

## TEST REPORT

**Applicant** : SHARP CORPORATION, Consumer Electronics Company,  
Communication Systems Division

**Address** : 2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,  
739-0192, Japan

**Products** : Cellular Phone

**Model No.** : SH-01J

**Serial No.** : 004401115830891  
004401115830727

**FCC ID** : APYHRO00240

**Test Standard** : CFR 47 FCC Rules and Regulations Part 15

**Test Results** : **Passed**

**Date of Test** : July 22 ~ 30, 2016



A handwritten signature in black ink, appearing to read 'K. Shibata', positioned above a horizontal line.

Kousei Shibata

Manager

Japan Quality Assurance Organization

KITA-KANSAI Testing Center

SAITO EMC Branch

7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

- 
- The test results in this test report was made by using the measuring instruments which are traceable to national standards of measurement in accordance with ISO/IEC 17025.
  - The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
  - The test results presented in this report relate only to the offered test sample.
  - The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
  - This test report shall not be reproduced except in full without the written approval of JQA.
  - VLAC does not approve, certify or warrant the product by this test report.

## TABLE OF CONTENTS

|                                                 | <b>Page</b> |
|-------------------------------------------------|-------------|
| 1 Description of the Equipment Under Test ..... | 3           |
| 2 Summary of Test Results .....                 | 4           |
| 3 Test Procedure .....                          | 5           |
| 4 Test Location .....                           | 5           |
| 5 Recognition of Test Laboratory .....          | 5           |
| 6 Description of Test Setup .....               | 6           |
| 7 Test Requirements .....                       | 9           |

## DEFINITIONS FOR ABBREVIATION AND SYMBOLS USED IN THIS TEST REPORT

**EUT** : Equipment Under Test

**AE** : Associated Equipment

**N/A** : Not Applicable

**N/T** : Not Tested

**EMC** : Electromagnetic Compatibility

**EMI** : Electromagnetic Interference

**EMS** : Electromagnetic Susceptibility

☒ - indicates that the listed condition, standard or equipment is applicable for this report.

☐ - indicates that the listed condition, standard or equipment is not applicable for this report.

## 1 Description of the Equipment Under Test

1. Manufacturer : SHARP CORPORATION, Consumer Electronics Company,  
Communication Systems Division  
2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,  
739-0192, Japan
2. Products : Cellular Phone
3. Model No. : SH-01J
4. Serial No. : 004401115830891  
004401115830727
5. Product Type : Pre-production
6. Date of Manufacture : June, 2016
7. Power Rating : 4.0VDC (Lithium-ion Battery SH44 1800mAh)
8. Grounding : None
9. Transmitting Frequency : 2402.0 MHz(00CH) – 2480.0MHz(78CH)
10. Receiving Frequency : 2402.0 MHz(00CH) – 2480.0MHz(78CH)
11. Max. RF Output Power : 7.02dBm(Measure Value)
12. Antenna Type : Inverted-L Type Antenna (Integral)
13. Antenna Gain : 0 dBi
14. Category : Spread Spectrum Transmitter(FHSS)
15. EUT Authorization : Certification
16. Received Date of EUT : July 20, 2016

### 17. Channel Plan

The carrier spacing is 1 MHz.

The carrier frequency is designated by the absolute frequency channel number (ARFCN).

The carrier frequency is expressed in the equation shown as follows:

Normal Mode:

Transmitting Frequency (in MHz) =  $2402.0 + n$

Receiving Frequency (in MHz) =  $2402.0 + n$

where,  $n$  : channel number ( $0 \leq n \leq 78$ )

## 2 Summary of Test Results

Applied Standard : CFR 47 FCC Rules and Regulations Part 15  
Subpart C – Intentional Radiators

The EUT described in clause 1 was tested according to the applied standard shown above.

Details of the test configuration is shown in clause 6.

The conclusion for the test items of which are required by the applied standard is indicated under the test result.

- ☒ - The test result was **passed** for the test requirements of the applied standard.
- ☐ - The test result was **failed** for the test requirements of the applied standard.
- ☐ - The test result was **not judged** the test requirements of the applied standard.

In the approval of test results,

- Determining compliance with the limits in this report was based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- No deviations were employed from the applied standard.
- No modifications were conducted by JQA to achieve compliance to the limitations.

Reviewed by:

Tested by:



---

Shigeru Kinoshita  
Assistant Manager  
JQA KITA-KANSAI Testing Center  
SAITO EMC Branch



---

Shigeru Osawa  
Deputy Manager  
JQA KITA-KANSAI Testing Center  
SAITO EMC Branch

### 3 Test Procedure

Test Requirements : §15.247, §15.207 and §15.209

Test Procedure : ANSI C63.10-2013  
Testing unlicensed wireless devices.

FCC Public Notice DA 00-705, released March 30, 2000.

KDB937606 (Publication Date: October 10, 2014)

Test Site Requirements for Part 15 and 18 Devices Operating Below 30MHz.

### 4 Test Location

Japan Quality Assurance Organization (JQA)  
KITA-KANSAI Testing Center  
7-7, Ishimaru, 1-chome, Minoh-shi, Osaka, 562-0027, Japan  
SAITO EMC Branch  
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

### 5 Recognition of Test Laboratory

JQA KITA-KANSAI Testing Center SAITO EMC Branch is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility is registered by the following bodies.

VLAC Accreditation No. : VLAC-001-2 (Expiry date : March 30, 2018)

VCCI Registration No. : A-0002 (Expiry date : March 30, 2018)

BSMI Registration No. : SL2-IS-E-6006, SL2-IN-E-6006, SL2-R1/R2-E-6006, SL2-A1-E-6006  
(Expiry date : September 14, 2016)

IC Registration No. : 2079E-3, 2079E-4 (Expiry date : July 16, 2017)

Accredited as conformity assessment body for Japan electrical appliances and material law by METI.  
(Expiry date : February 22, 2019)

## 6 Description of Test Setup

### 6.1 Test Configuration

The equipment under test (EUT) consists of :

|   | Item             | Manufacturer        | Model No. | Serial No.                                 | FCC ID      |
|---|------------------|---------------------|-----------|--------------------------------------------|-------------|
| A | Cellular Phone   | Sharp               | SH-01J    | 004401115830891 *1)<br>004401115830727 *2) | APYHRO00240 |
| B | AC Adapter       | Fujitsu Corporation | 05        | XEA                                        | N/A         |
| C | Stereo Handsfree | Sharp               | SHLDL1    | --                                         | N/A         |
| D | Conversion Cable | NTT docomo          | 02        | --                                         | N/A         |

\*1) Used for AC Powerline Conducted Emission and Field Strength of Spurious Emission

\*2) Used for Antenna Conducted Emission

The auxiliary equipment used for testing :

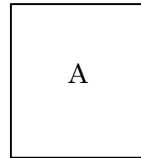
None

Type of Cable:

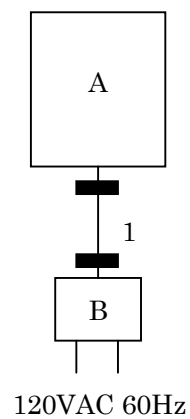
| No. | Description                                     | Identification<br>(Manu. etc.) | Connector<br>Shielded | Cable<br>Shielded | Ferrite<br>Core | Length<br>(m) |
|-----|-------------------------------------------------|--------------------------------|-----------------------|-------------------|-----------------|---------------|
| 1   | USB conversion cable                            | --                             | --                    | NO                | YES             | 1.2           |
| 2   | Handsfree Cable (Including<br>Conversion cable) | --                             | --                    | NO                | NO              | 1.6           |

## 6.2 Test Arrangement (Drawings)

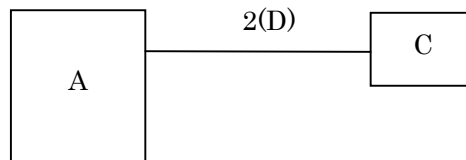
a) Single Unit



b) AC Adapter used



c) Earphone used



 : Ferrite Core

### 6.3 Operating Condition

Power Supply Voltage : 4.0 VDC (for Battery)  
120 VAC, 60 Hz (For AC Adapter)

Transmitting/Receiving

Bluetooth 4.0 + EDR + LE

Transmitting frequency : 2402.0 MHz(0CH) – 2480.0 MHz(78CH)

Receiver frequency : 2402.0 MHz(0CH) – 2480.0 MHz(78CH)

The test were carried under 2 mode shown as follows:

- 1) BDR
- 2) EDR

In Spurious Emissions(Conducted) and Radiated Emissions, the worst case is BDR mode.

Modulation Type

1. DH1/ DH3/ DH5 Packet (Modulation Type : GFSK)
2. 2DH1/ 2DH3/ 2DH5 Packet (Modulation Type :  $\pi/4$ -DQPSK)
3. 3DH1/ 3DH3/ 3DH5 Packet (Modulation Type : 8DPSK)

Other Clock Frequency

19.2MHz, 27MHz, 27.12MHz

The EUT was rotated through three orthogonal axis (X, Y and Z axis) in radiated measurement.  
The EUT with temporary antenna port was used in conducted measurement.

The test were carried out using the following test program supplied by applicant;

- Software Name: SH-01J\_WLAN\_BT Manual test mode operation
- Software Version: -- (Dated 2016/07/12)
- Storage Location: Controller PC(supplied by applicant)

## 7 Test Requirements

### 7.0 Summary of the Test Results

| Test Item                       | FCC Specification         | Reference of the Test Report | Results | Remarks |
|---------------------------------|---------------------------|------------------------------|---------|---------|
| Antenna Requirement             | Section 15.203            | Section 1.12                 | Passed  | -       |
| Channel Separation              | Section 15.247(a)(1)      | Section 7.1                  | Passed  | -       |
| Minimum Hopping Channel         | Section 15.247(a)(1)(iii) | Section 7.2                  | Passed  | -       |
| Occupied Bandwidth              | Section 15.247(a)(1)      | Section 7.3                  | Passed  | -       |
| Dwell Time                      | Section 15.247(a)(1)(iii) | Section 7.4                  | Passed  | -       |
| Peak Output Power (Conduction)  | Section 15.247(b)(1)      | Section 7.5                  | Passed  | -       |
| Peak Power Density (Conduction) | Section 15.247(e)         | -                            | -       | -       |
| Spurious Emissions (Conduction) | Section 15.247(d)         | Section 7.7                  | Passed  | -       |
| AC Powerline Conducted Emission | Section 15.207            | Section 7.8                  | Passed  | -       |
| Radiated Emission               | Section 15.247(d)         | Section 7.9                  | Passed  | -       |

## 7.1 Channel Separation

For the requirements, ☒ - Applicable [ ☒ - Tested. ☐ - Not tested by applicant request. ]  
☐ - Not Applicable

### 7.1.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Channel Separation is 1.000 MHz  
Channel Separation (Inquiry) is 2.000 MHz

Uncertainty of Measurement Results ± 0.9 %(2σ)

Remarks : \_\_\_\_\_

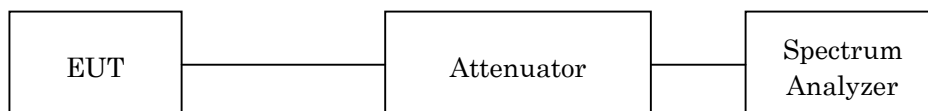
### 7.1.2 Test Instruments

| Shielded Room S4  |             |                   |              |            |
|-------------------|-------------|-------------------|--------------|------------|
| Type              | Model       | Serial No. (ID)   | Manufacturer | Cal. Due   |
| Spectrum Analyzer | E4446A      | US44300388 (A-39) | Agilent      | 2016/08/11 |
| Attenuator        | 54A-10      | W5675 (D-28)      | Weinschel    | 2016/08/16 |
| RF Cable          | SUCOFLEX102 | 14253/2 (C-52)    | HUBER+SUHNER | 2016/08/16 |

NOTE : The calibration interval of the above test instruments is 12 months.

### 7.1.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

|                 |               |
|-----------------|---------------|
| Res. Bandwidth  | 100 kHz       |
| Video Bandwidth | 300 kHz       |
| Span            | 3 MHz / 5 MHz |
| Sweep Time      | AUTO          |
| Trace           | Maxhold       |

#### 7.1.4 Test Data

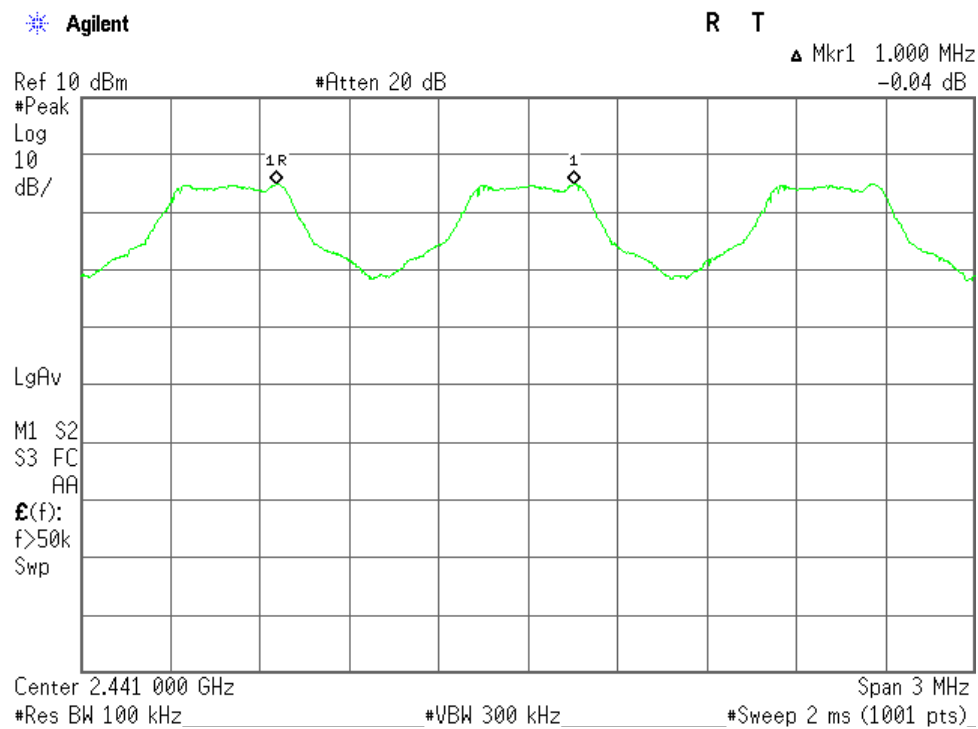
Test Date : July 25, 2016

Temp.: 27°C, Humi: 62%

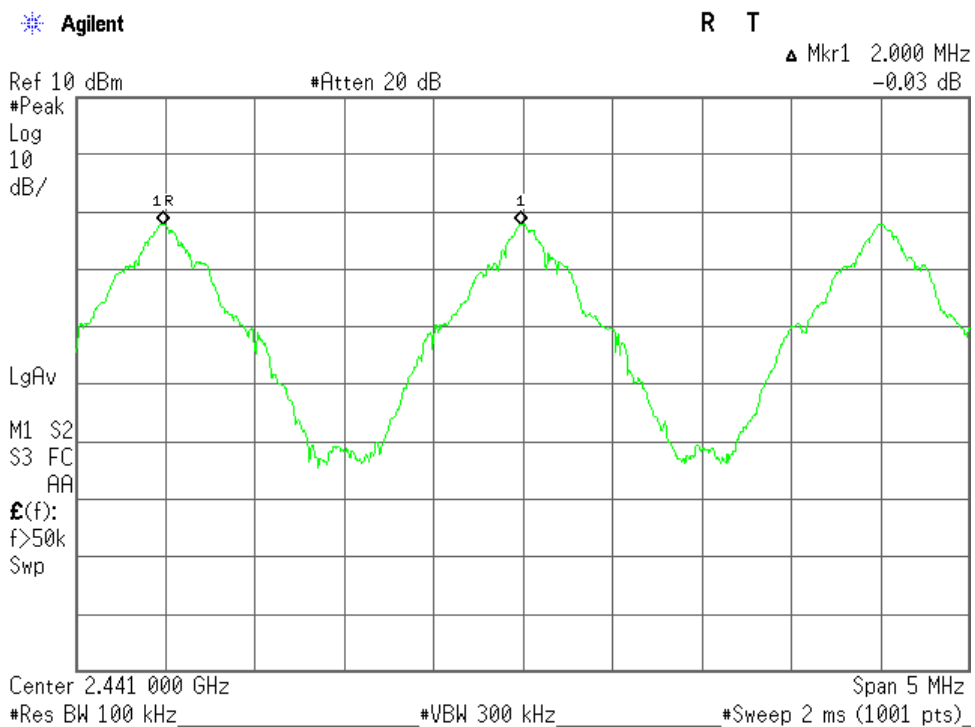
| Mode of EUT | Channel Separation (MHz) | Limit* (MHz) |
|-------------|--------------------------|--------------|
| Hopping     | 1.000                    | 0.857        |
| Inquiry     | 2.000                    | 0.550        |

Note: Two-thirds of the maximum 20 dB bandwidth of the hopping channel or 25 kHz (whichever is greater). Refer to the section 7.3.

Mode of EUT : Hopping



Mode of EUT : Inquiry



## 7.2 Minimum Hopping Channel

For the requirements, ☒ - Applicable [ ☒ - Tested. ☐ - Not tested by applicant request. ]  
☐ - Not Applicable

### 7.2.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

|                                |    |
|--------------------------------|----|
| Number of Channel is           | 79 |
| Number of Channel (Inquiry) is | 32 |
| Number of Channel (AFH) is     | 20 |

Remarks : \_\_\_\_\_

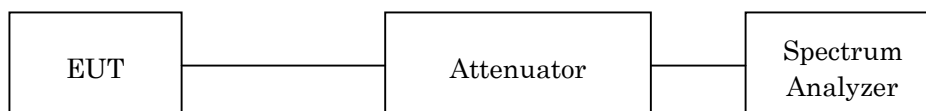
### 7.2.2 Test Instruments

| Shielded Room S4  |             |                   |              |            |
|-------------------|-------------|-------------------|--------------|------------|
| Type              | Model       | Serial No. (ID)   | Manufacturer | Cal. Due   |
| Spectrum Analyzer | E4446A      | US44300388 (A-39) | Agilent      | 2016/08/11 |
| Attenuator        | 54A-10      | W5675 (D-28)      | Weinschel    | 2016/08/16 |
| RF Cable          | SUCOFLEX102 | 14253/2 (C-52)    | HUBER+SUHNER | 2016/08/16 |

NOTE : The calibration interval of the above test instruments is 12 months.

