



# **RADIO TEST REPORT**

**Test Report No.: 4786002620S-A**

**Applicant** : PIONEER CORPORATION  
**Type of Equipment** : DVD RDS AV RECEIVER  
**Model No.** : AVH-X7500BT  
**FCC ID** : AJDK062  
**Test regulation** : FCC Part15 Subpart C: 2012  
**Test result** : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

**Date of test:** December 27, 2012 to January 10, 2013

**Tested by:**

  
Akio Hayashi  
Engineer of WiSE Japan,  
UL Verification Service

**Approved by :**

  
Toyokazu Imamura  
Leader of WiSE Japan,  
UL Verification Service



- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
☒ There is no testing item of "Non-accreditation".

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13-EM-F0429

## REVISION HISTORY

**Original Test Report No.: 4786002620S-A**

[illegible]

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## **SECTION 1: Customer information**

Company Name : PIONEER CORPORATION  
Brand name : Pioneer  
Address : 25-1 Aza-Nishi-machi, Yamada, Kawagoe-shi, Saitama, 350-8555, JAPAN  
Telephone Number : +81-49-228-6278  
Facsimile Number : +81-49-228-6497  
Contact Person : Takahiro Yano

## **SECTION 2: Equipment under test (E.U.T.)**

### **2.1 Identification of E.U.T.**

Type of Equipment : DVD RDS AV RECEIVER  
Model No. : AVH-X7500BT  
Serial No. : See Section 4.  
Rating : DC 14.4V  
Country of Mass-production : Thailand  
Condition of EUT : Production prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No modification by the test lab.  
Receipt date of Sample : December 25, 2012

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## 2.2 Product description

Model: AVH-X7500BT (referred to as the EUT in this report) is a DVD RDS AV RECEIVER.

Clock Frequency:

- (1) SYSTEM MICRO COMPUTER: 12.5MHz,
- (2) DC-DC CONVERTER: 365.8kHz/413.9kHz,
- (3) DC-DC CONVERTER (SH): 365.8kHz/413.9kHz,
- (4) DC-DC CONVERTER (USB): 365.8kHz/413.9kHz,
- (5) DC-DC CONVERTER (HIOUT): 365.8kHz/413.9kHz,
- (6) DISPLAY CONVERTER: 48.00MHz, 13.3333MHz, 16.9344MHz,
- (7) Video Decoder: 32.00MHz/27MHz/33.231MHz/33.333MHz,
- (8) LCD BACK LIGHT DRIVER: 476.6kHz/ 515.7kHz,
- (9) DC-DC CONVERTER (LCD): 723kHz/1000kHz,
- (10) FM/AM TUNER: 36.48MHz,
- (11) DVD DRIVE, DVD DECODER: 27MHz, 33.8688MHz, 36.864MHz, 40.5MHz, 67.5MHz, 108MHz, 121.5MHz, 405MHz,
- (12) Blue tooth module OSC: 26MHz

Radio specification:

|                              |                              |
|------------------------------|------------------------------|
| Equipment type               | : Transceiver                |
| Frequency of operation       | : 2402-2480MHz               |
| Bandwidth & channel spacing  | : 79MHz & 1MHz               |
| Type of modulation           | : GFSK, $\pi/4$ DQPSK, 8DPSK |
| Antenna type                 | : PWB pattern                |
| Antenna gain with cable loss | : -3.9dBi (max)              |
| Antenna connector type       | : None                       |
| Operation temperature range  | : -10 to +60 deg.C.          |

FCC 15.31 (e)

The equipment provides the wireless transmitter with stable power supply (DC1.8V and DC3.3V). Therefore, the equipment complies with the requirement.

FCC 15.203

The equipment and its antenna comply with this requirement since this antenna is built in the equipment and it cannot be replaced by end users.

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## SECTION 3: Test specification, procedures & results

### 3.1 Test specification

Test specification : Test specification: FCC Part 15 Subpart C: 2012,  
final revised on August 13, 2012 and effective September 12, 2012  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.209 Radiated emission limits, general requirements  
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,  
and 5725-5850MHz

The EUT has been tested for compliance with FCC Part 15 Subpart B by the customer.

### 3.2 Procedures & Results

| Item                                                                                                                              | Test Procedure                                                                                     | Specification             | Remarks                | Deviation  | Worst Margin                                                                                                  | Results  |
|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------|------------------------|------------|---------------------------------------------------------------------------------------------------------------|----------|
| Conducted emission                                                                                                                | ANSI C63.4:2009<br>7. AC powerline<br>conducted emission<br>measurements                           | FCC 15.207                | -                      | N/A<br>*1) | -                                                                                                             | N/A      |
| Carrier<br>frequency<br>separation                                                                                                | FCC Public Notice<br>DA 00-705 &<br>ANSI C63.4:2009<br>13. Measurement of<br>intentional radiators | FCC 15.247<br>(a)(1)      | Conducted              | N/A        | *See data.                                                                                                    | Complied |
| 20dB<br>bandwidth                                                                                                                 | FCC Public Notice<br>DA 00-705 &<br>ANSI C63.4:2009<br>13. Measurement of<br>intentional radiators | FCC 15.247<br>(a)(1)      | Conducted              | N/A        |                                                                                                               | -        |
| Number of<br>hopping<br>frequency                                                                                                 | FCC Public Notice<br>DA 00-705 &<br>ANSI C63.4:2009<br>13. Measurement of<br>intentional radiators | FCC 15.247<br>(a)(1)(iii) | Conducted              | N/A        |                                                                                                               | Complied |
| Dwell time                                                                                                                        | FCC Public Notice<br>DA 00-705 &<br>ANSI C63.4:2009<br>13. Measurement of<br>intentional radiators | FCC 15.247<br>(a)(1)(iii) | Conducted              | N/A        |                                                                                                               | Complied |
| Maximum<br>peak output<br>power                                                                                                   | FCC Public Notice<br>DA 00-705 &<br>ANSI C63.4:2009<br>13. Measurement of<br>intentional radiators | FCC 15.247<br>(b)(1)      | Conducted              | N/A        |                                                                                                               | Complied |
| Band edge<br>compliance<br>&<br>Spurious<br>emission                                                                              | FCC Public Notice<br>DA 00-705 &<br>ANSI C63.4:2009<br>13. Measurement of<br>intentional radiators | FCC 15.247 (d)<br>15.209  | Conducted/<br>Radiated | N/A        | 10.2dB<br>Freq.: 12400MHz<br>Polarization: Vertical<br>Detection: Average<br>Mode: Tx 2480MHz,<br>DH5 & 3-DH5 | Complied |
| Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422<br>*1) The test is not applicable since the EUT has no AC mains. |                                                                                                    |                           |                        |            |                                                                                                               |          |

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### 3.3 Addition to standard

| Item                                                             | Test Procedure                                                             | Specification | Remarks   | Worst Margin | Results |
|------------------------------------------------------------------|----------------------------------------------------------------------------|---------------|-----------|--------------|---------|
| Occupied Bandwidth (99%)                                         | ANSI C63.4:2009<br>13. Measurement of intentional radiators, RSS-Gen 4.6.1 | -             | Conducted | -            | -       |
| Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422 |                                                                            |               |           |              |         |

\* Other than above, no addition, exclusion nor deviation has been made from the standard.

### 3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

| Item                                                    | Frequency range | No.1 SAC <sup>*1</sup> /SR <sup>*2</sup><br>(±) | No.2 SAC/SR<br>(±) | No.3 SAC/SR<br>(±) |
|---------------------------------------------------------|-----------------|-------------------------------------------------|--------------------|--------------------|
| <b>Radiated emission<br/>(Measurement distance: 3m)</b> | 9kHz-30MHz      | 3.7 dB                                          | 3.7 dB             | 3.6 dB             |
|                                                         | 30MHz-300MHz    | 4.9 dB                                          | 5.1 dB             | 4.9 dB             |
|                                                         | 300MHz-1GHz     | 5.0 dB                                          | 5.2 dB             | 4.9 dB             |
|                                                         | 1GHz-15GHz      | 4.8 dB                                          | 4.8 dB             | 4.9 dB             |
| <b>Radiated emission<br/>(Measurement distance: 1m)</b> | 15GHz-18GHz     | 5.6 dB                                          | 5.6 dB             | 5.6 dB             |
|                                                         | 18GHz-40GHz     | 4.6 dB                                          | 4.3 dB             | 4.4 dB             |

\*1: SAC=Semi-Anechoic Chamber

\*2: SR= Shielded Room is applied besides radiated emission

#### Radiated emission

The data listed in this test report has enough margin, more than site margin.

#### Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 1.5dB

Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.7dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.9dB

Bandwidth measurement uncertainty for this test was: (±) 5.4%

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### 3.5 Test location

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JAB Accreditation No. : RTL02610

|                                                                | FCC<br>Registration<br>No. | IC<br>Registration<br>No. | Width x Depth x<br>Height (m) | Size of reference<br>ground plane (m)<br>/ horizontal<br>conducting plane | Maximum<br>measurement<br>distance |
|----------------------------------------------------------------|----------------------------|---------------------------|-------------------------------|---------------------------------------------------------------------------|------------------------------------|
| <input type="checkbox"/> No.1 Semi-anechoic chamber            | 697847                     | 2973D-1                   | 20.6 x 11.3 x 7.65            | 20.6 x 11.3                                                               | 10m                                |
| <input type="checkbox"/> No.2 Semi-anechoic chamber            | 697847                     | 2973D-2                   | 20.6 x 11.3 x 7.65            | 20.6 x 11.3                                                               | 10m                                |
| <input checked="" type="checkbox"/> No.3 Semi-anechoic chamber | 697847                     | 2973D-3                   | 12.7 x 7.7 x 5.35             | 12.7 x 7.7                                                                | 5m                                 |
| <input type="checkbox"/> No.4 Semi-anechoic chamber            | -                          | -                         | 8.1 x 5.1 x 3.55              | 8.1 x 5.1                                                                 | -                                  |
| <input type="checkbox"/> No.1 shielded room                    | -                          | -                         | 6.8 x 4.1 x 2.7               | 6.8 x 4.1                                                                 | -                                  |
| <input type="checkbox"/> No.2 shielded room                    | -                          | -                         | 6.8 x 4.1 x 2.7               | 6.8 x 4.1                                                                 | -                                  |
| <input type="checkbox"/> No.3 shielded room                    | -                          | -                         | 6.3 x 4.7 x 2.7               | 6.3 x 4.7                                                                 | -                                  |
| <input type="checkbox"/> No.4 shielded room                    | -                          | -                         | 4.4 x 4.7 x 2.7               | 4.4 x 4.7                                                                 | -                                  |
| <input checked="" type="checkbox"/> No.5 shielded room         | -                          | -                         | 7.8 x 6.4 x 2.7               | 7.8 x 6.4                                                                 | -                                  |
| <input type="checkbox"/> No.6 shielded room                    | -                          | -                         | 7.8 x 6.4 x 2.7               | 7.8 x 6.4                                                                 | -                                  |

### 3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating mode**

| Test item                                            | Operating mode                                                                                            | Tested frequency                             |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Carrier frequency separation                         | Transmitting Hopping ON (DH5 / 3-DH5)/Inquiry, Payload: PRBS9                                             | -                                            |
| 20dB bandwidth                                       | Transmitting Hopping OFF (DH5 / 3-DH5) / Inquiry, Payload: PRBS9                                          | 2402MHz, 2441MHz, 2480MHz                    |
| Number of hopping frequency                          | Transmitting Hopping ON (DH5 / 3-DH5)/Inquiry, Payload: PRBS9                                             | -                                            |
| Dwell time                                           | Transmitting (Hopping ON), Payload: PRBS9<br>- DH1, - DH3, - DH5<br>- 3-DH1, - 3-DH3, - 3-DH5<br>-Inquiry | -                                            |
| Maximum peak output power                            | Transmitting Hopping OFF , Payload: PRBS9<br>- DH5, - 2-DH5, - 3-DH5                                      | 2402MHz, 2441MHz, 2480MHz                    |
| Band edge compliance & Spurious emission (Conducted) | Transmitting (DH5 / 3-DH5), Payload: PRBS9<br>-Hopping ON<br>-Hopping OFF                                 | Band edge compliance: 2402MHz, 2480MHz       |
| (Radiated)                                           | Transmitting (DH5 / 3-DH5), Payload: PRBS9<br>-Hopping OFF                                                | Spurious emission: 2402MHz, 2441MHz, 2480MHz |
| 99% occupied bandwidth                               | Transmitting (DH5 / 3-DH5), Payload: PRBS9 / Inquiry<br>-Hopping ON<br>-Hopping OFF                       | 2402MHz, 2441MHz, 2480MHz                    |

\*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload (except Dwell time test).

\*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not affect the output power and bandwidth of the EUT.  
As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

\*EUT has the power settings by the software as follows;

Power settings: 4

Software: BT module only Control software: HW05-SW01.27.20

**Justification:** The system was configured in typical fashion (as customer would normally use it) for testing.

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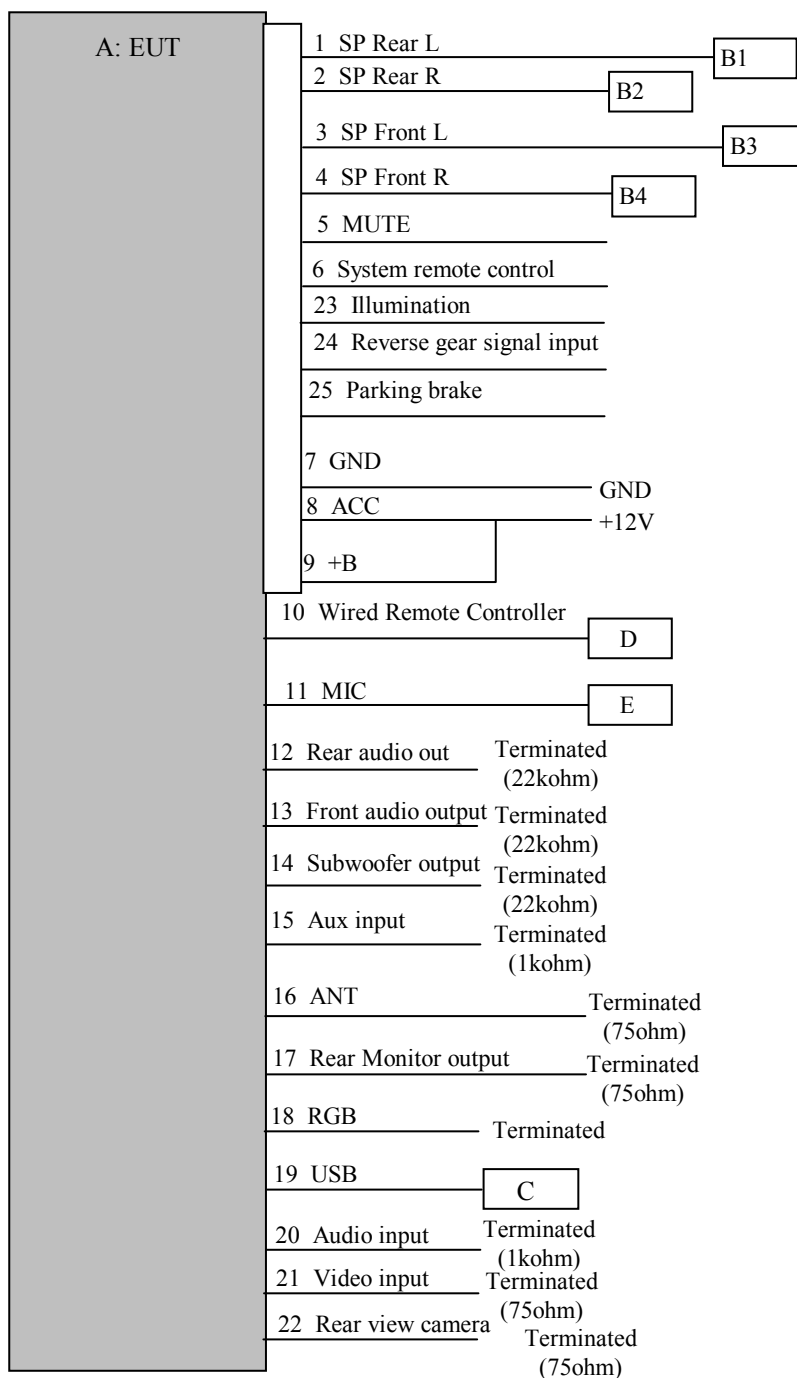
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## 4.2 Configuration of and peripherals



\* Test data was taken under worse case conditions.

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#### Description of EUT and support equipment

| No. | Item                    | Model number | Serial number | Manufacturer | Remarks |
|-----|-------------------------|--------------|---------------|--------------|---------|
| A   | DVD RDS AV RECEIVER     | AVH-X7500BT  | *1)           | PIONEER      | EUT     |
| B1  | Speaker                 | KFC-RS160    | -             | KENWOOD      | -       |
| B2  | Speaker                 | KFC-RS160    | -             | KENWOOD      | -       |
| B3  | Speaker                 | KFC-RS160    | -             | KENWOOD      | -       |
| B4  | Speaker                 | KFC-RS160    | -             | KENWOOD      | -       |
| C   | USB Memory              | DT101 G2     | -             | Kingston     | -       |
| D   | Wired Remote Controller | RM-X2S       | -             | SONY         | -       |
| E   | HF-MIC                  | -            | -             | PIONEER      | -       |

\*1) Antenna terminal conducted tests: LJTM000022UC, Radiated emission tests: LJTM000018UC

#### List of cables used

| No. | Cable name                | Length(m) | Shield     |            | Remarks |
|-----|---------------------------|-----------|------------|------------|---------|
|     |                           |           | Cable      | Connector  |         |
| 1   | SP Rear L                 | 0.15+1.8  | Unshielded | Unshielded | -       |
| 2   | SP Rear R                 | 0.15+1.8  | Unshielded | Unshielded | -       |
| 3   | SP Front L                | 0.15+1.8  | Unshielded | Unshielded | -       |
| 4   | SP Front R                | 0.15+1.8  | Unshielded | Unshielded | -       |
| 5   | MUTE                      | 0.15+1.0  | Unshielded | Unshielded | -       |
| 6   | System Remote Control     | 0.15+1.0  | Unshielded | Unshielded | -       |
| 7   | GND                       | 0.15+2.2  | Unshielded | Unshielded | -       |
| 8   | ACC                       | 0.15+2.2  | Unshielded | Unshielded | -       |
| 9   | +B                        | 0.15+2.2  | Unshielded | Unshielded | -       |
| 10  | Wired Remote Controller   | 2.0       | Shielded   | Shielded   | -       |
| 11  | MIC                       | 4.0       | Shielded   | Shielded   | -       |
| 12  | Rear audio out            | 1.5       | Shielded   | Shielded   | -       |
| 13  | Front audio out           | 6.1       | Shielded   | Shielded   | -       |
| 14  | Sub-woofer out            | 6.1       | Shielded   | Shielded   | -       |
| 15  | Aux input                 | 3.1       | Shielded   | Shielded   | -       |
| 16  | FM ANT                    | 0.1+0.4   | Shielded   | Shielded   | -       |
| 17  | Rear monitor output       | 6.1       | Shielded   | Shielded   | -       |
| 18  | RGB                       | 0.6       | Shielded   | Shielded   | -       |
| 19  | USB                       | 1.5       | Shielded   | Shielded   | -       |
| 20  | Audio input               | 1.6       | Shielded   | Shielded   | -       |
| 21  | Video input               | 6.1       | Shielded   | Shielded   | -       |
| 22  | Rear view camera          | 1.6       | Shielded   | Shielded   | -       |
| 23  | Illumination              | 0.15+1.0  | Unshielded | Unshielded | -       |
| 24  | Reverse gear signal input | 0.15+1.0  | Unshielded | Unshielded | -       |
| 25  | Parking brake             | 2.0       | Unshielded | Unshielded | -       |

\*All cables used for the measurement are exclusive use or marketed.

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## **SECTION 5: Carrier frequency separation**

### **Test procedure**

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX

## **SECTION 6: 20dB bandwidth & Occupied bandwidth (99%)**

### **Test procedure**

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

Summary of the test results: Pass  
Refer to APPENDIX

## **SECTION 7: Number of hopping frequency**

### **Test procedure**

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX

## **SECTION 8: Dwell time**

### **Test procedure**

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX

## **SECTION 9: Maximum peak output power**

### **Test procedure**

The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX

## **SECTION 10: Spurious emissions (Antenna port conducted)**

### **Test procedure**

The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

Summary of the test results: Pass  
Refer to APPENDIX

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## **SECTION 11: Radiated emission**

### **11.1 Operating environment**

Test room : See test data (APPENDIX)  
Temperature : See test data (APPENDIX)  
Humidity : See test data (APPENDIX)

### **11.2 Test configuration**

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Photographs of the set up are shown in APPENDIX.

### **11.3 Test conditions**

Frequency range : 30MHz to 25GHz  
EUT position : Table top

### **11.4 Test procedure**

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m (below 15GHz) / 1m (above 15GHz) (Refer to Figure 1). Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

The radiated emission measurements were made with the following detection of the test receiver.

| Frequency      | 30 - 1000MHz | 1 - 25GHz            |                      | 20dBc                       |
|----------------|--------------|----------------------|----------------------|-----------------------------|
| Detection Type | : Quasi-Peak | Peak                 | * Average            | Peak                        |
| IF Bandwidth   | : 120kHz     | RBW:1MHz<br>VBW:3MHz | RBW:1MHz<br>VBW:10Hz | RBW: 100kHz,<br>VBW: 300kHz |

\* When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold. Although 00-705 accepts VBW=10Hz for AV measurements, confirmed that superfluous smoothing was not performed.

The carrier level and noise levels were confirmed at angle of 0 to 30 deg. based on the product specification to see the position of maximum noise, and the test was made at the position (0 deg.) that has the maximum noise.

