.0           | 1.8            |
| V   | 1909.8             | -23.4                | 23.7                 | 1.1                | 8.4               | 31.0            | 33.0           | 2.0            |

## 6. Peak to Average Ratio

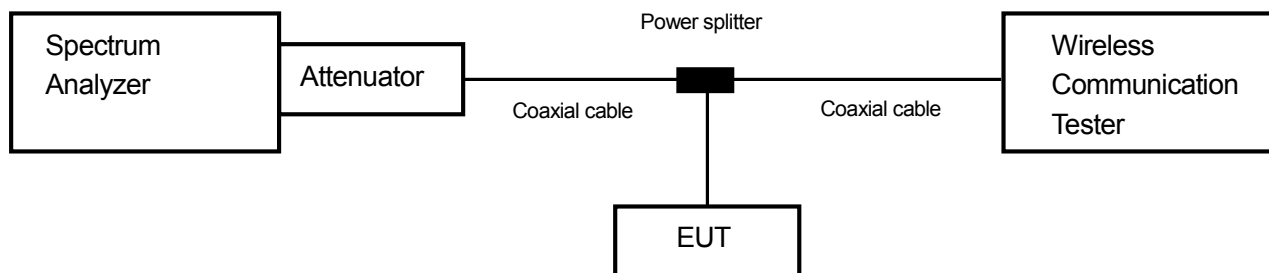
### 6.1 Measurement procedure [FCC 24.232(d)]

The peak to average ratio was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

- a) Span = 5MHz
- b) RBW = 1MHz
- c) VBW  $\geq 3 \times$  RBW
- d) Detector = Peak / Average
- e) Sweep time = auto-couple
- f) Trace mode=Max hold

- Test configuration



### 6.2 Limit

13dB or less

### 6.3 Measurement result

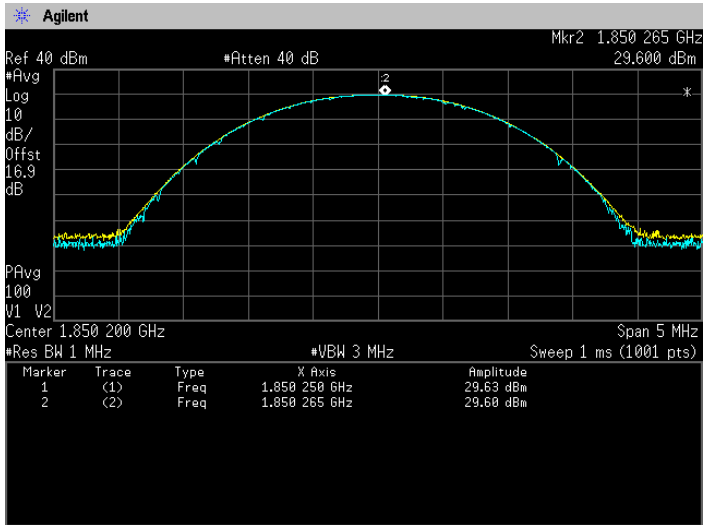
Date : November 12, 2015  
 Temperature : 23.2 [°C]  
 Humidity : 48.1 [%]  
 Test place : Shielded room No.4

Test engineer : Kazunori Saito

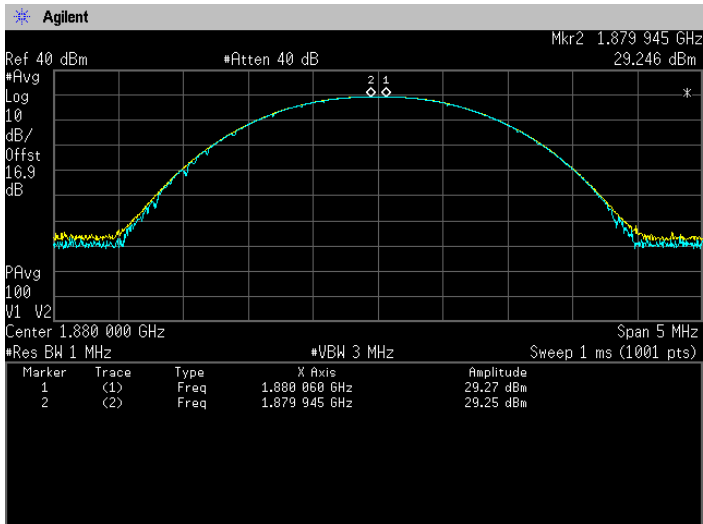
| Mode    | Channel | Frequency [MHz] | Peak to Average Power Ratio [dB] | Limit [dB] |
|---------|---------|-----------------|----------------------------------|------------|
| GSM1900 | 512     | 1850.2          | 0.03                             | 13.0       |
|         | 661     | 1880.0          | 0.02                             |            |
|         | 810     | 1909.8          | 0.03                             |            |

