



Test report No. : 10373518S-A
Page : 1 of 43
Issued date : July 3, 2014
Revised date : July 9, 2014
FCC ID : AK8NWZA10

RADIO TEST REPORT

Test Report No.: 10373518S-A

Applicant : **Sony Corporation**
Type of Equipment : **Digital Media Player**
Model No. : **NWZ-A17**
FCC ID : **AK8NWZA10**
Test regulation : **FCC Part15 Subpart C: 2014**
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.
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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: June 18 to 20, 2014

Tested by: *M. Hosaka*
Makoto Hosaka
Engineer
Consumer Technology Division

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Toyokazu Imamura
Leader
Consumer Technology Division



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13-EM-F0429

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SECTION 1: Customer information

Company Name : Sony Corporation
Brand Name : SONY
Address : 2-10-1 Osaki, Shinagawa-ku, Tokyo, 141-8610, Japan
Telephone Number : +81 50 3750 7634
Contact Person : Shinichi Maru

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

2.1 Identification of E.U.T.

Type of Equipment : Digital Media Player
Model Number : NWZ-A17
Serial Number : Refer to Clause 4.2
Rating : DC3.7V
Country of Mass-production : Malaysia
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : May 28, 2014
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: NWZ-A17 (referred to as the EUT in this report) is a Digital Media Player.

Variant model: NWZ-A15

Difference is the memory capacity: NWZ-A15 (16GB), NWZ-A17 (64GB)

Clock frequency(ies) in the system : 533MHz (CPU), 49.152MHz (Audio CODEC), 27.12MHz (NFC),
24MHz (USB), 24.576MHz (Audio), 22.5792MHz (Audio),
32.768kHz (PMIC), 26MHz (BT)

Bluetooth specification:

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth / Channel spacing : 1MHz / 1MHz
Type of modulation : FHSS (GFSK, $\pi/4$ -DQPSK, 8DPSK)
Antenna type : Chip
Antenna connector type : None
Antenna gain : 1.6dBi
ITU code : F1D, G1D
Operation temperature range : +5 to +35 deg.C

NFC specification:

Equipment type : Transceiver
Frequency of operation : 13.56MHz
Type of modulation : ASK
Antenna type : Pattern
Antenna connector type : None
ITU code : A1D
Operation temperature range : +5 to +35 deg.C.

* For NFC part, refer to the test report: 10373518S-C.

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FCC 15.31 (e)

The EUT is a battery-operated device and test was performed with the full-charged battery. Therefore, the EUT complies with the requirement.

FCC 15.203

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore the EUT complies with the requirement.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2014, final revised on May 1, 2014 and effective June 2, 2014
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.

3.2 Procedures & Results

| Item | Test Procedure | Specification | Remarks | Deviation | Worst Margin | Results |
|--|--|---------------------------|------------------------|------------|--------------|---|
| Conducted emission | ANSI C63.4:2009 7. AC powerline conducted emission measurements | FCC 15.207 | - | N/A *1) | - | - |
| Carrier frequency separation | FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators | FCC 15.247 (a)(1) | Conducted | N/A | *See data. | Complied |
| 20dB bandwidth | FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators | FCC 15.247 (a)(1) | Conducted | N/A | | - |
| Number of hopping frequency | FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators | FCC 15.247 (a)(1)(iii) | Conducted | N/A | | Complied |
| Dwell time | FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators | FCC 15.247 (a)(1)(iii) | Conducted | N/A | | Complied |
| Maximum peak output power | FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators | FCC 15.247 (b)(1) | Conducted | N/A | | Complied |
| Band edge compliance & Spurious emission | FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators | FCC 15.247 (d) 15.209 | Conducted/ Radiated | N/A | | 7.0 dB Freq.: 12010.000MHz Detection: AV Polarization: Horizontal Mode: Tx 2402MHz, DH5 Polarization: Horizontal Mode: Tx 2402MHz, 3-DH5 Polarization: Vertical Mode: Tx 2402MHz, 3-DH5 |

Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422

*1) The test is not applicable since the EUT has no AC mains. Bluetooth does not operate during charging.

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3.3 Addition to standard

| Item | Test Procedure | Specification | Remarks | Worst Margin | Results |
|--------------------------|--|---------------|-----------|--------------|---------|
| Occupied Bandwidth (99%) | ANSI C63.4:2009 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 ^{*1} /SR ^{*2} (±) | No.2 SAC/SR (±) | No.3 SAC/SR (±) |
|--|-----------------|---|--------------------|--------------------|
| Radiated emission (Measurement distance: 3m) | 9kHz-30MHz | 3.7 dB | 3.7 dB | 3.6 dB |
| | 30MHz-300MHz | 4.8 dB | 5.0 dB | 4.8 dB |
| | 300MHz-1GHz | 5.0 dB | 5.0 dB | 4.8 dB |
| | 1GHz-15GHz | 4.9 dB | 4.9 dB | 4.9 dB |
| Radiated emission (Measurement distance: 1m) | 15GHz-18GHz | 5.7 dB | 5.6 dB | 5.6 dB |
| | 18GHz-40GHz | 5.2 dB | 4.3 dB | 4.3 dB |

*1: SAC=Semi-Anechoic Chamber

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

The data listed in this test report has enough margin, more than the 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: (±) 1.6dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 1.4dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 2.8dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.5dB

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

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3.5 Test location

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Telephone number : +81 463 50 6400

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JAB Accreditation No. : RTL02610

| | IC Registration No. | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Maximum measurement distance |
|--|---------------------|----------------------------|--|------------------------------|
| <input type="checkbox"/> No.1 semi-anechoic chamber | 2973D-1 | 20.6 x 11.3 x 7.65 | 20.6 x 11.3 | 10m |
| <input type="checkbox"/> No.2 semi-anechoic chamber | 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 | 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 | - |
| <input type="checkbox"/> No.1 Measurement room | - | 2.55 x 4.1 x 2.5 | - | - |

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 - DH1, - DH3, - DH5 - 3-DH1, - 3-DH3, - 3-DH5 | - |
| | -Inquiry | |
| Maximum peak output power | Transmitting Hopping OFF, Payload: PRBS9 - DH5, - 2-DH5, - 3-DH5 | 2402MHz, 2441MHz, 2480MHz |
| Spurious emission (Conducted) | Transmitting (DH5 / 3-DH5), Payload: PRBS9 -Hopping OFF | Band edge compliance: 2402MHz, 2480MHz |
| Band edge compliance & Spurious emission (Radiated) | Transmitting (DH5 / 3-DH5), Payload: PRBS9 -Hopping OFF | Spurious emission: 2402MHz, 2441MHz, 2480MHz |
| 99% occupied bandwidth | Transmitting (DH5 / 3-DH5), Payload: PRBS9 / Inquiry -Hopping ON -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.

Power settings: Fixed

Test software: BT RADIO TEST ver. 1.10

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

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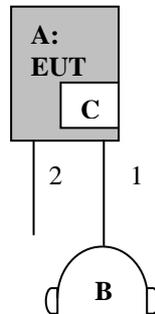
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4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and Auxiliary equipment

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|----------------------|--------------|---------------|--------------|---------|
| A | Digital Media Player | NWZ-A17 | *1) | Sony | EUT |
| B | Headphones | MDR-1RMK2 | - | Sony | - |
| C | Micro SD Memory | SR-16A4 | TPSN002554976 | Sony | - |

*1) Antenna port conducted tests: 2000232(except Inquiry mode) / 2000234(Inquiry mode) , Radiated emission tests: 2000231

List of cables used

| No. | Item | Length(m) | Shield (Cable) | Shield (Connector) | Remarks |
|-----|------------|-----------|----------------|--------------------|---------|
| 1 | Headphones | 3.0 | Unshielded | Unshielded | - |
| 2 | USB | 1.0 | Shielded | Shielded | - |

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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 1.

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 1.

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 1.

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 1.

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 1.

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 1.

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SECTION 11: Radiated emission

11.1 Operating environment

Test room : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

11.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 0.5m, 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 3.

11.3 Test conditions

Frequency range : 30MHz - 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.

| Frequency | 30 - 1000MHz | 1 - 25GHz | |
|----------------|--------------|----------------------|----------------------|
| Detection Type | Quasi-Peak | Peak | * Average |
| IF Bandwidth | 120kHz | RBW:1MHz VBW:3MHz | RBW:1MHz VBW:10Hz |

* 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 each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Combinations of the worst case

| | Frequency Antenna polarization | Carrier *2) | Spurious | | | |
|-----|--------------------------------------|----------------|------------|---------|----------|----------|
| | | | Below 1GHz | 1-15GHz | 15-18GHz | 15-25GHz |
| EUT | Horizontal | Z | X | X | X | X |
| | Vertical | Y | X | Y | X | X |

*2) with spurious emissions near carrier frequency.

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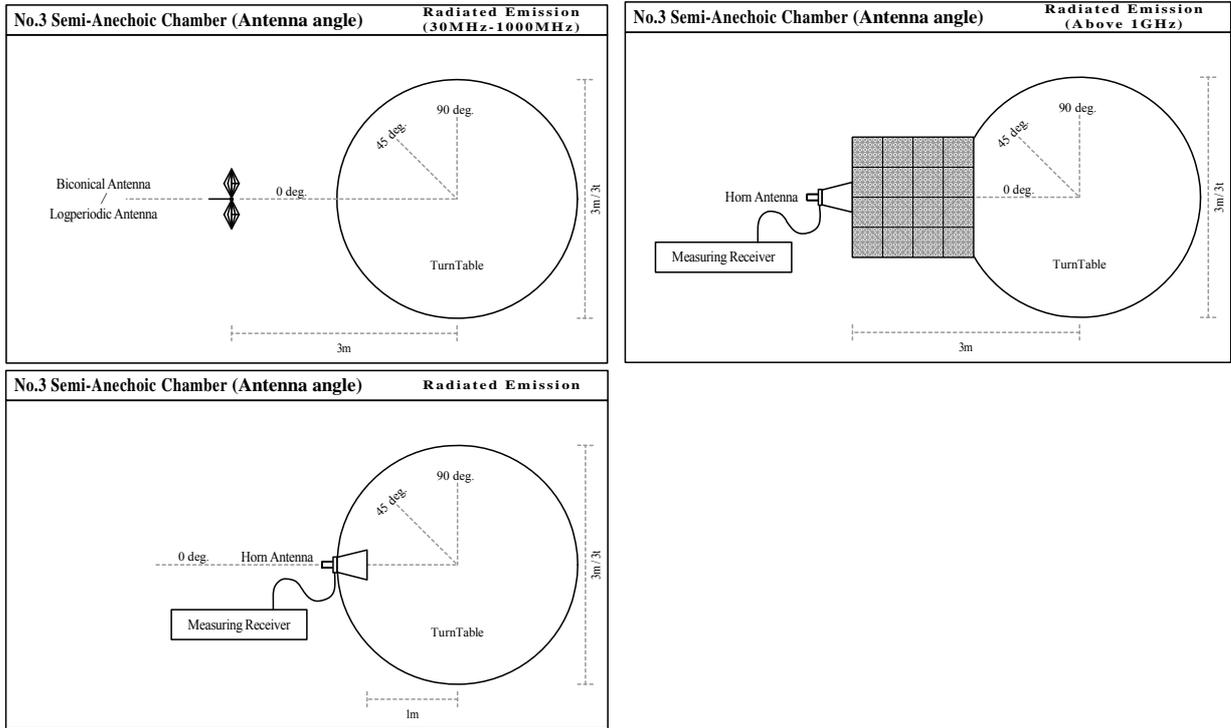
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Figure 1. Antenna angle



11.5 Band edge

Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209 and band edge level at 2400MHz is below the 20dBc. Refer to the data.

11.6 Results

Summary of the test results: Pass *No noise was detected above the 5th order harmonics.

Refer to APPENDIX 1.