### 7.2.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

|                 |         |
|-----------------|---------|
| Res. Bandwidth  | 300 kHz |
| Video Bandwidth | 300 kHz |
| Span            | 30 MHz  |
| Sweep Time      | AUTO    |
| Trace           | Maxhold |

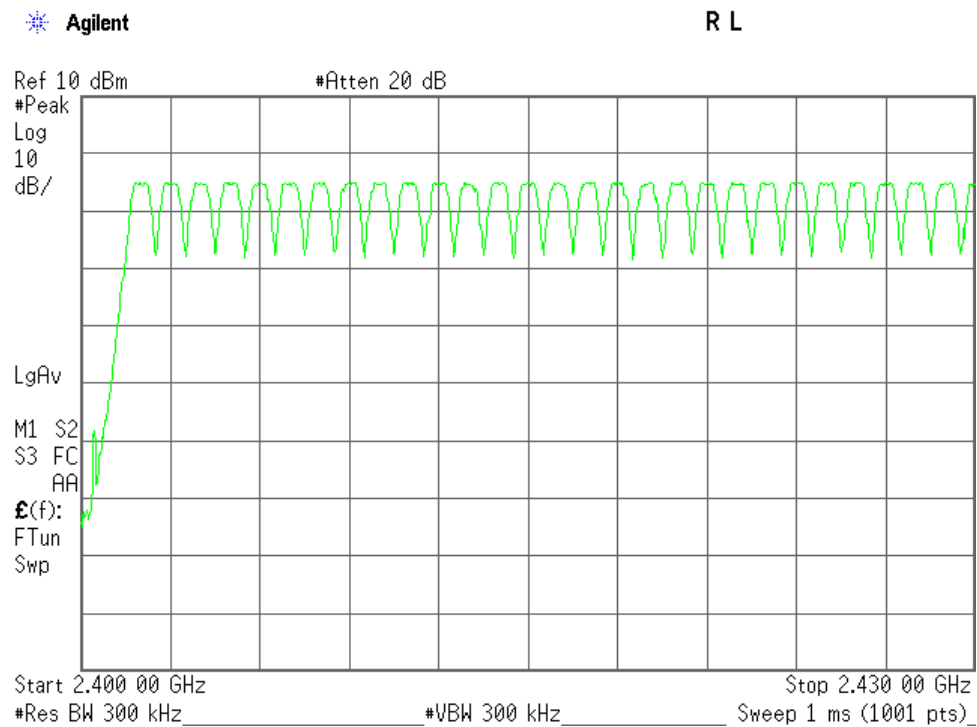
## 7.2.4 Test Data

Test Date : July 25, 2016

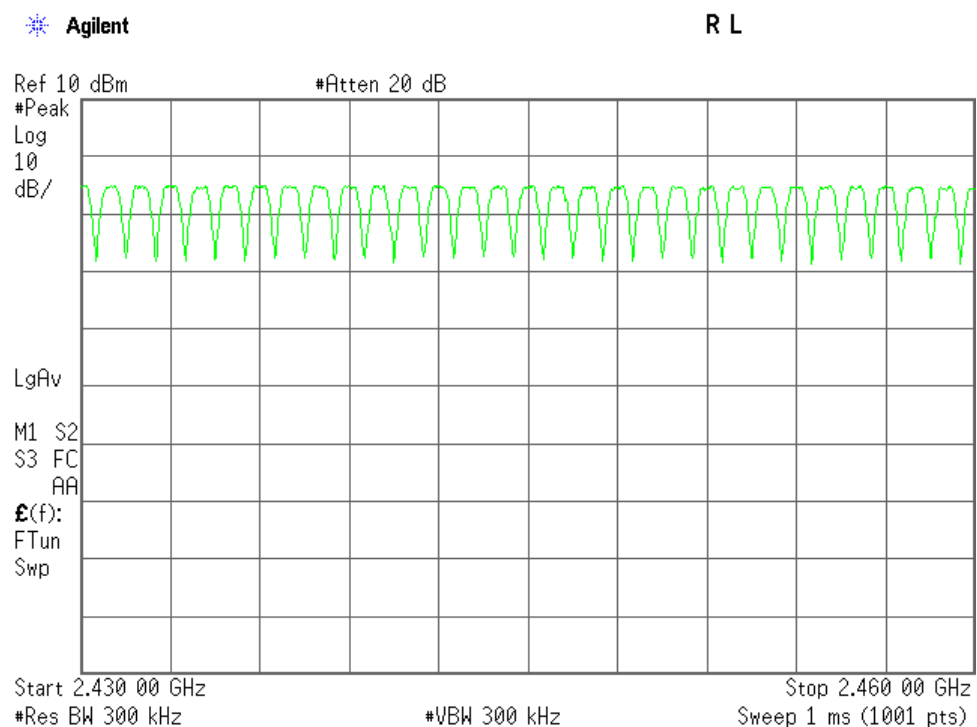
Temp.: 27°C, Humi: 62%

| Mode of EUT  | Minimum Hopping Channel | Limit |
|--------------|-------------------------|-------|
| Hopping      | 79                      | 15    |
| Inquiry      | 32                      | 15    |
| AFH(minimum) | 20                      | 15    |

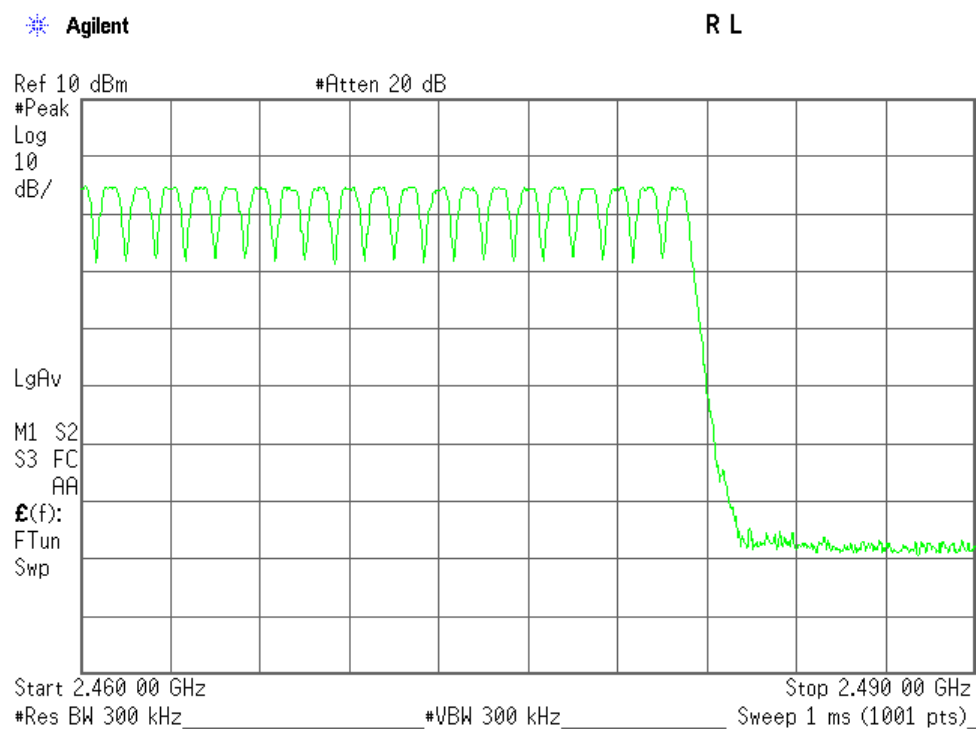
Mode of EUT : Hopping(1/3)



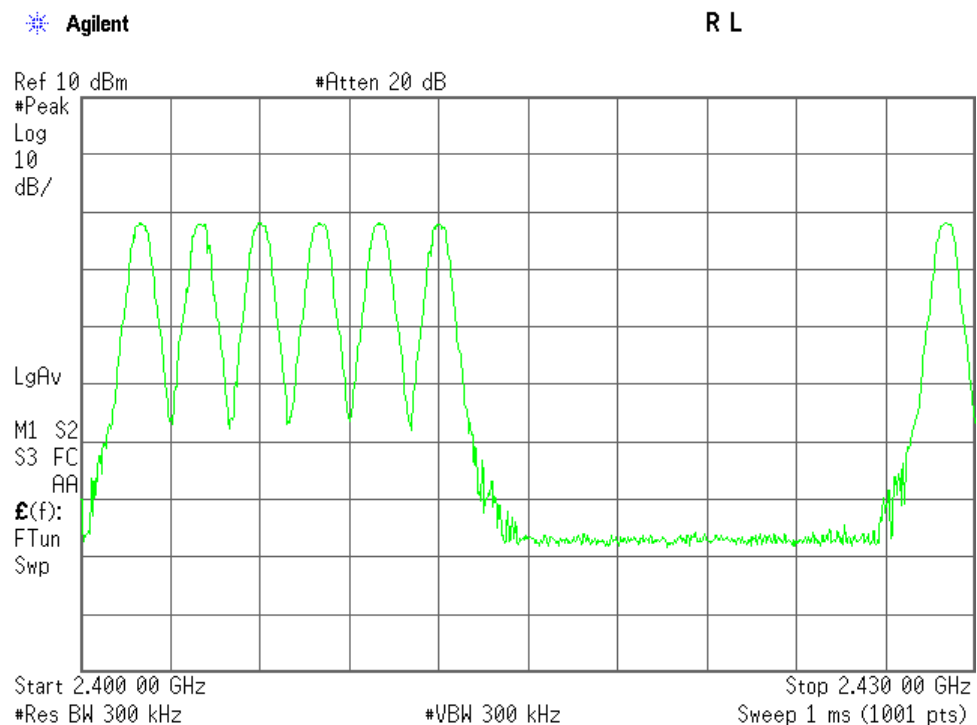
Mode of EUT : Hopping(2/3)



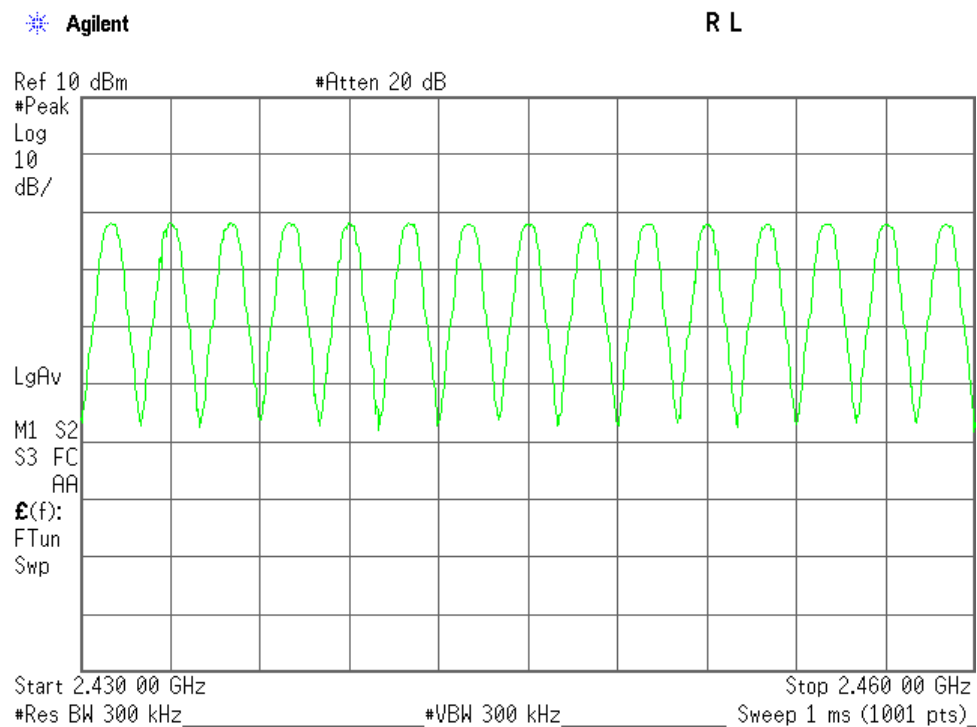
Mode of EUT : Hopping(3/3)



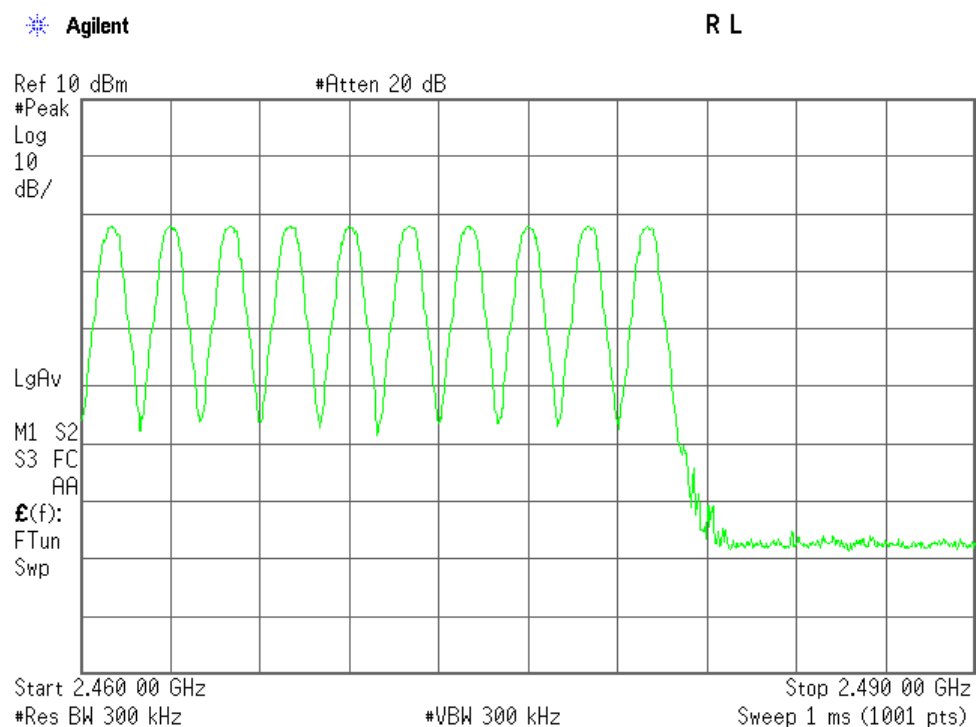
Mode of EUT : Inquiry(1/3)



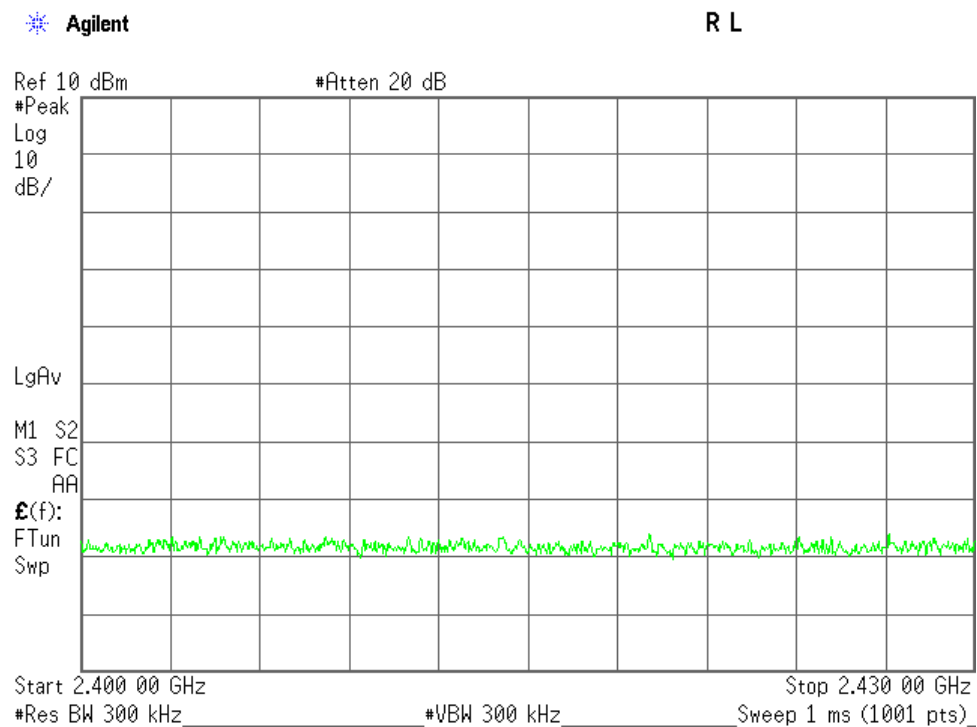
Mode of EUT : Inquiry(2/3)



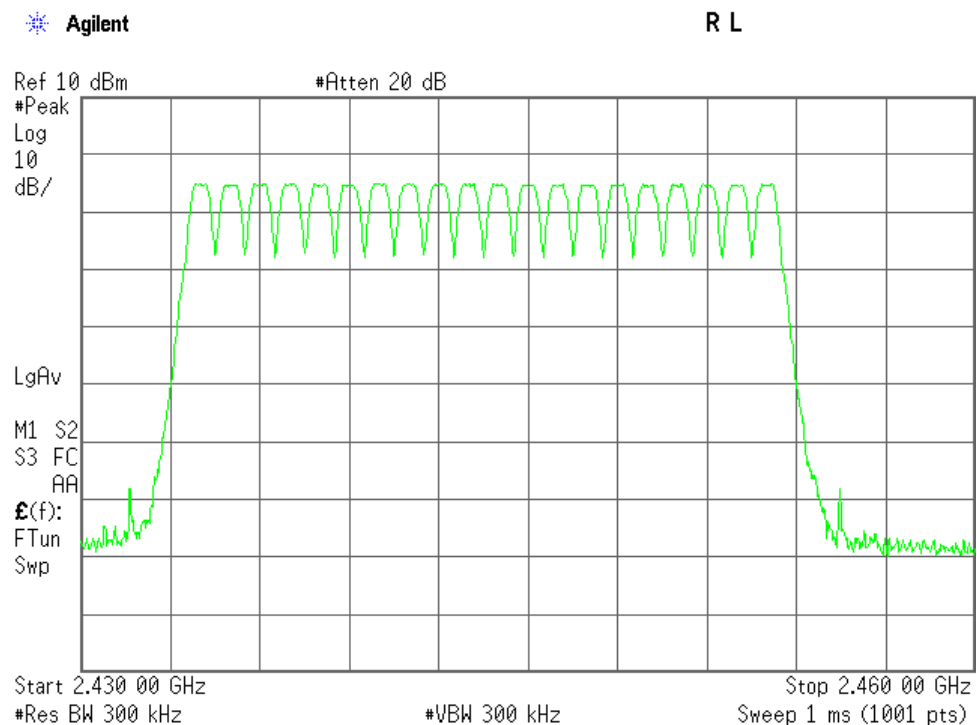
Mode of EUT : Inquiry(3/3)



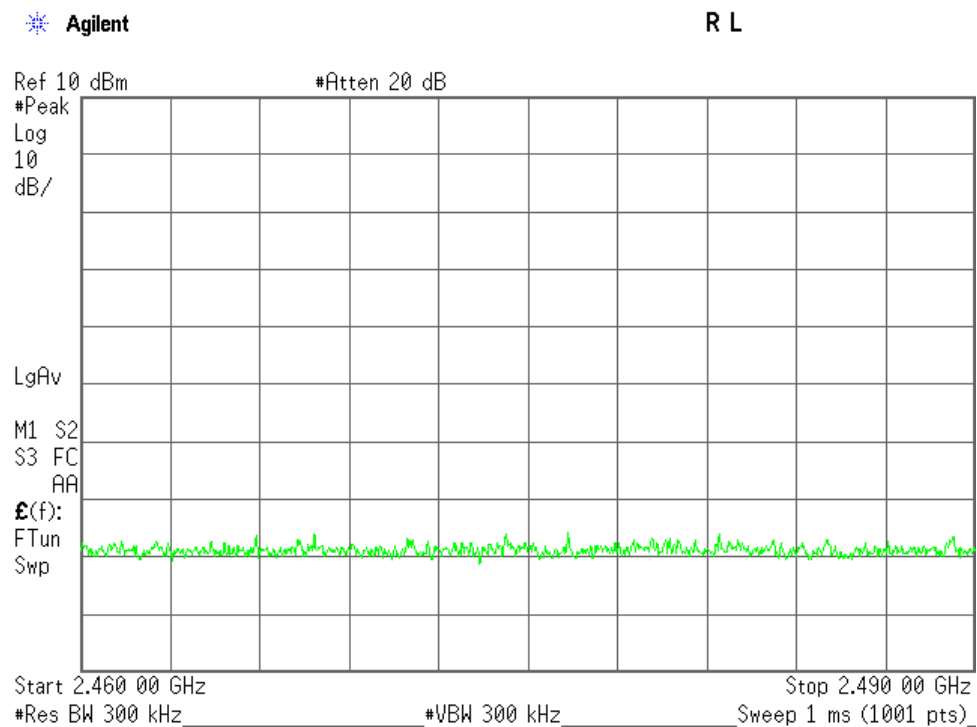
Mode of EUT : AFH(minimum)(1/3)



Mode of EUT : AFH(minimum) (2/3)



Mode of EUT : AFH(minimum) (3/3)



### 7.3 Occupied Bandwidth

For the requirements, ☒ - Applicable [ ☒ - Tested. ☐ - Not tested by applicant request. ]  
☐ - Not Applicable

#### 7.3.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

The 99% Bandwidth is 1184.4 kHz at 2441.0 MHz  
The 20dB Bandwidth is 1286.0 kHz at 2441.0 MHz

Uncertainty of Measurement Results ± 0.9 %(2σ)

Remarks : \_\_\_\_\_

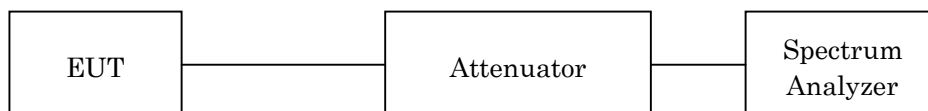
#### 7.3.2 Test Instruments

| Shielded Room S4  |             |                   |              |            |
|-------------------|-------------|-------------------|--------------|------------|
| Type              | Model       | Serial No. (ID)   | Manufacturer | Cal. Due   |
| Spectrum Analyzer | E4446A      | US44300388 (A-39) | Agilent      | 2016/08/11 |
| Attenuator        | 54A-10      | W5675 (D-28)      | Weinschel    | 2016/08/16 |
| RF Cable          | SUCOFLEX102 | 14253/2 (C-52)    | HUBER+SUHNER | 2016/08/16 |

NOTE : The calibration interval of the above test instruments is 12 months.