6.4 Trace data  
[GSM1900]

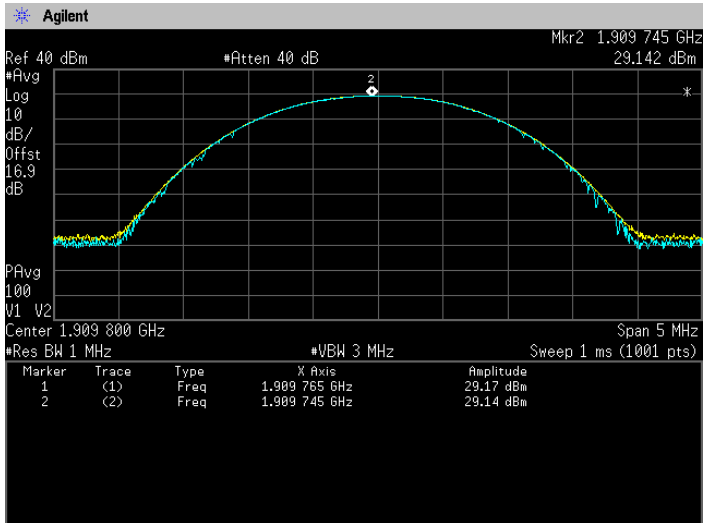
Channel: 512



Channel: 661



Channel: 810



## 7. Occupied Bandwidth

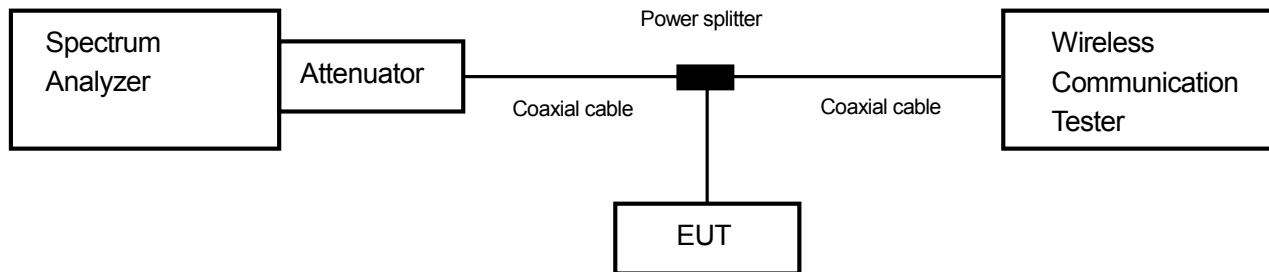
### 7.1 Measurement procedure [FCC 24.238(a), 2.1049]

The Occupied bandwidth was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

- a) RBW = 1-5% of the expected OBW & VBW  $\geq 3 \times$  RBW
- b) Detector = Peak
- c) Trace mode = Max hold
- d) Sweep time = auto-couple

- Test configuration



### 7.2 Limit

None

### 7.3 Measurement result

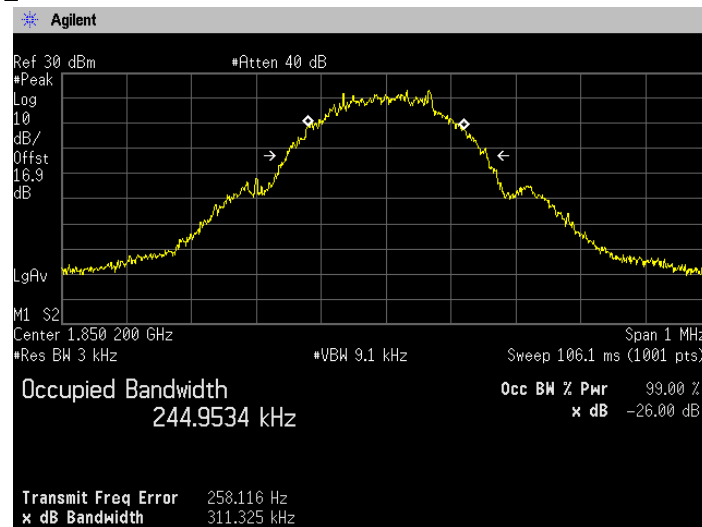
Date : November 12, 2015  
 Temperature : 23.2 [°C]  
 Humidity : 48.1 [%]  
 Test place : Shielded room No.4

Test engineer : Kazunori Saito

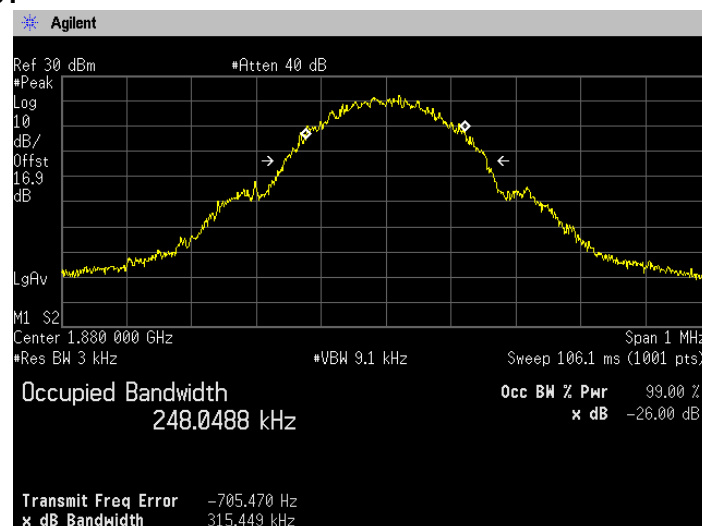
| Band    | Channel | Frequency (MHz) | Test Result (kHz) |
|---------|---------|-----------------|-------------------|
| GSM1900 | 512     | 1850.2          | 244.9534          |
|         | 661     | 1880.0          | 248.0488          |
|         | 810     | 1909.8          | 245.9053          |