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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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APPENDIX 1: Data of Radio tests

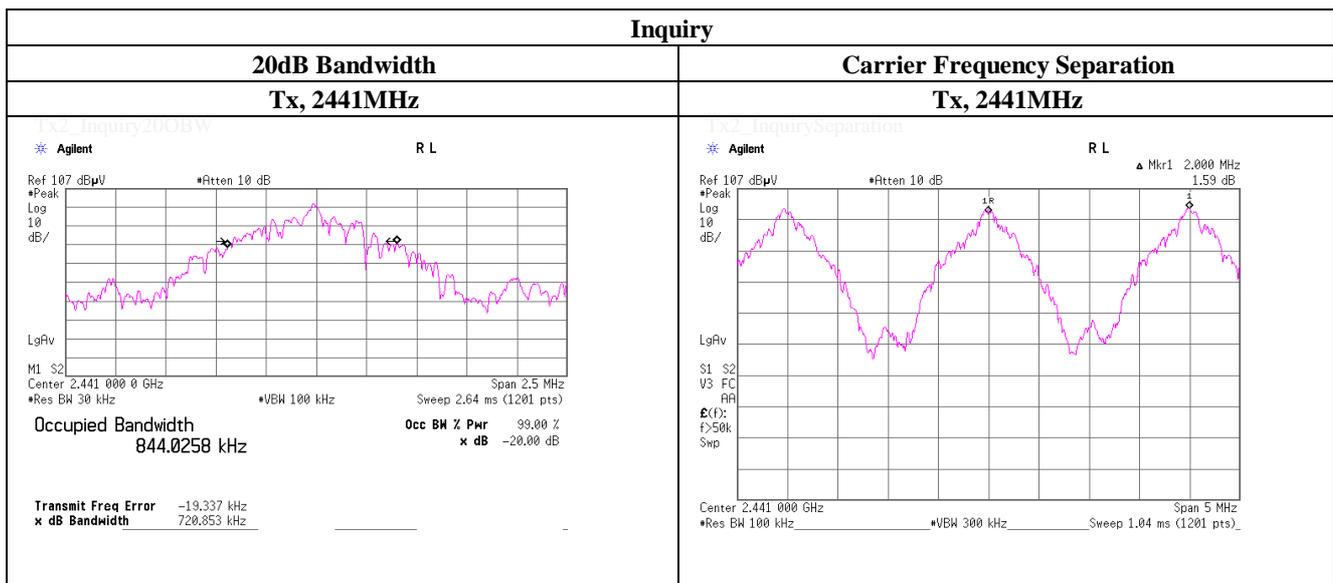
20dB Bandwidth and Carrier Frequency Separation

| | | |
|------------------------|--------------------------------|--------------------|
| Test place | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date | June 20, 2014 | |
| Temperature / Humidity | 24 deg.C , 52% | |
| Engineer | Shinichi Takano | |
| Mode | Tx, Bluetooth, BDR, PRBS9 | |

| Mode | Freq. [MHz] | 20dB Bandwidth [MHz] | Carrier Frequency Separation [MHz] | Limit for Carrier Frequency Separation [MHz] |
|---------|----------------|----------------------------|---|--|
| DH5 | 2402.0 | 0.954 | 1.000 | >= 0.636 |
| DH5 | 2441.0 | 1.010 | 1.000 | >= 0.673 |
| DH5 | 2480.0 | 0.956 | 1.000 | >= 0.637 |
| Inquiry | 2441.0 | 0.721 | 2.000 | >= 0.481 |

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

No limit applies to 20dB Bandwidth.



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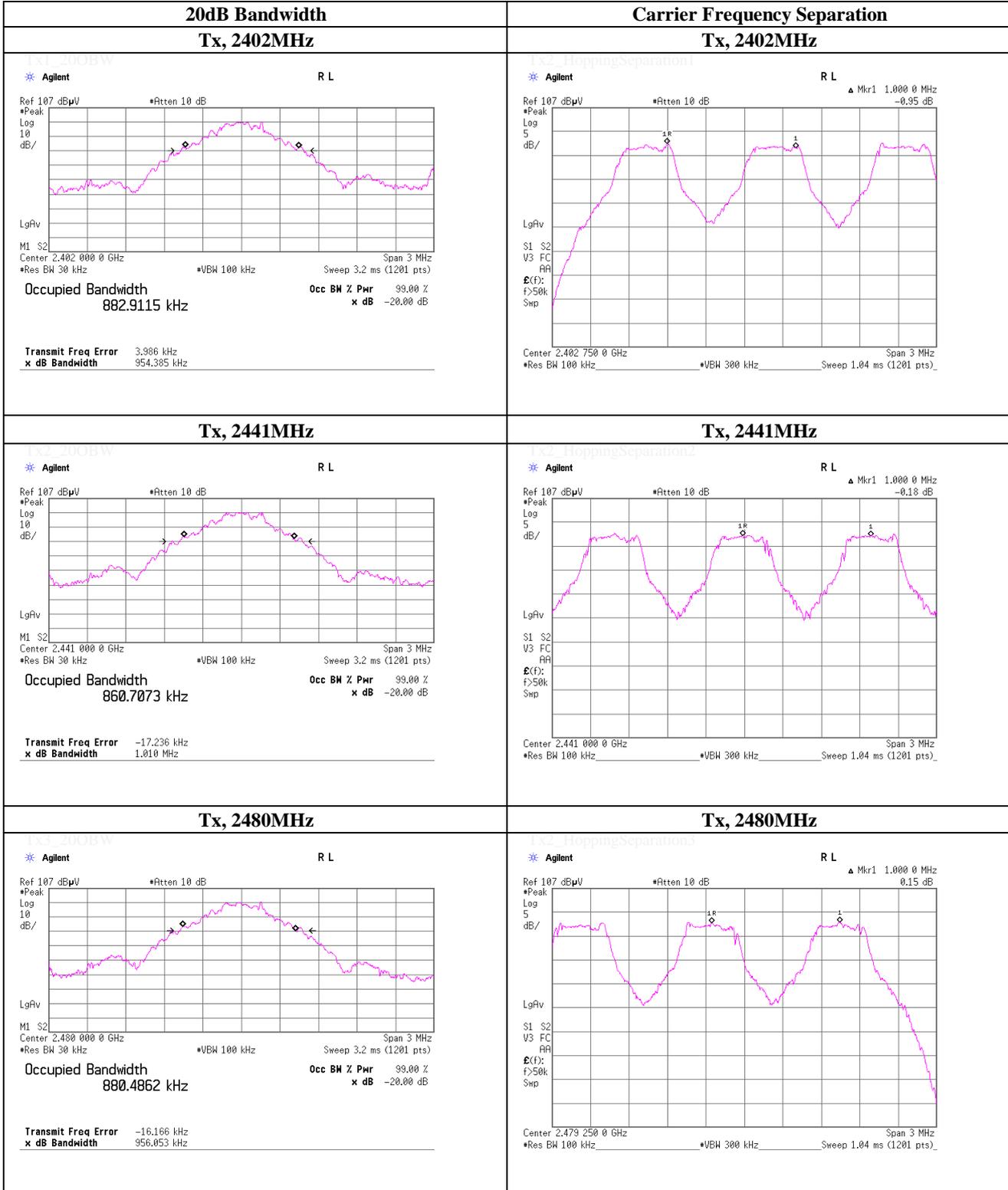
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20dB Bandwidth and Carrier Frequency Separation

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 June 20, 2014
Temperature / Humidity 24 deg.C , 52%
Engineer Shinichi Takano
Mode Tx, Bluetooth, EDR, PRBS9

| Mode | Freq. [MHz] | 20dB Bandwidth [MHz] | Carrier Frequency Separation [MHz] | Limit for Carrier Frequency Separation [MHz] |
|-------|----------------|----------------------------|---|--|
| 3-DH5 | 2402.0 | 1.250 | 1.000 | >= 0.834 |
| 3-DH5 | 2441.0 | 1.275 | 1.000 | >= 0.850 |
| 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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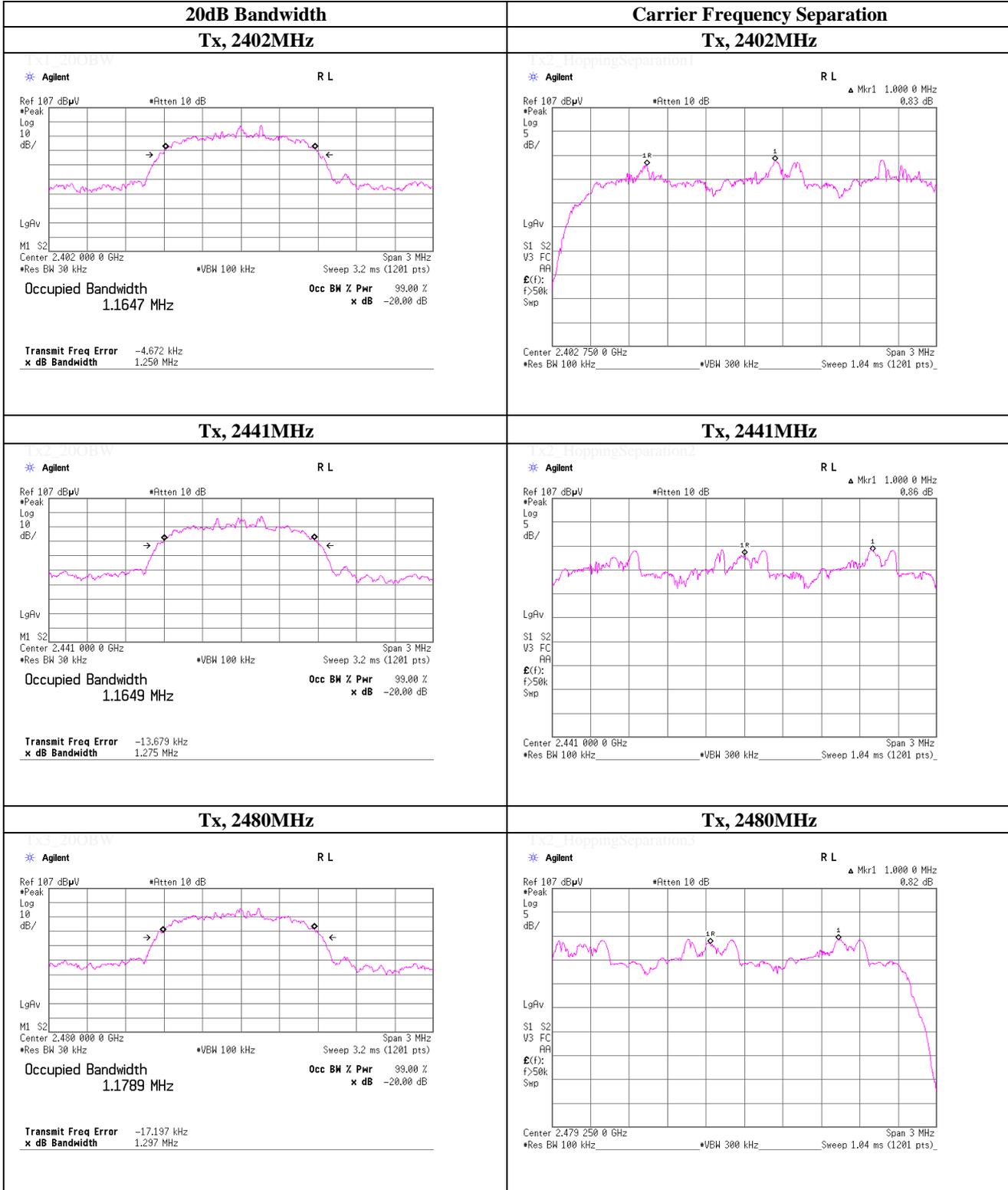
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



