



Zacta

# TEST REPORT

Report number : Z071C-13155

Issue date : May 23, 2013

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

## FCC Part15 Subpart C

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

|                            |                       |
|----------------------------|-----------------------|
| Applicant                  | : KYOCERA Corporation |
| Equipment under test (EUT) | : Mobile Phone        |
| Model number               | : YAKF-1              |
| FCC ID                     | : JOYYAKF-1           |

Date of test : April 17, 19, 24, May 23, 2013  
 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 client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Tested by : Chiaki Kanno  
 Chiaki Kanno

Taiki Watanabe  
 Taiki Watanabe

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

**NVLAP**<sup>®</sup>  
 NVLAP LAB CODE 200306-0



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## 1. Summary of Test

### 1.1 Purpose of test

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

### 1.2 Standards

CFR47 FCC Part 15 Subpart C

#### 1.2.1 Test Methods

ANSI C63.4-2003

#### 1.2.2 Deviation from standards

None

### 1.3 List of applied test to the EUT

| Test items Section            | Test items                                     | Condition             | Result |
|-------------------------------|------------------------------------------------|-----------------------|--------|
| 15.247(a)(1)                  | 20dB Bandwidth                                 | Conducted             | PASS   |
| 15.247(a)(1)                  | Carrier Frequency Separation                   | Conducted             | PASS   |
| 15.247(a)(1)(iii)             | Number of Hopping Frequencies                  | Conducted             | PASS   |
| 15.247(a)(1)(iii)             | Time of Occupancy (Dwell Time)                 | Conducted             | PASS   |
| 15.247(b)(3)                  | Maximum Peak Output Power                      | Conducted             | PASS   |
| 15.247(d)                     | Band Edge Compliance of RF Conducted Emissions | Conducted             | PASS   |
| 15.247(d)<br>15.205<br>15.209 | Spurious Emissions                             | Conducted<br>Radiated | PASS   |
| 15.247(d)<br>15.205<br>15.209 | Restricted Bands of Operation                  | Radiated              | PASS   |
| 15.207                        | AC Power Line Conducted Emissions              | Conducted             | PASS   |

#### 1.3.1 Test set up

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### 1.4 Modification to the EUT by laboratory

None



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## **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                  | : | YAKF-1                                                                                                                                             |
| Serial number                 | : | N/A                                                                                                                                                |
| EUT condition                 | : | Pre-Production                                                                                                                                     |
| Max. frequency                | : | 1.5GHz                                                                                                                                             |
| Power ratings                 | : | Battery: DC 3.8 V                                                                                                                                  |
| Size                          | : | (W) 134 × (D) 66 × (H) 10.9mm                                                                                                                      |
| Environment                   | : | Indoor and Outdoor use                                                                                                                             |
| Terminal limitation           | : | -20°C to 60°C                                                                                                                                      |
| RF Specification<br>Protocol  | : | Bluetooth 4.0 + EDR                                                                                                                                |
| Frequency range               | : | 2402MHz-2480MHz                                                                                                                                    |
| Number of RF<br>Channels      | : | 79 Channels                                                                                                                                        |
| Modulation type/<br>Data rate | : | FHSS: GFSK (1Mbps), π/4-DQPSK (2Mbps), 8-DPSK (3Mbps)                                                                                              |
| Channel separation            | : | 1MHz                                                                                                                                               |
| Output power                  | : | 6.138mW (DH5)<br>5.070mW (3-DH5)                                                                                                                   |
| Antenna type                  | : | Internal antenna                                                                                                                                   |
| Antenna gain                  | : | 0dBi                                                                                                                                               |

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

Not applicable

### 2.4 Operating channels and frequencies

| Channel | Frequency [MHz] | Channel | Frequency [MHz] | Channel | Frequency [MHz] |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 0       | 2402            | 27      | 2429            | 54      | 2456            |
| 1       | 2403            | 28      | 2430            | 55      | 2457            |
| 2       | 2404            | 29      | 2431            | 56      | 2458            |
| 3       | 2405            | 30      | 2432            | 57      | 2459            |
| 4       | 2406            | 31      | 2433            | 58      | 2460            |
| 5       | 2407            | 32      | 2434            | 59      | 2461            |
| 6       | 2408            | 33      | 2435            | 60      | 2462            |
| 7       | 2409            | 34      | 2436            | 61      | 2463            |
| 8       | 2410            | 35      | 2437            | 62      | 2464            |
| 9       | 2411            | 36      | 2438            | 63      | 2465            |
| 10      | 2412            | 37      | 2439            | 64      | 2466            |
| 11      | 2413            | 38      | 2440            | 65      | 2467            |
| 12      | 2414            | 39      | 2441            | 66      | 2468            |
| 13      | 2415            | 40      | 2442            | 67      | 2469            |
| 14      | 2416            | 41      | 2443            | 68      | 2470            |
| 15      | 2417            | 42      | 2444            | 69      | 2471            |
| 16      | 2418            | 43      | 2445            | 70      | 2472            |
| 17      | 2419            | 44      | 2446            | 71      | 2473            |
| 18      | 2420            | 45      | 2447            | 72      | 2474            |
| 19      | 2421            | 46      | 2448            | 73      | 2475            |
| 20      | 2422            | 47      | 2449            | 74      | 2476            |
| 21      | 2423            | 48      | 2450            | 75      | 2477            |
| 22      | 2424            | 49      | 2451            | 76      | 2478            |
| 23      | 2425            | 50      | 2452            | 77      | 2479            |
| 24      | 2426            | 51      | 2453            | 78      | 2480            |
| 25      | 2427            | 52      | 2454            |         |                 |
| 26      | 2428            | 53      | 2455            |         |                 |

## 2.5 Description of Test mode

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

| Tested Channel | Frequency [MHz] |
|----------------|-----------------|
| Low            | 2402            |
| Middle         | 2441            |
| High           | 2480            |

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

| Tested Channel    | Modulation Technology | Modulation Type | Packet Type |
|-------------------|-----------------------|-----------------|-------------|
| Low, Middle, High | FHSS                  | GFSK            | DH5         |
| Low, Middle, High | FHSS                  | 8-DPSK          | 3-DH5       |

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

## 2.6 Operating mode

[Tx mode]

- i) Bluetooth test program setup to the DM tool
- ii) Select a test mode
  - Operating frequency:
    - No hopping (Channel Low: 2402MHz, Channel Middle: 2441MHz, Channel High: 2480MHz)
    - Hopping
  - Packet type: DH5, 3-DH5
- iii) Start test mode

[Rx mode]

- i) Bluetooth test program setup to the DM tool
- ii) Select a test mode
  - Operating frequency: Channel Low: 2402MHz, Channel Middle: 2441MHz, Channel High: 2480MHz
- iii) Start test mode

### 3. Configuration of equipment

#### 3.1 Equipment(s) used

| No. | Equipment    | Company  | Model No. | Serial No. | FCC ID / DoC | Comment |
|-----|--------------|----------|-----------|------------|--------------|---------|
| 1   | Mobile Phone | KYOCERA  | YAKF-1    | N/A        | JOYYAKF-1    | EUT     |
| 2   | AC Adapter   | SoftBank | AC01-MU-K | N/A        | -            | *       |

\*: AC power line Conducted Emission Test.

#### 3.2 Cable(s) used

| No. | Cable    | Length[m] | Shield | Connector | Comment |
|-----|----------|-----------|--------|-----------|---------|
| a   | DC cable | 1.5       | No     | Plastic   | *       |

\*: AC power line Conducted Emission Test.

#### 3.3 System configuration



# : Un-detachable cable

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



## 4. 20dB Bandwidth

### 4.1 Measurement procedure [FCC 15.247(a)(1)]

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- RBW=30kHz, VBW=100kHz, Span=3MHz, Sweep=auto, Detector=Peak, Trace mode=Max hold

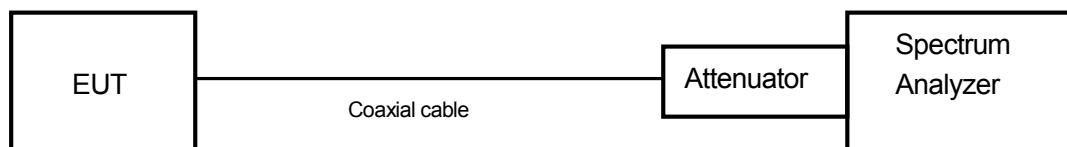
The EUT was set to operate with following conditions.

- No hopping [Channel Low: 2402MHz, Channel Middle: 2441MHz, Channel High: 2480MHz]

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 4.2 Limit

None

### 4.3 Measurement result

Date : Apr. 17, 2013  
 Temperature : 20.0 [°C]  
 Humidity : 50.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

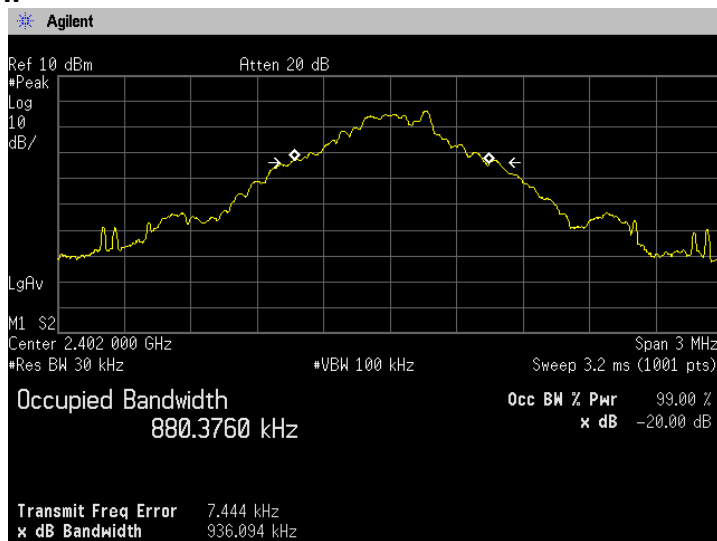
| Channel | Frequency [MHz] | 20dB bandwidth [MHz] |       |
|---------|-----------------|----------------------|-------|
|         |                 | DH5                  | 3-DH5 |
| Low     | 2402            | 0.936                | 1.311 |
| Middle  | 2441            | 0.933                | 1.311 |
| High    | 2480            | 0.934                | 1.311 |



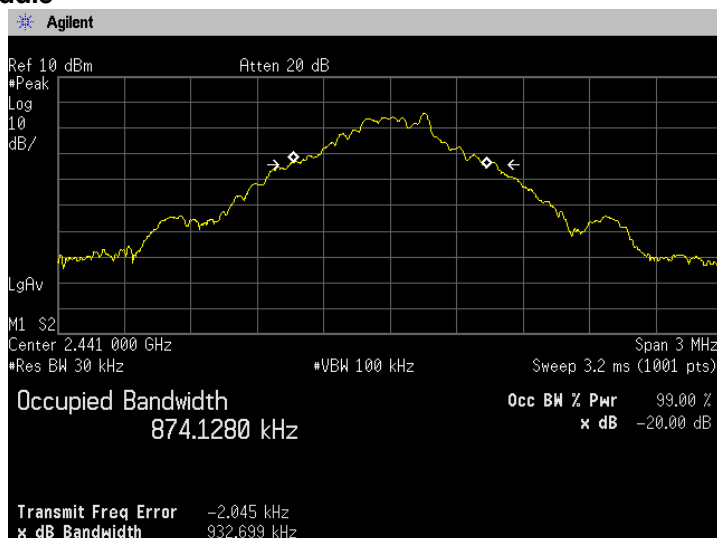
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### 4.4 Trace data [DH5]

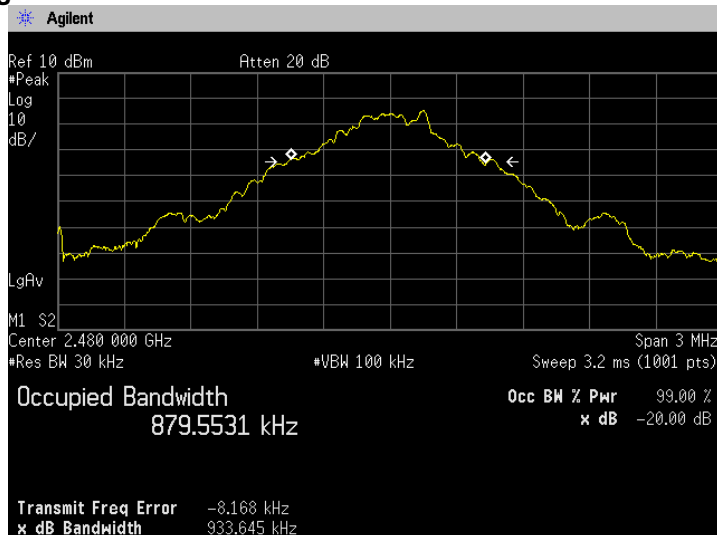
#### Channel Low



#### Channel Middle



#### Channel High

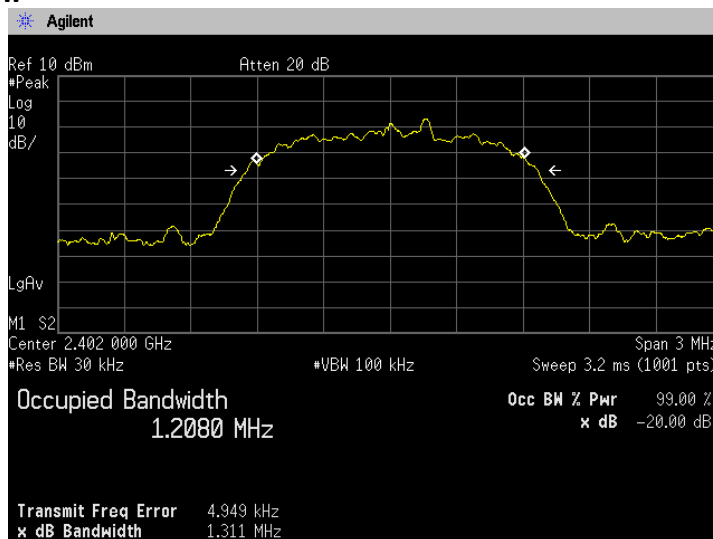




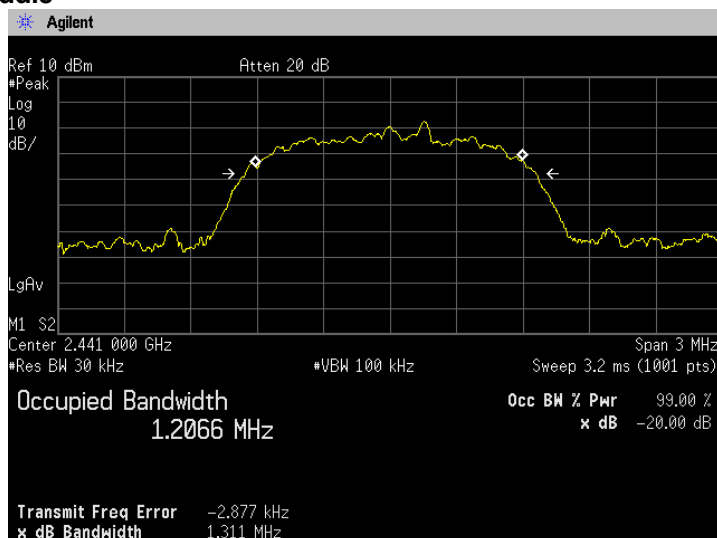
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[3-DH5]

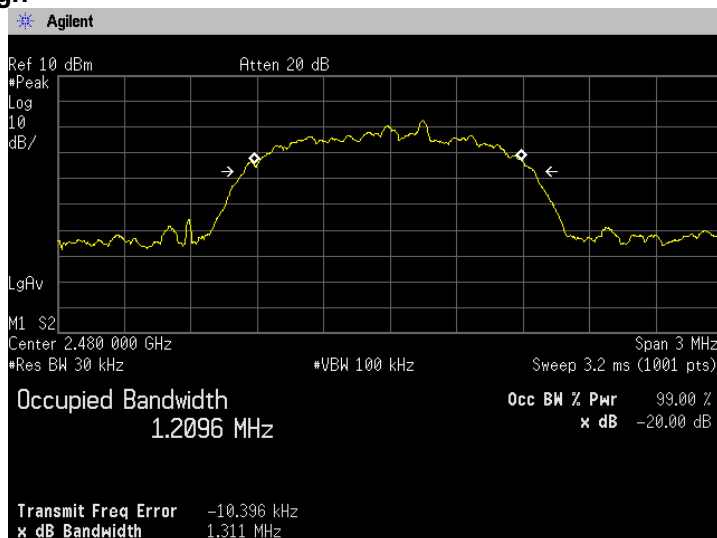
**Channel Low**



**Channel Middle**



**Channel High**



## 5. Carrier Frequency Separation

### 5.1 Measurement procedure [FCC 15.247(a)(1)]

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

The spectrum analyzer is set to;

- RBW=30kHz, VBW=30kHz, Span=3MHz, Sweep=auto, Detector=Peak, Trace mode=Max hold

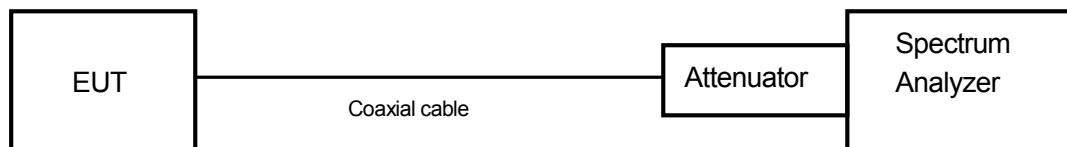
The EUT was set to operate with following conditions.

