

# TEST REPORT

Report number : Z101C-15147

Issue date : January 12, 2016

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

## FCC Part 22 Subpart H

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 2, 4, 16, 25, December 15, 16, 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 Tadahiro Seino  
Kazunori Saito Tadahiro Seino  
Taiki Watanabe  
Taiki Watanabe

Authorized by : Hiroaki Suzuki  
Hiroaki Suzuki  
Manager of EMC Technical Department



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## 1. Summary of Test

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### 1.1 Purpose of test

It is the original test in order to verify conformance to FCC Part 22 Subpart H.

### 1.2 Standards

CFR47 FCC Part 22 Subpart H

#### 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   |
| 22.913(a)             | Effective Radiated Power                               | Radiated  | PASS   |
| 22.917(a)<br>2.1049   | Occupied Bandwidth                                     | Conducted | PASS   |
| 22.917(a)<br>2.1051   | Band Edge Spurious and Harmonic at<br>Antenna Terminal | Conducted | PASS   |
| 22.917(a)<br>2.1053   | Radiated emissions and<br>Harmonic Emissions           | Radiated  | PASS   |
| 22.355<br>2.1055      | Frequency Stability                                    | 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>Frequency of<br>Operation | : | Up Link<br>GSM850: 824.2-848.8MHz<br>WCDMA Band V: 826.4-846.6MHz<br><br>Down Link<br>GSM850: 869.2-893.8MHz<br>WCDMA Band V: 871.4-891.6MHz      |
| Modulation type                               | : | GSM850: GMSK<br>WCDMA Band V: QPSK, 16QAM                                                                                                         |
| Emission designator                           | : | GSM850: 244KGXW<br>WCDMA Band V: 4M15F9W                                                                                                          |
| Output power                                  | : | GSM850: 1.928W (32.85dBm)<br>WCDMA Band V: 0.241W (23.82dBm)                                                                                      |
| Antenna type                                  | : | Internal antenna                                                                                                                                  |
| Antenna gain                                  | : | GSM850: -0.6dBi<br>WCDMA Band V: -0.6dBi                                                                                                          |

### 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 |
|--------------|---------|-----------|
| GSM850       | 128     | 824.2MHz  |
|              | 190     | 836.6MHz  |
|              | 251     | 848.8MHz  |
| WCDMA Band V | 4132    | 826.4MHz  |
|              | 4183    | 836.6MHz  |
|              | 4233    | 846.6MHz  |

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

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#### 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)

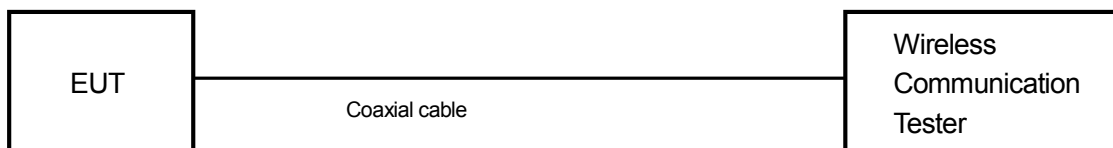
Note1: Numbers assigned to equipment on this diagram correspond to the list in "3.1 Equipment(s) used".

## 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 |
| GSM<br>850 | 128     | 824.2              | 32.74                                     | 32.69                | 30.75                | 28.54                | 27.34                |
|            | 190     | 836.6              | <b>32.85</b>                              | 32.74                | 30.58                | 28.67                | 27.47                |
|            | 251     | 848.8              | 32.59                                     | 32.78                | 30.72                | 28.79                | 27.56                |

| 3GPP<br>Release<br>Version | Mode                |     | Sub-<br>Test | Power [dBm]  |       |       | MPR   | Bc    | βd    | Bc/βd |
|----------------------------|---------------------|-----|--------------|--------------|-------|-------|-------|-------|-------|-------|
|                            | Channel             |     |              | 4132         | 4183  | 4233  |       |       |       |       |
|                            | Frequency [MHz]     |     |              | 826.4        | 836.6 | 846.6 |       |       |       |       |
| 99                         | W-CDMA              | RMC | -            | <u>23.82</u> | 23.49 | 23.43 | -     | -     | -     | -     |
|                            |                     | AMR |              | 23.81        | 23.46 | 23.42 |       |       |       |       |
| 5                          | HSDPA<br>(Cellular) |     | 1            | 22.79        | 22.52 | 22.49 | 0     | 2/15  | 15/15 | 2/15  |
| 2                          |                     |     | 22.78        | 22.50        | 22.49 | 0     | 12/15 | 15/15 | 12/15 |       |
| 3                          |                     |     | 22.26        | 22.05        | 21.99 | 0.5   | 15/15 | 8/15  | 15/8  |       |
| 4                          |                     |     | 22.23        | 22.01        | 21.93 | 0.5   | 15/15 | 4/15  | 15/4  |       |
| 6                          | HSUPA               |     | 1            | 22.12        | 22.01 | 21.86 | 0     | 11/15 | 15/15 | 11/15 |
| 2                          |                     |     | 21.25        | 21.04        | 21.15 | 2     | 6/15  | 15/15 | 6/15  |       |
| 3                          |                     |     | 21.56        | 21.33        | 20.99 | 1     | 15/15 | 9/15  | 15/9  |       |
| 4                          |                     |     | 21.66        | 21.46        | 21.44 | 2     | 2/15  | 15/15 | 2/15  |       |
| 5                          |                     |     | 22.76        | 22.49        | 22.44 | 0     | 15/15 | 15/15 | 15/15 |       |

## 5. Effective Radiated Power

### 5.1 Measurement procedure [FCC 22.913(a)]

#### <Step 1>

The EUT and support equipment are placed on a 1 meter x 2.0 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 turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission.

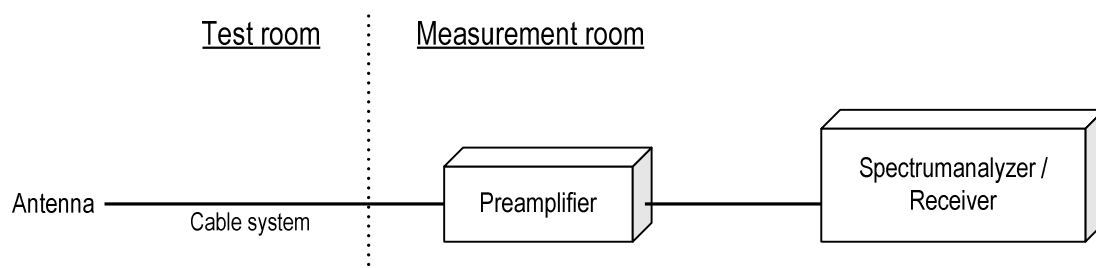
#### <Step 2>

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

Margin = Limit - Result (ERP)

Example:

Limit @ 836.6MHz : 38.4dBm

S.G Reading = 28.6dBm Cable loss = 0.7dB Ant. Gain = -10.7dB

Result =  $28.6 - 0.7 + (-10.7) = 17.2\text{dBm}$

Margin =  $38.4 - 17.2 = 21.2\text{dB}$

## 5.3 Limit

7 W (38.45dBm)

## 5.4 Test data

|             |                            |               |   |                       |
|-------------|----------------------------|---------------|---|-----------------------|
| Date        | : November 25, 2015        | Test engineer | : | <u>Kazunori Saito</u> |
| Temperature | : 20.3 [°C]                |               |   |                       |
| Humidity    | : 34.8 [%]                 |               |   |                       |
| Test place  | : 3m Semi-anechoic chamber |               |   |                       |
| Date        | : December 15, 2015        | Test engineer | : | <u>Kazunori Saito</u> |
| Temperature | : 24.3 [°C]                |               |   |                       |
| Humidity    | : 21.1 [%]                 |               |   |                       |
| Test place  | : 3m Semi-anechoic chamber |               |   |                       |
| Date        | : December 16, 2015        | Test engineer | : | <u>Kazunori Saito</u> |
| Temperature | : 23.9 [°C]                |               |   |                       |
| Humidity    | : 20.9 [%]                 |               |   |                       |
| Test place  | : 3m Semi-anechoic chamber |               |   |                       |
| Date        | : December 17, 2015        | Test engineer | : | <u>Taiki Watanabe</u> |
| Temperature | : 20.8 [°C]                |               |   |                       |
| Humidity    | : 22.7 [%]                 |               |   |                       |
| Test place  | : 3m Semi-anechoic chamber |               |   |                       |