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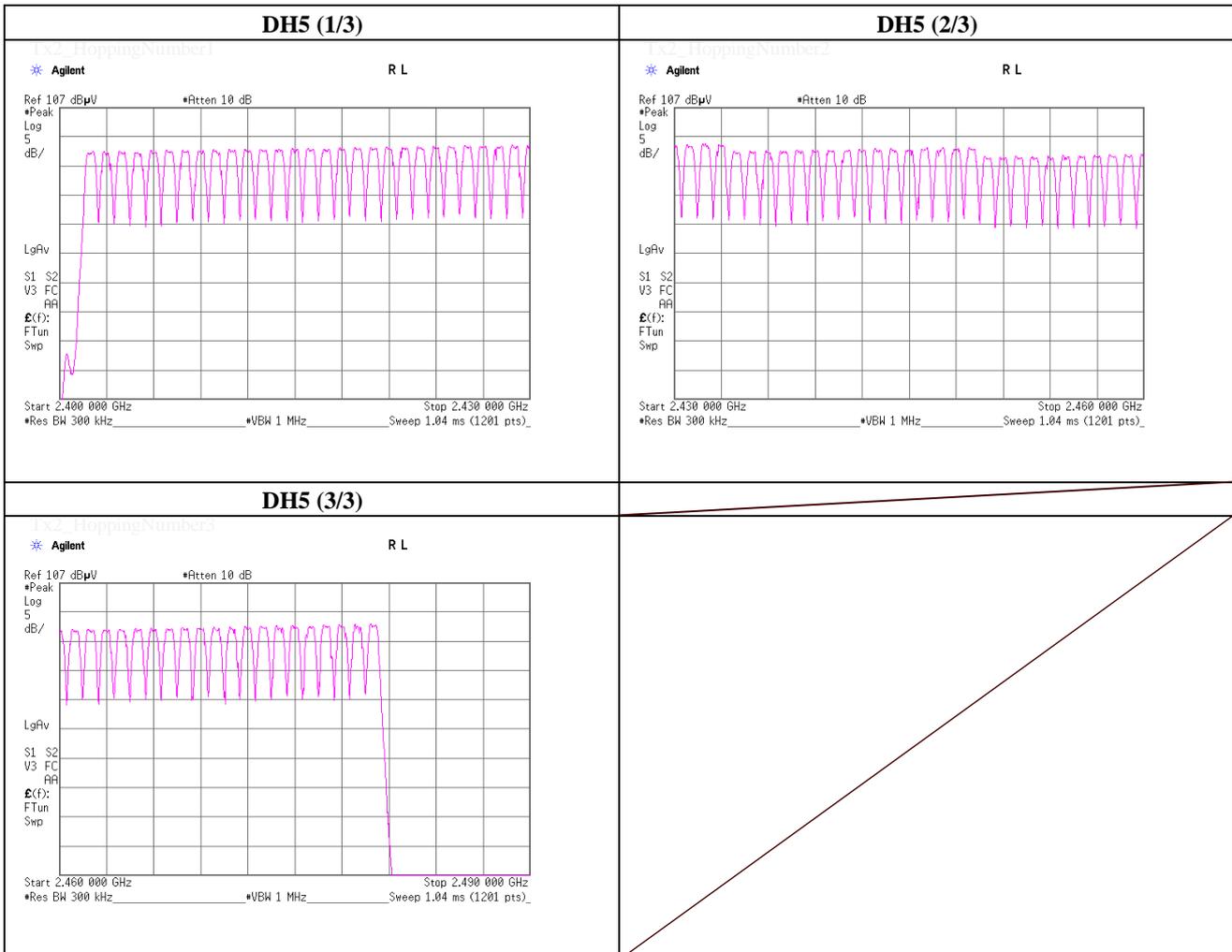
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Number of Hopping Frequency

| | | |
|------------------------|--------------------------------|--------------------|
| Test place | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date | June 20, 2014 | |
| Temperature / Humidity | 24 deg.C , 52% | |
| Engineer | Shinichi Takano | |
| 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.

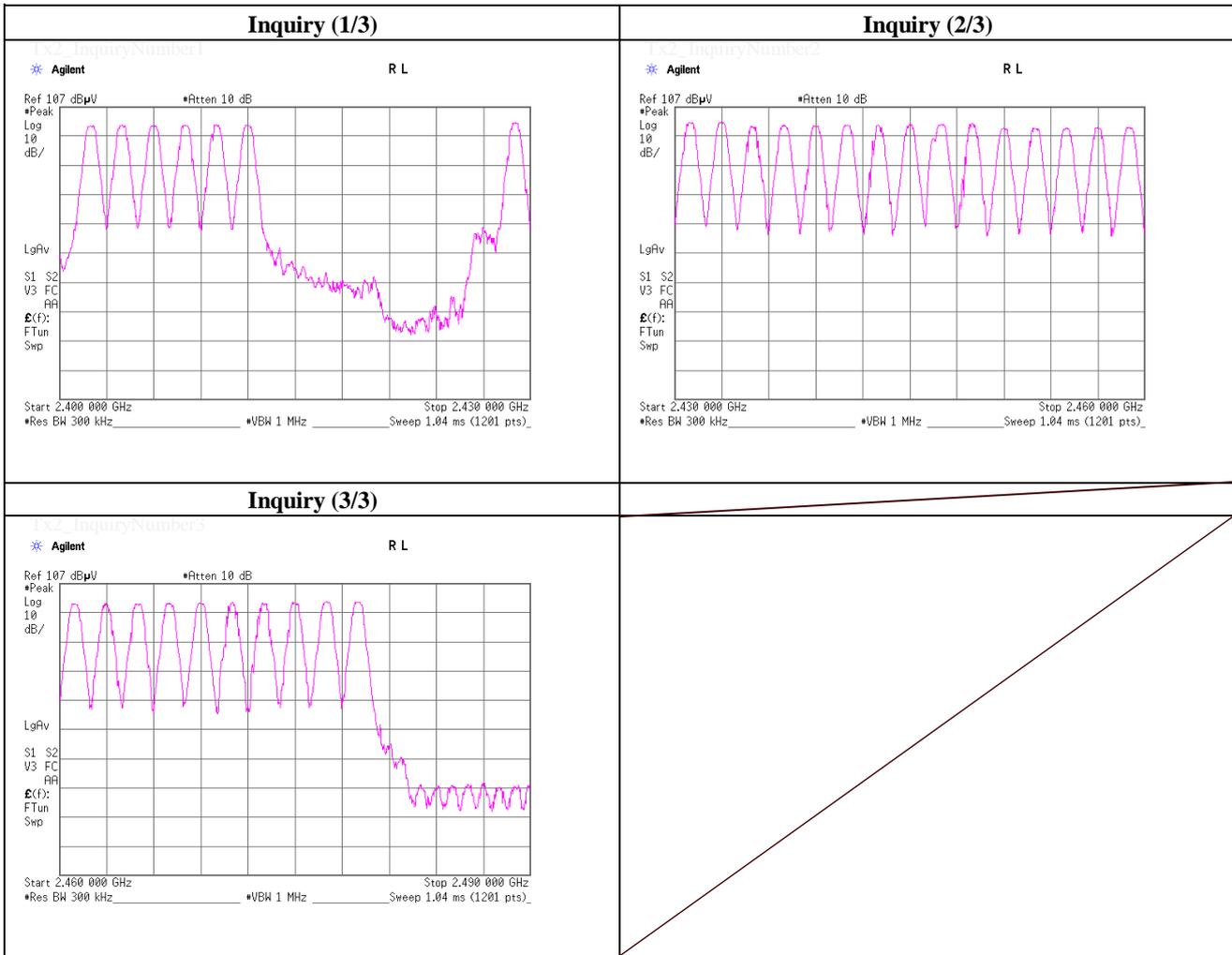


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Number of Hopping Frequency

| | | |
|------------------------|--------------------------------|--------------------|
| Test place | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date | June 20, 2014 | |
| Temperature / Humidity | 24 deg.C , 52% | |
| Engineer | Shinichi Takano | |
| Mode | Tx, Bluetooth, Inquiry | |

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



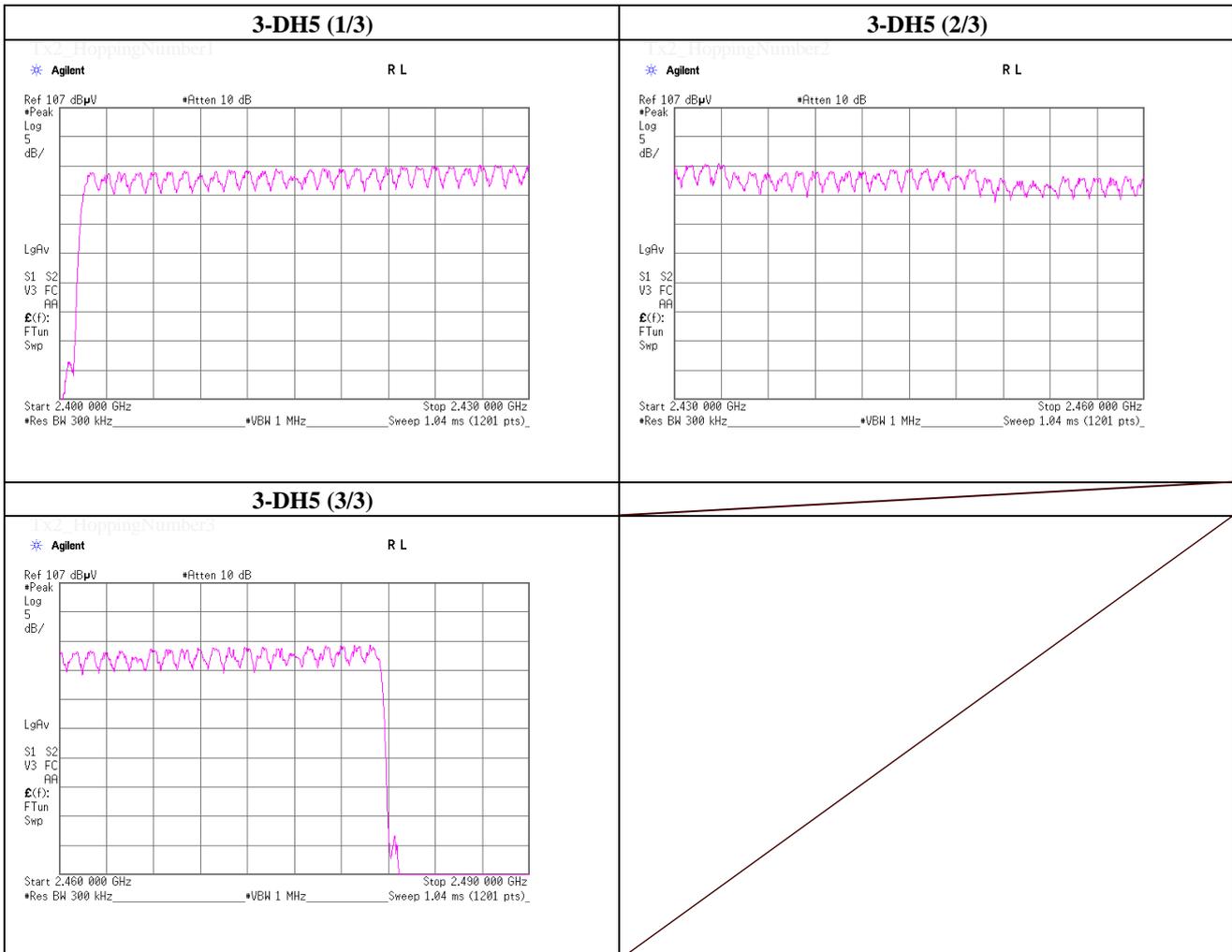
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 Facsimile : +81 463 50 6401

Number of Hopping Frequency

| | | |
|------------------------|--------------------------------|--------------------|
| Test place | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date | June 20, 2014 | |
| Temperature / Humidity | 24 deg.C , 52% | |
| Engineer | Shinichi Takano | |
| 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.