- Hopping [Channel Middle: 2441MHz]

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 5.2 Limit

System shall have hopping channel carrier frequencies separated by a minimum of, 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

### 5.3 Measurement result

Date : Apr. 17, 2013  
 Temperature : 20.0 [°C]  
 Humidity : 50.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

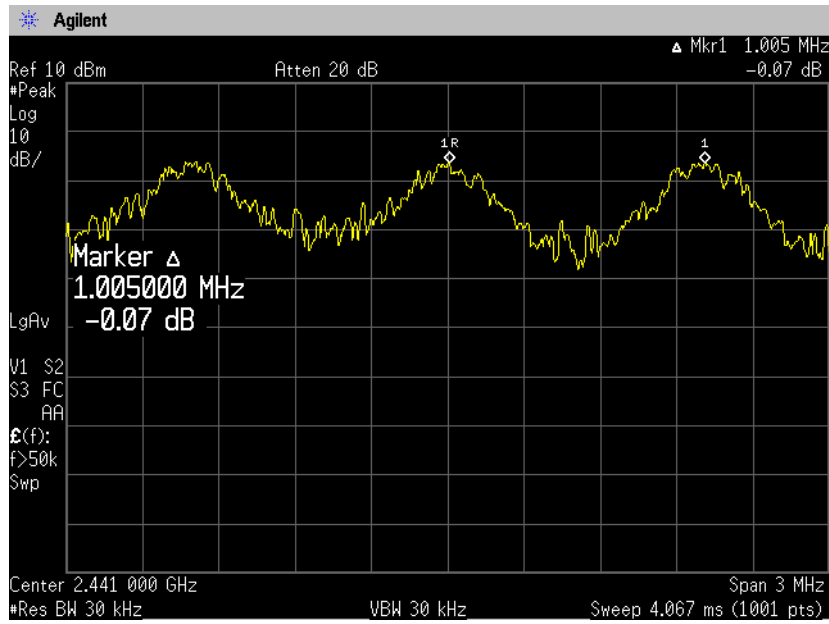
Chiaki Kanno

| Packet type | Channel separation [MHz] | Limit [MHz]                               | Result |
|-------------|--------------------------|-------------------------------------------|--------|
| DH5         | 1.005                    | >two-thirds of the 20dB Bandwidth =624kHz | PASS   |
| 3-DH5       | 1.011                    | >two-thirds of the 20dB Bandwidth =874kHz | PASS   |

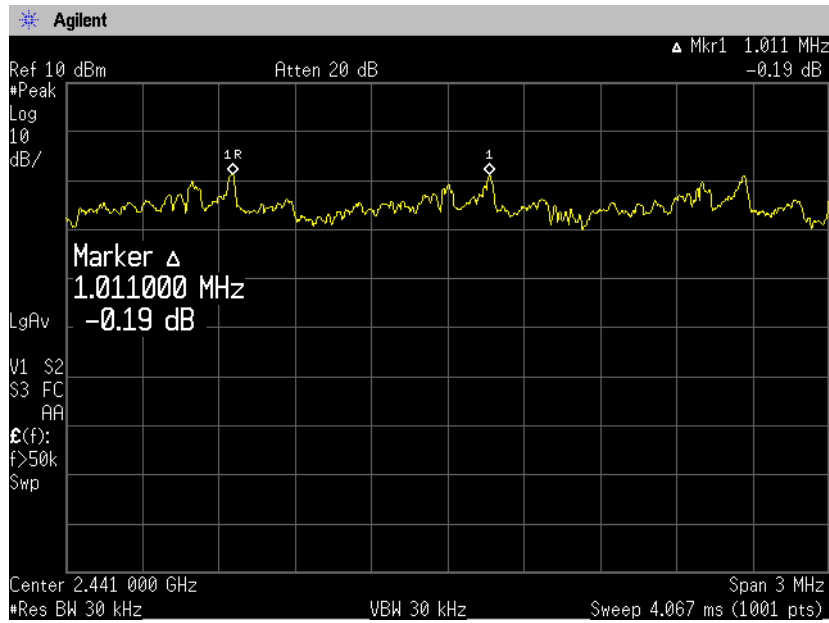


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### 5.4 Trace data [DH5]



### [3-DH5]



## 6. Number of Hopping Frequencies

### 6.1 Measurement procedure [FCC 15.247(a)(1)(iii)]

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

The spectrum analyzer is set to;

- RBW=510kHz, VBW=510kHz, Span=Arbitrary setting, Sweep=auto, Detector=Peak,  
Trace mode=Max hold

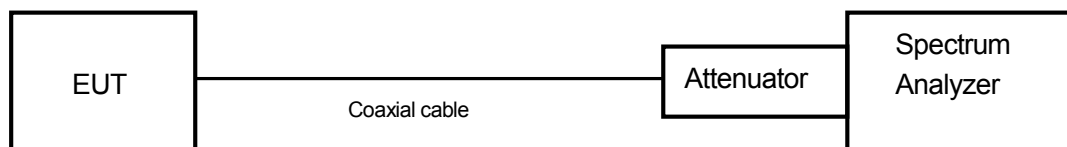
The EUT was set to operate with following conditions.

- Hopping

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 6.2 Limit

Shall have more than 15 channels.

### 6.3 Measurement result

Date : Apr. 17, 2013  
 Temperature : 20.0 [°C]  
 Humidity : 50.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

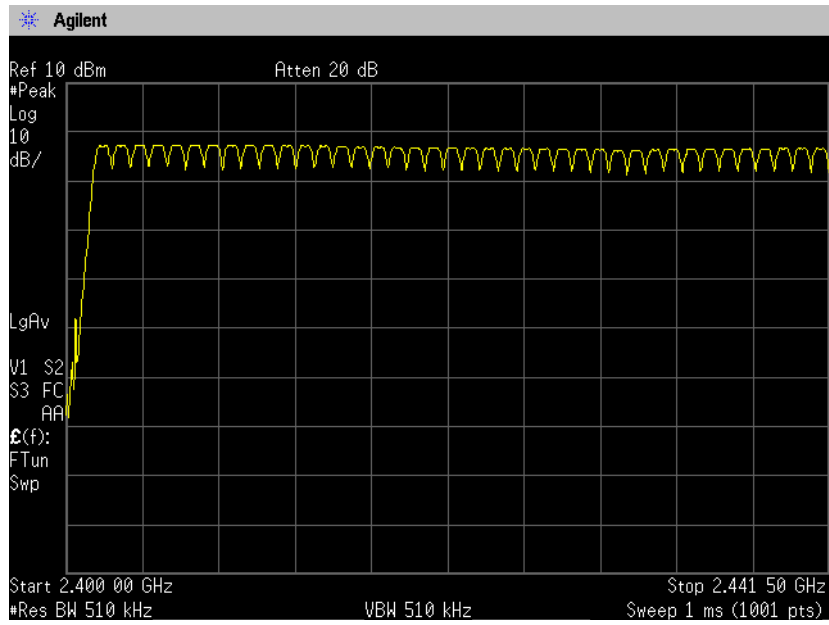
| Number of channels | Limit       | Result |
|--------------------|-------------|--------|
| 79                 | ≥15 channel | PASS   |



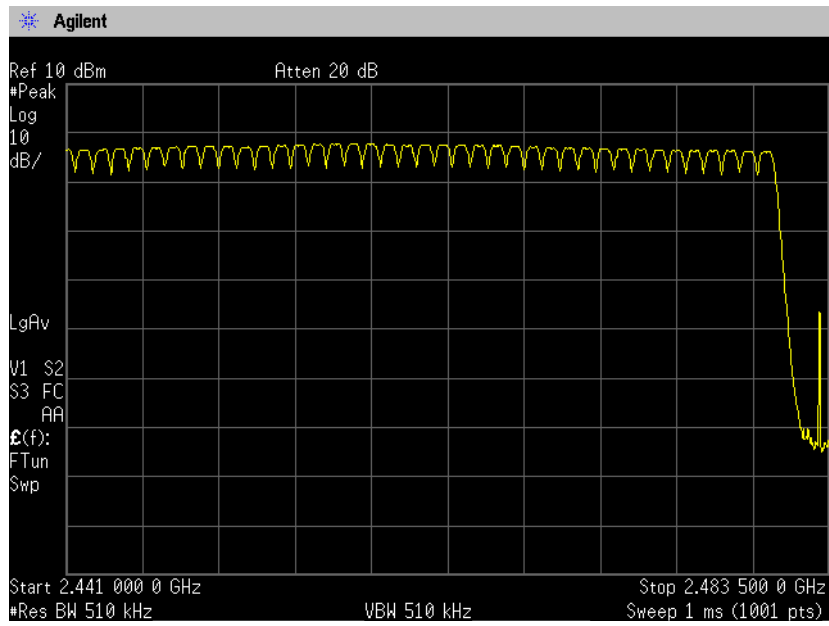
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### 6.4 Trace data [DH5]

Low



High

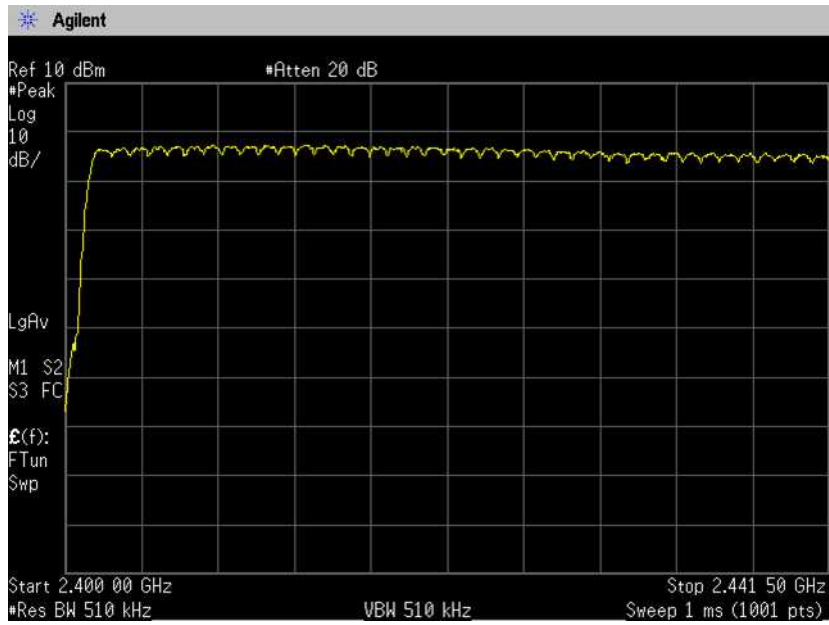




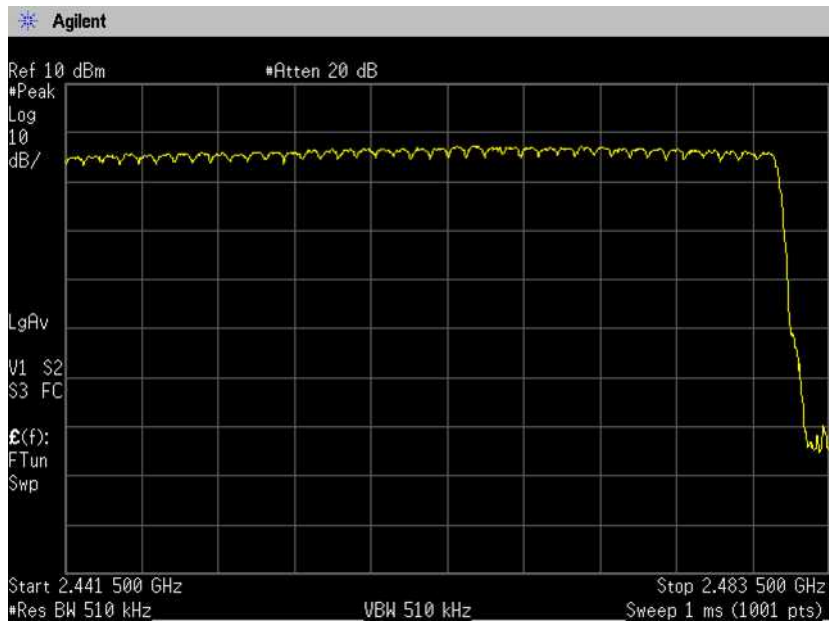
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[3-DH5]

Low



High





## 7. Time of Occupancy (Dwell Time)

### 7.1 Measurement procedure [FCC 15.247(a)(1)(iii)]

The time occupancy of hopping channel is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- RBW=1MHz, VBW=1MHz, Span=0Hz, Sweep=10ms, Detector=Peak, Trace mode=Single

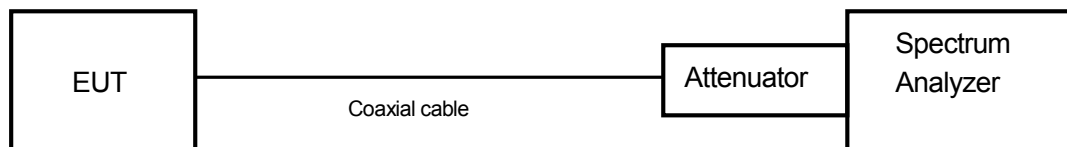
The EUT was set to operate with following conditions.

- Hopping

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 7.2 Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 7.3 Measurement result

Date : Apr. 17, 2013  
 Temperature : 20.0 [°C]  
 Humidity : 50.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki kanno

| Channel | Frequency (MHz) | Packet type | Dwell time (ms) | Occupancy time of 31.6 seconds (s) | Limit | Result |
|---------|-----------------|-------------|-----------------|------------------------------------|-------|--------|
| Low     | 2402            | DH5         | 2.880           | 0.307                              | <0.4s | PASS   |
|         |                 | 3-DH5       | 2.880           | 0.307                              | <0.4s | PASS   |
| Middle  | 2441            | DH5         | 2.880           | 0.307                              | <0.4s | PASS   |
|         |                 | 3-DH5       | 2.880           | 0.307                              | <0.4s | PASS   |
| High    | 2480            | DH5         | 2.880           | 0.307                              | <0.4s | PASS   |
|         |                 | 3-DH5       | 2.880           | 0.307                              | <0.4s | PASS   |

$DH5/3-DH5 = \text{Dwell time (ms)} \times 1600 / 6 / 79 \times 31.6$

The hopping rates of Bluetooth devices change with different types of payload. The longer the payload is, the slower the hopping rate. The hopping rate scenario is defined in Bluetooth core specification.