### [GSM850]

| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBd] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| H   | 824.2              | -12.6                | 36.0                 | 0.7                | -10.7             | 24.6            | 38.4           | 13.8           |
| H   | 836.6              | -13.3                | 34.9                 | 0.7                | -10.7             | 23.5            | 38.4           | 14.9           |
| H   | 848.8              | -14.0                | 34.5                 | 0.8                | -10.7             | 23.1            | 38.4           | 15.3           |

### [WCDMA Band V]

| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBd] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| H   | 826.4              | -10.7                | 28.6                 | 0.7                | -10.7             | 17.2            | 38.4           | 21.2           |
| H   | 836.6              | -11.1                | 29.4                 | 0.7                | -10.7             | 18.0            | 38.4           | 20.4           |
| H   | 846.6              | -10.5                | 29.9                 | 0.8                | -10.7             | 18.5            | 38.4           | 19.9           |

## 6. Occupied Bandwidth

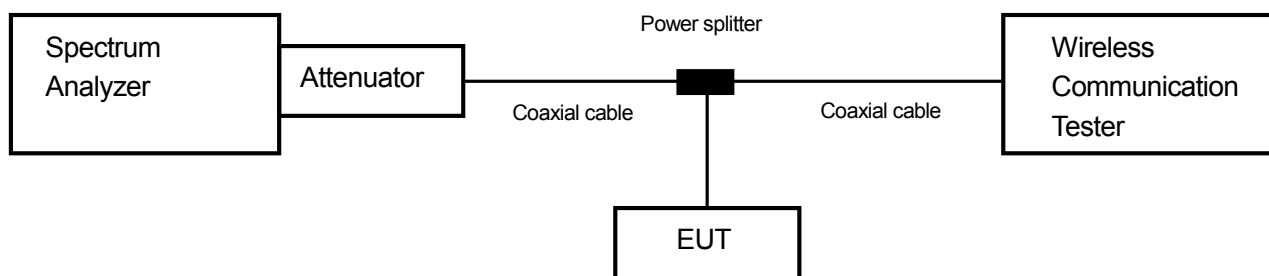
### 6.1 Measurement procedure [FCC 22.917(a), 2.1049]

The Occupied bandwidth was measured with a spectrum analyzer connected to the antenna terminal. The spectrum analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth.

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



### 6.2 Limit

None

### 6.3 Measurement result

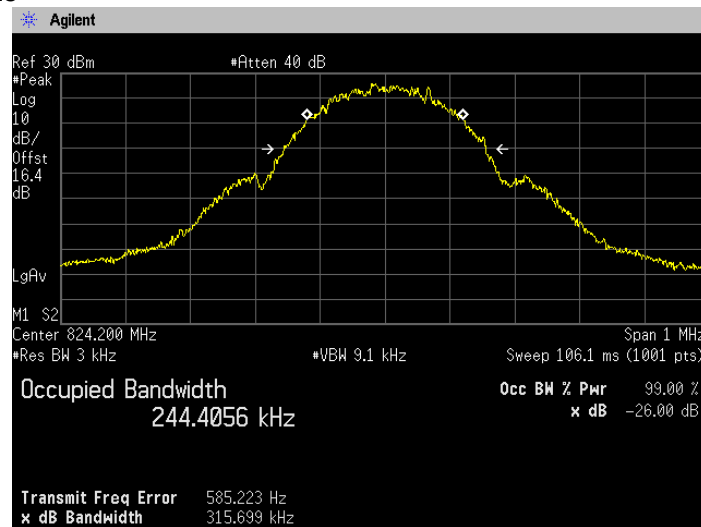
Date : November 2, 2015  
 Temperature : 23.2 [°C]  
 Humidity : 48.1 [%]  
 Test place : Shielded room No.4

Test engineer : Kazunori Saito

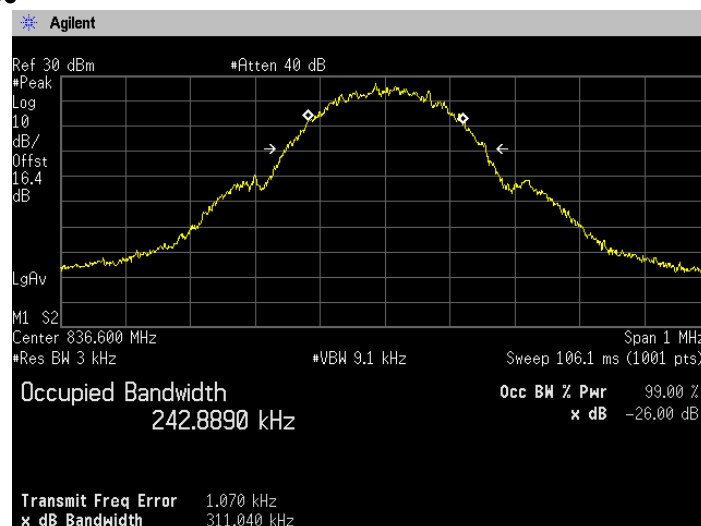
| Band      | Channel | Frequency (MHz) | Test Result (kHz) |
|-----------|---------|-----------------|-------------------|
| GSM850    | 128     | 824.2           | 244.4056          |
|           | 190     | 836.6           | 242.8890          |
|           | 251     | 848.8           | 243.4393          |
| W-CDMA850 | 4132    | 826.4           | 4145.8            |
|           | 4183    | 836.6           | 4141.5            |
|           | 4233    | 846.6           | 4134.8            |