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Dwell Time

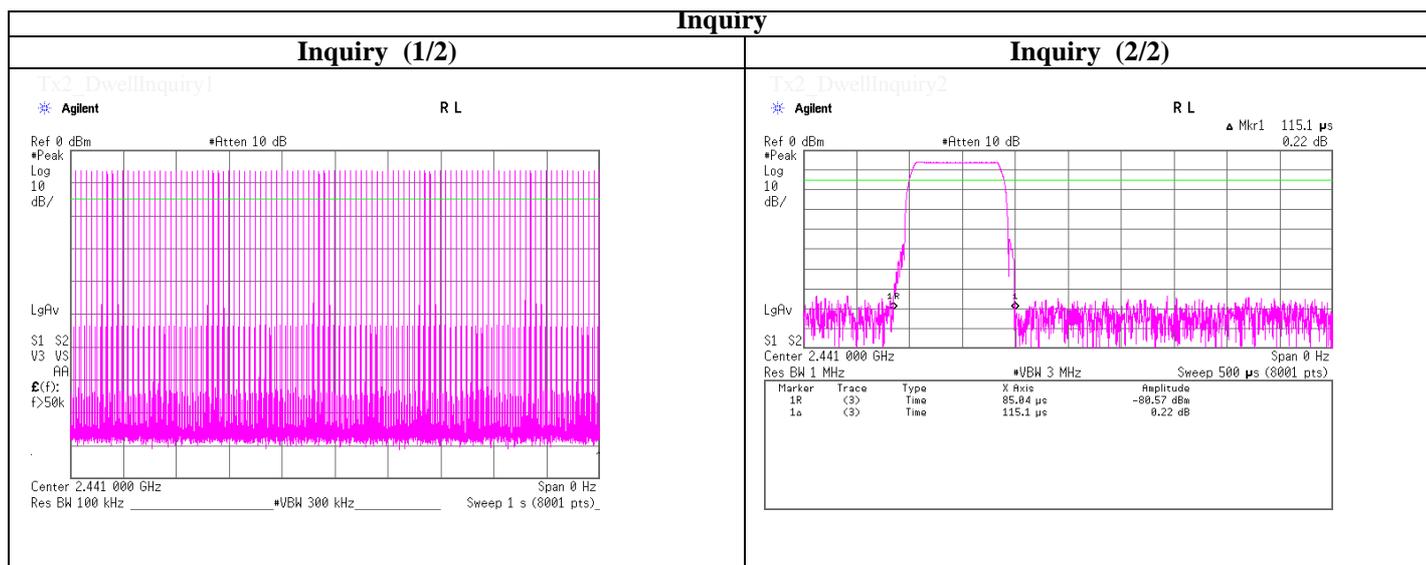
Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date June 20, 2014
 Temperature / Humidity 24 deg.C , 52%
 Engineer Shinichi Takano
 Mode Tx, Bluetooth, BDR, PRBS9

| Mode | Number of transmission in a 31.6 (79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period | Length of transmission time [msec] | Result [msec] | Limit [msec] |
|---------|---|--|------------------|-----------------|
| DH1 | 51.0 / 5.0 sec. x 31.6 sec. = 323 times | 0.413 | 133 | 400 |
| DH3 | 17.0 / 5.0 sec. x 31.6 sec. = 108 times | 1.609 | 174 | 400 |
| DH5 | 6.0 / 5.0 sec. x 31.6 sec. = 38 times | 2.920 | 111 | 400 |
| Inquiry | 100.0 / 1.0 sec. x 12.8 sec. = 1280 times | 0.115 | 147 | 400 |

Sample Calculation

Result = Number of transmission x Length of transmission time

* 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.

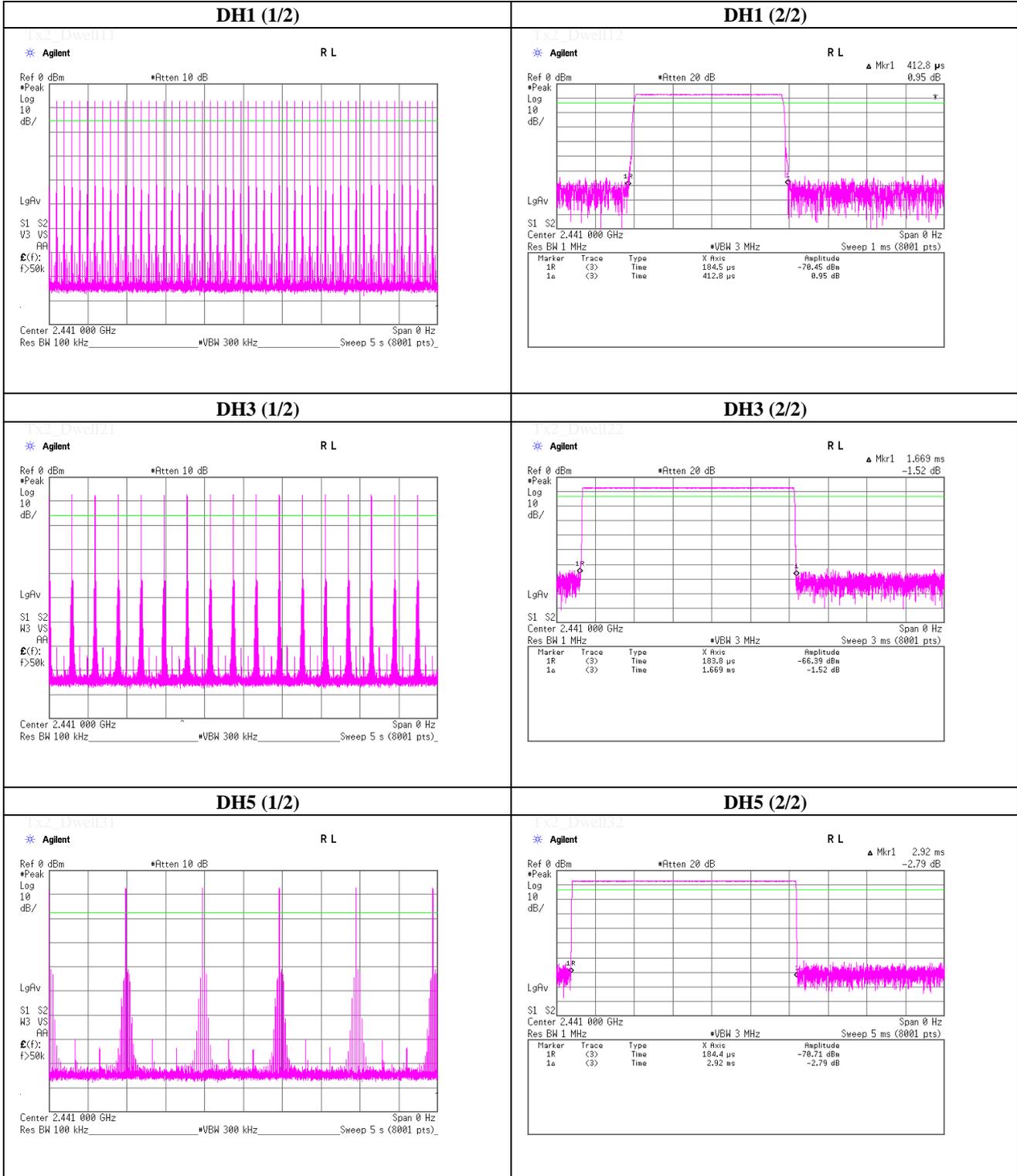
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Dwell time

Tx, Bluetooth, BDR, PRBS9



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date June 20, 2014
 Temperature / Humidity 24 deg.C , 52%
 Engineer Shinichi Takano
 Mode Tx, Bluetooth, EDR, PRBS9

| Mode | Number of transmission in a 31.6 (79 Hopping x 0.4) second | Length of transmission time [msec] | Result [msec] | Limit [msec] |
|-------|---|--|------------------|-----------------|
| 3-DH1 | 51.0 / 5.0 sec. x 31.6 sec. = 323 times | 0.426 | 137 | 400 |
| 3-DH3 | 13.0 / 5.0 sec. x 31.6 sec. = 83 times | 1.677 | 139 | 400 |
| 3-DH5 | 6.0 / 5.0 sec. x 31.6 sec. = 38 times | 2.928 | 111 | 400 |

Sample Calculation

Result = Number of transmission x Length of transmission time

* 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 $N=79$.

UL Japan, Inc.

Shonan EMC Lab.

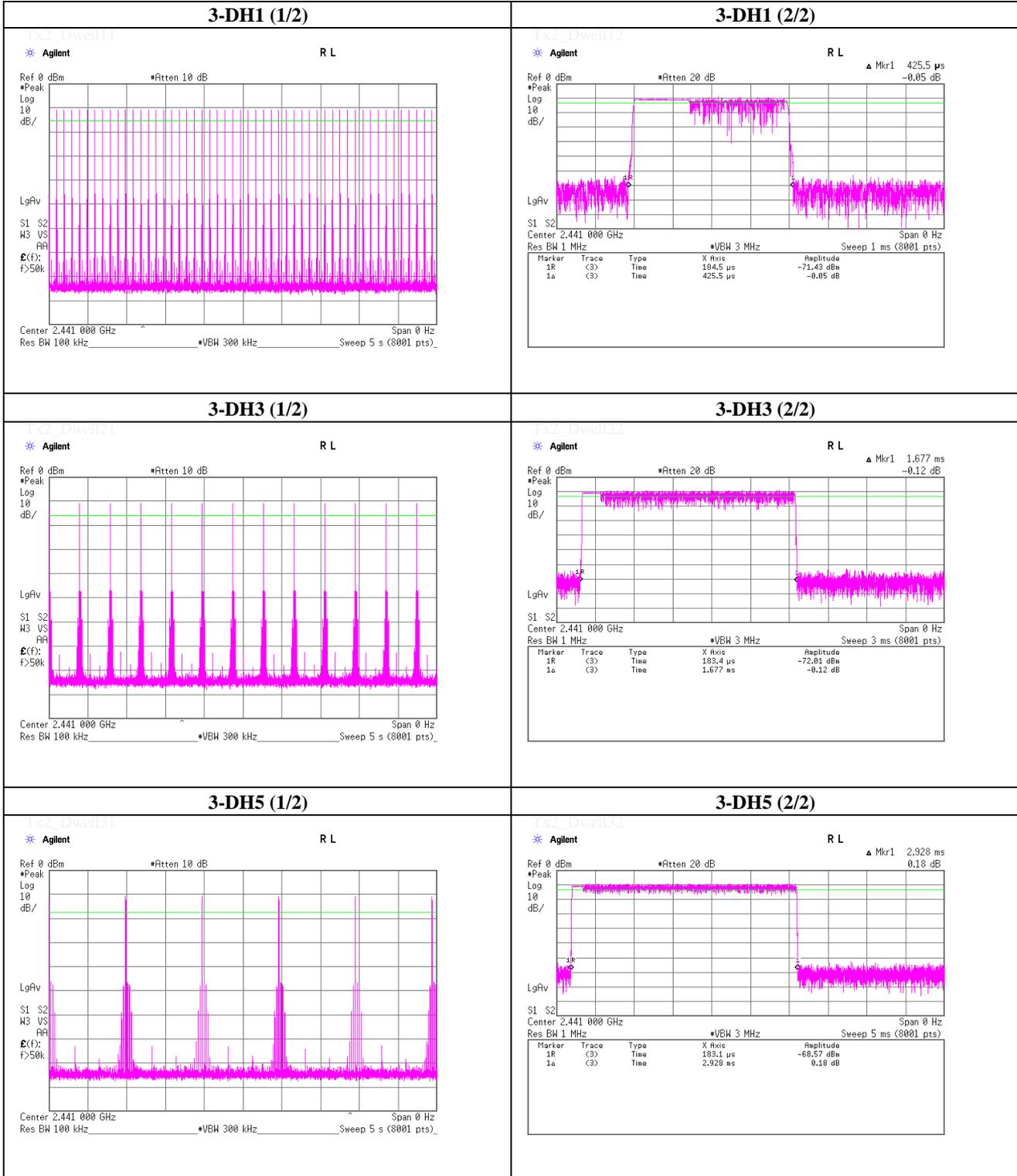
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Dwell time

Tx, Bluetooth, EDR, PRBS9



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Maximum Peak Conducted Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date June 20, 2014
 Temperature / Humidity 24 deg.C , 52%
 Engineer Shinichi Takano
 Mode Tx, Bluetooth