Calculation:

Occupancy time of 31.6 seconds\* = time domain slot length x hop rate / number of hopper channel / 79 / x 31.6

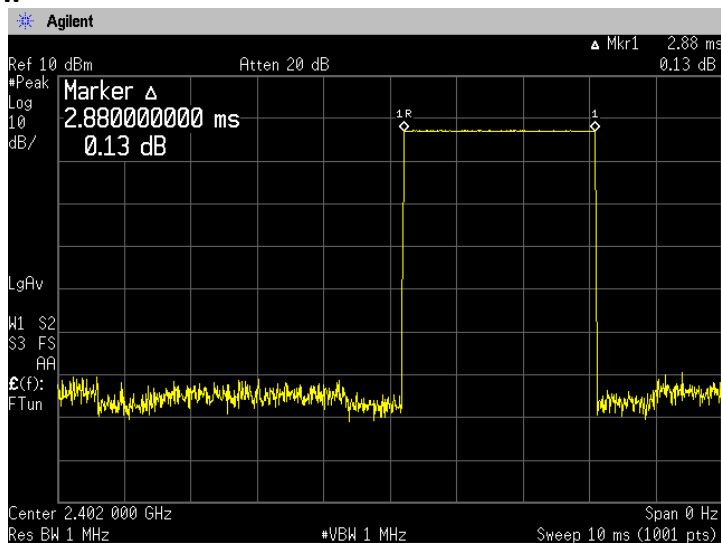
Ex.) for Channel Middle, DH5 = 2.880ms x 1600 / 6 / 79 x 31.6 = 307ms



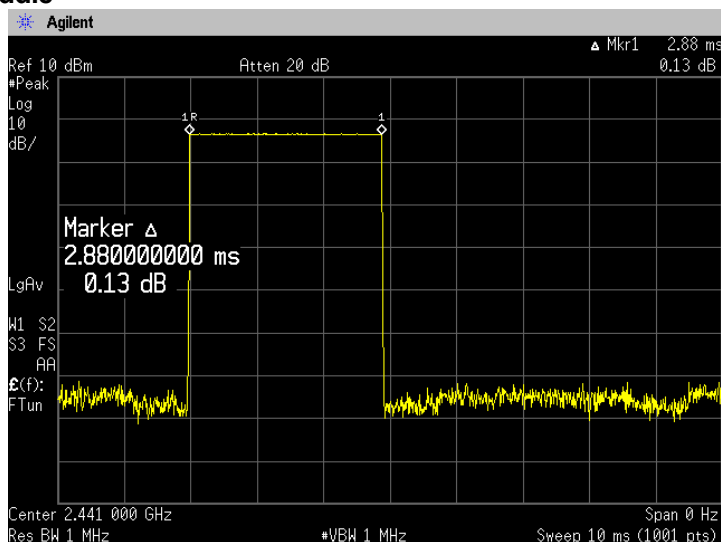
Zacta

### 7.4 Trace data [DH5]

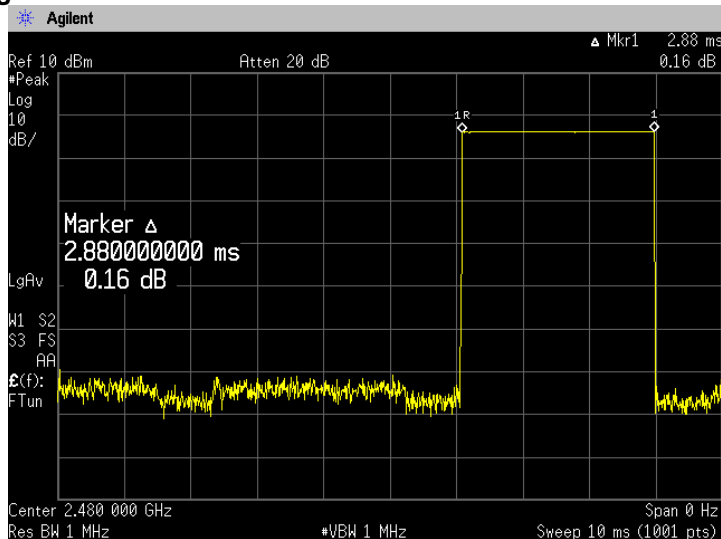
#### Channel Low



#### Channel Middle

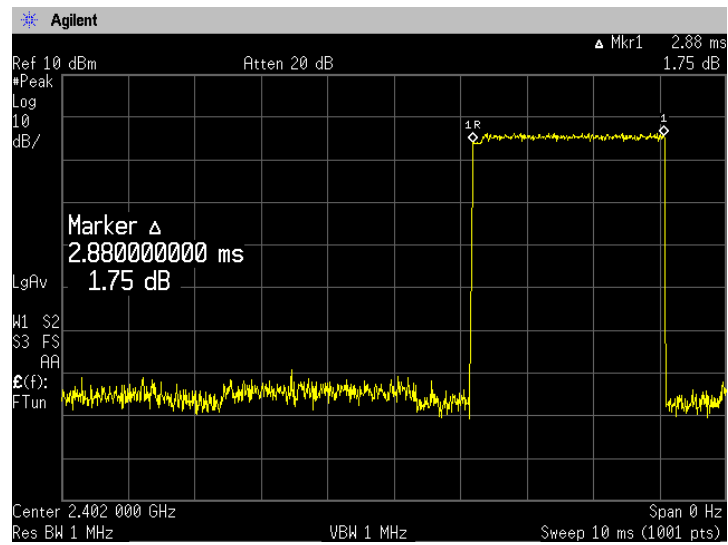


#### Channel High

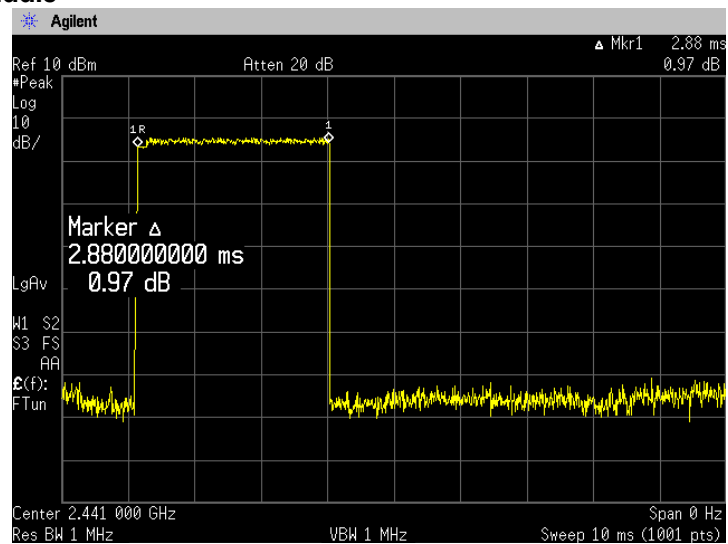


[3-DH5]

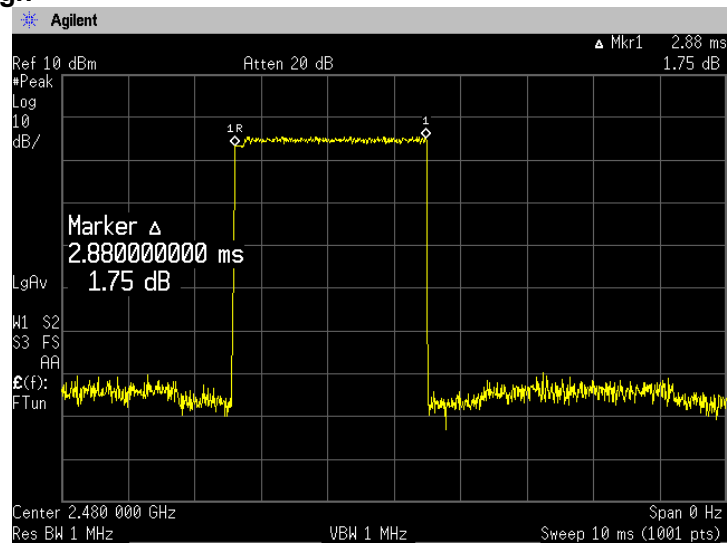
### Channel Low



### Channel Middle



### Channel High



## 8. Maximum Peak Output Power

### 8.1 Measurement procedure

[FCC 15.247(b)(3), 15.31(e)]

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

The spectrum analyzer is set to;

- RBW=1MHz, VBW=3MHz, Span=5MHz, Sweep=auto, Detector=Peak, Trace mode=Max hold

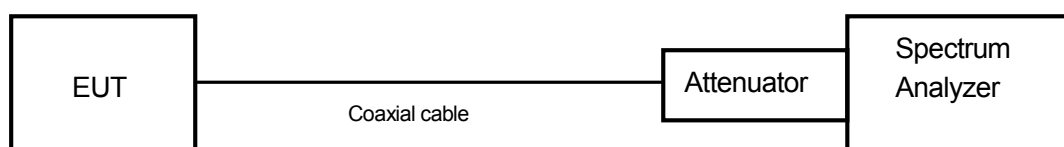
The EUT was set to operate with following conditions.

- No hopping [Channel Low: 2402MHz, Channel Middle: 2441MHz, Channel High: 2480MHz]

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 8.2 Limit

0.125 W or less

### 8.3 Measurement result

Date : Apr. 17, 2013  
 Temperature : 20.0 [°C]  
 Humidity : 50.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki kanno

| Channel | Frequency (MHz) | Packet type | Reading (dBm) | Factor (dB) | Level (dBm) | Peak Output Power (mW) | Limit (mW) | Result |
|---------|-----------------|-------------|---------------|-------------|-------------|------------------------|------------|--------|
| Low     | 2402.00         | DH5         | -2.79         | 10.67       | 7.88        | 6.138                  | ≤125       | PASS   |
|         |                 | 3-DH5       | -3.62         | 10.67       | 7.05        | 5.070                  | ≤125       | PASS   |
| Middle  | 2441.00         | DH5         | -3.30         | 10.67       | 7.37        | 5.458                  | ≤125       | PASS   |
|         |                 | 3-DH5       | -4.28         | 10.67       | 6.39        | 4.355                  | ≤125       | PASS   |
| High    | 2480.00         | DH5         | -3.67         | 10.67       | 7.00        | 5.012                  | ≤125       | PASS   |
|         |                 | 3-DH5       | -4.30         | 10.67       | 6.37        | 4.335                  | ≤125       | PASS   |

Calculation;

$$\text{Reading (dBm)} + \text{Factor (dB)} = \text{Level (dBm)}$$

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

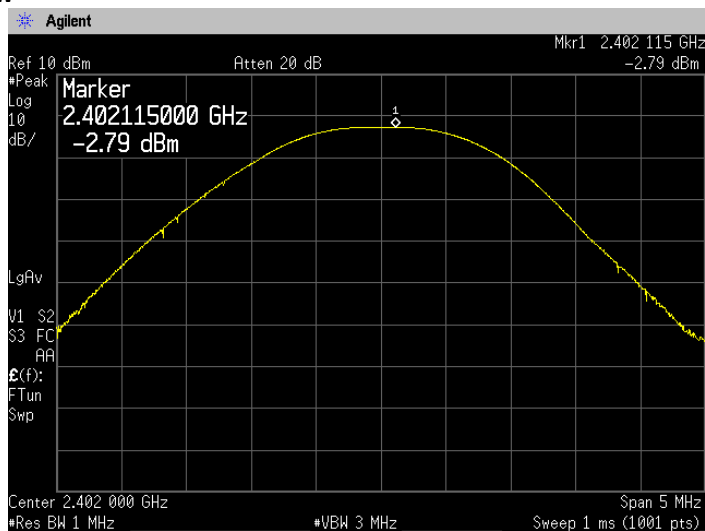
$$P = 10^{(\text{Maximum Peak Output Power} / 10)} \text{ (mW)}$$



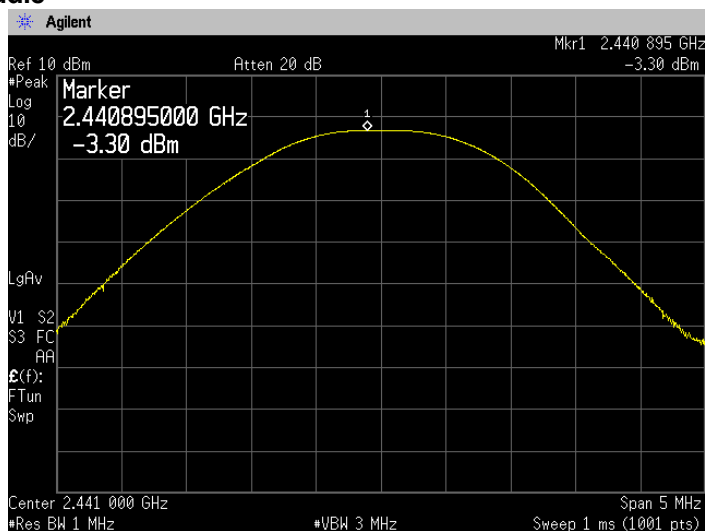
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### 8.4 Trace data [DH5]

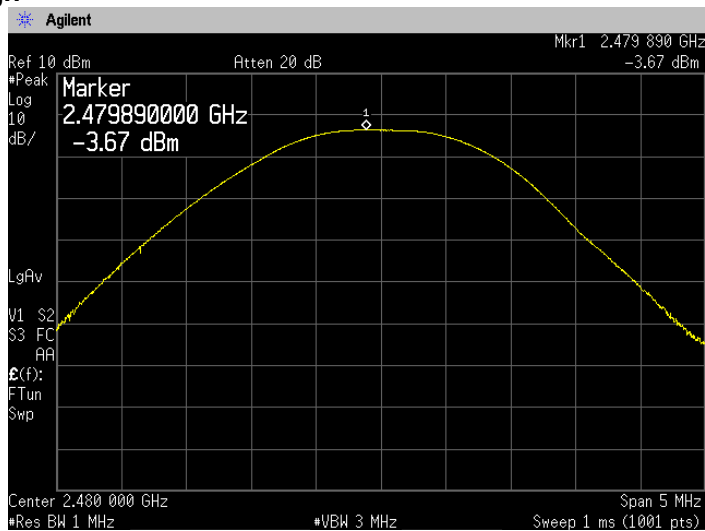
#### Channel Low



#### Channel Middle



#### Channel High

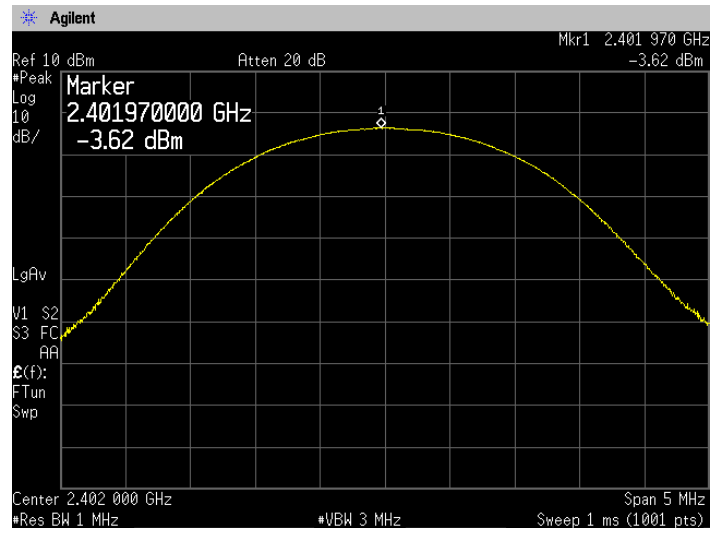




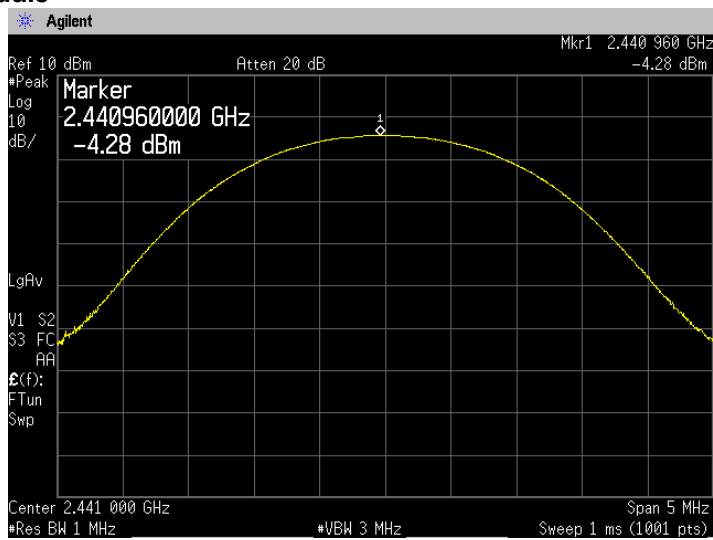
Zacta

[3-DH5]

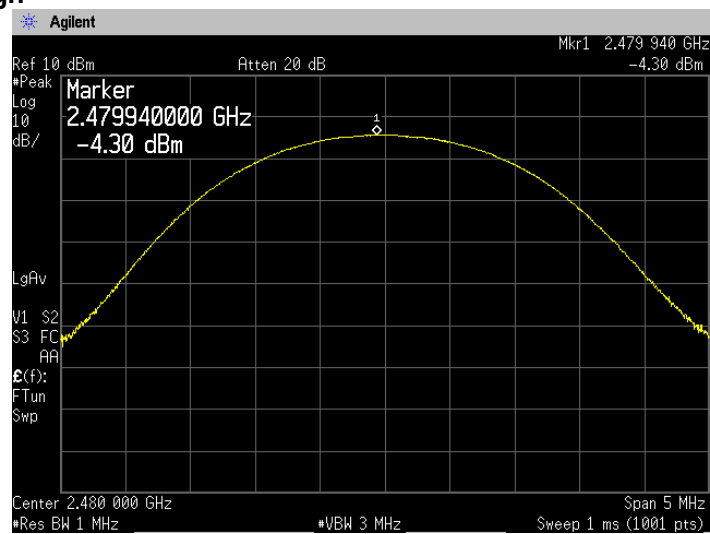
### Channel Low



### Channel Middle



### Channel High



## 9. Band Edge Compliance of RF Conducted Emissions

### 9.1 Measurement procedure [FCC 15.247(d)]

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

The spectrum analyzer is set to;

- RBW=100kHz, VBW=100kHz, Span=Arbitrary setting, Sweep=auto, Detector=Peak, Trace mode=Max hold

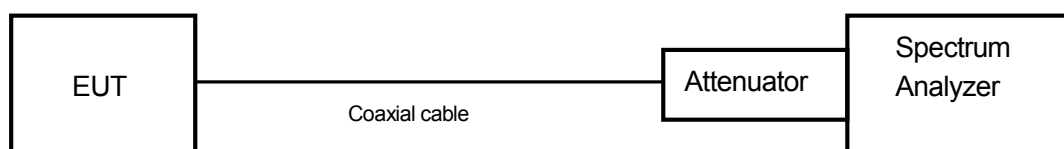
The EUT was set to operate with following conditions.