## 6.4 Trace data [GSM850]

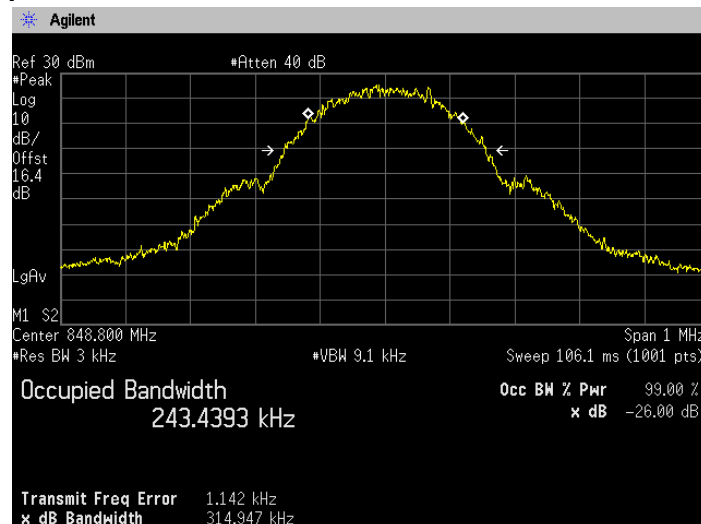
### Channel: 128



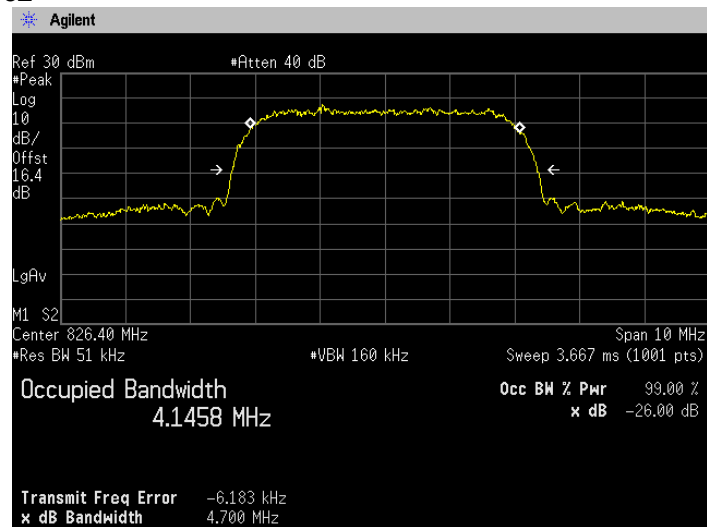
### Channel: 190



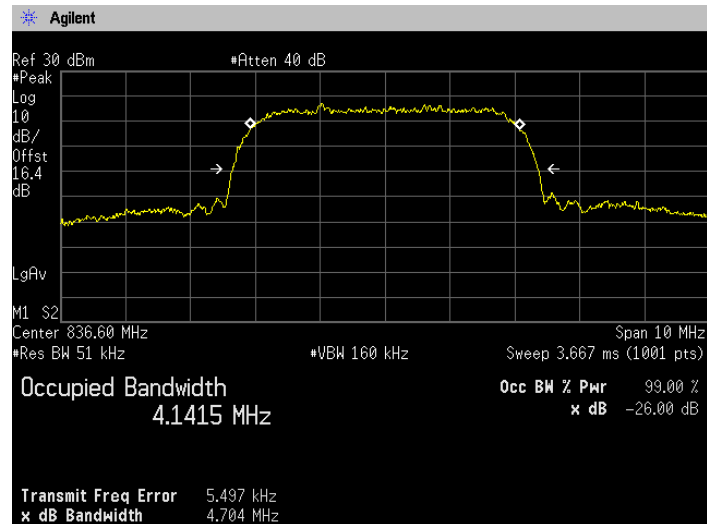
### Channel: 251



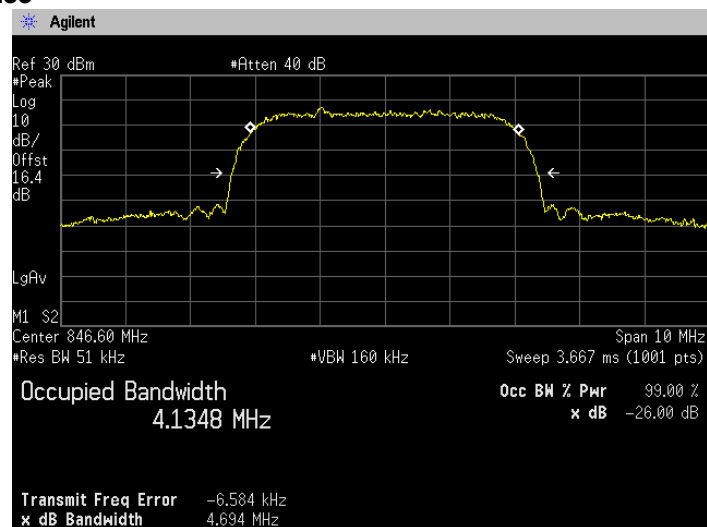
**[WCDMA Band V]**  
**Channel: 4132**



**Channel: 4183**



**Channel: 4233**



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

### 7.1 Measurement procedure [FCC 22.917(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;

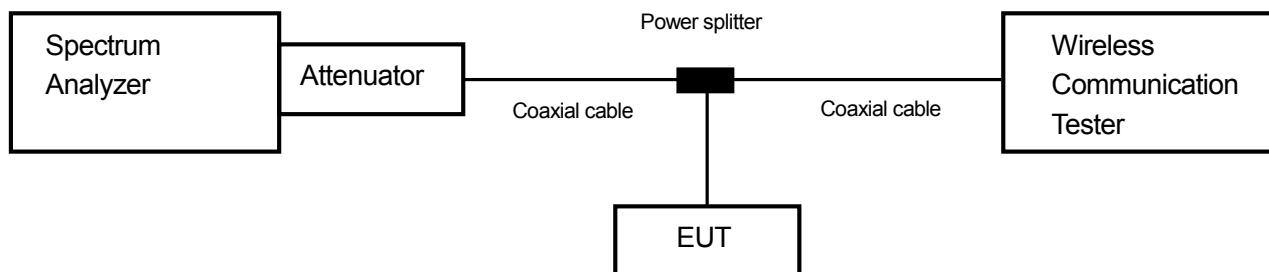
<Band Edge>

- 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



### 7.2 Limit

-13dBm or less

### 7.3 Measurement result

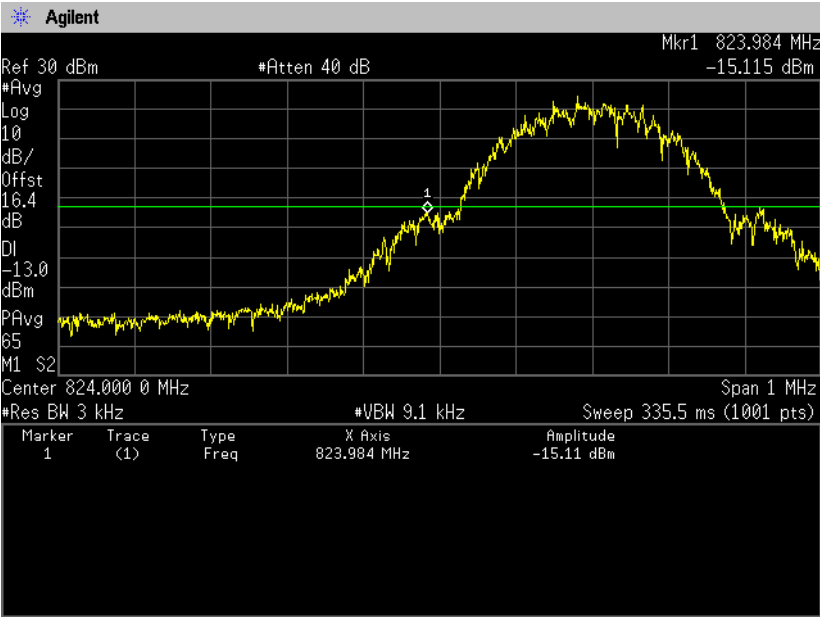
Date : November 2, 2015  
 Temperature : 23.2 [°C]  
 Humidity : 48.1 [%]  
 Test place : Shielded room No.4

Test engineer : Kazunori Saito

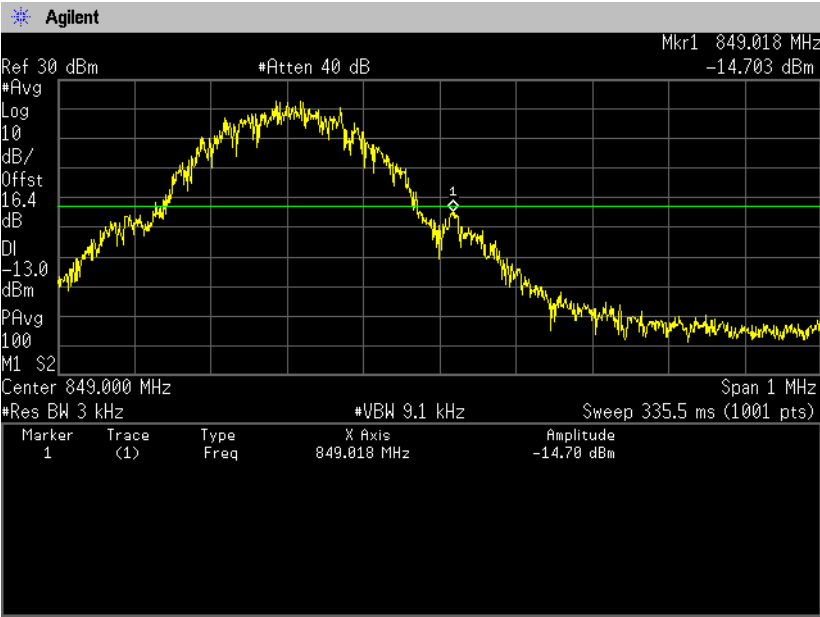
| Band            | Channel | Frequency<br>[MHz] | Limit<br>[dB] | Results            |      |
|-----------------|---------|--------------------|---------------|--------------------|------|
| GSM850          | 128     | 824.2              | -13.0         | See the trace data | PASS |
|                 | 190     | 836.6              | -13.0         | See the trace data | PASS |
|                 | 251     | 848.8              | -13.0         | See the trace data | PASS |
| WCDMA<br>Band V | 4132    | 826.4              | -13.0         | See the trace data | PASS |
|                 | 4183    | 836.6              | -13.0         | See the trace data | PASS |
|                 | 4233    | 846.6              | -13.0         | See the trace data | PASS |