## 7.4 Trace data [GSM1900]

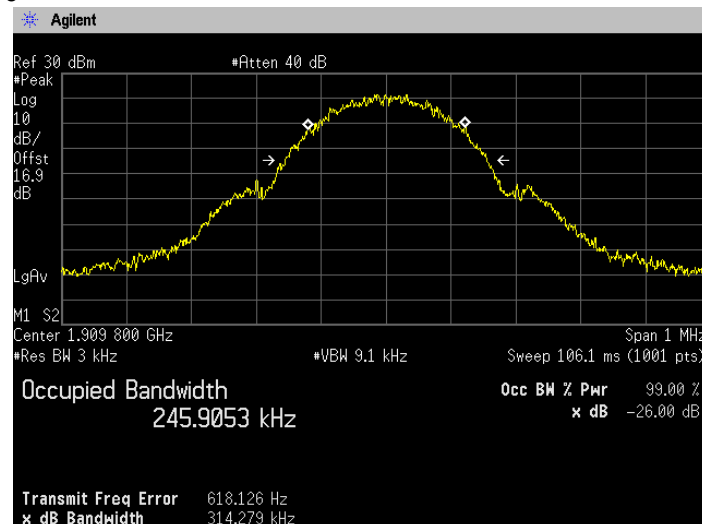
Channel: 512



Channel: 661



Channel: 810



## 8. Band Edge Spurious and Harmonic at Antenna Terminals

### 8.1 Measurement procedure [FCC 24.238(a), 2.1051]

The band edge spurious and harmonic was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

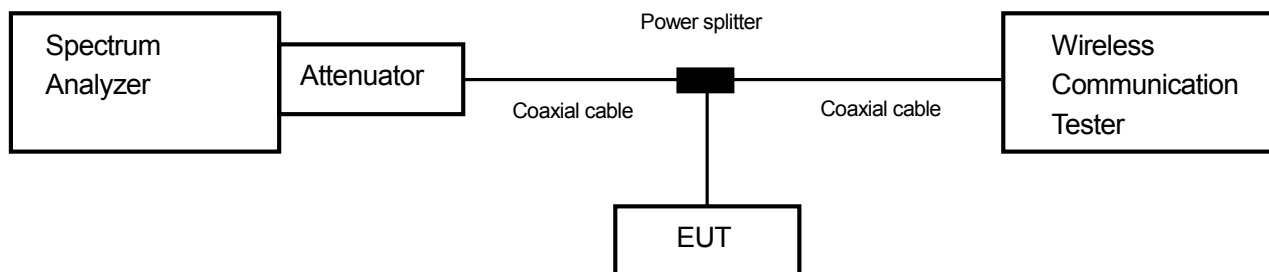
<Band Edge>

- a) Span was set large enough so as to capture all out of band emissions near the band edge
- b) RBW  $\geq 1\%$  of the emission bandwidth or 2% of the emission bandwidth
- c) VBW  $\geq 3 \times$  RBW
- d) Detector = RMS
- e) Trace mode = Max hold
- f) Sweep time = auto-couple
- g) Number of sweep point  $\geq 2 \times$  span / RBW

<Spurious Emissions>

- a) RBW = 1MHz & VBW  $\geq 3 \times$  RBW
- b) Detector = Peak
- c) Trace mode = Max hold
- d) Sweep time = auto-couple
- e) Number of sweep point  $\geq 2 \times$  span / RBW

- Test configuration



### 8.2 Limit

-13dBm or less

### 8.3 Measurement result

Date : November 12, 2015  
 Temperature : 23.2 [°C]  
 Humidity : 48.1 [%]  
 Test place : Shielded room No.4