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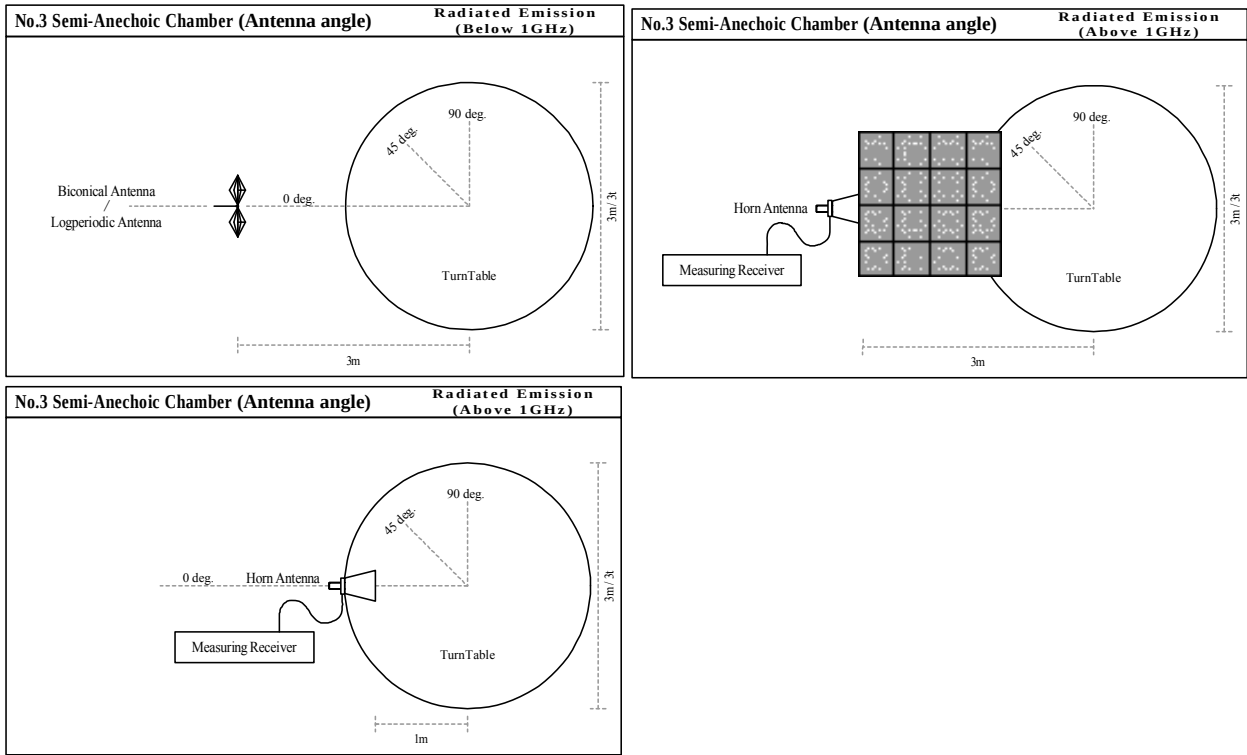
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Figure 1. Antenna angle



11.5 Band edge

Band edge level is below the limits of FCC 15.209. Refer to the data.

11.6 Results

Summary of the test results : Pass \*No noise was detected above the 5<sup>th</sup> order harmonics.

Refer to APPENDIX

## **Contents of APPENDIXES**

### **APPENDIX 1: Data of Radio tests**

20dB bandwidth and Carrier frequency separation  
Number of hopping frequency  
Dwell time  
Maximum peak output power  
Radiated emission  
Spurious emission (Antenna port conducted)  
Occupied bandwidth

### **APPENDIX 2: Test instruments**

Test instruments

### **APPENDIX 3: Photographs of test setup**

Radiated emission

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**UL Japan, Inc.**

**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

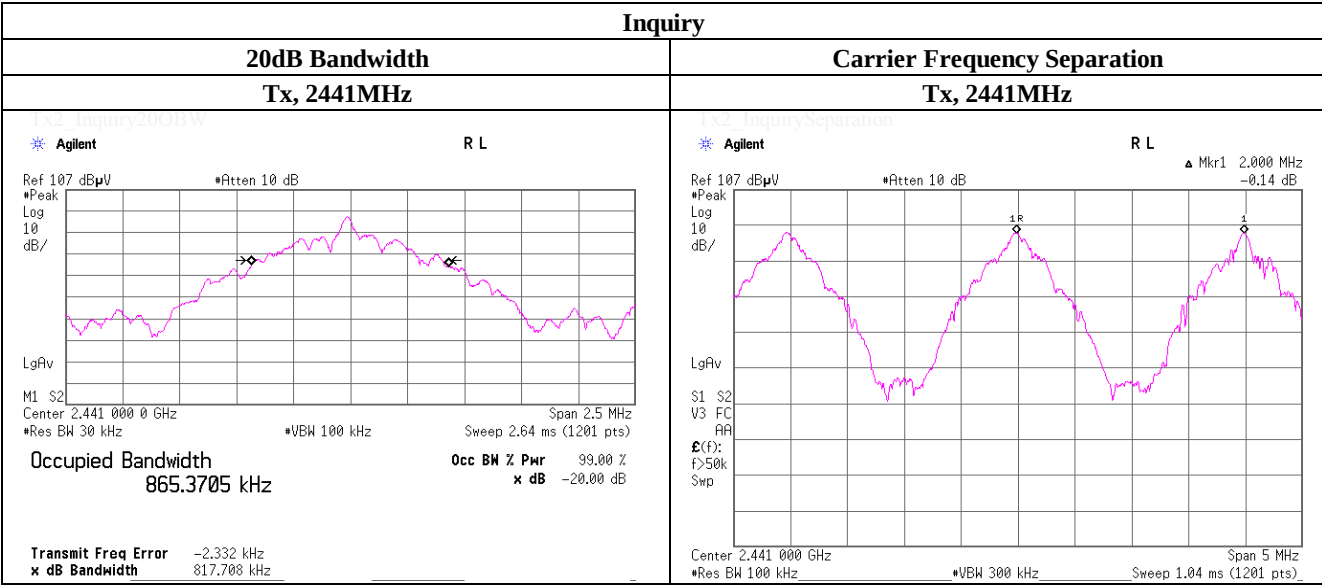
**APPENDIX 1: Data of Radio tests**

**20dB Bandwidth and Carrier Frequency Separation**

|                        |                                |                    |
|------------------------|--------------------------------|--------------------|
| Test place             | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date                   | December 27, 2012              |                    |
| Temperature / Humidity | 23 deg.C , 36 %RH              |                    |
| Engineer               | Kenichi Adachi                 |                    |
| Mode                   | Tx, Bluetooth, BDR, PRBS9      |                    |

| Mode    | Freq.<br>[MHz] | 20dB<br>Bandwidth<br>[MHz] | Carrier<br>Frequency<br>Separation<br>[MHz] | Limit for<br>Carrier<br>Frequency<br>Separation<br>[MHz] |
|---------|----------------|----------------------------|---------------------------------------------|----------------------------------------------------------|
| DH5     | 2402.0         | 0.931                      | 1.000                                       | >= 0.621                                                 |
| DH5     | 2441.0         | 0.943                      | 1.000                                       | >= 0.629                                                 |
| DH5     | 2480.0         | 0.931                      | 1.000                                       | >= 0.621                                                 |
| Inquiry | 2441.0         | 0.818                      | 2.000                                       | >= 0.545                                                 |

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).  
No limit applies to 20dB Bandwidth.



**UL Japan, Inc.**

**Shonan EMC Lab.**

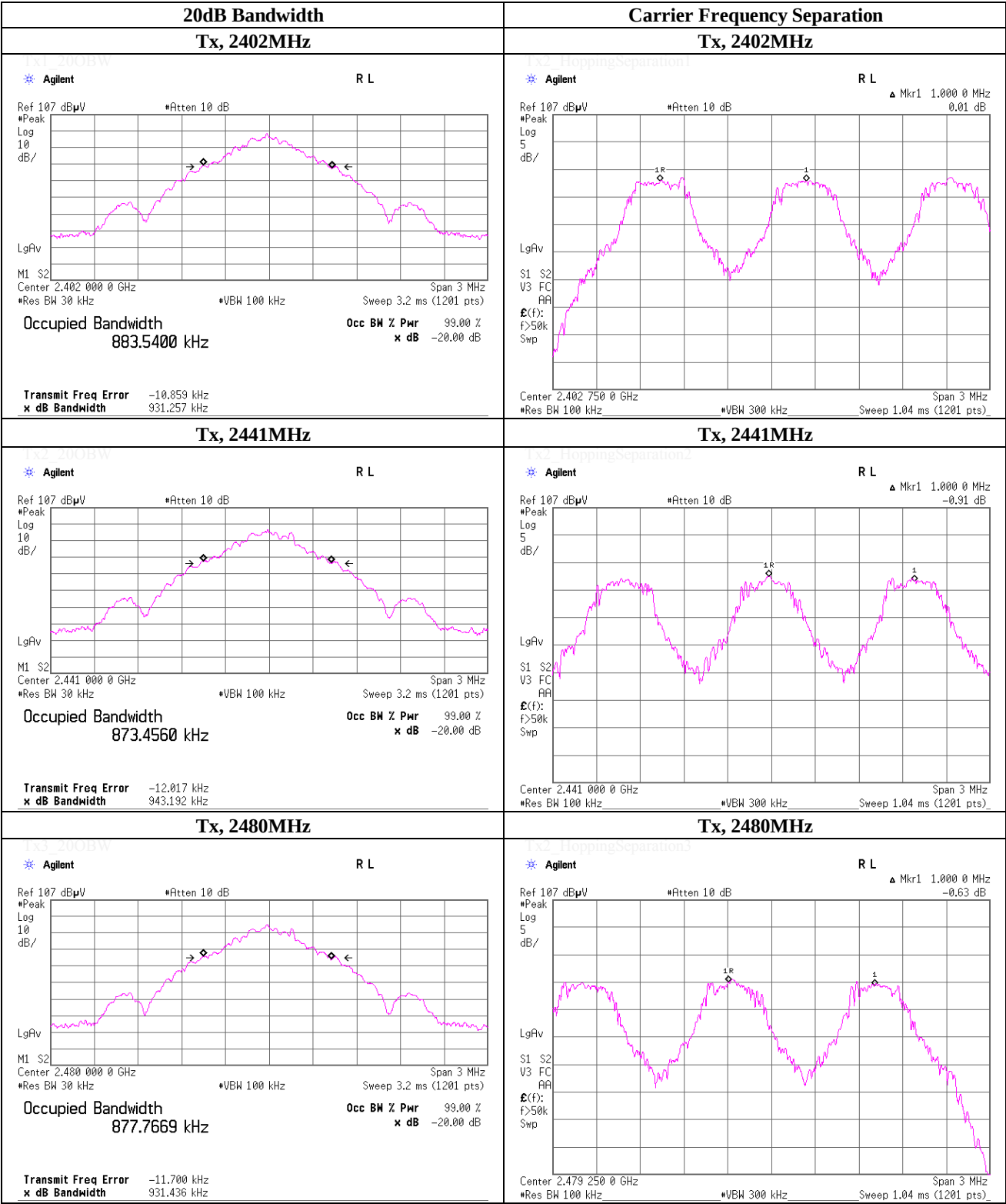
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9



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## **20dB Bandwidth and Carrier Frequency Separation**

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.5 Shielded Room  
Date                              December 27, 2012  
Temperature / Humidity        23 deg.C        , 36 %RH  
Engineer                        Kenichi Adachi  
Mode                              Tx, Bluetooth, EDR, PRBS9

| Mode  | Freq.<br>[MHz] | 20dB<br>Bandwidth<br>[MHz] | Carrier<br>Frequency<br>Separation<br>[MHz] | Limit for<br>Carrier<br>Frequency<br>Separation<br>[MHz] |
|-------|----------------|----------------------------|---------------------------------------------|----------------------------------------------------------|
| 3-DH5 | 2402.0         | 1.301                      | 1.000                                       | >= 0.867                                                 |
| 3-DH5 | 2441.0         | 1.291                      | 1.003                                       | >= 0.860                                                 |
| 3-DH5 | 2480.0         | 1.297                      | 1.000                                       | >= 0.865                                                 |

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).  
No limit applies to 20dB Bandwidth.

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**UL Japan, Inc.**

**Shonan EMC Lab.**

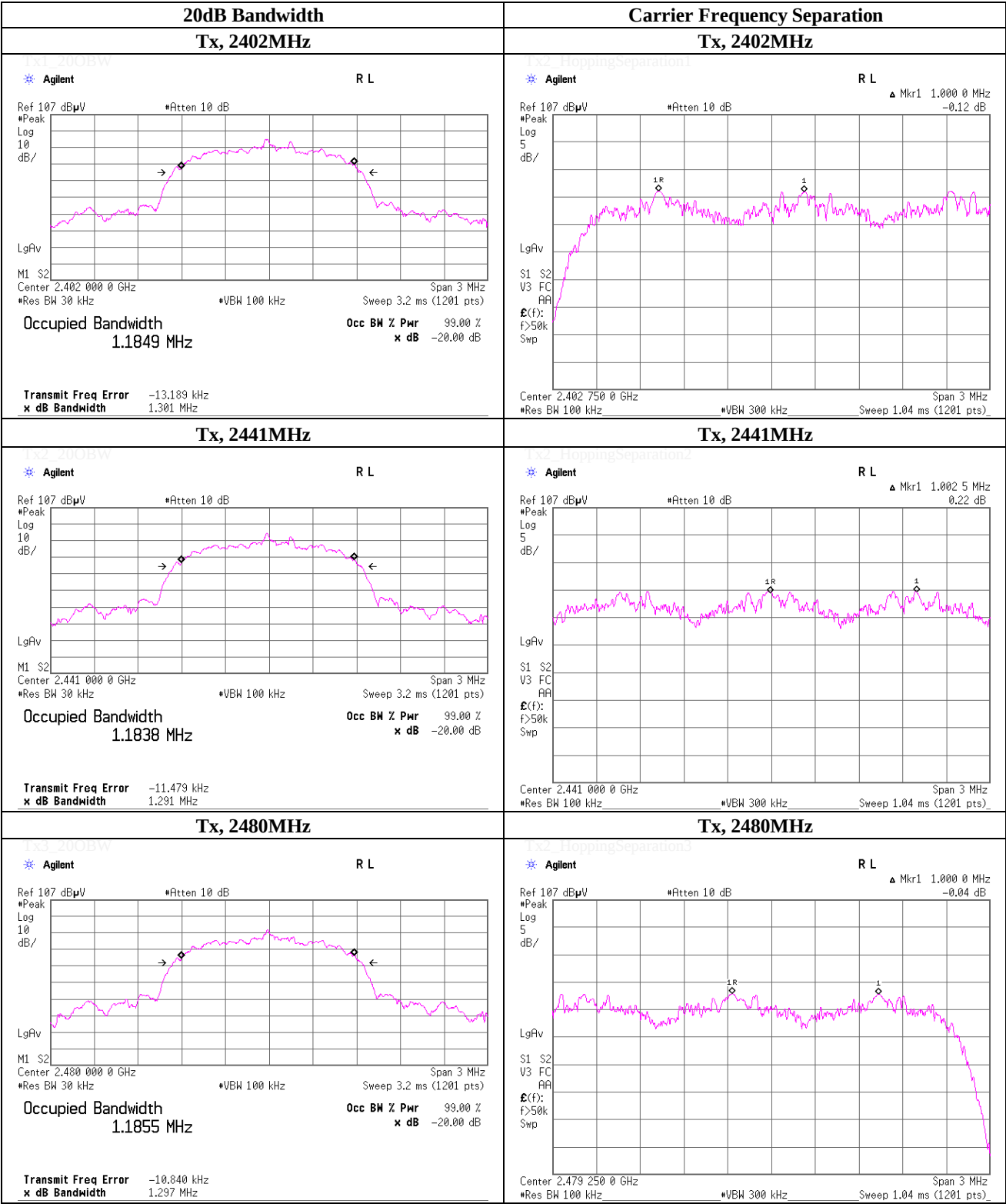
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



UL Japan, Inc.

Shonan EMC Lab.

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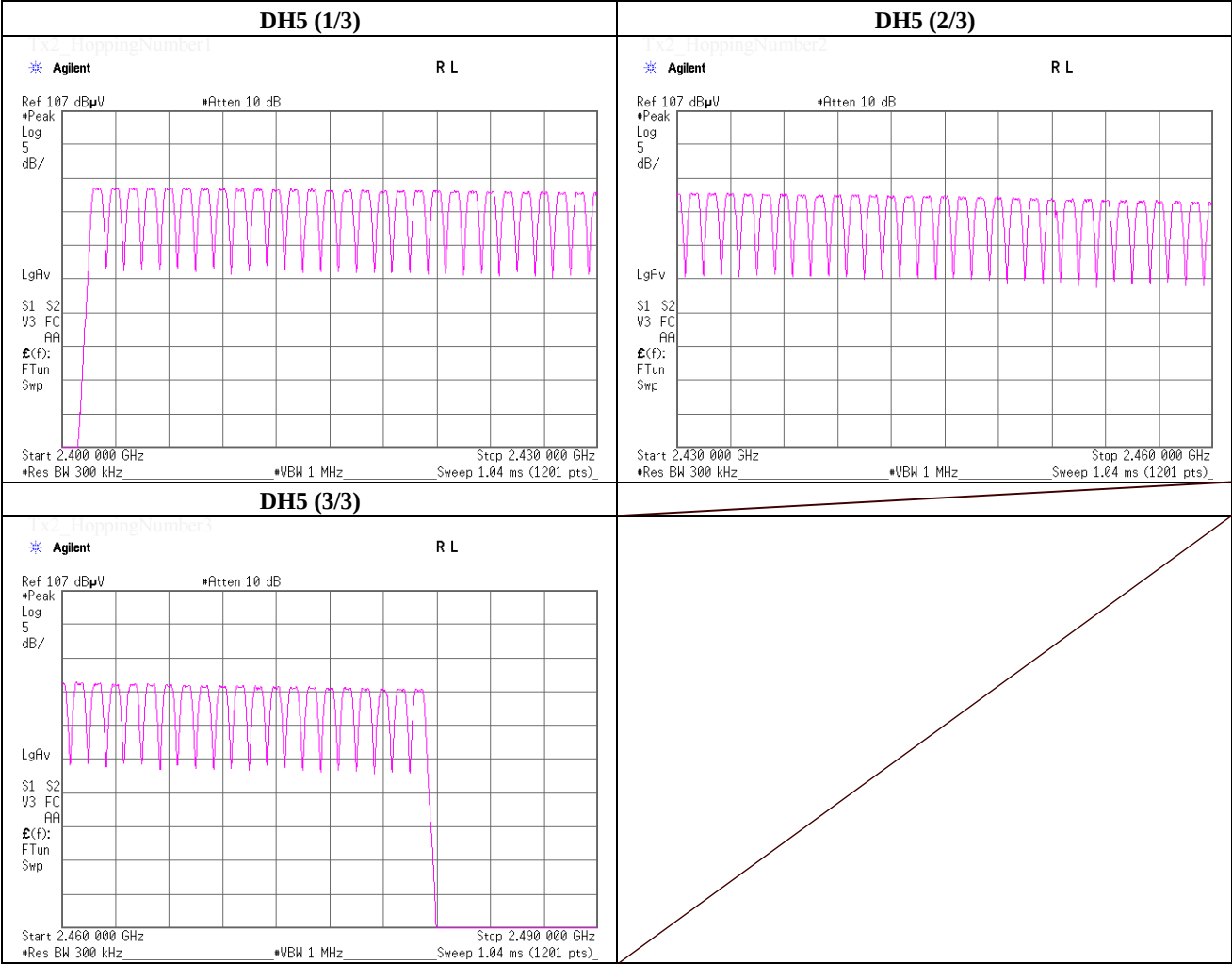
Facsimile : +81 463 50 6401

Number of Hopping Frequency

|                        |                                |                    |
|------------------------|--------------------------------|--------------------|
| Test place             | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date                   | December 27, 2012              |                    |
| Temperature / Humidity | 23 deg.C , 36 %RH              |                    |
| Engineer               | Kenichi Adachi                 |                    |
| Mode                   | Tx, Bluetooth, BDR, PRBS9      |                    |

| Mode | Number of Channel [times] | Limit [times] |
|------|---------------------------|---------------|
| DH5  | 79                        | >= 15         |

\* Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

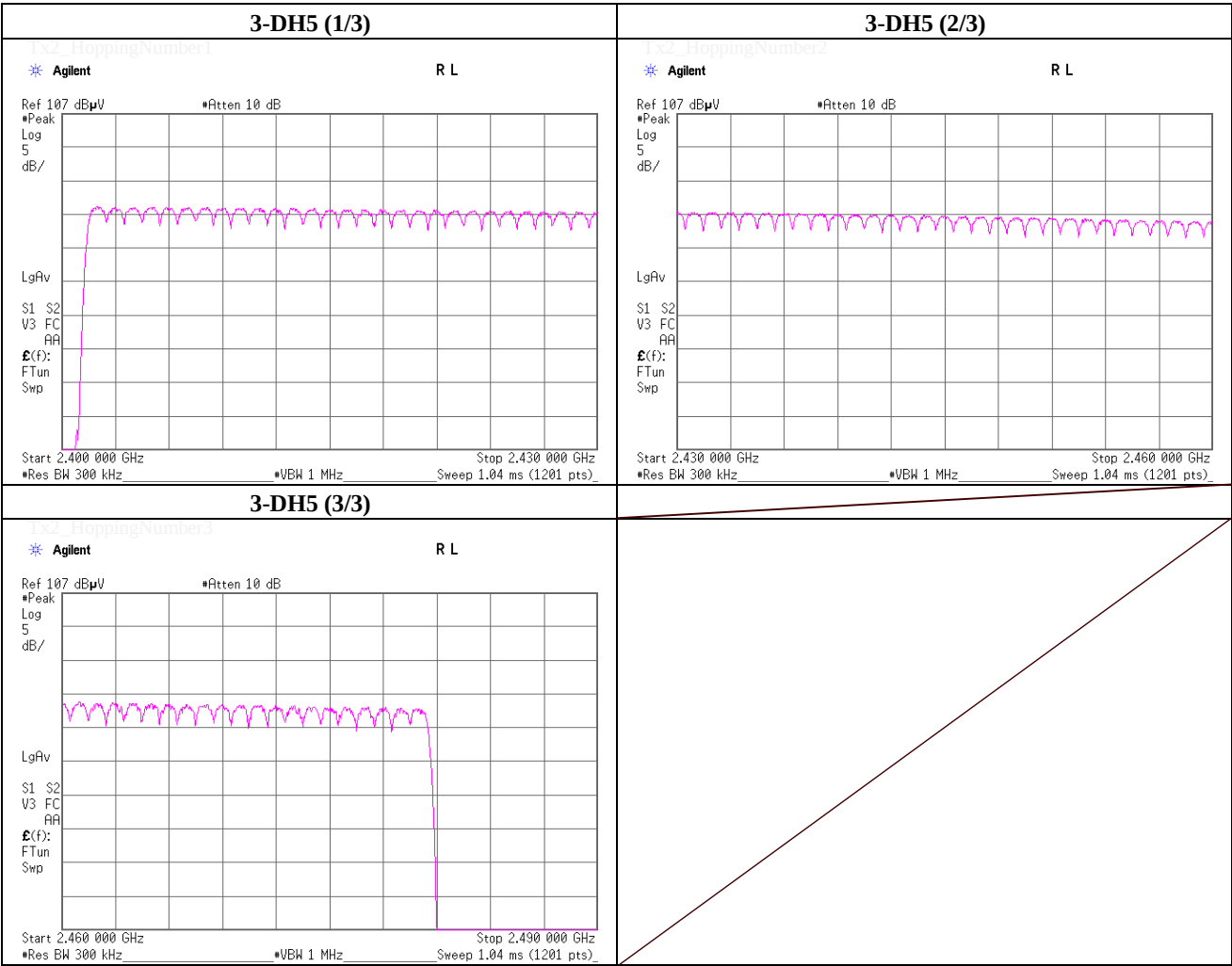


Number of Hopping Frequency

|                        |                                |                    |
|------------------------|--------------------------------|--------------------|
| Test place             | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date                   | December 27, 2012              |                    |
| Temperature / Humidity | 23 deg.C , 36 %RH              |                    |
| Engineer               | Kenichi Adachi                 |                    |
| Mode                   | Tx, Bluetooth, EDR, PRBS9      |                    |

| Mode  | Number of Channel [times] | Limit [times] |
|-------|---------------------------|---------------|
| 3-DH5 | 79                        | >= 15         |