7.4 Trace data  
[GSM850]  
(Band Edge)

Channel: 128



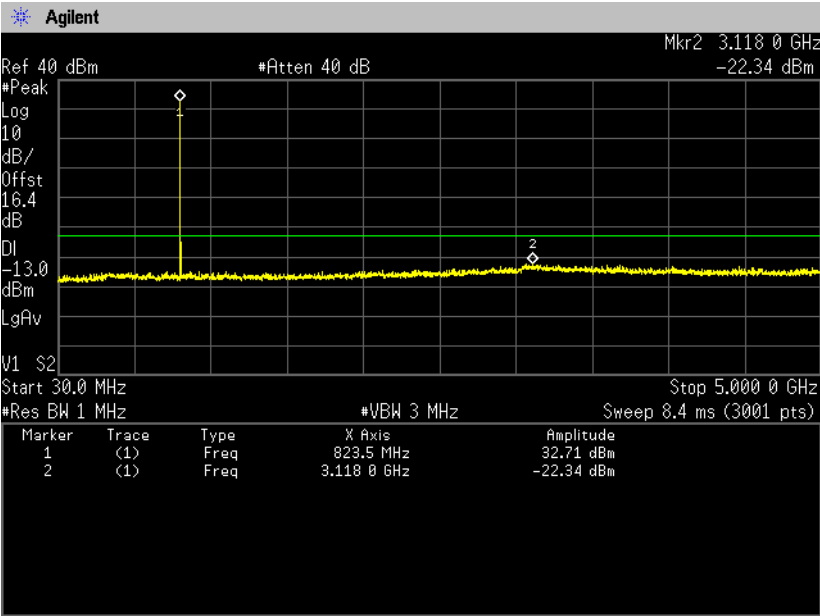
Channel: 251



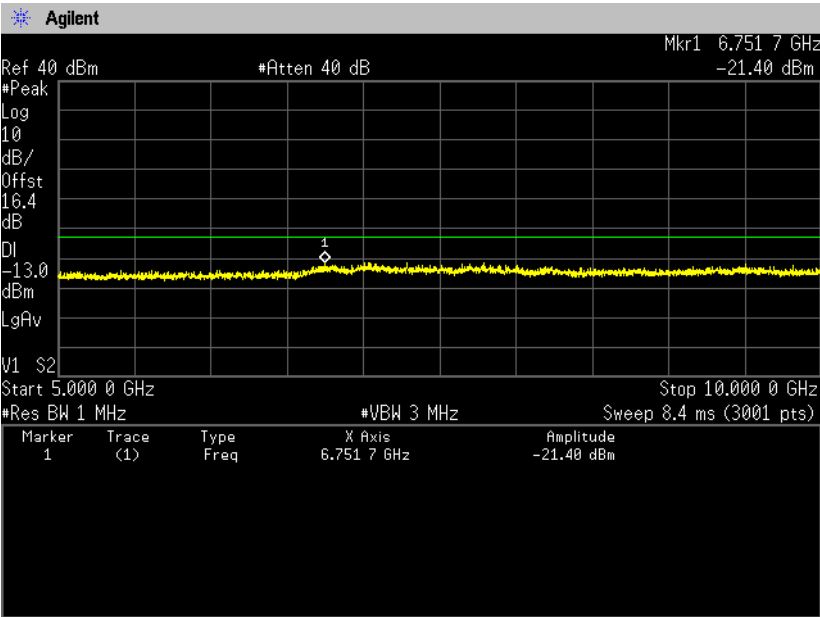
**(Spurious Emissions)**

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

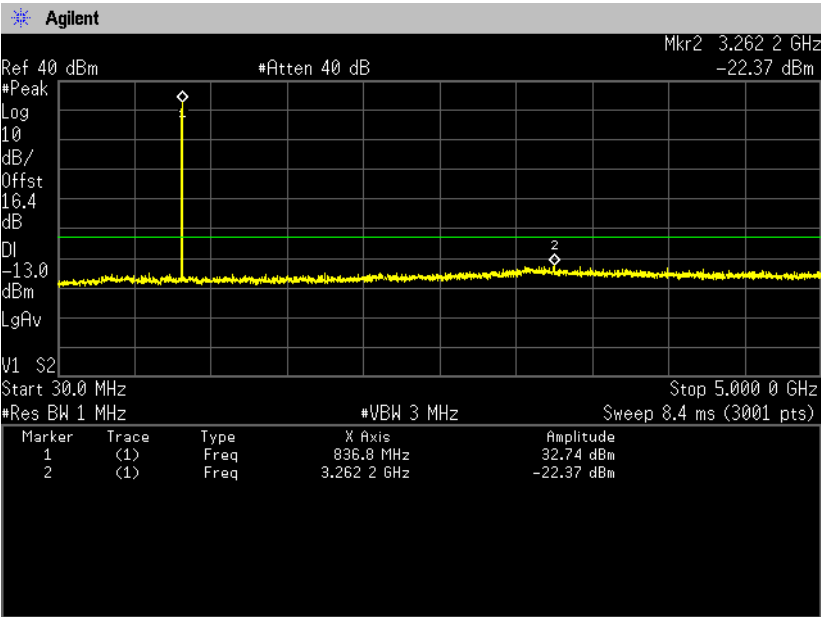
**Channel: 128  
30MHz-5GHz**



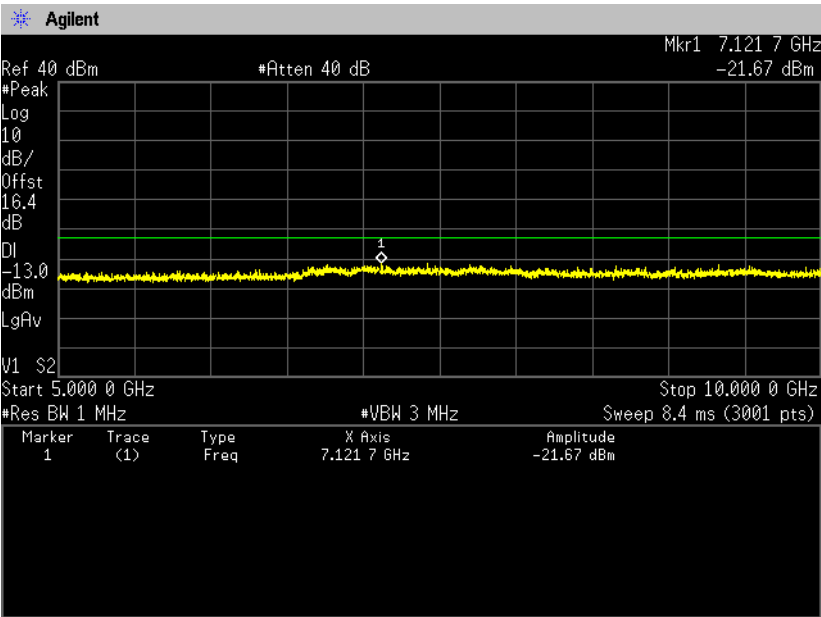