#### 7.3.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

|                 |               |
|-----------------|---------------|
| Res. Bandwidth  | 30 kHz        |
| Video Bandwidth | 100 kHz       |
| Span            | 2 MHz / 3 MHz |
| Sweep Time      | AUTO          |
| Trace           | Maxhold       |

### 7.3.4 Test Data

Mode of EUT : BDR+EDR

Test Date : July 25, 2016

Temp.:27°C, Humi:62%

The resolution bandwidth was set to about 1% of emission bandwidth, -20dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

#### 1)Packet Setting : DH5(Modulation type : GFSK)

| Channel | Frequency (MHz) | 99% Bandwidth (kHz) | -20dBc Bandwidth (kHz) | Two-thirds of the 20 dB bandwidth (kHz) |
|---------|-----------------|---------------------|------------------------|-----------------------------------------|
| 00      | 2402.0          | 901.1               | 976.0                  | 650.7                                   |
| 39      | 2441.0          | 900.2               | 975.7                  | 650.5                                   |
| 78      | 2480.0          | 901.4               | 969.5                  | 646.3                                   |

#### 2)Packet Setting : 2DH5(Modulation type : pi/4-DQPSK)

| Channel | Frequency (MHz) | 99% Bandwidth (kHz) | -20dBc Bandwidth (kHz) | Two-thirds of the 20 dB bandwidth (kHz) |
|---------|-----------------|---------------------|------------------------|-----------------------------------------|
| 00      | 2402.0          | 1174.6              | 1280.0                 | 853.3                                   |
| 39      | 2441.0          | 1173.8              | 1284.0                 | 856.0                                   |
| 78      | 2480.0          | 1167.4              | 1280.0                 | 853.3                                   |

#### 3)Packet Setting : 3DH5(Modulation type : 8DPSK)

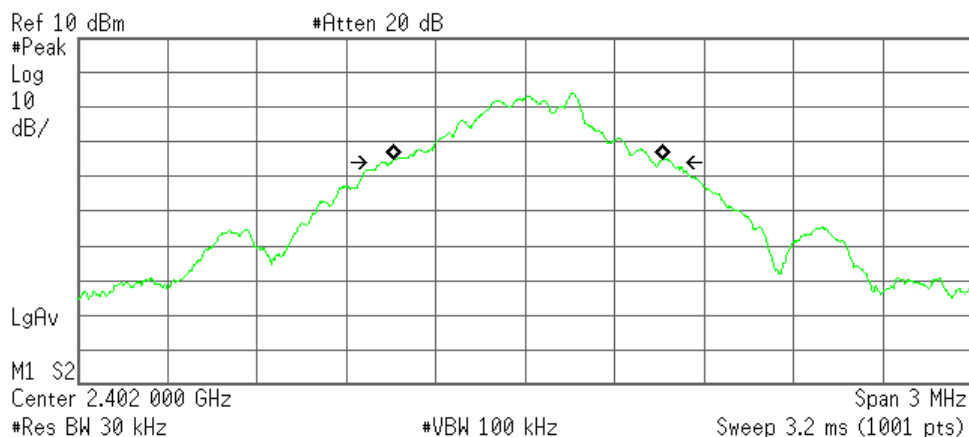
| Channel | Frequency (MHz) | 99% Bandwidth (kHz) | -20dBc Bandwidth (kHz) | Two-thirds of the 20 dB bandwidth (kHz) |
|---------|-----------------|---------------------|------------------------|-----------------------------------------|
| 00      | 2402.0          | 1168.5              | 1279.0                 | 852.7                                   |
| 39      | 2441.0          | 1184.4              | 1286.0                 | 857.3                                   |
| 78      | 2480.0          | 1167.7              | 1283.0                 | 855.3                                   |

## 1)Packet Setting : DH5(Modulation type : GFSK)

### Low Channel

Agilent

R L



Occupied Bandwidth  
901.0737 kHz

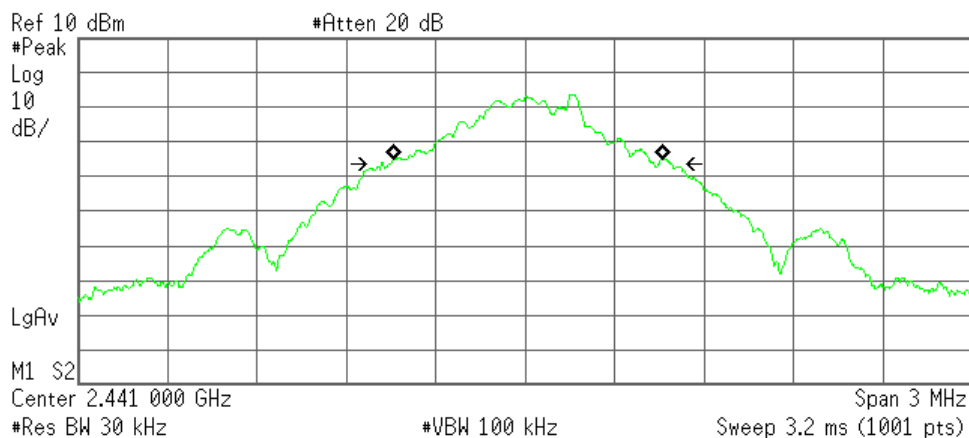
Occ BW % Pwr 99.00 %  
x dB -20.00 dB

Transmit Freq Error 9.403 kHz  
Occupied Bandwidth 976.026 kHz

### Middle Channel

Agilent

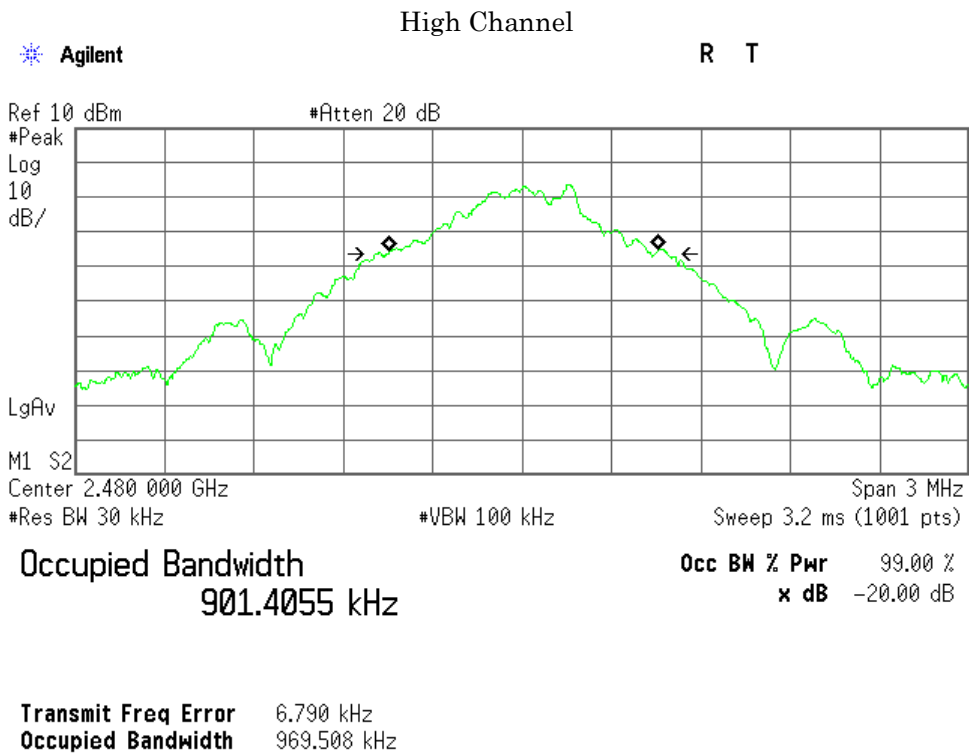
R T



Occupied Bandwidth  
900.2129 kHz

Occ BW % Pwr 99.00 %  
x dB -20.00 dB

Transmit Freq Error 8.675 kHz  
Occupied Bandwidth 975.705 kHz

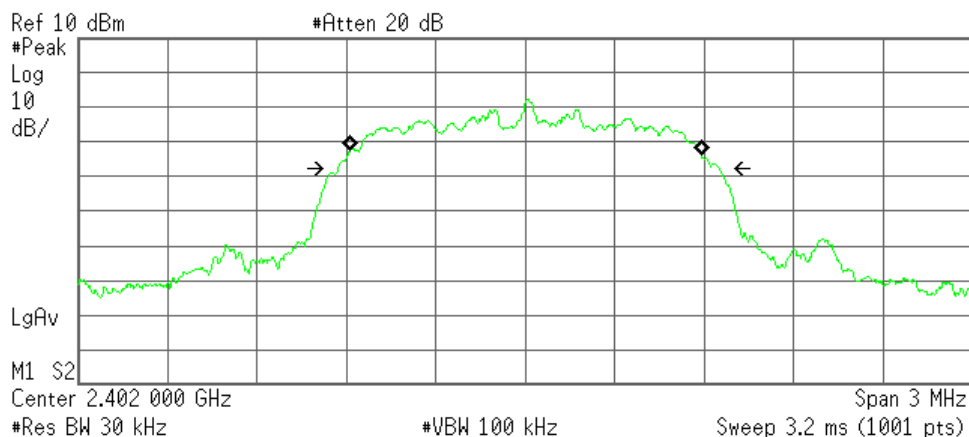


## 2)Packet Setting : 2DH5(Modulation type : pi/4-DQPSK)

### Low Channel

Agilent

R L



Occupied Bandwidth  
1.1746 MHz

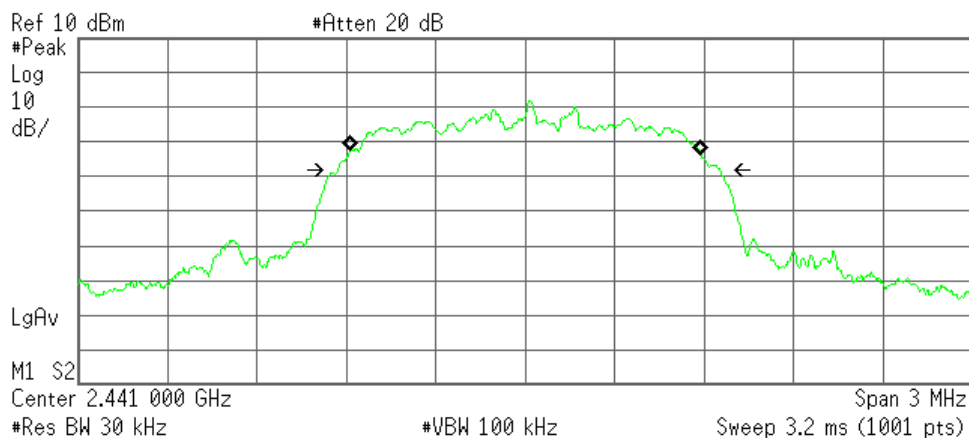
Occ BW % Pwr 99.00 %  
x dB -20.00 dB

Transmit Freq Error 2.500 kHz  
Occupied Bandwidth 1.280 MHz

### Middle Channel

Agilent

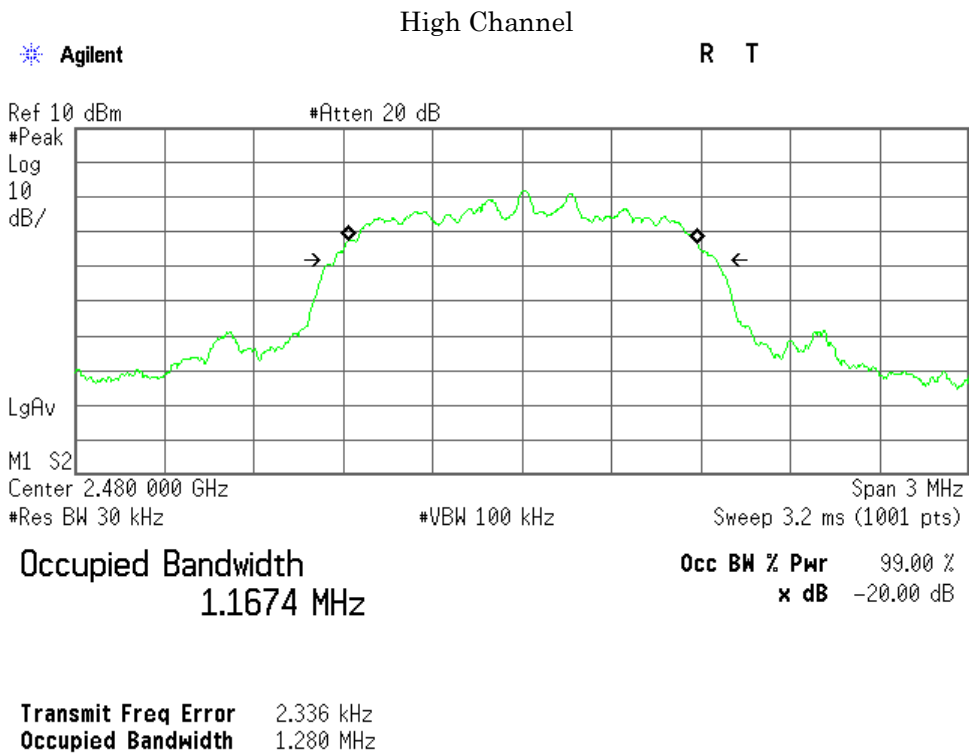
R T



Occupied Bandwidth  
1.1738 MHz

Occ BW % Pwr 99.00 %  
x dB -20.00 dB

Transmit Freq Error 1.544 kHz  
Occupied Bandwidth 1.284 MHz

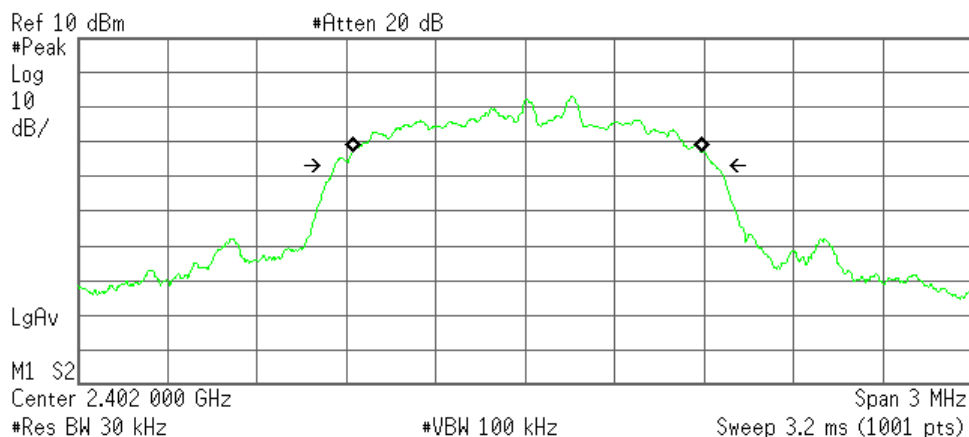


### 3)Packet Setting : 3 DH5(Modulation type : 8DPSK)

#### Low Channel

Agilent

R L



Occupied Bandwidth  
1.1685 MHz

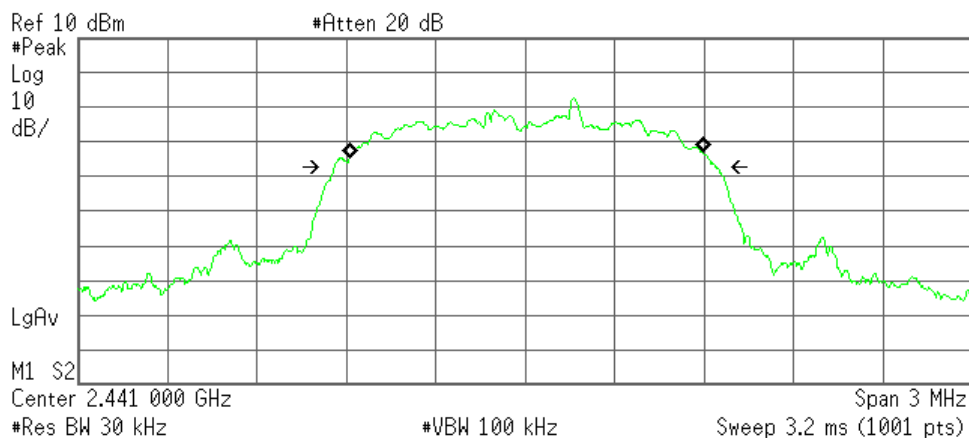
Occ BW % Pwr 99.00 %  
x dB -20.00 dB

Transmit Freq Error 5.917 kHz  
Occupied Bandwidth 1.279 MHz

#### Middle Channel

Agilent

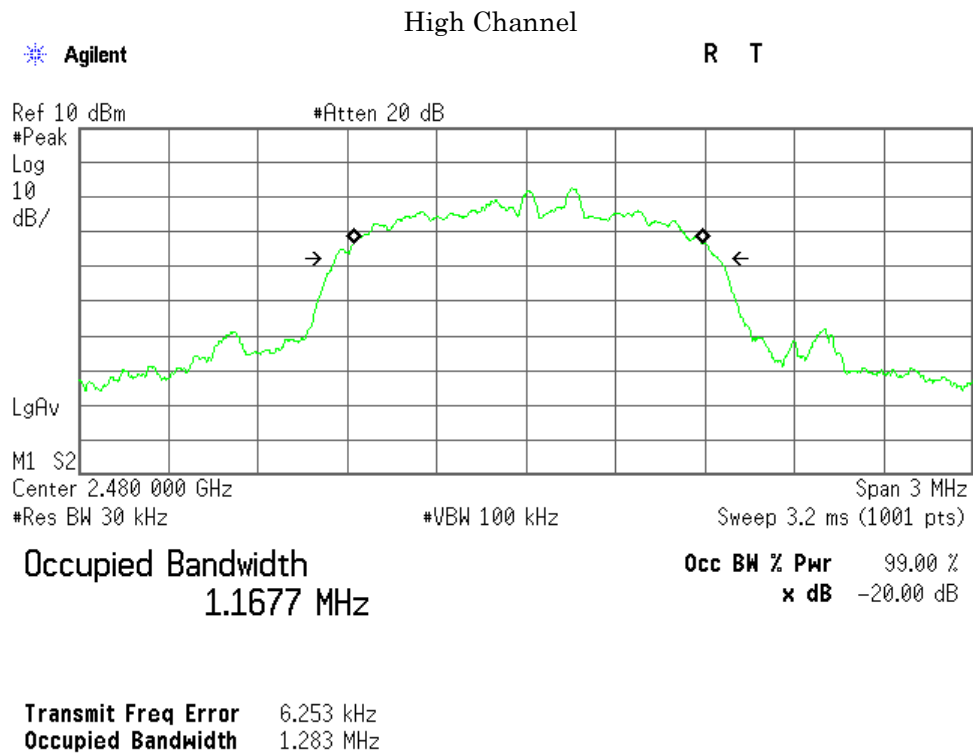
R L



Occupied Bandwidth  
1.1844 MHz

Occ BW % Pwr 99.00 %  
x dB -20.00 dB

Transmit Freq Error 4.523 kHz  
Occupied Bandwidth 1.286 MHz



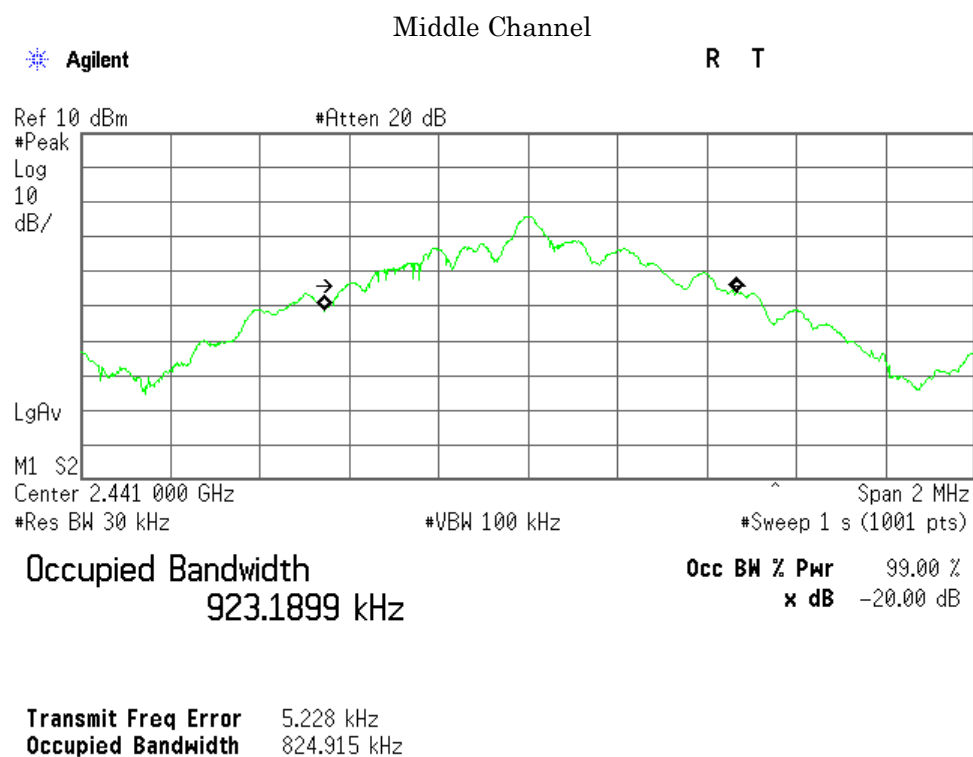
Mode of EUT : Inquiry

Test Date : July 25, 2016

Temp.: 27°C, Humi: 62%

The resolution bandwidth was set to about 1% of emission bandwidth, -20dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

| Frequency (MHz) | 99% Bandwidth (kHz) | -20dBc Bandwidth (kHz) | Two-thirds of the 20 dB bandwidth (kHz) |
|-----------------|---------------------|------------------------|-----------------------------------------|
| 2441.0          | 923.2               | 824.9                  | 549.9                                   |



## 7.4 Dwell Time

For the requirements, ☒ - Applicable [ ☒ - Tested. ☐ - Not tested by applicant request. ]  
☐ - Not Applicable

### 7.4.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Dwell Time is 307.8 msec  
Dwell Time (Inquiry) is 63.7 msec  
Dwell Time (AFH) is 307.8 msec

Uncertainty of Measurement Results ± 0.6 %(2σ)

Remarks : \_\_\_\_\_

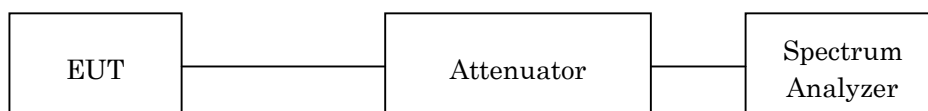
### 7.4.2 Test Instruments

| Shielded Room S4  |             |                   |              |            |
|-------------------|-------------|-------------------|--------------|------------|
| Type              | Model       | Serial No. (ID)   | Manufacturer | Cal. Due   |
| Spectrum Analyzer | E4446A      | US44300388 (A-39) | Agilent      | 2016/08/11 |
| Attenuator        | 54A-10      | W5675 (D-28)      | Weinschel    | 2016/08/16 |
| RF Cable          | SUCOFLEX102 | 14253/2 (C-52)    | HUBER+SUHNER | 2016/08/16 |

NOTE : The calibration interval of the above test instruments is 12 months.