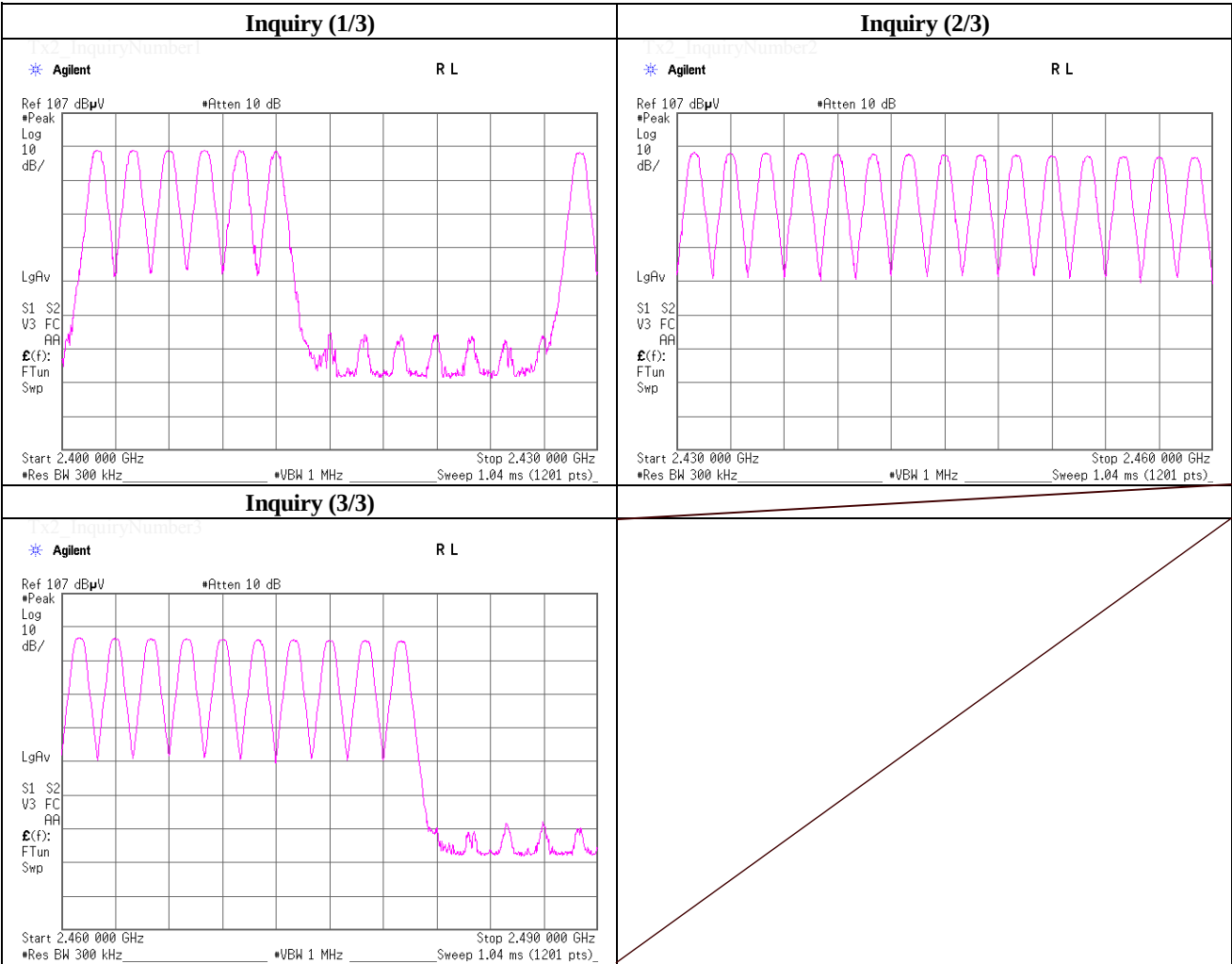
\* Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.



Number of Hopping Frequency

|                        |                                |                    |
|------------------------|--------------------------------|--------------------|
| Test place             | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date                   | December 27, 2012              |                    |
| Temperature / Humidity | 23 deg.C , 36 %RH              |                    |
| Engineer               | Kenichi Adachi                 |                    |
| Mode                   | Tx, Bluetooth, Inquiry         |                    |

|         |                           |               |
|---------|---------------------------|---------------|
| Mode    | Number of Channel [times] | Limit [times] |
| Inquiry | 32                        | >= 15         |



## Dwell Time

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.5 Shielded Room  
Date                              December 27, 2012  
Temperature / Humidity    23 deg.C      , 36 %RH  
Engineer                        Kenichi Adachi  
Mode                              Tx, Bluetooth, BDR, PRBS9

| Mode    | Number of transmission<br>in a 31.6 (79 Hopping x 0.4)<br>/ 12.8 (32 Hopping x 0.4) second period |                                     | Length of<br>transmission<br>time [msec] | Result<br>[msec] | Limit<br>[msec] |
|---------|---------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------|------------------|-----------------|
| DH1     | 20.8                                                                                              | / 5.0 sec. x 31.6 sec. = 132 times  | 0.399                                    | 53               | 400             |
| DH3     | 21.2                                                                                              | / 5.0 sec. x 31.6 sec. = 134 times  | 1.655                                    | 222              | 400             |
| DH5     | 18.2                                                                                              | / 5.0 sec. x 31.6 sec. = 116 times  | 2.903                                    | 337              | 400             |
| Inquiry | 100.0                                                                                             | / 1.0 sec. x 12.8 sec. = 1280 times | 0.101                                    | 129              | 400             |

Sample Calculation

Result = Number of transmission x Length of transmission time

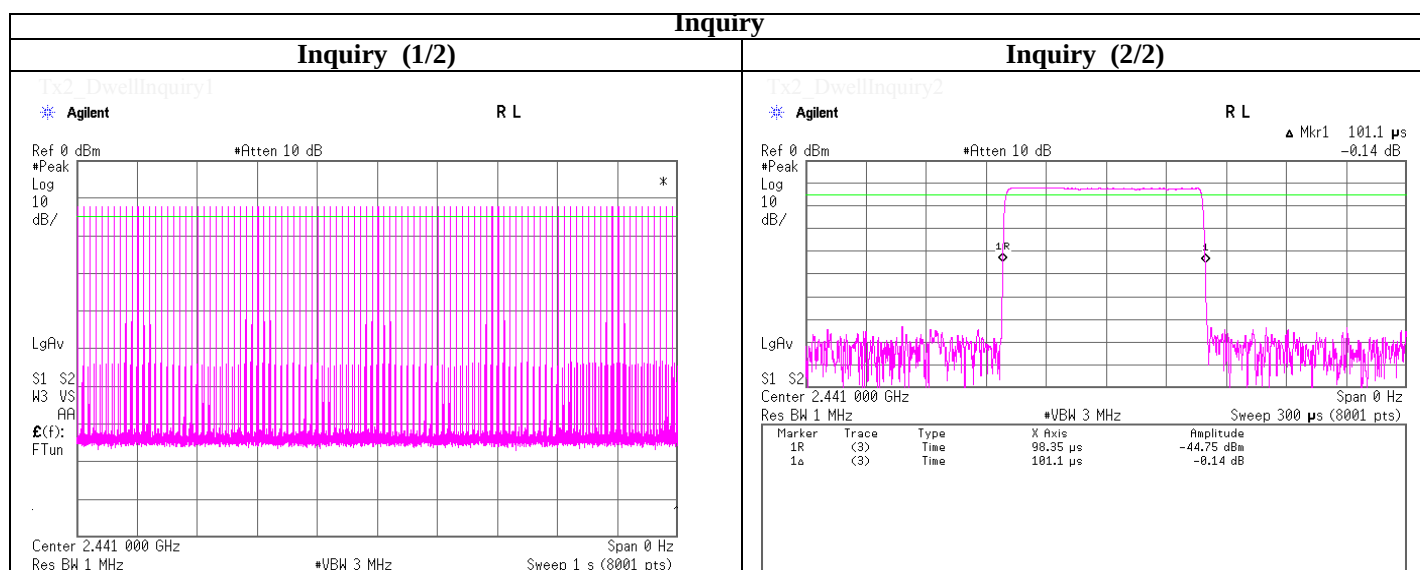
\*Average data of 5 tests.(except Inquiry)

| Mode    | Sampling [times] |     |     |     |     | Average<br>[times] |
|---------|------------------|-----|-----|-----|-----|--------------------|
|         | 1                | 2   | 3   | 4   | 5   |                    |
| DH1     | 17               | 20  | 27  | 19  | 21  | 20.8               |
| DH3     | 18               | 23  | 19  | 24  | 22  | 21.2               |
| DH5     | 16               | 19  | 16  | 24  | 16  | 18.2               |
| Inquiry | 100              | 100 | 100 | 100 | 100 | 100.0              |

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

\* This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in  $N \times 0.4s$ , where N is the number of channels being used in the hopping sequence ( $20 \leq N \leq 79$ ), is always less than 0.4s regardless of packet size (DH1, DH3 or DH5). This is confirmed in the test report for N=79.



**UL Japan, Inc.**

**Shonan EMC Lab.**

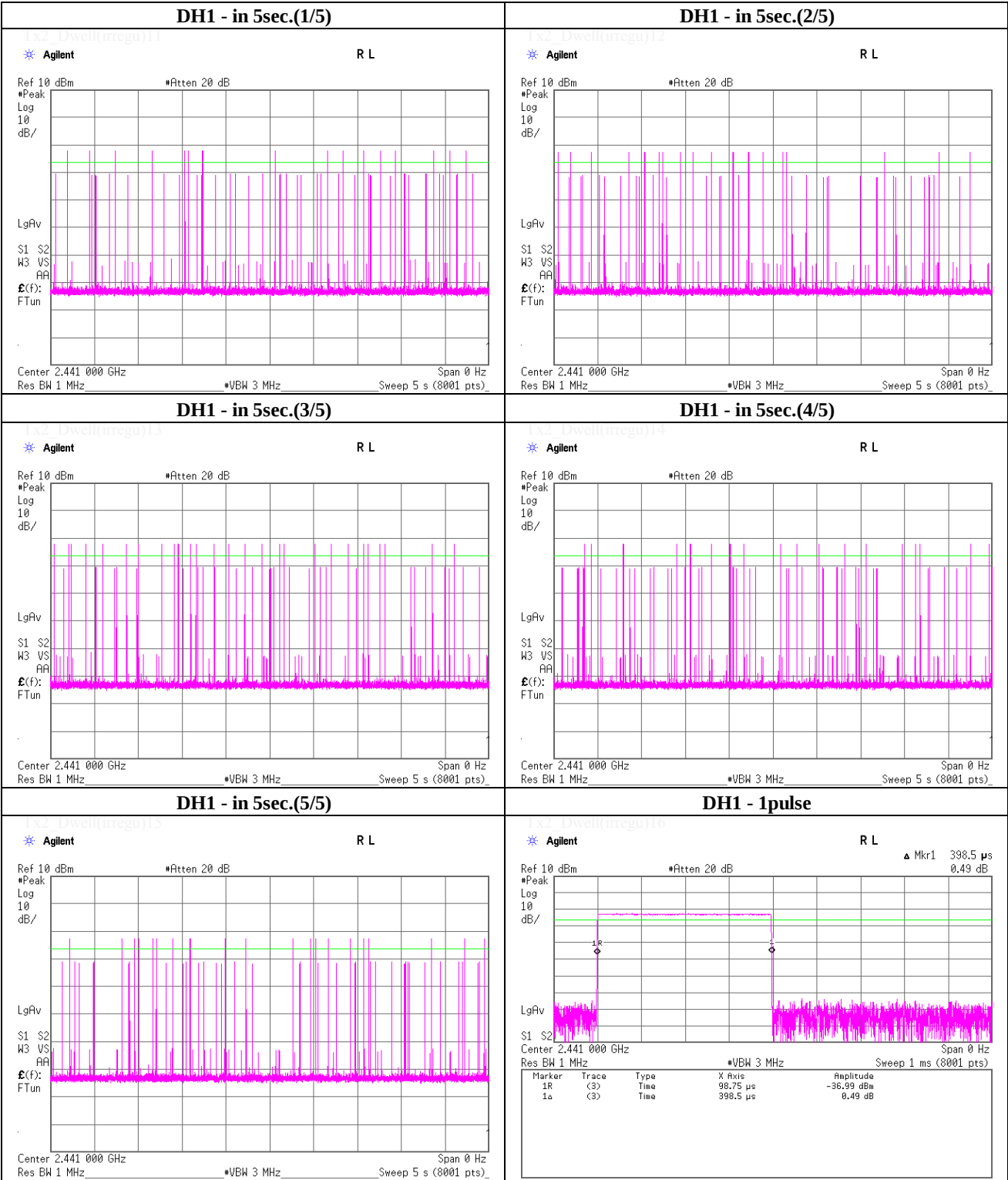
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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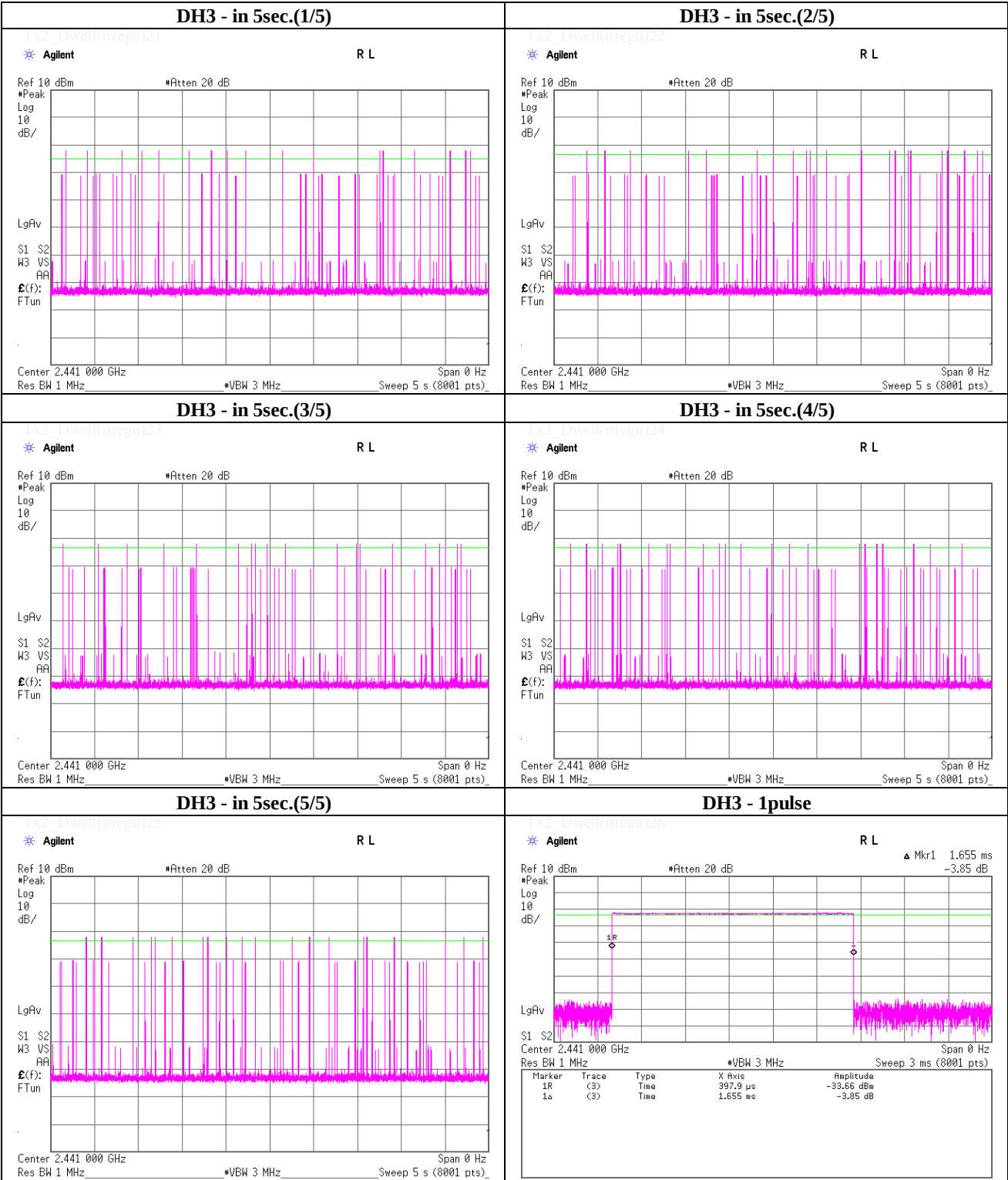
Dwell time

Tx, Bluetooth, BDR, PRBS9



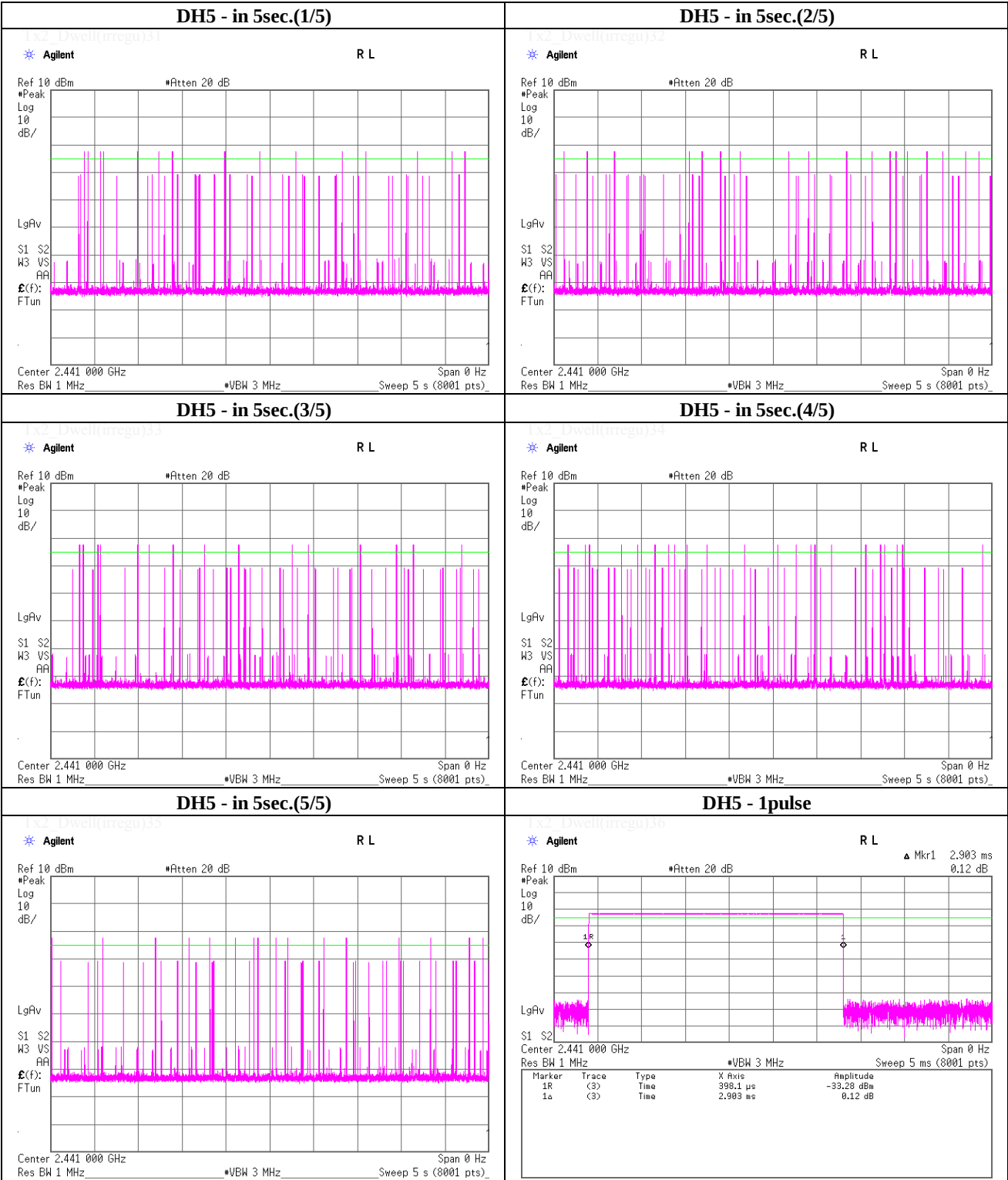
**Dwell time**

**Tx, Bluetooth, BDR, PRBS9**



**Dwell time**

**Tx, Bluetooth, BDR, PRBS9**



## Dwell Time

Test place                    UL Japan, Inc. Shonan EMC Lab.                    No.5 Shielded Room  
Date                            December 27, 2012  
Temperature / Humidity    23 deg.C    , 36 %RH  
Engineer                     Kenichi Adachi  
Mode                          Tx, Bluetooth, EDR, PRBS9

| Mode  | Number of transmission<br>in a 31.6 (79 Hopping x 0.4) second |            |                         | Length of<br>transmission<br>time [msec] | Result<br>[msec] | Limit<br>[msec] |
|-------|---------------------------------------------------------------|------------|-------------------------|------------------------------------------|------------------|-----------------|
| 3-DH1 | 20.8                                                          | / 5.0 sec. | x 31.6 sec. = 132 times | 0.409                                    | 54               | 400             |
| 3-DH3 | 17.2                                                          | / 5.0 sec. | x 31.6 sec. = 109 times | 1.660                                    | 181              | 400             |
| 3-DH5 | 17.4                                                          | / 5.0 sec. | x 31.6 sec. = 110 times | 2.912                                    | 320              | 400             |

Sample Calculation

Result = Number of transmission x Length of transmission time

\*Average data of 5 tests.(except Inquiry)

| Mode  | Sampling [times] |    |    |    |    | Average<br>[times] |
|-------|------------------|----|----|----|----|--------------------|
|       | 1                | 2  | 3  | 4  | 5  |                    |
| 3-DH1 | 19               | 24 | 27 | 19 | 15 | 20.8               |
| 3-DH3 | 18               | 21 | 18 | 14 | 15 | 17.2               |
| 3-DH5 | 18               | 19 | 18 | 17 | 15 | 17.4               |

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

\* This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in  $N \times 0.4s$ , where  $N$  is the number of channels being used in the hopping sequence ( $20 \leq N \leq 79$ ), is always less than 0.4s regardless of packet size (3-DH1, 3-DH3 or 3-DH5). This is confirmed in the test report for  $N=79$ .