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

| | Freq. [MHz] | P/M (Peak) Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result | | Limit | | Margin [dB] |
|-------|----------------|--------------------------------|-----------------------|------------------------|--------|------|-------|------|----------------|
| | | | | | [dBm] | [mW] | [dBm] | [mW] | |
| DH5 | 2402.0 | -7.12 | 2.38 | 9.65 | 4.91 | 3.10 | 20.97 | 125 | 16.06 |
| DH5 | 2441.0 | -6.69 | 2.39 | 9.66 | 5.36 | 3.44 | 20.97 | 125 | 15.61 |
| DH5 | 2480.0 | -6.63 | 2.40 | 9.66 | 5.43 | 3.49 | 20.97 | 125 | 15.54 |
| 2-DH5 | 2402.0 | -9.15 | 2.38 | 9.65 | 2.88 | 1.94 | 20.97 | 125 | 18.09 |
| 2-DH5 | 2441.0 | -8.87 | 2.39 | 9.66 | 3.18 | 2.08 | 20.97 | 125 | 17.79 |
| 2-DH5 | 2480.0 | -8.75 | 2.40 | 9.66 | 3.31 | 2.14 | 20.97 | 125 | 17.66 |
| 3-DH5 | 2402.0 | -8.76 | 2.38 | 9.65 | 3.27 | 2.12 | 20.97 | 125 | 17.70 |
| 3-DH5 | 2441.0 | -8.55 | 2.39 | 9.66 | 3.50 | 2.24 | 20.97 | 125 | 17.47 |
| 3-DH5 | 2480.0 | -8.47 | 2.40 | 9.66 | 3.59 | 2.29 | 20.97 | 125 | 17.38 |

Sample Calculation:

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

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date June 18, 2014 June 19, 2014
 Temperature / Humidity 24 deg.C, 55 %RH 26 deg.C, 50 %RH
 Engineer Makoto Hosaka
 Mode Tx, 2402 MHz
 Tx, Bluetooth, BDR, 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. | 479.999 | QP | 22.2 | 17.1 | 9.2 | 32.1 | 16.4 | 46.0 | 29.6 | 150 | 203 | |
| Hori. | 533.005 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 150 | 43 | |
| Hori. | 2390.000 | PK | 46.9 | 26.8 | 14.6 | 41.1 | 47.2 | 73.9 | 26.7 | 100 | 177 | |
| Hori. | 4804.000 | PK | 58.4 | 30.9 | 7.5 | 39.8 | 57.0 | 73.9 | 16.9 | 100 | 3 | |
| Hori. | 7206.000 | PK | 47.6 | 37.1 | 8.6 | 40.2 | 53.1 | 73.9 | 20.8 | 100 | 0 | |
| Hori. | 9608.000 | PK | 47.8 | 38.6 | 9.6 | 40.1 | 55.9 | 73.9 | 18.0 | 100 | 0 | |
| Hori. | 12010.000 | PK | 47.8 | 39.6 | 10.7 | 39.6 | 58.5 | 73.9 | 15.4 | 100 | 0 | |
| Hori. | 2390.000 | AV | 34.6 | 26.8 | 14.6 | 41.1 | 34.9 | 53.9 | 19.0 | 100 | 177 | |
| Hori. | 4804.000 | AV | 47.2 | 30.9 | 7.5 | 39.8 | 45.8 | 53.9 | 8.1 | 100 | 3 | |
| Hori. | 7206.000 | AV | 35.4 | 37.1 | 8.6 | 40.2 | 40.9 | 53.9 | 13.0 | 100 | 0 | |
| Hori. | 9608.000 | AV | 35.6 | 38.6 | 9.6 | 40.1 | 43.7 | 53.9 | 10.2 | 100 | 0 | |
| Hori. | 12010.000 | AV | 36.2 | 39.6 | 10.7 | 39.6 | 46.9 | 53.9 | 7.0 | 100 | 0 | |
| Vert. | 479.999 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 100 | 144 | |
| Vert. | 533.005 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 100 | 341 | |
| Vert. | 2390.000 | PK | 47.1 | 26.8 | 14.6 | 41.1 | 47.4 | 73.9 | 26.5 | 100 | 281 | |
| Vert. | 4804.000 | PK | 56.9 | 30.9 | 7.5 | 39.8 | 55.5 | 73.9 | 18.4 | 100 | 329 | |
| Vert. | 7206.000 | PK | 47.6 | 37.1 | 8.6 | 40.2 | 53.1 | 73.9 | 20.8 | 100 | 0 | |
| Vert. | 9608.000 | PK | 47.7 | 38.6 | 9.6 | 40.1 | 55.8 | 73.9 | 18.1 | 100 | 0 | |
| Vert. | 12010.000 | PK | 48.2 | 39.6 | 10.7 | 39.6 | 58.9 | 73.9 | 15.0 | 100 | 0 | |
| Vert. | 2390.000 | AV | 35.1 | 26.8 | 14.6 | 41.1 | 35.4 | 53.9 | 18.5 | 100 | 281 | |
| Vert. | 4804.000 | AV | 45.0 | 30.9 | 7.5 | 39.8 | 43.6 | 53.9 | 10.3 | 100 | 329 | |
| Vert. | 7206.000 | AV | 35.5 | 37.1 | 8.6 | 40.2 | 41.0 | 53.9 | 12.9 | 100 | 0 | |
| Vert. | 9608.000 | AV | 35.7 | 38.6 | 9.6 | 40.1 | 43.8 | 53.9 | 10.1 | 100 | 0 | |
| Vert. | 12010.000 | AV | 36.1 | 39.6 | 10.7 | 39.6 | 46.8 | 53.9 | 7.1 | 100 | 0 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Ampriifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori. | 2402.000 | PK | 88.7 | 26.8 | 14.6 | 41.1 | 89.0 | - | - | |
| Hori. | 2399.205 | PK | 40.8 | 26.8 | 14.6 | 41.1 | 41.1 | 69.0 | 27.9 | |
| Hori. | 2400.000 | PK | 43.6 | 26.8 | 14.6 | 41.1 | 43.9 | 69.0 | 25.1 | |
| Vert. | 2402.000 | PK | 89.9 | 26.8 | 14.6 | 41.1 | 90.2 | - | - | |
| Vert. | 2399.205 | PK | 42.0 | 26.8 | 14.6 | 41.1 | 42.3 | 70.2 | 27.9 | |
| Vert. | 2400.000 | PK | 44.9 | 26.8 | 14.6 | 41.1 | 45.2 | 70.2 | 25.0 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Ampriifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date June 18, 2014 June 19, 2014
 Temperature / Humidity 24 deg.C, 55 %RH 26 deg.C, 50 %RH
 Engineer Makoto Hosaka
 Mode Tx, 2441 MHz
 Tx, Bluetooth, BDR, 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. | 480.007 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 150 | 177 | |
| Hori. | 533.003 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 150 | 175 | |
| Hori. | 4882.000 | PK | 55.6 | 31.4 | 7.5 | 39.7 | 54.8 | 73.9 | 19.1 | 100 | 7 | |
| Hori. | 7323.000 | PK | 46.8 | 37.2 | 8.6 | 40.3 | 52.3 | 73.9 | 21.6 | 100 | 0 | |
| Hori. | 9764.000 | PK | 47.4 | 38.8 | 9.6 | 40.0 | 55.8 | 73.9 | 18.1 | 100 | 0 | |
| Hori. | 12205.000 | PK | 46.6 | 39.6 | 10.8 | 39.8 | 57.2 | 73.9 | 16.7 | 100 | 0 | |
| Hori. | 4882.000 | AV | 44.3 | 31.4 | 7.5 | 39.7 | 43.5 | 53.9 | 10.4 | 100 | 7 | |
| Hori. | 7323.000 | AV | 35.1 | 37.2 | 8.6 | 40.3 | 40.6 | 53.9 | 13.3 | 100 | 0 | |
| Hori. | 9764.000 | AV | 34.9 | 38.8 | 9.6 | 40.0 | 43.3 | 53.9 | 10.6 | 100 | 0 | |
| Hori. | 12205.000 | AV | 35.0 | 39.6 | 10.8 | 39.8 | 45.6 | 53.9 | 8.3 | 100 | 0 | |
| Vert. | 480.007 | QP | 22.4 | 17.1 | 9.2 | 32.1 | 16.6 | 46.0 | 29.4 | 100 | 3 | |
| Vert. | 533.003 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 100 | 279 | |
| Vert. | 4882.000 | PK | 54.9 | 31.4 | 7.5 | 39.7 | 54.1 | 73.9 | 19.8 | 100 | 339 | |
| Vert. | 7323.000 | PK | 47.1 | 37.2 | 8.6 | 40.3 | 52.6 | 73.9 | 21.3 | 100 | 0 | |
| Vert. | 9764.000 | PK | 47.1 | 38.8 | 9.6 | 40.0 | 55.5 | 73.9 | 18.4 | 100 | 0 | |
| Vert. | 12205.000 | PK | 47.1 | 39.6 | 10.8 | 39.8 | 57.7 | 73.9 | 16.2 | 100 | 0 | |
| Vert. | 4882.000 | AV | 43.6 | 31.4 | 7.5 | 39.7 | 42.8 | 53.9 | 11.1 | 100 | 339 | |
| Vert. | 7323.000 | AV | 35.1 | 37.2 | 8.6 | 40.3 | 40.6 | 53.9 | 13.3 | 100 | 0 | |
| Vert. | 9764.000 | AV | 34.6 | 38.8 | 9.6 | 40.0 | 43.0 | 53.9 | 10.9 | 100 | 0 | |
| Vert. | 12205.000 | AV | 34.9 | 39.6 | 10.8 | 39.8 | 45.5 | 53.9 | 8.4 | 100 | 0 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date June 18, 2014 June 19, 2014
 Temperature / Humidity 24 deg.C, 55 %RH 26 deg.C, 50 %RH
 Engineer Makoto Hosaka
 Mode Tx, 2480 MHz
 Tx, Bluetooth, BDR, 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. | 480.001 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 150 | 97 | |
| Hori. | 533.000 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 150 | 267 | |
| Hori. | 2483.500 | PK | 48.5 | 26.9 | 14.7 | 41.1 | 49.0 | 73.9 | 24.9 | 100 | 182 | |