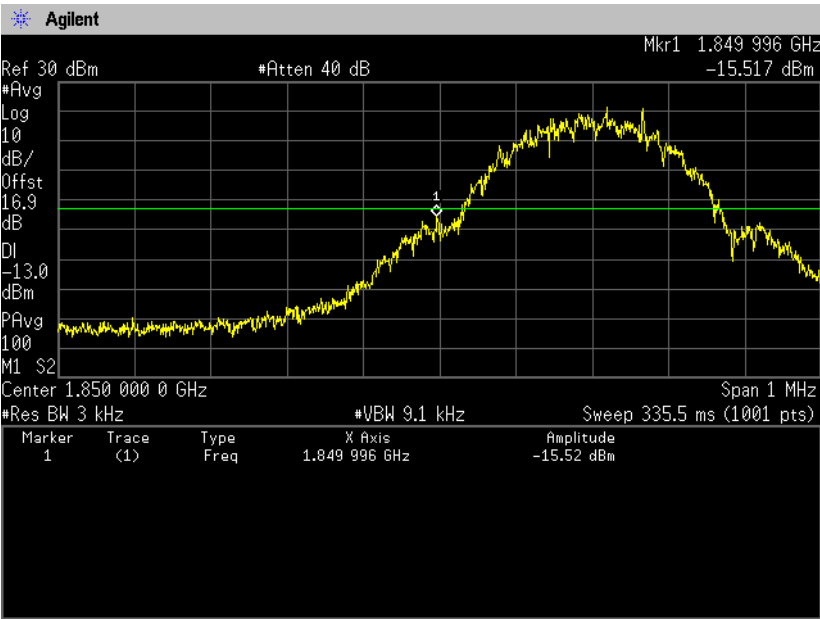
Test engineer : Kazunori Saito

| Band    | Channel | Frequency [MHz] | Limit [dB] | Results            | Results |
|---------|---------|-----------------|------------|--------------------|---------|
| GSM1900 | 512     | 1850.2          | -13.0      | See the trace data | PASS    |
|         | 810     | 1909.8          | -13.0      | See the trace data | PASS    |

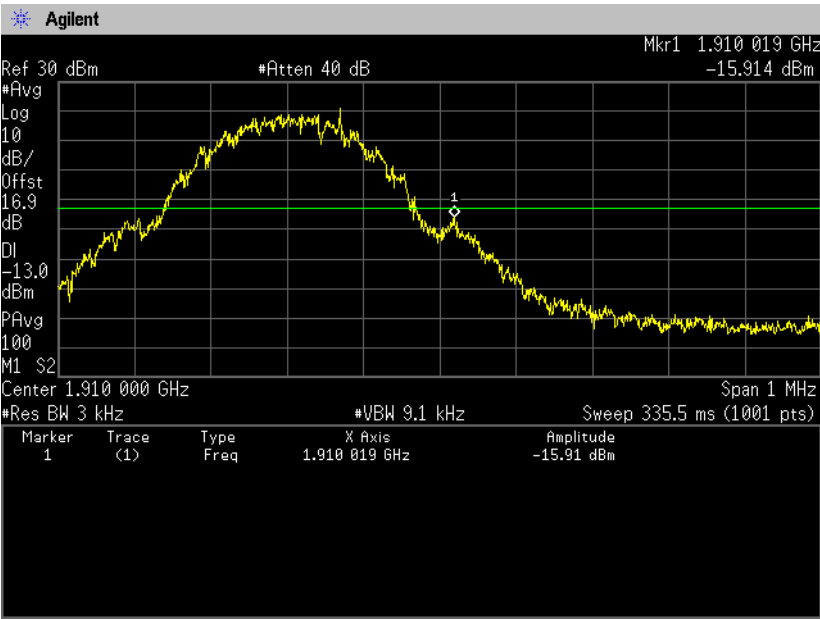


8.4 Trace data  
[GSM1900]  
(Band Edge)

Channel: 512



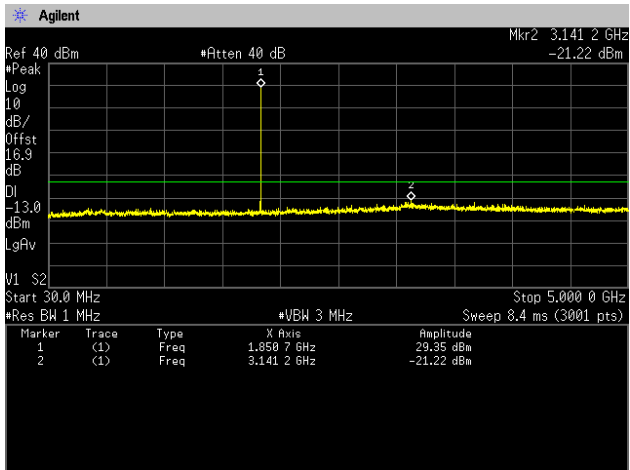
Channel: 810



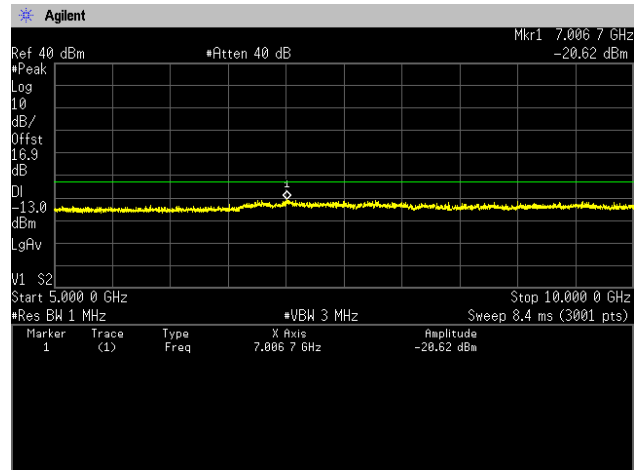
**(Spurious Emissions)**

Note: Conducted spurious test was measured in the worst case of conducted output power.