### 7.4.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

|                 |           |
|-----------------|-----------|
| Res. Bandwidth  | 1 MHz     |
| Video Bandwidth | 1 MHz     |
| Span            | Zero Span |

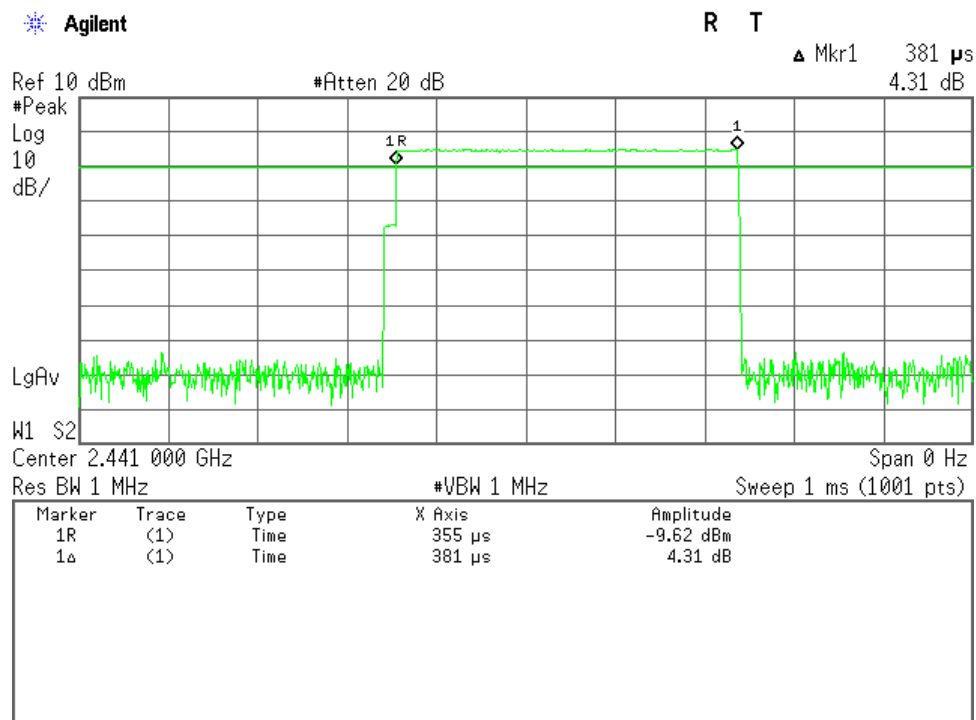
#### 7.4.4 Test Data

Test Date : July 25, 2016

Temp.: 27°C, Humi: 53%

| Mode of EUT | Dwell Time (msec) | Limit (msec) |
|-------------|-------------------|--------------|
| DH1         | 121.9             | 400          |
| DH3         | 262.1             | 400          |
| DH5         | 307.8             | 400          |
| Inquiry     | 63.7              | 400          |

DH1 (Modulation type : GFSK)

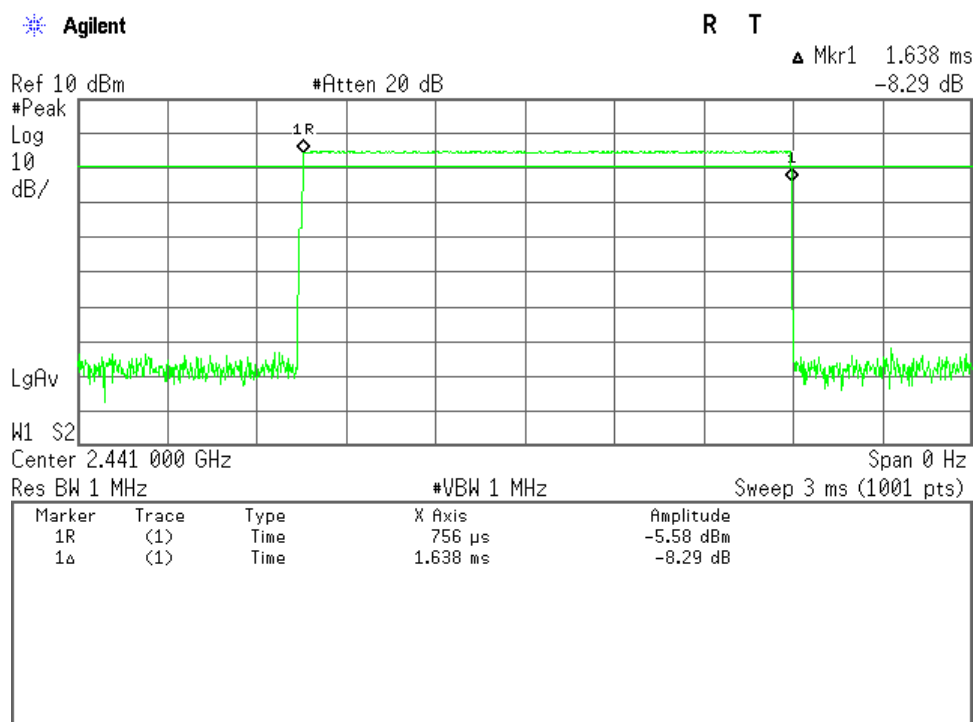


Note : The system makes worst case 1600 hops per second or 1 time slot has a length of 625 μs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So the system has each channel 10.1266 times per second and so for 31.6 seconds the system have 320.0 times of appearance.

Each tx-time per appearance is 0.381 ms.

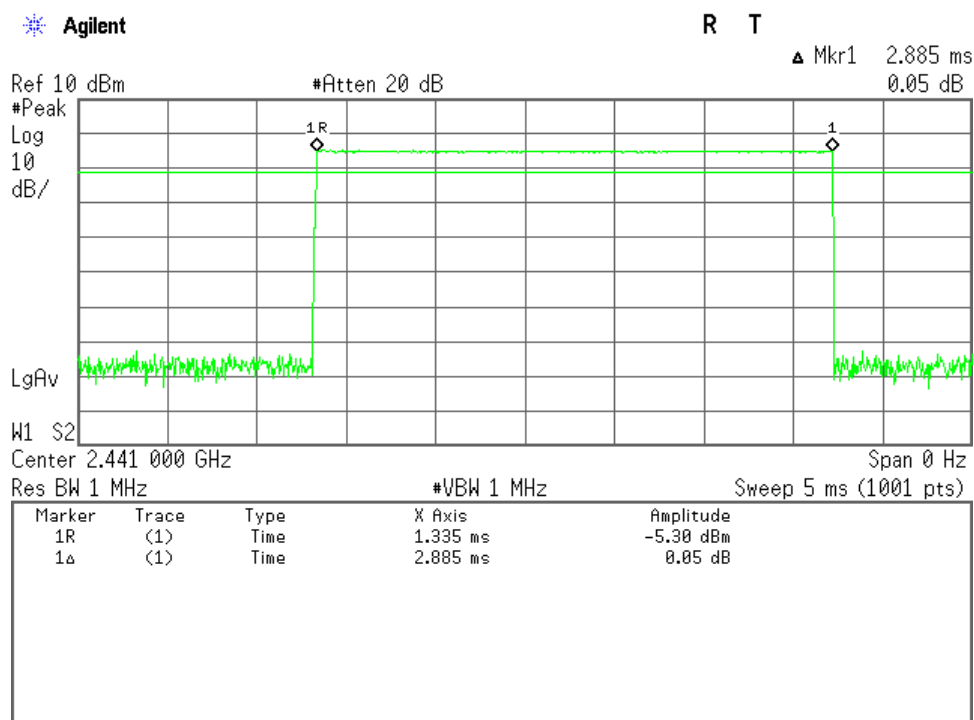
Dwell time = 320.0 \* 0.381 = 121.9 ms

## DH3(Modulation type : GFSK)



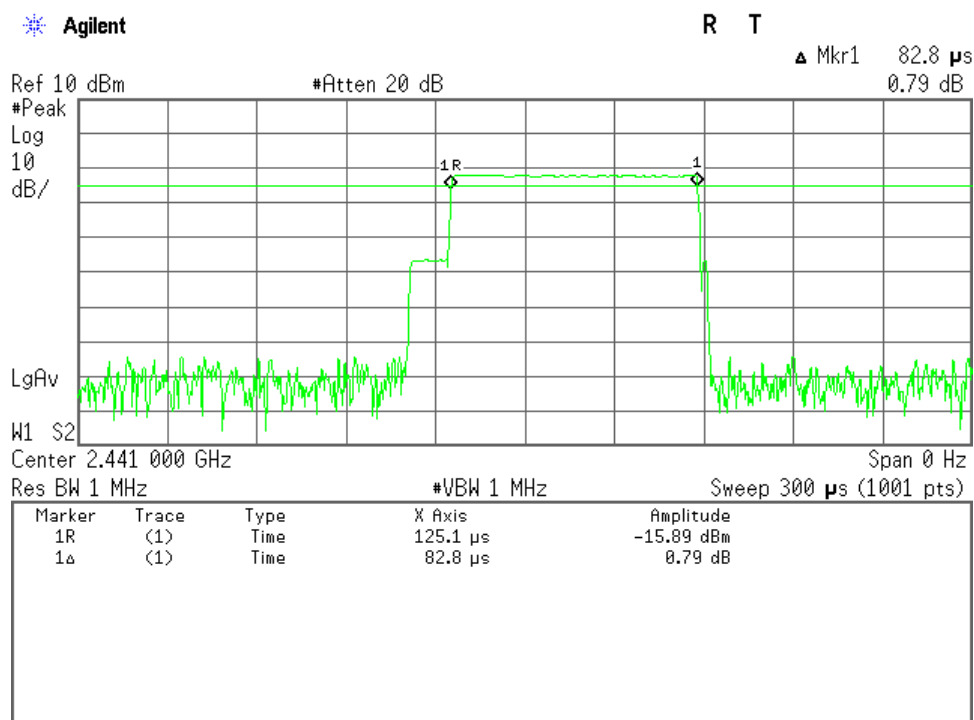
Note : A DH3 Packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 400 hops per second with 79 channels. So the system have each channel 5.063 times per second and so for 31.6 seconds the system have 160.0 times of appearance. Each tx-time per appearance is 1.638 ms.  
Dwell time = 160.0 \* 1.638 = 262.1 ms

## DH5(Modulation type : GFSK)



Note : A DH5 Packet need 5 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 266.667 hops per second with 79 channels. So the system have each channel 3.3755 times per second and so for 31.6 seconds the system have 106.7 times of appearance. Each tx-time per appearance is 2.885 ms.  
Dwell time = 106.7 \* 2.885 = 307.8 ms

## Inquiry



Note : The system have 32 hopping channel in Inquiry mode.

The time period =  $32 * 0.4 = 12.8$  seconds

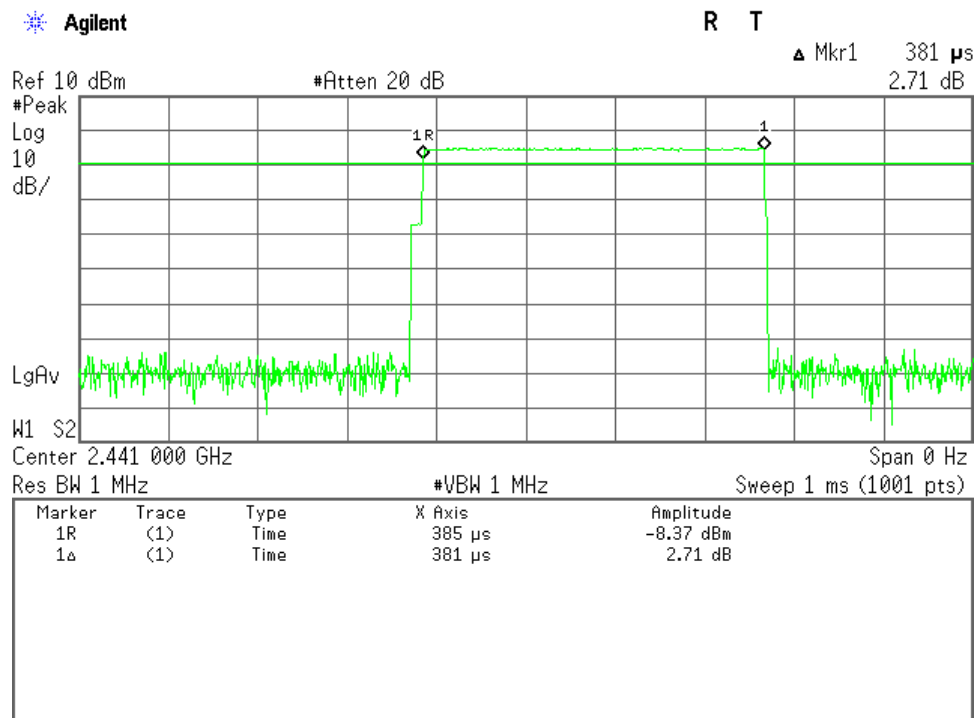
In maximum case the Bluetooth system have three blocks of 2560 ms in 12.8 s period. One block has 256 burst at each hopping channel.

Each tx-time per appearance is 0.083 ms.

Dwell time =  $0.083 * 256 * 3 = 63.7$  ms

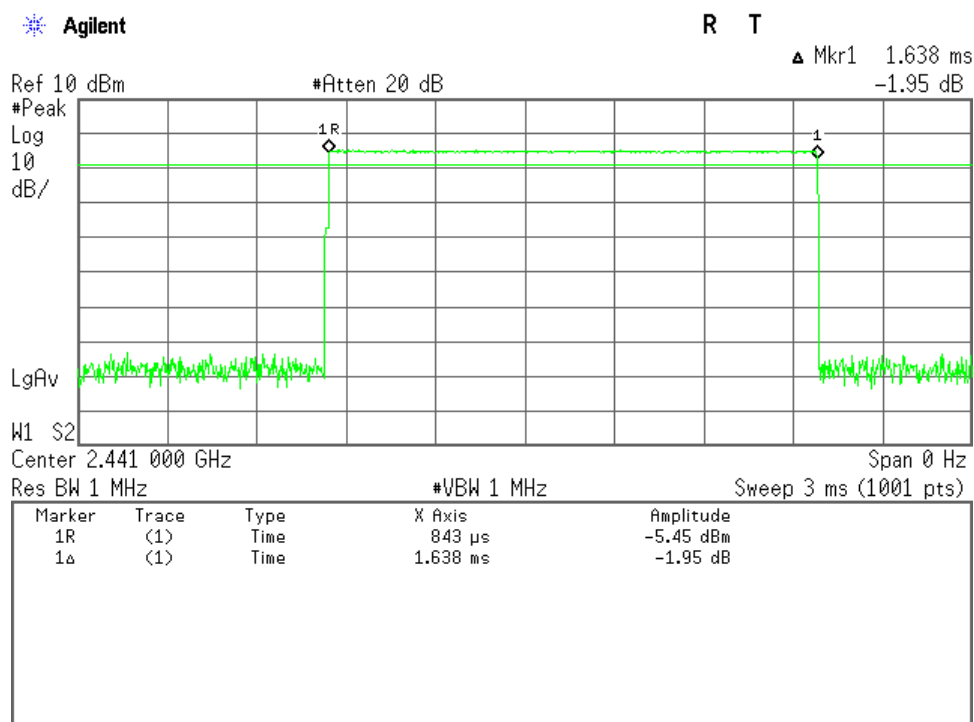
| Mode of EUT | Dwell Time (msec) | Limit (msec) |
|-------------|-------------------|--------------|
| DH1(AFH)    | 121.9             | 400          |
| DH3(AFH)    | 262.1             | 400          |
| DH5(AFH)    | 307.8             | 400          |

DH1(AFH mode, Modulation type : GFSK)



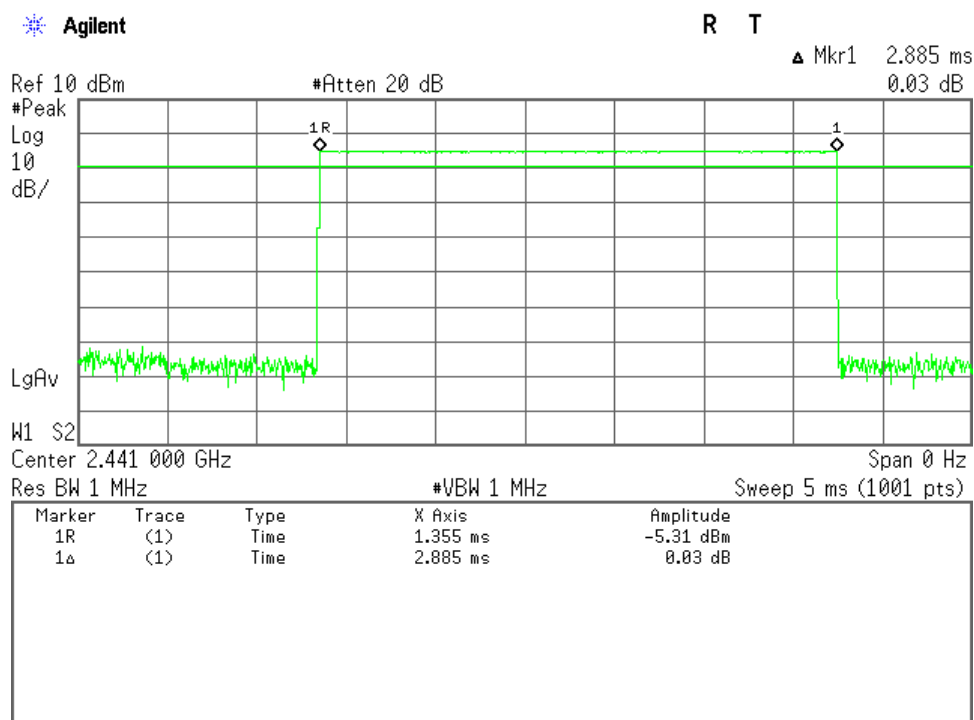
Note : The system makes worst case 1600 hops per second or 1 time slot has a length of 625 μs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 20 channels. So the system has each channel 40 times per second and so for 8 seconds the system have 320.0 times of appearance. Each tx-time per appearance is 0.381 ms.  
Dwell time = 320.0 \* 0.381 = 121.9 ms

## DH3(AFH mode, Modulation type : GFSK)



Note : A DH3 Packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 400 hops per second with 20 channels. So the system have each channel 20 times per second and so for 8 seconds the system have 160.0 times of appearance. Each tx-time per appearance is 1.638 ms.  
Dwell time = 160.0 \* 1.638 = 262.1 ms

## DH5(AFH mode, Modulation type : GFSK)



Note : A DH5 Packet need 5 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 266.667 hops per second with 20 channels. So the system have each channel 13.33335 times per second and so for 8 seconds the system have 106.7 times of appearance. Each tx-time per appearance is 2.885 ms.  
Dwell time = 106.7 \* 2.885 = 307.8 ms

## 7.5 Peak Output Power(Conduction)

For the requirements, ☒ - Applicable [ ☒ - Tested. ☐ - Not tested by applicant request. ]  
☐ - Not Applicable

### 7.5.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Peak Output Power is 7.02 dBm at 2402.0 MHz

Uncertainty of Measurement Results ± 0.9 dB(2σ)

Remarks : \_\_\_\_\_

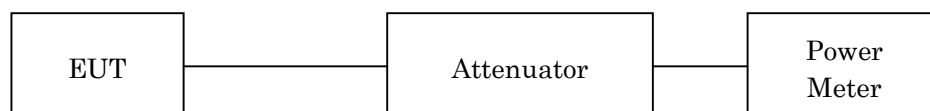
### 7.5.2 Test Instruments

| Shielded Room S4 |             |                   |              |            |
|------------------|-------------|-------------------|--------------|------------|
| Type             | Model       | Serial No. (ID)   | Manufacturer | Cal. Due   |
| Power Meter      | N1911A      | GB45100291 (B-63) | Agilent      | 2017/07/10 |
| Power Sensor     | N1921A      | US44510470 (B-64) | Agilent      | 2017/07/10 |
| Attenuator       | 54A-10      | W5675 (D-28)      | Weinschel    | 2016/08/16 |
| RF Cable         | SUCOFLEX102 | 14253/2 (C-52)    | HUBER+SUHNER | 2016/08/16 |

NOTE : The calibration interval of the above test instruments is 12 months.