| Hori. | 4960.000 | PK | 55.0 | 31.8 | 7.5 | 39.6 | 54.7 | 73.9 | 19.2 | 100 | 7 | |
| Hori. | 7440.000 | PK | 47.4 | 37.4 | 8.8 | 40.4 | 53.2 | 73.9 | 20.7 | 100 | 0 | |
| Hori. | 9920.000 | PK | 46.7 | 38.9 | 9.6 | 39.9 | 55.3 | 73.9 | 18.6 | 100 | 0 | |
| Hori. | 12400.000 | PK | 46.1 | 39.7 | 10.9 | 40.0 | 56.7 | 73.9 | 17.2 | 100 | 0 | |
| Hori. | 2483.500 | AV | 36.6 | 26.9 | 14.7 | 41.1 | 37.1 | 53.9 | 16.8 | 100 | 182 | |
| Hori. | 4960.000 | AV | 43.3 | 31.8 | 7.5 | 39.6 | 43.0 | 53.9 | 10.9 | 100 | 7 | |
| Hori. | 7440.000 | AV | 34.4 | 37.4 | 8.8 | 40.4 | 40.2 | 53.9 | 13.7 | 100 | 0 | |
| Hori. | 9920.000 | AV | 33.4 | 38.9 | 9.6 | 39.9 | 42.0 | 53.9 | 11.9 | 100 | 0 | |
| Hori. | 12400.000 | AV | 33.4 | 39.7 | 10.9 | 40.0 | 44.0 | 53.9 | 9.9 | 100 | 0 | |
| Vert. | 480.001 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 100 | 341 | |
| Vert. | 533.000 | QP | 22.4 | 17.7 | 9.4 | 32.1 | 17.4 | 46.0 | 28.6 | 100 | 322 | |
| Vert. | 2483.500 | PK | 47.8 | 26.9 | 14.7 | 41.1 | 48.3 | 73.9 | 25.6 | 100 | 280 | |
| Vert. | 4960.000 | PK | 54.5 | 31.8 | 7.5 | 39.6 | 54.2 | 73.9 | 19.7 | 100 | 325 | |
| Vert. | 7440.000 | PK | 47.9 | 37.4 | 8.8 | 40.4 | 53.7 | 73.9 | 20.2 | 100 | 0 | |
| Vert. | 9920.000 | PK | 46.7 | 38.9 | 9.6 | 39.9 | 55.3 | 73.9 | 18.6 | 100 | 0 | |
| Vert. | 12400.000 | PK | 46.7 | 39.7 | 10.9 | 40.0 | 57.3 | 73.9 | 16.6 | 100 | 0 | |
| Vert. | 2483.500 | AV | 35.3 | 26.9 | 14.7 | 41.1 | 35.8 | 53.9 | 18.1 | 100 | 280 | |
| Vert. | 4960.000 | AV | 42.6 | 31.8 | 7.5 | 39.6 | 42.3 | 53.9 | 11.6 | 100 | 325 | |
| Vert. | 7440.000 | AV | 34.6 | 37.4 | 8.8 | 40.4 | 40.4 | 53.9 | 13.5 | 100 | 0 | |
| Vert. | 9920.000 | AV | 33.6 | 38.9 | 9.6 | 39.9 | 42.2 | 53.9 | 11.7 | 100 | 0 | |
| Vert. | 12400.000 | AV | 33.6 | 39.7 | 10.9 | 40.0 | 44.2 | 53.9 | 9.7 | 100 | 0 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Ampriplier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date June 18, 2014 June 19, 2014
 Temperature / Humidity 24 deg.C, 55 %RH 26 deg.C, 50 %RH
 Engineer Makoto Hosaka
 Mode Tx, 2402 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. | 480.003 | QP | 22.2 | 17.1 | 9.2 | 32.1 | 16.4 | 46.0 | 29.6 | 150 | 1 | |
| Hori. | 533.004 | QP | 22.4 | 17.7 | 9.4 | 32.1 | 17.4 | 46.0 | 28.6 | 150 | 131 | |
| Hori. | 2390.000 | PK | 47.9 | 26.8 | 14.6 | 41.1 | 48.2 | 73.9 | 25.7 | 100 | 187 | |
| Hori. | 4804.000 | PK | 56.4 | 30.9 | 7.5 | 39.8 | 55.0 | 73.9 | 18.9 | 100 | 2 | |
| Hori. | 7206.000 | PK | 46.9 | 37.1 | 8.6 | 40.2 | 52.4 | 73.9 | 21.5 | 100 | 0 | |
| Hori. | 9608.000 | PK | 47.4 | 38.6 | 9.6 | 40.1 | 55.5 | 73.9 | 18.4 | 100 | 0 | |
| Hori. | 12010.000 | PK | 48.1 | 39.6 | 10.7 | 39.6 | 58.8 | 73.9 | 15.1 | 100 | 0 | |
| Hori. | 2390.000 | AV | 34.7 | 26.8 | 14.6 | 41.1 | 35.0 | 53.9 | 18.9 | 100 | 187 | |
| Hori. | 4804.000 | AV | 41.7 | 30.9 | 7.5 | 39.8 | 40.3 | 53.9 | 13.6 | 100 | 2 | |
| Hori. | 7206.000 | AV | 35.4 | 37.1 | 8.6 | 40.2 | 40.9 | 53.9 | 13.0 | 100 | 0 | |
| Hori. | 9608.000 | AV | 35.6 | 38.6 | 9.6 | 40.1 | 43.7 | 53.9 | 10.2 | 100 | 0 | |
| Hori. | 12010.000 | AV | 36.2 | 39.6 | 10.7 | 39.6 | 46.9 | 53.9 | 7.0 | 100 | 0 | |
| Vert. | 480.003 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 100 | 105 | |
| Vert. | 533.004 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 100 | 357 | |
| Vert. | 2390.000 | PK | 47.8 | 26.8 | 14.6 | 41.1 | 48.1 | 73.9 | 25.8 | 100 | 267 | |
| Vert. | 4804.000 | PK | 54.5 | 30.9 | 7.5 | 39.8 | 53.1 | 73.9 | 20.8 | 100 | 351 | |
| Vert. | 7206.000 | PK | 49.0 | 37.1 | 8.6 | 40.2 | 54.5 | 73.9 | 19.4 | 100 | 0 | |
| Vert. | 9608.000 | PK | 47.7 | 38.6 | 9.6 | 40.1 | 55.8 | 73.9 | 18.1 | 100 | 0 | |
| Vert. | 12010.000 | PK | 48.1 | 39.6 | 10.7 | 39.6 | 58.8 | 73.9 | 15.1 | 100 | 0 | |
| Vert. | 2390.000 | AV | 35.0 | 26.8 | 14.6 | 41.1 | 35.3 | 53.9 | 18.6 | 100 | 267 | |
| Vert. | 4804.000 | AV | 41.2 | 30.9 | 7.5 | 39.8 | 39.8 | 53.9 | 14.1 | 100 | 351 | |
| Vert. | 7206.000 | AV | 35.4 | 37.1 | 8.6 | 40.2 | 40.9 | 53.9 | 13.0 | 100 | 0 | |
| Vert. | 9608.000 | AV | 35.7 | 38.6 | 9.6 | 40.1 | 43.8 | 53.9 | 10.1 | 100 | 0 | |
| Vert. | 12010.000 | AV | 36.2 | 39.6 | 10.7 | 39.6 | 46.9 | 53.9 | 7.0 | 100 | 0 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori. | 2402.000 | PK | 84.3 | 26.8 | 14.6 | 41.1 | 84.6 | - | - | |
| Hori. | 2400.000 | PK | 38.2 | 26.8 | 14.6 | 41.1 | 38.5 | 64.6 | 26.1 | |
| Vert. | 2402.000 | PK | 85.9 | 26.8 | 14.6 | 41.1 | 86.2 | - | - | |
| Vert. | 2400.000 | PK | 38.7 | 26.8 | 14.6 | 41.1 | 39.0 | 66.2 | 27.2 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date June 18, 2014 June 19, 2014
 Temperature / Humidity 24 deg.C, 55 %RH 26 deg.C, 50 %RH
 Engineer Makoto Hosaka
 Mode Tx, 2441 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. | 480.001 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 150 | 14 | |
| Hori. | 533.003 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 150 | 357 | |
| Hori. | 4882.000 | PK | 53.4 | 31.4 | 7.5 | 39.7 | 52.6 | 73.9 | 21.3 | 100 | 8 | |
| Hori. | 7323.000 | PK | 46.9 | 37.2 | 8.6 | 40.3 | 52.4 | 73.9 | 21.5 | 100 | 0 | |
| Hori. | 9764.000 | PK | 46.8 | 38.8 | 9.6 | 40.0 | 55.2 | 73.9 | 18.7 | 100 | 0 | |
| Hori. | 12205.000 | PK | 47.4 | 39.6 | 10.8 | 39.8 | 58.0 | 73.9 | 15.9 | 100 | 0 | |
| Hori. | 4882.000 | AV | 39.5 | 31.4 | 7.5 | 39.7 | 38.7 | 53.9 | 15.2 | 100 | 8 | |
| Hori. | 7323.000 | AV | 35.1 | 37.2 | 8.6 | 40.3 | 40.6 | 53.9 | 13.3 | 100 | 0 | |
| Hori. | 9764.000 | AV | 34.8 | 38.8 | 9.6 | 40.0 | 43.2 | 53.9 | 10.7 | 100 | 0 | |
| Hori. | 12205.000 | AV | 34.9 | 39.6 | 10.8 | 39.8 | 45.5 | 53.9 | 8.4 | 100 | 0 | |
| Vert. | 480.001 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 100 | 167 | |
| Vert. | 533.003 | QP | 22.2 | 17.7 | 9.4 | 32.1 | 17.2 | 46.0 | 28.8 | 100 | 91 | |
| Vert. | 4882.000 | PK | 53.8 | 31.4 | 7.5 | 39.7 | 53.0 | 73.9 | 20.9 | 100 | 321 | |
| Vert. | 7323.000 | PK | 47.3 | 37.2 | 8.6 | 40.3 | 52.8 | 73.9 | 21.1 | 100 | 0 | |
| Vert. | 9764.000 | PK | 47.4 | 38.8 | 9.6 | 40.0 | 55.8 | 73.9 | 18.1 | 100 | 0 | |
| Vert. | 12205.000 | PK | 47.9 | 39.6 | 10.8 | 39.8 | 58.5 | 73.9 | 15.4 | 100 | 0 | |
| Vert. | 4882.000 | AV | 39.2 | 31.4 | 7.5 | 39.7 | 38.4 | 53.9 | 15.5 | 100 | 321 | |
| Vert. | 7323.000 | AV | 35.0 | 37.2 | 8.6 | 40.3 | 40.5 | 53.9 | 13.4 | 100 | 0 | |
| Vert. | 9764.000 | AV | 34.6 | 38.8 | 9.6 | 40.0 | 43.0 | 53.9 | 10.9 | 100 | 0 | |
| Vert. | 12205.000 | AV | 35.0 | 39.6 | 10.8 | 39.8 | 45.6 | 53.9 | 8.3 | 100 | 0 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Ampriifier)