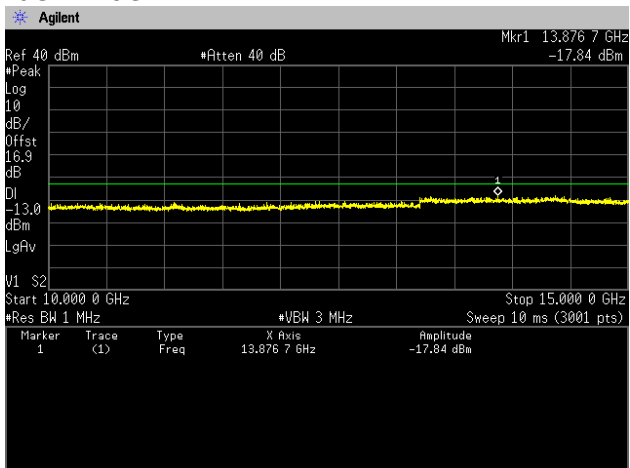
Channel: 512  
30MHz-5GHz



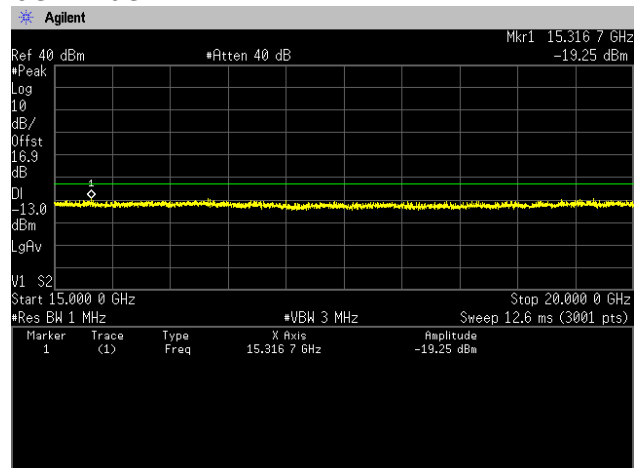
5GHz-10GHz



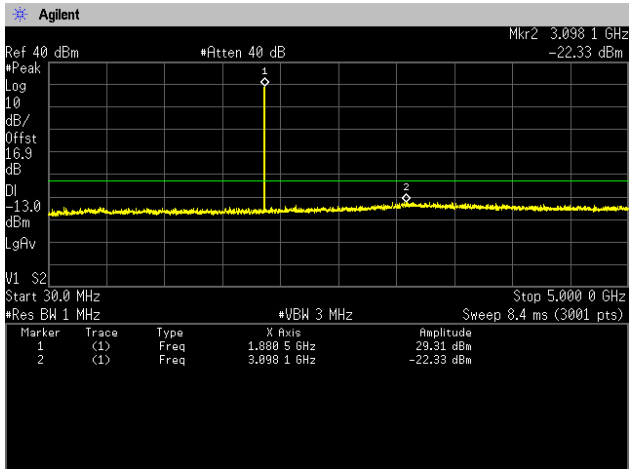
10GHz-15GHz



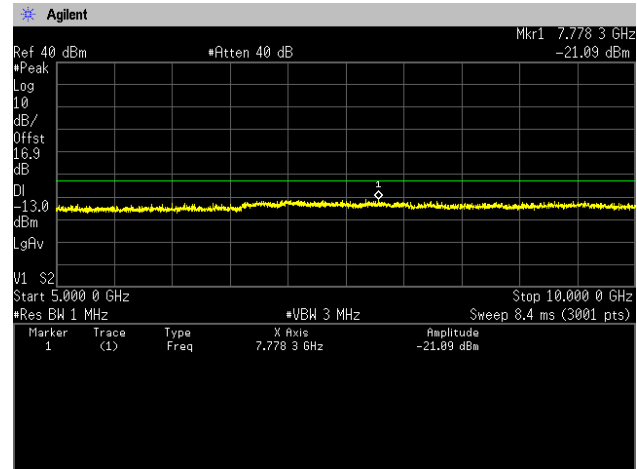
15GHz-20GHz



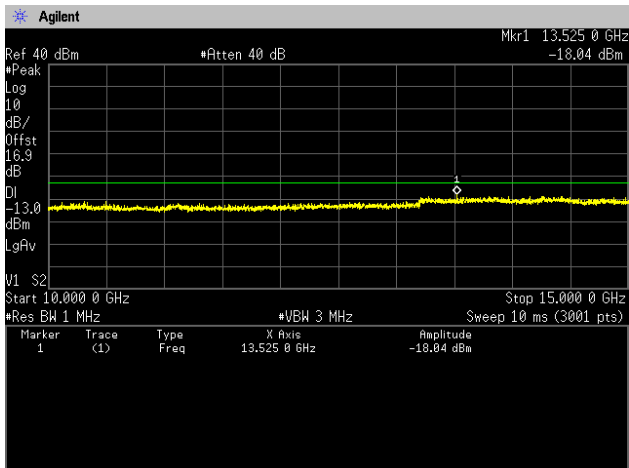
Channel: 661  
30MHz-5GHz



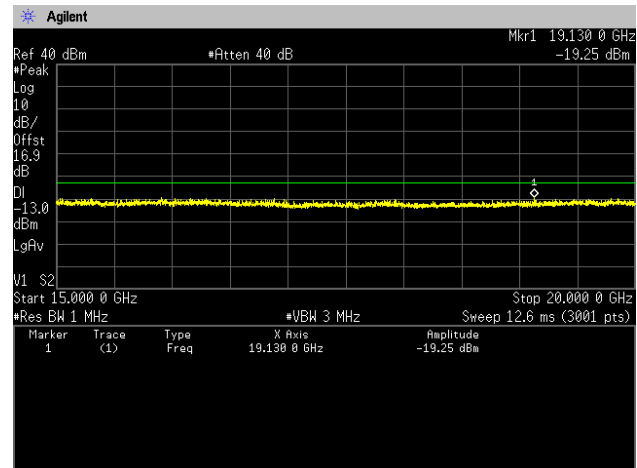
5GHz-10GHz



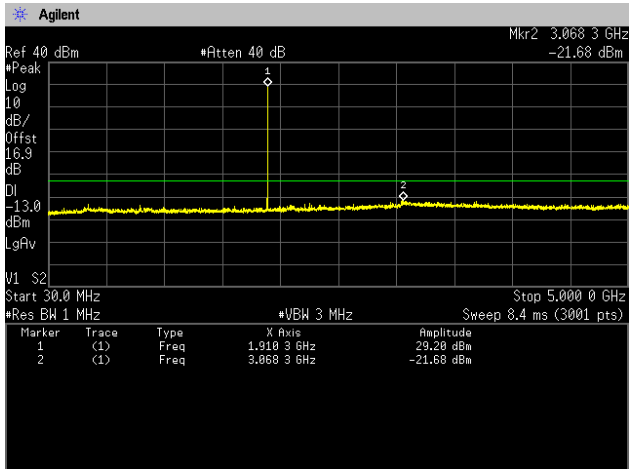
10GHz-15GHz



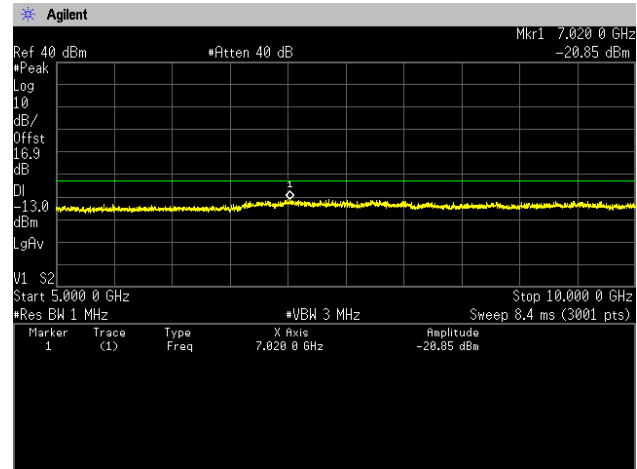
15GHz-20GHz



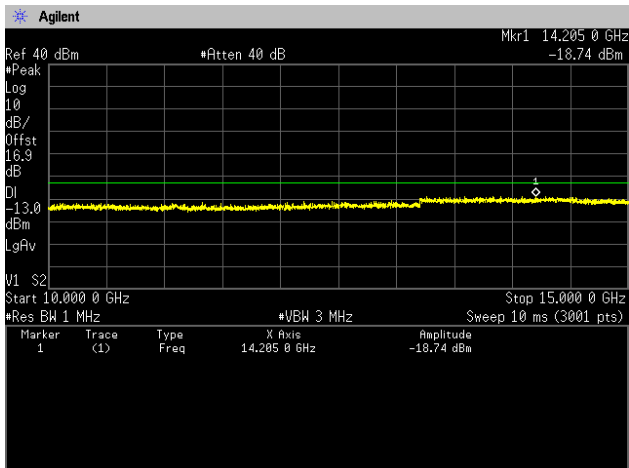
Channel: 810  
30MHz-5GHz



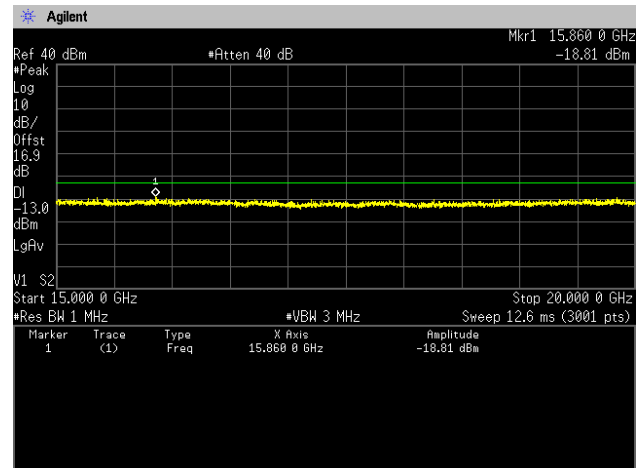
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz



## 9. Radiated Emissions and Harmonic Emissions

### 9.1 Measurement procedure [FCC 24.238(a), 2.1053]

#### <Step 1>

The EUT and support equipment are placed on a 1 meter x 2 meter surface, 0.8 meter height FRP table. Radiated emission measurements are performed at 3 meter distance with the broadband antenna (Biconical antenna, Log periodic antenna and double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission.

The bandwidth of the spectrum analyzer is set to 1MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission. The frequency is investigated up to 20GHz.