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**Shonan EMC Lab.**

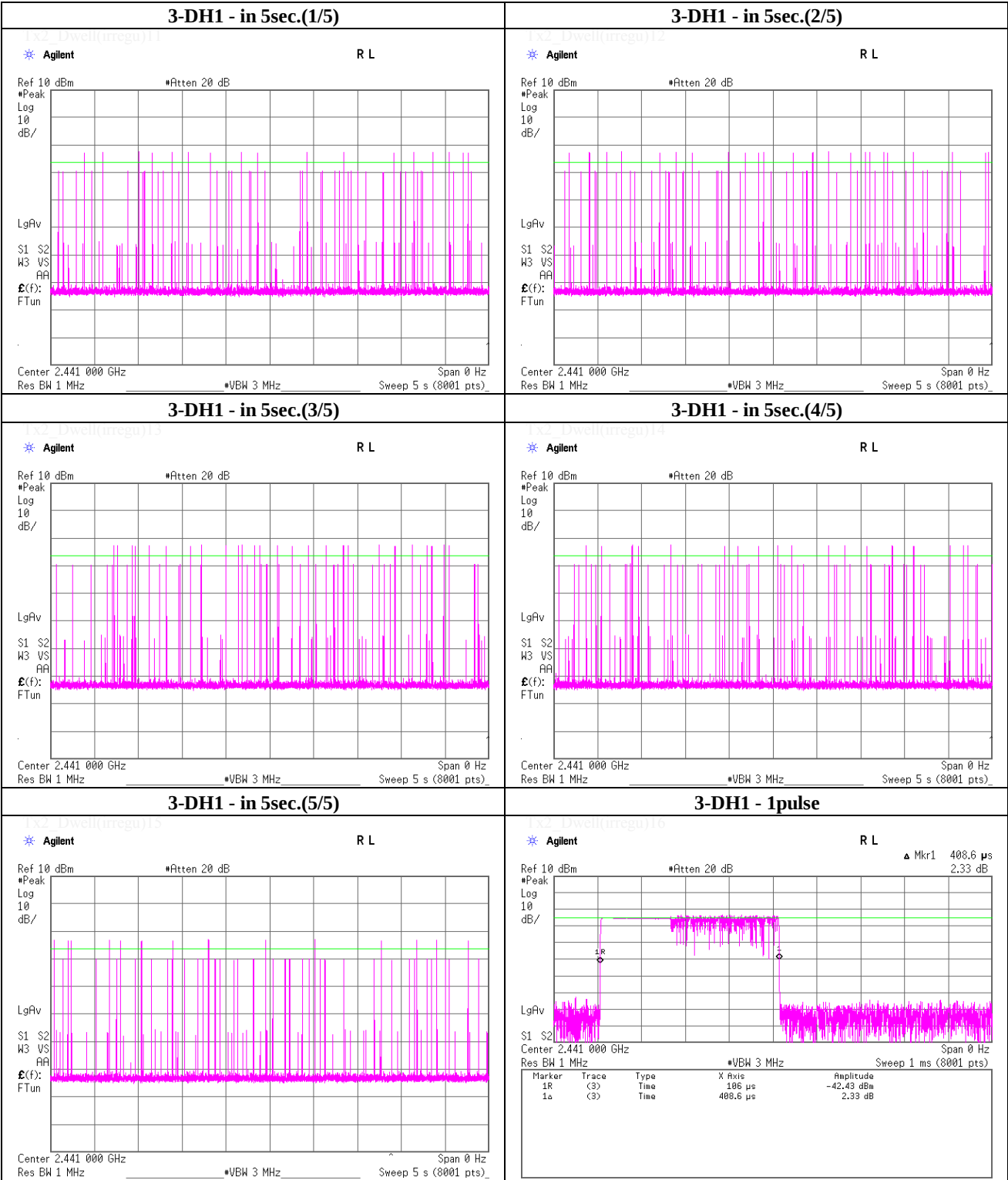
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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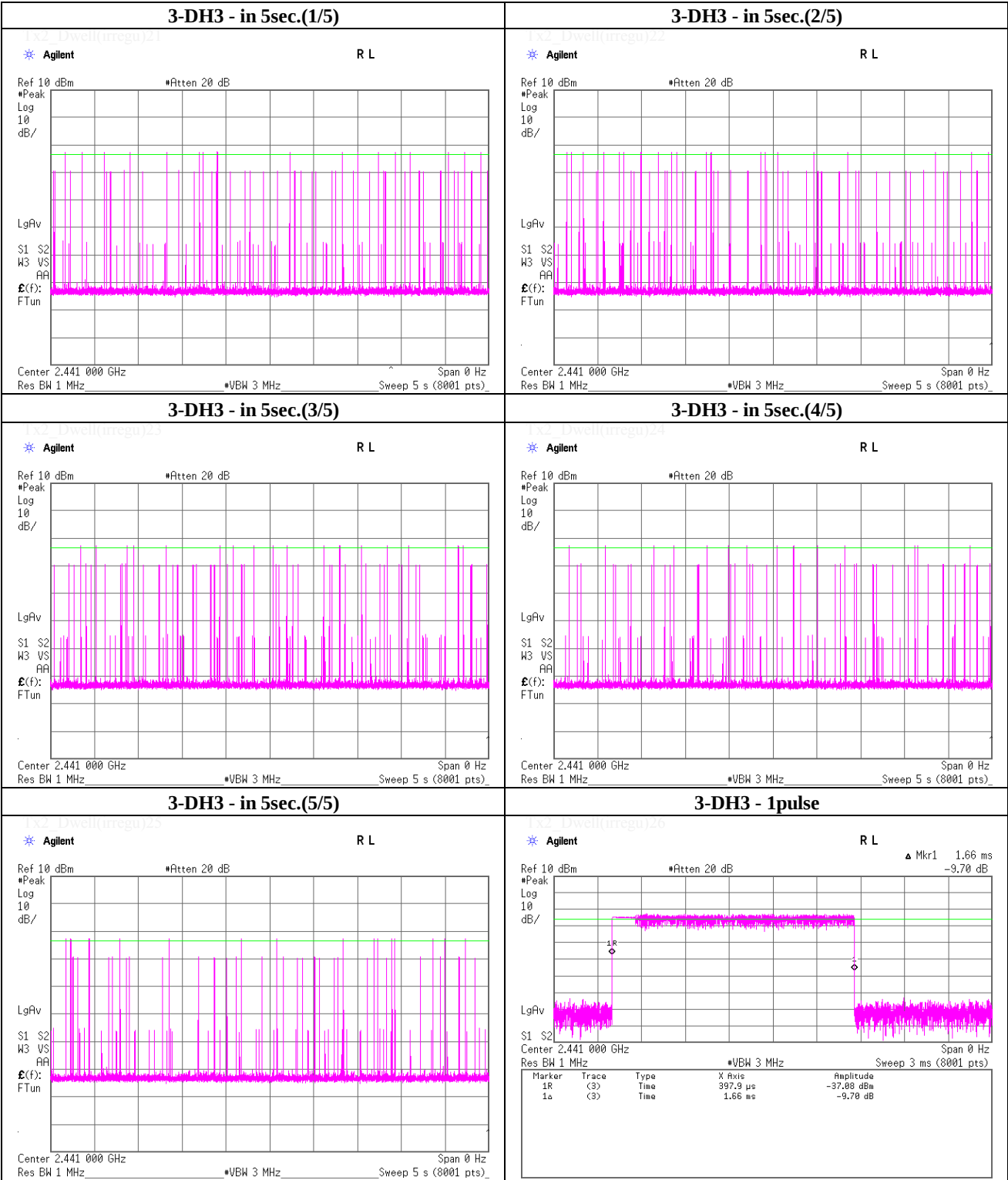
**Dwell time**

**Tx, Bluetooth, EDR, PRBS9**



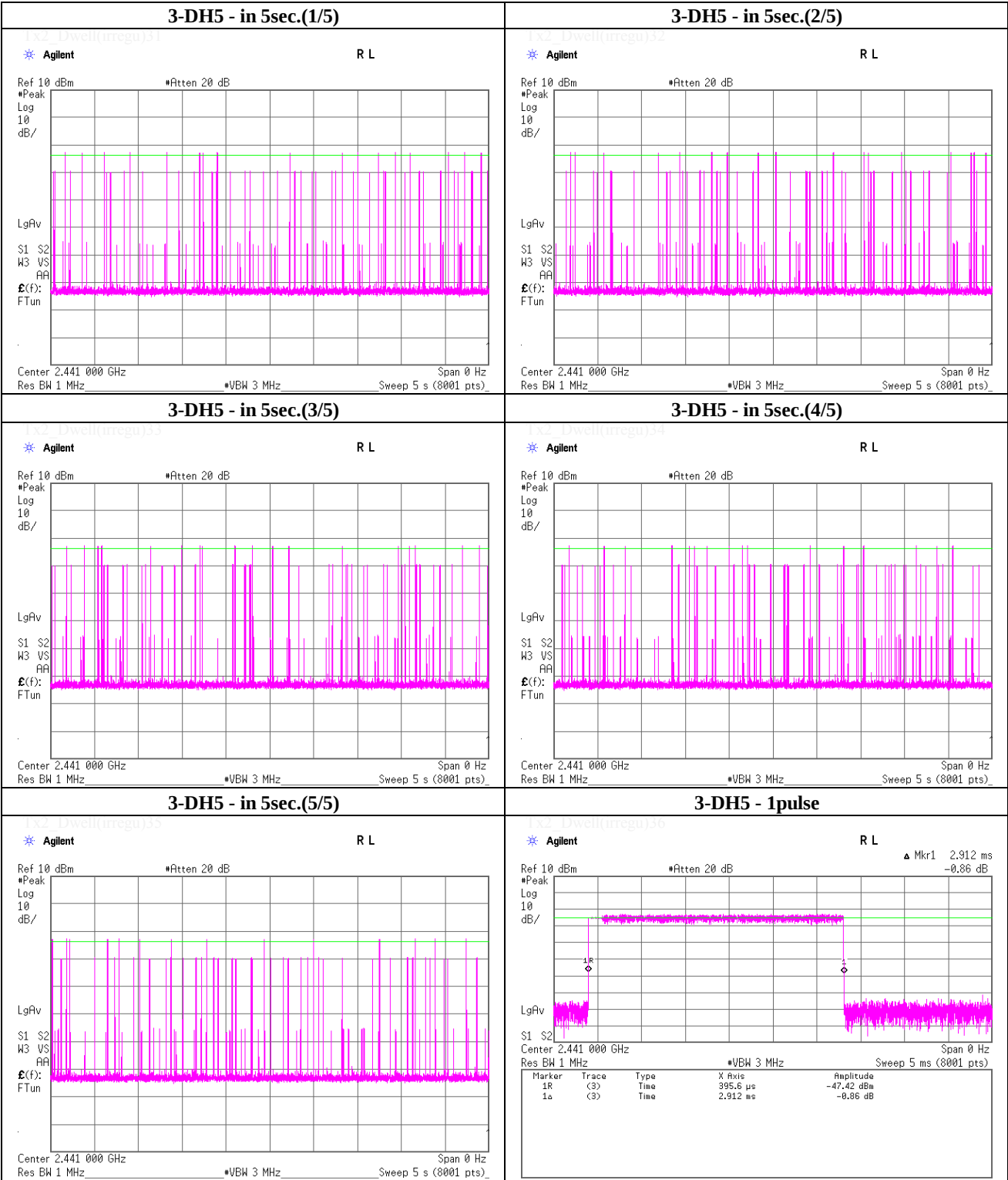
**Dwell time**

**Tx, Bluetooth, EDR, PRBS9**



**Dwell time**

**Tx, Bluetooth, EDR, PRBS9**



## Maximum Peak Conducted Output Power (Conducted)

Test place                      UL Japan, Inc. Shonan EMC Lab.              No.5 Shielded Room  
Date                              December 27, 2012  
Temperature / Humidity        23 deg.C        , 36 %RH  
Engineer                        Kenichi Adachi  
Mode                              Tx, Bluetooth

(\* P/M: Power Meter with power sensor)

|       | Freq.  | P/M (Peak)<br>Reading | Cable<br>Loss | Atten.<br>Loss | Result |      | Limit |      | Margin |
|-------|--------|-----------------------|---------------|----------------|--------|------|-------|------|--------|
|       | [MHz]  | [dBm]                 | [dB]          | [dB]           | [dBm]  | [mW] | [dBm] | [mW] | [dB]   |
| DH5   | 2402.0 | -11.14                | 2.10          | 9.97           | 0.93   | 1.24 | 20.97 | 125  | 20.04  |
| DH5   | 2441.0 | -12.23                | 2.11          | 9.97           | -0.15  | 0.97 | 20.97 | 125  | 21.12  |
| DH5   | 2480.0 | -14.12                | 2.12          | 9.97           | -2.03  | 0.63 | 20.97 | 125  | 23.00  |
| 2-DH5 | 2402.0 | -11.83                | 2.10          | 9.97           | 0.24   | 1.06 | 20.97 | 125  | 20.73  |
| 2-DH5 | 2441.0 | -12.92                | 2.11          | 9.97           | -0.84  | 0.82 | 20.97 | 125  | 21.81  |
| 2-DH5 | 2480.0 | -14.89                | 2.12          | 9.97           | -2.80  | 0.52 | 20.97 | 125  | 23.77  |
| 3-DH5 | 2402.0 | -11.36                | 2.10          | 9.97           | 0.71   | 1.18 | 20.97 | 125  | 20.26  |
| 3-DH5 | 2441.0 | -12.59                | 2.11          | 9.97           | -0.51  | 0.89 | 20.97 | 125  | 21.48  |
| 3-DH5 | 2480.0 | -14.56                | 2.12          | 9.97           | -2.47  | 0.57 | 20.97 | 125  | 23.44  |

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

**UL Japan, Inc.**  
**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Date January 8, 2013 January 10, 2013  
Temperature / Humidity 26deg.C / 34%RH 23deg.C / 33%RH  
Engineer Akio Hayashi Akio Hayashi  
Mode Tx, 2402 MHz  
Tx, Bluetooth, BDR, PRBS9  
(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 75.001             | QP       | 39.8              | 6.5                | 7.1          | 32.2         | 21.2               | 40.0              | 18.8           | 400            | 293            |        |
| Hori.    | 166.075            | QP       | 38.1              | 15.4               | 7.8          | 32.1         | 29.2               | 43.5              | 14.3           | 190            | 236            |        |
| Hori.    | 324.002            | QP       | 41.8              | 14.5               | 8.7          | 32.0         | 33.0               | 46.0              | 13.0           | 100            | 314            |        |
| Hori.    | 351.001            | QP       | 40.1              | 15.1               | 8.8          | 31.9         | 32.1               | 46.0              | 13.9           | 100            | 204            |        |
| Hori.    | 405.002            | QP       | 41.5              | 16.3               | 9.0          | 32.0         | 34.8               | 46.0              | 11.2           | 100            | 243            |        |
| Hori.    | 416.005            | QP       | 38.8              | 16.4               | 9.1          | 32.0         | 32.3               | 46.0              | 13.7           | 100            | 296            |        |
| Hori.    | 2390.000           | PK       | 45.7              | 27.4               | 14.2         | 41.4         | 45.9               | 73.9              | 28.0           | 100            | 199            |        |
| Hori.    | 2400.000           | PK       | 46.0              | 27.4               | 14.2         | 41.4         | 46.2               | 73.9              | 27.7           | 100            | 199            |        |
| Hori.    | 4804.000           | PK       | 49.3              | 31.1               | 6.8          | 41.2         | 46.0               | 73.9              | 27.9           | 100            | 303            |        |
| Hori.    | 7206.000           | PK       | 46.8              | 36.6               | 8.3          | 41.4         | 50.3               | 73.9              | 23.6           | 100            | 0              |        |
| Hori.    | 9608.000           | PK       | 43.0              | 38.5               | 9.5          | 38.9         | 52.1               | 73.9              | 21.8           | 100            | 0              |        |
| Hori.    | 12010.000          | PK       | 44.5              | 39.4               | 10.9         | 39.4         | 55.4               | 73.9              | 18.5           | 100            | 0              |        |
| Hori.    | 2390.000           | AV       | 34.0              | 27.4               | 14.2         | 41.4         | 34.2               | 53.9              | 19.7           | 100            | 199            |        |
| Hori.    | 2400.000           | AV       | 34.1              | 27.4               | 14.2         | 41.4         | 34.3               | 53.9              | 19.6           | 100            | 199            |        |
| Hori.    | 4804.000           | AV       | 36.3              | 31.1               | 6.8          | 41.2         | 33.0               | 53.9              | 20.9           | 100            | 303            |        |
| Hori.    | 7206.000           | AV       | 33.9              | 36.6               | 8.3          | 41.4         | 37.4               | 53.9              | 16.5           | 100            | 0              |        |
| Hori.    | 9608.000           | AV       | 30.4              | 38.5               | 9.5          | 38.9         | 39.5               | 53.9              | 14.4           | 100            | 0              |        |
| Hori.    | 12010.000          | AV       | 31.7              | 39.4               | 10.9         | 39.4         | 42.6               | 53.9              | 11.3           | 100            | 0              |        |
| Vert.    | 99.575             | QP       | 44.1              | 10.1               | 7.3          | 32.2         | 29.3               | 43.5              | 14.2           | 100            | 219            |        |
| Vert.    | 351.001            | QP       | 38.9              | 15.1               | 8.8          | 31.9         | 30.9               | 46.0              | 15.1           | 100            | 11             |        |
| Vert.    | 2390.000           | PK       | 46.1              | 27.4               | 14.2         | 41.4         | 46.3               | 73.9              | 27.6           | 100            | 340            |        |
| Vert.    | 2400.000           | PK       | 46.8              | 27.4               | 14.2         | 41.4         | 47.0               | 73.9              | 26.9           | 100            | 340            |        |
| Vert.    | 4804.000           | PK       | 50.2              | 31.1               | 6.8          | 41.2         | 46.9               | 73.9              | 27.0           | 100            | 307            |        |
| Vert.    | 7206.000           | PK       | 47.2              | 36.6               | 8.3          | 41.4         | 50.7               | 73.9              | 23.2           | 100            | 0              |        |
| Vert.    | 9608.000           | PK       | 43.0              | 38.5               | 9.5          | 38.9         | 52.1               | 73.9              | 21.8           | 100            | 0              |        |
| Vert.    | 12010.000          | PK       | 43.8              | 39.4               | 10.9         | 39.4         | 54.7               | 73.9              | 19.2           | 100            | 0              |        |
| Vert.    | 2390.000           | AV       | 34.1              | 27.4               | 14.2         | 41.4         | 34.3               | 53.9              | 19.6           | 100            | 340            |        |
| Vert.    | 2400.000           | AV       | 34.2              | 27.4               | 14.2         | 41.4         | 34.4               | 53.9              | 19.5           | 100            | 340            |        |
| Vert.    | 4804.000           | AV       | 39.1              | 31.1               | 6.8          | 41.2         | 35.8               | 53.9              | 18.1           | 100            | 307            |        |
| Vert.    | 7206.000           | AV       | 33.9              | 36.6               | 8.3          | 41.4         | 37.4               | 53.9              | 16.5           | 100            | 0              |        |
| Vert.    | 9608.000           | AV       | 30.4              | 38.5               | 9.5          | 38.9         | 39.5               | 53.9              | 14.4           | 100            | 0              |        |
| Vert.    | 12010.000          | AV       | 31.6              | 39.4               | 10.9         | 39.4         | 42.5               | 53.9              | 11.4           | 100            | 0              |        |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
\*Distance factor [dB](15GHz - 40GHz)= 20 x log ( 3.0[m] / 1.0[m] ) = 9.5 [dB]

**Radiated Emission**

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.3 Semi Anechoic Chamber  
Date                              January 8, 2013                              January 10, 2013  
Temperature / Humidity        26deg.C / 34%RH                              23deg.C / 33%RH  
Engineer                        Akio Hayashi                              Akio Hayashi  
Mode                              Tx,                              2441 MHz  
                                         Tx, Bluetooth, BDR, PRBS9  
                                         (\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 75.005             | QP       | 39.5              | 6.5                | 7.1          | 32.2         | 20.9               | 40.0              | 19.1           | 400            | 294            |        |
| Hori.    | 165.972            | QP       | 38.0              | 15.4               | 7.8          | 32.1         | 29.1               | 43.5              | 14.4           | 190            | 236            |        |
| Hori.    | 323.886            | QP       | 42.0              | 14.5               | 8.7          | 32.0         | 33.2               | 46.0              | 12.8           | 119            | 234            |        |
| Hori.    | 351.003            | QP       | 40.0              | 15.1               | 8.8          | 31.9         | 32.0               | 46.0              | 14.0           | 100            | 205            |        |
| Hori.    | 405.001            | QP       | 41.0              | 16.3               | 9.0          | 32.0         | 34.3               | 46.0              | 11.7           | 100            | 252            |        |
| Hori.    | 416.003            | QP       | 38.9              | 16.4               | 9.1          | 32.0         | 32.4               | 46.0              | 13.6           | 100            | 299            |        |
| Hori.    | 566.999            | QP       | 33.4              | 18.4               | 9.7          | 32.0         | 29.5               | 46.0              | 16.5           | 209            | 12             |        |
| Hori.    | 4882.000           | PK       | 47.1              | 31.3               | 6.9          | 41.1         | 44.2               | 73.9              | 29.7           | 100            | 201            |        |
| Hori.    | 7323.000           | PK       | 46.2              | 36.6               | 8.4          | 41.4         | 49.8               | 73.9              | 24.1           | 100            | 0              |        |
| Hori.    | 9764.000           | PK       | 43.3              | 38.7               | 9.5          | 38.9         | 52.6               | 73.9              | 21.3           | 100            | 0              |        |
| Hori.    | 12205.000          | PK       | 44.6              | 39.5               | 10.9         | 39.3         | 55.7               | 73.9              | 18.2           | 100            | 0              |        |
| Hori.    | 4882.000           | AV       | 35.2              | 31.3               | 6.9          | 41.1         | 32.3               | 53.9              | 21.6           | 100            | 201            |        |
| Hori.    | 7323.000           | AV       | 34.0              | 36.6               | 8.4          | 41.4         | 37.6               | 53.9              | 16.3           | 100            | 0              |        |
| Hori.    | 9764.000           | AV       | 30.8              | 38.7               | 9.5          | 38.9         | 40.1               | 53.9              | 13.8           | 100            | 0              |        |
| Hori.    | 12205.000          | AV       | 32.2              | 39.5               | 10.9         | 39.3         | 43.3               | 53.9              | 10.6           | 100            | 0              |        |
| Vert.    | 60.865             | QP       | 32.5              | 7.8                | 6.5          | 32.2         | 14.6               | 40.0              | 25.4           | 100            | 243            |        |
| Vert.    | 99.571             | QP       | 44.1              | 10.1               | 7.3          | 32.2         | 29.3               | 43.5              | 14.2           | 100            | 235            |        |
| Vert.    | 351.003            | QP       | 39.0              | 15.1               | 8.8          | 31.9         | 31.0               | 46.0              | 15.0           | 100            | 33             |        |
| Vert.    | 4882.000           | PK       | 47.2              | 31.3               | 6.9          | 41.1         | 44.3               | 73.9              | 29.6           | 100            | 8              |        |
| Vert.    | 7323.000           | PK       | 46.0              | 36.6               | 8.4          | 41.4         | 49.6               | 73.9              | 24.3           | 100            | 0              |        |
| Vert.    | 9764.000           | PK       | 42.5              | 38.7               | 9.5          | 38.9         | 51.8               | 73.9              | 22.1           | 100            | 0              |        |
| Vert.    | 12205.000          | PK       | 44.3              | 39.5               | 10.9         | 39.3         | 55.4               | 73.9              | 18.5           | 100            | 0              |        |
| Vert.    | 4882.000           | AV       | 36.8              | 31.3               | 6.9          | 41.1         | 33.9               | 53.9              | 20.0           | 100            | 8              |        |
| Vert.    | 7323.000           | AV       | 34.4              | 36.6               | 8.4          | 41.4         | 38.0               | 53.9              | 15.9           | 100            | 0              |        |
| Vert.    | 9764.000           | AV       | 31.0              | 38.7               | 9.5          | 38.9         | 40.3               | 53.9              | 13.6           | 100            | 0              |        |
| Vert.    | 12205.000          | AV       | 32.2              | 39.5               | 10.9         | 39.3         | 43.3               | 53.9              | 10.6           | 100            | 0              |        |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
\*Distance factor [dB](15GHz - 40GHz)= 20 x log ( 3.0[m] / 1.0[m] ) = 9.5 [dB]