### 7.5.3 Test Method and Test Setup (Diagrammatic illustration)

The Conducted RF Power Output was measured with a power meter, one attenuator and a short, low loss cable.



#### 7.5.4 Test Data

1)DH5(Modulation type : GFSK)

Test Date: July 22, 2016  
Temp.: 27 °C, Humi: 53 %

| Transmitting Frequency |       | Correction Factor | Meter Reading | Conducted Peak Output Power |      | Limits | Margin |
|------------------------|-------|-------------------|---------------|-----------------------------|------|--------|--------|
| CH                     | [MHz] | [dB]              | [dBm]         | [dBm]                       | [mW] | [dBm]  | [dB]   |
| 00                     | 2402  | 10.39             | -4.85         | 5.54                        | 3.58 | 20.97  | +15.43 |
| 39                     | 2441  | 10.42             | -4.96         | 5.46                        | 3.52 | 20.97  | +15.51 |
| 78                     | 2480  | 10.43             | -5.22         | 5.21                        | 3.32 | 20.97  | +15.76 |

Calculated result at 2402.000 MHz, as the worst point shown on underline:

|                   |   |                    |
|-------------------|---|--------------------|
| Correction Factor | = | 10.39 dB           |
| + ) Meter Reading | = | -4.85 dBm          |
| Result            | = | 5.54 dBm = 3.58 mW |

Minimum Margin: 20.97 - 5.54 = 15.43 (dB)

#### NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

|                   |            |
|-------------------|------------|
| Detector Function | Video B.W. |
| Peak              | Off        |

## 2) 2DH5(Modulation type : pi/4-DQPSK)

Test Date: July 22, 2016
Temp.: 27 °C, Humi: 53 %

| Transmitting Frequency |       | Correction Factor | Meter Reading | Conducted Peak Output Power |      | Limits | Margin |
|------------------------|-------|-------------------|---------------|-----------------------------|------|--------|--------|
| CH                     | [MHz] | [dB]              | [dBm]         | [dBm]                       | [mW] | [dBm]  | [dB]   |
| 00                     | 2402  | 10.39             | -3.77         | 6.62                        | 4.59 | 20.97  | +14.35 |
| 39                     | 2441  | 10.42             | -3.87         | 6.55                        | 4.52 | 20.97  | +14.42 |
| 78                     | 2480  | 10.43             | -4.13         | 6.30                        | 4.27 | 20.97  | +14.67 |

Calculated result at 2402.000 MHz, as the worst point shown on underline:

|                   |   |                    |
|-------------------|---|--------------------|
| Correction Factor | = | 10.39 dB           |
| + ) Meter Reading | = | -3.77 dBm          |
| Result            | = | 6.62 dBm = 4.59 mW |

Minimum Margin: 20.97 - 6.62 = 14.35 (dB)

## NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

|                   |            |
|-------------------|------------|
| Detector Function | Video B.W. |
| Peak              | Off        |

## 3) 3DH5(Modulation type : 8DPSK)

Test Date: July 22, 2016
Temp.: 27 °C, Humi: 53 %

| Transmitting Frequency |       | Correction Factor | Meter Reading | Conducted Peak Output Power |      | Limits | Margin |
|------------------------|-------|-------------------|---------------|-----------------------------|------|--------|--------|
| CH                     | [MHz] | [dB]              | [dBm]         | [dBm]                       | [mW] | [dBm]  | [dB]   |
| 00                     | 2402  | 10.39             | -3.37         | 7.02                        | 5.04 | 20.97  | +13.95 |
| 39                     | 2441  | 10.42             | -3.44         | 6.98                        | 4.99 | 20.97  | +13.99 |
| 78                     | 2480  | 10.43             | -3.69         | 6.74                        | 4.72 | 20.97  | +14.23 |

Calculated result at 2402.000 MHz, as the worst point shown on underline:

|                   |   |                    |
|-------------------|---|--------------------|
| Correction Factor | = | 10.39 dB           |
| + ) Meter Reading | = | -3.37 dBm          |
| Result            | = | 7.02 dBm = 5.04 mW |

Minimum Margin: 20.97 - 7.02 = 13.95 (dB)

## NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

|                   |            |
|-------------------|------------|
| Detector Function | Video B.W. |
| Peak              | Off        |

## 7.6 Peak Power Density(Conduction)

For the requirements, ☐ - Applicable [ ☐ - Tested. ☐ - Not tested by applicant request. ]  
☒ - Not Applicable

Remarks : \_\_\_\_\_

## 7.7 Spurious Emissions(Conduction)

For the requirements, ☒ - Applicable [ ☒ - Tested. ☐ - Not tested by applicant request. ]  
☐ - Not Applicable

### 7.7.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Uncertainty of Measurement Results

|                 |              |        |
|-----------------|--------------|--------|
| 9 kHz – 1 GHz   | <u>± 1.4</u> | dB(2σ) |
| 1 GHz – 18 GHz  | <u>± 1.7</u> | dB(2σ) |
| 18 GHz – 40 GHz | <u>± 2.3</u> | dB(2σ) |

Remarks : \_\_\_\_\_

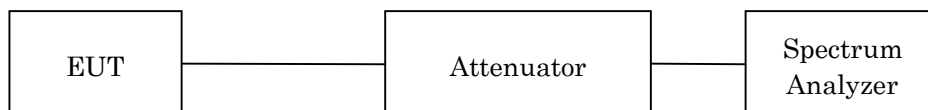
### 7.7.2 Test Instruments

| Shielded Room S4  |             |                   |              |            |
|-------------------|-------------|-------------------|--------------|------------|
| Type              | Model       | Serial No. (ID)   | Manufacturer | Cal. Due   |
| Spectrum Analyzer | E4446A      | US44300388 (A-39) | Agilent      | 2016/08/11 |
| Attenuator        | 54A-10      | W5675 (D-28)      | Weinschel    | 2016/08/16 |
| RF Cable          | SUCOFLEX102 | 14253/2 (C-52)    | HUBER+SUHNER | 2016/08/16 |

NOTE : The calibration interval of the above test instruments is 12 months.

### 7.7.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

|                 |                 |           |
|-----------------|-----------------|-----------|
| Frequency Range | 30 MHz - 25 GHz | Band-Edge |
| Res. Bandwidth  | 100 kHz         | 100 kHz   |
| Video Bandwidth | 300 kHz         | 300 kHz   |
| Sweep Time      | AUTO            | AUTO      |
| Trace           | Maxhold         | Maxhold   |

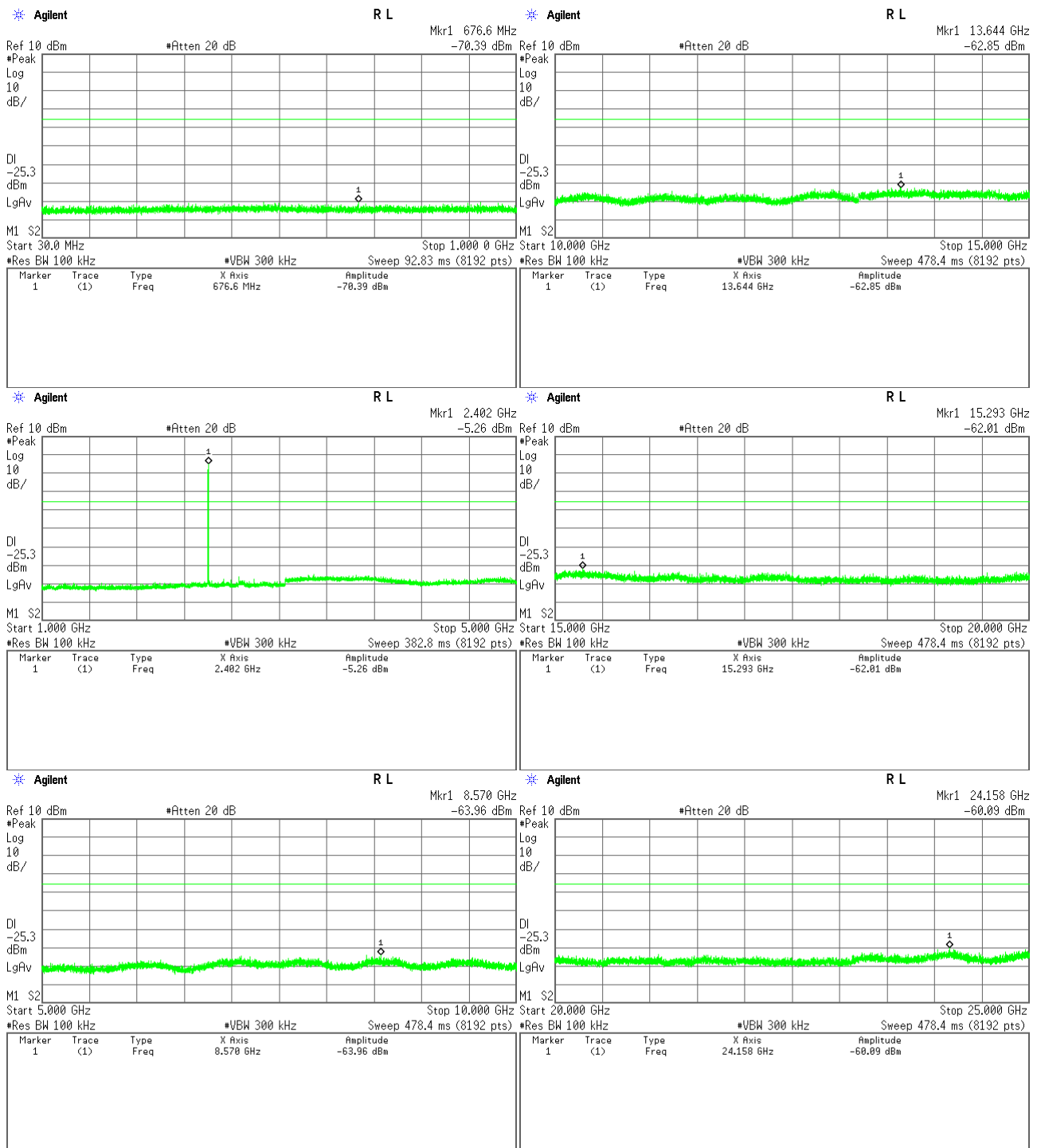
## 7.7.4 Test Data

Test Date : July 25, 2016

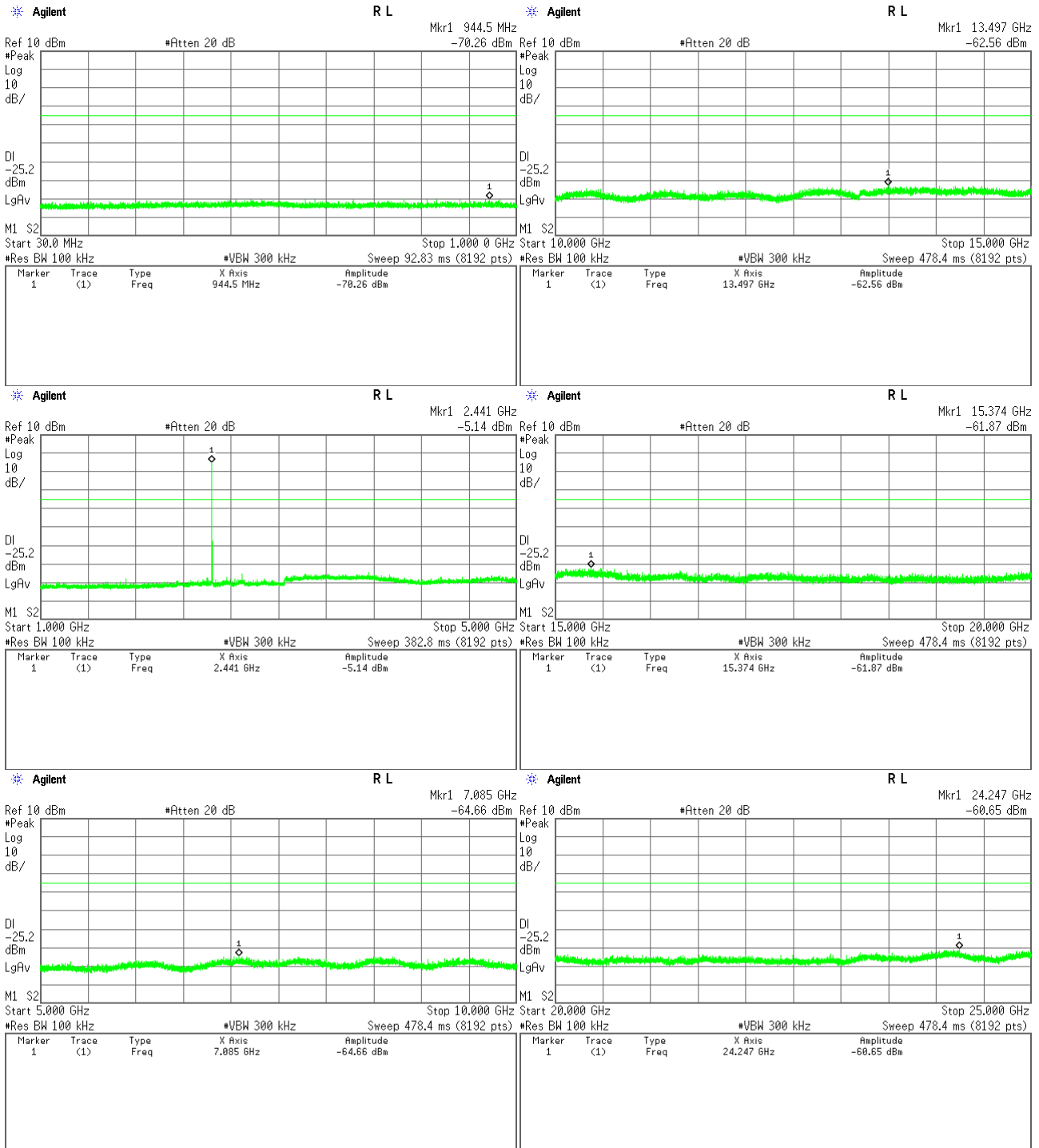
Temp.: 27°C, Humi: 62%

Mode of EUT : BDR (worst case)