#### <Step 2>

The substitution antenna is replaced by the transmitter antenna (EUT).

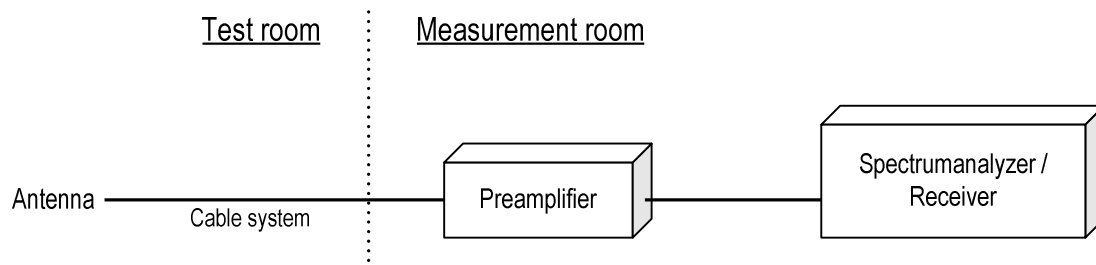
The frequency of the signal generator is adjusted to the measurement frequency.

Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

The spectrum analyzer is set to;

- a) RBW = 100kHz for below 1GHz and 1MHz for above 1GHz / VBW  $\geq 3 \times$  RBW
- b) Detector = Peak
- c) Trace mode = Max hold
- d) Sweep time = auto-couple

- Test configuration



## 9.2 Calculation method

Result = S.G Reading – Cable loss + Antenna Gain

Margin = Limit – Result (EIRP)

Example:

Limit @ 3757.5MHz : -13.0dBm

S.G Reading = -54.3dBm Cable loss = 1.6dB Ant. Gain = 9.2dBi

Result = -54.3 - 1.6 + 9.2 = -46.7dBm

Margin = -13.0 - (-46.7) = 33.7dB

## 9.3 Limit

-13dBm or less

## 9.4 Test data

Date : December 15, 2015  
 Temperature : 20.3 [°C]  
 Humidity : 40.0 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer : Kazunori Saito

Date : December 17, 2015  
 Temperature : 21.9 [°C]  
 Humidity : 29.1 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer : Taiki Watanabe

### [GSM1900]

#### (Channel: 512)

| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBi] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| H   | 3700.4             | -56.3                | -42.9                | 1.6                | 9.5               | -35.0           | -13.0          | 22.0           |
| V   | 3700.4             | -56.4                | -49.4                | 1.6                | 9.5               | -41.5           | -13.0          | 28.5           |

#### (Channel: 661)

| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBi] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| H   | 3760.0             | -56.8                | -44.0                | 1.6                | 9.2               | -36.4           | -13.0          | 23.4           |
| V   | 3760.0             | -56.3                | -48.4                | 1.6                | 9.2               | -40.8           | -13.0          | 27.8           |

#### (Channel: 810)

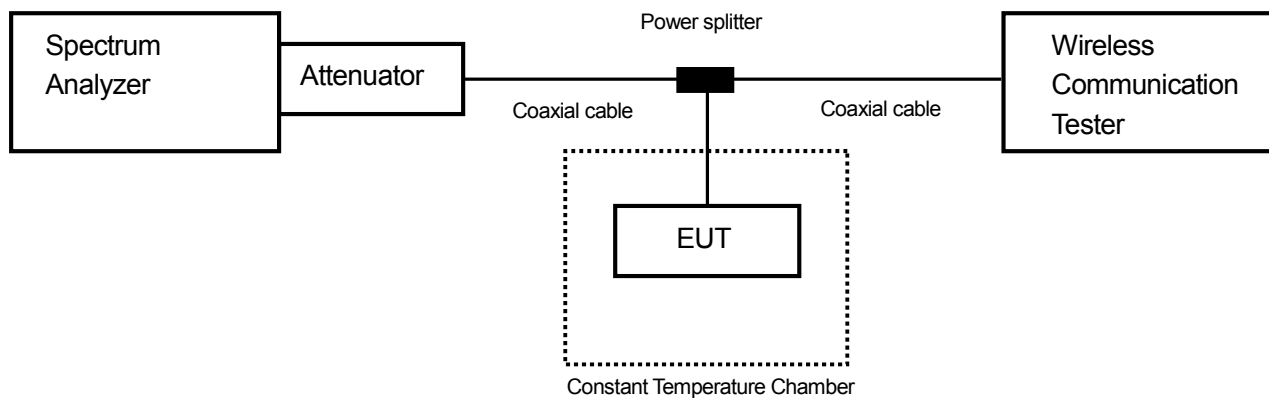
| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBi] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| H   | 3819.6             | -56.6                | -50.3                | 1.6                | 9.3               | -42.6           | -13.0          | 29.6           |
| V   | 3819.6             | -56.4                | -48.4                | 1.6                | 9.3               | -40.7           | -13.0          | 27.7           |

## 10. Frequency Stability

### 10.1 Measurement procedure [FCC 24.235, 2.1055]

The EUT was placed inside of a constant temperature chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10°C intervals and the unit was allowed to stabilize at each measurement. The frequency drift was measured with the normal Temperature and voltage tolerance and it is presented as the ppm unit.