- No hopping [Channel Low: 2402MHz, Channel High: 2480MHz]
- Hopping

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 9.2 Limit

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

### 9.3 Measurement result

Date : Apr. 17, 2013  
 Temperature : 20.0 [°C]  
 Humidity : 50.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

#### [Hopping]

| Channel | Frequency (MHz) | Packet type | RF Power Level (dBm) | Band-edge Frequency (MHz) | Band-edge Level (dBm) | Difference Level (dBm) | Limit (dBm)                         | Result |
|---------|-----------------|-------------|----------------------|---------------------------|-----------------------|------------------------|-------------------------------------|--------|
| Low     | 2402.00         | DH5         | -2.86                | 2389.37                   | -69.99                | 67.13                  | At least 20dB below from peak of RF | PASS   |
|         |                 | 3-DH5       | -5.87                | 2389.28                   | -69.88                | 64.01                  |                                     | PASS   |
| High    | 2480.00         | DH5         | -3.77                | 2484.93                   | -68.54                | 64.77                  | At least 20dB below from peak of RF | PASS   |
|         |                 | 3-DH5       | -6.95                | 2483.58                   | -68.48                | 61.53                  |                                     | PASS   |



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**[No hopping]**

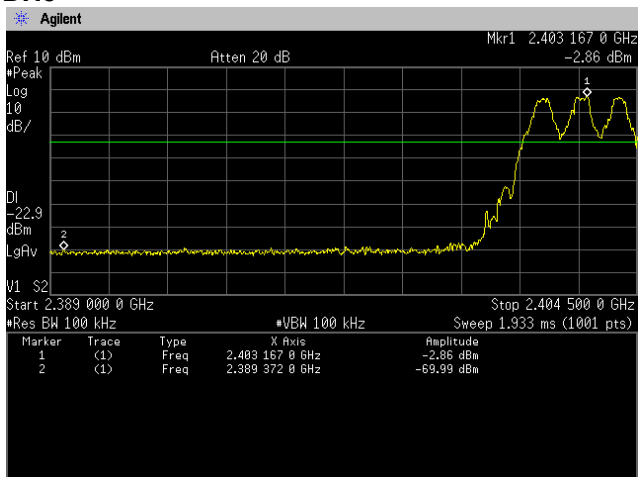
| Channel | Frequency (MHz) | Packet type | RF Power Level (dBm) | Band-edge Frequency (MHz) | Band-edge Level (dBm) | Difference Level (dBm) | Limit (dBm)              | Result |
|---------|-----------------|-------------|----------------------|---------------------------|-----------------------|------------------------|--------------------------|--------|
| Low     | 2402.00         | DH5         | -2.87                | 2389.53                   | -68.61                | 65.74                  | At least<br>20dB         | PASS   |
|         |                 | 3-DH5       | -5.97                | 2389.45                   | -69.04                | 63.07                  |                          | PASS   |
| High    | 2480.00         | DH5         | -3.81                | 2483.56                   | -67.82                | 64.01                  | below from<br>peak of RF | PASS   |
|         |                 | 3-DH5       | -6.70                | 2483.88                   | -69.59                | 62.89                  |                          | PASS   |



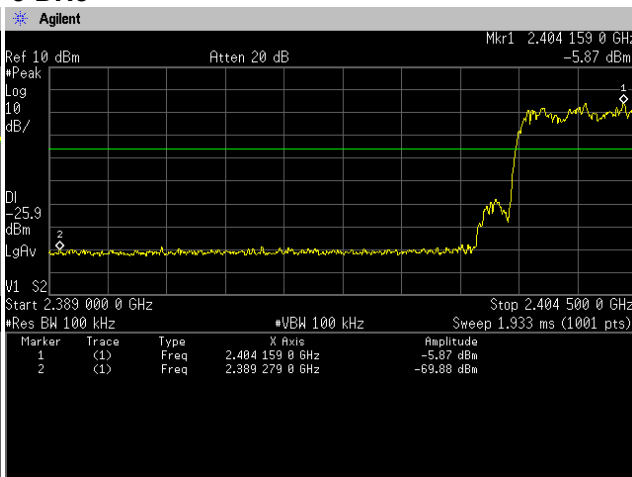


Zacta

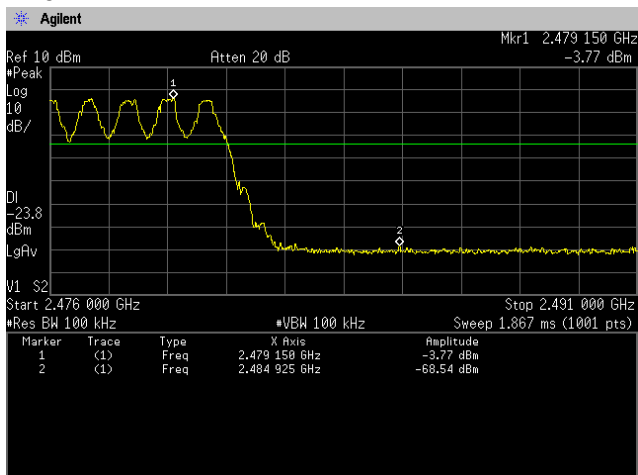
**9.4 Trace data**  
**[Hopping]**  
**Channel Low**  
**DH5**



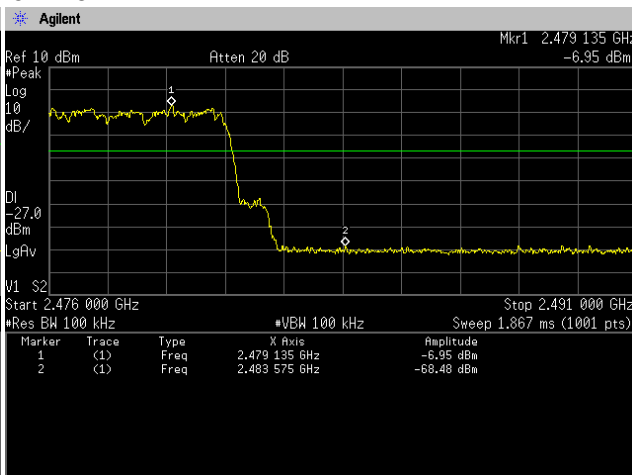
**3-DH5**



**Channel High**  
**DH5**



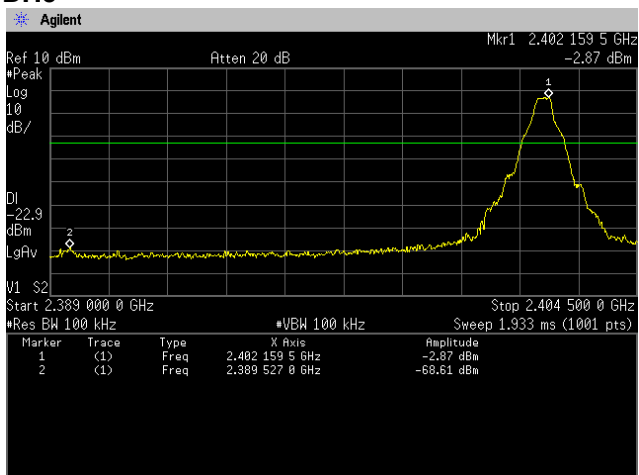
**3-DH5**



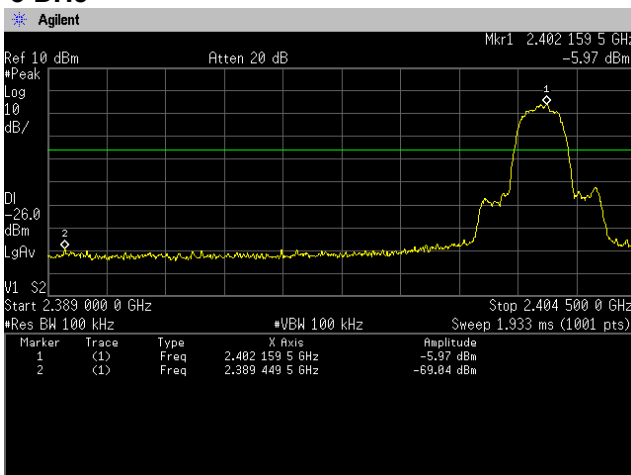


Zacta

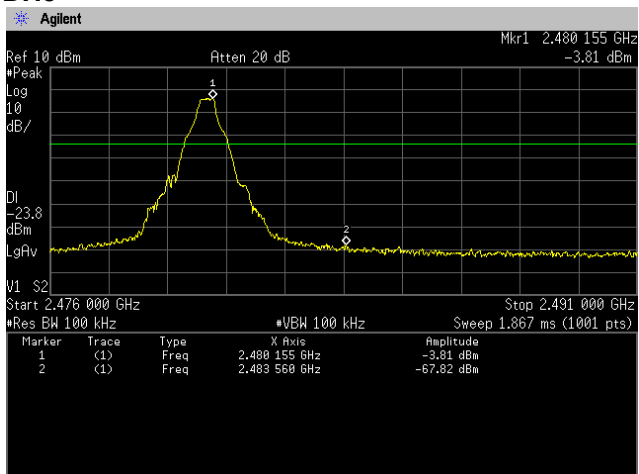
**[No hopping]  
Channel Low  
DH5**



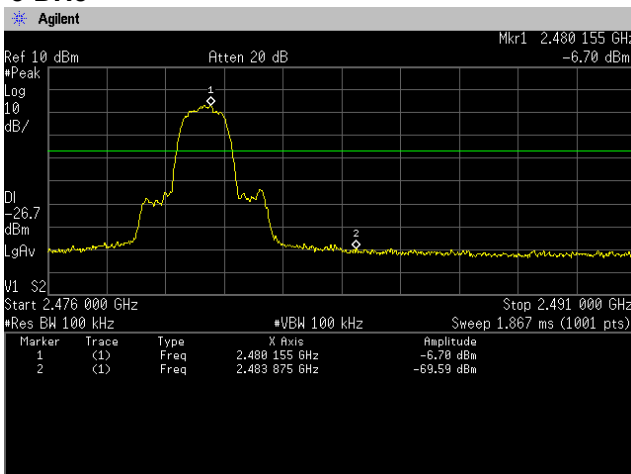
**3-DH5**



**Channel High  
DH5**



**3-DH5**



## 10. Spurious emissions - Conducted -

### 10.1 Measurement procedure [FCC 15.247(d)]

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

The spectrum analyzer is set to;

- RBW=100kHz, VBW=300kHz, Span=Arbitrary setting, Sweep=auto, Detector=Peak, Trace mode=Max hold

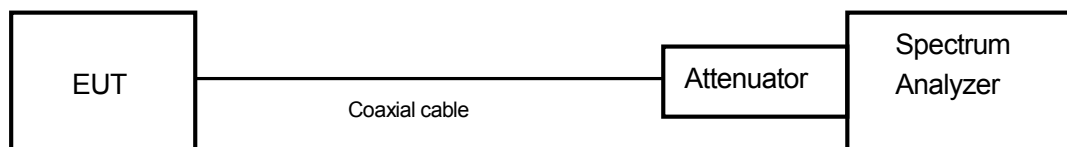
The EUT was set to operate with following conditions.

- No hopping [Channel Low: 2402MHz, Channel Middle: 2441MHz, Channel High: 2480MHz]

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 10.2 Limit

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

### 10.3 Measurement result

Date : Apr. 17, 2013  
 Temperature : 20.0 [°C]  
 Humidity : 50.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

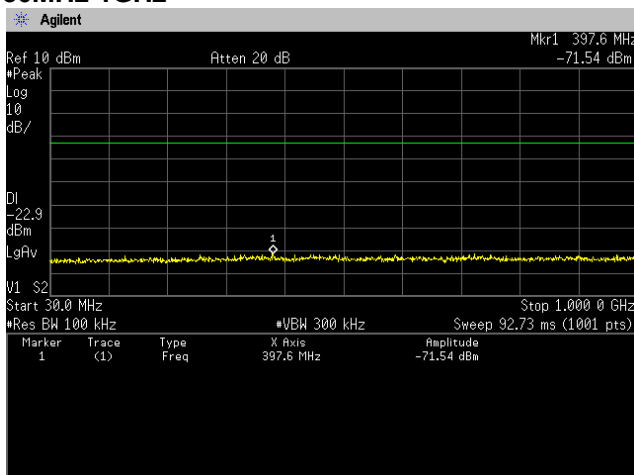
Chiaki Kanno

| Channel | Frequency [MHz] | Limit [dB]                          | Results Chart      | Result |
|---------|-----------------|-------------------------------------|--------------------|--------|
| Low     | 2402            | At least 20dB below from peak of RF | See the trace Data | PASS   |
| Middle  | 2441            | At least 20dB below from peak of RF | See the trace Data | PASS   |
| High    | 2480            | At least 20dB below from peak of RF | See the trace Data | PASS   |

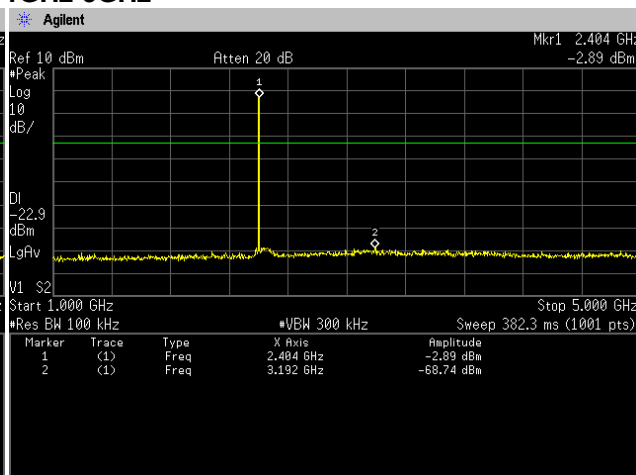


Zacta

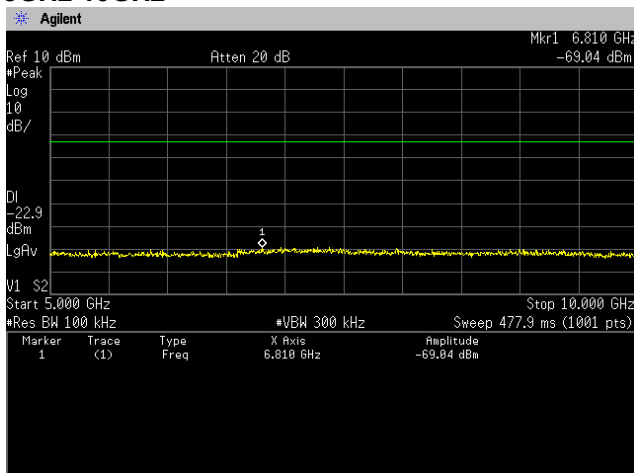
**10.4 Trace data**  
**[DH5]**  
**Channel Low**  
**30MHz-1GHz**