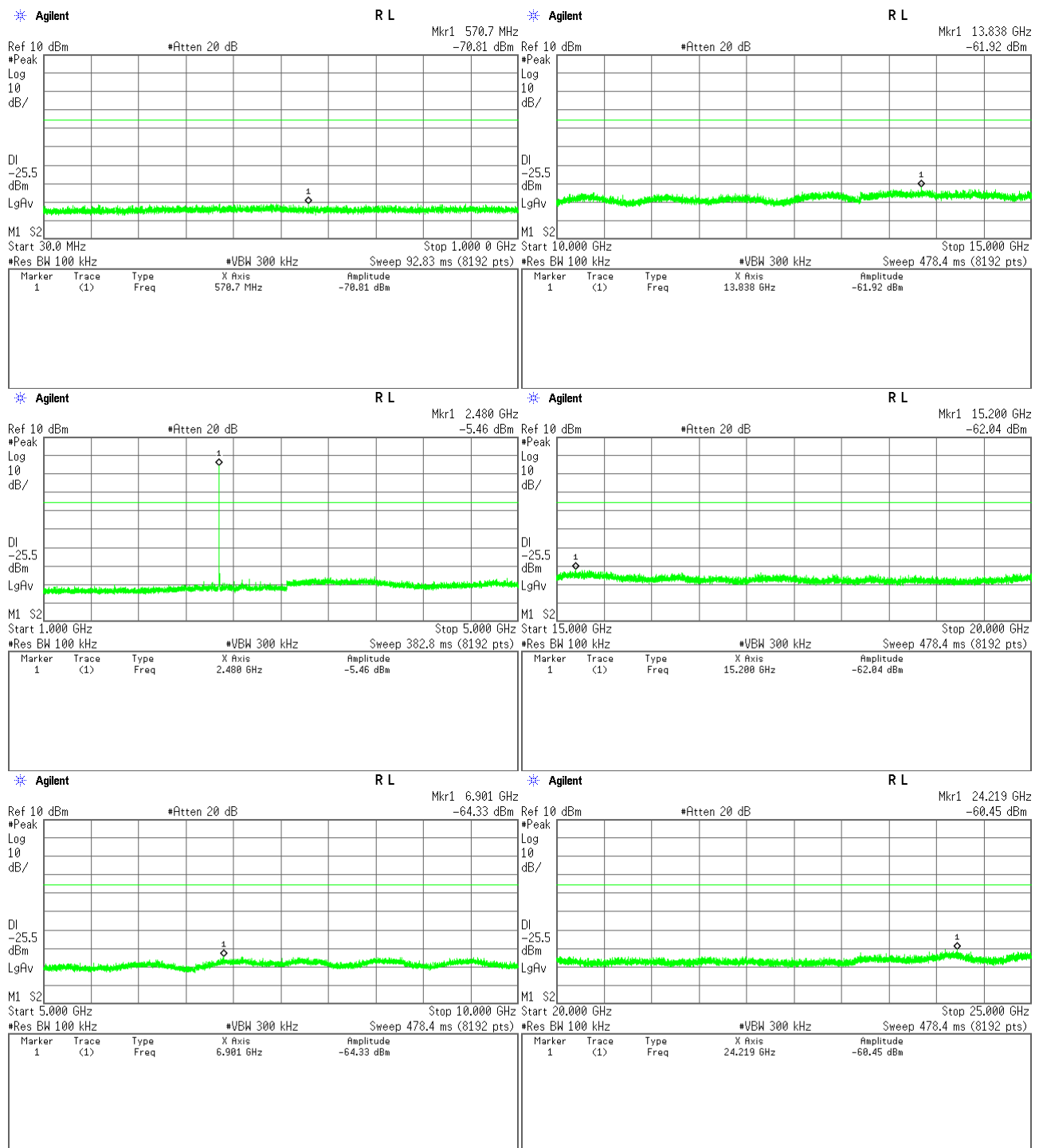
### Low Channel



## Middle Channel

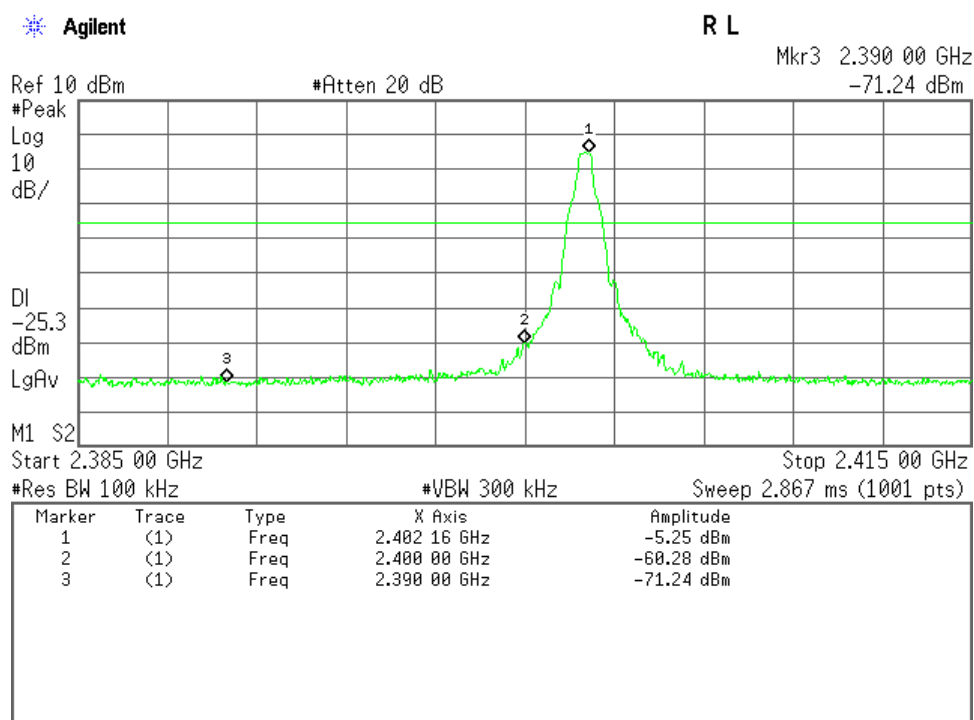


## High Channel

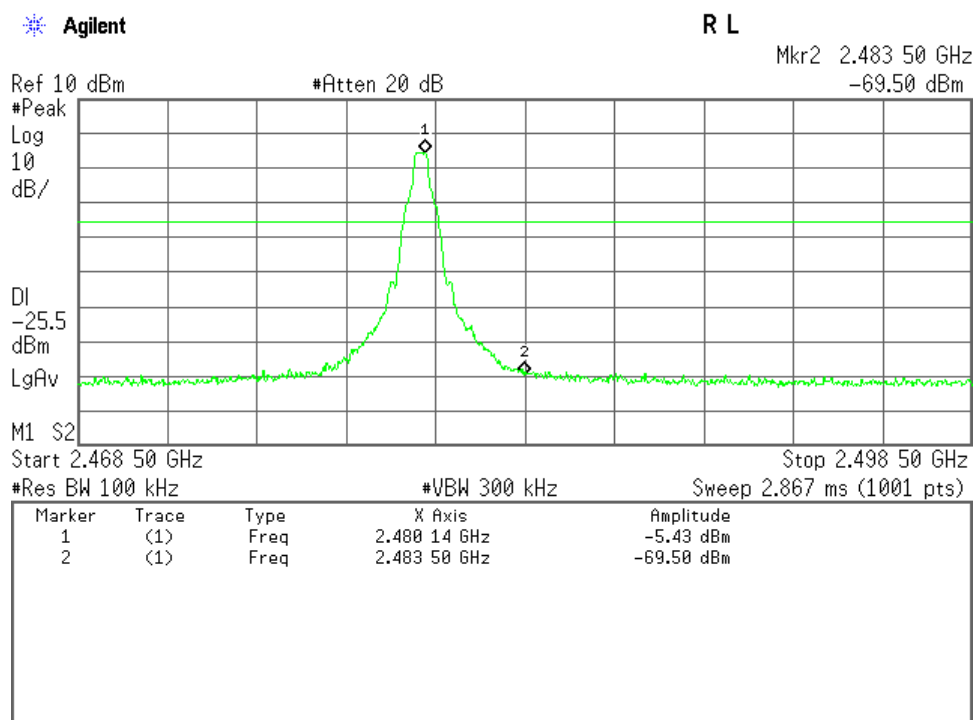


## Band-Edge Emission

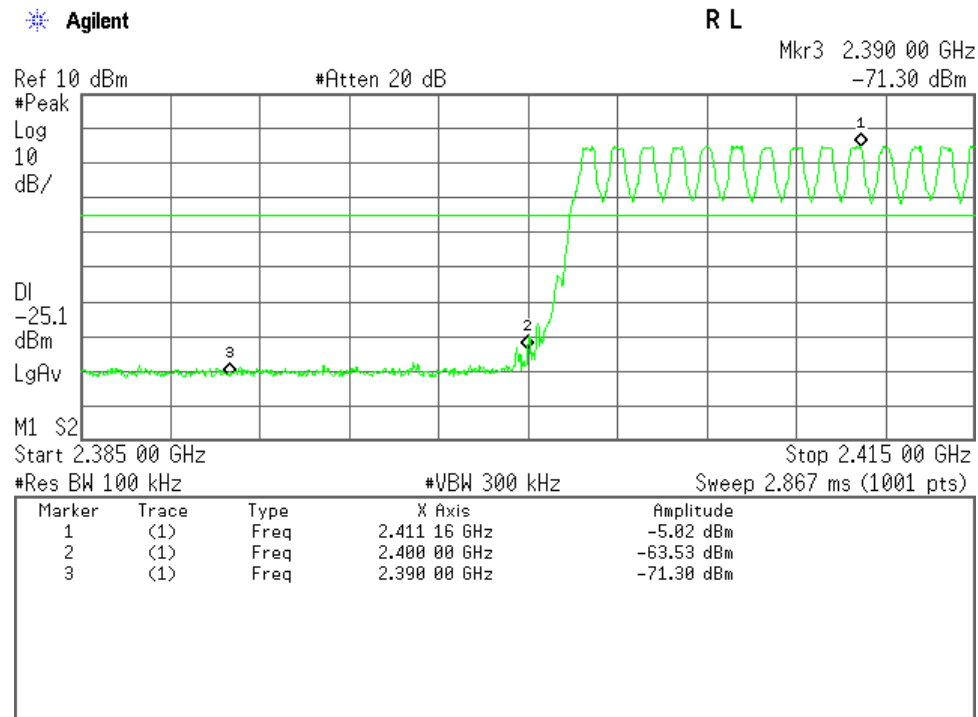
### Low Channel(Hopping off), Band-Edge Emission



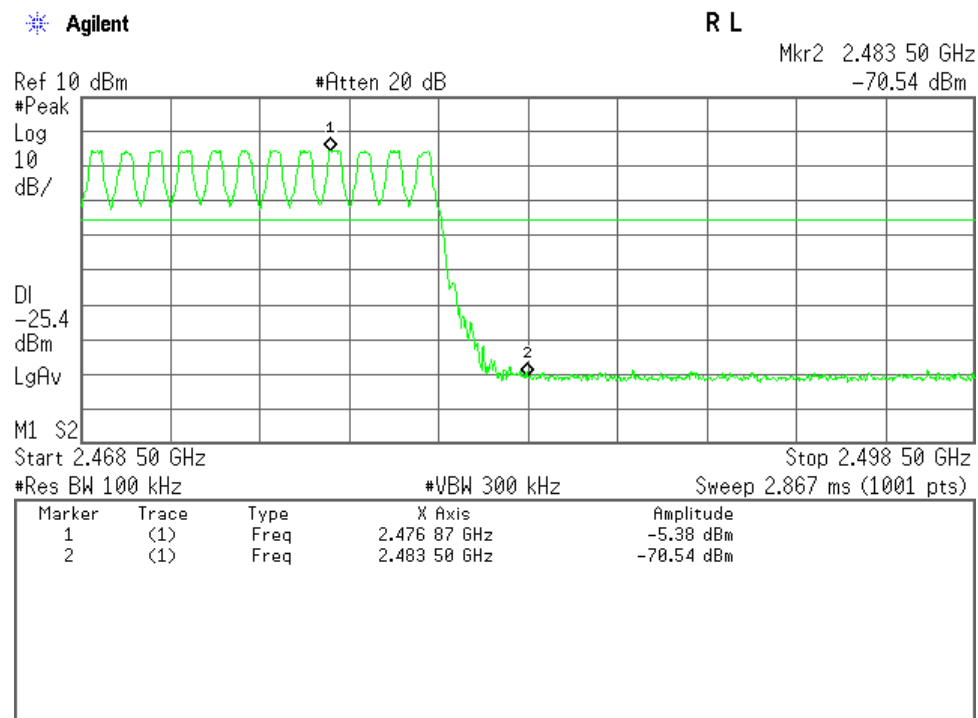
### High Channel(Hopping off), Band-Edge Emission



## Low Channel(Hopping on), Band-Edge Emission



## High Channel(Hopping on), Band-Edge Emission



## 7.8 AC Powerline Conducted Emission

For the requirements, ☒ - Applicable [ ☒ - Tested. ☐ - Not tested by applicant request. ]  
☐ - Not Applicable

### 7.8.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Min. Limit Margin (Quasi-Peak) 8.4 dB at 3.366 MHz

Uncertainty of Measurement Results ± 2.6 dB(2σ)

Remarks : \_\_\_\_\_

### 7.8.2 Test Instruments

| Measurement Room M2 |          |                 |                 |            |
|---------------------|----------|-----------------|-----------------|------------|
| Type                | Model    | Serial No. (ID) | Manufacturer    | Cal. Due   |
| Test Receiver       | ESCI     | 100453 (A-42)   | Rohde & Schwarz | 2016/12/09 |
| AMN (main)          | KNW-407R | 8-1832-1 (D-39) | Kyoritsu        | 2016/09/17 |
| RF Cable            | RG223/U  | --- (H-34)      | HUBER+SUHNER    | 2017/05/30 |

NOTE : The calibration interval of the above test instruments is 12 months.

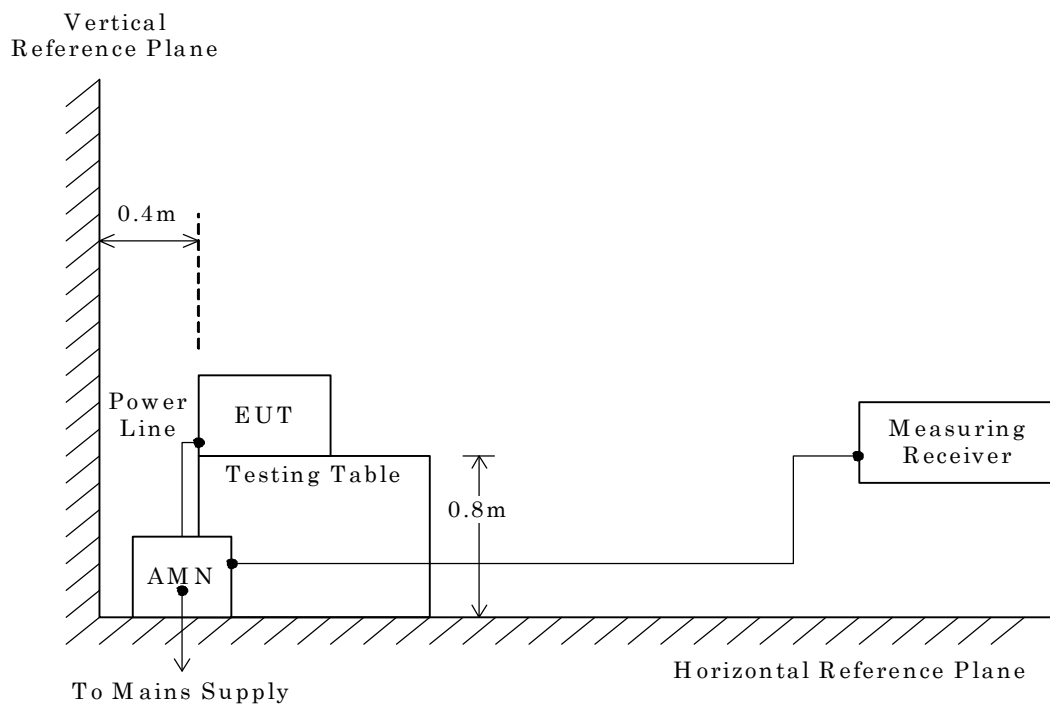
### 7.8.3 Test Method and Test Setup (Diagrammatic illustration)

The preliminary tests were performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for final tests.

– Side View –



#### NOTE

AMN : Artificial Mains Network

#### 7.8.4 Test Data

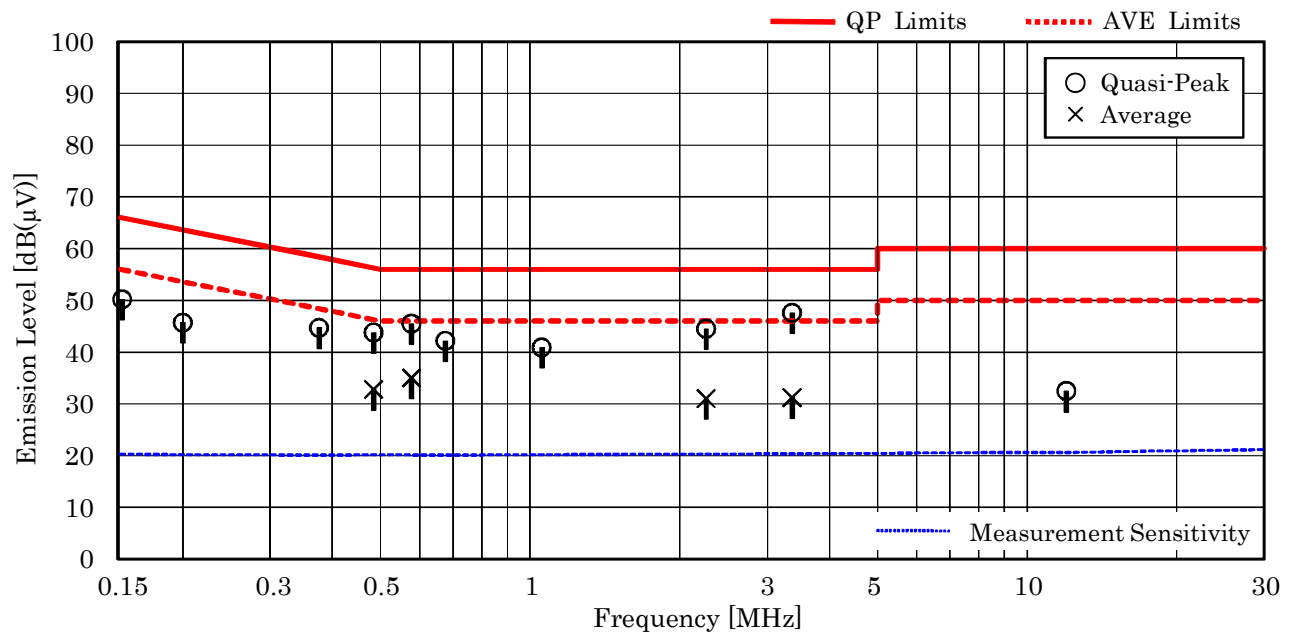
Mode of EUT : All modes have been investigated and the worst case mode for channel (39ch: 2441MHz) has been listed.

Test voltage : 120VAC 60Hz

Test Date: July 30, 2016  
Temp.: 25 °C, Humi.: 67 %

Measured phase : L1

| Frequency<br>[MHz] | Corr.<br>Factor<br>[dB] | Meter Readings<br>[dB(μV)] |      | Limits<br>[dB(μV)] |      | Results<br>[dB(μV)] |      | Margin<br>[dB] |       | Remarks |
|--------------------|-------------------------|----------------------------|------|--------------------|------|---------------------|------|----------------|-------|---------|
|                    |                         | QP                         | AVE  | QP                 | AVE  | QP                  | AVE  | QP             | AVE   |         |
| 0.151              | 10.3                    | 39.9                       | --   | 65.9               | 55.9 | 50.2                | --   | +15.7          | --    | -       |
| 0.200              | 10.2                    | 35.5                       | --   | 63.6               | 53.6 | 45.7                | --   | +17.9          | --    | -       |
| 0.376              | 10.2                    | 34.5                       | --   | 58.4               | 48.4 | 44.7                | --   | +13.7          | --    | -       |
| 0.484              | 10.1                    | 33.7                       | 22.7 | 56.3               | 46.3 | 43.8                | 32.8 | +12.5          | +13.5 | -       |
| 0.577              | 10.2                    | 35.3                       | 24.8 | 56.0               | 46.0 | 45.5                | 35.0 | +10.5          | +11.0 | -       |
| 0.675              | 10.1                    | 32.1                       | --   | 56.0               | 46.0 | 42.2                | --   | +13.8          | --    | -       |
| 1.055              | 10.2                    | 30.7                       | --   | 56.0               | 46.0 | 40.9                | --   | +15.1          | --    | -       |
| 2.261              | 10.3                    | 34.2                       | 20.7 | 56.0               | 46.0 | 44.5                | 31.0 | +11.5          | +15.0 | -       |
| 3.366              | 10.3                    | 37.3                       | 20.9 | 56.0               | 46.0 | 47.6                | 31.2 | + 8.4          | +14.8 | -       |
| 11.995             | 10.6                    | 21.9                       | --   | 60.0               | 50.0 | 32.5                | --   | +27.5          | --    | -       |



#### NOTES

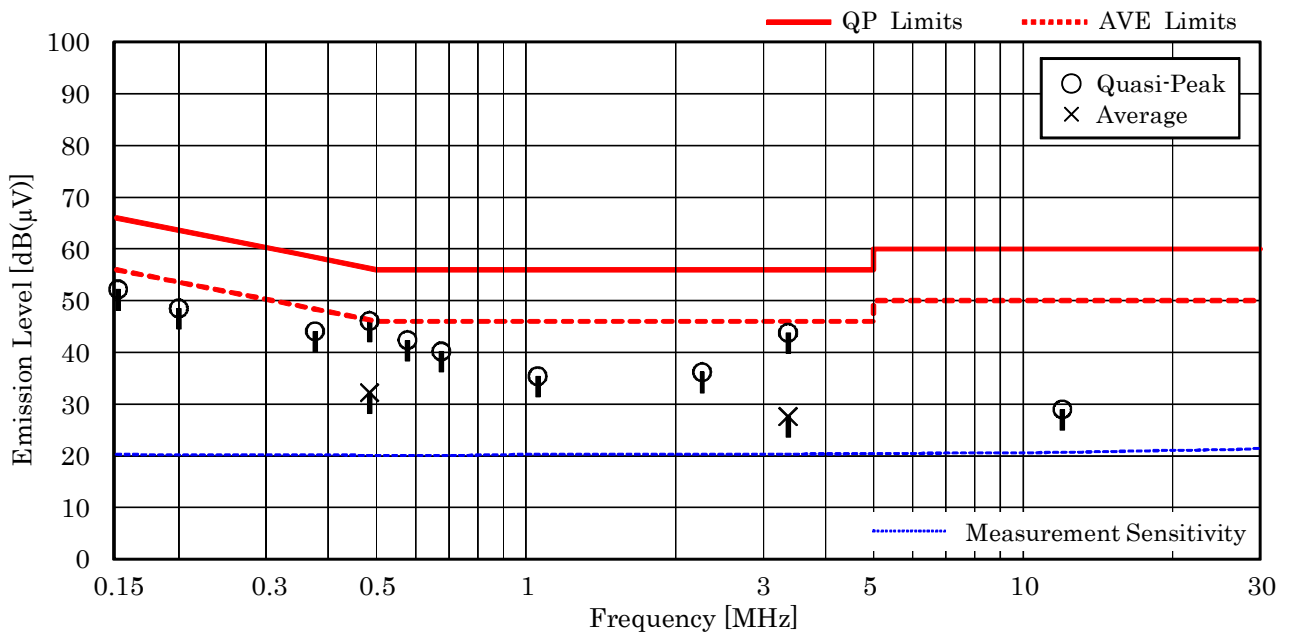
1. The spectrum was checked from 150 kHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 3.366 MHz, as the worst point shown on underline:  
Correction Factor + Meter Reading (QP) = 10.3 + 37.3 = 47.6 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

Test voltage : 120VAC 60Hz

Test Date: July 30, 2016  
Temp.: 25 °C, Humi.: 67 %

Measured phase : L2

| Frequency<br>[MHz] | Corr.<br>Factor<br>[dB] | Meter Readings<br>[dB(μV)] |      | Limits<br>[dB(μV)] |      | Results<br>[dB(μV)] |      | Margin<br>[dB] |       | Remarks |
|--------------------|-------------------------|----------------------------|------|--------------------|------|---------------------|------|----------------|-------|---------|
|                    |                         | QP                         | AVE  | QP                 | AVE  | QP                  | AVE  | QP             | AVE   |         |
| 0.151              | 10.3                    | 41.9                       | --   | 65.9               | 55.9 | 52.2                | --   | +13.7          | --    | -       |
| 0.200              | 10.2                    | 38.3                       | --   | 63.6               | 53.6 | 48.5                | --   | +15.1          | --    | -       |
| 0.376              | 10.2                    | 33.9                       | --   | 58.4               | 48.4 | 44.1                | --   | +14.3          | --    | -       |
| 0.484              | 10.1                    | 36.0                       | 22.1 | 56.3               | 46.3 | 46.1                | 32.2 | +10.2          | +14.1 | -       |
| 0.577              | 10.1                    | 32.3                       | --   | 56.0               | 46.0 | 42.4                | --   | +13.6          | --    | -       |
| 0.675              | 10.2                    | 30.0                       | --   | 56.0               | 46.0 | 40.2                | --   | +15.8          | --    | -       |
| 1.055              | 10.3                    | 25.1                       | --   | 56.0               | 46.0 | 35.4                | --   | +20.6          | --    | -       |
| 2.261              | 10.3                    | 25.9                       | --   | 56.0               | 46.0 | 36.2                | --   | +19.8          | --    | -       |
| 3.366              | 10.3                    | 33.5                       | 17.3 | 56.0               | 46.0 | 43.8                | 27.6 | +12.2          | +18.4 | -       |
| 11.995             | 10.7                    | 18.3                       | --   | 60.0               | 50.0 | 29.0                | --   | +31.0          | --    | -       |