**Radiated Emission**

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.3 Semi Anechoic Chamber  
Date                              January 8, 2013                              January 10, 2013  
Temperature / Humidity        26deg.C / 34%RH                              23deg.C / 33%RH  
Engineer                        Akio Hayashi                              Akio Hayashi  
Mode                              Tx,                              2480 MHz  
                                         Tx, Bluetooth, BDR, PRBS9  
                                         (\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 75.009             | QP       | 39.6              | 6.5                | 7.1          | 32.2         | 21.0               | 40.0              | 19.0           | 400            | 306            |        |
| Hori.    | 165.988            | QP       | 37.8              | 15.4               | 7.8          | 32.1         | 28.9               | 43.5              | 14.6           | 188            | 241            |        |
| Hori.    | 324.003            | QP       | 41.9              | 14.5               | 8.7          | 32.0         | 33.1               | 46.0              | 12.9           | 107            | 315            |        |
| Hori.    | 351.006            | QP       | 40.2              | 15.1               | 8.8          | 31.9         | 32.2               | 46.0              | 13.8           | 100            | 57             |        |
| Hori.    | 405.004            | QP       | 42.3              | 16.3               | 9.0          | 32.0         | 35.6               | 46.0              | 10.4           | 100            | 245            |        |
| Hori.    | 416.003            | QP       | 38.9              | 16.4               | 9.1          | 32.0         | 32.4               | 46.0              | 13.6           | 100            | 302            |        |
| Hori.    | 459.005            | QP       | 37.5              | 17.0               | 9.3          | 32.0         | 31.8               | 46.0              | 14.2           | 100            | 245            |        |
| Hori.    | 2483.500           | PK       | 45.9              | 27.5               | 14.3         | 41.4         | 46.3               | 73.9              | 27.6           | 100            | 213            |        |
| Hori.    | 4960.000           | PK       | 47.7              | 31.6               | 6.9          | 41.0         | 45.2               | 73.9              | 28.7           | 100            | 216            |        |
| Hori.    | 7440.000           | PK       | 47.4              | 36.7               | 8.5          | 41.5         | 51.1               | 73.9              | 22.8           | 100            | 0              |        |
| Hori.    | 9920.000           | PK       | 43.7              | 39.0               | 9.7          | 38.9         | 53.5               | 73.9              | 20.4           | 100            | 0              |        |
| Hori.    | 12400.000          | PK       | 45.6              | 39.5               | 10.8         | 39.3         | 56.6               | 73.9              | 17.3           | 100            | 0              |        |
| Hori.    | 2483.500           | AV       | 34.1              | 27.5               | 14.3         | 41.4         | 34.5               | 53.9              | 19.4           | 100            | 213            |        |
| Hori.    | 4960.000           | AV       | 35.3              | 31.6               | 6.9          | 41.0         | 32.8               | 53.9              | 21.1           | 100            | 216            |        |
| Hori.    | 7440.000           | AV       | 34.9              | 36.7               | 8.5          | 41.5         | 38.6               | 53.9              | 15.3           | 100            | 0              |        |
| Hori.    | 9920.000           | AV       | 31.3              | 39.0               | 9.7          | 38.9         | 41.1               | 53.9              | 12.8           | 100            | 0              |        |
| Hori.    | 12400.000          | AV       | 32.6              | 39.5               | 10.8         | 39.3         | 43.6               | 53.9              | 10.3           | 100            | 0              |        |
| Vert.    | 99.574             | QP       | 44.1              | 10.1               | 7.3          | 32.2         | 29.3               | 43.5              | 14.2           | 100            | 121            |        |
| Vert.    | 351.006            | QP       | 38.6              | 15.1               | 8.8          | 31.9         | 30.6               | 46.0              | 15.4           | 100            | 21             |        |
| Vert.    | 2483.500           | PK       | 47.0              | 27.5               | 14.3         | 41.4         | 47.4               | 73.9              | 26.5           | 100            | 342            |        |
| Vert.    | 4960.000           | PK       | 47.5              | 31.6               | 6.9          | 41.0         | 45.0               | 73.9              | 28.9           | 100            | 345            |        |
| Vert.    | 7440.000           | PK       | 47.6              | 36.7               | 8.5          | 41.5         | 51.3               | 73.9              | 22.6           | 100            | 0              |        |
| Vert.    | 9920.000           | PK       | 43.4              | 39.0               | 9.7          | 38.9         | 53.2               | 73.9              | 20.7           | 100            | 0              |        |
| Vert.    | 12400.000          | PK       | 45.7              | 39.5               | 10.8         | 39.3         | 56.7               | 73.9              | 17.2           | 100            | 0              |        |
| Vert.    | 2483.500           | AV       | 34.1              | 27.5               | 14.3         | 41.4         | 34.5               | 53.9              | 19.4           | 100            | 342            |        |
| Vert.    | 4960.000           | AV       | 36.4              | 31.6               | 6.9          | 41.0         | 33.9               | 53.9              | 20.0           | 100            | 345            |        |
| Vert.    | 7440.000           | AV       | 34.8              | 36.7               | 8.5          | 41.5         | 38.5               | 53.9              | 15.4           | 100            | 0              |        |
| Vert.    | 9920.000           | AV       | 31.4              | 39.0               | 9.7          | 38.9         | 41.2               | 53.9              | 12.7           | 100            | 0              |        |
| Vert.    | 12400.000          | AV       | 32.7              | 39.5               | 10.8         | 39.3         | 43.7               | 53.9              | 10.2           | 100            | 0              |        |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
\*Distance factor [dB](15GHz - 40GHz)= 20 x log ( 3.0[m] / 1.0[m] ) = 9.5 [dB]

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Date January 8, 2013 January 10, 2013  
Temperature / Humidity 26deg.C / 34%RH 23deg.C / 33%RH  
Engineer Akio Hayashi Akio Hayashi  
Mode Tx, 2402 MHz  
Tx, Bluetooth, EDR, PRBS9  
(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 75.009             | QP       | 39.6              | 6.5                | 7.1          | 32.2         | 21.0               | 40.0              | 19.0           | 400            | 120            |        |
| Hori.    | 165.976            | QP       | 38.1              | 15.4               | 7.8          | 32.1         | 29.2               | 43.5              | 14.3           | 187            | 234            |        |
| Hori.    | 324.004            | QP       | 38.9              | 14.5               | 8.7          | 32.0         | 30.1               | 46.0              | 15.9           | 100            | 292            |        |
| Hori.    | 351.008            | QP       | 38.5              | 15.1               | 8.8          | 31.9         | 30.5               | 46.0              | 15.5           | 100            | 152            |        |
| Hori.    | 405.005            | QP       | 41.0              | 16.3               | 9.0          | 32.0         | 34.3               | 46.0              | 11.7           | 100            | 251            |        |
| Hori.    | 416.006            | QP       | 38.8              | 16.4               | 9.1          | 32.0         | 32.3               | 46.0              | 13.7           | 102            | 301            |        |
| Hori.    | 2390.000           | PK       | 46.6              | 27.4               | 14.2         | 41.4         | 46.8               | 73.9              | 27.1           | 100            | 198            |        |
| Hori.    | 2400.000           | PK       | 47.9              | 27.4               | 14.2         | 41.4         | 48.1               | 73.9              | 25.8           | 100            | 198            |        |
| Hori.    | 4804.000           | PK       | 48.4              | 31.1               | 6.8          | 41.2         | 45.1               | 73.9              | 28.8           | 100            | 138            |        |
| Hori.    | 7206.000           | PK       | 46.6              | 36.6               | 8.3          | 41.4         | 50.1               | 73.9              | 23.8           | 100            | 0              |        |
| Hori.    | 9608.000           | PK       | 42.8              | 38.5               | 9.5          | 38.9         | 51.9               | 73.9              | 22.0           | 100            | 0              |        |
| Hori.    | 12010.000          | PK       | 44.1              | 39.4               | 10.9         | 39.4         | 55.0               | 73.9              | 18.9           | 100            | 0              |        |
| Hori.    | 2390.000           | AV       | 34.2              | 27.4               | 14.2         | 41.4         | 34.4               | 53.9              | 19.5           | 100            | 198            |        |
| Hori.    | 2400.000           | AV       | 34.4              | 27.4               | 14.2         | 41.4         | 34.6               | 53.9              | 19.3           | 100            | 198            |        |
| Hori.    | 4804.000           | AV       | 35.2              | 31.1               | 6.8          | 41.2         | 31.9               | 53.9              | 22.0           | 100            | 138            |        |
| Hori.    | 7206.000           | AV       | 34.0              | 36.6               | 8.3          | 41.4         | 37.5               | 53.9              | 16.4           | 100            | 0              |        |
| Hori.    | 9608.000           | AV       | 30.6              | 38.5               | 9.5          | 38.9         | 39.7               | 53.9              | 14.2           | 100            | 0              |        |
| Hori.    | 12010.000          | AV       | 31.7              | 39.4               | 10.9         | 39.4         | 42.6               | 53.9              | 11.3           | 100            | 0              |        |
| Vert.    | 99.566             | QP       | 44.7              | 10.1               | 7.3          | 32.2         | 29.9               | 43.5              | 13.6           | 100            | 239            |        |
| Vert.    | 351.008            | QP       | 38.5              | 15.1               | 8.8          | 31.9         | 30.5               | 46.0              | 15.5           | 100            | 19             |        |
| Vert.    | 2390.000           | PK       | 46.1              | 27.4               | 14.2         | 41.4         | 46.3               | 73.9              | 27.6           | 100            | 340            |        |
| Vert.    | 2400.000           | PK       | 48.6              | 27.4               | 14.2         | 41.4         | 48.8               | 73.9              | 25.1           | 100            | 340            |        |
| Vert.    | 4804.000           | PK       | 48.8              | 31.1               | 6.8          | 41.2         | 45.5               | 73.9              | 28.4           | 100            | 22             |        |
| Vert.    | 7206.000           | PK       | 47.0              | 36.6               | 8.3          | 41.4         | 50.5               | 73.9              | 23.4           | 100            | 0              |        |
| Vert.    | 9608.000           | PK       | 43.3              | 38.5               | 9.5          | 38.9         | 52.4               | 73.9              | 21.5           | 100            | 0              |        |
| Vert.    | 12010.000          | PK       | 44.5              | 39.4               | 10.9         | 39.4         | 55.4               | 73.9              | 18.5           | 100            | 0              |        |
| Vert.    | 2390.000           | AV       | 34.2              | 27.4               | 14.2         | 41.4         | 34.4               | 53.9              | 19.5           | 100            | 340            |        |
| Vert.    | 2400.000           | AV       | 35.5              | 27.4               | 14.2         | 41.4         | 35.7               | 53.9              | 18.2           | 100            | 340            |        |
| Vert.    | 4804.000           | AV       | 38.0              | 31.1               | 6.8          | 41.2         | 34.7               | 53.9              | 19.2           | 100            | 22             |        |
| Vert.    | 7206.000           | AV       | 34.0              | 36.6               | 8.3          | 41.4         | 37.5               | 53.9              | 16.4           | 100            | 0              |        |
| Vert.    | 9608.000           | AV       | 30.6              | 38.5               | 9.5          | 38.9         | 39.7               | 53.9              | 14.2           | 100            | 0              |        |
| Vert.    | 12010.000          | AV       | 31.8              | 39.4               | 10.9         | 39.4         | 42.7               | 53.9              | 11.2           | 100            | 0              |        |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
\*Distance factor [dB](15GHz - 40GHz)= 20 x log ( 3.0[m] / 1.0[m] ) = 9.5 [dB]

**Radiated Emission**

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.3 Semi Anechoic Chamber  
Date                              January 8, 2013                              January 10, 2013  
Temperature / Humidity        26deg.C / 34%RH                              23deg.C / 33%RH  
Engineer                        Akio Hayashi                              Akio Hayashi  
Mode                              Tx,                              2441 MHz  
                                         Tx, Bluetooth, EDR, PRBS9  
                                         (\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 75.001             | QP       | 39.6              | 6.5                | 7.1          | 32.2         | 21.0               | 40.0              | 19.0           | 400            | 305            |        |
| Hori.    | 165.996            | QP       | 38.1              | 15.4               | 7.8          | 32.1         | 29.2               | 43.5              | 14.3           | 185            | 244            |        |
| Hori.    | 323.766            | QP       | 38.9              | 14.5               | 8.7          | 32.0         | 30.1               | 46.0              | 15.9           | 124            | 303            |        |
| Hori.    | 351.003            | QP       | 38.6              | 15.1               | 8.8          | 31.9         | 30.6               | 46.0              | 15.4           | 100            | 153            |        |
| Hori.    | 405.005            | QP       | 40.5              | 16.3               | 9.0          | 32.0         | 33.8               | 46.0              | 12.2           | 100            | 250            |        |
| Hori.    | 416.008            | QP       | 38.5              | 16.4               | 9.1          | 32.0         | 32.0               | 46.0              | 14.0           | 100            | 18             |        |
| Hori.    | 4882.000           | PK       | 47.2              | 31.3               | 6.9          | 41.1         | 44.3               | 73.9              | 29.6           | 100            | 202            |        |
| Hori.    | 7323.000           | PK       | 46.9              | 36.6               | 8.4          | 41.4         | 50.5               | 73.9              | 23.4           | 100            | 0              |        |
| Hori.    | 9764.000           | PK       | 44.1              | 38.7               | 9.5          | 38.9         | 53.4               | 73.9              | 20.5           | 100            | 0              |        |
| Hori.    | 12205.000          | PK       | 44.5              | 39.5               | 10.9         | 39.3         | 55.6               | 73.9              | 18.3           | 100            | 0              |        |
| Hori.    | 4882.000           | AV       | 35.1              | 31.3               | 6.9          | 41.1         | 32.2               | 53.9              | 21.7           | 100            | 202            |        |
| Hori.    | 7323.000           | AV       | 33.9              | 36.6               | 8.4          | 41.4         | 37.5               | 53.9              | 16.4           | 100            | 0              |        |
| Hori.    | 9764.000           | AV       | 30.7              | 38.7               | 9.5          | 38.9         | 40.0               | 53.9              | 13.9           | 100            | 0              |        |
| Hori.    | 12205.000          | AV       | 32.2              | 39.5               | 10.9         | 39.3         | 43.3               | 53.9              | 10.6           | 100            | 0              |        |
| Vert.    | 99.572             | QP       | 44.6              | 10.1               | 7.3          | 32.2         | 29.8               | 43.5              | 13.7           | 110            | 226            |        |
| Vert.    | 351.003            | QP       | 38.6              | 15.1               | 8.8          | 31.9         | 30.6               | 46.0              | 15.4           | 100            | 31             |        |
| Vert.    | 4882.000           | PK       | 47.9              | 31.3               | 6.9          | 41.1         | 45.0               | 73.9              | 28.9           | 100            | 9              |        |
| Vert.    | 7323.000           | PK       | 46.5              | 36.6               | 8.4          | 41.4         | 50.1               | 73.9              | 23.8           | 100            | 0              |        |
| Vert.    | 9764.000           | PK       | 43.0              | 38.7               | 9.5          | 38.9         | 52.3               | 73.9              | 21.6           | 100            | 0              |        |
| Vert.    | 12205.000          | PK       | 45.0              | 39.5               | 10.9         | 39.3         | 56.1               | 73.9              | 17.8           | 100            | 0              |        |
| Vert.    | 4882.000           | AV       | 37.1              | 31.3               | 6.9          | 41.1         | 34.2               | 53.9              | 19.7           | 100            | 9              |        |
| Vert.    | 7323.000           | AV       | 33.9              | 36.6               | 8.4          | 41.4         | 37.5               | 53.9              | 16.4           | 100            | 0              |        |
| Vert.    | 9764.000           | AV       | 30.7              | 38.7               | 9.5          | 38.9         | 40.0               | 53.9              | 13.9           | 100            | 0              |        |
| Vert.    | 12205.000          | AV       | 32.1              | 39.5               | 10.9         | 39.3         | 43.2               | 53.9              | 10.7           | 100            | 0              |        |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
\*Distance factor [dB](15GHz - 40GHz)= 20 x log ( 3.0[m] / 1.0[m] ) = 9.5 [dB]

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Date January 8, 2013 January 10, 2013  
Temperature / Humidity 26deg.C / 34%RH 23deg.C / 33%RH  
Engineer Akio Hayashi Akio Hayashi  
Mode Tx, 2480 MHz  
Tx, Bluetooth, EDR, PRBS9  
(\* PK: Peak, AV: Average, QP: Quasi-Peak)

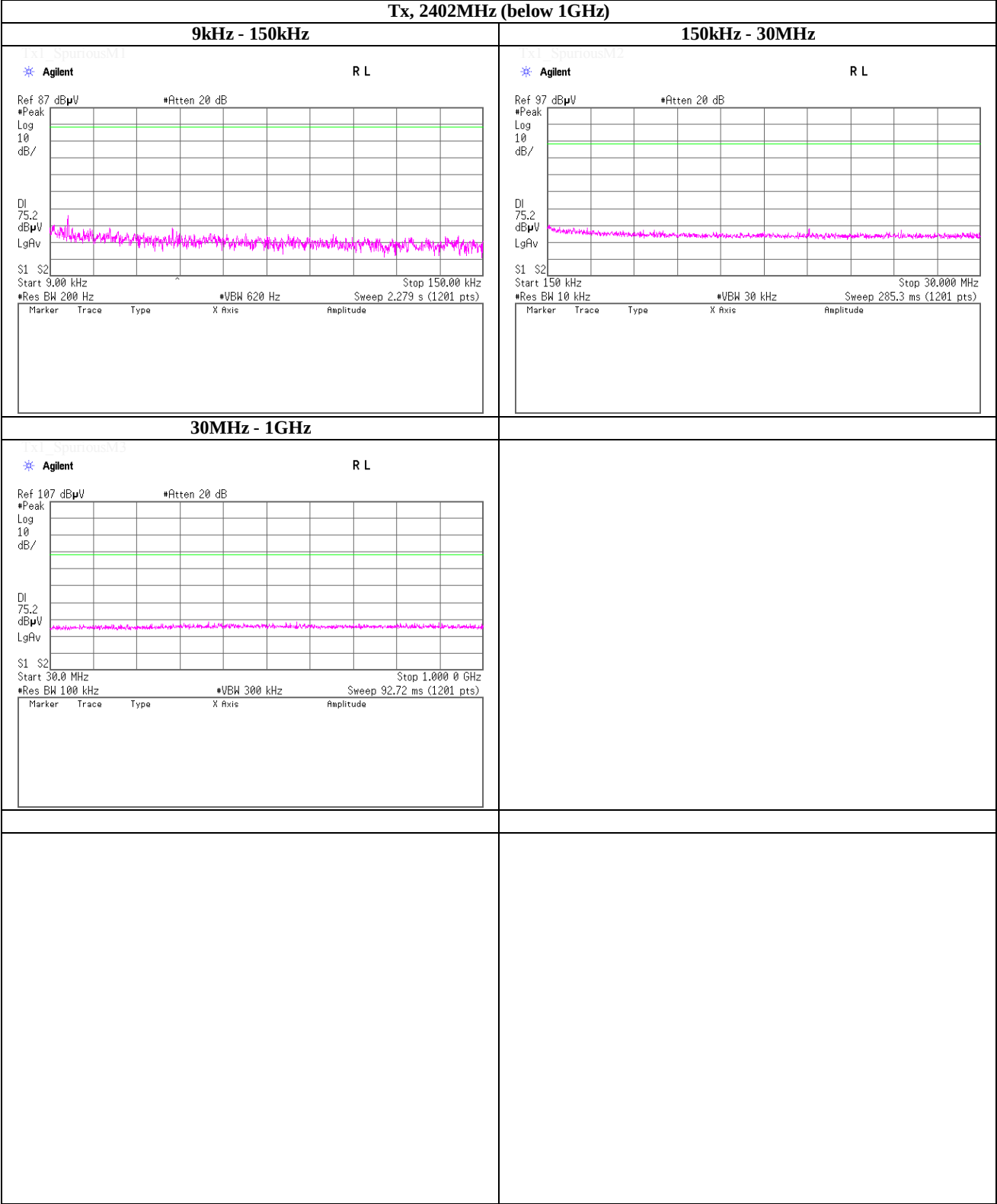
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|-------------|-------------|--------|
| Hori.    | 75.009          | QP       | 39.5           | 6.5             | 7.1       | 32.2      | 20.9            | 40.0           | 19.1        | 400         | 301         |        |
| Hori.    | 165.985         | QP       | 37.9           | 15.4            | 7.8       | 32.1      | 29.0            | 43.5           | 14.5        | 198         | 228         |        |
| Hori.    | 324.002         | QP       | 37.4           | 14.5            | 8.7       | 32.0      | 28.6            | 46.0           | 17.4        | 107         | 318         |        |
| Hori.    | 351.005         | QP       | 39.4           | 15.1            | 8.8       | 31.9      | 31.4            | 46.0           | 14.6        | 100         | 197         |        |
| Hori.    | 405.000         | QP       | 40.6           | 16.3            | 9.0       | 32.0      | 33.9            | 46.0           | 12.1        | 100         | 250         |        |
| Hori.    | 416.005         | QP       | 38.8           | 16.4            | 9.1       | 32.0      | 32.3            | 46.0           | 13.7        | 100         | 296         |        |
| Hori.    | 2483.500        | PK       | 46.7           | 27.5            | 14.3      | 41.4      | 47.1            | 73.9           | 26.8        | 100         | 215         |        |
| Hori.    | 4960.000        | PK       | 47.5           | 31.6            | 6.9       | 41.0      | 45.0            | 73.9           | 28.9        | 100         | 218         |        |
| Hori.    | 7440.000        | PK       | 48.2           | 36.7            | 8.5       | 41.5      | 51.9            | 73.9           | 22.0        | 100         | 0           |        |
| Hori.    | 9920.000        | PK       | 44.0           | 39.0            | 9.7       | 38.9      | 53.8            | 73.9           | 20.1        | 100         | 0           |        |
| Hori.    | 12400.000       | PK       | 46.2           | 39.5            | 10.8      | 39.3      | 57.2            | 73.9           | 16.7        | 100         | 0           |        |
| Hori.    | 2483.500        | AV       | 34.6           | 27.5            | 14.3      | 41.4      | 35.0            | 53.9           | 18.9        | 100         | 215         |        |
| Hori.    | 4960.000        | AV       | 35.3           | 31.6            | 6.9       | 41.0      | 32.8            | 53.9           | 21.1        | 100         | 218         |        |
| Hori.    | 7440.000        | AV       | 35.0           | 36.7            | 8.5       | 41.5      | 38.7            | 53.9           | 15.2        | 100         | 0           |        |
| Hori.    | 9920.000        | AV       | 31.3           | 39.0            | 9.7       | 38.9      | 41.1            | 53.9           | 12.8        | 100         | 0           |        |
| Hori.    | 12400.000       | AV       | 32.6           | 39.5            | 10.8      | 39.3      | 43.6            | 53.9           | 10.3        | 100         | 0           |        |
| Vert.    | 99.574          | QP       | 44.2           | 10.1            | 7.3       | 32.2      | 29.4            | 43.5           | 14.1        | 100         | 243         |        |
| Vert.    | 351.005         | QP       | 38.8           | 15.1            | 8.8       | 31.9      | 30.8            | 46.0           | 15.2        | 100         | 23          |        |
| Vert.    | 2483.500        | PK       | 46.8           | 27.5            | 14.3      | 41.4      | 47.2            | 73.9           | 26.7        | 100         | 337         |        |
| Vert.    | 4960.000        | PK       | 48.3           | 31.6            | 6.9       | 41.0      | 45.8            | 73.9           | 28.1        | 100         | 346         |        |
| Vert.    | 7440.000        | PK       | 48.3           | 36.7            | 8.5       | 41.5      | 52.0            | 73.9           | 21.9        | 100         | 0           |        |
| Vert.    | 9920.000        | PK       | 43.5           | 39.0            | 9.7       | 38.9      | 53.3            | 73.9           | 20.6        | 100         | 0           |        |
| Vert.    | 12400.000       | PK       | 45.1           | 39.5            | 10.8      | 39.3      | 56.1            | 73.9           | 17.8        | 100         | 0           |        |
| Vert.    | 2483.500        | AV       | 34.1           | 27.5            | 14.3      | 41.4      | 34.5            | 53.9           | 19.4        | 100         | 337         |        |
| Vert.    | 4960.000        | AV       | 36.4           | 31.6            | 6.9       | 41.0      | 33.9            | 53.9           | 20.0        | 100         | 346         |        |
| Vert.    | 7440.000        | AV       | 35.0           | 36.7            | 8.5       | 41.5      | 38.7            | 53.9           | 15.2        | 100         | 0           |        |
| Vert.    | 9920.000        | AV       | 31.3           | 39.0            | 9.7       | 38.9      | 41.1            | 53.9           | 12.8        | 100         | 0           |        |
| Vert.    | 12400.000       | AV       | 32.7           | 39.5            | 10.8      | 39.3      | 43.7            | 53.9           | 10.2        | 100         | 0           |        |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
\*Distance factor [dB](15GHz - 40GHz)= 20 x log ( 3.0[m] / 1.0[m] ) = 9.5 [dB]