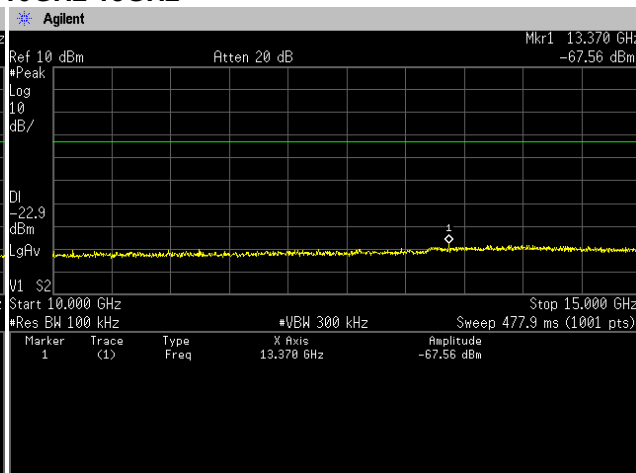
**1GHz-5GHz**



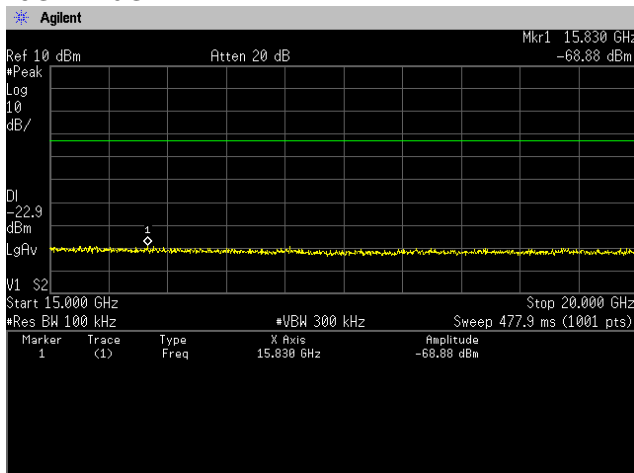
**5GHz-10GHz**



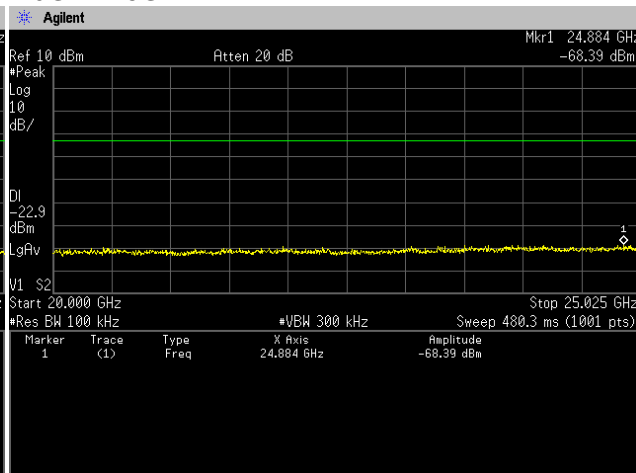
**10GHz-15GHz**



**15GHz-20GHz**



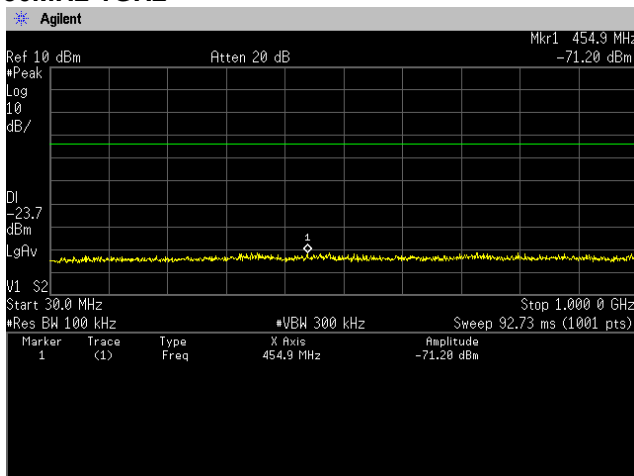
**20GHz-25GHz**



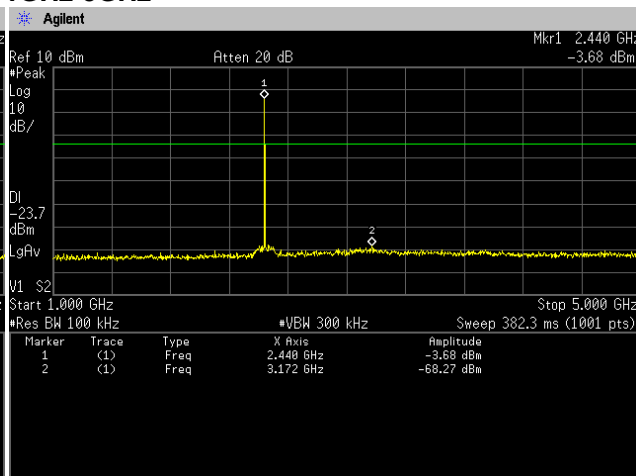


Zacta

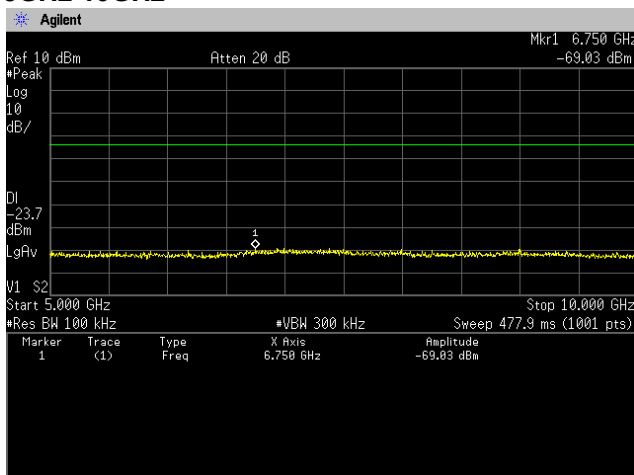
### Channel Middle 30MHz-1GHz



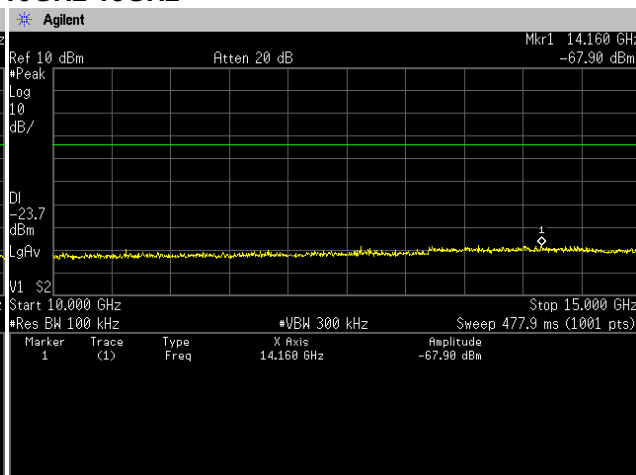
### 1GHz-5GHz



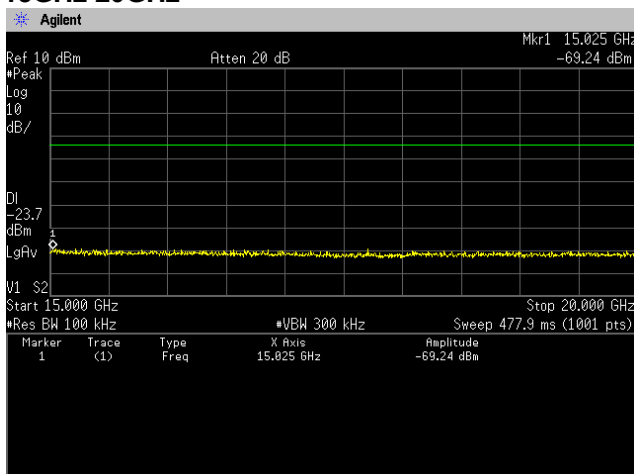
### 5GHz-10GHz



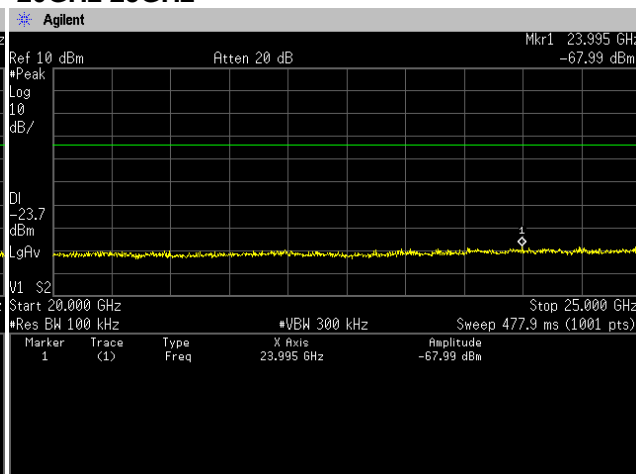
### 10GHz-15GHz



### 15GHz-20GHz



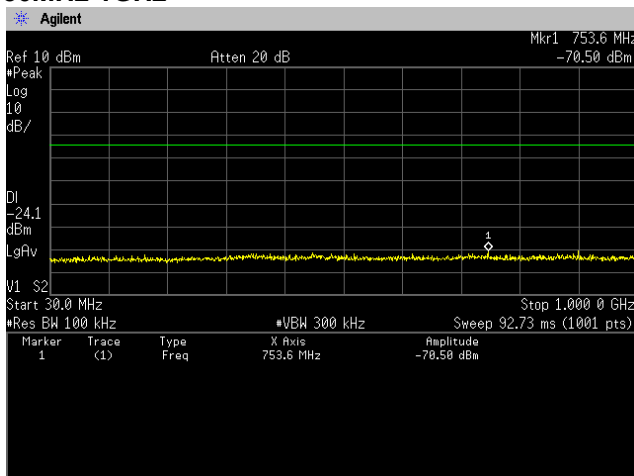
### 20GHz-25GHz



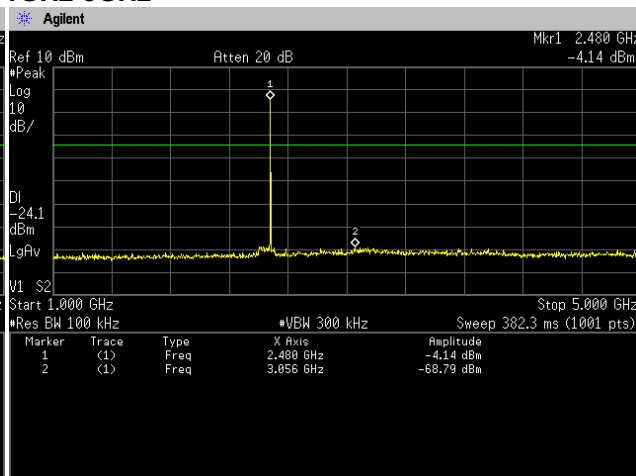


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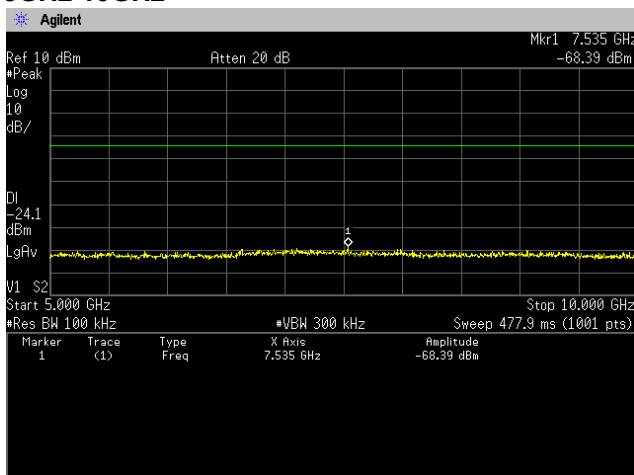
### Channel High 30MHz-1GHz



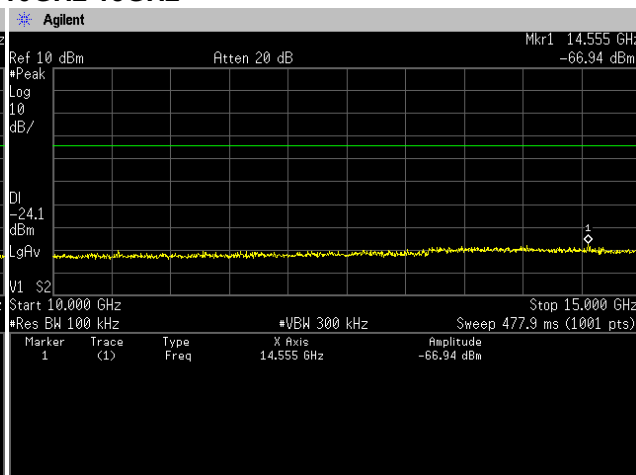
### 1GHz-5GHz



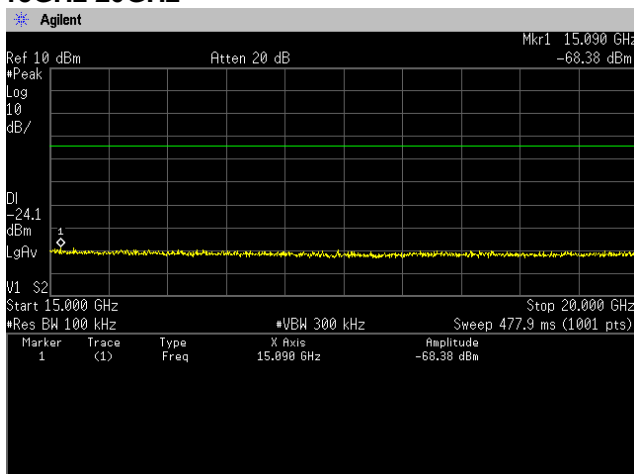
### 5GHz-10GHz



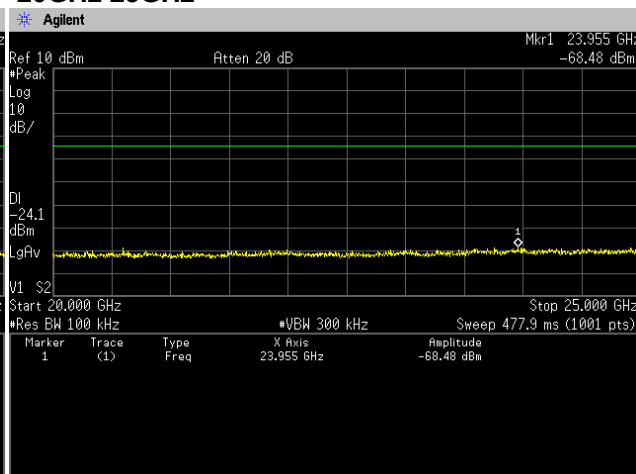
### 10GHz-15GHz



### 15GHz-20GHz



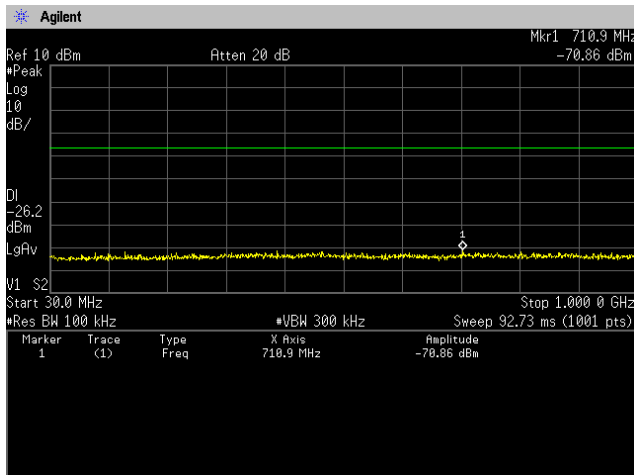
### 20GHz-25GHz



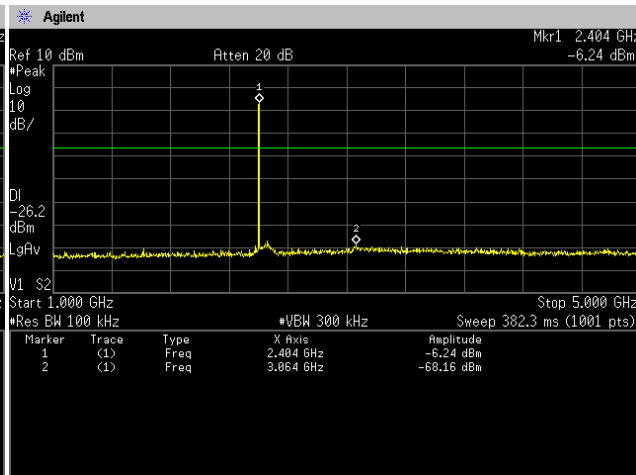


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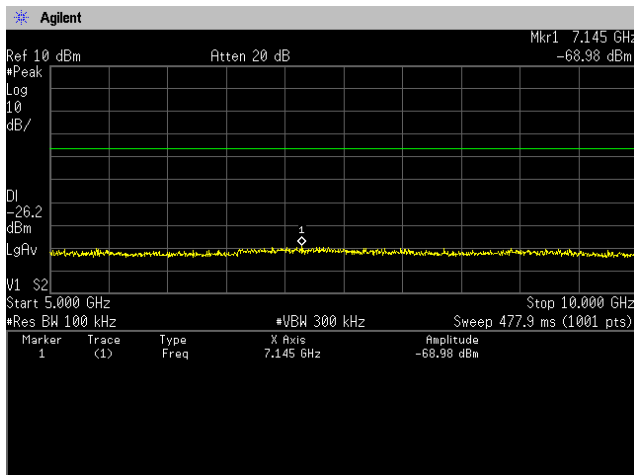
**[3-DH5]  
Channel Low  
30MHz-1GHz**