## NOTES

1. The spectrum was checked from 150 kHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.484 MHz, as the worst point shown on underline:  
Correction Factor + Meter Reading (QP) = 10.1 + 36.0 = 46.1 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

## 7.9 Radiated Emission

For the requirements, ☒ - Applicable [ ☒ - Tested. ☐ - Not tested by applicant request. ]  
☐ - Not Applicable

### 7.9.1 Test Results

For the standard, ☒ - Passed ☐ - Failed ☐ - Not judged

Min. Limit Margin (Quasi-Peak) 4.2 dB at 262.08 MHz

|                                    |                    |              |        |
|------------------------------------|--------------------|--------------|--------|
| Uncertainty of Measurement Results | 9 kHz – 30 MHz     | <u>± 3.0</u> | dB(2σ) |
|                                    | 30 MHz – 300 MHz   | <u>± 3.8</u> | dB(2σ) |
|                                    | 300 MHz – 1000 MHz | <u>± 4.8</u> | dB(2σ) |
|                                    | 1 GHz – 6 GHz      | <u>± 4.7</u> | dB(2σ) |
|                                    | 6 GHz – 18 GHz     | <u>± 4.6</u> | dB(2σ) |
|                                    | 18 GHz – 40 GHz    | <u>± 5.5</u> | dB(2σ) |

Remarks : X-axis position

## 7.9.2 Test Instruments

| Anechoic Chamber A2   |                   |                     |                 |            |
|-----------------------|-------------------|---------------------|-----------------|------------|
| Type                  | Model             | Serial No. (ID)     | Manufacturer    | Cal. Due   |
| Test Receiver         | ESU 26            | 100170 (A-6)        | Rohde & Schwarz | 2017/04/27 |
| Loop Antenna          | HFH2-Z2           | 872096/25 (C-2)     | Rohde & Schwarz | 2017/07/21 |
| RF Cable              | RG213/U           | --- (H-28)          | HUBER+SUHNER    | 2017/07/21 |
| Pre-Amplifier         | 310N              | 304573 (A-17)       | SONOMA          | 2017/04/03 |
| Biconical Antenna     | VHA9103/BBA9106   | 2355 (C-30)         | Schwarzbeck     | 2017/05/18 |
| Log-periodic Antenna  | UHALP9108-A1      | 0694 (C-31)         | Schwarzbeck     | 2017/05/18 |
| RF Cable              | S 10162 B-11 etc. | --- (H-4)           | HUBER+SUHNER    | 2017/04/03 |
| Pre-Amplifier         | TPA0118-36        | 1010 (A-37)         | TOYO            | 2017/05/17 |
| Horn Antenna          | 91888-2           | 562 (C-41-1)        | EATON           | 2017/06/12 |
| Horn Antenna          | 91889-2           | 568 (C-41-2)        | EATON           | 2017/06/12 |
| Horn Antenna          | 3160-04           | 9903-1053<br>(C-55) | EMCO            | 2017/06/13 |
| Horn Antenna          | 3160-05           | 9902-1061<br>(C-56) | EMCO            | 2017/06/13 |
| Horn Antenna          | 3160-06           | 9712-1045<br>(C-57) | EMCO            | 2017/06/13 |
| Horn Antenna          | 3160-07           | 9902-1113<br>(C-58) | EMCO            | 2017/06/13 |
| Horn Antenna          | 3160-08           | 9904-1099<br>(C-59) | EMCO            | 2017/06/13 |
| Horn Antenna          | 3160-09           | 9808-1117<br>(C-48) | EMCO            | 2017/06/15 |
| Attenuator            | 54A-10            | W5713 (D-29)        | Weinschel       | 2016/08/16 |
| Attenuator            | 2-10              | BA6214 (D-79)       | Weinschel       | 2016/11/19 |
| RF Cable              | SUCOFLEX104       | 267479/4 (C-66)     | HUBER+SUHNER    | 2017/01/06 |
| RF Cable              | SUCOFLEX104       | 267414/4 (C-67)     | HUBER+SUHNER    | 2017/01/06 |
| RF Cable              | SUCOFLEX102EA     | 3041/2EA<br>(C-69)  | HUBER+SUHNER    | 2017/01/06 |
| Band Rejection Filter | BRM50701          | 029 (D-93)          | MICRO-TRONICS   | 2017/02/17 |

NOTE : The calibration interval of the above test instruments is 12 months.

### 7.9.3 Test Method and Test Setup (Diagrammatic illustration)

#### 7.9.3.1 Radiated Emission 9 kHz – 30 MHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

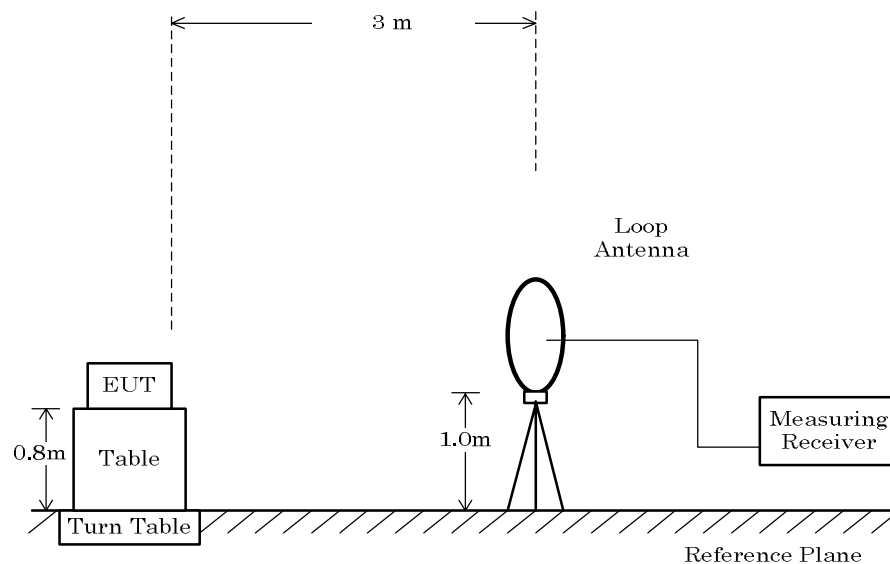
The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

The measurement were performed about three antenna orientations (parallel, perpendicular, and ground-parallel).

According to KDB 937606, a used anechoic chamber were equivalent to those on an open fields site based on comparison measurements.

This configurations was used for the final tests.

– Side View –



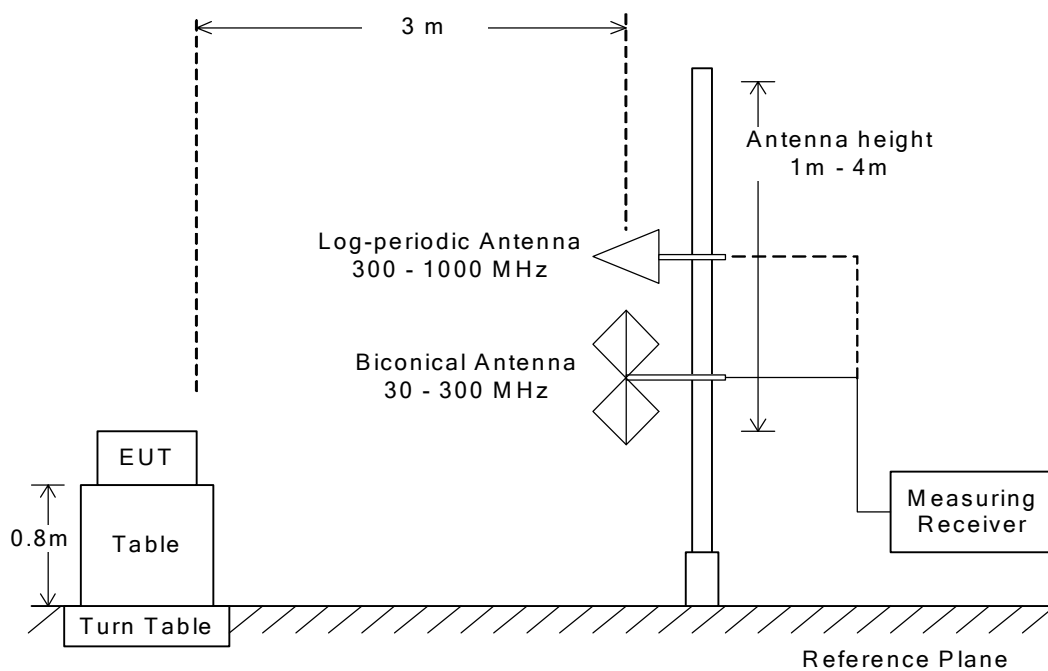
### 7.9.3.2 Radiated Emission 30 MHz – 1000 MHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for the final tests.

– Side View –



### 7.9.3.3 Radiated Emission above 1 GHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for the final tests.

The setting of the measuring instruments are shown as follows:

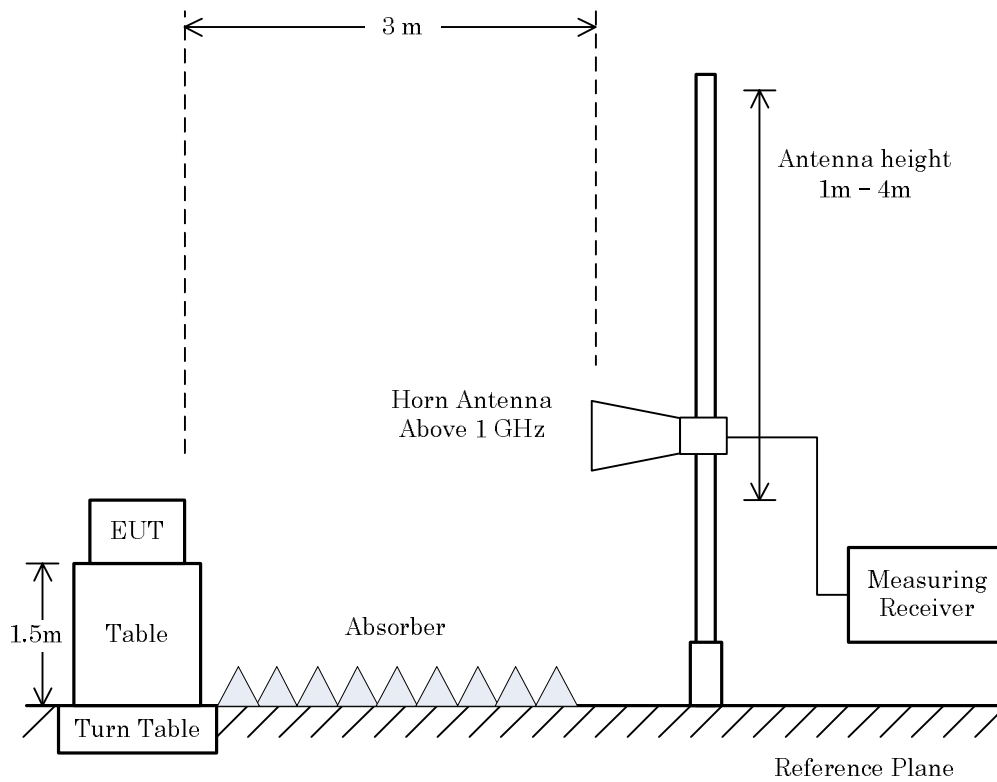
| Type              | Peak           | Average        |
|-------------------|----------------|----------------|
| Detector Function | Peak           | Peak           |
| Res. Bandwidth    | 1 MHz          | 1 MHz          |
| Video Bandwidth   | 3 MHz          | $\geq 1/T *1)$ |
| Video Filtering   | Linear Voltage | Linear Voltage |
| Sweep Time        | AUTO           | AUTO           |
| Trace             | Max Hold       | Max Hold       |

Note: 1. T: Minimum transmission duration

Average (VBW) Setting:

| Mode     | Interval<br>(msec) | Cycle<br>(msec) | Duty cycle<br>(%) | Burst on period(T)<br>(msec) | Min. VBW(1/T)<br>(kHz) | VBW Setting<br>(kHz) |
|----------|--------------------|-----------------|-------------------|------------------------------|------------------------|----------------------|
| BDR(DH5) | 0.86               | 3.75            | 77.1%             | 2.89                         | 0.35                   | 0.50                 |

– Side View –



**NOTE**

When the EUT is manipulated through three different orientations, the scan height upper range for the measurement antenna is limited to 2.5 m or 0.5 m above the top of the EUT.

## 7.9.4 Test Data

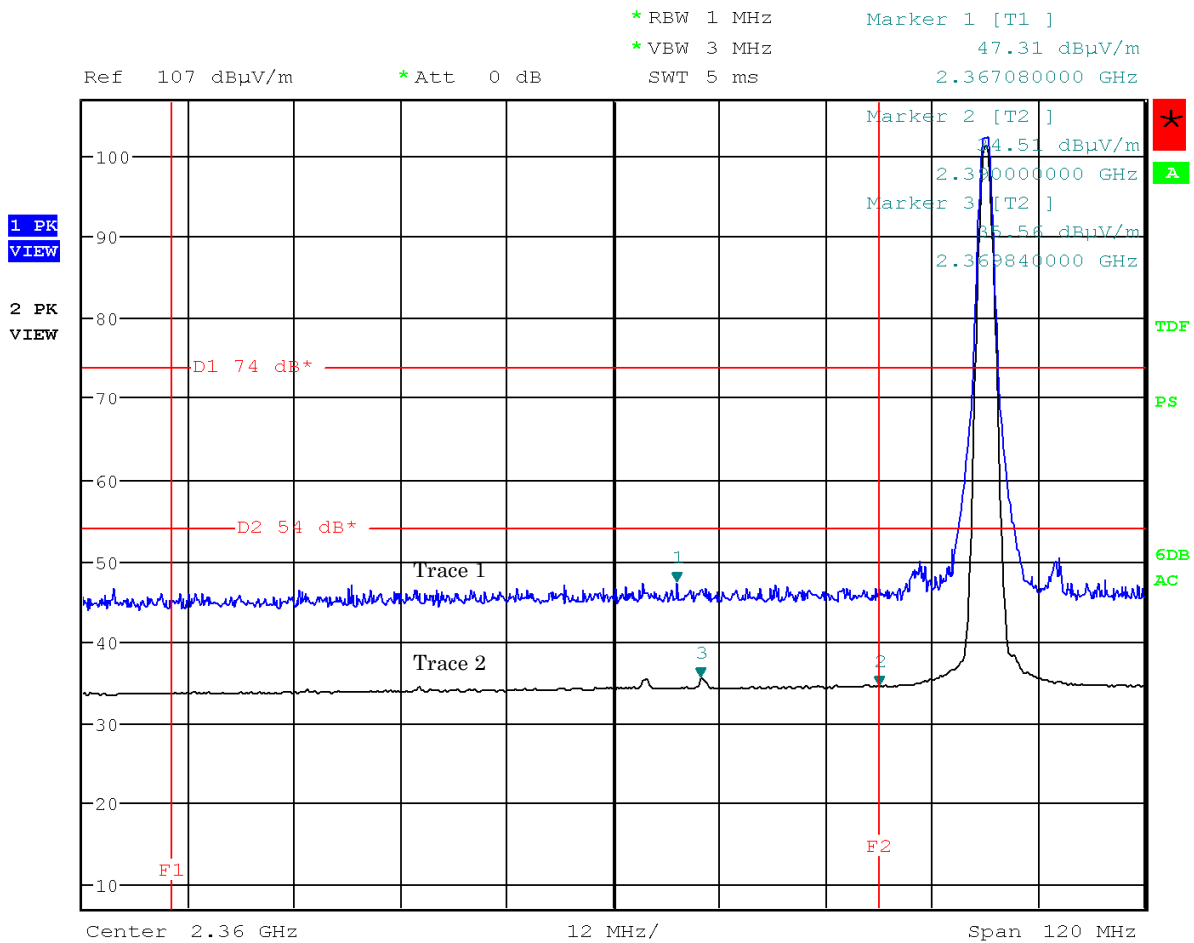
### 7.9.4.1 Band-edge Compliance

Test Date : July 23, 2016

Temp.: 24°C, Humi: 68%

Mode of EUT : BDR, Hopping off (0ch: 2402 MHz) (worst case)

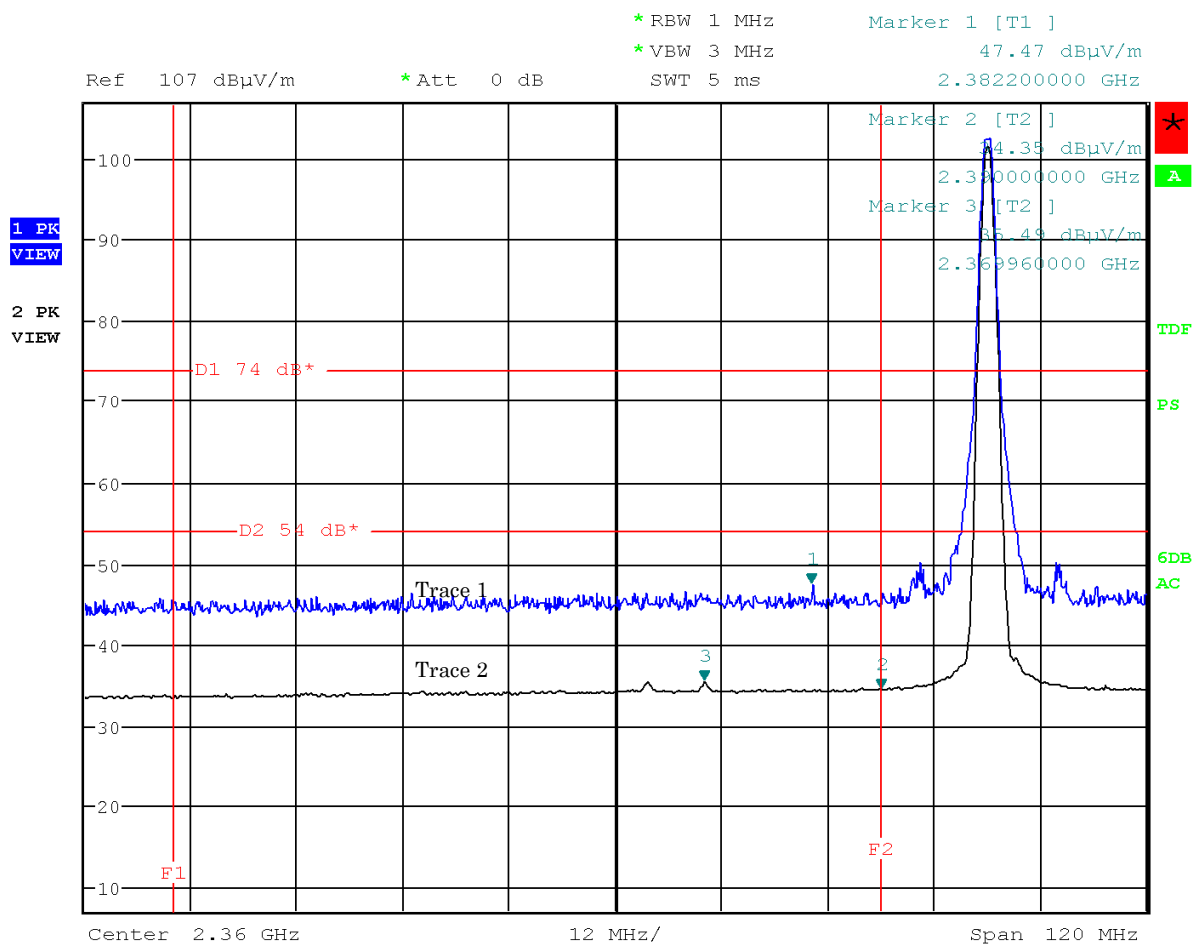
Antenna Polarization : Horizontal



Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : BDR, Hopping off (0ch: 2402 MHz) (worst case)