Distance factor : 15GHz -40GHz : $20\log(3.0m/1.0m) = 9.5dB$

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
Date June 18, 2014 June 19, 2014
Temperature / Humidity 24 deg.C, 55 %RH 26 deg.C, 50 %RH
Engineer Makoto Hosaka
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. | 480.002 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 150 | 76 | |
| Hori. | 533.002 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 150 | 356 | |
| Hori. | 2483.500 | PK | 46.9 | 26.9 | 14.7 | 41.1 | 47.4 | 73.9 | 26.5 | 100 | 183 | |
| Hori. | 4960.000 | PK | 52.5 | 31.8 | 7.5 | 39.6 | 52.2 | 73.9 | 21.7 | 100 | 5 | |
| Hori. | 7440.000 | PK | 47.0 | 37.4 | 8.8 | 40.4 | 52.8 | 73.9 | 21.1 | 100 | 0 | |
| Hori. | 9920.000 | PK | 46.6 | 38.9 | 9.6 | 39.9 | 55.2 | 73.9 | 18.7 | 100 | 0 | |
| Hori. | 12400.000 | PK | 46.4 | 39.7 | 10.9 | 40.0 | 57.0 | 73.9 | 16.9 | 100 | 0 | |
| Hori. | 2483.500 | AV | 34.9 | 26.9 | 14.7 | 41.1 | 35.4 | 53.9 | 18.5 | 100 | 183 | |
| Hori. | 4960.000 | AV | 38.5 | 31.8 | 7.5 | 39.6 | 38.2 | 53.9 | 15.7 | 100 | 5 | |
| Hori. | 7440.000 | AV | 34.4 | 37.4 | 8.8 | 40.4 | 40.2 | 53.9 | 13.7 | 100 | 0 | |
| Hori. | 9920.000 | AV | 33.4 | 38.9 | 9.6 | 39.9 | 42.0 | 53.9 | 11.9 | 100 | 0 | |
| Hori. | 12400.000 | AV | 33.4 | 39.7 | 10.9 | 40.0 | 44.0 | 53.9 | 9.9 | 100 | 0 | |
| Vert. | 480.002 | QP | 22.3 | 17.1 | 9.2 | 32.1 | 16.5 | 46.0 | 29.5 | 100 | 233 | |
| Vert. | 533.002 | QP | 22.3 | 17.7 | 9.4 | 32.1 | 17.3 | 46.0 | 28.7 | 100 | 358 | |
| Vert. | 2483.500 | PK | 47.3 | 26.9 | 14.7 | 41.1 | 47.8 | 73.9 | 26.1 | 100 | 131 | |
| Vert. | 4960.000 | PK | 52.2 | 31.8 | 7.5 | 39.6 | 51.9 | 73.9 | 22.0 | 100 | 323 | |
| Vert. | 7440.000 | PK | 47.9 | 37.4 | 8.8 | 40.4 | 53.7 | 73.9 | 20.2 | 100 | 0 | |
| Vert. | 9920.000 | PK | 46.7 | 38.9 | 9.6 | 39.9 | 55.3 | 73.9 | 18.6 | 100 | 0 | |
| Vert. | 12400.000 | PK | 47.1 | 39.7 | 10.9 | 40.0 | 57.7 | 73.9 | 16.2 | 100 | 0 | |
| Vert. | 2483.500 | AV | 34.9 | 26.9 | 14.7 | 41.1 | 35.4 | 53.9 | 18.5 | 100 | 131 | |
| Vert. | 4960.000 | AV | 38.1 | 31.8 | 7.5 | 39.6 | 37.8 | 53.9 | 16.1 | 100 | 323 | |
| Vert. | 7440.000 | AV | 34.6 | 37.4 | 8.8 | 40.4 | 40.4 | 53.9 | 13.5 | 100 | 0 | |
| Vert. | 9920.000 | AV | 33.6 | 38.9 | 9.6 | 39.9 | 42.2 | 53.9 | 11.7 | 100 | 0 | |
| Vert. | 12400.000 | AV | 33.6 | 39.7 | 10.9 | 40.0 | 44.2 | 53.9 | 9.7 | 100 | 0 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Ampriifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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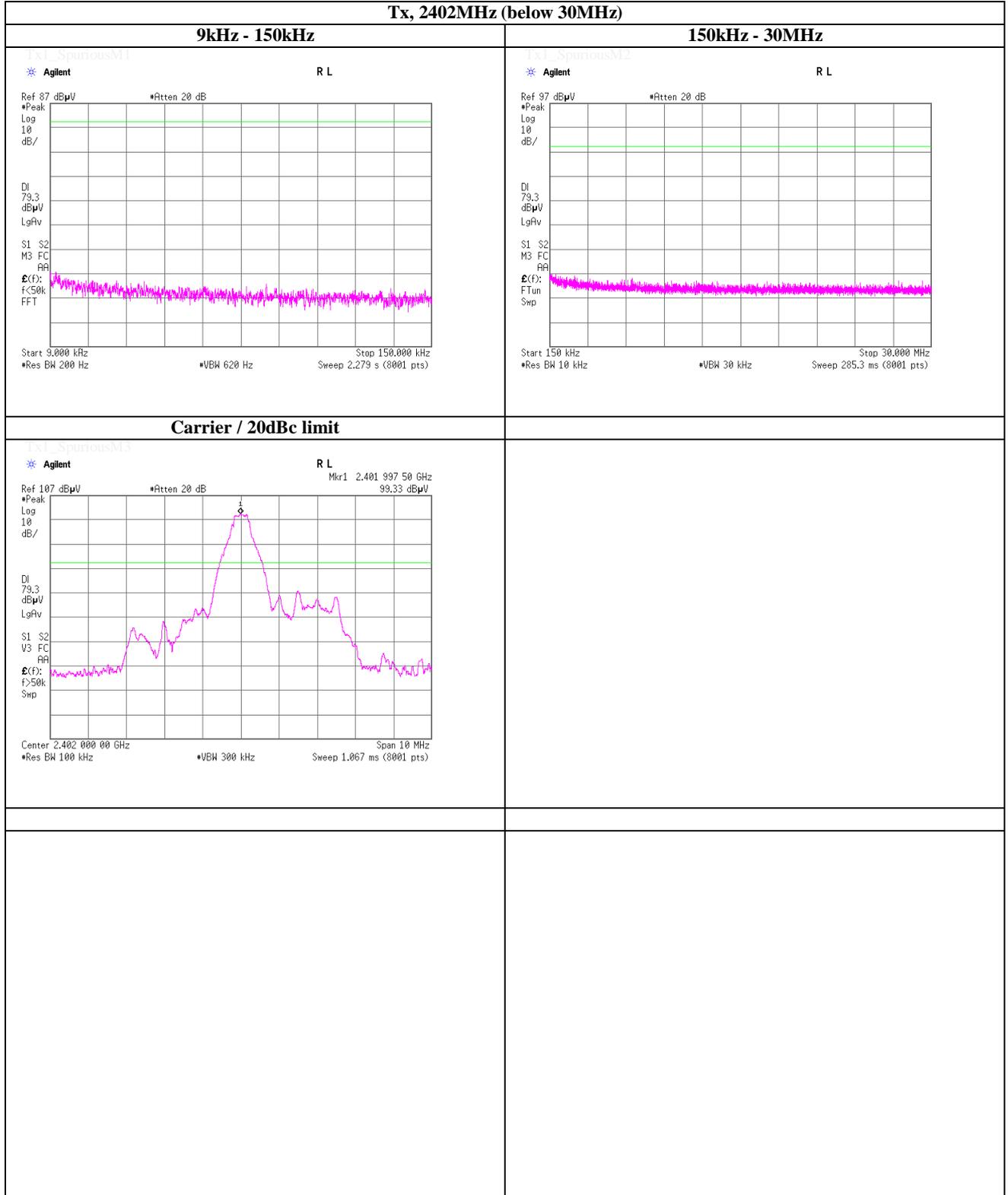
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date June 20, 2014
 Temperature / Humidity 24 deg.C , 52%
 Engineer Shinichi Takano

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (below 30MHz)



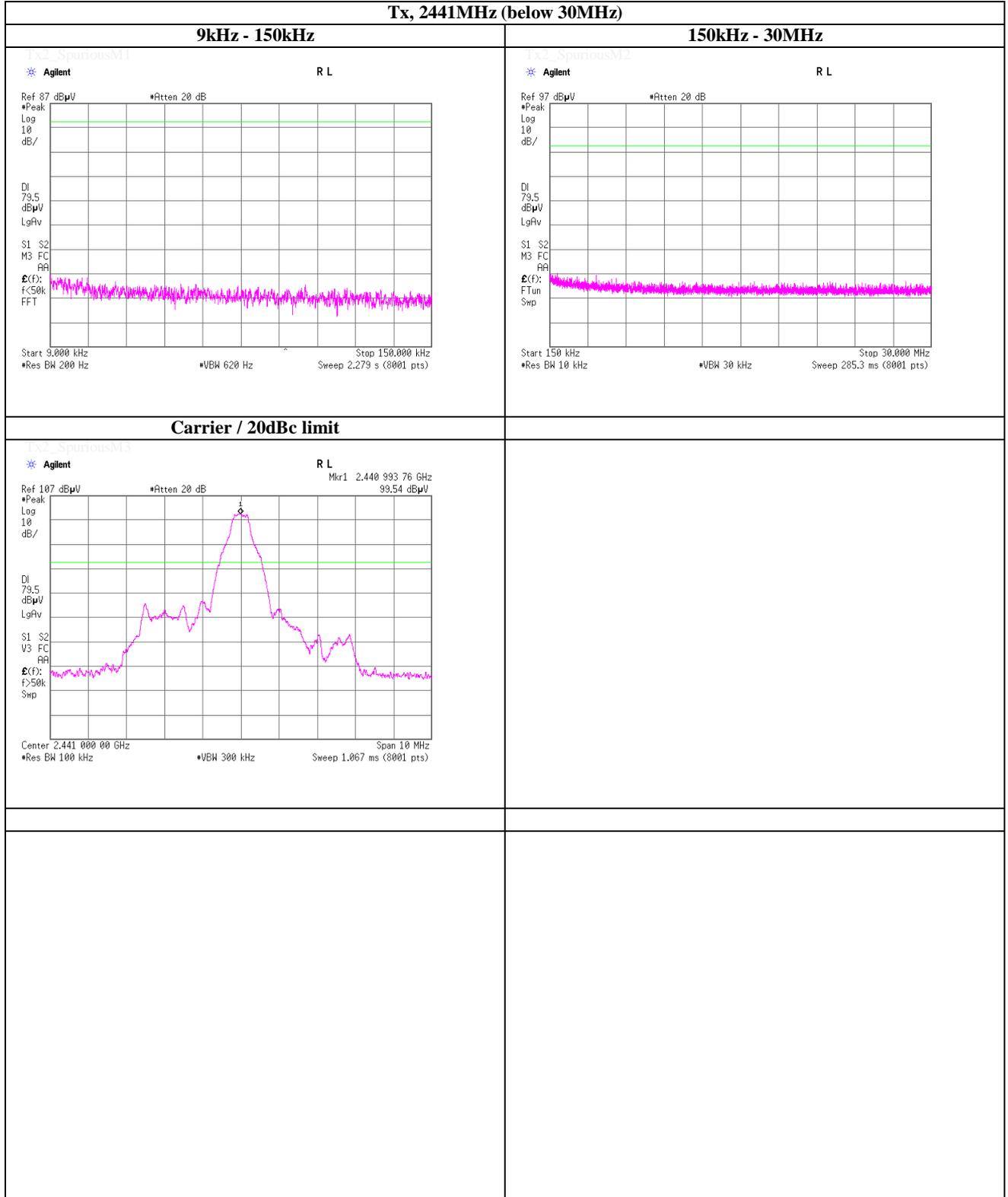
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Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date June 20, 2014
 Temperature / Humidity 24 deg.C , 52%
 Engineer Shinichi Takano

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (below 30MHz)



UL Japan, Inc.

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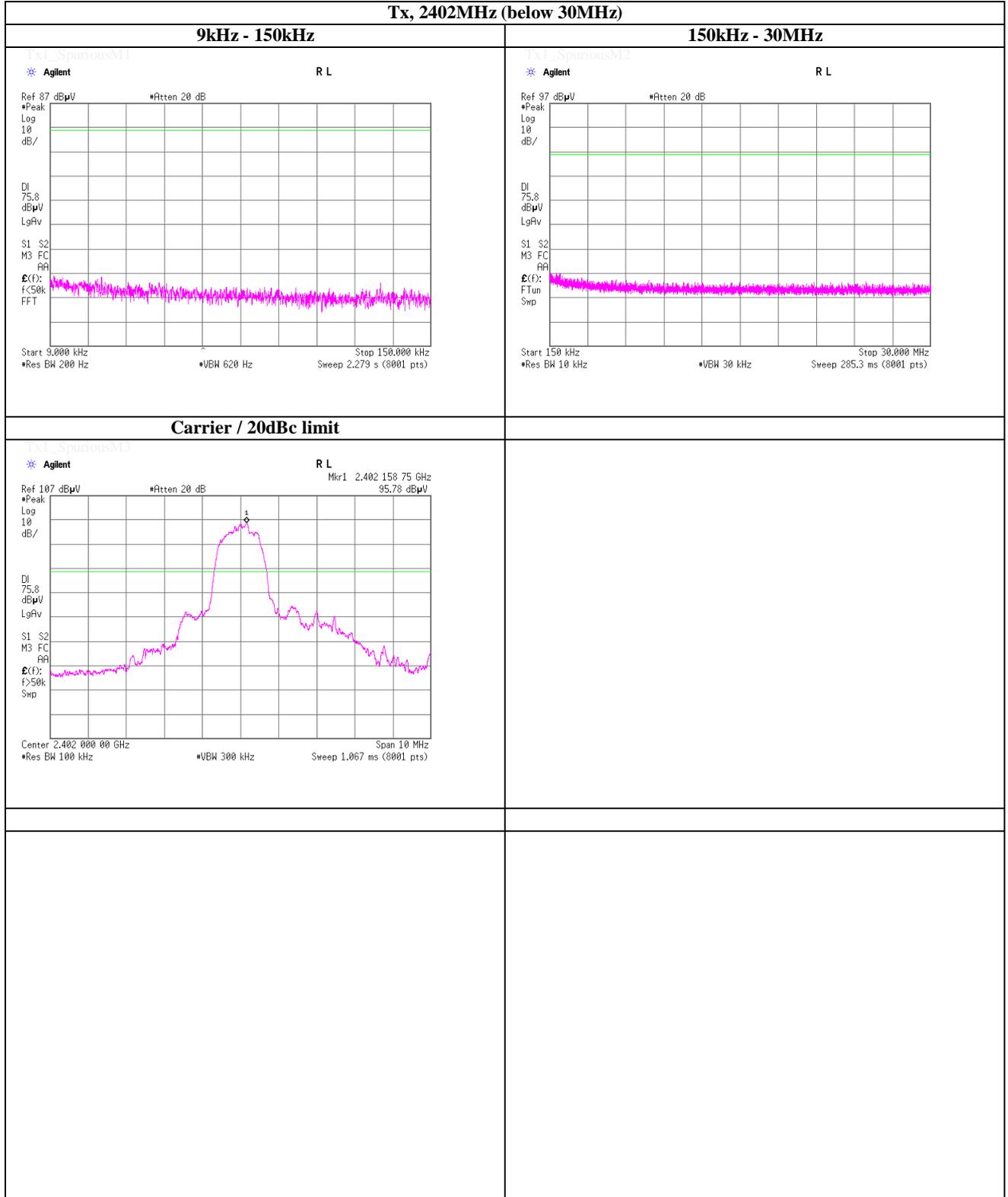
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date June 20, 2014
 Temperature / Humidity 24 deg.C , 52%
 Engineer Shinichi Takano

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (below 30MHz)



UL Japan, Inc.