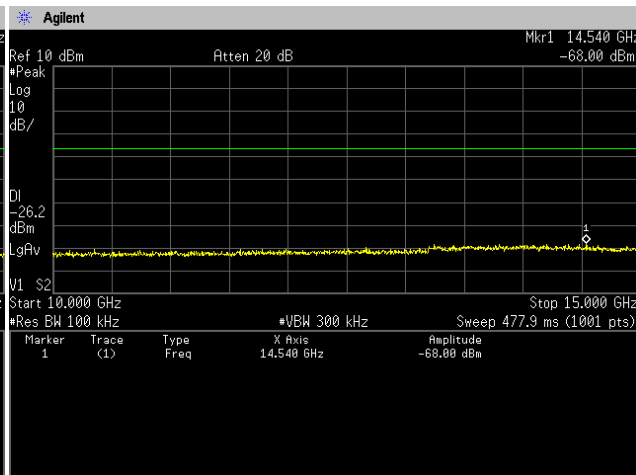
**1GHz-5GHz**



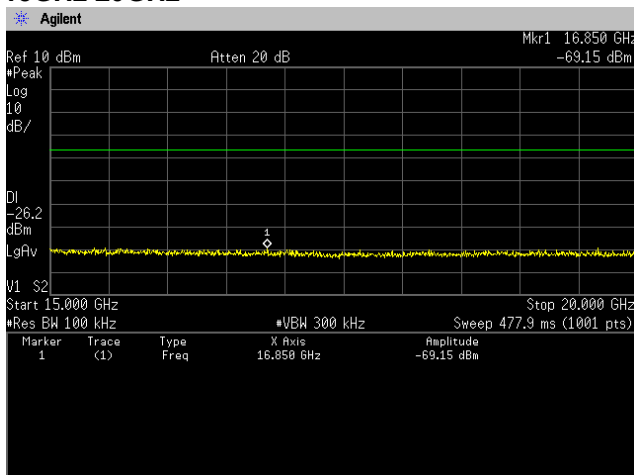
**5GHz-10GHz**



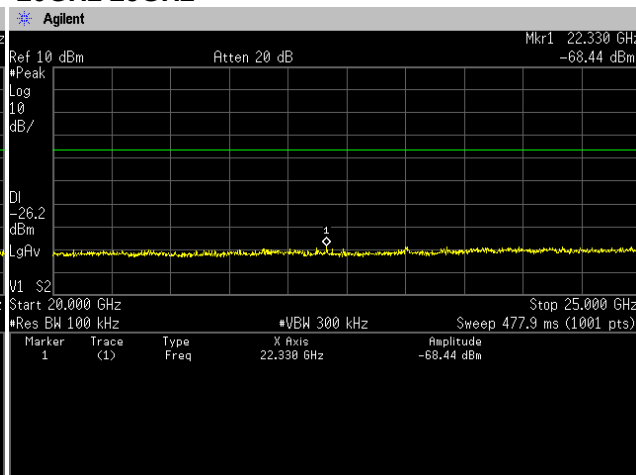
**10GHz-15GHz**



**15GHz-20GHz**



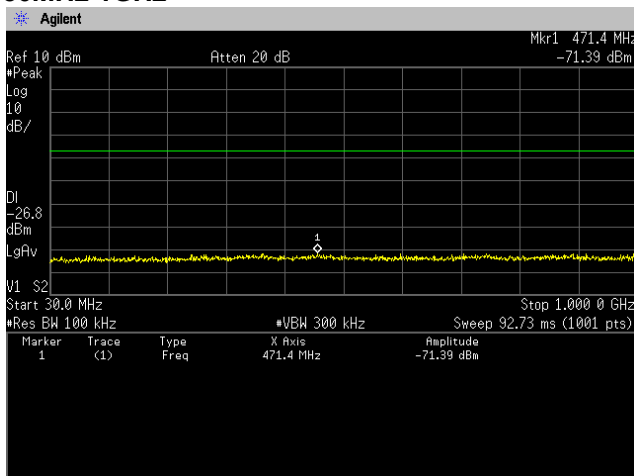
**20GHz-25GHz**



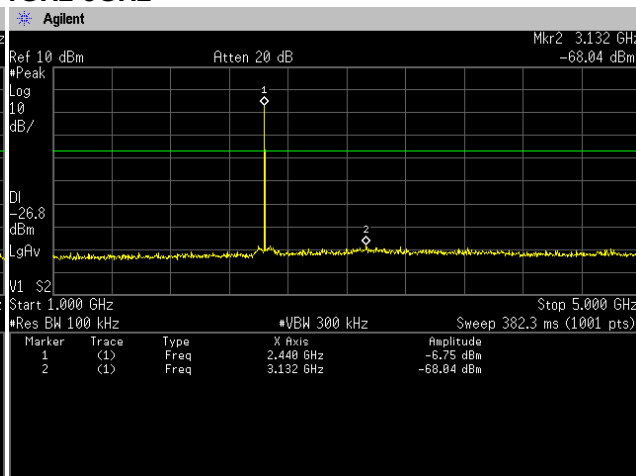


Zacta

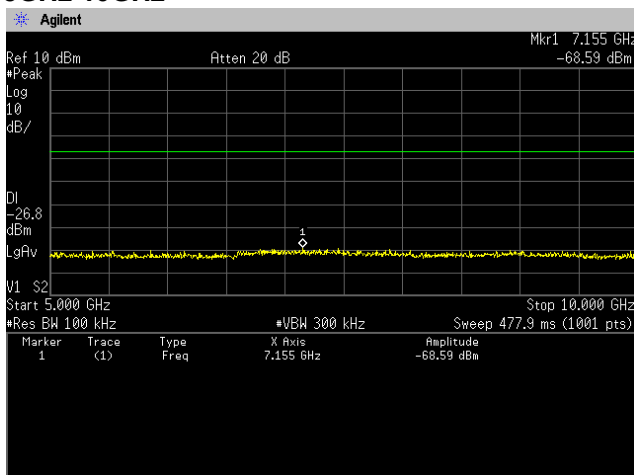
### Channel Middle 30MHz-1GHz



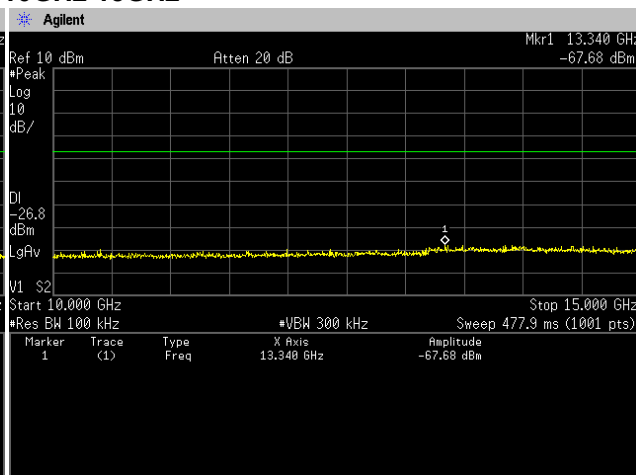
### 1GHz-5GHz



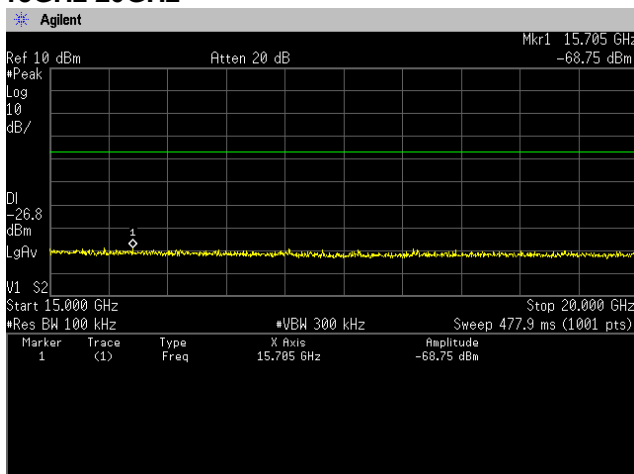
### 5GHz-10GHz



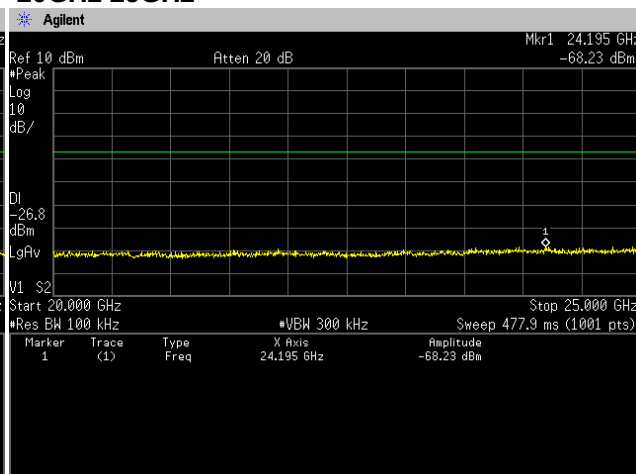
### 10GHz-15GHz



### 15GHz-20GHz



### 20GHz-25GHz

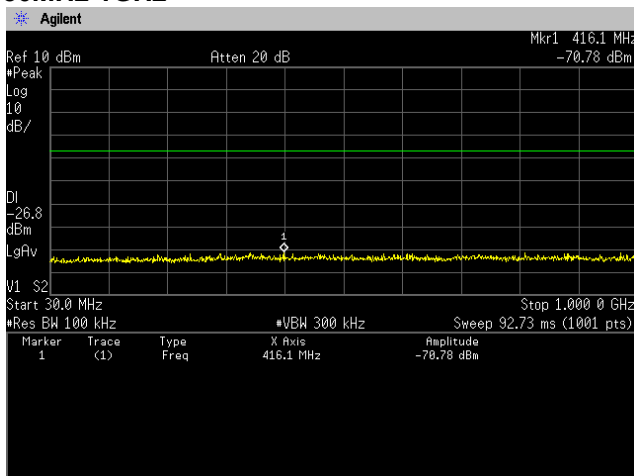




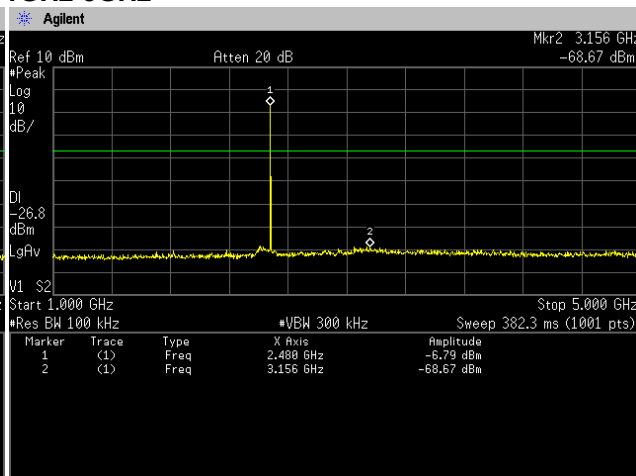


Zacta

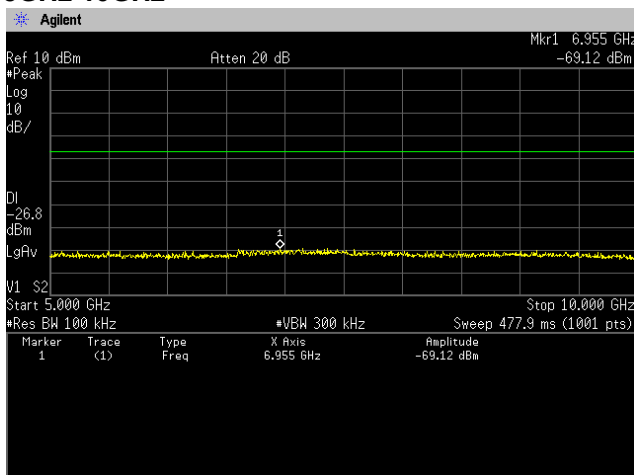
### Channel High 30MHz-1GHz



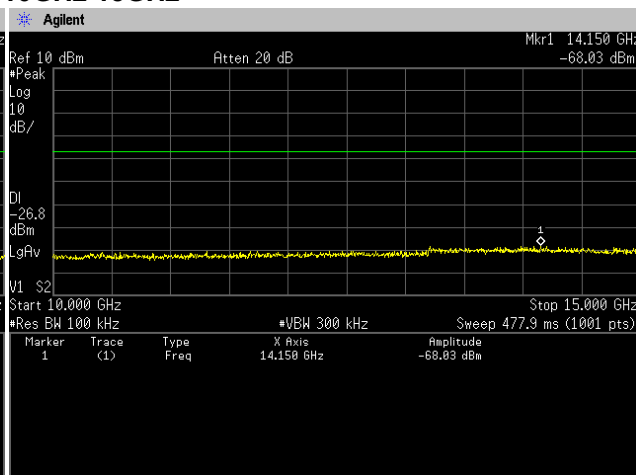
### 1GHz-5GHz



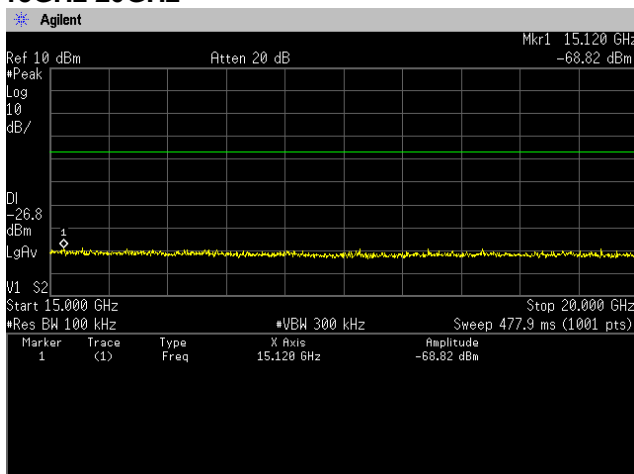
### 5GHz-10GHz



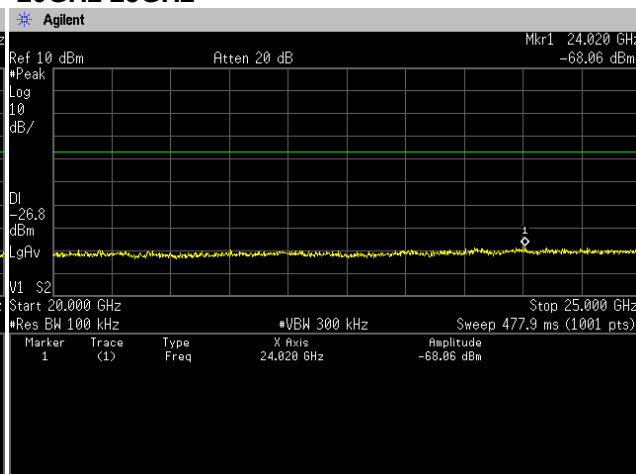
### 10GHz-15GHz



### 15GHz-20GHz



### 20GHz-25GHz



## 11. Spurious Emissions - Radiated -

### 11.1 Measurement procedure

[FCC 247(d), 15,205, 15.209]

Test was applied by following conditions.

|                           |   |                                                                 |
|---------------------------|---|-----------------------------------------------------------------|
| Test method               | : | ANSI C63.4                                                      |
| Frequency range           | : | 9kHz to 25GHz                                                   |
| Test place                | : | 3m Semi-anechoic chamber                                        |
| EUT was placed on         | : | FRP table / (W)2.0m × (D)1.0m × (H)0.8m                         |
| Antenna distance          | : | 3m                                                              |
| Test receiver setting     | : | Below 1GHz                                                      |
| - Detector                | : | Average (9kHz-90kHz, 110kHz-490kHz), Quasi-peak                 |
| - Bandwidth               | : | 200Hz, 120kHz                                                   |
| Spectrum analyzer setting | : | Above 1GHz                                                      |
| - Peak                    | : | RBW=1MHz, VBW=1MHz, Span=0Hz, Sweep=auto                        |
| - Average                 | : | RBW=1MHz, VBW=10Hz, Span=0Hz, Sweep=auto<br>Display mode=Linear |

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

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

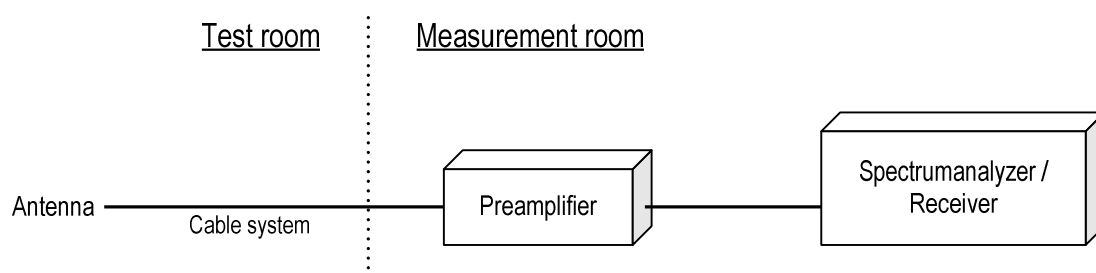
The EUT was set to operate with following conditions.