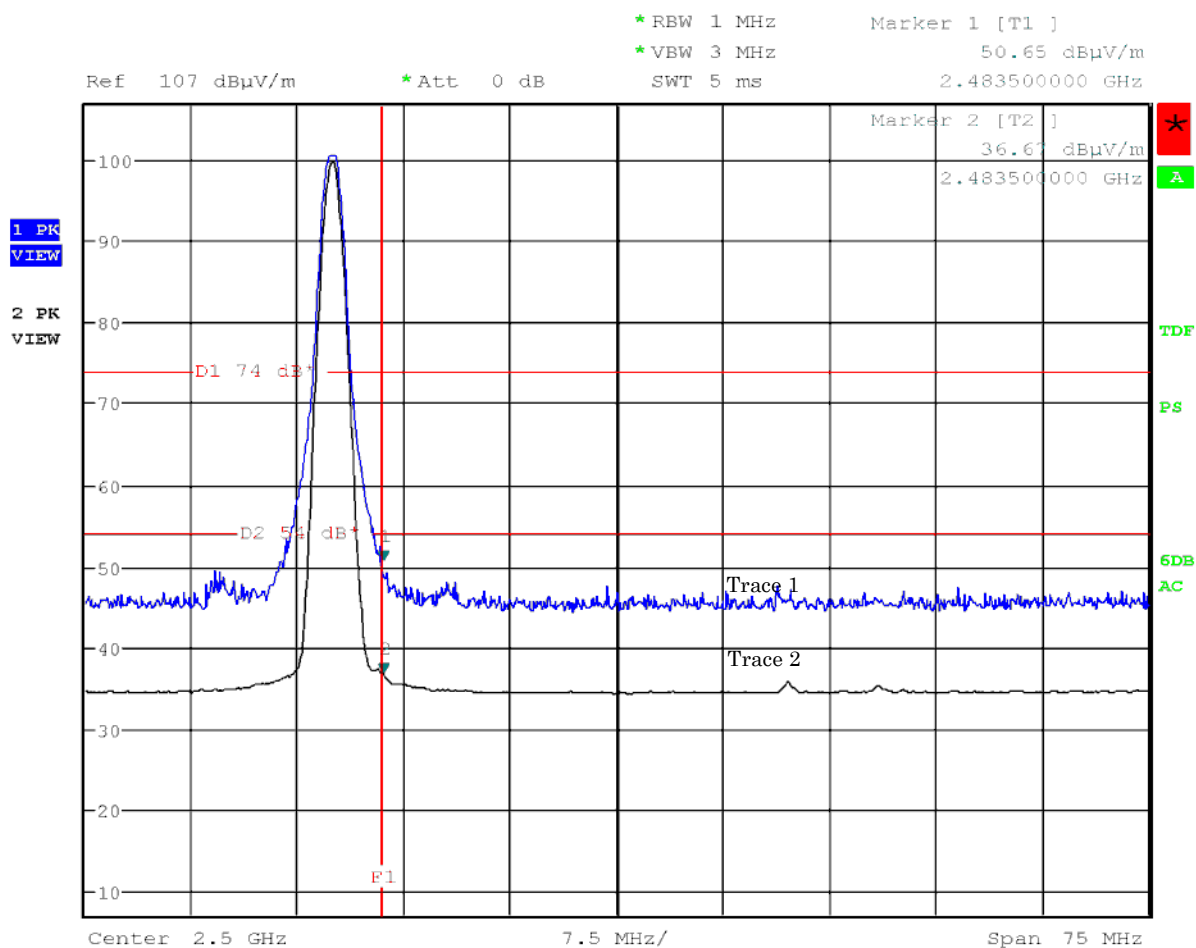
Antenna Polarization : Vertical



Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : BDR, Hopping off (78ch: 2480 MHz) (worst case)

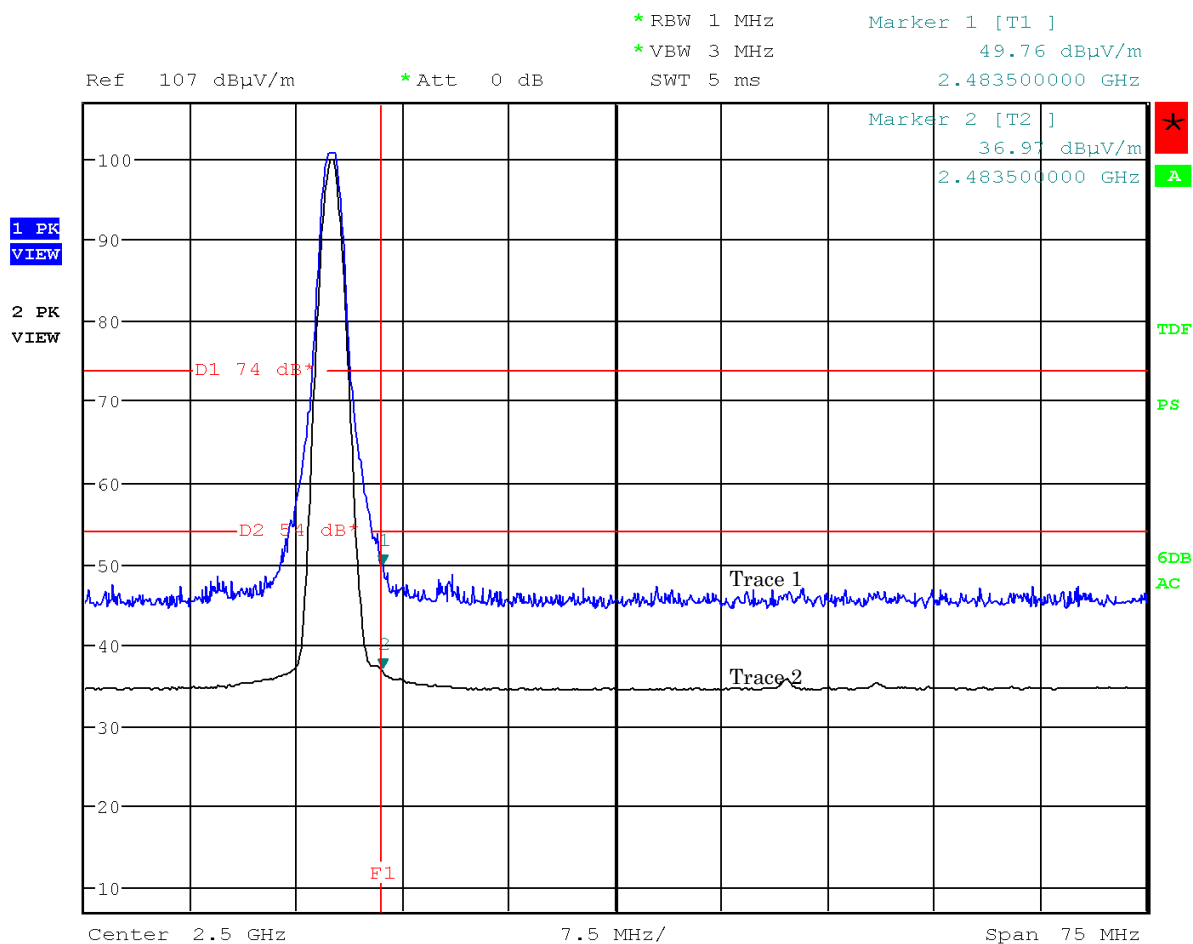
Antenna Polarization : Horizontal



Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : BDR, Hopping off (78ch: 2480 MHz) (worst case)

Antenna Polarization : Vertical



Note: The trace 1 is Peak . The trace 2 is Average.

#### 7.9.4.2 Other Spurious Emission (9kHz – 30MHz)

Test Date : July 29, 2016

Temp.: 26°C, Humi: 70%

Mode of EUT : All modes have been investigated and the worst case mode has been listed.

Results : No spurious emissions in the range 20dB below the limit.

#### 7.9.4.3 Other Spurious Emission (30MHz – 1000MHz)

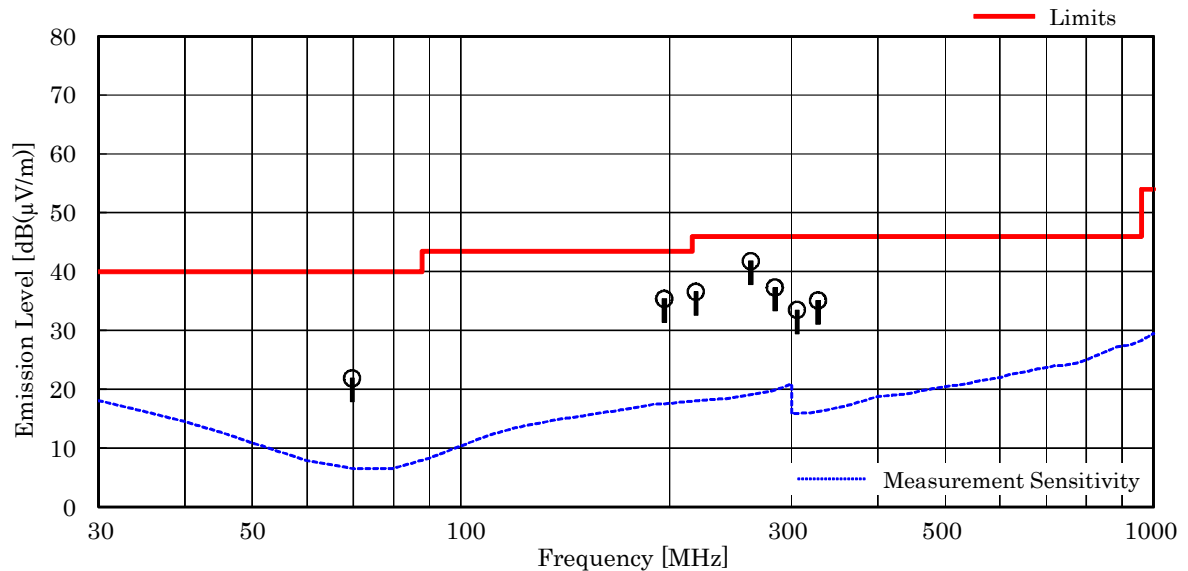
Mode of EUT : All modes have been investigated and the worst case mode has been listed.

Test Date: July 29, 2016

Temp.: 26 °C, Humi: 70 %

Antenna pole : Horizontal

| Frequency<br>[MHz] | Antenna<br>Factor<br>[dB(1/m)] | Corr.<br>Factor<br>[dB] | Meter Readings<br>[dB(μV)] | Limits<br>[dB(μV/m)] | Results<br>[dB(μV/m)] | Margin<br>[dB] | Remarks |
|--------------------|--------------------------------|-------------------------|----------------------------|----------------------|-----------------------|----------------|---------|
| 69.69              | 6.6                            | -27.1                   | 42.4                       | 40.0                 | 21.9                  | +18.1          | -       |
| 196.56             | 16.5                           | -25.9                   | 44.8                       | 43.5                 | 35.4                  | + 8.1          | -       |
| 218.40             | 16.8                           | -25.7                   | 45.5                       | 46.0                 | 36.6                  | + 9.4          | -       |
| 262.08             | 17.6                           | -25.4                   | 49.6                       | 46.0                 | 41.8                  | + 4.2          | -       |
| 283.92             | 18.2                           | -25.3                   | 44.4                       | 46.0                 | 37.3                  | + 8.7          | -       |
| 305.76             | 14.1                           | -25.2                   | 44.6                       | 46.0                 | 33.5                  | +12.5          | -       |
| 327.60             | 14.2                           | -25.0                   | 45.9                       | 46.0                 | 35.1                  | +10.9          | -       |



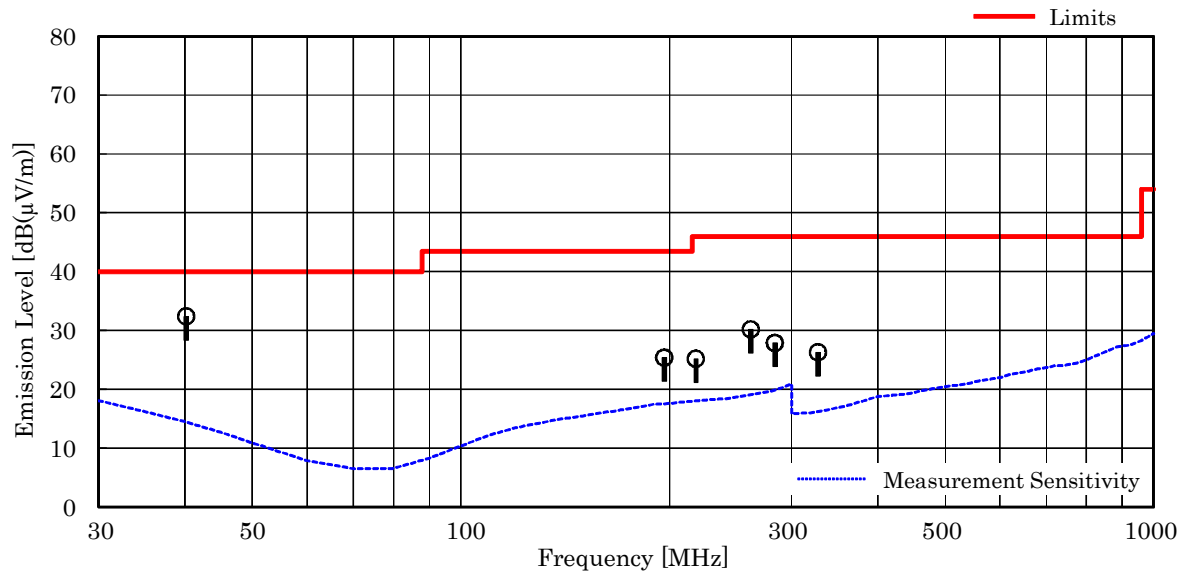
#### NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 262.08 MHz, as the worst point shown on underline:  
Antenna Factor + Correction Factor + Meter Reading = 17.6 + (-25.4) + 49.6 = 41.8 dB(μV/m)  
Antenna Height : 124 cm, Turntable Angle : 93 °
7. Test receiver setting(s) : CISPR QP 120 kHz [QP : Quasi-Peak]

Test Date: July 29, 2016  
Temp.: 26 °C, Humi: 70 %

**Antenna pole : Vertical**

| Frequency<br>[MHz] | Antenna<br>Factor<br>[dB(1/m)] | Corr.<br>Factor<br>[dB] | Meter Readings<br>[dB(μV)] | Limits<br>[dB(μV/m)] | Results<br>[dB(μV/m)] | Margin<br>[dB] | Remarks |
|--------------------|--------------------------------|-------------------------|----------------------------|----------------------|-----------------------|----------------|---------|
| 40.13              | 15.0                           | -27.5                   | 44.9                       | 40.0                 | 32.4                  | + 7.6          | -       |
| 196.56             | 16.5                           | -25.9                   | 34.8                       | 43.5                 | 25.4                  | +18.1          | -       |
| 218.40             | 16.8                           | -25.7                   | 34.1                       | 46.0                 | 25.2                  | +20.8          | -       |
| 262.08             | 17.6                           | -25.4                   | 38.0                       | 46.0                 | 30.2                  | +15.8          | -       |
| 283.92             | 18.2                           | -25.3                   | 35.0                       | 46.0                 | 27.9                  | +18.1          | -       |
| 327.60             | 14.2                           | -25.0                   | 37.1                       | 46.0                 | 26.3                  | +19.7          | -       |



**NOTES**

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 40.13 MHz, as the worst point shown on underline:  
Antenna Factor + Correction Factor + Meter Reading = 15.0 + (-27.5) + 44.9 = 32.4 dB(μV/m)  
Antenna Height : 100 cm, Turntable Angle : 178 °
7. Test receiver setting(s) : CISPR QP 120 kHz [QP : Quasi-Peak]

#### 7.9.4.4 Other Spurious Emission (Above 1000MHz)

Mode of EUT : BDR (worst case)

Test Date: July 27, 2016  
Temp.: 25 °C, Humi: 70 %

| Frequency                     | Antenna   | Corr.  | D.C.F. | Meter Readings [dB(μV)] |        |          |        | Limits     |      | Results    |        | Margin  | Remarks |
|-------------------------------|-----------|--------|--------|-------------------------|--------|----------|--------|------------|------|------------|--------|---------|---------|
|                               | Factor    | Factor |        | Horizontal              |        | Vertical |        | [dB(μV/m)] |      | [dB(μV/m)] |        |         |         |
|                               | [dB]      | [dB]   |        | [dB]                    | PK     | AVE      | PK     | AVE        | PK   | AVE        | PK     |         |         |
| [MHz]                         | [dB(1/m)] | [dB]   | [dB]   |                         |        |          |        |            |      |            |        |         |         |
| Test condition : Tx Low Ch    |           |        |        |                         |        |          |        |            |      |            |        |         |         |
| 4804.0                        | 27.1      | -15.9  | 0.0    | < 38.0                  | < 28.0 | < 38.0   | < 28.0 | 74.0       | 54.0 | < 49.2     | < 39.2 | > +14.8 |         |
| 12010.0                       | 33.5      | -25.4  | 0.0    | < 38.0                  | < 28.0 | < 38.0   | < 28.0 | 74.0       | 54.0 | < 46.1     | < 36.1 | > +17.9 |         |
| 19216.0                       | 40.5      | -43.0  | 0.0    | < 50.0                  | < 40.0 | < 50.0   | < 40.0 | 74.0       | 54.0 | < 47.5     | < 37.5 | > +16.5 |         |
| Test condition : TX Middle Ch |           |        |        |                         |        |          |        |            |      |            |        |         |         |
| 4882.0                        | 27.0      | -15.8  | 0.0    | < 38.0                  | < 28.0 | < 38.0   | < 28.0 | 74.0       | 54.0 | < 49.2     | < 39.2 | > +14.8 |         |
| 7323.0                        | 29.9      | -16.2  | 0.0    | < 38.0                  | < 28.0 | < 38.0   | < 28.0 | 74.0       | 54.0 | < 51.7     | < 41.7 | > +12.3 |         |
| 12205.0                       | 33.3      | -25.7  | 0.0    | < 38.0                  | < 28.0 | < 38.0   | < 28.0 | 74.0       | 54.0 | < 45.6     | < 35.6 | > +18.4 |         |
| 19528.0                       | 40.4      | -42.9  | 0.0    | < 50.0                  | < 40.0 | < 50.0   | < 40.0 | 74.0       | 54.0 | < 47.5     | < 37.5 | > +16.5 |         |
| Test condition : TX High Ch   |           |        |        |                         |        |          |        |            |      |            |        |         |         |
| 4960.0                        | 27.0      | -15.7  | 0.0    | < 38.0                  | < 28.0 | < 38.0   | < 28.0 | 74.0       | 54.0 | < 49.3     | < 39.3 | > +14.7 |         |
| 7440.0                        | 29.8      | -16.3  | 0.0    | < 38.0                  | < 28.0 | < 38.0   | < 28.0 | 74.0       | 54.0 | < 51.5     | < 41.5 | > +12.5 |         |
| 12400.0                       | 33.3      | -26.2  | 0.0    | < 38.0                  | < 28.0 | < 38.0   | < 28.0 | 74.0       | 54.0 | < 45.1     | < 35.1 | > +18.9 |         |
| 19840.0                       | 40.4      | -42.9  | 0.0    | < 50.0                  | < 40.0 | < 50.0   | < 40.0 | 74.0       | 54.0 | < 47.5     | < 37.5 | > +16.5 |         |
| 22320.0                       | 40.6      | -43.4  | 0.0    | < 50.0                  | < 40.0 | < 50.0   | < 40.0 | 74.0       | 54.0 | < 47.2     | < 37.2 | > +16.8 |         |

Calculated result at 7323.0 MHz, as the worst point shown on underline:

|                      |   |                |
|----------------------|---|----------------|
| Antenna Factor       | = | 29.9 dB(1/m)   |
| Corr. Factor         | = | -16.2 dB       |
| D.C.F.(For AVE only) | = | 0.0 dB         |
| + ) Meter Reading    | = | <28.0 dB(μV)   |
| Result               | = | <41.7 dB(μV/m) |

Minimum Margin: 54.0 - <41.7 = >12.3 (dB)

#### NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
  - Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
  - Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
  - Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (over 18 GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak / AVE : Average
7. D.C.F. Calculation. (D.C.F. ; Duty Cycle Correction Factor)
  - Time to cycle through all channels =  $t = T \text{ [ms]} \times 20$  (AFH minimum hopping channels), where T = burst on duration
  - $100 \text{ ms} / t = h \rightarrow$  Round up to next highest integer, to account for worst case, H
  - The Worst Case Dwell Time [ms] =  $T \times H$
  - D.C.F. [dB] =  $20 \times \log(\text{The Worst Case Dwell Time} / 100 \text{ [ms]})$

TX Low/Middle/High ch (Horizontal/Vertical)