**5GHz-10GHz**



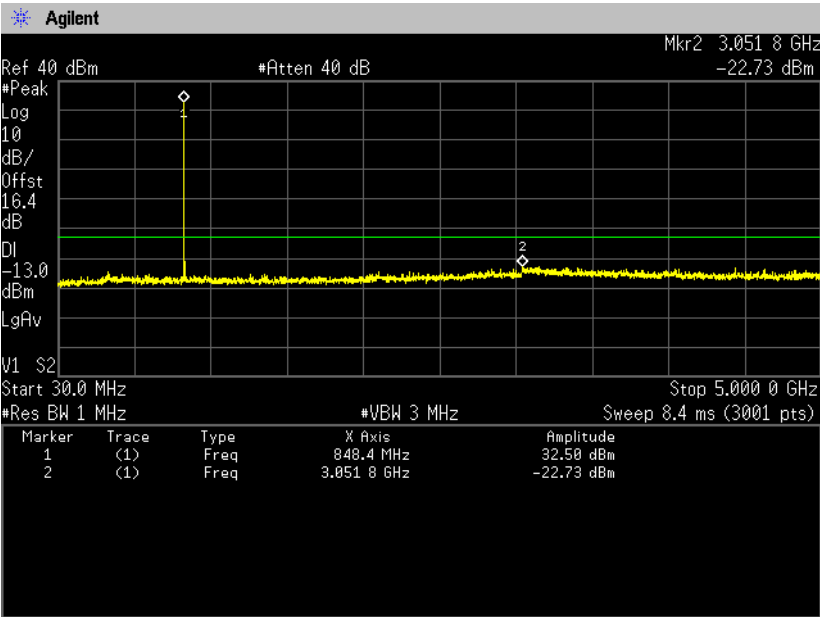
Channel: 190  
30MHz-5GHz



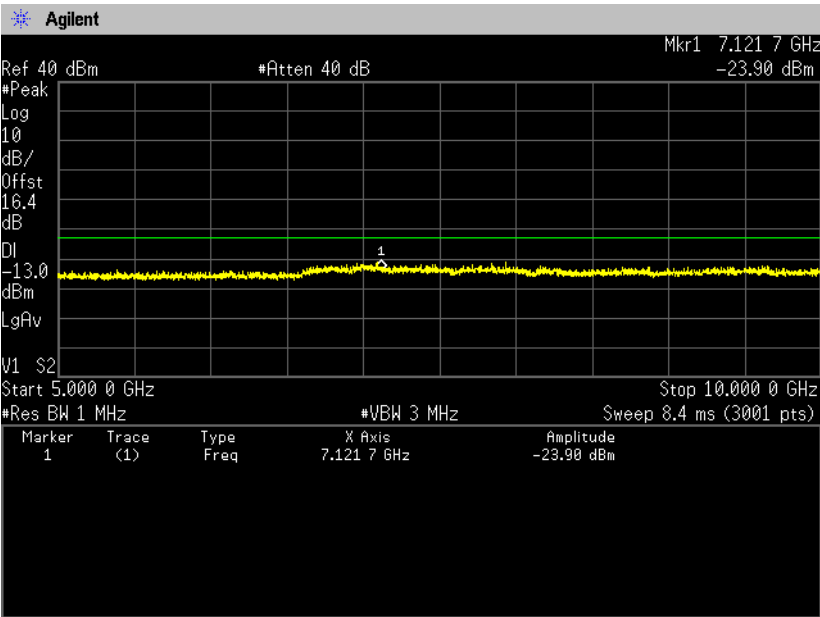
5GHz-10GHz



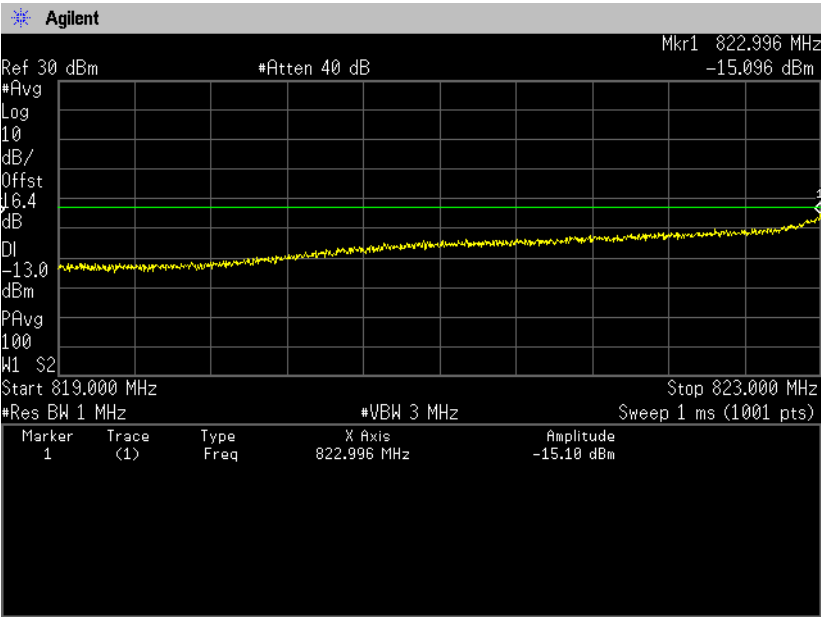
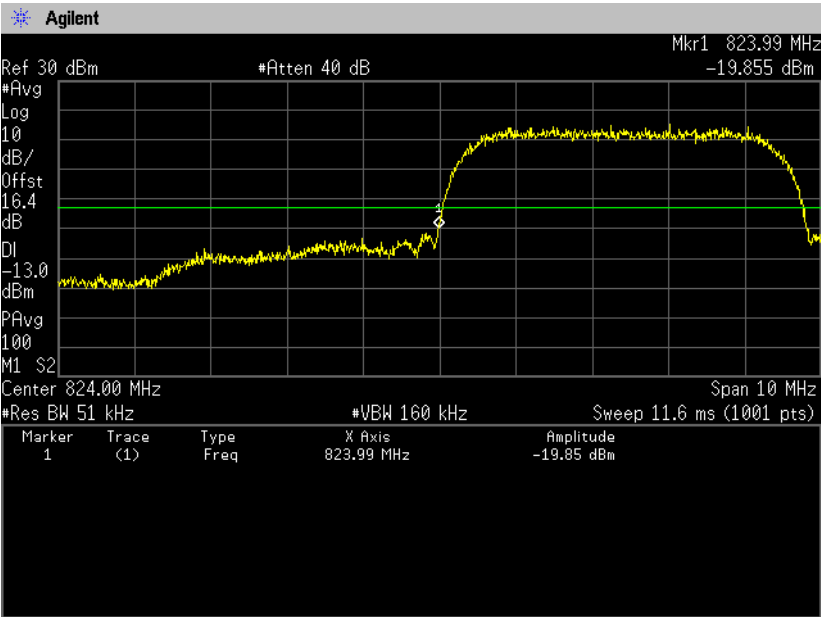
Channel: 251  
30MHz-5GHz



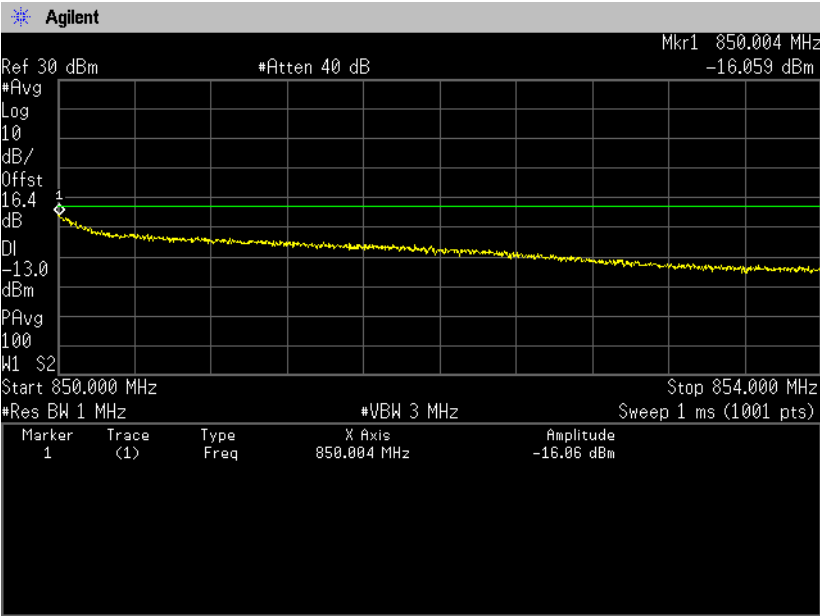
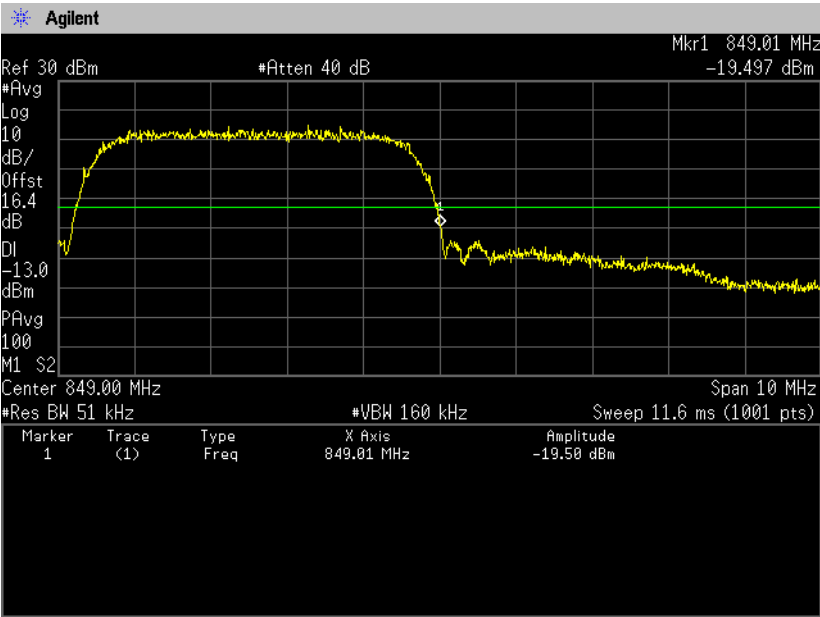
5GHz-10GHz