- No hopping [Channel Low: 2402MHz, Channel Middle: 2441MHz, Channel High: 2480MHz]

The test mode of EUT is as follows.

- Tx mode, Rx mode

- Test configuration



## 11.2 Calculation method

[9kHz to 150kHz]

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

Margin = Limit – Emission level

[150kHz to 25GHz]

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

Margin = Limit – Emission level

## 11.3 Limit

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

Note:

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



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## 11.4 Test data

Date : Apr. 19, 2013 Test personnel :  
 Temperature : 21.0 [°C]  
 Humidity : 31.3 [%] Tested by :  
 Test place : 3m Semi-anechoic chamber Chiaki kanno

### [DH5]

#### Channel Low

| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|
| 1   | 4802.000        | H   | 48.1                | 40.3                | 8.6           | 56.7                 | 48.9                 | 74.0                | 54.0                | 17.3           | 5.1            | 100.0       | 0.0       |
| 2   | 7206.000        | H   | 45.8                | 34.8                | 13.4          | 59.2                 | 48.2                 | 74.0                | 54.0                | 14.8           | 5.8            | 100.0       | 0.0       |

#### Channel Middle

| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|
| 1   | 4882.200        | H   | 49.6                | 42.6                | 9.0           | 58.6                 | 51.6                 | 74.0                | 54.0                | 15.4           | 2.4            | 100.0       | 357.0     |
| 2   | 7322.600        | H   | 46.5                | 36.0                | 14.1          | 60.6                 | 50.1                 | 74.0                | 54.0                | 13.4           | 3.9            | 100.0       | 356.0     |

#### Channel High

| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|
| 1   | 4960.000        | H   | 49.0                | 40.8                | 9.3           | 58.3                 | 50.1                 | 74.0                | 54.0                | 15.7           | 3.9            | 100.0       | 355.0     |
| 2   | 7440.000        | H   | 46.7                | 35.3                | 14.3          | 61.0                 | 49.6                 | 74.0                | 54.0                | 13.0           | 4.4            | 100.0       | 355.0     |

### [3-DH5]

#### Channel Low

| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|
| 1   | 4804.000        | H   | 46.4                | 35.5                | 8.6           | 55.0                 | 44.1                 | 74.0                | 54.0                | 19.0           | 9.9            | 100.0       | 357.0     |
| 2   | 7206.000        | H   | 44.8                | 31.7                | 13.4          | 58.2                 | 45.1                 | 74.0                | 54.0                | 15.8           | 8.9            | 100.0       | 0.0       |

#### Channel Middle

| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|
| 1   | 4881.800        | H   | 48.2                | 36.8                | 9.0           | 57.2                 | 45.8                 | 74.0                | 54.0                | 16.8           | 8.2            | 100.0       | 356.0     |
| 2   | 7323.000        | H   | 43.9                | 31.6                | 14.1          | 58.0                 | 45.7                 | 74.0                | 54.0                | 16.0           | 8.3            | 100.0       | 0.0       |

#### Channel High

| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|
| 1   | 4960.200        | H   | 47.6                | 37.3                | 9.3           | 56.9                 | 46.6                 | 74.0                | 54.0                | 17.1           | 7.4            | 100.0       | 355.0     |
| 2   | 7440.000        | H   | 44.5                | 32.4                | 14.3          | 58.8                 | 46.7                 | 74.0                | 54.0                | 15.2           | 7.3            | 100.0       | 0.0       |

#### Note:

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

## 12. Restricted Band of Operation

### 12.1 Measurement procedure [FCC 247(d), 15.205, 15.209]

Test was applied by following conditions.

Test method : ANSI C63.4  
 Test place : 3m Semi-anechoic chamber  
 EUT was placed on : FRP table / (W)2.0m × (D)1.0m × (H)0.8m  
 Antenna distance : 3m

Spectrum analyzer setting  
 - Peak : RBW=1MHz, VBW=1MHz, Span=Arbitrary setting, Sweep=auto  
 - Average : RBW=1MHz, VBW=10Hz, Span=Arbitrary setting, Sweep=auto  
 Display mode=Linear

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

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

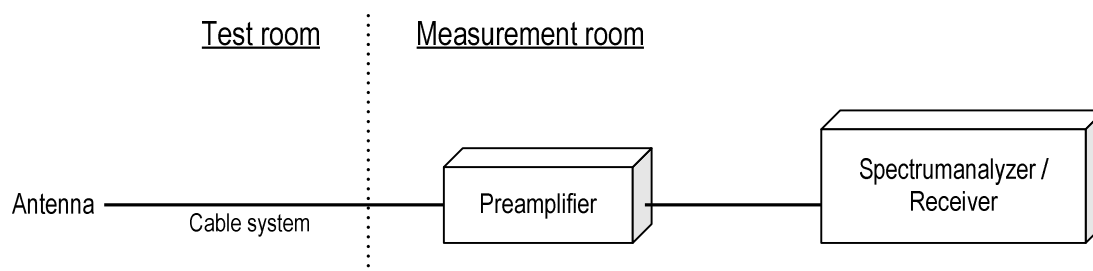
The EUT was set to operate with following conditions.

- No hopping [Channel Low: 2402MHz, Channel High: 2480MHz]

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 12.2 Limit

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

### 12.3 Measurement Result

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



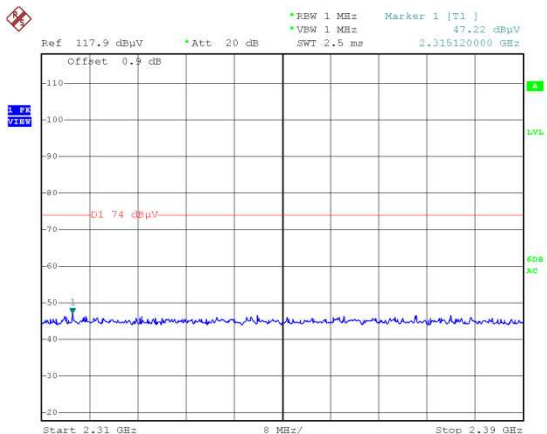
Zacta

### 12.4 Test data

Date : Apr. 24, 2013  
 Temperature : 21.5 [°C]  
 Humidity : 33.5 [%]  
 Test place : 3m Semi-anechoic chamber

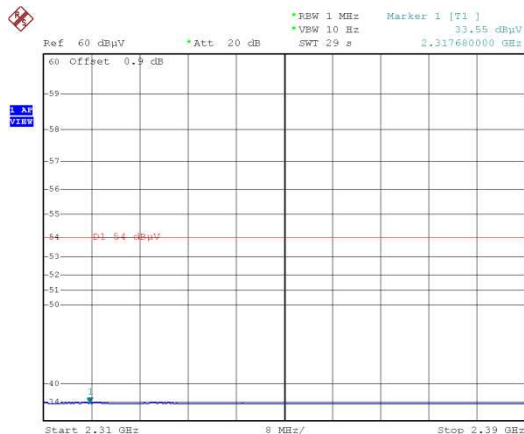
Test personnel :  
 Tested by : Chiaki Kanno

#### [DH5] Channel Low Horizontal Peak



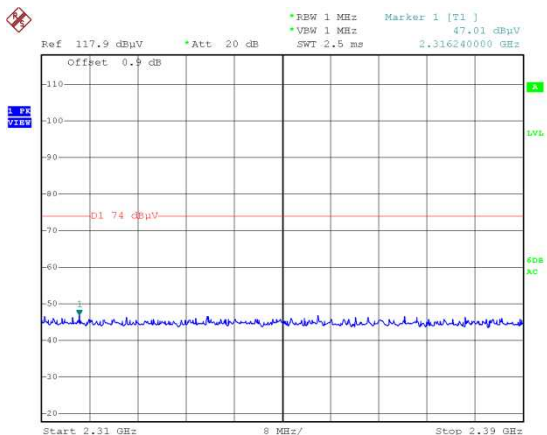
Date: 24.APR.2013 10:12:48

#### Average



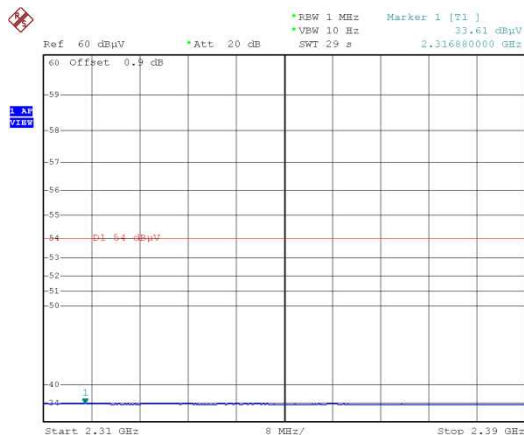
Date: 24.APR.2013 10:15:25

#### Vertical Peak



Date: 24.APR.2013 11:26:44

#### Average

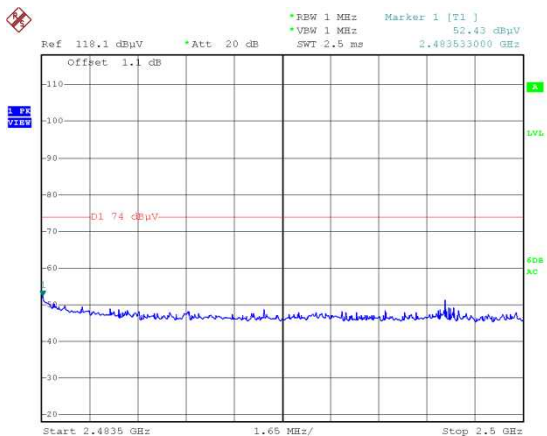


Date: 24.APR.2013 11:29:18



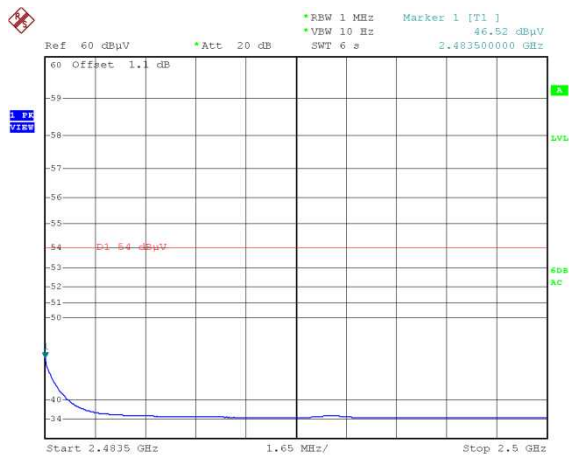
Zacta

### Channel High Horizontal Peak



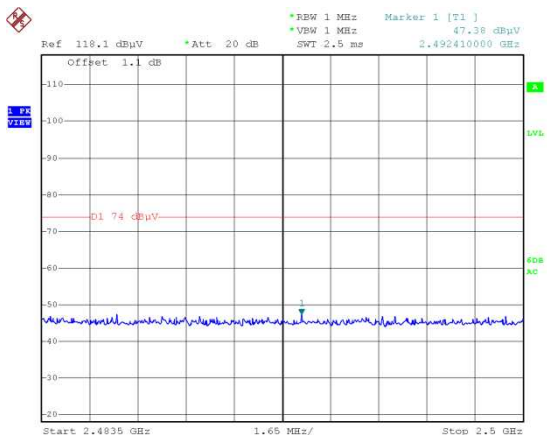
Date: 24.APR.2013 11:44:07

### Average



Date: 24.APR.2013 11:45:54

### Vertical Peak



Date: 24.APR.2013 11:49:15

### Average

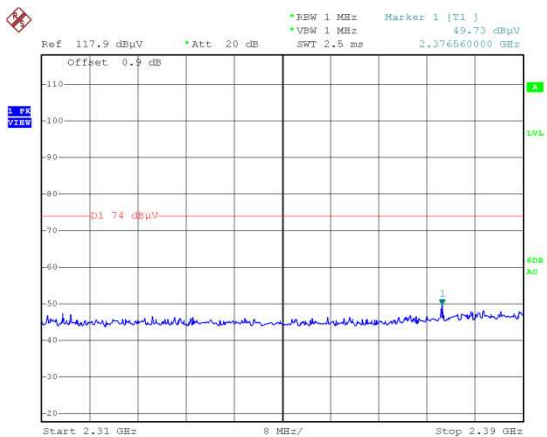


Date: 24.APR.2013 11:51:28



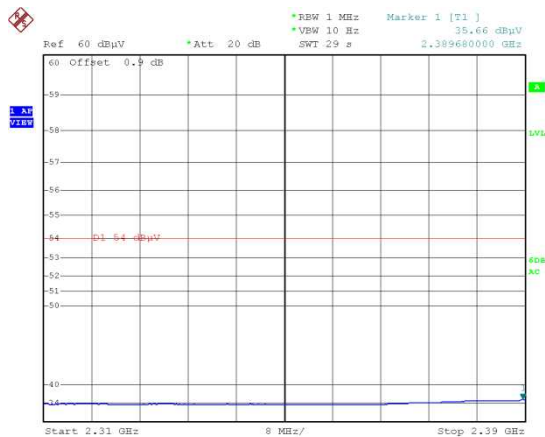
Zacta

### [3-DH5] Channel Low Horizontal Peak



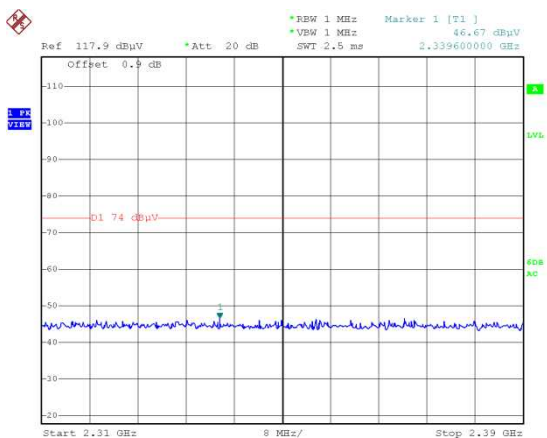
Date: 24.APR.2013 12:13:13

### Average



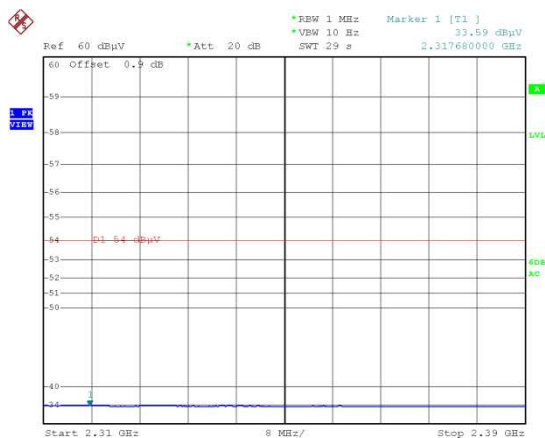
Date: 24.APR.2013 12:15:01

### Vertical Peak



Date: 24.APR.2013 12:17:23

### Average



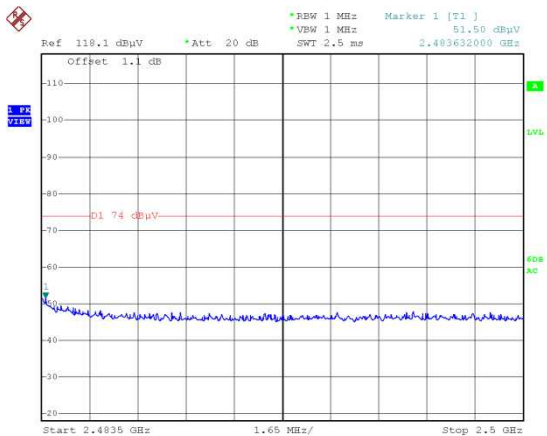
Date: 24.APR.2013 12:19:32





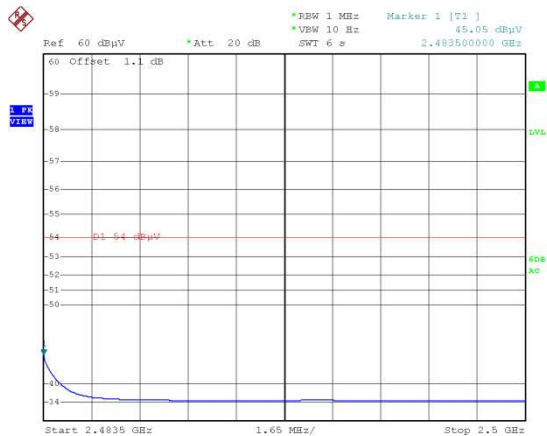
Zacta

### Channel High Horizontal Peak



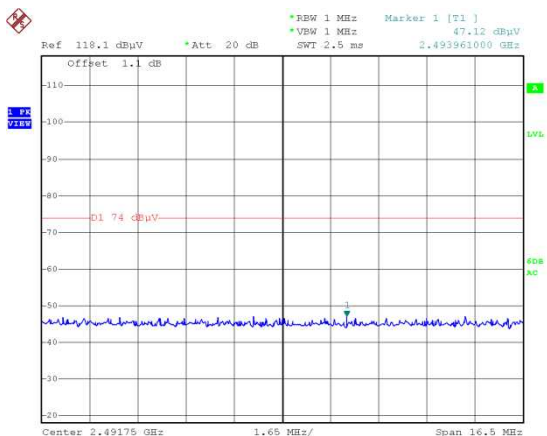
Date: 24.APR.2013 11:55:35

### Average



Date: 24.APR.2013 11:57:20

### Vertical Peak



Date: 24.APR.2013 12:00:49

### Average



Date: 24.APR.2013 12:02:45

## 13. AC Power Line Conducted Emissions

### 13.1 Measurement procedure [FCC 15.207]

Test was applied by following conditions.