**Spurious emission (Conducted)**

**Tx, Bluetooth, BDR, PRBS9**

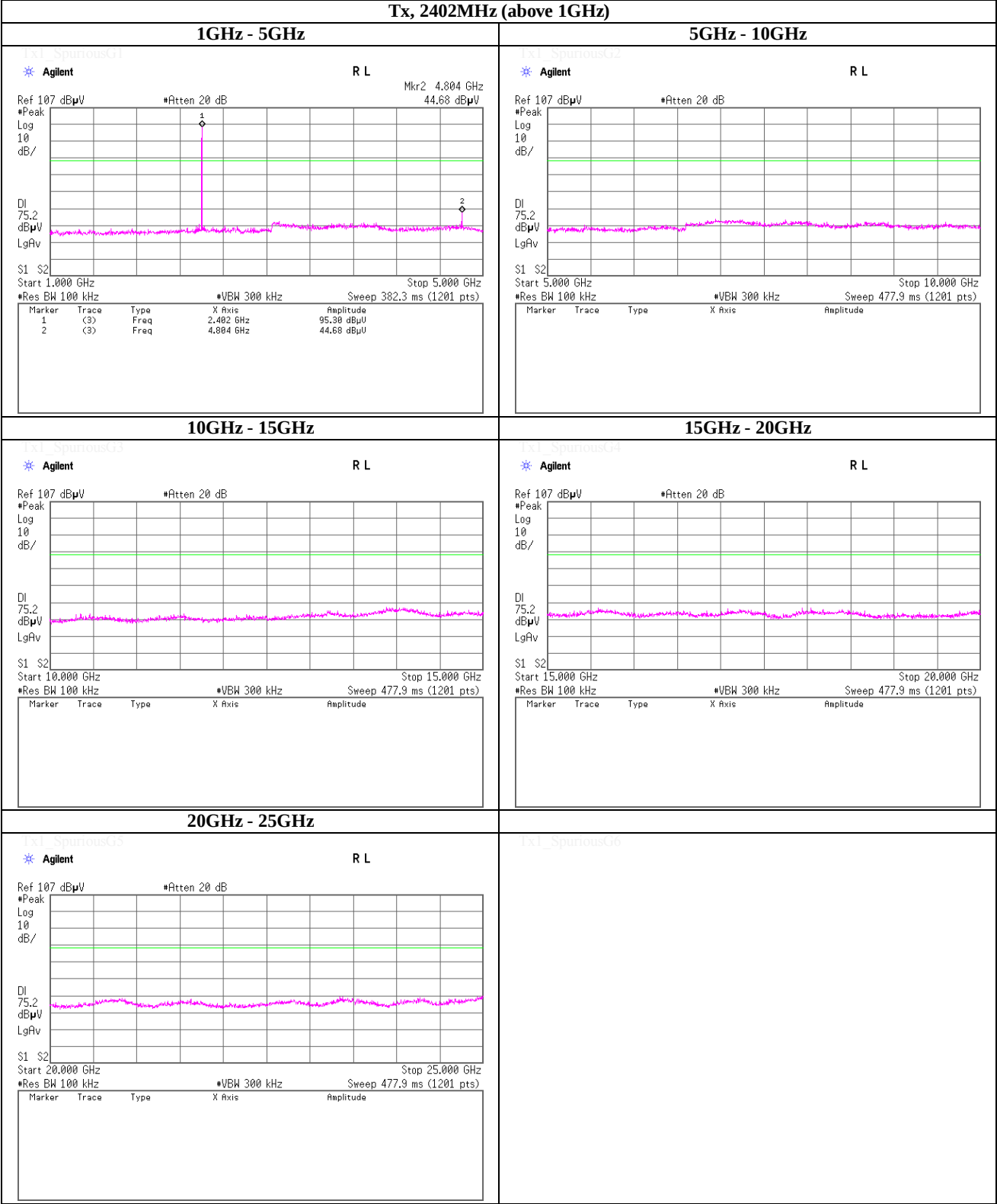
**Tx, 2402MHz (below 1GHz)**



**Spurious emission (Conducted)**

**Tx, Bluetooth, BDR, PRBS9**

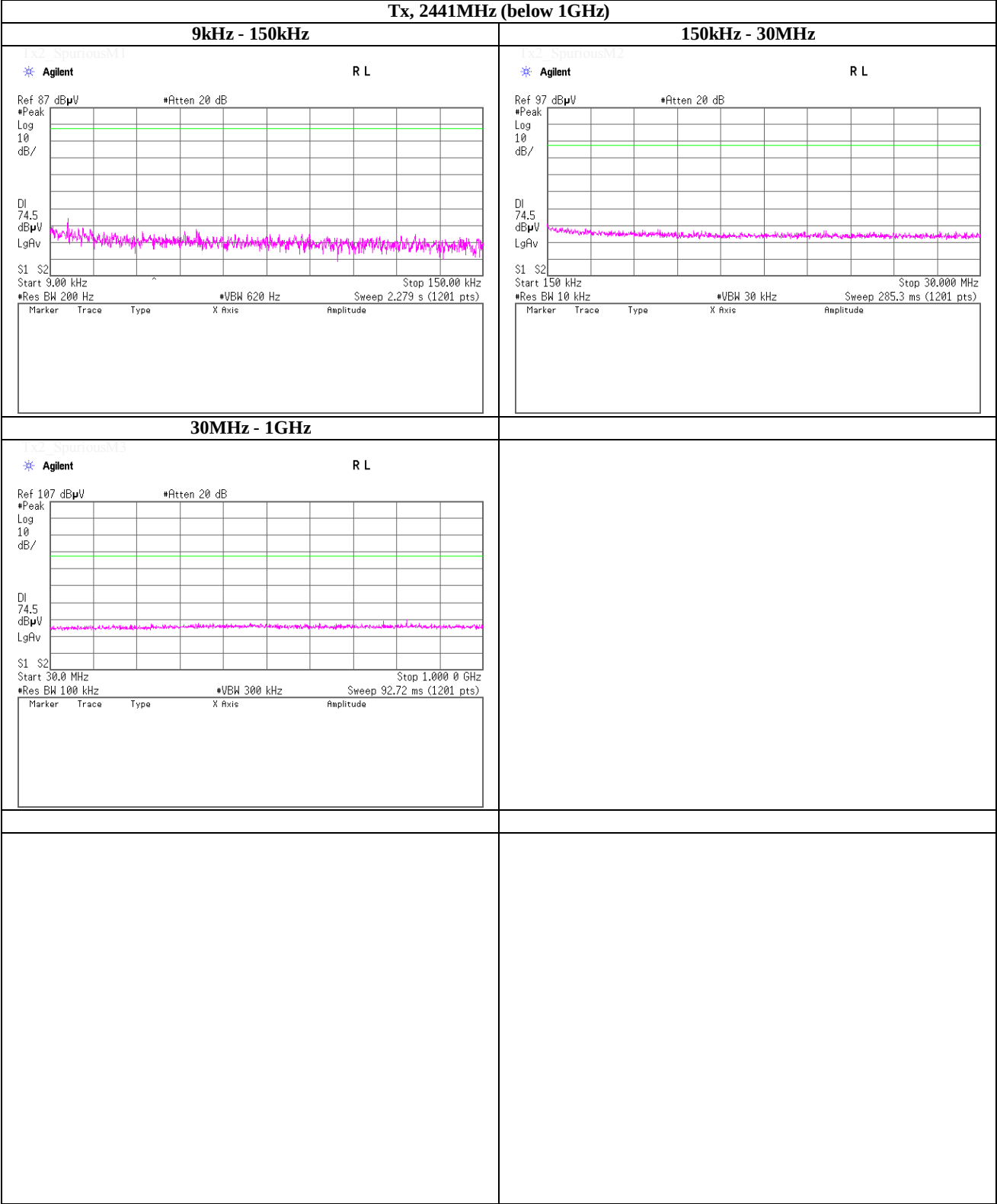
**Tx, 2402MHz (above 1GHz)**



**Spurious emission (Conducted)**

**Tx, Bluetooth, BDR, PRBS9**

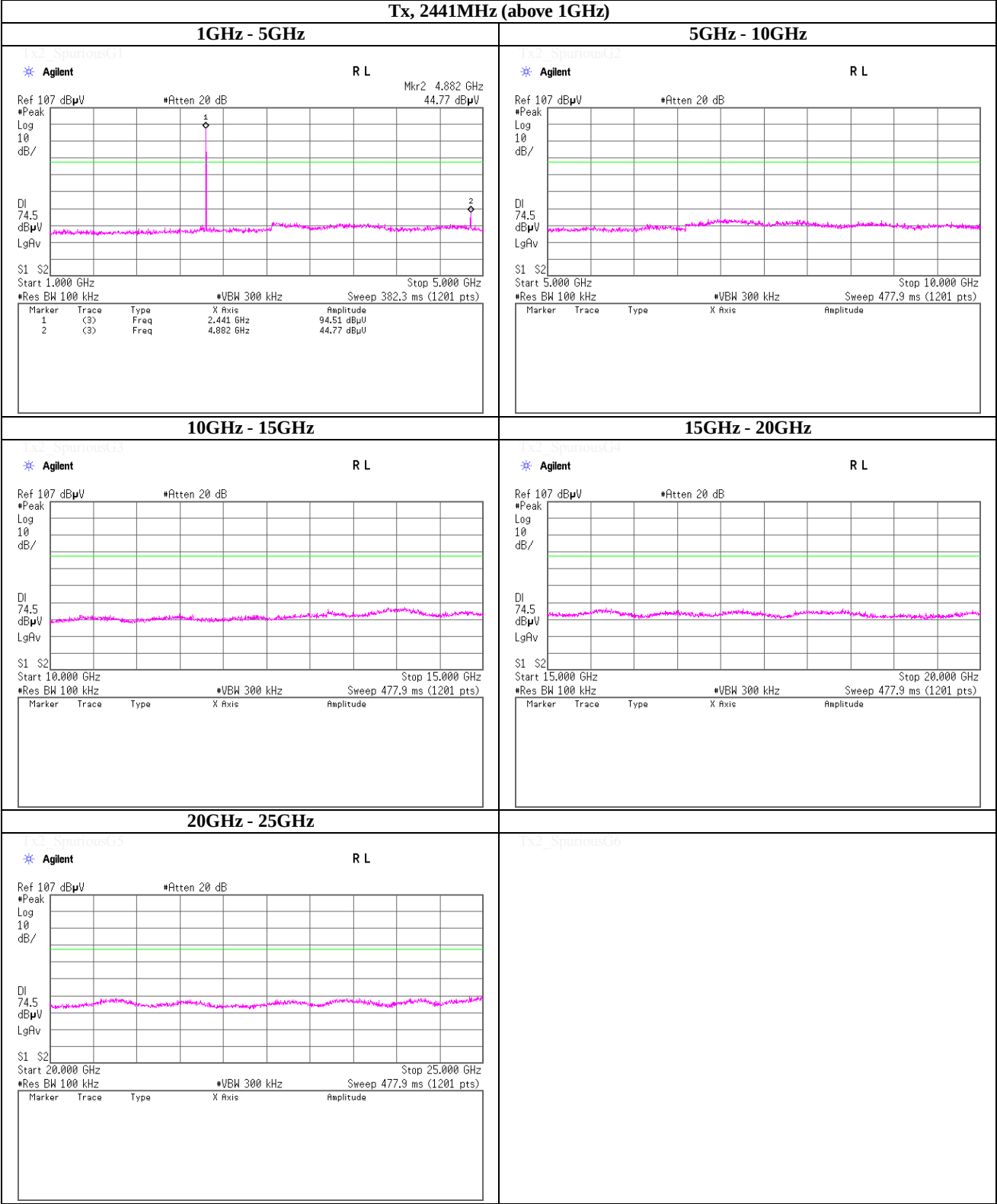
**Tx, 2441MHz (below 1GHz)**



**Spurious emission (Conducted)**

**Tx, Bluetooth, BDR, PRBS9**

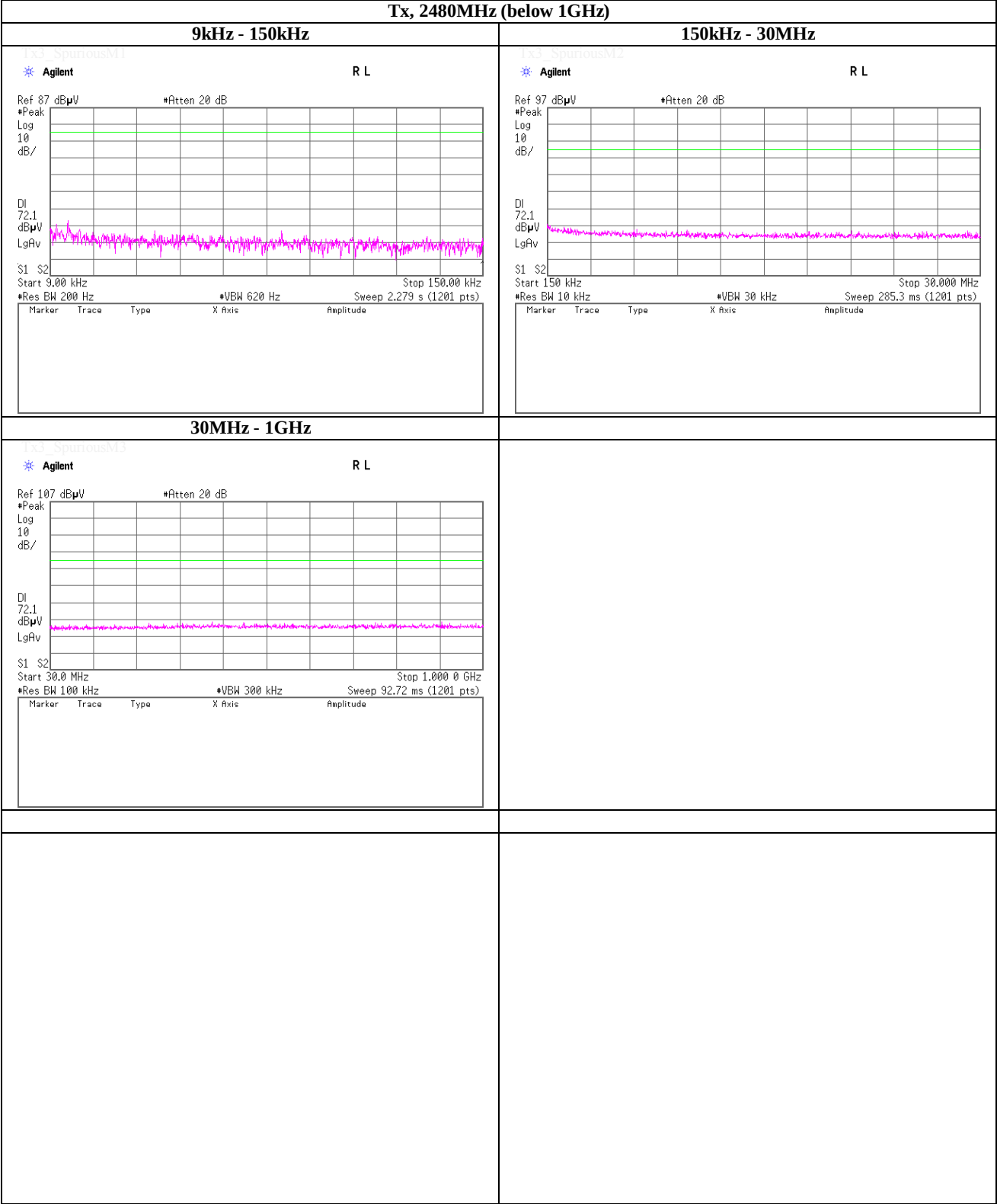
**Tx, 2441MHz (above 1GHz)**



**Spurious emission (Conducted)**

**Tx, Bluetooth, BDR, PRBS9**

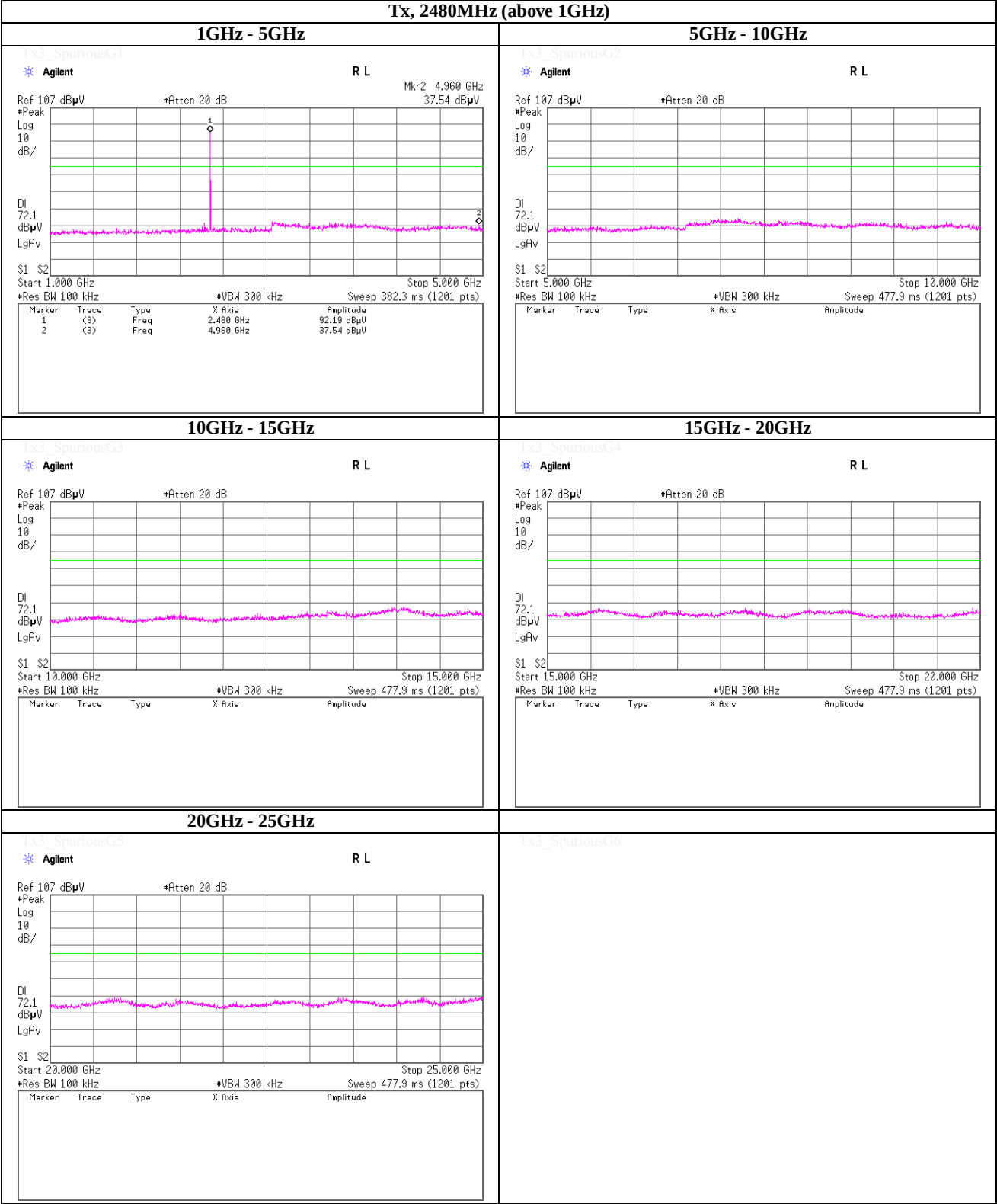
**Tx, 2480MHz (below 1GHz)**



**Spurious emission (Conducted)**

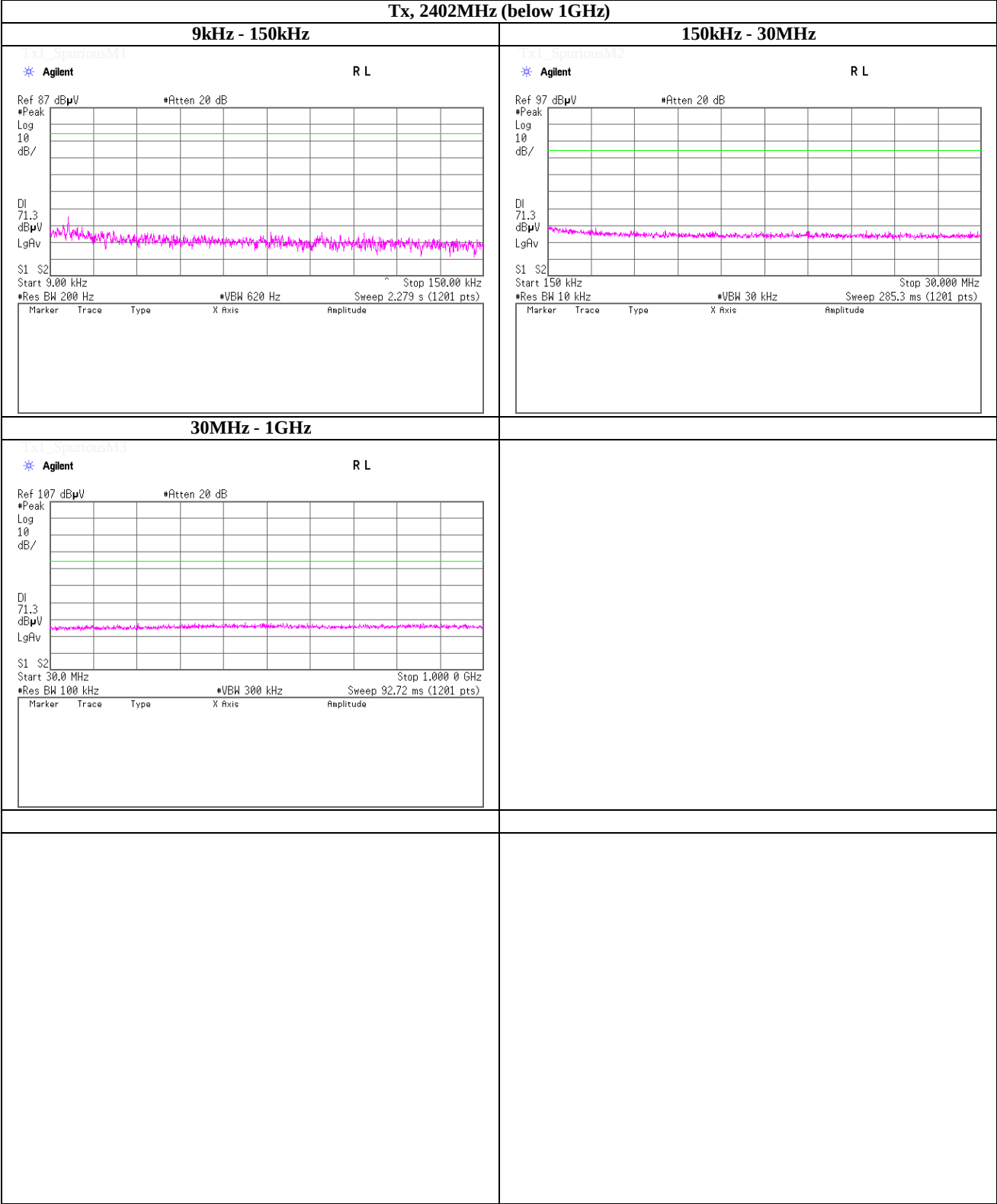
**Tx, Bluetooth, BDR, PRBS9**

**Tx, 2480MHz (above 1GHz)**



**Spurious emission (Conducted)**

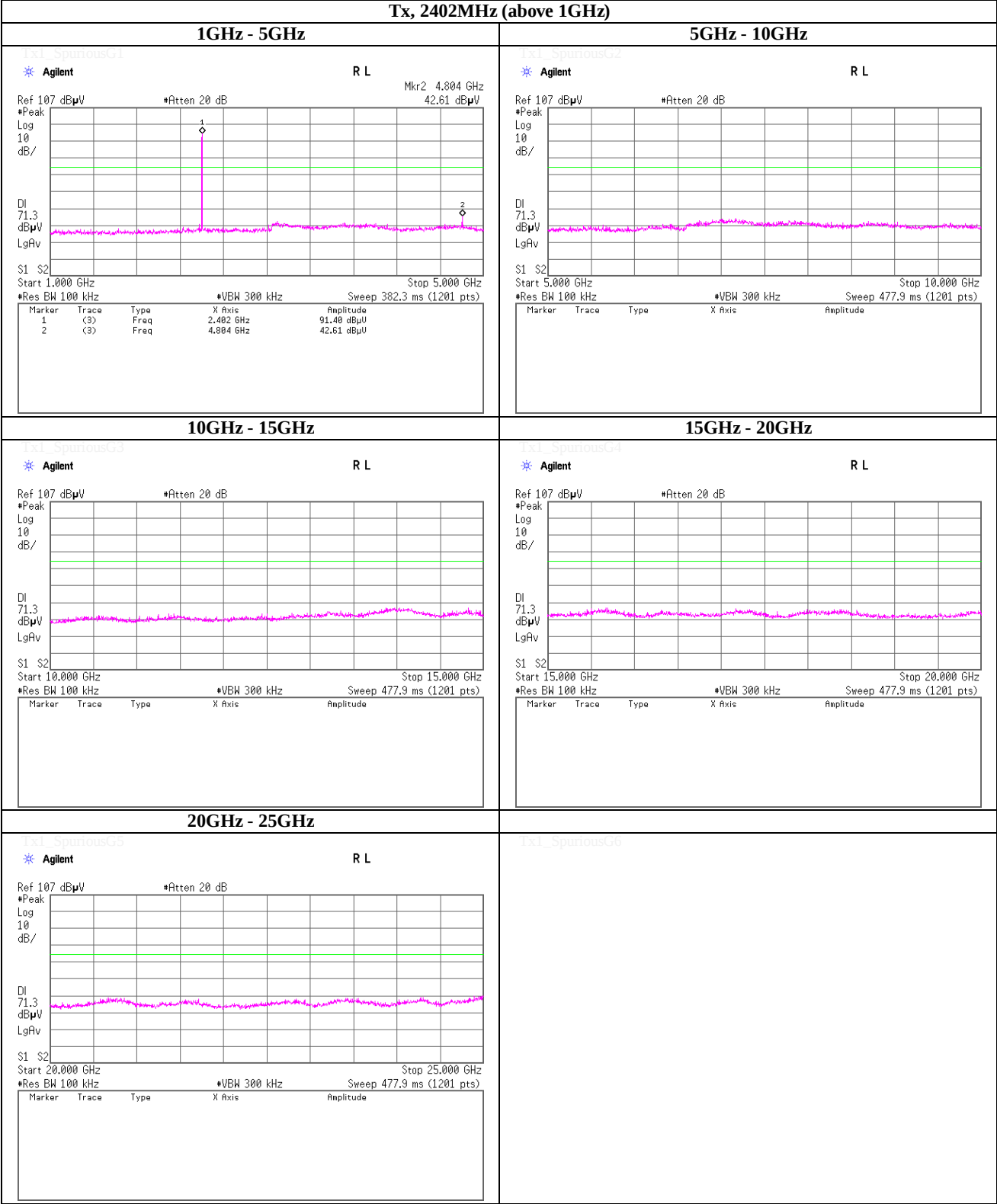
**Tx, Bluetooth, EDR, PRBS9**  
**Tx, 2402MHz (below 1GHz)**