[WCDMA Band V]  
(Band Edge)  
Channel: 4132



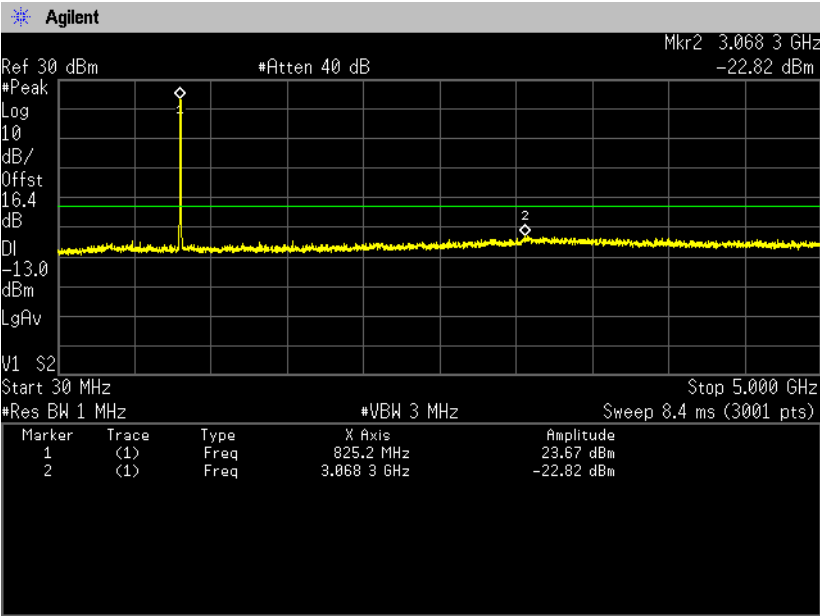
Channel: 4233



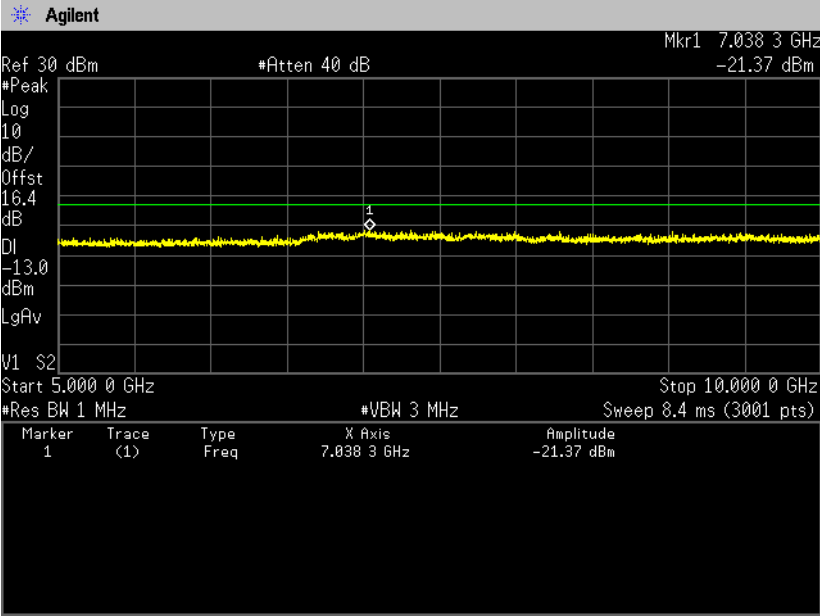
**(Spurious Emissions)**

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

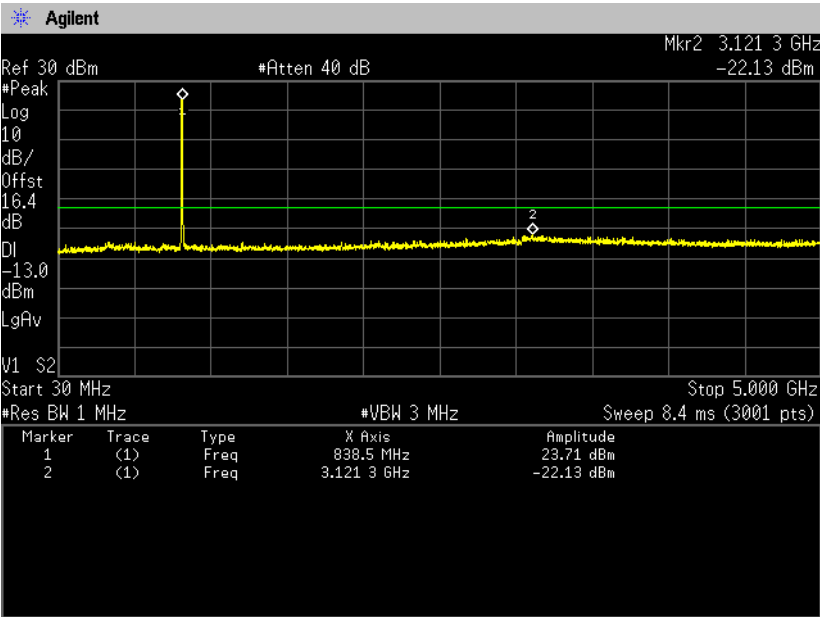
**Channel: 4132**  
**30MHz-5GHz**



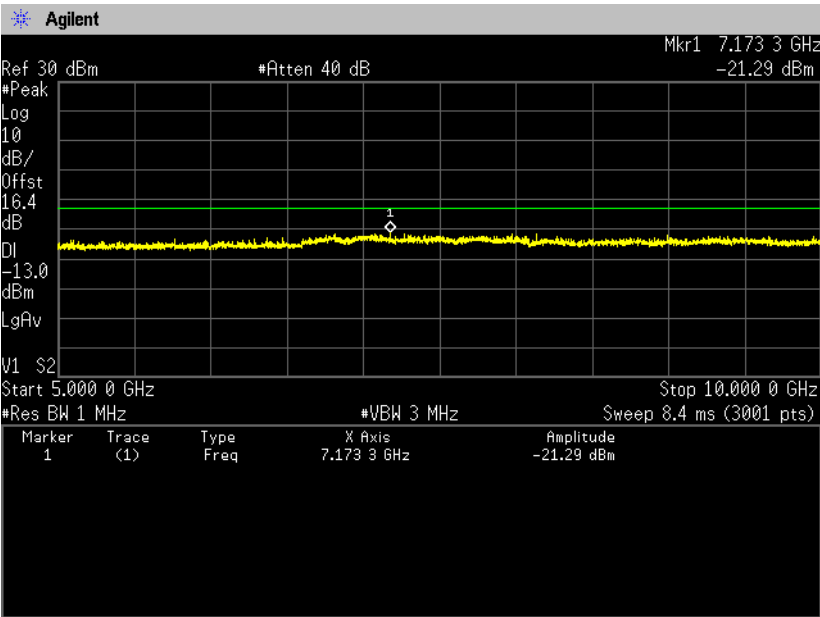
**5GHz-10GHz**



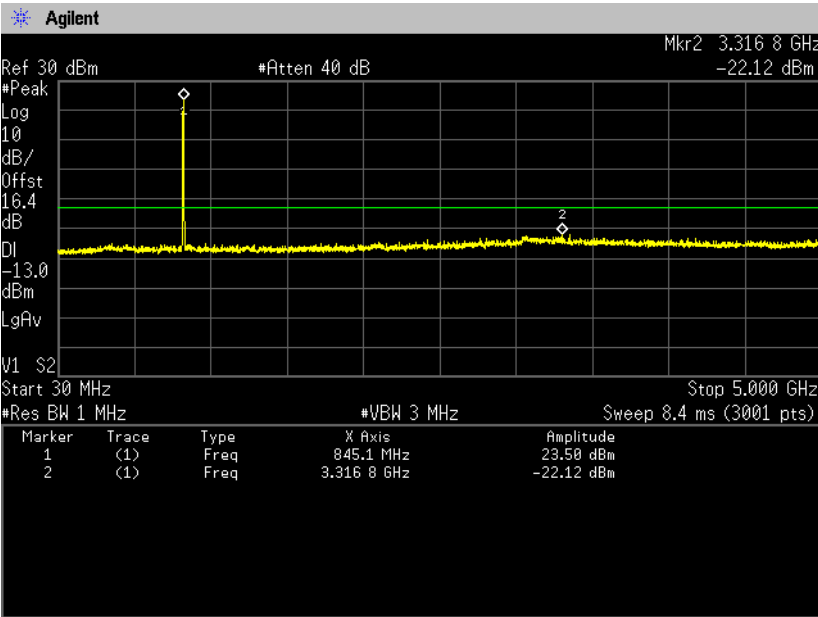
Channel: 4183  
30MHz-5GHz



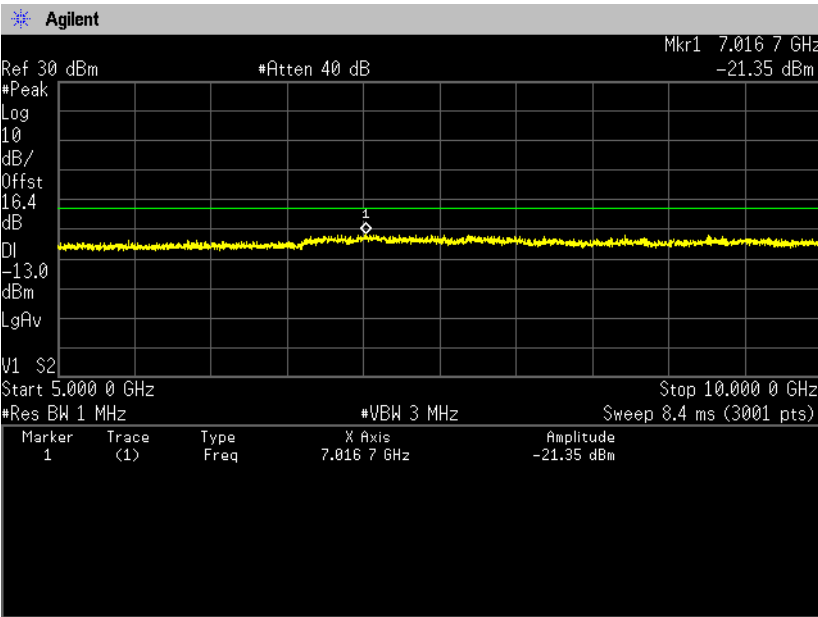
5GHz-10GHz



Channel: 4233  
30MHz-5GHz



5GHz-10GHz



## 8. Radiated Emissions and Harmonic Emissions

### 8.1 Measurement procedure [FCC 22.917(a), 2.1053]

#### <Step 1>

The EUT and support equipment are placed on a 1 meter x 2.0 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).

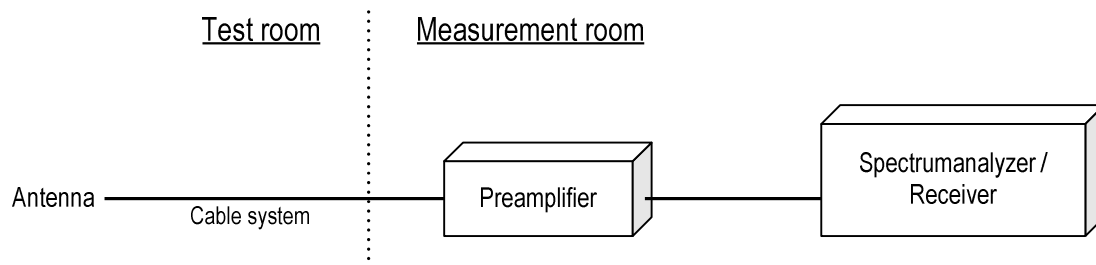
The frequency of the signal generator is adjusted to the measurement frequency.

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



## 8.2 Calculation method

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

Margin = Limit - Result (ERP)

Example:

Limit @ 3346.6MHz : -13.0dBm

S.G Reading = -64.6dBm Cable loss = 1.5dB Ant. Gain = 7.5dBd

Result =  $-64.6 - 1.5 + 7.5 = -58.6$ dBm

Margin =  $-13.0 - (-58.6) = 45.6$ dB

## 8.3 Limit

-13dBm or less

#### 8.4 Test data

Date : November 16, 2015  
 Temperature : 20.3 [°C]  
 Humidity : 34.8 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer : Kazunori Saito

Date : December 17, 2015  
 Temperature : 20.8 [°C]  
 Humidity : 22.7 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer : Taiki Watanabe

#### [GSM850] (Channel: 128)

| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBd] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| H   | 1648.4             | -40.9                | -50.9                | 1.0                | 6.9               | -45.1           | -13.0          | 32.1           |
| V   | 1648.4             | -43.7                | -53.6                | 1.0                | 6.9               | -47.8           | -13.0          | 34.8           |
| H   | 2472.6             | -44.5                | -50.8                | 1.3                | 7.4               | -44.7           | -13.0          | 31.7           |