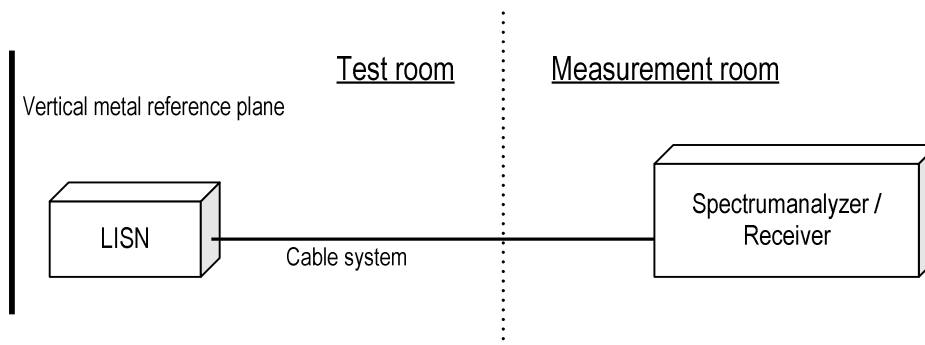
|                                |                                           |
|--------------------------------|-------------------------------------------|
| Test method                    | : ANSI C63.4                              |
| Frequency range                | : 0.15MHz to 30MHz                        |
| Test place                     | : 10m Semi-anechoic chamber               |
| EUT was placed on              | : FRP table / (W)2.0m × (D)1.0m × (H)0.8m |
| Vertical Metal Reference Plane | : (W)2.0m × (H)2.0m 0.4m away from EUT    |
| Test receiver setting          |                                           |
| - Detector                     | : Quasi-peak, Average                     |
| - Bandwidth                    | : 9kHz                                    |

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

LISN for peripheral is terminated in 50Ω.

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

- Test configuration



### 13.2 Calculation method

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

Margin = Limit – Emission level

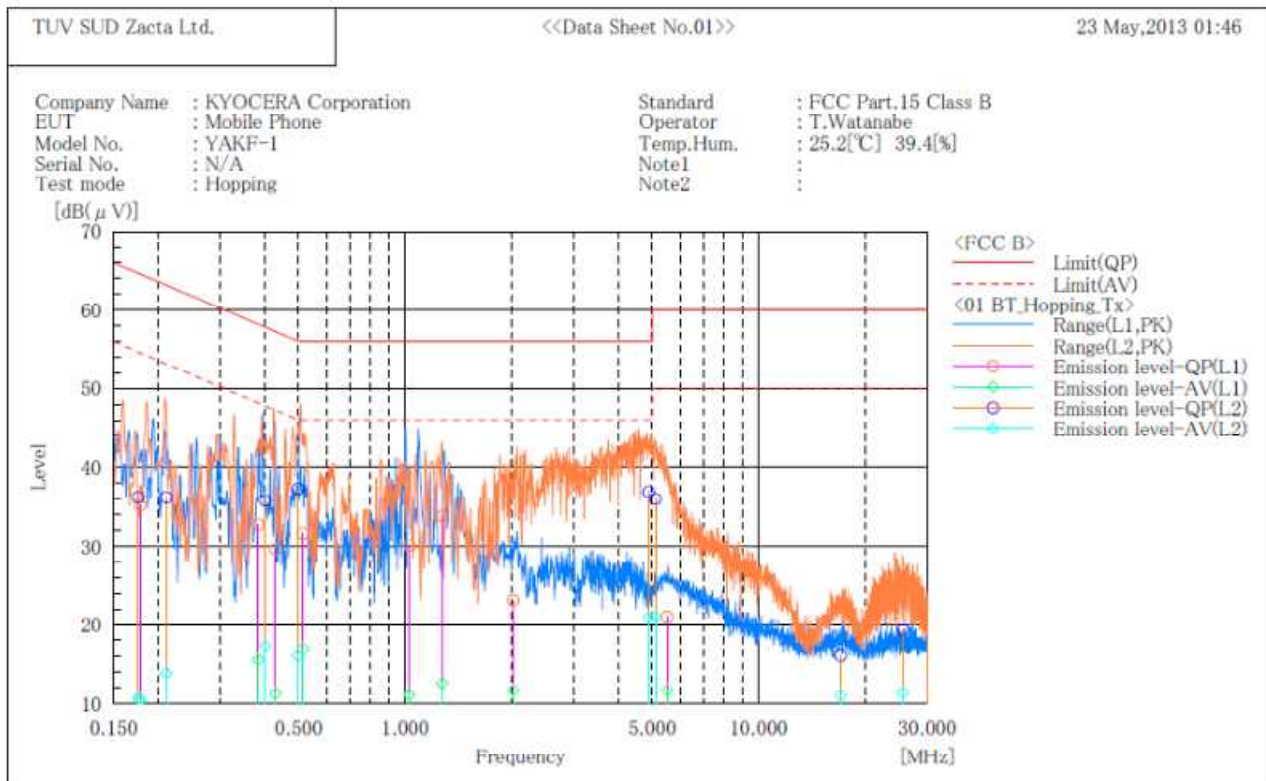
### 13.3 Limit

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

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

## 13.4 Test data

\*\*\*\*\* CONDUCTED EMISSION at MAINS PORT \*\*\*\*\*  
 < 3m Semi-anechoic chamber >



## Final Result

## — L1 Phase —

| No. | Frequency [MHz] | Reading QP [dB(μV)] | Reading AV [dB(μV)] | c. f [dB] | Result QP [dB(μV)] | Result AV [dB(μV)] | Limit QP [dB(μV)] | Limit AV [dB(μV)] | Margin QP [dB] | Margin AV [dB] |
|-----|-----------------|---------------------|---------------------|-----------|--------------------|--------------------|-------------------|-------------------|----------------|----------------|
| 1   | 0.178           | 24.8                | 0.1                 | 10.4      | 35.2               | 10.5               | 64.6              | 54.6              | 29.4           | 44.1           |
| 2   | 0.384           | 22.4                | 5.3                 | 10.3      | 32.7               | 15.6               | 58.2              | 48.2              | 25.5           | 32.6           |
| 3   | 0.430           | 19.3                | 1.0                 | 10.3      | 29.6               | 11.3               | 57.3              | 47.3              | 27.7           | 36.0           |
| 4   | 0.514           | 21.3                | 6.6                 | 10.3      | 31.6               | 16.9               | 56.0              | 46.0              | 24.4           | 29.1           |
| 5   | 1.028           | 19.7                | 0.7                 | 10.4      | 30.1               | 11.1               | 56.0              | 46.0              | 25.9           | 34.9           |
| 6   | 1.273           | 23.4                | 2.2                 | 10.4      | 33.8               | 12.6               | 56.0              | 46.0              | 22.2           | 33.4           |
| 7   | 2.021           | 12.7                | 1.3                 | 10.4      | 23.1               | 11.7               | 56.0              | 46.0              | 32.9           | 34.3           |
| 8   | 5.518           | 10.4                | 1.1                 | 10.6      | 21.0               | 11.7               | 60.0              | 50.0              | 39.0           | 38.3           |

## — L2 Phase —

| No. | Frequency [MHz] | Reading QP [dB(μV)] | Reading AV [dB(μV)] | c. f [dB] | Result QP [dB(μV)] | Result AV [dB(μV)] | Limit QP [dB(μV)] | Limit AV [dB(μV)] | Margin QP [dB] | Margin AV [dB] |
|-----|-----------------|---------------------|---------------------|-----------|--------------------|--------------------|-------------------|-------------------|----------------|----------------|
| 1   | 0.176           | 25.8                | 0.3                 | 10.4      | 36.2               | 10.7               | 64.7              | 54.7              | 28.5           | 44.0           |
| 2   | 0.211           | 25.8                | 3.5                 | 10.4      | 36.2               | 13.9               | 63.2              | 53.2              | 27.0           | 39.3           |
| 3   | 0.402           | 25.5                | 7.0                 | 10.3      | 35.8               | 17.3               | 57.8              | 47.8              | 22.0           | 30.5           |
| 4   | 0.498           | 27.0                | 5.8                 | 10.3      | 37.3               | 16.1               | 56.0              | 46.0              | 18.7           | 29.9           |
| 5   | 4.880           | 26.4                | 10.4                | 10.5      | 36.9               | 20.9               | 56.0              | 46.0              | 19.1           | 25.1           |
| 6   | 5.100           | 25.5                | 10.6                | 10.5      | 36.0               | 21.1               | 60.0              | 50.0              | 24.0           | 28.9           |
| 7   | 17.044          | 5.2                 | 0.1                 | 10.9      | 16.1               | 11.0               | 60.0              | 50.0              | 43.9           | 39.0           |
| 8   | 25.530          | 8.1                 | 0.1                 | 11.3      | 19.4               | 11.4               | 60.0              | 50.0              | 40.6           | 38.6           |



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## **14. Antenna requirement**

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

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

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



Zacta

## 16. 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  |
|---------------------------|-------------------|-----------------------------------|-------------------------------------|--------------------------|--------------|
| 10m Semi-anechoic chamber | -                 | VLAC-013                          |                                     | VLAC-013                 | Jul. 3, 2013 |
| 3m Semi-anechoic chamber  |                   |                                   |                                     | -                        |              |
| Shielded room No.1        |                   | VLAC-013                          |                                     | -                        |              |

3) FCC filing:

| Site name                 | Registration Number | Expiry Date  |
|---------------------------|---------------------|--------------|
| Site 2                    | 91065               | Oct.31, 2014 |
| Site 3                    |                     |              |
| 10m Semi-anechoic chamber | 540072              | Jan. 9, 2016 |
| 3m Semi-anechoic chamber  |                     |              |
| Shielded room No.1        |                     |              |

4) Industry Canada Oats site filing:

| Site name                 | Sites on file: Oats 3m/10m | Expiry Date   |
|---------------------------|----------------------------|---------------|
| Site 2                    | 4224A-2                    | Jan. 23, 2015 |
| Site 3                    | 4224A-3                    |               |
| 3m Semi-anechoic chamber  | 4224A-4                    |               |
| 10m Semi-anechoic chamber | 4224A-5                    |               |
|                           |                            |               |

5) VCCI site filing:

| Site name                 | Radiated emission | Conducted emission for mains port | Expiry Date   | Conducted emission for telecom port | Expiry Date   |
|---------------------------|-------------------|-----------------------------------|---------------|-------------------------------------|---------------|
| Site 2                    | R-137             | C-133                             | Nov. 16, 2014 | T-1221                              | Nov. 28, 2014 |
| Site 3                    | R-138             | C-134                             |               | T-1222                              |               |
| 10m Semi-anechoic chamber | R-2480            | C-2722                            | Jul. 3, 2013  | T-1474                              | Jul. 3, 2013  |
|                           | G-81              | -                                 |               | -                                   | -             |
| 3m Semi-anechoic chamber  | R-2481            | C-2723                            |               | T-1475                              | Jul. 3, 2013  |
|                           | G-82              | -                                 |               | -                                   | -             |
| Shielded room No.1        | -                 | C-2724                            |               | T-1476                              | Jul. 3, 2013  |

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    | US40420937 | Oct. 2013 | Oct. 19, 2012 |
| Microwave cable   | RS                   | YH_13S5   | N/A (S403) | May 2013  | May 10, 2012  |
| Attenuator        | Weinschel            | 56-10     | J4180      | Nov. 2013 | Nov. 12, 2012 |

### Radiated emission

| Equipment                   | Company              | Model No.        | Serial No.      | Cal. Due  | Cal. Date     |
|-----------------------------|----------------------|------------------|-----------------|-----------|---------------|
| EMI Receiver                | ROHDE&SCHWARZ        | ECSI             | 100764          | Jul. 2013 | Jul. 6, 2012  |
| Preamplifier                | ANRITSU              | MH648A           | M96057          | Jun. 2013 | Jun. 12, 2012 |
| Loop antenna                | ROHDE&SCHWARZ        | HFH2-Z2          | 892246/010      | Sep. 2013 | Sep. 14, 2012 |
| TRILOG Antenna              | Schwarzbeck          | VULB9160         | 9160-3218       | May 2014  | May 2, 2012   |
| Attenuator                  | TME                  | CFA-01NPJ-6      | N/A (S274)      | Jun. 2013 | Jun. 12, 2012 |
| Spectrum analyzer           | Agilent Technologies | E4447A           | MY46180188      | Mar. 2014 | Mar. 8, 2013  |
| Preamplifier                | Agilent Technologies | 8449B            | 3008A1008       | Dec. 2013 | Dec. 9, 2012  |
| Double ridged guide antenna | EMCO                 | 3115             | 4328            | Jan. 2014 | Jan. 21, 2013 |
| Attenuator                  | AEROFLEX             | 40A-03           | 081217-20       | Feb. 2014 | Feb. 23, 2013 |
| Broad-Band Horn Antenna     | Schwarzbeck          | BBHA9170         | BBHA9170189     | Apr. 2013 | Apr. 20, 2010 |
| Preamplifier                | TSJ                  | MLA-1840-B03-35  | 1240332         | Apr. 2013 | Apr. 20, 2010 |
| Microwave cable             | SUHNER               | SUCOFLEX104/9m   | 346316/4        | Oct. 2013 | Oct. 6, 2012  |
|                             |                      | SUCOFLEX104/1m   | 322084/4        | Oct. 2013 | Oct. 6, 2012  |
|                             |                      | SUCOFLEX104/1.5m | 317226/4        | Oct. 2013 | Oct. 6, 2012  |
|                             |                      | SUCOFLEX104/7m   | 41625/6         | Oct. 2013 | Oct. 6, 2012  |
| PC                          | DELL                 | DIMENSION E521   | 75465BX         | N/A       | N/A           |
| Software                    | TOYO Corporation     | EP5/RE-AJ        | 0611193/V5.3.61 | N/A       | N/A           |
| 3m Semi-anechoic chamber    | TOKIN                | N/A              | N/A (9002-NSA)  | May 2013  | May 19, 2012  |

### Conducted emission at mains port

| Equipment                                    | Company                         | Model No.   | Serial No. | Cal. due  | Cal. date     |
|----------------------------------------------|---------------------------------|-------------|------------|-----------|---------------|
| EMI Receiver                                 | ROHDE&SCHWARZ                   | ECSI        | 100764     | Jul. 2013 | Jul. 6, 2012  |
| Attenuator                                   | HUBER+SUHNER                    | 6810.01.A   | N/A (S411) | Jun. 2013 | Jun. 25, 2012 |
| Line impedance stabilization network for EUT | Kyoritsu Electrical Works, Ltd. | KNW-407F    | 8-2003-1   | Mar. 2014 | Mar. 12, 2013 |
| Coaxial cable                                | FUJIKURA                        | 5D-2W/4m    | N/A (S350) | Feb. 2014 | Feb. 4, 2013  |
| Coaxial cable                                | FUJIKURA                        | 5D-2W/1m    | N/A (S193) | Feb. 2014 | Feb. 4, 2013  |
| Coaxial cable                                | SUHNER                          | RG214/U/10m | N/A (S194) | Feb. 2014 | Feb. 4, 2013  |
| PC                                           | DELL                            | DIMENSION   | 75465BX    | N/A       | N/A           |