**Spurious emission (Conducted)**

**Tx, Bluetooth, EDR, PRBS9**

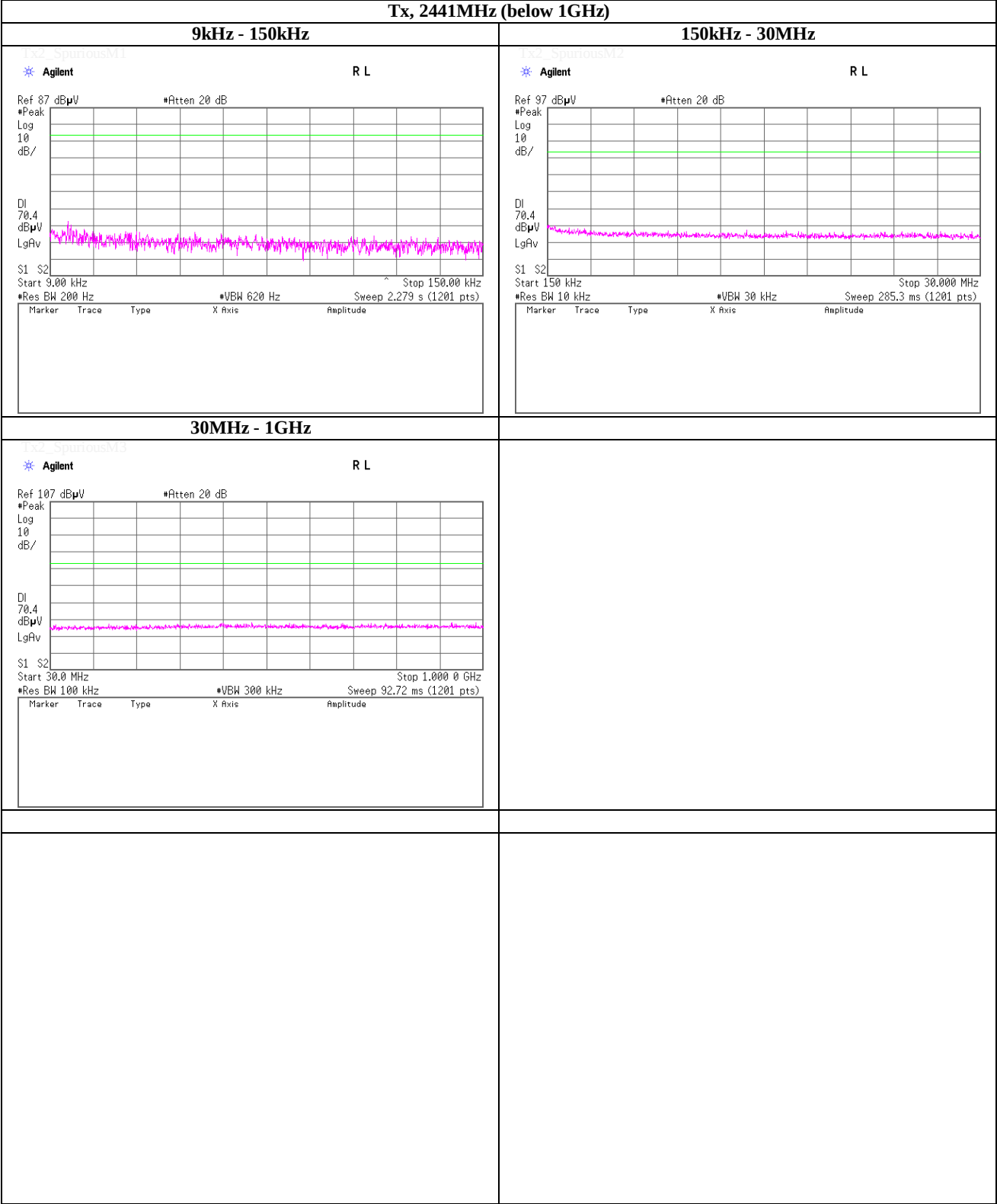
**Tx, 2402MHz (above 1GHz)**



**Spurious emission (Conducted)**

**Tx, Bluetooth, EDR, PRBS9**

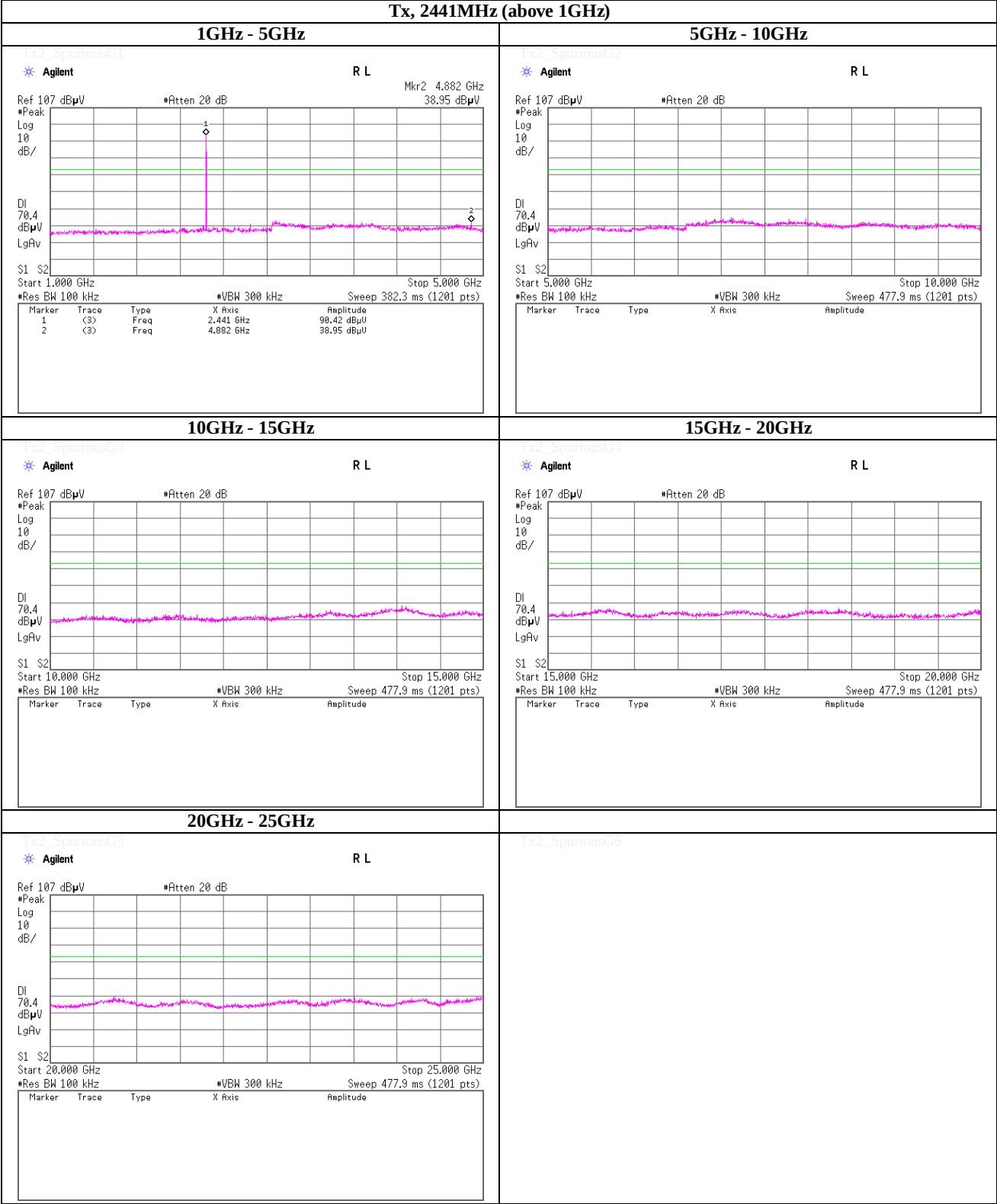
**Tx, 2441MHz (below 1GHz)**



**Spurious emission (Conducted)**

**Tx, Bluetooth, EDR, PRBS9**

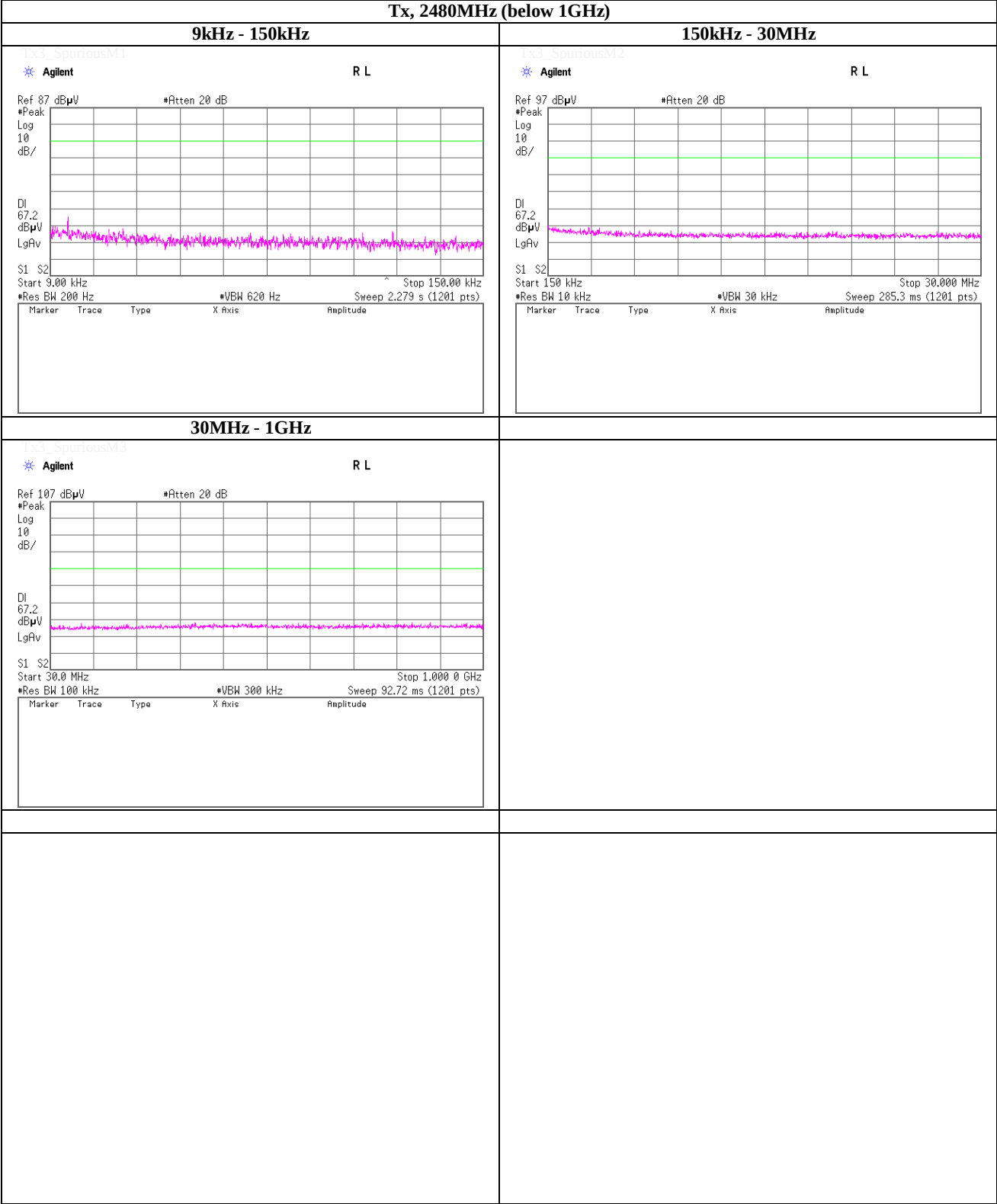
**Tx, 2441MHz (above 1GHz)**



**Spurious emission (Conducted)**

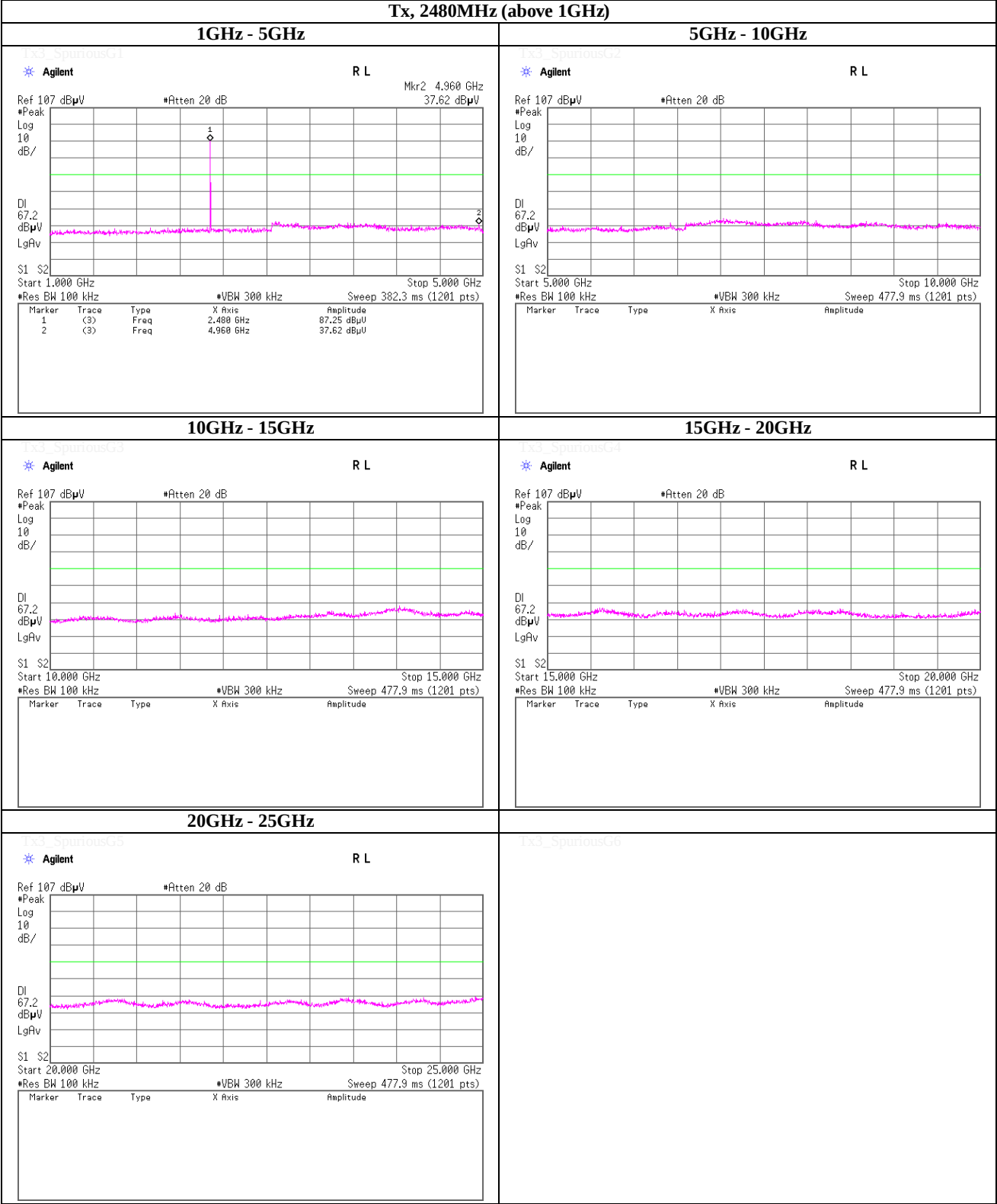
**Tx, Bluetooth, EDR, PRBS9**

**Tx, 2480MHz (below 1GHz)**



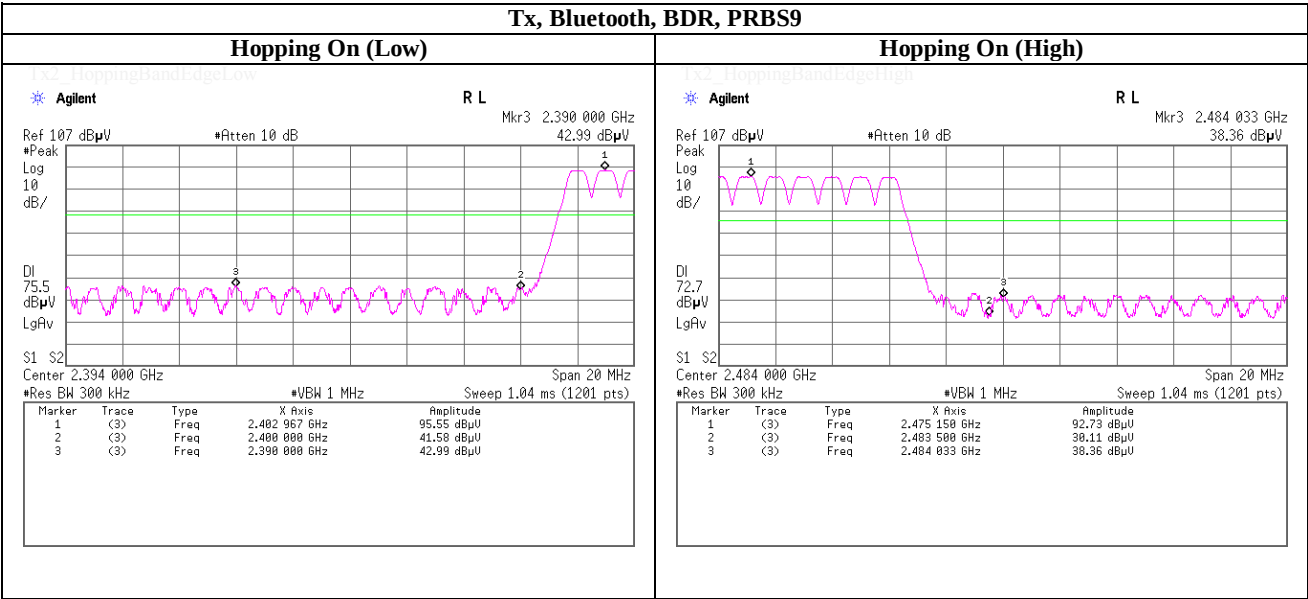
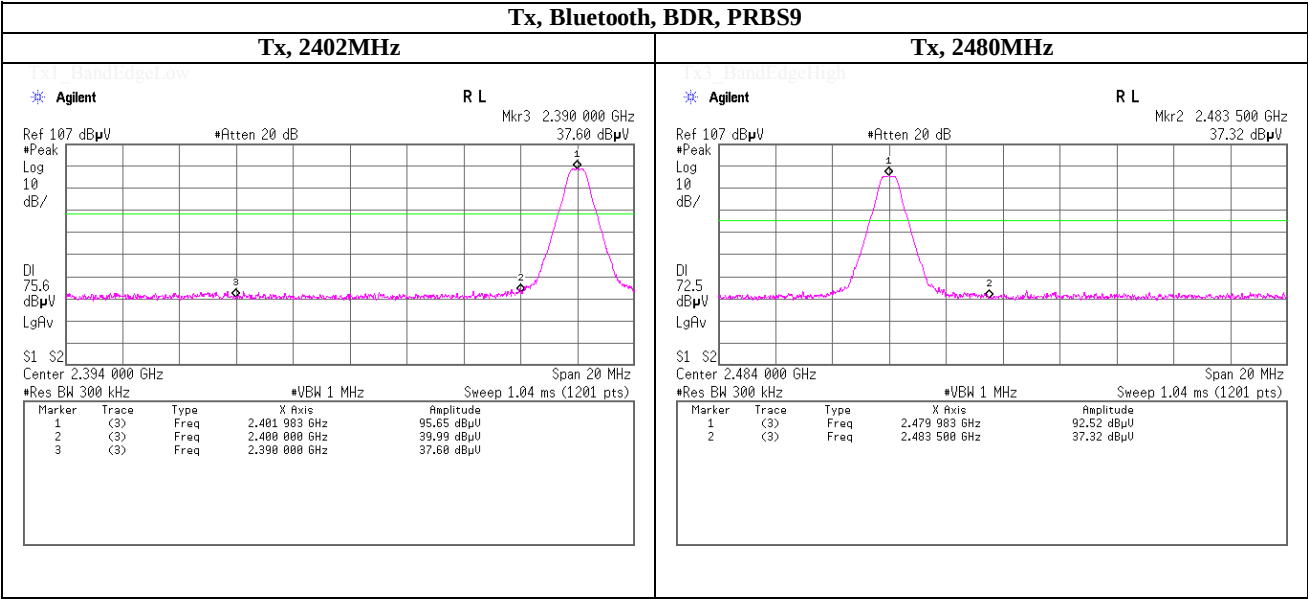
**Spurious emission (Conducted)**

**Tx, Bluetooth, EDR, PRBS9**  
**Tx, 2480MHz (above 1GHz)**



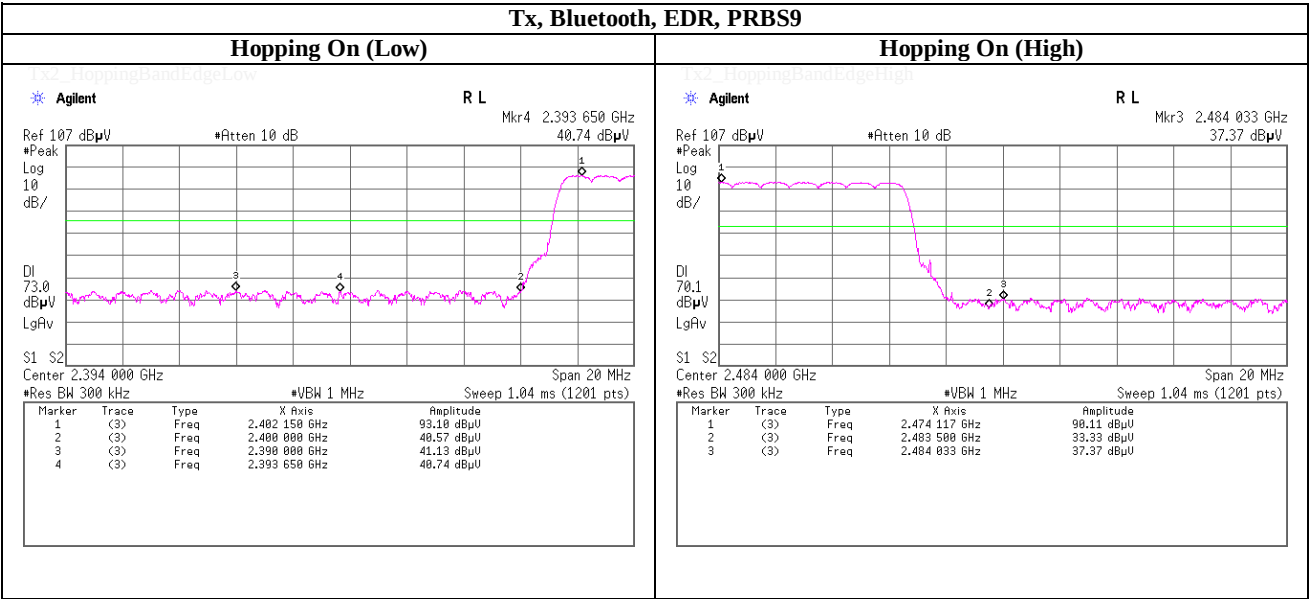
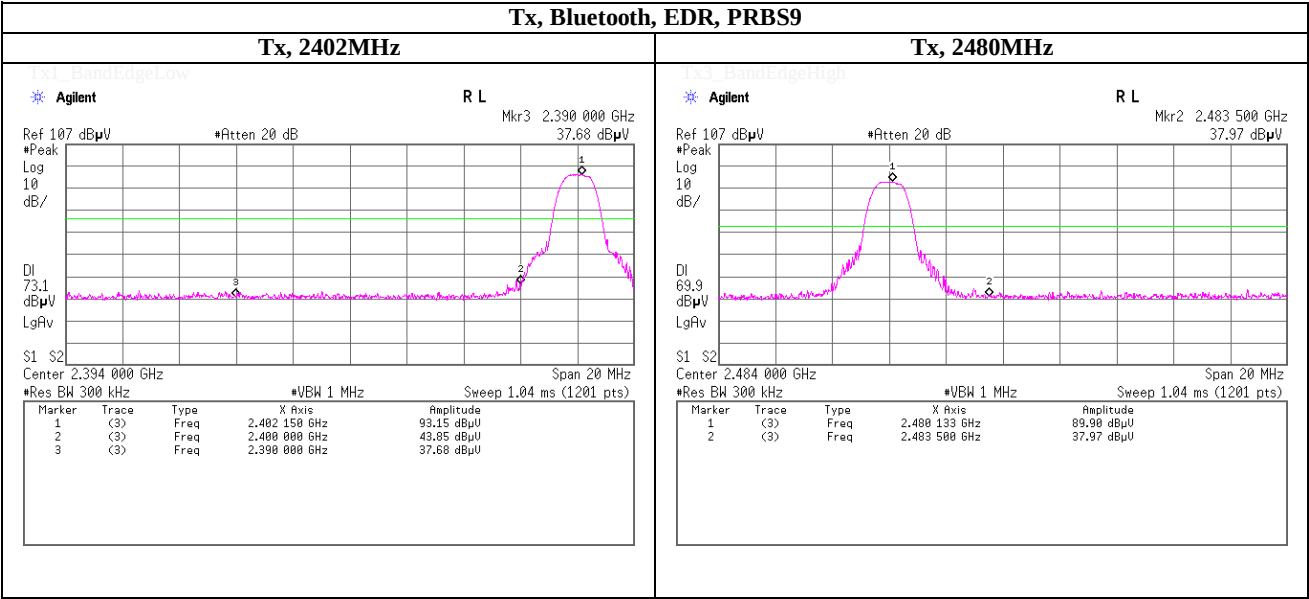
**Spurious emission (Conducted)**

**Band Edge compliance**

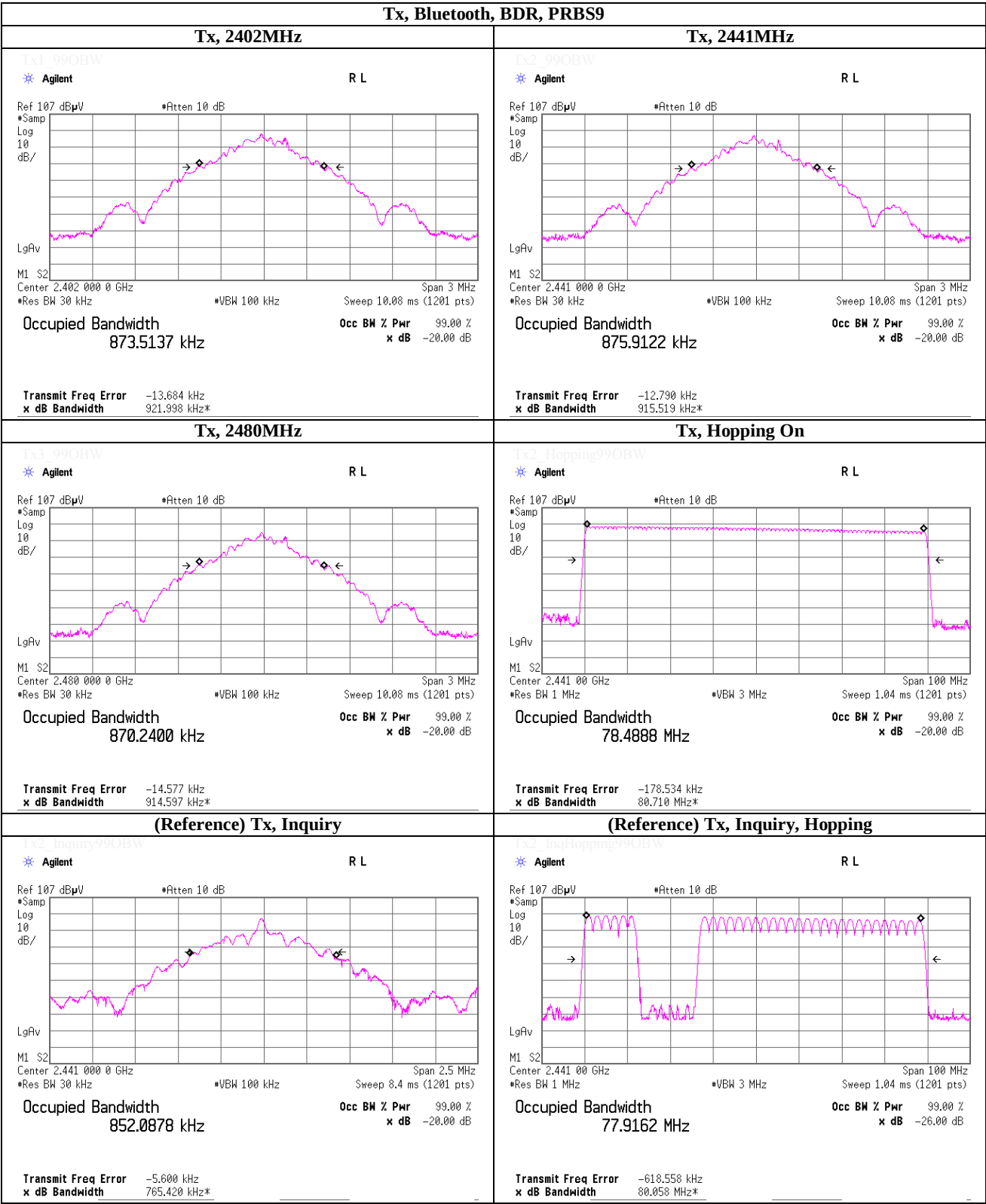


**Spurious emission (Conducted)**

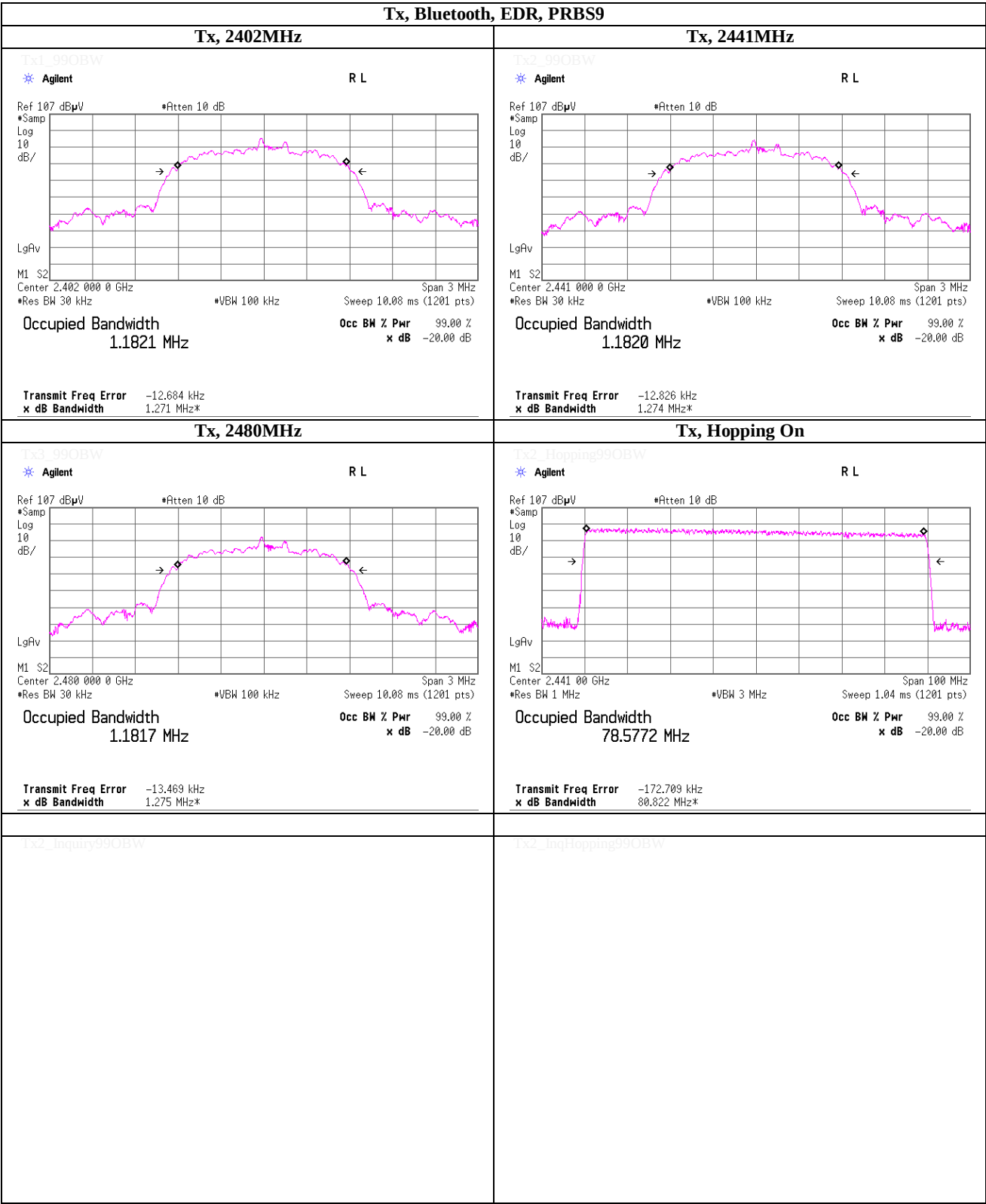
**Band Edge compliance**



**99% Occupied Bandwidth**



99% Occupied Bandwidth



## APPENDIX 2

### Test Instruments

#### EMI test equipment

| Control No.                    | Instrument                | Manufacturer                                | Model No                                   | Serial No               | Test Item | Calibration Date<br>* Interval(month) |
|--------------------------------|---------------------------|---------------------------------------------|--------------------------------------------|-------------------------|-----------|---------------------------------------|
| SPM-06                         | Power Meter               | Anritsu                                     | ML2495A                                    | 0850009                 | AT        | 04/19/2012 * 12                       |
| SPSS-03                        | Power sensor              | Anritsu                                     | MA2411B                                    | 0917063                 | AT        | 04/19/2012 * 12                       |
| SSA-03                         | Spectrum Analyzer         | Agilent                                     | E4448A                                     | MY48250152              | AT        | 01/08/2013 * 12                       |
| SAT10-10                       | Attenuator                | Weinschel Corp.                             | 54A-10                                     | 37584                   | AT        | 04/06/2012 * 12                       |
| SCC-G14                        | Coaxial Cable             | Suhner                                      | SUCOFLEX 102                               | 31600/2                 | AT        | 03/12/2012 * 12                       |
| SOS-09                         | Humidity Indicator        | A&D                                         | AD-5681                                    | 4061484                 | AT        | 03/26/2012 * 12                       |
| SAEC-03(NSA)                   | Semi-Anechoic Chamber     | TDK                                         | SAEC-03(NSA)                               | 3                       | RE        | 09/21/2012 * 12                       |
| SAF-06                         | Pre Amplifier             | TOYO Corporation                            | TPA0118-36                                 | 1440491                 | RE        | 07/18/2012 * 12                       |
| SCC-G03                        | Coaxial Cable             | Suhner                                      | SUCOFLEX 104A                              | 46499/4A                | RE        | 04/10/2012 * 12                       |
| SCC-G23                        | Coaxial Cable             | Suhner                                      | SUCOFLEX 104                               | 297342/4                | RE        | 05/22/2012 * 12                       |
| SHA-03                         | Horn Antenna              | Schwarzbeck                                 | BBHA9120D                                  | 9120D-739               | RE        | 08/17/2012 * 12                       |