| V   | 2472.6             | -44.0                | -52.3                | 1.3                | 7.4               | -46.2           | -13.0          | 33.2           |

#### (Channel: 190)

| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBd] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| H   | 1673.2             | -41.9                | -51.7                | 1.1                | 6.6               | -46.1           | -13.0          | 33.1           |
| V   | 1673.2             | -44.9                | -53.9                | 1.1                | 6.6               | -48.3           | -13.0          | 35.3           |
| H   | 2509.8             | -41.8                | -50.7                | 1.3                | 7.5               | -44.6           | -13.0          | 31.6           |
| V   | 2509.8             | -44.7                | -52.6                | 1.3                | 7.5               | -46.5           | -13.0          | 33.5           |

#### (Channel: 251)

| H/V | Frequency<br>[MHz] | S.A Reading<br>[dBm] | S.G Reading<br>[dBm] | Cable loss<br>[dB] | Ant.Gain<br>[dBd] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----|--------------------|----------------------|----------------------|--------------------|-------------------|-----------------|----------------|----------------|
| H   | 1697.6             | -43.5                | -54.0                | 1.1                | 6.3               | -48.7           | -13.0          | 35.7           |
| V   | 1697.6             | -42.6                | -52.2                | 1.1                | 6.3               | -46.9           | -13.0          | 33.9           |
| H   | 2546.4             | -43.9                | -45.1                | 1.3                | 7.6               | -38.8           | -13.0          | 25.8           |
| V   | 2546.4             | -44.9                | -45.2                | 1.3                | 7.6               | -38.9           | -13.0          | 25.9           |

Date : December 15, 2015  
 Temperature : 24.3 [°C]  
 Humidity : 21.1 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer :

Kazunori Saito

Date : December 17, 2015  
 Temperature : 20.8 [°C]  
 Humidity : 22.7 [%]  
 Test place : 3m Semi-anechoic chamber

Test engineer :