Shonan EMC Lab.

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Telephone : +81 463 50 6400

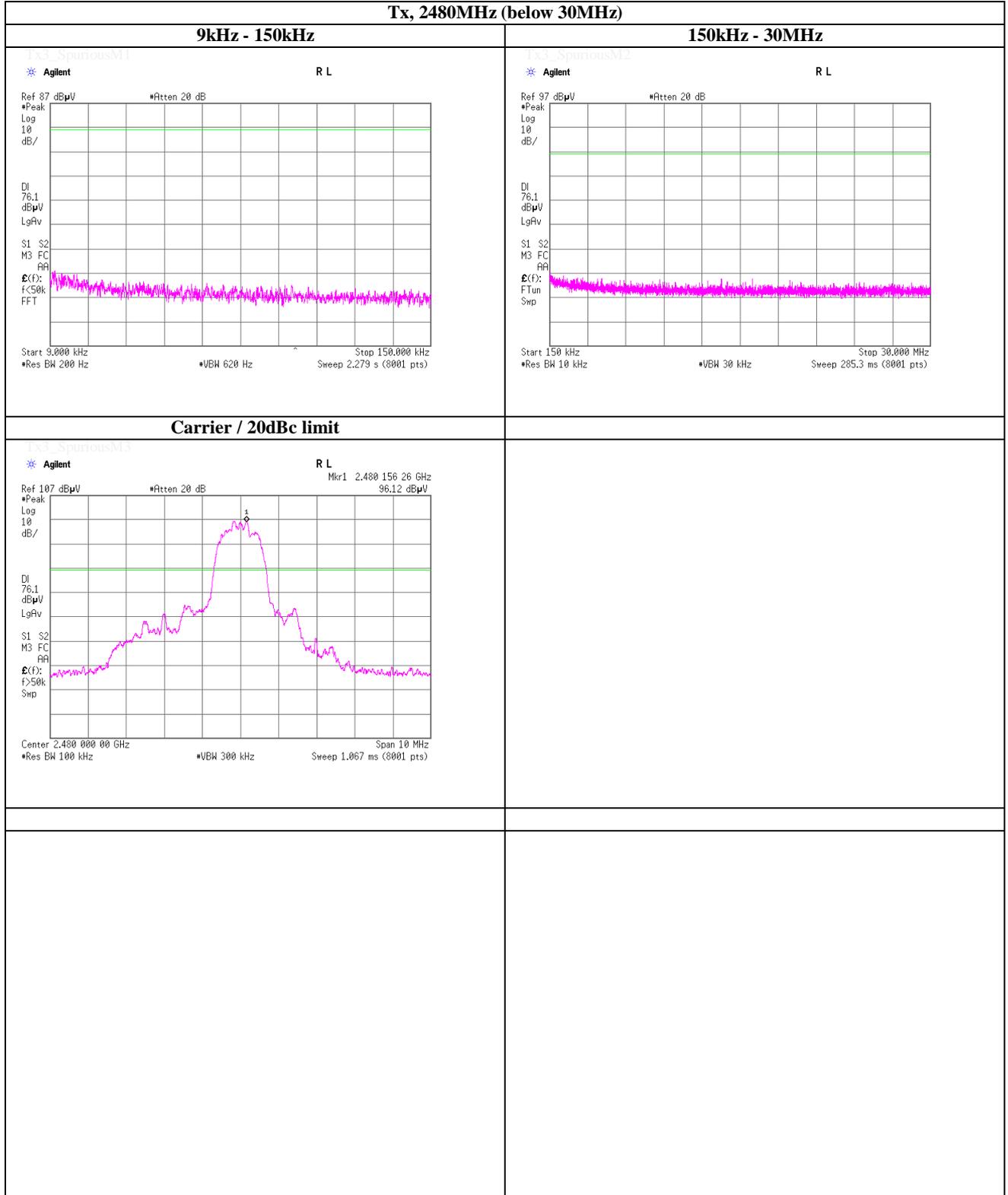
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date June 20, 2014
 Temperature / Humidity 24 deg.C , 52%
 Engineer Shinichi Takano

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 30MHz)



UL Japan, Inc.

Shonan EMC Lab.

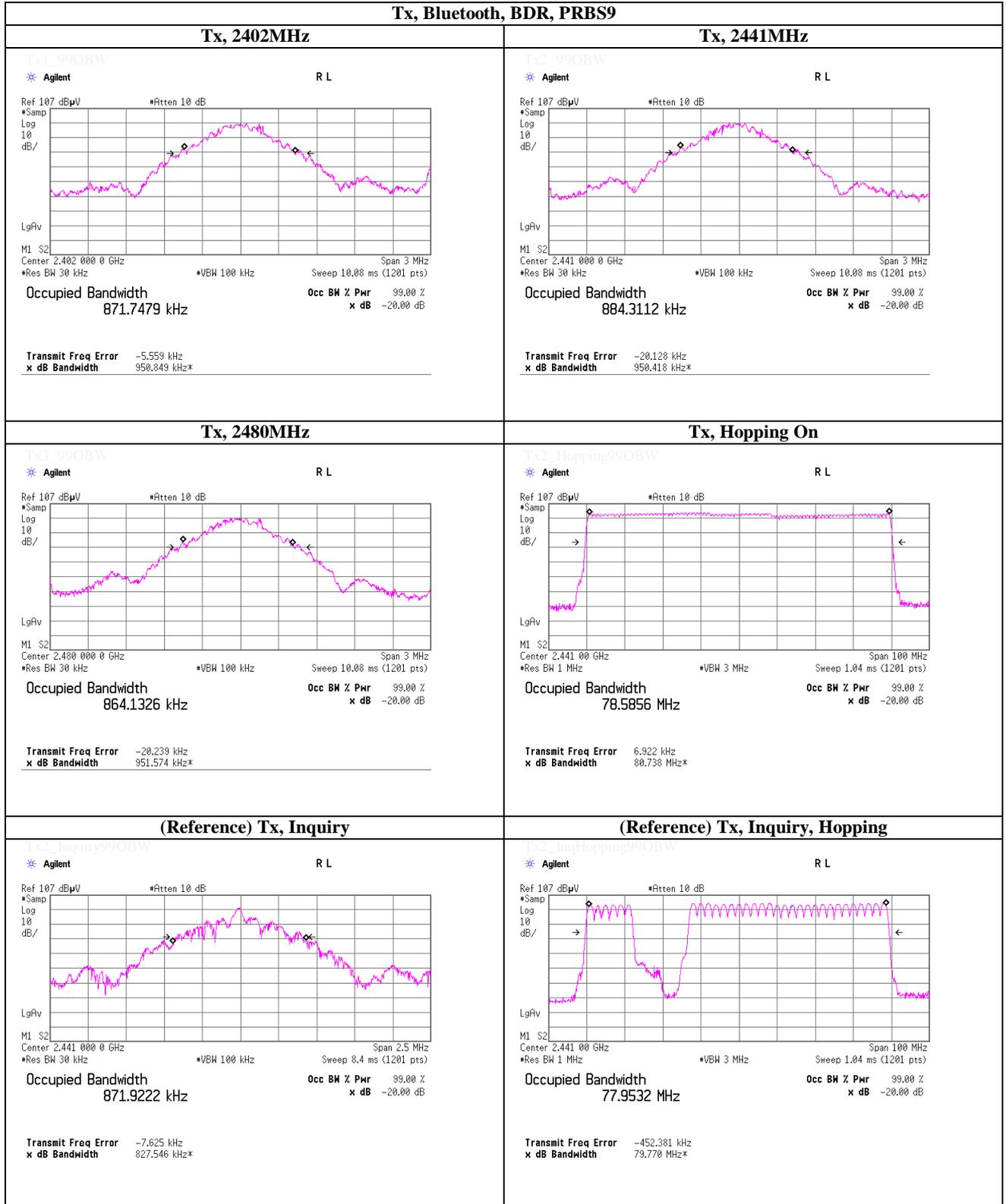
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Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date June 20, 2014
 Temperature / Humidity 24 deg.C , 52%
 Engineer Shinichi Takano

99% Occupied Bandwidth



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APPENDIX 2 Test Instruments

EMI test equipment

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|--------------------------------|---------------------------|--|--|-------------------------|-----------|---------------------------------------|
| SAEC-03(NSA) | Semi-Anechoic Chamber | TDK | SAEC-03(NSA) | 3 | RE | 2013/07/09 * 12 |
| SAF-06 | Pre Amplifier | TOYO Corporation | TPA0118-36 | 1440491 | RE | 2014/05/23 * 12 |
| SAT10-06 | Attenuator | Agilent | 8493C-010 | 74865 | RE | 2013/11/22 * 12 |
| SFL-02 | Highpass Filter | MICRO-TRONICS | HPM50111 | 051 | RE | 2013/11/22 * 12 |
| SCC-G01 | Coaxial Cable | Suhner | SUCOFLEX 104A | 46497/4A | RE | 2014/04/22 * 12 |
| SCC-G21 | Coaxial Cable | Suhner | SUCOFLEX 104 | 296169/4 | RE | 2014/05/15 * 12 |
| SHA-03 | Horn Antenna | Schwarzbeck | BBHA9120D | 9120D-739 | RE | 2013/08/19 * 12 |
| SOS-05 | Humidity Indicator | A&D | AD-5681 | 4062518 | RE | 2014/02/21 * 12 |
| SSA-02 | Spectrum Analyzer | Agilent | E4448A | MY48250106 | RE | 2014/03/17 * 12 |
| SJM-15 | Measure | ASKUL | - | - | RE | - |
| COTS-SEMI-1 | EMI Software | TSJ | TEPTO-DV(RE,CE, RFLMF) | - | RE | - |
| SAF-08 | Pre Amplifier | TOYO Corporation | HAP18-26W | 00000019 | RE | 2014/03/14 * 12 |
| SHA-04 | Horn Antenna | ETS LINDGREN | 3160-09 | LM3640 | RE | 2014/03/15 * 12 |
| SCC-G15 | Coaxial Cable | Suhner | SUCOFLEX 102 | 32703/2 | RE | 2014/03/13 * 12 |
| SAF-03 | Pre Amplifier | SONOMA | 310N | 290213 | RE | 2014/02/14 * 12 |
| SAT6-06 | Attenuator | JFW | 50HF-006N | - | RE | 2014/02/17 * 12 |
| SBA-03 | Biconical Antenna | Schwarzbeck | BBA9106 | 91032666 | RE | 2013/10/26 * 12 |
| SCC-C1/C2/C3/C4/C5/C10/SRSE-03 | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO | 8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906 | -/0901-271(RF Selector) | RE | 2014/04/25 * 12 |
| SLA-03 | Logperiodic Antenna | Schwarzbeck | UHALP9108A | UHALP 9108-A 0901 | RE | 2013/10/26 * 12 |
| STR-06 | Test Receiver | Rohde & Schwarz | ESCI | 101259 | RE | 2014/03/04 * 12 |
| SSA-03 | Spectrum Analyzer | Agilent | E4448A | MY48250152 | AT | 2014/02/03 * 12 |
| SPM-06 | Power Meter | Anritsu | ML2495A | 0850009 | AT | 2014/04/08 * 12 |
| SPSS-03 | Power sensor | Anritsu | MA2411B | 0917063 | AT | 2014/04/08 * 12 |
| SAT10-09 | Attenuator | Weinschel Corp. | 54A-10 | W5692 | AT | 2013/11/27 * 12 |
| SCC-G13 | Coaxial Cable | Suhner | SUCOFLEX 102 | 31599/2 | AT | 2014/03/14 * 12 |
| SOS-09 | Humidity Indicator | A&D | AD-5681 | 4061484 | AT | 2014/03/07 * 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 disturbance voltage