| SOS-05                         | Humidity Indicator        | A&D                                         | AD-5681                                    | 4062518                 | RE        | 02/06/2012 * 12                       |
| KSA-08                         | Spectrum Analyzer         | Agilent                                     | E4446A                                     | MY46180525              | RE        | 02/16/2012 * 12                       |
| SJM-11                         | Measure                   | PROMART                                     | SEN1935                                    | -                       | RE        | -                                     |
| COTS-SEMI-1                    | EMI Software              | TSJ                                         | TEPTO-DV(RE,CE,RFI,MF)                     | -                       | RE        | -                                     |
| SAT10-06                       | Attenuator                | Agilent                                     | 8493C-010                                  | 74865                   | RE        | 12/18/2012 * 12                       |
| SFL-02                         | Highpass Filter           | MICRO-TRONICS                               | HPM50111                                   | 051                     | RE        | 12/18/2012 * 12                       |
| SHA-04                         | Horn Antenna              | ETS LINDGREN                                | 3160-09                                    | LM3640                  | RE        | 03/30/2012 * 12                       |
| SAF-08                         | Pre Amplifier             | TOYO Corporation                            | HAP18-26W                                  | 00000019                | RE        | 03/12/2012 * 12                       |
| SCC-G17                        | Coaxial Cable             | Suhner                                      | SUCOFLEX 104A                              | 46291/4A                | RE        | 03/12/2012 * 12                       |
| SAF-03                         | Pre Amplifier             | SONOMA                                      | 310N                                       | 290213                  | RE        | 02/10/2012 * 12                       |
| SAT6-03                        | Attenuator                | JFW                                         | 50HF-006N                                  | -                       | RE        | 02/10/2012 * 12                       |
| SBA-03                         | Biconical Antenna         | Schwarzbeck                                 | BBA9106                                    | 91032666                | RE        | 10/08/2012 * 12                       |
| SCC-C1/C2/C3/C4/C5/C10/SRSE-03 | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO | 8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906 | -/0901-271(RF Selector) | RE        | 04/10/2012 * 12                       |
| SLA-03                         | Logperiodic Antenna       | Schwarzbeck                                 | UHALP9108A                                 | UHALP 9108-A 0901       | RE        | 10/08/2012 * 12                       |
| STR-03                         | Test Receiver             | Rohde & Schwarz                             | ESI40                                      | 100054/040              | RE        | 06/14/2012 * 12                       |
|                                |                           |                                             |                                            |                         |           |                                       |
|                                |                           |                                             |                                            |                         |           |                                       |

The expiration date of the calibration is the end of the expired month .

As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .

Test Item :

RE: Radiated emission ,

AT: Antenna terminal conducted tests ,