- Test configuration



### 10.2 Limit

$\pm 2.5\text{ppm}$



### 10.3 Measurement result

Date : November 12, 2015  
 Temperature : 23.2 [°C]  
 Humidity : 48.1 [%]  
 Test place : Shielded room No.4

Test engineer :

Kazunori Saito

#### [GSM1900]

(Channel: 661)

| Limit: $\pm 0.00025\% = \pm 2.5\text{ppm}$ |             |                        |                     |           |        |
|--------------------------------------------|-------------|------------------------|---------------------|-----------|--------|
| Power Supply                               | Temperature | Measurements Frequency | Frequency Tolerance | Limit     | Result |
| [V]                                        | [°C]        | [Hz]                   | [ppm]               | [ppm]     |        |
| 3.80                                       | 25(Ref.)    | 1,880,000,026          | 0.00000             | $\pm 2.5$ | Pass   |
|                                            | 50          | 1,880,000,028          | 0.00067             | $\pm 2.5$ | Pass   |
|                                            | 40          | 1,880,000,029          | 0.00155             | $\pm 2.5$ | Pass   |
|                                            | 30          | 1,880,000,038          | 0.00634             | $\pm 2.5$ | Pass   |
|                                            | 20          | 1,880,000,025          | -0.00079            | $\pm 2.5$ | Pass   |
|                                            | 10          | 1,880,000,038          | 0.00615             | $\pm 2.5$ | Pass   |
|                                            | 0           | 1,880,000,029          | 0.00149             | $\pm 2.5$ | Pass   |
|                                            | -10         | 1,880,000,033          | 0.00342             | $\pm 2.5$ | Pass   |
|                                            | -20         | 1,880,000,037          | 0.00563             | $\pm 2.5$ | Pass   |
|                                            | -30         | 1,880,000,039          | 0.00653             | $\pm 2.5$ | Pass   |
| 3.230                                      | 25          | 1,880,000,033          | 0.00368             | $\pm 2.5$ | Pass   |
| 4.370                                      | 25          | 1,880,000,029          | 0.00120             | $\pm 2.5$ | Pass   |

Calculation;

Frequency Tolerance (ppm) = Measurements Frequency (Hz) – Reference Frequency (Hz) / Reference Frequency (Hz) x 1000000

## 11. Uncertainty of measurement

---

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) | $\pm 3.9\text{dB}$      |

## 12. 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            | J4993      | Nov. 30, 2016 | Nov. 12, 2015 |
| Microwave cable                            | SUHNER               | SUCOFLEX104/1.5m | 322086/4   | May 31, 2016  | May 29, 2015  |
| Power splitter                             | ANRITSU              | K240B            | 020205     | Jul. 31, 2016 | Jul. 12, 2015 |
| Power meter                                | ROHDE&SCHWARZ        | NRP2             | 103269     | Jun. 20, 2016 | Jun. 25, 2015 |
| Power sensor                               | ROHDE&SCHWARZ        | NRP-Z81          | 102467     | Jun. 20, 2016 | Jun. 25, 2015 |
| Wideband radio frequency tester            | ROHDE&SCHWARZ        | CMW500           | 116338     | Apr. 30, 2016 | Apr. 2, 2015  |
| Operation type temperature controlled bath | Espec                | PL1KP            | 14007261   | Jan. 31, 2016 | Jan. 9, 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 |
| Biconical antenna               | Schwarzbeck          | VHA9103/BBA9106  | 2125             | 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  |
| Dipole antenna                  | Schwarzbeck          | VHAP             | 1021             | Oct. 31, 2016 | Oct. 2, 2015  |
| Dipole antenna                  | Schwarzbeck          | UHAP             | 993              | Oct. 31, 2016 | Oct. 2, 2015  |
| Double ridged guide antenna     | EMCO                 | 3115             | 5205             | Feb. 29, 2016 | Feb. 16, 2015 |
| Attenuator                      | Agilent Technologies | 8491B            | MY39268633       | Feb. 29, 2016 | Feb. 1, 2015  |
| Double ridged guide antenna     | EMCO                 | 3115             | 000058532        | Nov. 30, 2016 | Nov. 6, 2015  |
| Signal generator                | ROHDE&SCHWARZ        | SMB100A          | 177525           | Jun. 30, 2016 | Jun. 19, 2015 |
| Power amplifier                 | R&K                  | CGA020M602-2633R | B40240           | Mar. 31, 2016 | Mar. 23, 2015 |
| Microwave cable                 | SUHNER               | SUCOFELX102/2m   | 31648/2          | Mar. 31, 2016 | Mar. 10, 2015 |
| High pass filter                | Micro-Tronics        | HPM50115         | 004              | Jul. 31, 2016 | Jul. 12, 2015 |
| High pass filter                | Wainwright           | WHKX2.8/18G-6SS  | 1                | Jul. 31, 2016 | Jul. 29, 2015 |
| Wideband radio frequency tester | ROHDE&SCHWARZ        | CMW500           | 126079           | Sep. 30, 2016 | Sep. 15, 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/V5.4.011 | 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 |

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