Taiki Watanabe

**[WCDMA Band V]**  
**(Channel: 4132)**

| H/V | Frequency [MHz] | S.A Reading [dBm] | S.G Reading [dBm] | Cable loss [dB] | Ant.Gain [dBd] | Result [dBm] | Limit [dBm] | Margin [dB] |
|-----|-----------------|-------------------|-------------------|-----------------|----------------|--------------|-------------|-------------|
| H   | 1652.8          | -51.8             | -62.1             | 1.1             | 6.8            | -56.3        | -13.0       | 43.3        |
| V   | 1652.8          | -54.0             | -64.0             | 1.1             | 6.8            | -58.2        | -13.0       | 45.2        |
| H   | 2479.2          | -54.3             | -57.7             | 1.3             | 7.4            | -51.6        | -13.0       | 38.6        |
| V   | 2479.2          | -55.3             | -58.4             | 1.3             | 7.4            | -52.3        | -13.0       | 39.3        |

**(Channel: 4183)**

| H/V | Frequency [MHz] | S.A Reading [dBm] | S.G Reading [dBm] | Cable loss [dB] | Ant.Gain [dBd] | Result [dBm] | Limit [dBm] | Margin [dB] |
|-----|-----------------|-------------------|-------------------|-----------------|----------------|--------------|-------------|-------------|
| H   | 1673.2          | -51.1             | -60.9             | 1.1             | 6.6            | -55.3        | -13.0       | 42.3        |
| V   | 1673.2          | -52.9             | -61.9             | 1.1             | 6.6            | -56.3        | -13.0       | 43.3        |
| H   | 2509.8          | -55.7             | -58.1             | 1.3             | 7.5            | -52.0        | -13.0       | 39.0        |
| V   | 2509.8          | -54.8             | -58.9             | 1.3             | 7.5            | -52.8        | -13.0       | 39.8        |

**(Channel: 4233)**

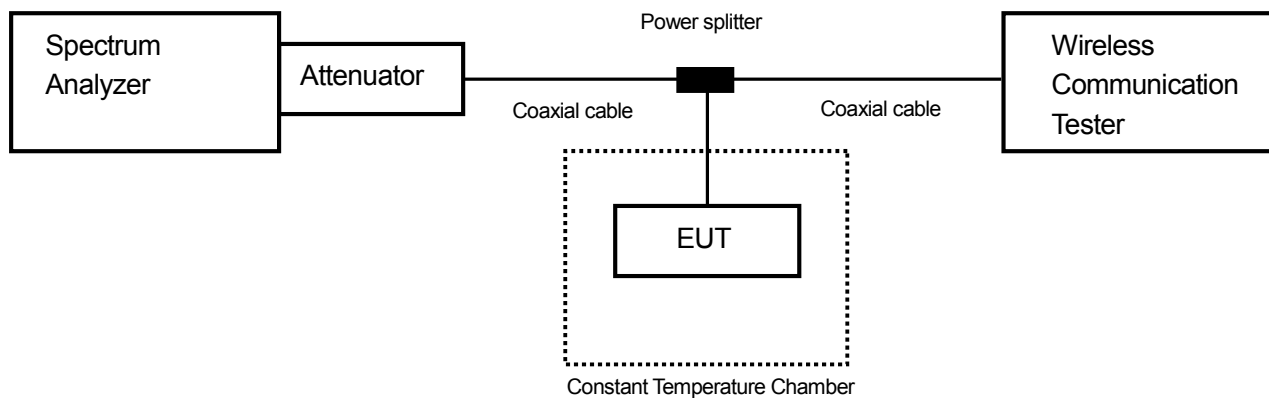
| H/V | Frequency [MHz] | S.A Reading [dBm] | S.G Reading [dBm] | Cable loss [dB] | Ant.Gain [dBd] | Result [dBm] | Limit [dBm] | Margin [dB] |
|-----|-----------------|-------------------|-------------------|-----------------|----------------|--------------|-------------|-------------|
| H   | 1693.2          | -51.8             | -61.7             | 1.1             | 6.4            | -56.4        | -13.0       | 43.4        |
| V   | 1693.2          | -51.5             | -61.8             | 1.1             | 6.4            | -56.5        | -13.0       | 43.5        |
| H   | 2539.8          | -56.3             | -58.9             | 1.3             | 7.6            | -52.6        | -13.0       | 39.6        |
| V   | 2539.8          | -56.4             | -59.3             | 1.3             | 7.6            | -53.0        | -13.0       | 40.0        |

## 9. Frequency Stability

### 9.1 Measurement procedure [FCC 22.355, 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



### 9.2 Limit

$\pm 2.5\text{ppm}$

### 9.3 Measurement result

Date : November 4, 2015  
 Temperature : 23.6 [°C]  
 Humidity : 32.2 [%]  
 Test place : Shielded room No.4

Test engineer : Kazunori Saito

#### [GSM850]

(Channel: 190)

| Limit: $\pm 0.00025\% = \pm 2.5\text{ppm}$ |                  |                             |                           |             |        |
|--------------------------------------------|------------------|-----------------------------|---------------------------|-------------|--------|
| Power Supply [V]                           | Temperature [°C] | Measurements Frequency [Hz] | Frequency Tolerance [ppm] | Limit [ppm] | Result |
| 3.80                                       | 25(Ref.)         | 836,600,025                 | 0.00000                   | $\pm 2.5$   | Pass   |
|                                            | 50               | 836,600,021                 | -0.00506                  | $\pm 2.5$   | Pass   |
|                                            | 40               | 836,600,024                 | -0.00120                  | $\pm 2.5$   | Pass   |
|                                            | 30               | 836,600,024                 | -0.00212                  | $\pm 2.5$   | Pass   |
|                                            | 20               | 836,600,024                 | -0.00104                  | $\pm 2.5$   | Pass   |
|                                            | 10               | 836,600,028                 | 0.00359                   | $\pm 2.5$   | Pass   |
|                                            | 0                | 836,600,029                 | 0.00490                   | $\pm 2.5$   | Pass   |
|                                            | -10              | 836,600,031                 | 0.00656                   | $\pm 2.5$   | Pass   |
|                                            | -20              | 836,600,027                 | 0.00189                   | $\pm 2.5$   | Pass   |
|                                            | -30              | 836,600,030                 | 0.00571                   | $\pm 2.5$   | Pass   |
| 3.230                                      | 25               | 836,600,028                 | 0.00320                   | $\pm 2.5$   | Pass   |
| 4.370                                      | 25               | 836,600,022                 | -0.00378                  | $\pm 2.5$   | Pass   |

#### [WCDMA Band V]

(Channel: 4183)

| Limit: $\pm 0.00025\% = \pm 2.5\text{ppm}$ |                  |                             |                           |             |        |
|--------------------------------------------|------------------|-----------------------------|---------------------------|-------------|--------|
| Power Supply [V]                           | Temperature [°C] | Measurements Frequency [Hz] | Frequency Tolerance [ppm] | Limit [ppm] | Result |
| 3.80                                       | 25(Ref.)         | 836,599,996                 | 0.00000                   | $\pm 2.5$   | Pass   |
|                                            | 50               | 836,599,996                 | -0.00035                  | $\pm 2.5$   | Pass   |
|                                            | 40               | 836,599,995                 | -0.00111                  | $\pm 2.5$   | Pass   |
|                                            | 30               | 836,599,996                 | -0.00045                  | $\pm 2.5$   | Pass   |
|                                            | 20               | 836,599,996                 | -0.00022                  | $\pm 2.5$   | Pass   |
|                                            | 10               | 836,599,996                 | -0.00020                  | $\pm 2.5$   | Pass   |
|                                            | 0                | 836,599,997                 | 0.00025                   | $\pm 2.5$   | Pass   |
|                                            | -10              | 836,600,011                 | 0.01712                   | $\pm 2.5$   | Pass   |
|                                            | -20              | 836,599,996                 | -0.00019                  | $\pm 2.5$   | Pass   |
|                                            | -30              | 836,599,997                 | 0.00025                   | $\pm 2.5$   | Pass   |
| 3.230                                      | 25               | 836,599,997                 | 0.00093                   | $\pm 2.5$   | Pass   |
| 4.370                                      | 25               | 836,599,997                 | 0.00043                   | $\pm 2.5$   | Pass   |

Calculation;

$$\text{Frequency Tolerance (ppm)} = \frac{\text{Measurements Frequency (Hz)} - \text{Reference Frequency (Hz)}}{\text{Reference Frequency (Hz)}} \times 1000000$$

## 10. 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) | $\pm 3.9\text{dB}$      |

## 11. 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, 2015 | Nov. 12, 2014 |
| 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.